Electronic Supplementary Information

Construction of polycyclic bridged indene derivatives by a tandem 1,3-rearrangement/intramolecular Friedel-Crafts cyclization of propargyl acetates

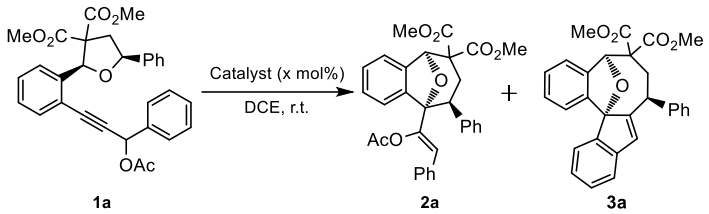
Jiantao Zhang,[a] Zhehui Liao,[a] Lianfen Chen,[a] Huanfeng Jiang,[a] and Shifa Zhu*[a,b]

[a] Key Laboratory of Functional Molecular Engineering of Guangdong Province, School of Chemistry and Chemical Engineering, South China University of Technology, Guangzhou, 510640, P. R. China. E-mail: zhusf@scut.edu.cn

[b] State Key Laboratory of Elemento-Organic Chemistry, Nankai University, Tianjin 300071, P. R. China.

Contents

I. Table S1 Optimization of the reaction condition for 3a

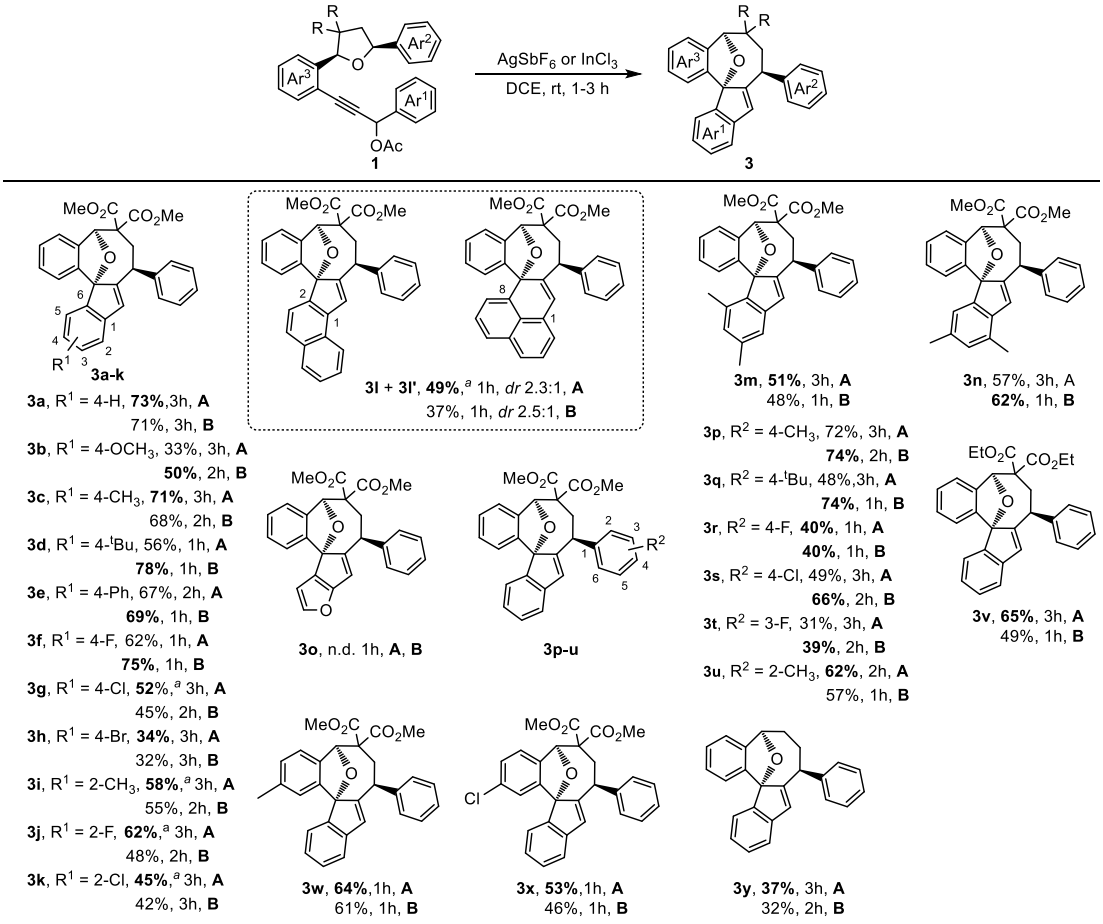


1a 2a 3a

Entry	Catalyst (x mol%)	**2a**/%	**3a**/%
1	IPrAuCl (5 %) + $AgSbF_6$ (5 %)	24	13
2	SIPrAuCl (5 %) + $AgSbF_6$ (5 %)	10	30
3	IMesAuCl (5 %) + $AgSbF_6$ (5 %)	10	54
4	SIMesAuCl (5 %) + $AgSbF_6$ (5 %)	3	61
5	PPh_3AuCl (5 %) + $AgSbF_6$ (5 %)	-	52
6	**$AgSbF_6$ (5 %)**	**-**	**73**[b]
7	$Cu(OTf)_2$ (20 %)	-	36
8	$Zn(OTf)_2$ (20 %)	-	19
9	$Sn(OTf)_2$ (20 %)	-	28
10	$Sc(OTf)_3$ (20 %)	-	41
11	$Yb(OTf)_3$ (20 %)	-	31
12	$Fe(OTf)_3$ (20 %)	-	20
13	**$InCl_3$ (20 %)**	**-**	**71**[b]
14	$AgSbF_6$ (2 %)	-	64
15	$AgSbF_6$ (10 %)	-	65
16	$AgBF_4$ (5 %)	-	56
17	$AgNTf_2$ (5 %)	-	69
18	TfOH (20 %)	-	30

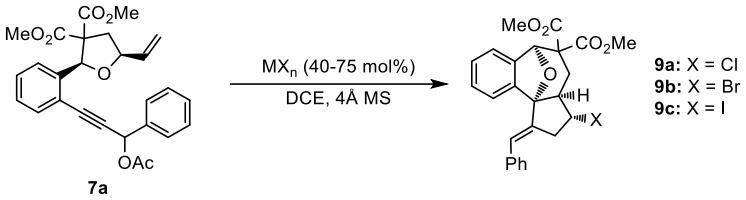
[a] Unless other noted, the reaction was performed in air by using 20 mol% catalysts at r.t. for 1-3 h, **1a** (0.1 mmol), [**1a**] = 0.1 M. [b] Isolated yield.

II. Table S2 Substrate scope for the synthesis of 3



Condition **A**: $AgSbF_6$ (5 mol%); Condition **B**: $InCl_3$ (20 mol%). The reaction was performed at r.t. for 1-3 h; **1** (0.1 mmol), [**1**] = 0.1 M; isolated yield. [a] 2 mol% $AgSbF_6$ was used.

III. Table S3 Optimization of the reaction condition for 9



7a

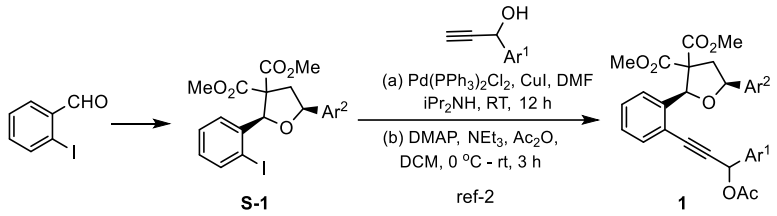
Entry	MX_n/%	T/°C	t/h	**9**/%
1	$InCl_3$ (50 %)	r.t.	12	29 (**9a**)
2	$FeCl_2$ (75 %)	r.t.	12	n.r.
3	$NiCl_2$ (75 %)	r.t.	12	n.r.
4	CuCl (150 %)	r.t.	12	n.r.
5	$CrCl_2$ (75 %)	50	12	n.r.
6	$PdCl_2$ (75 %)	50	12	n.r.
7	$ZrCl_4$ (40 %)	r.t.	0.5	n.d.
8	$CdCl_2$ (75 %)	50	12	n.r.
9	$CoCl_2$ (75 %)	50	12	trace (**9a**)
10	$ZnCl_2$ (75 %)	50	24	18 (**9a**)
11	$InCl_3$ (50 %)	0	12	n.r.
12	$MgBr_2$ (75 %)	r.t.	12	trace (**9b**)
13	$MnBr_2$ (75 %)	50	12	5 (**9b**)
14	$ZnBr_2$ (75 %)	r.t.	12	34 (**9b**)
15[a]	$ZnBr_2$ (20 %)	r.t.	12	n.r.
16[a]	$ZnBr_2$ (20 %)	40	12	n.r.
17	ZnI_2 (75 %)	r.t.	12	35 (**9c**)

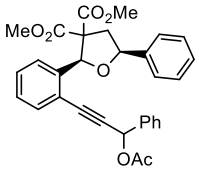
Unless other noted, the reaction was performed under N_2 at r.t. by adding 100 mg 4Å MS, **7a** (0.1 mmol), [**7a**] = 0.1 M; isolated yield. [a]1.5 equiv. of KBr was used as additive.

IV. Supplemental experimental procedures

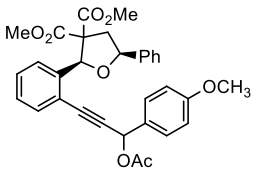
1. General information

The substrates **S-1**[1] were synthesized according to the literature. ^{1}H, ^{13}C, ^{19}F NMR spectra were recorded on a Bruker AVANCE 400 (400 MHz or 500 MHz for ^{1}H; 100 MHz for ^{13}C; 376 MHz for ^{19}F), ^{1}H NMR and ^{13}C NMR chemical shifts were determined relative to internal standard TMS at δ 0.0. Chemical shifts (δ) are reported in ppm, and coupling constants (J) are in Hertz (Hz). The following abbreviations were used to explain the multiplicities: s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet. Infrared (IR) spectra were recorded on a Nicolet 210 spectrophotometer and were recorded in potassium bromide (KBr) pellet. Mass spectra were obtained using *ESI* mass spectrometer. Melting points were determined using a hot stage apparatus. All reagents were used as received from commercial sources, unless specified otherwise, or prepared as described in the literature.



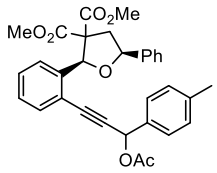


Compound **1a** (1:0.83 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 (d, J = 6.9 Hz, 2H), 7.54 – 7.47 (m, 3H), 7.42 (dd, J = 19.1, 8.1 Hz, 6H), 7.32 (t, J = 7.2 Hz, 2H), 7.21 (d, J = 7.3 Hz, 1H), 6.81 and 6.79 (d, J = 9.2 Hz, 1H), 6.52 and 6.45 (d, J = 28.1 Hz, 1H), 5.02 (d, J = 11.1 Hz, 1H), 3.77 and 3.69 (d, J = 32.4 Hz, 3H), 3.12 and 3.09 (d, J = 8.5 Hz, 3H), 3.02 (t, J = 12.5 Hz, 1H), 2.67 – 2.58 (m, 1H), 2.17 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.94 and 170.91, 169.88 and 169.86, 168.81 and 168.79, 140.92 and 140.80, 139.38 and 139.35, 137.29 and 137.25, 132.14 and 132.05, 128.90, 128.69, 128.64, 128.59, 128.12 and 128.11, 128.01, 127.96, 127.51 and 127.49, 126.27, 121.75 and 121.68, 90.6 and 90.51, 84.73 and 84.69, 81.77 and 81.70, 79.62, 66.28 and 66.25, 66.13 and 66.12, 53.15 and 53.13, 53.06 and 53.03, 52.09 and 52.05, 42.93 and 42.85, 21.21. **IR (KBr)** ν_{max} 3816, 3704, 3520, 3498, 2952, 1735, 1451, 1226, 1052, 1016, 760, 699 cm^{-1}. **HRMS** (ESI) calcd for $C_{31}H_{28}NaO_7$ $[M + Na]^+$: 473.1571; Found: 535.1729.

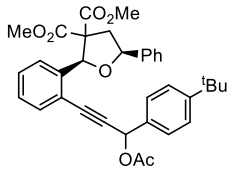


Compound **1b** (1:0.77 diasteromer): R_f = 0.30 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.58 (d, J = 8.6 Hz, 2H), 7.52 (dd, J = 12.8, 5.9 Hz, 3H), 7.44 (d, J = 7.6 Hz, 1H), 7.39 (t, J = 7.3 Hz, 2H), 7.35 – 7.29 (m, 2H), 7.22 (t, J = 7.5 Hz, 1H), 6.93 (d, J = 8.6 Hz, 2H), 6.76 and 6.74 (d, J = 6.3 Hz, 1H), 6.51 and 6.44 (d, J = 27.6 Hz, 1H), 5.02 (m, 1H), 3.81 (s, 3H), 3.79 and 3.71 (d, J = 31.9 Hz, 3H), 3.13 and 3.11 (d, J = 7.5 Hz, 3H), 3.05 – 2.98 (m, 1H), 2.64 (dt, J = 13.3, 5.1 Hz, 1H), 2.14 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.95 and 170.91, 169.93 and 169.90, 168.79 and 168.77, 160.10, 140.88 and 140.76, 139.40 and 139.37, 132.13 and 132.06, 129.58, 129.54 and 129.49, 128.62 and 128.56, 128.09 and 128.07, 127.91, 127.51 and 127.49, 126.25 and 126.24, 121.84 and 121.77, 113.97,

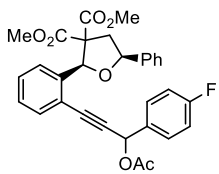
90.82 and 90.74, 84.53 and 84.47, 81.80 and 81.74, 79.62, 66.30 and 66.27, 65.87, 55.36 and 55.34, 53.13 and 53.10, 53.03 and 53.01, 52.07 and 52.03, 42.93 and 42.85, 21.22 and 21.21. **IR (KBr)** ν_{max} 3744, 3521, 3497, 2952, 1736, 1513, 1453, 1369, 1256, 1227, 1174, 1093, 1053, 1015, 948, 834, 759, 702, 568 cm^{-1}. **HRMS (ESI)** calcd for $C_{32}H_{30}NaO_8$ $[M + Na]^+$: 565.1833; Found: 565.1837.



Compound **1c** (1:0.88 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.62 – 7.55 (m, 5H), 7.51 (d, J = 7.3 Hz, 1H), 7.47 – 7.42 (m, 2H), 7.40 – 7.35 (m, 2H), 7.29 – 7.25 (m, 3H), 6.85 and 6.83 (d, J = 8.1 Hz, 1H), 6.60 and 6.52 (d, J = 28.5 Hz, 1H), 5.12 – 5.06 (m, 1H), 3.85 and 3.77 (d, J = 33.9 Hz, 3H), 3.19 and 3.17 (d, J = 8.8 Hz, 3H), 3.13 – 3.05 (m, 1H), 2.71 (dt, J = 13.3, 5.2 Hz, 1H), 2.42 (s, 3H), 2.21 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.96 and 170.93, 169.87 and 169.84, 168.82 and 168.78, 140.95 and 140.82, 139.46 and 139.42, 138.80, 134.46 and 134.40, 132.12 and 132.07, 129.33 and 129.31, 128.64, 128.59, 128.12 and 128.10, 128.04 and 127.99, 127.93, 127.53 and 127.51, 126.28 and 126.26, 121.87 and 121.80, 90.85 and 90.77, 84.58 and 84.52, 81.83 and 81.77, 79.63, 66.31 and 66.29, 66.06 and 66.03, 53.12 and 53.11, 53.02 and 53.01, 52.07 and 52.03, 42.98 and 42.91, 21.28 and 21.21. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3464, 2952, 1741, 1489, 1451, 1368, 1273, 1093, 1053, 1016, 949, 909, 847, 816, 758, 567, 503 cm^{-1}. **HRMS (ESI)** calcd for $C_{32}H_{30}NaO_7$ $[M + Na]^+$: 549.1884; Found: 549.1888.

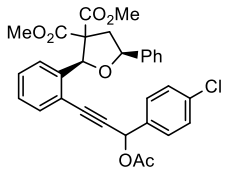


Compound **1d** (1:0.85 diasteromer): R_f = 0.37 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.58 (d, J = 8.3 Hz, 2H), 7.51 (td, J = 9.0, 3.5 Hz, 3H), 7.46 – 7.41 (m, 3H), 7.40 – 7.36 (m, 2H), 7.34 – 7.29 (m, 2H), 7.23 – 7.18 (m, 1H), 6.79 and 6.72 (d, J = 5.8 Hz, 1H), 6.53 and 6.45 (d, J = 29.4 Hz, 1H), 5.02 (dt, J = 11.5, 4.4 Hz, 1H), 3.78 and 3.70 (d, J = 33.2 Hz, 3H), 3.12 and 3.10 (d, J = 9.5 Hz, 3H), 3.05 – 2.98 (m, 1H), 2.64 (m, 1H), 2.16 and 2.15 (d, J = 1.0 Hz, 3H), 1.33 and 1.32 (d, J = 1.2 Hz, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.95 and 170.91, 169.90 and 169.86, 168.83 and 168.79, 151.97 and 151.94, 140.91 and 140.79, 139.45 and 139.41, 134.31 and 134.27, 132.14 and 132.06, 128.61, 128.57, 128.09 and 128.08, 127.90, 127.82 and 127.76, 127.51 and 127.48, 126.27 and 126.25, 125.58, 121.88 and 121.81, 90.83 and 90.74, 84.57 and 84.50, 81.83 and 81.76, 79.62, 66.30 and 66.28, 65.96, 53.10 and 53.09, 53.02 and 53.00, 52.06 and 52.02, 42.96 and 42.89, 34.70, 31.36, 21.22. **IR (KBr)** ν_{max} 3744, 3521, 3497, 2952, 1737, 1452, 1368, 1272, 1227, 1093, 1054, 1016, 949, 759, 701, 579 cm^{-1}. **HRMS (ESI)** calcd for $C_{35}H_{36}NaO_7$ $[M + Na]^+$: 591.2353; Found: 591.2349.

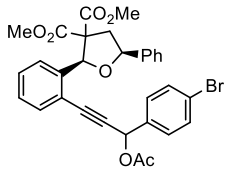


Compound **1e** (1:0.9 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 (dd, J = 8.4, 5.5 Hz, 2H), 7.55 – 7.48 (m, 3H), 7.44 (d, J = 7.6 Hz, 1H), 7.41 – 7.36 (m, 2H), 7.32 (tt, J = 5.5, 2.1 Hz, 2H), 7.21 (dd, J = 7.5, 1.0 Hz, 1H), 7.09 (t, J = 8.6 Hz, 2H), 6.78 and 6.76 (d, J = 7.5 Hz, 1H), 6.50 and 6.44 (d, J = 25.6 Hz, 1H), 5.01 (dt, J = 11.6, 4.2 Hz, 1H), 3.759 and 3.71 (d, J = 30.7 Hz, 3H), 3.11 and 3.10 (d, J = 4.5 Hz, 3H), 3.02 (t, J = 12.5 Hz, 1H), 2.63 (dt, J = 13.3, 4.4 Hz, 1H), 2.15 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.93 and 170.89, 169.77 and 169.74, 168.71 and 168.69, 162.99 (d, J = 247.7 Hz), 140.94 and 140.85, 139.34 and 139.31, 133.29 (d, J = 3.0 Hz) and 133.26 (d, J = 3.3 Hz),

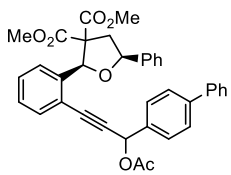
132.15 and 132.06, 130.03 (d, J = 5.0 Hz) and 129.94 (d, J = 5.0 Hz), 128.77 and 128.74, 128.58, 128.12 and 128.11, 127.96, 127.59 and 127.57, 126.25 and 126.23, 121.59 and 121.54, 115.63 and 115.42, 90.33 and 90.25, 84.91 and 84.87, 81.75 and 81.69, 79.63, 66.30 and 66.28, 65.46, 53.11 and 53.08, 53.01 and 52.99, 52.07 and 52.04, 42.89 and 42.81, 21.13 and 21.12. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -112.71, -112.74. **IR (KBr)** ν_{max} 3744, 3521, 3497, 2953, 1736, 1511, 1369, 1272, 1224, 1094, 1054, 1016, 760, 702 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}FNaO_7$ $[M + Na]^+$: 553.1633; Found: 553.1639.



Compound **1f** (1:0.87 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.59 (d, J = 8.1 Hz, 2H), 7.51 (dd, J = 14.0, 5.3 Hz, 3H), 7.44 (d, J = 7.6 Hz, 1H), 7.38 (t, J = 6.5 Hz, 4H), 7.33 (t, J = 5.7 Hz, 2H), 7.20 (d, J = 7.5 Hz, 1H), 6.77 and 6.75 (d, J = 8.9 Hz, 1H), 6.50 and 6.43 (d, J = 24.8 Hz, 1H), 5.01 (dd, J = 11.7, 4.1 Hz, 1H), 3.78 and 3.70 (d, J = 31.4 Hz, 3H), 3.11 and 3.10 (d, J = 4.4 Hz, 3H), 3.02 (t, J = 12.5 Hz, 1H), 2.63 (dt, J = 13.3, 4.6 Hz, 1H), 2.15 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.92 and 170.89, 169.74 and 169.72, 168.70 and 168.68, 140.97 and 140.88, 139.33 and 139.30, 135.90 and 135.87, 134.79 and 134.78, 132.15 and 132.06, 129.47, 129.40, 128.83 and 128.81, 128.59, 128.14 and 128.13, 127.99, 127.60 and 127.58, 126.26 and 126.24, 121.52 and 121.47, 90.11 and 90.04, 85.04 and 85.00, 81.74 and 81.67, 79.64, 66.30 and 66.28, 65.44, 53.14 and 53.12, 53.04 and 53.02, 52.09 and 52.06, 42.89 and 42.82, 21.12 and 21.11 cm^{-1}. **IR (KBr)** ν_{max} 3744, 3522, 3497, 3464, 2952, 1736, 1490, 1435, 1369, 1271, 1225, 1171, 1092, 950, 825, 758, 605, 547 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}ClNaO_7$ $[M + Na]^+$: 569.1338; Found: 569.1343.

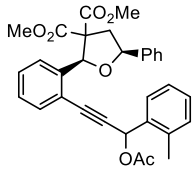


Compound **1g** (1:0.92 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.55 – 7.48 (m, 7H), 7.43 (d, J = 7.6 Hz, 1H), 7.38 (t, J = 7.5 Hz, 2H), 7.32 (m, 2H), 7.21 (d, J = 7.1 Hz, 1H), 6.75 and 6.73 (d, J = 9.2 Hz, 1H), 6.49 and 6.42 (d, J = 24.8 Hz, 1H), 5.00 (dd, J = 11.6, 4.2 Hz, 1H), 3.78 and 3.71 (d, J = 31.2 Hz, 3H), 3.11 and 3.10 (d, J = 4.5 Hz, 3H), 3.06 – 2.98 (m, 1H), 2.63 (dt, J = 13.3, 4.7 Hz, 1H), 2.16 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.90 and 170.88, 169.71 and 169.69, 168.69 and 168.67, 140.97 and 140.88, 139.33 and 139.29, 136.40 and 136.38, 132.15 and 132.05, 131.79 and 131.77, 129.75 and 129.68, 128.82 and 128.79, 128.58, 128.12 and 128.11, 127.97, 127.60 and 127.58, 126.25 and 126.24, 123.01, 121.51 and 121.46, 90.02 and 89.95, 85.05 and 85.02, 81.73 and 81.66, 79.63, 66.29 and 66.27, 65.48, 53.13 and 53.11, 53.03 and, 53.02, 52.09 and 52.05, 42.89 and 42.81, 21.11. **IR (KBr)** ν_{max} 3744, 3521, 3494, 2952, 1736, 1487, 1453, 1370, 1270, 1226, 1172, 1094, 1052, 1014, 950, 841, 758, 701, 571, 545 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}BrNaO_7$ $[M + Na]^+$: 613.0832; Found: 613.0836.

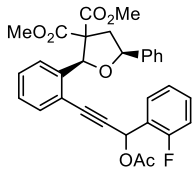


Compound **1h** (1:0.86 diasteromer): R_f = 0.40 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.73 (d, J = 7.7 Hz, 2H), 7.63 (d, J = 7.8 Hz, 2H), 7.59 (d, J = 7.5 Hz, 2H), 7.52 (dd, J = 17.4, 7.0 Hz, 3H), 7.47 – 7.41 (m, 3H), 7.35 (dd, J = 16.8, 7.5 Hz, 5H), 7.21 (d, J = 5.4 Hz, 1H), 6.86 and 6.84 (d, J = 7.9 Hz, 1H), 6.55 and 6.48 (d, J = 27.4 Hz, 1H), 5.06 – 4.98 (m, 1H), 3.79 and 3.70 (d, J = 35.2 Hz, 3H), 3.13 and 3.11 (d, J = 7.4 Hz, 3H), 3.03 (t, J = 12.5 Hz, 1H), 2.64 (dt, J = 11.7, 4.9 Hz, 1H), 2.18 (s, 3H). **^{13}C NMR**

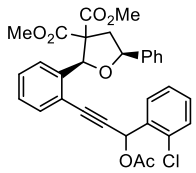
(100 MHz, $CDCl_3$) δ 170.98 and 170.95, 169.93 and 169.91, 168.84 and 168.81, 141.89, 140.97 and 140.86, 140.62 and 140.57, 139.41 and 139.37, 136.29 and 136.25, 132.17 and 132.10, 128.90, 128.74 and 128.71, 128.61, 128.55 and 128.47, 128.15 and 128.13, 127.98, 127.64 and 127.62, 127.56 and 127.55, 127.43 and 127.41, 127.21 and 127.19, 126.30 and 126.29, 121.77 and 121.71, 90.60 and 90.51, 84.88 and 84.82, 81.83 and 81.76, 79.66, 66.33 and 66.30, 65.96, 53.18 and 53.16, 53.07 and 53.06, 52.14 and 52.10, 42.98 and 42.90, 21.25. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3031, 2952, 1735, 1487, 1453, 1368, 1271, 1225, 1093, 1053, 1015, 949, 846, 760, 700, 625, 573, 521 cm^{-1}. **HRMS (ESI)** calcd for $C_{37}H_{32}NaO_7$ $[M + Na]^+$: 611.2040; Found: 611.2046.



Compound **1i** (1:0.9 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.84 – 7.78 (m, 1H), 7.57 (dd, J = 11.7, 4.4 Hz, 3H), 7.49 – 7.41 (m, 3H), 7.34 (dtd, J = 19.9, 7.2, 2.8 Hz, 4H), 7.26 (dd, J = 8.8, 5.3 Hz, 2H), 6.97 and 6.95 (d, J = 6.9 Hz, 1H), 6.57 and 6.48 (d, J = 33.5 Hz, 1H), 5.07 (dt, J = 10.9, 5.1 Hz, 1H), 3.84 and 3.75 (d, J = 37.3 Hz, 3H), 3.17 and 3.14 (d, J = 11.9 Hz, 3H), 3.11 – 3.03 (m, 1H), 2.68 (m, 1H), 2.56 and 2.55 (d, J = 1.6 Hz, 3H), 2.23 and 2.22 (d, J = 2.0 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.90 and 170.86, 169.73 and 169.72, 168.82 and 168.77, 140.89 and 140.75, 139.43 and 139.41, 136.42 and 136.41, 135.32 and 135.30, 132.11 and 132.06, 130.77 and 130.72, 128.94 and 128.91, 128.60, 128.57, 128.50 and 128.47, 128.09 and 128.08, 127.90, 127.51, 126.26, 126.23, 121.90 and 121.82, 90.58 and 90.50, 84.61 and 84.55, 81.78 and 81.69, 79.60, 66.28 and 66.26, 64.18, 53.09 and 53.07, 52.98 and 52.95, 52.03 and 52.00, 42.87, 21.07 and 21.06, 19.13. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2952, 1741, 1490, 1453, 1369, 1273, 1229, 1093, 1053, 1016, 950, 758, 701, 571 cm^{-1}. **HRMS (ESI)** calcd for $C_{32}H_{30}NaO_7$ $[M + Na]^+$: 549.1884; Found: 549.1887.

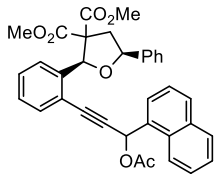


Compound **1j** (0.92:1 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.88 (t, J = 7.5 Hz, 1H), 7.56 (m, 3H), 7.52 – 7.47 (m, 1H), 7.45 – 7.34 (m, 5H), 7.25 (d, J = 7.5 Hz, 2H), 7.17 – 7.11 (m, 1H), 7.08 and 7.07 (d, J = 6.8 Hz, 1H), 6.56 and 6.47 (d, J = 35.1 Hz, 1H), 5.06 (m, 1H), 3.80 (d, J = 25.4 Hz, 3H), 3.16 (d, J = 7.2 Hz, 3H), 3.06 (t, J = 13.6 Hz, 1H), 2.68 (dd, J = 13.3, 4.8 Hz, 1H), 2.21 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.88 and 170.86, 169.44, 168.77 and 168.75, 160.29 (d, J = 254.7 Hz), 140.97 and 140.85, 139.38 and 139.36, 132.24 and 132.13, 130.89 (d, J = 2.6 Hz) and 130.80 (d, J = 2.6 Hz), 130.06 and 130.03, 128.77 and 128.74, 128.57, 128.10 and 128.08, 127.95 and 127.94, 127.53 and 127.51, 126.25 and 126.23, 124.56, 124.39 (d, J = 6.3 Hz) and 124.30 (d, J = 4.4 Hz), 121.59 and 121.53, 115.75 (d, J = 1.8 Hz) and 115.54 (d, J = 1.9 Hz), 89.54 and 89.42, 84.83 and 84.77, 81.74 and 81.66, 79.61, 66.27, 60.39 and 60.33, 60.31 and 60.26, 53.11 and 53.09, 53.03 and 53.02, 52.06 and 52.03, 42.85 and 42.77, 20.98. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -117.37, -117.40. **IR (KBr)** ν_{max} 3743, 3521, 3497, 3464, 2953, 1736, 1589, 1492, 1454, 1272, 1234, 1172, 1094, 1052, 956, 912, 759, 605, 531 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}FNaO_7$ $[M + Na]^+$: 553.1633; Found: 553.1639.

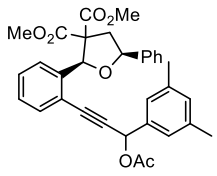


Compound **1k** (1:0.81 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.99 (d, J = 7.3 Hz, 1H), 7.56 (dt, J = 11.8, 5.7 Hz, 3H), 7.52 – 7.48 (m, 1H), 7.41 (m, 7H), 7.26 (d, J = 7.5 Hz, 1H), 7.13 and 7.11 (d, J = 7.7 Hz,

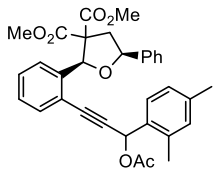
1H), 6.57 and 6.49 (d, *J* = 32.7 Hz, 1H), 5.07 (m, 1H), 3.83 and 3.77 (d, *J* = 25.7 Hz, 3H), 3.17 (s, 3H), 3.06 (td, *J* = 12.6, 4.0 Hz, 1H), 2.68 (dd, *J* = 13.3, 4.5 Hz, 1H), 2.22 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) *δ* 170.87, 169.44, 168.75 and 168.74, 140.96 and 140.85, 139.39 and 139.36, 134.62 and 134.57, 133.61 and 133.57, 132.30 and 132.19, 130.28 and 130.13, 129.75, 128.78 and 128.76, 128.58, 128.11 and 128.09, 127.97, 127.56 and 127.53, 127.17 and 127.11, 126.25, 126.23, 121.62 and 121.56, 89.59 and 89.49, 85.11 and 85.04, 81.73 and 81.67, 79.62, 66.30, 63.45 and 63.39, 53.15 and 53.13, 53.06 and 53.03, 52.08, 42.83 and 42.74, 20.92. **IR (KBr)** ν_{max} 3744, 3521, 1497, 3464, 1953, 1738, 1480, 1440, 1369, 1335, 1272, 1222, 1170, 1093, 1052, 1017, 956, 912, 758, 625, 570 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}ClNaO_7$ $[M + Na]^+$: 569.1338; Found: 569.1340.



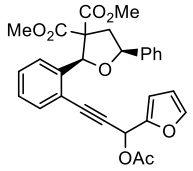
Compound **1l** (1:0.88 diasteromer): R_f = 0.37 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) *δ* 8.35 and 8.33 (d, *J* = 8.4 Hz, 1H), 7.96 and 7.95 (d, *J* = 7.1 Hz, 1H), 7.87 and 7.85 (d, *J* = 7.8 Hz, 2H), 7.59 – 7.47 (m, 6H), 7.45 – 7.34 (m, 4H), 7.29 (t, *J* = 7.5 Hz, 2H), 7.17 and 7.15 (d, *J* = 7.4 Hz, 1H), 6.57 and 6.46 (d, *J* = 47.2 Hz, 1H), 5.00 (m, 1H), 3.74 and 3.65 (d, *J* = 39.0 Hz, 3H), 3.08 and 3.02 (d, *J* = 8.8 Hz, 3H), 3.02 (d, *J* = 24.8 Hz, 1H), 2.63 (d, *J* = 13.1 Hz, 1H), 2.15 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) *δ* 170.97 and 170.95, 169.96, 168.93 and 168.84, 140.96 and 140.76, 139.47 and 139.44, 134.13 and 134.08, 132.65 and 132.61, 132.17 and 132.13, 130.84 and 130.79, 130.00 and 129.95, 128.91 and 128.89, 128.73, 128.64, 128.17 and 128.16, 128.00, 127.56, 127.05 and 126.97, 126.70 and 126.67, 126.32, 126.06 and 126.04, 125.35 and 125.33, 124.00 and 123.98, 121.92 and 121.81, 90.77 and 90.64, 85.36 and 85.26, 81.87 and 81.78, 79.66, 66.35 and 66.33, 64.64 and 64.52, 53.18 and 53.16, 53.08 and 53.06, 52.15 and 52.07, 42.98, 21.19. **IR (KBr)** ν_{max} 3744, 3521, 3497, 2952, 1736, 1512, 1435, 1368, 1270, 1223, 1170, 1092, 1052, 1017, 947, 804, 779, 760, 701, 570 cm^{-1}. **HRMS (ESI)** calcd for $C_{35}H_{30}NaO_7$ $[M + Na]^+$: 585.1884; Found: 585.1883.



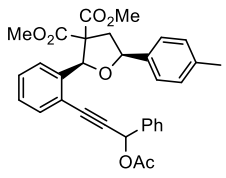
Compound **1m** (0.92:1 diasteromer): R_f = 0.37 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) *δ* 7.55 – 7.48 (m, 3H), 7.44 (d, *J* = 7.6 Hz, 1H), 7.38 (t, *J* = 7.3 Hz, 2H), 7.31 (t, *J* = 7.5 Hz, 2H), 7.22 (d, *J* = 4.7 Hz, 3H), 7.00 (s, 1H), 6.75 and 6.72 (d, *J* = 13.9 Hz, 1H), 6.52 and 6.45 (d, *J* = 27.9 Hz, 1H), 5.02 (d, *J* = 11.3 Hz, 1H), 3.78 and 3.69 (d, *J* = 35.2 Hz, 3H), 3.13 and 3.11 (d, *J* = 9.8 Hz, 3H), 3.02 (t, *J* = 12.5 Hz, 1H), 2.63 (dt, *J* = 12.9, 6.2 Hz, 1H), 2.34 (s, 6H), 2.17 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) *δ* 170.93 and 170.90, 169.93 and 169.90, 168.89 and 168.87, 140.87 and 140.75, 139.43 and 139.39, 138.26 and 138.24, 137.10 and 137.07, 132.06 and 132.03, 130.63 and 130.56, 128.59, 128.52, 128.12 and 128.11, 127.93, 127.48 and 127.47, 126.27, 125.77 and 125.75, 121.93 and 121.88, 90.85 and 90.80, 84.53 and 84.45, 81.84 and 81.77, 79.64, 66.30 and 66.26, 66.22 and 66.14, 53.12 and 53.10, 52.99 and 52.96, 52.06, 43.06 and 43.01, 21.32 and 21.27. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3465, 2952, 1737, 1606, 1486, 1436, 1369, 1331, 1270, 1169, 1093, 1053, 1016, 946, 851, 817, 701, 606, 571, 537 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{32}NaO_7$ $[M + Na]^+$: 563.2040; Found: 563.2042.



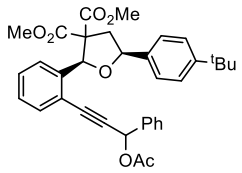
Compound **1n** (1:0.92 diasteromer): R_f = 0.37 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 and 7.63 (d, J = 7.8 Hz, 1H), 7.51 (t, J = 7.1 Hz, 3H), 7.39 (q, J = 7.8, 7.3 Hz, 3H), 7.34 – 7.27 (m, 2H), 7.19 (d, J = 7.5 Hz, 1H), 7.05 (dd, J = 15.6, 5.6 Hz, 2H), 6.88 and 6.86 (d, J = 6.3 Hz, 1H), 6.51 and 6.42 (d, J = 34.1 Hz, 1H), 5.01 (dt, J = 11.3, 5.5 Hz, 1H), 3.74 (d, J = 37.4 Hz, 3H), 3.10 (d, J = 12.8 Hz, 3H), 3.01 (t, J = 12.5 Hz, 1H), 2.62 (dt, J = 13.3, 3.9 Hz, 1H), 2.45 (s, 3H), 2.32 (s, 3H), 2.15 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.93 and 170.88, 169.80 and 169.79, 168.86 and 168.80, 140.86 and 140.71, 139.45 and 139.42, 138.81 and 138.77, 136.31 and 136.28, 132.42 and 132.38, 132.07, 131.58 and 131.52, 128.64 and 128.62, 128.58, 128.51, 128.10 and 128.08, 127.90, 127.48, 126.92 and 126.89, 126.27 and 126.26, 121.98 and 121.90, 90.79 and 90.74, 84.46 and 84.38, 81.80 and 81.71, 79.60, 66.27 and 66.26, 64.12 and 64.09, 53.10 and 53.08, 52.97, 52.05 and 52.02, 42.91, 21.14 and 21.11, 19.05. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2952, 1736, 1490, 1436, 1271, 1225, 1170, 1093, 1053, 1016, 950, 908, 822, 760, 701, 609, 572, 531 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{32}NaO_7$ $[M + Na]^+$: 563.2040; Found: 563.2043.



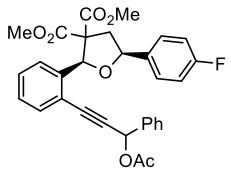
Compound **1o** (1:0.88 diasteromer): R_f = 0.36 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers.**^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.55 – 7.45 (m, 5H), 7.39 (t, J = 7.5 Hz, 2H), 7.33 (q, J = 6.6 Hz, 2H), 7.22 (d, J = 7.5 Hz, 1H), 6.85 and 6.84 (d, J = 3.1 Hz, 1H), 6.68 (dd, J = 8.1, 3.2 Hz, 1H), 6.49 and 6.43 (d, J = 22.9 Hz, 1H), 6.42 – 6.38 (m, 1H), 5.05 – 4.99 (m, 1H), 3.78 and 3.74 (d, J = 22.2 Hz, 3H), 3.14 and 3.12 (d, J = 8.8 Hz, 3H), 3.02 (t, J = 12.5 Hz, 1H), 2.64 (dt, J = 13.3, 5.1 Hz, 1H), 2.17 and 2.16 (d, J = 3.2 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.93 and 170.91, 169.68 and 169.63, 168.81 and 168.79, 149.71 and 149.66, 143.55 and 143.49, 141.05 and 140.95, 139.36 and 139.33, 132.27 and 132.15, 128.84 and 128.82, 128.56, 128.10 and 128.09, 127.94, 127.52 and 127.48, 126.26 and 126.25, 121.44 and 121.39, 110.62, 110.31, 88.05 and 87.96, 83.87 and 83.83 , 81.78 and 81.73, 79.64, 66.30 and 66.28, 59.13 and 59.08, 53.15 and 53.12, 53.07 and 53.05, 52.09 and 52.05, 42.98 and 42.89, 20.99.



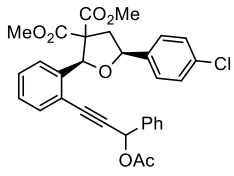
Compound **1p** (1:0.8 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 (d, J = 7.7 Hz, 2H), 7.52 (dd, J = 7.4, 5.1 Hz, 1H), 7.41 (dt, J = 16.2, 8.1 Hz, 6H), 7.31 (t, J = 7.7 Hz, 1H), 7.21 (t, J = 8.3 Hz, 3H), 6.80 and 6.78 (d, J = 8.6 Hz, 1H), 6.50 and 6.43 (d, J = 27.8 Hz, 1H), 4.98 (dt, J = 11.5, 4.0 Hz, 1H), 3.77 and 3.69 (d, J = 32.2 Hz, 3H), 3.12 and 3.10 (d, J = 8.7 Hz, 3H), 3.05 – 2.97 (m, 1H), 2.60 (dt, J = 13.3, 5.0 Hz, 1H), 2.36 (s, 3H), 2.17 (s, 3H). **^{13}C NMR** (10 MHz, $CDCl_3$) δ 170.97 and 170.94, 169.87 and 169.84, 168.84 and 168.82, 141.00 and 140.88, 137.83 and 137.81, 137.31 and 137.27, 136.32 and 136.29, 132.10 and 132.02, 129.24, 128.86, 128.66, 128.62, 127.99 and 127.95, 127.87, 127.55 and 127.53, 126.28 and 126.27, 121.73 and 121.67, 90.56 and 90.47, 84.76 and 84.72, 81.70 and 81.63, 79.55, 66.30 and 66.27, 66.13, 53.09 and 53.06, 53.00 and 52.98, 52.04 and 52.00, 42.83 and 42.75, 21.18.



Compound **1q** (1:0.77 diasteromer): R_f = 0.37 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 (d, J = 7.7 Hz, 2H), 7.54 (dd, J = 7.5, 4.9 Hz, 1H), 7.42 (p, J = 7.5, 6.9 Hz, 7H), 7.37 – 7.35 (m, 1H), 7.31 (t, J = 8.0 Hz, 1H), 7.19 (d, J = 7.4 Hz, 1H), 6.81 and 6.79 (d, J = 9.4 Hz, 1H), 6.51 and 6.44 (d, J = 27.7 Hz, 1H), 4.99 (dt, J = 11.6, 3.9 Hz, 1H), 3.77 and 3.68 (d, J = 34.2 Hz, 3H), 3.11 and 3.09 (d, J = 8.5 Hz, 3H), 3.08 – 3.01 (m, 1H), 2.60 (dt, J = 13.3, 5.0 Hz, 1H), 2.16 (s, 3H), 1.33 (s, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.01 and 170.98, 169.84 and 169.81, 168.85 and 168.82, 151.11 and 151.09, 141.06 and 140.95, 137.34 and 137.31, 136.29 and 136.26, 132.10 and 132.01, 128.88, 128.64 and 128.63, 128.01, 127.97, 127.88, 127.61 and 127.58, 126.16 and 126.14, 125.50, 121.74 and 121.67, 90.61 and 90.51, 84.80 and 84.76, 81.75 and 81.67, 79.54, 66.33 and 66.31, 66.14, 53.11 and 53.09, 53.02 and 52.99, 52.03 and 51.99, 42.77 and 42.69, 34.62, 31.41, 21.19. **IR (KBr)** ν_{max} 3725, 3521, 1497, 2957, 1736, 1488, 1453, 1368, 1271, 1225, 1171, 1061, 949, 834, 762, 737, 699, 577 cm^{-1}. **HRMS (ESI)** calcd for $C_{35}H_{36}NaO_7$ $[M + Na]^+$: 591.2353; Found: 591.2357.

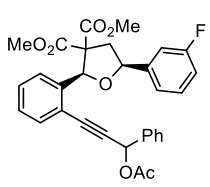


Compound **1r** (1:0.8 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 and 7.68 (d, J = 7.6 Hz, 2H), 7.51 (dt, J = 12.6, 5.4 Hz, 4H), 7.44 (q, J = 9.4, 8.5 Hz, 3H), 7.36 (t, J = 7.8 Hz, 1H), 7.25 (d, J = 7.5 Hz, 1H), 7.11 (t, J = 8.5 Hz, 2H), 6.85 and 6.83 (d, J = 9.4 Hz, 1H), 6.53 and 6.46 (d, J = 29.4 Hz, 1H), 5.02 (dt, J = 11.3, 4.1 Hz, 1H), 3.77 (d, J = 34.1 Hz, 3H), 3.15 (d, J = 9.4 Hz, 3H), 3.06 – 2.98 (m, 1H), 2.65 (dt, J = 13.3, 5.0 Hz, 1H), 2.21 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.84 and 170.81, 169.83 and 169.81, 168.78 and 168.74, 162.56 (d, J = 246.5 Hz), 140.71 and 140.57, 137.27 and 137.24, 135.16 (d, J = 3.6 Hz) and 135.12 (d, J = 3.2 Hz), 132.19 and 132.11, 128.88, 128.66, 128.62 (d, J = 1.4 Hz), 128.07, 127.99, 127.97, 127.93, 127.39 and 127.36, 121.80 and 121.73, 115.45 (d, J = 21.5 Hz), 90.66 and 90.56, 84.68 and 84.63, 81.83 and 81.75, 78.99, 66.20 and 66.18, 66.09, 53.12 and 53.10, 53.03 and 53.01, 52.10 and 52.05, 42.98 and 42.90, 21.17 and 21.16. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -114.14, -114.17. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3464, 2953, 1737, 1604, 1512, 1436, 1272, 1054, 1016, 941, 836, 762, 737, 700, 630, 569, 518 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}FNaO_7$ $[M + Na]^+$: 553.1633; Found: 553.1635.

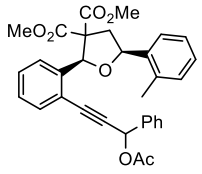


Compound **1s** (1:1 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 and 7.63 (d, J = 7.2 Hz, 2H), 7.45 (dd, J = 17.1, 8.5 Hz, 4H), 7.40 (d, J = 7.6 Hz, 2H), 7.38 – 7.29 (m, 4H), 7.21 (d, J = 7.5 Hz, 1H), 6.81 and 6.78 (d, J = 8.9 Hz, 1H), 6.50 and 6.43 (d, J = 29.0 Hz, 1H), 5.02 – 4.95 (m, 1H), 3.78 and 3.69 (d, J = 33.8 Hz, 3H), 3.11 (d, J = 9.1 Hz, 3H), 2.96 (t, J = 12.4 Hz, 1H), 2.63 (dt, J = 13.1, 4.8 Hz, 1H), 2.16 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.79 and 170.77, 169.83 and 169.81, 168.69 and 168.65, 140.67 and 140.53, 138.03 and 137.99, 137.26 and 137.22, 133.79 and 133.77, 132.21 and 132.13, 128.90, 128.75, 128.69, 128.65 and 128.63, 128.03, 127.97 and 127.93, 127.62, 127.39 and 127.37, 121.79 and 121.72, 90.71 and 90.61, 84.67 and 84.62, 81.89 and 81.82, 78.89, 66.19 and 66.18, 66.10, 53.17 and 53.14, 53.08 and 53.06, 52.13 and 52.09, 42.86 and 42.78, 21.18 and 21.16. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3033, 2952, 1735, 1594, 1491, 1369, 1273, 1226, 1171, 1089, 1055, 1015, 949, 907, 824, 762, 699, 636, 568 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}ClNaO_7$ $[M + Na]^+$:

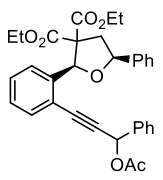
569.1338; Found: 569.1342.



Compound **1t** (1:0.79 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.68 (d, J = 7.6 Hz, 2H), 7.51 (dd, J = 13.3, 7.9 Hz, 2H), 7.41 (dq, J = 21.4, 7.1 Hz, 5H), 7.26 (d, J = 6.4 Hz, 3H), 7.05 (t, J = 8.3 Hz, 1H), 6.85 and 6.82 (d, J = 9.7 Hz, 1H), 6.55 and 6.48 (d, J = 28.9 Hz, 1H), 5.04 (dt, J = 11.3, 4.0 Hz, 1H), 3.82 and 3.74 (d, J = 33.0 Hz, 3H), 3.16 and 3.14 (d, J = 9.1 Hz, 3H), 3.04 – 2.96 (m, 1H), 2.68 (dt, J = 13.2, 4.9 Hz, 1H), 2.21 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.78 and 170.76, 169.84 and 169.82, 168.63 and 168.60, 162.97 (d, J = 246.1 Hz), 142.17 (d, J = 3.8 Hz) and 142.10 (d, J = 3.6 Hz), 140.64 and 140.51, 137.26 and 137.23, 132.19 and 132.11, 130.17 and 130.09, 128.88, 128.72 and 128.68, 128.63 and 128.62, 128.03 and 128.02, 127.96 and 127.93, 127.41 and 127.38, 121.78 (d, J = 1.8 Hz) and 121.74 (d, J = 1.3 Hz), 114.99 and 114.98, 114.79 and 114.77, 113.23 and 113.02, 90.68 and 90.59, 84.66 and 84.62, 81.88 and 81.80, 78.86, 66.17 and 66.15, 66.12 and 66.10, 53.16 and 53.14, 53.07 and 53.05, 52.11 and 52.07, 42.86 and 42.78, 21.15. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -112.61. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3464, 2953, 1736, 1615, 1489, 1451, 1272, 1226, 1196, 1093, 1055, 1018, 953, 891, 786, 762, 698, 631, 604, 522 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}FNaO_7$ $[M + Na]^+$: 553.1633; Found: 553.1630.

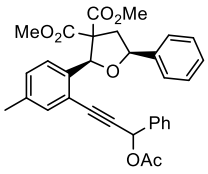


Compound **1u** (1:0.86 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.78 and 7.76 (d, J = 7.5 Hz, 1H), 7.70 and 7.68 (d, J = 7.5 Hz, 2H), 7.60 (dd, J = 7.7, 3.5 Hz, 1H), 7.51 and 7.49 (d, J = 7.6 Hz, 1H), 7.42 (dt, J = 28.9, 7.3 Hz, 4H), 7.32 (d, J = 7.3 Hz, 1H), 7.26 (d, J = 7.7 Hz, 2H), 7.20 (d, J = 7.3 Hz, 1H), 6.86 and 6.84 (d, J = 7.4 Hz, 1H), 6.52 and 6.45 (d, J = 28.8 Hz, 1H), 5.21 (dt, J = 10.8, 4.3 Hz, 1H), 3.82 and 3.73 (d, J = 37.4 Hz, 3H), 3.17 and 3.14 (d, J = 9.5 Hz, 3H), 3.01 – 2.93 (m, 1H), 2.70 (dt, J = 12.8, 5.7 Hz, 1H), 2.39 (s, 3H), 2.21 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.98 and 170.96, 169.87 and 169.84, 168.88 and 168.86, 140.90 and 140.79, 137.44 and 137.38, 137.31 and 137.28, 135.19 and 135.13, 132.20 and 132.11, 130.36, 128.87, 128.67, 128.62 and 128.61, 127.99 and 127.94, 127.91 and 127.90, 127.78 and 127.75, 127.61 and 127.58, 126.33, 125.14, 121.81 and 121.74, 90.55 and 90.46, 84.81 and 84.77, 81.43 and 81.37, 66.32 and 66.29, 66.14, 53.11 and 53.08, 53.00 and 52.98, 52.06 and 52.02, 41.53 and 41.44, 21.19, 19.24. **IR (KBr)** ν_{max} 3744, 3521, 3497, 2952, 1736, 1490, 1453, 1370, 1272, 1225, 1122, 1052, 1017, 949, 758, 699 cm^{-1}. **HRMS (ESI)** calcd for $C_{32}H_{30}NaO_7$ $[M + Na]^+$: 549.1884; Found: 549.1889.

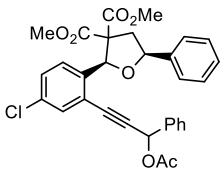


Compound **1v** (1:0.92 diasteromer): R_f = 0.36 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.71 (d, J = 7.3 Hz, 2H), 7.60 (d, J = 7.8 Hz, 1H), 7.56 (d, J = 7.3 Hz, 2H), 7.46 (dt, J = 13.7, 7.2 Hz, 6H), 7.37 (t, J = 7.4 Hz, 2H), 7.26 (d, J = 7.4 Hz, 1H), 6.89 and 6.86 (d, J = 13.5 Hz, 1H), 6.60 and 6.54 (d, J = 23.3 Hz, 1H), 5.10 – 5.04 (m, 1H), 4.42 – 4.33 (m, 0.5H), 4.31 – 4.15 (m, 1.5H), 3.84 – 3.73 (m, 1H), 3.46 – 3.35 (m, 1H), 3.08 (t, J = 12.5 Hz, 1H), 2.67 (dt, J = 12.9, 4.6 Hz, 1H), 2.21 (s, 3H), 1.31 (t, J = 7.0 Hz, 1.5H), 1.25 (t, J = 7.0 Hz, 1.5H), 0.88 (q, J = 8.2, 7.5 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.48 and 170.46, 169.81, 168.41, 141.18 and 141.07, 139.47 and 139.44, 137.37 and 137.32, 132.05 and 131.99, 128.84, 128.69 and 128.66,

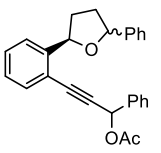
128.62 and 128.60, 128.57, 128.09 and 128.07, 128.03 and 127.97, 127.91, 127.71 and 127.68, 126.29 and 126.26, 122.11 and 122.06, 90.69 and 90.60, 84.88 and 84.84, 81.51 and 81.47, 79.51, 66.19 and 66.14, 61.90 and 61.80, 61.42 and 61.40, 43.09 and 43.01, 21.17, 14.09 and 14.04, 13.39. **IR (KBr)** ν_{max} 3743, 3521, 3497, 3034, 2983, 1736, 1490, 1451, 1369, 1265, 1225, 1180, 1094, 1053, 953, 905, 759, 699, 605, 546 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{32}NaO_7$ $[M + Na]^+$: 563.2040; Found: 563.2044.



Compound **1w** (1:0.64 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 (d, J = 7.0 Hz, 2H), 7.49 (d, J = 7.2 Hz, 2H), 7.43 – 7.35 (m, 6H), 7.32 (d, J = 7.5 Hz, 1H), 7.25 (d, J = 13.2 Hz, 1H), 7.13 (d, J = 7.9 Hz, 1H), 6.80 and 6.78 (d, J = 8.2 Hz, 1H), 6.48 and 6.41 (d, J = 26.2 Hz, 1H), 5.00 (d, J = 9.1 Hz, 1H), 3.77 and 3.70 (d, J = 30.7 Hz, 3H), 3.15 and 3.13 (d, J = 7.9 Hz, 3H), 2.99 (t, J = 12.4 Hz, 1H), 2.62 (dd, J = 12.4, 4.9 Hz, 1H), 2.28 (s, 3H), 2.16 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.98 and 170.96, 169.88, 168.86 and 168.84, 139.53 and 139.49, 137.95 and 137.83, 137.73 and 137.72, 137.34 and 137.31, 132.59 and 132.49, 129.63 and 129.61, 128.87, 128.63 and 128.55, 128.05, 128.00, 127.97, 127.48 and 127.45, 126.25 and 126.23, 121.51 and 121.44, 90.10 and 89.99, 84.97 and 84.93, 81.68 and 81.62, 79.51, 66.23 and 66.20, 66.16, 53.10 and 53.01, 52.09 and 52.06, 42.83 and 42.74, 21.20 and 20.90. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2952, 1735, 1540, 1454, 1368, 1271, 1226, 1054, 1017, 953, 757, 699 cm^{-1}. **HRMS (ESI)** calcd for $C_{32}H_{30}NaO_7$ $[M + Na]^+$: 549.1884; Found: 549.1882.

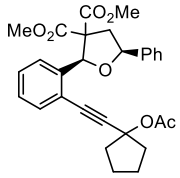


Compound **1x** (1:0.43 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.62 (d, J = 7.0 Hz, 2H), 7.41 (dt, J = 15.9, 9.5 Hz, 9H), 7.31 (dd, J = 18.0, 7.8 Hz, 2H), 6.78 and 6.76 (d, J = 12.1 Hz, 1H), 6.45 and 6.38 (d, J = 29.8 Hz, 1H), 4.99 (d, J = 11.4 Hz, 1H), 3.79 and 3.69 (d, J = 38.5 Hz, 3H), 3.19 and 3.16 (d, J = 11.1 Hz, 3H), 2.98 (t, J = 12.5 Hz, 1H), 2.63 (dd, J = 13.0, 5.0 Hz, 1H), 2.17 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.74 and 170.71, 169.79, 168.66 and 168.63, 139.46 and 139.33, 139.14 and 139.11, 136.95 and 136.93, 133.68, 131.63 and 131.57, 129.00 and 128.96, 128.92 and 128.88, 128.71 and 128.69, 128.62, 128.21, 127.95, 127.89, 126.22, 123.32 and 123.25, 91.89 and 91.81, 83.30 and 83.26, 81.29 and 81.22, 79.66, 66.11, 65.95 and 65.92, 53.19 and 53.09, 52.25 and 52.20, 42.80 and 42.73, 21.15. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3464, 2952, 1736, 1560, 1489, 1454, 1435, 1369, 1274, 1172, 1091, 1019, 952, 755, 699, 594, 533, 502 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{27}ClNaO_7$ $[M + Na]^+$: 569.1338; Found: 569.1343.

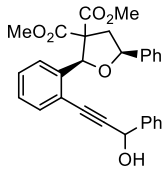


Compound **1y** (1:0.83 diasteromer): R_f = 0.4 (EtOAc/petroleum ether = 1/10), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 (d, J = 7.8 Hz, 1H), 7.59 (t, J = 7.5 Hz, 3H), 7.47 (d, J = 6.2 Hz, 2H), 7.37 (p, J = 8.9, 8.2 Hz, 7H), 7.27 (q, J = 7.7 Hz, 1H), 7.19 (d, J = 7.5 Hz, 1H), 6.70 (d, J = 6.9 Hz, 1H), 5.57 (t, J = 7.0 Hz, 1H), 5.38 (t, J = 6.8 Hz, 1H), 5.28 (q, J = 6.7 Hz, 1H), 5.00 (t, J = 7.1 Hz, 1H), 2.44 (m, 2H), 2.12 (d, J = 12.0 Hz, 3H), 1.87 (m, 2H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 169.87, 169.85, 169.85, 169.83, 146.74, 146.64, 146.12, 146.04, 143.65, 142.60, 142.58, 137.26, 137.11, 132.54, 132.49, 132.43, 132.38, 129.28, 129.25, 129.22, 129.06, 129.03, 128.78, 128.44, 128.40, 127.78, 127.74, 127.70, 127.43, 127.24, 126.80, 126.12, 125.59, 125.58, 125.04, 124.99, 124.74, 124.71, 119.31,

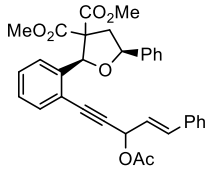
119.27, 119.13, 119.09, 90.80, 90.71, 90.64, 90.60, 85.39, 85.39, 85.33, 81.72, 81.30, 81.27, 79.90, 79.20, 66.30, 35.57, 34.65, 34.58, 33.93, 33.89, 33.83, 21.15, 21.12. **IR (KBr)** ν_{max} 3839, 3818, 3744, 3675, 3652, 3522, 3498, 3465, 2928, 1739, 1540, 1453, 1368, 1223, 1018, 953, 756, 698 cm^{-1}. **HRMS (ESI)** calcd for $C_{27}H_{24}NaO_3$ $[M + Na]^+$: 419.1618; Found: 419.1621.



Compound **1aa** R_f = 0.4 (EtOAc/petroleum ether = 1/8), yellow oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.49 (t, J = 8.7 Hz, 3H), 7.39 (t, J = 7.7 Hz, 3H), 7.35 – 7.26 (m, 2H), 7.18 (t, J = 7.5 Hz, 1H), 6.45 (s, 1H), 5.03 (dd, J = 11.7, 4.5 Hz, 1H), 3.83 (s, 3H), 3.16 (s, 3H), 2.99 (t, J = 12.5 Hz, 1H), 2.62 (dd, J = 13.3, 4.6 Hz, 1H), 2.39 – 2.27 (m, 4H), 2.07 (s, 3H), 1.88 – 1.75 (m, 4H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.1, 169.5, 168.7, 140.4, 139.5, 132.1, 128.5, 128.1, 128.0, 127.8, 127.4, 126.2, 122.5, 94.5, 82.2, 81.6, 81.1, 79.5, 66.2, 53.1, 52.1, 42.5, 40.4, 40.3, 23.6, 23.5, 21.8. **IR (KBr)** ν_{max} 3464, 2953, 2906, 1736, 1635, 1442, 1344, 1269, 1177, 1053, 1015, 754, 701, 613 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{30}NaO_7$ $[M + Na]^+$: 513.1884; Found: 513.1882.



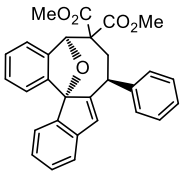
Compound **1ab** (1:0.69 diasteromer)**:** R_f = 0.3 (EtOAc/petroleum ether = 1/3), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.72 (dd, J = 10.6, 8.1 Hz, 2H), 7.63 (t, J = 7.4 Hz, 1H), 7.58 (d, J = 7.5 Hz, 2H), 7.46 (t, J = 7.0 Hz, 5H), 7.39 (dt, J = 11.1, 5.3 Hz, 3H), 7.27 (s, 1H), 6.65 (d, J = 10.0 Hz, 1H), 5.78 – 5.74 (m, 1H), 5.03 (dd, J = 11.6, 4.6 Hz, 1H), 3.97 – 3.89 (m, 1H), 3.79 (d, J = 47.6 Hz, 3H), 3.16 (t, J = 6.4 Hz, 4H), 2.70 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.30 and 172.19, 168.77 and 168.73, 141.27 and 141.06, 140.57 and 140.53, 139.23 and 139.18, 131.36 and 131.19, 128.64, 128.60, 128.49, 128.38, 128.26, 128.18 and 128.15, 128.01, 127.38, 126.85, 126.38 and 126.37, 122.03, 94.49, 84.52, 84.36, 82.04, 81.96, 79.70, 66.30, 66.23, 64.96, 53.50, 52.26, 52.17, 43.48, 43.38. **IR (KBr)** ν_{max} 3524, 3035, 2952, 2878, 2226, 1961, 1891, 1814, 1729, 1489, 1444, 1382, 1276, 1183, 1019, 814, 757, 703, 636, 503 cm^{-1}.



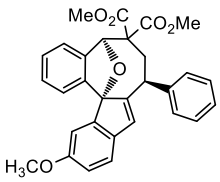
Compound **1ac** (1:0.83 diasteromer)**:** R_f = 0.4 (EtOAc/petroleum ether = 1/6), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.56 (td, J = 13.1, 11.9, 5.9 Hz, 6H), 7.44 (t, J = 7.4 Hz, 3H), 7.38 (t, J = 7.3 Hz, 4H), 7.33 – 7.30 (m, 1H), 7.02 (d, J = 15.5 Hz, 1H), 6.58 (s, 1H), 6.52 – 6.42 (m, 2H), 5.08 (dd, J = 11.7, 4.6 Hz, 1H), 3.81 – 3.77 (m, 3H), 3.19 (d, J = 3.0 Hz, 3H), 3.15 – 3.09 (m, 1H), 2.73 – 2.67 (m, 1H), 2.22 (d, J = 3.8 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.97 and 170.93, 169.82, 168.83 and 168.81, 140.98, 140.95, 139.39, 139.36, 136.05, 136.01, 134.52, 134.45, 132.24, 132.06, 128.72, 128.68, 128.64, 128.59, 128.41, 128.39, 128.13, 127.98, 127.96, 127.57, 127.52, 127.03, 126.97, 126.30, 126.28, 124.26, 124.24, 121.74, 121.71, 89.75, 89.69, 84.69, 84.58, 81.80, 79.65, 66.32, 66.29, 64.93, 53.17 and 53.14, 53.12 and 53.09, 52.12, 43.08, 42.94, 21.21. **IR (KBr)** ν_{max} 3818, 3744, 3521, 3497, 2920, 1733, 1539, 1367, 1270, 1014, 753 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{30}NaO_7$ $[M + Na]^+$: 561.1884; Found: 561.1888.

2. General procedure for synthesis of 3

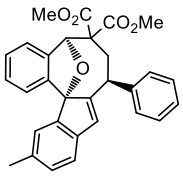
To a solution of **1** in DCE was added the catalyst (2-5 mol% $AgSbF_6$ or 20 mol% $InCl_3$) at room temperature. Then the solution mixture was stirred at the same temperature, after completion of the reaction, the solvent was removed under reduced pressure and the crude product was subjected to silica gel column chromatography to afford **3**.



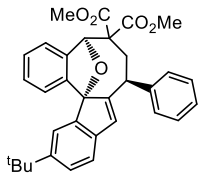
Compound **3a**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 73%, yellow solid (m.p. 157-158 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31 – 7.23 (m, 5H), 7.21 – 7.16 (m, 2H), 7.04 (m, 5H), 6.79 – 6.75 (m, 1H), 6.51 (s, 1H), 5.83 (d, *J* = 2.6 Hz, 1H), 4.35 (dt, *J* = 12.5, 2.8 Hz, 1H), 3.88 (s, 3H), 3.75 (s, 3H), 2.35 – 2.30 (m, 1H), 1.69 (dd, *J* = 15.0, 12.6 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.5, 159.0, 146.7, 145.5, 143.7, 140.8, 129.0, 128.9, 128.5, 128.1, 128.0, 127.1, 127.1, 126.6, 125.5, 123.3, 122.5, 121.3, 120.5, 97.4, 85.4, 65.7, 53.10, 52.88, 43.1, 34.5. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2953, 1736, 1492, 1456, 1266, 1131, 1042, 1108, 969, 887, 751, 702, 638, 526 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{24}NaO_5$ $[M + Na]^+$: 475.1516; Found: 475.1519.



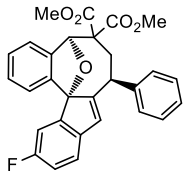
Compound **3b**: R_f = 0.48 (EtOAc/petroleum ether = 1/5), Yield: 50%, yellow solid (m.p. 206-207 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32 (d, *J* = 7.6 Hz, 3H), 7.26 (d, *J* = 7.2 Hz, 2H), 7.24 – 7.19 (m, 1H), 7.07 (d, *J* = 7.1 Hz, 2H), 6.96 (d, *J* = 8.1 Hz, 1H), 6.81 (d, *J* = 7.1 Hz, 1H), 6.75 (d, *J* = 8.2 Hz, 1H), 6.71 (s, 1H), 6.53 (s, 1H), 5.80 (s, 1H), 4.34 (d, *J* = 12.5 Hz, 1H), 3.92 (s, 3H), 3.79 (s, 3H), 3.73 (s, 3H), 2.37 – 2.31 (m, 1H), 1.70 (s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.5, 158.4, 156.8, 148.5, 145.6, 144.1, 140.6, 136.4, 129.0, 128.5, 128.1, 128.0, 126.7, 126.5, 122.3, 121.4, 121.0, 114.2, 110.1, 97.3, 85.4, 65.7, 55.5, 53.1, 52.9, 43.0, 34.5. **IR (KBr)** ν_{max} 3743, 3522, 3497, 3464, 2952, 1735, 1593, 1271, 1041, 750, 704 cm^{-1}. **HRMS (ESI)** calcd for $C_{30}H_{26}NaO_6$ $[M + Na]^+$: 505.1622; Found: 505.1625.



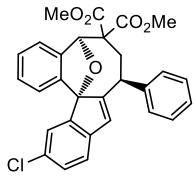
Compound **3c**: R_f = 0.57 (EtOAc/petroleum ether = 1/5), Yield: 71%, yellow solid (m.p. 214-215 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29 (d, *J* = 7.5 Hz, 2H), 7.26 – 7.21 (m, 3H), 7.20 – 7.16 (m, 1H), 7.04 (d, *J* = 7.3 Hz, 2H), 6.99 (d, *J* = 7.6 Hz, 1H), 6.91 (d, *J* = 6.6 Hz, 2H), 6.79 (d, *J* = 7.5 Hz, 1H), 6.50 (s, 1H), 5.80 (s, 1H), 4.35 (d, *J* = 12.5 Hz, 1H), 3.88 (s, 3H), 3.75 (s, 3H), 2.34 – 2.29 (m, 1H), 2.24 (s, 3H), 1.71 – 1.63 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.6, 157.9, 146.9, 145.6, 144.0, 141.0, 140.8, 135.3, 129.4, 128.9, 128.5, 128.1, 128.0, 127.1, 126.5, 124.3, 122.4, 121.4, 120.2, 97.4, 85.4, 65.7, 53.11, 52.88, 43.0, 34.5, 21.3. **IR (KBr)** ν_{max} 3744, 3522, 3498, 2952, 1737, 1540, 1270, 1130, 1043, 969, 843, 750 cm^{-1}. **HRMS (ESI)** calcd for $C_{30}H_{26}NaO_5$ $[M + Na]^+$: 489.1672; Found: 489.1671.



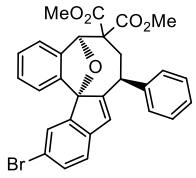
Compound **3d**: R_f = 0.58 (EtOAc/petroleum ether = 1/5), Yield: 78%, yellow solid (m.p. 145-146 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32 – 7.25 (m, 3H), 7.21 (dd, *J* = 16.4, 7.3 Hz, 4H), 7.10 (s, 1H), 7.03 (d, *J* = 7.1 Hz, 2H), 6.94 (d, *J* = 7.8 Hz, 1H), 6.77 (d, *J* = 7.4 Hz, 1H), 6.51 (s, 1H), 5.80 (d, *J* = 2.1 Hz, 1H), 4.31 (d, *J* = 12.5 Hz, 1H), 3.88 (s, 3H), 3.76 (s, 3H), 2.35 – 2.28 (m, 1H), 1.71 – 1.63 (m, 1H), 1.22 (s, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.6, 158.4, 148.9, 146.6, 145.6, 144.2, 141.0, 140.8, 128.9, 128.5, 128.1, 127.9, 126.9, 126.5, 125.7, 122.3, 121.4, 120.6, 119.9, 97.6, 85.3, 65.7, 53.11, 52.89, 43.1, 34.8, 34.5, 31.5. **IR (KBr)** ν_{max} 3839, 3744, 3522, 3497, 3464, 2954, 1540, 1367, 1274, 1060, 751, 523 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{32}NaO_5$ $[M + Na]^+$: 531.2142; Found: 531.2146.



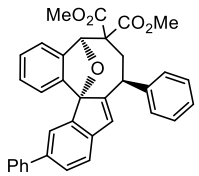
Compound **3e**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 75%, yellow solid (m.p. 238-239 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29 (dd, *J* = 14.7, 5.9 Hz, 3H), 7.22 (dd, *J* = 15.3, 7.3 Hz, 3H), 7.03 (d, *J* = 7.2 Hz, 2H), 6.95 (dd, *J* = 8.0, 5.0 Hz, 1H), 6.88 (td, *J* = 9.3, 2.2 Hz, 1H), 6.83 – 6.76 (m, 2H), 6.50 (s, 1H), 5.79 (d, *J* = 2.3 Hz, 1H), 4.32 (d, *J* = 12.4 Hz, 1H), 3.89 (s, 3H), 3.76 (s, 3H), 2.35 – 2.29 (m, 1H), 1.67 (dd, *J* = 14.8, 12.8 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.80, 168.40, 162.89, 160.45, 159.01, 158.97, 148.96, 148.89, 145.25, 143.21, 140.70, 139.46, 139.43, 129.05, 128.56, 128.26, 128.03, 126.61, 126.21, 122.55, 121.22, 121.12, 121.04, 115.49, 115.26, 111.83, 111.59, 97.11, 97.09, 85.52, 65.61, 53.16, 53.13, 52.94, 52.91, 43.05, 34.42. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -116.89. **IR (KBr)** ν_{max} 3838, 3744, 3693, 3522, 3497, 3464, 3442, 2953, 1733, 1540, 1522, 1472, 1369, 1272, 1033, 751 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}FNaO_5$ $[M + Na]^+$: 493.1422; Found: 493.1424.



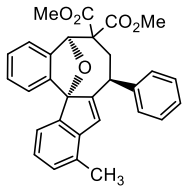
Compound **3f**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 52%, yellow solid (m.p. 256-257 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32 (dd, *J* = 15.9, 8.2 Hz, 3H), 7.24 (d, *J* = 8.6 Hz, 2H), 7.18 (dd, *J* = 14.4, 7.4 Hz, 2H), 7.08 – 7.00 (m, 3H), 6.94 (d, *J* = 7.9 Hz, 1H), 6.79 (d, *J* = 7.1 Hz, 1H), 6.50 (s, 1H), 5.80 (s, 1H), 4.34 (d, *J* = 12.4 Hz, 1H), 3.89 (s, 3H), 3.76 (s, 3H), 2.36 – 2.29 (m, 1H), 1.66 (s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.78, 168.4, 159.7, 148.5, 145.1, 142.8, 142.2, 140.7, 131.5, 129.1, 129.0, 128.6, 128.3, 128.0, 126.7, 126.3, 124.1, 122.6, 121.30, 121.26, 97.1, 85.5, 77.4, 77., 76.7, 65.6, 53.18, 52.96, 43.1, 34.4. **IR (KBr)** ν_{max} 3837, 3819, 3745, 3621, 3522, 3498, 3464, 3434, 2952, 1731, 1651, 1540, 1522, 1456, 1432, 1367, 1261, 1211, 1032, 750, 701, 525 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}ClNaO_5$ $[M + Na]^+$: 509.1126; Found: 509.1121.



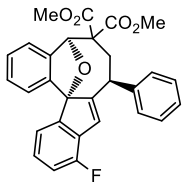
Compound **3g**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 34%, yellow solid (m.p. 268-369 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32 (q, *J* = 9.1, 7.7 Hz, 4H), 7.26 – 7.16 (m, 4H), 7.02 (d, *J* = 7.2 Hz, 2H), 6.89 (d, *J* = 7.9 Hz, 1H), 6.79 (d, *J* = 7.1 Hz, 1H), 6.50 (s, 1H), 5.79 (s, 1H), 4.33 (d, *J* = 12.0 Hz, 1H), 3.89 (s, 3H), 3.76 (s, 3H), 2.32 (d, *J* = 14.7 Hz, 1H), 1.66 (t, *J* = 13.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.8, 168.4, 159.7, 148.7, 145.1, 142.8, 142.6, 140.7, 132.0, 129.1, 128.6, 128.4, 128.0, 126.8, 126.7, 126.3, 122.7, 121.8, 121.3, 119.4, 97.2, 85.6, 65.6, 53.19, 52.98, 43.1, 34.4. **IR (KBr)** ν_{max} 3745, 3522, 3497, 2926, 1725, 1540, 1545, 1208, 1122, 1053, 1032, 998, 781, 741, 587, 526 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}BrNaO_5$ $[M + Na]^+$: 553.0621; Found: 553.0619.



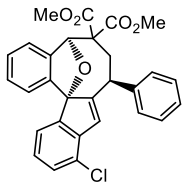
Compound **3h**: R_f = 0.58 (EtOAc/petroleum ether = 1/5), Yield: 69%, yellow solid (m.p. 210-211 ºC). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.44 (d, J = 7.5 Hz, 2H), 7.37 (d, J = 7.6 Hz, 1H), 7.28 (d, J = 7.5 Hz, 2H), 7.16 (dd, J = 21.8, 7.1 Hz, 8H), 7.02 (d, J = 7.7 Hz, 1H), 6.98 (d, J = 7.1 Hz, 2H), 6.75 (d, J = 7.1 Hz, 1H), 6.46 (s, 1H), 5.80 (s, 1H), 4.29 (d, J = 11.9 Hz, 1H), 3.82 (s, 3H), 3.69 (s, 3H), 2.27 (d, J = 14.7 Hz, 1H), 1.63 (t, J = 13.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.5, 159.4, 147.5, 145.4, 143.6, 143.0, 141.1, 140.8, 138.6, 129.0, 128.62, 128.58, 128.1, 127.9, 127.0, 126.92, 126.88, 126.6, 122.5, 122.4, 121.5, 120.8, 97.4, 85.5, 65.7, 53.18, 52.95, 43.20, 34.48. **IR (KBr)** ν_{max} 3838, 3818, 3693, 3653, 3497, 3464, 2956, 1737, 1540, 1522, 1457, 1368, 1273, 751 cm^{-1}. **HRMS (ESI)** calcd for $C_{35}H_{28}NaO_5$ $[M + Na]^+$: 551.1829; Found: 551.1826.



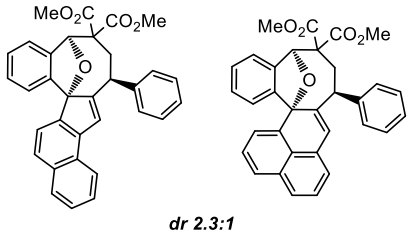
Compound **3i**: R_f = 0.57 (EtOAc/petroleum ether = 1/5), Yield: 58%, yellow solid (m.p. 205-206 ºC). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31 – 7.27 (m, 2H), 7.25 (d, J = 5.9 Hz, 3H), 7.22 – 7.18 (m, 1H), 7.06 (d, J = 7.3 Hz, 2H), 6.97 (dt, J = 14.7, 7.4 Hz, 2H), 6.89 (d, J = 7.0 Hz, 1H), 6.79 (d, J = 7.6 Hz, 1H), 6.50 (s, 1H), 5.94 (s, 1H), 4.38 (d, J = 12.4 Hz, 1H), 3.87 (s, 3H), 3.75 (s, 3H), 2.34 – 2.28 (m, 1H), 2.22 (s, 3H), 1.71 – 1.64 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.6, 158.2, 146.6, 145.7, 143.8, 142.2, 140.9, 130.3, 129.7, 128.9, 128.6, 128.1, 128.0, 126.5, 125.7, 125.5, 122.5, 121.4, 120.9, 97.7, 85.4, 65.7, 53.1, 52.9, 43.2, 34.7, 18.1. **IR (KBr)** ν_{max} 3818, 3746, 3521, 3497, 2953, 1735, 1600, 1491, 1455, 1436, 1333, 1268, 1130, 1056, 1010, 968, 924, 870, 845, 817, 746, 702, 644, 623, 531, 501 cm^{-1}. **HRMS (ESI)** calcd for $C_{30}H_{26}NaO_5$ $[M + Na]^+$: 489.1672; Found: 489.1675.



Compound **3j**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 62%, yellow solid (m.p. 148-149 ºC). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.34 – 7.26 (m, 4H), 7.24 (s, 1H), 7.22 – 7.19 (m, 1H), 7.03 (m, 3H), 6.89 (dd, J = 20.4, 8.1 Hz, 2H), 6.79 (d, J = 7.3 Hz, 1H), 6.51 (s, 1H), 5.96 (s, 1H), 4.34 (d, J = 12.4 Hz, 1H), 3.89 (s, 3H), 3.76 (s, 3H), 2.33 (d, J = 14.9 Hz, 1H), 1.70 – 1.65 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.78, 168.40, 159.26, 156.48, 154.01, 149.55, 149.49, 145.01, 143.03, 140.71, 130.09, 129.93, 129.08, 128.63, 128.29, 128.18, 128.03, 127.27, 127.21, 126.71, 122.56, 121.51, 121.27, 119.42, 119.39, 116.30, 116.10, 97.52, 85.56, 65.60, 53.18, 53.16, 52.96, 52.95, 43.12, 34.37. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -123.31. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2954, 1735, 1540, 1472, 1269, 1008, 701 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}FNaO_5$ $[M + Na]^+$: 493.1422; Found: 493.1421.

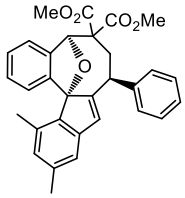


Compound **3k**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 45%, yellow solid (m.p. 178-179 ºC). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.33 – 7.30 (m, 1H), 7.27 (d, J = 9.5 Hz, 3H), 7.25 (s, 1H), 7.23 – 7.20 (m, 1H), 7.17 (m, 1H), 7.05 – 7.02 (m, 2H), 7.01 – 6.95 (m, 2H), 6.82 (d, J = 7.2 Hz, 1H), 6.50 (s, 1H), 5.98 (d, J = 2.6 Hz, 1H), 4.36 (dt, J = 12.5, 2.9 Hz, 1H), 3.89 (s, 3H), 3.76 (s, 3H), 2.33 (m, 1H), 1.66 (d, J = 2.5 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.8, 168.4, 160.3, 148.4, 145.0, 142.7, 141.7, 140.8, 129.3, 129.1, 128.7, 128.4, 128.1, 126.9, 126.7, 125.9, 124.4, 122.6, 121.7, 121.3, 97.9, 85.6, 65.6, 53.18, 52.96, 43.2, 34.5. **IR (KBr)** ν_{max} 3819, 3746, 3691, 3498, 3440, 2953, 1733, 1539, 1454, 1434, 1296, 1133, 1054, 1003, 749, 703, 530 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}ClNaO_5$ $[M + Na]^+$: 509.1126; Found: 509.1127.

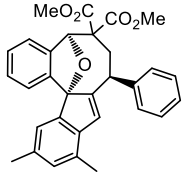


dr 2.3:1

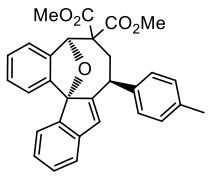
Compound **3l** and **3l'**: R_f = 0.57 (EtOAc/petroleum ether = 1/5), Yield: 49%, yellow solid (m.p. 257-258 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.81 (t, *J* = 8.0 Hz, 1.33H), 7.71 (d, *J* = 7.9 Hz, 0.33H), 7.66 (d, *J* = 8.5 Hz, 0.33H), 7.59 (t, *J* = 9.1 Hz, 1H), 7.48 – 7.35 (m, 2H), 7.34 – 7.26 (m, 4H), 7.25 – 7.17 (m, 2H), 7.11 (d, *J* = 7.1 Hz, 2H), 7.05 (dd, *J* = 16.3, 7.3 Hz, 1H), 6.69 (d, *J* = 6.1 Hz, 1H), 6.58 (s, 1H), 6.54 (d, *J* = 7.5 Hz, 0.33H), 6.37 (s, 0.69H), 5.81 (s, 0.33H), 4.45 (d, *J* = 12.5 Hz, 0.67H), 4.08 (d, *J* = 11.7 Hz, 0.33H), 3.89 (s, 3H), 3.80 (s, 1H), 3.77 (s, 2H), 2.53 (d, *J* = 15.1 Hz, 0.33H), 2.38 (d, *J* = 14.7 Hz, 0.67H), 1.90 – 1.81 (m, 0.33H), 1.75 (t, *J* = 13.7 Hz, 0.67H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.91, 168.51, 160.05, 145.46, 143.48, 142.94, 141.12, 140.19, 134.37, 130.36, 128.97, 128.69, 128.64, 128.51, 128.19, 127.07, 127.00, 125.88, 125.77, 125.23, 124.08, 122.59, 121.21, 121.14, 98.28, 85.74, 65.72, 53.17, 52.96, 43.39, 34.66. **IR (KBr)** ν_{max} 3834, 3798, 3747, 3712, 3692, 3670, 3584, 3565, 3438, 2918, 2355, 1732, 1538, 1455, 1342, 1269, 1009, 748, 511 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{26}NaO_5$ $[M + Na]^+$: 525.1672; Found: 525.1670.



Compound **3m**: R_f = 0.58 (EtOAc/petroleum ether = 1/5), Yield: 51%, yellow solid (m.p. 103-104 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.30 (d, *J* = 7.0 Hz, 1H), 7.24 (d, *J* = 9.2 Hz, 4H), 7.19 (d, *J* = 8.0 Hz, 1H), 7.04 (d, *J* = 7.2 Hz, 2H), 6.81 (d, *J* = 7.1 Hz, 1H), 6.66 (s, 1H), 6.60 (s, 1H), 6.49 (s, 1H), 5.74 (s, 1H), 4.30 (d, *J* = 12.1 Hz, 1H), 3.88 (s, 3H), 3.75 (s, 3H), 2.31 (d, *J* = 14.9 Hz, 1H), 2.24 (s, 3H), 1.81 (s, 3H), 1.70 (t, *J* = 13.8 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.5, 158.6, 145.6, 144.1, 142.8, 140.8, 140.4, 138.9, 134.3, 128.9, 128.5, 128.2, 128.1, 127.9, 127.3, 126.5, 122.4, 120.9, 119.1, 97.8, 85.1, 65.8, 53.12, 52.86, 43.2, 34.4, 21.4, 16.8. **IR (KBr)** ν_{max} 3836, 3817, 3744, 3692, 3522, 3497, 3464, 2954, 1735, 1539, 1522, 1456, 1434, 1367, 1271, 1012, 966, 750, 703, 524 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{28}NaO_5$ $[M + Na]^+$: 503.1829; Found: 503.1832.

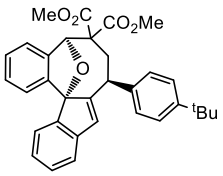


Compound **3n**: R_f = 0.58 (EtOAc/petroleum ether = 1/5), Yield: 62%, yellow solid (m.p. 236-237 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.28 (d, *J* = 7.0 Hz, 2H), 7.24 (t, *J* = 3.7 Hz, 3H), 7.19 (t, *J* = 7.1 Hz, 1H), 7.05 (d, *J* = 7.1 Hz, 2H), 6.82 (d, *J* = 4.6 Hz, 2H), 6.73 (s, 1H), 6.49 (s, 1H), 5.90 (d, *J* = 2.2 Hz, 1H), 4.38 (d, *J* = 12.4 Hz, 1H), 3.87 (s, 3H), 3.74 (s, 3H), 2.34 – 2.28 (m, 1H), 2.20 (s, 3H), 2.18 (s, 3H), 1.66 (dd, *J* = 14.7, 12.8 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.6, 157.1, 146.8, 145.8, 144.1, 140.8, 139.6, 135.4, 130.9, 129.4, 128.9, 128.6, 128.2, 127.9, 126.5, 125.4, 122.5, 121.8, 121.5, 97.6, 85.3, 65.7, 53.08, 52.88, 43.1, 34.8, 21.2, 18.0. **IR (KBr)** ν_{max} 3849, 3814, 3733, 3709, 3646, 3567, 3529, 3458, 3377, 2955, 2350, 1734, 1436, 1268, 1133, 1057, 1010, 968, 899, 864, 746, 702, 636, 601, 526 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{28}NaO_5$ $[M + Na]^+$: 503.1829; Found: 503.1827.

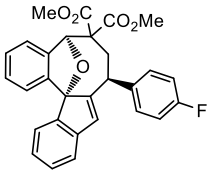


Compound **3p**: R_f = 0.57 (EtOAc/petroleum ether = 1/5), Yield: 74%, yellow solid (m.p. 185-186 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31 – 7.26 (m, 2H), 7.23 (s, 1H), 7.18 (td, *J* = 7.2, 1.7 Hz, 1H), 7.08 – 7.01 (m, 5H), 6.93 (d, *J* = 7.9 Hz, 2H), 6.76 (d, *J* = 7.0 Hz, 1H), 6.50 (s, 1H), 5.84 (d, *J* = 2.5 Hz, 1H), 4.35 – 4.29 (m, 1H), 3.87 (s, 3H), 3.75 (s, 3H), 2.30 (s, 4H), 1.67 (dd, *J* = 14.9, 12.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.6, 159.2, 146.8, 143.78, 143.76, 142.5, 140.9, 136.1, 129.2, 129.0, 128.9,

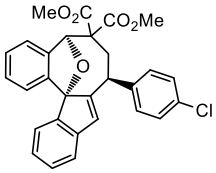
128.0, 127.9, 127.0, 125.5, 123.3, 122.5, 121.3, 120.5, 97.4, 85.4, 65.6, 53.09, 52.86, 42.7, 34.6, 21.1 (d, J = 1.8 Hz). **IR (KBr)** ν_{max} 3744, 3522, 3497, 2952, 1736, 1512, 1457, 1436, 1266, 1121, 1042, 1010, 969, 888, 752, 633, 520 cm^{-1}. **HRMS (ESI)** calcd for $C_{30}H_{26}NaO_5$ $[M + Na]^+$: 489.1672; Found: 489.1676.



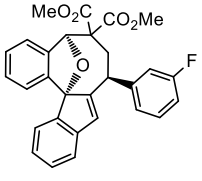
Compound **3q**: R_f = 0.58 (EtOAc/petroleum ether = 1/5), Yield: 74%, yellow solid (m.p. 206-207 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.26 (d, J = 5.4 Hz, 5H), 7.18 (t, J = 7.1 Hz, 1H), 7.05 (q, J = 7.2 Hz, 3H), 6.96 (d, J = 8.0 Hz, 2H), 6.77 (d, J = 7.0 Hz, 1H), 6.50 (s, 1H), 5.89 – 5.85 (m, 1H), 4.34 (d, J = 12.3 Hz, 1H), 3.87 (s, 3H), 3.75 (s, 3H), 2.35 – 2.29 (m, 1H), 1.70 – 1.63 (m, 1H), 1.29 (s, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.6, 159.1, 149.3, 146.8, 143.82, 143.75, 142.4, 140.9, 129.0, 128.9, 128.0, 127.6, 127.1, 125.5, 125.4, 123.3, 122.5, 121.3, 120.5, 97.4, 85.4, 65.6, 53.08, 52.86, 42.5, 34.6, 34.4, 31.4. **IR (KBr)** ν_{max} 3834, 3742, 3521, 3497, 3464, 2956, 1736, 1511, 1458, 1364, 1266, 1042, 1011, 969, 751 cm^{-1}. **HRMS (ESI)** calcd for $C_{33}H_{32}NaO_5$ $[M + Na]^+$: 531.2142; Found: 531.2146.



Compound **3r**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 40%, yellow solid (m.p. 181-182 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.30 (dd, J = 13.9, 6.7 Hz, 2H), 7.25 (s, 1H), 7.20 (td, J = 7.3, 2.6 Hz, 1H), 7.08 – 7.03 (m, 3H), 7.02 – 6.97 (m, 2H), 6.93 (t, J = 8.6 Hz, 2H), 6.75 (d, J = 7.8 Hz, 1H), 6.51 (s, 1H), 5.82 (d, J = 2.3 Hz, 1H), 4.35 (d, J = 12.5 Hz, 1H), 3.88 (s, 3H), 3.77 (s, 3H), 2.32 – 2.26 (m, 1H), 1.62 (d, J = 14.6 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.82, 168.43, 162.75, 160.32, 158.87, 146.68, 143.63, 143.55, 141.19, 141.16, 140.75, 129.55, 129.47, 129.06, 128.98, 128.10, 127.19, 125.65, 123.36, 122.47, 121.25, 120.59, 115.42, 115.21, 97.36, 85.39, 65.60, 53.17, 53.15, 52.96, 52.94, 42.32, 34.60. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -116.42. **IR (KBr)** ν_{max} 3745, 3651, 3567, 3522, 3464, 3442, 2953, 1736, 1651, 1558, 1540, 1457, 1453, 1335, 1265, 1220, 1042, 969, 842, 751, 523 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}FNaO_5$ $[M + Na]^+$: 493.1422; Found: 493.1424.

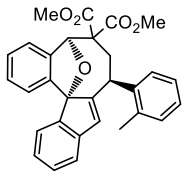


Compound **3s**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 66%, yellow solid (m.p. 178-179 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.30 (dd, J = 15.0, 8.0 Hz, 2H), 7.21 (t, J = 8.1 Hz, 4H), 7.08 – 7.03 (m, 3H), 6.98 (d, J = 8.1 Hz, 2H), 6.75 (d, J = 7.8 Hz, 1H), 6.51 (s, 1H), 5.83 (d, J = 2.2 Hz, 1H), 4.35 (d, J = 12.5 Hz, 1H), 3.88 (s, 3H), 3.77 (s, 3H), 2.28 (dd, J = 14.9, 2.5 Hz, 1H), 1.63 (s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.8, 168.4, 158.5, 146.6, 143.9, 143.6, 143.5, 140.8, 132.3, 129.5, 129.1, 129.0, 128.7, 128.1, 127.3, 125.7, 123.4, 122.5, 121.3, 120.6, 97.4, 85.4, 65.6, 53.16, 52.96, 42.4, 34.4. **IR (KBr)** ν_{max} 3744, 3521, 3498, 2953, 1736, 1539, 1263, 1013, 751 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}ClNaO_5$ $[M + Na]^+$: 509.1126; Found: 509.1125.

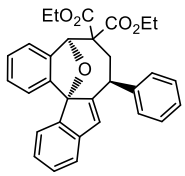


Compound **3t**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 39%, yellow solid (m.p. 137-138 °C). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.32 – 7.29 (m, 1H), 7.27 (d, J = 7.5 Hz, 1H), 7.26 – 7.24 (m, 1H), 7.23 – 7.18 (m, 2H), 7.08 – 7.04 (m, 3H), 6.91 – 6.85 (m, 2H), 6.77 (d, J = 7.3 Hz, 1H), 6.72 (m, 1H), 6.51 (s, 1H), 5.86 (d, J = 2.6 Hz, 1H), 4.37 (dt, J = 12.5, 2.8 Hz, 1H), 3.89 (s, 3H), 3.77 (s, 3H), 2.31 (m, 1H), 1.65 (d, J = 2.4 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.77, 168.38, 164.06, 161.61, 158.15, 147.92, 147.85, 146.63, 143.52, 143.51, 140.71, 130.04, 129.96, 129.09, 129.06, 128.16, 127.38, 125.72, 123.84,

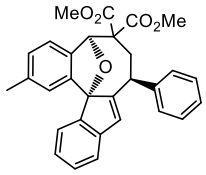
123.81, 123.37, 122.47, 121.30, 120.65, 115.01, 114.80, 113.61, 113.40, 97.38, 85.39, 65.62, 53.20, 53.18, 52.98, 52.97, 42.81, 34.28. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -113.01. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2954, 1736, 1588, 1486, 1438, 1334, 1265, 1130, 1043, 1012, 969, 914, 885, 790, 752, 639, 521 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}FNaO_5$ $[M + Na]^+$: 493.1422; Found: 493.1426.



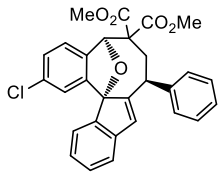
Compound **3u**: R_f = 0.57 (EtOAc/petroleum ether = 1/5), Yield: 62%, yellow solid (m.p. 192-193 °C). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.30 (d, J = 7.3 Hz, 1H), 7.25 (s, 1H), 7.21 – 7.13 (m, 3H), 7.09 – 7.01 (m, 5H), 6.79 (d, J = 7.1 Hz, 1H), 6.73 (d, J = 7.6 Hz, 1H), 6.53 (s, 1H), 5.76 (d, J = 2.4 Hz, 1H), 4.65 (d, J = 12.3 Hz, 1H), 3.88 (s, 3H), 3.76 (s, 3H), 2.44 (s, 3H), 2.23 (dd, J = 15.0, 2.8 Hz, 1H), 1.66 – 1.62 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.9, 168.5, 159.5, 146.7, 144.0, 143.8, 143.7, 140.8, 135.4, 130.1, 129.02, 128.99, 128.1, 128.0, 126.6, 126.4, 126.3, 125.5, 123.3, 122.5, 121.4, 120.5, 97.6, 85.5, 65.6, 53.1, 52.9, 38.0, 33.6, 19.5. **IR (KBr)** ν_{max} 3745, 3521, 3497, 2953, 1736, 1458, 1436, 1334, 1267, 1131, 1043, 1010, 969, 748, 638 cm^{-1}. **HRMS (ESI)** calcd for $C_{30}H_{26}NaO_5$ $[M + Na]^+$: 489.1672; Found: 489.1674.



Compound **3v**: R_f = 0.58 (EtOAc/petroleum ether = 1/5), Yield: 65%, yellow solid (m.p. 168-169 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.26 (dd, J = 13.9, 7.2 Hz, 6H), 7.21 – 7.15 (m, 2H), 7.04 (q, J = 8.0, 7.4 Hz, 5H), 6.76 (d, J = 7.2 Hz, 1H), 6.50 (s, 1H), 5.82 (s, 1H), 4.43 (dd, J = 10.7, 7.1 Hz, 1H), 4.35 (d, J = 12.4 Hz, 1H), 4.23 (ddt, J = 18.0, 10.8, 5.4 Hz, 3H), 2.31 (d, J = 14.7 Hz, 1H), 1.72 – 1.65 (m, 1H), 1.34 (t, J = 7.1 Hz, 3H), 1.28 (t, J = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.0, 168.1, 159.2, 146.9, 145.6, 143.8, 143.8, 141.0, 128.9, 128.9, 128.5, 128.1, 128.0, 127.1, 126.5, 125.5, 123.4, 122.5, 121.3, 120.5, 97.4, 85.4, 65.7, 62.0, 61.9, 43.1, 34.3, 14.2, 14.1. **IR (KBr)** ν_{max} 3743, 3522, 3498, 3464, 2929, 1733, 1593, 1457, 1367, 1264, 1019, 750, 701, 525 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{28}NaO_5$ $[M + Na]^+$: 503.1829; Found: 503.1827.

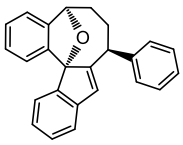


Compound **3w**: R_f = 0.57 (EtOAc/petroleum ether = 1/5), Yield: 64%, yellow solid (m.p. 179-180 °C). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.28 – 7.26 (m, 1H), 7.24 (s, 1H), 7.21 – 7.17 (m, 2H), 7.10 (m, 2H), 7.04 (m, 5H), 6.56 (s, 1H), 6.46 (s, 1H), 5.82 (d, J = 2.4 Hz, 1H), 4.32 – 4.28 (m, 1H), 3.88 (s, 3H), 3.75 (s, 3H), 2.33 – 2.30 (m, 1H), 2.29 (s, 3H), 1.71 (dd, J = 14.9, 12.6 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 169.0, 168.5, 159.3, 146.8, 145.4, 143.9, 143.8, 139.0, 138.0, 129.0, 128.9, 128.5, 128.1, 127.0, 126.6, 125.5, 123.4, 122.1, 121.6, 120.5, 97.4, 85.3, 65.7, 53.10, 52.88, 43.1, 34.4, 21.4. **IR (KBr)** ν_{max} 3744, 3521, 3497, 3464, 2952, 1736, 1539, 1456, 1266, 1043, 751, 703 cm^{-1}. **HRMS (ESI)** calcd for $C_{30}H_{26}NaO_5$ $[M + Na]^+$: 489.1672; Found: 489.1673.

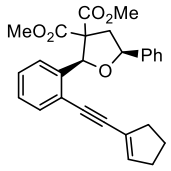


Compound **3x**: R_f = 0.56 (EtOAc/petroleum ether = 1/5), Yield: 53%, yellow solid (m.p. 201-202 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.28 (s, 2H), 7.25 – 7.18 (m, 4H), 7.05 (d, J = 19.4 Hz, 5H), 6.74 (s, 1H), 6.46 (s, 1H), 5.85 (s, 1H), 4.38 (d, J = 12.2 Hz, 1H), 3.88 (s, 3H), 3.74 (s, 3H), 2.35 (d, J = 14.9 Hz, 1H), 1.71 (t, J = 13.8 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.7, 168.5, 158.5, 146.2, 146.1, 145.1, 143.6, 139.4, 134.8, 129.3, 128.7, 128.4, 128.1, 127.7, 126.7, 125.8, 123.9, 123.4, 121.5, 120.8, 97.2, 85.1, 65.5, 53.20, 53.01, 43.1, 34.5. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2954, 1735, 1492, 1457, 1436,

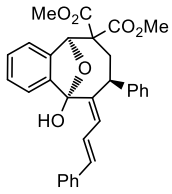
1262, 1131, 1045, 1008, 823, 750, 702, 641, 540, 518 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{23}ClNaO_5$ [M + Na]$^+$: 509.1126; Found: 509.1125.



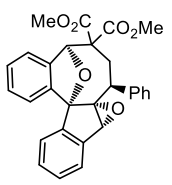
Compound **3y**: R_f = 0.48 (EtOAc/petroleum ether = 1/10), Yield: 37%, yellow oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31 (t, *J* = 7.3 Hz, 1H), 7.23 (d, *J* = 8.3 Hz, 3H), 7.20 – 7.17 (m, 2H), 7.08 (dd, *J* = 13.4, 7.4 Hz, 2H), 7.01 (d, *J* = 7.1 Hz, 3H), 6.72 (d, *J* = 7.5 Hz, 1H), 5.80 (s, 1H), 5.75 (s, 1H), 3.88 (d, *J* = 12.3 Hz, 1H), 2.43 (t, *J* = 13.4 Hz, 1H), 2.06 – 2.00 (m, 1H), 1.51 – 1.45 (m, 1H), 1.34 (d, *J* = 12.0 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 160.8, 147.4, 146.1, 143.8, 143.7, 143.2, 128.8, 128.4, 128.0, 127.9, 127.9, 127.0, 126.3, 125.4, 123.1, 120.9, 120.4, 120.4, 97.3, 83.7, 48.3, 38.6, 30.0. **IR (KBr)** ν_{max} 3744, 3521, 3497, 2928, 1739, 1540, 1457, 1265, 1033, 750, 701 cm^{-1}. **HRMS (ESI)** calcd for $C_{25}H_{21}O_5$ [M + H]$^+$: 337.1587; Found: 337.1591.



Compound **3aa**: R_f = 0.45 (EtOAc/petroleum ether = 1/8), Yield: 37%, yellow oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.54 (d, *J* = 6.9 Hz, 3H), 7.43 (t, *J* = 7.9 Hz, 3H), 7.39 – 7.30 (m, 2H), 7.24 (t, *J* = 7.4 Hz, 1H), 6.53 (s, 1H), 6.28 (s, 1H), 5.06 (dd, *J* = 11.5, 4.5 Hz, 1H), 3.86 (s, 3H), 3.17 (s, 3H), 3.07 (t, *J* = 12.5 Hz, 1H), 2.67 (dd, *J* = 13.5, 4.5 Hz, 3H), 2.54 (s, 2H), 2.00 (q, *J* = 7.5 Hz, 2H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.2, 167.0, 140.2, 139.4, 138.3, 131.6, 128.5, 128.1, 127.9, 127.8, 127.4, 126.3, 124.9, 123.2, 91.7, 88.2, 82.0, 79.6, 66.2, 53.1, 52.1, 43.2, 36.3, 33.5, 23.4. **IR (KBr)** ν_{max} 3682, 3065, 2956, 2200, 1734, 1500, 1441, 1370, 1272, 1094, 1042, 937, 756, 705, 562 cm^{-1}. **HRMS (ESI)** calcd for $C_{27}H_{26}NaO_5$ [M + Na]$^+$: 453.1672; Found: 453.1674.

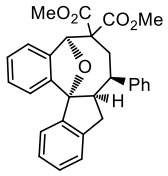


Compound **4ac**: R_f = 0.2 (EtOAc/petroleum ether = 1/3), Yield: 21%, yellow solid (m.p. 168-169 ^{o}C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.99 (dd, *J* = 15.5, 11.4 Hz, 1H), 7.59 (d, *J* = 7.3 Hz, 1H), 7.42 (d, *J* = 7.6 Hz, 2H), 7.37 (d, *J* = 7.6 Hz, 2H), 7.34 – 7.30 (m, 4H), 7.28 (d, *J* = 8.2 Hz, 1H), 7.24 – 7.19 (m, 2H), 7.06 (d, *J* = 7.4 Hz, 2H), 7.01 (d, *J* = 7.3 Hz, 1H), 6.35 (s, 1H), 6.22 (d, *J* = 15.6 Hz, 1H), 5.35 (d, *J* = 11.4 Hz, 1H), 4.04 (d, *J* = 10.7 Hz, 1H), 3.83 (s, 3H), 3.78 (s, 3H), 3.60 (s, 1H), 2.60 (d, *J* = 15.0 Hz, 1H), 1.86 (dd, *J* = 14.9, 10.9 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 169.5, 168.0, 147.8, 144.9, 144.7, 137.5, 137.4, 134.7, 130.0, 129.2, 129.0, 128.71, 128.65, 128.6, 127.6, 126.7, 126.6, 125.8, 122.3, 122.1, 109.9, 83.3, 64.7, 53.18, 53.15, 53.12, 52.80, 46.2, 34.7. **IR (KBr)** ν_{max} 3672, 3146, 3067, 2954, 1735, 1493, 1442, 1266, 1026, 978, 894, 754, 701, 541 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{28}NaO_6$ [M + Na]$^+$: 519.1778; Found: 519.1770.



Compound **5a**: To a solution of **3a** in DCM was added the *m*-CPBA (2.0 eq) and $NaHCO_3$ (1.5 eq) at room temperature. Then the solution mixture was stirred at the same temperature for 3 h, after completion of the reaction, the solvent was removed under reduced pressure and the crude product was subjected to silica gel column chromatography to afford **5**. R_f = 0.52 (EtOAc/petroleum ether = 1/5), Yield: 75%, yellow solid (m.p. 117-118 ^{o}C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31 (dd, *J* = 12.7, 6.8 Hz, 3H), 7.25 (d, *J* = 5.3 Hz, 5H), 7.07 (t, *J* = 7.7 Hz, 4H), 6.90 (d, *J* = 7.3 Hz, 1H), 6.52 (s, 1H), 3.95 (d, *J* = 11.5 Hz, 1H), 3.85 (s, 3H), 3.81 (s, 3H), 3.57 (s, 1H), 2.51 (d, *J* = 15.0 Hz, 1H), 2.28 – 2.20 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 169.3, 167.9, 147.7, 145.1, 140.93, 140.0, 138.5, 129.2, 129.0, 128.9, 128.8, 128.3, 128.1,

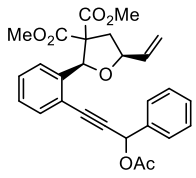
127.0, 126.5, 125.1, 124.7, 120.9, 92.3, 85.8, 75.8, 65.4, 60.8, 53.21, 52.95, 40.8, 31.9. **IR (KBr)** ν_{max} 3838, 3818, 3745, 3693, 3522, 3497, 3464, 3442, 2926, 1736, 1540, 1522, 1367, 1275, 1072, 751 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{24}NaO_6$ $[M + Na]^+$: 491.1465; Found: 491.1463.



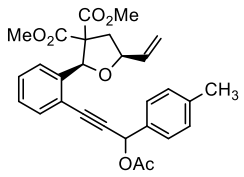
Compound **6a**: R_f = 0.54 (EtOAc/petroleum ether = 1/5), Yield: 86%, yellow solid (m.p. 205-206 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29 – 7.25 (m, 1H), 7.22 – 7.15 (m, 4H), 7.14 – 7.11 (m, 1H), 7.08 (d, J = 7.3 Hz, 3H), 7.02 (d, J = 7.3 Hz, 1H), 6.95 – 6.89 (m, 2H), 6.85 (d, J = 7.5 Hz, 1H), 6.28 (s, 1H), 3.78 (s, 3H), 3.70 (s, 3H), 2.99 (t, J = 10.6 Hz, 1H), 2.83 (q, J = 8.9 Hz, 1H), 2.69 (d, J = 8.1 Hz, 2H), 2.31 (d, J = 15.0 Hz, 1H), 1.96 – 1.85 (m, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 169.9, 168.1, 149.0, 146.2, 144.5, 143.6, 138.7, 129.5, 129.1, 128.7, 127.7, 127.2, 127.2, 126.4, 126.1, 124.2, 122.1, 121.4, 96.9, 84.3, 65.0, 57.9, 53.1, 52.8, 46.4, 38.5, 34.9. **IR (KBr)** ν_{max} 3744, 3522, 3497, 2952, 1739, 1456, 1436, 1340, 1260, 1153, 1016, 961, 868, 756, 702, 531 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{26}NaO_5$ $[M + Na]^+$: 477.1672; Found: 477.1673.

3. General procedure for synthesis of 7

7 were synthesized according to **1**

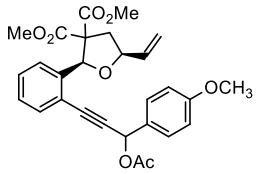


Compound **7a** (1:0.87 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.63 (d, J = 7.3 Hz, 2H), 7.39 (q, J = 7.3 Hz, 5H), 7.31 (t, J = 7.5 Hz, 1H), 7.20 (t, J = 7.4 Hz, 1H), 6.77 and 6.76 (d, J = 5.1 Hz, 1H), 6.40 and 6.34 (d, J = 25.7 Hz, 1H), 6.05 (dt, J = 16.8, 8.2 Hz, 1H), 5.42 (d, J = 17.2 Hz, 1H), 5.27 (d, J = 10.4 Hz, 1H), 4.48 – 4.40 (m, 1H), 3.75 and 3.69 (d, J = 24.4 Hz, 3H), 3.12 and 3.10 (d, J = 7.4 Hz, 3H), 2.78 (t, J = 12.4 Hz, 1H), 2.46 – 2.38 (m, 1H), 2.16 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.77 and 170.76, 169.85 and 169.83, 168.57 and 168.56, 140.97 and 140.86, 137.23 and 137.19, 136.01 and 135.99, 132.09 and 131.97, 128.86, 128.66, 128.61, 127.97 and 127.93, 127.87, 127.48 and 127.44, 121.50 and 121.44, 117.90, 90.48 and 90.35, 84.66 and 84.62, 81.55 and 81.49, 79.23, 66.16 and 66.09, 53.08 and 53.06, 53.01 and 52.98, 52.05 and 52.02, 40.74 and 40.64, 21.16.

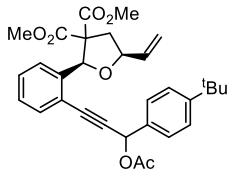


Compound **7d** (1:0.87 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.52 (d, J = 8.1 Hz, 2H), 7.43 – 7.40 (m, 2H), 7.33 – 7.29 (m, 1H), 7.20 (t, J = 6.9 Hz, 3H), 6.73 and 6.72 (d, J = 5.4 Hz, 1H), 6.40 and 6.33 (d, J = 32.9 Hz, 1H), 6.05 (m, 1H), 5.42 (m, 1H), 5.29 – 5.25 (m, 1H), 4.47 – 4.42 (m, 1H), 3.76 and 3.70 (d, J = 30.6 Hz, 3H), 3.13 and 3.11 (d, J = 10.3 Hz, 3H), 2.80 – 2.75 (m, 1H), 2.42 (m, 1H), 2.37 (s, 3H), 2.15 and 2.14 (d, J = 2.5 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.79 and 170.77, 169.86 and 169.83, 168.57 and 168.55, 140.96 and 140.84, 138.77, 136.06 and 136.03, 134.36 and 134.30, 132.06 and 131.98, 129.27, 128.59 and 128.56, 127.98 and 127.93, 127.85 and 127.84, 127.47 and 127.43, 121.60 and 121.54, 117.82 and 117.79, 90.67 and 90.56, 84.48 and 84.42, 81.59 and 81.53, 79.21, 66.19 and 66.17, 65.99, 53.05 and 53.04, 52.98 and 52.95, 52.02 and 51.99, 40.76 and 40.68, 21.24 and 21.16. **IR (KBr)** ν_{max} 3918, 3744, 3520, 2952, 1737, 1513, 1434, 1369, 1271,

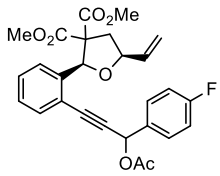
1226, 1094, 1014, 950, 764, 548 cm^{-1}. **HRMS (ESI)** calcd for $C_{28}H_{28}NaO_7$ $[M + Na]^+$: 499.1727; Found: 499.1731.



Compound **7e** (1:0.88 diasteromer): R_f = 0.30 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.56 (d, J = 8.4 Hz, 2H), 7.41 (d, J = 7.6 Hz, 2H), 7.31 (t, J = 7.6 Hz, 1H), 7.20 (t, J = 7.5 Hz, 1H), 6.93 and 6.91 (d, J = 8.3 Hz, 2H), 6.72 and 6.71 (d, J = 2.4 Hz, 1H), 6.40 and 6.33 (d, J = 25.2 Hz, 1H), 6.05 (m, 1H), 5.42 (d, J = 17.2 Hz, 1H), 5.27 (d, J = 10.4 Hz, 1H), 4.49 – 4.41 (m, 1H), 3.81 (s, 3H), 3.76 and 3.70 (d, J = 23.5 Hz, 3H), 3.13 and 3.12 (d, J = 6.0 Hz, 3H), 2.78 (t, J = 12.4 Hz, 1H), 2.42 (dt, J = 13.2, 4.2 Hz, 1H), 2.13 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.79 and 170.76, 169.90 and 169.87, 168.55 and 168.53, 160.07, 140.94 and 140.83, 136.04 and 136.02, 132.08 and 131.98, 129.54 and 129.50, 129.43, 128.59 and 128.56, 127.85 and 127.84, 127.48 and 127.44, 121.59 and 121.53, 117.81, 113.95, 90.71 and 90.59, 84.46 and 84.40, 81.58 and 81.53, 79.21, 66.19, 66 and 17, 65.83, 55.35 and 55.33, 53.06 and 53.04, 52.99 and 52.97, 52.03 and 52.01, 40.75 and 40.65, 21.17. **IR (KBr)** ν_{max} 3743, 3521, 3497, 2953, 1736, 1610, 1584, 1613, 1485, 1435, 1369, 1341, 1226, 1177, 1040, 946, 832, 763, 608, 556 cm^{-1}. **HRMS (ESI)** calcd for $C_{28}H_{28}NaO_8$ $[M + Na]^+$: 515.1676; Found: 515.1679.

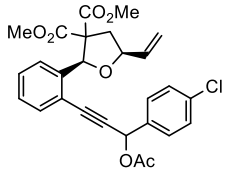


Compound **7f** (1:1 diasteromer): R_f = 0.38 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.56 (d, J = 7.9 Hz, 2H), 7.42 (d, J = 8.1 Hz, 4H), 7.30 (t, J = 7.6 Hz, 1H), 7.20 (t, J = 7.5 Hz, 1H), 6.74 (s, 1H), 6.41 and 6.34 (d, J = 27.9 Hz, 1H), 6.05 (m, 1H), 5.45 – 5.38 (m, 1H), 5.26 (d, J = 10.4 Hz, 1H), 4.49 – 4.41 (m, 1H), 3.75 and 3.70 (d, J = 23.4 Hz, 3H), 3.13 and 3.11 (d, J = 8.7 Hz, 3H), 2.78 (t, J = 12.4 Hz, 1H), 2.43 (dt, J = 13.1, 4.2 Hz, 1H), 2.14 (s, 3H), 1.33 (s, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.79 and 170.77, 169.88 and 169.84, 168.58 and 168.55, 151.94 and 151.91, 140.96 and 140.85, 136.08 and 136.05, 134.24 and 134.19, 132.08 and 131.98, 128.58 and 128.55, 127.84, 127.78 and 127.72, 127.47 and 127.43, 125.55, 121.62 and 121.56, 117.81 and 117.79, 90.72 and 90.59, 84.49 and 84.43, 81.61 and 81.55, 79.21, 66.19 and 66.17, 65.92, 53.04 and 53.03, 52.98 and 52.96, 52.02 and 51.99, 40.77 and 40.68, 34.67, 31.33, 21.18. **IR (KBr)** ν_{max} 3743, 3521, 3497, 3465, 2957, 2870, 2231, 1738, 1512, 1483, 1434, 1368, 1336, 1271, 1226, 1156, 1095, 1048, 950, 835, 762, 702, 607, 518 cm^{-1}. **HRMS (ESI)** calcd for $C_{31}H_{34}NaO_7$ $[M + Na]^+$: 541.2197; Found: 541.2194.



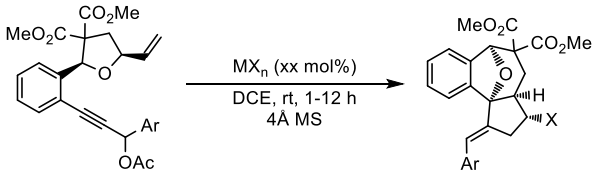
Compound **7g** (1:0.92 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 – 7.60 (m, 2H), 7.44 – 7.40 (m, 2H), 7.32 (t, J = 7.6 Hz, 1H), 7.21 (t, J = 7.5 Hz, 1H), 7.08 (t, J = 8.6 Hz, 2H), 6.74 and 6.73 (d, J = 3.9 Hz, 1H), 6.38 and 6.33 (d, J = 22.5 Hz, 1H), 6.05 (m, 1H), 5.42 (d, J = 17.2 Hz, 1H), 5.27 (d, J = 10.4 Hz, 1H), 4.44 (dt, J = 10.5, 4.6 Hz, 1H), 3.76 and 3.70 (d, J = 23.1 Hz, 3H), 3.12 and 3.11 (d, J = 2.4 Hz, 3H), 2.78 (t, J = 12.4 Hz, 1H), 2.42 (dt, J = 13.2, 3.7 Hz, 1H), 2.15 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.76 and 170.74, 169.75 and 169.73, 168.46 and 168.45, 162.95 (d, J = 247.6 Hz), 140.98 and 140.90, 135.97 and 135.95, 133.21 (d, J = 3.8 Hz) and 133.18 (d, J = 3.5 Hz), 132.09 and 131.97, 129.98 (d, J = 5.2 Hz) and 129.90 (d, J = 5.2 Hz), 128.74 and 128.72, 127.90, 127.52 (d, J = 2.9 Hz), 121.34 and 121.28, 117.85 and 117.84, 115.50 (d, J = 21.8 Hz), 90.19 and 90.09, 84.83

and 84.79, 81.52 and 81.47, 79.21, 66.17 and 66.16, 65.42, 53.03 and 53.02, 52.97 and 52.95, 52.02 and 52.01, 40.71 and 40.61, 21.09. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -112.75, -112.80. **IR (KBr)** ν_{max} 3744, 3522, 3497, 3464, 2953, 1737, 1604, 1511, 1486, 1434, 1369, 1224, 1158, 1095, 1047, 951, 837, 763, 608, 550 cm^{-1}. **HRMS (ESI)** calcd for $C_{27}H_{25}FNaO_7$ $[M + Na]^+$: 503.1477; Found: 503.1481.



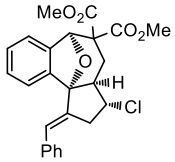
Compound **7h** (1:0.94 diasteromer): R_f = 0.35 (EtOAc/petroleum ether = 1/5), yellow oil. The following data are for a mixture of two diastereomers. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.58 (d, J = 7.3 Hz, 2H), 7.39 (dd, J = 14.4, 7.4 Hz, 4H), 7.32 (t, J = 7.6 Hz, 1H), 7.21 (t, J = 7.6 Hz, 1H), 6.73 and 6.72 (d, J = 5.3 Hz, 1H), 6.37 and 6.32 (d, J = 21.8 Hz, 1H), 6.04 (m, 1H), 5.42 (d, J = 17.2 Hz, 1H), 5.27 (d, J = 10.4 Hz, 1H), 4.43 (dt, J = 11.2, 5.4 Hz, 1H), 3.76 and 3.70 (d, J = 23.8 Hz, 3H), 3.12 and 3.11 (d, J = 2.8 Hz, 3H), 2.81 – 2.74 (m, 1H), 2.42 (dt, J = 13.2, 4.0 Hz, 1H), 2.15 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.74 and 170.73, 169.71 and 169.69, 168.46, 140.99 and 140.92, 135.95 and, 135.93, 135.82 and 135.79, 134.78 and 134.76, 132.09 and 131.97, 129.41, 129.34, 128.78, 127.89, 127.54 and 127.51, 121.27 and 121.23, 117.88 and 117.86, 89.94 and 89.84, 84.95 and 84.92, 81.51, 81.46 and 79.21, 66.17 and 66.16, 65.39, 53.06 and 53.05, 52.98 and 52.96, 52.04 and 52.02, 40.72 and 40.62, 21.08. **IR (KBr)** ν_{max} 3743, 3522, 3497, 3464, 2952, 2231, 1736, 1489, 1434, 1369, 1333, 1270, 1156, 1092, 1047, 953, 824, 737, 606, 546 cm^{-1}. **HRMS (ESI)** calcd for $C_{27}H_{25}ClNaO_7$ $[M + Na]^+$: 519.1181; Found: 519.1186.

4. General procedure for synthesis of 9

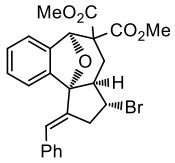


7 **9**

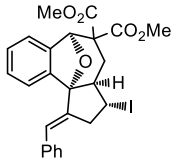
To a solution of **7** in DCE was added the catalyst (50-75 mol% MX_n) at room temperature. Then the solution mixture was stirred at the same temperature, after completion of the reaction, the solvent was removed under reduced pressure and the crude product was subjected to silica gel column chromatography to afford **9**.



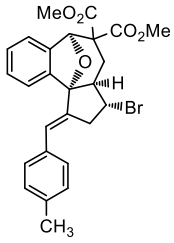
Compound **9a**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 29%, yellow solid (m.p. 158-159 ^{o}C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.39 (d, J = 6.2 Hz, 1H), 7.34 (s, 4H), 7.30 (s, 1H), 7.26 (s, 2H), 6.92 (d, J = 5.5 Hz, 1H), 6.48 (s, 1H), 6.00 (s, 1H), 3.88 (s, 3H), 3.81 – 3.75 (m, 1H), 3.73 (s, 3H), 3.62 (dd, J = 17.9, 7.8 Hz, 1H), 3.18 (dd, J = 17.9, 8.4 Hz, 1H), 2.79 (d, J = 13.2 Hz, 1H), 2.61 (dt, J = 11.6, 6.2 Hz, 1H), 1.07 (t, J = 12.8 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.7, 168.6, 143.9, 140.7, 136.5, 136.5, 128.6, 128.5, 128.4, 128.0, 127.3, 125.0, 122.7, 121.0, 90.4, 82.2, 55.7, 55.3, 53.4, 52.8, 48.2, 41.7, 26.9. **IR (KBr)** ν_{max} 3744, 3521, 1497, 2953, 1735, 1540, 1262, 992, 751 cm^{-1}. **HRMS (ESI)** calcd for $C_{25}H_{23}ClNaO_5$ $[M + Na]^+$: 461.1126; Found: 461.1121.



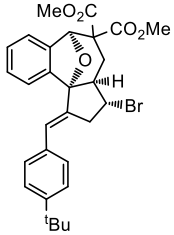
Compound **9b**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 34%, yellow solid (m.p. 134-135 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.39 (d, J = 6.6 Hz, 1H), 7.34 (d, J = 3.8 Hz, 4H), 7.28 (d, J = 7.7 Hz, 1H), 7.24 (d, J = 8.3 Hz, 2H), 6.92 (d, J = 6.5 Hz, 1H), 6.48 (s, 1H), 5.99 (s, 1H), 3.88 (s, 3H), 3.81 – 3.74 (m, 1H), 3.73 (s, 3H), 3.66 (dd, J = 17.6, 7.7 Hz, 1H), 3.32 (dd, J = 17.7, 8.1 Hz, 1H), 2.77 (dd, J = 13.3, 3.9 Hz, 1H), 2.68 (td, J = 11.8, 4.1 Hz, 1H), 1.03 (t, J = 12.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.7, 168.6, 143.8, 140.7, 137.1, 136.4, 128.6, 128.5, 128.4, 128.0, 127.3, 124.8, 122.7, 121.1, 90.3, 82.2, 55.4, 53.4, 52.8, 48.8, 44.9, 42.2, 27.2. **IR (KBr)** ν_{max} 3745, 3522, 3497, 2954, 1736, 1492, 1435, 1265, 1219, 1123, 1064, 991, 913, 865, 762, 697, 644, 518 cm^{-1}. **HRMS (ESI)** calcd for $C_{25}H_{23}BrNaO_5$ $[M + Na]^+$: 505.0621; Found: 505.0623.



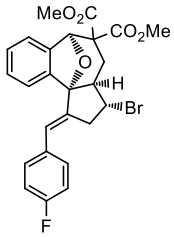
Compound **9c**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 35%, yellow solid (m.p. 125-126 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.39 (d, J = 6.5 Hz, 1H), 7.34 (s, 4H), 7.28 (d, J = 7.6 Hz, 2H), 7.23 (s, 1H), 6.92 (d, J = 6.6 Hz, 1H), 6.46 (s, 1H), 5.96 (s, 1H), 3.87 (s, 3H), 3.77 – 3.69 (m, 4H), 3.65 (t, J = 7.7 Hz, 1H), 3.46 – 3.38 (m, 1H), 2.73 – 2.68 (m, 1H), 2.63 (td, J = 12.0, 4.2 Hz, 1H), 0.96 (t, J = 12.6 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.7, 168.6, 143.8, 140.7, 138.3, 136.5, 128.6, 128.5, 128.4, 128.0, 127.3, 124.5, 122.7, 121.3, 89.7, 82.1, 55.7, 53.4, 52.8, 50.1, 44.0, 27.8, 18.3. **IR (KBr)** ν_{max} 3744, 3522, 3498, 2952, 1735, 1540, 1434, 1266, 1218, 990, 864, 762, 697, 519 cm^{-1}. **HRMS (ESI)** calcd for $C_{25}H_{23}INaO_5$ $[M + Na]^+$: 553.0482; Found: 553.0480.



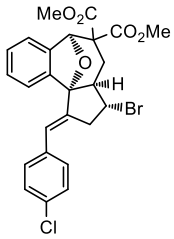
Compound **9d**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 45%, yellow solid (m.p. 118-119 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.39 (d, J = 6.5 Hz, 1H), 7.27 (d, J = 13.3 Hz, 2H), 7.23 (s, 2H), 7.15 (d, J = 7.7 Hz, 2H), 6.91 (d, J = 6.5 Hz, 1H), 6.44 (s, 1H), 5.98 (s, 1H), 3.87 (s, 3H), 3.74 (d, J = 7.4 Hz, 4H), 3.64 (dd, J = 17.8, 7.8 Hz, 1H), 3.31 (dd, J = 17.7, 8.2 Hz, 1H), 2.77 (d, J = 13.4 Hz, 1H), 2.68 (dt, J = 12.1, 6.0 Hz, 1H), 2.34 (s, 3H), 1.03 (t, J = 12.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.7, 168.6, 143.9, 140.7, 137.2, 136.0, 133.7, 129.2, 128.5, 128.3, 128.0, 124.7, 122.7, 121.1, 90.3, 82.1, 55.4, 53.39, 52.75, 48.8, 45.1, 42.3, 27.2, 21.2. **IR (KBr)** ν_{max} 3468, 3423, 3023, 3005, 2953, 1739, 1585, 1513, 1443, 1343, 1116, 994, 810, 763, 637, 518 cm^{-1}. **HRMS (ESI)** calcd for $C_{26}H_{25}BrNaO_5$ $[M + Na]^+$: 519.0778; Found: 519.0780.



Compound **9f**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 37%, yellow solid (m.p. 142-143 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.38 (d, J = 7.9 Hz, 3H), 7.29 (d, J = 8.4 Hz, 2H), 7.25 (d, J = 6.0 Hz, 2H), 6.90 (d, J = 6.6 Hz, 1H), 6.46 (s, 1H), 5.98 (s, 1H), 3.87 (s, 3H), 3.73 (s, 4H), 3.65 (dd, J = 17.9, 7.6 Hz, 1H), 3.32 (dd, J = 17.4, 8.1 Hz, 1H), 2.77 (dd, J = 13.4, 3.3 Hz, 1H), 2.67 (td, J = 11.8, 4.1 Hz, 1H), 1.32 (s, 9H), 1.03 (t, J = 12.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.7, 168.6, 150.4, 143.9, 140.7, 136.2, 133.7, 128.38, 128.35, 128.0, 1255, 124.6, 122.7, 121.1, 90.3, 82.1, 55.4, 53.42, 52.77, 48.8, 45.1, 42.3, 34.6, 31.3, 27.2. **IR (KBr)** ν_{max} 3675, 3275, 3074, 2959, 2322, 1739, 1509, 1443, 1366, 1263, 1218, 1114, 1058, 985, 868, 818, 764, 636, 559 cm^{-1}. **HRMS (ESI)** calcd for $C_{29}H_{31}BrNaO_5$ $[M + Na]^+$: 561.1247; Found: 561.1245.



Compound **9g**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 41%, yellow solid (m.p. 127-128 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 (d, J = 6.4 Hz, 1H), 7.34 – 7.27 (m, 3H), 7.26 (s, 1H), 7.04 (t, J = 8.4 Hz, 2H), 6.92 (d, J = 6.5 Hz, 1H), 6.44 (s, 1H), 5.98 (s, 1H), 3.87 (s, 3H), 3.73 (s, 4H), 3.62 (dd, J = 17.8, 7.6 Hz, 1H), 3.27 (dd, J = 17.8, 8.6 Hz, 1H), 2.80 – 2.74 (m, 1H), 2.67 (td, J = 11.9, 3.9 Hz, 1H), 1.03 (t, J = 12.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.65, 168.53, 163.08, 160.61, 143.68, 140.65, 136.70, 136.68, 132.64, 132.61, 130.22, 130.14, 128.38, 128.04, 123.67, 122.76, 121.02, 115.61, 115.39, 90.24, 82.15, 55.40, 53.41, 53.39, 52.77, 52.75, 48.77, 44.75, 27.15. ^{19}F NMR (376 MHz, $CDCl_3$) δ -113.99. **IR (KBr)** ν_{max} 3733, 3473, 3415, 3279, 2954, 2840, 1793, 1605, 1545, 1441, 1366, 1264, 1224, 1164, 1112, 1060, 997, 868, 821, 766, 739, 636, 522 cm^{-1}. **HRMS (ESI)** calcd for $C_{25}H_{22}BrFNaO_5$ $[M + Na]^+$: 523.0527; Found: 523.0526.



Compound **9h**: R_f = 0.36 (EtOAc/petroleum ether = 1/8), Yield: 44%, yellow solid (m.p. 120-121 °C). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 (d, J = 6.3 Hz, 1H), 7.31 (d, J = 8.4 Hz, 3H), 7.26 (d, J = 4.2 Hz, 3H), 6.91 (d, J = 6.7 Hz, 1H), 6.43 (s, 1H), 5.98 (s, 1H), 3.87 (s, 3H), 3.73 (s, 4H), 3.62 (dd, J = 18.0, 7.6 Hz, 1H), 3.27 (dd, J = 18.1, 8.3 Hz, 1H), 2.77 (dd, J = 13.3, 3.8 Hz, 1H), 2.67 (td, J = 11.9, 4.2 Hz, 1H), 1.03 (t, J = 12.7 Hz, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.6, 168.5, 143.6, 140.6, 137.9, 134.9, 133.1, 129.8, 128.7, 128.4, 128.1, 123.6, 122.8, 121.0, 90.2, 82.2, 55.4, 53.44, 52.80, 48.7, 44.7, 42.1, 27.1. **IR (KBr)** ν_{max} 3674, 3289, 3037, 2953, 1739, 1492, 1441, 1264, 1221, 1096, 1059, 997, 868, 816, 740, 662, 522 cm^{-1}.

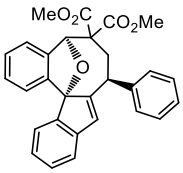
V. Supplemental References

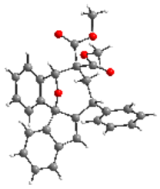
(1). P. D. Pohlhaus, S. D. Sanders, A. T. Parsons, W. Li, J. S. Johnson, *J. Am. Chem. Soc.* **2008**, *130*, 8642-8650.
(2) J. Zhang, Z. Liao, L. Chen, and S. Zhu, *Chem. Eur. J.* **2019**, *25*, DOI: 10.1002/chem.201900807.

VI. Supplemental Figures

1. Crystal data and structure refinement for 3a

The crystal structure of has been deposited at the Cambridge Crystallographic Data Centre and allocated the deposition number: 1896147.

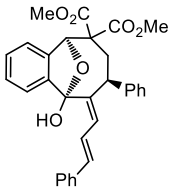


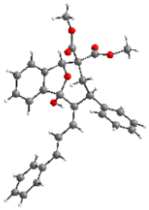


Identification code	3a
Empirical formula	$C_{29}H_{24}O_5$
Formula weight	452.48
Temperature/K	100.00(10)
Crystal system	triclinic
Space group	P-1
a/Å	10.1019(10)
b/Å	10.2418(11)
c/Å	11.6590(11)
α/°	68.442(10)
β/°	84.392(8)
γ/°	87.479(8)
Volume/Å^3	1116.5(2)
Z	2
ρ_{calc}g/cm^3	1.346
μ/mm^{-1}	0.092
F(000)	476.0
Crystal size/mm^3	0.15 × 0.13 × 0.12
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	4.276 to 50
Index ranges	-12 ≤ h ≤ 9, -11 ≤ k ≤ 12, -13 ≤ l ≤ 13
Reflections collected	7816
Independent reflections	3939 [R_{int} = 0.0547, R_{sigma} = 0.0776]
Data/restraints/parameters	3939/0/309
Goodness-of-fit on F^2	1.029
Final R indexes [I>=2σ (I)]	R_1 = 0.0721, wR_2 = 0.1811
Final R indexes [all data]	R_1 = 0.0923, wR_2 = 0.2026
Largest diff. peak/hole / e Å^{-3}	0.40/-0.37

2. Crystal data and structure refinement for 4ac

The crystal structure of has been deposited at the Cambridge Crystallographic Data Centre and allocated the deposition number: 1905661.

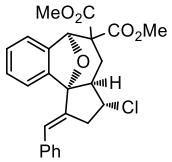


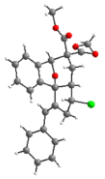


Identification code	4ac
Empirical formula	$C_{31}H_{28}O_6$
Formula weight	496.53
Temperature/K	100.00(10)
Crystal system	monoclinic
Space group	$P2_1/c$
a/Å	10.6945(8)
b/Å	24.562(2)
c/Å	9.9544(9)
α/°	90
β/°	98.892(7)
γ/°	90
Volume/Å^3	2583.4(4)
Z	4
ρ_{calc}g/cm^3	1.277
μ/mm^{-1}	0.088
F(000)	1048.0
Crystal size/mm^3	0.12 × 0.11 × 0.1
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	4.196 to 49.99
Index ranges	$-12 \le h \le 12$, $-25 \le k \le 29$, $-9 \le l \le 11$
Reflections collected	11688
Independent reflections	4545 [R_{int} = 0.0569, R_{sigma} = 0.0780]
Data/restraints/parameters	4545/0/337
Goodness-of-fit on F^2	1.056
Final R indexes [I>=2σ (I)]	R_1 = 0.0576, wR_2 = 0.1177
Final R indexes [all data]	R_1 = 0.0895, wR_2 = 0.1321
Largest diff. peak/hole / e Å^{-3}	0.23/-0.23

3. Crystal data and structure refinement for 9a

The crystal structure of has been deposited at the Cambridge Crystallographic Data Centre and allocated the deposition number: 1896148.

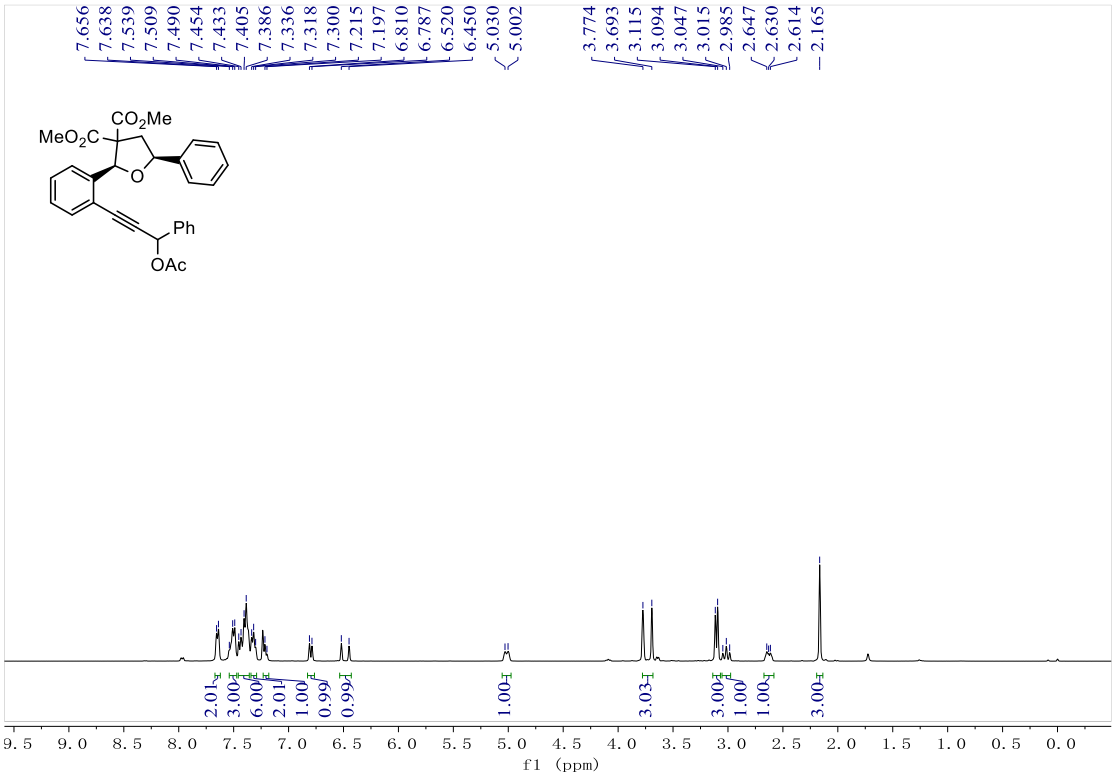


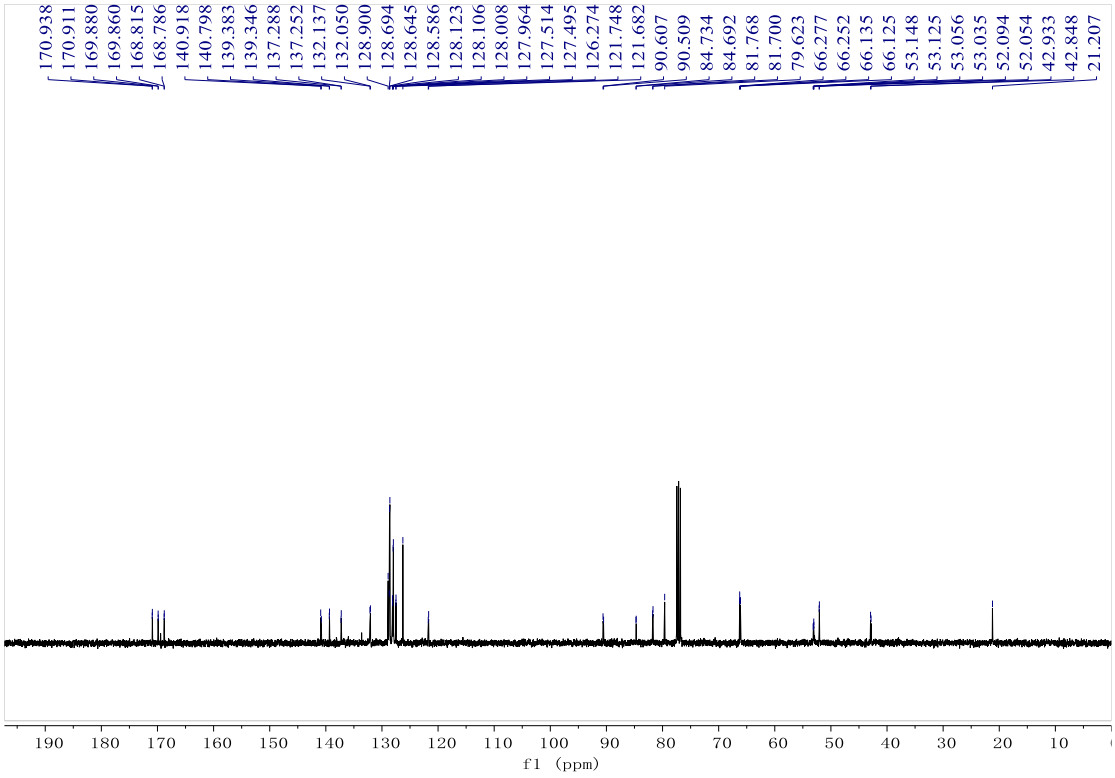


Identification code	9a
Empirical formula	$C_{25}H_{23}ClO_5$
Formula weight	438.88
Temperature/K	100.00(10)
Crystal system	triclinic
Space group	P-1
a/Å	10.7102(14)
b/Å	11.1405(13)
c/Å	11.3689(13)
α/°	69.694(11)
β/°	76.371(11)
γ/°	62.034(13)
Volume/Å^3	1119.3(3)
Z	2
ρ_{calc}g/cm^3	1.302
μ/mm^{-1}	1.791
F(000)	460.0
Crystal size/mm^3	0.12 × 0.11 × 0.1
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	8.324 to 148.87
Index ranges	-10 ≤ h ≤ 12, -10 ≤ k ≤ 13, -14 ≤ l ≤ 13
Reflections collected	7321
Independent reflections	4371 [R_{int} = 0.0614, R_{sigma} = 0.0653]
Data/restraints/parameters	4371/0/282
Goodness-of-fit on F^2	1.092
Final R indexes [I>=2σ (I)]	R_1 = 0.0971, wR_2 = 0.2885
Final R indexes [all data]	R_1 = 0.1089, wR_2 = 0.3048
Largest diff. peak/hole / e Å^{-3}	0.92/-0.76

4. Copies of NMR spectra

1a





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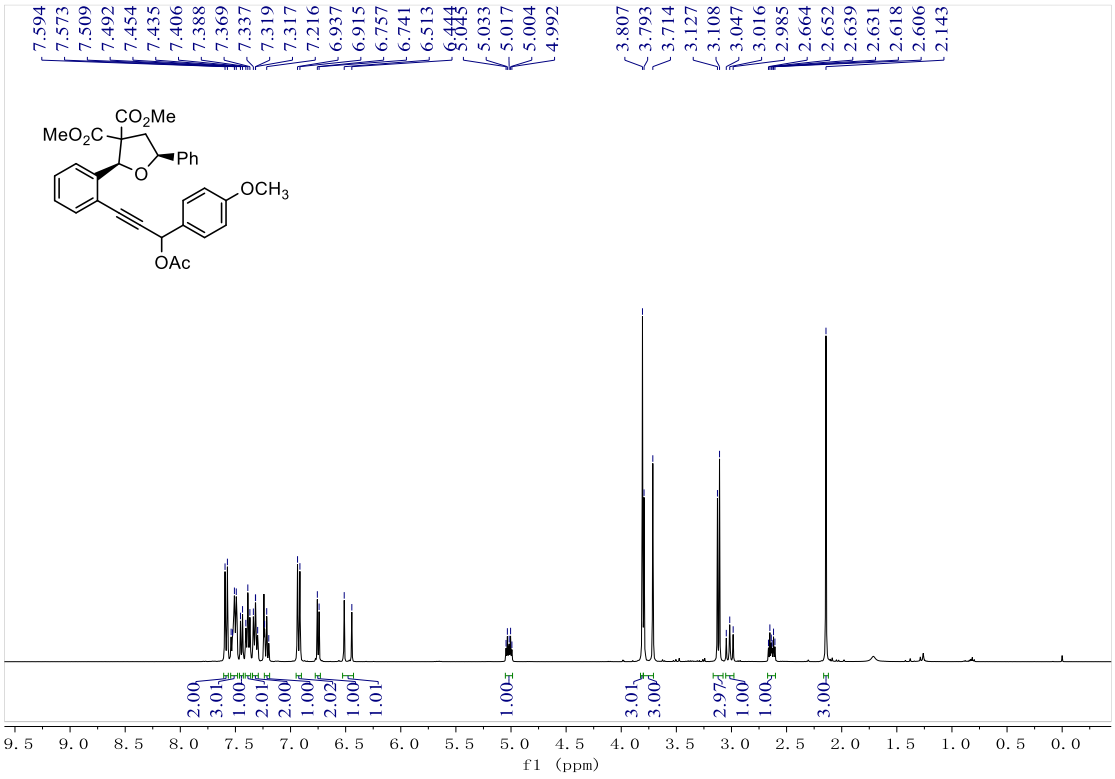
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7.216
6.937
6.915
6.757
6.741
6.513
5.033
5.017
5.004
4.992
3.807
3.793
3.714
3.127
3.108
3.047
3.016
2.985
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2.652
2.639
2.631
2.618
2.606
2.143
CO2Me
MeO2C
Ph
O
OCH3
OAc
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3.01
1.00
2.01
2.00
1.00
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1.00
1.01
1.00
3.01
3.00
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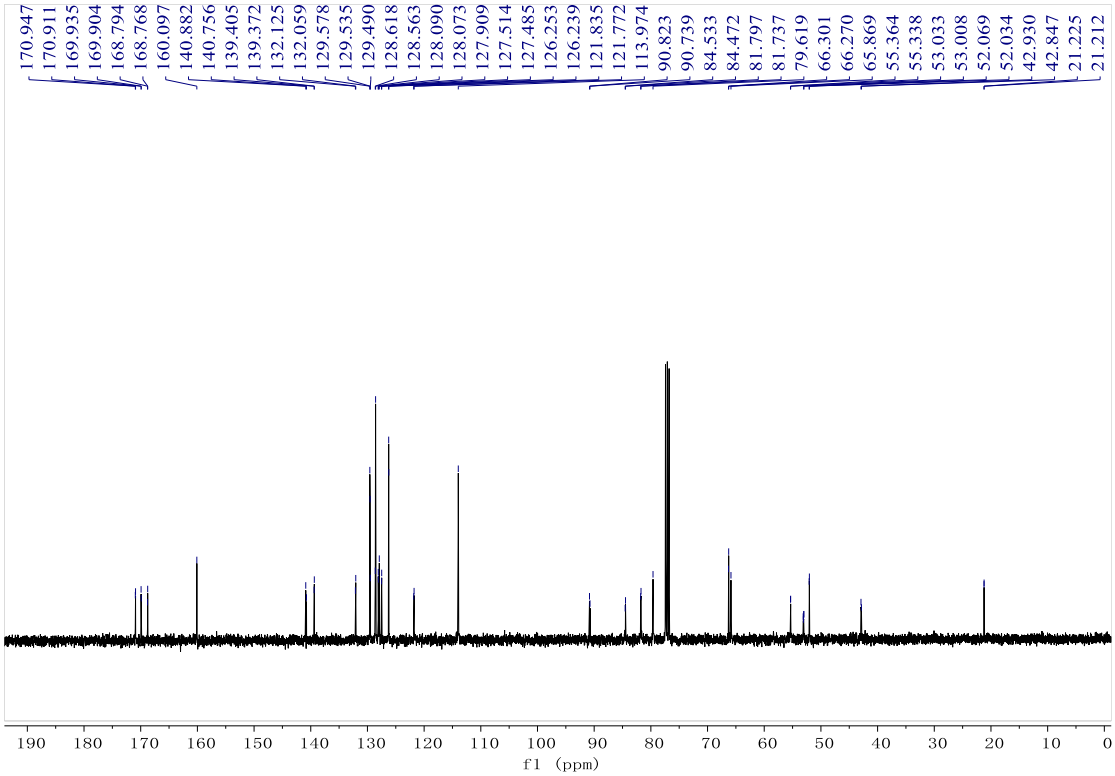
1.00
1.00
3.00
f1 (ppm)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129.578
129.535
129.490
128.618
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127.909
127.514
127.485
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126.239
121.835
121.772
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90.823
90.739
84.533
84.472
81.797
81.737
79.619
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66.270
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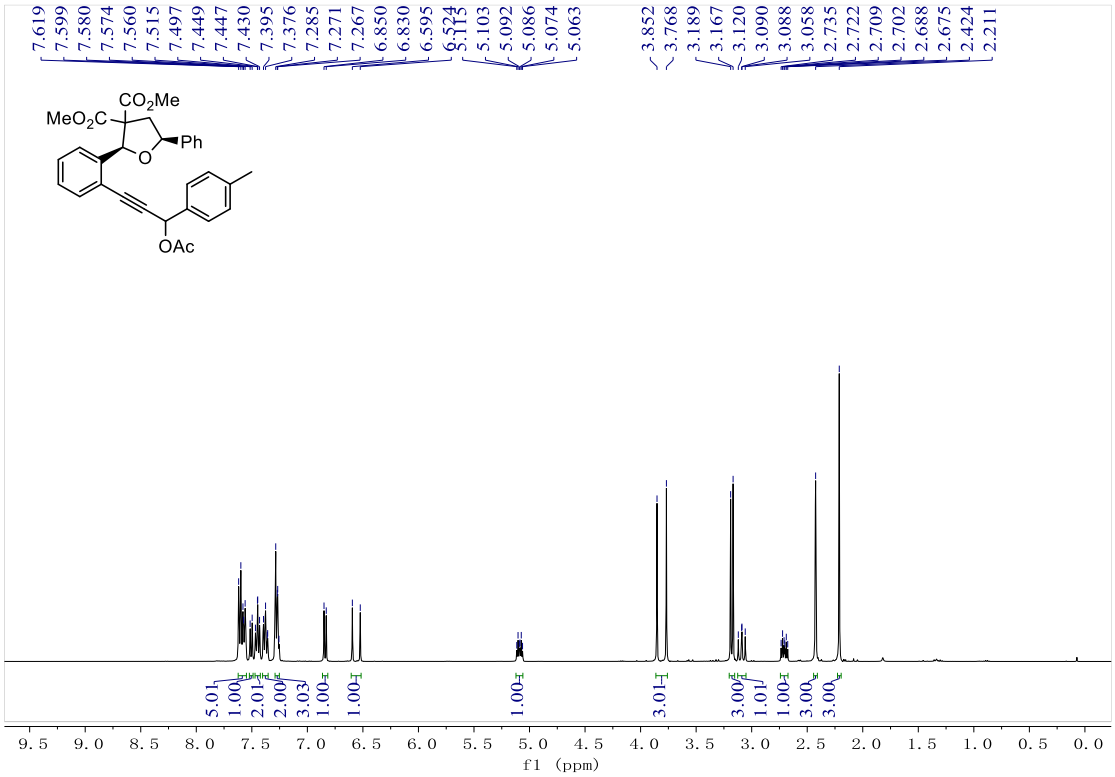
f1 (ppm)

1c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6.830
6.595
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MeO2C
Ph
O
OAc
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2.01
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1.00
3.01
3.00
1.01
1.00
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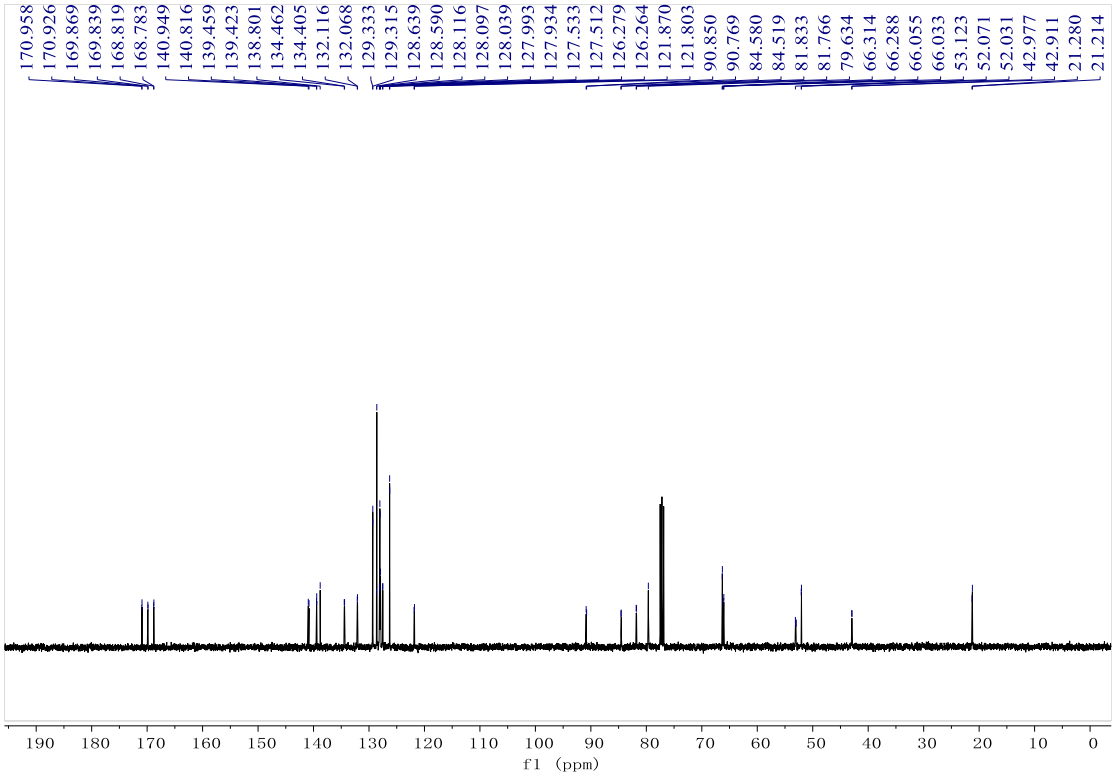
3.00
f1 (ppm)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132.068
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129.315
128.639
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128.039
127.993
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127.533
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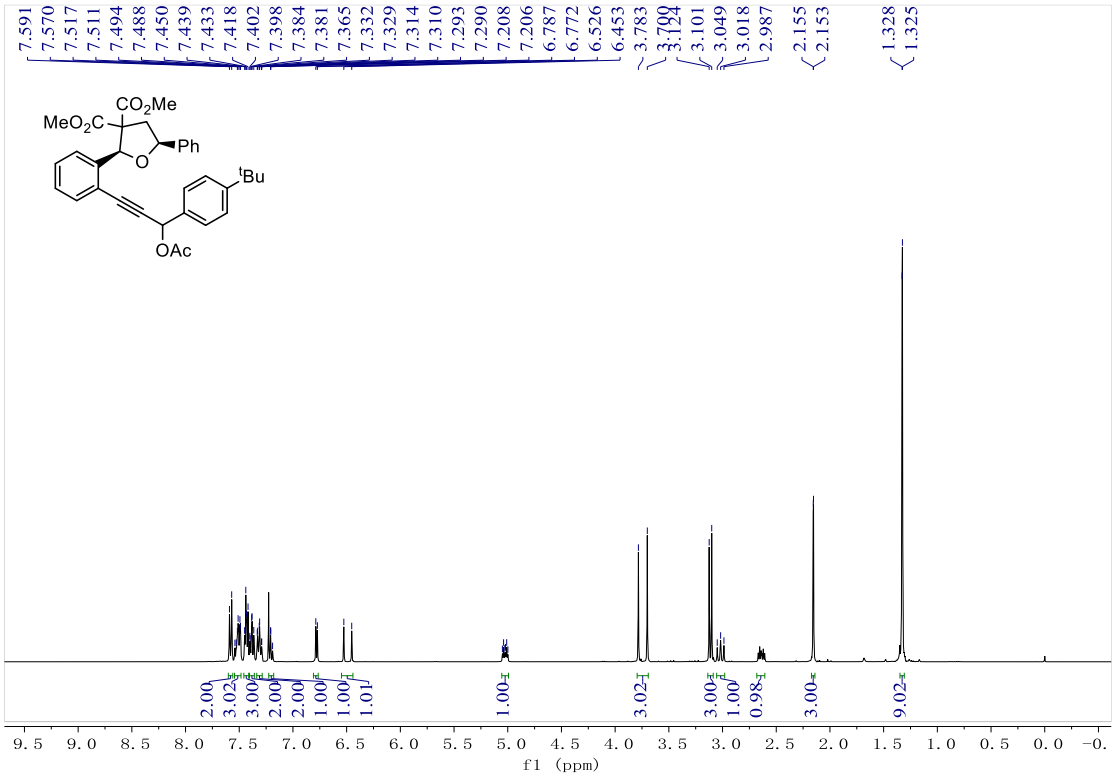
f1 (ppm)

1d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7.418
7.402
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7.384
7.381
7.365
7.332
7.329
7.314
7.310
7.293
7.290
7.208
7.206
6.787
6.772
6.526
6.453
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3.700
3.124
3.101
3.049
3.018
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1.325
CO2Me
MeO2C
Ph
O
tBu
OAc
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3.02
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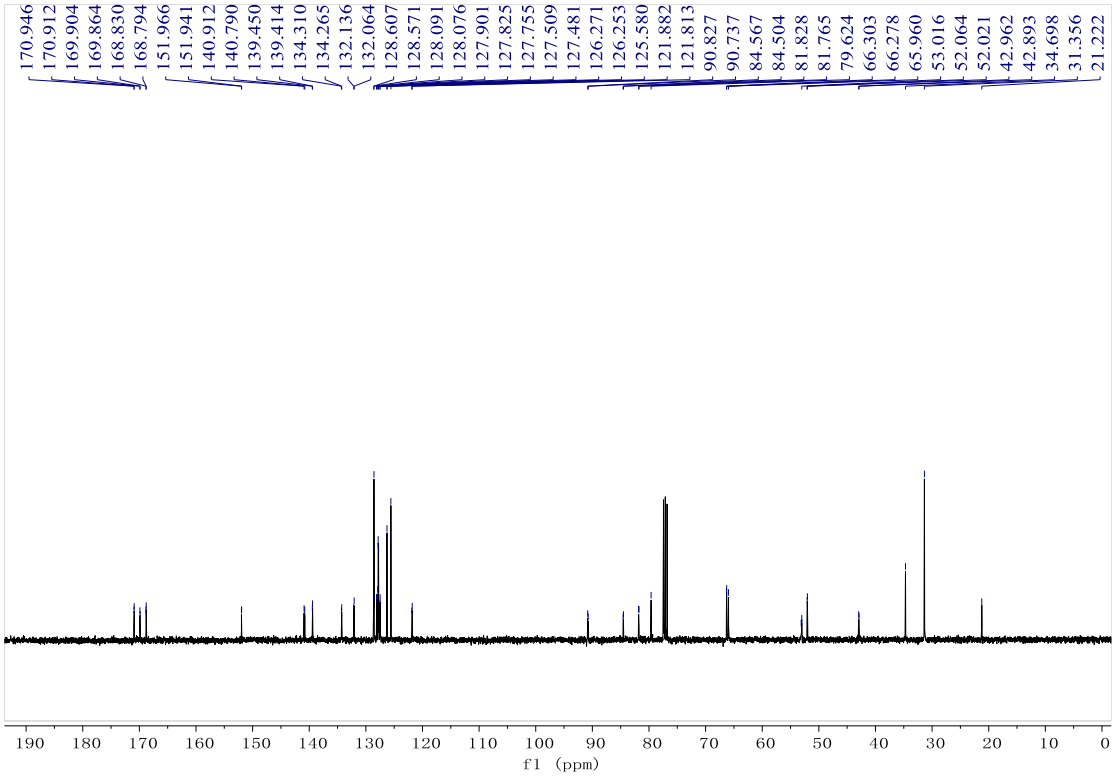
f1 (ppm)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139.414
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134.265
132.136
132.064
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127.901
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127.481
126.271
126.253
125.580
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90.737
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81.765
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66.303
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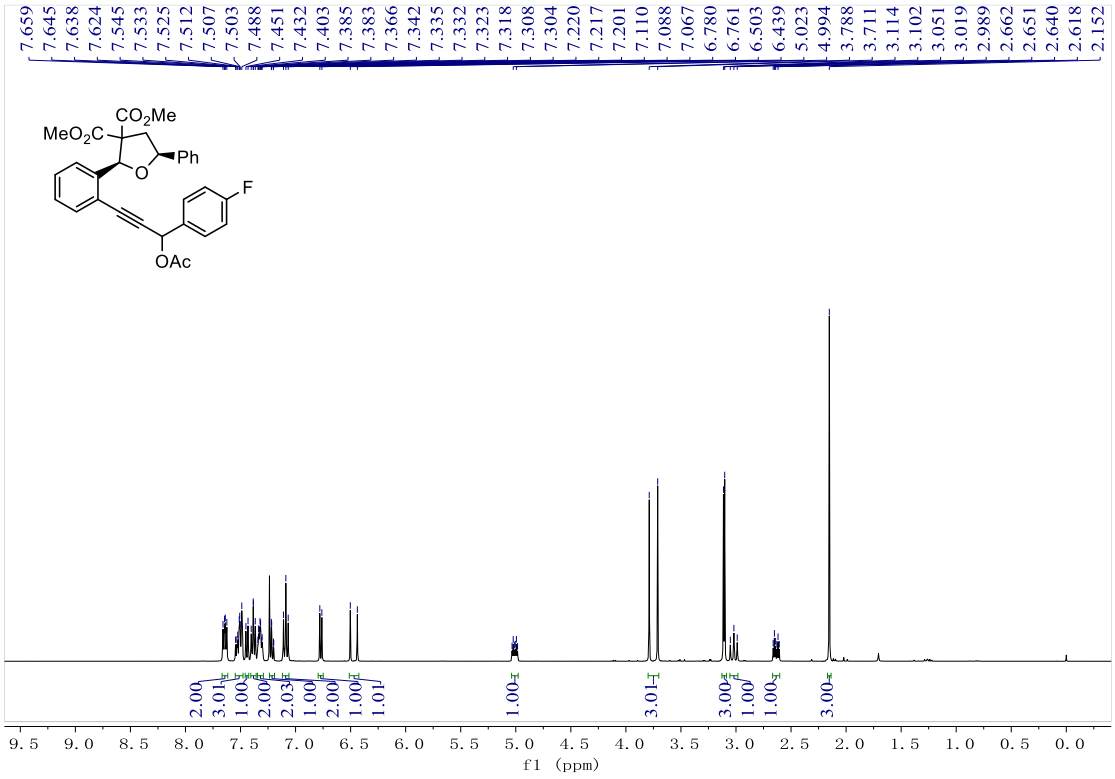
f1 (ppm)

1e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6.439
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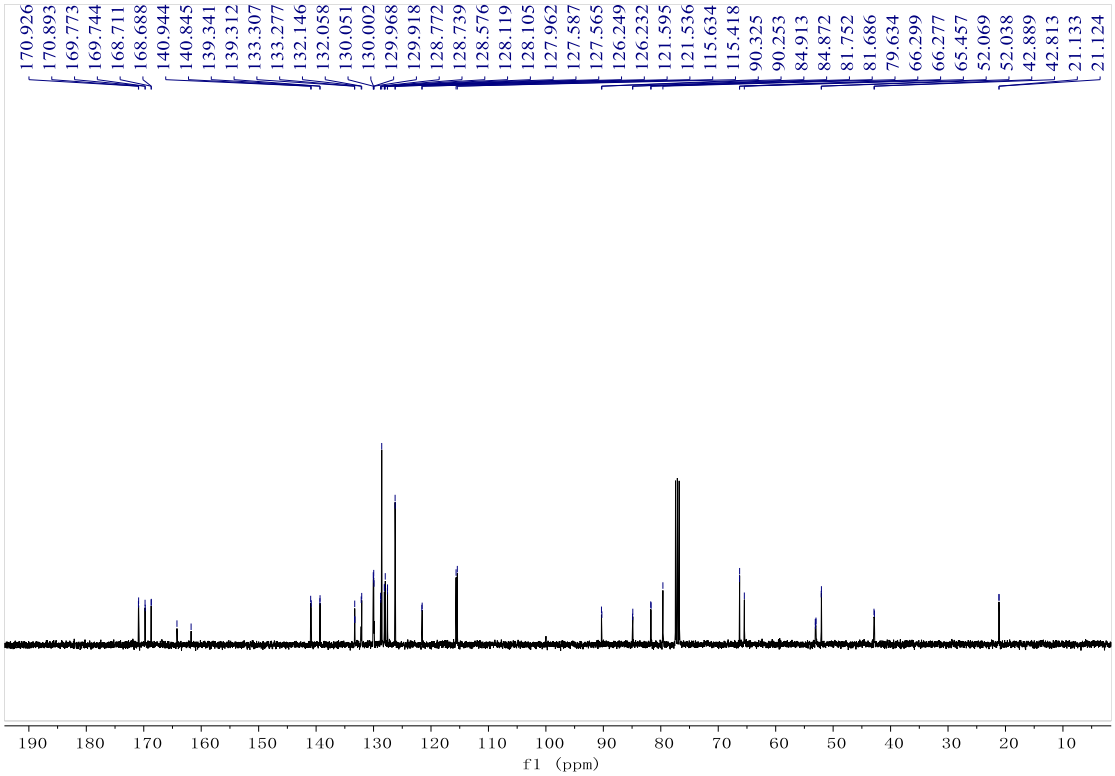
3.788
3.711
3.114
3.102
3.051
3.019
2.989
2.662
2.651
2.640
2.618
2.152
CO2Me
MeO2C
Ph
O
F
OAc
2.00
3.01
1.00
2.00
2.03
1.00
2.00
1.01
1.00
3.01
3.00
1.00
1.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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130.051
130.002
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129.918
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128.739
128.576
128.119
128.105
127.962
127.587
127.565
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126.232
121.595
121.536
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115.418
90.325
90.253
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81.752
81.686
79.634
66.299
66.277
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42.813
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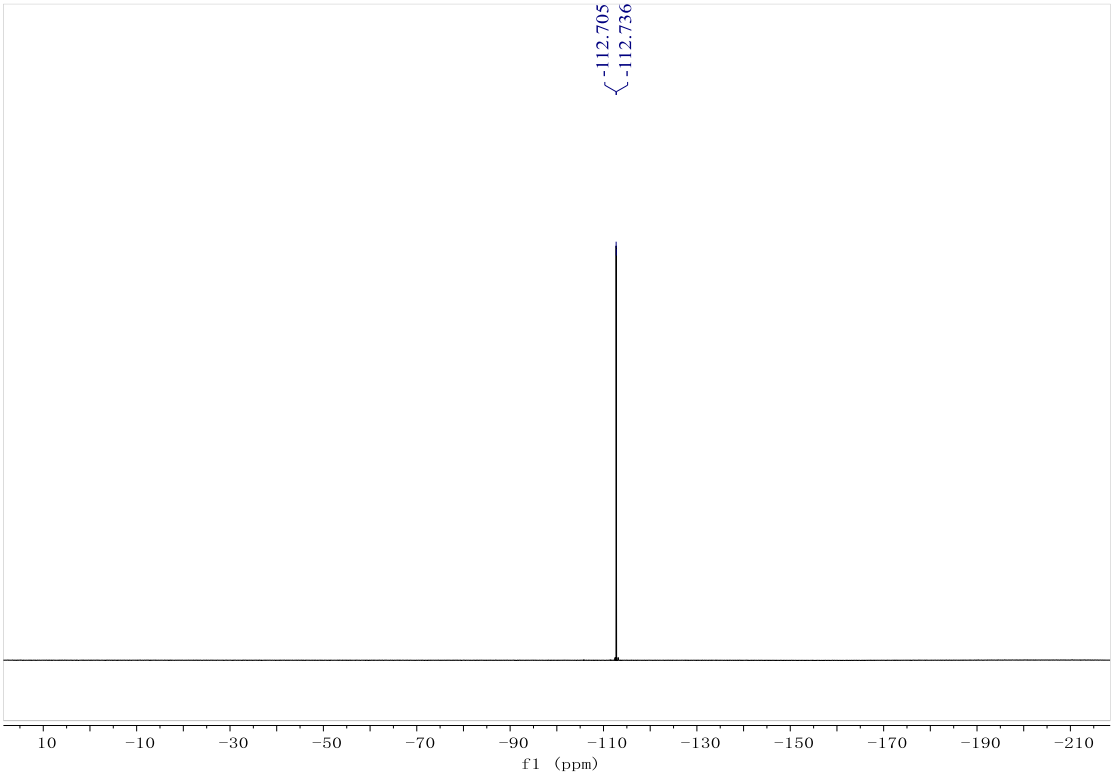
f1 (ppm)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10
-10
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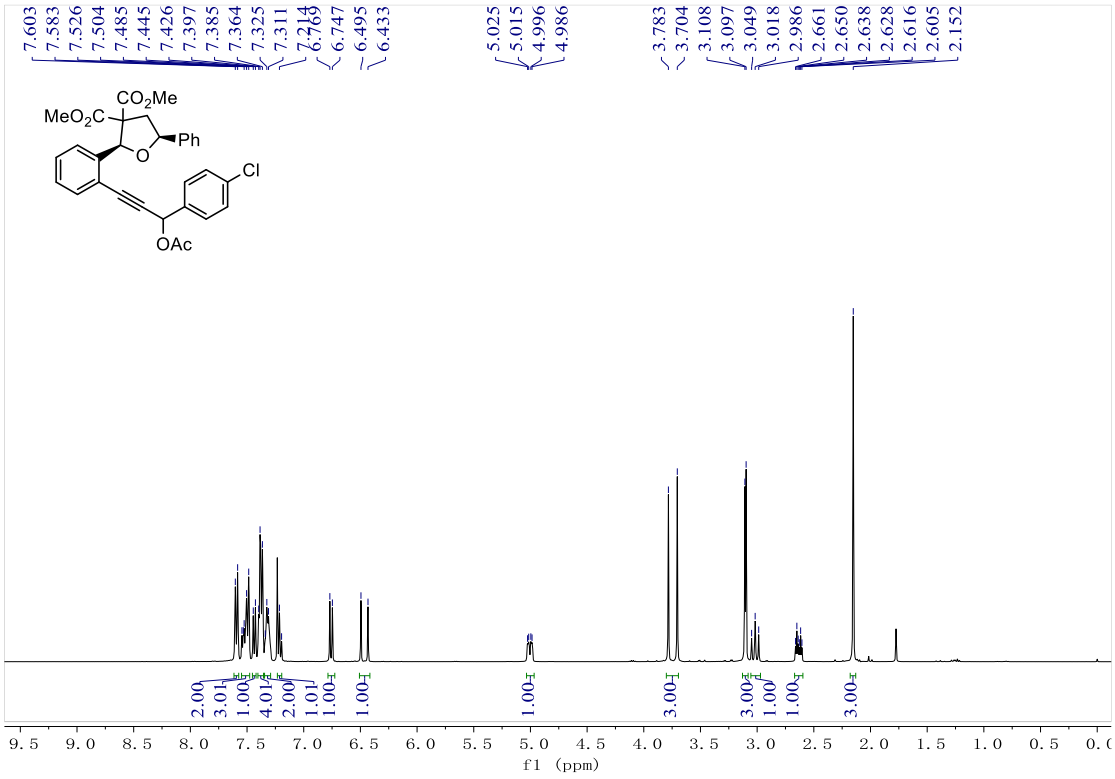
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

1f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7.426
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7.364
7.325
7.311
7.214
6.763
6.747
6.495
6.433
5.025
5.015
4.996
4.986
3.783
3.704
3.108
3.097
3.049
3.018
2.986
2.661
2.650
2.638
2.628
2.616
2.605
2.152
CO2Me
MeO2C
Ph
O
Cl
OAc
2.00
3.01
1.00
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2.00
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1.00
1.00
1.00
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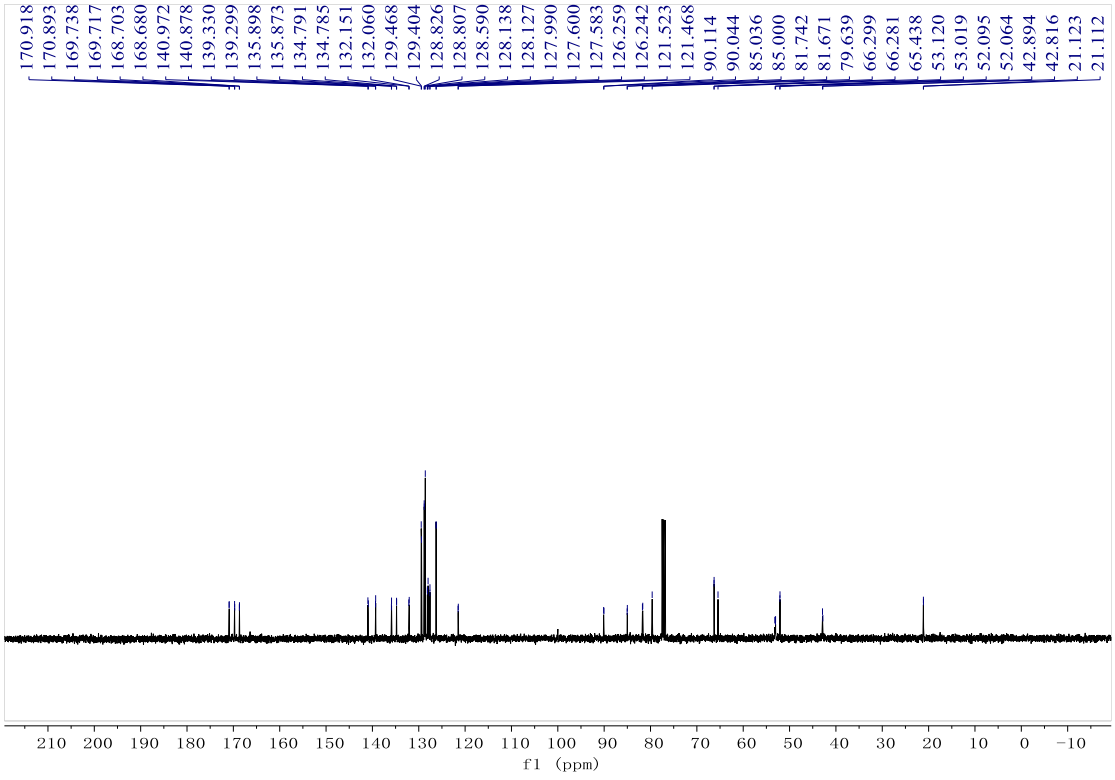
3.00
1.00
1.00
3.00
f1 (ppm)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134.785
132.151
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129.404
128.826
128.807
128.590
128.138
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127.990
127.600
127.583
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126.242
121.523
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85.000
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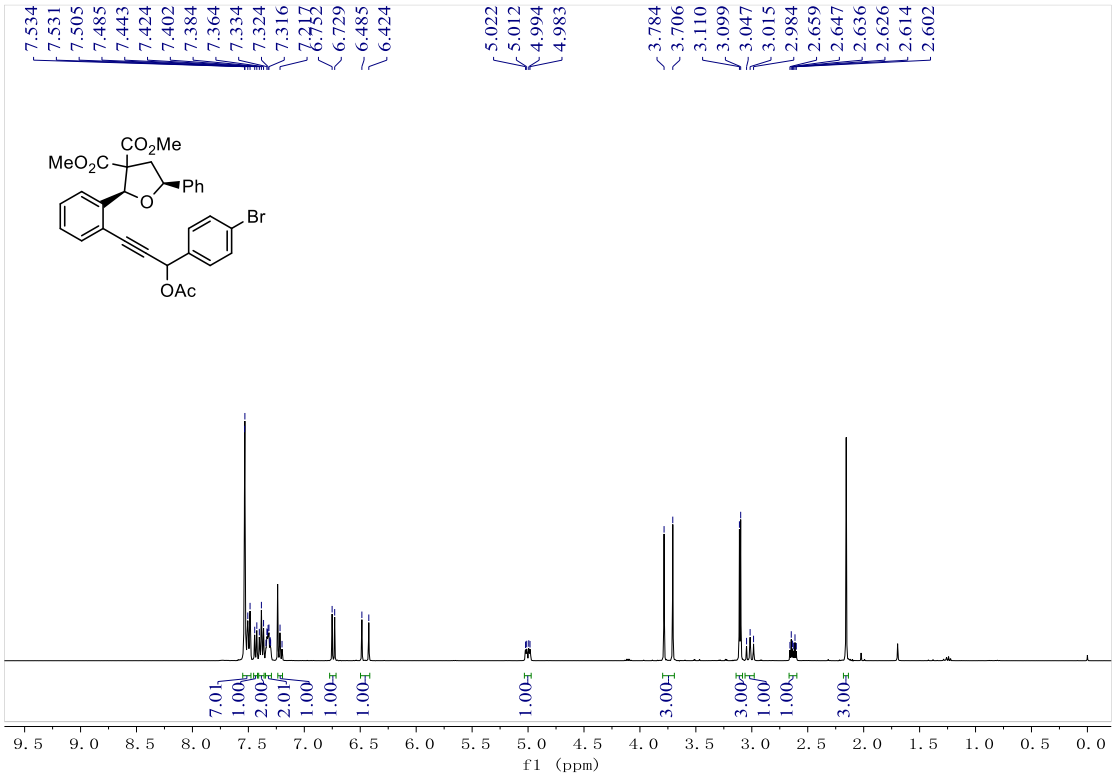
f1 (ppm)

1g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7.217
6.752
6.729
6.485
6.424
5.022
5.012
4.994
4.983
3.784
3.706
3.110
3.099
3.047
3.015
2.984
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2.647
2.636
2.626
2.614
2.602
CO2Me
MeO2C
Ph
O
Br
OAc
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1.00
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1.00
1.00
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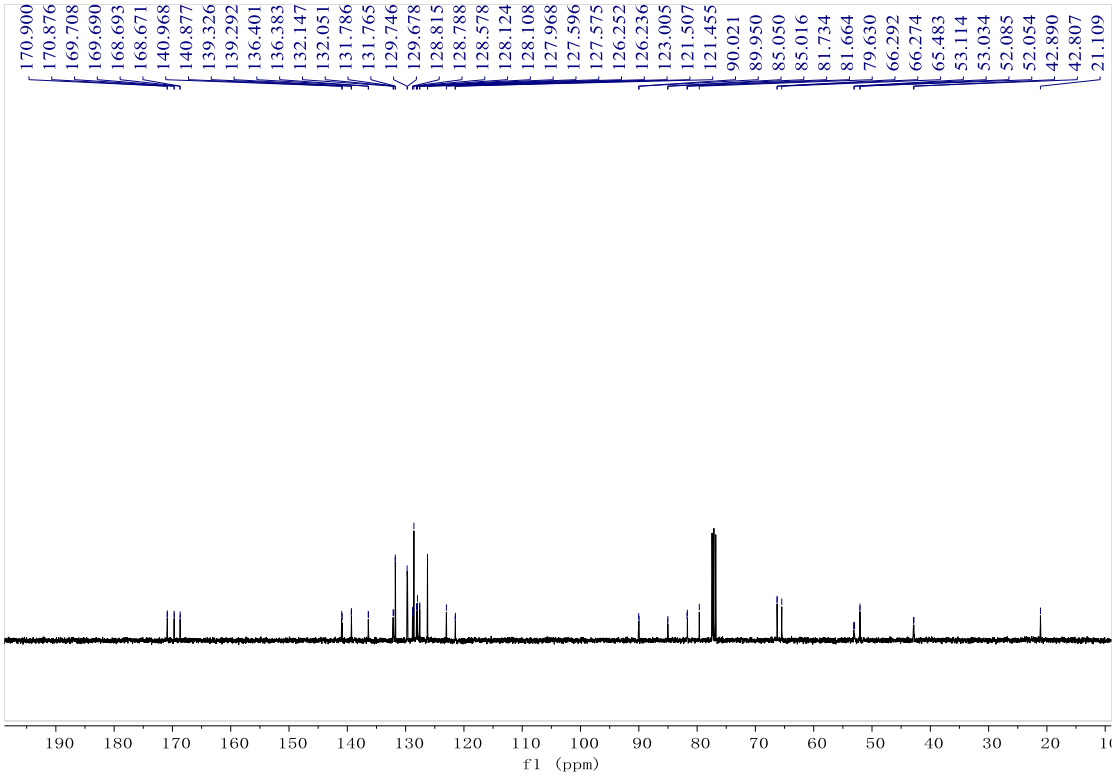
3.00
1.00
1.00
3.00
f1 (ppm)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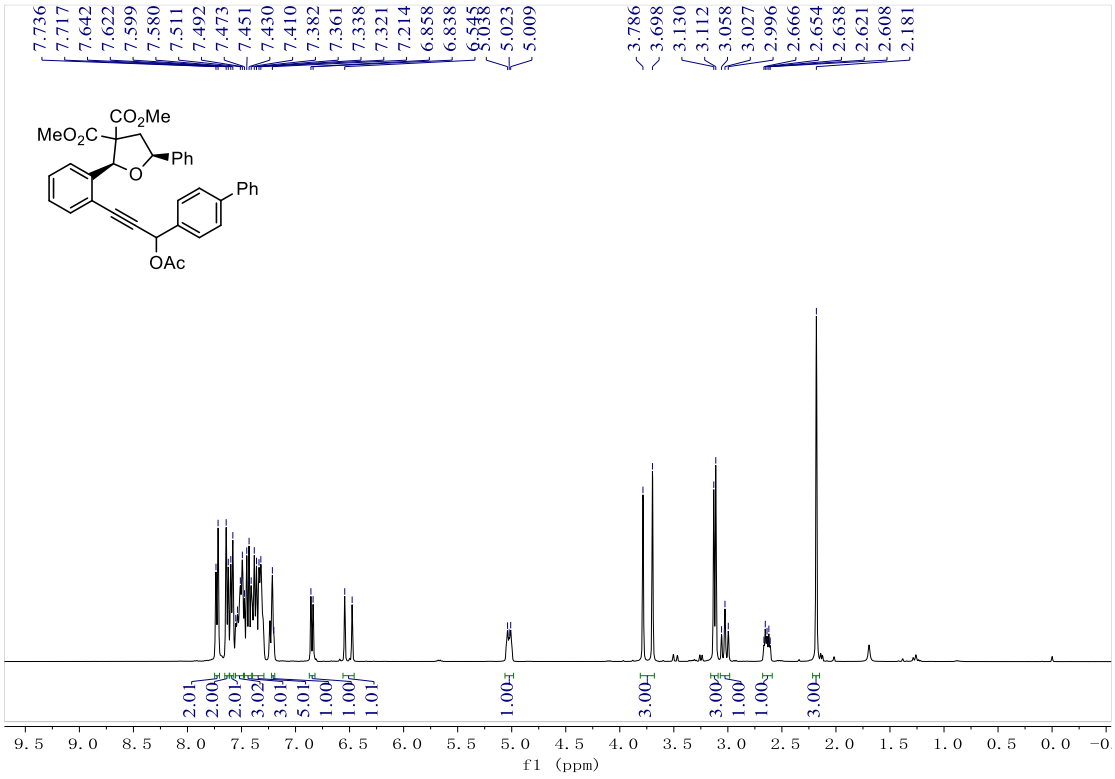
f1 (ppm)

1h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7.410
7.382
7.361
7.338
7.321
7.214
6.858
6.838
6.545
5.038
5.023
5.009
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3.698
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3.112
3.058
3.027
2.996
2.666
2.654
2.638
2.621
2.608
2.181
CO2Me
MeO2C
Ph
O
Ph
OAc
2.01
2.00
2.01
3.02
3.01
5.01
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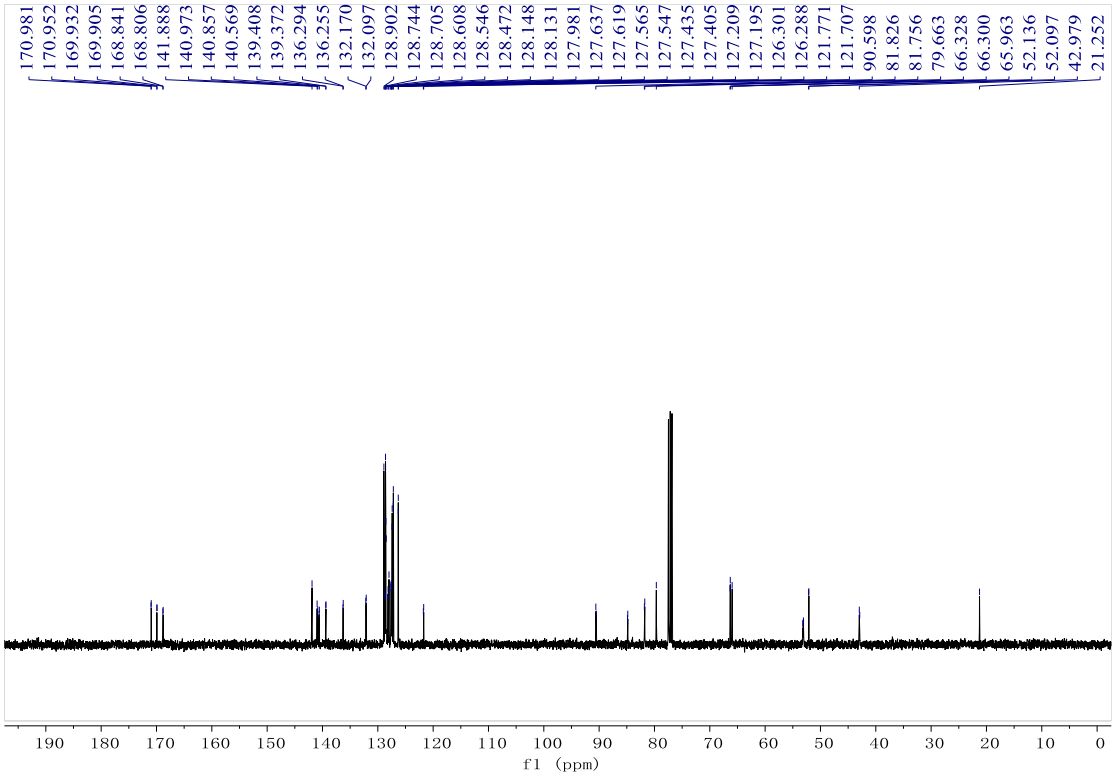
1.00
1.01
1.00
3.00
3.00
1.00
1.00
3.00
f1 (ppm)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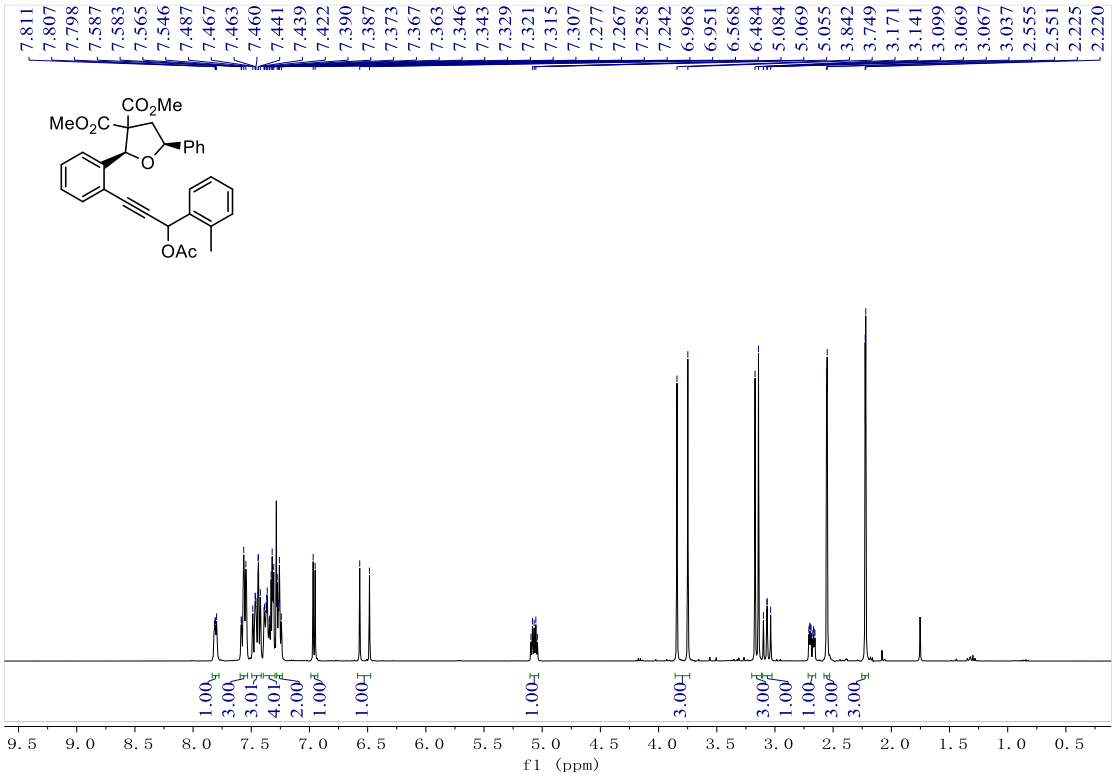
21.252
f1 (ppm)

1i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7.487
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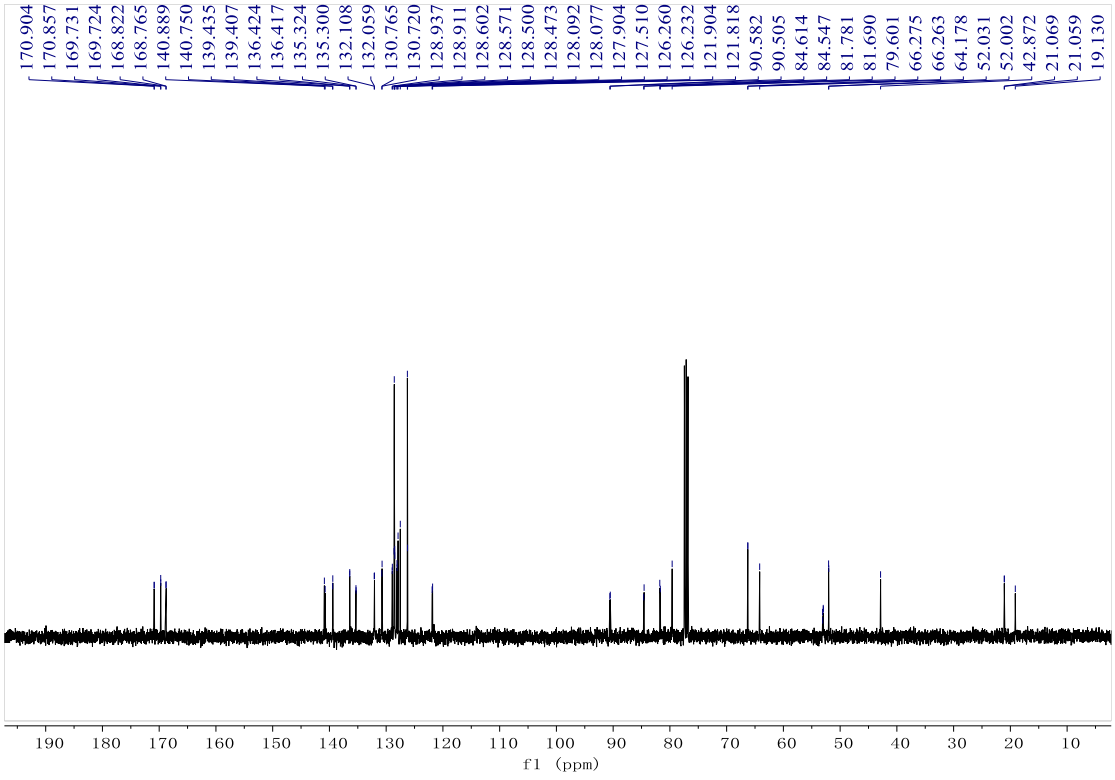
7.463
7.460
7.441
7.439
7.422
7.390
7.387
7.373
7.367
7.363
7.346
7.343
7.329
7.321
7.315
7.307
7.277
7.267
7.258
7.242
6.968
6.951
6.568
6.484
5.084
5.069
5.055
3.842
3.749
3.171
3.141
3.099
3.069
3.067
3.037
2.555
2.551
2.225
2.220
CO2Me
MeO2C
Ph
O
OAc
1.00
3.00
3.01
4.01
2.00
1.00
1.00
1.00
3.00
3.00
1.00
1.00
3.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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169.731
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140.889
140.750
139.435
139.407
136.424
136.417
135.324
135.300
132.108
132.059
130.765
130.720
128.937
128.911
128.602
128.571
128.500
128.473
128.092
128.077
127.904
127.510
126.260
126.232
121.904
121.818
90.582
90.505
84.614
84.547
81.781
81.690
79.601
66.275
66.263
64.178
52.031
52.002
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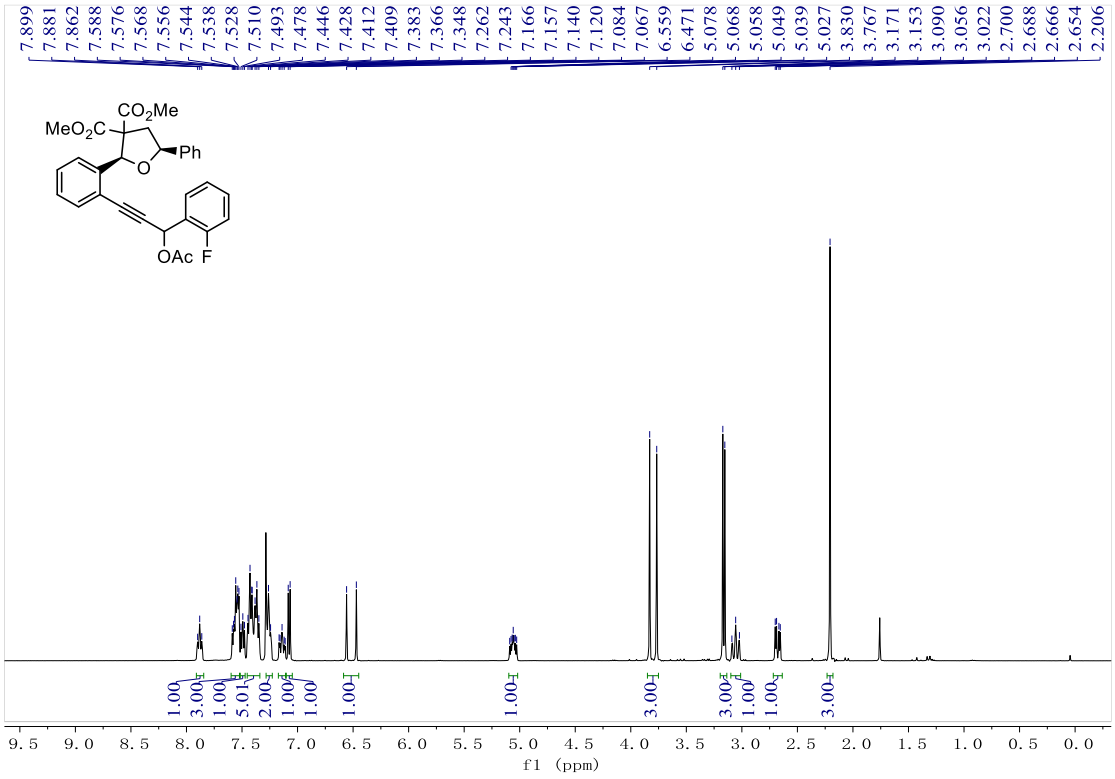
21.069
21.059
19.130
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

1j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7.862
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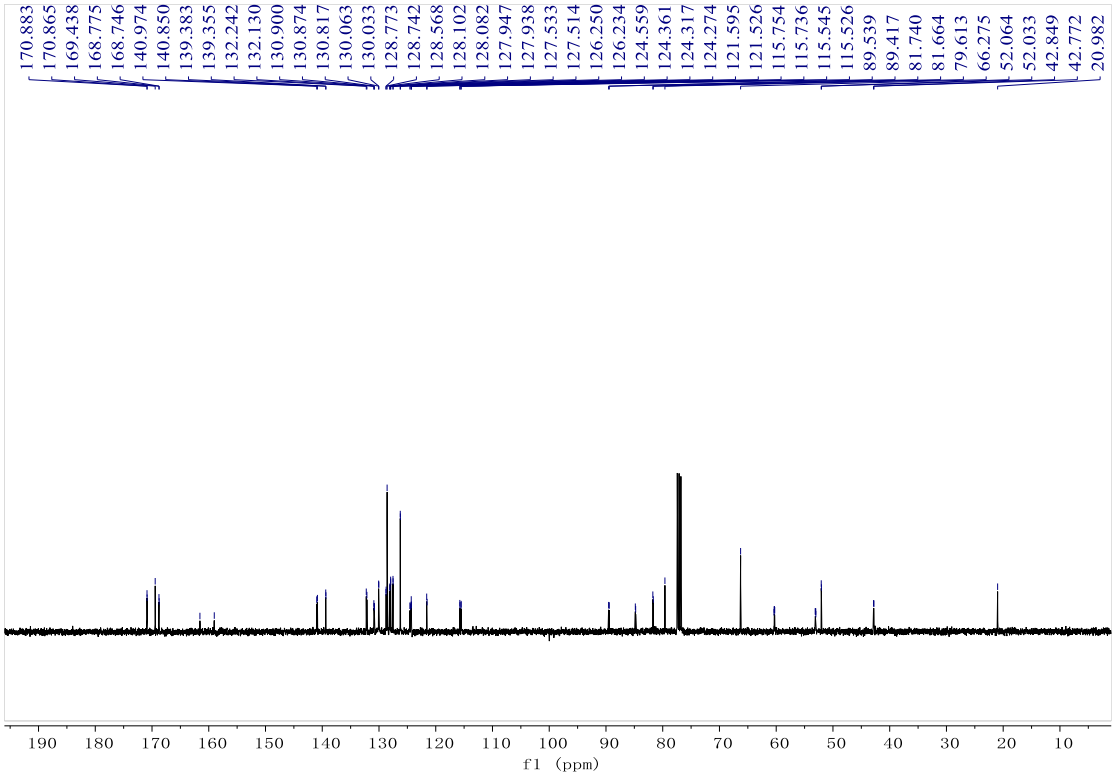
7.544
7.538
7.528
7.510
7.493
7.478
7.446
7.428
7.412
7.409
7.383
7.366
7.348
7.262
7.243
7.166
7.157
7.140
7.120
7.084
7.067
6.559
6.471
5.078
5.068
5.058
5.049
5.039
5.027
3.830
3.767
3.171
3.153
3.090
3.056
3.022
2.700
2.688
2.666
2.654
2.206
CO2Me
MeO2C
Ph
O
OAc
F
1.00
3.00
1.00
5.01
2.00
1.00
1.00
1.00
1.00
3.00
3.00
1.00
3.00
f1 (ppm)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139.383
139.355
132.242
132.130
130.900
130.874
130.817
130.063
130.033
128.773
128.742
128.568
128.102
128.082
127.947
127.938
127.533
127.514
126.250
126.234
124.559
124.361
124.317
124.274
121.595
121.526
115.754
115.736
115.545
115.526
89.539
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81.664
79.613
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52.033
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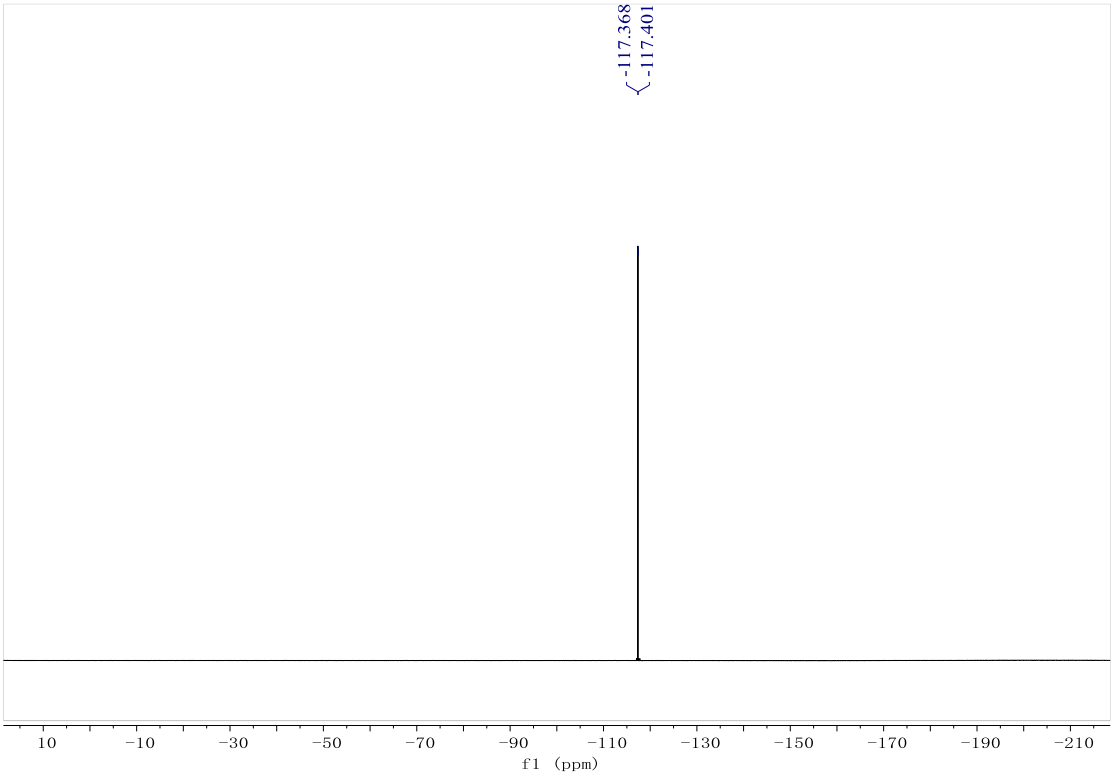
20.982
f1 (ppm)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-117.401
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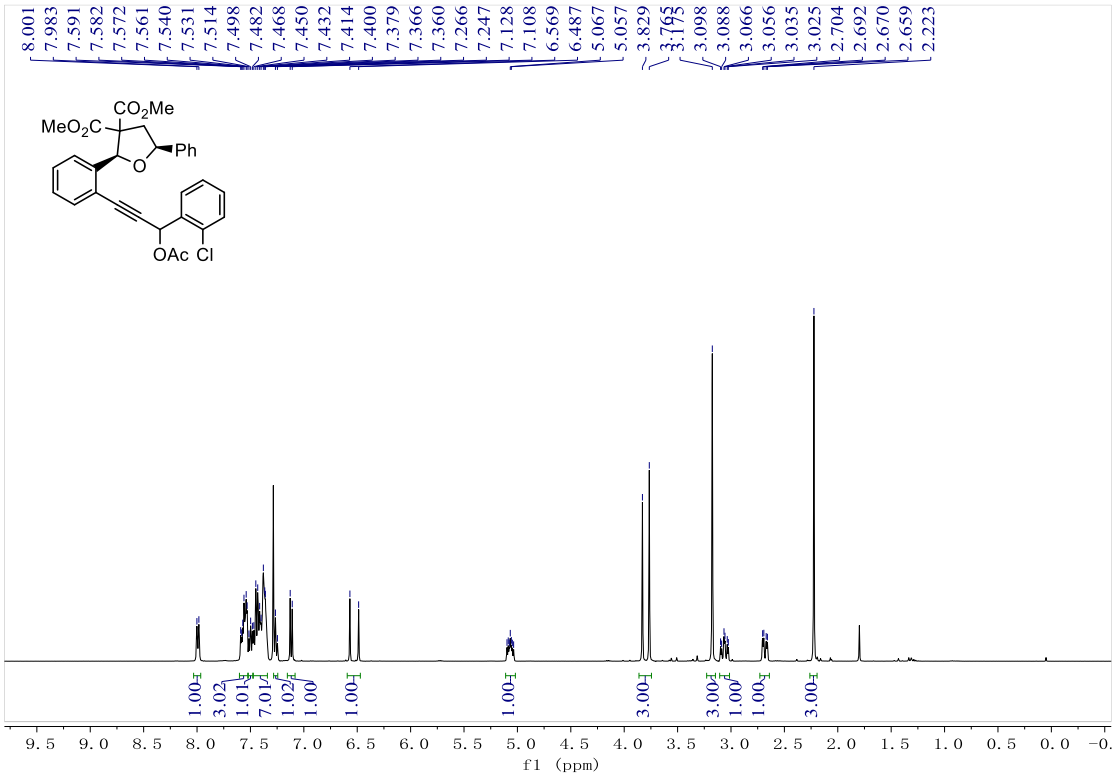
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

1k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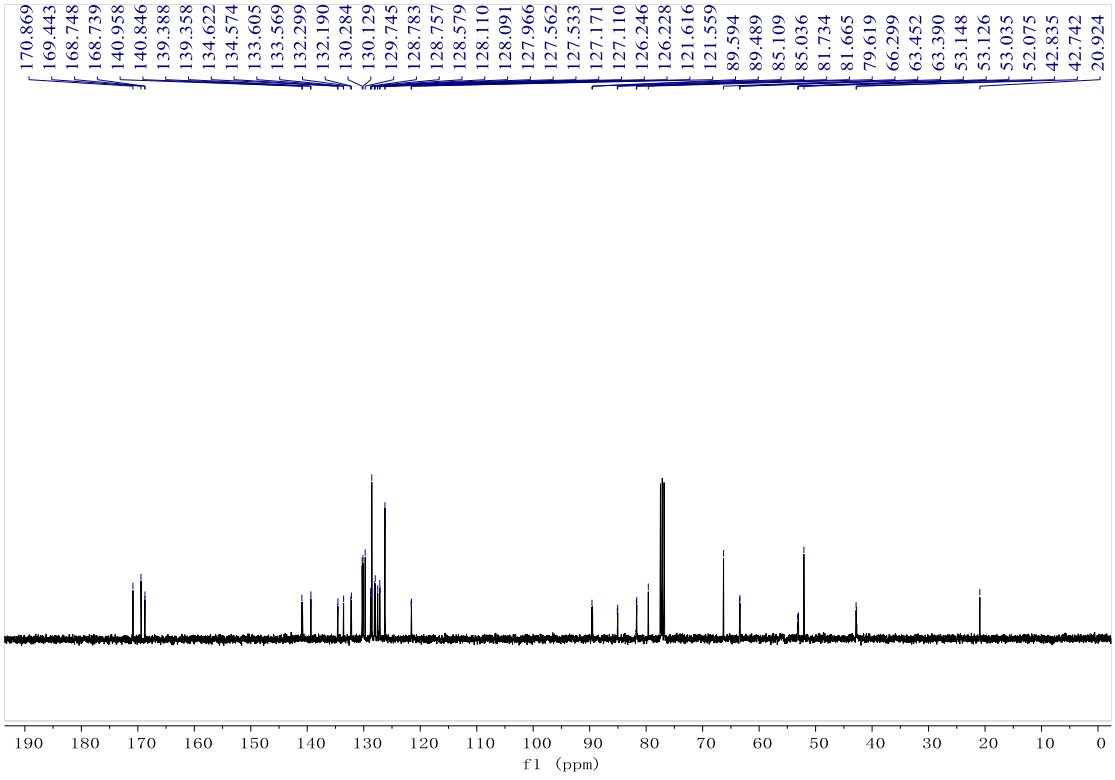
7.591
7.582
7.572
7.561
7.540
7.531
7.514
7.498
7.482
7.468
7.450
7.432
7.414
7.400
7.379
7.366
7.360
7.266
7.247
7.128
7.108
6.569
6.487
5.067
5.057
3.829
3.098
3.088
3.066
3.056
3.035
3.025
2.704
2.692
2.670
2.659
2.223
CO2Me
MeO2C
Ph
O
OAc Cl
1.00
3.02
1.01
7.01
1.02
1.00
1.00
1.00
3.00
3.00
1.00
1.00
3.00
f1 (ppm)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168.748
168.739
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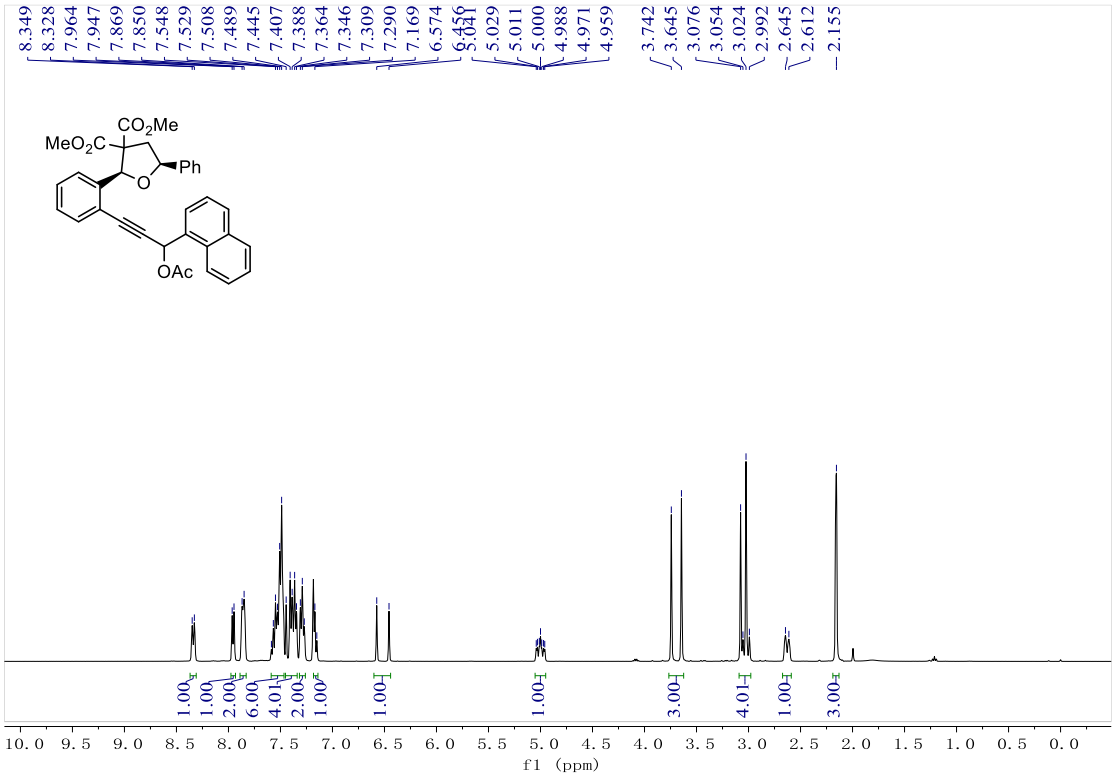
140.846
139.388
139.358
134.622
134.574
133.605
133.569
132.299
132.190
130.284
130.129
129.745
128.783
128.757
128.579
128.110
128.091
127.966
127.562
127.533
127.171
127.110
126.246
126.228
121.616
121.559
89.594
89.489
85.109
85.036
81.734
81.665
79.619
66.299
63.452
63.390
53.148
53.126
53.035
52.075
42.835
42.742
20.924
f1 (ppm)

1l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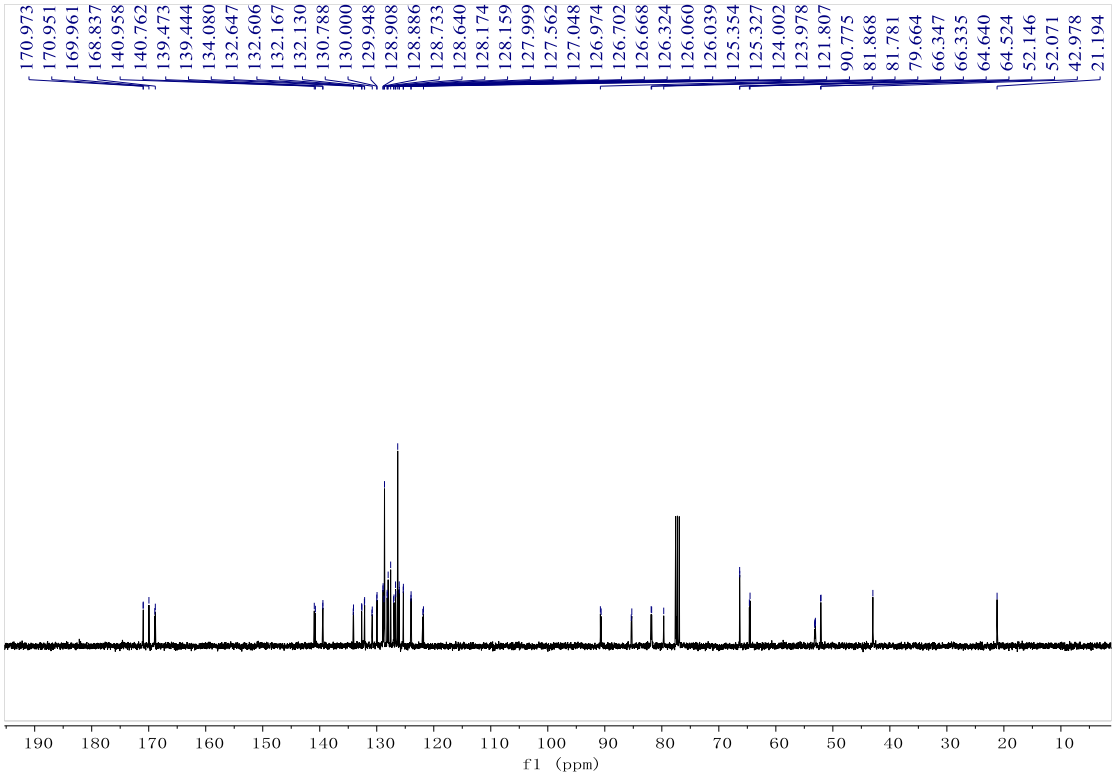
8.328
7.964
7.947
7.869
7.850
7.548
7.529
7.508
7.489
7.445
7.407
7.388
7.364
7.346
7.309
7.290
7.169
6.574
6.456
5.041
5.029
5.011
5.000
4.988
4.971
4.959
3.742
3.645
3.076
3.054
3.024
2.992
2.645
2.612
2.155
CO2Me
MeO2C
Ph
O
OAc
1.00
1.00
2.00
6.00
4.01
2.00
1.00
1.00
1.00
3.00
4.01
1.00
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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140.762
139.473
139.444
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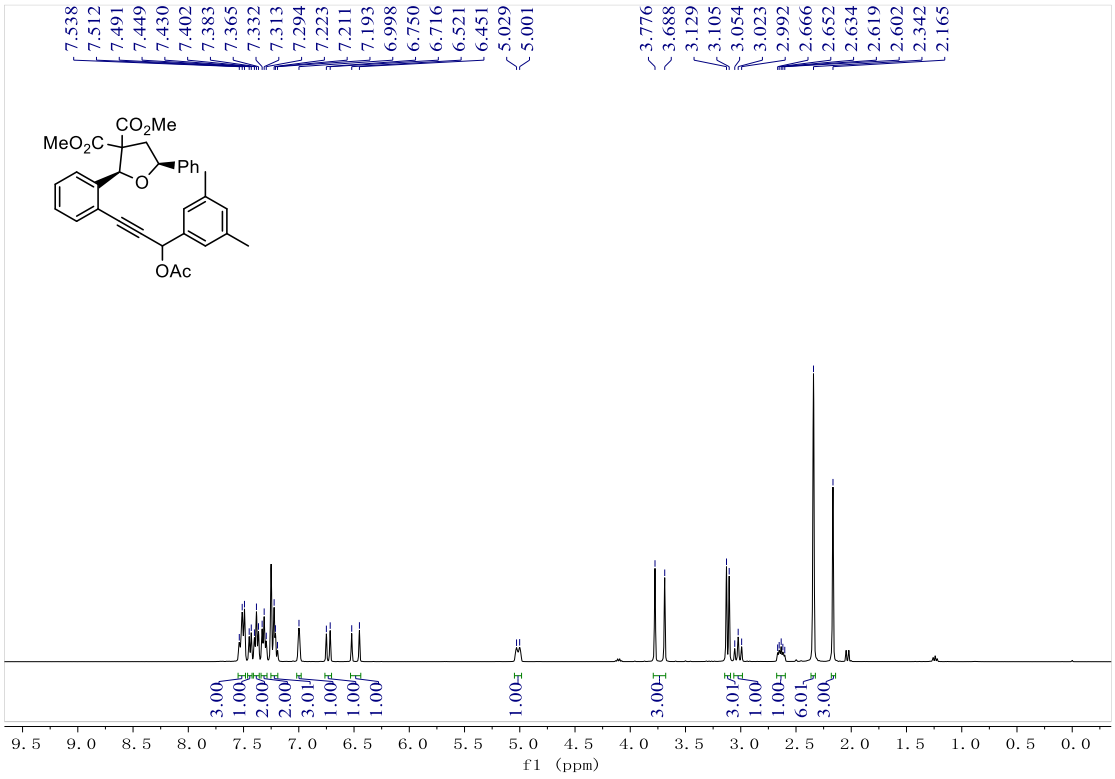
132.647
132.606
132.167
132.130
130.788
130.000
129.948
128.908
128.886
128.733
128.640
128.174
128.159
127.999
127.562
127.048
126.974
126.702
126.668
126.324
126.060
126.039
125.354
125.327
124.002
123.978
121.807
90.775
81.868
81.781
79.664
66.347
66.335
64.640
64.524
52.146
52.071
42.978
21.194
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

1m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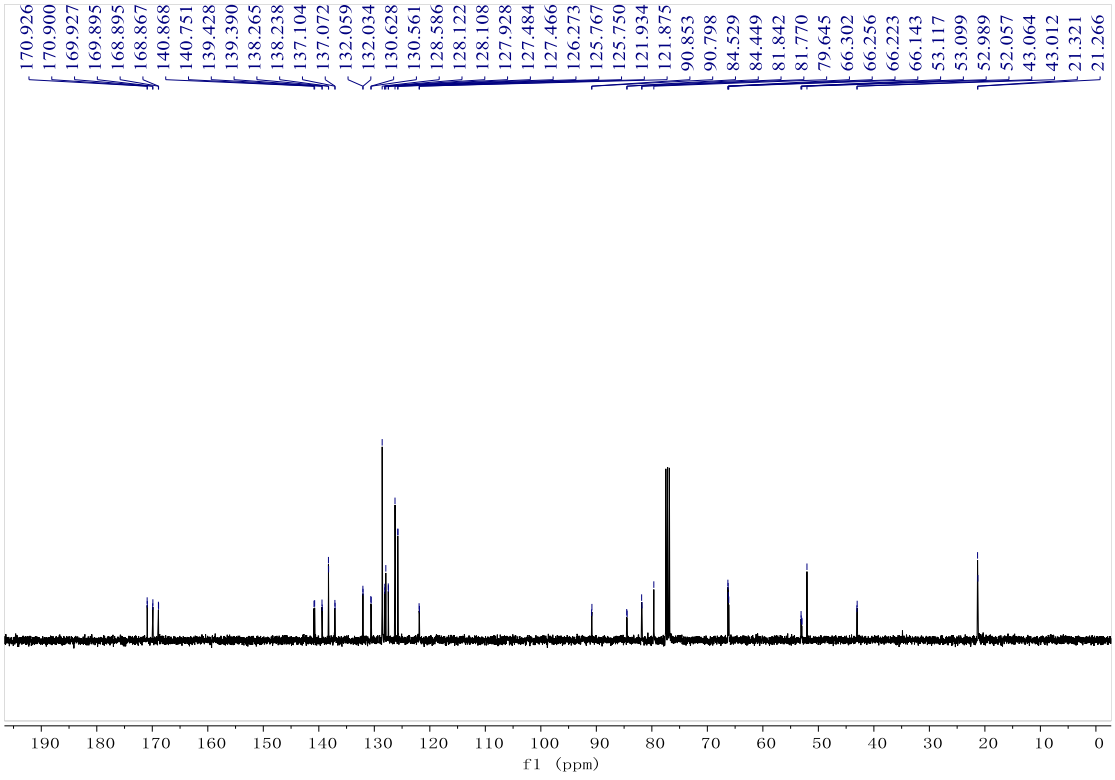
7.491
7.449
7.430
7.402
7.383
7.365
7.332
7.313
7.294
7.223
7.211
7.193
6.998
6.750
6.716
6.521
6.451
5.029
5.001
3.776
3.688
3.129
3.105
3.054
3.023
2.992
2.666
2.652
2.634
2.619
2.602
2.342
2.165
CO2Me
MeO2C
Ph
O
OAc
3.00
1.00
2.00
2.00
3.01
1.00
1.00
1.00
1.00
3.00
3.01
1.00
1.00
6.01
3.00
f1 (ppm)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169.927
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140.868
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139.390
138.265
138.238
137.104
137.072
132.059
132.034
130.628
130.561
128.586
128.122
128.108
127.928
127.484
127.466
126.273
125.767
125.750
121.934
121.875
90.853
90.798
84.529
84.449
81.842
81.770
79.645
66.302
66.256
66.223
66.143
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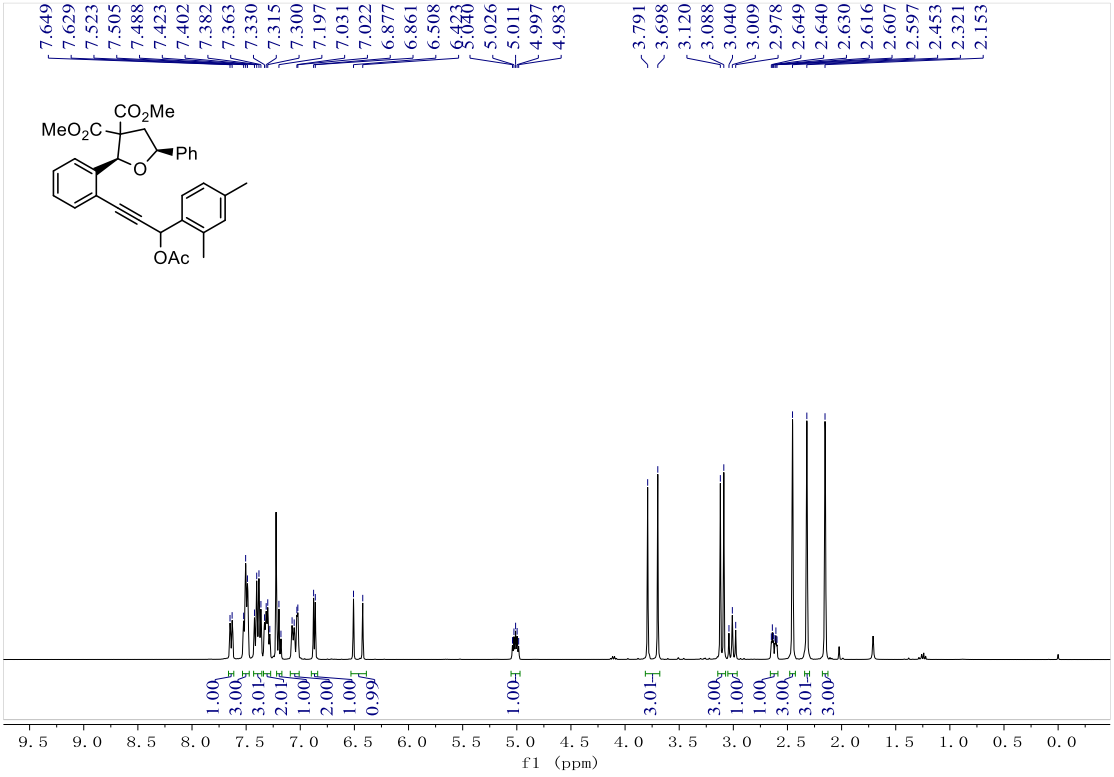
53.099
52.989
52.057
43.064
43.012
21.321
21.266
f1 (ppm)

1n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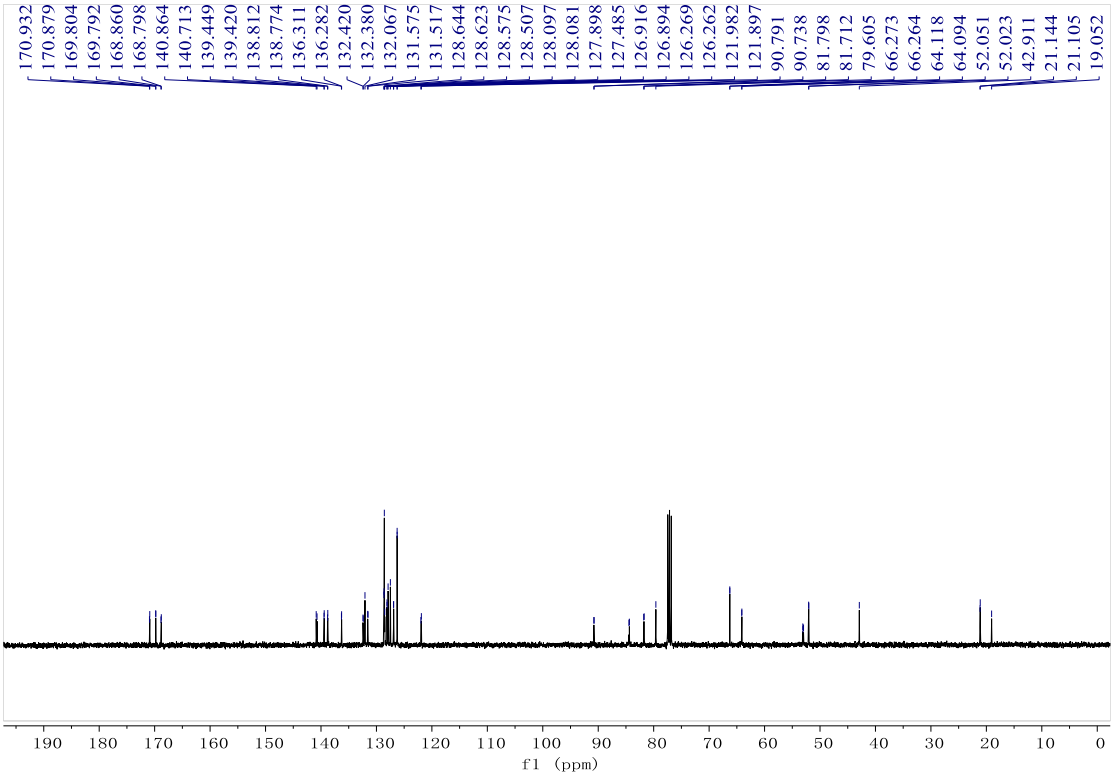
7.523
7.505
7.488
7.423
7.402
7.382
7.363
7.330
7.315
7.300
7.197
7.031
7.022
6.877
6.861
6.508
6.423
5.040
5.026
5.011
4.997
4.983
3.791
3.698
3.120
3.088
3.040
3.009
2.978
2.649
2.640
2.630
2.616
2.607
2.597
2.453
2.321
2.153
CO2Me
MeO2C
Ph
O
OAc
1.00
3.00
3.01
2.01
1.00
2.00
1.00
0.99
1.00
3.01
3.00
1.00
1.00
3.00
3.01
3.00
f1 (ppm)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140.713
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138.774
136.311
136.282
132.420
132.380
132.067
131.575
131.517
128.644
128.623
128.575
128.507
128.097
128.081
127.898
127.485
126.916
126.894
126.269
126.262
121.982
121.897
90.791
90.738
81.798
81.712
79.605
66.273
66.264
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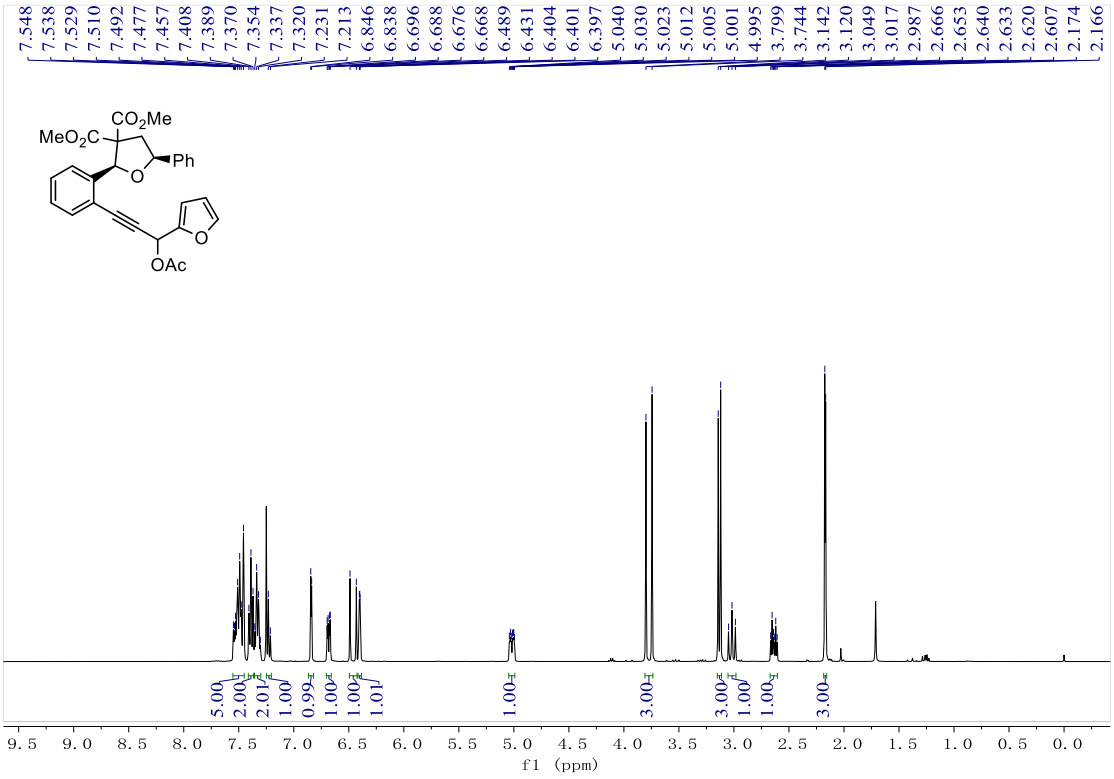
64.094
52.051
52.023
42.911
21.144
21.105
19.052
f1 (ppm)

1o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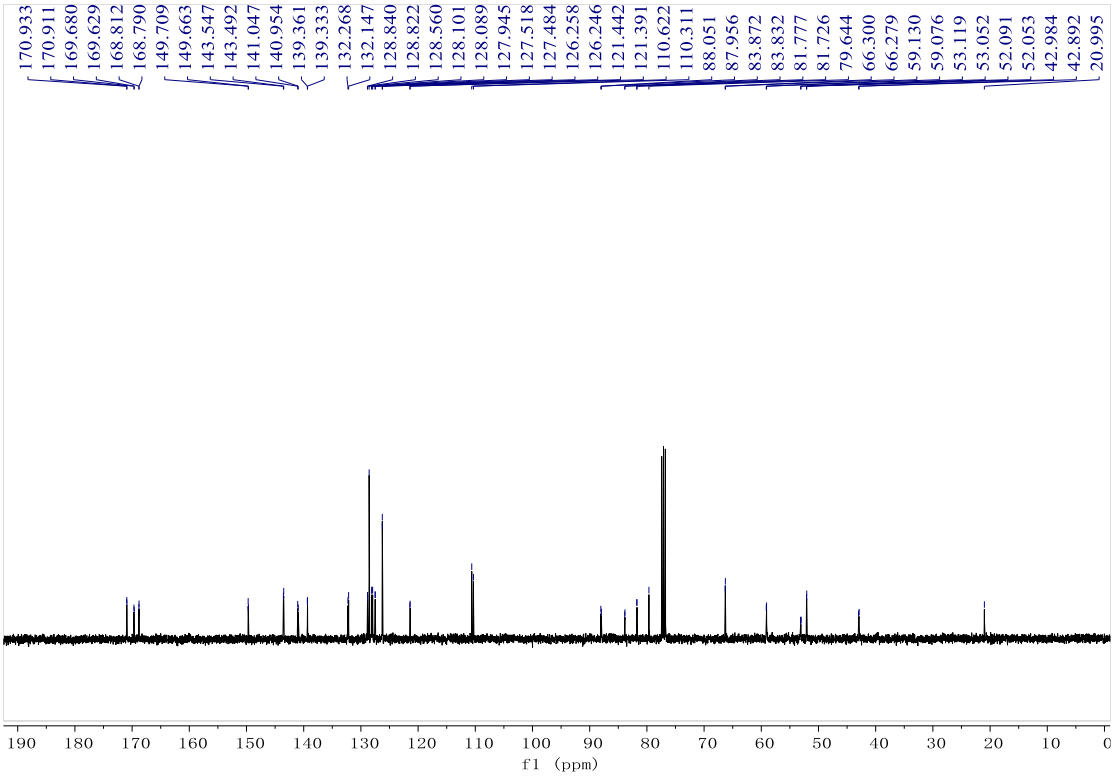
7.457
7.408
7.389
7.370
7.354
7.337
7.320
7.231
7.213
6.846
6.838
6.696
6.688
6.676
6.668
6.489
6.431
6.404
6.401
6.397
5.040
5.030
5.023
5.012
5.005
5.001
4.995
3.799
3.744
3.142
3.120
3.049
3.017
2.987
2.666
2.653
2.640
2.633
2.620
2.607
2.174
2.166
CO2Me
MeO2C
Ph
O
O
OAc
5.00
2.00
2.01
1.00
0.99
1.00
1.00
1.01
1.00
3.00
3.00
1.00
1.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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149.663
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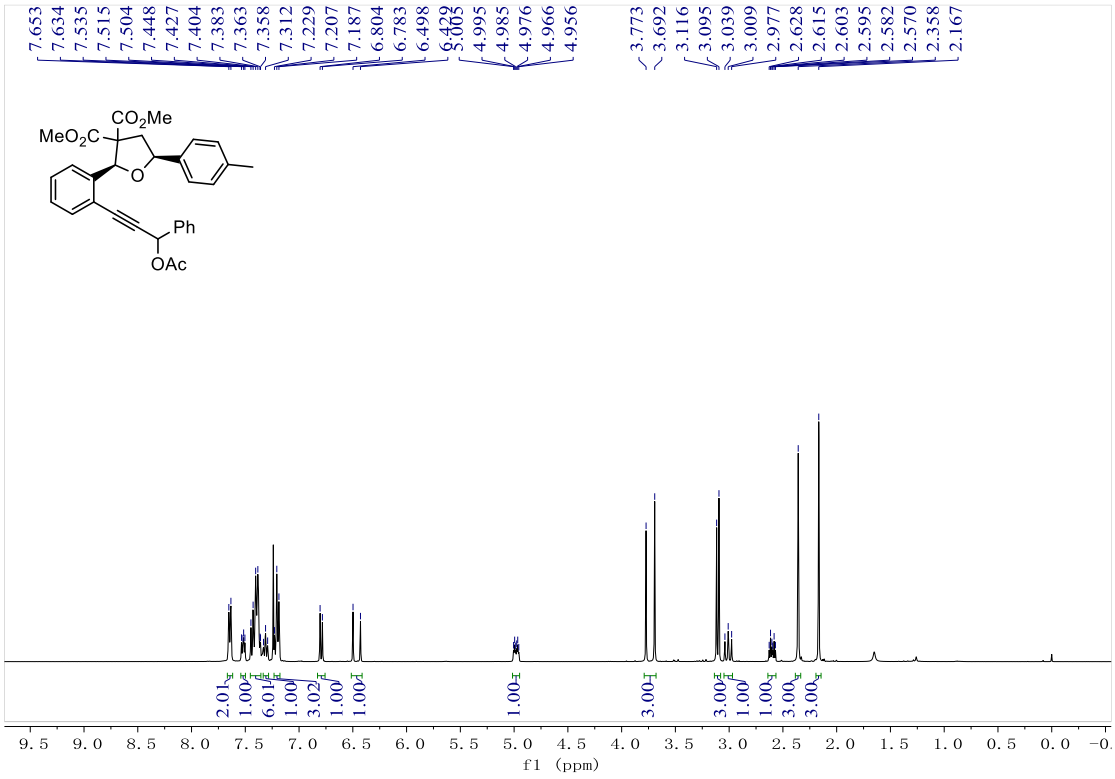
143.492
141.047
140.954
139.361
139.333
132.268
132.147
128.840
128.822
128.560
128.101
128.089
127.945
127.518
127.484
126.258
126.246
121.442
121.391
110.622
110.311
88.051
87.956
83.872
83.832
81.777
81.726
79.644
66.300
66.279
59.130
59.076
53.119
53.052
52.091
52.053
42.984
42.892
20.995
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

1p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7.448
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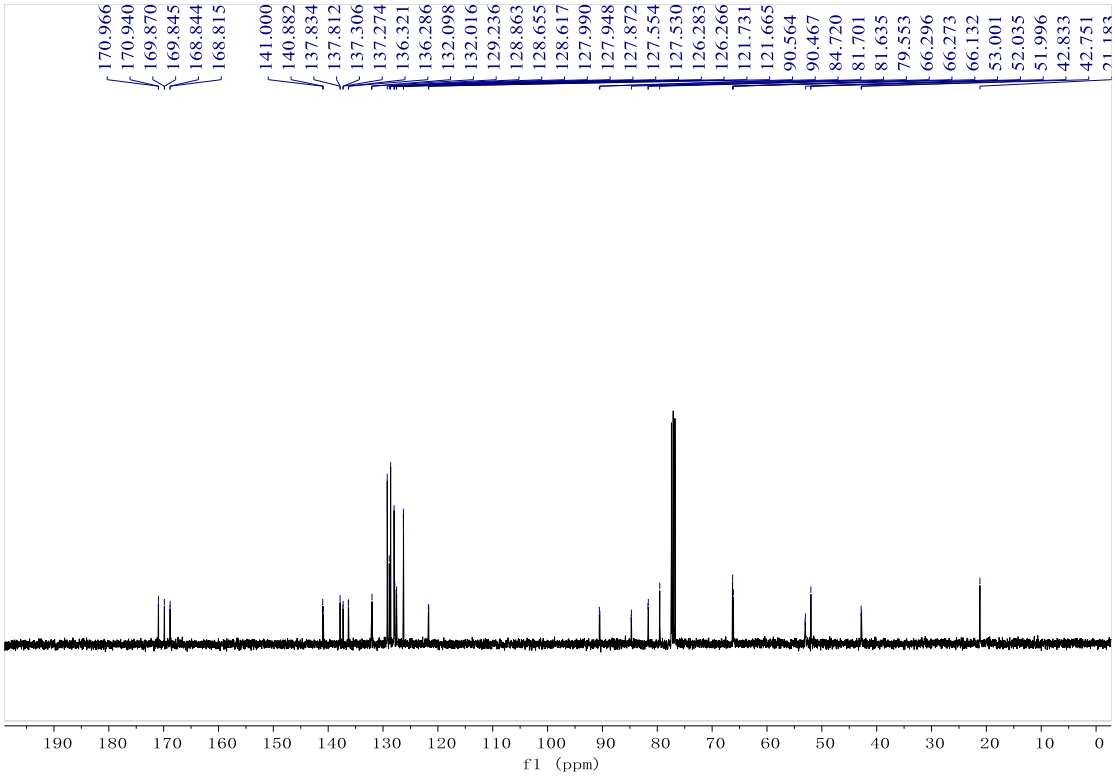
7.404
7.383
7.363
7.358
7.312
7.229
7.207
7.187
6.804
6.783
6.498
6.429
5.005
4.995
4.985
4.976
4.966
4.956
3.773
3.692
3.116
3.095
3.039
3.009
2.977
2.628
2.615
2.603
2.595
2.582
2.570
2.358
2.167
CO2Me
MeO2C
O
Ph
OAc
2.01
1.00
6.01
1.00
3.02
1.00
1.00
1.00
3.00
3.00
1.00
1.00
3.00
3.00
f1 (ppm)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137.812
137.306
137.274
136.321
136.286
132.098
132.016
129.236
128.863
128.655
128.617
127.990
127.948
127.872
127.554
127.530
126.283
126.266
121.731
121.665
90.564
90.467
84.720
81.701
81.635
79.553
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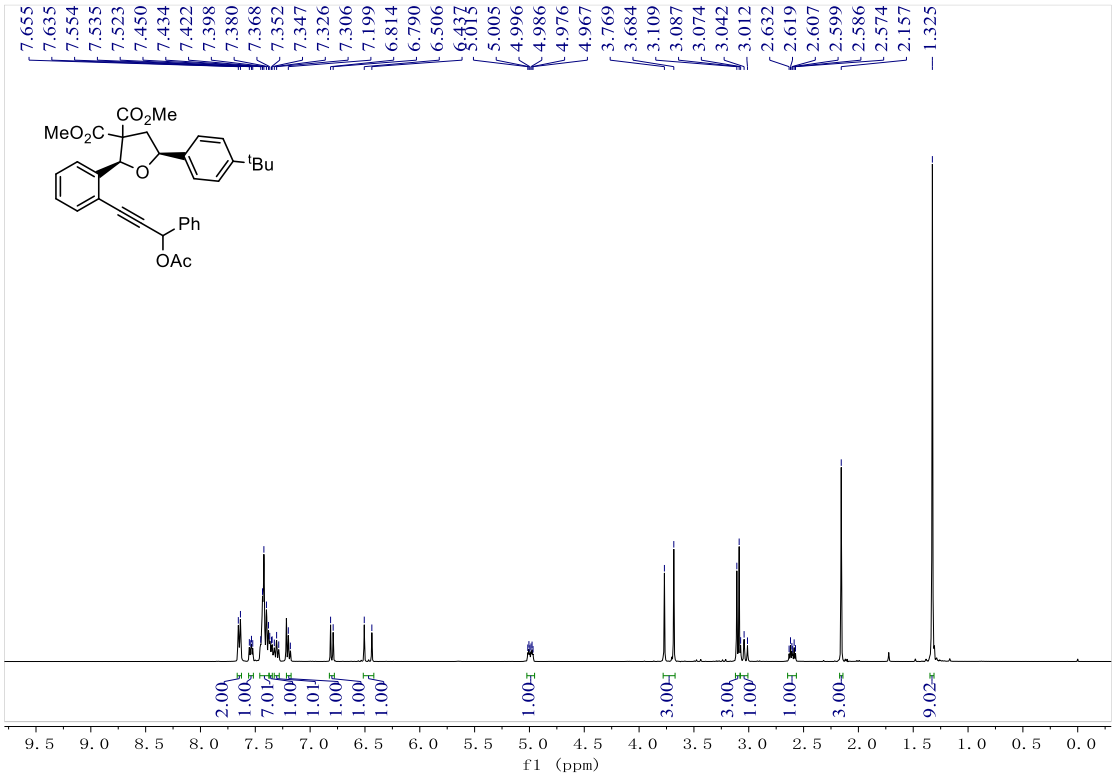
66.273
66.132
53.001
52.035
51.996
42.833
42.751
f1 (ppm)

1q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7.554
7.535
7.523
7.450
7.434
7.422
7.398
7.380
7.368
7.352
7.347
7.326
7.306
7.199
6.814
6.790
6.506
6.437
6.015
5.005
4.996
4.986
4.976
4.967
3.769
3.684
3.109
3.087
3.074
3.042
3.012
2.632
2.619
2.607
2.599
2.586
2.574
2.157
1.325
CO2Me
MeO2C
O
tBu
Ph
OAc
2.00
1.00
7.01
1.00
1.01
1.00
1.00
1.00
1.00
3.00
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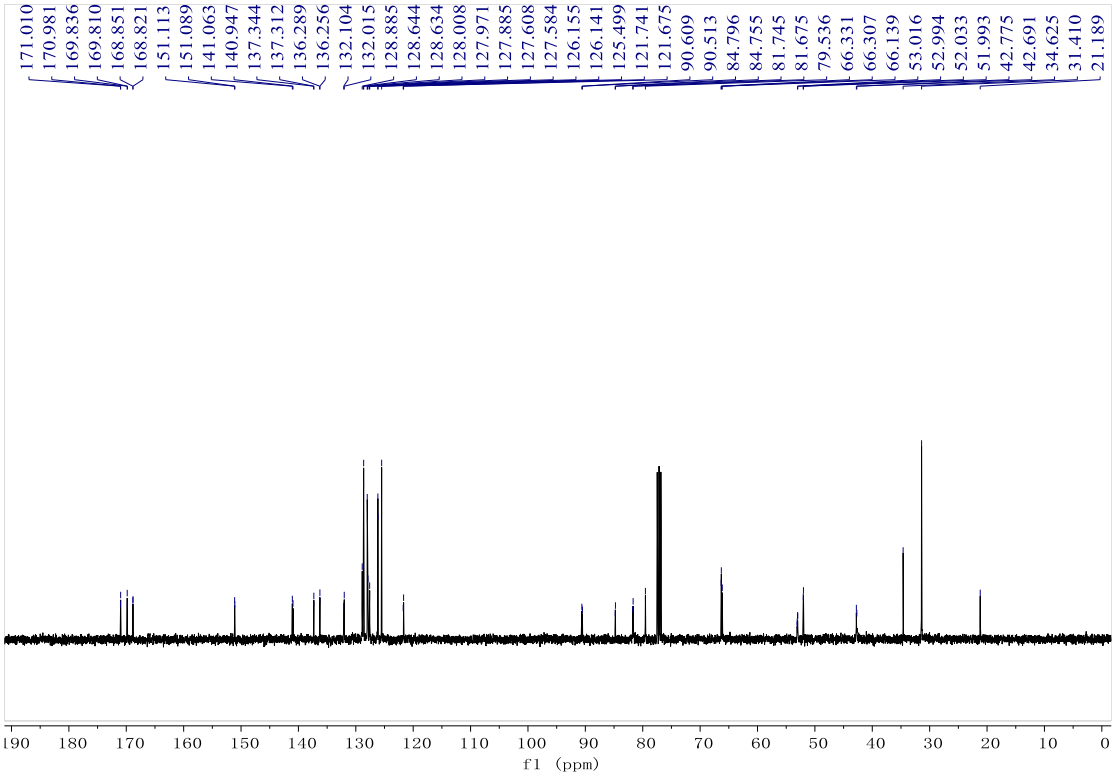
1.00
1.00
3.00
9.02
f1 (ppm)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169.810
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168.821
151.113
151.089
141.063
140.947
137.344
137.312
136.289
136.256
132.104
132.015
128.885
128.644
128.634
128.008
127.971
127.885
127.608
127.584
126.155
126.141
125.499
121.741
121.675
90.609
90.513
84.796
84.755
81.745
81.675
79.536
66.331
66.307
66.139
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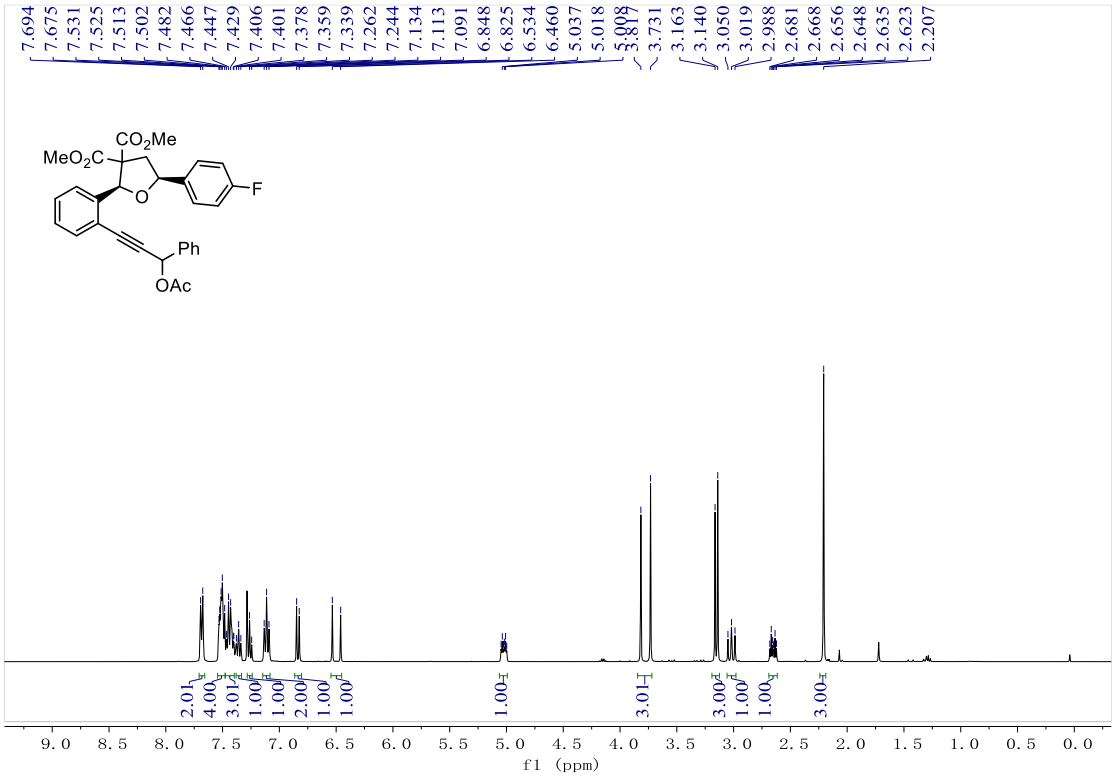
52.033
51.993
42.775
42.691
34.625
31.410
21.189
f1 (ppm)

1r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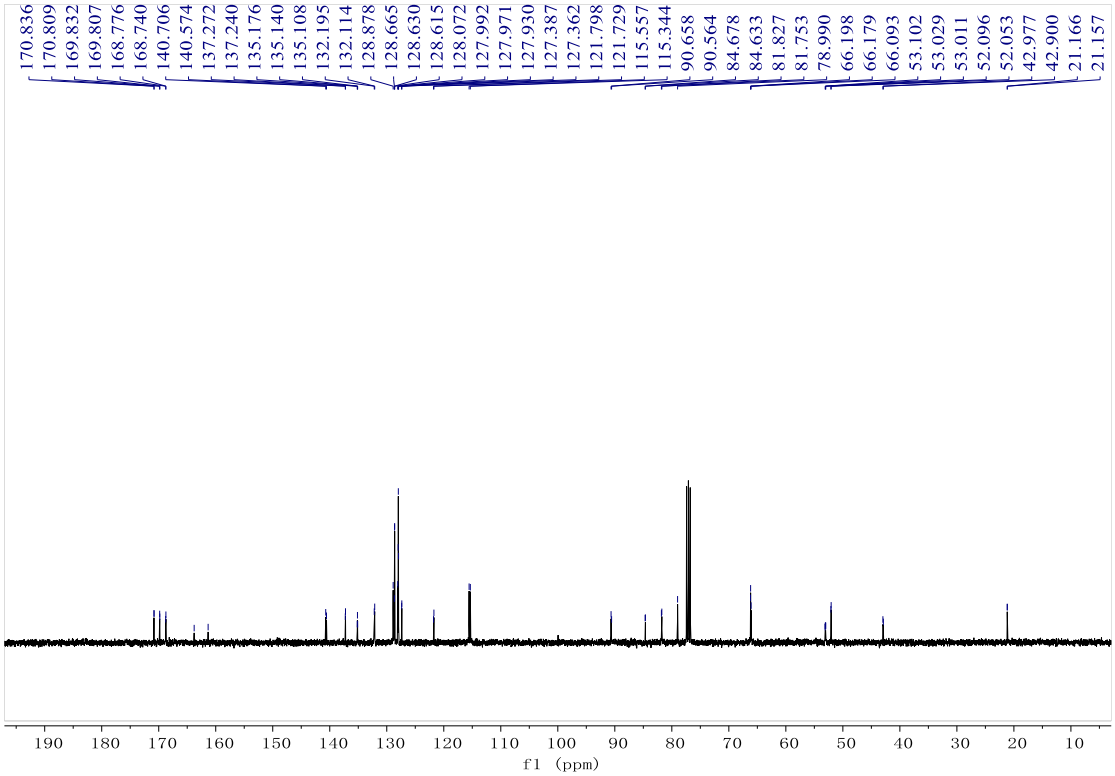
7.429
7.406
7.401
7.378
7.359
7.339
7.262
7.244
7.134
7.113
7.091
6.848
6.825
6.534
6.460
5.037
5.018
5.008
3.817
3.731
3.163
3.140
3.050
3.019
2.988
2.681
2.668
2.656
2.648
2.635
2.623
2.207
CO2Me
MeO2C
O
F
Ph
OAc
2.01
4.00
3.01
1.00
1.00
2.00
1.00
1.00
1.00
3.01
3.00
1.00
1.00
3.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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169.807
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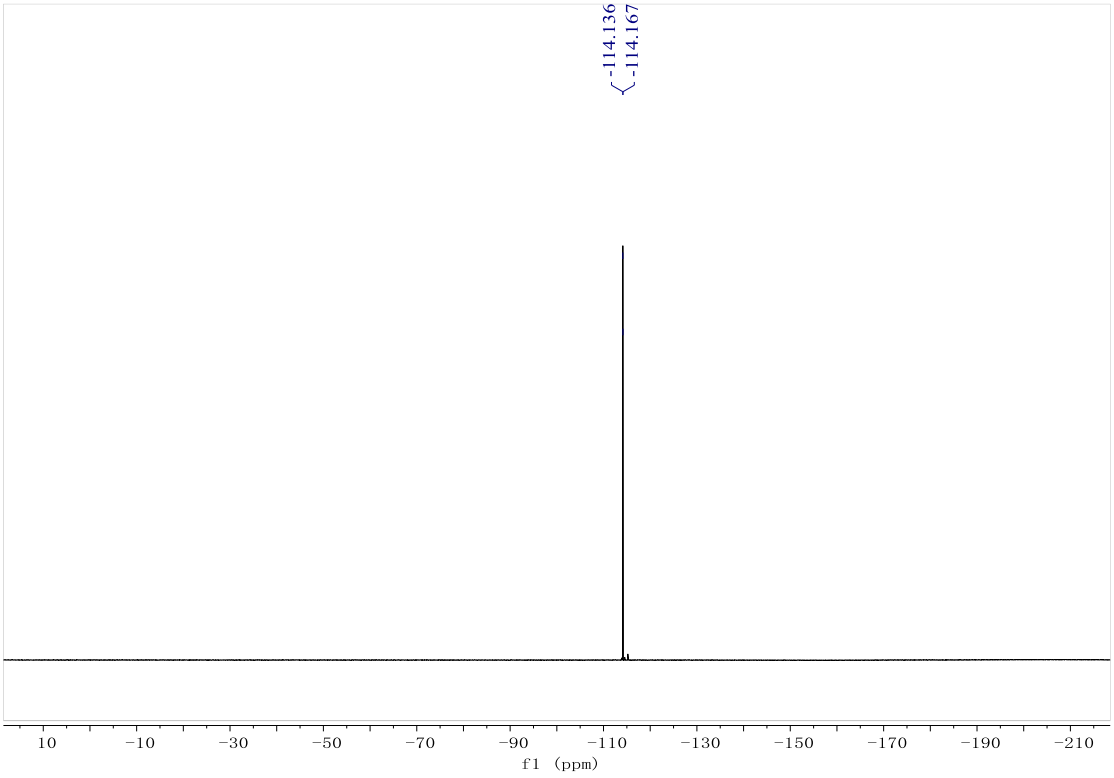
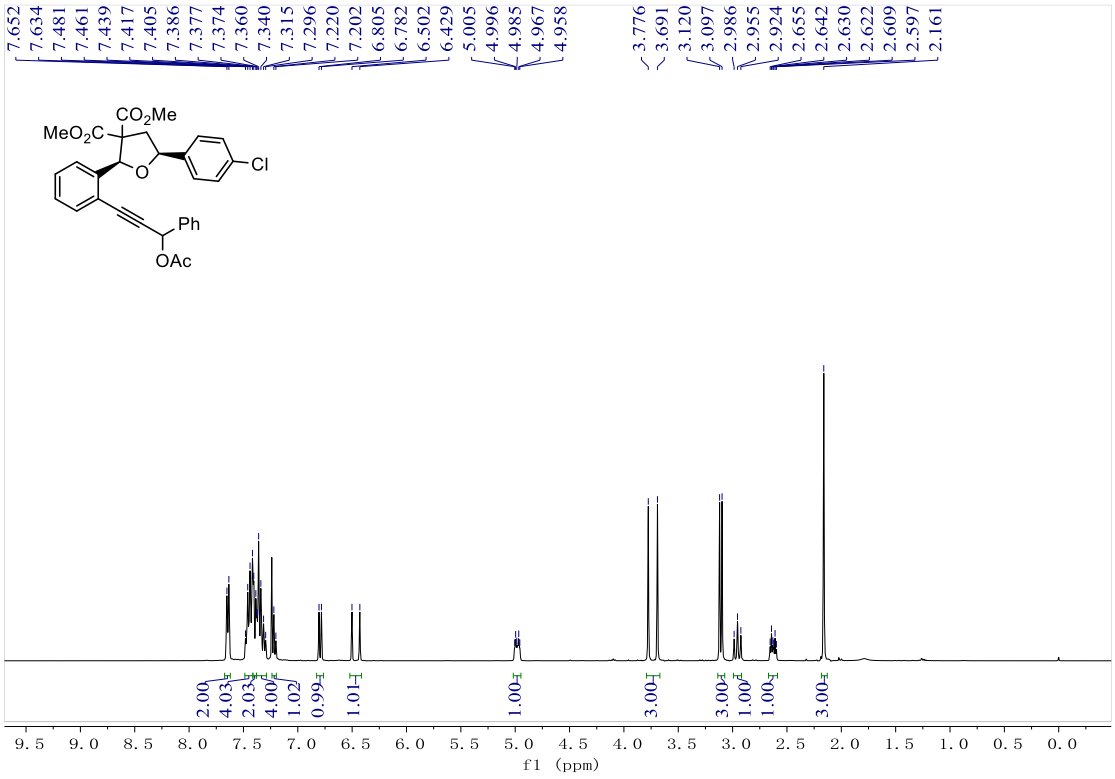
140.706
140.574
137.272
137.240
135.176
135.140
135.108
132.195
132.114
128.878
128.665
128.630
128.615
128.072
127.992
127.971
127.930
127.387
127.362
121.798
121.729
115.557
115.344
90.658
90.564
84.678
84.633
81.827
81.753
78.990
66.198
66.179
66.093
53.102
53.029
53.011
52.096
52.053
42.977
42.900
21.166
21.157
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)


-114.136
-114.167
10
−10
−30
−50
−70
−90
−110
−130
−150
−170
−190
−210
f1 (ppm)

1s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7.439
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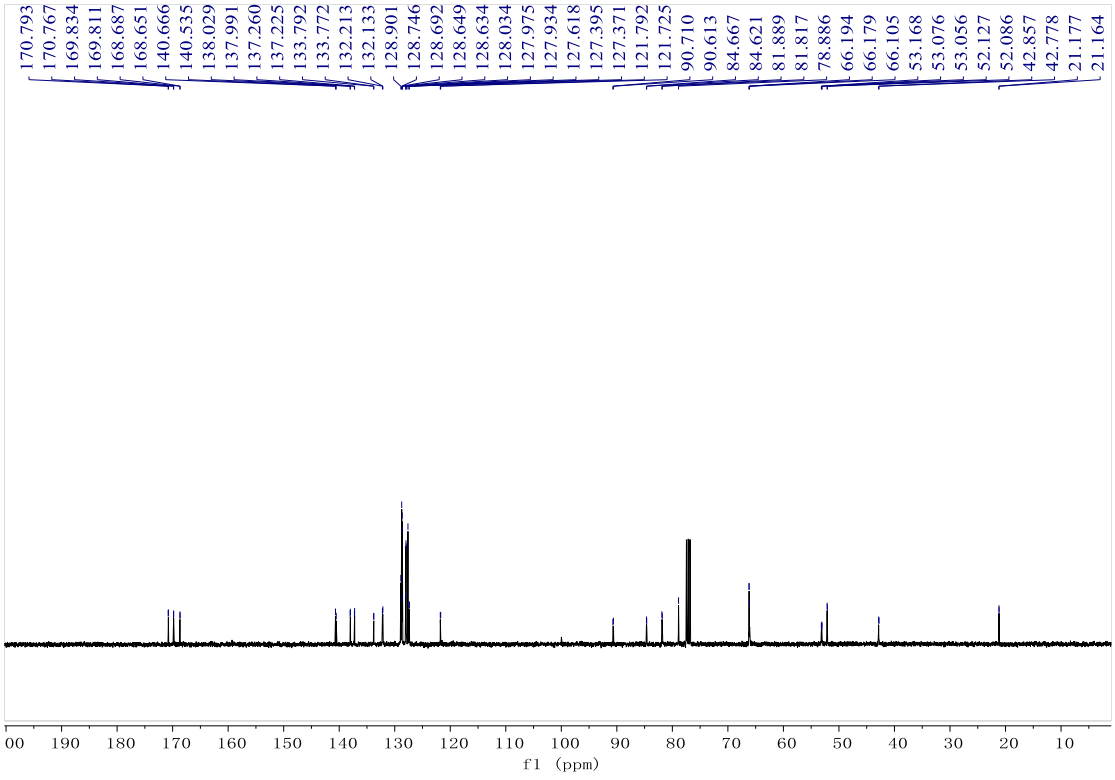
7.386
7.377
7.374
7.360
7.340
7.315
7.296
7.220
7.202
6.805
6.782
6.502
6.429
5.005
4.996
4.985
4.967
4.958
3.776
3.691
3.120
3.097
2.986
2.955
2.924
2.655
2.642
2.630
2.622
2.609
2.597
2.161
CO2Me
MeO2C
O
Cl
Ph
OAc
2.00
4.03
2.03
4.00
1.02
0.99
1.01
1.00
3.00
3.00
1.00
1.00
3.00
f1 (ppm)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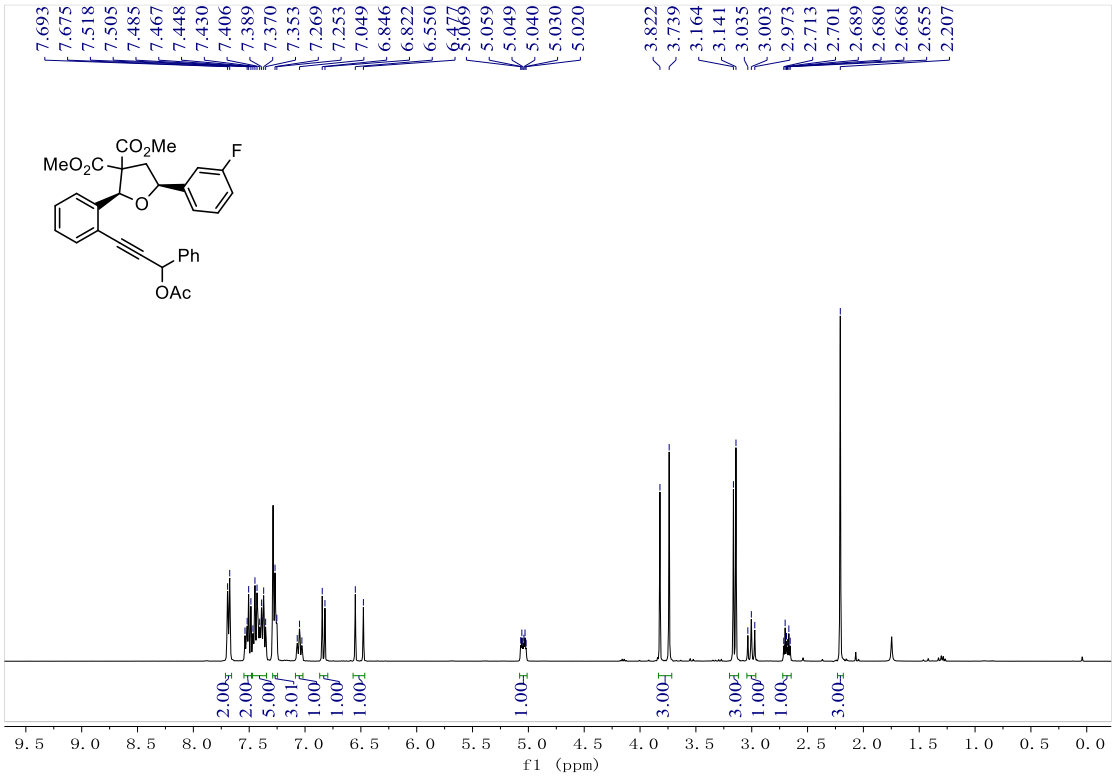
137.260
137.225
133.792
133.772
132.213
132.133
128.901
128.746
128.692
128.649
128.634
128.034
127.975
127.934
127.618
127.395
127.371
121.792
121.725
90.710
90.613
84.667
84.621
81.889
81.817
78.886
66.194
66.179
66.105
53.168
53.076
53.056
52.127
52.086
42.857
42.778
21.177
21.164
f1 (ppm)

1t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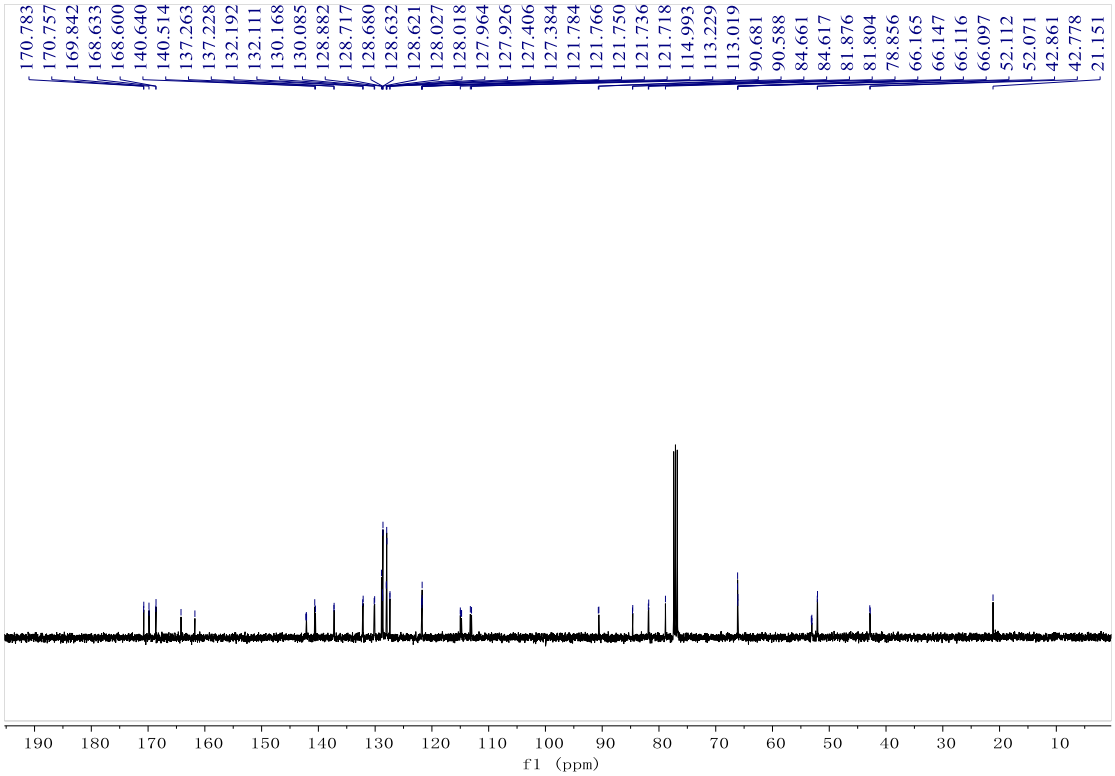
7.505
7.485
7.467
7.448
7.430
7.406
7.389
7.370
7.353
7.269
7.253
7.049
6.846
6.822
6.550
6.477
5.069
5.059
5.049
5.040
5.030
5.020
3.822
3.739
3.164
3.141
3.035
3.003
2.973
2.713
2.701
2.689
2.680
2.668
2.655
2.207
CO2Me
MeO2C
F
O
Ph
OAc
2.00
2.00
5.00
3.01
1.00
1.00
1.00
3.00
3.00
1.00
1.00
3.00
f1 (ppm)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170.757
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168.633
168.600
140.640
140.514
137.263
137.228
132.192
132.111
130.168
130.085
128.882
128.717
128.680
128.632
128.621
128.027
128.018
127.964
127.926
127.406
127.384
121.784
121.766
121.750
121.736
121.718
114.993
113.229
113.019
90.681
90.588
84.661
84.617
81.876
81.804
78.856
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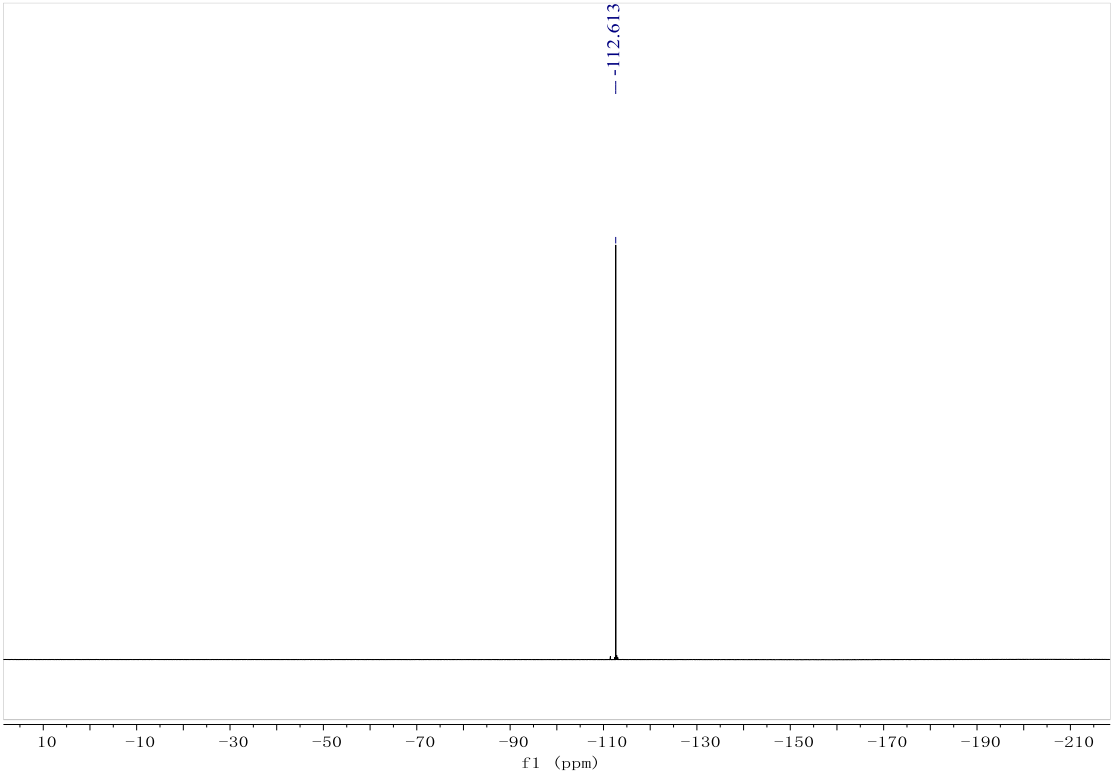
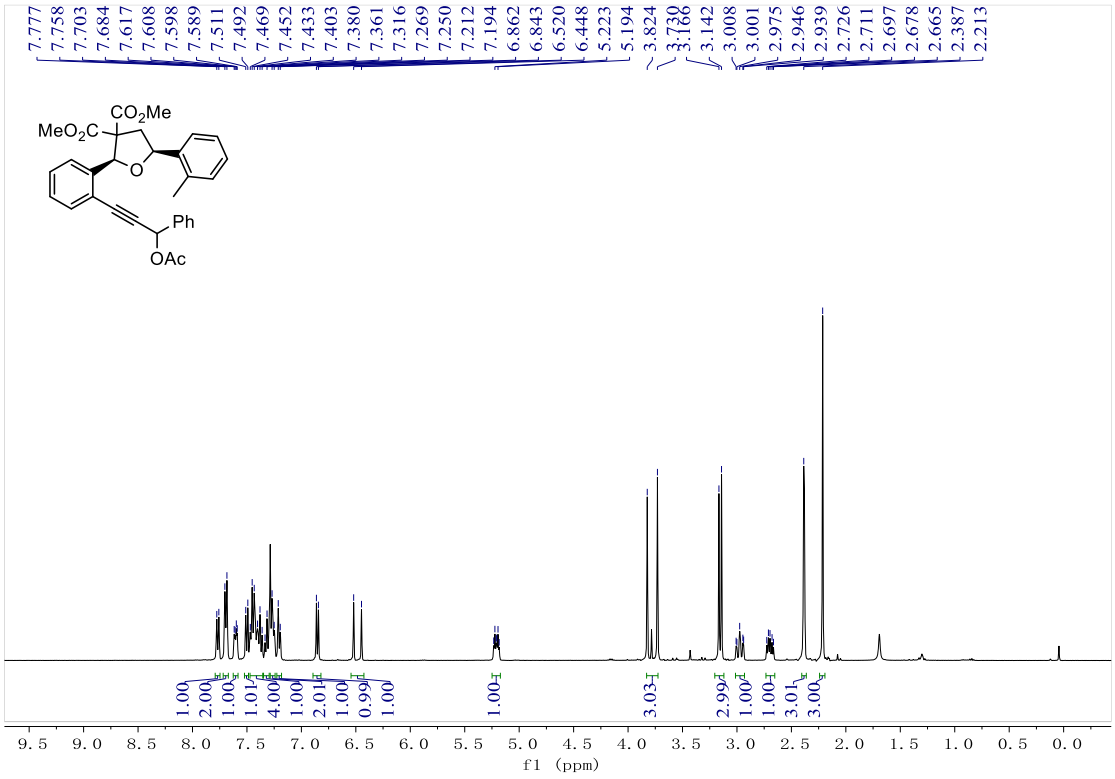
66.147
66.116
66.097
52.112
52.071
42.861
42.778
21.151
f1 (ppm)


-112.613
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

1u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7.703
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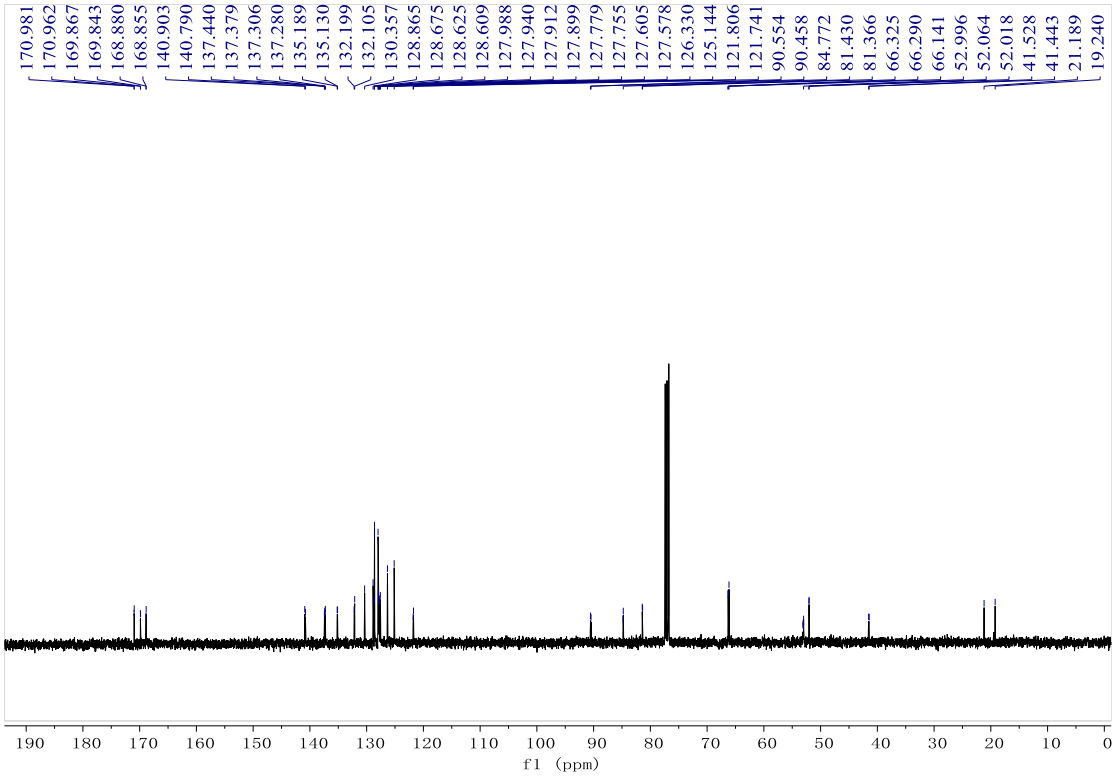
7.617
7.608
7.598
7.589
7.511
7.492
7.469
7.452
7.433
7.403
7.380
7.361
7.316
7.269
7.250
7.212
7.194
6.862
6.843
6.520
6.448
5.223
5.194
3.824
3.730
3.166
3.142
3.008
3.001
2.975
2.946
2.939
2.726
2.711
2.697
2.678
2.665
2.387
2.213
CO2Me
MeO2C
O
Ph
OAc
1.00
2.00
1.00
1.01
4.00
1.00
2.01
1.00
0.99
1.00
1.00
3.03
2.99
1.00
1.00
3.01
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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168.855
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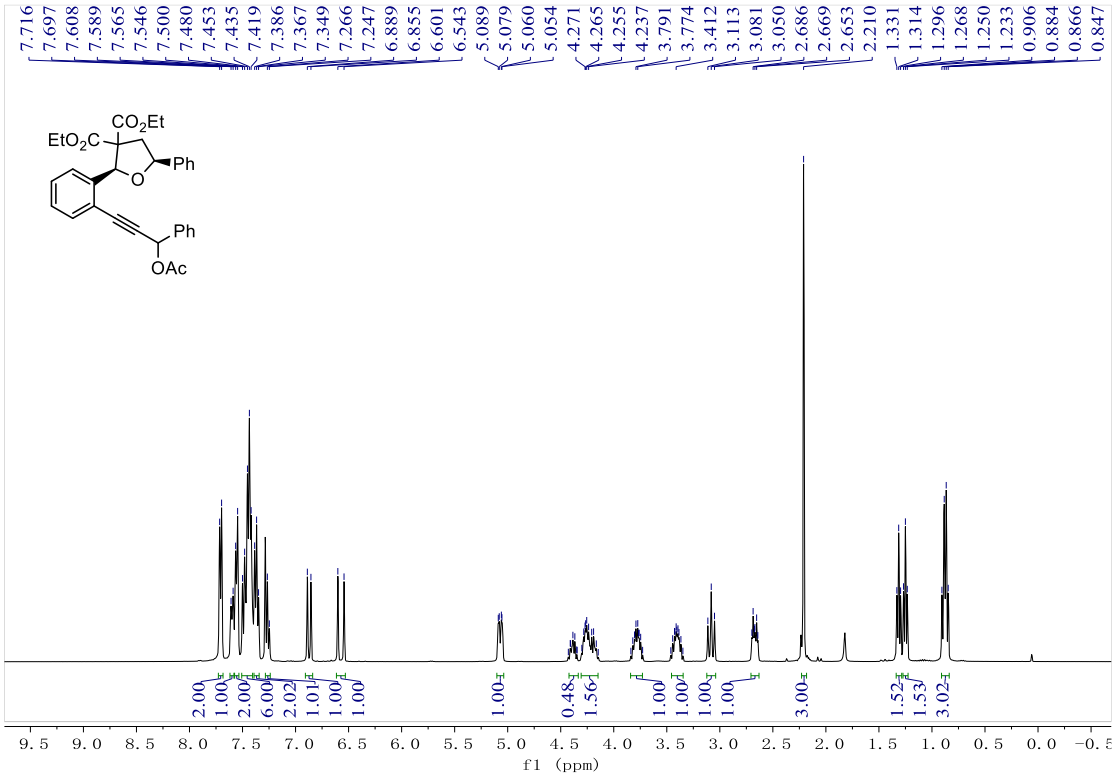
140.790
137.440
137.379
137.306
137.280
135.189
135.130
132.199
132.105
130.357
128.865
128.675
128.625
128.609
127.988
127.940
127.912
127.899
127.779
127.755
127.605
127.578
126.330
125.144
121.806
121.741
90.554
90.458
84.772
81.430
81.366
66.325
66.290
66.141
52.996
52.064
52.018
41.528
41.443
21.189
19.240
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

1v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7.608
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7.565
7.546
7.500
7.480
7.453
7.435
7.419
7.386
7.367
7.349
7.266
7.247
6.889
6.855
6.601
6.543
5.089
5.079
5.060
5.054
4.271
4.265
4.255
4.237
3.791
3.774
3.412
3.113
3.081
3.050
2.686
2.669
2.653
2.210
1.331
1.314
1.296
1.268
1.250
1.233
0.906
0.884
0.866
0.847
CO2Et
EtO2C
Ph
O
Ph
OAc
2.00
1.00
2.00
6.00
2.02
1.01
1.00
1.00
1.00
0.48
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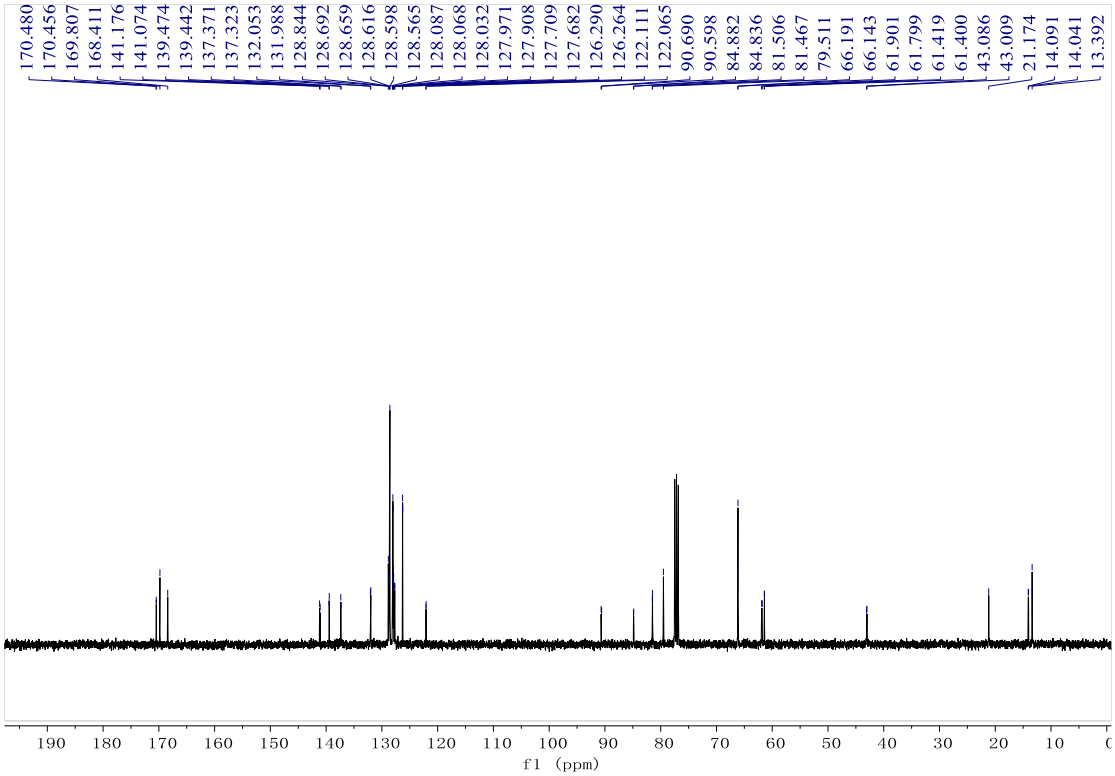
1.00
1.00
1.00
1.00
3.00
1.52
1.53
3.02
f1 (ppm)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141.074
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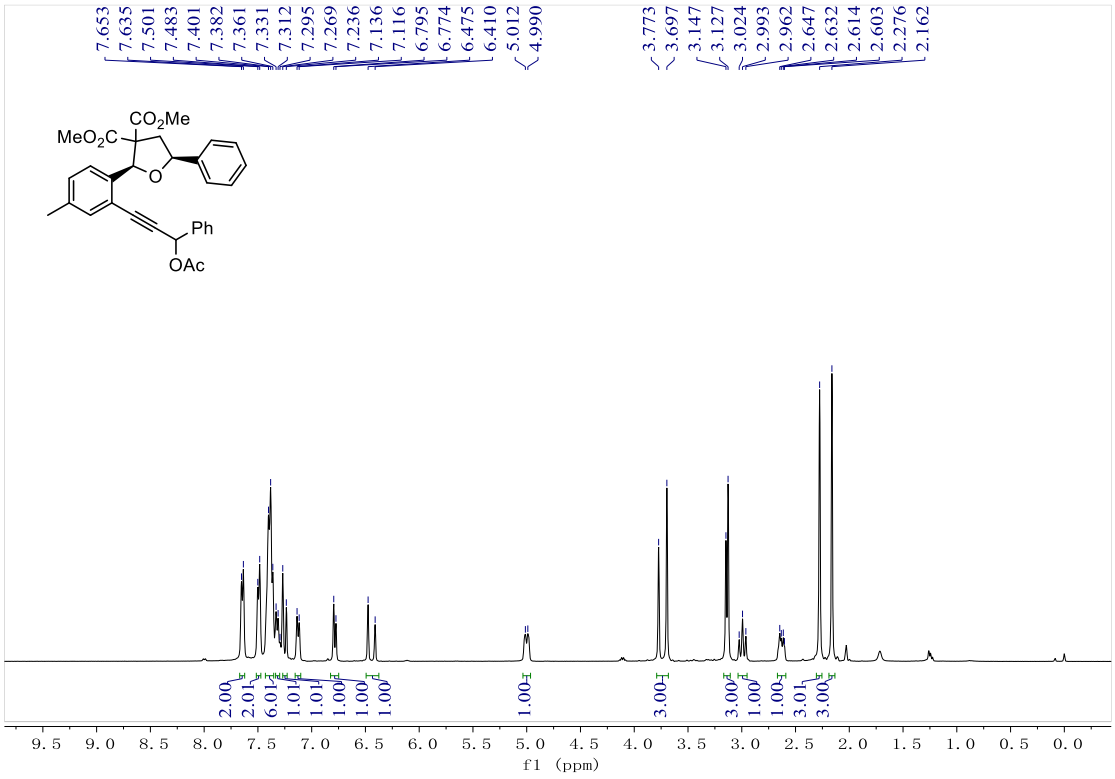
139.442
137.371
137.323
132.053
131.988
128.844
128.692
128.659
128.616
128.598
128.565
128.087
128.068
128.032
127.971
127.908
127.709
127.682
126.290
126.264
122.111
122.065
90.690
90.598
84.882
84.836
81.506
81.467
79.511
66.191
66.143
61.901
61.799
61.419
61.400
43.086
43.009
21.174
14.091
14.041
13.392
f1 (ppm)

1w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7.401
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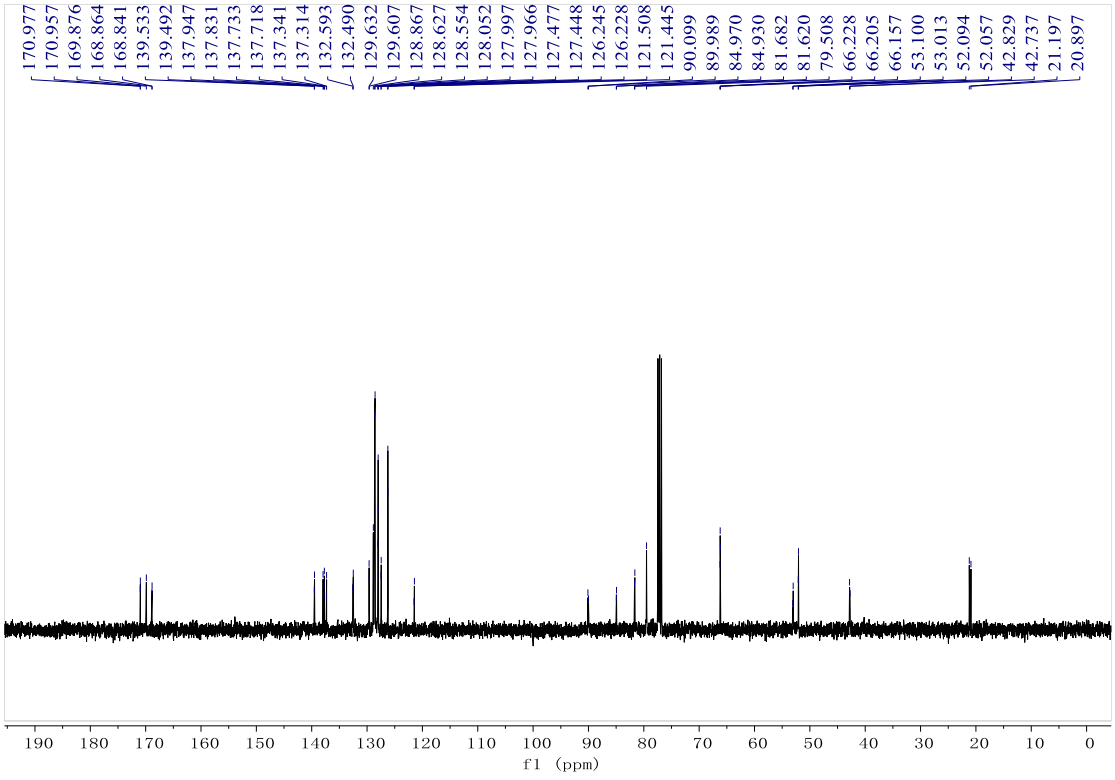
7.361
7.331
7.312
7.295
7.269
7.236
7.136
7.116
6.795
6.774
6.475
6.410
5.012
4.990
3.773
3.697
3.147
3.127
3.024
2.993
2.962
2.647
2.632
2.614
2.603
2.276
2.162
CO2Me
MeO2C
O
Ph
OAc
2.00
2.01
6.01
1.01
1.01
1.00
1.00
1.00
1.00
3.00
3.00
1.00
1.00
3.01
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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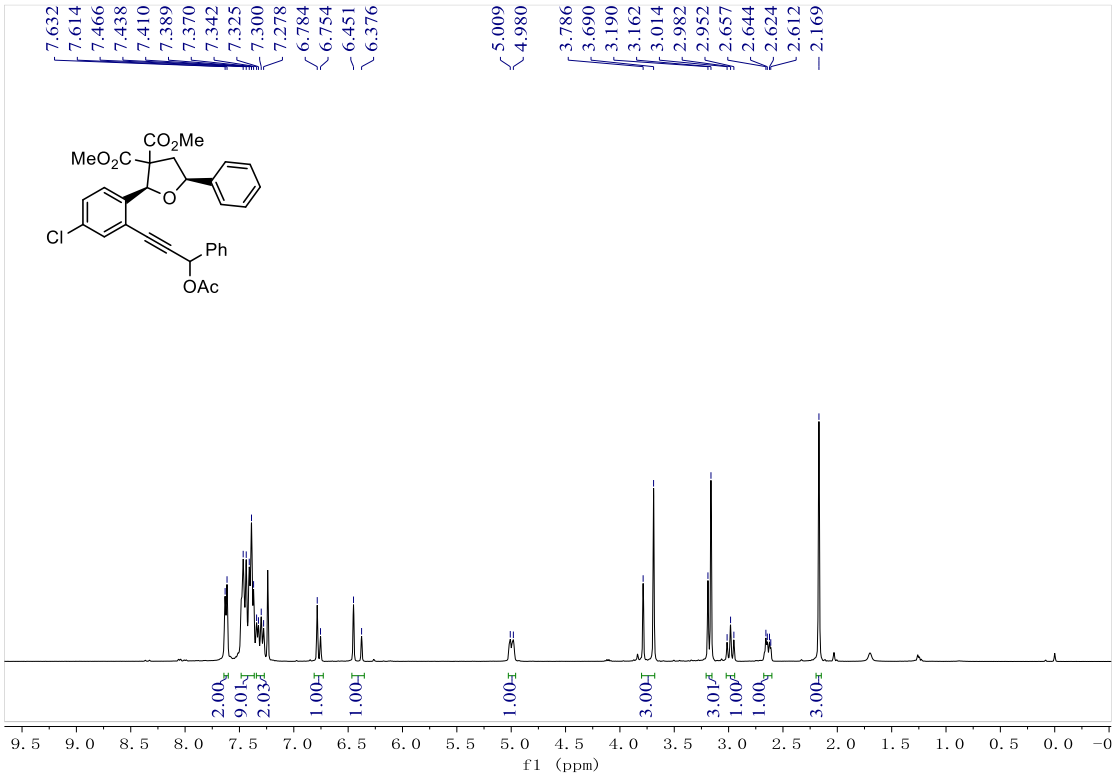
137.947
137.831
137.733
137.718
137.341
137.314
132.593
132.490
129.632
129.607
128.867
128.627
128.554
128.052
127.997
127.966
127.477
127.448
126.245
126.228
121.508
121.445
90.099
89.989
84.970
84.930
81.682
81.620
79.508
66.228
66.205
66.157
53.100
53.013
52.094
52.057
42.829
42.737
21.197
20.897
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

1x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7.438
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7.389
7.370
7.342
7.325
7.300
7.278
6.784
6.754
6.451
6.376
5.009
4.980
3.786
3.690
3.190
3.162
3.014
2.982
2.952
2.657
2.644
2.624
2.612
2.169
CO2Me
MeO2C
O
Cl
Ph
OAc
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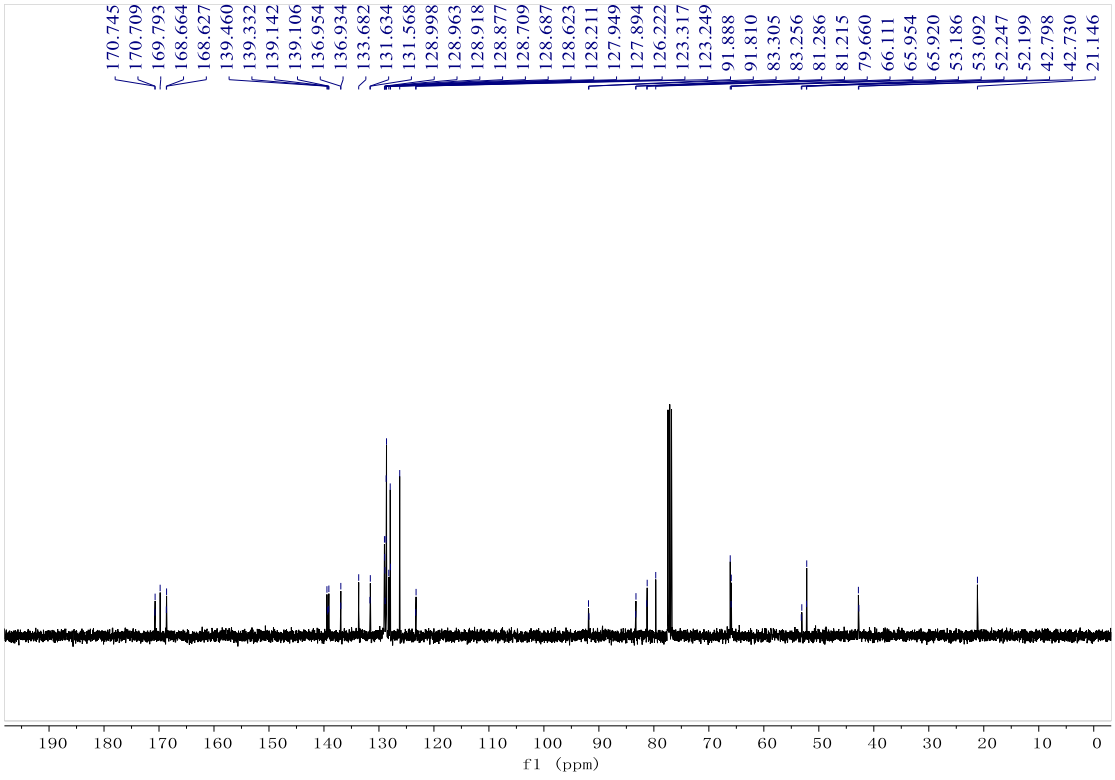
2.03
1.00
1.00
1.00
3.00
3.01
1.00
1.00
3.00
f1 (ppm)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139.142
139.106
136.954
136.934
133.682
131.634
131.568
128.998
128.963
128.918
128.877
128.709
128.687
128.623
128.211
127.949
127.894
126.222
123.317
123.249
91.888
91.810
83.305
83.256
81.286
81.215
79.660
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65.954
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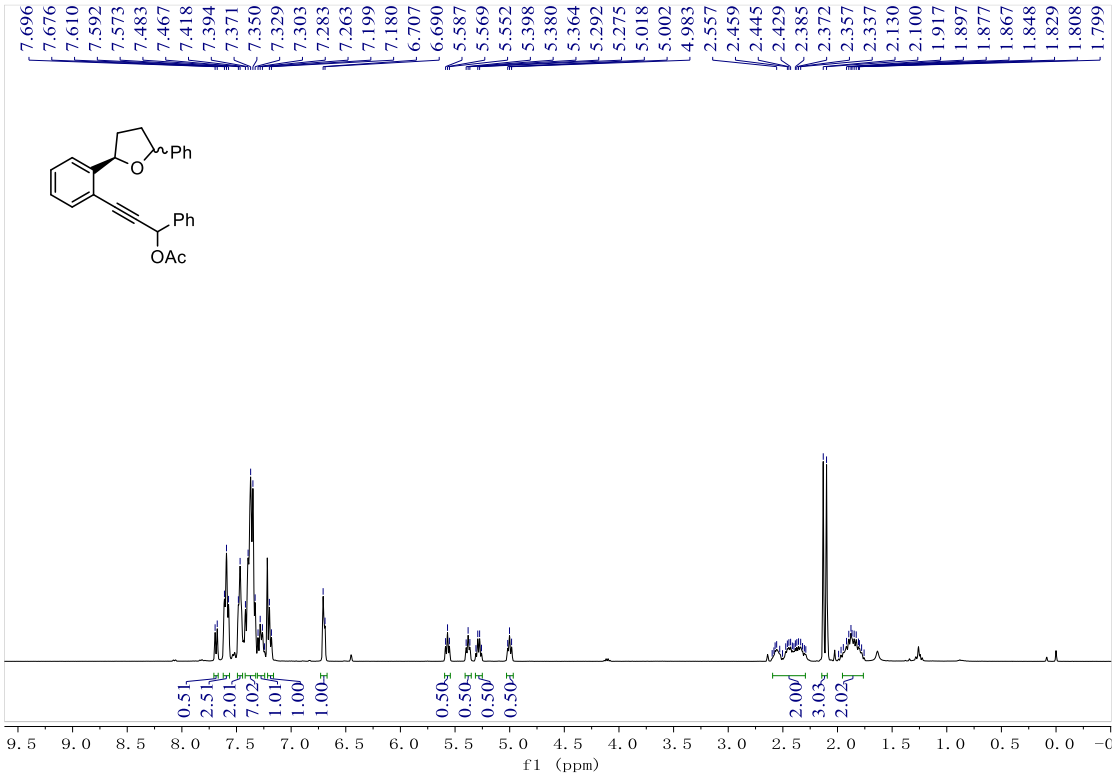
53.186
53.092
52.247
52.199
42.798
42.730
21.146
f1 (ppm)

1y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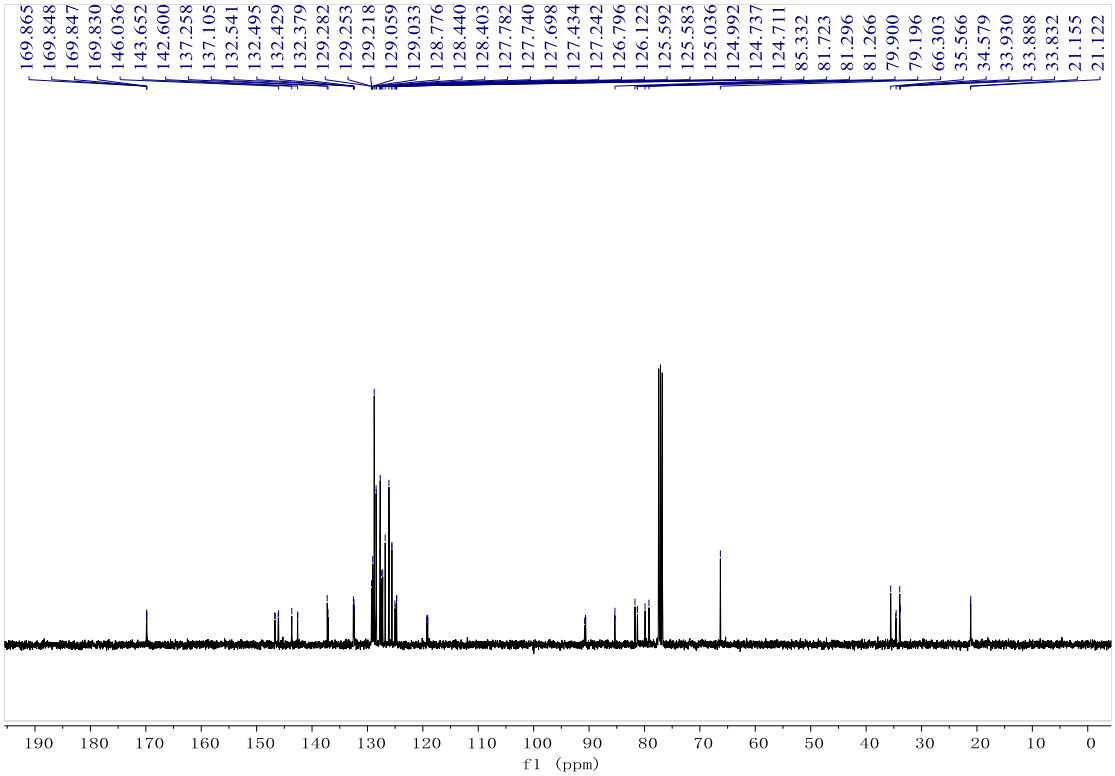
7.467
7.418
7.394
7.371
7.350
7.329
7.303
7.283
7.263
7.199
7.180
6.707
6.690
5.587
5.569
5.552
5.398
5.380
5.364
5.292
5.275
5.018
5.002
4.983
2.557
2.459
2.445
2.429
2.385
2.372
2.357
2.337
2.130
2.100
1.917
1.897
1.877
1.867
1.848
1.829
1.808
1.799
Ph
O
Ph
OAc
0.51
2.51
2.01
7.02
1.01
1.00
1.00
0.50
0.50
0.50
0.50
2.00
3.03
2.02
f1 (ppm)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137.258
137.105
132.541
132.495
132.429
132.379
129.282
129.253
129.218
129.059
129.033
128.776
128.440
128.403
127.782
127.740
127.698
127.434
127.242
126.796
126.122
125.592
125.583
125.036
124.992
124.737
124.711
85.332
81.723
81.296
81.266
79.900
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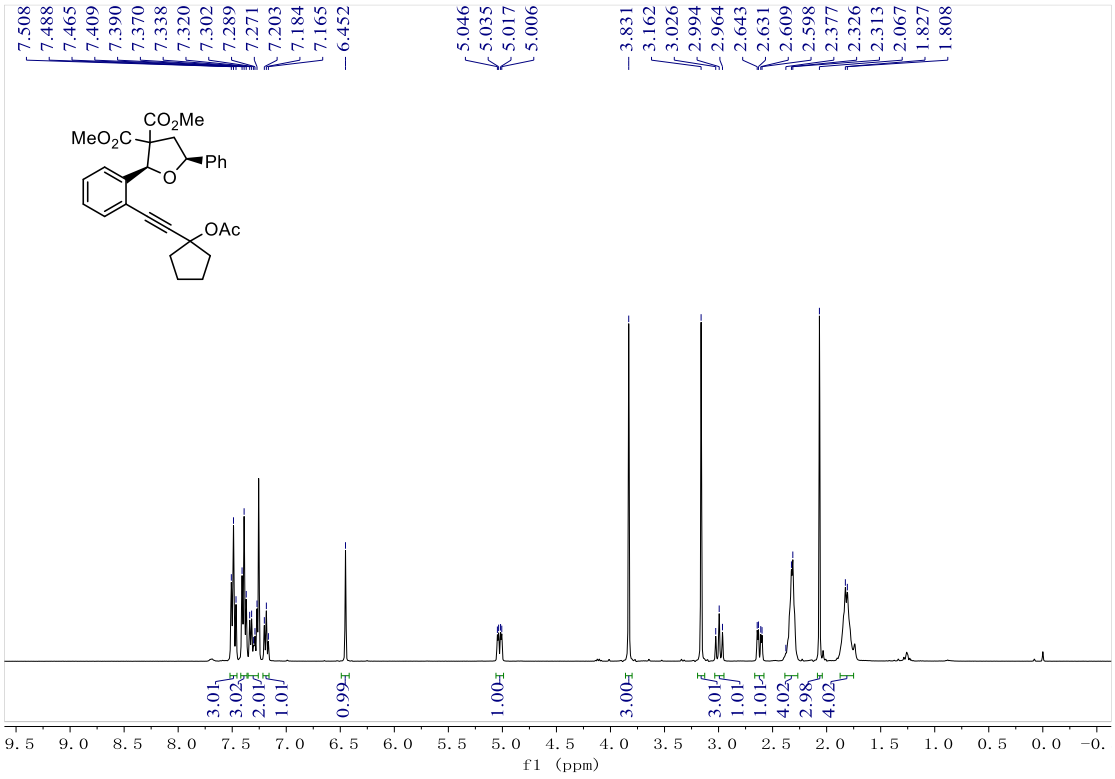
35.566
34.579
33.930
33.888
33.832
21.155
21.122
f1 (ppm)

1aa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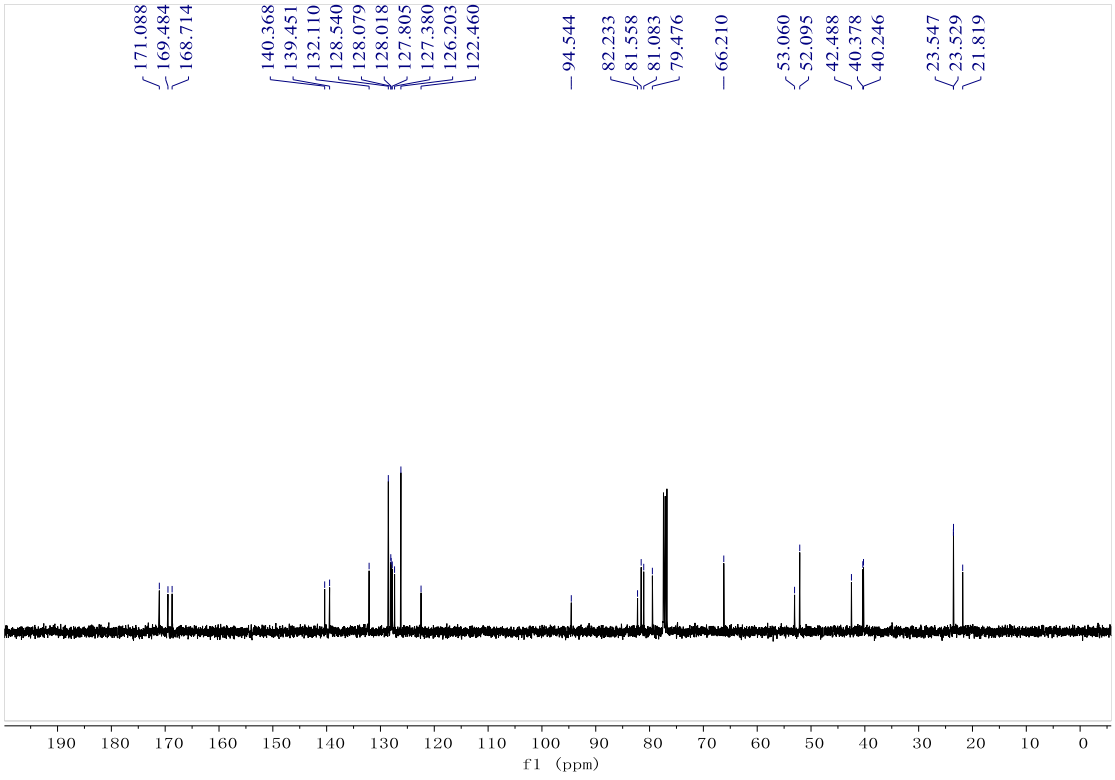
7.409
7.390
7.370
7.338
7.320
7.302
7.289
7.271
7.203
7.184
7.165
6.452
5.046
5.035
5.017
5.006
3.831
3.162
3.026
2.994
2.964
2.643
2.631
2.609
2.598
2.377
2.326
2.313
2.067
1.827
1.808
CO2Me
MeO2C
Ph
O
OAc
3.01
3.02
2.01
1.01
0.99
1.00
3.00
3.01
1.01
1.01
4.02
2.98
4.02
f1 (ppm)


171.088
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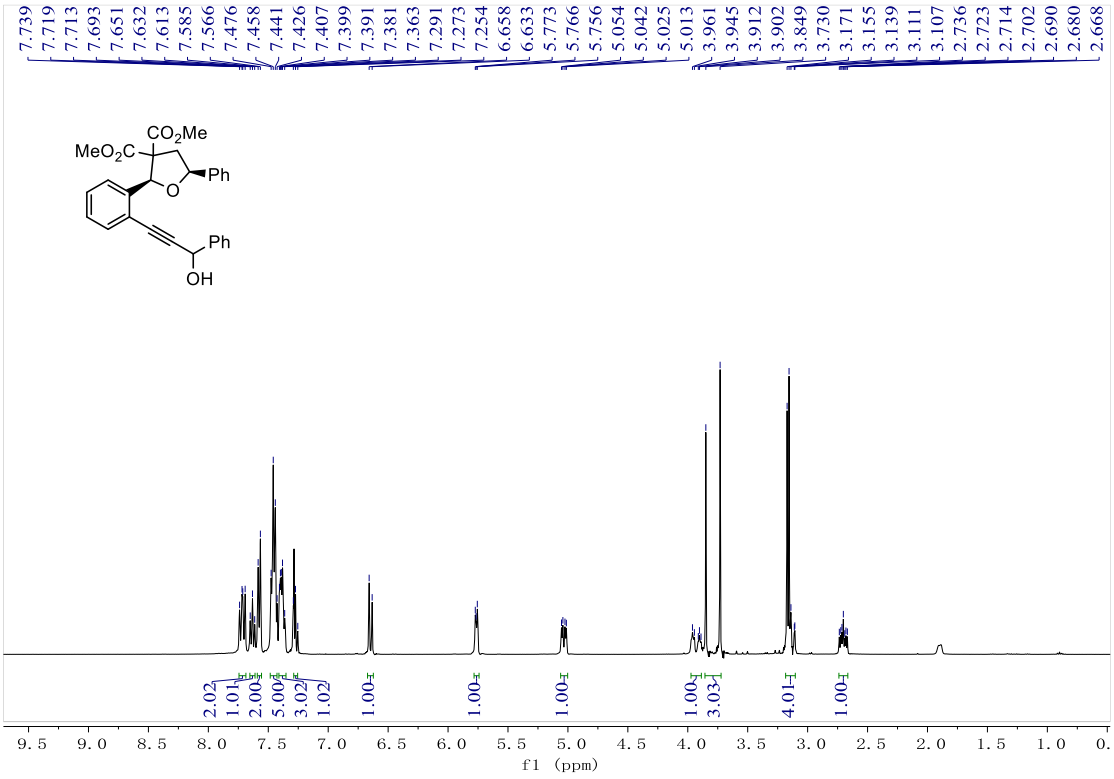
168.714
140.368
139.451
132.110
128.540
128.079
128.018
127.805
127.380
126.203
122.460
94.544
82.233
81.558
81.083
79.476
66.210
53.060
52.095
42.488
40.378
40.246
23.547
23.529
21.819
f1 (ppm)

1ab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7.713
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7.632
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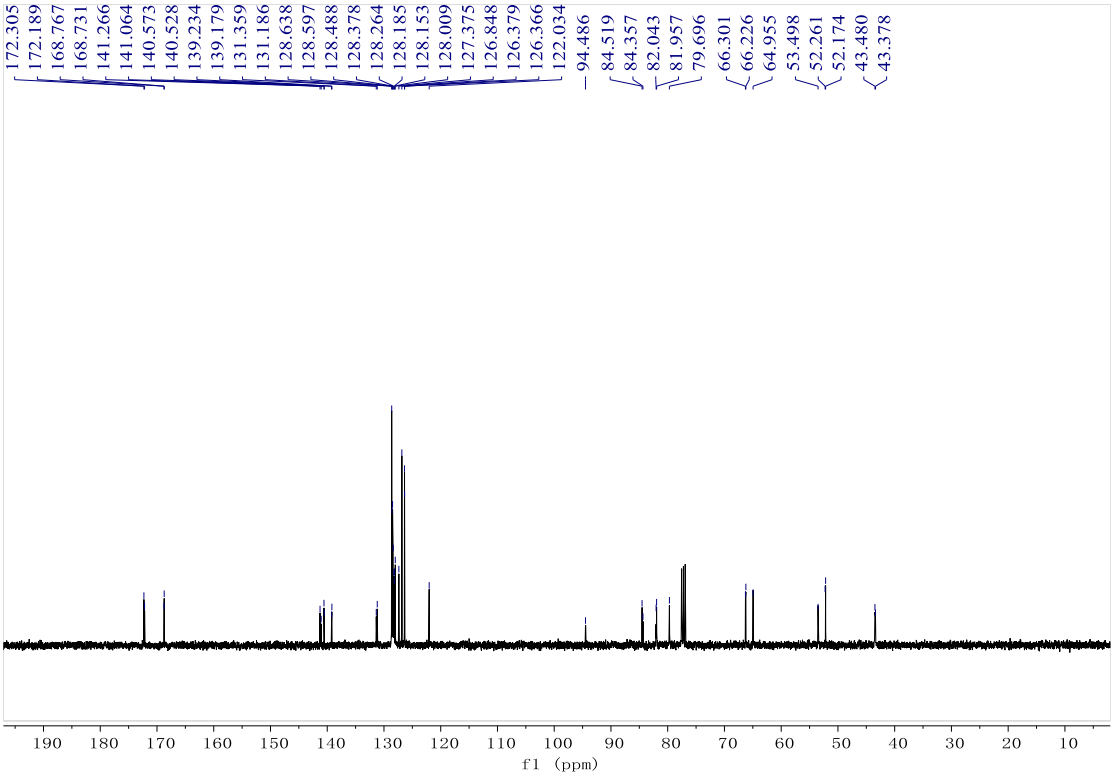
7.476
7.458
7.441
7.426
7.407
7.399
7.391
7.381
7.363
7.291
7.273
7.254
6.658
6.633
5.773
5.766
5.756
5.054
5.042
5.025
5.013
3.961
3.945
3.912
3.902
3.849
3.730
3.171
3.155
3.139
3.111
3.107
2.736
2.723
2.714
2.702
2.690
2.680
2.668
CO2Me
MeO2C
Ph
O
Ph
OH
2.02
1.01
2.00
5.00
3.02
1.02
1.00
1.00
1.00
1.00
3.03
4.01
1.00
f1 (ppm)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141.064
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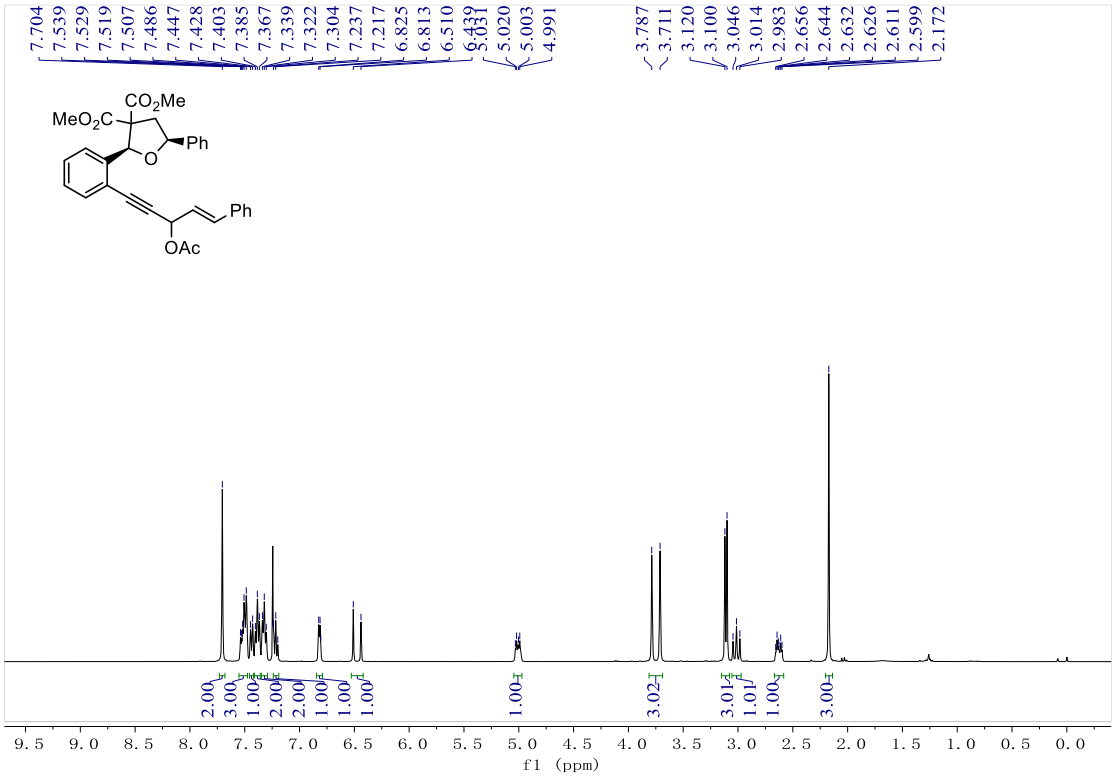
140.528
139.234
139.179
131.359
131.186
128.638
128.597
128.488
128.378
128.264
128.185
128.153
128.009
127.375
126.848
126.379
126.366
122.034
94.486
84.519
84.357
82.043
81.957
79.696
66.301
66.226
64.955
53.498
52.261
52.174
43.480
43.378
f1 (ppm)

1ac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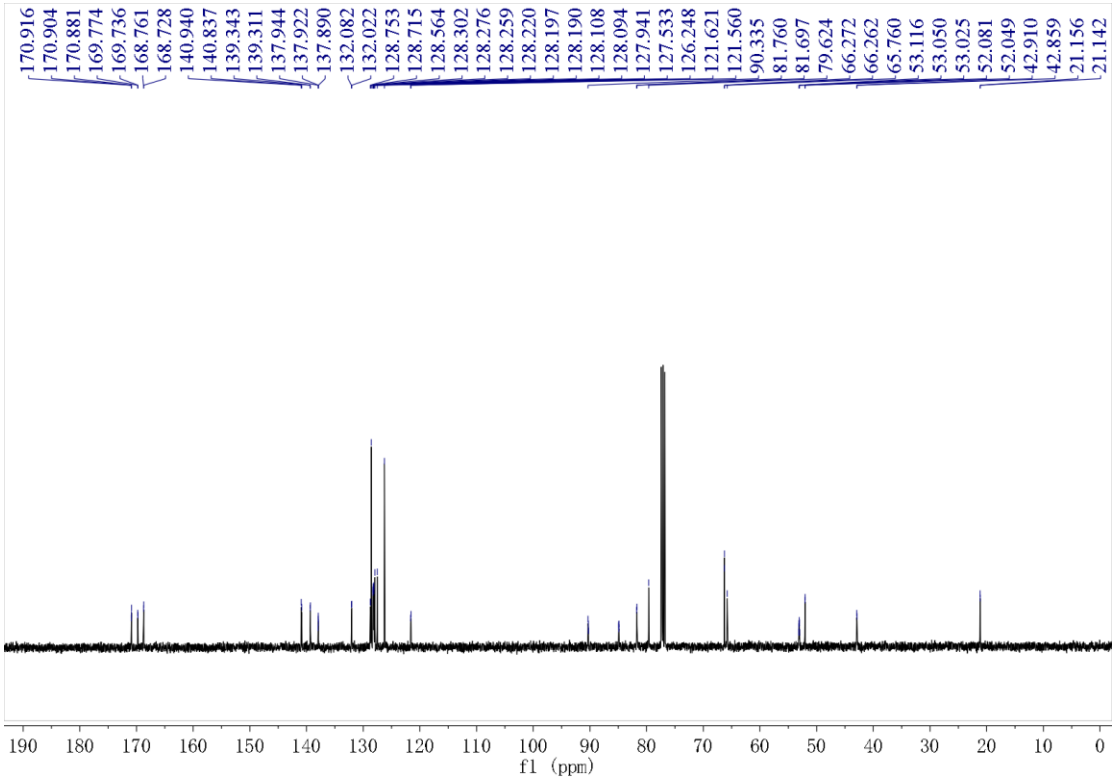
7.529
7.519
7.507
7.486
7.447
7.428
7.403
7.385
7.367
7.339
7.322
7.304
7.237
7.217
6.825
6.813
6.510
6.439
5.031
5.020
5.003
4.991
3.787
3.711
3.120
3.100
3.046
3.014
2.983
2.656
2.644
2.632
2.626
2.611
2.599
2.172
CO2Me
MeO2C
Ph
O
Ph
OAc
2.00
3.00
1.00
2.00
2.00
1.00
1.00
1.00
1.00
3.02
3.01
1.01
1.00
3.00
f1 (ppm)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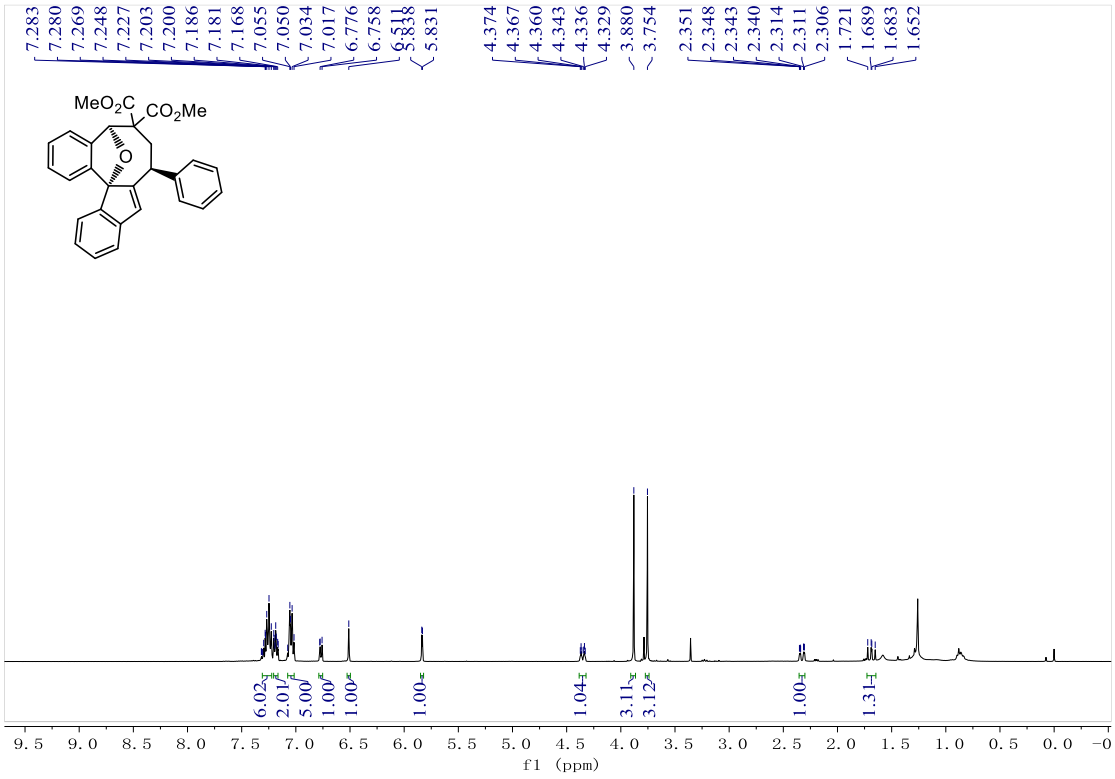
140.837
139.343
139.311
137.944
137.922
137.890
132.082
132.022
128.753
128.715
128.564
128.302
128.276
128.259
128.220
128.197
128.190
128.108
128.094
127.941
127.533
126.248
121.621
121.560
90.335
81.760
81.697
79.624
66.272
66.262
65.760
53.116
53.050
53.025
52.081
52.049
42.910
42.859
21.156
21.142
f1 (ppm)

3a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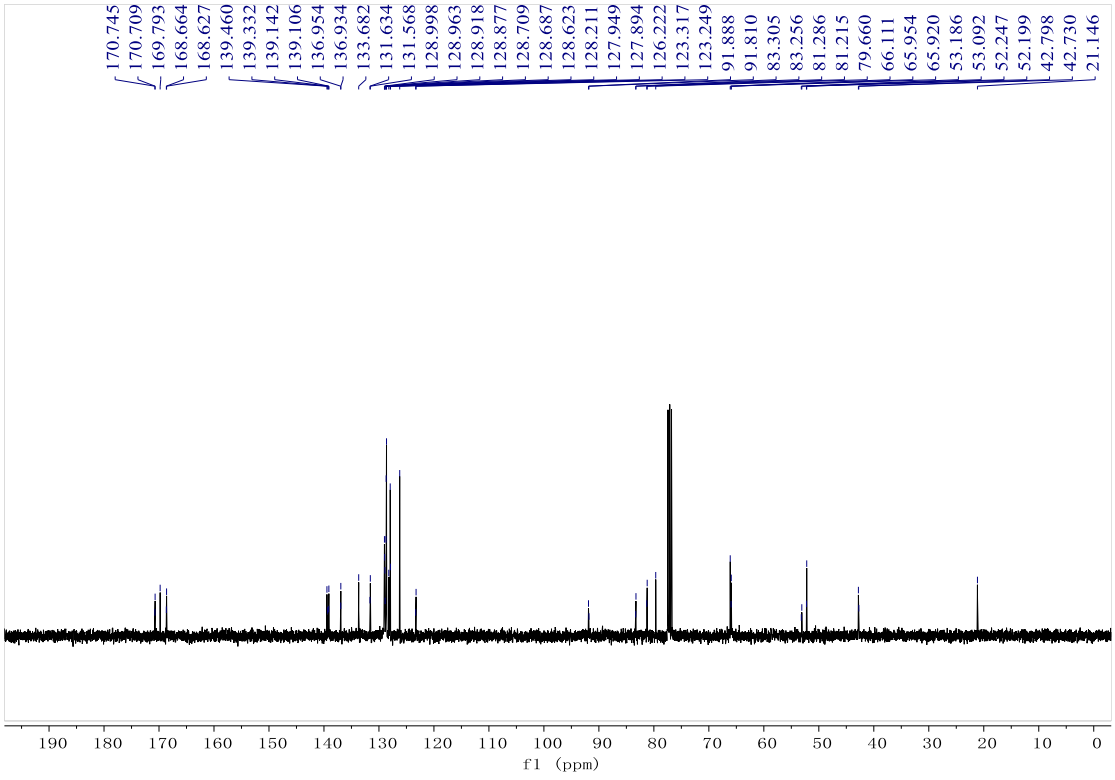
7.280
7.269
7.248
7.227
7.203
7.200
7.186
7.181
7.168
7.055
7.050
7.034
7.017
6.776
6.758
6.511
5.838
5.831
4.374
4.367
4.360
4.343
4.336
4.329
3.880
3.754
2.351
2.348
2.343
2.340
2.314
2.311
2.306
1.721
1.689
1.683
1.652
MeO2C
CO2Me
O
6.02
2.01
5.00
1.00
1.00
1.04
3.11
3.12
1.00
1.31
f1 (ppm)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169.793
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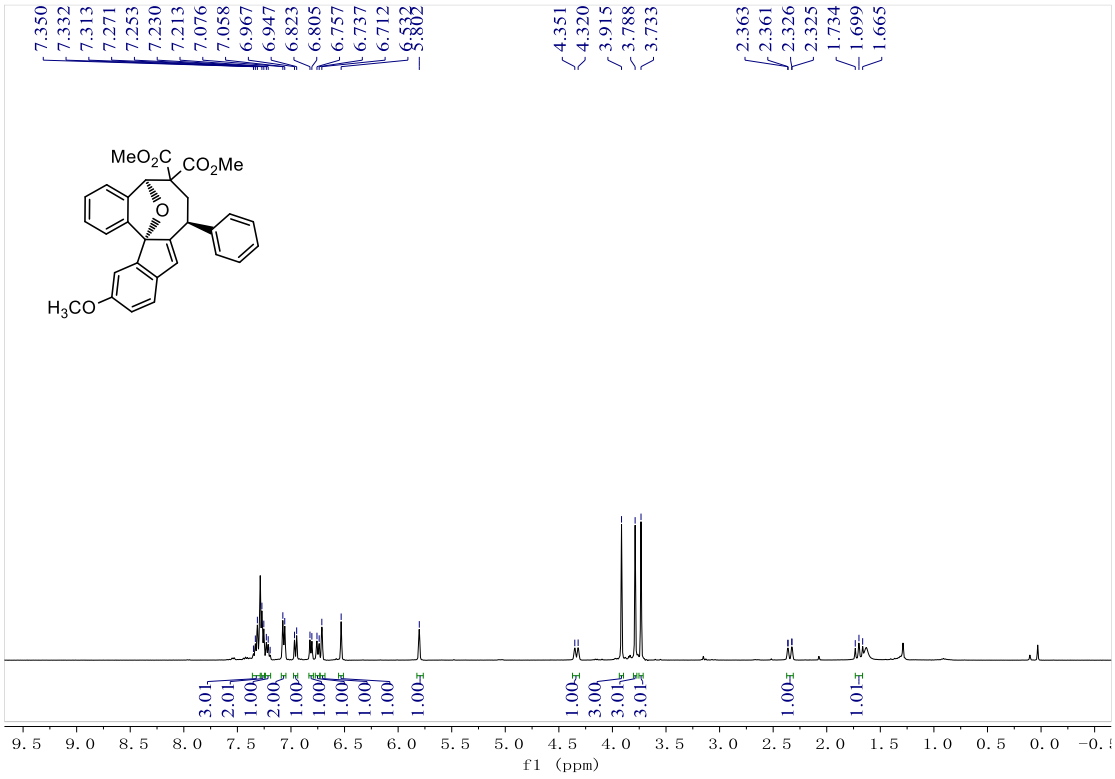
139.332
139.142
139.106
136.954
136.934
133.682
131.634
131.568
128.998
128.963
128.918
128.877
128.709
128.687
128.623
128.211
127.949
127.894
126.222
123.317
123.249
91.888
91.810
83.305
83.256
81.286
81.215
79.660
66.111
65.954
65.920
53.186
53.092
52.247
52.199
42.798
42.730
21.146
f1 (ppm)

3b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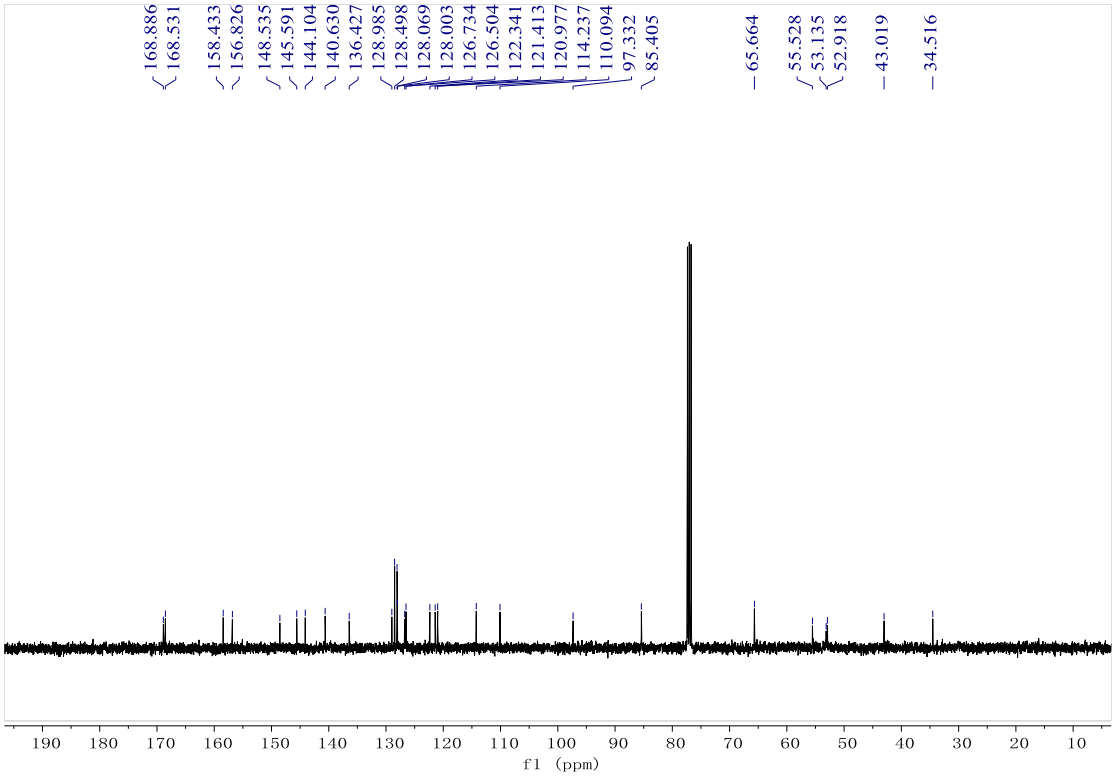
7.332
7.313
7.271
7.253
7.230
7.213
7.076
7.058
6.967
6.947
6.823
6.805
6.757
6.737
6.712
6.532
5.802
4.351
4.320
3.915
3.788
3.733
2.363
2.361
2.326
2.325
1.734
1.699
1.665
MeO2C
CO2Me
O
H3CO
3.01
2.01
1.00
2.00
1.00
1.00
1.00
1.00
1.00
1.00
3.00
3.01
3.01
1.00
1.01
f1 (ppm)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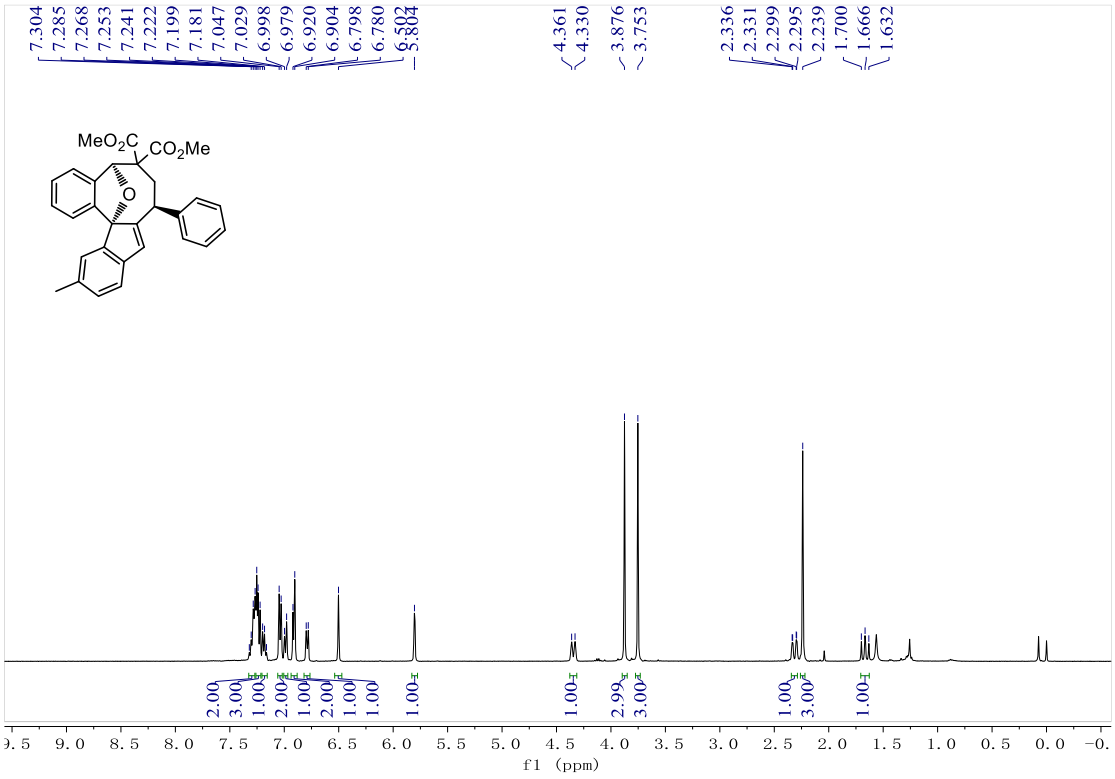
168.531
158.433
156.826
148.535
145.591
144.104
140.630
136.427
128.985
128.498
128.069
128.003
126.734
126.504
122.341
121.413
120.977
114.237
110.094
97.332
85.405
65.664
55.528
53.135
52.918
43.019
34.516
f1 (ppm)

3c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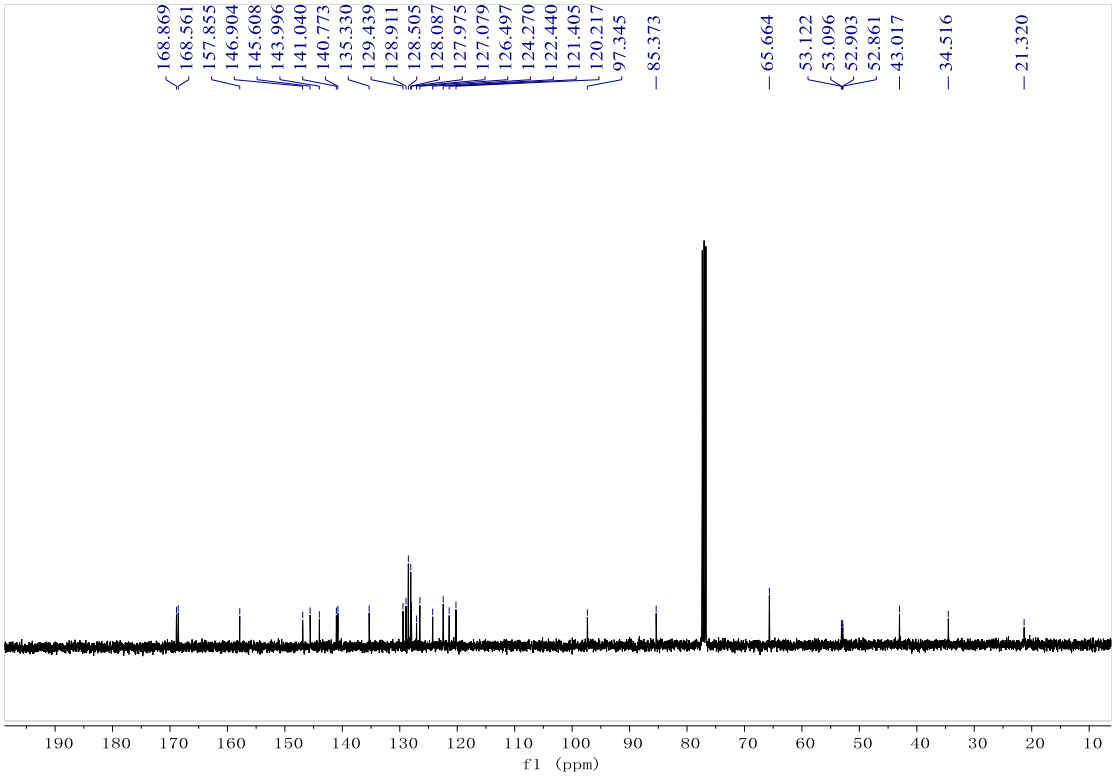
7.285
7.268
7.253
7.241
7.222
7.199
7.181
7.047
7.029
6.998
6.979
6.920
6.904
6.798
6.780
5.804
4.361
4.330
3.876
3.753
2.336
2.331
2.299
2.295
2.239
1.700
1.666
1.632
MeO2C
CO2Me
O
2.00
3.00
1.00
2.00
1.00
2.00
1.00
1.00
1.00
1.00
2.99
3.00
1.00
3.00
1.00
f1 (ppm)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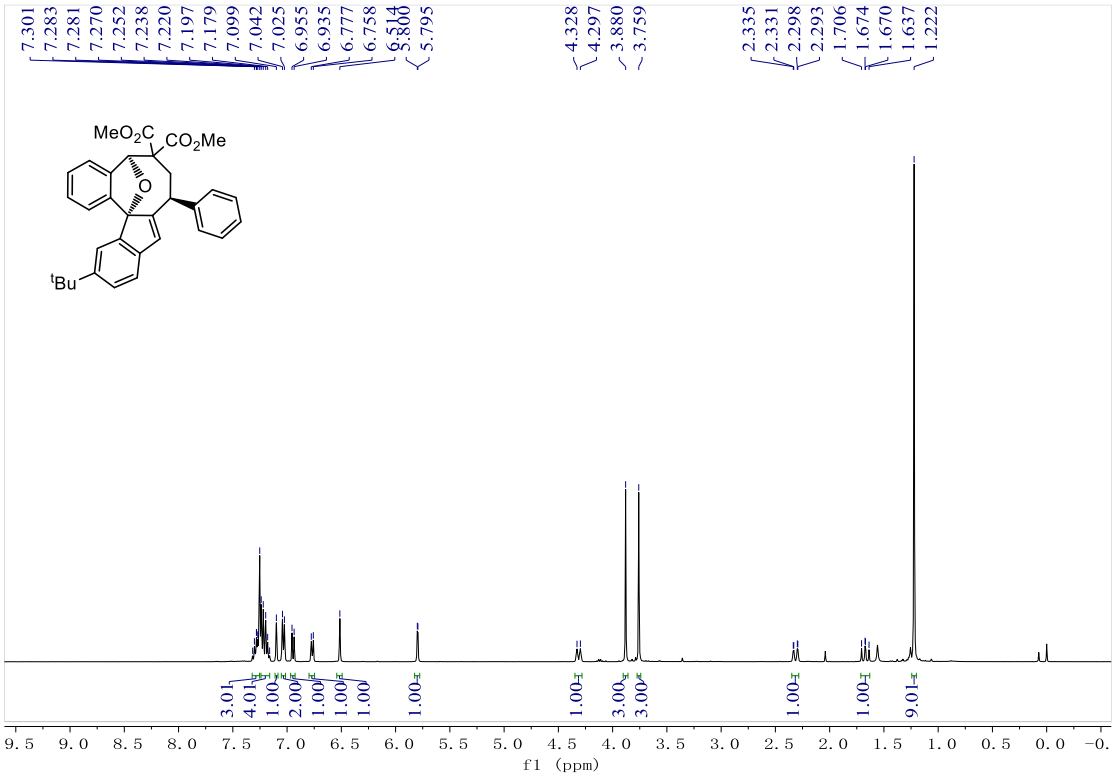
168.561
157.855
146.904
145.608
143.996
141.040
140.773
135.330
129.439
128.911
128.505
128.087
127.975
127.079
126.497
124.270
122.440
121.405
120.217
97.345
85.373
65.664
53.122
53.096
52.903
52.861
43.017
34.516
21.320
f1 (ppm)

3d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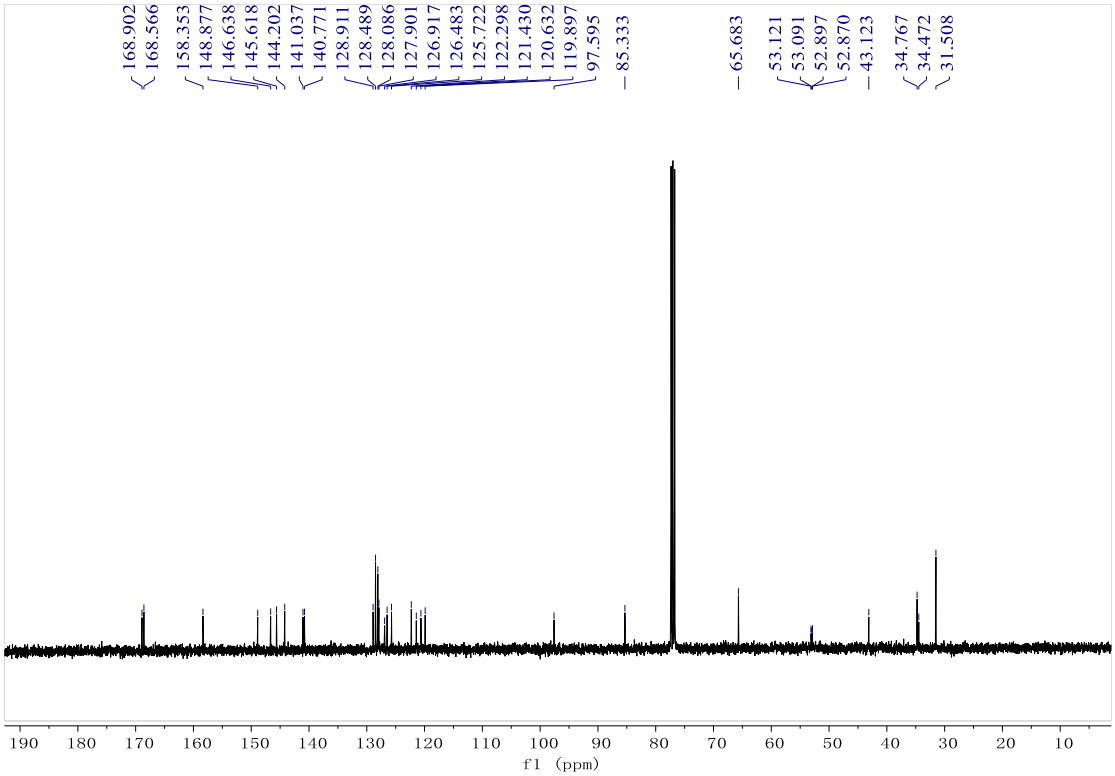
7.283
7.281
7.270
7.252
7.238
7.220
7.197
7.179
7.099
7.042
7.025
6.955
6.935
6.777
6.758
6.514
5.800
5.795
4.328
4.297
3.880
3.759
2.335
2.331
2.298
2.293
1.706
1.674
1.670
1.637
1.222
MeO2C
CO2Me
O
tBu
3.01
4.01
1.00
2.00
1.00
1.00
1.00
1.00
1.00
3.00
3.00
1.00
1.00
9.01
f1 (ppm)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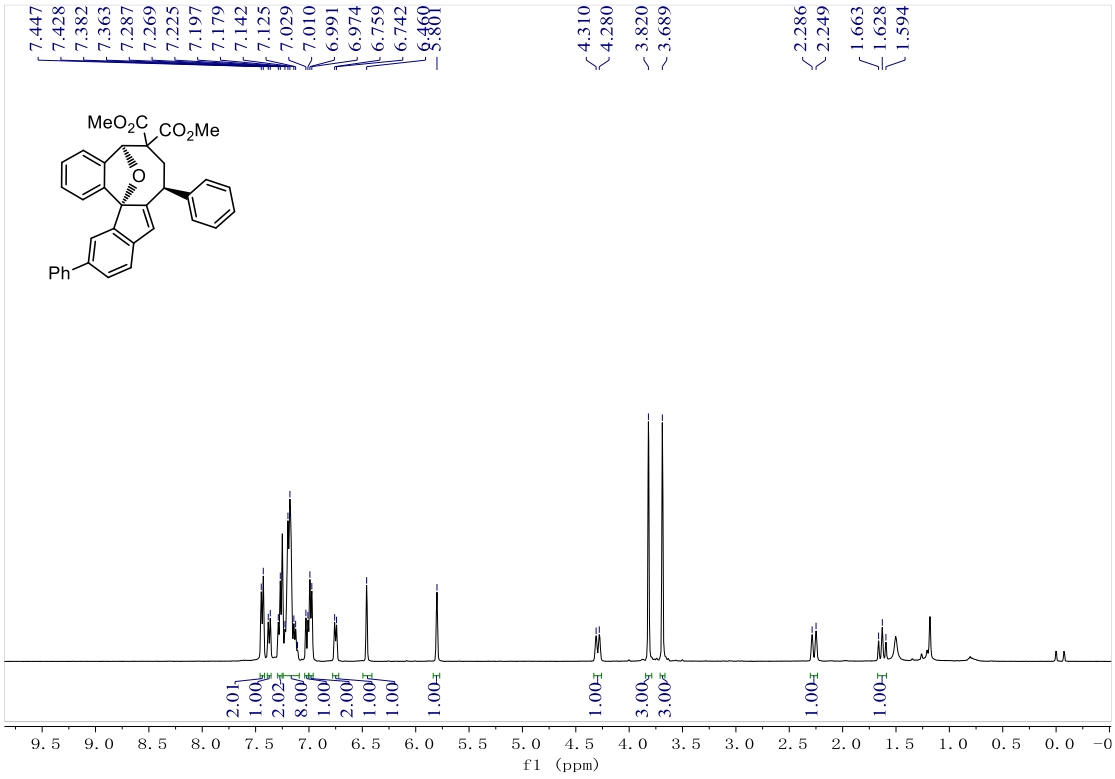
168.566
158.353
148.877
146.638
145.618
144.202
141.037
140.771
128.911
128.489
128.086
127.901
126.917
126.483
125.722
122.298
121.430
120.632
119.897
97.595
85.333
65.683
53.121
53.091
52.897
52.870
43.123
34.767
34.472
31.508
f1 (ppm)

3e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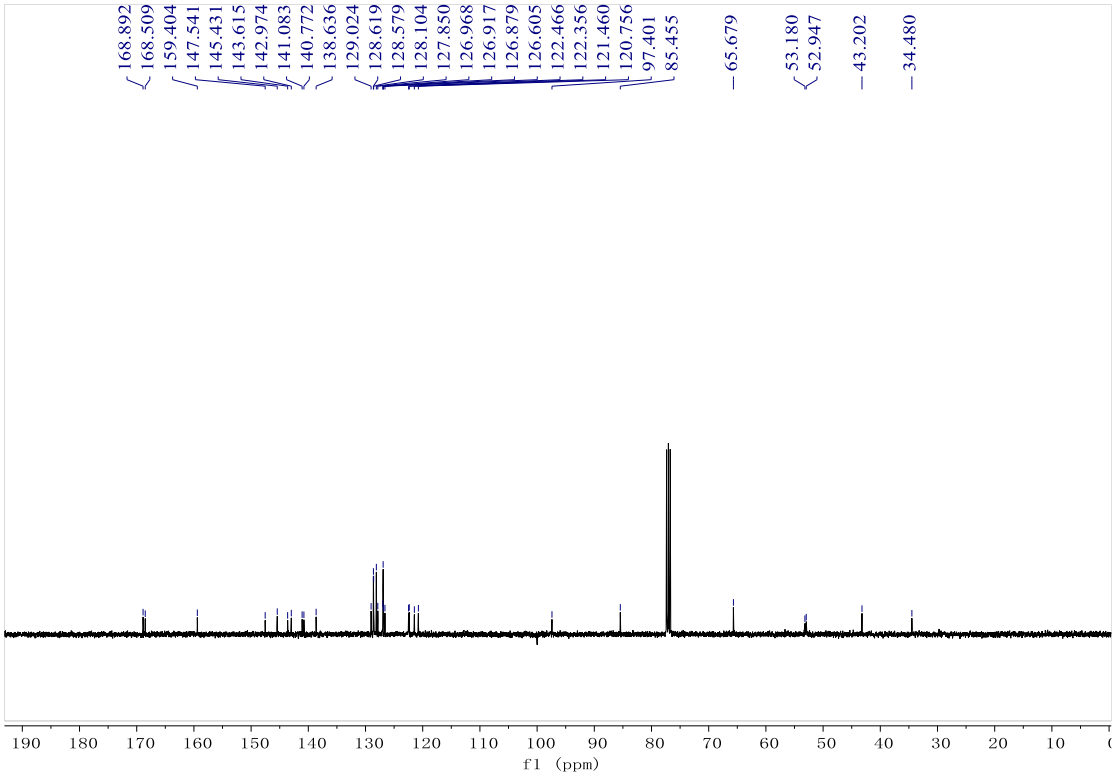
7.428
7.382
7.363
7.287
7.269
7.225
7.197
7.179
7.142
7.125
7.029
7.010
6.991
6.974
6.759
6.742
6.460
5.801
4.310
4.280
3.820
3.689
2.286
2.249
1.663
1.628
1.594
MeO2C
CO2Me
O
Ph
2.01
1.00
2.02
8.00
1.00
2.00
1.00
1.00
1.00
3.00
3.00
1.00
1.00
f1 (ppm)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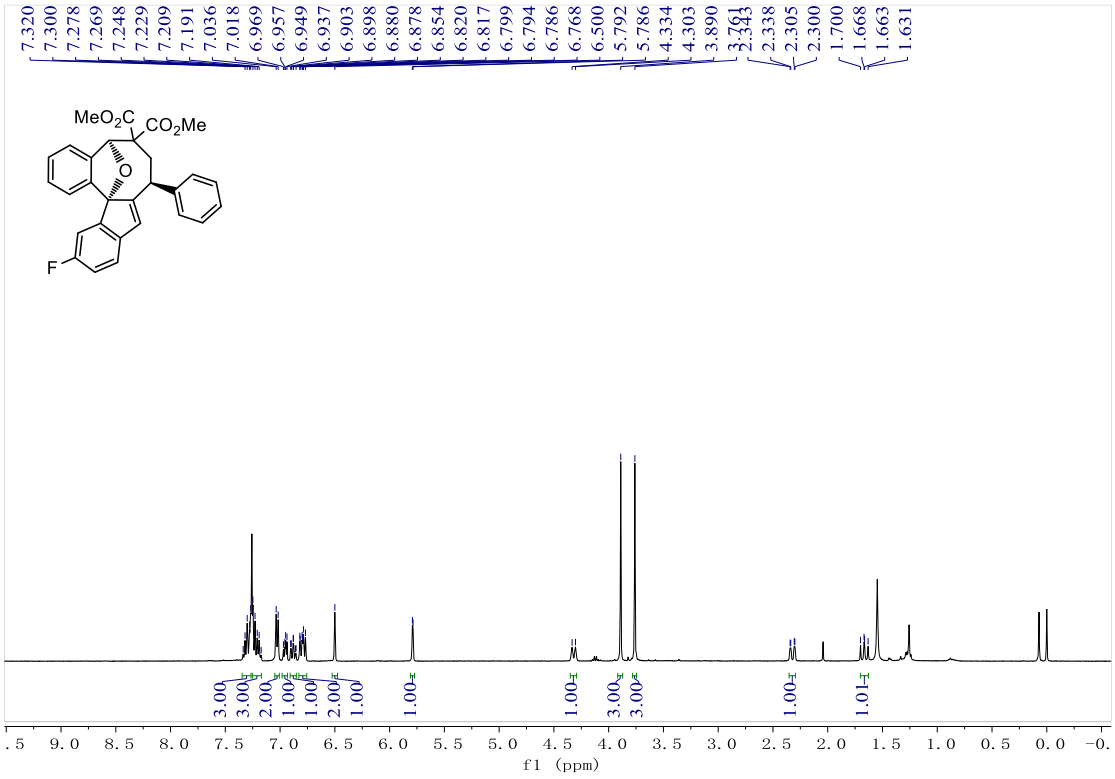
143.615
142.974
141.083
140.772
138.636
129.024
128.619
128.579
128.104
127.850
126.968
126.917
126.879
126.605
122.466
122.356
121.460
120.756
97.401
85.455
65.679
53.180
52.947
43.202
34.480
f1 (ppm)

3f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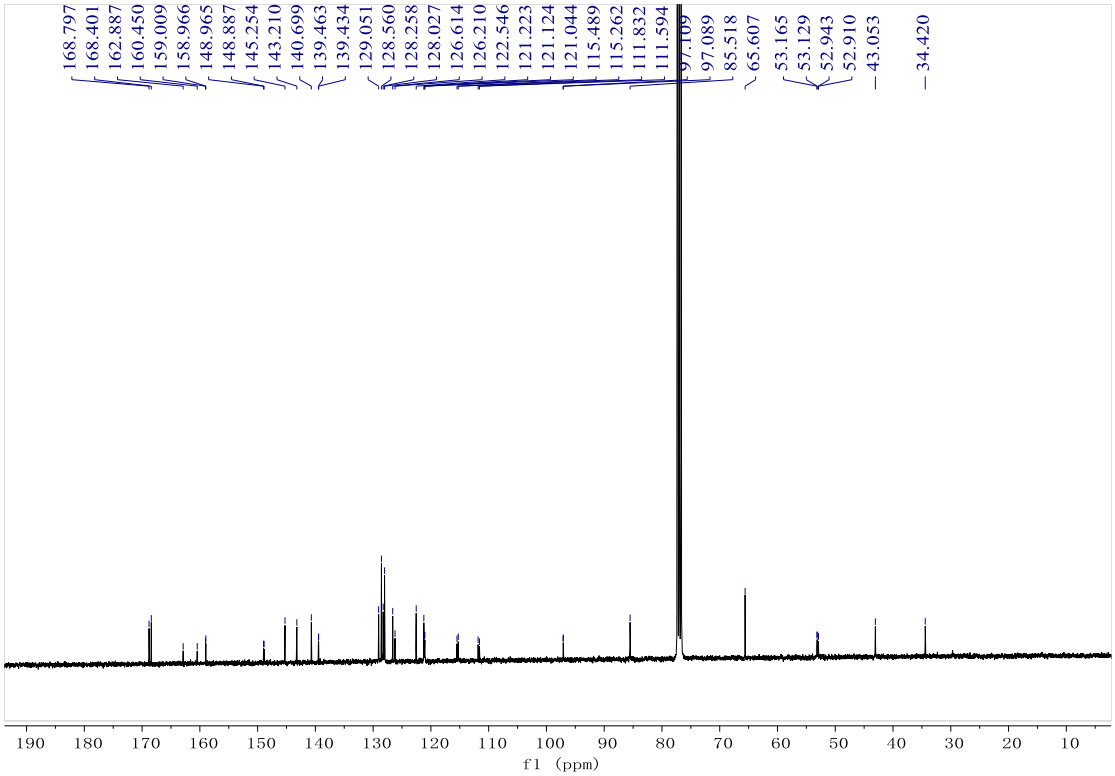
7.300
7.278
7.269
7.248
7.229
7.209
7.191
7.036
7.018
6.969
6.957
6.949
6.937
6.903
6.898
6.880
6.878
6.854
6.820
6.817
6.799
6.794
6.786
6.768
6.500
5.792
5.786
4.334
4.303
3.890
2.343
2.338
2.305
2.300
1.700
1.668
1.663
1.631
MeO2C
CO2Me
O
F
3.00
3.00
2.00
1.00
1.00
2.00
1.00
1.00
1.00
3.00
3.00
1.00
1.01
f1 (ppm)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168.401
162.887
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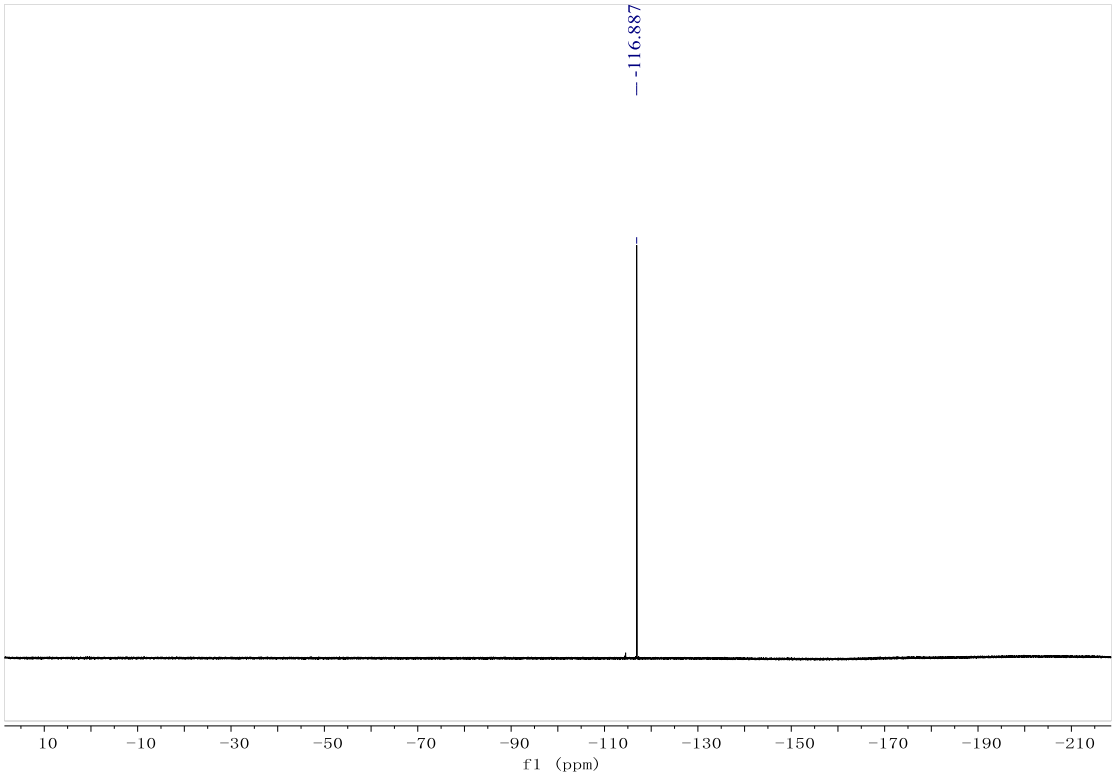
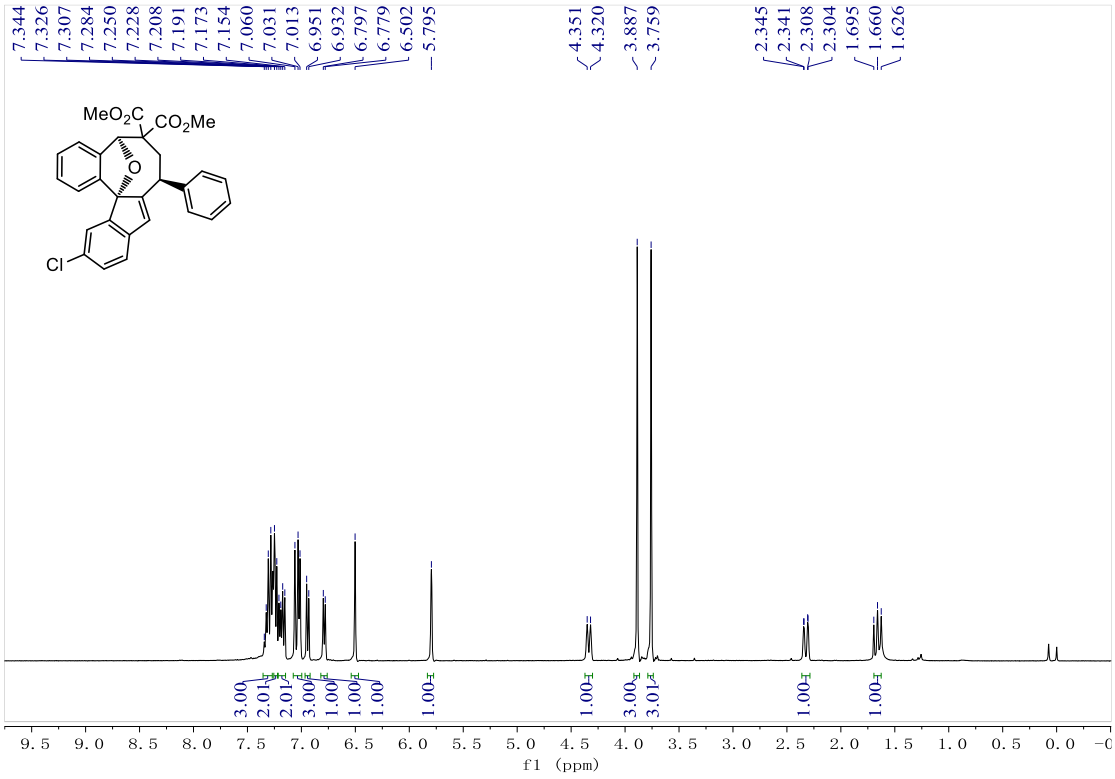
159.009
158.966
148.965
148.887
145.254
143.210
140.699
139.463
139.434
129.051
128.560
128.258
128.027
126.614
126.210
122.546
121.223
121.124
121.044
115.489
115.262
111.832
111.594
97.109
97.089
85.518
65.607
53.165
53.129
52.943
52.910
43.053
34.420
f1 (ppm)


-116.887
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

3g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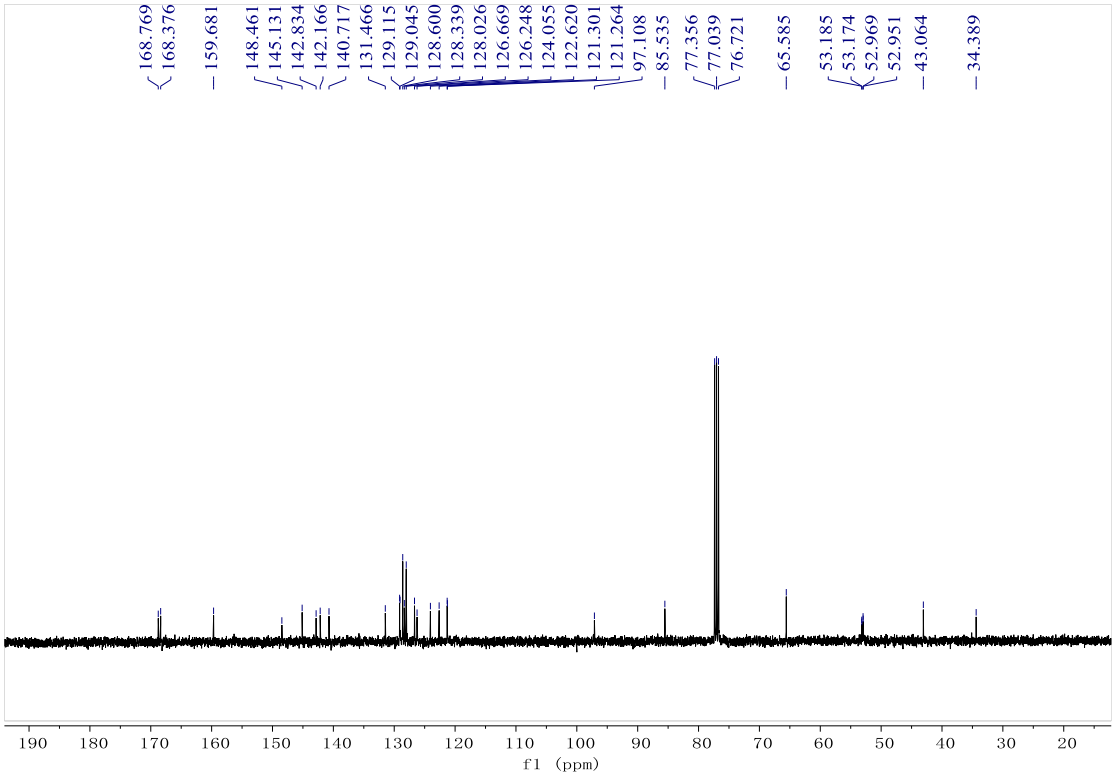
7.326
7.307
7.284
7.250
7.228
7.208
7.191
7.173
7.154
7.060
7.031
7.013
6.951
6.932
6.797
6.779
6.502
5.795
4.351
4.320
3.887
3.759
2.345
2.341
2.308
2.304
1.695
1.660
1.626
MeO2C
CO2Me
O
Cl
3.00
2.01
2.01
3.00
1.00
1.00
1.00
1.00
1.00
3.00
3.01
1.00
1.00
f1 (ppm)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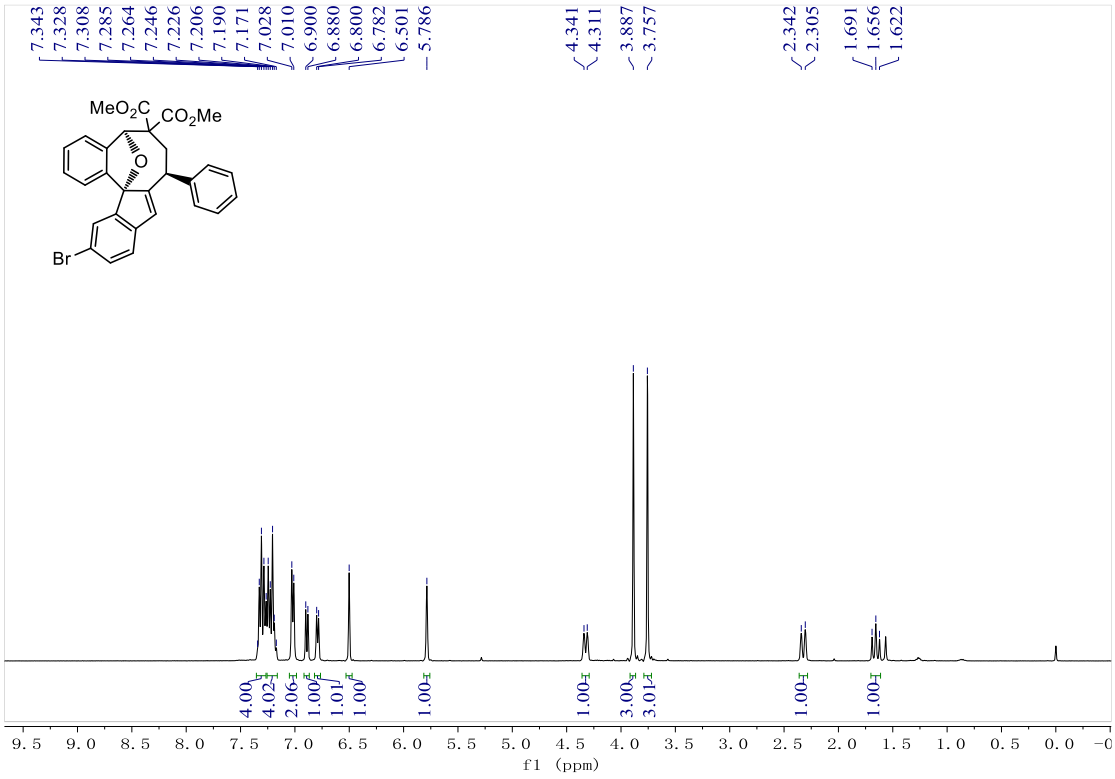
159.681
148.461
145.131
142.834
142.166
140.717
131.466
129.115
129.045
128.600
128.339
128.026
126.669
126.248
124.055
122.620
121.301
121.264
97.108
85.535
77.356
77.039
76.721
65.585
53.185
53.174
52.969
52.951
43.064
34.389
f1 (ppm)

3h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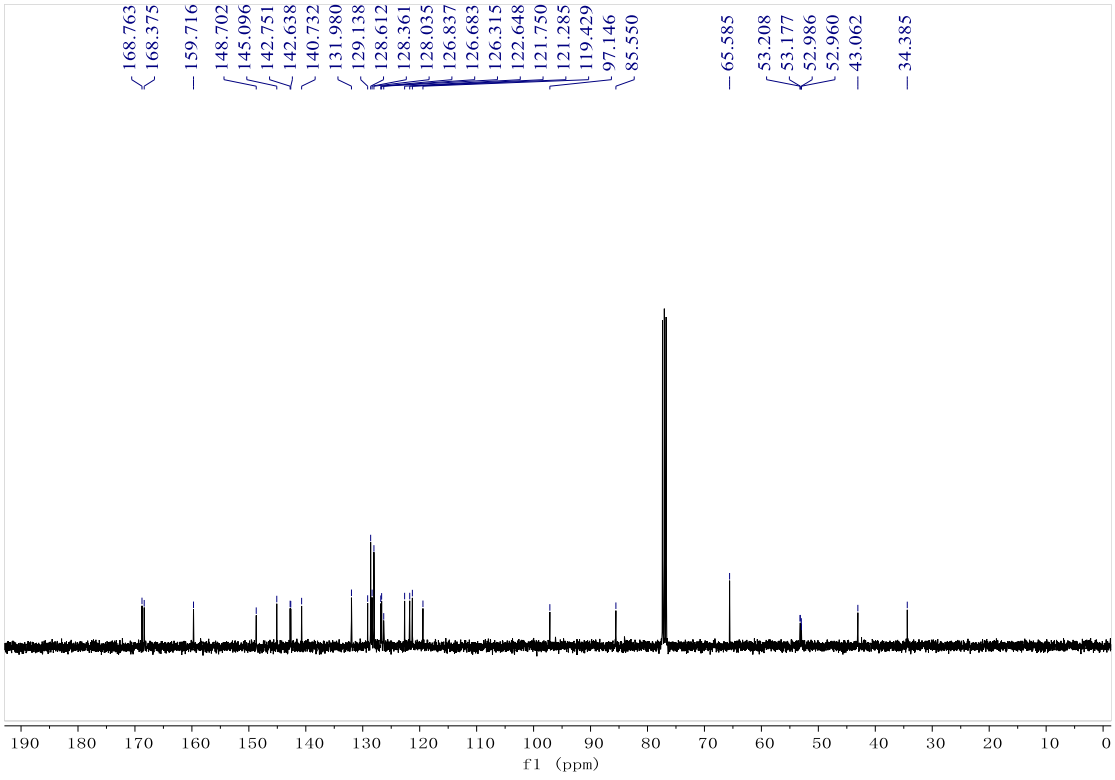
7.308
7.285
7.264
7.246
7.226
7.206
7.190
7.171
7.028
7.010
6.900
6.880
6.800
6.782
6.501
5.786
4.341
4.311
3.887
3.757
2.342
2.305
1.691
1.656
1.622
MeO2C
CO2Me
O
Br
4.00
4.02
2.06
1.00
1.01
1.00
1.00
1.00
3.00
3.01
1.00
1.00
f1 (ppm)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142.751
142.638
140.732
131.980
129.138
128.612
128.361
128.035
126.837
126.683
126.315
122.648
121.750
121.285
119.429
97.146
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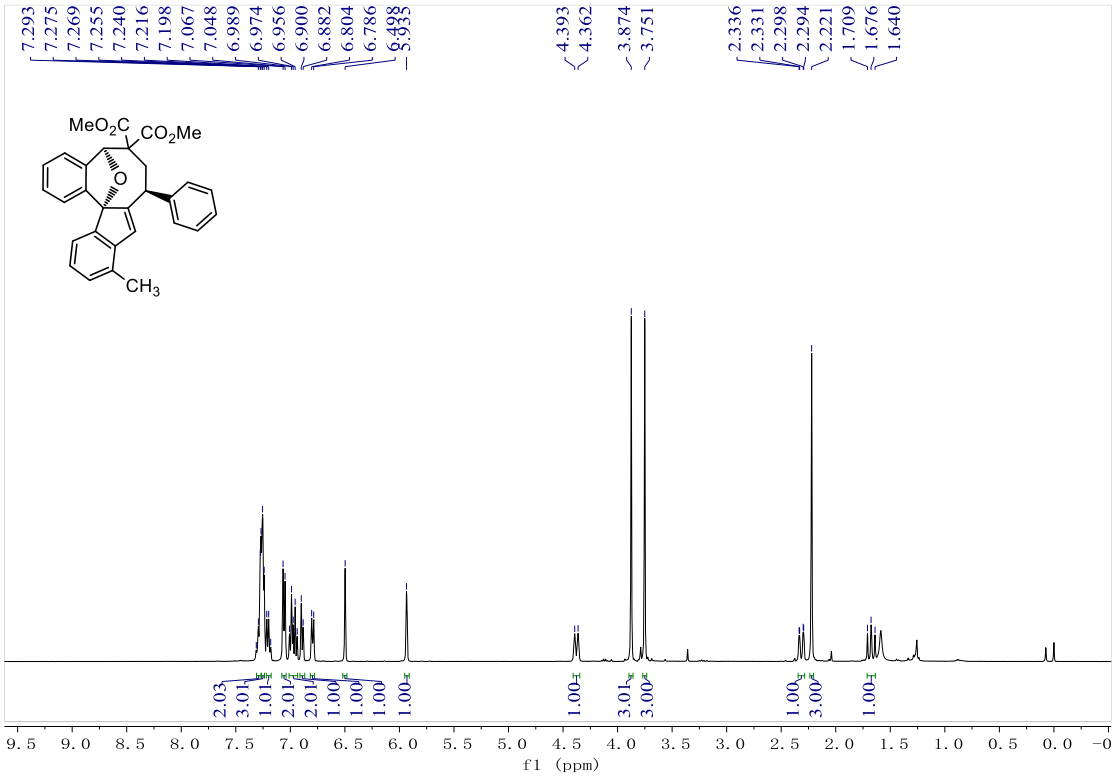
65.585
53.208
53.177
52.986
52.960
43.062
34.385
f1 (ppm)

3i


7.293
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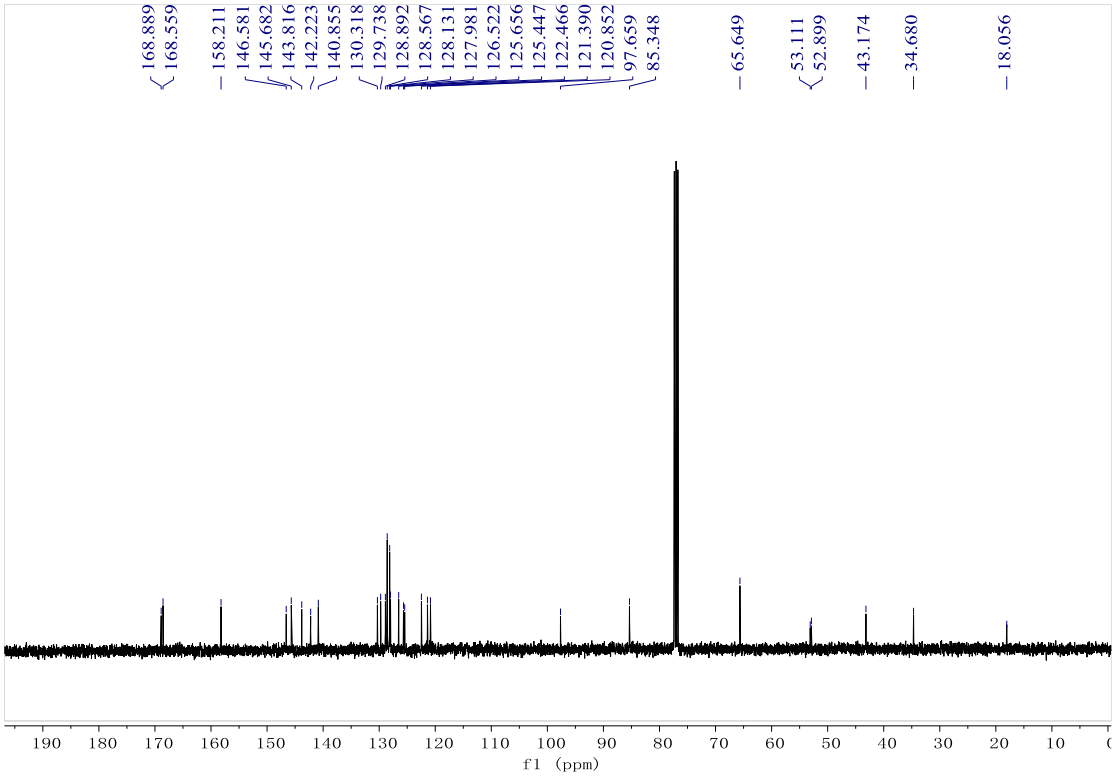
7.255
7.240
7.216
7.198
7.067
7.048
6.989
6.974
6.956
6.900
6.882
6.804
6.786
6.498
5.933
4.393
4.362
3.874
3.751
2.336
2.331
2.298
2.294
2.221
1.709
1.676
1.640
MeO2C
CO2Me
O
CH3
2.03
3.01
1.01
2.01
2.01
1.00
1.00
1.00
1.00
3.01
3.00
1.00
3.00
1.00
f1 (ppm)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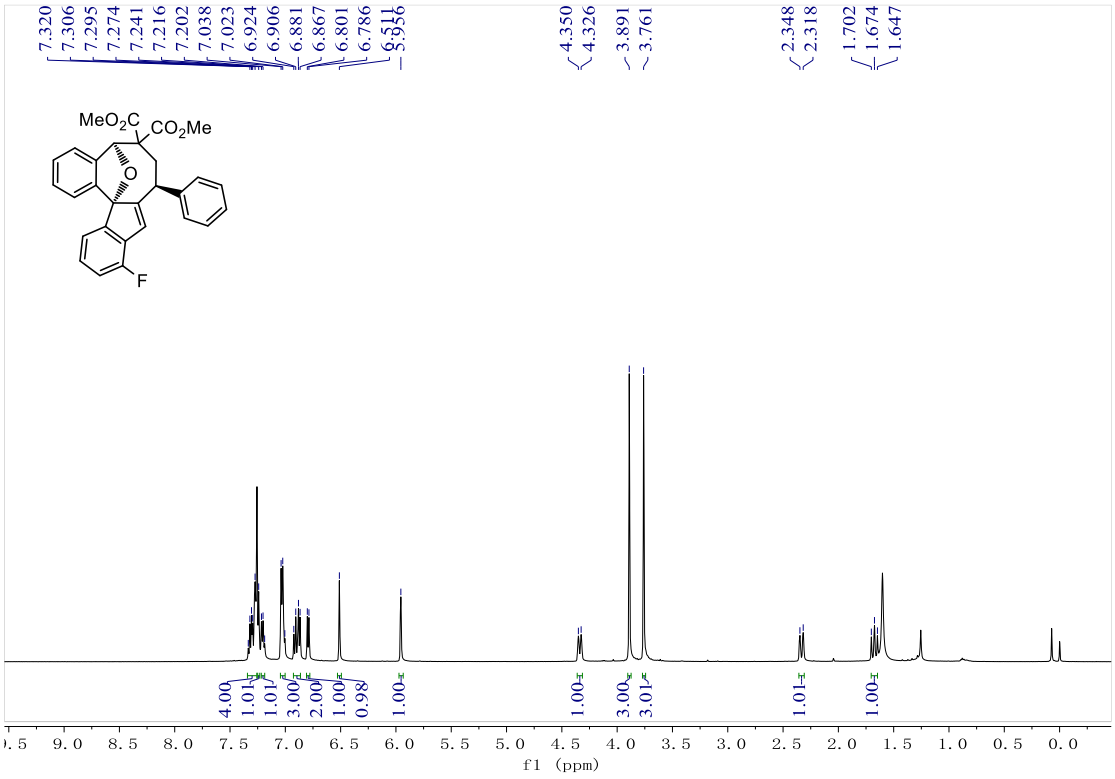
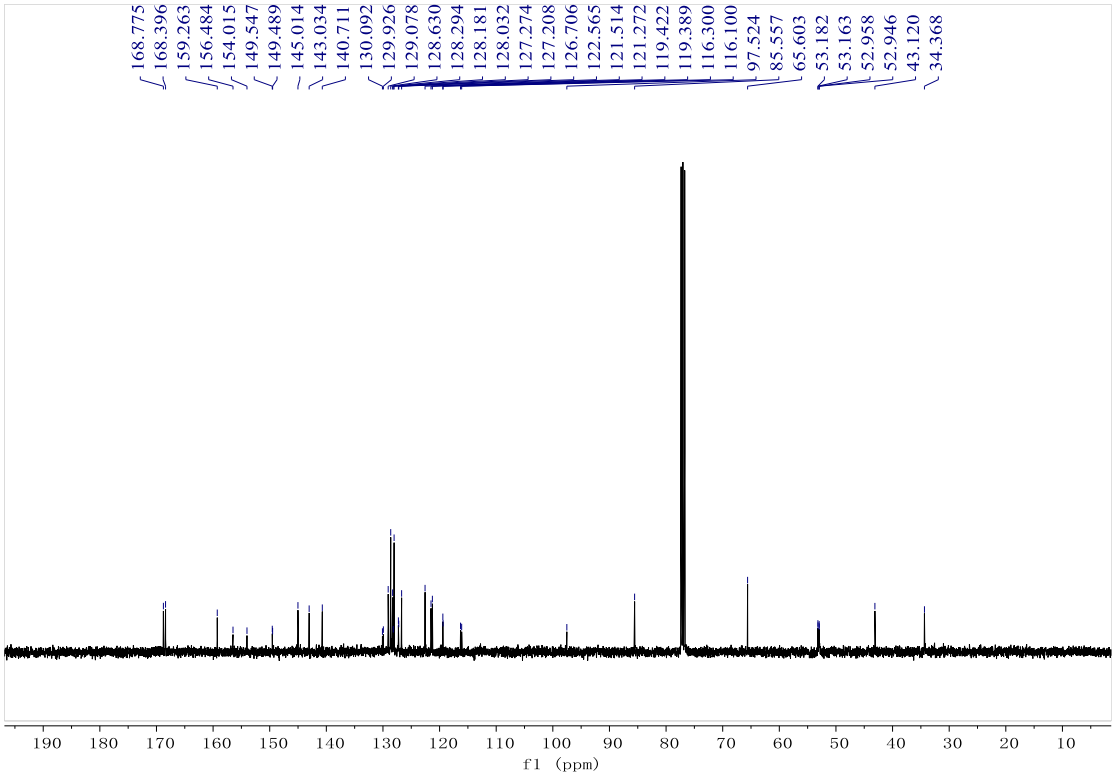
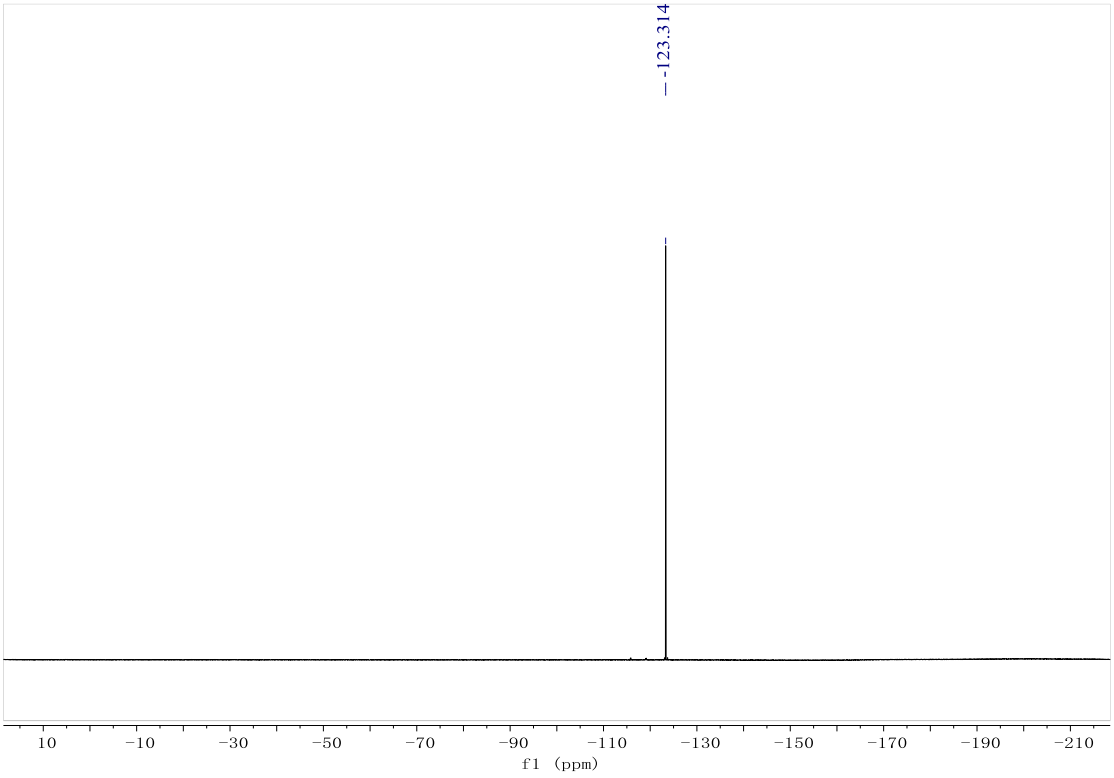
146.581
145.682
143.816
142.223
140.855
130.318
129.738
128.892
128.567
128.131
127.981
126.522
125.656
125.447
122.466
121.390
120.852
97.659
85.348
65.649
53.111
52.899
43.174
34.680
18.056
f1 (ppm)

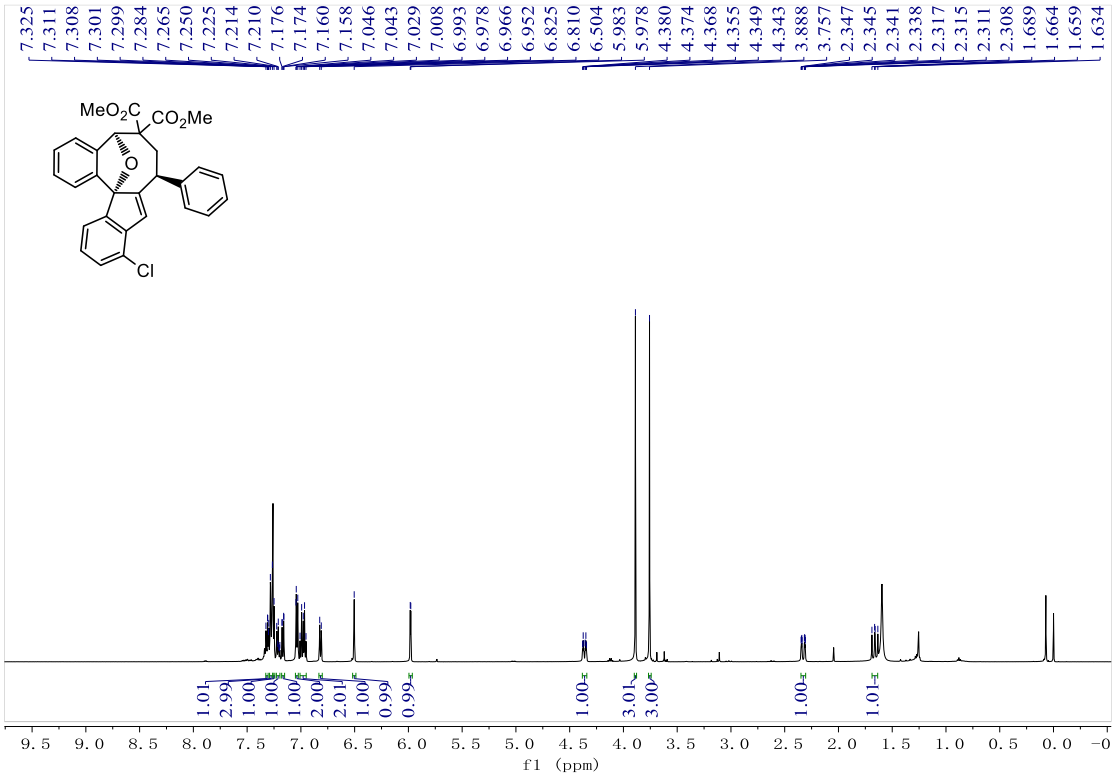
3j


7.320
7.306
7.295
7.274
7.241
7.216
7.202
7.038
7.023
6.924
6.906
6.881
6.867
6.801
6.786
6.511
5.956
4.350
4.326
3.891
3.761
2.348
2.318
1.702
1.674
1.647
MeO2C
CO2Me
O
F
4.00
1.01
1.01
3.00
2.00
1.00
0.98
1.00
1.00
3.00
3.01
1.01
1.00
f1 (ppm)


168.775
168.396
159.263
156.484
154.015
149.547
149.489
145.014
143.034
140.711
130.092
129.926
129.078
128.630
128.294
128.181
128.032
127.274
127.208
126.706
122.565
121.514
121.272
119.422
119.389
116.300
116.100
97.524
85.557
65.603
53.182
53.163
52.958
52.946
43.120
34.368
f1 (ppm)


-123.314
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

3k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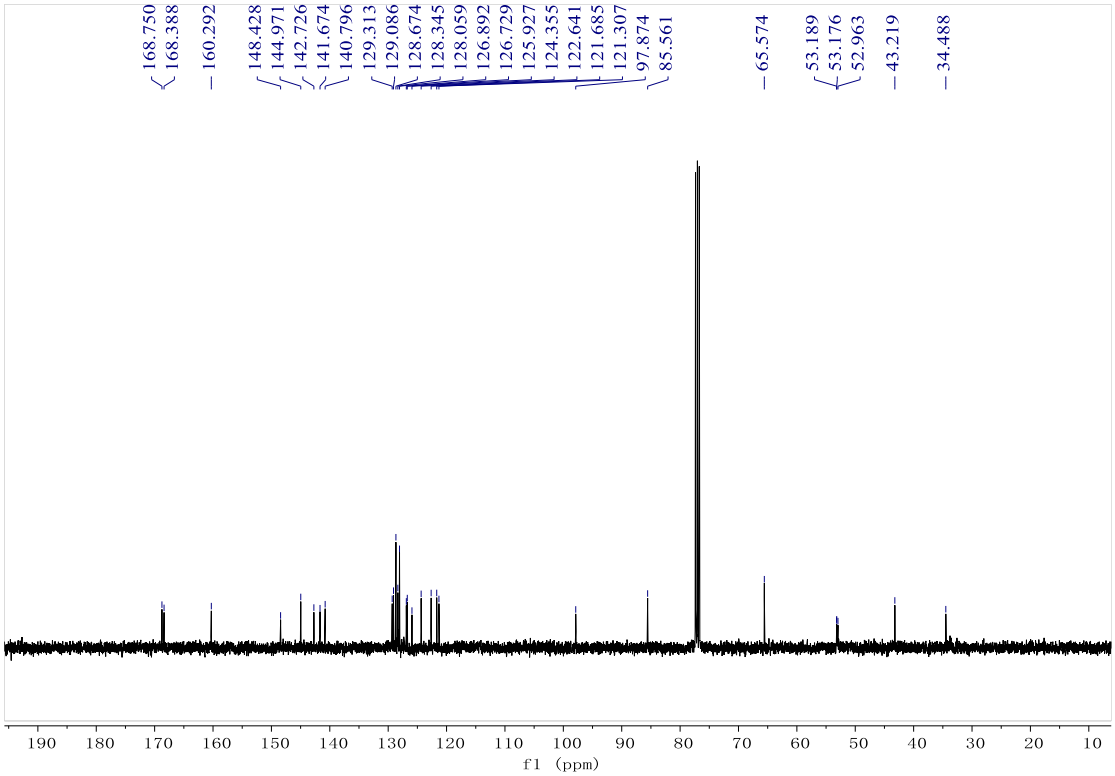
7.311
7.308
7.301
7.299
7.284
7.265
7.250
7.225
7.214
7.210
7.176
7.174
7.160
7.158
7.046
7.043
7.029
7.008
6.993
6.978
6.966
6.952
6.825
6.810
6.504
5.983
5.978
4.380
4.374
4.368
4.355
4.349
4.343
3.888
3.757
2.347
2.345
2.341
2.338
2.317
2.315
2.311
2.308
1.689
1.664
1.659
1.634
MeO2C
CO2Me
O
Cl
1.01
2.99
1.00
1.00
1.00
2.00
2.01
1.00
0.99
0.99
1.00
3.01
3.00
1.00
1.01
f1 (ppm)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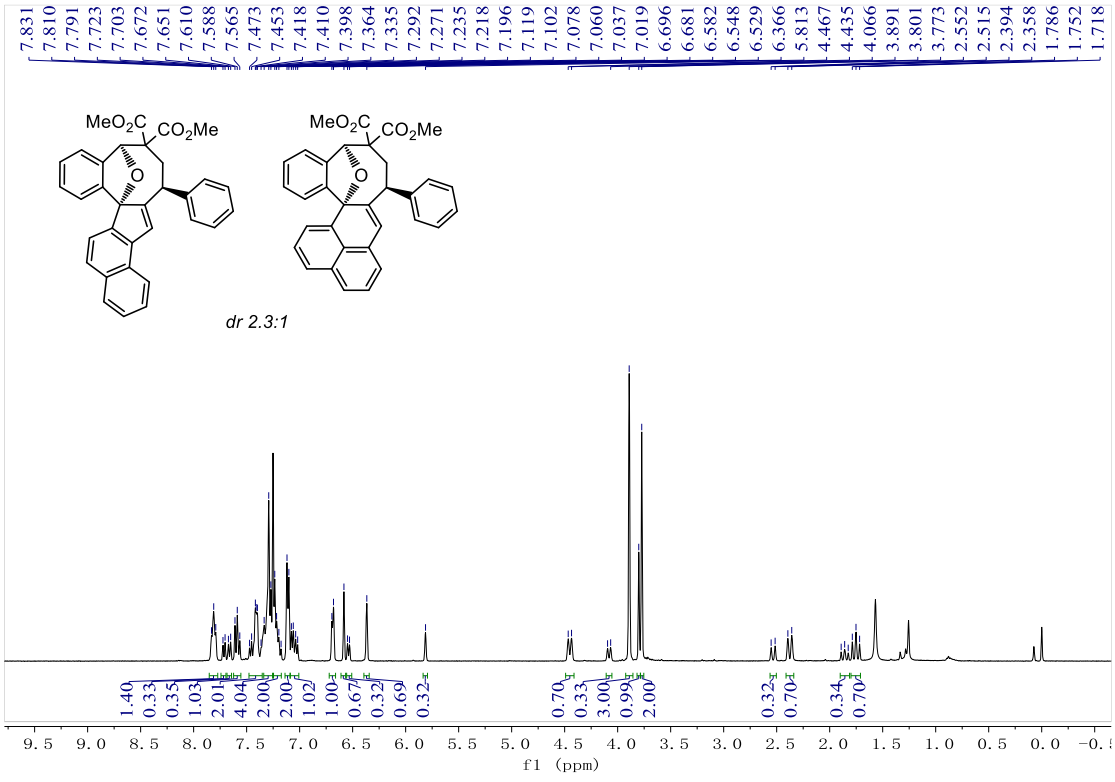
144.971
142.726
141.674
140.796
129.313
129.086
128.674
128.345
128.059
126.892
126.729
125.927
124.355
122.641
121.685
121.307
97.874
85.561
65.574
53.189
53.176
52.963
43.219
34.488
f1 (ppm)

3l and **3l'**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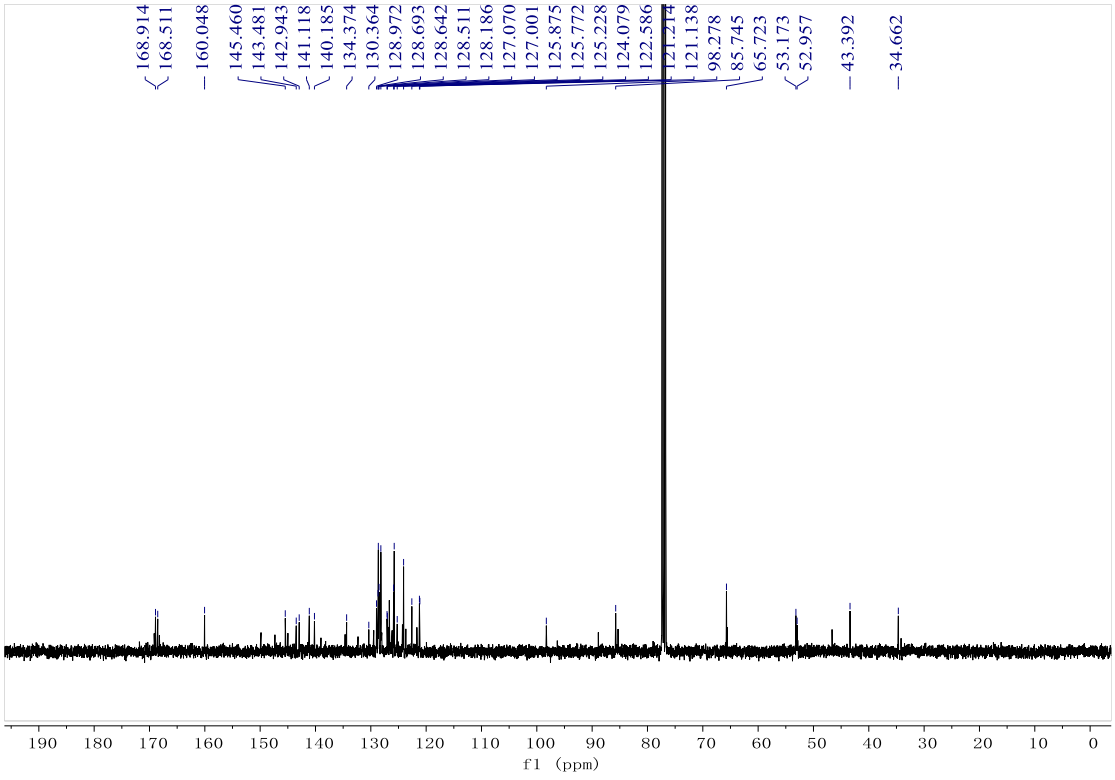
7.810
7.791
7.723
7.703
7.672
7.651
7.610
7.588
7.565
7.473
7.453
7.418
7.410
7.398
7.364
7.335
7.292
7.271
7.235
7.218
7.196
7.119
7.102
7.078
7.060
7.037
7.019
6.696
6.681
6.582
6.548
6.529
6.366
5.813
4.467
4.435
4.066
3.891
3.801
3.773
2.552
2.515
2.394
2.358
1.786
1.752
1.718
MeO2C
CO2Me
O
MeO2C
CO2Me
O
dr 2.3:1
1.40
0.33
0.35
1.03
2.01
4.04
2.00
2.00
1.02
1.00
0.67
0.32
0.69
0.32
0.70
0.33
3.00
0.99
2.00
0.32
0.70
0.34
0.70
f1 (ppm)


168.914
168.511
160.048
145.460
143.481
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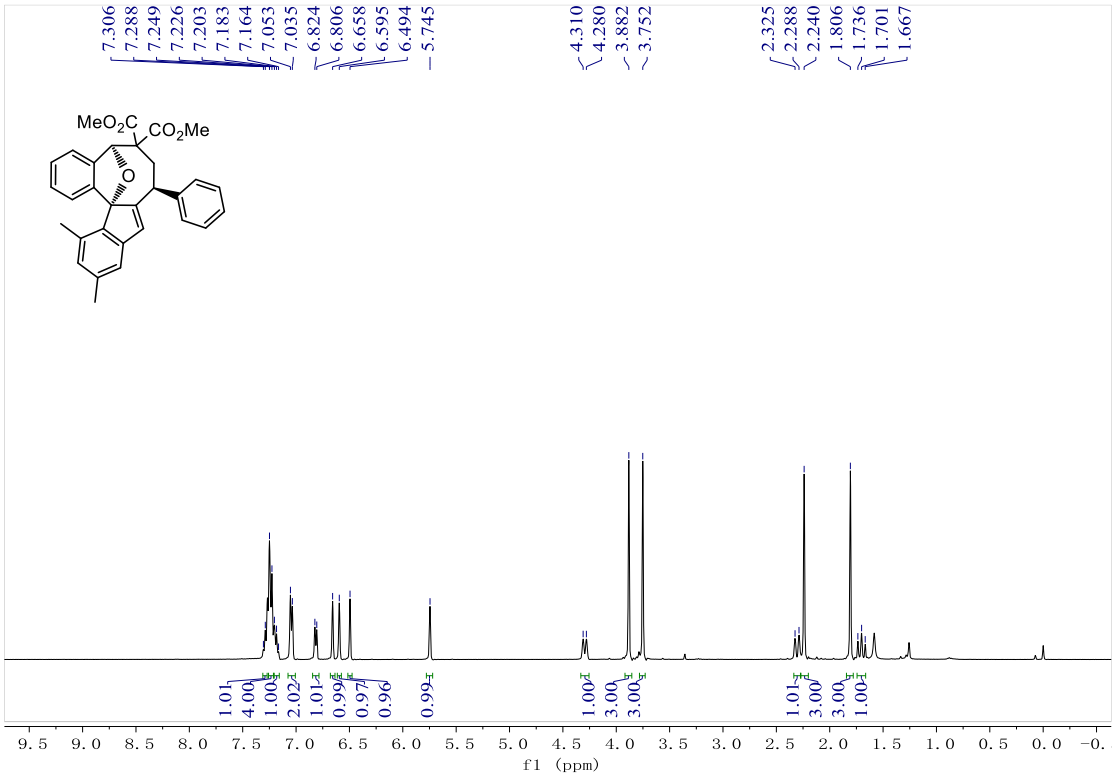
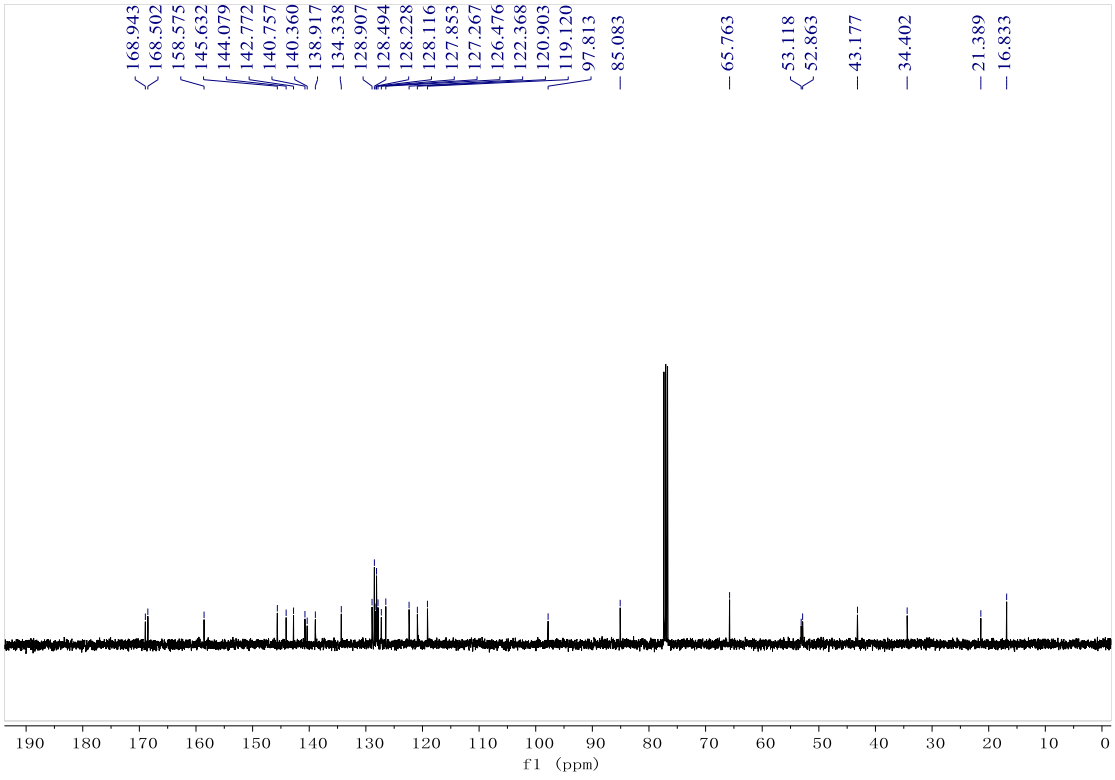
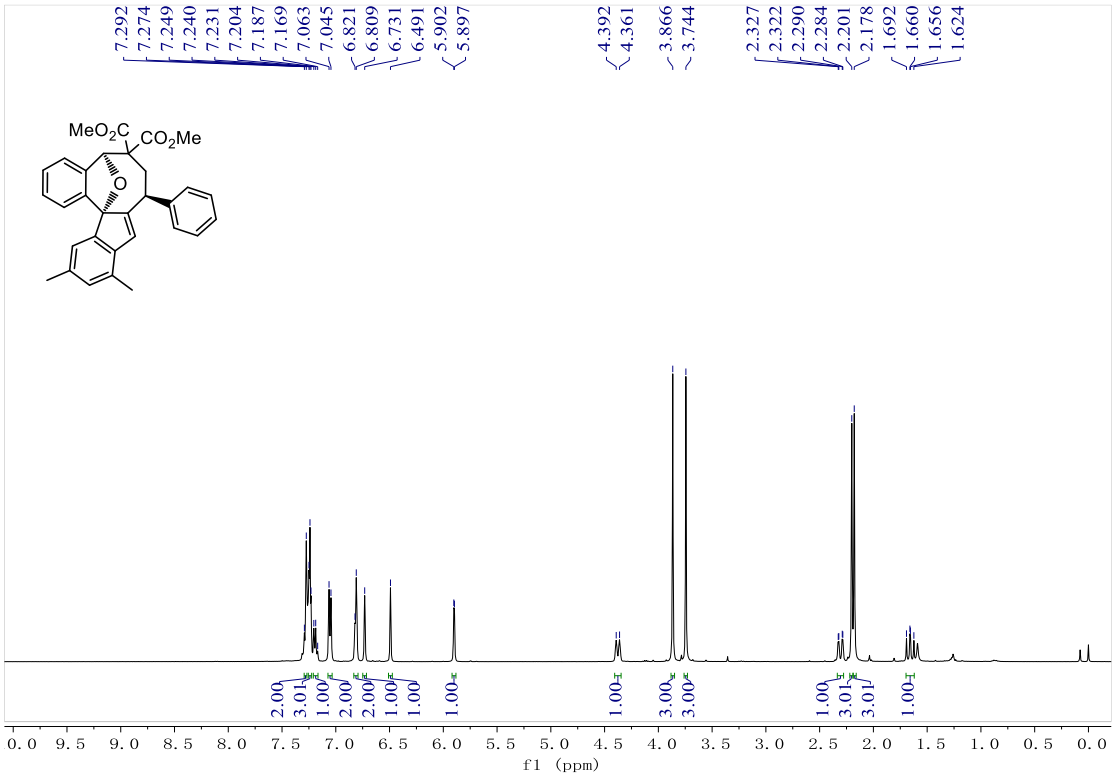
141.118
140.185
134.374
130.364
128.972
128.693
128.642
128.511
128.186
127.070
127.001
125.875
125.772
125.228
124.079
122.586
121.214
121.138
98.278
85.745
65.723
53.173
52.957
43.392
34.662
f1 (ppm)

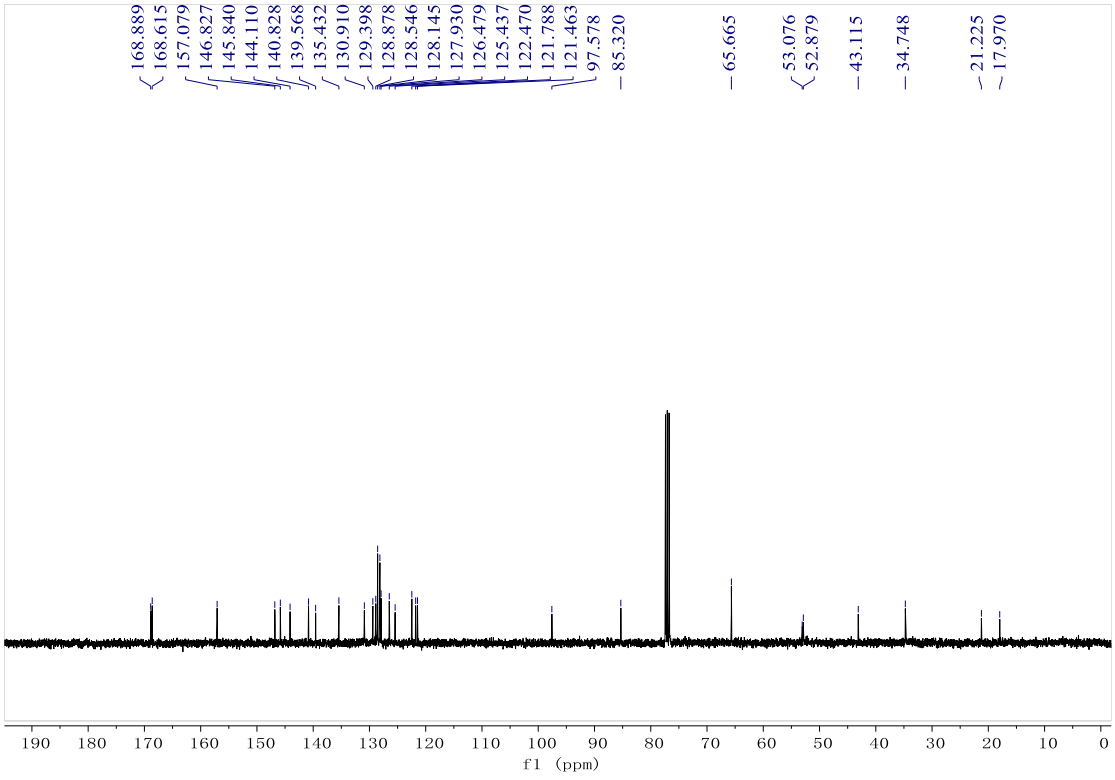
3m


7.306
7.288
7.249
7.226
7.203
7.183
7.164
7.053
7.035
6.824
6.806
6.658
6.595
6.494
5.745
4.310
4.280
3.882
3.752
2.325
2.288
2.240
1.806
1.736
1.701
1.667
MeO2C
CO2Me
O
1.01
4.00
1.00
2.02
1.01
0.99
0.97
0.96
0.99
1.00
3.00
3.00
1.01
3.00
3.00
1.00
f1 (ppm)

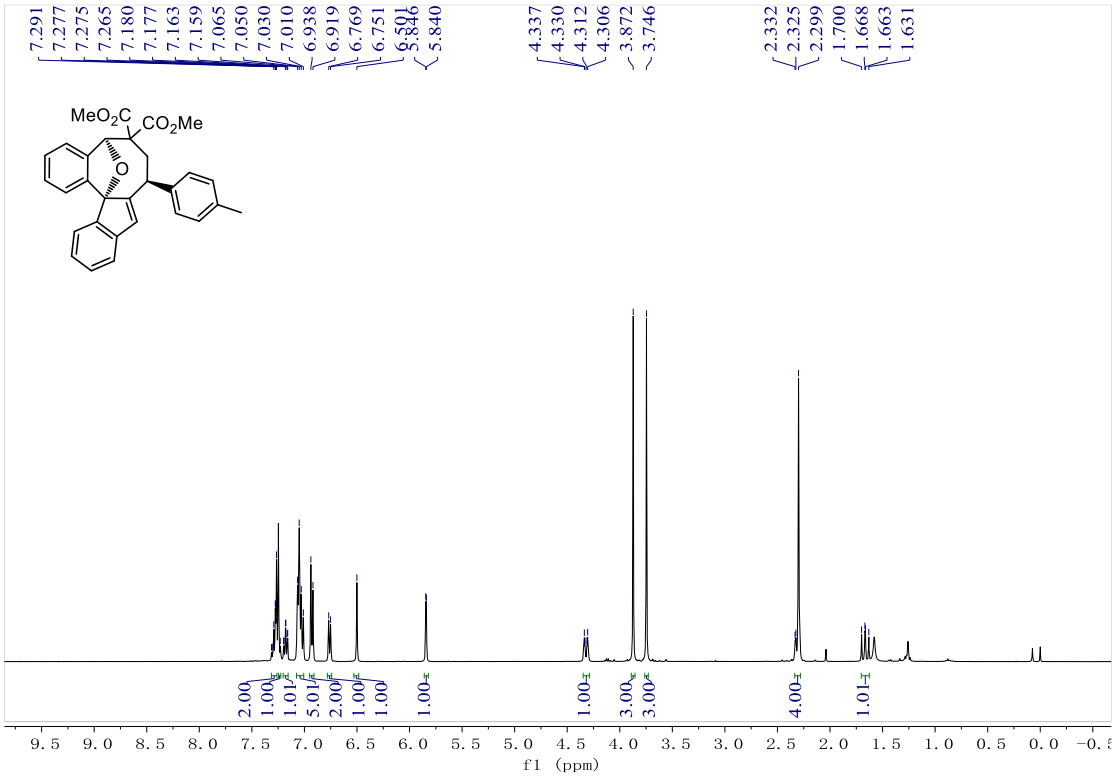

168.943
168.502
158.575
145.632
144.079
142.772
140.757
140.360
138.917
134.338
128.907
128.494
128.228
128.116
127.853
127.267
126.476
122.368
120.903
119.120
97.813
85.083
65.763
53.118
52.863
43.177
34.402
21.389
16.833
f1 (ppm)

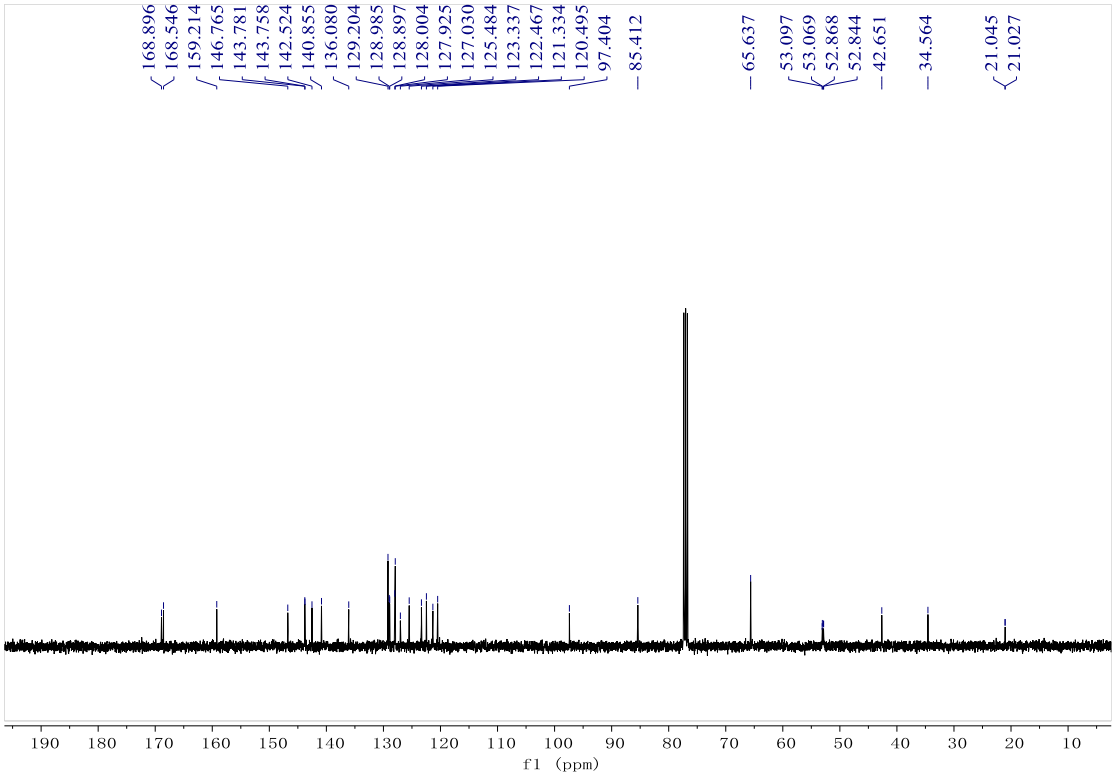
3n


7.292
7.274
7.249
7.240
7.231
7.204
7.187
7.169
7.063
7.045
6.821
6.809
6.731
6.491
5.902
5.897
4.392
4.361
3.866
3.744
2.327
2.322
2.290
2.284
2.201
2.178
1.692
1.660
1.656
1.624
MeO2C
CO2Me
O
2.00
3.01
1.00
2.00
2.00
1.00
1.00
1.00
1.00
3.00
3.00
1.00
3.01
3.01
1.00
f1 (ppm)


168.889
168.615
157.079
146.827
145.840
144.110
140.828
139.568
135.432
130.910
129.398
128.878
128.546
128.145
127.930
126.479
125.437
122.470
121.788
121.463
97.578
85.320
65.665
53.076
52.879
43.115
34.748
21.225
17.970
f1 (ppm)

3p


7.291
7.277
7.275
7.265
7.180
7.177
7.163
7.159
7.065
7.050
7.030
7.010
6.938
6.919
6.769
6.751
6.501
5.846
5.840
4.337
4.330
4.312
4.306
3.872
3.746
2.332
2.325
2.299
1.700
1.668
1.663
1.631
MeO2C
CO2Me
O
2.00
1.00
1.01
5.01
2.00
1.00
1.00
1.00
3.00
3.00
4.00
1.01
f1 (ppm)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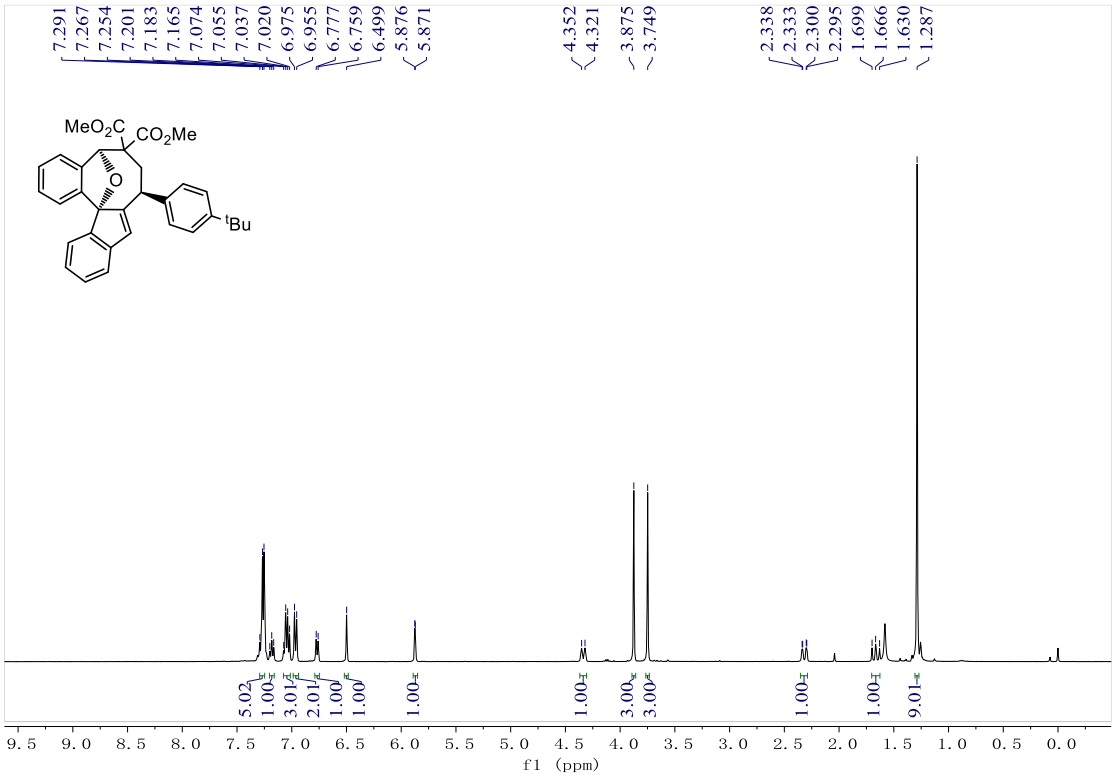
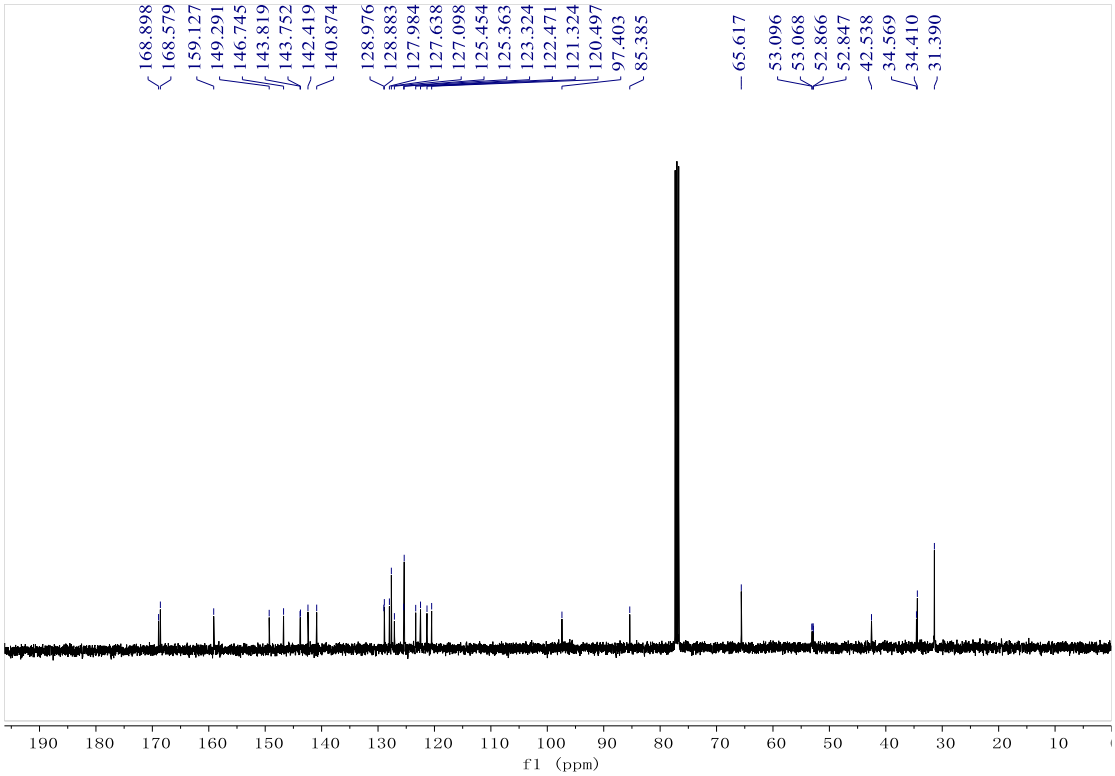
168.546
159.214
146.765
143.781
143.758
142.524
140.855
136.080
129.204
128.985
128.897
128.004
127.925
127.030
125.484
123.337
122.467
121.334
120.495
97.404
85.412
65.637
53.097
53.069
52.868
52.844
42.651
34.564
21.045
21.027
f1 (ppm)

3q


7.291
7.267
7.254
7.201
7.183
7.165
7.074
7.055
7.037
7.020
6.975
6.955
6.777
6.759
6.499
5.876
5.871
4.352
4.321
3.875
3.749
2.338
2.333
2.300
2.295
1.699
1.666
1.630
1.287
MeO2C
CO2Me
O
tBu
5.02
1.00
3.01
2.01
1.00
1.00
1.00
1.00
3.00
3.00
1.00
1.00
9.01
f1 (ppm)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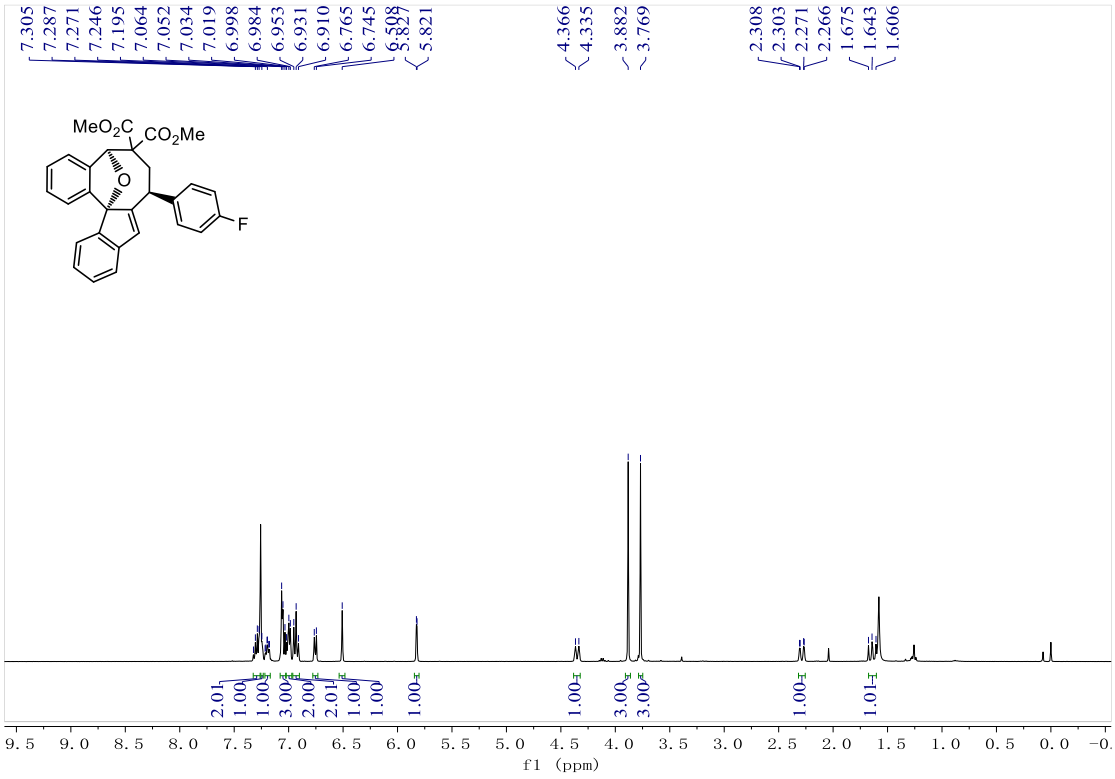
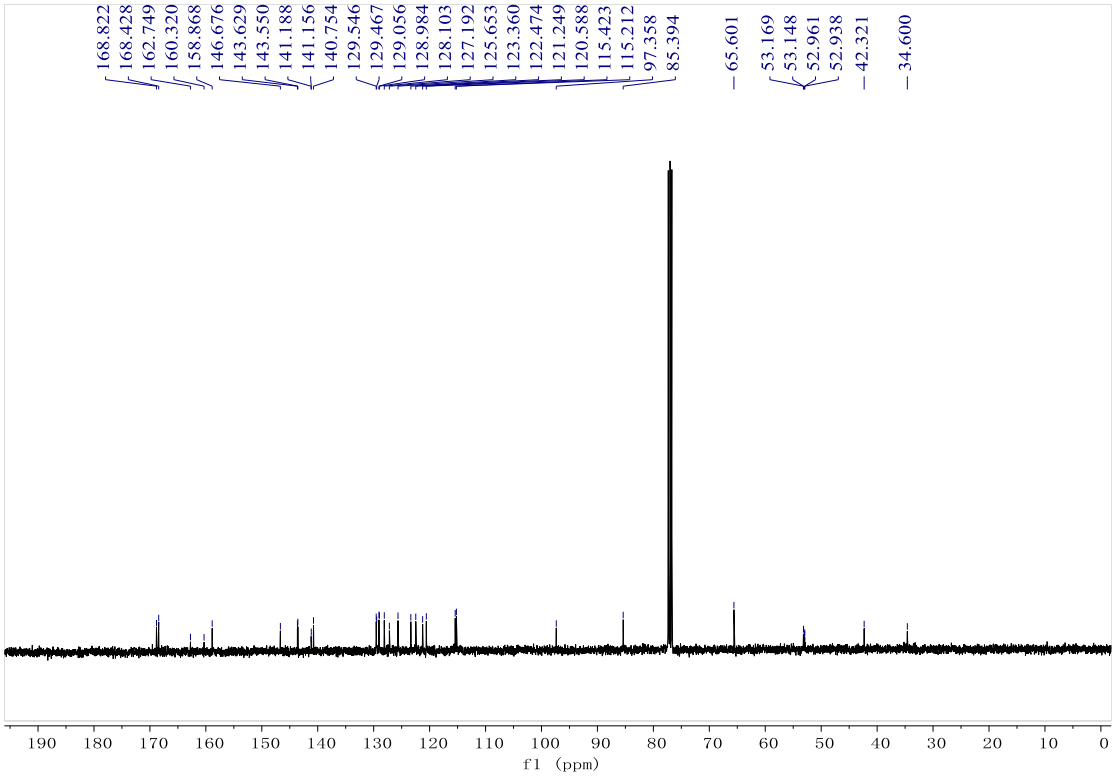
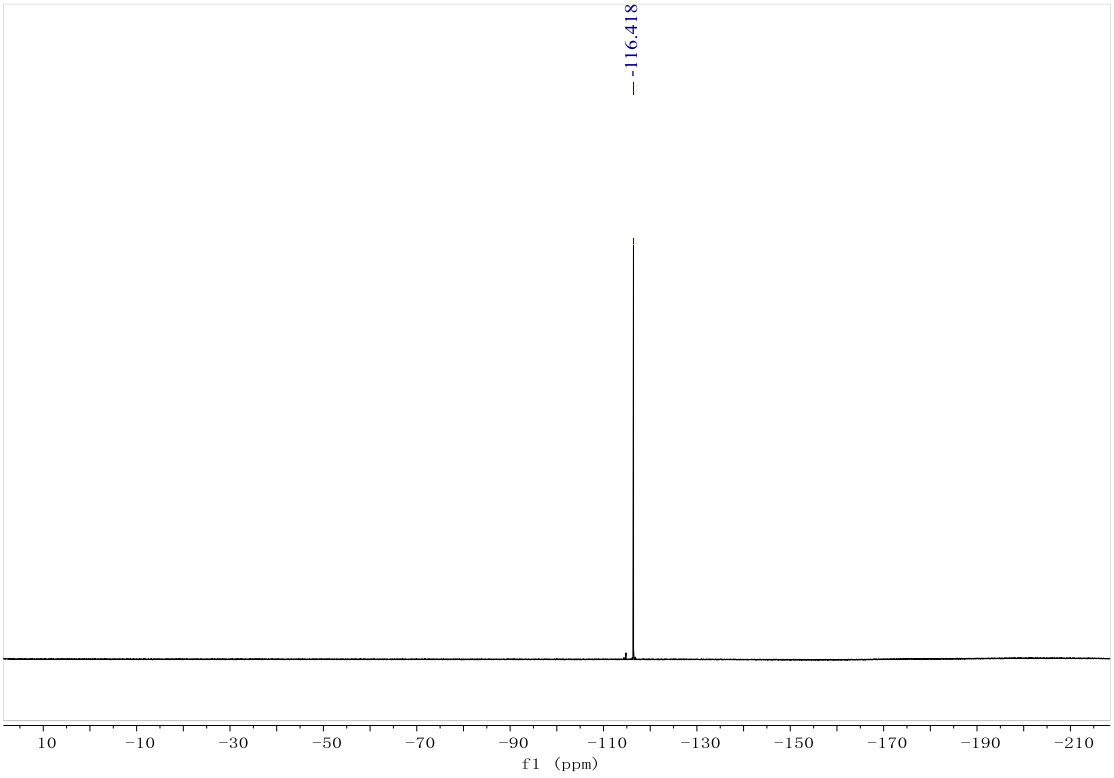
168.579
159.127
149.291
146.745
143.819
143.752
142.419
140.874
128.976
128.883
127.984
127.638
127.098
125.454
125.363
123.324
122.471
121.324
120.497
97.403
85.385
65.617
53.096
53.068
52.866
52.847
42.538
34.569
34.410
31.390
f1 (ppm)

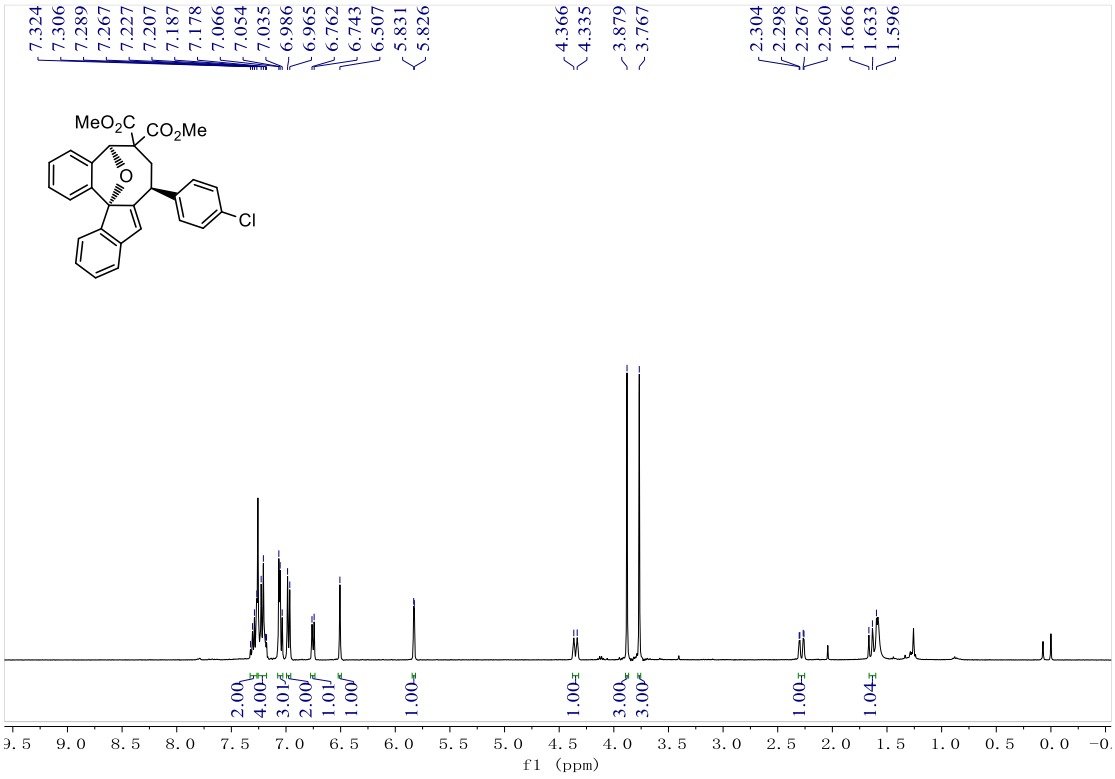
3r

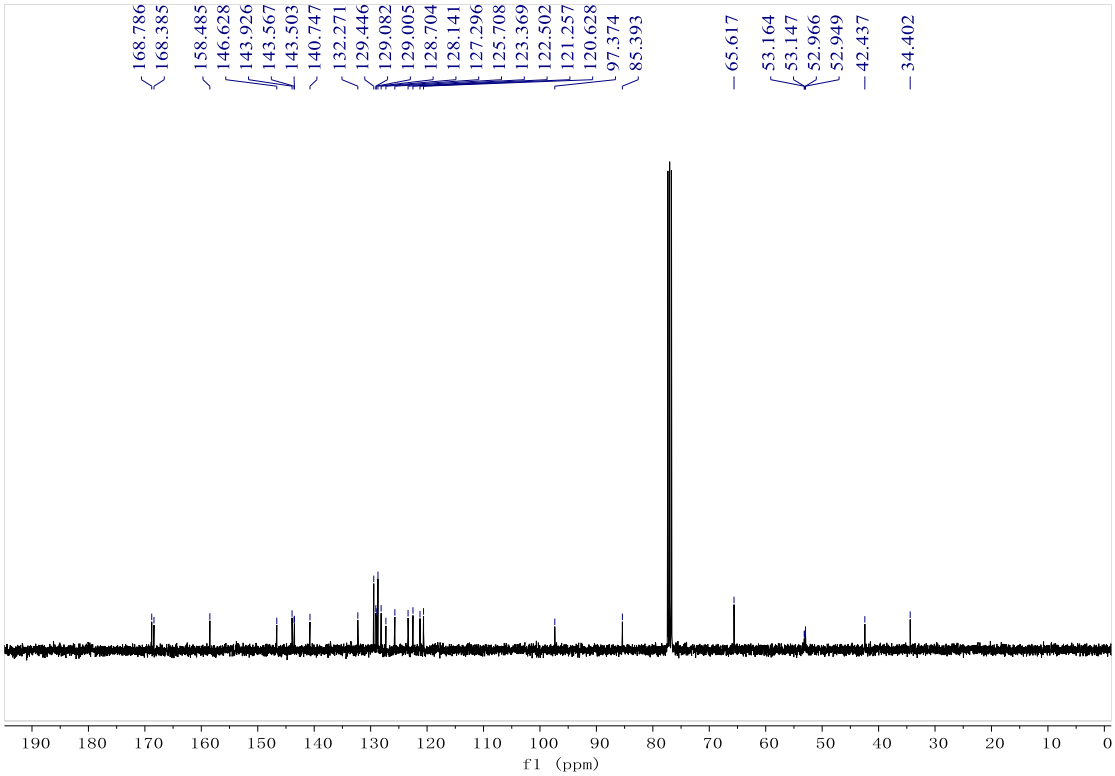

7.305
7.287
7.271
7.246
7.195
7.064
7.052
7.034
7.019
6.998
6.984
6.953
6.931
6.910
6.765
6.745
6.508
5.827
5.821
4.366
4.335
3.882
3.769
2.308
2.303
2.271
2.266
1.675
1.643
1.606
MeO2C
CO2Me
O
F
2.01
1.00
1.00
3.00
2.00
2.01
1.00
1.00
1.00
1.00
3.00
3.00
1.00
1.01
f1 (ppm)


168.822
168.428
162.749
160.320
158.868
146.676
143.629
143.550
141.188
141.156
140.754
129.546
129.467
129.056
128.984
128.103
127.192
125.653
123.360
122.474
121.249
120.588
115.423
115.212
97.358
85.394
65.601
53.169
53.148
52.961
52.938
42.321
34.600
f1 (ppm)


-116.418
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

3s


7.324
7.306
7.289
7.267
7.227
7.207
7.187
7.178
7.066
7.054
7.035
6.986
6.965
6.762
6.743
6.507
5.831
5.826
4.366
4.335
3.879
3.767
2.304
2.298
2.267
2.260
1.666
1.633
1.596
MeO2C
CO2Me
O
Cl
2.00
4.00
3.01
2.00
1.01
1.00
1.00
1.00
3.00
3.00
1.00
1.04
f1 (ppm)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168.385
158.485
146.628
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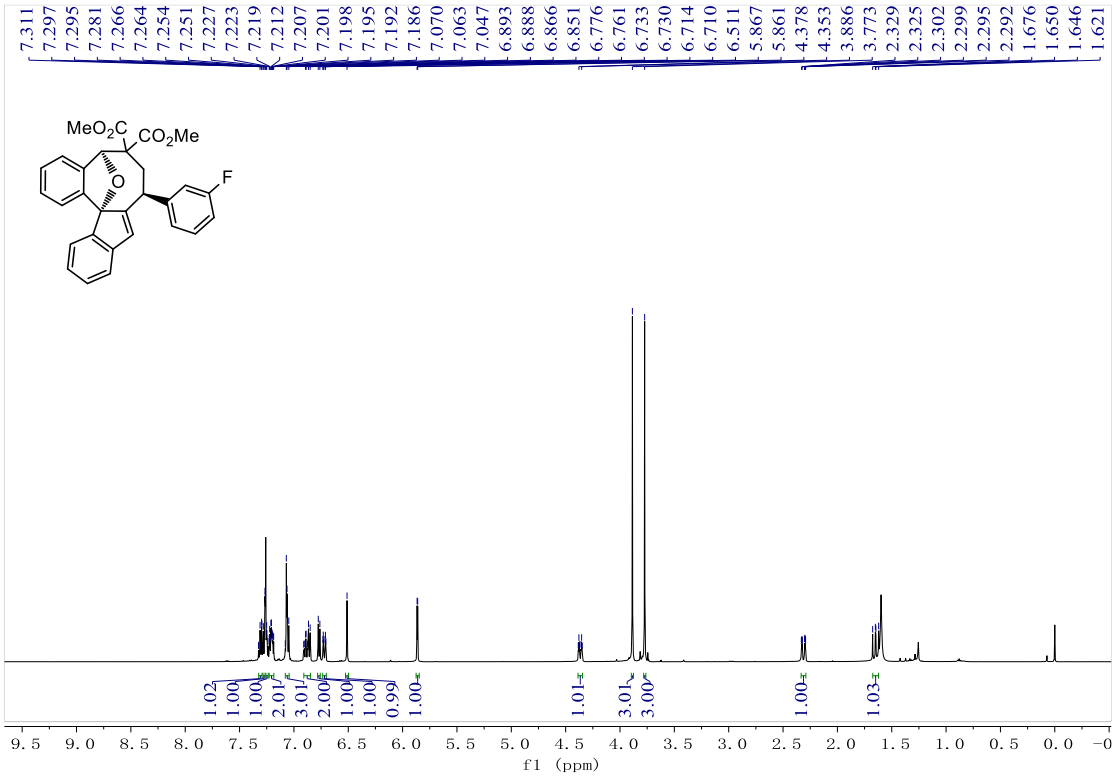
143.567
143.503
140.747
132.271
129.446
129.082
129.005
128.704
128.141
127.296
125.708
123.369
122.502
121.257
120.628
97.374
85.393
65.617
53.164
53.147
52.966
52.949
42.437
34.402
f1 (ppm)

3t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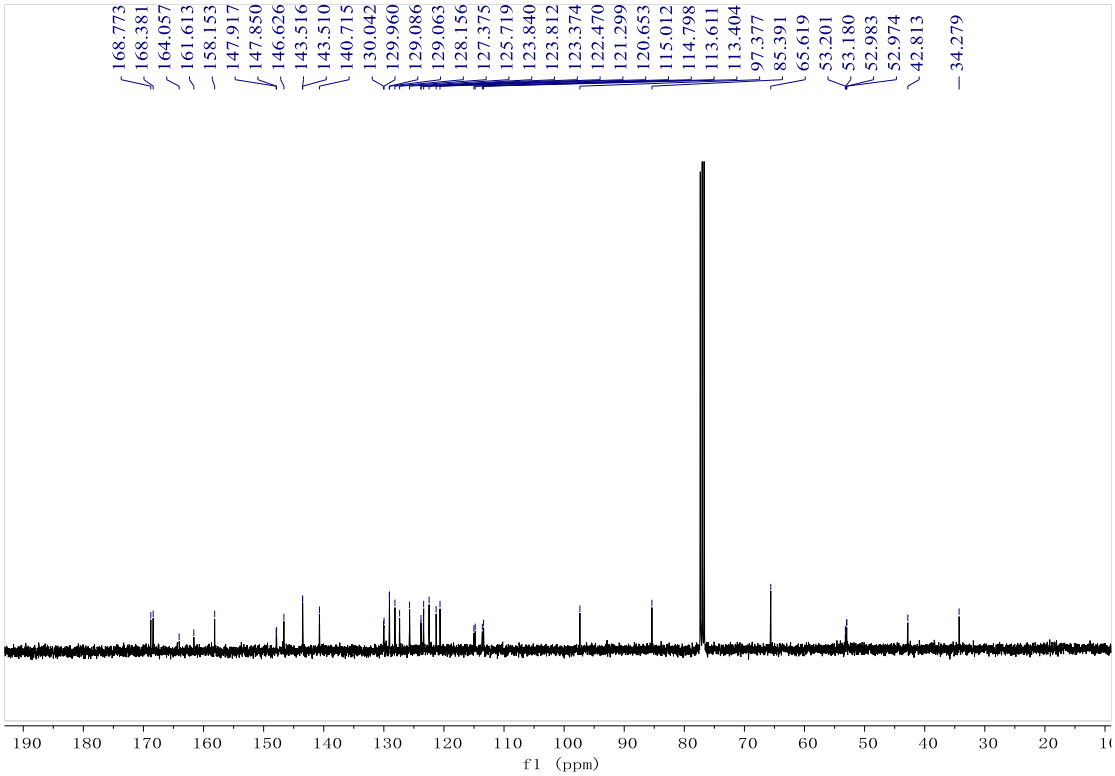
7.281
7.266
7.264
7.254
7.251
7.227
7.223
7.219
7.212
7.207
7.201
7.198
7.195
7.192
7.186
7.070
7.063
7.047
6.893
6.888
6.866
6.851
6.776
6.761
6.733
6.730
6.714
6.710
6.511
5.867
5.861
4.378
4.353
3.886
3.773
2.329
2.325
2.302
2.299
2.295
2.292
1.676
1.650
1.646
1.621
MeO2C
CO2Me
O
F
1.02
1.00
1.00
2.01
3.01
2.00
1.00
1.00
0.99
1.00
1.01
3.01
3.00
1.00
1.03
f1 (ppm)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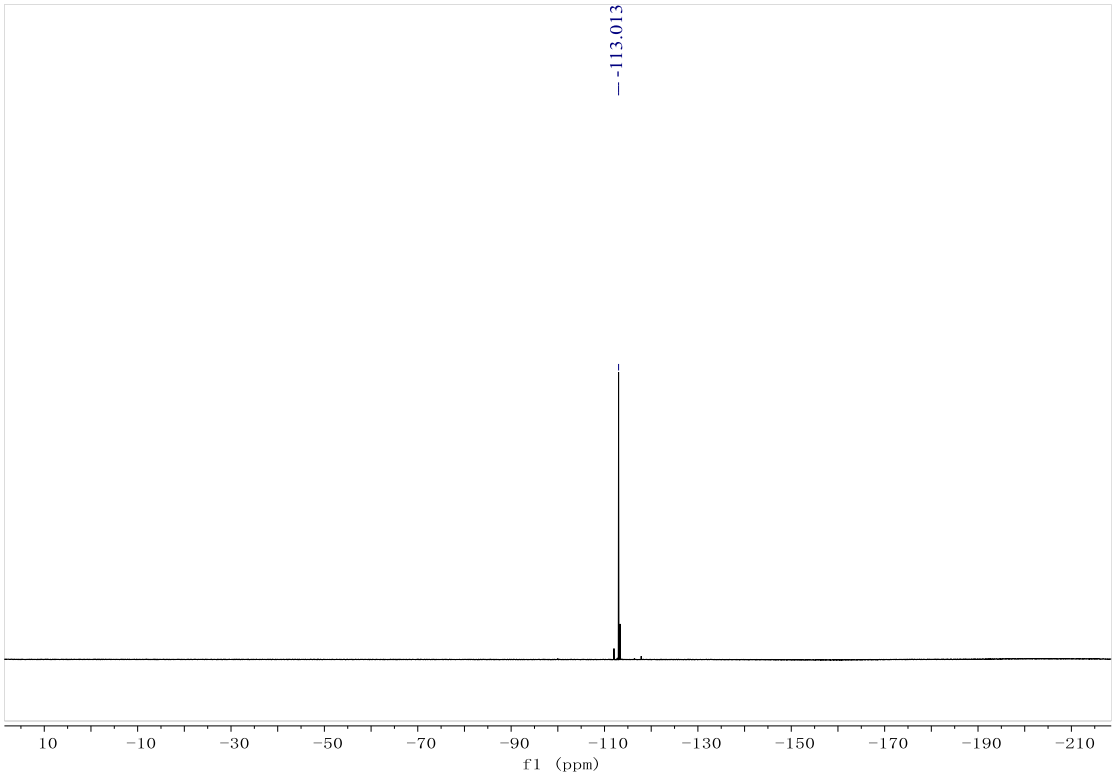
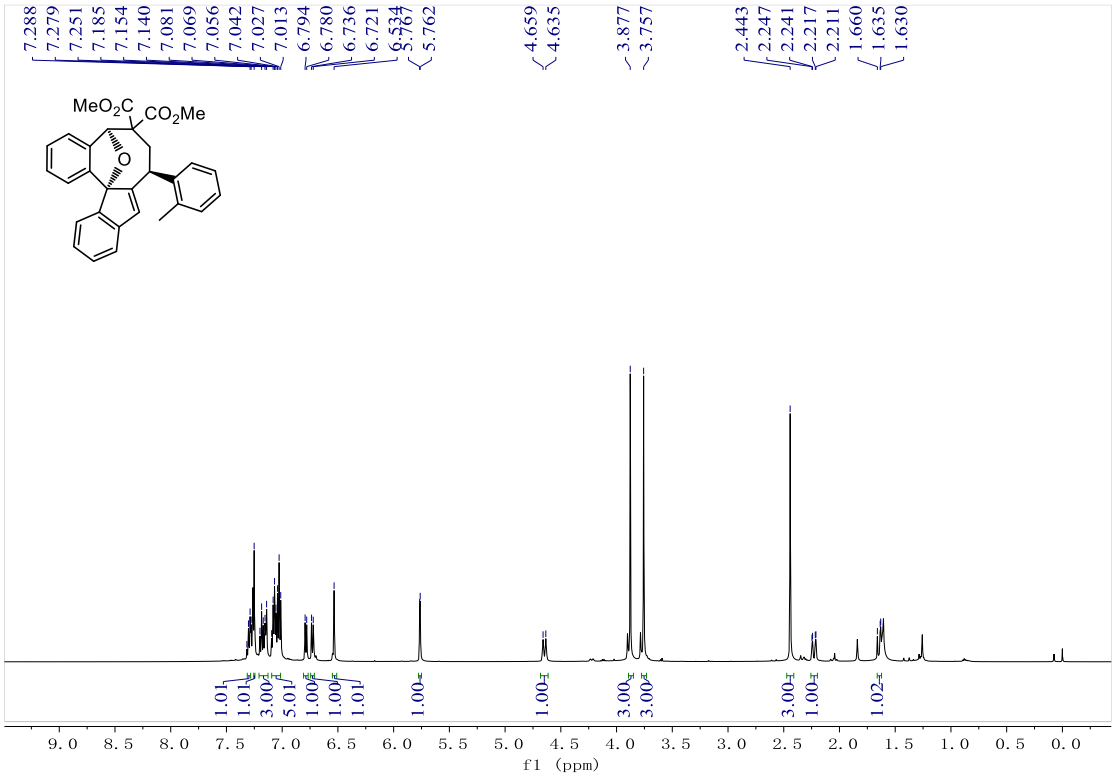
161.613
158.153
147.917
147.850
146.626
143.516
143.510
140.715
130.042
129.960
129.086
129.063
128.156
127.375
125.719
123.840
123.812
123.374
122.470
121.299
120.653
115.012
114.798
113.611
113.404
97.377
85.391
65.619
53.201
53.180
52.983
52.974
42.813
34.279
f1 (ppm)


-113.013
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

3u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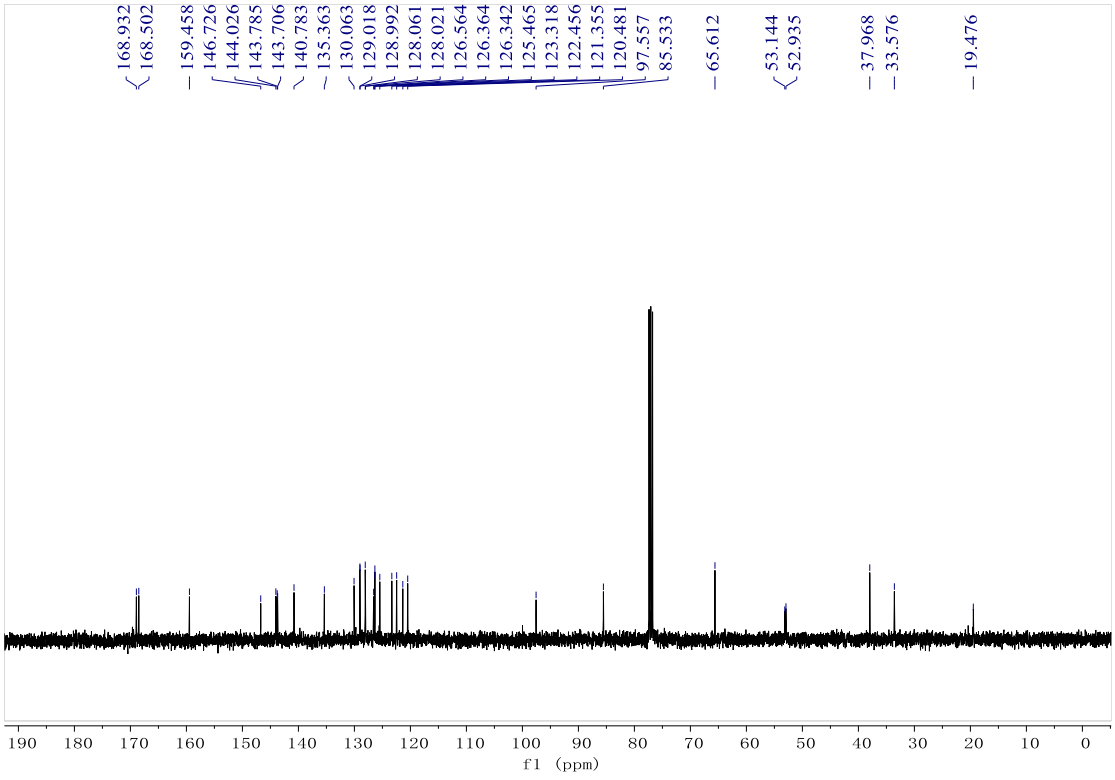
7.185
7.154
7.140
7.081
7.069
7.056
7.042
7.027
7.013
6.794
6.780
6.736
6.721
6.534
6.517
5.762
4.659
4.635
3.877
3.757
2.443
2.247
2.241
2.217
2.211
1.660
1.635
1.630
MeO2C
CO2Me
O
1.01
1.01
3.00
5.01
1.00
1.00
1.01
1.00
1.00
3.00
3.00
3.00
1.00
1.02
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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159.458
146.726
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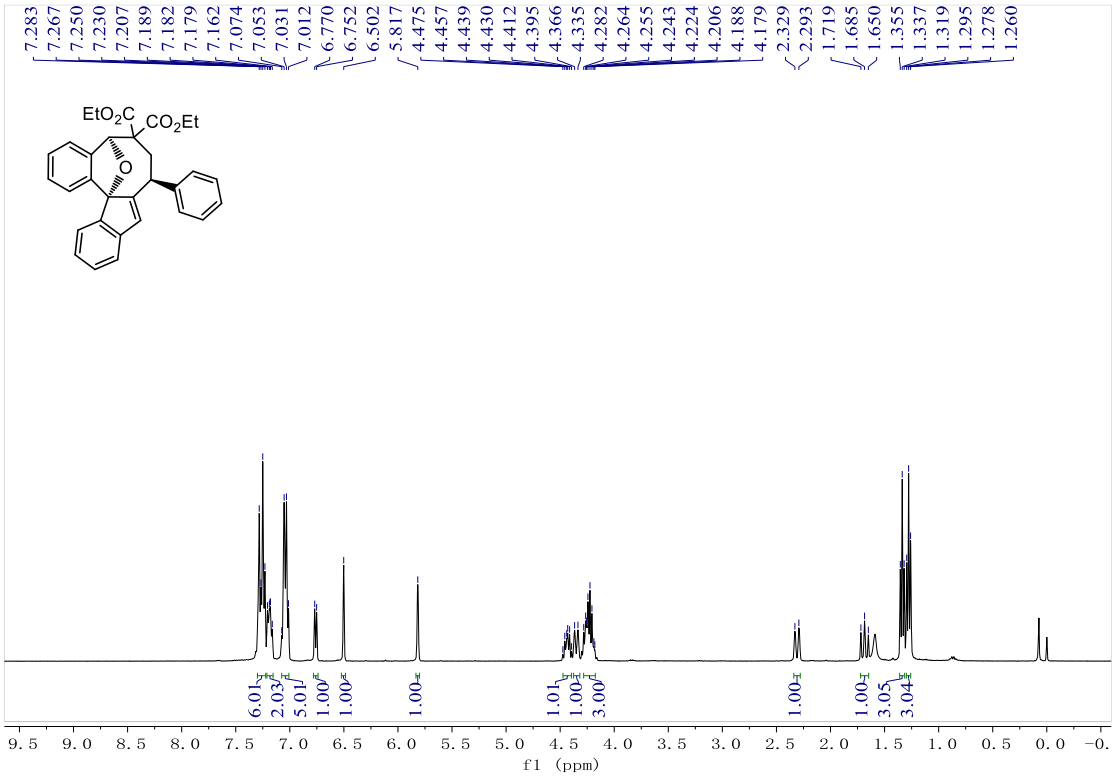
143.785
143.706
140.783
135.363
130.063
129.018
128.992
128.061
128.021
126.564
126.364
126.342
125.465
123.318
122.456
121.355
120.481
97.557
85.533
65.612
53.144
52.935
37.968
33.576
19.476
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

3v


7.283
7.267
7.250
7.230
7.207
7.189
7.182
7.179
7.162
7.074
7.053
7.031
7.012
6.770
6.752
6.502
5.817
4.475
4.457
4.439
4.430
4.412
4.395
4.366
4.335
4.282
4.264
4.255
4.243
4.224
4.206
4.188
4.179
2.329
2.293
1.719
1.685
1.650
1.355
1.337
1.319
1.295
1.278
1.260
EtO2C
CO2Et
O
6.01
2.03
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1.00
1.01
1.00
3.00
1.00
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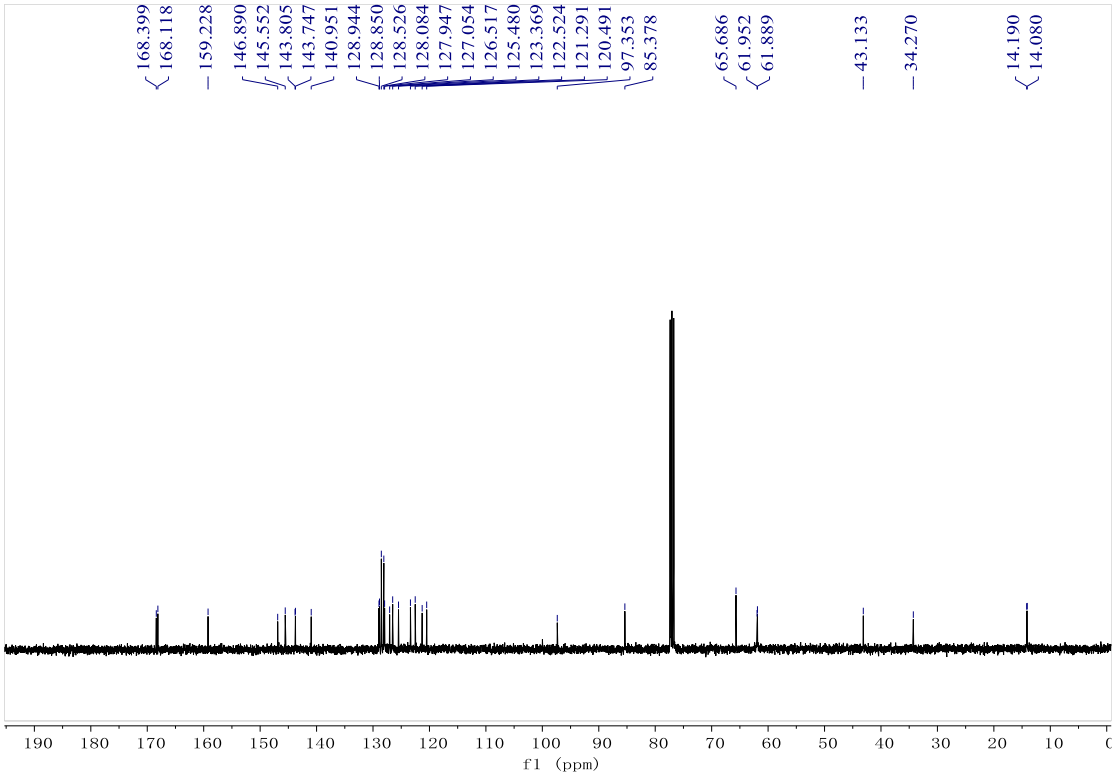
3.04
f1 (ppm)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128.084
127.947
127.054
126.517
125.480
123.369
122.524
121.291
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97.353
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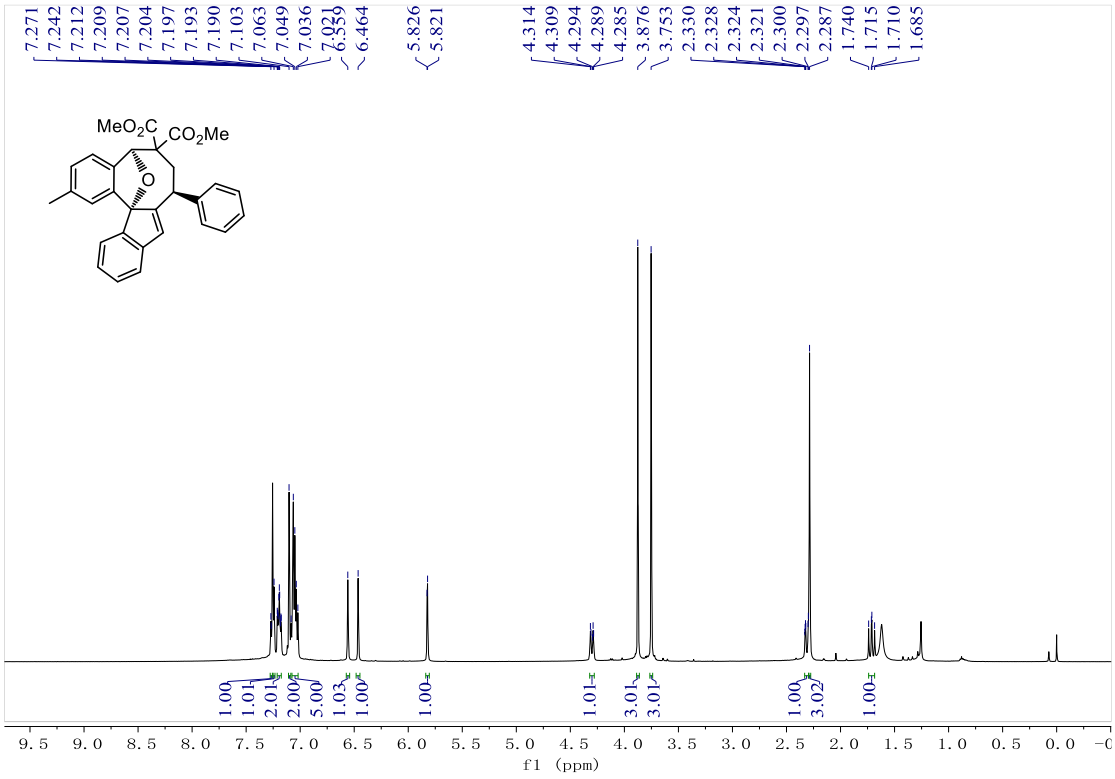
65.686
61.952
61.889
43.133
34.270
14.190
14.080
f1 (ppm)

3w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7.193
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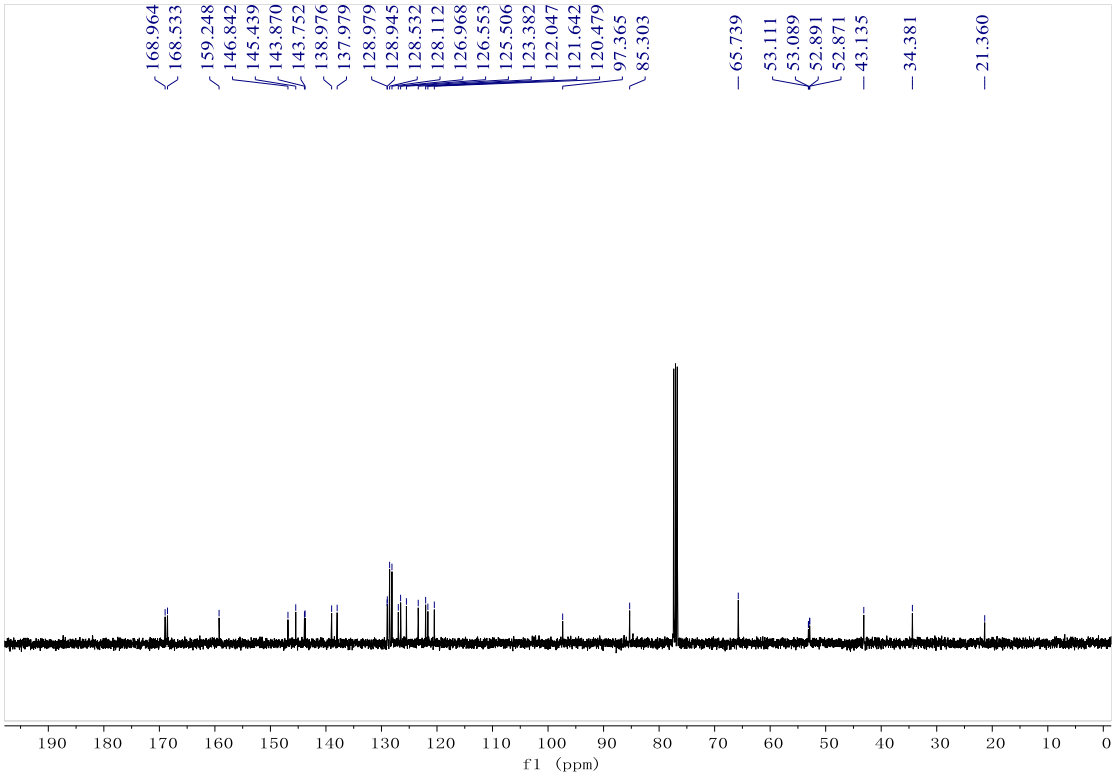
7.049
7.036
7.021
6.559
6.464
5.826
5.821
4.314
4.309
4.294
4.289
4.285
3.876
3.753
2.330
2.328
2.324
2.321
2.300
2.297
2.287
1.740
1.715
1.710
1.685
MeO2C
CO2Me
O
1.00
1.01
2.01
2.00
5.00
1.03
1.00
1.00
1.01
3.01
3.01
1.00
3.02
1.00
f1 (ppm)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138.976
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128.532
128.112
126.968
126.553
125.506
123.382
122.047
121.642
120.479
97.365
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53.111
53.089
52.891
52.871
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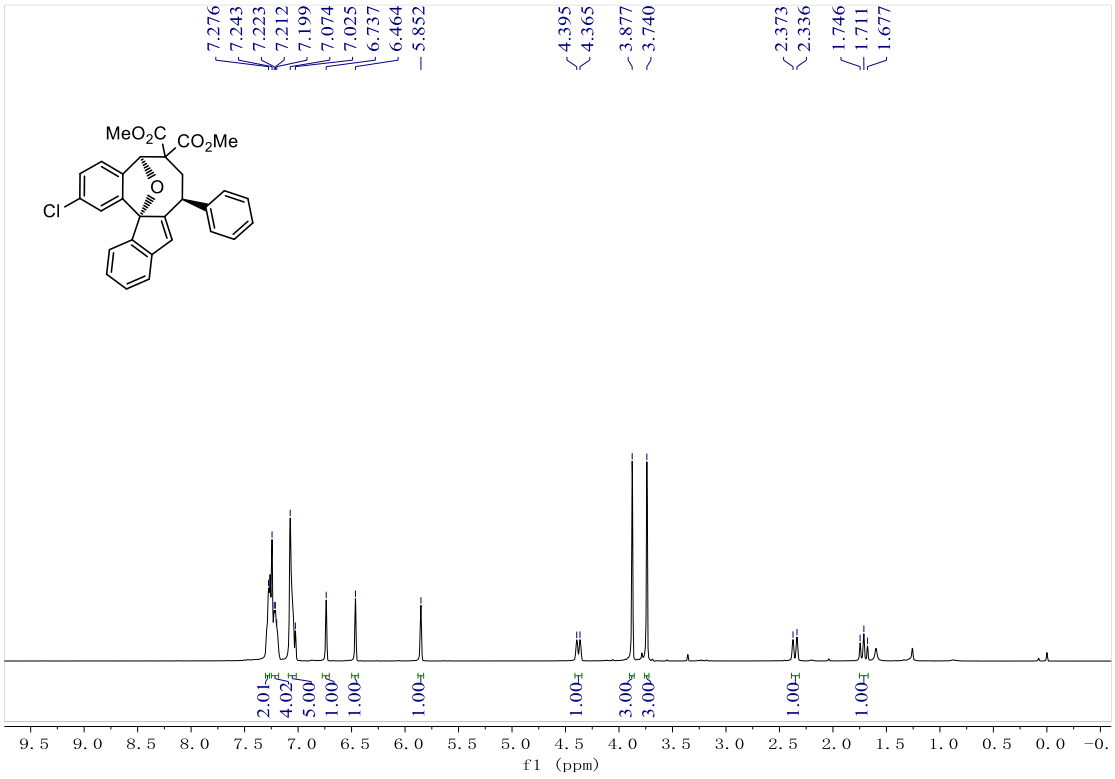
21.360
f1 (ppm)

3x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7.243
7.223
7.212
7.199
7.074
7.025
6.737
6.464
5.852
4.395
4.365
3.877
3.740
2.373
2.336
1.746
1.711
1.677
MeO2C
CO2Me
O
Cl
2.01
4.02
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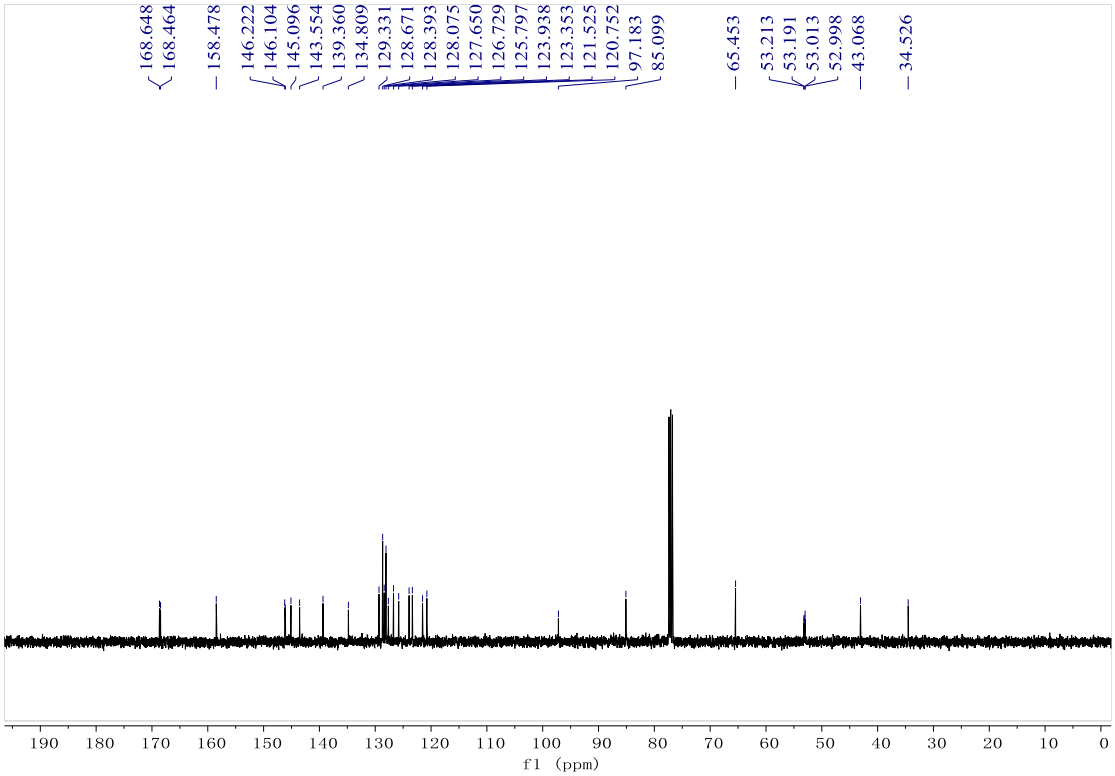
1.00
1.00
1.00
1.00
3.00
3.00
1.00
1.00
f1 (ppm)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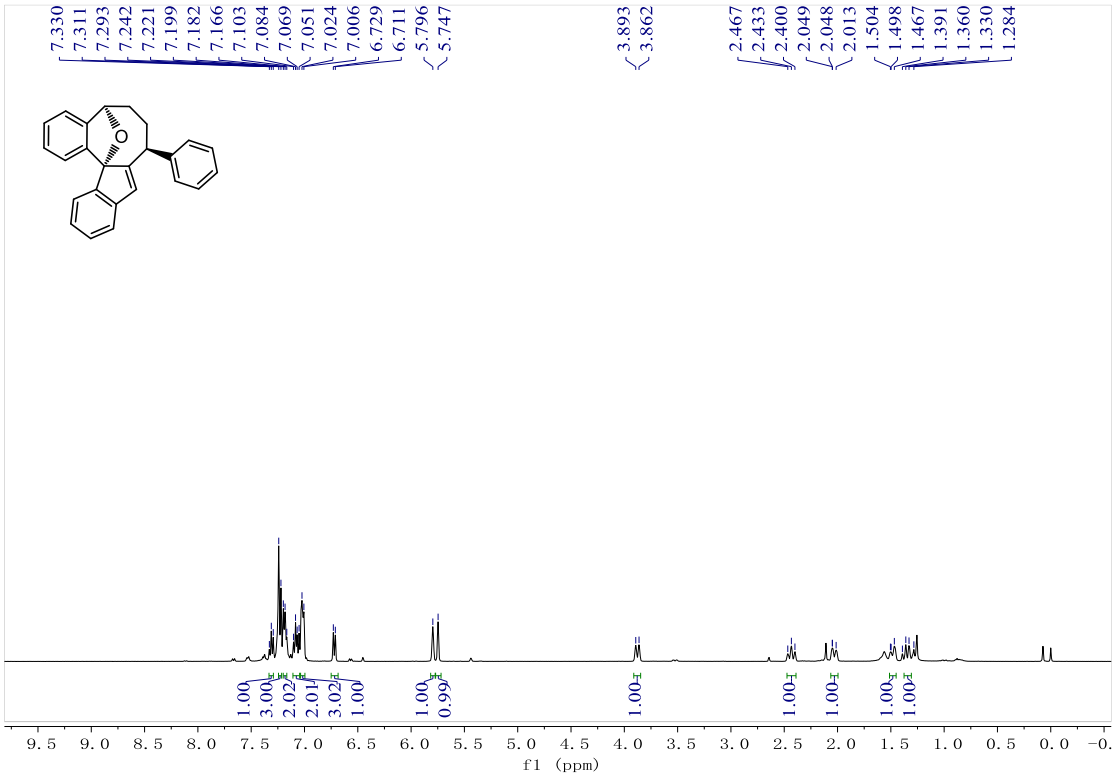
158.478
146.222
146.104
145.096
143.554
139.360
134.809
129.331
128.671
128.393
128.075
127.650
126.729
125.797
123.938
123.353
121.525
120.752
97.183
85.099
65.453
53.213
53.191
53.013
52.998
43.068
34.526
f1 (ppm)

3y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7.242
7.221
7.199
7.182
7.166
7.103
7.084
7.069
7.051
7.024
7.006
6.729
6.711
5.796
5.747
3.893
3.862
2.467
2.433
2.400
2.049
2.048
2.013
1.504
1.498
1.467
1.391
1.360
1.330
1.284
O
1.00
3.00
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2.01
3.02
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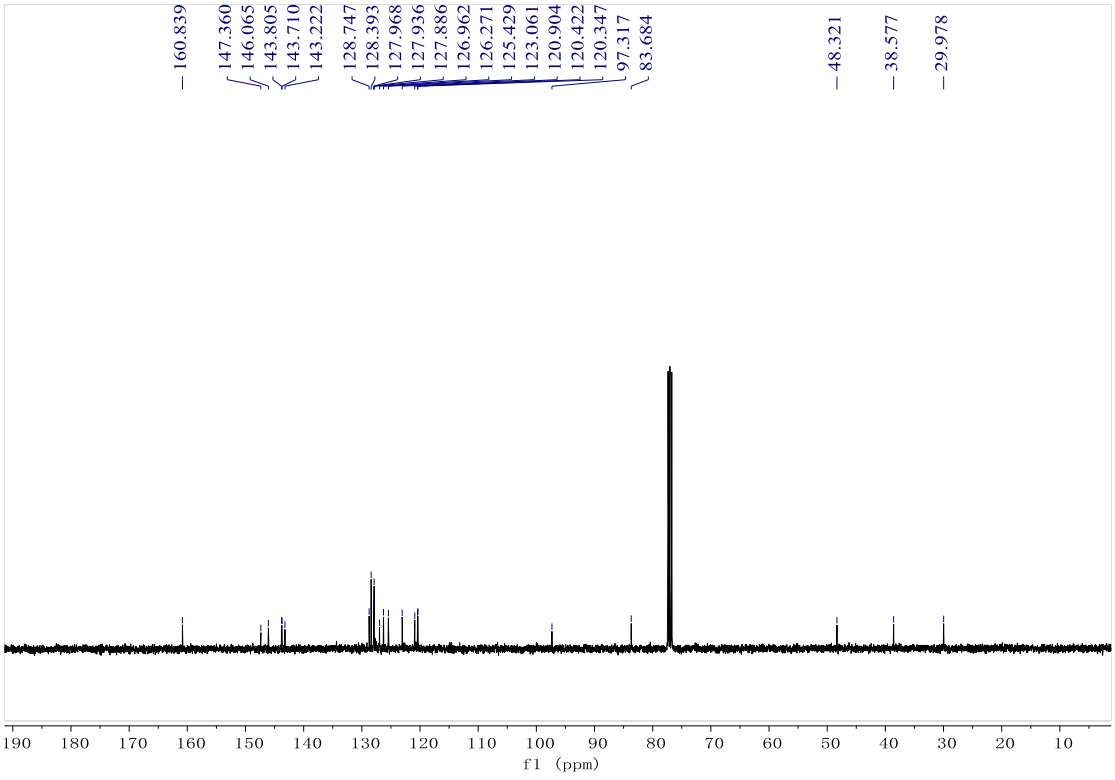
1.00
f1 (ppm)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146.065
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143.222
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128.393
127.968
127.936
127.886
126.962
126.271
125.429
123.061
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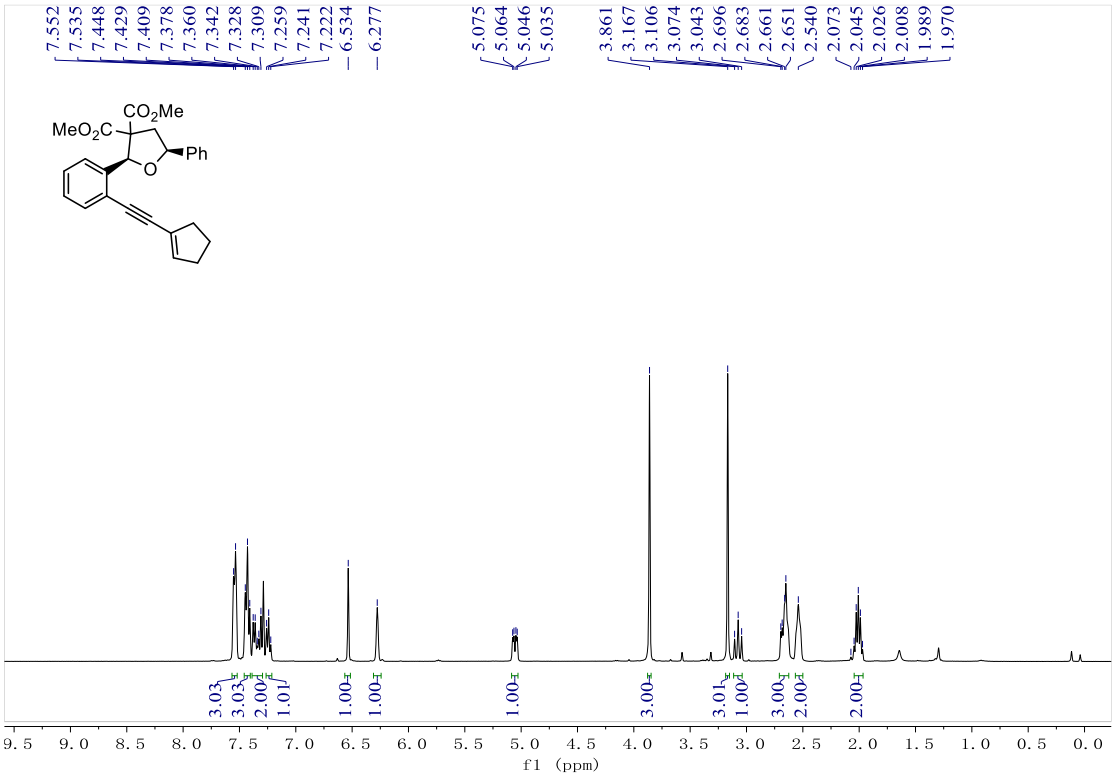
120.422
120.347
97.317
83.684
48.321
38.577
29.978
f1 (ppm)

3aa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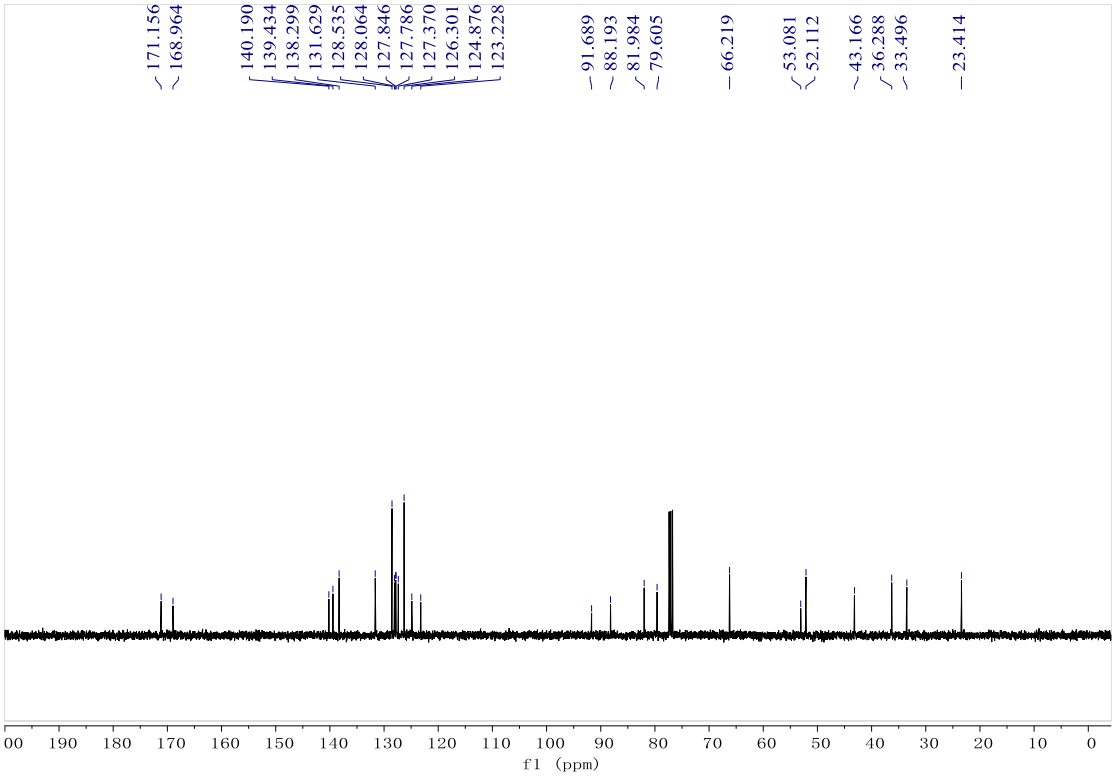
7.535
7.448
7.429
7.409
7.378
7.360
7.342
7.328
7.309
7.259
7.241
7.222
6.534
6.277
5.075
5.064
5.046
5.035
3.861
3.167
3.106
3.074
3.043
2.696
2.683
2.661
2.651
2.540
2.073
2.045
2.026
2.008
1.989
1.970
CO2Me
MeO2C
Ph
O
3.03
3.03
2.00
1.01
1.00
1.00
1.00
3.00
3.01
1.00
3.00
2.00
2.00
f1 (ppm)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140.190
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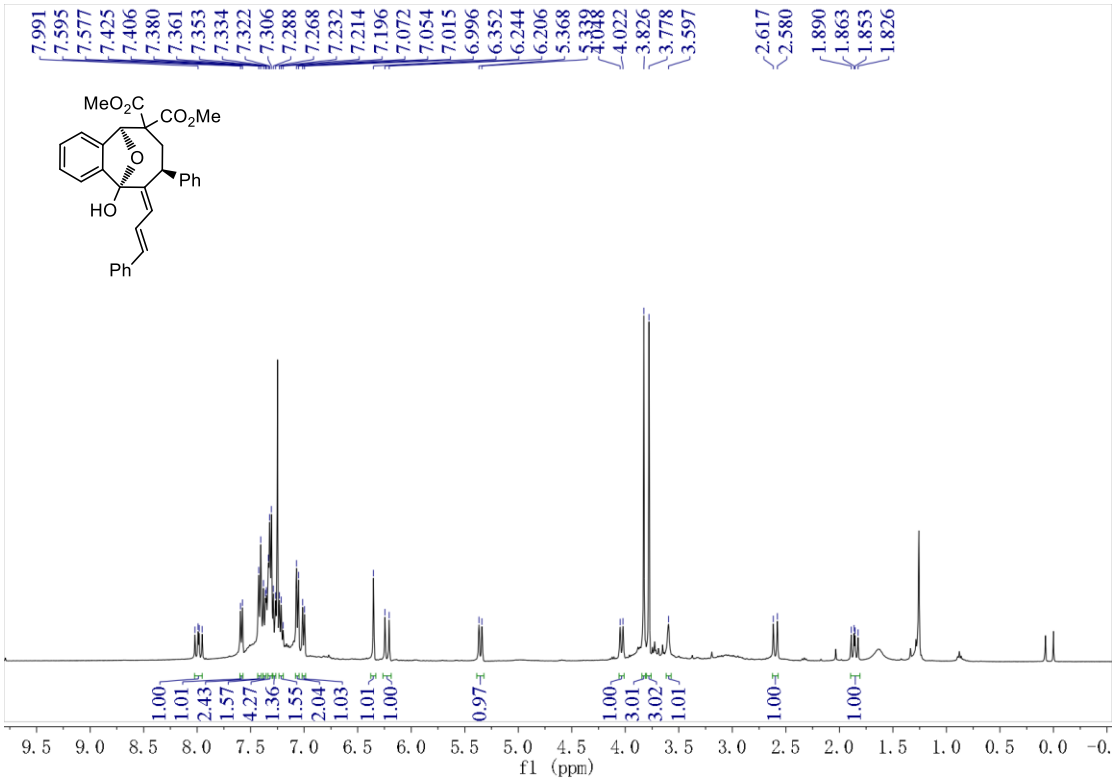
138.299
131.629
128.535
128.064
127.846
127.786
127.370
126.301
124.876
123.228
91.689
88.193
81.984
79.605
66.219
53.081
52.112
43.166
36.288
33.496
23.414
f1 (ppm)

4ac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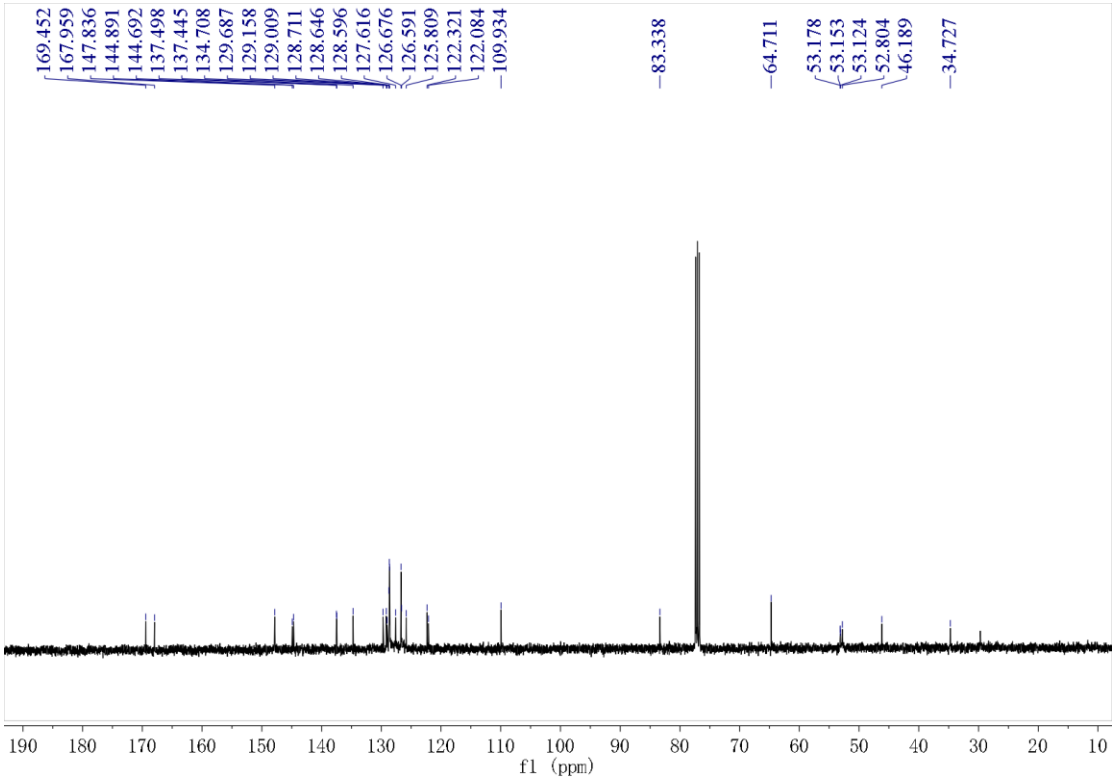
7.425
7.406
7.380
7.361
7.353
7.334
7.322
7.306
7.288
7.268
7.232
7.214
7.196
7.072
7.054
7.015
6.996
6.352
6.244
6.206
5.368
4.022
3.826
3.778
3.597
2.617
2.580
1.890
1.863
1.853
1.826
MeO2C
CO2Me
O
Ph
HO
Ph
1.00
1.01
2.43
1.57
4.27
1.36
1.55
2.04
1.03
1.01
1.00
0.97
1.00
3.01
3.02
1.01
1.00
1.00
f1 (ppm)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144.692
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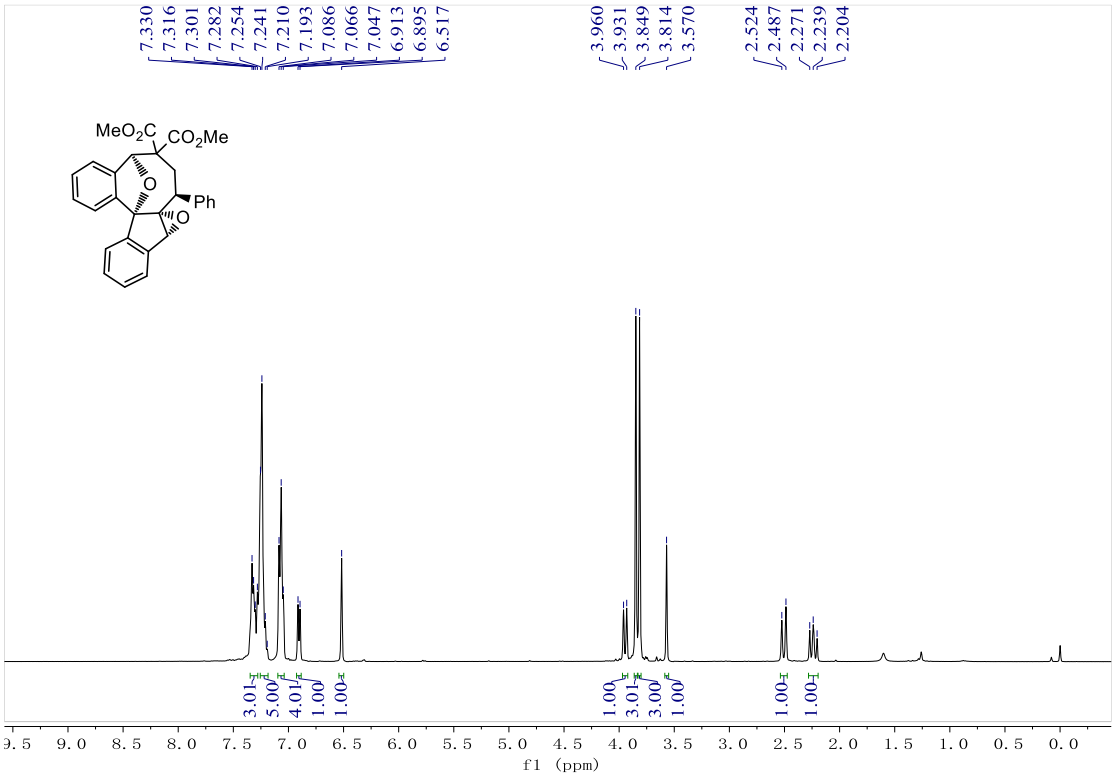
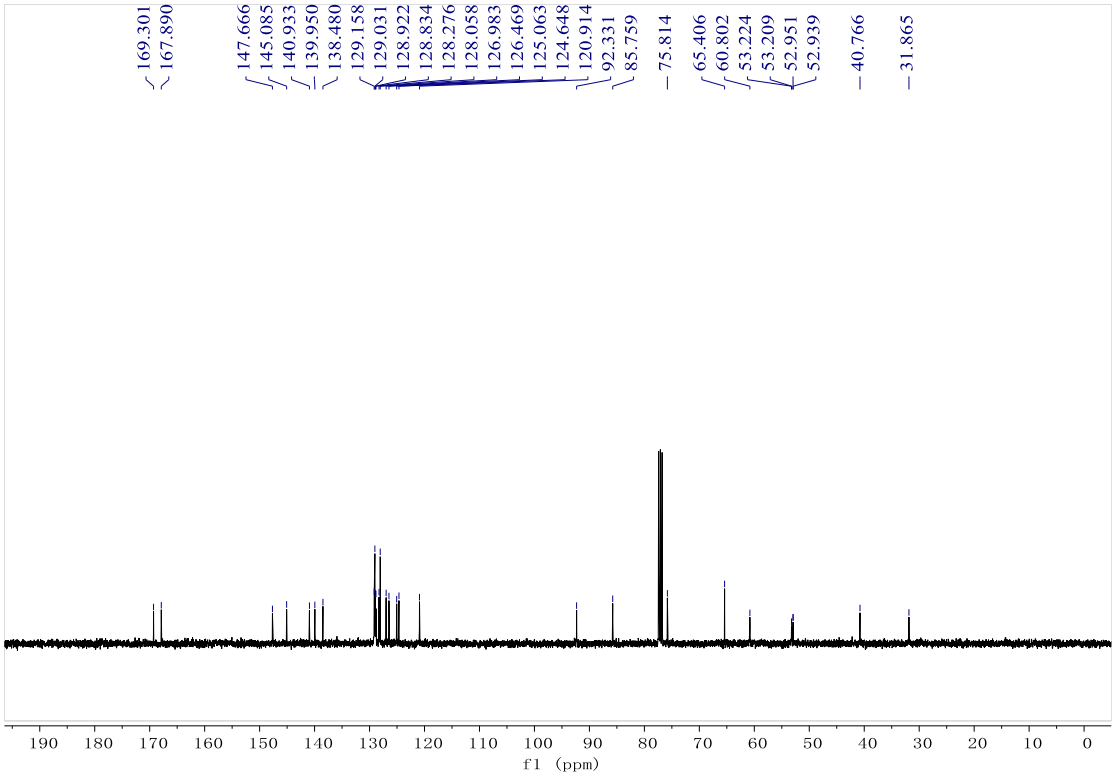
137.445
134.708
129.687
129.158
129.009
128.711
128.646
128.596
127.616
126.676
126.591
125.809
122.321
122.084
109.934
83.338
64.711
53.178
53.153
53.124
52.804
46.189
34.727
f1 (ppm)

5a


7.330
7.316
7.301
7.282
7.254
7.241
7.210
7.193
7.086
7.066
7.047
6.913
6.895
6.517
3.960
3.931
3.849
3.814
3.570
2.524
2.487
2.271
2.239
2.204
MeO2C
CO2Me
Ph
O
O
3.01
5.00
4.01
1.00
1.00
1.00
3.01
3.00
1.00
1.00
1.00
f1 (ppm)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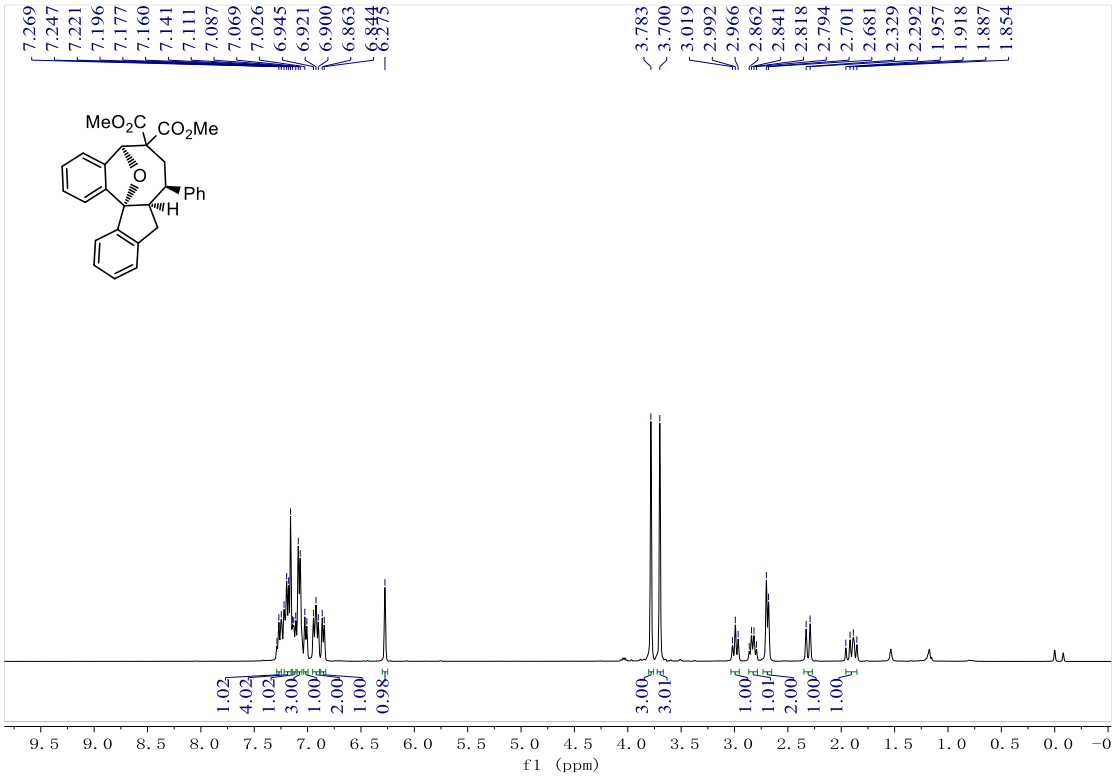
167.890
147.666
145.085
140.933
139.950
138.480
129.158
129.031
128.922
128.834
128.276
128.058
126.983
126.469
125.063
124.648
120.914
92.331
85.759
75.814
65.406
60.802
53.224
53.209
52.951
52.939
40.766
31.865
f1 (ppm)

6a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7.247
7.221
7.196
7.177
7.160
7.141
7.111
7.087
7.069
7.026
6.945
6.921
6.900
6.863
6.844
6.275
3.783
3.700
3.019
2.992
2.966
2.862
2.841
2.818
2.794
2.701
2.681
2.329
2.292
1.957
1.918
1.887
1.854
MeO2C
CO2Me
O
Ph
H
1.02
4.02
1.02
3.00
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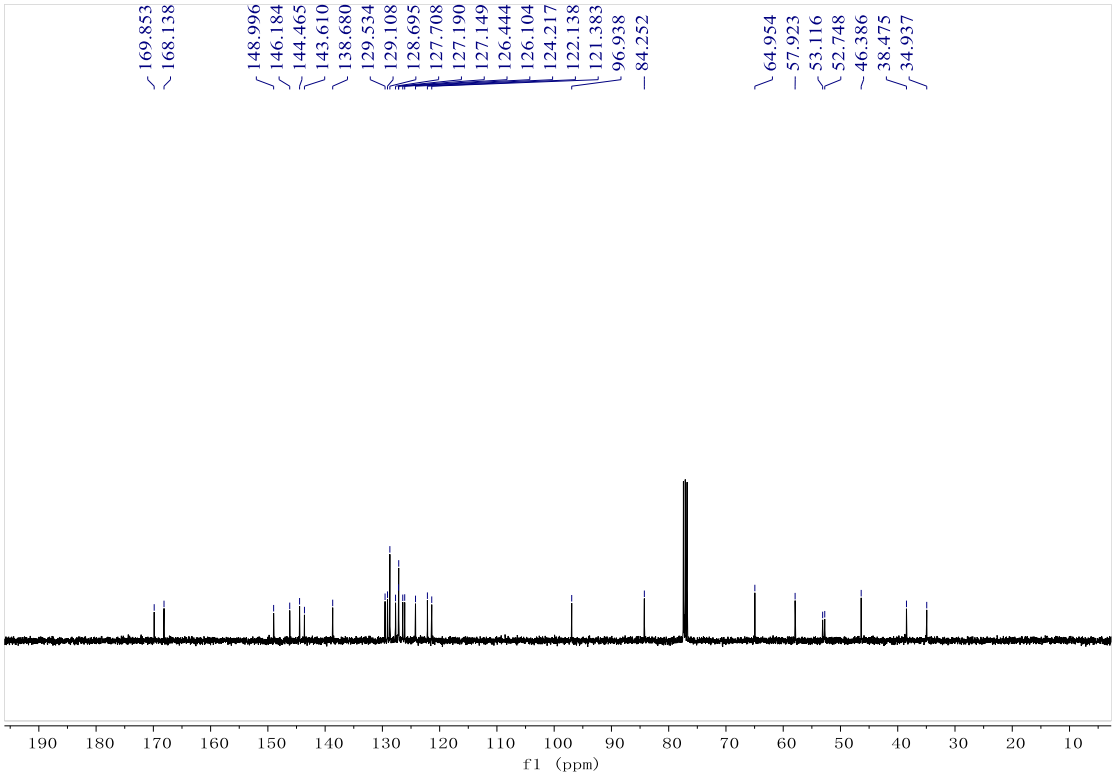
1.00
f1 (ppm)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129.534
129.108
128.695
127.708
127.190
127.149
126.444
126.104
124.217
122.138
121.383
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64.954
57.923
53.116
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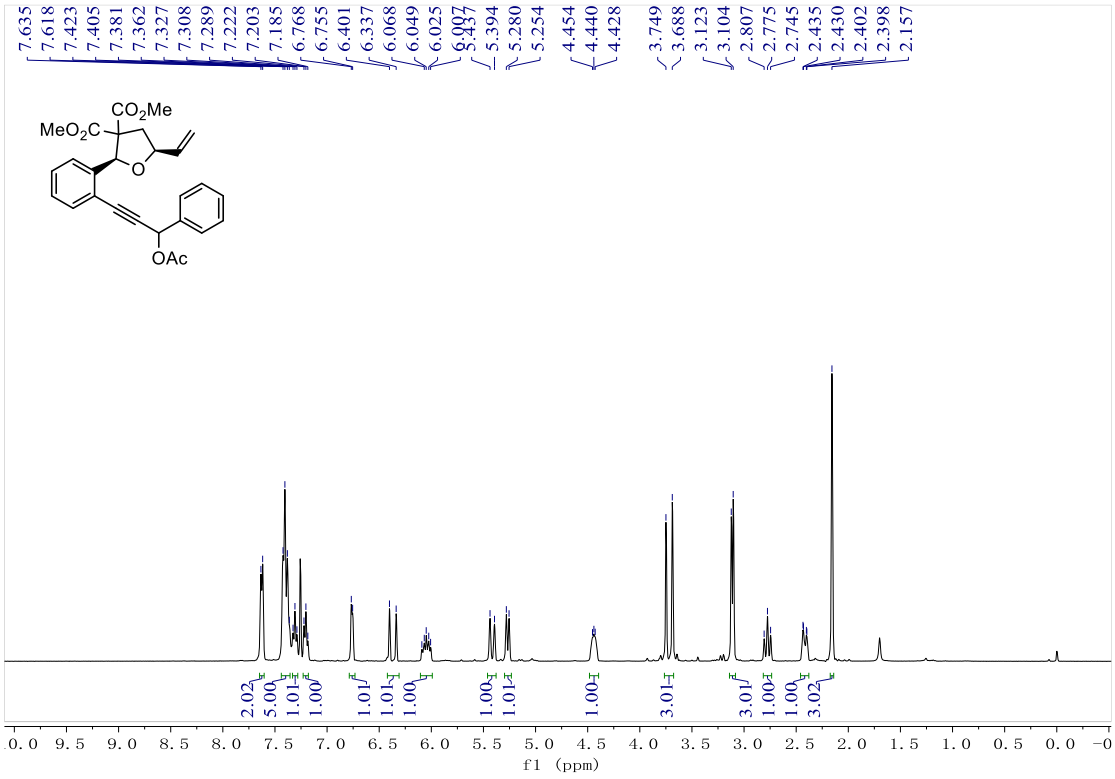
46.386
38.475
34.937
f1 (ppm)

7a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7.308
7.289
7.222
7.203
7.185
6.768
6.755
6.401
6.337
6.068
6.049
6.025
6.007
5.437
5.394
5.280
5.254
4.454
4.440
4.428
3.749
3.688
3.123
3.104
2.807
2.775
2.745
2.435
2.430
2.402
2.398
2.157
CO2Me
MeO2C
O
OAc
2.02
5.00
1.01
1.00
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1.01
1.00
1.00
1.01
1.00
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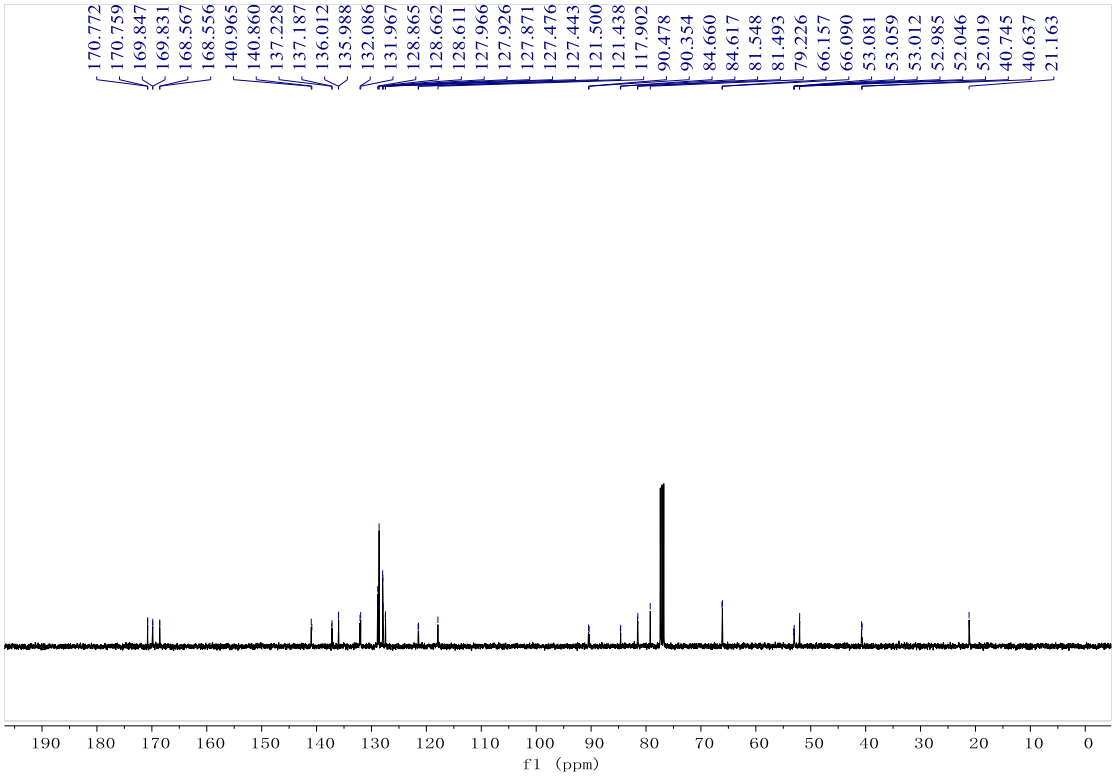
1.00
1.00
3.02
f1 (ppm)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131.967
128.865
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128.611
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127.871
127.476
127.443
121.500
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90.354
84.660
84.617
81.548
81.493
79.226
66.157
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53.012
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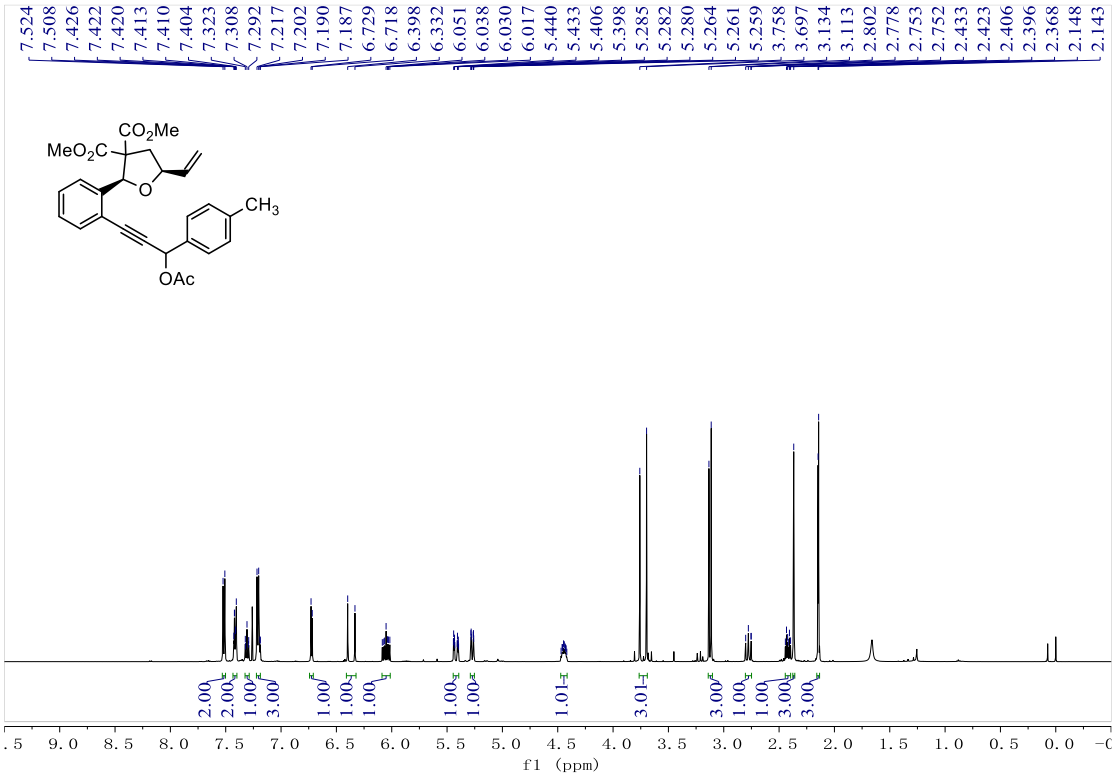
f1 (ppm)

7d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7.413
7.410
7.404
7.323
7.308
7.292
7.217
7.202
7.190
7.187
6.729
6.718
6.398
6.332
6.051
6.038
6.030
6.017
5.440
5.433
5.406
5.398
5.285
5.282
5.280
5.264
5.261
5.259
3.758
3.697
3.134
3.113
2.802
2.778
2.753
2.752
2.433
2.423
2.406
2.396
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2.148
2.143
CO2Me
MeO2C
O
CH3
OAc
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2.00
1.00
3.00
1.00
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1.00
1.01
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1.00
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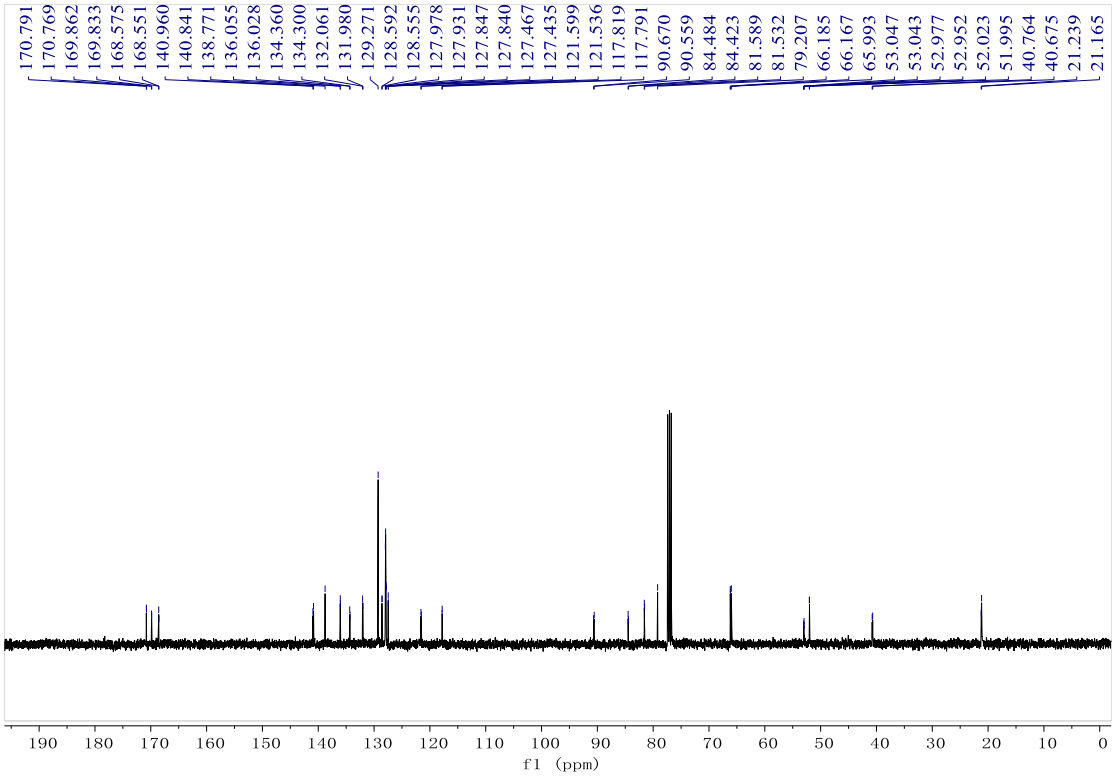
3.00
f1 (ppm)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140.841
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136.028
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134.300
132.061
131.980
129.271
128.592
128.555
127.978
127.931
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127.840
127.467
127.435
121.599
121.536
117.819
117.791
90.670
90.559
84.484
84.423
81.589
81.532
79.207
66.185
66.167
65.993
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53.043
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52.023
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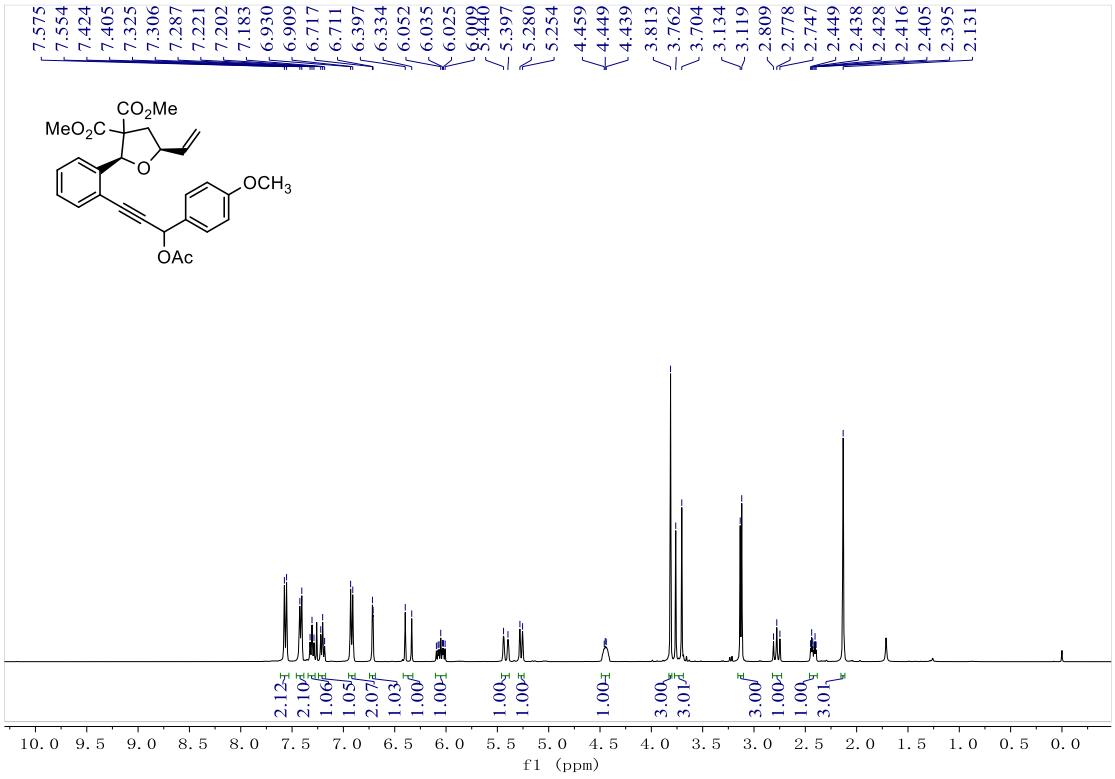
21.165
f1 (ppm)

7e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7.306
7.287
7.221
7.202
7.183
6.930
6.909
6.717
6.711
6.397
6.334
6.052
6.035
6.025
6.009
5.440
5.397
5.280
5.254
4.459
4.449
4.439
3.813
3.762
3.704
3.134
3.119
2.809
2.778
2.747
2.449
2.438
2.428
2.416
2.405
2.395
2.131
CO2Me
MeO2C
O
OCH3
OAc
2.12
2.10
1.06
1.05
2.07
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1.00
1.00
1.00
1.00
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3.00
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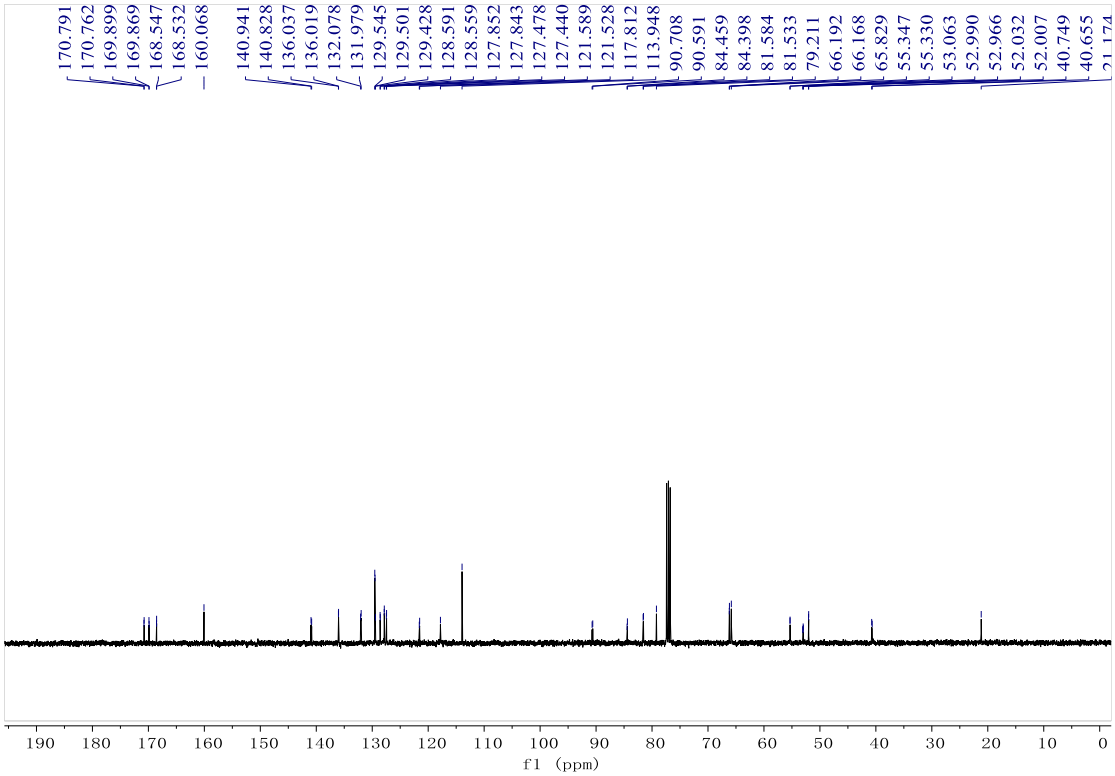
3.01
f1 (ppm)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129.428
128.591
128.559
127.852
127.843
127.478
127.440
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121.528
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90.708
90.591
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84.398
81.584
81.533
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66.168
65.829
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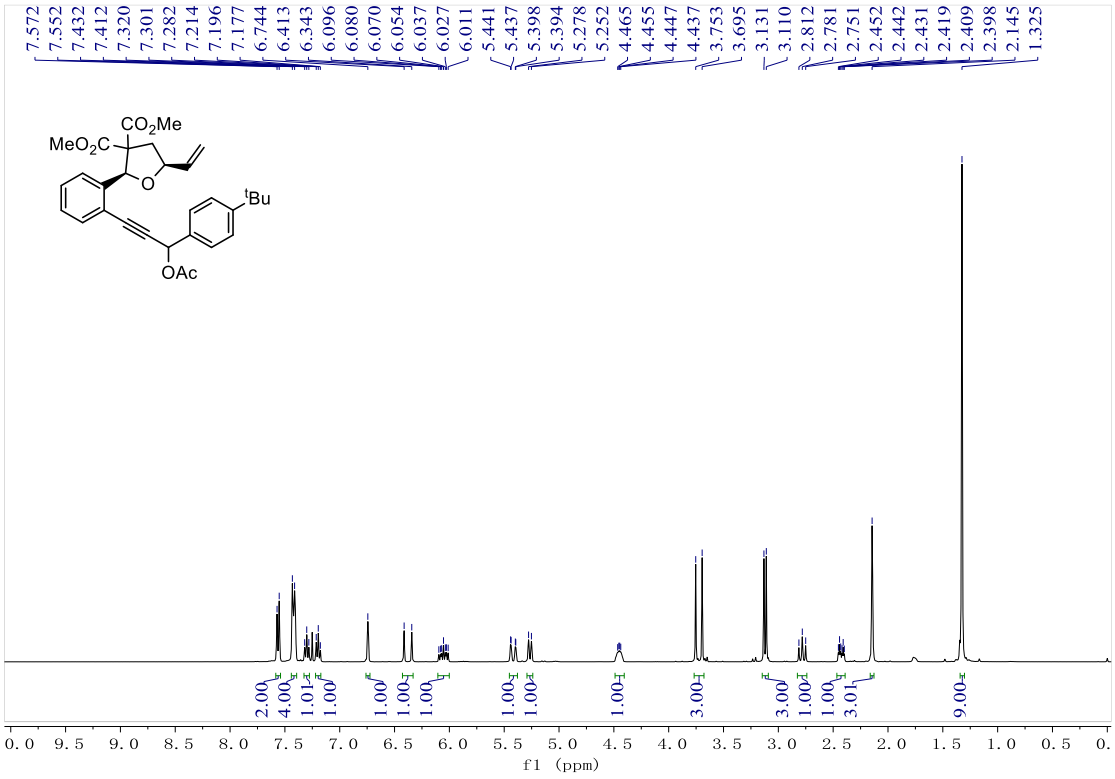
f1 (ppm)

7f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7.214
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7.177
6.744
6.413
6.343
6.096
6.080
6.070
6.054
6.037
6.027
6.011
5.441
5.437
5.398
5.394
5.278
5.252
4.465
4.455
4.447
4.437
3.753
3.695
3.131
3.110
2.812
2.781
2.751
2.452
2.442
2.431
2.419
2.409
2.398
2.145
1.325
CO2Me
MeO2C
O
tBu
OAc
2.00
4.00
1.01
1.00
1.00
1.00
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1.00
1.00
1.00
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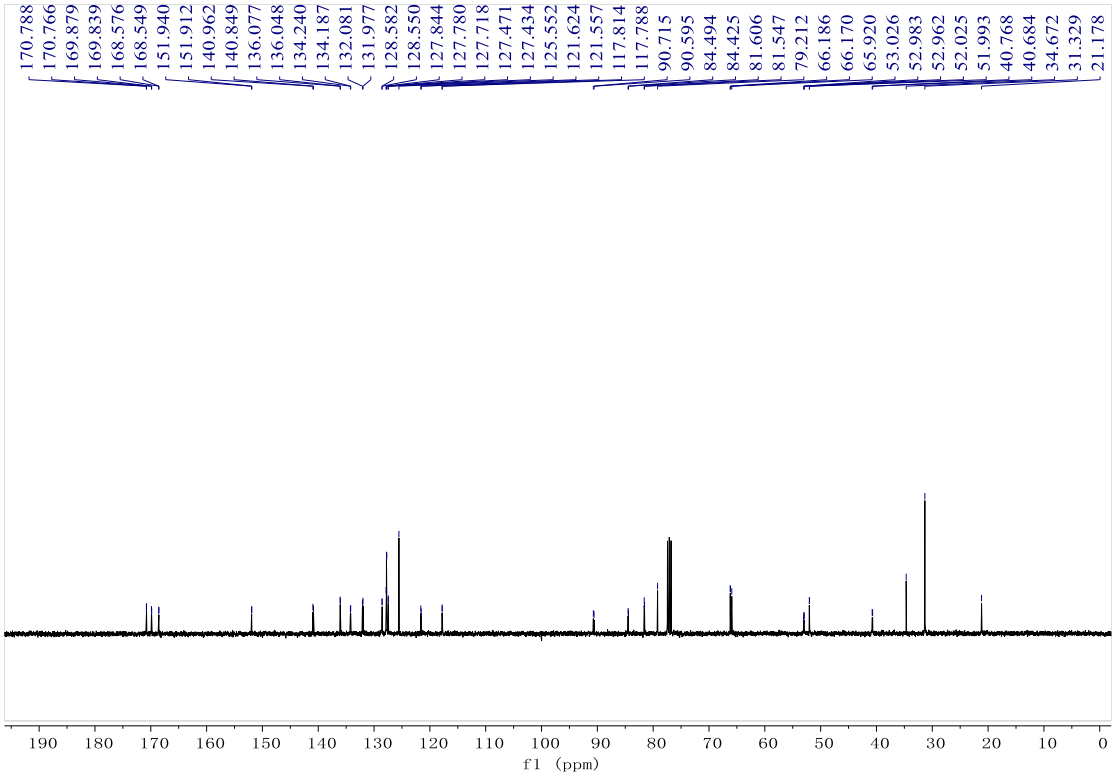
f1 (ppm)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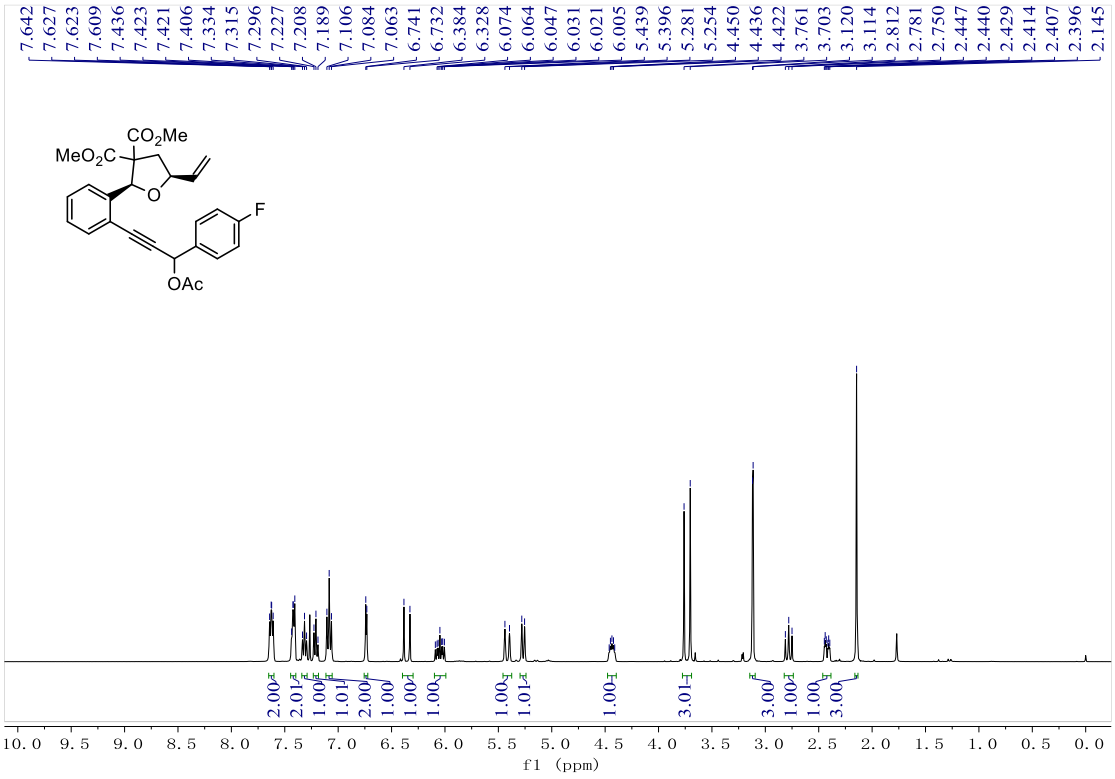
136.077
136.048
134.240
134.187
132.081
131.977
128.582
128.550
127.844
127.780
127.718
127.471
127.434
125.552
121.624
121.557
117.814
117.788
90.715
90.595
84.494
84.425
81.606
81.547
79.212
66.186
66.170
65.920
53.026
52.983
52.962
52.025
51.993
40.768
40.684
34.672
31.329
21.178
f1 (ppm)

7g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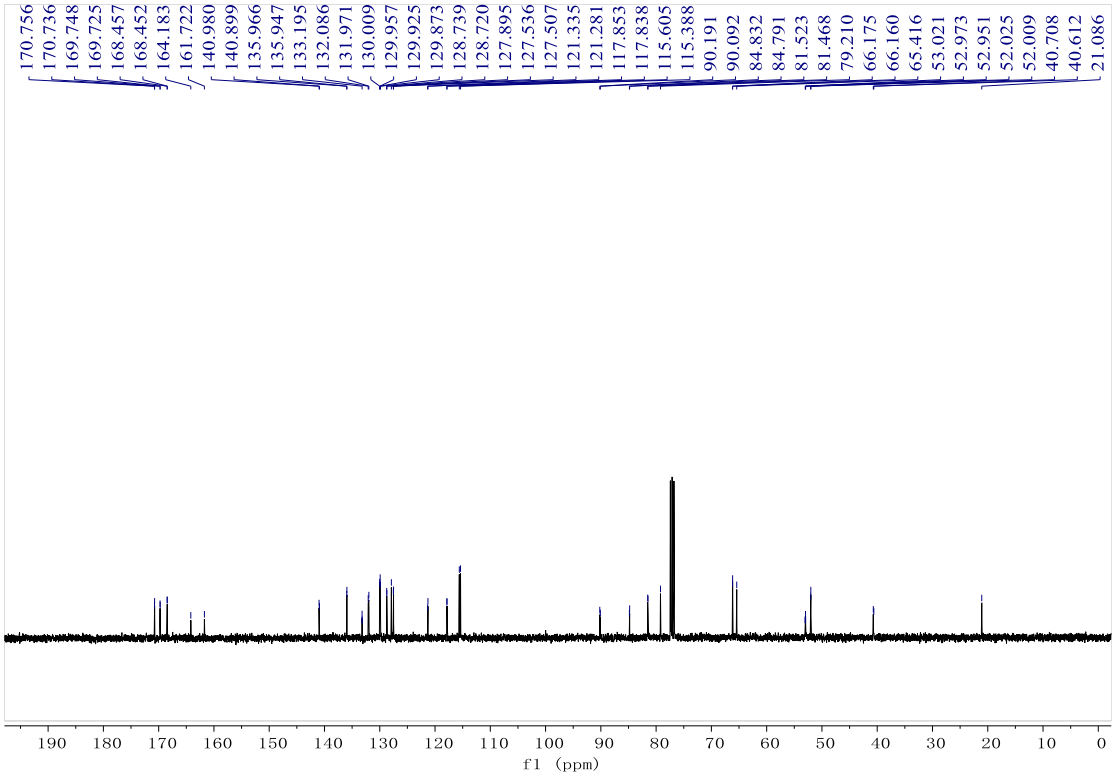
7.436
7.423
7.421
7.406
7.334
7.315
7.296
7.227
7.208
7.189
7.106
7.084
7.063
6.741
6.732
6.384
6.328
6.074
6.064
6.047
6.031
6.021
6.005
5.439
5.396
5.281
5.254
4.450
4.436
4.422
3.761
3.703
3.120
3.114
2.812
2.781
2.750
2.447
2.440
2.429
2.414
2.407
2.396
2.145
CO2Me
MeO2C
O
F
OAc
2.00
2.01
1.00
1.01
2.00
1.00
1.00
1.00
1.01
1.00
3.01
3.00
1.00
1.00
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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169.748
169.725
168.457
168.452
164.183
161.722
140.980
140.899
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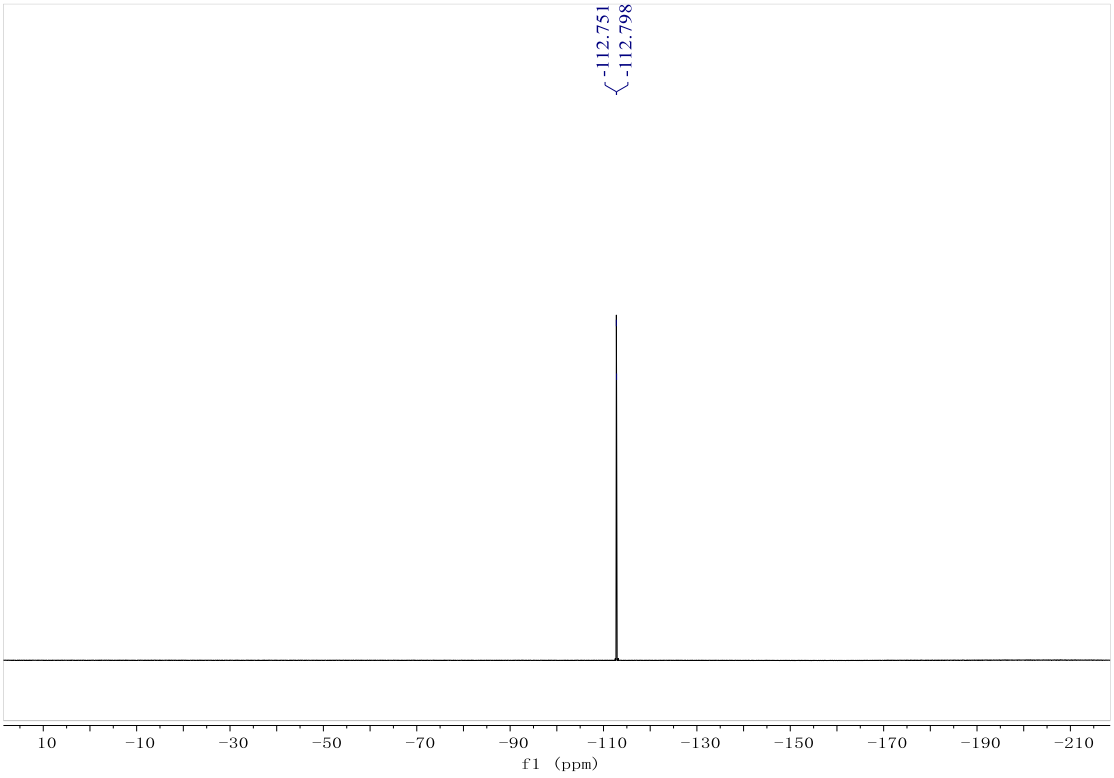
135.947
133.195
132.086
131.971
130.009
129.957
129.925
129.873
128.739
128.720
127.895
127.536
127.507
121.335
121.281
117.853
117.838
115.605
115.388
90.191
90.092
84.832
84.791
81.523
81.468
79.210
66.175
66.160
65.416
53.021
52.973
52.951
52.025
52.009
40.708
40.612
21.086
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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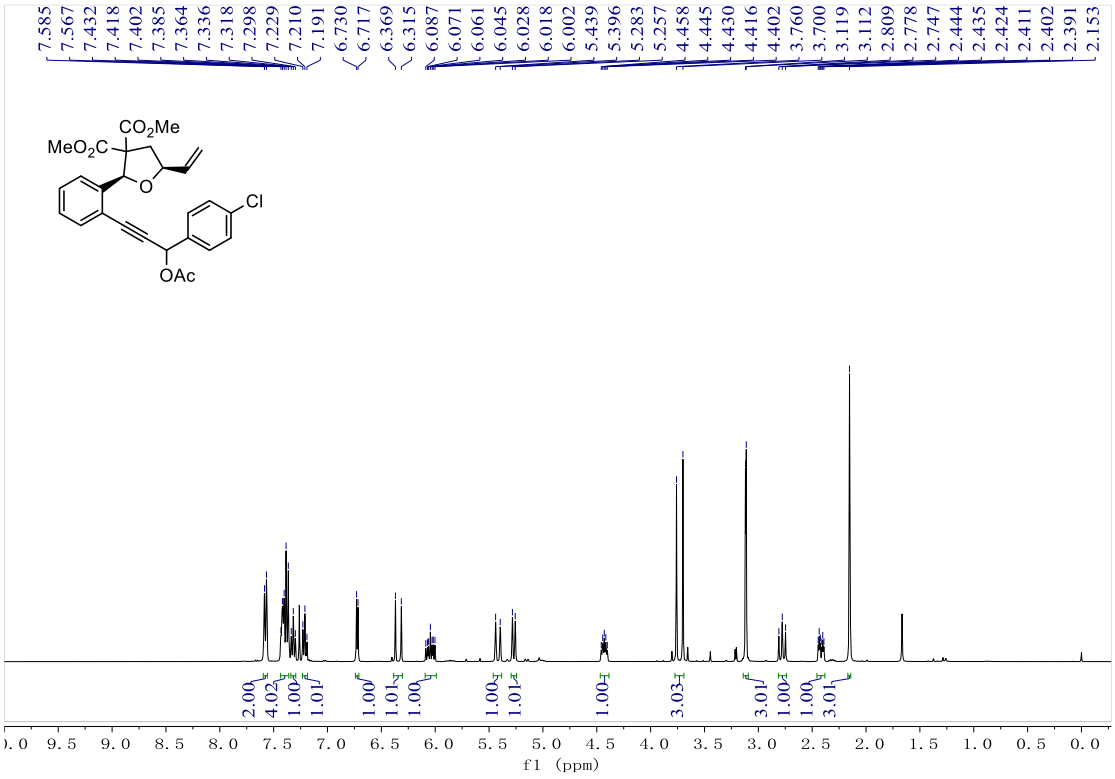
-112.798
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

7h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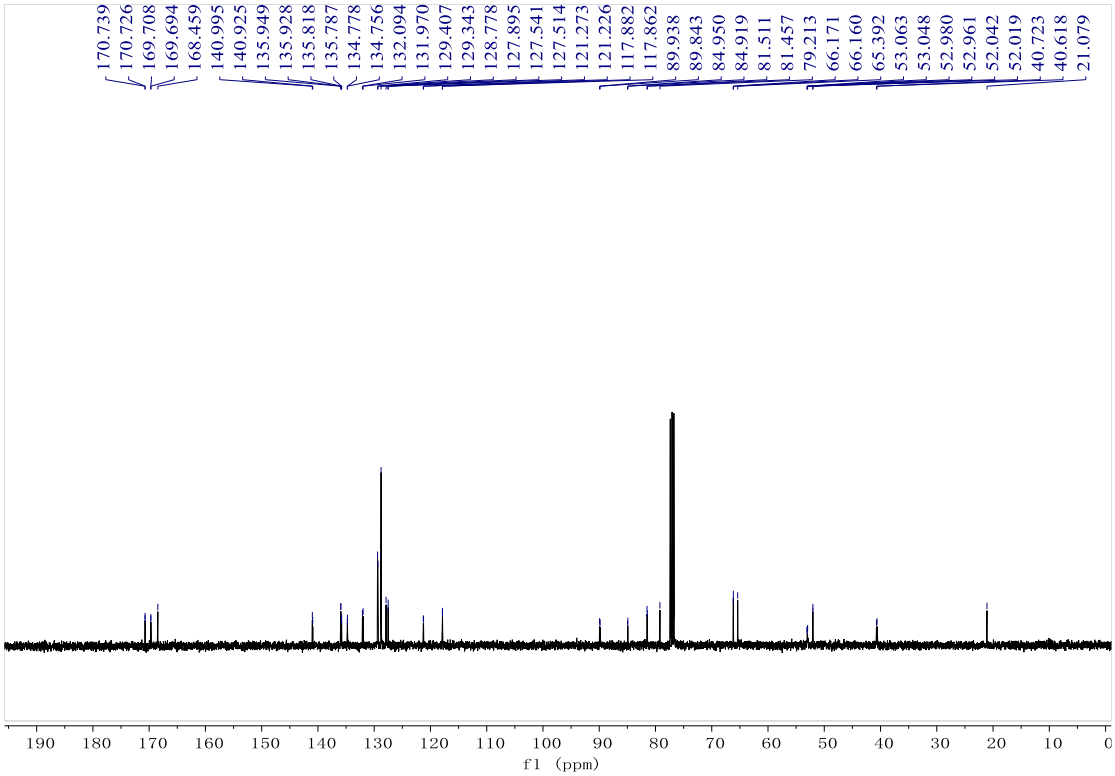
7.567
7.432
7.418
7.402
7.385
7.364
7.336
7.318
7.298
7.229
7.210
7.191
6.730
6.717
6.369
6.315
6.087
6.071
6.061
6.045
6.028
6.018
6.002
5.439
5.396
5.283
5.257
4.458
4.445
4.430
4.416
4.402
3.760
3.700
3.119
3.112
2.809
2.778
2.747
2.444
2.435
2.424
2.411
2.402
2.391
2.153
CO2Me
MeO2C
O
Cl
OAc
2.00
4.02
1.00
1.01
1.00
1.01
1.00
1.00
1.01
1.00
3.03
3.01
1.00
3.01
f1 (ppm)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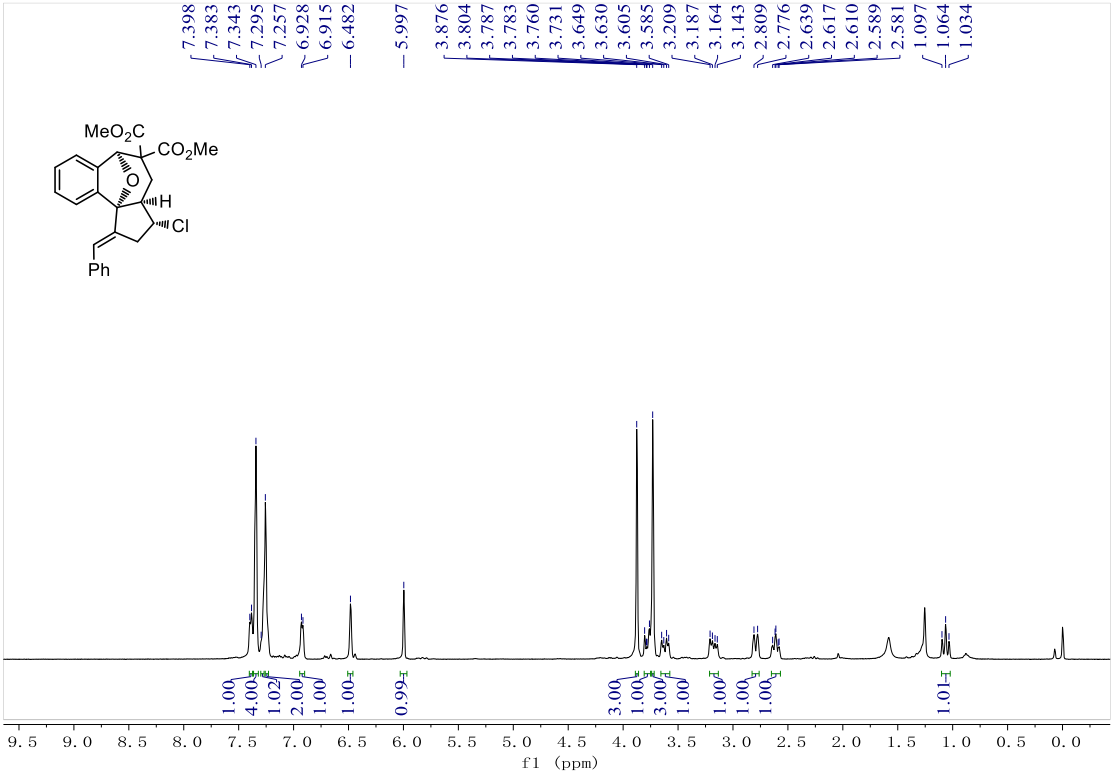
170.726
169.708
169.694
168.459
140.995
140.925
135.949
135.928
135.818
135.787
134.778
134.756
132.094
131.970
129.407
129.343
128.778
127.895
127.541
127.514
121.273
121.226
117.882
117.862
89.938
89.843
84.950
84.919
81.511
81.457
79.213
66.171
66.160
65.392
53.063
53.048
52.980
52.961
52.042
52.019
40.723
40.618
21.079
f1 (ppm)

9a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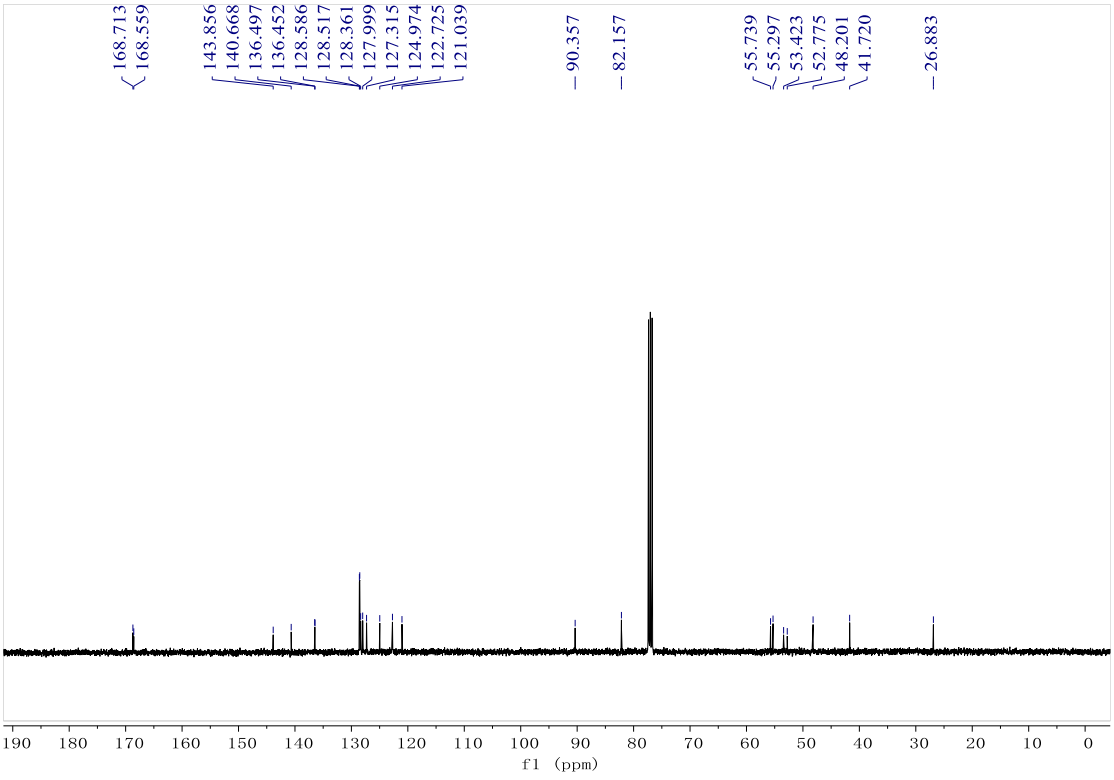
7.383
7.343
7.295
7.257
6.928
6.915
6.482
5.997
3.876
3.804
3.787
3.783
3.760
3.731
3.649
3.630
3.605
3.585
3.209
3.187
3.164
3.143
2.809
2.776
2.639
2.617
2.610
2.589
2.581
1.097
1.064
1.034
MeO2C
CO2Me
O
H
Cl
Ph
1.00
4.00
1.02
2.00
1.00
1.00
0.99
3.00
1.00
3.00
1.00
1.00
1.00
1.00
1.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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143.856
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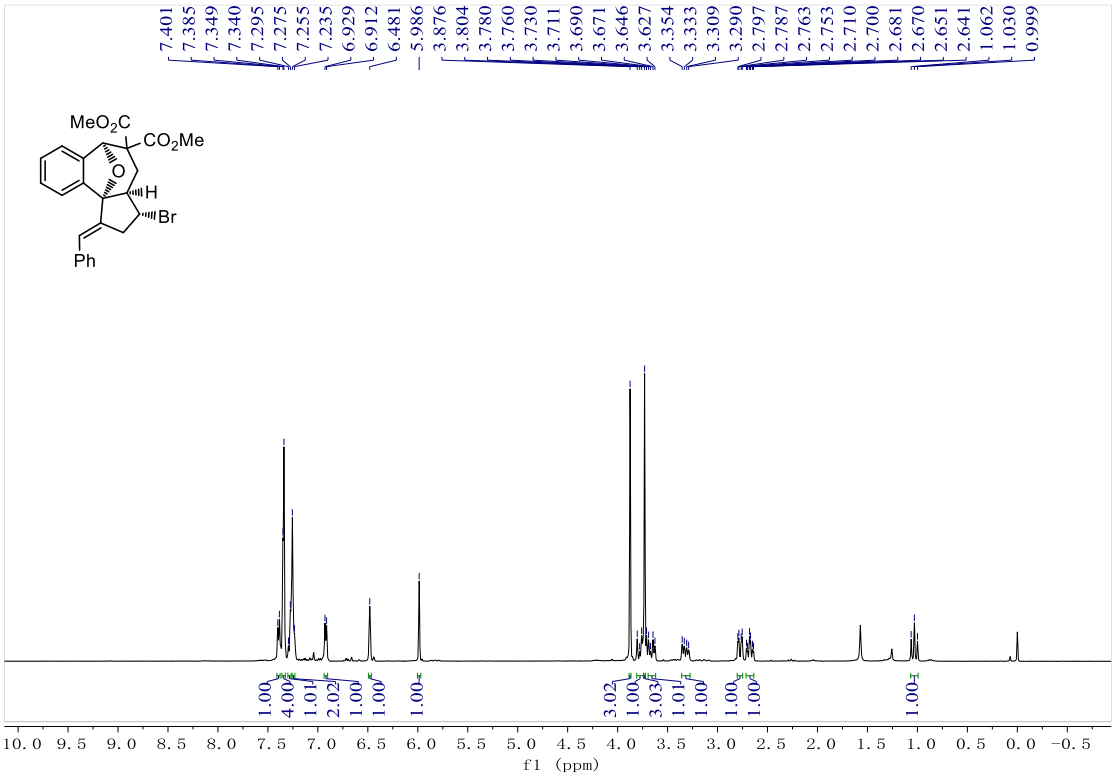
136.452
128.586
128.517
128.361
127.999
127.315
124.974
122.725
121.039
90.357
82.157
55.739
55.297
53.423
52.775
48.201
41.720
26.883
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

9b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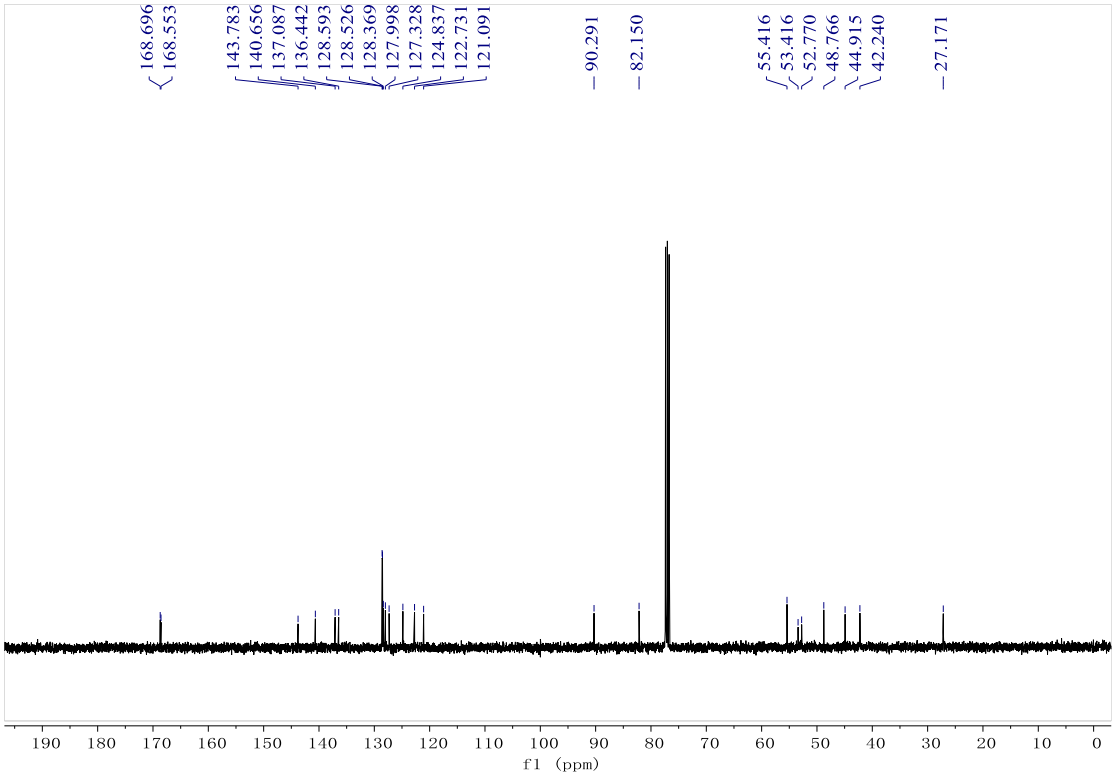
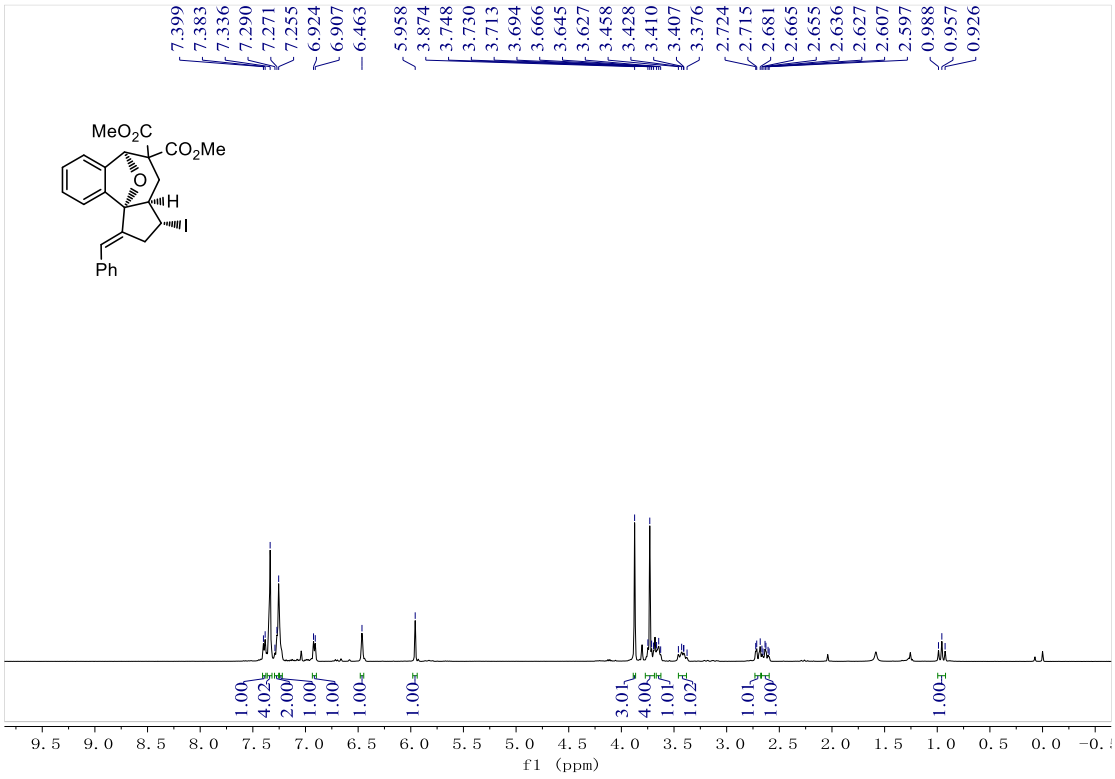
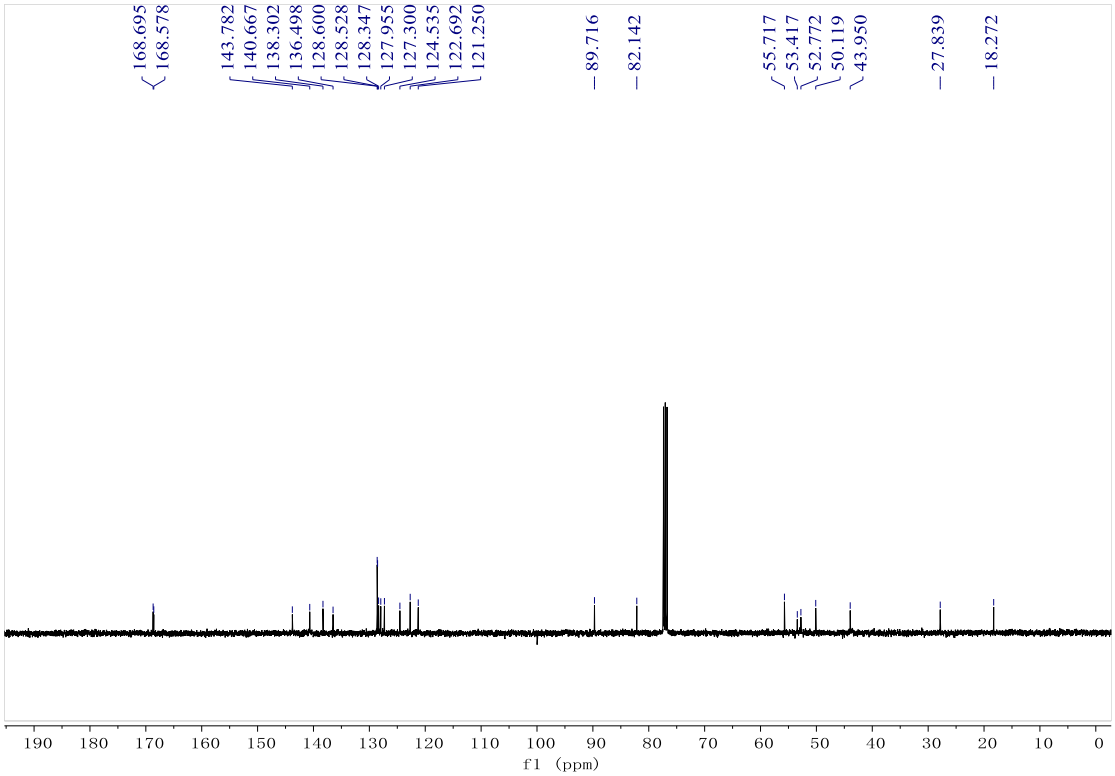
7.385
7.349
7.340
7.295
7.275
7.255
7.235
6.929
6.912
6.481
5.986
3.876
3.804
3.780
3.760
3.730
3.711
3.690
3.671
3.646
3.627
3.354
3.333
3.309
3.290
2.797
2.787
2.763
2.753
2.710
2.700
2.681
2.670
2.651
2.641
1.062
1.030
0.999
MeO2C
CO2Me
O
H
Br
Ph
1.00
4.00
1.01
2.02
1.00
1.00
3.02
1.00
3.03
1.01
1.00
1.00
1.00
1.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

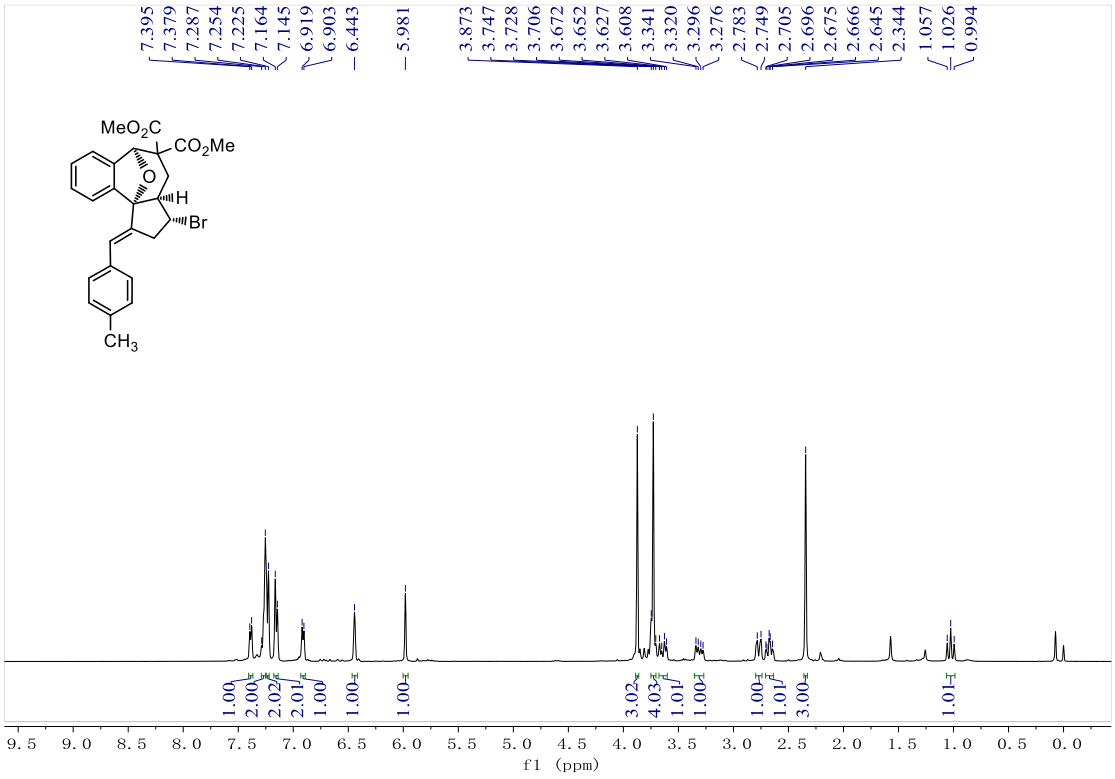

168.696
168.553
143.783
140.656
137.087
136.442
128.593
128.526
128.369
127.998
127.328
124.837
122.731
121.091
90.291
82.150
55.416
53.416
52.770
48.766
44.915
42.240
27.171
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

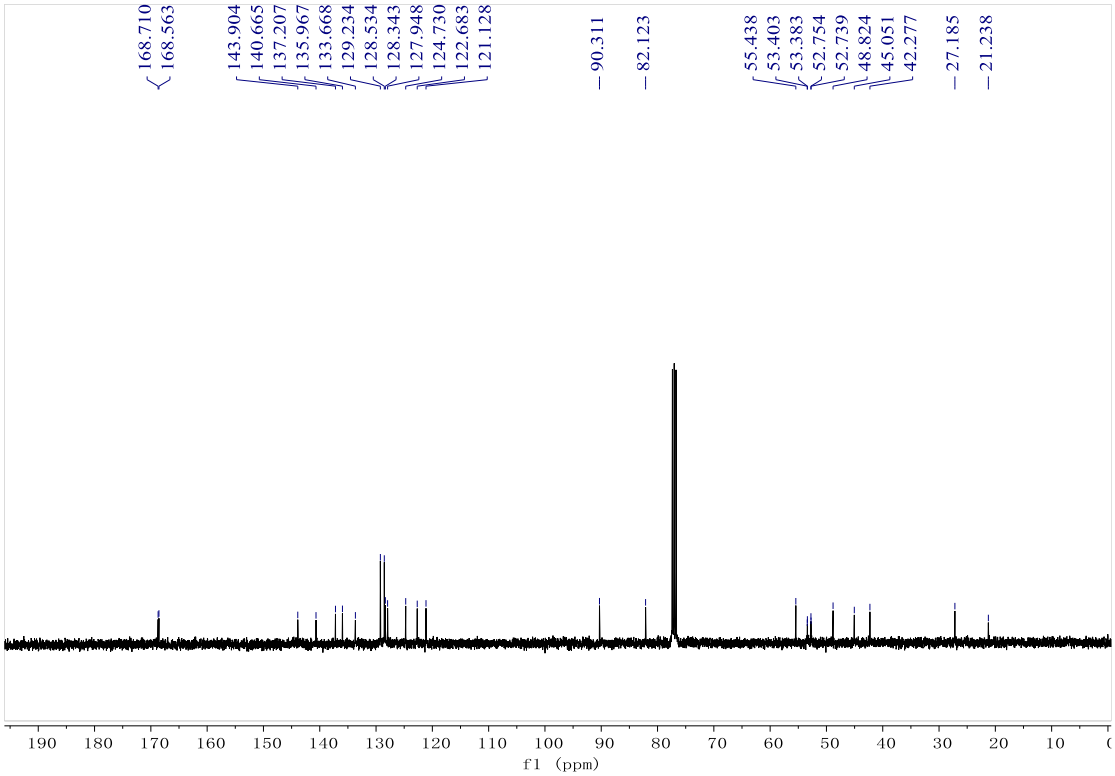
9c


7.399
7.383
7.336
7.290
7.271
7.255
6.924
6.907
6.463
5.958
3.874
3.748
3.730
3.713
3.694
3.666
3.645
3.627
3.458
3.428
3.410
3.407
3.376
2.724
2.715
2.681
2.665
2.655
2.636
2.627
2.607
2.597
0.988
0.957
0.926
MeO2C
CO2Me
O
H
I
Ph
1.00
4.02
2.00
1.00
1.00
1.00
1.00
3.01
4.00
1.01
1.02
1.01
1.00
1.00
f1 (ppm)


168.695
168.578
143.782
140.667
138.302
136.498
128.600
128.528
128.347
127.955
127.300
124.535
122.692
121.250
89.716
82.142
55.717
53.417
52.772
50.119
43.950
27.839
18.272
f1 (ppm)

9d


7.395
7.379
7.287
7.254
7.225
7.164
7.145
6.919
6.903
6.443
5.981
3.873
3.747
3.728
3.706
3.672
3.652
3.627
3.608
3.341
3.320
3.296
3.276
2.783
2.749
2.705
2.696
2.675
2.666
2.645
2.344
1.057
1.026
0.994
MeO2C
CO2Me
O
H
Br
CH3
1.00
2.00
2.02
2.01
1.00
1.00
1.00
3.02
4.03
1.01
1.00
1.00
1.01
3.00
1.01
f1 (ppm)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168.563
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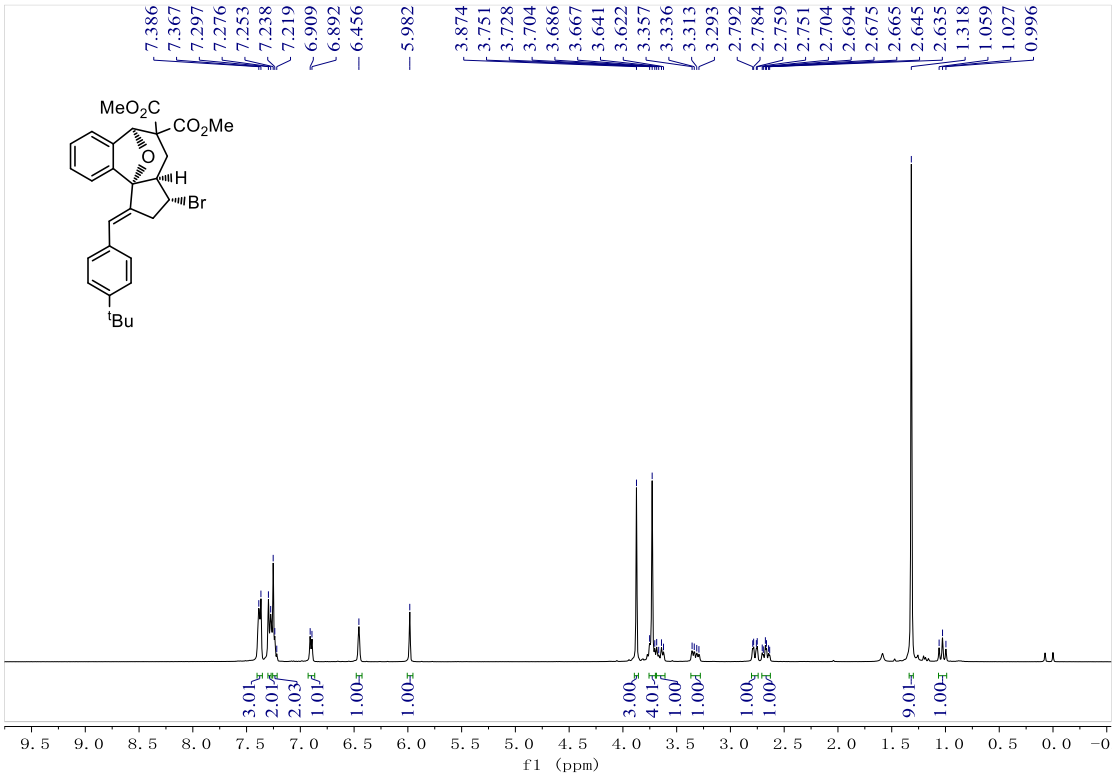
137.207
135.967
133.668
129.234
128.534
128.343
127.948
124.730
122.683
121.128
90.311
82.123
55.438
53.403
53.383
52.754
52.739
48.824
45.051
42.277
27.185
21.238
f1 (ppm)

9f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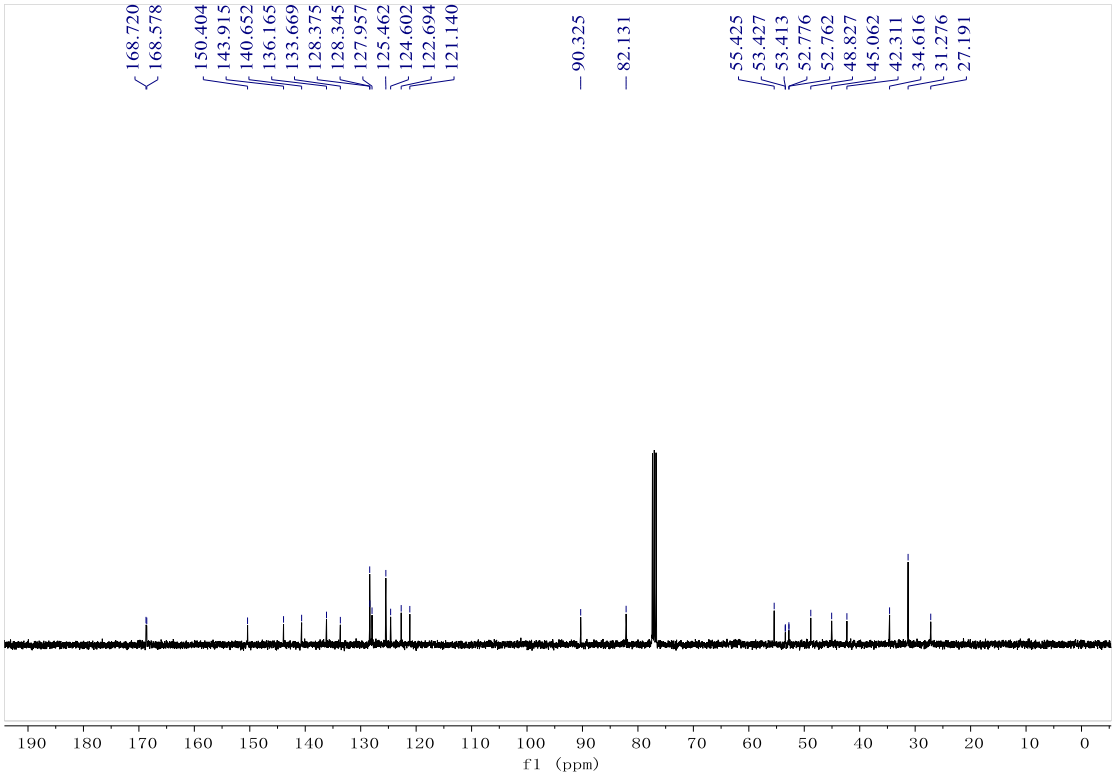
7.367
7.297
7.276
7.253
7.238
7.219
6.909
6.892
6.456
5.982
3.874
3.751
3.728
3.704
3.686
3.667
3.641
3.622
3.357
3.336
3.313
3.293
2.792
2.784
2.759
2.751
2.704
2.694
2.675
2.665
2.645
2.635
1.318
1.059
1.027
0.996
MeO2C
CO2Me
O
H
Br
tBu
3.01
2.01
2.03
1.01
1.00
1.00
3.00
4.01
1.00
1.00
1.00
1.00
9.01
1.00
f1 (ppm)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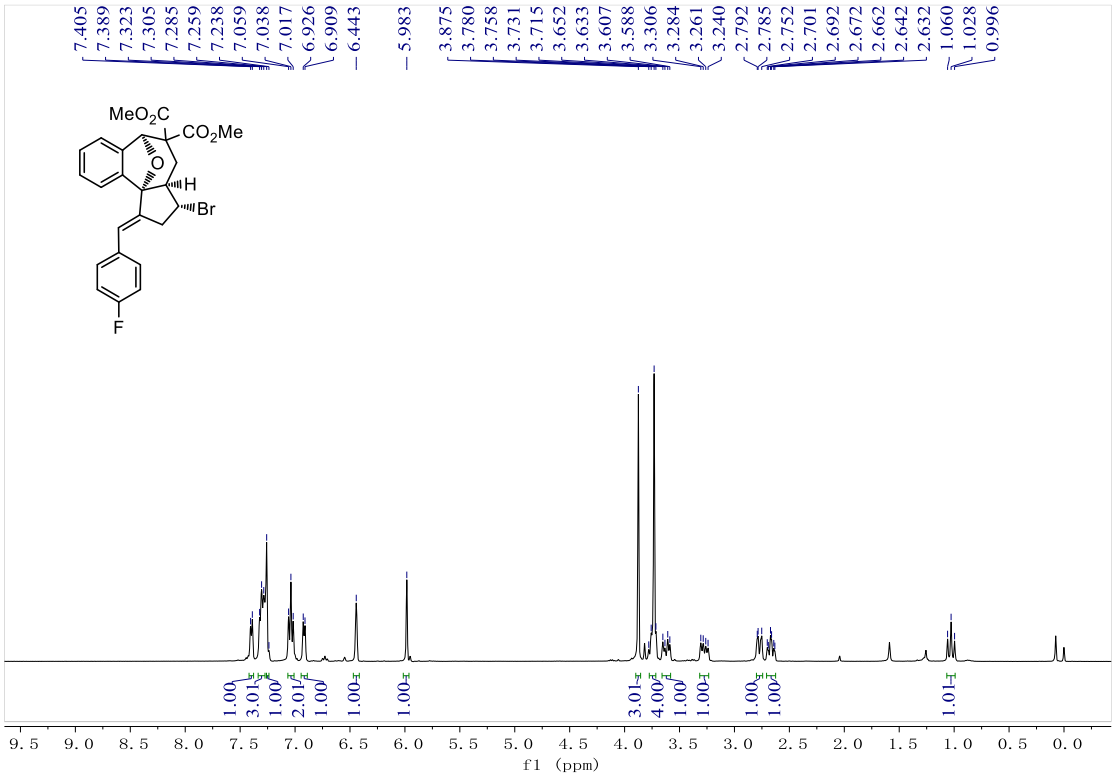
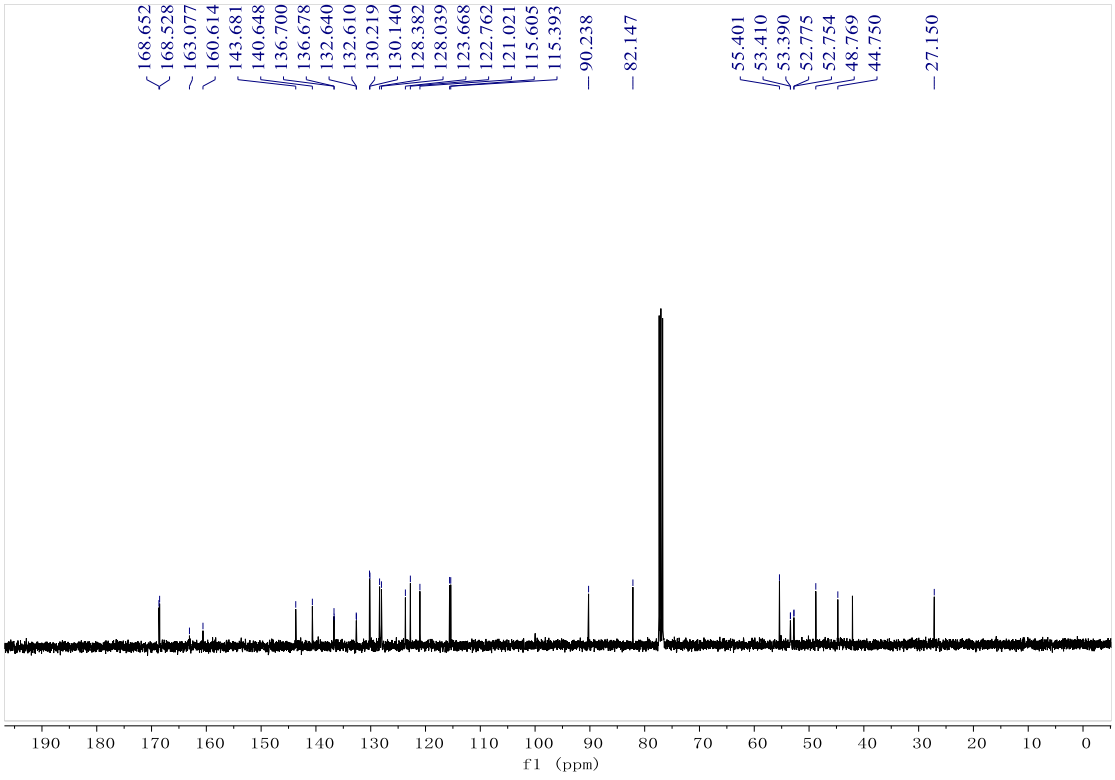
150.404
143.915
140.652
136.165
133.669
128.375
128.345
127.957
125.462
124.602
122.694
121.140
90.325
82.131
55.425
53.427
53.413
52.776
52.762
48.827
45.062
42.311
34.616
31.276
27.191
f1 (ppm)

9g


7.405
7.389
7.323
7.305
7.285
7.259
7.238
7.059
7.038
7.017
6.926
6.909
6.443
5.983
3.875
3.780
3.758
3.731
3.715
3.652
3.633
3.607
3.588
3.306
3.284
3.261
3.240
2.792
2.785
2.752
2.701
2.692
2.672
2.662
2.642
2.632
1.060
1.028
0.996
MeO2C
CO2Me
O
H
Br
F
1.00
3.01
1.00
2.01
1.00
1.00
1.00
3.01
4.00
1.00
1.00
1.00
1.00
1.01
f1 (ppm)


168.652
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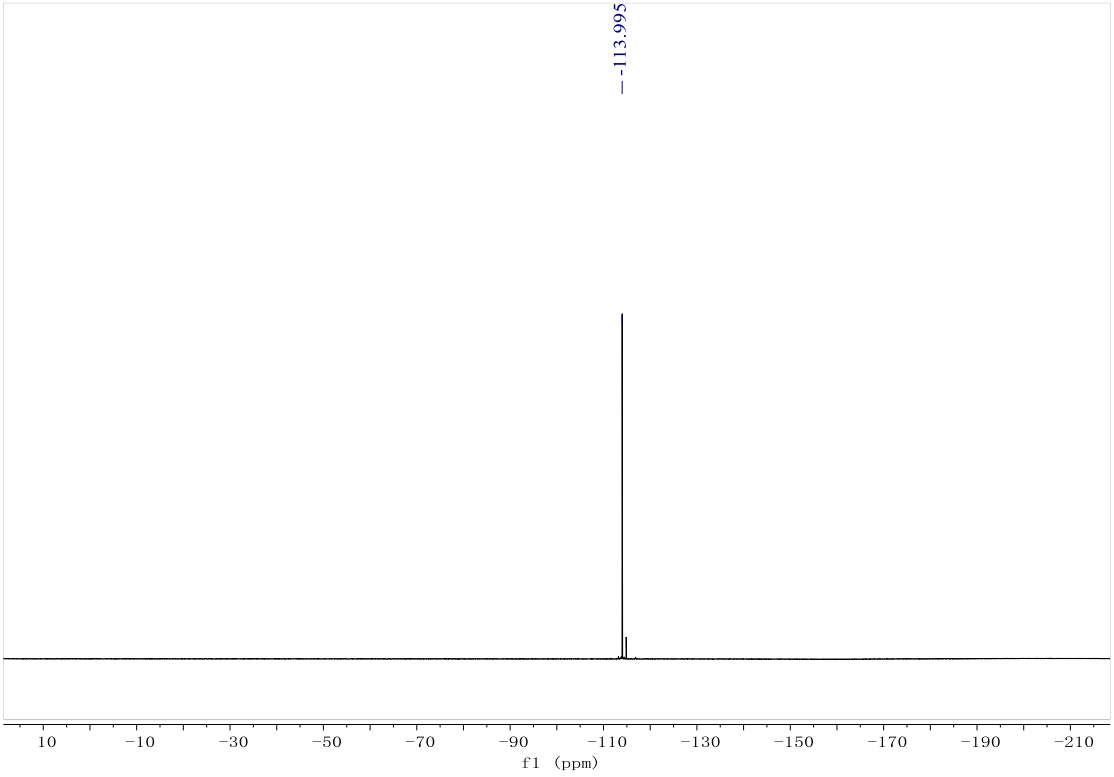
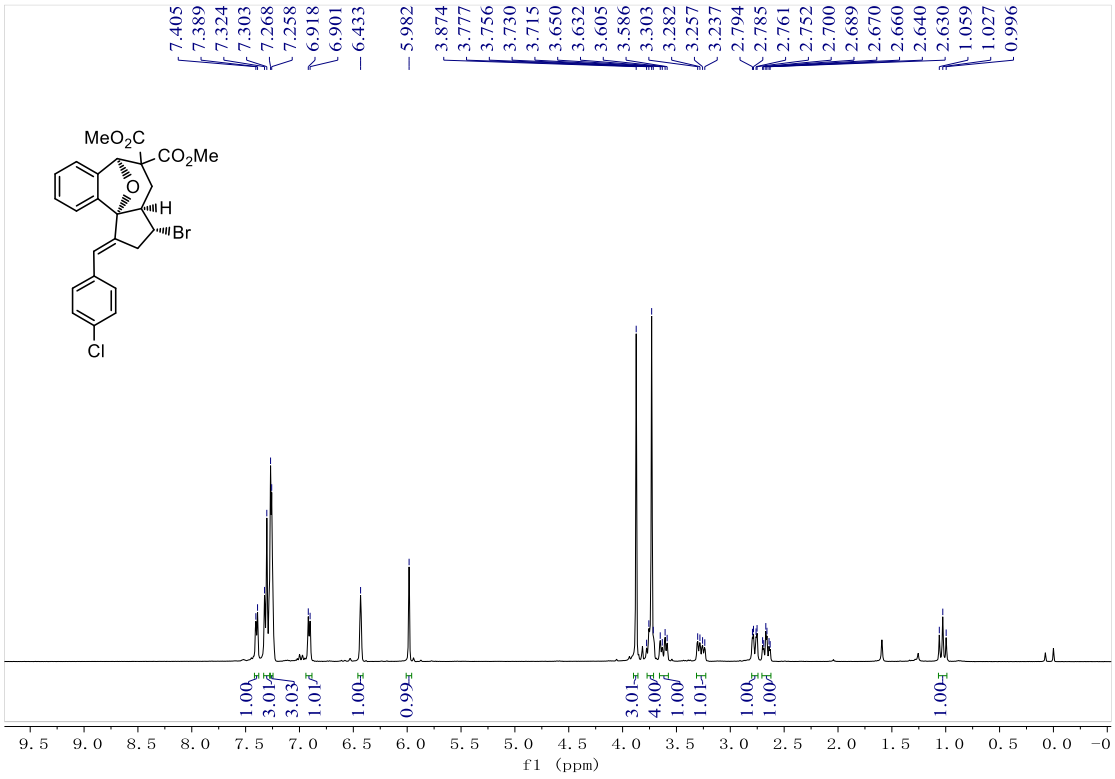
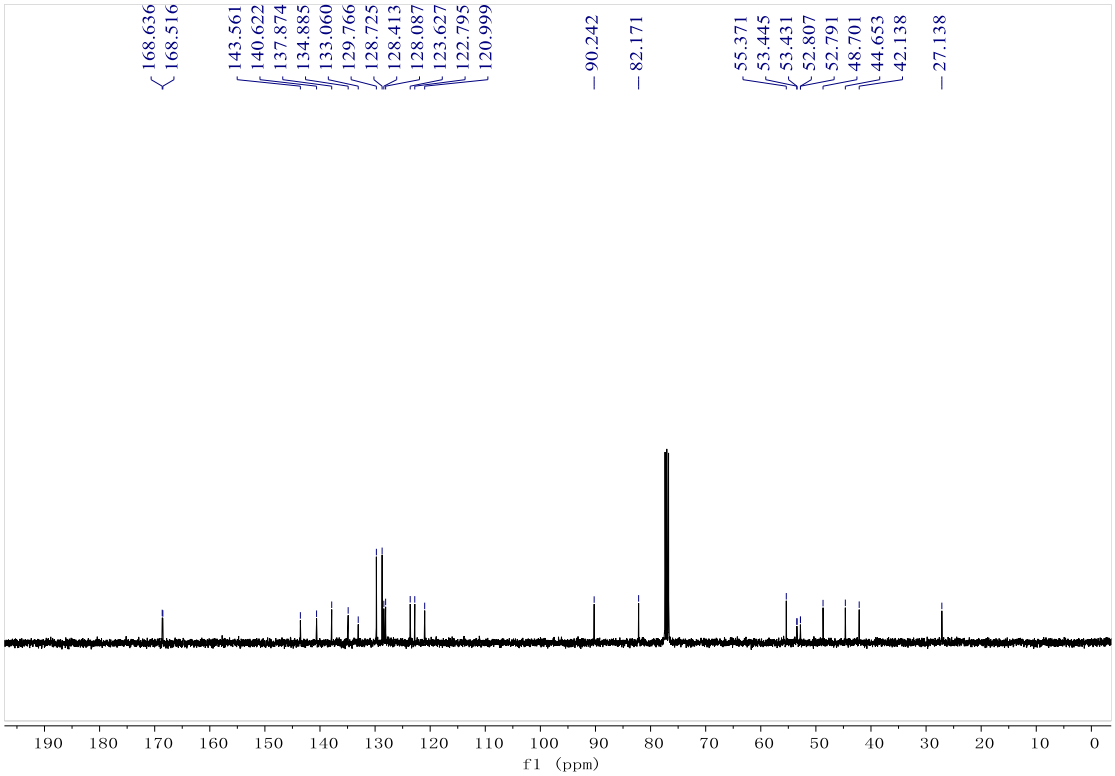
140.648
136.700
136.678
132.640
132.610
130.219
130.140
128.382
128.039
123.668
122.762
121.021
115.605
115.393
90.238
82.147
55.401
53.410
53.390
52.775
52.754
48.769
44.750
27.150
f1 (ppm)


-113.995
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
f1 (ppm)

9h


7.405
7.389
7.324
7.303
7.268
7.258
6.918
6.901
6.433
5.982
3.874
3.777
3.756
3.730
3.715
3.650
3.632
3.605
3.586
3.303
3.282
3.257
3.237
2.794
2.785
2.761
2.752
2.700
2.689
2.670
2.660
2.640
2.630
1.059
1.027
0.996
MeO2C
CO2Me
O
H
Br
Cl
1.00
3.01
3.03
1.01
1.00
0.99
3.01
4.00
1.00
1.01
1.00
1.00
1.00
f1 (ppm)


168.636
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140.622
137.874
134.885
133.060
129.766
128.725
128.413
128.087
123.627
122.795
120.999
90.242
82.171
55.371
53.445
53.431
52.807
52.791
48.701
44.653
42.138
27.138
f1 (ppm)