Supporting Information

Preparation of Cu Cluster Catalysts by Simultaneous Cooling-Microwave Heating: Application in Radical Cascade Annulation

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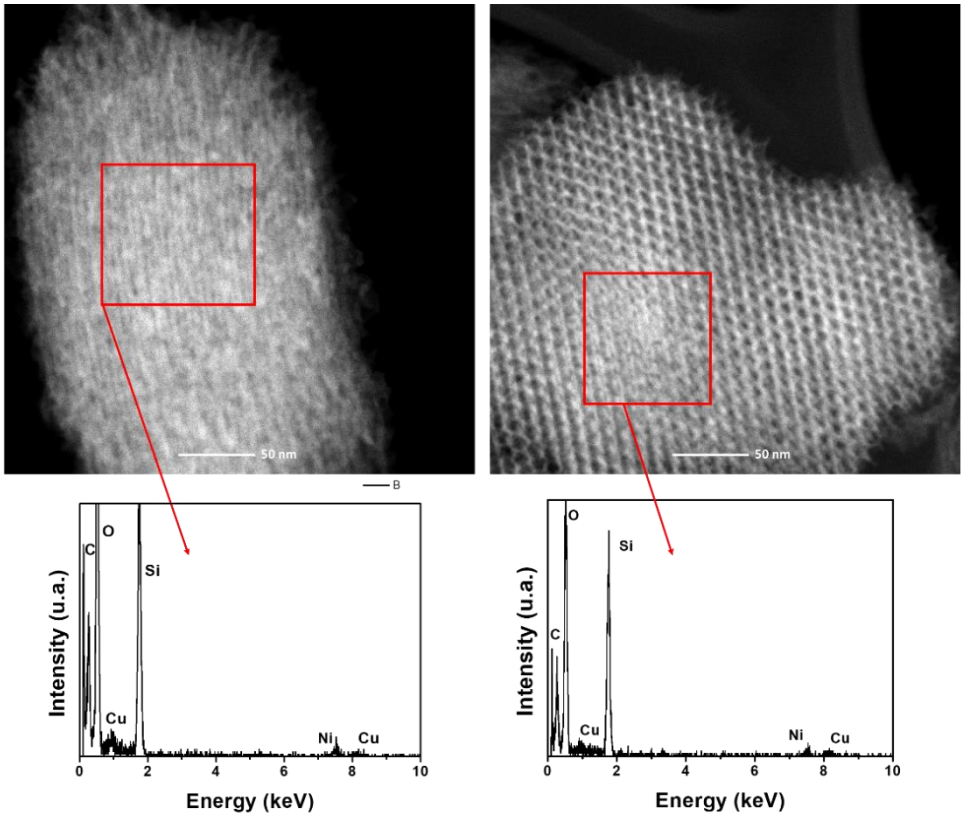
Contents

General information

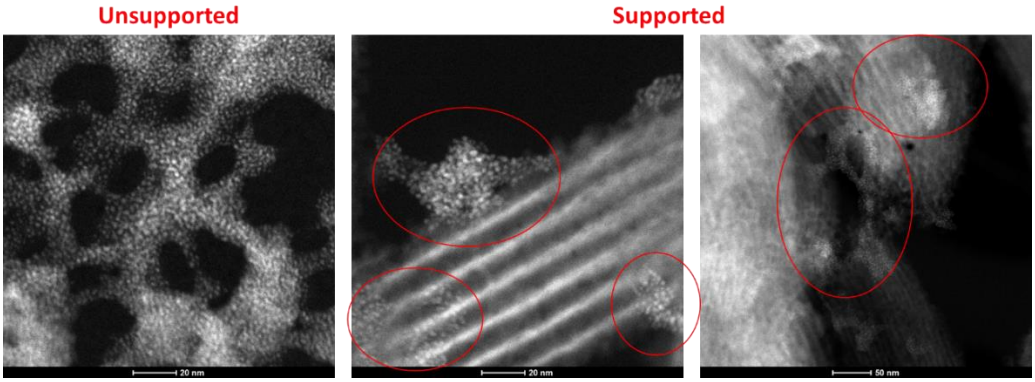
Commercially available reagents were used without additional purification. Substrate **1** were synthesized according to the literature.[1] Column chromatography was performed with silica gel (70-230 mesh). ^{1}H and ^{13}C NMR spectra were recorded on a Bruker AM (300 or 400 MHz) spectrometer at ambient temperature using $CDCl_3$ as solvent. HRMS (ESI) spectrometry data were acquired on a quadrupole orthogonal acceleration time-of-flight mass spectrometer [Synapt G2 high definition mass spectrometer (HDMS), Waters, Milford, MA]. Samples were infused at 3 μL min^{-1}, and spectra were obtained in the positive ionization mode with a resolution of 15000 [full width at half maximum (FWHM)] with leucine encephalin as lock mass. Melting points were recorded on a Reichert Thermovar apparatus and are uncorrected.

Additional characterization of Cu NCs

EDS analysis of two different areas were presented. Even if the low contrast between copper and silica did not allow to clearly distinguish the nanoclusters from the substrate, an evident Cu signal was observed in different zones. Therefore, we may conclude that copper was uniformly distributed over SBA-15.

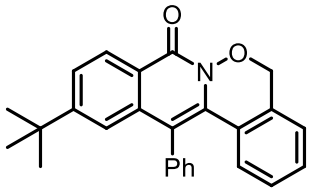


The PAA stabilizer ligand forms two bonds with the Cu(II) resulting in inter-chain connection of the polymeric template. The interaction between the reticulated PAA-Cu structure and the support is low, observing a non-uniform grafting.



Cu NCs-catalyzed radical cascade annulations

To a Schlenk flask equipped with a stir bar were added **1** (0.1 mmol), Cu NCs (5 mol%), *t*BuOOH (50 mol%) and 1,4-dioxane (1.0 mL) without any particular precautions to extrude oxygen or moisture. The reaction vial was immersed in an oil bath preheated at 100 °C and stirred at 800 rpm. After the 20 h, the reaction mixture was centrifuged and the catalyst was washed three times with 1,4-dioxane. The resulting organic layer was evaporated under reduced pressure, and the residue was purified by silica gel column chromatography (*n*-heptane/ethyl acetate from 2:1 to 1:2).



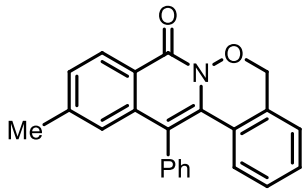
2a

2a was obtained as a yellow solid (64%). Melting point 245 - 247 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.50 (d, *J* = 8.5 Hz, 1H), 7.58 (d, *J* = 8.4 Hz, 1H), 7.48 (s, 3H), 7.28 (dd, *J* = 8.6, 4.4 Hz, 2H), 7.21 (s, 3H), 6.93 (t, *J* = 7.0 Hz, 1H), 6.80 (d, *J* = 8.1 Hz, 1H), 5.23 (s, 2H), 1.22 (s, 9H).

^{13}C NMR (75 MHz, $CDCl_3$) δ 156.5, 155.5, 136.6, 136.1, 135.2, 131.6, 131.4, 129.4, 129.3, 128.5, 128.2, 127.6, 127.3, 126.4, 125.2, 124.7, 123.7, 122.0, 116.7, 73.3, 35.2, 30.9.

HRMS (ESI) calculated for $C_{26}H_{24}NO_2^+$ ($[M+H]^+$): 382.1801, found 382.1799.



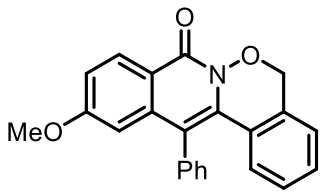
2b

2b was obtained as a yellow solid (68%). Melting point 241 - 243 °C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.50 (d, *J* = 8.2 Hz, 1H), 7.52 (dd, *J* = 6.9, 2.9 Hz, 3H), 7.36 (dd, *J* = 8.2, 1.1 Hz, 1H), 7.30 (dd, *J* = 6.5, 3.0 Hz, 2H), 7.27 – 7.20 (m, 2H), 7.01 (s, 1H), 6.98 – 6.91 (m, 1H), 6.77 (d, *J* = 8.1 Hz, 1H), 5.27 (s, 2H), 2.38 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.6, 142.7, 136.6, 136.3, 135.3, 131.8, 131.5, 129.4, 128.8, 128.6, 128.2, 127.8, 127.3, 126.4, 125.6, 124.7, 123.7, 116.2, 73.3, 22.1.

HRMS (ESI) calculated for $C_{23}H_{18}NO_2^+$ ([M+H]$^+$): 340.1332, found 340.1339.



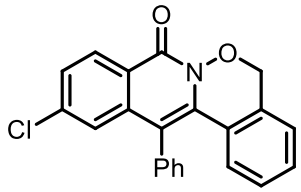
2c

2c was obtained as a yellow solid (51%). Melting point 219 - 221 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.52 (d, *J* = 8.9 Hz, 1H), 7.50 (dd, *J* = 5.1, 1.9 Hz, 3H), 7.31 (d, *J* = 3.9 Hz, 2H), 7.24 (d, *J* = 6.7 Hz, 2H), 7.11 (dd, *J* = 8.9, 2.5 Hz, 1H), 6.95 (td, *J* = 7.3, 6.4, 2.3 Hz, 1H), 6.79 (d, *J* = 8.1 Hz, 1H), 6.60 (d, *J* = 2.4 Hz, 1H), 5.26 (s, 2H), 3.73 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.6, 156.4, 138.3, 136.5, 135.3, 132.3, 131.4, 129.9, 129.5, 129.4, 128.7, 128.2, 127.3, 126.3, 124.7, 119.7, 115.9, 107.9, 73.3, 55.3.

HRMS (ESI) calculated for $C_{23}H_{18}NO_3^+$ ([M+H]$^+$): 356.1281, found 356.1280.



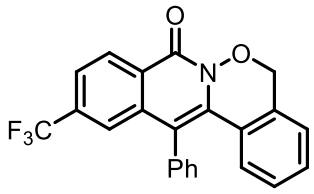
2d

2d was obtained as a yellow solid (40%). Melting point 199 - 201 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.53 (d, *J* = 8.6 Hz, 1H), 7.57 – 7.50 (m, 3H), 7.47 (dd, *J* = 8.6, 2.0 Hz, 1H), 7.29 (q, *J* = 2.5, 2.0 Hz, 3H), 7.23 (dd, *J* = 10.4, 2.2 Hz, 2H), 6.96 (td, *J* = 7.6, 6.9, 1.9 Hz, 1H), 6.79 (d, *J* = 8.1 Hz, 1H), 5.28 (s, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.1, 138.9, 137.6, 135.7, 135.2, 133.0, 131.4, 129.7, 129.6, 129.5, 129.1, 128.6, 127.6, 127.5, 125.9, 125.2, 124.8, 124.1, 115.3, 73.3.

HRMS (ESI) calculated for $C_{22}H_{15}ClNO_2^+$ ([M+H]$^+$): 360.0786, found 360.0788.



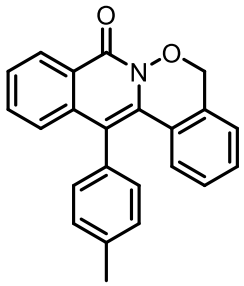
2e

2e was obtained as a yellow solid (28%). Melting point 173 - 175 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.72 (d, *J* = 8.5 Hz, 1H), 7.72 (d, *J* = 8.5 Hz, 1H), 7.58 – 7.50 (m, 4H), 7.32 – 7.26 (m, 4H), 6.98 (t, *J* = 7.3 Hz, 1H), 6.81 (d, *J* = 8.1 Hz, 1H), 5.30 (s, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 155.9, 136.4, 135.4, 135.2, 131.3, 129.8, 129.6, 129.3, 129.0, 128.8, 127.6, 125.7, 124.8, 123.1 (q, *J* = 4.2 Hz), 123.0 (q, *J* = 3.5 Hz), 115.9, 73.3.

HRMS (ESI) calculated for $C_{23}H_{15}F_3NO_2^+$ ([M+H]$^+$): 394.1049, found 394.1041.



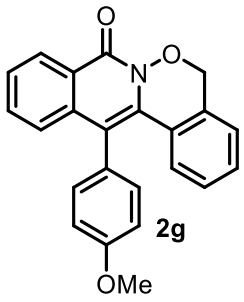
2f

2f was obtained as a yellow solid (55%). Melting point 261 - 263 °C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.61 – 8.55 (m, 1H), 7.57 – 7.47 (m, 2H), 7.30 (d, *J* = 7.8 Hz, 2H), 7.26 – 7.18 (m, 3H), 7.16 (d, *J* = 7.9 Hz, 2H), 7.00 – 6.92 (m, 1H), 6.86 (d, *J* = 8.1 Hz, 1H), 5.25 (s, 2H), 2.47 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.6, 138.0, 136.5, 135.2, 133.3, 132.0, 131.7, 131.2, 130.2, 129.5, 128.6, 127.7, 127.4, 127.0, 126.4, 126.0, 125.9, 124.7, 116.4, 73.3, 21.4.

HRMS (ESI) calculated for $C_{23}H_{18}NO_2^+$ ([M+H]$^+$): 340.1332, found 340.1338.



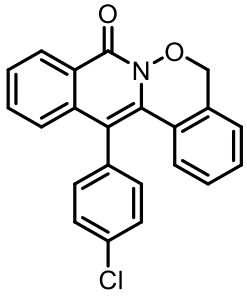
2g

2g was obtained as a yellow solid (57%). Melting point 223 - 225 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.60 (d, *J* = 8.5 Hz, 1H), 7.55 (dq, *J* = 14.2, 7.1 Hz, 2H), 7.31 – 7.19 (m, 5H), 7.02 (dd, *J* = 14.6, 7.6 Hz, 3H), 6.89 (d, *J* = 8.0 Hz, 1H), 5.27 (s, 2H), 3.93 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.5, 156.6, 136.7, 135.2, 132.5, 132.0, 129.4, 128.6, 128.4, 127.8, 127.5, 127.0, 126.4, 126.0, 124.7, 124.3, 116.1, 114.9, 114.2, 73.3, 55.4.

HRMS (ESI) calculated for $C_{23}H_{18}NO_3^+$ ([M+H]$^+$): 356.1281, found 356.1272.



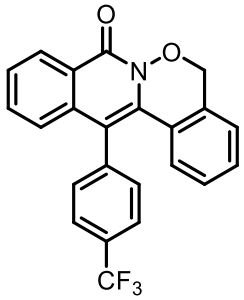
2h

2h was obtained as a yellow solid (47%). Melting point 210 - 212 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.61 (d, *J* = 7.6 Hz, 1H), 7.66 – 7.46 (m, 5H), 7.24 (dd, *J* = 15.0, 8.0 Hz, 4H), 7.04 (t, *J* = 7.3 Hz, 1H), 6.85 (d, *J* = 8.0 Hz, 1H), 5.27 (s, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.6, 136.0, 135.4, 135.0, 134.4, 132.9, 132.3, 129.8, 129.3, 129.0, 128.0, 127.6, 127.3, 126.0, 125.9, 125.6, 124.9, 114.9, 73.3.

HRMS (ESI) calculated for $C_{22}H_{15}ClNO_2^+$ ([M+H]$^+$): 360.0786, found 360.0787.



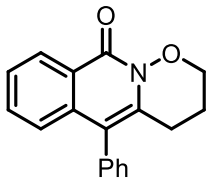
2i

2i was obtained as a yellow solid (52%). Melting point 272 - 274 °C.

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.68 – 8.56 (m, 1H), 7.79 (d, *J* = 8.0 Hz, 2H), 7.63 – 7.52 (m, 2H), 7.47 (d, *J* = 7.8 Hz, 2H), 7.30 – 7.26 (m, 2H), 7.16 (d, *J* = 7.2 Hz, 1H), 6.99 (t, *J* = 7.4 Hz, 1H), 6.74 (d, *J* = 8.1 Hz, 1H), 5.29 (s, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.5, 140.6, 135.6, 135.5, 132.4, 132.1, 129.3, 129.1, 128.1, 127.6, 127.4, 126.4 (q, *J* = 3.7 Hz), 125.9, 125.7, 125.4, 125.0, 114.6, 100.0, 73.3.

HRMS (ESI) calculated for $C_{23}H_{15}F_3NO_2^+$ ([M+H]$^+$): 394.1049, found 394.1045.

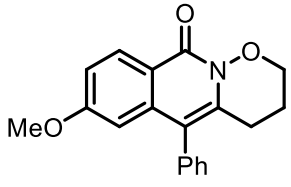


2j

2j was obtained as a yellow solid (46%).[2]

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.55 (d, *J* = 8.0 Hz, 1H), 7.55 – 7.43 (m, 5H), 7.33 – 7.27 (m, 2H), 7.18 (d, *J* = 7.9 Hz, 1H), 4.52 – 4.39 (m, 2H), 2.73 (t, *J* = 6.8 Hz, 2H), 2.16 – 2.00 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.4, 138.4, 136.2, 135.1, 131.9, 131.1, 128.9, 128.0, 127.8, 126.0, 125.5, 125.1, 114.8, 70.9, 21.8, 21.4.

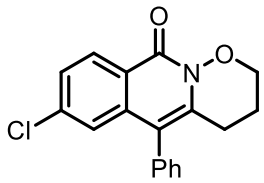


2k

2k was obtained as a yellow solid (51%).[2]

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.47 (d, *J* = 8.9 Hz, 1H), 7.58 – 7.41 (m, 3H), 7.34 – 7.27 (m, 2H), 7.04 (dd, *J* = 8.9, 2.4 Hz, 1H), 6.54 (d, *J* = 2.3 Hz, 1H), 4.50 – 4.38 (m, 2H), 3.72 (s, 3H), 2.70 (t, *J* = 6.8 Hz, 2H), 2.08 (dq, *J* = 14.5, 7.2 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.5, 157.2, 139.0, 138.2, 135.2, 131.1, 129.9, 129.3, 128.9, 128.0, 119.4, 114.8, 114.3, 113.8, 106.9, 70.8, 55.3, 21.8, 21.5.



2l

2l was obtained as a yellow solid (56%).[2]

^{1}H NMR (300 MHz, $CDCl_3$) δ 8.47 (d, *J* = 8.6 Hz, 1H), 7.59 – 7.43 (m, 3H), 7.40 (dd, *J* = 8.7, 1.8 Hz, 1H), 7.32 – 7.22 (m, 2H), 7.14 (d, *J* = 1.6 Hz, 1H), 4.52 – 4.38 (m, 2H), 2.71 (t, *J* = 6.9 Hz, 2H), 2.18 – 2.01 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.8, 140.0, 138.7, 137.5, 134.3, 131.0, 129.6, 129.1, 128.9, 128.9, 128.3, 126.6, 124.4, 123.8, 113.9, 70.9, 21.7, 21.6.

Single crystal X-ray diffraction

A single crystal of **2a** was obtained by slow diffusion from a solution of the compound in $CHCl_3$ layered with heptane at room temperature for several days. X-ray intensity data were collected at 294(2) K on an Agilent SuperNova diffractometer with Eos CCD detector using MoKα radiation. The images were processed (unit cell determination, intensity data integration, correction for Lorentz and polarization effects, and empirical absorption correction) using CrysAlisPRO[3]. Using Olex2[4], the structure was solved with the ShelXT[5] structure solution program using Intrinsic Phasing and refined with the ShelXL[6] refinement package using full-matrix least-squares minimization on F^2. The asymmetric unit contains one molecule **2a** and one molecule $CHCl_3$. All H atoms were placed in idealized positions and refined in the riding mode. Non-hydrogen atoms were refined anisotropically and hydrogen atoms with isotropic temperature factors fixed at 1.2 times U_{eq} of the parent atoms (1.5 for methyl groups). Crystal data, data collection and structure refinement details are summarized in Table S1. Crystallographic data for **2a** has been deposited with the Cambridge Crystallographic Data Centre as supplementary publication number CCDC 2041832.

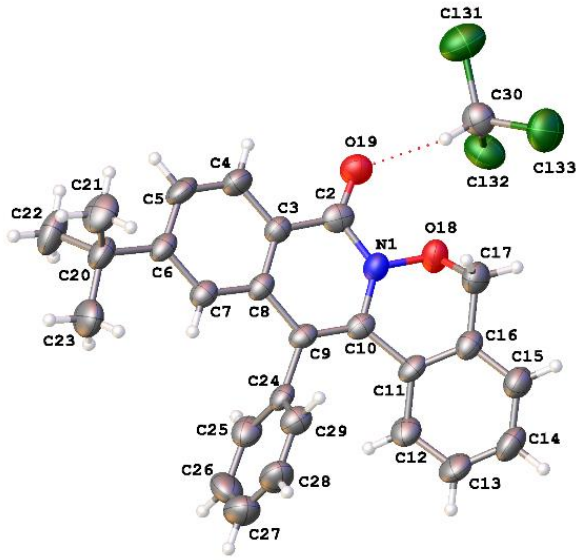


Figure S1. Molecular structure of **2a** showing the atom-labelling scheme. Displacement ellipsoids are drawn at the 50% probability level. H atoms are shown as small circles of arbitrary radii.

Table S1. Crystal data, data collection and structure refinement details of compound **2a**

	2a
Empirical formula	$C_{27}H_{24}Cl_3NO_2$
Formula weight	500.82
Temperature/K	294
Crystal system	monoclinic
Space group	*I*2/a
a/Å	27.341(2)
b/Å	6.0723(2)
c/Å	31.6111(16)
α/°	90
β/°	107.460(7)
γ/°	90
Volume/Å^3	5006.4(5)
Z	8
ρ_{calc} g/cm^3	1.329
μ/mm^{-1}	0.391
F(000)	2080.0
Crystal size/mm^3	0.4 × 0.1 × 0.05
Radiation	MoKα (λ = 0.71073 Å)
2Θ range for data collection/°	5.37 to 52.74
Index ranges	-34 ≤ h ≤ 34, -7 ≤ k ≤ 7, -25 ≤ l ≤ 39
Reflections collected	12531

Independent reflections	5119 [R_{int} = 0.0927, R_{sigma} = 0.1193]
Data/restraints/parameters	5119/0/301
Goodness-of-fit on F^2	0.967
Final R indexes [I>=2σ (I)]	R1 = 0.0625, wR_2 = 0.1115
Final R indexes [all data]	R1 = 0.1515, wR_2 = 0.1503
Largest diff. peak/hole / e $Å^{-3}$	0.20/-0.34

References

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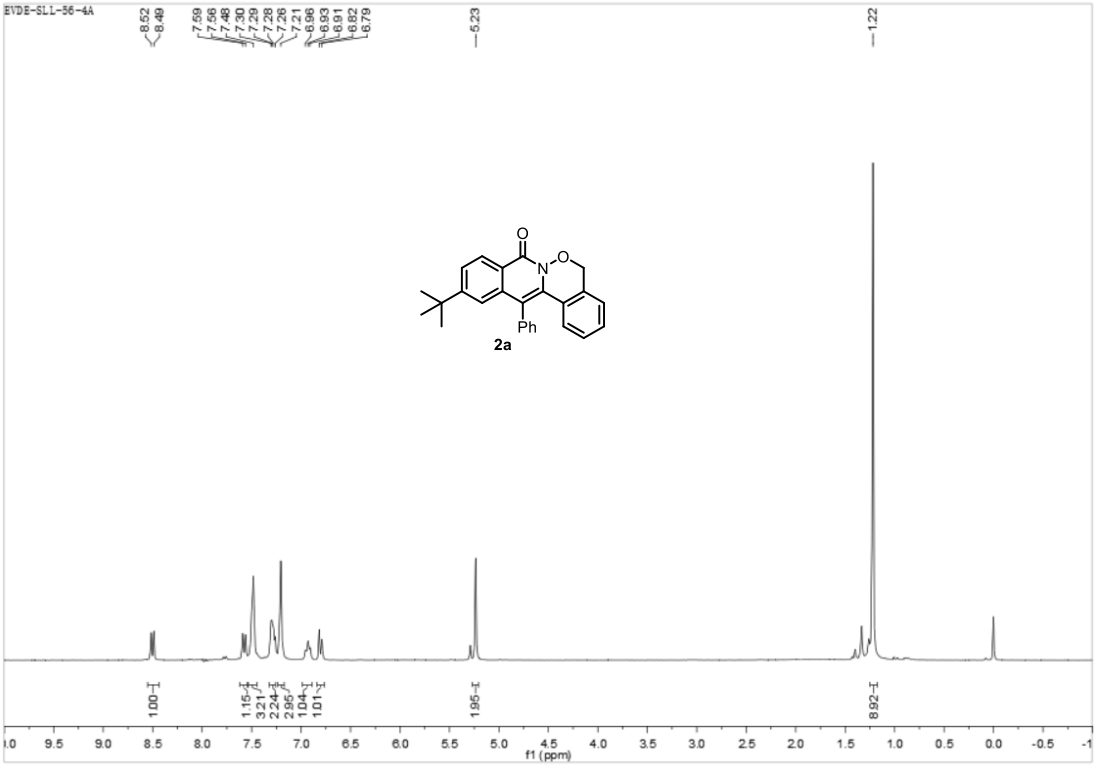
NMR spectra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8.49
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7.56
7.48
7.30
7.29
7.28
7.26
7.21
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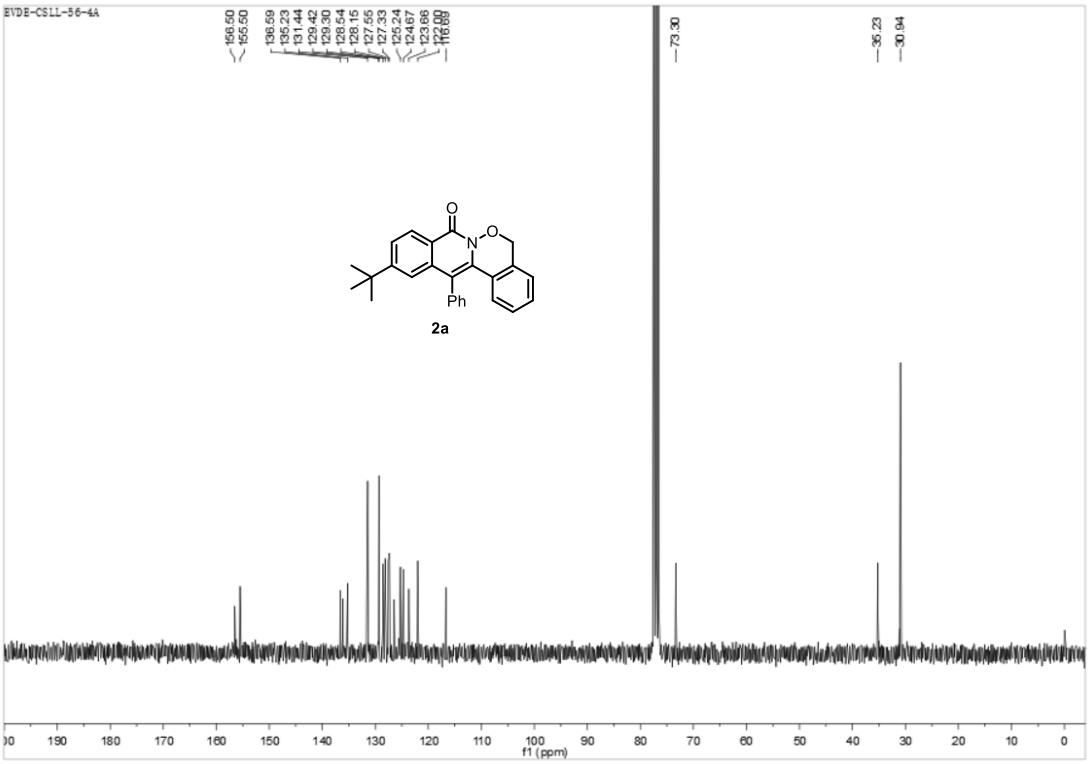
6.93
6.91
6.82
6.79
5.23
1.22
O
N
O
Ph
2a
1.00
1.15
3.21
2.24
2.95
1.04
1.01
1.95
8.92
f1 (ppm)


EVDE-CSLL-56-4A
156.50
155.50
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135.23
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128.15
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77.30
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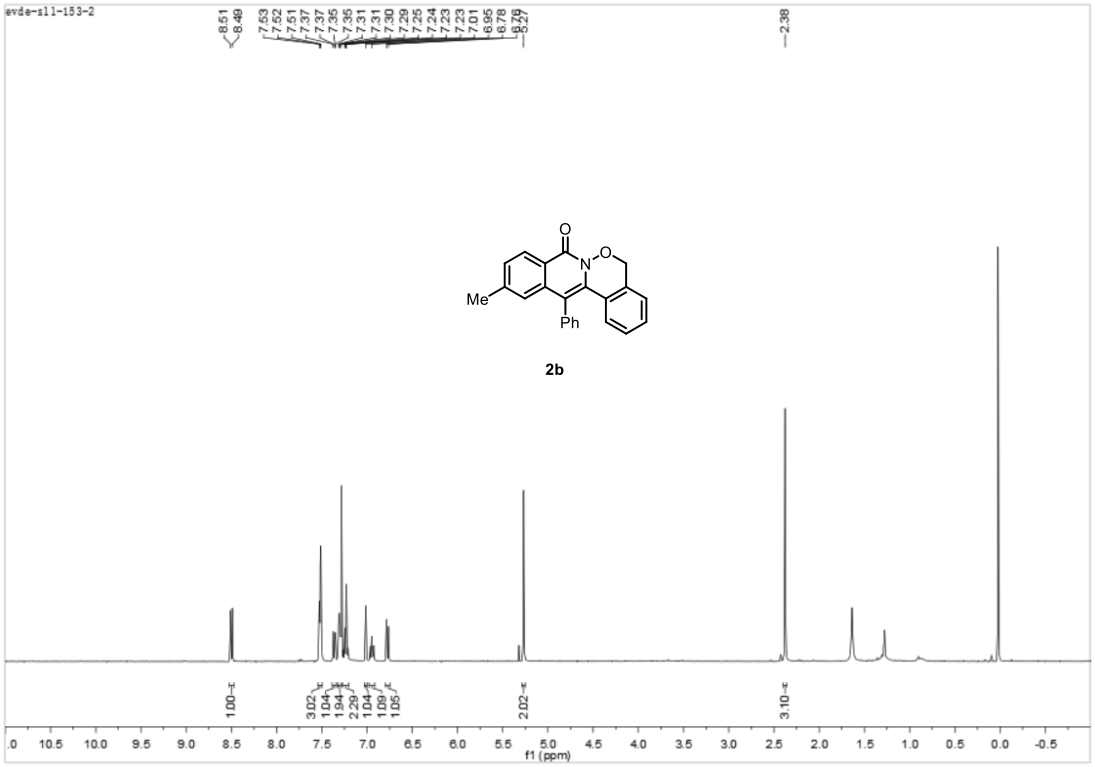
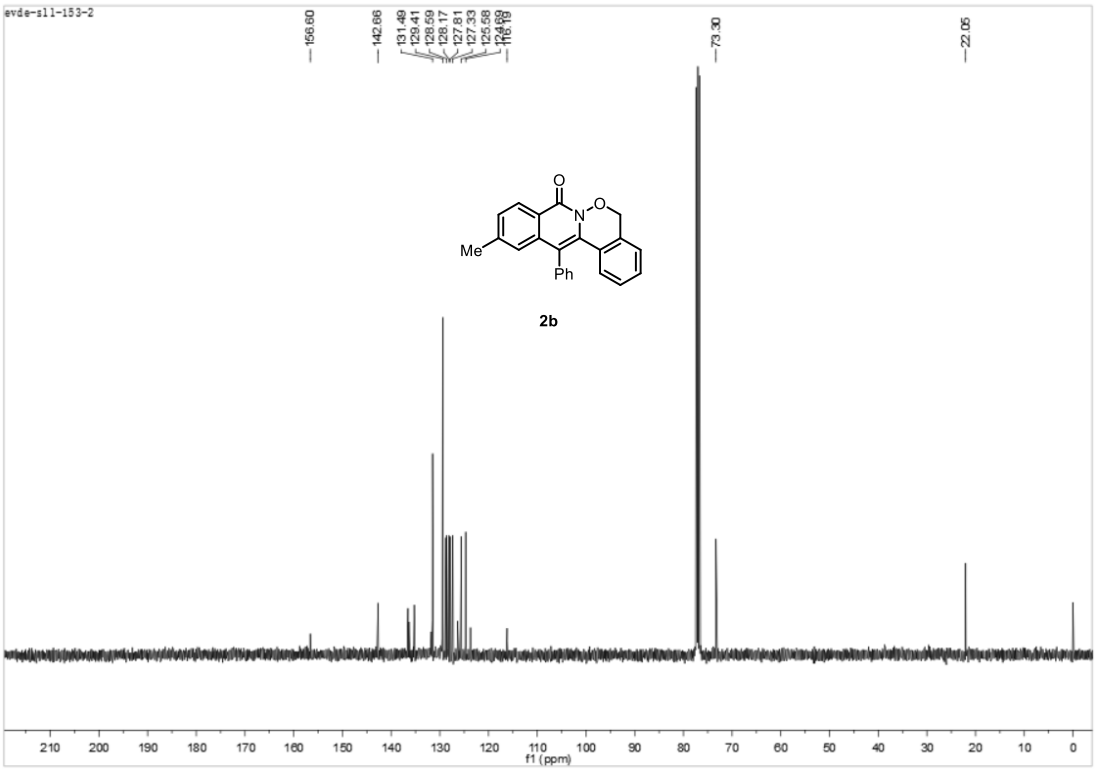
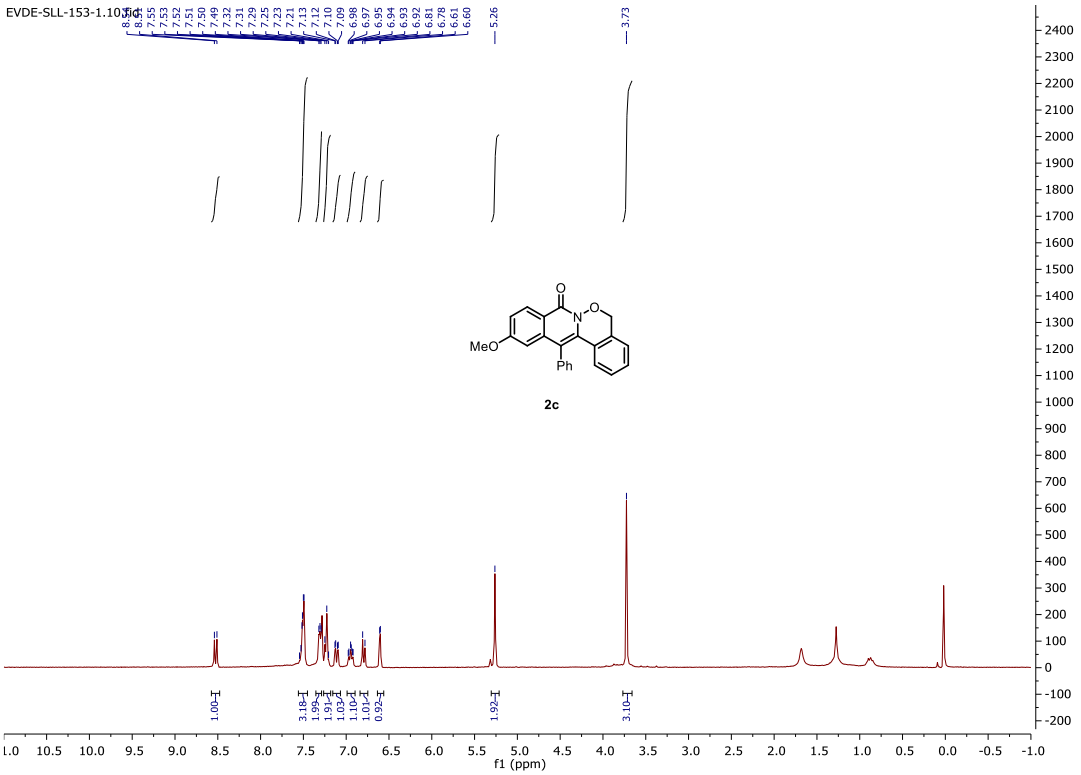
O
N
O
Ph
2a
f1 (ppm)

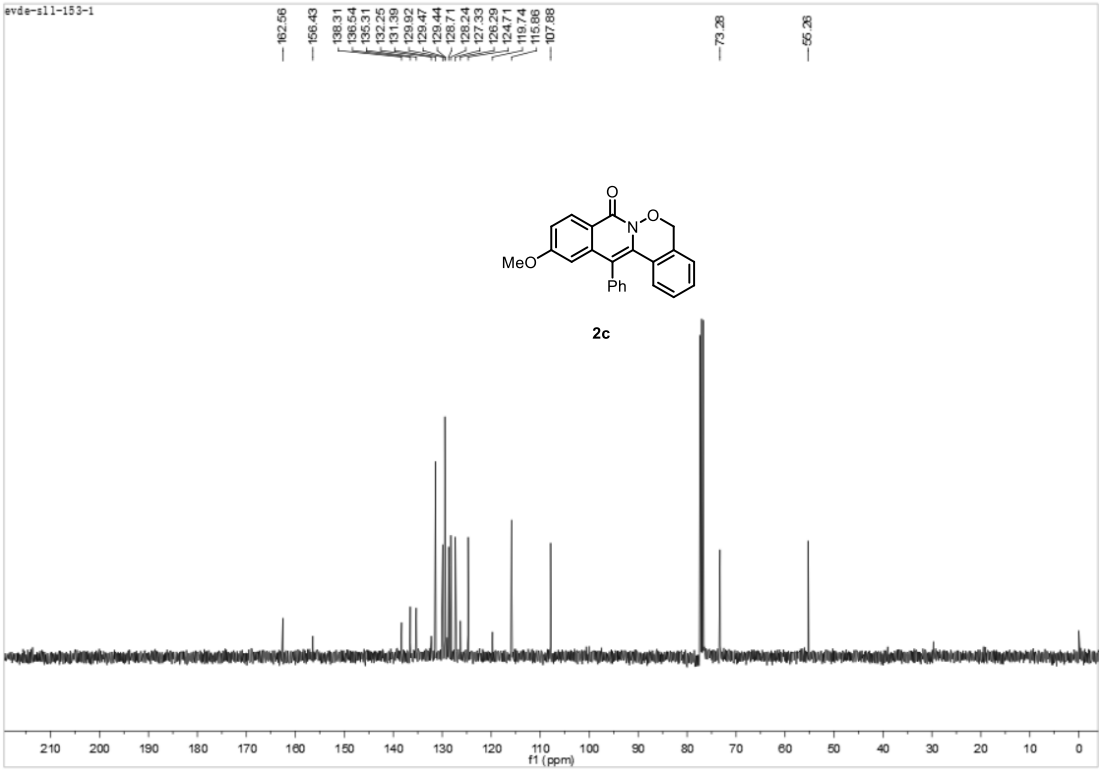

evde-s11-153-2
8.51
8.49
7.53
7.52
7.51
7.37
7.37
7.35
7.35
7.31
7.31
7.30
7.29
7.25
7.24
7.23
7.23
7.01
6.95
6.78
6.76
5.27
2.38
O
N
O
Me
Ph
1.00
3.02
1.04
1.94
2.39
1.04
1.09
1.05
2.02
3.10
f1 (ppm)

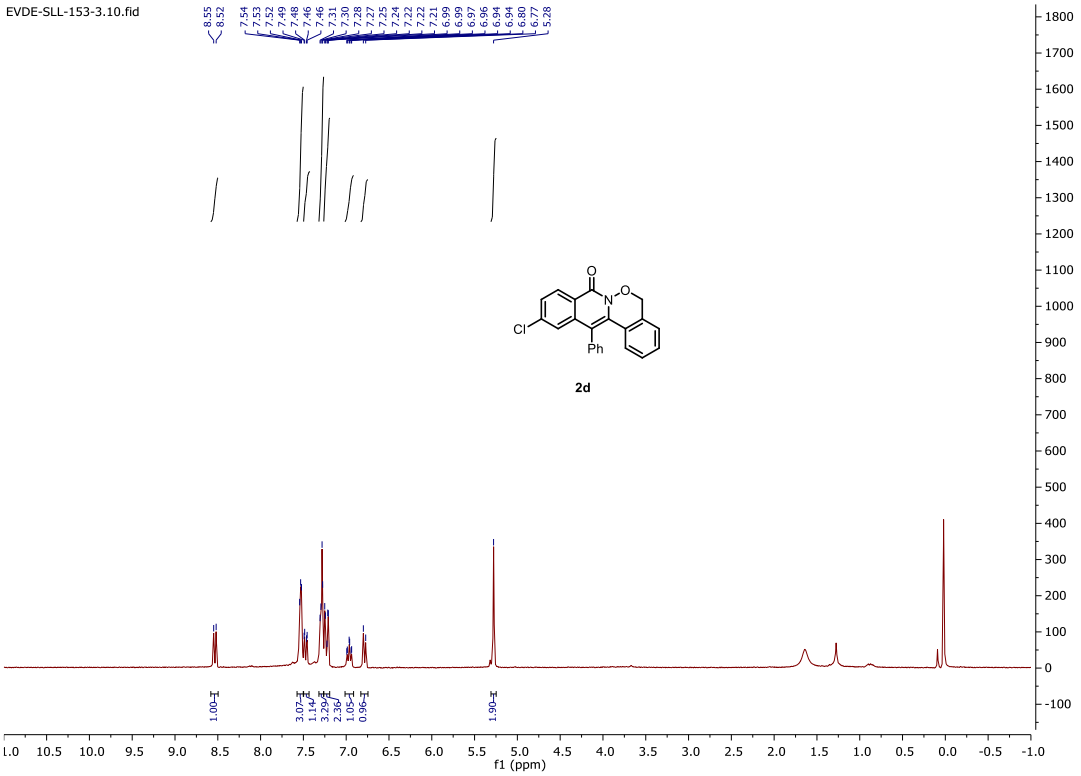
2b

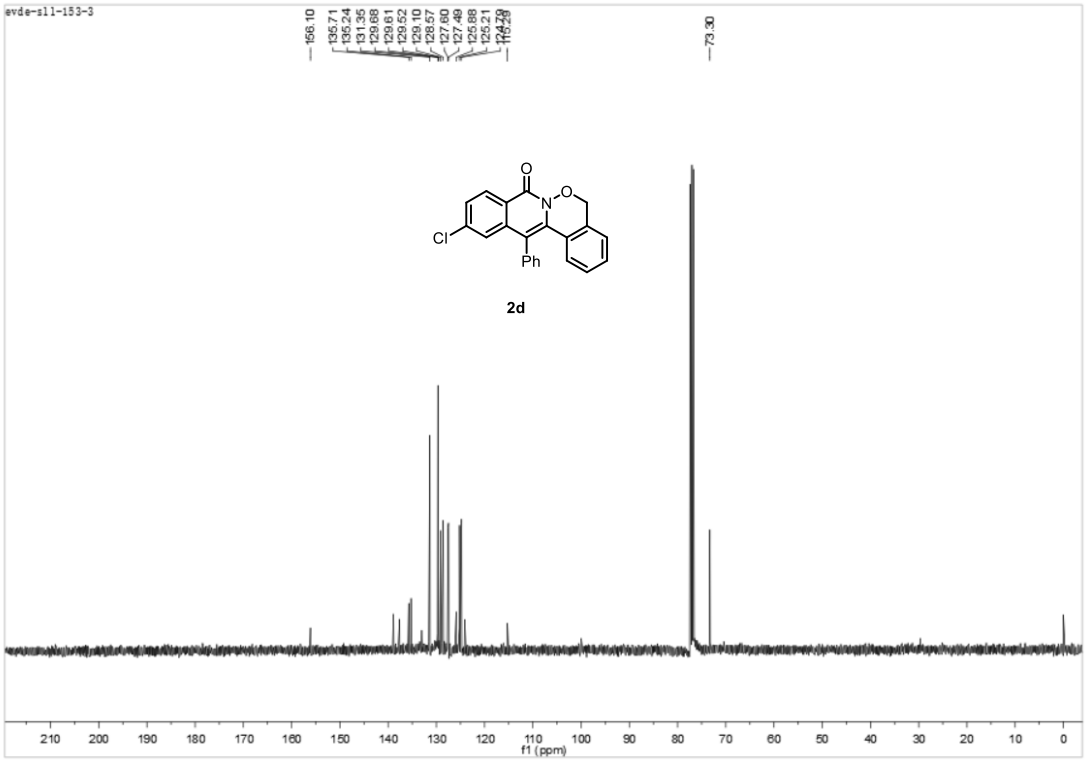

evde-s11-153-2
156.60
142.66
131.49
129.41
128.59
128.17
127.81
127.33
125.58
73.30
22.05
O
N
O
Me
Ph
f1 (ppm)

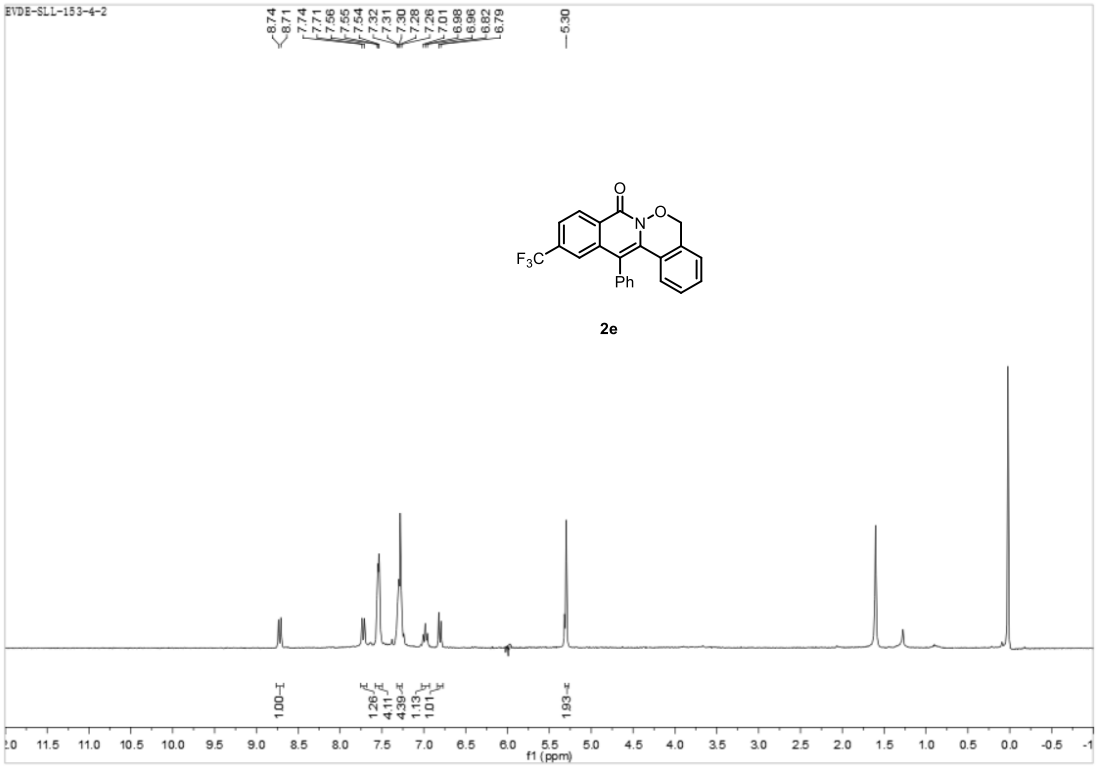
2b


EVDE-SLL-153-1.10.fid
8.54
7.55
7.53
7.52
7.51
7.50
7.49
7.32
7.31
7.29
7.25
7.23
7.21
7.13
7.12
7.10
7.09
6.98
6.97
6.95
6.94
6.93
6.92
6.81
6.78
6.61
6.60
5.26
3.73
MeO
Ph
2c
1.00
3.18
1.99
1.91
1.03
1.10
1.01
0.92
1.92
3.10
f1 (ppm)

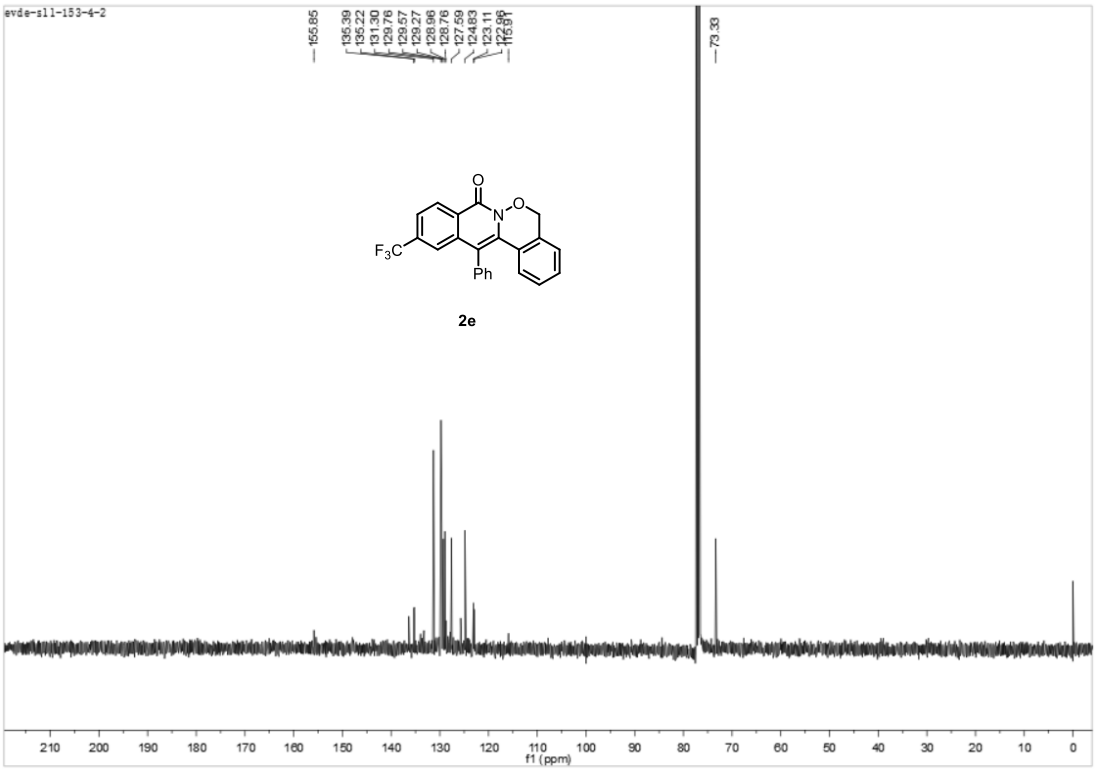

evde-sll-153-1
162.56
156.43
138.31
136.54
135.31
132.25
131.39
129.92
129.47
129.44
128.71
128.24
127.33
126.29
124.71
119.74
115.86
107.88
73.28
55.26
MeO
Ph
2c
f1 (ppm)


EVDE-SLL-153-3.10.fid
8.55
8.52
7.54
7.53
7.52
7.49
7.48
7.46
7.46
7.31
7.30
7.28
7.27
7.25
7.24
7.22
7.22
7.21
6.99
6.97
6.96
6.94
6.94
6.80
6.77
5.28
Cl
Ph
2d
1.00
3.07
1.14
3.29
2.36
1.05
0.96
1.90
f1 (ppm)

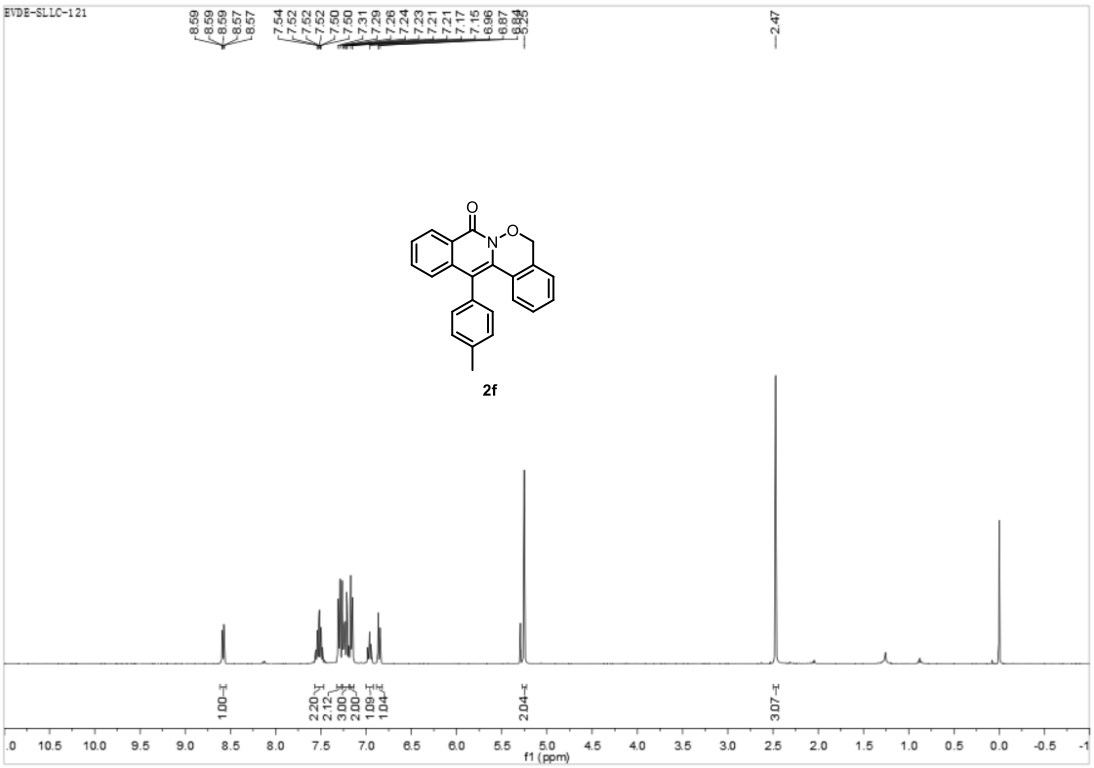

evde-sll-153-3
156.10
135.71
135.24
131.35
129.68
129.61
129.52
129.10
128.57
127.60
127.49
125.88
125.21
73.30
Cl
Ph
2d
f1 (ppm)

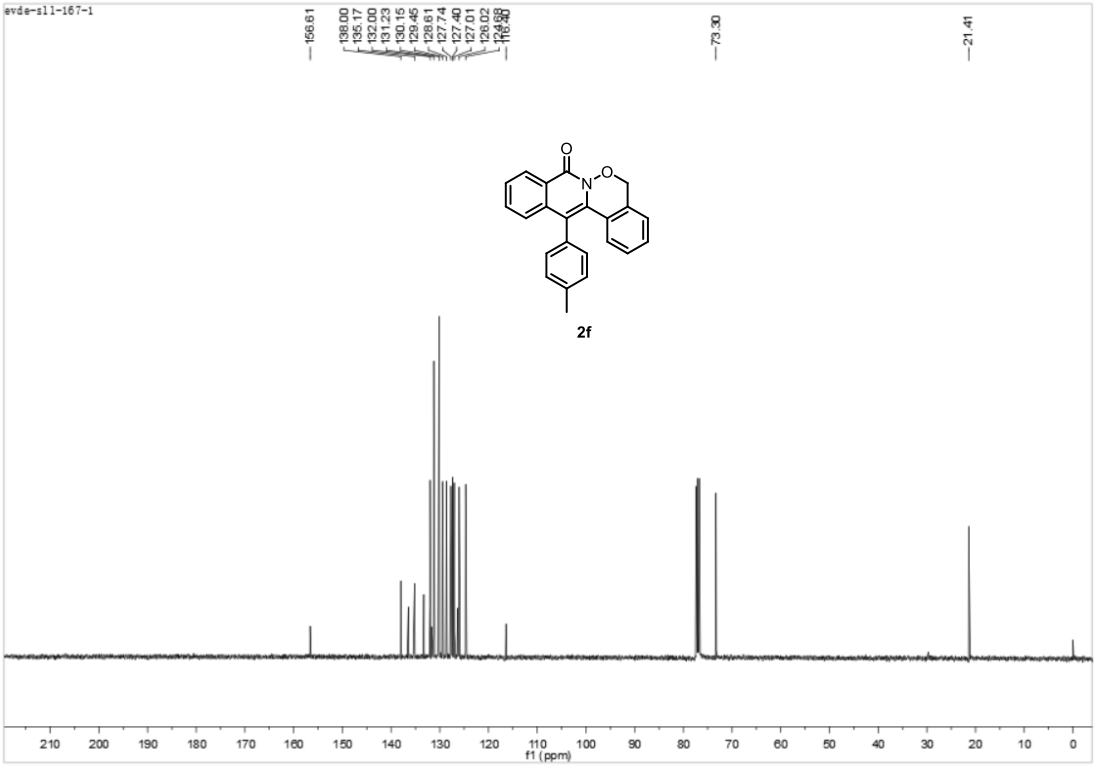

EVDE-SLL-153-4-2
8.74
8.71
7.74
7.71
7.56
7.55
7.54
7.32
7.31
7.30
7.28
7.26
7.01
6.98
6.96
6.82
6.79
5.30
O
N
O
F3C
Ph
1.00
1.26
4.11
4.39
1.13
1.01
1.93
f1 (ppm)

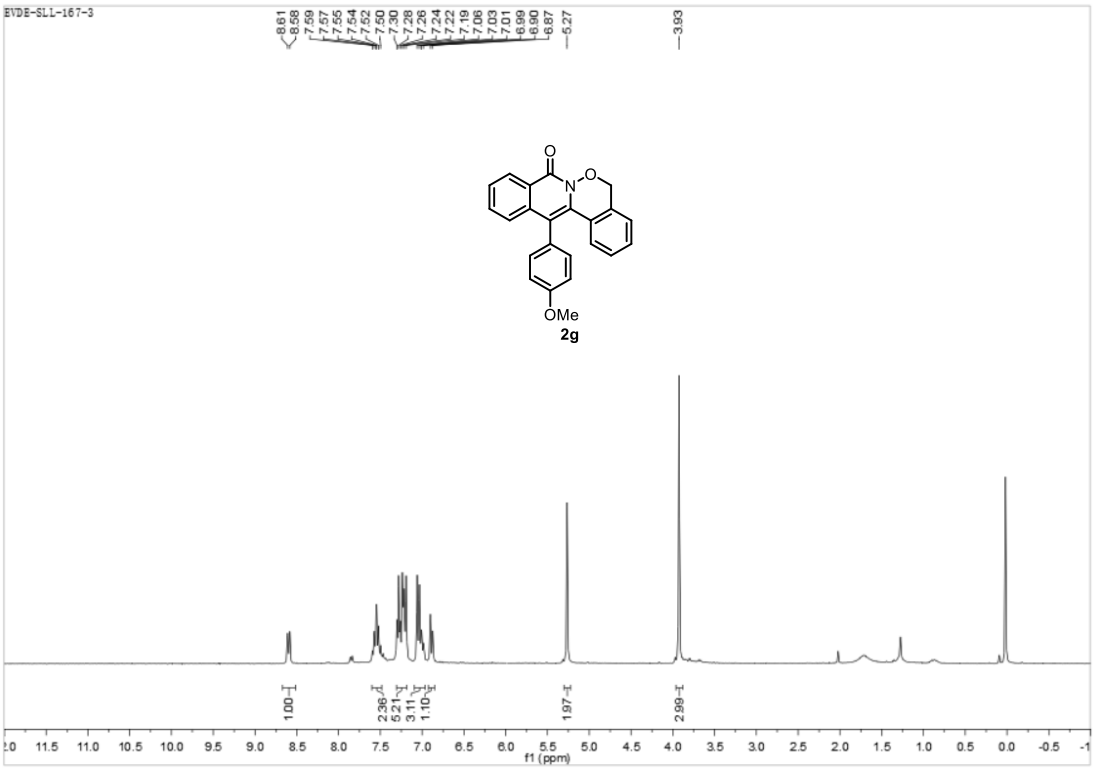
2e

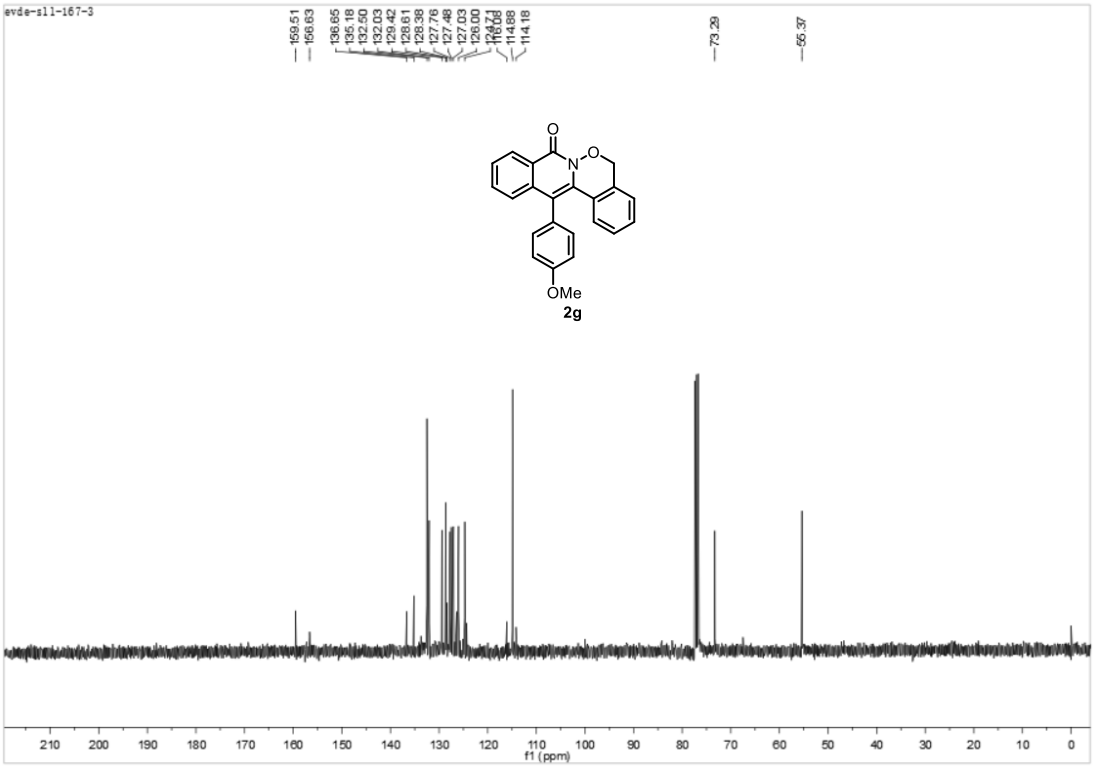

evde-sll-153-4-2
155.85
135.39
135.22
131.30
129.76
129.57
129.27
128.96
128.76
127.59
124.83
123.11
73.33
O
N
O
F3C
Ph
f1 (ppm)

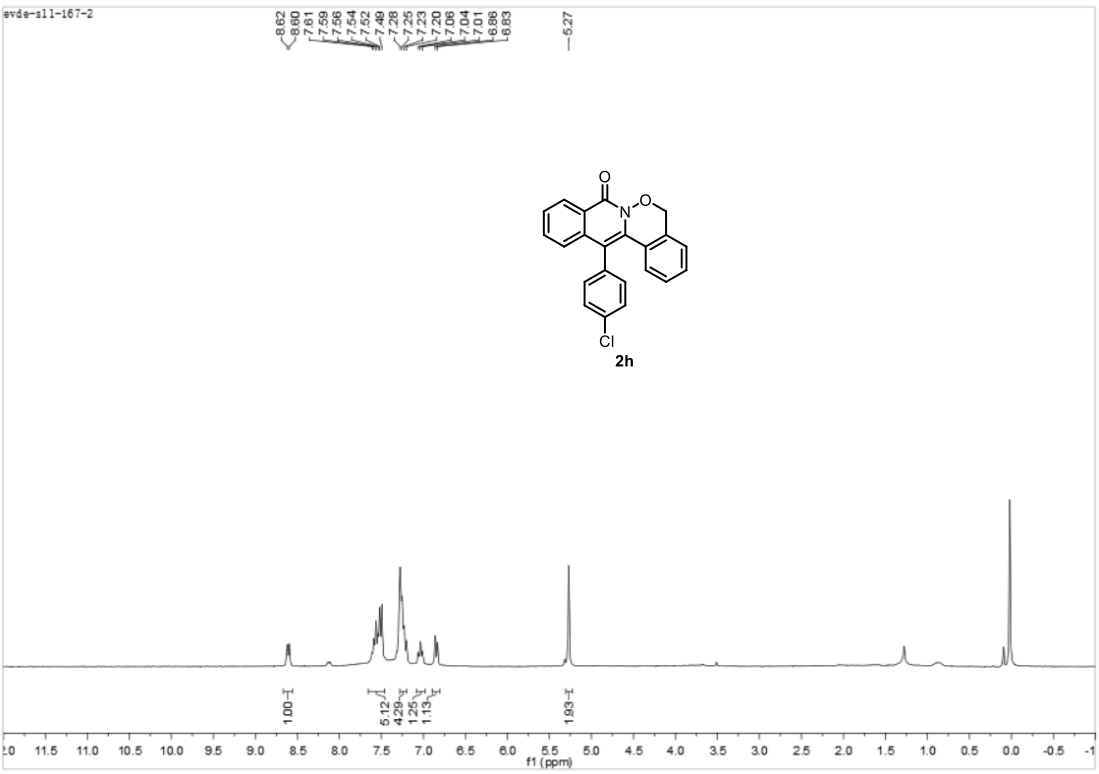
2e

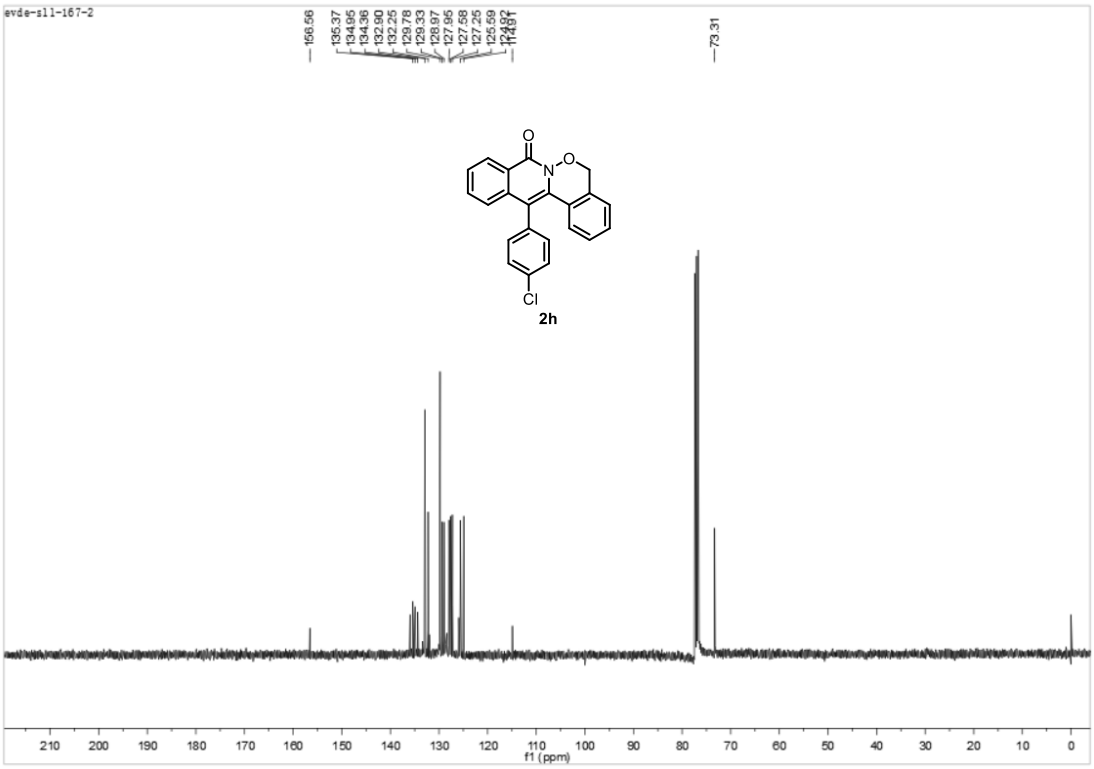

EVDE-SLLC-121
8.59
8.59
8.59
8.57
8.57
7.54
7.52
7.52
7.52
7.50
7.50
7.31
7.29
7.26
7.24
7.23
7.21
7.21
7.17
7.15
6.96
6.87
5.25
2.47
O
N
O
2f
1.00
2.20
2.12
2.00
2.00
1.09
1.04
2.04
3.07
f1 (ppm)

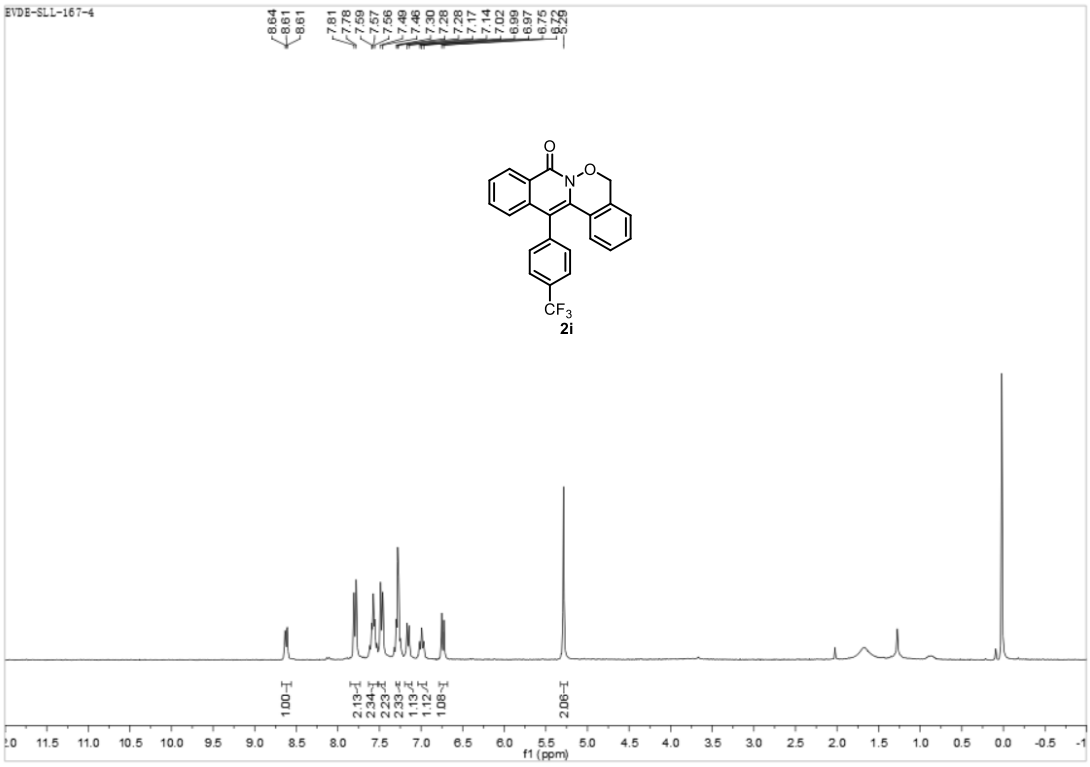

evde-sll-167-1
166.61
138.00
135.17
132.00
131.23
130.15
129.45
128.61
127.74
127.40
127.01
126.02
73.30
21.41
O
N
O
2f
f1 (ppm)

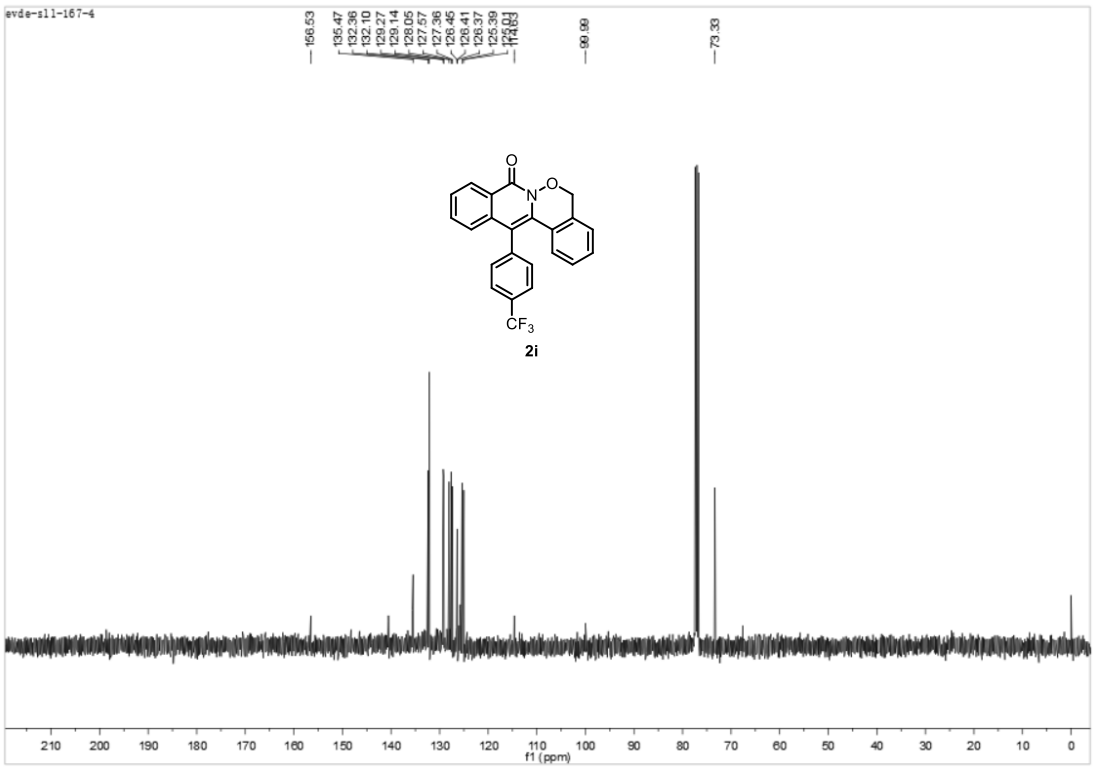

EVDE-SL1-167-3
8.61
8.58
7.59
7.57
7.55
7.54
7.52
7.50
7.30
7.28
7.26
7.24
7.22
7.19
7.06
7.03
7.01
6.99
6.90
6.87
5.27
3.93
O
N
O
OMe
2g
1.00
2.36
5.21
3.11
1.10
1.97
2.99
f1 (ppm)

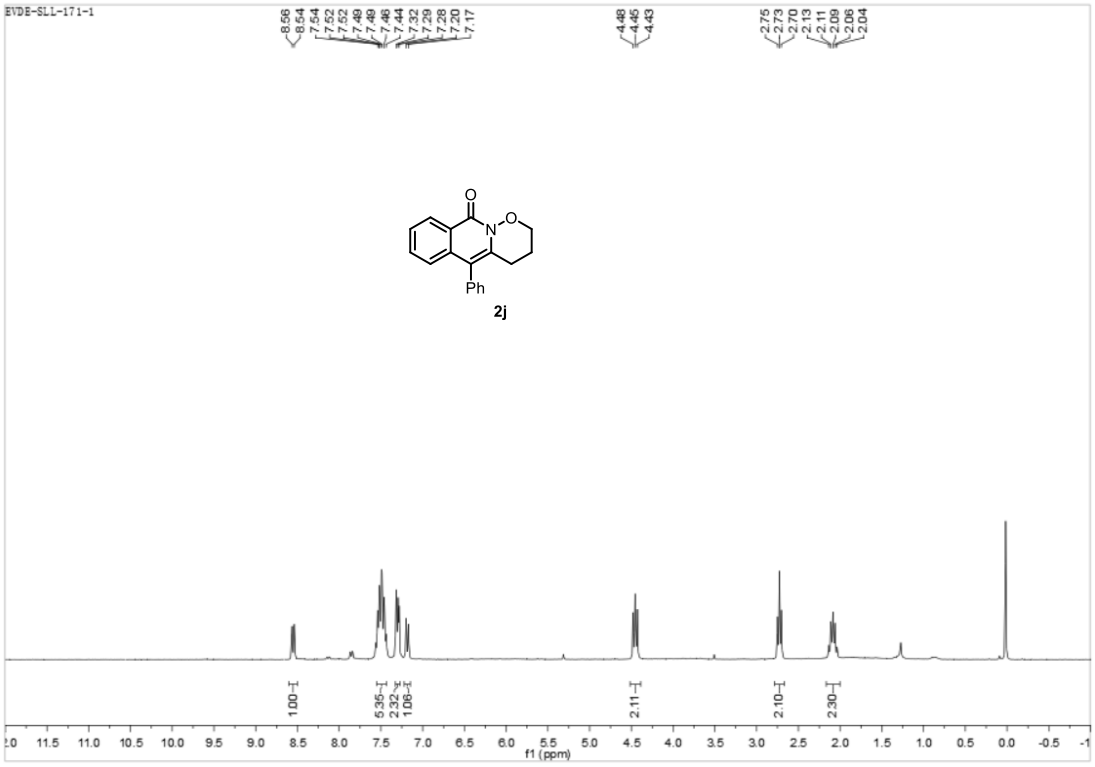

evde-sl1-167-3
159.51
156.63
136.65
135.18
132.50
132.03
129.42
128.61
128.38
127.76
127.48
127.03
126.00
116.08
114.88
114.18
73.29
65.37
O
N
O
OMe
2g
f1 (ppm)


evde-s11-167-2
8.62
8.60
7.61
7.59
7.56
7.54
7.52
7.49
7.28
7.25
7.23
7.20
7.06
7.04
7.01
6.86
6.83
5.27
O
N
O
Cl
2h
1.00
5.12
4.29
1.25
1.13
1.93
f1 (ppm)

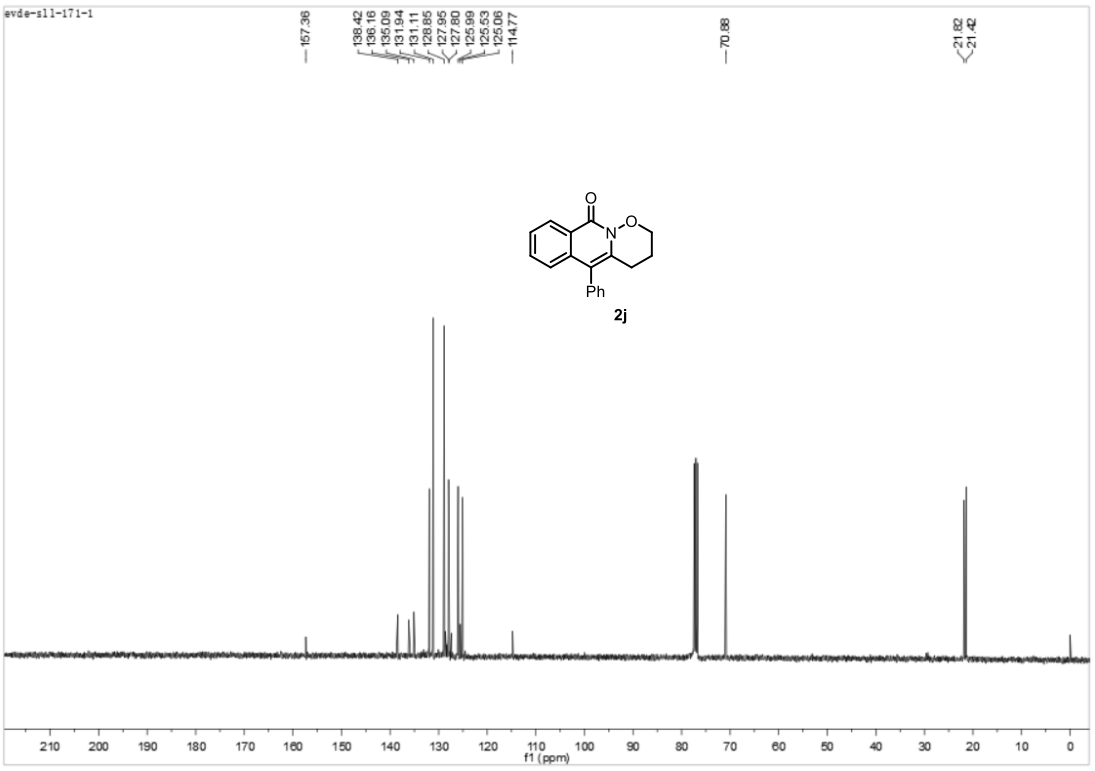

evde-s11-167-2
156.56
135.37
134.95
134.36
132.90
132.25
129.78
129.33
128.97
127.95
127.58
127.25
125.59
73.31
O
N
O
Cl
2h
f1 (ppm)


EVDE-SLL-167-4
8.64
8.61
8.61
7.81
7.78
7.59
7.57
7.56
7.49
7.46
7.30
7.28
7.28
7.17
7.14
7.02
6.99
6.97
6.75
6.72
5.29
O
N
O
CF3
2i
1.00
2.13
2.34
2.23
2.33
1.13
1.12
1.08
2.06
f1 (ppm)

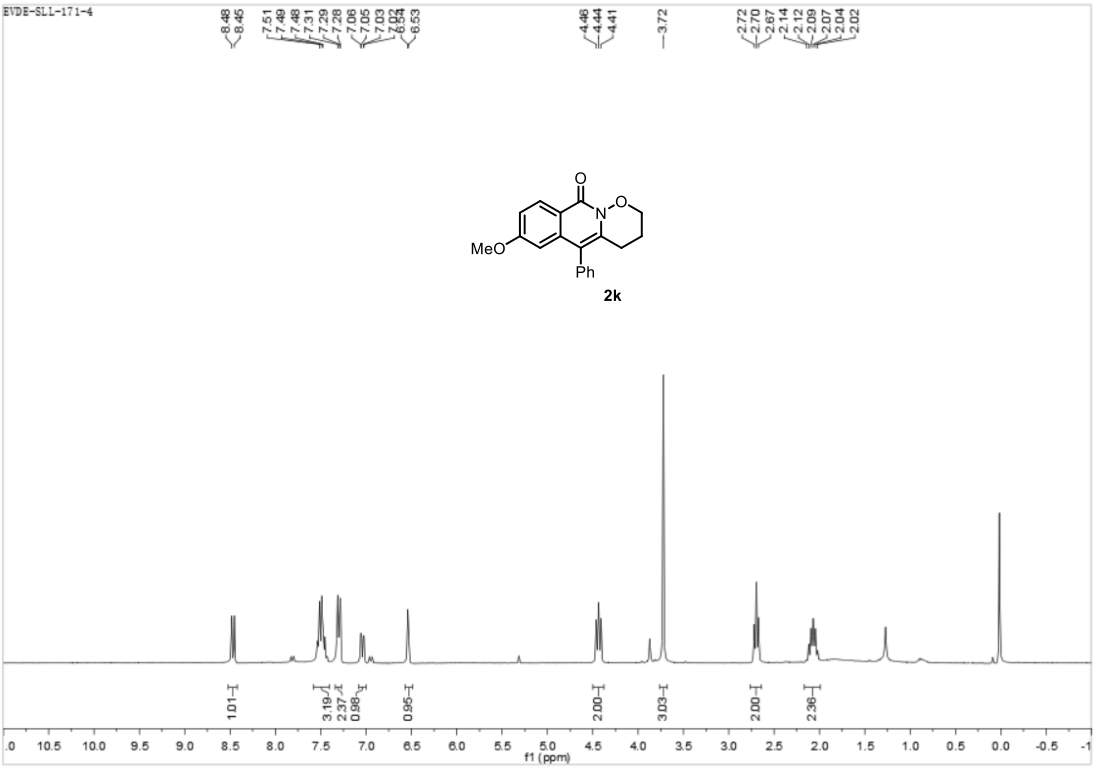

evde-sll-167-4
156.53
135.47
132.36
132.10
129.27
129.14
128.05
127.57
127.36
126.45
126.41
126.37
125.39
125.01
114.83
99.99
73.33
O
N
O
CF3
2i
f1 (ppm)

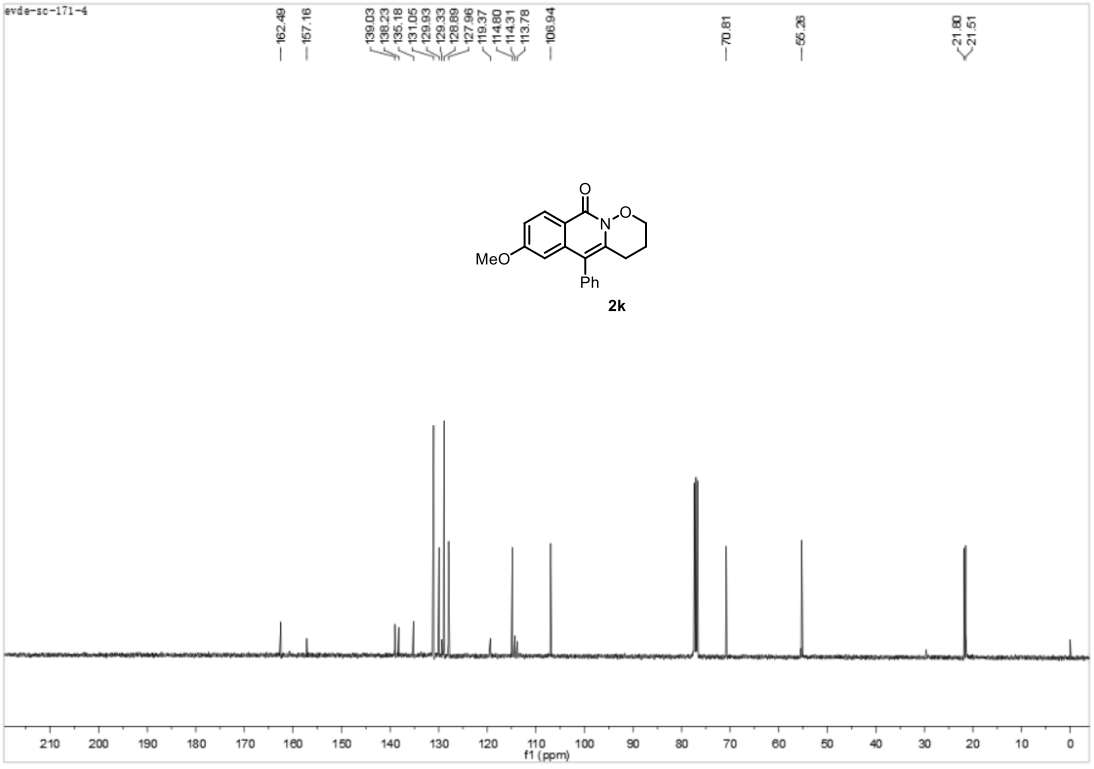

EVDE-SLL-171-1
8.56
8.54
7.54
7.52
7.52
7.49
7.49
7.46
7.44
7.32
7.29
7.28
7.20
7.17
4.48
4.45
4.43
2.75
2.73
2.70
2.13
2.11
2.09
2.06
2.04
O
N
O
Ph
1.00
5.35
2.32
1.06
2.11
2.10
2.30
f1 (ppm)

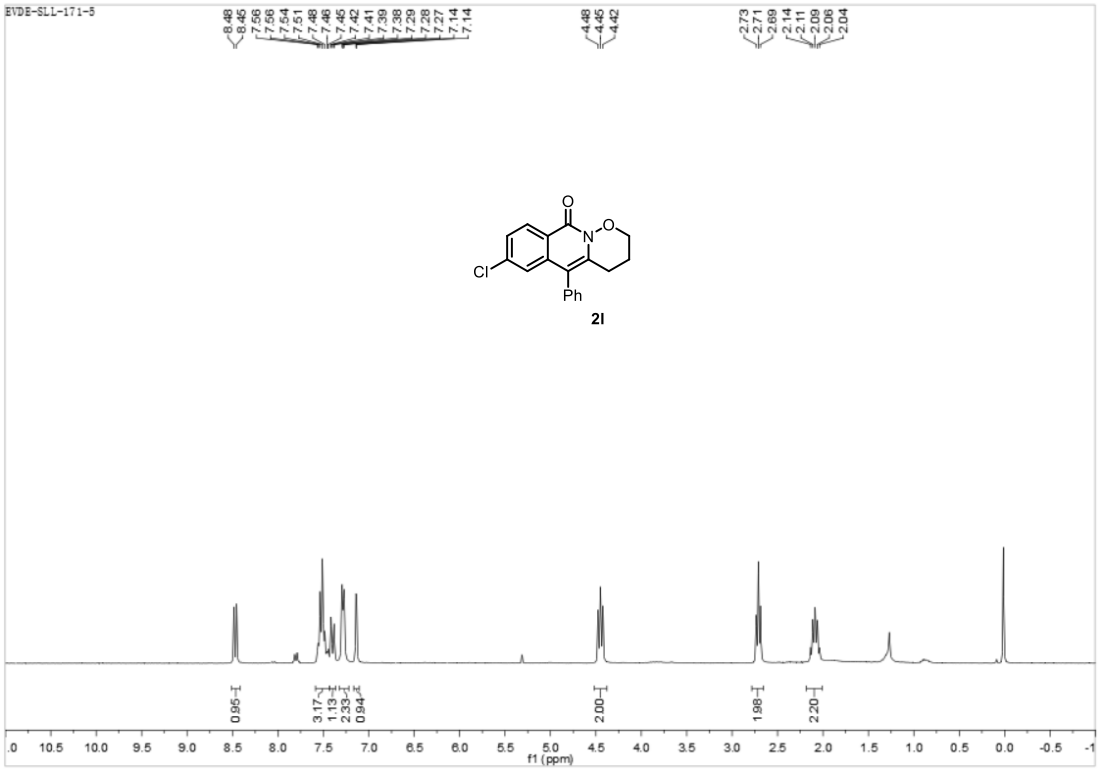
2j


evde-sll-171-1
157.36
138.42
136.16
135.09
131.94
131.11
128.85
127.95
127.80
125.99
125.53
125.06
114.77
70.88
21.82
21.42
O
N
O
Ph
f1 (ppm)

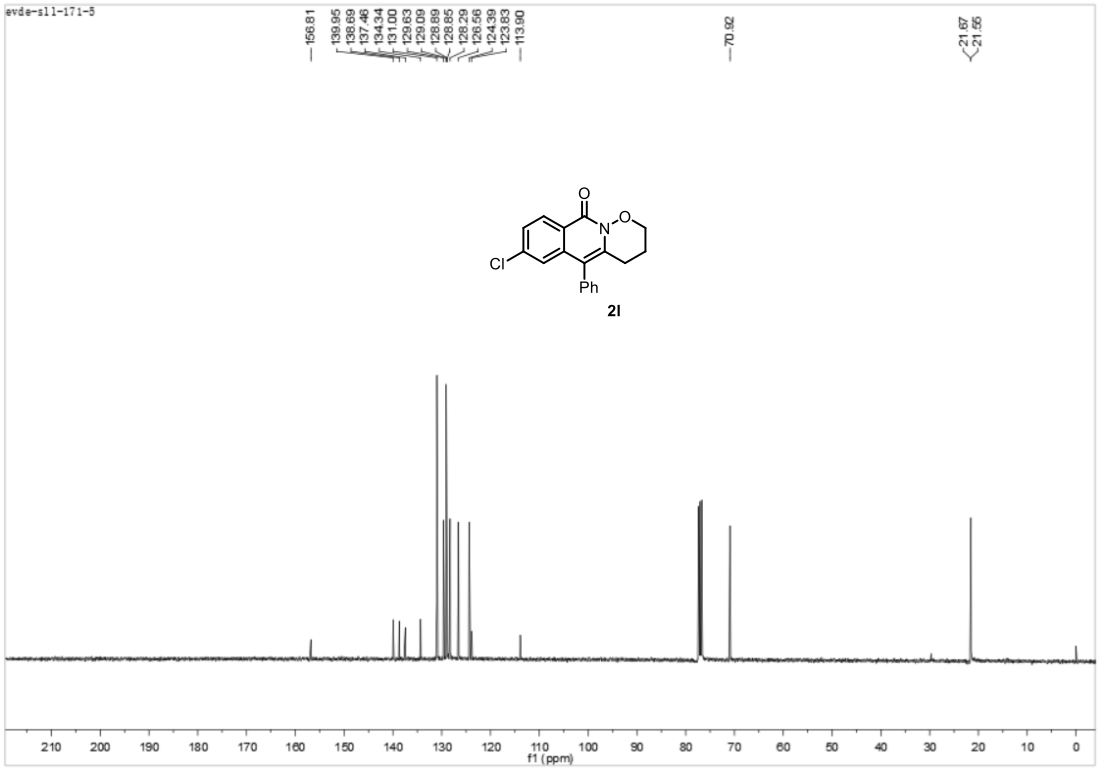
2j


EVDE-SLL-171-4
8.48
8.45
7.51
7.49
7.48
7.31
7.29
7.28
7.06
7.05
7.03
7.02
6.54
6.53
4.46
4.44
4.41
3.72
2.72
2.70
2.67
2.14
2.12
2.09
2.07
2.04
2.02
O
N
O
MeO
Ph
2k
1.01
3.19
2.37
0.98
0.95
2.00
3.03
2.00
2.36
f1 (ppm)


evde-sc-171-4
162.49
157.16
139.03
138.23
135.18
131.05
129.93
129.33
128.89
127.96
119.37
114.60
114.31
113.78
106.94
70.81
55.26
21.80
21.51
O
N
O
MeO
Ph
2k
f1 (ppm)


EVDE-SLL-171-5
8.48
8.45
7.56
7.56
7.54
7.51
7.48
7.46
7.45
7.42
7.41
7.39
7.38
7.29
7.28
7.27
7.14
7.14
4.48
4.45
4.42
2.73
2.71
2.69
2.14
2.11
2.09
2.06
2.04
O
N
O
Cl
Ph
0.95
3.17
1.13
2.33
0.94
2.00
1.98
2.20
f1 (ppm)

2l


evde-sll-171-5
156.81
139.95
138.69
137.46
134.34
131.00
129.63
129.09
128.89
128.85
128.29
126.56
124.39
123.83
113.90
70.92
21.67
21.55
O
N
O
Cl
Ph
f1 (ppm)

2l