

Supporting Information

Piano-Stool Rhodium Enalcarbenoids: Application to Catalyst Controlled Metal-Templated Annulations of Diazoenals and 1,3-Dicarbonyls

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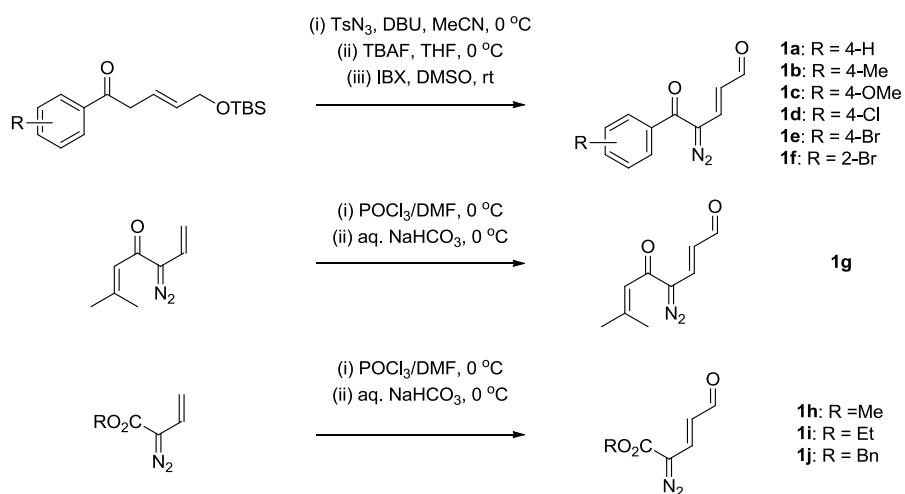
1. General methods:

All the reactions were performed in an oven-dried glassware under argon atmosphere. Solvents were dried using standard methods. Dichloromethane, dichloroethane, and toluene were distilled over calcium hydride. Unless otherwise stated, all the commercial reagents were used as received. Progress of the reaction was monitored by thin layer chromatography (Merck silica gel 60 F-254, 0.25 nm, precoated plates on alumina). Column chromatographic purifications were performed on Merck silica gel (100-200 mesh). Melting points were recorded on a digital melting point apparatus and are uncorrected.

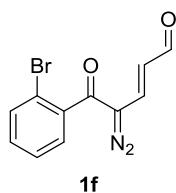
Spectroscopic characterizations were carried out at the Central Instrumentation Facility (CIF), Indian Institute of Science Education and Research (IISER) Bhopal. ¹H-NMR spectra were recorded on Bruker Avance III FT-NMR spectrometers at 400 MHz, 500 MHz or 700 MHz and ¹³C-NMR spectra were recorded at 101 MHz, 126 MHz or 176 MHz. ¹H-NMR chemical shifts are reported in ppm relative to the TMS ($\delta=0$) or CDCl₃ signal ($\delta=7.26$) and are abbreviated as follows: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), br (broad). ¹³C-NMR chemical shifts are reported in ppm relative to the residual CDCl₃ signal ($\delta=77.16$). IR spectra were recorded on a Perkin Elmer FT-IR spectrometer. HRMS data was obtained on a Bruker micro TOF-QII or Agilent 5975C high resolution mass spectrometers.

2. Starting materials:

Diazoenals **1a-j** were prepared according to our reported procedures (Scheme S1).^{1a}

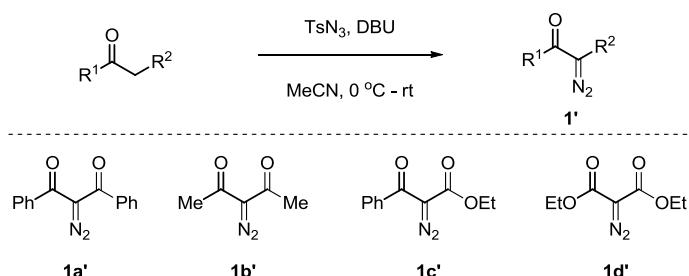


Scheme S1: Preparation of diazoenals **1a-j**



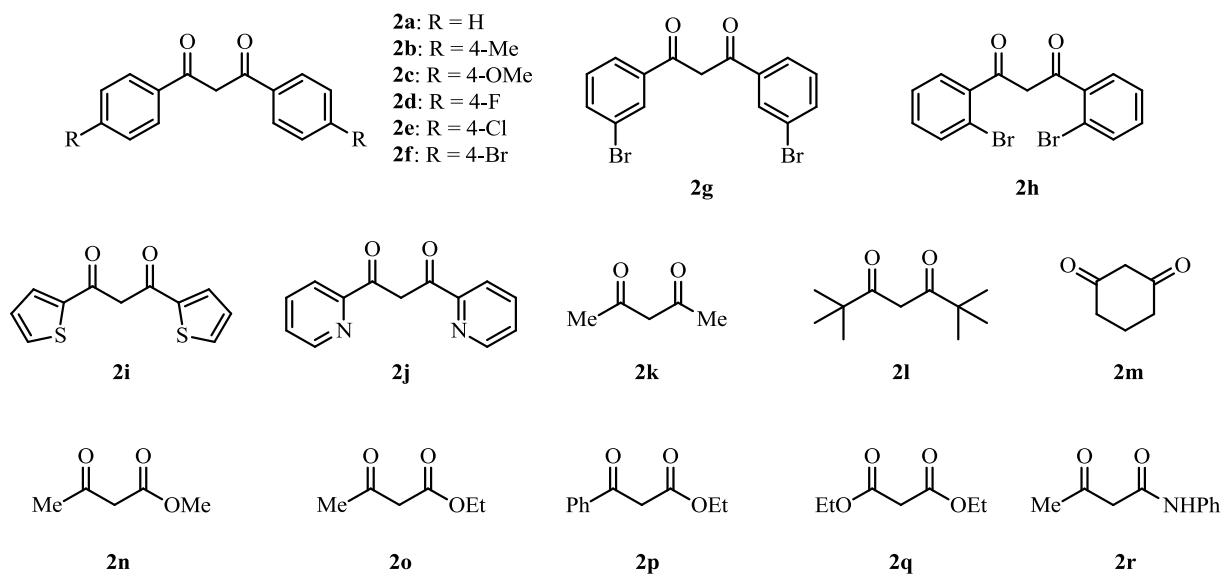
(E)-5-(2-bromophenyl)-4-diazo-5-oxopent-2-enal (1f): Obtained as a yellow solid; **¹H NMR** (400 MHz, DMSO-d₆) δ 9.49 (d, *J* = 7.2 Hz, 1H), 7.76 (d, *J* = 7.8 Hz, 1H), 7.58 – 7.51 (m, 2H), 7.51 – 7.46 (m, 1H), 7.33 (brs, 1H), 6.28 (brs, 1H); **IR** (neat): 2830, 2107, 1673, 1644, 1603, 1336, 1108 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₁₁H₇BrO₂ (M+H)⁺ 250.9702 found 250.9697.

Diazo compounds **1a'-d'** were prepared according to the reported procedure (Scheme S2).^{1b}



Scheme S2: Preparation of diazo compounds **1a'-d'**

1,3-dicarbonyl compounds **2a**, **2c**, **2i**, **2k-2q**, were obtained from commercial sources. Known 1,3-dicarbonyl compounds **2b**, **2d-2i**, **2r** were prepared according to the literature procedures.²

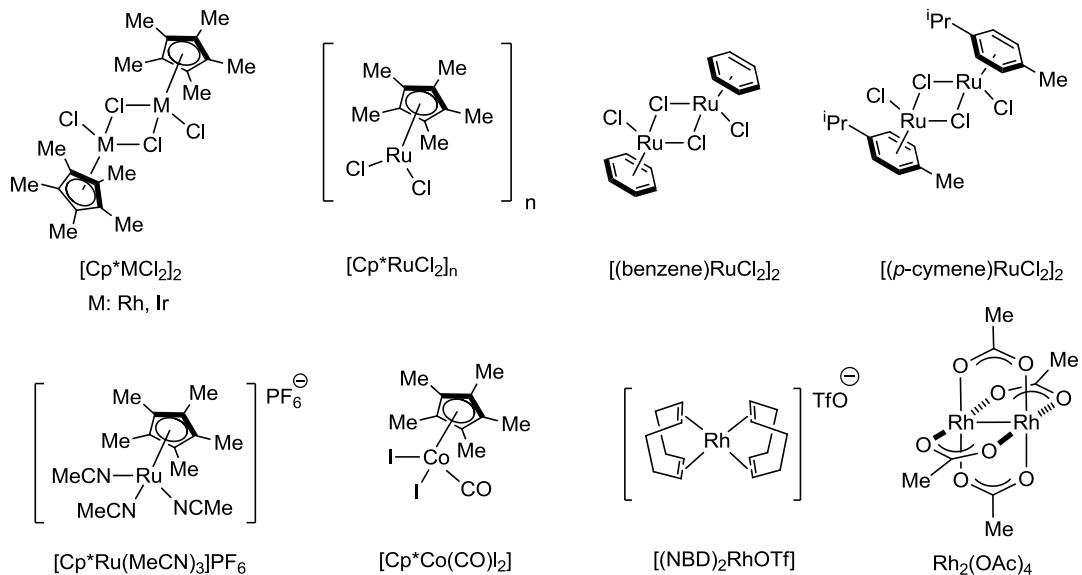


3. [3+2] Annulation of diazoenals and 1,3-dicarbonyls:

A. Table S1: Optimization of the [3+2] annulation reaction ^[a-c]

Entry	Deviation from standard conditions	3a [%]	4a [%]
1	No deviation	82	–
2	[Cp*Co(CO)I ₂] instead of [Cp*RhCl ₂] ₂	<5	28
3	[Cp*IrCl ₂] ₂ instead of [Cp*RhCl ₂] ₂	22	30
4	[Cp*RuCl ₂] _n instead of [Cp*RhCl ₂] ₂	<5	64
5	[(benzene)RuCl ₂] ₂ instead of [Cp*RhCl ₂] ₂	49	–
6	[(<i>p</i> -cymene)RuCl ₂] ₂ instead of [Cp*RhCl ₂] ₂	52	–
7	[Cp*Ru(MeCN) ₃]PF ₆ instead of [Cp*RhCl ₂] ₂	–	–
8	Reaction performed with 2 mol % [(NBD) ₂ Rh(OTf)]	–	–
9	Reaction performed with 5 mol % Rh ₂ (OAc) ₄ at 25 °C	–	–
10	Reaction performed with 5 mol % Rh ₂ (esp) ₂ at 25 °C	–	–
11	Reaction performed with 2 mol % Rh ₂ (OAc) ₄ 80 °C	–	–
12	Reaction performed without [Cp*RhCl ₂] ₂	–	–
13	Reaction performed without AgOTf	–	–
14	AgNTf ₂ instead of AgOTf	60	–
15	AgSbF ₆ instead of AgOTf	43	–
16	AgBF ₄ instead of AgOTf	–	–
17	AgOAc instead of AgOTf	–	–
18	5 mol % AgOTf was used	52	–
19	2 mol % [Cp*RhCl ₂] ₂ was used	55	–
20	Reaction performed at 25 °C in DCM	–	–
21	Reaction performed at 65 °C in chloroform	54	–
22	Reaction performed at 100 °C in toluene	71	–

[a] Reaction conditions: A solution of **1a** (0.14 mmol in 2 mL) was added over 3 h to a solution of **2a** (0.13 mmol in 1 mL), catalyst and Ag-salt, and continued the reaction for another 1 h. [b] Yield of isolated product. [c] For entries 7-13, and 16-17, **1a** was decomposed, For entry **20** unreacted **1a** and **2a** were recovered.

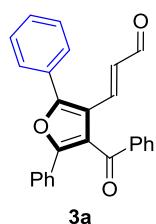


B. Substrate scope of the [3+2] annulation

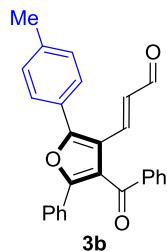


General procedure A:

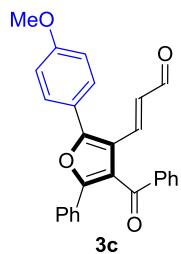
An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with 1,3-dicarbonyl compound **2** (30 mg), $[\text{Cp}^*\text{RhCl}_2]_2$ (1 mol %), AgOTf (10 mol %), and 1.5 mL of freshly distilled dichloroethane (DCE). To the gently stirring reaction mixture at 80 °C under nitrogen atmosphere was added keto-diazoenal **1** (1.1 equiv) in 2 mL of DCE over 3 h via a syringe pump. The reaction was continued for another 1 h (as judged by TLC) and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 2:8) furnished the enal-functionalized tetrasubstituted furan **3**.



(E)-3-(4-benzoyl-2,5-diphenylfuran-3-yl)acrylaldehyde 3a: Prepared by following procedure A. Obtained as a yellow solid; yield = 82% (41 mg); m.p.=120-122 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.48 (d, J = 7.5 Hz, 1H), 7.97 (dd, J = 8.3, 1.2 Hz, 2H), 7.74 (dd, J = 8.2, 1.3 Hz, 2H), 7.58 – 7.49 (m, 7H), 7.41 (t, J = 7.8 Hz, 2H), 7.30 – 7.26 (m, 3H), 6.21 (dd, J = 16.1, 7.5 Hz, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.5, 193.5, 155.0, 152.3, 142.0, 136.9, 134.5, 130.8, 130.1, 129.9, 129.3, 129.3, 129.2, 129.1, 128.7, 128.8, 128.2, 126.5, 120.5, 118.6; **IR** (neat): 3081, 2926, 2825, 1675, 1632, 1489, 1240, 1133, 905, 759 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{26}\text{H}_{18}\text{O}_3$ ($\text{M}+\text{H}$) $^+$ 379.1310 found 379.1329. The CCDC 1554018 contains the supplementary crystallographic data for this compound.

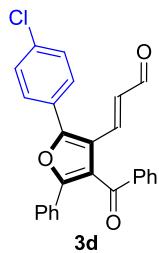


(E)-3-(4-benzoyl-5-phenyl-2-(p-tolyl)furan-3-yl)acrylaldehyde 3b: Prepared by following procedure A. Obtained as a yellow solid; yield = 74% (39 mg); m.p.= 147-149 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.49 (d, J = 7.5 Hz, 1H), 7.99 (d, J = 7.2 Hz, 2H), 7.65 (d, J = 8.1 Hz, 2H), 7.60 – 7.56 (m, 3H), 7.54 (d, J = 16.1 Hz, 1H), 7.44 (t, J = 7.8 Hz, 2H), 7.39 (d, J = 7.9 Hz, 2H), 7.30 – 7.26 (m, 3H), 6.23 (dd, J = 16.1, 7.5 Hz, 1H), 2.49 (s, 3H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.6, 193.5, 155.5, 152.0, 142.3, 140.4, 136.9, 134.4, 130.4, 130.0, 130.0, 129.2, 129.1, 128.9, 128.2, 128.1, 126.5, 126.3, 120.4, 118.1, 21.6; **IR** (neat): 2989, 2931, 1660, 1403, 1243, 1116, 901, 759 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{27}\text{H}_{20}\text{O}_3$ ($\text{M}+\text{H}$) $^+$ 393.1489 found 393.1485.

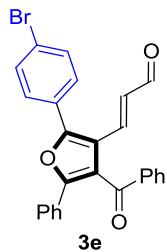


(E)-3-(4-benzoyl-2-(4-methoxyphenyl)-5-phenylfuran-3-yl)acrylaldehyde 3c: Prepared by following procedure A. Obtained as a yellow solid; yield = 75% (40 mg); m.p.= 59-61 °C; R_f = 0.3 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.49 (d, J = 7.5 Hz, 1H),

7.99 (d, $J = 7.2$ Hz, 2H), 7.70 (d, $J = 8.8$ Hz, 2H), 7.59 – 7.54 (m, 3H), 7.51 (d, $J = 16.1$ Hz, 1H), 7.43 (t, $J = 7.8$ Hz, 2H), 7.35 – 7.27 (m, 3H), 7.10 (d, $J = 8.8$ Hz, 2H), 6.22 (dd, $J = 16.1, 7.5$ Hz, 1H), 3.93 (s, 3H); ^{13}C NMR (126 MHz, CDCl_3) δ 193.7, 193.6, 161.2, 155.6, 151.9, 142.5, 136.9, 134.5, 130.3, 130.2, 129.9, 129.2, 129.2, 128.3, 128.9, 126.5, 121.8, 120.5, 117.7, 114.9, 55.7; IR (neat): 2989, 2945, 2866, 1644, 1410, 1266, 1123, 757 cm^{-1} ; HRMS (ESI) m/z calc. for $\text{C}_{27}\text{H}_{20}\text{O}_4$ ($\text{M}+\text{H}$) $^+$ 409.1446 found 409.1434.

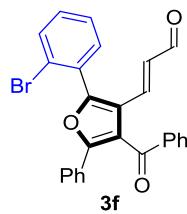


(E)-3-(4-benzoyl-2-(4-chlorophenyl)-5-phenylfuran-3-yl)acrylaldehyde 3d: Prepared by following procedure A. Obtained as a yellow solid; yield = 78% (42 mg); m.p.= 129-131 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); ^1H NMR (500 MHz, CDCl_3) δ 9.48 (d, $J = 7.4$ Hz, 1H), 7.95 (d, $J = 7.4$ Hz, 2H), 7.67 (d, $J = 8.5$ Hz, 2H), 7.59 – 7.50 (m, 6H), 7.46 (d, $J = 16.1$ Hz, 1H), 7.41 (t, $J = 7.7$ Hz, 2H), 7.32 – 7.27 (m, 2H), 6.22 (dd, $J = 16.1, 7.4$ Hz, 1H); ^{13}C NMR (126 MHz, CDCl_3) δ 193.3, 153.6, 152.6, 141.4, 136.8, 136.1, 134.6, 134.6, 131.2, 130.0, 129.6, 129.4, 129.3, 129.1, 128.9, 128.6, 127.6, 126.6, 120.6, 118.9; IR (neat): 2993, 2918, 1660, 1408, 1246, 1189, 1096, 759 cm^{-1} ; HRMS (ESI) m/z calc. for $\text{C}_{26}\text{H}_{17}\text{ClO}_3$ ($\text{M}+\text{H}$) $^+$ 413.0921 found 413.0939.

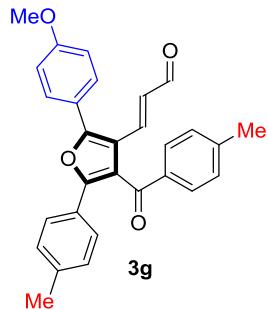


(E)-3-(4-benzoyl-2-(4-bromophenyl)-5-phenylfuran-3-yl)acrylaldehyde 3e: Prepared by following procedure A. Obtained as a yellow solid; yield = 83% (50 mg); m.p.= 113-115 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); ^1H NMR (500 MHz, CDCl_3) δ 9.48 (d, $J = 7.4$ Hz, 1H), 7.95 (dd, $J = 8.4, 1.2$ Hz, 2H), 7.69 (d, $J = 8.6$ Hz, 2H), 7.60 (d, $J = 8.6$ Hz, 2H), 7.57 – 7.52 (m, 3H), 7.46 (d, $J = 16.1$ Hz, 1H), 7.41 (t, $J = 7.8$ Hz, 2H), 7.30-7.27 (m, 3H), 6.22 (dd, $J = 16.1, 7.4$ Hz, 1H); ^{13}C NMR (126 MHz, CDCl_3) δ 193.3, 193.3, 153.6, 152.6, 141.3, 136.8, 134.6, 132.6, 131.2, 130.0, 129.5, 129.4, 129.1, 128.9, 128.6, 128.1, 126.6, 124.4,

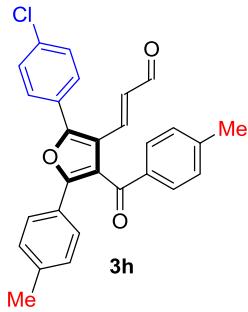
120.6, 118.9; **IR** (neat): 2918, 2852, 1676, 1640, 1473, 1406, 1237, 1140, 1009, 755 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{26}\text{H}_{17}\text{BrO}_3$ ($\text{M}+\text{H}$) $^+$ 457.0405 found 457.0434.



(E)-3-(4-benzoyl-2-(2-bromophenyl)-5-phenylfuran-3-yl)acrylaldehyde 3f: Prepared by following procedure A. Obtained as a viscous liquid; yield = 42% (25 mg); R_f = 0.4 (Ethyl acetate/Hexane = 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.41 (d, J = 7.6 Hz, 1H), 7.98 (dd, J = 8.4, 1.2 Hz, 2H), 7.82 (dd, J = 8.0, 1.0 Hz, 1H), 7.60 – 7.55 (m, 4H), 7.52 (td, J = 7.5, 1.2 Hz, 1H), 7.46 – 7.41 (m, 3H), 7.29 – 7.27 (m, 3H), 7.23 (d, J = 16.2 Hz, 1H), 6.11 (dd, J = 16.2, 7.6 Hz, 1H). **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.7, 193.2, 153.7, 153.5, 141.8, 136.9, 134.4, 134.0, 132.7, 132.0, 130.4, 130.3, 130.1, 129.4, 129.1, 128.8, 128.7, 127.9, 126.9, 124.2, 120.4, 119.6; **IR** (neat): 2924, 2852, 1728, 1673, 1454, 1258, 761 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{26}\text{H}_{17}\text{BrO}_3$ ($\text{M}+\text{H}$) $^+$ 459.0397 found 459.0415.

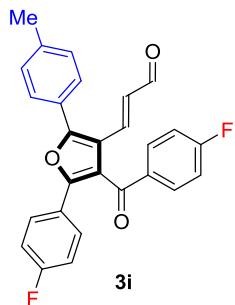


(E)-3-(2-(4-methoxyphenyl)-4-(4-methylbenzoyl)-5-(p-tolyl)furan-3-yl)acrylaldehyde 3g: Prepared by following procedure A. Obtained as a yellow solid; yield = 80% (41 mg); m.p.= 143-145 °C; R_f = 0.3 (Ethyl acetate/Hexane = 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.45 (d, J = 7.5 Hz, 1H), 7.87 (d, J = 8.2 Hz, 2H), 7.66 (d, J = 8.8 Hz, 2H), 7.48 (d, J = 16.1 Hz, 1H), 7.44 (d, J = 8.2 Hz, 2H), 7.20 (d, J = 8.0 Hz, 2H), 7.10 - 7.05 (m, 4H), 6.17 (dd, J = 16.0, 7.5 Hz, 1H), 3.90 (s, 3H), 2.38 (s, 3H), 2.29 (s, 3H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.6, 193.4, 160.9, 155.2, 151.6, 145.6, 142.6, 139.1, 134.5, 130.2, 129.9, 129.8, 129.7, 129.5, 126.2, 121.8, 119.8, 117.6, 114.8, 55.6, 21.9, 21.4; **IR** (neat): 2989, 2860, 1658, 1548, 1435, 1257, 1116, 1017, 759 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{29}\text{H}_{24}\text{O}_4$ ($\text{M}+\text{H}$) $^+$ 437.1771 found 437.1747.



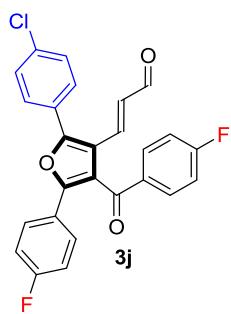
(E)-3-(2-(4-chlorophenyl)-4-(4-methylbenzoyl)-5-(p-tolyl)furan-3-yl)acrylaldehyde 3h:

Prepared by following procedure A. Obtained as a yellow solid; yield = 74% (38 mg); m.p.= 150-152 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.47 (d, J = 7.4 Hz, 1H), 7.85 (d, J = 8.2 Hz, 2H), 7.66 (d, J = 8.6 Hz, 2H), 7.55 (d, J = 8.6 Hz, 2H), 7.50 – 7.45 (m, 3H), 7.24 (d, J = 8.0 Hz, 2H), 7.10 (d, J = 8.1 Hz, 2H), 6.20 (dd, J = 16.1, 7.4 Hz, 1H), 2.38 (s, 3H), 2.30 (s, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.4, 193.1, 153.3, 152.4, 145.7, 141.6, 139.5, 136.0, 134.4, 130.9, 130.2, 129.9, 129.6, 129.2, 127.8, 126.3, 125.9, 120.1, 118.9, 21.9, 21.5; **IR** (neat): 2984, 2909, 1683, 1601, 1412, 1254, 1108, 750 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₈H₂₁ClO₃ (M+H)⁺ 441.1244 found 441.1252.



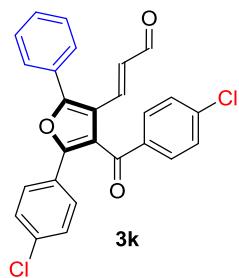
(E)-3-(4-(4-fluorobenzoyl)-5-(4-fluorophenyl)-2-(p-tolyl)furan-3-yl)acrylaldehyde 3i:

Prepared by following procedure A. Obtained as a yellow solid; yield = 72% (35 mg); m.p.= 118-120 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.47 (d, J = 7.5 Hz, 1H), 8.00 – 7.96 (m, 2H), 7.61 (d, J = 8.1 Hz, 2H), 7.55 – 7.52 (m, 2H), 7.50 (d, J = 15.1 Hz, 1H), 7.36 (d, J = 8.0 Hz, 2H), 7.08 (t, J = 8.6 Hz, 2H), 6.99 (t, J = 8.6 Hz, 2H), 6.18 (dd, J = 16.1, 7.5 Hz, 1H), 2.46 (s, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.4, 191.7, 166.6 (d, J = 257.6 Hz), 163.2 (d, J = 250.8 Hz), 155.5, 151.3, 142.0, 140.6, 133.3 (d, J = 2.8 Hz), 132.8 (d, J = 9.7 Hz), 130.6, 130.0, 128.5 (d, J = 8.4 Hz), 128.1, 126.1, 125.1 (d, J = 3.3 Hz), 119.9, 117.9, 116.4 (d, J = 22.1 Hz), 116.1 (d, J = 22.0 Hz), 21.6; **IR** (neat): 2949, 2870, 1661, 1403, 1239, 1127, 766 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₇H₁₈F₂O₃ (M+H)⁺ 429.1307 found 429.1297.



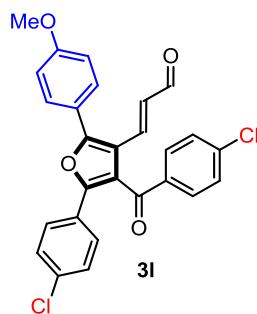
(E)-3-(2-(4-chlorophenyl)-4-(4-fluorobenzoyl)-5-(4-fluorophenyl)furan-3-yl)acrylaldehyde 3j:

Prepared by following procedure A. Obtained as a yellow solid; yield = 70% (36 mg); m.p.= 57-59 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.49 (d, J = 7.4 Hz, 1H), 7.98 – 7.94 (m, 2H), 7.65 (d, J = 8.4 Hz, 2H), 7.55 – 7.48 (m, 4H), 7.45 (d, J = 16.1 Hz, 1H), 7.08 (t, J = 8.5 Hz, 2H), 7.00 (t, J = 8.6 Hz, 2H), 6.20 (dd, J = 16.1, 7.4 Hz, 1H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.2, 191.4, 166.7 (d, J = 257.9 Hz), 163.3 (d, J = 251.2 Hz), 153.7, 151.8, 141.1, 136.3, 133.2 (d, J = 2.8 Hz), 132.8 (d, J = 9.7 Hz), 131.3, 129.7, 129.2, 128.7 (d, J = 8.5 Hz), 127.4, 124.8 (d, J = 3.4 Hz), 120.1, 118.8, 116.5 (d, J = 22.1 Hz), 116.2 (d, J = 22.1 Hz); **IR** (neat): 2984, 2927, 1662, 1594, 1509, 1408, 1237, 1096, 759 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₆H₁₅ClF₂O₃ (M+H)⁺ 449.0726 found 449.0751.



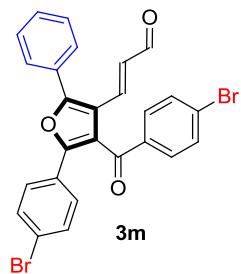
(E)-3-(4-(4-chlorobenzoyl)-5-(4-chlorophenyl)-2-phenylfuran-3-yl)acrylaldehyde 3k:

Prepared by following procedure A. Obtained as a yellow solid; yield = 79% (36 mg); m.p.= 175-177 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.48 (d, J = 7.5 Hz, 1H), 7.89 (d, J = 8.7 Hz, 2H), 7.75 – 7.69 (m, 2H), 7.60 – 7.50 (m, 4H), 7.48 (d, J = 8.2 Hz, 2H), 7.40 (d, J = 8.7 Hz, 2H), 7.28 (d, J = 8.7 Hz, 2H), 6.18 (dd, J = 16.1, 7.5 Hz, 1H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.3, 191.8, 155.3, 151.2, 141.5, 141.4, 135.5, 135.0, 131.3, 130.9, 130.2, 129.6, 129.4, 129.3, 128.9, 128.2, 127.7, 127.1, 120.4, 118.5; **IR** (neat): 2984, 2931, 1651, 1399, 1259, 1099, 980, 761 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₆H₁₆Cl₂O₃ (M+H)⁺ 447.0521 found 447.0549.



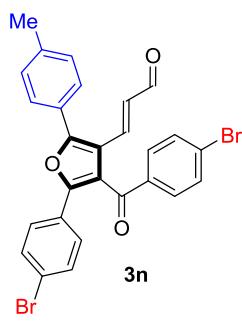
(E)-3-(4-(4-chlorobenzoyl)-5-(4-chlorophenyl)-2-(4-methoxyphenyl)furan-3-yl)acrylaldehyde 3l :

Prepared by following procedure A. Obtained as a yellow solid; yield = 83% (40 mg); m.p.= 170-172 °C; R_f = 0.3 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.49 (d, J = 7.5 Hz, 1H), 7.99 - 7.93 (m, 2H), 7.68 (d, J = 8.8 Hz, 2H), 7.54 – 7.46 (m, 3H), 7.42 (d, J = 8.5 Hz, 2H), 7.29 (d, J = 8.1 Hz, 2H), 7.10 (d, J = 8.7 Hz, 2H), 6.18 (dd, J = 16.1, 7.5 Hz, 1H), 3.93 (s, 3H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.3, 192.1, 161.3, 155.8, 150.7, 141.9, 141.3, 135.3, 135.0, 131.3, 130.4, 129.8, 129.6, 129.2, 127.6, 127.2, 121.3, 120.3, 117.5, 114.9, 55.7; **IR** (neat): 2940, 2855, 1644, 1408, 1256, 1107, 759 cm^{-1} ; **HRMS (ESI)** m/z calc. for $\text{C}_{27}\text{H}_{18}\text{Cl}_2\text{O}_4$ ($\text{M}+\text{H}$) $^+$ 477.0630 found 477.0655.



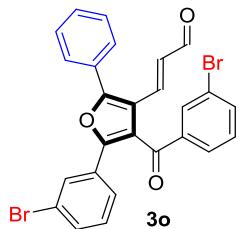
(E)-3-(4-(4-bromobenzoyl)-5-(4-bromophenyl)-2-phenylfuran-3-yl)acrylaldehyde 3m:

Prepared by following procedure A. Obtained as a yellow solid; yield = 84% (35 mg); m.p.= 186-188 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.48 (d, J = 7.4 Hz, 1H), 7.80 (d, J = 8.6 Hz, 2H), 7.75 – 7.69 (m, 2H), 7.59 – 7.52 (m, 5H), 7.49 (d, J = 16.1 Hz, 1H), 7.45-7.39 (m, 4H), 6.17 (dd, J = 16.1, 7.4 Hz, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.2, 192.2, 155.4, 151.2, 141.5, 135.4, 132.7, 132.2, 131.6, 131.0, 130.3, 130.3, 129.4, 128.8, 128.2, 127.8, 127.5, 123.8, 120.4, 118.5; **IR** (neat): 2989, 2923, 1675, 1587, 1397, 1250, 1121, 1027, 755 cm^{-1} ; **HRMS (ESI)** m/z calc. for $\text{C}_{26}\text{H}_{16}\text{Br}_2\text{O}_3$ ($\text{M}+\text{H}$) $^+$ 534.9548 found 534.9539.



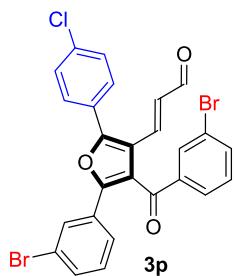
(E)-3-(4-(4-bromobenzoyl)-5-(4-bromophenyl)-2-(p-tolyl)furan-3-yl)acrylaldehyde 3n:

Prepared by following procedure A. Obtained as a yellow solid; yield = 86% (37 mg); m.p.= 191-193 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.47 (d, J = 7.5 Hz, 1H), 7.80 (d, J = 8.6 Hz, 2H), 7.60 (d, J = 8.1 Hz, 2H), 7.57 (d, J = 8.6 Hz, 2H), 7.48 (d, J = 16.1 Hz, 1H), 7.45 – 7.34 (m, 6H), 6.15 (dd, J = 16.1, 7.5 Hz, 1H), 2.46 (s, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.3, 192.3, 155.8, 150.9, 141.7, 140.7, 135.4, 132.6, 132.2, 131.4, 130.6, 130.3, 130.1, 128.1, 127.8, 127.6, 126.0, 123.7, 120.4, 118.0, 21.7; **IR** (neat): 2980, 2936, 1655, 1401, 1121, 1007, 823, 755 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₇H₁₈Br₂O₃ (M+H)⁺ 550.9654 found 550.9677.



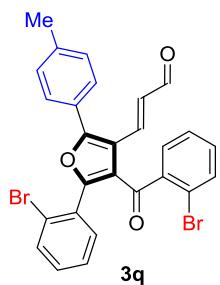
(E)-3-(4-(3-bromobenzoyl)-5-(3-bromophenyl)-2-phenylfuran-3-yl)acrylaldehyde 3o:

Prepared by following procedure A. Obtained as a pale yellow viscous liquid; yield = 70% (29 mg); R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **¹H NMR** (400 MHz, CDCl₃) δ 9.47 (d, J = 7.4 Hz, 1H), 8.02 (s, 1H), 7.80 (d, J = 7.8 Hz, 1H), 7.70 - 7.42 (m, 3H), 7.66 (d, J = 8.0 Hz, 1H), 7.53- 7.46 (m, 4H), 7.39 (d, J = 8.0 Hz, 1H), 7.34 (d, J = 7.9 Hz, 1H), 7.25 (dd, J = 14.4, 6.5 Hz, 1H), 7.11 (t, J = 7.9 Hz, 1H), 6.17 (dd, J = 16.2, 7.4 Hz, 1H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.3, 191.6, 155.5, 151.1, 141.5, 138.4, 137.4, 132.6, 132.4, 131.2, 130.7, 130.4, 130.3, 129.4, 129.4, 128.7, 128.6, 128.3, 126.7, 125.2, 123.5, 123.1, 120.8, 118.4; **IR** (neat): 3068, 2927, 2839, 1676, 1626, 1563, 1475, 1327, 1131, 972, 791 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₆H₁₆Br₂O₃ (M+Na)⁺ 556.9358 found 556.9352.



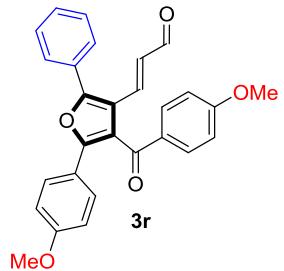
(E)-3-(4-(3-bromobenzoyl)-5-(3-bromophenyl)-2-(4-chlorophenyl)furan-3-yl)acrylaldehyde 3p:

Prepared by following procedure A. Obtained as a pale yellow viscous liquid; yield = 64% (28 mg); R_f = 0.4 (Ethyl acetate/Hexane = 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.50 (d, J = 7.4 Hz, 1H), 8.03 (t, J = 1.7 Hz, 1H), 7.83 – 7.80 (m, 1H), 7.72 (t, J = 1.7 Hz, 1H), 7.71 – 7.68 (m, 1H), 7.67 (d, J = 8.6 Hz, 2H), 7.54 (d, J = 8.6 Hz, 2H), 7.46 (d, J = 16.1 Hz, 1H), 7.44–7.40 (m, 1H), 7.39–7.36 (m, 1H), 7.29 (t, J = 7.9 Hz, 1H), 7.14 (t, J = 7.9 Hz, 1H), 6.21 (dd, J = 16.2, 7.4 Hz, 1H); **¹³C NMR** (126 MHz, CDCl₃) δ 193.1, 191.4, 154.1, 151.4, 140.8, 138.3, 137.5, 136.5, 132.6, 132.6, 131.6, 130.6, 130.5, 130.3, 129.7, 129.5, 129.3, 128.5, 127.2, 125.3, 123.5, 123.1, 120.9, 118.7; **IR** (neat): 3072, 2925, 2843, 1677, 1626, 1566, 1479, 1325, 1226, 1131, 1014, 911, 791 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₆H₁₅Br₂ClO₃ (M+Na)⁺ 592.8949 found 592.8944.



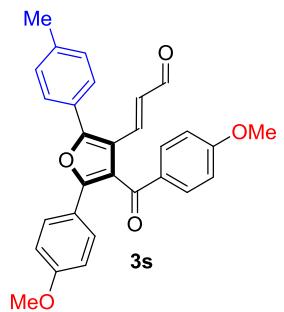
(E)-3-(4-(2-bromobenzoyl)-5-(2-bromophenyl)-2-(*p*-tolyl)furan-3-yl)acrylaldehyde 3q:

Prepared by following procedure A. Obtained as a yellow viscous liquid; yield = 24% (10 mg); R_f = 0.4 (Ethyl acetate/Hexane = 30/70); **¹H NMR** (500 MHz, CDCl₃) δ 9.64 (d, J = 7.7 Hz, 1H), 7.83 (d, J = 16.2 Hz, 1H), 7.60 (d, J = 8.2 Hz, 2H), 7.42 (dd, J = 7.9, 1.3 Hz, 1H), 7.38 (dd, J = 7.5, 1.8 Hz, 1H), 7.34 (dd, J = 7.9, 1.2 Hz, 1H), 7.30 (d, J = 7.9 Hz, 2H), 7.28 (dd, J = 7.5, 1.8 Hz, 1H), 7.12 - 7.03 (m, 4H), 6.73 (dd, J = 16.2, 7.7 Hz, 1H), 2.43 (s, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 194.2, 190.9, 157.1, 155.5, 142.9, 140.4, 140.0, 133.2, 132.7, 132.5, 131.9, 131.9, 131.2, 130.2, 130.1, 129.8, 128.1, 126.7, 126.7, 126.1, 123.9, 123.8, 120.6, 116.8, 21.5.; **IR** (neat): 2983, 2932, 1650, 1408, 1121, 1037, 823, 745 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₇H₁₈Br₂O₃ (M+H)⁺ 550.9671 found 550.9677.



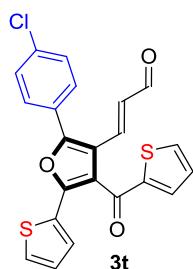
(E)-3-(4-(4-methoxybenzoyl)-5-(4-methoxyphenyl)-2-phenylfuran-3-yl)acrylaldehyde 3r:

Prepared by following procedure A. Obtained as a yellow solid; yield = 18% (8 mg); m.p.= 91-93 °C; R_f = 0.3 (Ethyl acetate/Hexane= 30/70) **1H NMR** (500 MHz, CDCl₃) δ 9.47 (d, J = 7.5 Hz, 1H), 7.95 (d, J = 8.9 Hz, 2H), 7.71 (d, J = 7.1 Hz, 2H), 7.56 - 7.49 (m, 6H), 6.88 (d, J = 9.0 Hz, 2H), 6.82 (d, J = 9.0 Hz, 2H), 6.22 (dd, J = 16.1, 7.5 Hz, 1H), 3.84 (s, 3H), 3.77 (s, 3H); **13C NMR** (126 MHz, CDCl₃) δ 193.6, 192.1, 164.7, 160.3, 154.6, 151.9, 142.4, 132.5, 130.5, 130.1, 129.8, 129.4, 129.2, 128.1, 127.9, 121.7, 119.9, 118.6, 114.4, 114.3, 55.7, 55.4; **IR** (neat): 3015, 2917, 2847, 1633, 1506, 1425, 1259, 1132, 1035, 751 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₈H₂₂O₅ (M+H)⁺ 439.1543 found 439.1540.



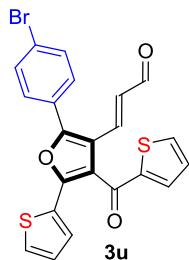
(E)-3-(4-(4-methoxybenzoyl)-5-(4-methoxyphenyl)-2-(p-tolyl)furan-3-yl)acrylaldehyde

3s: Prepared by following procedure A. Obtained as a yellow solid; yield = 20% (9 mg); m.p.= 96-98 °C; R_f = 0.3 (Ethyl acetate/Hexane= 30/70) **1H NMR** (500 MHz, CDCl₃) δ 9.46 (d, J = 7.6 Hz, 1H), 7.95 (d, J = 8.7 Hz, 2H), 7.60 (d, J = 8.1 Hz, 2H), 7.54 – 7.46 (m, 3H), 7.35 (d, J = 8.1 Hz, 2H), 6.88 (d, J = 8.8 Hz, 2H), 6.81 (d, J = 8.8 Hz, 2H), 6.20 (dd, J = 16.0, 7.5 Hz, 1H), 3.84 (s, 3H), 3.77 (s, 3H), 2.45 (s, 3H). **13C NMR** (126 MHz, CDCl₃) δ 193.7, 192.2, 164.6, 160.2, 155.0, 151.7, 142.7, 140.1, 132.5, 130.1, 130.1, 129.9, 128.1, 127.9, 126.5, 121.7, 119.1, 118.1, 114.4, 114.3, 55.7, 55.4, 21.6; **IR** (neat): 2918, 2835, 1673, 1598, 1509, 1257, 1170, 1029, 755 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₉H₂₄O₅ (M+H)⁺ 453.1734 found 453.1697.



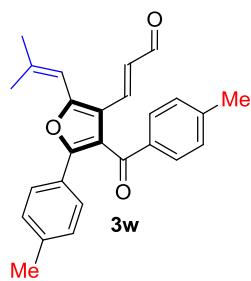
(E)-3-(2-(4-chlorophenyl)-5-(thiophen-2-yl)-4-(thiophene-2-carbonyl)furan-3-yl)acrylaldehyde 3t:

Prepared by following procedure A. Obtained as a yellow solid; yield = 80% (43 mg); m.p.= 115-117 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.54 (d, J = 7.4 Hz, 1H), 7.78 (dd, J = 4.9, 1.1 Hz, 1H), 7.68 – 7.65 (m, 3H), 7.55 (d, J = 8.6 Hz, 2H), 7.48 (d, J = 16.1 Hz, 1H), 7.36 (dd, J = 5.0, 1.1 Hz, 1H), 7.32 (dd, J = 3.7, 1.1 Hz, 1H), 7.10 (dd, J = 4.8, 3.9 Hz, 1H), 7.02 (dd, J = 5.0, 3.8 Hz, 1H), 6.34 (dd, J = 16.1, 7.4 Hz, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.2, 183.9, 153.1, 148.6, 144.0, 140.9, 136.7, 136.2, 135.9, 131.4, 130.2, 129.7, 129.2, 128.8, 128.0, 127.7, 127.3, 127.3, 119.5, 118.5; **IR** (neat): 3015, 2993, 1640, 1406, 1256, 1092, 755 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{22}\text{H}_{13}\text{ClO}_3\text{S}_2$ ($\text{M}+\text{H}$) $^+$ 425.0043 found 425.0067.



(E)-3-(2-(4-bromophenyl)-5-(thiophen-2-yl)-4-(thiophene-2-carbonyl)furan-3-yl)acrylaldehyde 3u:

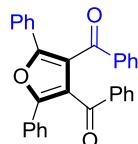
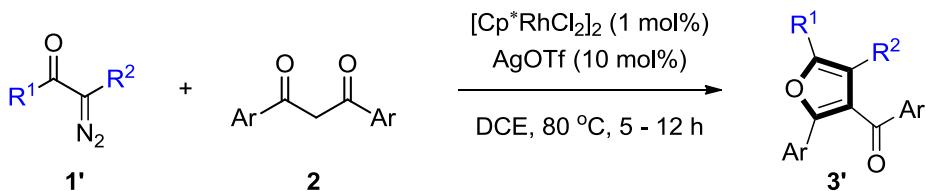
Prepared by following procedure A. Obtained as a yellow solid; yield = 78% (46 mg); m.p.= 145-147 °C; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 9.52 (d, J = 7.4 Hz, 1H), 7.76 (dd, J = 4.9, 1.2 Hz, 1H), 7.68 (d, J = 8.7 Hz, 2H), 7.63 (dd, J = 3.8, 1.2 Hz, 1H), 7.57 (d, J = 8.6 Hz, 2H), 7.45 (d, J = 16.1 Hz, 1H), 7.34 (dd, J = 5.0, 1.1 Hz, 1H), 7.30 (dd, J = 3.8, 1.1 Hz, 1H), 7.07 (dd, J = 4.9, 3.9 Hz, 1H), 6.99 (dd, J = 5.0, 3.8 Hz, 1H), 6.32 (dd, J = 16.1, 7.4 Hz, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.2, 183.9, 153.2, 148.6, 144.1, 140.9, 136.8, 135.9, 132.6, 131.4, 130.2, 129.4, 128.8, 128.0, 127.8, 127.7, 127.3, 124.5, 119.6, 118.6; **IR** (neat): 2997, 2931, 1644, 1412, 1261, 1114, 759 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{22}\text{H}_{13}\text{BrO}_3\text{S}_2$ ($\text{M}+\text{H}$) $^+$ 468.9639 found 468.9562.



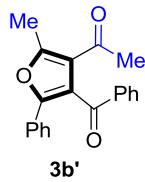
(E)-3-(4-(4-methylbenzoyl)-2-(2-methylprop-1-en-1-yl)-5-(p-tolyl)furan-3-yl)acrylaldehyde 3w:

Prepared by following procedure A. Obtained as a yellow viscous liquid; yield = 68% (31 mg); R_f = 0.4 (Ethyl acetate/Hexane= 30/70); **1H NMR** (500 MHz, CDCl_3) δ 9.44 (d, J = 7.6 Hz, 1H), 7.81 (d, J = 8.2 Hz, 2H), 7.38 (d, J = 8.3 Hz, 2H), 7.33 (d, J = 16.0 Hz, 1H), 7.18 (d, J = 8.0 Hz, 2H), 7.06 (d, J = 8.1 Hz, 2H), 6.29 – 6.27 (m, 1H), 6.14 (dd, J = 16.0, 7.6 Hz, 1H), 2.36 (s, 3H), 2.28 (s, 3H), 2.25 (s, 3H), 2.06 (s, 3H); **13C NMR** (126 MHz, CDCl_3) δ 193.7, 193.3, 153.9, 151.6, 145.4, 143.5, 141.8, 139.0, 134.6, 130.1, 129.8, 129.5, 129.1, 126.2, 126.1, 119.1, 118.5, 111.1, 28.1, 21.9, 21.4, 21.2; **IR** (neat): 3028, 2980, 2918, 1654, 1601, 1414, 1228, 1125, 752 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{26}\text{H}_{24}\text{O}_3$ ($\text{M}+\text{H}$)⁺ 385.1776 found 385.1798.

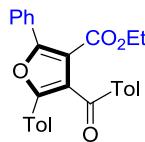
C. [3+2] Annulation with other diazo compounds:



(2,5-diphenylfuran-3,4-diyl)bis(phenylmethanone) 3a': Prepared by following procedure A. Obtained as a colourless viscous liquid; Yield = 78% (44 mg); R_f = 0.3 (Ethyl acetate/Hexane= 20/80); **1H NMR** (400 MHz, CDCl_3) δ 7.70 – 7.66 (m, 8H), 7.42 (t, J = 7.4 Hz, 2H), 7.35 – 7.29 (m, 6H), 7.24 (t, J = 7.8 Hz, 4H); **13C NMR** (101 MHz, CDCl_3) δ 191.56, 153.03, 137.61, 133.40, 129.56, 129.45, 128.98, 128.72, 128.50, 127.34, 123.37; **IR** (neat): 3025, 2929, 2852, 1741, 1723, 1658, 1594, 1452, 1237, 906, 693; **HRMS** (ESI) m/z calc. for $\text{C}_{30}\text{H}_{20}\text{O}_3$ ($\text{M}+\text{H}$)⁺ 429.1485 found 429.1491.



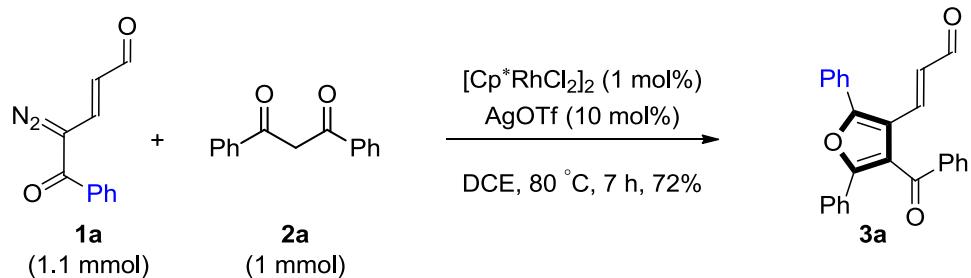
1-(4-benzoyl-2-methyl-5-phenylfuran-3-yl)ethanone **3b':** Prepared by following procedure A. Obtained as a white solid; Yield = 83% (33 mg); m.p.= 121-123 °C; R_f = 0.3 (Ethyl acetate/Hexane= 20/80); ^1H NMR (500 MHz, CDCl_3) δ 7.94 (d, J = 7.2 Hz, 2H), 7.59 – 7.51 (m, 3H), 7.43 (t, J = 7.7 Hz, 2H), 7.32 – 7.24 (m, 3H), 2.74 (s, 3H), 2.28 (s, 3H); ^{13}C NMR (126 MHz, CDCl_3) δ 193.66, 192.88, 157.09, 149.58, 137.58, 133.82, 129.54, 128.98, 128.90, 128.79, 125.93, 125.11, 120.38, 30.06, 14.89; IR (neat): 2923, 2857, 1669, 1596, 1491, 1399, 1324, 1237, 1072, 893, 691 cm^{-1} ; HRMS (ESI) m/z calc. for $\text{C}_{20}\text{H}_{16}\text{O}_3$ ($\text{M}+\text{H}$) $^+$ 305.1172 found 305.1187.



ethyl 4-(4-methylbenzoyl)-2-phenyl-5-(p-tolyl)furan-3-carboxylate **3c':**

Prepared by following procedure A with 12 h of reaction time. Obtained as a colourless liquid; Yield = 72% (36 mg); R_f = 0.3 (Ethyl acetate/Hexane= 20/80); ^1H NMR (500 MHz, CDCl_3) δ 8.05 (d, J = 6.8 Hz, 2H), 7.88 (d, J = 8.2 Hz, 2H), 7.54 (d, J = 8.3 Hz, 2H), 7.51 – 7.43 (m, 3H), 7.24 (d, J = 8.0 Hz, 2H), 7.12 (d, J = 8.1 Hz, 2H), 3.98 (q, J = 7.1 Hz, 2H), 2.40 (s, 3H), 2.31 (s, 3H), 0.91 (t, J = 7.1 Hz, 3H); ^{13}C NMR (126 MHz, CDCl_3) δ 192.25, 162.81, 155.77, 150.46, 144.55, 139.09, 135.45, 129.86, 129.66, 129.56, 129.54, 129.27, 128.62, 128.39, 126.28, 126.04, 121.64, 115.67, 61.02, 21.88, 21.44, 13.48; IR (neat): 2984, 2846, 1724, 1668, 1599, 1502, 1384, 1221, 1111, 1072, 900, 764 cm^{-1} ; HRMS (ESI) m/z calc. for $\text{C}_{28}\text{H}_{24}\text{O}_4$ ($\text{M}+\text{H}$) $^+$ 425.1647 found 425.1754.

D. Large scale [3+2] annulation:



A dry 25 mL RB flask with magnetic stir bar was charged with diketone **2a** (224 mg, 1 mmol), $[\text{Cp}^*\text{RhCl}_2]_2$ (6 mg, 0.01 mmol), AgOTf (25 mg, 0.1 mmol), and 5 mL freshly distilled DCE. To the gently stirring reaction mixture at 80 °C under nitrogen atmosphere was added keto-diazoenal **1a** (220 mg, 1.1 mmol) in 5 mL of DCE over 5 h via a syringe pump. The reaction was continued for another 2 h (as judged by TLC) and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 2:8) furnished the enal-functionalized tetrasubstituted furan **3a** (272 mg, 72%).

4. [2+3] Annulation of diazoenals and 1,3-dicarbonyls:

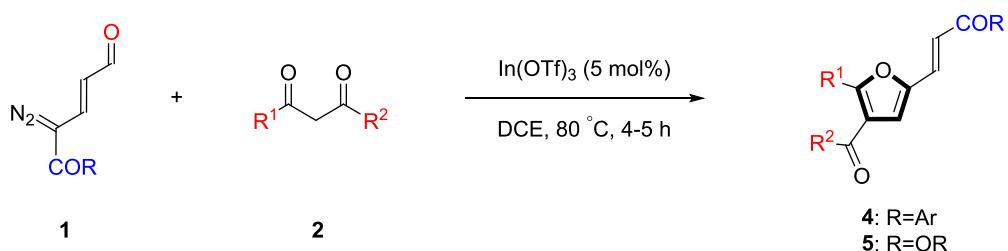
A. Table S2: Optimization of the [2+3] annulation ^[a-c]

The reaction scheme shows the [2+3] annulation of diazoaldehyde **1a** (0.14 mmol) and 1,3-diketone **2a** (0.13 mmol). The reaction conditions involve a catalyst (x mol %) in a solvent at temperature t °C for 4-5 h. The product is **4a**, a substituted furan derivative.

Entry	Catalyst (x mol %)	Solvent	Temp (t °C)	4a [%]
1 ^[d]	[Cp*Co(CO)I ₂] (1), AgOTf (10)	DCE	80 °C	28
2 ^[e]	[Cp*IrCl ₂] ₂ (1), AgOTf (10)	DCE	80 °C	30
3 ^[f]	[Cp*RuCl ₂] _n (1), AgOTf (10)	DCE	80 °C	64
4	RuCl ₃ (1), AgOTf (10)	DCE	80 °C	42
5	RuCl ₃ (1)	DCE	80 °C	—
6	AgOTf (10)	DCE	80 °C	—
7	CuOTf toluene complex (5)	DCE	80 °C	42
8	Cu(OTf) ₂ (5)	DCE	80 °C	60
9	Zn(OTf) ₂ (5)	DCE	80 °C	30
10	Sn(OTf) ₂ (5)	DCE	80 °C	38
11	Yb(OTf) ₃ (5)	DCE	80 °C	35
12	Nd(OTf) ₃ (5)	DCE	80 °C	40
13	Sc(OTf) ₃ (5)	DCE	80 °C	60
14	In(OTf)₃ (5)	DCE	80 °C	78
15	Mg(OTf) ₂ (5)	DCE	80 °C	—
16	La(OTf) ₃ (5)	DCE	80 °C	—
17	Ca(OTf) ₂ (5)	DCE	80 °C	—
18	In(OTf) ₃ (5)	DCM	40 °C	31
19	In(OTf) ₃ (5)	chloroform	60 °C	72
20	In(OTf) ₃ (5)	toluene	80 °C	60
21	In(OTf) ₃ (5)	toluene	100 °C	57
22	InCl ₃ (5)	DCE	80 °C	—
23	InCl ₃ (5), AgOTf (15)	DCE	80 °C	43

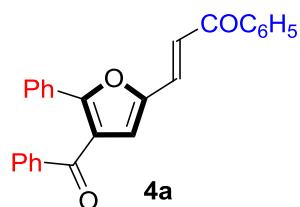
[a] Reaction conditions: A solution of **1a** (0.14 mmol in 2 mL) was added over 3 h to a solution of **2a** (0.13 mmol in 1 mL), and catalyst, and continued the reaction for another 1-2 h. [b] Yield of isolated product. [c] For entries 5-6, 15-17, and 22 **1a** was decomposed. [d] <5% of **3a**. [e] 22% of **3a**. [f] <5% of **3a**.

B. Substrate scope of the [2+3] annulation:

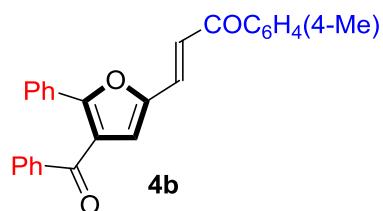


General procedure B:

An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with 1,3-dicarbonyl compound **2** (30 mg), 5 mol % In(OTf)₃, and 1.5 mL of freshly distilled DCE. To the gently stirring reaction mixture at 80 °C under nitrogen atmosphere was added diazoenol **1** (1.1 equiv) in 2 mL of DCE over 3 h via a syringe pump. The reaction was continued for another 1-2 h (as judged by TLC) and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 1:9) furnished the trisubstituted furan **4/5**.

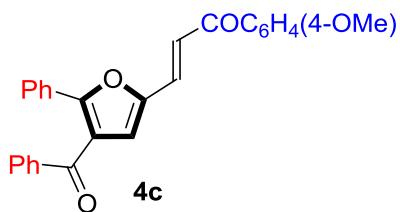


(E)-3-(4-benzoyl-5-phenylfuran-2-yl)-1-phenylprop-2-en-1-one **4a:** Prepared by following procedure B. Obtained as a yellow solid; yield = 78% (39 mg); m.p.= 122-124 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **¹H NMR** (500 MHz, CDCl₃) δ 8.06 (dd, J = 8.3, 1.3 Hz, 2H), 7.86 (dd, J = 8.3, 1.3 Hz, 2H), 7.83 – 7.78 (m, 2H), 7.63 – 7.58 (m, 3H), 7.53 – 7.60 (m, 3H), 7.45 (t, J = 7.8 Hz, 2H), 7.38 – 7.41 (m, 3H), 6.01 (s, 1H); **¹³C NMR** (126 MHz, CDCl₃) δ 191.1, 189.6, 157.5, 150.0, 138.1, 137.7, 133.4, 133.1, 130.1, 129.9, 129.9, 129.1, 128.8, 128.7(2C), 128.6, 127.9, 123.5, 120.8, 119.3; **IR** (neat): 2910, 1657, 1610, 1450, 1250, 1157, 1036, 755 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₆H₁₈O₃ (M+H)⁺ 379.1329 found 379.1310.

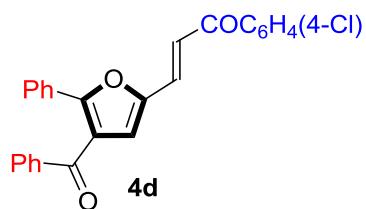


(E)-3-(4-benzoyl-5-phenylfuran-2-yl)-1-(*p*-tolyl)prop-2-en-1-one **4b:** Prepared by following procedure B. Obtained as a yellow viscous liquid; yield = 69% (36 mg); R_f = 0.5

(Ethyl acetate/Hexane= 10/90); **¹H NMR** (700 MHz, CDCl₃) δ 7.98 (d, *J* = 8.2 Hz, 2H), 7.86 (d, *J* = 7.1 Hz, 2H), 7.82 – 7.78 (m, 2H), 7.60 (d, *J* = 1.8 Hz, 2H), 7.57 - 7.54 (m, 1H), 7.42 (t, *J* = 7.8 Hz, 2H), 7.38 – 7.35 (m, 3H), 7.32 (d, *J* = 7.9 Hz, 2H), 6.96 (s, 1H), 2.45 (s, 3H); **¹³C NMR** (176 MHz, CDCl₃) δ 191.1, 189.1, 157.4, 150.1, 144.0, 137.7, 135.5, 133.4, 130.1, 129.9, 129.8, 129.6, 129.1, 128.8, 128.7, 127.9, 123.5, 120.9, 119.0, 21.9; **IR** (neat): 2920, 1667, 1602, 1440, 1258, 1177, 1023, 758 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₇H₂₀O₃ (M+H)⁺ 393.1489 found 393.1485.

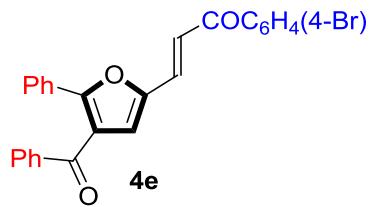


(E)-3-(4-benzoyl-5-phenylfuran-2-yl)-1-(4-methoxyphenyl)prop-2-en-1-one 4c: Prepared by following procedure B. Obtained as a yellow solid; yield = 73% (39 mg); m.p.= 164-166 °C; R_f = 0.4 (Ethyl acetate/Hexane= 10/90); **¹H NMR** (500 MHz, CDCl₃) δ 8.08 (d, *J* = 8.9 Hz, 2H), 7.88- 7.85 (m, 2H), 7.81 – 7.78 (m, 2H), 7.60 (s, 2H), 7.55 (t, *J* = 7.4 Hz, 1H), 7.42 (t, *J* = 7.8 Hz, 2H), 7.39 – 7.34 (m, 3H), 7.00 (d, *J* = 8.8 Hz, 2H), 6.95 (s, 1H), 3.90 (s, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 191.1, 187.9, 163.7, 157.3, 150.2, 137.7, 133.4, 131.1, 131.0, 130.0, 129.9, 129.2, 129.2, 128.7, 127.9, 123.5, 120.8, 118.8, 114.1, 55.7; **IR** (neat): 2989, 2931, 1715, 1375, 1256, 1169, 1096, 978, 757 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₇H₂₀O₄ (M+H)⁺ 409.1413 found 409.1434.

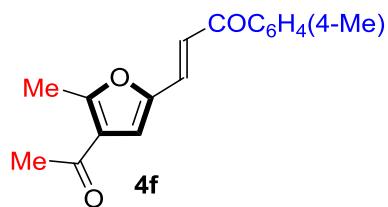


(E)-3-(4-benzoyl-5-phenylfuran-2-yl)-1-(4-chlorophenyl)prop-2-en-1-one 4d: Prepared by following procedure B. Obtained as a yellow viscous liquid; yield = 76% (42 mg); R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **¹H NMR** (500 MHz, CDCl₃) δ 8.01 (d, *J* = 8.7 Hz, 2H), 7.86 (dd, *J* = 8.3, 1.2 Hz, 2H), 7.81 – 7.78 (m, 2H), 7.62 (d, *J* = 15.3 Hz, 1H), 7.58 – 7.53 (m, 2H), 7.50 (d, *J* = 8.7 Hz, 2H), 7.43 (dd, *J* = 11.0, 4.5 Hz, 2H), 7.40 – 7.35 (m, 3H), 6.99 (s, 1H); **¹³C NMR** (126 MHz, CDCl₃) δ 191.1, 188.4, 157.7, 150.0, 139.7, 137.7, 136.5, 133.6, 130.4, 130.3, 130.1, 129.9, 129.3, 129.1, 128.8, 128.1, 123.7, 120.2, 119.6; **IR** (neat): 2922, 2851,

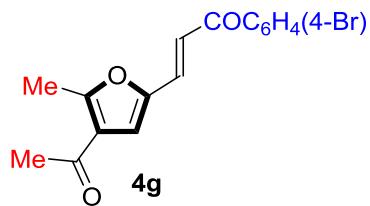
1673, 1592, 1450, 1260, 1092, 758 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{26}\text{H}_{17}\text{ClO}_3$ ($\text{M}+\text{H}$) $^+$ 413.0916 found 413.0939.



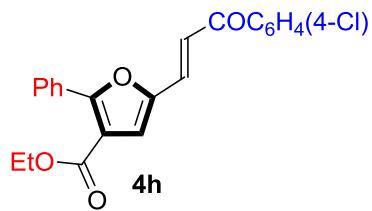
(E)-3-(4-benzoyl-5-phenylfuran-2-yl)-1-(4-bromophenyl)prop-2-en-1-one 4e: Prepared by following procedure B. Obtained as a yellow solid; yield = 78% (47 mg); m.p.= 126-128 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 7.93 (d, J = 8.6 Hz, 2H), 7.86 (dd, J = 8.3, 1.2 Hz, 2H), 7.80 (dd, J = 6.8, 3.0 Hz, 2H), 7.66 (d, J = 8.6 Hz, 2H), 7.62 (d, J = 15.3 Hz, 1H), 7.56 (t, J = 7.4 Hz, 1H), 7.52 (d, J = 15.3 Hz, 1H), 7.42 (t, J = 7.8 Hz, 2H), 7.38 – 7.35 (m, 3H), 6.99 (s, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 191.0, 188.5, 157.7, 149.9, 137.6, 136.9, 133.5, 132.2, 130.4, 130.2, 130.2, 129.9, 129.0, 128.7, 128.3, 127.9, 123.6, 120.1, 119.7; **IR** (neat): 2993, 2936, 1717, 1392, 1215, 1075, 974, 750 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{26}\text{H}_{17}\text{BrO}_3$ ($\text{M}+\text{H}$) $^+$ 459.0387 found 459.0415.



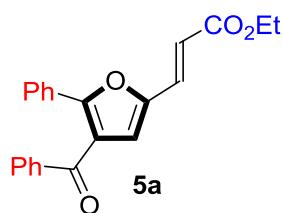
(E)-3-(4-acetyl-5-methylfuran-2-yl)-1-(p-tolyl)prop-2-en-1-one 4f: Prepared by following procedure B. Obtained as a yellow solid; yield = 67% (54 mg); m.p.= 131-133 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 7.95 (d, J = 8.2 Hz, 2H), 7.51 (d, J = 15.3 Hz, 1H), 7.45 (d, J = 15.3 Hz, 1H), 7.30 (d, J = 8.3 Hz, 2H), 6.88 (s, 1H), 2.68 (s, 3H), 2.43 (s, 6H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.6, 189.1, 161.1, 149.5, 143.9, 135.5, 129.6, 129.5, 128.7, 123.9, 119.9, 115.9, 29.2, 21.8, 14.9; **IR** (neat): 2998, 2931, 1718, 1388, 1272, 1213, 1099, 978, 755 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{17}\text{H}_{16}\text{O}_3$ ($\text{M}+\text{Na}$) $^+$ 291.0987 found 291.0992.



(E)-3-(4-acetyl-5-methylfuran-2-yl)-1-(4-bromophenyl)prop-2-en-1-one 4g: Prepared by following procedure B. Obtained as a yellow solid; yield = 68% (67 mg); m.p.= 150-152 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (700 MHz, CDCl_3) δ 7.90 (d, J = 8.6 Hz, 2H), 7.64 (d, J = 8.6 Hz, 2H), 7.52 (d, J = 15.2 Hz, 1H), 7.39 (d, J = 15.3 Hz, 1H), 6.92 (s, 1H), 2.69 (s, 3H), 2.44 (s, 3H); **$^{13}\text{C NMR}$** (176 MHz, CDCl_3) δ 193.7, 188.5, 161.5, 149.3, 136.9, 132.2, 130.5, 130.2, 128.3, 124.1, 119.2, 116.8, 29.4, 15.0; **IR** (neat): 2980, 2936, 1712, 1384, 1274, 1215, 1099, 980, 755 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{16}\text{H}_{13}\text{BrO}_3$ ($\text{M}+\text{Na}$) $^+$ 356.9938 found 356.9920.

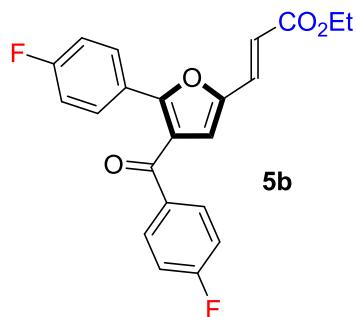


Ethyl (E)-5-(3-(4-chlorophenyl)-3-oxoprop-1-en-1-yl)-2-phenylfuran-3-carboxylate 4h: Prepared by following procedure B. Obtained as a yellow solid; yield = 65% (38 mg); m.p.= 79-81 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 8.07 (dd, J = 7.8, 1.9 Hz, 2H), 7.99 (d, J = 8.6 Hz, 2H), 7.60 (d, J = 15.3 Hz, 1H), 7.51 – 7.44 (m, 6H), 7.16 (s, 1H), 4.33 (q, J = 7.1 Hz, 2H), 1.36 (t, J = 7.1 Hz, 3H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 188.4, 162.9, 159.4, 149.9, 139.7, 136.5, 130.6, 130.5, 130.1, 129.2, 129.2, 129.1, 128.5, 120.1, 119.3, 116.9, 61.2, 14.5; **IR** (neat): 2984, 2923, 1717, 1609, 1384, 1235, 1101, 974, 761 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{22}\text{H}_{17}\text{ClO}_4$ ($\text{M}+\text{Na}$) $^+$ 403.0723 found 403.0708.

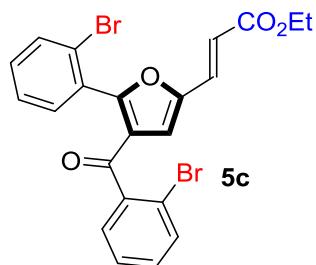


Ethyl (E)-3-(4-benzoyl-5-phenylfuran-2-yl)acrylate 5a: Prepared by following procedure B. Obtained as a yellow viscous liquid; yield = 75% (34 mg); R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (400 MHz, CDCl_3) δ 7.86 – 7.82 (m, 2H), 7.76 - 7.73 (m, 2H), 7.54 (t, J = 7.4 Hz, 1H), 7.45 (d, J = 15.9 Hz, 1H), 7.43 – 7.38 (m, 2H), 7.36 - 7.30 (m, 3H), 6.86 (s, 1H), 6.49 (d, J = 15.7 Hz, 1H), 4.28 (q, J = 7.1 Hz, 2H), 1.34 (t, J = 7.1 Hz, 3H); **$^{13}\text{C NMR}$** (101 MHz, CDCl_3) δ 191.2, 166.8, 157.2, 149.3, 137.7, 133.4, 130.2, 129.9, 129.8, 129.1, 128.6, 128.6, 127.8, 123.2, 117.9, 117.7, 60.8, 14.5; **IR** (neat): 3063, 2981, 2929,

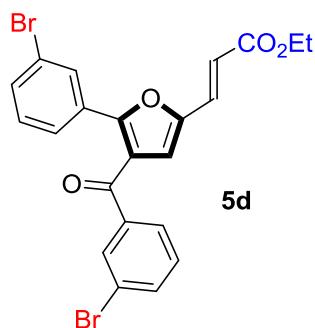
1710, 1635, 1598, 1483, 1447, 1257, 1171, 1036, 971, 891, 729 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₂H₁₈O₄ (M+H)⁺ 347.1294 found 347.1278.



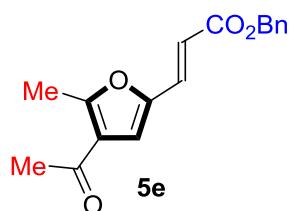
Ethyl (E)-3-(4-(4-fluorobenzoyl)-5-(4-fluorophenyl)furan-2-yl)acrylate 5b: Prepared by following procedure B. Obtained as a yellow viscous liquid; yield = 73% (32 mg); R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **¹H NMR** (500 MHz, CDCl₃) δ 7.86 (dd, *J* = 8.9, 5.4 Hz, 2H), 7.77 (dd, *J* = 9.0, 5.3 Hz, 2H), 7.43 (d, *J* = 15.7 Hz, 1H), 7.08 (m, 4H), 6.82 (s, 1H), 6.47 (d, *J* = 15.7 Hz, 1H), 4.27 (q, *J* = 7.1 Hz, 2H), 1.34 (t, *J* = 7.1 Hz, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 189.4, 167.0, 166.7, 164.9, 164.7, 162.7, 156.3, 149.3, 134.0 (d, *J* = 3.0 Hz), 132.5 (d, *J* = 9.3 Hz), 129.9 (d, *J* = 8.7 Hz), 125.3 (d, *J* = 3.4 Hz), 122.6, 118.0, 117.6, 115.9 (d, *J* = 22.0 Hz), 60.9, 14.4; **IR** (neat): 2973, 2930, 1708, 1636, 1598, 1493, 1235, 1158, 844 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₂H₁₆F₂O₄ (M+H)⁺ 383.1116 found 383.1089.



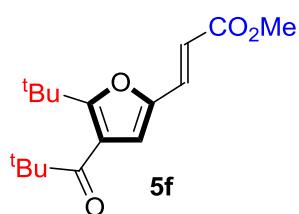
Ethyl (E)-3-(4-(2-bromobenzoyl)-5-(2-bromophenyl)furan-2-yl)acrylate 5c: Prepared by following procedure B. Obtained as a viscous liquid; yield = 48% (18 mg); R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **¹H NMR** (500 MHz, CDCl₃) δ 7.50 – 7.47 (m, 1H), 7.45 (d, *J* = 15.8 Hz, 1H), 7.38 (dd, *J* = 7.7, 1.3 Hz, 1H), 7.32 – 7.26 (m, 2H), 7.19 – 7.13 (m, 2H), 7.13 – 7.05 (m, 2H), 7.03 (s, 1H), 6.43 (d, *J* = 15.8 Hz, 1H), 4.25 (q, *J* = 7.1 Hz, 2H), 1.31 (t, *J* = 7.1 Hz, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 189.4, 166.6, 158.6, 150.8, 140.2, 133.1, 132.9, 132.3, 131.5, 131.4, 130.5, 130.1, 129.1, 126.9, 126.6, 125.9, 123.7, 119.8, 118.7, 114.9, 60.8, 14.4; **IR** (neat): 2925, 1709, 1643, 1397, 1170, 1026, 752 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₂H₁₆Br₂O₄ (M+H)⁺ 502.9488 found 502.9475.



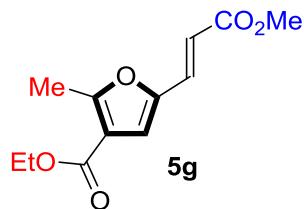
Ethyl (E)-3-(4-(3-bromobenzoyl)-5-(3-bromophenyl)furan-2-yl)acrylate 5d: Prepared by following procedure B. Obtained as a pale yellow viscous liquid; yield = 58% (23 mg); R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (400 MHz, CDCl_3) δ 7.93 (d, J = 12.5 Hz, 2H), 7.72 (d, J = 7.8 Hz, 1H), 7.68 (d, J = 7.9 Hz, 2H), 7.49 (d, J = 8.1 Hz, 1H), 7.44 (d, J = 15.8 Hz, 1H), 7.30 (t, J = 7.9 Hz, 1H), 7.22 (t, J = 8.0 Hz, 1H), 6.84 (s, 1H), 6.51 (d, J = 15.8 Hz, 1H), 4.28 (q, J = 7.1 Hz, 2H), 1.35 (t, J = 7.1 Hz, 3H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 189.1, 166.4, 155.7, 149.8, 139.3, 136.2, 132.9, 132.5, 130.6, 130.5, 130.1, 130.0, 129.6, 128.2, 126.4, 123.2, 122.9, 122.6, 118.6, 117.2, 60.8, 14.3; **IR** (neat): 2924, 2855, 1708, 1640, 1567, 1519, 1464, 1303, 1219, 1082, 972, 757 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{22}\text{H}_{16}\text{Br}_2\text{O}_4$ ($\text{M}+\text{Na}$) $^+$ 526.9290 found 526.9289.



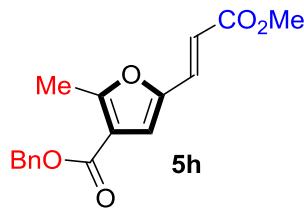
Benzyl (E)-3-(4-acetyl-5-methylfuran-2-yl)acrylate 5e: Prepared by following procedure B. Obtained as a white solid; yield = 76% (65 mg); mp: 94-96 °C; ; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 7.41 – 7.32 (m, 6H), 6.79 (s, 1H), 6.37 (d, J = 15.7 Hz, 1H), 5.23 (s, 2H), 2.63 (s, 3H), 2.41 (s, 3H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.5, 166.7, 160.9, 148.6, 136.1, 130.7, 128.7, 128.4, 128.3, 123.7, 116.4, 114.9, 66.5, 29.2, 14.8. **IR** (neat): 2977, 2933, 1708, 1684, 1549, 1429, 1308, 1169, 1015, 830 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{17}\text{H}_{16}\text{O}_4$ ($\text{M}+\text{Na}$) $^+$ 307.0941 found 307.0940.



Ethyl (E)-3-(5-(tert-butyl)-4-pivaloylfuran-2-yl)acrylate 5f: Prepared by following procedure B. Obtained as a yellow viscous liquid; yield = 51% (24 mg); R_f = 0.5 (Ethyl acetate/Hexane= 10/90); $^1\text{H NMR}$ (500 MHz, CDCl_3) δ 7.34 (d, J = 15.7 Hz, 1H), 6.65 (s, 1H), 6.29 (d, J = 15.7 Hz, 1H), 3.79 (s, 3H), 1.33 (s, 9H), 1.25 (s, 9H); $^{13}\text{C NMR}$ (126 MHz, CDCl_3) δ 206.9, 167.3, 166.1, 146.7, 130.6, 121.4, 115.6, 115.0, 51.7, 44.8, 34.9, 28.9, 27.5; **IR** (neat): 2990, 2850, 1708, 1638, 1538, 1463, 1251, 1163, 1023, 755 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{17}\text{H}_{24}\text{O}_4$ ($\text{M}+\text{H}$) $^+$ 293.1751 found 293.1747.

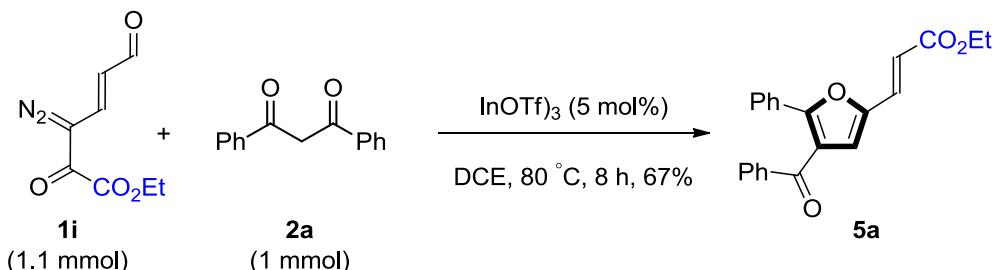


Ethyl (E)-5-(3-methoxy-3-oxoprop-1-en-1-yl)-2-methylfuran-3-carboxylate 5g : Prepared by following procedure B. Obtained as a white solid; yield = 68% (37 mg); m.p.= 88-90 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); $^1\text{H NMR}$ (500 MHz, CDCl_3) δ 7.33 (d, J = 15.7 Hz, 1H), 6.82 (s, 1H), 6.28 (d, J = 15.7 Hz, 1H), 4.29 (q, J = 7.1 Hz, 2H), 3.78 (s, 3H), 2.61 (s, 3H), 1.34 (t, J = 7.1 Hz, 3H); $^{13}\text{C NMR}$ (176 MHz, CDCl_3) δ 167.4, 163.4, 161.5, 148.7, 130.7, 116.3, 115.9, 115.4, 60.6, 51.9, 14.5, 14.2; **IR** (neat): 2963, 2890, 1719, 1682, 1640, 1460, 1435, 1235, 1166, 926, 808 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{12}\text{H}_{14}\text{O}_5$ ($\text{M}+\text{H}$) $^+$ 239.0905 found 239.0914. The CCDC 1554017 contains the supplementary crystallographic data for this compound.



Benzyl (E)-5-(3-methoxy-3-oxoprop-1-en-1-yl)-2-methylfuran-3-carboxylate 5h: Prepared by following procedure B. Obtained as a white solid; yield = 65% (30 mg); m.p.= 78-80 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); $^1\text{H NMR}$ (700 MHz, CDCl_3) δ 7.41 – 7.34 (m, 5H), 7.32 (d, J = 15.7 Hz, 1H), 6.85 (s, 1H), 6.29 (d, J = 15.7 Hz, 1H), 5.28 (s, 2H), 3.78 (s, 3H), 2.62 (s, 3H); $^{13}\text{C NMR}$ (176 MHz, CDCl_3) δ 167.4, 163.2, 161.9, 148.8, 136.0, 130.6, 128.8, 128.4, 128.3, 116.1, 115.9, 115.3, 66.4, 51.9, 14.3; **IR** (neat): 2990, 1704, 1637, 1450, 1305, 1225, 1167, 1123, 1083 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{17}\text{H}_{16}\text{O}_5$ ($\text{M}+\text{H}$) $^+$ 301.1072 found 301.1071.

C. Large scale [2+3] annulation:

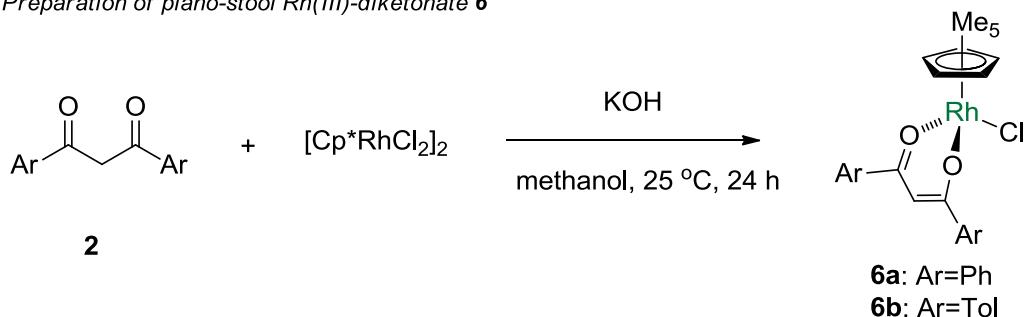


A dry 25 mL RB flask with magnetic stir bar was charged with diketone **2a** (224 mg, 1 mmol), $\text{In}(\text{OTf})_3$ (28 mg, 0.05 mmol), and 5 mL freshly distilled DCE. To the gently stirring reaction mixture at 80 °C under nitrogen atmosphere was added ester-diazoenal **1i** (216 mg, 1.1 mmol) in 5 mL of DCE over 5 h via a syringe pump. The reaction was continued for another 3 h (as judged by TLC) and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 2:8) furnished trisubstituted furan **5a** (232 mg, 67%).

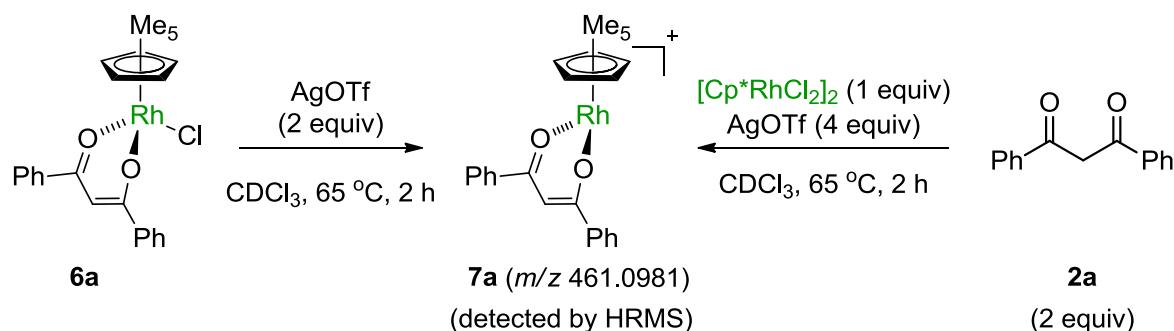
5. Mechanistic studies:

A. Detection of cationic piano-stool Rh(III)-diketonate 7

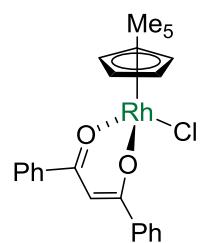
(i) Preparation of piano-stool Rh(III)-diketonate **6**



(ii) Detection of cationic piano-stool Rh(III)-diketonate **7**

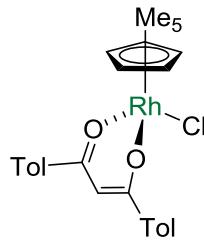


(i) Preparation of Piano-stool Rh(III)-diketonates **6a and **6b**:** Prepared by following the literature procedure.³ An oven dried 10 mL RB flask with magnetic stir bar was charged with KOH (2.2 mg, 0.04 mmol), and diaryl 1,3-propanedione **2** (0.04 mmol) in dry methanol (1.5 mL) and stirred for 1 h at the room temperature. To the reaction mixture was added $[\text{Cp}^*\text{RhCl}_2]_2$ (10 mg, 0.016 mmol), and continued stirring at the room temperature for 24 h. The precipitate was separated by filtration and the filtrate was concentrated to 0.5 mL volume. Cooling the filtrate at 0-5 °C furnished the piano-stool Rh(III)-diketonate **6** as a red solid which was filtered and dried under vacuum.



Piano-stool Rh(III)-diketonate **6a:** Obtained as a red solid (14 mg, 87%);

¹H NMR (500 MHz, CDCl_3) δ 7.96 (d, $J = 7.1$ Hz, 4H), 7.44 (t, $J = 7.3$ Hz, 2H), 7.39 (t, $J = 7.4$ Hz, 4H), 6.45 (s, 1H), 1.73 (s, 15H); **¹³C NMR** (126 MHz, CDCl_3) δ 181.51, 139.90, 130.88, 128.21, 127.47, 93.19, 92.45 (d, $J = 9.3$ Hz), 8.83.



Piano-stool Rh(III)-diketonate 6b: Obtained as a red solid (16 mg, 88%);
¹H NMR (500 MHz, CDCl₃) δ 7.87 (d, *J* = 8.2 Hz, 4H), 7.18 (d, *J* = 8.1 Hz, 4H), 6.43 (s, 1H), 2.38 (s, 6H), 1.71 (s, 15H); **¹³C NMR** (126 MHz, CDCl₃) δ 181.09, 141.13, 137.24, 128.88, 127.50, 92.53, 92.33 (d, *J* = 9.2 Hz), 21.63, 8.80.

(ii) Detection of cationic piano-stool Rh(III)-diketonate 7a by HRMS: A dry 10 mL RB flask with stir bar was charged with [Cp*RhCl₂]₂ (10 mg, 0.016 mmol), AgOTf (16 mg, 0.064 mmol), diphenyl 1,3-propanedione **2a** (7 mg, 0.031 mmol), and CDCl₃. The contents were stirred at 65 °C under nitrogen atmosphere for 2 h. HRMS analysis (Figure S1) of the reaction mixture showed formation of the cationic piano stool Rh(III)-diaketonate **7a** (*m/z*: 461.0981) along with its CDCl₃ adduct **7a.CDCl₃** (*m/z*: 582.9). Moreover, reaction of **6a** with AgOTf (2 equiv) in CDCl₃ at 65 °C for 2 h also provided **7a** (observed by HRMS).

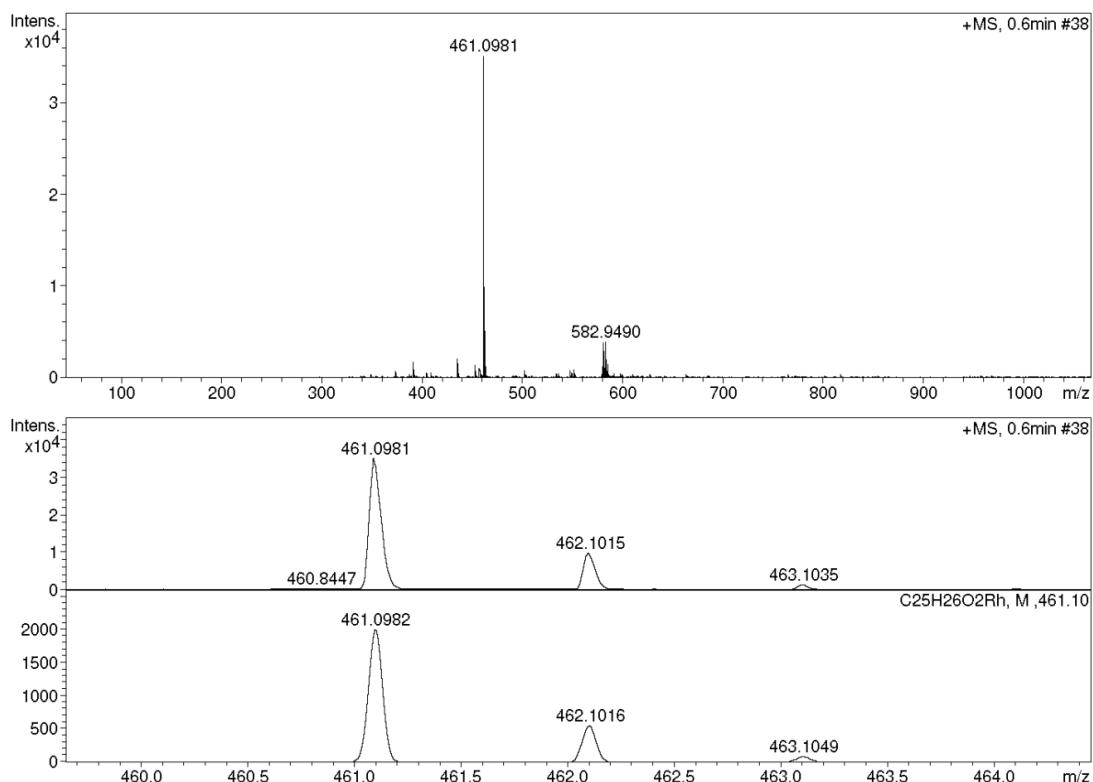
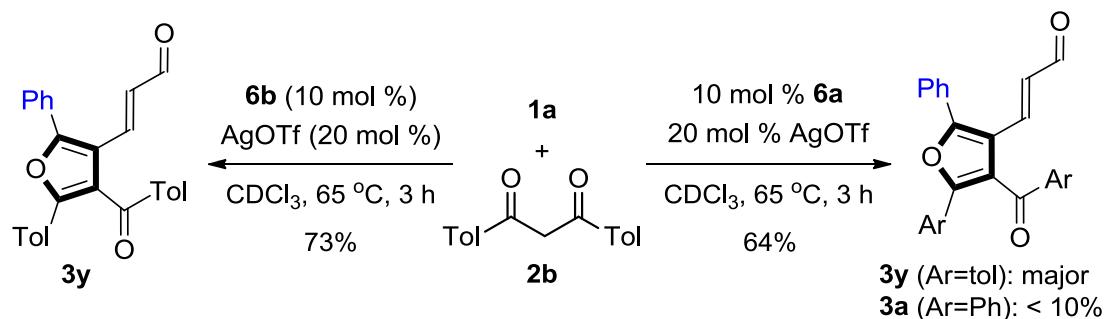


Figure S1: HRMS detection of cationic piano-stool Rh(III)-diketonate **7a**

B. [3+2] Annulation with piano-stool Rh(III)-diketonate precatalyst 6



[3+2] annulation of **1a and **2b** using piano-stool Rh(III)-diketonate complex **6b**:** An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with 1,3-dicarbonyl compound **2b** (30 mg, 0.12 mmol), Rh(III)-diketonate **6b** (5.5 mg, 0.012 mmol), AgOTf (6 mg, 0.024 mmol), and 1 mL of CDCl₃. To the gently stirring reaction mixture at 65 °C under nitrogen atmosphere was added diazoenol **1a** (26 mg, 0.13 mmol) in 1 mL of CDCl₃ over 2 h via a syringe pump. The reaction was continued for another 1 h (as judged by TLC) and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 2:8) furnished the tetrasubstituted furanyl-enal **3y** (36 mg, 73%) as a pale yellow viscous liquid. R_f = 0.4 (Ethyl acetate/Hexane= 30/70); ¹H NMR (500 MHz, CDCl₃) δ 9.47 (d, J = 7.5 Hz, 1H), 7.87 (d, J = 8.2 Hz, 2H), 7.73 (d, J = 7.1 Hz, 2H), 7.55 (t, J = 7.4 Hz, 1H), 7.53 (d, J = 4.4 Hz, 1H), 7.50 (t, J = 6.8 Hz, 2H), 7.46 (d, J = 8.2 Hz, 2H), 7.21 (d, J = 8.0 Hz, 2H), 7.09 (d, J = 8.1 Hz, 2H), 6.20 (dd, J = 16.1, 7.5 Hz, 1H), 2.38 (s, 3H), 2.30 (s, 3H); ¹³C NMR (126 MHz, CDCl₃) δ 193.58, 193.29, 154.76, 152.11, 145.64, 142.27, 139.31, 134.50, 130.52, 130.20, 129.86, 129.85, 129.57, 129.29, 129.25, 128.17, 126.29, 126.09, 119.95, 118.54, 21.95, 21.45; IR (neat): 3028, 2922, 2853, 1712, 1679, 1603, 1485, 1331, 1178, 902, 694 cm⁻¹; HRMS (ESI) m/z calc. for C₂₈H₂₂O₃ (M+H)⁺ 407.1626 found 407.1642.

[3+2] annulation of **1a and **2b** using piano-stool Rh(III)-diketonate complex **6a**:** An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with 1,3-dicarbonyl compound **2b** (30 mg, 0.12 mmol), Rh(III)-diketonate **6a** (5 mg, 0.012 mmol), AgOTf (6 mg, 0.024 mmol), and 1 mL of CDCl₃. To the gently stirring reaction mixture at 65 °C under nitrogen atmosphere was added diazoenol **1a** (26 mg, 0.13 mmol) in 1 mL of CDCl₃ over 2 h via a syringe pump. The reaction was continued for another 1 h (as judged by TLC). ¹H-NMR analysis (Figure S2) of the reaction mixture showed formation of the tetrasubstituted furanyl-

enal **3y** as the major product along with minor amount of furanyl enal **3a** (< 10%) as an inseparable mixture (31 mg, ~ 64%).

In the absence of AgOTf, the [3+2] annulation reaction using Rh(III)-diketonate **6** was unsuccessful.

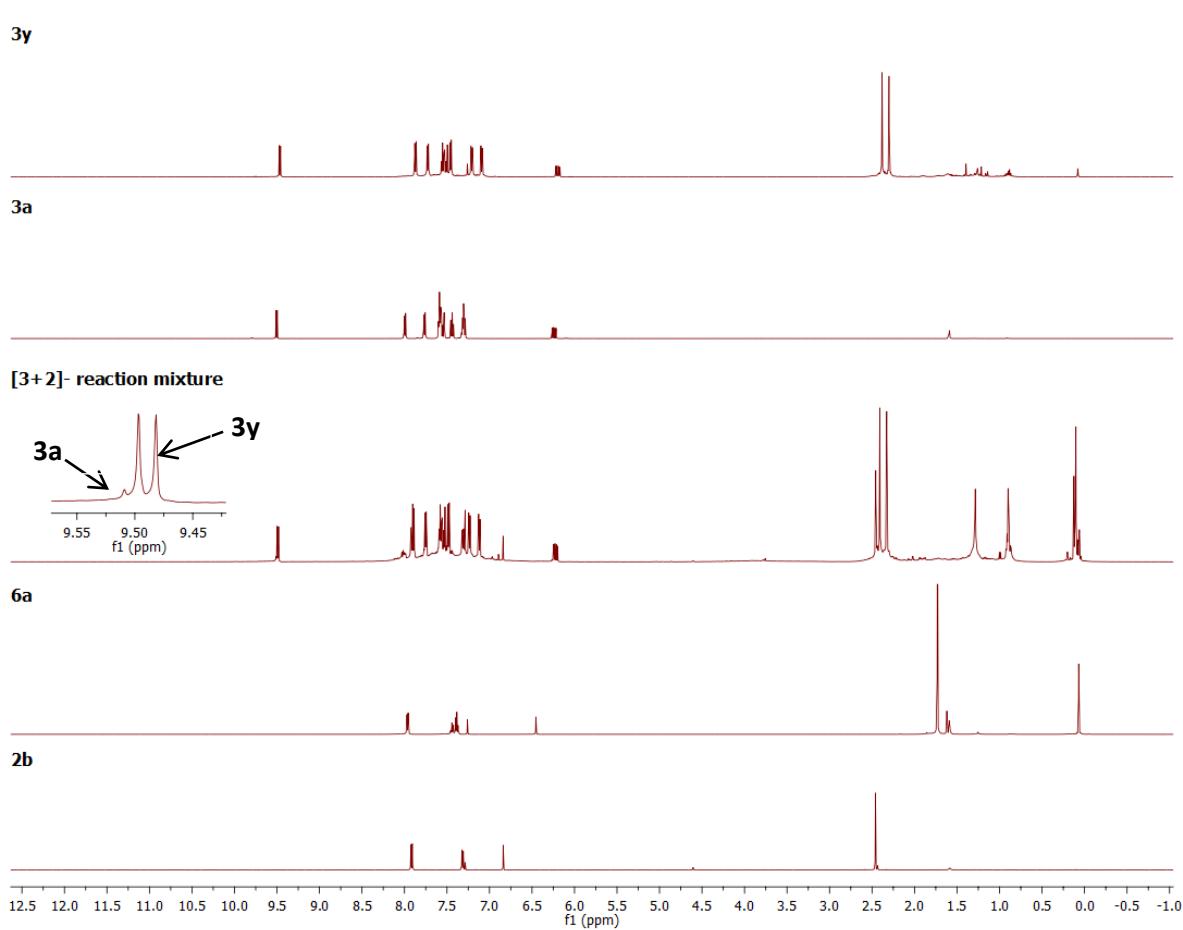
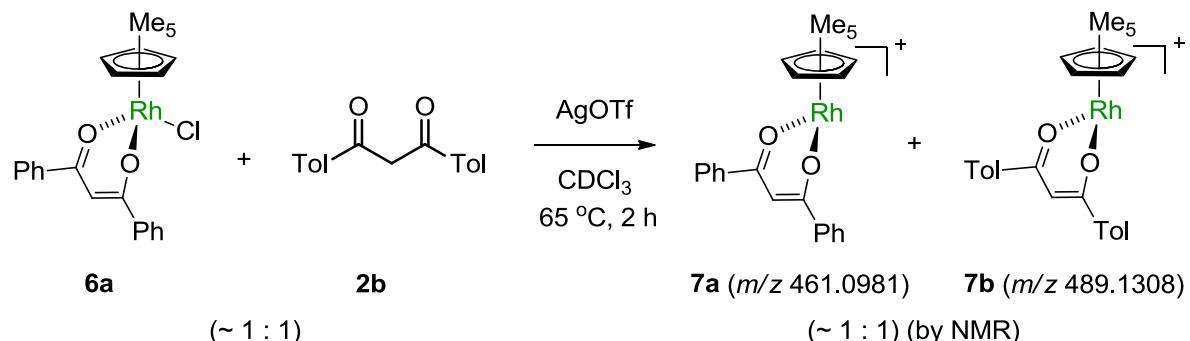


Figure S2: NMR study of the [3+2] annulation of **1a** and **2b** using Rh(III)-diketonate **6a**

C. Ligand exchange reaction of Rh(III)-diketonate **6a**



An oven dried 10 mL RB flask was charged with Rh(III)-diketonate **6a** (10 mg, 0.020 mmol), tolyl-1,3-dione **2b** (5 mg, 0.020 mmol), AgOTf (10 mg, 0.040 mmol), and 1 mL CDCl₃. The reaction mixture was refluxed for 2 h under nitrogen atmosphere. The reaction mixture was cooled to room temperature. HRMS data (Figure S3) of the reaction mixture confirmed the formation of cationic Rh(III)-diketonates **7a** (*m/z*: 461.0996) and **7b** (*m/z*: 489.1308). 1H-NMR analysis (Figure S4) of the reaction mixture showed presence of ~1:1 ratio of Rh(III)-diketonates **7a** and **7b** (determined from the integration of Me₅ signals at δ 1.73 and 1.74 ppm). Ligand exchange reaction was not observed in the absence of AgOTf.

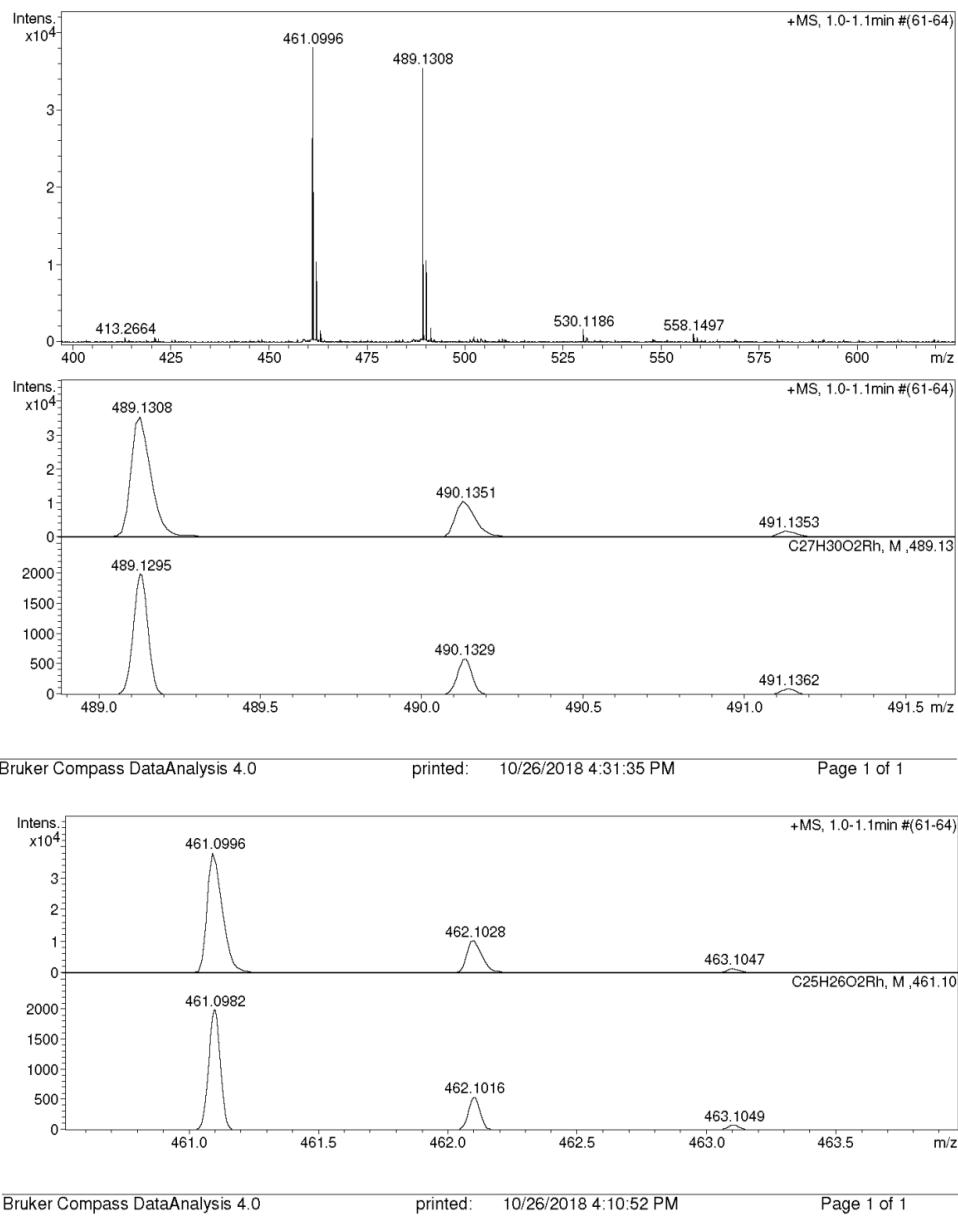


Figure S3: HRMS detection of cationic piano-stool Rh(III)-diketonates **7a** and **7b**

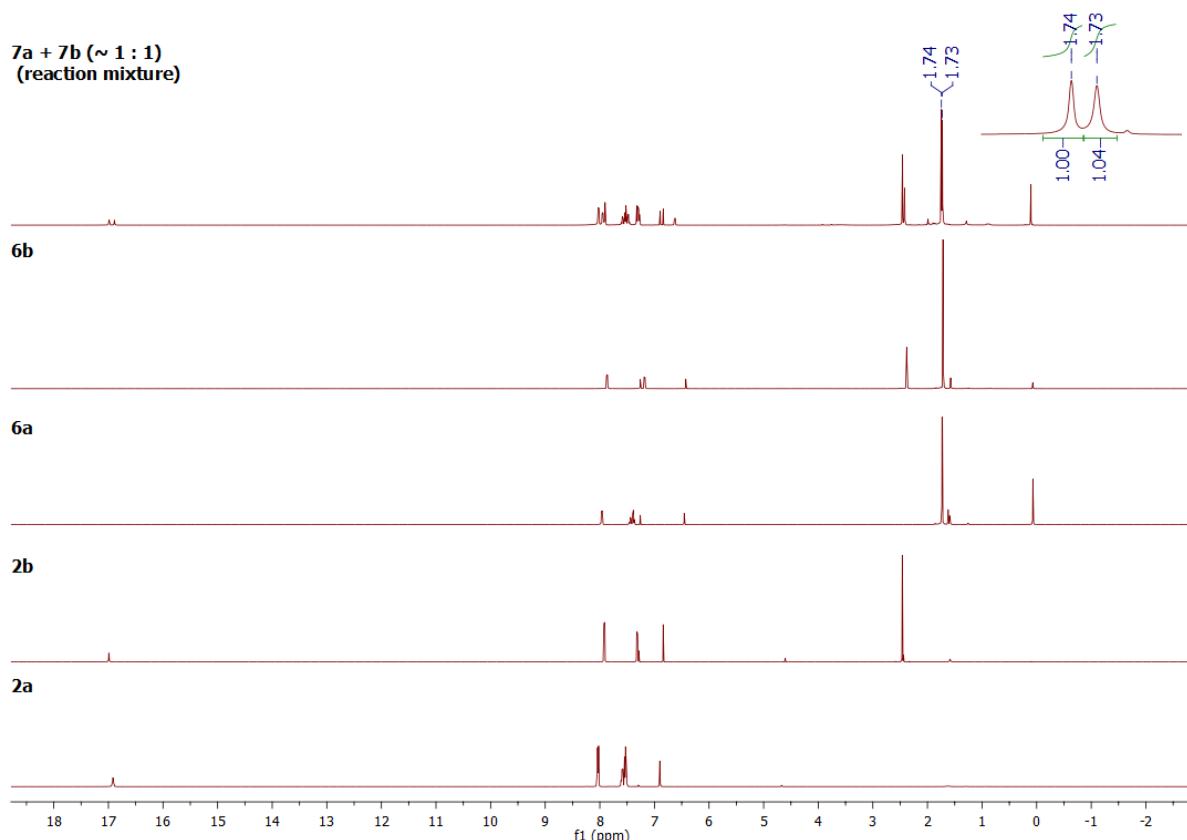
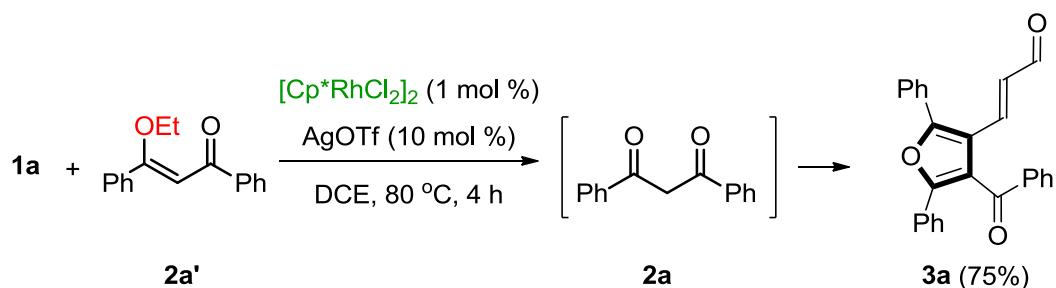


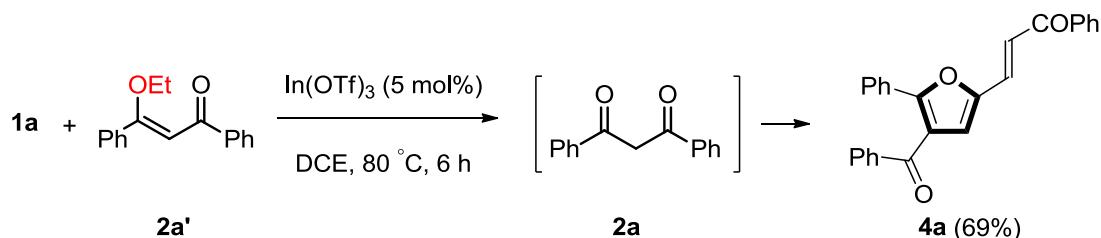
Figure S4: NMR detection of cationic Rh(III)-diketonates **7a** and **7b**

D. Annulation with vinylether **2a'**

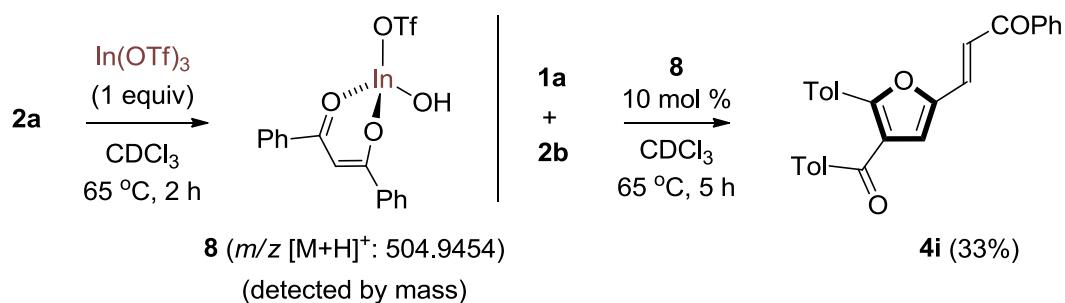


An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with vinylether **2a'** (30 mg, 0.12 mmol), $[\text{Cp}^*\text{RhCl}_2]_2$ (0.8 mg, 0.0012 mmol), AgOTf (3 mg, 0.012 mmol), and 1.5 mL of freshly distilled DCE. To the gently stirring reaction mixture at 80 °C under nitrogen atmosphere was added keto-diazoenol **1a** (26 mg, 0.13 mmol) in 2 mL of DCE over 3 h via a syringe pump. The reaction was continued for another 1 h (as judged by TLC) which furnished the enal-functionalized tetrasubstituted furan **3a**. It was observed that under the reaction conditions, **2a'** was rapidly hydrolysed to diketone **2a** (within few minutes) and subsequently reacted to give furan **3a** (34 mg, 75%).

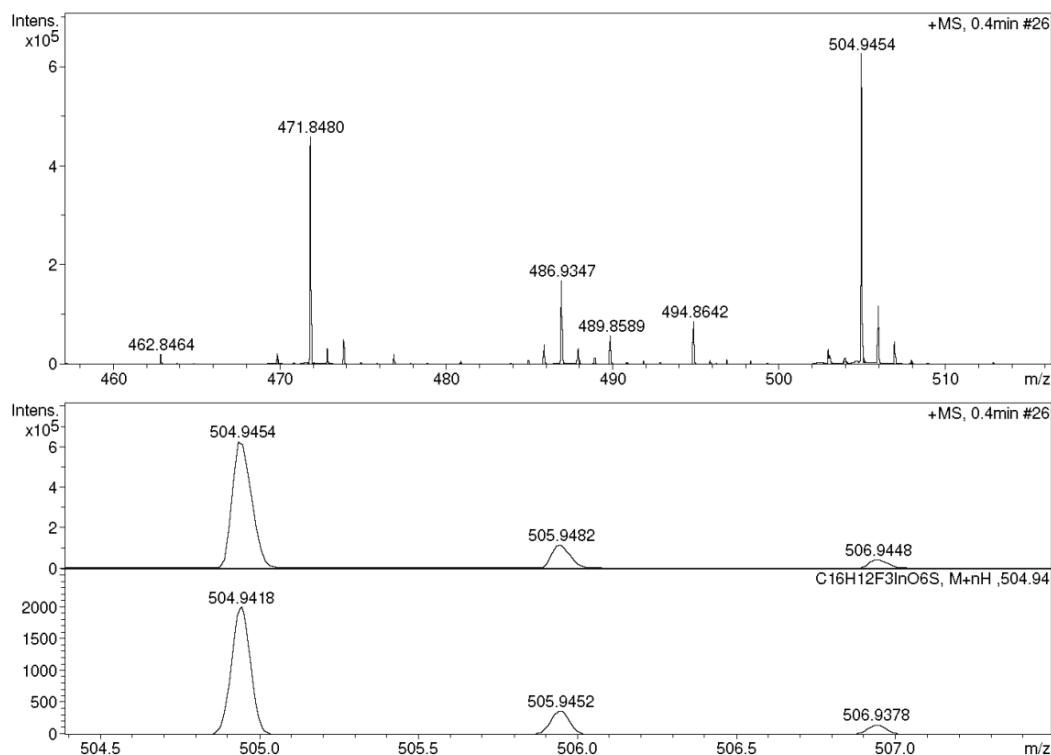
Similarly, in case of $\text{In}(\text{OTf})_3$ catalyzed [2+3] annulation of vinylether **2a'** and **1a**, the vinyl ether **2a'** was rapidly converted to diketone **2a** under the standard reaction conditions which subsequently underwent [2+3] annulation to give trisubstituted furan **4a**.



E. Detection of In(III) -diketonate complex **8**



An oven dried 10 mL RB flask with magnetic stir bar was charged with indium triflate (20 mg, 0.035 mmol), diketone **2a** (8 mg, 0.035 mmol), and 1 mL CDCl_3 . The reaction mixture was stirred at 65 °C under nitrogen atmosphere for 2 h. HRMS analysis of reaction mixture (Figure S5) showed formation of In(III) -diketonate complex **8** with m/z : 504.9454 ($\text{M}+\text{H}$)⁺.



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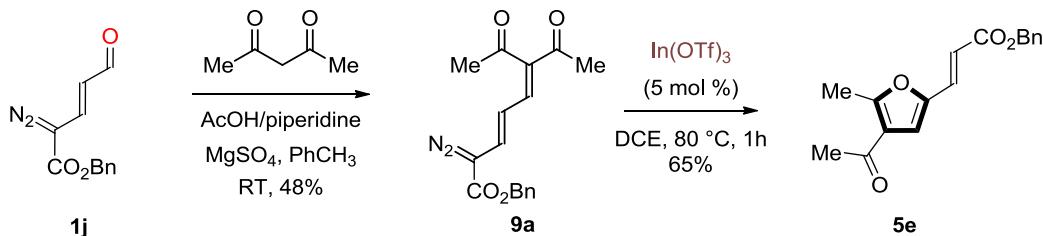
Page 1 of 1

Figure S5: HRMS detection of In(III)-diketonate complex **8**

[2+3] annulation with In(III)-diketonate complex **8:** An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with diketone **2b** (20 mg, 0.08 mmol), complex **8** (4 mg, 0.008 mmol), and 1 mL of CDCl₃. To the gently stirring reaction mixture at 65 °C under nitrogen atmosphere was added keto-diazoenial **1a** (18 mg, 0.08 mmol) in 1 mL of CDCl₃ over 2 h via a syringe pump. The reaction was continued for another 3 h (as judged by TLC) and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 1:9) furnished the trisubstituted furan **4i** (11 mg, 33%) as a pale yellow viscous liquid; R_f = 0.4 (Ethyl acetate/Hexane= 30/70); ¹H NMR (500 MHz, CDCl₃) δ 8.06 (d, J = 7.1 Hz, 2H), 7.78 (d, J = 8.2 Hz, 2H), 7.72 (d, J = 8.3 Hz, 2H), 7.64 – 7.56 (m, 2H), 7.53 (t, J = 7.5 Hz, 3H), 7.23 (d, J = 7.9 Hz, 2H), 7.18 (d, J = 8.1 Hz, 2H), 6.94 (s, 1H), 2.41 (s, 3H), 2.37 (s, 3H); ¹³C NMR (126 MHz, CDCl₃) δ 190.98, 189.84, 157.57, 149.72, 144.50, 140.50, 138.31, 135.31, 133.15, 130.16 (2C), 129.52, 129.50, 128.93, 128.73, 127.87, 126.53, 123.30, 120.49, 119.66,

21.96, 21.73; IR (neat): 2993, 2936, 1717, 1392, 1215, 1075, 974, 750 cm^{-1} ; HRMS (ESI) m/z calc. for $\text{C}_{28}\text{H}_{22}\text{O}_3$ ($\text{M}+\text{H}$)⁺ 407.1642 found 407.1654.

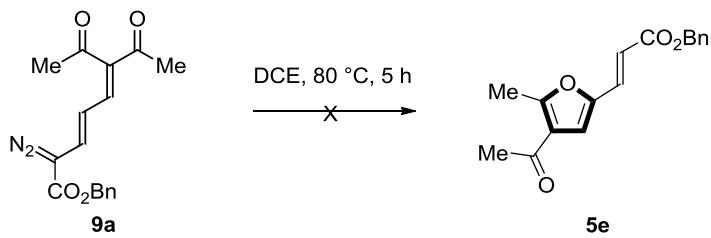
F. Probing the aldol reaction pathway of [2+3] annulation



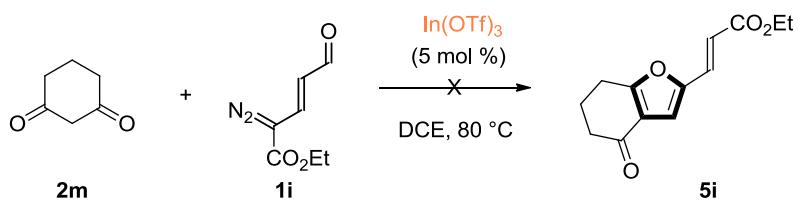
Preparation of diazo-dienone **9a:** An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with ester diazoenial **1j** (276 mg, 1.2 mmol), 1,3-pentanedione **2i** (100 mg, 1 mmol), acetic acid (30 mg, 0.5 mmol), piperidine (9 mg, 0.1 mmol), MgSO_4 (120 mg), and 10 mL toluene. The reaction mixture was stirred for 7 h at the room temperature and filtered through a celite pad. Solvent was evaporated under reduced pressure and the residue was extracted with water (10 mL) and dichloromethane (30 mL). The organic layer was dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 2:8) furnished the aldol condensation product diazo-dienone **9a** as a yellow liquid in 48% yield (150 mg). **¹H NMR** (500 MHz, CDCl_3) δ 7.40 – 7.34 (m, 5H), 7.15 (d, $J = 11.4$ Hz, 1H), 6.68 (d, $J = 15.4$ Hz, 1H), 6.39 (dd, $J = 15.4$, 11.4 Hz, 1H), 5.28 (s, 2H), 2.36 (s, 6H); **¹³C NMR** (126 MHz, CDCl_3) δ 202.8, 197.3, 163.3, 143.0, 138.1, 135.2, 129.9, 128.9, 128.8, 128.6, 117.6, 67.7, 31.8, 26.6; **HRMS** (ESI) m/z calc. for $\text{C}_{17}\text{H}_{16}\text{N}_2\text{O}_4$ ($\text{M}+\text{Na}$)⁺ 335.1025 found 335.1002

Reaction of **9a with **In(OTf)₃**:** A solution of the intermediate **9a** (40 mg, 0.13 mmol), and In(OTf)_3 (3.7 mg, 0.007 mmol, 5 mol %) in 2 mL DCE was heated at 80 °C for 1 h. Solvent was evaporated and the residue was purified on a silica gel column (eluent: EtOAc/Hexanes 2:8) which furnished the trisubstituted furan **5e** in 65% yield (24 mg).

Heating a solution of the intermediate **9a** (40 mg, 0.13 mmol) in 2 mL DCE at 80 °C for 5 h resulted in the decomposition of **9a** and furan product **5e** was not obtained. This result further demonstrated the role of In(OTf)_3 in the conversion of **9a** to furan product **5e**.

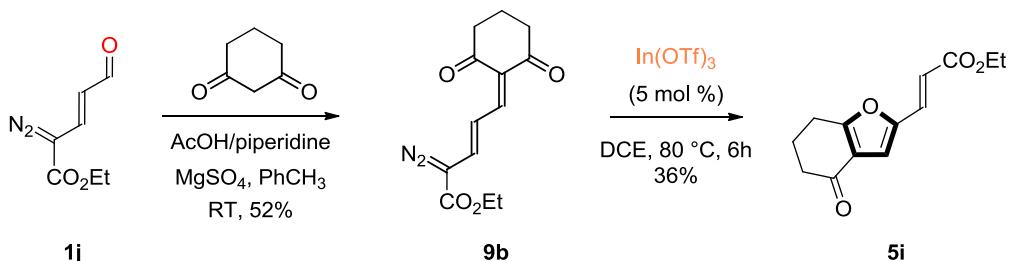


G. [2+3] Annulation with cyclic 1,3-dione



An oven dried 10 mL RB flask, charged with 1,3-cyclohexanedione (30 mg, 0.27 mmol), $\text{In}(\text{OTf})_3$ (7 mg, 0.013 mmol, 5 mol %) and 1 mL DCE was maintained at 80 °C. To the gently stirring reaction mixture was added a solution of diazoenol **1i** (50 mg, 0.30 mmol) in 2 mL DCE over 2 h via syringe pump and the reaction was continued for another 3 h. However, the reaction was failed to deliver the desired furan **5i** and diazoenol was decomposed. This result could be explained by the failure of the cyclic 1,3-diketones to give metal-diketonates.

Further, the reaction of the aldol condensation product **9b** with $\text{In}(\text{OTf})_3$ gave the furan **5i** in 36% yield. Clearly, this experiment further demonstrates that the [2+3]-annulation proceeds via metal templated aldol reaction.

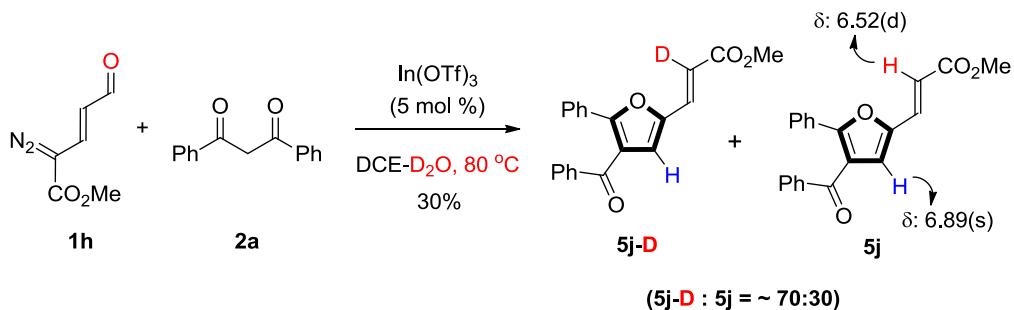


Ethyl (E)-2-diazo-5-(2,6-dioxocyclohexylidene)pent-3-enoate **9b:** Prepared by following the procedure for **9a**. Obtained as a yellow liquid in 52% yield; $^1\text{H NMR}$ (500 MHz, CDCl_3) δ 7.78 (d, $J = 12.1$ Hz, 1H), 7.58 (dd, $J = 14.8, 12.5$ Hz, 1H), 7.09 (d, $J = 15.2$ Hz, 1H), 4.33 (q, $J = 7.1$ Hz, 2H), 2.60 (t, $J = 6.5$ Hz, 4H), 2.07 – 1.94 (m, 2H), 1.33 (t, $J = 7.1$ Hz, 3H); $^{13}\text{C NMR}$

NMR (126 MHz, CDCl₃) δ 199.6, 198.2, 162.6, 150.9, 139.5, 126.9, 119.3, 62.6, 40.3, 38.7, 18.4, 14.5; **HRMS** (ESI) *m/z* calc. for C₁₃H₁₄N₂O₄ (M+H)⁺ 263.1045 found 263.1026.

Reaction of 9b with In(OTf)₃: A solution of the intermediate **9b** (20 mg, 0.07 mmol), and In(OTf)₃ (2.1 mg, 0.0038 mmol, 5 mol %) in 2 mL DCE was heated at 80 °C for 6 h. Solvent was evaporated and the residue was purified on a silica gel column (eluent: EtOAc/Hexanes 2:8) which furnished the fused furan **5i** in 36% yield (6 mg) as an inseparable 2:1 mixture of rotamers; **¹H NMR** (500 MHz, CDCl₃) (major isomer) δ 7.38 (d, *J* = 15.7 Hz, 1H), 6.82 (s, 1H), 6.34 (d, *J* = 15.7 Hz, 1H), 4.42 – 4.08 (m, 2H), 2.95 – 2.88 (m, 2H), 2.54 – 2.51 (m, 2H), 2.31 – 2.17 (m, 2H), 1.40 – 1.26 (m, 3H); **HRMS** (ESI) *m/z* calc. for C₁₃H₁₆O₄ (M+H)⁺ 235.0965 found 235.0952

H. Deuterium incorporation study



A 10 mL round bottom flask with a magnetic stir bar was charged with 1,3-dicarbonyl compound **2a** (30 mg, 0.133 mmol), In(OTf)₃ (3.7 mg, 0.0067 mmol, 5 mol %), D₂O (186 mg, 9.3 mmol), and 1.5 mL of distilled dichloroethane (DCE). To the gently stirring reaction mixture at 80 °C under nitrogen atmosphere was added ester-diazoenial **1h** (22 mg, 0.14 mmol) in 2 mL of DCE over 3 h via a syringe pump. The reaction was continued for another 2 h and the solvent was evaporated under reduced pressure using a rotary evaporator. Purification of the residue on a silica gel column (eluent: EtOAc/Hexanes 2:8) furnished the trisubstituted furan **5j** (13 mg, 30%) with 70% D-incorporation as determined by ¹H-NMR (Figure S6).

Methyl (E)-3-(4-benzoyl-5-phenylfuran-2-yl)acrylate 5j: Prepared by following the procedure B. Obtained as a white solid; yield = 69% (31 mg); m.p.= 110-112 °C; R_f = 0.5 (Ethyl acetate/Hexane= 10/90); **¹H NMR** (500 MHz, CDCl₃) δ 7.84 (dd, *J* = 8.3, 1.2 Hz, 2H), 7.76 – 7.73 (m, 2H), 7.57 – 7.52 (m, 1H), 7.46 (d, *J* = 15.7 Hz, 1H), 7.41 (t, *J* = 7.8 Hz, 2H),

7.36 – 7.32 (m, 3H), 6.87 (s, 1H), 6.49 (d, $J = 15.7$ Hz, 1H), 3.82 (s, 3H); **^{13}C NMR** (126 MHz, CDCl_3) δ 191.2, 167.2, 157.3, 149.2, 137.7, 133.4, 130.4, 130.0, 129.8, 129.1, 128.6, 128.6, 127.8, 123.2, 118.0, 117.2, 51.9; **IR** (neat): 2970, 1714, 1637, 1484, 1435, 1386, 1260, 1226, 1167, 971, 890, 770 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{21}\text{H}_{16}\text{O}_4$ ($\text{M}+\text{H}$) $^+$ 333.1151 found 333.1121.

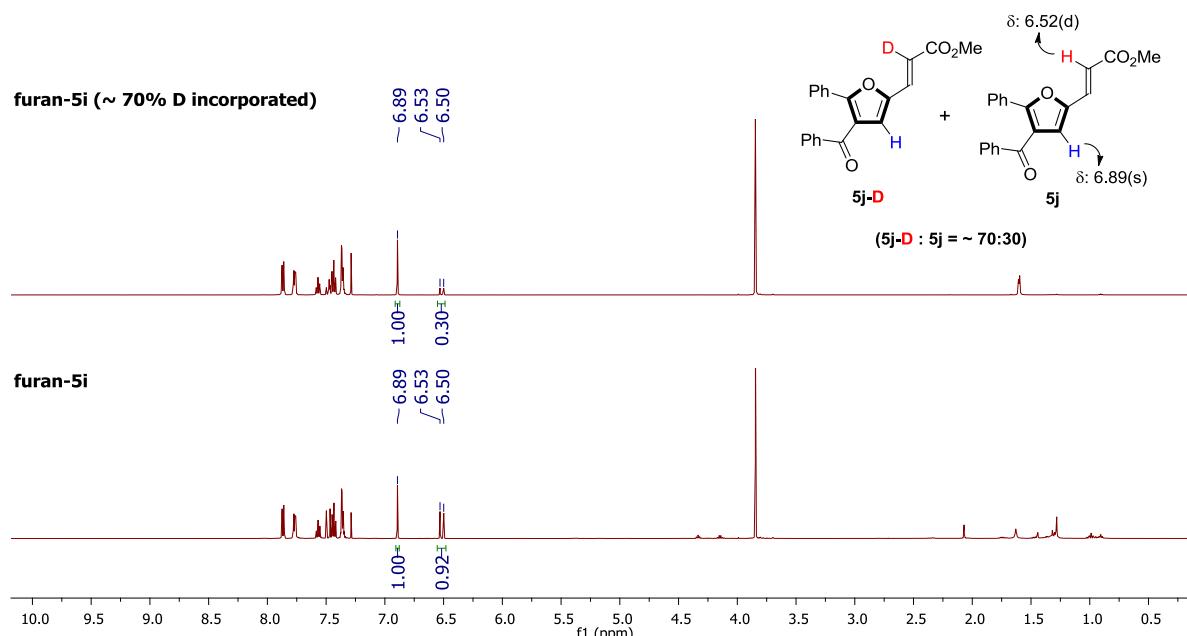
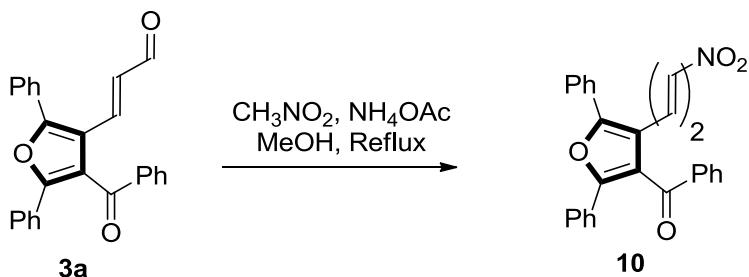


Figure S6: Deuterium incorporation study of [2+3] annulation

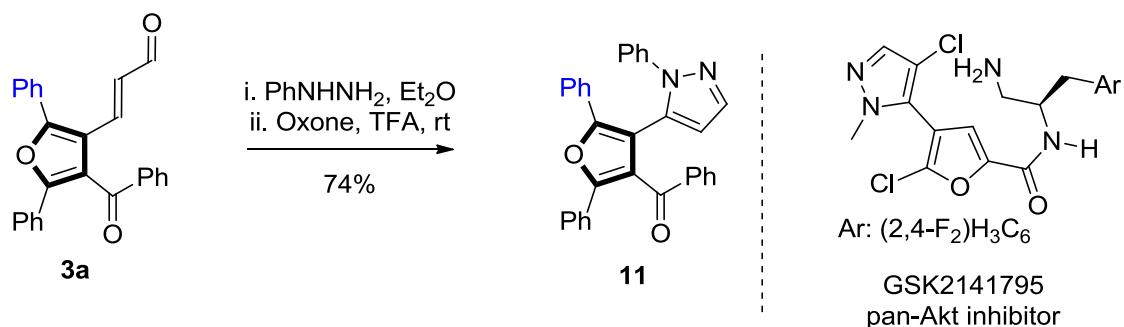
6. Synthetic applications of the tri and tetrasubstituted furans:

A. Preparation of furanyl nitrodiene **10**



An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with the enal-functionalized furan **3a** (98 mg, 0.26 mmol), nitromethane (19 mg, 0.31 mmol), NH_4OAc (6 mg, 0.078 mmol), and 1.5 mL methanol. The reaction mixture was refluxed for 8 h and the solvent was evaporated under reduced pressure. The residue was extracted with EtOAc and washed with water and brine. The organic layer was dried over anhydrous Na_2SO_4 and concentrated under the reduced pressure. Purification of the residue by a silica gel column chromatography using ethyl acetate/hexanes (2:8) as the eluent furnished the furanyl nitrodiene **10** as a yellow solid in 90% yield (41 mg); m.p.= 159-161 °C; **1H NMR** (500 MHz, CDCl_3) δ 7.97 - 7.95 (m, 2H), 7.73 - 7.70 (m, 2H), 7.60 – 7.53 (m, 6H), 7.51 - 7.48 (m, 1H), 7.42 (t, J = 7.8 Hz, 2H), 7.31 – 7.26 (m, 3H), 7.16 (d, J = 15.7 Hz, 1H), 6.94 (d, J = 13.0 Hz, 1H), 6.37 (dd, J = 15.4, 11.7 Hz, 1H); **13C NMR** (126 MHz, CDCl_3) δ 194.0, 154.0, 152.4, 139.4, 138.5, 137.0, 135.4, 134.5, 129.9, 129.7, 129.4, 129.2, 129.2, 129.1, 128.9, 128.8, 127.9, 126.6, 123.7, 120.4, 119.6; **IR** (neat): 3382, 1616, 1332, 1237, 1160, 766, 687 cm^{-1} ; **HRMS** (ESI) m/z calc. for $\text{C}_{27}\text{H}_{19}\text{NO}_4$ ($\text{M}+\text{H}$)⁺ 422.1387 found 422.1382.

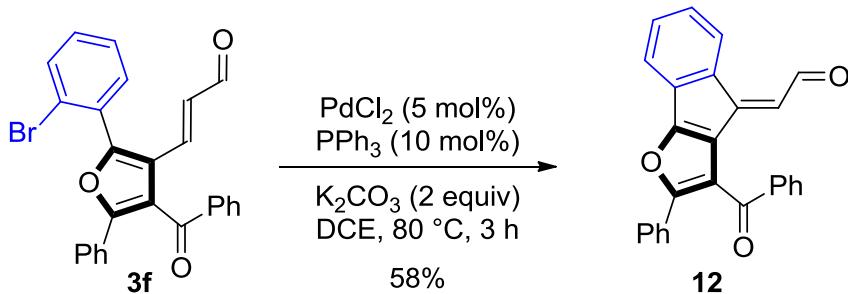
B. Preparation of pan-Akt inhibitor GSK2141795 analogue **11**



An oven dried 10 mL round bottom flask with a magnetic stir bar was charged with the enal-functionalized tetra-substituted furan **3a** (30 mg, 0.079 mmol), phenyl hydrazine (9 mg, 0.087

mmol), and 2 mL of dry diethyl ether. The reaction mixture was stirred at rt for 4 h and the solvent was evaporated under reduced pressure. To an ice-cold solution of crude hydrazone in 1 mL TFA was added oxone (39 mg, 0.12 mmol, 2 equiv) and stirred for 2 h. The reaction was quenched with water and extracted with CHCl_3 . The organic layer was washed with water, brine and dried over anhydrous Na_2SO_4 . Solvent was evaporated under reduced pressure and the residue was purified on a silica gel column using ethyl acetate/hexanes (2:8) as the eluent which furnished the pan-Akt inhibitor analogue **11** as a yellow viscous liquid in 74% yield (27 mg); **$^1\text{H NMR}$** (500 MHz, CDCl_3) δ 7.69 (d, $J = 1.8$ Hz, 1H), 7.62 (dd, $J = 8.3$, 1.2 Hz, 2H), 7.49 - 7.46 (m, 4H), 7.43 - 7.40 (m, 1H), 7.34 - 7.28 (m, 3H), 7.24 - 7.20 (m, 6H), 7.19 - 7.17 (m, 1H), 7.12 - 7.05 (m, 3H), 6.43 (d, $J = 1.9$ Hz, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 191.7, 152.2, 150.6, 140.7, 139.6, 136.8, 133.5, 133.4, 129.8, 129.4, 129.1, 128.9, 128.8, 128.7, 128.6, 128.4, 127.4, 126.9, 125.7, 124.6, 123.2, 113.3, 109.9; **HRMS** (ESI) m/z calc. for $\text{C}_{32}\text{H}_{22}\text{N}_2\text{O}_2$ ($\text{M}+\text{H}$)⁺ 467.1777 found 467.1754.

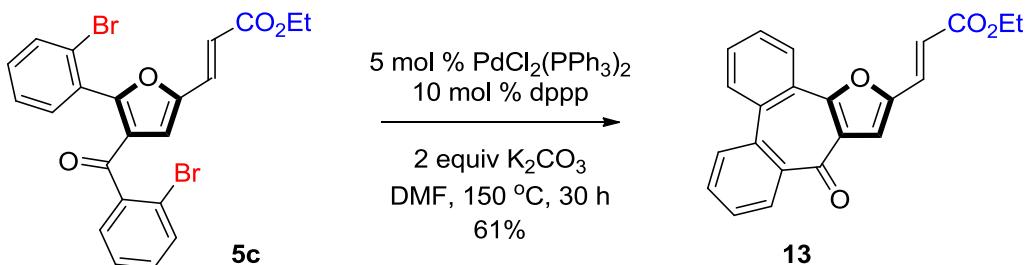
C. Preparation of tricyclic indeno[1,2-*b*]furan **12**



A dry schlenk tube was charged with tetrastubstituted furanyl-enal **3f** (20 mg, 0.043 mmol), PdCl_2 (0.4 mg, 0.002 mmol), PPh_3 (1 mg, 0.004 mmol), K_2CO_3 (12 mg, 0.086 mmol), and anhydrous DCE (2 mL). The reaction mixture was degassed with argon and heated on an oil bath at 80 °C for 3 h. The reaction mixture was cooled to the room temperature and passed through a pad of celite. Solvent was evaporated under reduced pressure and the residue was purified on a silica gel column using EtOAc/hexanes (3/97) as the eluent which furnished the tricyclic furan **12** in 58% yield (9 mg, 4:1 isomers); **$^1\text{H NMR}$** (500 MHz, CDCl_3) (major isomer) δ 9.74 (d, $J = 8.0$ Hz, 1H), 8.01 (dd, $J = 8.4, 1.3$ Hz, 2H), 7.63 (dd, $J = 8.2, 1.5$ Hz, 2H), 7.62 - 7.58 (m, 2H), 7.48 (d, $J = 7.2$ Hz, 1H), 7.46 - 7.41 (m, 3H), 7.36 - 7.32 (m, 2H), 7.30 - 7.28 (m, 2H), 6.57 (d, $J = 8.0$ Hz, 1H); **$^{13}\text{C NMR}$** (126 MHz, CDCl_3) δ 193.4, 191.4, 164.9, 157.1, 143.9, 141.1, 136.4, 134.6, 130.9, 130.1, 129.9, 129.8, 129.2, 129.1, 129.0, 128.7 (2C), 128.5, 127.6, 127.2, 126.4, 123.4, 122.6, 121.5, 119.0, 117.9; **IR** (neat): 2927,

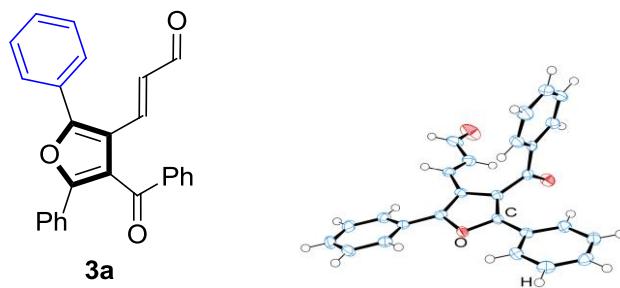
2848, 1666, 1607, 1467, 1395, 1219, 1129 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₆H₁₆O₃ (M+H)⁺ 377.1172 found 377.1152.

D. Preparation of tetracyclic furan 13 (core structure of OLED material)



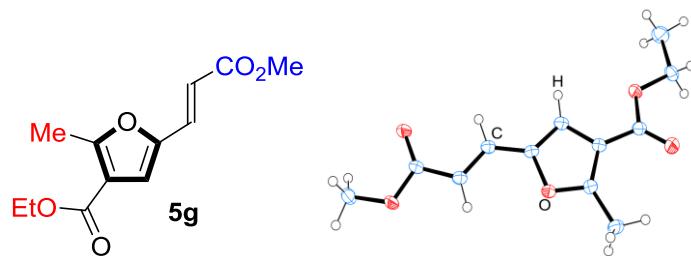
Prepared by modified literature procedure.⁴ A dry schlenk tube was charged with tri-substituted furan **5c** (30 mg, 0.059 mmol), PdCl₂(PPh₃)₂ (2 mg, 0.003 mmol, 5 mol %), dppp (2.4 mg, 0.006 mmol, 10 mol %), and K₂CO₃ (16 mg, 0.12 mmol, 2 equiv), and anhydrous DMF (2 mL). The reaction mixture was degassed with argon and heated on an oil bath at 150 °C for 30 h. The reaction mixture was cooled to room temperature and quenched with 10 mL water. The contents were extracted with EtOAc, and the organic layer was washed with water, brine, and dried over anhydrous Na₂SO₄. Solvent was evaporated under reduced pressure and the residue was purified on a silica gel column using EtOAc/hexanes (2/98) as the eluent which furnished the tetracyclic furan **13** in 61% yield (12 mg); **¹H NMR** (500 MHz, CDCl₃) δ 8.22 (dd, *J* = 7.9, 1.5 Hz, 1H), 8.20 – 8.17 (m, 1H), 7.99 – 7.93 (m, 2H), 7.73 – 7.67 (m, 1H), 7.65 – 7.57 (m, 3H), 7.50 (d, *J* = 15.7 Hz, 1H), 7.18 (s, 1H), 6.57 (d, *J* = 15.7 Hz, 1H), 4.29 (q, *J* = 7.1 Hz, 2H), 1.36 (t, *J* = 7.1 Hz, 3H); **¹³C NMR** (126 MHz, CDCl₃) δ 185.7, 166.6, 155.5, 150.7, 139.1, 136.9, 135.9, 132.1, 131.8, 131.7, 130.2, 129.8, 129.7, 129.7, 128.8, 128.7, 126.4, 126.3, 118.7, 115.0, 60.9, 14.5; **IR** (neat): 2924, 2857, 1719, 1636, 1444, 1373, 1265, 1033, 898, 746 cm⁻¹; **HRMS** (ESI) *m/z* calc. for C₂₂H₁₆O₄ (M+H)⁺ 345.1144 found 344.1121.

7. X-Ray crystal structure data of 3a and 5g:



CCDC	1554018
Empirical formula	C ₂₆ H ₁₈ O ₃
Formula weight	378.40
Temperature/K	120(2)
Crystal system	Monoclinic
Space group	C2/c
a/Å	24.897(3)
b/Å	5.8589(6)
c/Å	26.361(3)
α/°	90
β/°	100.161(4)
γ/°	90
Volume/Å ³	3784.9(7)
Z	8
ρ _{calcd} /cm ³	1.328
μ/mm ⁻¹	?
F(000)	1584.0
Crystal size/mm ³	0.14 × 0.12 × 0.10
Radiation	MoKα ($\lambda = 0.71073$)
2Θ range for data collection/°	4.96 to 54.29
Index ranges	-31 ≤ h ≤ 31, -6 ≤ k ≤ 7, -33 ≤ l ≤ 33
Reflections collected	18674
Independent reflections	4081 [R _{int} = 0.0895, R _{sigma} = 0.0708]
Data/restraints/parameters	4081/0/263

Goodness-of-fit on F^2	1.018
Final R indexes [$I \geq 2\sigma(I)$]	$R_1 = 0.0532$, $wR_2 = 0.0994$
Final R indexes [all data]	$R_1 = 0.0983$, $wR_2 = 0.1152$
Largest diff. peak/hole / e \AA^{-3}	0.25/-0.23



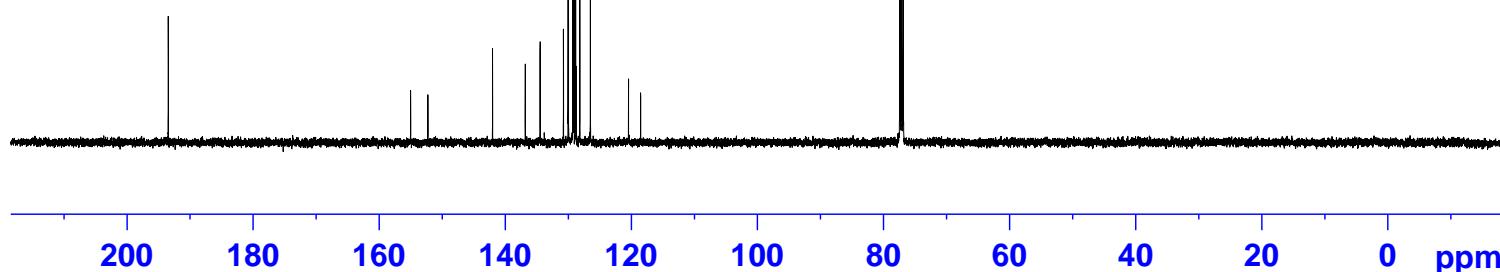
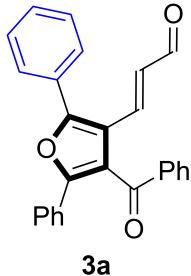
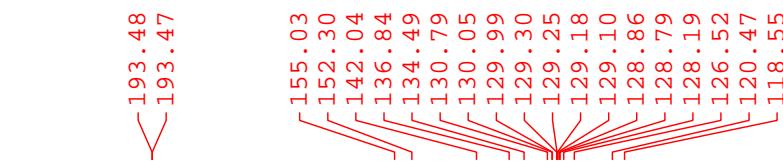
CCDC	1554017
Empirical formula	$\text{C}_{12}\text{H}_{14}\text{O}_5$
Formula weight	238.23
Temperature/K	140(2)
Crystal system	Triclinic
Space group	P-1
$a/\text{\AA}$	5.8118(8)
$b/\text{\AA}$	7.6603(10)
$c/\text{\AA}$	13.506(2)
$\alpha/^\circ$	82.491(7)
$\beta/^\circ$	89.314(7)
$\gamma/^\circ$	82.461(7)
Volume/ \AA^3	590.97(14)
Z	2
$\rho_{\text{calc}}/\text{g}/\text{cm}^3$	1.339
μ/mm^{-1}	?
$F(000)$	252.0
Crystal size/ mm^3	$0.15 \times 0.12 \times 0.10$
Radiation	$\text{MoK}\alpha (\lambda = 0.71073)$
2 Θ range for data collection/ $^\circ$	5.852 to 50.13

Index ranges	$-6 \leq h \leq 6, -9 \leq k \leq 9, -16 \leq l \leq 16$
Reflections collected	16686
Independent reflections	2086 [$R_{\text{int}} = 0.0431, R_{\text{sigma}} = 0.0224$]
Data/restraints/parameters	2086/0/158
Goodness-of-fit on F^2	1.055
Final R indexes [$I \geq 2\sigma(I)$]	$R_1 = 0.0358, wR_2 = 0.0858$
Final R indexes [all data]	$R_1 = 0.0455, wR_2 = 0.0908$
Largest diff. peak/hole / e Å ⁻³	0.21/-0.21

8. References:

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- (5) Mareev, A. V.; Ushakov, I. A.; Rulev, A. Y. Nucleophilic substitution of α -Haloenones with Phenols. *Tetrahedron* **2015**, *71*, 1971-1974.

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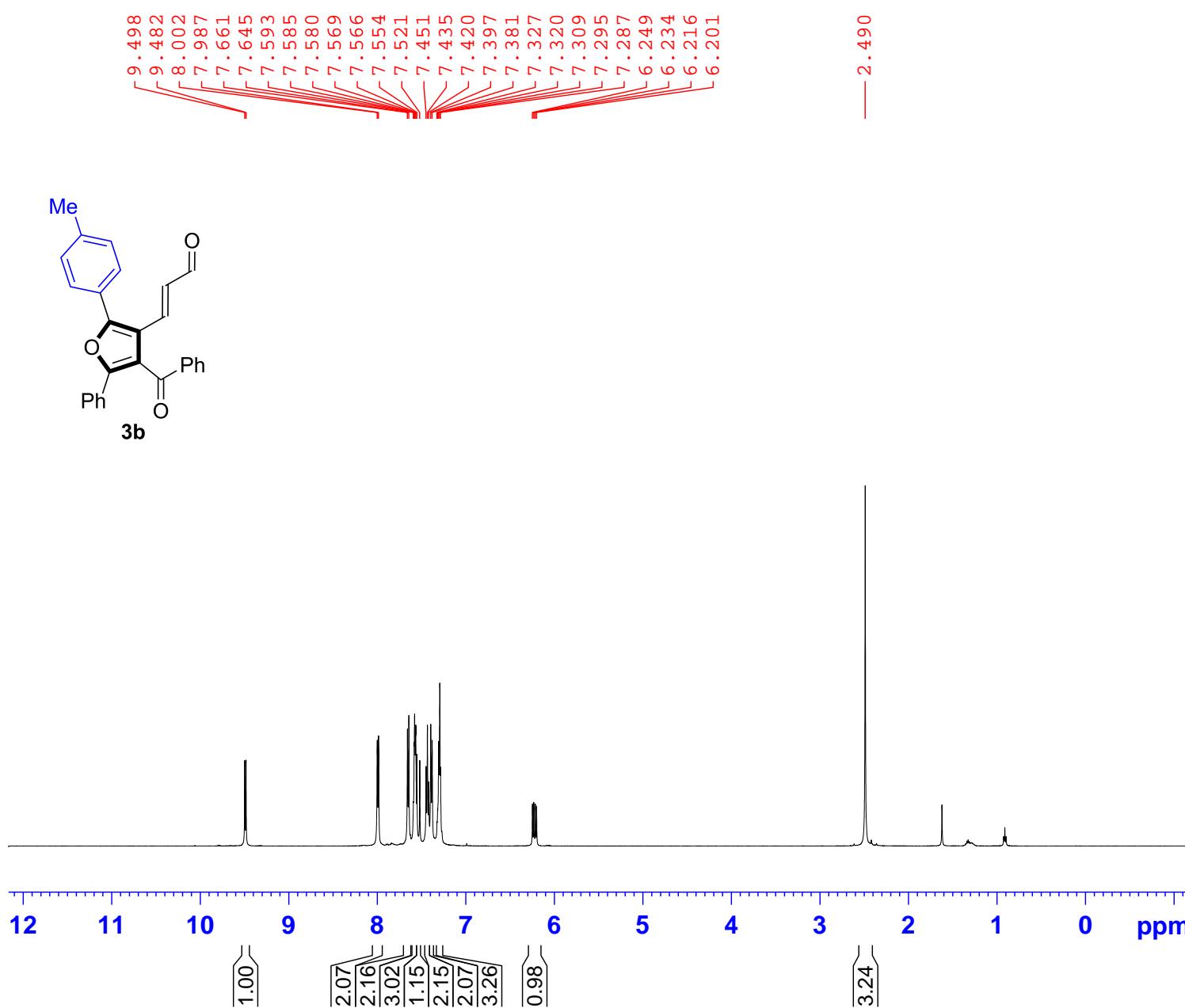
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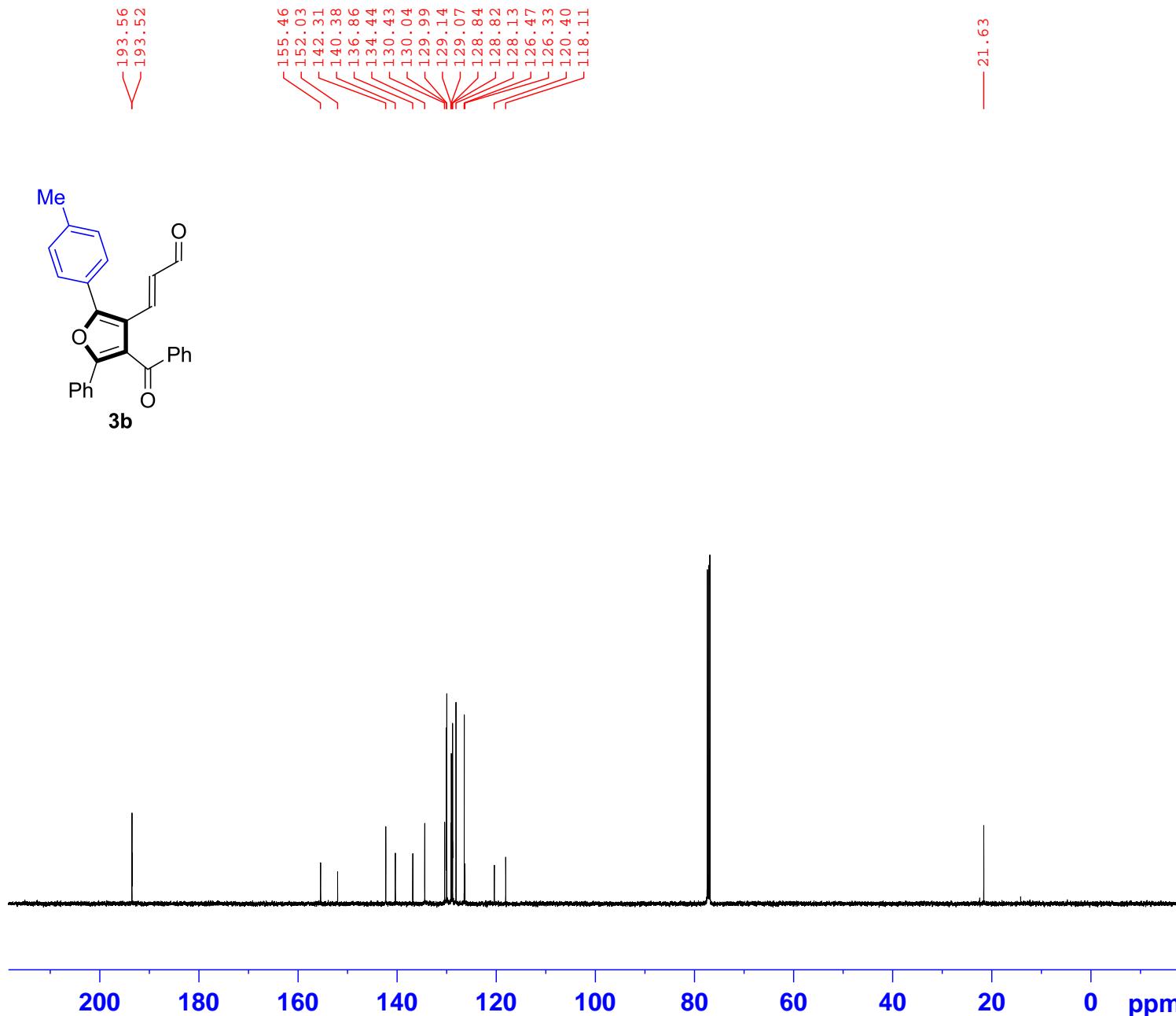
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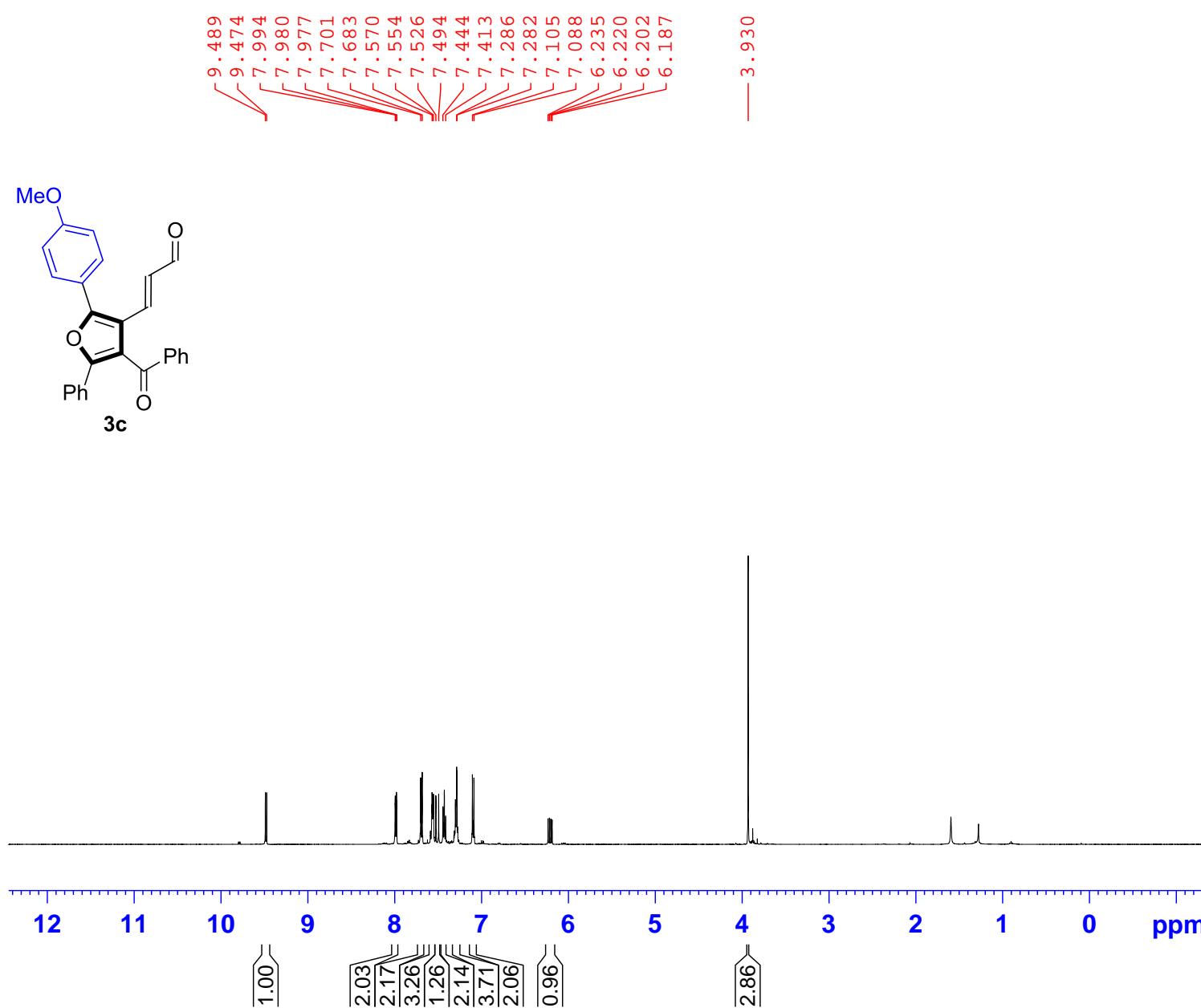
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SI 32768
SF 125.7577748 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-40-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 5



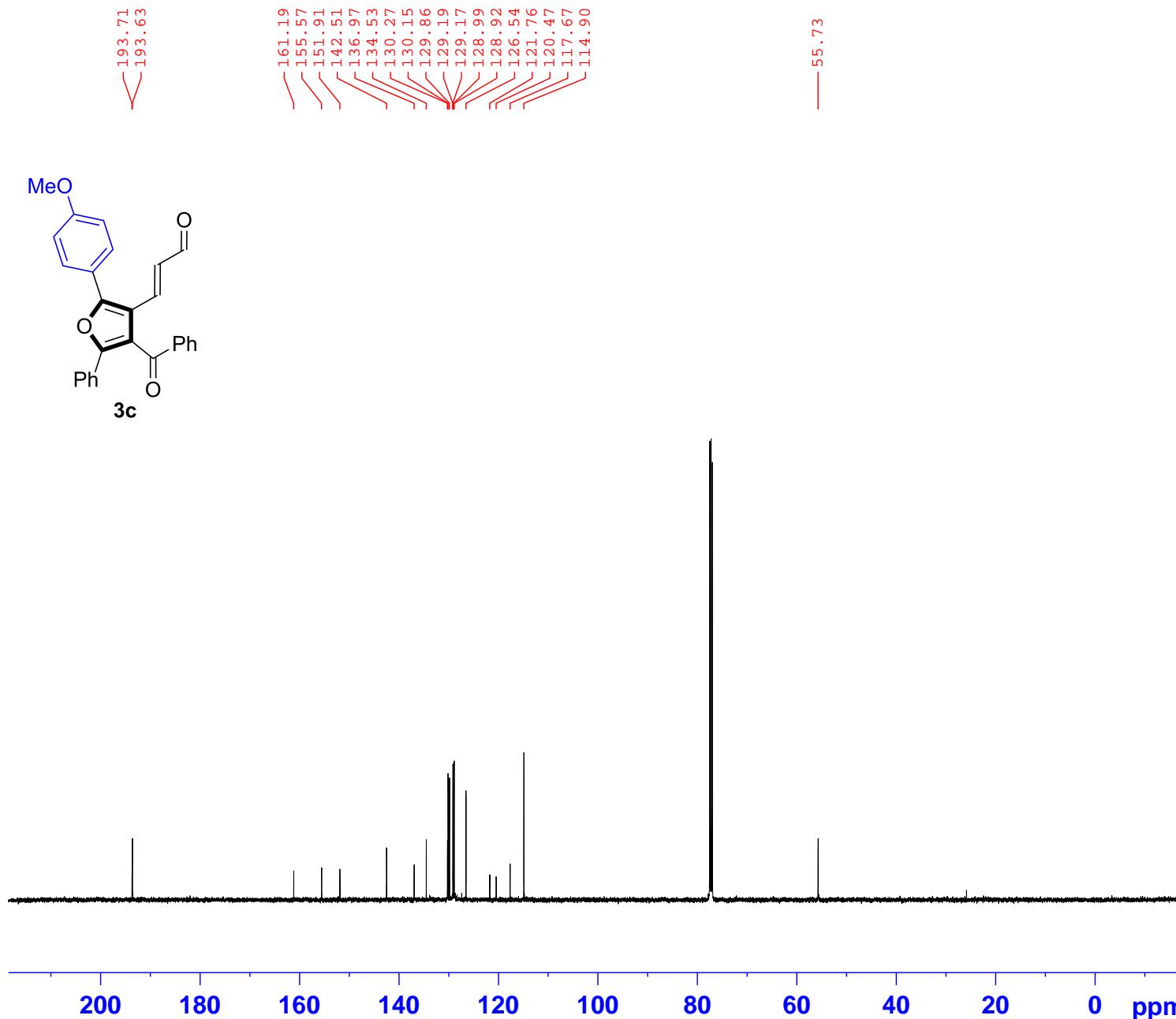
Current Data Parameters
NAME 3c- BSL-05-40-A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161014
Time 16.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 161
DW 50.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300023 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-40 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 24



Current Data Parameters
NAME 3c - BSL-05-40 (500MHz)
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161013
Time 9.48
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577609 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-46(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 11

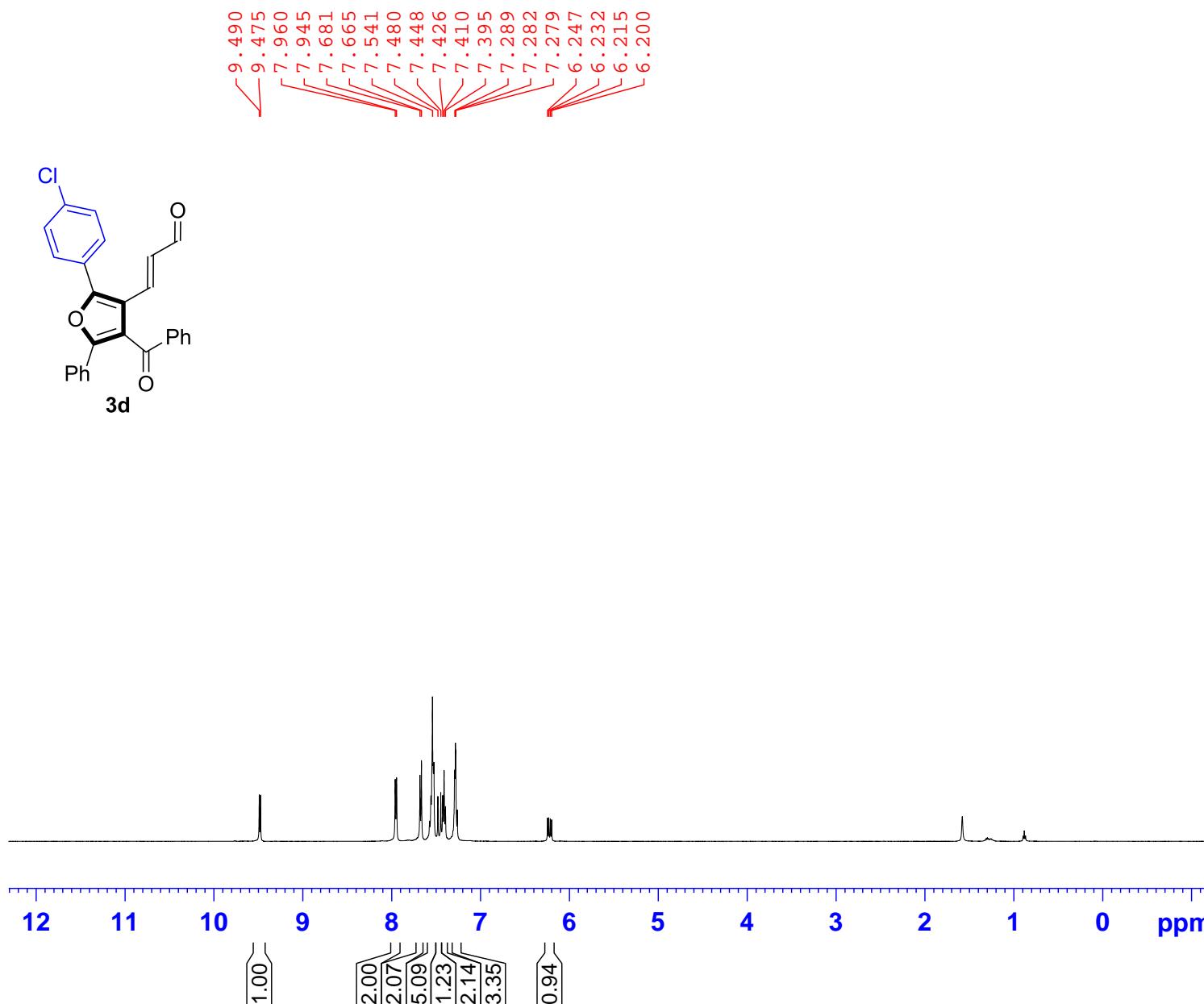


Current Data Parameters
NAME 3d- BSL-05-46(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161013
Time 11.44
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300126 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-46 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 11



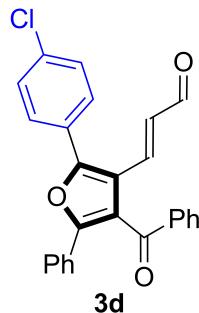
Current Data Parameters
NAME 3d- BSL-05-46(500MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161013
Time 23.57
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

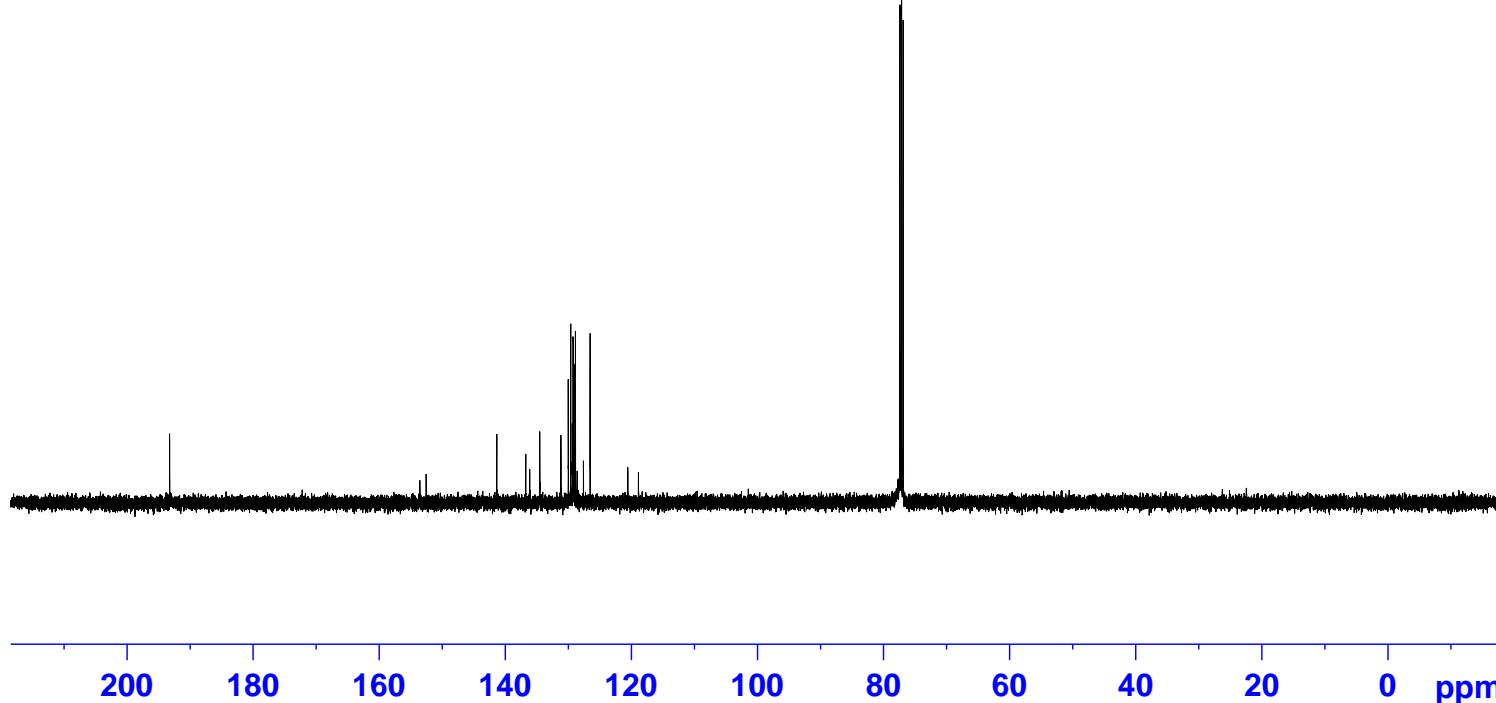
===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577727 MHz
WDW EM
SSB 0
LB 0 Hz
GB 0
PC 1.40

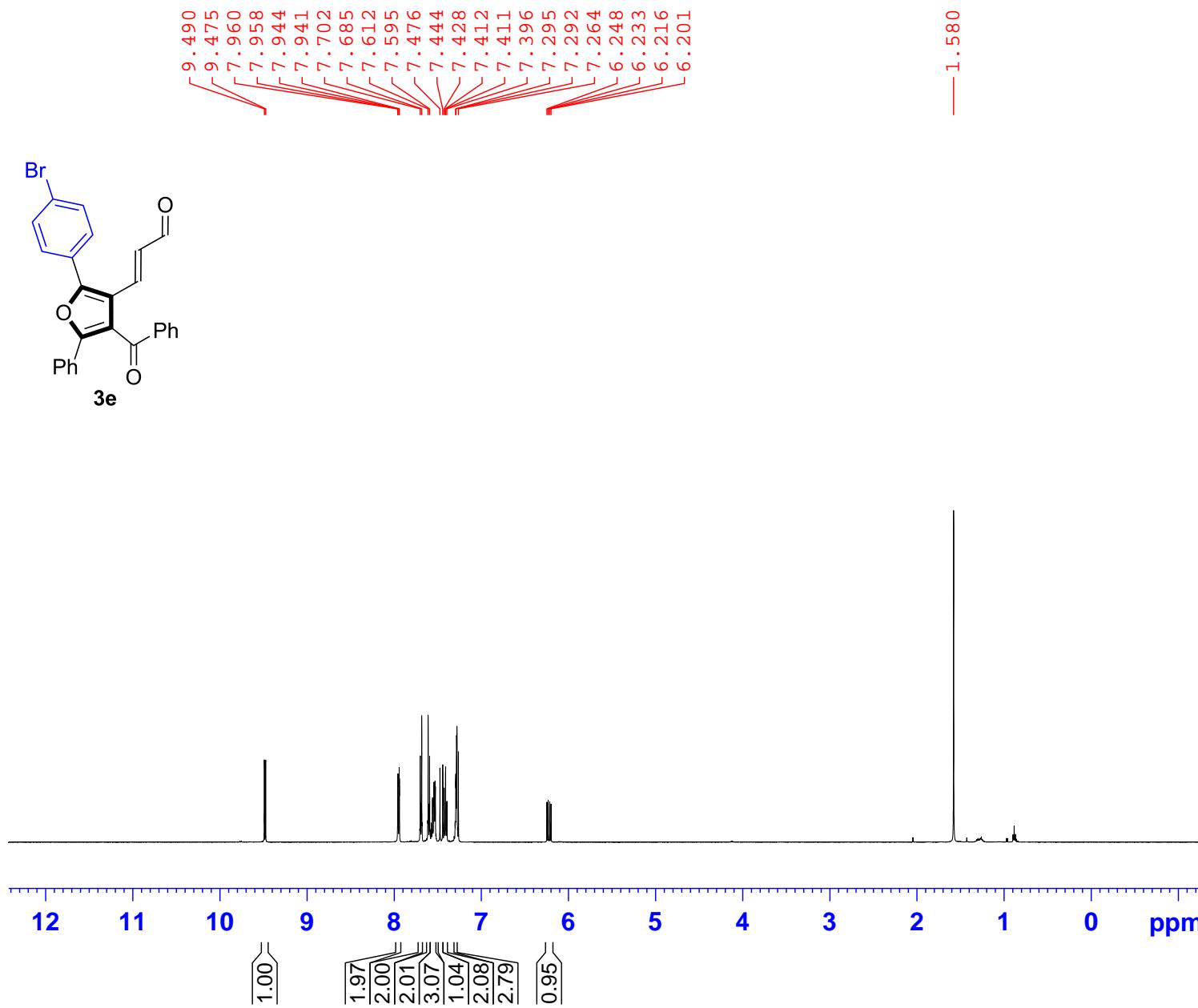


193.27
193.25

153.57
152.57
141.37
136.77
136.15
134.55
131.20
130.03
129.64
129.40
129.26
129.12
128.90
128.62
127.62
126.56
120.58
118.89



SK-BSL-05-29-1(500MHz)
PROTONRO CDCl₃ /opt/topspin/sk nmrsu 5



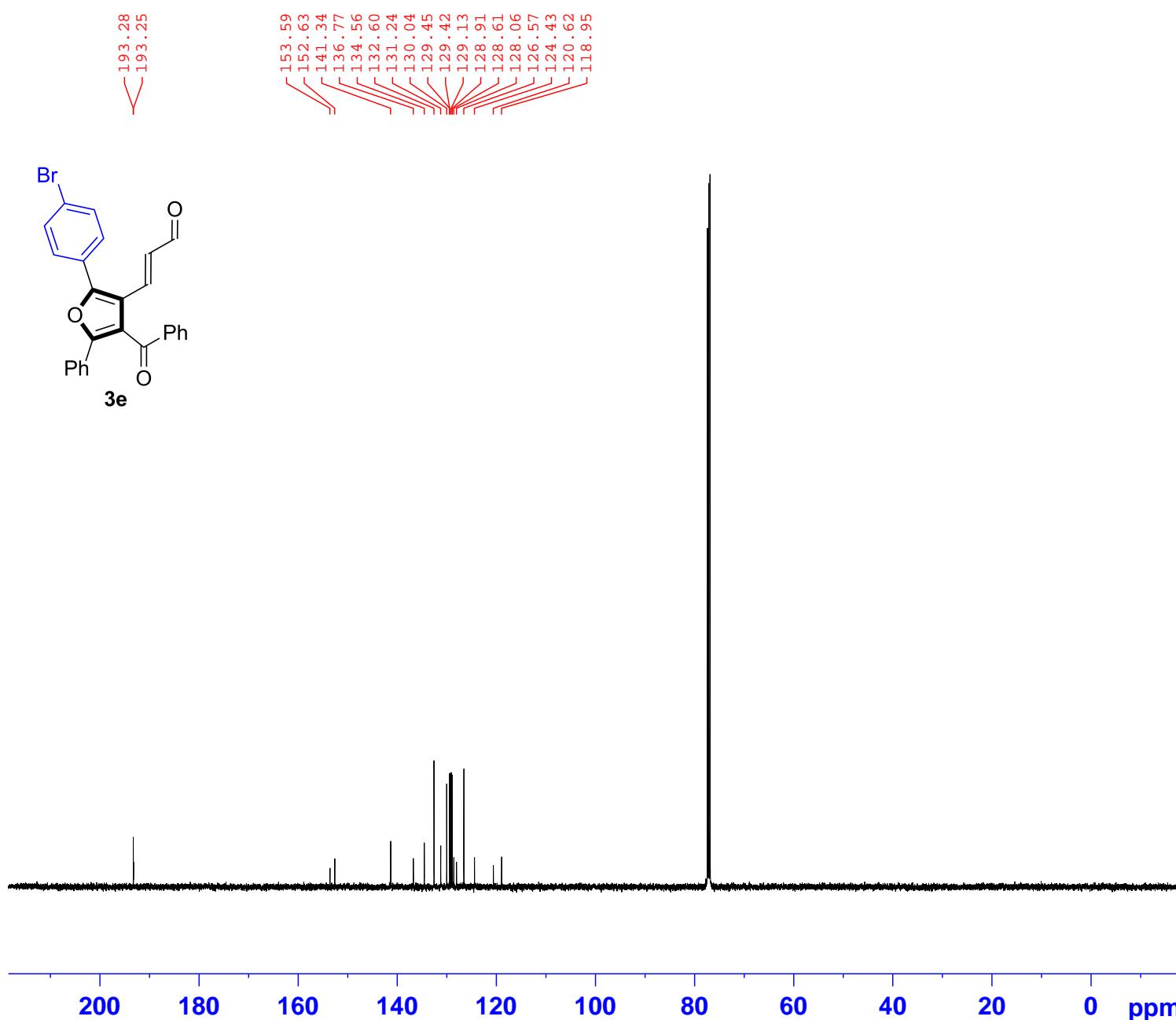
Current Data Parameters
NAME 3e- BSL-05-29-1(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161007
Time 11.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 181
DW 50.000 usec
DE 6.50 usec
TE 297.9 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300115 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-29-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 5



Current Data Parameters
NAME 3e- BSL-05-29-1(500MHz)
EXPNO 2
PROCNO 1

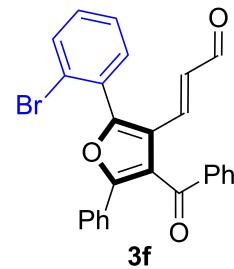
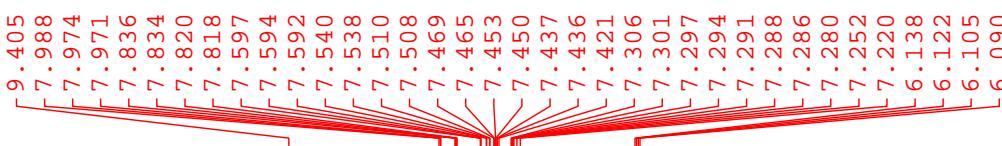
F2 - Acquisition Parameters
Date_ 20161007
Time 14.25
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577715 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-325-2-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 20

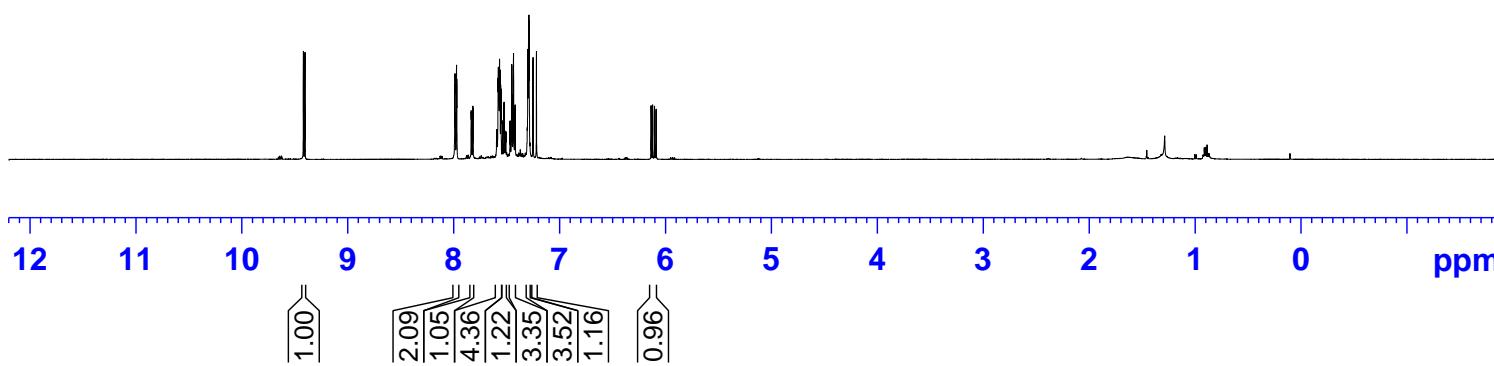


Current Data Parameters
NAME 3f - BSL-05-325-2-A(500MHz)
EXPNO 1
PROCNO 1

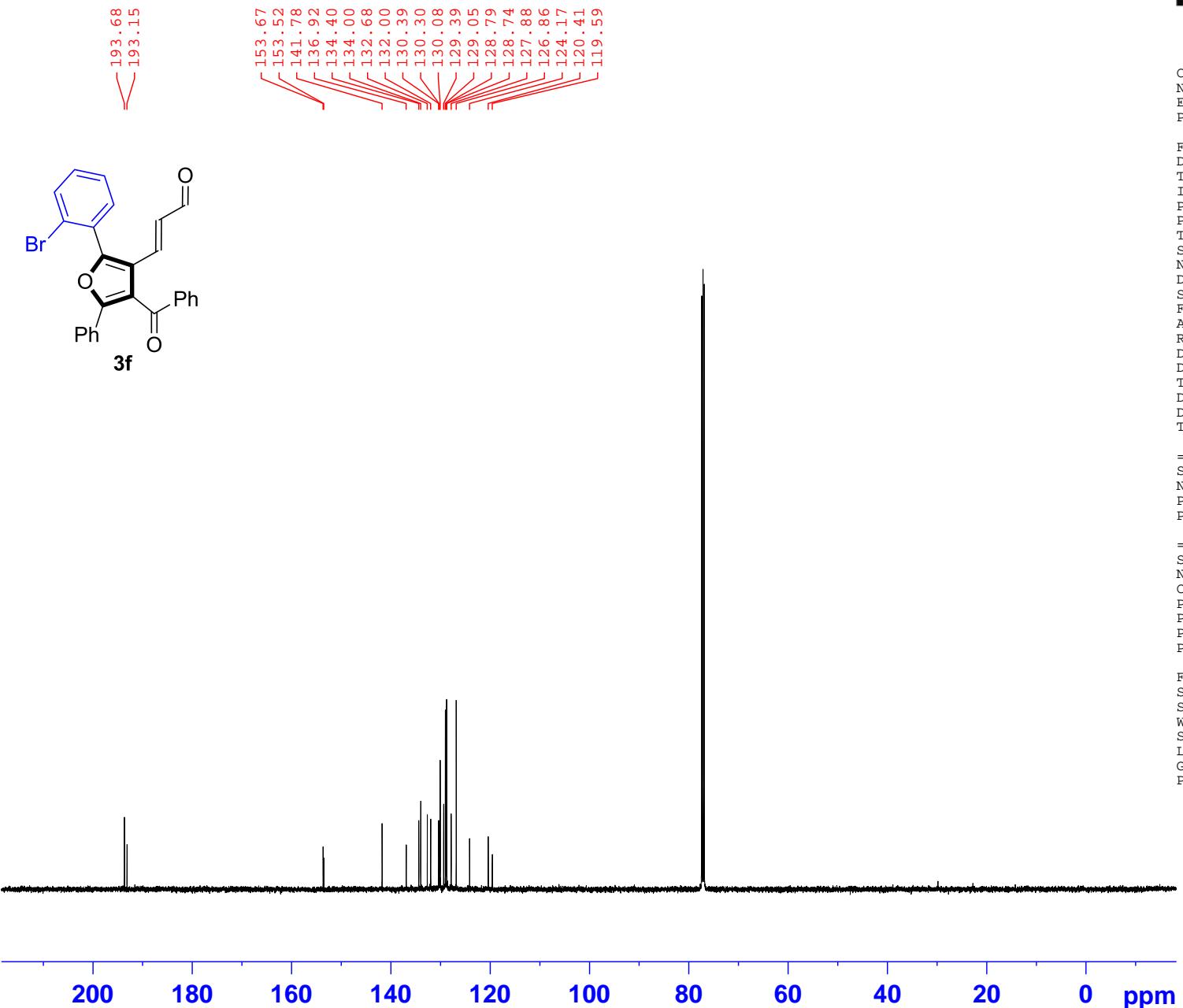
F2 - Acquisition Parameters
Date_ 20180308
Time 12.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1299981 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-325-2-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 20



Current Data Parameters
NAME 3f - BSL-05-325-2-A(500MHz)
EXPNO 2
PROCNO 1

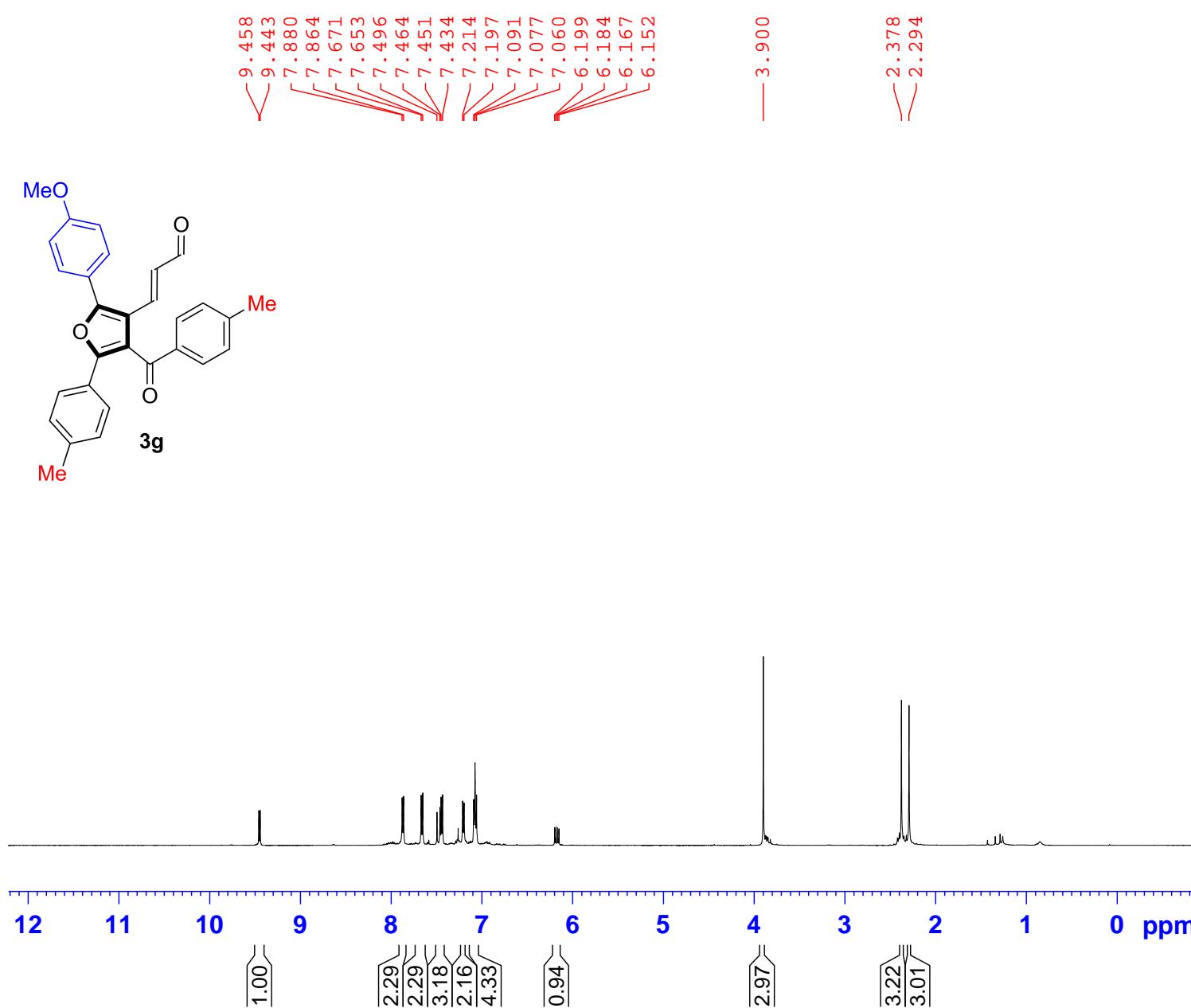
F2 - Acquisition Parameters
Date_ 20180309
Time 8.14
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgppg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577730 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-41A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 10



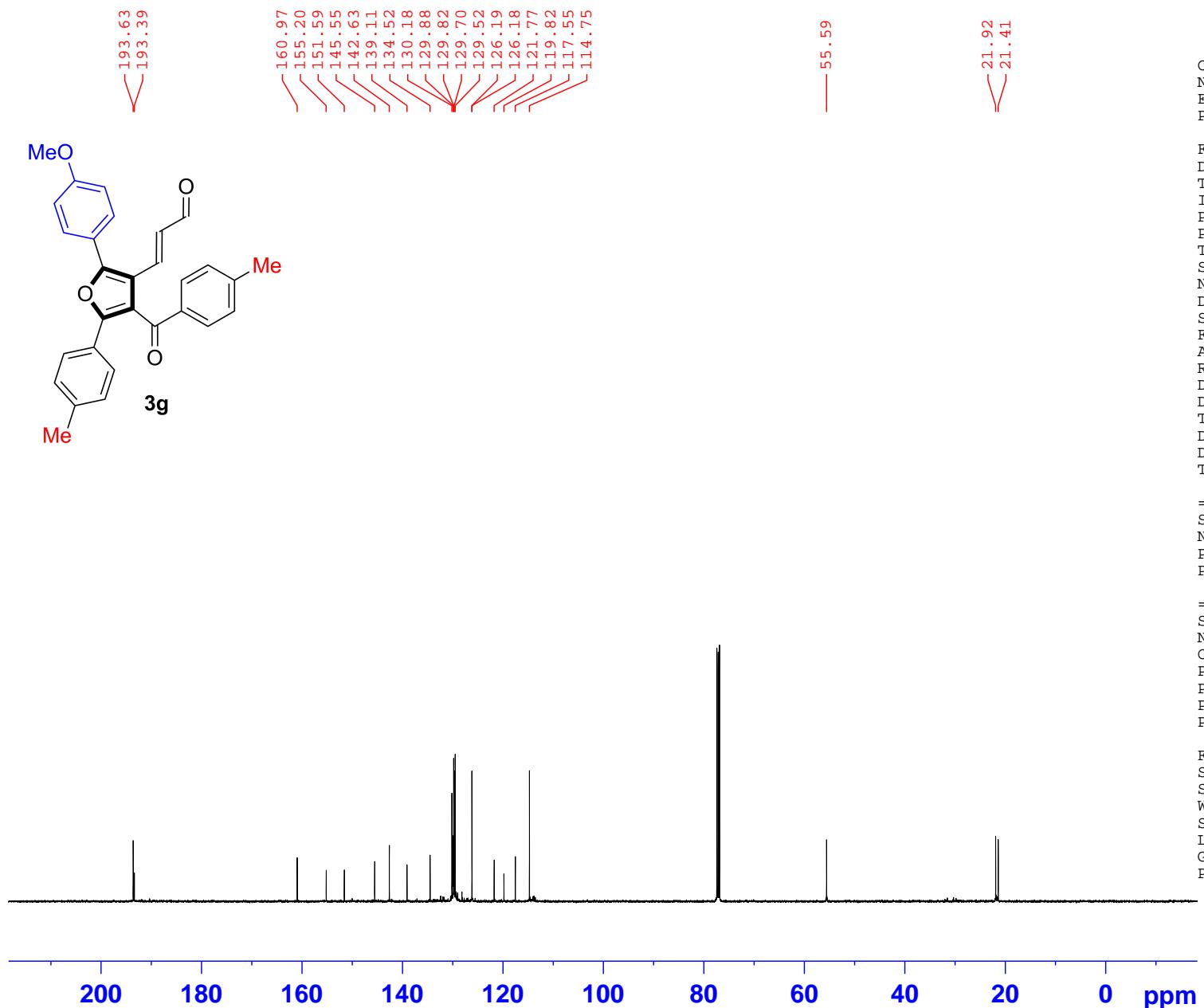
Current Data Parameters
NAME 3g- BSL-05-41A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20170107
Time 11.20
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 80.6
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300117 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-41A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 10



Current Data Parameters
NAME 3g- BSL-05-41A(500MHz)
EXPNO 2
PROCNO 1

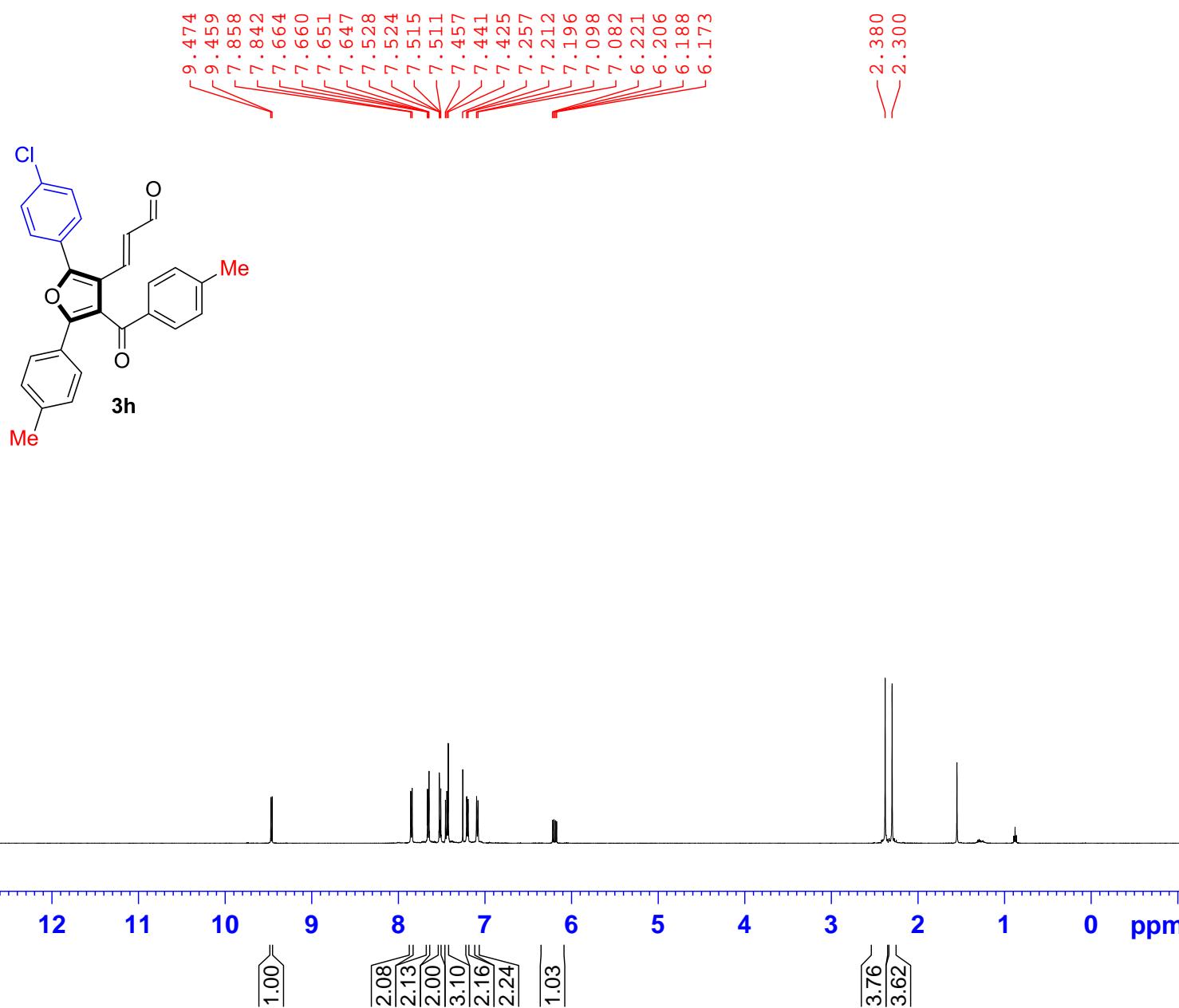
F2 - Acquisition Parameters
Date_ 20170109
Time 23.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577766 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-48(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 13



Current Data Parameters
NAME 3h - BSL-05-48(500MHz)
EXPNO 1
PROCNO 1

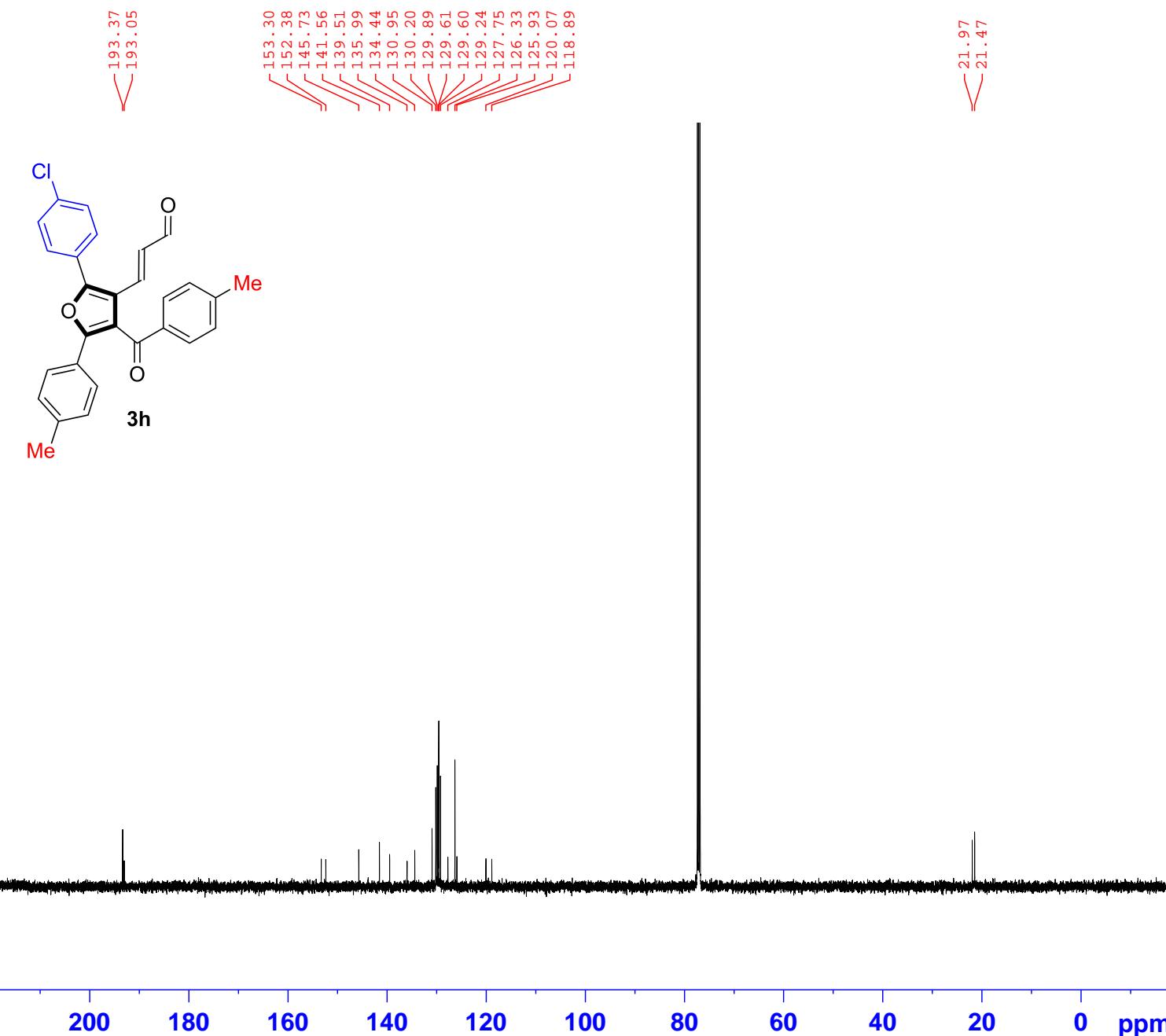
F2 - Acquisition Parameters
Date_ 20161013
Time 11.54
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 181
DW 50.000 usec
DE 6.50 usec
TE 297.9 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300149 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-48 (500MHz)

C13CPD CDCl₃ /opt/topspin/sk nmrsu 13



Current Data Parameters
NAME 3h - BSL-05-48(500MHz)
EXPNO 2
PROCNO 1

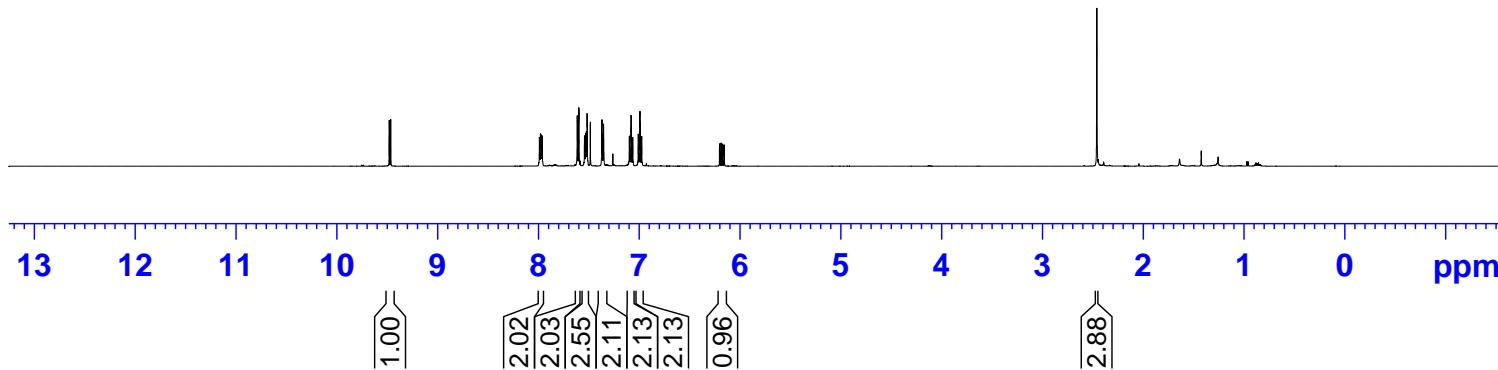
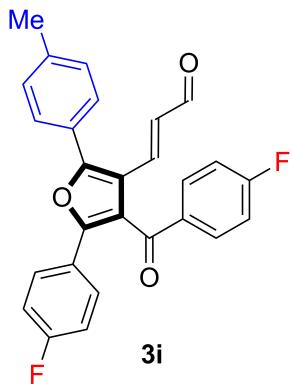
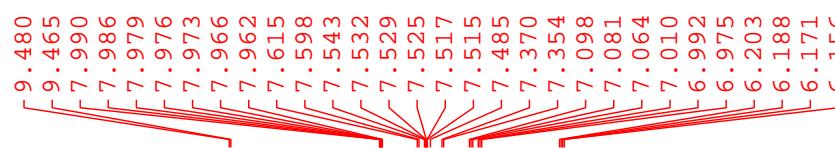
F2 - Acquisition Parameters
Date_ 20161014
Time 1.01
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577718 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-99 (500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 16



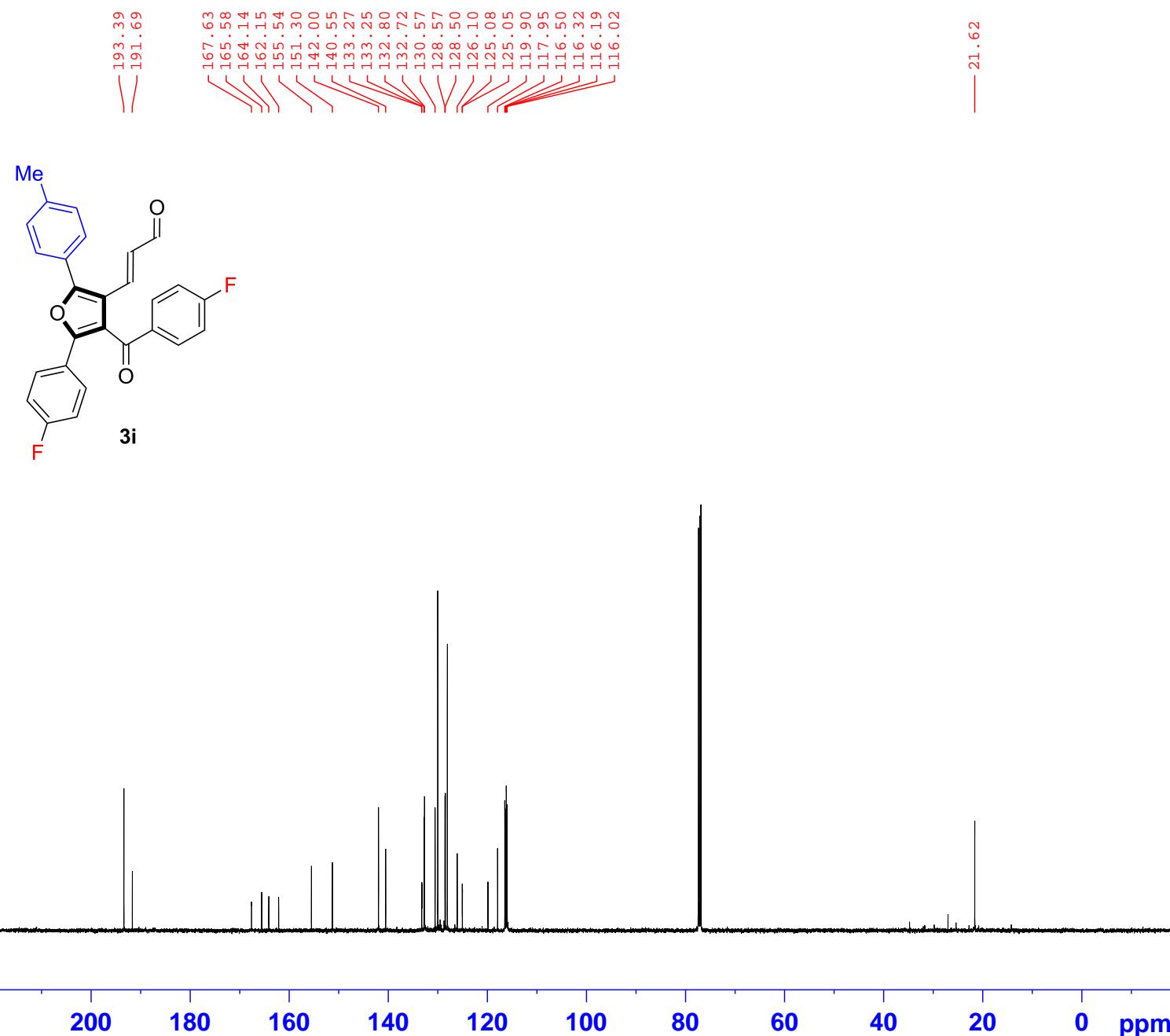
Current Data Parameters
NAME 3i - BSL-05-99(500MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161220
Time 15.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 80.6
DW 50.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300124 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-99 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 16



Current Data Parameters
NAME 3i - BSL-05-99(500MHz)
EXPNO 3
PROCNO 1

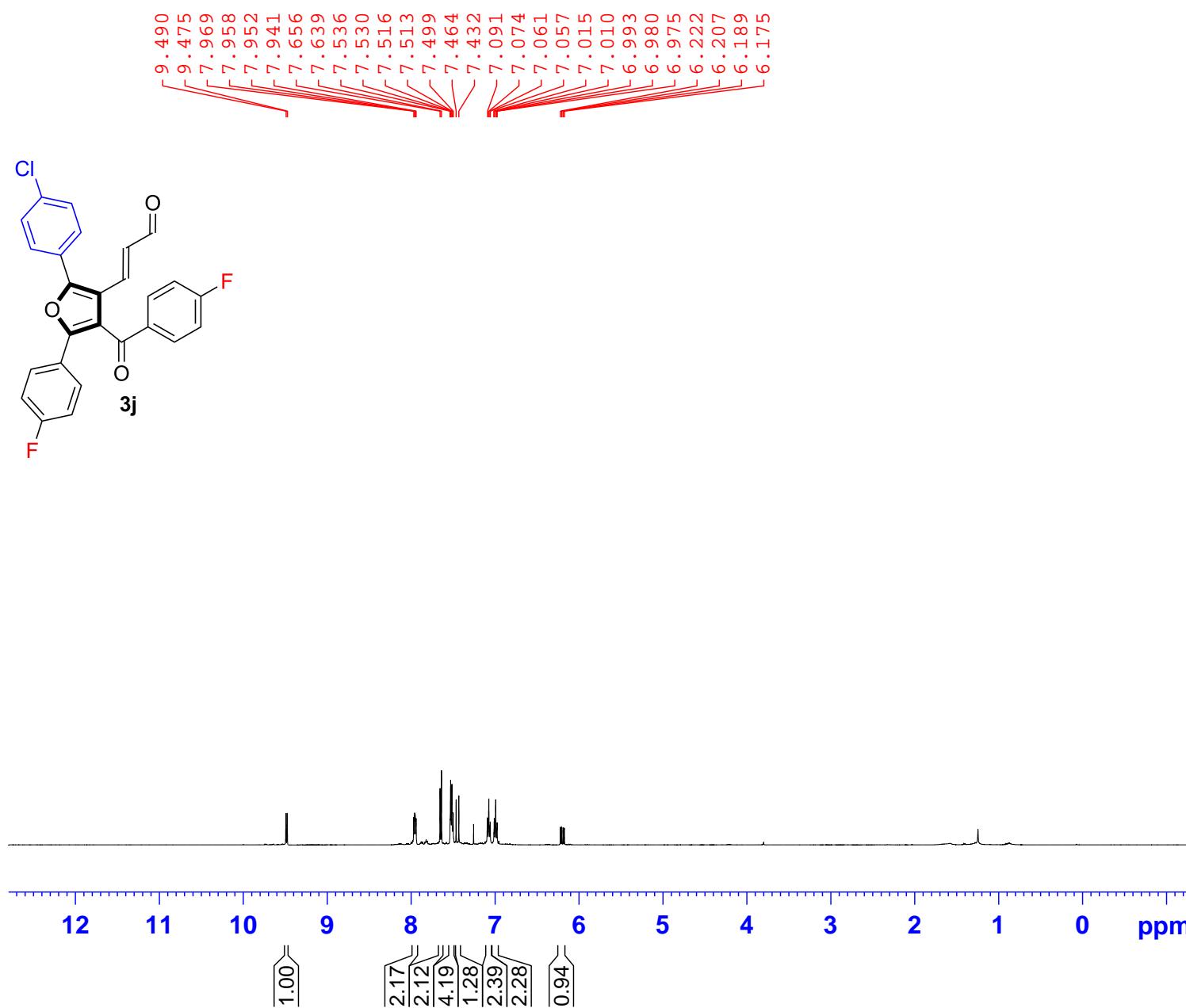
F2 - Acquisition Parameters
Date_ 20161220
Time 22.39
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 297.9 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 ======
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577752 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-98-B(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 17



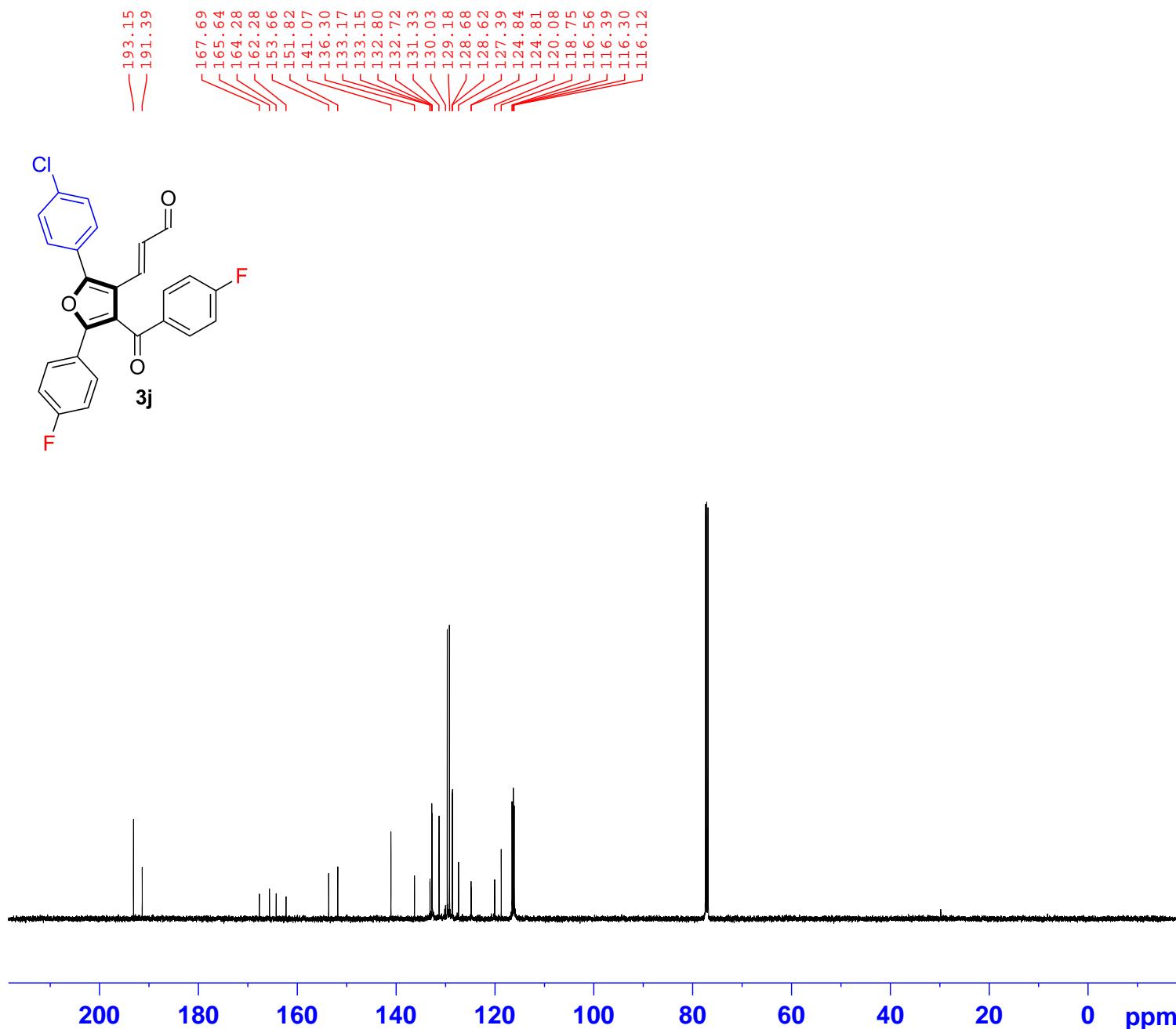
Current Data Parameters
NAME 3j- BSL-05-98-B(500MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161220
Time 15.35
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 114
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300153 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-98-B(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 17



Current Data Parameters
NAME 3j- BSL-05-98-B(500MHz)
EXPNO 3
PROCNO 1

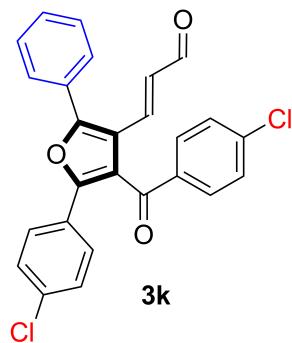
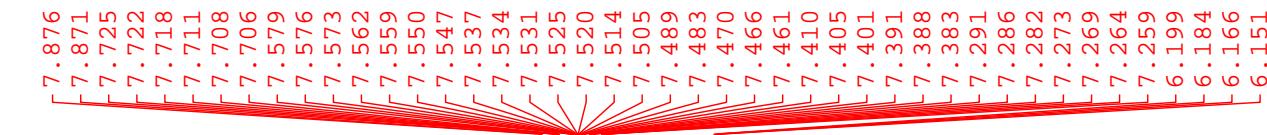
F2 - Acquisition Parameters
Date_ 20161220
Time 23.10
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577734 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-68A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 2

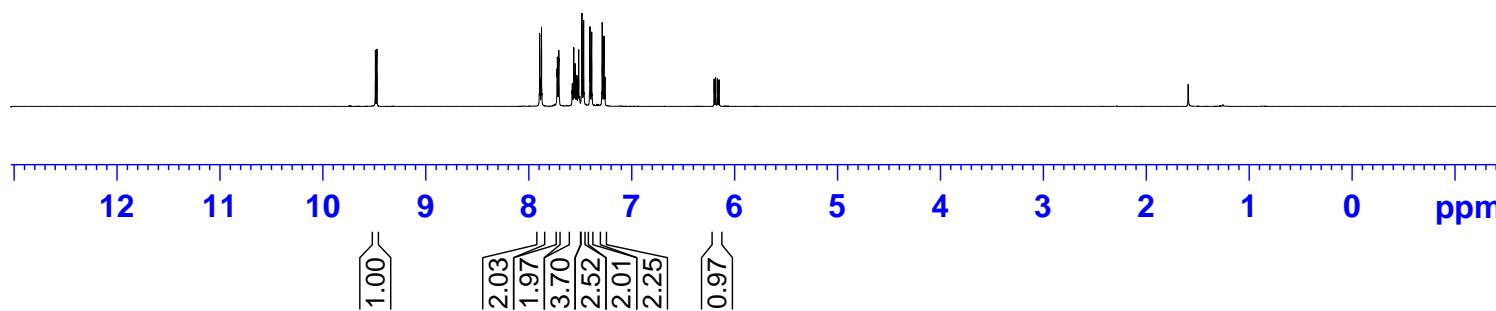


Current Data Parameters
NAME 3k- BSL-05-68A(500MHz)
EXPNO 1
PROCNO 1

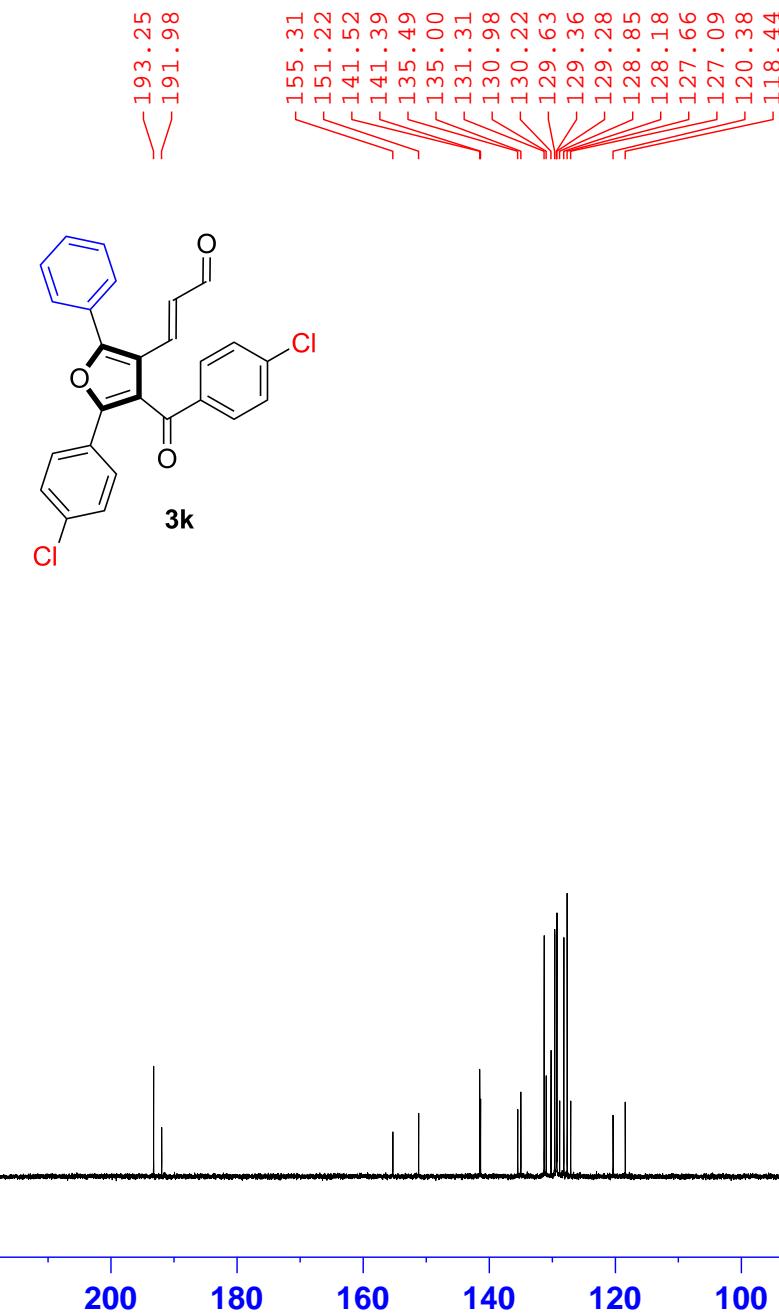
F2 - Acquisition Parameters
Date_ 20161027
Time 10.51
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 128
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300139 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-68A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 2



Current Data Parameters
NAME 3k- BSL-05-68A(500MHz)
EXPNO 2
PROCNO 1

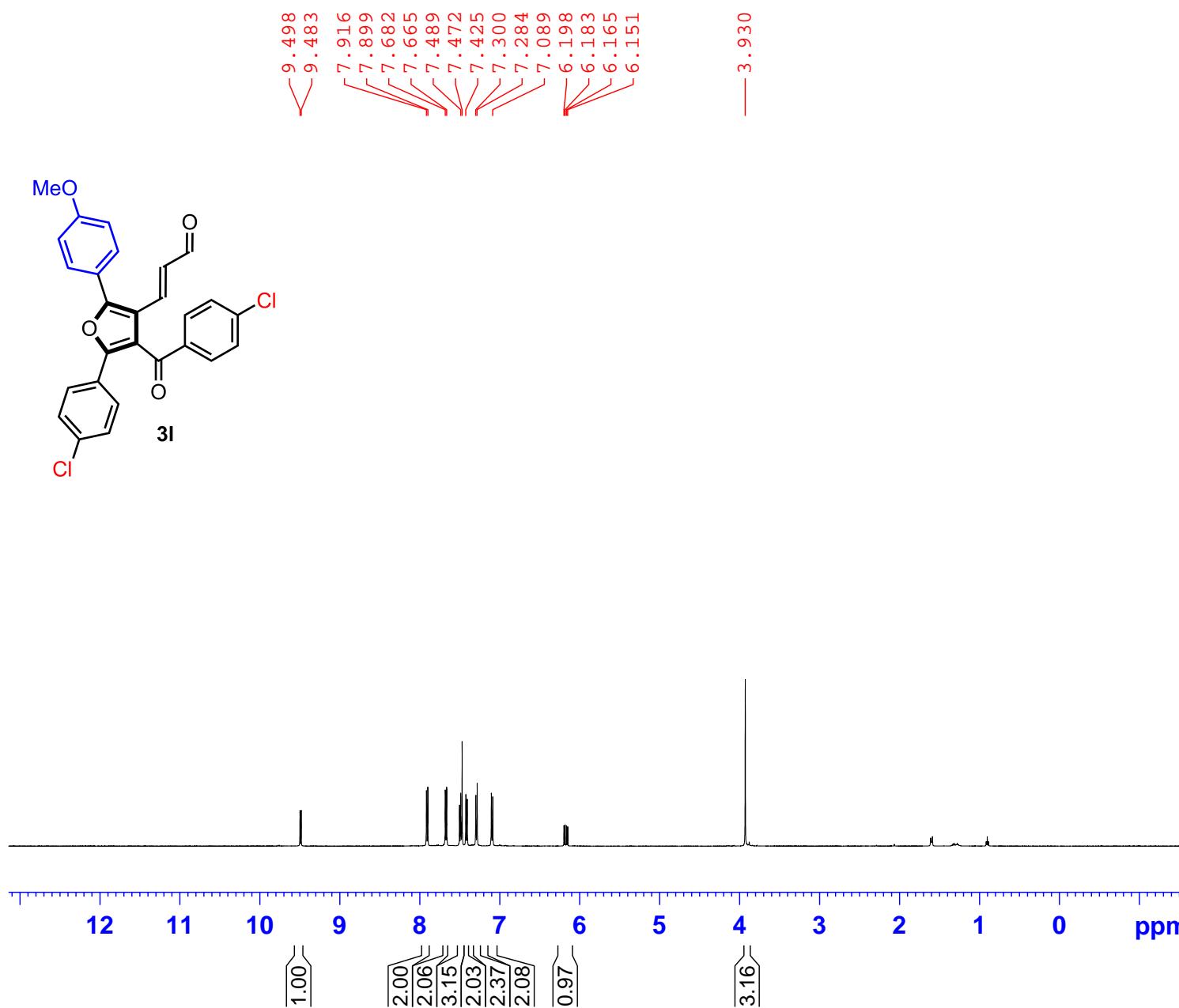
F2 - Acquisition Parameters
Date_ 20161027
Time 19.24
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577735 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-65 (500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 6



Current Data Parameters
NAME 31 - BSL-05-65 (500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161025
Time 11.46
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300015 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

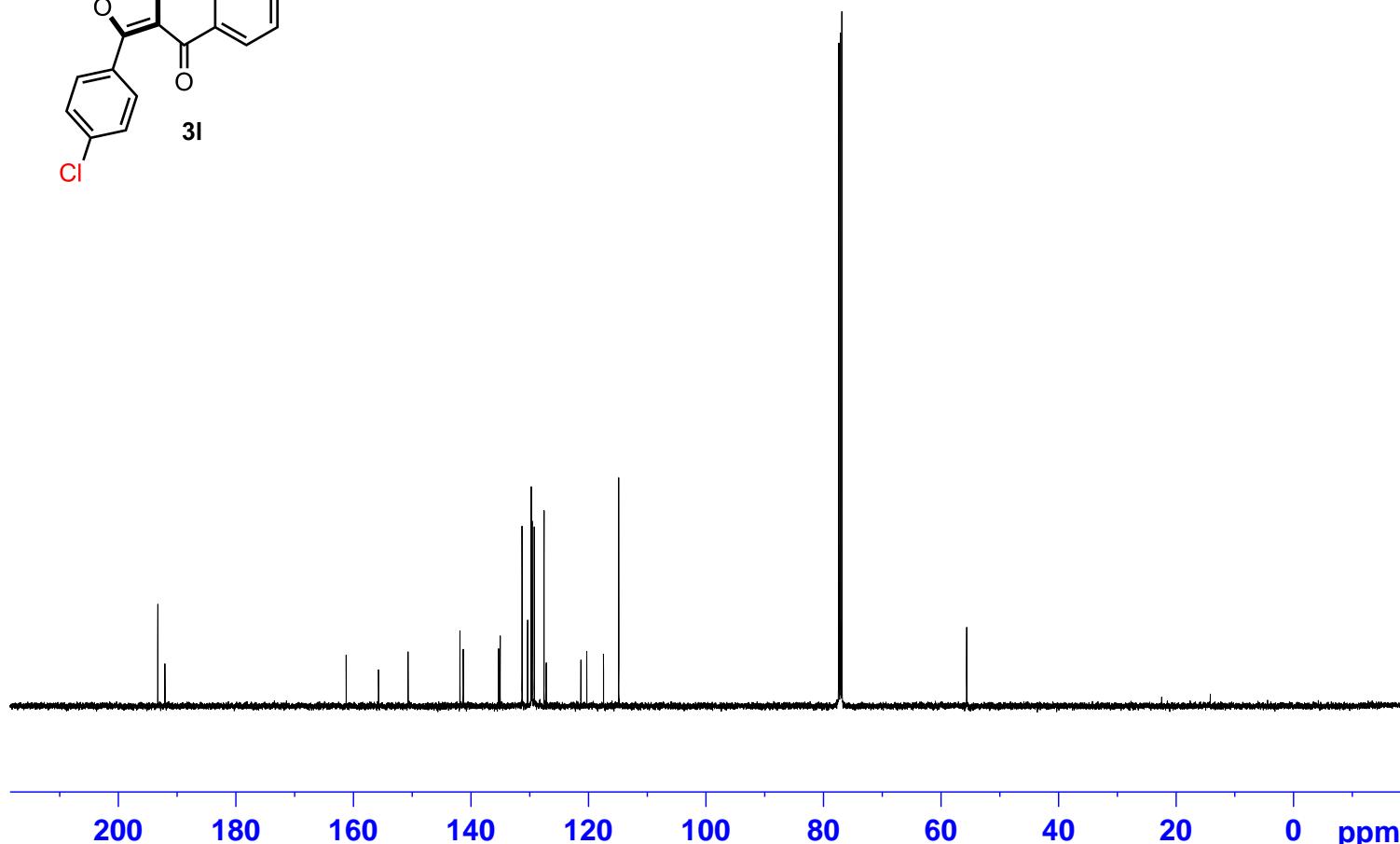
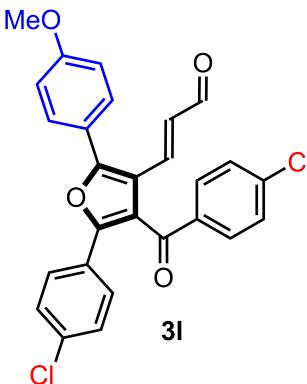
SK-BSL-05-65 (500MHz)

C13CPD CDCl₃ /opt/topspin/sk nmrsu 6

193.31
192.10

161.25
155.74
150.71
141.89
141.32
135.31
135.04
131.32
130.37
129.76
129.60
129.24
127.58
127.20
121.31
120.30
117.45
114.87

55.65



Current Data Parameters
NAME 31 - BSL-05-65(500MHz)
EXPNO 2
PROCNO 1

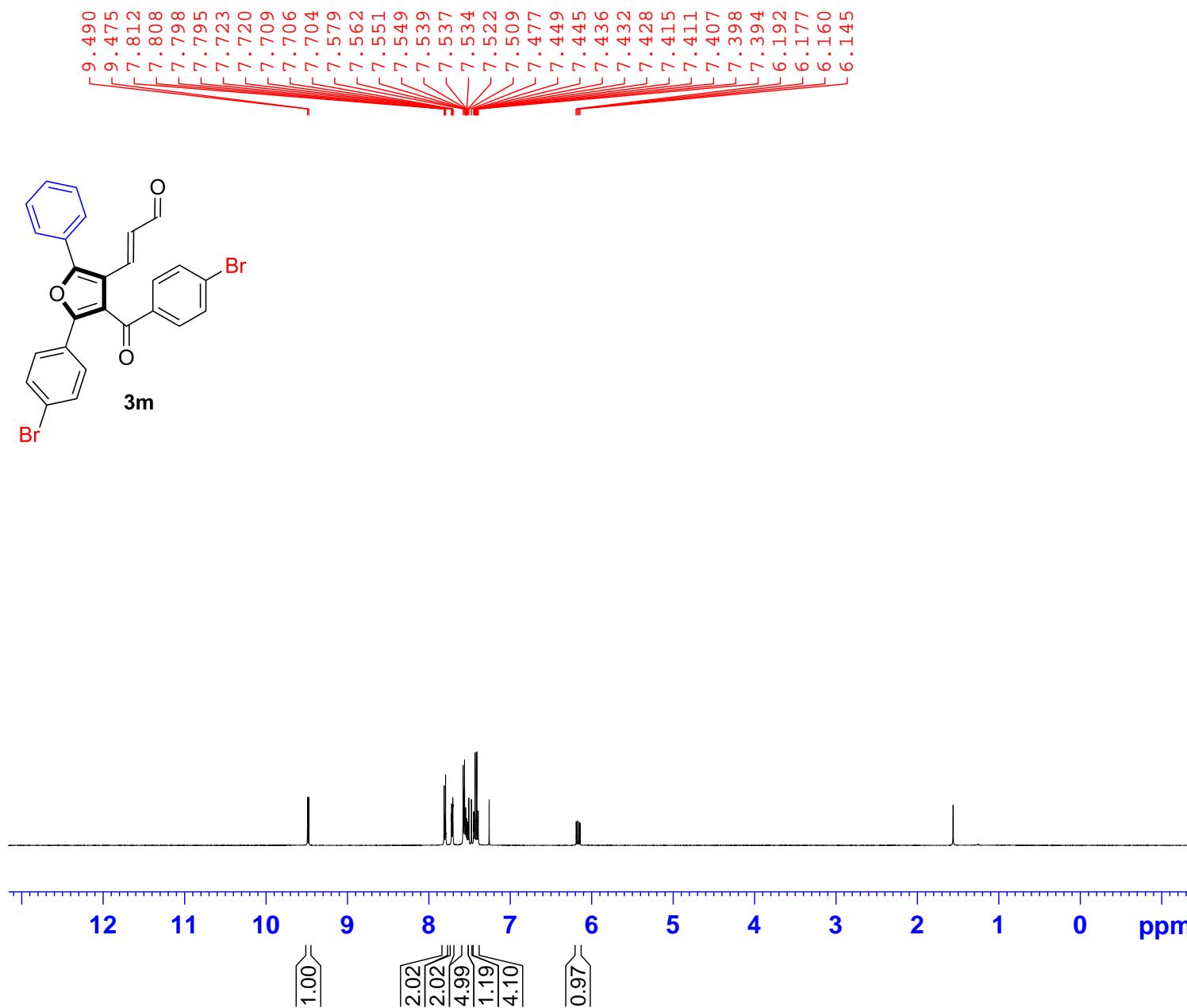
F2 - Acquisition Parameters
Date_ 20161025
Time 19.30
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577734 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-66-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 2



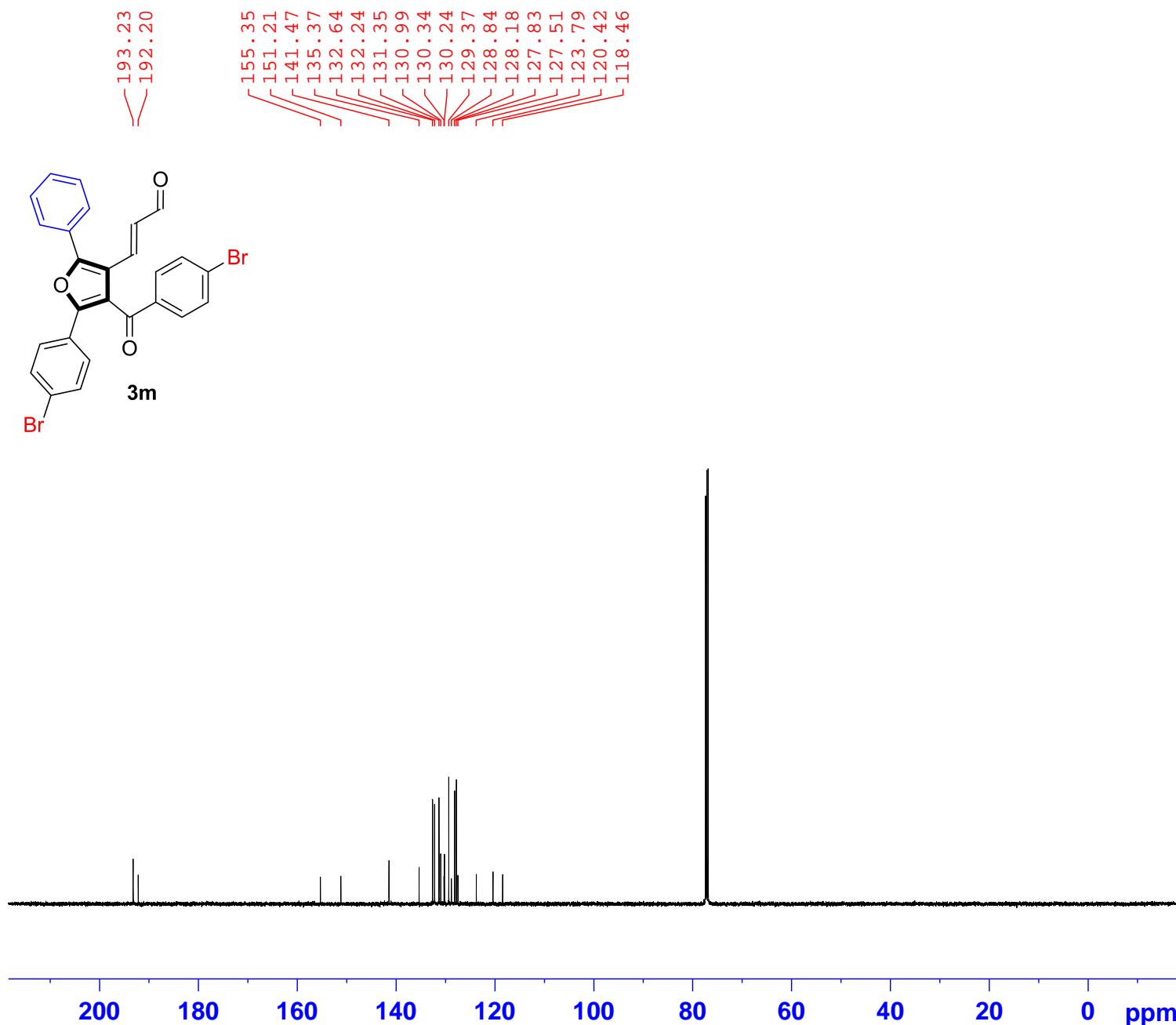
Current Data Parameters
NAME 3m- BSL-05-66-A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161026
Time 12.08
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 181
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300138 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-66-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 2



Current Data Parameters
NAME 3m- BSL-05-66-A(500MHz)
EXPNO 2
PROCNO 1

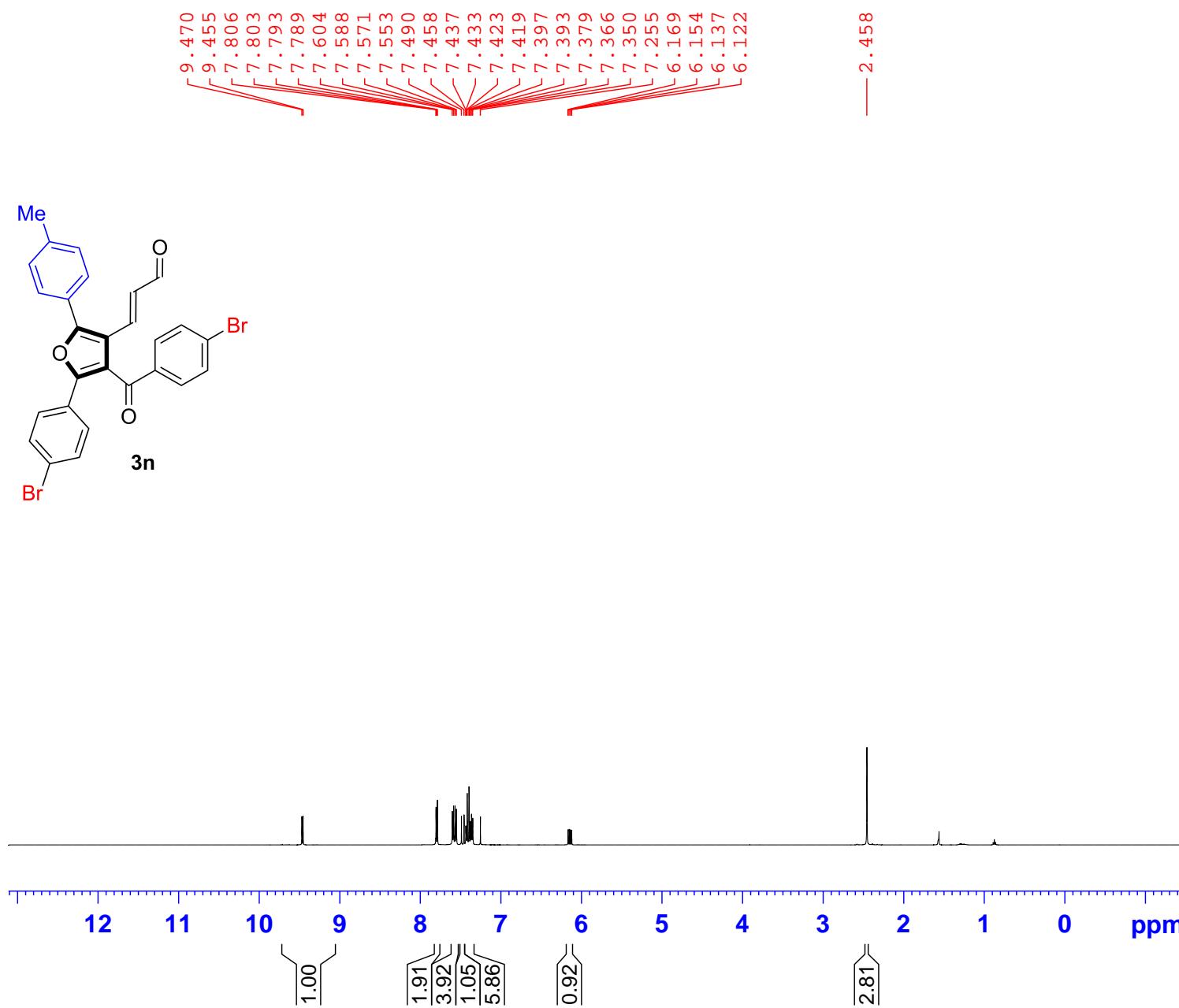
F2 - Acquisition Parameters
Date_ 20161026
Time 15.42
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577728 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-64 (500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 8



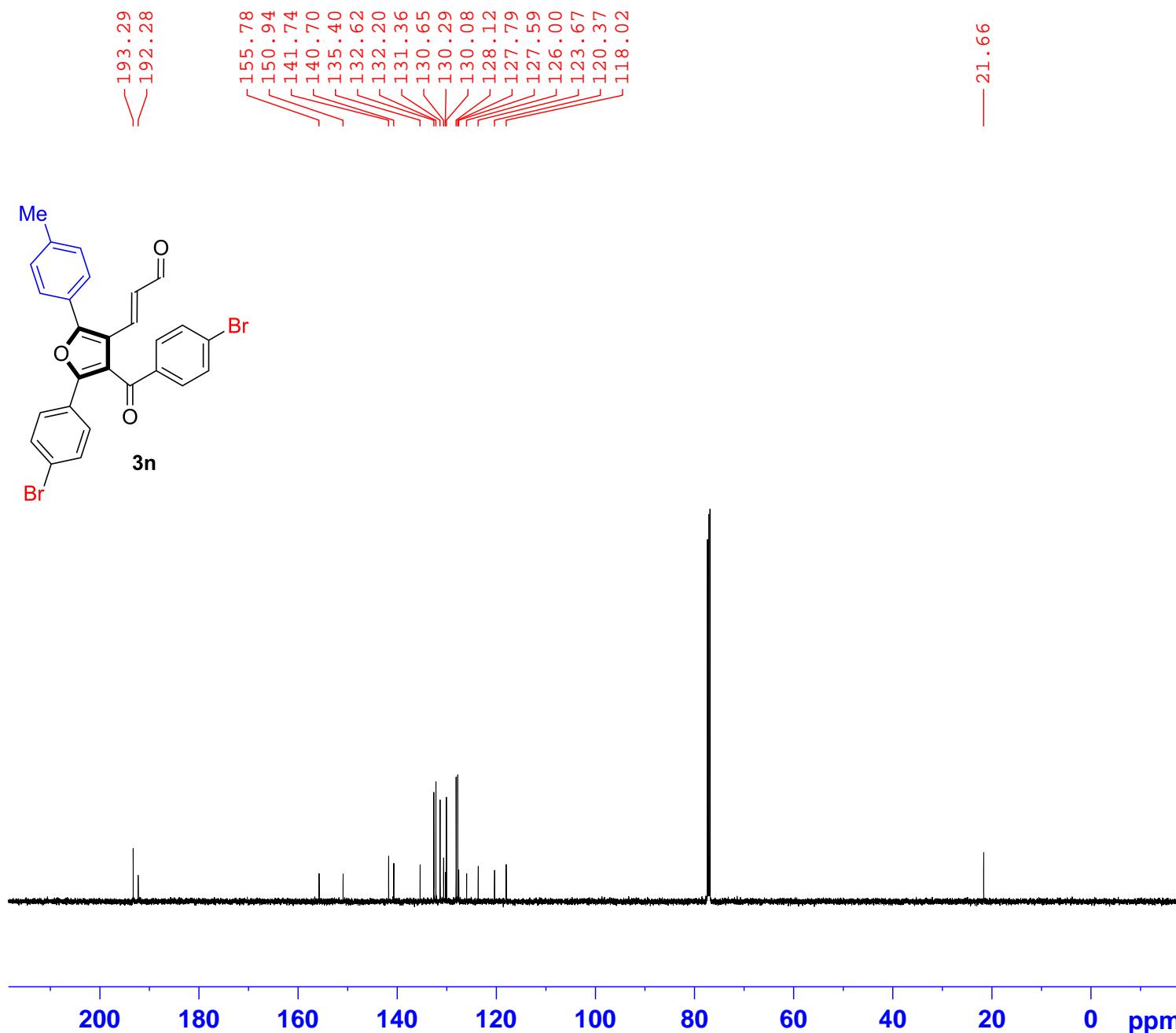
Current Data Parameters
NAME 3n- BSL-05-64 (500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161024
Time 14.53
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300159 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-64 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 8



Current Data Parameters
NAME 3n- BSL-05-64(500MHz)
EXPNO 2
PROCNO 1

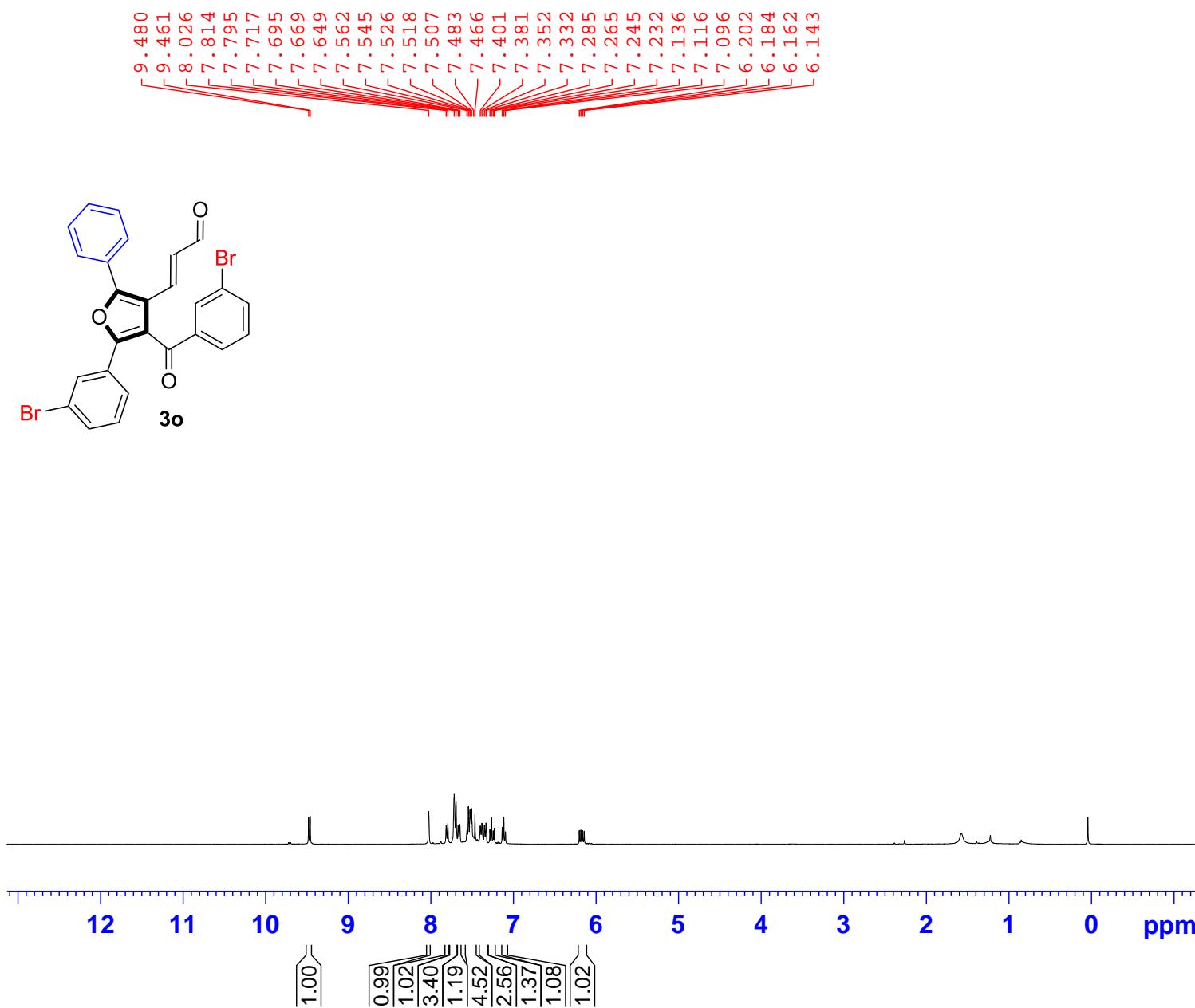
F2 - Acquisition Parameters
Date_ 20161024
Time 16.46
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 198
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.3 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2 waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577730 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-396-1



Current Data Parameters
NAME 3o-SK-BSL-05-396-1
EXPNO 1
PROCNO 1

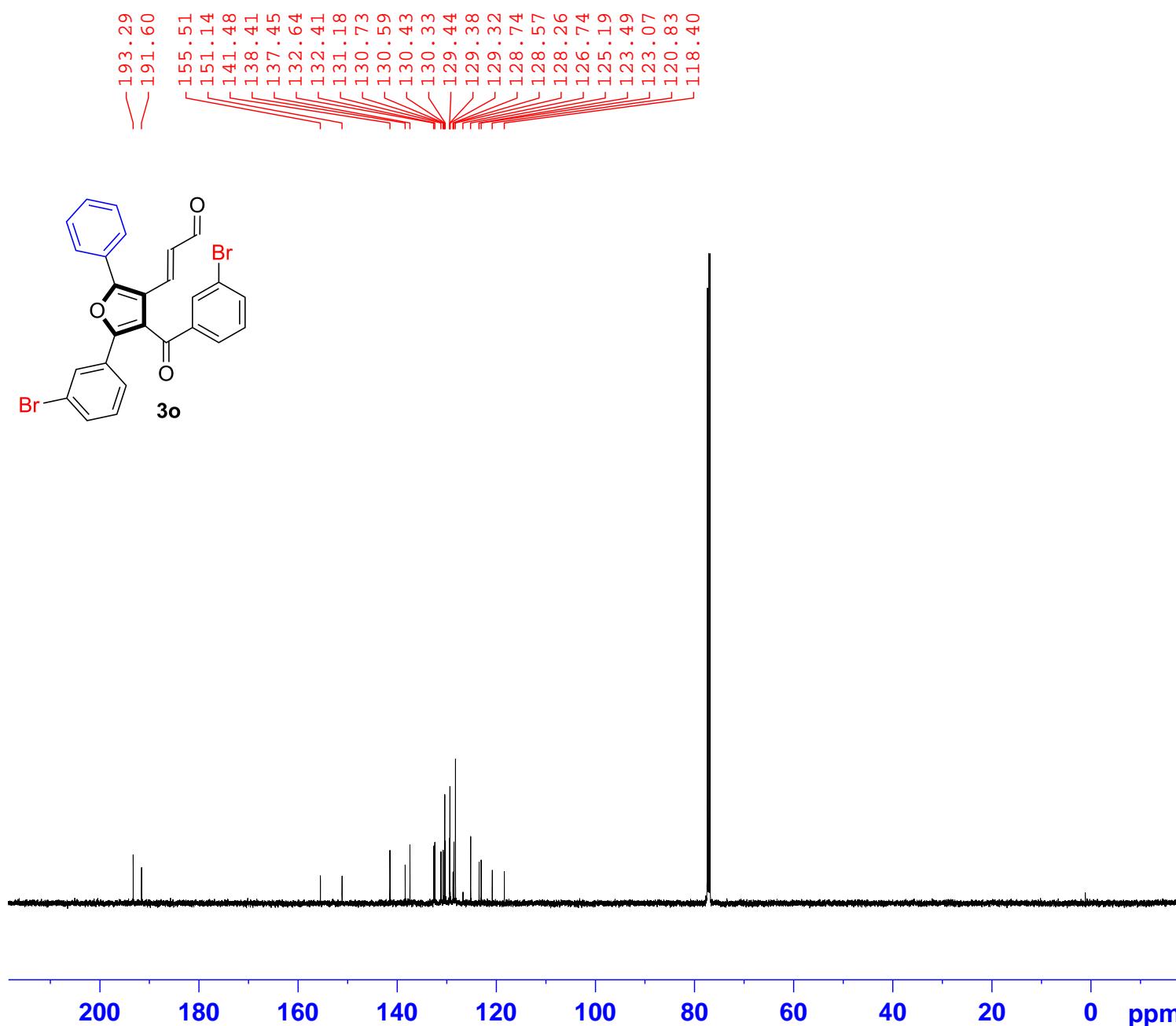
F2 - Acquisition Parameters

Date_ 20180730
Time 16.44 h
INSTRUM spect
PROBHD Z104450_0382 (zg30
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8196.722 Hz
FIDRES 0.250144 Hz
AQ 3.9976959 sec
RG 203
DW 61.000 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
SFO1 400.1324008 MHz
NUC1 1H
P1 6.40 usec
PLW1 14.10000038 W

F2 - Processing parameters

SI 32768
SF 400.1300148 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-396-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 16



Current Data Parameters
NAME 3o-SK-BSL-05-396-1(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180731
Time 3.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgppg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

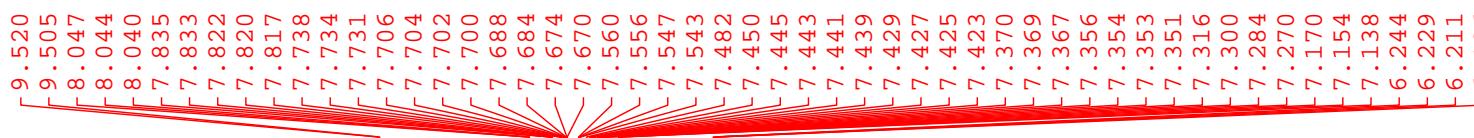
===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577731 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-398-3 (500MHz)

PROTONRO CDCl₃ /opt/topspin/sk nmrsu 20



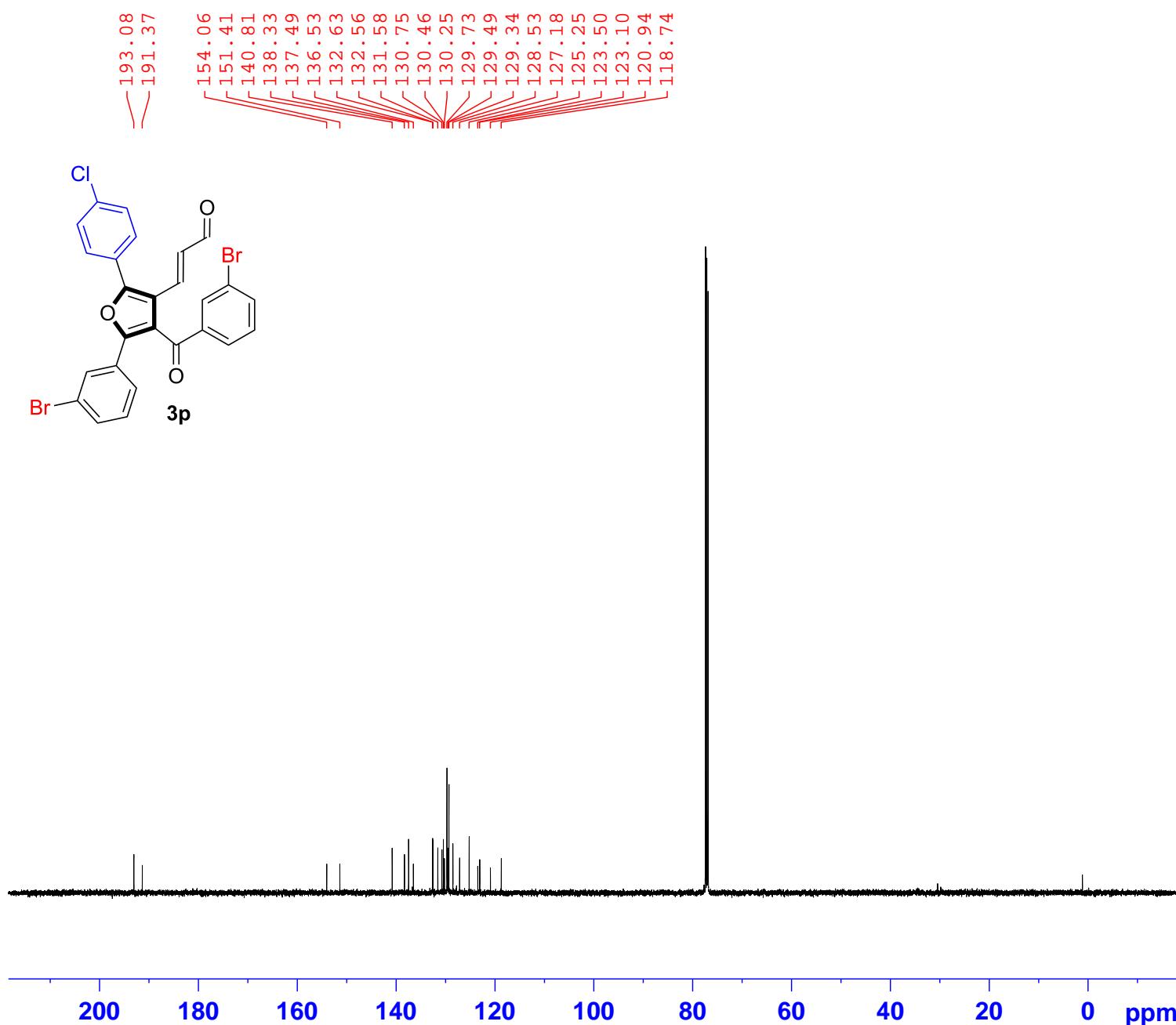
Current Data Parameters
NAME 3p- SK-BSL-05-398-3(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180801
Time 15.49
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300087 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-398-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 13



Current Data Parameters
NAME 3p-SK-BSL-05-398-1(500MHz)
EXPNO 1
PROCNO 1

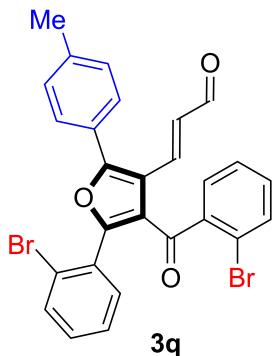
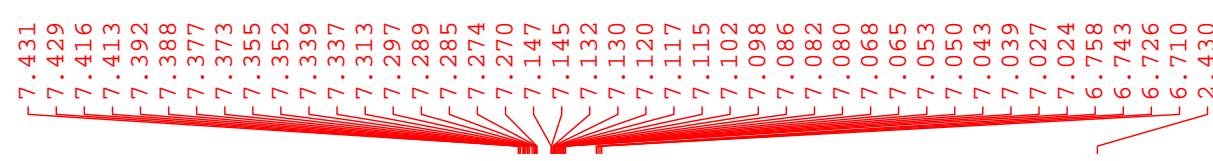
F2 - Acquisition Parameters
Date_ 20180731
Time 2.22
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgppg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577732 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-326-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 12



3q

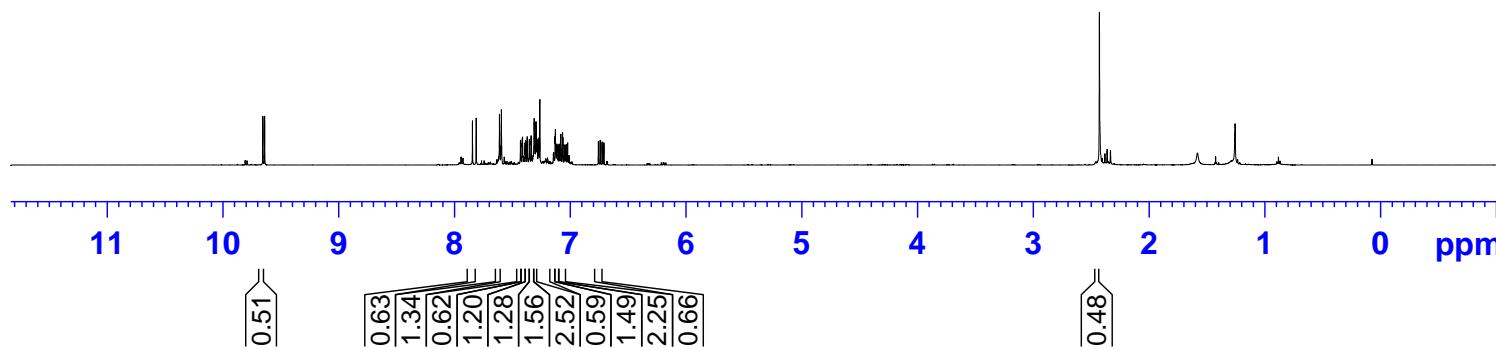


Current Data Parameters
NAME 3q- BSL-05-326-A(500MHz)
EXPNO 1
PROCNO 1

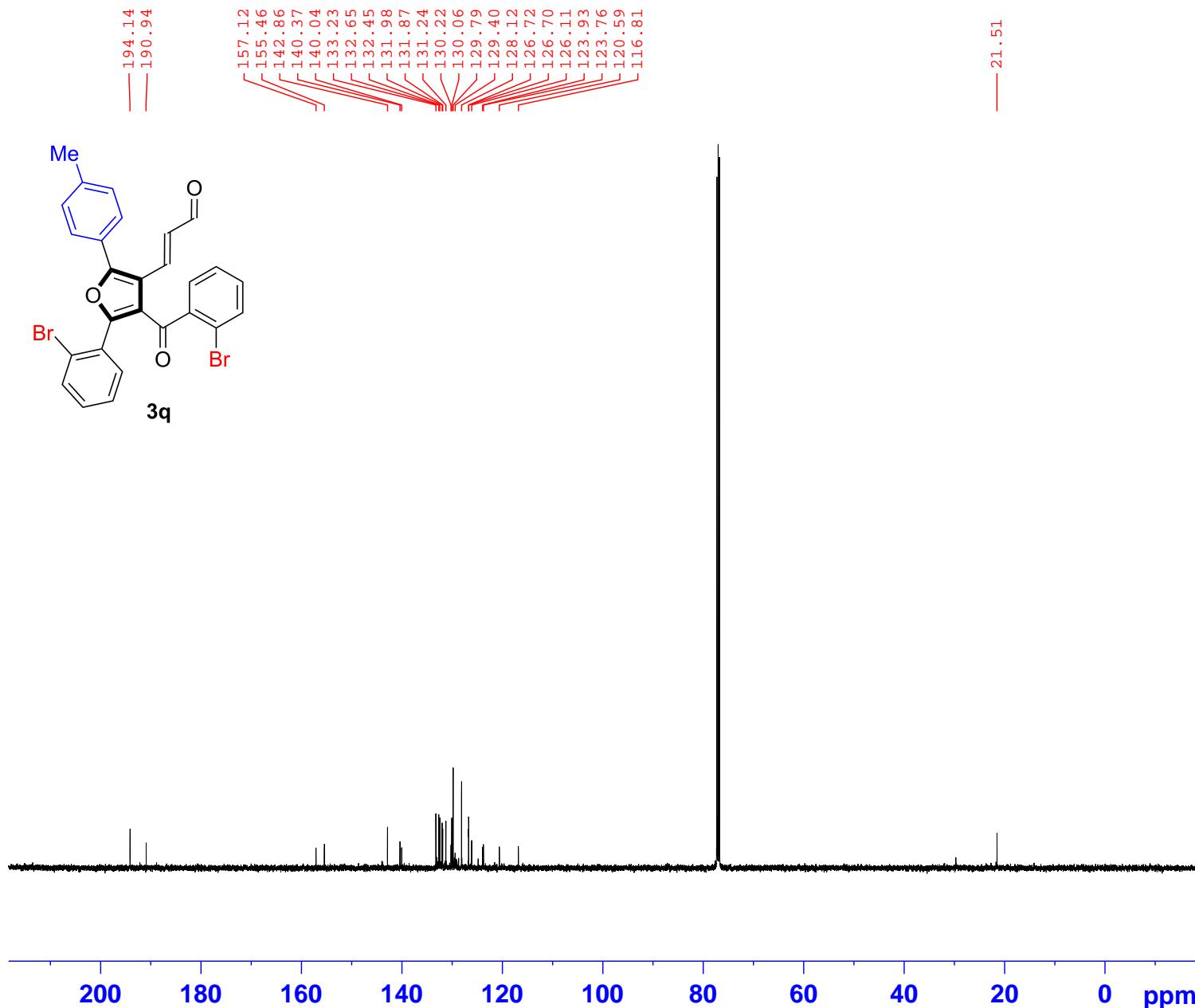
F2 - Acquisition Parameters
Date_ 20180306
Time 12.59
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 161
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300117 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-326-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 3



Current Data Parameters
NAME 3q- BSL-05-326-A(500MHz)
EXPNO 2
PROCNO 1

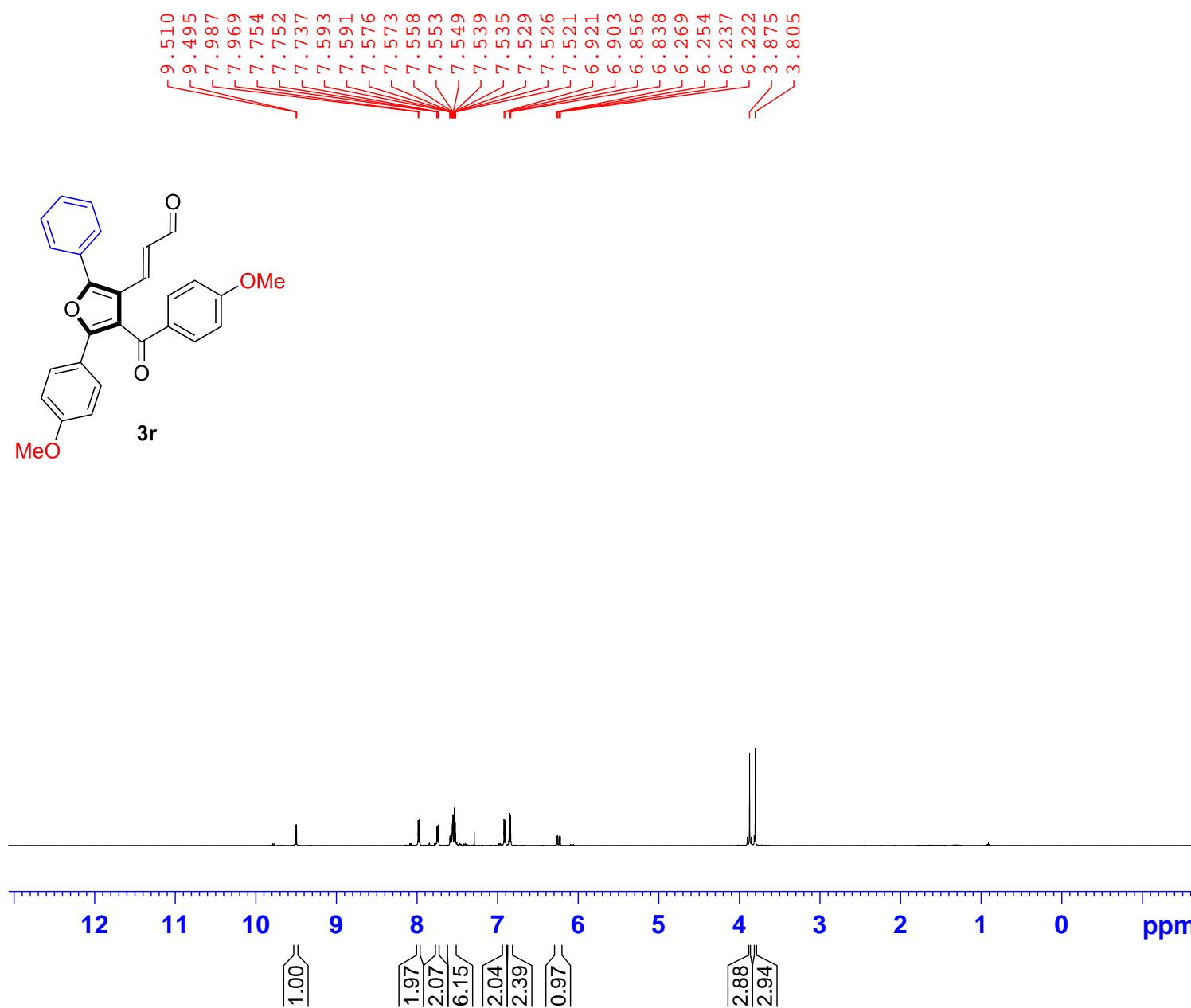
F2 - Acquisition Parameters
Date_ 20180306
Time 20.49
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zpgg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577890 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-57(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 15



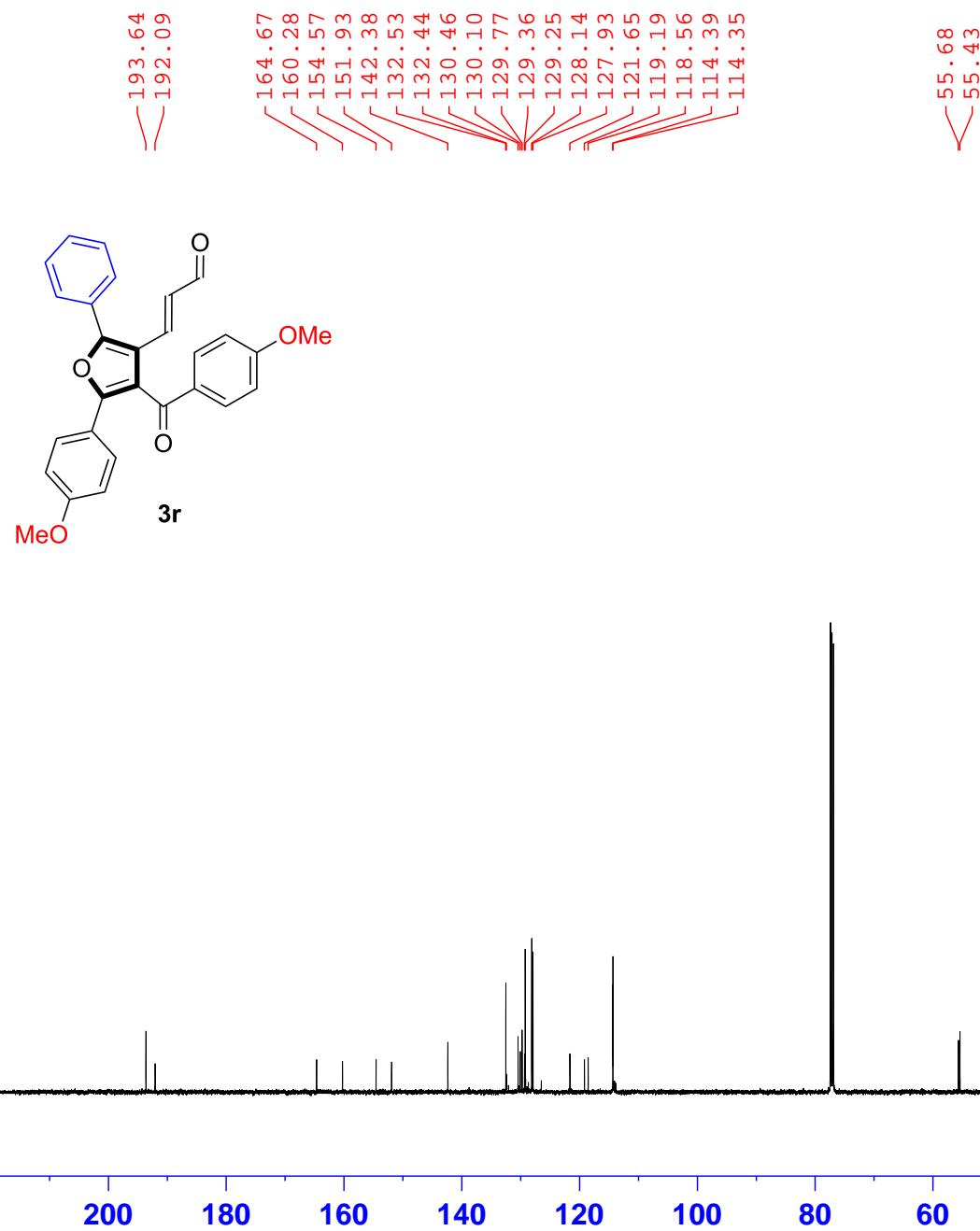
Current Data Parameters
NAME 3r - BSL-05-57(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161020
Time 16.59
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1299983 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-57(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 15



Current Data Parameters
NAME 3r - BSL-05-57(500MHz)
EXPNO 2
PROCNO 1

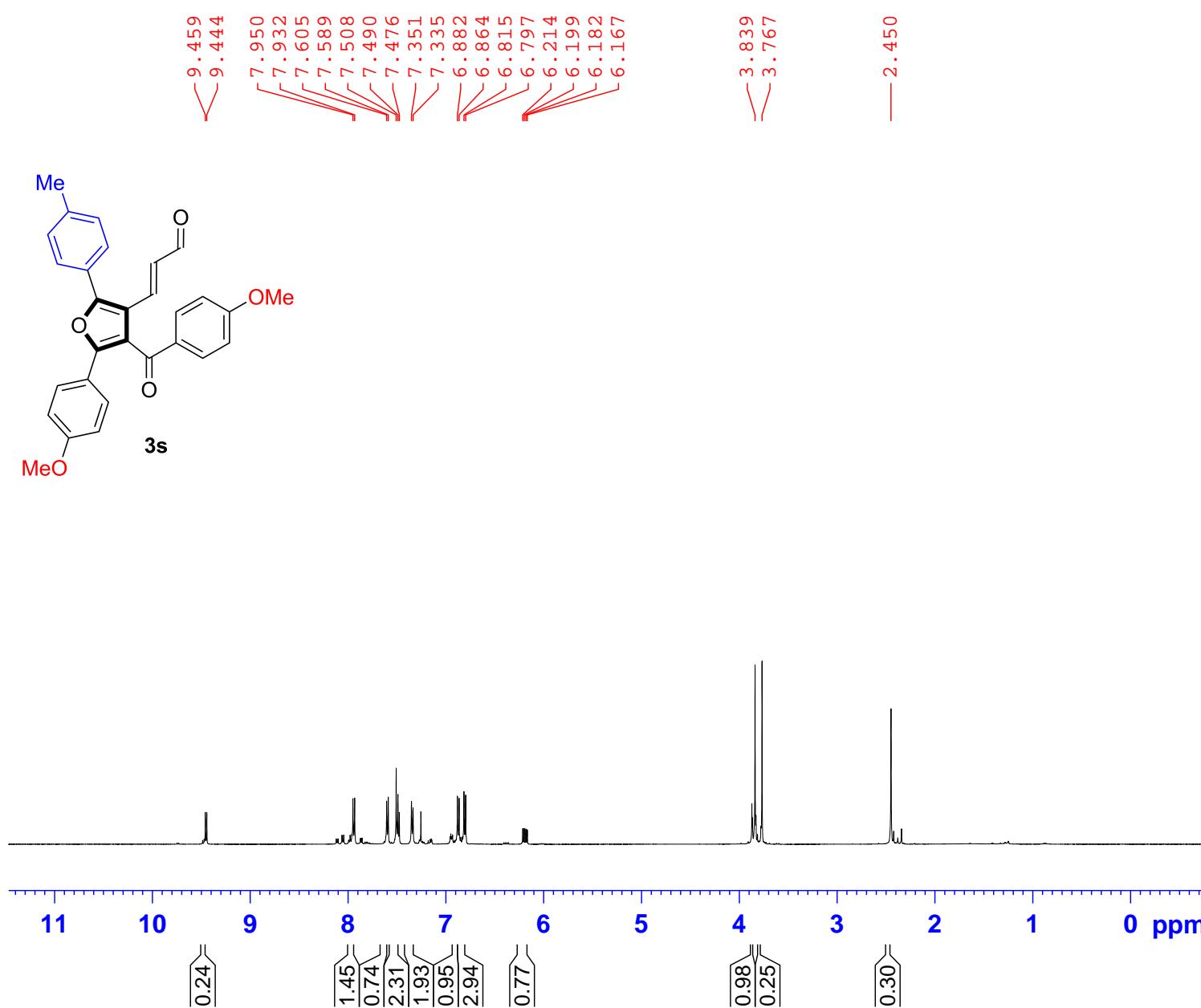
F2 - Acquisition Parameters
Date_ 20161021
Time 11.25
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.2 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPKG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577726 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-58 (500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 2



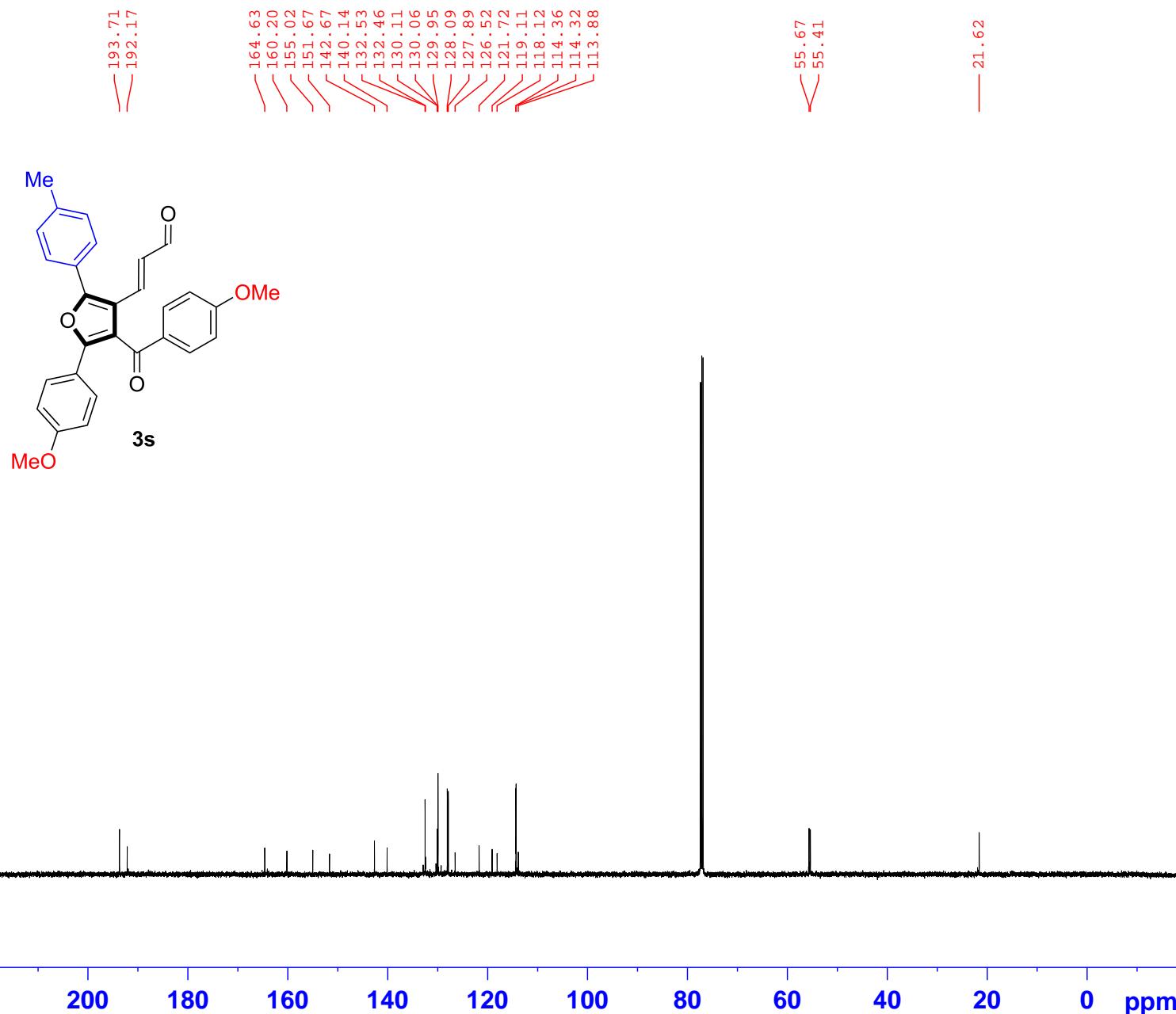
Current Data Parameters
NAME 3s - BSL-05-58(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161022
Time 12.02
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 161
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300159 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-58 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 9



Current Data Parameters
NAME 3s - BSL-05-58(500MHz)
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161024
Time 15.01
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 ======
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577734 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-50(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 12

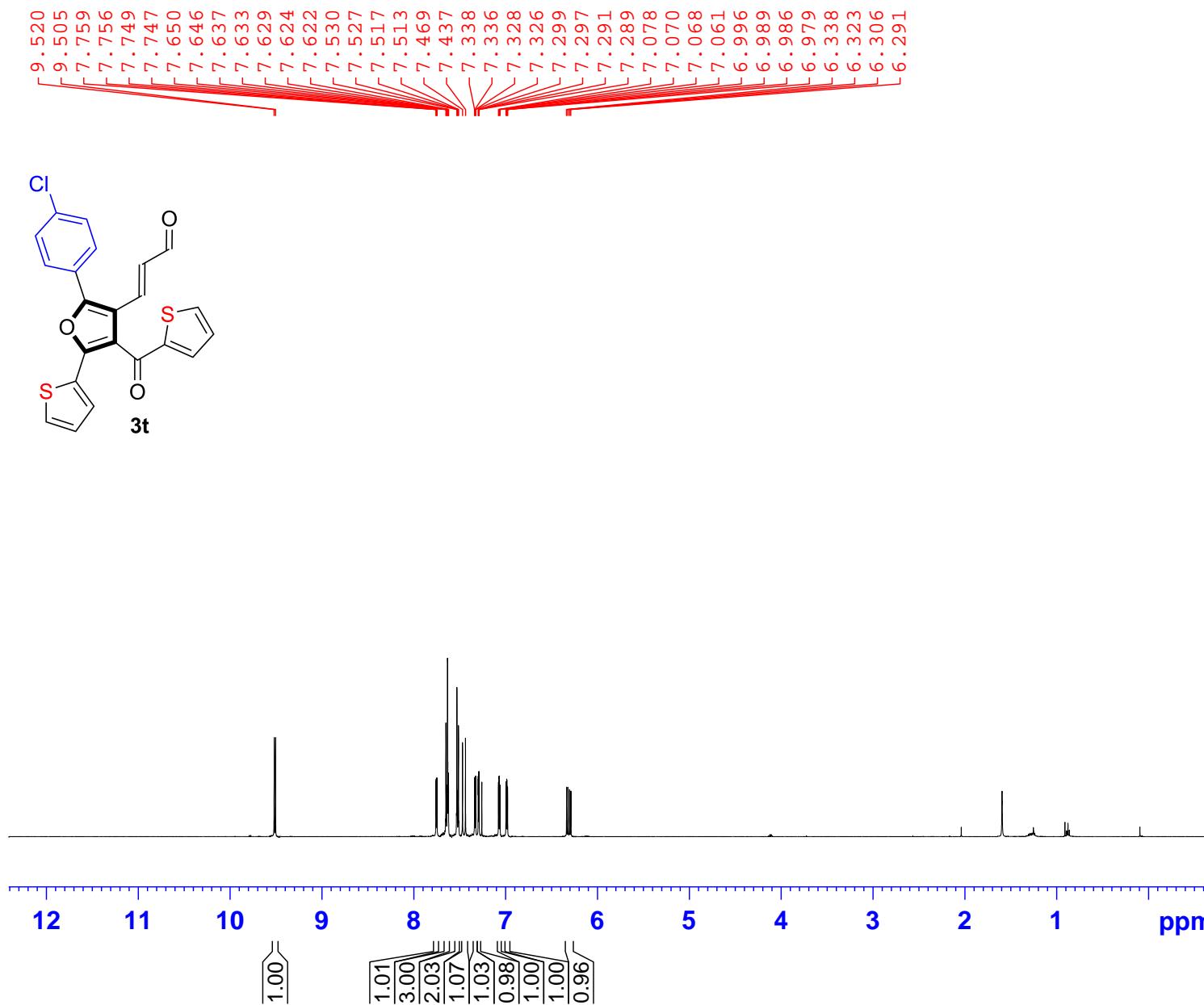


Current Data Parameters
NAME SK-BSL-05-50(500MHz)
EXPNO 1
PROCNO 1

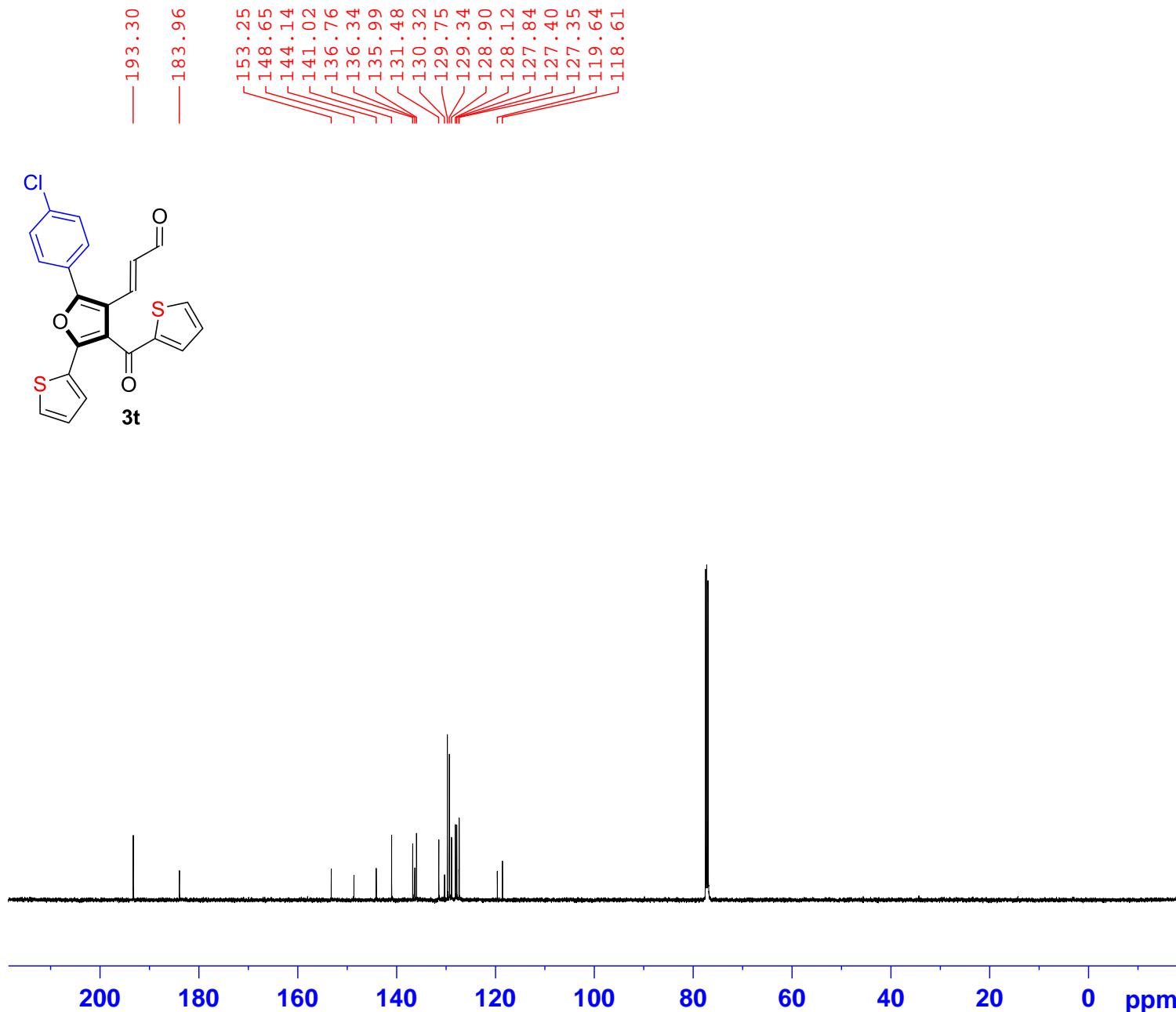
F2 - Acquisition Parameters
Date_ 20161013
Time 11.49
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 297.9 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300139 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-50(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 12



Current Data Parameters
NAME 3t - BSL-05-50(500MHz)
EXPNO 2
PROCNO 1

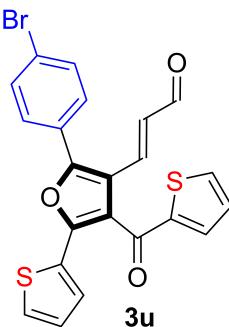
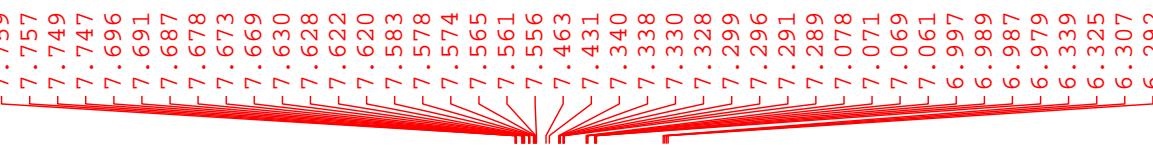
F2 - Acquisition Parameters
Date_ 20161014
Time 0.29
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577609 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-51-1(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 1

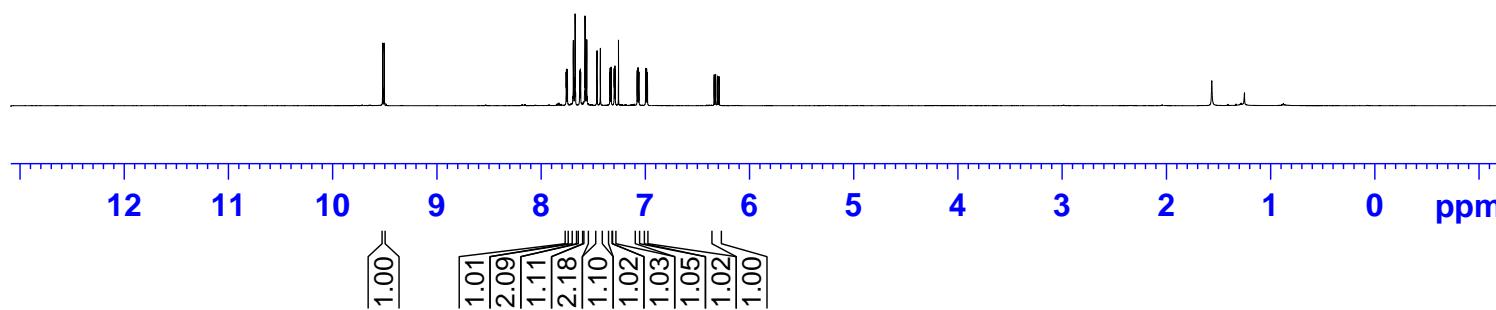


Current Data Parameters
NAME 3u- BSL-05-51-1(500MHz)
EXPNO 1
PROCNO 1

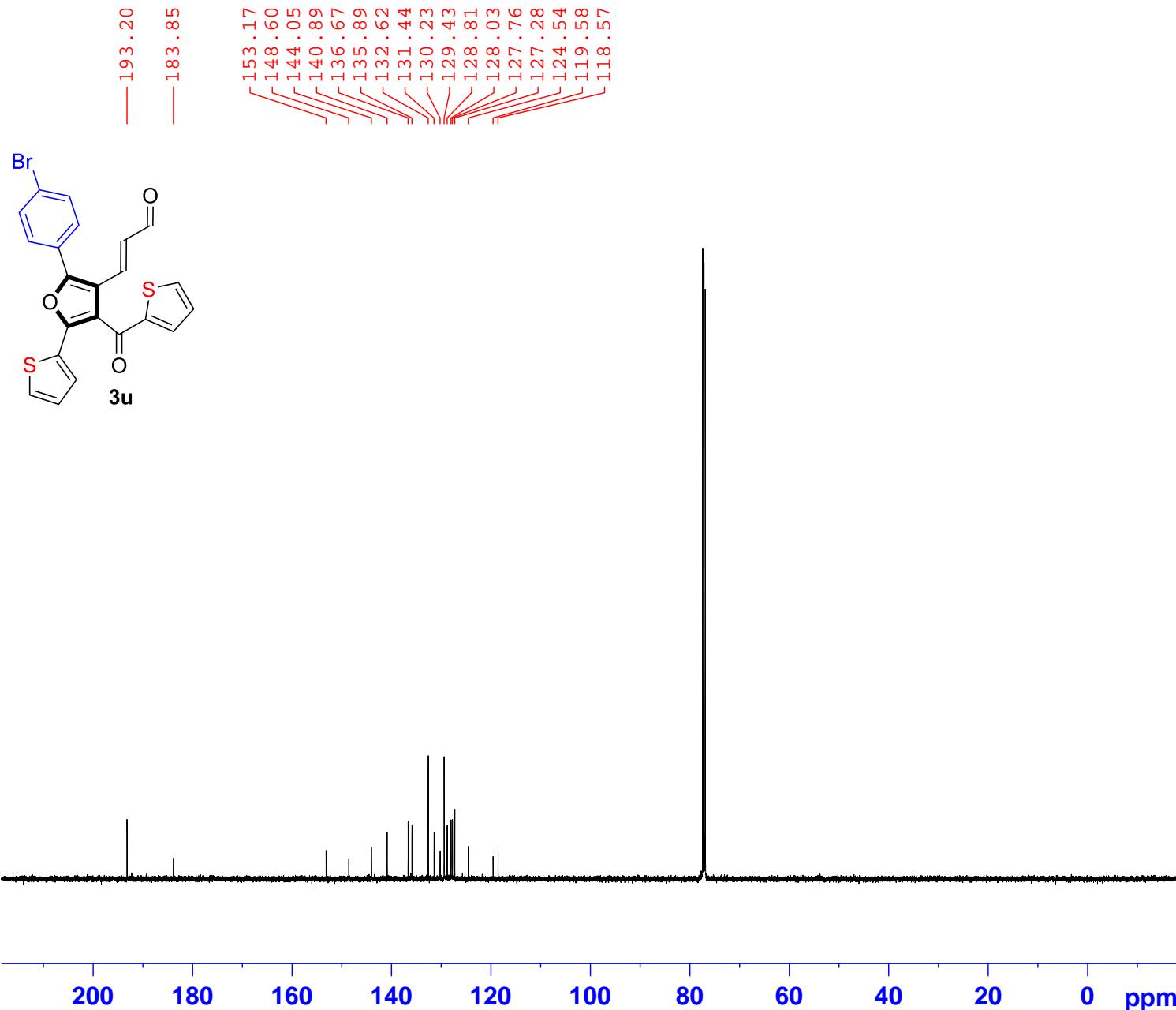
F2 - Acquisition Parameters
Date_ 20161015
Time 10.54
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 181
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300148 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-51-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 1



Current Data Parameters
NAME 3u- BSL-05-51-1(500MHz)
EXPNO 2
PROCNO 1

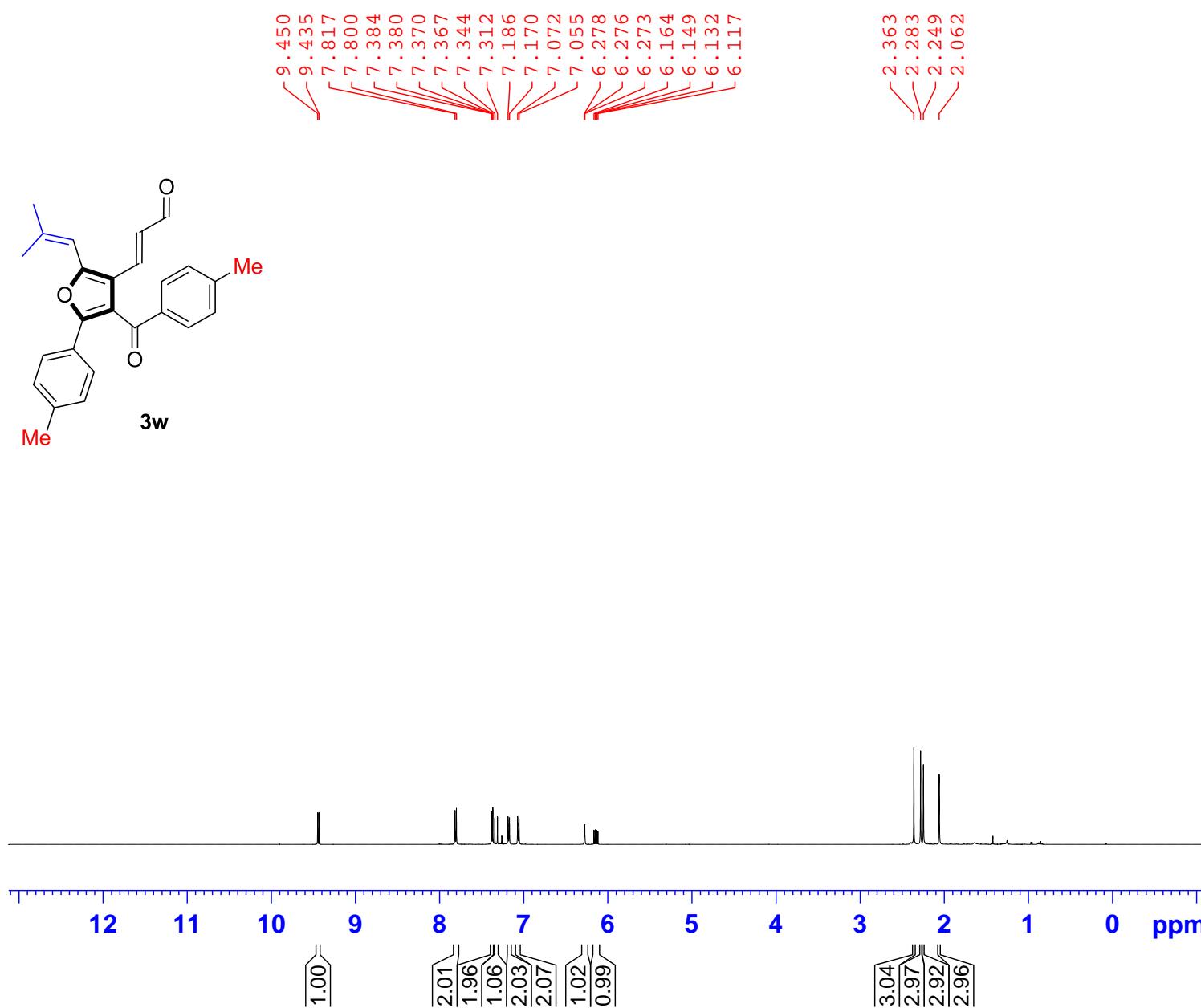
F2 - Acquisition Parameters
Date_ 20161015
Time 16.57
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577717 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-89(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 1



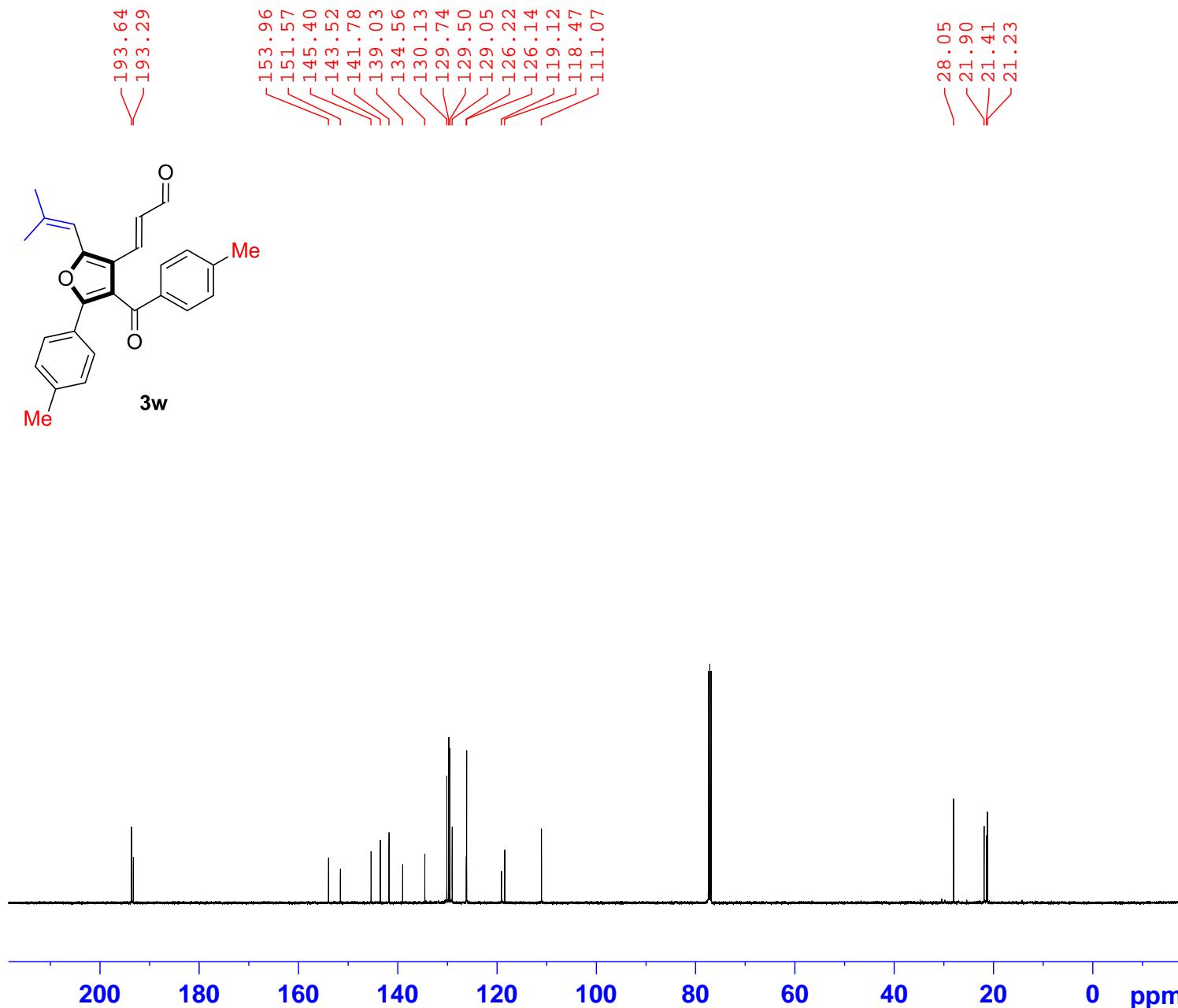
Current Data Parameters
NAME 3w- BSL-05-89(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20161125
Time 14.41
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 71.8
DW 50.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300132 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-89 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 1



Current Data Parameters
NAME 3w- BSL-05-89(500MHz)
EXPNO 2
PROCNO 1

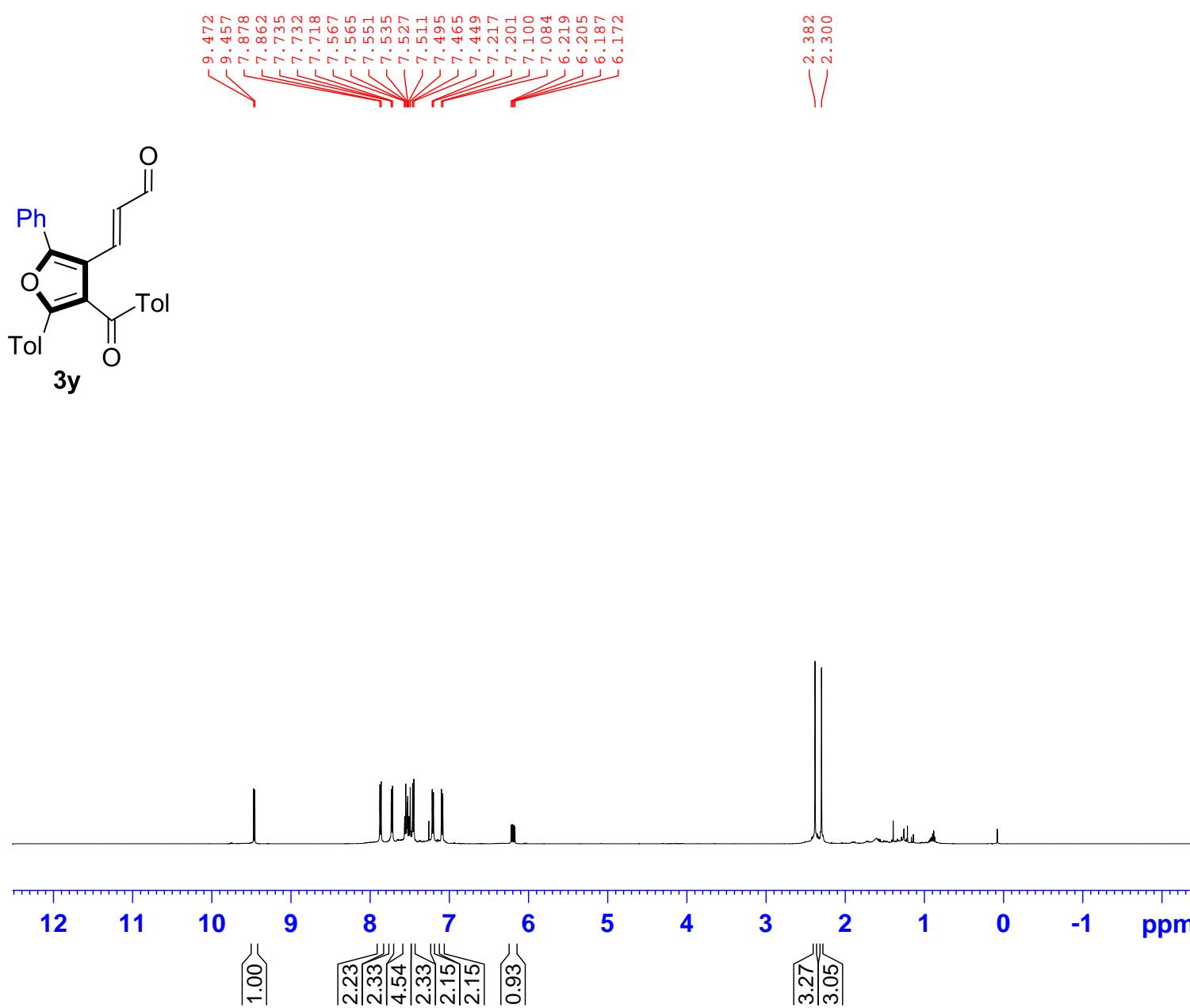
F2 - Acquisition Parameters
Date_ 20161125
Time 16.54
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPFG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577758 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-449-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 8



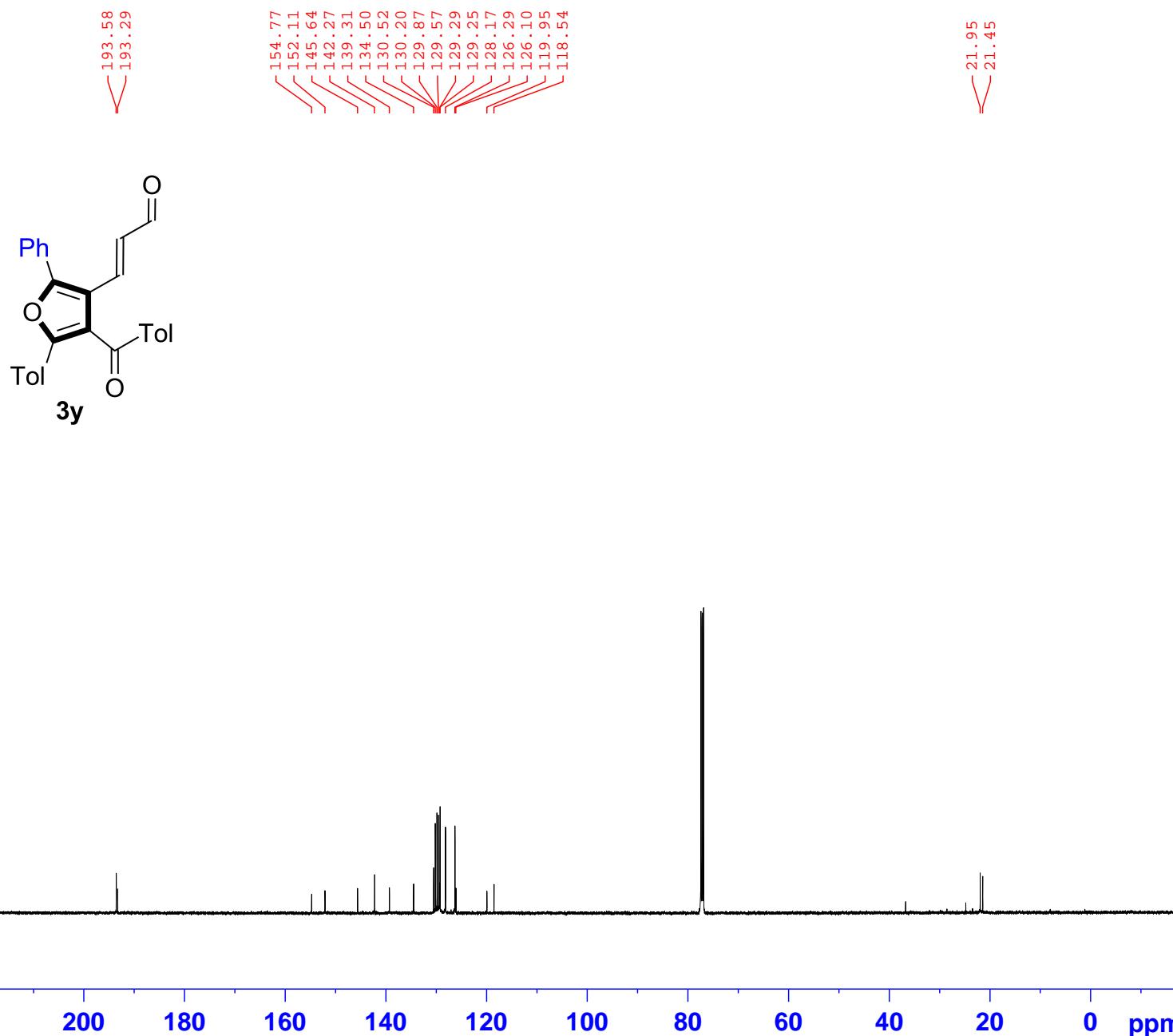
Current Data Parameters
NAME SK-BSL-05-449-A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20181023
Time 10.24
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 32
DS 2
SWH 21008.404 Hz
FIDRES 0.320563 Hz
AQ 1.5597568 sec
RG 101
DW 23.800 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1294999 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300131 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-449-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 8



Current Data Parameters
NAME SK-BSL-05-449-A(500MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20181023
Time 21.49
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

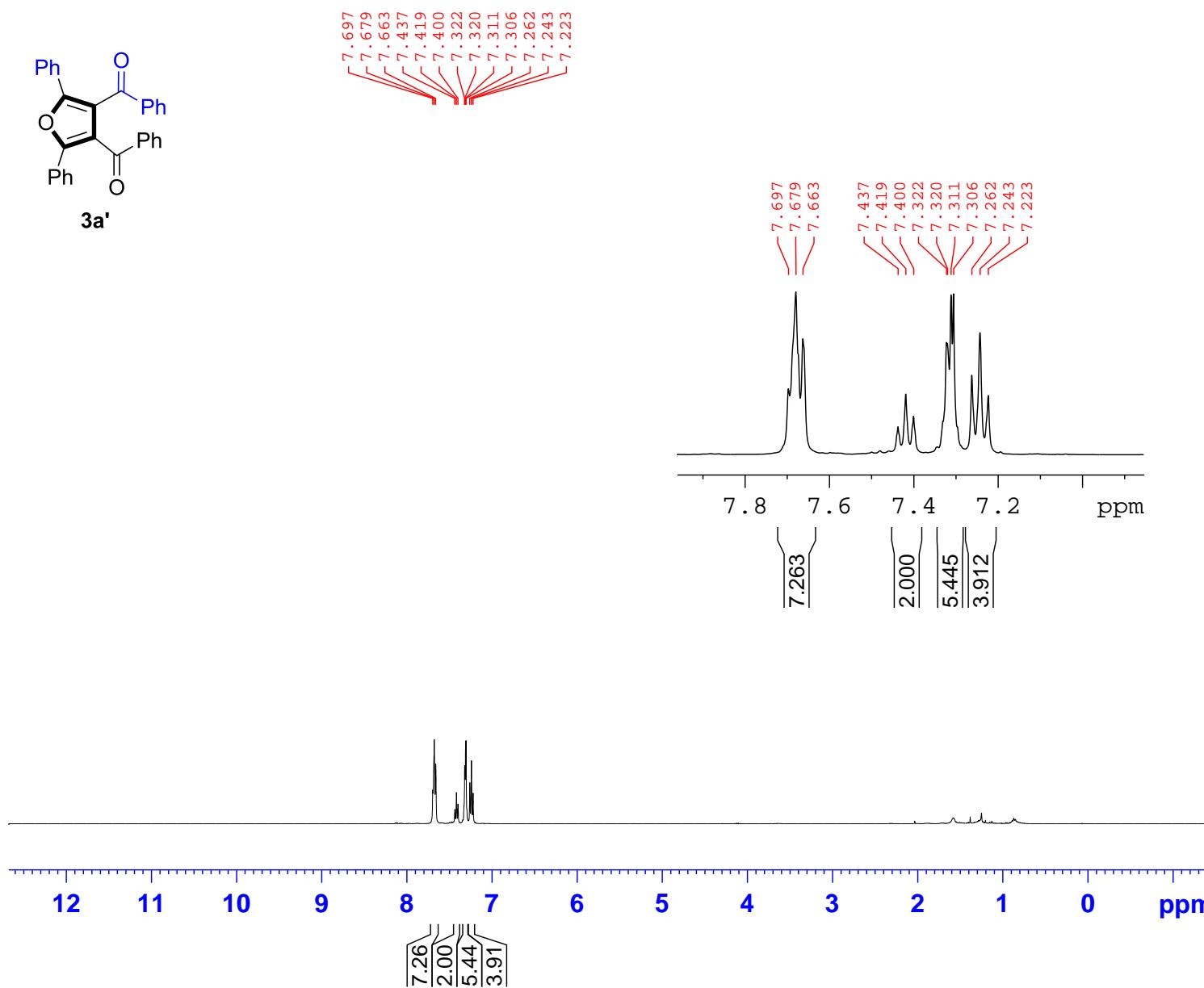
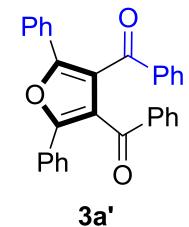
===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577734 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-359

PROTONRO CDC13 /opt/topspin/nmrsu/SK/JUN18 nmrsu 10



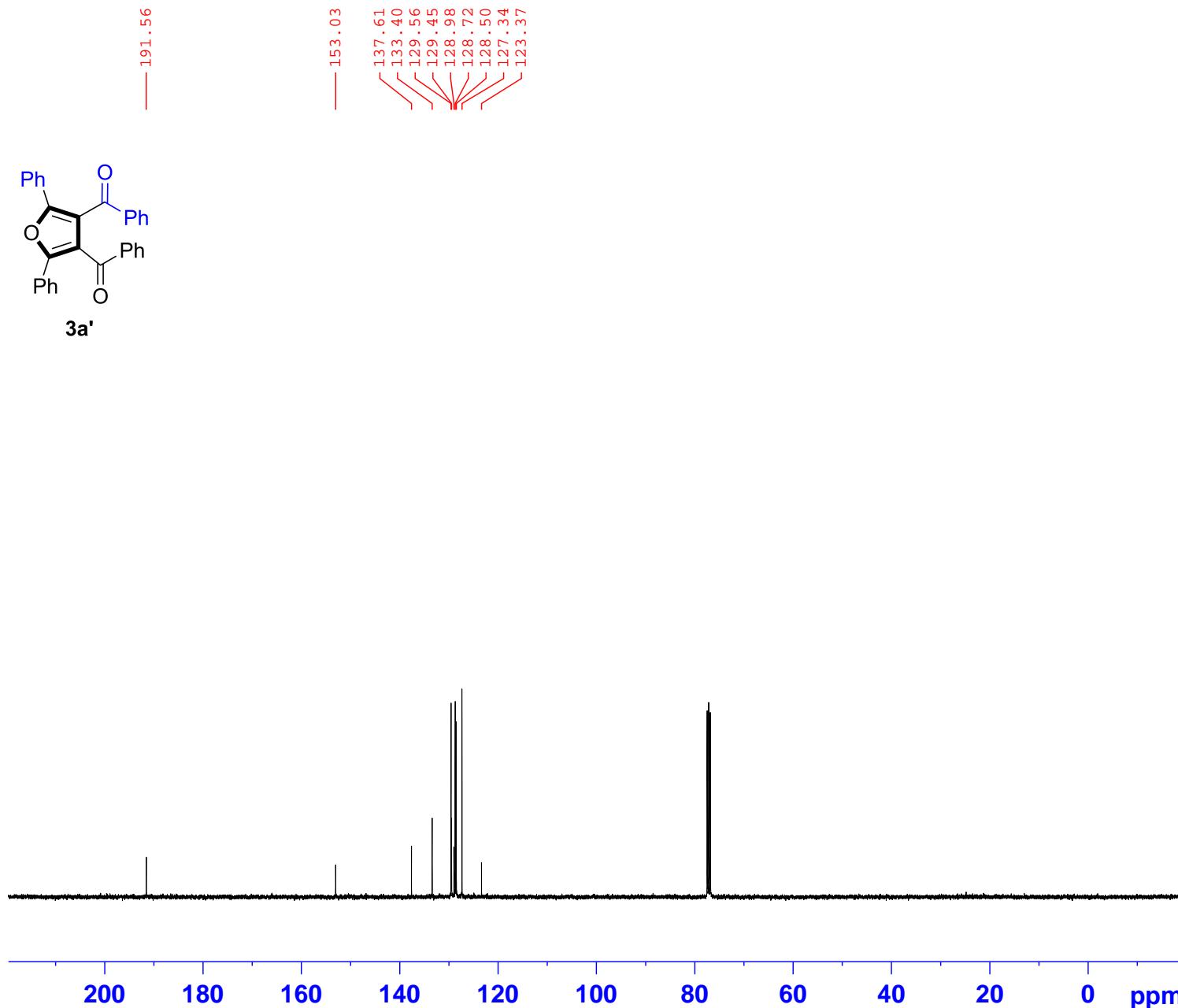
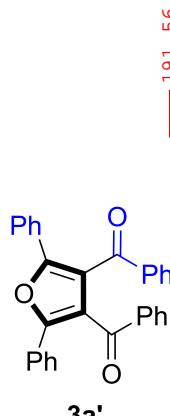
Current Data Parameters
NAME SK-BSL-05-359
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180609
Time 11.45 h
INSTRUM spect
PROBHD Z8247_0068 (PH
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8196.722 Hz
FIDRES 0.250144 Hz
AQ 3.9976959 sec
RG 64
DW 61.000 usec
DE 6.50 usec
TE 298.3 K
D1 1.00000000 sec
TD0 1
SFO1 400.1324008 MHz
NUC1 1H
P1 6.40 usec
PLW1 14.10000038 W

F2 - Processing parameters
SI 32768
SF 400.1300161 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-359

C13CPD CDCl₃ /opt/topspin/nmrsu/SK/JUN18 nmrsu 10

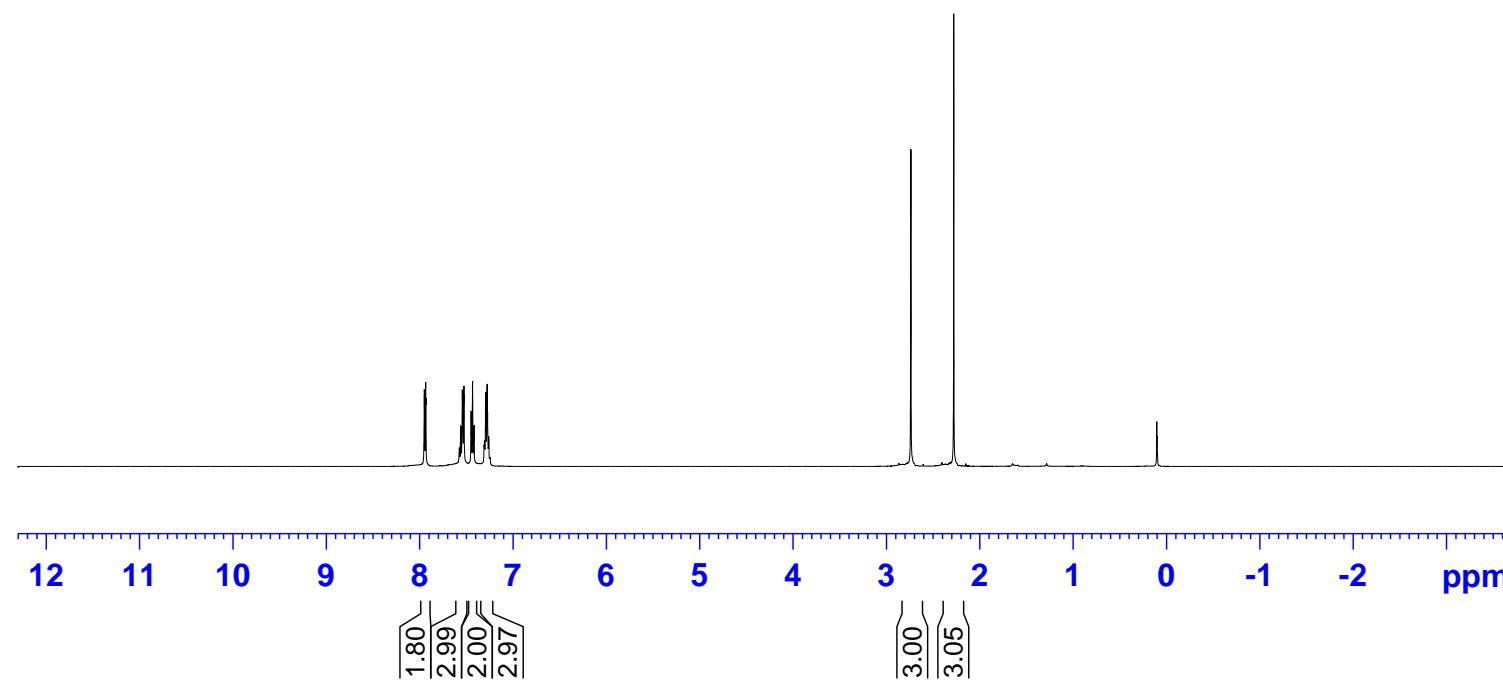
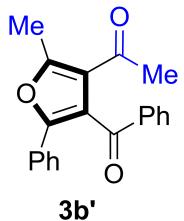
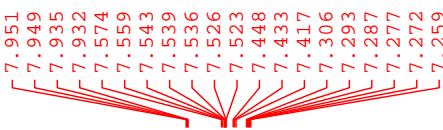


Current Data Parameters
NAME SK-BSL-05-359
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180609
Time 13.26 h
INSTRUM spect
PROBHD Z8247_0068 (PH
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 645
DS 4
SWH 24038.461 Hz
FIDRES 0.733596 Hz
AQ 1.3631488 sec
RG 203
DW 20.800 usec
DE 6.50 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
SFO1 100.6228298 MHz
NUC1 ¹³C
P1 13.60 usec
PLW1 86.40000153 W
SFO2 400.1316005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 14.10000038 W
PLW12 0.07130100 W
PLW13 0.03586400 W

F2 - Processing parameters
SI 32768
SF 100.6127568 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-474(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 14



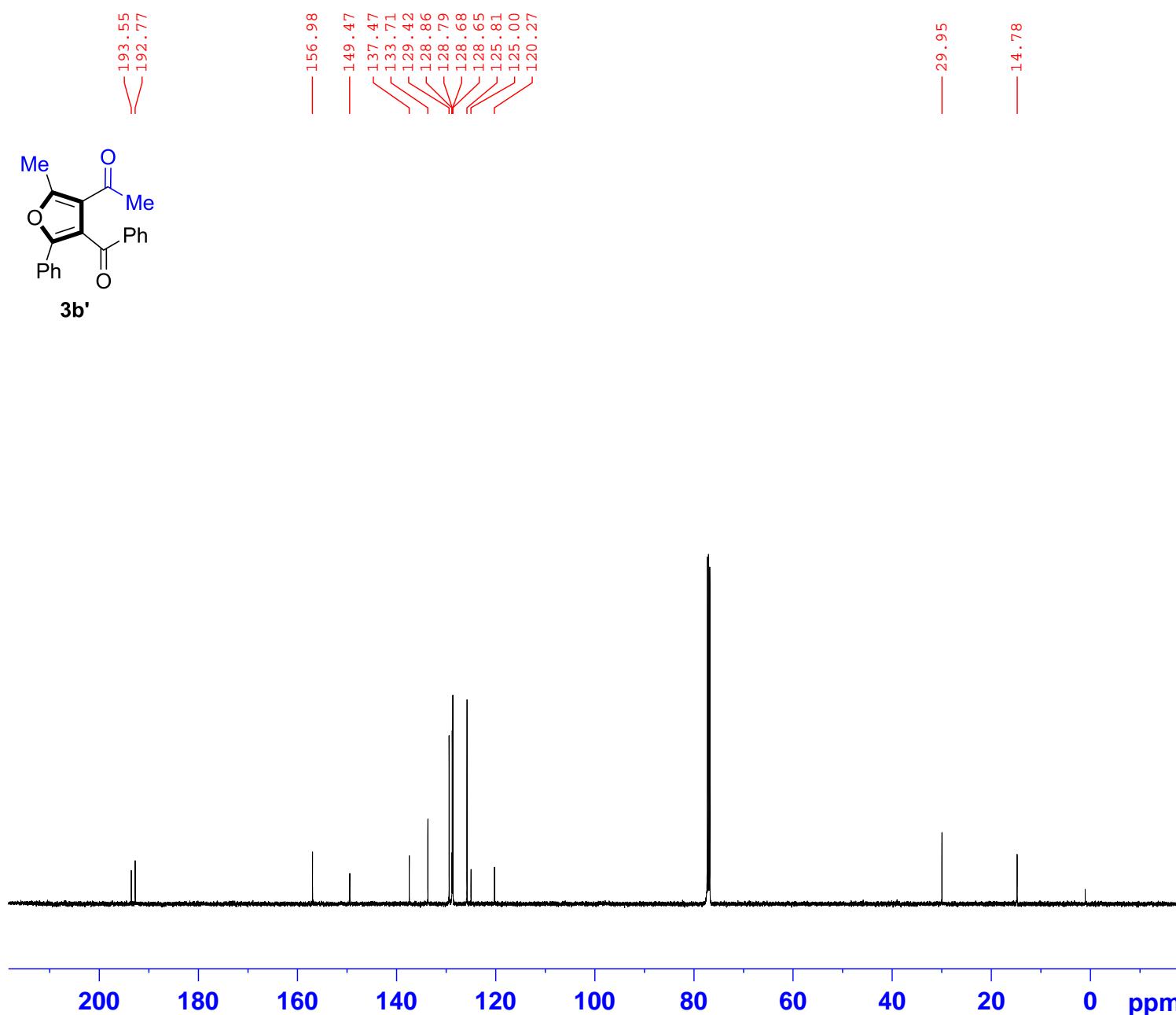
Current Data Parameters
NAME SK-BSL-05-474(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20181101
Time 13.09
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 32
DS 2
SWH 21008.404 Hz
FIDRES 0.320563 Hz
AQ 1.5597568 sec
RG 128
DW 23.800 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1294999 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-474(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 14



Current Data Parameters
NAME SK-BSL-05-474(500MHz)
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20181102
Time 14.01
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577880 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-445-1(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 14

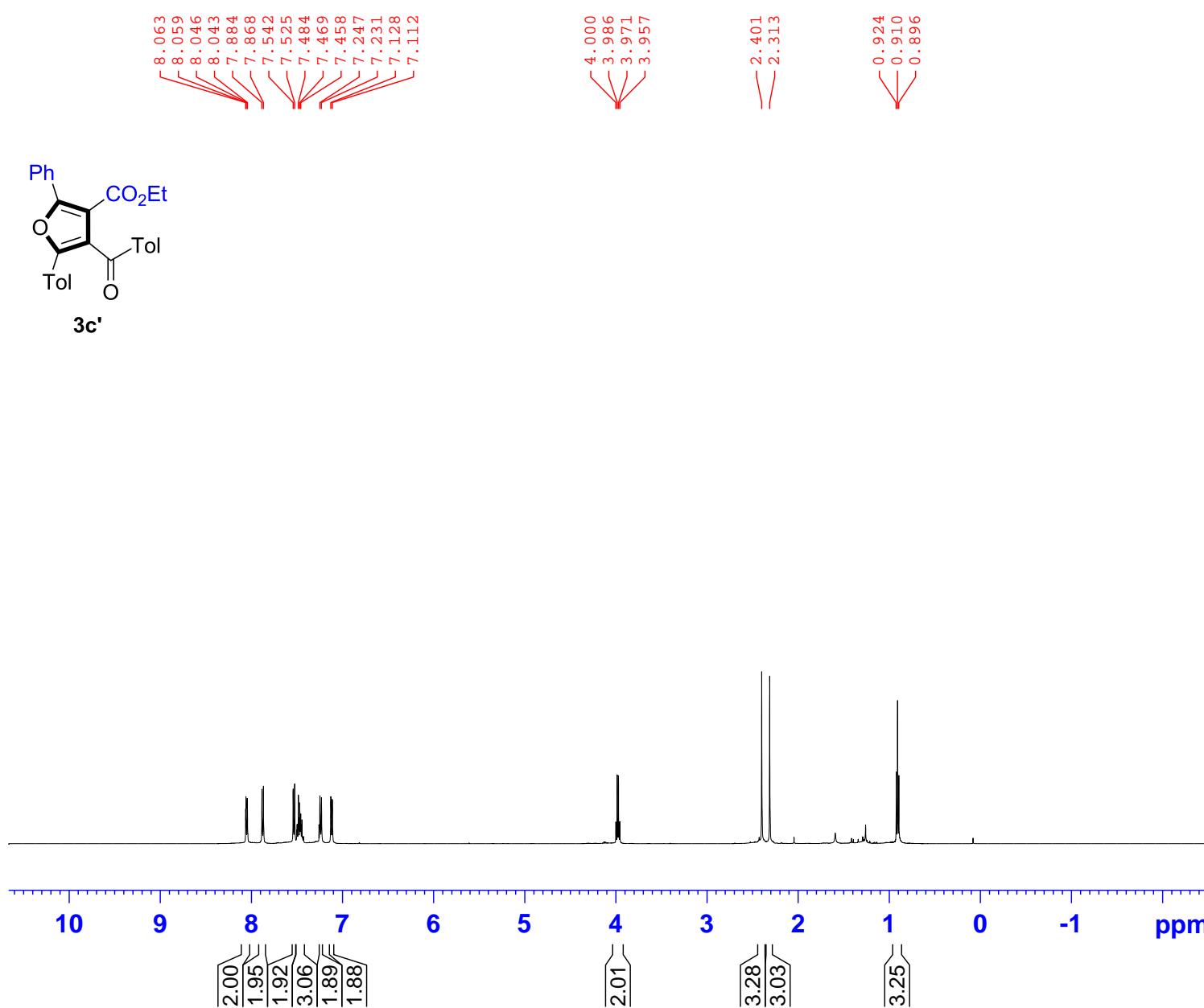


Current Data Parameters
NAME SK-BSL-05-445-1(500MHz)
EXPNO 1
PROCNO 1

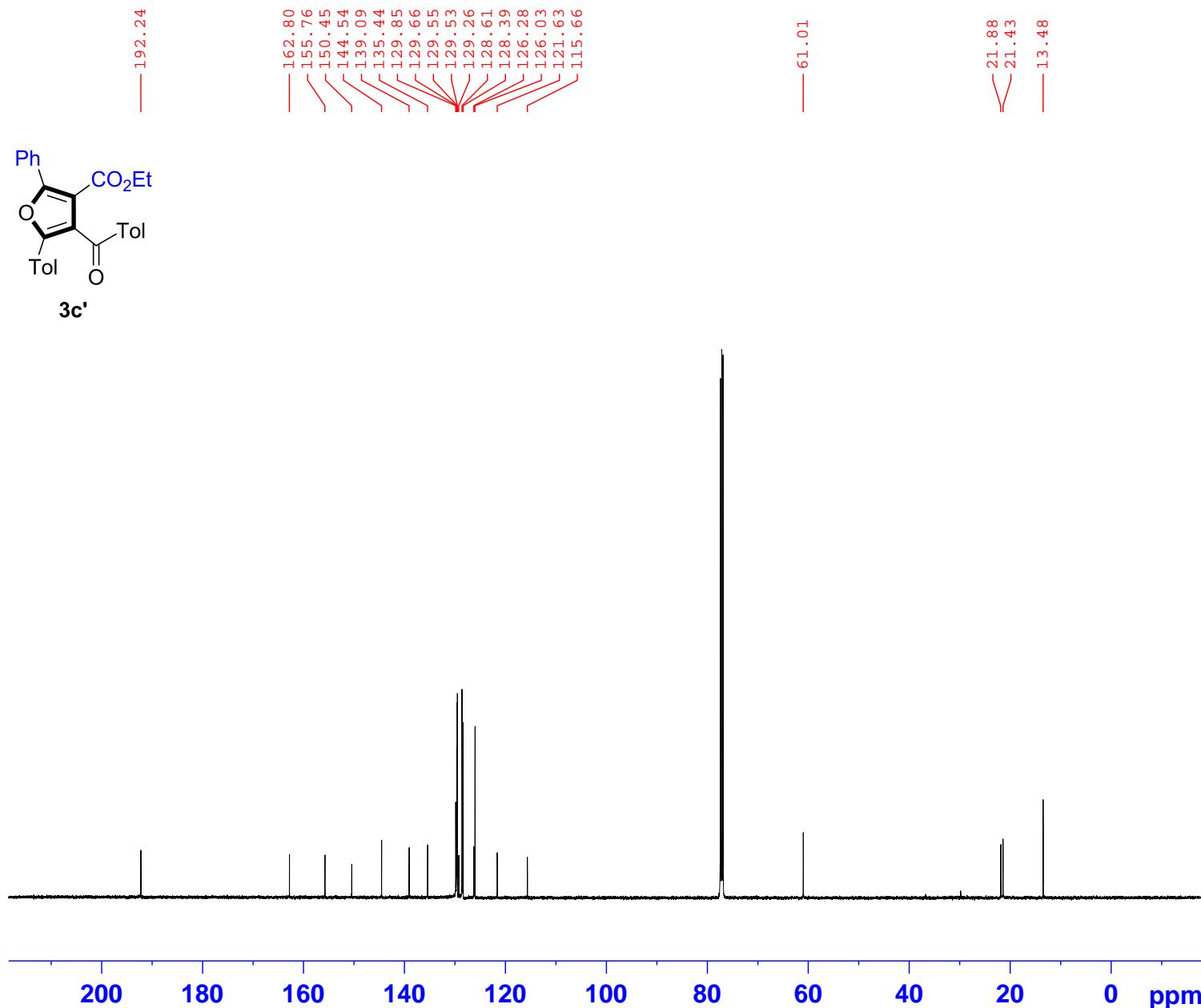
F2 - Acquisition Parameters
Date_ 20181022
Time 10.57
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 32
DS 2
SWH 21008.404 Hz
FIDRES 0.320563 Hz
AQ 1.5597568 sec
RG 101
DW 23.800 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1305001 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300143 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-445-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 14



Current Data Parameters
NAME SK-BSL-05-445-1(500MHz)
EXPNO 2
PROCNO 1

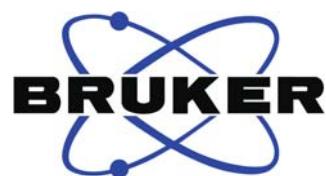
F2 - Acquisition Parameters
Date_ 20181022
Time 17.48
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 2000
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577752 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-356(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 12

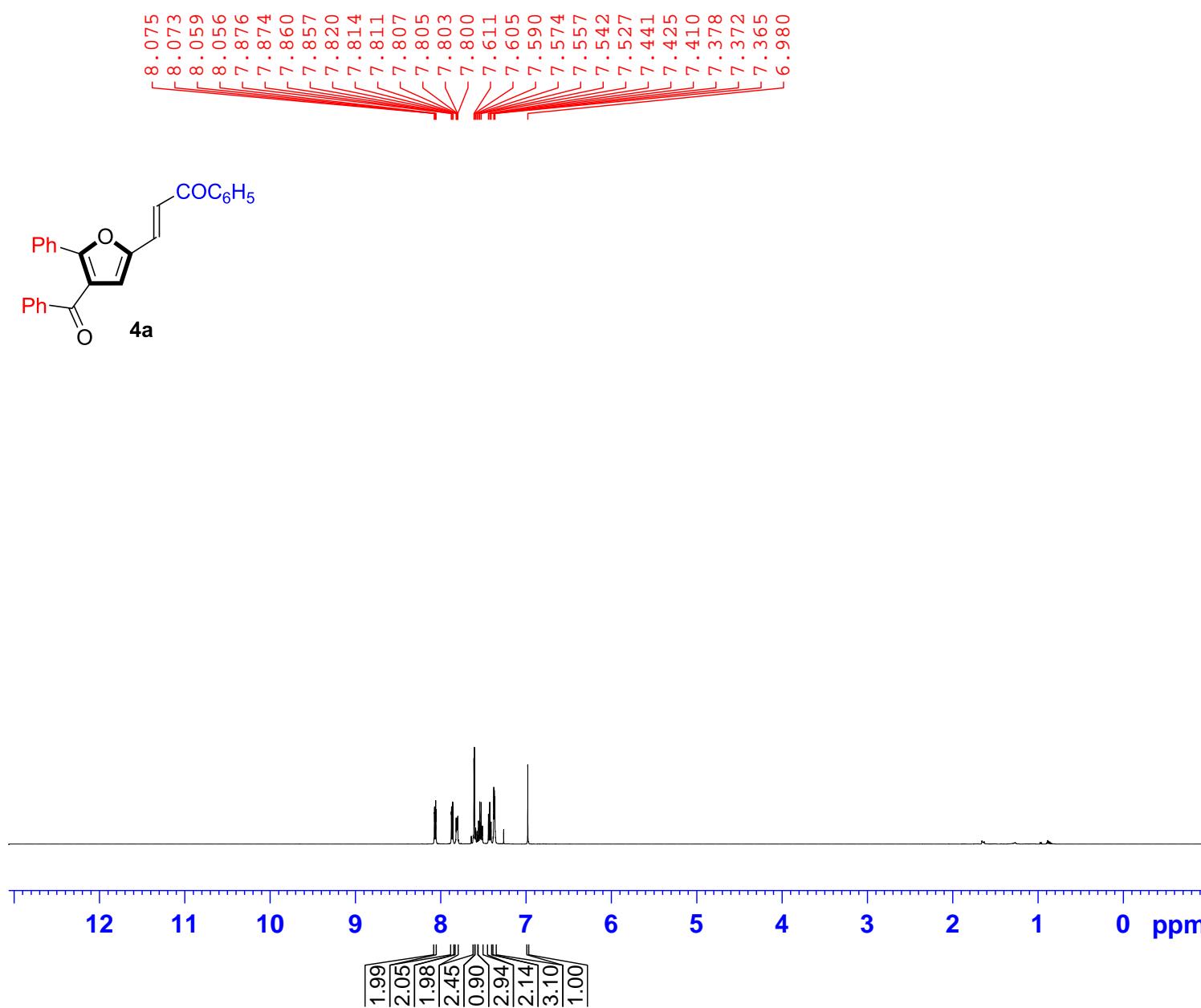


Current Data Parameters
NAME 4a- BSL-05-(500MHz)
EXPNO 1
PROCNO 1

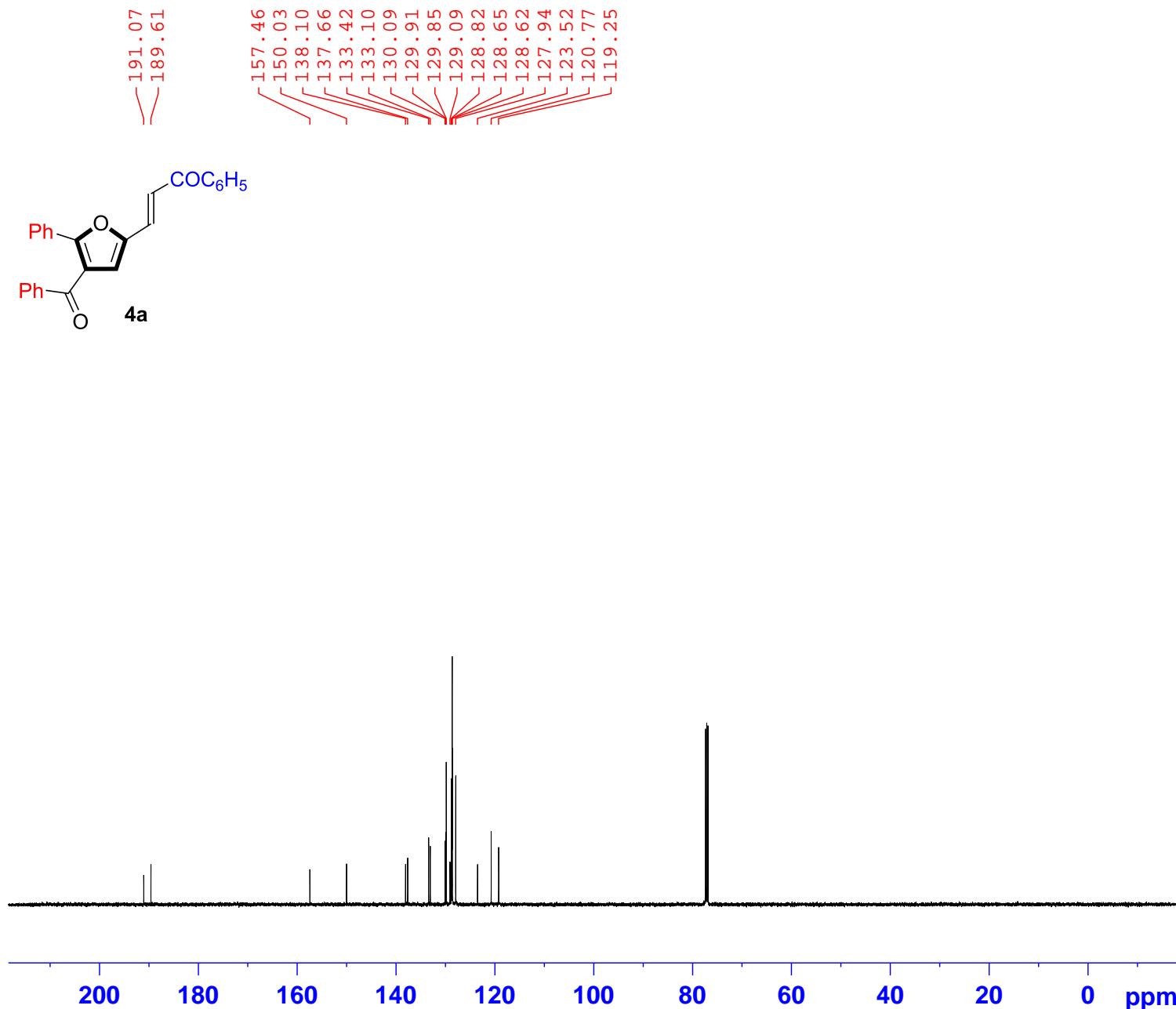
F2 - Acquisition Parameters
Date_ 20180516
Time 12.28
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 101
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300120 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-356(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 15



Current Data Parameters
NAME 4a- BSL-05-356(500MHz)
EXPNO 2
PROCNO 1

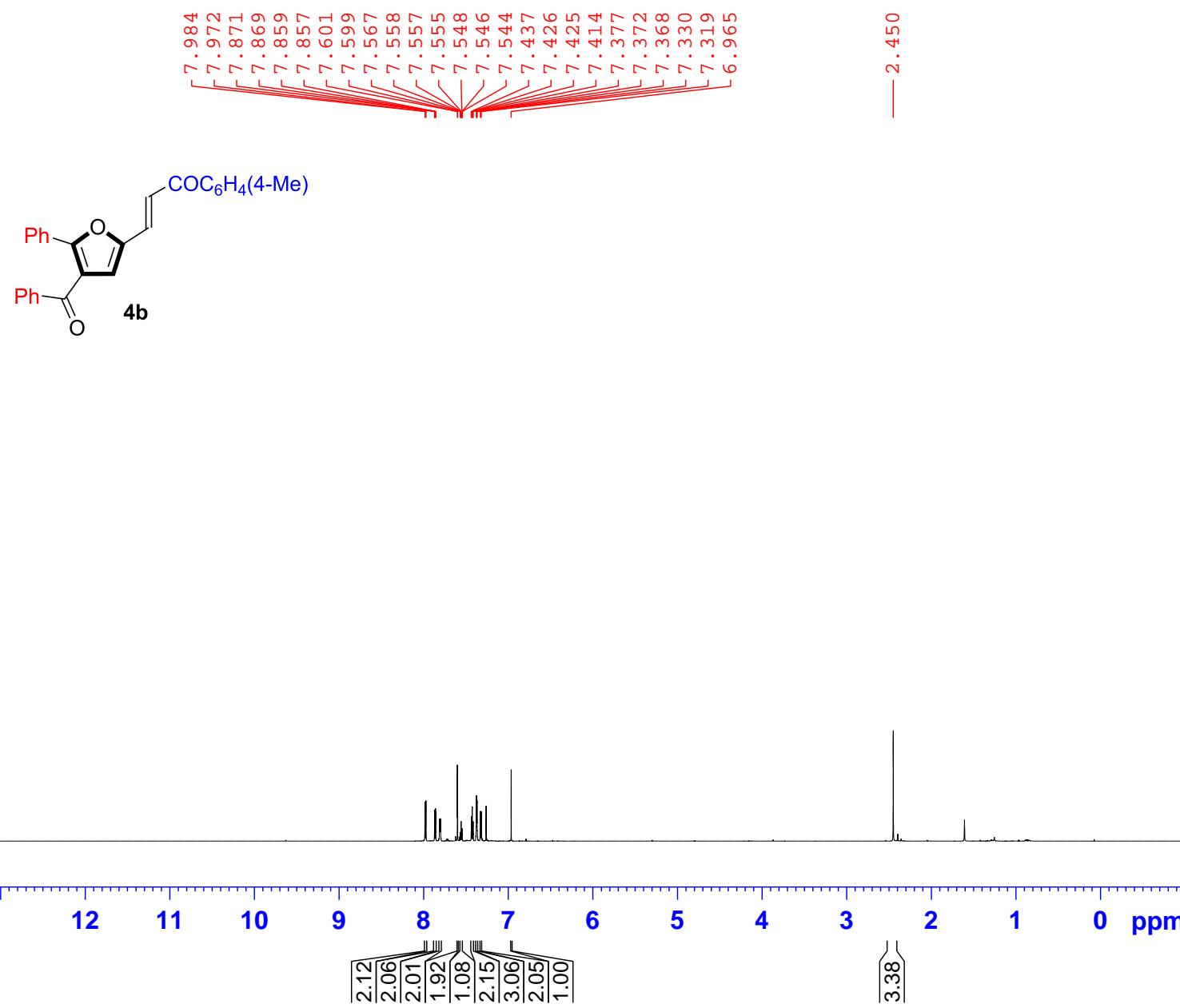
F2 - Acquisition Parameters
Date_ 20180516
Time 15.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 216
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577755 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-100 (700MHz)



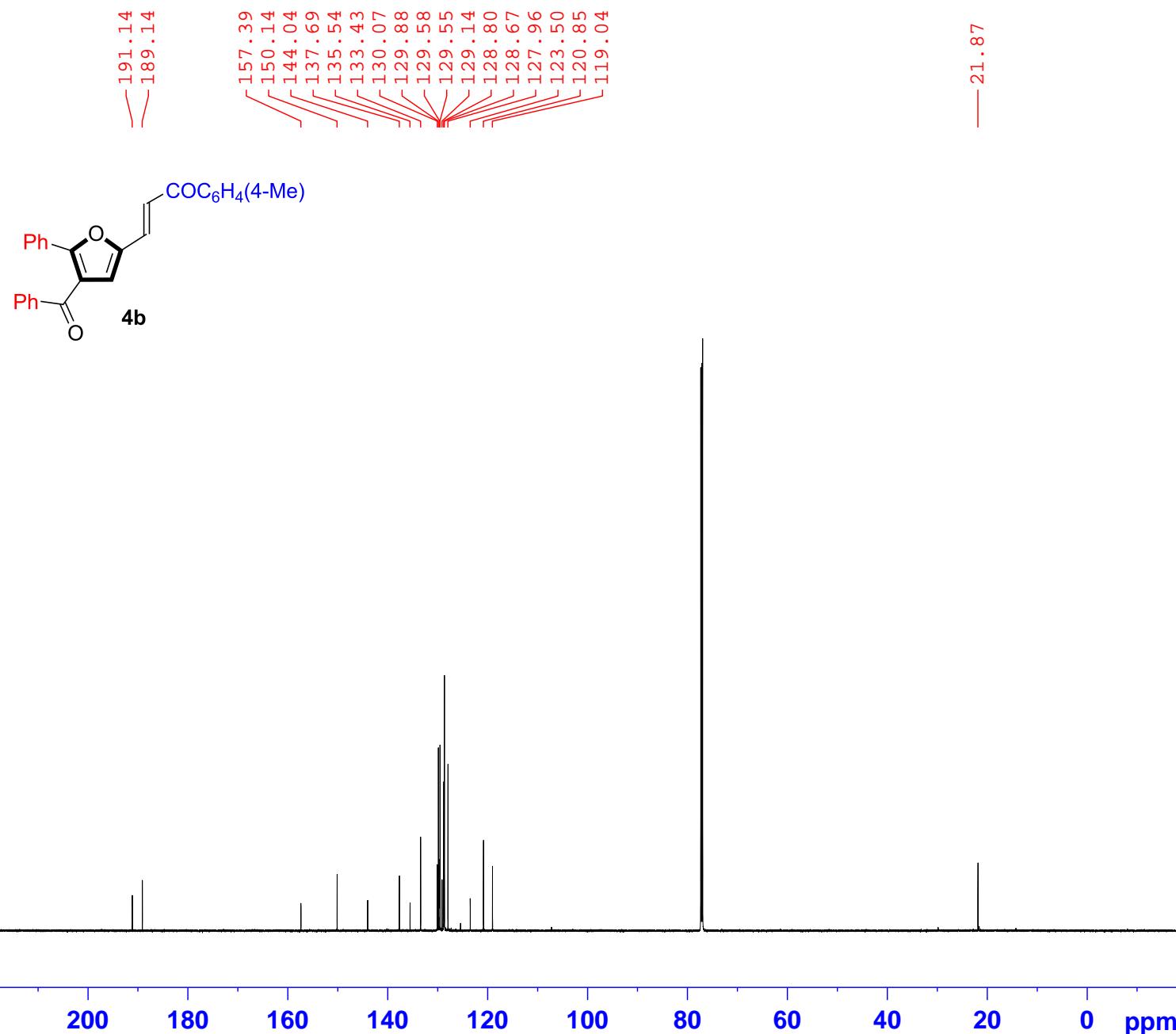
Current Data Parameters
NAME 4b - BSL-04-100(700MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151215
Time 12.31
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 14097.744 Hz
FIDRES 0.215115 Hz
AQ 2.3243434 sec
RG 5.05
DW 35.467 usec
DE 10.00 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 700.1943240 MHz
NUC1 1H
P1 9.45 usec
PLW1 7.41309977 W

F2 - Processing parameters
SI 65536
SF 700.1900164 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-100 (700MHz)



Current Data Parameters
NAME 4b - BSL-04-100 (700MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151215
Time 17.50
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zgppg30
TD 65536
SOLVENT CDCl3
NS 258
DS 4
SWH 41666.668 Hz
FIDRES 0.635783 Hz
AQ 0.7864320 sec
RG 178.51
DW 12.000 usec
DE 18.00 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 176.0805210 MHz
NUC1 13C
P1 11.20 usec
PLW1 128.82000732 W

===== CHANNEL f2 ======
SFO2 700.1928008 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 65.00 usec
PLW2 7.41309977 W
PLW12 0.15669000 W
PLW13 0.06620100 W

F2 - Processing parameters
SI 32768
SF 176.0628936 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-207(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 2

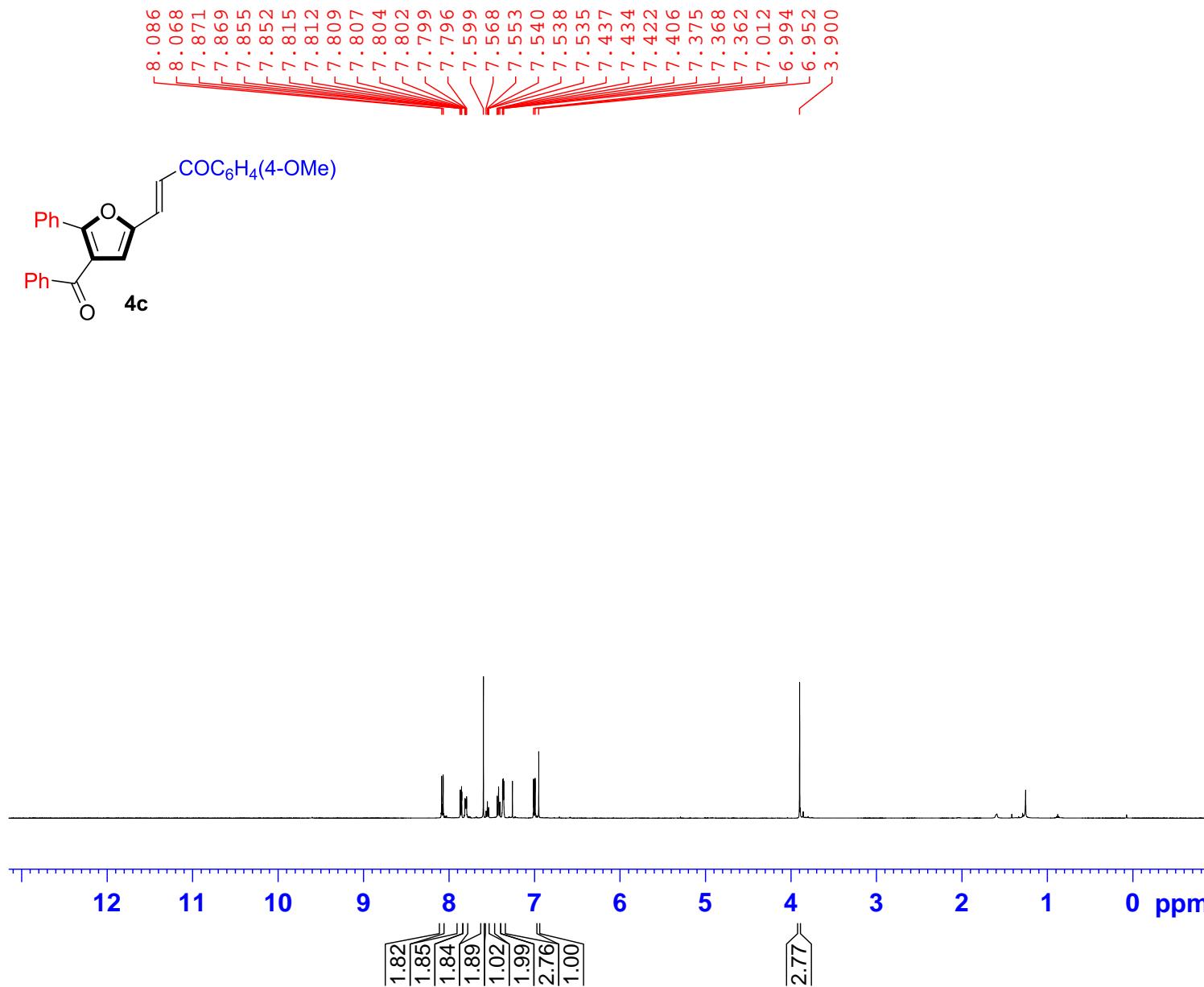


Current Data Parameters
NAME 4c - BSL-04-207(500MHz)
EXPNO 1
PROCNO 1

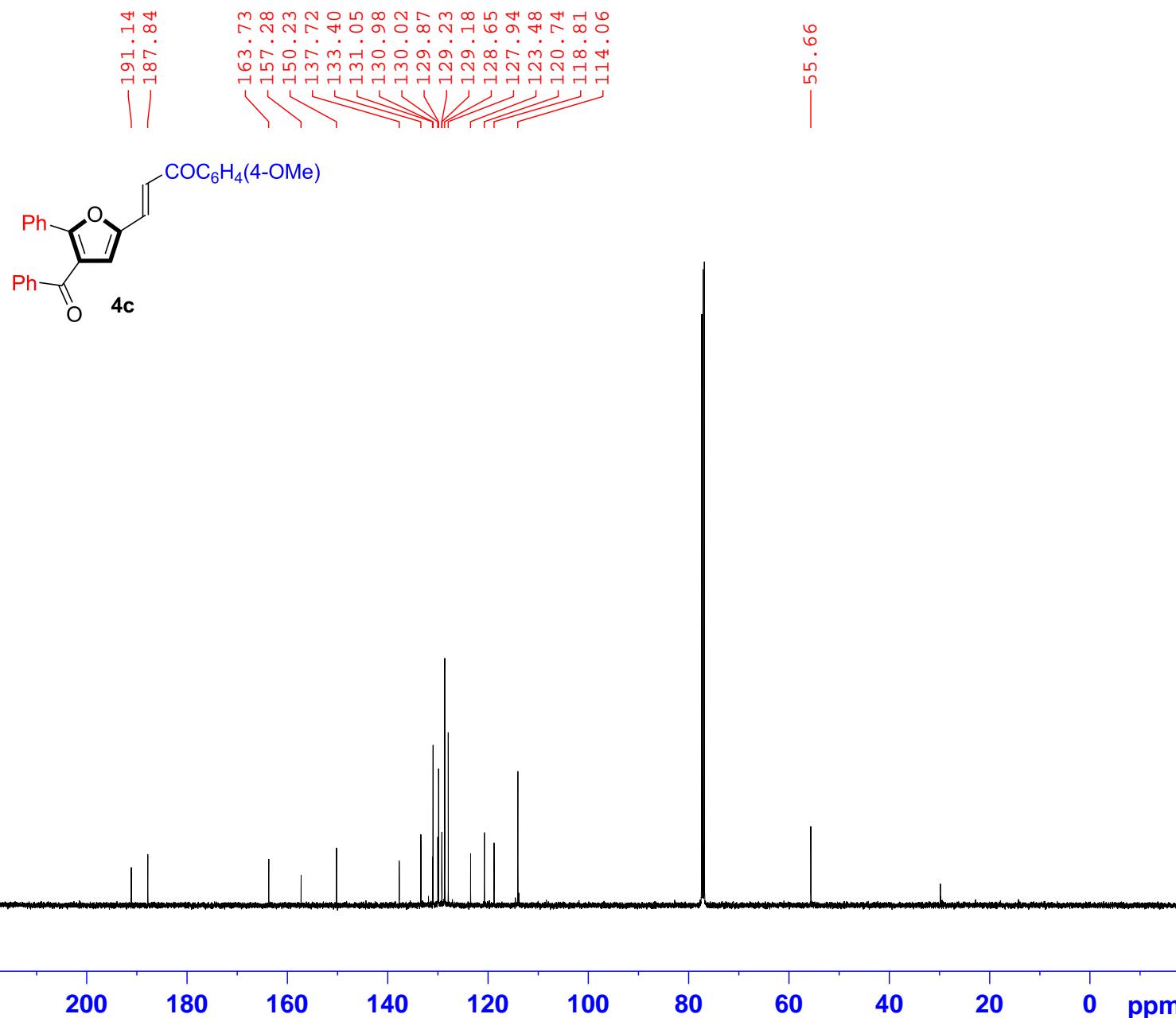
F2 - Acquisition Parameters
Date_ 20160226
Time 11.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 128
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300132 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-04-207(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 2



Current Data Parameters
NAME 4c- BSL-04-207(500MHz)
EXPNO 2
PROCNO 1

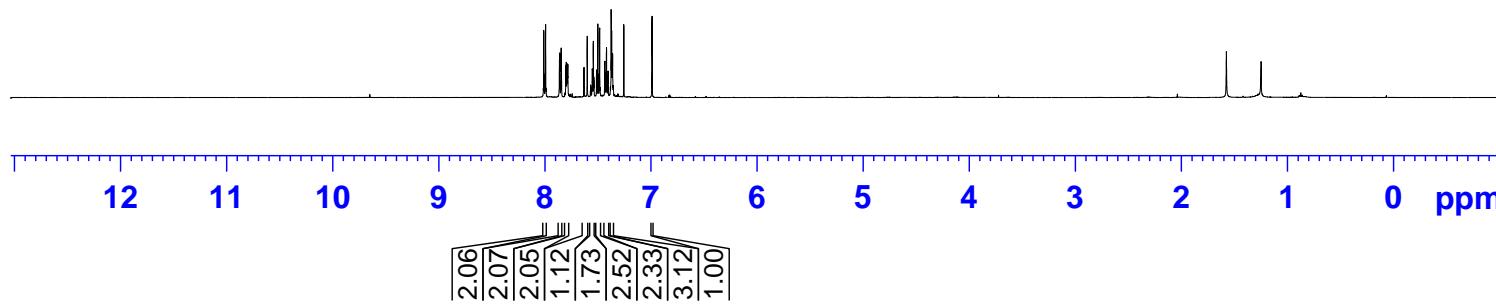
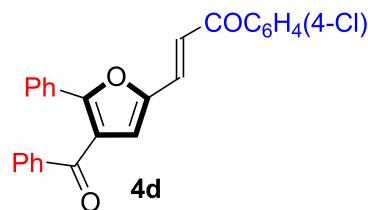
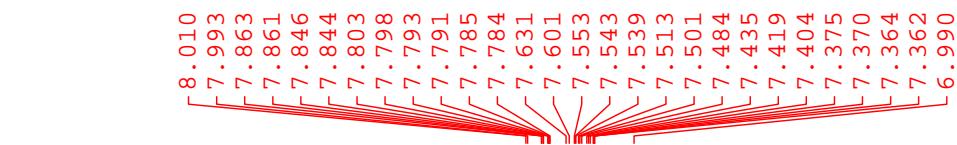
F2 - Acquisition Parameters
Date_ 20160226
Time 15.32
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 ======
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.1600000 W

F2 - Processing parameters
SI 32768
SF 125.7577732 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-107(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 2



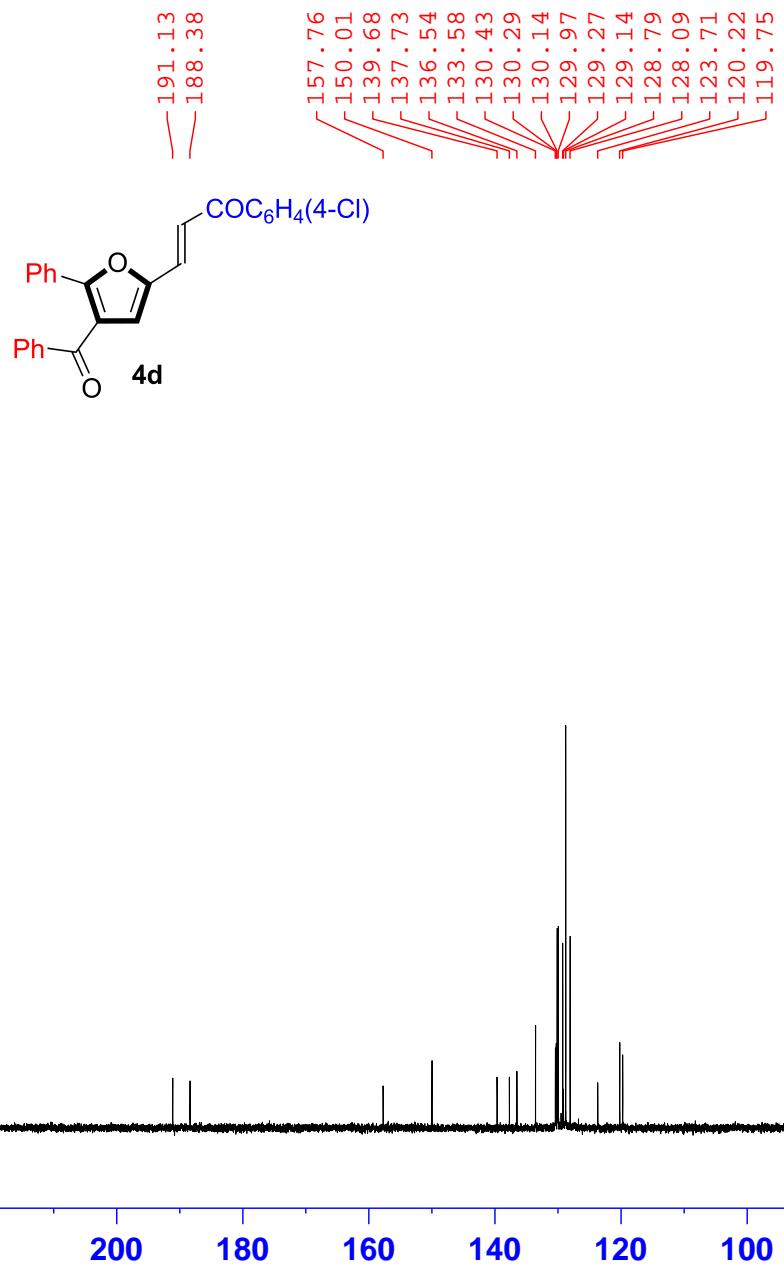
Current Data Parameters
NAME SK-BSL-04-107(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151218
Time 10.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 161
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300156 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-107(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 2



Current Data Parameters
NAME SK-BSL-04-107(500MHz)
EXPNO 2
PROCNO 1

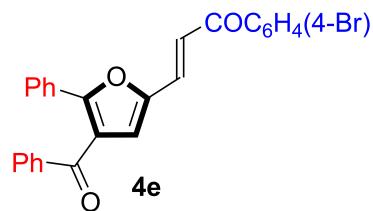
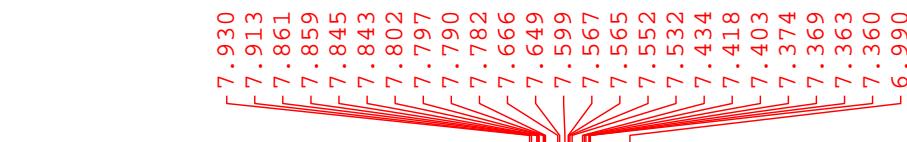
F2 - Acquisition Parameters
Date_ 20151218
Time 17.40
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPFG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577595 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-198(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 7

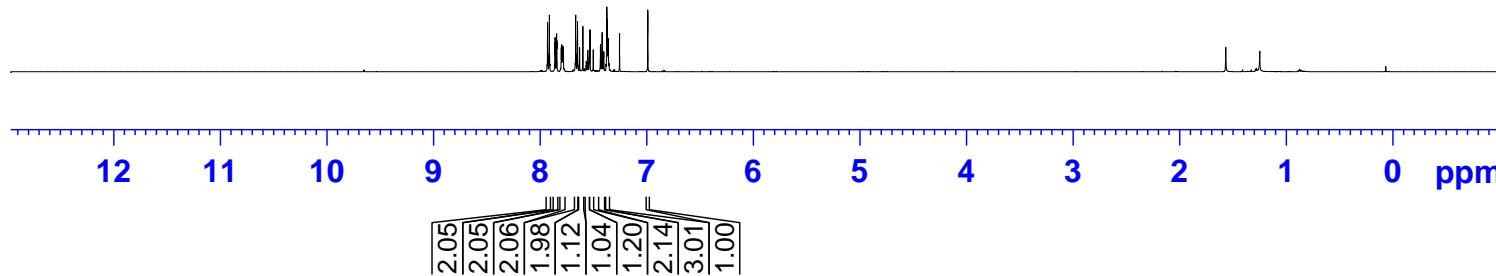


Current Data Parameters
NAME 4e- BSL-04-198(500MHz)
EXPNO 1
PROCNO 1

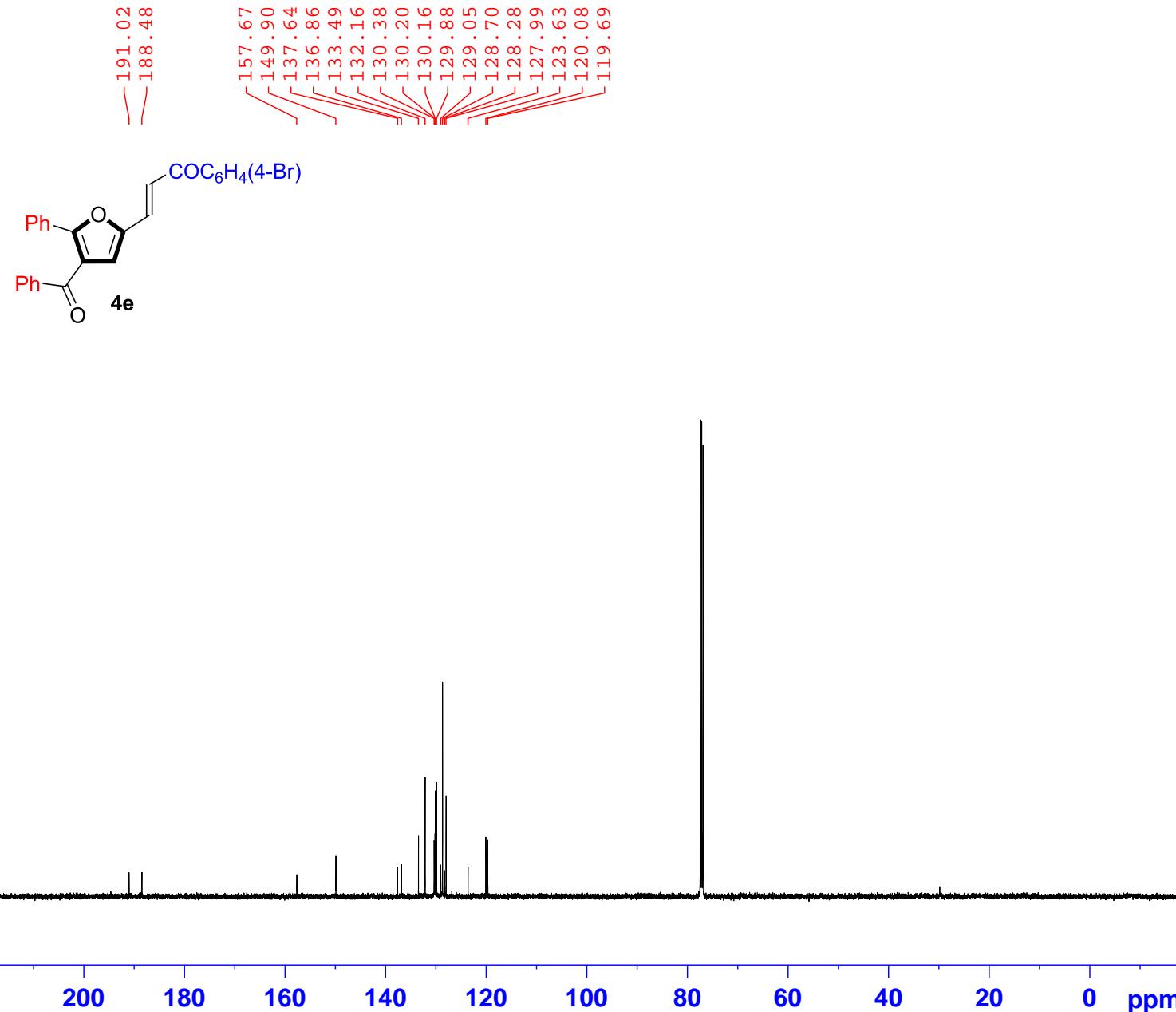
F2 - Acquisition Parameters
Date_ 20160216
Time 14.29
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300160 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-04-198(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 7



Current Data Parameters
NAME 4e- BSL-04-198(500MHz)
EXPNO 2
PROCNO 1

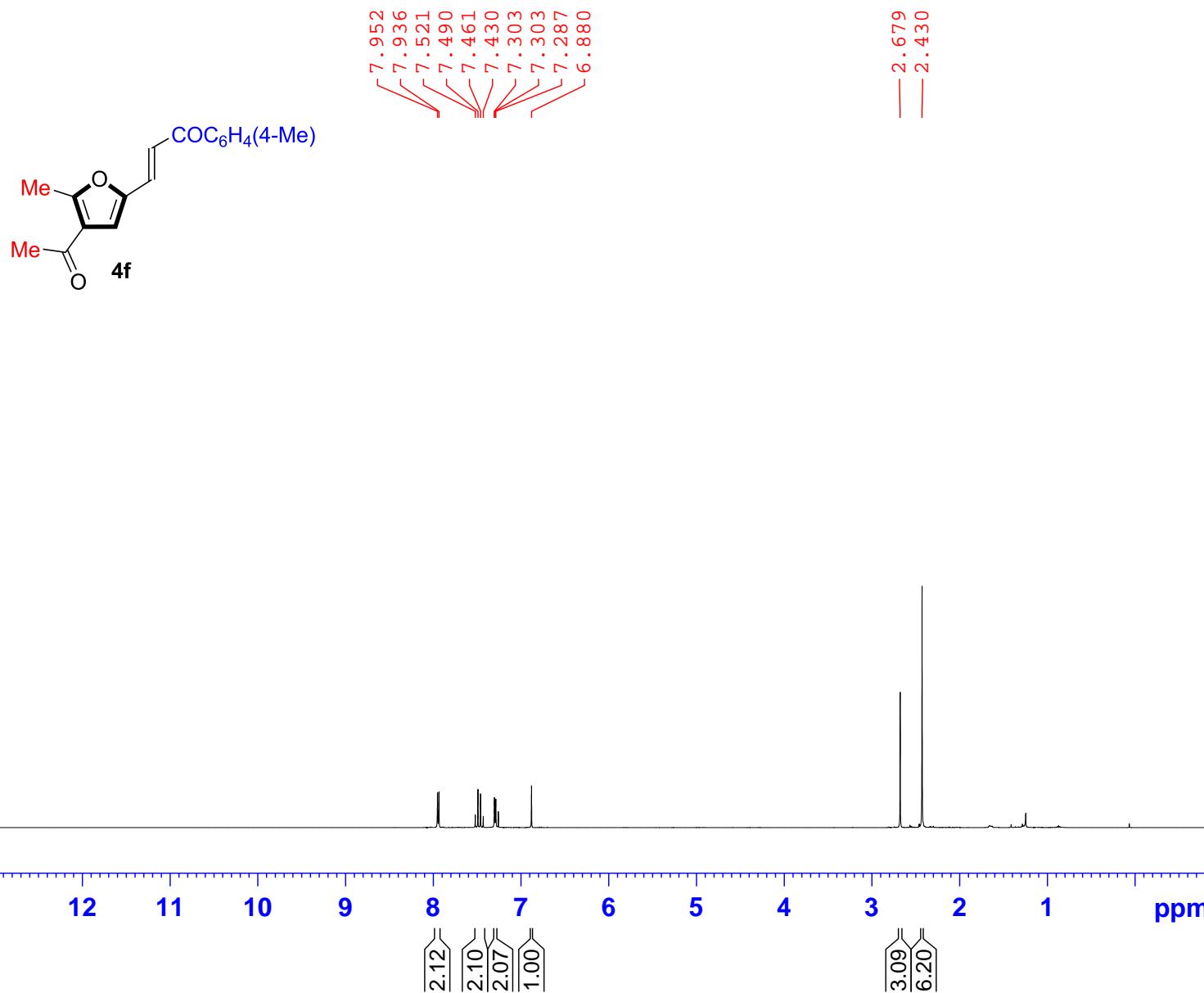
F2 - Acquisition Parameters
Date_ 20160217
Time 4.15
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 ======
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577713 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-216(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 11



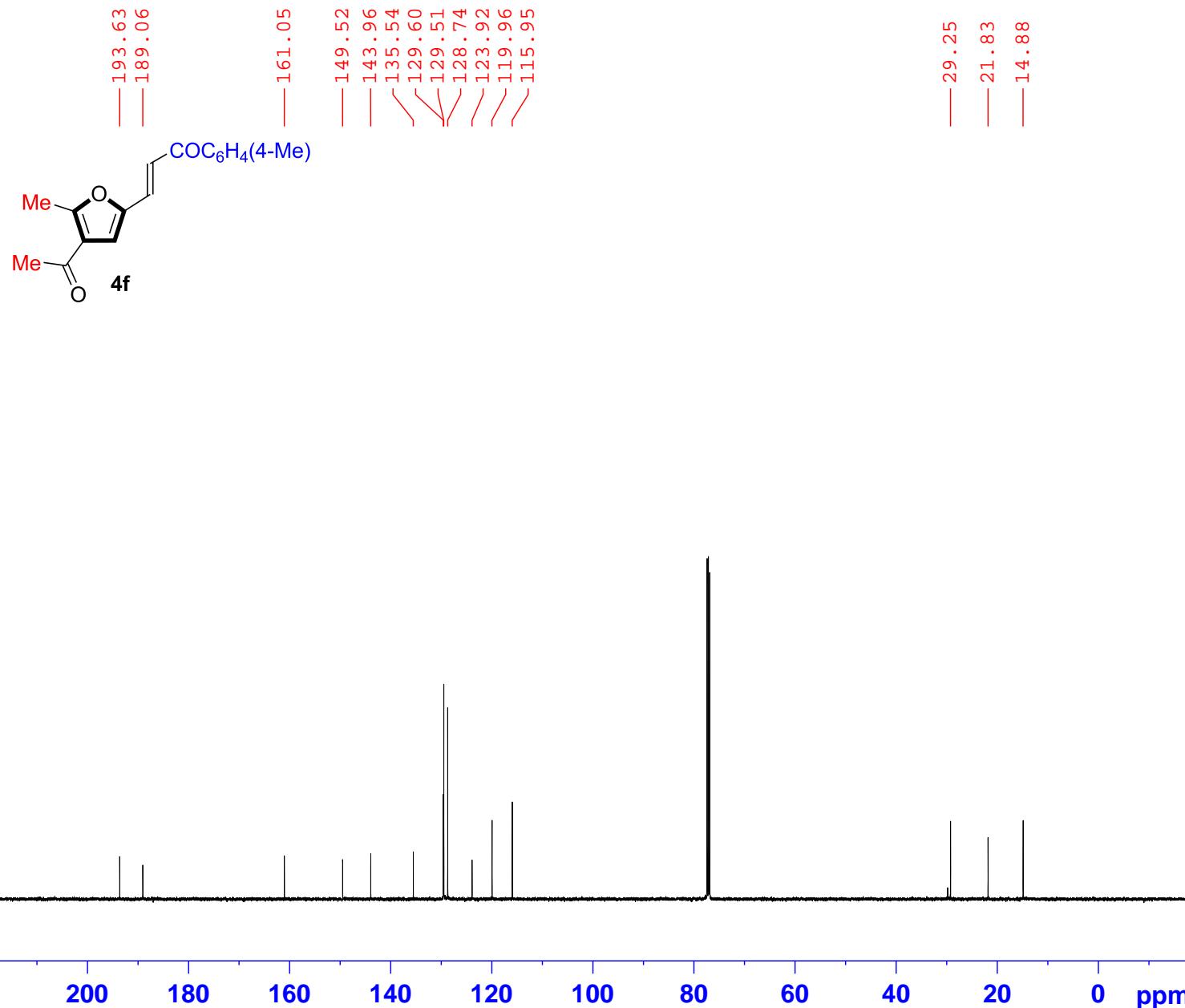
Current Data Parameters
NAME 4f- BSL-04-216_010316(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160301
Time 16.30
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 114
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300141 MHz
WDW EM
SSB 0 0.30 Hz
LB 0
GB 0
PC 1.00

SK-BSL-04-216(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 11



Current Data Parameters
NAME 4f - BSL-04-216_010316(500MHz)
EXPNO 2
PROCNO 1

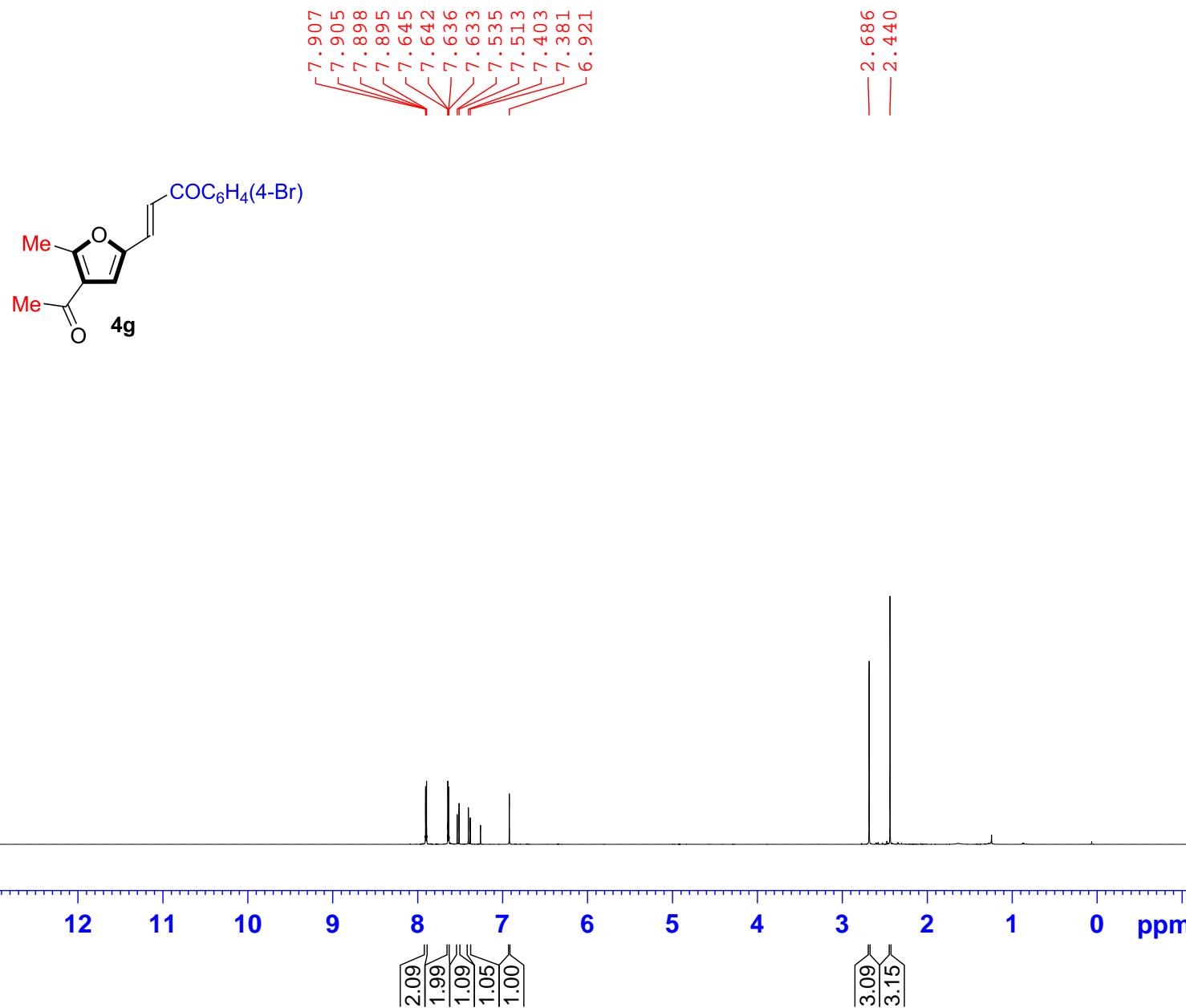
F2 - Acquisition Parameters
Date_ 20160301
Time 18.10
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgppg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577725 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-200 (700MHz)



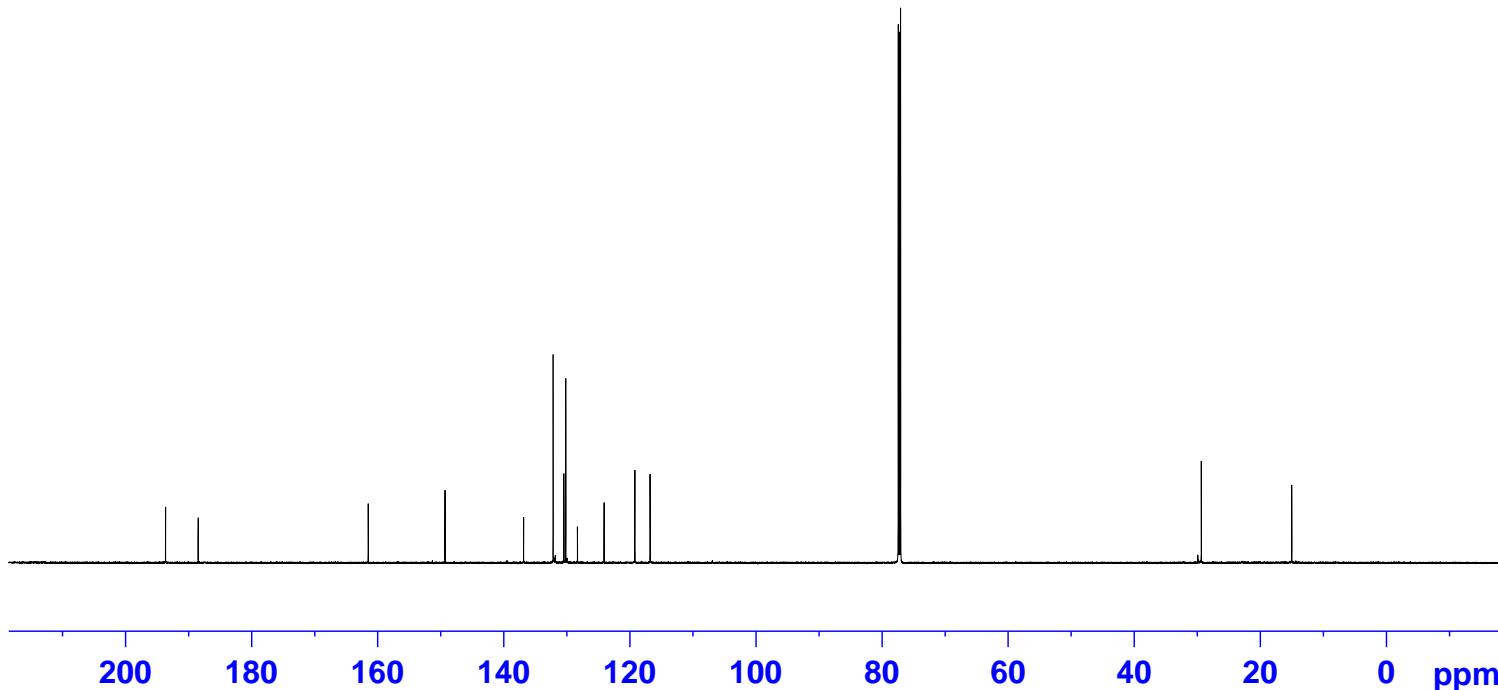
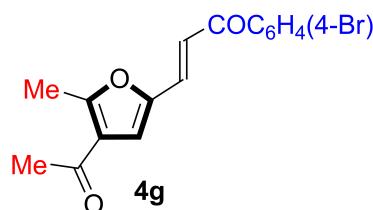
Current Data Parameters
NAME 4g- BSL-04-200(700MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160217
Time 16.44
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 14097.744 Hz
FIDRES 0.215115 Hz
AQ 2.3243434 sec
RG 4.43
DW 35.467 usec
DE 10.00 usec
TE 295.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 700.1943240 MHz
NUC1 1H
P1 9.45 usec
PLW1 7.41309977 W

F2 - Processing parameters
SI 65536
SF 700.1900177 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-200 (700MHz)



Current Data Parameters
NAME 4g- BSL-04-200(700MHz)
EXPNO 2
PROCNO 1

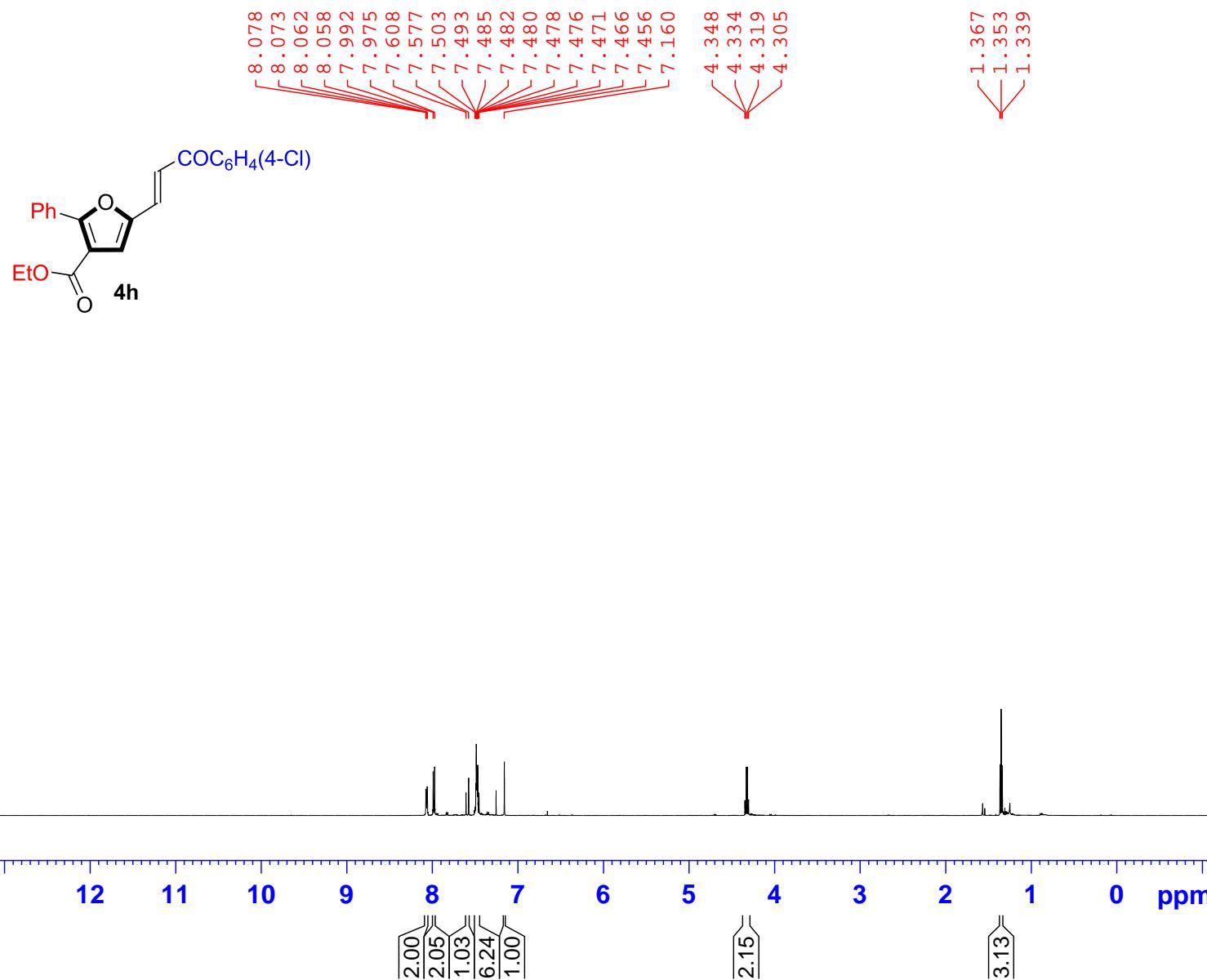
F2 - Acquisition Parameters
Date_ 20160217
Time 18.14
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 356
DS 4
SWH 41666.668 Hz
FIDRES 0.635783 Hz
AQ 0.7864320 sec
RG 178.51
DW 12.000 usec
DE 18.00 usec
TE 295.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 ======
SFO1 176.0805210 MHz
NUC1 13C
P1 11.20 usec
PLW1 128.82000732 W

===== CHANNEL f2 ======
SFO2 700.1928008 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 65.00 usec
PLW2 7.41309977 W
PLW12 0.15669000 W
PLW13 0.06620100 W

F2 - Processing parameters
SI 32768
SF 176.0628790 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-246(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 13



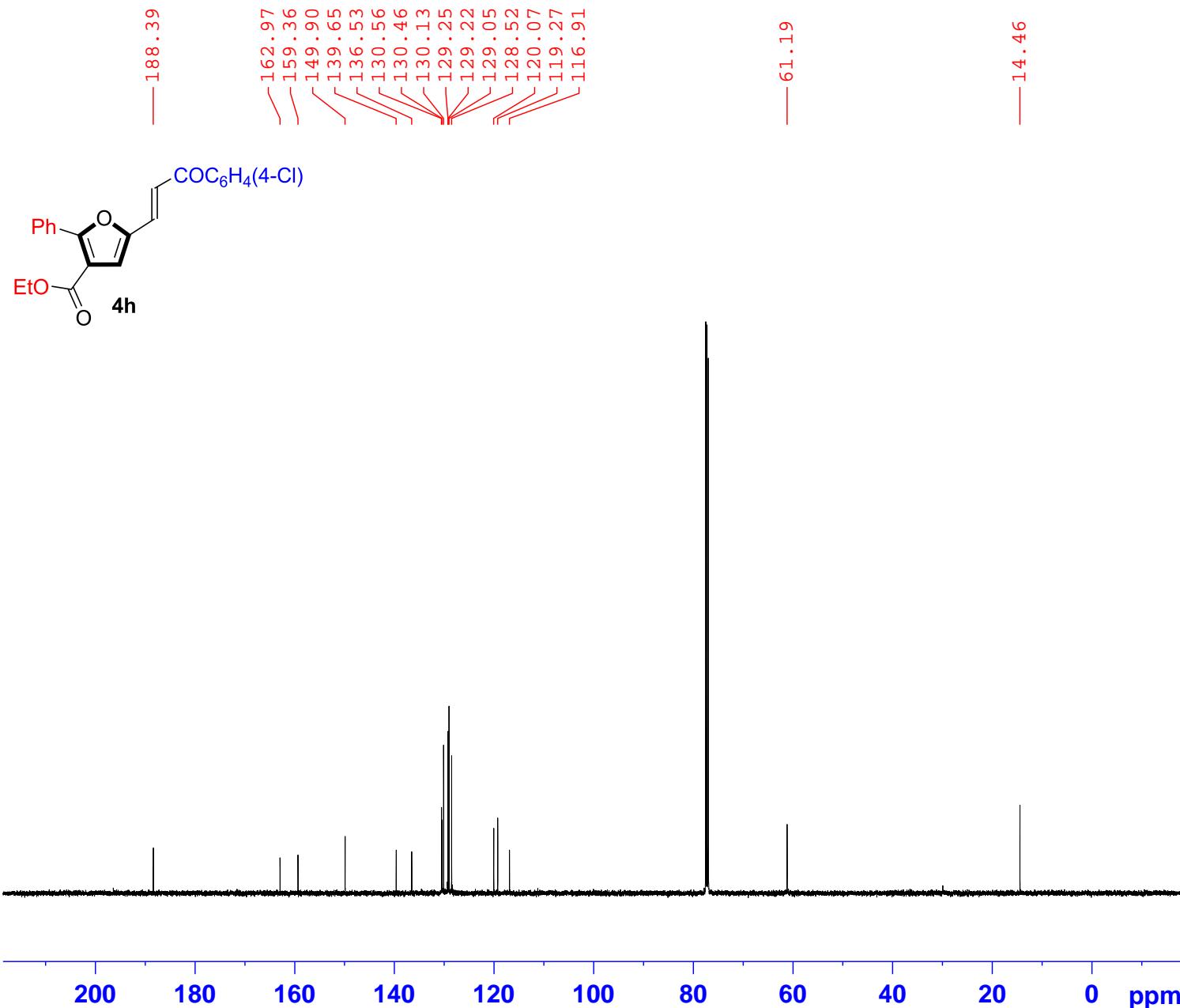
Current Data Parameters
NAME 4h- BSL-04-246(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160328
Time 11.45
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300152 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-246(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 13



Current Data Parameters
NAME 4h- BSL-04-246(500MHz)
EXPNO 2
PROCNO 1

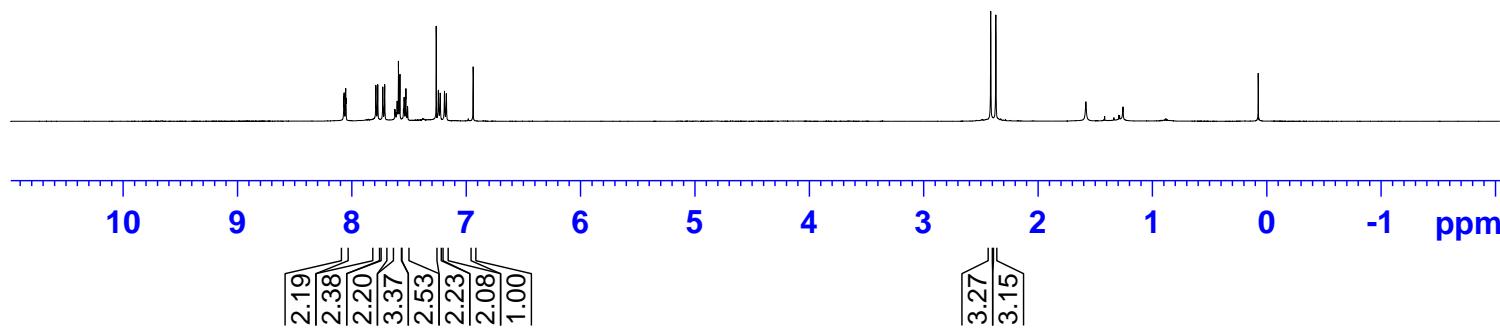
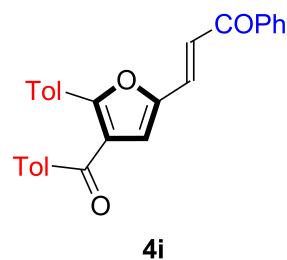
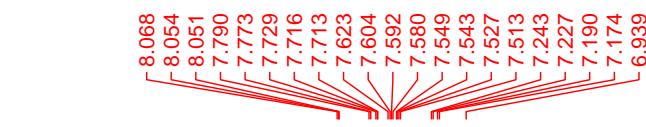
F2 - Acquisition Parameters
Date_ 20160328
Time 18.03
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577590 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-458-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 10



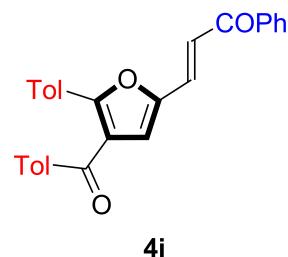
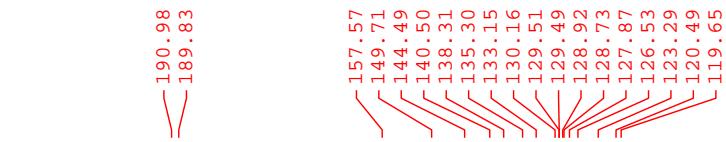
Current Data Parameters
NAME SK-BSL-05-458-A(500MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20181026
Time 1.50
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDC13
NS 32
DS 2
SWH 21008.404 Hz
FIDRES 0.320563 Hz
AQ 1.5597568 sec
RG 161
DW 23.800 usec
DE 6.50 usec
TE 297.9 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1294999 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300122 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-458-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 10



21.96
21.73



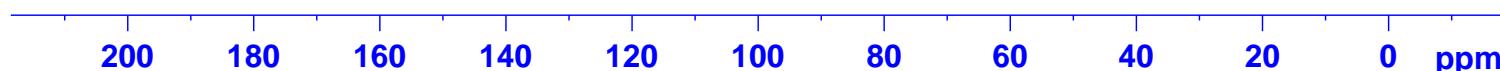
Current Data Parameters
NAME SK-BSL-05-458-A(500MHz)
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20181026
Time 2.45
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

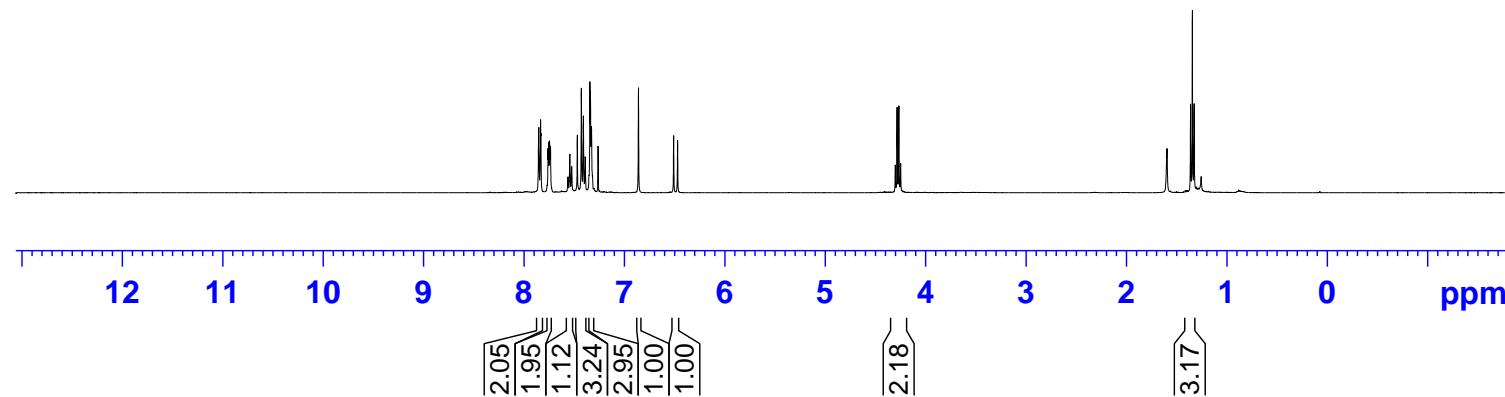
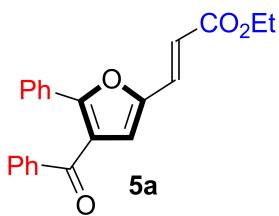
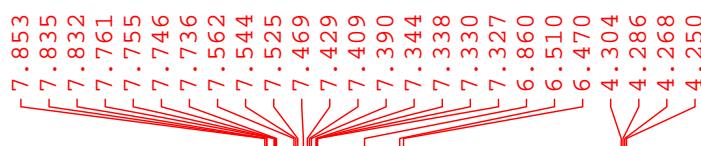
===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577599 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



SK-BSL-04-17-A

PROTONRO CDC13 /opt/topspin/nmrsu/SK/OCT15 nmrsu



Current Data Parameters
NAME SK-BSL-04-17-A
EXPNO 1
PROCNO 1

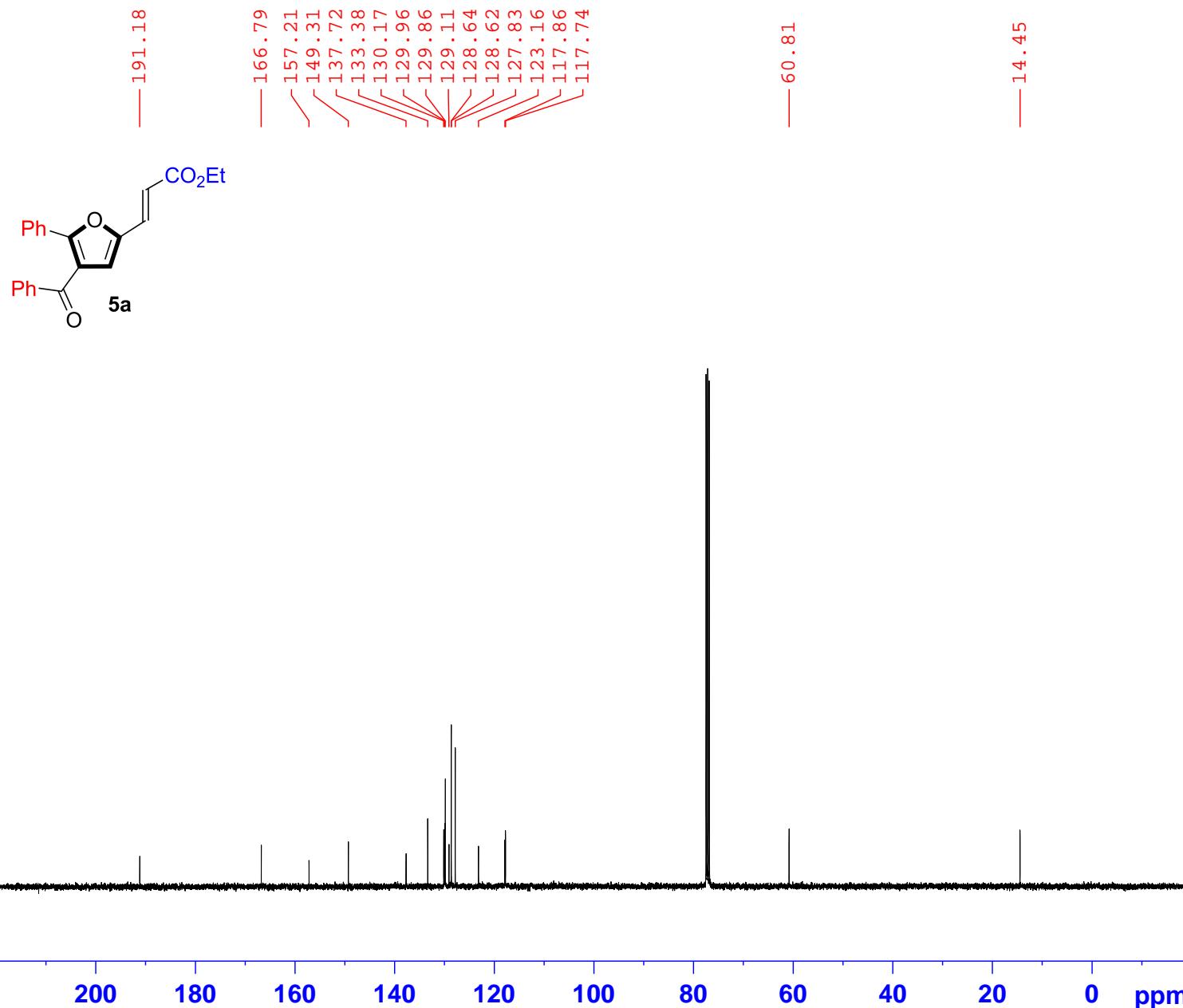
F2 - Acquisition Parameters
Date_ 20151024
Time 11.26
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8196.722 Hz
FIDRES 0.125072 Hz
AQ 3.9976959 sec
RG 181
DW 61.000 usec
DE 6.50 usec
TE 298.2 K
D1 4.00000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 12.50 usec
PLW1 12.00000000 W
SFO1 400.1324008 MHz

F2 - Processing parameters
SI 32768
SF 400.1300086 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-17-A

C13CPD CDCl₃ /opt/topspin/nmrsu/SK/OCT15 nmrsu

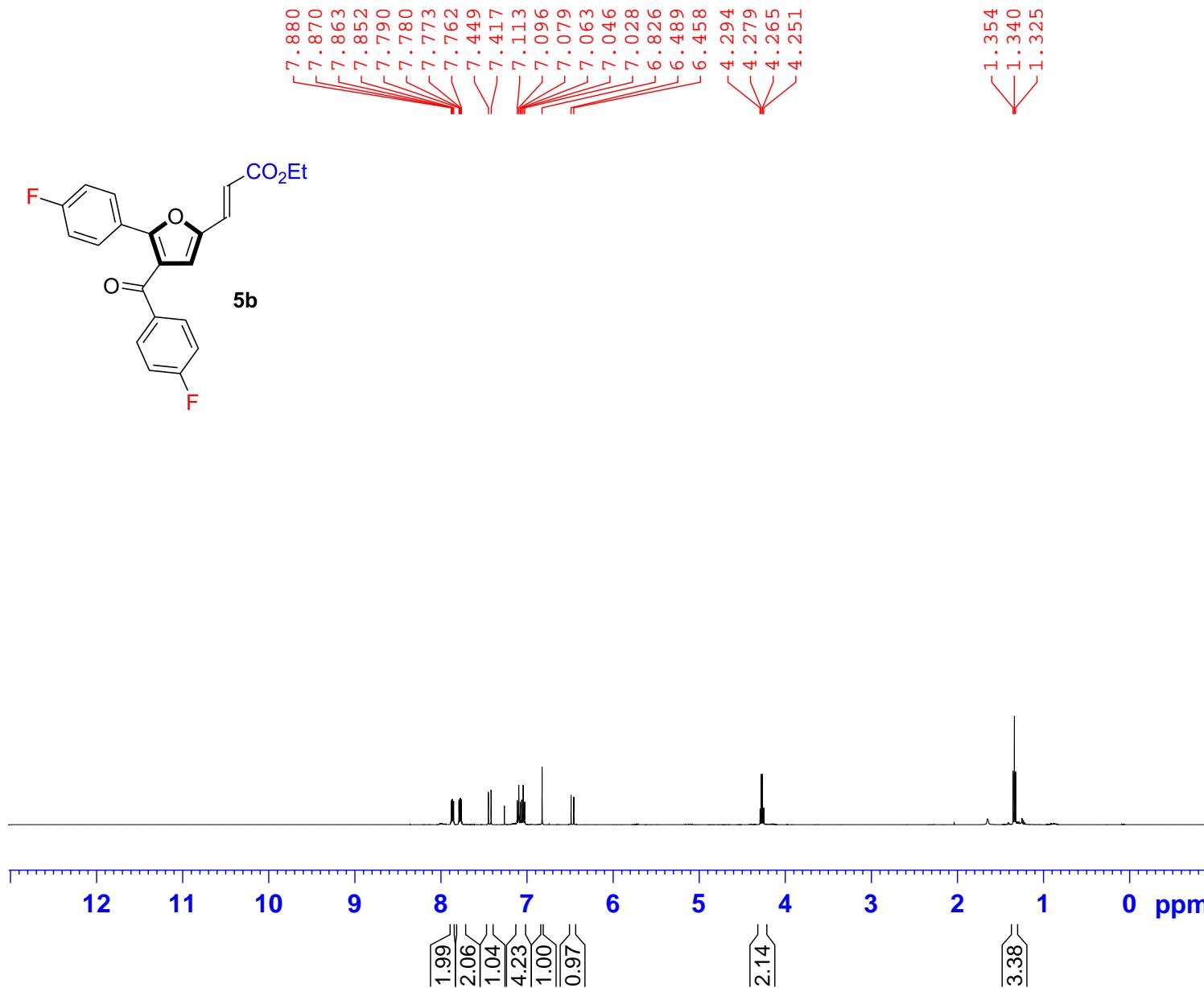


Current Data Parameters
NAME SK-BSL-04-17-A
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151024
Time 19.29
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 203
DW 20.800 usec
DE 6.50 usec
TE 298.2 K
D1 4.00000000 sec
d11 0.03000000 sec
DELTA 3.90000010 sec
TD0 1
SFO1 100.6228293 MHz
NUC1 ¹³C
P1 8.90 usec
PLW1 58.00000000 W
SFO2 400.1316005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 12.00000000 W
PLW12 0.23148000 W
PLW13 0.18750000 W

F2 - Processing parameters
SI 32768
SF 100.6127549 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-03-213(512MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 20



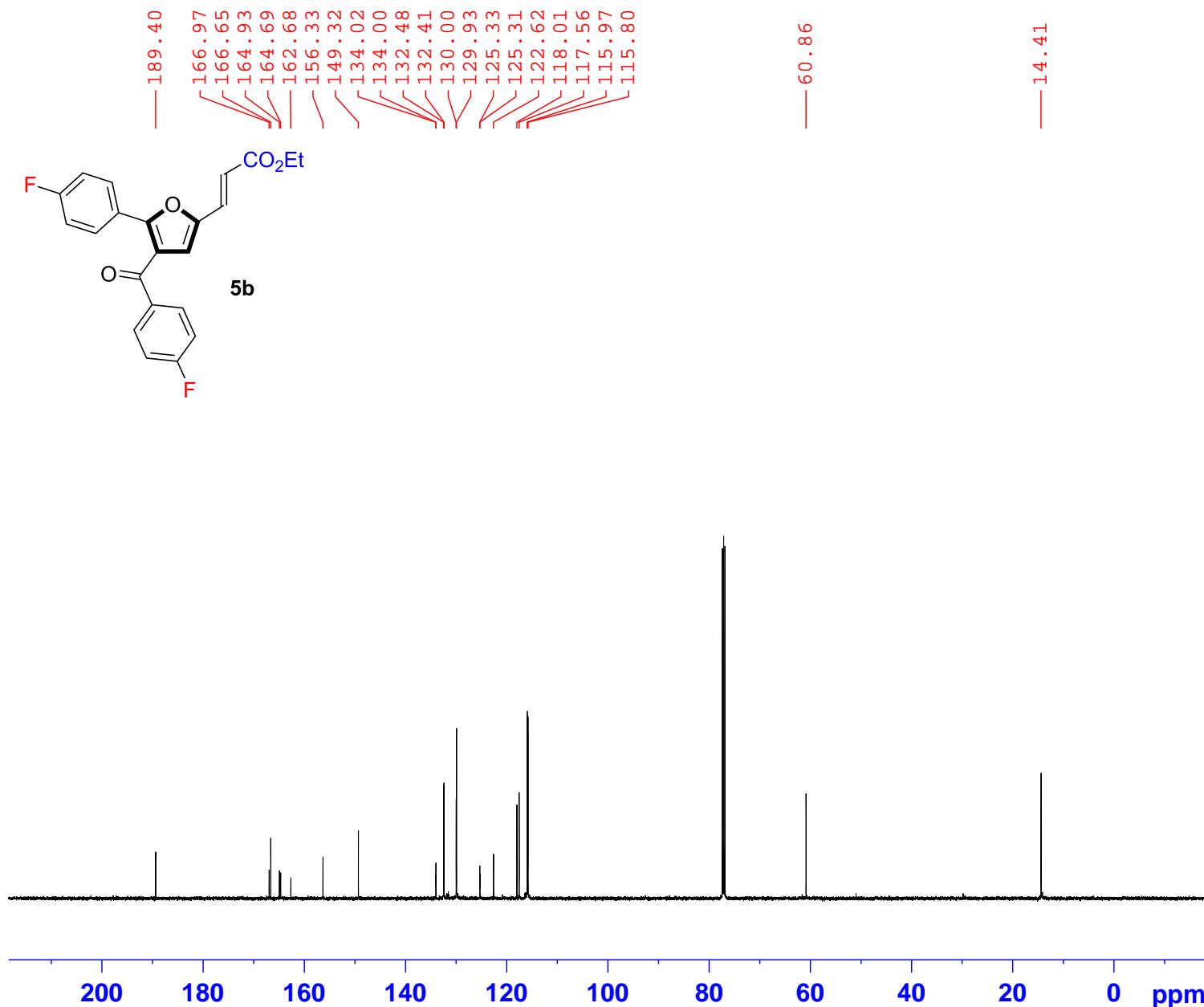
Current Data Parameters
NAME 5b-BSL-03-213(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150714
Time 16.43
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 90.5
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300116 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-03-213(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 19



Current Data Parameters
NAME 5b- BSL-03-213(500MHz)
EXPNO 2
PROCNO 1

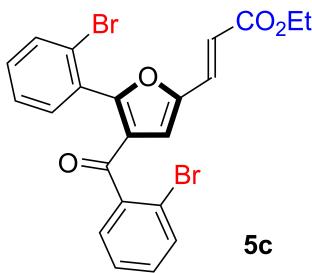
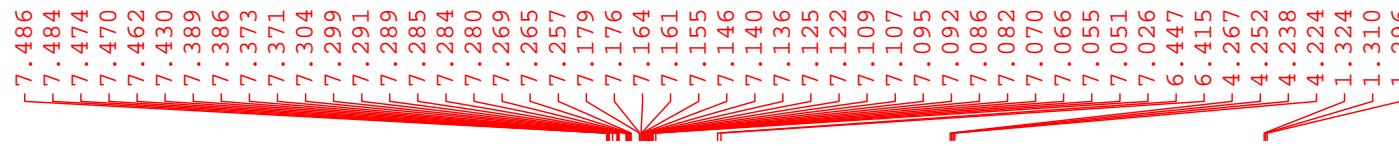
F2 - Acquisition Parameters
Date_ 20150715
Time 16.50
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2 waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577741 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-322-D(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 14

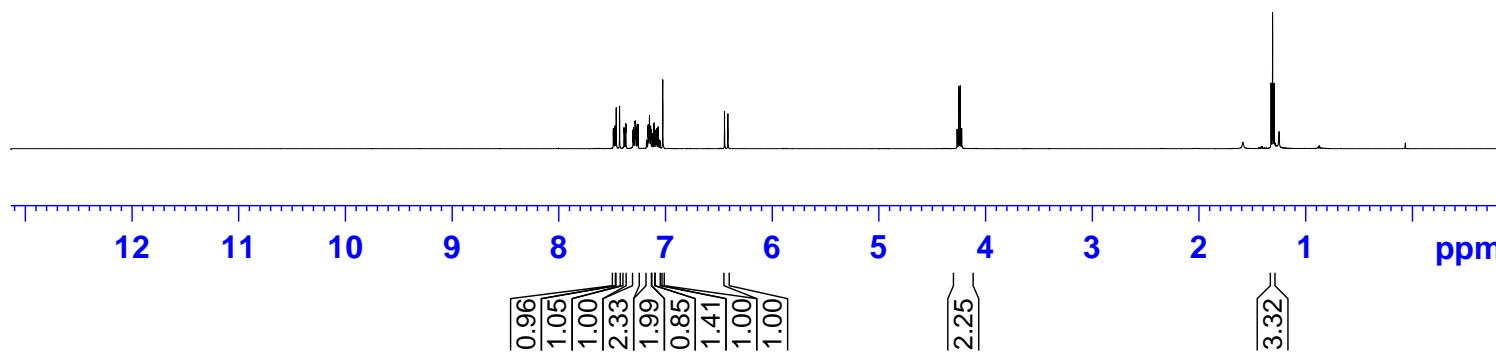


Current Data Parameters
NAME 5c- BSL-05-322-D(500MHz)
EXPNO 1
PROCNO 1

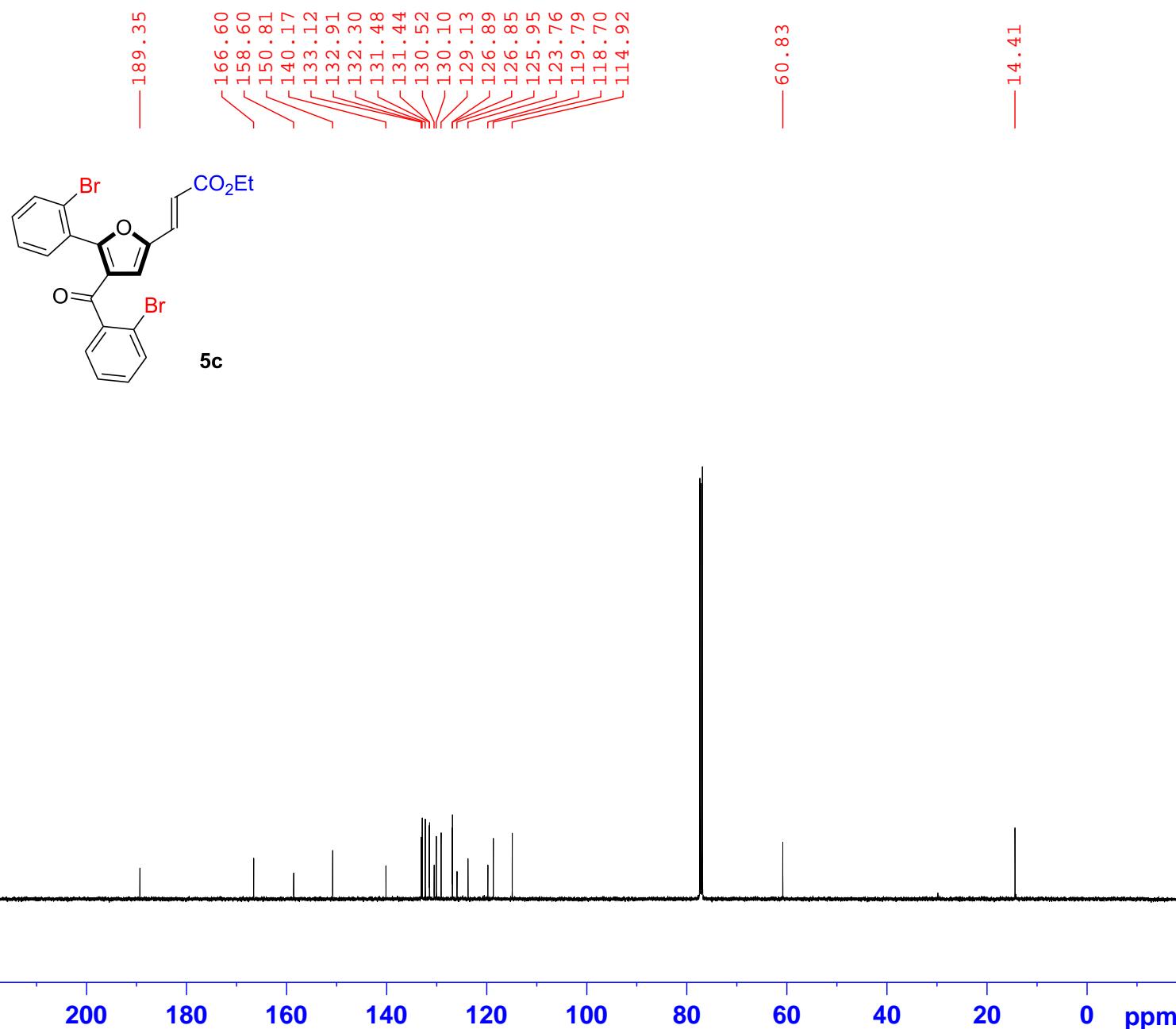
F2 - Acquisition Parameters
Date_ 20180306
Time 17.27
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300150 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00



SK-BSL-05-322-D(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 14



Current Data Parameters
NAME 5c- BSL-05-322-D(500MHz)
EXPNO 2
PROCNO 1

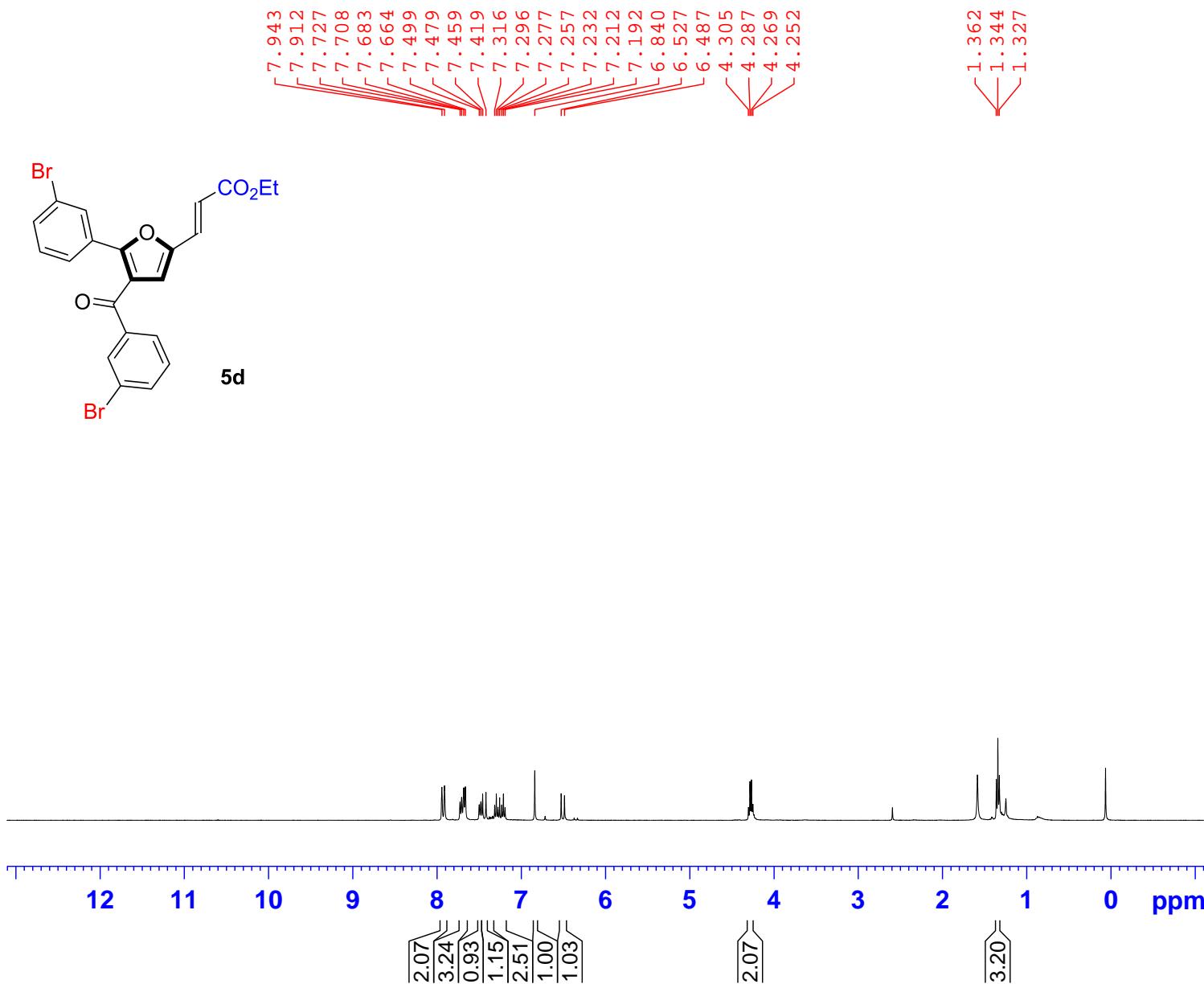
F2 - Acquisition Parameters
Date_ 20180307
Time 14.38
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zpgg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577728 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-397-1

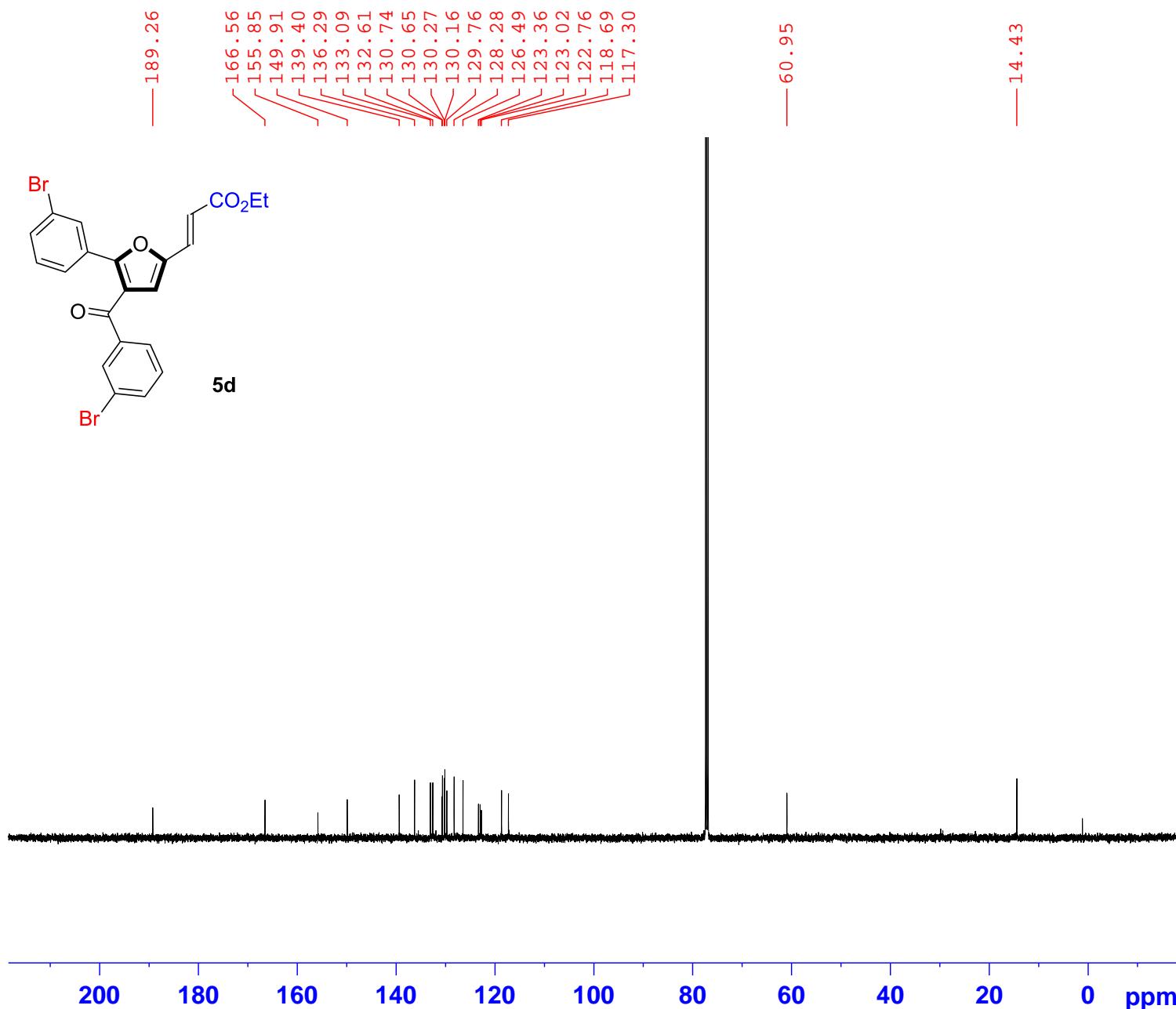


Current Data Parameters
NAME 5d- SK-BSL-05-397-1
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180730
Time 16.55 h
INSTRUM spect
PROBHD z104450_0382 (zg30
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 8196.722 Hz
FIDRES 0.250144 Hz
AQ 3.9976959 sec
RG 203
DW 61.000 usec
DE 6.50 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
SFO1 400.1324008 MHz
NUC1 ¹H
P1 6.40 usec
PLW1 14.10000038 W

F2 - Processing parameters
SI 32768
SF 400.1300049 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-397-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 12



Current Data Parameters
NAME 5d- SK-BSL-05-397-1(500MHz)
EXPNO 1
PROCNO 1

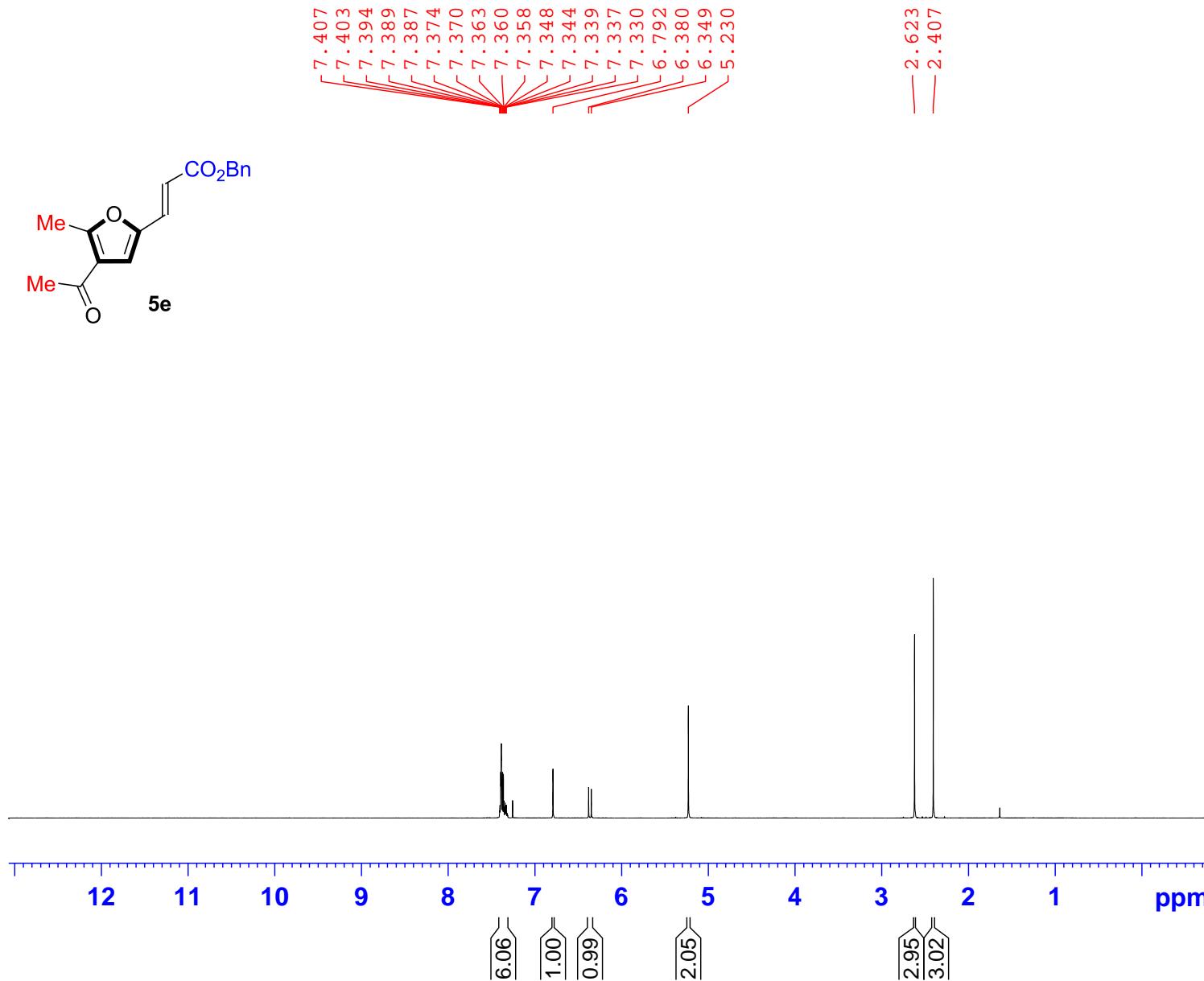
F2 - Acquisition Parameters
Date_ 20180731
Time 1.52
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577728 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-312(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 5



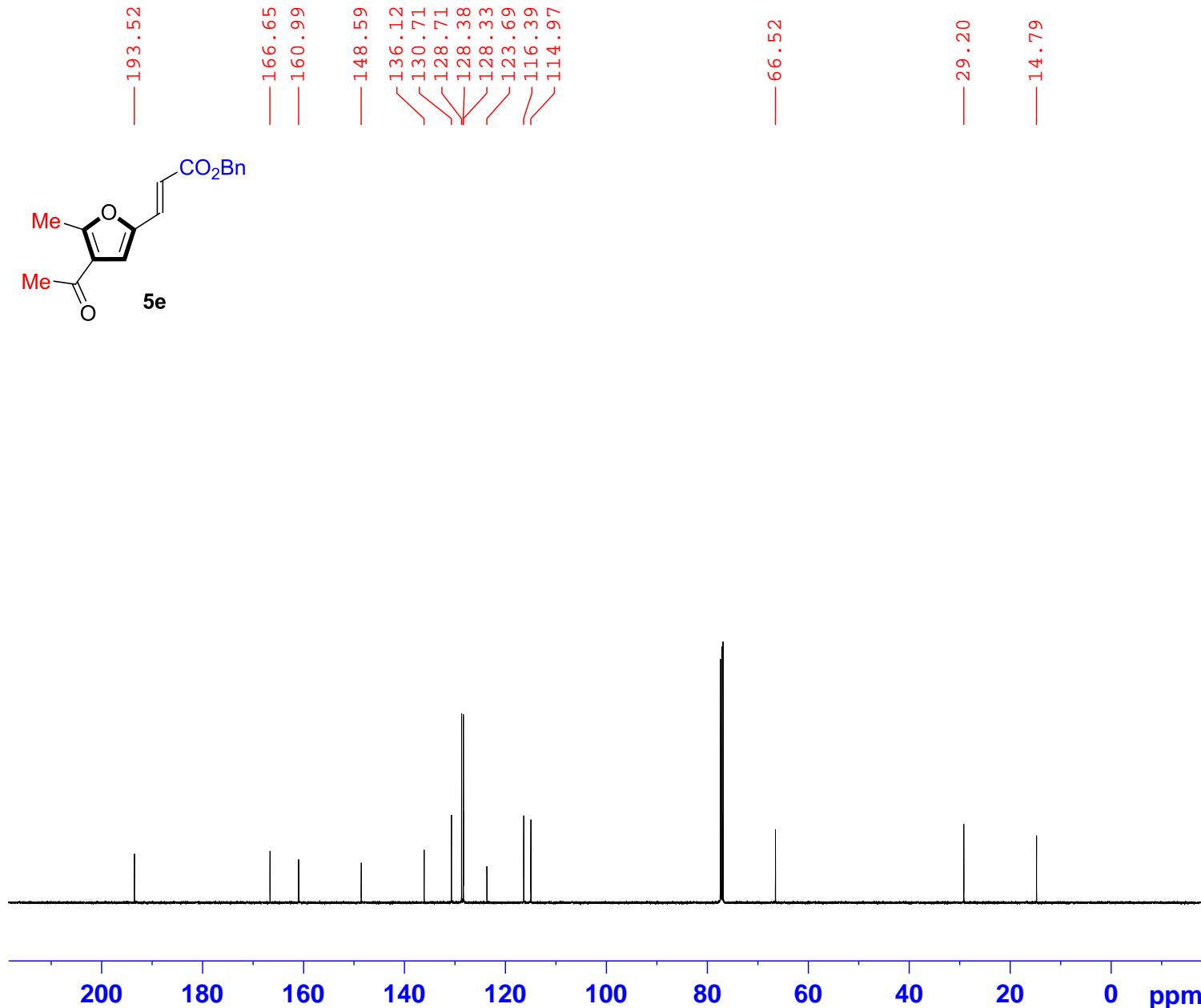
Current Data Parameters
NAME 5e-BSL-05-312(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20170620
Time 16.48
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 114
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300149 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-312(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 5



Current Data Parameters
NAME 5e-BSL-05-312(500MHz)
EXPNO 2
PROCNO 1

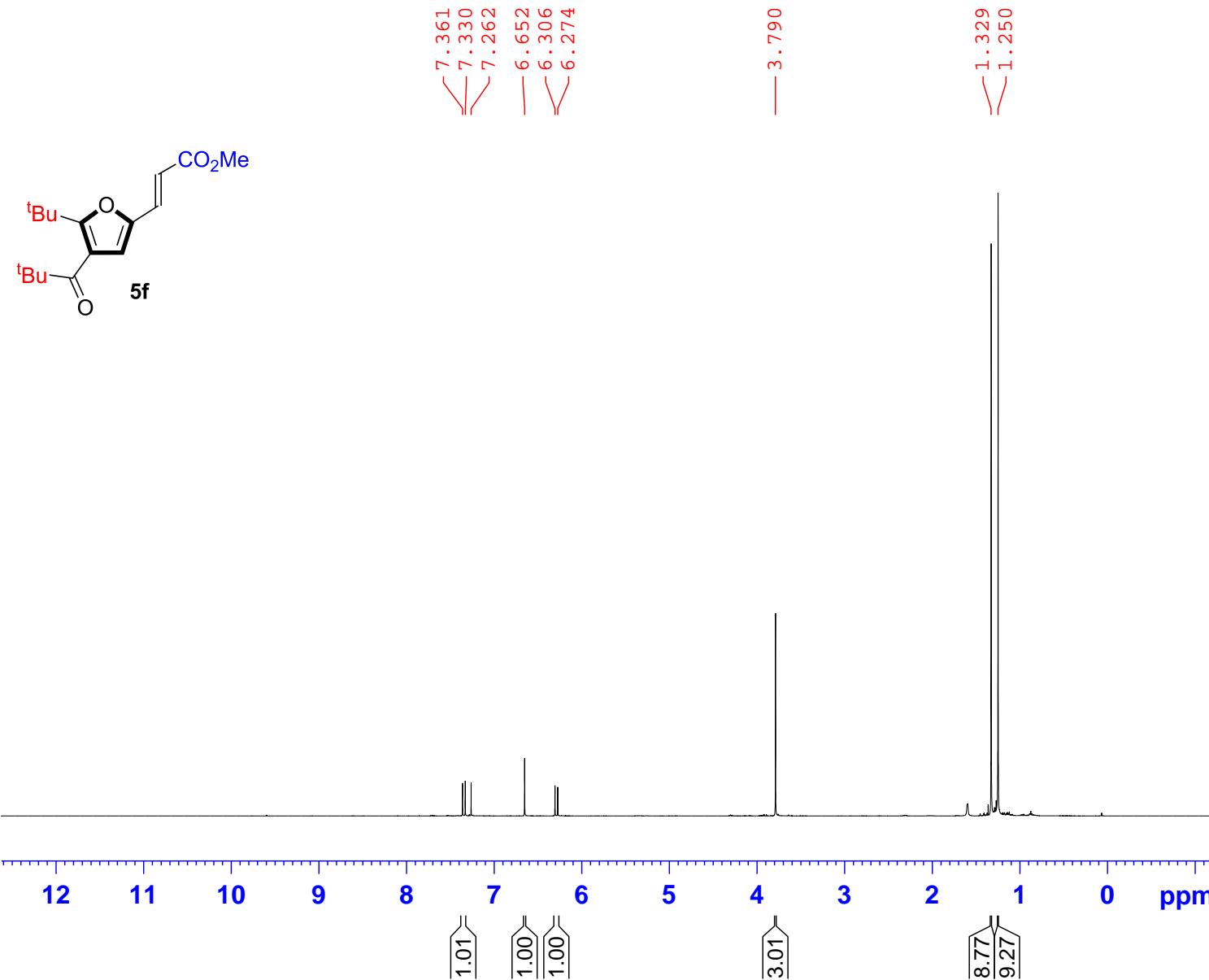
F2 - Acquisition Parameters
Date_ 20170620
Time 18.29
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577749 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-03-292(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 19



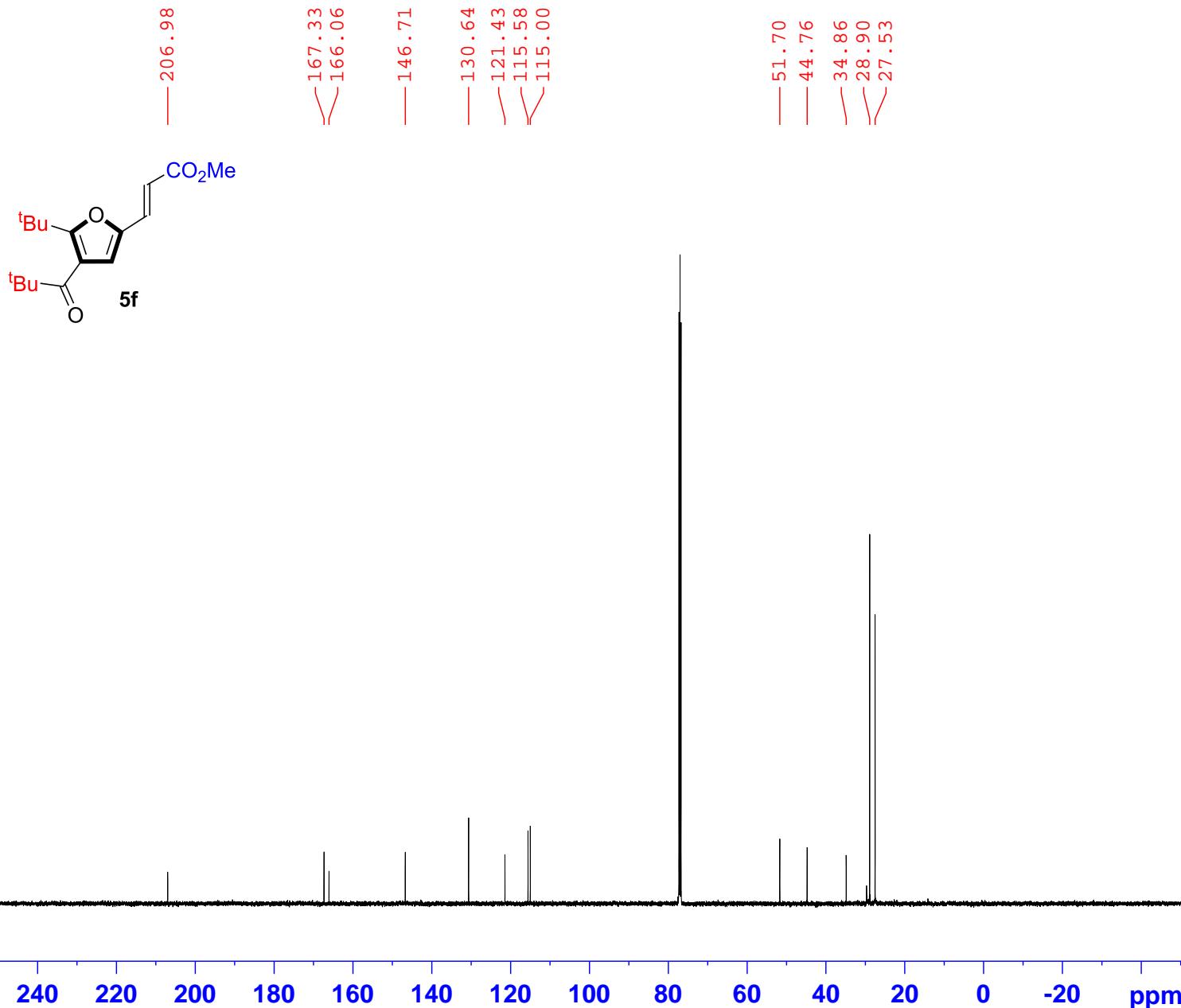
Current Data Parameters
NAME SK-BSL-03-292(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150921
Time 16.25
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 114
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300119 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-03-292(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 19



Current Data Parameters
NAME SK-BSL-03-292(500MHz)
EXPNO 2
PROCNO 1

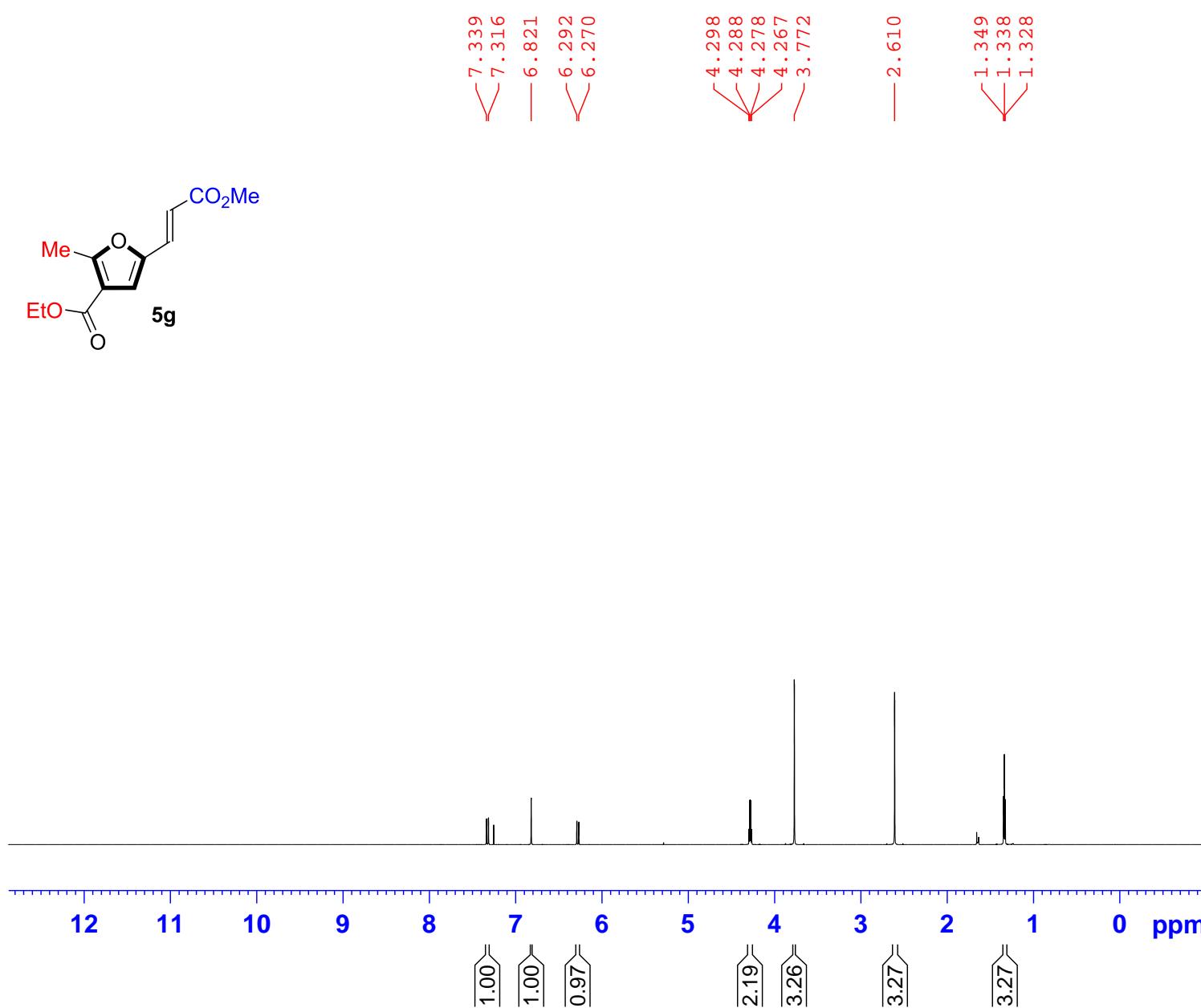
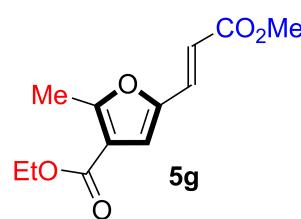
F2 - Acquisition Parameters
Date_ 20150921
Time 19.03
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 37878.789 Hz
FIDRES 0.577984 Hz
AQ 0.8650752 sec
RG 203
DW 13.200 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577892 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-92 (700MHz)



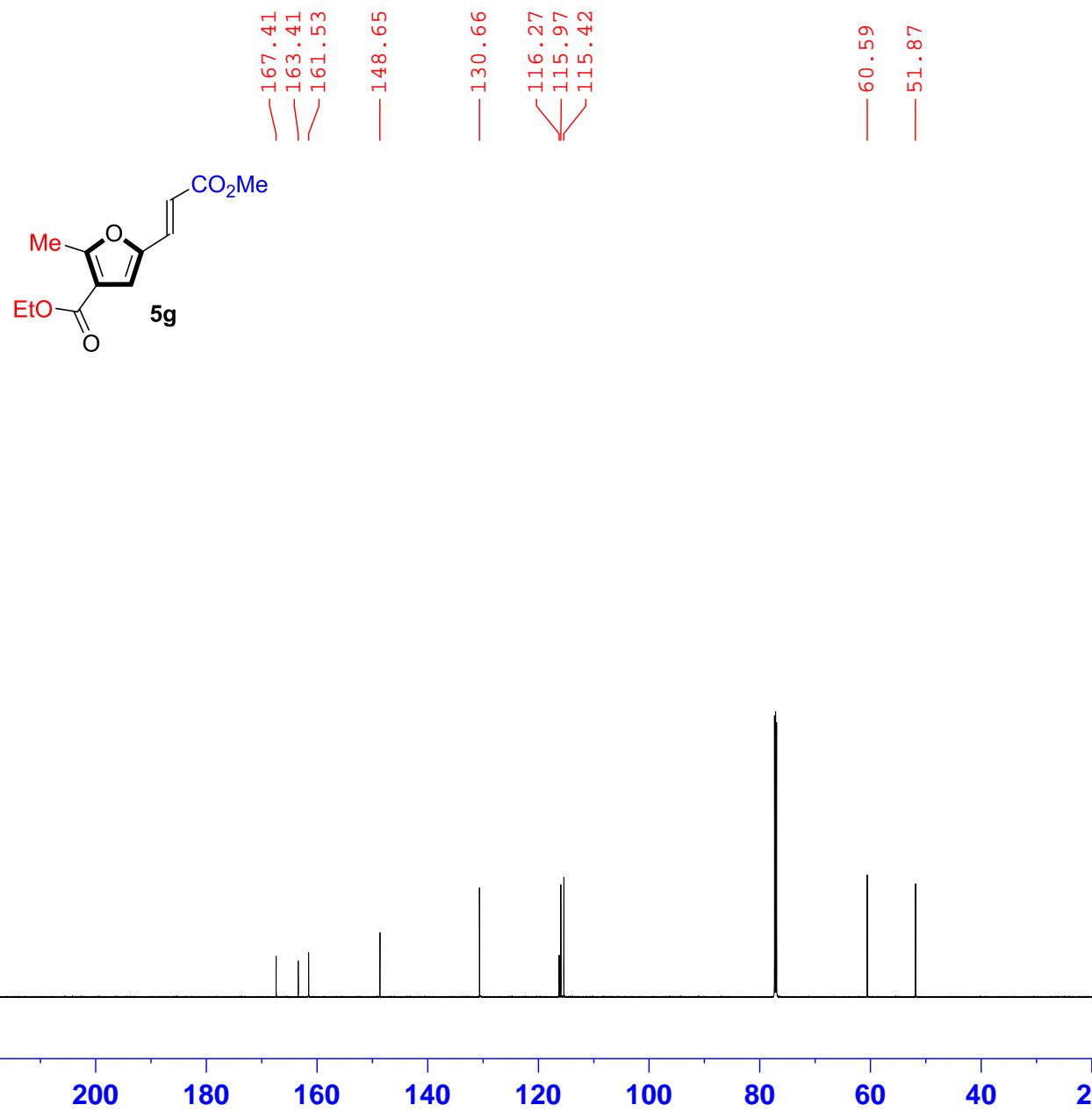
Current Data Parameters
NAME 5g - BSL-04-92(700MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151214
Time 10.47
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 14097.744 Hz
FIDRES 0.215115 Hz
AQ 2.3243434 sec
RG 5.05
DW 35.467 usec
DE 10.00 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 700.1943240 MHz
NUC1 1H
P1 9.45 usec
PLW1 7.41309977 W

F2 - Processing parameters
SI 65536
SF 700.1900216 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-92 (700MHz)



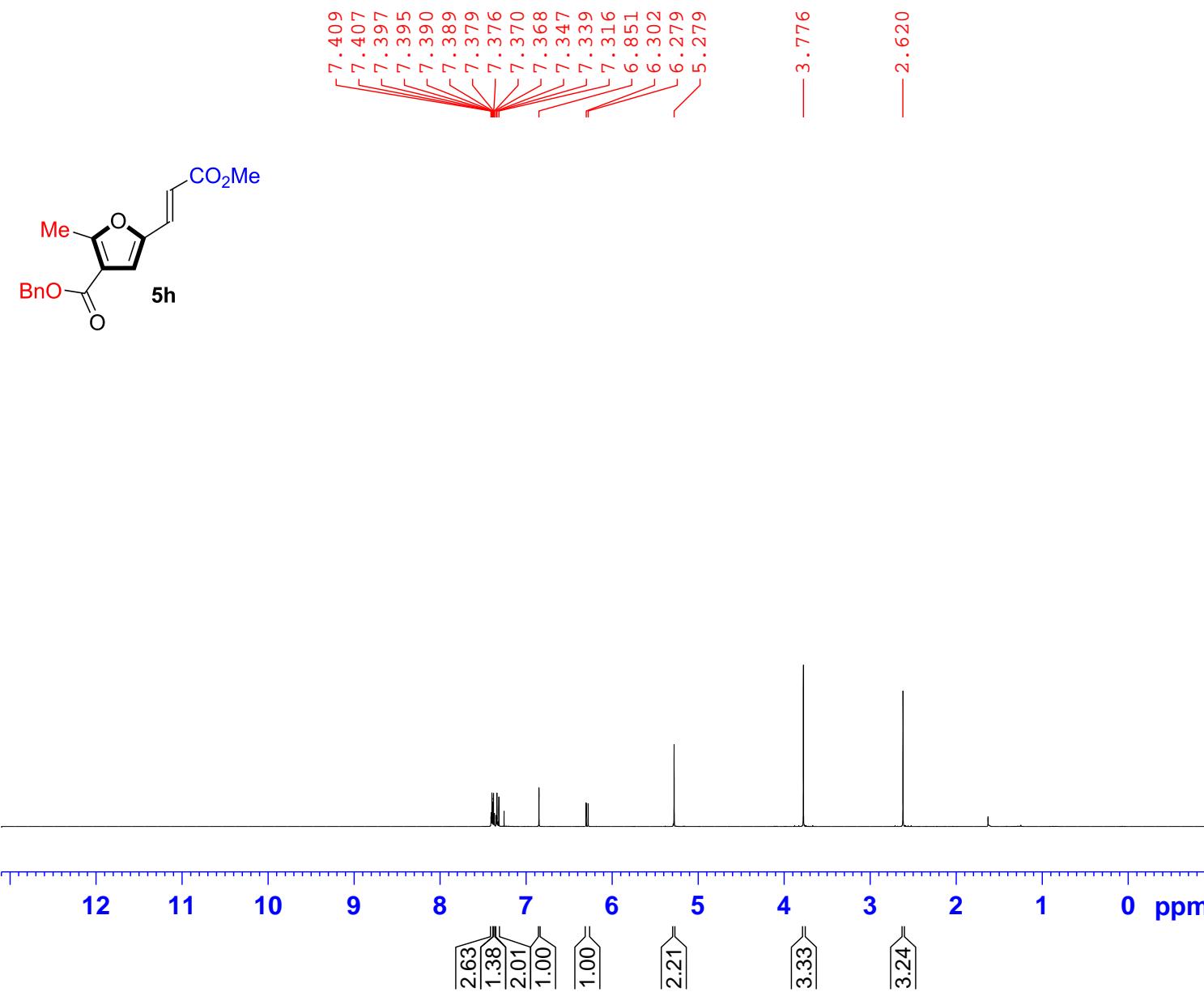
Current Data Parameters
NAME 5g - BSL-04-92(700MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151214
Time 10.54
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 138
DS 4
SWH 41666.668 Hz
FIDRES 0.635783 Hz
AQ 0.7864320 sec
RG 178.51
DW 12.000 usec
DE 18.00 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 176.0805210 MHz
NUC1 13C
P1 11.20 usec
PLW1 128.82000732 W

===== CHANNEL f2 =====
SFO2 700.1928008 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 65.00 usec
PLW2 7.41309977 W
PLW12 0.15669000 W
PLW13 0.06620100 W

F2 - Processing parameters
SI 32768
SF 176.0628940 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40



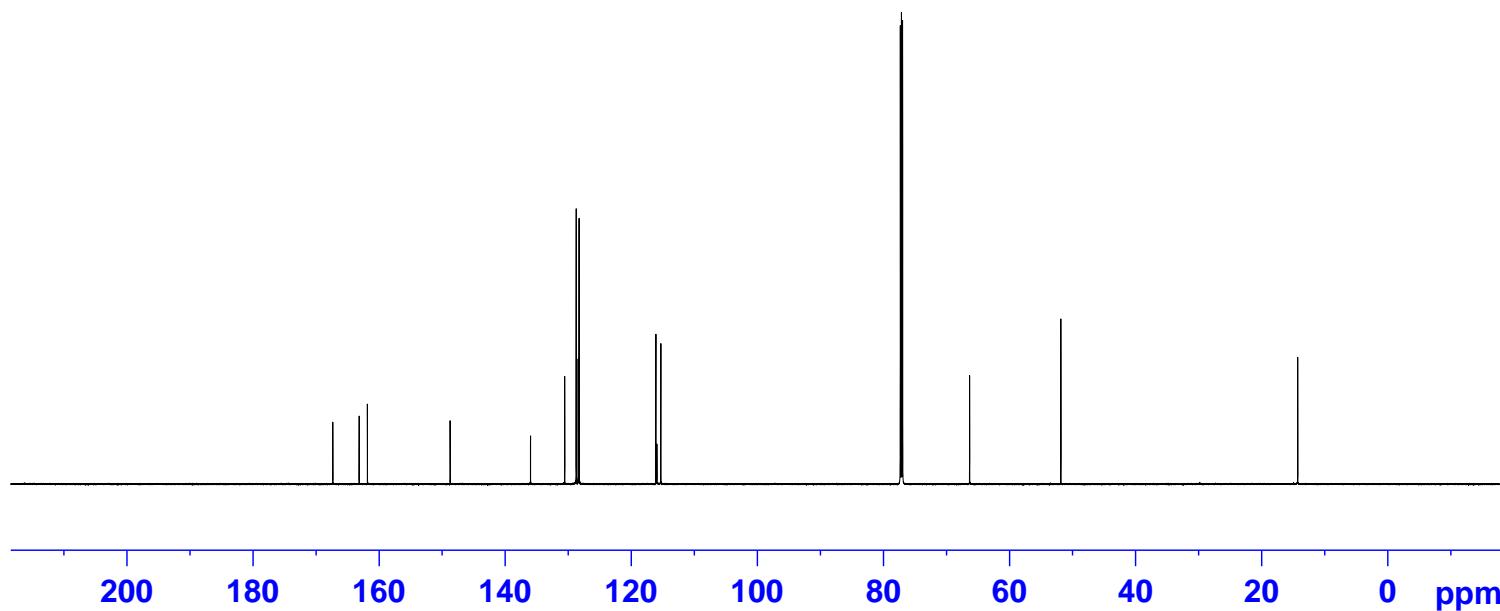
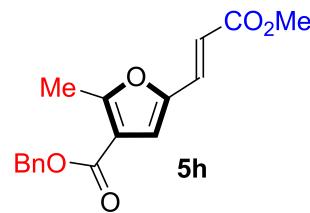
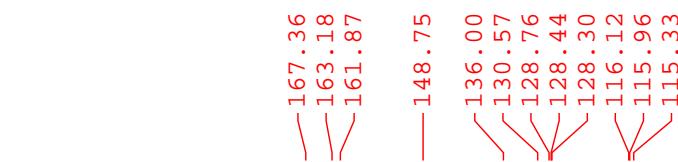
Current Data Parameters
 NAME 5h - BSL-04-91(700MHz)
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20151214
 Time 10.13
 INSTRUM spect
 PROBHD 5 mm CPTCI 1H-
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 14097.744 Hz
 FIDRES 0.215115 Hz
 AQ 2.3243434 sec
 RG 5.05
 DW 35.467 usec
 DE 10.00 usec
 TE 298.0 K
 D1 1.0000000 sec
 TDO 1

===== CHANNEL f1 =====
 SFO1 700.1943240 MHz
 NUC1 1H
 P1 9.45 usec
 PLW1 7.41309977 W

F2 - Processing parameters
 SI 65536
 SF 700.1900187 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

SK-BSL-04-91 (700MHz)



Current Data Parameters
NAME 5h - BSL-04-91(700MHz)
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151214
Time 12.49
INSTRUM spect
PROBHD 5 mm CPTCI 1H-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 308
DS 4
SWH 41666.668 Hz
FIDRES 0.635783 Hz
AQ 0.7864320 sec
RG 178.51
DW 12.000 usec
DE 18.00 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

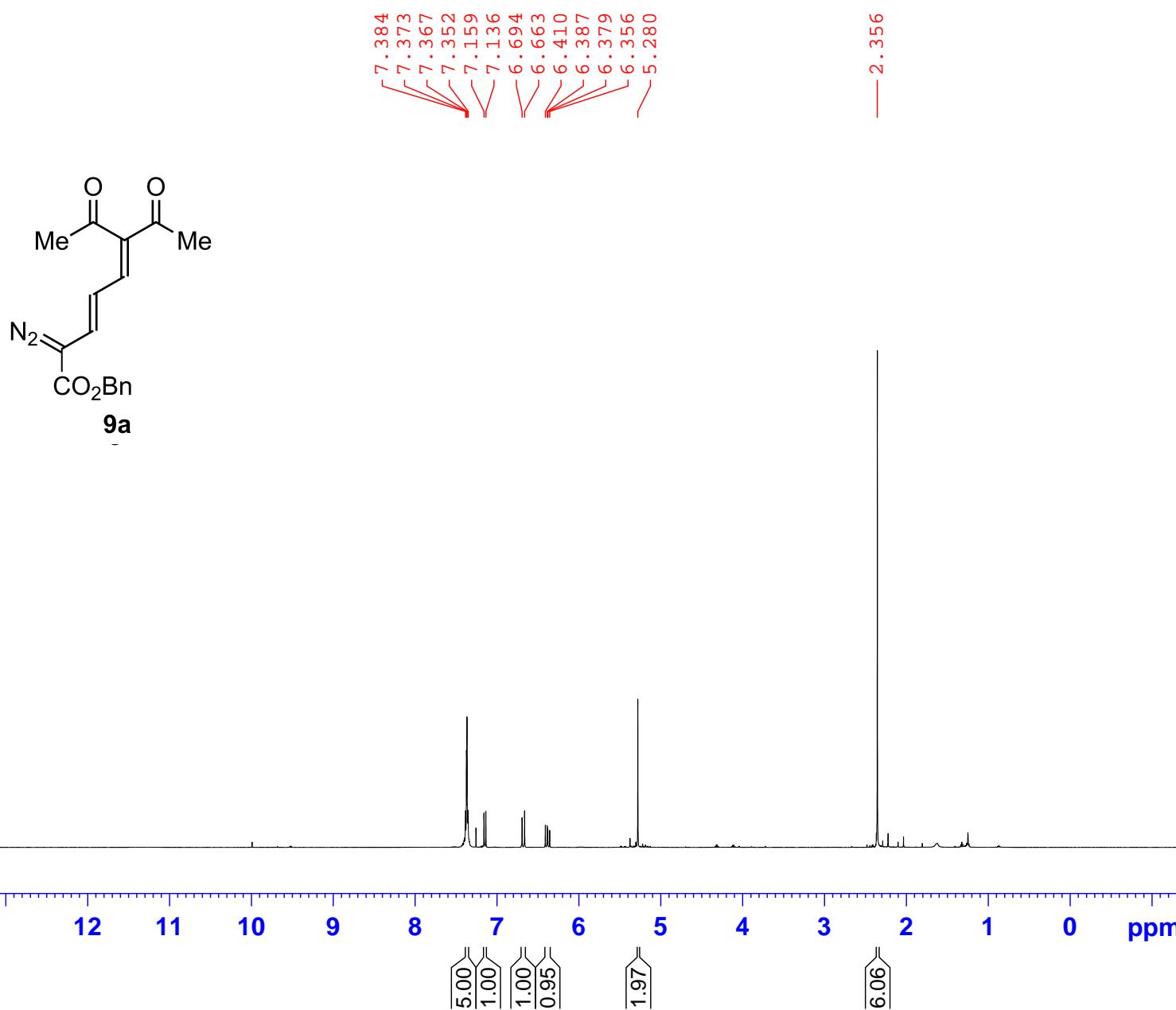
===== CHANNEL f1 =====
SFO1 176.0805210 MHz
NUC1 ¹³C
P1 11.20 usec
PLW1 128.82000732 W

===== CHANNEL f2 =====
SFO2 700.1928008 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 65.00 usec
PLW2 7.41309977 W
PLW12 0.15669000 W
PLW13 0.06620100 W

F2 - Processing parameters
SI 32768
SF 176.0628964 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-242(500MHz)

PROTONRO CDC13 /opt/topspin/sk nmrsu 11



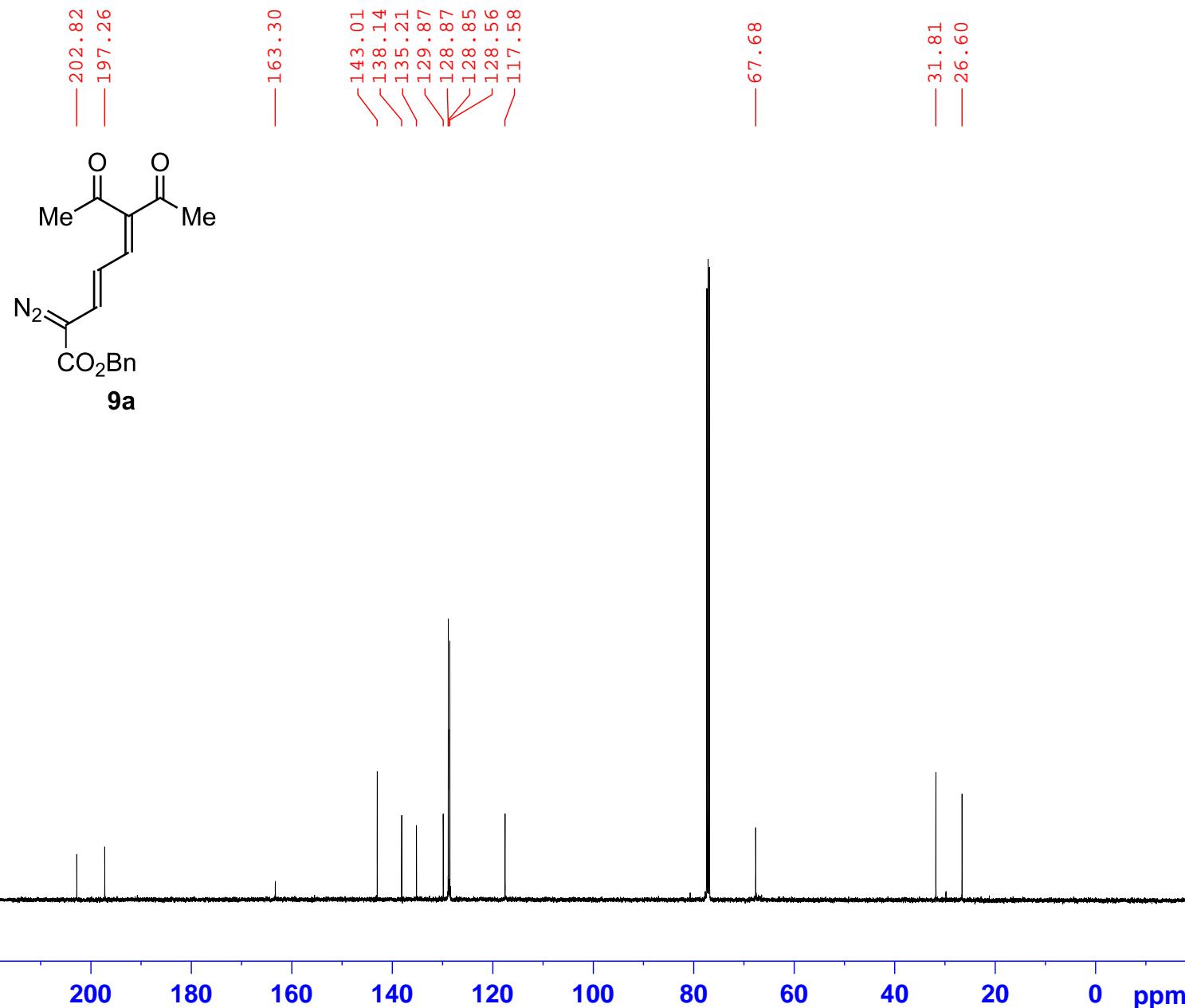
Current Data Parameters
NAME SK-BSL-04-242(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20160321
Time 17.31
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 128
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300149 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-242(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 11



Current Data Parameters
NAME SK-BSL-04-242(500MHz)
EXPNO 2
PROCNO 1

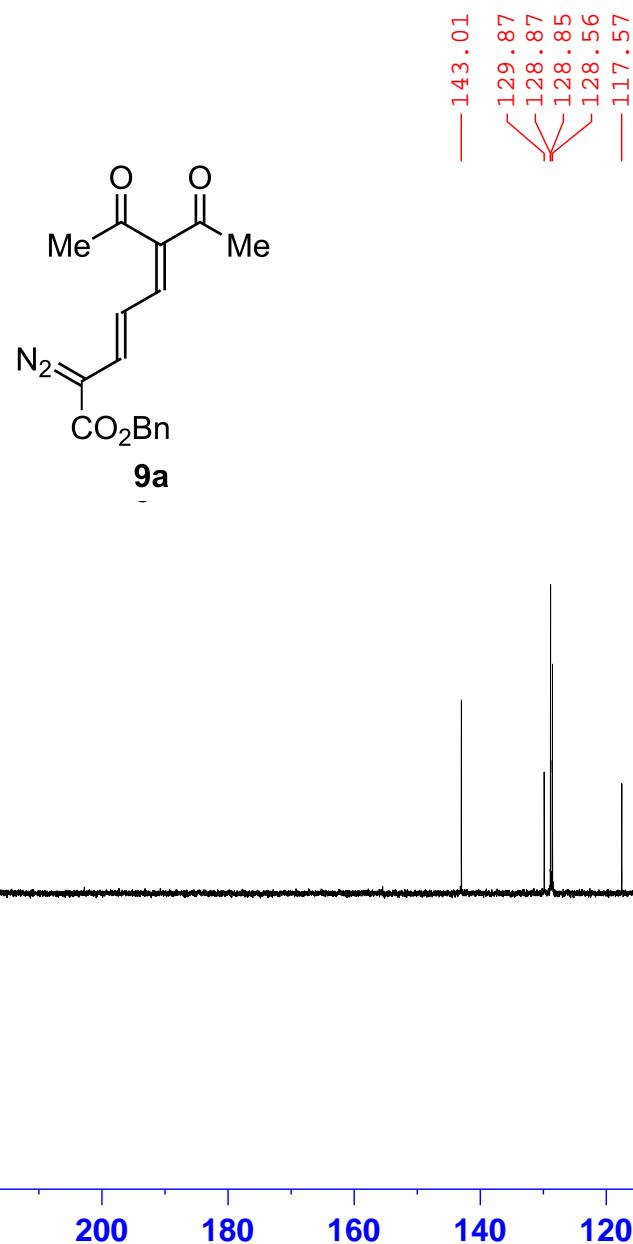
F2 - Acquisition Parameters
Date_ 20160321
Time 18.59
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.0000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.0000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577730 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-04-242(500MHz)
C13DEPT135 CDCl₃ /opt/topspin/sk nmrsu 11



Current Data Parameters
NAME SK-BSL-04-242(500MHz)
EXPNO 3
PROCNO 1

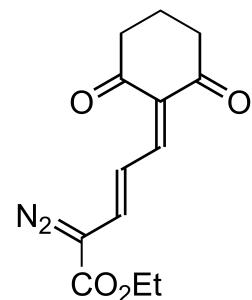
F2 - Acquisition Parameters
Date_ 20160321
Time 19.14
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG deptsp135
TD 65536
SOLVENT CDCl₃
NS 256
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
D2 0.00344828 sec
D12 0.00002000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703635 MHz
NUC1 13C
P1 9.00 usec
P13 2000.00 usec
PLW0 0 W
PLW1 117.00000000 W
SPNAM[5] Crp60comp.4
SPOAL5 0.500
SPOFFS5 0 Hz
SPW5 14.47999954 W

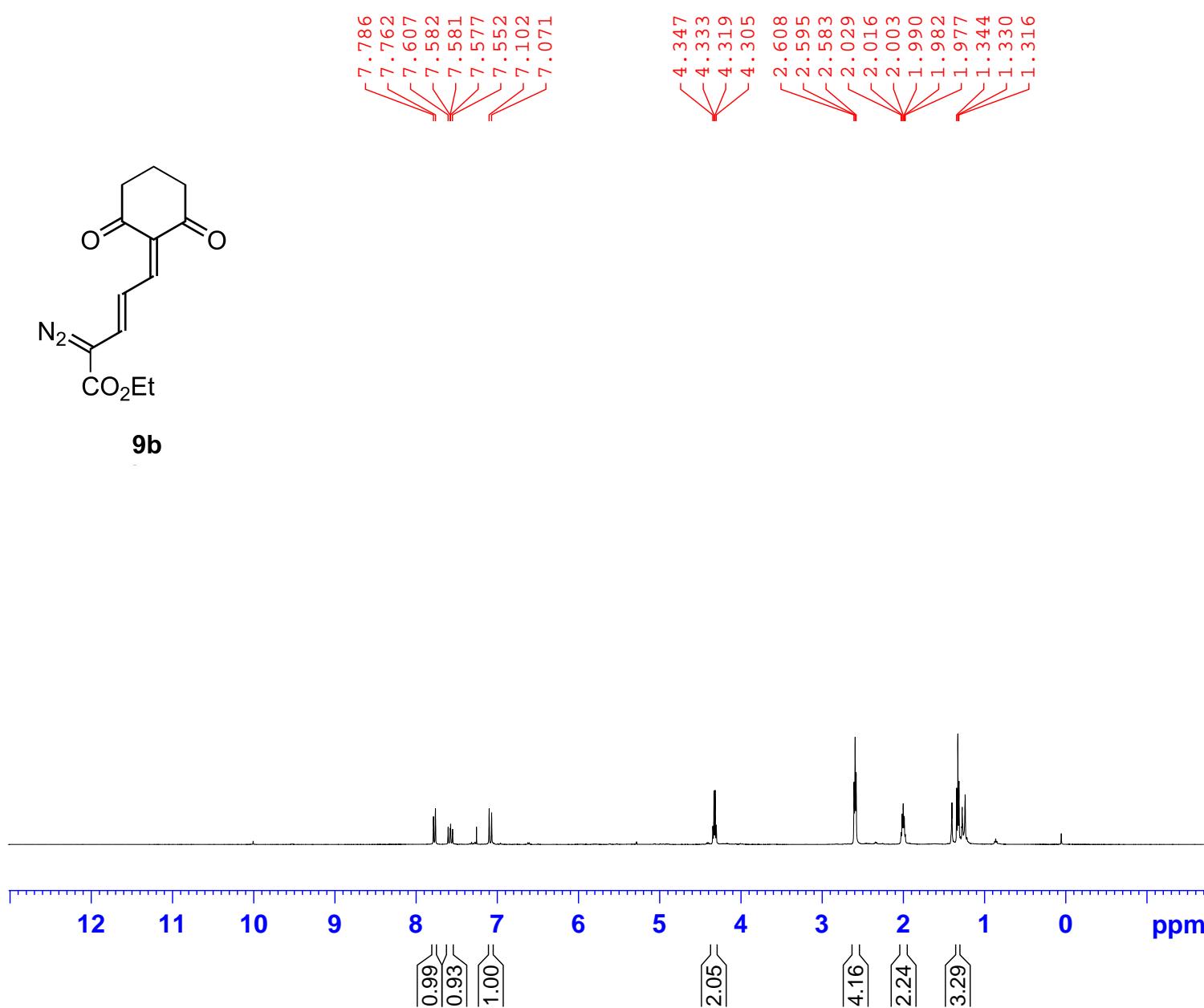
===== CHANNEL f2 =====
SFO2 500.1315995 MHz
NUC2 1H
CPDPRG[2] waltz16
P3 11.30 usec
P4 22.60 usec
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W

F2 - Processing parameters
SI 32768
SF 125.7577736 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-414(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 5



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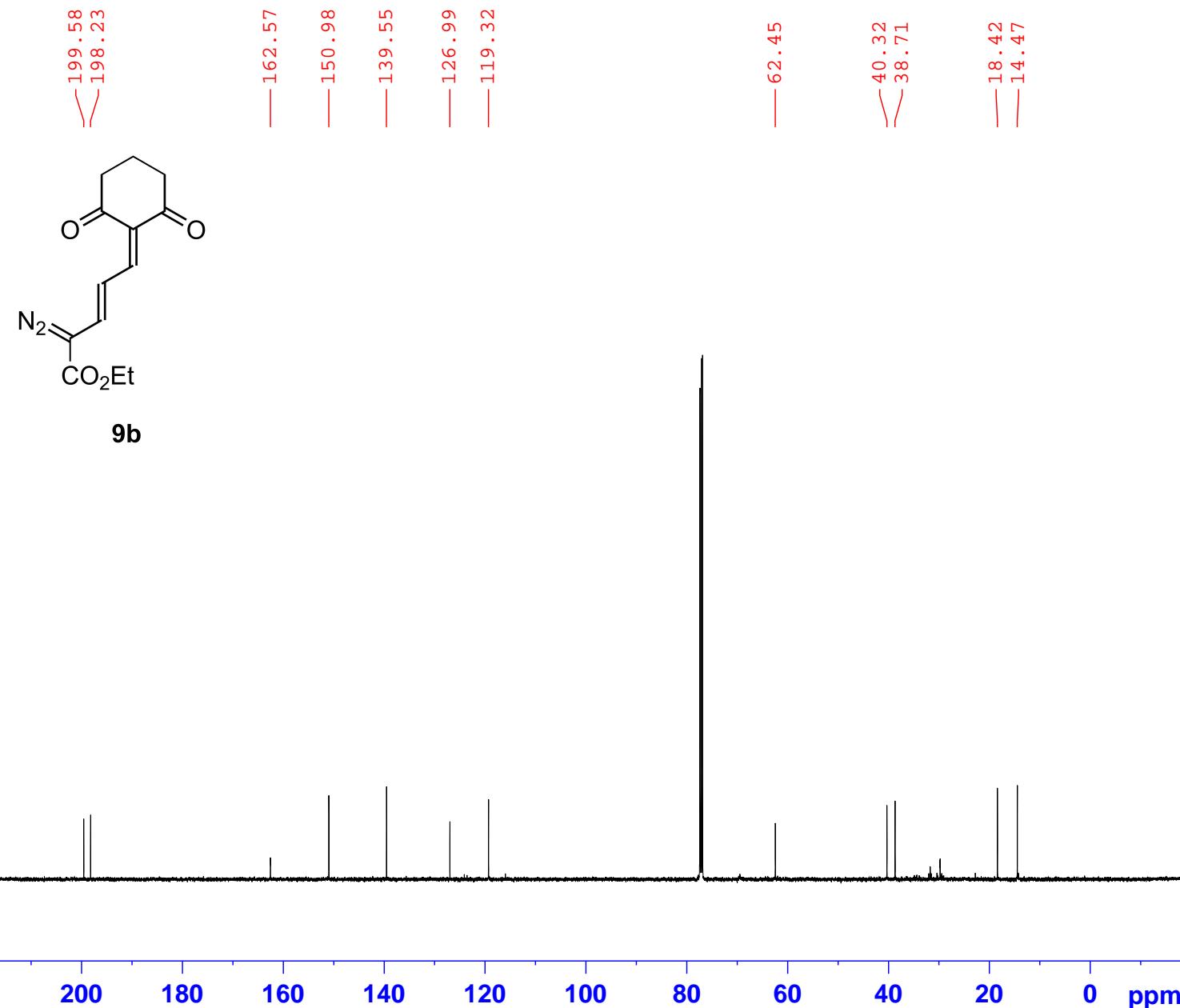
Current Data Parameters
NAME 8A-BSL-05-414(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180901
Time 11.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 20000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6384000 sec
RG 128
DW 25.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1300000 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300147 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-414(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 6



Current Data Parameters
NAME 8A-BSL-05-414(500MHz)
EXPNO 2
PROCNO 1

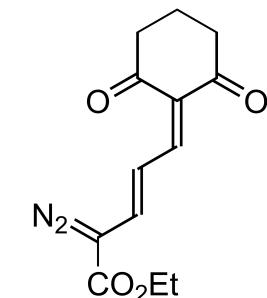
F2 - Acquisition Parameters
Date_ 20180901
Time 14.15
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

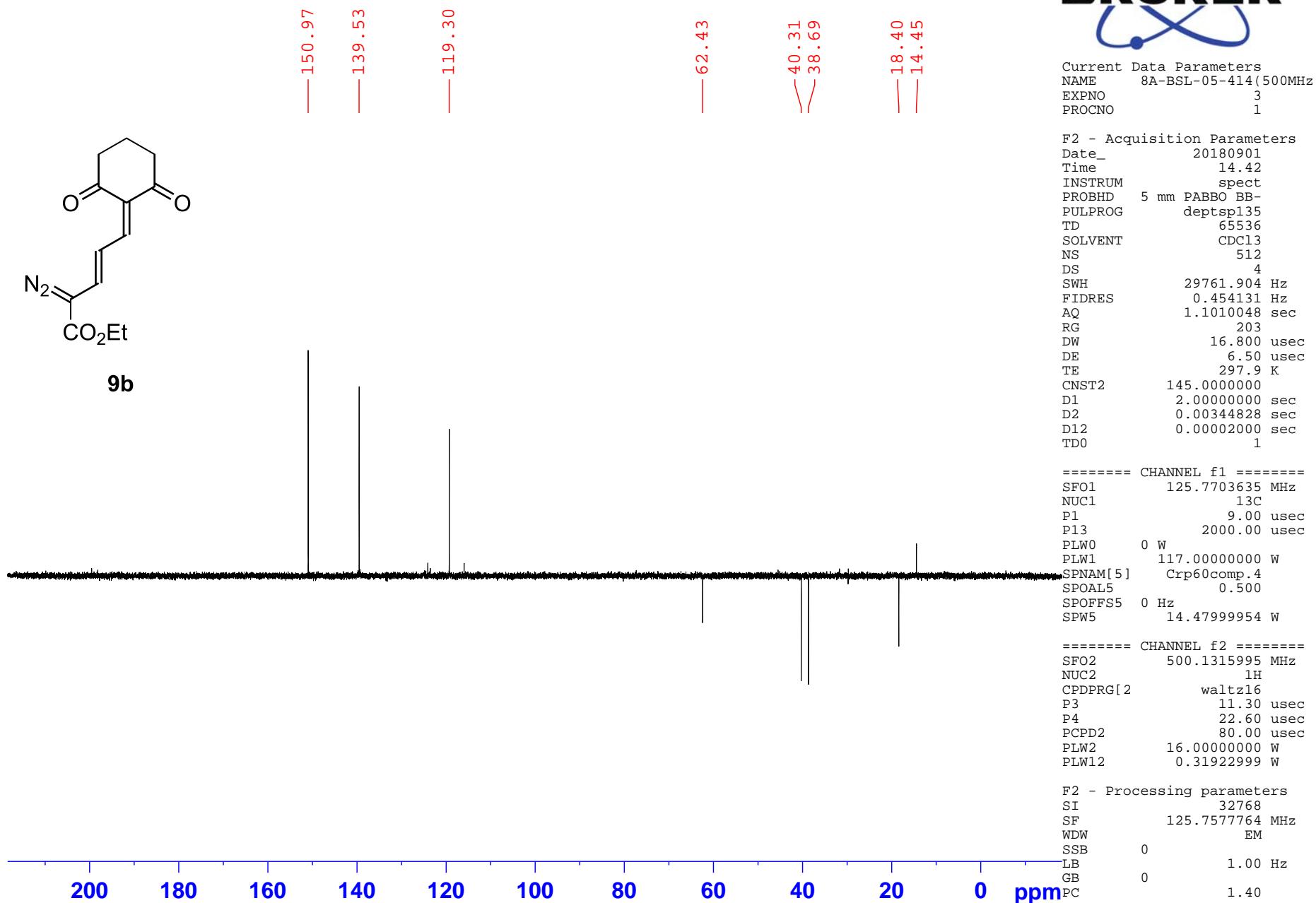
===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577743 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-414(500MHz)
C13DEPT135 CDCl₃ /opt/topspin/sk nmrsu 6



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Current Data Parameters
NAME 8A-BSL-05-414(500MHz)
EXPNO 3
PROCNO 1

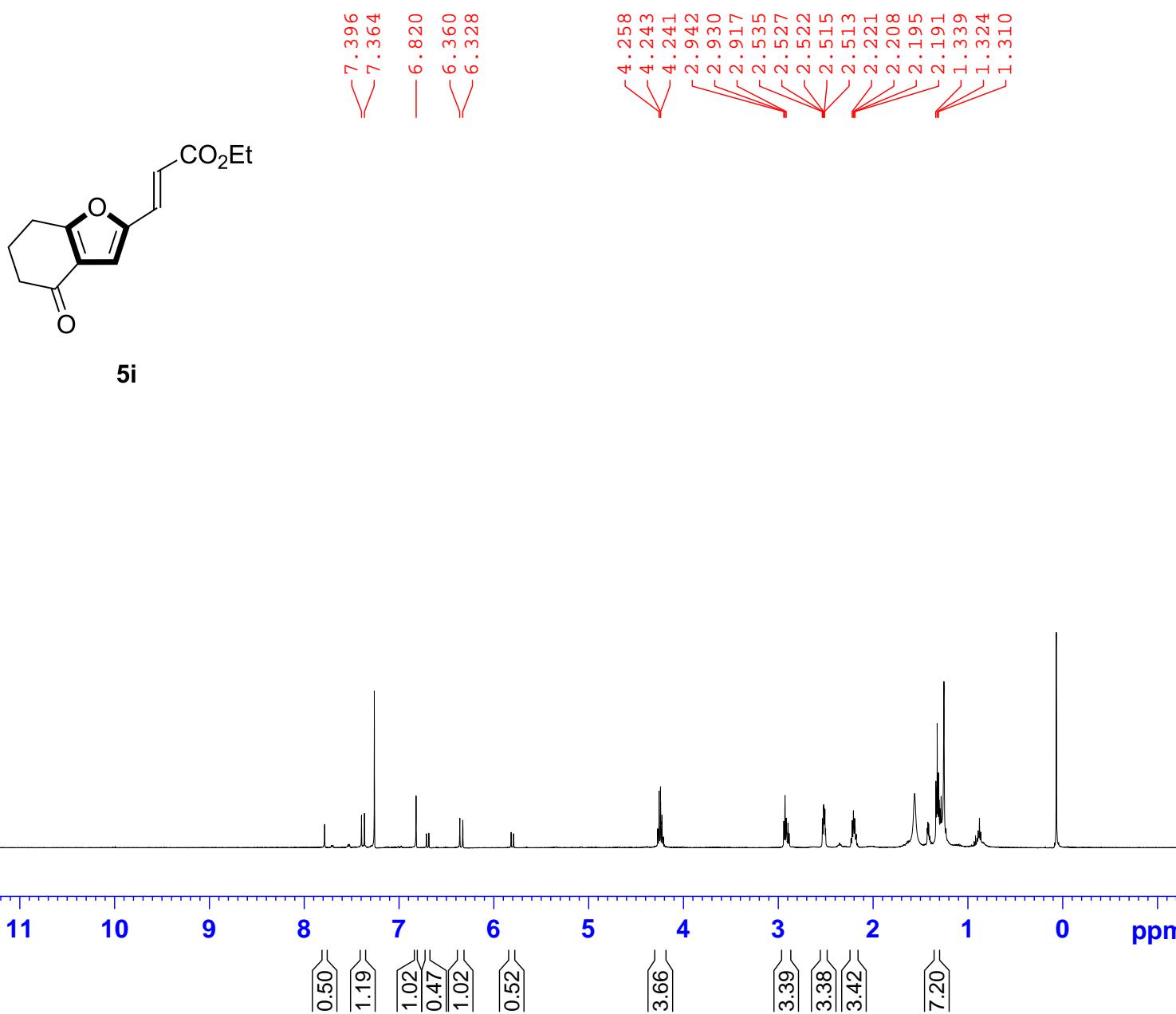
F2 - Acquisition Parameters
Date_ 20180901
Time 14.42
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG deptsp135
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 297.9 K
CNST2 145.0000000
D1 2.0000000 sec
D2 0.00344828 sec
D12 0.00002000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703635 MHz
NUC1 13C
P1 9.00 usec
P13 2000.00 usec
PLW0 0 W
PLW1 117.00000000 W
SPNAM[5] Crp60comp.4
SPOALS5 0.500
SPOFFSS 0 Hz
SPW5 14.47999954 W

===== CHANNEL f2 =====
SFO2 500.1315995 MHz
NUC2 1H
CPDPRG[2] waltz16
P3 11.30 usec
P4 22.60 usec
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W

F2 - Processing parameters
SI 32768
SF 125.7577764 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-415-1(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 18



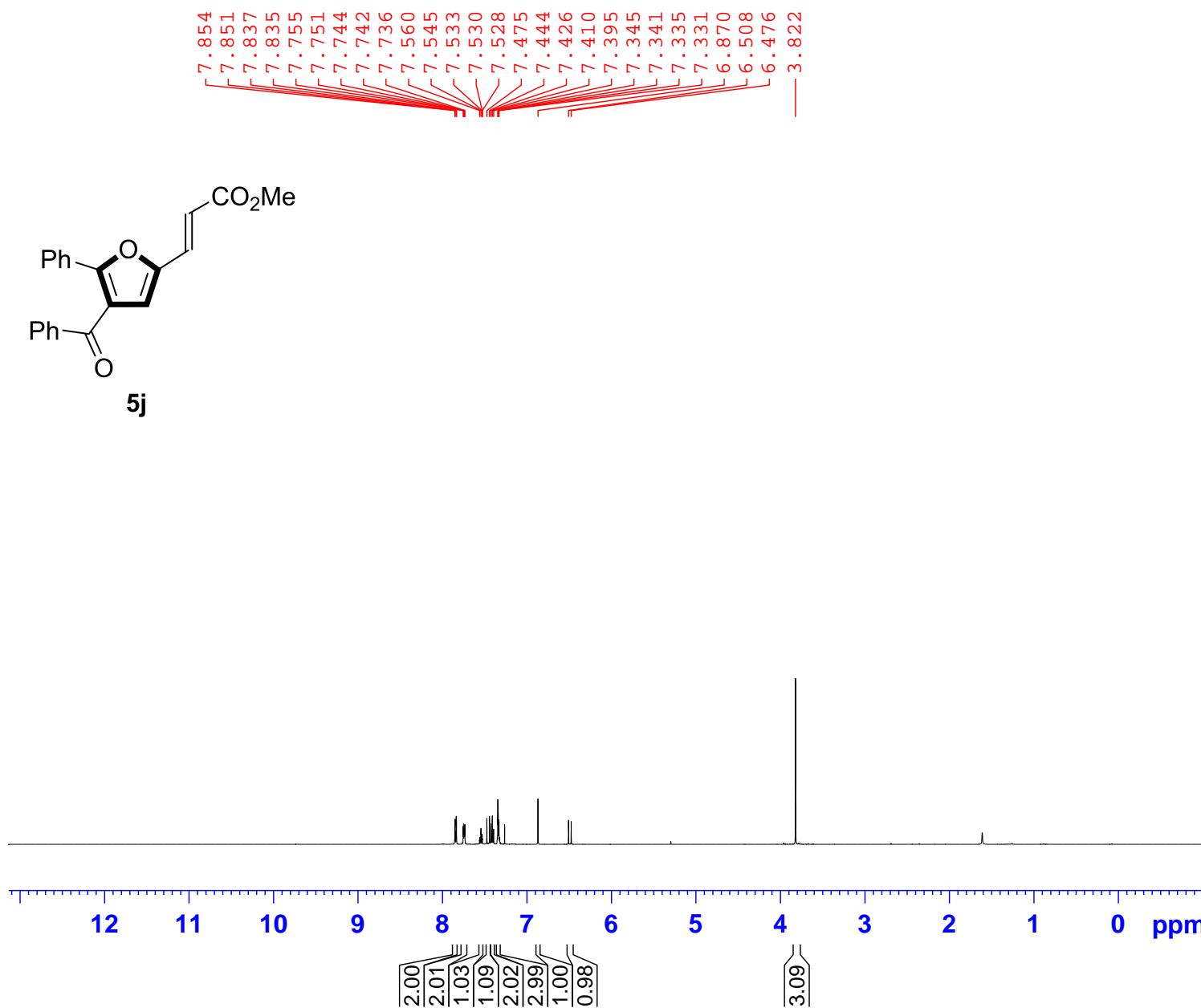
Current Data Parameters
NAME 5i-BSL-415-1(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180903
Time 11.09
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 20000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6384000 sec
RG 203
DW 25.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1300000 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300136 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-18 (500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 3



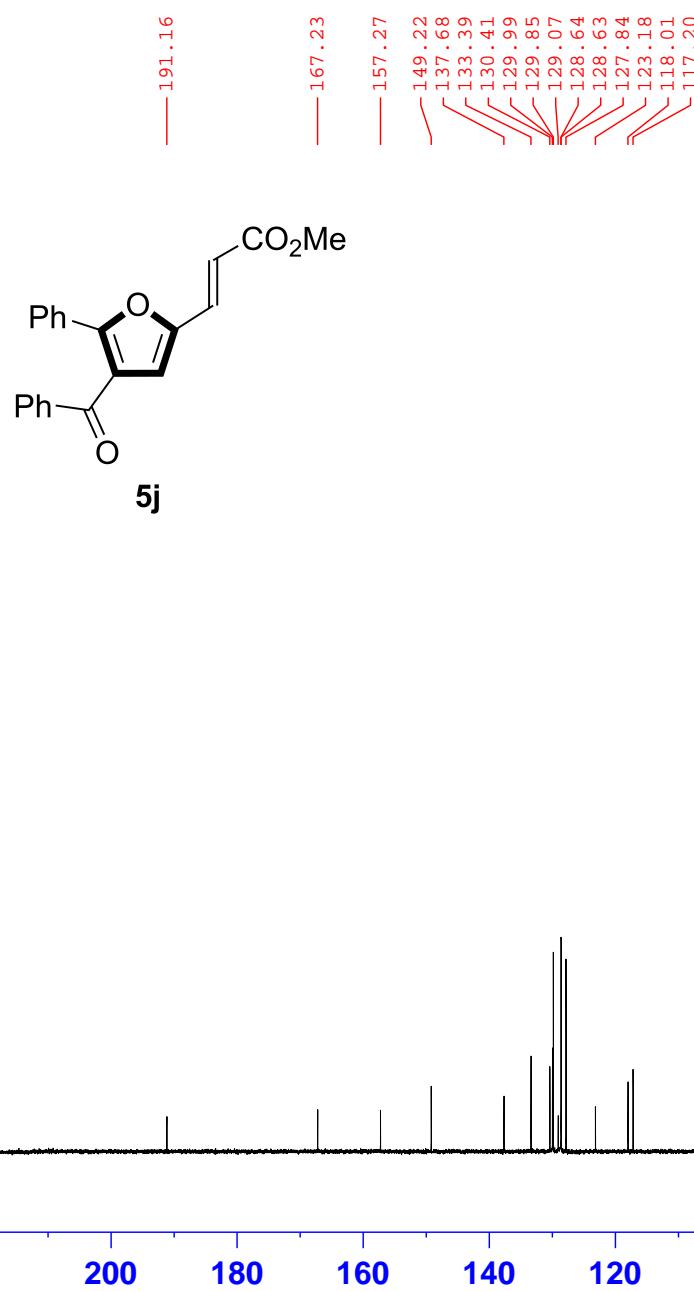
Current Data Parameters
NAME SK-BSL-04-18 (500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20151026
Time 10.22
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 128
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.00000000 W

F2 - Processing parameters
SI 65536
SF 500.1300109 MHz
WDW EM
SSB 0
LB 0 0.30 Hz
GB 0
PC 1.00

SK-BSL-04-18 (500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 3



Current Data Parameters
NAME SK-BSL-04-18(500MHz)
EXPNO 2
PROCNO 1

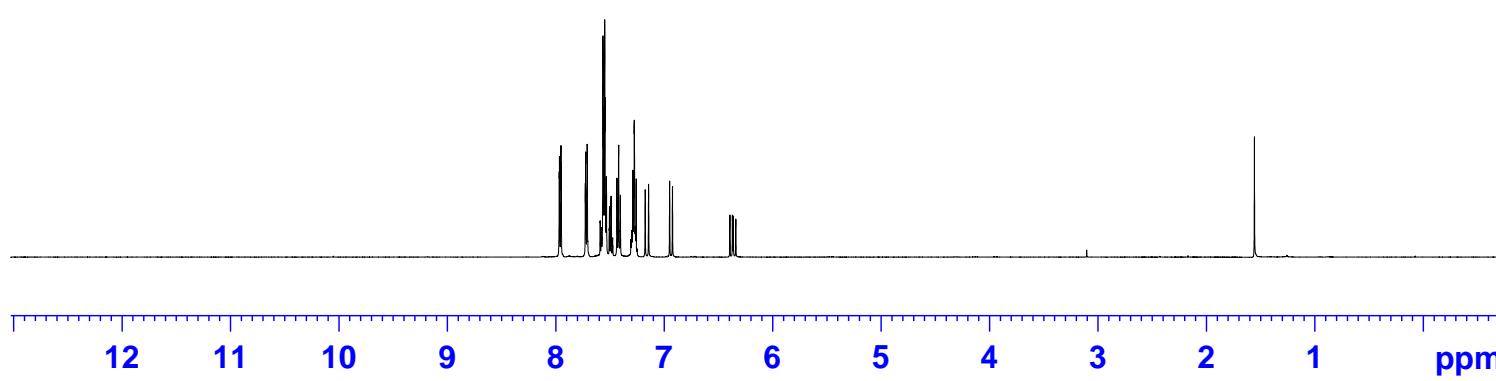
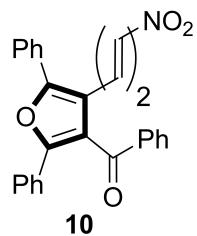
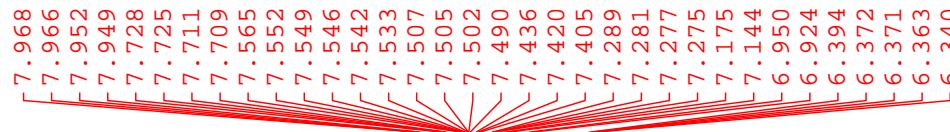
F2 - Acquisition Parameters
Date_ 20151026
Time 13.49
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577728 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-151-1(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 6



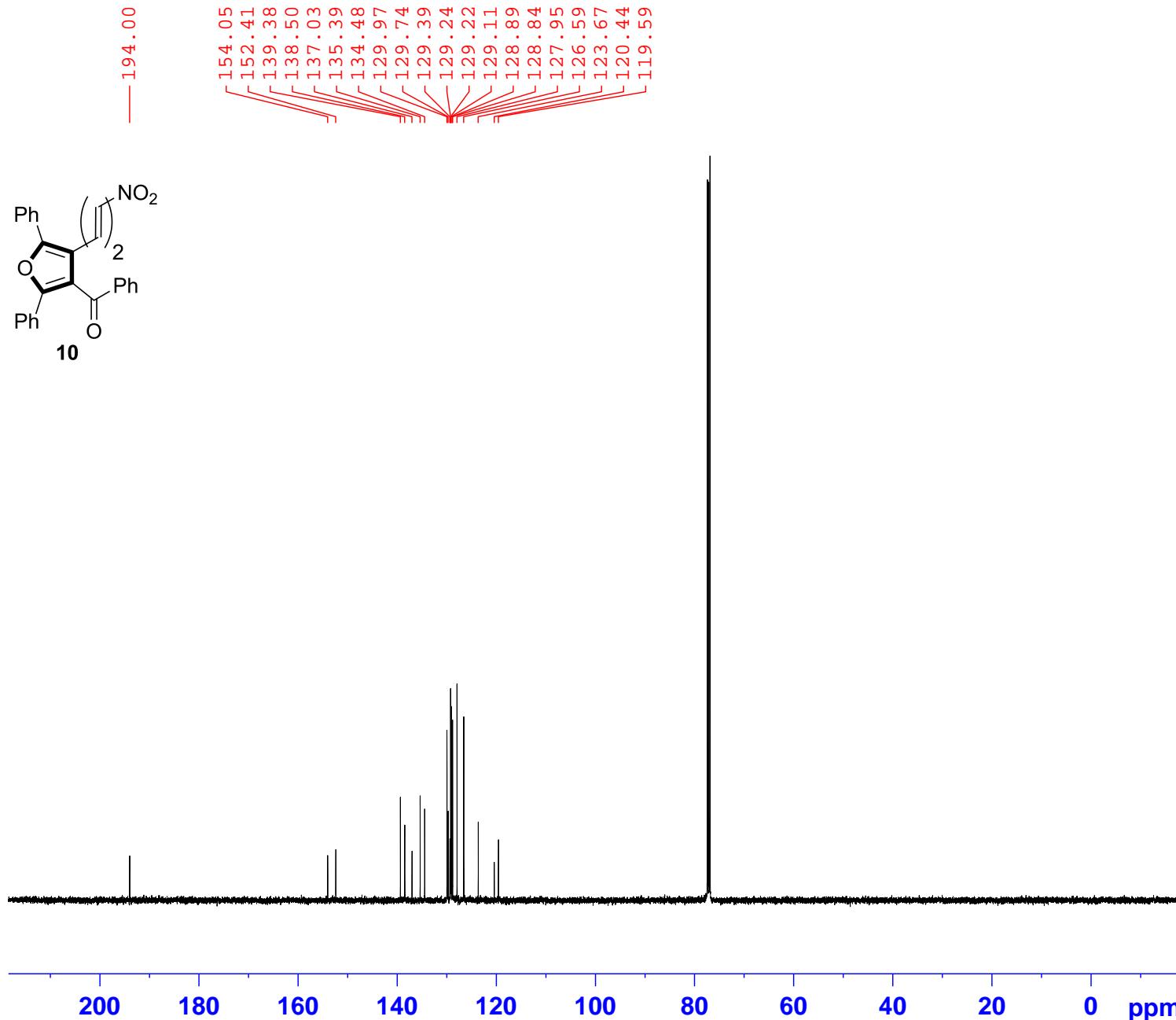
Current Data Parameters
NAME 9- BSL-05-151-1(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20170213
Time 11.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300140 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-151-1(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 6



Current Data Parameters
NAME 9- BSL-05-151-1(500MHz)
EXPNO 2
PROCNO 1

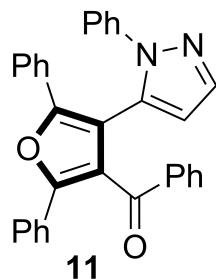
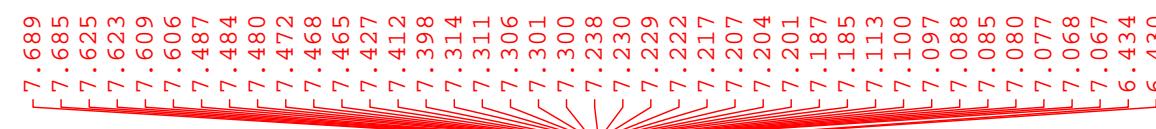
F2 - Acquisition Parameters
Date_ 20170213
Time 14.09
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 512
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577726 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-303A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 6



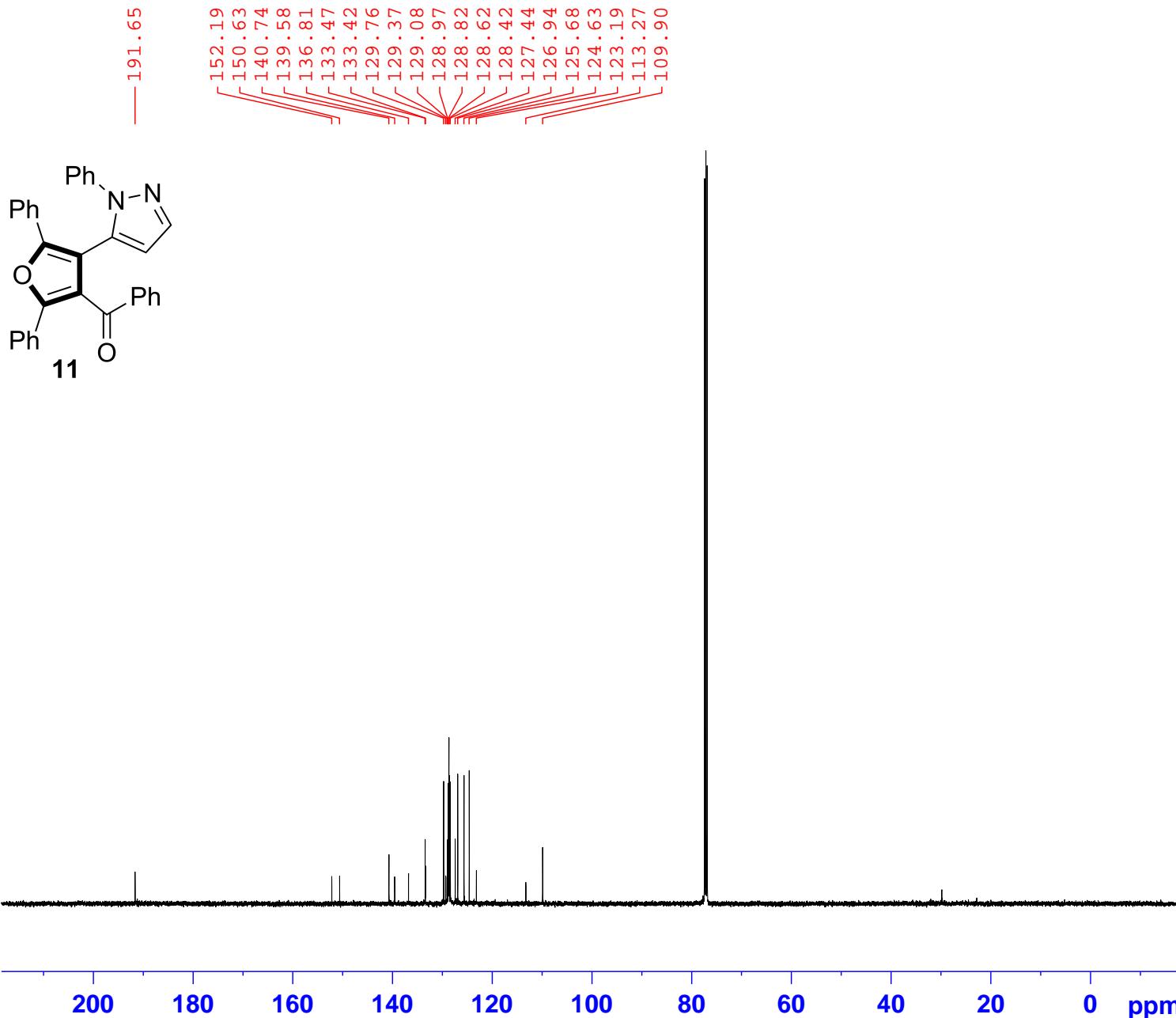
Current Data Parameters
NAME 10- BSL-05-303A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20170620
Time 16.53
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 144
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1300137 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-303A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 6



Current Data Parameters
NAME 10- BSL-05-303A(500MHz)
EXPNO 2
PROCNO 1

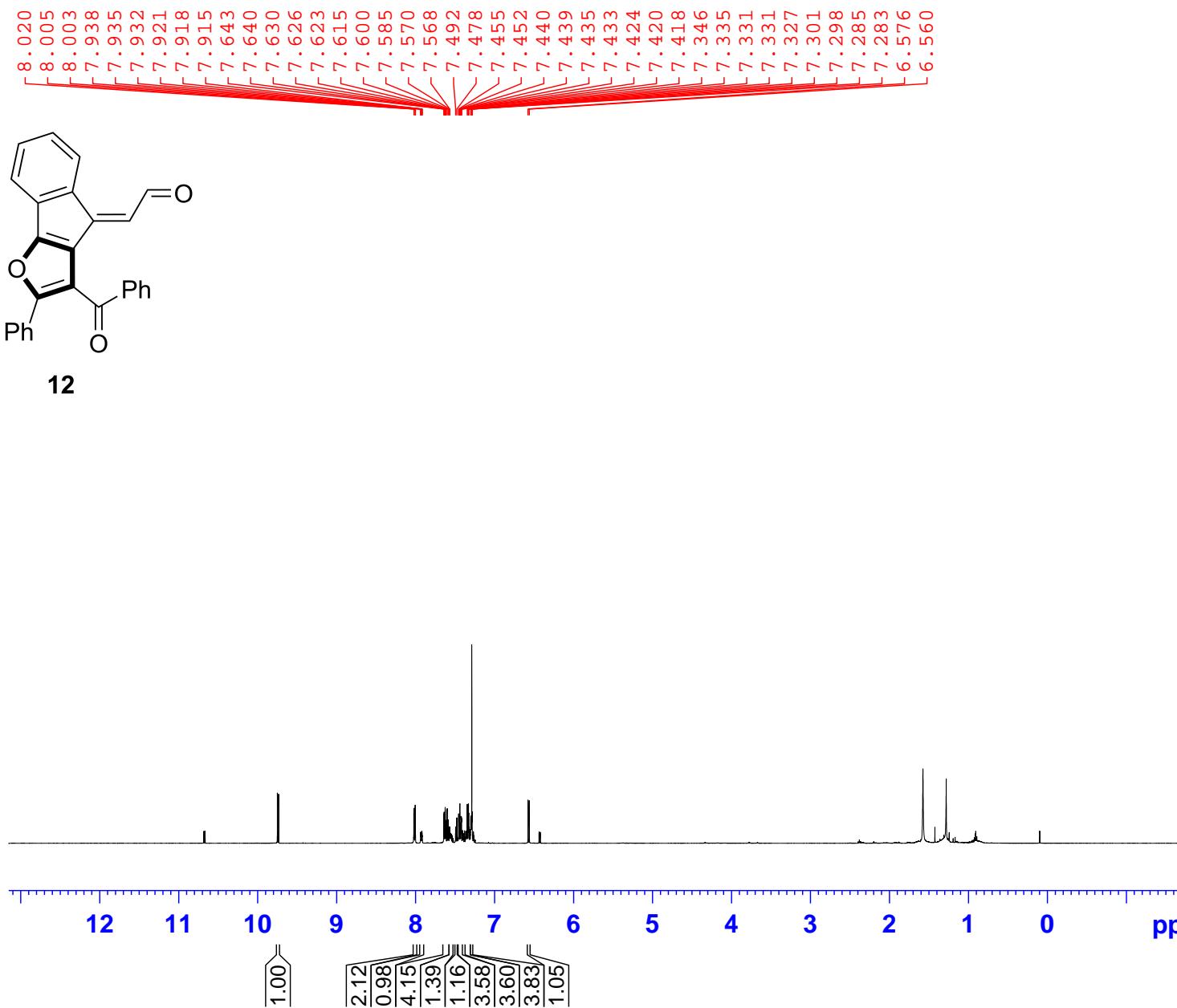
F2 - Acquisition Parameters
Date_ 20170620
Time 19.36
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1024
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577721 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-349-3-A(500MHz)
PROTONRO CDC13 /opt/topspin/sk nmrsu 8



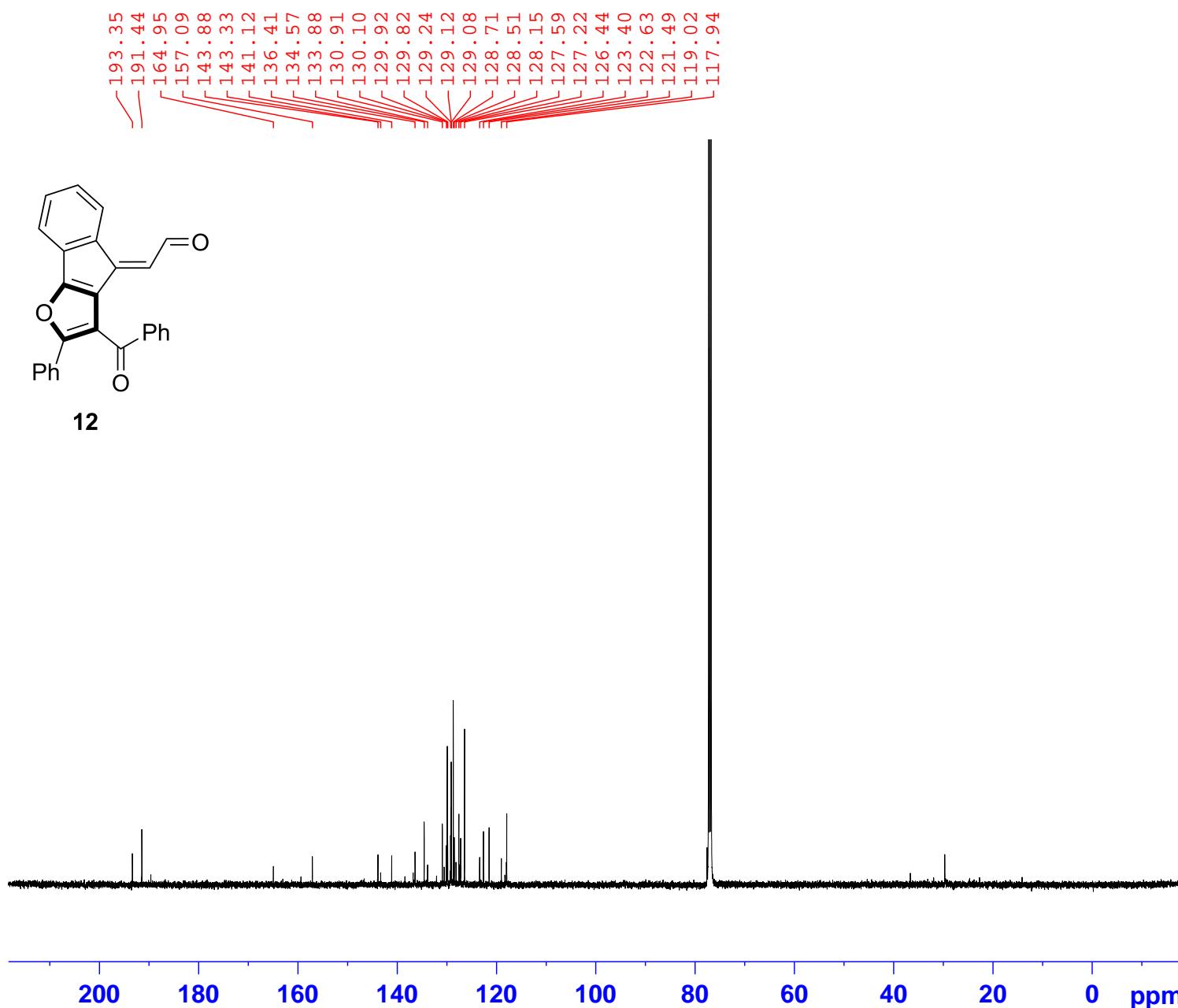
Current Data Parameters
NAME 11- BSL-05-349-3-A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180430
Time 19.51
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 64
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2767999 sec
RG 203
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 500.1330885 MHz
NUC1 1H
P1 10.78 usec
PLW1 16.0000000 W

F2 - Processing parameters
SI 65536
SF 500.1299994 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

SK-BSL-05-349-3-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 8



Current Data Parameters
NAME 11- BSL-05-349-3-A(500MHz)
EXPNO 2
PROCNO 1

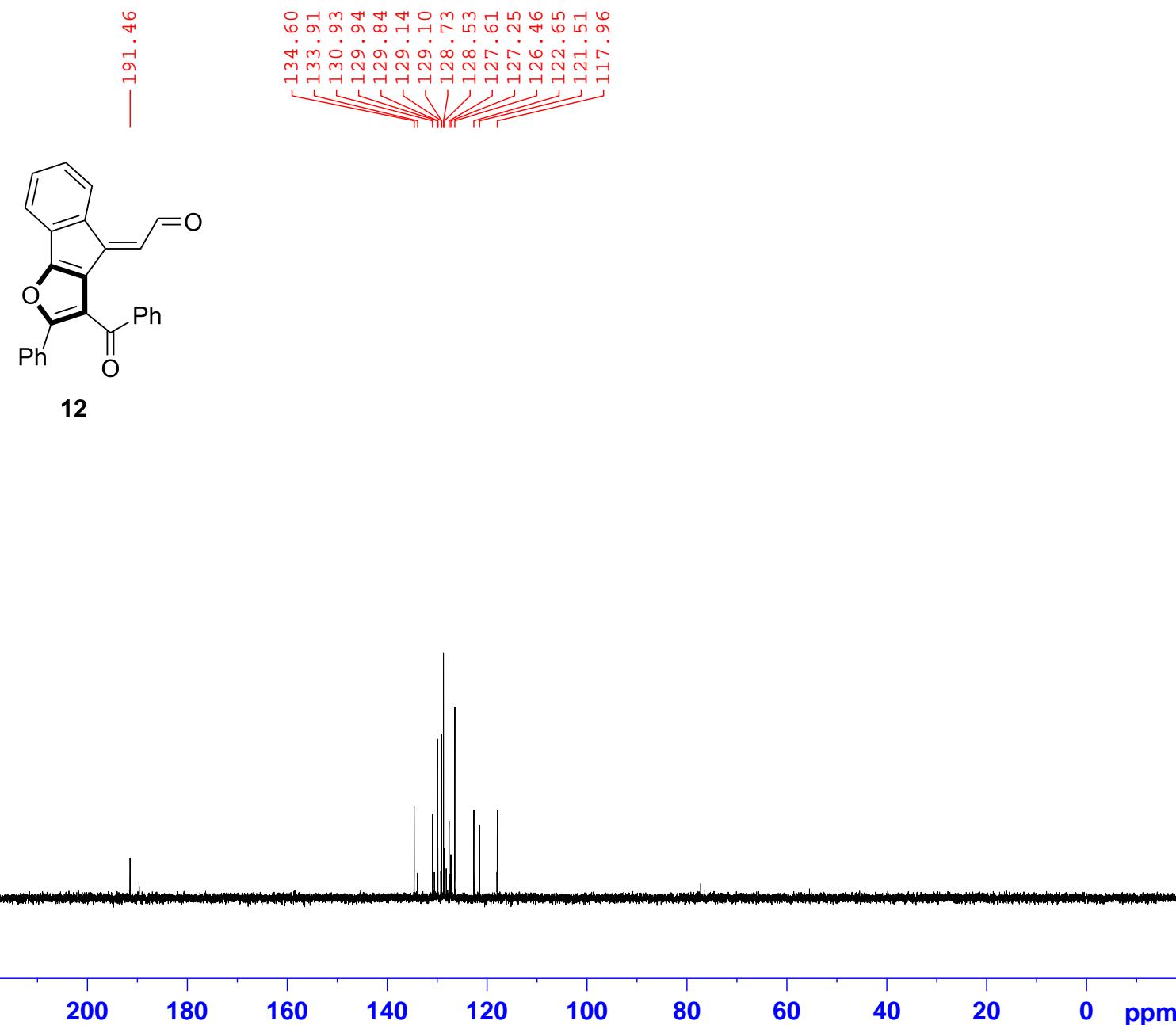
F2 - Acquisition Parameters
Date_ 20180501
Time 9.04
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgppg30
TD 65536
SOLVENT CDCl₃
NS 15000
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 ¹³C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 ¹H
CPDPG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577890 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-349-3-A(500MHz)
C13DEPT135 CDCl₃ /opt/topspin/sk nmrsu 17



Current Data Parameters
NAME 11- BSL-05-349-3-A(500MHz)
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180501
Time 14.28
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG deptspl35
TD 65536
SOLVENT CDCl₃
NS 3000
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
CNST2 145.0000000
D1 2.0000000 sec
D2 0.00344828 sec
D12 0.00002000 sec
TD0 1

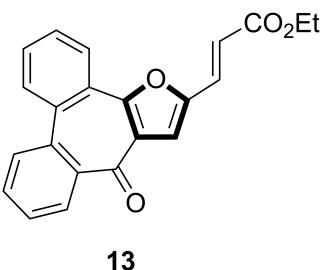
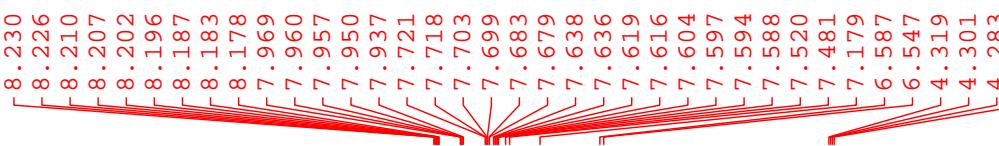
===== CHANNEL f1 =====
SFO1 125.7703635 MHz
NUC1 ¹³C
P1 9.00 usec
P13 2000.00 usec
PLW0 0 W
PLW1 117.00000000 W
SPNAM[5] Crp60comp.4
SPOAL5 0.500
SPOFFS5 0 Hz
SPW5 14.47999954 W

===== CHANNEL f2 =====
SFO2 500.1315995 MHz
NUC2 ¹H
CPDPRG[2] waltz16
P3 11.30 usec
P4 22.60 usec
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W

F2 - Processing parameters
SI 32768
SF 125.7577864 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-340-A

PROTONRO CDC13 /opt/topspin/nmrsu/SK/MAR18 nmrsu 50



1.377
1.359
1.341



Current Data Parameters
NAME SK-BSL-05-340-A
EXPNO 1
PROCNO 1

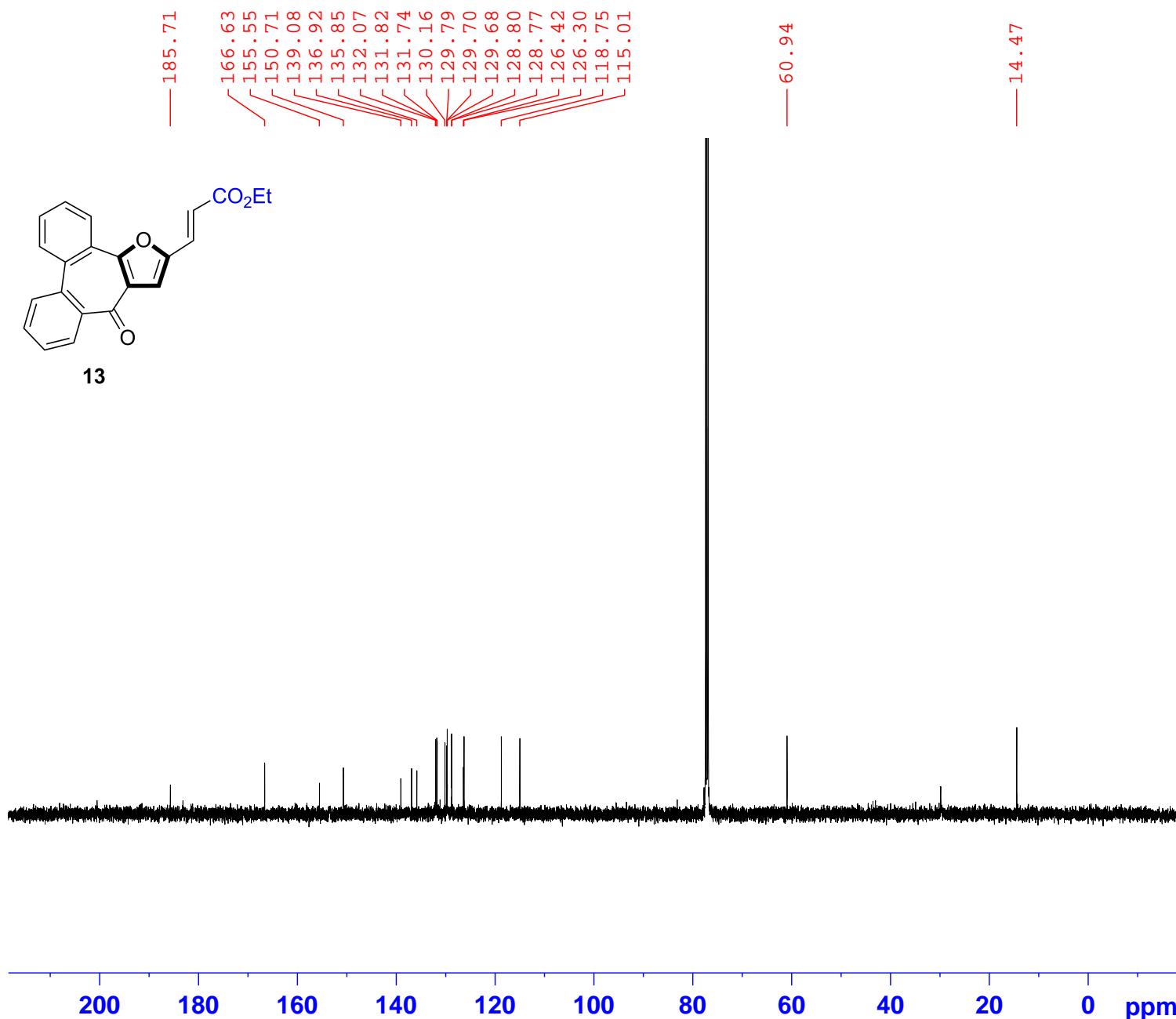
F2 - Acquisition Parameters

Date_ 20180321
Time 16.55 h
INSTRUM spect
PROBHD Z8247_0068 (PH
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8196.722 Hz
FIDRES 0.250144 Hz
AQ 3.9976959 sec
RG 203
DW 61.000 usec
DE 6.50 usec
TE 298.1 K
D1 1.00000000 sec
TD0 1
SFO1 400.1324008 MHz
NUC1 1H
P1 6.40 usec
PLW1 14.10000038 W

F2 - Processing parameters

SI 32768
SF 400.1300112 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-340-A(500MHz)
C13CPD CDCl₃ /opt/topspin/sk nmrsu 7



Current Data Parameters
NAME SK-BSL-05-340-A(500MHz)
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180322
Time 21.35
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl₃
NS 1500
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010048 sec
RG 203
DW 16.800 usec
DE 6.50 usec
TE 298.1 K
D1 2.0000000 sec
D11 0.03000000 sec
TD0 1

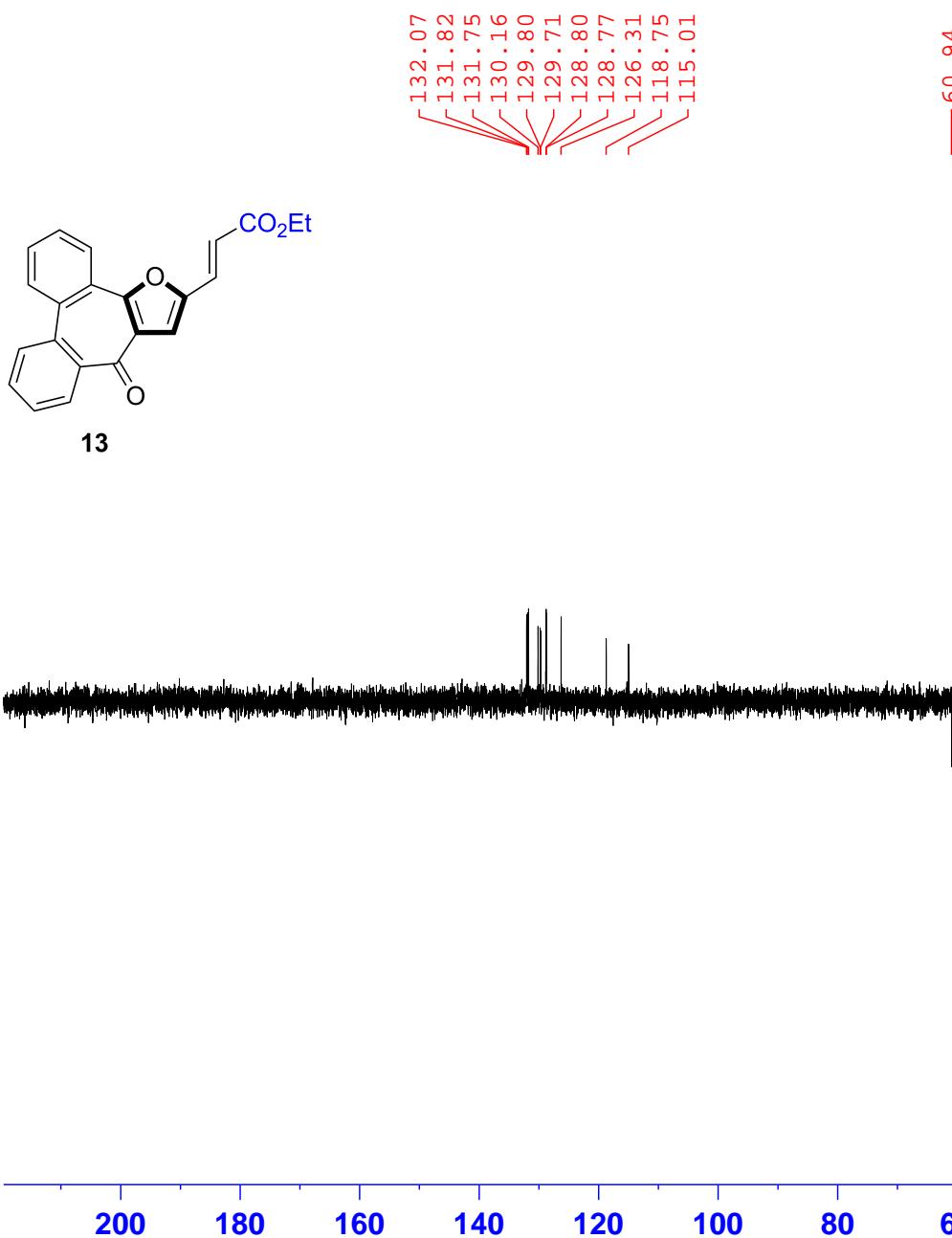
===== CHANNEL f1 =====
SFO1 125.7703637 MHz
NUC1 13C
P1 9.00 usec
PLW1 117.00000000 W

===== CHANNEL f2 =====
SFO2 500.1320005 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 80.00 usec
PLW2 16.00000000 W
PLW12 0.31922999 W
PLW13 0.16000000 W

F2 - Processing parameters
SI 32768
SF 125.7577704 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

SK-BSL-05-340-A

C13DEPT135 CDCl₃ /opt/topspin/nmrsu/SK/MAR18 nmrsu 50



Current Data Parameters
NAME SK-BSL-05-340-A
EXPNO 3
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180321
Time 22.40 h
INSTRUM spect
PROBHD Z8247_0068 (PH
PULPROG deptsp135
TD 65536
SOLVENT CDCl₃
NS 512
DS 8
SWH 24038.461 Hz
FIDRES 0.733596 Hz
AQ 1.3631488 sec
RG 203
DW 20.800 usec
DE 6.50 usec
TE 298.2 K
CNST2 145.0000000
D1 2.00000000 sec
D2 0.00344828 sec
D12 0.00002000 sec
TD0 1
SFO1 100.6228293 MHz
NUC1 ¹³C
P1 13.60 usec
P13 2000.00 usec
PLW0 0 W
PLW1 86.40000153 W
SPNAM[5] Crp60comp.4
SPOAL5 0.500
SPOFFS5 0 Hz
SPW5 24.41600037 W
SFO2 400.1316005 MHz
NUC2 1H
CPDPRG[2] waltz16
P3 6.40 usec
P4 12.80 usec
PCPD2 90.00 usec
PLW2 14.10000038 W
PLW12 0.07130100 W

F2 - Processing parameters
SI 32768
SF 100.6127539 MHz
WDW EM
SSB 0
LB 0 1.00 Hz
GB 0 1.40