Supporting Information

Direct Synthesis of Dialkylaryl-vinylsilane Derivatives: Metathesis of Dialkylaryl-iso-propenylsilane and Its Application to Tetracyclic Silacycle Dye Synthesis

Shohei Yoshioka, Tsunayoshi Takehara, Tsuyoshi Matsuzaki, Takeyuki Suzuki, Hirofumi Tsujino, Tadayuki Uno, Yasuo Tsutsumi, Kenichi Murai, Hiromichi Fujioka, Mitsuhiro Arisawa*

Graduate School of Pharmaceutical Sciences, Osaka University

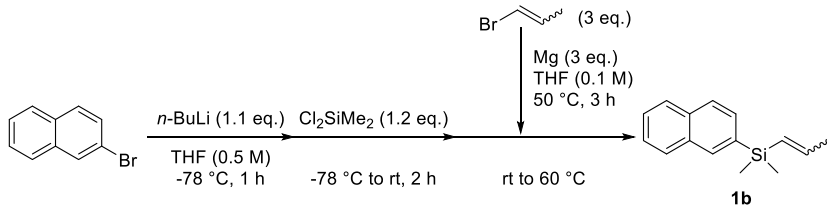
1-6 Yamada-oka, Suita, Osaka 565-0871, Japan

arisaw@phs.osaka-u.ac.jp

General

^{1}H-NMR spectra were recorded in $CDCl_3$ at 25 °C unless otherwise noted, at 300, 400 or 500 MHz, with TMS as an internal standard. ^{13}C-NMR spectra were recorded in $CDCl_3$ at 25 °C unless otherwise noted, at 300, 400 or 500MHz with TMS or $CDCl_3$ as an internal standard. ^{19}F NMR spectra were recorded in $CDCl_3$ at 25 °C unless otherwise noted, at 470 MHz, with C_6F_6 as an internal standard

1. Synthesis of Cross metathesis substrate **1**

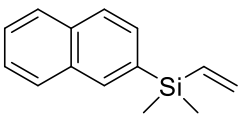


To a solution of 2-bromonaphtalene (5.0 mmol, 1.035 g) in THF (0.5 M) was added dropwise 2.76 M *n*-BuLi (1.1 eq.) in *n*-hexane at -78 °C. After the mixture was stirred at -78 °C for 1 h, Me_2SiCl_2 (1.2 eq.) was added dropwise to the mixture. The reaction mixture was warmed to room temperature over 2 h. We call this reaction mixture, solution α.

On the other hand, to a solution of magnesium (3.0 eq.) in THF (0.2 M) was added dropwise a solution of 1-bromopropene in THF (0.2 M) at 50 °C for 3 h. We call this reaction mixture, solution β.

To a solution α was dropwisely added solution β at room temperature and heated to 50 °C for 3 h. After that, the reaction was quenched by the addition of 1M HCl aq. to the reaction mixture. The organic compound was extracted with $CHCl_3$. The organic layer was dried over Na_2SO_4, and the solvent was evaporated. The residue was subjected to column chromatography (only *n*-hexane) on silica gel 60N to give compound **1b** (a colorless oil, E/Z = 7/2: 0.550 mmol, 124.6 mg, 11%).

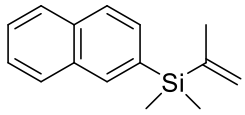
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.02 (1H, s), 7.86-7.81 (3H, m), 7.64-7.62 (1H, m), 7.49-7.46 (2H, m), 6.58 (1H, ddd, *J* = 14.0, 6.8, 1.8 Hz), 5.73 (1H, d, *J* = 14.0 Hz), 1.73 (3H, dd, *J* = 6.8, 1.8 Hz), 0.43 (6H, s).^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 144.45, 136.83, 134.49, 133.79, 133.07, 130.37, 129.34, 128.18, 127.83, 127.01, 126.36, 125.96, 22.89, -2.29 HRMS (MALDI-TOF) calcd for $C_{15}H_{18}NaSi$: 249.1070 ($[M + Na]^+$), found 249.1074 ($[M + Na]^+$).



1a

1a (a yellow oil, quant, 1.06 g, 5.00 mmol) was prepared from 2-bromonaphtalene (1.04 mg, 0.500 mmol) by the same procedure with **1b** using dimethylvinylchlorosilane instead of dimethyldichlorosilane and Grignard reagent.

^{1}H-NMR ($CDCl_3$, 300 MHz) δ: 8.04 (1H, s), 7.89-7.82 (3H, m), 7.62 (1H, dd, *J* = 8.0, 1.1 Hz), 7.52-7.48 (2H, m), 6.39 (1H, dd, *J* = 20.2, 14.7 Hz), 6.12 (1H, dd, *J* = 14.7, 3.7 Hz), 5.83 (1H, dd, *J* = 20.2, 3.7 Hz), 0.46 (6H, s). ^{13}C-NMR (75 MHz, $CHCl_3$) δ: 137.98, 135.90, 134.54, 133.76, 133.14, 132.97, 130.18, 128.12, 127.77, 127.04, 126.39, 125.97, -2.79. HRMS (ESI) calcd for $C_{14}H_{16}Si$: 213.1100 ($[M+H]^+$), found 213.1092 ($[M+H]^+$).

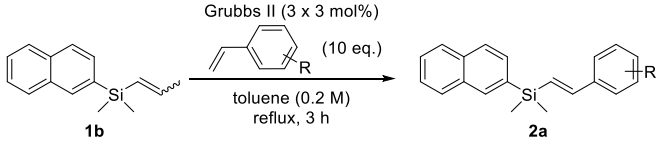


1c

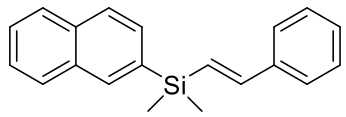
1c (a colorless oil, 43%, 0.486 g, 0.215 mmol) was prepared from 2-bromonaphtalene (1.04 mg, 0.500 mmol) by the same procedure with **1b** using 2-bromopropene instead of 1-bromopropene.

^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 8.12 (1H, s), 7.94-7.91 (3H, m), 7.69 (1H, dd, J = 8.0, 1.1 Hz), 7.57-7.56 (2H, m), 5.83 (1H, s), 5.50 (1H, s), 0.55 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 146.10, 135.56, 134.62, 133.81, 133.02, 130.28, 128.14, 127.79, 127.03, 126.82, 126.38, 125.94, 22.70, -3.35 HRMS (ESI) calcd for $C_{15}H_{18}NaSi$: 249.1070 ($[M+Na]^+$) found 249.1066 ($[M+Na]^+$)

2. Cross metathesis of compound **1b** (general procedure **A)**



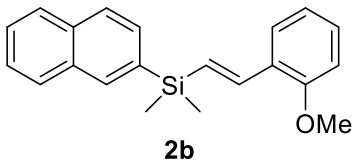
To a solution of **1b** (1.0 mmol) in toluene (0.2 M) was added Grubbs II (3 x 3 mol%, every hour) and the mixture was refluxed for 3 h. The solvent was evaporated and the residue was subjected to column chromatography on neutral flash silica gel 60N to give **2a**.



2a

2a (a colorless oil, 85%, 24.5 mg, 0.850 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and styrene (104.2 mg, 1.00 mmol) by a general procedure **A**.

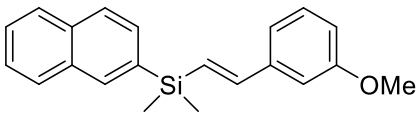
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.07 (1H, s), 7.86-7.82 (3H, m), 7.65 (1H, dd, J = 8.5, 1.2 Hz), 7.50-7.46 (4H, m), 7.37-7.32 (2H, m), 7.29-7.26 (1H, m), 6.99 (1H, d, J = 19.5 Hz), 6.66 (1H, d, J = 19.5 Hz), 0.52 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 145.5, 138.2, 136.1, 134.6, 133.8, 133.0, 130.3, 128.6, 128.3, 128.1, 127.8, 127.1, 126.61, 126.58, 126.4, 126.00, -2.4. HRMS (ESI) calcd for $C_{20}H_{20}Si$: 311.1232 ($[M+Na]^+$) found 311.1221 ($[M+Na]^+$)



2b

2d (a colorless oil, 97%, 30.8 mg, 0.967 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and 2-vinylanisole (134.2 mg, 1.00 mmol) by a general procedure **A**.

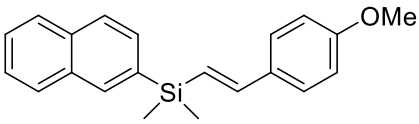
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.91 (1H, s), 7.69-7.64 (3H, m), 7.49 (1H, dd, J = 8.1, 1.1 Hz), 7.42 (1H, dd, J = 7.8, 1.8 Hz), 7.32-7.29 (3H, m), 7.08-7.05 (1H, m), 6.79 (1H, d, J = 7.8 Hz), 6.70 (1H, dd, J = 8.1, 0.9 Hz), 6.47 (1H, d, J = 19.2 Hz), 3.66 (3H, s), 0.36 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 156.8, 139.9, 136.6, 134.7, 133.8, 133.1, 130.4, 129.4, 128.2, 127.8, 127.4, 127.4, 127.1, 126.5, 126.4, 126.0, 120.7, 111.1, 55.6, -2.2 HRMS (MALDI-TOF) calcd for $C_{21}H_{22}ONaSi$: 341.1332 ($[M+Na]^+$), found 341.1329 ($[M+Na]^+$).



2c

2c (a colorless oil, 84%, 26.8 mg, 0.842 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and 3-vinylanisole (134.2 mg, 1.00 mmol) by a general procedure **A**.

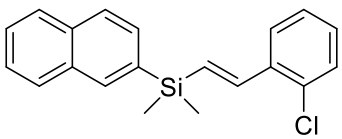
^{1}H-NMR ($CDCl_3$, 400MHz) δ: 8.08 (1H, s), 7.88-7.84 (3H, m), 7.66 (1H, dd, *J* = 8.2, 0.9 Hz), 7.52-7.49 (2H, m), 7.27 (1H, dd, *J* = 8.2, 8.2 Hz), 7.08 (1H, d, *J* = 8.0 Hz), 7.02 (1H, dd, *J* = 2.1, 2.1 Hz), 6.97 (1H, d, *J* = 19.0 Hz), 6.84 (1H, dt, *J* = 8.0, 1.4 Hz), 6.66 (1H, d, *J* = 19.0 Hz), 3.83 (3H, s), 0.54 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 156.0, 145.4, 139.7, 136.0, 134.7, 133.8, 133.0, 130.3, 129.6, 128.2, 127.8, 127.5, 127.1, 126.5, 126.0, 119.4, 114.3, 111.4, 55.3, -2.4 HRMS (MALDI-TOF) calcd for $C_{21}H_{22}OSi$: 318.1434 ($[M+H]^+$), found 318.1435 ($[M+H]^+$).



2d

2d (a colorless oil, 90%, 28.7 mg, 0.901 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-vinylanisole (134.2 mg, 1.00 mmol) by a general procedure **A**.

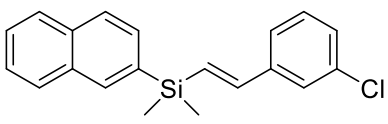
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.09 (1H, s), 7.89-7.84 (3H, m), 7.67 (1H, dd, *J* = 8.2, 0.9 Hz), 7.52-7.49 (2H, m), 7.45-7.42 (2H, m), 6.96 (1H, d, *J* = 19.2 Hz), 6.91-6.87 (2H, m), 6.51 (1H, d, *J* = 19.2 Hz), 3.83 (3H, s), 0.53 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 159.8, 145.0, 136.4, 134.6, 133.8, 133.0, 131.2, 130.4, 128.2, 127.9, 127.8, 127.1, 126.4, 126.0, 124.2, 114.0, 55.4, -2.2. HRMS (MALDI-TOF) calcd for $C_{21}H_{22}OSi$: 318.1434 ($[M+H]^+$), found 318.1432 ($[M+H]^+$).



2e

2e (a colorless oil, 52%, 16.9 mg, 0.0523 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-chlorostyrene (138.6 mg, 1.00 mmol) by a general procedure **A**.

^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 8.09 (1H, s), 7.88-7.83 (3H, m), 7.68-7.65 (2H, m), 7.51-7.49 (2H, m), 7.45 (1H, d, *J* = 18.9 Hz), 7.37 (1H, d, *J* = 7.8 Hz), 7.25 (1H, dd, *J* = 7.8, 7.8 Hz), 7.22-7.19 (1H, m), 6.67 (1H, d, *J* = 18.9 Hz), 0.56 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 141.3, 136.3, 135.8, 134.6, 133.8, 133.3, 133.0, 130.8, 130.2, 129.8, 129.1, 128.2, 127.8, 127.2, 126.9, 126.5, 126.3, 126.0, -2.4 HRMS (MALDI-TOF) calcd for $C_{20}H_{19}NaSiCl$: 345.0837 ($[M+Na]^+$), found 345.0823 ($[M+Na]^+$).

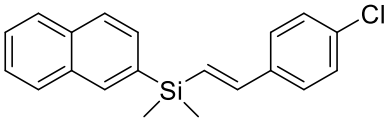


2f

2f (a colorless oil, 63%, 20.2 mg, 0.0626 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-chlorostyrene (138.6 mg, 1.00 mmol) by a general procedure **A**.

^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 8.06 (1H, s), 7.85-7.84 (3H, m), 7.64-7.62 (1H, m), 7.51-7.49 (2H, m), 7.47-7.45 (1H, m), 7.32-7.31 (1H, m), 7.28-7.22 (2H, m), 6.90

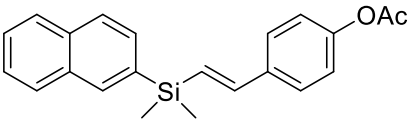
(1H, d, J = 19.5 Hz), 6.68 (1H, d, J = 18.9 Hz), 0.53 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 144.0, 140.1, 135.6, 134.7, 133.8, 133.0, 130.2, 129.8, 129.2, 128.15, 128.13, 127.8, 127.2, 126.5, 126.1, 124.9, -2.5. HRMS (MALDI-TOF) calcd for $C_{20}H_{19}SiCl$: 322.0939 ($[M+H]^+$), found 322.0934 ($[M+H]^+$).



2g

2g (a colorless oil, 69%, 22.3 mg, 0.0691 mmol) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-chlorostyrene (138.6 mg, 1.00 mmol) by a general procedure **A**.

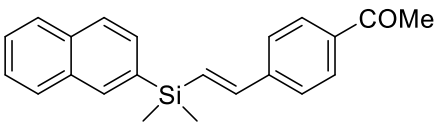
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.08 (1H, s), 7.89-7.84 (3H, m), 7.65 (1H, d, J = 7.9 Hz), 7.52-7.50 (2H, m), 7.40 (2H, d, J = 8.6 Hz), 7.31 (2H, d, J = 8.6 Hz), 6.93 (1H, d, J = 19.2 Hz), 6.64 (1H, d, J = 19.2 Hz), 0.54 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 144.1, 136.7, 135.7, 134.6, 133.9, 133.8, 133.0, 130.2, 128.8, 128.14, 128.09, 127.80, 127.76, 127.2, 126.5, 126.1, -2.4. HRMS (ESI) calcd for $C_{20}H_{19}ClSi$: 345.0842 ($[M+Na]^+$), found 345.0833 ($[M+Na]^+$).



2h

2h (a colorless oil, 88%, 30.5 mg) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-acetoxystyrene (162.2 mg, 1.00 mmol) by a general procedure **A**.

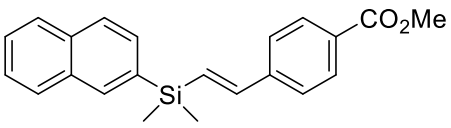
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.06 (1H, s), 7.85-7.84 (3H, m), 7.64 (1H, d, J = 8.0 Hz), 7.49-7.48 (4H, m), 7.07 (2H, d, J = 8.7 Hz), 6.96 (1H, d, J = 19.0 Hz), 6.61 (1H, d, J = 19.0 Hz), 2.30 (3H, s), 0.52 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ:169.51, 150.55, 144.42, 136.04, 135.91, 134.63, 133.79, 132.99, 130.25, 128.14, 127.78, 127.58, 127.46, 127.11, 126.45, 126.01, 121.72, 21.23, -2.39 HRMS (ESI) calcd for $C_{22}H_{22}NaO_2Si$: 369.1281 ($[M+Na]^+$) found 369.1281 ($[M+Na]^+$)



2i

2i (a pale yellow oil, 43%, 14.2 mg) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-acetylstyrene (146.2 mg, 1.00 mmol) by a general procedure **A**.

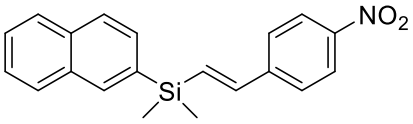
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.06 (1H, s), 7.94-7.91 (2H, m), 7.87-7.83 (3H, m), 7.63 (1H, d, J = 8.4 Hz), 7.54-7.48 (4H, m), 7.00 (1H, d, J = 19.0 Hz), 6.81 (1H, d, J = 19.0 Hz), 2.60 (3H, s), 0.53 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 197.76, 144.21, 142.54, 136.51, 135.42, 134.69, 133.85, 133.00, 131.24, 130.17, 128.82, 128.14, 127.81, 127.21, 126.69, 126.57, 126.10, 26.75, -2.50 HRMS (ESI) calcd for $C_{22}H_{22}NaOSi$: 353.1332 ($[M+Na]^+$) found 353.1331 ($[M+Na]^+$)



2j

2j (a pale yellow oil, 51%, 17.7 mg) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-(Methoxycarbonyl)styrene (162.2 mg, 1.00 mmol) by a general procedure **A**.

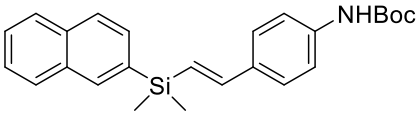
^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 8.07 (1H, s), 8.02-8.00 (2H, m), 7.86-7.85 (3H, m), 7.64 (1H, d, *J* = 8.2 Hz), 7.52-7.49 (4H, m), 7.00 (1H, d, *J* = 18.9 Hz), 6.80 (1H, d, *J* = 18.9 Hz), 3.92 (3H, s), 0.54 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 166.97, 144.35, 142.40, 135.47, 134.68, 133.85, 133.00, 130.87, 130.18, 129.99, 129.54, 128.15, 127.81, 127.20, 126.55, 126.50, 126.08, 52.18, -2.50 HRMS (ESI) calcd for $C_{22}H_{22}NaO_2Si$: 369.1276 ($[M+Na]^+$) found 369.1278 ($[M+Na]^+$)



2k

2k (a pale yellow oil, 35%, 11.7 mg) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-nitrostyrene (162.2 mg, 1.00 mmol) by a general procedure **A**.

^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 8.21-8.18 (2H, m), 8.06 (1H, s), 7.86-7.84 (3H, m), 7.63 (1H, dd, *J* = 8.3, 0.9 Hz), 7.58-7.56 (2H, m), 7.52-7.49 (2H, m), 7.00 (1H, d, *J* = 18.8 Hz), 6.87 (1H, d, *J* = 18.8 Hz), 0.55 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 147.32, 144.19, 142.96, 134.90, 134.74, 133.94, 133.90, 133.00, 130.06, 128.14, 127.83, 127.33, 127.16, 126.68, 126.18, 124.06, -2.61 HRMS (ESI) calcd for $C_{20}H_{19}NNaO_2Si$: 356.1072 ($[M+Na]^+$) found 356.1075 ($[M+Na]^+$)

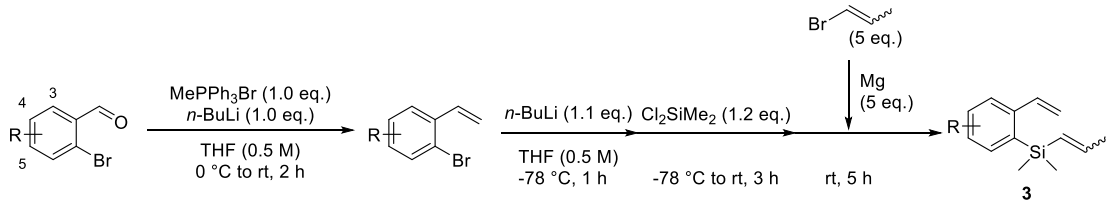


2l

2l (a pale yellow oil, 59%, 23.8 mg) was prepared from **1b** (22.6 mg, 0.100 mmol) and 4-(*tert*-butoxycarbonyl-amino)styrene (219.3 mg, 1.00 mmol) by a general procedure **A**

^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 8.06 (1H, s), 7.84-7.83 (3H, m), 7.64 (1H, d, *J* = 8.3 Hz), 7.50-7.47 (2H, m), 7.40 (2H, d, *J* = 8.6 Hz), 7.33 (2H, d, *J* = 8.6 Hz), 6.92 (1H, d, *J* = 19.2 Hz), 6.53 (1H, d, *J* = 19.2 Hz), 6.53 (1H, br s), 0.51 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 152.62, 144.88, 138.37, 136.22, 134.61, 133.79, 133.21, 133.00, 130.32, 128.15, 127.78, 127.34, 127.06, 126.39, 125.96, 125.22, 118.33, 80.74, 28.41, -2.33 HRMS (ESI) calcd for $C_{25}H_{29}NNaO_2Si$: 426.1865 ($[M+Na]^+$) found 426.1850 ($[M+Na]^+$)

3. Synthesis of ring-closing metathesis substrate **3** (general procedure **B**)

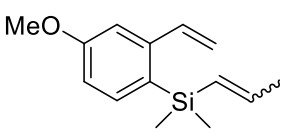


To a solution of $MePPh_3Br$ (1.0 eq.) in THF (0.5 M) was dropwise 2.76 M solution of *n*-BuLi (1.0 eq.) in *n*-hexane at 0 °C to room temperature over a period of 2 h. After that, a solution of an *o*-bromobenzaldehyde derivative (1.0 eq.) was added to the reaction mixture at 0 °C and warmed to room temperature. After stirring for 2 h, the reaction was stopped by the addition of 1 M HCl aq. to the reaction mixture. The organic compound was extracted with $CHCl_3$. The organic layer was dried over Na_2SO_4, and the solvent was evaporated. The residue was subjected to column chromatography (only *n*-hexane) on silica gel 60N to give an *o*-bromostyrene derivative.

To a solution of the *o*-bromostyrene derivative in THF (0.5 M) was added dropwise 2.76 M solution of *n*-BuLi (1.1 eq.) in *n*-hexane at -78 °C. After the mixture was stirred at -78 °C for 1 h, the mixture was added dropwise to a solution of Me_2SiCl_2 (1.2 eq.) in THF (2 M). The reaction mixture was warmed to room temperature over 2 h. We call this reaction mixture, solution α.

On the other hand, to a mixture of magnesium (3.0 eq.) in THF (0.2 M) was added dropwise a solution of 1-bromopropene in THF (0.2 M) at 50 °C for 3 h. We call this reaction mixture, solution β.

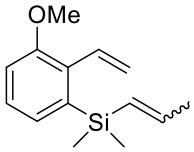
To the solution α was dropwised added the solution β at room temperature and the reaction mixture was heated to 50 °C for 3 h. After that, the reaction was stopped by the addition of 1M HCl aq. to the reaction mixture. The organic compound was extracted with $CHCl_3$. The organic layer was dried over Na_2SO_4, and the solvent was evaporated. The residue was subjected to column chromatography (only *n*-hexane) on silica gel to give compound **3**.



3a

3a (a colorless oil, *E*/*Z* = 4/1, 64%, 743 mg, 3.20 mmol) was prepared from 2-bromo-5-methoxybenzaldehyde (1.08 g, 5.00 mmol) by a general procedure **B**.

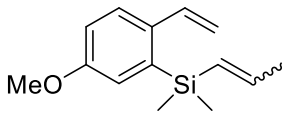
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.48 (1H, d, *J* = 7.9 Hz), 7.11 (1H, dd, *J* = 2.4, 2.4 Hz), 7.05 (1H, dd, *J* = 17.1, 11.0 Hz), 6.82 (1H, dd, *J* = 7.9, 2.4 Hz), 6.48 (1H, dq, *J* = 14.0, 7.0 Hz), 5.70 (1H, dq, *J* = 14.0, 1.5 Hz), 5.63 (1H, dd, *J* = 17.1, 1.2 Hz), 5.25 (1H, dd, *J* = 10.4, 1.2 Hz), 3.84 (3H, s), 1.66 (3H, dd, *J* = 7.0, 1.5 Hz), 0.40 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 160.7, 145.4, 144.4, 138.1, 136.1, 130.2, 129.1, 114.9, 112.6, 110.7, 55.1, 19.1, 0.0. HRMS (ESI) calcd for $C_{14}H_{20}OSi$: 255.1181 ([M+Na]$^+$) found 255.1170 ([M+Na]$^+$)



3b

3b (a colorless oil, *E*/*Z* = 18/1, a colorless oil, 23%, 268 mg, 1.15 mmol) was prepared from 2-bromo-6-methoxybenzaldehyde (1.08 g, 5.00 mmol) by a general procedure **B**.

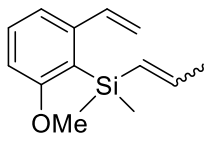
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.22 (1H, dd, *J* = 9.0, 7.3 Hz), 7.15 (1H, dd, *J* = 7.3, 1.2 Hz), 6.94 (1H, dd, *J* = 9.0, 1.2 Hz), 6.89 (1H, dd, *J* = 17.7, 11.6 Hz), 6.11 (1H, dq, *J* = 18.3, 6.1 Hz), 5.84 (1H, dd, *J* = 18.3, 1.8 Hz), 5.77 (1H, dd, *J* = 17.7, 2.4 Hz), 5.47 (1H, dd, *J* = 11.6, 2.4 Hz), 3.84 (3H, s), 1.84 (3H, dd, *J* = 6.1, 1.8 Hz), 0.36 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 157.5, 143.4, 139.9, 134.8, 132.6, 130.4, 127.5, 127.3, 119.6, 112.1, 55.4, 22.8, -0.7. HRMS (ESI) calcd for $C_{14}H_{20}OSi$: 255.1181 ($[M+Na]^+$) found 255.1174 ($[M+Na]^+$)



3c

3c (a colorless oil, *E*/*Z* = 1.8/1, 46%, 533 mg, 2.29 mmol) was prepared from 2-bromo-4-methoxybenzaldehyde (1.08 g, 5.00 mmol) by a general procedure **B**.

^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.55 (1H, d, *J* = 8.5 Hz), 7.12 (1H, d, *J* = 2.7 Hz), 7.01 (1H, dd, *J* = 17.4, 11.0 Hz), 6.90 (1H, dd, *J* = 8.5, 2.7 Hz), 6.51 (1H, dq, *J* = 13.8, 6.8 Hz), 5.71 (1H, dd, *J* = 13.8, 1.2 Hz), 5.54 (1H, dd, *J* = 17.4, 1.2 Hz), 5.14 (1H, dd, *J* = 11.0, 1.2 Hz), 3.8 (3H, s), 1.68 (3H, dd, *J* = 6.8, 1.6 Hz), 0.44-0.38 (6H, m). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 158.6, 144.9, 139.6, 137.7, 136.5, 128.7, 126.5, 120.4, 114.4, 112.8, 55.4, 19.4, -0.1. HRMS (ESI) calcd for $C_{14}H_{20}OSi$: 233.1362 ($[M+H]^+$) found 233.1358 ($[M+H]^+$)

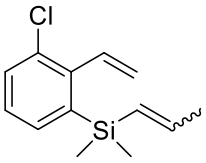


3d

3d (a colorless oil, *E*/*Z* = 11/5, 40%, 158 mg, 0.679 mmol) was prepared from 2-bromo-3-methoxybenzaldehyde (538 mg, 2.50 mmol) by a general procedure **B** (2-bromo-3-methoxybenzaldehyde was synthesized from 2-bromo-3-hydroxybenzaldehyde by method of previous report[1]).

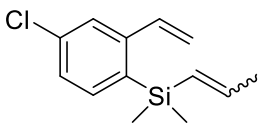
^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 7.31 (1H, dd, *J* = 8.0, 7.6 Hz), 7.15 (1H, d, *J* = 7.6 Hz), 7.11 (1H, dd, *J* = 16.0, 10.7 Hz), 6.77 (1H, d, *J* = 8.0 Hz), 6.09 (1H, dq, *J* = 18.3, 6.1 Hz), 5.94 (1H, d, *J* = 18.3 Hz), 5.53 (1H, dd, *J* = 16.0, 1.5 Hz), 5.20 (1H, dd, *J* = 10.7, 1.5 Hz), 3.79 (3H, s), 1.84 (3H, dd, *J* = 6.1, 1.6 Hz), 0.42 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 164.79, 146.29, 141.51, 139.80, 132.33, 131.45, 130.53, 125.00, 119.55, 115.02, 109.25, 55.28, 22.69, 0.90. HRMS (APCI) calcd for $C_{14}H_{20}OSi$: 233.1356 ($[M+H]^+$) found 233.1352 ($[M+H]^+$)

Ref. 1) Guoqing Zhao, Guangqing Xu, Chao Qian and Wenjun Tan *J. Am. Chem. Soc.* **2017**, *139*, 3360-3363



3e

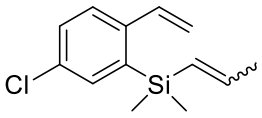
3e (a colorless oil, *E*/*Z* = 12/1, 15%, 178 mg, 0.753 mmol) was prepared from 2-bromo-6-chlorobenzaldehyde (1.10 g, 5.00 mmol) by a general procedure **B**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.43 (1H, d, *J* = 7.3 Hz), 7.38 (1H, d, *J* = 8.0 Hz), 7.17 (1H, dd, *J* = 8.0, 7.3 Hz), 6.85 (1H, dd, *J* = 17.1, 11.5 Hz), 6.07 (1H, dq, *J* = 18.3, 6.1 Hz), 5.80 (1H, dq, *J* = 18.3, 1.3 Hz), 5.56 (1H, dd, *J* = 11.5, 1.3 Hz), 5.45 (1H, dd, *J* = 17.1, 1.3 Hz), 1.84 (3H, dd, *J* = 6.1, 1.3 Hz), 0.33 (6H, s). ^{13}C NMR ($CDCl_3$, 100 MHz) δ: 143.7, 140.5, 135.9, 133.6, 133.1, 130.4, 130.4, 130.2, 127.5, 121.5, 22.8, -0.7. HRMS (ESI) calcd for $C_{13}H_{17}ClSi$: 259.0686 ($[M+Na]^+$) found 259.0685 ($[M+Na]^+$)



3f

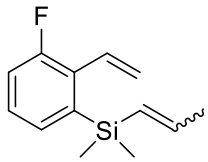
3f (a colorless oil, *E*/*Z* = 1/1, 21%, 250 mg, 1.05 mmol) was prepared from 2-bromo-5-chlorobenzaldehyde (1.10 g, 5.00 mmol) by a general procedure **B**.

^{1}H-NMR ($CDCl_3$) δ: 7.53 (1H, d, *J* = 2.3 Hz), 7.48 (1H, d, *J* = 8.0 Hz), 7.22 (1H, dd, *J* = 8.0, 2.3 Hz), 7.05 (1H, dd, *J* = 8.0, 8.0 Hz), 6.50 (1H, dq, *J* = 14.0, 6.7 Hz), 5.69 (1H, dq, *J* = 14.0, 1.4 Hz), 5.66 (1H, dd, *J* = 4.0, 1.3 Hz), 5.31 (1H, d, *J* = 4.0 Hz), 1.65 (3H, dd, *J* = 6.7, 1.4 Hz), 0.36 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 145.5, 145.1, 137.1, 136.3, 136.0, 135.8, 128.2, 126.8, 125.2, 116.0, 22.8, -0.3. HRMS (ESI) calcd for $C_{13}H_{17}ClSi$: 259.0686 ($[M+Na]^+$) found 259.0681 ($[M+Na]^+$)



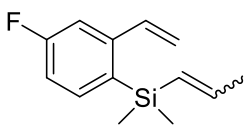
3g

3g (a colorless oil, only *E*, 20%, 234mg, 0.99 mmol) was prepared from 2-bromo-4-chlorobenzaldehyde (1.10 g, 5.00 mmol) by a general procedure **B**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.51 (1H, d, *J* = 1.8 Hz), 7.41 (1H, d, *J* = 7.9 Hz), 7.20 (1H, dd, *J* = 7.9, 1.8 Hz), 7.02 (1H, dd, *J* = 17.4, 11.0 Hz), 6.12 (1H, dq, *J* = 18.3, 6.1 Hz), 5.81 (1H, dq, *J* = 18.3, 1.8 Hz), 5.63 (1H, d, *J* = 17.4 Hz), 5.29 (1H, d, *J* = 11.0 Hz), 1.85 (3H, dd, *J* = 6.1, 1.8 Hz), 0.34 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 145.7, 144.4, 137.2, 136.3, 135.8, 135.5, 129.3, 126.8, 125.2, 116.0, 22.8, -1.3. HRMS (ESI) calcd for $C_{13}H_{17}ClSi$: 259.0686 ($[M+Na]^+$) found 259.0675 ($[M+Na]^+$)



3h

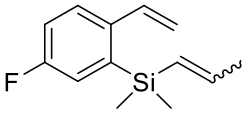
3h (a colorless oil, *E*/*Z* = 1.8/1, 34%, 378 mg, 1.72 mmol) was prepared from 2-bromo-6-fluorobenzaldehyde (1.01 g, 5.00 mmol) by a general procedure **B**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.30-7.28 (1H, m), 7.19-7.17 (1H, m), 7.10-7.05 (1H, m), 6.80 (1H, dd, *J* = 18.0, 11.9 Hz), 6.16-6.10 (1H, m), 5.85-5.77 (2H, m), 5.55-5.52 (1H, m), 1.85 (3H, dd, *J* = 6.4, 1.5 Hz), 0.37 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 161.1 (*J* = 251 Hz), 144.5 (*J* = 60 Hz), 132.1, 130.6 (*J* = 20 Hz), 130.6 (*J* = 7 Hz), 129.5, 128.4, 127.8 (*J* = 3 Hz), 120.6 (*J* = 11 Hz), 117.1 (*J* = 23 Hz), 22.8, -1.1 ^{19}F-NMR ($CDCl_3$, 376 MHz) δ: -110.2 (m) HRMS (ESI) calcd for $C_{13}H_{17}FSi$: 243.0981 ($[M+Na]^+$) found 243.0971 ($[M+Na]^+$)



3i

3i (a colorless oil, *E*/*Z* = 20/1, 49%, 542 mg, 2.46 mmol) was prepared from 2-bromo-5-fluorobenzaldehyde (1.01 g, 5.00 mmol) by a general procedure **B**.

^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.29 (1H, d, *J* = 7.6 Hz), 7.21-7.17 (1H, m), 7.07 (1H, dd, *J* = 11.6, 7.6 Hz), 6.80 (1H, dd, *J* = 17.8, 12.3 Hz), 6.13 (1H, dq, *J* = 12.0, 6.1 Hz), 5.81 (2H, dd, *J* = 17.8, 12.3 Hz), 5.53 (1H, dq, *J* = 12.0, 1.8 Hz), 1.85 (3H, dd, *J* = 6.1, 1.8 Hz), 0.39 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 162.3 (*J* = 250 Hz), 144.2, 141.1, 132.1, 130.6 (*J* = 20 Hz), 130.6 (*J* = 7 Hz), 129.5, 127.8 (*J* = 8 Hz), 120.6 (*J* = 11 Hz), 117.1 (*J* = 23 Hz), 22.8, -1.1 ^{19}F-NMR ($CDCl_3$, 376 MHz) δ: -110.2 (m). HRMS (ESI) calcd for $C_{13}H_{17}FSi$: 243.0981 ($[M+Na]^+$) found 243.0973 ($[M+Na]^+$)

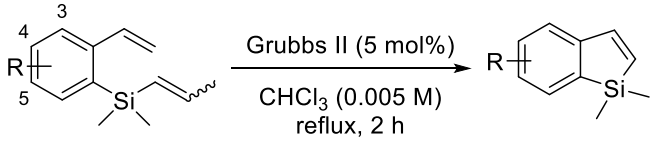


3j

3j (a colorless oil, *E*/*Z* = 4/1, 49%, 542 mg, 2.46 mmol) was prepared from 2-bromo-4-fluorobenzaldehyde (1.01 g, 5.00 mmol) by a general procedure **B**.

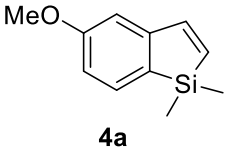
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.73-7.71 (1H, m), 7.44-7.36 (1H, m), 7.26-7.19 (2H, m), 6.34 (1H, dq, *J* = 18.3, 6.1 Hz), 6.02 (1H, dd, *J* = 18.3, 1.5 Hz), 5.75 (1H, d, *J* = 18.3 Hz), 5.42 (1H, d, *J* = 11.0 Hz), 2.06 (3H, dd, *J* = 6.1, 1.5 Hz), 0.56 (6H, d, *J* = 3.7 Hz). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 162.0 (*J* = 247 Hz), 144.6, 140.2 (*J* = 4 Hz), 137.2, 129.1, 127.9, 127.0 (*J* = 7 Hz), 121.1 (*J* = 19 Hz), 116.2 (*J* = 21 Hz), 114.5, 22.8, -1.5 ^{19}F-NMR ($CDCl_3$, 376 MHz) δ: -110.0 (m). HRMS (ESI) calcd for $C_{13}H_{17}FSi$: 243.0981 ($[M+Na]^+$) found 243.0973 ($[M+Na]^+$)

4. Ring-closing metathesis of **3** (general procedure **C**)



3 **4**

To a solution of **14** in $CHCl_3$ (0.005 M) was added Grubbs II (5 mol%) and the mixture was refluxed for 2 h. The solvent was evaporated and the residue was subjected to column chromatography on neutral flash silica gel 60N to give **15**.

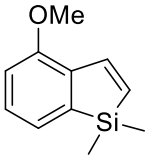


4a

4a (a colorless oil, quant, 19.0 mg, 0.0998 mmol) was prepared from **3a** (23.2 mg, 0.100 mmol) by a general procedure **C**.

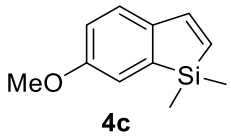
^{1}H-NMR ($CDCl_3$, 400 NHz) δ: 7.47 (1H, d, *J* = 7.8 Hz), 7.32 (1H, d, *J* = 10.1 Hz), 6.88 (1H, s), 6.80 (1H, dd, *J* = 7.8, 1.0 Hz), 6.36 (1H, dd, *J* = 10.1, 1.0 Hz),

3.84 (3H, s), 0.35 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 161.6, 151.4, 148.8, 134.2, 132.7, 129.0, 111.9, 110.9, 55.3, -3.7. HRMS (ESI) calcd for $C_{11}H_{14}OSi$: 213.0712 ($[M+Na]^+$) found 213.0703 ($[M+Na]^+$)



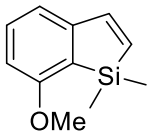
4b

4b (a colorless oil, 35%, 6.6 mg, 0.0348 mmol) was prepared from **3b** (23.2 mg, 0.100 mmol) by a general procedure **C**.
^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 7.67 (1H, d, *J* = 10.3 Hz), 7.22 (1H, dd, *J* = 8.0, 6.9 Hz), 7.12 (1H, d, *J* = 6.9 Hz), 6.87 (1H, d, *J* = 8.0 Hz), 6.19 (1H, d, *J* = 10.3 Hz), 3.85 (3H, s), 0.31 (6H, s). ^{13}C NMR ($CDCl_3$, 100 MHz) δ: 154.31, 143.93, 140.55, 137.02, 130.66, 128.51, 123.88, 112.49, 55.43, -3.96. HRMS (APCI) calcd for $C_{11}H_{14}OSi$: 191.0887 ($[M+H]^+$) found 191.0885 ($[M+H]^+$)



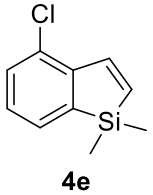
4c

4c (a colorless oil, quant, 19.0 mg, 0.100 mmol) was prepared from **3c** (23.2 mg, 0.100 mmol) by a general procedure **C**.
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.32 (1H, d, *J* = 10.3 Hz), 7.19 (1H, d, *J* = 8.1 Hz), 7.12 (1H, d, *J* = 2.4 Hz), 6.83 (1H, dd, *J* = 8.1, 2.4 Hz), 6.12 (1H, d, *J* = 10.3 Hz), 3.84 (3H, s), 0.33 (6H, s). ^{13}C NMR ($CDCl_3$, 100 MHz) δ: 159.1, 148.8, 142.2, 140.8, 129.7, 124.8, 118.4, 113.8, 55.5, -3.7. HRMS (APCI) calcd for $C_{11}H_{14}OSi$: 191.0887 ($[M+H]^+$) found 191.0883 ($[M+H]^+$)



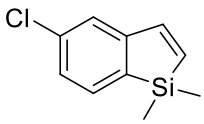
4d

4d (a colorless oil, 63%, 14.6 mg, 0.0626 mmol) was prepared from **3d** (23.3 mg, 0.100 mmol) by a general procedure **C**.
^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 7.28 (1H, dd, *J* = 7.5, 7.5 Hz), 7.23 (1H, d, *J* = 10.8 Hz), 6.86 (1H, d, *J* = 7.5 Hz), 6.70 (1H, d, *J* = 7.5 Hz), 6.22 (1H, d, *J* = 10.8 Hz), 3.79 (3H, s), 0.32 (6H, s). ^{13}C-NMR ($CDCl_3$, 125 MHz) δ: 163.15, 151.04, 148.31, 133.44, 132.00, 117.49, 109.41, 55.37, -4.41. HRMS (APCI) calcd for $C_{11}H_{14}OSi$: 191.0887 ($[M+H]^+$) found 191.0883 ($[M+H]^+$)



4e

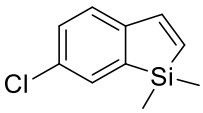
4e (a colorless oil, 25%, 4.9 mg, 0.0252 mmol) was prepared from **3e** (23.7 mg, 0.100 mmol) by a general procedure **C**.
^{1}H-NMR ($CDCl_3$, 300 MHz) δ: 7.65 (1H, d, *J* = 10.6 Hz), 7.37 (1H, d, *J* = 6.9 Hz), 7.29 (1H, dd, *J* = 7.8, 0.9 Hz), 7.14 (1H, dd, *J* = 7.8, 6.9 Hz), 6.38 (1H, d, *J* = 10.6 Hz), 0.32 (7H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 145.76, 145.68, 141.34, 134.12, 130.41, 130.15, 129.75, 128.37, -4.08. HRMS (APCI) calcd for $C_{10}H_{11}ClSi$: 195.0391 ($[M+H]^+$) found 195.0387 ($[M+H]^+$)



4f

4f (a colorless oil, 62%, 12.1 mg, 0.0621 mmol) was prepared from **3f** (23.7 mg, 0.100 mmol) by a general procedure **C**.

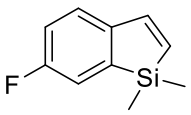
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.42 (1H, d, J = 7.3 Hz), 7.26 (1H, d, J = 10.4 Hz), 7.23 (1H, d, J = 2.3 Hz), 7.19 (1H, dd, J = 7.3, 2.3 Hz), 6.35 (1H, d, J = 10.4 Hz), 0.32 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 151.1, 148.0, 136.5, 135.9, 134.6, 132.6, 126.7, 124.3, -4.1. HRMS (ESI) calcd for $C_{10}H_{11}ClSi$: 195.0397 ($[M+H]^+$) found 195.0391 ($[M+H]^+$)



4g

4g (a colorless oil, 80%, 15.6 mg, 0.0801 mmol) was prepared from **3g** (23.7 mg, 0.100 mmol) by a general procedure **C**.

^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.42 (1H, d, J = 2.1 Hz), 7.25 (1H, d, J = 10.3 Hz), 7.23 (1H, dd, J = 8.0, 2.1 Hz), 7.11 (1H, d, J = 8.0 Hz), 6.23 (1H, d, J = 10.3 Hz), 0.29 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 148.3, 147.5, 141.1, 133.2, 132.9, 131.8, 129.5, 125.1, -4.1. LRMS (EI) calcd for $C_{10}H_{11}ClSi$: 217.0216 ($[M+Na]^+$) found 217.0211 ($[M+Na]^+$)

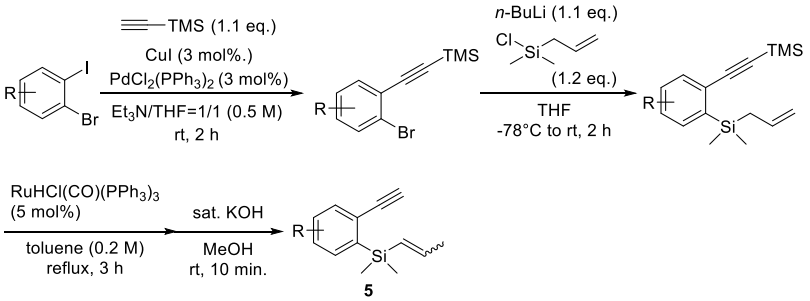


4j

4j (a colorless oil, 42%, 7.4 mg, 0.0415 mmol) was prepared from **3j** (20.2 mg, 0.100 mmol) by a general procedure **C**.

^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.29 (1H, d, J = 10.5 Hz), 7.19 (1H, dd, J = 7.8, 0.9 Hz), 7.19 (1H, dd, J = 8.6, 7.8 Hz), 6.97 (1H, ddd, J = 8.6, 6.4, 0.9 Hz), 6.21 (1H, d, J = 10.5 Hz), 0.31 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 162.6 (J = 246 Hz), 148.3, 145.1, 141.7, 131.8, 125.1, 118.8 (J = 20 Hz), 115.9 (J = 22 Hz), -4.0. ^{19}F-NMR ($CDCl_3$, 376 MHz) δ: -111.6 (m). HRMS (APCI) calcd for $C_{10}H_{11}FSi$: 179.0687 ($[M+H]^+$) found 179.0684 ($[M+H]^+$)

5. Synthesis of enyne metathesis substrate **5** (general procedure **D**)

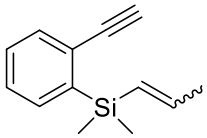


To a solution of $PdCl_2(PPh_3)_2$ (3 mol %), CuI (3 mol%) and an *o*-bromoiodobenze derivative (1.0 eq.) in Et_3N/THF=1/1 (0.5 M) was added trimethylsilylacetylene (1.1 eq.) at room temperature. After the mixture was stirred at room temperature for 2 h, the mixture was filtrated through celite cake and the solvent was evaporated under reduced pressure. The residue was subjected to column

chromatography on neutral flash silica gel 60N to give an *o*-bromotrimethylsillylacetylene derivative.

To a solution of compound *o*-bromotromethylsillyacetylene derivative in THF (0.5 M) was added dropwise 2.76 M *n*-BuLi in *n*-hexane (1.1 eq.) at -78 °C, After the mixture was stirred at -78 °C for 1 h, allylchlorodimethylsilane (1.2 eq.) was added dropwise to the mixture. The reaction mixture was stirred at -78 °C for 1 h, and warmed to room temperature. The reaction was stopped with the addition of 1M HCl aq. to the reaction mixture and organic compound was extracted with $CHCl_3$. The organic layer was dried over Na_2SO_4, and the solvent was evaporated. The residue was subjected to column chromatography on neutral flash silica gel 60N to give compound *o*-trimethylsillyacetylene-dimethylallysillybenzene derivative.

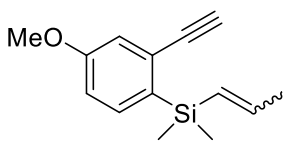
To a solution of compound *o*-trimethylsillyacetylenedimethylallysillybenzene derivative in toluene (0.2 M) was added $RuHCl(CO)(PPh_3)_3$ (5 mol%) and the mixture was refluxed for 3 h. After cooled to room temperature, saturated KOH in MeOH was added to the reaction mixture and stirred for 10 minutes. The reaction was stopped with 1M HCl aq. and organic compound was extracted with $CHCl_3$. The organic layer was dried over Na_2SO_4, and the solvent was evaporated. The residue was subjected to column chromatography on neutral flash silica gel 60N to give compound **5**.



5a

5a (a colorless oil, *E*/*Z* = 10/1, 40%, 397 mg, 1.98 mmol) was prepared from *o*-bromoiodobenzene (1.41 g, 5.00 mmol) by a general procedure **D**.

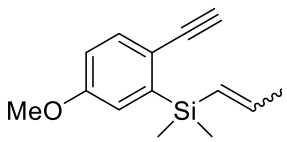
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.55-7.54 (2H, m), 7.33-7.33 (2H, m), 6.19 (1H, dq, *J* = 20.0, 6.4 Hz), 5.99 (1H, d, *J* = 20.0 Hz), 3.24 (1H, s), 1.90 (3H, d, *J* = 6.4 Hz), 0.46 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 147.1, 145.2, 137.6, 136.4, 131.9, 131.8, 131.0, 130.4, 88.3, 83.3, 25.8, 0.6. HRMS (EI) calcd for $C_{13}H_{16}Si$: 223.0919 ($[M+Na]^+$) found 223.0912 ($[M+Na]^+$)



5b

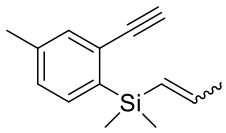
12b (a colorless oil, *E*/*Z* = 10/1, 32%, 327 mg, 1.42 mmol) was prepared from 3-bromo-2-iodoanisole (1.37 g, 4.39 mmol) by a general procedure **D**.

^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.49 (1H, dd, *J* = 8.5, 5.3 Hz), 7.17 (1H, dd, *J* = 8.8, 2.7 Hz), 6.97 (1H, ddd, *J* = 8.8, 8.5, 2.7 Hz), 6.18 (1H, dq, *J* = 18.3, 6.2 Hz), 5.90 (1H, dq, *J* = 18.3, 1.6 Hz), 3.80 (3H, s), 3.17 (1H, s), 1.87 (3H, dd, *J* = 6.2, 1.6 Hz), 0.43 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 163.0, 146.8, 139.2, 136.3, 132.4, 131.8, 121.6, 117.6, 88.2, 83.2, 58.2, 25.9, 0.9. HRMS (ESI) calcd for $C_{14}H_{18}OSi$: 231.1205 ($[M+H]^+$) found 231.1197 ($[M+H]^+$)



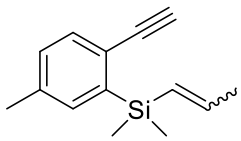
5c

5c (a yellow oil, *E*/*Z* = 10/1, 44%, 505 mg, 2.19 mmol) was prepared from 2-bromo-3-iodoanisole (1.56 g, 5.00 mmol) by a general procedure **D**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.47 (1H, d, *J* = 8.2 Hz), 7.03 (1H, d, *J* = 2.7 Hz), 6.81 (1H, dd, *J* = 8.2, 2.7 Hz), 6.18 (1H, dq, *J* = 18.4, 6.1 Hz), 5.94 (1H, dq, *J* = 18.4, 1.2 Hz), 3.81 (3H, s), 3.13 (1H, s), 1.87 (3H, dd, *J* = 6.1, 1.2 Hz), 0.43 (6H, s). ^{13}C-NMR ($CHCl_3$, 100 MHz) δ: 159.0, 144.3, 144.2, 135.1, 128.7, 120.9, 119.4, 113.4, 85.2, 78.8, 55.2, 22.8, -2.5. HRMS (ESI) calcd for $C_{14}H_{18}OSi$: 231.1205 ($[M+H]^+$) found 231.1198 ($[M+H]^+$)



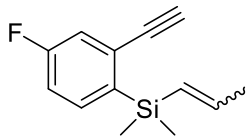
5d

5d (a pale yellow oil, *E*/*Z* = 10/1, 44%, 476 mg, 2.22 mmol) was prepared from 3-bromo-4-iodoluene (1.57 g, 5.00 mmol) by a general procedure **D**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.42 (1H, d, *J* = 7.3 Hz), 7.39 (1H, s), 7.16 (1H, d, *J* = 7.3 Hz), 6.20 (1H, dq, *J* = 19.1, 6.1 Hz), 5.98 (1H, d, *J* = 19.1 Hz), 3.21 (1H, s), 2.34 (3H, s), 1.90 (3H, d, *J* = 6.0 Hz), 0.46 (6H, s). ^{13}C-NMR ($CHCl_3$, 100 MHz) δ: 143.9, 138.7, 138.6, 134.8, 134.1, 129.2, 129.0, 127.4, 85.4, 80.1, 22.9, 21.2, -2.3. HRMS (ESI) calcd for $C_{14}H_{18}Si$:237.1075 ($[M+Na]^+$) found 237.1068 ($[M+Na]^+$)



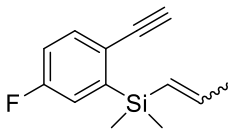
5e

5e (a yellow oil, *E*/*Z* = 10/1, 52%, 560 mg, 2.61 mmol) was prepared from 2-bromo-3-iodoluene (1.57 g, 5.00 mmol) by a general procedure **D**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.44 (1H, d, *J* = 7.8 Hz), 7.31 (1H, d, *J* = 1.4 Hz), 7.13 (1H, dd, *J* = 7.8, 1.4 Hz), 6.19 (1H, dq, *J* = 18.3, 6.0 Hz), 5.97 (1H, dq, *J* = 18.3, 1.6 Hz), 3.18 (1H, s), 2.35 (3H, s), 1.89 (3H, dd, *J* = 6.0, 1.6 Hz), 0.45 (6H, s). ^{13}C-NMR ($CHCl_3$, 100 MHz) δ: 143.9, 141.9, 137.8, 135.3, 133.4, 129.6, 129.0, 124.4, 85.4, 79.6, 22.8, 21.7, -2.4. HRMS (ESI) calcd for $C_{14}H_{18}Si$: 241.0825 ($[M+Na]^+$) found 241.0818 ($[M+Na]^+$)



5f

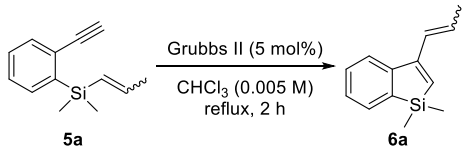
5f (a pale yellow oil, *E*/*Z* = 10/1, 17%, 186 mg, 0.851 mmol) was prepared from 2-bromo-5-fluoroiodobenzene (1.50 g, 5.00 mmol) by a general procedure **D**. ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.47 (1H, dd, *J* = 8.2, 6.4 Hz), 7.22 (1H, dd, *J* = 9.6, 2.3 Hz), 7.02 (1H, ddd, *J* = 8.2, 8.2, 2.3 Hz), 6.18 (1H, dq, *J* = 19.2, 6.0 Hz), 5.92 (1H, dd, *J* = 19.2, 1.8 Hz), 3.26 (1H, s), 1.88 (3H, dd, *J* = 6.0, 1.8 Hz), 0.44 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 162.0 (*J* = 248 Hz), 144.3, 137.9 (*J* = 4 Hz), 136.7 (*J* = 9 Hz), 129.4 (*J* = 8 Hz), 128.7, 120.2 (*J* = 22 Hz), 115.4 (*J* = 19 Hz), 84.1, 81.2, 22.8, -2.4. ^{19}F-NMR ($CDCl_3$, 283 MHz) δ: -108.1 (m). HRMS (ESI) calcd for $C_{13}H_{15}FSi$: 241.0825 ($[M+Na]^+$) found 241.0819 ($[M+Na]^+$)



5g

5g (a pale yellow oil, *E*/*Z* = 3/1, 13%, 143 mg, 0.655 mmol) was prepared from 2-bromo-4-fluoroiodobenzene (1.50 g, 5.00 mmol) by a general procedure **D**. ^{1}H-NMR ($CDCl_3$, 300 MHz) δ: 7.49 (1H, dd, *J* = 8.6, 5.3 Hz), 7.17 (1H, dd, *J* = 8.6, 2.8 Hz), 7.00-6.94 (1H, m), 6.19 (1H, dq, *J* = 18.4, 6.2 Hz), 5.91 (1H, dq, *J* = 18.4, 1.6 Hz), 3.18 (1H, s), 1.88 (3H, dd, *J* = 6.2, 1.6 Hz), 0.43 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 161.9 (*J* = 250 Hz), 145.8 (*J* = 5 Hz), 144.8, 135.5 (*J* = 8 Hz), 128.0, 123.1, 121.4 (*J* = 20 Hz), 115.7 (*J* = 22 Hz), 84.2, 80.0, 22.7, -2.8. ^{19}F-NMR ($CDCl_3$, 283 MHz) δ: -107.7 (m). HRMS (ESI) calcd for $C_{13}H_{15}FSi$: 241.0825 ($[M+Na]^+$) found 241.0818 ($[M+Na]^+$)

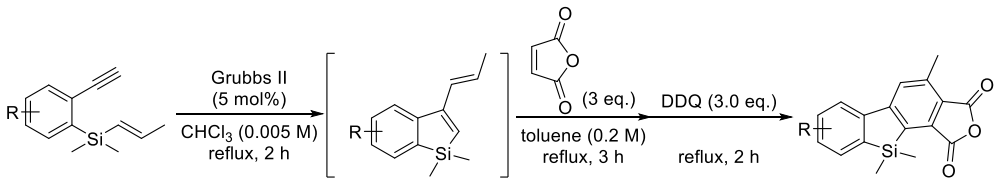
6. Synthesis of enyne metathesis compound **6a**



5a **6a**

To a solution of **5a** (20.0 mg, 0.100 mmol) in $CHCl_3$ (2 mL, 0.05 M) was added Grubbs II (4.2 mg, 5 mol%) and the mixture was refluxed for 2 h. The solvent was evaporated and the residue was subjected to column chromatography on neutral flash silica gel 60N to give **6a** (a pale yellow oil, 60%, 12.1 mg, 0.0604 mmol, *E*/*Z* = 4:1). ^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.53 (1H, dd, *J* = 6.6, 1.2 Hz), 7.45 (1H, d, *J* = 7.3 Hz), 7.35 (1H, ddd, *J* = 7.8, 7.3, 1.2 Hz), 7.24 (1H, dd, *J* = 7.8, 6.6 Hz), 6.54 (1H, dq, *J* = 15.6, 1.2 Hz), 6.31 (1H, dq, *J* = 15.6, 6.5 Hz), 6.21 (1H, s), 1.91 (3H, dd, *J* = 6.5, 1.2 Hz), 0.30 (6H, s). ^{13}C-NMR ($CDCl_3$, 100 MHz) δ: 156.34, 148.95, 140.18, 131.81, 130.11, 129.60, 127.19, 126.81, 125.15, 121.47, 18.82, -3.79 HRMS (APCI) calcd for $C_{13}H_{16}Si$: 201.1094 ($[M+H]^+$) found 201.1090 ($[M+H]^+$)

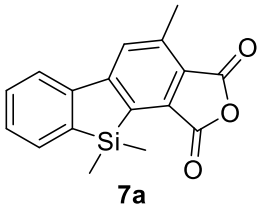
7. Synthesis of polycyclic compound **7** (general procedure **E**)



5 **6** **7**

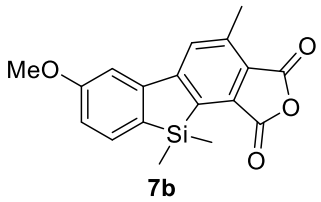
To a solution of **5** in $CHCl_3$ (0.005 M) was added Grubbs II (5 mol%) and the mixture was reflux for 2 h. After the solvent was evaporated, the residue was dissolved in toluene (0.2 M). Then maleic anhydride (3.0 eq.) was added to the mixture and the mixture was reflux for 3 h. 2,3-dichloro-5,6-dicyano-*p*-benzoquinone (3.0 eq.) was added to the reaction mixture and the mixture was reflux for 3 h. The solvent was evaporated and the residue was subjected to column chromatography on neutral

flash silica gel 60N to give **7**.



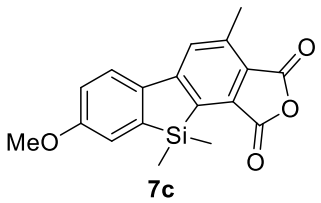
7a

7a (a white solid, 52%, 15.3 mg, 0.0520 mmol) was prepared from **5a** (20.0 mg, 0.100 mmol) by a general procedure **E**.
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.98 (1H, s), 7.92 (1H, d, *J* = 7.9 Hz), 7.73 (1H, d, *J* = 7.0 Hz), 7.52 (1H, dd, *J* = 7.9, 7.0 Hz), 7.43 (1H, dd, *J* = 7.0, 7.0 Hz), 2.78 (3H, s), 0.56 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 164.7, 163.8, 156.3, 145.0, 142.6, 141.4, 136.9, 136.6, 133.5, 130.7, 129.8, 128.7, 126.5, 122.4, 18.4, -4.3 HRMS (MALDI-TOF) calcd for $C_{17}H_{15}O_3Si$: 295.0785 ($[M+H]^+$), found 295.0785 ($[M+H]^+$). m.p. >250 °C (recrystallized from $CHCl_3$, a white column).



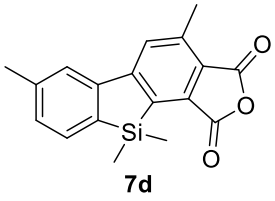
7b

7b (a yellow solid, 35%, 15.3 mg, 0.0520 mmol) was prepared from **5b** (23.0 mg, 0.100 mmol) by a general procedure **E**.
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.92 (1H, s), 7.64 (1H, d, *J* = 7.8 Hz), 7.42 (1H, d, *J* = 2.3 Hz), 6.99 (1H, dd, *J* = 7.8, 2.3 Hz), 3.92 (3H, s), 2.78 (3H, s), 0.53 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 164.6, 163.7, 162.1, 155.9, 146.9, 142.4, 138.0, 136.4, 134.5, 132.0, 128.6, 126.5, 115.4, 108.4, 55.4, 18.3, -4.1 HRMS (MALDI-TOF) calcd for $C_{18}H_{16}O_4Si$: 324.0812 ($[M+H]^+$), found 324.0805 ($[M+H]^+$). m.p. 241.0-242.0 °C (recrystallized from $CHCl_3$, a pale yellow column).



7c

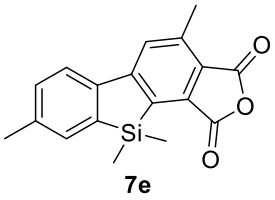
7c (an orange solid, 48%, 15.7 mg, 0.0484 mmol) was prepared from **5c** (23.0 mg, 0.100 mmol) by general procedure **E**.
^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 7.85 (1H, s), 7.84 (1H, d, *J* = 8.6 Hz), 7.22 (1H, d, *J* = 2.6 Hz), 7.02 (1H, dd, *J* = 8.6, 2.6 Hz), 3.90 (3H, s), 0.55 (6H, s). ^{13}C-NMR (125 MHz, $CHCl_3$) δ: 164.8, 163.8, 161.1, 156.3, 143.6, 142.6, 137.6, 136.5, 135.9, 127.6, 125.2, 123.8, 118.2, 116.2, 55.5, 18.3, -4.4 HRMS (MALDI-TOF) calcd for $C_{18}H_{16}O_4Si$: 324.0812 ($[M+H]^+$), found 324.0820 ($[M+H]^+$). m.p. >250 °C (recrystallized from $CHCl_3$, an orange needle).



7d

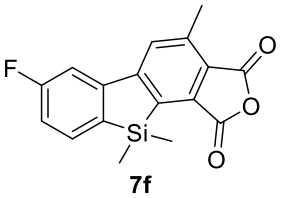
7d (an orange solid, 24%, 7.3 mg, 0.0237 mmol) was prepared from **5d** (21.8 mg, 0.100 mmol) by a general procedure **E**.
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.98 (1H, s), 7.75 (1H, s), 7.62 (1H, d, *J* = 7.3 Hz), 7.26 (1H, d, *J* = 7.3 Hz), 2.78 (3H, s), 2.47 (3H, s), 0.53 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 164.7, 163.8, 163.8, 162.2, 156.0, 156.0, 147.0, 142.5, 138.1, 136.5, 134.6, 132.1, 128.7, 126.6, 115.5, 108.5, 55.5, 18.4, -4.0. HRMS (MALDI-TOF) calcd for $C_{18}H_{17}O_3Si$: 309.0942 ($[M+H]^+$), found 309.0940 ([M +

H]$^+$). m.p. 249.0-250.0 °C (recrystallized from $CHCl_3$, a yellow column).



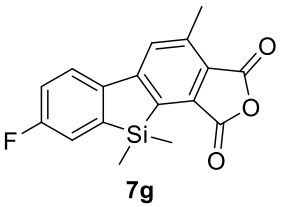
7e

7e (an orange solid, 21%, 6.5 mg, 0.0211 mmol) was prepared from **5e** (21.8 mg, 0.100 mmol) by a general procedure **E**.
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.93 (1H, s), 7.80 (1H, d, J = 7.8 Hz), 7.54 (1H, d, J = 1.4 Hz), 7.33 (1H, dd, J = 7.8, 1.4 Hz), 2.77 (3H, s), 2.43 (3H, s), 0.54 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 164.7, 163.8, 156.4, 142.5, 142.4, 141.4, 139.9, 136.5, 136.5, 134.1, 131.4, 128.2, 126.0, 122.2, 21.5, 18.3, -4.4. HRMS (MALDI-TOF) calcd for $C_{18}H_{16}O_3Si$: 308.0863 ([M+H]$^+$), found 308.0863 ([M+H]$^+$). m.p. >250 °C (recrystallized from $CHCl_3$, a yellow needle).



7f

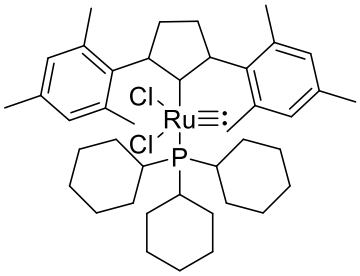
7f (a white solid, 39%, 12.2 mg, 0.0391 mmol) was prepared from **5f** (21.8 mg, 0.100 mmol) by a general procedure **E**.
^{1}H-NMR ($CDCl_3$, 500 MHz) δ: 7.91 (1H, s), 7.68 (1H, dd, J = 7.9, 5.5 Hz), 7.58 (1H, dd, J = 10.5, 2.3 Hz), 7.14 (1H, ddd, J = 9.0, 7.9, 2.3 Hz), 2.79 (3H, s), 0.55 (6H, s). ^{13}C-NMR (125 MHz, $CHCl_3$) δ: 165.1 (J = 247 Hz), 164.4, 163.5, 154.9, 147.6 (J = 8 Hz), 142.7, 137.5, 136.5, 135.4, 135.0 (J = 8 Hz), 128.9, 126.9, 116.8 (J = 20 Hz) , 109.7 (J = 21 Hz), 18.3, -4.4 ^{19}F-NMR (376 MHz, $CHCl_3$) δ: -105.1 (ddd, J = 10.5, 9.0, 5.5) HRMS (MALDI-TOF) calcd for $C_{17}H_{14}O_3FSi$: 313.0691 ([M+H]$^+$), found 313.0689 ([M+H]$^+$). m.p. 249.0-250.0 °C (recrystallized from $CHCl_3$, a white column).



7g

7g (a white solid, 38%, 11.8 mg, 0.0379 mmol) was prepared from **5g** (21.8 mg, 0.100 mmol) by a general procedure **E**.
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 7.91 (1H, s), 7.89 (1H, dd, J = 8.7, 4.6 Hz), 7.39 (1H, dd, J = 7.6, 2.5 Hz), 7.19 (1H, ddd, J = 8.7, 8.7, 2.5 Hz), 2.78 (3H, s), 0.56 (6H, s). ^{13}C-NMR (100 MHz, $CHCl_3$) δ: 164.3 (J = 201 Hz), 164.6, 163.6, 155.3, 144.5 (J = 5 Hz), 142.8, 140.8, 136.6, 136.2, 128.4, 126.1, 124.1 (J = 6 Hz), 120.0 (J = 16 Hz), 117.6 (J = 18 Hz), 18.3, -4.5 ^{19}F-NMR (376 MHz, $CHCl_3$) δ: -106.5 (ddd, J = 8.7, 7.6, 4.6 Hz) HRMS (MALDI-TOF) calcd for $C_{17}H_{14}O_3FSi$: 313.0691 ([M + H]$^+$), found 313.0700 ([M + H]$^+$). m.p. >250 °C (recrystallized from $CHCl_3$, a yellow column).

8. Synthesis of carbide complex

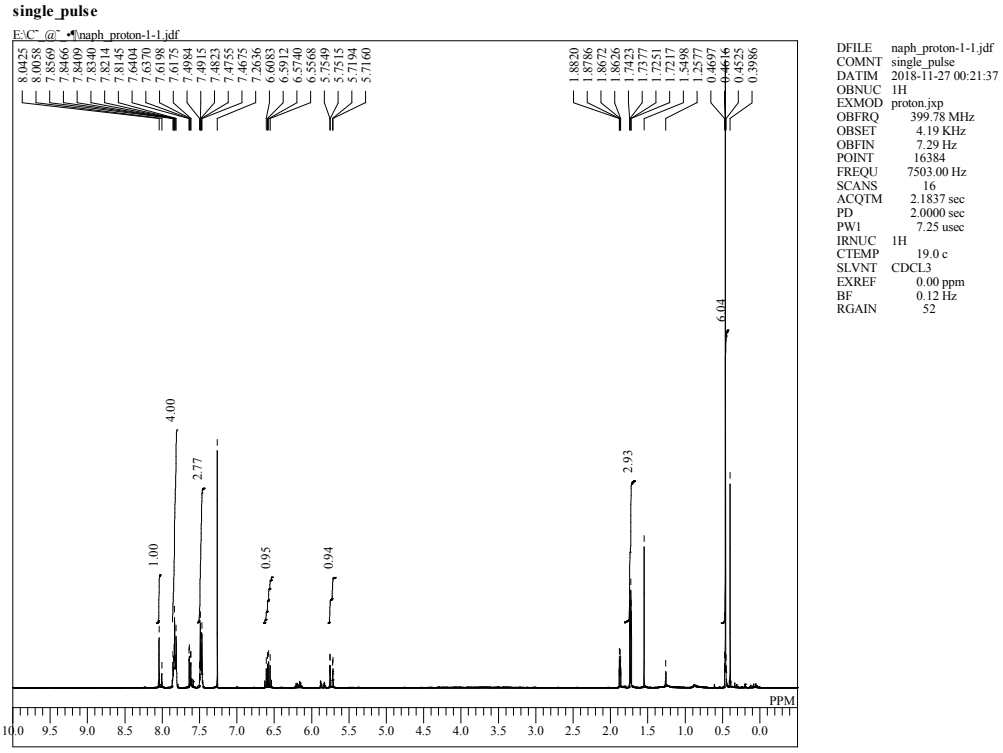


To a solution of **1b** (63.7 mg, 0.300 mmol) in $CHCl_3$ (2 mL, 0.05 M) was added Grubbs II (84.9 mg, 0.100 mmol) and the mixture was heated for 2 h at 45 °C. The solvent was evaporated and the residue was subjected to column chromatography (*n*-hexane/AcOEt = 20/1) on neutral flash silica gel 60N to give carbide complex (an orange solid, 34%, 26.4 mg, 0.0343 mmol).

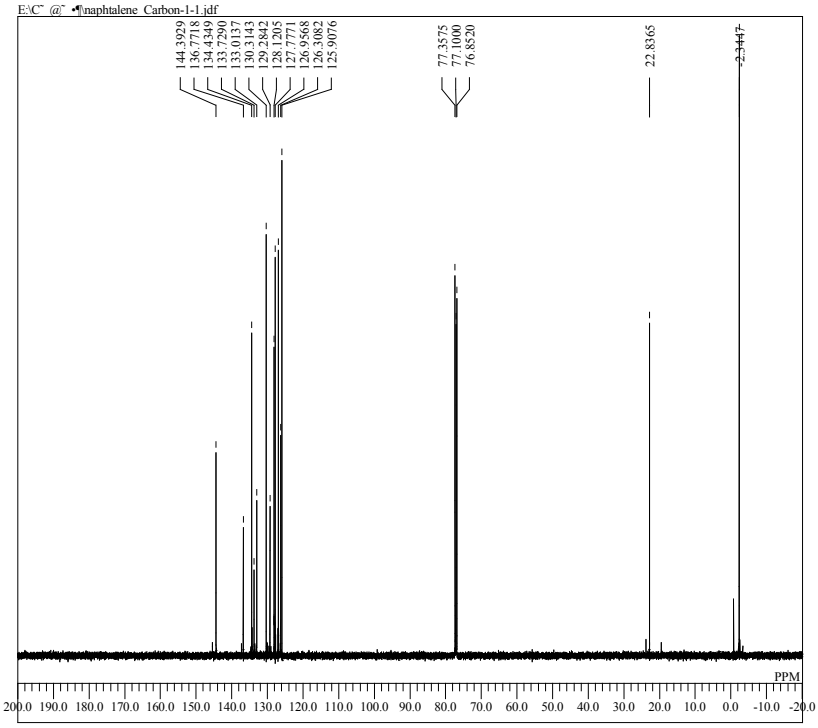
^{1}H-NMR ($CDCl_3$, 400 MHz) δ: 6.95 (2H, s), 6.89 (2H, s), 4.10-4.04 (4H, m), 2.54 (6H, s), 2.49 (6H, s), 2.34-2.29 (3H, m), 2.29 (3H, s), 2.24 (3H, s), 1.88-1.86 (6H, m), 1.67-1.60 (6H, m), 1.19-1.12 (12H, m).

9. NMR chart

1b

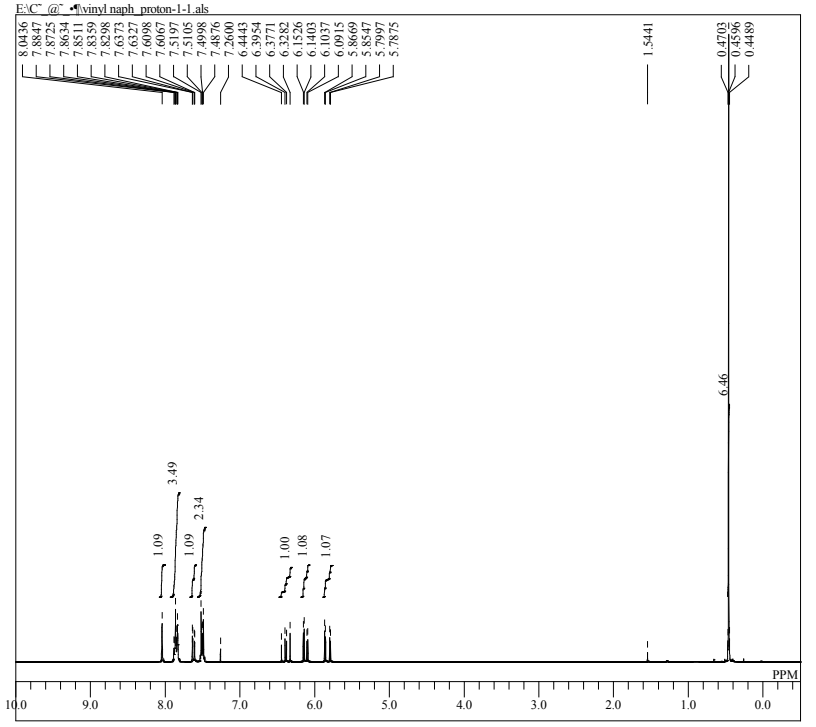


1b



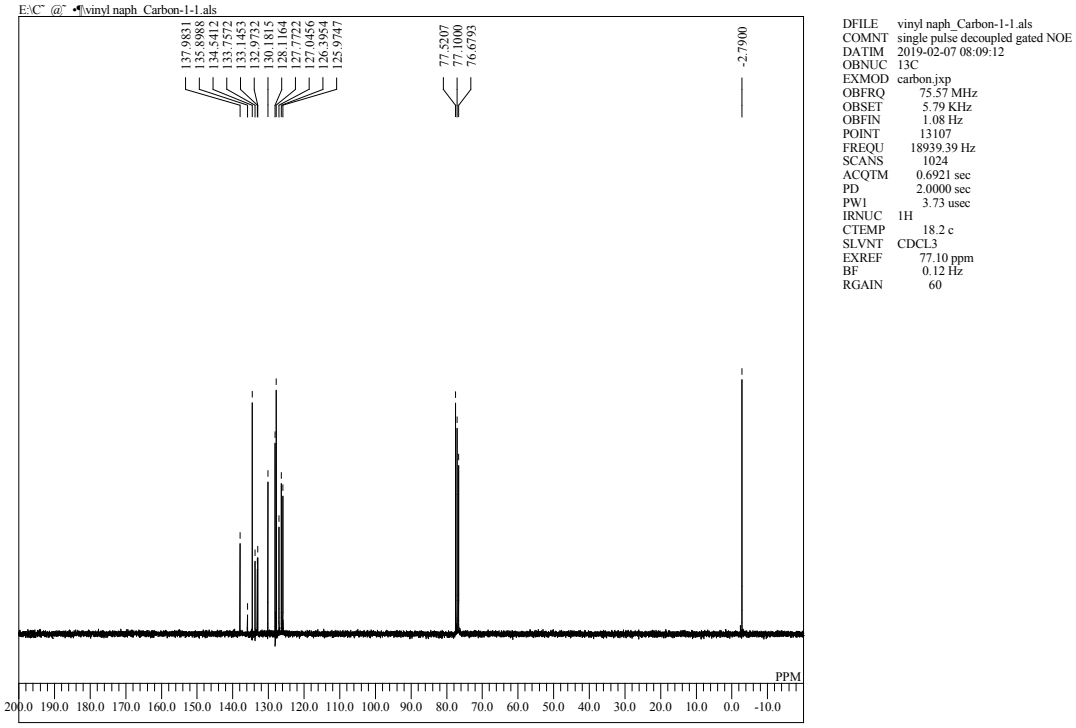
DFILE naphtalene_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-11-20 11:18:53
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 284
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 21.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 58

1a

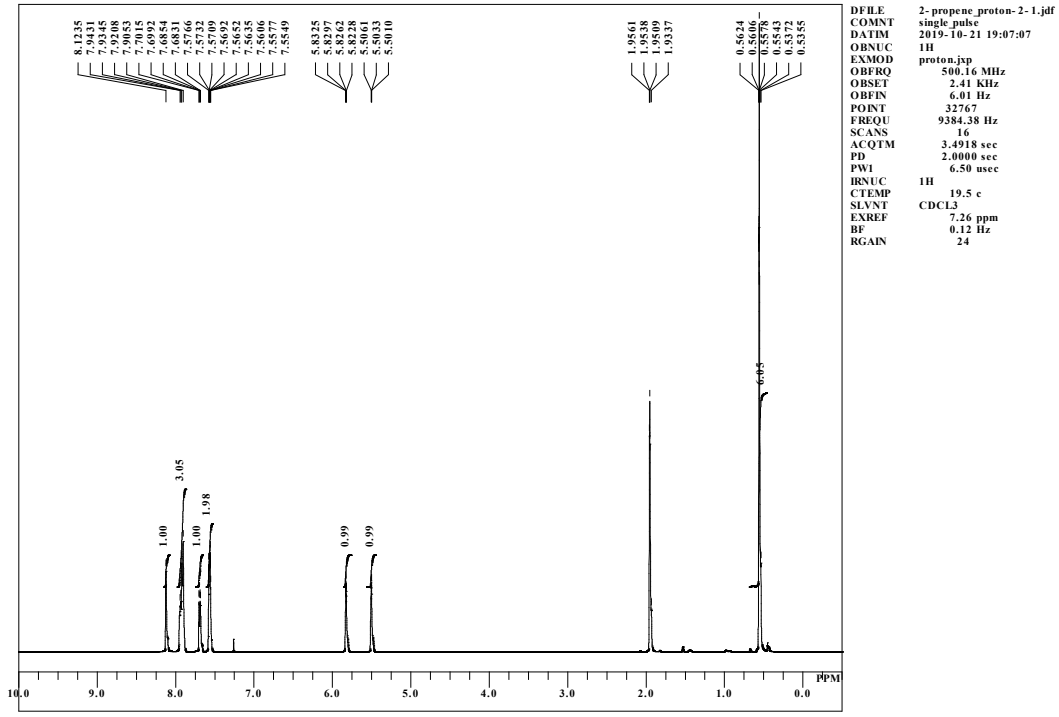


DFILE vinyl naph_proton-1-1.als
COMNT single_pulse
DATIM 2019-02-07 05:00:57
OBNUC 1H
EXMOD proton.jxp
OBFRQ 300.53 MHz
OBSET 1.15 KHz
OBFIN 8.57 Hz
POINT 13107
FREQU 6016.85 Hz
SCANS 16
ACQTM 2.1784 sec
PD 2.0000 sec
PW1 5.50 usec
IRNUC 1H
CTEMP 18.0 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 36

1a

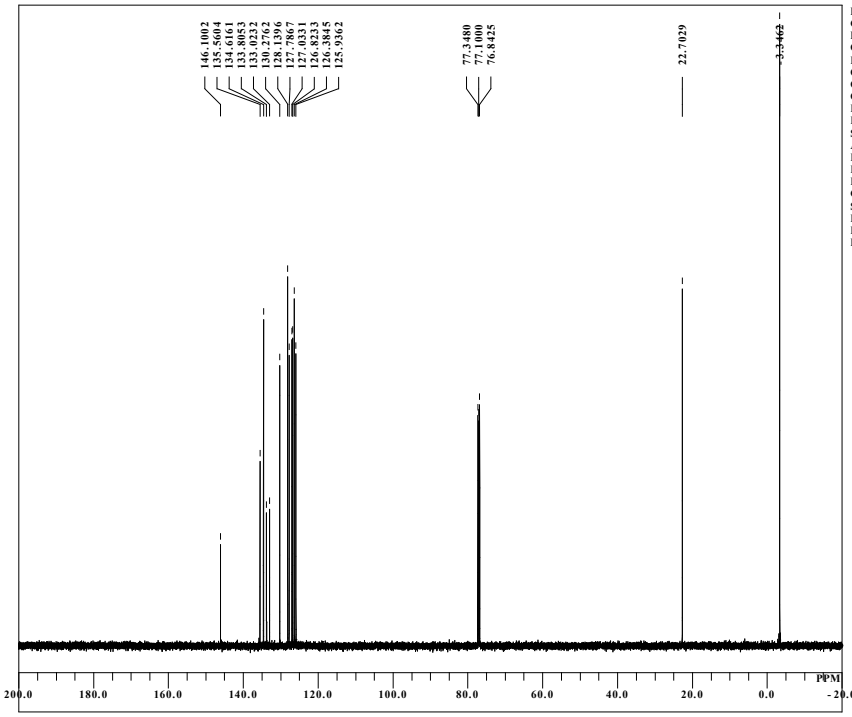

single pulse decoupled gated NOE
E:\C" @¯ •¶\vinyl naph_Carbon-1-1.als
137.9831
135.8988
134.5412
133.7572
133.4455
130.1732
128.1865
128.1164
127.7722
127.0456
126.3954
125.9747
77.5207
77.1000
76.6793
-2.7900
DFILE vinyl naph_Carbon-1-1.als
COMNT single pulse decoupled gated NOE
DATIM 2019-02-07 08:09:12
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 75.57 MHz
OBSET 5.79 KHz
OBFIN 1.08 Hz
POINT 13107
FREQU 18939.39 Hz
SCANS 1024
ACQTM 0.6921 sec
PD 2.0000 sec
PW1 3.73 usec
IRNUC 1H
CTEMP 18.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0

1c


single_pulse
8.1235
7.9431
7.9345
7.9208
7.9053
7.7015
7.6992
7.6854
7.6831
7.5766
7.5732
7.5700
7.5692
7.5652
7.5635
7.5606
7.5577
7.5549
5.8325
5.8297
5.8262
5.8228
5.5061
5.5033
5.5010
1.9561
1.9538
1.9509
1.9337
0.5624
0.5606
0.5578
0.5543
0.5372
0.5355
6.05
3.05
1.98
1.00
1.00
0.99
0.99
DFILE 2-propene_proton-2-1.jdf
COMNT single_pulse
DATIM 2019-10-21 19:07:07
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 32767
FREQU 9384.38 Hz
SCANS 16
ACQTM 3.4918 sec
PD 2.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 19.5 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 24
PPM
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0

1c

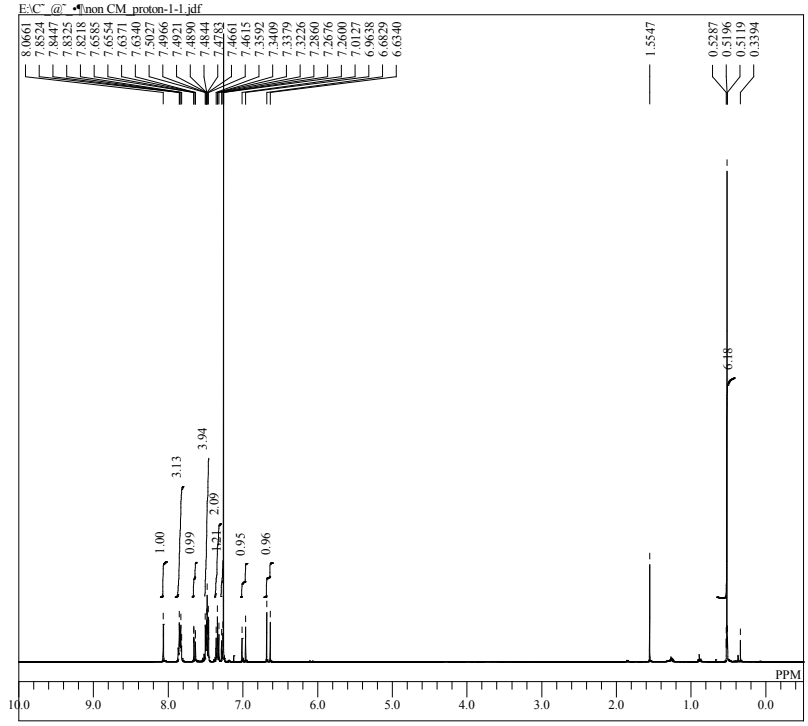
single pulse decoupled gated NOE



DFILE	2-propene_Carbon-2-1.jdf
COMNT	single pulse decoupled gated NOE
DATIM	2019-10-21 19:10:42
OBNUC	13C
EXMOD	carbon.jxp
OBFRQ	125.77 MHz
OBSET	7.87 KHz
OBFIN	4.21 Hz
POINT	32767
FREQU	39308.18 Hz
SCANS	198
ACQTM	0.8336 sec
PD	2.0000 sec
PW1	3.27 usec
IRNUC	1H
CTEMP	19.9 c
SLVNT	CDCL3
EXREF	77.10 ppm
BF	0.12 Hz
RGAIN	60

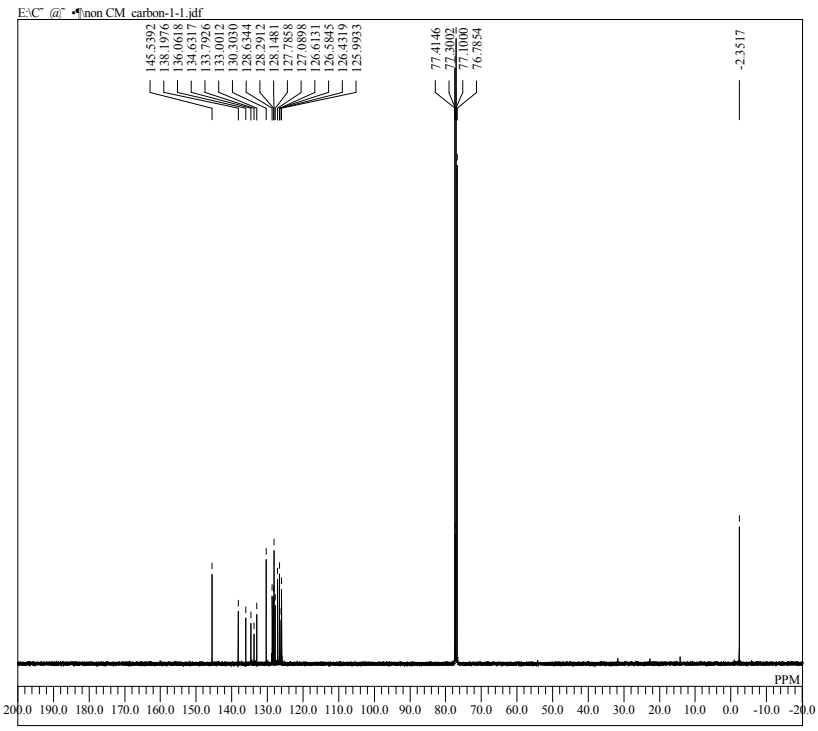
2a

single_pulse



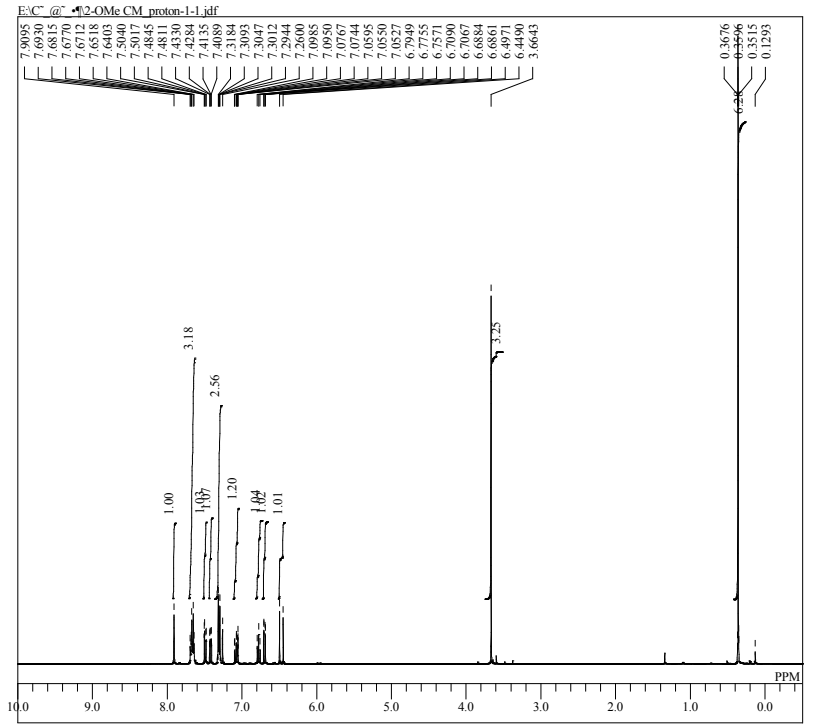
DFILE	non CM_proton-1-1.jdf
COMNT	single_pulse
DATIM	2019-02-04 04:04:01
OBNUC	1H
EXMOD	proton.jxp
OBFRQ	399.78 MHz
OBSET	4.19 KHz
OBFIN	7.29 Hz
POINT	16384
FREQU	10000.00 Hz
SCANS	16
ACQTM	1.6384 sec
PD	1.0000 sec
PW1	7.25 usec
IRNUC	1H
CTEMP	19.0 c
SLVNT	CDCL3
EXREF	7.26 ppm
BF	0.12 Hz
RGAIN	44

2a



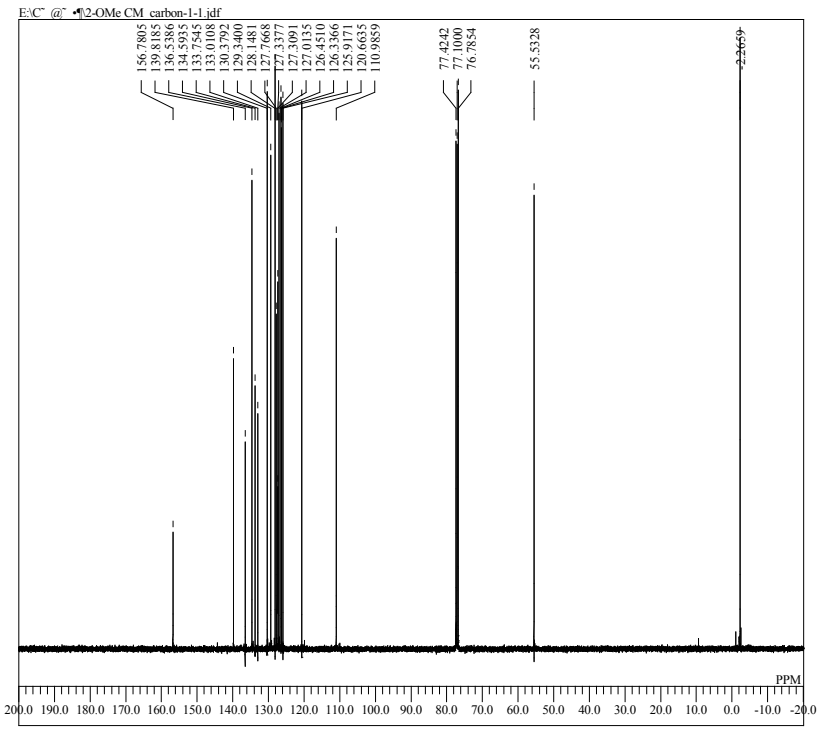
DFILE non CM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-02-04 04:06:28
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 5353
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.3 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2b



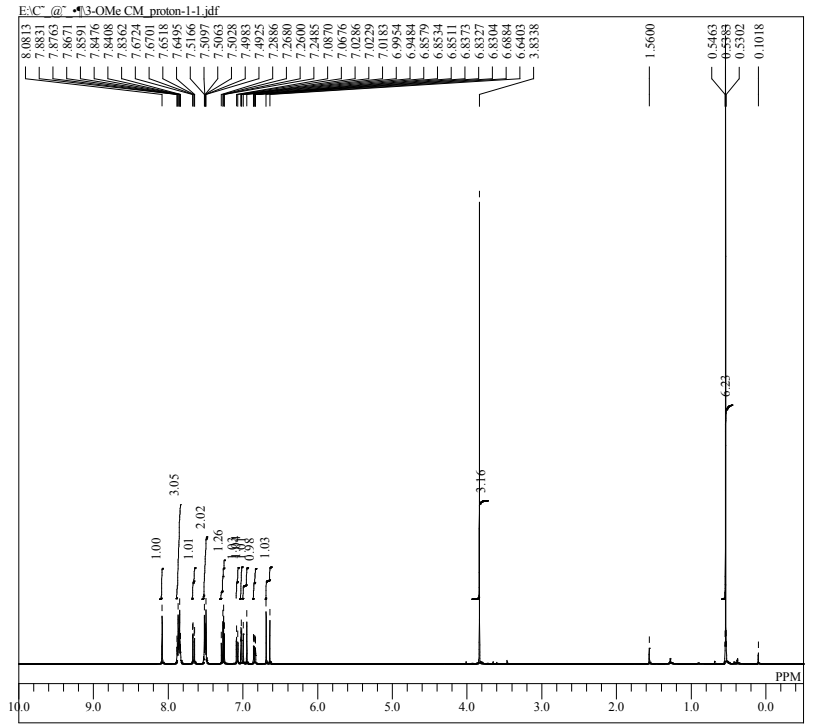
DFILE 2-OMe CM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-13 20:47:13
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 8
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 30

2b



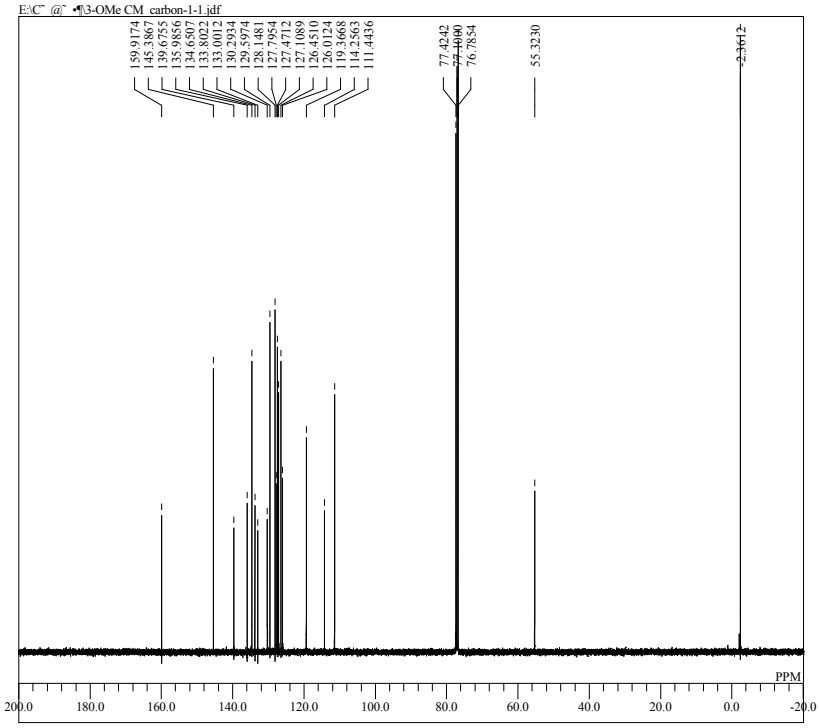
DFILE 2-OMe CM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-13 20:49:35
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 1842
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.0 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2c



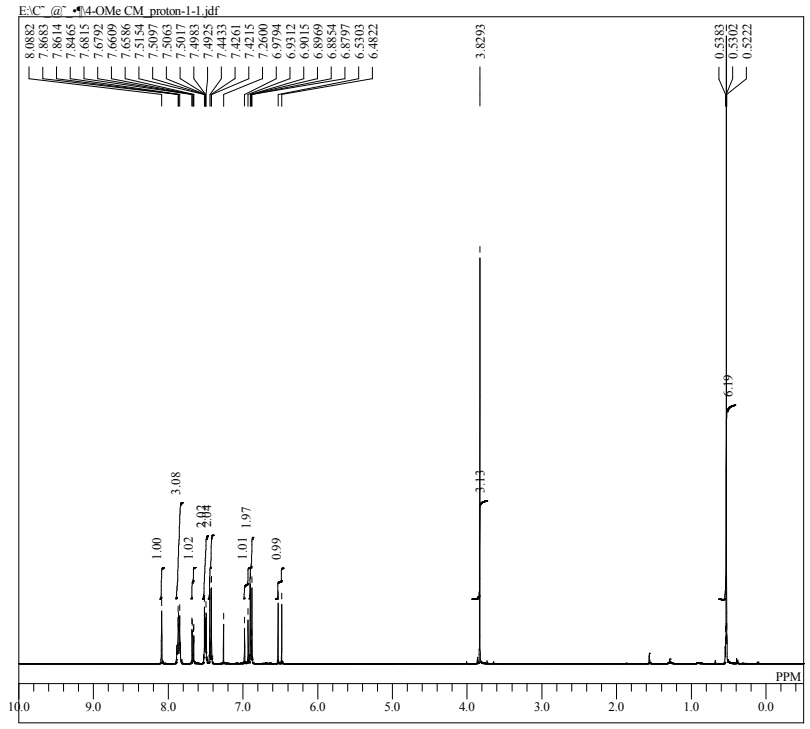
DFILE 3-OMe CM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-13 18:19:37
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 8
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 36

2c



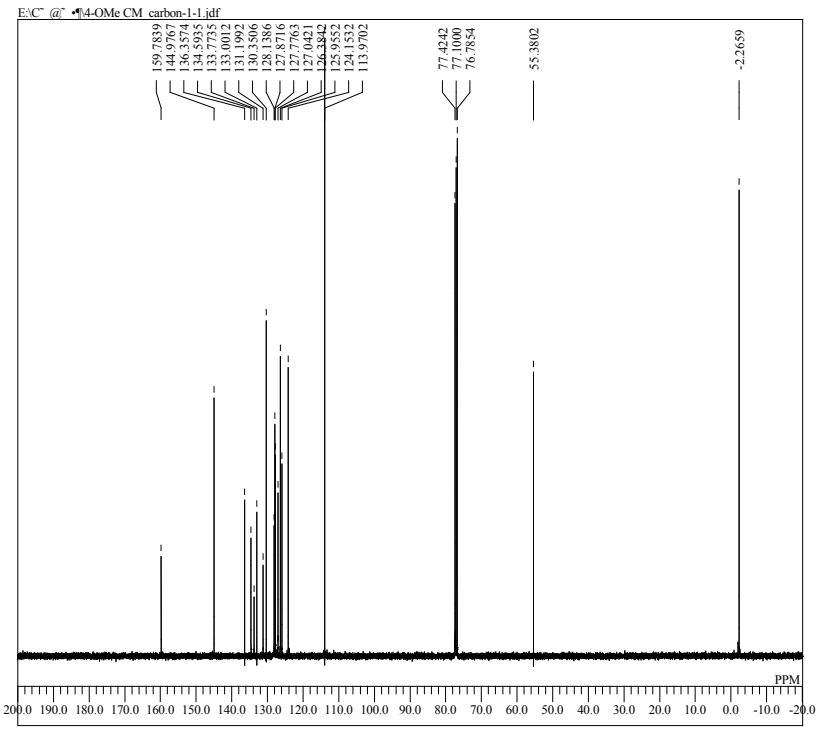
DFILE 3-OMe CM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-13 18:22:01
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 1486
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2d



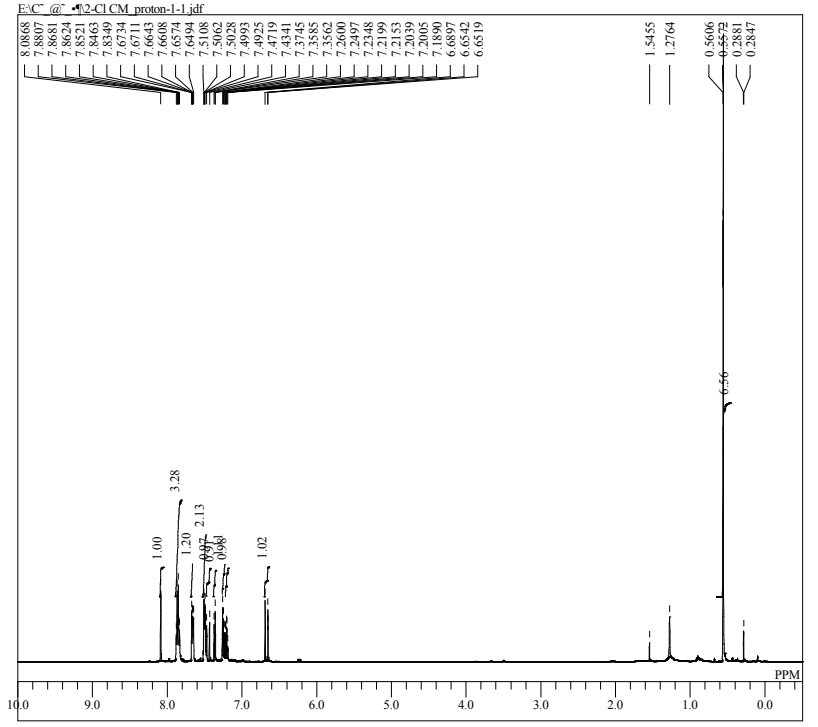
DFILE 4-OMe CM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-13 19:43:00
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 8
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 34

2d



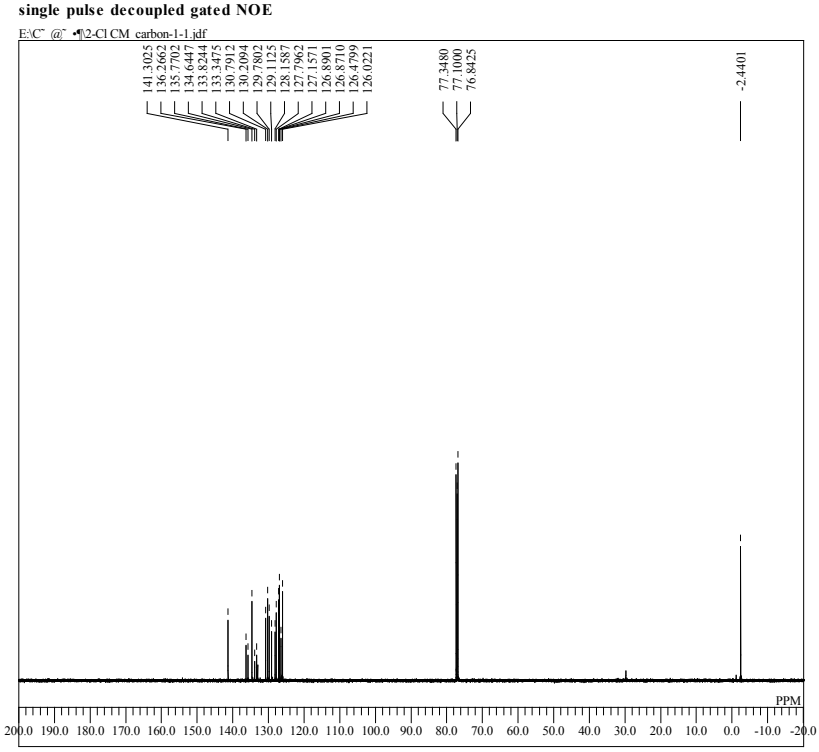
DFILE 4-OMe CM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-13 19:45:21
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 1112
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2e



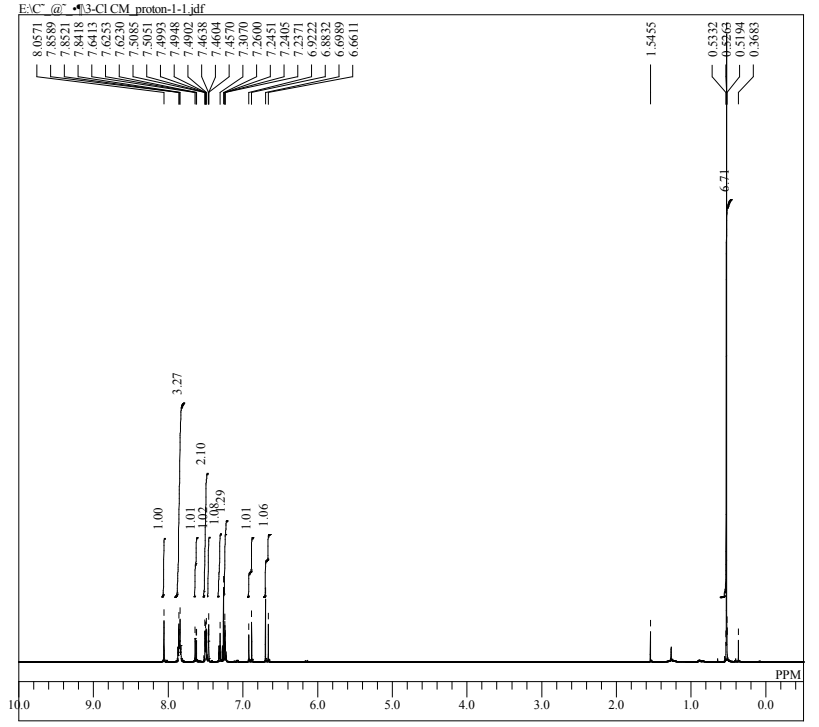
DFILE 2-Cl CM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-23 23:53:09
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 16
ACQTM 1.7459 sec
PD 1.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 20.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 42

2e



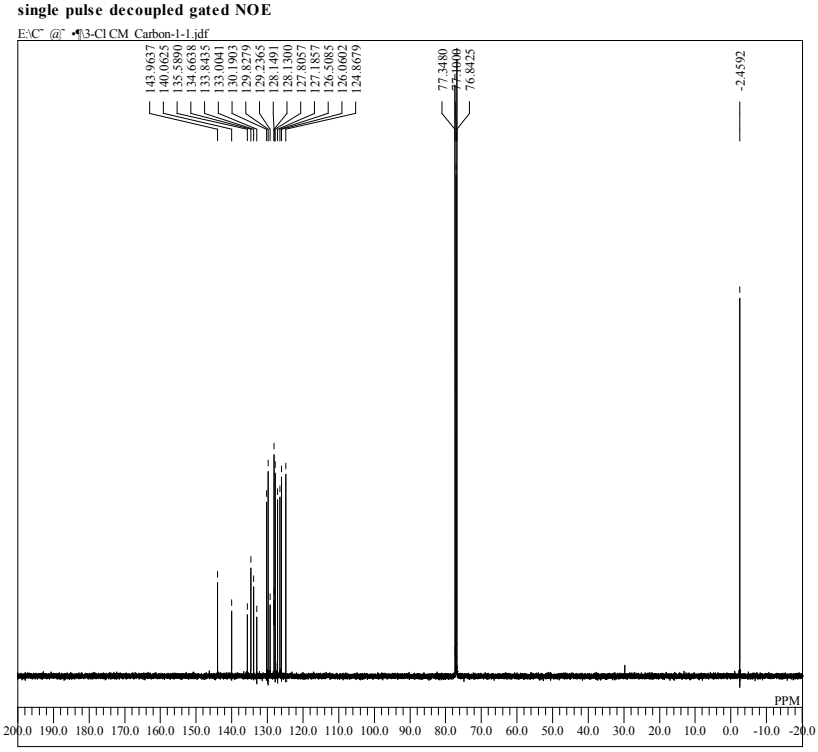
DFILE 2-Cl CM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-23 23:56:22
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 748
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.4 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2f



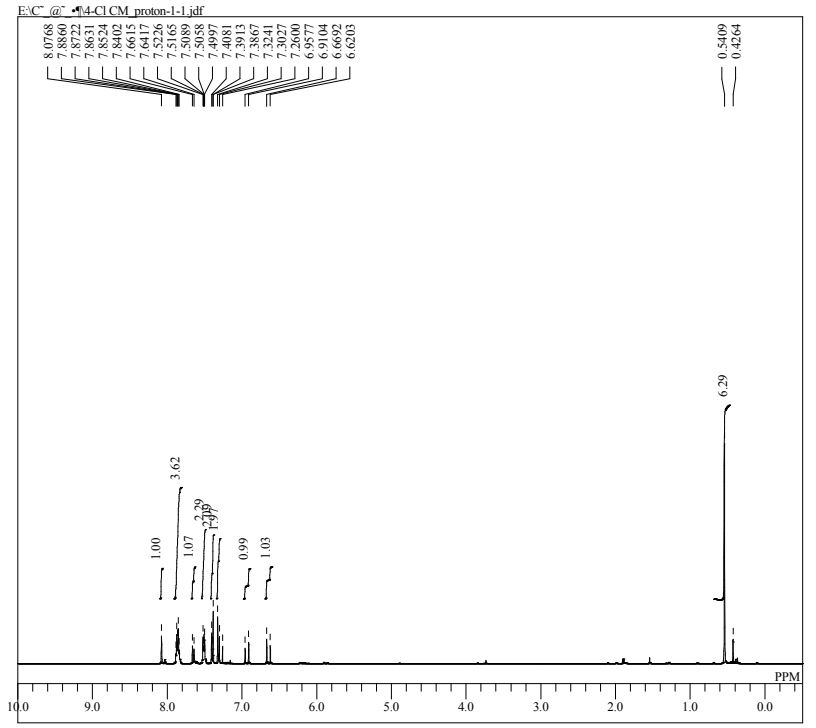
DFILE 3-Cl CM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-24 00:37:04
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 16
ACQTM 1.7459 sec
PD 1.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 20.5 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 42

2f



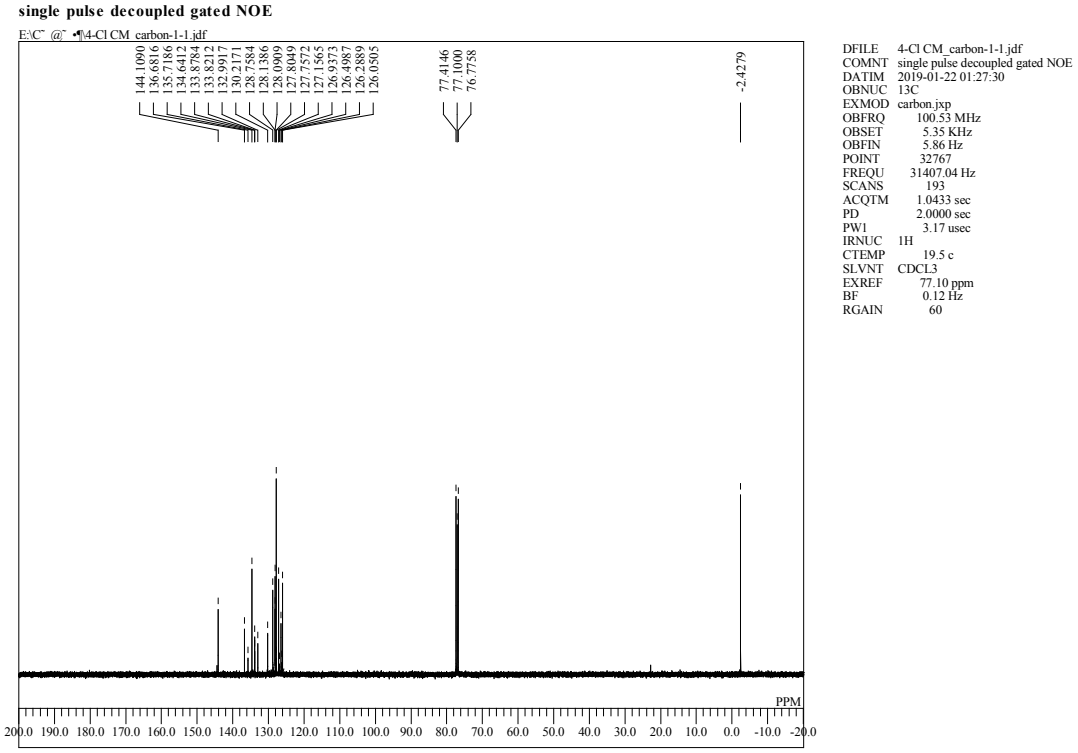
DFILE 3-Cl CM_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-24 00:40:07
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 1200
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.8 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2g

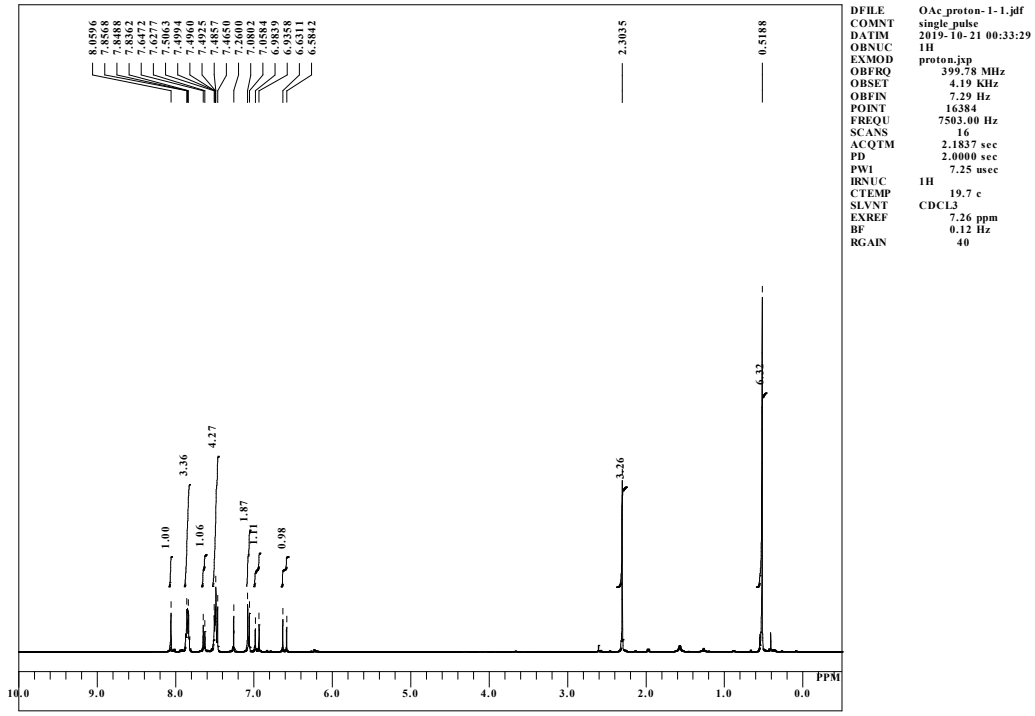


DFILE 4-Cl CM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-22 01:24:45
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.5 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 36

2g

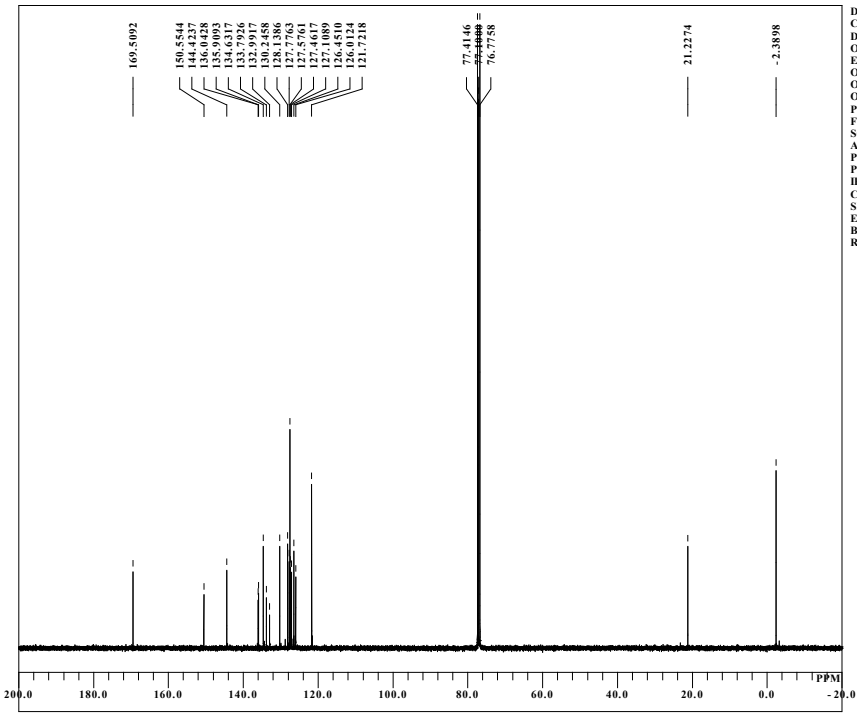

single pulse decoupled gated NOE
E:\C" @¯ •¶\4-Cl CM_carbon-1-1.jdf
144.1090
136.6816
135.7186
134.6412
133.8784
133.8212
132.9917
130.2171
128.7584
128.1386
128.0909
127.8049
127.7572
127.1565
126.9373
126.4987
126.2889
126.0595
77.4146
77.1000
76.7758
-2.4279
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 4-Cl CM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-22 01:27:30
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 193
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.5 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

2h


single_pulse
8.0596
7.8568
7.8488
7.8452
7.6472
7.6277
7.5063
7.4994
7.4960
7.4925
7.4857
7.4650
7.2600
7.0802
7.0584
6.9839
6.9358
6.6311
6.5842
2.3035
0.5188
6.32
4.27
3.36
3.26
1.87
1.71
1.06
1.00
0.98
PPM
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
DFILE OAc_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-10-21 00:33:29
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.7 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 40

2h

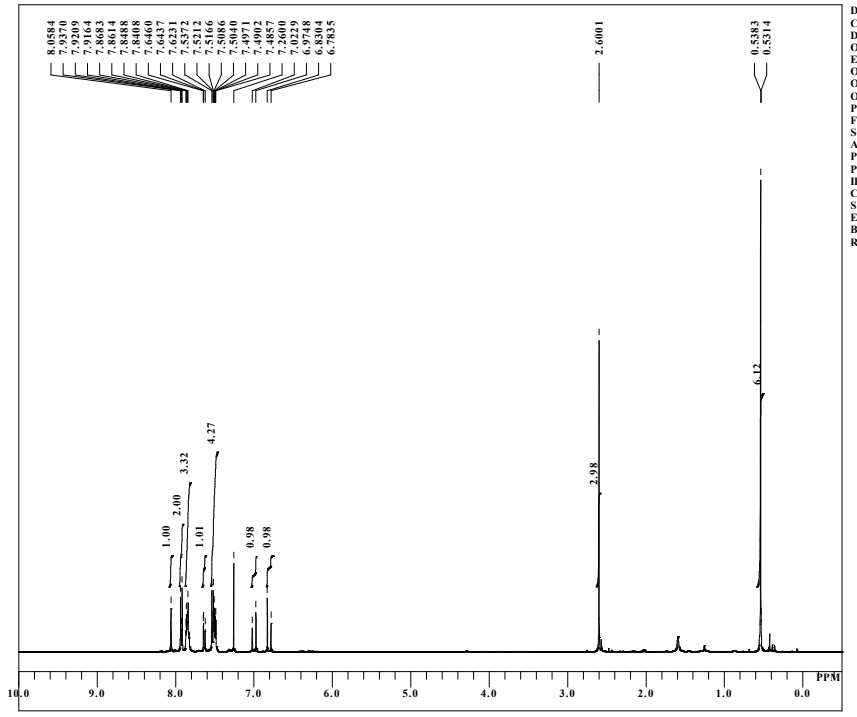
single pulse decoupled gated NOE



DFILE	OAc_carbon-1-1.jdf
COMNT	single pulse decoupled gated NOE
DATIM	2019-10-21 04:17:10
OBNUC	13C
EXMOD	carbon.jxp
OBFRQ	100.53 MHz
OBSET	5.35 KHz
OBFIN	5.86 Hz
POINT	32767
FREQU	31407.04 Hz
SCANS	4096
ACQTM	1.0433 sec
PD	1.0000 sec
PW1	3.17 usec
IRNUC	1H
CTEMP	19.9 c
SLVNT	CDCL3
EXREF	77.10 ppm
BF	0.12 Hz
RGAIN	60

2i

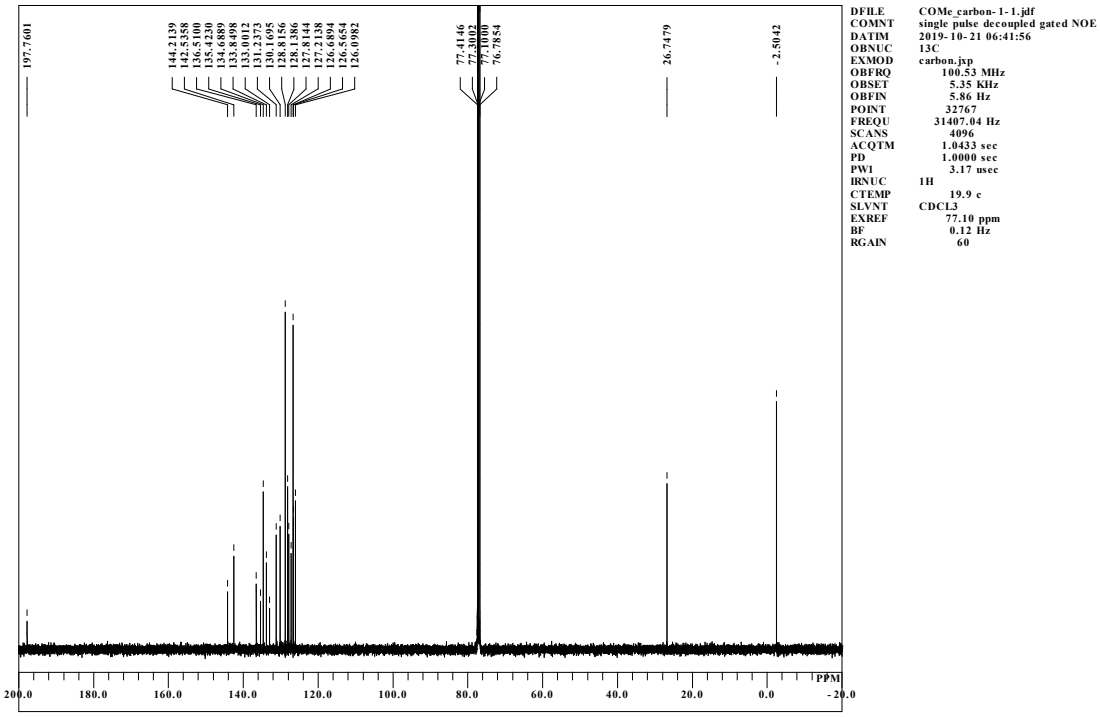
single_pulse



DFILE	COMe_proton-1-1.jdf
COMNT	single_pulse
DATIM	2019-10-21 00:39:54
OBNUC	1H
EXMOD	proton.jxp
OBFRQ	399.78 MHz
OBSET	4.19 KHz
OBFIN	7.29 Hz
POINT	16384
FREQU	7503.00 Hz
SCANS	16
ACQTM	2.1837 sec
PD	2.0000 sec
PW1	7.25 usec
IRNUC	1H
CTEMP	19.6 c
SLVNT	CDCL3
EXREF	7.26 ppm
BF	0.12 Hz
RGAIN	46

2i

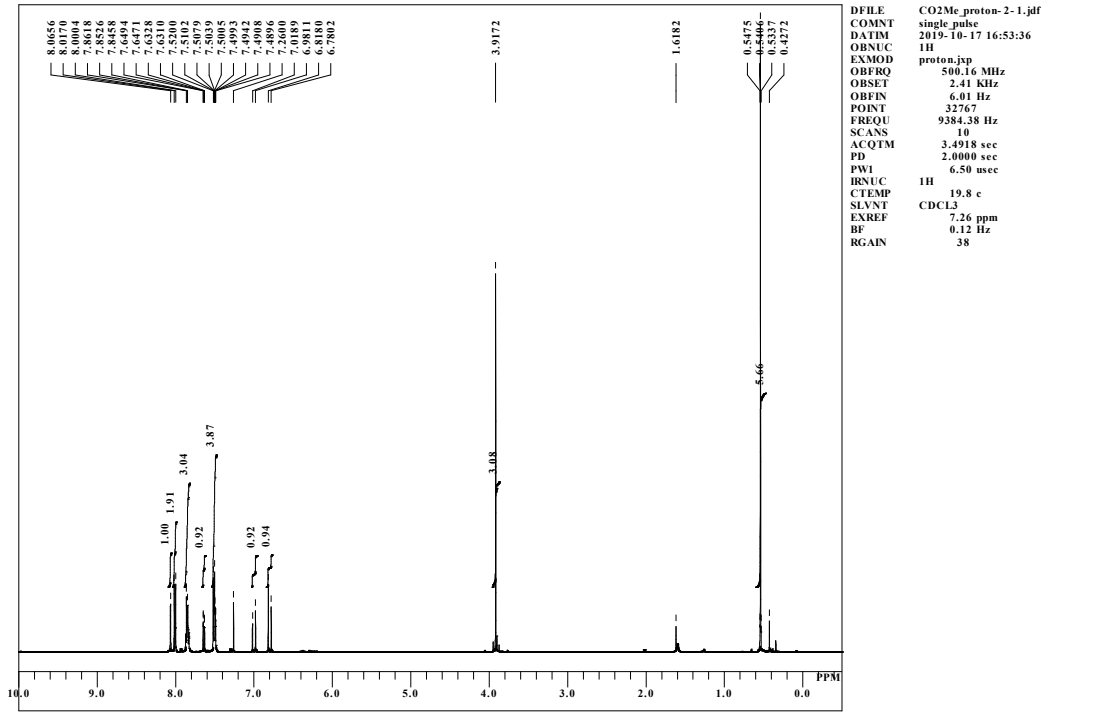
single pulse decoupled gated NOE



DFILE	COMe_carbon-1-1.jdf
COMNT	single pulse decoupled gated NOE
DATIM	2019-10-21 06:41:56
OBNUC	13C
EXMOD	carbon.jxp
OBFRQ	100.53 MHz
OBSET	5.35 KHz
OBFIN	5.86 Hz
POINT	32767
FREQU	31407.04 Hz
SCANS	4096
ACQTM	1.0433 sec
PD	1.0000 sec
PW1	3.17 usec
IRNUC	1H
CTEMP	19.9 c
SLVNT	CDCL3
EXREF	77.10 ppm
BF	0.12 Hz
RGAIN	60

2j

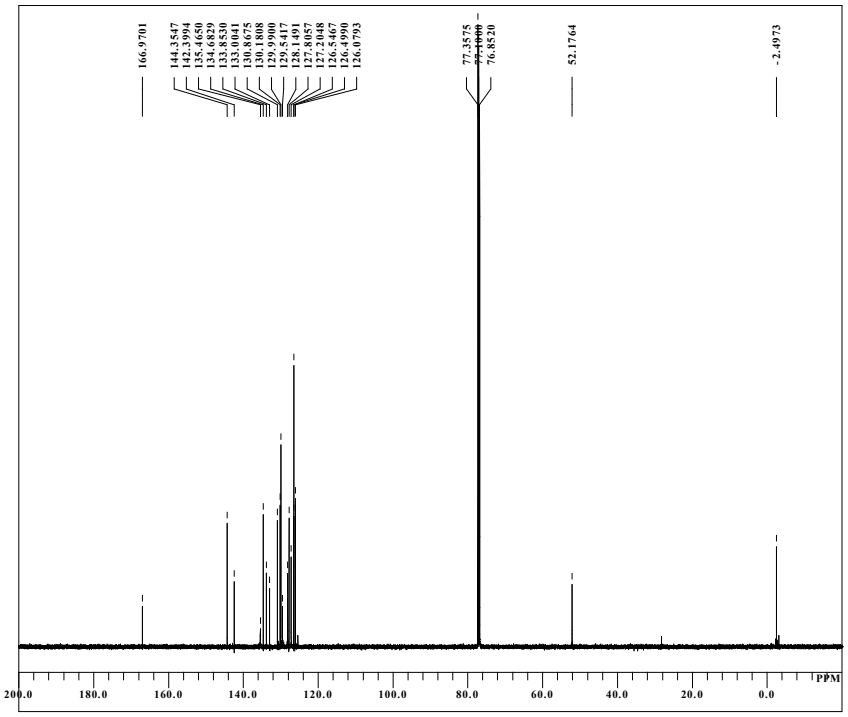
single_pulse



DFILE	CO2Me_proton-2-1.jdf
COMNT	single_pulse
DATIM	2019-10-17 16:53:36
OBNUC	1H
EXMOD	proton.jxp
OBFRQ	500.16 MHz
OBSET	2.41 KHz
OBFIN	6.01 Hz
POINT	32767
FREQU	9384.38 Hz
SCANS	10
ACQTM	3.4918 sec
PD	2.0000 sec
PW1	6.50 usec
IRNUC	1H
CTEMP	19.8 c
SLVNT	CDCL3
EXREF	7.26 ppm
BF	0.12 Hz
RGAIN	38

2j

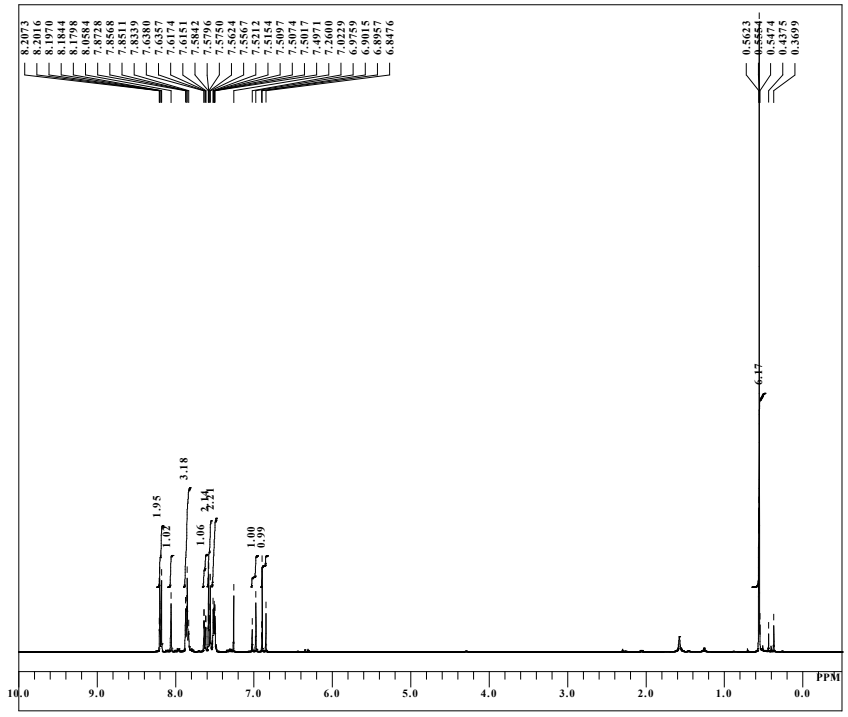
single pulse decoupled gated NOE



DFILE	CO2Me_Carbon-1-1.jdf
COMNT	single pulse decoupled gated NOE
DATIM	2019-10-18 03:40:22
OBNUC	13C
EXMOD	carbon.jxp
OBFRQ	125.77 MHz
OBSET	7.87 KHz
OBFIN	4.21 Hz
POINT	32767
FREQU	39308.18 Hz
SCANS	1024
ACQTM	0.8336 sec
PD	4.0000 sec
PW1	3.27 usec
IRNUC	1H
CTEMP	20.4 c
SLVNT	CDCL3
EXREF	77.10 ppm
BF	0.12 Hz
RGAIN	56

2k

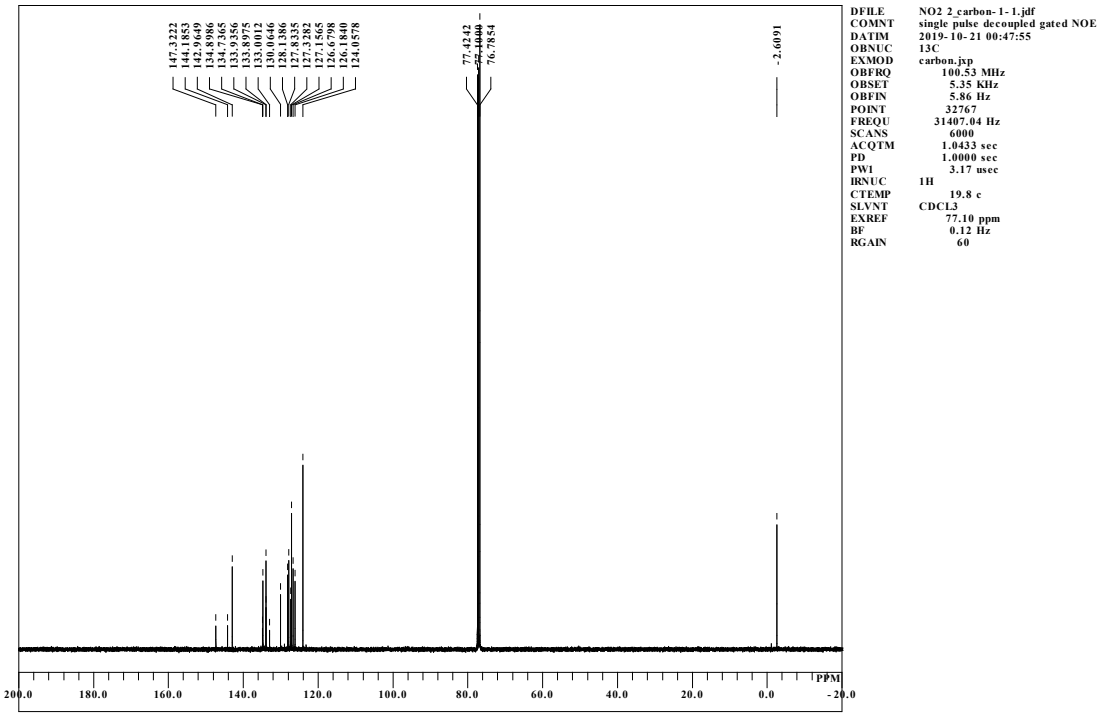
single_pulse



DFILE	NO2 2_proton-1-1.jdf
COMNT	single_pulse
DATIM	2019-10-21 00:26:48
OBNUC	1H
EXMOD	proton.jxp
OBFRQ	399.78 MHz
OBSET	4.19 KHz
OBFIN	7.29 Hz
POINT	16384
FREQU	7503.00 Hz
SCANS	16
ACQTM	2.1837 sec
PD	2.0000 sec
PW1	7.25 usec
IRNUC	1H
CTEMP	19.8 c
SLVNT	CDCL3
EXREF	7.26 ppm
BF	0.12 Hz
RGAIN	44

2k

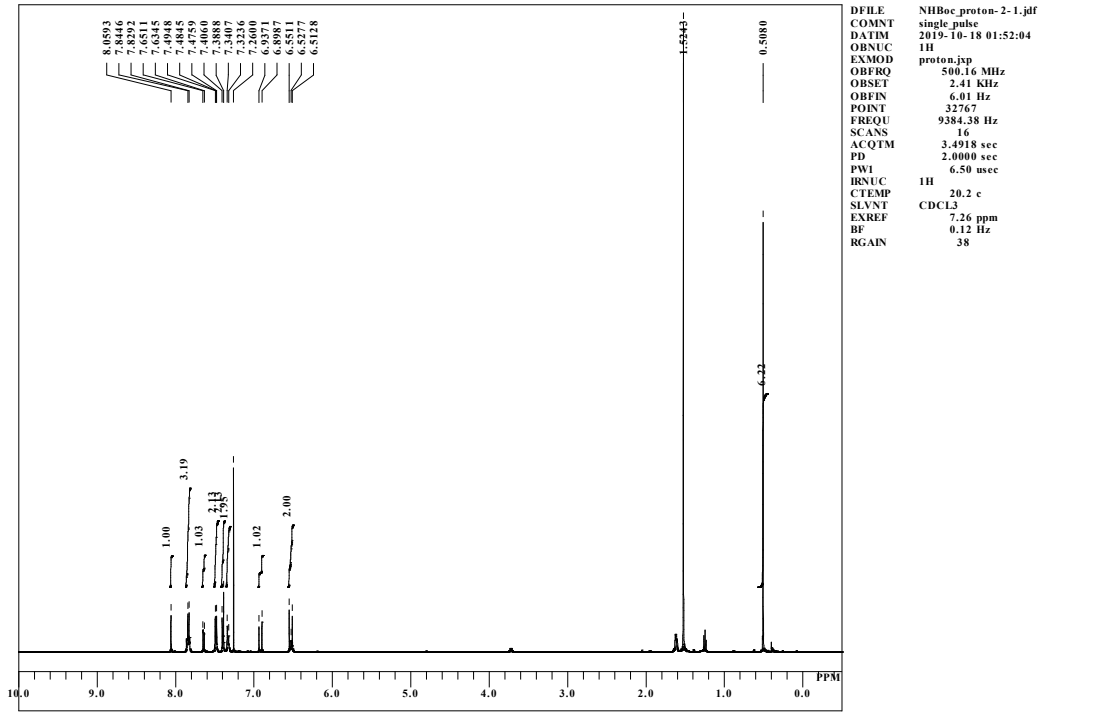
single pulse decoupled gated NOE



DFILE	NO2 2_carbon-1-1.jdf
COMNT	single pulse decoupled gated NOE
DATIM	2019-10-21 00:47:55
OBNUC	13C
EXMOD	carbon.jxp
OBFRQ	100.53 MHz
OBSET	5.35 KHz
OBFIN	5.86 Hz
POINT	32767
FREQU	31407.04 Hz
SCANS	6000
ACQTM	1.0433 sec
PD	1.0000 sec
PW1	3.17 usec
IRNUC	1H
CTEMP	19.8 c
SLVNT	CDCL3
EXREF	77.10 ppm
BF	0.12 Hz
RGAIN	60

2l

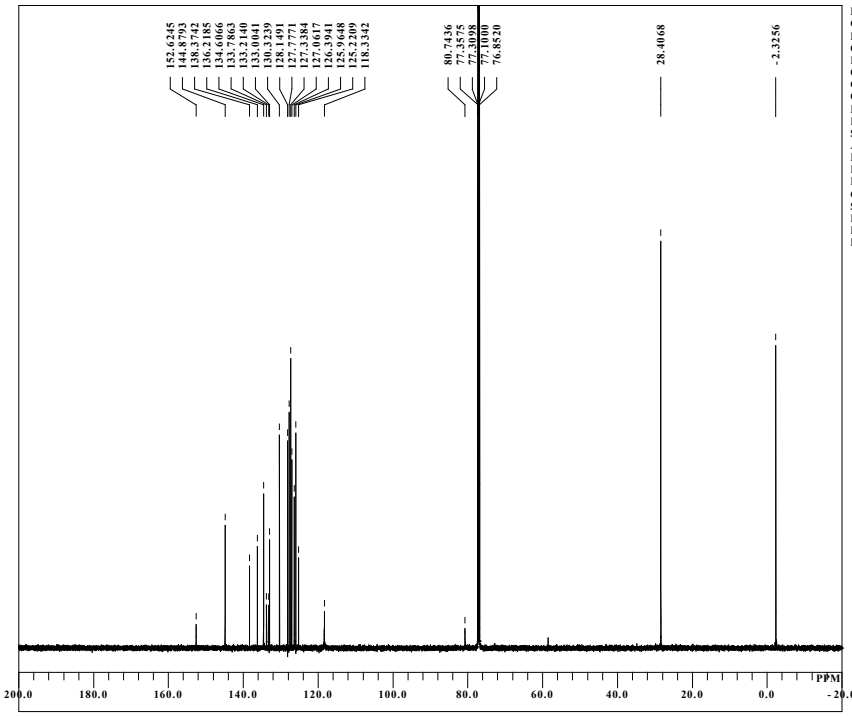
single_pulse



DFILE	NHBoc_proton-2-1.jdf
COMNT	single_pulse
DATIM	2019-10-18 01:52:04
OBNUC	1H
EXMOD	proton.jxp
OBFRQ	500.16 MHz
OBSET	2.41 KHz
OBFIN	6.01 Hz
POINT	32767
FREQU	9384.38 Hz
SCANS	16
ACQTM	3.4918 sec
PD	2.0000 sec
PW1	6.50 usec
IRNUC	1H
CTEMP	20.2 c
SLVNT	CDCL3
EXREF	7.26 ppm
BF	0.12 Hz
RGAIN	38

2l

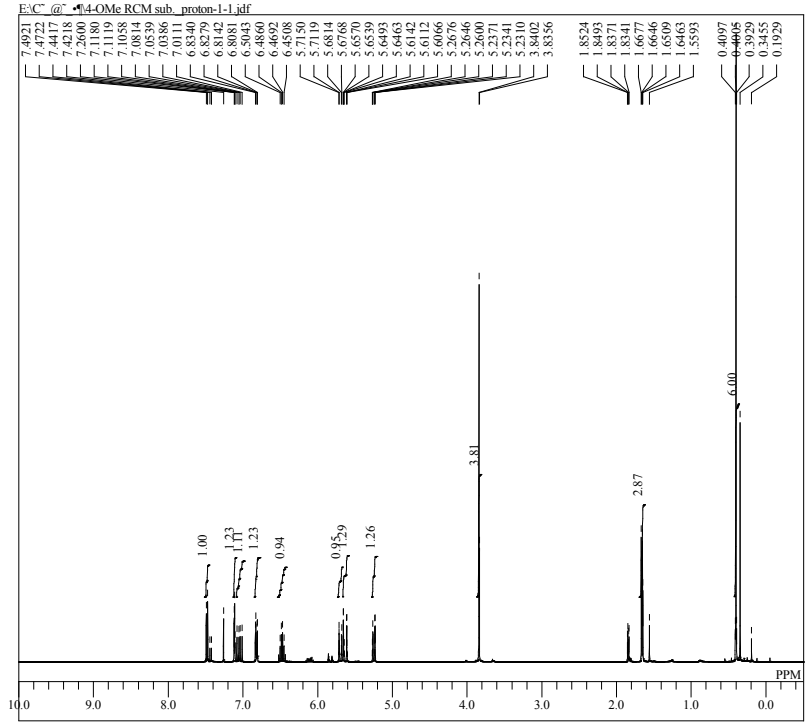
single pulse decoupled gated NOE



DFILE NHBoc_Carbon-2-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-10-18 05:28:59
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 2048
ACQTM 0.8336 sec
PD 4.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

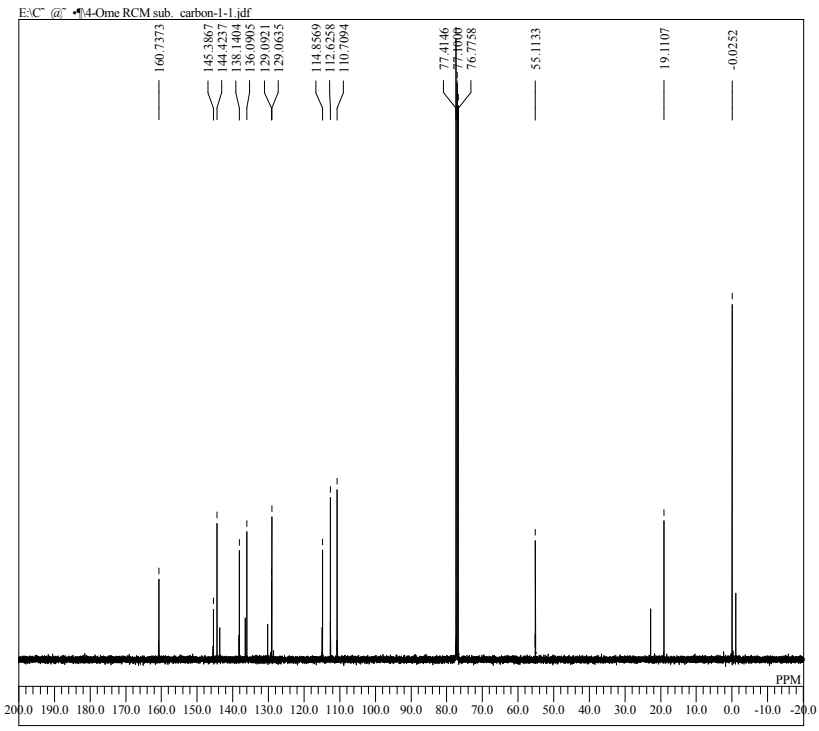
3a

single_pulse



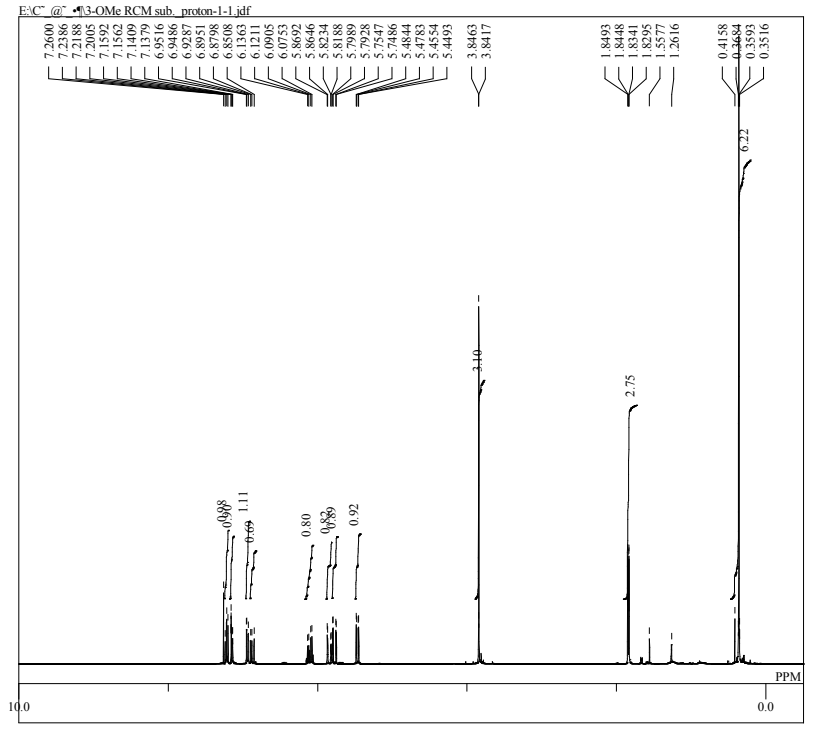
DFILE 4-OMe RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-28 16:16:18
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 40

3a



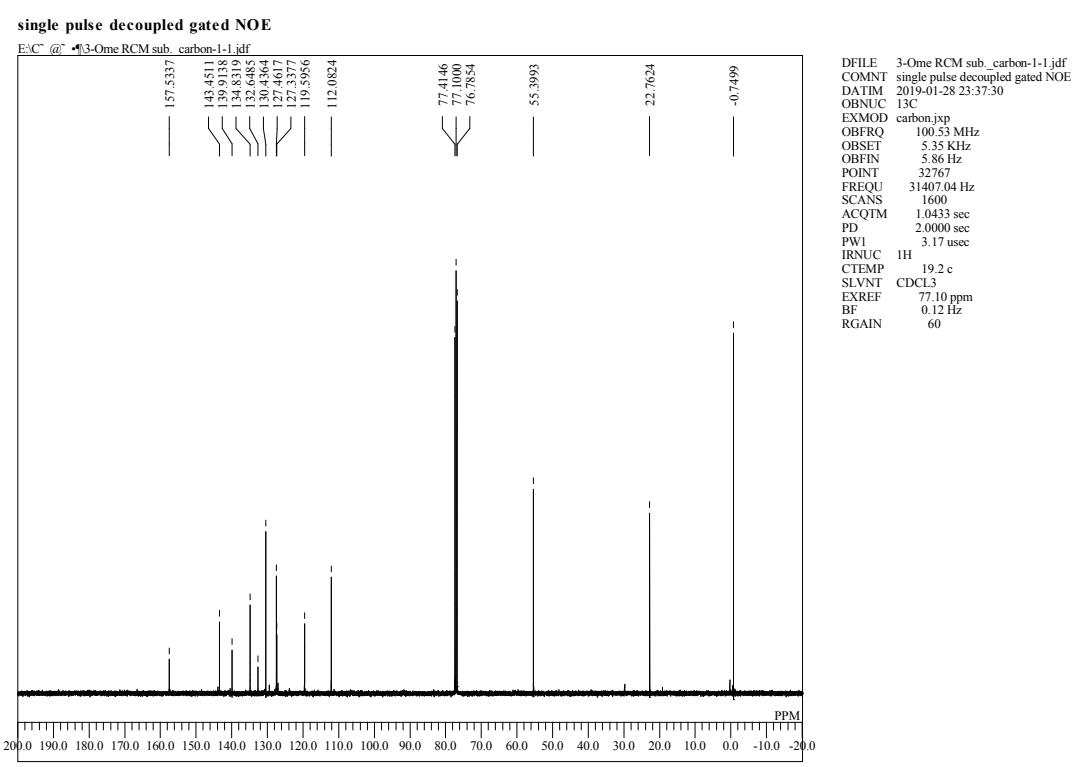
DFILE 4-Ome RCM sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-29 01:07:35
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 1304
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 18.9 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3b



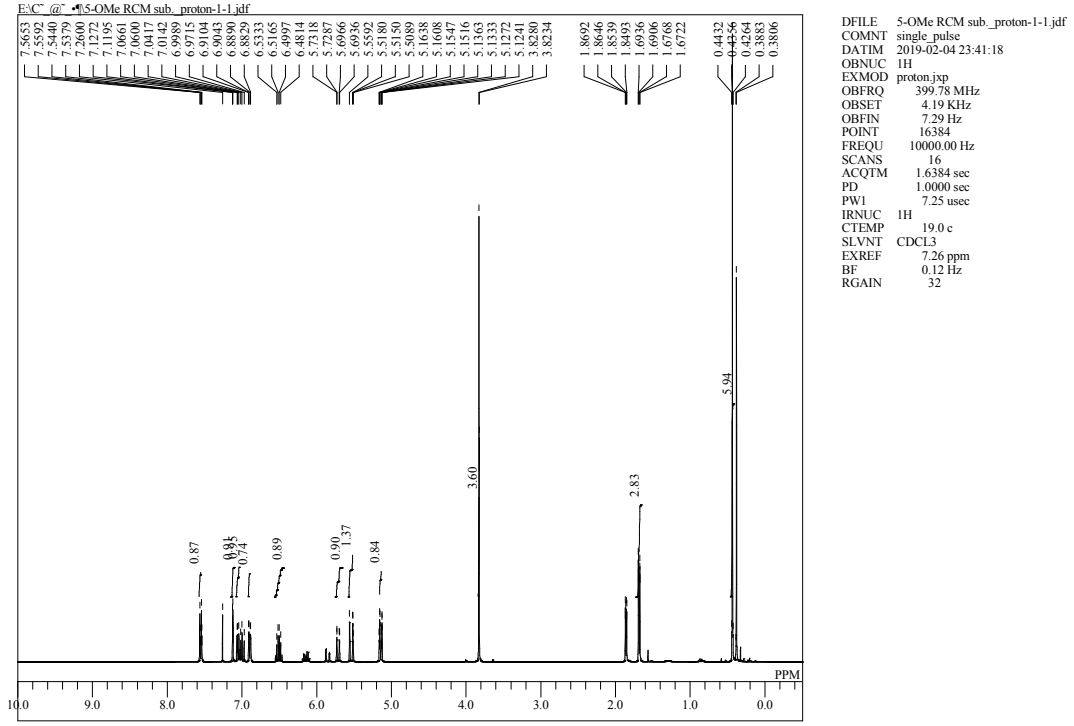
DFILE 3-OMe RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-28 16:24:59
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.0 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

3b



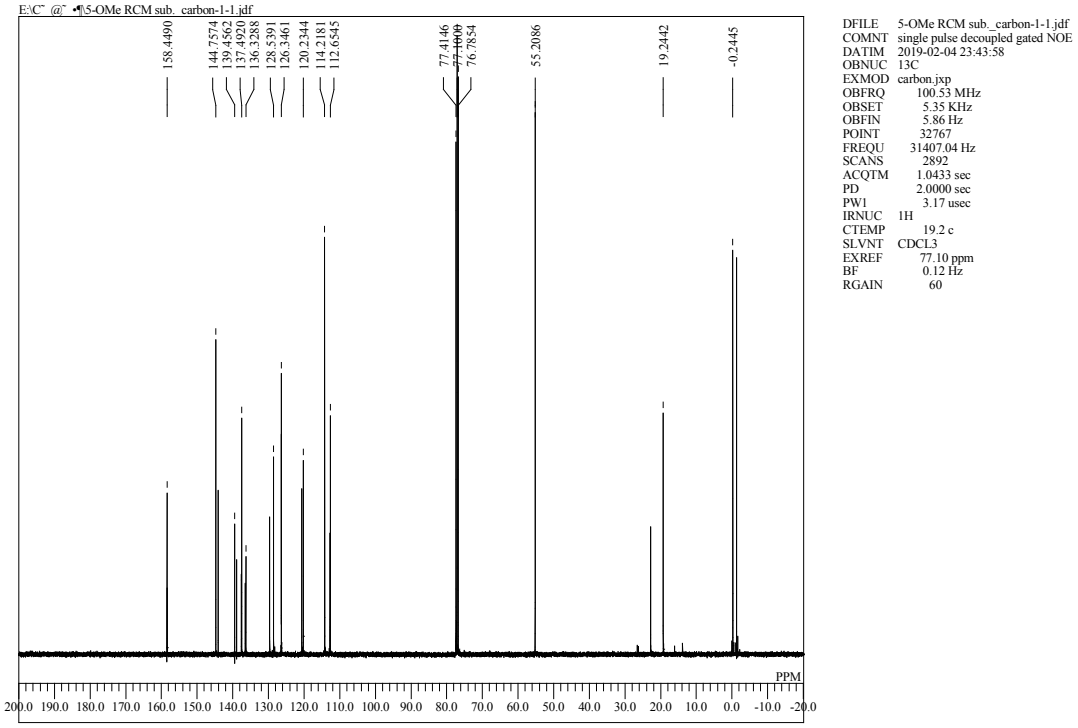
DFILE 3-Ome RCM sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-28 23:37:30
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 1600
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3c

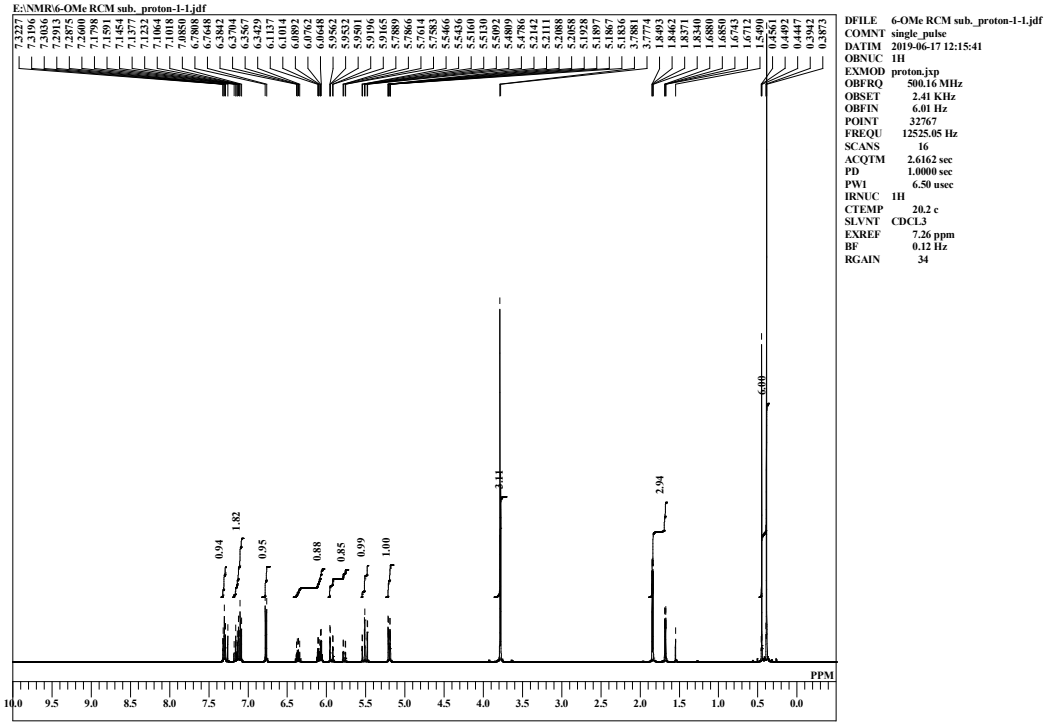


DFILE 5-OMe RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-02-04 23:41:18
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.0 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 32

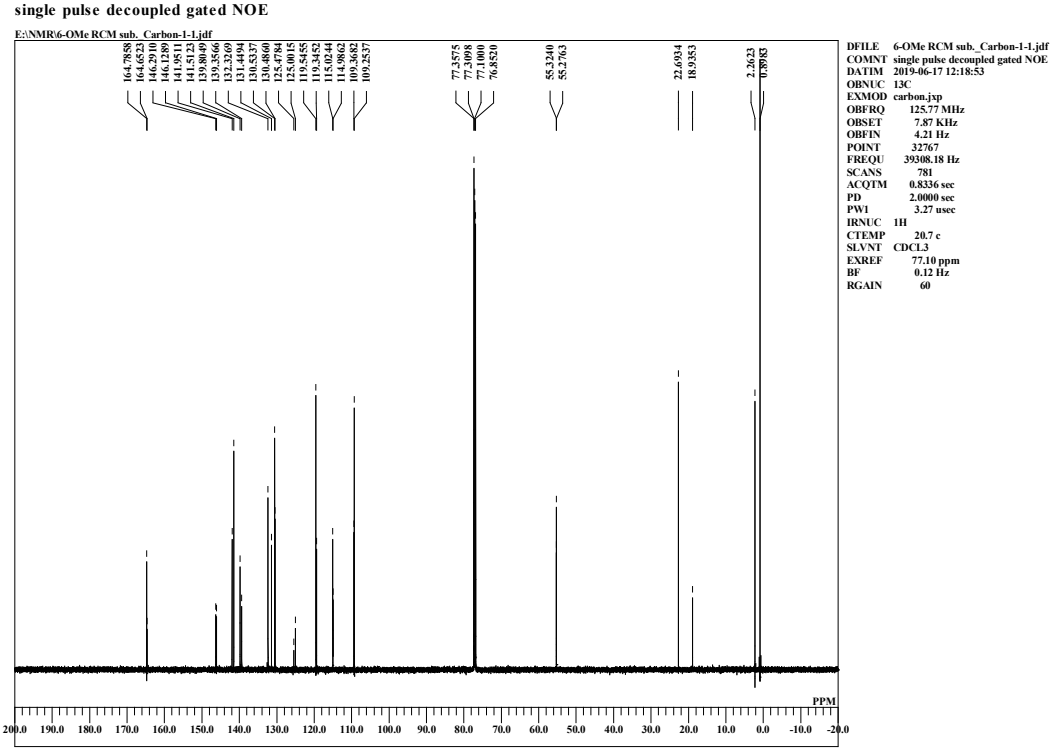
3c


single pulse decoupled gated NOE
E:\C" @¯ •¶\5-OMe RCM sub._carbon-1-1.jdf
158.4490
144.7574
139.4502
137.4020
136.3288
128.5391
126.3461
120.2344
114.2181
112.6545
77.4146
77.1000
76.7854
55.2086
19.2442
-0.2445
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 5-OMe RCM sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-02-04 23:43:58
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 2892
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

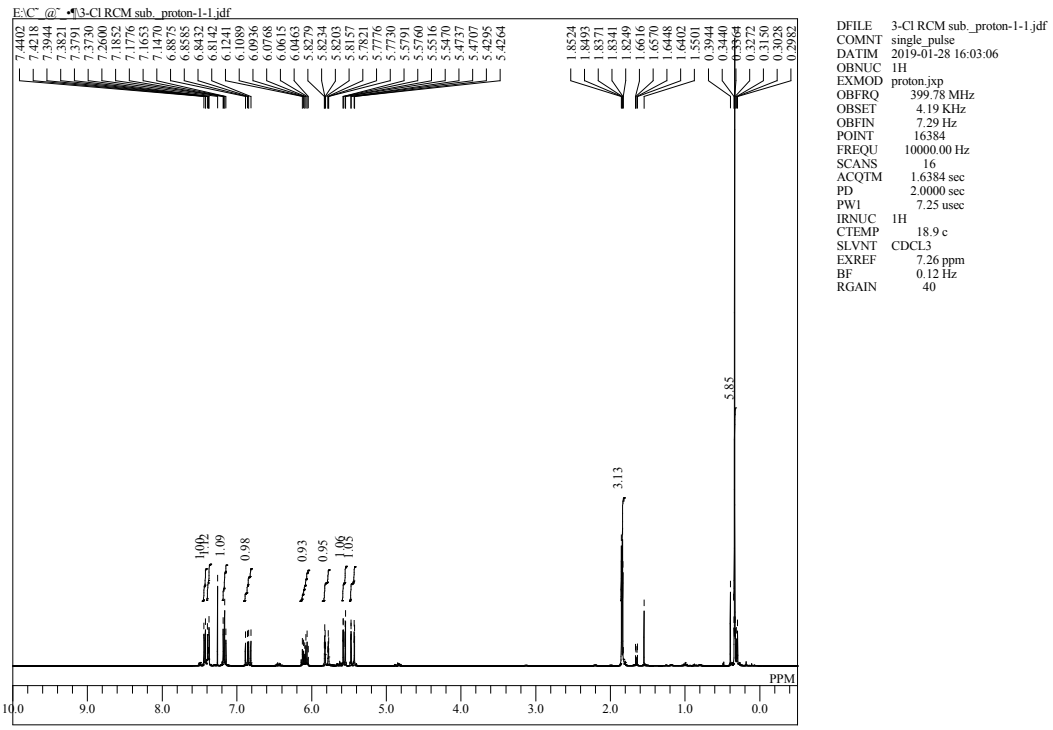
3d


single_pulse
E:\NMR\6-OMe RCM sub._proton-1-1.jdf
7.3227
7.3196
7.3036
7.2913
7.2875
7.2690
7.2508
7.1591
7.1454
7.1377
7.1232
7.1064
7.1018
7.0850
6.7808
6.7648
6.3842
6.3704
6.3567
6.3429
6.1137
6.1014
6.0892
6.0762
6.0648
5.9562
5.9532
5.9501
5.9196
5.9165
5.7889
5.7866
5.7614
5.7583
5.5466
5.5316
5.5160
5.5130
5.5092
5.4809
5.4786
5.2142
5.2111
5.2088
5.1958
5.1928
5.1897
5.1867
5.1836
3.7881
3.7774
1.8493
1.8462
1.8371
1.8340
1.6880
1.6850
1.6743
1.6712
1.5490
0.4561
0.4492
0.4447
0.3942
0.3873
0.94
1.82
0.95
0.88
0.85
0.99
1.00
3.11
2.94
6.00
PPM
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
DFILE 6-OMe RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-06-17 12:15:41
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 32767
FREQU 12525.05 Hz
SCANS 16
ACQTM 2.6162 sec
PD 1.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 20.2 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 34

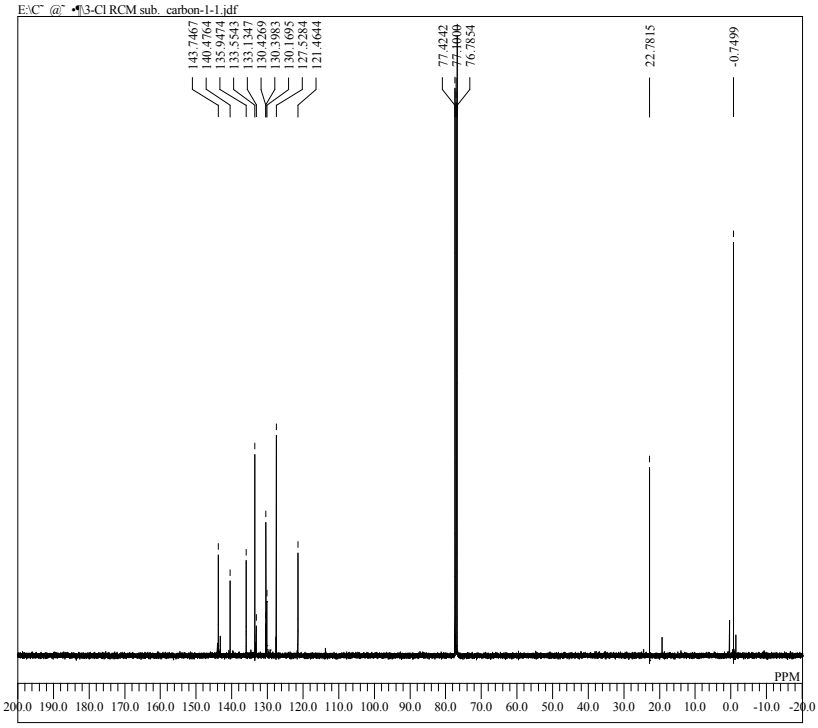
3d


single pulse decoupled gated NOE
E:\NMR\6-OMe RCM sub._Carbon-1-1.jdf
164.7858
164.6623
146.4310
146.1289
141.9511
141.5123
139.8049
139.3566
132.3269
131.4494
130.5337
130.4860
125.4704
125.0015
119.5455
119.3452
115.0244
114.9862
109.3682
109.2537
77.3575
77.3098
77.1000
76.8520
55.3240
55.2763
22.6934
18.9353
2.2623
0.2983
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 6-OMe RCM sub._Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-06-17 12:18:53
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 781
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.7 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3e

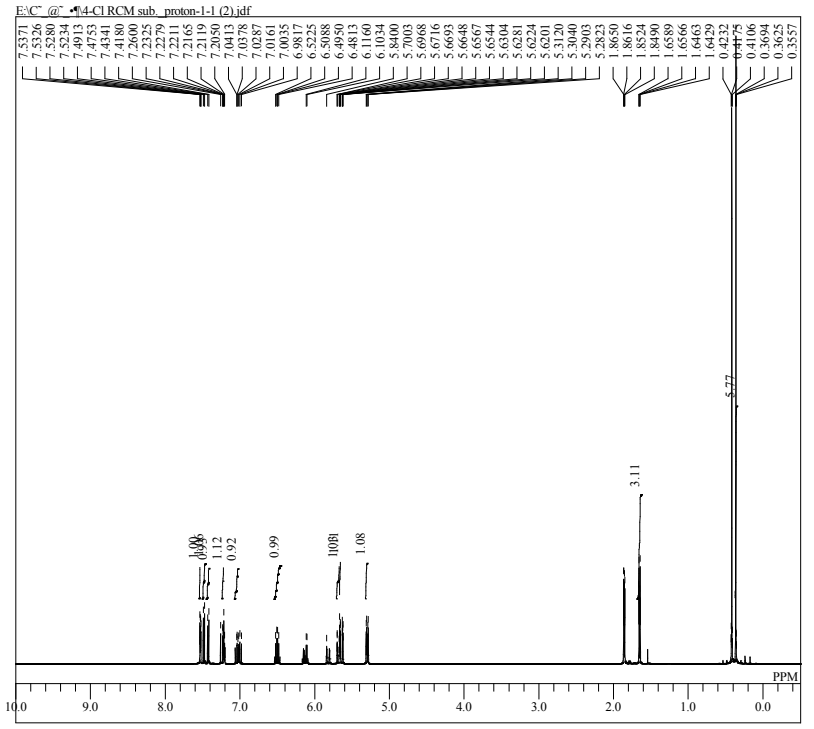

single_pulse
E:\C~ @~ -¶\3-Cl RCM sub._proton-1-1.jdf
7.4402
7.4218
7.3944
7.3821
7.3791
7.3730
7.2600
7.1852
7.1776
7.1653
7.1470
6.8875
6.8585
6.8432
6.8142
6.1241
6.1089
6.0936
6.0768
6.0615
6.0463
5.8279
5.8234
5.8203
5.8157
5.7821
5.7776
5.7730
5.5791
5.5760
5.5516
5.5470
5.4737
5.4707
5.4295
5.4264
1.8524
1.8493
1.8371
1.8341
1.8249
1.6616
1.6570
1.6448
1.6402
1.5501
0.3944
0.3440
0.3364
0.3272
0.3150
0.3028
0.2982
5.85
3.13
1.02
1.09
0.98
0.93
0.95
1.06
1.05
PPM
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
DFILE 3-Cl RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-28 16:03:06
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.9 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 40

3e



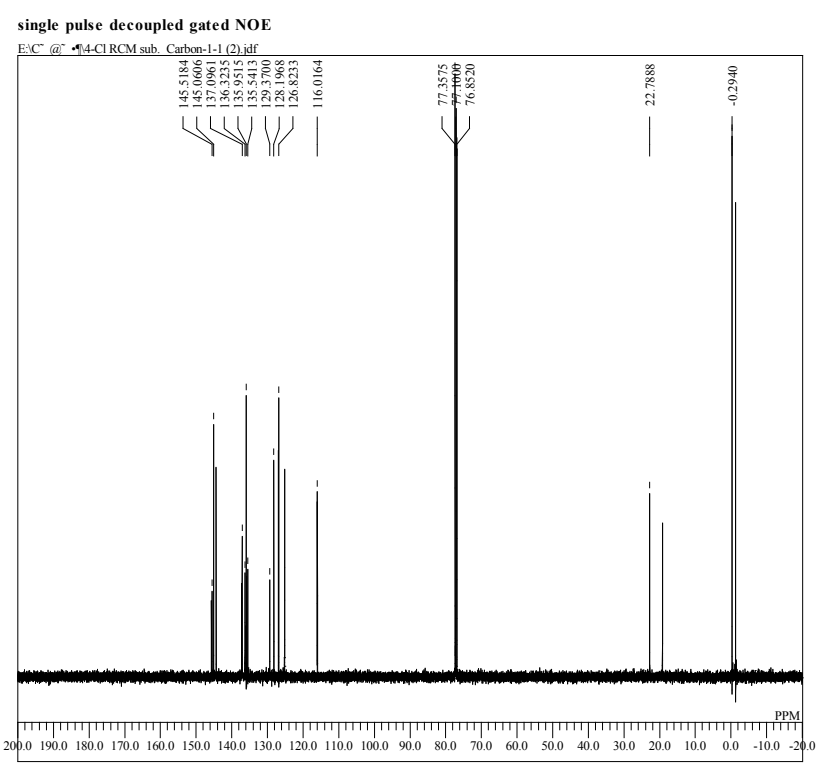
DFILE 3-Cl RCM sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-29 22:27:18
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 2048
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 18.9 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3f



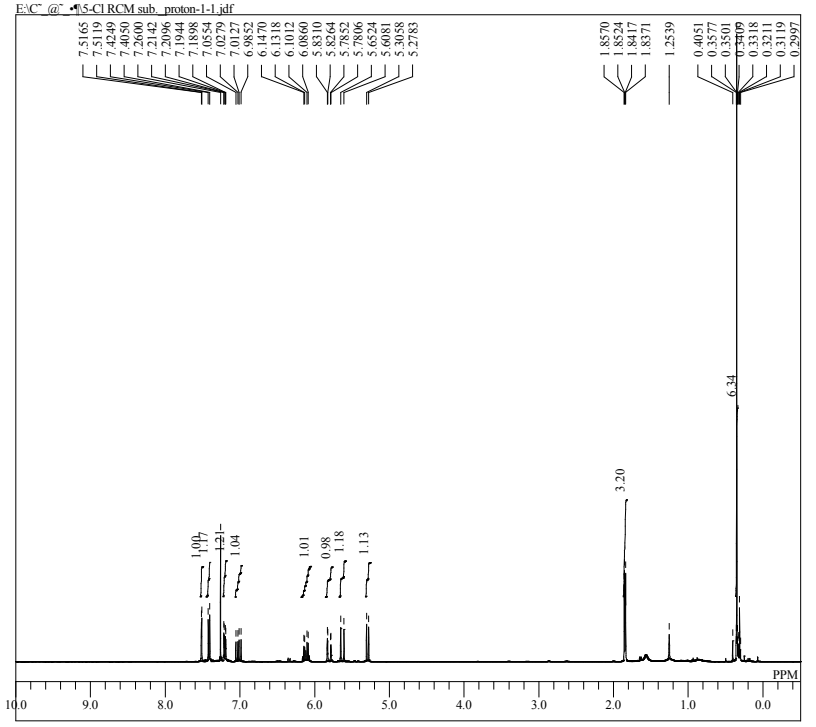
DFILE 4-Cl RCM sub._proton-1-1 (2).jdf
COMNT single_pulse
DATIM 2018-11-20 12:05:22
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 16
ACQTM 1.7459 sec
PD 1.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 20.6 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 34

3f



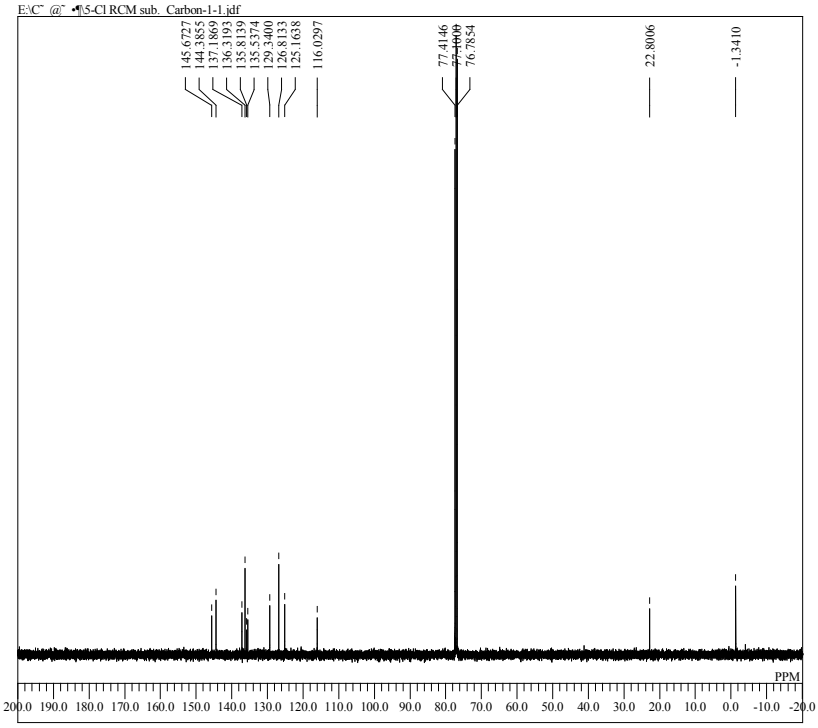
DFILE 4-Cl RCM sub._Carbon-1-1 (2).jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-11-20 12:08:24
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 287
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 21.1 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3g



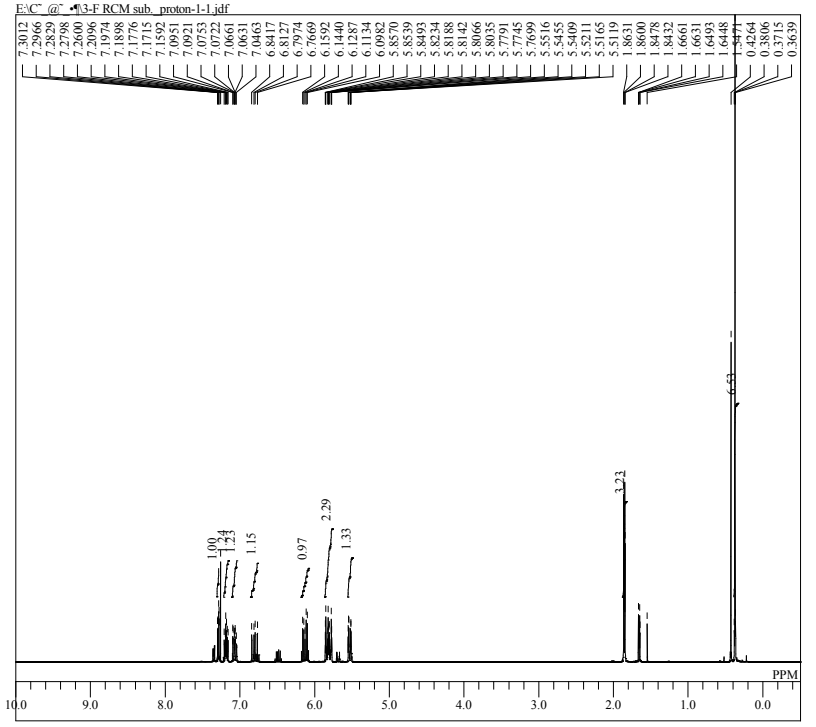
DFILE 5-Cl RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-28 15:49:09
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.6 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 46

3g



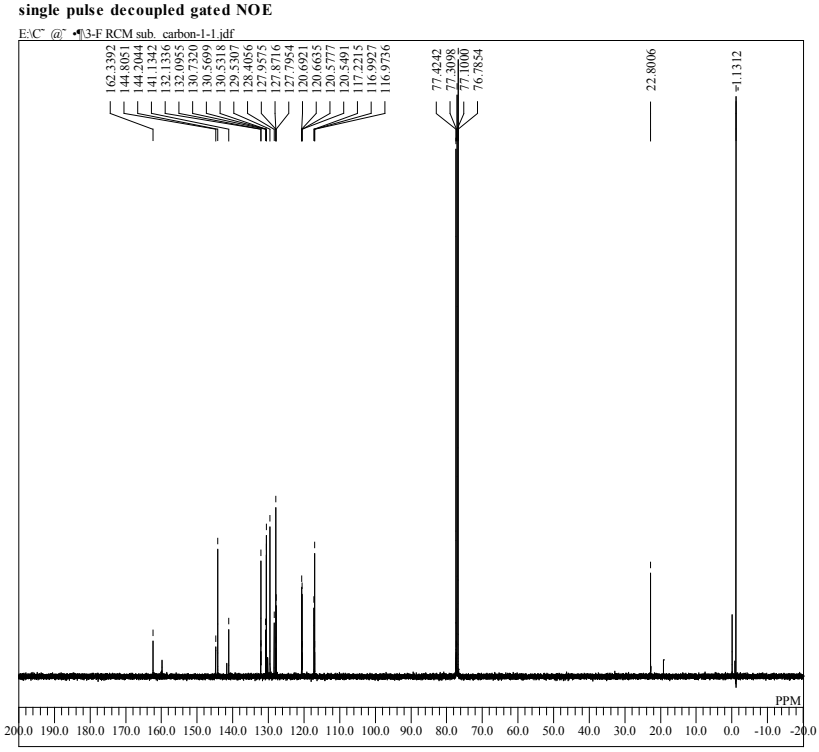
DFILE 5-Cl RCM sub._Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-30 00:17:52
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 602
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.0 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3h



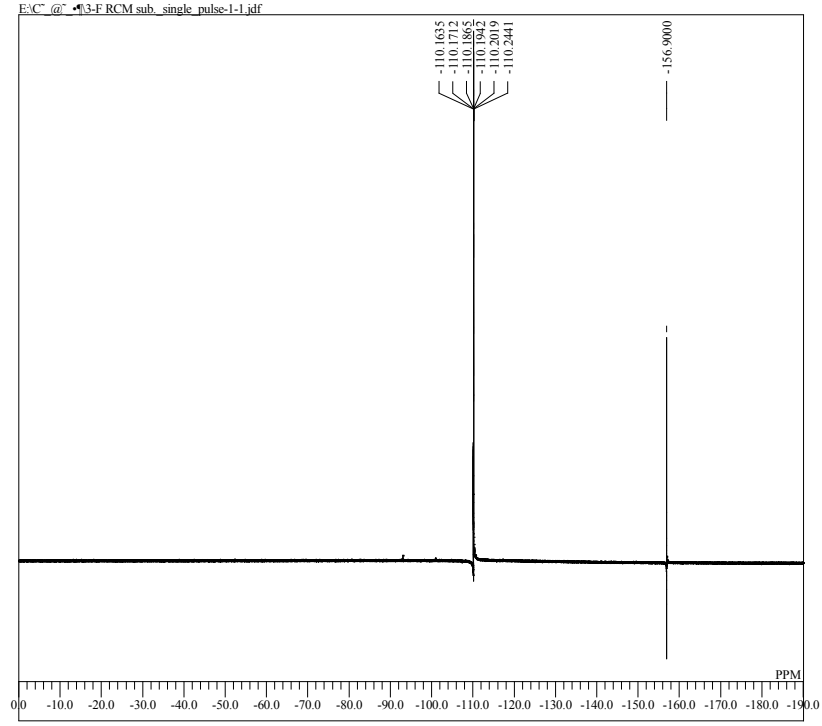
DFILE 3-F RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-31 21:00:29
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

3h



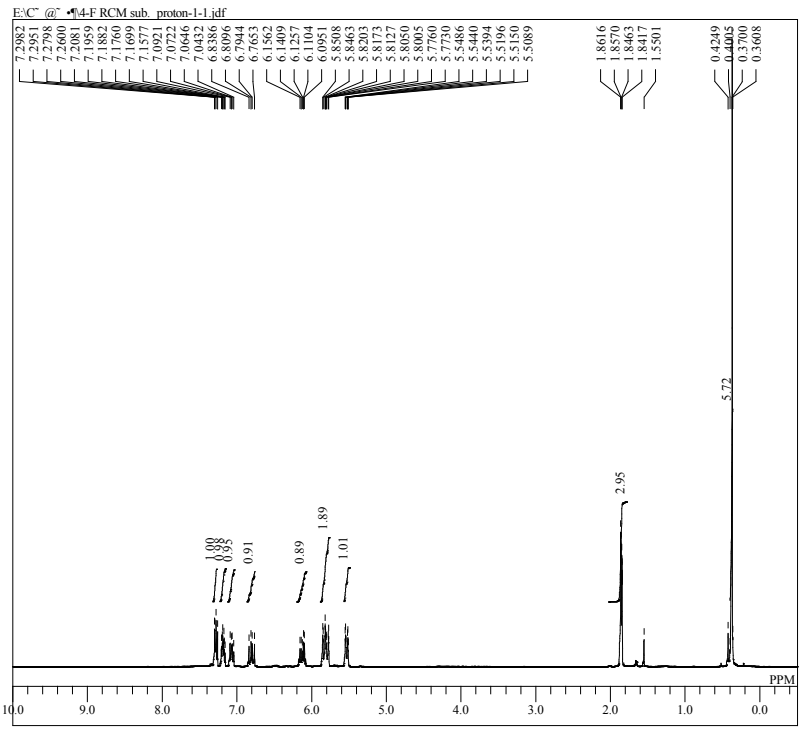
DFILE 3-F RCM sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-31 21:03:15
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 1892
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3h



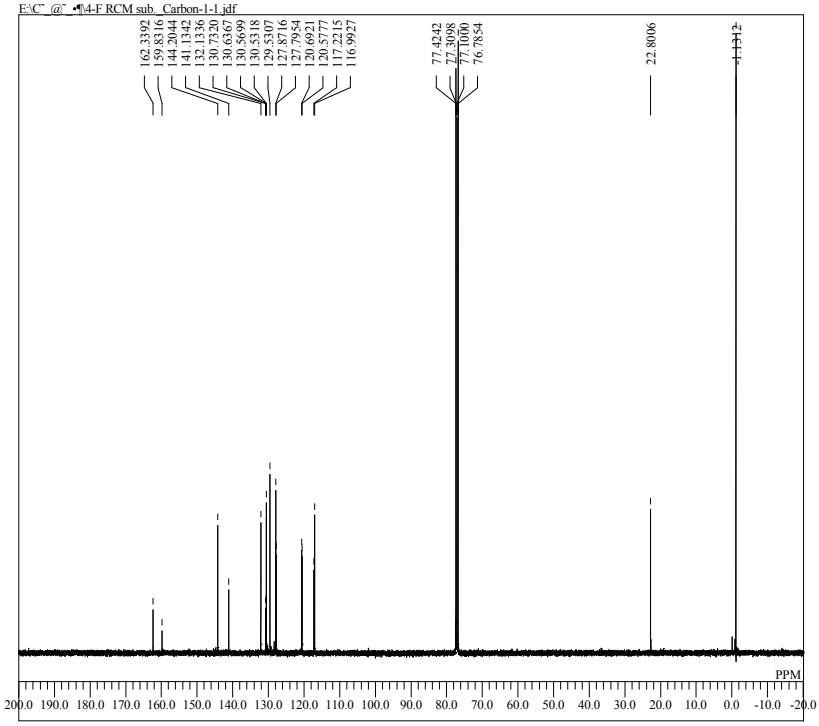
DFILE 3-F RCM sub._single_pulse-1-1.jdf
COMNT single_pulse
DATIM 2019-02-02 00:55:12
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 376.17 MHz
OBSET 1.05 KHz
OBFIN 3.93 Hz
POINT 131071
FREQU 189393.94 Hz
SCANS 17
ACQTM 0.6921 sec
PD 5.0000 sec
PW1 7.80 usec
IRNUC 19F
CTEMP 18.7 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 42

3i



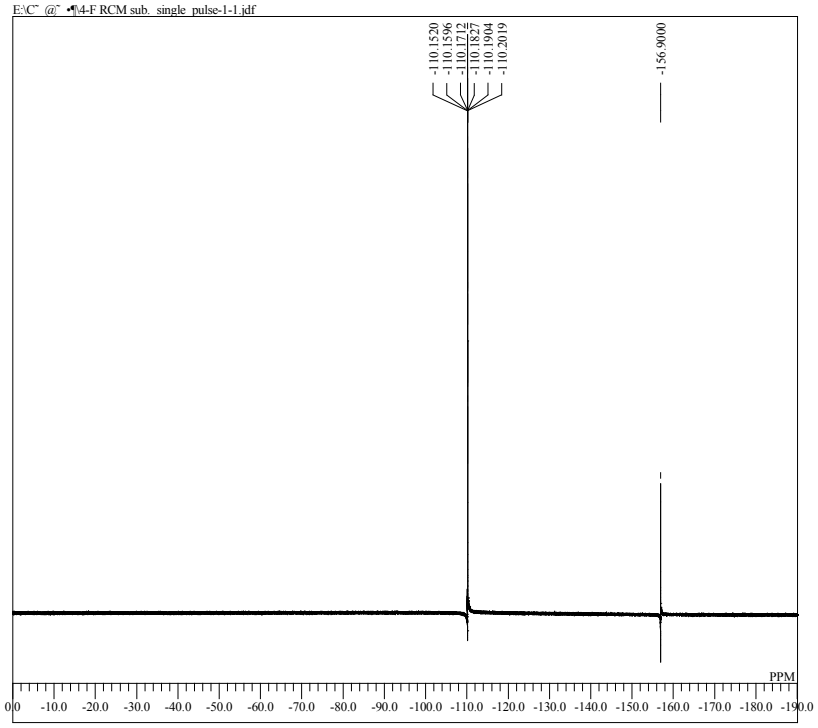
DFILE 4-F RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-28 16:09:59
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 40

3i



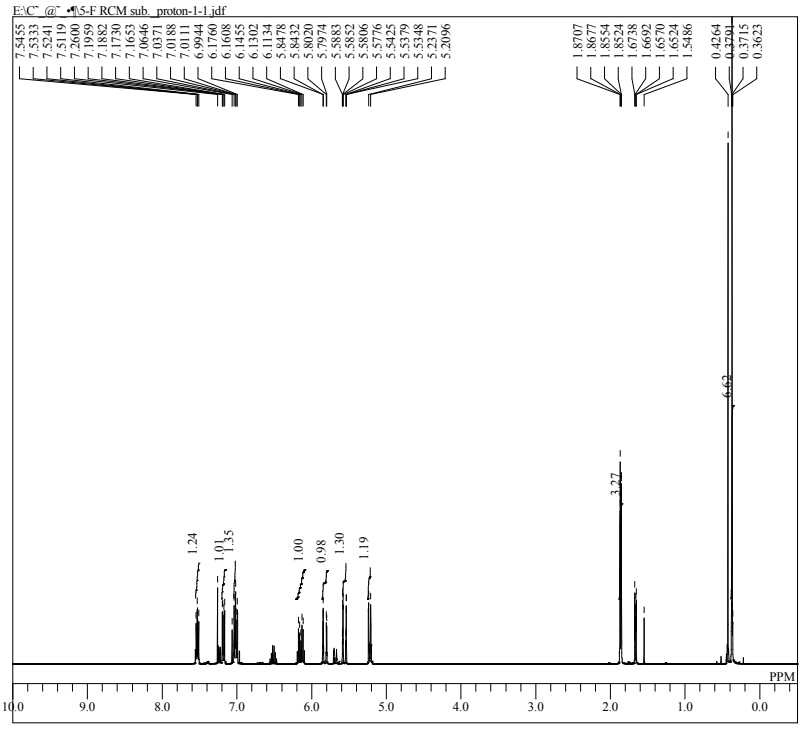
DFILE 4-F RCM sub._Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-30 22:31:15
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 2307
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

3i



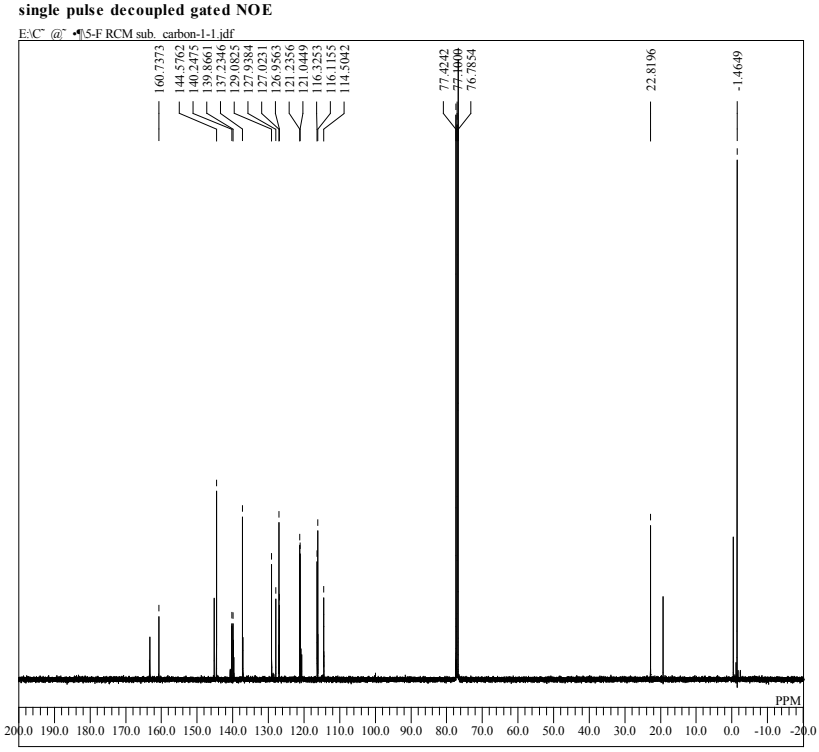
DFILE 4-F RCM sub._single_pulse-1-1.jdf
COMNT single_pulse
DATIM 2019-01-31 00:34:46
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 376.17 MHz
OBSET 1.05 KHz
OBFIN 3.93 Hz
POINT 131071
FREQU 189393.94 Hz
SCANS 9
ACQTM 0.6921 sec
PD 5.0000 sec
PW1 7.80 usec
IRNUC 19F
CTEMP 18.9 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 44

3j



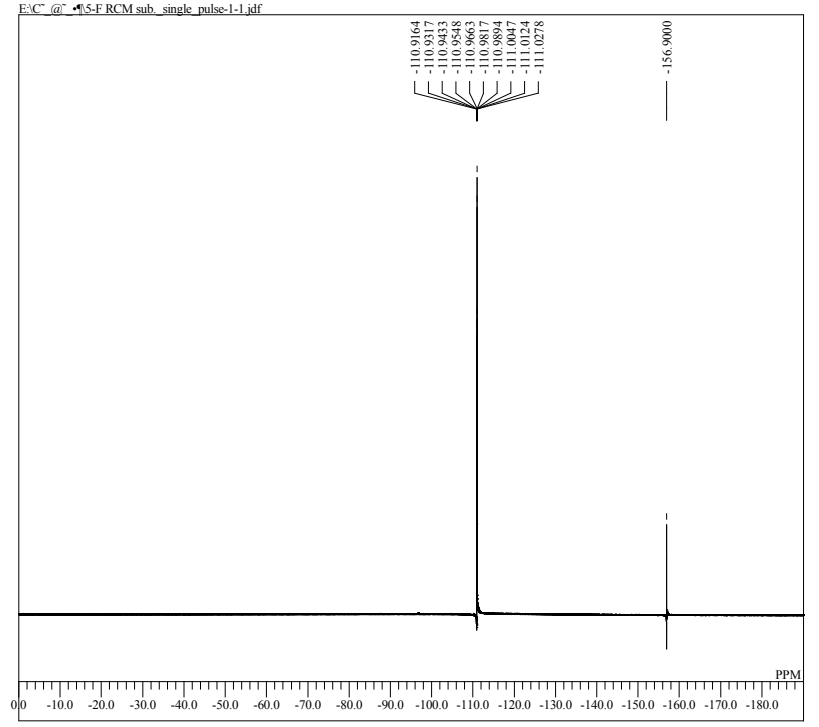
DFILE 5-F RCM sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-02-01 22:42:41
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.6 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

3j



DFILE 5-F RCM sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-02-01 22:45:24
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 2181
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

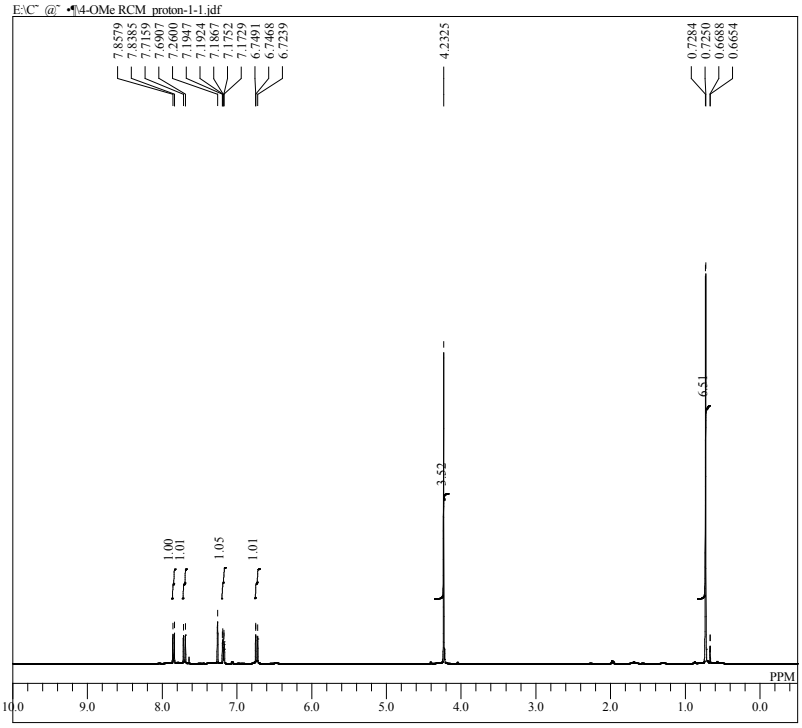
3j



DFILE 5-F RCM sub._single_pulse-1-1.jdf
COMNT single_pulse
DATIM 2019-02-02 01:03:05
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 376.17 MHz
OBSET 1.05 KHz
OBFIN 3.93 Hz
POINT 131071
FREQU 189393.94 Hz
SCANS 32
ACQTM 0.6921 sec
PD 5.0000 sec
PW1 7.80 usec
IRNUC 19F
CTEMP 18.5 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 44

4a

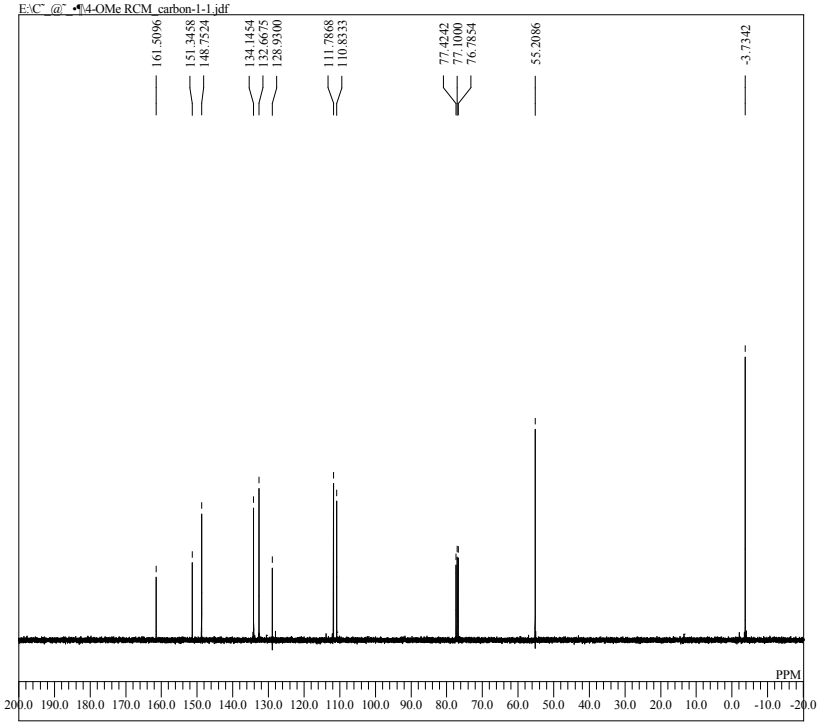
single_pulse



DFILE 4-OMe RCM_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-08 20:43:26
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 28

4a

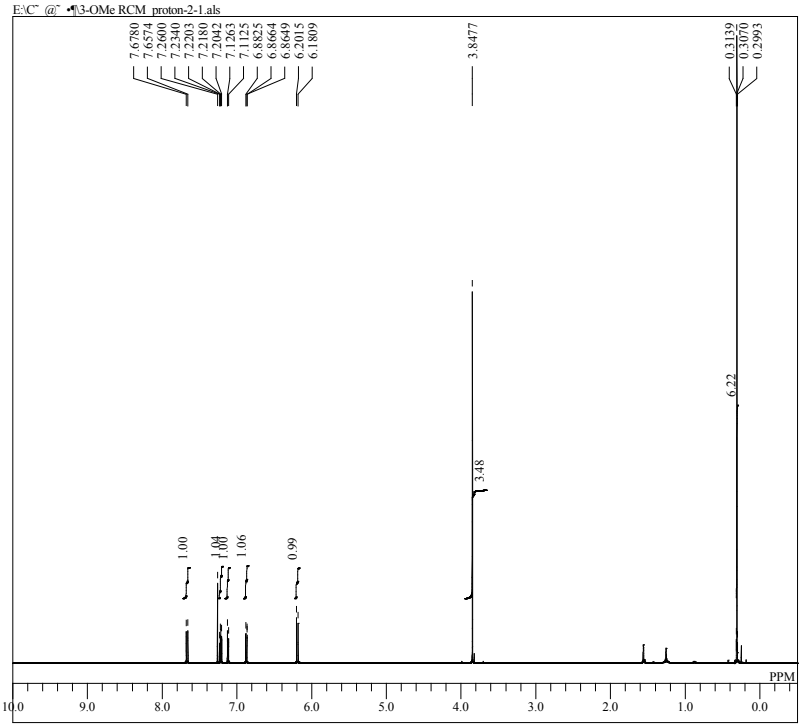
single pulse decoupled gated NOE



DFILE 4-OMe RCM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-08 20:46:12
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 52
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.5 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4b

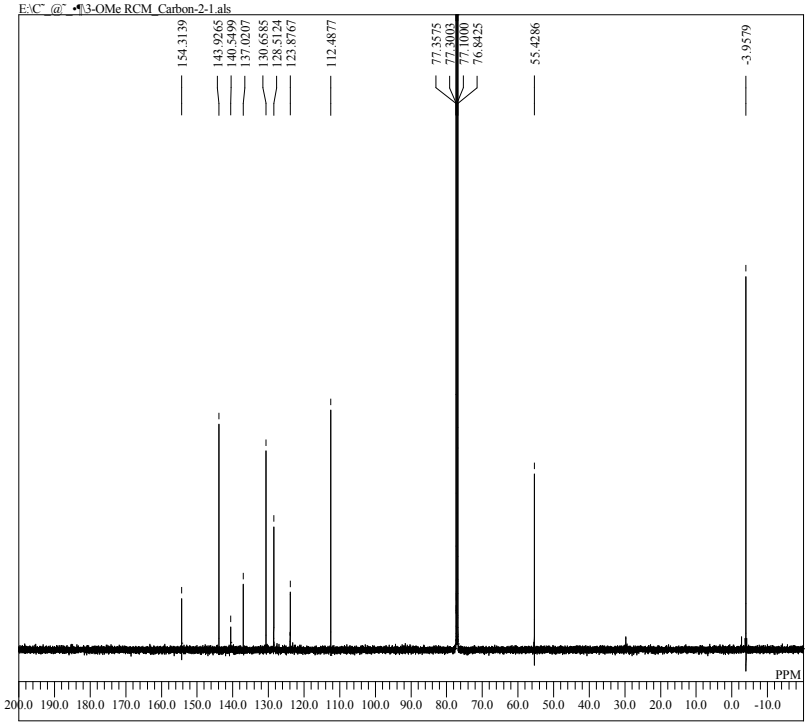
single_pulse



DFILE 3-OMe RCM_proton-2-1.als
COMNT single_pulse
DATIM 2019-05-09 17:31:11
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 26214
FREQU 10020.04 Hz
SCANS 16
ACQTM 2.6162 sec
PD 2.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 18.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 46

4b

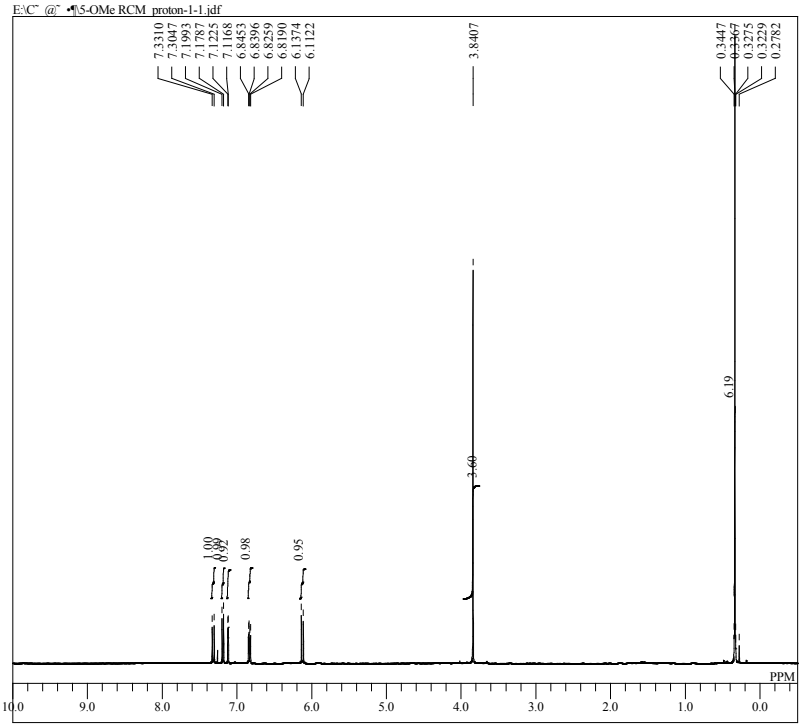
single pulse decoupled gated NOE



DFILE 3-OMe RCM_Carbon-2-1.als
COMNT single pulse decoupled gated NOE
DATIM 2019-05-09 17:34:40
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 26214
FREQU 31446.54 Hz
SCANS 3596
ACQTM 0.8336 sec
PD 1.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 18.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4c

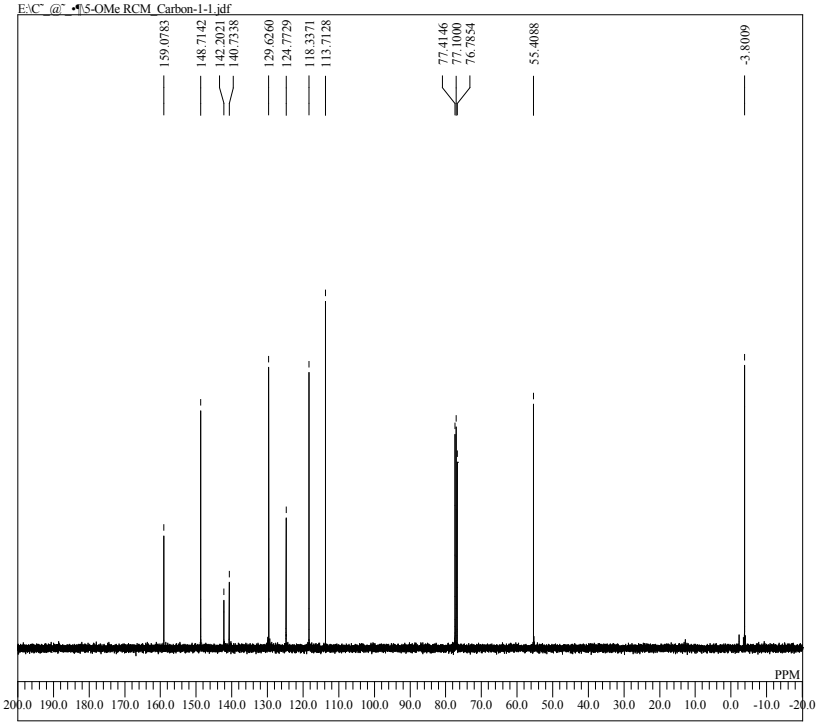
single_pulse



DFILE 5-OMe RCM_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-08 20:55:01
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 32

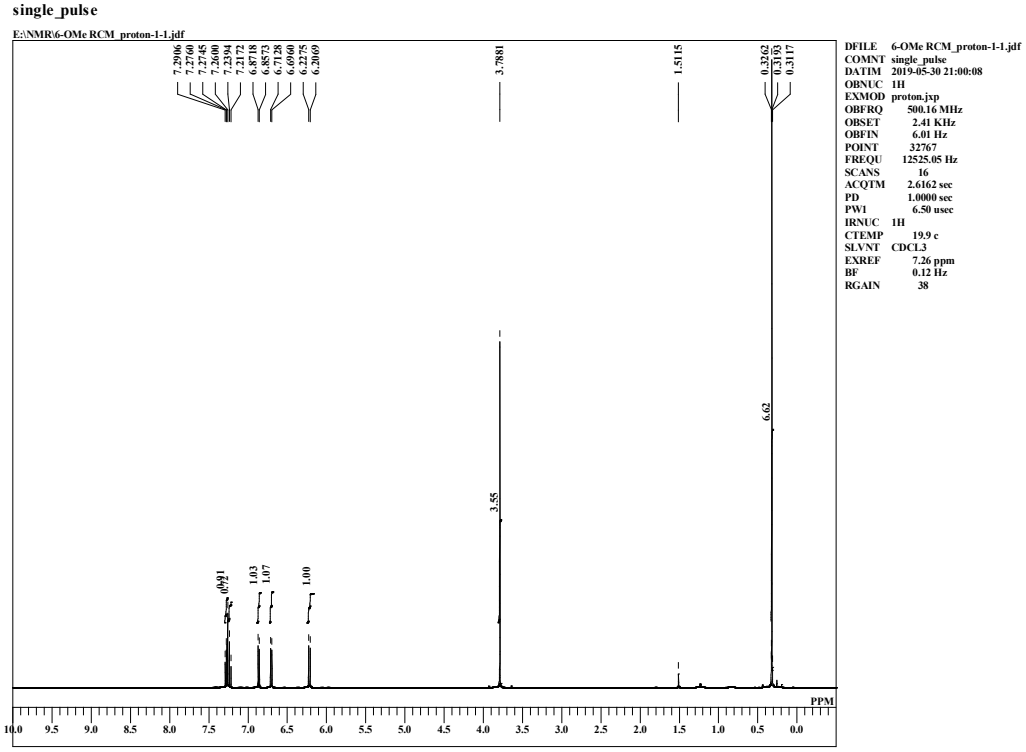
4c

single pulse decoupled gated NOE

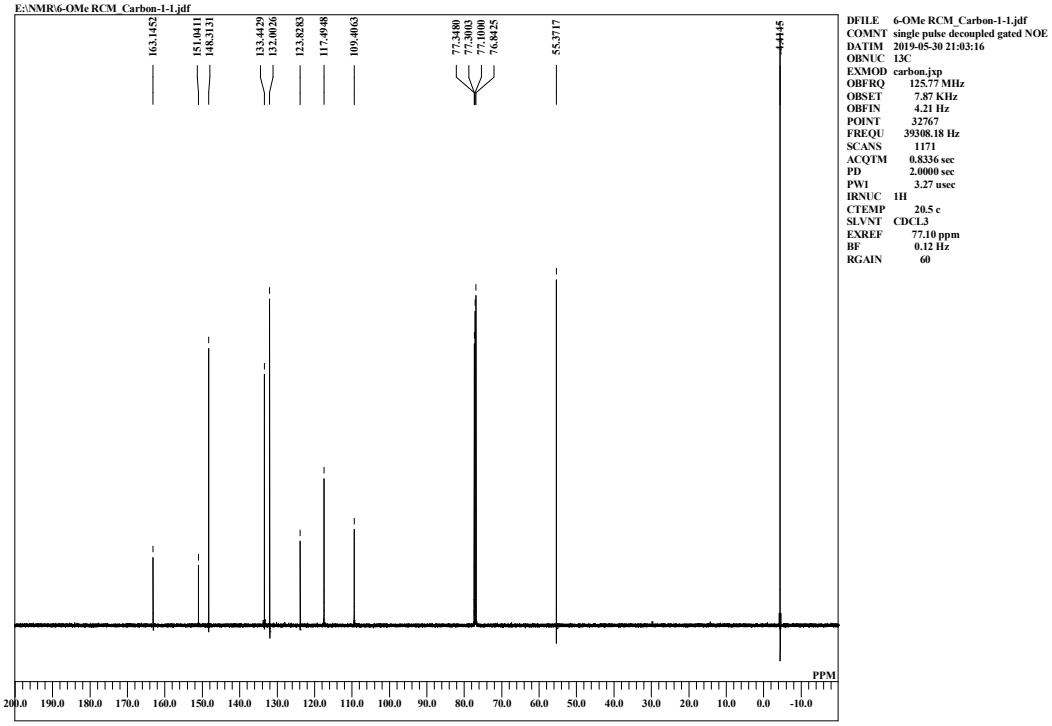


DFILE 5-OMe RCM_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-08 20:57:40
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 148
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4d

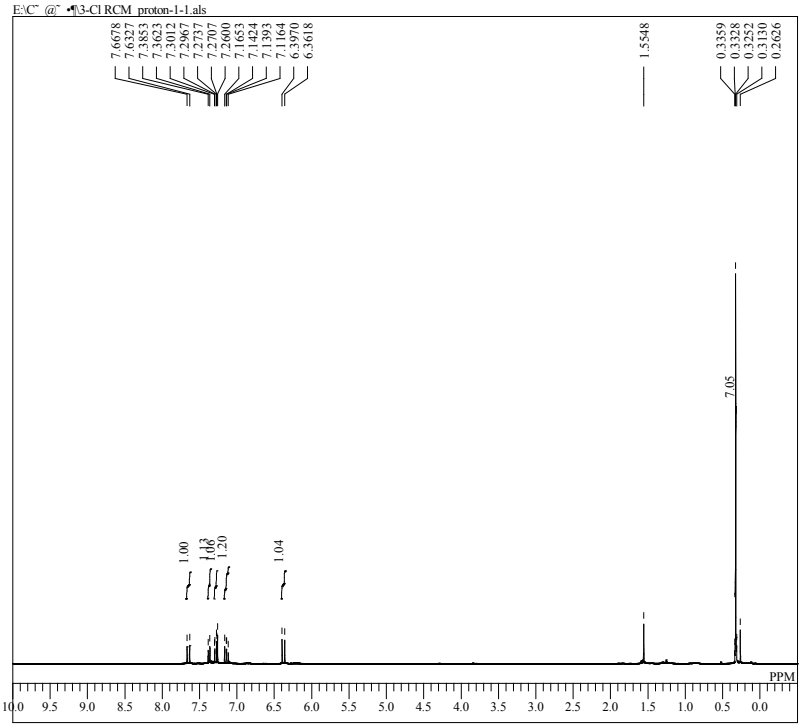

single_pulse
E:\NMR\6-OMe RCM_proton-1-1.jdf
7.2906
7.2760
7.2745
7.2600
7.2394
7.2172
6.8718
6.8573
6.7128
6.6980
6.2275
6.2069
3.7881
1.5115
0.3362
0.3193
0.3117
6.62
3.55
0.92
1.03
1.07
1.00
PPM
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
DFILE 6-OMe RCM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-05-30 21:00:08
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 32767
FREQU 12525.05 Hz
SCANS 16
ACQTM 2.6162 sec
PD 1.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 19.9 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

4d


single pulse decoupled gated NOE
E:\NMR\6-OMe RCM_Carbon-1-1.jdf
163.1452
151.0411
148.5131
133.4429
132.0036
123.8283
117.4948
109.4063
77.3480
77.3003
77.1000
76.8425
55.3717
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0
DFILE 6-OMe RCM_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-05-30 21:03:16
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 1171
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.5 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4e

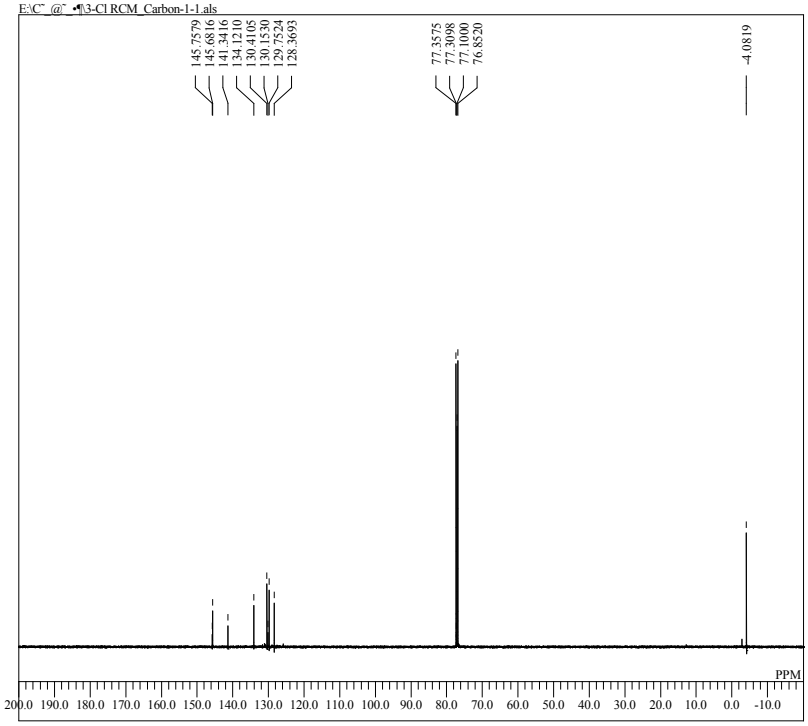
single_pulse



DFILE 3-Cl RCM_proton-1-1.als
COMNT single_pulse
DATIM 2019-05-16 22:57:05
OBNUC 1H
EXMOD proton.jxp
OBFRQ 300.53 MHz
OBSET 1.15 KHz
OBFIN 8.57 Hz
POINT 13107
FREQU 6016.85 Hz
SCANS 16
ACQTM 2.1784 sec
PD 1.0000 sec
PW1 5.50 usec
IRNUC 1H
CTEMP 19.9 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

4e

single pulse decoupled gated NOE

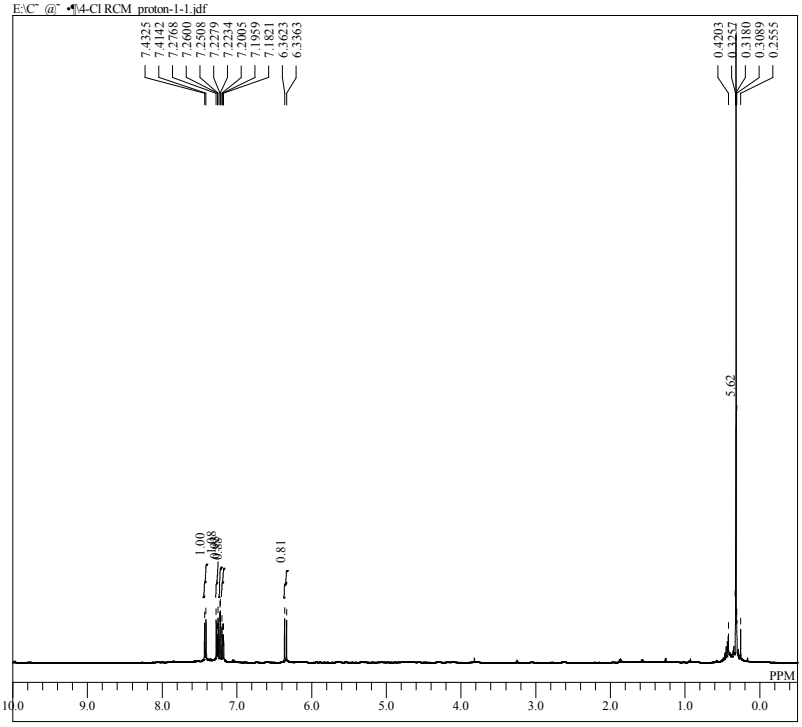


DFILE 3-Cl RCM_Carbon-1-1.als
COMNT single pulse decoupled gated NOE
DATIM 2019-05-17 10:25:28
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 26214
FREQU 31446.54 Hz
SCANS 1882
ACQTM 0.8336 sec
PD 3.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.5 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 56

4f

single_pulse

E:\C˜ @˜ ·¶\4-Cl RCM_proton-1-1.jdf

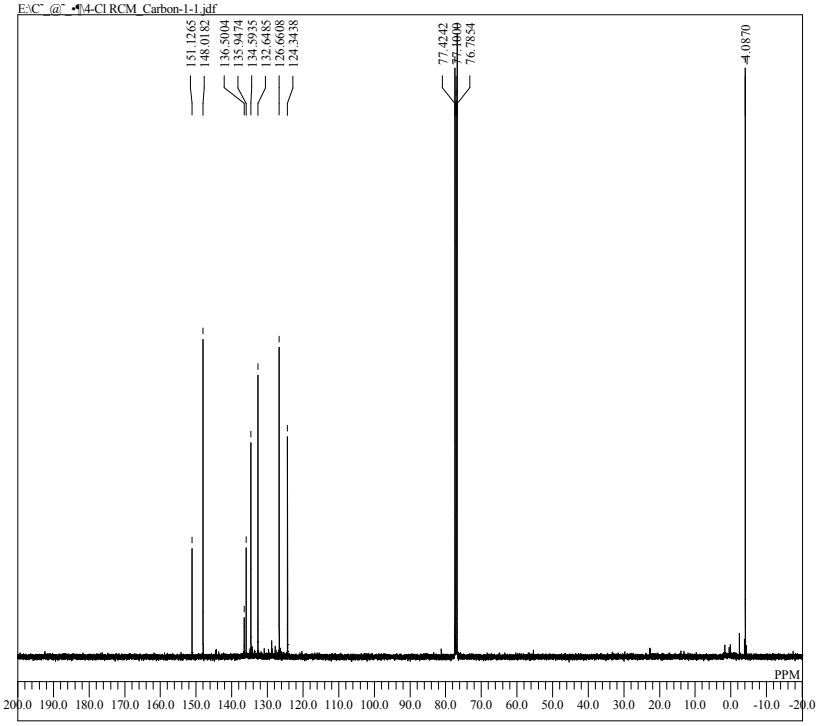


DFILE 4-Cl RCM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-02-05 07:05:42
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.9 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

4f

single pulse decoupled gated NOE

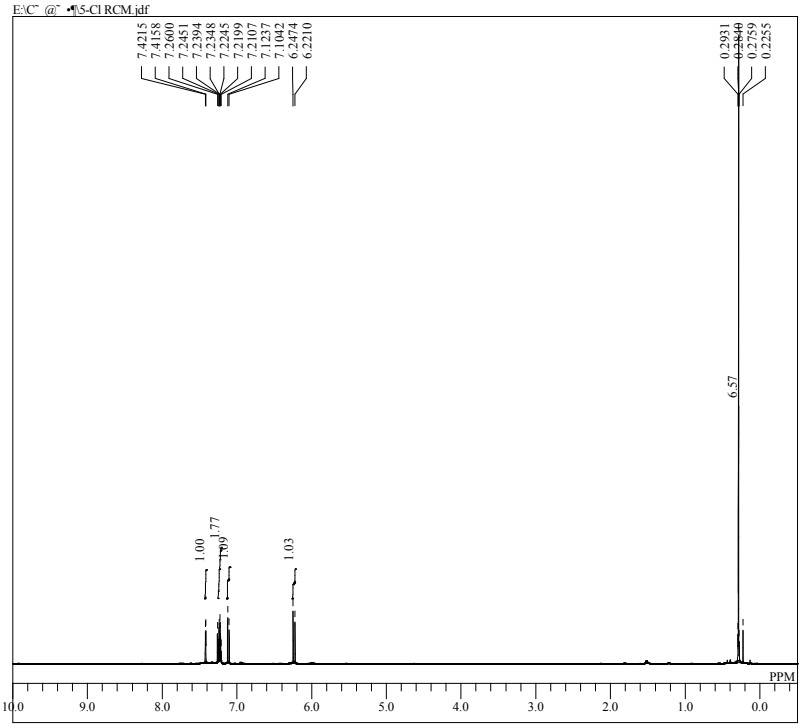
E:\C˜ @˜ ·¶\4-Cl RCM_Carbon-1-1.jdf



DFILE 4-Cl RCM_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-02-05 07:25:37
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 2444
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4g

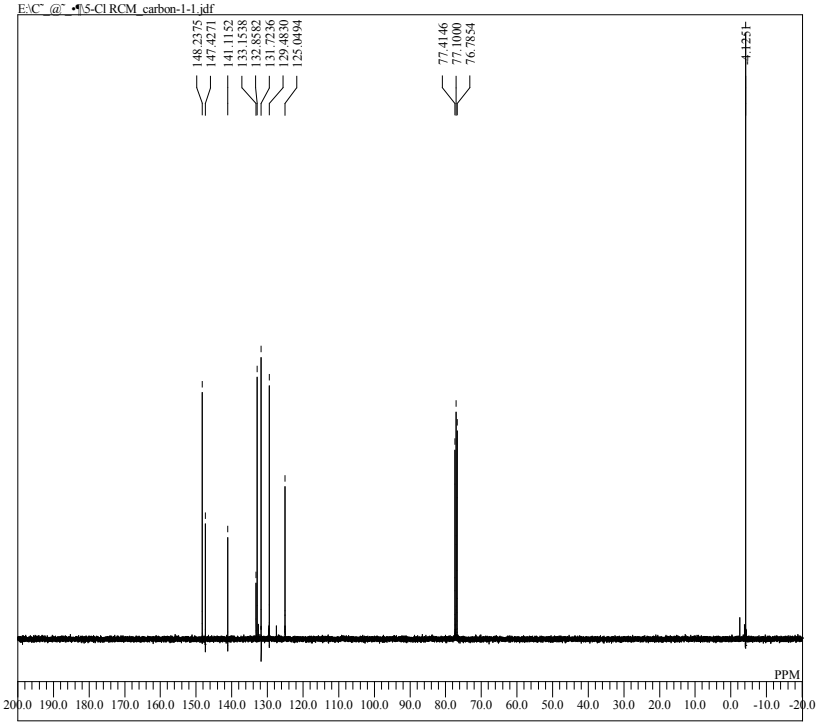
single_pulse



DFILE 5-Cl RCM.jdf
COMNT single_pulse
DATIM 2018-12-08 18:12:02
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 36

4g

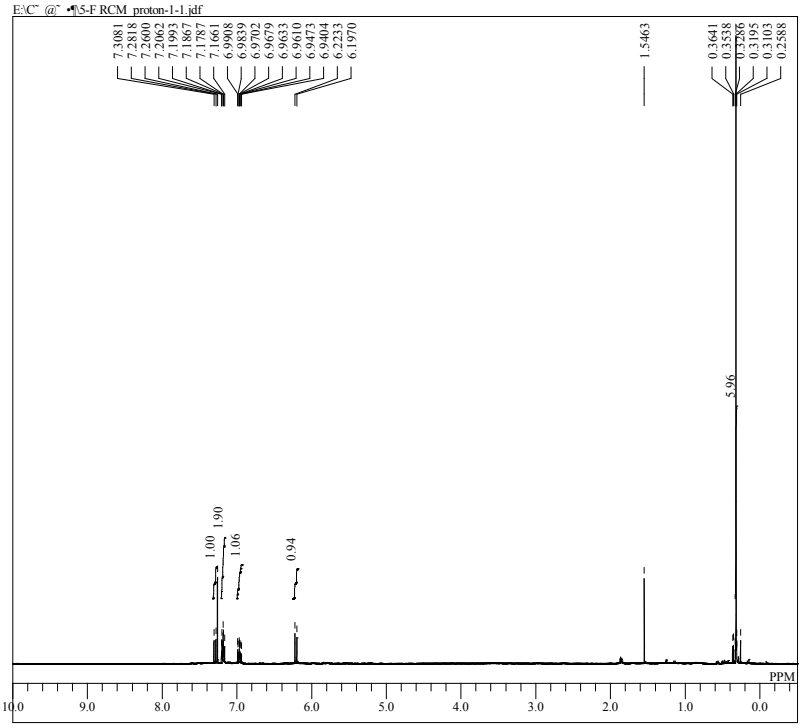
single pulse decoupled gated NOE



DFILE 5-Cl RCM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-08 18:14:42
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 294
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.4 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4j

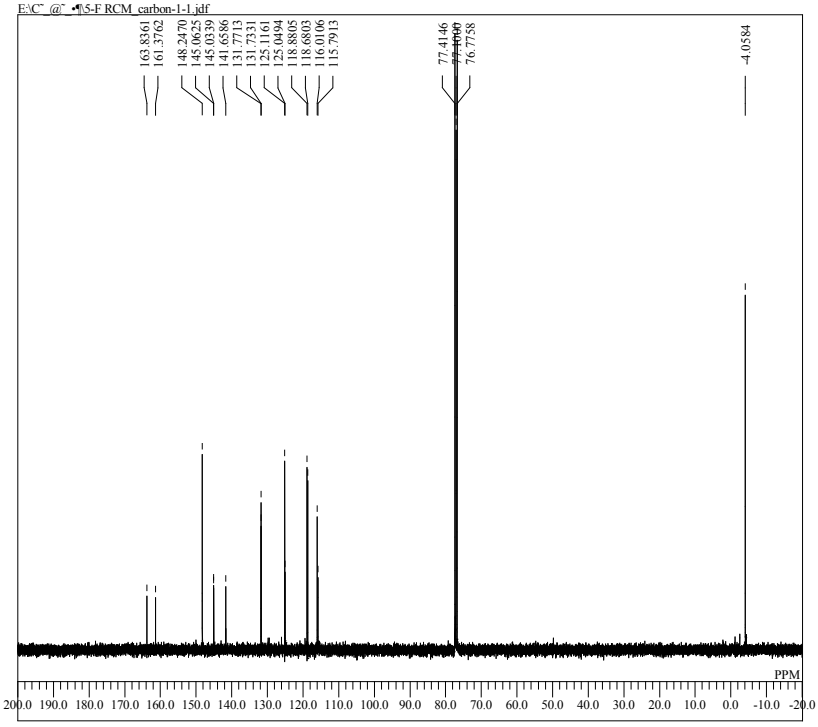
single_pulse



DFILE 5-F RCM_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-11-27 00:14:41
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 52

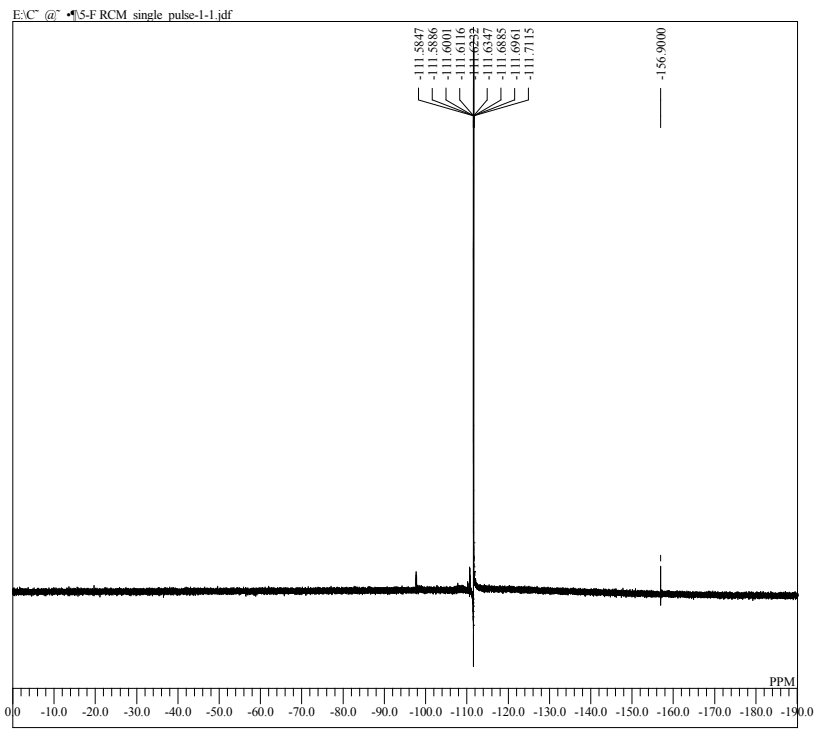
4j

single pulse decoupled gated NOE



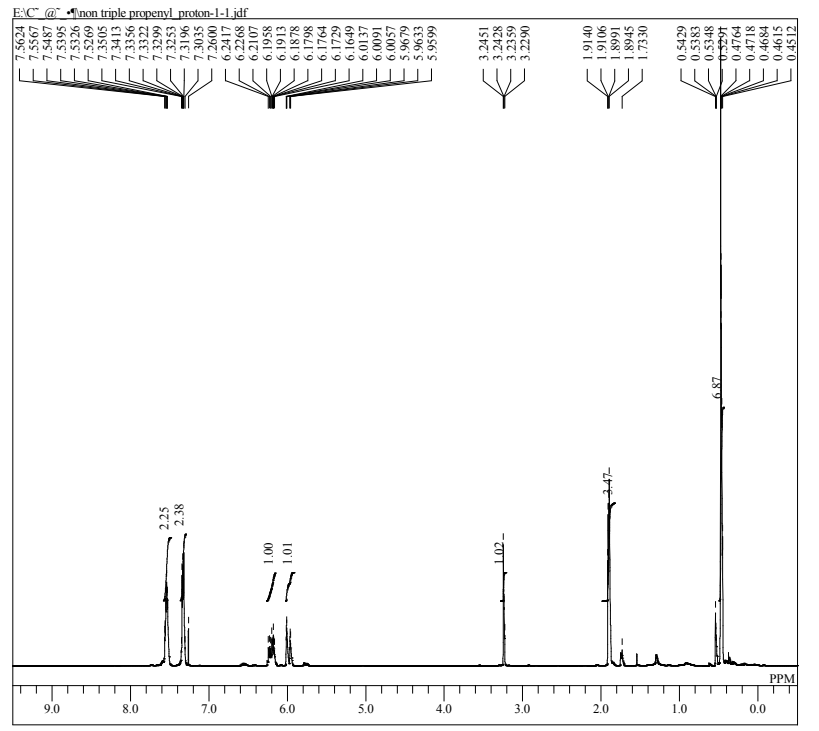
DFILE 5-F RCM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-08 20:16:58
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 406
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

4j



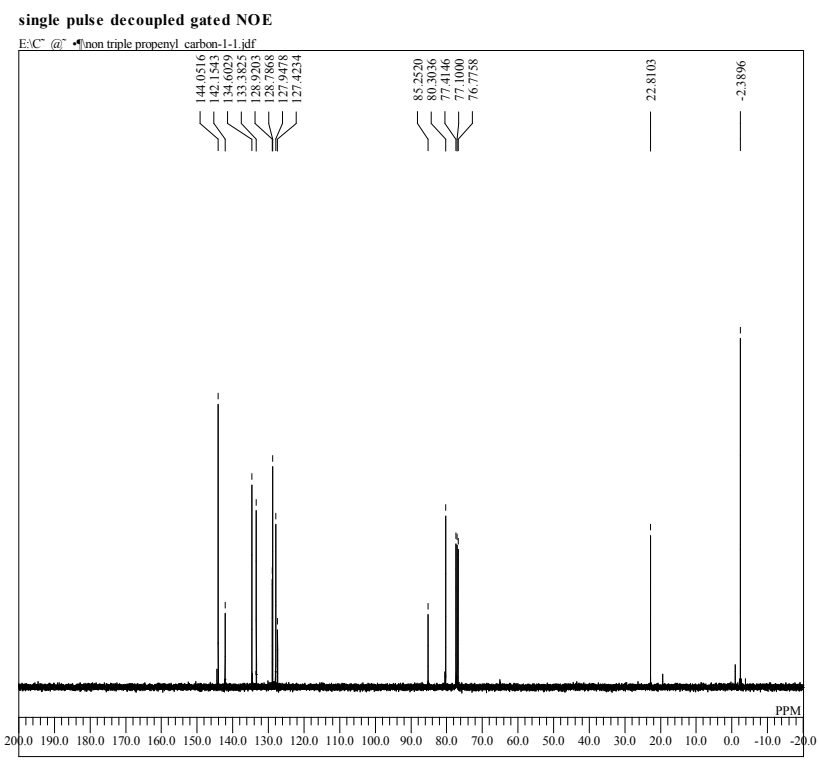
DFILE 5-F RCM_single_pulse-1-1.jdf
COMNT single_pulse
DATIM 2019-02-06 00:00:15
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 376.17 MHz
OBSET 1.05 KHz
OBFIN 3.93 Hz
POINT 131071
FREQU 189393.94 Hz
SCANS 10
ACQTM 0.6921 sec
PD 5.0000 sec
PW1 7.80 usec
IRNUC 19F
CTEMP 19.1 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 42

5a



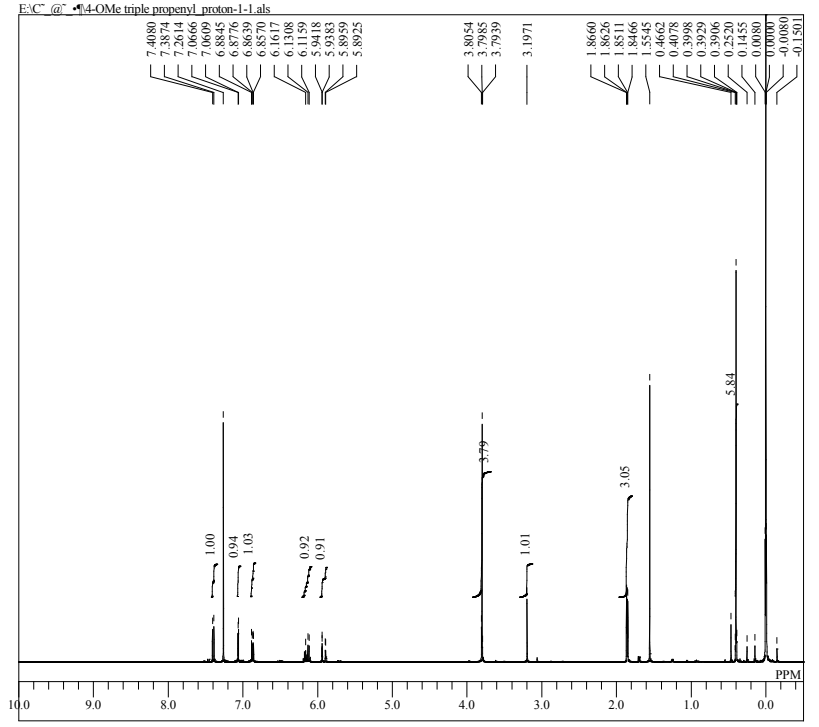
DFILE non triple propenyl_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-11 23:45:50
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.3 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 28

5a



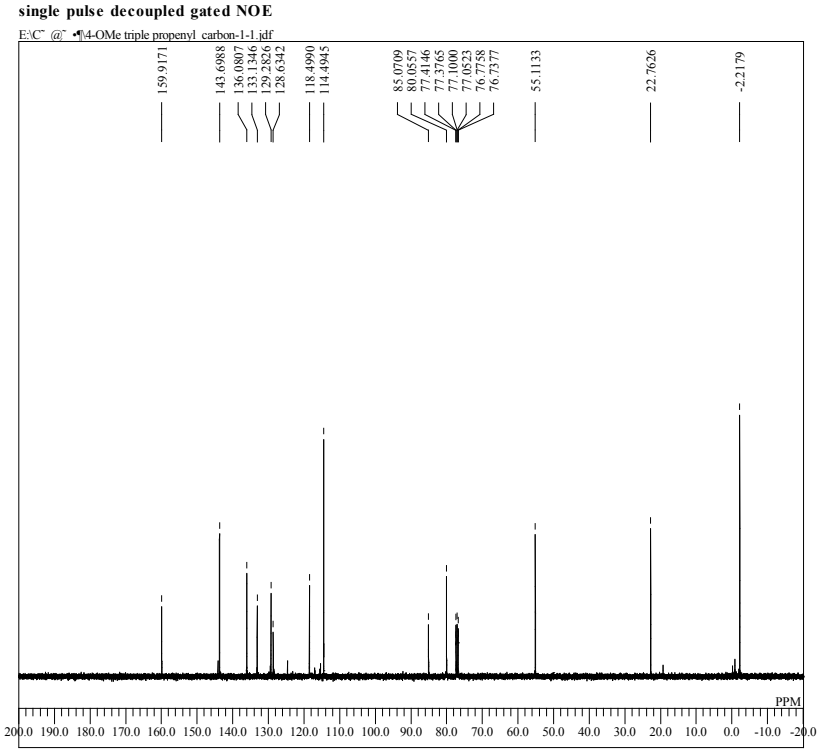
DFILE non triple propenyl_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-11 23:48:30
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 200
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

5b



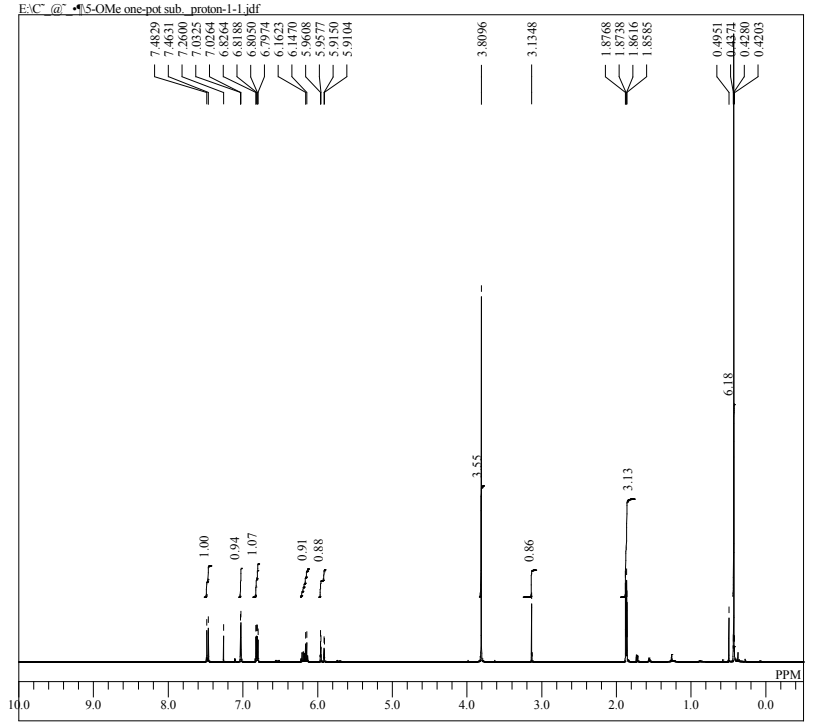
DFILE 4-OMe triple propenyl_proton-1-1.als
COMNT single_pulse
DATIM 2019-01-07 14:36:43
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 13107
FREQU 6002.40 Hz
SCANS 16
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.9 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 48

5b



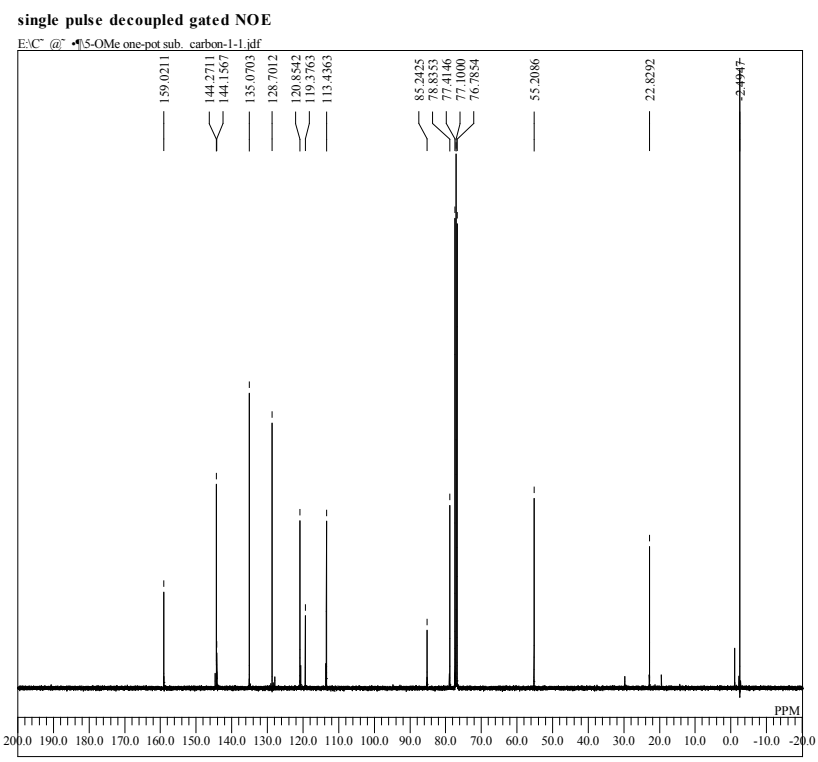
DFILE 4-OMe triple propenyl_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-11 23:36:46
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 106
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.5 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

5c



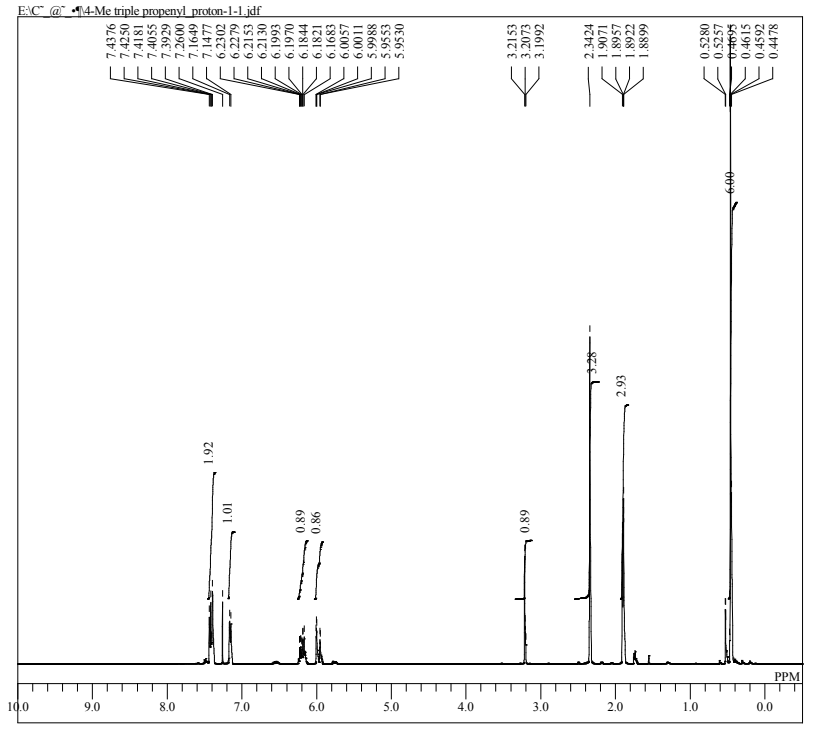
DFILE 5-OMe one-pot sub._proton-1-1.jdf
COMNT single_pulse
DATIM 2019-02-05 04:18:60
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 10000.00 Hz
SCANS 16
ACQTM 1.6384 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

5c



DFILE 5-OMe one-pot sub._carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-02-05 04:21:27
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 3000
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

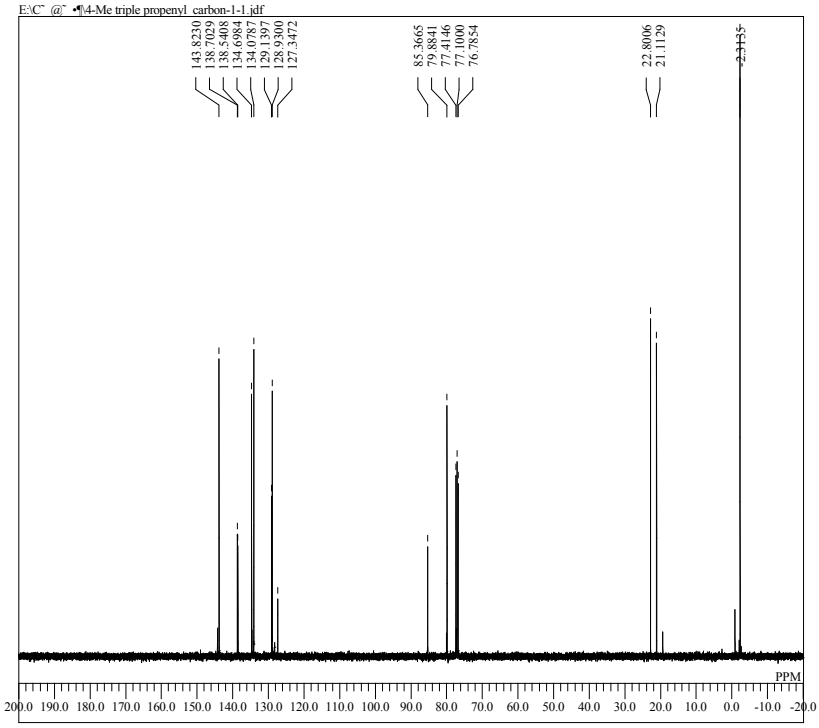
5d



DFILE 4-Me triple propenyl_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-14 22:53:54
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 28

5d

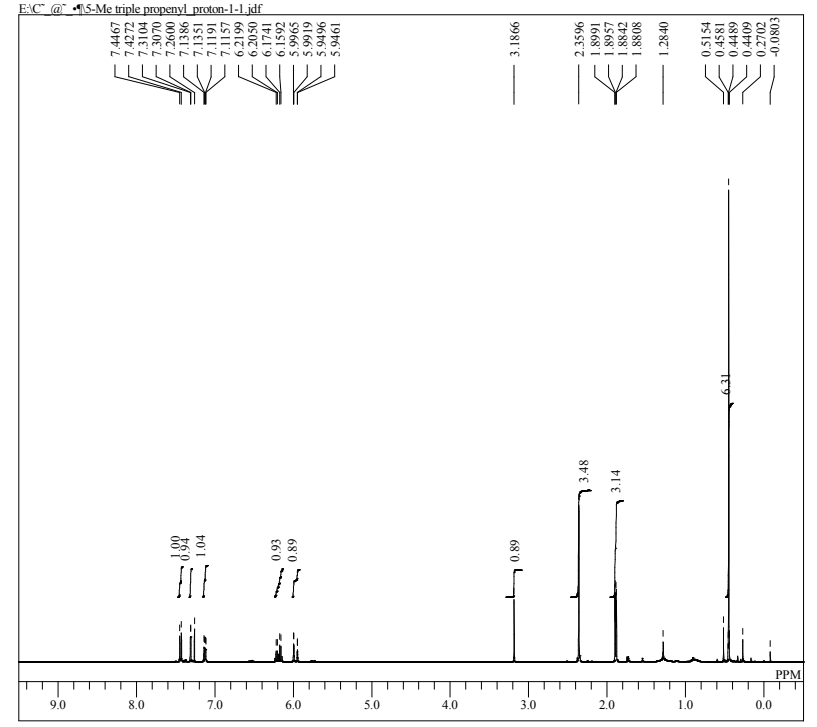
single pulse decoupled gated NOE



DFILE 4-Me triple propenyl_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-14 22:56:34
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 253
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

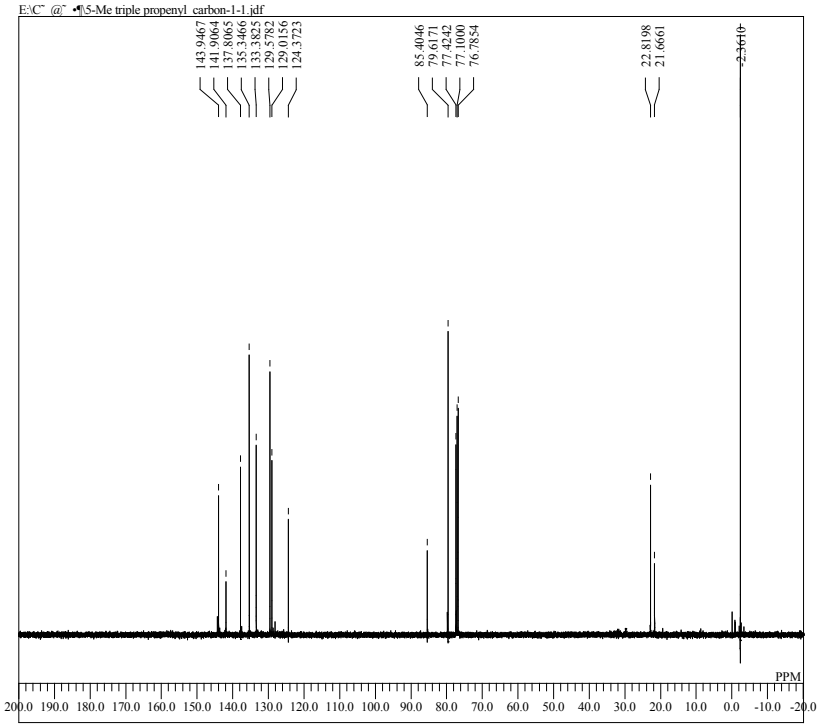
5e

single_pulse



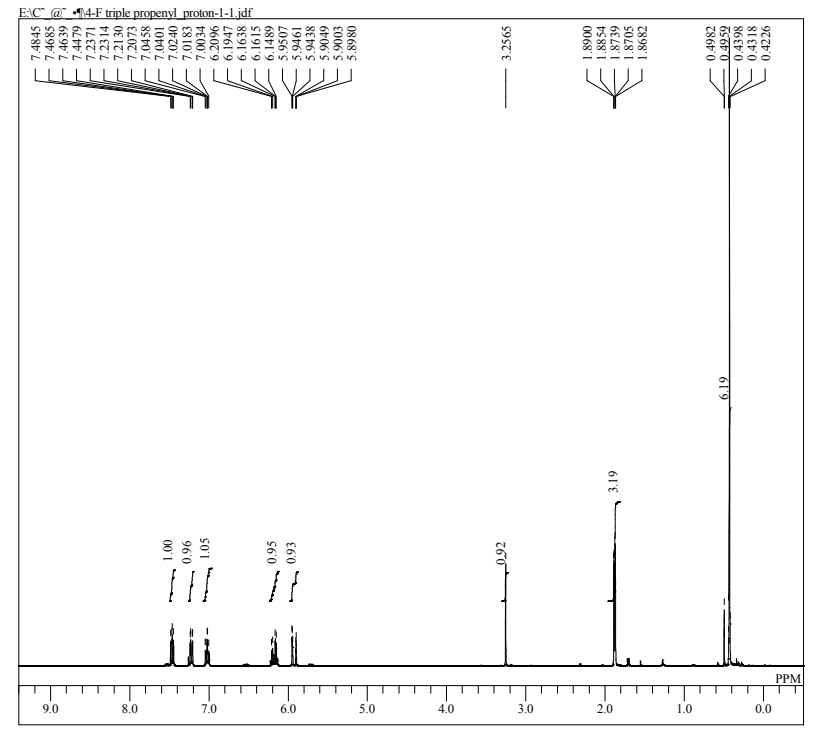
DFILE 5-Me triple propenyl_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-11 23:14:55
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 19.3 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 28

5e



DFILE 5-Me triple propenyl_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-11 23:17:35
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 244
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

5f

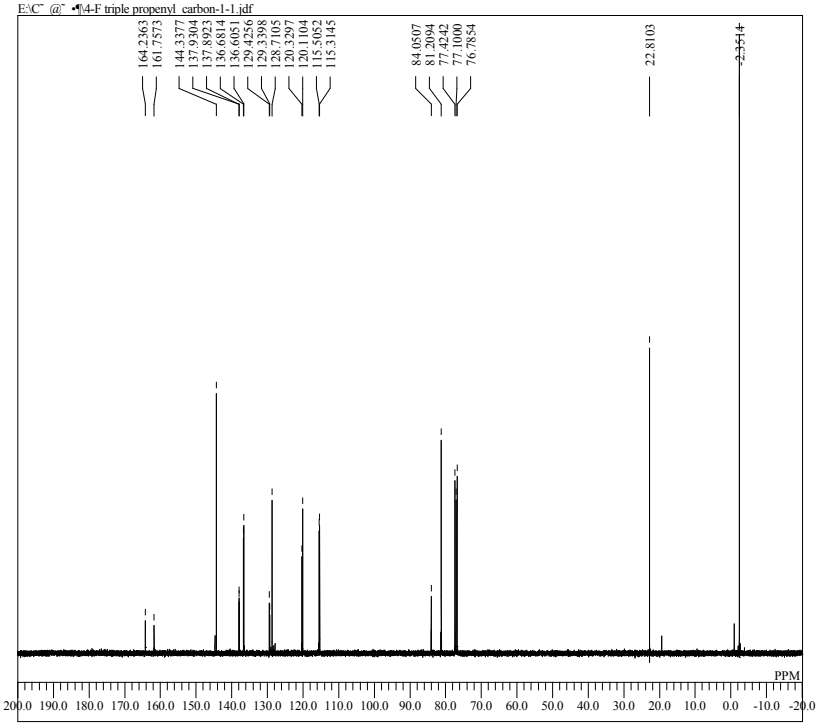


DFILE 4-F triple propenyl_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-11 22:29:08
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 28

5f

single pulse decoupled gated NOE

E:\C" @¯ •¶\4-F triple propenyl_carbon-1-1.jdf

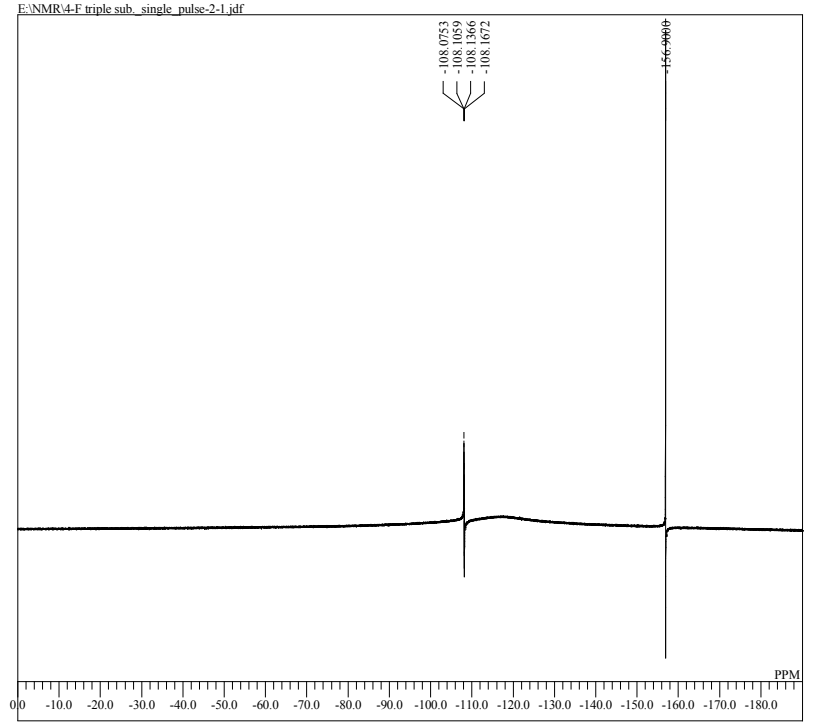


DFILE 4-F triple propenyl_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-11 22:31:51
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 202
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

5f

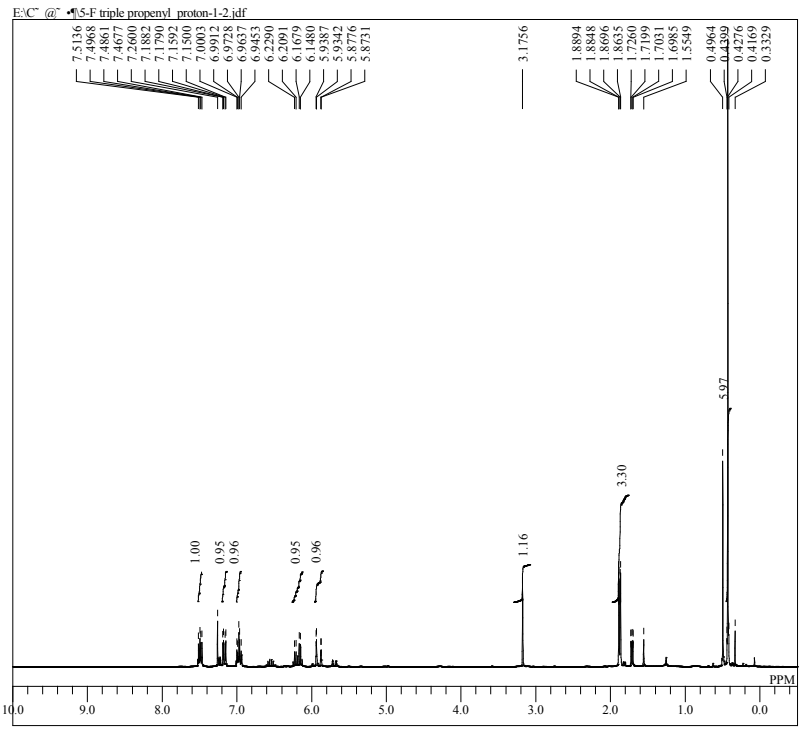
single_pulse

E:\NMR\4-F triple sub._single_pulse-2-1.jdf



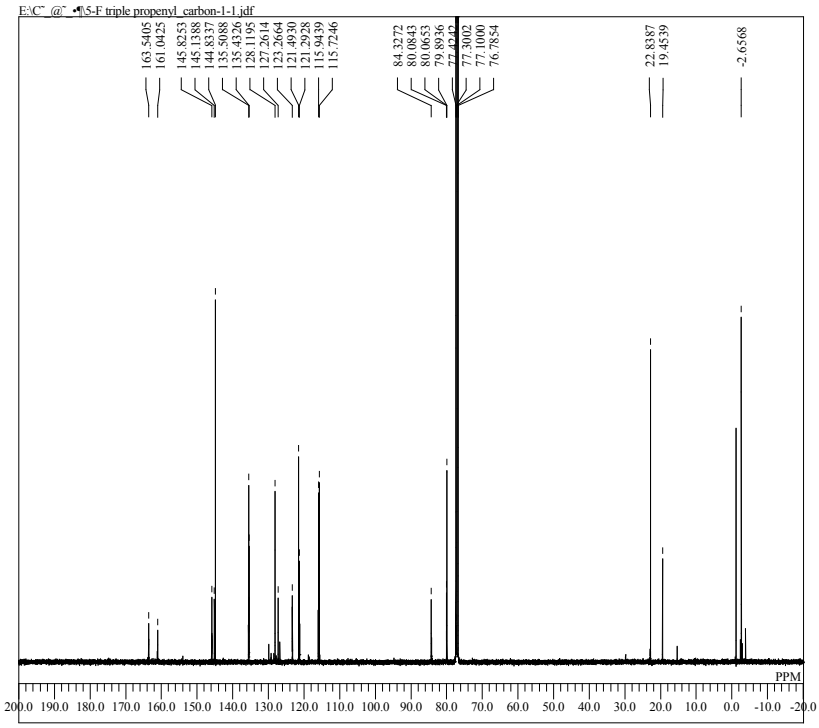
DFILE 4-F triple sub._single_pulse-2-1.jdf
COMNT single_pulse
DATIM 2019-02-06 08:34:36
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 282.75 MHz
OBSET 2.09 KHz
OBFIN 0.53 Hz
POINT 16384
FREQU 71022.73 Hz
SCANS 32
ACQTM 0.2307 sec
PD 5.0000 sec
PW1 6.00 usec
IRNUC 19F
CTEMP 18.0 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 38

5g



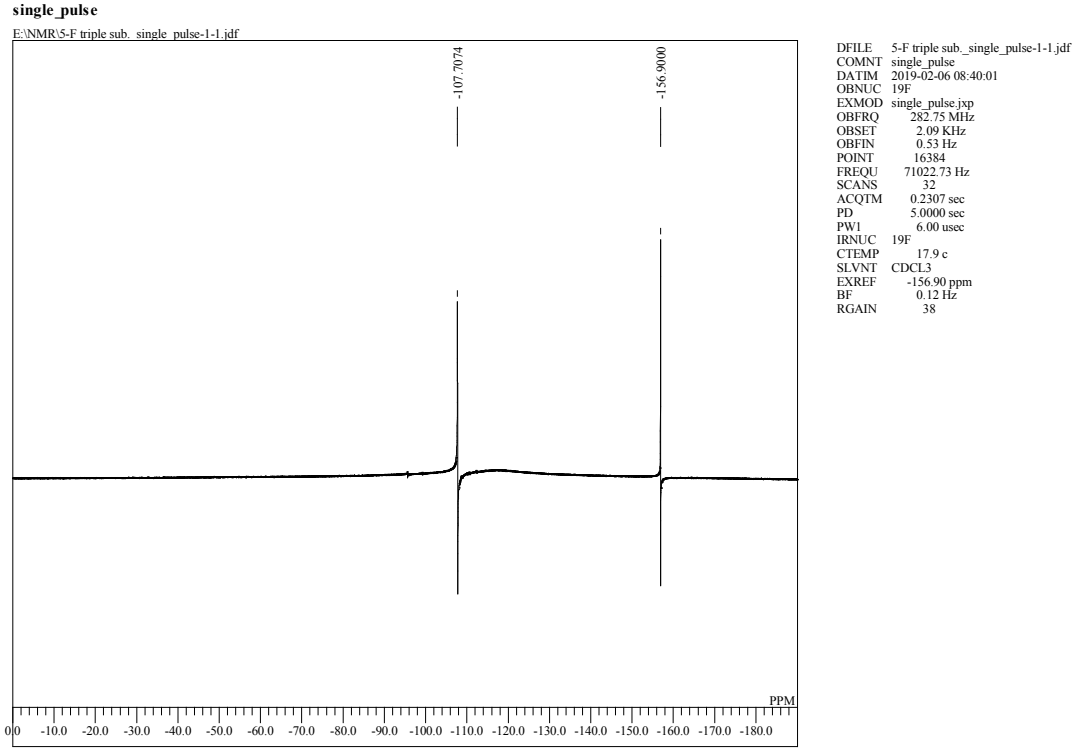
DFILE 5-F triple propenyl_proton-1-2.jdf
COMNT single_pulse
DATIM 2018-12-13 10:24:39
OBNUC 1H
EXMOD proton.jxp
OBFRQ 300.53 MHz
OBSET 1.15 KHz
OBFIN 8.57 Hz
POINT 16384
FREQU 7521.06 Hz
SCANS 16
ACQTM 2.1784 sec
PD 1.0000 sec
PW1 5.50 usec
IRNUC 1H
CTEMP 18.5 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 38

5g

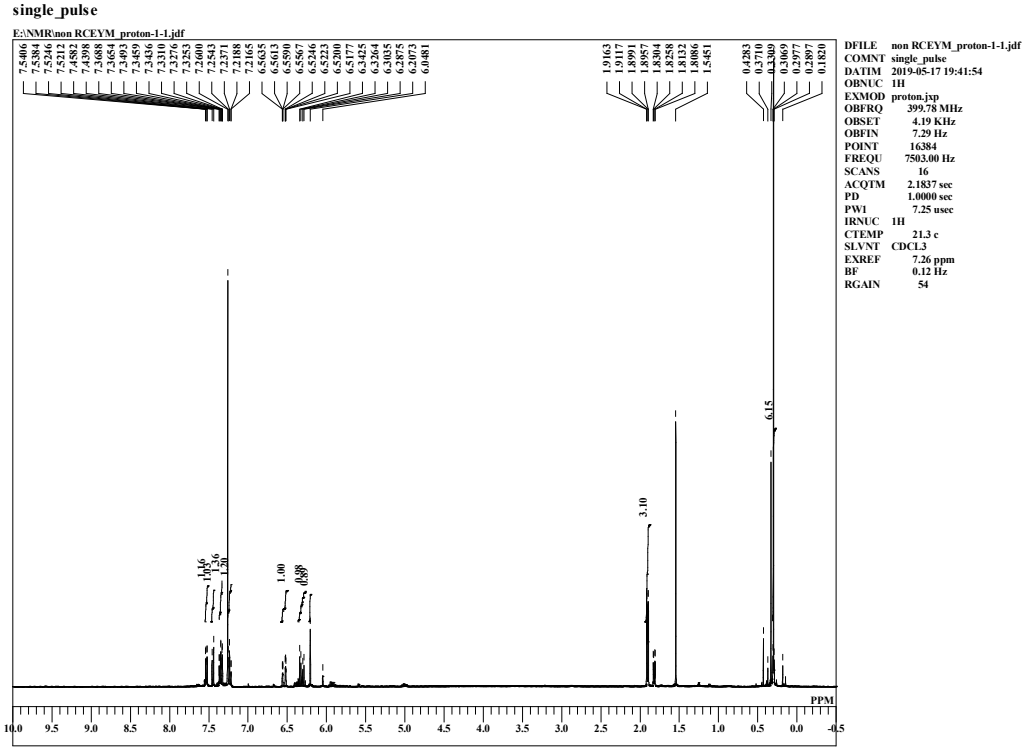


DFILE 5-F triple propenyl_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-15 00:19:33
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 11179
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

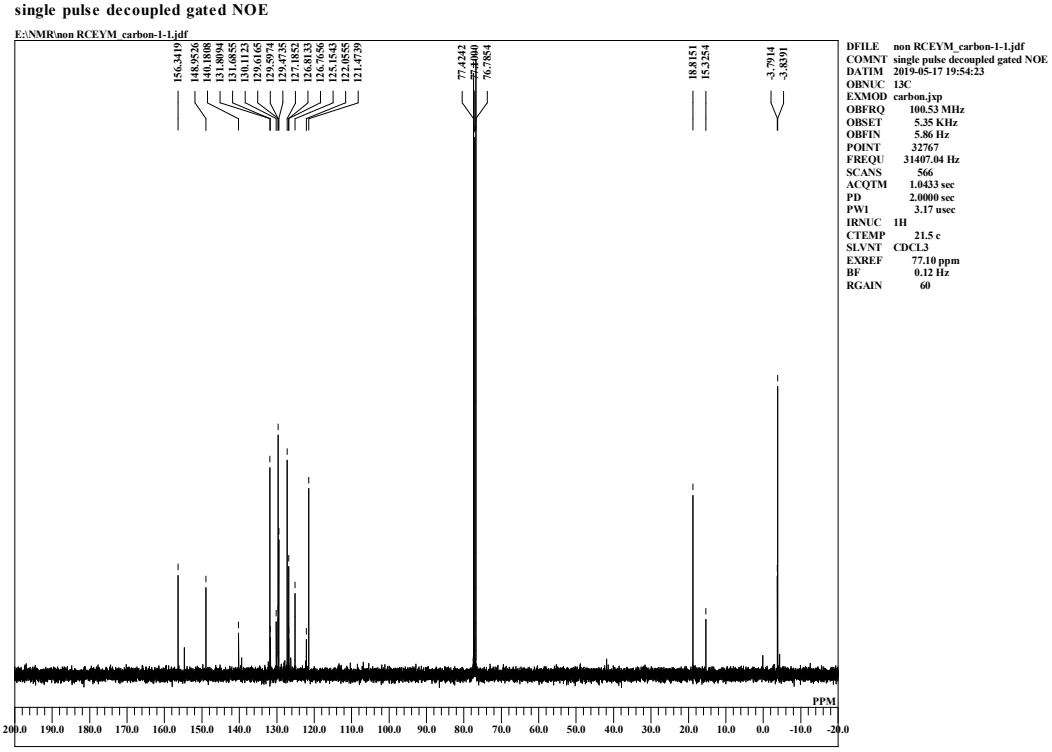
5g


single_pulse
E:\NMR\5-F triple sub._single_pulse-1-1.jdf
-107.7074
-156.9000
PPM
0.0 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0 -80.0 -90.0 -100.0 -110.0 -120.0 -130.0 -140.0 -150.0 -160.0 -170.0 -180.0
DFILE 5-F triple sub._single_pulse-1-1.jdf
COMNT single_pulse
DATIM 2019-02-06 08:40:01
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 282.75 MHz
OBSET 2.09 KHz
OBFIN 0.53 Hz
POINT 16384
FREQU 71022.73 Hz
SCANS 32
ACQTM 0.2307 sec
PD 5.0000 sec
PW1 6.00 usec
IRNUC 19F
CTEMP 17.9 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 38

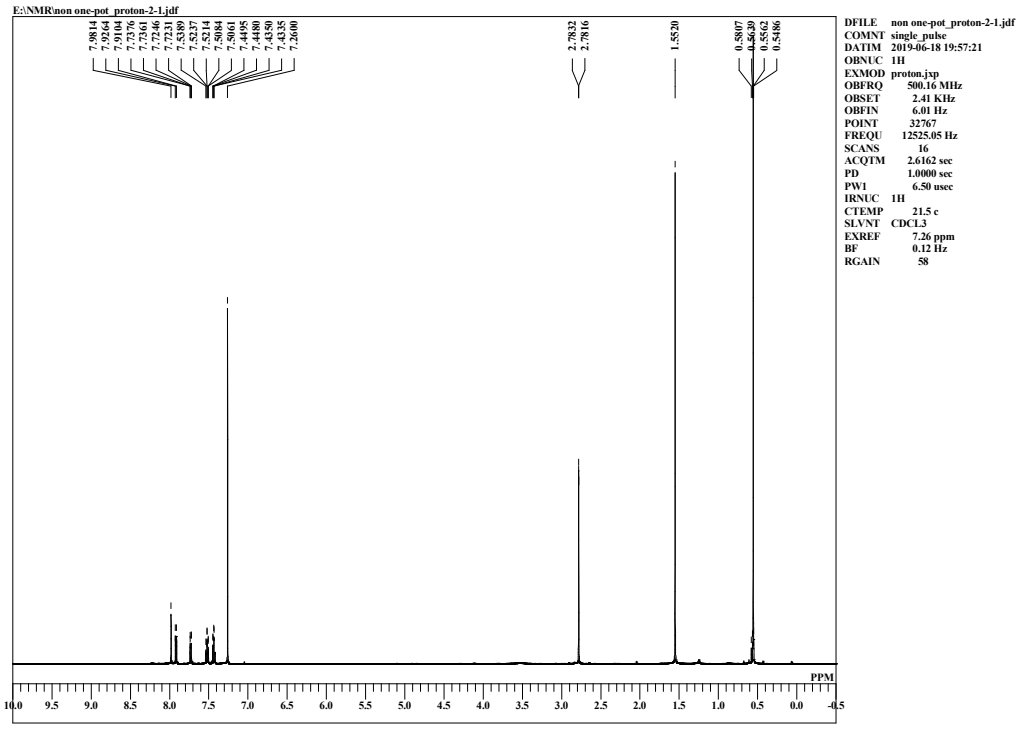
6a


single_pulse
E:\NMR\non RCEYM_proton-1-1.jdf
7.5406 7.5384 7.5246 7.5212 7.4582 7.4398 7.3688 7.3654 7.3493 7.3436 7.3310 7.3276 7.3253 7.2600 7.2543 7.2371 7.2188 7.2165 6.5635 6.5613 6.5590 6.5567 6.5246 6.5223 6.5200 6.5177 6.3425 6.3404 6.3035 6.2875 6.2073 6.0481
1.9163 1.9117 1.8991 1.8957 1.8304 1.8258 1.8123 1.8086 1.5451
0.4283 0.3710 0.3309 0.3069 0.2977 0.2907 0.1820
1.16 1.16 1.36 1.36
1.00 0.88 0.89
3.10
6.15
PPM
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
DFILE non RCEYM_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-05-17 19:41:54
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 1.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 21.3 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 54

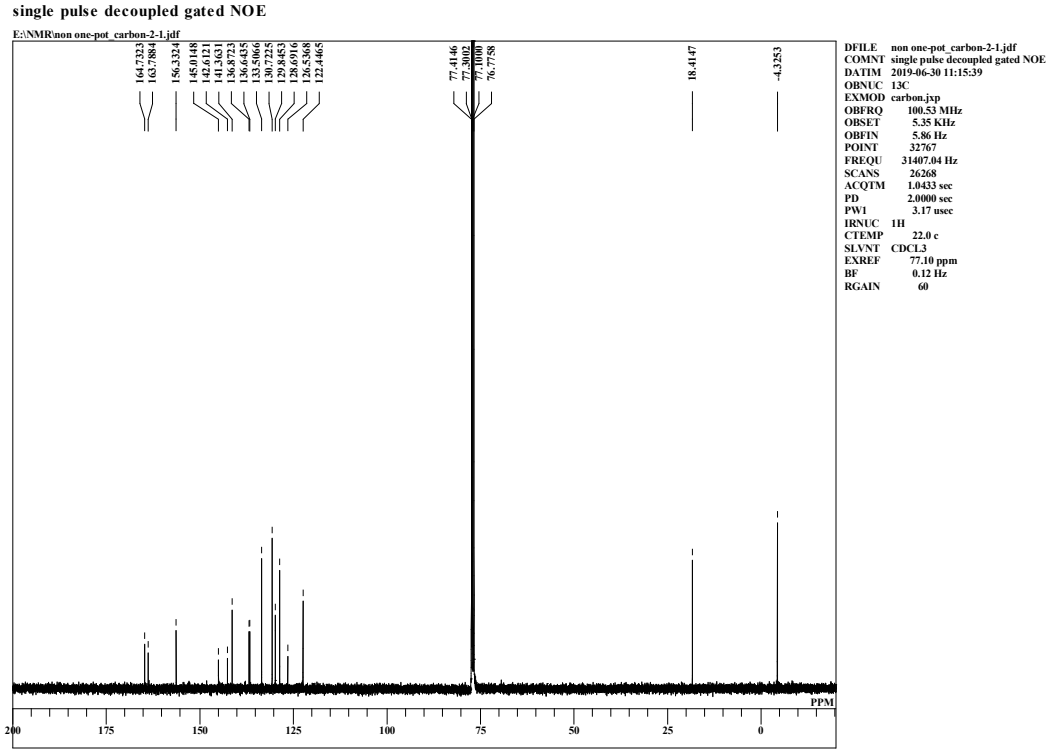
6a


single pulse decoupled gated NOE
E:\NMR\non RCEYM_carbon-1-1.jdf
156.3419
148.9526
140.1808
131.8094
131.0855
130.1123
129.6165
129.5974
129.4735
127.1852
126.8133
125.7656
125.1543
122.0555
121.4739
77.4242
77.4000
76.7854
18.8151
15.3254
-3.7914
-3.8591
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE non RCEYM_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-05-17 19:54:23
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 566
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 21.5 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

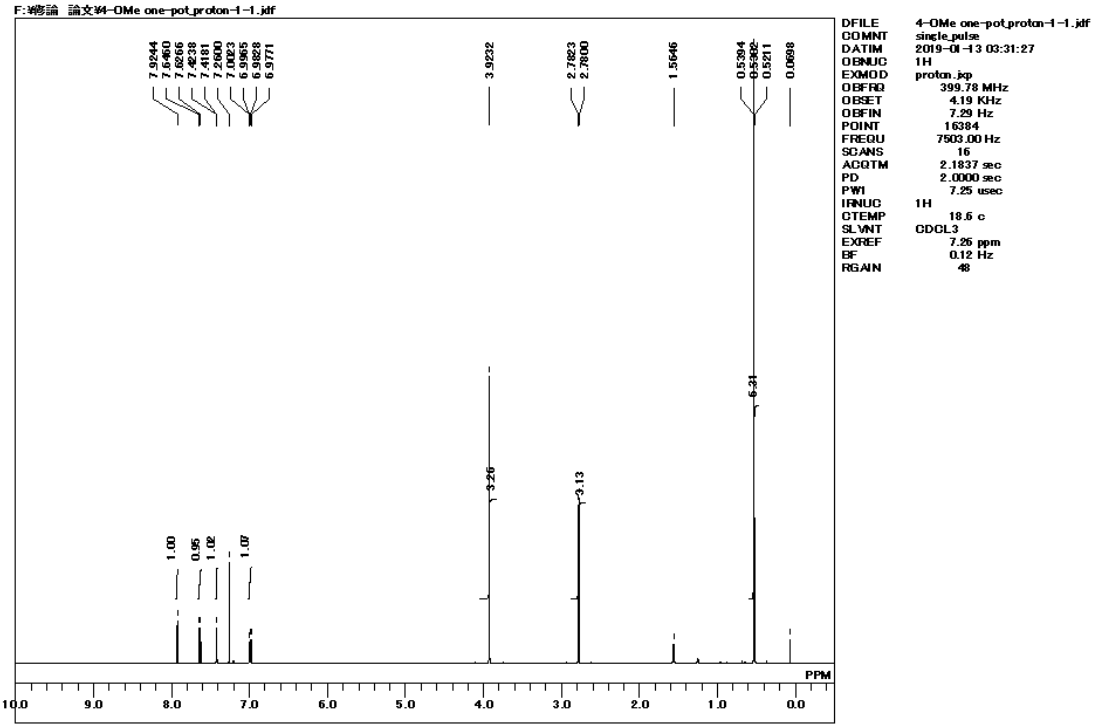
7a


single_pulse
E:\NMR\non one-pot_proton-2-1.jdf
7.9814
7.9264
7.9104
7.7376
7.7361
7.7246
7.7231
7.5389
7.5237
7.5214
7.5084
7.5061
7.4495
7.4480
7.4350
7.4335
7.2600
2.7832
2.7816
1.5520
0.8807
0.8639
0.5562
0.5486
PPM
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
DFILE non one-pot_proton-2-1.jdf
COMNT single_pulse
DATIM 2019-06-18 19:57:21
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 32767
FREQU 12525.05 Hz
SCANS 16
ACQTM 2.6162 sec
PD 1.0000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 21.5 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 58

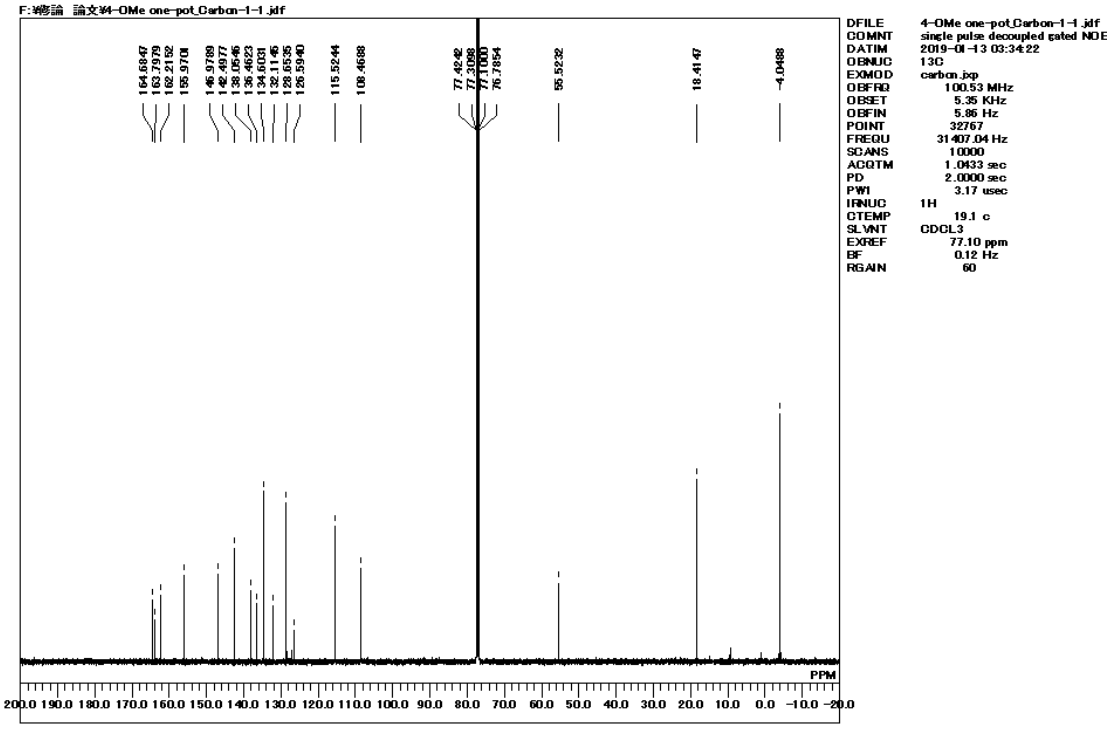
7a


single pulse decoupled gated NOE
E:\NMR\non one-pot_carbon-2-1.jdf
164.7323
163.7884
156.3324
145.0148
142.6121
141.3631
136.8723
136.6435
133.5066
130.7225
129.8453
128.6916
126.5368
122.4465
77.4146
77.3002
77.1000
76.7758
18.4147
-4.3353
PPM
200
175
150
125
100
75
50
25
0
DFILE non one-pot_carbon-2-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-06-30 11:15:39
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 26268
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 22.0 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

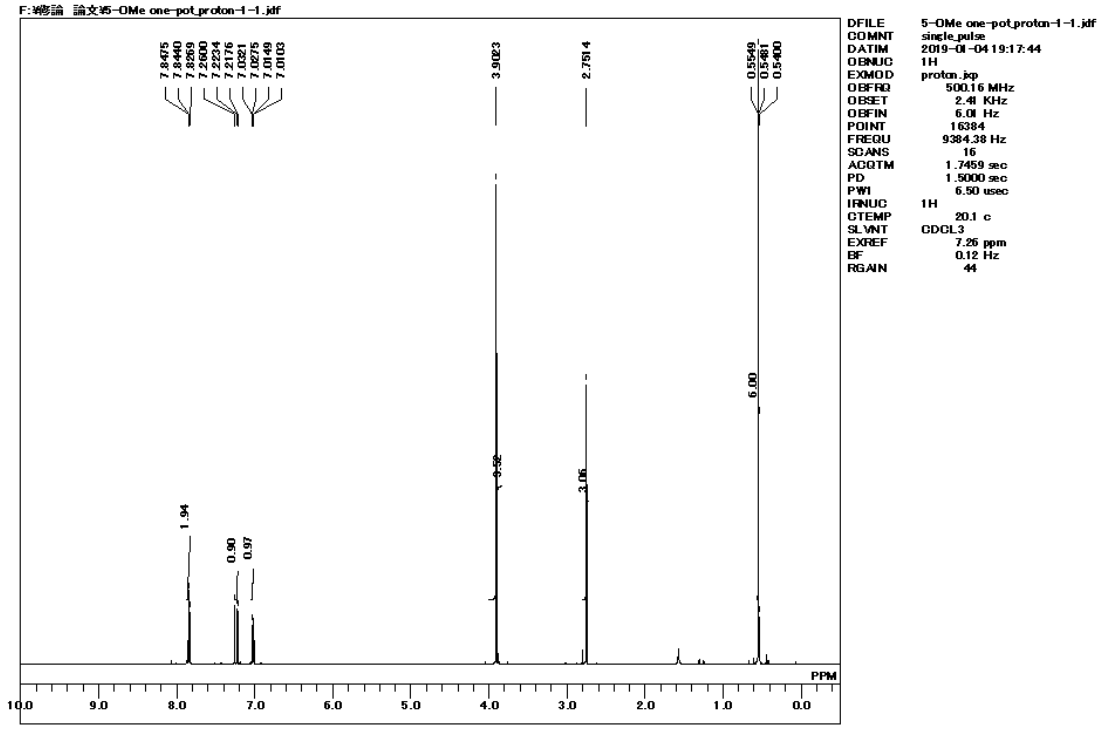
7b


F:¥唐論 論文¥4-OMe one-pot_proton-1-1.jdf
7.9944
7.6460
7.6266
7.4238
7.4181
7.2600
7.0023
6.9965
6.9828
6.9771
3.9232
2.7823
2.7600
1.5646
0.5304
0.5282
0.5211
0.0698
6.31
3.26
3.13
1.00
0.95
1.02
1.07
PPM
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
DFILE 4-OMe one-pot_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-13 03:31:27
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.6 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 48

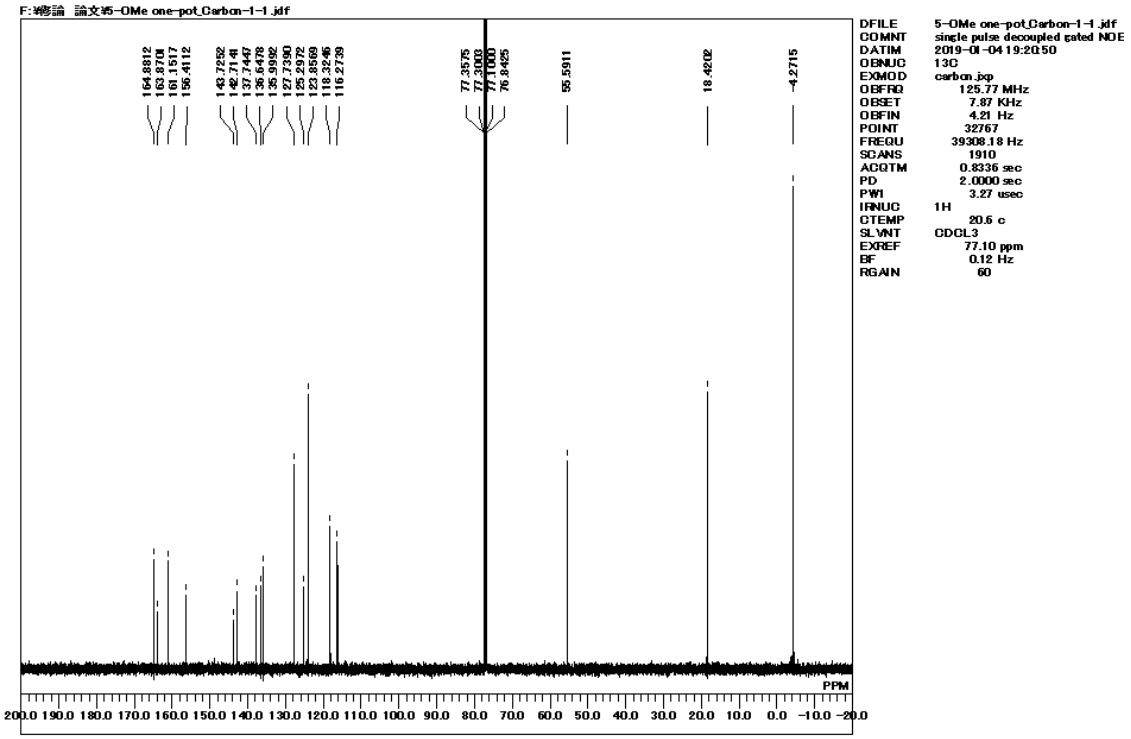
7b


F:¥物論 論文¥4-OMe one-pot_Carbon-1-1.jdf
164.6847
163.7979
162.2152
155.9701
146.9789
142.4977
138.0546
136.4623
134.6031
132.1146
128.6535
126.5940
115.5244
108.4688
77.4242
77.3088
77.1000
76.7854
55.5232
18.4147
-4.0488
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 4-OMe one-pot_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-13 03:34:22
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 10000
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.1 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

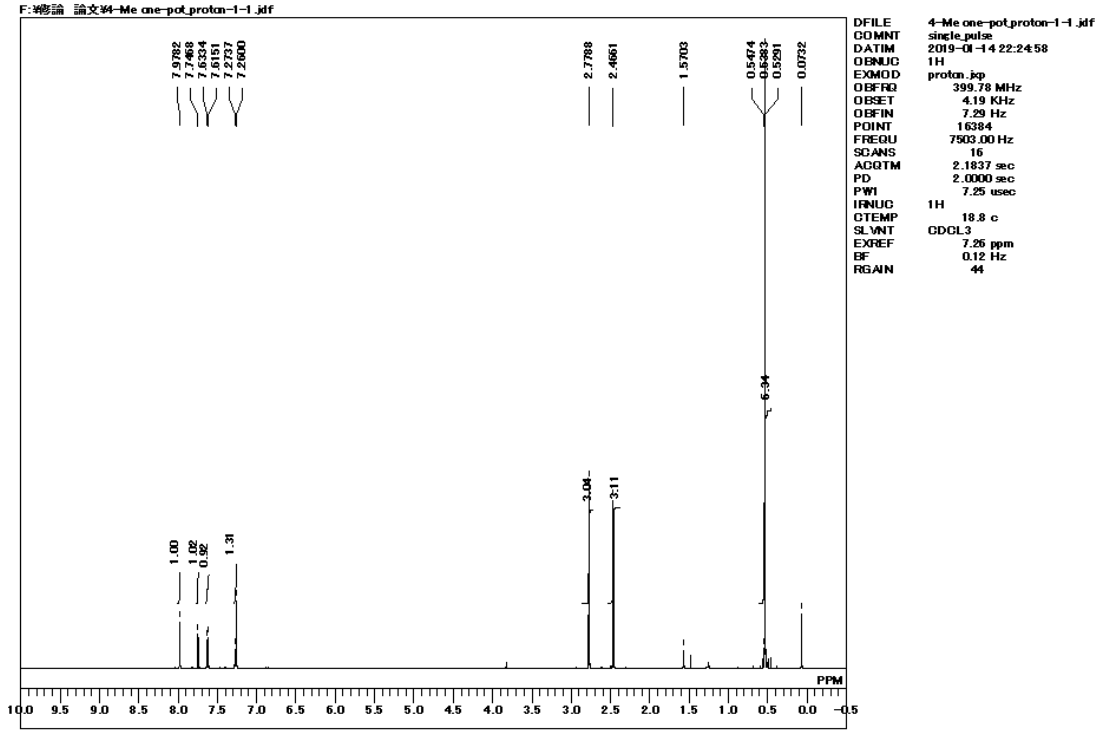
7c


F:¥物論 論文¥5-OMe one-pot_proton-1-1.jdf
7.8475
7.8440
7.8269
7.2600
7.2254
7.2175
7.0351
7.0275
7.0149
7.0103
3.9023
2.7514
0.5549
0.5481
0.5400
1.94
0.90
0.97
6.00
PPM
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
DFILE 5-OMe one-pot_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-04 19:17:44
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 16
ACQTM 1.7459 sec
PD 1.5000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 20.1 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 44

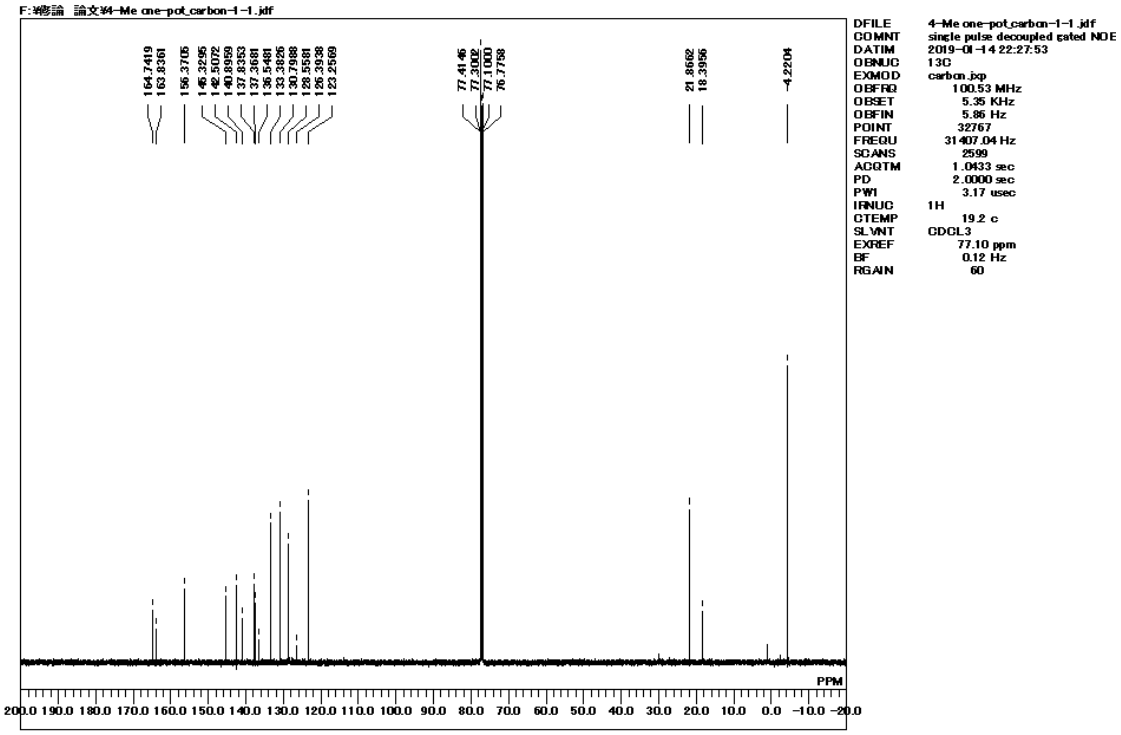
7c


F:¥修論 論文¥5-OMe one-pot_Carbon-1-1.jdf
164.8812
163.8704
161.1517
156.4112
143.7252
142.7141
137.7447
136.6478
135.5992
127.7390
125.2972
123.3588
118.2936
116.2739
77.3575
77.3003
77.1000
76.8425
55.5911
18.4202
-4.2715
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 5-OMe one-pot_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-04 19:20:50
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 1910
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

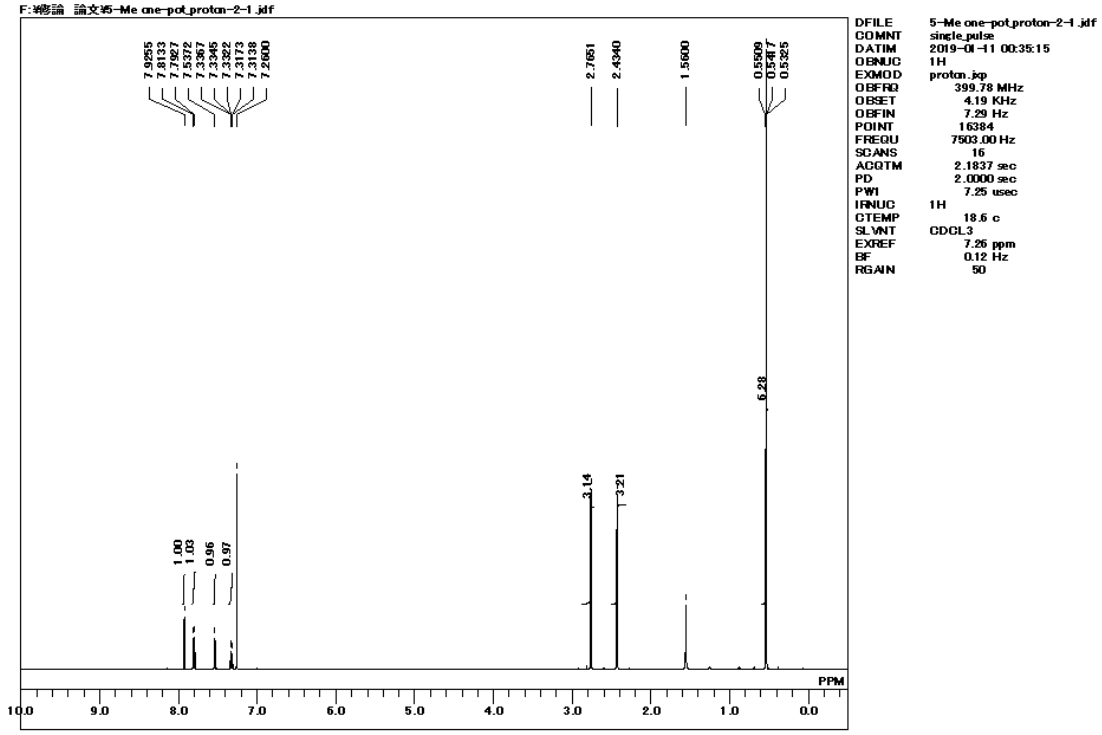
7d


F:¥修論 論文¥4-Me one-pot_proton-1-1.jdf
7.9782
7.7468
7.6334
7.6151
7.2737
7.2600
2.7788
2.4661
1.5703
0.5474
0.5382
0.5291
0.0732
6.94
3.04
3.11
1.00
1.02
0.92
1.31
PPM
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
DFILE 4-Me one-pot_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-14 22:24:58
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.8 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 44

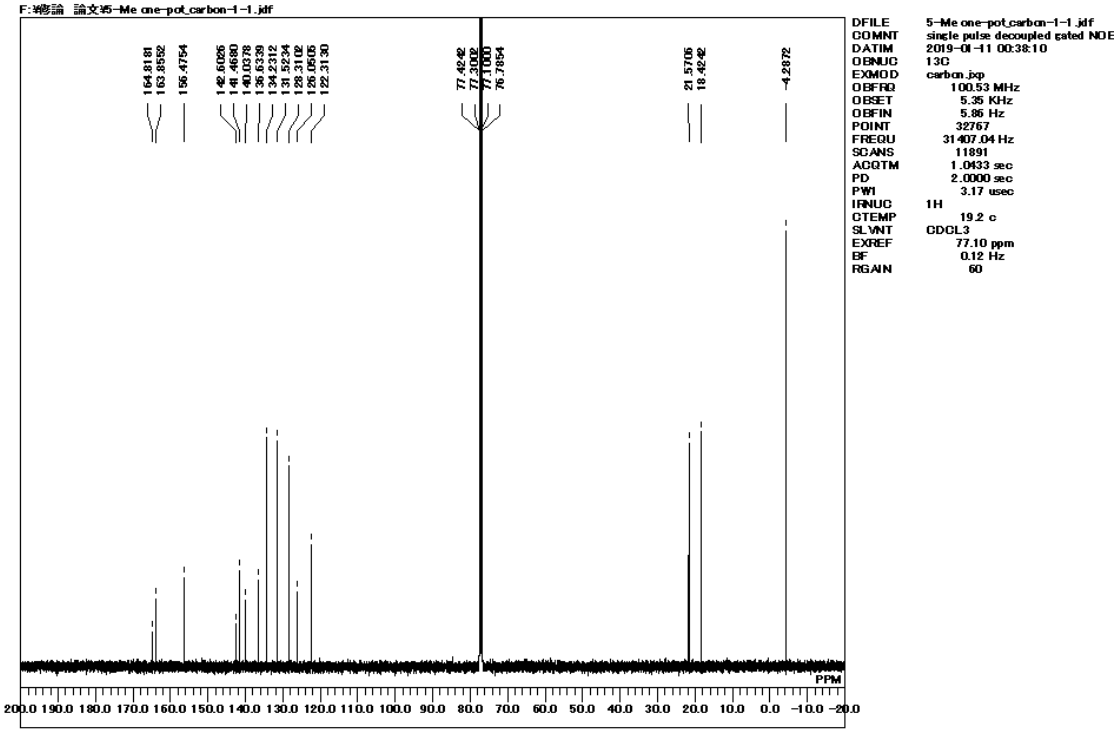
7d


F:¥修論 論文¥4-Me one-pot_carbon-1-1.jdf
164.7419
163.8361
156.3705
146.3295
145.5072
140.8999
137.8353
137.3681
136.5481
133.3826
130.7988
129.5581
126.3938
123.2569
77.4146
77.3002
77.1000
76.7798
21.8662
18.3956
-4.2204
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 4-Me one-pot_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-14 22:27:53
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 2599
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

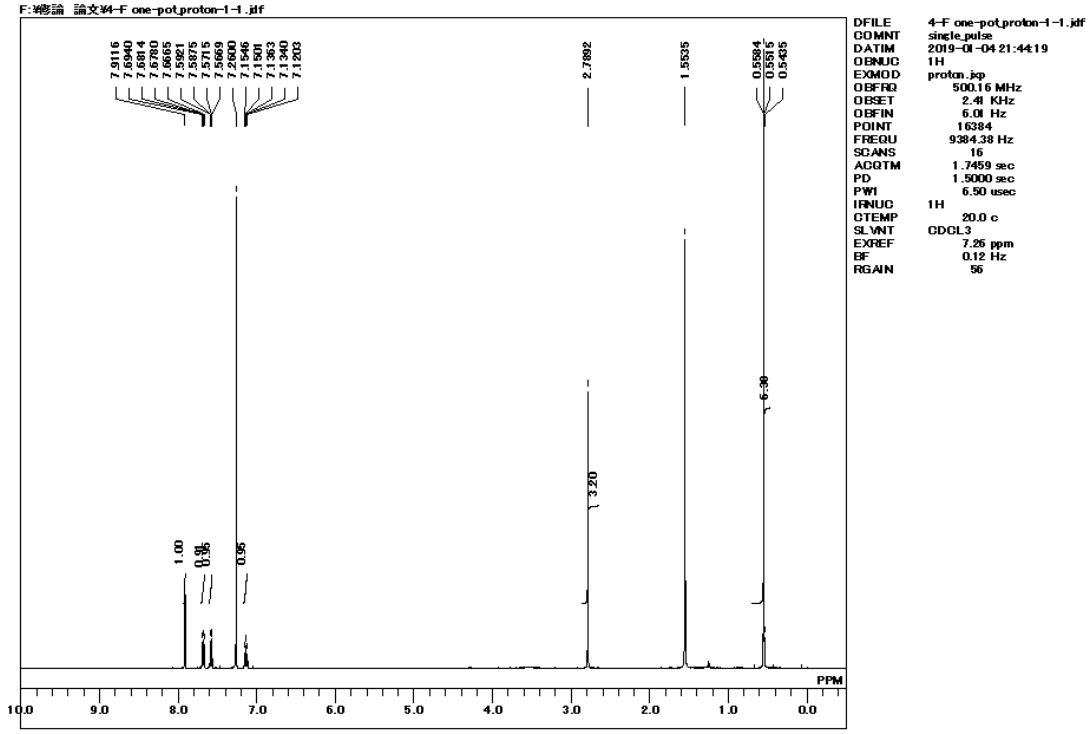
7e


F:¥修論 論文¥5-Me one-pot_proton-2-1.jdf
7.9555
7.8133
7.7927
7.5572
7.3357
7.3345
7.3322
7.3173
7.3138
7.2600
2.7651
2.4340
1.5600
0.5509
0.5467
0.5325
6.28
3.14
3.21
1.00
1.03
0.96
0.97
PPM
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
DFILE 5-Me one-pot_proton-2-1.jdf
COMNT single_pulse
DATIM 2019-01-11 00:35:15
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 16
ACQTM 2.1837 sec
PD 2.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.6 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 50

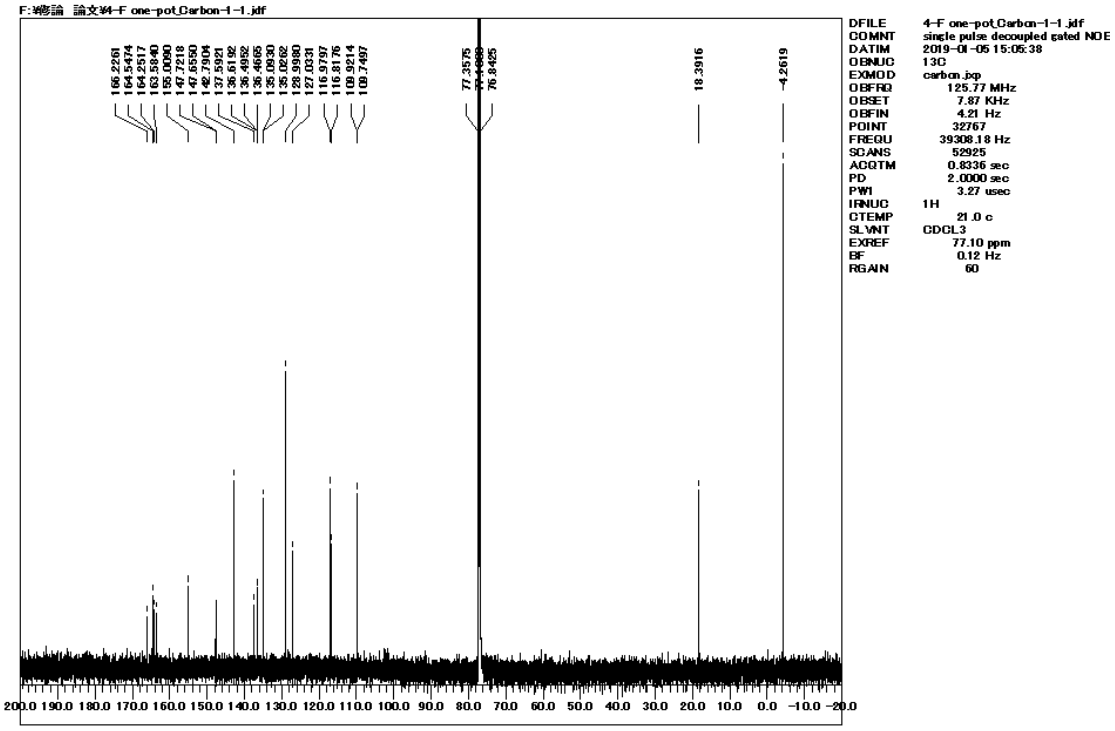
7e


F:¥修論 論文¥5-Me one-pot_carbon-1-1.jdf
164.8181
163.8552
156.4754
142.6026
141.4680
140.0378
136.6339
134.2312
131.5234
131.1108
129.0505
122.3130
77.4242
77.3002
77.1000
76.7854
21.5706
18.4242
-4.2872
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 5-Me one-pot_carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-11 00:38:10
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 100.53 MHz
OBSET 5.35 KHz
OBFIN 5.86 Hz
POINT 32767
FREQU 31407.04 Hz
SCANS 11891
ACQTM 1.0433 sec
PD 2.0000 sec
PW1 3.17 usec
IRNUC 1H
CTEMP 19.2 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

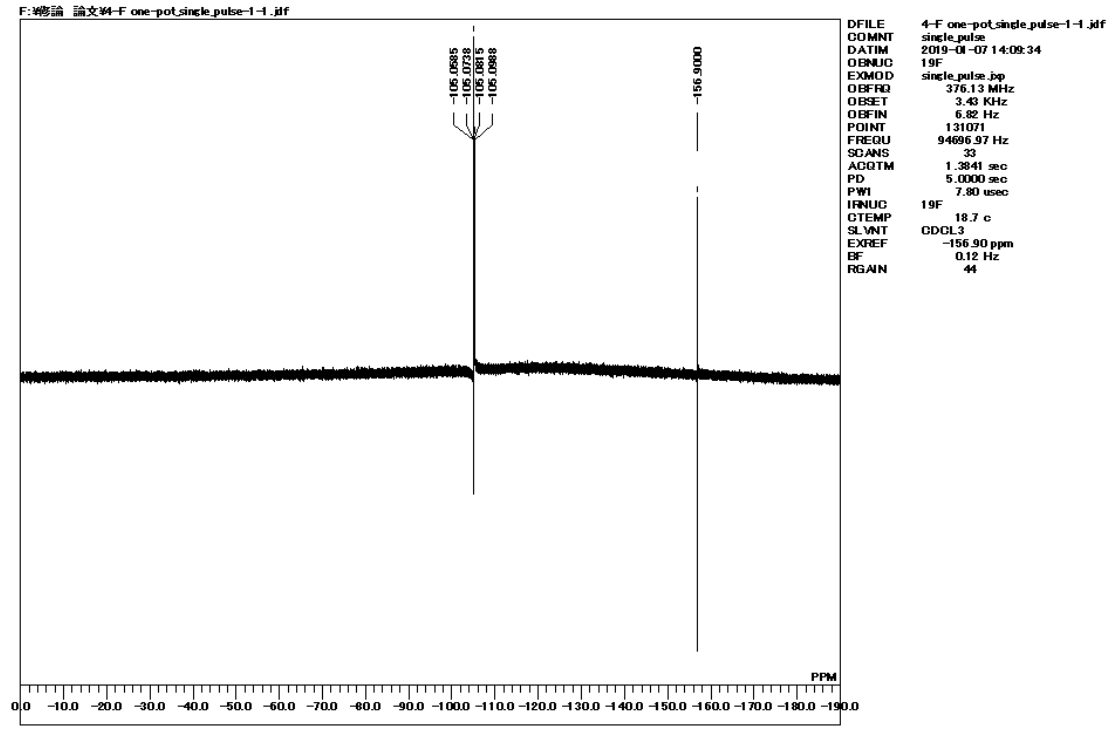
7f


F:¥修論 論文¥4-F one-pot_proton-1-1.jdf
7.9116
7.6940
7.6814
7.6780
7.6665
7.5921
7.5875
7.5715
7.5669
7.2900
7.1546
7.1501
7.1353
7.1340
7.1203
2.7892
1.5535
0.5884
0.5815
0.5435
1.00
0.91
0.96
0.96
3.20
6.30
PPM
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
DFILE 4-F one-pot_proton-1-1.jdf
COMNT single_pulse
DATIM 2019-01-04 21:44:19
OBNUC 1H
EXMOD proton.jxp
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 16
ACQTM 1.7459 sec
PD 1.5000 sec
PW1 6.50 usec
IRNUC 1H
CTEMP 20.0 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 56

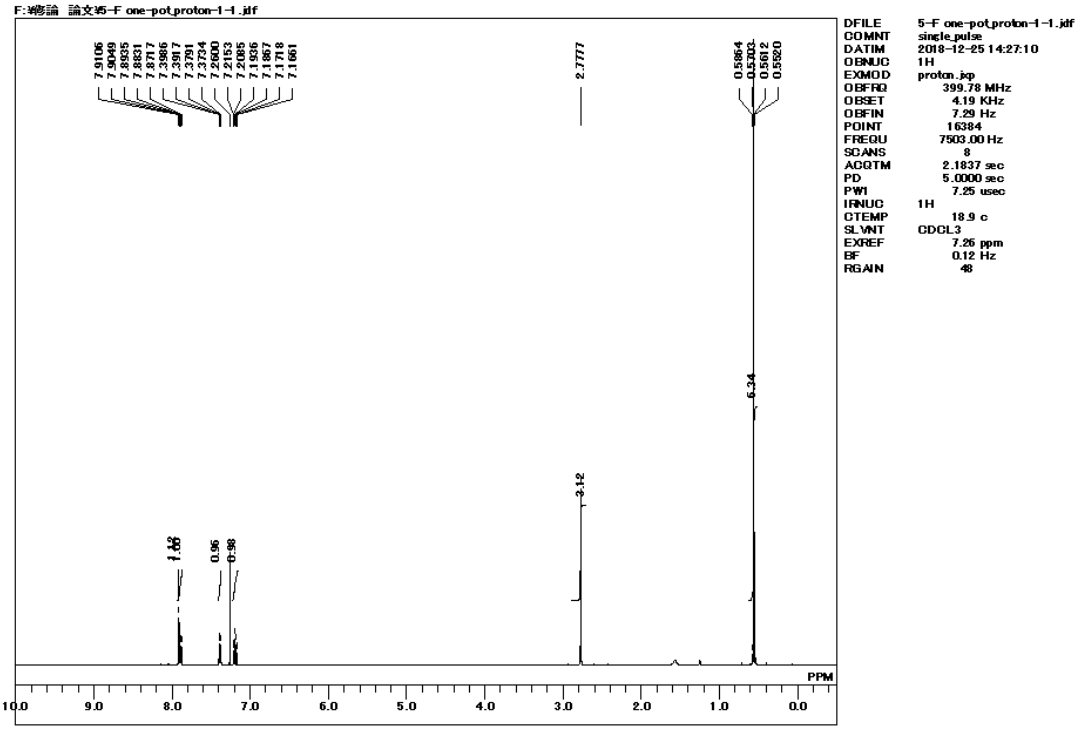
7f


F:¥博論 論文¥4-F one-pot_Carbon-1-1.jdf
166.2261
164.5474
164.2517
163.5840
155.0090
147.7218
147.6550
142.7904
137.5921
136.6192
136.4952
136.4665
135.0500
135.0260
129.9980
127.0331
116.9797
116.8176
109.9214
109.7497
77.3575
77.1449
76.8425
18.3916
-4.2619
DFILE 4-F one-pot_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2019-01-05 15:05:38
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 52925
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 21.0 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0

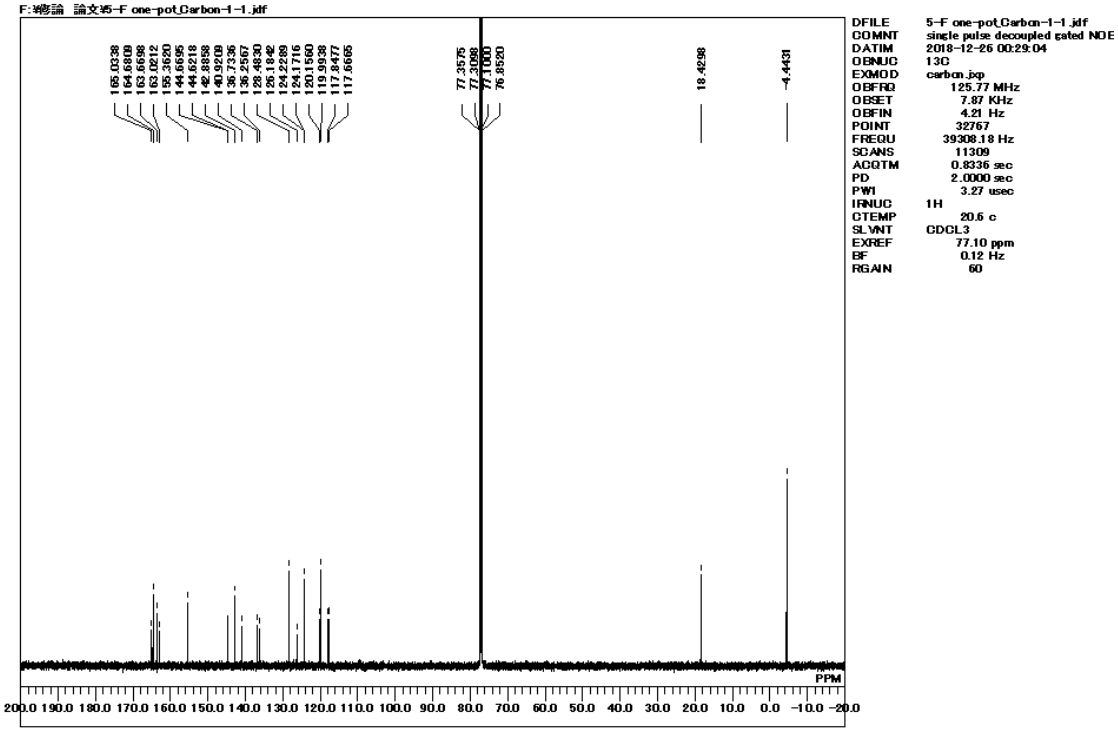
7f


F:¥博論 論文¥4-F one-pot_single_pulse-1-1.jdf
-105.0695
-105.0778
-105.0815
-105.0868
-156.9000
DFILE 4-F one-pot_single_pulse-1-1.jdf
COMNT single_pulse
DATIM 2019-01-07 14:09:34
OBNUC 19F
EXMOD single_pulse.jxp
OBFRQ 376.13 MHz
OBSET 3.43 KHz
OBFIN 6.82 Hz
POINT 131071
FREQU 94696.97 Hz
SCANS 32
ACQTM 1.3841 sec
PD 5.0000 sec
PW1 7.80 usec
IRNUC 19F
CTEMP 18.7 c
SLVNT CDCL3
EXREF -156.90 ppm
BF 0.12 Hz
RGAIN 44
PPM
0.0 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0 -80.0 -90.0 -100.0 -110.0 -120.0 -130.0 -140.0 -150.0 -160.0 -170.0 -180.0 -190.0

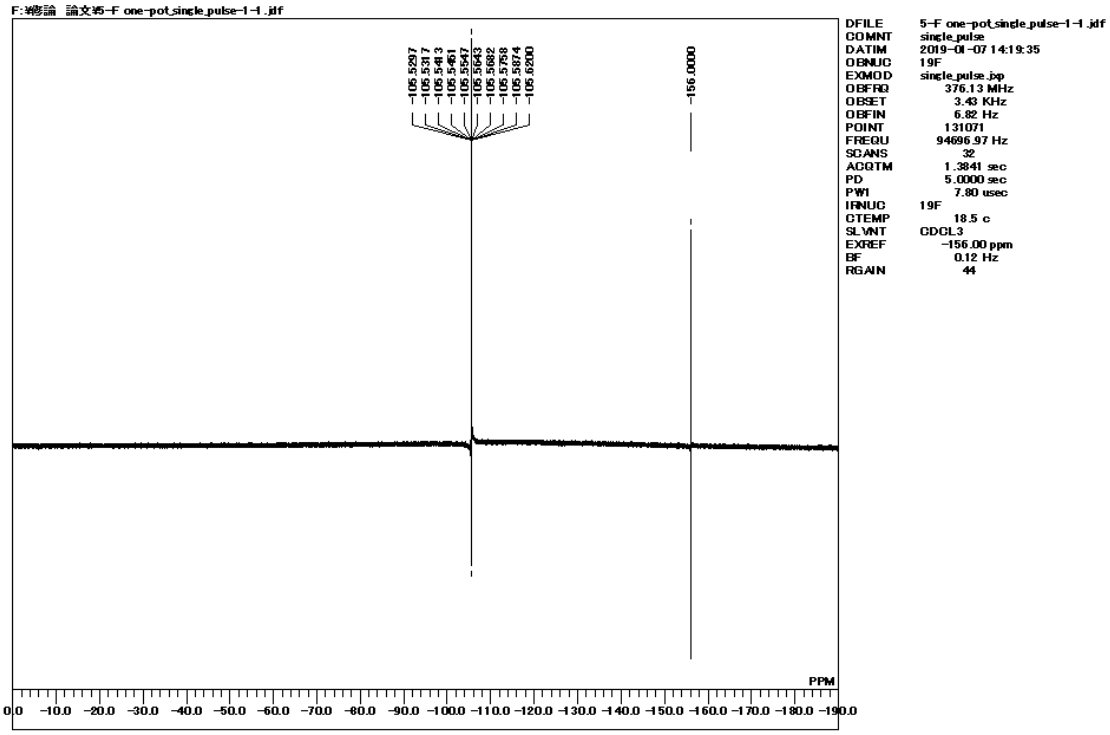
7g


F:¥修論 論文¥5-F one-pot_proton-1-1.jdf
7.8106
7.8049
7.8025
7.8831
7.8717
7.3986
7.3917
7.3791
7.3734
7.2600
7.2153
7.2085
7.1936
7.1857
7.1718
7.1661
2.7777
0.5864
0.5703
0.5612
0.5520
6.34
3.12
1.00
0.96
0.98
PPM
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
DFILE 5-F one-pot_proton-1-1.jdf
COMNT single_pulse
DATIM 2018-12-25 14:27:10
OBNUC 1H
EXMOD proton.jxp
OBFRQ 399.78 MHz
OBSET 4.19 KHz
OBFIN 7.29 Hz
POINT 16384
FREQU 7503.00 Hz
SCANS 8
ACQTM 2.1837 sec
PD 5.0000 sec
PW1 7.25 usec
IRNUC 1H
CTEMP 18.9 c
SLVNT CDCL3
EXREF 7.26 ppm
BF 0.12 Hz
RGAIN 48

7g


F:¥修論 論文¥5-F one-pot_Carbon-1-1.jdf
165.0338
164.6809
163.6698
163.0212
155.3620
144.6695
144.6218
142.8858
140.9209
136.7336
136.2567
128.4830
124.2298
124.1716
120.1560
119.9938
117.8477
117.6665
77.3575
77.3098
77.1000
76.8520
18.4298
-4.4431
PPM
200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0
DFILE 5-F one-pot_Carbon-1-1.jdf
COMNT single pulse decoupled gated NOE
DATIM 2018-12-26 00:29:04
OBNUC 13C
EXMOD carbon.jxp
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32767
FREQU 39308.18 Hz
SCANS 11309
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.27 usec
IRNUC 1H
CTEMP 20.6 c
SLVNT CDCL3
EXREF 77.10 ppm
BF 0.12 Hz
RGAIN 60

7g



Carbide complex