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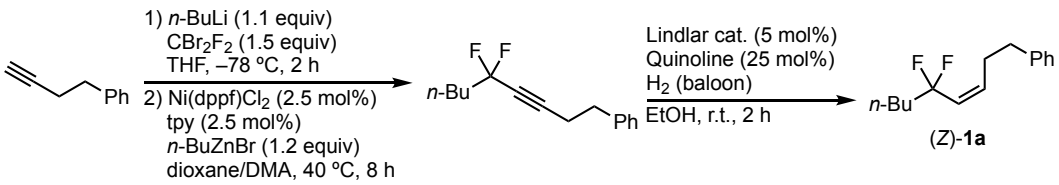
1. Instrumentation and Chemicals

Materials were obtained from commercial suppliers and purified by standard procedures unless otherwise noted. Solvents were also purchased from commercial suppliers, degassed via three freeze-pump-thaw cycles, and further dried over molecular sieves (MS 4Å). NMR spectra were recorded on JEOL JNM-ECX400P, JNM-ECS400 and Varian Unity INOVA 400, 500, or 600 spectrometers (^{1}H: 392, 396, 399, 400, 401, 500, and 600 MHz, ^{13}C: 100, 125 and 150 MHz and ^{19}F: 373, 376, 564 MHz). Tetramethylsilane (^{1}H), $CDCl_3$ (^{1}H, ^{13}C) and Fluorobenzene (^{19}F, δ –113.60) were employed as the external standards, respectively. Fluorobenzene was used as an internal standard to determine NMR yield. Multiplicity was recorded as follows: s = singlet, brs = broad singlet, d = doublet, t = triplet, q = quartet, quint = quintet, m = multiplet. CuCl (ReagentPlus® grade, ≥99%) was purchased from Sigma-Aldrich Co. and Strem. and used as received. GLC analyses were conducted with a Shimadzu GC-2014 or GC-2025 equipped with a ULBON HR-1 glass capillary column (Shinwa Chemical Industries) and a FID detector. Enantiomeric ratios were determined by HPLC analysis (high-performance liquid chromatography) with a Hitachi Chromaster HPLC [Chiral Technologies Chiralpak IA-3 (4.6 x 250 mm), Chiral Technologies Chiralpak IBN-3 (4.6 x 250 mm), Chiral Technologies Chiralpak IC-3 (4.6 x 250 mm), Chiral Technologies Chiralpak ID-3 (4.6 x 250 mm), Chiral Technologies Chiralpak IE-3 (4.6 x 250 mm), or Chiral Technologies Chiralpak IF-3 (4.6 x 250 mm)] and Shimadzu chromatograph [Chiral Technologies Chiralcel AZ-H (4.6 x 250 mm), Chiral Technologies Chiralcel OC-H (4.6 x 250 mm), Chiral Technologies Chiralcel OD-H (4.6 x 250 mm), Chiral Technologies Chiralcel OJ-H (4.6 x 250 mm), Chiral Technologies Chiralcel OZ-H (4.6 x 250 mm), or Chiral Technologies Chiralpak AD-H (4.6 x 250 mm)]. Specific optical rotations were measured with HORIBA SEPA-300 and a Rudolph Research Analytical Autopol IV Polarimeter. Medium-pressure column chromatography was carried out on a Biotage Flash Purification System Isolera, which is equipped with a UV detector. Recycle preparative gel permeation chromatography (GPC) was conducted with a JAI LC-9101 using $CHCl_3$ as the eluent. High-resolution mass spectra were recorded at the Global Facility Center, Hokkaido University and at the Boston College Mass Spectrometry Facility.

2. Substrate Preparation Procedures

2.1. (*Z*)-Alkene substrates synthesis

Preparation of (*Z*)-(5,5-difluoronon-3-en-1-yl)benzene [(*Z*)-1a].[1,2]



To a solution of 4-phenyl-1-butyne (1.0 g, 7.7 mmol) in anhydrous THF (16 mL) at –78 °C was added *n*-BuLi (2.5 M in hexanes, 3.4 mL, 8.5 mmol) in a dropwise manner under N_2 atm. The mixture was allowed to stir for 60 min at –78 °C, after which it was cooled to –196 °C (liquid N_2). Dibromodifluoromethane (2.413 g, 11.6 mmol) was added to the mixture by cannula. The mixture was then allowed to warm to 22 °C slowly and stir for 2 h at 22 °C. The reaction was quenched by the addition of a saturated solution of NH_4Cl (10 mL), and the volatiles were removed in vacuo. The brown oil residue was washed with *n*-pentane (3 x 50 mL) and the combined organic layers were washed with a saturated solution of NaCl (50 mL), dried over Na_2SO_4, and concentrated in vacuo. The brown oil residue was purified by silica gel chromatography (hexanes) to give (5-bromo-5,5-difluoropent-3-yn-1-yl)benzene (1.9 g, 95% yield) as colorless oil.

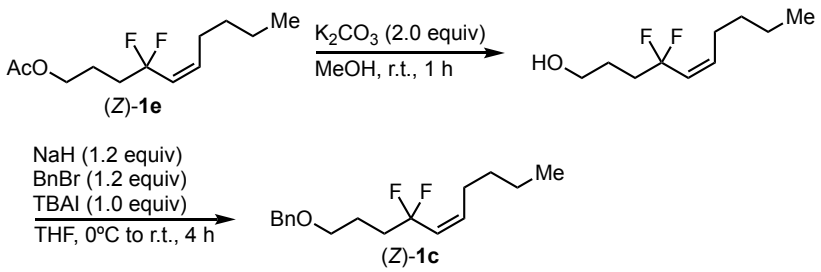
To a 100 mL Schlenk tube was added Ni(dppf)Cl_2 (20.5 mg, 0.03 mmol) and terpyridine (7.0 mg, 0.03 mmol). The tube was placed under vacuum and backfilled with N_2 3 times, then (5-bromo-5,5-difluoropent-3-yn-1-yl)benzene (335.0 mg, 1.2 mmol) was added followed by 1,4-dioxane (8 mL). The mixture was allowed to stir for 10 min at 22 °C, at which time *n*-butylzinc(II) bromide (1.44 mmol, 0.41 M in dimethylacetamide) was added in a dropwise manner over a period of 15 min. The tube was capped and placed in a preheated oil bath (40 °C). The mixture was allowed to stir for 8 h at 40 °C for 8 h and to cool to r.t. The mixture was diluted with EtOAc (50 mL) and filtered through a pad of celite. The filtrate was washed with a saturated solution of NaCl (50 mL). The organic layer was dried over Na_2SO_4, filtered, and concentrated in vacuo. The brown oil residue was purified by silica gel chromatography (hexanes) to furnish (5,5-difluoronon-3-yn-1-yl)benzene (224 mg, 79% yield) as colorless oil.

In a vacuum dried 50 mL round bottomed flask, Lindlar's catalyst (744.9 mg, 0.35 mmol) was dissolved in EtOH (100 mL) and quinoline (207 μL, 1.75 mmol) was added to this mixture. The corresponding difluoro compound (1.78 g, 7.0 mmol) was then added to this mixture and stirred for 2 h under H_2 atmosphere (H_2 balloon). The mixture was then filtered through a Celite pad and concentrated under reduced pressure. The oily residue was subjected

to silica gel chromatography (hexanes). (*Z*)-**1a** was obtained in 73% yield (1.56 g, 6.6 mmol) as colorless oil.

^{1}H NMR (396 MHz, $CDCl_3$): δ 0.90 (t, *J* = 7.1 Hz, 3H), 1.25–1.44 (m, 4H), 1.74–1.89 (m, 2H), 2.53–2.62 (m, 2H), 2.70 (t, *J* = 7.5 Hz, 2H), 5.40–5.53 (m, 1H), 5.70 (tdt, *J* = 1.9, 7.7, 11.7 Hz, 1H), 7.18–7.31 ppm (m, 5H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 13.8 (*C*H_3), 22.4 (*C*H_2), 24.4 (*C*H_2), 30.1 (*C*H_2), 35.6 (*C*H_2), 38.1 (t, *J* = 26.8 Hz, *C*H_2), 122.7 (t, *J* = 241.4 Hz, *C*), 125.4 (t, *J* = 27.8 Hz, *C*H), 126.0 (*C*H), 128.4 (d, *J* = 10.6 Hz, *C*H), 136.4 (t, *J* = 6.2 Hz, *C*H), 141.3 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –91.3 ppm (d, *J* = 34.3 Hz, 2F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{15}H_{20}F_2$, 238.1533; found, 238.1532.

Preparation of (*Z*)-{[(4,4-difluorodec-5-en-1-yl)oxy]methyl}benzene [(*Z*)-1c].

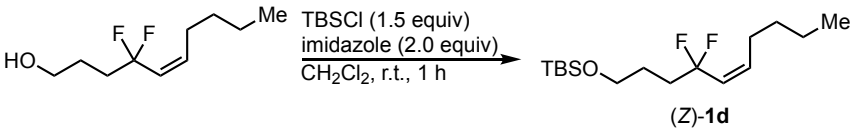


(*Z*)-**1e** was added to a solution of K_2CO_3 (2.21 g, 16 mmol) in MeOH (100 mL). The mixture was allowed to stir for 1 h, afterwards the solution was filtered and volatiles removed in vacuo. The oily residue was subjected to silica gel chromatography (Hexanes) to afford the corresponding alcohol in 89% yield (1.37 g, 7.1 mmol) as colorless oil.

The alcohol (384.5 mg, 2.0 mmol) was added dropwise to a solution of NaH (95.2 mg, 2.4 mmol) in THF (5.0 mL) at 0 ºC. Benzylbromide (282 μL, 2.38 mmol) was then added dropwise and the mixture was allowed to stir at 22 °C for 4 h. Water is added and the resulting biphasic solution extracted with ether. The residue was subjected to silica gel column chromatography (hexanes) to afford (*Z*)-**1c** in 75% yield (421.3 mg, 1.5 mmol) as colorless oil.

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.90 (t, *J* = 7.3 Hz, 3H), 1.24–1.44 (m, 4H), 1.74–1.86 (m, 2H), 1.93–2.11 (m, 2H), 2.20–2.29 (m, 2H), 3.52 (t, *J* = 6.3 Hz, 2H), 4.51 (s, 2H), 5.38–5.52 (m, 1H), 5.65–5.76 (m, 1H), 7.23–7.38 (m, 5H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 13.8 (*C*H_3), 22.2 (*C*H_2), 22.8 (*C*H_2), 27.9 (*C*H_2), 31.4 (*C*H_2), 35.3 (t, *J* = 27.2 Hz, *C*H_2), 69.3 (*C*H_2), 72.7 (*C*H_2), 122.5 (t, *J* = 238.4 Hz, *C*), 124.5 (t, *J* = 27.2 Hz, *C*H), 127.4 (*C*H), 128.2 (*C*H), 138.0 (t, *J* = 6.2 Hz, *C*H), 138.3 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –91.4 (d, *J* = 34.3 Hz, 2F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{17}H_{24}OF_2Na$, 305.1687; found, 305.1688.

Preparation of (*Z*)-*tert*-butyl[(4,4-difluorodec-5-en-1-yl)oxy]dimethylsilane [(*Z*)-1d].

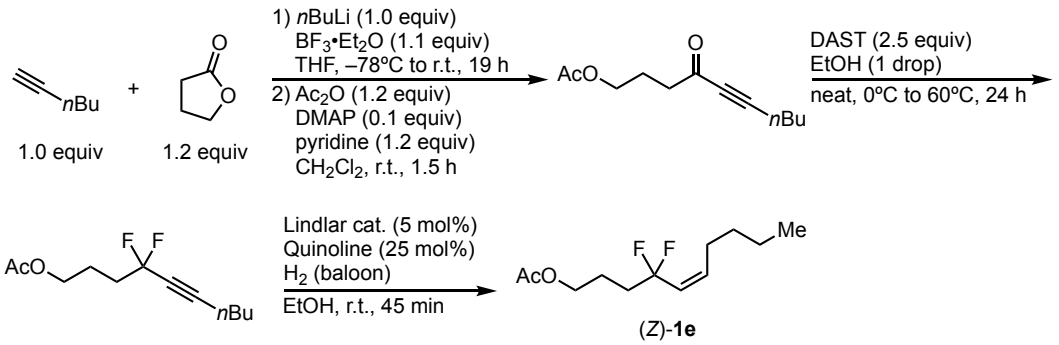


(*Z*)-**1d**

The corresponding alcohol (384.5 mg, 2.0 mmol) was added dropwise to a solution of imidazole (272.3 mg, 4.0 mmol) in CH_2Cl_2 (5.0 mL) at 22 °C. TBSCl (452.2 mg, 3.0 mmol) was then added to the solution and the mixture was allowed to stir at 22 °C for 1 h. Subsequently water was added and the mixture extracted with ether. The oily residue was subjected to silica gel chromatography (hexanes) to afford (*Z*)-**1d** in 58% yield (355.1 mg, 1.2 mmol) as colorless oil.

^{1}H NMR (401 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.89–0.92 (m, 12H), 1.28–1.42 (m, 4H), 1.64–1.73 (m, 2H), 1.92–2.05 (m, 2H), 2.21–2.29 (m, 2H), 3.65 (t, J = 6.4 Hz, 2H), 5.40–5.51 (m, 1H), 5.71 (tdt, J = 1.8, 7.8, 11.7 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ –5.4 (*C*H$_3$), 13.9 (*C*H), 18.2 (*C*), 22.3 (*C*H$_2$), 25.8 (*C*H$_2$), 25.9 (*C*H$_3$), 28.1 (*C*H$_2$), 31.6 (*C*H$_2$), 35.1 (t, J = 27.3 Hz, *C*H), 62.3 (*C*H$_2$), 122.7 (t, J = 236.4 Hz, *C*), 124.8 (t, J = 27.2 Hz, *C*H), 138.0 (t, J = 5.8 Hz, *C*H). ^{19}F NMR (373 MHz, $CDCl_3$): δ –91.1 (s, 2F). HRMS–EI (*m*/*z*): $[M+Na]^+$ calcd for $C_{16}H_{32}OF_2NaSi$, 329.2083; found, 329.2085.

Preparation of (*Z*)-4,4-difluorodec-5-en-1-yl acetate [(*Z*)-1e].[3]



(*Z*)-**1e**

In a vacuum dried 500 mL round bottomed flask, *n*-BuLi (1.6 M in hexane, 37.5 mL) was added dropwise to the mixture of hex-1-yne (6.9 mL, 60 mmol) and dry THF (180 mL) at –78 ºC under a nitrogen atmosphere. After 30 minutes, BF_3•Et_2O (66 mL) was added dropwise to the mixture. The mixture was allowed to stir for 30 minutes, then dihydrofuran-2(3*H*)-one was added dropwise. The mixture was allowed to stir and warm to 22 °C over the course of 19 h. Subsequently aqueous NH_4Cl was added at 0 ºC and the solution extracted with Et_2O three times. The combined organic layer was dried over $MgSO_4$. After filtration, the volatiles were removed under reduced pressure. The oily residue was subjected to silica gel chromatography (EtOAc/Hexane 0:100–30:70) to give the corresponding γ-hydroxy ketone (5.47 g, 54% yield) as colorless oil.

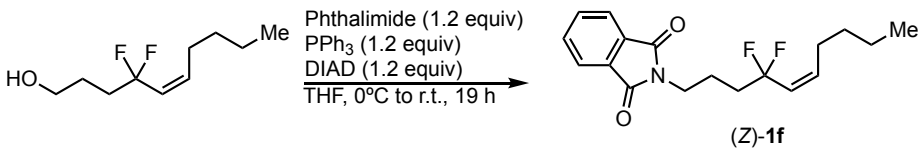
A vacuum dried 200 mL round bottomed flask was charged with γ-hydroxy ketone (30 mmol) and CH_2Cl_2 (90 mL). = DMAP (367.0 mg, 3.0 mmol), pyridine (2.91 mL, 36 mmol) and Ac_2O (3.4 mL, 36 mmol) were added and the solution was allowed to stir at 22°C for 17 hours. Subsequently water was added and the mixture extracted with CH_2Cl_2. After volatiles were removed in vacuo, the resulting oily residue was subjected to silica gel chromatography (EtOAc/Hexane 0:100–15:85) to give the corresponding ketone (6.97g, quant.) as colorless oil.

To a vacuum dried 100 mL round bottomed flask containing the corresponding ketone (6.97 g, 30 mmol) was added DAST (9.9 mL, 75.0 mmol) in one portion at 0 ºC. EtOH (1 drop) was added and the mixture allowed to stir for 22 h at 60 ºC. CH_2Cl_2 (40 mL) was added and aqueous NH_4Cl at carefully added at 0 ºC. The mixture is subsequently extracted with CH_2Cl_2. The oily residue was subjected to silica gel chromatography (EtOAc/Hexane 0:100–7:93) to give the corresponding difluoro compound (3.03 g, 44% yield) as brown oil.

A vacuum dried 300 mL round bottomed flask was charged with Lindlar's catalyst (1.19 g, 0.56 mmol), EtOH (200 mL) and quinoline (331 μL, 2.8 mmol). The difluoro compound (2.73 g, 11.2 mmol) was added and the mixture allowed to stir for 45 minutes under a H_2 atmosphere (H_2 balloon). The suspension was then filtered through a Celite pad and volatiles were removed under reduced pressure. The oily residue was subjected to silica gel chromatography (hexanes) to give (*Z*)-**1e** in 86% yield (2.36 g, 9.63 mmol) as colorless oil.

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.91 (t, *J* = 7.1 Hz, 3H), 1.28–1.43 (m, 4H), 1.79–2.05 (m, 4H), 2.06 (s, 3H), 2.20–2.29 (m, 2H), 4.10 (t, *J* = 6.5 Hz, 2 H), 5.45 (tdt, *J* = 1.7, 12.2, 14.1 Hz, 1H), 5.73 (tdt, *J* = 1.9, 7.8, 11.7 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 13.6 (*C*H_3), 20.6 (*C*H_3), 21.7 (t, *J* = 4.3 Hz, *C*H_2), 22.1 (*C*H_2), 27.8 (*C*H_2), 31.4 (*C*H_2), 34.9 (t, *J* = 27.3 Hz, *C*H_2), 122.0 (t, *J* = 240.5 Hz, *C*), 124.2 (t, *J* = 27.3 Hz, *C*H), 138.3 (*C*H), 170.7 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –91.6 (d, *J* = 34.3 Hz, 2F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{12}H_{20}O_2F_2Na$, 257.1324; found, 257.1326.

Preparation of (*Z*)-2-(4,4-difluorodec-5-en-1-yl)isoindoline-1,3-dione [(*Z*)-1f].



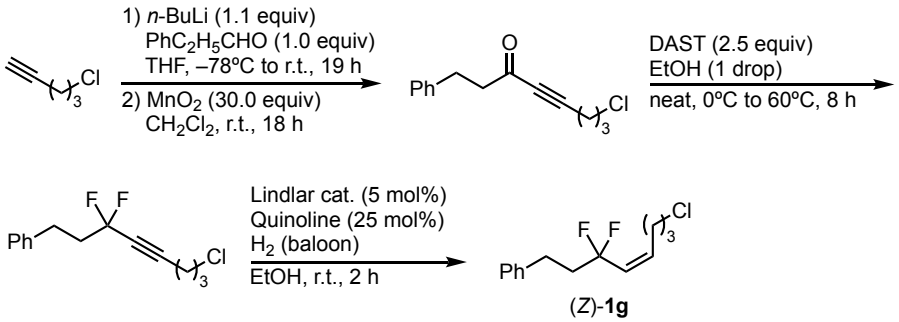
(*Z*)-**1f**

DIAD (467 μL, 2.4 mmol) was added dropwise to a solution of phthalimide (353.1 mg, 2.4 mmol), PPh_3 (629.5 mg, 2.4 mmol) and the corresponding alcohol (384.5 mg, 2.0 mmol) in THF (5.0 mL) at 0 ºC. The mixture was allowed to stir at 22°C for 19 h. and then concentrated under reduced pressure. The oily residue was subjected to silica gel

chromatography (EtOAc/Hexane 4:96–10:90) to afford (*Z*)-**1f** in 70% yield (451.7 mg, 1.4 mmol) as colorless oil.

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.87 (t, *J* = 7.1 Hz, 3H), 1.19–1.40 (m, 4H), 1.83–2.06 (m, 4H), 2.16–2.27 (m, 2H), 3.74 (t, *J* = 7.1 Hz, 2H), 5.36–5.49 (m, 1H), 5.71 (tdt, *J* = 1.8, 7.8, 11.8 Hz, 1H), 7.70–7.76 (m, 2H), 7.82–7.89 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 13.6 (*C*H$_3$), 21.6 (t, *J* = 3.8 Hz, *C*H$_2$), 22.0 (*C*H$_2$), 27.7 (*C*H$_2$), 31.2 (*C*H$_2$), 35.7 (t, *J* = 27.8 Hz, *C*H$_2$), 37.1 (*C*H$_2$), 121.9 (t, *J* = 240.8 Hz, *C*), 122.9 (*C*H), 124.0 (t, *J* = 26.9 Hz, *C*H), 131.7 (*C*), 133.7 (*C*H), 138.2 (t, *J* = 6.1 Hz, *C*H), 167.9 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –91.4 (d, *J* = 22.8 Hz, 2F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{18}H_{21}O_2NF_2Na$, 344.1433; found, 344.1434.

Preparation of (*Z*)-(8-chloro-3,3-difluorooct-4-en-1-yl)benzene [(*Z*)-1g].[3]



In a vacuum dried 200 mL round bottomed flask, *n*-BuLi (1.6 M hexane solution, 13.8 mL) was added dropwise to the mixture of 5-chloropent-1-yne (2.09 mL, 20 mmol) and dry THF (30 mL) at –78 ºC under a nitrogen atmosphere. After the 30 minutes, PhC_2H_5CHO (2.63 mL, 20 mL) was added dropwise to the mixture, then the mixture was allowed to warm to room temperature and stirred for 19 hours. The mixture was quenched by aqueous NH_4Cl at 0 ºC and extracted with Et_2O three times. The combined organic layer was dried over $MgSO_4$. After filtration, the solvent was removed by evaporation under reduced pressure. The product was carried forward without purification.

In a vacuum dried 200 mL round bottomed flask, MnO_2 (52.1 g, 600 mmol) was dissolved in CH_2Cl_2 (50 mL). The alcohol was then added dropwise to the mixture. After the mixture was allowed to stir for 18 hours at room temperature, CH_2Cl_2 (100 mL) was added and the mixture was filtered through a Celite pad. After the removal of the solvent, the oily residue was subjected to silica gel chromatography (EtOAc/Hexane 0:100–15:85) to give the corresponding ketone (2.72 g, 58% yield) as colorless oil.

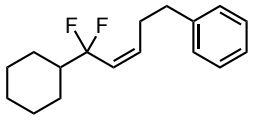
In a vacuum dried 50 mL round bottomed flask, DAST (3.82 mL, 29 mmol) was added by one portion to the corresponding ketone (2.72 g, 11.6 mmol) at 0 ºC. EtOH (1 drop) was added and the mixture was allowed to stir for 8 h at 60 ºC. CH_2Cl_2 (20 mL) was then added

and the mixture was carefully quenched by aqueous NH_4Cl at 0 ºC and extracted with CH_2Cl_2. The oily residue was subjected to silica gel chromatography (hexanes) to give the corresponding difluoro compound (1.76 g, 59% yield) as brown oil.

In a vacuum dried 50 mL round bottomed flask, Lindlar's catalyst (592.3 mg, 0.28 mmol) was dissolved in EtOH (100 mL) and quinoline (165.0 μL, 1.39 mmol) was added to this mixture. The corresponding difluoro compound (1.76 g, 5.6 mmol) was then added to the mixture and stirred for 2 h under H_2 atmosphere (H_2 balloon). The mixture was then filtered through a Celite pad and volatiles removed under reduced pressure. The oily residue was subjected to silica gel chromatography (hexanes). (*Z*)-**1g** was obtained in 43% yield (0.62 g, 2.4 mmol) as colorless oil.

^{1}H NMR (401 MHz, $CDCl_3$): δ 1.90 (dt, *J* = 7.1, 14.0 Hz, 2H), 2.16–2.30 (m, 2H), 2.40–2.49 (m, 2H), 2.77–2.85 (m, 2H), 3.56 (t, *J* = 6.6 Hz, 2H), 5.51–5.63 (m, 1H), 5.69–5.78 (m, 1H), 7.17–7.33 (m, 5H).^{13}C NMR (100 MHz, $CDCl_3$): δ 25.6 (*C*H_2), 28.5 (*C*H_2), 32.1 (*C*H_2), 40.2 (*t*, *J* = 26.7 Hz, *C*H_2), 44.1 (*C*H_2), 121.9 (t, *J* = 238.8 Hz, *C*), 125.8 (t, *J* = 26.7 Hz, *C*H), 126.1 (*C*H), 128.2 (*C*H), 128.4 (*C*H), 136.1 (t, *J* = 5.8 Hz, *C*H), 140.4 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –92.3 (s, 2F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{14}H_{17}ClF_2$, 258.0987; found, 258.0987.

(*Z*)-(5-Cyclohexyl-5,5-difluoropent-3-en-1-yl)benzene [(*Z*)-1h].

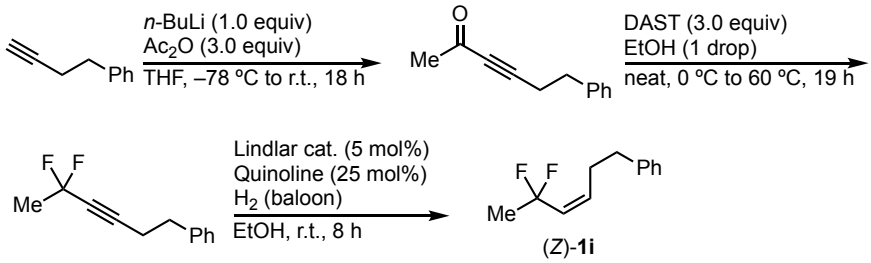


(*Z*)-**1h**

(*Z*)-**1h** was prepared from the corresponding alkyne and aldehyde according to the procedure described above.

^{1}H NMR (396 MHz, $CDCl_3$): δ 1.03–1.26 (m, 5H), 1.60–1.85 (m, 6H), 2.53–2.62 (m, 2H), 2.71 (t, *J* = 7.5 Hz, 2H), 5.34–5.48 (m, 1H), 5.71–5.80 (m, 1H), 7.14–7.23 (m, 3H), 7.24–7.33 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 25.6 (*C*H_2), 25.9 (*C*H_2), 30.2 (*C*H_2), 35.7 (*C*H_2), 45.7 (t, *J* = 25.4 Hz, *C*H), 123.7 (t, *J* = 242.9 Hz, *C*), 124.1 (t, *J* = 27.3 Hz, *C*H), 125.9 (*C*H), 128.3 (*C*H), 128.4 (*C*H), 136.6 (t, *J* = 5.8 Hz, *C*H), 141.3 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –99.3 (t, *J* = 15.5 Hz, 2F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{17}H_{22}F_2$, 264.1690; found, 264.1691.

Preparation of (*Z*)-(5,5-difluorohex-3-en-1-yl)benzene [(*Z*)-1i].[3]



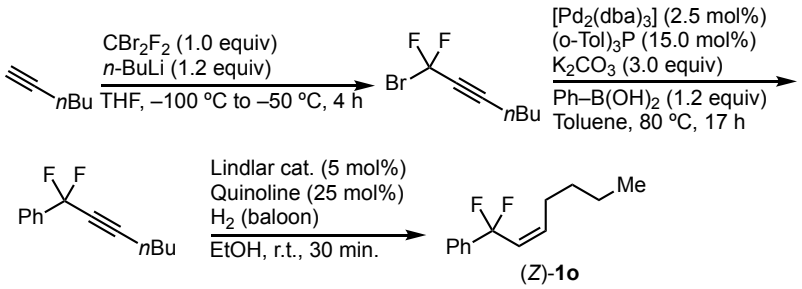
In a vacuum dried 200 mL round bottomed flask, *n*-BuLi (1.6 M hexane solution, 12.5 mL) was added dropwise to the mixture of 3-butyn-1-ylbenzene (2.77 mL, 20 mmol) and dry THF (30 mL) at –78 ºC under a nitrogen atmosphere. After 30 minutes, Ac_2O (5.62 mL, 60 mmol) was added dropwise to the mixture. The mixture was warmed up to room temperature over the course of 18 h. The mixture was then quenched by aqueous NH_4Cl at 0 ºC and extracted with Et_2O three times. The combined organic layer was dried over $MgSO_4$. After filtration, the solvent was removed by evaporation under reduced pressure. The oily residue was subjected to silica gel chromatography (EtOAc/Hexane 0:100–10:70) to give the corresponding ketone (3.11 g, 90% yield) as colorless oil.

In a vacuum dried 50 mL round bottomed flask, DAST (5.80 mL, 45.0 mmol) was added by one portion to the corresponding ketone (2.58 g, 15.0 mmol) at 0 ºC. EtOH (1 drop) was added and the mixture was allowed to stir for 19 h at 60 ºC. After that, CH_2Cl_2 (40 mL) was added and the mixture was carefully quenched by aqueous NH_4Cl at 0 ºC and extracted with CH_2Cl_2. The oily residue was subjected to silica gel chromatography (EtOAc/Hexane 0:100–7:93) to give the corresponding difluoro-containing compound (1.28 g, 42% yield) as brown oil.

In a vacuum dried 200 mL round bottomed flask, Lindlar's catalyst (319.3 g, 0.15 mmol) was dissolved in EtOH (60 mL) and quinoline (88.9 μL, 0.75 mmol) was added to this mixture. Then, the corresponding difluoro-containing compound (582.6 mg, 3.0 mmol) was added to this mixture and stirred for 8 h under H_2 atmosphere (H_2 balloon). The mixture was then filtered through a Celite pad and concentrated under reduced pressure. The oily residue was subjected to silica gel chromatography (hexanes). (*Z*)-**1i** was obtained in 58% yield (341.6 mg, 1.74 mmol) as colorless oil.

^{1}H NMR (399 MHz, $CDCl_3$): δ 1.62 (t, *J* = 18.0 Hz, 3H), 2.55–2.61 (m, 2H), 2.72 (t, *J* = 7.6 Hz, 2H), 5.48–5.58 (m, 1H), 5.72 (tdt, *J* = 1.8, 7.6, 11.5 Hz, 1H), 7.18–7.22 (m, 3H), 7.27–7.31 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 25.3 (t, *J* = 29.3 Hz, *C*H$_3$), 29.9 (*C*H$_2$), 35.5 (*C*H$_2$), 121.4 (t, *J* = 233.1 Hz, *C*), 126.0 (*C*H), 126.2 (t, *J* = 26.9 Hz, *C*H), 128.3 (*C*H), 128.4 (*C*H), 136.1 (t, *J* = 6.1 Hz, *C*H), 141.2 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –84.1 (d, *J* = 22.8 Hz, 2F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{11}H_{14}F_2$, 196.1064; found, 196.1061.

Preparation of (*Z*)-(1,1-difluorohept-2-en-1-yl)benzene [(*Z*)-1o].[1,4]



To a solution of hex-1-yne (5.7 mL, 50 mmol) in THF (250 mL), a solution of *n*-BuLi (1.6 M in hexane, 31.3 mL) was added dropwise at –90 °C. After the mixture had been stirred for 30 min at that temperature, the mixture was cooled to –110 °C. Cold CF_2Br_2 (–78°C) (5.5 mL, 60 mmol) was added to the mixture. After the addition was complete, the mixture was allowed to warm to –50 °C and stirring for 3 h before being quenched with aqueous NH_4Cl solution. The aqueous layer was extracted with Et_2O and the organic layer was washed with H_2O. The organic layer was dried over Na_2SO_4. After evaporation of the solvent, the oily residue was subjected to distillation to afford the corresponding difluoro compound in 73% yield (7.69 g, 36.5 mmol).

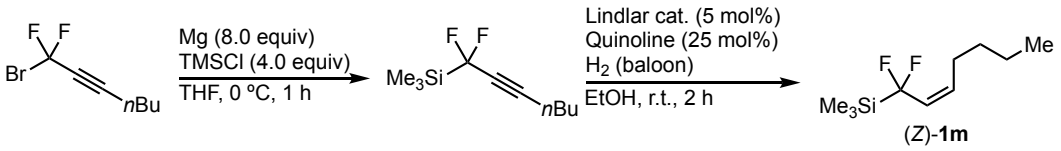
To a solution of $[Pd_2(dba)_3]$ (207.1 mg, 0.25 mmol), (*o*-Tol)$_3$P (456.6 mg, 1.5 mmol), K_2CO_3 (4.15 g, 30 mmol) and $PhB(OH)_2$ (1.46 g, 12 mmol) in toluene (66 mL), the corresponding difluoro compound (2.15 g, 10 mmol) was added dropwise. Then, the mixture was allowed to stir at 80 ºC for 17 h. The mixture was then extracted with Et_2O and the organic layer was washed with H_2O. The organic layer was dried over $MgSO_4$. After evaporation of the solvent, The oily residue was subjected to silica gel chromatography (hexanes) to afford the coupling product in 53% yield (1.30 g, 6.2 mmol) as colorless oil.

In a vacuum dried 200 mL round bottomed flask, Lindlar's catalyst (564 mg, 0.27 mmol) was dissolved in EtOH (100 mL) and quinoline (158 µL, 1.33 mmol) was added to this mixture. Then, the corresponding difluoro compound (1.11 g, 5.3 mmol) was added to this mixture and stirred for 30 minutes under H_2 atmosphere (H_2 balloon). The mixture was then filtered through a Celite pad and concentrated under reduced pressure. The oily residue was subjected to silica gel chromatography (hexanes) and gel-permeation chromatography. (*Z*)-**1o** was obtained in 53% yield (591.7 mg, 2.8 mmol) as colorless oil.

^{1}H NMR (401 MHz, $CDCl_3$): δ 0.83 (t, *J* = 7.0 Hz, 3H), 1.20–1.37 (m, 4H), 2.10–2.20 (m, 2H), 5.72–5.87 (m, 2H), 7.37–7.46 (m, 3H), 7.51–7.58 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 13.8 (*C*H$_3$), 22.2 (*C*H), 28.1 (*C*H$_2$), 31.3 (*C*H$_2$), 120.0 (t, *J* = 242.3 Hz, *C*), 125.3 (t, *J* = 29.6 Hz, *C*H), 125.3 (t, *J* = 5.3 Hz, *C*H), 128.4 (*C*H), 129.8 (*C*H), 138.0 (t, *J* = 28.2 Hz, *C*), 138.8 (t, *J* = 7.2 Hz, *C*H). ^{19}F NMR (373 MHz, $CDCl_3$): δ –85.2 (s, 2F). HRMS–EI (*m*/*z*): $[M]^+$

calcd for $C_{13}H_{16}F_2$, 210.1220; found, 210.1224.

Preparation of (*Z*)-(1,1-difluorohept-2-en-1-yl)trimethylsilane [(*Z*)-1m].[5]

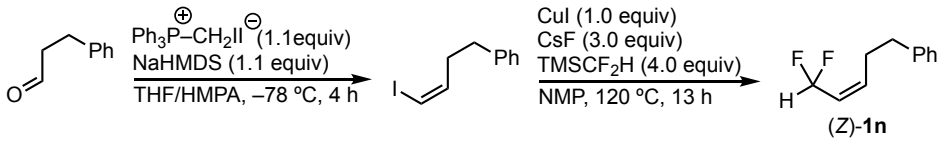


TMSCl (3.03 mL, 24 mmol) was added to a solution of activated Mg turnings (1.17 g, 48 mmol) in THF (60 mL) at 0 ºC. After being allowed to stir for 1 h, the propargyl bromide (1.26 g, 6.0 mmol) was added dropwise. The mixture was allowed to stir at 0 ºC for 1 h. Subsequently the mixture was filtered, extracted with Et_2O and the organic layer was washed with H_2O, then dried over $MgSO_4$. After removal of volatiles in vacuo, the oily residue was subjected to silica gel chromatography (hexanes) to afford the silylated compound in 51% yield (627.5 mg, 3.1 mmol) as colorless oil.

In a vacuum dried 100 mL round bottomed flask, Lindlar's catalyst (266.1 mg, 0.125 mmol) was suspended in EtOH (50 mL) and quinoline (74.1 µL, 0.63 mmol) was added to the mixture. The corresponding silylated compound (520.6 mg, 2.5 mmol) was added to the mixture and allowed to stir for 30 minutes under a H_2 atmosphere (H_2 balloon). The mixture was then filtered through a Celite pad and solvent removed under reduced pressure. The oily residue was subjected to silica gel chromatography (hexanes) followed by gel-permeation chromatography. (*Z*)-**1m** was obtained in 44% yield (232.0 mg, 1.1 mmol) as colorless oil.

^{1}H NMR (401 MHz, $CDCl_3$): δ 0.16 (s, 9H), 0.90 (t, *J* = 6.8 Hz, 3H), 1.24–1.43 (m, 4H), 2.15–2.26 (m, 2H), 5.29–5.46 (m, 1H), 5.59–5.70 (m, 1H). ^{13}C NMR (99 MHz, $CDCl_3$): δ –4.9 (*C*H_3), 13.9 (*C*H_3), 22.4 (*C*H), 28.5 (*C*H_2), 32.1 (*C*H_2), 124.5 (t, *J* = 20.3 Hz, *C*), 128.9 (t, *J* = 260.6 Hz, *C*H), 136.2 (t, *J* = 8.5 Hz, *C*H). ^{19}F NMR (373 MHz, $CDCl_3$): δ –109.2 (d, *J* = 23.1, 2F). HRMS–FI (*m*/*z*): $[M]^+$ calcd for $C_{10}H_{20}F_2Si$, 206.1302; found, 206.1309.

Preparation of (*Z*)-(5,5-difluoropent-3-en-1-yl)benzene [(*Z*)-1n].[6]



Sodium hexamethyldisilazide (NaHMDS) (3.03 mL, 24 mmol) was added to a solution of the ylide (15.8 g, 29.9 mmol) in THF (110 mL) at 22 °C. After the solution was allowed to cool to –78 ºC, hexamethylphosphoric triamide (HMPA) (420 µL) was added. The aldehyde (3.50 mL, 23.9 mmol) was added dropwise and the mixture was allowed to stir at –78 ºC for 1 h. Subsequently the solution was allowed to warm to 22 °C and allowed to stir for 1 h. The

mixture was quenched by cold brine, extracted with pentane three times, and the organic layer was washed with H_2O. After the organic layer was dried over $MgSO_4$ and evaporation of the solvent, the oily residue was subjected to silica gel chromatography (hexanes) to afford the compound in 21% yield (1.35 g, 5.0 mmol) as colorless oil.

CuI (1.24 g, 6.5 mmol) and CsF (2.96 g, 19.5 mmol) were dissolved in *N*-methylpyrrolidone (NMP) (32.5 mL). The corresponding vinyl iodide (1.82 g, 6.5 mmol) and $TMSCF_2H$ (3.23 g, 4.0 mmol) were added to the mixture. The mixture was allowed to stir at 120 ºC for 17 h and was quenched with aqueous NH_4Cl solution. The mixture was extracted with Et_2O and washed with H_2O three times, then the organic layer was dried over $MgSO_4$. After evaporation of the solvent, the oily residue was subjected to silica gel chromatography (hexanes) to afford (*Z*)-**1n** in 39% yield (465.2 mg, 2.5 mmol) as colorless oil.

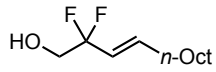
^{1}H NMR (401 MHz, $CDCl_3$): δ 2.46–2.55 (m, 2H), 2.74 (t, *J* = 7.6 Hz, 2H), 5.54–5.65 (m, 1H), 5.86–5.95 (m, 1H), 6.28 (td, *J* = 6.8, 55.7 Hz, 1H), 7.16–7.24 (m, 3H), 7.28–7.33 (m, 2 H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 29.6 (*C*H_2), 35.2 (*C*H_2), 111.8 (t, *J* = 230.7 Hz, *C*H), 123.3 (t, *J* = 24.9 Hz, *C*H), 126.2 (*C*H), 128.3 (*C*H), 128.4 (*C*H), 138.5 (t, *J* = 12.0 Hz, *C*H), 140.6 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –111.4 (d, *J* = 57.1 Hz, 2F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{11}H_{12}F_2$, 182.0907; found, 182.0907.

2.2. (*E*)-Alkene substrates synthesis

General Procedure for Substrates made through Olefin Metathesis

In a N_2-filled glove box, an oven-dried 20 mL vial equipped with a magnetic stirring bar was charged with *gem*-difluoromethyl substituted olefin (1.0 equiv.), a terminal olefin cross partner (1.5–2.0 equiv.) and methylene chloride (0.5 M). Ruthenium complex **Ru-1** (5 mol%) was added subsequently, the vial tightly capped and transferred to an oil bath preheated to 50 °C. The mixture was allowed to stir for 12 h after which the solvent was evaporated under reduced pressure, the residue was subjected to silica gel chromatography (hexanes and Et_2O) to afford the desired product.

(E)-2,2-Difluorododec-3-en-1-ol [(*E*)-4a)]

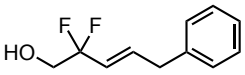


(*E*)-**4a**

Prepared from 2,2-Difluorobut-3-en-1-ol (21.6 mg, 0.20 mmol, 1.0 equiv.)[7] and 1-decene (56 mg, 0.40 mmol, 2.0 equiv.), isolated as colorless oil in 77% yield (34 mg, 0.154 mmol).

^{1}H NMR (500 MHz, $CDCl_3$): δ 0.88 ppm (3H, t, *J* = 6.8 Hz), 1.28 (12H, td, *J* = 10.3, 8.1, 4.7 Hz), 1.41 (2H, dd, *J* = 9.1, 5.4 Hz), 2.22–2.01 (3H, m), 3.76 (2H, td, *J* = 12.9, 6.0 Hz), 5.75–5.39 (1H, m), 6.18 (1H, dddd, *J* = 16.1, 9.4, 6.8, 2.6 Hz). ^{13}C NMR (101 MHz, $CDCl_3$): δ 14.0 (*C*H_3), 22.6 (*C*H_2), 28.3 (*C*H_2), 29.1 (*C*H_2), 29.2 (*C*H_2), 29.3 (*C*H_2), 31.8 (*C*H_2), 31.9 (*C*H_2), 65.0 (t, *J* = 32.3 Hz, *C*H_2), 119.3 (t, *J* = 239.2 Hz, *C*F_2), 122.1 (t, *J* = 25.4 Hz, *C*H), 138.5 (t, *J* = 9.0 Hz, *C*H). ^{19}F NMR (376 MHz, $CDCl_3$): δ –106.99 ppm (dt, *J* = 13.5, 2.7 Hz). HRMS (DART) Calcd for $C_{12}H_{26}NOF_2$ $[M+NH_4]^+$: 238.1977; Found 238.1975.

(E)-2,2-Difluoro-5-phenylpent-3-en-1-ol [(*E*)-4b]



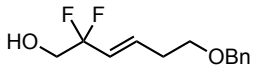
(*E*)-**4b**

Prepared from 2,2-Difluorobut-3-en-1-ol (21.6 mg, 0.20 mmol, 1.0 equiv.) and allylbenzene (47 mg, 0.4 mmol, 2.0 equiv.), isolated as colorless oil in 55% yield (22 mg, 0.111 mmol).

^{1}H NMR ($CDCl_3$, 400 MHz): δ 2.05 ppm (1H, t, *J* = 6.3 Hz), 3.52 – 3.41 (2H, m), 3.79 (2H, td, *J* = 13.0, 5.1 Hz), 5.63 (1H, dtt, *J* = 15.7, 11.1, 1.7 Hz), 6.37 (1H, dtt, *J* = 15.9, 6.7, 2.6 Hz), 7.20 (2H, d, *J* = 7.3 Hz), 7.26 (1H, t, *J* = 7.0 Hz), 7.33 (2H, t, *J* = 7.5 Hz). ^{13}C NMR ($CDCl_3$, 101 MHz): δ 38.3 (*C*H_2), 65.1 (t, *J* = 32.2 Hz, *C*H_2), 119.4 (t, *J* = 239.5 Hz, *C*F_2),

123.6 (t, J = 25.5 Hz, *C*H), 126.7 (C_{Ar}), 128.8 (C_{Ar}), 128.8 (C_{Ar}), 137.0 (t, J = 9.1 Hz, *C*H), 138.4 (C_{Ar}). ^{19}F NMR ($CDCl_3$, 376 MHz): δ –106.1 ppm (m). HRMS (DART) Calcd for $C_{11}H_{12}OF_2$ $[M]^+$: 198.0851; Found 198.0841.

(*E*)-6-(Benzyloxy)-2,2-difluorohex-3-en-1-ol [(*E*)-4c]

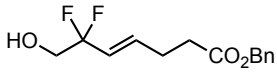


(*E*)-**4c**

Prepared from 2,2-Difluorobut-3-en-1-ol (ref for the preparation)[7] (21.6 mg, 0.20 mmol, 1.0 equiv.) and 4-benzyloxybut-1-ene (81 mg, 0.500 mmol, 2.5 equiv.), isolated as colorless oil in 50% yield (25 mg, 0.100 mmol).

^{1}H NMR (500 MHz, $CDCl_3$): δ 2.56–2.24 (3H, m), 3.57 (2H, *t*, J=6.5 Hz), 3.74 (2H, t, J = 12.8 Hz), 4.52 (2H, s), 5.68 (1H, dtt, J = 16.0, 11.1, 1.6 Hz), 6.28–6.13 (1H, m), 7.40–7.24 (5H, m). ^{13}C NMR (101 MHz, $CDCl_3$): δ 32.5 (CH_2), 65.0 (t, J = 32.4 Hz, CH_2), 68.7 (d, J = 1.8 Hz, CH_2), 73.1 (CH_2), 119.3 (t, J = 239.8 Hz, CF_2), 124.3 (t, J = 25.6 Hz, *C*H), 127.9 (C_{Ar}), 128.6 (C_{Ar}), 134.9 (t, J = 9.2 Hz, *C*H), 138.1 (C_{Ar}). ^{19}F NMR (470 MHz, $CDCl_3$): δ –103.52 to –110.52 ppm (m). HRMS (DART) Calcd for $C_{13}H_{20}NO_2F_2$ $[M+NH_4]^+$: 260.1457; Found 260.1460.

Benzyl (*E*)-6,6-difluoro-7-hydroxyhept-4-enoate [(*E*)-4d]

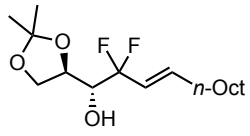


(*E*)-**4d**

Prepared from 2,2-Difluorobut-3-en-1-ol (ref for the preparation)[7] (18.1 mg, 0.166 mmol, 1.0 equiv.) and 4-benzyloxybut-1-ene (47.3 mg, 0.249 mmol, 1.5 equiv.), isolated as colorless oil in 94% yield (42 mg, 0.155 mmol).

^{1}H NMR (400 MHz, $CDCl_3$): δ 2.30 – 2.18 ppm (1H, m), 2.56 – 2.40 (4H, m), 3.72 (2H, ddd, J = 16.8, 9.4, 4.1 Hz), 5.13 (2H, s), 5.62 (1H, dtt, J = 15.8, 11.0, 1.4 Hz), 6.26 – 6.09 (1H, m), 7.43 – 7.30 (5H, m). ^{13}C NMR (151 MHz, $CDCl_3$): δ 27.3 (CH_2), 33.1 (CH_2), 65.0 (t, J = 32.5 Hz, CH_2), 66.6 (CH_2), 119.3 (t, J = 239.9 Hz, CF_2), 123.8 (t, J = 25.7 Hz, *C*H), 128.4 (d, J = 8.4 Hz, *C*H), 128.7 (C_{Ar}), 135.9 (C_{Ar}), 136.0 (C_{Ar}), 172.5 (CO_2). ^{19}F NMR (376 MHz, $CDCl_3$): δ –106.48 ppm (tdd, J = 13.0, 10.5, 2.9 Hz). HRMS (DART) Calcd for $C_{14}H_{17}O_3F_2$ $[M]^+$: 271.1140; Found 271.1148.

Preparation of (*R*,*E*)-1-((*R*)-2,2-dimethyl-1,3-dioxolan-4-yl)-2,2-difluorododec-3-en-1-ol [(*E*)-4e]



(*E*)-**4e**

1-Decene (1.51 mL, 8.00 mmol, 4.0 equiv.) and **Ru-1** (63.0 mg, 0.10 mmol, 5 mol%) were added to a solution of (*R*)-1-((*R*)-2,2-dimethyl-1,3-dioxolan-4-yl)-2,2-difluorobut-3-en-1-ol **4**[8](88:12 *d.r.*, 416 mg, 2.00 mmol, 1.0 equiv.) in CH_2Cl_2 (2.0 mL, 1.0 m). The mixture was heated at 50 °C for 16 h, then was allowed to cool to r.t. and concentrated under reduced pressure. ^{19}F NMR spectra of the crude mixture showed 75% conversion to the desired product. Purification by silica gel chromatography (petroleum ether:Et_2O = 9:1 to 5:1) afforded the alkene (*E*)-**4e** as colourless oil in 71% yield (455 mg, 1.42 mmol, 91:9 d.r.).

^1H NMR ($CDCl_3$, 400 MHz): δ 0.87 ppm (3H, t, J = 6.7 Hz), 1.33–1.22 (m, 10H), 1.35 (3H, s), 1.43–1.35 (2H, m), 1.42 (3H, s), 2.18–2.05 (2H, m), 2.66 (1H, d, J = 3.8 Hz), 4.07–3.93 (3H, m), 4.26 (1H, td, J = 6.6, 3.8 Hz), 5.69–5.54 (1H, m), 6.16 (1H, dddd, J = 15.9, 11.8, 5.8, 2.4 Hz). ^{13}C NMR ($CDCl_3$, 101 MHz): δ 14.2 (CH_3), 22.8 (CH_2), 25.4 (CH_2), 26.4 (CH_2), 28.5 (CH_2), 29.2 (CH_2), 29.3 (CH_2), 29.5 (CH_2), 32.0 (CH_2), 32.1 (CH_2), 64.8 (dd, $J_{C,F}$ = 3.8, 1.8 Hz, CH_2), 73.2 (dd, $J_{C,F}$ = 29.7, 27.9 Hz), 74.4 (t, $J_{C,F}$ = 2.4 Hz), 109.0 (CH), 119.5 (dd, $J_{C,F}$ = 244.2, 241.5 Hz, CF_2), 122.1 (t, $J_{C,F}$ = 24.4 Hz, CH), 138.2 (t, $J_{C,F}$ = 9.1 Hz, CH). ^{19}F NMR ($CDCl_3$, 377 MHz): δ −105.2 (dtd, J = 251.3, 10.9, 2.8 Hz), −107.4 ppm (dt, J = 251.3, 12.9 Hz). HRMS (MALDI): Calcd for $C_{17}H_{30}F_2KO_3$ $[M+K]^+$: 359.1795, Found: 359.1779. Specific rotation: $[\alpha]_D^{20}$ = +70.1 (*c* 1.0, $CHCl_3$).

3. General Borylation and Derivatization Procedures

Procedure for the copper(I)-catalyzed enantioselective boryl substitution of (*Z*)-1a (Scheme 2, Condition A).

An oven-dried reaction vial was charged with copper chloride (2.5 mg, 0.025 mmol), bis(pinacolato)diboron (190.0 mg, 0.75 mmol), (*R*,*R*)-BenzP* (7.1 mg, 0.025 mmol) and transferred to an argon filled glove box. NaOMe (40.7 mg, 0.75 mmol) was added, the vial was capped with a rubber septum and removed from the glovebox. The solids were suspended in THF (1.0 mL) and the suspension was allowed to stir for 30 min at 30 ºC. (*Z*)-**1** (120.1 mg, 0.50 mmol) was added to the suspension and the mixture was allowed to stir until full consumption of starting material was observed. Subsequently, the mixture was passed through a short plug of silica gel (Φ: 10 mm, height of the silica-gel column: 30 mm), eluted with Et_2O and volatiles removed in vacuo. The resulting oily residue was subjected to silica gel chromatography (Et_2O/hexane, typically 0:100–5:95) to give the corresponding borylation product **2** as colorless oil. Racemic products were synthesized with (9,9-dimethyl-9*H*-xanthene-4,5-diyl)bis(diphenylphosphane) replacing (*R*,*R*)-BenzP*.

Procedure for the copper(I)-catalyzed enantioselective boryl substitution of (*E*)-4a (Scheme 2, Condition B).

In a N_2-filled glove box, an oven-dried 8 mL vial, equipped with a magnetic stirring bar was charged with CuCl (5 mol%), (*S,S*)-phenyl-bpe (6 mol%), bis(pinacolato)diboron (1.1 equiv.), LiO*t*-Bu (1.5 equiv.) followed by (*E*)-**4a** (1.0 equiv.) in toluene solution (0.1 M). The vial was tightly capped and allowed to stir for 14 h at 22 °C. Subsequently the solvent was evaporated under reduced pressure and the oily residue subjected to silica gel chromatography (hexanes and Et_2O) to afford the desired product. Racemic products were synthesized with 1,3-Bis-(2,6-diisopropylphenyl) imidazolinium chloride replacing (*S*,*S*)-phenyl-bpe.

Procedure for the oxidation of the borylation products to allylic alcohols.

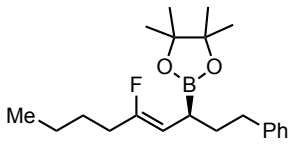
An 8 mL vial equipped with a magnetic stirring bar is charged with the borylation product (0.1 mmol) and THF/H_2O (1:1, 1.0 mL). $NaBO_3$•$4H_2O$ (76.9 mg, 0.5 mmol) was added, and the suspension allowed to stir for 2 hours at 22 °C. The mixture was extracted with Et_2O and the organic layer was dried over $MgSO_4$. After filtration, the residue is subjected to silica gel chromatography (ethyl acetate/hexanes, typically 5:95–15:85) to afford the corresponding alcohol.

Esterification procedure of the borylation product

The alcohol was obtained through the oxidation of the borylation product according to the procedure described above. In a reaction vial, the obtained alcohol (0.1 mmol) and DMAP (0.05 mmol) was dissolved in CH_2Cl_2 (2.0 mL). Et_3N (28.0 μL, 0.2 mmol) and *p*-nitrobenzoyl chloride (27.8 mg, 0.15 mmol) were then added to the mixture at room temperature. After stirred for 3 hours, the mixture was passed through a short silica gel column (Φ: 10 mm, height of the silica-gel column: 30 mm) eluting with Et_2O. The crude material was purified by silica gel chromatography (ethyl acetate/hexane, typically 0:100–4:96) to give the corresponding ester.

4. Borylation Product Characterizations

(*S*,*Z*)-2-(5-Fluoro-1-phenylnon-4-en-3-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*,*Z*)-2a].

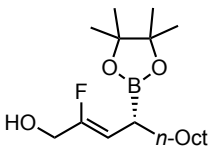


(*S*,*Z*)-**2a**

Prepared according to condition A. The reaction was conducted for 2 h with 120.1 mg (0.50 mmol) of (*Z*)-**1a.** The product (*S,Z*)-**2a** was obtained in 93% yield (160.2 mg) with 97/3 e.r. The stereoselectivity of (*S*,*Z*)-**2a** was determined by GC analysis (*Z:E* = 95:5).

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.91 (t, *J* = 7.3 Hz, 3H), 1.24 (s, 12H), 1.35 (dq, *J* = 7.2, 14.6 Hz, 2H), 1.43–1.52 (m, 2H), 1.58–1.70 (m, 1H), 1.77–1.89 (m, 1H), 2.11–2.22 (m, 3H), 2.49–2.71 (m, 2H), 4.50 (dd, *J* = 9.4, 38.4 Hz, 1H), 7.13–7.20 (m, 3H), 7.23–7.29 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 13.7 (*C*H_3), 19.9 (br, B–*C*H), 21.8 (*C*H_2), 24.56 (*C*H_3), 24.63 (*C*H_3), 28.4 (*C*H_2), 31.7 (d, *J* = 28.3 Hz, *C*H_2), 33.2 (*C*H_2), 35.4 (*C*H_2), 83.1 (*C*), 105.3 (d, *J* = 16.1 Hz, *C*H), 125.5 (*C*H), 128.1 (*C*H), 128.4 (*C*H), 142.6 (*C*), 159,4 (d, *J* = 253.9 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –108.9 – –108.7 (m, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{21}H_{32}BFO_2$, 346.2483; found, 346.2481. $[\alpha]_D^{18.8}$ +0.35 (*c* 1.60, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IC-3, 2-PrOH/Hexane = 4/96, 0.5 mL/min, 40°C, retention time: 18.88 min [(*Z*)-alcohol major enantiomer], 16.37 min [(*Z*)-alcohol minor enantiomer], and 13.88 min [(*E*)-alcohol major enantiomer]. Minor enantiomer of (*E*)-alcohol was not detected by HPLC analysis.

(*R*)-*(Z)*-2-Fluoro-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)dodec-2-en-1-ol [(*R*,*Z*)-2b]

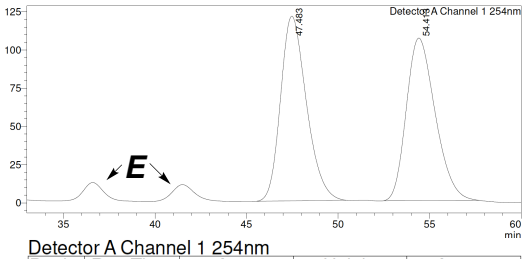


(*R*,*Z*)-**2b**

Prepared according to condition B from (*E*)-**4a** (34 mg, 154 μmol) and isolated as colorless oil in 51% yield (26 mg, 79 μmol).

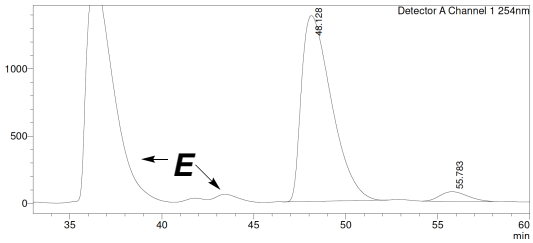
^{1}H NMR ($CDCl_3$, 600 MHz): δ 0.87 (3H, td, *J* = 7.0, 1.2 Hz), 1.42 – 1.17 (25H, m), 1.53 (1H, tt, *J* = 10.9, 5.1 Hz), 1.73 (1H, d, *J* = 7.2 Hz), 2.14 (1H, q, *J* = 8.7 Hz), 4.11 (2H,

dd, J = 16.2, 4.1 Hz), 4.82 (1H, dd, J = 37.1, 9.9 Hz). ^{13}C NMR ($CDCl_3$, 151 MHz): δ 14.3 (*C*H_3), 22.8 (*C*H_2), 24.8 (*C*H_3), 24.8 (*C*H_3), 29.2, 29.4(*C*H_2), 29.6 (*C*H_2), 29.7 (*C*H_2), 31.1 (*C*H_2), 32.0 (*C*H_2), 61.7 (d, J = 31.9 Hz, *C*H_2OH), 83.5 (*C*H), 109.6 (d, J = 14.5 Hz *C*H), 157.1 (d, J = 252.5 Hz, *C*F). ^{19}F NMR ($CDCl_3$, 376 MHz): δ –120.8 ppm (dt, J = 37.1, 16.4 Hz). HRMS (DART-TOF) m/z: $C_{18}H_{38}BNO_3F$ $[M+NH_4]^+$: 346.2923; Found: 346.2927. $[\alpha]_D^{20}$ +11.1 (c = 1.0, $CHCl_3$). Enantiomeric purity of (*R*,*Z*)-**2b** was determined by HPLC analysis after oxidation of **2b** to the corresponding allylic alcohol followed by benzoylation, in comparison with authentic racemic material, during oxidation the double bond isomerized to a 1:1 *E:Z* mixture (ODH column, 97:3 hexanes:*i*PrOH, 0.5 mL/min, 254 nm). (*R*)-enantiomer t_r = 48.1 min, (*S*)-enantiomer t_r = 55.8 min.



Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	47.483	11889468	120765	50.483
2	54.413	11662138	106213	49.517
Total		23551606	226977	100.000

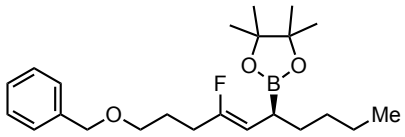


Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	48.128	156905049	1380748	95.497
2	55.783	7398730	71145	4.503
Total		164303779	1451893	100.000

Peak #	Ret. Time	Area	Area %	Peak #	Ret. Time	Area	Area %
1	47.483 min	11889468	50.483	1	48.128	156905049	95.497
2	54.413 min	11662138	49.517	2	55.783	71145	4.503

(*S*,*Z*)-2-(10-(Benzyloxy)-7-fluorodec-6-en-5-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*,*Z*)-2c].



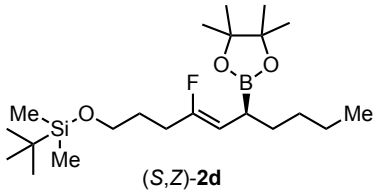
(*S*,*Z*)-**2c**

Prepared according to condition A. The reaction was conducted for 1.5 h with 141.1 mg (0.50 mmol) of (*Z*)-**1c.** The product (*S,Z*)-**2c** was obtained in 92% yield (180.0 mg) with 96:4 e.r. The stereoselectivity of (*S,Z*)-**2c** was determined by GC analysis (*Z:E* = 94:6).

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.87 (t, J = 6.9 Hz, 3H), 1.18–1.55 (m, 18H), 1.80 (quin, J = 7.0 Hz, 2H), 2.08 (q, J = 8.0 Hz, 1H), 2.26 (dt, J = 7.4, 17.9 Hz, 2H), 3.50 (t, J = 6.3 Hz, 2H), 4.47 (dd, J = 9.8, 38.4 Hz, 1H), 4.50 (s, 2H), 7.27–7.37 (m, 5H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 14.0 (*C*H_3), 19.9 (br, B–*C*H), 22.5 (*C*H_2), 24.5 (*C*H_3), 24.6 (*C*H_3), 26.5 (*C*H_2), 28.7 (d, J = 29.3 Hz, *C*H_2), 30.7 (*C*H_2), 31.2 (*C*H_2), 69.0 (*C*H_2), 72.8 (*C*H_2), 82.9 (*C*), 106.3 (d, J =

17.0 Hz, *C*H), 127.4 (*C*H), 127.5 (*C*H), 128.2 (*C*H), 138.4 (*C*), 158.2 (d, *J* = 253.0 Hz, *C*F_2). ^{19}F NMR (373 MHz, $CDCl_3$): δ –110.0 to –110.2 (m, 1F). HRMS–ESI (*m*/*z*): $[M+H]^+$ calcd for $C_{23}H_{37}O_3BF$, 391.2819; found, 391.2818. $[\alpha]_D^{21.9}$ +1.2 (*c* 1.02, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IBN-3, 2-PrOH/Hexane = 2/98, 0.5 mL/min, 40°C, retention time: 34.69 min [(*Z*)-alcohol major enantiomer], 31.64 min [(*Z*)-alcohol minor enantiomer] and 27.26 min [(*E*)-alcohol major enantiomer]. Minor enantiomer of (*E*)-alcohol was not detected by HPLC analysis.

(*S*,*Z*)-*tert*-Butyl{(4-fluoro-6-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)dec-4-en-1-yl)oxy}dimethylsilane [(*S*,*Z*)-2d].

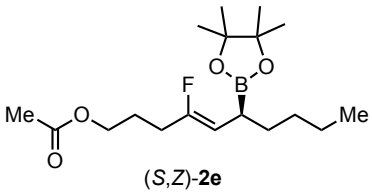


(*S*,*Z*)-**2d**

Prepared according to condition A. The reaction was conducted for 1.5 h with 157.4 mg (0.51 mmol) of (*Z*)-**1d.** The product (*S,Z*)-**2d** was obtained in 99% yield (200.1 mg) with 96:4 e.r. The stereoselectivity of (*S,Z*)-**2d** was determined by GC analysis (*Z:E* = 95:5).

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.04 (s, 6H), 0.84–0.93 (m, 12H), 1.18–1.55 (m, 18H), 1.69 (quin, *J* = 6.9 Hz, 2H), 2.08 (q, *J* = 8.0 Hz, 1H), 2.22 (dt, *J* = 7.4, 17.9 Hz, 2H), 3.62 (t, *J* = 6.3 Hz, 2H), 4.46 (dd, *J* = 9.8, 38.4 Hz, 1H). ^{13}C NMR (99 MHz, $CDCl_3$): δ –5.4 (*C*H_3), 14.0 (*C*H_3), 18.3 (*C*), 20.0 (br, B–*C*H), 22.6 (*C*H_2), 24.59 (*C*H_3), 24.62 (*C*H_3), 25.9 (*C*H_3), 28.4 (d, *J* = 28.8 Hz, *C*H_2), 29.5 (*C*H_2), 30.8 (*C*H_2), 31.3 (*C*H_2), 61.9 (*C*H_2), 83.0 (*C*), 106.1 (d, *J* = 16.3 Hz, *C*H), 158.6 (d, *J* = 252.9 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –109.5 to –109.7 (m, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{22}H_{44}O_3BFNaSi$, 437.3033; found, 437.3030. $[\alpha]_D^{21.7}$ +1.1 (*c* 1.55, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IC-3, 2-PrOH/Hexane = 1.5/98.5, 0.5 mL/min, 40°C, retention time: 15.97 min [(*Z*)-alcohol major enantiomer], 14.87 min [(*Z*)-alcohol minor enantiomer], 12.59 min [(*E*)-alcohol major enantiomer], and 13.46 min [(*E*)-alcohol minor enantiomer].

(*S*,*Z*)-4-Fluoro-6-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)dec-4-en-1-yl acetate [(*S*,*Z*)-2e].

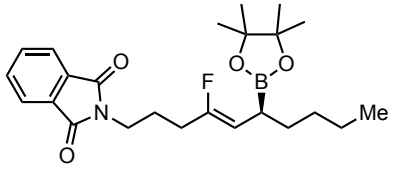


(*S*,*Z*)-**2e**

Prepared according to condition A. The reaction was conducted for 2 h with 117.2 mg (0.50 mmol) of (*Z*)-**1e.** The product (*S,Z*)-**2e** was obtained in 90% yield (153.2 mg) with 96:4 e.r. The stereoselectivity of (*S,Z*)-**2e** was determined by GC analysis (*Z:E* = 90:10).

^{1}H NMR (396 MHz, $CDCl_3$): δ 0.87 (t, *J* = 7.0 Hz, 3H), 1.16–1.56 (m, 18H), 1.82 (quin, *J* = 7.0 Hz, 2H), 2.05–2.12 (m, 4H), 2.24 (dt, *J* = 7.5, 17.9 Hz, 2H), 4.09 (t, *J* = 6.6 Hz, 2H), 4.50 (dd, *J* = 7.5, 17.9 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 13.9 (*C*H$_3$), 19.9 (br, B–*C*H), 20.8 (*C*H$_3$), 22.5 (*C*H$_2$), 24.5 (*C*H$_3$), 25.4 (*C*H$_2$), 28.5 (d, *J* = 28.7 Hz, *C*H$_2$), 30.7 (*C*H$_2$), 31.2 (*C*H$_2$), 63.3 (*C*H$_2$), 83.0 (*C*), 106.8 (d, *J* = 16.3 Hz, *C*H), 157.4 (d, *J* = 252.9 Hz, *C*), 170.9 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –110.6 (t, *J* = 22.8 Hz, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{18}H_{32}O_4BF$, 342.2381; found, 342.2382. $[\alpha]_D^{21.8}$ +1.2 (*c* 1.09, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 4/96, 0.5 mL/min, 40 °C, retention time: 36.06 min [(*Z*)-alcohol major enantiomer], 35.01 min [(*Z*)-alcohol minor enantiomer] and 53.45 min [(*E*)-alcohol major enantiomer]. Minor enantiomer of (*E*)-alcohol was not detected by HPLC analysis.

(*S*,*Z*)-2-{4-Fluoro-6-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)dec-4-en-1-yl}isoindoline-1,3-dione [(*S*,*Z*)-2f].



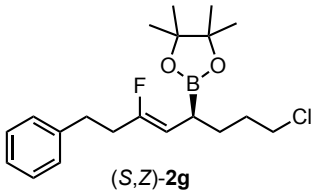
(*S*,*Z*)-**2f**

Prepared according to condition A. The reaction was conducted for 1.5 h with 160.0 mg (0.50 mmol) of (*Z*)-**1f.** The product (*S,Z*)-**2f** was obtained in 56% yield (119.4 mg) with 95:5 e.r. The stereoselectivity of (*S,Z*)-**2f** was determined by GC analysis (*Z:E* = 96:4).

^{1}H NMR (396 MHz, $CDCl_3$): δ 0.87 (t, *J* = 5.8 Hz, 3H), 1.01–1.54 (m, 18H), 1.87 (quin, *J* = 7.0 Hz, 2H), 2.07 (q, *J* = 8.0 Hz, 1H), 2.22 (dt, *J* = 8.0, 16.0 Hz, 2H), 3.72 (t, *J* = 7.2 Hz, 2H), 4.52 (dd, *J* = 9.6, 38.5 Hz, 1H), 7.65–7.73 (m, 2H), 7.78–7.86 (m, 2H). ^{13}C NMR (99

MHz, $CDCl_3$): δ 14.0 (*C*H_3), 19.8 (br, B–*C*H), 22.5 (*C*H_2), 24.5 (*C*H_3), 24.6 (*C*H_3), 25.5 (*C*H_2), 29.6 (d, *J* = 28.3 Hz, *C*H_2), 30.7 (*C*H_2), 31.2 (*C*H_2), 37.2 (*C*H_2), 83.0 (*C*), 106.7 (d, *J* = 17.0 Hz, *C*H), 123.1 (*C*H), 132.0 (*C*), 133.8 (*C*H), 157.4 (d, *J* = 255.0 Hz, *C*), 168.2 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –109.9 to –110.1 (m, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{24}H_{33}O_4BFN$, 429.2491; found, 429.2475. $[\alpha]_D^{21.7}$ +0.66 (*c* 1.14, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the boryl group. Daicel CHIRALPAK® IE-3, 2-PrOH/Hexane = 1.5/98.5, 0.5 mL/min, 40 °C, retention time: 32.78 min [(*Z*)-**2f** major enantiomer], 29.56 min [(*Z*)-**2f** minor enantiomer], 25.84 min [(*E*)-**2f** major enanomer] and 27.53 min [(*E*)-**2f** minor enantiomer].

(*S*,*Z*)-2-(1-Chloro-6-fluoro-8-phenyloct-5-en-4-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*,*Z*)-2g].

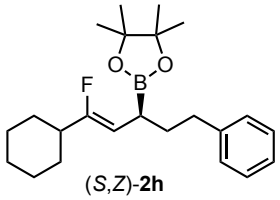


(*S*,*Z*)-**2g**

Prepared according to condition A. The reaction was conducted for 1 h with 129.4 mg (0.50 mmol) of (*Z*)-**1g.** The product (*S,Z*)-**2g** was obtained in 93% yield (170.0 mg) with 93.5:6.5 e.r. The stereoselectivity of (*S,Z*)-**2g** was determined by GC analysis (*Z*:*E* = 94:6).

^{1}H NMR (396 MHz, $CDCl_3$): δ 1.23 (s, 12H), 1.34–1.46 (m, 1H), 1.58–1.73 (m, 3H), 2.08 (td, *J* = 5.7, 9.6 Hz, 1H), 2.36–2.56 (m, 2H), 2.80 (t, *J* = 7.7 Hz, 2H), 3.47 (t, *J* = 6.5 Hz, 2H), 4.42 (dd, *J* = 10.1, 38.2 Hz, 1H), 7.16–7.22 (m, 3H), 7.24–7.31 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 19.2 (br, B–*C*H), 24.60 (*C*H_3), 24.63 (*C*H_3), 28.2 (*C*H_2), 31.8 (*C*H_2), 32.6 (*C*H_2), 33.9 (d, *J* = 27.7 Hz, *C*H_2), 45.0 (*C*H_2), 83.0 (*C*), 105.9 (d, *J* = 15.3 Hz, *C*H), 126.0 (*C*H), 128.3 (*C*H), 128.4 (*C*H), 140.8 (*C*), 158.5 (d, *J* = 253.0 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –110.2 to –110.0 (m, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{20}H_{29}O_2BClFNa$, 389.1829; found, 389.1831. $[\alpha]_D^{17.7}$ +1.3 (*c* 0.94, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IBN-3, 2-PrOH/Hexane = 5/95, 0.5 mL/min, 40°C, retention time: 21.83 min [(*Z*)-alcohol major enantiomer], 27.77 min [(*Z*)-alcohol minor enantiomer], 17.53 min [(*E*)-alcohol major enantiomer], and 23.13 min [(*E*)-alcohol minor enantiomer].

(*S*,*Z*)-2-(1-cyclohexyl-1-fluoro-5-phenylpent-1-en-3-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*,*Z*)-2h].

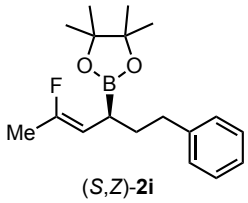


(*S*,*Z*)-**2h**

Prepared according to condition A. The reaction was conducted for 1 h with 132.2 mg (0.50 mmol) of (*Z*)-**1h.** The product (*S,Z*)-**2h** was obtained in 95% yield (176.0 mg) with 97:5 e.r. The stereoselectivity of (*S,Z*)-**2h** was determined by GC analysis (*Z:E*= >98:2).

^{1}HNMR (392 MHz, $CDCl_3$): δ 1.11–1.31 (m, 18H), 1.56–1.69 (m, 2H), 1.71–1.88 (m, 4H), 2.00–2.17 (m, 2H), 2.47–2.70 (m, 2H), 4.46 (dd, *J* = 9.6, 39.4 Hz, 1H), 7.12–7.19 (m, 3H), 7.22–7.28 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 19.7 (br, B–*C*H), 24.5 (*C*H_3), 24.6 (*C*H_3), 25.8 (*C*H_2), 26.0 (*C*H_2), 30.1 (*C*H_2), 33.2 (*C*H_2), 35.4 (*C*H_2), 40.5 (d, *J* = 26.4 Hz, *C*H), 83.1 (*C*), 103.0 (d, *J* = 17.0 Hz, *C*H), 125.5 (*C*H), 128.1 (*C*H), 128.4 (*C*H), 142.6 (*C*), 163.6 (d, *J* = 255.0 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –112.7 (d, *J* = 22.8 Hz, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{23}H_{34}O_2BF$, 372.2640; found, 372.2639. $[\alpha]_D^{20.6}$ +0.44 (*c* 0.90, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IBN-3, 2-PrOH/Hexane = 5/95, 0.5 mL/min, 40°C, retention time: 17.27 min [(*Z*)-alcohol major enantiomer], 18.22 min [(*Z*)-alcohol minor enantiomer].

(*S*,*Z*)-2-(5-Fluoro-1-phenylhex-4-en-3-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*,*Z*)-2i].



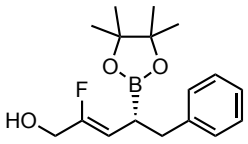
(*S*,*Z*)-**2i**

Prepared according to condition A. The reaction was conducted for 4 h with 99.6 mg (0.50 mmol) of (*Z*)-**1i.** The product (*S,Z*)-**2i** was obtained in 86% yield (132.2 mg) with 99:1 e.r. The stereoselectivity of (*S,Z*)-**2i** was determined by ^{1}H NMR analysis (*Z:E* = 83:17).

^{1}H NMR (396 MHz, $CDCl_3$): δ 1.24 (s, 12H), 1.59–1.70 (m, 1H), 1.77–1.95 (m, 4H), 2.15 (q, *J* = 8.3 Hz, 1H), 2.47–2.76 (m, 2H), 4.51 (dd, *J* = 9.5, 37.6 Hz, 1H), 7.13–7.21 (m, 3H), 7.23–7.31 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$): δ 17.9 (d, *J* = 30.6 Hz, *C*H_3), 20.1 (br, B–*C*H), 24.6 (*C*H_3), 24.7 (*C*H_3), 33.2 (*C*H_2), 35.4 (*C*H_2), 83.1 (*C*), 105.8 (d, *J* = 16.3 Hz, *C*H),

125.5 (*C*H), 128.2 (*C*H), 128.4 (*C*H), 142.6 (*C*), 156.0 (d, J = 251.0 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –102.4 – –102.1 (m, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{18}H_{26}O_2BF$, 303.2046; found, 303.2047. $[\alpha]_D^{21.6}$ +0.07 (*c* 1.00, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding ester after oxidation of the boryl group and esterification of the alcohol. Daicel CHIRALPAK® IE-3, 2-PrOH/Hexane = 3/97, 0.5 mL/min, 40°C, retention time: 26.46 min [(*Z*)-ester major enantiomer], 23.30 min [(*Z*)-ester minor enantiomer], 16.87 min [(*E*)-ester major enantiomer], and 15.43 min [(*E*)-ester minor enantiomer].

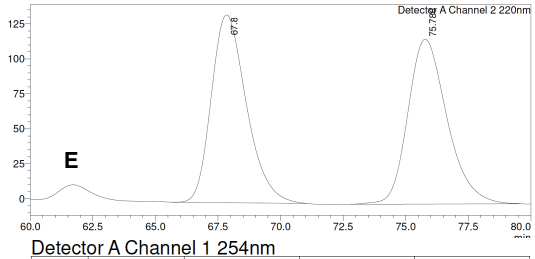
(*R*,*Z*)-2-Fluoro-5-phenyl-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)pent-2-en-1-ol [(*R*,*Z*)-2j].



(*R*,*Z*)-**2j**

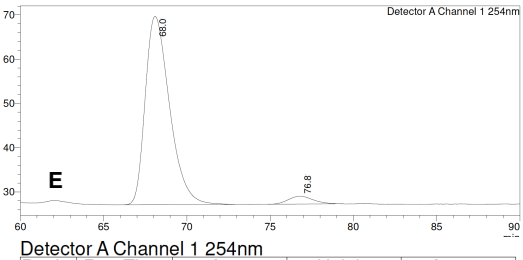
Prepared according to conditions B from (*E*)-**4b** (67 mg, 338 μmol) and isolated as colorless oil in 61% yield (63 mg, 206 μmol).

^{1}H NMR ($CDCl_3$, 500 MHz): δ 1.17 (6H, s), 1.19 (6H, s), 1.25 (1H, br s), 2.53 (1H, q, J = 8.5 Hz), 2.72 (1H, dd, J = 13.8, 8.5 Hz), 2.88 (1H, dd, J = 13.8, 7.5 Hz), 4.05 (2H, d, J = 15.2 Hz), 4.84 (1H, dd, J = 36.9, 9.6 Hz), 7.16 (1H, t, J = 7.1 Hz), 7.20 (2H, d, J = 6.7 Hz), 7.27–7.22 (2H, m). ^{13}C NMR ($CDCl_3$, 150 MHz): δ 24.8 (CH_3), 29.9 (CH_3), 36.9 (CH_2), 61.6 (d, J = 31.8 Hz, CH_2), 83.7 (*C*), 108.6 (d, J = 14.1 Hz, *C*H), 126.1 (*C*), 128.2 (*C*), 129.0 (*C*), 141.2 (*C*), 157.4 (d, J = 254.0 Hz, *C*F). ^{19}F NMR ($CDCl_3$, 376 MHz): δ –119.01 (dt, J = 35.5, 16.3 Hz). HRMS (DART-TOF) m/z: $[M+NH_4]^+$ Calcd for $C_{17}H_{28}BNO_3F$ $[M+NH_4]^+$: 324.2141; Found: 324.2153. $[\alpha]_D^{20}$ +18.13 (*c* = 0.5, CH_2Cl_2). Enantiomeric purity of **2j** was determined by HPLC analysis after oxidation of **2j** to the corresponding allylic alcohol in comparison with authentic racemic material (ADH column, 95:5 hexanes:*i*PrOH, 0.5 mL/min, 254 nm). (*R*)-enantiomer t_r = 68.1 min, (*S*)-enantiomer t_r = 76.8 min.



Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	67.819	851687	9085	50.245
2	75.790	843388	7883	49.755
Total		1695075	16968	100.000

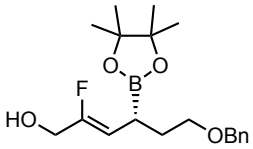


Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	68.093	4336156	42565	95.940
2	76.810	183511	1775	4.060
Total		4519668	44340	100.000

Peak #	Ret. Time	Area	Area %	Peak #	Ret. Time	Area	Area %
1	67.819 min	851687	50.245	1	68.093	4336156	95.940
2	75.790 min	843388	49.755	2	76.810	183511	4.060

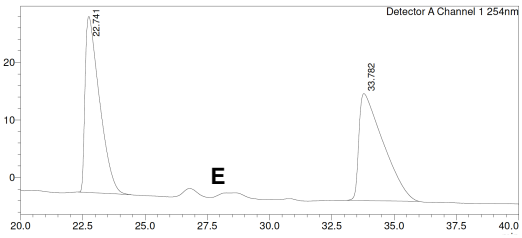
(*R*,*Z*)-6-(Benzyloxy)-2-fluoro-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)hex-2-en-1-ol [(*R*,*Z*)-2k]



(*R*,*Z*)-**2k**

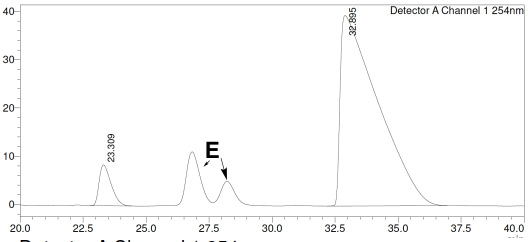
Prepared according to conditions B from (*E*)-**4c** (28 mg 122 μmol) and isolated as colorless oil in 52% yield (22 mg, 63 μmol).

^{1}H NMR ($CDCl_3$, 500 MHz): δ 1.21 (12H, s), 1.22 (1H, m, overlapping), 1.69 (1H, ddt, *J* = 20.6, 13.2, 6.3 Hz), 1.92 (1H, dq, *J* = 13.7, 6.9 Hz), 2.32–2.22 (1H, m), 3.47 (2H, m), 4.09 (2H, d, *J* = 16.2 Hz), 4.49 (2H, s), 4.84 (1H, dd, *J* = 36.9, 10.0 Hz), 7.37–7.29 (5H, m). ^{13}C NMR ($CDCl_3$, 126 MHz): δ 24.77 (*C*H_3), 24.81 (*C*H_3), 30.9 (*C*H_2), 34.8 (*C*H), 58.5 (*C*H_2), 61.6 (d, *J* = 32.0 Hz, *C*H_2), 69.4 (*C*), 73.0 (*C*), 108.8 (d, *J* = 14.3 Hz, *C*H), 127.6 (*C*), 127.9 (*C*), 128.4 (*C*), 138.7 (*C*), 157.5 (d, *J* = 253.6 Hz, *C*F) ^{19}F NMR ($CDCl_3$, 376 MHz): δ –119.93 (dt, J = 37.3, 16.2 Hz). HRMS (DART-TOF) m/z: $[M]^+$ Calcd for $C_{19}H_{29}BF_1O_4^+$ = 351.2137, Found 351.2134. $[\alpha]_D^{20}$ +9.5 (*c* = 1.0, $CHCl_3$). Enantiomeric purity of **2k** was determined by HPLC analysis after oxidation of **2k** to the corresponding allylic alcohol in comparison with authentic racemic material (OZ3 column, 92:8 hexanes:*i*PrOH, 0.5 mL/min, 254 nm). (*R*)-enantiomer t_r = 23.3 min, (*S*)-enantiomer t_r = 32.9 min.



Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	22.741	1232579	30601	49.441
2	33.782	1260458	18589	50.559
Total		2493038	49190	100.000

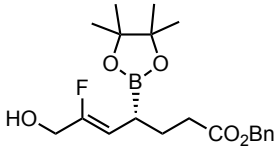


Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	23.309	279909	8469	6.374
2	32.895	4111738	39478	93.626
Total		4391647	47947	100.000

Peak #	Ret. Time	Area	Area %	Peak #	Ret. Time	Area	Area %
1	22.741 min	1232579	49.441	1	23.309	279909	6.374
2	33.782 min	1260458	50.559	2	32.895	4111738	93.626

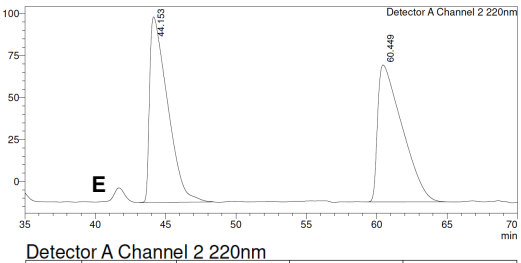
(*R*)-Benzyl-(*Z*)-6-fluoro-7-hydroxy-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)hept-5-enoate [(*R*,*Z*)-2l]



(*R*,*Z*)-**2l**

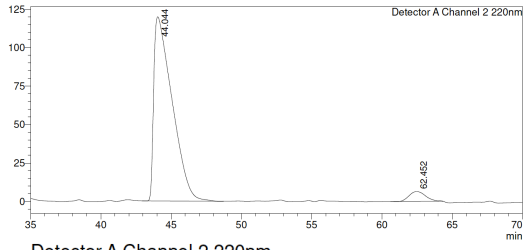
Prepared according to conditions B from (*E*)-**4d** (28 mg, 100 µmol) and isolated as colorless oil in 63% yield (24 mg, 63 µmol).

^{1}H NMR ($CDCl_3$, 400 MHz): δ 1.23 ~~ppm~~ (12H, s), 1.27 (1H, s), 1.72 (1H, dtd, *J* =13.3, 9.0, 6.3 Hz), 1.94 (1H, ddt, *J* = 12.6, 9.3, 6.2 Hz), 2.15 (1H, td, *J* = 9.7, 5.8 Hz), 2.49 – 2.28 (2H, m), 4.09 (2H, dd, *J* = 15.9, 5.8 Hz), 4.80 (1H, dd, *J* = 36.5, 10.2 Hz), 5.10 (2H, s), 7.40–7.28 (5H, m). ^{13}C NMR ($CDCl_3$, 151 MHz): δ 24.7 (CH_3), 24.8 (CH_3), 25.0 (CH_2), 26.0 (CH_2), 33.8 (*C*H), 61.5 (d, *J* = 32.2 Hz, *C*H_2), 66.3 (*C*H_2), 83.7 (*C*), 108.0 (d, *J* = 14.3 Hz, *C*H), 128.3 (*C*), 128.3 (*C*), 128.7 (*C*), 136.2 (*C*), 158.0 (d, *J* = 254.2 Hz, *C*F), 173.5 (*C*). ^{19}F NMR ($CDCl_3$, 376 MHz): δ –119.51 (dt, *J* = 36.4, 15.8 Hz). HRMS (DART-TOF) m/z: $[M+H]^+$ Calcd for $C_{20}H_{29}F_1O_5B^+$ = 379.20866; Found 379.20804. $[\alpha]_D^{20}$ +3.1 (*c* = 0.6, $CHCl_3$). Enantiomeric purity of **2l** was determined by HPLC analysis after oxidation of **2l** to the corresponding allylic alcohol in comparison (OZ3 column, 92:8 hexanes:*i*PrOH, 0.5 mL/min, 220 nm). (*R*)-enantiomer t_r = 44.0 min, (*S*)-enantiomer t_r = 62.4 min.



Detector A Channel 2 220nm

Peak#	Ret. Time	Area	Area%	Height
1	44.153	9818011	49.849	110558
2	60.449	9877358	50.151	81580
Total		19695369	100.000	192138

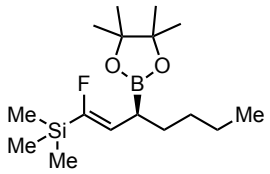


Detector A Channel 2 220nm

Peak#	Ret. Time	Area	Area%	Height
1	44.044	10869602	95.470	119627
2	62.452	515785	4.530	6371
Total		11385386	100.000	125998

Peak #	Ret. Time	Area	Area %	Peak #	Ret. Time	Area	Area %
1	44.153 min	9818011	49.849	1	44.044	1086902	95.470
2	60.449 min	9877358	50.151	2	62.452	515785	4.530

(*S*,*E*)-{1-Fluoro-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)hept-1-en-1-yl}trimethylsilane [(*S*,*E*)-2m].

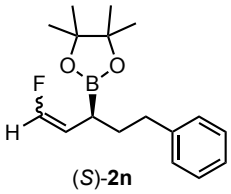


(*S*,*E*)-**2m**

Prepared according to conditions A. The reaction was conducted for 24 h with 103.2 mg (0.50 mmol) of (*Z*)-**1m.** The product (*S*,*E*)-**2m** was obtained in 30% yield (46.8 mg) with 88.5:11.5 e.r. The stereoselectivity of (*S*,*E*)-**2m** was determined by GC analysis (*E:Z* = >98:2).

^{1}H NMR (401 MHz, $CDCl_3$): δ 0.13 (s, 9H), 0.87 (t, *J* = 6.8 Hz, 3H), 1.17–1.44 (m, 18H), 2.27 (q, *J* = 8.2 Hz, 1H), 5.00 (dd, *J* = 9.2, 50.1 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$): δ –2.5 (*C*H$_3$), 14.0 (*C*H$_3$), 20.7 (br, B–*C*H), 22.6 (*C*H$_2$), 24.5 (*C*H$_3$), 30.6 (*C*H$_2$), 31.4 (*C*H$_2$), 83.0 (*C*), 122.9 (d, *J* = 4.7 Hz, *C*H), 167.1 (d, *J* = 274.0 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –106.4 (s, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{16}H_{32}O_2BFNaSi$, 337.2144; found, 337.2142. $[\alpha]_D^{21.9}$ +1.6 (*c* 1.27, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IE-3, 2-PrOH/Hexane = 3/97, 0.5 mL/min, 40°C, retention time: 9.23 min [(*E*)-alcohol major enantiomer], 9.62 min [(*E*)-alcohol minor enantiomer].

(*S*)-2-(1-Fluoro-5-phenylpent-1-en-3-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*)-2n].



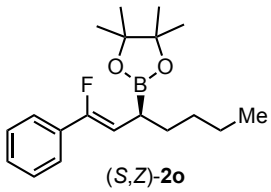
(*S*)-**2n**

Prepared according to conditions A. The reaction was conducted for 1.5 h with 99.1 mg (0.50 mmol) of (*Z*)-**1n.** The product (*S*)-**2n** was obtained in 95% yield (137.5 mg) with 94:6 e.r. The stereoselectivity of (*S*)-**2n** was determined by GC analysis (*Z:E* = 50:50).

^{1}H NMR (396 MHz, * indicates signals of the isomer, $CDCl_3$): δ 1.24 (s, 12H), 1.60–1.73 (m, 2H), 1.79–1.93* (m, 2H), 2.27 (td, *J* = 6.2, 9.5 Hz, 1H), 2.50–2.73 (m, 2H), 4.77 (ddd, *J* = 5.0, 10.4, 43.7 Hz, 1H), 5.32–5.42* (m, 1H), 6.38–6.44 (m, 1H), 6.60–6.66* (m, 1H), 7.14–7.20 (m, 3H), 7.24–7.30 (m, 2H). ^{13}C NMR (100 MHz, * indicates signals of the isomer, $CDCl_3$): δ 19.5 (br, B–*C*H), 20.6* (br, B–*C*H), 24.6 (*C*H$_3$), 24.7* (*C*H$_3$), 32.78 (*C*H$_2$), 32.84* (*C*H$_2$), 35.0 (*C*H$_2$), 35.3* (*C*H$_2$), 83.3 (*C*), 83.4* (*C*), 111.6 (d, *J* = 5.8 Hz, *C*H), 112.1* (d, *J* = 9.6 Hz, *C*H), 125.6 (*C*H), 125.7* (*C*H), 128.2 (*C*H), 128.3* (*C*H), 128.4 (*C*H), 142.1 (*C*), 142.4* (*C*), 147.4 (d, *J* = 256.7 Hz, *C*H), 148.4* (d, *J* = 254.8 Hz, *C*H). ^{19}F NMR (373 MHz, $CDCl_3$): δ –130.6 – –130.2 (m, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{17}H_{24}O_2BF$, 290.1857;

found, 290.1866. $[\alpha]_D^{21.6}$ +0.07 (*c* 1.16, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding ester after oxidation of the boryl group and esterification of the alcohol. Daicel CHIRALPAK® IBN-3, 2-PrOH/Hexane = 3/97, 0.5 mL/min, 40°C, retention time: 25.33 min [major enantiomer], 32.98 min [minor enantiomer], 24.21 min [isomer major enantiomer], and 29.70 min [isomer minor enantiomer].

(*S*,*Z*)-2-(1-Fluoro-1-phenylhept-1-en-3-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*S*,*Z*)-2o].

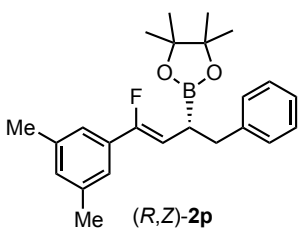


(*S*,*Z*)-**2o**

Prepared according to conditions A. The reaction was conducted with for 1 h with 105.1 mg (0.50 mmol) of (*Z*)-**1o.** The product (*S,Z*)-**2o** was obtained in 88% yield (140.4 mg) with 97.5:2.5 e.r. The stereoselectivity of (*S,Z*)-**2o** was determined by GC analysis (*Z:E* = >98:2).

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.88 (t, *J* = 4.9 Hz, 3H), 1.26 (s, 12H), 1.23–1.39 (m, 4H), 1.41–1.66 (m, 2H), 2.28–2.38 (m, 1H), 5.40 (dd, *J* = 10.0, 37.4 Hz, 1H), 7.23–7.35 (m, 3H), 7.46–7.52 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 14.0 (*C*H_3), 20.8 (br, B–*C*H), 22.6 (*C*H_2), 24.6 (*C*H_3), 30.8 (*C*H_2), 31.4 (*C*H_2), 83.2 (*C*), 107.6 (d, *J* = 18.2 Hz, *C*H), 123.7 (d, *J* = 6.7 Hz, *C*H), 127.9 (*C*H), 128.2 (*C*H), 133.0 (d, *J* = 29.7 Hz, *C*), 156.0 (d, *J* = 245.2 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –121.4 (d, *J* = 45.9 Hz, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{19}H_{28}O_2BF$, 318.2170; found, 318.2167. $[\alpha]_D^{20.8}$ –0.8 (*c* 1.21, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IBN-3, 2-PrOH/Hexane = 5/95, 0.5 mL/min, 40°C, retention time: 29.51 min [(*Z*)-alcohol major enantiomer], 16.22 min [(*Z*)-alcohol minor enantiomer].

(*R*,*Z*)-2-(4-(3,5-Dimethylphenyl)-4-fluoro-1-phenylbut-3-en-2-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane [(*R*,*Z*)-2p]

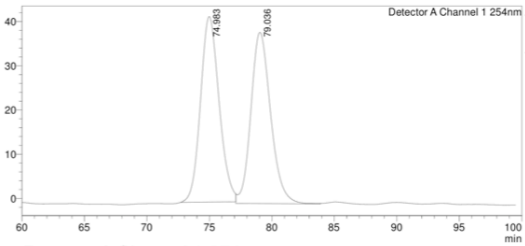


(*R*,*Z*)-**2p**

Prepared according to conditions B from the corresponding crude difluoroallyl compound. In a N_2-filled glove box, an oven-dried 10 mL vial equipped with a magnetic stirring bar was

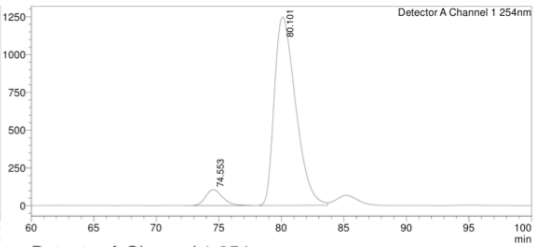
charged with 1-(1,1-difluoroallyl)-3,5-dimethylbenzene (18.2 mg, 100 μmol, 1.0 equiv.) and allylbenzene (18 mg, 150 μmol, 1.5 equiv.) then ruthenium complex **Ru-1** (3.6 mg, 5 μmol, 5 mol%) in methylene chloride solution (0.2 mL, 0.5 M), was added, the vial tightly capped and transferred into an oil bath preheated to 50 °C. The mixture was allowed to stir for 12 h after which the solvent was evaporated under reduced pressure, the dark solid residue taken up in hexanes, passed through a short plug of silica gel (2 cm x 1 cm), concentrated under reduced pressure. The dark oily residue containing unpurified *gem*-allyldifluoride (70 μmol) was transferred back into the glove box. An oven-dried 8 mL vial, equipped with a magnetic stirring bar was charged with CuCl (0.4 mg, 4 μmol, 5 mol%), (*S,S*)-phenyl-bpe (2.5 mg, 5 μmol, 6 mol%), $B_2(pin)_2$ (20 mg, 77 μmol, 1.1 equiv.) and LiO*t*-Bu (8.4 mg, 105 μmol, 1.5 equiv.). The allylic fluoride residue was taken up in toluene (0.7 mL, 0.1 M) and introduced to the eight mL vial containing the other reagents. The vial was tightly capped and allowed to stir for 14 h at 22 °C. Subsequently the reaction was concentrated under reduced pressure and the residue subjected to silica gel chromatography (hexanes and Et_2O) to afford the desired product as colorless oil in 49% yield (13 mg, 34 μmol).

^{1}H NMR ($CDCl_3$, 400 MHz): δ 1.17 (6H, s), 1.19 (6H, s), 2.30 (6H, s), 2.70 (1H, q, *J* = 8.4 Hz), 2.83 (1H, dd, *J* = 13.7, 8.1 Hz), 2.94 (1H, dd, *J* = 13.6, 8.0 Hz), 5.37 (1H, dd, *J* = 37.3, 9.6 Hz), 6.91 (1H, s), 7.08 (2H, s), 7.16 (1H, m), 7.26–7.22 (4H, m). ^{13}C NMR ($CDCl_3$, 126 MHz): δ 21.5 (*C*H_3), 24.8 (*C*H_3), 37.2 (*C*H_2), 83.6 (*C*), 106.4 (d, *J* = 17.8 Hz, *C*), 121.8 (d, *J* = 6.7 Hz *C*), 126.0 (*C*), 128.3 (*C*), 129.0 (*C*), 130.0 (*C*), 132.9 (d, *J* = 28.6 Hz *C*H), 138.0 (d, *J* = 2.0 Hz, *C*), 141.5 (*C*), 156.7 (d, *J* = 245.7 Hz, *C*F). ^{19}F NMR ($CDCl_3$, 376 MHz): δ –118.33 (d, *J* = 37.4 Hz). HRMS (DART-TOF) m/z: $[M+NH_4]^+$ Calcd for $C_{24}H_{34}B_1F_1O_2N_1^+$ = 398.2661, Found 398.2650. Specific rotation: $[\alpha]_D^{20}$ +12.2 (*c* = 0.6, $CHCl_3$) after oxidation. Enantiomeric purity of **2p** was determined by HPLC analysis after oxidation of **2p** to the corresponding allylic alcohol in comparison with authentic racemic material (ADH column, 99:1 hexanes:*i*PrOH, 0.5 mL/min, 254 nm). (*R*)-enantiomer t_r = 80.1 min, (*S*)-enantiomer t_r = 74.5 min.



Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	74.983	4332199	41909	50.387
2	79.036	4265728	38714	49.613
Total		8597926	80624	100.000



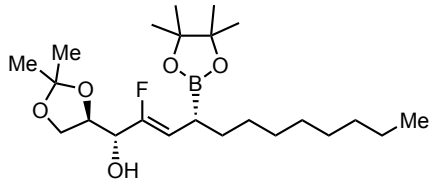
Detector A Channel 1 254nm

Peak#	Ret. Time	Area	Height	Area%
1	74.553	9998660	105970	6.329
2	80.101	147974151	1247520	93.671
Total		157972811	1353491	100.000

Peak #	Ret. Time	Area	Area %	Peak #	Ret. Time	Area	Area %

1	74.983 min	4332199	50.387	1	74.553	9998660	6.329
2	79.036 min	4265728	49.613	2	80.101	147974151	93.671

(1*R*,4*R*,*Z*)-1-{(*R*)-2,2-dimethyl-1,3-dioxolan-4-yl)-2-fluoro-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)}dodec-2-en-1-ol [5a]

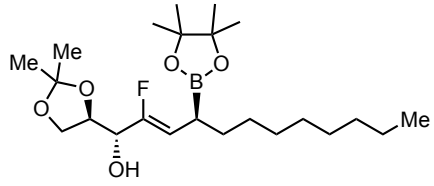


5a

In a N_2-filled glove box, an oven-dried vial (7 mL) containing a magnetic stir bar was charged with (*S*,*S*)-phenyl-bpe (11.1 mg, 2.20 μmol, 5.5 mol%), CuCl (2.00 mg, 2.00 μmol, 5.0 mol%), LiO*t*-Bu (48.0 mg, 0.60 mmol, 1.5 equiv.) and toluene (2 mL). The resulting mixture was allowed to stir at 22 °C, then a solution of $B_2(pin)_2$ (112 mg, 0.44 mmol, 1.5 equiv.) and alkene (*E*)-**4e** (112 mg, 0.40 mmol, 1.0 equiv.) in toluene (2 mL) was added. The reaction was allowed to stir at 22 °C for 14 h then was concentrated under reduced pressure. Purification by silica gel chromatography (petroleum ether:Et_2O = 4:1 to 3:1) afforded the trisubstituted alkenyl fluoride **5a** as colourless oil in 77% yield (132 mg, 0.31 mmol).

^{1}H NMR ($CDCl_3$, 400 MHz): δ 0.85 (3H, t, *J* = 6.8 Hz), 1.30–1.14 (m, 25H), 1.34 (3H, s), 1.41 (3H, s), 1.57–1.45 (1H, m), 2.14 (1H, q, *J* = 8.5 Hz), 2.53 (1H, bs), 4.05–3.92 (2H, m), 4.32–4.17 (2H, m), 4.87 (1H, dd, *J* = 38.1, 10.1 Hz). ^{13}C NMR ($CDCl_3$, 101 MHz): δ 14.2 (*C*H_3), 20.2 (*C*H_2), 24.8 (*C*H_3), 24.8 (*C*H_3), 25.2 (*C*H_2), 26.6 (*C*H_2), 29.1 (*C*H_2), 29.4 (*C*H_2), 29.6 (*C*H_2), 30.9 (*C*H_2), 32.0 (*C*H_2), 65.0 (d, $J_{C,F}$ = 2.2 Hz, *C*H), 70.0 (*C*), 70.3 (*C*), 76.2 (*C*H), 83.4 (*C*H), 109.6 (*C*H), 109.9 (d, $J_{C,F}$ = 13.1 Hz, *C*H), 155.6 (d, $J_{C,F}$ = 252.3 Hz, *C*F). ^{19}F NMR ($CDCl_3$, 377 MHz): δ −126.0 (dd, *J* = 38.1, 15.9 Hz). HRMS (MALDI): Calcd for $C_{23}H_{42}BFNaO_5$ $[M+Na]^+$: 451.3002, Found: 451.2949. Specific rotation: $[\alpha]_D^{20}$ +75.0 (*c* 1.0, $CHCl_3$).

(1*R*,4*S*,*Z*)-1-{(*R*)-2,2-dimethyl-1,3-dioxolan-4-yl)-2-fluoro-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)}dodec-2-en-1-ol [5b]



5b

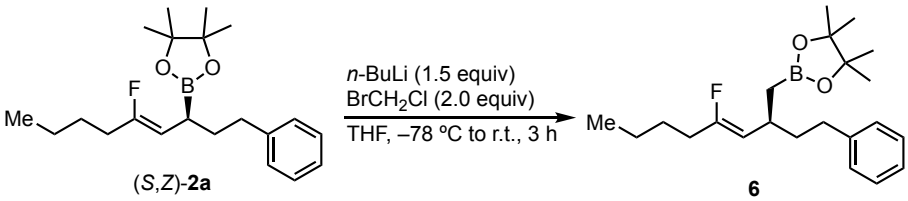
In a N_2-filled glove box, an oven-dried vial (7 mL) containing a magnetic stir bar was charged with (*R*,*R*)-phenyl-bpe (11.1 mg, 2.20 μmol, 5.5 mol%), CuCl (2.00 mg, 2.00 μmol,

5.0 mol%), LiO*t*-Bu (48.0 mg, 0.60 mmol, 1.5 equiv.) and toluene (2 mL). The resulting mixture was allowed to stir at 22 °C, then a solution of $B_2(pin)_2$ (112 mg, 0.44 mmol, 1.5 equiv.) and alkene (*E*)-**4e** (112 mg, 0.40 mmol, 1.0 equiv.) in toluene (2 mL) was added. The reaction was allowed to stir at 22 °C for 14 h then was concentrated under reduced pressure. Purification by silica gel chromatography (petroleum ether:Et_2O = 4:1 to 3:1) afforded the trisubstituted alkenyl fluoride **5b** as colourless oil in 92% yield (158 mg, 0.37 mmol).

^{1}H NMR ($CDCl_3$, 400 MHz): δ 0.85 (3H, t, *J* = 6.8 Hz), 1.29–1.18 (m, 25H), 1.33 (3H, s), 1.41 (3H, s), 1.59–1.44 (1H, m), 2.12 (1H, q, *J* = 8.8, 8.2 Hz), 2.50 (1H, s), 3.97 (2H, d, *J* = 5.9 Hz), 4.31–4.15 (2H, m), 4.88 (1H, dd, *J* = 38.4, 10.1 Hz). ^{13}C NMR ($CDCl_3$, 101 MHz): δ 14.2 (*C*H_3), 20.2 (*C*H_3), 22.8 (*C*H_3), 24.7 (*C*H_3), 25.3 (*C*H_2), 26.6 (*C*H_2), 29.2 (*C*H_2), 29.4 (*C*H_2), 29.6 (*C*H_2), 30.9 (*C*H_2), 32.0 (*C*H_2), 65.0 (d, $J_{C,F}$ = 2.2 Hz, *C*H), 70.0 (*C*), 70.3 (*C*), 76.3 (*C*), 83.4 (*C*), 109.5 (*C*H), 110.0 (d, $J_{C,F}$ = 13.0 Hz, *C*H), 155.7 (d, $J_{C,F}$ = 252.8 Hz, *C*F). ^{19}F NMR ($CDCl_3$, 377 MHz): δ –125.4 ppm (dd, *J* = 38.4, 16.5 Hz). HRMS (MALDI): Calcd for $C_{23}H_{42}BFNaO_5$ $[M+Na]^+$: 451.3002, Found: 451.2978. Specific rotation: $[\alpha]_D^{20}$ +74.1 (*c* 1.0, $CHCl_3$).

5. Derivatization of γ-Monofluoroallylboronates

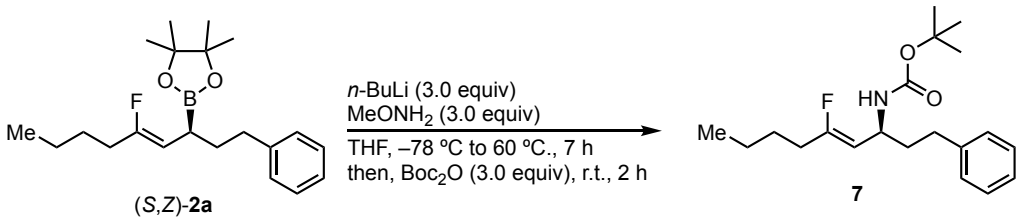
Experimental Procedure of Homologation of (*S,Z*)-2a.



The homologation was performed according to the literature procedure.[9] In an oven-dried reaction vial, (*S,Z*)-**2a** (34.6 mg, 0.10 mmol) and bromochloromethane (13.4 μL, 0.20 mmol) were dissolved in dry THF (600 μL) in nitrogen atmosphere. After the mixture was cooled to –78 °C, a solution of *n*-BuLi in hexane (1.6 M, 94 μL, 0.15 mmol) was added dropwise. The mixture was allowed to stir at 22°C for 3 h. The mixture was then quenched by addition of saturated aqueous NH_4Cl solution and extracted three times with Et_2O. The combined organic layer was washed with brine, dried over $MgSO_4$ followed by filtration. The crude material was purified by silica gel chromatography (Et_2O/hexane, 0:100–10:90) to give the corresponding **6** (32.5 mg, 0.090 mmol, 90%) as colorless oil with 97:3 e.r. The stereoselectivity of **6** was determined by GC analysis (*Z:E* = 95:5).

^{1}H NMR (392 MHz, $CDCl_3$): δ 0.75–0.96 (m, 5H), 1.22 (s, 12H), 1.29–1.40 (m, 2H), 1.41–1.53 (m, 3H), 1.64–1.76 (m, 1H), 2.08–2.20 (m, 2H), 2.46–2.66 (m, 2H), 2.72–2.84 (m, 1H), 4.36 (dd, *J* = 10.1, 38.2 Hz, 1H), 7.11–7.18 (m, 3H), 7.21–7.28 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 13.8 (*C*H_3), 18.7 (br, B–*C*H_2), 22.0 (*C*H_2), 24.7 (*C*H_3), 24.8 (*C*H_3), 28.5 (*C*H_2), 30.4 (d, *J* = 3.8 Hz, *C*H), 31.7 (d, *J* = 28.3 Hz, *C*H_2), 34.0 (*C*H_2), 40.1 (*C*H_2), 82.9 (*C*), 110.6 (d, *J* = 15.6 Hz, *C*H), 125.5 (*C*H), 128.2 (*C*H), 128.4 (*C*H), 142.9 (*C*), 158.9 (d, *J* = 254.5 Hz, *C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –109.2 ppm (dt, *J* = 20.8 Hz, 1F). HRMS-ESI (*m/z*): $[M+Na]^+$ calcd for $C_{22}H_{34}BFO_2Na$, 383.2532; found, 383.2530. $[\alpha]_D^{18.9}$ +0.66 (*c* 1.00, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IC-3, 2-PrOH/Hexane = 2/98, 0.5 mL/min, 40°C, retention time: 42.91 min [(*Z*)-alcohol major enantiomer], 30.85 min [(*Z*)-alcohol minor enantiomer], 26.29 min [(*E*)-alcohol major enantiomer], and 33.97 min [(*E*)-alcohol minor enantiomer].

Experimental Procedure of Amination of (*S,Z*)-2a.

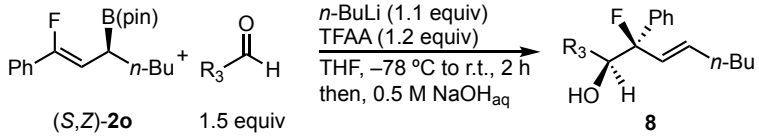


The amination was performed according to the literature procedure.[10] In an oven-dried reaction vial, $MeONH_2$ (0.5 M in THF, 600 μL, 0.30 mmol) was dissolved in THF (200 μL). After the mixture was cooled to –78 °C, a solution of *n*-BuLi in hexane (1.6 M, 188 μL, 0.30 mmol) was added dropwise. Then the boronate (34.6 mg, 0.10 mmol) in THF (240 μL) was added dropwise to the solution and stirred at 60 ºC. After 7 h, $(Boc)_2O$ was added to the mixture and stirred for 2 h at room temperature. The mixture was then quenched by addition of H_2O and extracted three times with Et_2O. The combined organic layer was dried over $MgSO_4$ followed by filtration. The crude material was purified by silica gel chromatography (EtOAc/hexane, 0:100–10:90) to give the corresponding **7** (20.9 mg, 0.060 mmol, 62%) as colorless oil with 97.5:2.5 e.r. The stereoselectivity of **7** was determined by GC analysis (*Z:E* = >98:2). ±H and ^{13}C NMR spectra contain conformational isomers, which is caused by the restricted C–N bond rotation around the carbamate group.

^1H NMR (392 MHz, $CDCl_3$): δ 0.91 (t, *J* = 7.1 Hz, 3H), 1.29–1.41 (m, 2H), 1.44 (s, 9H), 1.45–1.52 (m, 2H), 1.71–1.83 (m, 1H), 1.86–1.97 (m, 1H), 2.15 (dt, *J* = 7.3, 12.5 Hz, 2H), 2.63 (ddd, *J* = 2.8, 6.7, 9.5 Hz, 2H), 4.36–4.61 (m, 3H), 7.13–7.19 (m, 3H), 7.23–7.28 (m, 2H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 13.8 (*C*H_3), 21.9 (*C*H_2), 28.1 (*C*H_2), 28.4 (*C*H_3), 29.7 (*C*), 31.5 (d, *J* = 3.8 Hz, *C*H), 31.7 (d, *J* = 26.9 Hz, *C*H_2), 32.3 (*C*H_2), 37.7 (*C*H_2), 46.3 (*C*H), 83.7 (*C*), 106.2 (*C*H), 125.8 (*C*H), 128.3 (*C*H), 141.7 (*C*), 155.1 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –104.2 (s, 1F). HRMS-ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{20}H_{30}NFO_2Na$, 358.2153; found, 358.2153. $[\alpha]_D^{18.1}$ +0.14 (*c* 1.58, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis of the corresponding alcohol after oxidation of the boryl group. Daicel CHIRALPAK® IC-3, 2-PrOH/Hexane = 4/96, 0.5 mL/min, 40°C, retention time: 24.21 min [major enantiomer], 13.81 min [minor enantiomer].

6. Allylation of Aldehyde with γ-Monofluoroallylboronates

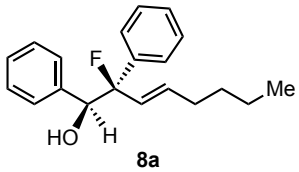
Experimental procedures of allylation reaction between (*S,Z*)-2o and aldehyde.[11]



(*S,Z*)-**2o** 1.5 equiv **8**

In an oven-dried reaction vial, a solution of γ-monofluoroallylboronate (*S,Z*)-**2o** (31.8 mg, 0.10 mmol) in THF (1.0 mL) was treated with *n*-BuLi in hexane (1.6 M, 70.6 μL, 0.113 mmol) at –78 °C and the solution was allowed to stir for 15 min. Trifluoroacetic anhydride (17 μL, 0.12 mmol) was added dropwise to the mixture and the reaction was allowed to stir for another 30 min at –78 °C. Aldehyde (0.15 mmol) was then added at –78 °C and the mixture was allowed to stir for 2 h at –78 ºC, then allowed to slowly warm up to room temperature. After 2 h, the reaction was quenched by addition of 0.5 M aqueous NaOH solution and extracted three times with Et_2O. The combined organic layer was dried over Na_2SO_4 followed by filtration. The crude material was purified by silica gel chromatography (Et_2O/hexane, 0:100–5:95) or pentane wash of the crude solid material to give the corresponding monofluoro compounds. The products were unstable in $CHCl_3$.

(1*S*,2*R*,*E*)-2-Fluoro-1,2-diphenyloct-3-en-1-ol (8a).

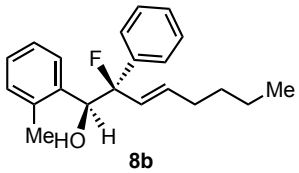


8a

The product **8a** was obtained by pentane wash in 54% yield (16.2 mg) with 99:1 e.r. The stereoselectivity of **8a** was determined by ^{1}H NMR analysis (*E/Z* = >98:2, d.r. = >98:2).

^{1}H NMR (396 MHz, $(CD_3)_2CO$): δ 0.87 (t, *J* = 7.1 Hz, 3H), 1.17–1.39 (m, 4H), 1.98–2.12 (m, 2H), 4.72 (dd, *J* = 2.2, 5.0 Hz, 1H), 5.02 (dd, *J* = 5.0, 14.5 Hz, 1H), 5.63 (dt, *J* = 7.4, 15.0 Hz, 1H), 6.12–6.21 (m, 1H), 7.12–7.43 (m, 10H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.3 (*C*H$_3$), 22.9 (*C*H$_2$), 32.0 (*C*H$_2$), 32.8 (*C*H$_2$), 79.5 (d, J = 27.8 Hz, *C*H), 99.2 (d, *J* = 183.0 Hz, *C*), 127.1 (d, *J* = 8.6 Hz, *C*H), 127.9 (*C*H), 128.1 (*C*H), 128.2 (*C*H), 128.5 (*C*H), 129.3 (*C*H), 129.5 (d, *J* = 19.1 Hz, *C*H), 133.1 (d, *J* = 10.5 Hz, *C*H), 141.2 (*C*), 142.6 (d, *J* = 22.0 Hz, *C*). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –160.1 (s, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{20}H_{23}OFNa$, 321.1625; found, 321.1627. $[\alpha]_D^{21.9}$ –0.17 (*c* 1.47, THF). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 1/99, 0.5 mL/min, 40°C, retention time: 44.26 min [major enantiomer], 39.73 min [minor enantiomer].

(1*S*,2*R*,*E*)-2-Fluoro-2-phenyl-1-(*o*-tolyl)oct-3-en-1-ol (8b).



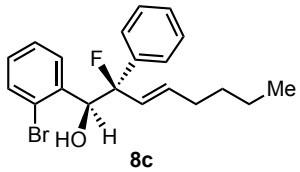
8b

The product **8b** was obtained by flash column chromatography in 40% yield (12.4 mg) with 96.5:3.5 e.r. The stereoselectivity of **8b** was determined by ^{1}H NMR analysis (*E:Z* = >98:2, d.r. = >98:2).

^{1}H NMR (396 MHz, $(CD_3)_2CO$): δ 0.89 (t, *J* = 7.2 Hz, 3H), 1.20–1.38 (m, 4H), 2.05–2.12 (m, 2H), 2.17 (s, 3H), 4.57 (dd, *J* = 0.8, 4.8 Hz, 1H), 5.28 (dd, *J* = 5.2, 1 1.2 Hz, 1H), 5.61 (dt, *J* = 3.2, 11.2 Hz, 1H), 6.26 (ddt, *J* = 1.5, 15.6, 21.1 Hz, 1H), 6.99–7.05 (m, 1H), 7.08–7.1 (m, 2H), 7.24–7.34 (m, 3H), 7.42–7.46 (m, 3H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.2 (*C*H$_3$), 20.0 (d, *J* = 3.8 Hz), 22.9 (*C*H$_2$), 32.0 (*C*H$_2$), 32.9 (*C*H$_2$), 74.9 (d, *J* = 29.2 Hz, *C*H), 99.6 (d, *J* = 178.2 Hz, *C*), 125.6 (*C*H), 127.1 (d, *J* = 8.4 Hz, *C*H), 128.0 (*C*H), 128.3 (*C*H), 128.5 (*C*H), 129.0 (d, *J* = 22.7 Hz, *C*H), 129.8 (*C*H), 130.2 (*C*H), 132.7 (d, *J* = 11.4 Hz, *C*H), 137.1 (*C*), 139.6 (C), 143.3 (d, *J* = 22.0 Hz, *C*). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –159.9 (s, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{21}H_{25}OFNa$, 335.1782; found, 335.1791. $[\alpha]_D^{21.4}$ +2.1

(*c* 1.24, THF). The ee value was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 1/99, 0.5 mL/min, 40°C, retention time: 28.38 min [major enantiomer], 33.68 min [minor enantiomer].

(1*S*,2*R*,*E*)-1-(2-Bromophenyl)-2-fluoro-2-phenyloct-3-en-1-ol (8c).

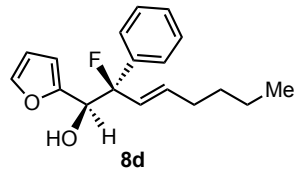


8c

The product **8c** was obtained by flash column chromatography in 58% yield (21.7 mg) with 97.5:2.5 e.r. The stereoselectivity of **8c** was determined by ^{1}H NMR analysis (*E:Z* = >98:2, d.r. = >98:2).

^{1}H NMR (399 MHz, $(CD_3)_2CO$): δ 0.89 (t, *J* = 7.2 Hz, 3H), 1.24–1.42 (m, 4H), 2.09–2.17 (m, 2H), 5.01 (d, *J* = 5.2 Hz, 1H), 5.52 (dd, *J* = 5.2, 9.2 Hz, 1H), 5.59 (dt, *J* = 7.0, 15.7 Hz, 1H), 6.30 (ddt, *J* = 1.5, 15.7, 20.9 Hz, 1H), 7.17 (td, *J* =1.6, 7.6 Hz, 1H), 7.25–7.37 (m, 4H), 7.46–7.59 (m, 4H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.3 (*C*H$_3$), 23.0 (*C*H$_2$), 32.0 (*C*H$_2$), 32.9 (*C*H$_2$), 77.3 (d, *J* = 28.8 Hz, *C*H), 99.1 (d, *J* = 183.0 Hz, *C*), 125.1 (*C*), 127.2 (d, *J* = 8.6 Hz, *C*H), 127.5 (*C*H), 128.3 (d, *J* = 18.2 Hz, *C*H), 128.5 (*C*H), 128.6 (*C*H), 130.1 (*C*H), 131.9 (*C*H), 132.8 (*C*H), 133.2 (d, *J* = 11.5 Hz, *C*H), 140.7 (*C*), 143.31 (d, *J* = 23.0 Hz, *C*). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –158.9 (s, 1F). HRMS–ESI (*m/z*): $[M+Na]^+$ calcd for $C_{20}H_{22}OBrFNa$, 399.0730; found, 399.0734. $[\alpha]_D^{21.8}$ +3.2 (*c* 1.58, THF). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 1/99, 0.5 mL/min, 40°C, retention time: 26.81 min [major enantiomer], 31.59 min [minor enantiomer].

(1*S*,2*R*,*E*)-2-Fluoro-1-(furan-2-yl)-2-phenyloct-3-en-1-ol (8d).



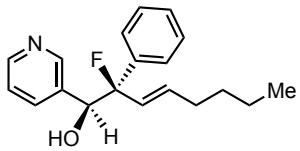
8d

The product **8d** was obtained by flash column chromatography in 60% yield (17.4 mg) with 97.5:2.5 e.r. The stereoselectivity of **8d** was determined by ^{1}H NMR analysis (*E:Z* = >98:2, d.r. = >98:2).

^{1}H NMR (396 MHz, $(CD_3)_2CO$): δ 0.88 (t, *J* = 7.3 Hz, 3H), 1.24–1.41 (m, 4H), 2.08–2.15 (m, 2H), 4.80 (d, *J* = 6.3 Hz, 1H), 5.03 (dd, *J* = 6.3, 15.4 Hz, 1H), 5.71 (dtd, *J* = 1.6, 6.9, 15.6 Hz, 1H), 6.13–6.22 (m, 2H), 6.29 (dd, *J* =1.8, 3.2 Hz, 1H), 7.03–7.35 (m, 3H), 7.36–7.43 (m,

3H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.2 (*C*H$_3$), 22.8 (*C*H$_2$), 31.9 (*C*H$_2$), 32.8 (*C*H$_2$), 73.9 (d, *J* = 28.7 Hz, *C*H), 98.9 (d, *J* = 182.0 Hz, *C*), 108.9 (*C*H), 110.9 (*C*H), 126.7 (d, *J* = 9.6 Hz, *C*H), 128.3 (*C*H), 128.5 (*C*H), 129.7 (d, *J* = 18.2 Hz, *C*H), 133.5 (d, *J* = 10.5 Hz, *C*H), 142.1 (d, *J* = 23.0 Hz, *C*), 142.3 (*C*H), 154.8 (*C*). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –160.0 (s, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{18}H_{21}O_2FNa$, 311.1418; found, 311.1421. $[\alpha]_D^{21.8}$ +1.3 (*c* 1.76, THF). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 2/98, 0.5 mL/min, 40°C, retention time: 44.69 min [major enantiomer], 38.80 min [minor enantiomer].

(1*S*,2*R*,*E*)-2-Fluoro-2-phenyl-1-(pyridin-3-yl)oct-3-en-1-ol (8e).

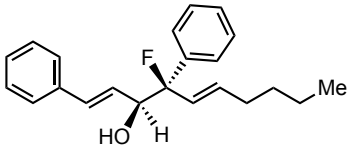


8e

The product **8e** was obtained by flash column chromatography in 56% yield (16.6 mg) with 97:3 e.r. The stereoselectivity of **8e** was determined by ^{1}H NMR analysis (*E:Z* = >98:2, d.r. = 93:7).

^{1}H NMR (401 MHz, $(CD_3)_2CO$): δ 0.87 (t, *J* = 7.2 Hz, 3H), 1.20–1.43 (m, 4H), 2.07–2.13 (m, 2H), 4.96–5.07 (m, 1H), 5.08–5.14 (m, 1H), 5.64 (dt, *J* = 7.4, 15.1 Hz, 1H), 6.14–6.26 (m, 1H), 7.18–7.24 (m, 1H), 7.25–7.36 (m, 3H), 7.37–7.42 (m, 2H), 7.63 (d, *J* = 8.4 Hz, 1H), 8.37–8.42 (m, 2H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.2 (*C*H$_3$), 22.8 (*C*H$_2$), 31.9 (*C*H$_2$), 32.8 (*C*H$_2$), 77.4 (d, *J* = 27.8 Hz, *C*H), 99.1 (d, *J* = 183.0 Hz, *C*), 123.2 (*C*H), 126.9 (d, *J* = 8.8 Hz, *C*H), 128.5 (*C*H), 128.7 (*C*H), 129.0 (*C*H), 133.7 (d, *J* = 11.5 Hz, *C*H), 136.4 (*C*H), 136.6 (*C*), 142.3 (d, *J* = 22.1 Hz, *C*), 149.4 (*C*H), 150.5 (*C*H). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –161.3 (s, 1F). HRMS–EI (*m*/*z*): $[M]^+$ calcd for $C_{19}H_{23}ONF$, 300.1758; found, 300.1767. $[\alpha]_D^{21.3}$ +0.14 (*c* 1.66, THF). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 1/99, 0.5 mL/min, 40°C, retention time: 43.49 min [major enantiomer], 36.49 min [minor enantiomer].

(1*E*,3*S*,4*R*,5*E*)-4-Fluoro-1,4-diphenyldeca-1,5-dien-3-ol (8f).

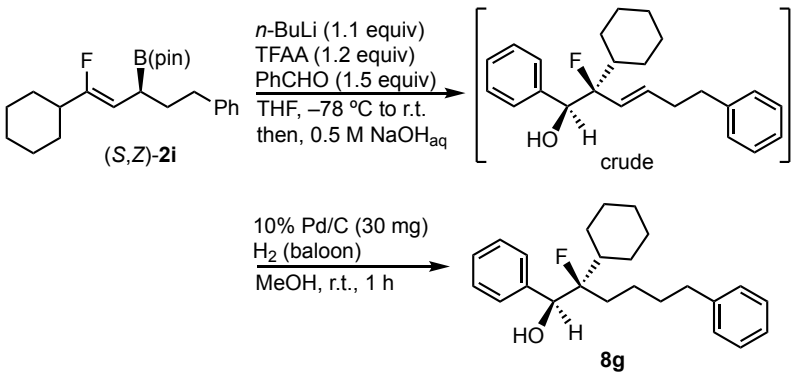


8f

The product **8f** was obtained by pentane wash in 33% yield (10.7 mg) with >99:1 e.r. The stereoselectivity of **8f** was determined by ^{1}H NMR analysis (*E:Z* = >98:2, d.r. = >98:2).

^{1}H NMR (396 MHz, $(CD_3)_2CO$): δ 0. 86 (t, *J* = 7.1 Hz, 3H), 1.21–1.40 (m, 4H), 2.06–2.16 (m, 2H), 4.50–4.49 (m, 1H), 4.61 (dt, *J* = 6.3, 13.0 Hz, 1H), 5.79 (dt, *J* =7.4, 15.0 Hz, 1H), 6.13–6.22 (m, 1H), 6.28 (dd, *J* = 6.0, 16.0 Hz, 1H), 6.62 (d, *J* = 15.8 Hz, 1H), 7.20–7.38 (m, 8H), 7.48–7.50 (m, 2H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.2 (*C*H$_3$), 22.9 (*C*H$_2$), 32.1 (*C*H$_2$), 32.9 (*C*H$_2$), 78.3 (d, *J* = 28.8 Hz, *C*H), 99.3 (d, *J* = 180.1 Hz, *C*), 126.9 (d, *J* = 9.6 Hz, *C*H), 127.3 (*C*H), 128.3 (d, *J* = 4.8 Hz, *C*H), 128.4 (*C*H), 128.7 (*C*H), 128.9 (d, *J* = 3.8 Hz, *C*H), 129.5 (*C*H), 129.9 (d, *J* = 18.2 Hz, *C*H), 132.7 (*C*H), 133.5 (d, *J* = 10.5 Hz, *C*H), 138.1 (*C*), 142.4 (d, *J* = 22.0 Hz, *C*). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –158.8 (s, 1F). HRMS–EI (*m*/*z*): $[M+Na]^+$ calcd for $C_{22}H_{25}OFNa$, 347.1782; found, 347.1787. $[\alpha]_D^{20.8}$ –11.2 (*c* 1.0, THF). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 2/98, 0.5 mL/min, 40°C, retention time: 35.08 min [major enantiomer], 45.09 min [minor enantiomer].

Allylation reaction between (*S*,*Z*)-2i and benzaldehyde followed by H_2 hydrogenation with Pd/C.



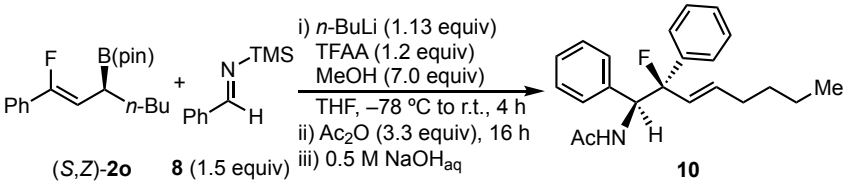
The reaction was conducted with 37.2 mg (0.10 mmol) of (*S*,*Z*)-**2i**. The title compound was submitted to the subsequent hydrogenation without further purification. In a reaction vial, 10% Pd/C (30 mg) was dissolved in MeOH (1.0 mL). The crude material of the allylation reaction in MeOH (0.5 mL) was then added to this solution. After stirred for 1 h at room temperature under H_2 atmosphere (H_2 balloon), the mixture was filtered through a Celite pad and concentrated under reduced pressure. The crude material was purified by silica gel chromatography (Et_2O/hexane, 0:100–6:94). The product **8g** was obtained in 53% yield (18.9 mg) with 97:3 e.r. The stereoselectivity of **8g** was determined by ^{1}H NMR analysis (d.r. = 92:8).

^{1}H NMR (392 MHz, $CDCl_3$): δ 1.02–1.88 (m, 17H), 2.02 (d, *J* = 3.9 Hz, 1H), 2.60 (t, *J* = 7.4 Hz, 2H), 4.93 (dd, *J* = 4.3, 13.3 Hz, 1H), 7.14–7.41 (m, 10H). ^{13}C NMR (99 MHz, $CDCl_3$): δ 22.9 (d, *J* = 8.0 Hz, *C*H$_2$), 26.4 (*C*H$_2$), 26.5 (*C*H$_2$), 26.7 (*C*H$_2$), 26.5 (d, *J* = 8.5 Hz, *C*H$_2$), 27.4 (d, *J* = 5.2 Hz, *C*H$_2$), 31.3 (d, *J* = 23.2 Hz, *C*H$_2$), 32.1 (*C*H$_2$), 35.7 (*C*H$_2$), 42.1 (d, *J*

= 21.3 Hz, *C*H), 100.6 (d, *J* = 175.5 Hz, *C*), 125.6 (*C*H), 127.4 (d, *J* = 1.9 Hz, *C*H), 127.7 (*C*H), 128.0 (*C*H), 128.2 (*C*H), 128.3 (*C*H), 140.4 (*C*), 142.5 (*C*). ^{19}F NMR (373 MHz, $CDCl_3$): δ –164.5 (d, *J* = 33.9 Hz, 1F). HRMS–ESI (*m*/*z*): $[M+Na]^+$ calcd for $C_{24}H_{31}OFNa$, 377.2251; found, 377.2255. $[\alpha]_D^{19.7}$ +1.64 (*c* 1.55, $CHCl_3$). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IBN-3, 2-PrOH/Hexane = 1.5/98.5, 0.5 mL/min, 40°C, retention time: 46.95 min [*syn*-**8g** major enantiomer], 29.58 min [*syn*-**8g** minor enantiomer], 29.58 min [*anti*-**8g** major enantiomer], and 27.17 min [*anti*-**8g** minor enantiomer].

7. Allylation of Aldimine with γ-Monofluoroallylboronates

Experimental procedures of allylation reaction between (*S*,*Z*)-2o and aldimine.[10]



(*S*,*Z*)-**2o** **8** (1.5 equiv) **10**

In an oven-dried reaction vial, a solution of γ-monofluoroallylboronate (*S*,*Z*)-**2o** (31.8 mg, 0.10 mmol) in THF (1.0 mL) was treated with *n*-BuLi in hexane (1.6 M, 70.6 μL, 0.113 mmol) at –78 °C and the solution was allowed to stir for 15 min. Trifluoroacetic anhydride (16.9 μL, 0.12 mmol) was added dropwise to the mixture and the reaction was allowed to stir for a further 30 min at –78 °C. *N*-Trimethylsilyl benzaldimine (18.4 μL, 0.15 mmol) and MeOH (30 μL, 0.74 mmol) was then added at –78 °C and the mixture was allowed to stir for 1 h at –78 ºC, then allowed to slowly warm up to room temperature. After 3 h, Ac_2O (34 μL, 0.33 mmol) was added to the mixture and stirred at room temperature. After 16 h, the reaction was quenched by addition of 0.5 M aqueous NaOH solution and extracted three times with Et_2O. The combined organic layer was dried over Na_2SO_4 followed by filtration. The solid crude material was purified by hexane wash. The product **10** was obtained in 59% yield (20.0 mg) with 98:2 e.r. The stereoselectivity of **10** was determined by ^{1}H NMR analysis (*E*:*Z* = >98:2, d.r. = >98:2).

^{1}H NMR (396 MHz, $(CD_3)_2CO$): δ 0.89 (t, *J* = 6.9 Hz, 3H), 1.25–1.43 (m, 4H), 1.93 (s, 3H), 2.07–2.13 (m, 2H), 5.53 (dd, *J* = 9.5, 30.1 Hz, 1H), 5.77–5.84 (m, 1H), 5.95–6.03 (m, 1H), 7.06–7.24 (m, 10H), 7.83–7.94 (m, 1H). ^{13}C NMR (100 MHz, $(CD_3)_2CO$): δ 14.2 (*C*H_3), 22.8 (*C*H_2), 22.9 (*C*H_3), 32.1 (*C*H_2), 32.7 (*C*H_2), 60.2 (d, *J* = 20.2 Hz, *C*H), 100.8 (d, *J* = 185.9 Hz, C), 125.8 (d, *J* = 9.5 Hz, *C*H), 127.8 (*C*H), 128.0 (*C*H), 128.3 (*C*H), 128.7 (*C*H), 129.9 (*C*H), 131.1 (d, *J* = 19.1 Hz, *C*H), 132.3 (d, *J* = 10.5 Hz, CH), 139.1 (*C*), 142.1 (d, *J* = 22.0 Hz, *C*), 169.3 (*C*). ^{19}F NMR (373 MHz, $(CD_3)_2CO$): δ –169.6 (t, *J* = 22.8 Hz, 1F). HRMS–EI (*m*/*z*): $[M+Na]^+$ calcd for $C_{22}H_{26}ONFNa$, 362.1891; found, 362.1900. $[\alpha]_D^{21.0}$ +0.12 (*c* 1.68, THF). Enantiomeric purity was determined by HPLC analysis. Daicel CHIRALPAK® IF-3, 2-PrOH/Hexane = 15/85, 0.5 mL/min, 40°C, retention time: 13.15 min [major enantiomer], 16.64 min [minor enantiomer].

8. Single Crystal X-ray Structural Analysis

The absolute configuration of the products were determined based on X-ray crystallographic
analysis of the products **2h**, **2o**, **8a** and **8g**. The absolute configurations of other products were deduced by these products. The details were summarized in Figure S1–S4 and Table S1–S4.

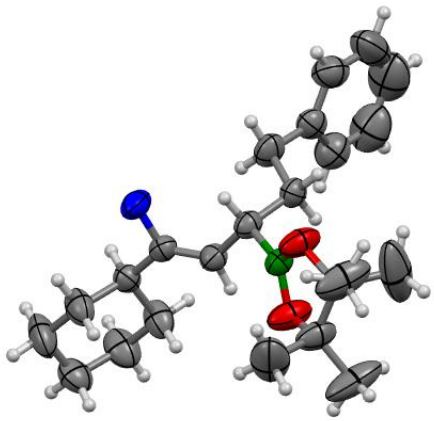


Figure S1. Molecular structure of (*S,Z*)-**2h**. Thermal ellipsoids set at 50% probability.

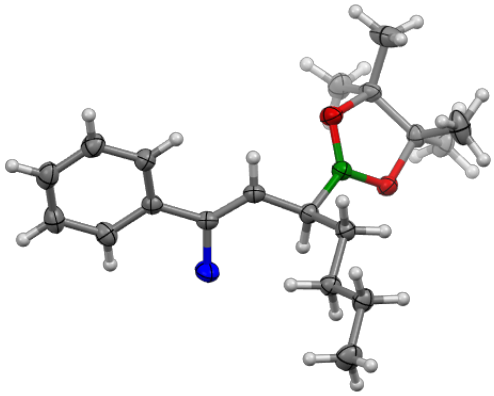


Figure S2. Molecular structure of (*S,Z*)-**2o**. Thermal ellipsoids set at 50% probability.

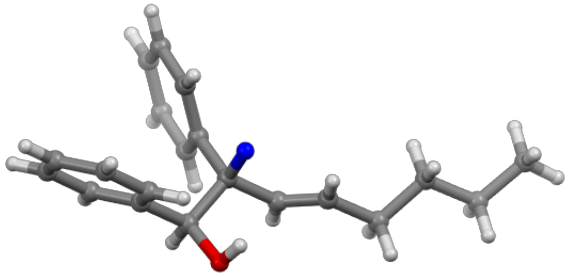


Figure S3. Molecular structure of (1*S*,2*R*,*E*)-**8a**.

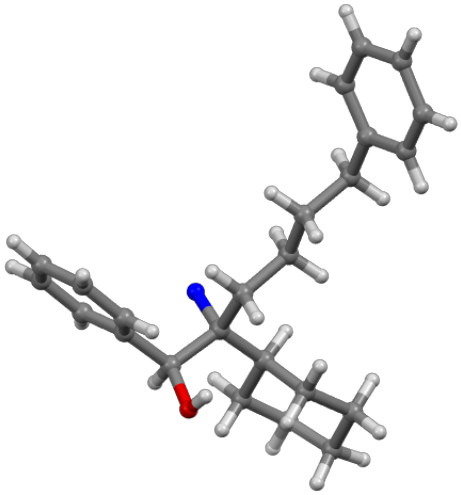


Figure S4. Molecular structure of (1*S*,2*R*)-**8g**.

Table S1. Summary of X-ray crystallographic data for (*S,Z*)-**2h.**

CCDC	1905700
Empirical formula	$C_{23}H_{34}BFO_2$
Formula weight	372.31
Temperature/K	243
Crystal system	monoclinic
Space group	$P2_1$
a / Å	6.51580(10)
b / Å	20.1138(3)
c / Å	8.74810(10)
α/°	90
β/°	99.239(2)
γ/°	90
Volume/Å^3	1131.63(3)
Z	2
ρ_{calc} g/cm^3	1.093
μ/mm^{-1}	0.572
F(000)	404.0
Crystal size/mm^3	0.38×0.26×0.21
Radiation	CuKα (λ = 1.54184)
2θ range for data collection/°	8.792 to 147.57
Index ranges	$-7 \leqq h \leqq 7$, $-24 \leqq k \leqq 24$, $-10 \leqq l \leqq 10$
Reflections collected	11342
Independent reflections	4405 [R_{int} = 0.0233, R_{sigma} = 0.0251]
Data/restraints/parameters	4405/1/248
Goodness-of-fit on F^2	1.072
Final R indexes [I>=2σ (I)]	R_1 = 0.0581, wR_2 = 0.1715
Final R indexes [all data]	R_1 = 0.0611, wR_2 = 0.1735
Largest diff. peak/hole / e Å^{-3}	0.33/–0.18
Flack parameter	0.06(8)

Table S2. Summary of X-ray crystallographic data for (*S,Z*)-**2o.**

CCDC	1905696
Empirical formula	$C_{19}H_{28}BFO_2$
Formula weight	318.22
Temperature/K	123
Crystal system	orthorhombic
Space group	$P2_12_12_1$
a / Å	9.29320(10)
b / Å	11.89520(10)
c / Å	16.6460(10)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	1840.12(3)
Z	4
ρ_{calc} g/cm^3	1.149
μ/mm^{-1}	0.625
F(000)	688.0
Crystal size/mm^3	0.274×0.147×0.1
Radiation	CuKα (λ = 1.54184)
2θ range for data collection/°	9.138 to 148.066
Index ranges	$-11 \leqq h \leqq 11$, $-14 \leqq k \leqq 14$, $-20 \leqq l \leqq 20$
Reflections collected	53118
Independent reflections	3701 [R_{int} = 0.1171, R_{sigma} = 0.0316]
Data/restraints/parameters	3701/0/213
Goodness-of-fit on F^2	1.099
Final R indexes [I>=2σ (I)]	R_1 = 0.0460, wR_2 = 0.1165
Final R indexes [all data]	R_1 = 0.0486, wR_2 = 0.1200
Largest diff. peak/hole / e Å^{-3}	0.14/–0.28
Flack parameter	–0.05(7)

Table S3. Summary of X-ray crystallographic data for **8a.**

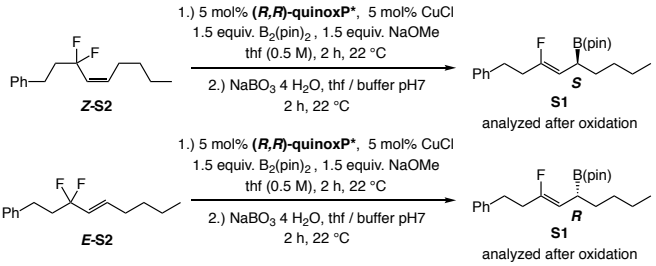
CCDC	1905693
Empirical formula	$C_{20}H_{23}FO$
Formula weight	298.38
Temperature/K	123
Crystal system	monoclinic
Space group	$P2_1$
a / Å	16.0231(2)
b / Å	5.46870(10)
c / Å	18.5413(3)
α/°	90
β/°	92.4760(10)
γ/°	90
Volume/Å^3	1623.17(4)
Z	4
ρ_{calc} g/cm^3	1.221
μ/mm^{-1}	0.644
F(000)	640.0
Crystal size/mm^3	0.342×0.04×0.04
Radiation	CuKα (λ = 1.54184)
2θ range for data collection/°	4.77 to 140.628
Index ranges	$-17 \leqq h \leqq 19$, $-5 \leqq k \leqq 6$, $-22 \leqq l \leqq 22$
Reflections collected	55714
Independent reflections	5650 [R_{int} = 0.01826, R_{sigma} = 0.0531]
Data/restraints/parameters	5650/1/353
Goodness-of-fit on F^2	1.036
Final R indexes [I>=2σ (I)]	R_1 = 0.0598, wR_2 = 0.1584
Final R indexes [all data]	R_1 = 0.0627, wR_2 = 0.1619
Largest diff. peak/hole / e Å^{-3}	0.50/–0.41
Flack parameter	0.03(15)

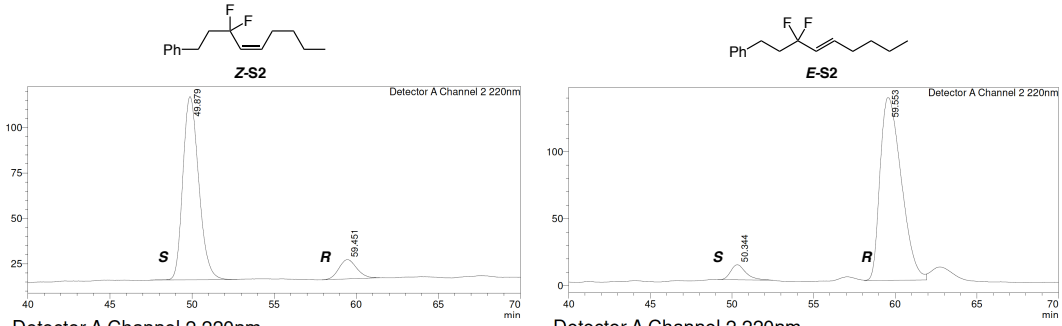
Table S4. Summary of X-ray crystallographic data for **8g**

CCDC	1905684
Empirical formula	$C_{24}H_{31}FO$
Formula weight	354.49
Temperature/K	123
Crystal system	monoclinic
Space group	$P2_1$
a / Å	12.0730(10)
b / Å	5.54330(10)
c / Å	14.6277(2)
α/°	90
β/°	96.7300(10)
γ/°	90
Volume/Å^3	972.26(2)
Z	2
ρ_{calc} g/cm^3	1.211
μ/mm^{-1}	0.613
F(000)	384.0
Crystal size/mm^3	0.295×0.11×0.06
Radiation	CuKα (λ = 1.54184)
2θ range for data collection/°	6.084 to 148.214
Index ranges	$-14 \leqq h \leqq 15$, $-6 \leqq k \leqq 6$, $-18 \leqq l \leqq 18$
Reflections collected	37395
Independent reflections	3847 [R_{int} = 0.1160, R_{sigma} = 0.0378]
Data/restraints/parameters	3847/1/236
Goodness-of-fit on F^2	1.065
Final R indexes [I>=2σ (I)]	R_1 = 0.0473, wR_2 = 0.1284
Final R indexes [all data]	R_1 = 0.0501, wR_2 = 0.1312
Largest diff. peak/hole / e Å^{-3}	0.23/–0.22
Flack parameter	0.03(11)

9. Stereoproof of the borylation products form (*E*)-4.

As the stereochemistry was proven for Cu–B(pin) addition, fluoride elimination of *Z-gem*-difluoro substituted olefins, comparison of stereochemical outcome of a *Z*-substrate and its *E*- counterpart with **(***R,R*)-quinoxP* and (*R,R*)-phenyl-bpe reveals, *Z*- and *E*- olefins lead to opposing stereochemical outcomes with the same ligand enantiomer, further (*R,R*)-phenyl-bpe forms the *R*-enantiomer of the product from *Z*-substrates and the *S*-enantiomer from *E*-substrates.



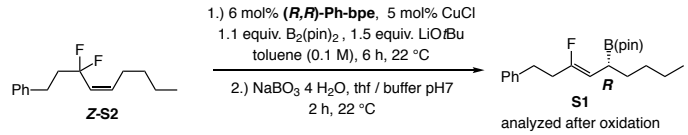


Detector A Channel 2 220nm

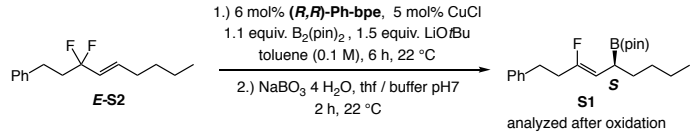
Peak#	Ret. Time	Area	Height	Area%
1	49.879	6800288	100848	89.479
2	59.451	799584	10633	10.521
Total		7599871	111481	100.000

Detector A Channel 2 220nm

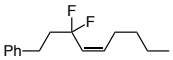
Peak#	Ret. Time	Area	Area%	Height
1	50.344	732597	5.590	11254
2	59.553	12373106	94.410	136487
Total		13105703	100.000	147741

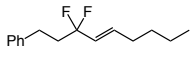


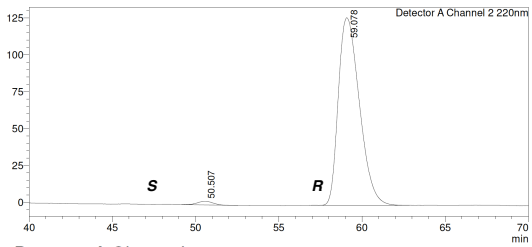
analyzed after oxidation



analyzed after oxidation

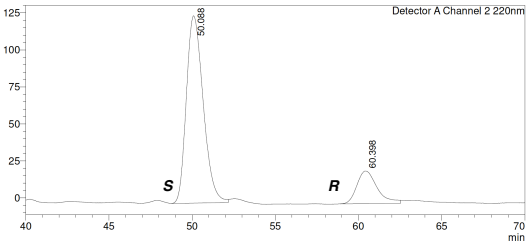






Detector A Channel 2 220nm

Peak#	Ret. Time	Area	Area%	Height
1	50.507	157600	1.385	2495
2	59.078	11218257	98.615	127224
Total		11375856	100.000	129719



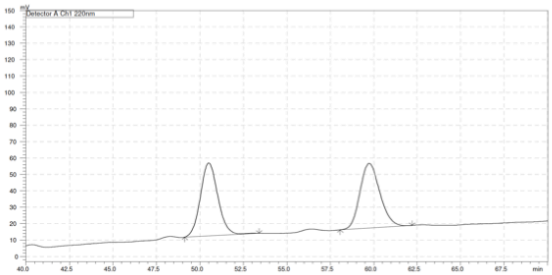
Detector A Channel 2 220nm

Peak#	Ret. Time	Area	Area%	Height
1	50.088	8925583	82.552	126483
2	60.398	1886500	17.448	22085
Total		10812083	100.000	148568

(*S*)-(*Z*)-2-(3-Fluoro-1-phenylnon-3-en-5-yl)-4,4,5,5-tetramethyl-1,3,2-dioxaborolane (S1).

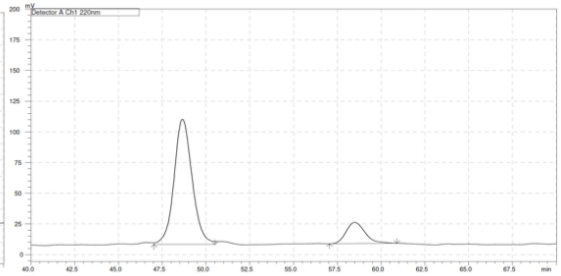
Prepared according to conditions B with (*R,R*)-phenyl-bpe and isolated as colorless oil in 59% yield (59:41 *Z/E*).

^{1}H NMR ($CDCl_3$, 600 MHz): δ 0.87 (3H, t, *J* = 7.0 Hz), 1.23 (16H, s), 1.48 (1H, ddd, *J* = 12.9, 6.5, 3.5 Hz), 2.08 (1H, td, *J* = 9.0, 6.7 Hz), 2.56–2.37 (2H, m), 2.80 (2H, t, *J* = 7.7 Hz), 4.45 (1H, dd, *J* = 38.4, 9.7 Hz), 7.19 (3H, m, *J* = 7.3 Hz), 7.30–7.24 (2H, m). ^{13}C NMR ($CDCl_3$, 150 MHz): δ 14.2 (*C*H_3), 22.78 (*C*H_3), 24.80 (*C*H_3), 24.82 (*C*H_2), 31.0 (d, *J* = 1.6 Hz, *C*H_2), 31.4 (*C*H), 33.0 (*C*H_2), 34.1 (*C*H_2), 34.3 (*C*H_2), 83.2 (*C*), 106.9 (d, *J* = 16.1 Hz, *C*H), 126.1 (*C*), 128.4 (*C*), 128.6 (*C*), 141.2 (*C*), 158.1 (d, *J* = 251.7 Hz, *C*F). ^{19}F NMR ($CDCl_3$, 376 MHz): δ –110.18 (dt, *J* = 37.4, 17.8 Hz). HRMS (DART-TOF) m/z: $[M]^+$ Calcd for $C_{21}H_{33}BF_1O_2^+$ = 347.2552, Found 347.2569. Specific rotation: $[\alpha]_D^{20}$ = +5.5 (*c* 1.0, $CHCl_3$). Enantiomeric purity of **S1** was determined by HPLC analysis after oxidation of **S1** to the corresponding allylic alcohol in comparison with authentic racemic material (ADH column, 99:1 hexanes:*i*PrOH, 0.5 mL/min, 254 nm). (*S*)-enantiomer t_r = 48.7 min, (*R*)-enantiomer t_r = 58.5 min.



Detector A Channel 1 220nm

Peak#	Ret. Time	Area	Area%	Height
1	50.484	3106074	49.582	44489
2	59.742	3158466	50.418	39416
Total		6264540	100.000	83905



Detector A Channel 1 220nm

Peak#	Ret. Time	Area	Area%	Height
1	48.676	7350040	84.853	101974
2	58.496	1312037	15.147	17482
Total		8662076	100.000	119457

Peak #	Ret. Time	Area	Area %	Peak #	Ret. Time	Area	Area %
1	50.484 min	3106074	49.582	1	48.676 min	7350040	84.853
2	59.742 min	3158466	50.418	2	58.496 min	1312037	15.147

(*E*)-(3,3-Difluorononon-4-en-1-yl)benzene (S2).

Prepared through olefin metathesis from (3,3-Difluoropent-4-en-1-yl)benzene (1.0 equiv.) and *cis*-5-decene (2.0 equiv.), isolated as colorless oil in 79% yield.

^{1}H NMR (400 MHz, $CDCl_3$): δ 0.92 ppm (3H, *t*, *J* = 7.1 Hz), 1.37 (2H, dtdd, *J* = 11.5, 8.0, 4.7, 2.0 Hz), 2.36–2.11 (2H, m), 2.88–2.73 (1H, m), 5.56–5.44 (1H, m), 5.75 (1H, dtt, *J* = 11.4,

7.7, 1.8 Hz), 7.24–7.17 (2H, m), 7.34–7.27 (1H, m). ^{13}C NMR (101 MHz, $CDCl_3$): δ 14.0 (*C*H_3), 22.5 (*C*H_2), 28.2 (t, *J* = 1.7 Hz, *C*H_2), 28.8 (t, *J* = 4.4 Hz, *C*H_2), 31.7 (t, *J* = 1.3 Hz, *C*H_2), 40.6 (t, *J* = 27.0 Hz, *C*H_2), 122.0 (*C*), 125.1–123.8 (m, *C*H), 126.3 (*C*), 128.4 (*C*), 128.7 (*C*), 138.6 (t, *J* = 6.2 Hz, *C*H), 140.8 (*C*). ^{19}F NMR (376 MHz, $CDCl_3$): δ –88.88 to –93.35 (m). HRMS (DART) Calcd for $C_{15}H_{20}F_2$ $[M]^+$: 238.1528; Found 238.1518.

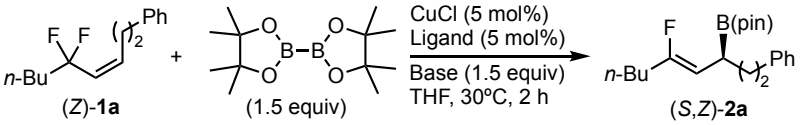
(3,3-Difluoropent-4-en-1-yl)benzene (S3).

A 20 mL vial equipped with a magnetic stirring bar was charged with 5-phenylpent-1-en-3-one (1.02 g, 6.4 mmol, 1.0 equiv.), then DAST (3.08 g, 19.1 mmol, 3.0 equiv.) was added dropwise. Ethanol (40 µL) was carefully added, the vial tightly capped and allowed to stir for 12 h at 65 °C. The mixture was then diluted in dichloromethane (20 mL) and slowly introduced to a sat. aq. $NaHCO_3$ solution. The organic layer was separated, dried over $MgSO_4$ and concentrated. The oily reddish residue is subjected to silica gel chromatography affording the product as colorless liquid in 35% yield (405 mg, 2.2 mmol).

^{1}H NMR (400 MHz, $CDCl_3$): δ 2.36–2.06 (2H, m), 2.90–2.67 (2H, m), 5.45 (1H, dq, *J* = 11.0, 0.7 Hz), 5.66 (1H, dtd, *J* = 17.4, 2.6, 0.8 Hz), 5.95 (1H, dtd, *J* = 17.3, 11.1, 10.6 Hz), 7.24–7.17 (3H, m), 7.30 (2H, ddt, *J* = 8.0, 6.6, 0.9 Hz). ^{13}C NMR (101 MHz, $CDCl_3$): δ 28.7 (t, *J* = 4.6 Hz), 39.1 (t, *J* = 26.5 Hz, *C*H_2), 119.5 (t, *J* = 9.5 Hz, *C*H_2), 121.0 (t, *J* = 238.8 Hz, *C*F_2), 126.4 (*C*), 128.4 (*C*), 128.7 (*C*), 133.1 (*C*), 140.7 (*C*), (t, *J* = 27.4 Hz, *C*H). ^{19}F NMR (376 MHz, $CDCl_3$): δ –98.48 to –98.70 (m).

10. Optimization Conditions for the borylation products

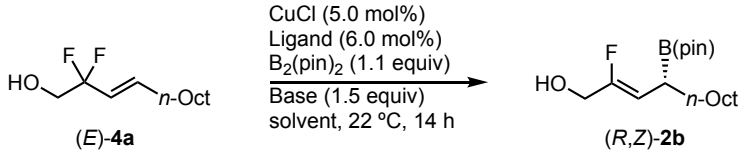
Table S5. Optimization of the Reaction Conditions for the synthesis of (*S*,*Z*)-**2a**[a]



Entry	Ligand	Base	Conv. (%)[b]	*Z*:*E*[b]	e.r.[c]
1[d]	(*R*,*R*)-BenzP*	NaOMe	99 (93)	95:5	97:3
2	(*R*,*R*)-QuinoxP*	NaOMe	93	95:5	96:4
3	(*R*,*S*)-Josiphos	NaOMe	66	93:8	83.5:6.5
4	(*R*)-BINAP	NaOMe	trace	–	–
5	(*R*)-Segphos	NaOMe	36	91:9	50:50
6	(*R*,*R*)-BenzP*	KOMe	85	96:4	95:5
7	(*R*,*R*)-BenzP*	LiOMe	trace	–	–
8	(*R*,*R*)-BenzP*	Na(O-*t*-Bu)	16	–	–
9[e]	(*R*,*R*)-BenzP*	NaOMe	97	97:3	96.5:3.5
10[f]	(*R*,*R*)-BenzP*	NaOMe	70	94:6	96:4

[a]Conditions: **1a** (0.20 mmol), CuCl (0.0100 mmol), ligand (0.0100 mmol), base (0.350 mmol), diboron (0.350 mmol) in THF (400 µL). [b]Determined by ^{19}F NMR analysis of crude mixture with an internal standard.[c]The e.r. values of the products were determined by HPLC analysis of the saturated alcohols derived from the corresponding boronates. [d]0.50 mmol scale, Isolated yield. [e]The reaction was conducted at 0ºC. [f]Toluene was used as solvent.

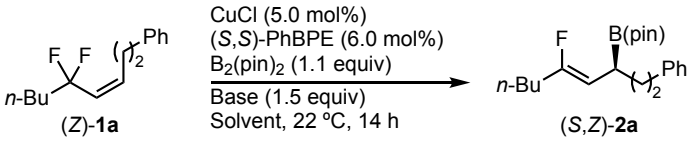
Table S6. Optimization of the Reaction Conditions for the synthesis of (*R*,*Z*)-**2b**[a]



Entry	Ligand	Base	Solvent	Conv. (%)[b]	*Z*:*E*[b]	e.r.[c]
1	(*S*,*S*)-Ph-BPE	LiO*t*-Bu	toluene	98	>98:2	95:5
2	(*S*,*S*)-Ph-BPE	NaOMe	THF	30	98:2	90:10
3	(*R*,*R*)-QuinoxP*	NaOMe	THF	45	98:2	93:7

[a]Conditions: **4a** (0.10 mmol), CuCl (0.005 mmol), ligand (0.006 mmol), base (0.11 mmol), diboron (0.15 mmol) in solvent (1 mL). [b]Determined by ^{19}F NMR analysis of crude mixture with an internal standard.[c]The e.r. values of the products were determined by HPLC analysis of the saturated alcohols derived from the corresponding boronates.

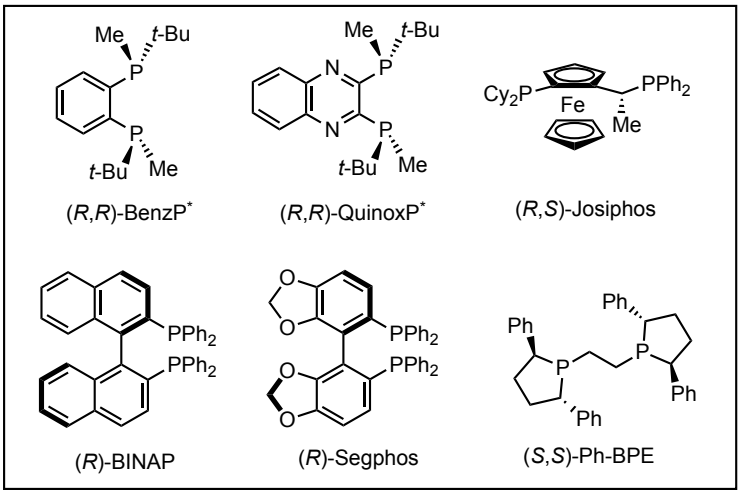
Table S7. Comparison Data of the Reaction Conditions for the synthesis of (*S*,*Z*)-**2b**[a]



(*Z*)-**1a** (*S*,*Z*)-**2a**

Entry	Base	Solvent	Conv. (%)[b]	*Z*:*E*[b]	e.r.[c]
1[d]	NaOMe	THF	80	96:4	92.5:7.5
2	LiO*t*-Bu	THF	52	89:11	97.5:2.5
3	NaOMe	toluene	92	93:7	99:1
4	LiO*t*-Bu	toluene	35	90:10	97.5:2.5

[a]Conditions: **1a** (0.10 mmol), CuCl (0.005 mmol), ligand (0.006 mmol), base (0.11 mmol), diboron (0.15 mmol) in solvent (1 mL). [b]Determined by ^{19}F NMR analysis of crude mixture with an internal standard.[c]The e.r. values of the products were determined by HPLC analysis of the saturated alcohols derived from the corresponding boronates.[d]0.2 mmol scale. The reaction time was 16 h.



11. Density Functional Theory (DFT) Calculations

DFT computations[12] were performed with the Gaussian 09/Gaussian 16 suite of programs.[13] Geometries were optimized with the M06–L[14] functional and the Def2SVP basis set[15] in conjunction with the corresponding Coulomb fitting basis set to speed up calculations.[16] The effect of a polar reaction medium (tetraydrofuran, THF) was approximated by means of the SMD solvation model.[17] Stationary points were probed through vibrational analysis and Gibbs free energy corrections were performed under standard conditions (298.15 K, 1.0 atm). Transition states have been verified through Intrinsic Reaction Coordiante calculations (IRC) employing the L(ocal) Q(uadratic) A(approximation) method,[18] followed by subsequent optimization of the end points with the above mentioned optimization method. We furthermore probed the performance of various density functionals through single point energy calculations at the geometries optimized with the level described above by means of the SMD solvation model with THF as solvent and the larger def2-TZVPP[14] basis set. The results with M06L/DF-Def2SVP$_{THF(SMD)}$ and M06L/Def2TZVPP$_{THF(SMD)}$//M06L/DF-Def2SVP$_{THF(SMD)}$ energies are reported(Table. S6–S11). A file for convenient viewing of computed geometries with the program Mercury 3.3 is appended as separate “coordinates.xyz” file in Section 2.[19]

11.1 Energies of transition states in Fig. 2

For the stereochemistry determining Cu–B addition step, the methyl group attached to the fluorine containing carbon can adopt various different conformations, which are analyzed and the lowest energy transition state are selected. The driving force for the high enantioselectivity is the steric interaction between the olefin substituent and *t*Bu group of the ligand in the minor transition states.

Scheme S1. 3D models for the transition states.

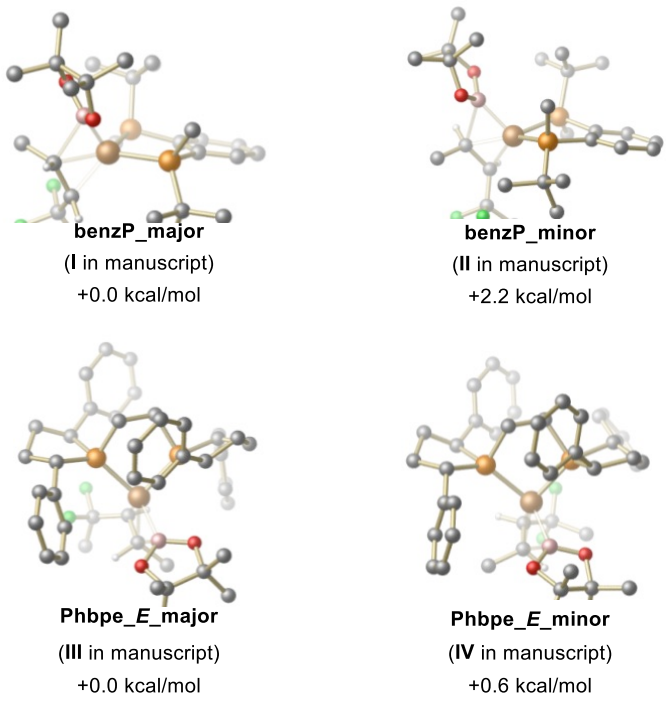


Table S8. BenzP-Cu promoted reaction transition state energies and Gibbs free energies calculated with M06-L/Def2SVP, calculations were carried out in thf with the SMD solvation model.

Transition State	**E** [Hartree]	**ΔE** [kcal/mol]	**G** [Hartree]	**ΔG** [kcal/mol]	**ΔG_{corr}** [kcal/mol]	**Freq** [cm^{-1}]
benzP_major	-3754.449082	0.0	-3753.815863	0.0	0.0	-111.0521
benzP_minor	-3754.444127	3.1	-3753.811742	2.6	-0.5	-118.70

Table S9. BenzP-Cu promoted reaction transition state single point energies calculated with M06-L /Def2TZVPP, calculations were carried out in thf with the SMD solvation model.

Transition State	**E** [Hartree]	**ΔE** [kcal/mol]	**ΔG** [kcal/mol]
benzP_major	-3756.491896	0.0	0.0
benzP_minor	-3756.487545	2.7	2.2

Table S10. Phenyl-bpe-Cu promoted *E* olefin reaction transition state energies and Gibbs free energies calculated with M06-L/Def2SVP, calculations were carried out in thf with the SMD solvation model.

Transition State	E [Hartree]	ΔE [kcal/mol]	G [Hartree]	ΔG [kcal/mol]	ΔG_{corr} [kcal/mol]	Freq [cm^{-1}]
Phbpe_*E*_major	-4444.648098	0.0	-4443.822364	0.0	0.0	-44.73
Phbpe_*E*_minor	-4444.647524	0.4	-4443.817626	3.0	2.6	-140.55

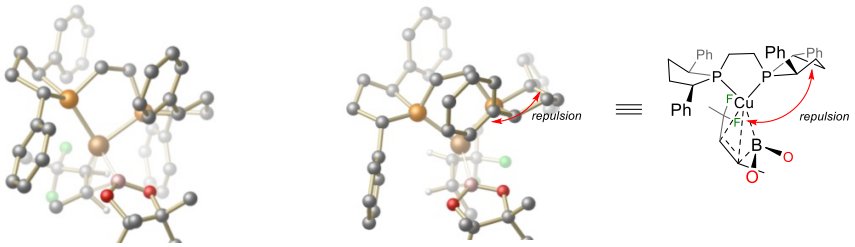
Table S11. Phenyl-bpe–Cu promoted *E* olefin reaction transition state single point energies calculated with M06-L /Def2TZVPP, calculations were carried out in thf with the SMD solvation model.

Transition State	E [Hartree]	ΔE [kcal/mol]	ΔG [kcal/mol]
Phbpe_*E*_major	-4447.395047	0.0	0.0
Phbpe_*E*_minor	-4447.398245	-2.0	0.6

11.2. Energies of transition states of the reaction with *Z* olefin promoted by phenyl-bpe

Phenyl-bpe–Cu is shown to be suitable catalyst for the reaction with Z olefin. DFT studies are carried out to investigate the origin of enantioselectivity. Similar to the reactions with *E* olefins, there is significant steric repulsion between the phenyl ring in the ligand and the CF_2Me substituent of the olefin in the minor transition state. A series of conformations are analyzed and the lowest energy conformation is selected.

Scheme S2. 3D models for the transition states involving *Z* olefin and phenyl-bpe–Cu complex.



Phbpe_Z_major_Mode_A

+0.0 kcal/mol

Phbpe_Z_minor_Mode_A

+1.4 kcal/mol

Table S12. Phenyl-bpe-Cu promoted *Z* olefin reaction transition state energies and Gibbs free energies calculated with M06-L/Def2SVP, calculations were carried out in thf with the SMD solvation model.

Transition State	E [Hartree]	ΔE [kcal/mol]	G [Hartree]	ΔG [kcal/mol]	ΔG_{corr} [kcal/mol]	Freq [cm^{-1}]
Phbpe_Z_major	-4444.643311	2.2	-4443.815522	0.9	-1.4	-85.19
Phbpe_*Z*_minor	-4444.643477	2.1	-4443.813744	2.0	-0.2	-147.29

Table S13. Phenyl-bpe–Cu promoted Z olefin reaction transition state single point energies calculated with M06-L/Def2TZVPP, calculations were carried out in thf with the SMD solvation model.

Transition State	**E [Hartree]**	**ΔE [kcal/mol]**	**ΔG [kcal/mol]**
Phbpe_Z_major	-4447.393365	0.0	0.0
Phbpe_*Z*_minor	-4447.393022	0.2	1.4

11.3. Coordinates after optimization with M06L/DF-Def2SVP$_{THF(SMD)}$

83

benzP_Major / electronic enery: -3754.449082 a.u. / lowest freq: -111.0521 cm^{-1}

C	**4.677919**	**-2.402873**	**0.282091**
C	**3.513870**	**-2.297138**	**-0.475714**
C	**4.863299**	**-1.567334**	**1.382402**
C	**3.858560**	**-0.674962**	**1.750311**
C	**2.670269**	**-0.571543**	**1.011147**
C	**2.521263**	**-1.358891**	**-0.155359**
H	**5.443054**	**-3.133492**	**0.008485**
H	**3.377949**	**-2.962235**	**-1.331507**
H	**5.781950**	**-1.625976**	**1.971341**
H	**4.002145**	**-0.058057**	**2.641091**
P	**1.250870**	**0.455179**	**1.591764**
P	**1.057286**	**-1.088712**	**-1.243241**
C	**0.550605**	**-0.586147**	**3.022707**
Cu	**-0.136755**	**0.603509**	**-0.266438**
C	**2.065504**	**1.850712**	**2.445220**
C	**0.373348**	**-2.774176**	**-1.408123**
C	**0.042768**	**-1.894688**	**2.426683**
C	**-0.626994**	**0.210565**	**3.582009**
C	**1.558043**	**-0.877343**	**4.125732**
H	**2.760391**	**1.547889**	**3.241022**
H	**1.300085**	**2.503262**	**2.885578**
H	**2.616640**	**2.450712**	**1.708698**
H	**-0.672220**	**-1.706015**	**1.609941**
H	**-0.477431**	**-2.487883**	**3.196700**
H	**0.862167**	**-2.517821**	**2.033044**
H	**2.397115**	**-1.497219**	**3.777292**
H	**1.066190**	**-1.438551**	**4.937372**
H	**1.971050**	**0.035674**	**4.579939**
H	**-1.387853**	**0.402936**	**2.811003**
H	**-0.314229**	**1.174146**	**4.013024**
H	**-1.114664**	**-0.359174**	**4.390095**
C	**1.733358**	**-0.712366**	**-2.976023**

C	**2.616825**	**0.523537**	**-2.855914**
C	**0.492083**	**-0.383739**	**-3.808196**
C	**2.502334**	**-1.843025**	**-3.646831**
H	**-0.114386**	**0.407904**	**-3.342687**
H	**-0.159540**	**-1.259642**	**-3.949889**
H	**0.788930**	**-0.035077**	**-4.810202**
H	**-0.063094**	**-3.079313**	**-0.447263**
H	**1.129248**	**-3.519638**	**-1.695380**
H	**-0.431034**	**-2.776438**	**-2.156197**
H	**3.477238**	**-2.030253**	**-3.176868**
H	**2.710051**	**-1.571480**	**-4.695038**
H	**1.940835**	**-2.788812**	**-3.671324**
H	**2.081202**	**1.345749**	**-2.358663**
H	**2.926066**	**0.874128**	**-3.853675**
H	**3.533387**	**0.321872**	**-2.279378**
B	**-2.050511**	**-0.092286**	**-0.142459**
O	**-2.860261**	**-0.186405**	**0.974557**
O	**-2.579988**	**-0.834731**	**-1.193012**
C	**-4.095165**	**-0.846808**	**0.597823**
C	**-3.663259**	**-1.645201**	**-0.673656**
C	**-5.113993**	**0.237751**	**0.290179**
C	**-4.561633**	**-1.697202**	**1.758772**
C	**-4.733300**	**-1.770380**	**-1.736361**
C	**-3.097400**	**-3.015063**	**-0.335894**
H	**-3.776072**	**-2.377469**	**2.112555**
H	**-5.441051**	**-2.298051**	**1.483462**
H	**-4.850311**	**-1.057747**	**2.604917**
H	**-2.319631**	**-2.952097**	**0.439217**
H	**-2.645410**	**-3.462774**	**-1.231561**
H	**-3.878766**	**-3.701476**	**0.020400**
H	**-5.059109**	**-0.792720**	**-2.112739**
H	**-5.615209**	**-2.301611**	**-1.348646**
H	**-4.352131**	**-2.344353**	**-2.592688**
H	**-4.793388**	**0.868895**	**-0.551600**
H	**-5.242850**	**0.885950**	**1.168320**
H	**-6.098264**	**-0.184695**	**0.042102**

C	-1.614451	1.939518	-0.663327
C	-0.326092	2.413437	-1.197918
C	-2.269647	2.689206	0.477377
H	-1.674789	2.658374	1.399120
H	-3.258167	2.281273	0.718648
H	-2.395869	3.750732	0.212720
H	-2.332894	1.702707	-1.463297
C	0.331839	3.642325	-0.711402
C	1.708065	3.913029	-1.251694
F	0.400457	3.698744	0.674129
F	-0.445141	4.795133	-1.014920
H	2.412445	3.143389	-0.911769
H	2.059159	4.892213	-0.900525
H	1.699604	3.918480	-2.348843
H	-0.216380	2.333443	-2.286669

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benzP_Minor / electronic enery: -3754.444127 a.u. / lowest freq: -118.7019 cm^{-1}

C	-4.868574	1.532579	-1.379345
C	-3.736210	0.840454	-1.802571
C	-4.891767	2.114220	-0.112779
C	-3.764128	2.036375	0.700835
C	-2.609863	1.357600	0.281925
C	-2.610266	0.707328	-0.975683
H	-5.737026	1.609288	-2.038209
H	-3.737976	0.390117	-2.796902
H	-5.782183	2.642736	0.236489
H	-3.782542	2.522046	1.680036
P	-1.074668	1.355902	1.299611
P	-1.167301	-0.353003	-1.431906
C	-0.423380	3.130415	1.127760
Cu	0.118000	-0.456017	0.467484
C	-1.710269	1.293815	3.012357
C	-0.474266	0.515819	-2.885433
C	0.107984	3.266492	-0.294609
C	0.727496	3.252540	2.125728
C	-1.463058	4.208909	1.398021

H	-2.323786	2.159639	3.302141
H	-0.865886	1.223196	3.712207
H	-2.312243	0.381876	3.132470
H	0.867011	2.497817	-0.507544
H	0.577947	4.253624	-0.436753
H	-0.695704	3.177943	-1.043754
H	-2.259303	4.224847	0.639923
H	-0.981799	5.200806	1.374746
H	-1.934391	4.111043	2.387810
H	1.473040	2.455007	1.988319
H	0.375784	3.228704	3.168378
H	1.244930	4.215694	1.983860
C	-1.828218	-1.963911	-2.184612
C	-2.852764	-2.546400	-1.218519
C	-0.591696	-2.864733	-2.234469
C	-2.409571	-1.861930	-3.589923
H	-0.134577	-2.968012	-1.241709
H	0.177475	-2.474335	-2.919685
H	-0.866676	-3.870584	-2.590484
H	0.032483	1.432700	-2.556212
H	-1.244344	0.788145	-3.622424
H	0.274875	-0.122489	-3.374602
H	-3.344210	-1.287964	-3.640348
H	-2.649035	-2.873680	-3.956683
H	-1.701705	-1.427033	-4.310225
H	-2.451606	-2.609724	-0.195941
H	-3.129723	-3.567697	-1.525630
H	-3.777641	-1.950396	-1.185110
B	2.035325	-0.027165	-0.042400
O	2.759177	0.994997	0.553493
O	2.660290	-0.462727	-1.197116
C	4.043727	1.092517	-0.108632
C	3.743824	0.452511	-1.503231
C	5.029280	0.279736	0.714248
C	4.459626	2.546761	-0.150699
C	4.892453	-0.333127	-2.097484

C 3.216432 1.460622 -2.510737

H 3.682739 3.185768 -0.590615

H 5.384806 2.679051 -0.731051

H 4.653011 2.915137 0.866941

H 2.387315 2.051374 -2.094855

H 2.841389 0.934409 -3.399499

H 4.000077 2.157247 -2.841275

H 5.196826 -1.169196 -1.455281

H 5.768679 0.311744 -2.261095

H 4.603182 -0.751253 -3.071852

H 4.742328 -0.780927 0.756775

H 5.048345 0.660101 1.745249

H 6.051625 0.341254 0.314810

C 1.574816 -1.578260 1.351634

C 0.265275 -1.790308 1.998457

C 2.255569 -2.744981 0.668049

H 2.382186 -3.575543 1.379830

H 3.249095 -2.475434 0.286025

H 1.684655 -3.138671 -0.182155

H 2.276088 -1.030200 1.998690

C -0.373167 -3.112599 2.127915

C -1.732094 -3.111701 2.771174

F 0.425514 -4.005210 2.894122

F -0.465109 -3.788097 0.915365

H -1.671628 -2.697690 3.785588

H -2.116808 -4.137699 2.836299

H -2.436298 -2.503157 2.190133

H 0.129605 -1.225659 2.929902

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Phenyl_bpe_*E*_Major / electronic enery: -4444.648098 a.u. / lowest freq: -44.7263 cm^{-1}

P -0.263335 -1.982130 -0.107530

C 0.960702 -3.405460 -0.283944

C 0.281723 -4.367793 -1.266928

C 2.378926 -3.043604 -0.625075

H 0.967045 -3.904793 0.701155

H 0.370694 -3.976981 -2.295449

H	0.778664	-5.350647	-1.257457
C	-1.176176	-4.441915	-0.854242
C	-1.695318	-3.007773	-0.809595
H	-1.780685	-5.062592	-1.535050
H	-1.237626	-4.914473	0.140589
H	-1.784351	-2.645171	-1.843036
C	-2.996768	-2.743364	-0.108876
C	-0.586086	-2.054951	1.715868
C	-1.418706	-0.889009	2.229914
H	-1.057544	-3.019329	1.973052
H	0.407310	-2.067958	2.192275
H	-2.482999	-1.030323	1.980959
H	-1.365314	-0.820714	3.330919
P	-0.926355	0.726224	1.468467
C	-2.264393	1.888484	2.131458
C	0.361500	1.342213	2.710482
C	-0.458807	2.018200	3.802142
C	1.331004	0.270645	3.111901
H	0.904709	2.115070	2.143036
H	-0.940952	1.265764	4.449837
H	0.174958	2.636726	4.458623
C	-1.530308	2.828355	3.098341
C	-3.515809	-3.603156	0.870575
C	-3.713064	-1.567646	-0.397087
C	-4.901500	-1.268773	0.264831
C	-4.701653	-3.298679	1.542052
C	-5.401543	-2.130702	1.242922
H	-3.319390	-0.876569	-1.146564
H	-2.991649	-4.529416	1.119239
H	-5.083369	-3.987330	2.300618
H	-5.444646	-0.355151	0.009347
H	-6.334901	-1.897912	1.761931
C	3.431918	-3.777101	-0.056353
C	2.695766	-2.017414	-1.524972
C	4.759533	-3.498010	-0.376240
C	4.023289	-1.730883	-1.840959

C	5.060211	-2.469223	-1.270839
H	6.100480	-2.240610	-1.517655
H	3.200253	-4.576527	0.655460
H	5.563506	-4.080987	0.081090
H	4.242768	-0.911149	-2.529215
H	1.893700	-1.414506	-1.961809
u	-0.165559	0.325613	-0.731617
B	1.536822	1.472471	-0.713360
O	1.521452	2.686502	-0.047395
O	2.787393	1.212014	-1.225231
H	-2.237617	3.299224	3.798343
H	-1.059134	3.649050	2.530491
C	2.341915	-0.123271	2.217112
C	1.235241	-0.415844	4.331206
C	3.209102	-1.170338	2.517155
C	2.100528	-1.469833	4.632989
C	3.086836	-1.857680	3.726475
C	-3.036603	2.567810	1.038966
H	-2.953316	1.252054	2.712190
C	-2.389848	3.417890	0.127993
C	-4.412808	2.359747	0.889257
C	-5.126264	2.978833	-0.138530
C	-3.100881	4.046226	-0.891987
C	-4.473100	3.826760	-1.031784
H	-1.308426	3.576117	0.216071
H	-4.930803	1.699113	1.591329
H	-6.199944	2.798340	-0.238906
H	-2.579495	4.706680	-1.590309
H	-5.029543	4.315037	-1.835624
H	2.001081	-1.990572	5.589114
H	3.762596	-2.683269	3.964275
H	2.433844	0.383761	1.253394
H	3.981586	-1.451741	1.795689
H	0.471652	-0.132257	5.060002
C	2.842530	3.283530	-0.037690
C	3.699234	2.300556	-0.939306

C 2.722118 4.694553 -0.585111

C 3.298881 3.358486 1.410580

C 4.915326 1.717806 -0.242233

C 4.118878 2.890214 -2.275220

H 3.330239 2.373511 1.894420

H 4.297439 3.809325 1.498465

H 2.602693 3.988507 1.983266

H 4.648429 1.157885 0.663899

H 5.436896 1.024338 -0.916485

H 5.630132 2.504124 0.039852

H 2.318208 4.722249 -1.604383

H 2.046684 5.281309 0.053551

H 3.696119 5.204689 -0.592235

H 3.259905 3.239095 -2.863367

H 4.812401 3.733854 -2.150703

H 4.633158 2.122675 -2.870644

H -0.271363 3.055162 -3.690890

H 0.839152 0.800903 -3.077502

H 1.092793 3.235921 -2.574134

C 0.087806 2.806201 -2.676929

C 0.056378 1.312255 -2.496889

H -2.111073 1.281818 -2.433620

C -1.221889 0.639119 -2.502496

H -0.567205 3.323173 -1.963577

H -2.157472 0.733675 -5.147592

H -0.398273 0.466741 -5.198467

C -1.362766 0.000180 -4.961899

C -1.391340 -0.435355 -3.520235

F -2.592978 -1.107476 -3.330378

H -1.513420 -0.860316 -5.628066

F -0.408044 -1.413745 -3.370721

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Phenyl_bpe_*E*_Minor / electronic enery: -4444.647524 a.u. / lowest freq: -140.5469 cm^{-1}

P -0.179029 2.012768 -0.737605

C -1.619279 3.214077 -1.065010

C -1.149069 4.086921 -2.227311

C	-2.965844	2.564443	-1.198858
H	-1.639744	3.843522	-0.158717
H	-1.262706	3.552207	-3.185092
H	-1.761399	4.998993	-2.303931
C	0.318837	4.383079	-1.991616
C	1.006218	3.035739	-1.804602
H	0.775019	4.954126	-2.815918
H	0.421797	5.002027	-1.084283
H	0.987307	2.503319	-2.772207
C	2.415698	3.022449	-1.297601
C	0.274815	2.483260	0.999094
C	1.264230	1.523629	1.646543
H	0.655254	3.518911	1.029496
H	-0.676106	2.489823	1.559407
H	2.260666	1.632723	1.183338
H	1.389534	1.749762	2.718157
P	0.818713	-0.250867	1.387885
C	2.155542	-1.193127	2.327586
C	-0.496132	-0.712373	2.690785
C	0.179546	-1.707829	3.646092
C	-1.177957	0.452449	3.345657
H	-1.238594	-1.255799	2.086270
H	0.545676	-1.185182	4.543679
H	-0.548048	-2.453264	4.001441
C	1.358947	-2.342322	2.935624
C	2.935632	4.039098	-0.482573
C	3.247936	1.935472	-1.610647
C	4.554927	1.869986	-1.136406
C	4.243306	3.969884	0.001464
C	5.059754	2.886668	-0.323407
H	2.860490	1.128148	-2.236366
H	2.319581	4.904283	-0.224234
H	4.628420	4.776397	0.631119
H	5.180773	1.016146	-1.407825
H	6.086548	2.839074	0.049304
C	-3.756014	2.379656	-0.054701

C	-3.480283	2.126990	-2.427853
C	-5.008391	1.773794	-0.127351
C	-4.735749	1.524038	-2.506163
C	-5.505773	1.342218	-1.357771
H	-6.489936	0.870945	-1.421778
H	-3.375084	2.729929	0.909389
H	-5.602748	1.643882	0.781821
H	-5.114585	1.192916	-3.476852
H	-2.896712	2.256585	-3.342802
Cu	0.044533	-0.318847	-0.751775
B	-1.537876	-1.622781	-0.676061
O	-1.269434	-2.818102	-0.015021
O	-2.886070	-1.502680	-0.941374
H	1.981340	-2.945980	3.614715
H	1.002501	-3.022059	2.141131
C	-2.449502	0.864312	2.918999
C	-0.564273	1.182563	4.377090
C	-3.091989	1.951485	3.511850
C	-1.198018	2.277105	4.961970
C	-2.469022	2.664934	4.535267
C	3.416492	-1.546717	1.596902
H	2.426313	-0.500564	3.146853
C	3.695536	-2.857800	1.186125
C	4.386743	-0.561429	1.356264
C	5.589237	-0.873305	0.726596
C	4.896979	-3.171357	0.550703
C	5.849876	-2.181483	0.316896
H	2.966846	-3.651714	1.366605
H	4.201512	0.464931	1.689305
H	6.333289	-0.089481	0.561631
H	5.089317	-4.201562	0.239047
H	6.793663	-2.428132	-0.175475
H	-0.696652	2.828829	5.761377
H	-2.971533	3.516501	5.000333
H	-2.935561	0.325786	2.099514
H	-4.089352	2.243395	3.171278

H	0.430844	0.894337	4.729027
C	-2.449889	-3.656544	-0.113834
C	-3.586877	-2.600890	-0.301307
C	-2.269045	-4.545662	-1.332960
C	-2.557549	-4.496282	1.139409
C	-4.136359	-2.092483	1.019820
C	-4.719742	-3.038433	-1.204737
H	-2.539844	-3.884036	2.050264
H	-3.485304	-5.087475	1.142555
H	-1.716187	-5.201511	1.196539
H	-3.330534	-1.810285	1.711828
H	-4.757052	-1.202810	0.844630
H	-4.761282	-2.847164	1.518412
H	-2.203029	-3.959188	-2.261360
H	-1.340583	-5.125353	-1.233200
H	-3.097241	-5.259384	-1.447017
H	-4.374207	-3.265925	-2.221119
H	-5.223242	-3.930789	-0.804144
H	-5.471862	-2.240382	-1.281641
H	-1.103150	0.514687	-3.372075
H	-0.625925	-2.405165	-2.464955
H	-2.397824	-0.680310	-3.150467
C	-1.332612	-0.562318	-3.387982
C	-0.433989	-1.320604	-2.443400
H	1.246804	-0.152345	-3.183588
C	0.981371	-0.948409	-2.475054
H	-1.172000	-0.909024	-4.423098
H	1.406123	-2.906615	-0.534023
H	0.932574	-3.782336	-2.006023
C	1.732865	-3.192616	-1.541861
C	2.033855	-1.975358	-2.366164
F	3.222275	-1.405399	-1.907110
H	2.630086	-3.820462	-1.474761
F	2.413560	-2.433614	-3.649133

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Phenyl_boe_*Z*_Major / electronic enery: -4444.643311 a.u. / lowest freq: -85.1912 cm^{-1}

P	0.396102	2.069080	-0.293021
C	-0.872556	3.445139	-0.616354
C	-0.090703	4.582940	-1.291939
C	-2.085626	3.002188	-1.380912
H	-1.190830	3.778686	0.385635
H	-0.061636	4.410561	-2.381276
H	-0.603099	5.546141	-1.145480
C	1.322324	4.580968	-0.745202
C	1.835811	3.155142	-0.886712
H	1.975825	5.298994	-1.266771
H	1.309075	4.885968	0.315017
H	1.931002	2.933742	-1.964027
C	3.122391	2.789608	-0.211107
C	0.615121	2.252658	1.546620
C	1.388337	1.109680	2.191409
H	1.095250	3.221478	1.767246
H	-0.400713	2.315899	1.967054
H	2.452463	1.143760	1.906040
H	1.357040	1.191556	3.291964
P	0.738972	-0.526336	1.630259
C	1.965392	-1.781515	2.334370
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C	0.274834	-1.449284	4.118067
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O	-1.661511	-2.467862	0.174996
O	-2.876360	-0.921254	-0.970058
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H	5.241584	-3.507380	-0.535935
H	1.316203	-5.281484	-0.701420
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109

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B	-1.649199	-1.451829	-0.543887
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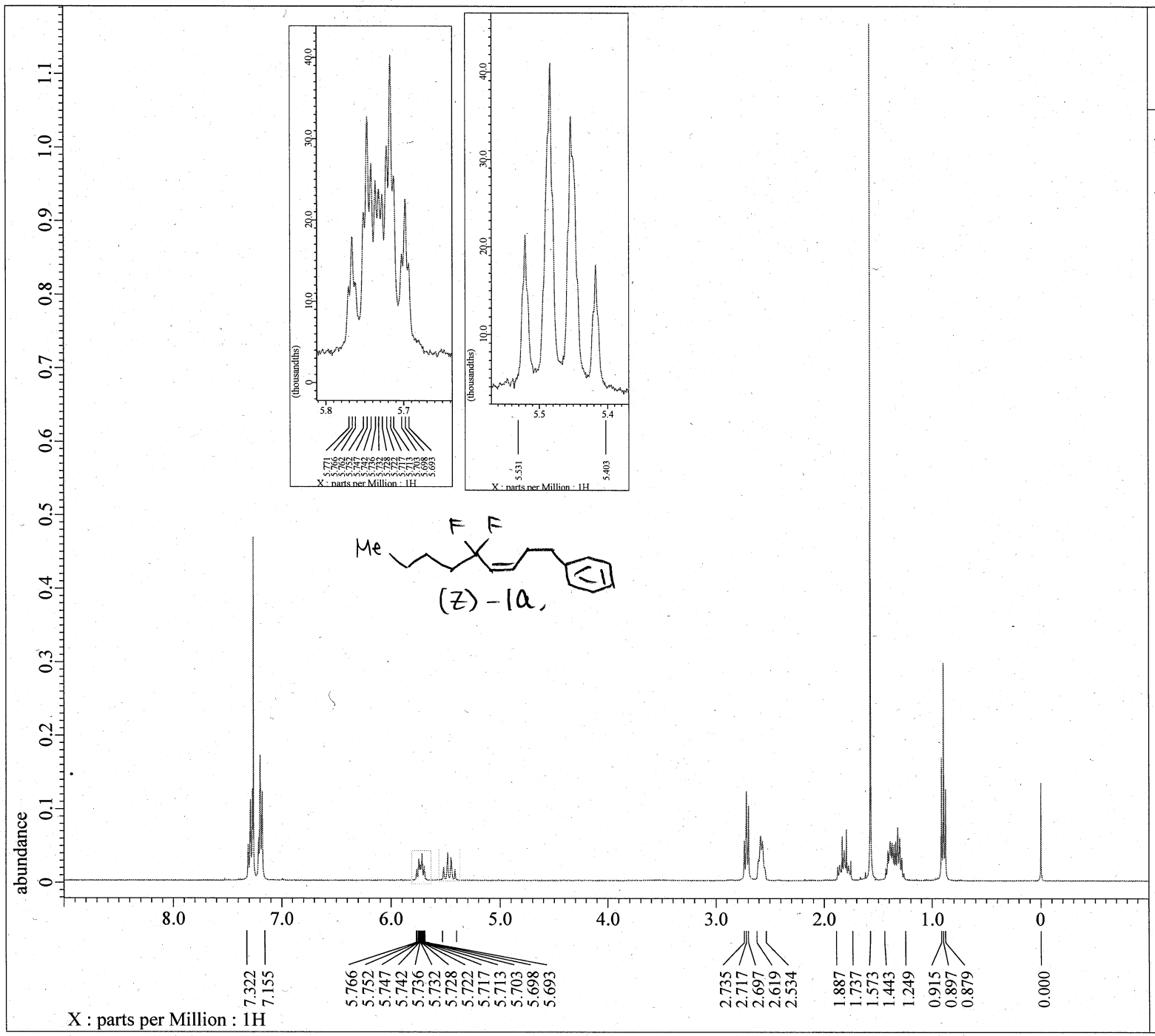
19. Lichtenberger, D. L. & Gladysz, J. A. *Organometallics* **2014**, *33*, 835. The “coordinates.xyz” file can be generated by copying all the coordinates in Section 11.3 into a text file without empty lines and changing the extension to “.xyz”.



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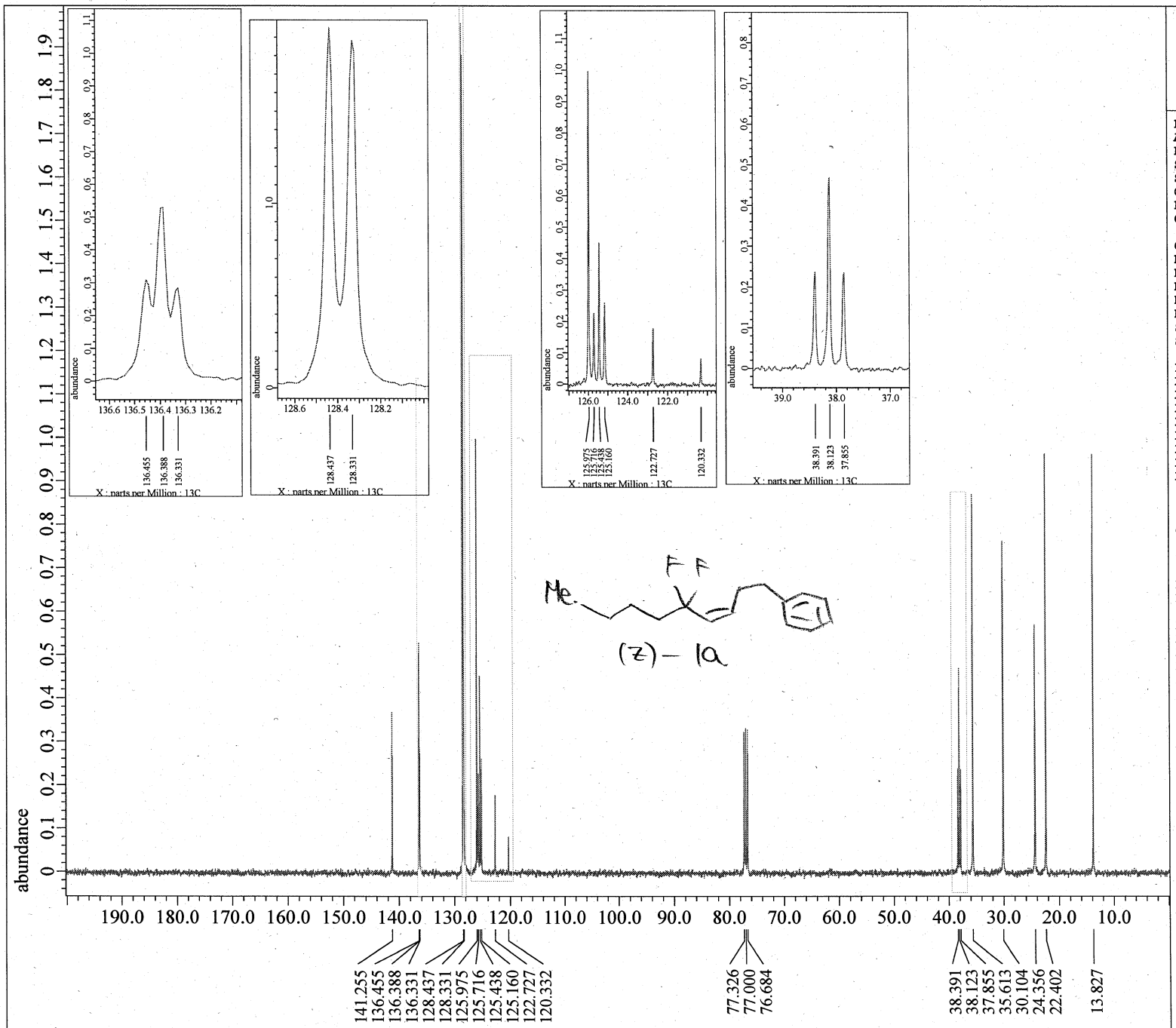

JEOL Solutions for Innovation

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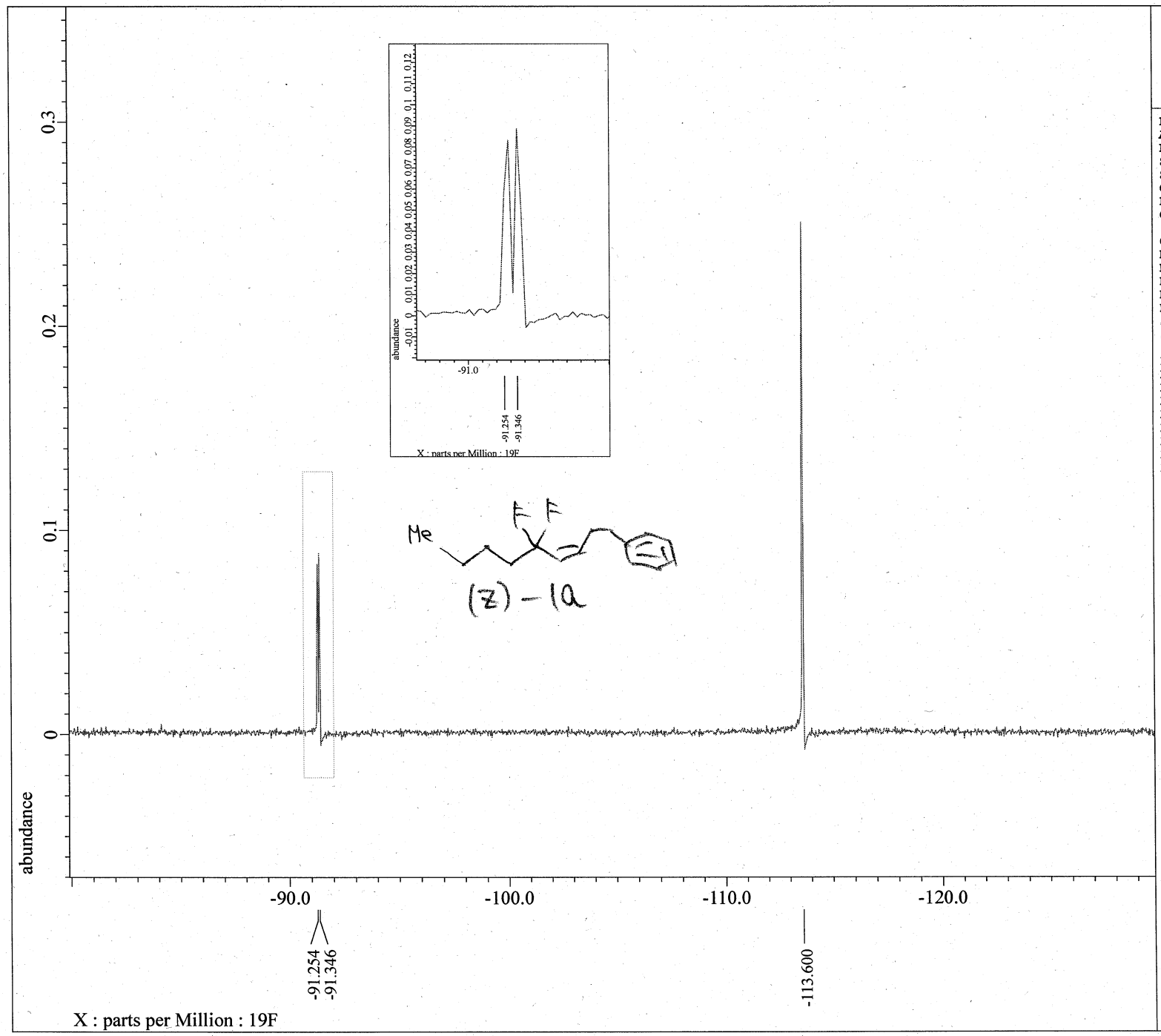

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Solutions for Innovation

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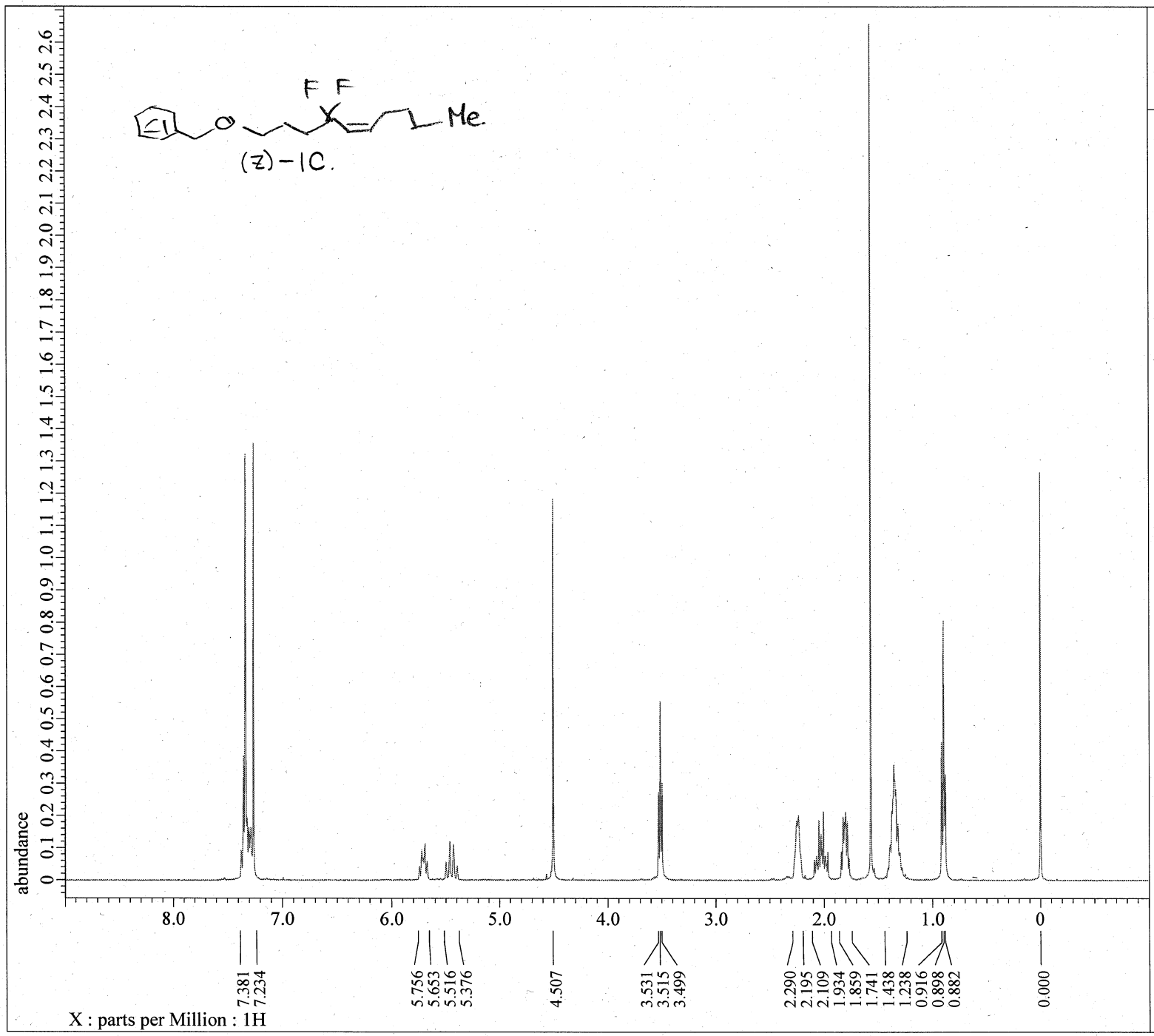
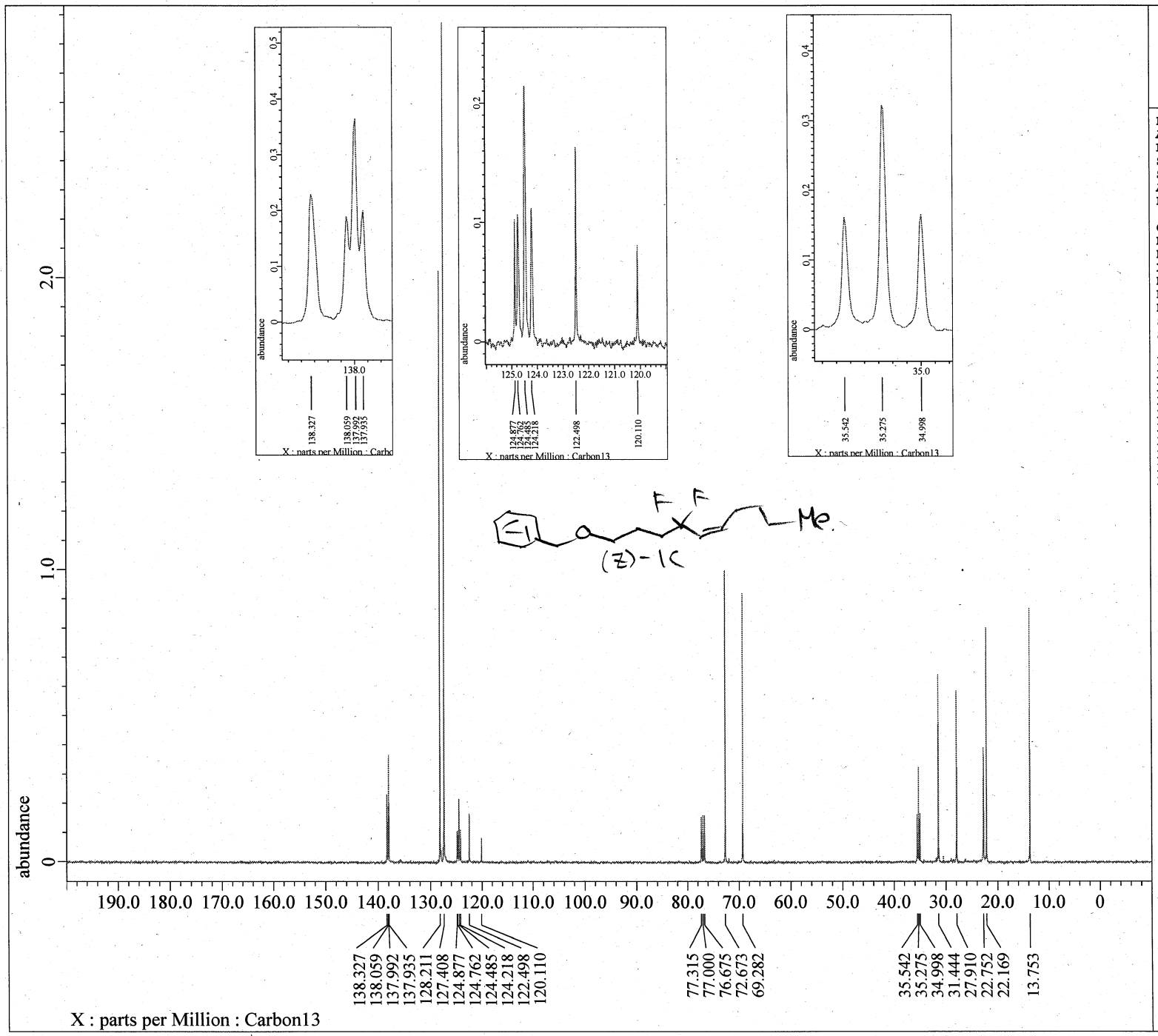
Solvent	= CHLOROFORM-D
Creation_Time	= 10-JUL-2018 10:10:09
Revision_Time	= 10-JUL-2018 15:25:27
Current_Time	= 10-JUL-2018 15:25:31
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 20.4[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



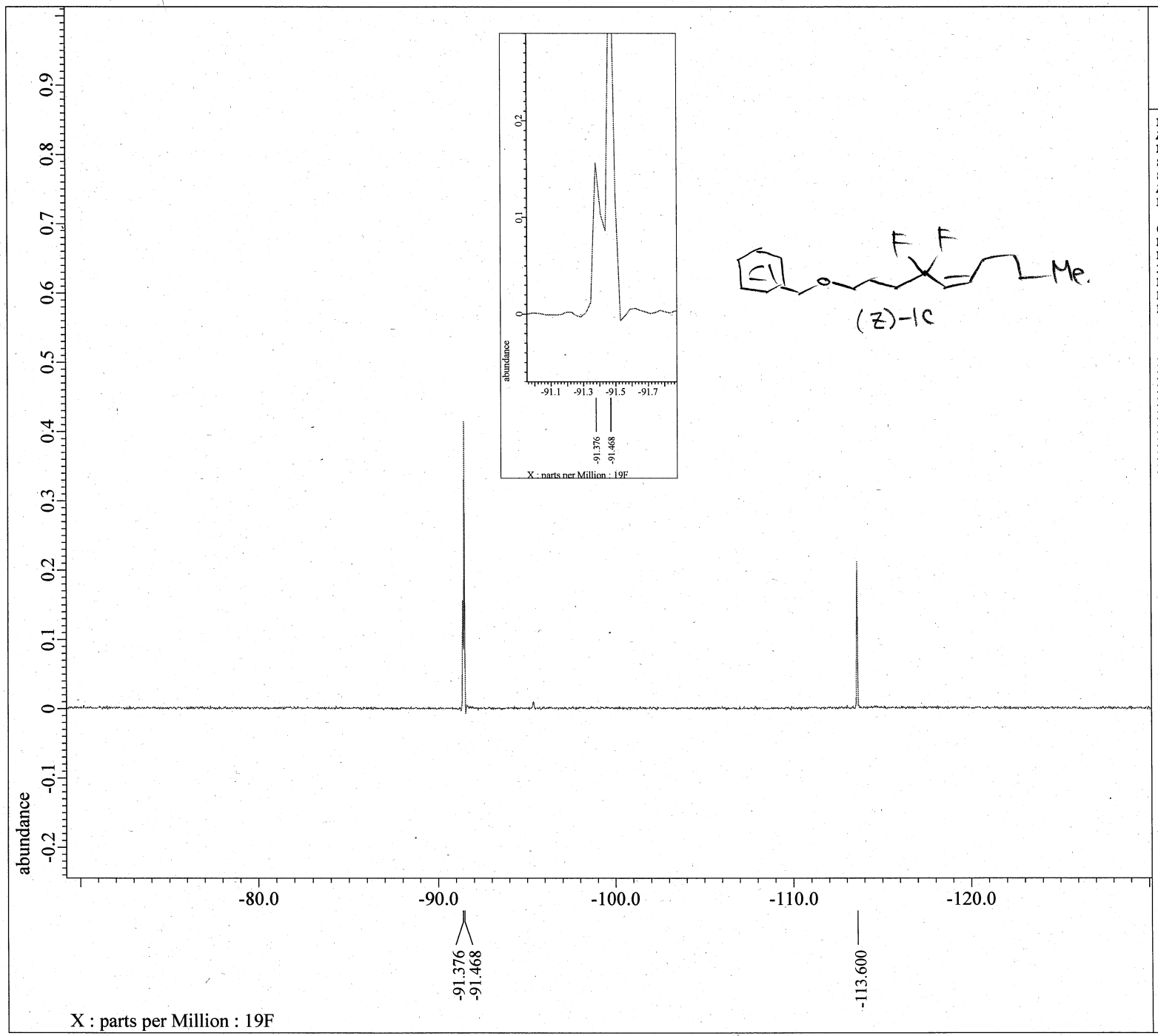
JEOL

Filename	= AKY684-pure-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#773695
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 10-OCT-2018 05:01:06
Revision_Time	= 29-MAR-2019 18:48:42
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 48
Temp_Get	= 19.6[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]



JEOL

Filename	= AKY684-carbon_Carbon-1-2.
Author	= element
Experiment	= carbon.jxp
Sample_Id	= AKY684-carbon
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 9-OCT-2018 22:33:41
Revision_Time	= 13-NOV-2018 12:54:34
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.04333312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clipped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 19.1[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_Noe	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]



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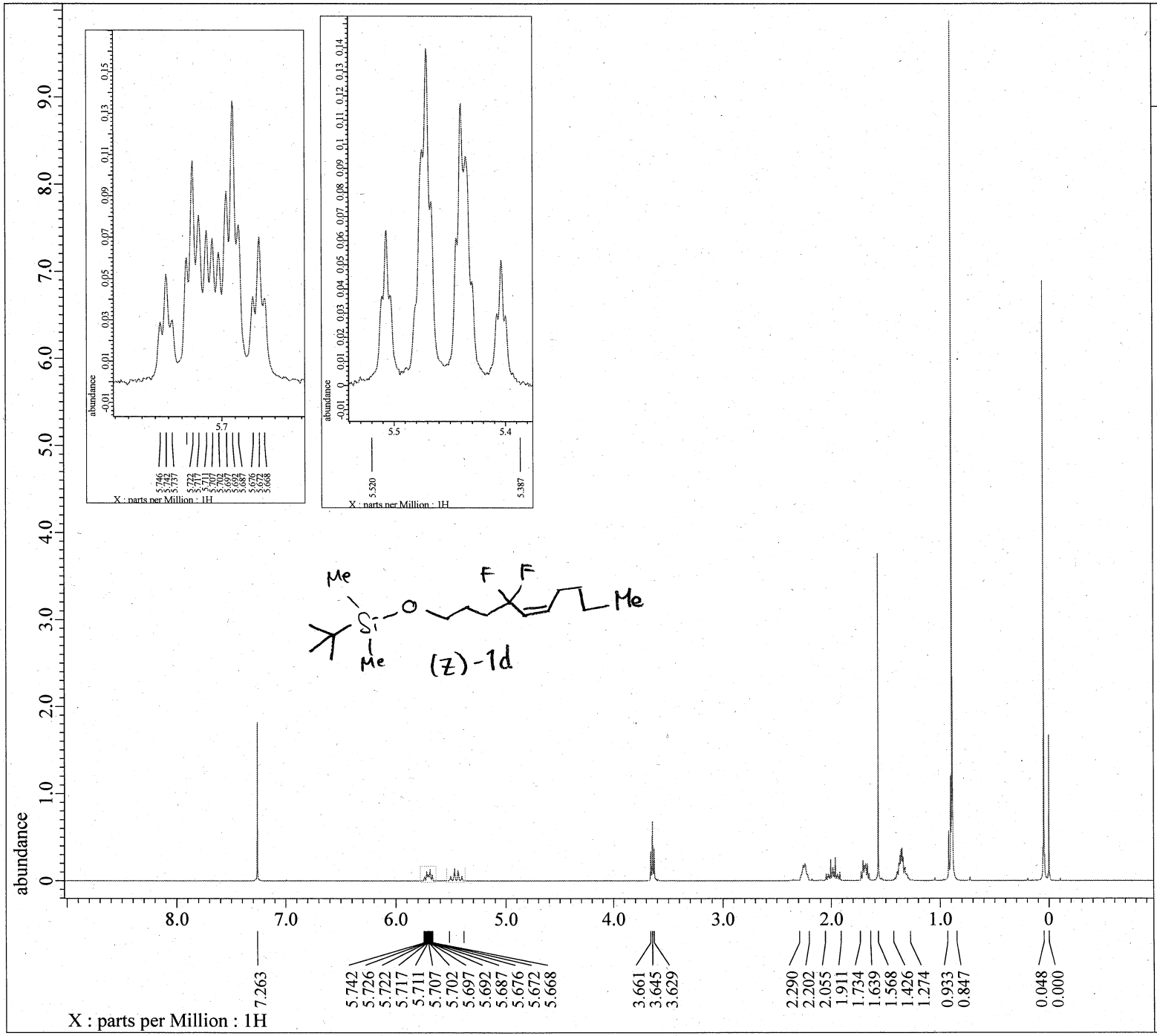
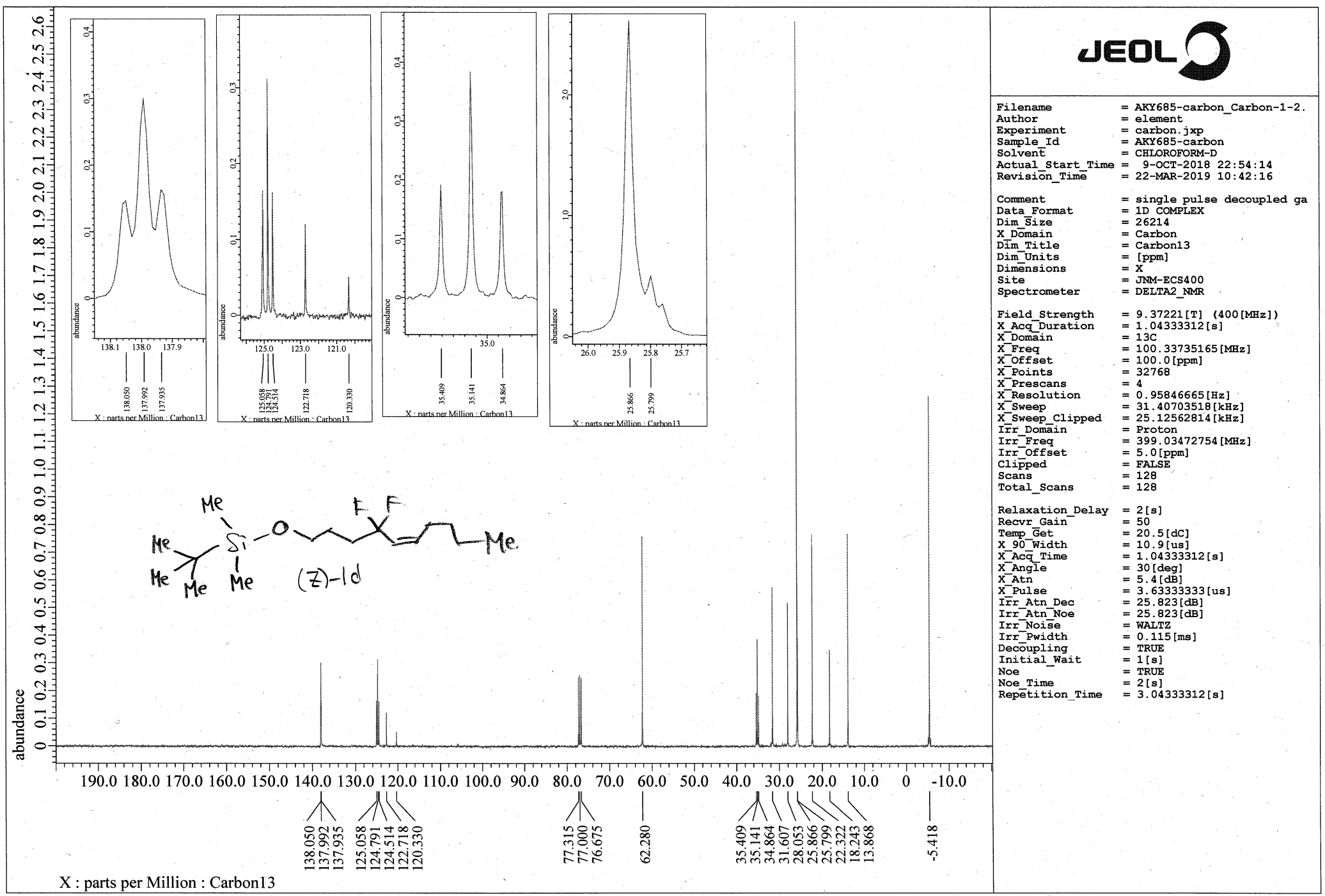
JEOL

Filename	= AKY684-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#825610
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 10-OCT-2018 07:25:41
Revision_Time	= 13-NOV-2018 12:59:12
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 23.3[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



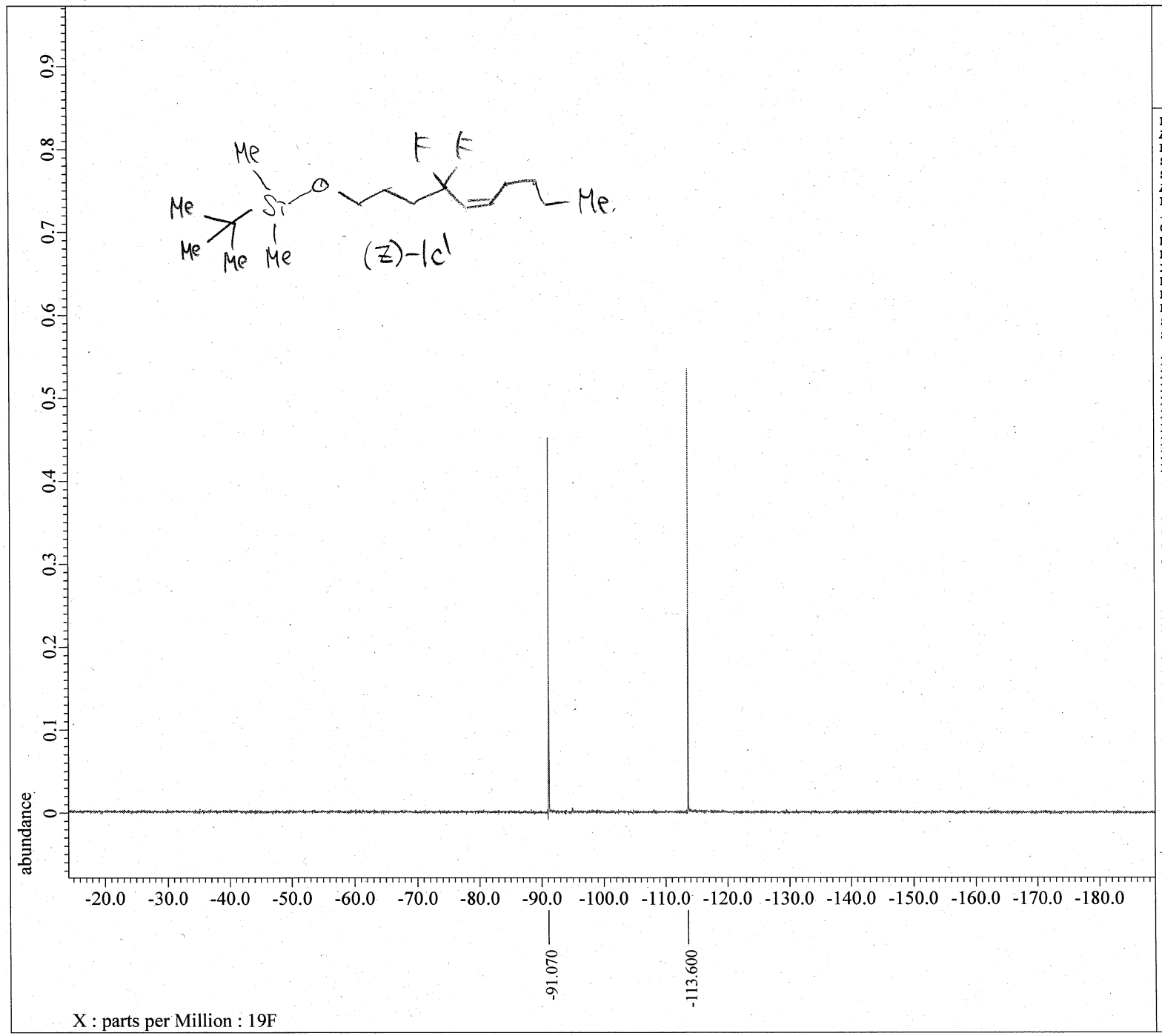
JEOL

Filename	= AKY685-pure-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#777806
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 10-OCT-2018 05:07:57
Revision_Time	= 29-MAR-2019 19:00:07
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 46
Temp_Get	= 19.5[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]



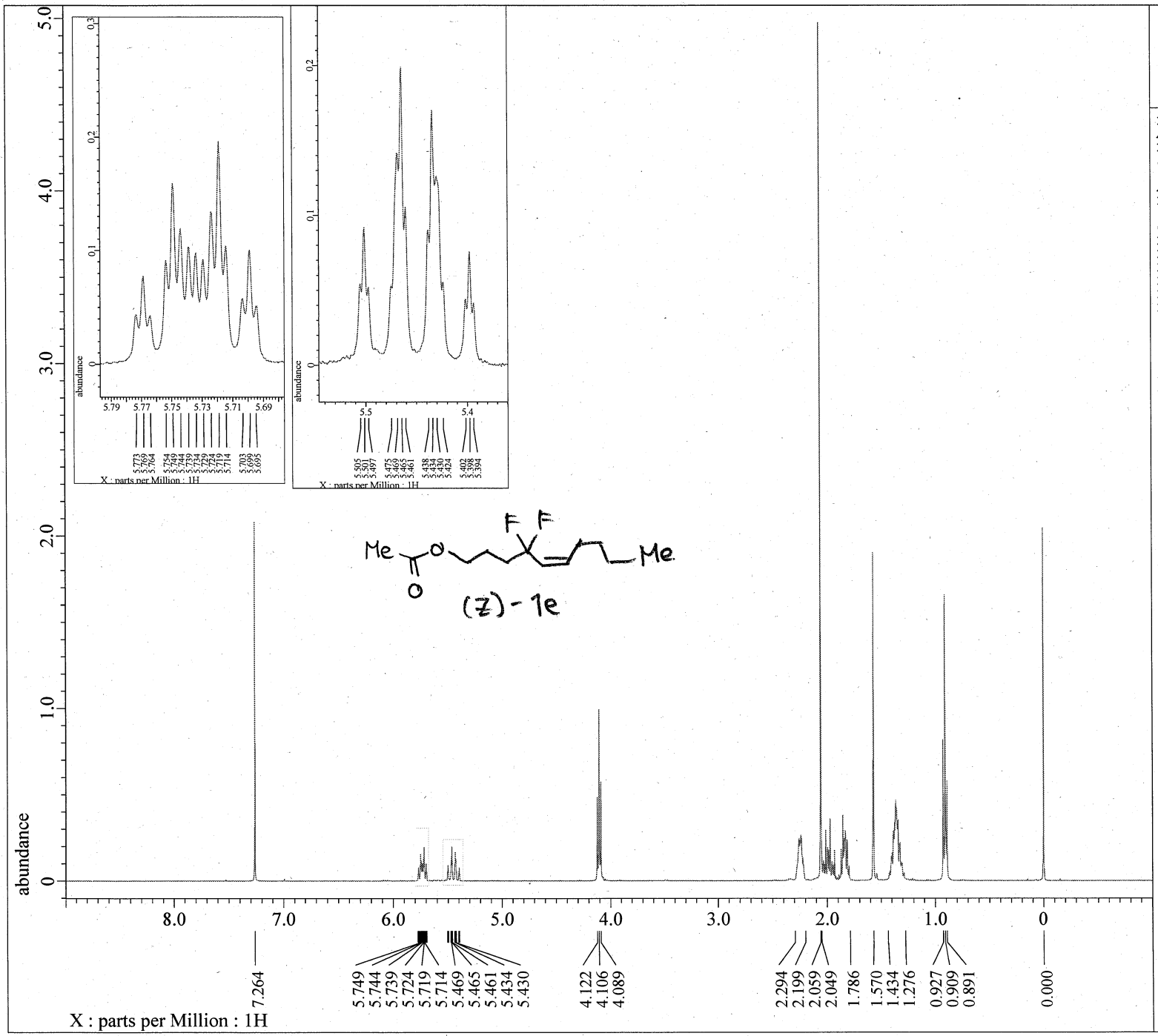
JEOL

Filename	= AKY685-carbon_Carbon-1-2.
Author	= element
Experiment	= carbon.jxp
Sample_Id	= AKY685-carbon
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 9-OCT-2018 22:54:14
Revision_Time	= 22-MAR-2019 10:42:16
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.04333312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clipped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 20.5[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_Noe	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]

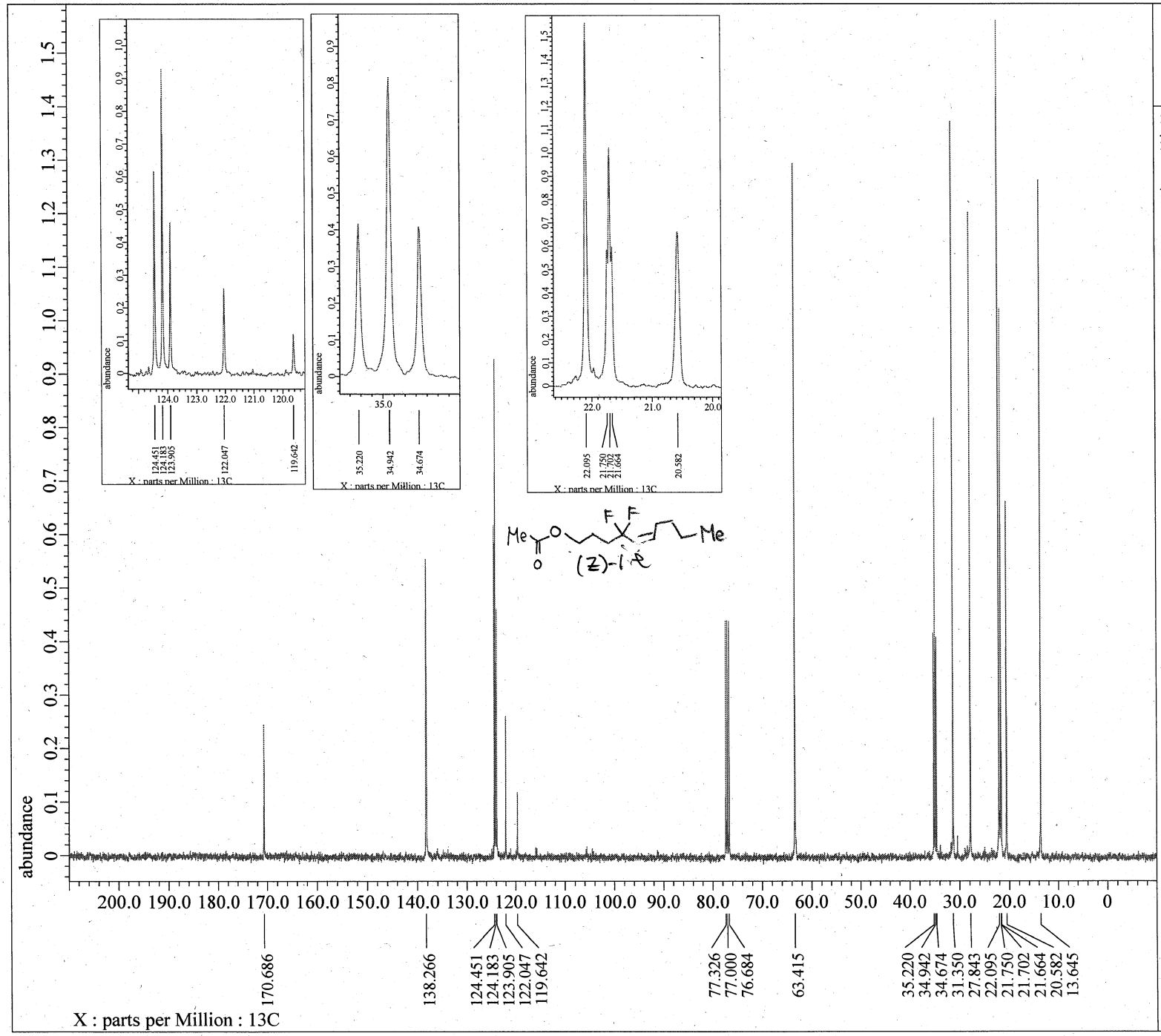


JEOL

```
Filename           = AKY685-fnmr-2.jdf
Author             = element
Experiment         = single_pulse.ex2
Sample_Id          = S#829270
Solvent            = CHLOROFORM-D
Actual_Start_Time  = 10-OCT-2018 07:31:38
Revision_Time      = 22-MAR-2019 10:54:29

Comment            = single_pulse
Data_Format        = 1D COMPLEX
Dim_Size           = 13107
X_Domain           = 19F
Dim_Title          = 19F
Dim_Units          = [ppm]
Dimensions         = X
Site               = ECX 400P
Spectrometer       = DELTA2_NMR

Field_Strength     = 9.2982153[T] (400[MHz])
X_Acq_Duration     = 87.81824[ms]
X_Domain           = 19F
X_Freq             = 372.50336686[MHz]
X_Offset           = 0[ppm]
X_Points           = 16384
X_Prescans         = 1
X_Resolution       = 11.38715602[Hz]
X_Sweep            = 186.56716418[kHz]
Irr_Domain         = 19F
Irr_Freq           = 372.50336686[MHz]
Irr_Offset         = 5[ppm]
Tri_Domain         = 19F
Tri_Freq           = 372.50336686[MHz]
Tri_Offset         = 5[ppm]
Clipped            = FALSE
Scans              = 8
Total_Scans        = 8

Relaxation_Delay   = 5[s]
Recvr_Gain         = 24
Temp_Get           = 23.5[dC]
X_90_Width         = 13.9[us]
X_Acq_Time         = 87.81824[ms]
X_Angle            = 45[deg]
X_Atn              = 4[dB]
X_Pulse            = 6.95[us]
Irr_Mode           = Off
Tri_Mode           = Off
Dante_Presat       = FALSE
Initial_Wait       = 1[s]
Repetition_Time    = 5.08781824[s]
```

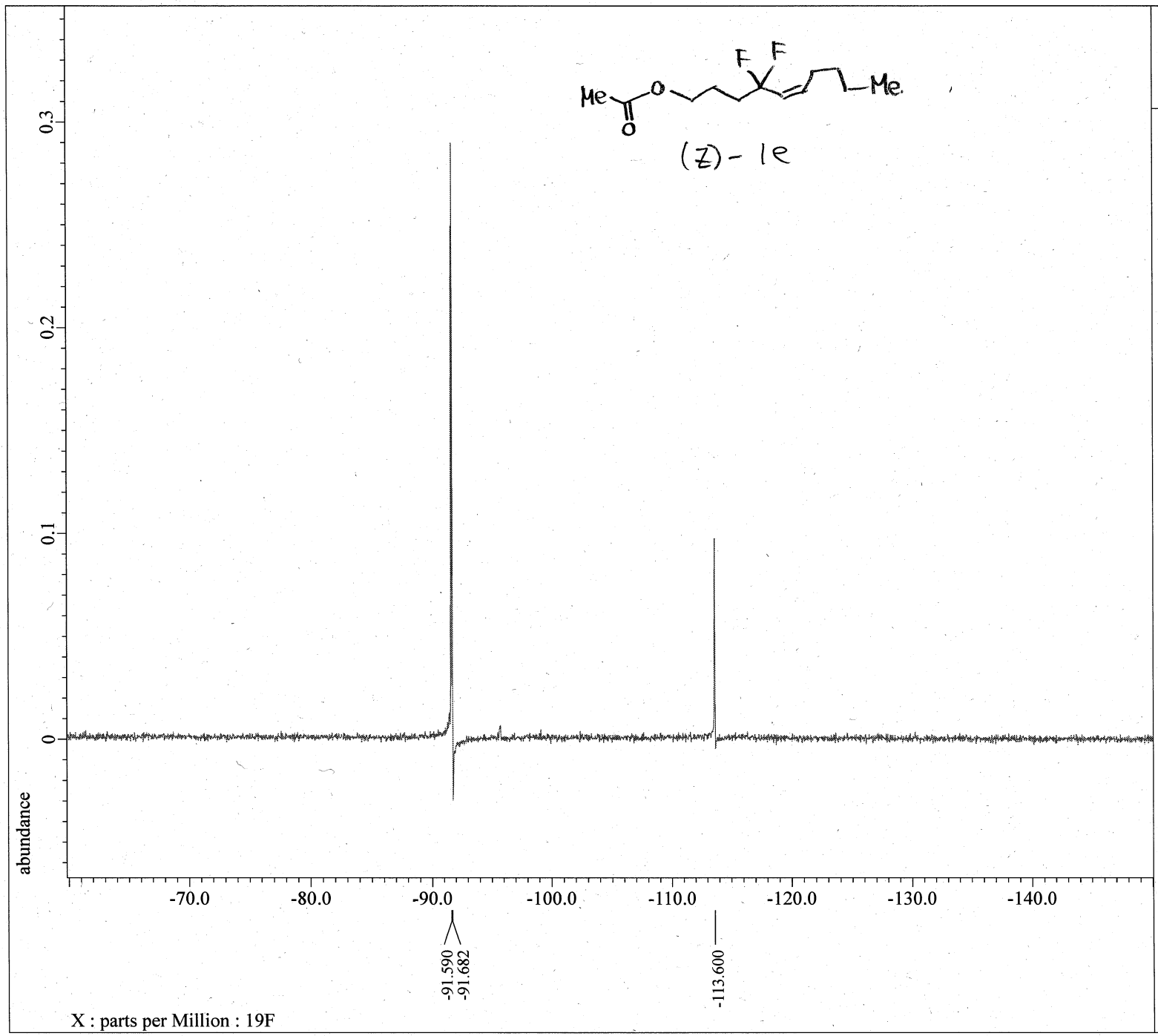


Filename	= AKY662-pureag-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#635534
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 13-SEP-2018 01:14:39
Revision_Time	= 29-MAR-2019 19:10:28
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 46
Temp_Get	= 20.4[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]



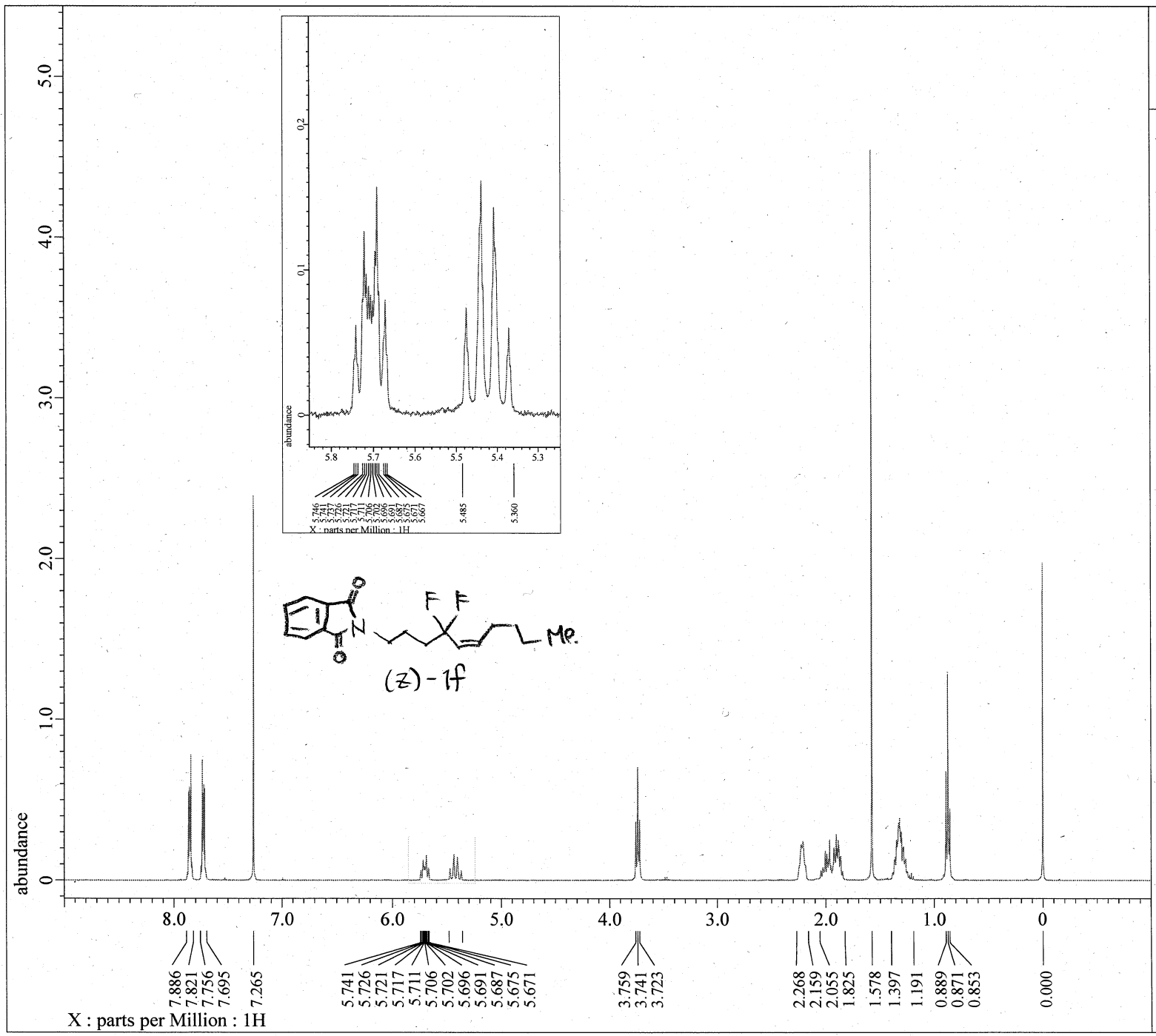
JEOL

Filename	= AKY662-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#471018
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 25-SEP-2018 21:33:54
Revision_Time	= 20-MAR-2019 19:43:19
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 54
Temp_Get	= 21.3[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]

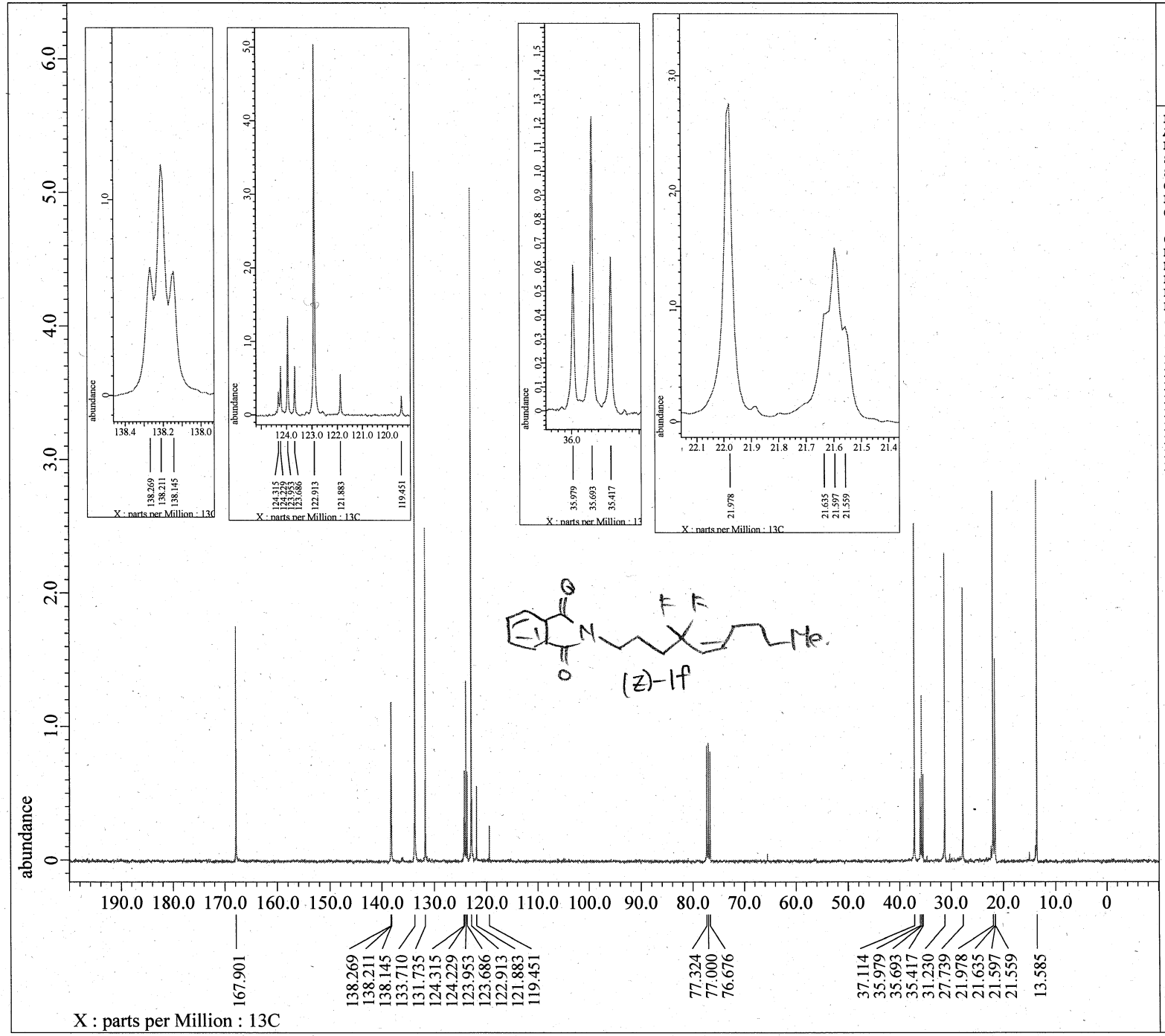


JEOL Solutions for Innovation

Filename	= AKY662-pure-fnmrag-13.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#705644
Solvent	= CHLOROFORM-D
Creation_Time	= 12-SEP-2018 19:06:17
Revision_Time	= 5-OCT-2018 13:26:14
Current_Time	= 5-OCT-2018 13:26:23
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 21.2[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

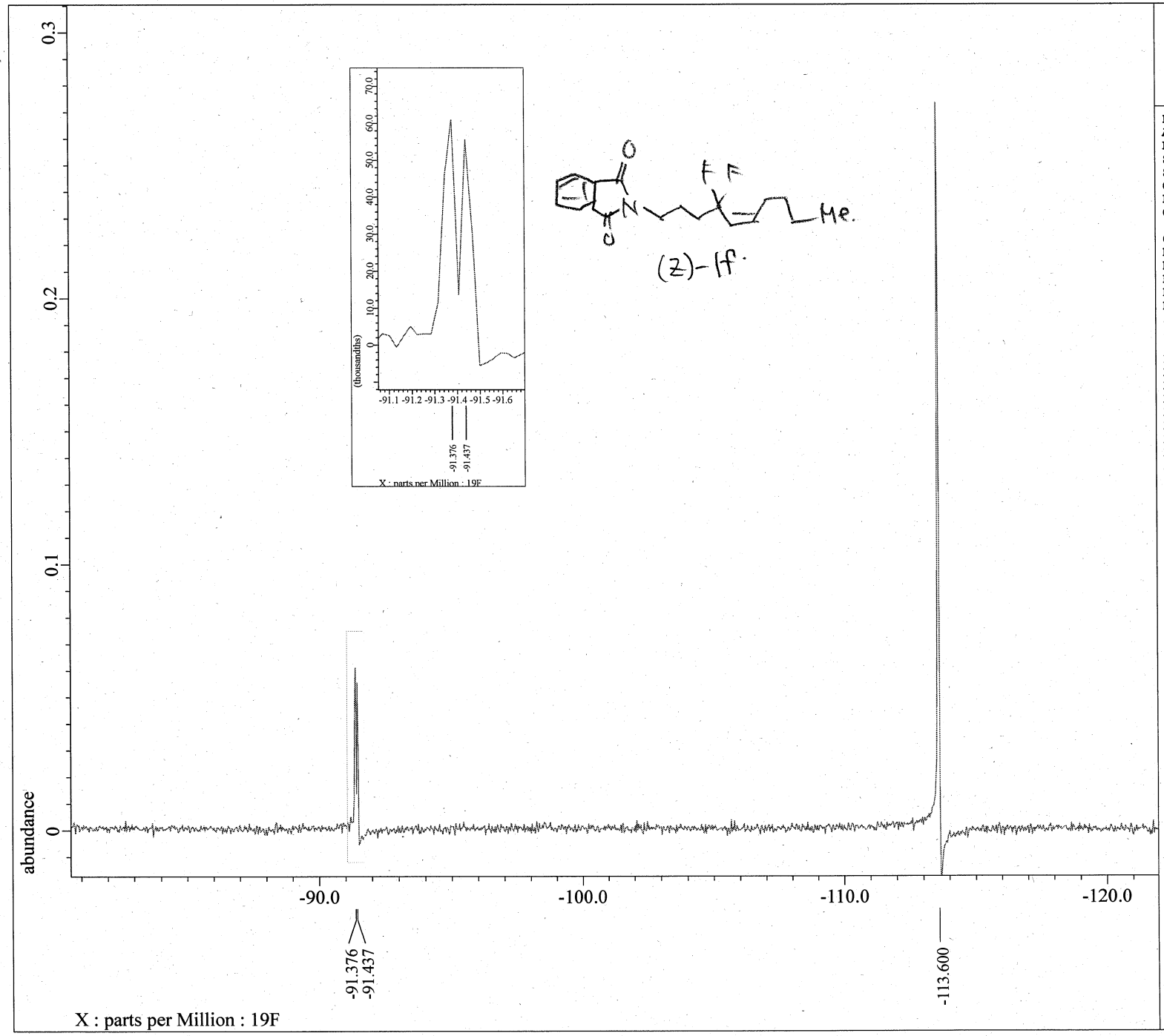


Filename	= AKY694-pure-ag-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#510561
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 18-OCT-2018 21:41:06
Revision_Time	= 29-MAR-2019 19:07:17
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 50
Temp_Get	= 18.9[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]



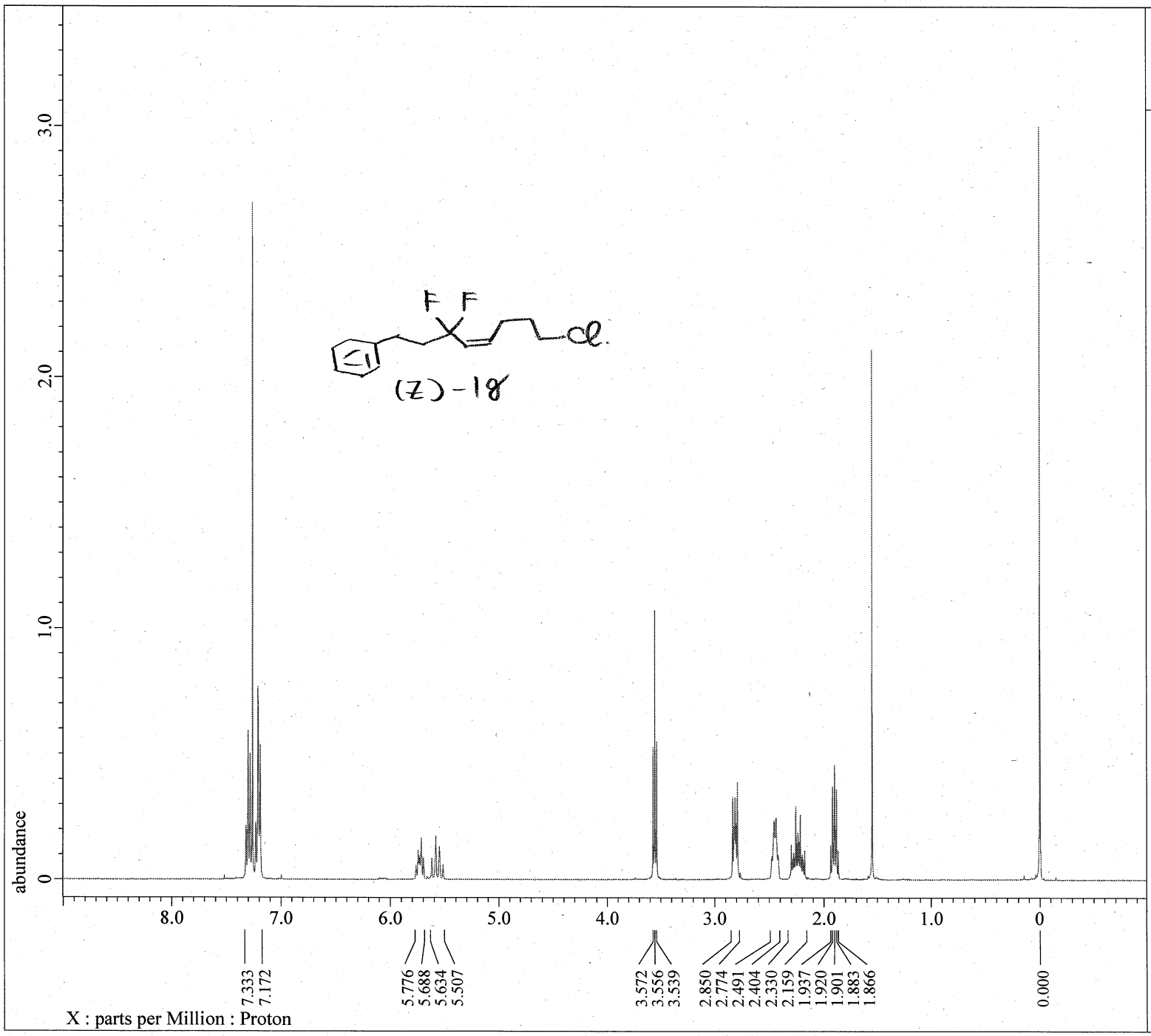
JEOL
Solutions for Innovation

Filename	= AKY694-carbon-4.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#514858
Solvent	= CHLOROFORM-D
Creation_Time	= 18-OCT-2018 12:54:06
Revision_Time	= 18-OCT-2018 15:38:19
Current_Time	= 18-OCT-2018 15:38:29
Comment	= single pulse decoupled gat
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 19.1[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]



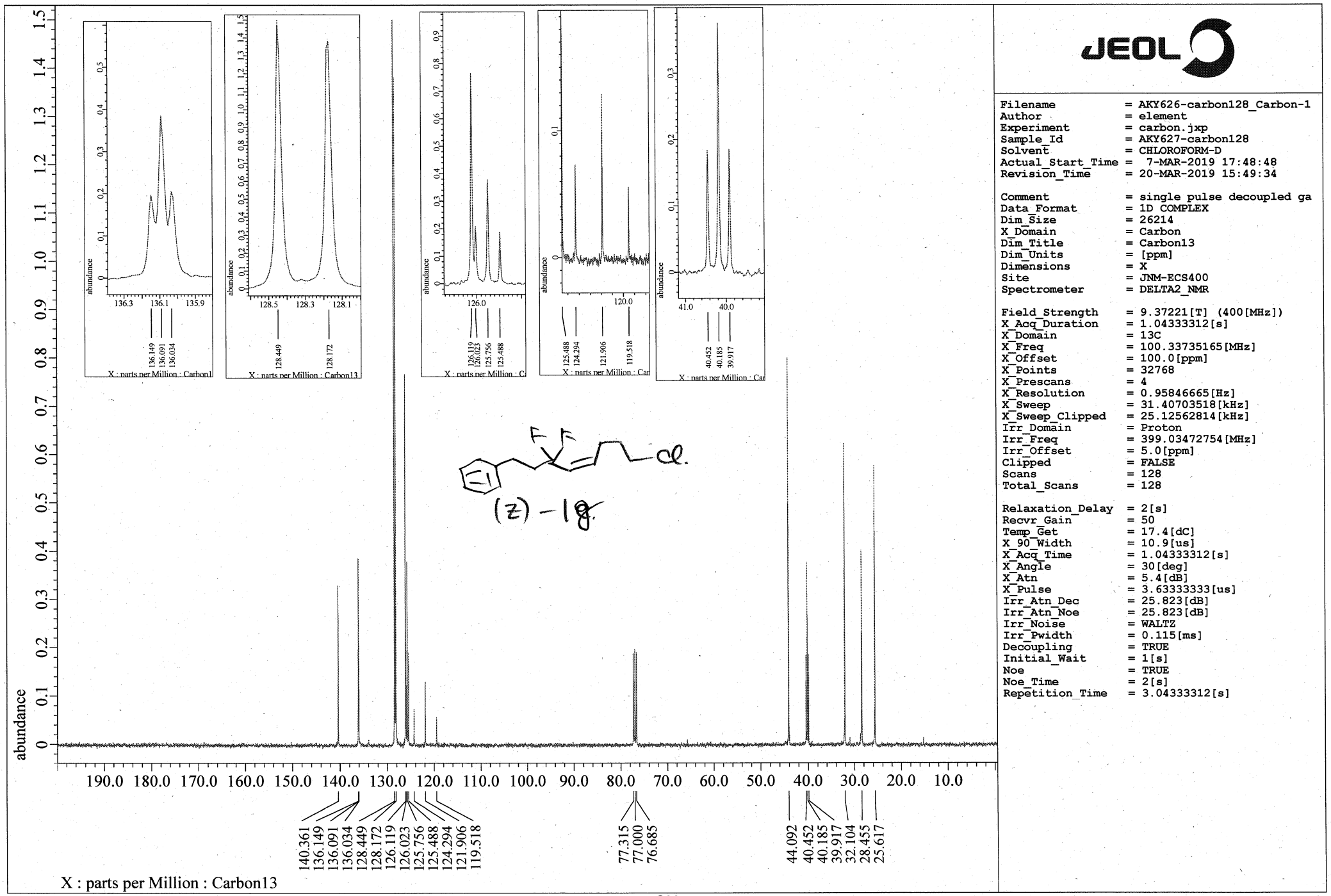
JEOL
Solutions for Innovation

Filename	= AKY694-fnmr-10.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#526358
Solvent	= CHLOROFORM-D
Creation_Time	= 18-OCT-2018 14:07:39
Revision_Time	= 18-OCT-2018 15:29:59
Current_Time	= 18-OCT-2018 15:30:04
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.7[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



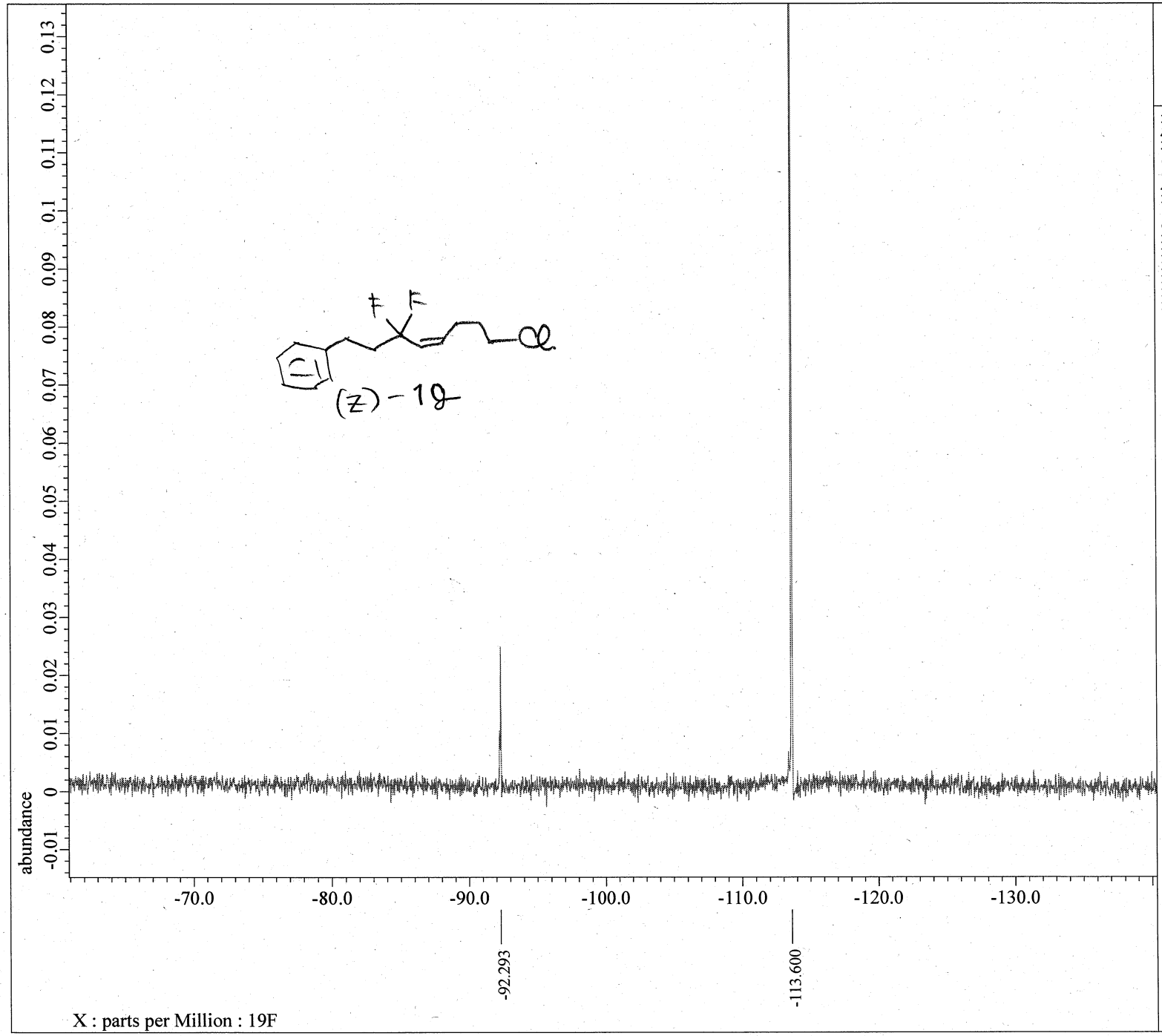
JEOL

Filename	= AKY626-gpc_Proton-1-4.jdf
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY626-gpc
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 21-NOV-2018 09:55:46
Revision_Time	= 29-MAR-2019 19:15:22
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 48
Temp_Get	= 19.4[dC]
X_90_Width	= 6.22[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3.11[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]



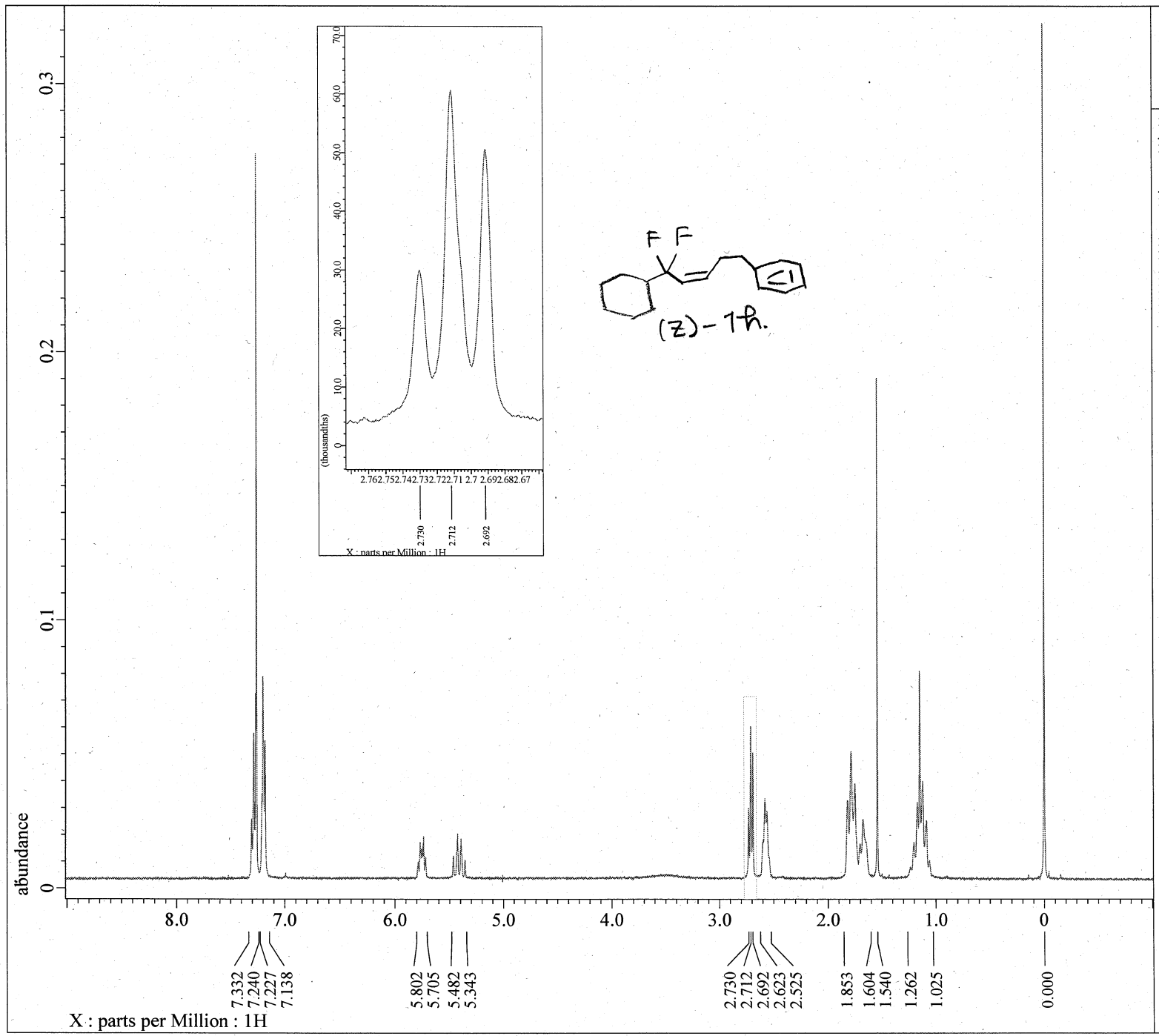
JEOL

Filename	= AKY626-carbon128_Carbon-1
Author	= element
Experiment	= carbon.jxp
Sample_Id	= AKY627-carbon128
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 7-MAR-2019 17:48:48
Revision_Time	= 20-MAR-2019 15:49:34
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.04333312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clipped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 17.4[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_Noe	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]



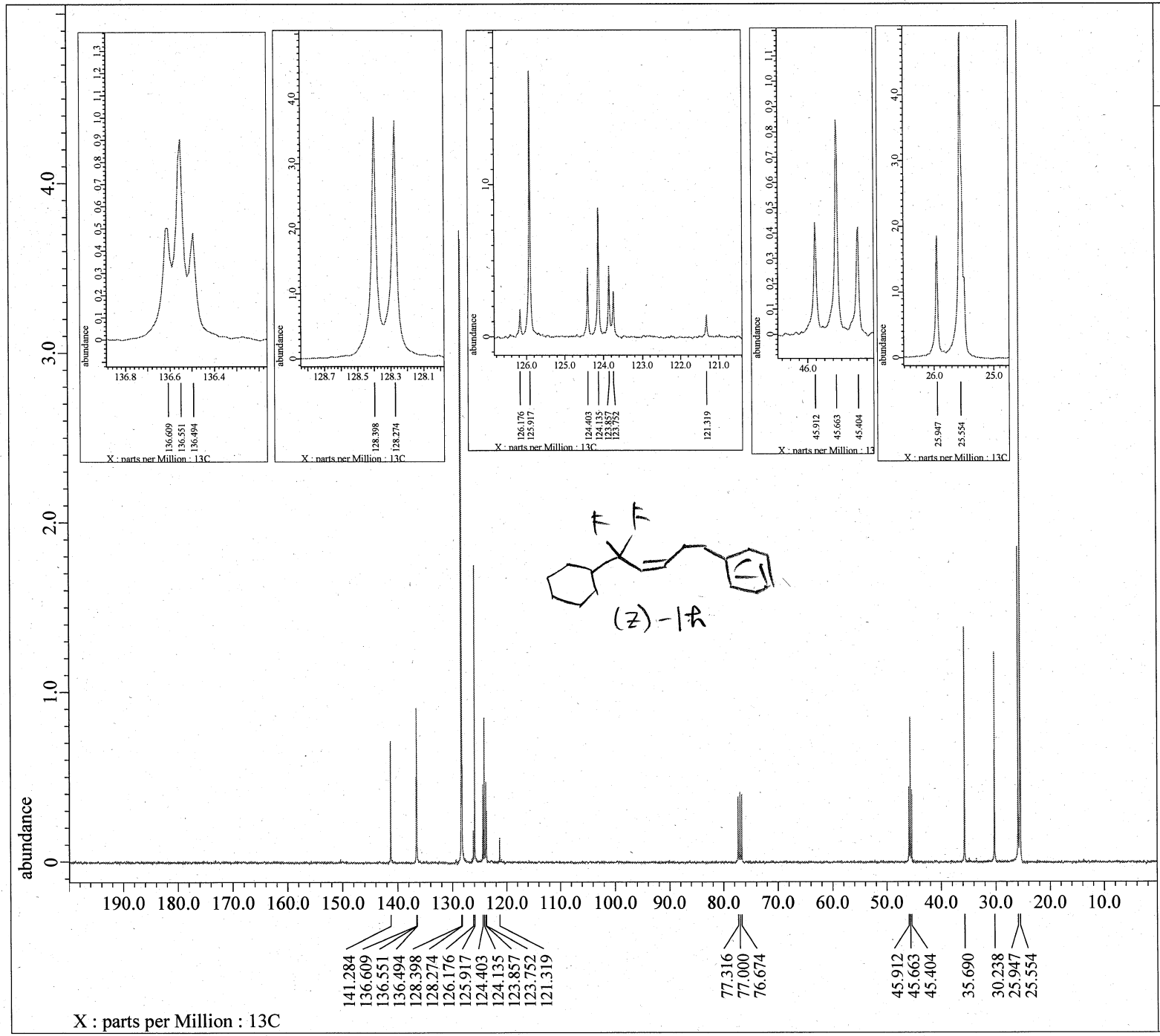
JEOL

```
Filename            = AKY626-FNMRag-2.jdf
Author              = element
Experiment          = single_pulse.ex2
Sample_Id           = S#632685
Solvent             = CHLOROFORM-D
Actual_Start_Time   =  8-MAR-2019 02:05:08
Revision_Time       = 20-MAR-2019 16:54:37

Comment             = single_pulse
Data_Format         = 1D COMPLEX
Dim_Size            = 13107
X_Domain            = 19F
Dim_Title           = 19F
Dim_Units           = [ppm]
Dimensions          = X
Site                = ECX 400P
Spectrometer        = DELTA2_NMR

Field_Strength      = 9.2982153[T] (400[MHz])
X_Acq_Duration      = 87.81824[ms]
X_Domain            = 19F
X_Freq              = 372.50336686[MHz]
X_Offset            = 0[ppm]
X_Points            = 16384
X_Prescans          = 1
X_Resolution        = 11.38715602[Hz]
X_Sweep             = 186.56716418[kHz]
Irr_Domain          = 19F
Irr_Freq            = 372.50336686[MHz]
Irr_Offset          = 5[ppm]
Tri_Domain          = 19F
Tri_Freq            = 372.50336686[MHz]
Tri_Offset          = 5[ppm]
Clipped             = FALSE
Scans               = 8
Total_Scans         = 8

Relaxation_Delay    = 5[s]
Recvr_Gain          = 24
Temp_Get            = 19[dC]
X_90_Width          = 13.9[us]
X_Acq_Time          = 87.81824[ms]
X_Angle             = 45[deg]
X_Atn               = 4[dB]
X_Pulse             = 6.95[us]
Irr_Mode            = Off
Tri_Mode            = Off
Dante_Presat        = FALSE
Initial_Wait        = 1[s]
Repetition_Time     = 5.08781824[s]
```

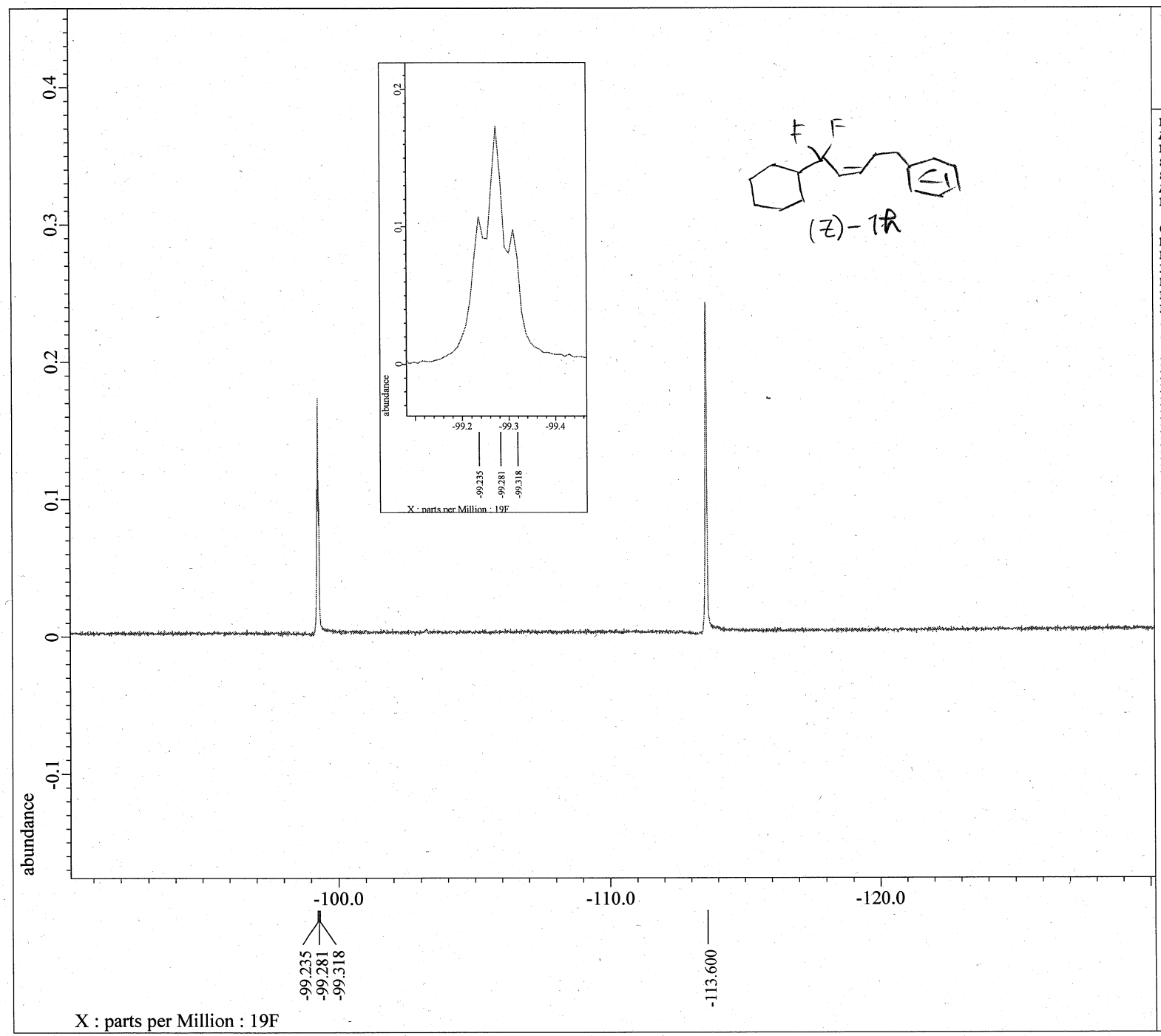


JEOL

Filename	= AKY627-pure-again-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= 1
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 12-NOV-2018 23:15:49
Revision_Time	= 29-MAR-2019 19:20:35
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 2.20725248[s]
X_Domain	= 1H
X_Freq	= 395.88430144[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45305193[Hz]
X_Sweep	= 7.42280285[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 395.88430144[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 38
Temp_Get	= 28.2[dC]
X_90_Width	= 13.2[us]
X_Acq_Time	= 2.20725248[s]
X_Angle	= 45[deg]
X_Atn	= 3.5[dB]
X_Pulse	= 6.6[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.20725248[s]

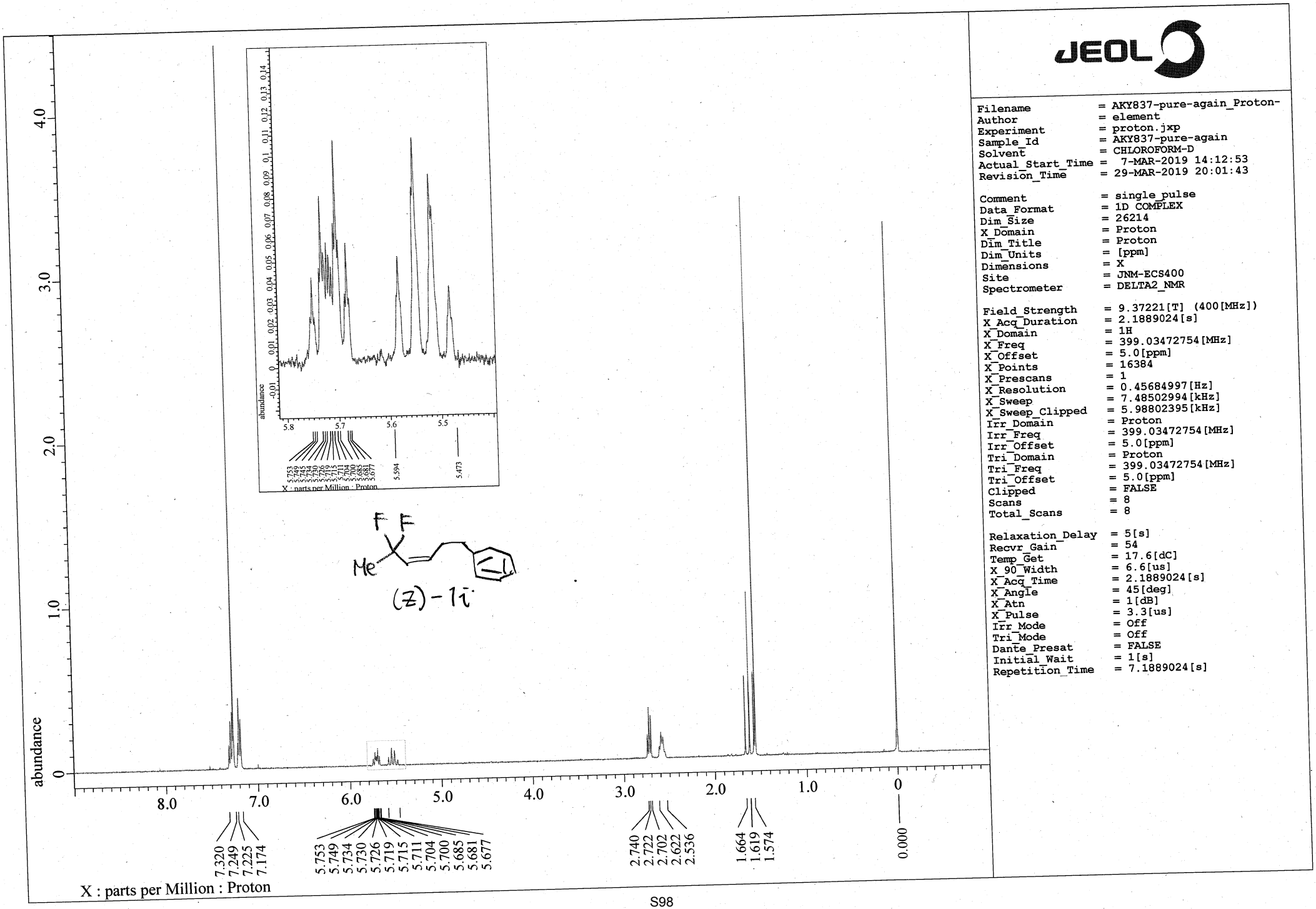


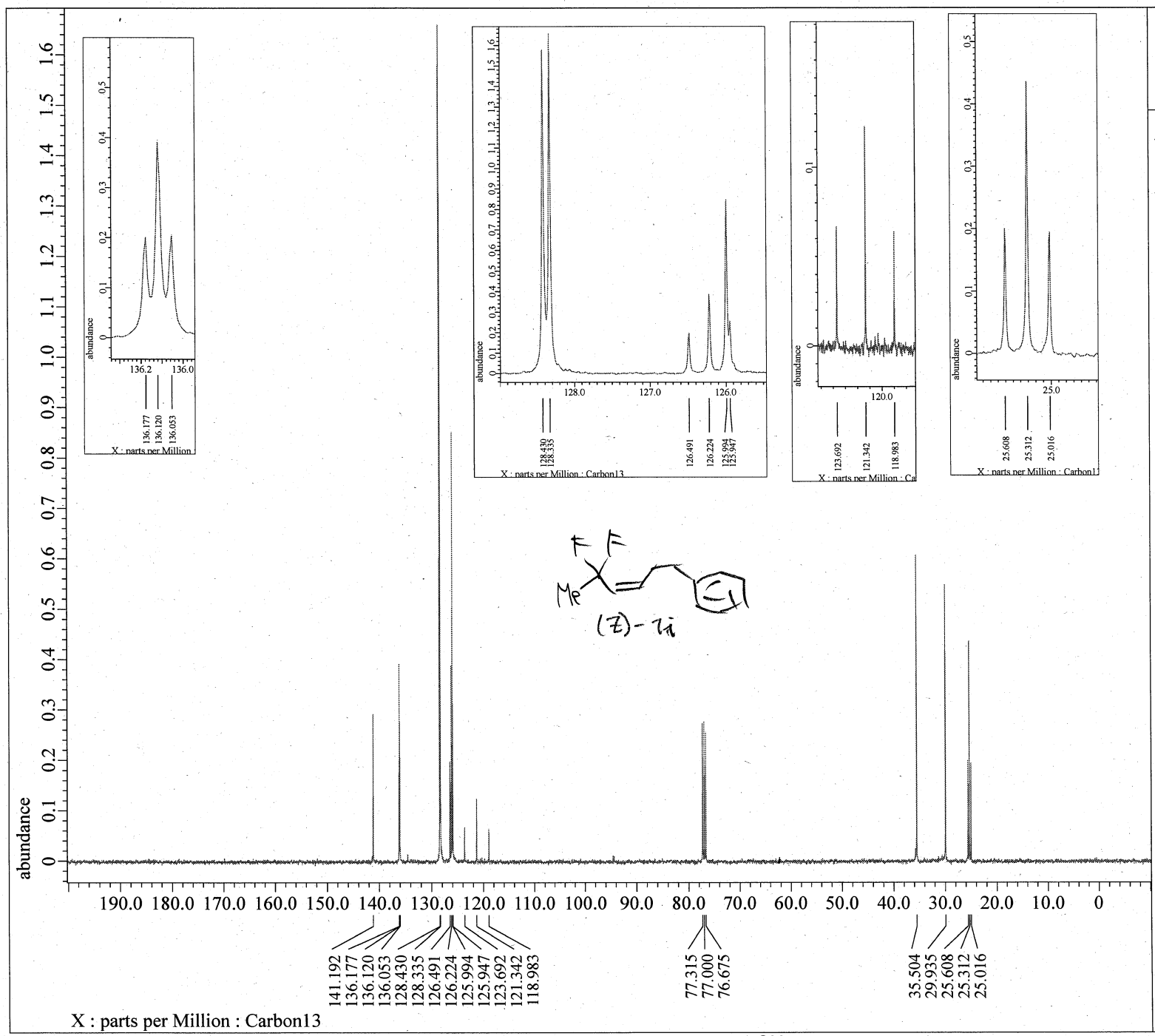
Filename	= AKY627-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= 2
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 12-NOV-2018 23:24:03
Revision_Time	= 12-NOV-2018 20:54:25
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 54
Temp_Get	= 30.7[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



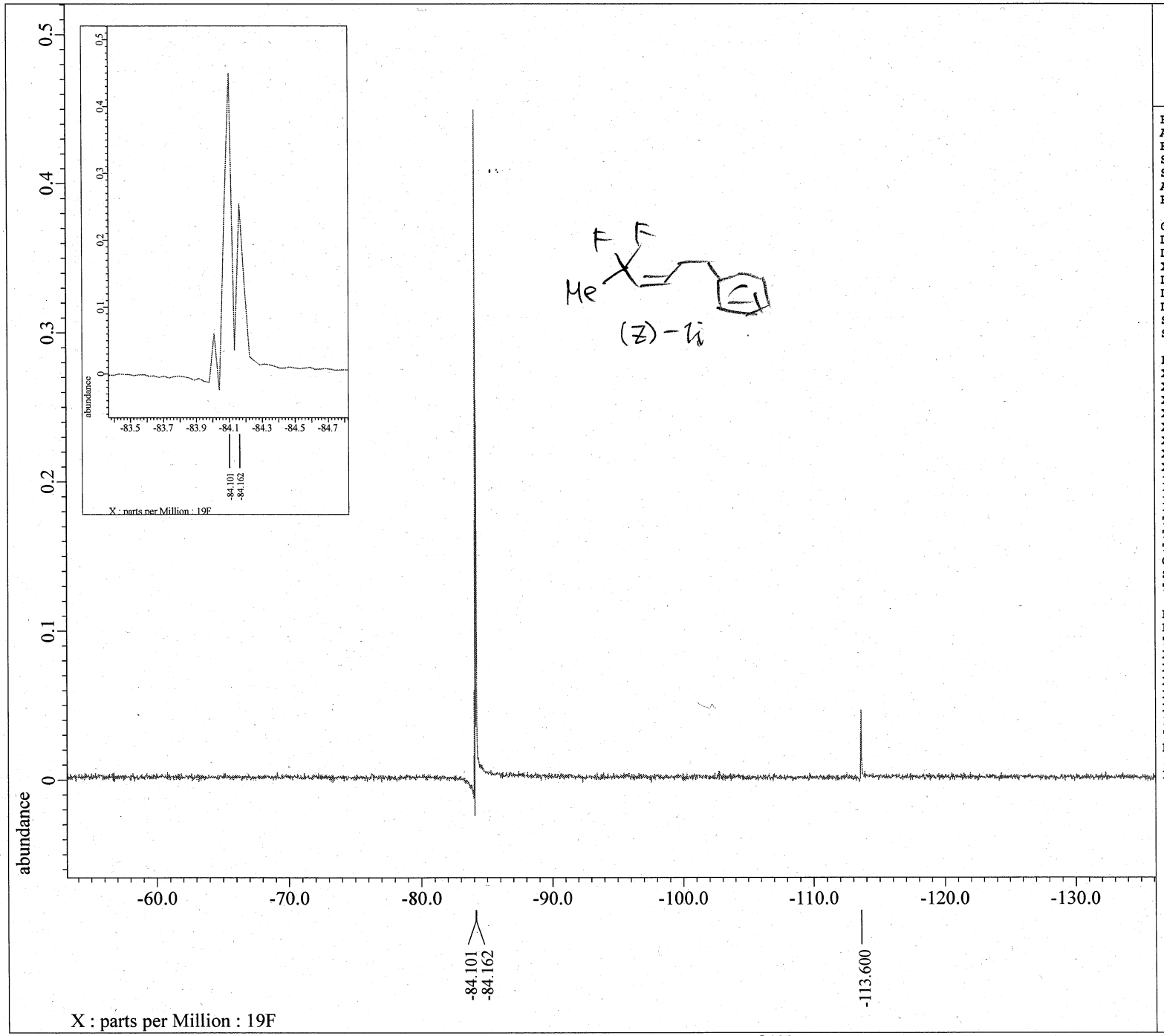
JEOL

Filename	= AKY627-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#574099
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 13-NOV-2018 00:26:14
Revision_Time	= 12-NOV-2018 20:59:15
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 0.29097984[s]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= -70[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 3.4366642[Hz]
X_Sweep	= 56.30630631[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 30
Temp_Get	= 63.7[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 0.29097984[s]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.29097984[s]

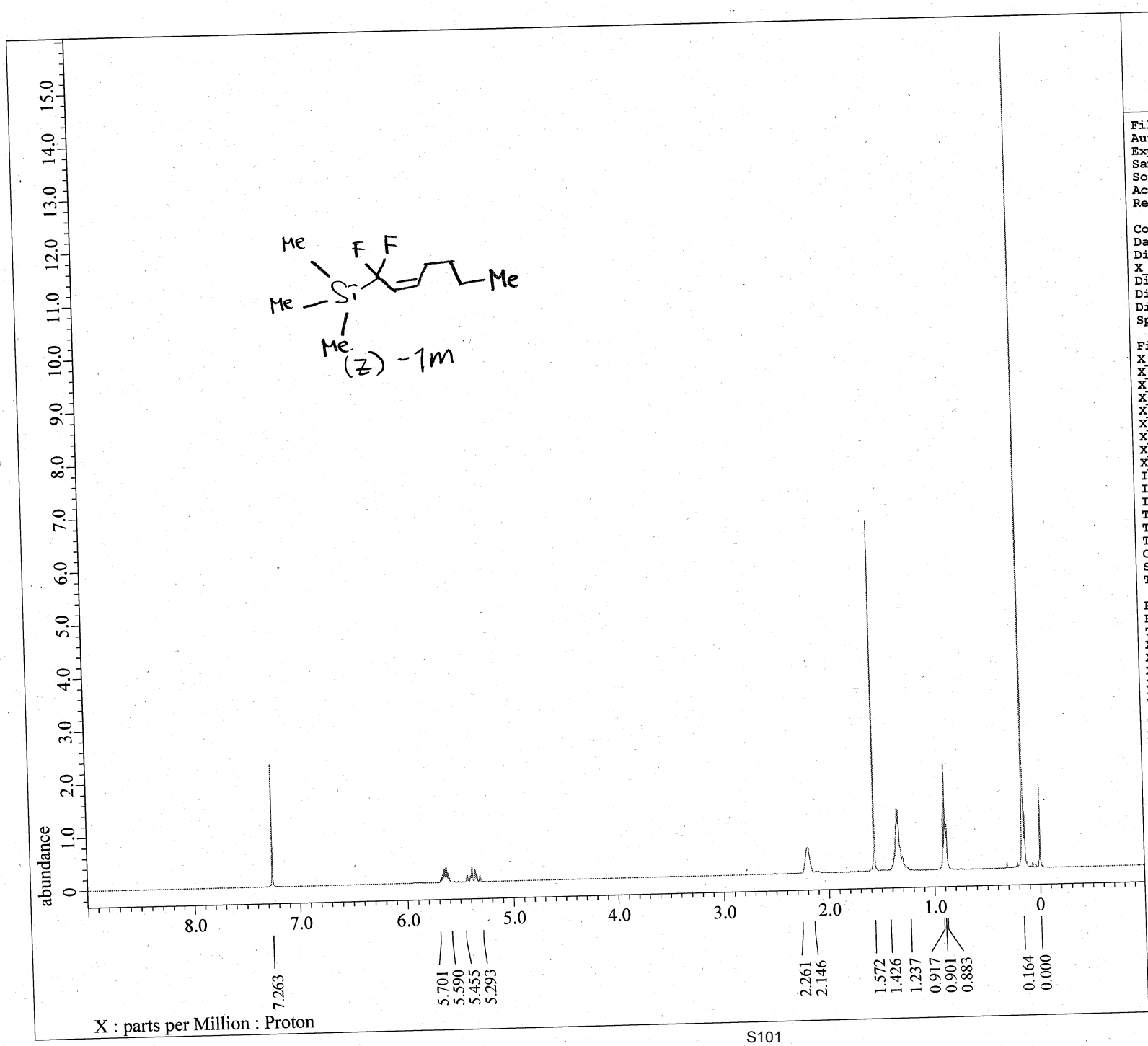

abundance
X : parts per Million : Proton
7.320
7.249
7.225
7.174
5.753
5.749
5.734
5.730
5.726
5.719
5.715
5.711
5.704
5.700
5.685
5.681
5.677
2.740
2.722
2.702
2.622
2.536
1.664
1.619
1.574
0.000
F F
Me
(Z)-1i
JEOL
Filename = AKY837-pure-again_Proton-
Author = element
Experiment = proton.jxp
Sample_Id = AKY837-pure-again
Solvent = CHLOROFORM-D
Actual_Start_Time = 7-MAR-2019 14:12:53
Revision_Time = 29-MAR-2019 20:01:43
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Proton
Dim_Title = Proton
Dim_Units = [ppm]
Dimensions = X
Site = JNM-ECS400
Spectrometer = DELTA2_NMR
Field_Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 2.1889024[s]
X_Domain = 1H
X_Freq = 399.03472754[MHz]
X_Offset = 5.0[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45684997[Hz]
X_Sweep = 7.48502994[kHz]
X_Sweep_Clipped = 5.98802395[kHz]
Irr_Domain = Proton
Irr_Freq = 399.03472754[MHz]
Irr_Offset = 5.0[ppm]
Tri_Domain = Proton
Tri_Freq = 399.03472754[MHz]
Tri_Offset = 5.0[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 54
Temp_Get = 17.6[dC]
X_90_Width = 6.6[us]
X_Acq_Time = 2.1889024[s]
X_Angle = 45[deg]
X_Atn = 1[dB]
X_Pulse = 3.3[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.1889024[s]



Filename	= AKY837-carbon-128_Carbon-
Author	= element
Experiment	= carbon.jxp
Sample_Id	= AKY837-carbon-128
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 7-MAR-2019 14:20:32
Revision_Time	= 22-MAR-2019 13:26:03
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.04333312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clipped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 17.6[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_Noe	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]

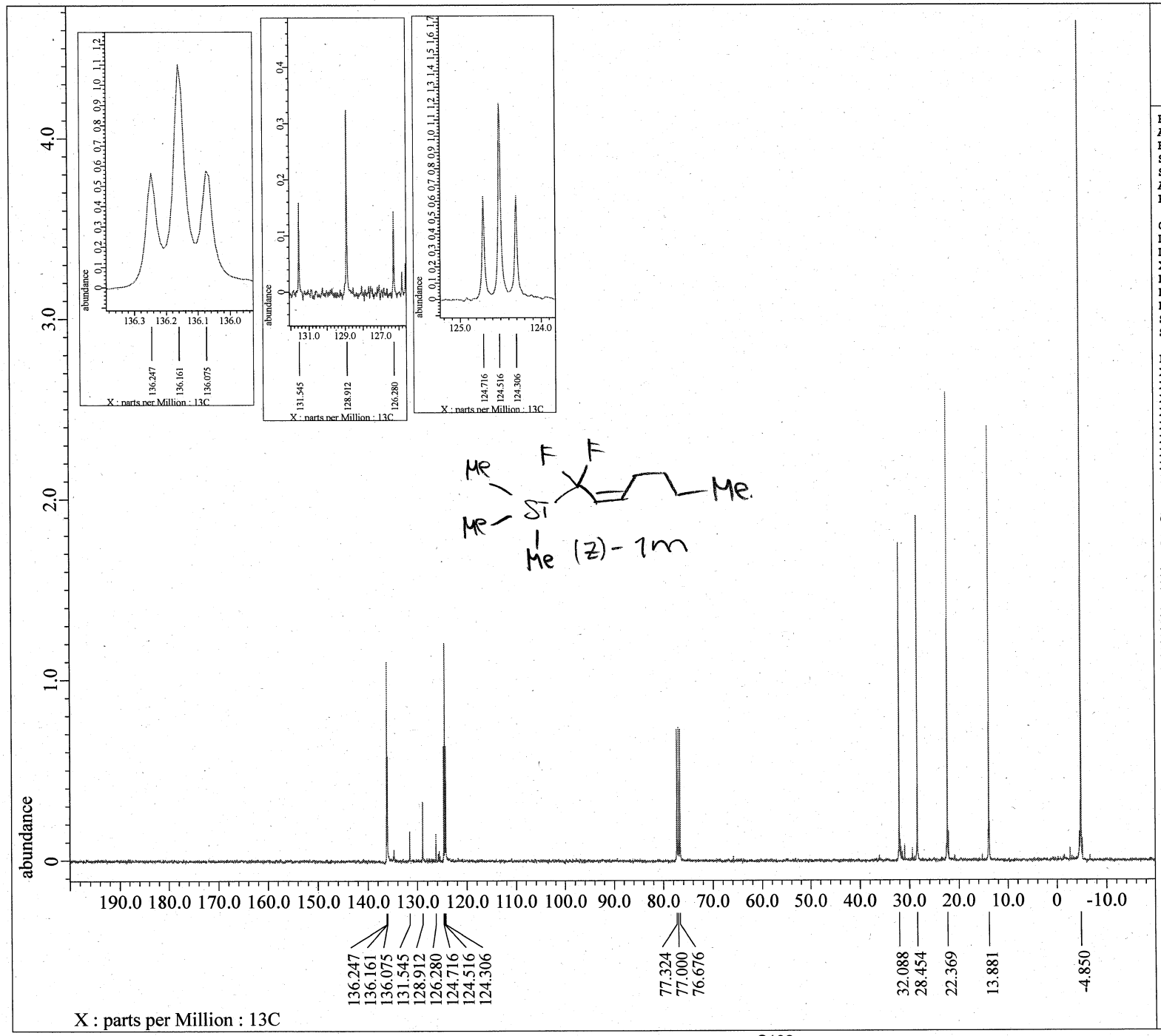


Filename	= AKY837-pure-FNMR-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#508373
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 7-MAR-2019 22:38:00
Revision_Time	= 22-MAR-2019 13:28:47
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 26
Temp_Get	= 19.5[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

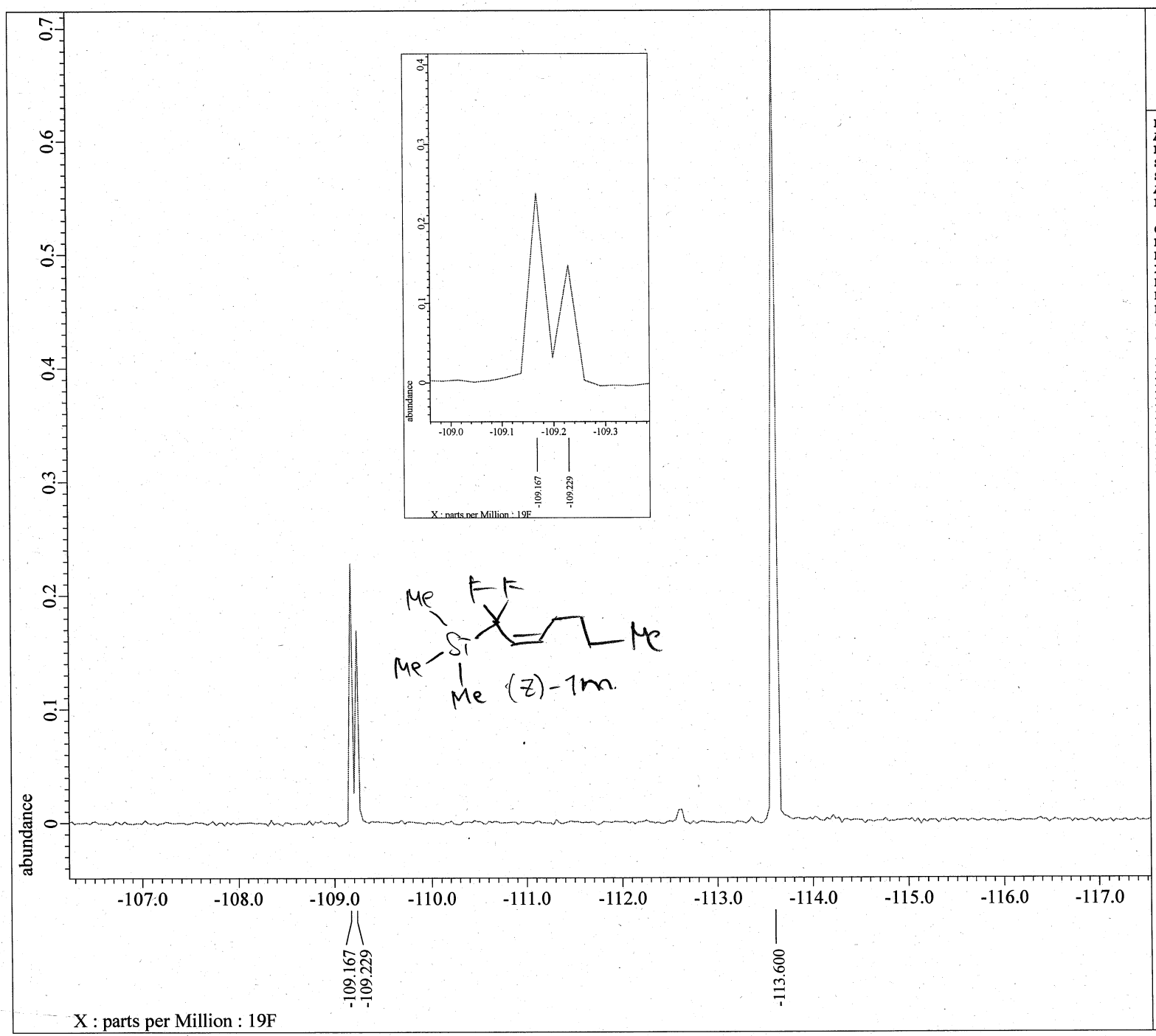


JEOL

Filename	= AKY639-pure_Proton-1-2.jd
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY639-pure
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 2-AUG-2018 15:39:47
Revision_Time	= 29-MAR-2019 20:07:17
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 42
Temp_Get	= 20.3[dC]
X_90_Width	= 6.22[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3.11[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]

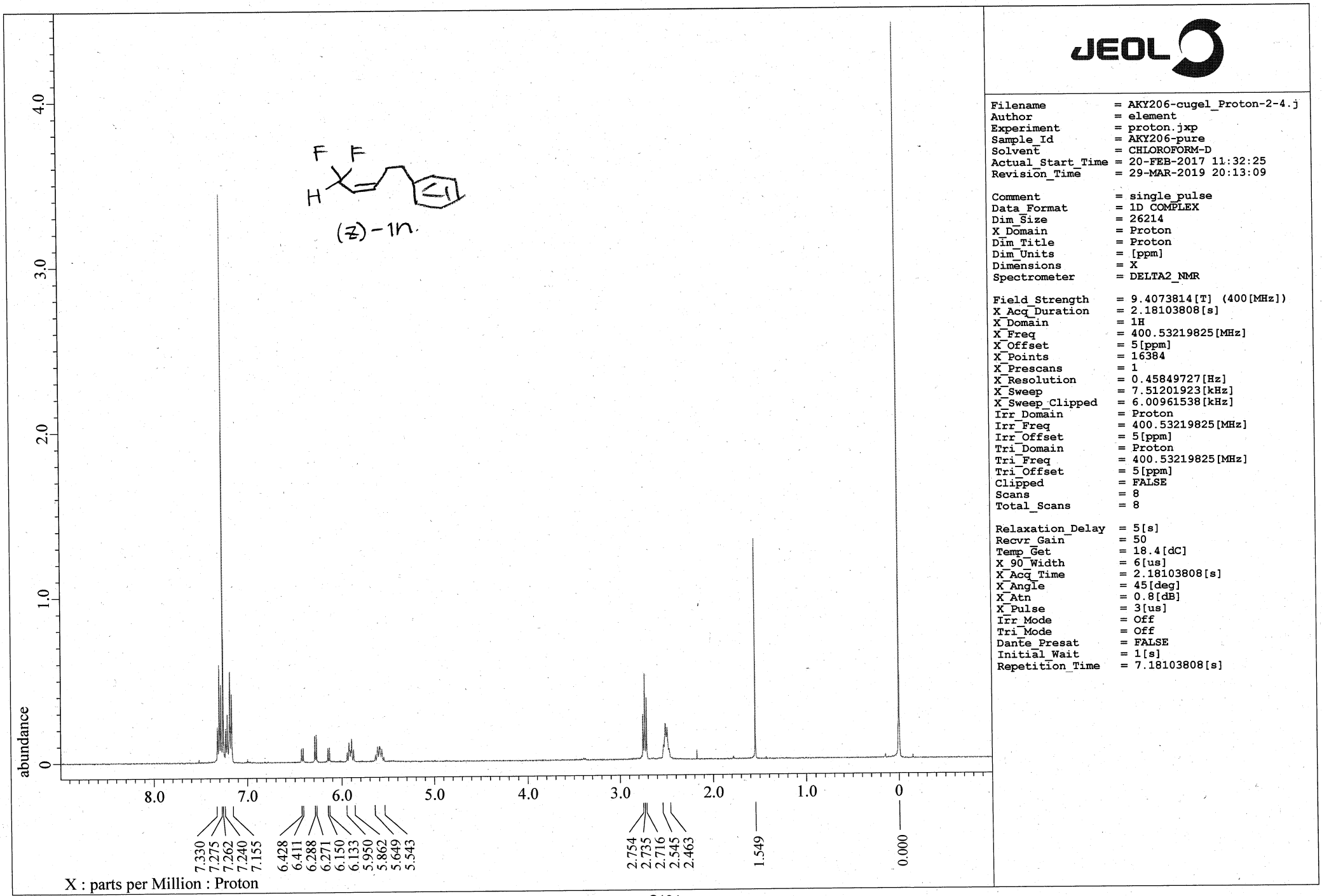


Filename	= AKY639-carbonag-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#463997
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 7-AUG-2018 20:27:36
Revision_Time	= 13-NOV-2018 14:07:50
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 256
Total_Scans	= 256
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 21.9[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]



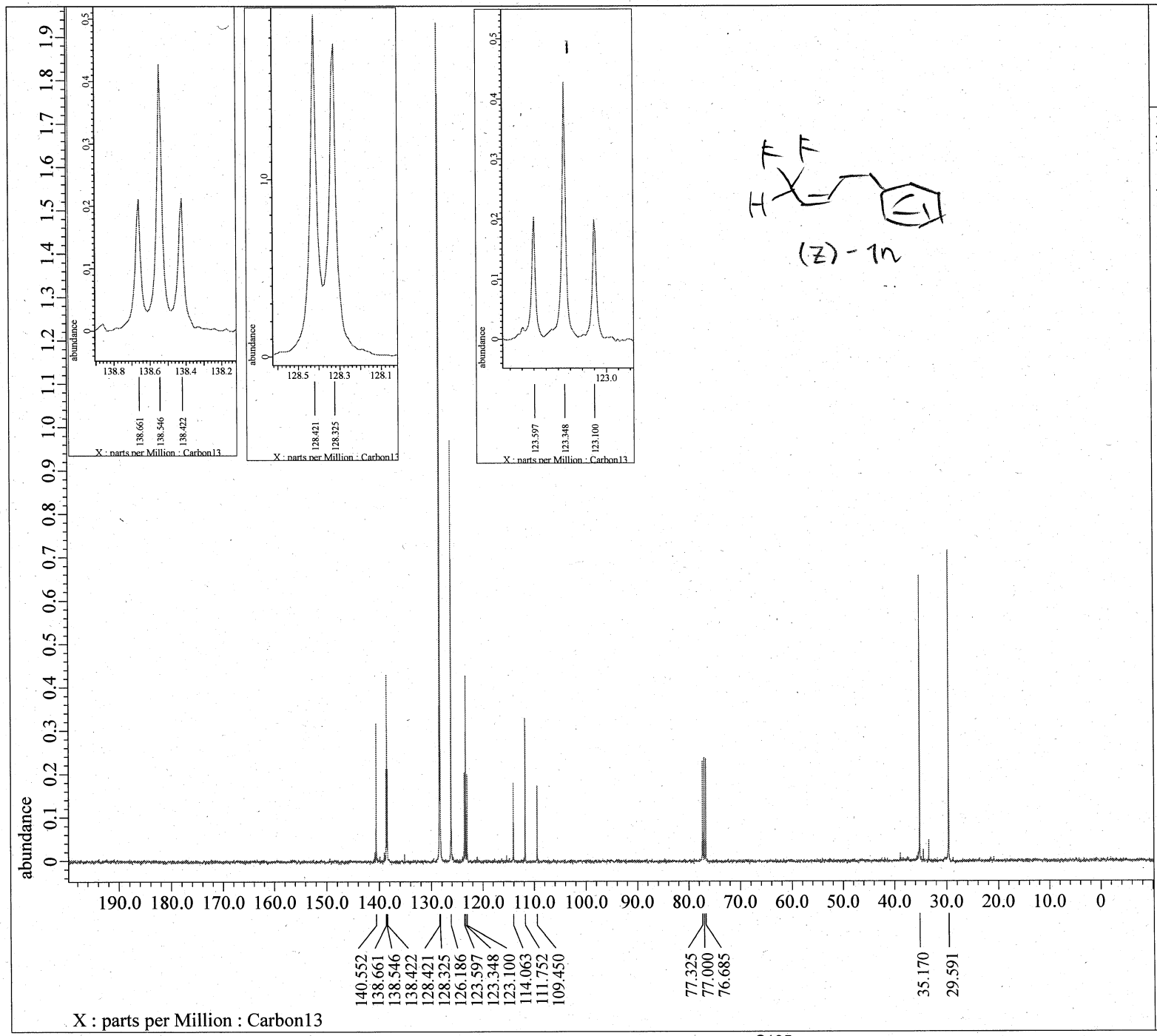
JEOL

Filename	= AKY639-pure-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#348065
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 7-AUG-2018 18:15:04
Revision_Time	= 13-NOV-2018 14:10:17
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 22.4[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

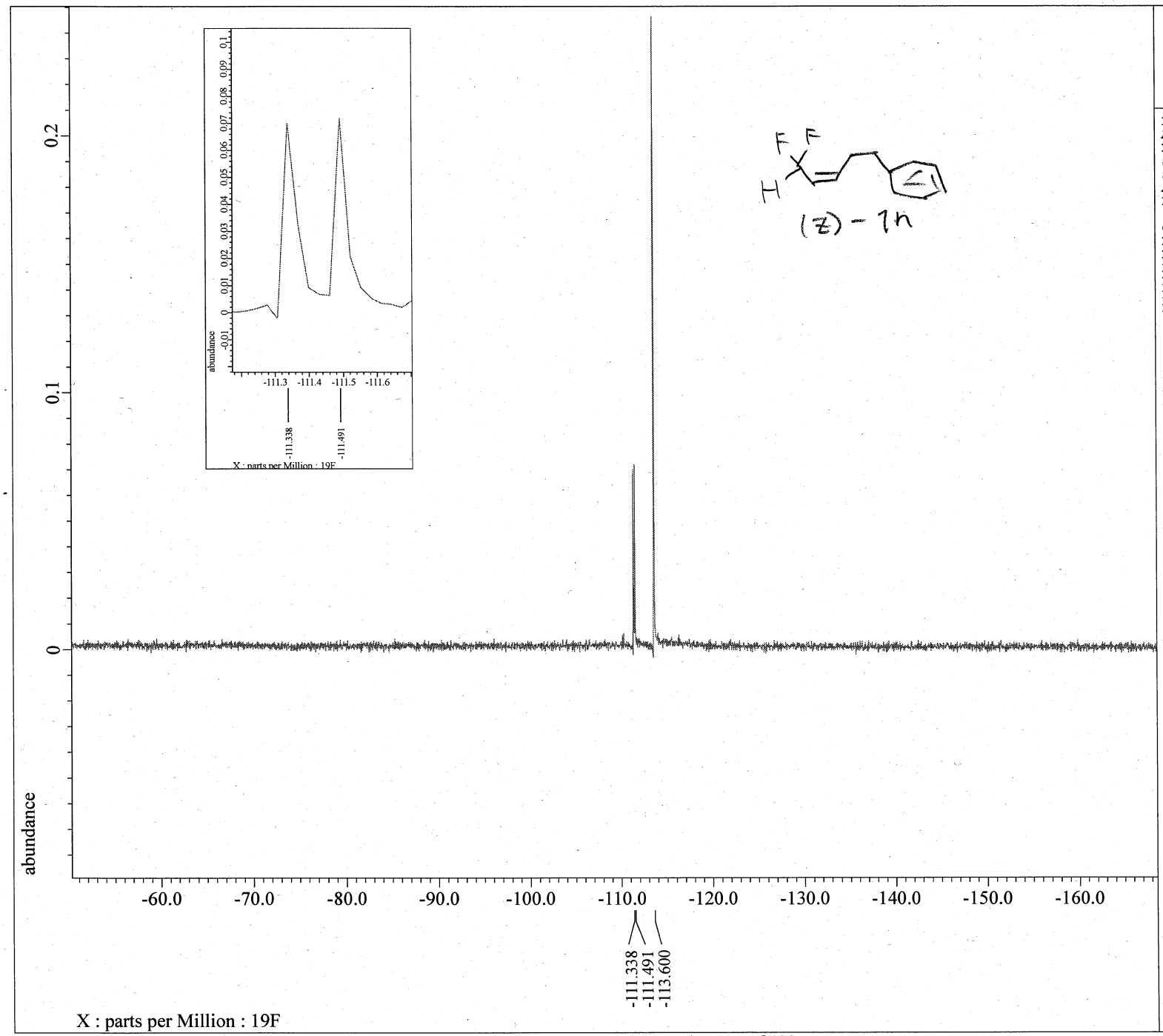


JEOL

Filename	= AKY206-cugel_Proton-2-4.j
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY206-pure
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 20-FEB-2017 11:32:25
Revision_Time	= 29-MAR-2019 20:13:09
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 50
Temp_Get	= 18.4[dC]
X_90_Width	= 6[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]

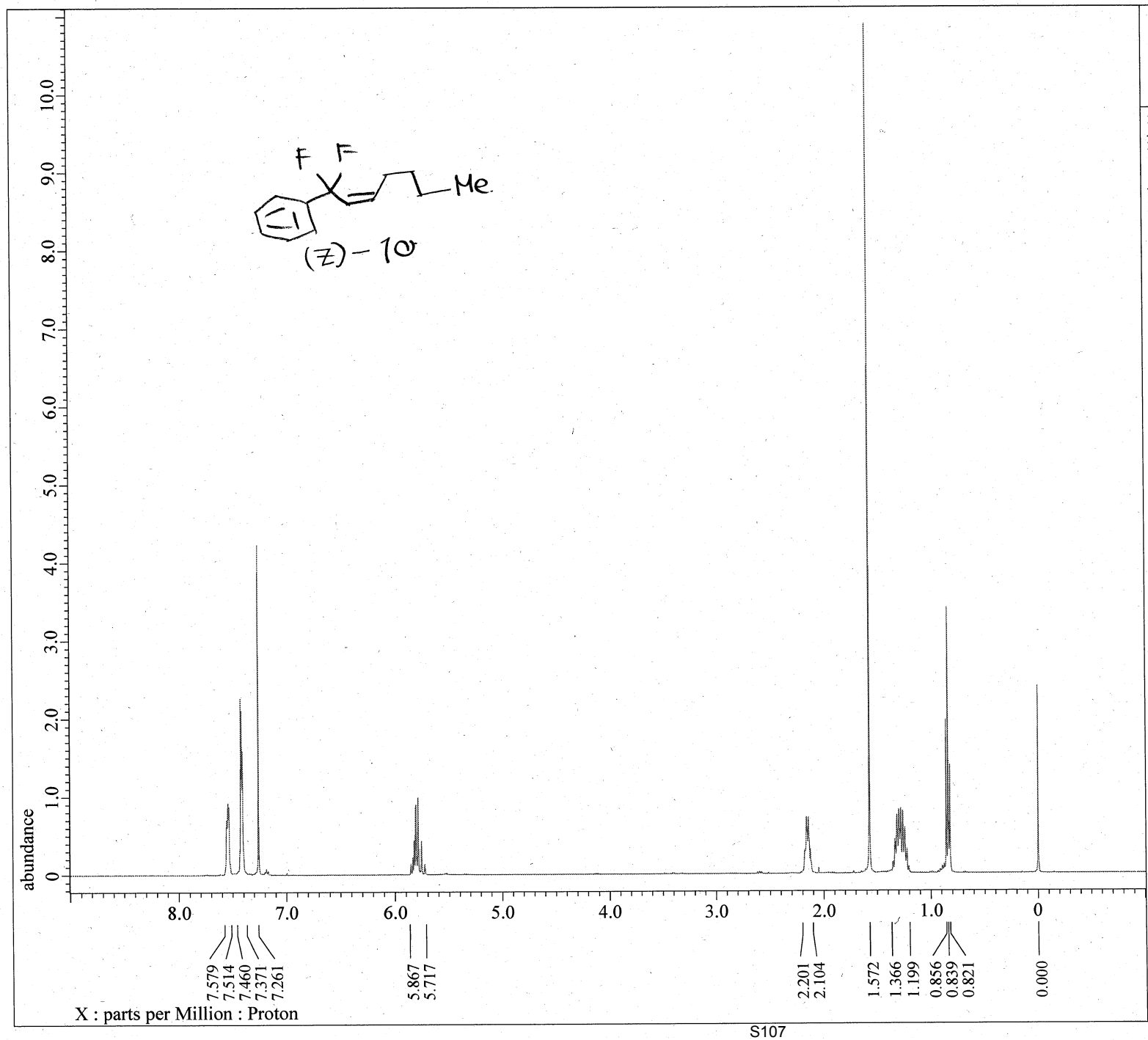


Filename	= AKY206-carbon128_Carbon-1
Author	= element
Experiment	= carbon.jxp
Sample_Id	= AKY206-carbon128
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 7-MAR-2019 16:45:00
Revision_Time	= 22-MAR-2019 16:55:21
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Carbon
Dim_Title	= Carbon13
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 1.04333312[s]
X_Domain	= 13C
X_Freq	= 100.33735165[MHz]
X_Offset	= 100.0[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95846665[Hz]
X_Sweep	= 31.40703518[kHz]
X_Sweep_Clipped	= 25.12562814[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 17.3[dC]
X_90_Width	= 10.9[us]
X_Acq_Time	= 1.04333312[s]
X_Angle	= 30[deg]
X_Atn	= 5.4[dB]
X_Pulse	= 3.63333333[us]
Irr_Atn_Dec	= 25.823[dB]
Irr_Atn_Noe	= 25.823[dB]
Irr_Noise	= WALTZ
Irr_Pwidth	= 0.115[ms]
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.04333312[s]



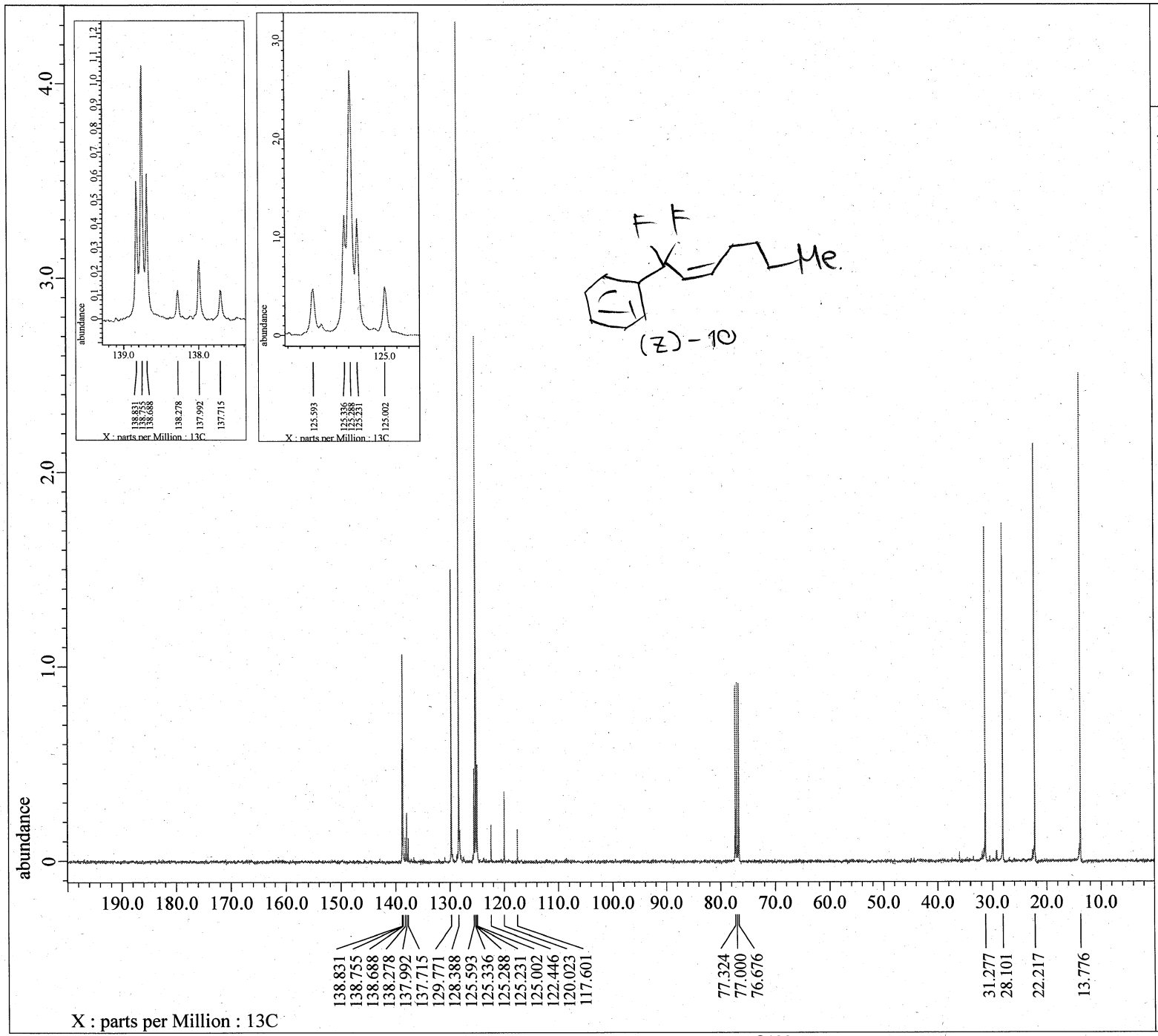
JEOL

Filename	= AKY206-pure-FNMR-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#595868
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 8-MAR-2019 01:03:38
Revision_Time	= 22-MAR-2019 16:57:42
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.1[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

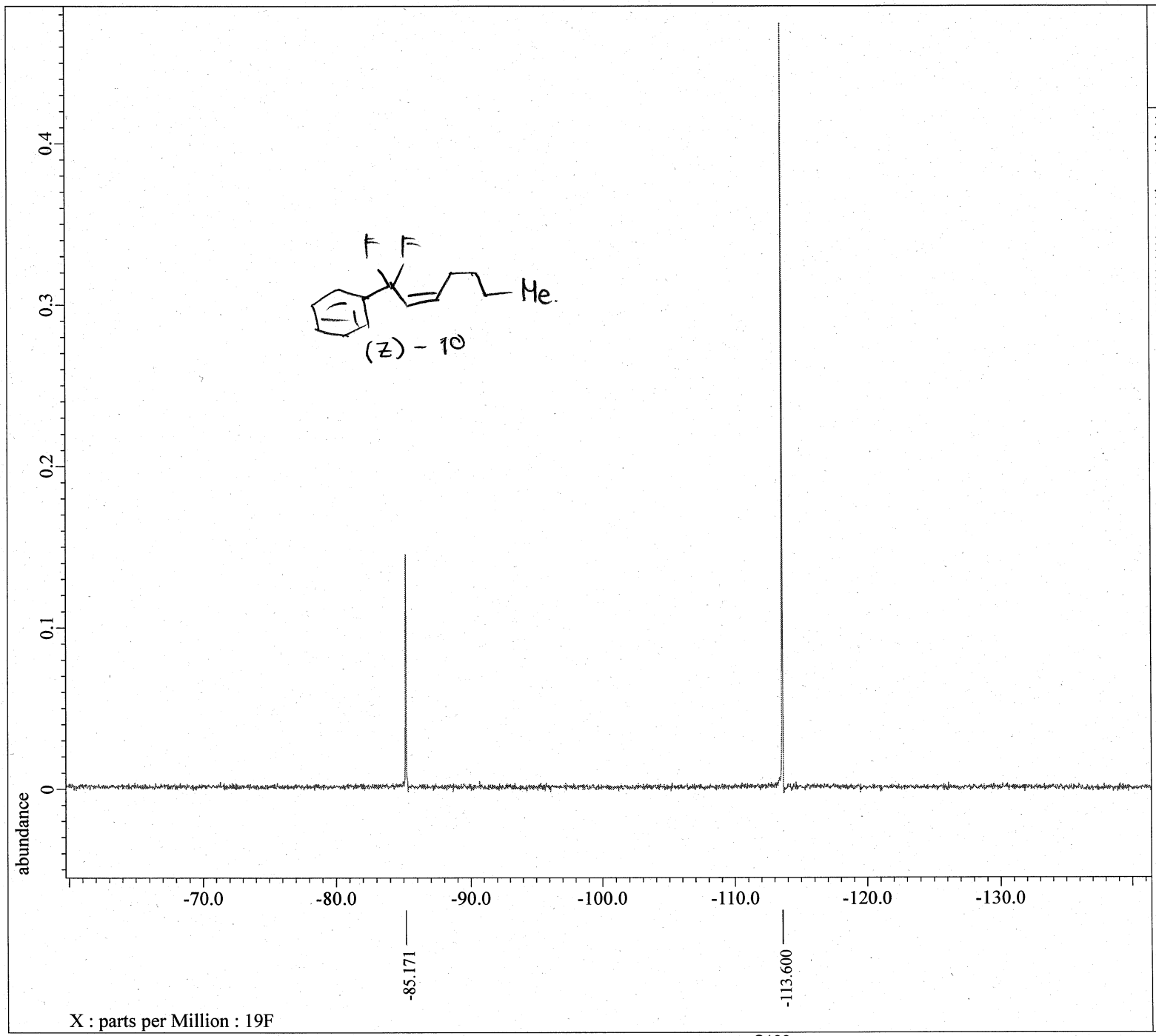


JEOL

Filename	= AKY640-gpc-2_Proton-1-2.j
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY640-gpc-2
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 3-AUG-2018 21:48:11
Revision_Time	= 29-MAR-2019 20:17:26
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 48
Temp_Get	= 19.8[dC]
X_90_Width	= 6.22[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3.11[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]

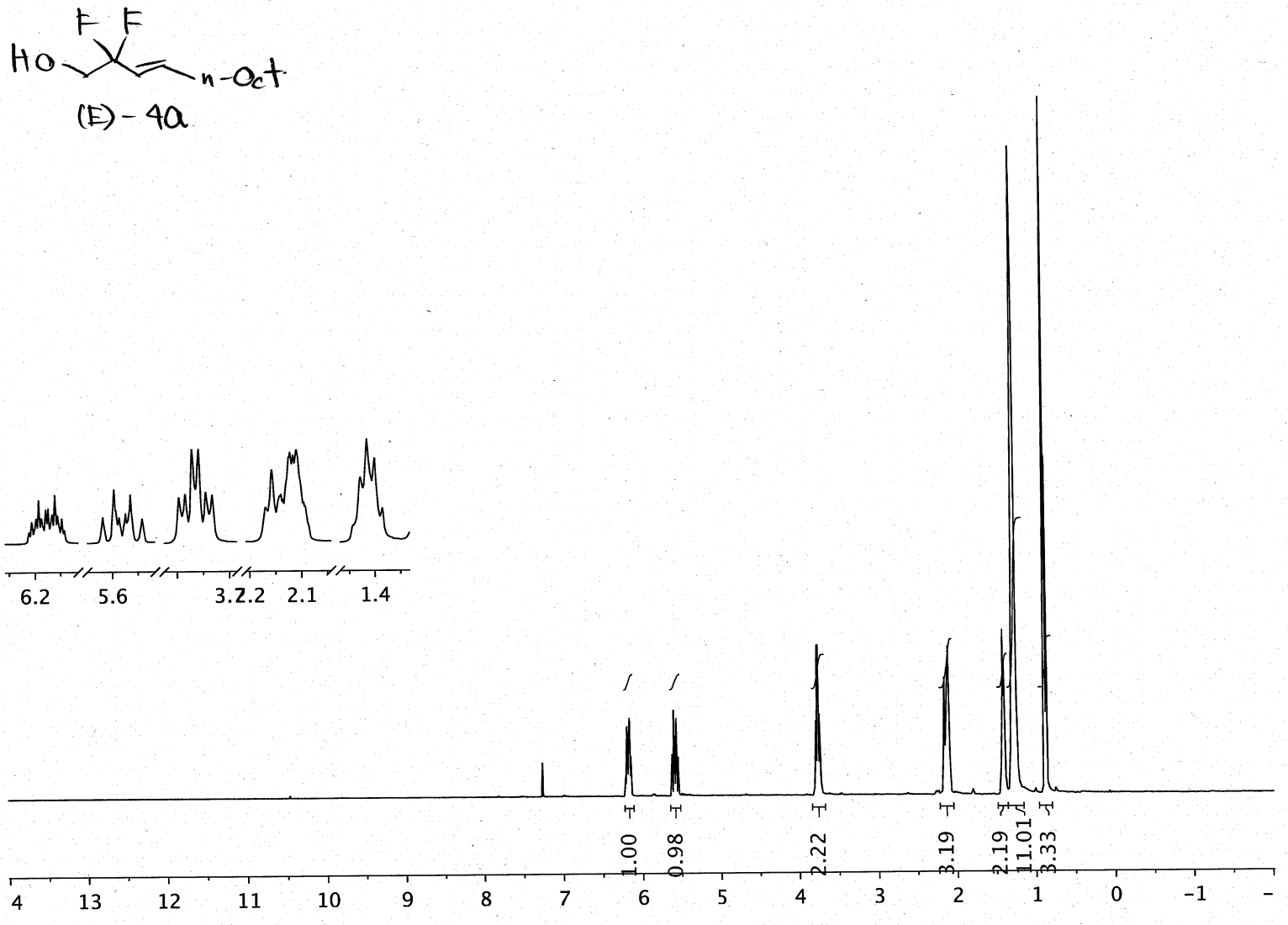


Filename	= AKY640-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#515720
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 4-AUG-2018 21:54:12
Revision_Time	= 13-NOV-2018 13:51:10
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 256
Total_Scans	= 256
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 22.1[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]

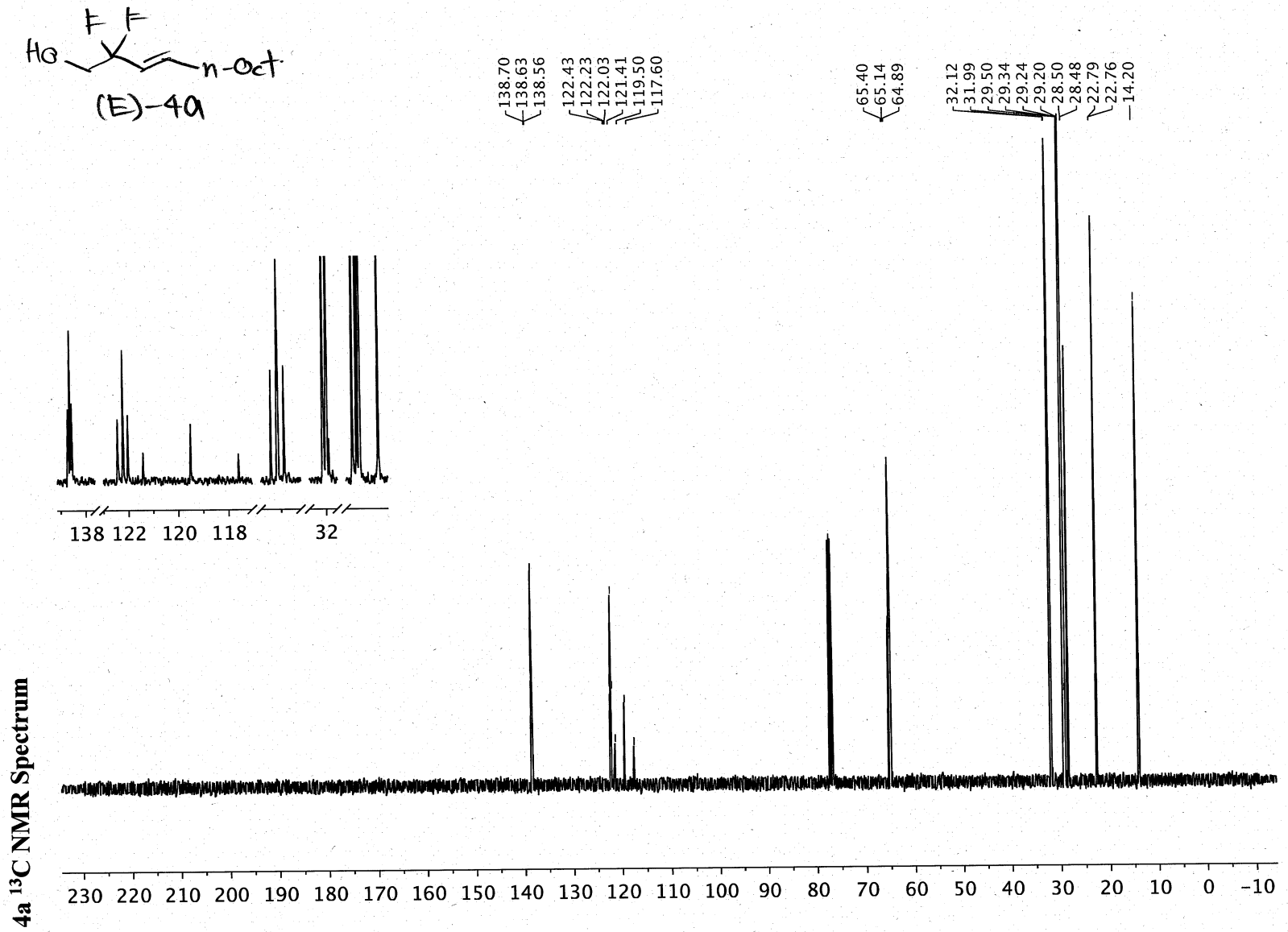


JEOL

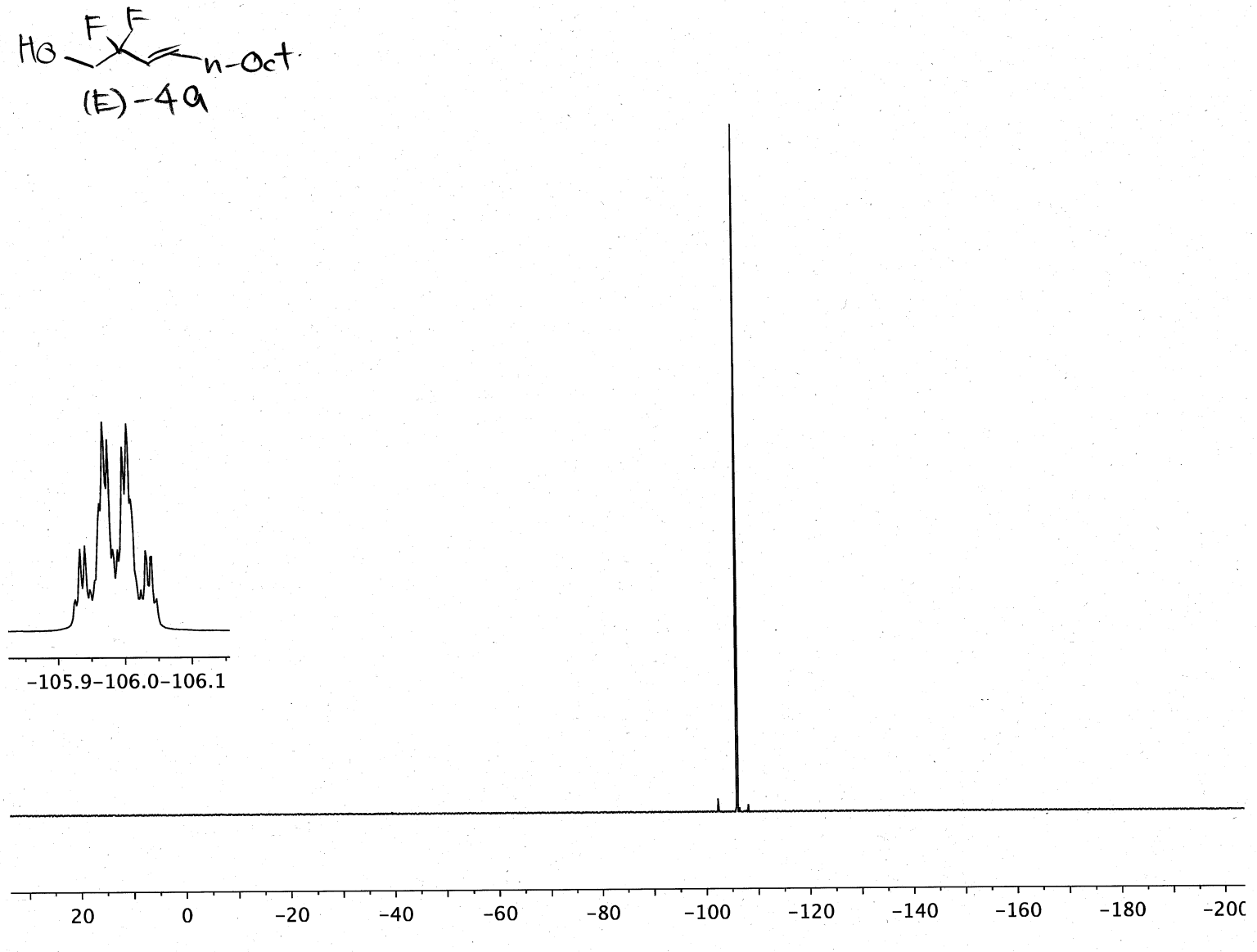
```
Filename          = AKY640-fnmr-1real-1.jdf
Author            = element
Experiment        = single_pulse.ex2
Sample_Id         = S#639198
Solvent           = CHLOROFORM-D
Actual_Start_Time = 21-AUG-2018 02:20:24
Revision_Time     = 13-NOV-2018 13:53:46

Comment           = single_pulse
Data_Format       = 1D COMPLEX
Dim_Size          = 13107
X_Domain          = 19F
Dim_Title         = 19F
Dim_Units         = [ppm]
Dimensions        = X
Site              = ECX 400P
Spectrometer      = DELTA2_NMR

Field_Strength    = 9.2982153[T] (400[MHz])
X_Acq_Duration    = 87.81824[ms]
X_Domain          = 19F
X_Freq            = 372.50336686[MHz]
X_Offset          = 0[ppm]
X_Points          = 16384
X_Prescans        = 1
X_Resolution      = 11.38715602[Hz]
X_Sweep           = 186.56716418[kHz]
Irr_Domain        = 19F
Irr_Freq          = 372.50336686[MHz]
Irr_Offset        = 5[ppm]
Tri_Domain        = 19F
Tri_Freq          = 372.50336686[MHz]
Tri_Offset        = 5[ppm]
Clipped           = FALSE
Scans             = 8
Total_Scans       = 8

Relaxation_Delay  = 5[s]
Recvr_Gain        = 24
Temp_Get          = 22.2[dC]
X_90_Width        = 13.9[us]
X_Acq_Time        = 87.81824[ms]
X_Angle           = 45[deg]
X_Atn             = 4[dB]
X_Pulse           = 6.95[us]
Irr_Mode          = Off
Tri_Mode          = Off
Dante_Presat      = FALSE
Initial_Wait      = 1[s]
Repetition_Time   = 5.08781824[s]
```



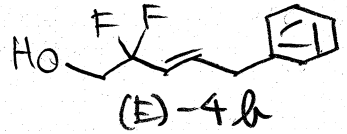
4a ^{1}H NMR Spectrum



4a ^{13}C NMR Spectrum

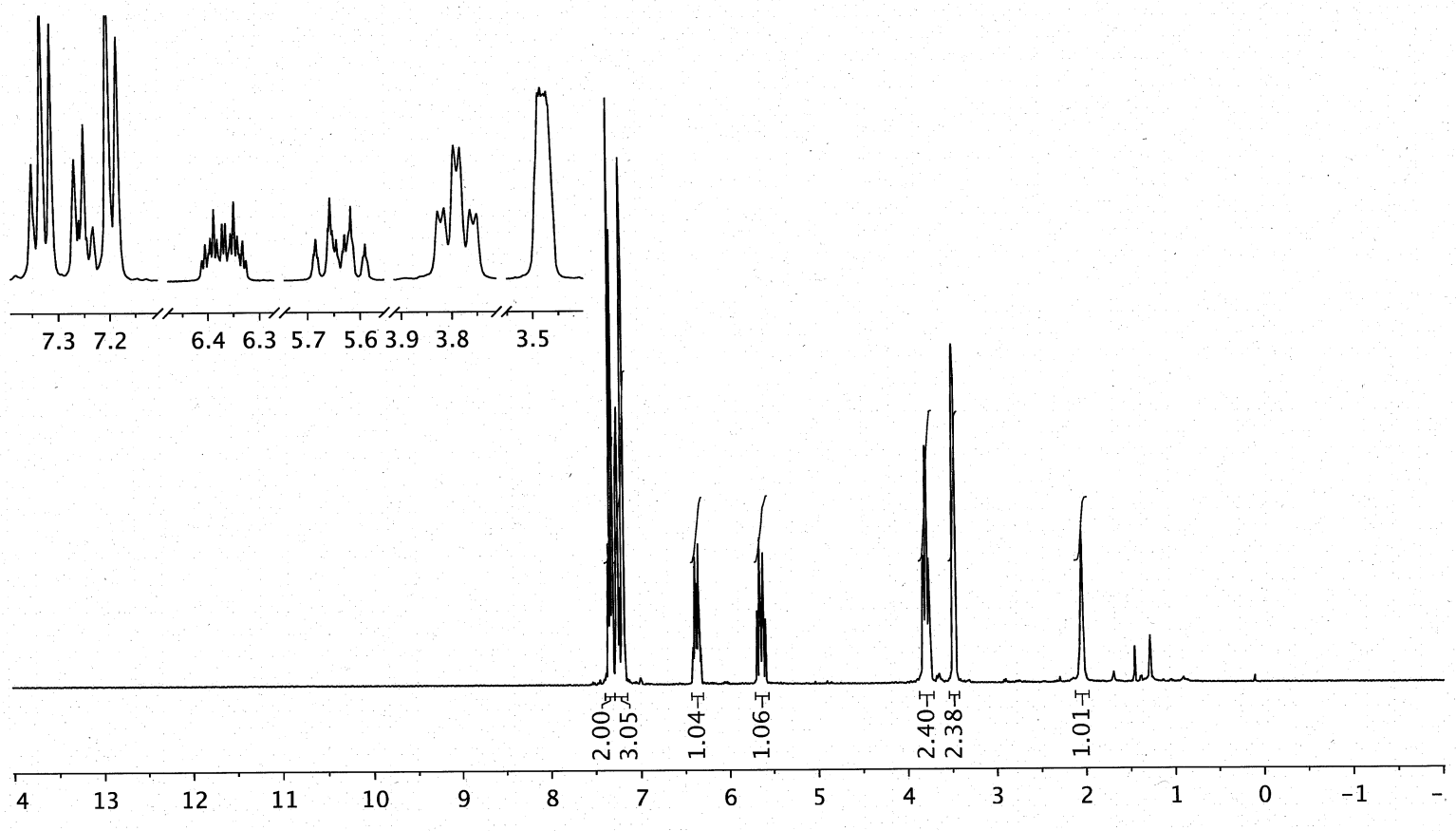


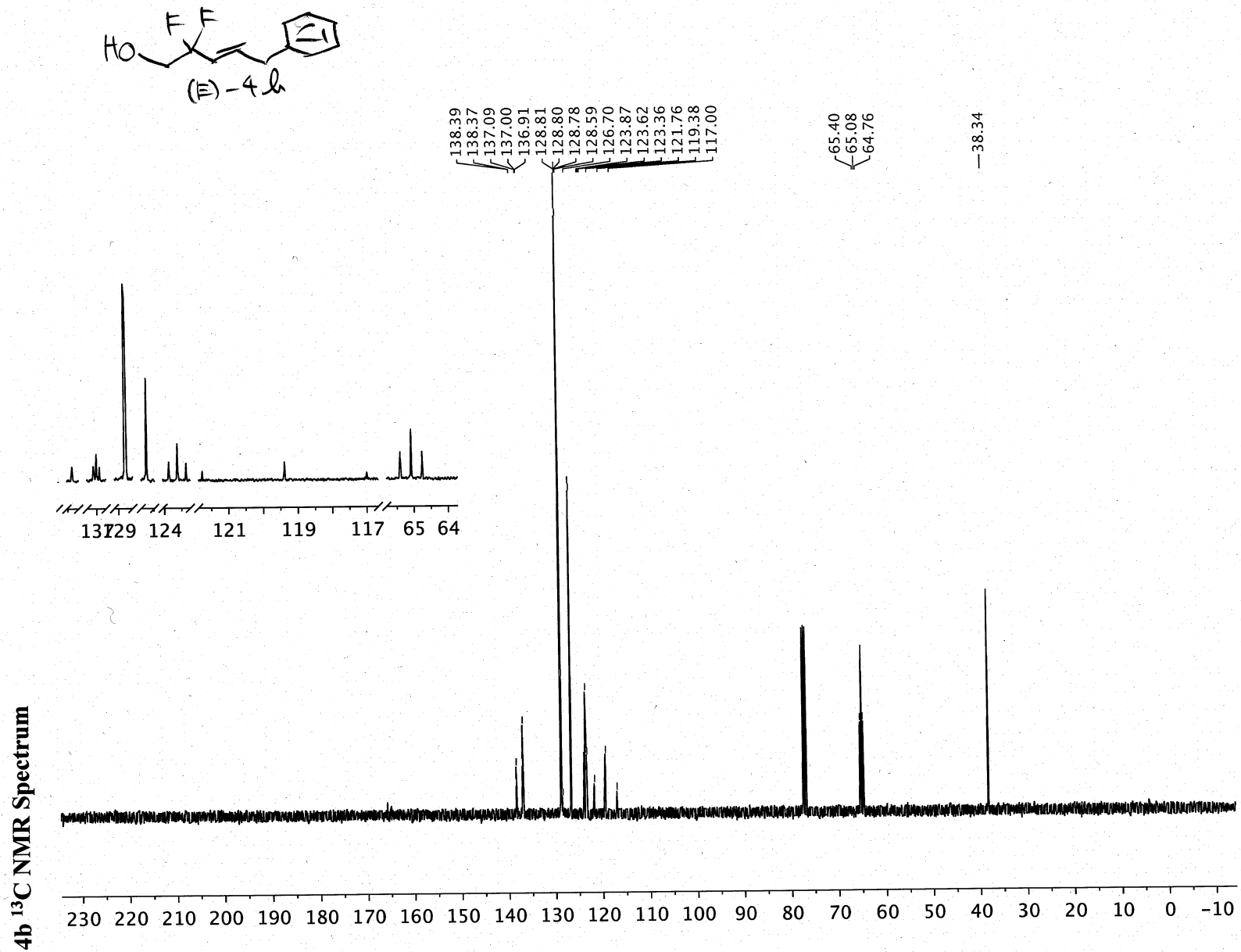
4a ^{19}F NMR Spectrum



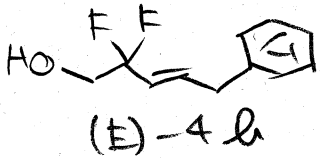
(E)-4b

4b ^{1}H NMR Spectrum

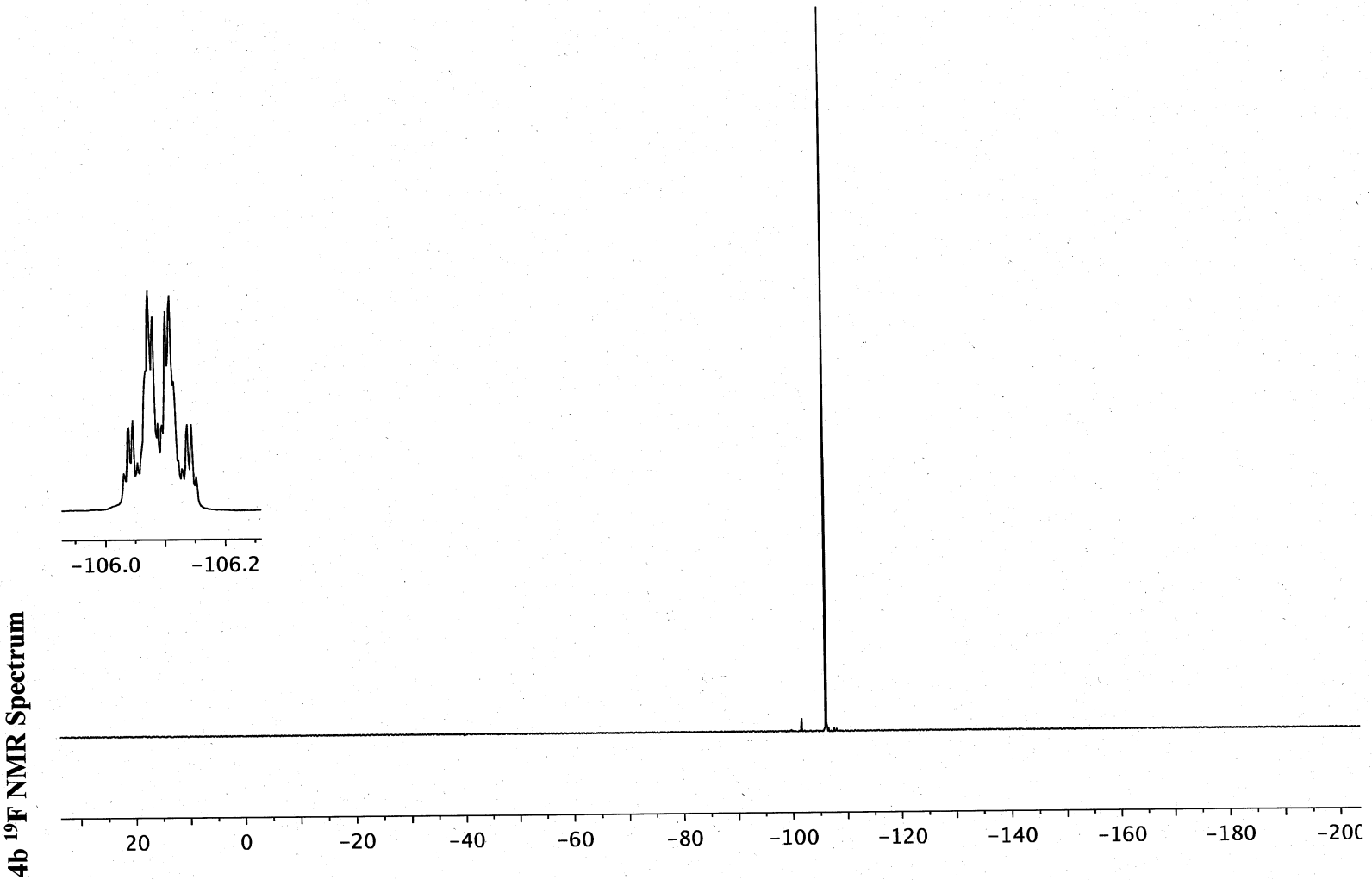




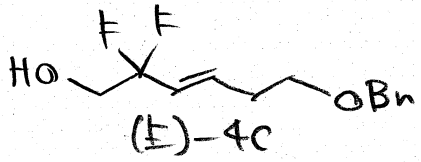
4b ^{13}C NMR Spectrum



(E)-4b

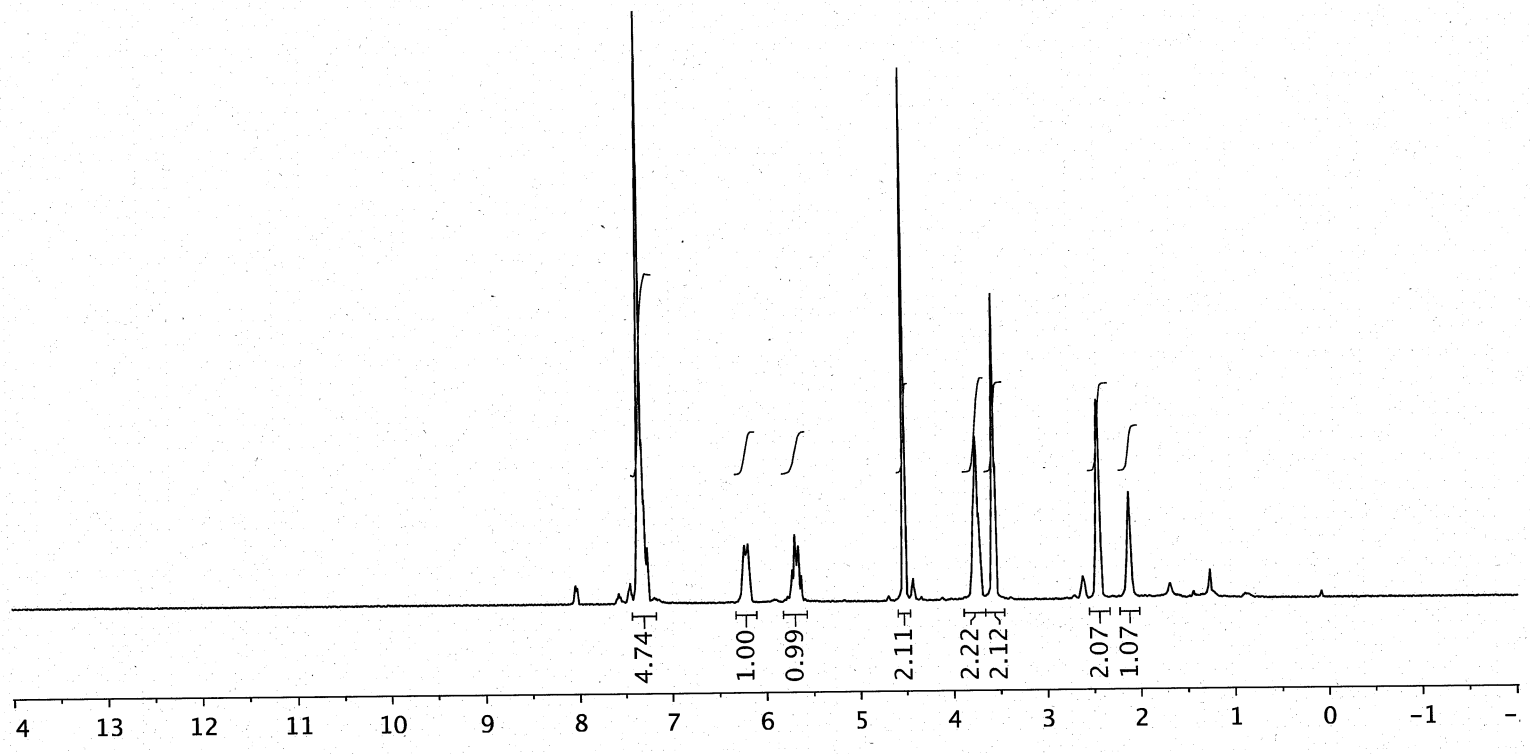


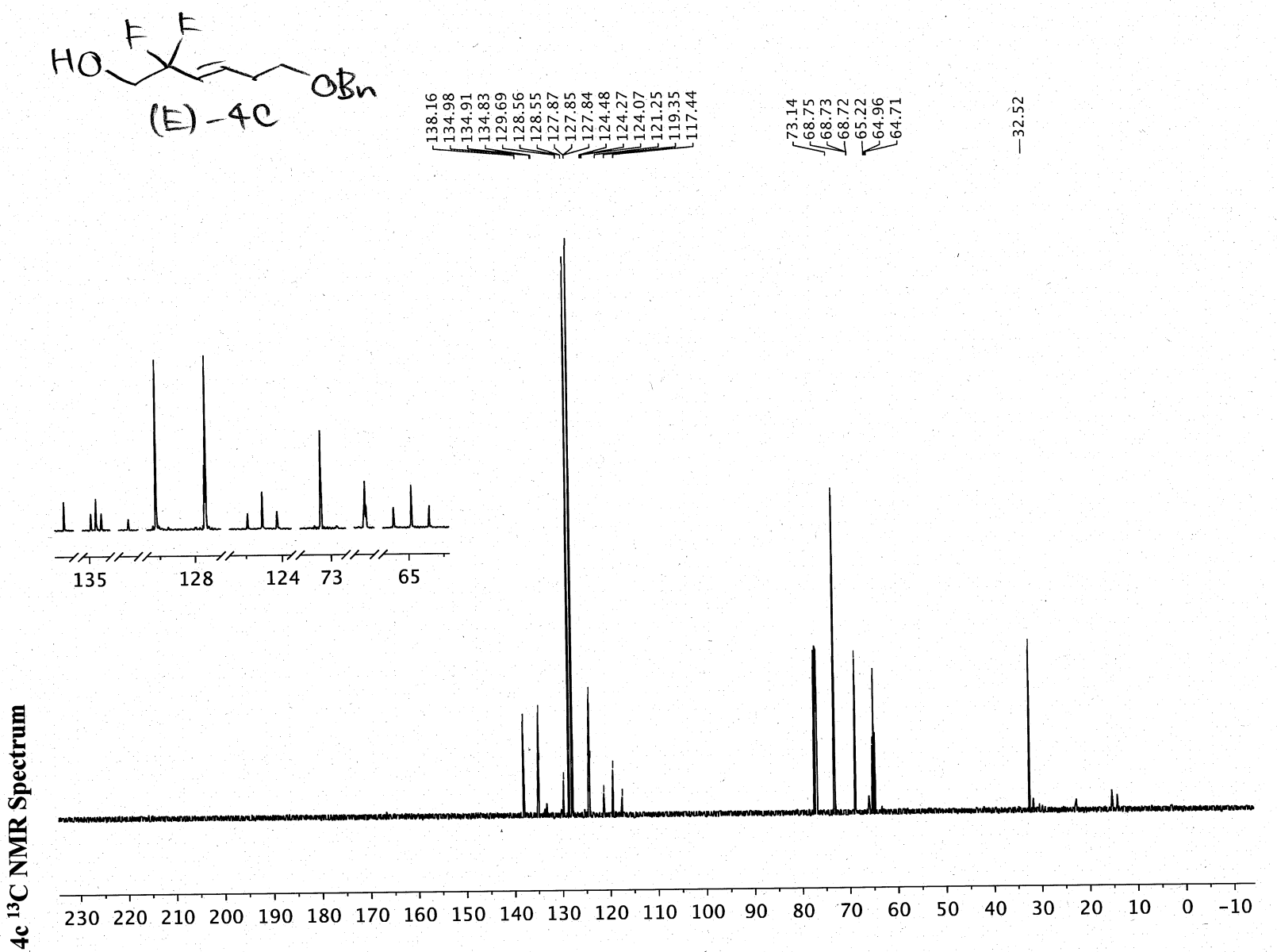
4b ^{19}F NMR Spectrum



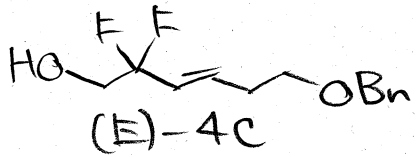
(±)-4c

4c ^{1}H NMR Spectrum



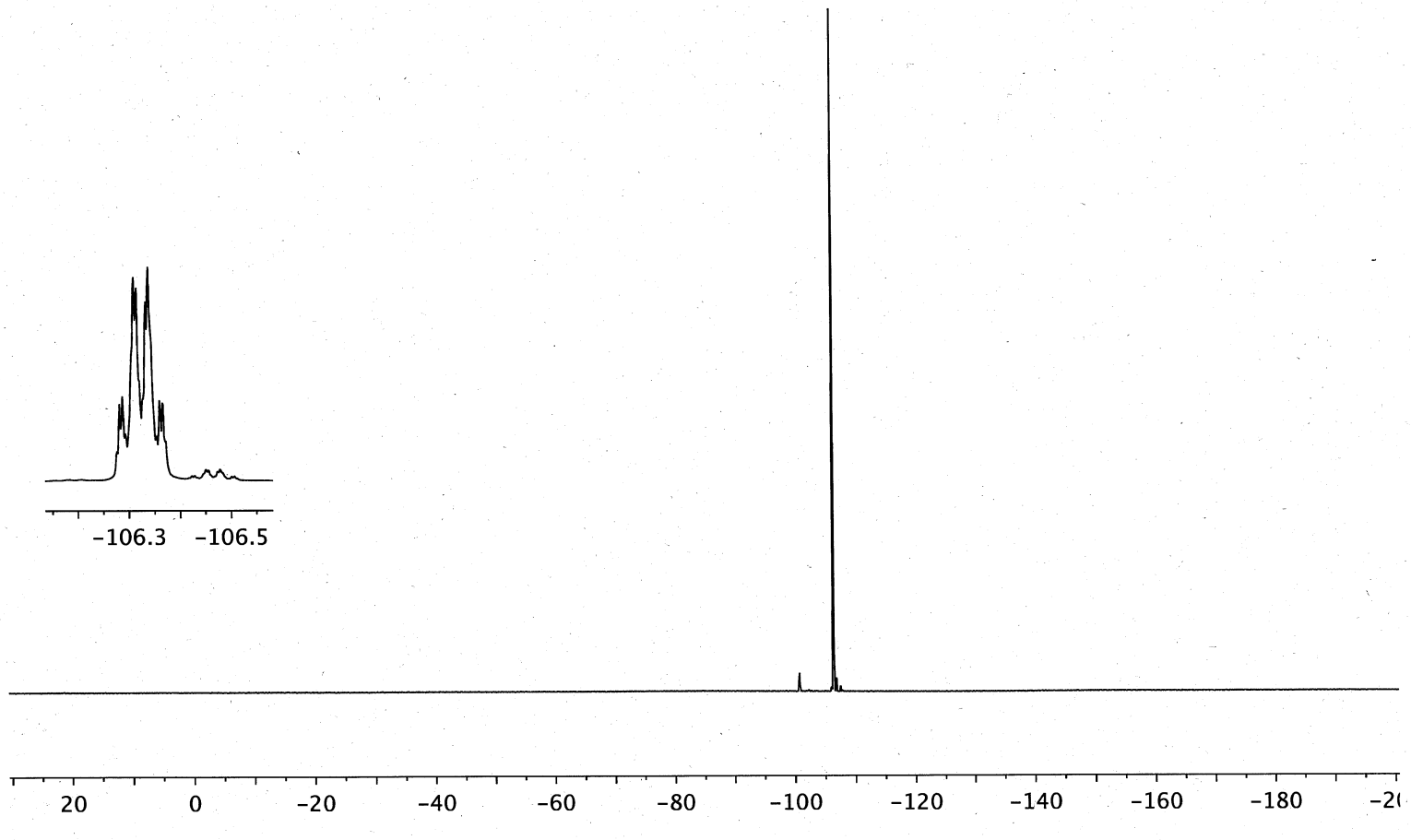


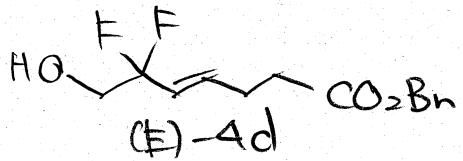
4c ^{13}C NMR Spectrum



(E)-4c

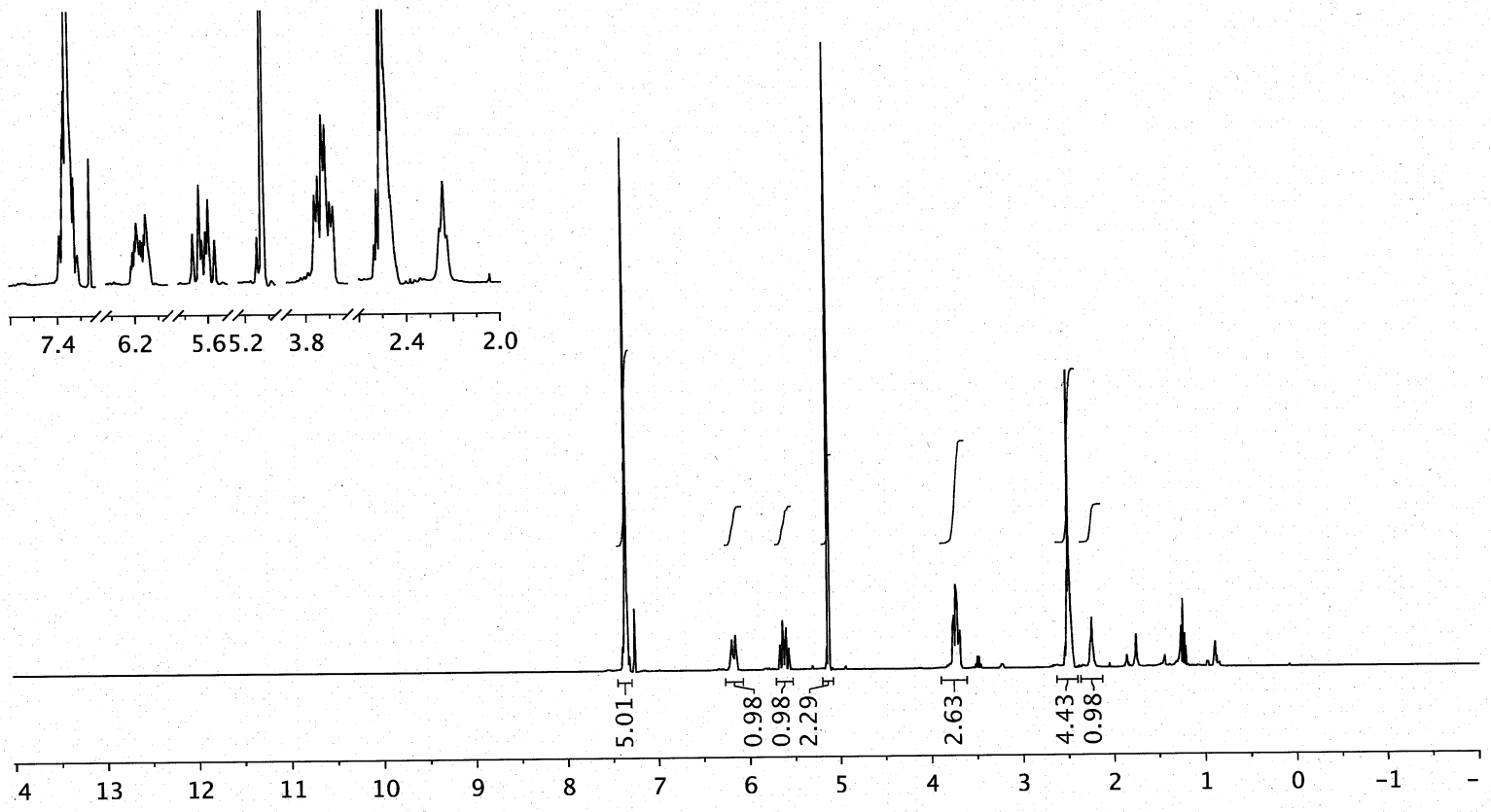
4c ^{19}F NMR Spectrum

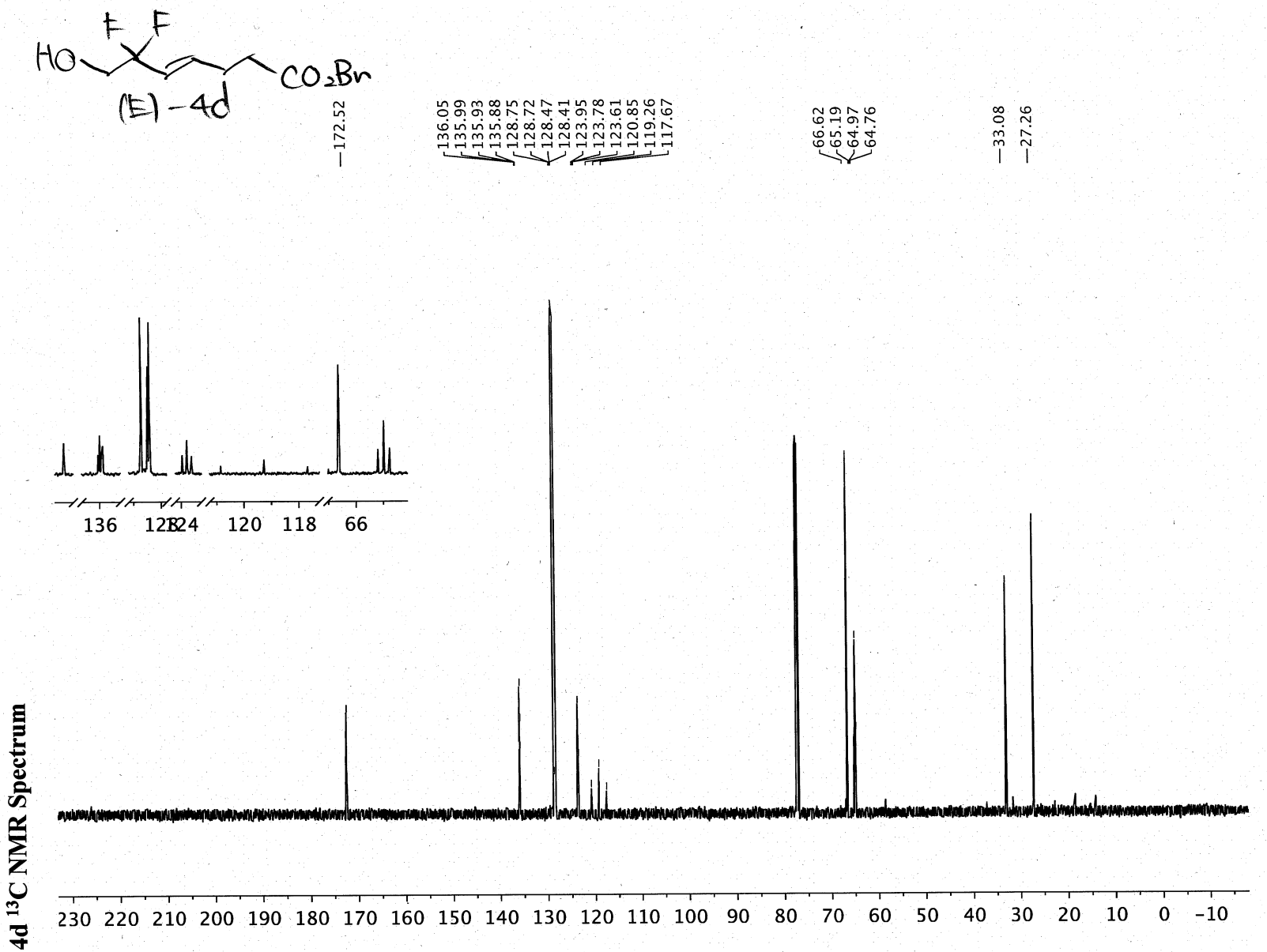




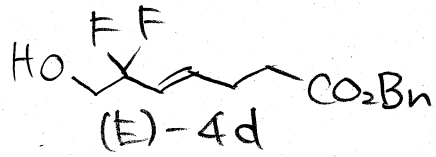
(E)-4d

4d ^{1}H NMR Spectrum



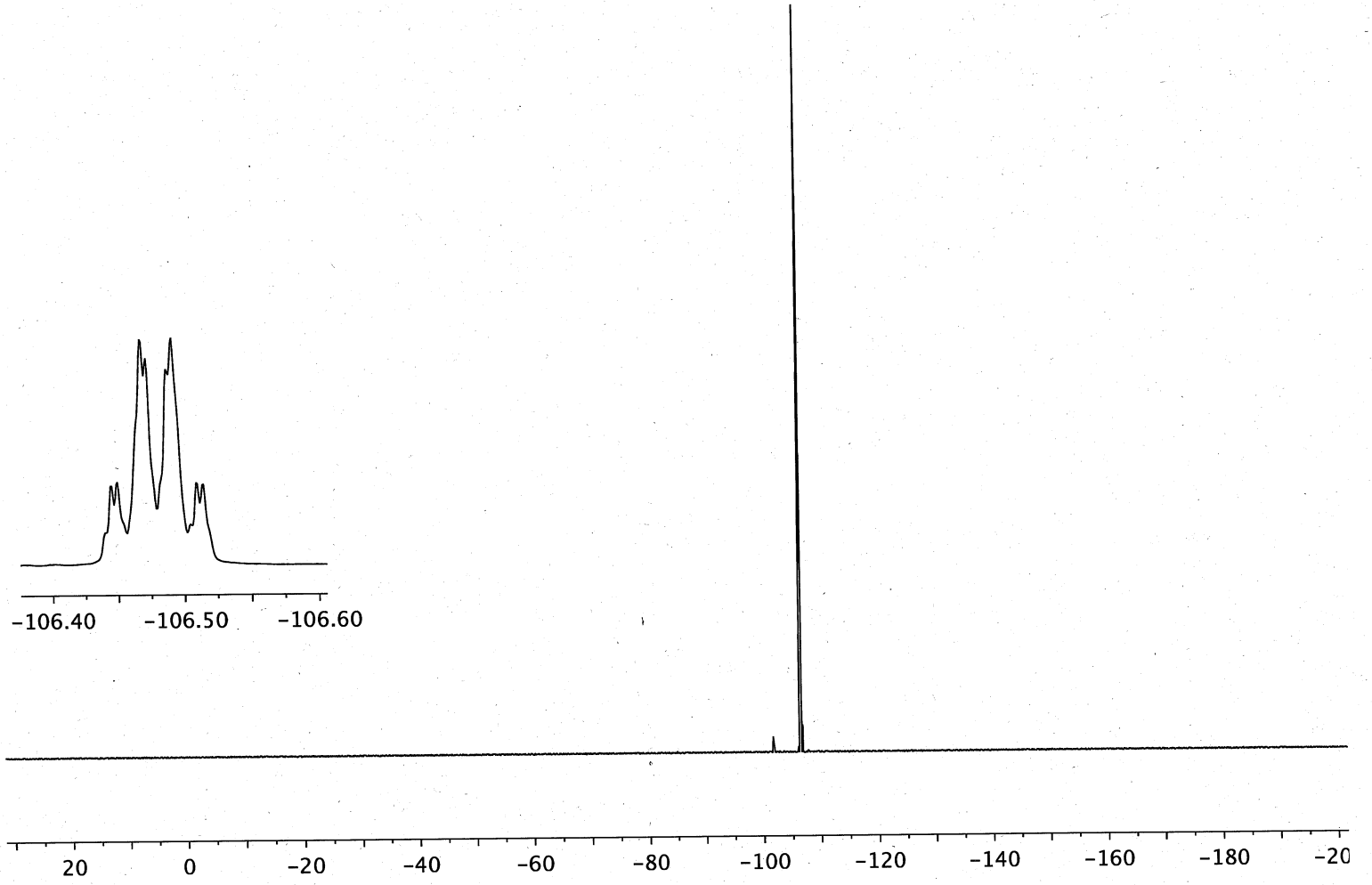


4d ^{13}C NMR Spectrum

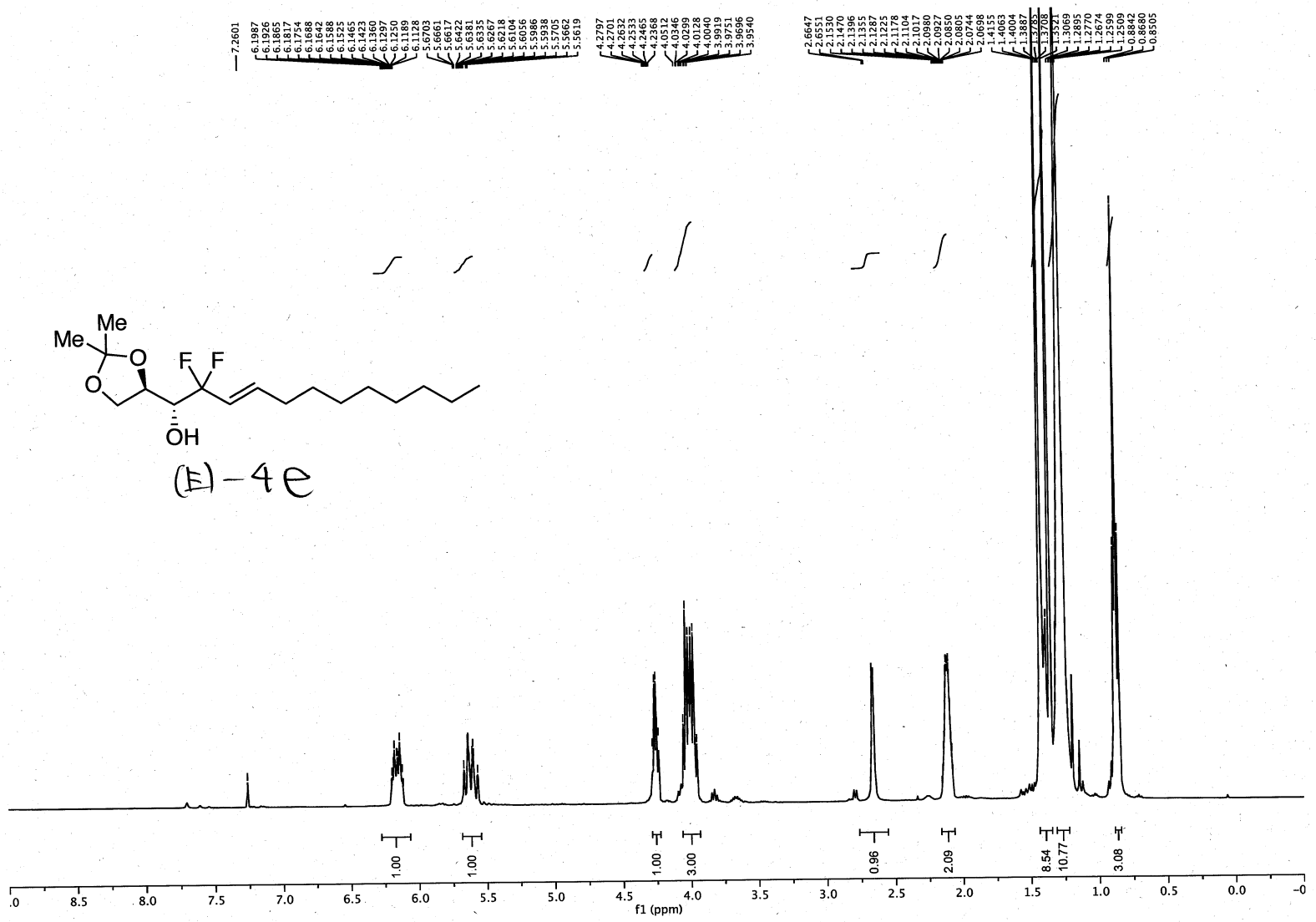


(E)-4d

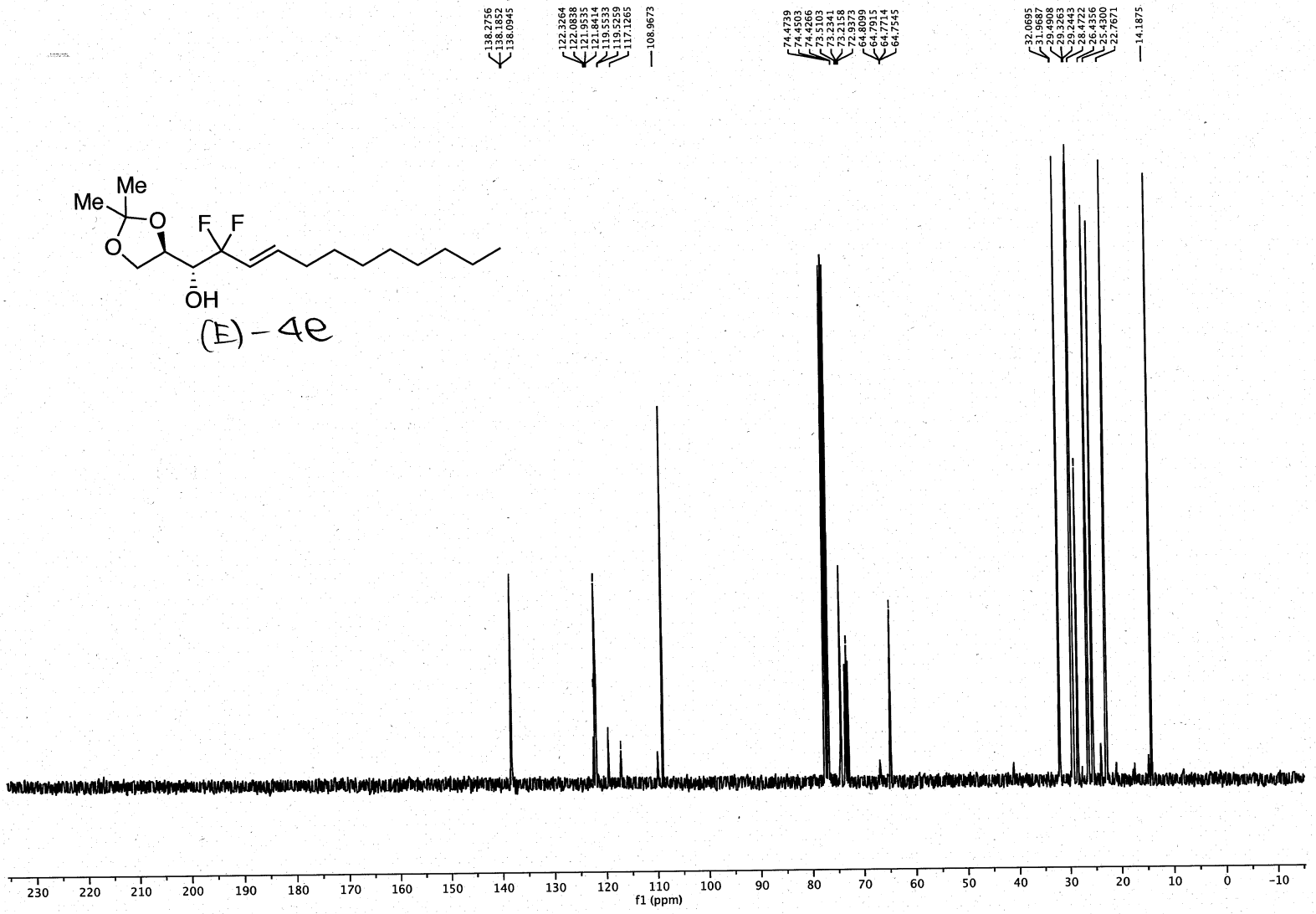
4d ^{19}F NMR Spectrum



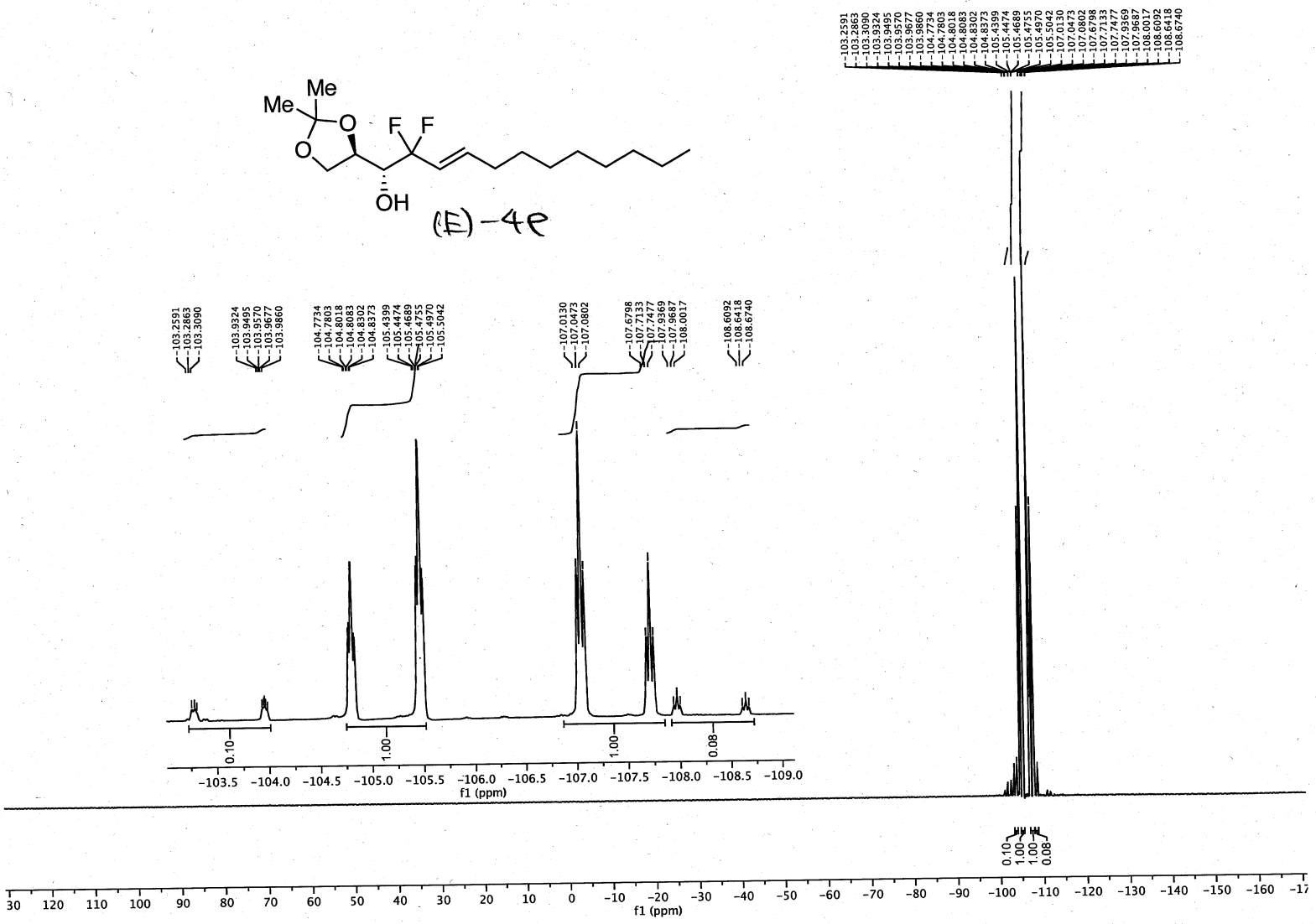
4e ^{1}H NMR Spectrum

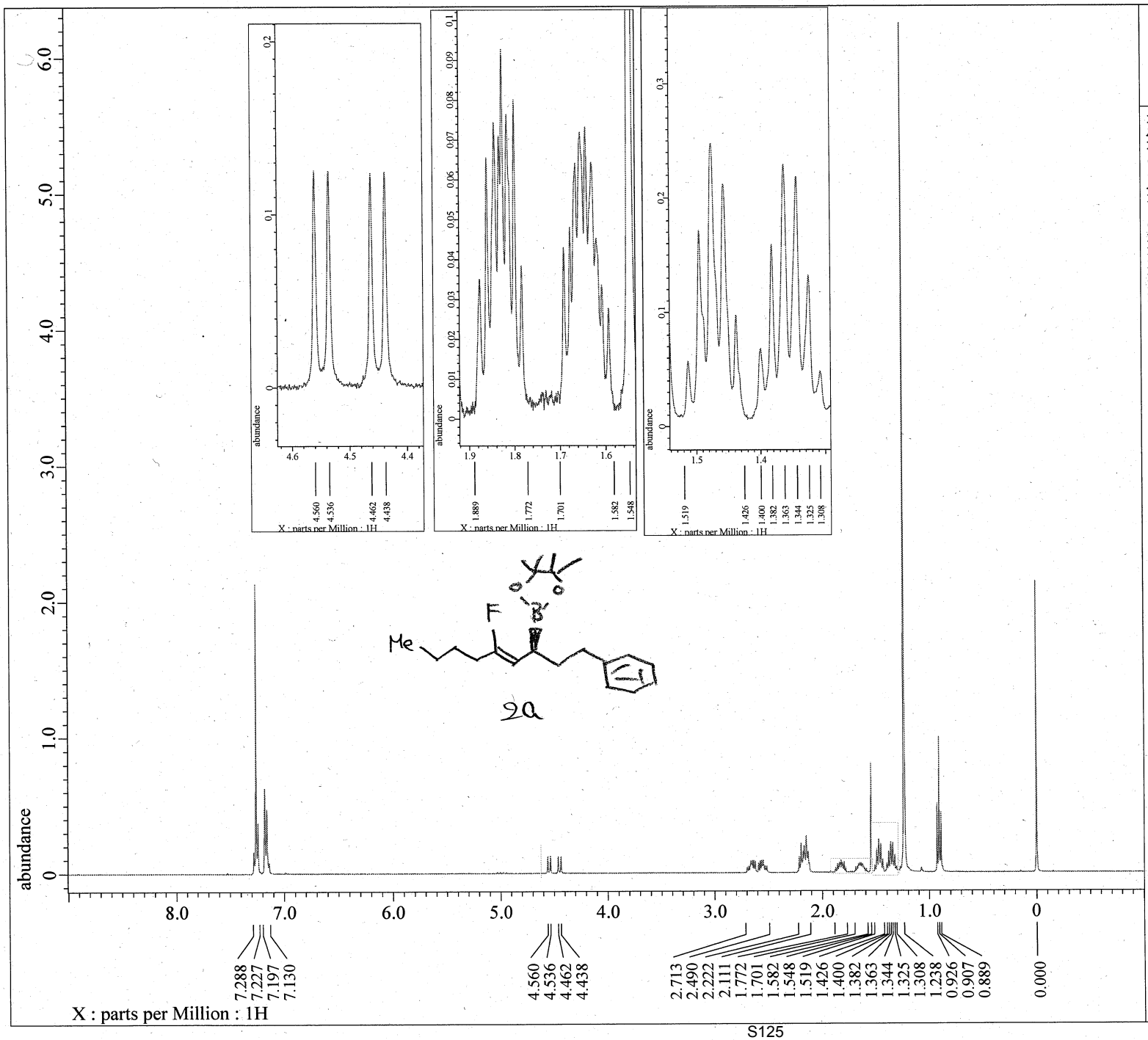


4e ^{13}C NMR Spectrum

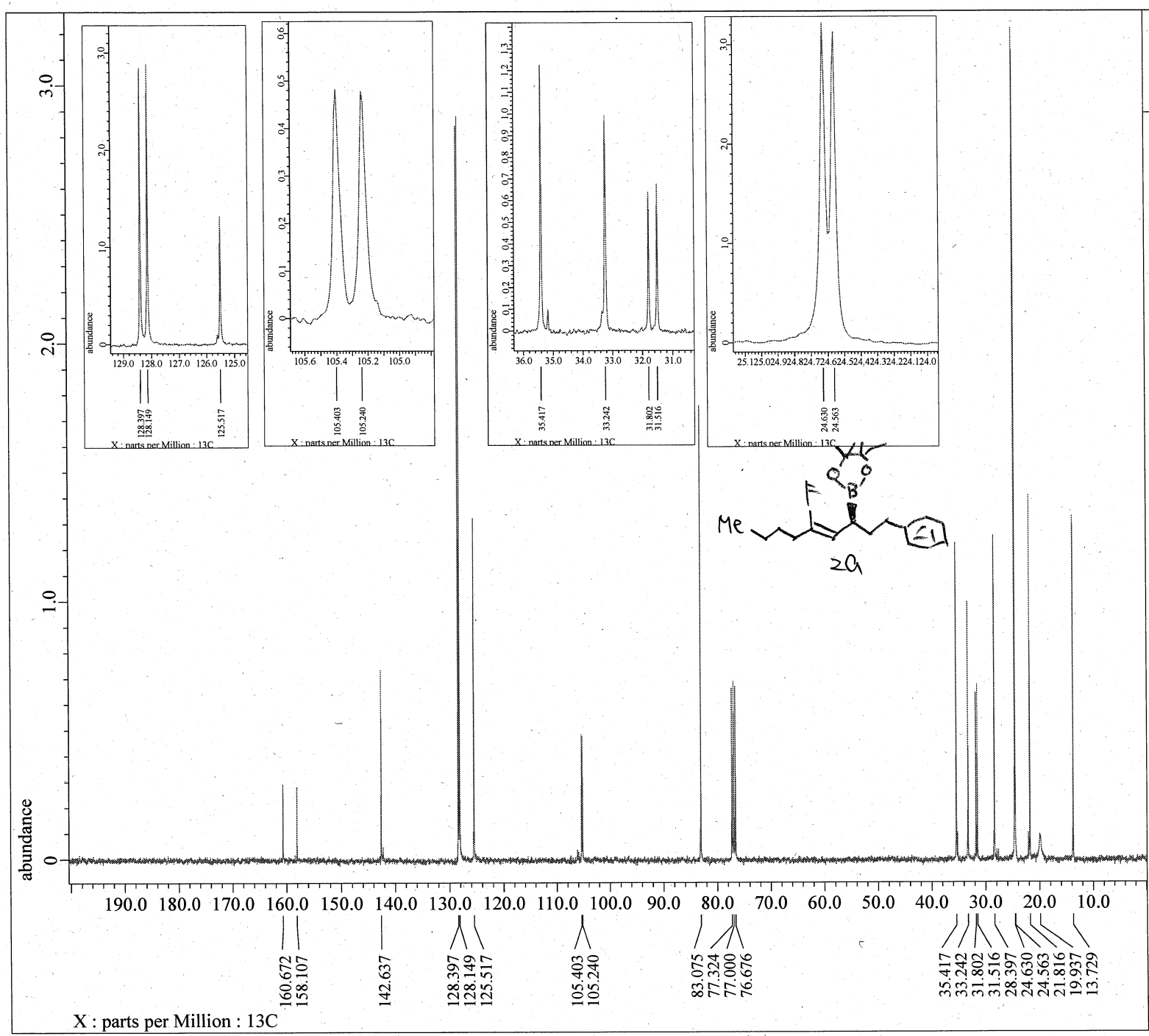


4e ^{19}F NMR Spectrum



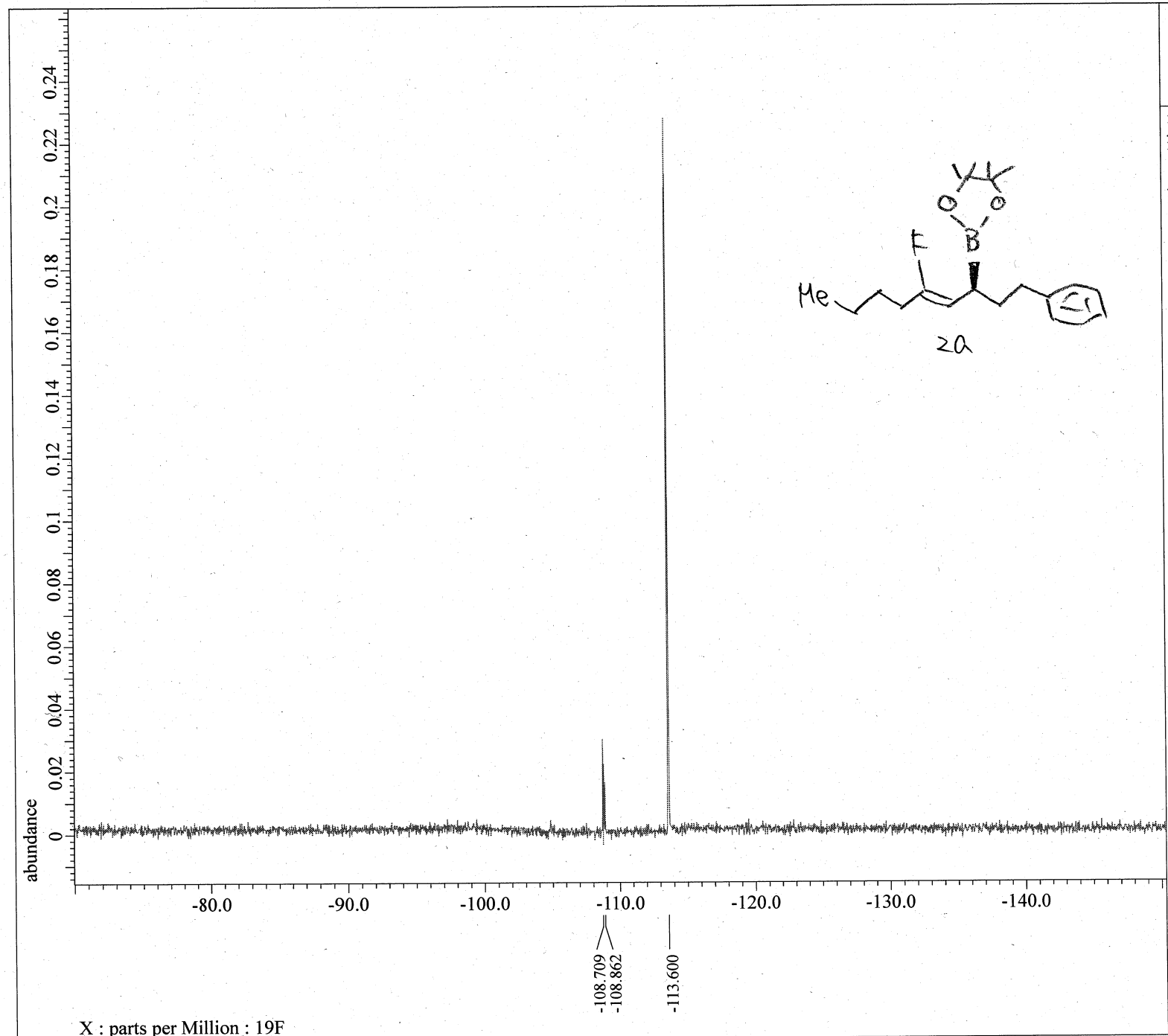


Filename	= AKY719-pure-4.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#342377
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 8-NOV-2018 16:57:47
Revision_Time	= 29-MAR-2019 20:25:14
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 50
Temp_Get	= 20.5[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]



JEOL

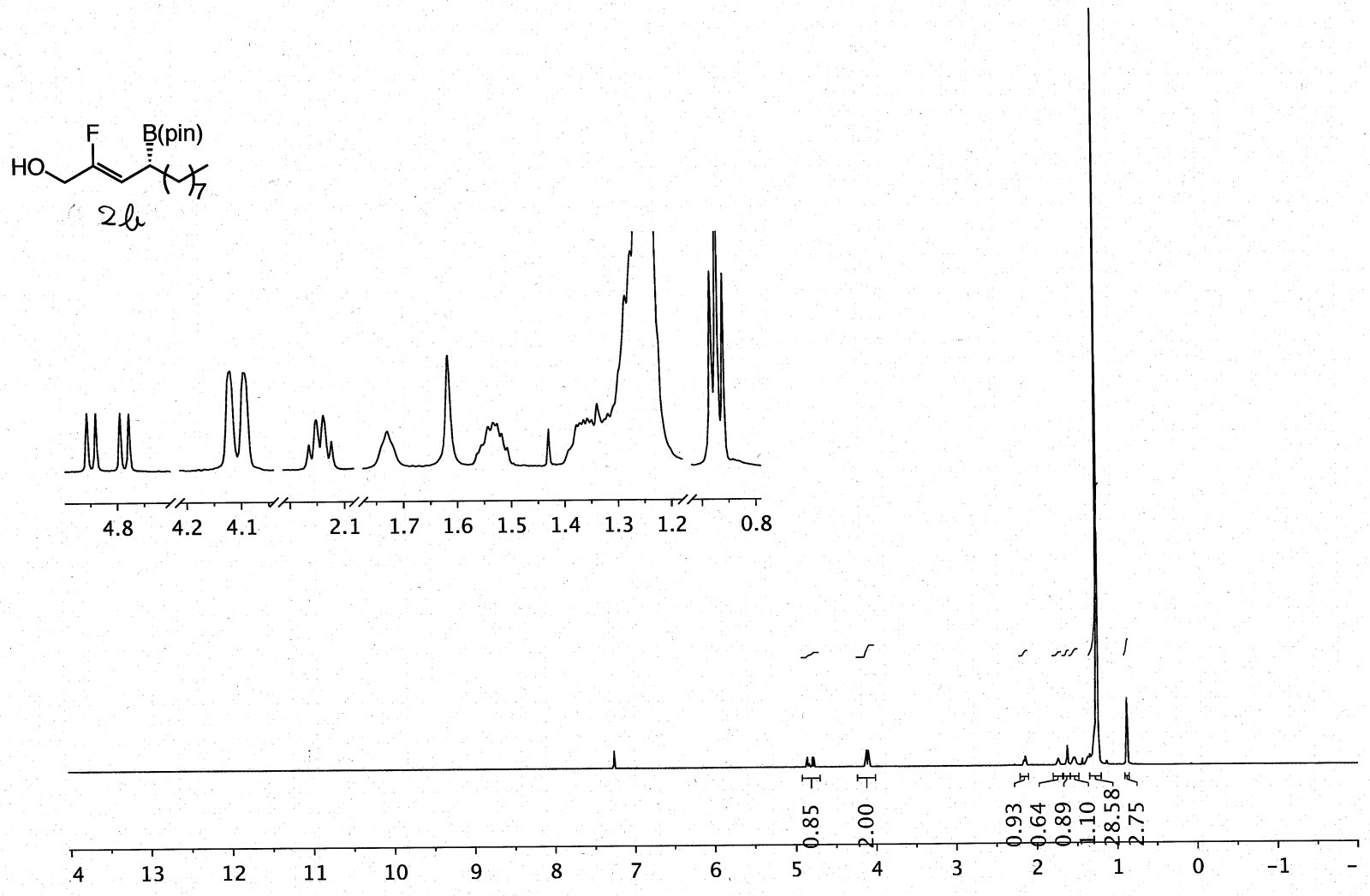
Filename	= AKY719-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#346250
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 8-NOV-2018 17:03:21
Revision_Time	= 8-NOV-2018 13:14:14
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 20.9[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]

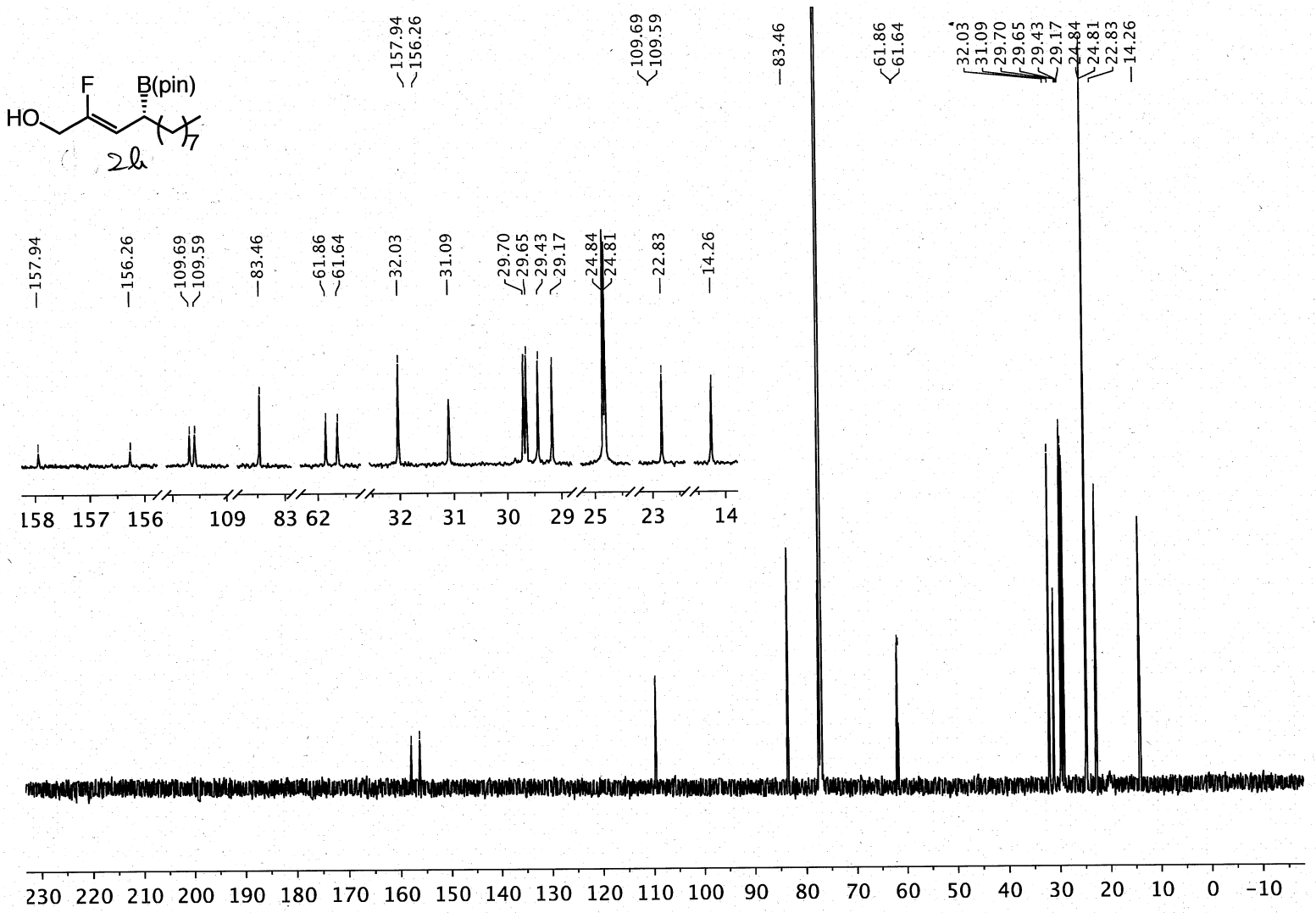


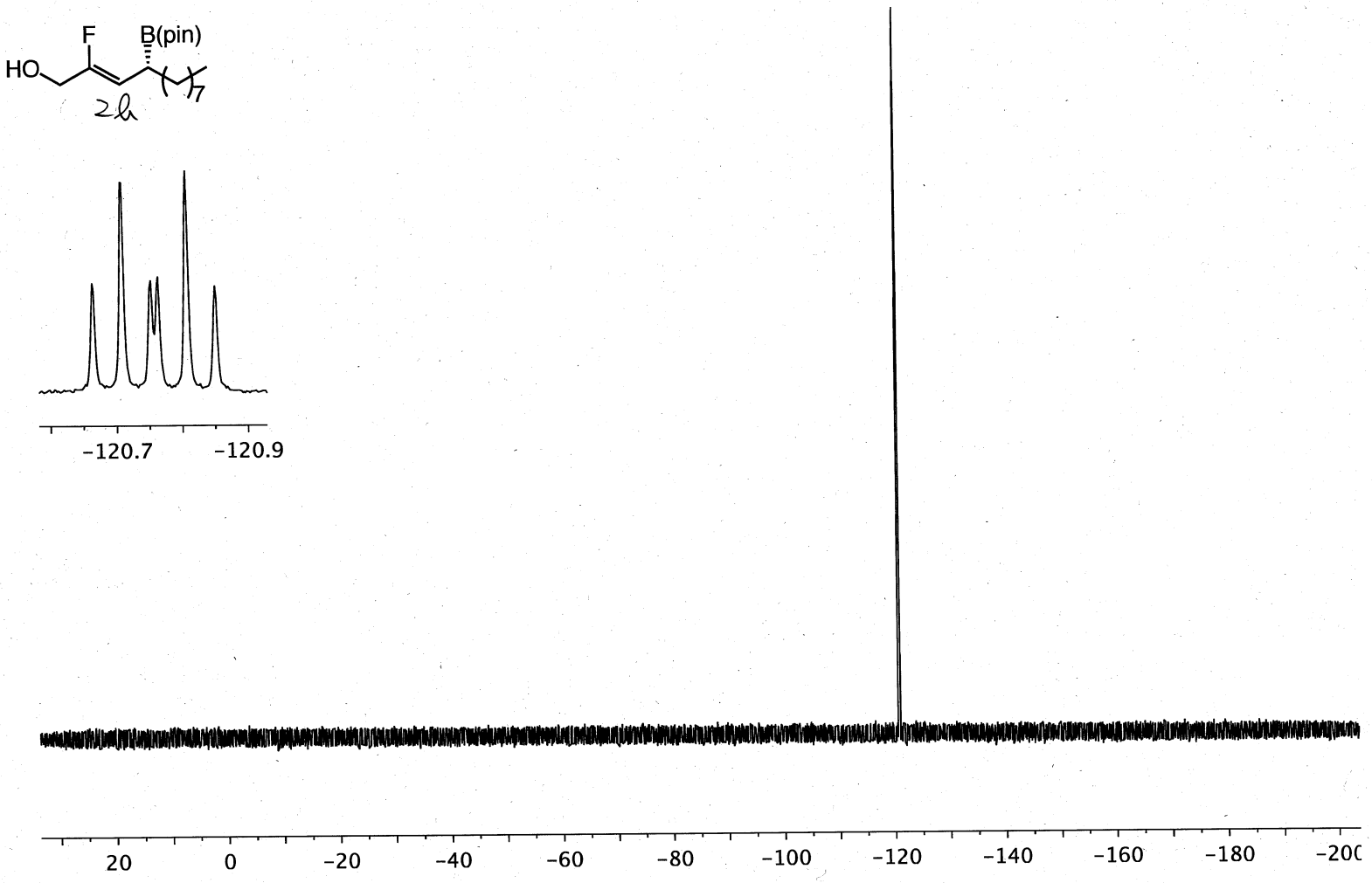
2a

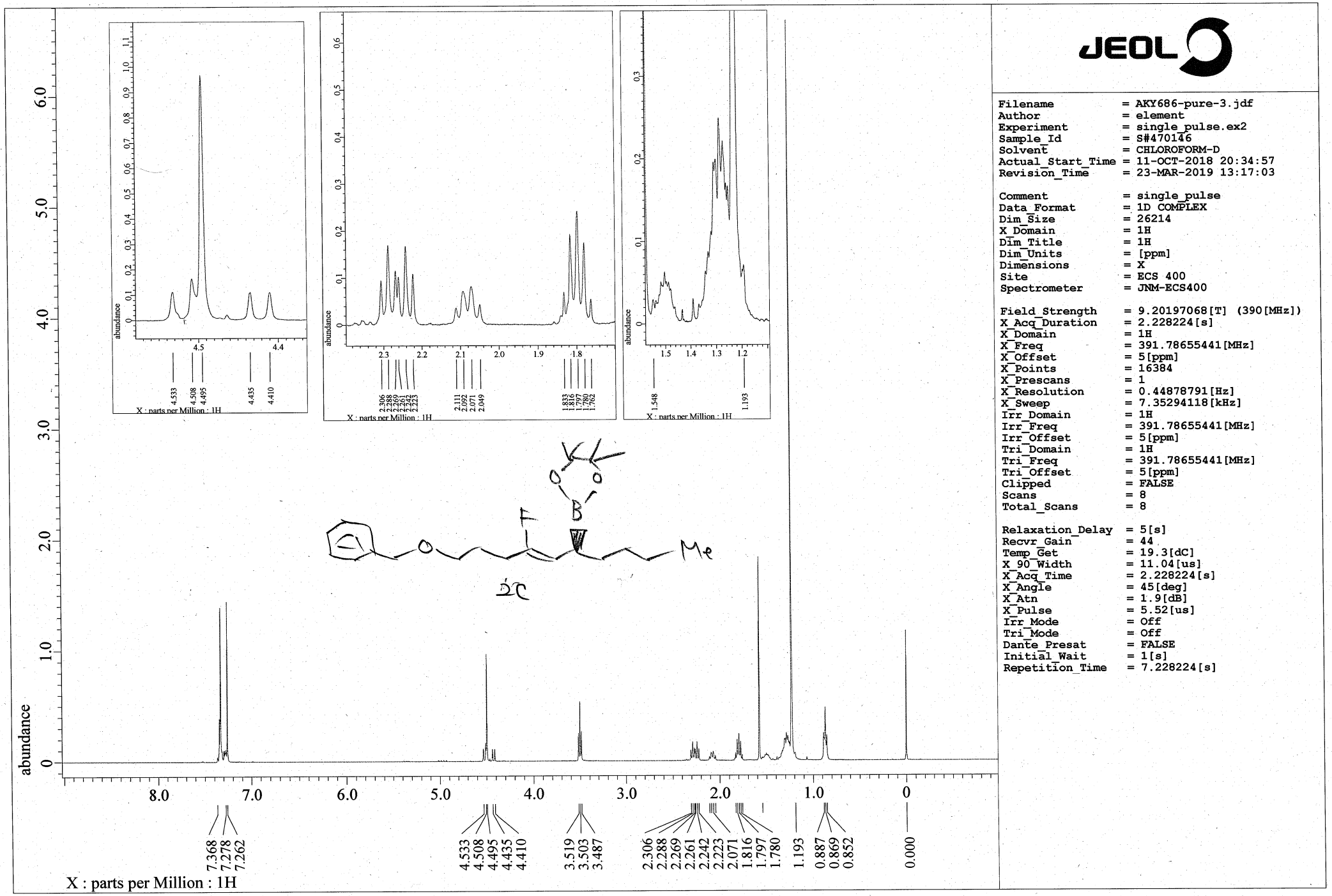
JEOL

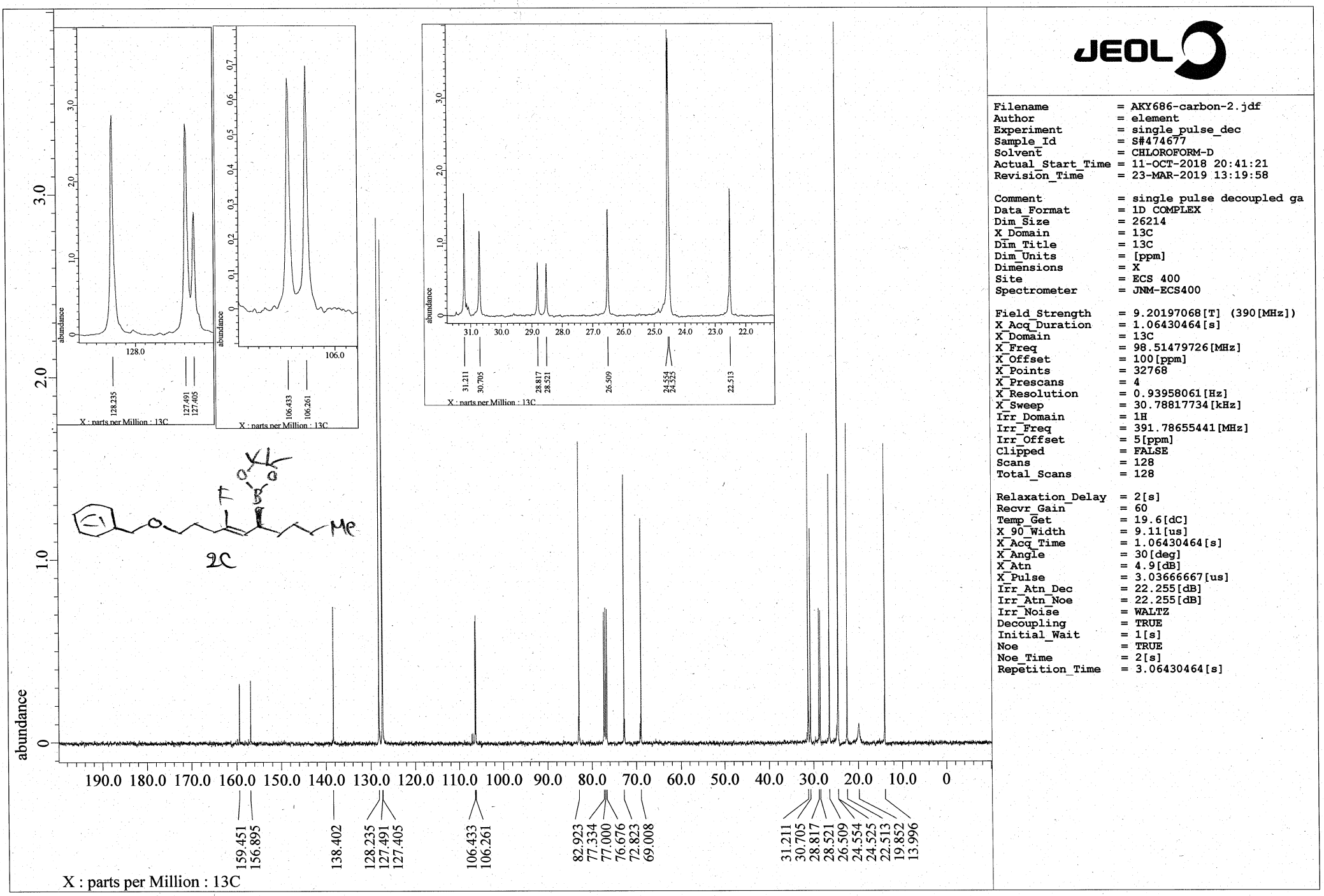
Filename	= AKY719-fnmr-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#361400
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 8-NOV-2018 18:31:57
Revision_Time	= 22-MAR-2019 18:09:40
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 21.8[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

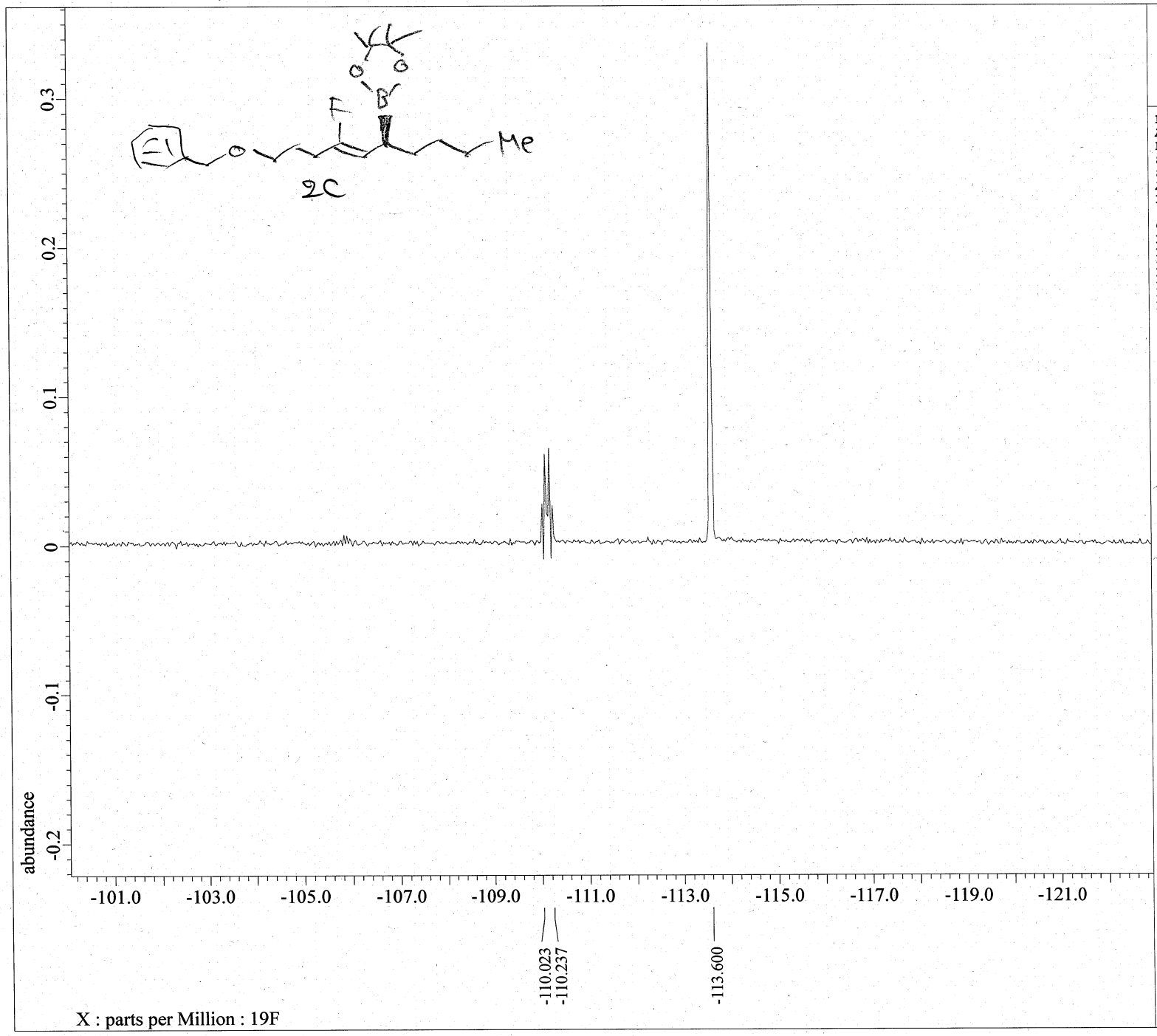

F
B(pin)
HO
2b
4.8
4.2
4.1
2.1
1.7
1.6
1.5
1.4
1.3
1.2
0.8
0.85
2.00
0.93
0.64
0.89
1.10
28.58
2.75
4
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1


F
B(pin)
HO
2h
157.94
156.26
109.69
109.59
83.46
61.86
61.64
32.03
31.09
29.70
29.65
29.43
29.17
24.84
24.81
22.83
14.26
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10


F
B(pin)
HO
2h
-120.7
-120.9
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200

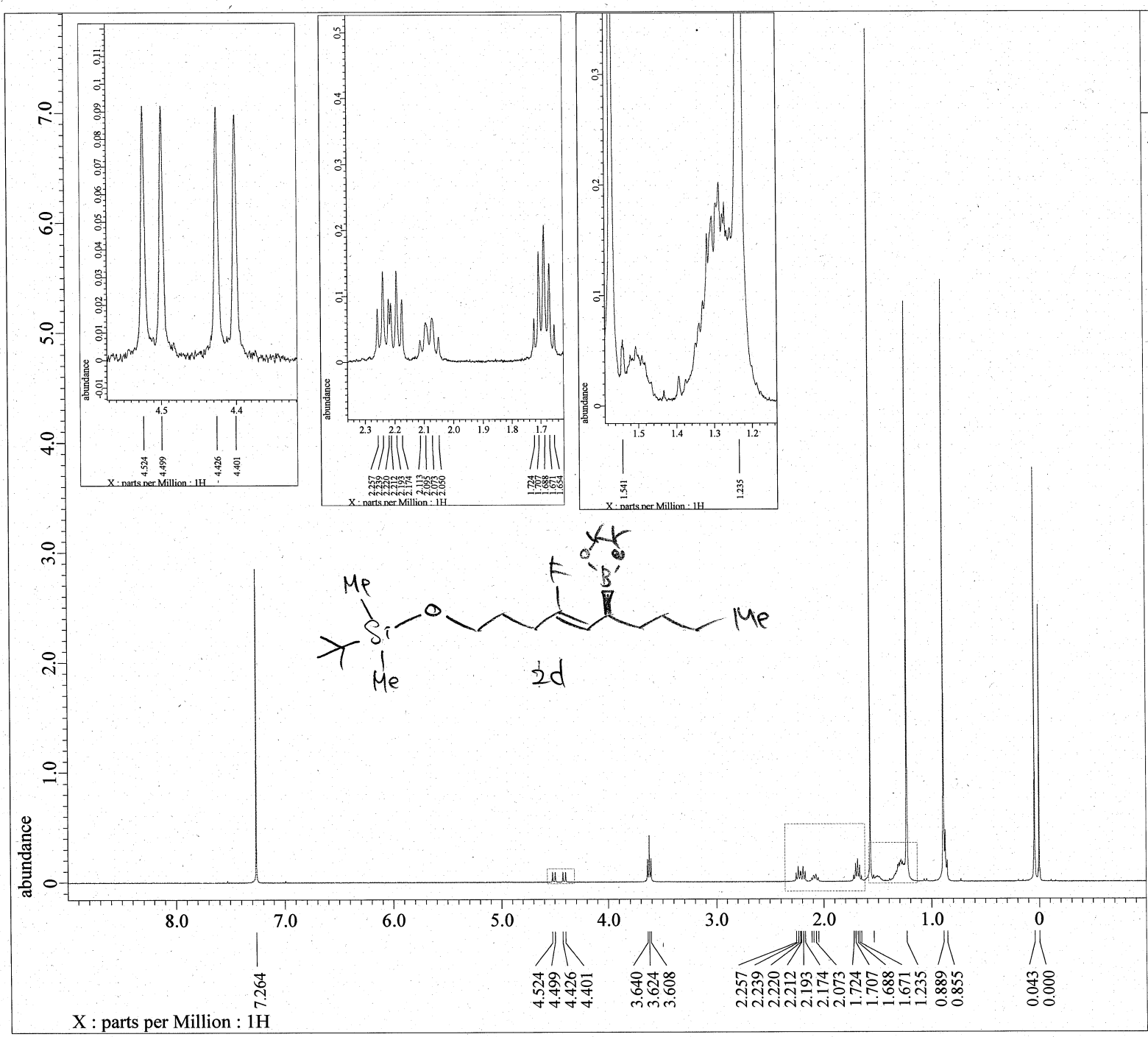

JEOL
Filename = AKY686-pure-3.jdf
Author = element
Experiment = single_pulse.ex2
Sample_Id = S#470146
Solvent = CHLOROFORM-D
Actual_Start_Time = 11-OCT-2018 20:34:57
Revision_Time = 23-MAR-2019 13:17:03
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 1H
Dim_Title = 1H
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400
Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 2.228224[s]
X_Domain = 1H
X_Freq = 391.78655441[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.44878791[Hz]
X_Sweep = 7.35294118[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = 1H
Tri_Freq = 391.78655441[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 44
Temp_Get = 19.3[dC]
X_90_Width = 11.04[us]
X_Acq_Time = 2.228224[s]
X_Angle = 45[deg]
X_Atn = 1.9[dB]
X_Pulse = 5.52[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.228224[s]
Me
2c
abundance
X : parts per Million : 1H
7.368
7.278
7.262
4.533
4.508
4.495
4.435
4.410
3.519
3.503
3.487
2.306
2.288
2.269
2.261
2.242
2.223
2.071
1.816
1.797
1.780
1.193
0.887
0.869
0.852
0.000


abundance
X : parts per Million : 13C
159.451
156.895
138.402
128.235
127.491
127.405
106.433
106.261
82.923
77.334
77.000
76.676
72.823
69.008
31.211
30.705
28.817
28.521
26.509
24.554
24.525
22.513
19.852
13.996
2C
Filename = AKY686-carbon-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = S#474677
Solvent = CHLOROFORM-D
Actual_Start_Time = 11-OCT-2018 20:41:21
Revision_Time = 23-MAR-2019 13:19:58
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400
Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 128
Total_Scans = 128
Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 19.6[dC]
X_90_Width = 9.11[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.03666667[us]
Irr_Atn_Dec = 22.255[dB]
Irr_Atn_Noe = 22.255[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]



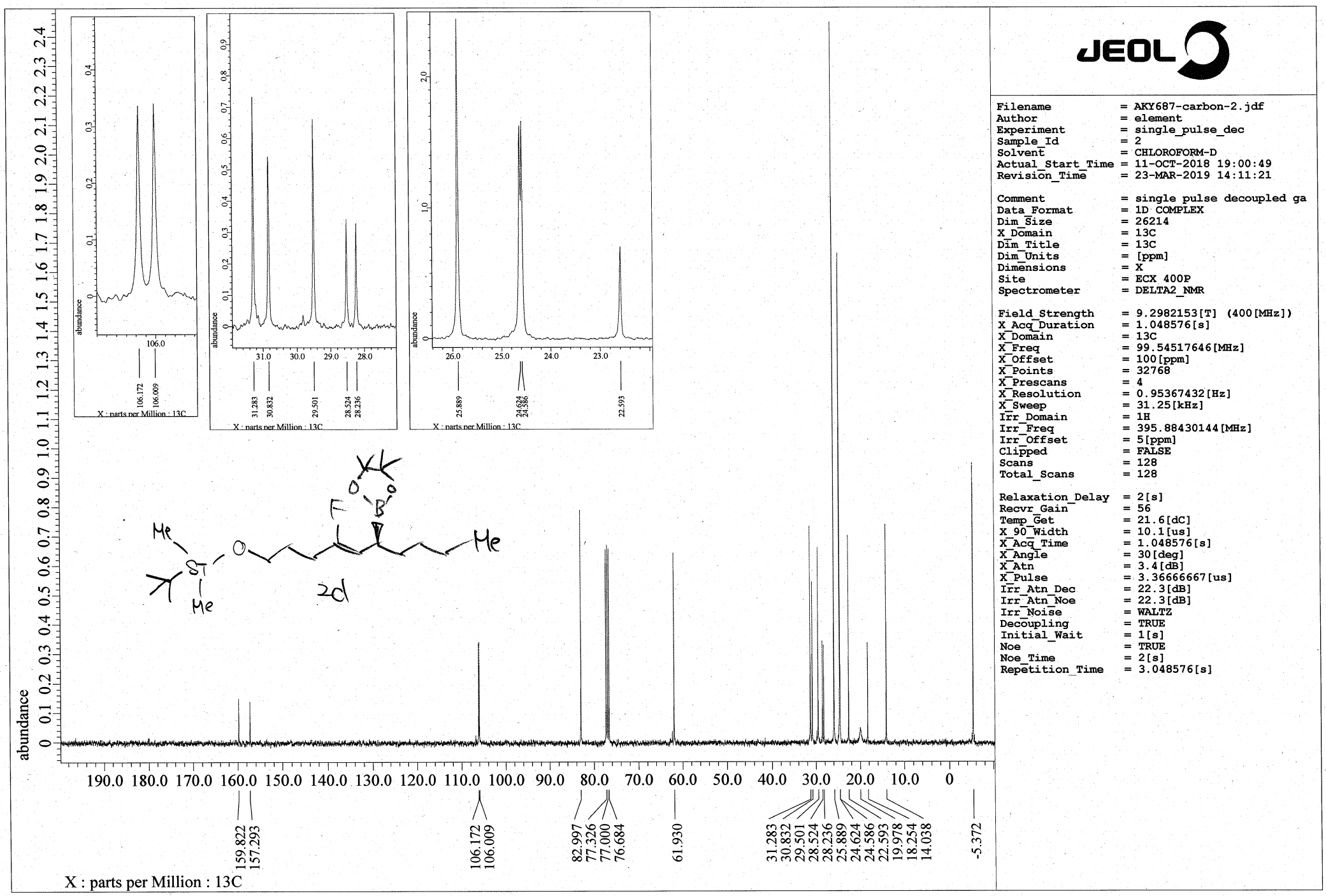
JEOL

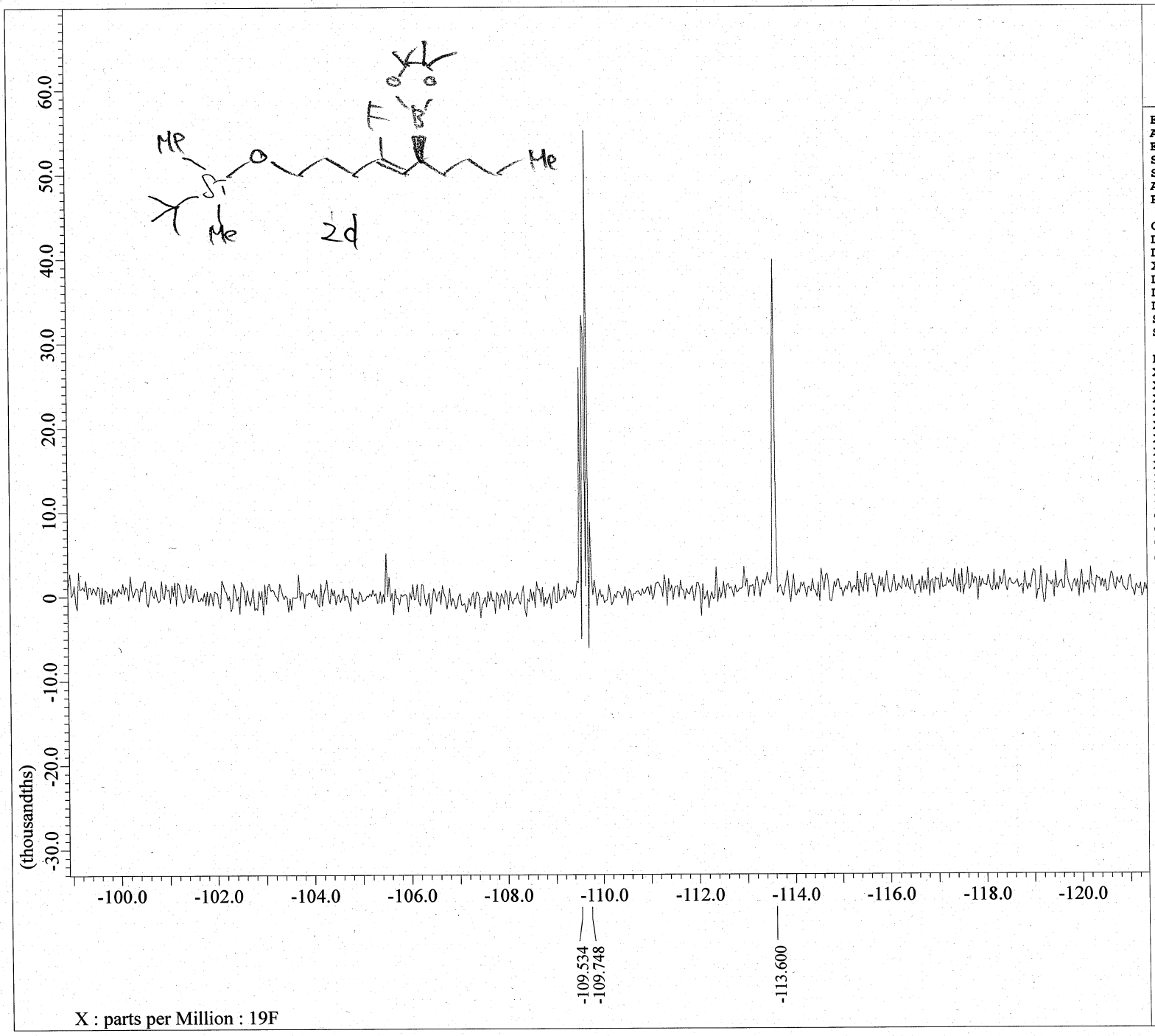
Filename	= AKY686-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#506480
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 11-OCT-2018 22:33:45
Revision_Time	= 23-MAR-2019 13:25:07
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 22.9[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



JEOL

Filename	= AKY687-pure-ag-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#400104
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 11-OCT-2018 18:37:59
Revision_Time	= 23-MAR-2019 14:09:46
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 50
Temp_Get	= 19.6[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]


JEOL
Filename = AKY687-carbon-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = 2
Solvent = CHLOROFORM-D
Actual_Start_Time = 11-OCT-2018 19:00:49
Revision_Time = 23-MAR-2019 14:11:21
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 1.048576[s]
X_Domain = 13C
X_Freq = 99.54517646[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.95367432[Hz]
X_Sweep = 31.25[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 128
Total_Scans = 128
Relaxation_Delay = 2[s]
Recvr_Gain = 56
Temp_Get = 21.6[dC]
X_90_Width = 10.1[us]
X_Acq_Time = 1.048576[s]
X_Angle = 30[deg]
X_Atn = 3.4[dB]
X_Pulse = 3.36666667[us]
Irr_Atn_Dec = 22.3[dB]
Irr_Atn_Noe = 22.3[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.048576[s]
abundance
X : parts per Million : 13C
159.822
157.293
106.172
106.009
82.997
77.326
77.000
76.684
61.930
31.283
30.832
29.501
28.524
28.236
25.889
24.624
24.586
22.593
19.978
18.254
14.038
-5.372
2d

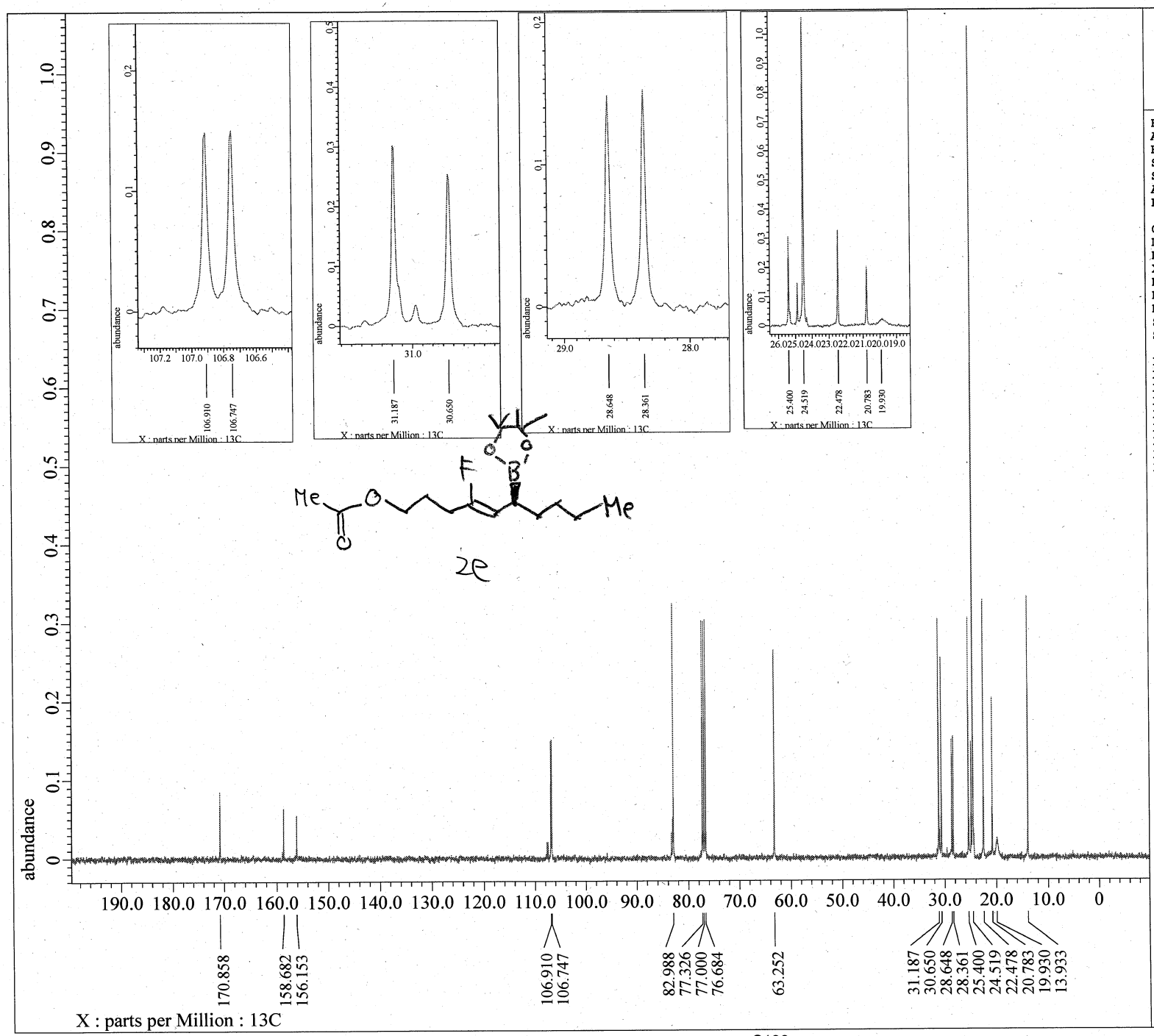


JEOL

Filename	= AKY687-FNMR--ag-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#423852
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 11-OCT-2018 20:16:02
Revision_Time	= 23-MAR-2019 14:14:04
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 20.8[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

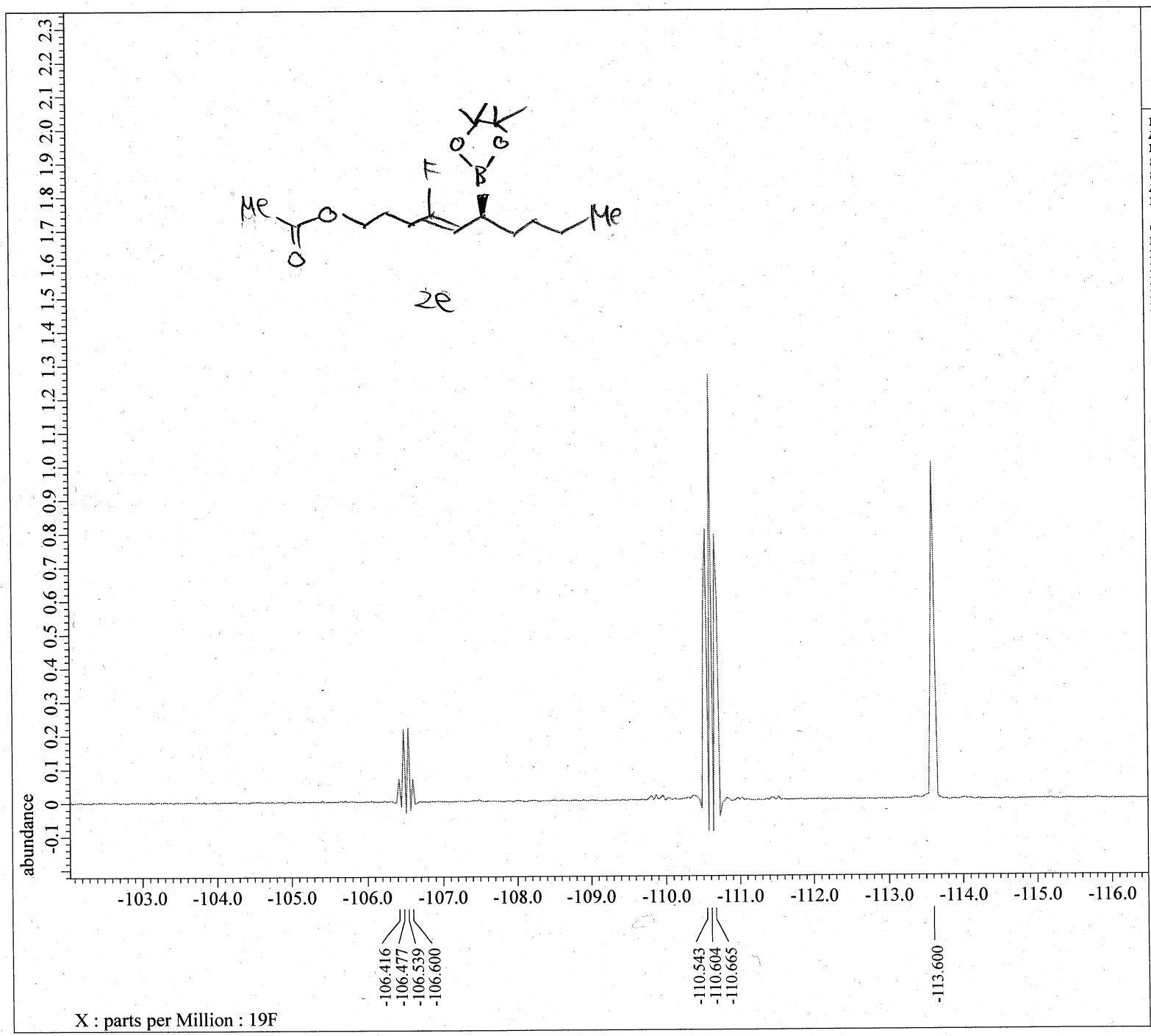
JEOL

Filename	= AKY668-pure_Proton-1-2.jd
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY668-pure
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 20-SEP-2018 18:40:43
Revision_Time	= 22-MAR-2019 19:31:31
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 38
Temp_Get	= 20[dC]
X_90_Width	= 6.22[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3.11[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]



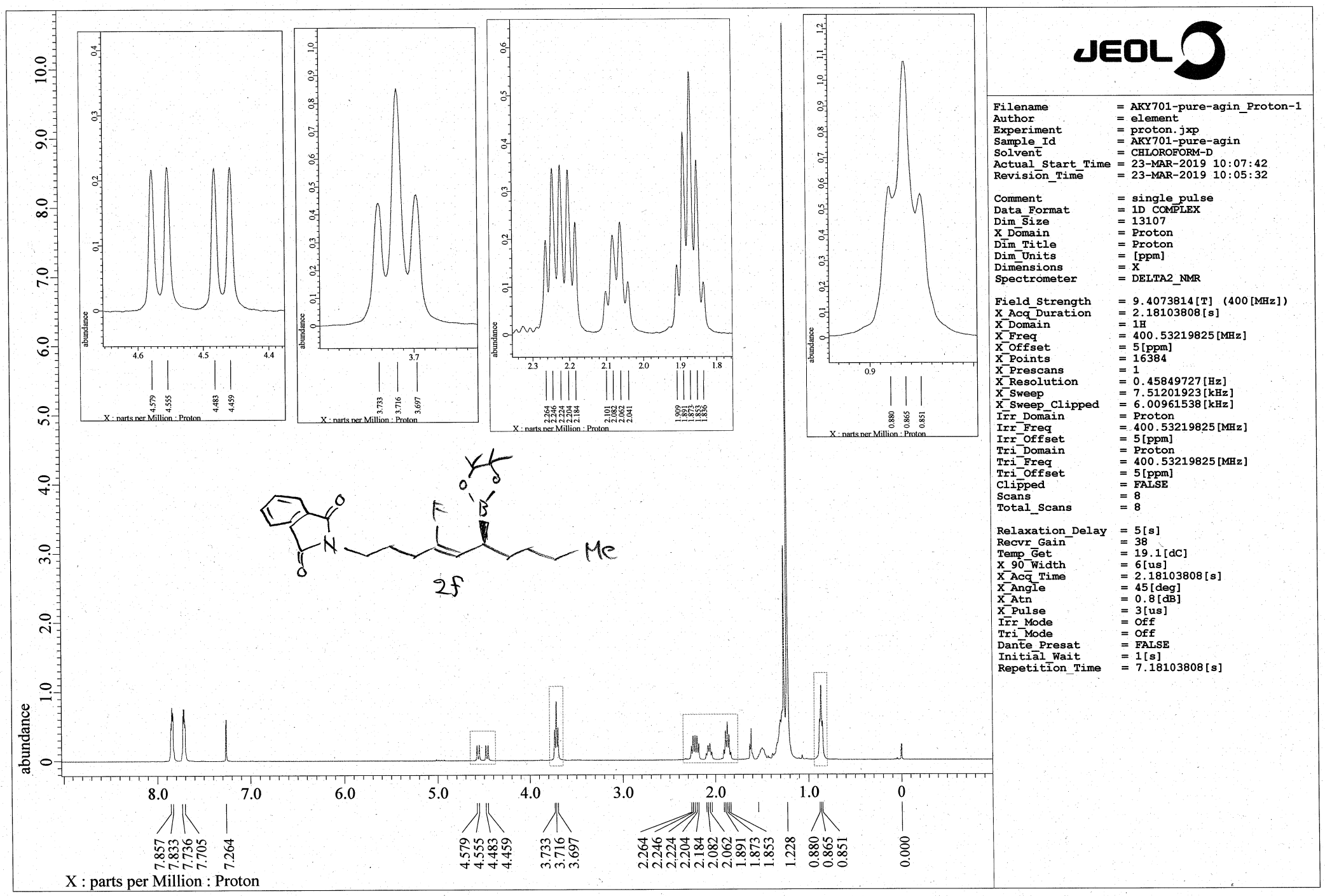
JEOL

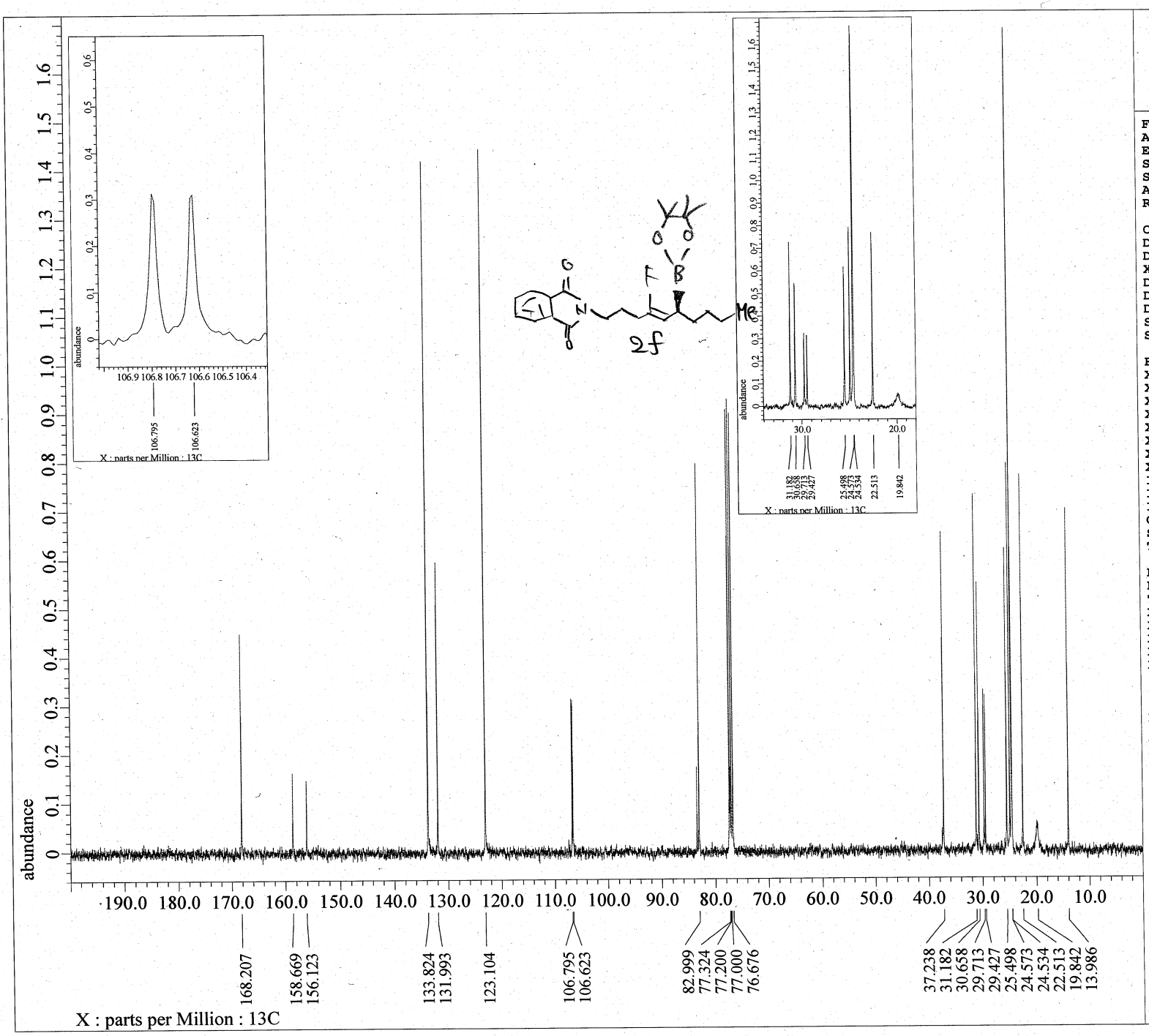
Filename	= AKY668-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#687255
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 21-SEP-2018 03:33:38
Revision_Time	= 22-MAR-2019 19:35:53
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 48
Temp_Get	= 21.4[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



JEOL

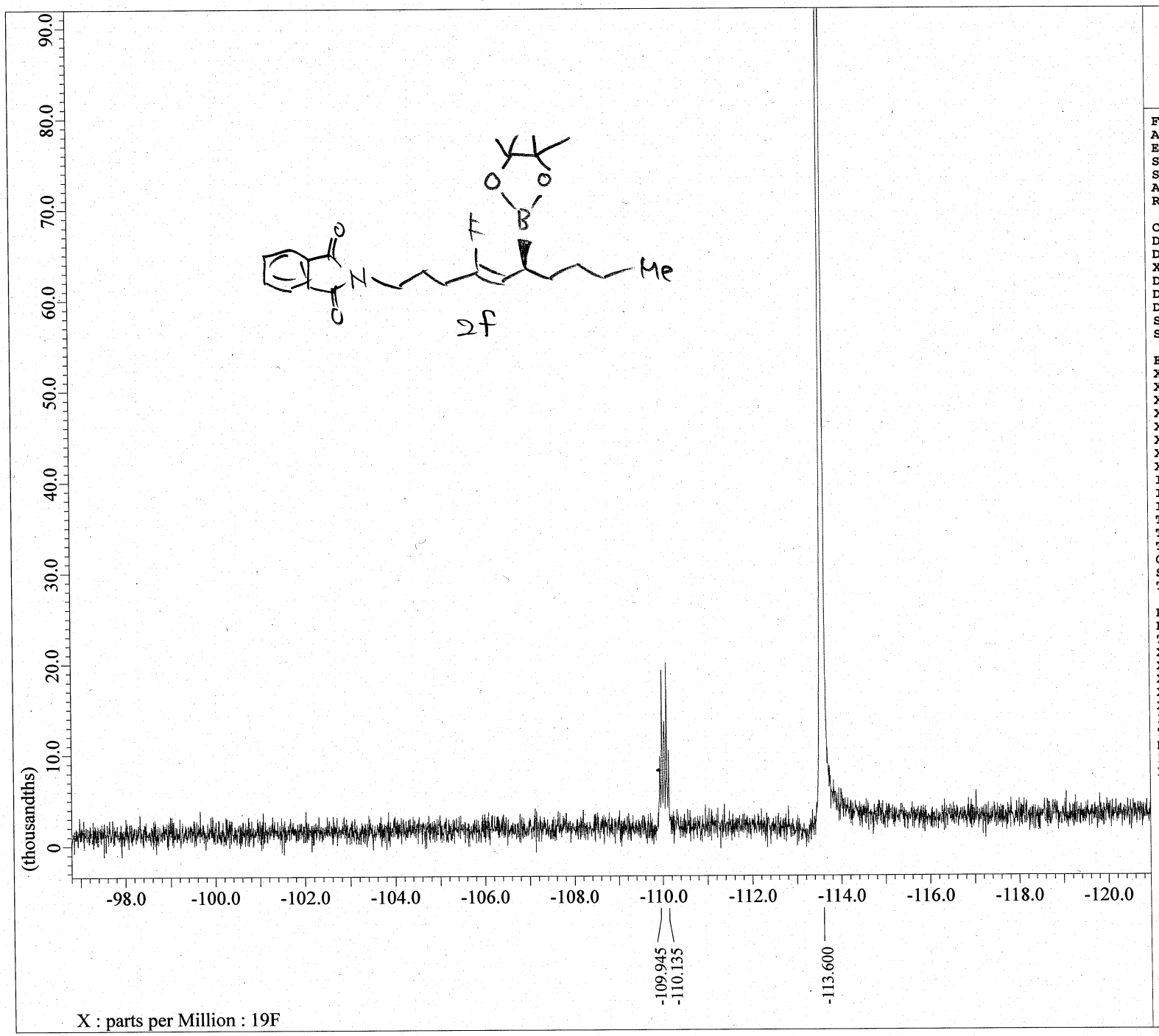
Filename	= AKY668-pure-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#510288
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 20-SEP-2018 22:40:01
Revision_Time	= 22-MAR-2019 20:34:01
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 21.3[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]


JEOL
Filename = AKY701-pure-agin_Proton-1
Author = element
Experiment = proton.jxp
Sample_Id = AKY701-pure-agin
Solvent = CHLOROFORM-D
Actual_Start_Time = 23-MAR-2019 10:07:42
Revision_Time = 23-MAR-2019 10:05:32
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 13107
X_Domain = Proton
Dim_Title = Proton
Dim_Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR
Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 2.18103808[s]
X_Domain = 1H
X_Freq = 400.53219825[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45849727[Hz]
X_Sweep = 7.51201923[kHz]
X_Sweep_Clipped = 6.00961538[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = Proton
Tri_Freq = 400.53219825[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 38
Temp_Get = 19.1[dC]
X_90_Width = 6[us]
X_Acq_Time = 2.18103808[s]
X_Angle = 45[deg]
X_Atn = 0.8[dB]
X_Pulse = 3[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.18103808[s]
Me
2f
abundance
X : parts per Million : Proton
7.857
7.833
7.736
7.705
7.264
4.579
4.555
4.483
4.459
3.733
3.716
3.697
2.264
2.246
2.224
2.204
2.184
2.082
2.062
1.891
1.873
1.853
1.228
0.880
0.865
0.851
0.000



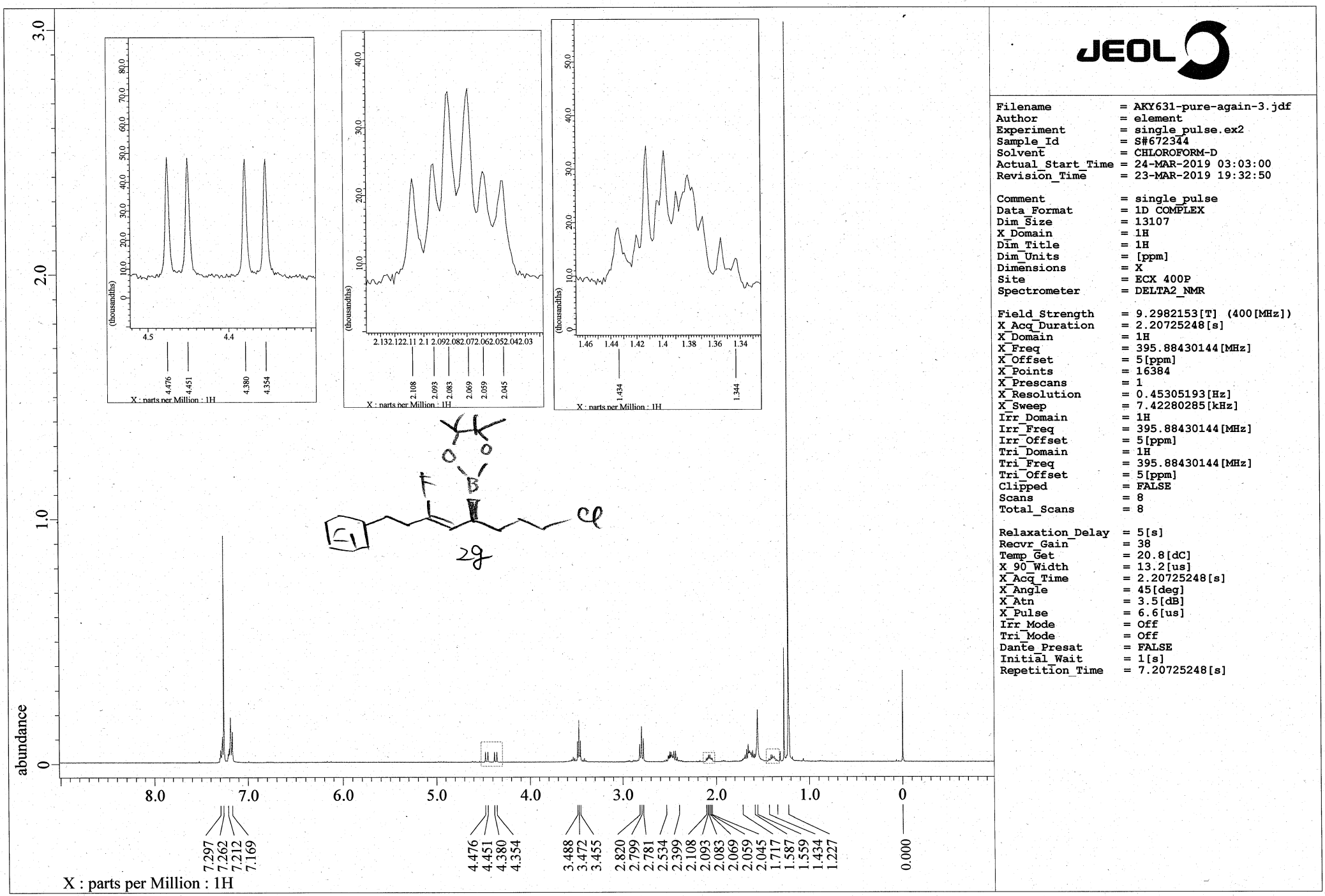
JEOL

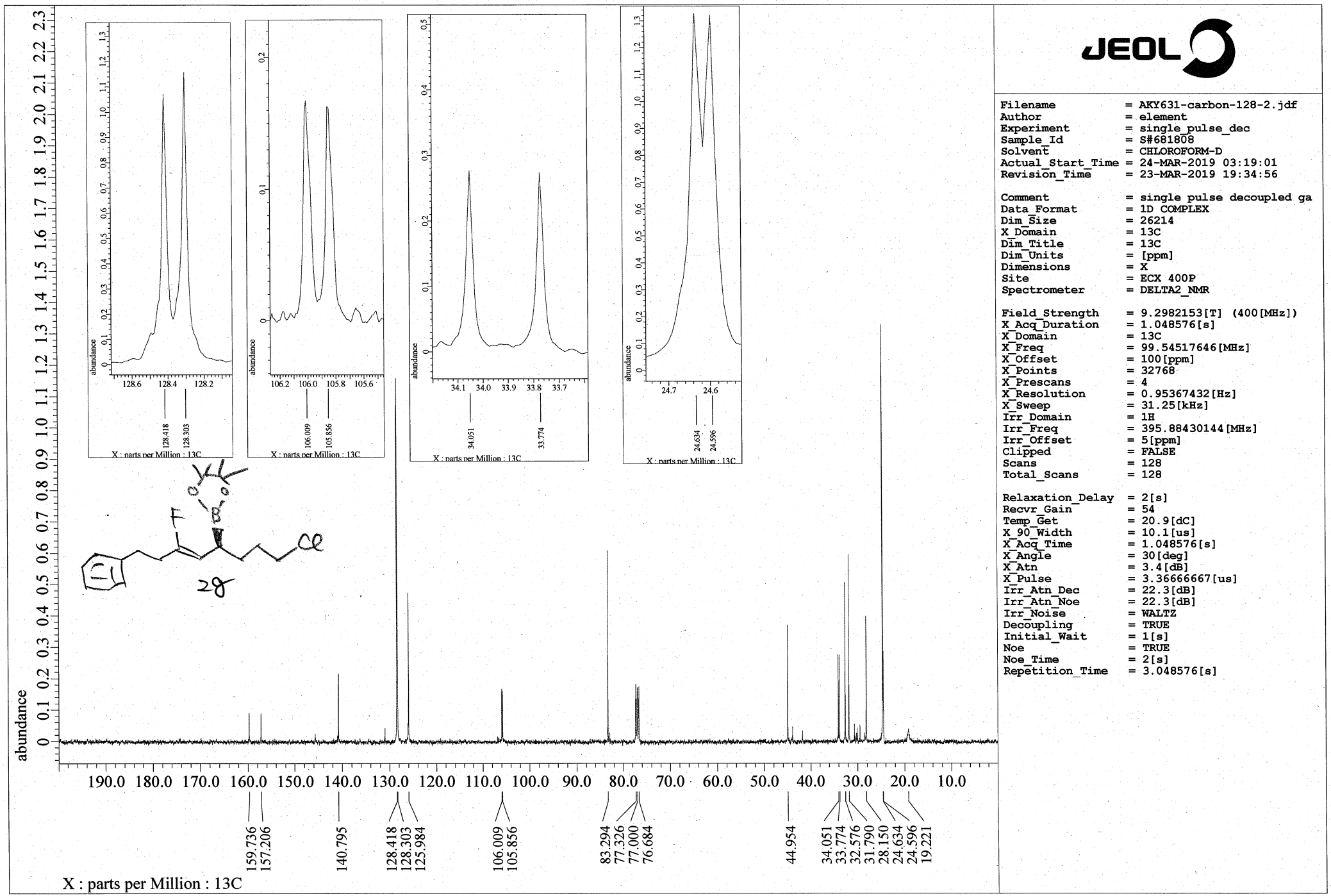
Filename	= AKY701-carbon-again-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#347521
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 25-OCT-2018 17:08:11
Revision_Time	= 23-MAR-2019 11:40:19
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 19.4[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]

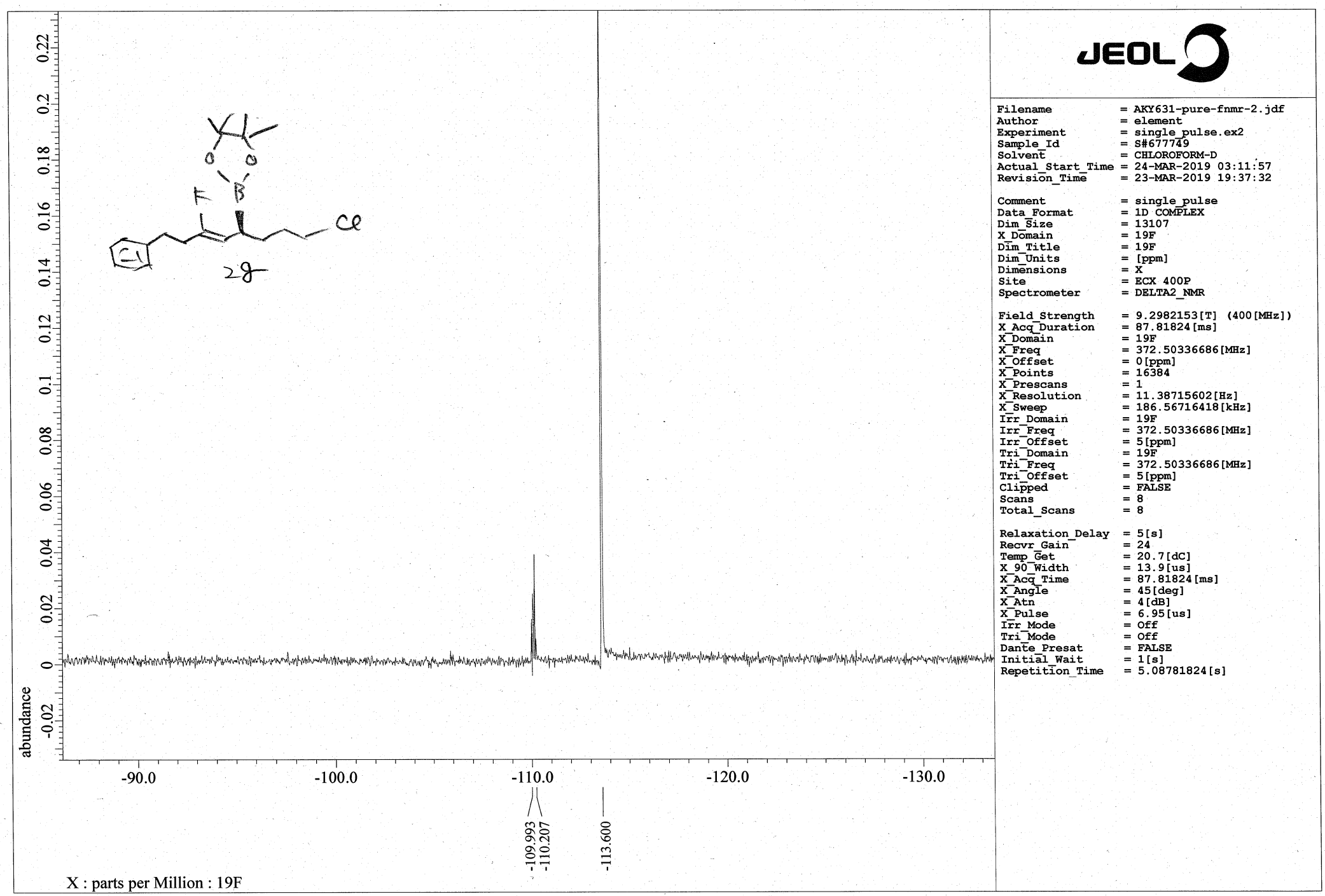


JEOL

Filename	= AKY701-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= 2
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 25-OCT-2018 06:35:51
Revision_Time	= 23-MAR-2019 11:14:53
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 0.43778048[s]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= -90[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 2.28424986[Hz]
X_Sweep	= 37.4251497[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 32
Temp_Get	= 21[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 0.43778048[s]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.43778048[s]

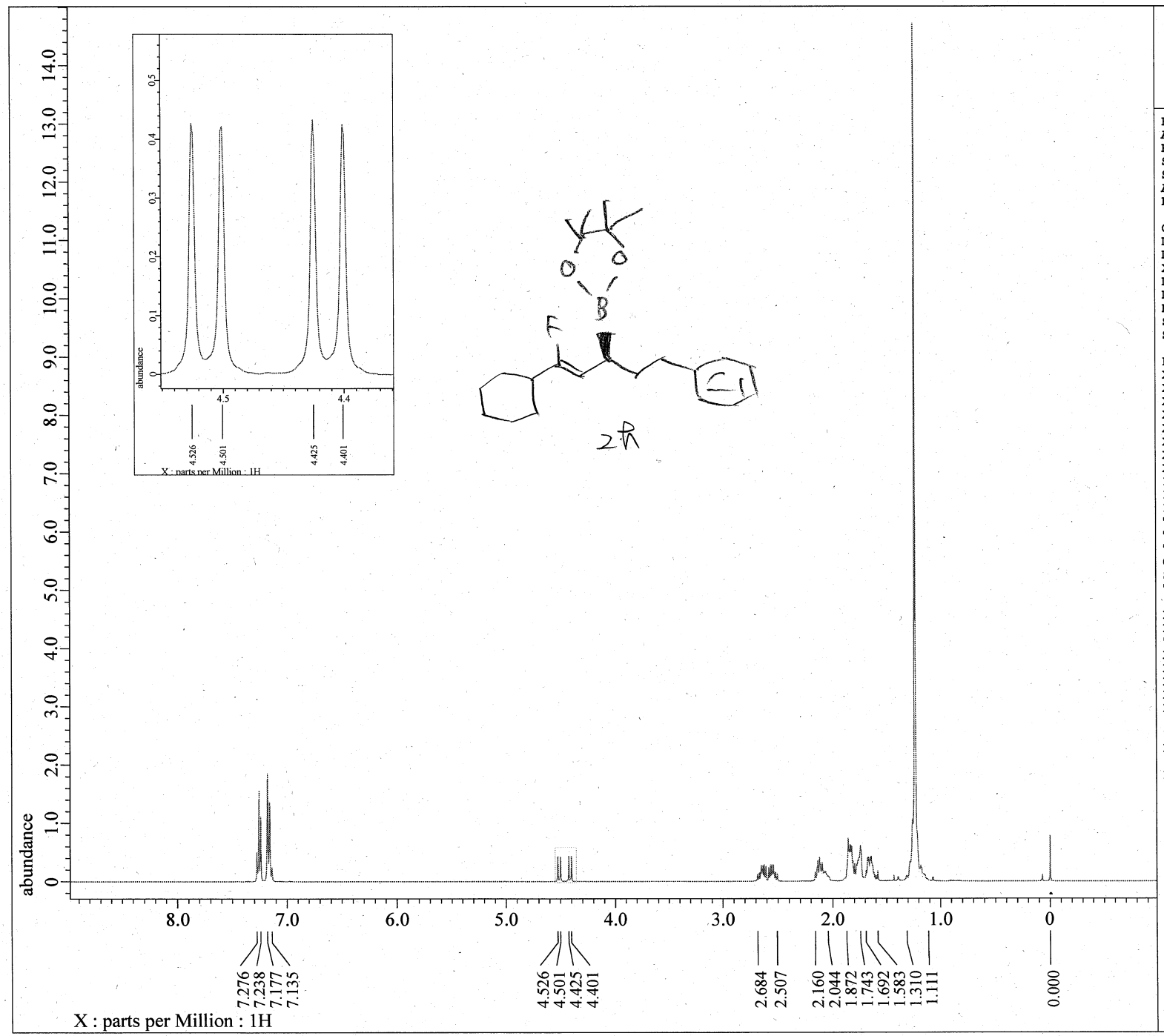

JEOL
Filename = AKY631-pure-again-3.jdf
Author = element
Experiment = single_pulse.ex2
Sample_Id = S#672344
Solvent = CHLOROFORM-D
Actual_Start_Time = 24-MAR-2019 03:03:00
Revision_Time = 23-MAR-2019 19:32:50
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 13107
X_Domain = 1H
Dim_Title = 1H
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 2.20725248[s]
X_Domain = 1H
X_Freq = 395.88430144[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45305193[Hz]
X_Sweep = 7.42280285[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = 1H
Tri_Freq = 395.88430144[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 38
Temp_Get = 20.8[dC]
X_90_Width = 13.2[us]
X_Acq_Time = 2.20725248[s]
X_Angle = 45[deg]
X_Atn = 3.5[dB]
X_Pulse = 6.6[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.20725248[s]
abundance
X : parts per Million : 1H
7.297
7.262
7.212
7.169
4.476
4.451
4.380
4.354
3.488
3.472
3.455
2.820
2.799
2.781
2.534
2.399
2.108
2.093
2.083
2.069
2.059
2.045
1.717
1.587
1.559
1.434
1.227
0.000
29


JEOL
Filename = AKY631-carbon-128-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = S#681808
Solvent = CHLOROFORM-D
Actual_Start_Time = 24-MAR-2019 03:19:01
Revision_Time = 23-MAR-2019 19:34:56
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 1.048576[s]
X_Domain = 13C
X_Freq = 99.54517646[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.95367432[Hz]
X_Sweep = 31.25[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 128
Total_Scans = 128
Relaxation_Delay = 2[s]
Recvr_Gain = 54
Temp_Get = 20.9[dC]
X_90_Width = 10.1[us]
X_Acq_Time = 1.048576[s]
X_Angle = 30[deg]
X_Atn = 3.4[dB]
X_Pulse = 3.36666667[us]
Irr_Atn_Dec = 22.3[dB]
Irr_Atn_Noe = 22.3[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.048576[s]
abundance
X : parts per Million : 13C
159.736
157.206
140.795
128.418
128.303
125.984
106.009
105.856
83.294
77.326
77.000
76.684
44.954
34.051
33.774
32.576
31.790
28.150
24.634
24.596
19.221
128.418
128.303
106.009
105.856
34.051
33.774
24.634
24.596
28

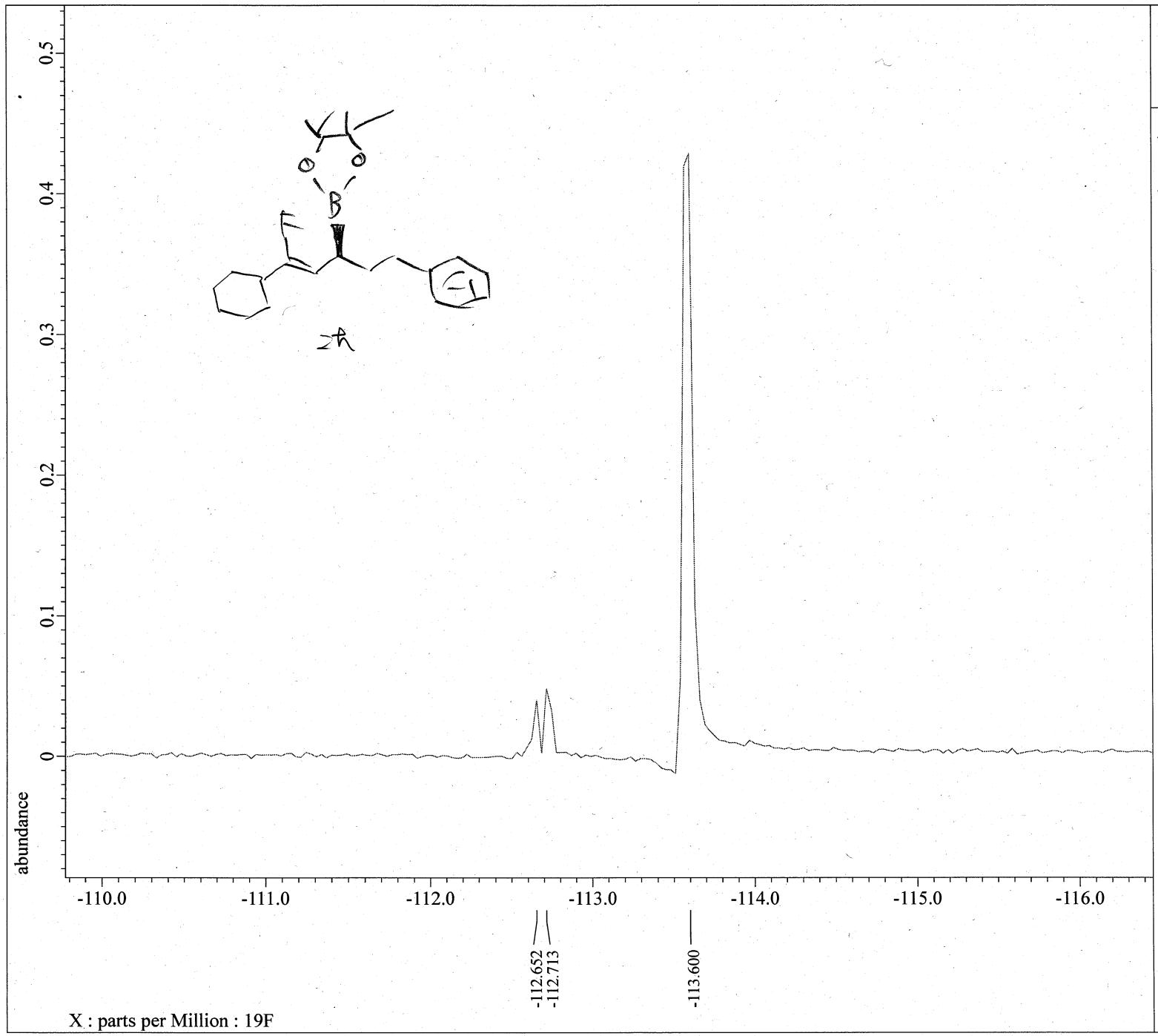


JEOL

Filename	= AKY631-pure-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#677749
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 24-MAR-2019 03:11:57
Revision_Time	= 23-MAR-2019 19:37:32
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 20.7[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

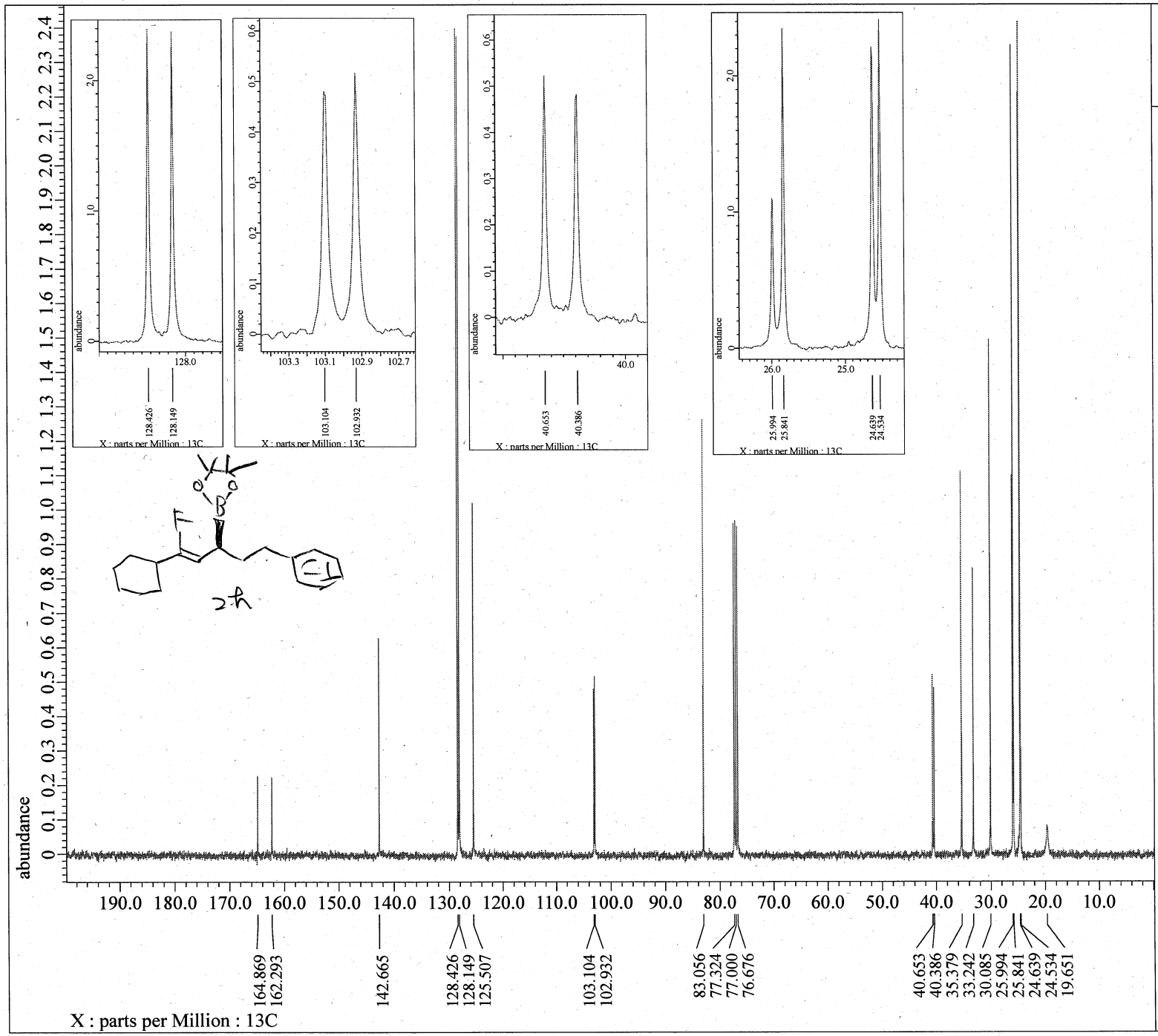


Filename	= AKY6XX-Cy-pure-aagin-2.jd
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#574021
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 30-OCT-2018 23:25:33
Revision_Time	= 31-OCT-2018 09:59:29
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 34
Temp_Get	= 18.4[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]

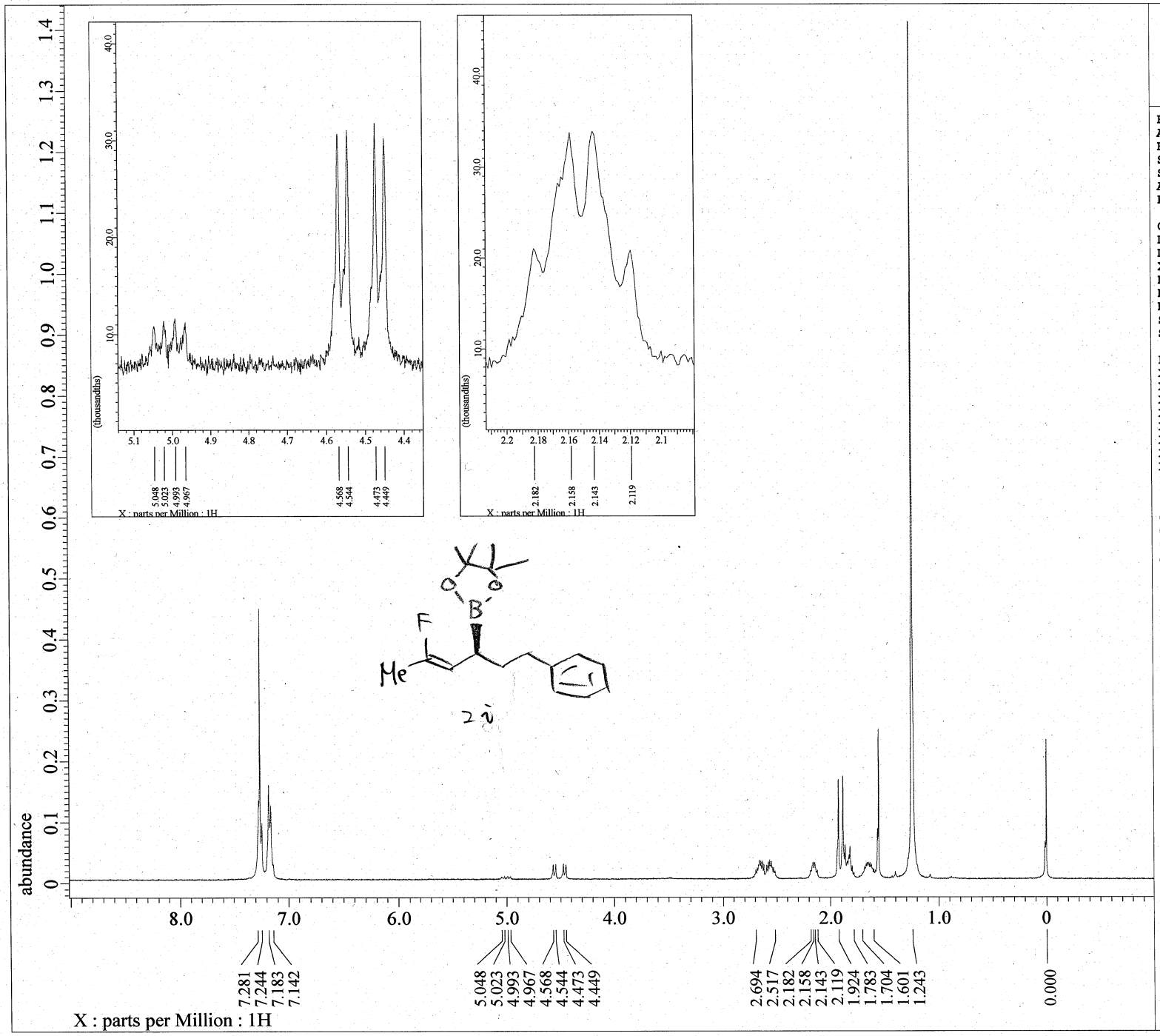


JEOL

Filename	= AKY6XX-Cy-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#568437
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 31-OCT-2018 00:16:57
Revision_Time	= 31-OCT-2018 10:11:13
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.1[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

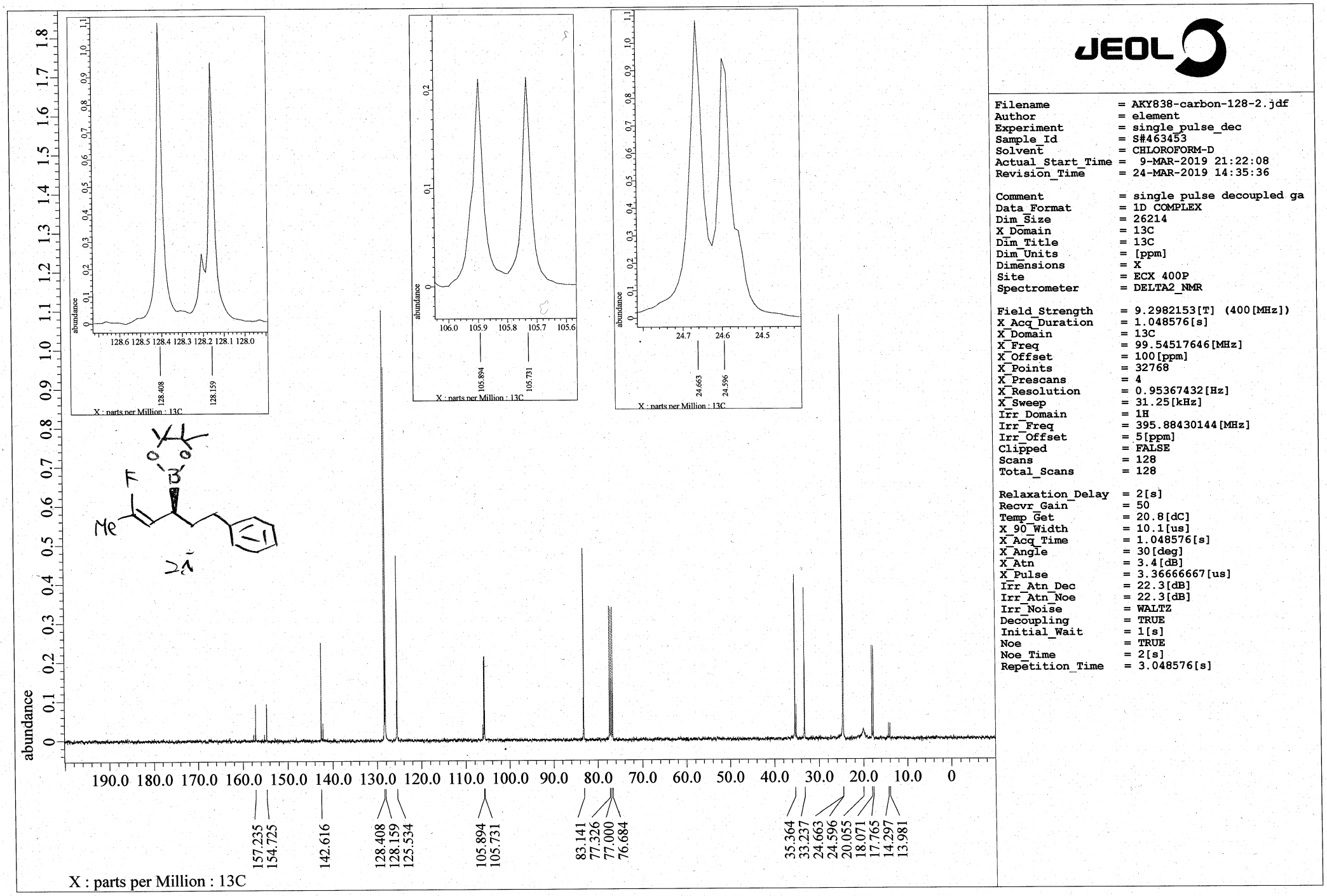


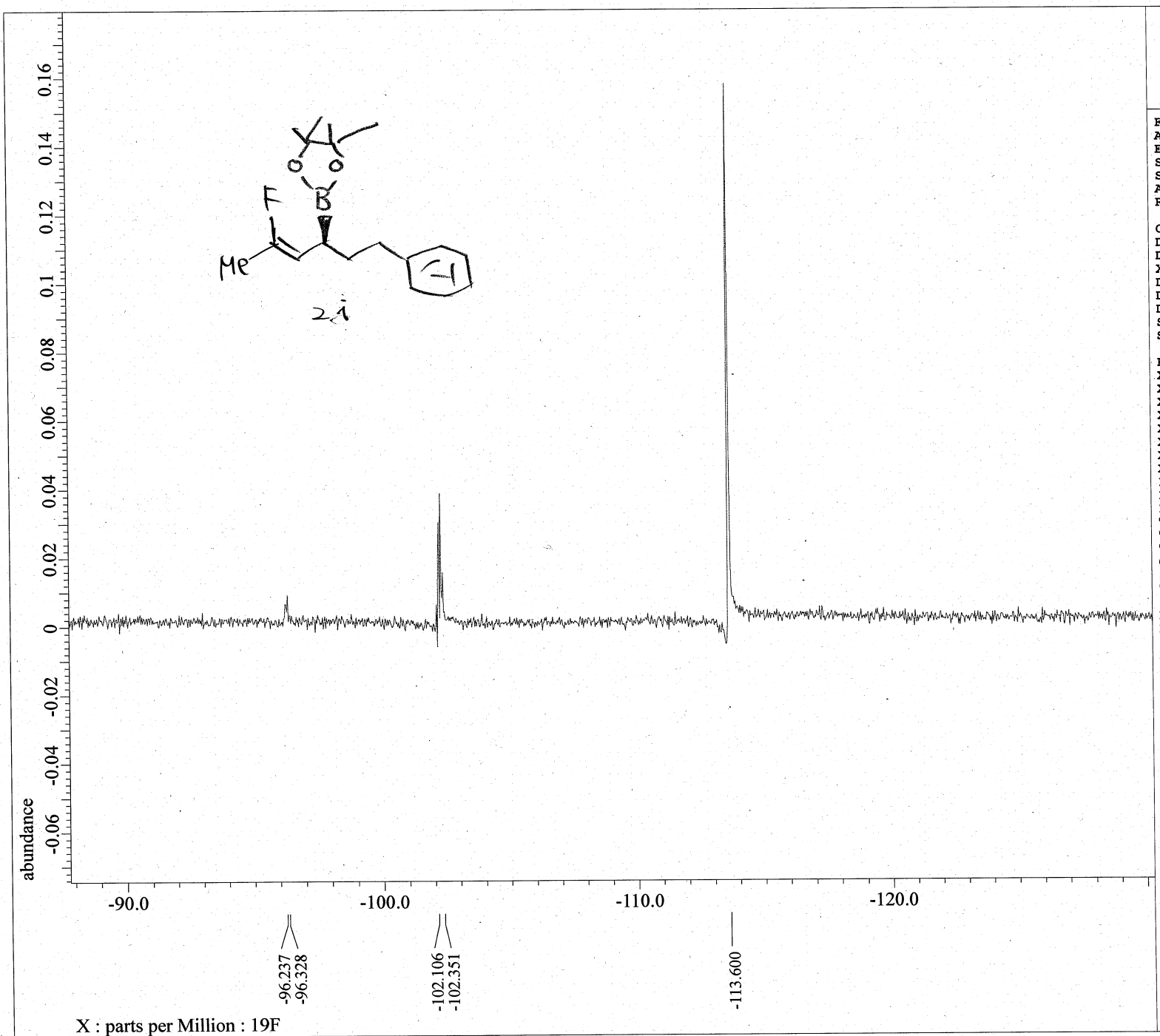
Filename	= AKY6XX-Cy-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#578338
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 30-OCT-2018 23:31:24
Revision_Time	= 31-OCT-2018 10:06:26
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 19.2[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]



JEOL

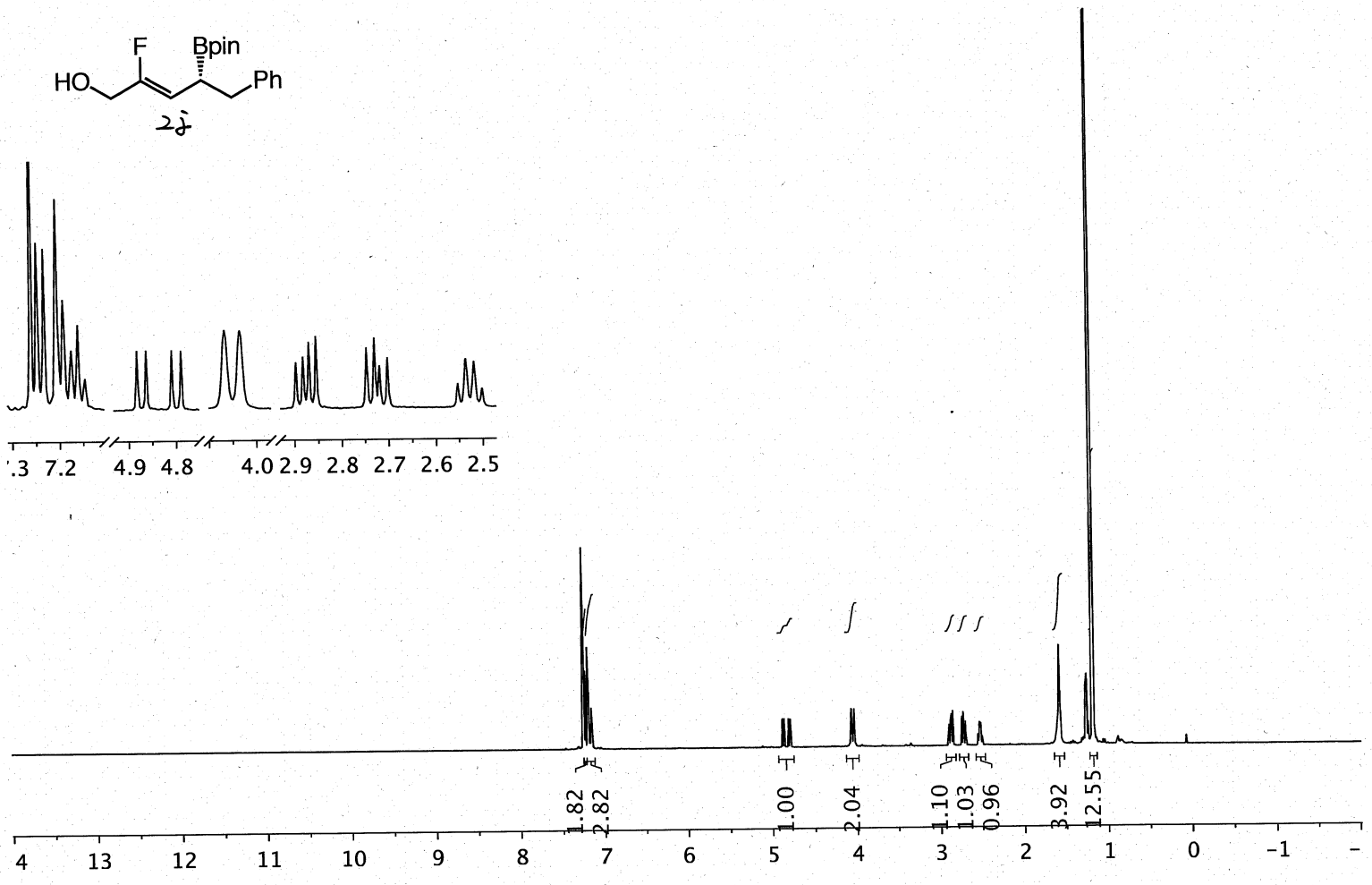
Filename	= AKY838-pure-HNMR-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#459729
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 9-MAR-2019 21:16:09
Revision_Time	= 24-MAR-2019 14:29:03
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 2.20725248[s]
X_Domain	= 1H
X_Freq	= 395.88430144[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45305193[Hz]
X_Sweep	= 7.42280285[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 395.88430144[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 38
Temp_Get	= 20.4[dC]
X_90_Width	= 13.2[us]
X_Acq_Time	= 2.20725248[s]
X_Angle	= 45[deg]
X_Atn	= 3.5[dB]
X_Pulse	= 6.6[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.20725248[s]

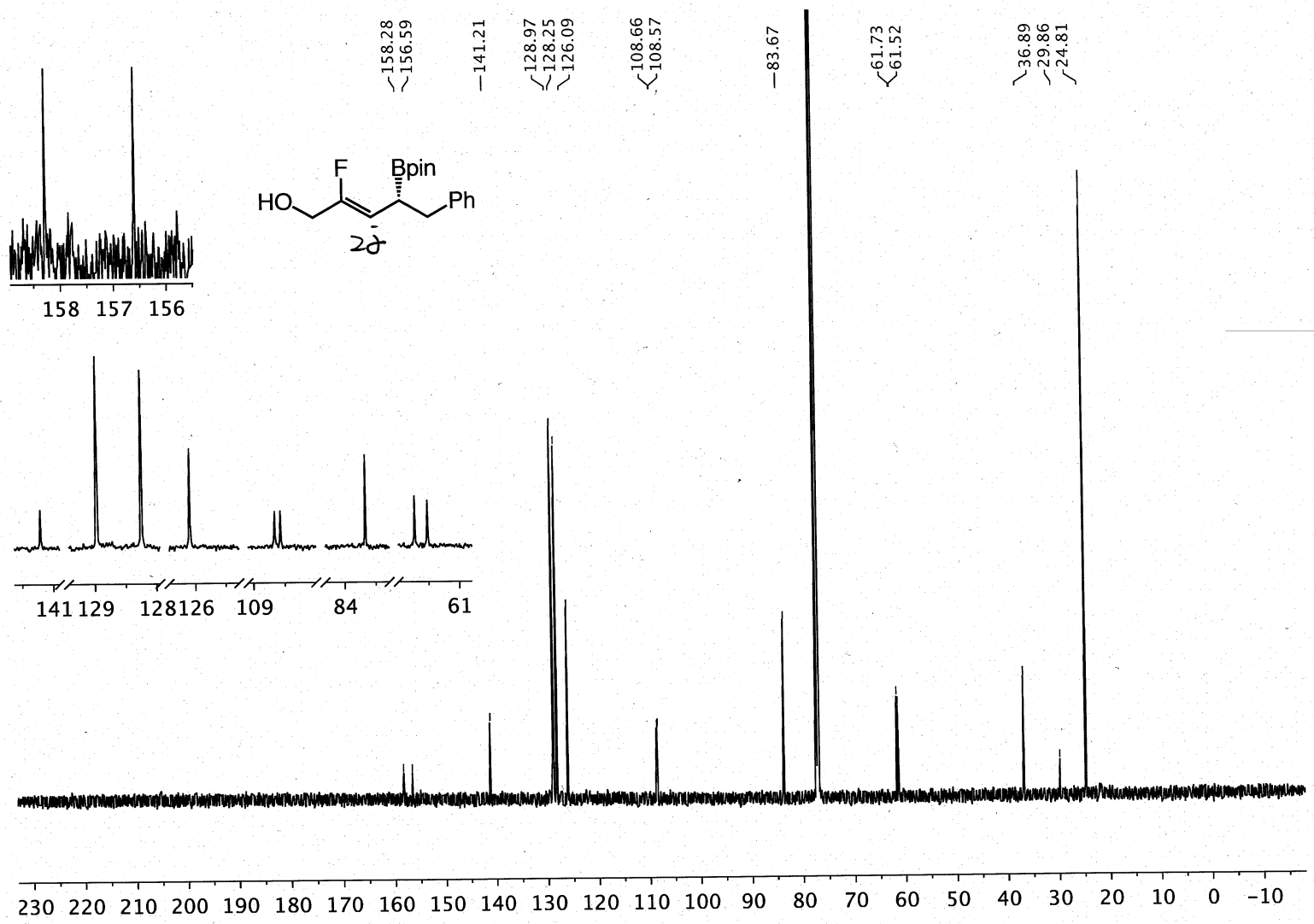

JEOL
Filename = AKY838-carbon-128-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = S#463453
Solvent = CHLOROFORM-D
Actual_Start_Time = 9-MAR-2019 21:22:08
Revision_Time = 24-MAR-2019 14:35:36
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 1.048576[s]
X_Domain = 13C
X_Freq = 99.54517646[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.95367432[Hz]
X_Sweep = 31.25[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 128
Total_Scans = 128
Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 20.8[dC]
X_90_Width = 10.1[us]
X_Acq_Time = 1.048576[s]
X_Angle = 30[deg]
X_Atn = 3.4[dB]
X_Pulse = 3.36666667[us]
Irr_Atn_Dec = 22.3[dB]
Irr_Atn_Noe = 22.3[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.048576[s]
abundance
X : parts per Million : 13C
157.235
154.725
142.616
128.408
128.159
125.534
105.894
105.731
83.141
77.326
77.000
76.684
35.364
33.237
24.663
24.596
20.055
18.071
17.765
14.297
13.981
Me
Ph

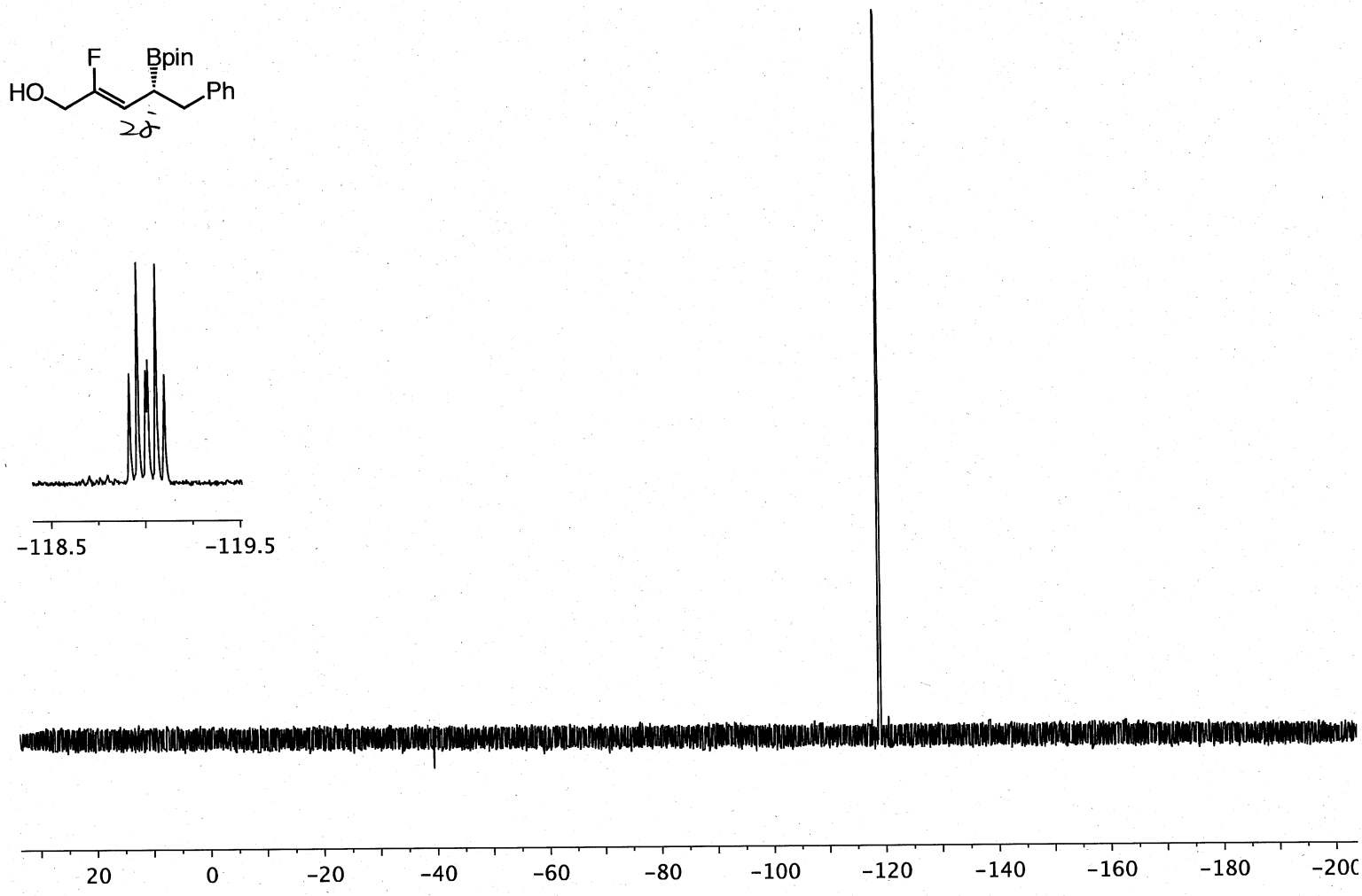


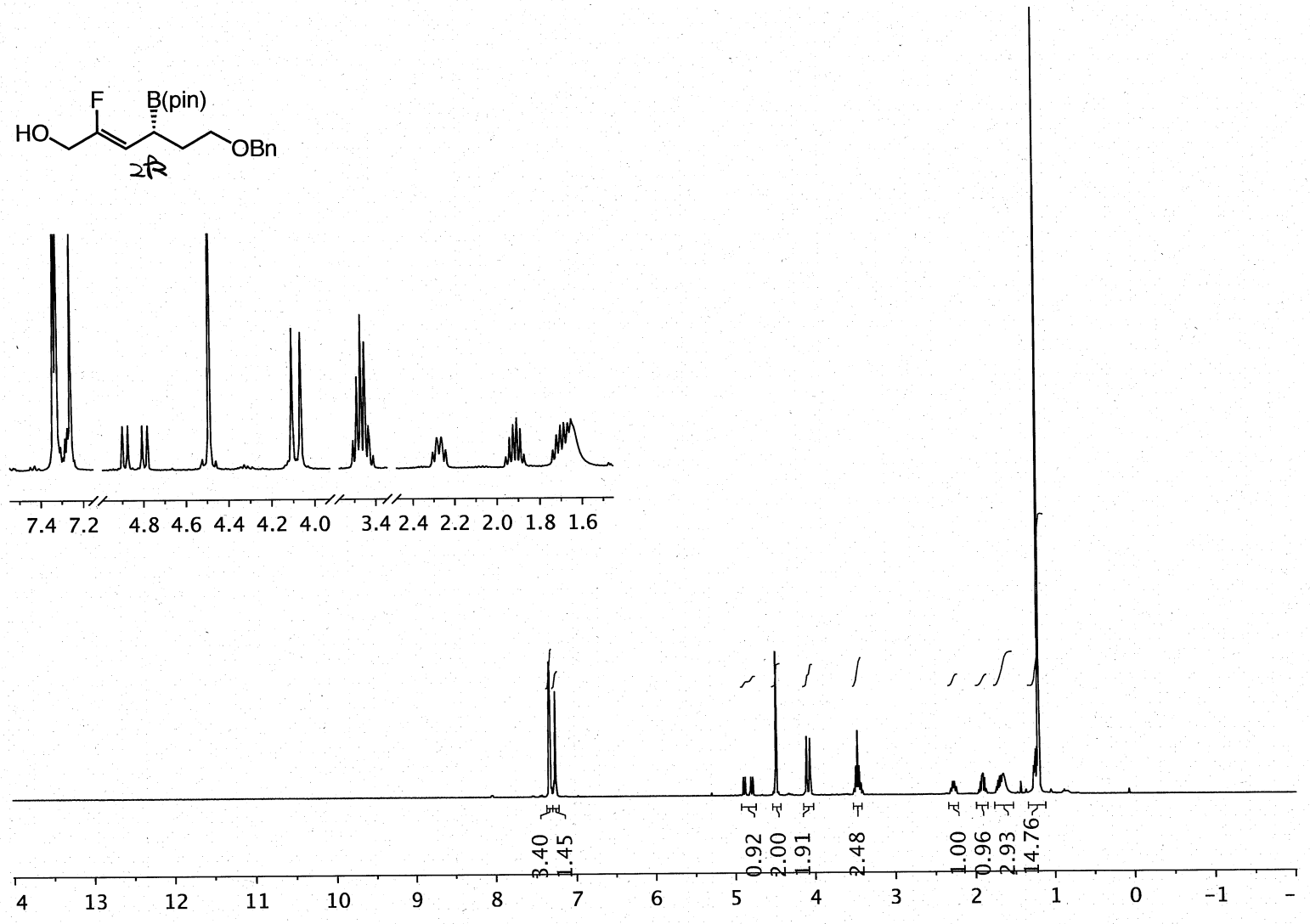
JEOL

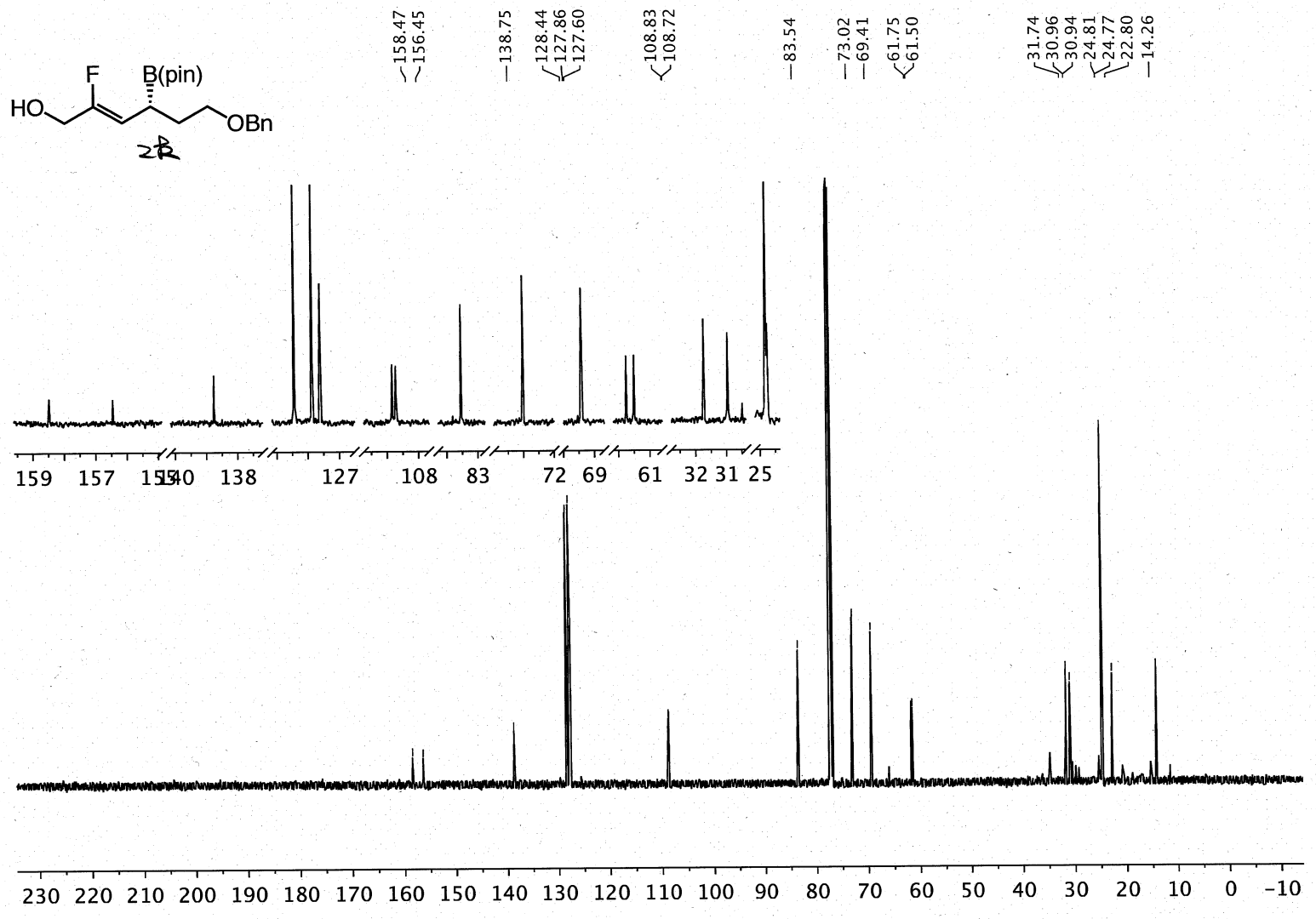
Filename	= AKY838-pure-FNMR-ag-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#496025
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 9-MAR-2019 22:17:18
Revision_Time	= 24-MAR-2019 14:44:26
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 20.6[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

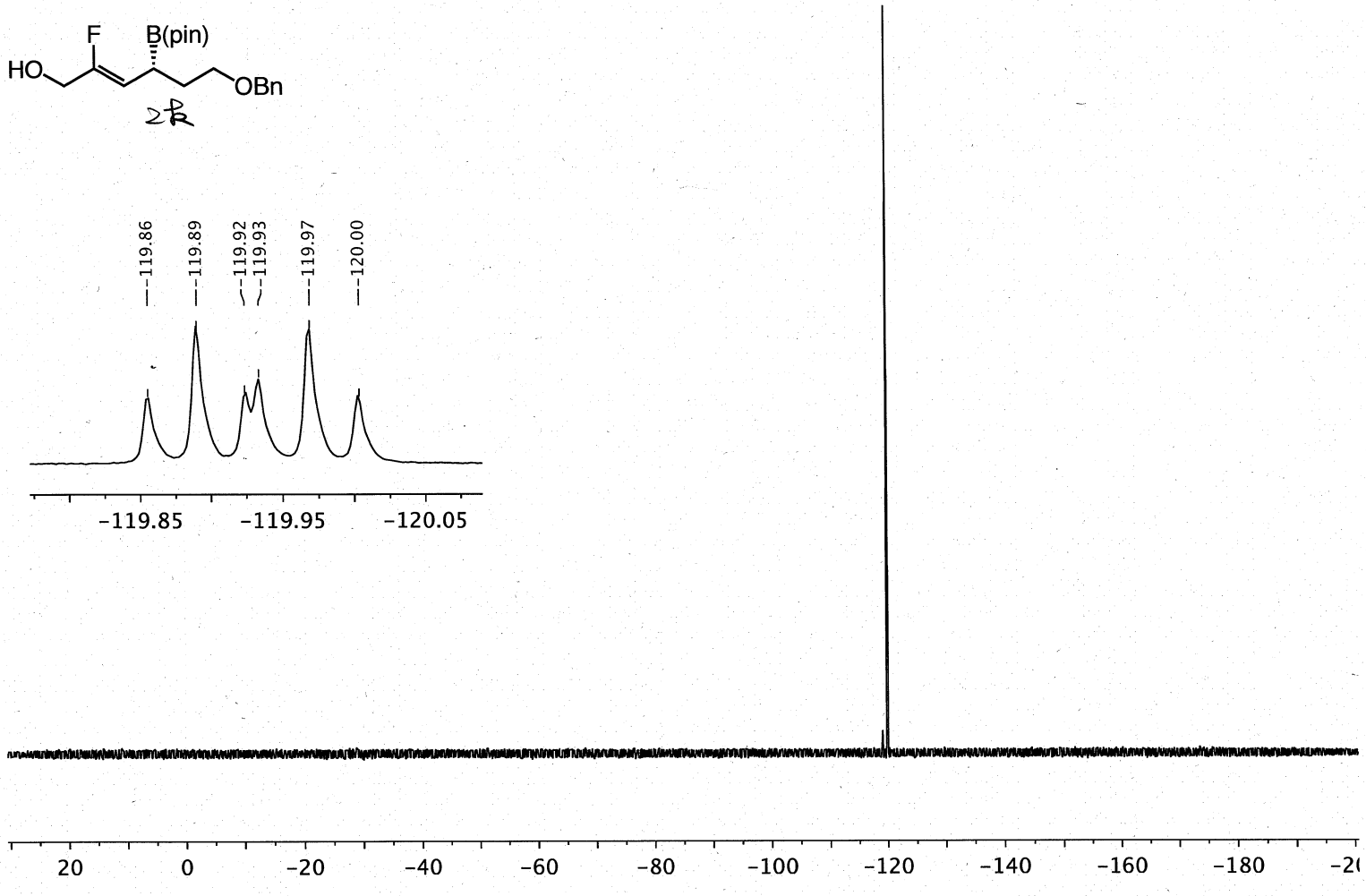

F
Bpin
HO
Ph
2j
7.3 7.2 4.9 4.8 4.0 2.9 2.8 2.7 2.6 2.5
1.82
2.82
1.00
2.04
1.10
1.03
0.96
3.92
12.55
4 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1

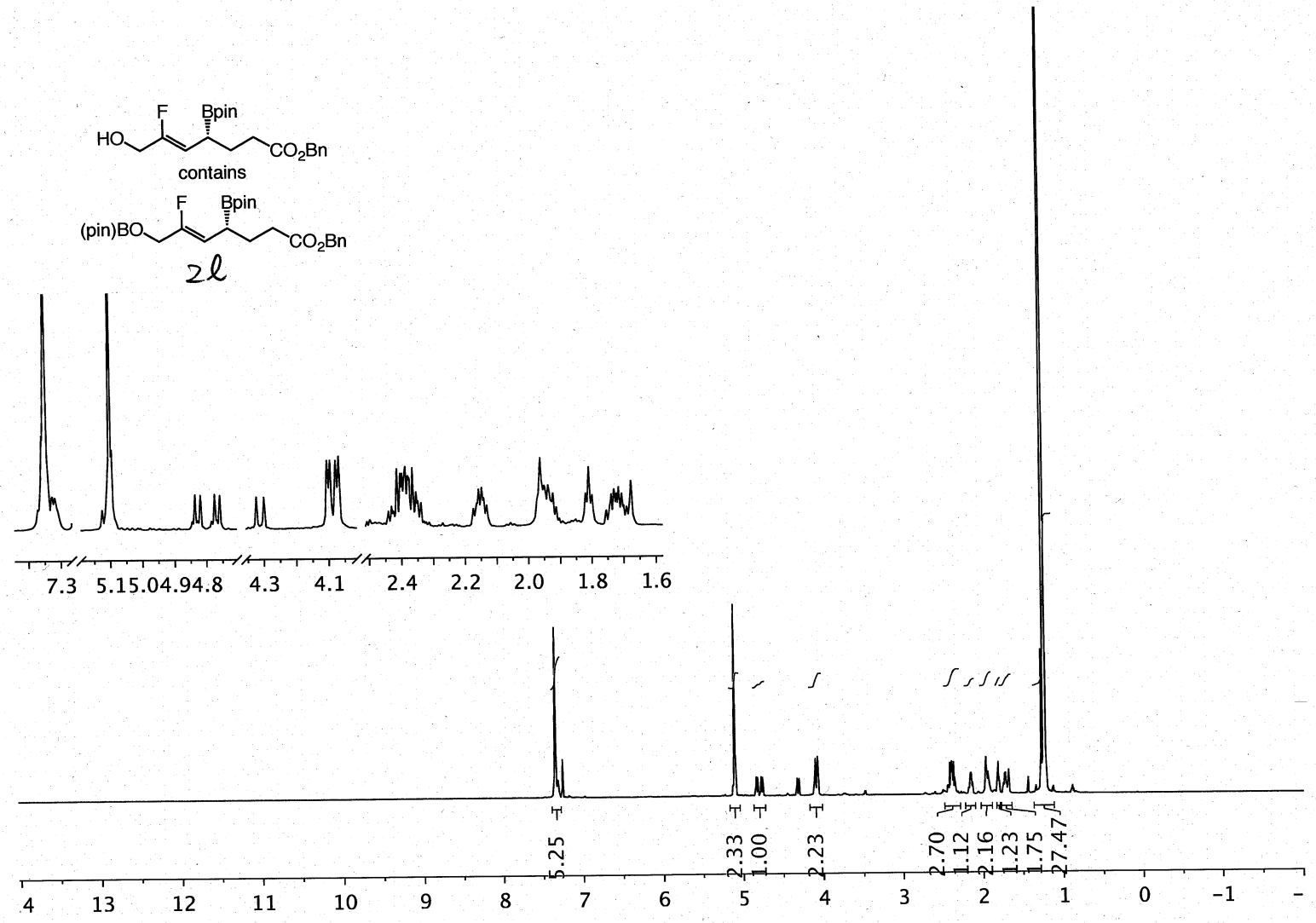

158.28
156.59
141.21
128.97
128.25
126.09
108.66
108.57
83.67
61.73
61.52
36.89
29.86
24.81
F
Bpin
HO
Ph
2d
158 157 156
141 129 128126 109 84 61
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10

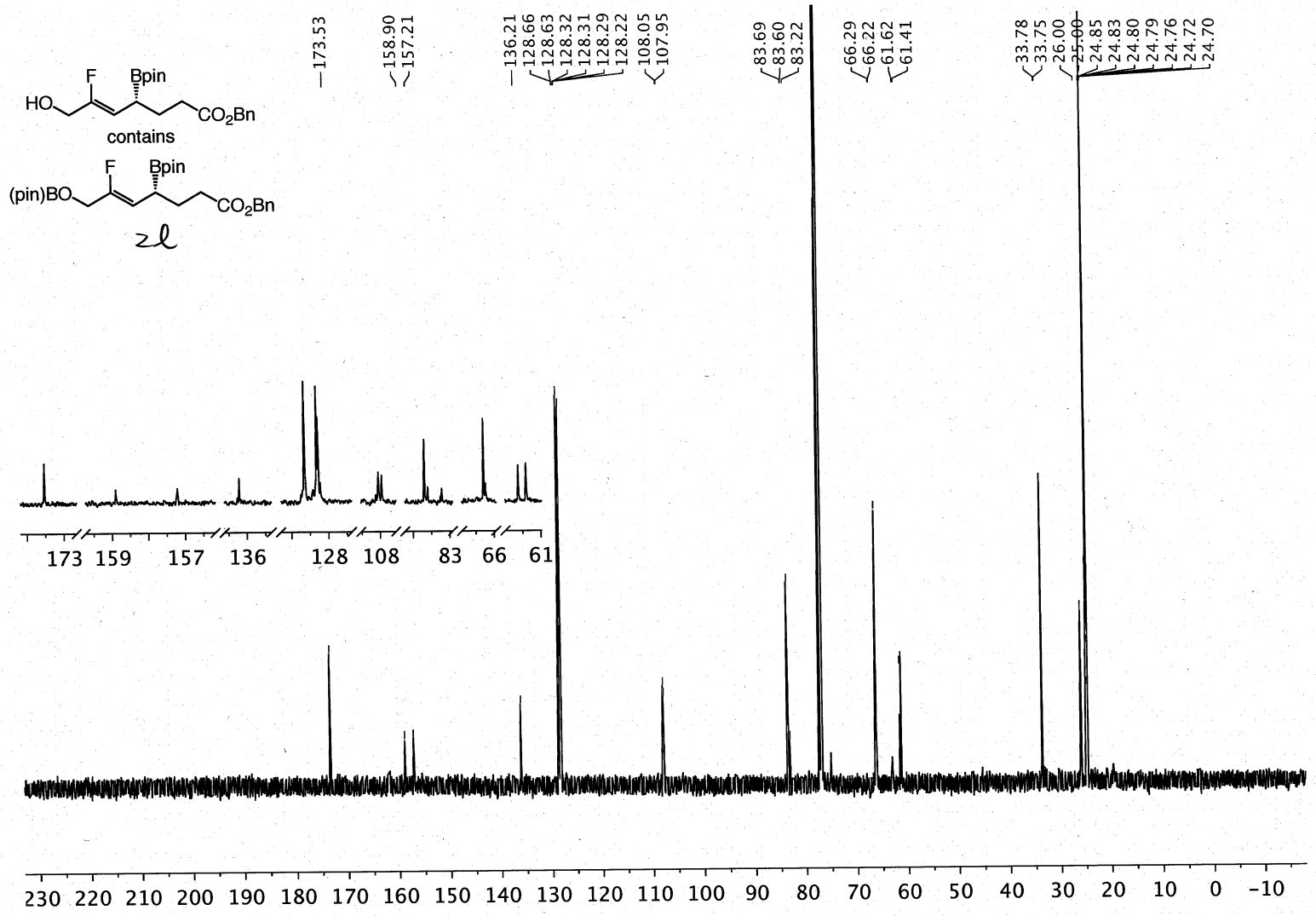

F
Bpin
HO
Ph
2d
-118.5
-119.5
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200

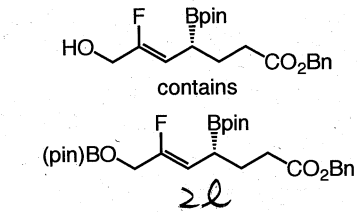

F
B(pin)
HO
OBn
2R
7.4 7.2 4.8 4.6 4.4 4.2 4.0 3.4 2.4 2.2 2.0 1.8 1.6
3.40
1.45
0.92
2.00
1.91
2.48
1.00
0.96
2.93
14.76
4 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1

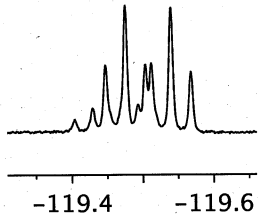

F
B(pin)
HO
OBn
2R
158.47
156.45
138.75
128.44
127.86
127.60
108.83
108.72
83.54
73.02
69.41
61.75
61.50
31.74
30.96
30.94
24.81
24.77
22.80
14.26
159 157 154 140 138 127 108 83 72 69 61 32 31 25
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10


F
B(pin)
HO
OBn
2R
-119.86
-119.89
-119.92
-119.93
-119.97
-120.00
-119.85
-119.95
-120.05
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180

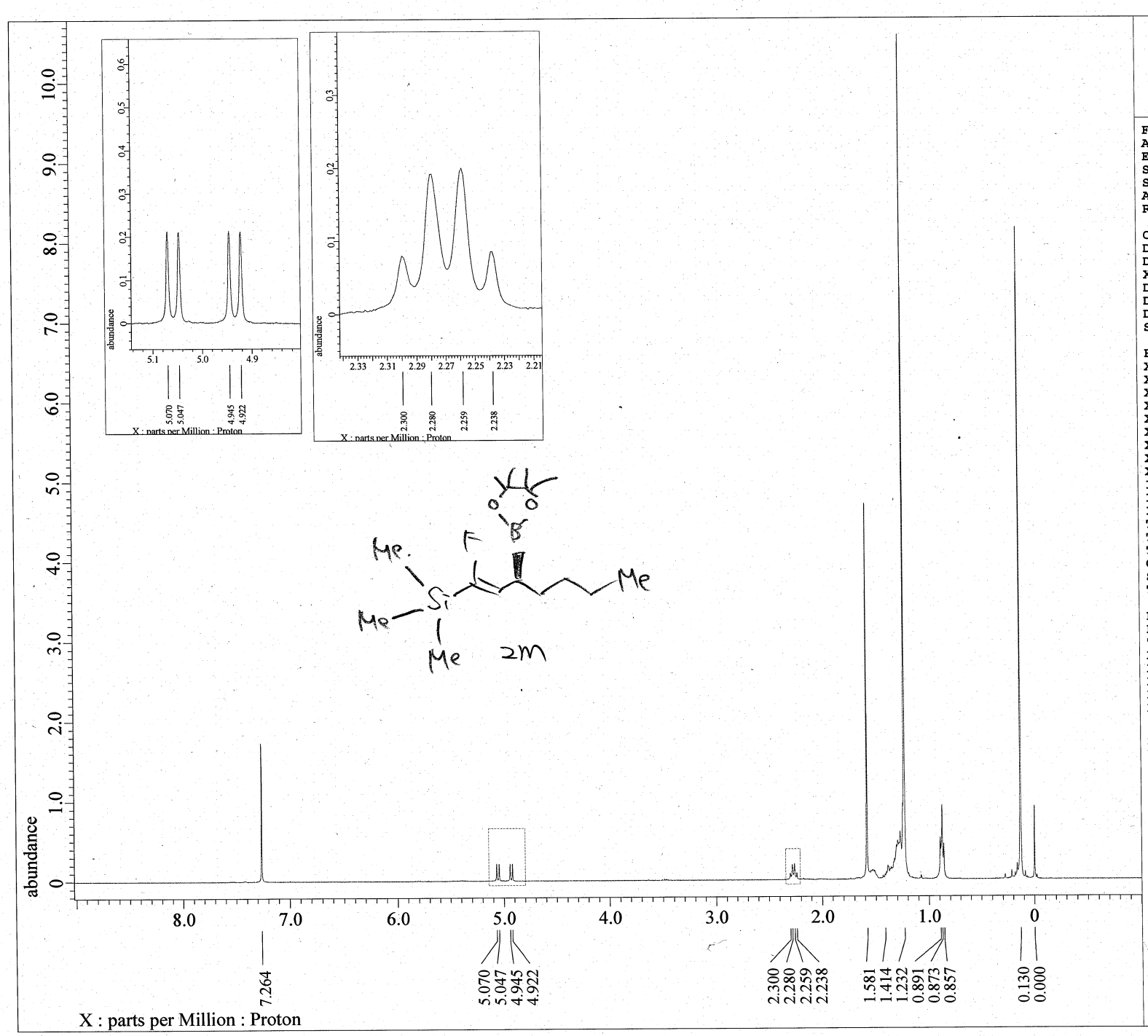

F
Bpin
HO
CO2Bn
contains
F
Bpin
(pin)BO
CO2Bn
2l
7.3
5.1
5.0
4.9
4.8
4.3
4.1
2.4
2.2
2.0
1.8
1.6
5.25
2.33
1.00
2.23
2.70
1.12
2.16
1.23
1.75
27.47
4
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1


F
Bpin
HO
CO2Bn
contains
F
Bpin
(pin)BO
CO2Bn
2l
173.53
158.90
157.21
136.21
128.66
128.63
128.32
128.31
128.29
128.22
108.05
107.95
83.69
83.60
83.22
66.29
66.22
61.62
61.41
33.78
33.75
26.00
25.00
24.85
24.83
24.80
24.79
24.76
24.72
24.70
173 159 157 136 128 108 83 66 61
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10


F
Bpin
HO
CO2Bn
contains
F
Bpin
(pin)BO
CO2Bn
2l

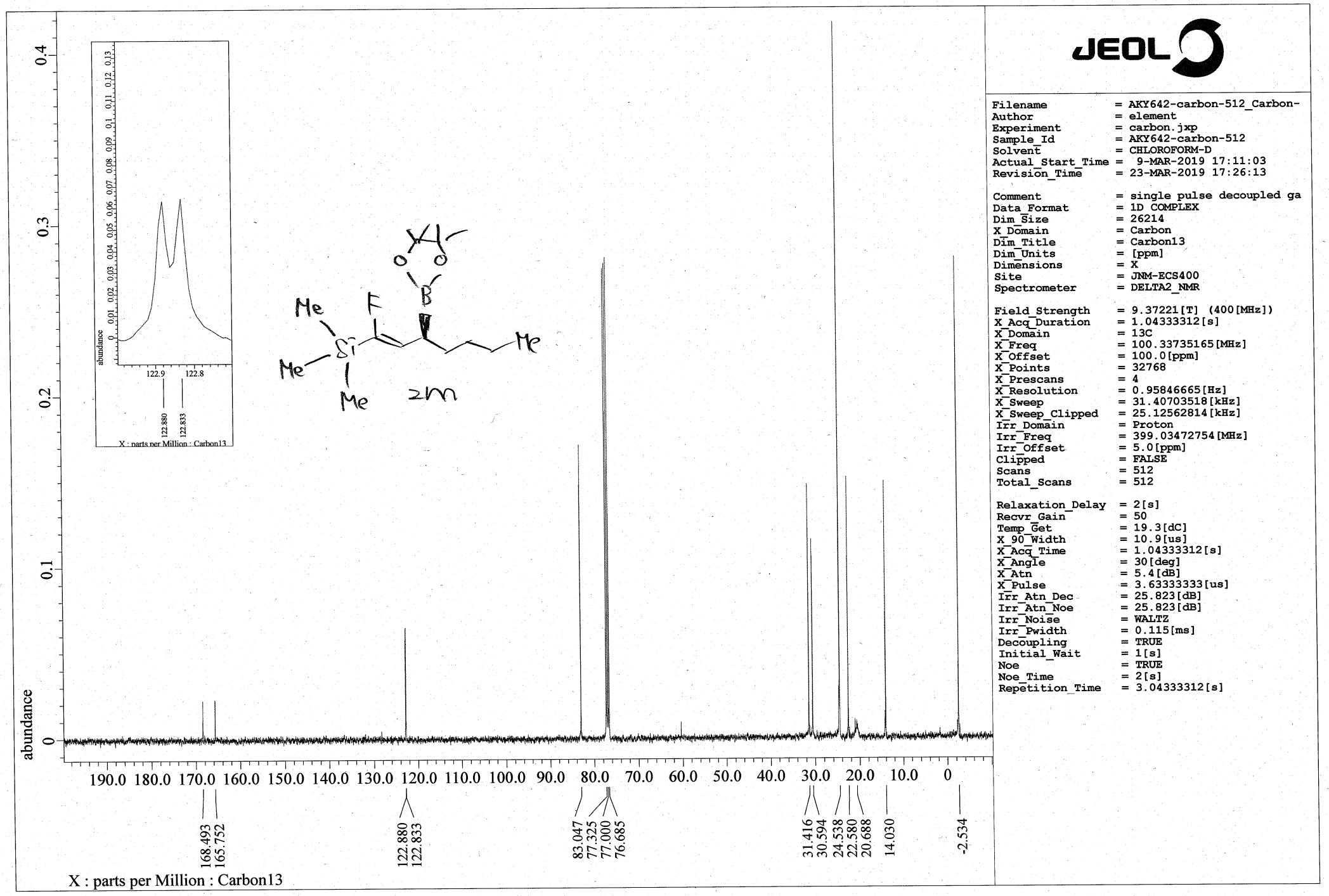

-119.4
-119.6

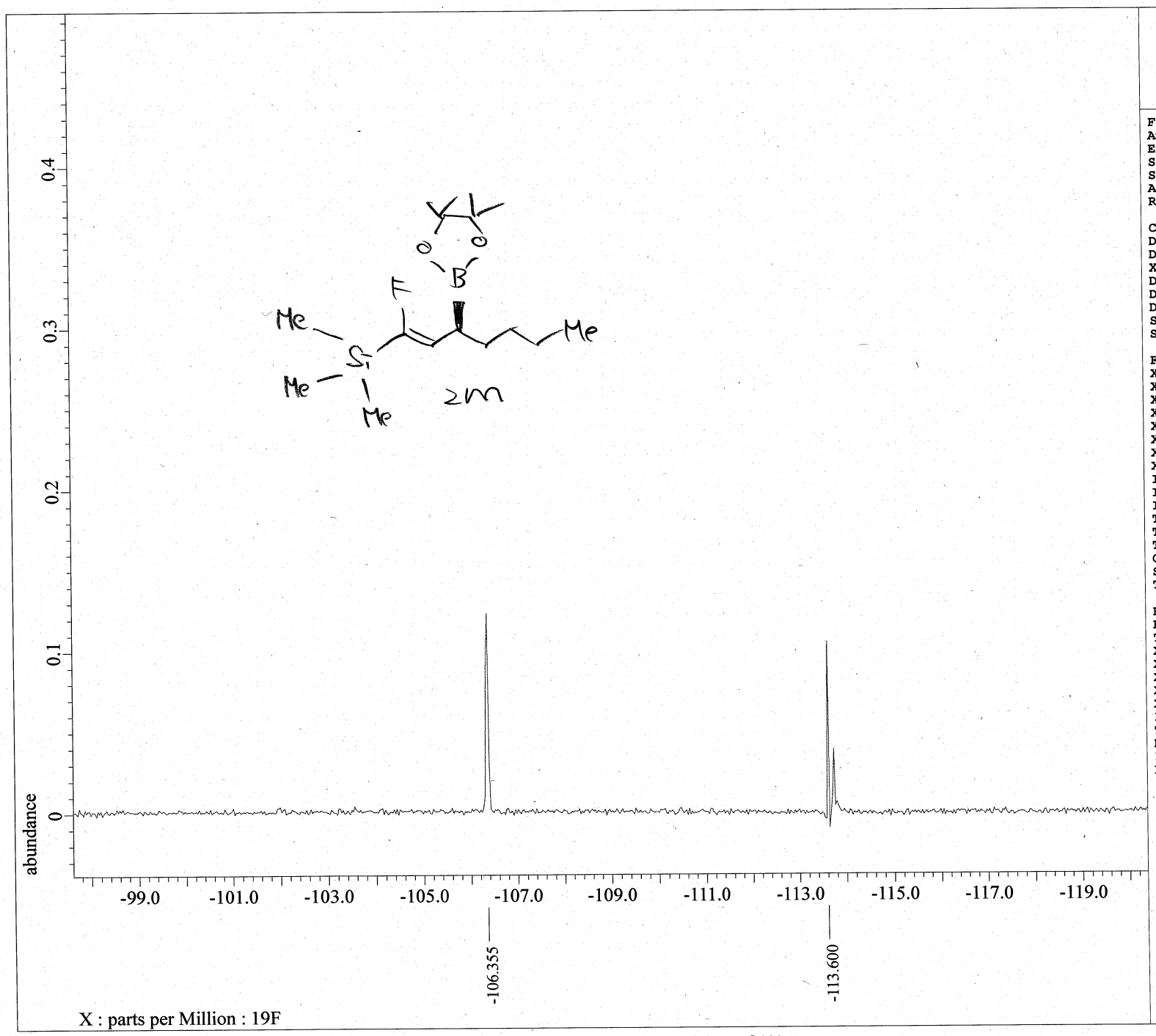
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-20



JEOL

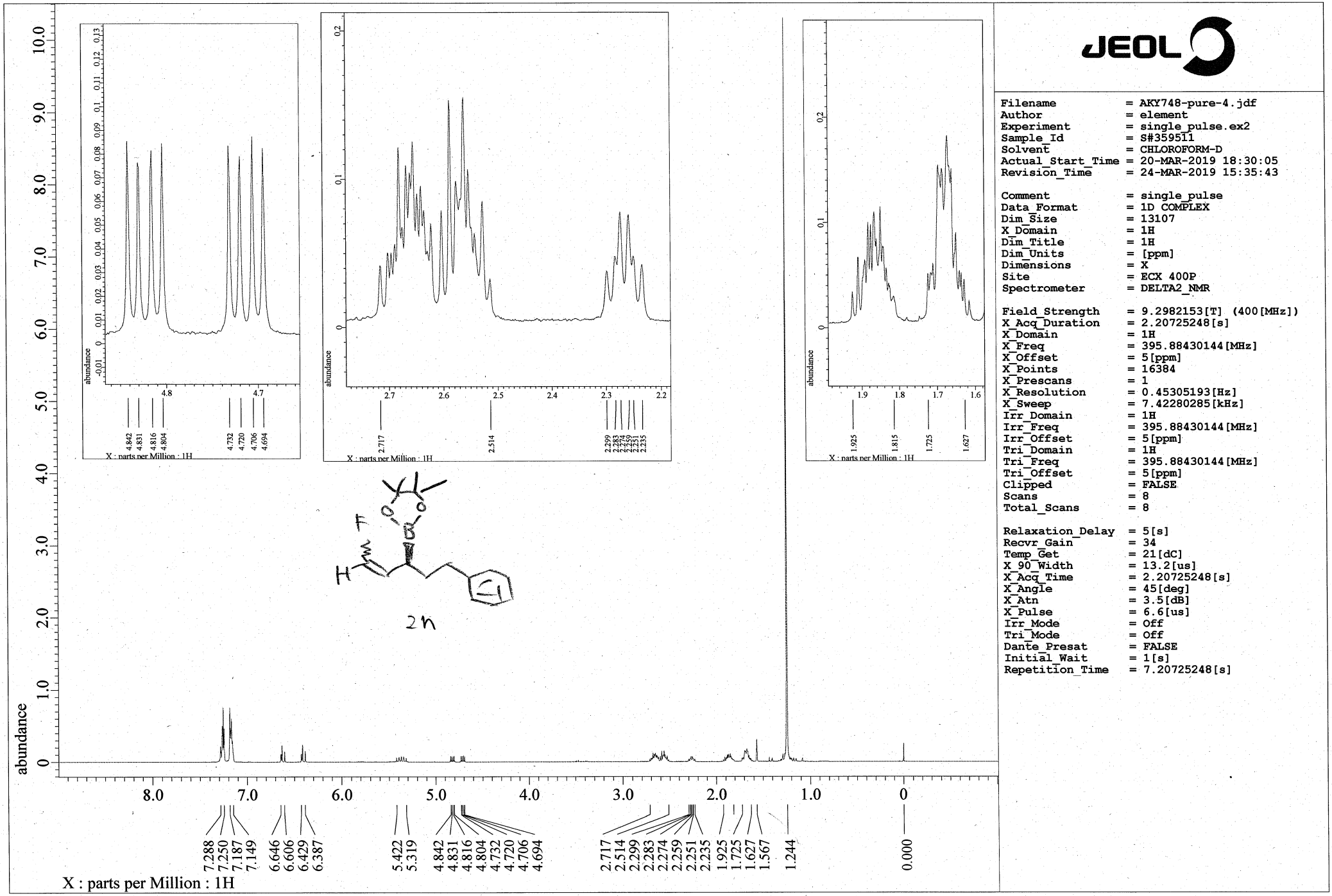
Filename	= AKY642-pure_Proton-1-3.jd
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY642-pure
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 9-AUG-2018 09:38:52
Revision_Time	= 23-MAR-2019 17:24:48
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 42
Temp_Get	= 19.8[dC]
X_90_Width	= 6.22[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3.11[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]

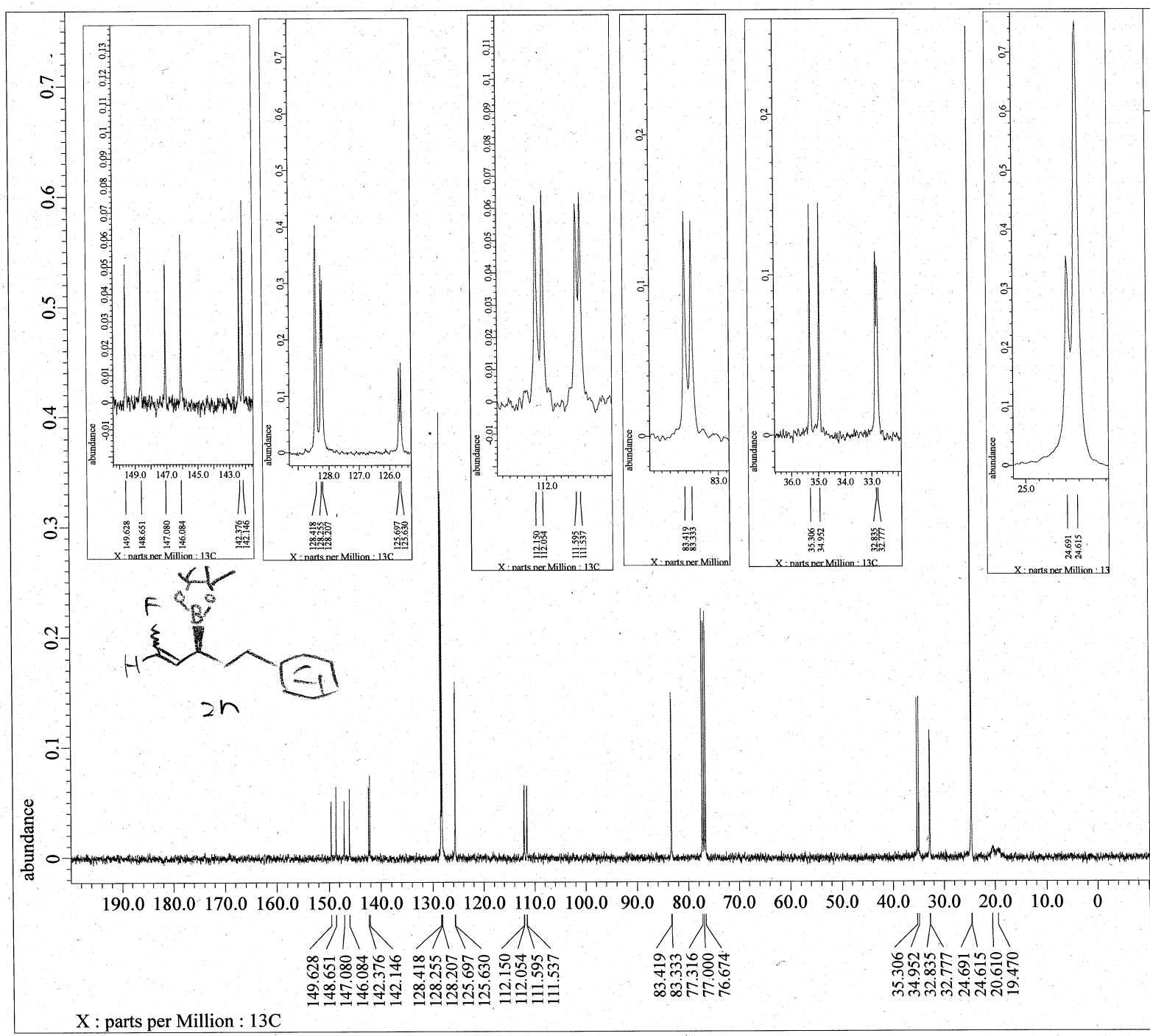

JEOL
Filename = AKY642-carbon-512_Carbon-
Author = element
Experiment = carbon.jxp
Sample_Id = AKY642-carbon-512
Solvent = CHLOROFORM-D
Actual_Start_Time = 9-MAR-2019 17:11:03
Revision_Time = 23-MAR-2019 17:26:13
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Carbon
Dim_Title = Carbon13
Dim_Units = [ppm]
Dimensions = X
Site = JNM-ECS400
Spectrometer = DELTA2_NMR
Field_Strength = 9.37221[T] (400[MHz])
X_Acq_Duration = 1.04333312[s]
X_Domain = 13C
X_Freq = 100.33735165[MHz]
X_Offset = 100.0[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.95846665[Hz]
X_Sweep = 31.40703518[kHz]
X_Sweep_Clipped = 25.12562814[kHz]
Irr_Domain = Proton
Irr_Freq = 399.03472754[MHz]
Irr_Offset = 5.0[ppm]
Clipped = FALSE
Scans = 512
Total_Scans = 512
Relaxation_Delay = 2[s]
Recvr_Gain = 50
Temp_Get = 19.3[dC]
X_90_Width = 10.9[us]
X_Acq_Time = 1.04333312[s]
X_Angle = 30[deg]
X_Atn = 5.4[dB]
X_Pulse = 3.63333333[us]
Irr_Atn_Dec = 25.823[dB]
Irr_Atn_Noe = 25.823[dB]
Irr_Noise = WALTZ
Irr_Pwidth = 0.115[ms]
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.04333312[s]
abundance
0
0.1
0.2
0.3
0.4
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
168.493
165.752
122.880
122.833
83.047
77.325
77.000
76.685
31.416
30.594
24.538
22.580
20.688
14.030
-2.534
X : parts per Million : Carbon13
abundance
122.9
122.8
122.880
122.833
X : parts per Million : Carbon13
Me
Me
Me
Si
F
B
O
O
Me
2m



JEOL

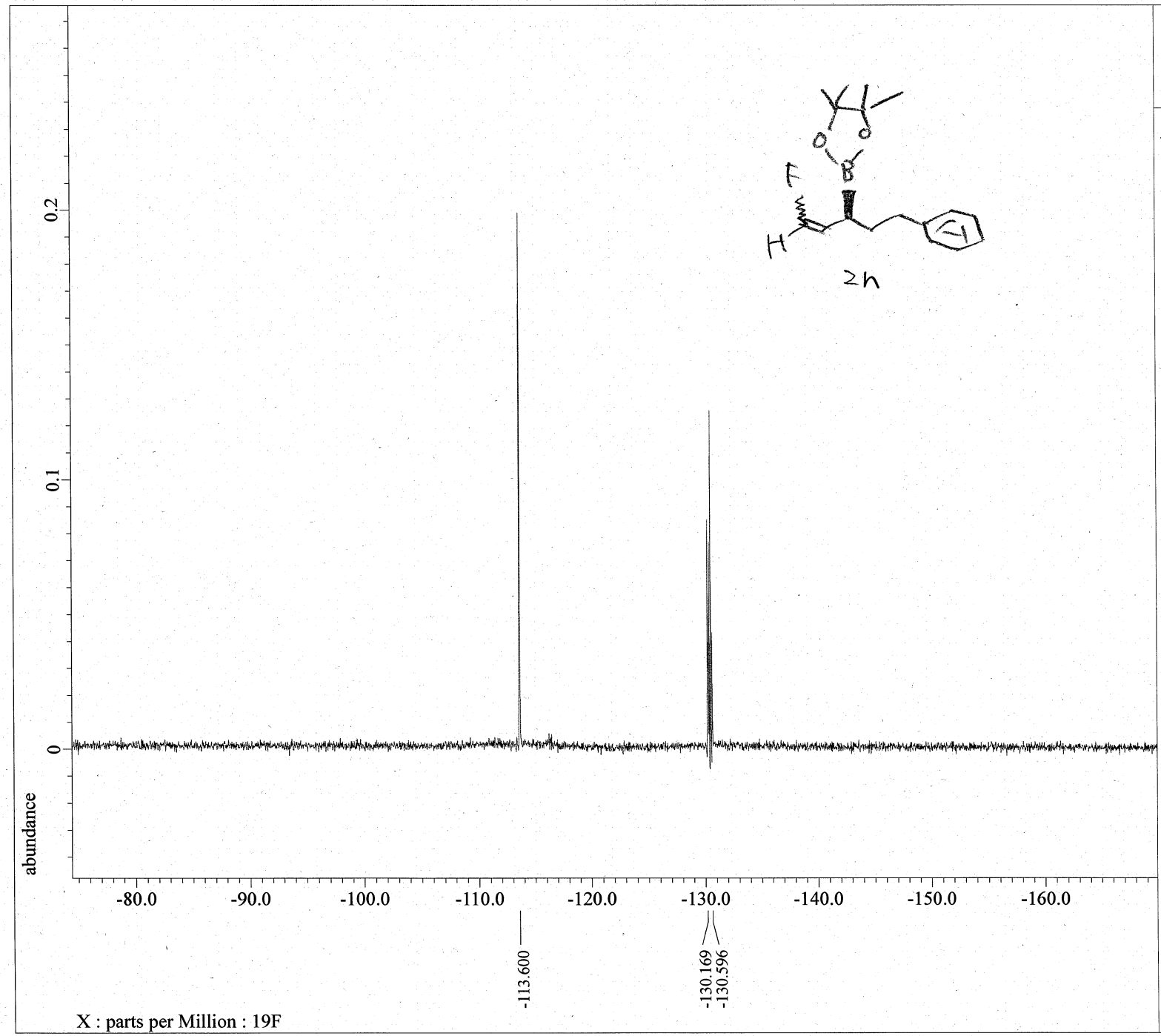
Filename	= AKY642-pure-FNMR-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#591976
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 10-MAR-2019 00:57:12
Revision_Time	= 23-MAR-2019 17:28:57
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 21[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]


JEOL
Filename = AKY748-pure-4.jdf
Author = element
Experiment = single_pulse.ex2
Sample_Id = S#359511
Solvent = CHLOROFORM-D
Actual_Start_Time = 20-MAR-2019 18:30:05
Revision_Time = 24-MAR-2019 15:35:43
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 13107
X_Domain = 1H
Dim_Title = 1H
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 2.20725248[s]
X_Domain = 1H
X_Freq = 395.88430144[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45305193[Hz]
X_Sweep = 7.42280285[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = 1H
Tri_Freq = 395.88430144[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 34
Temp_Get = 21[dC]
X_90_Width = 13.2[us]
X_Acq_Time = 2.20725248[s]
X_Angle = 45[deg]
X_Atn = 3.5[dB]
X_Pulse = 6.6[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.20725248[s]
abundance
X : parts per Million : 1H
7.288 7.250 7.187 7.149 6.646 6.606 6.429 6.387 5.422 5.319 4.842 4.831 4.816 4.804 4.732 4.720 4.706 4.694 2.717 2.514 2.299 2.283 2.274 2.259 2.251 2.235 1.925 1.725 1.627 1.567 1.244 0.000
2n



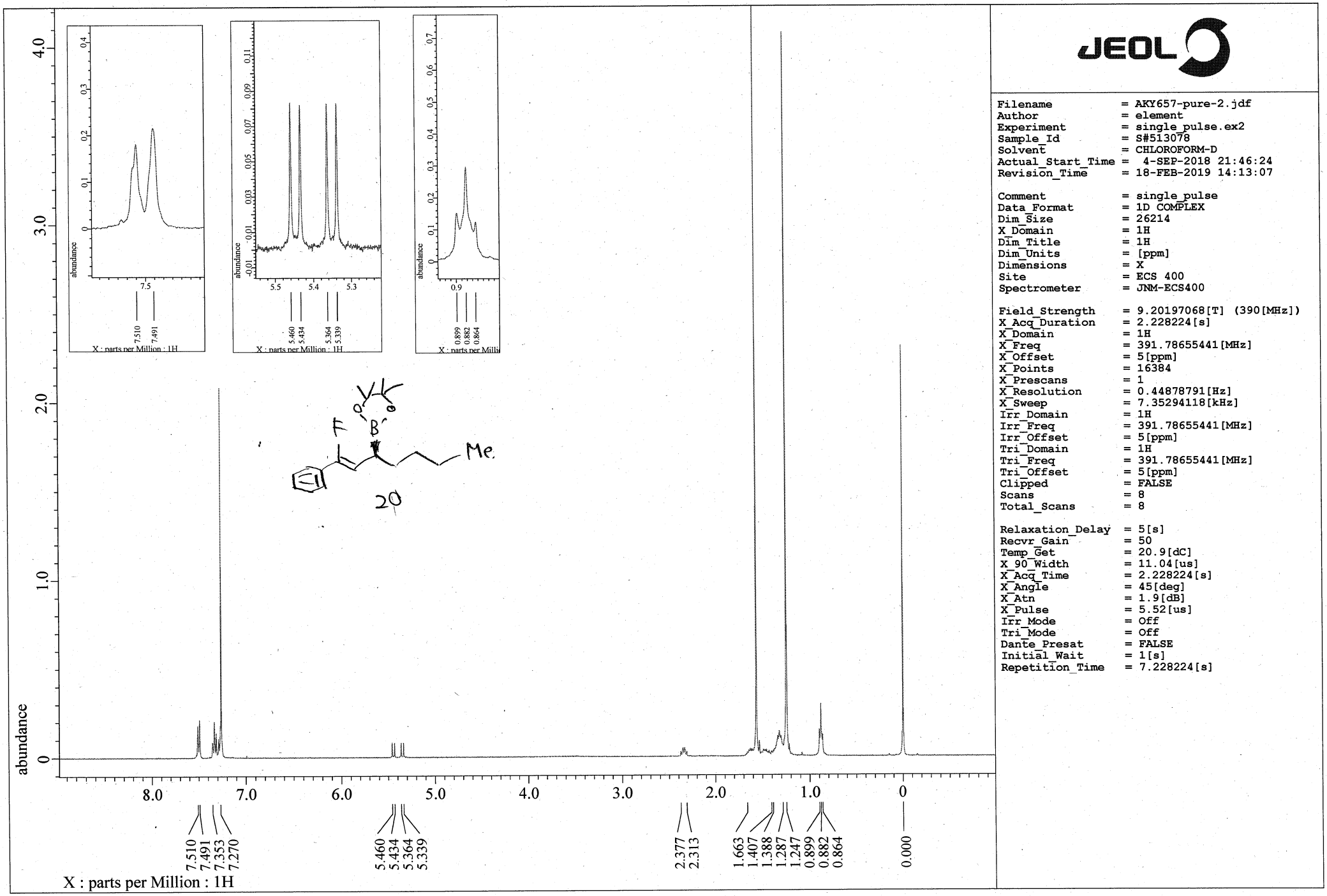
JEOL

Filename	= AKY748-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#338232
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 20-MAR-2019 17:53:40
Revision_Time	= 24-MAR-2019 16:07:02
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 48
Temp_Get	= 21.4[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]

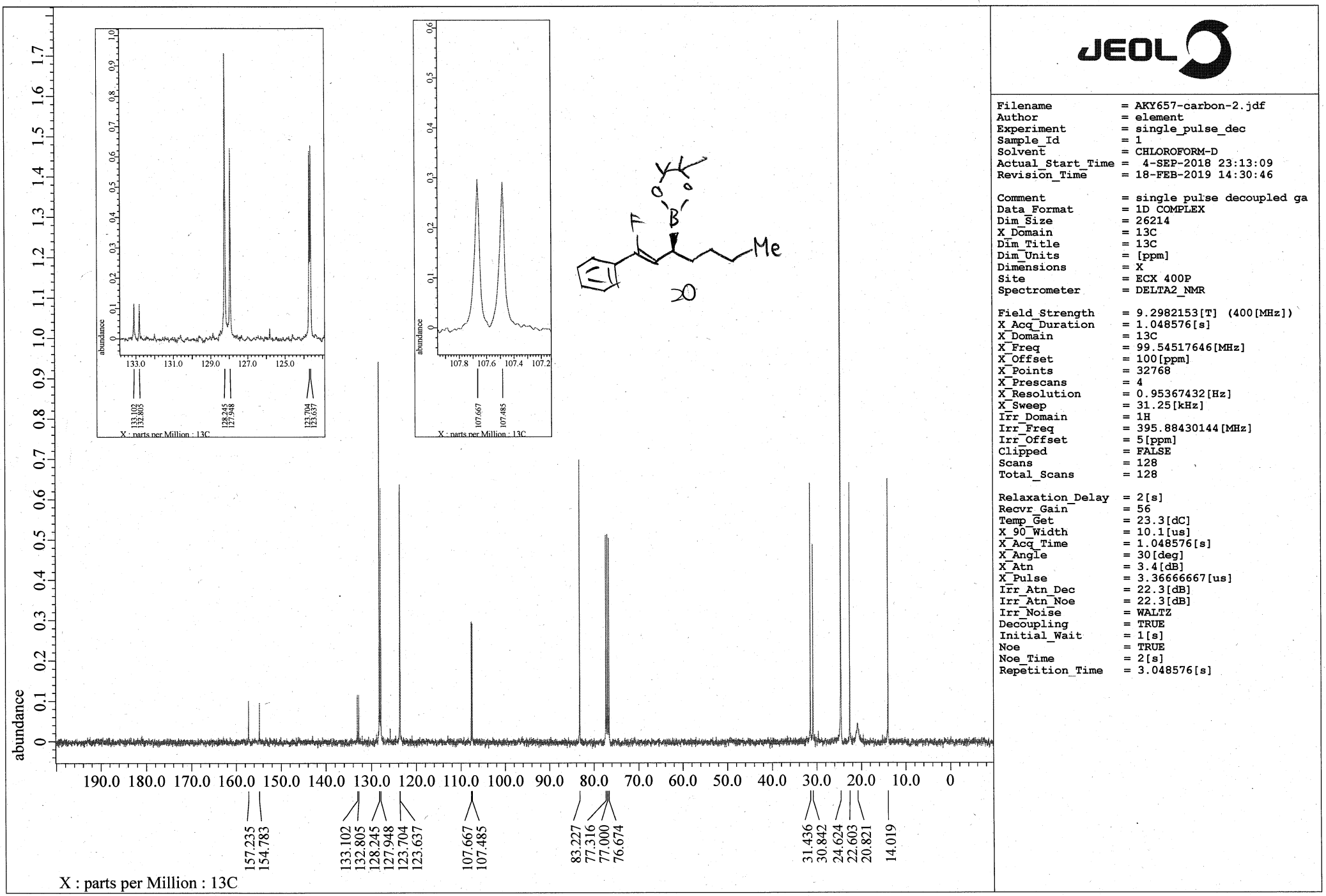


JEOL

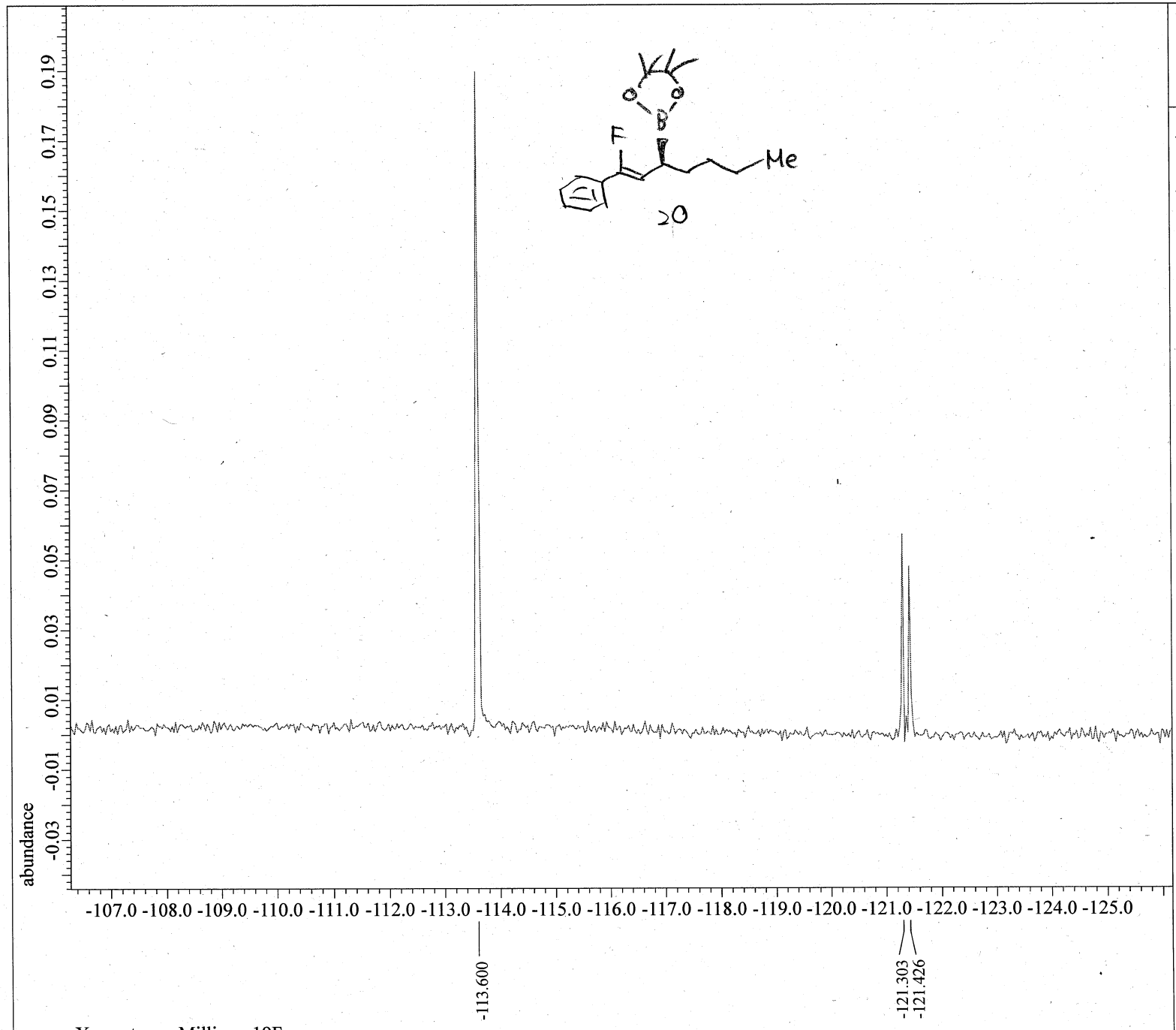
Filename	= AKY748-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#351315
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 20-MAR-2019 18:16:14
Revision_Time	= 24-MAR-2019 15:44:57
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 21[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



Filename	= AKY657-pure-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#513078
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 4-SEP-2018 21:46:24
Revision_Time	= 18-FEB-2019 14:13:07
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 50
Temp_Get	= 20.9[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]

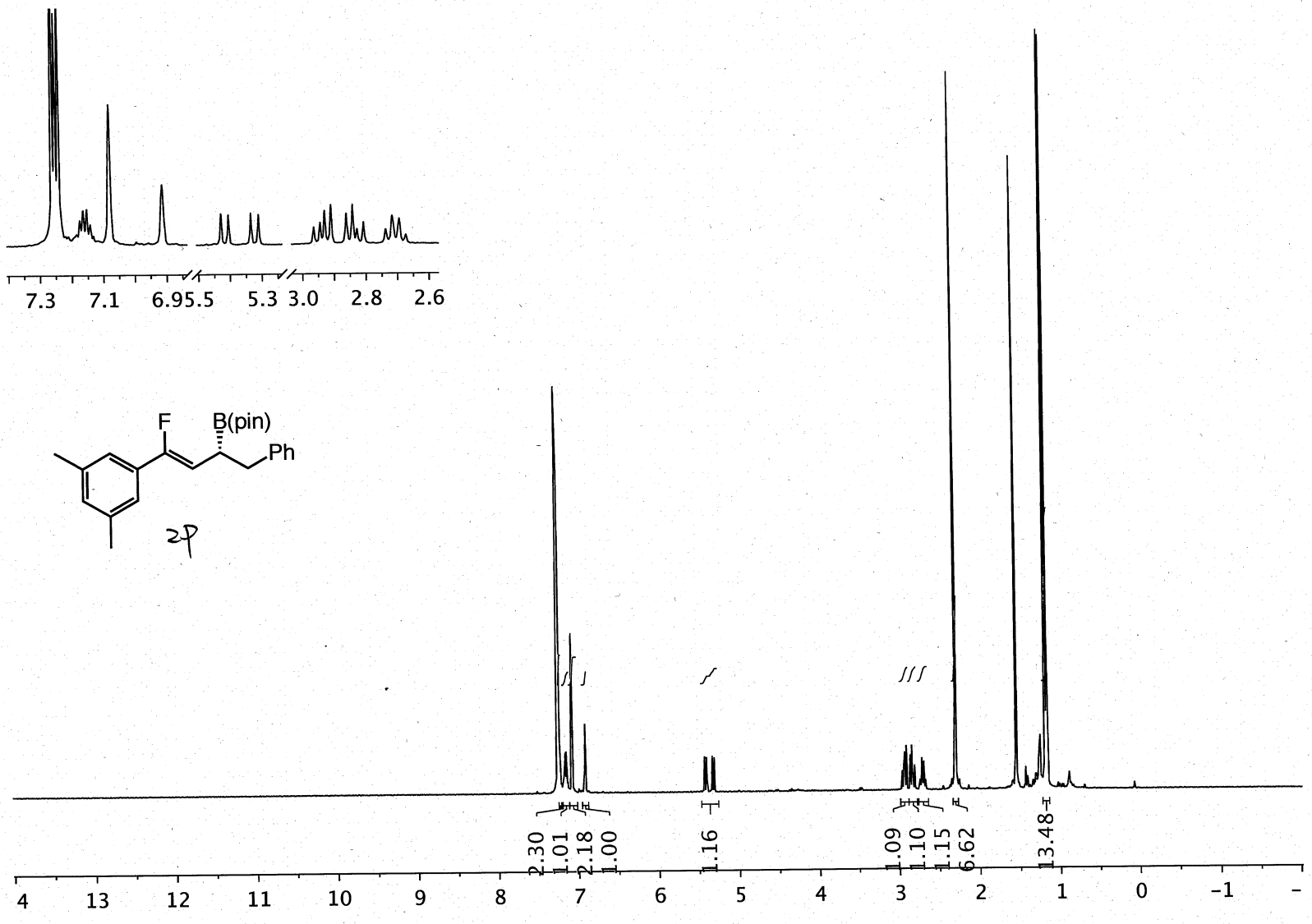


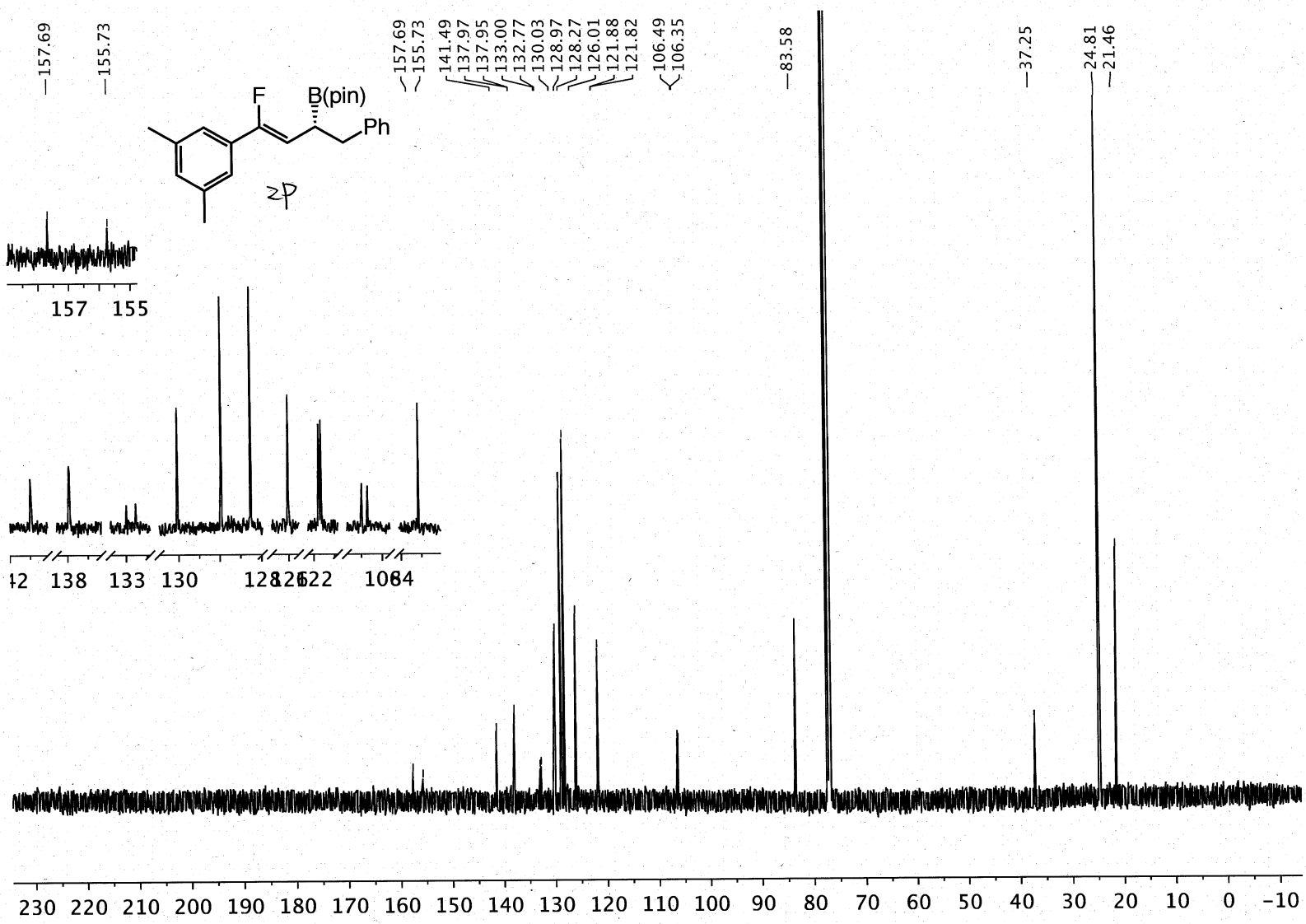
Filename	= AKY657-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= 1
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 4-SEP-2018 23:13:09
Revision_Time	= 18-FEB-2019 14:30:46
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 128
Total_Scans	= 128
Relaxation_Delay	= 2[s]
Recvr_Gain	= 56
Temp_Get	= 23.3[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]

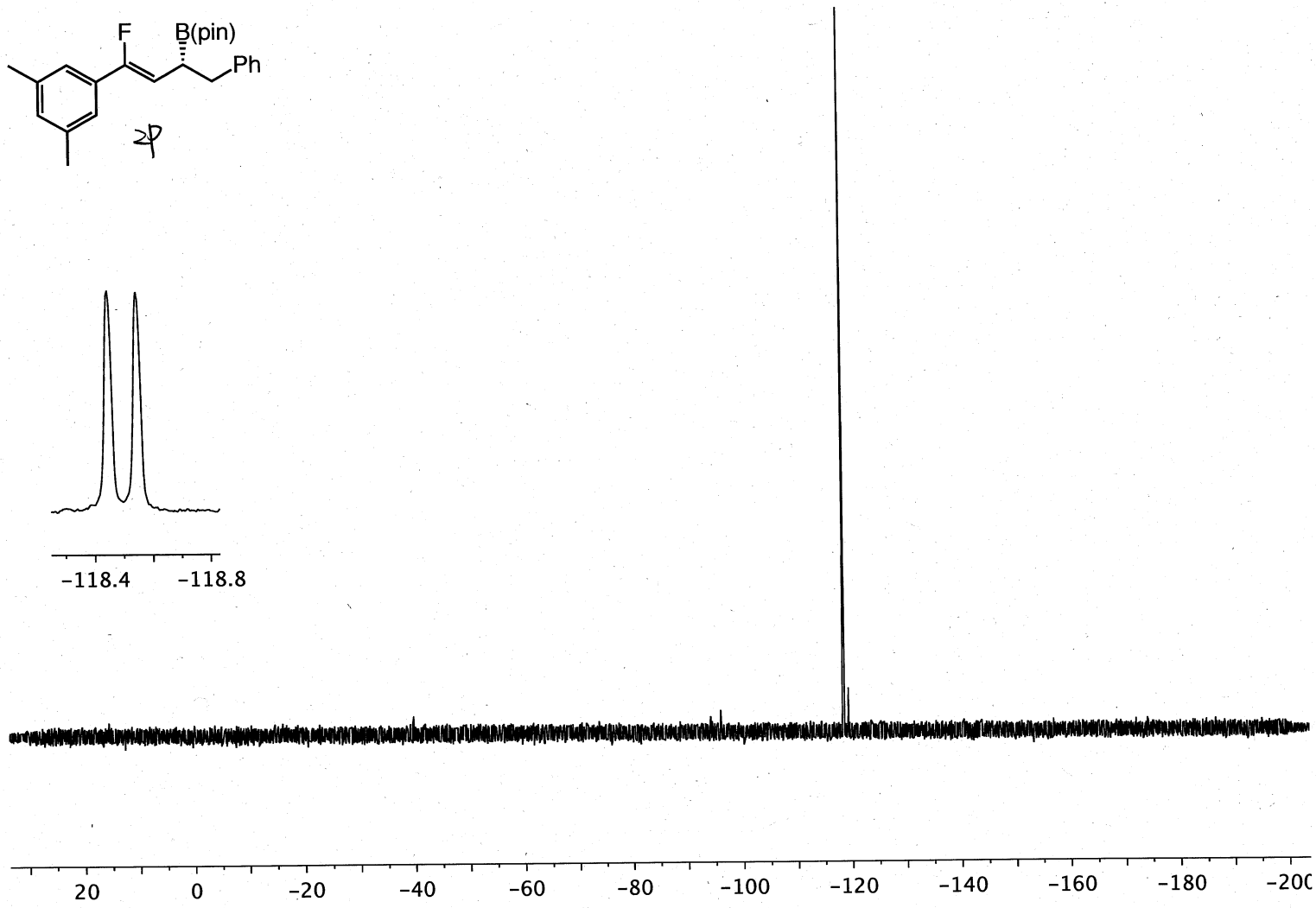


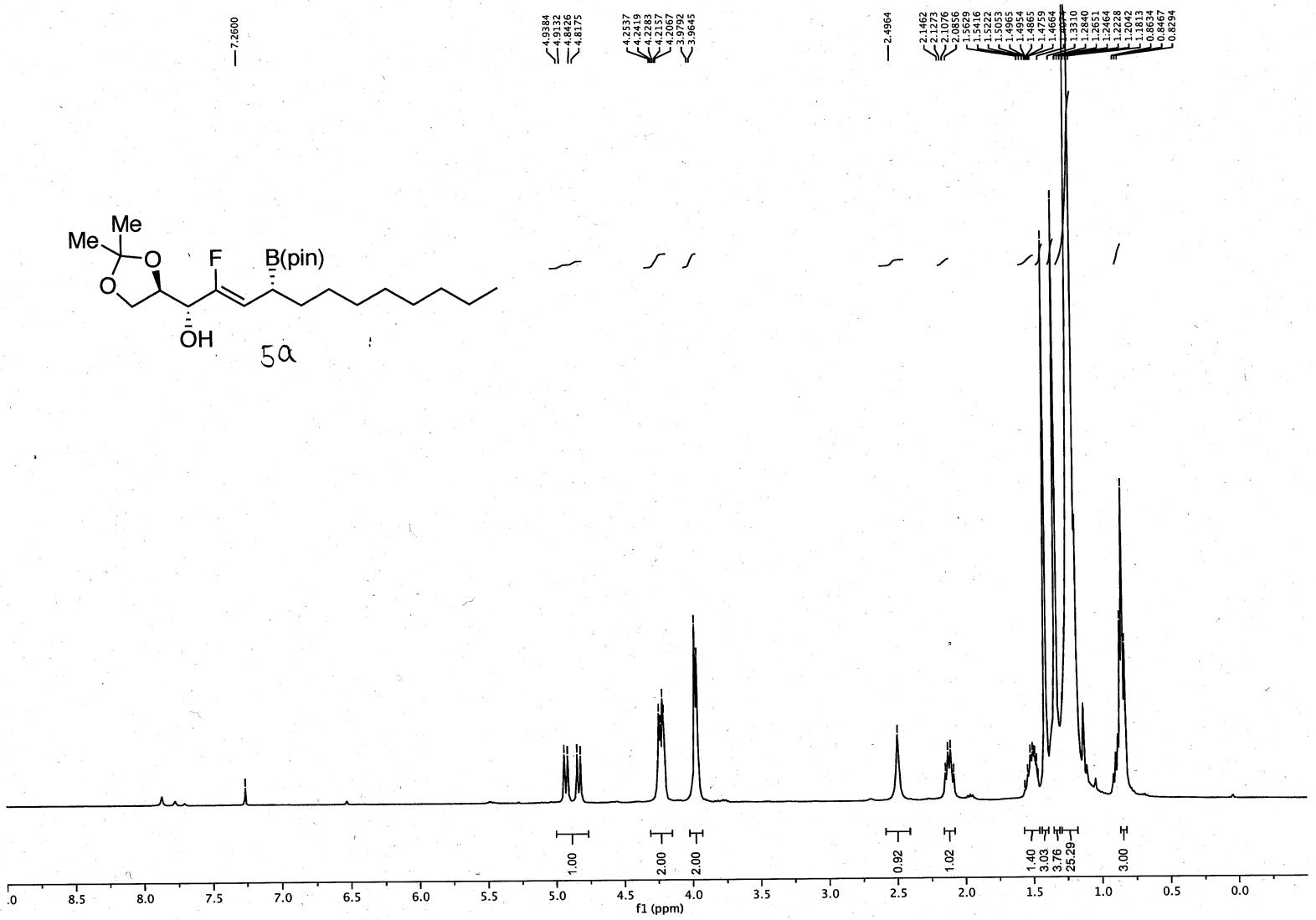
JEOL

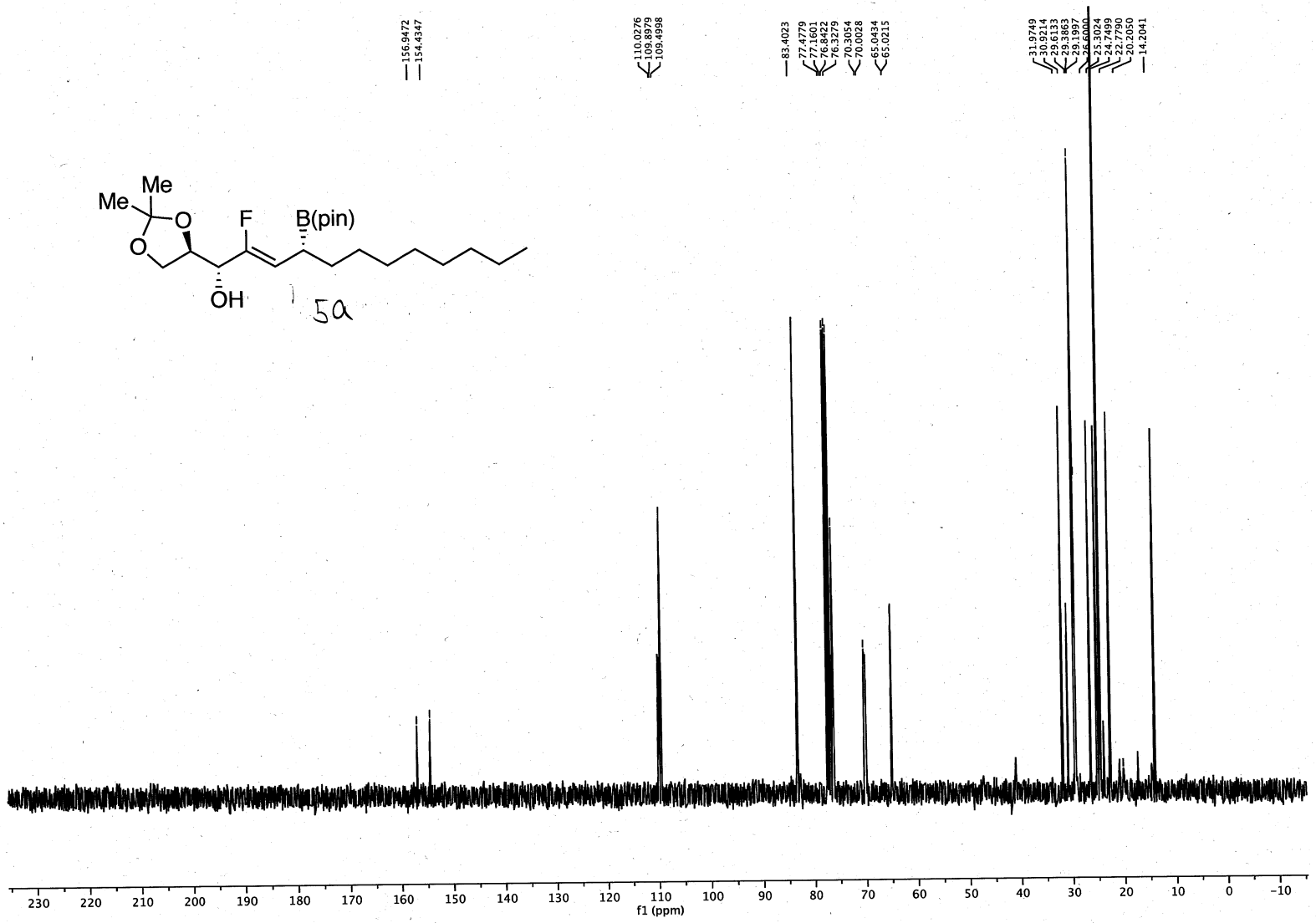
Filename	= AKY657-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#545743
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 4-SEP-2018 23:44:47
Revision_Time	= 18-FEB-2019 14:35:43
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 22.5[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

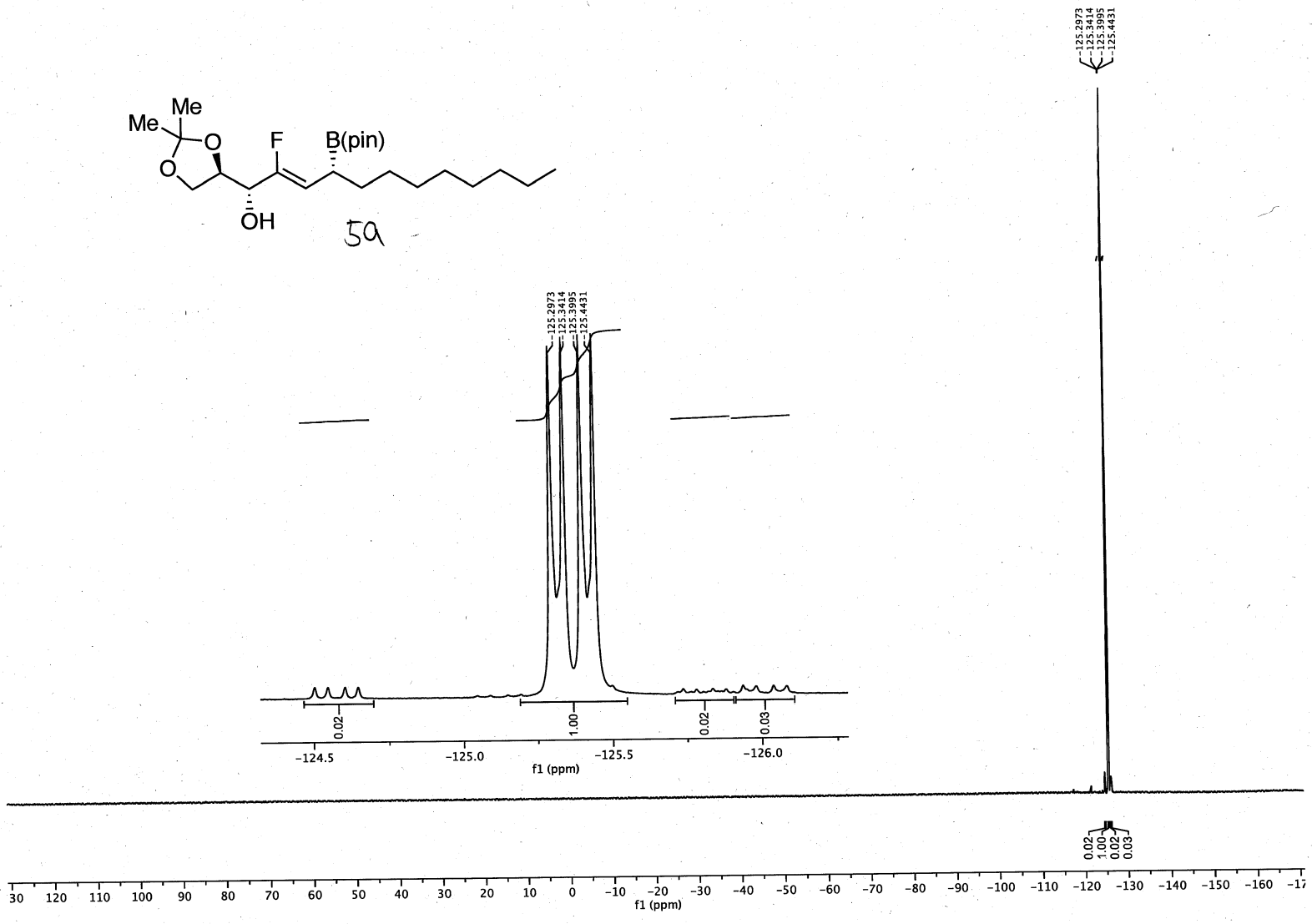

F
B(pin)
Ph
2P
7.3
7.1
6.95.5
5.3 3.0
2.8
2.6
2.30
1.01
2.18
1.00
1.16
1.09
1.10
1.15
6.62
13.48
4
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1

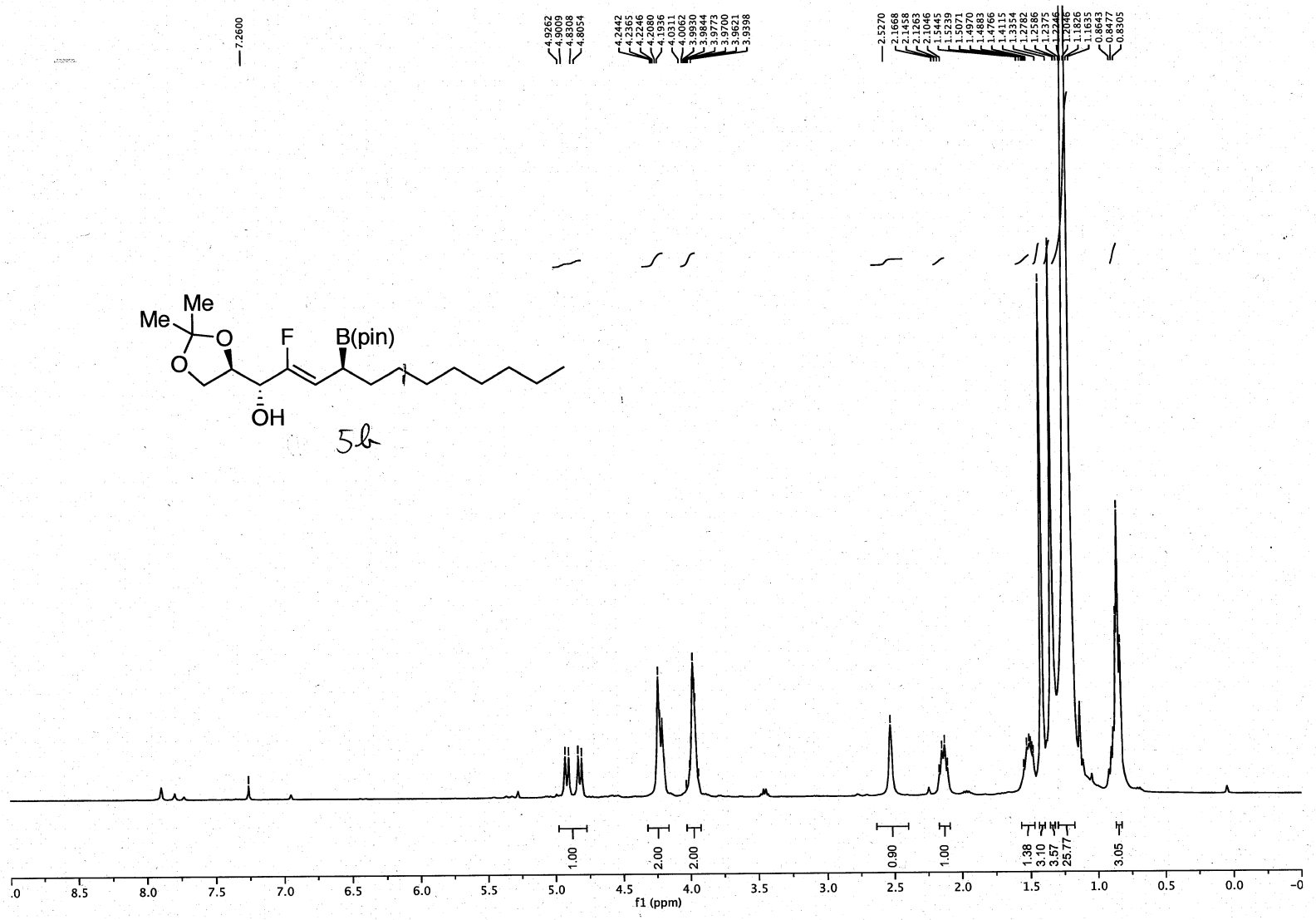

157.69
155.73
F
B(pin)
Ph
zp
157.69
155.73
141.49
137.97
137.95
133.00
132.77
130.03
128.97
128.27
126.01
121.88
121.82
106.49
106.35
83.58
37.25
24.81
21.46
157
155
138
133
130
106
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10

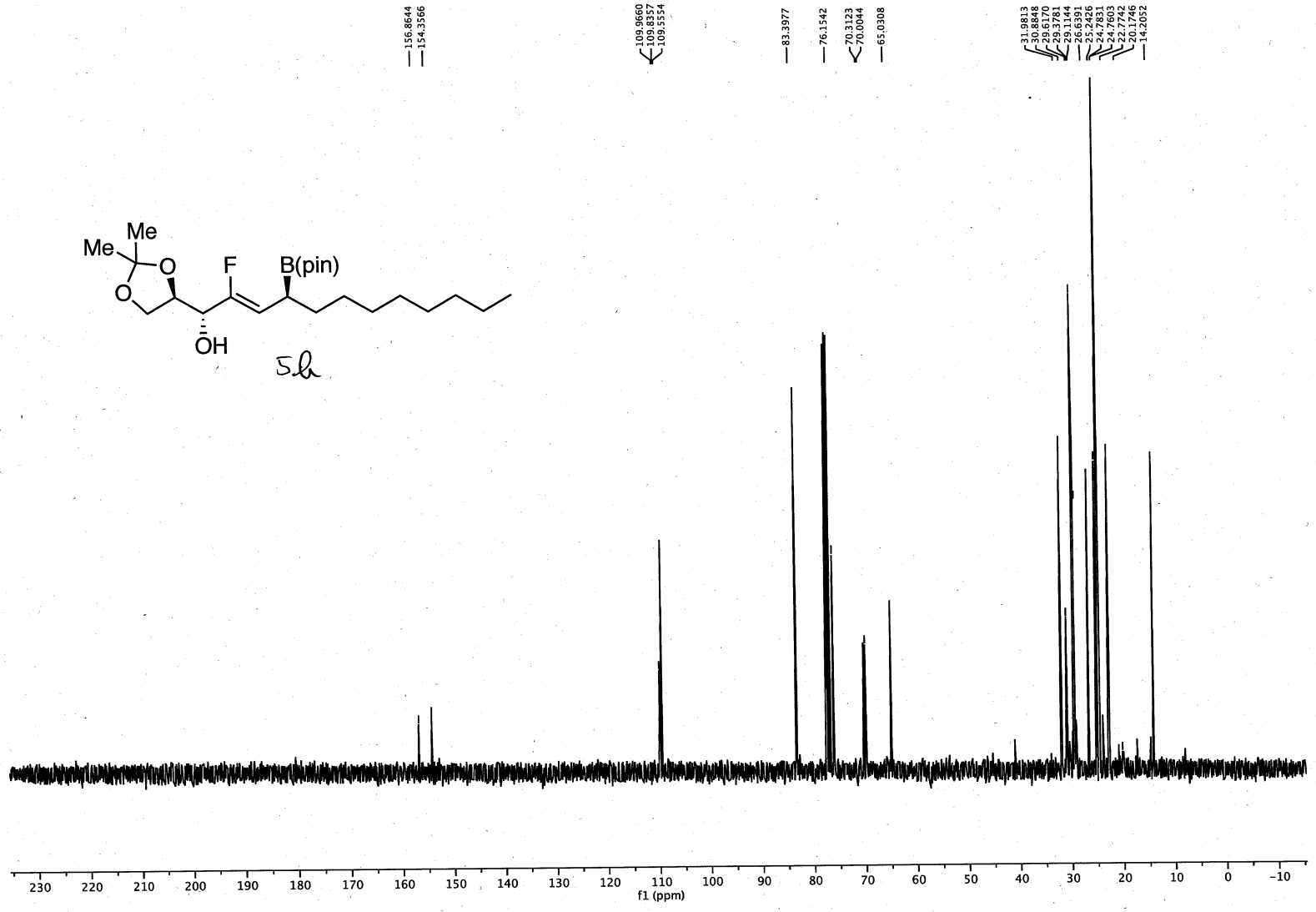

F
B(pin)
Ph
2p
-118.4
-118.8
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200

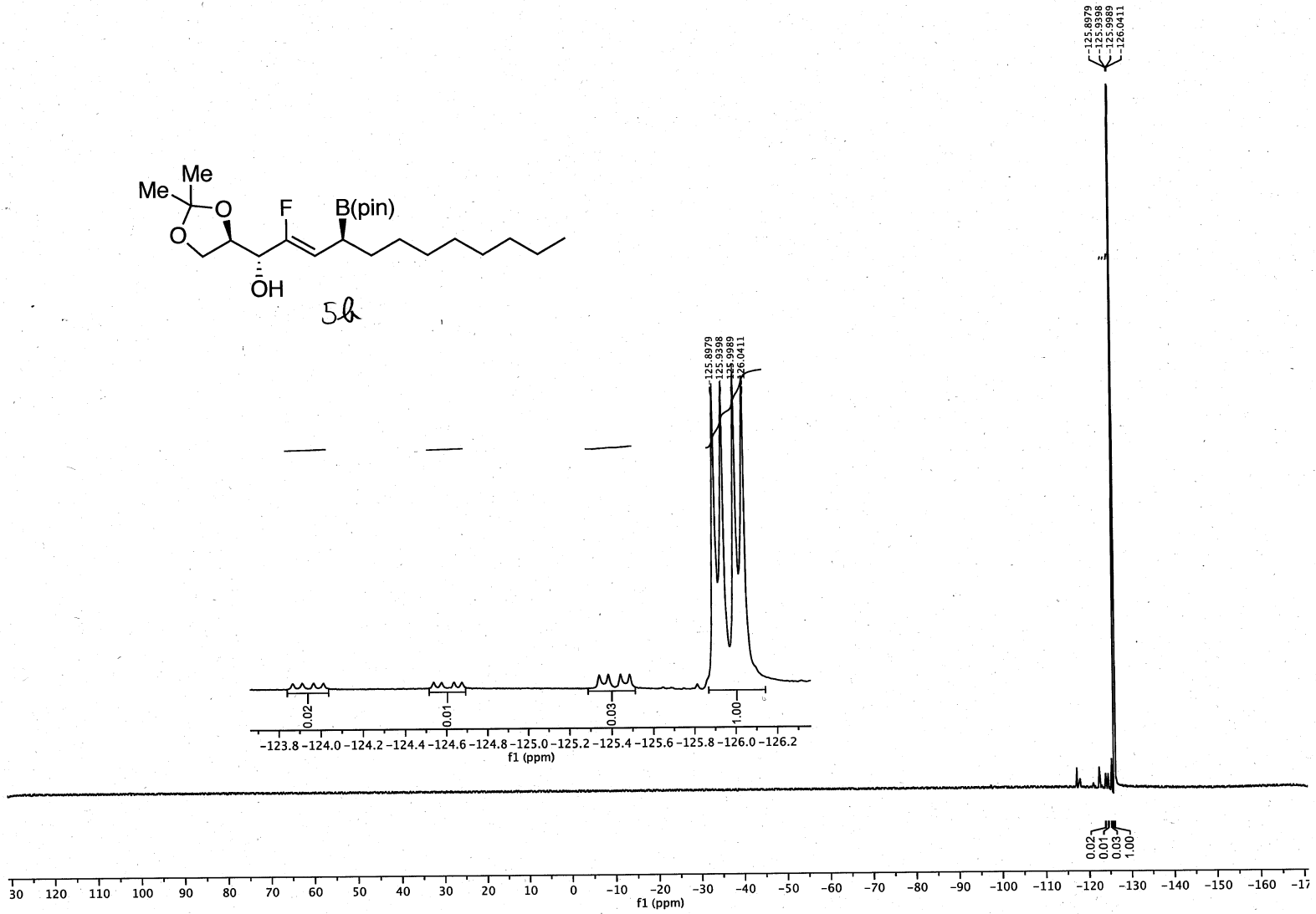

7.2600
4.9384
4.9132
4.8426
4.8175
4.2537
4.2419
4.2283
4.2157
4.2067
3.9792
3.9645
2.4964
2.1462
2.1273
2.0796
2.0555
1.9629
1.5416
1.5222
1.5053
1.4965
1.4954
1.4865
1.4759
1.4664
1.3310
1.2660
1.2651
1.2464
1.2228
1.2042
1.1813
0.8634
0.8467
0.8294
Me
Me
O
O
F
B(pin)
OH
5a
1.00
2.00
2.00
0.92
1.02
1.40
3.03
3.76
25.29
3.00
f1 (ppm)

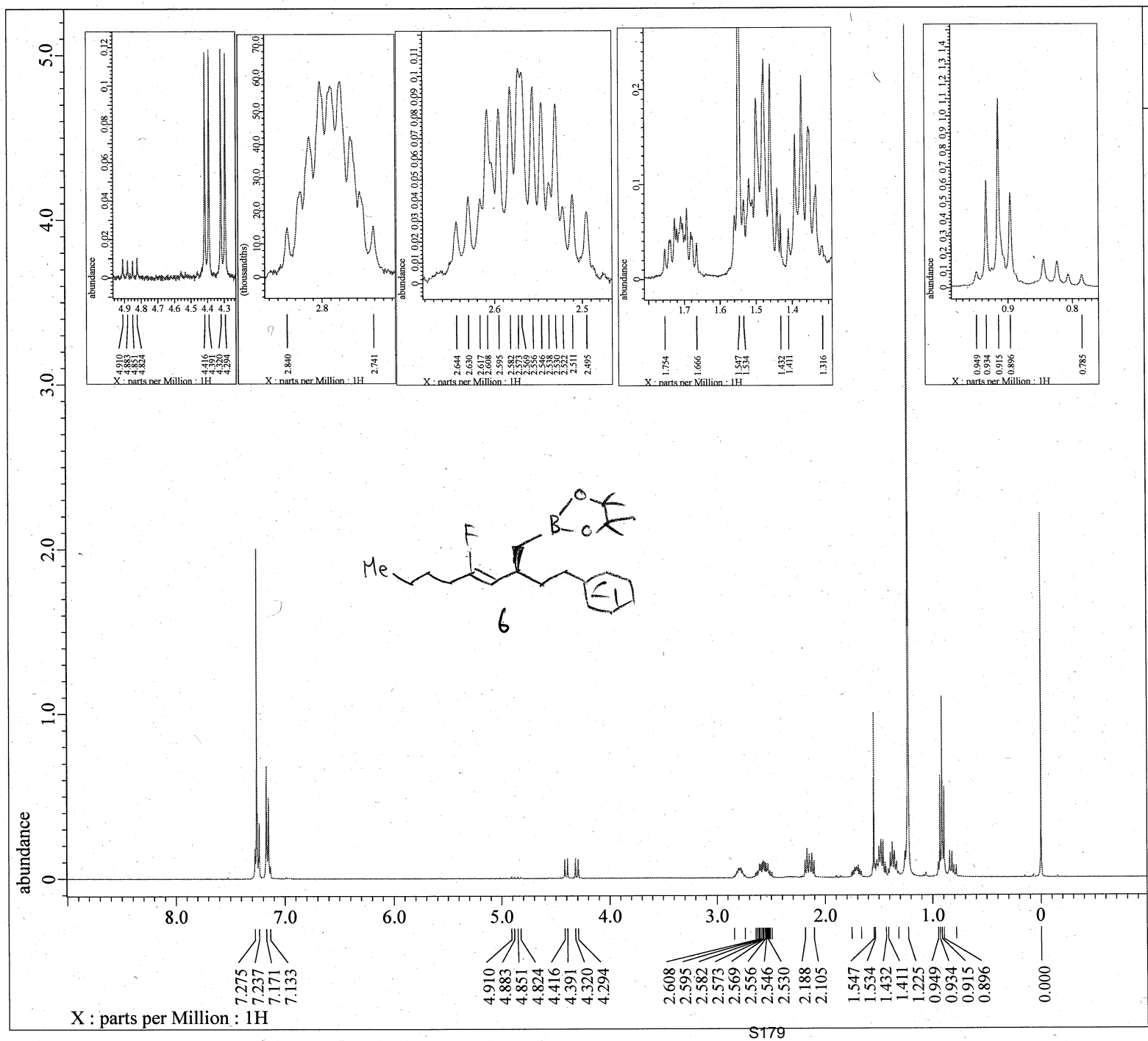

156.9472
154.4347
110.0276
109.8979
109.4998
83.4023
77.4779
77.1601
76.8422
76.3279
70.3054
70.0028
65.0434
65.0215
31.9749
30.9214
29.6133
29.3863
29.1997
26.6000
25.3024
24.7499
22.7790
20.2050
14.2041
Me
Me
O
O
F
B(pin)
OH
5a
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


Me
Me
O
O
F
B(pin)
OH
59
-125.2973
-125.3414
-125.3995
-125.4431
0.02
1.00
0.02
0.03
-124.5
-125.0
-125.5
-126.0
f1 (ppm)
f1 (ppm)

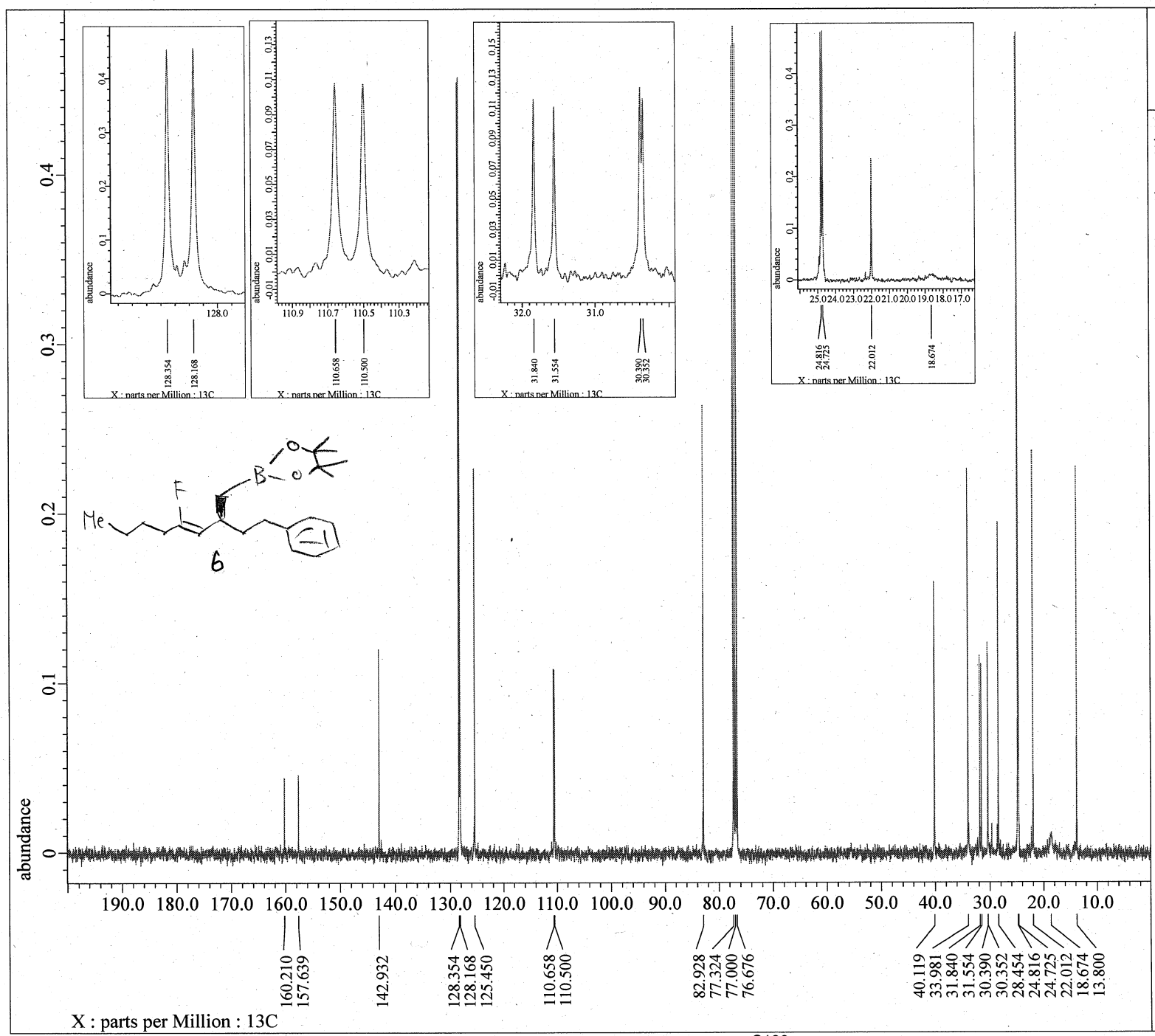

7.2600
4.9262
4.9099
4.8908
4.8054
4.2442
4.2365
4.2246
4.2080
4.1936
4.0311
4.0062
3.9930
3.9844
3.9773
3.9700
3.9621
3.9398
2.5270
2.1668
2.1458
2.1263
2.1046
1.5445
1.5239
1.5071
1.4970
1.4883
1.4766
1.4115
1.3354
1.2782
1.2586
1.2375
1.2246
1.2046
1.1826
1.1635
0.8643
0.8477
0.8305
Me
Me
O
O
F
B(pin)
OH
5b
1.00
2.00
2.00
0.90
1.00
1.38
3.10
3.57
25.77
3.05
f1 (ppm)


156.8644
154.3566
109.9660
109.8357
109.5554
83.3977
76.1542
70.3123
70.0044
65.0308
31.9813
30.8848
29.6170
29.3781
29.1144
26.6391
25.2426
24.7831
24.7603
22.7742
20.1746
14.2052
Me
Me
O
O
F
B(pin)
OH
5h
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


Me
Me
O
O
F
B(pin)
OH
5b
-125.8979
-125.9398
-125.9989
-126.0411
0.02
0.01
0.03
1.00
-123.8 -124.0 -124.2 -124.4 -124.6 -124.8 -125.0 -125.2 -125.4 -125.6 -125.8 -126.0 -126.2
f1 (ppm)
30 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -17
f1 (ppm)

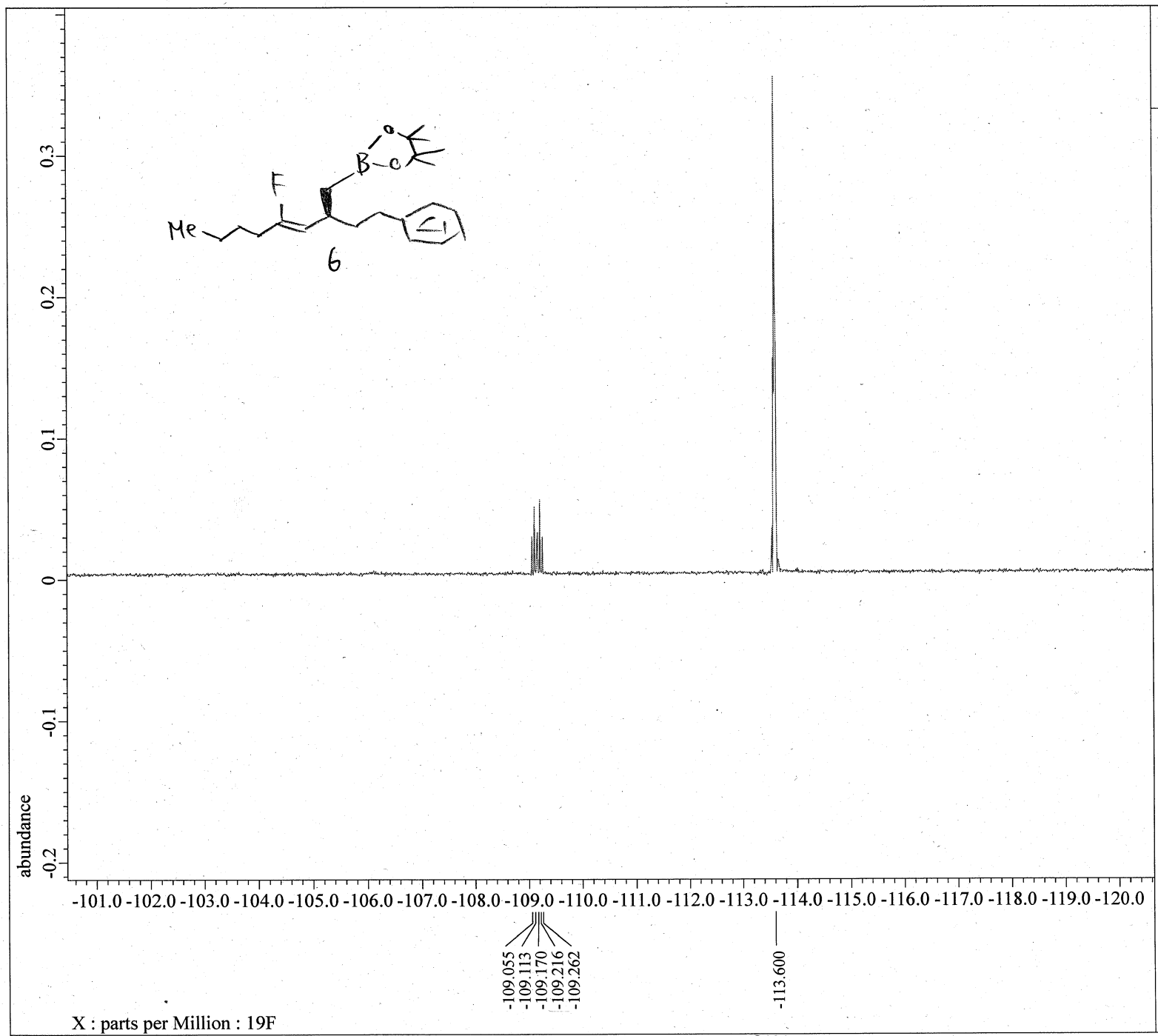


Filename	= AKY730-pure-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#412633
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 17-NOV-2018 18:53:49
Revision_Time	= 17-NOV-2018 14:52:39
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 48
Temp_Get	= 21.5[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]



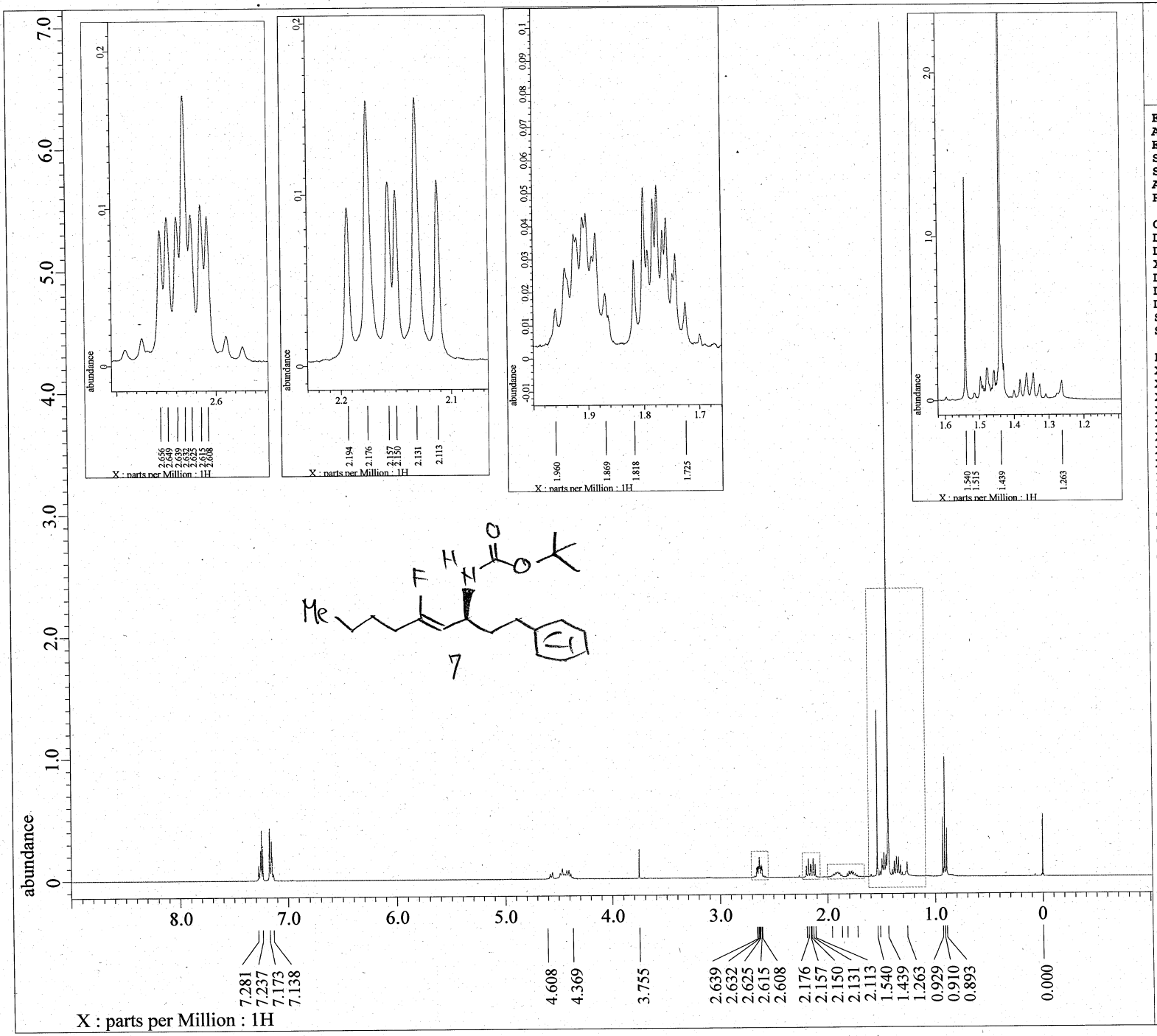
JEOL

Filename	= AKY730-carbon-3.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#417834
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 17-NOV-2018 19:01:22
Revision_Time	= 17-NOV-2018 13:23:05
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 52428
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 256
Total_Scans	= 256
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 21.9[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]



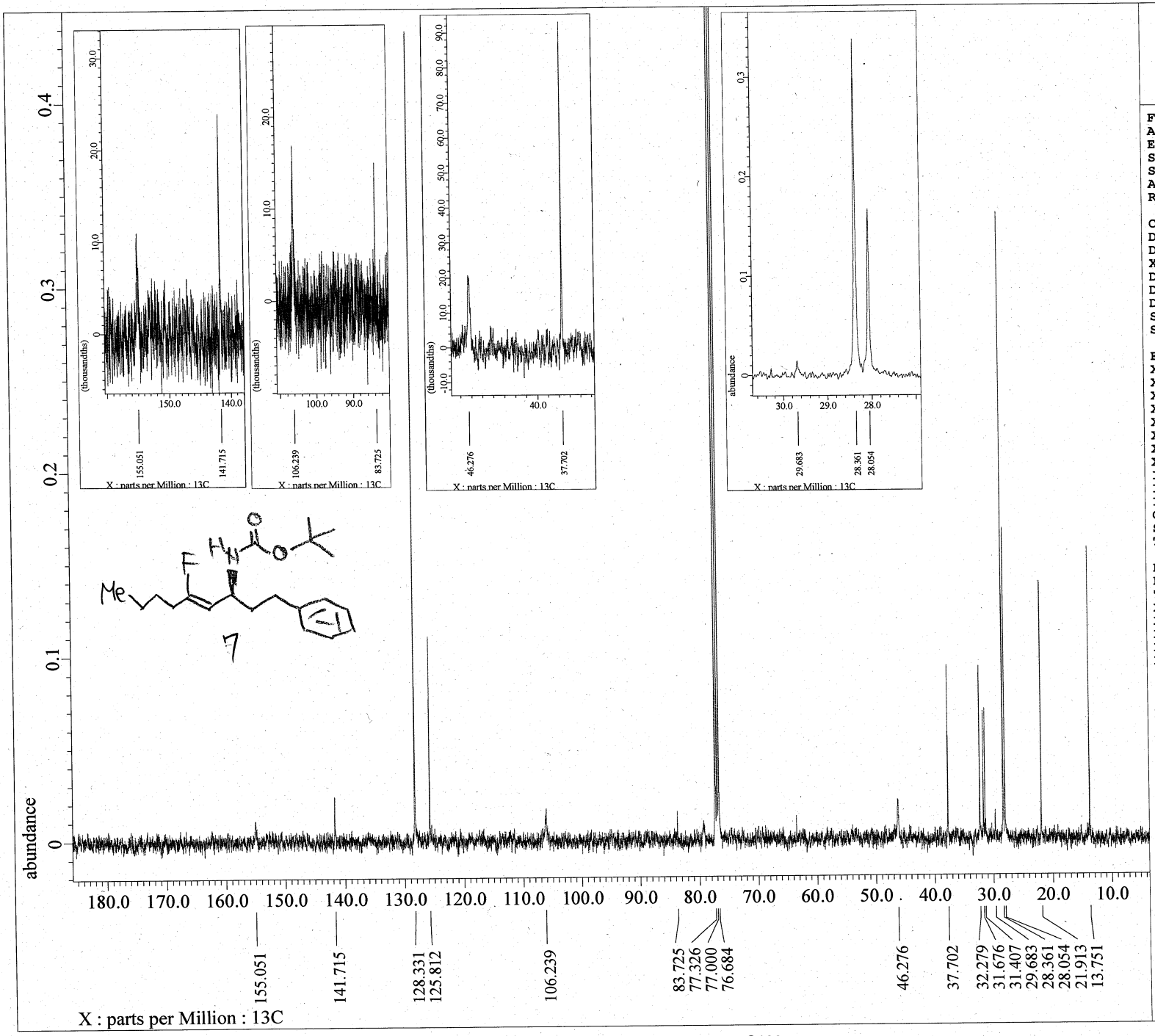
JEOL

Filename	= AKY730-pure-fnmr-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#442060
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 17-NOV-2018 20:46:10
Revision_Time	= 17-NOV-2018 13:28:53
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 0.23330816[s]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= -60[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 4.2861767[Hz]
X_Sweep	= 70.2247191[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 16
Total_Scans	= 16
Relaxation_Delay	= 5[s]
Recvr_Gain	= 30
Temp_Get	= 22[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 0.23330816[s]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.23330816[s]



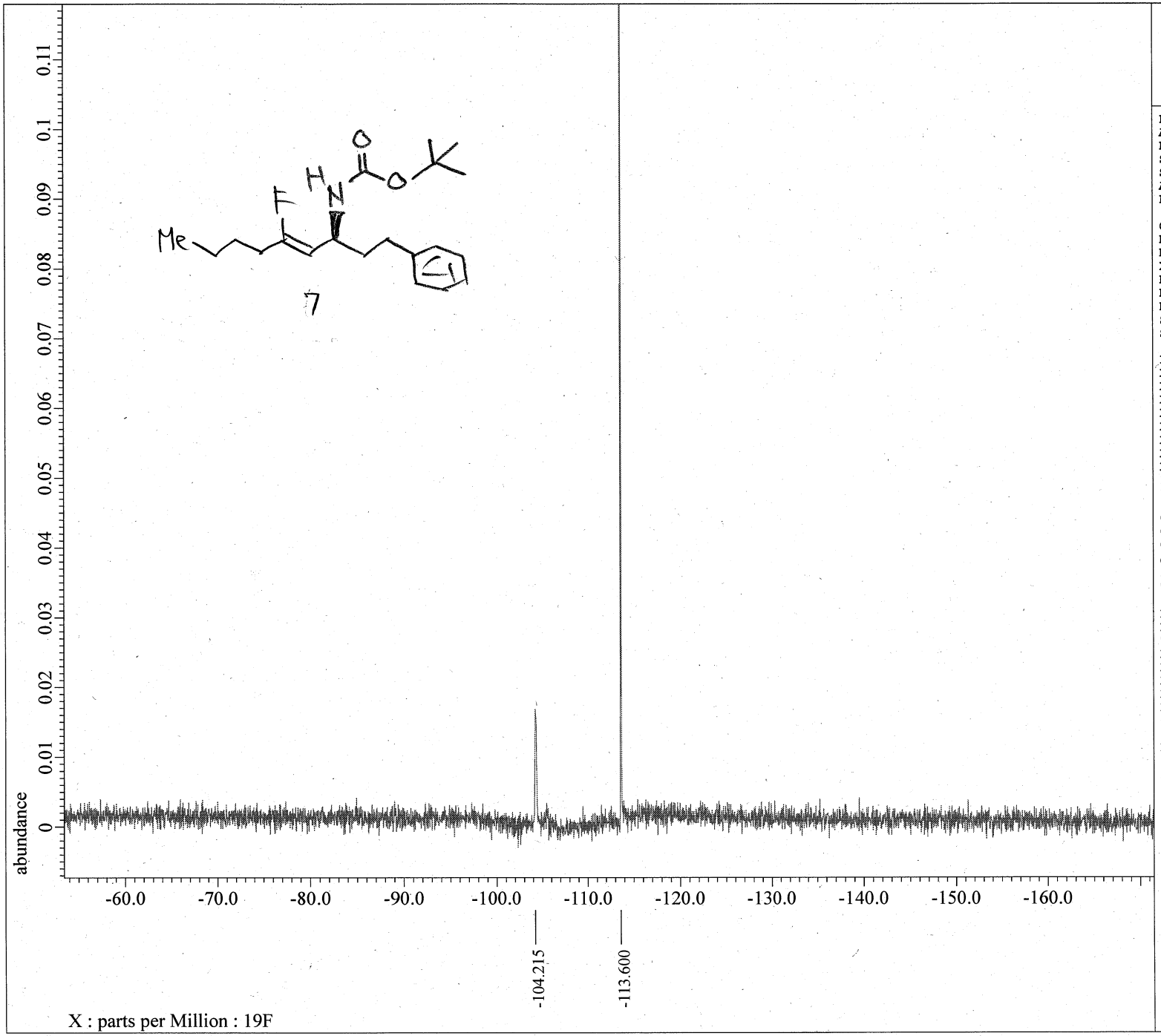
JEOL

Filename	= AKY763-pure-60-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#537868
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 13-DEC-2018 23:26:28
Revision_Time	= 25-MAR-2019 10:50:08
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 2.20725248[s]
X_Domain	= 1H
X_Freq	= 395.88430144[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45305193[Hz]
X_Sweep	= 7.42280285[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 395.88430144[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 36
Temp_Get	= 60[dC]
X_90_Width	= 13.2[us]
X_Acq_Time	= 2.20725248[s]
X_Angle	= 45[deg]
X_Atn	= 3.5[dB]
X_Pulse	= 6.6[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.20725248[s]



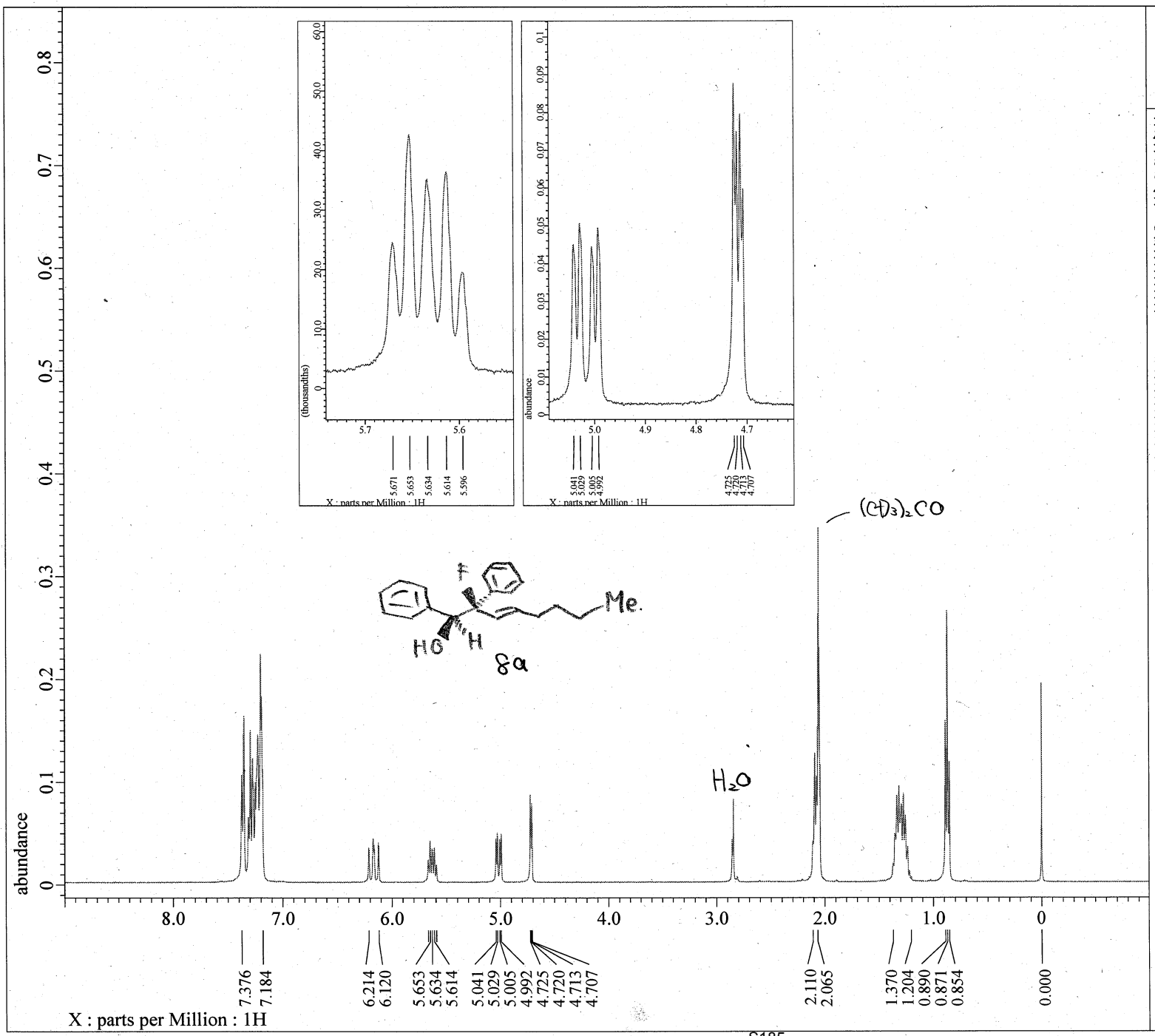
JEOL

Filename	= AKY763-carbonag-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#794162
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 20-DEC-2018 06:33:08
Revision_Time	= 25-MAR-2019 13:18:54
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 256
Total_Scans	= 256
Relaxation_Delay	= 2[s]
Recvr_Gain	= 54
Temp_Get	= 27.2[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



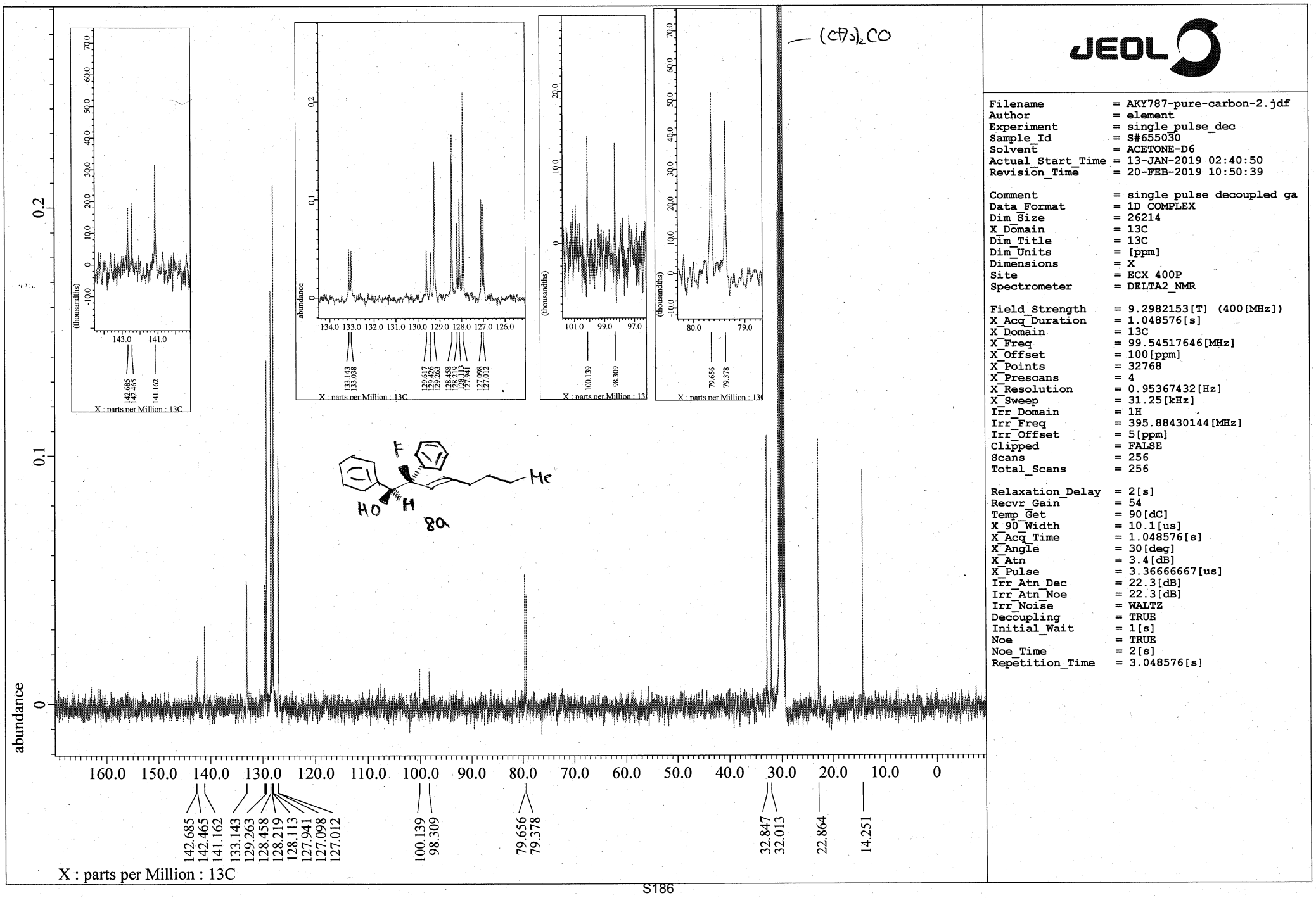
JEOL

Filename	= AKY763-pure-FNMR-again-2.
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#749921
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 8-MAR-2019 05:20:40
Revision_Time	= 25-MAR-2019 10:55:19
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.1[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



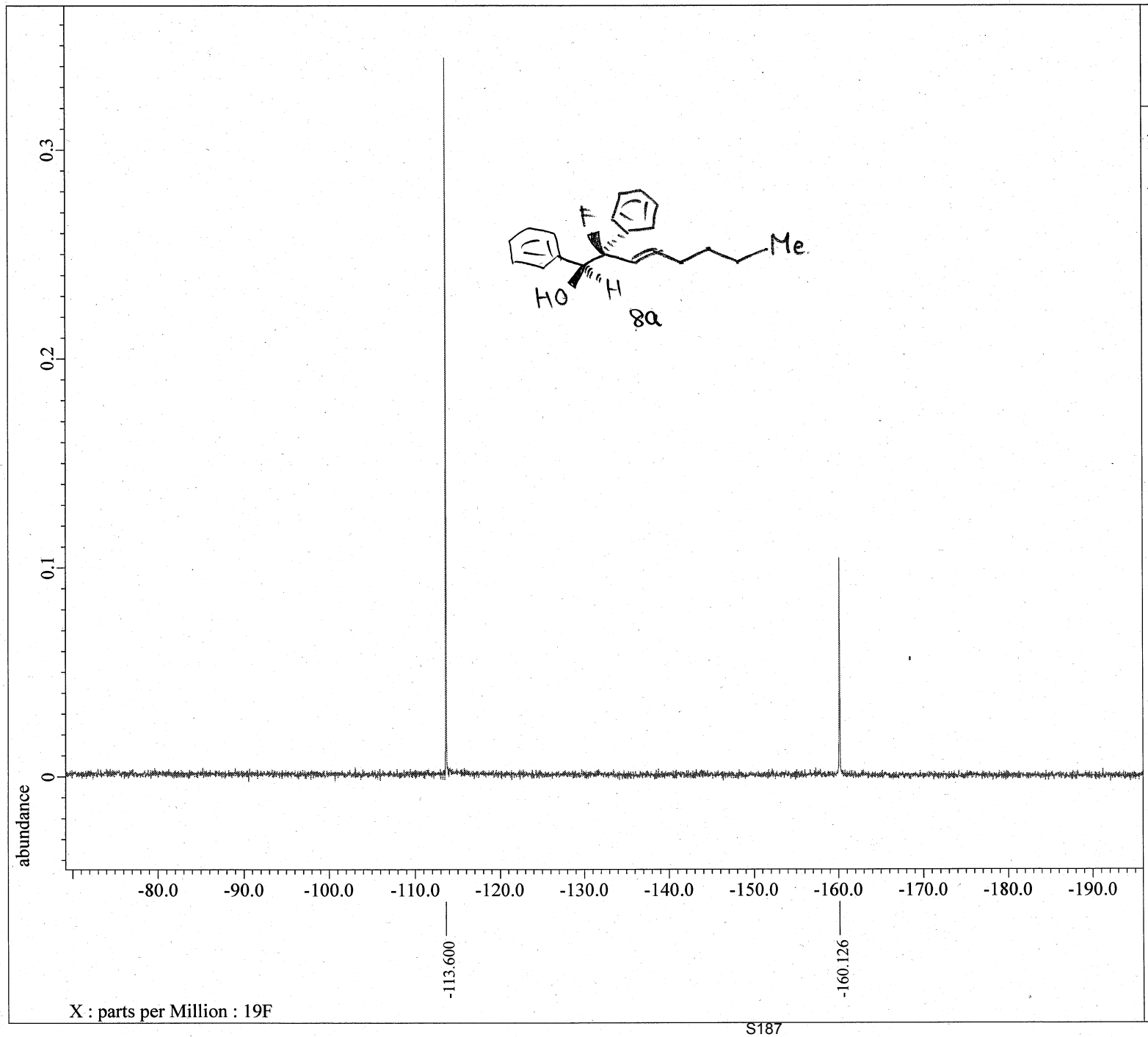
JEOL

Filename	= AKY787-pure-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#650605
Solvent	= ACETONE-D6
Actual_Start_Time	= 13-JAN-2019 02:34:04
Revision_Time	= 20-FEB-2019 10:31:43
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 2.20725248[s]
X_Domain	= 1H
X_Freq	= 395.88430144[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45305193[Hz]
X_Sweep	= 7.42280285[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 395.88430144[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 36
Temp_Get	= 86[dC]
X_90_Width	= 13.2[us]
X_Acq_Time	= 2.20725248[s]
X_Angle	= 45[deg]
X_Atn	= 3.5[dB]
X_Pulse	= 6.6[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.20725248[s]



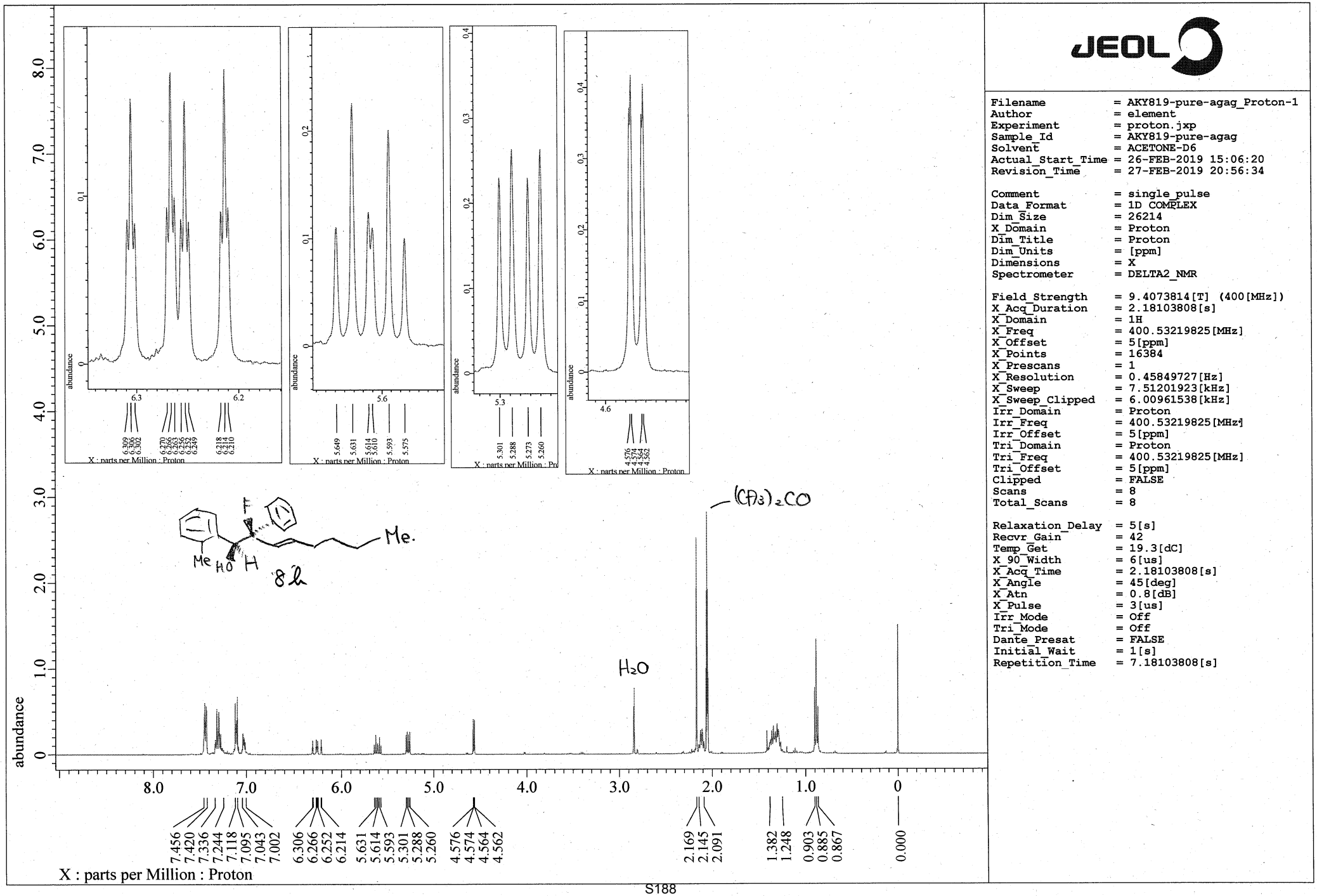
JEOL

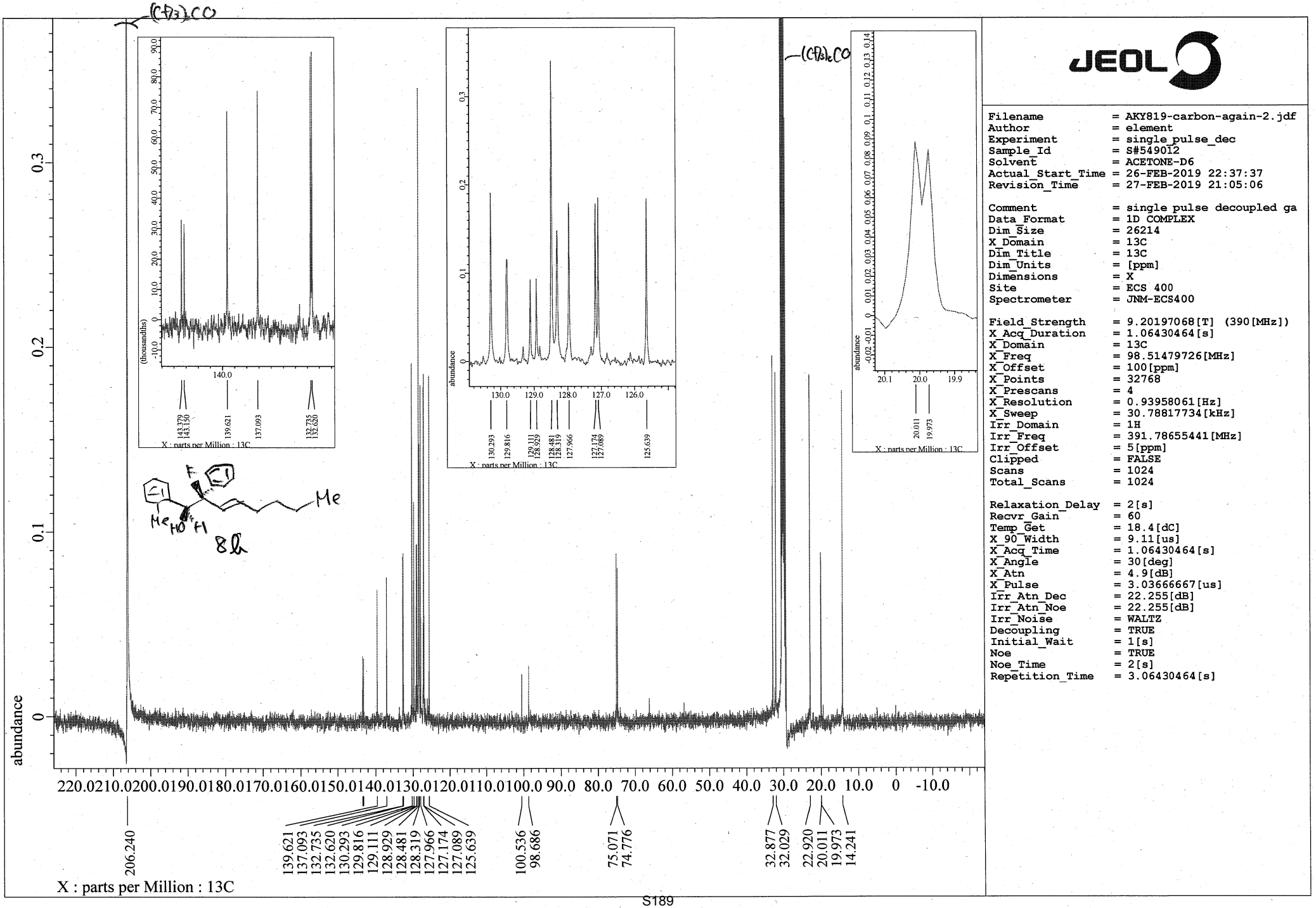
Filename	= AKY787-pure-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#655030
Solvent	= ACETONE-D6
Actual_Start_Time	= 13-JAN-2019 02:40:50
Revision_Time	= 20-FEB-2019 10:50:39
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 256
Total_Scans	= 256
Relaxation_Delay	= 2[s]
Recvr_Gain	= 54
Temp_Get	= 90[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



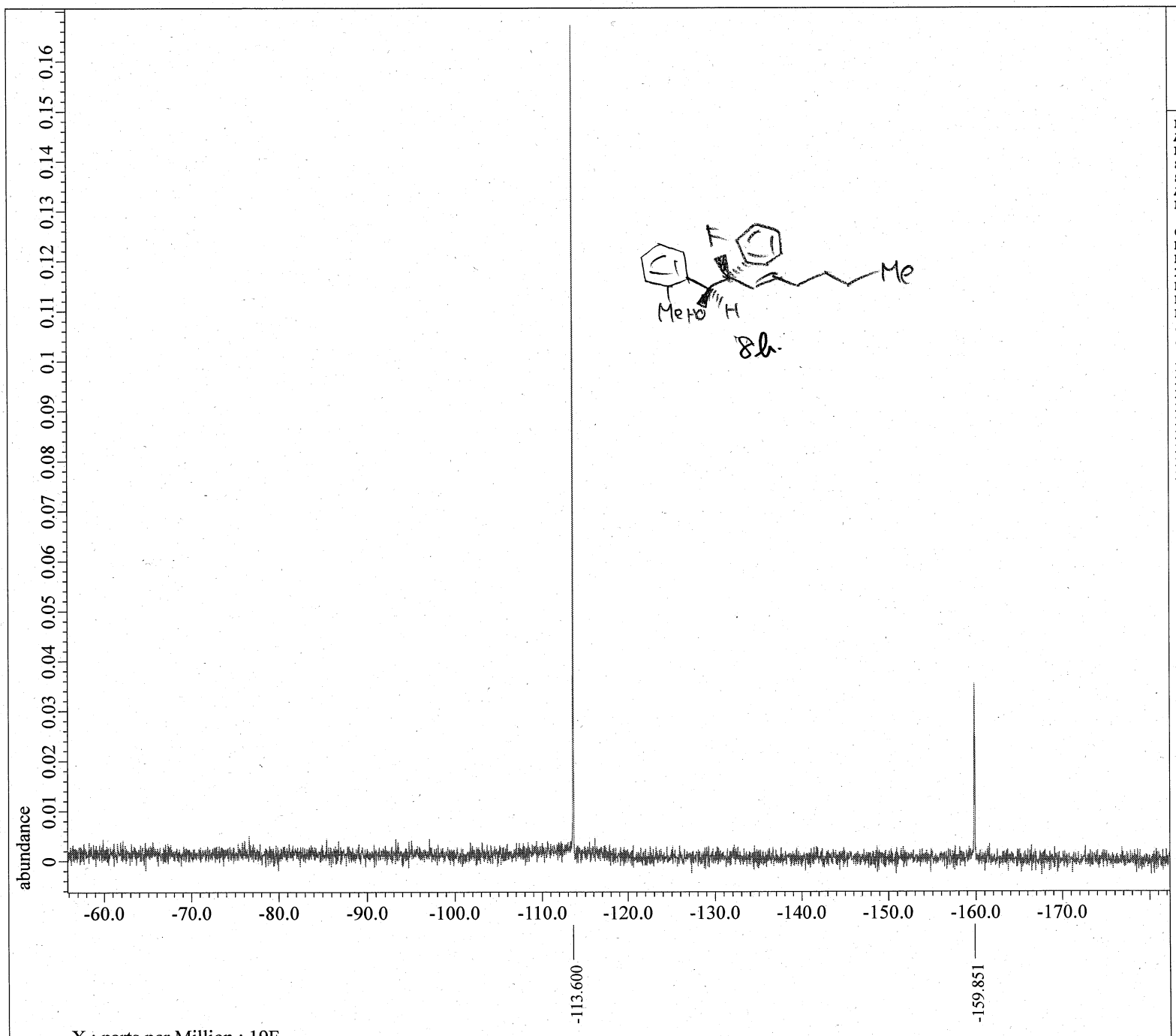
JEOL

Filename	= AKY787-pure-FNMR-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#593741
Solvent	= ACETONE-D6
Actual_Start_Time	= 19-FEB-2019 01:00:11
Revision_Time	= 20-FEB-2019 10:58:01
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]


JEOL
Filename = AKY819-pure-agag_Proton-1
Author = element
Experiment = proton.jxp
Sample_Id = AKY819-pure-agag
Solvent = ACETONE-D6
Actual_Start_Time = 26-FEB-2019 15:06:20
Revision_Time = 27-FEB-2019 20:56:34
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = Proton
Dim_Title = Proton
Dim_Units = [ppm]
Dimensions = X
Spectrometer = DELTA2_NMR
Field_Strength = 9.4073814[T] (400[MHz])
X_Acq_Duration = 2.18103808[s]
X_Domain = 1H
X_Freq = 400.53219825[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45849727[Hz]
X_Sweep = 7.51201923[kHz]
X_Sweep_Clipped = 6.00961538[kHz]
Irr_Domain = Proton
Irr_Freq = 400.53219825[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = Proton
Tri_Freq = 400.53219825[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 42
Temp_Get = 19.3[dC]
X_90_Width = 6[us]
X_Acq_Time = 2.18103808[s]
X_Angle = 45[deg]
X_Atn = 0.8[dB]
X_Pulse = 3[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.18103808[s]
abundance
X : parts per Million : Proton
H2O
(CH3)2CO
Me
Me
HO
H
F
8h
7.456
7.420
7.336
7.244
7.118
7.095
7.043
7.002
6.306
6.266
6.252
6.214
5.631
5.614
5.593
5.301
5.288
5.260
4.576
4.574
4.564
4.562
2.169
2.145
2.091
1.382
1.248
0.903
0.885
0.867
0.000

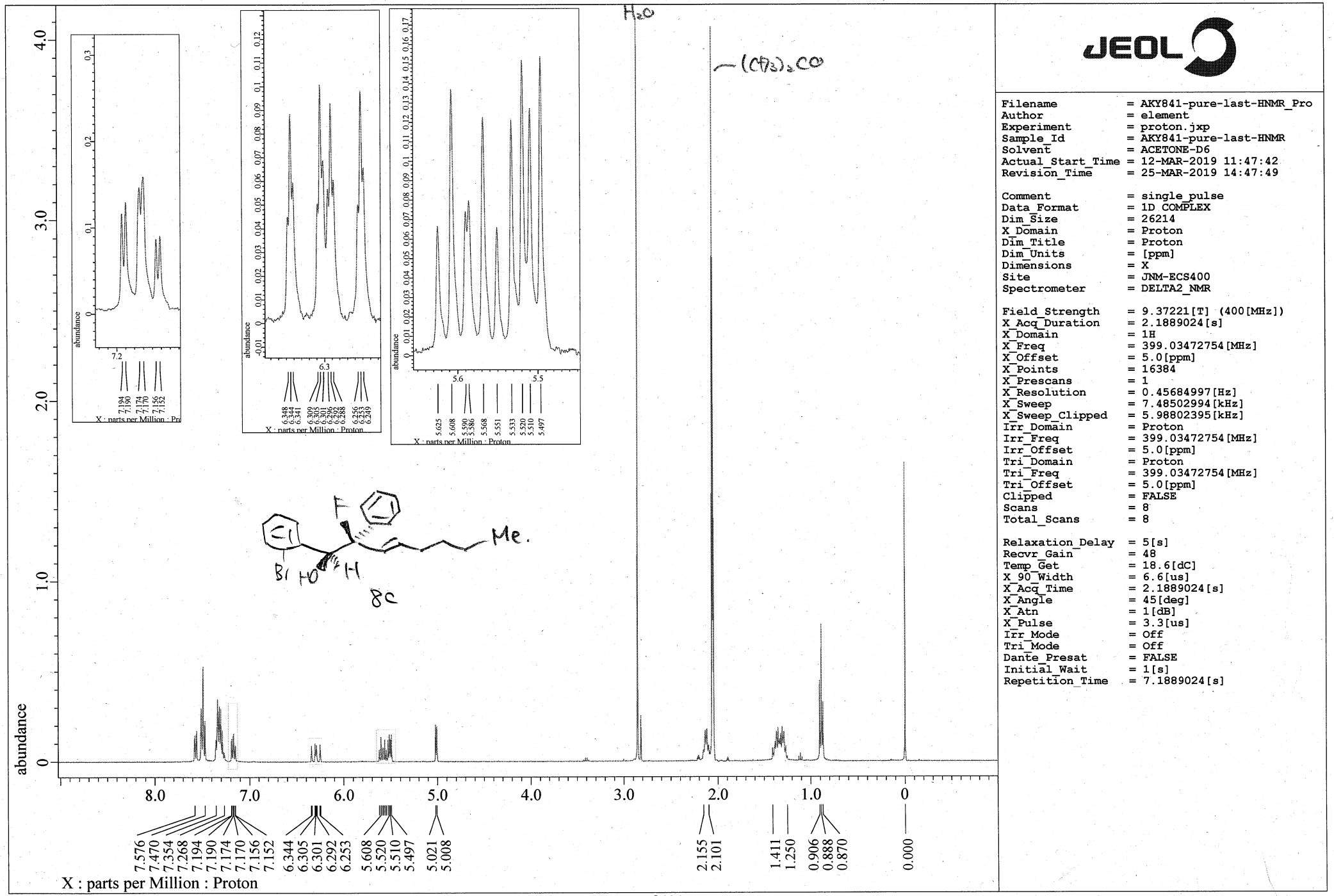


Filename	= AKY819-carbon-again-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#549012
Solvent	= ACETONE-D6
Actual_Start_Time	= 26-FEB-2019 22:37:37
Revision_Time	= 27-FEB-2019 21:05:06
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 1.06430464[s]
X_Domain	= 13C
X_Freq	= 98.51479726[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.93958061[Hz]
X_Sweep	= 30.78817734[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 1024
Total_Scans	= 1024
Relaxation_Delay	= 2[s]
Recvr_Gain	= 60
Temp_Get	= 18.4[dC]
X_90_Width	= 9.11[us]
X_Acq_Time	= 1.06430464[s]
X_Angle	= 30[deg]
X_Atn	= 4.9[dB]
X_Pulse	= 3.03666667[us]
Irr_Atn_Dec	= 22.255[dB]
Irr_Atn_Noe	= 22.255[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.06430464[s]



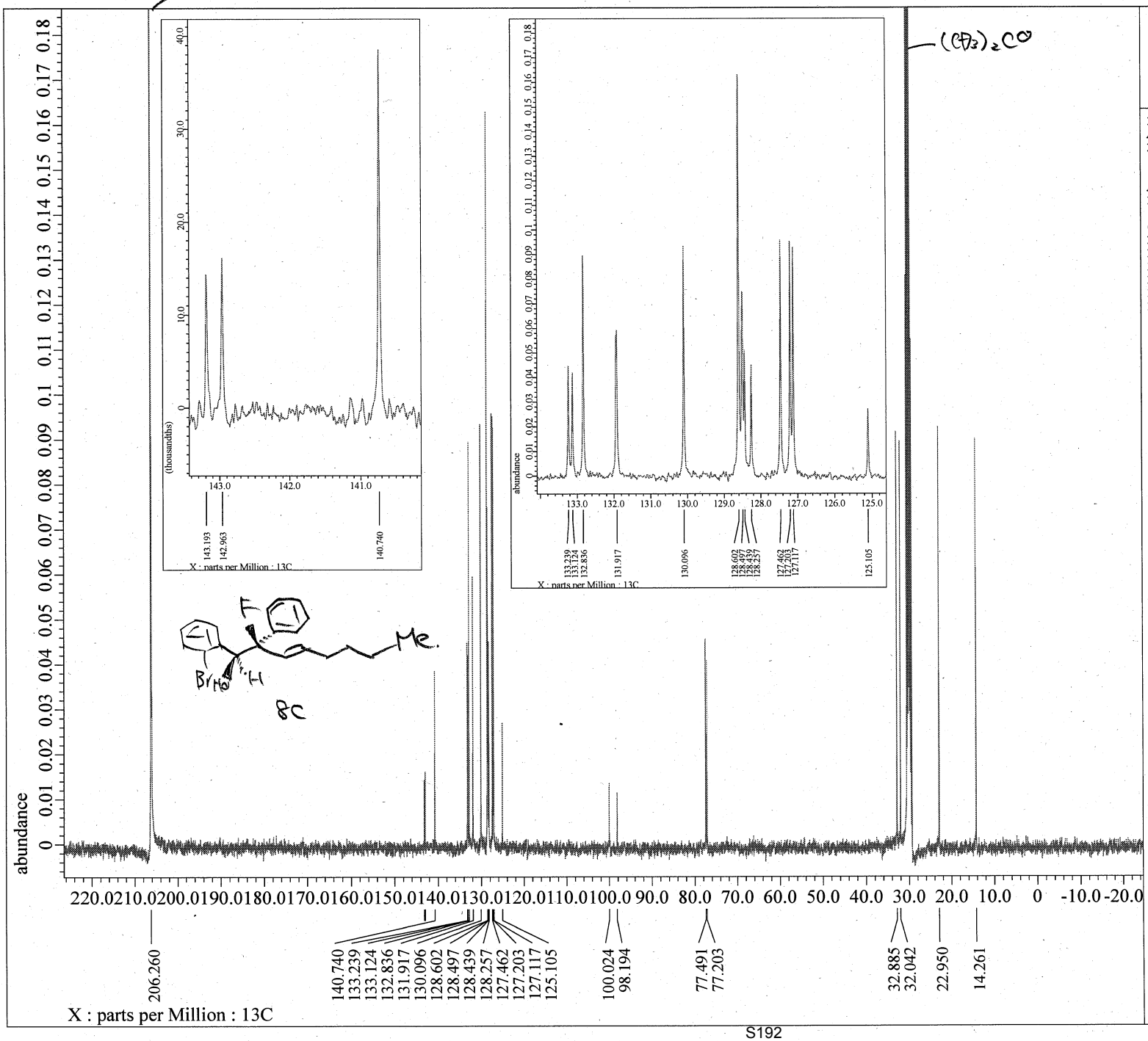
JEOL

Filename	= AKY819-pure-FNMR-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#506103
Solvent	= ACETONE-D6
Actual_Start_Time	= 8-MAR-2019 22:34:07
Revision_Time	= 25-MAR-2019 14:19:46
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.5[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



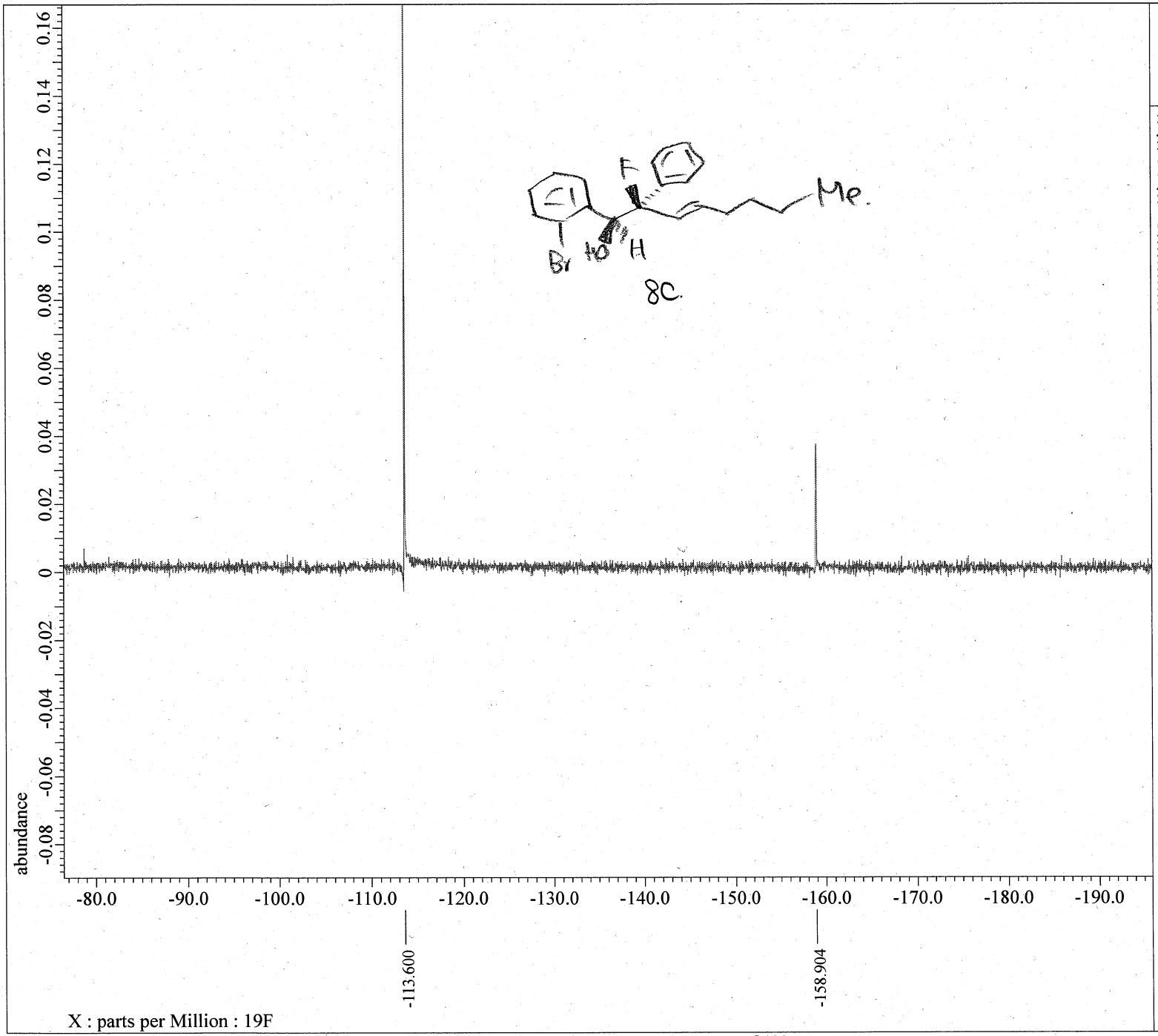
JEOL

Filename	= AKY841-pure-last-HNMR_Pro
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY841-pure-last-HNMR
Solvent	= ACETONE-D6
Actual_Start_Time	= 12-MAR-2019 11:47:42
Revision_Time	= 25-MAR-2019 14:47:49
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Site	= JNM-ECS400
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.37221[T] (400[MHz])
X_Acq_Duration	= 2.1889024[s]
X_Domain	= 1H
X_Freq	= 399.03472754[MHz]
X_Offset	= 5.0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45684997[Hz]
X_Sweep	= 7.48502994[kHz]
X_Sweep_Clipped	= 5.98802395[kHz]
Irr_Domain	= Proton
Irr_Freq	= 399.03472754[MHz]
Irr_Offset	= 5.0[ppm]
Tri_Domain	= Proton
Tri_Freq	= 399.03472754[MHz]
Tri_Offset	= 5.0[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 48
Temp_Get	= 18.6[dC]
X_90_Width	= 6.6[us]
X_Acq_Time	= 2.1889024[s]
X_Angle	= 45[deg]
X_Atn	= 1[dB]
X_Pulse	= 3.3[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.1889024[s]



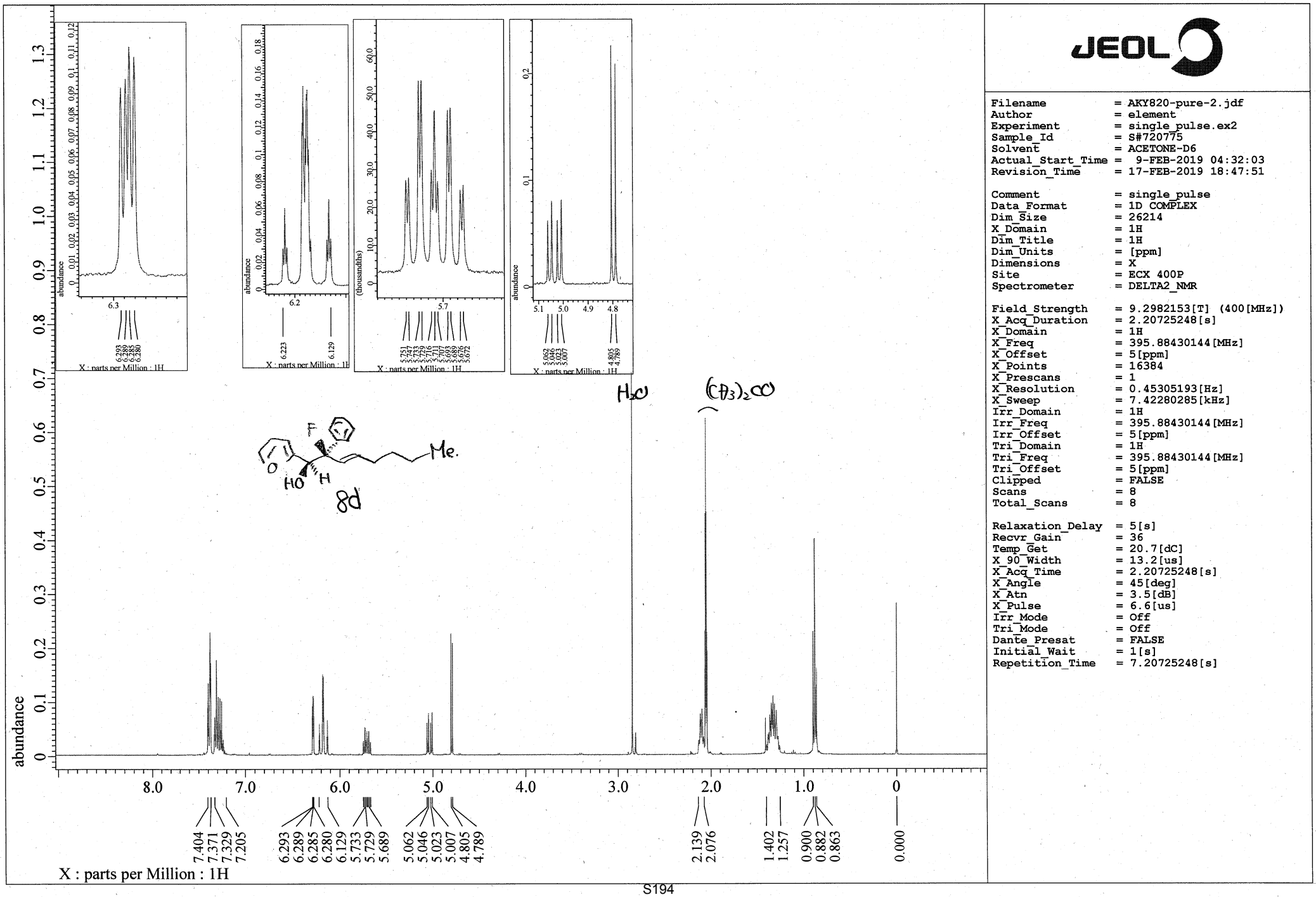
JEOL

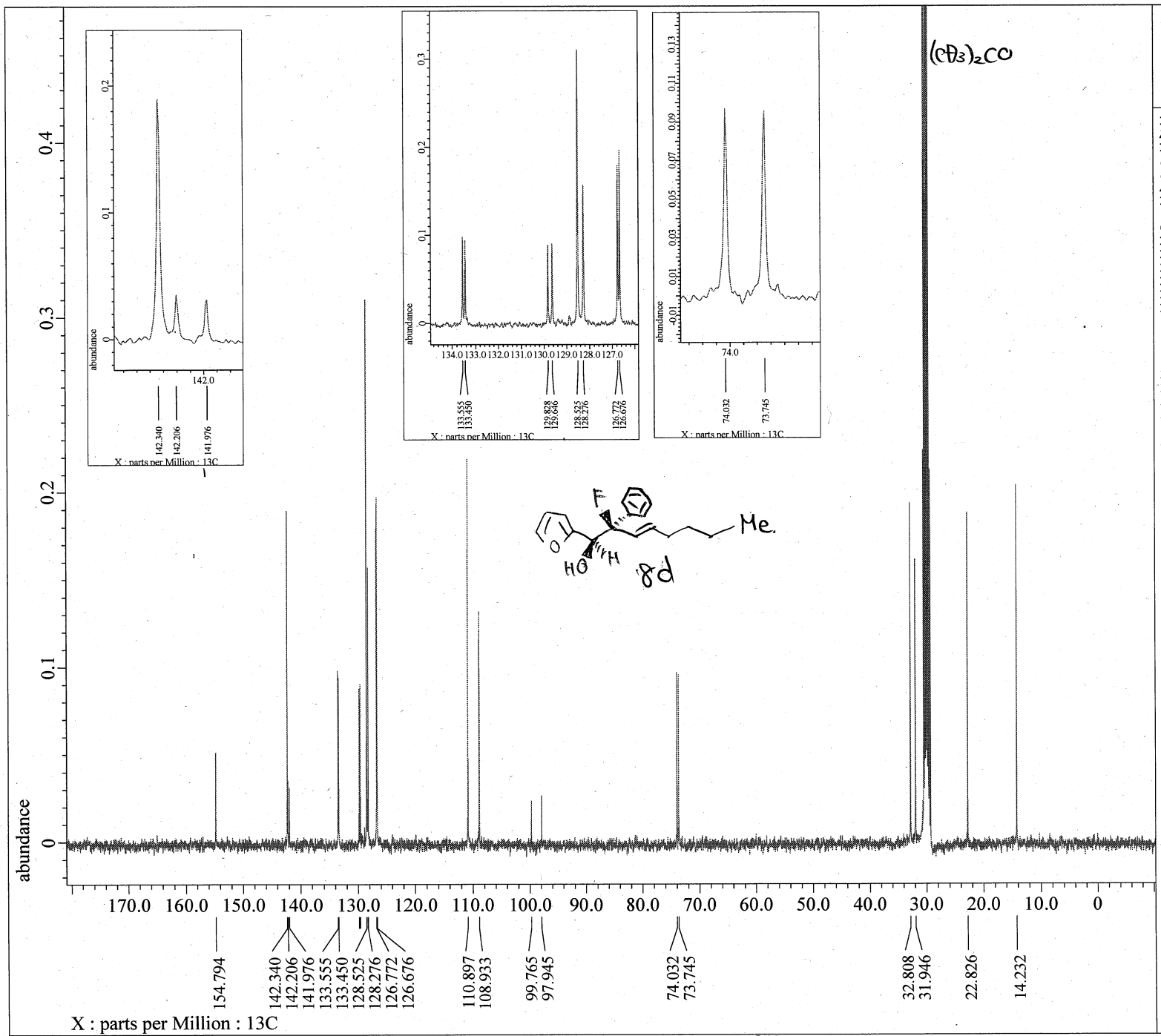
Filename	= AKY841-pure-carbon1024-2.
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#819755
Solvent	= ACETONE-D6
Actual_Start_Time	= 12-MAR-2019 07:15:30
Revision_Time	= 25-MAR-2019 14:49:35
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 1024
Total_Scans	= 1024
Relaxation_Delay	= 2[s]
Recvr_Gain	= 50
Temp_Get	= 20.8[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



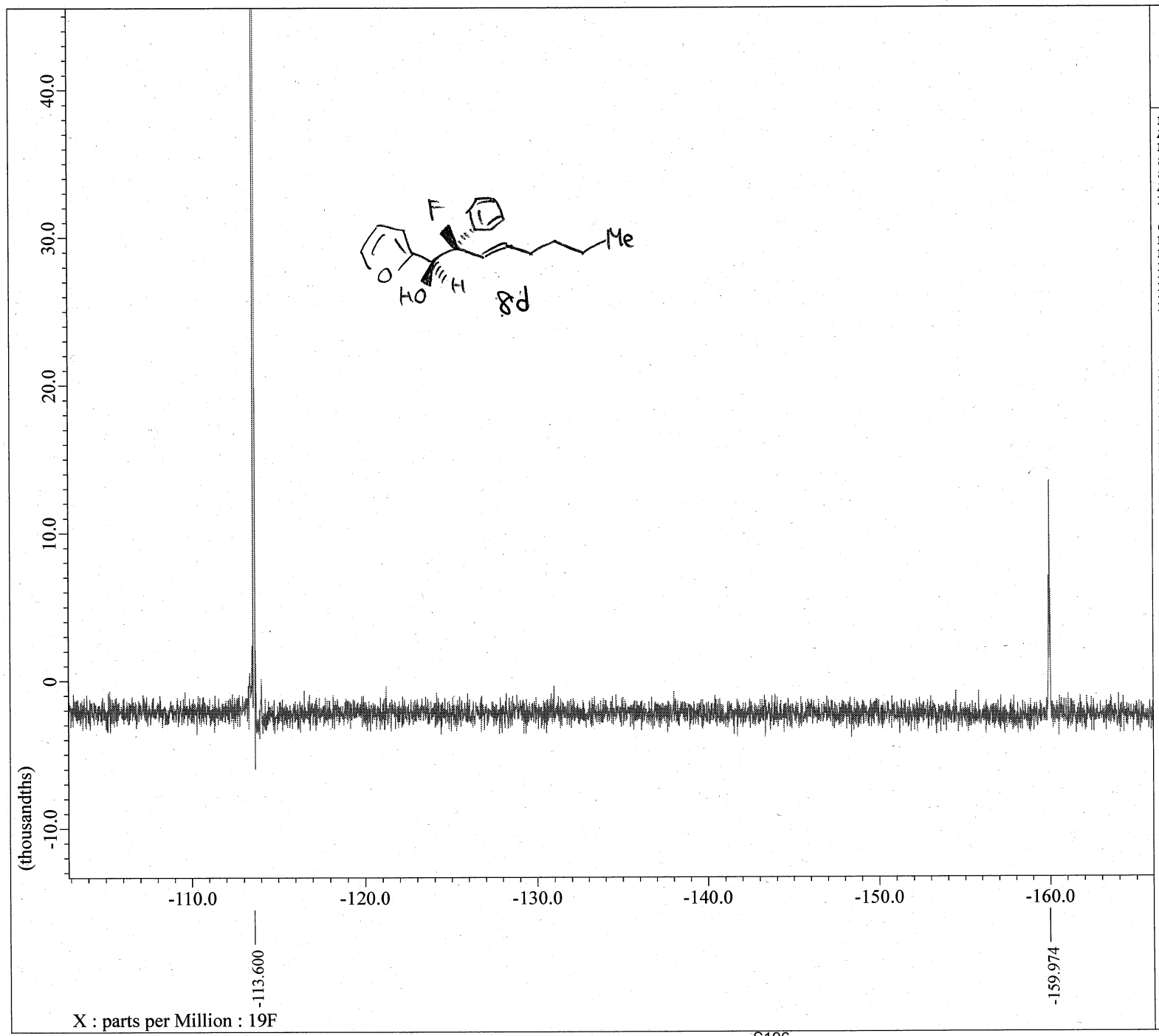
JEOL

Filename	= AKY841-pure-FNMRAGAin-2.j
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#348731
Solvent	= ACETONE-D6
Actual_Start_Time	= 12-MAR-2019 18:11:47
Revision_Time	= 25-MAR-2019 14:51:36
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.9[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]


JEOL
Filename = AKY820-pure-2.jdf
Author = element
Experiment = single_pulse.ex2
Sample_Id = S#720775
Solvent = ACETONE-D6
Actual_Start_Time = 9-FEB-2019 04:32:03
Revision_Time = 17-FEB-2019 18:47:51
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 1H
Dim_Title = 1H
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 2.20725248[s]
X_Domain = 1H
X_Freq = 395.88430144[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45305193[Hz]
X_Sweep = 7.42280285[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = 1H
Tri_Freq = 395.88430144[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 36
Temp_Get = 20.7[dC]
X_90_Width = 13.2[us]
X_Acq_Time = 2.20725248[s]
X_Angle = 45[deg]
X_Atn = 3.5[dB]
X_Pulse = 6.6[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.20725248[s]
H2O
(CH3)2CO
Me
HO
H
8d
abundance
X : parts per Million : 1H
7.404
7.371
7.329
7.205
6.293
6.289
6.285
6.280
6.129
5.733
5.729
5.689
5.062
5.046
5.023
5.007
4.805
4.789
2.139
2.076
1.402
1.257
0.900
0.882
0.863
0.000

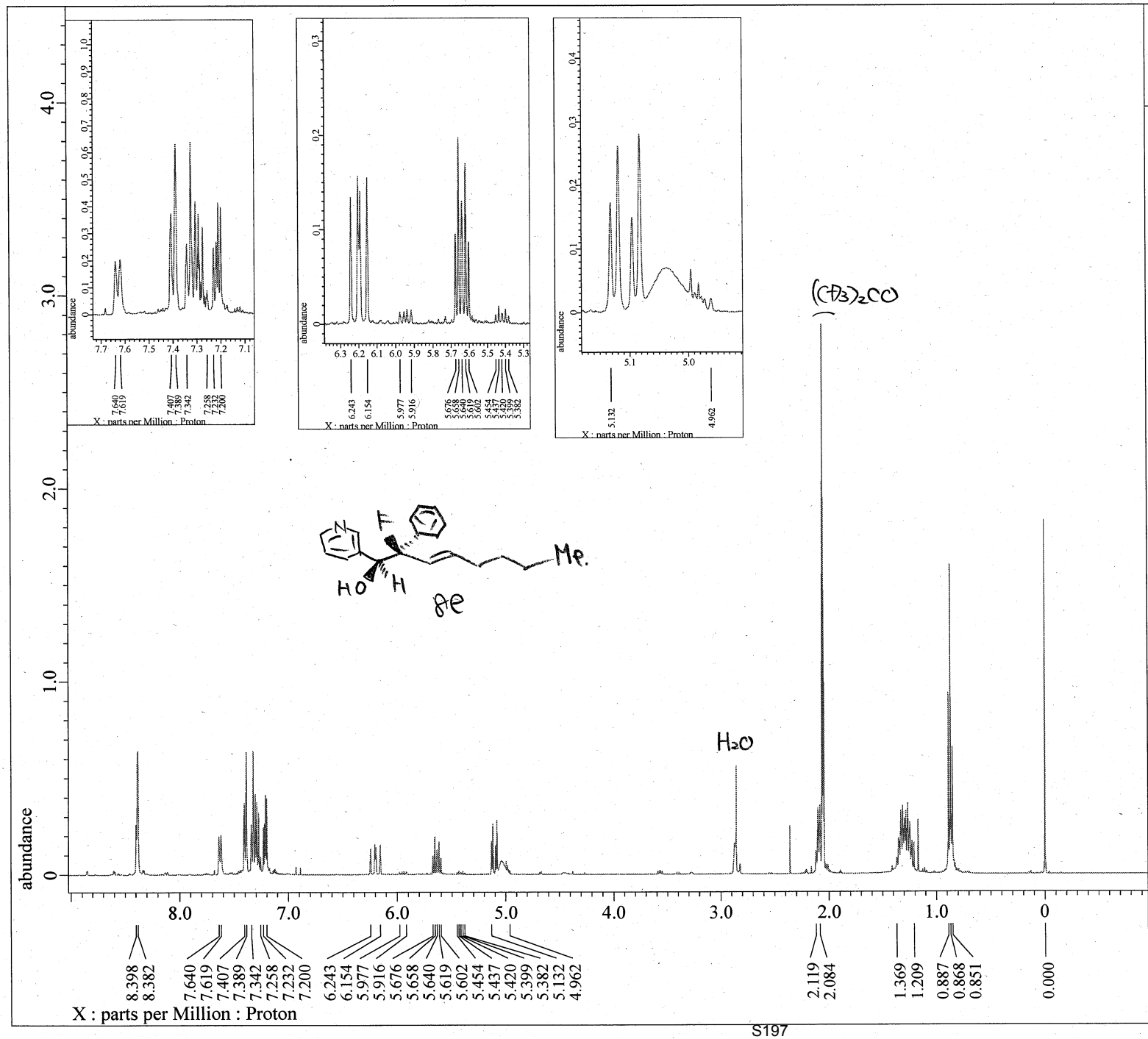


Filename	= AKY820-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#553236
Solvent	= ACETONE-D6
Actual_Start_Time	= 17-FEB-2019 23:52:25
Revision_Time	= 17-FEB-2019 18:51:35
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 512
Total_Scans	= 512
Relaxation_Delay	= 2[s]
Recvr_Gain	= 54
Temp_Get	= 19.3[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



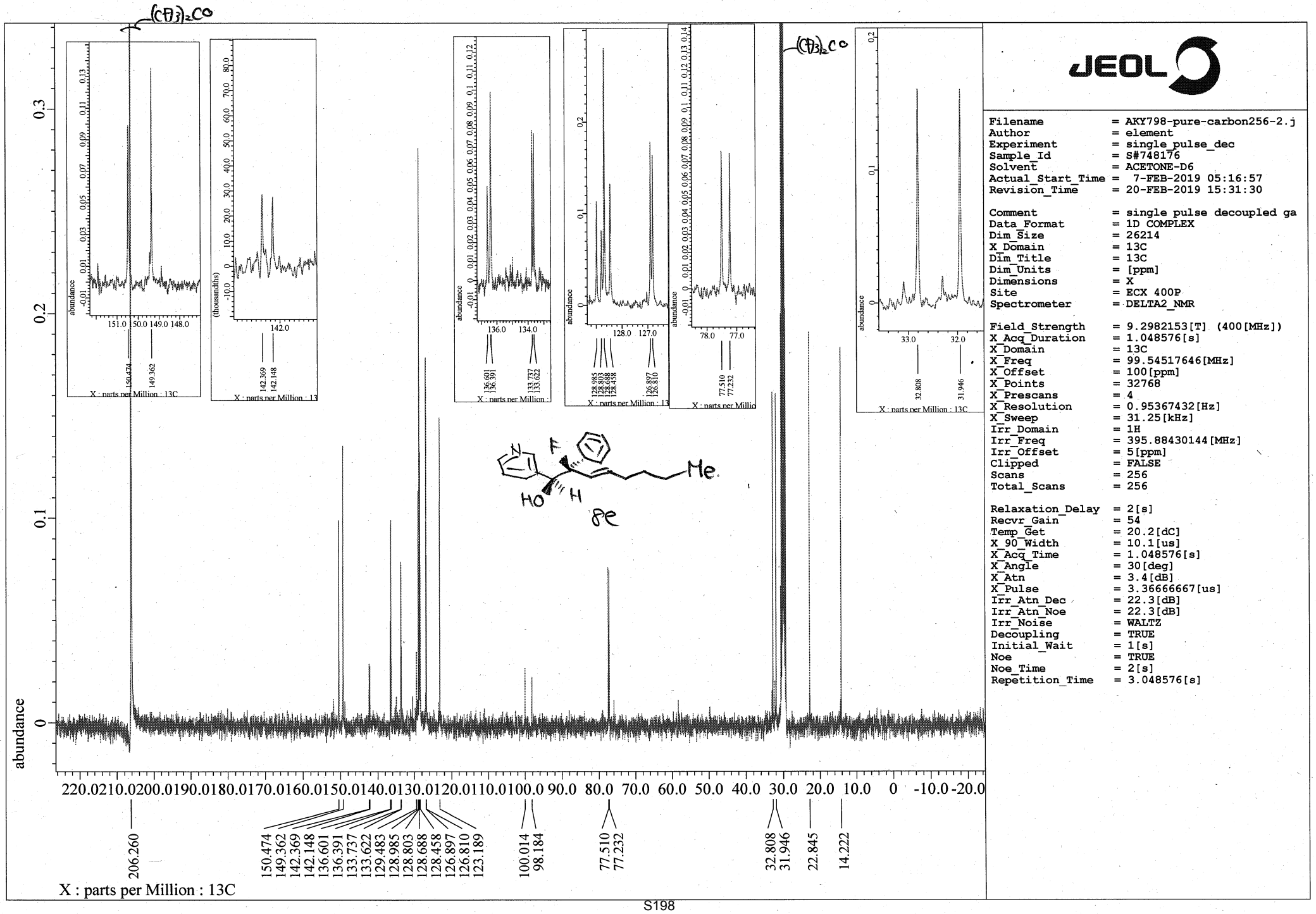
JEOL

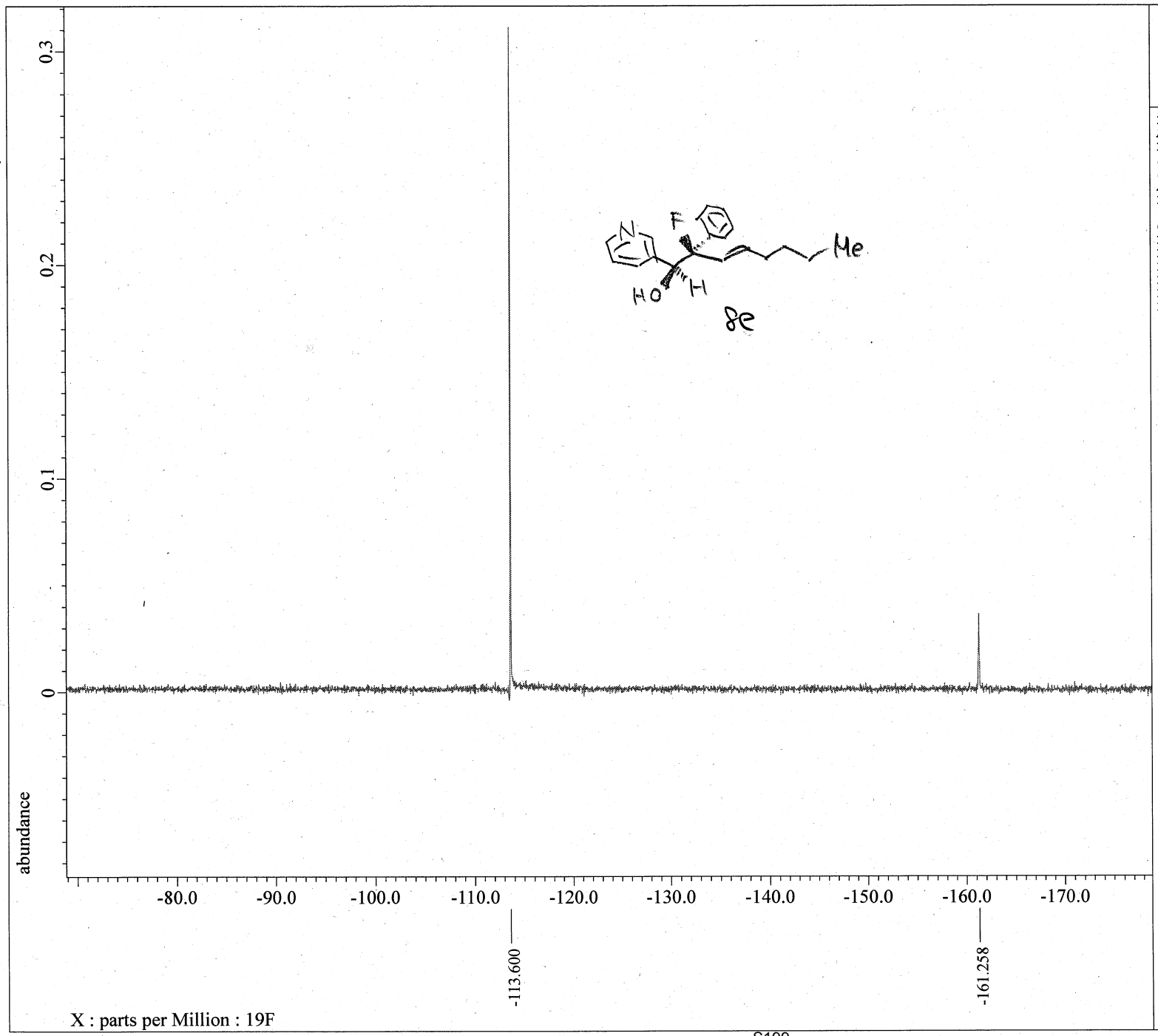
```
Filename            = AKY820-FNMR-32-2.jdf
Author              = element
Experiment          = single_pulse.ex2
Sample_Id           = S#601516
Solvent             = ACETONE-D6
Actual_Start_Time   = 18-FEB-2019 01:12:46
Revision_Time       = 17-FEB-2019 19:06:58

Comment             = single_pulse
Data_Format         = 1D COMPLEX
Dim_Size            = 13107
X_Domain            = 19F
Dim_Title           = 19F
Dim_Units           = [ppm]
Dimensions          = X
Site                = ECX 400P
Spectrometer        = DELTA2_NMR

Field_Strength      = 9.2982153[T] (400[MHz])
X_Acq_Duration      = 0.17563648[s]
X_Domain            = 19F
X_Freq              = 372.50336686[MHz]
X_Offset            = -100[ppm]
X_Points            = 16384
X_Prescans          = 1
X_Resolution        = 5.69357801[Hz]
X_Sweep             = 93.28358209[kHz]
Irr_Domain          = 19F
Irr_Freq            = 372.50336686[MHz]
Irr_Offset          = 5[ppm]
Tri_Domain          = 19F
Tri_Freq            = 372.50336686[MHz]
Tri_Offset          = 5[ppm]
Clipped             = FALSE
Scans               = 32
Total_Scans         = 32

Relaxation_Delay    = 5[s]
Recvr_Gain          = 30
Temp_Get            = 20[dC]
X_90_Width          = 13.9[us]
X_Acq_Time          = 0.17563648[s]
X_Angle             = 45[deg]
X_Atn               = 4[dB]
X_Pulse             = 6.95[us]
Irr_Mode            = Off
Tri_Mode            = Off
Dante_Presat        = FALSE
Initial_Wait        = 1[s]
Repetition_Time     = 5.17563648[s]
```



JEOL

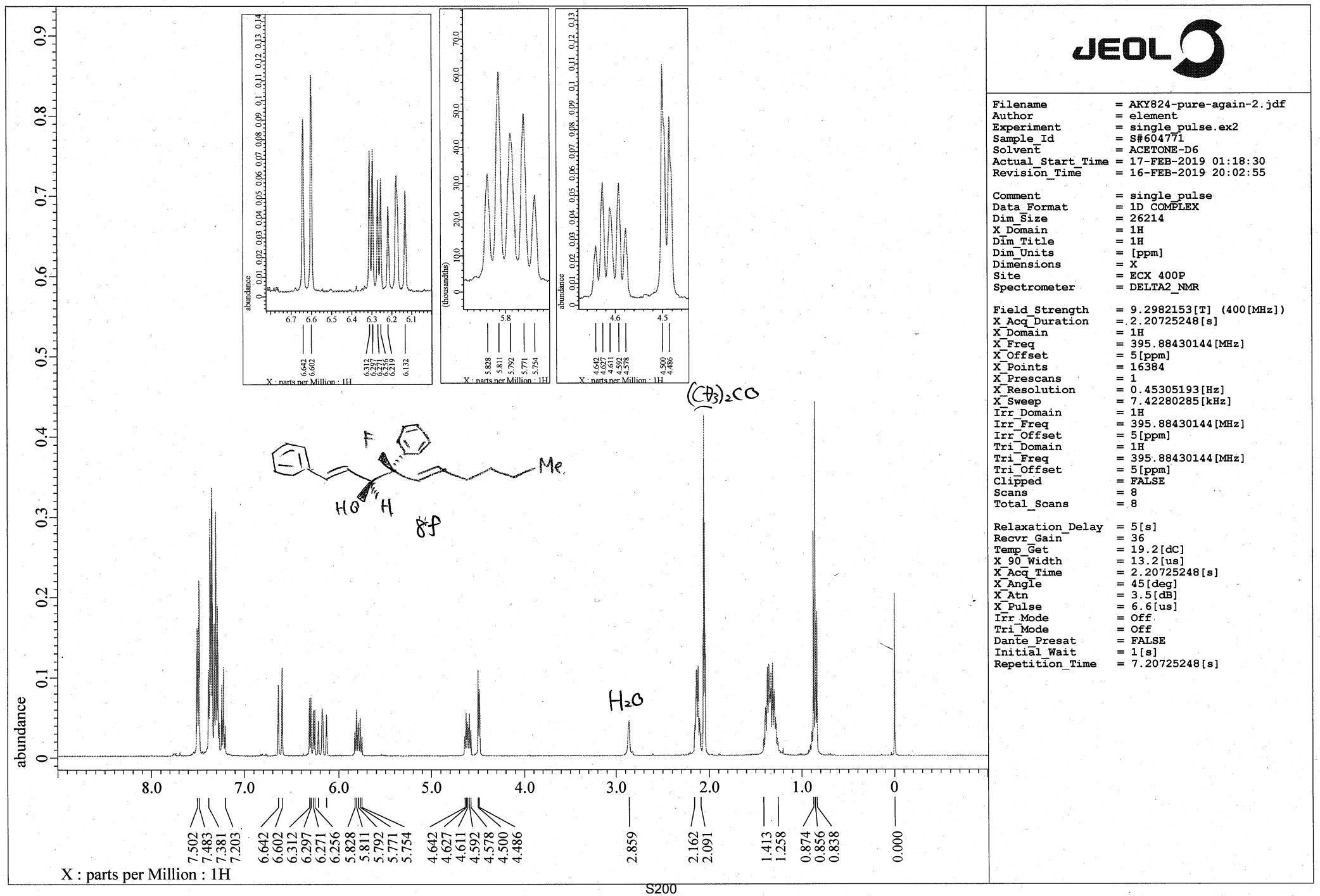
Filename	= AKY798-pure1_Proton-1-2.j
Author	= element
Experiment	= proton.jxp
Sample_Id	= AKY798-pure1
Solvent	= ACETONE-D6
Actual_Start_Time	= 22-JAN-2019 14:38:04
Revision_Time	= 20-FEB-2019 15:24:03
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= Proton
Dim_Title	= Proton
Dim_Units	= [ppm]
Dimensions	= X
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.4073814[T] (400[MHz])
X_Acq_Duration	= 2.18103808[s]
X_Domain	= 1H
X_Freq	= 400.53219825[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45849727[Hz]
X_Sweep	= 7.51201923[kHz]
X_Sweep_Clipped	= 6.00961538[kHz]
Irr_Domain	= Proton
Irr_Freq	= 400.53219825[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= Proton
Tri_Freq	= 400.53219825[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 44
Temp_Get	= 17.6[dC]
X_90_Width	= 6[us]
X_Acq_Time	= 2.18103808[s]
X_Angle	= 45[deg]
X_Atn	= 0.8[dB]
X_Pulse	= 3[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.18103808[s]

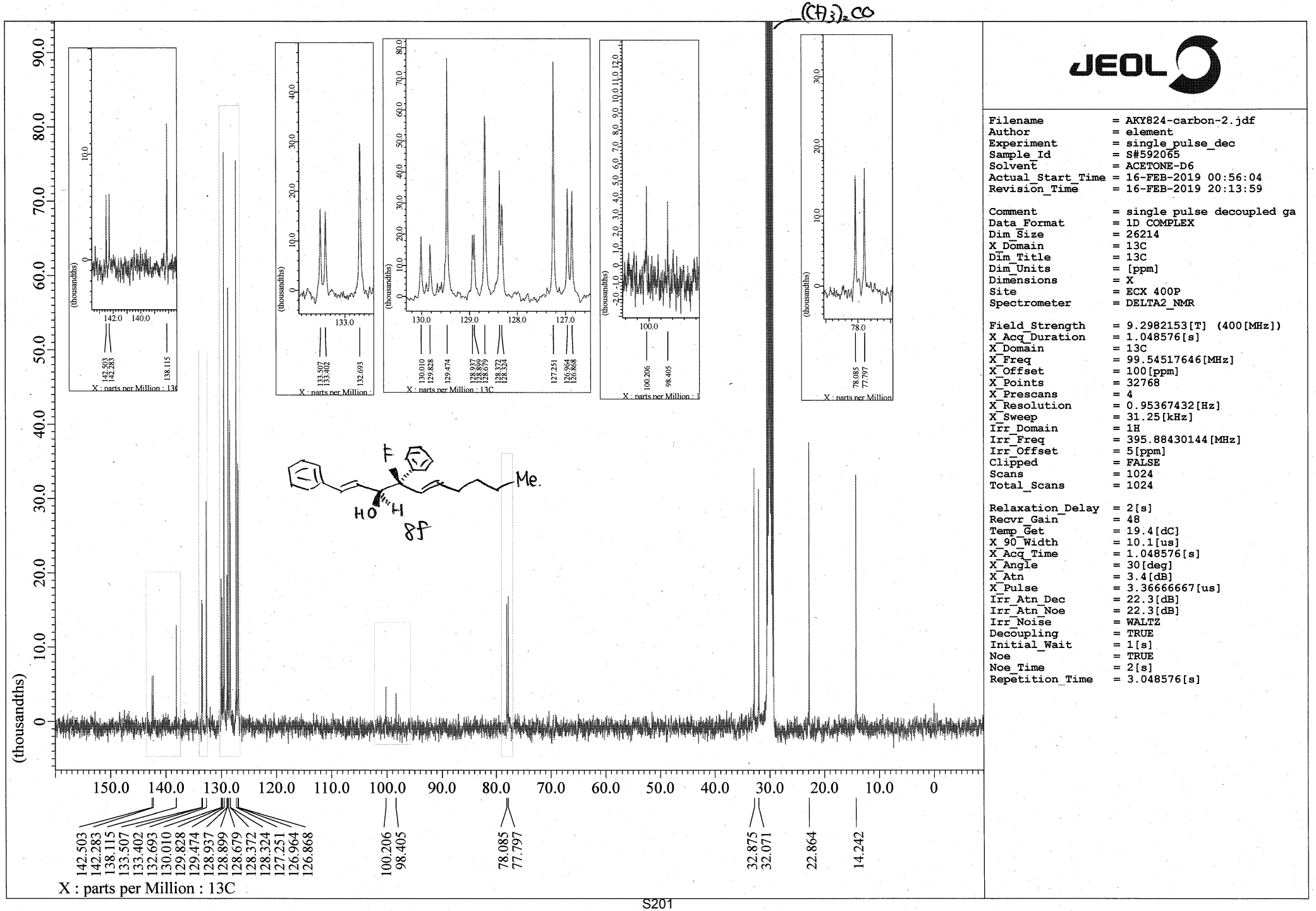

(CD3)2CO
(CD3)2CO
HO
H
F
N
Me
8e
abundance
X : parts per Million : 13C
206.260
150.474
149.362
142.369
142.148
136.601
136.391
133.737
133.622
129.483
128.985
128.803
128.688
128.458
126.897
126.810
123.189
100.014
98.184
77.510
77.232
32.808
31.946
22.845
14.222
Filename = AKY798-pure-carbon256-2.j
Author = element
Experiment = single_pulse_dec
Sample_Id = S#748176
Solvent = ACETONE-D6
Actual_Start_Time = 7-FEB-2019 05:16:57
Revision_Time = 20-FEB-2019 15:31:30
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 1.048576[s]
X_Domain = 13C
X_Freq = 99.54517646[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.95367432[Hz]
X_Sweep = 31.25[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 256
Total_Scans = 256
Relaxation_Delay = 2[s]
Recvr_Gain = 54
Temp_Get = 20.2[dC]
X_90_Width = 10.1[us]
X_Acq_Time = 1.048576[s]
X_Angle = 30[deg]
X_Atn = 3.4[dB]
X_Pulse = 3.36666667[us]
Irr_Atn_Dec = 22.3[dB]
Irr_Atn_Noe = 22.3[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.048576[s]



JEOL

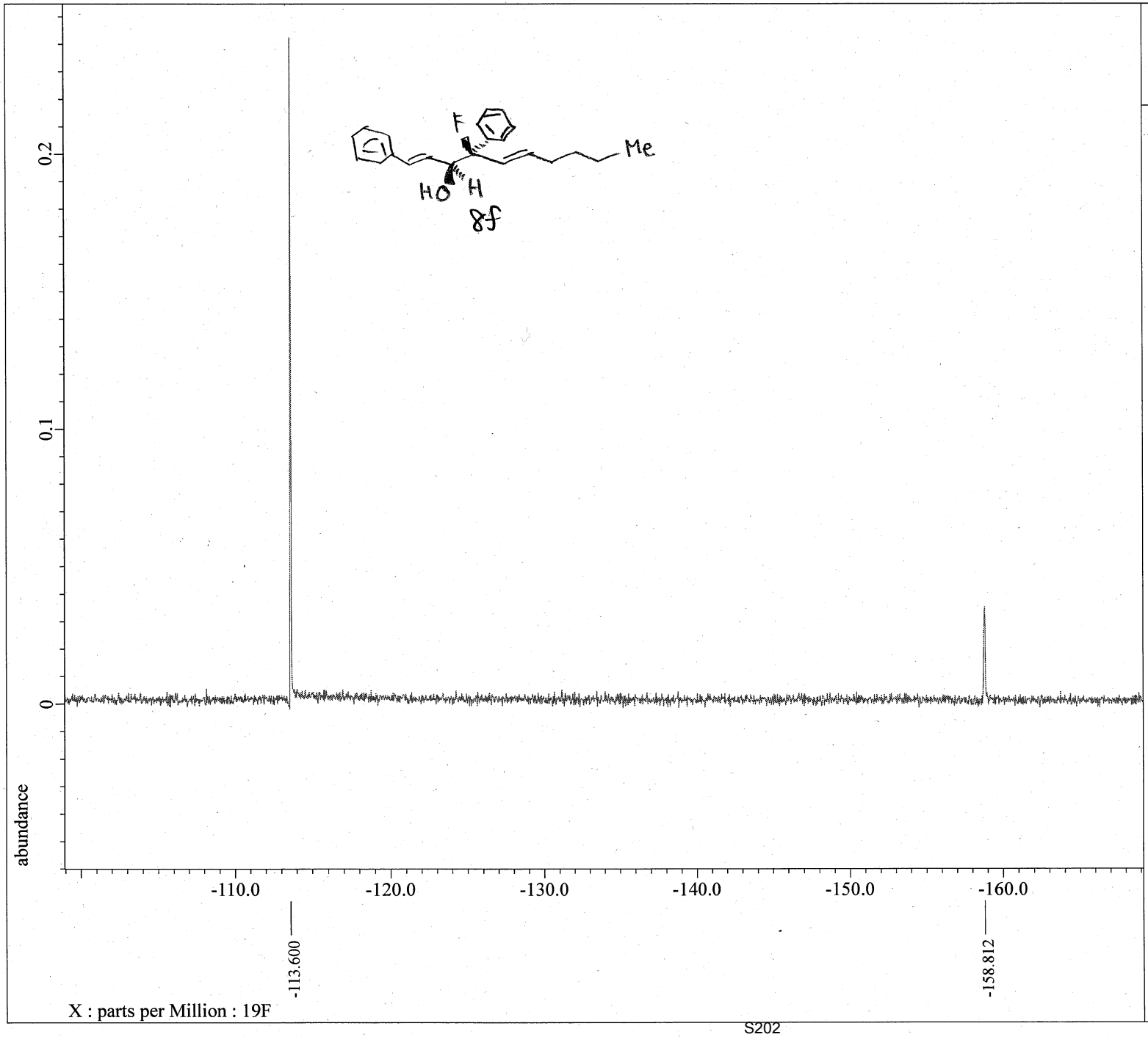
Filename	= AKY798-pure-FNMR-3.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#782013
Solvent	= ACETONE-D6
Actual_Start_Time	= 7-FEB-2019 06:13:54
Revision_Time	= 20-FEB-2019 15:52:25
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 20.9[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]


JEOL
Filename = AKY824-pure-again-2.jdf
Author = element
Experiment = single_pulse.ex2
Sample_Id = S#604771
Solvent = ACETONE-D6
Actual_Start_Time = 17-FEB-2019 01:18:30
Revision_Time = 16-FEB-2019 20:02:55
Comment = single_pulse
Data_Format = 1D COMPLEX
Dim_Size = 26214
X_Domain = 1H
Dim_Title = 1H
Dim_Units = [ppm]
Dimensions = X
Site = ECX 400P
Spectrometer = DELTA2_NMR
Field_Strength = 9.2982153[T] (400[MHz])
X_Acq_Duration = 2.20725248[s]
X_Domain = 1H
X_Freq = 395.88430144[MHz]
X_Offset = 5[ppm]
X_Points = 16384
X_Prescans = 1
X_Resolution = 0.45305193[Hz]
X_Sweep = 7.42280285[kHz]
Irr_Domain = 1H
Irr_Freq = 395.88430144[MHz]
Irr_Offset = 5[ppm]
Tri_Domain = 1H
Tri_Freq = 395.88430144[MHz]
Tri_Offset = 5[ppm]
Clipped = FALSE
Scans = 8
Total_Scans = 8
Relaxation_Delay = 5[s]
Recvr_Gain = 36
Temp_Get = 19.2[dC]
X_90_Width = 13.2[us]
X_Acq_Time = 2.20725248[s]
X_Angle = 45[deg]
X_Atn = 3.5[dB]
X_Pulse = 6.6[us]
Irr_Mode = Off
Tri_Mode = Off
Dante_Presat = FALSE
Initial_Wait = 1[s]
Repetition_Time = 7.20725248[s]
abundance
X : parts per Million : 1H
(CH3)2CO
H2O
Me
HO
H
F
7.502
7.483
7.381
7.203
6.642
6.602
6.312
6.297
6.271
6.256
5.828
5.811
5.792
5.771
5.754
4.642
4.627
4.611
4.592
4.578
4.500
4.486
2.859
2.162
2.091
1.413
1.258
0.874
0.856
0.838
0.000



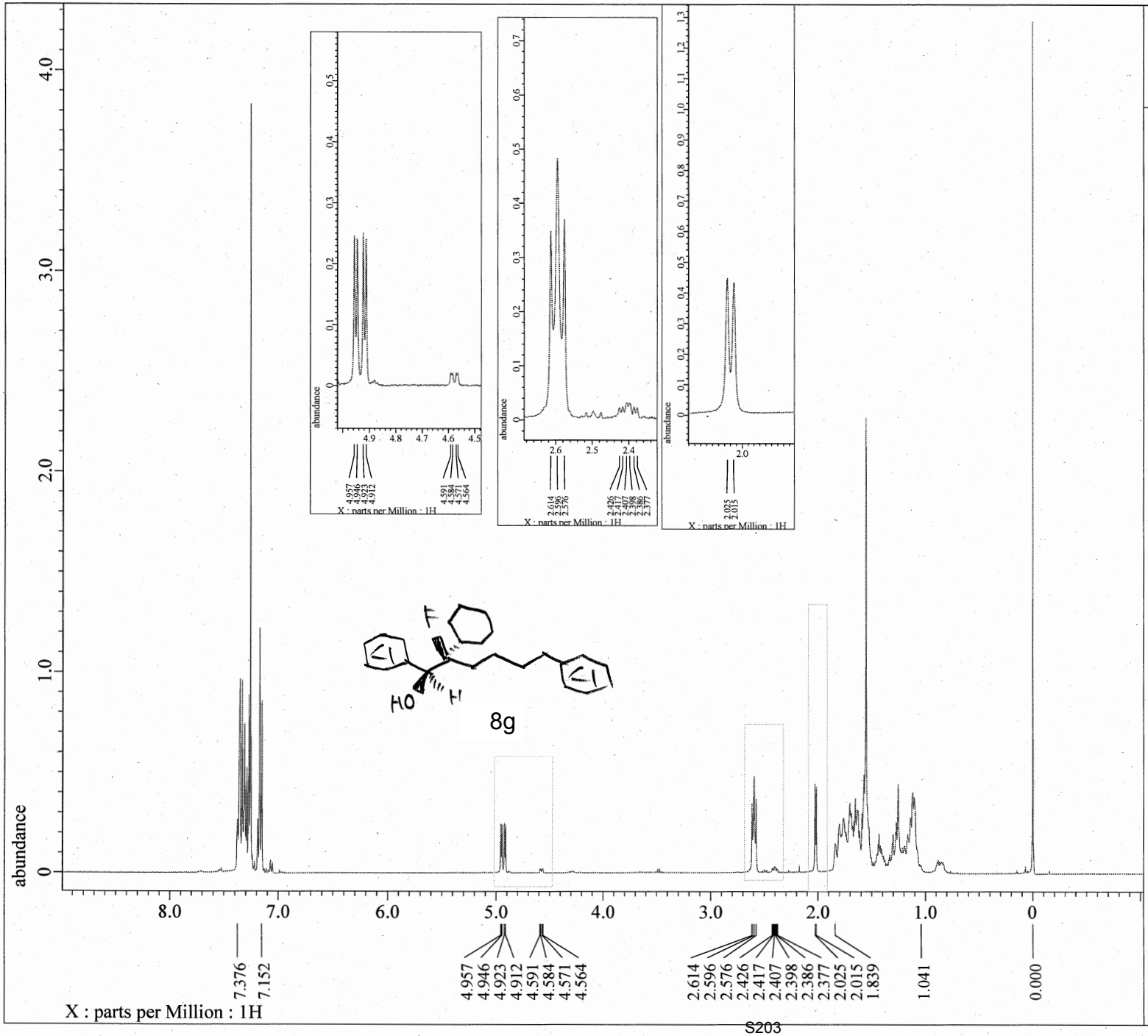
JEOL

Filename	= AKY824-carbon-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#592065
Solvent	= ACETONE-D6
Actual_Start_Time	= 16-FEB-2019 00:56:04
Revision_Time	= 16-FEB-2019 20:13:59
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 1024
Total_Scans	= 1024
Relaxation_Delay	= 2[s]
Recvr_Gain	= 48
Temp_Get	= 19.4[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



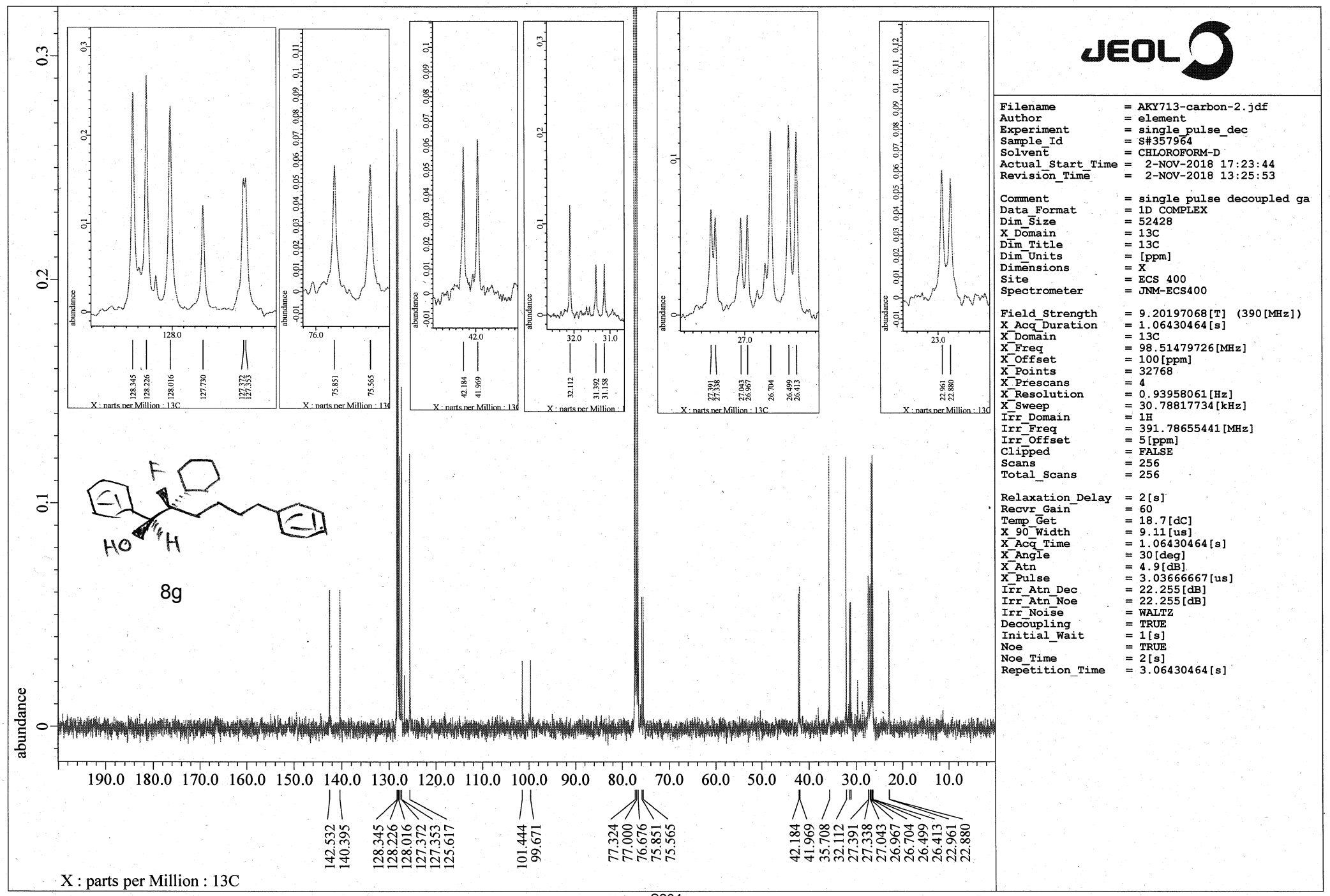
JEOL

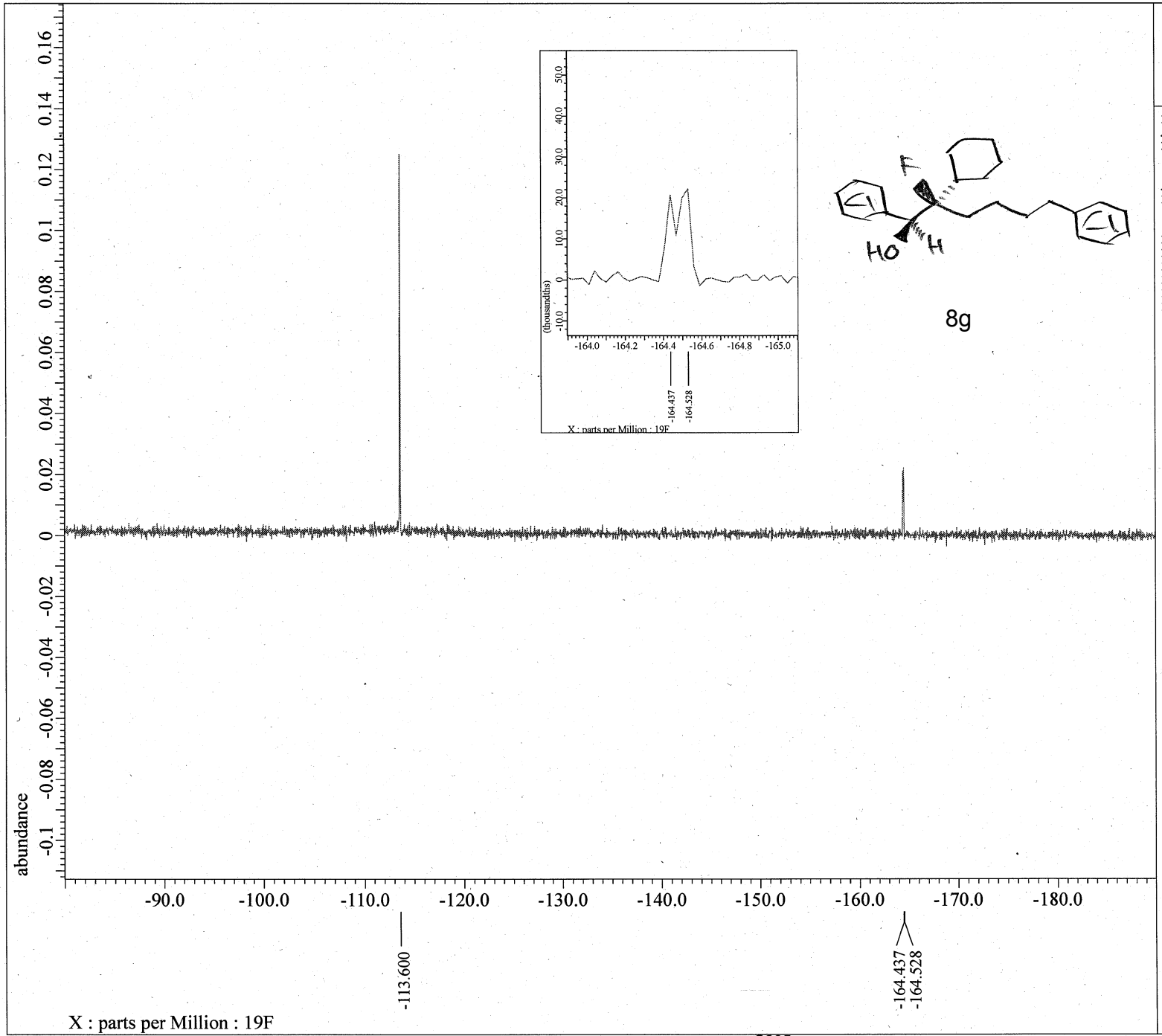
```
Filename            = AKY824-pure-fnmr-again-2.
Author              = element
Experiment          = single_pulse.ex2
Sample_Id           = S#629184
Solvent             = ACETONE-D6
Actual_Start_Time   = 17-FEB-2019 01:59:10
Revision_Time       = 16-FEB-2019 20:38:45

Comment             = single_pulse
Data_Format         = 1D COMPLEX
Dim_Size            = 13107
X_Domain            = 19F
Dim_Title           = 19F
Dim_Units           = [ppm]
Dimensions          = X
Site                = ECX 400P
Spectrometer        = DELTA2_NMR

Field_Strength      = 9.2982153[T] (400[MHz])
X_Acq_Duration      = 87.81824[ms]
X_Domain            = 19F
X_Freq              = 372.50336686[MHz]
X_Offset            = 0[ppm]
X_Points            = 16384
X_Prescans          = 1
X_Resolution        = 11.38715602[Hz]
X_Sweep             = 186.56716418[kHz]
Irr_Domain          = 19F
Irr_Freq            = 372.50336686[MHz]
Irr_Offset          = 5[ppm]
Tri_Domain          = 19F
Tri_Freq            = 372.50336686[MHz]
Tri_Offset          = 5[ppm]
Clipped             = FALSE
Scans               = 8
Total_Scans         = 8

Relaxation_Delay    = 5[s]
Recvr_Gain          = 26
Temp_Get            = 19.2[dC]
X_90_Width          = 13.9[us]
X_Acq_Time          = 87.81824[ms]
X_Angle             = 45[deg]
X_Atn               = 4[dB]
X_Pulse             = 6.95[us]
Irr_Mode            = Off
Tri_Mode            = Off
Dante_Presat        = FALSE
Initial_Wait        = 1[s]
Repetition_Time     = 5.08781824[s]
```



JEOL

Filename	= AKY713-pure-1 2-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#378499
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 2-NOV-2018 17:59:05
Revision_Time	= 25-MAR-2019 19:27:14
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECS 400
Spectrometer	= JNM-ECS400
Field_Strength	= 9.20197068[T] (390[MHz])
X_Acq_Duration	= 2.228224[s]
X_Domain	= 1H
X_Freq	= 391.78655441[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.44878791[Hz]
X_Sweep	= 7.35294118[kHz]
Irr_Domain	= 1H
Irr_Freq	= 391.78655441[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 391.78655441[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 32
Total_Scans	= 32
Relaxation_Delay	= 5[s]
Recvr_Gain	= 46
Temp_Get	= 19.4[dC]
X_90_Width	= 11.04[us]
X_Acq_Time	= 2.228224[s]
X_Angle	= 45[deg]
X_Atn	= 1.9[dB]
X_Pulse	= 5.52[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.228224[s]

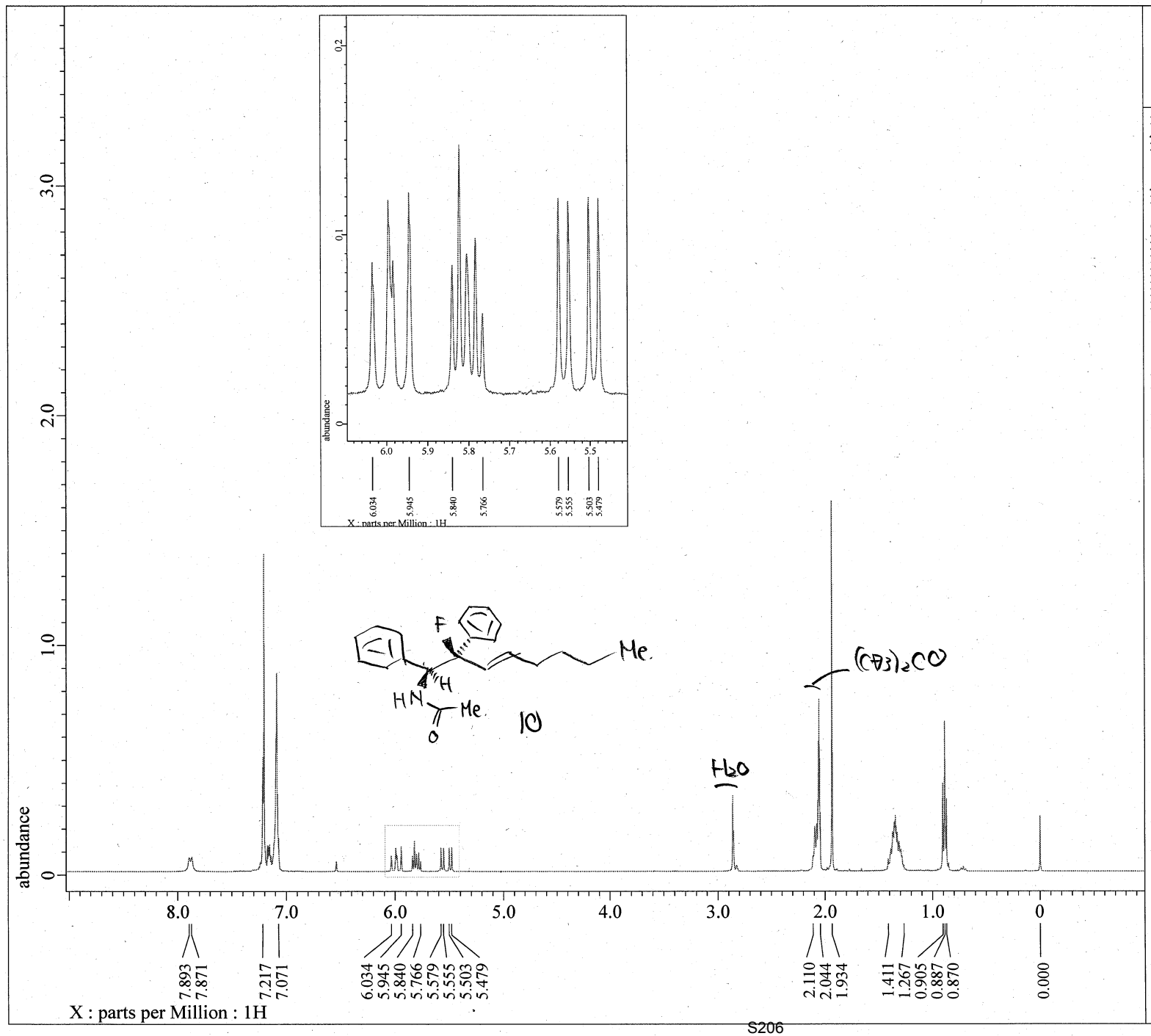

JEOL
Filename = AKY713-carbon-2.jdf
Author = element
Experiment = single_pulse_dec
Sample_Id = S#357964
Solvent = CHLOROFORM-D
Actual_Start_Time = 2-NOV-2018 17:23:44
Revision_Time = 2-NOV-2018 13:25:53
Comment = single pulse decoupled ga
Data_Format = 1D COMPLEX
Dim_Size = 52428
X_Domain = 13C
Dim_Title = 13C
Dim_Units = [ppm]
Dimensions = X
Site = ECS 400
Spectrometer = JNM-ECS400
Field_Strength = 9.20197068[T] (390[MHz])
X_Acq_Duration = 1.06430464[s]
X_Domain = 13C
X_Freq = 98.51479726[MHz]
X_Offset = 100[ppm]
X_Points = 32768
X_Prescans = 4
X_Resolution = 0.93958061[Hz]
X_Sweep = 30.78817734[kHz]
Irr_Domain = 1H
Irr_Freq = 391.78655441[MHz]
Irr_Offset = 5[ppm]
Clipped = FALSE
Scans = 256
Total_Scans = 256
Relaxation_Delay = 2[s]
Recvr_Gain = 60
Temp_Get = 18.7[dC]
X_90_Width = 9.11[us]
X_Acq_Time = 1.06430464[s]
X_Angle = 30[deg]
X_Atn = 4.9[dB]
X_Pulse = 3.03666667[us]
Irr_Atn_Dec = 22.255[dB]
Irr_Atn_Noe = 22.255[dB]
Irr_Noise = WALTZ
Decoupling = TRUE
Initial_Wait = 1[s]
Noe = TRUE
Noe_Time = 2[s]
Repetition_Time = 3.06430464[s]
8g
abundance
X : parts per Million : 13C
142.532
140.395
128.345
128.226
128.016
127.372
127.353
125.617
101.444
99.671
77.324
77.000
76.676
75.851
75.565
42.184
41.969
35.708
32.112
27.391
27.338
27.043
26.967
26.704
26.499
26.413
22.961
22.880



8g

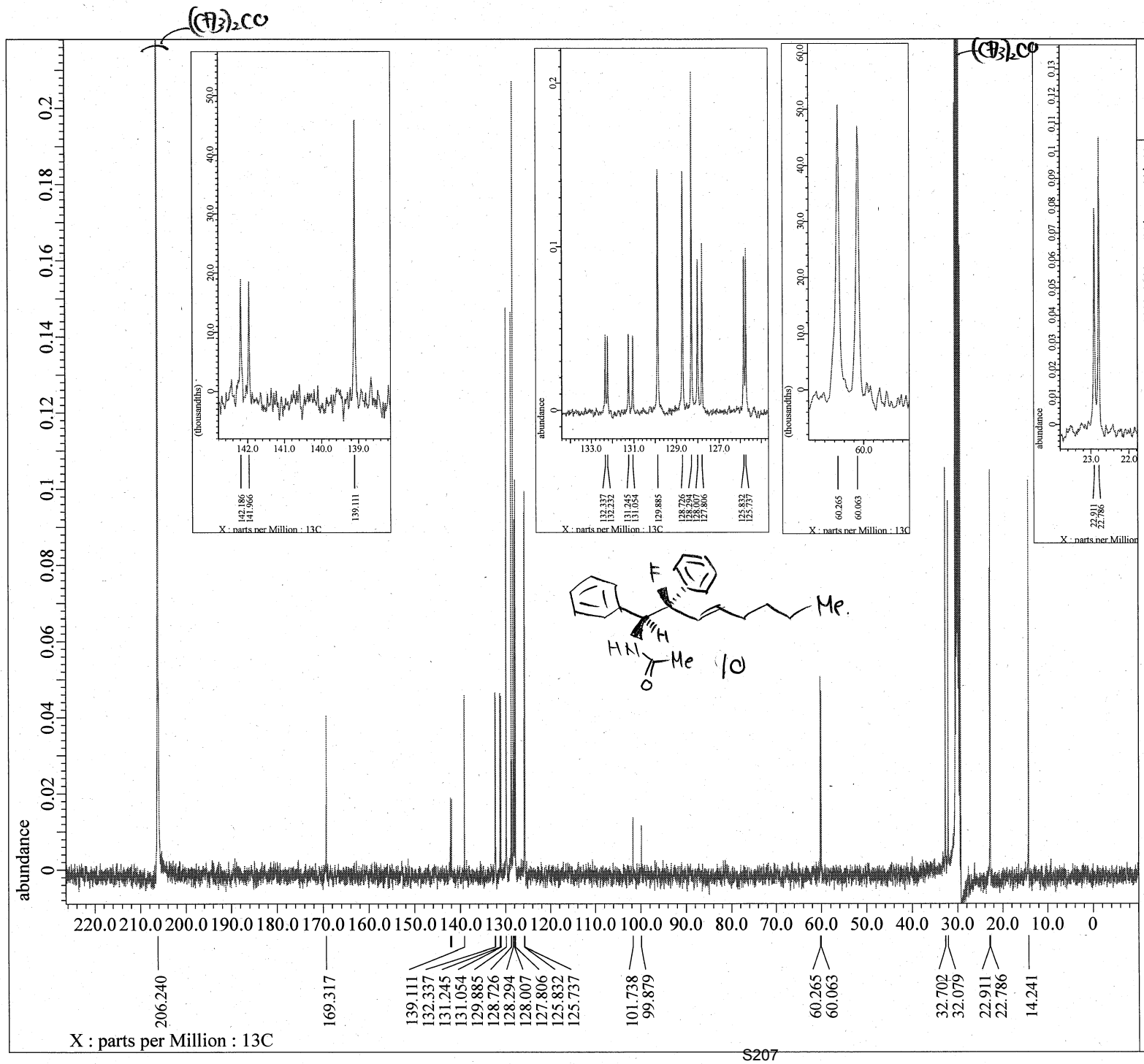
JEOL

Filename	= AKY713-pure-fnmr-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#397178
Solvent	= CHLOROFORM-D
Actual_Start_Time	= 2-NOV-2018 19:31:40
Revision_Time	= 2-NOV-2018 13:15:29
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 21.5[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]



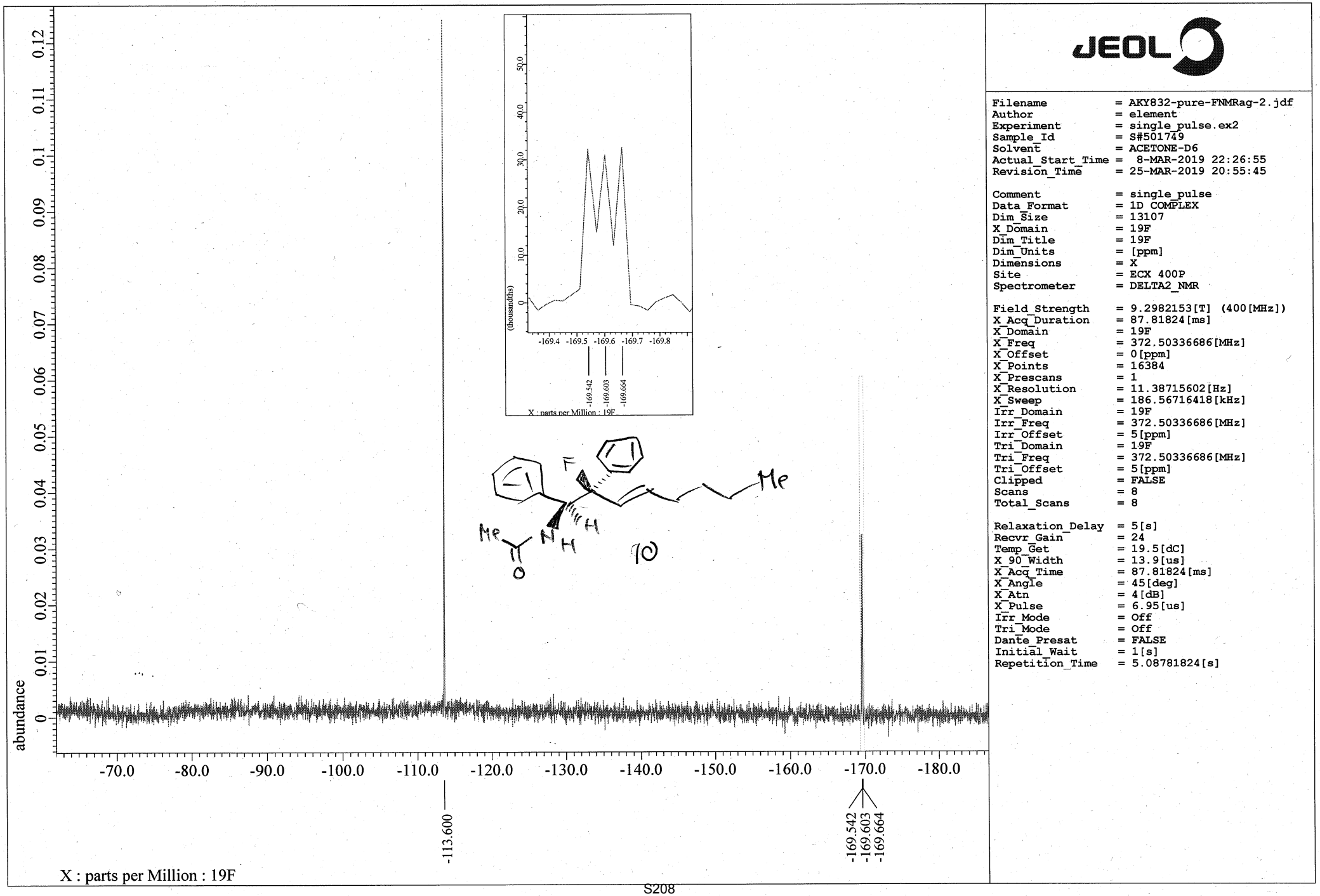
JEOL

Filename	= AKY832-pure-again-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#583695
Solvent	= ACETONE-D6
Actual_Start_Time	= 2-MAR-2019 00:43:40
Revision_Time	= 4-MAR-2019 16:28:22
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 1H
Dim_Title	= 1H
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 2.20725248[s]
X_Domain	= 1H
X_Freq	= 395.88430144[MHz]
X_Offset	= 5[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 0.45305193[Hz]
X_Sweep	= 7.42280285[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 1H
Tri_Freq	= 395.88430144[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 36
Temp_Get	= 20[dC]
X_90_Width	= 13.2[us]
X_Acq_Time	= 2.20725248[s]
X_Angle	= 45[deg]
X_Atn	= 3.5[dB]
X_Pulse	= 6.6[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 7.20725248[s]



JEOL

Filename	= AKY832-carbom1024-2.jdf
Author	= element
Experiment	= single_pulse_dec
Sample_Id	= S#610014
Solvent	= ACETONE-D6
Actual_Start_Time	= 2-MAR-2019 01:26:46
Revision_Time	= 4-MAR-2019 16:52:28
Comment	= single pulse decoupled ga
Data_Format	= 1D COMPLEX
Dim_Size	= 26214
X_Domain	= 13C
Dim_Title	= 13C
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 1.048576[s]
X_Domain	= 13C
X_Freq	= 99.54517646[MHz]
X_Offset	= 100[ppm]
X_Points	= 32768
X_Prescans	= 4
X_Resolution	= 0.95367432[Hz]
X_Sweep	= 31.25[kHz]
Irr_Domain	= 1H
Irr_Freq	= 395.88430144[MHz]
Irr_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 1024
Total_Scans	= 1024
Relaxation_Delay	= 2[s]
Recvr_Gain	= 54
Temp_Get	= 20.4[dC]
X_90_Width	= 10.1[us]
X_Acq_Time	= 1.048576[s]
X_Angle	= 30[deg]
X_Atn	= 3.4[dB]
X_Pulse	= 3.36666667[us]
Irr_Atn_Dec	= 22.3[dB]
Irr_Atn_Noe	= 22.3[dB]
Irr_Noise	= WALTZ
Decoupling	= TRUE
Initial_Wait	= 1[s]
Noe	= TRUE
Noe_Time	= 2[s]
Repetition_Time	= 3.048576[s]



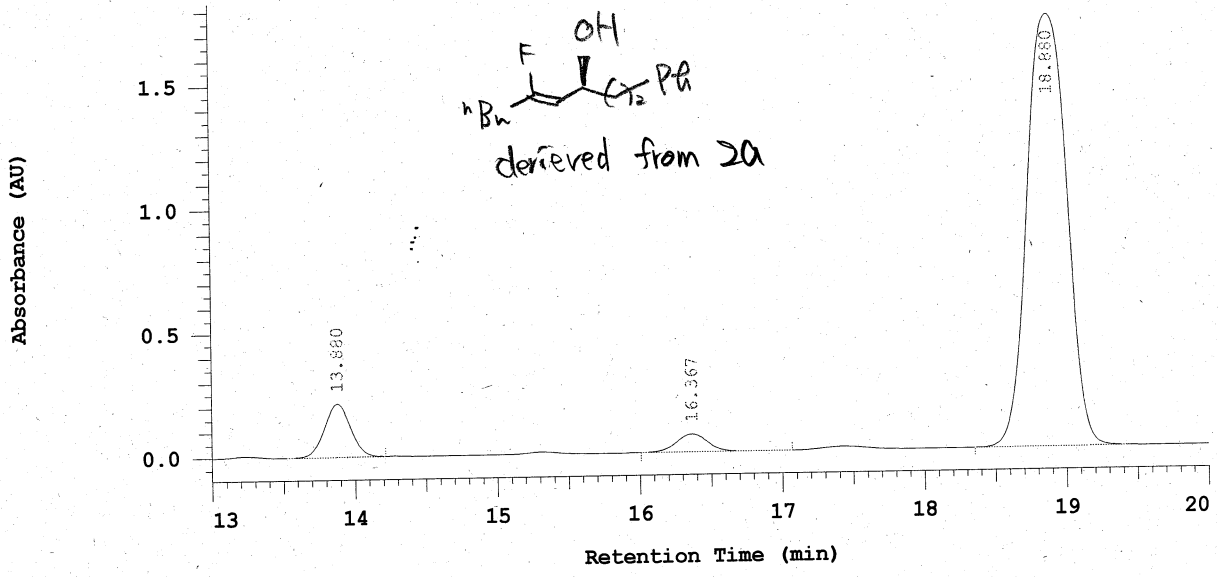
JEOL

Filename	= AKY832-pure-FNMRag-2.jdf
Author	= element
Experiment	= single_pulse.ex2
Sample_Id	= S#501749
Solvent	= ACETONE-D6
Actual_Start_Time	= 8-MAR-2019 22:26:55
Revision_Time	= 25-MAR-2019 20:55:45
Comment	= single_pulse
Data_Format	= 1D COMPLEX
Dim_Size	= 13107
X_Domain	= 19F
Dim_Title	= 19F
Dim_Units	= [ppm]
Dimensions	= X
Site	= ECX 400P
Spectrometer	= DELTA2_NMR
Field_Strength	= 9.2982153[T] (400[MHz])
X_Acq_Duration	= 87.81824[ms]
X_Domain	= 19F
X_Freq	= 372.50336686[MHz]
X_Offset	= 0[ppm]
X_Points	= 16384
X_Prescans	= 1
X_Resolution	= 11.38715602[Hz]
X_Sweep	= 186.56716418[kHz]
Irr_Domain	= 19F
Irr_Freq	= 372.50336686[MHz]
Irr_Offset	= 5[ppm]
Tri_Domain	= 19F
Tri_Freq	= 372.50336686[MHz]
Tri_Offset	= 5[ppm]
Clipped	= FALSE
Scans	= 8
Total_Scans	= 8
Relaxation_Delay	= 5[s]
Recvr_Gain	= 24
Temp_Get	= 19.5[dC]
X_90_Width	= 13.9[us]
X_Acq_Time	= 87.81824[ms]
X_Angle	= 45[deg]
X_Atn	= 4[dB]
X_Pulse	= 6.95[us]
Irr_Mode	= Off
Tri_Mode	= Off
Dante_Presat	= FALSE
Initial_Wait	= 1[s]
Repetition_Time	= 5.08781824[s]

Chromaster System Manager Report

Analyzed Date and Time: 2018/11/10 12:37
Reported Date and Time: 2018/11/10 14:03:10
Processed Date and Time: 2018/11/10 14:02
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0086\
Processing Method: column3(IC-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY723-chiral-nBuPh-IC-4%
Injection from this vial: 1 of 1
Sample Description:
Series: 0086
Vial Number: 21
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 207 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 207 nm

Peak Quantitation: AREA
Calculation Method: AREA%

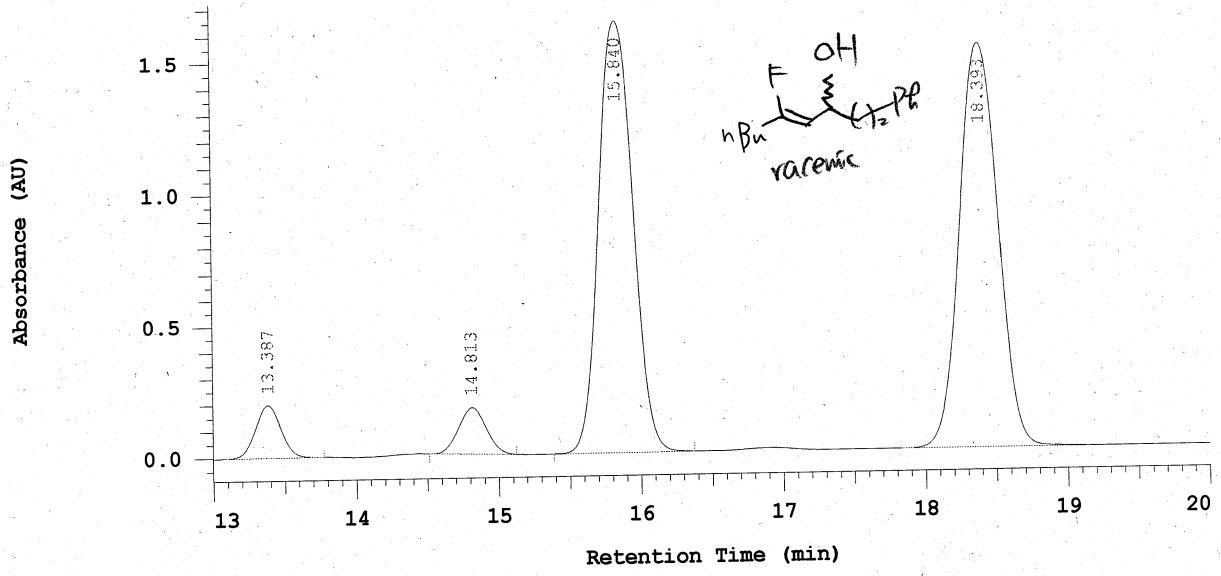
No.	RT	Area	Conc 1	BC
1	13.880	1363396	7.211	BB
2	16.367	548834	2.903	BB
3	18.880	16994292	89.886	BB
		18906522	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/11/10 11:36
Reported Date and Time: 2018/11/10 13:39:49
Processed Date and Time: 2018/11/10 13:39
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0085\
Processing Method: column3(IC-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY721-rac-nBuPh-IC-4%
Injection from this vial: 1 of 1
Sample Description:
Series: 0085
Vial Number: 20
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 207 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 207 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	13.387	1247840	4.074	MC
2	14.813	1190811	3.887	MC
3	15.840	13771837	44.959	MC
4	18.393	14421539	47.080	BB
		30632027	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/10/11 19:31 Reported Date and Time: 2018/10/11 20:32:50

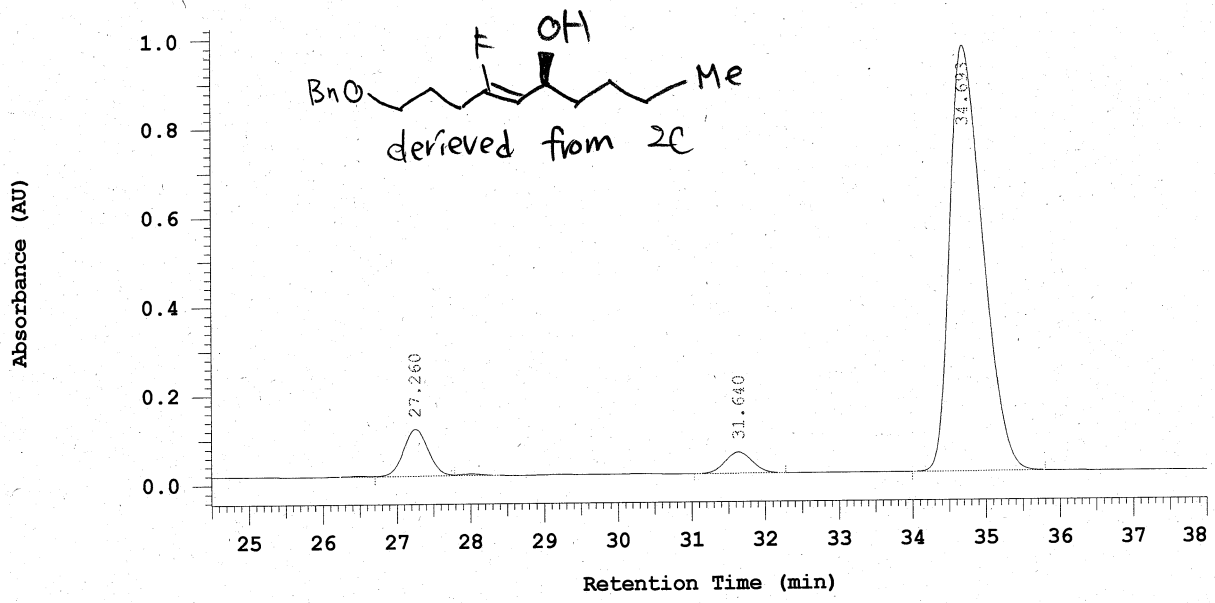
Processed Date and Time: 2018/10/11 20:32

Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0047_Bn-chiral\

Processing Method: column2(IBN-3)

System (acquisition): Sys 1 Series: 0047_Bn-chiral
Application(data): AKY Vial Number: 9
Sample Name: AKY688-chiralBn-IBN3-2% Vial Type: UNK
Injection from this vial: 1 of 1 Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C: Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	27.260	1245271	7.408	VV
2	31.640	632459	3.762	BB
3	34.693	14932712	88.830	BB
		16810442	100.000	

Peak rejection level: 0

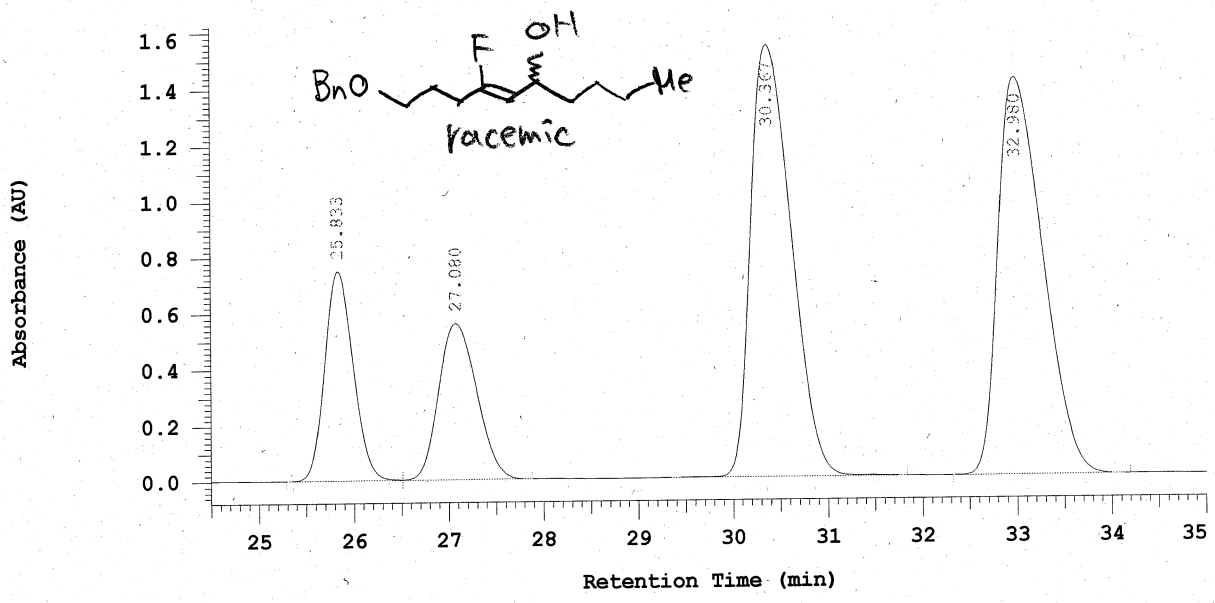
Chromaster System Manager Report

Analyzed Date and Time: 2018/10/11 16:36
Reported Date and Time: 2018/10/11 20:26:41
Processed Date and Time: 2018/10/11 20:26
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0045\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY678-racBn-IBN3-2%-ag
Injection from this vial: 1 of 1
Sample Description:

Series: 0045
Vial Number: 10
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm

Peak Quantitation: AREA
Calculation Method: AREA%

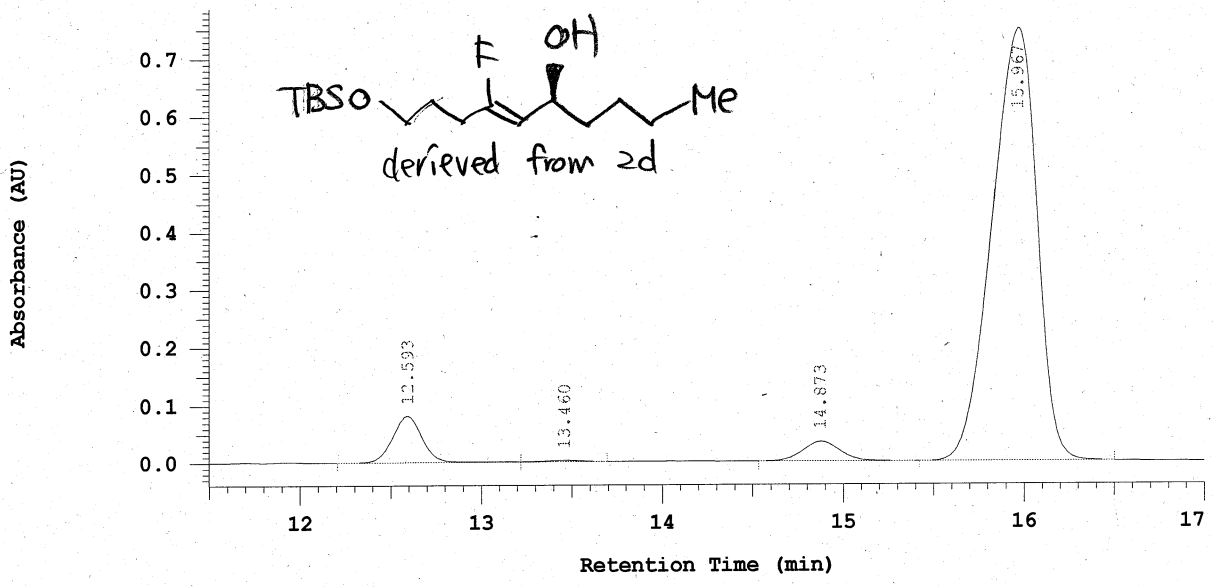
No.	RT	Area	Conc 1	BC
1	25.833	7782850	12.622	BV
2	27.080	7807706	12.663	VB
3	30.367	22791091	36.963	VB
4	32.980	23276922	37.751	BB
		61658569	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/10/12 01:01
Reported Date and Time: 2018/10/12 09:18:49
Processed Date and Time: 2018/10/12 09:17
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0051\
Processing Method: column3(IC-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY689-chiralTBS-IC3-1.5%
Injection from this vial: 1 of 1
Sample Description:
Series: 0051
Vial Number: 12
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

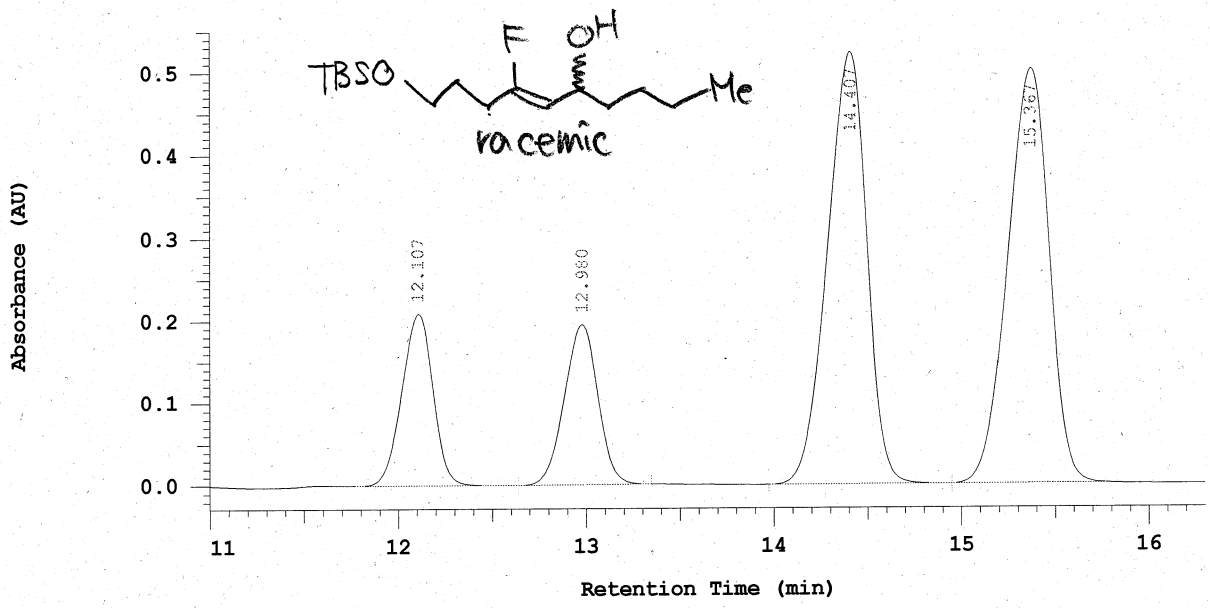
No.	RT	Area	Conc 1	BC
1	12.593	468461	6.530	BB
2	13.460	15507	0.216	BB
3	14.873	246761	3.440	BB
4	15.967	6443397	89.814	BB
		7174126	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/10/12 00:09
Reported Date and Time: 2018/10/12 09:08:31
Processed Date and Time: 2018/10/12 09:08
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0050\
Processing Method: column3(IC-3)
System (acquisition): Sys 1
Series: 0050
Application(data): AKY
Vial Number: 11
Sample Name: AKY679-racTBS-IC3-1.5%-ag
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm

Peak Quantitation: AREA
Calculation Method: AREA%

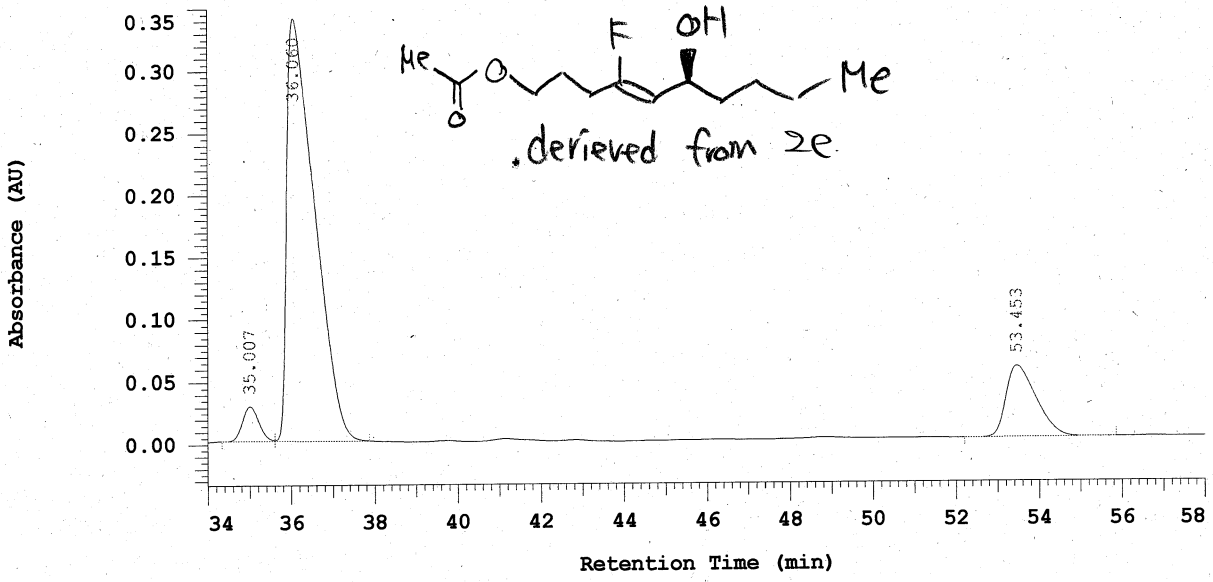
No.	RT	Area	Conc 1	BC
1	12.107	1206899	11.970	BB
2	12.980	1207290	11.974	BB
3	14.407	3831661	38.002	BB
4	15.367	3836825	38.054	BB
		10082675	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/09/21 15:22
Reported Date and Time: 2018/10/02 15:30:14
Processed Date and Time: 2018/10/02 15:29
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0025Ac-chiral\
Processing Method: column2(IBN-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY669-chiral-IF-3-4%-60min
Series: 0025Ac-chiral
Vial Number: 11
Vial Type: UNK
Volume: 10.0 ul
Injection from this vial: 1 of 1
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	35.007	386631	4.006	MC
2	36.060	7816462	80.981	MC
3	53.453	1449071	15.013	MC
		9652164	100.000	

Peak rejection level: 0

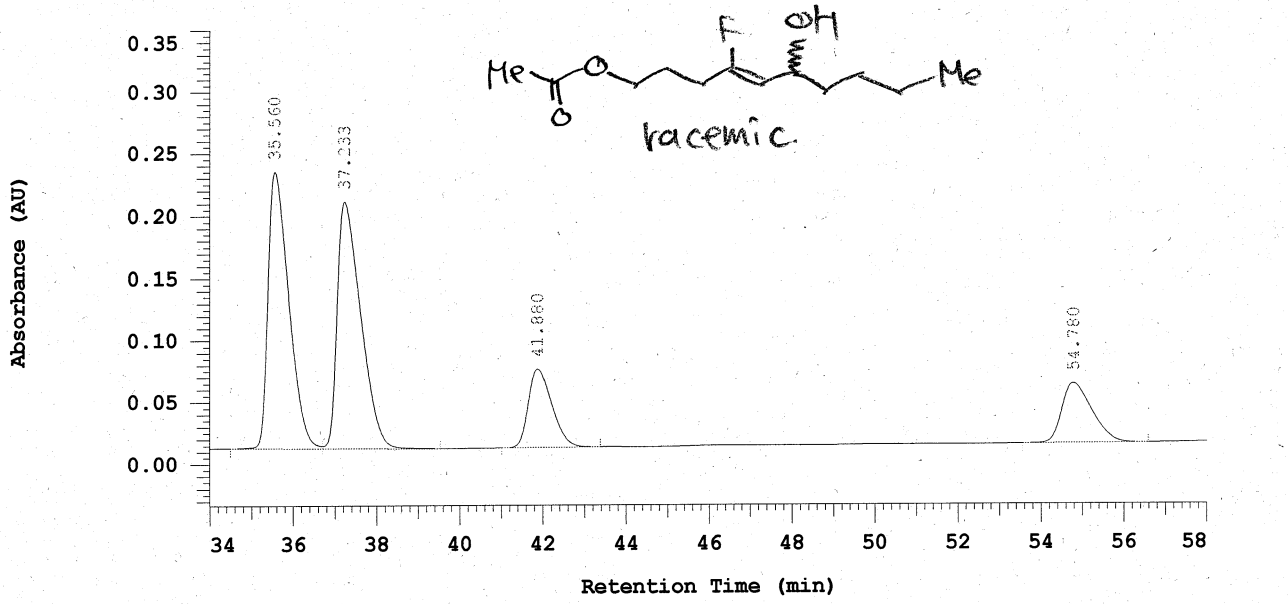
Chromaster System Manager Report

Analyzed Date and Time: 2018/09/21 14:01
Reported Date and Time: 2018/10/02 15:28:52
Processed Date and Time: 2018/10/02 15:28
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0024Ac-rac\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY665-rac-IF-3-4%-60min
Injection from this vial: 1 of 1
Sample Description:

Series: 0024Ac-rac
Vial Number: 10
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm

Peak Quantitation: AREA
Calculation Method: AREA%

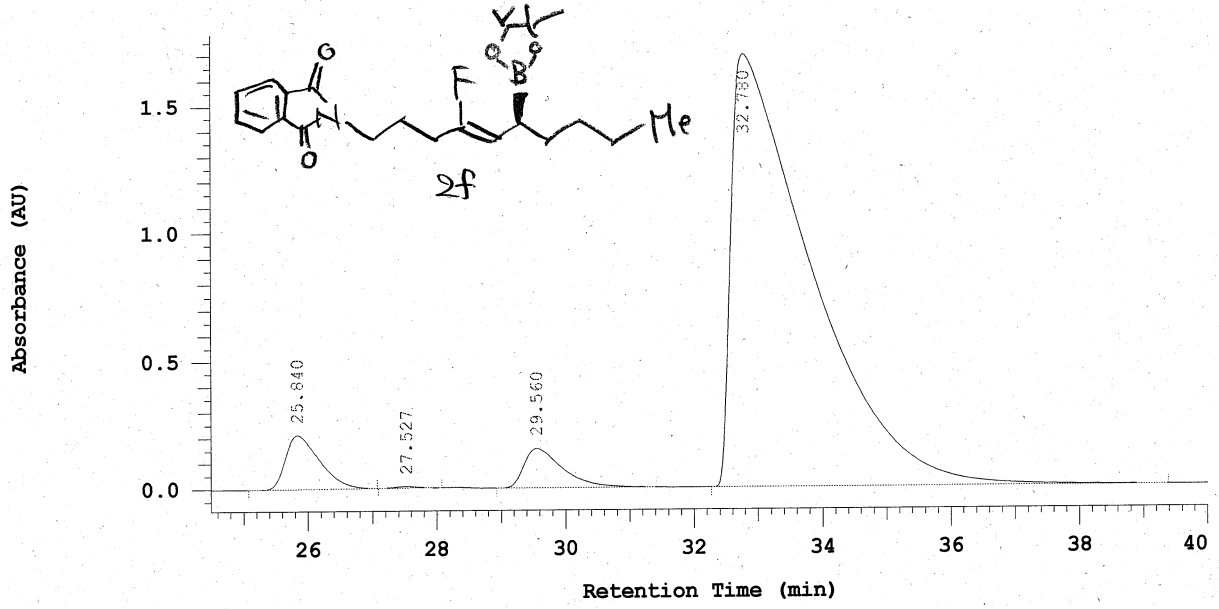
No.	RT	Area	Conc 1	BC
1	35.560	3879244	37.938	BV
2	37.233	3895764	38.100	VB
3	41.880	1228750	12.017	BB
4	54.780	1221370	11.945	BB
		10225128	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/10/24 23:23
Reported Date and Time: 2018/10/25 09:04:17
Processed Date and Time: 2018/10/25 09:03
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0066\
Processing Method: column5(IE-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY701-chiralNPhth-IE3-1.5%
Series: 0066
Vial Number: 15
Vial Type: UNK
Volume: 10.0 ul
Injection from this vial: 1 of 1
Sample Description:

Chrom Type: Fixed WL Chromatogram, 216 nm



Processing Method: column5(IE-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 216 nm

Peak Quantitation: AREA
Calculation Method: AREA%

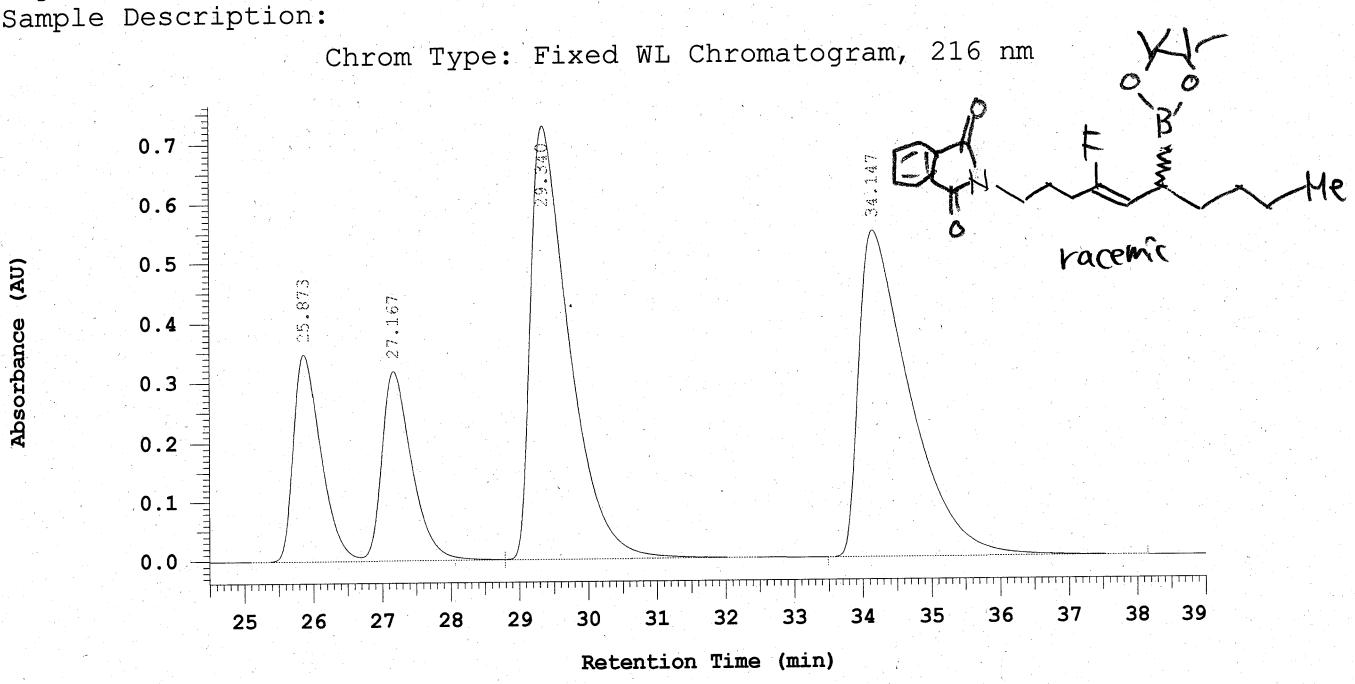
No.	RT	Area	Conc 1	BC
1	25.840	3903780	4.835	MC
2	27.527	75138	0.093	MC
3	29.560	3214553	3.981	MC
4	32.780	73550499	91.091	BB
		80743970	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/10/24 21:51
Reported Date and Time: 2018/10/25 09:01:06
Processed Date and Time: 2018/10/24 22:53
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0065\
Processing Method: column5(IE-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY691-racNPhth-IE3-1.5%
Injection from this vial: 1 of 1
Sample Description:
Series: 0065
Vial Number: 13
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 216 nm



Processing Method: column5(IE-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 216 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	25.873	4837142	12.681	BV
2	27.167	4898065	12.841	VV
3	29.340	14192446	37.206	VB
4	34.147	14217643	37.272	BB
		38145296	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/08/29 15:33 Reported Date and Time: 2019/03/14 11:28:15

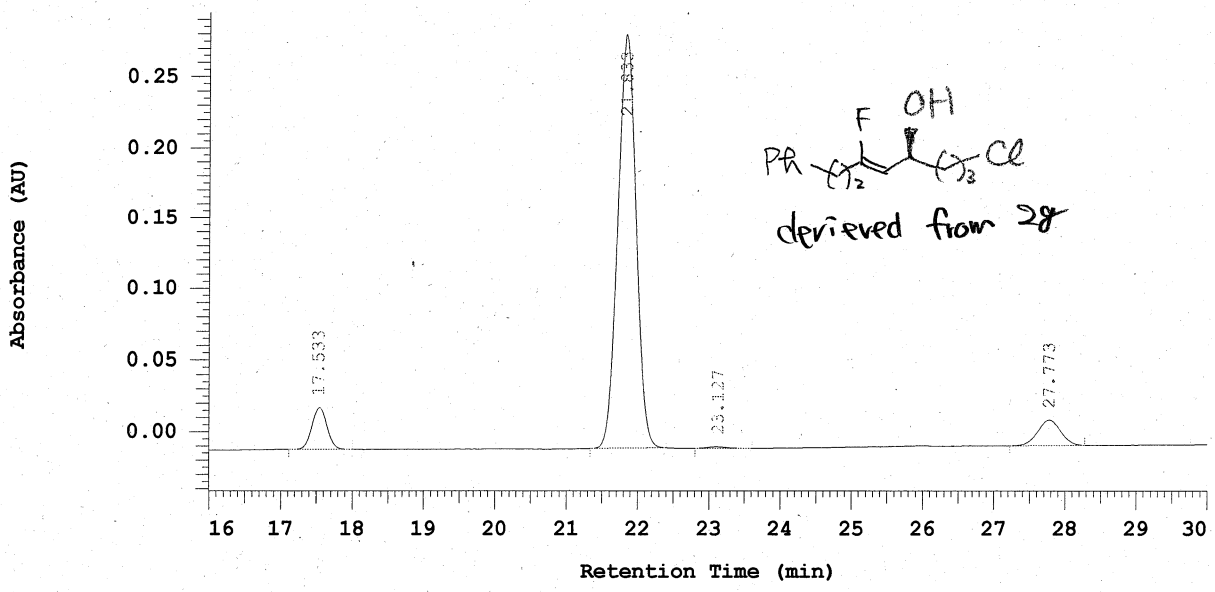
Processed Date and Time: 2019/03/14 11:27

Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0005\

Processing Method: 20180824_column2(IBN-3)

System (acquisition): Sys 1 Series: 0005
Application(data): AKY Vial Number: 4
Sample Name: AKY650-IBN3-5% Vial Type: UNK
Injection from this vial: 1 of 1 Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: 20180824_column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C: Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	17.533	211675	6.950	MC
2	21.833	2626639	86.245	BB
3	23.127	8354	0.274	MC
4	27.773	198876	6.530	BB
		3045544	100.000	

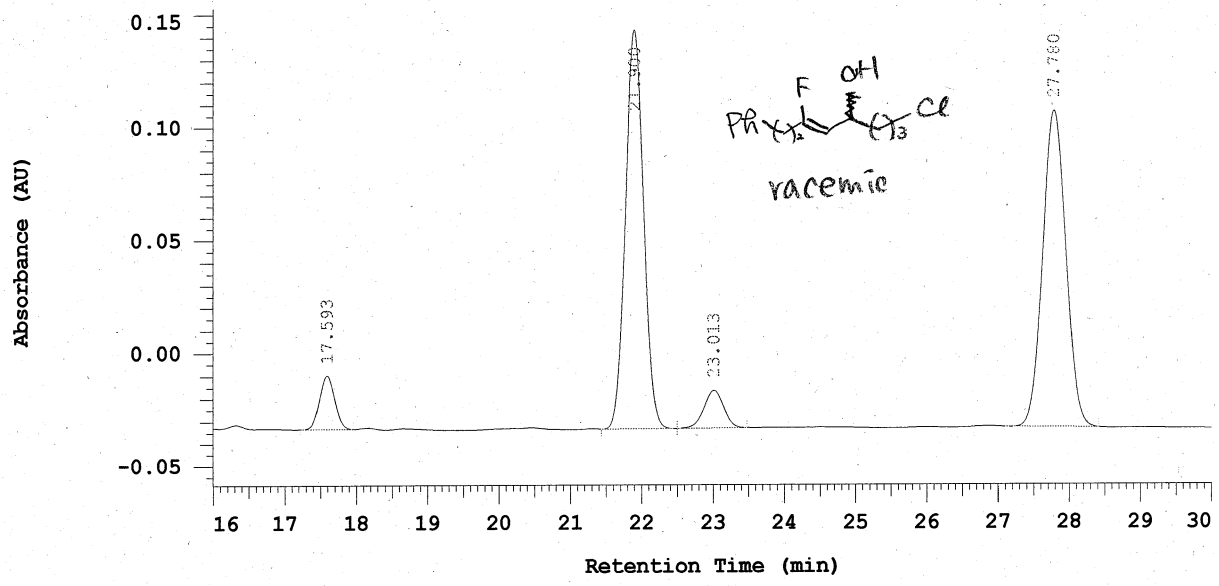
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/08/24 17:32
Reported Date and Time: 2019/03/14 11:28:41
Processed Date and Time: 2019/03/14 11:28
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0002\
Processing Method: 20180824_column2(IBN-3)

System (acquisition): Sys 1
Series: 0002
Application(data): AKY
Vial Number: 1
Sample Name: AKY648-IBN3-5%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: 20180824_column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	17.593	175114	5.009	MC
2	21.900	1575645	45.067	BB
3	23.013	160155	4.581	BB
4	27.780	1585278	45.343	BB
		3496192	100.000	

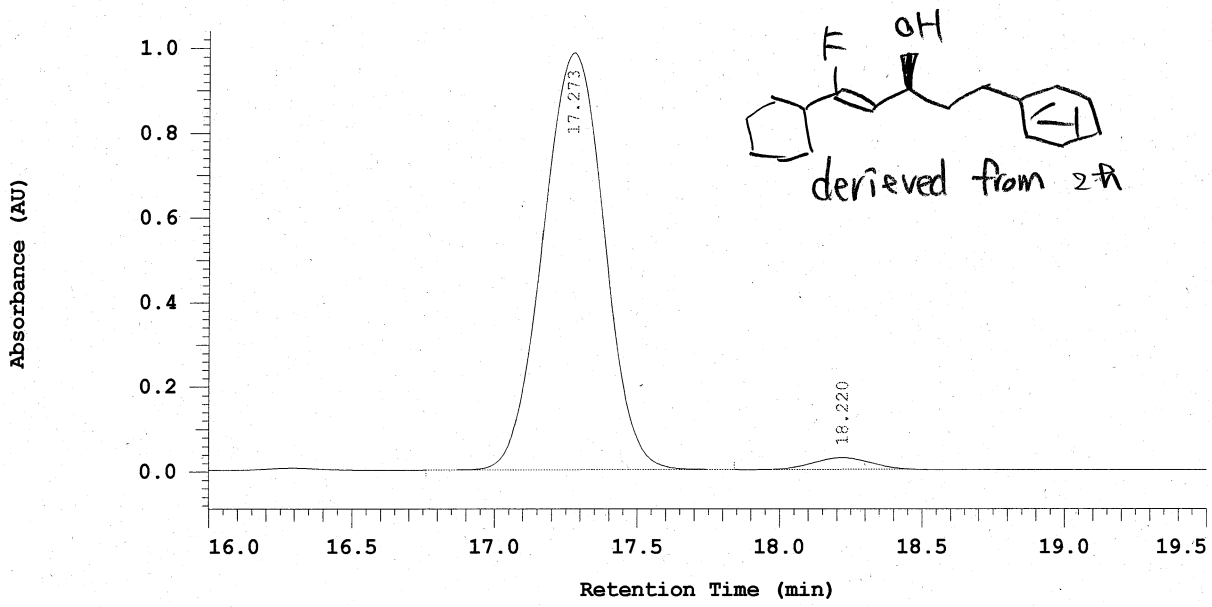
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/08/24 21:04
Reported Date and Time: 2019/03/23 16:18:36
Processed Date and Time: 2019/03/23 16:18
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0004\
Processing Method: column1(IA-3)

System (acquisition): Sys 1
Series: 0004
Application(data): AKY
Vial Number: 3
Sample Name: AKY633-IBN3-5%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column1(IA-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	17.273	7326901	97.486	MC
2	18.220	188971	2.514	MC
		7515872	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/08/24 20:12 Reported Date and Time: 2019/03/23 16:17:45

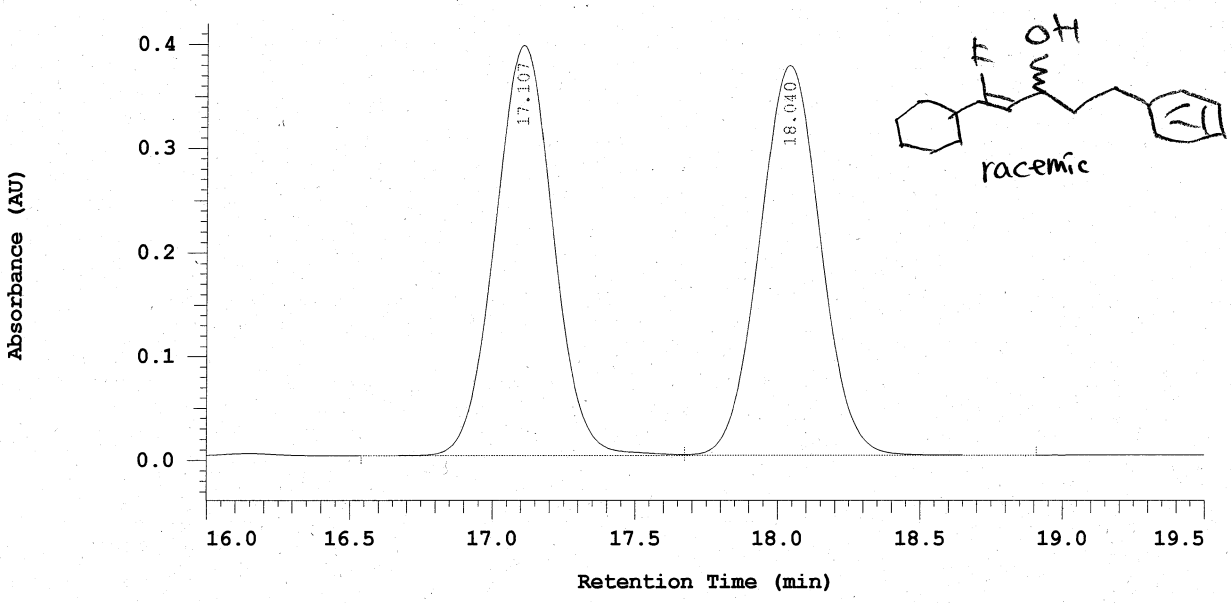
Processed Date and Time: 2019/03/23 16:17

Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0003\

Processing Method: column1(IA-3)

System (acquisition): Sys 1 Series: 0003
Application(data): AKY Vial Number: 2
Sample Name: AKY630-IBN3-5% Vial Type: UNK
Injection from this vial: 1 of 1 Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column1(IA-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C: Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	17.107	2788372	50.135	BV
2	18.040	2773376	49.865	VB
		5561748	100.000	

Peak rejection level: 0

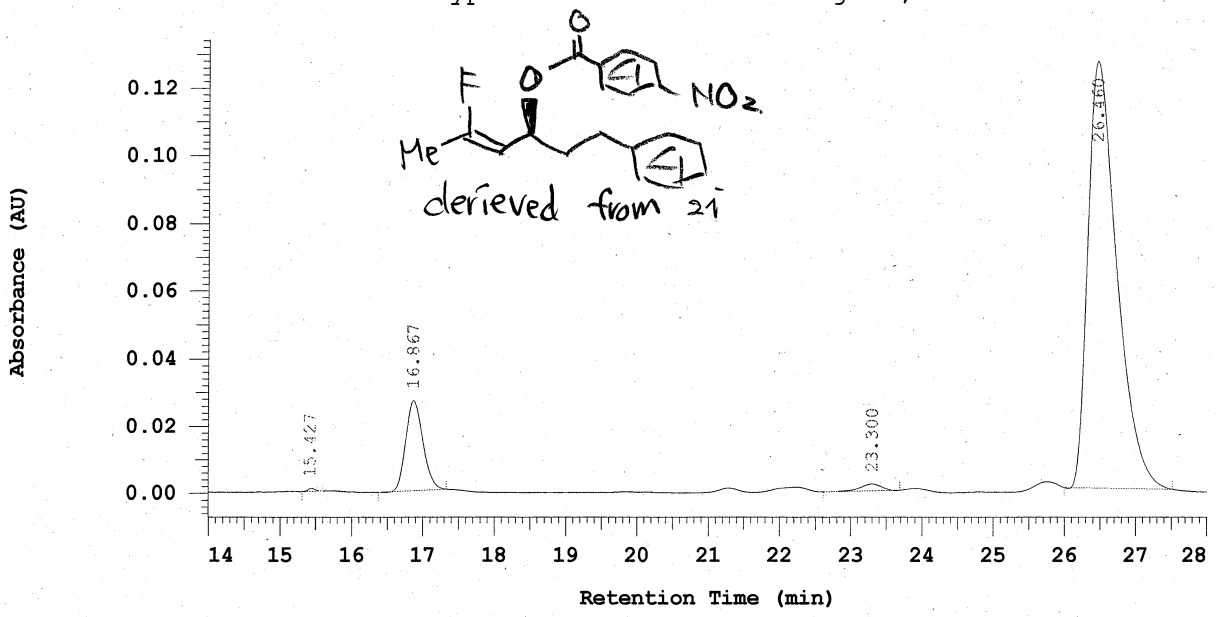
Chromaster System Manager Report

Analyzed Date and Time: 2019/03/12 18:59
Reported Date and Time: 2019/03/23 16:27:03
Processed Date and Time: 2019/03/23 16:26
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0247_Me-chiral\
Processing Method: column5(IE-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY840-MeAcchiral-IE-3%
Injection from this vial: 1 of 1
Sample Description:

Series: 0247_Me-chiral
Vial Number: 103
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column5(IE-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	15.427	2929	0.144	MC
2	16.867	226530	11.103	MC
3	23.300	21534	1.056	MC
4	26.460	1789202	87.698	MC
		2040195	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/12 13:57 Reported Date and Time: 2019/03/23 16:26:19

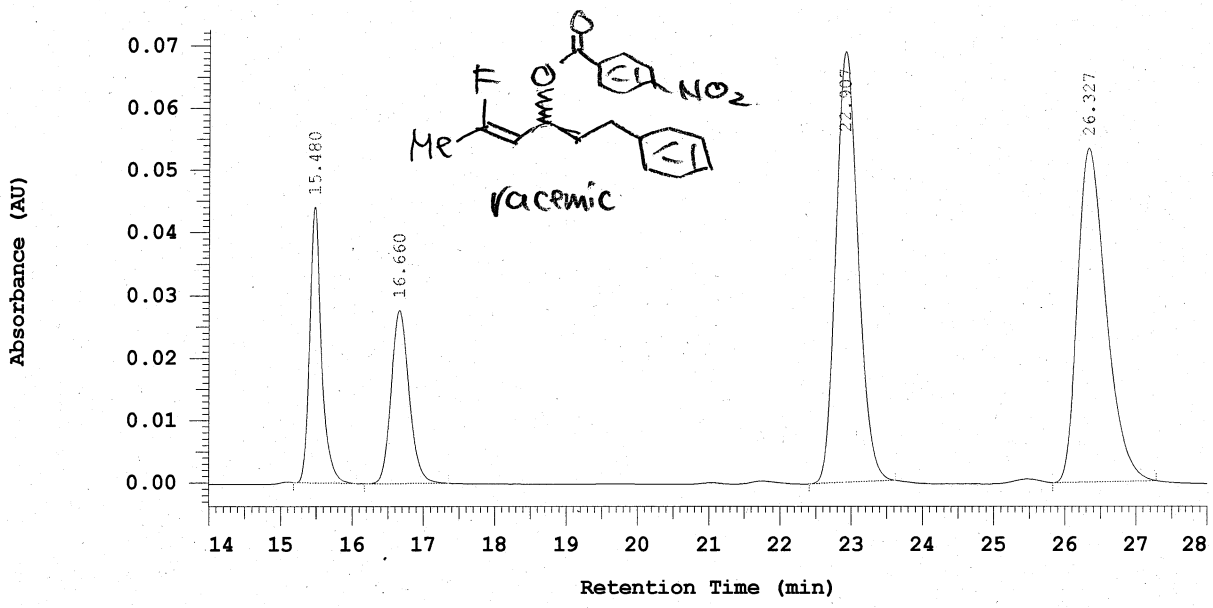
Processed Date and Time: 2019/03/23 16:26

Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0243_Me-rac\

Processing Method: column5(IE-3)

System (acquisition): Sys 1 Series: 0243_Me-rac
Application(data): AKY Vial Number: 101
Sample Name: AKY588-MeAc-rac-IE-3% Vial Type: UNK
Injection from this vial: 1 of 1 Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column5(IE-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C: Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	15.480	245792	12.295	MC
2	16.660	246380	12.324	MC
3	22.907	758406	37.937	MC
4	26.327	748563	37.444	MC
		1999141	100.000	

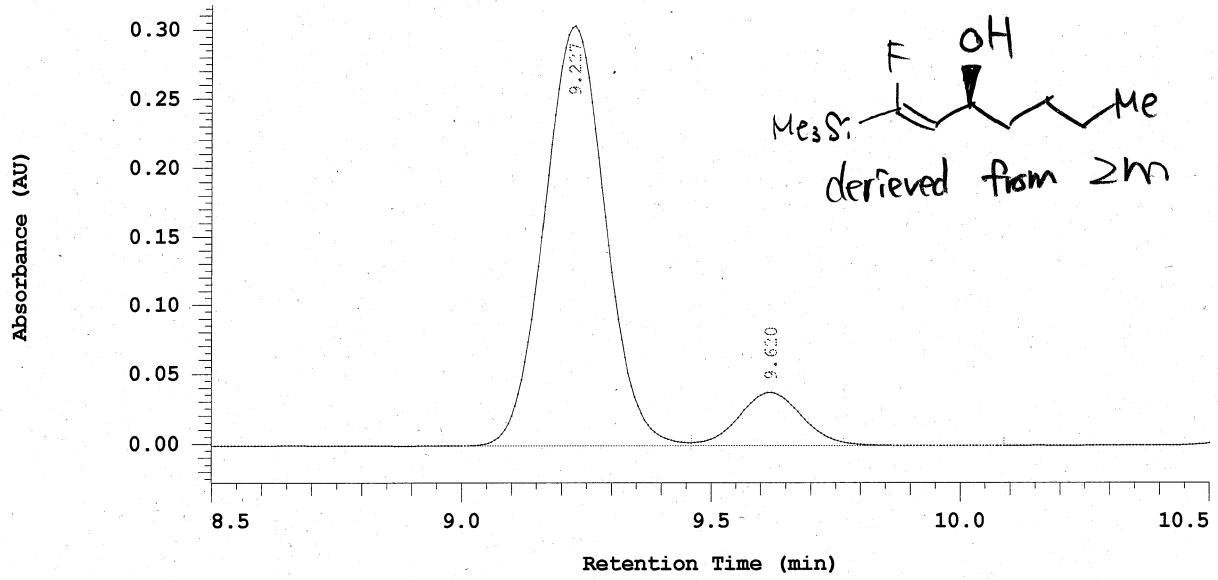
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/08/29 21:17
Reported Date and Time: 2019/03/23 16:23:51
Processed Date and Time: 2019/03/23 16:23
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0011\
Processing Method: column5(IE-3)

System (acquisition): Sys 1
Series: 0011
Application(data): AKY
Vial Number: 6
Sample Name: AKY652-IE3-3%-chiral
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column5(IE-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	9.227	1283594	88.470	BV
2	9.620	167280	11.530	VB
		1450874	100.000	

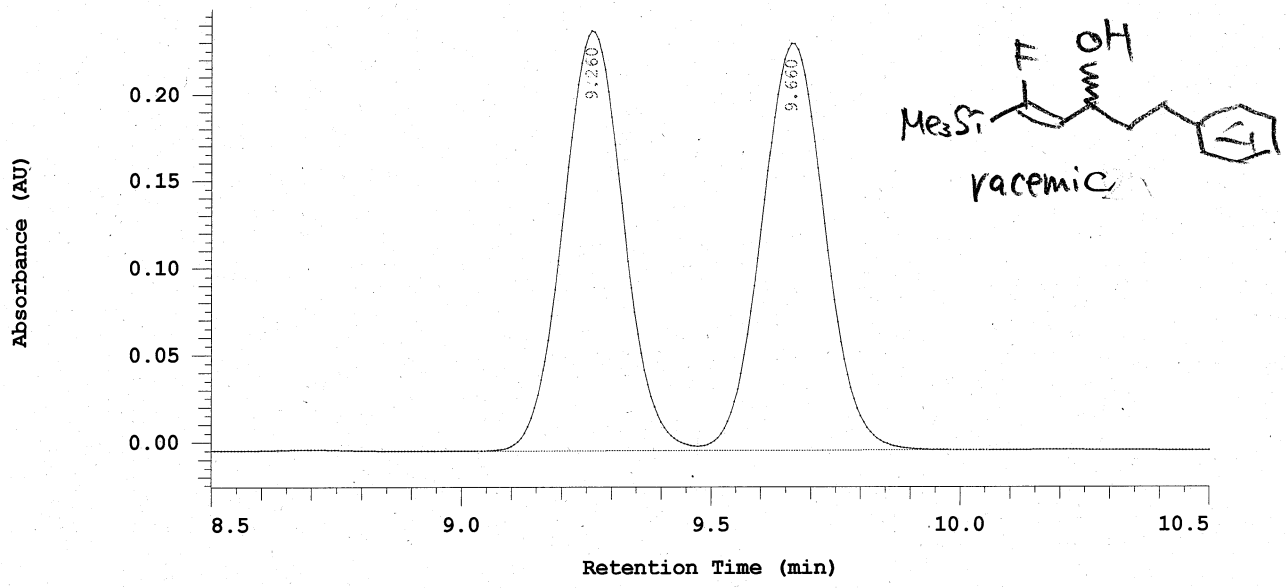
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/08/29 20:38
Reported Date and Time: 2019/03/23 16:23:06
Processed Date and Time: 2019/03/23 16:22
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0010\
Processing Method: column5(IE-3)

System (acquisition): Sys 1
Series: 0010
Application(data): AKY
Vial Number: 5
Sample Name: AKY651-IE3-3%-rac
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column5(IE-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	9.260	1015375	49.640	BV
2	9.660	1030087	50.360	VB
		2045462	100.000	

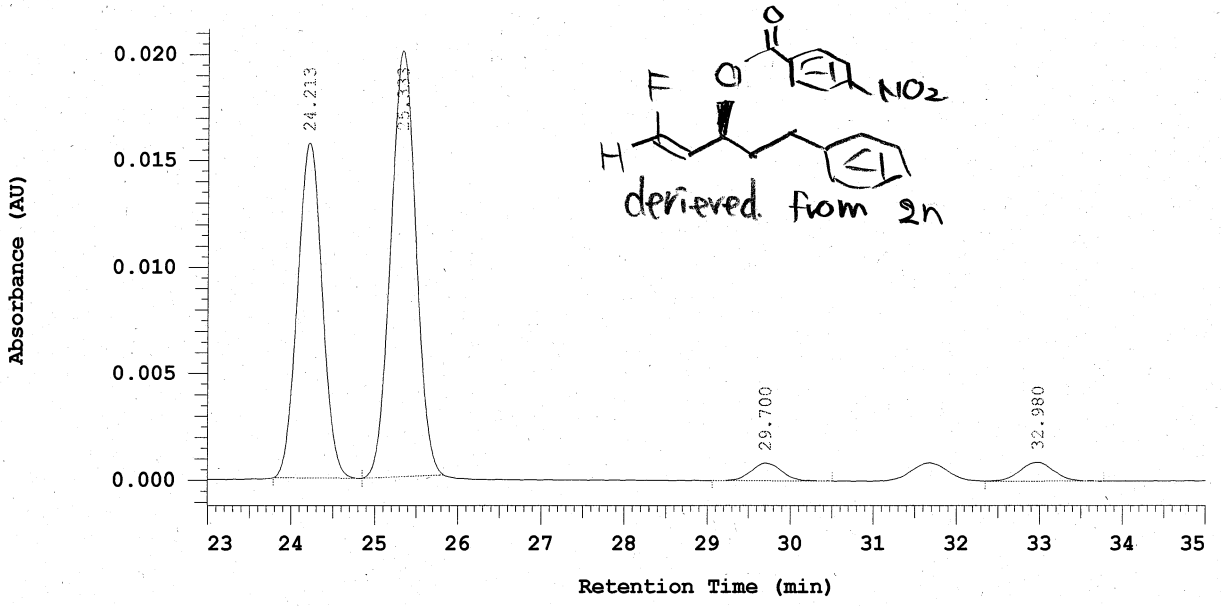
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/26 14:17
Reported Date and Time: 2019/03/26 15:29:17
Processed Date and Time: 2019/03/26 15:28
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0272\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Series: 0272
Application(data): AKY
Vial Number: 114
Sample Name: AKY851-chiral-acyl-IBN-3%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	24.213	159751	40.529	BB
2	25.333	211733	53.717	BB
3	29.700	10364	2.629	MC
4	32.980	12316	3.125	MC
		394164	100.000	

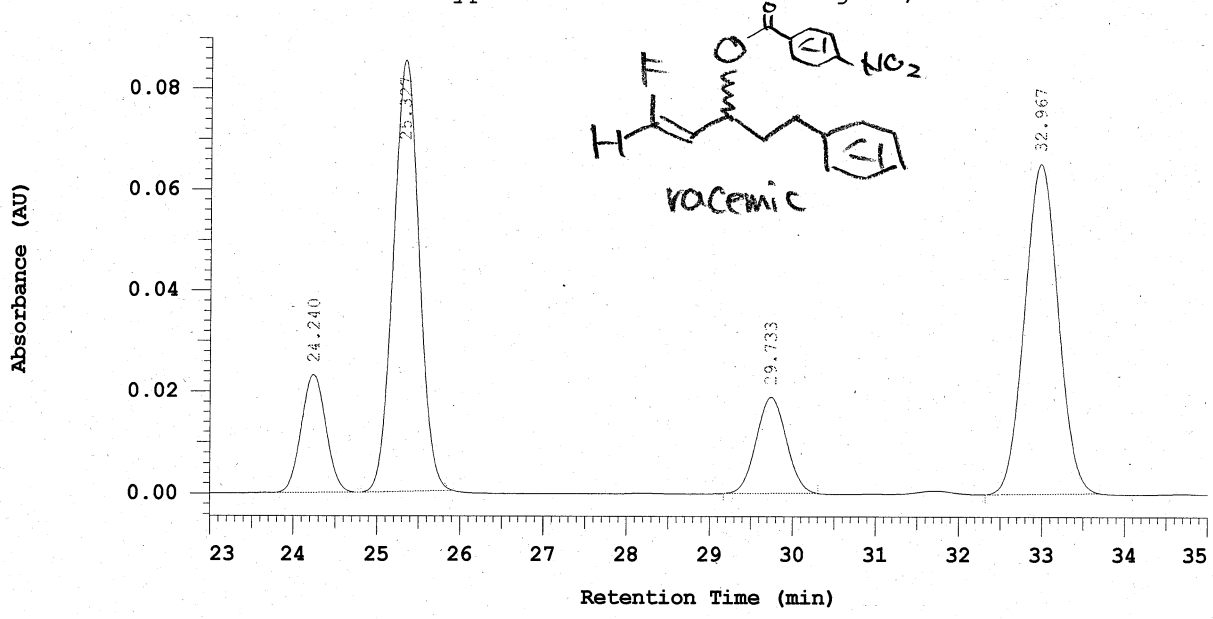
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/26 13:25
Reported Date and Time: 2019/03/26 15:26:04
Processed Date and Time: 2019/03/26 15:25
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0271\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Series: 0271
Application(data): AKY
Vial Number: 113
Sample Name: AKY554-rac-acyl-IBN-3%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	24.240	234441	10.168	BB
2	25.327	924308	40.087	BB
3	29.733	233700	10.136	BB
4	32.967	913293	39.609	BB
		2305742	100.000	

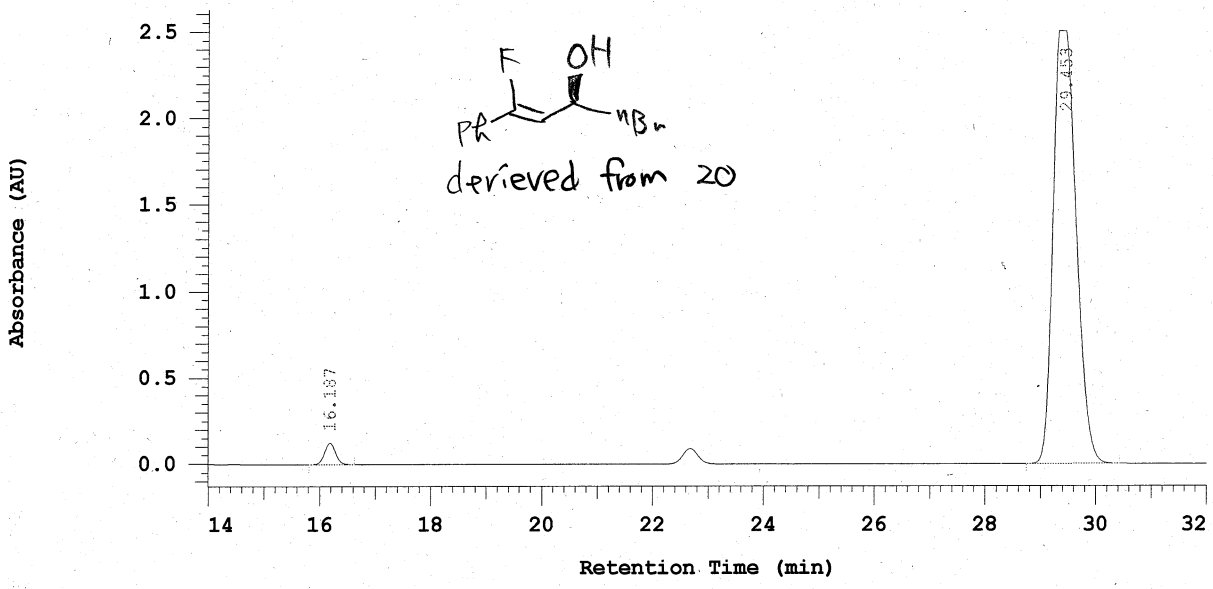
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/05 13:29
Reported Date and Time: 2019/03/05 16:04:27
Processed Date and Time: 2019/03/05 16:04
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0234\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Series: 0234
Application(data): AKY
Vial Number: 102
Sample Name: AKY819-ph-chiral-Ib-5%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	16.187	853861	2.294	BB
2	29.453	36363059	97.706	BB
		37216920	100.000	

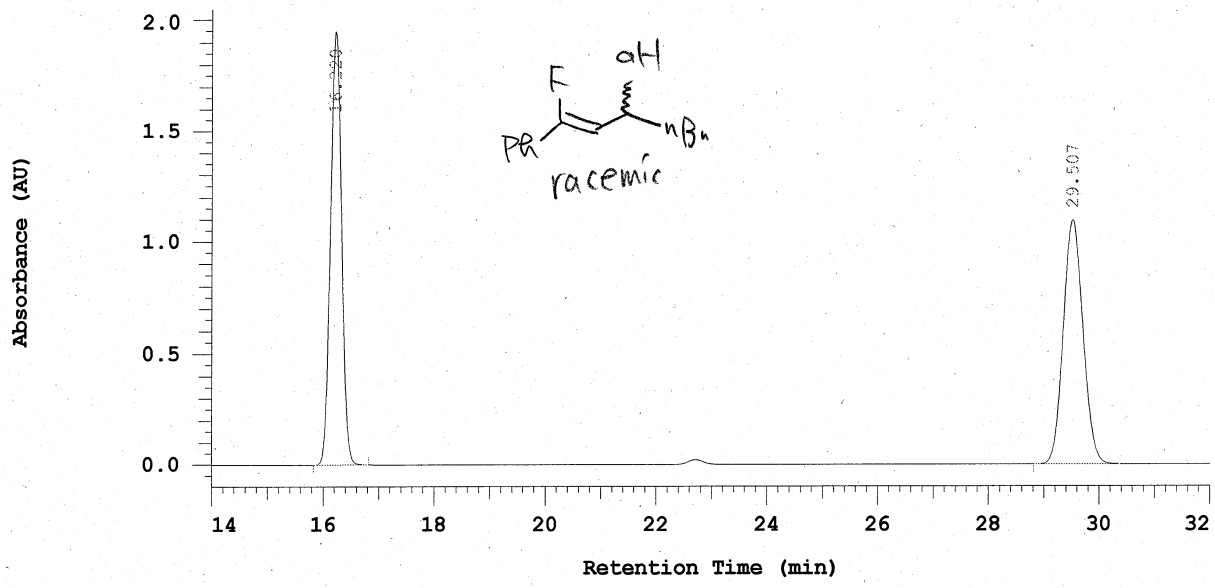
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/05 14:36
Reported Date and Time: 2019/03/05 16:04:08
Processed Date and Time: 2019/03/05 16:04
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0235\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Series: 0235
Application(data): AKY
Vial Number: 101
Sample Name: AKY659-ph-rac-Ib-5%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	16.220	13501962	49.585	BB
2	29.507	13727800	50.415	BB
		27229762	100.000	

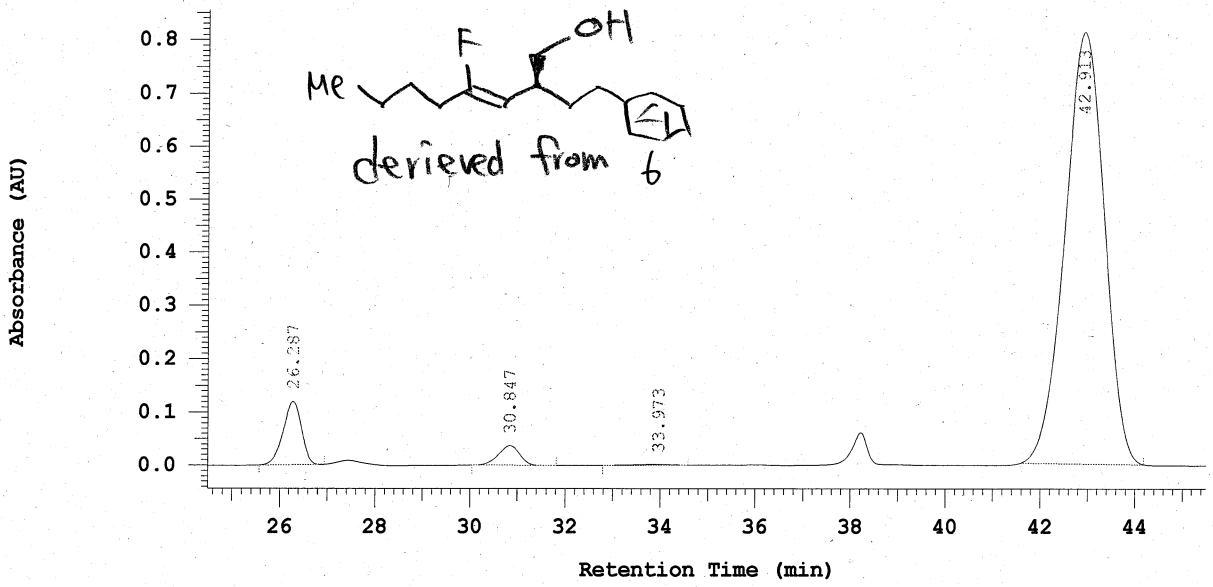
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/22 23:33
Reported Date and Time: 2019/02/23 11:06:48
Processed Date and Time: 2019/02/23 11:06
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0202\
Processing Method: column3(IC-3)

System (acquisition): Sys 1
Series: 0202
Application(data): AKY
Vial Number: 9
Sample Name: AKY735,6-Homolchi-IC-2%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	26.287	1612403	6.270	BB
2	30.847	579796	2.255	MC
3	33.973	35032	0.136	MC
4	42.913	23488793	91.339	BB
		25716024	100.000	

Peak rejection level: 0

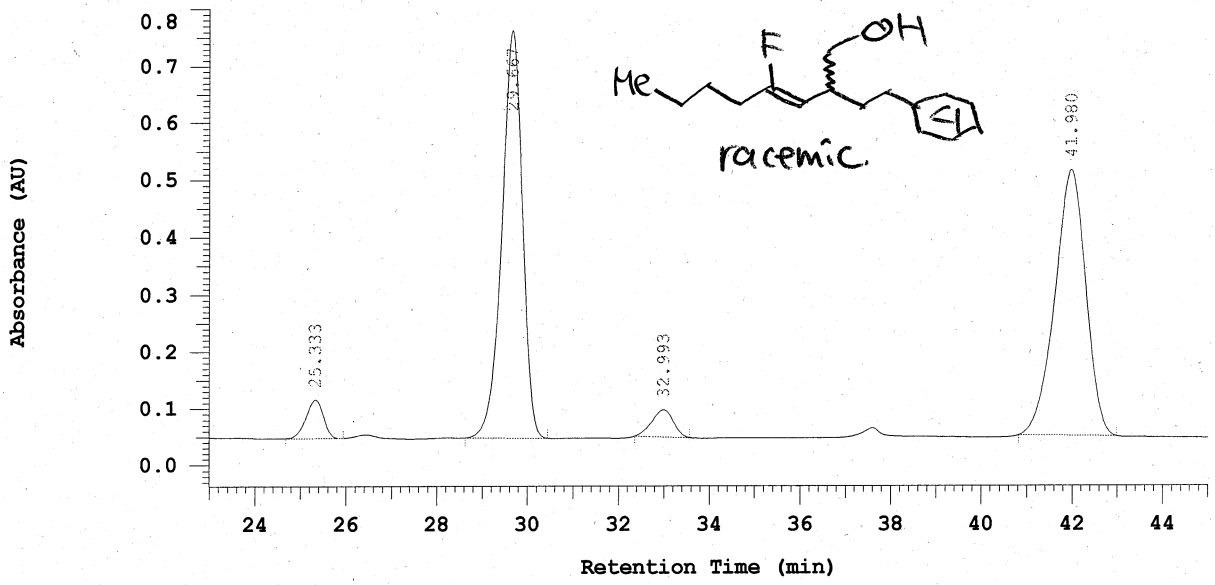
Chromaster System Manager Report

Analyzed Date and Time: 2019/02/22 22:26
Reported Date and Time: 2019/02/23 11:03:31
Processed Date and Time: 2019/02/23 11:03
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0201\
Processing Method: column3(IC-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY734-Homolrac-IC-2%
Injection from this vial: 1 of 1
Sample Description:

Series: 0201
Vial Number: 8
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	25.333	891426	3.695	BB
2	29.667	11327996	46.959	BB
3	32.993	785381	3.256	BB
4	41.980	11118542	46.090	BB
		24123345	100.000	

Peak rejection level: 0

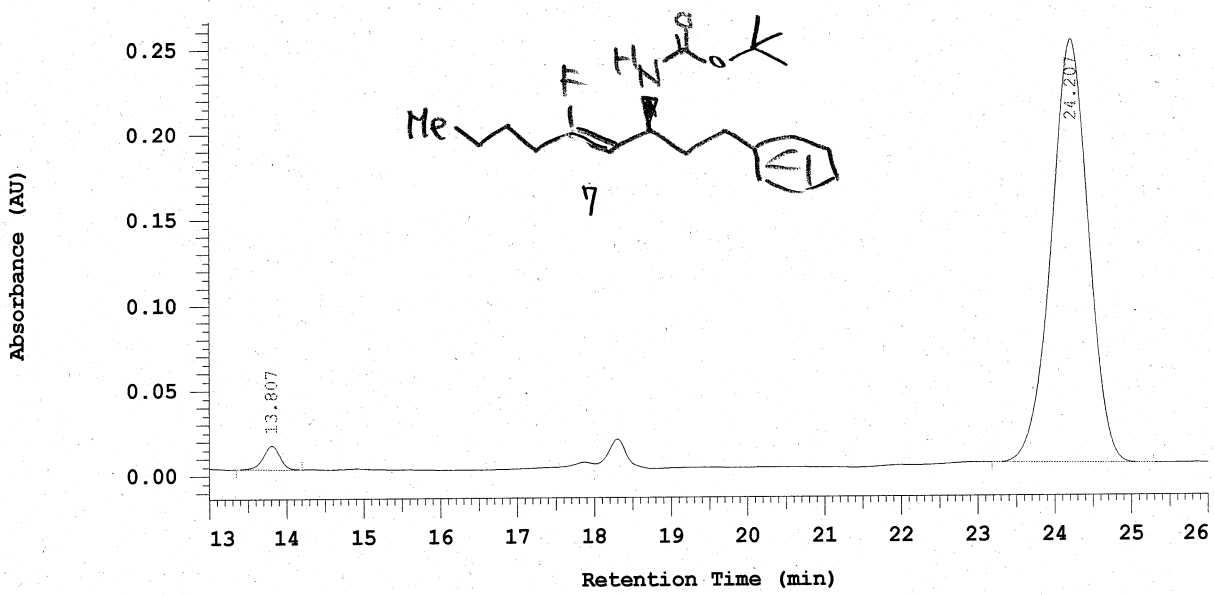
Chromaster System Manager Report

Analyzed Date and Time: 2018/12/19 22:51
Reported Date and Time: 2018/12/20 09:17:42
Processed Date and Time: 2018/12/20 09:17
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0133\
Processing Method: column3(IC-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY763-chiral-Ic-4%
Injection from this vial: 1 of 1
Sample Description:

Series: 0133
Vial Number: 31
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	13.807	106630	2.482	MC
2	24.207	4188887	97.518	MC
		4295517	100.000	

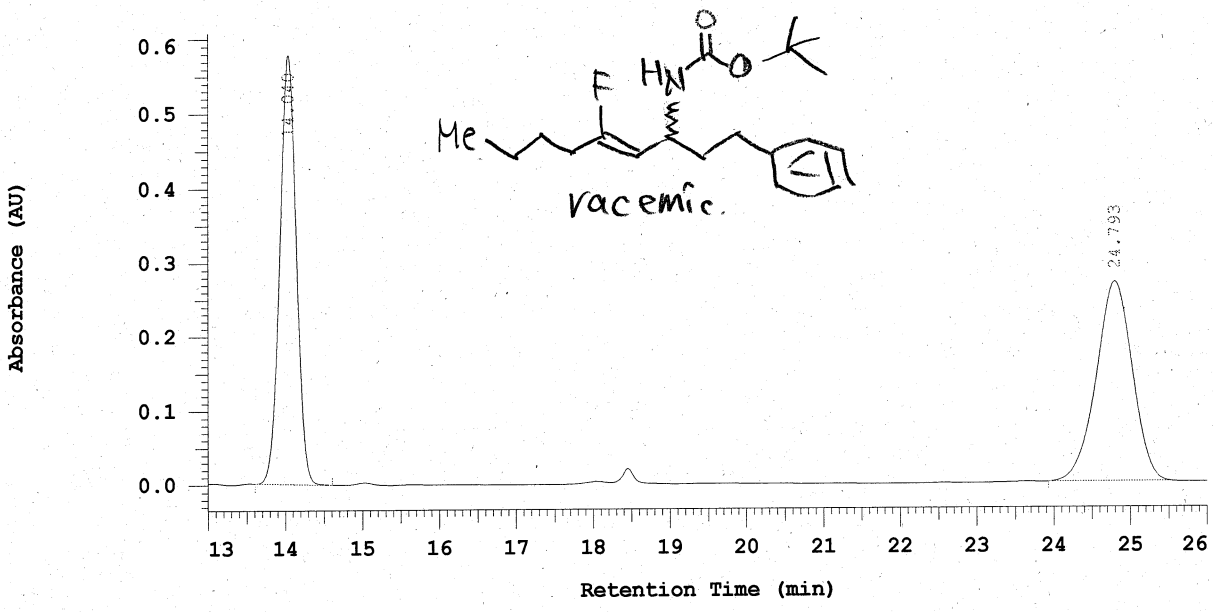
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/12/19 00:05
Reported Date and Time: 2018/12/20 09:19:43
Processed Date and Time: 2018/12/20 09:19
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0129\
Processing Method: column3(IC-3)

System (acquisition): Sys 1
Series: 0129
Application(data): AKY
Vial Number: 31
Sample Name: AKY762-rac-Ic-4%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column3(IC-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm
Peak Quantitation: AREA
Calculation Method: AREA%

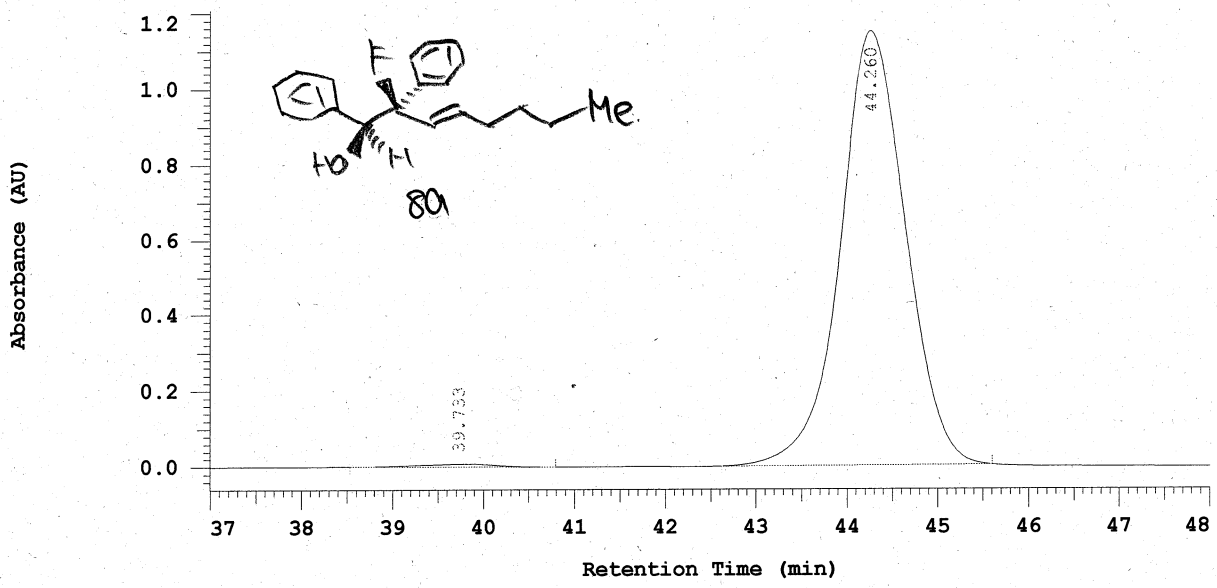
No.	RT	Area	Conc 1	BC
1	14.040	4377410	49.881	BB
2	24.793	4398346	50.119	BB
		8775756	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/13 17:15
Reported Date and Time: 2019/02/13 19:25:26
Processed Date and Time: 2019/02/13 19:25
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0175\
Processing Method: column6(IF-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY787-PhPhCHO-IF3-1%rac
Injection from this vial: 1 of 1
Sample Description:
Series: 0175
Vial Number: 49
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	39.733	224936	0.777	MC
2	44.260	28711557	99.223	MC
		28936493	100.000	

Peak rejection level: 0

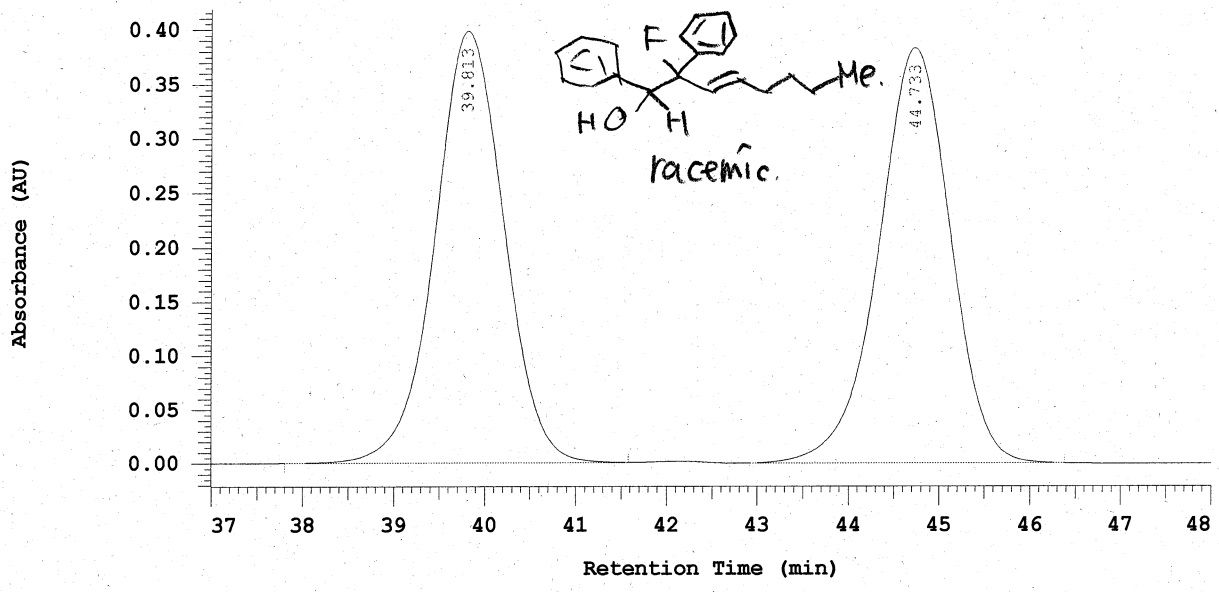
Chromaster System Manager Report

Analyzed Date and Time: 2019/02/13 18:26
Reported Date and Time: 2019/02/13 19:22:45
Processed Date and Time: 2019/02/13 19:22
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0176\
Processing Method: column6(IF-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY786-PhPhCHO-IF3-1%rac
Injection from this vial: 1 of 1
Sample Description:

Series: 0176
Vial Number: 48
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	39.813	10547536	50.021	MC
2	44.733	10538625	49.979	MC
		21086161	100.000	

Peak rejection level: 0

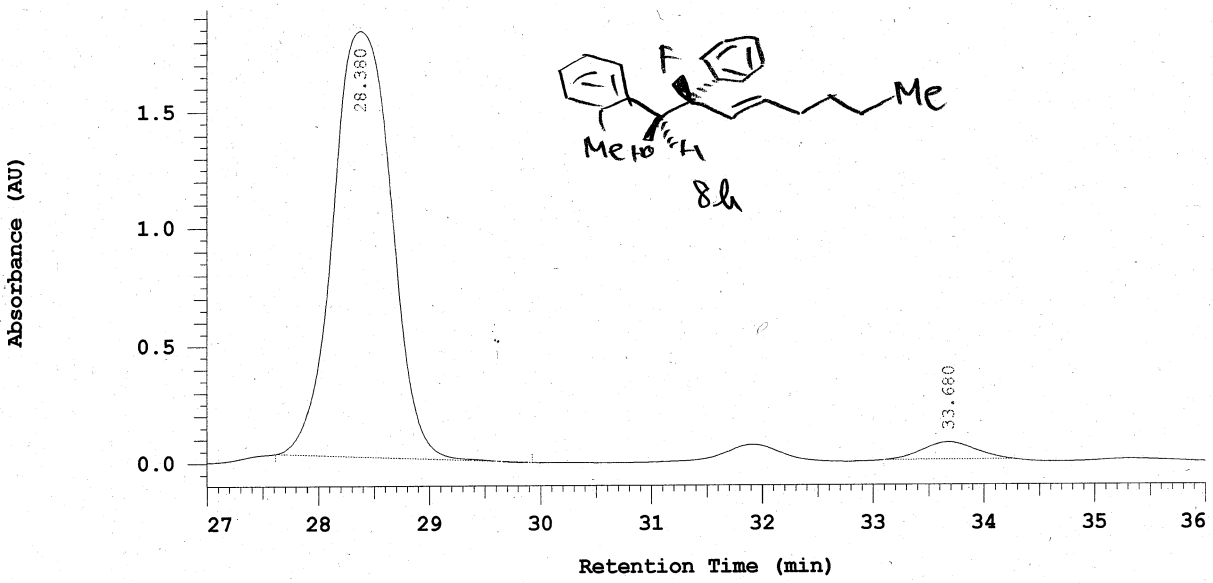
Chromaster System Manager Report

Analyzed Date and Time: 2019/02/25 14:34
Reported Date and Time: 2019/02/26 11:40:31
Processed Date and Time: 2019/02/26 11:40
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0211\
Processing Method: column6(IF-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY819-Me-chiral-IF-1%
Injection from this vial: 1 of 1
Sample Description:

Series: 0211
Vial Number: 94
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	28.380	33182182	96.349	MC
2	33.680	1257470	3.651	MC
		34439652	100.000	

Peak rejection level: 0

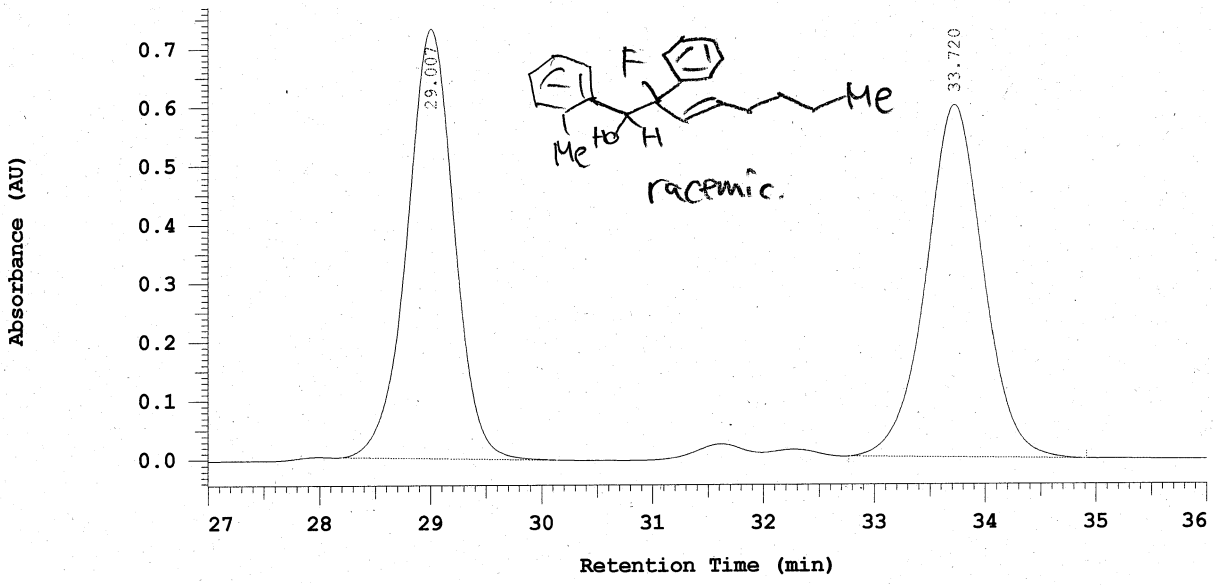
Chromaster System Manager Report

Analyzed Date and Time: 2019/02/25 19:13
Reported Date and Time: 2019/02/26 11:39:05
Processed Date and Time: 2019/02/26 11:39
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0215\
Processing Method: column6(IF-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY803-Me-rac-IF-1%
Injection from this vial: 1 of 1
Sample Description:

Series: 0215
Vial Number: 93
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

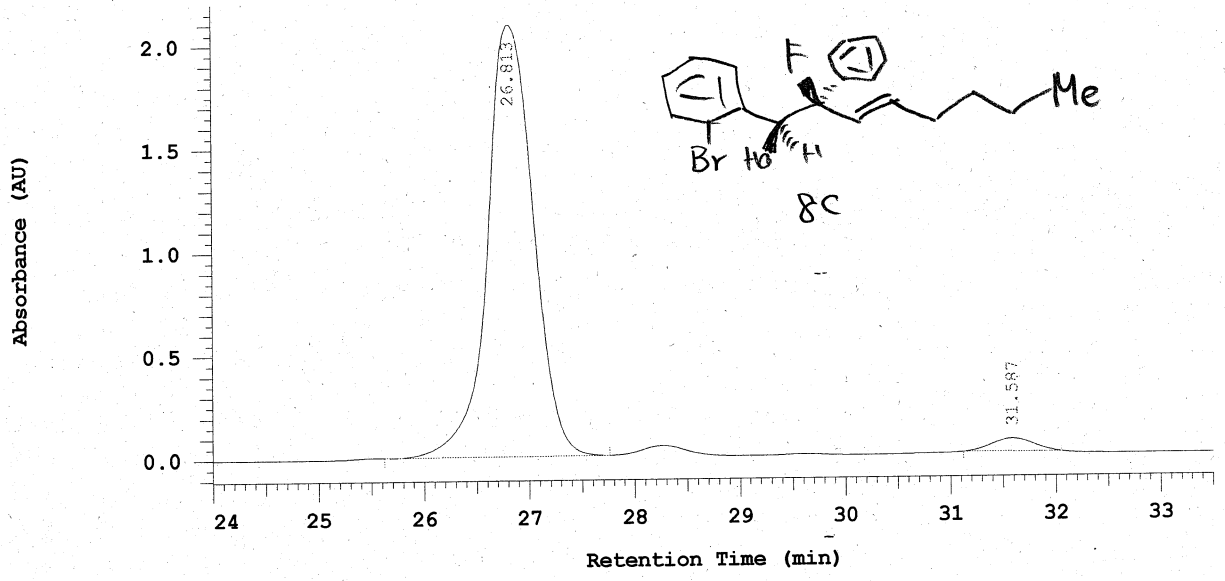
No.	RT	Area	Conc 1	BC
1	29.007	10776113	50.031	MC
2	33.720	10762549	49.969	MC
		21538662	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/13 14:19
Reported Date and Time: 2019/02/13 15:52:16
Processed Date and Time: 2019/02/13 15:51
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0172\
Processing Method: column6(IF-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY808-Br-IF3-1%chiral
Injection from this vial: 1 of 1
Sample Description:
Series: 0172
Vial Number: 46
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	26.813	31735019	97.360	MC
2	31.587	860610	2.640	BB
		32595629	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/13 15:18 Reported Date and Time: 2019/02/13 15:56:20

Processed Date and Time: 2019/02/13 15:56

Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0173\

Processing Method: column6(IF-3)

System (acquisition): Sys 1 Series: 0173

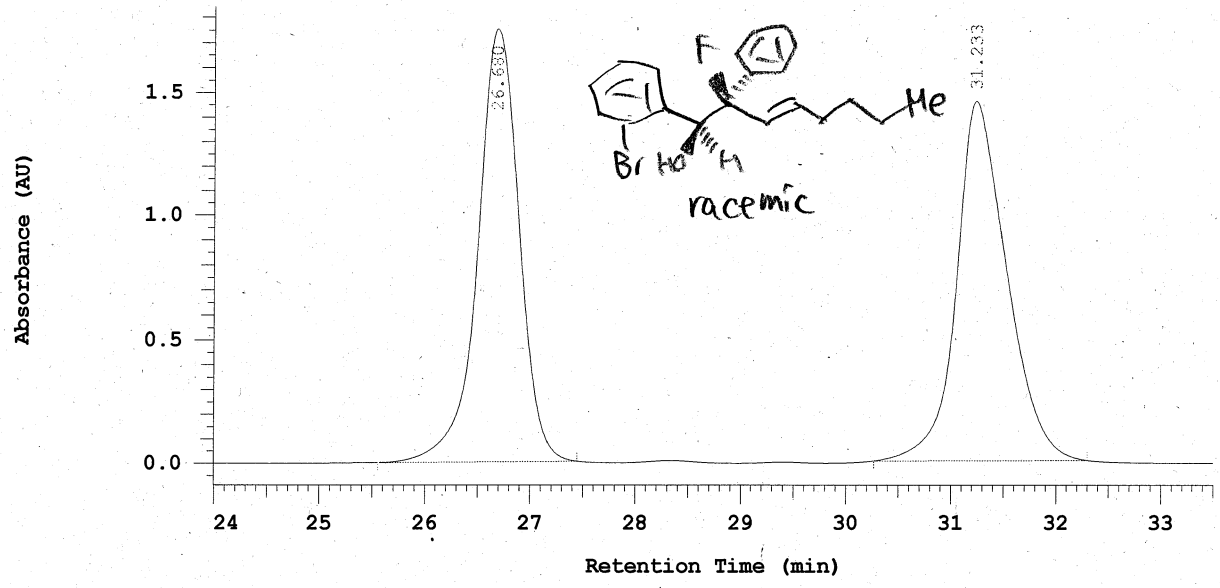
Application(data): AKY Vial Number: 45

Sample Name: AKY802-Br-IF3-1%rac Vial Type: UNK

Injection from this vial: 1 of 1 Volume: 10.0 ul

Sample Description:

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column6(IF-3)

Method Developer:

Pump 1: 5110

Pump 1 Solvent A: hexane Pump 1 Solvent B: 2-propanol

Pump 1 Solvent C: Pump 1 Solvent D:

Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm

Peak Quantitation: AREA

Calculation Method: AREA%

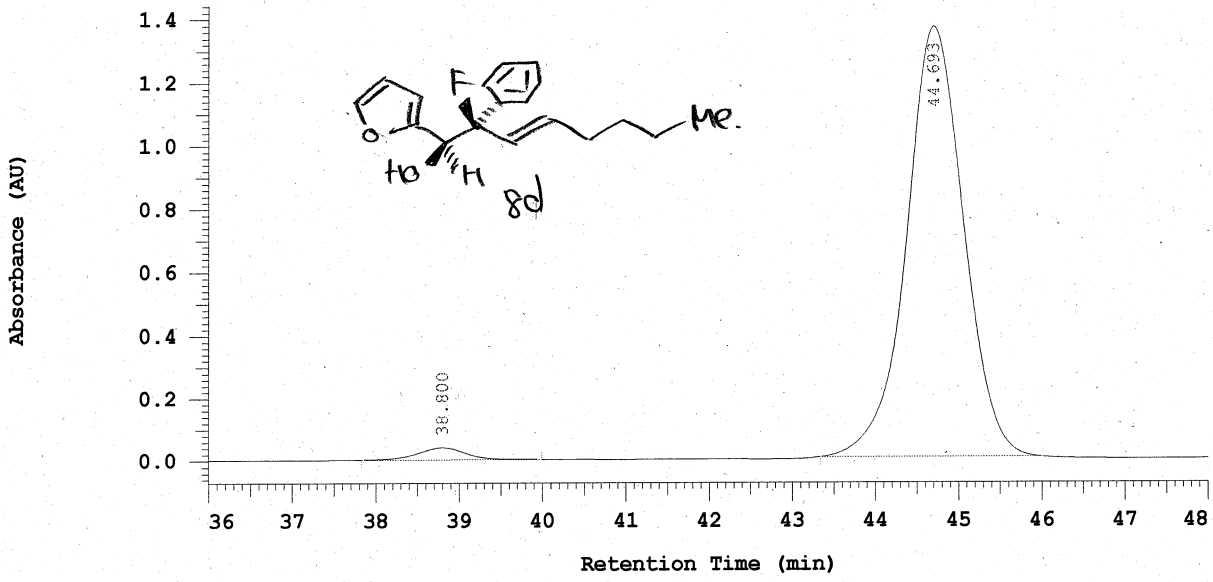
No.	RT	Area	Conc 1	BC
1	26.680	23993254	49.706	BB
2	31.233	24276897	50.294	BB
		48270151	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/17 20:12
Reported Date and Time: 2019/02/18 09:08:22
Processed Date and Time: 2019/02/18 09:08
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0198\
Processing Method: column6(IF-3)
System (acquisition): Sys 1
Series: 0198
Application(data): AKY
Vial Number: 62
Sample Name: AKY820-Ph-furan-IF-2%-chir
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	38.800	763662	2.289	MC
2	44.693	32596794	97.711	MC
		33360456	100.000	

Peak rejection level: 0

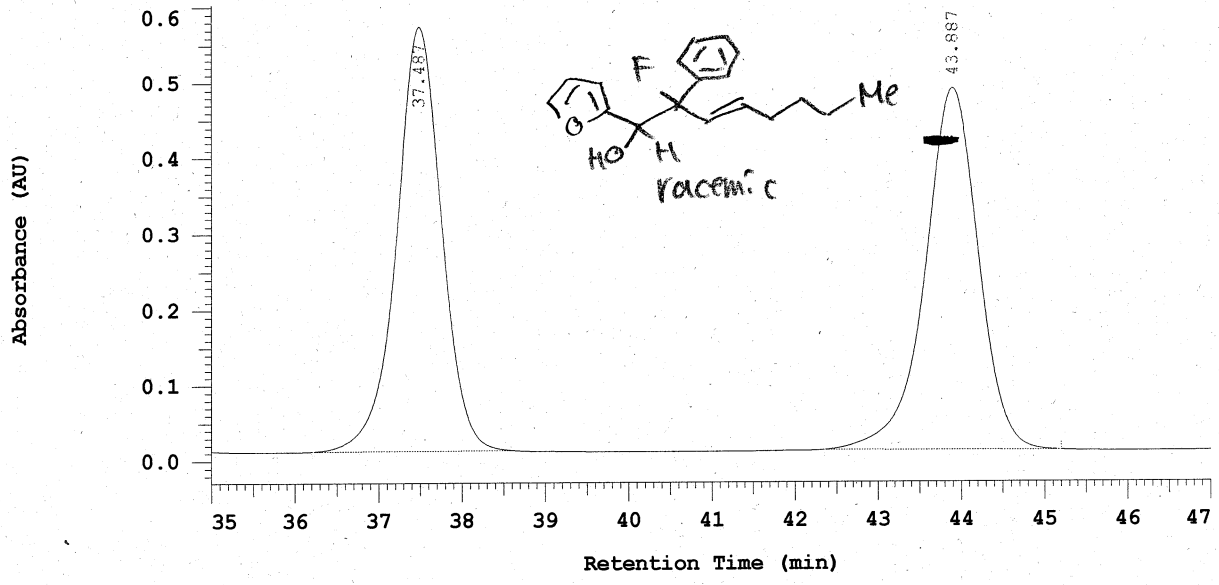
Chromaster System Manager Report

Analyzed Date and Time: 2019/02/17 19:00
Reported Date and Time: 2019/02/18 09:10:46
Processed Date and Time: 2019/02/18 09:10
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0197\
Processing Method: column6(IF-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY805-Ph-furan-IF-2%-rac
Injection from this vial: 1 of 1
Sample Description:

Series: 0197
Vial Number: 61
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm
Peak Quantitation: AREA
Calculation Method: AREA%

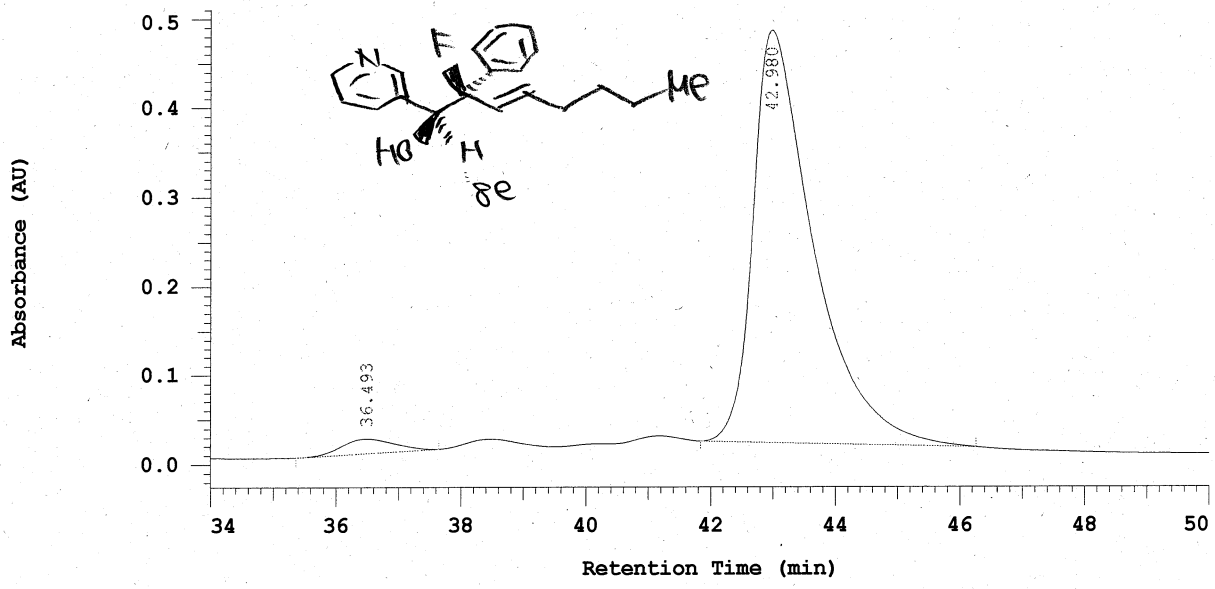
No.	RT	Area	Conc 1	BC
1	37.487	10561309	49.729	MC
2	43.887	10676580	50.271	MC
		21237889	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/23 11:02
Reported Date and Time: 2019/02/25 10:38:43
Processed Date and Time: 2019/02/25 10:38
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0206\
Processing Method: column6(IF-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY798-pyridine-IF-10%-chiral
Series: 0206
Vial Number: 92
Vial Type: UNK
Volume: 10.0 ul
Injection from this vial: 1 of 1
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	36.493	476384	2.980	MC
2	42.980	15510969	97.020	MC
		15987353	100.000	

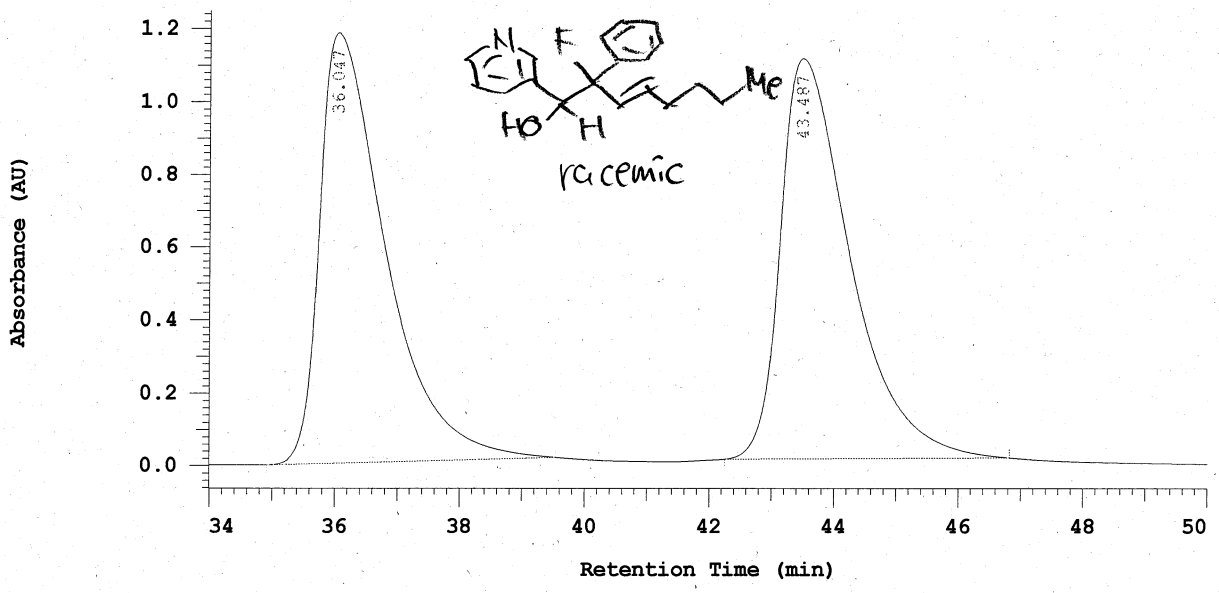
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/23 16:20
Reported Date and Time: 2019/02/25 10:43:03
Processed Date and Time: 2019/02/25 10:42
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0209\
Processing Method: column6(IF-3)

System (acquisition): Sys 1
Series: 0209
Application(data): AKY
Vial Number: 91
Sample Name: AKY795-pyridine-IF-10%-rac
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	36.047	43278602	50.269	BB
2	43.487	42815201	49.731	BB
		86093803	100.000	

Peak rejection level: 0

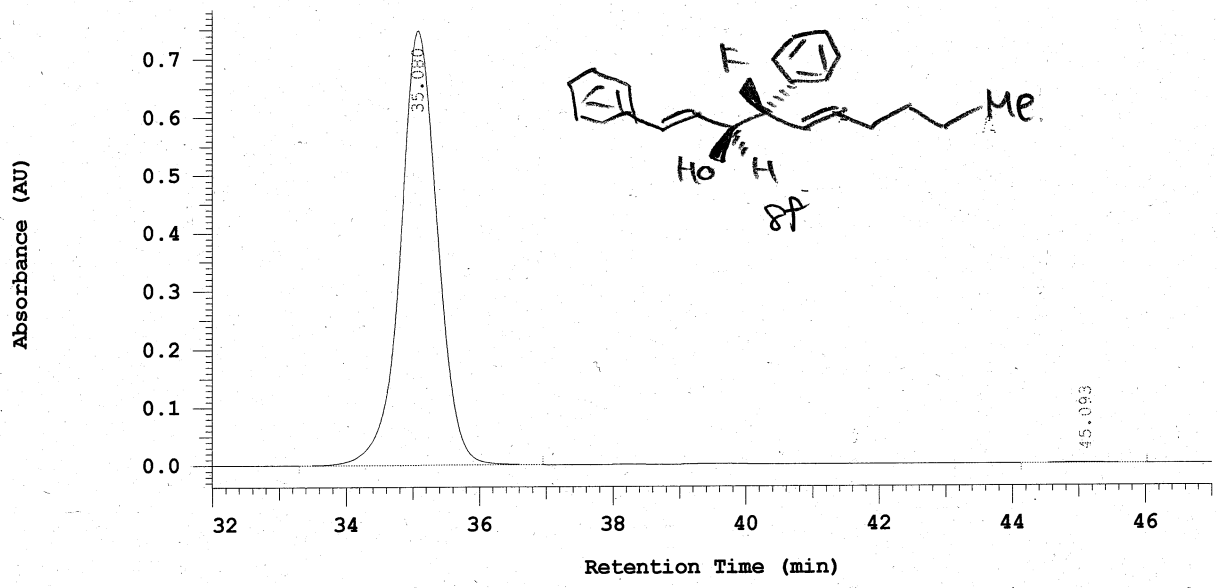
Chromaster System Manager Report

Analyzed Date and Time: 2019/02/16 21:34
Reported Date and Time: 2019/02/17 14:52:35
Processed Date and Time: 2019/02/17 14:49
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0196\
Processing Method: column6(IF-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY824-Ph-conjugate-IF-2%-chir
Series: 0196
Vial Number: 60
Vial Type: UNK
Volume: 10.0 ul

Injection from this vial: 1 of 1
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm

Peak Quantitation: AREA
Calculation Method: AREA%

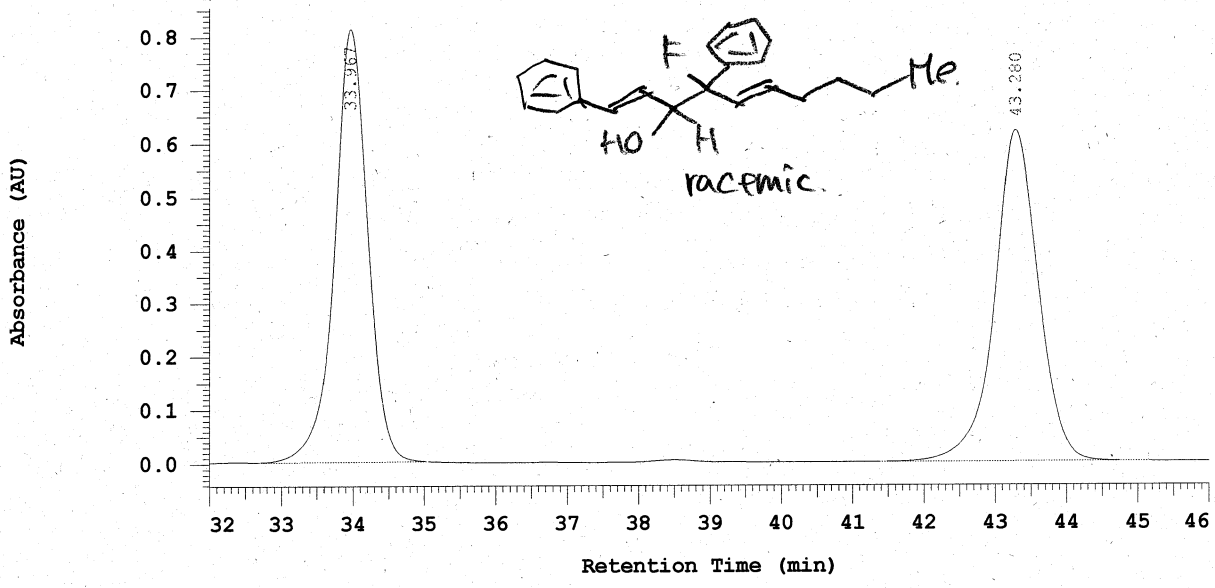
No.	RT	Area	Conc 1	BC
1	35.080	14594816	99.774	MC
2	45.093	33036	0.226	MC
		14627852	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/02/16 20:23
Reported Date and Time: 2019/02/17 14:46:48
Processed Date and Time: 2019/02/17 14:46
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0195\
Processing Method: column6(IF-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY799-Ph-conjugat-IF-2%-rac
Series: 0195
Vial Number: 59
Vial Type: UNK
Volume: 10.0 ul
Injection from this vial: 1 of 1
Sample Description:

Chrom Type: Fixed WL Chromatogram, 250 nm



Processing Method: column6(IF-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 250 nm
Peak Quantitation: AREA
Calculation Method: AREA%

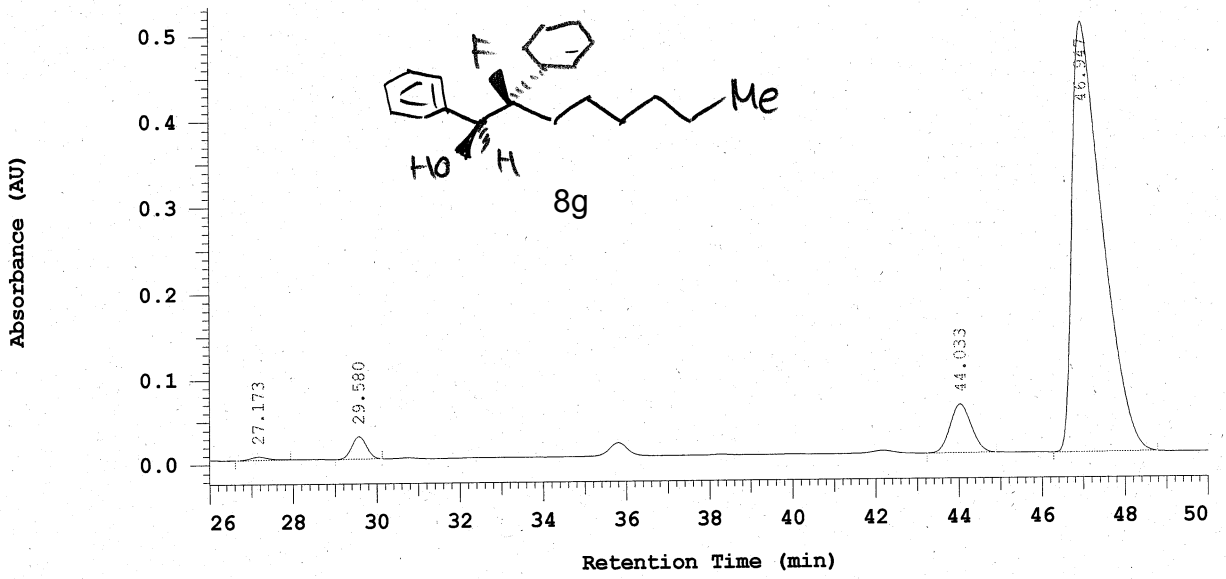
No.	RT	Area	Conc 1	BC
1	33.967	13039773	49.816	MC
2	43.280	13135973	50.184	MC
		26175746	100.000	

Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2018/11/02 14:34
Reported Date and Time: 2018/11/02 15:38:46
Processed Date and Time: 2018/11/02 15:38
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0075\
Processing Method: column2(IBN-3)
System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY713-chiraCy-allylb-IBN-1.5%
Series: 0075
Vial Number: 17
Vial Type: UNK
Volume: 10.0 ul
Injection from this vial: 1 of 1
Sample Description:

Chrom Type: Fixed WL Chromatogram, 206 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 206 nm

Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	27.173	55280	0.393	MC
2	29.580	330545	2.350	MC
3	44.033	1026848	7.301	BB
4	46.947	12651174	89.955	BB
		14063847	100.000	

Peak rejection level: 0

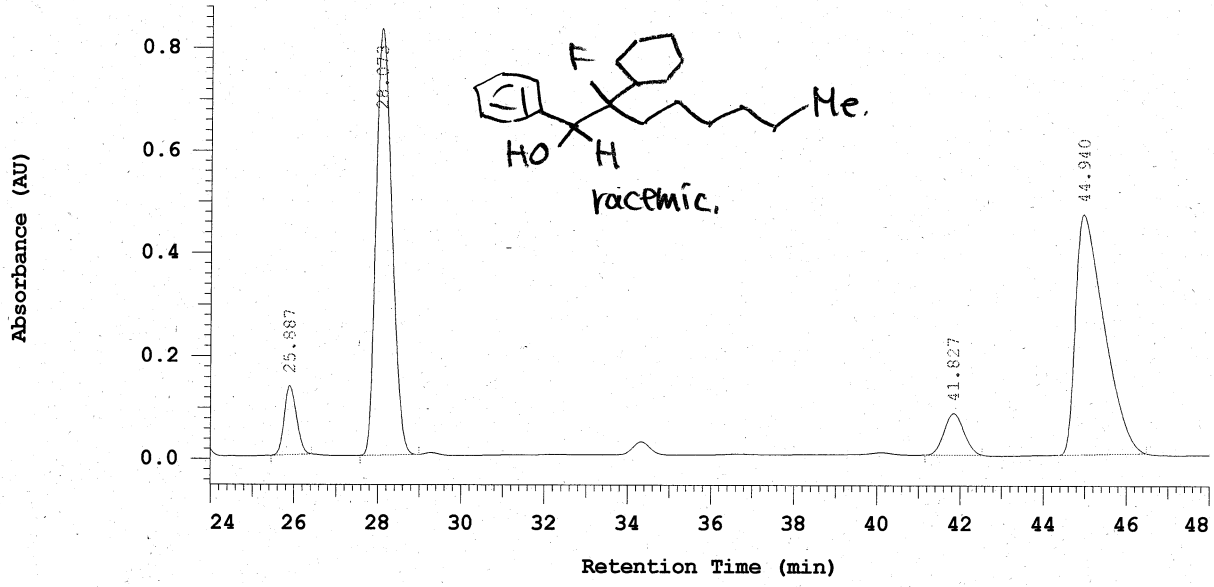
Chromaster System Manager Report

Analyzed Date and Time: 2018/11/02 13:58
Reported Date and Time: 2019/02/22 15:29:13
Processed Date and Time: 2019/02/22 15:29
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0073_Cy-PhCHO-rac\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Application(data): AKY
Sample Name: AKY711-racCy-allylb-IBN-1.5%
Injection from this vial: 1 of 1
Sample Description:

Series: 0073_Cy-PhCHO-rac
Vial Number: 16
Vial Type: UNK
Volume: 10.0 ul

Chrom Type: Fixed WL Chromatogram, 202 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 202 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	25.887	1402199	5.628	BB
2	28.073	10945221	43.931	BB
3	41.827	1369634	5.497	BB
4	44.940	11197789	44.944	BB
		24914843	100.000	

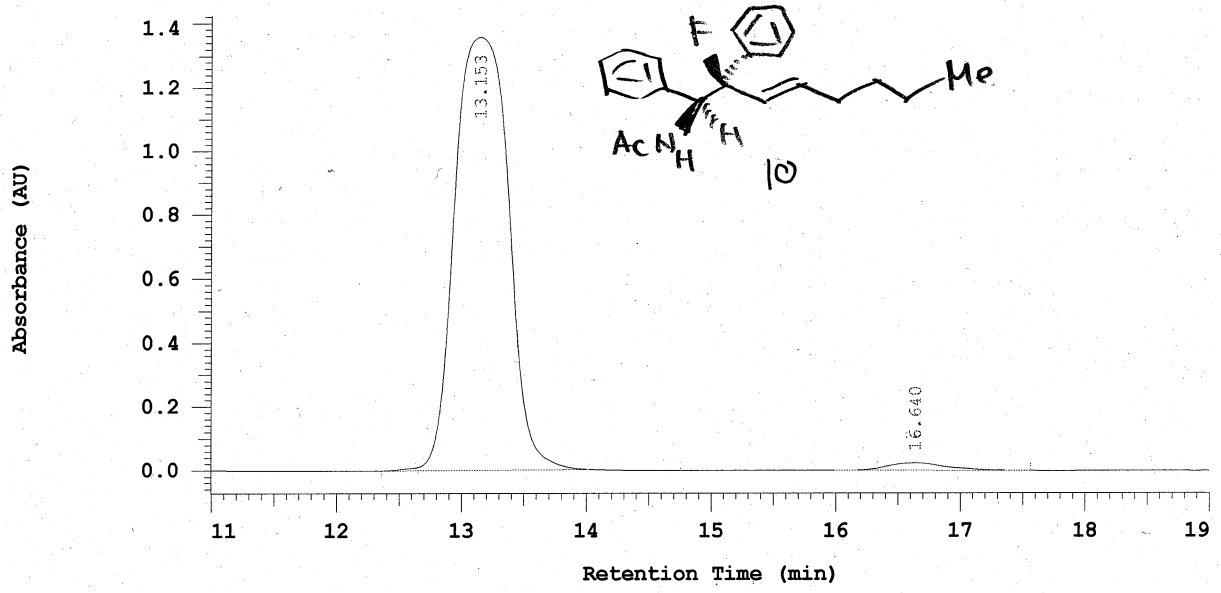
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/02 00:30
Reported Date and Time: 2019/03/25 20:34:41
Processed Date and Time: 2019/03/25 20:34
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0228\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Series: 0228
Application(data): AKY
Vial Number: 100
Sample Name: AKY832-NHAc-chiral-IF-15%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	13.153	20332035	98.133	MC
2	16.640	386792	1.867	MC
		20718827	100.000	

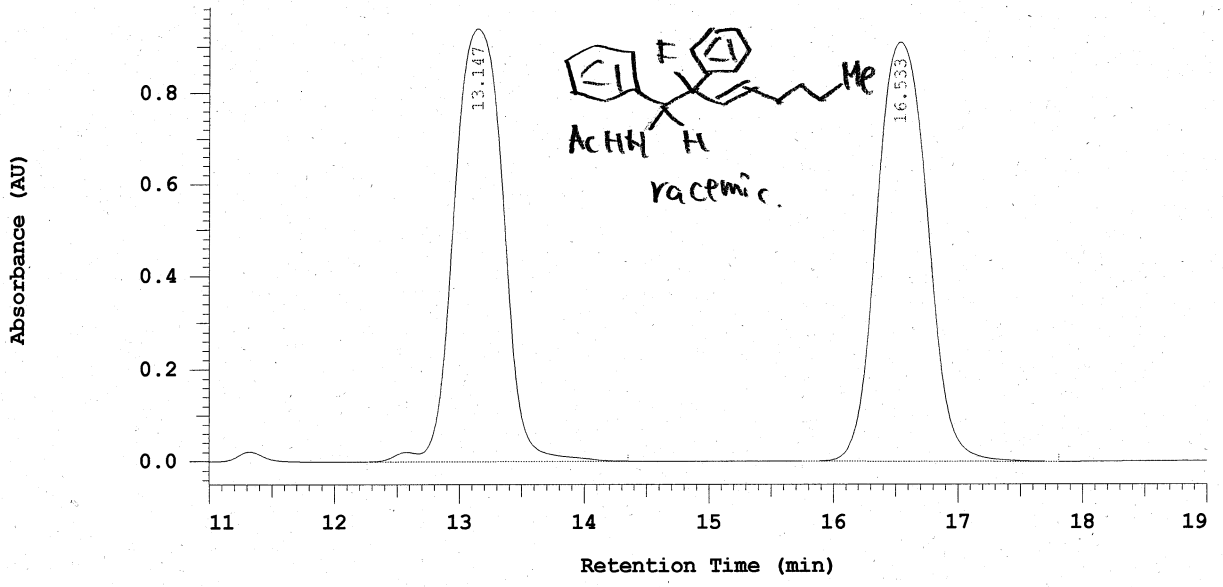
Peak rejection level: 0

Chromaster System Manager Report

Analyzed Date and Time: 2019/03/01 22:53
Reported Date and Time: 2019/03/25 20:38:15
Processed Date and Time: 2019/03/25 20:38
Data Path: C:\WIN32APP\CHROMASTER\AKY\DATA\0227\
Processing Method: column2(IBN-3)

System (acquisition): Sys 1
Series: 0227
Application(data): AKY
Vial Number: 99
Sample Name: AKY830-NHAc-rac-IF-15%
Vial Type: UNK
Injection from this vial: 1 of 1
Volume: 10.0 ul
Sample Description:

Chrom Type: Fixed WL Chromatogram, 203 nm



Processing Method: column2(IBN-3)
Method Developer:
Pump 1: 5110
Pump 1 Solvent A: hexane
Pump 1 Solvent B: 2-propanol
Pump 1 Solvent C:
Pump 1 Solvent D:
Method Description:

Chrom Type: Fixed WL Chromatogram, 203 nm
Peak Quantitation: AREA
Calculation Method: AREA%

No.	RT	Area	Conc 1	BC
1	13.147	12858525	50.002	MC
2	16.533	12857301	49.998	BB
		25715826	100.000	

Peak rejection level: 0