Supporting Information

Cooperation of *Cis* Vicinal Acceptors for Donor−Acceptor Cyclopropane Activation: TfOH-Promoted Ring-Opening/Aryl Shift Rearrangement to 3- and 5-Ylidenebutenolides

Jiru Shao,[†] Qinyuan Luo,[†] Hongyan Bi,[†] and Sunewang R. Wang[*,†,‡]

[†]Chang-Kung Chuang Institute, School of Chemistry and Molecular Engineering, East China Normal University, 500 Dongchuan Lu, Shanghai 200241, China

[‡]Shanghai Engineering Research Center of Molecular Therapeutics and New Drug Development, East China Normal University, 3663 North Zhongshan Lu, Shanghai 200062, China

Contents

1. General information

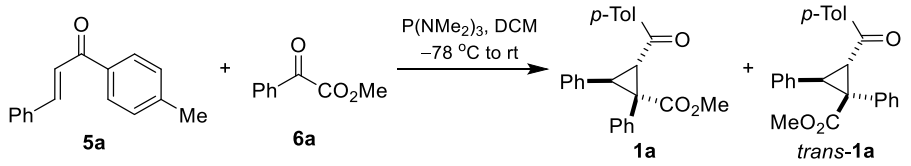
All reactions were carried out under dry argon atmosphere. All solvents and reagents were obtained from commercial sources and were purified according to standard procedures. All glassware was oven-dried before use.

NMR spectra were recorded on a Brucker 500 MHz (^{1}H: 500 MHz, ^{13}C: 125 MHz and ^{19}F: 470 MHz) or Brucker 600 MHz (^{1}H: 600 MHz, ^{13}C: 150 MHz) in $CDCl_3$ at 298 K. ^{1}H and ^{13}C NMR spectra in $CDCl_3$ were internally referenced to the proton (^{1}H) of the internal TMS signal at 0.00 ppm and the residual carbon nuclei (^{13}C) of the solvent signal at 77.16 ppm, respectively. ^{19}F NMR spectra were referenced to external standard $CFCl_3$ at 0.00 ppm. The data are reported in ppm as (s = singlet, d = doublet, t = triplet, q = quadruplet, m = multiplet or unresolved, br s = broad singlet, coupling constant(s) in Hz, integration). High resolution mass spectra were determined on a Brucker MAXIS impact mass spectrometer (ESI) or a Waters GCT Premier micromass spectrometer (EI). Melting points were obtained by SGW X4 Micro Melting Point Apparatus.

Substituted methyl benzoylformates[1] and 2-acylcyclopropane-1-carboxylates[2] were prepared according to the procedures reported in the literatures.

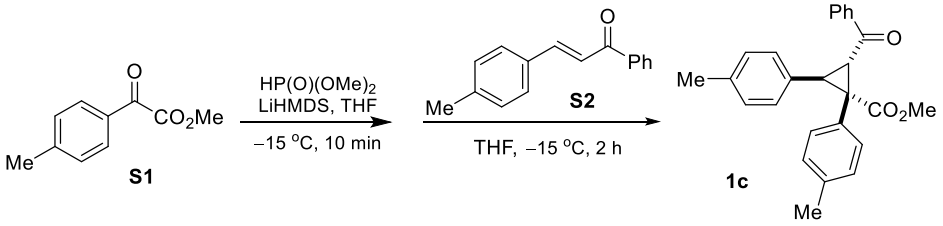
2. Preparation of new DACs

Method A:

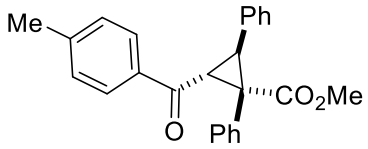


A modified procedure according to the literature:[2a] To a stirred solution of α,β-unsaturated ketone **5a** (500.1 mg, 2.252 mmol, 1.0 equiv) and methyl benzoylformate **6a** (425.7 mg, 2.593 mmol, 1.2 equiv) in DCM (6.0 mL) cooled at −78 ºC, was added dropwise $P(NMe_2)_3$ (496.1 mg, 3.040 mmol, 1.3 equiv) via microsyringe. Upon complete addition of $P(NMe_2)_3$, the solution was warmed to rt and vigorously stirred at rt. After the reaction was completed as monitored by TLC, the mixture was concentrated under vacuum and purified by flash column chromatography on silica gel eluted with PE/Et_2O/DCM (40/0.5/1 to 7/0.5/1, v/v/v) to afford the corresponding products **1a** (518.3 mg, 62%) and *trans*-**1a** (294.5 mg, 35%).

Method B:



The same procedure as reported in the literature:[2b] To a solution of α-Ketoester **S1** (360.9 mg, 2.025 mmol, 2.0 equiv) and dimethyl phosphite phosphite (0.18 mL, 2.0 mmol, 2.0 equiv) in THF (6.0 mL) cooled at −15 °C, was added dropwise 1.0 M LiHMDS in THF (2.0 mL, 2.0 mmol) at −15 °C. After additional 10 min, a solution of α,β-unsaturated ketone **S2** (222.6 mg, 1.001 mmol, 1.0 equiv) in THF (3.0 mL) was added dropwise. The reaction was stirred at the same temperature and was monitored by TLC. Once the α,β-unsaturated ketone was fully consumed (2 h), the reaction mixture was quenched with saturated aqueous ammonium chloride. After being warmed to rt, the mixture was extracted with ethyl acetate. The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under vacuum. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (30/1 to 10/1, v/v) to give the product **1c** (338.7 mg, 88%).



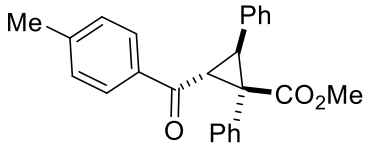
1a

Known compound.[2b]

Method A: 459.3 mg, 62% (based on **5a**: 500.1 mg, 2.252 mmol).

Colorless solid. PE/Et_2O/DCM = 40/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.99 (d, *J* = 8.5 Hz, 2H), 7.31 (d, *J* = 8.0 Hz, 2H), 7.21 (br s, 5H), 7.14-7.11 (m, 3H), 6.92-6.90 (m, 2H), 3.79 (d, *J* = 6.5 Hz, 1H), 3.73 (d, *J* = 6.5 Hz, 1H), 3.65 (s, 3H), 2.44 (s, 3H) ppm.



trans-**1a**

Method A: 276.1 mg, 35% (based on **5a**: 500.1 mg, 2.252 mmol).

Single-crystals for X-ray analysis were obtained from PE and EA at rt.

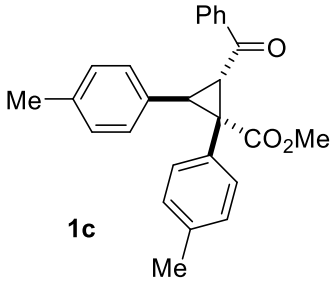
Colorless crystals. M.p. 158.2-159.1 °C. PE/Et_2O/DCM = 40/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.02 (d, *J* = 8.5 Hz, 2H), 7.38 (d, *J* = 7.5 Hz, 2H), 7.35-7.30 (m, 4H), 7.28-7.22 (m, 6H), 4.41 (d, *J* = 7.0 Hz, 1H), 3.99 (d, *J* = 7.0 Hz, 1H), 3.42 (s, 3H), 2.45 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 193.6, 170.1, 144.4, 135.6, 135.4, 134.9, 130.2, 129.6, 128.9, 128.7, 128.5, 128.0, 127.4, 52.9, 48.8, 35.5, 35.3, 21.9 ppm.

IR (neat): 3062 (w), 2952 (w), 1719 (s), 1672 (s), 1449 (m), 1428 (s), 1266 (s), 1207 (s), 1183 (s), 1162 (s), 806 (m), 745 (m), 716 (m), 698 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{22}O_3Na$ 393.1461; Found 393.1462.



1c

Method B: 338.7 mg, 88% (based on α,β-unsaturated ketone: 222.6 mg, 1.001 mmol).

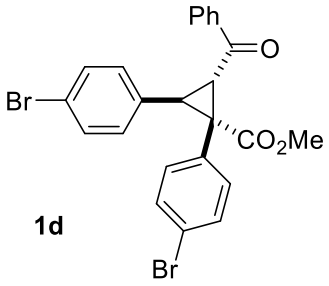
Colorless solid. M.p. 113.9-114.2 °C. PE/EA = 30/1 to 10/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.07 (d, *J* = 8.0 Hz, 2H), 7.60 (t, *J* = 7.5 Hz, 1H), 7.50 (t, *J* = 7.5 Hz, 2H), 7.11 (d, *J* = 8.0 Hz, 2H), 7.02 (d, *J* = 7.5 Hz, 2H), 6.95 (d, *J* = 8.0 Hz, 2H), 6.80 (d, *J* = 7.5 Hz, 2H), 3.74 (d, *J* = 6.5 Hz, 1H), 3.66 (d, *J* = 6.5 Hz, 1H), 3.64 (s, 3H), 2.28 (s, 3H), 2.25 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 196.1, 170.9, 137.7, 136.5, 133.4, 132.1, 131.3, 130.5, 129.3, 128.8, 128.4, 128.1, 52.9, 47.7, 37.3, 37.2, 21.3, 21.1 ppm.

IR (neat): 2946 (w), 1736 (s), 1661 (s), 1517 (m), 1451 (m), 1263 (s), 1152 (s), 1026 (m), 818 (s), 805 (s), 700 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{26}H_{24}O_3Na$ 407.1618; Found 407.1614.



1d

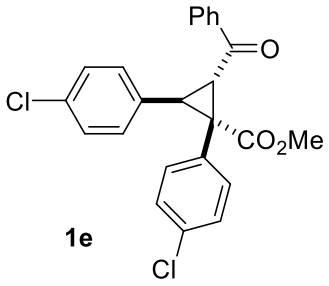
Method B: 385.9 mg, 75% (based on α,β-unsaturated ketone: 286.9 mg, 0.9990 mmol). Colorless solid. M.p. 103.7-104.5 °C. PE/EA = 30/1 to 10/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.04 (d, *J* = 7.5 Hz, 2H), 7.63 (t, *J* = 7.5 Hz, 1H), 7.52 (t, *J* = 7.8 Hz, 2H), 7.37 (d, *J* = 8.5 Hz, 2H), 7.30 (d, *J* = 8.5 Hz, 2H), 7.07 (d, *J* = 8.0 Hz, 2H), 6.79 (d, *J* = 8.0 Hz, 2H), 3.74 (d, *J* = 6.5 Hz, 1H), 3.64 (s, 3H), 3.62 (d, *J* = 7.0 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 195.1, 170.0, 137.2, 133.8, 133.7, 133.1, 132.3, 131.9, 131.5, 129.8, 129.0, 128.4, 122.5, 121.3, 53.1, 47.1, 36.9, 36.5 ppm.

Note: The crystals contain ca. 0.25 mol/mol of cyclohexane (δ 1.43 ppm and 27.0 ppm).

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}Br_2O_3Na$ 534.9515; Found 534.9517.



1e

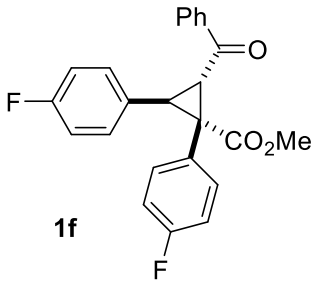
Method B: 366.3 mg, 79% (based on α,β-unsaturated ketone: 242.7 mg, 1.000 mmol). Colorless solid. M.p. 102.6-103.8 °C. PE/EA = 30/1 to 10/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.05 (d, *J* = 7.5 Hz, 2H), 7.63 (t, *J* = 7.5 Hz, 1H), 7.52 (t, *J* = 7.5 Hz, 2H), 7.21 (d, *J* = 8.5 Hz, 2H), 7.14 (d, *J* = 8.0 Hz, 2H), 7.13 (d, *J* = 8.0

Hz, 2H), 6.85 (d, *J* = 8.5 Hz, 2H), 3.76 (d, *J* = 7.0 Hz, 1H), 3.64 (s, 3H), 3.63 (d, *J* = 7.0 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 195.2, 170.1, 137.3, 134.3, 133.7, 133.3, 133.1, 132.6, 132.0, 129.4, 129.01, 128.98, 128.6, 128.4, 53.1, 47.0, 36.9, 36.5 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}Cl_2O_3Na$ 447.0525; Found 447.0524.



1f

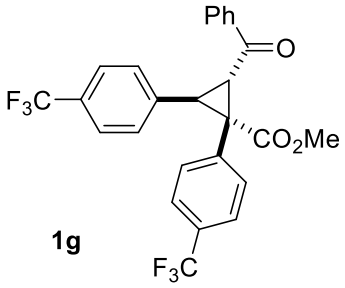
Method B: 330.7 mg, 84% (based on α,β-unsaturated ketone: 226.1 mg, 0.9992 mmol). Colorless solid. M.p. 153.6-155.7 °C. PE/EA = 30/1 to 10/1.

^{1}H NMR (600 MHz, $CDCl_3$): δ 8.06 (dd, *J* = 8.4, 1.2 Hz, 2H), 7.62 (t, *J* = 7.2 Hz, 1H), 7.52 (t, *J* = 7.2 Hz, 2H), 7.18-7.16 (m, 2H), 6.92 (t, *J* = 8.4 Hz, 2H), 6.89-6.84 (m, 4H), 3.77 (d, *J* = 6.6 Hz, 1H), 3.65 (s, 3H), 3.63 (d, *J* = 7.2 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 195.4, 170.4, 162.4 (C-F, $^{1}J_{C\text{-}F}$ = 246.4 Hz), 162.0 (C-F, $^{1}J_{C\text{-}F}$ = 244.6 Hz), 137.4, 133.6, 132.4 (C-F, $^{3}J_{C\text{-}F}$ = 8.1 Hz), 130.5 (C-F, $^{4}J_{C\text{-}F}$ = 2.8 Hz), 130.0 (C-F, $^{4}J_{C\text{-}F}$ = 2.8 Hz), 129.6 (C-F, $^{3}J_{C\text{-}F}$ = 8.1 Hz), 129.0, 128.4, 115.7 (C-F, $^{2}J_{C\text{-}F}$ = 21.8 Hz), 115.3 (C-F, $^{2}J_{C\text{-}F}$ = 20.8 Hz), 53.0, 46.9, 37.1, 36.4 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –113.4, –115.2 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}F_2O_3Na$ 415.1116; Found 415.1118.



1g

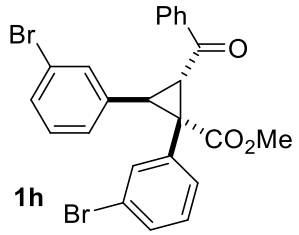
Method A: 276.1 mg, 56% (based on α,β-unsaturated ketone: 276.4 mg, 1.000 mmol). Colorless solid. M.p. 90.5-91.3 °C. PE/Et_2O/DCM = 30/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.06 (d, *J* = 8.0 Hz, 2H), 7.65 (t, *J* = 7.5 Hz, 1H), 7.54 (t, *J* = 7.5 Hz, 2H), 7.50 (d, *J* = 8.0 Hz, 2H), 7.43 (d, *J* = 8.0 Hz, 2H), 7.33 (d, *J* = 8.0 Hz, 2H), 7.03 (d, *J* = 8.0 Hz, 2H), 3.89 (d, *J* = 7.0 Hz, 1H), 3.76 (d, *J* = 6.5 Hz, 1H), 3.67 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 194.8, 169.6, 138.7, 137.9, 137.1, 133.9, 131.0, 130.6 (C-F, $^2J_{C\text{-}F}$ = 32.6 Hz), 129.6 (C-F, $^2J_{C\text{-}F}$ = 32.4 Hz), 129.1, 128.5, 128.4, 125.8 (C-F, $^3J_{C\text{-}F}$ = 4.4 Hz), 125.4 (C-F, $^3J_{C\text{-}F}$ = 4.4 Hz), 124.1 (C-F, $^1J_{C\text{-}F}$ = 270.8 Hz), 123.9 (C-F, $^1J_{C\text{-}F}$ = 269.7 Hz) ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –62.6, –62.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{26}H_{18}F_6O_3Na$ 515.1052; Found 515.1054.



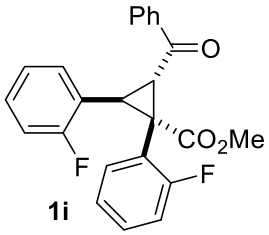
1h

Method A: 313.0 mg, 30% (based on α,β-unsaturated ketone: 574.7 mg, 2.001 mmol). Colorless solid. M.p. 132.7-133.3 °C. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.06 (d, *J* = 7.5 Hz, 2H), 7.64 (t, *J* = 7.5 Hz, 1H), 7.54 (t, *J* = 7.5 Hz, 2H), 7.41 (s, 1H), 7.39-7.37 (m, 1H), 7.29 (d, *J* = 8.0 Hz, 1H), 7.13-7.08 (m, 3H), 7.03 (t, *J* = 8.0 Hz, 1H), 6.81 (d, *J* = 8.0 Hz, 1H), 3.75 (d, *J* = 7.0 Hz, 1H), 3.67 (d, *J* = 7.0 Hz, 1H) 3.66 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 195.0, 169.8, 137.2, 137.0, 136.1, 133.8, 133.6, 131.5, 131.4, 130.4, 130.1, 129.8, 129.3, 129.0, 128.5, 126.6, 122.6, 122.4, 53.2, 47.2, 36.54, 36.49 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}Br_2O_3Na$ 534.9515; Found 534.9526.



1i

Method A: 601.1 mg, 77% (based on α,β-unsaturated ketone: 452.4 mg, 1.999 mmol). Colorless solid. M.p. 131.1-132.2°C. PE/Et_2O/DCM = 30/0.5/1 to 7/0.5/1.

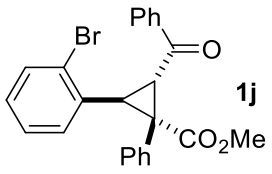
^{1}H NMR (500 MHz, $CDCl_3$): δ 8.10 (d, *J* = 7.5 Hz, 2H), 7.61 (t, *J* = 7.5 Hz, 1H), 7.50 (t, *J* = 7.5 Hz, 2H), 7.28 (t, *J* = 7.0 Hz, 1H), 7.20 (q, *J* = 6.5 Hz, 1H), 7.12 (q, *J* = 6.5 Hz, 1H), 7.03-6.97 (m, 2H), 6.89 (t, *J* = 9.0 Hz, 1H), 6.83 (t, *J* = 7.0 Hz, 1H), 6.66 (t, *J* = 7.5 Hz, 1H), 4.09 (d, *J* = 7.5 Hz, 1H), 3.83 (d, *J* = 7.5 Hz, 1H), 3.64 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 194.6, 169.8, 162.3 (C-F, $^1J_{C\text{-}F}$ = 246.4 Hz), 162.1 (C-F, $^1J_{C\text{-}F}$ = 248.1 Hz), 137.1, 133.6, 131.8 (C-F, $^3J_{C\text{-}F}$ = 3.6 Hz), 130.0 (C-F, $^3J_{C\text{-}F}$ =

8.1 Hz), 128.9, 128.8 (C-F, $^{3}J_{C\text{-}F}$ = 8.3 Hz), 128.6, 127.9 (C-F, $^{4}J_{C\text{-}F}$ = 2.6 Hz), 124.1 (C-F, $^{4}J_{C\text{-}F}$ = 2.8 Hz), 123.6 (C-F, $^{3}J_{C\text{-}F}$ = 3.6 Hz), 122.1 (C-F, $^{2}J_{C\text{-}F}$ = 13.5 Hz), 122.0 (C-F, $^{2}J_{C\text{-}F}$ = 12.6 Hz), 115.7 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 115.5 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 53.0, 41.1, 35.9, 30.5 (d, *J* = 4.5 Hz) ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –113.3, –116.4 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}F_2O_3Na$ 415.1116; Found 415.1118.

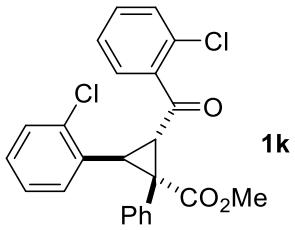


Method B: 218.7 mg, 50% (based on α,β-unsaturated ketone: 289.8 mg, 1.009 mmol). Colorless solid. M.p. 157.4-158.8 °C. PE/EA = 40/1 to 10/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.12 (d, *J* = 7.5 Hz, 2H), 7.62 (t, *J* = 7.5 Hz, 1H), 7.56-7.51 (m, 3H), 7.29-7.28 (m, 2H), 7.18-7.17 (m, 3H), 7.00-6.98 (m, 2H), 6.67-6.65 (m, 1H), 4.11 (d, *J* = 7.5 Hz, 1H), 3.84 (d, *J* = 7.5 Hz, 1H), 3.64 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 195.2, 170.4, 137.4, 134.5, 134.2, 133.6, 133.0, 130.0, 129.0, 128.6, 128.5, 128.4, 128.0, 127.9, 127.0, 126.8, 52.9, 46.7, 37.6, 35.6 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{19}BrO_3Na$ 457.0410; Found 457.0407.

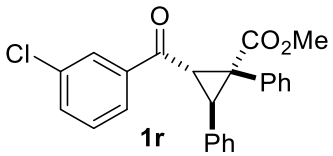


Method A: 317.0 mg, 37% (based on α,β-unsaturated ketone: 551.3 mg, 1.997 mmol). Colorless solid. M.p. 103.9-104.4 °C. PE/Et_2O/DCM = 40/1/1 to 10/1/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.64 (d, *J* = 7.0 Hz, 1H), 7.49-7.44 (m, 2H), 7.42-7.39 (m, 1H), 7.34 (d, *J* = 7.5 Hz, 1H), 7.21-7.20 (m, 2H), 7.14-7.13 (m, 3H), 7.05 (t, *J* = 7.5 Hz, 1H), 6.90 (t, *J* = 7.5 Hz, 1H), 6.64 (d, *J* = 8.0 Hz, 1H), 4.07 (d, *J* = 7.0 Hz, 1H), 3.86 (d, *J* = 6.5 Hz, 1H), 3.73 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 198.5, 170.2, 139.6, 136.0, 134.0, 132.8, 132.3, 131.3, 130.6, 130.0, 129.9, 129.6, 128.40, 128.36, 128.1, 128.0, 127.4, 126.3, 53.1, 48.9, 38.3, 36.4 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}Cl_2O_3Na$ 447.0525; Found 447.0519.



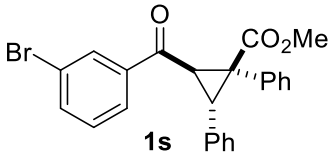
1r

Method B: 272.3 mg, 76% (based on α,β-unsaturated ketone: 242.6 mg, 1.000 mmol). Colorless oil. PE/Et_2O/DCM = 30/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.05 (s, 1H), 7.96 (d, *J* = 7.5 Hz, 1H), 7.58 (d, *J* = 7.5 Hz, 1H), 7.46 (t, *J* = 7.5 Hz, 1H), 7.22 (br s, 5H), 7.13 (br s, 3H), 6.91 (br s, 2H), 3.80 (d, *J* = 6.5 Hz, 1H), 3.67 (d, *J* = 6.0 Hz, 1H), 3.65 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 194.8, 170.4, 139.1, 135.3, 134.7, 134.0, 133.4, 130.6, 130.2, 128.6, 128.5, 128.19, 128.15, 128.1, 127.1, 126.5, 53.0, 48.5, 37.6, 36.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{19}ClO_3Na$ 413.0915; Found 413.0906.



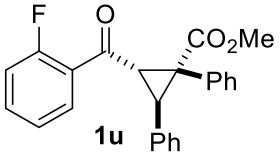
1s

Method B: 336.1 mg, 77% (based on α,β-unsaturated ketone: 287.7 mg, 1.002 mmol). Colorless oil. PE/Et_2O/DCM = 30/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.20 (s, 1H), 8.01 (d, *J* = 7.5 Hz, 1H), 7.74 (d, *J* = 8.0 Hz, 1H), 7.40 (t, *J* = 8.0 Hz, 1H), 7.22 (br s, 5H), 7.14-7.13 (m, 3H), 6.91-6.90 (m, 2H), 3.80 (d, *J* = 7.0 Hz, 1H), 3.67 (d, *J* = 7.0 Hz, 1H), 3.65 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 194.7, 170.4, 139.3, 136.3, 134.7, 134.0, 131.5, 130.6, 130.5, 128.6, 128.21, 128.16, 128.1, 127.1, 127.0, 123.3, 53.0, 48.5, 37.6, 36.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{19}BrO_3Na$ 457.0410; Found 457.0400.



1u

Method A: 222.4 mg, 29% (based on α,β-unsaturated ketone: 456.1 mg, 2.016 mmol). Colorless solid. M.p. 106.4-107.5 °C. PE/Et_2O/DCM = 30/0.5/1 to 10/0.5/1.

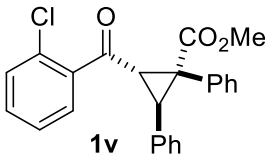
^{1}H NMR (500 MHz, $CDCl_3$): δ 7.85 (t, *J* = 7.5 Hz, 1H), 7.57 (q, *J* = 6.5 Hz, 1H), 7.28 (d, *J* = 7.5 Hz, 1H), 7.25-7.24 (m, 2H), 7.20-7.19 (m, 4H), 7.11-7.10 (m, 3H), 6.91-6.90 (m, 2H), 3.87 (dd, *J* = 6.5, 1.5 Hz, 1H), 3.81 (d, *J* = 6.5 Hz, 1H), 3.67 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 194.9 (C-F, $^3J_{C\text{-}F}$ = 2.6 Hz), 170.5, 162.0 (C-F, $^1J_{C\text{-}F}$ = 251.9 Hz), 135.1, 134.9 (C-F, $^3J_{C\text{-}F}$ = 9.0 Hz), 134.1, 131.0 (C-F, $^3J_{C\text{-}F}$ = 2.8 Hz), 130.6,

128.5, 128.2, 128.02, 127.96, 126.9, 126.7 (C-F, $^{2}J_{C\text{-}F}$ = 12.6 Hz), 124.8 (C-F, $^{4}J_{C\text{-}F}$ = 2.8 Hz), 116.8 (C-F, $^{2}J_{C\text{-}F}$ = 23.5 Hz), 52.9, 49.7, 39.8 (C-F, $^{4}J_{C\text{-}F}$ = 8.1 Hz), 38.1 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –110.3 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{19}FO_3Na$ 397.1210; Found 397.1212.



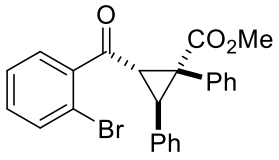
1v

Method B: 269.7 mg, 68% (based on α,β-unsaturated ketone: 246.5 mg, 1.016 mmol). Colorless solid. M.p. 95.8-96.5 °C. PE/Et_2O/DCM = 30/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.62 (d, *J* = 7.5 Hz, 1H), 7.48-7.45 (m, 2H), 7.39 (t, *J* = 7.0 Hz, 1H), 7.18 (br s, 5H), 7.11 (br s, 3H), 6.89 (br s, 2H), 3.79 (d, *J* = 6.5 Hz, 1H), 3.74 (d, *J* = 6.5 Hz, 1H), 3.71 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 199.1, 170.3, 139.7, 134.8, 133.9, 132.3, 131.5, 130.6, 130.5, 129.8, 128.5, 128.2, 128.1, 128.0, 127.3, 126.9, 53.0, 49.9, 39.9, 38.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{19}ClO_3Na$ 413.0915; Found 413.0917.



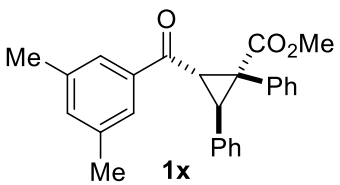
1w

Method B: 333.7 mg, 76% (based on α,β-unsaturated ketone: 289.3 mg, 1.007 mmol). Colorless solid. M.p. 96.3-97.1 °C. PE/Et_2O/DCM = 30/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.66 (d, *J* = 8.0 Hz, 1H), 7.59 (d, *J* = 7.0 Hz, 1H), 7.44 (t, *J* = 7.5 Hz, 1H), 7.36 (t, *J* = 7.5 Hz, 1H), 7.18 (br s, 5H), 7.11 (br s, 3H), 6.90 (br s, 2H), 3.81 (d, *J* = 6.0 Hz, 1H), 3.72 (s, 3H), 3.70 (d, *J* = 7.0 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 199.8, 170.3, 141.9, 134.8, 133.9, 133.8, 132.2, 130.5, 129.5, 128.5, 128.2, 128.1, 127.8, 127.0, 119.3, 53.0, 50.1, 39.7, 38.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{19}BrO_3Na$ 457.0410; Found 457.0404.



1x

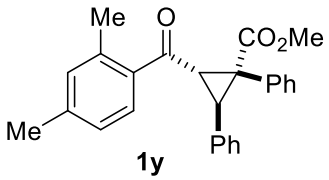
Method A: 297.5 mg, 39% (based on α,β-unsaturated ketone: 474.7 mg, 2.009 mmol).

Colorless oil. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.69 (s, 2H), 7.25-7.22 (m, 6H), 7.13-7.12 (m, 3H), 6.93-6.91 (m, 2H), 3.78 (d, *J* = 6.5 Hz, 1H), 3.73 (d, *J* = 7.0 Hz, 1H), 3.65 (s, 3H), 2.39 (s, 6H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 196.3, 170.7, 138.5, 137.8, 135.20, 135.15, 134.4, 130.6, 128.5, 128.2, 128.1, 128.0, 126.9, 126.2, 52.9, 48.3, 37.4, 36.8, 21.4 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{26}H_{24}O_3Na$ 407.1618; Found 407.1615.



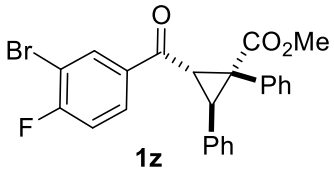
1y

Method B: 316.5 mg, 82% (based on α,β-unsaturated ketone: 238.0 mg, 1.007 mmol). Colorless solid. M.p. 91.2-92.3 °C. PE/Et_2O/DCM = 30/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.81 (d, *J* = 7.5 Hz, 1H), 7.20 (br s, 5H), 7.13-7.11 (m, 5H), 6.89-6.88 (m, 2H), 3.77 (d, *J* = 6.0 Hz, 1H), 3.66 (s, 3H), 3.60 (d, *J* = 6.5 Hz, 1H), 2.51 (s, 3H), 2.38 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 198.9, 170.7, 142.3, 138.8, 135.7, 135.2, 134.3, 132.9, 130.6, 129.3, 128.5, 128.2, 128.1, 127.9, 126.9, 126.6, 52.9, 48.7, 39.1, 37.6, 21.6. 21.2 ppm.

HRMS (ESI) m/z**:** $[M+Na]^+$ Calcd for $C_{26}H_{24}O_3Na$ 407.1618; Found 407.1617.



1z

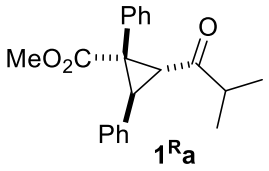
Method A: 478.1 mg, 52% (based on α,β-unsaturated ketone: 614.4 mg, 2.013 mmol). Colorless solid. M.p. 97.0-98.4 °C. PE/Et_2O/DCM = 30/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.31-8.30 (m, 1H), 8.05-8.03 (m, 1H), 7.25-7.19 (m, 6H), 7.15-7.14 (m, 3H), 6.91-6.90 (m, 2H), 3.79 (d, *J* = 6.5 Hz, 1H), 3.66 (s, 3H), 3.62 (d, *J* = 6.5 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 193.3, 170.4, 162.3 (C-F, $^1J_{C\text{-}F}$ = 253.6 Hz), 135.0 (C-F, $^3J_{C\text{-}F}$ = 3.6 Hz), 134.6, 134.3 (C-F, unresolved), 133.9, 130.6, 129.6 (C-F, $^3J_{C\text{-}F}$ = 8.1 Hz), 128.6, 128.2, 128.14, 128.12, 127.2, 116.9 (C-F, $^2J_{C\text{-}F}$ = 22.5 Hz), 110.2 (C-F, $^2J_{C\text{-}F}$ = 21.6 Hz), 53.0, 48.3, 37.5, 36.7 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –98.9 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}BrFO_3Na$ 475.0316; Found 475.0321.



1^{R}a

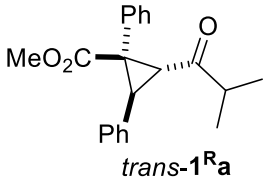
Method A: 250.2 mg, 39% (based on α,β-unsaturated ketone: 348.5 mg, 2.000 mmol). Colorless solid. M.p. 74.7-75.2 ºC. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.19-7.11 (m, 5H), 7.11-7.09 (m, 3H), 6.85-6.83 (m, 2H), 3.65 (s, 3H), 3.57 (d, *J* = 6.5 Hz, 1H), 3.15 (d, *J* = 6.5 Hz, 1H), 2.96 (hept, *J* = 7.0 Hz, 1H), 1.31 (d, *J* = 7.0 Hz, 3H), 1.23 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 209.8, 170.4, 135.1, 134.2, 130.5, 128.5, 128.1, 128.04, 127.99, 126.8, 52.8, 48.6, 42.3, 37.6, 36.8, 18.3, 18.0 ppm.

IR (neat): 2977 (w), 1729 (s), 1703 (s), 1432 (m), 1256 (s), 1188 (m), 1153 (s), 1069 (m), 1059 (m), 695 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{22}O_3Na$ 345.1461; Found 345.1455.



trans-**1^{R}a**

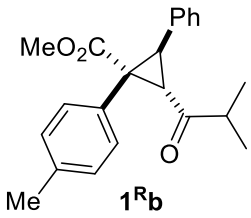
Method A: 174.9 mg, 27% (based on α,β-unsaturated ketone: 348.5 mg, 2.000 mmol). Colorless oil. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.35-7.24 (m, 10H), 3.80 (d, *J* = 7.5 Hz, 1H), 3.73 (d, *J* = 7.0 Hz, 1H),3.36 (s, 3H), 2.83 (hept, *J* = 7.0 Hz, 1H), 1.16 (d, *J* = 6.5 Hz, 3H), 1.14 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 207.7, 169.9, 135.2, 135.0, 130.2, 128.7, 128.5, 128.0, 127.4, 52.7, 48.8, 42.6, 36.6, 36.1, 17.9, 17.8 ppm.

IR (neat): 2968 (w), 1727 (s), 1703 (s), 1447 (m), 1253 (s), 1207 (s), 1156 (s), 1050 (m), 717 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{22}O_3Na$ 345.1461; Found 345.1461.



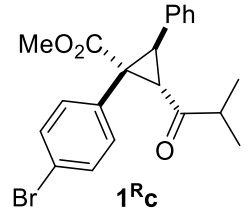
1^{R}b

Method B: 273.3 mg, 81% (based on α,β-unsaturated ketone: 174.5 mg, 1.002 mmol). Colorless oil. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.11-7.10 (m, 3H), 7.04 (d, *J* = 8.0 Hz, 2H), 6.98 (d, *J* = 8.0 Hz, 2H), 6.86-6.84 (m, 2H), 3.64 (s, 3H), 3.55 (d, *J* = 6.5 Hz, 1H), 3.12 (d, *J* = 6.5 Hz, 1H), 2.95 (hept, *J* = 7.0 Hz, 1H), 2.25 (s, 3H), 1.30 (d, *J* = 7.0 Hz, 3H), 1.22 (d, *J* = 6.5 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.9, 170.5, 137.8, 135.3, 131.1, 130.4, 129.2, 128.1, 128.0, 126.8, 52.8, 48.4, 42.4, 37.8, 36.8, 21.3, 18.3, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{24}O_3Na$ 359.1618; Found 359.1616.



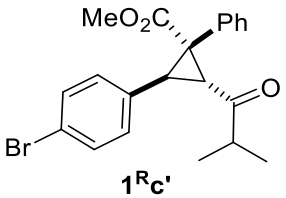
1^{R}c

Method A: 321.3 mg, 40% (based on α,β-unsaturated ketone: 349.2 mg, 2.004 mmol). Colorless oil. PE/Et_2O/DCM = 30/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.31 (d, *J* = 8.5 Hz, 2H), 7.15-7.12 (m, 3H), 7.01 (d, *J* = 8.5 Hz, 2H), 6.86-6.84 (m, 2H), 3.66 (s, 3H), 3.57 (d, *J* = 6.5 Hz, 1H), 3.09 (d, *J* = 6.5 Hz, 1H), 2.95 (hept, *J* = 7.0 Hz, 1H), 1.29 (d, *J* = 6.5 Hz, 3H), 1.22 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.4, 170.0, 134.7, 133.4, 132.3, 131.7, 128.3, 128.1, 127.1, 122.3, 53.0, 47.7, 42.3, 37.5, 36.8, 18.3, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{21}BrO_3Na$ 423.0566; Found 423.0561.



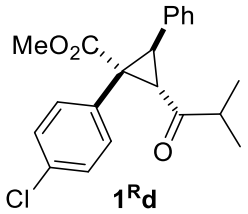
1^{R}c'

Method B: 326.5 mg, 81% (based on α,β-unsaturated ketone: 255.2 mg, 1.008 mmol). Colorless solid. M.p. 72.9-74.0 ºC. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.23-7.20 (m, 5H), 7.16-7.13 (m, 2H), 6.69 (d, *J* = 8.5 Hz, 2H), 3.65 (s, 3H), 3.51 (d, *J* = 6.5 Hz, 1H), 3.09 (d, *J* = 6.0 Hz, 1H), 2.95 (hept, *J* = 7.0 Hz, 1H), 1.30 (d, *J* = 7.0 Hz, 3H), 1.22 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.4, 170.1, 134.3, 133.8, 131.2, 130.4, 129.7, 128.7, 128.2, 120.8, 52.9, 48.6, 42.4, 37.7, 36.1, 18.2, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{21}BrO_3Na$ 423.0566; Found 423.0561.



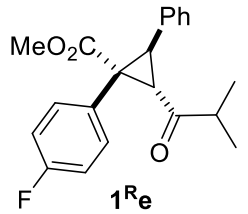
1^{R}d

Method B: 239.2 mg, 67% (based on α,β-unsaturated ketone: 174.3 mg, 1.001 mmol). Colorless solid. M.p. 64.7-66.1 ºC. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.16-7.12 (m, 5H), 7.07 (d, *J* = 9.0 Hz, 2H), 6.86-6.84 (m, 2H), 3.66 (s, 3H), 3.57 (d, *J* = 6.5 Hz, 1H), 3.10 (d, *J* = 6.5 Hz, 1H), 2.95 (hept, *J* = 7.0 Hz, 1H), 1.29 (d, *J* = 7.5 Hz, 3H), 1.22 (d, *J* = 7.5 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.5, 170.1, 134.7, 134.0, 132.8, 131.9, 128.8, 128.3, 128.1, 127.1, 53.0, 47.6, 42.3, 37.6, 36.8, 18.3, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{21}ClO_3Na$ 379.1071; Found 379.1074.



1^{R}e

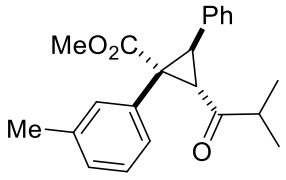
Method A: 77.1 mg, 23% (based on α,β-unsaturated ketone: 175.0 mg, 1.005 mmol). Colorless oil. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.13-7.10 (m, 5H), 6.88-6.83 (m, 4H), 3.66 (s, 3H), 3.56 (d, *J* = 6.5 Hz, 1H), 3.10 (d, *J* = 6.5 Hz, 1H), 2.95 (hept, *J* = 7.0 Hz, 1H), 1.30 (d, *J* = 7.0 Hz, 3H), 1.22 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.6, 170.3, 162.4 (C-F, $^1J_{C\text{-}F}$ = 246.4 Hz), 134.8, 132.3 (C-F, $^3J_{C\text{-}F}$ = 8.1 Hz), 130.1 (C-F, $^4J_{C\text{-}F}$ = 3.6 Hz), 128.2, 128.1, 127.0, 115.5 (C-F, $^2J_{C\text{-}F}$ = 21.6 Hz), 52.9, 47.6, 42.3, 37.8, 36.8, 18.3, 18.0 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –113.6 ppm.

HRMS(ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{21}FO_3Na$ 363.1367; Found 363.1368.



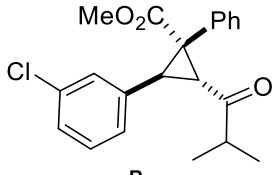
1^{R}f

Method B: 250.1 mg, 74% (based on α,β-unsaturated ketone: 175.1 mg, 1.005 mmol). Colorless oil. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.12-7.09 (m, 3H), 7.06 (t, *J* = 7.5 Hz, 1H), 6.99 (d, *J* = 7.5 Hz, 1H), 6.96 (s, 1H), 6.93 (d, *J* = 8.0 Hz, 1H), 6.85-6.83 (m, 2H), 3.65 (s, 3H), 3.55 (d, *J* = 6.5 Hz, 1H), 3.13 (d, *J* = 6.5 Hz, 1H), 2.97 (hept, *J* = 7.0 Hz, 1H), 2.21 (s, 3H), 1.30 (d, *J* = 7.0 Hz, 3H), 1.22 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.9, 170.5, 138.1, 135.2, 134.0, 131.2, 128.8, 128.3, 128.1, 128.0, 127.6, 126.8, 52.8, 48.5, 42.3, 37.7, 36.9, 21.4, 18.3, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{24}O_3Na$ 359.1618; Found 359.1619.



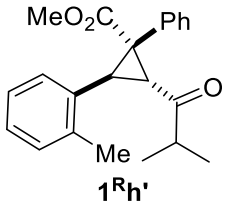
1^{R}g'

Method B: 263.4 mg, 73% (based on α,β-unsaturated ketone: 210.1 mg, 1.008 mmol). Colorless solid. M.p. 69.2-70.3 ºC. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.22-7.20 (m, 3H), 7.17-7.15 (m, 2H), 7.09-7.06 (m, 1H), 7.02 (t, *J* = 8.5 Hz, 1H), 6.83 (t, *J* = 1.5 Hz, 1H), 6.70 (d, *J* = 7.5 Hz, 1H), 3.65 (s, 3H), 3.53 (d, *J* = 6.5 Hz, 1H), 3.13 (d, *J* = 6.0 Hz, 1H), 2.97 (hept, *J* = 7.0 Hz, 1H), 1.31 (d, *J* = 7.0 Hz, 3H), 1.23 (d, *J* = 6.5 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.4, 170.0, 137.4, 134.0, 133.7, 130.4, 129.2, 128.7, 128.3, 127.0, 126.2, 52.9, 48.6, 42.4, 37.5, 36.1, 18.2, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{21}ClO_3Na$ 379.1071; Found 379.1074.



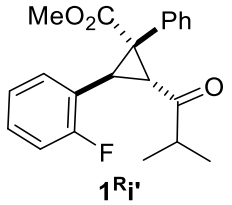
1^{R}h'

Method B: 199.4 mg, 59% (based on α,β-unsaturated ketone: 190.1 mg, 1.010 mmol). Colorless oil. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.12-7.11 (m, 4H), 7.09-7.06 (m, 2H), 7.02 (td, *J* = 7.5, 1.0 Hz, 1H), 6.86 (t, *J* = 7.5 Hz, 1H), 6.51 (d, *J* = 8.0 Hz, 1H), 3.69 (s, 3H), 3.63 (d, *J* = 7.0 Hz, 1H), 3.34 (d, *J* = 6.5 Hz, 1H), 2.99 (hept, *J* = 7.0 Hz, 1H), 2.58 (s, 3H), 1.32 (d, *J* = 7.0 Hz, 3H), 1.26 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 210.0, 170.6, 138.4, 134.3, 132.9, 130.2, 129.5, 128.3, 127.8, 127.0, 126.0, 125.4, 52.8, 48.1, 42.5, 35.6, 35.5, 20.1, 18.3, 18.1 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{24}O_3Na$ 359.1618; Found 359.1615.



1^{R}i'

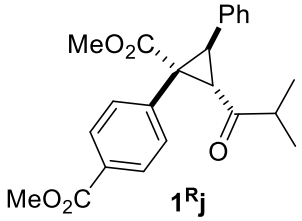
Method B: 282.1 mg, 81% (based on α,β-unsaturated ketone: 195.5 mg, 1.017 mmol). Colorless solid. M.p. 95.6-96.2 °C. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.18-7.16 (m, 5H), 7.08 (dd, *J* = 8.5, 6.5 Hz, 1H), 6.96 (t, *J* = 9.0 Hz, 1H), 6.79 (t, *J* =7.5 Hz, 1H), 6.54 (dd, *J* = 7.5, 6.5 Hz, 1H), 3.75 (d, *J* = 6.5 Hz, 1H), 3.68 (s, 3H), 3.27 (d, *J* = 7.0 Hz, 1H), 2.99 (hept, *J* = 7.0 Hz, 1H), 1.31 (d, *J* = 7.0 Hz, 3H), 1.26 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.4, 170.2, 162.0 (C-F, $^1J_{C\text{-}F}$ = 245.5 Hz), 134.2, 129.9, 128.61 (C, $^3J_{C\text{-}F}$ = 8.1 Hz), 130.59 (C-F, $^4J_{C\text{-}F}$ = 3.6 Hz), 128.5, 128.0, 123.5 (C-F, $^3J_{C\text{-}F}$ = 3.5 Hz), 122.5 (C-F, $^2J_{C\text{-}F}$ = 13.5 Hz), 115.4 (C-F, $^2J_{C\text{-}F}$ = 21.6 Hz), 52.9, 47.4, 42.3, 35.9 (C-F, $^4J_{C\text{-}F}$ = 1.8 Hz), 30.7 (C-F, $^3J_{C\text{-}F}$ = 4.5 Hz), 18.2, 18.0 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –115.9 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{21}FO_3Na$ 363.1367; Found 363.1368.



1^{R}j

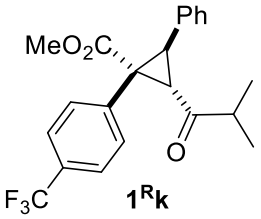
Method B: 259.2 mg, 68% (based on α,β-unsaturated ketone: 174.2 mg, 1.000 mmol). Colorless oil. PE/EA = 40/1 to 15/1.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.85 (d, *J* = 8.4 Hz, 2H), 7.22 (d, *J* = 8.4 Hz, 2H), 7.11-

7.10 (m, 3H), 6.85-6.83 (m, 2H), 3.86 (s, 3H), 3.66 (s, 3H), 3.61 (d, *J* = 6.0 Hz, 1H), 3.18 (d, *J* = 6.6 Hz, 1H), 2.98 (hept, *J* = 6.6 Hz, 1H), 1.30 (d, *J* = 6.6 Hz, 3H), 1.23 (d, *J* = 6.6 Hz, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 209.4, 169.9, 166.8, 139.4, 134.5, 130.6, 129.7, 128.3, 128.0, 127.1, 53.0, 52.3, 48.0, 42.3, 37.3, 36.9, 18.2, 18.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{24}O_5Na$ 403.1516; Found 403.1519.



1^{R}k

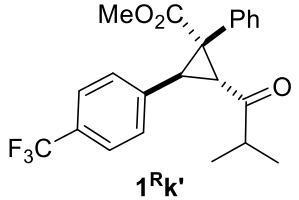
Method B: 179.8 mg, 46% (based on α,β-unsaturated ketone: 176.3 mg, 1.012 mmol). Colorless oil. PE/EA = 40/1 to 10/1.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.44 (d, *J* = 8.4 Hz, 2H), 7.26 (d, *J* = 7.8 Hz, 2H), 7.13-7.12 (m, 3H), 6.85-6.84 (m, 2H), 3.67 (s, 3H), 3.62 (d, *J* = 6.6 Hz, 1H), 3.15 (d, *J* = 6.6 Hz, 1H), 2.97 (hept, *J* = 7.2 Hz, 1H), 1.30 (d, *J* = 7.2 Hz, 3H), 1.23 (d, *J* = 6.6 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 209.3, 169.8, 138.4, 134.4, 131.0, 130.1 (C-F, $^2J_{C\text{-}F}$ = 26.3 Hz), 128.3, 128.0, 127.2, 125.4 (C-F, $^3J_{C\text{-}F}$ = 3.6 Hz), 124.0 (C-F, $^1J_{C\text{-}F}$ = 270.8 Hz), 53.0, 47.7, 42.3, 37.3, 36.8, 18.2, 18.0 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –62.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{21}F_3O_3Na$ 413.1335; Found 413.1336.



1^{R}k'

Method B: 322.7 mg, 82% (based on α,β-unsaturated ketone: 243.5 mg, 1.005 mmol). Colorless oil. PE/Et_2O/DCM = 40/1 to 10/1.

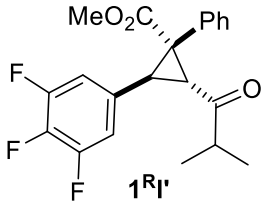
^{1}H NMR (600 MHz, $CDCl_3$): δ 7.35 (d, *J* = 8.4 Hz, 2H), 7.23-7.19 (m, 3H), 7.16-7.14 (m, 2H), 6.93 (d, *J* = 7.8 Hz, 2H), 3.66 (s, 3H), 3.61 (d, *J* = 6.0 Hz, 1H), 3.17 (d, *J* = 6.6 Hz, 1H), 2.97 (hept, *J* = 7.2 Hz, 1H), 1.32 (d, *J* = 7.2 Hz, 3H), 1.23 (d, *J* = 7.2 Hz, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 209.3, 169.9, 139.5, 133.6, 130.4, 129.1 (C-F, $^2J_{C\text{-}F}$ =

32.6 Hz), 128.8, 128.4, 125.0 (C-F, $^{3}J_{C\text{-}F}$ = 3.3 Hz), 124.2 (C-F, $^{1}J_{C\text{-}F}$ = 269.6 Hz), 53.0, 48.9, 42.4, 37.8, 36.1, 18.2, 18.0 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –62.5 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{21}F_3O_3Na$ 413.1335; Found 413.1340.



1^{R}l'

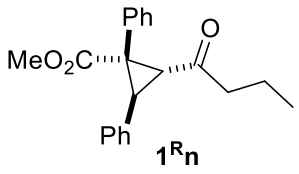
Method B: 256.6 mg, 74% (based on α,β-unsaturated ketone: 210.0 mg, 0.9202 mmol). Colorless solid. M.p. 119.6-120.6 ºC. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.26-7.22 (m, 3H), 7.16-7.15 (m, 2H), 6.45 (dd, *J* = 9.0, 6.5 Hz, 2H), 3.65 (s, 3H), 3.48 (d, *J* = 6.5 Hz, 1H), 3.05 (d, *J* = 6.5 Hz, 1H), 2.96 (hept, *J* = 7.0 Hz, 1H), 1.31 (d, *J* = 7.0 Hz, 3H), 1.23 (d, *J* = 7.0 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 208.8, 169.6, 150.9 (C-F, $^{1}J_{C\text{-}F}$ = 248.1 Hz, $^{2}J_{C\text{-}F}$ = 9.9 Hz, $^{3}J_{C\text{-}F}$ = 4.5 Hz), 138.7 (C-F, $^{1}J_{C\text{-}F}$ = 250.0 Hz, $^{2}J_{C\text{-}F}$ = 15.4 Hz), 133.2, 131.9 (C-F, m), 130.1, 128.9, 128.6, 112.2 (C-F, $^{2}J_{C\text{-}F}$ = 16.3 Hz, $^{3}J_{C\text{-}F}$ = 5.4 Hz), 53.0, 48.7, 42.4, 37.5, 35.3, 18.2, 17.9 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –134.6 (d, *J* = 21.6 Hz, 2F), –162.4 (t, *J* = 21.6 Hz, 1F) ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{19}F_3O_3Na$ 399.1178; Found 399.1177.



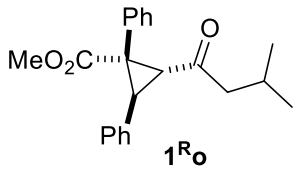
1^{R}n

Method A: 193.9 mg, 30% (bsed on α,β-unsaturated ketone: 350.9 mg, 2.014 mmol). Colorless oil. PE/Et_2O/DCM = 10/0.5/1 to 7/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.20-7.13 (m, 5H), 7.10-7.09 (m, 3H), 6.83-6.81 (m, 2H), 3.65 (s, 3H), 3.59 (d, *J* = 6.5 Hz, 1H), 3.09 (d, *J* = 6.5 Hz, 1H), 2.82-2.69 (m, 2H), 1.79-1.71 (m, 2H), 1.00 (t, *J* = 7.5 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 206.4, 170.4, 135.1, 134.1, 130.6, 128.5, 128.1, 128.04, 128.00, 126.8, 52.9, 48.4, 46.5, 39.1, 36.6, 17.5, 13.9 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{22}O_3Na$ 345.1461; Found 345.1464.



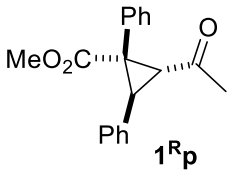
1^{R}o

Method A: 245.2 mg, 36% (based on α,β-unsaturated ketone: 378.7 mg, 2.011 mmol). Colorless oil. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.20-7.13 (m, 5H), 7.10-7.09 (m, 3H), 6.83-6.81 (m, 2H), 3.65 (s, 3H), 3.58 (d, *J* = 6.5 Hz, 1H), 3.08 (d, *J* = 6.5 Hz, 1H), 2.70-2.60 (m, 2H), 2.33-2.25 (m, 1H), 1.01 (d, *J* = 7.0 Hz, 3H), 1.00 (d, *J* = 6.5 Hz, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 206.1, 170.3, 135.1, 134.1, 130.6, 128.5, 128.3, 128.03, 127.99, 126.8, 53.6, 52.8, 48.5, 39.3, 36.8, 24.9, 22.8, 22.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{24}O_3Na$ 359.1618; Found 359.1618.



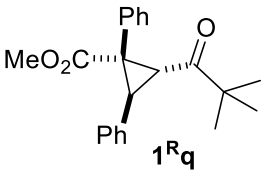
1^{R}p

Method A: 183.8 mg, 31% (based on α,β-unsaturated ketone: 295.3 mg, 2.020 mmol). Colorless solid. M.p. 149.7-150.7 ºC. PE/Et_2O/DCM = 40/0.5/1 to 10/0.5/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.20-7.13 (m, 5H), 7.11-7.09 (m, 3H), 6.83-6.81 (m, 2H), 3.66 (s, 3H), 3.60 (d, *J* = 6.5 Hz, 1H), 3.10 (d, *J* = 6.5 Hz, 1H), 2.49 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 204.0, 170.4, 134.9, 134.0, 130.7, 128.5, 128.10, 128.05, 128.0, 126.9, 53.0, 48.5, 39.8, 36.7, 31.5 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{19}H_{18}O_3Na$ 317.1148; Found 317.1147.



1^{R}q

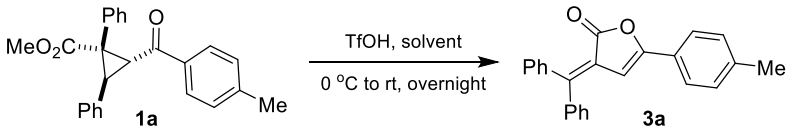
Method B: 274.6 mg, 81% (based on α,β-unsaturated ketone:189.3 mg, 1.005 mmol). Colorless solid. M.p. 100.7-101.3 ºC. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.19-7.09 (m, 8H), 6.86-6.84 (m, 2H), 3.66 (s, 3H), 3.55 (d, *J* = 6.0 Hz, 1H), 3.32 (d, *J* = 6.0 Hz, 1H), 1.33 (s, 9H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 210.9, 170.4, 135.2, 134.4, 130.4, 128.5, 128.09, 128.05, 128.0, 126.8, 52.8, 48.7, 44.7, 37.0, 34.7, 26.4 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{24}O_3Na$ 359.1618; Found 359.1628.

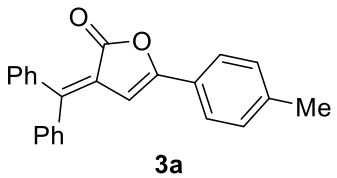
3. Condition optimization



General procedure: To a dry Schlenk tube equipped with a high vacuum valve, **1a** (55.3 mg, 0.149 mmol) was dissolved in 2.0 mL of dry solvent with a stir bar. A certain equivalent of TfOH was added dropwise via microsyringe to the solution at 0 °C. The reaction mixture was stirred overnight or about 14 h at rt, which was then neutralized with saturated $NaHCO_3$. The mixture was extracted with DCM (20 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (50/1 to 30/1, v/v) to afford the product **3a** as orange solid. Single-crystals for X-ray analysis were obtained from PE and EA at rt.

Table S1. Condition Optimization

entry	solvent	TfOH (equiv)	**3a** (%) (isolated)
1	DCM	2.0	53
2	DCM	3.0	89
3	DCM	3.5	99
4	DCM	5.0	83
5	DCE	3.5	75
6	PhMe	3.5	36
7	CH_3CN	3.5	18



3a

Yield: 50.1 mg, 99% (based on **1a**: 55.3 mg, 0.149 mmol).

Orange crystals. M.p. 150.1-152.3 °C. PE/EA = 50/1 to 30/1.

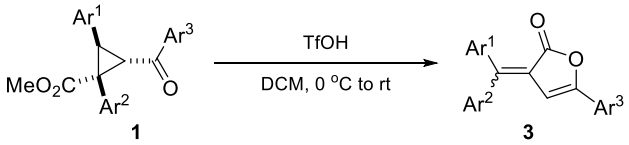
^{1}H NMR (500 MHz, $CDCl_3$): δ 7.57 (d, *J* = 8.0 Hz, 2H), 7.42-7.37 (m, 6H), 7.34-7.31 (m, 4H), 7.21 (d, *J* = 8.0 Hz, 2H), 6.51 (s, 1H), 2.38 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.9, 154.5, 152.3, 141.5, 140.4, 138.5, 130.9, 130.8, 129.63, 129.56, 128.5, 128.1, 125.7, 125.1, 124.5, 102.8, 21.7 ppm.

IR (neat): 3027 (w), 2921 (w), 1762 (s), 1616 (m), 1508 (m), 1443 (m), 1282 (m), 1206 (s), 1057 (m), 1008 (s), 890 (s), 830 (s), 809 (s), 758 (s), 698 (s) cm^{-1}.

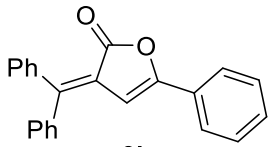
HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}O_2Na$ 361.1199; Found 361.1207.

4. TfOH-promoted transformation of DACs



1 3

Representative procedure for 3: To a dry Schlenk tube equipped with a high vacuum valve, **1a** (55.3 mg, 0.149 mmol) was dissolved in DCM (2.0 mL) with a stir bar. TfOH (46.5μL, 0.525 mmol) was added dropwise via microsyringe to the solution at 0 °C. The reaction mixture was stirred overnight at rt, which was then neutralized with saturated $NaHCO_3$. The mixture was extracted with DCM (20 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (50/1 to 30/1, v/v) to afford the product **3a** (50.1 mg, 99%) as orange solid.



3b

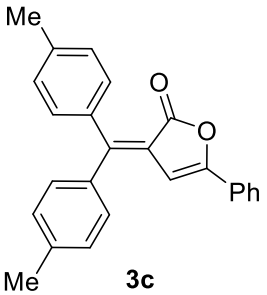
Yield: 38.4 mg, 75% (based on**1b**: 56.2 mg, 0.158 mmol).

Orange crystals. M.p. 163.9-165.8 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.68 (d, *J* = 7.0 Hz, 2H), 7.43-7.38 (m, 9H), 7.35-7.31 (m, 4H), 6.57 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.7, 154.3, 153.1, 141.4, 138.4, 130.88, 130.86, 130.0, 129.8, 129.7, 128.9, 128.54, 128.49, 128.1, 125.1, 124.3, 103.6 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{16}O_2Na$ 347.1043; Found 347.1050.



3c

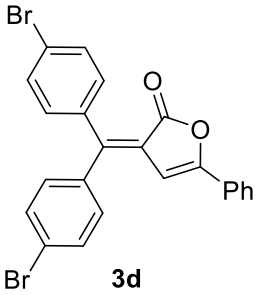
Yield: 42.4 mg, 81% (based on **1c**: 57.4 mg, 0.149 mmol).

Orange crystals. M.p. 164.5-164.7 ºC. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.66 (d, *J* = 7.0 Hz, 2H), 7.41-7.35 (m, 3H), 7.25-7.18 (m, 8H), 6.55 (s, 1H), 2.42 (s, 3H), 2.40 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 167.0, 153.8, 153.5, 140.15, 140.07, 138.8, 135.6, 131.1, 131.0, 129.8, 129.2, 128.8, 128.7, 125.0, 123.4, 104.1, 21.7, 21.6 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{20}O_2Na$ 375.1356; Found 375.1352.



3d

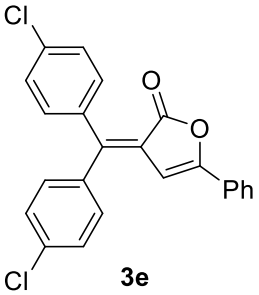
Yield: 67.1 mg, 92% (based on **1d**: 77.8 mg, 0.151 mmol).

Orange crystals. M.p. 196.3-197.5 ºC. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.68-7.67 (m, 2H), 7.57 (d, *J* = 8.0 Hz, 2H), 7.53 (d, *J* = 8.5 Hz, 2H), 7.42-7.41 (m, 3H), 7.20 (d, *J* = 8.5 Hz, 2H), 7.17 (d, *J* = 8.5 Hz, 2H), 6.50 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ166.4, 155.1, 149.7, 139.8, 136.7, 132.5, 132.3, 132.0, 131.6, 130.5, 129.0, 128.1, 125.3, 124.9, 124.6, 124.4, 103.1 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}Br_2O_2Na$ 502.9253; Found 502.9243.



3e

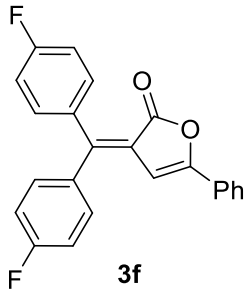
Yield: 56.6 mg, 96% (based on **1e**: 64.0 mg, 0.150 mmol).

Orange crystals. M.p. 174.5-175.9 ºC. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.68-7.67 (m, 2H), 7.42-7.40 (m, 5H), 7.37 (d, *J* = 8.4 Hz, 2H), 7.27 (d, *J* = 8.4 Hz, 2H), 7.24 (d, *J* = 8.4 Hz, 2H), 6.51 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.4, 155.0, 149.7, 139.4, 136.3, 136.11, 136.07, 132.3, 132.1, 130.4, 129.03, 128.99, 128.6, 128.1, 125.2, 124.9, 103.1 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}Cl_2O_2Na$ 415.0263; Found 415.0260.



3f

Yield: 53.7 mg, 99% (based on **1f**: 59.3 mg, 0.151 mmol).

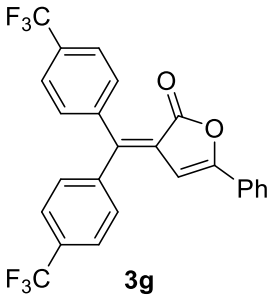
Orange crystals. M.p. 150.7-152.3 °C. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.68-7.66 (m, 2H), 7.42-7.39 (m, 3H), 7.33-7.28 (m, 4H), 7.13 (t, *J* = 8.4 Hz, 2H), 7.08 (t, *J* = 8.4 Hz, 2H), 6.51 (s, 1H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 166.6, 163.8 (C-F, $^{1}J_{C\text{-}F}$ = 249.2 Hz), 163.6 (C-F, $^{1}J_{C\text{-}F}$ = 250.2 Hz), 154.6, 150.4, 137.3 (C-F, $^{4}J_{C\text{-}F}$ = 3.3 Hz), 134.1 (C-F, $^{4}J_{C\text{-}F}$ = 3.3 Hz), 133.0 (C-F, $^{3}J_{C\text{-}F}$ = 7.7 Hz), 132.8 (C-F, $^{3}J_{C\text{-}F}$ = 8.7 Hz), 130.3, 129.0, 128.3, 125.2, 124.4, 115.9 (C-F, $^{2}J_{C\text{-}F}$ = 21.8 Hz), 115.4 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 103.3 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –110.0, –110.3 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}F_2O_2Na$ 383.0854; Found 383.0853.



3g

Yield: 33.3 mg, 48% (based on **1g**: 73.8 mg, 0.150 mmol).

Orange crystals. M.p. 153.8-155.7 °C. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

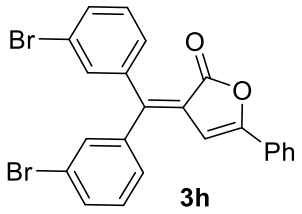
^{1}H NMR (500 MHz, $CDCl_3$): δ 7.71-7.69 (m, 4H), 7.66 (d, *J* = 8.5 Hz, 2H), 7.45-7.42 (m, 7H), 6.52 (s, 1H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 166.0, 156.4, 148.0, 144.2, 141.2, 131.6 (C-F, $^{2}J_{C\text{-}F}$ = 32.6 Hz), 131.5 (C-F, $^{2}J_{C\text{-}F}$ = 32.6 Hz), 131.0, 130.88, 130.86, 129.1, 127.8, 126.6,

125.8 (C-F, $^{3}J_{C\text{-}F}$ = 3.3 Hz), 125.5, 125.4 (C-F, $^{3}J_{C\text{-}F}$ = 3.3 Hz), 124.1 (C-F, $^{1}J_{C\text{-}F}$ = 270.8 Hz), 123.9 (C-F, $^{1}J_{C\text{-}F}$ = 269.3 Hz), 102.5 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –62.77, –62.85 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{14}F_6O_2Na$ 483.0790; Found 483.0798.



3h

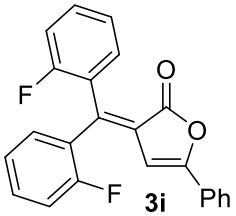
Yield: 60.4 mg, 83% (based on **1h**: 77.8 mg, 0.151 mmol).

Orange crystals. M.p. 156.7-158.9 ºC. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.70-7.68 (m, 2H), 7.59-7.56 (m, 2H), 7.43-7.42 (m, 5H), 7.33-7.28 (m, 3H), 7.24-7.23 (m, 1H), 6.51 (s, 1H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 166.1, 155.7, 148.4, 142.7, 139.7, 133.25, 133.17, 132.82, 132.78, 130.6, 130.3, 129.9, 129.3, 129.2, 129.0, 128.0, 125.9, 125.4, 123.0, 122.4, 102.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}Br_2O_2Na$ 502.9253; Found 502.9256.



3i

Yield: 44.1 mg, 82% (based on **1i**: 59.0 mg, 0.150 mmol).

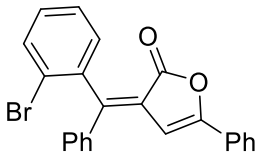
Yellow crystals. M.p. 122.5-123.8 ºC. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.69-7.68 (m, 2H), 7.44-7.37 (m, 5H), 7.28 (t, *J* = 7.2 Hz, 1H), 7.21 (t, *J* = 7.2 Hz, 1H), 7.18-7.12 (m, 4H), 6.34 (d, *J* = 1.8 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 165.5, 160.4 (C-F, $^{1}J_{C\text{-}F}$ = 248.3 Hz), 159.8 (C-F, $^{1}J_{C\text{-}F}$ = 250.0 Hz), 155.7, 137.6, 131.8 (C-F, $^{4}J_{C\text{-}F}$ = 2.6 Hz), 131.4, 131.3 (C-F, $^{3}J_{C\text{-}F}$ = 3.6 Hz), 131.1 (C-F, $^{3}J_{C\text{-}F}$ = 8.1 Hz), 130.5, 128.9, 128.4, 128.2, 127.9 (C-F, $^{2}J_{C\text{-}F}$ = 13.6 Hz), 125.9 (C-F, $^{2}J_{C\text{-}F}$ = 14.4 Hz), 125.5, 124.4 (C-F, $^{3}J_{C\text{-}F}$ = 3.6 Hz), 124.0 (C-F, $^{3}J_{C\text{-}F}$ = 3.5 Hz), 116.6 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 115.8 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 102.6 (C-F, $^{4}J_{C\text{-}F}$ = 1.9 Hz) ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –111.6, –112.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}F_2O_2Na$ 383.0854; Found 383.0853.



3j

Yield: 50.7 mg, 83% (based on **1j**: 65.8 mg, 0.151 mmol).

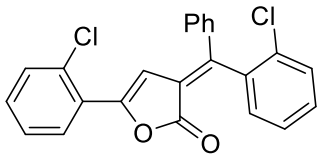
Yellow solid. PE/EA = 40/1 to 20/1.

The major isomer. Yellow crystals. M.p. 142.0-143.8 °C. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.71 (d, *J* = 7.8 Hz, 2H), 7.67 (d, *J* = 7.8 Hz, 1H), 7.42-7.38 (m, 9H), 7.29 (t, *J* = 7.8 Hz, 1H), 7.24 (d, *J* = 7.8 Hz, 1H), 6.77 (s, 1H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 166.1, 156.0, 149.1, 140.0, 139.2, 133.3, 130.8, 130.4, 130.1, 129.7, 129.0, 128.7, 128.3, 127.7, 126.1, 125.4, 123.2, 101.9 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}BrO_2Na$ 425.0148; Found 425.0136.



3k

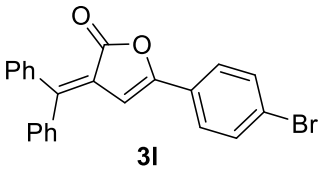
Yield: 54.7 mg, 93% (based on **1k**: 64.0 mg, 0.150 mmol).

Yellow crystals. M.p. 127.1-128.8 °C. PE/EA = 40/1 to 20/1. Single-crystals for X-ray analysis were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.87 (d, *J* = 6.5 Hz, 1H), 7.48 (d, *J* = 8.0 Hz, 1H), 7.45 (d, *J* = 8.0 Hz, 1H), 7.41-7.39 (m, 5H), 7.37-7.30 (m, 5H), 7.25-7.23 (m, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 165.3, 152.1, 149.6, 139.3, 137.9, 133.3, 132.2, 131.2, 130.9, 130.6, 130.12, 130.08, 130.01, 129.96, 129.2, 128.8, 127.2, 127.0, 126.7, 126.0, 108.5 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}Cl_2O_2Na$ 415.0263; Found 415.0261.



3l

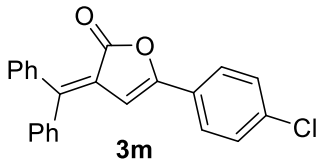
Yield: 57.2 mg, 94% (based on **1l**: 65.9 mg, 0.151 mmol).

Orange crystals. M.p. 165.1-167.3 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.53 (s, 4H), 7.44-7.38 (m, 6H), 7.34-7.30 (m, 4H), 6.56 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.4, 153.9, 153.2, 141.3, 138.3, 132.2, 130.9, 130.8, 129.9, 129.8, 128.6, 128.2, 127.4, 126.5, 124.2, 124.1, 104.2 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}BrO_2Na$ 425.0148; Found 425.0142.



3m

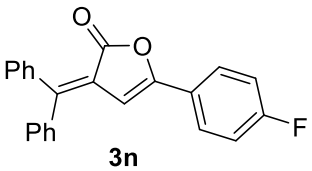
Yield: 52.1 mg, 97% (based on **1m**: 58.6 mg, 0.150 mmol).

Orange crystals. M.p. 173.3-174.2 °C. PE/EA = 40/1 to 20/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.60 (d, *J* = 8.5 Hz, 2H), 7.44-7.37 (m, 8H), 7.35-7.30 (m, 4H), 6.55 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.4, 153.8, 153.1, 141.3, 138.3, 135.9, 130.9, 130.8, 129.9, 129.8, 129.2, 128.6, 128.1, 127.0, 126.3, 124.1, 104.1 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}ClO_2Na$ 381.0653; Found 381.0648.



3n

Yield: 50.5 mg, 98% (based on **1n**: 56.2 mg, 0.150 mmol).

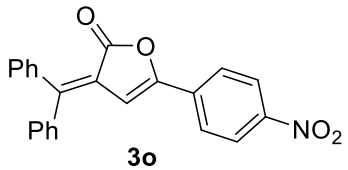
Orange crystals. M.p. 209.9-212.2 °C. PE:EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.68-7.65 (m, 2H), 7.45-7.38 (m, 6H), 7.35-7.30 (m, 4H), 7.10 (t, *J* = 8.5 Hz, 2H), 6.50 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.6, 163.7 (C-F, $^1J_{C\text{-}F}$ = 250.0 Hz), 153.3 (C-F, $^4J_{C\text{-}F}$ = 6.3 Hz), 141.4, 138.3, 130.9, 130.8, 129.8, 129.7, 128.6, 128.1, 127.1 (C-F, $^3J_{C\text{-}F}$ = 8.1 Hz), 124.9, 124.8, 124.2, 116.1 (C-F, $^2J_{C\text{-}F}$ = 22.6 Hz), 103.3 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –109.6 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}FO_2Na$ 365.0948; Found 365.0951.



3o

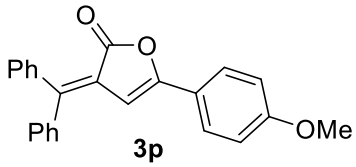
Yield: 48.3 mg, 87% (based on **1o**: 60.7 mg, 0.151 mmol).

Orange crystals. M.p. 167.4-168.3 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.26 (d, *J* = 9.0 Hz, 2H), 7.81 (d, *J* = 8.5 Hz, 2H), 7.50-7.40 (m, 6H), 7.36-7.31 (m, 4H), 6.75 (s, 1H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 165.8, 156.9, 151.7, 148.1, 141.0, 137.9, 134.3, 131.02, 131.01, 130.5, 130.4, 128.7, 128.2, 125.6, 124.3, 123.6, 107.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}NO_4Na$ 392.0893; Found 392.0884.



3p

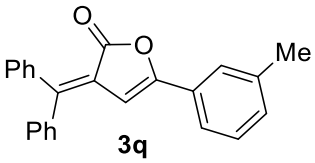
Yield: 24.6 mg, 46% (based on **1p**: 58.4 mg, 0.151 mmol).

Orange crystals. M.p. 157.4-158.2 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.62 (d, *J* = 8.5 Hz, 2H), 7.41-7.37 (m, 6H), 7.34-7.31 (m, 4H), 6.92 (d, *J* = 8.5 Hz, 2H), 6.44 (s, 1H), 3.85 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 167.0, 161.2, 154.3, 151.5, 141.6, 138.6, 130.9, 130.8, 129.54, 129.46, 128.5, 128.1, 126.8, 124.5, 121.2, 114.4, 101.7, 55.5 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}O_3Na$ 377.1148; Found 377.1148.



3q

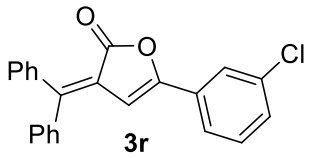
Yield: 49.4 mg, 98% (based on **1q**: 55.3 mg, 0.149 mmol).

Orange crystals. M.p. 106.1-107.4 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.50 (s, 1H), 7.48 (d, *J* = 8.0 Hz, 1H), 7.43-7.37 (m, 6H), 7.35-7.27 (m, 5H), 7.19 (d, *J* = 7.5 Hz, 1H), 6.54 (s, 1H), 2.37 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.8, 154.4, 152.8, 141.5, 138.6, 138.4, 130.91, 130.88, 130.86, 129.7, 129.6, 128.8, 128.5, 128.4, 128.1, 125.7, 124.4, 122.3, 103.5, 21.5 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}O_2Na$ 361.1199; Found 361.1191.



3r

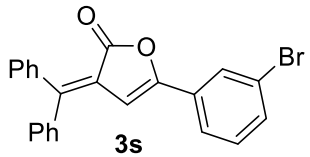
Yield: 53.3 mg, 99% (based on **1r**: 58.5 mg, 0.150 mmol).

Orange crystals. M.p. 130.2-132.8 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.65 (s, 1H), 7.55-7.54 (m, 1H), 7.44-7.38 (m, 6H), 7.35-7.33 (m, 4H), 7.31-7.30 (m, 2H), 6.57 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.3, 154.4, 152.7, 141.2, 138.2, 135.1, 130.91, 130.88, 130.3, 130.2, 130.0, 129.93, 129.89, 128.6, 128.2, 125.1, 123.9, 123.2, 104.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}ClO_2Na$ 381.0653; Found 381.0651.



3s

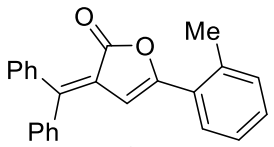
Yield: 59.9 mg, 95% (based on **1s**: 68.3 mg, 0.157 mmol).

Orange crystals. M.p. 150.6-151.8 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.81 (s, 1H), 7.59 (d, *J* = 7.5 Hz, 1H), 7.49 (d, *J* = 7.5 Hz, 1H), 7.44-7.38 (m, 6H), 7.35-7.27 (m, 5H), 6.57 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.3, 154.5, 152.6, 141.2, 138.2, 132.8, 130.91, 130.88, 130.5, 130.4, 130.0, 129.9, 128.6, 128.2, 127.9, 123.9, 123.6, 123.1, 104.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}BrO_2Na$ 425.0148; Found 425.0135.



3t

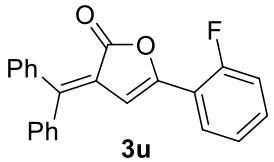
Yield: 50.2 mg, 99% (based on 55.6 mg, 0.150 mmol).

Orange crystals. M.p. 154.7-156.3 ºC. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.71 (d, *J* = 7.0 Hz, 1H), 7.43-7.38 (m, 6H), 7.36-7.32 (m, 4H), 7.31-7.23 (m, 3H) , 6.43 (s, 1H) 2.47 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.5, 154.3, 153.3, 141.4, 138.4, 136.6, 131.6, 130.9, 130.8, 129.8, 129.7, 128.5, 128.1, 128.0, 127.9, 126.3, 124.3, 107.8, 22.3 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{24}H_{18}O_2Na$ 361.1199; Found 361.1201.



3u

Yield: 50.2 mg, 97% (based on **1u**: 56.6 mg, 0.151 mmol).

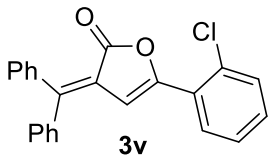
Orange crystals. M.p. 129.5-130.1 ºC. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.79 (t, *J* = 7.5 Hz, 1H), 7.43-7.38 (m, 6H), 7.35-7.31 (m, 5H), 7.22 (t, *J* = 7.5 Hz, 1H), 7.13-7.09 (m, 1H), 6.78 (d, *J* = 1.5 Hz, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.1, 160.6 (C-F, $^{1}J_{C\text{-}F}$ = 252.8 Hz), 154.5, 148.7 (C-F, $^{3}J_{C\text{-}F}$ = 3.6 Hz), 141.2, 138.4, 131.0, 130.9, 129.9, 128.5, 128.1, 127.5, 124.7 (C-F, $^{4}J_{C\text{-}F}$ = 2.8 Hz), 124.1, 117.1 (C-F, $^{3}J_{C\text{-}F}$ = 10.9 Hz), 116.1 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 109.3 (C-F, $^{2}J_{C\text{-}F}$ = 15.4 Hz) ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –111.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}FO_2Na$ 365.0948; Found 365.0952.



3v

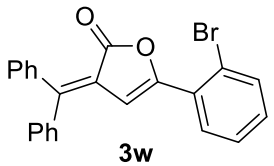
Yield: 47.9 mg, 89% (based on **1v**: 58.5 mg, 0.150 mmol).

Orange crystals. M.p. 187.3-187.6 ºC. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.86 (d, *J* = 7.5 Hz, 1H), 7.45-7.39 (m, 7H), 7.36-7.33 (m, 5H), 7.28 (t, *J* = 7.5 Hz, 1H), 7.12 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 165.9, 155.0, 150.5, 141.1, 138.3, 131.9, 131.2, 131.01, 130.97, 130.2, 130.0, 129.0, 128.5, 128.1, 127.2, 126.8, 124.1, 110.3 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}ClO_2Na$ 381.0653; Found 381.0646.



3w

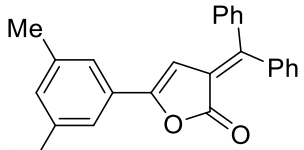
Yield: 46.7 mg, 77% (based on **1w**: 65.9 mg, 0.151 mmol).

Orange crystals. M.p. 193.9-195.2 ºC. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.83 (d, *J* = 8.0 Hz, 1H), 7.65 (d, *J* = 8.0 Hz, 1H), 7.45-7.39 (m, 7H), 7.37-7.33 (m, 4H), 7.21 (t, *J* = 7.0 Hz, 1H), 7.18 (s, 1H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.0, 155.0, 151.6, 141.2, 138.3, 134.7, 131.03, 130.98, 130.5, 130.0, 129.5, 128.8, 128.5, 128.1, 127.7, 123.9, 120.9, 110.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{15}BrO_2Na$ 425.0148; Found 425.0151.



3x

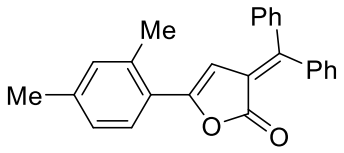
Yield: 46.7 mg, 88% (based on **1x**: 57.9 mg, 0.151 mmol).

Orange crystals. M.p. 182.6-183.5 ºC. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.43-7.37 (m, 6H), 7.35-7.30 (m, 6H), 7.02 (s, 1H), 6.52 (s, 1H), 2.33 (s, 6H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.8, 154.6, 152.6, 141.5, 138.50, 138.47, 131.9, 130.9, 130.8, 129.7, 129.6, 128.5, 128.3, 128.1, 124.4, 122.9, 103.3, 21.4 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{20}O_2Na$ 375.1356; Found 375.1350.



3y

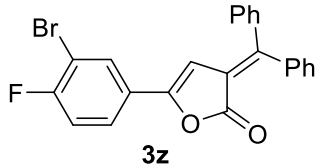
Yield: 49.7 mg, 94% (based on **1y**: 57.8 mg, 0.150 mmol).

Orange crystals. M.p. 165.8-167.3 °C. PE/EA = 40/1 to 20/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.61 (d, *J* = 7.5 Hz, 1H), 7.41-7.37 (m, 6H), 7.35-7.32 (m, 4H), 7.07-7.05 (m, 2H), 6.38 (s, 1H), 2.43 (s, 3H), 2.34 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 166.6, 154.5, 152.6, 141.5, 140.0, 138.5, 136.4, 132.5, 130.9, 130.8, 129.7, 129.6, 128.5, 128.1, 127.8, 127.1, 125.2, 124.5, 107.0, 22.2, 21.4 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{25}H_{20}O_2Na$ 375.1356; Found 375.1359.



3z

Yield: 59.7 mg, 94% (based on **1z**: 68.1 mg, 0.150 mmol).

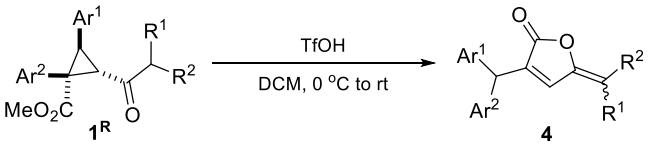
Orange crystals. M.p. 158.7-160.3 °C. PE/EA = 50/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.8 (dd, *J* = 6.6, 2.4 Hz, 1H), 7.59 (ddd, *J* = 8.4, 4.2, 1.8 Hz, 1H), 7.45-7.42 (m, 4H), 7.41-7.38 (m, 2H), 7.34-7.33 (m, 2H), 7.31-7.29 (m, 2H), 7.15 (t, *J* = 8.4 Hz, 1H), 6.51 (s, 1H) ppm.

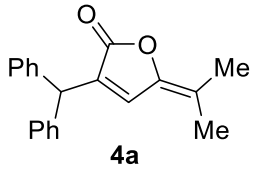
^{13}C NMR (125 MHz, $CDCl_3$): δ 166.2, 159.9 (C-F, $^{1}J_{C\text{-}F}$ = 250.0 Hz), 154.5, 151.8, 141.2, 138.2, 130.9, 130.8, 130.3, 130.0, 129.9, 128.6, 128.2, 126.3 (C-F, $^{3}J_{C\text{-}F}$ = 3.6 Hz), 125.8 (C-F, $^{3}J_{C\text{-}F}$ = 7.3 Hz), 123.8, 117.1 (C-F, $^{2}J_{C\text{-}F}$ = 23.5 Hz), 110.0 (C-F, $^{2}J_{C\text{-}F}$ = 21.6 Hz), 104.3 (C-F, $^{4}J_{C\text{-}F}$ = 1.9 Hz) ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –104.3 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{14}BrFO_2Na$ 443.0053; Found 443.0050.



Representative procedure for 4: To a dry Schlenk tube equipped with a high vacuum valve, **1^{R}a** (48.6 mg, 0.151 mmol) was dissolved in DCM (2.0 mL) with a stir bar. TfOH (47.0 μL, 0.525 mmol) was added dropwise via microsyringe to the solution at 0 ºC. The reaction mixture was stirred overnight at rt, which was then neutralized with saturated $NaHCO_3$. The mixture was extracted with DCM (20 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (40/1 to 30/1, v/v) to afford the product **4a** (42.6 mg, 97%) as colorless solid.



4a

Yield: 42.6 mg, 97% (based on **1^{R}a**: 48.6 mg, 0.151 mmol).

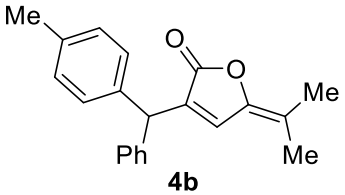
Colorless crystals. M.p. 121.0-121.8 ºC. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.32 (t, *J* = 7.2 Hz, 4H), 7.25 (t, *J* = 7.2 Hz, 2H), 7.16 (d, *J* = 7.2 Hz, 4H), 7.04 (d, *J* = 0.6 Hz, 1H), 5.27 (s, 1H), 1.99 (s, 3H), 1.86 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 170.0, 144.8, 141.1, 136.0, 135.0, 128.8, 128.7, 127.1, 122.3, 47.9, 18.9, 18.7 ppm.

IR (neat): 2918 (w), 1754 (s), 1493 (m), 1447 (m), 1162 (m), 1047 (s), 899 (m), 827 (m), 748 (s), 700 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{18}O_2Na$ 313.1199; Found 313.1198.



4b

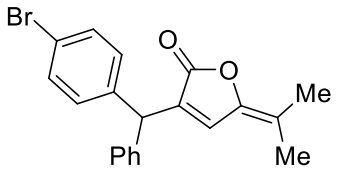
Yield: 46.2 mg, 99% (based on **1^{R}b**: 51.5 mg, 0.153 mmol).

Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.31 (t, *J* = 7.5 Hz, 2H), 7.24 (t, *J* = 7.0 Hz, 1H), 7.16 (d, *J* = 8.0 Hz, 2H), 7.12 (d, *J* = 7.5 Hz, 2H), 7.05-7.04 (m, 3H), 5.23 (s, 1H), 2.32 (s, 3H), 1.99 (s, 3H), 1.85 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 170.0, 144.8, 141.3, 138.1, 136.7, 135.9, 135.2, 129.5, 128.8, 128.7, 128.6, 127.0, 122.1, 47.6, 21.2, 18.9, 18.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{20}O_2Na$ 327.1356; Found 327.1352.



4c

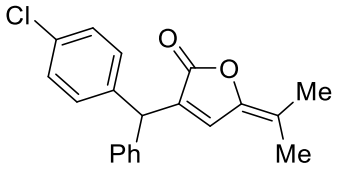
Yield: 54.9 mg, 98% (based on **1^{R}c**: 61.0 mg, 0.152 mmol); 54.8 mg, 99% (based on **1^{R}c'**: 60.3 mg, 0.150 mmol).

Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.44 (d, *J* = 8.0 Hz, 2H), 7.34-7.31 (m, 2H), 7.28-7.25 (m, 1H), 7.13 (d, *J* = 7.5 Hz, 2H), 7.05-7.03 (m, 3H), 5.22 (s, 1H), 2.00 (s, 3H), 1.87 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.8, 144.7, 140.5, 140.1, 136.1, 134.4, 131.9, 130.5, 129.0, 128.6, 127.4, 122.8, 121.1, 47.4, 18.9, 18.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{17}BrO_2Na$ 391.0304; Found 391.0300.



4d

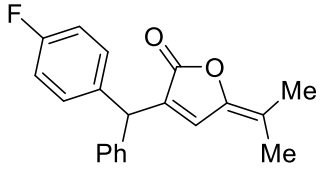
Yield: 45.1 mg, 92% (based on **1^{R}d**: 53.8 mg, 0.151 mmol).

Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.34-7.25 (m, 5H), 7.13 (d, *J* = 7.0 Hz, 2H), 7.10 (d, *J* = 9.0 Hz, 2H), 7.03 (d, *J* = 1.5 Hz, 1H) 5.24 (s, 1H), 2.00 (s, 3H), 1.87 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.8, 144.7, 140.6, 139.6, 136.1, 134.5, 133.0, 130.1, 128.99, 128.96, 128.6, 127.3, 122.8, 47.4, 18.9, 18.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{17}ClO_2Na$ 347.0809; Found 347.0807.



4e

Yield: 45.0 mg, 97% (based on **1^{R}e**: 51.2 mg, 0.150 mmol).

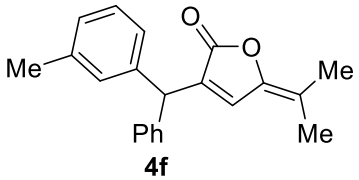
Colorless oil. PE/EA = 50/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.5 Hz, 2H), 7.28-7.26 (m, 1H), 7.15-7.11 (m, 4H), 7.02-6.99 (m, 3H), 5.25 (s, 1H), 2.00 (s, 3H), 1.86 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.8, 161.9 (C-F, $^1J_{C\text{-}F}$ = 244.5 Hz), 144.7, 140.9, 136.8 (C-F, $^4J_{C\text{-}F}$ = 3.6 Hz), 136.0, 134.8, 130.2 (C-F, $^3J_{C\text{-}F}$ = 7.3 Hz), 128.9, 128.6, 127.3, 122.6, 115.7 (C-F, $^2J_{C\text{-}F}$ = 21.6 Hz), 47.2, 18.9, 18.7 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –115.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{17}FO_2Na$ 331.1105; Found 331.1110.



4f

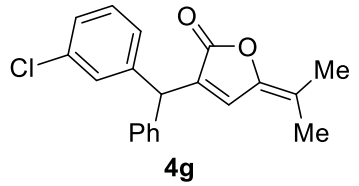
Yield: 42.5 mg, 92% (based on **1^{R}f**: 51.0 mg, 0.152 mmol).

Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.31 (t, *J* = 7.5 Hz, 2H), 7.25 (t, *J* = 7.5 Hz, 1H), 7.20 (t, *J* = 7.5 Hz, 1H), 7.16 (t, *J* = 7.5 Hz, 2H), 7.06 (d, *J* = 7.5 Hz, 1H), 7.04 (s, 1H), 6.97 (s, 1H), 6.95 (d, *J* = 7.5 Hz, 1H), 5.23 (s, 1H), 2.31 (s, 3H), 1.99 (s, 3H), 1.86 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 170.0, 144.8, 141.2, 140.9, 138.5, 135.9, 135.1, 129.5, 128.8, 128.73, 128.67, 127.9, 127.1, 125.7, 122.1, 47.9, 21.6, 18.9, 18.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{20}O_2Na$ 327.1356; Found 327.1357.



4g

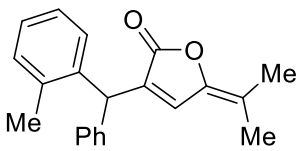
Yield: 47.7 mg, 97% (based on **1^{R}g'**: 54.0 mg, on 0.151 mmol).

Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.0 Hz, 2H), 7.29-7.24 (m, 3H), 7.15-7.14 (m, 3H), 7.07-7.04 (m, 2H), 5.24 (s, 1H), 2.00 (s, 3H), 1.87 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.7, 144.7, 143.0, 140.3, 136.2, 134.7, 134.2, 130.1, 129.0, 128.7, 128.6, 127.4, 127.0, 122.9, 47.6, 18.9, 18.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{17}ClO_2Na$ 347.0809; Found 347.0808.



4h

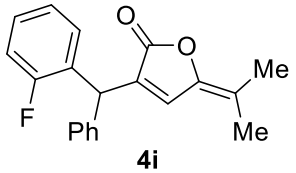
Yield: 42.4 mg, 93% (based on **1^{R}h'**: 50.5 mg, 0.150 mmol).

Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.33-7.30 (m, 2H), 7.26-7.24 (m, 1H), 7.18-7.11 (m, 5H), 6.95-6.94 (m, 2H), 5.40 (s, 1H), 2.27 (s, 3H), 1.99 (s, 3H), 1.84 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.9, 144.8, 140.6, 139.1, 136.6, 136.4, 135.0, 131.0, 128.9, 128.8, 128.0, 127.2, 127.0, 126.1, 122.0, 44.6, 19.9, 18.9, 18.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{20}O_2Na$ 327.1356; Found 327.1352.



4i

Yield: 43.6 mg, 94% (based on **1^{R}i'**: 51.2 mg, 0.150 mmol).

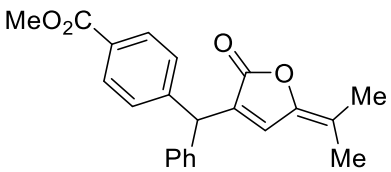
Colorless crystals. M.p. 133.9-135.4 ºC. PE/EA = 40/1 to 30/1. Single-crystals for X-ray analysis were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.5 Hz, 2H), 7.28-7.24 (m, 2H), 7.17 (d, *J* = 7.5 Hz, 2H), 7.11-7.05 (m, 4H), 5.51 (s, 1H), 2.00 (s, 3H), 1.86 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.7, 160.7 (C-F, $^{1}J_{C\text{-}F}$ = 246.4 Hz), 144.7, 139.7, 136.2, 133.7, 129.9 (C-F, $^{3}J_{C\text{-}F}$ = 3.6 Hz), 129.0 (C-F, $^{3}J_{C\text{-}F}$ = 8.1 Hz), 128.9, 128.6, 128.2 (C-F, $^{2}J_{C\text{-}F}$ = 14.5 Hz), 127.3, 124.3 (C-F, $^{4}J_{C\text{-}F}$ = 2.8 Hz), 122.5, 115.9 (C-F, $^{2}J_{C\text{-}F}$ = 21.8 Hz), 41.4 (C-F, $^{3}J_{C\text{-}F}$ = 2.6 Hz), 18.9, 18.7 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –116.0 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{17}FO_2Na$ 331.1105; Found 331.1107.



4j

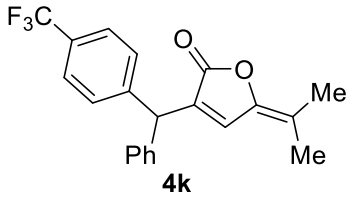
Yield: 40.2 mg, 77% (based on **1$_{R}$j**: 57.2 mg, 0.150 mmol).

Colorless oil. PE/EA = 40/1 to 10/1.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.99 (d, *J* = 7.8 Hz, 2H), 7.34-7.32 (m, 2H), 7.29-7.24 (m, 3H), 7.14 (d, *J* = 7.8 Hz, 2H), 7.03 (s, 1H), 5.32 (s, 1H), 3.90 (s, 3H), 2.00 (s, 3H), 1.86 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 169.7, 166.9, 146.2, 144.7, 140.3, 136.2, 134.1, 130.1, 129.1, 129.0, 128.8, 128.7, 127.4, 123.0, 52.2, 47.9, 29.8, 18.9, 18.8 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{20}O_4Na$ 371.1254; Found 371.1252.



4k

Yield: 16.7 mg, 31% (based on **1^{R}k**: 59.3 mg, 0.152 mmol); 40.6 mg, 76% (based on **1^{R}k'**: 58.1 mg, 0.149 mmol).

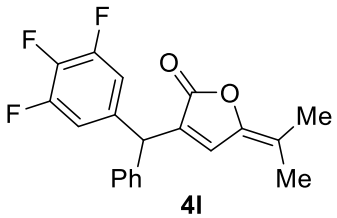
Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.58 (d, *J* = 8.0 Hz, 2H), 7.36-7.33 (m, 2H), 7.30-7.28 (m, 3H), 7.14 (d, *J* = 7.5 Hz, 2H), 7.05 (s, 1H), 5.32 (s, 1H), 2.01 (s, 3H), 1.88 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.7, 145.1, 144.6, 140.2, 136.2, 134.1, 129.5 (C-F, $^2J_{C\text{-}F}$ = 31.5 Hz), 129.09, 129.07, 128.7, 127.5, 125.8 (C-F, $^3J_{C\text{-}F}$ = 3.6 Hz), 124.2 (C-F, $^1J_{C\text{-}F}$ = 267.1 Hz) (partially overlapped with the signal at 123.2 ppm), 123.2, 47.8, 19.0, 18.8 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –62.5 ppm.

HRMS (ESI) m/z: Calcd for $C_{21}H_{17}F_3O_2Na$ 381.1073; Found 381.1078.



4l

Yield: 41.8 mg, 80% (based on **1^{R}l'**: 56.8 mg, 0.151 mmol).

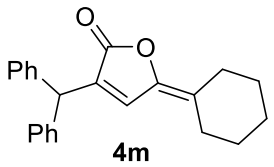
Colorless oil. PE/EA = 40/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.36 (t, *J* = 7.5 Hz, 2H), 7.30 (t, *J* = 7.5 Hz, 1H), 7.13 (d, *J* = 7.5 Hz, 2H), 7.05 (s, 1H), 6.78 (t, *J* = 7.5 Hz, 2H), 5.18 (s, 1H), 2.02 (s, 3H), 1.89 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.5, 151.4 (C-F, $^1J_{C\text{-}F}$ = 249.0 Hz, $^2J_{C\text{-}F}$ =15.0 Hz, $^3J_{C\text{-}F}$ = 3.6 Hz), 144.6, 139.6, 137.4 (C-F, m), 136.3, 133.5, 129.2, 128.6, 127.8, 123.8, 112.8 (C-F, $^2J_{C\text{-}F}$ = 16.3 Hz, $^3J_{C\text{-}F}$ = 4.5 Hz), 47.2, 19.0, 18.8 ppm.

^{19}F NMR (470 MHz, $CDCl_3$): δ –133.6 (d, *J* = 17.9 Hz, 2F), –162.2 (t, *J* = 17.9 Hz, 1F) ppm.

HRMS (ESI) m/z: Calcd for $C_{20}H_{15}F_3O_2Na$ 367.0916; Found 367.0909.



4m

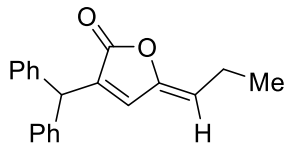
Yield: 46.5 mg, 94% (based on **1^{R}m**: 53.4 mg, 0.150 mmol).

Colorless crystals. M.p. 152.1-152.5 ºC. PE/EA = 40/1 to 30/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.32 (t, *J* = 7.5 Hz, 4H), 7.25 (t, *J* = 7.0 Hz, 2H), 7.17 (d, *J* = 7.0 Hz, 4H), 7.07 (d, *J* = 1.5 Hz, 1H), 5.27 (s, 1H), 2.50 (t, *J* = 5.5 Hz, 2H), 2.24 (t, *J* = 5.5 Hz, 2H), 1.66-1.61 (m, 4H), 1.57-1.56 (m, 2H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 170.1, 142.3, 141.1, 135.6, 134.9, 130.4, 128.8, 128.7, 127.1, 48.0, 29.3, 28.8, 28.1, 27.3, 26.3 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{23}H_{22}O_2Na$ 353.1512; Found 353.1508.



4n

Yield: 31.5 mg, 72% (based on **1^{R}n**: 48.2 mg, 0.150 mmol).

Colorless oil. PE/EA = 50/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.31 (t, *J* = 7.5 Hz, 4H), 7.25 (t, *J* = 7.5 Hz, 2H), 7.15 (d, *J* = 7.5 Hz, 4H), 6.78 (s, 1H), 5.25 (s, 1H), 5.16 (t, *J* = 7.5 Hz, 1H), 2.40 (m, 2H), 1.07 (t, *J* = 7.5 Hz, 3 H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.6, 148.0, 140.8, 139.8, 136.1, 128.9, 128.7, 127.2, 118.0, 47.9, 19.9, 13.7 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{18}O_2Na$ 313.1199; Found 313.1200.

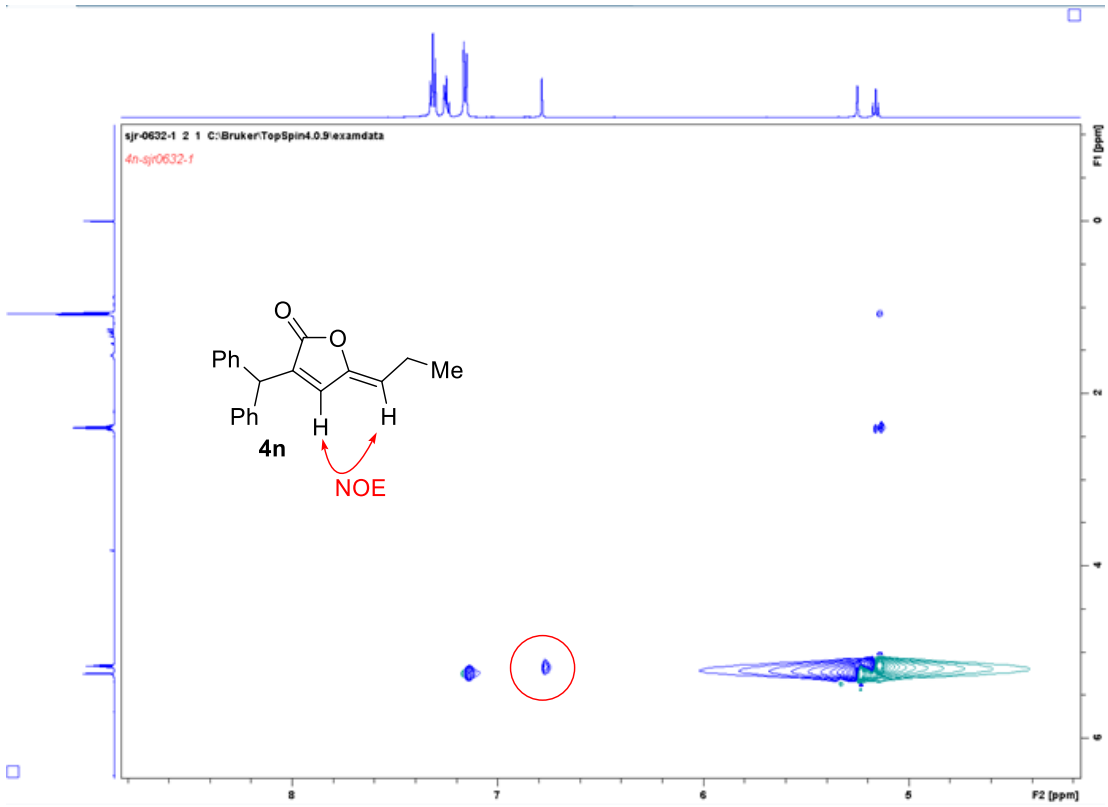
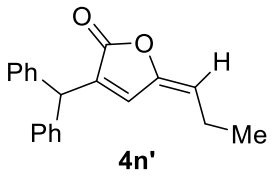


Figure S1. NOESY spectrum of **4n** (600 MHz, $CDCl_3$).



4n'

Yield: 10.0 mg, 23% (based on **1^{R}n**: 48.2 mg, 0.150 mmol).

Colorless oil. PE/EA = 50/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.5 Hz, 4H), 7.28-7.25 (m, 2H), 7.17 (d, *J* = 7.5 Hz, 4H), 7.05 (s, 1H), 5.69 (t, *J* = 8.0 Hz, 1H), 5.27 (s, 1H), 2.21 (m, 2H), 1.08 (t, *J* = 7.5 Hz, 3 H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.5, 148.2, 140.7, 137.1, 135.3, 128.9, 128.7, 127.2, 117.3, 48.1, 20.2, 14.6 ppm.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{20}H_{18}O_2Na$ 313.1199; Found 313.1196.

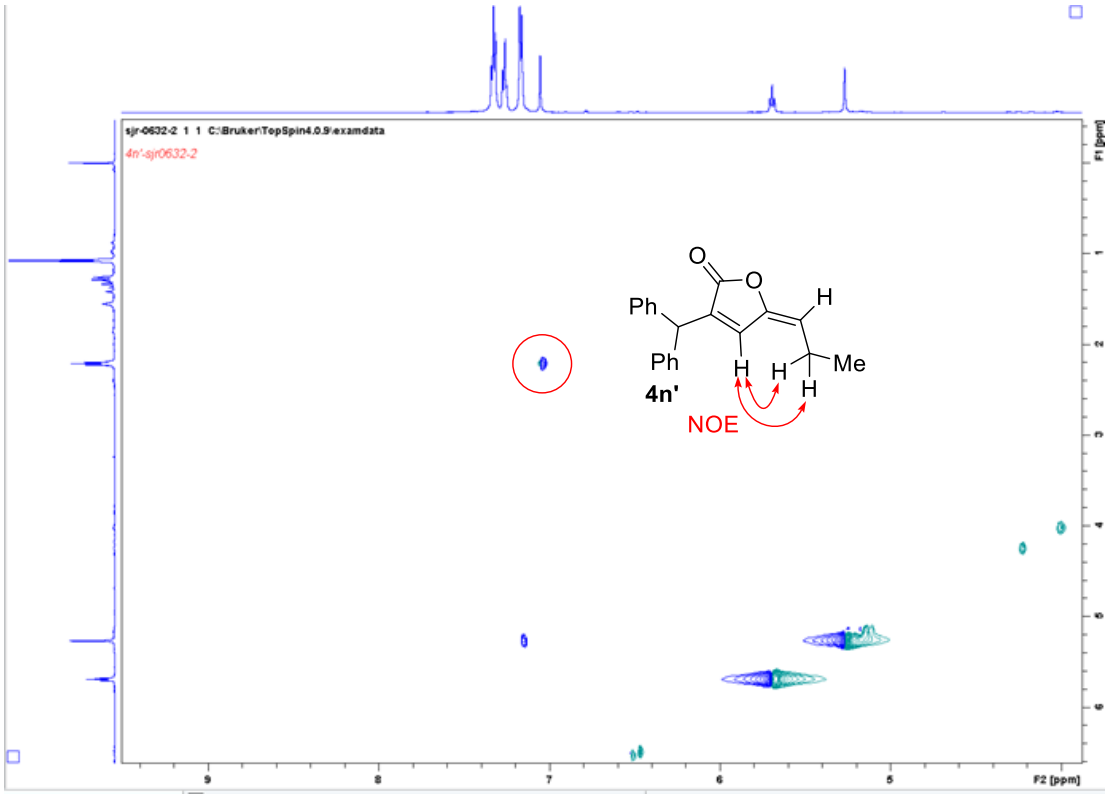
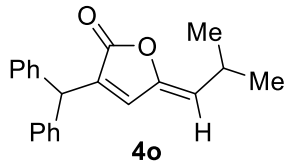


Figure S2. NOESY spectrum of **4n'** (600 MHz, $CDCl_3$).



4o

Yield: 34.2 mg, 74% (based on **1^{R}o**: 51.0 mg, 0.152 mmol).

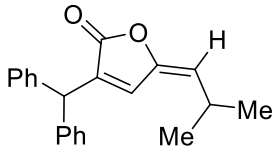
Colorless oil. PE/EA = 50/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.32 (t, *J* = 7.5 Hz, 4H), 7.26-7.23 (m, 2H), 7.17-7.15 (m, 4H), 6.77 (d, *J* = 1.5 Hz, 1H), 5.25 (s, 1H), 5.02 (d, *J* = 10.0 Hz, 1H), 3.04-2.97 (m, 1H), 1.08 (s, 3H), 1.07 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.7, 146.7, 140.8, 140.1, 136.0, 128.9, 128.7, 127.2, 123.3, 48.0, 26.5, 22.7 ppm.

IR (neat): 2959 (m), 1774 (s), 1495 (m), 1447 (m), 1301 (m), 1076 (m), 1037 (s), 964 (s), 779 (s), 699 (s) cm^{-1}.

HRMS (ESI) m/z: Calcd for $C_{21}H_{20}O_2Na$ 327.1356; Found 327.1356.



4o'

Yield: 11.0 mg, 24% (based on **1^{R}o**: 51.0 mg, 0.152 mmol).

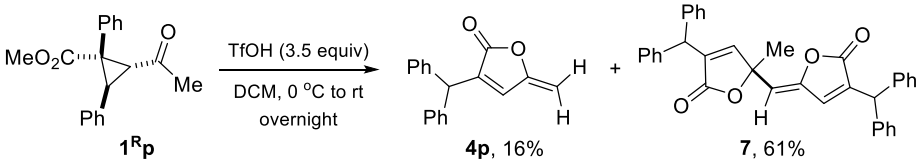
Colorless oil. PE/EA = 50/1 to 30/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.5 Hz, 4H), 7.28-7.25 (m, 2H), 7.17-7.16 (m, 4H), 7.05 (s, 1H), 5.55 (d, *J* = 11.0 Hz, 1H), 5.26 (s, 1H), 2.61-2.54 (m, 1H), 1.08 (s, 3H), 1.07 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 169.5, 147.1, 140.7, 137.2, 135.4, 128.9, 128.7, 127.2, 122.6, 48.2, 26.9, 23.6 ppm.

IR (neat): 2958 (m), 2920 (m), 2867 (m), 1763 (s), 1603 (m), 1494 (s), 1445 (m), 1304 (m), 1192 (m), 1077 (m), 1043 (s), 973 (s), 744 (s), 700 (s) cm^{-1}.

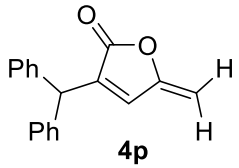
HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{21}H_{20}O_2Na$ 327.1356; Found 327.1350.



1^{R}p **4p**, 16% **7**, 61%

To a dry Schlenk tube equipped with a high vacuum valve, **1^{R}p** (117.5 mg, 0.3991 mmol) was dissolved in DCM (4.5 mL) with a stir bar. TfOH (124.0 μL, 1.401 mmol) was

added dropwise via microsyringe to the solution at 0 °C. The reaction mixture was stirred overnight at rt, which was then neutralized with saturated $NaHCO_3$. The mixture was extracted with DCM (50 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (40/1 to 6/1, v/v) to afford the product **4p** (16.8 mg, 16%) as light yellow solid and **7** (64.5 mg, 61%) as colorless solid.



4p

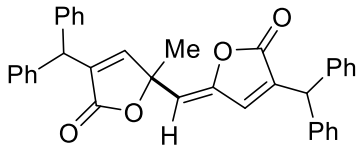
Yield: 16.8 mg, 16% (based on **1^{R}p**: 117.5 mg, 0.3991 mmol).

Light yellow crystals. M.p. 89.1-90.3 °C. PE/EA = 40/1 to 6/1. Crystals were obtained from PE and EA at rt.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.8 Hz, 4H), 7.27-7.25 (m, 2H), 7.16 (d, *J* = 7.8 Hz, 4H), 6.85 (s, 1H), 5.25 (s, 1H), 5.17 (s, 1H), 4.79 (s, 1H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 169.3, 153.8, 140.4, 139.2, 139.0, 128.9, 128.7, 127.3, 97.1, 48.0 ppm.

HRMS (ESI) m/z: Calcd for $C_{18}H_{14}O_2Na$ 285.0886; Found 285.0886.



7

Yield: 64.5 mg, 62% (based on **1^{R}p**: 117.5 mg, 0.3991 mmol).

Colorless crystals. M.p. 124.3-125.1 °C. PE/EA = 40/1 to 6/1. Single-crystals for X-ray analysis were obtained from PE and EA at rt.

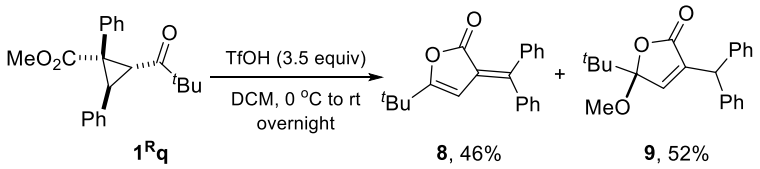
^{1}H NMR (500 MHz, $CDCl_3$): δ 7.36-7.23 (m, 10H), 7.25-7.22 (m, 2H), 7.17-7.15 (m, 8H), 7.12 (d, *J* = 1.5 Hz, 1H), 6.80 (d, *J* = 1.5 Hz, 1H), 5.30 (s, 1H), 5.23 (s, 1H), 5.15 (s, 1H), 1.73 (s, 3H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 171.4, 168.1, 153.0, 147.9, 140.6, 140.5, 140.08, 140.06, 140.0, 138.2, 136.1, 129.0, 128.94, 128.89, 128.7, 128.6, 127.5, 127.25, 127.20, 111.8, 84.2, 48.2, 47.9, 25.9 ppm.

IR (neat): 3028 (w), 1778 (s), 1752 (s), 1672 (m), 1494 (m), 1449 (m), 1219 (m), 1099

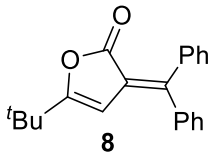
(m), 1022 (s), 927 (s), 758 (s), 697 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{36}H_{28}O_4Na$ 547.1880; Found 547.1879.



1^Rq 8, 46% 9, 52%

To a dry Schlenk tube equipped with a high vacuum valve, **1^Rq** (101.2 mg, 0.301 mmol) was dissolved in DCM (4.0 mL) with a stir bar. TfOH (93.0 μL, 1.051 mmol) was added dropwise via microsyringe to the solution at 0 °C. The reaction mixture was stirred overnight at rt, which was then neutralized with saturated $NaHCO_3$. The mixture was extracted with DCM (40 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (40/1 to 10/1, v/v) to afford the product **8** (41.8 mg, 46%) as yellow solid and **9** (52.5 mg, 52%) as colorless solid.



8

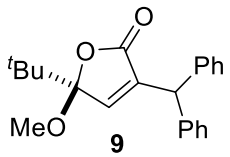
Known compouds.[3] Yield: 41.8 mg, 46% (based on **1^Rq**: 101.2 mg, 0.301 mmol).

Yellow solid. M.p. 170.0-171.2 °C. PE/EA = 40/1 to 10/1.

^{1}H NMR (600 MHz, $CDCl_3$): δ 7.38-7.35 (m, 6H), 7.29-7.28 (m, 2H), 7.25-7.24 (m, 2H), 5.82 (s, 1H), 1.22 (s, 9H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 167.4, 166.5, 151.5, 141.4, 138.6, 130.57, 130.55, 129.4, 129.3, 128.4, 128.1, 124.4, 101.2, 32.8, 27.5 ppm.

HRMS (ESI) m/z: Calcd for $C_{21}H_{20}O_2Na$ 327.1356; Found 327.1357.



9

Yield: 52.5 mg, 52% (based on **1^Rq**: 101.2 mg, 0.301 mmol).

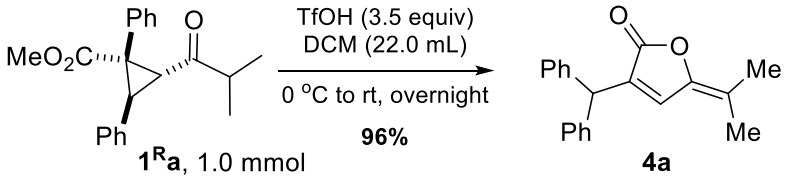
Colorless crystals. M.p. 79.4-80.2 °C. PE/EA = 40/1 to 10/1. Single-crystals for X-ray analysis were obtained from PE and EA at rt.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.35-7.31 (m, 4H), 7.28-7.24 (m, 2H), 7.18-7.15 (m, 4H), 6.54 (d, *J* = 1.5 Hz, 1H), 5.25 (s, 1H), 3.18 (s, 3H), 0.99 (s, 9H) ppm.

^{13}C NMR (125 MHz, $CDCl_3$): δ 170.3, 147.5, 142.1, 140.5, 140.4, 129.0, 128.9, 128.6, 127.30, 127.28, 113.1, 51.3, 48.3, 38.7, 25.2 ppm.

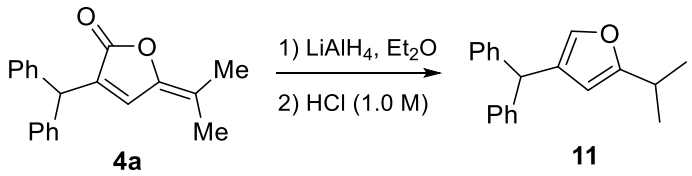
IR (neat): 2965 (w), 1760 (s), 1672 (m), 1492 (m), 1450 (m), 1279 (m), 1246 (m), 1210 (m), 1117 (s), 1075 (m), 959 (s), 706 (s), 699 (s) cm^{-1}.

HRMS (ESI) m/z: $[M+Na]^+$ Calcd for $C_{22}H_{24}O_3Na$ 359.1618; Found 359.1622.



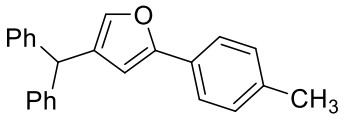
Procedure for 1.0 mmol scale reaction: To a dry Schlenk tube equipped with a high vacuum valve, **1^{R}a** (322.2 mg, 0.999 mmol) was dissolved in DCM (22.0 mL) with a stir bar. Neat TfOH (0.31 mL, 3.5 mmol) was added quickly via syringe to the solution at 0 °C. The reaction mixture was stirred overnight at rt, which was then neutralized with saturated $NaHCO_3$. The mixture was extracted with DCM (60 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel eluted with PE/EA (50/1 to 30/1, v/v) to afford the product **3a** (277.9 mg, 96%) as orange solid.

5. Reduction of **3a** and **4a** by $LiAlH_4$



4a **11**

To a dry Schlenk tube with a stir bar, **4a** (58.2 mg, 0.200 mmol) was dissolved in dry ether (4.0 mL). To the solution cooled at 0 ºC for 10 min, was added $LiAlH_4$ (23.0 mg, 0.606 mmol). After stirred at 0 ºC for 1 h, the reaction was quenched with 1.0 M HCl and stirred overnight at rt. The mixture was extracted with Et_2O (20 mL × 3). The combined organics were washed with brine, dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure and purified by flash column chromatography on silica gel eluted with PE/EA (100/1, v/v) to afford the product **11** (41.6 mg, 75%) as colorless oil.



10

Yield: 27.2 mg, 42% (based on **3a**: 67.7 mg, 0.200 mmol).

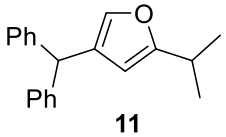
Colorless oil. PE/EA = 100/1.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.50 (d, *J* = 8.0 Hz, 2H), 7.32-7.29 (m, 4H), 7.25-7.21 (m, 6H), 7.15 (d, *J* = 8.0 Hz, 2H), 6.94 (s, 1H), 6.44 (s, 1H), 5.29 (s, 1H), 2.34 (s, 3H) ppm.

^{13}C NMR (150 MHz, $CDCl_3$): δ 154.7, 143.6, 140.3, 137.3, 130.4, 129.4, 128.9, 128.6, 128.3, 126.7, 123.8, 106.2, 48.5, 21.4 ppm.

IR (neat): 3027 (w), 2992 (w), 1771 (m), 1736 (m), 1493 (m), 1450 (m), 1239 (m), 1029 (m), 916 (m), 818 (s), 748 (s), 698 (s) cm^{-1}.

HRMS (EI) m/z: M^+ Calcd for $C_{24}H_{20}O$ 324.1514; Found 324.1510.



11

Yield: 41.6 mg, 75% (based on **4a**: 58.2 mg, 0.200 mmol).

Colorless oil. PE/EA = 100/1.

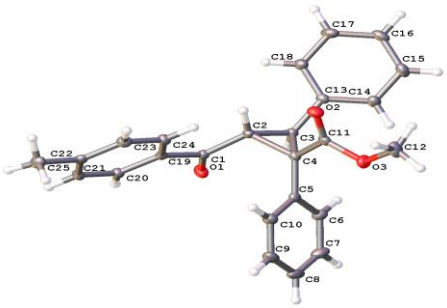
^{1}H NMR (600 MHz, $CDCl_3$): δ 7.31-7.28 (m, 4H), 7.23-7.21 (m, 6H), 6.79 (s, 1H), 5.82 (s, 1H), 5.22 (s, 1H), 2.92-2.85 (m, 1H), 1.22 (s, 3H), 1.21 (s, 3H) ppm.

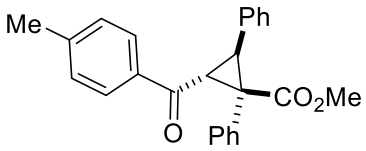
^{13}C NMR (125 MHz, $CDCl_3$): δ 162.4, 143.9, 139.2, 128.9, 128.7, 128.4, 126.5, 104.7, 48.7, 28.0, 21.2 ppm.

IR (neat): 2962 (w), 1609 (m), 1547 (m), 1494 (s), 1450 (s), 1260 (m), 1129 (m), 1091 (m), 1032 (m), 933 (s), 799 (s), 728 (s), 696 (s) cm^{-1}.

HRMS (EI) m/z: M^+ Calcd for $C_{20}H_{20}O$ 276.1514; Found 276.1516.

6. X-ray crystallographic data

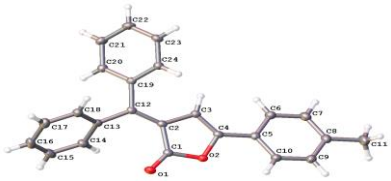


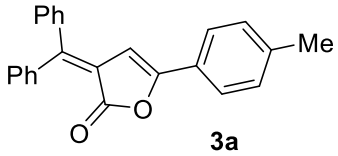


trans-**1a**

Crystal data and structure refinement for *trans*-1a:

Empirical formula	$C_{25}H_{22}O_3$
Formula weight	370.42
Temperature	170.03 K
Wavelength	1.34139 Å
Crystal system	Monoclinic
Space group	P 1 21/n 1
Unit cell dimensions	a = 13.0124(2) Å, α= 90°
	b = 9.00140(10) Å, β= 101.7520(10)°
	c = 17.0056(3) Å, γ = 90°
Volume	1950.11(5) $Å^3$
Z	4
Density (calculated)	1.262 mg/m^3
Absorption coefficient	0.418 mm^{-1}
F(000)	784
Crystal size	0.12 × 0.08 × 0.06 mm^3
Theta range for data collection	3.406 to 54.921°
Index ranges	–13⩽h⩽15, –10⩽k⩽10, –20⩽l⩽20
Reflections collected	20216
Independent reflections	3681 [R(int) = 0.0363]
Completeness to theta = 53.594°	99.3 %
Max. and min. transmission	0.7508 and 0.6385
Data / restraints / parameters	3681 / 0 / 255
Goodness-of-fit on F^2	1.051
Final R indices [I>2sigma(I)]	R_1 = 0.0401, wR_2 = 0.0973
R indices (all data)	R_1 = 0.0467, wR_2 = 0.1029
Largest diff. peak and hole	0.206 and –0.207 $eÅ^{-3}$

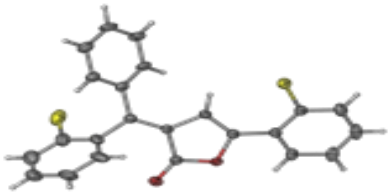


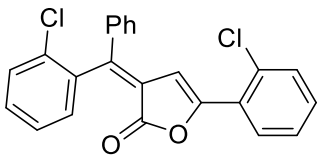


3a

Crystal data and structure refinement for 3a:

Empirical formula	$C_{24}H_{18}O_2$
Formula weight	338.38
Temperature	170.01 K
Wavelength	1.34139 Å
Crystal system	Monoclinic
Space group	P 1 21/c 1
Unit cell dimensions	a = 10.9549(2) Å, α= 90°
	b = 8.6376(2) Å, β= 97.0550(10)°
	c = 19.2969(4) Å, γ = 90°
Volume	1812.13(7) $Å^3$
Z	4
Density (calculated)	1.240 mg/m^3
Absorption coefficient	0.394 mm^{-1}
F(000)	712
Crystal size	0.15 × 0.12 × 0.08 mm^3
Theta range for data collection	4.886 to 54.873°
Index ranges	$-13 \leqslant h \leqslant 13$, $-8 \leqslant k \leqslant 10$, $-23 \leqslant l \leqslant 23$
Reflections collected	18563
Independent reflections	3392 [R(int) = 0.0299]
Completeness to theta = 53.594°	98.7 %
Max. and min. transmission	0.7508 and 0.6421
Data / restraints / parameters	3392 / 0 / 236
Goodness-of-fit on F^2	1.040
Final R indices [I>2sigma(I)]	R_1 = 0.0359, wR_2 = 0.0902
R indices (all data)	R_1 = 0.0374, wR_2 = 0.0916
Largest diff. peak and hole	0.210 and –0.183 $eÅ^{-3}$

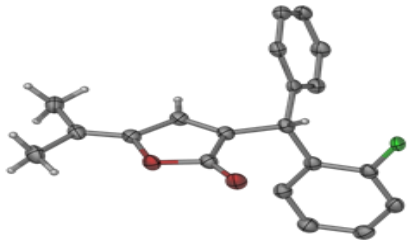


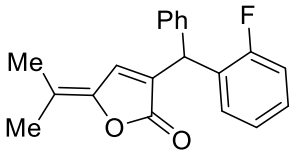


3k

Crystal data and structure refinement for 3k:

Empirical formula	$C_{23}H_{14}O_2Cl_2$
Formula weight	393.24
Temperature	293(2) K
Wavelength	1.54184 Å
Crystal system	Monoclinic
Space group	$P2_1/n$
Unit cell dimensions	a = 9.4518(2) Å, α = 90°
	b = 17.1313(2) Å, β = 109.841(2)°
	c = 12.0812(3) Å, γ = 90°
Volume	1840.08(7) $Å^3$
Z	4
Density (calculated)	1.419 mg/m^3
Absorption coefficient	3.297 mm^{-1}
F(000)	808.0
Crystal size	0.32 × 0.26 × 0.18 mm^3
Theta range for data collection	9.338 to 134.068°
Index ranges	$-11 \leqslant h \leqslant 11$, $-20 \leqslant k \leqslant 20$, $-14 \leqslant l \leqslant 14$
Reflections collected	40415
Independent reflections	3157 [R(int) = 0.0638]
Data / restraints / parameters	3157 / 14 / 232
Goodness-of-fit on F^2	1.036
Final R indices [I>2sigma(I)]	R_1 = 0.0925, wR_2 = 0.2334
R indices (all data)	R_1 = 0.0951, wR_2 = 0.2357
Largest diff. peak and hole	2.98 and –0.91 $eÅ^{-3}$

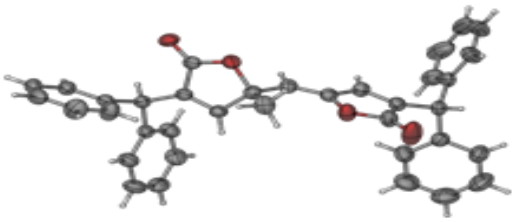


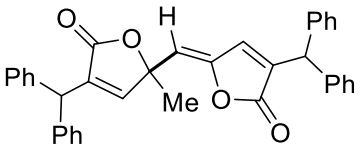


4i

Crystal data and structure refinement for 4i:

Empirical formula	$C_{20}H_{16}O_2F$
Formula weight	307.33
Temperature	100.00 (10) K
Wavelength	1.54184 Å
Crystal system	Monoclinic
Space group	$P2_1/c$
Unit cell dimensions	a = 8.9779(2) Å, α = 90°
	b = 17.0515(3) Å, β = 92.520(2)°
	c = 10.1052(2) Å, γ = 90°
Volume	1545.48(5) $Å^3$
Z	4
Density (calculated)	1.321 mg/m^3
Absorption coefficient	0.754 mm^{-1}
F(000)	644.0
Crystal size	0.32 × 0.26 × 0.12 mm^3
Theta range for data collection	9.862 to 134.108°
Index ranges	$-10 \leqslant h \leqslant 10$, $-17 \leqslant k \leqslant 20$, $-7 \leqslant l \leqslant 12$
Reflections collected	14704
Independent reflections	2743 [R(int) = 0.0404]
Data / restraints / parameters	2743 / 0 / 219
Goodness-of-fit on F^2	1.101
Final R indices [I>2sigma(I)]	R_1 = 0.0429, wR_2 = 0.1057
R indices (all data)	R_1 = 0.0460, wR_2 = 0.1075
Largest diff. peak and hole	0.19 and –0.18 $eÅ^{-3}$

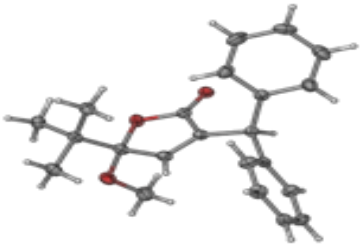


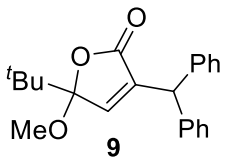


7

Crystal data and structure refinement for 7:

Empirical formula	$C_{36}H_{28}O_4$
Formula weight	524.58
Temperature	293.74(10) K
Wavelength	1.54184 Å
Crystal system	Monoclinic
Space group	$P2_1/c$
Unit cell dimensions	a = 9.47360(10) Å, α = 90°
	b = 16.7897(2) Å, β = 96.2320(10)°
	c = 17.7289(3) Å, γ = 90°
Volume	2803.27(7) $Å^3$
Z	4
Density (calculated)	1.243 mg/m^3
Absorption coefficient	0.638 mm^{-1}
F(000)	1104.0
Crystal size	0.32 × 0.28 × 0.11 mm^3
Theta range for data collection	7.272 to 134.116°
Index ranges	$-8 \leqslant h \leqslant 11$, $-20 \leqslant k \leqslant 20$, $-21 \leqslant l \leqslant 21$
Reflections collected	29794
Independent reflections	4998 [R(int) = 0.0428]
Data / restraints / parameters	4998 / 0 / 363
Goodness-of-fit on F^2	1.049
Final R indices [I>2sigma(I)]	R_1 = 0.0382, wR_2 = 0.0955
R indices (all data)	R_1 = 0.0455, wR_2 = 0.0966
Largest diff. peak and hole	0.21 and –0.14 $eÅ^{-3}$





9

Crystal data and structure refinement for 9:

Empirical formula	$C_{22}H_{24}O_3$
Formula weight	336.41
Temperature	100.00(10) K
Wavelength	1.54184 Å
Crystal system	Monoclinic
Space group	$P2_1/n$
Unit cell dimensions	a = 11.1433(2) Å, α = 90°
	b = 9.4429(2) Å, β = 97.0790(10)°
	c = 17.7217(3) Å, γ = 90°
Volume	1850.55(6) $Å^3$
Z	4
Density (calculated)	1.207 mg/m^3
Absorption coefficient	0.628 mm^{-1}
F(000)	720.0
Crystal size	0.42 × 0.26 × 0.12 mm^3
Theta range for data collection	8.906 to 134.118°
Index ranges	–13⩽h⩽13, –11⩽k⩽11, –21⩽l⩽21
Reflections collected	39794
Independent reflections	3292 [R(int) = 0.1005]
Data / restraints / parameters	3292 / 0 / 230
Goodness-of-fit on F^2	1.084
Final R indices [I>2sigma(I)]	R_1 = 0.0601, wR_2 = 0.1588
R indices (all data)	R_1 = 0.0626, wR2 = 0.1613
Largest diff. peak and hole	0.65 and –0.24 $eÅ^{-3}$

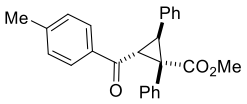
7. References

(1) Wu, W.; Zou, S.; Lin, L.; Ji, J.; Zhang, Y.; Ma, B.; Liu, X.; Feng, X. *Chem. Commun.* **2017**, *53*, 3232.

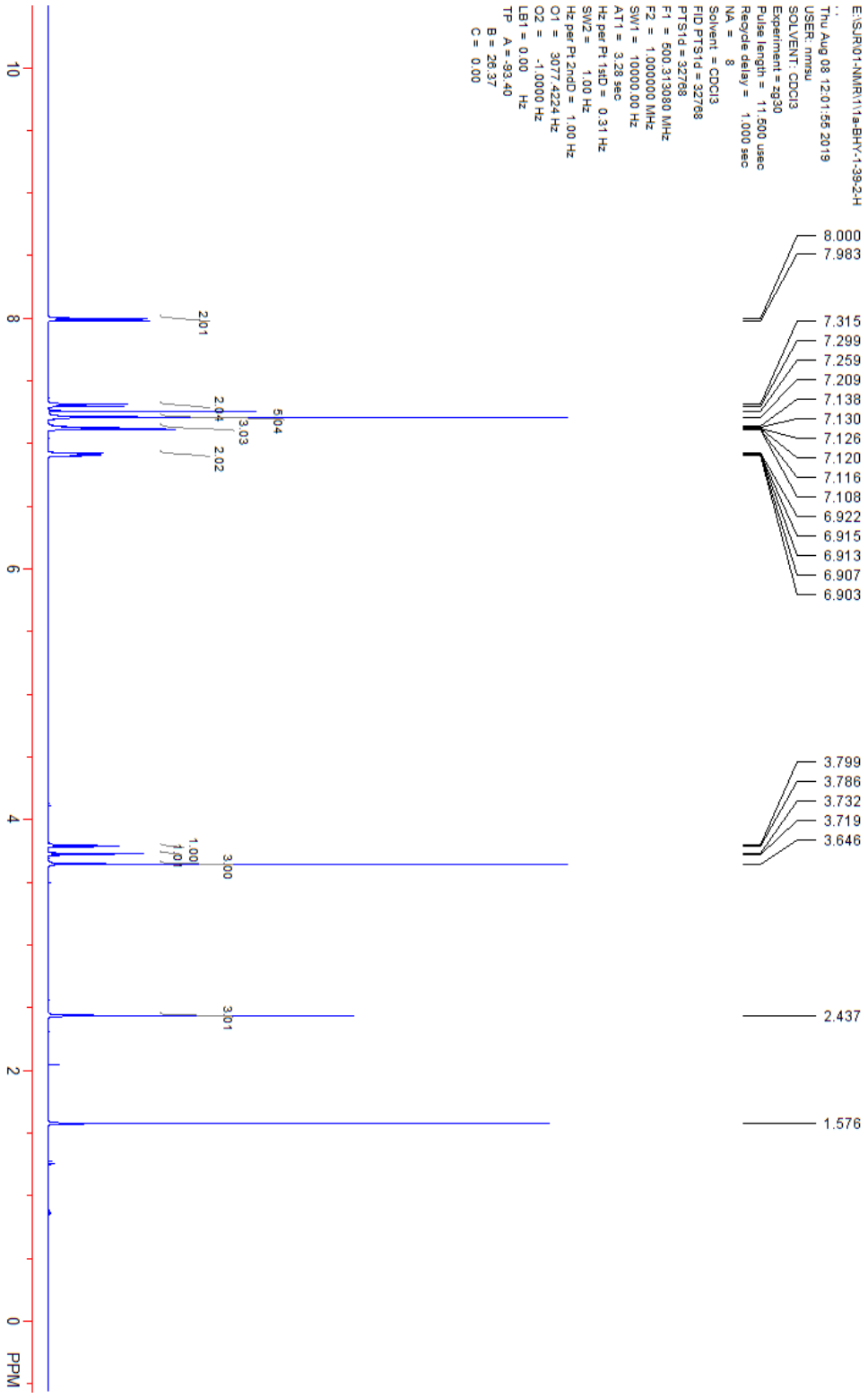
(2) (a) Fauduet, H.; Burgada, R. *Synthesis* **1980**, 642. (b) Yin, D.; Liu, H.; Lu, C.-D.; Xu, Y.-J. *J. Org. Chem.* **2017**, *82*, 3252.

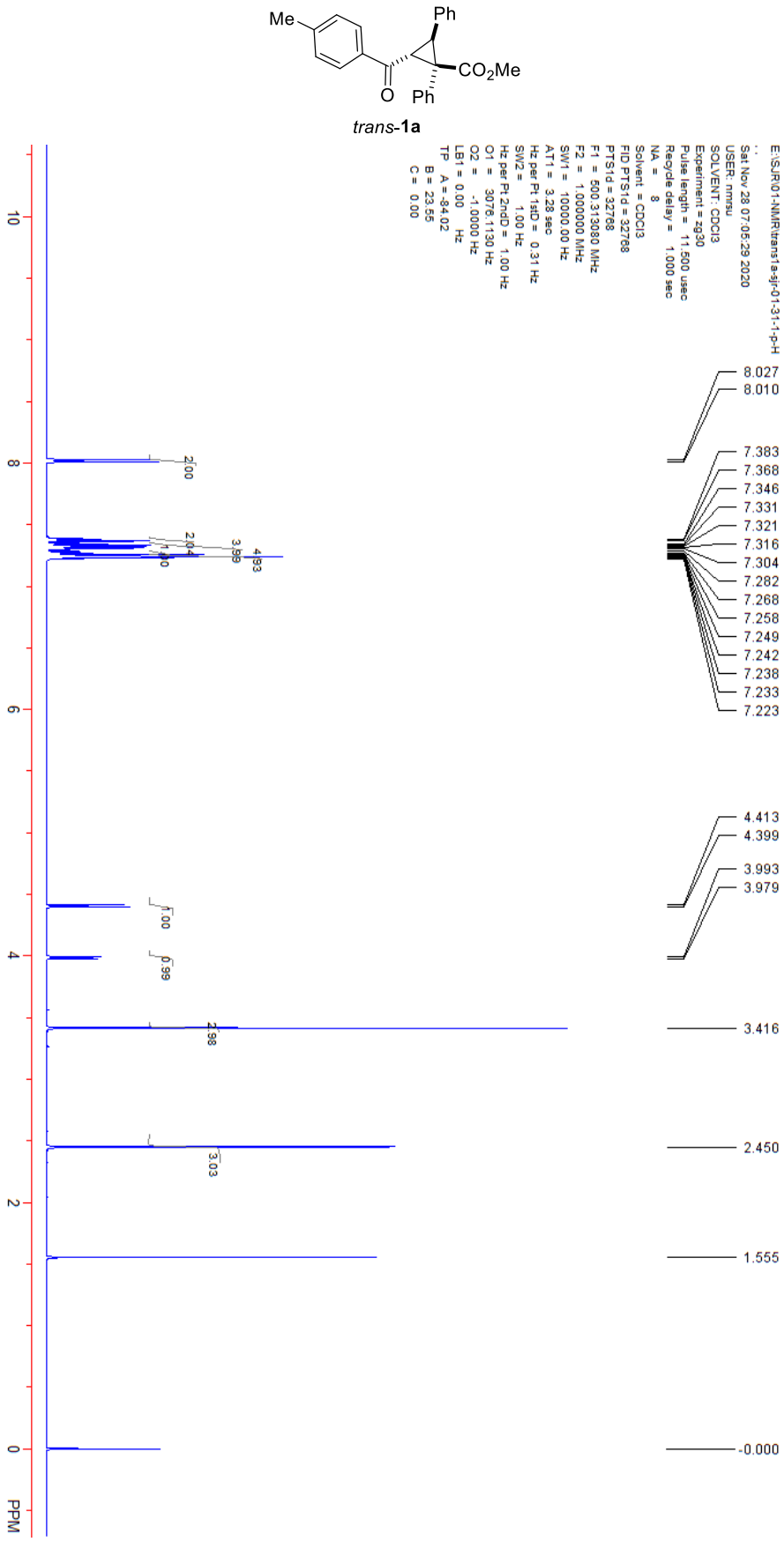
(3) Brückner, C.; Reissig, H.-U. *J. Org. Chem.* **1988**, *53*, 2440.

8. NMR spectra of new compounds



1a

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O
Ph
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LB1 = 0.00 Hz
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7.321
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7.304
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7.268
7.258
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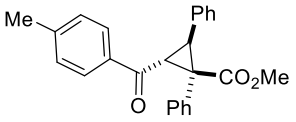
PPM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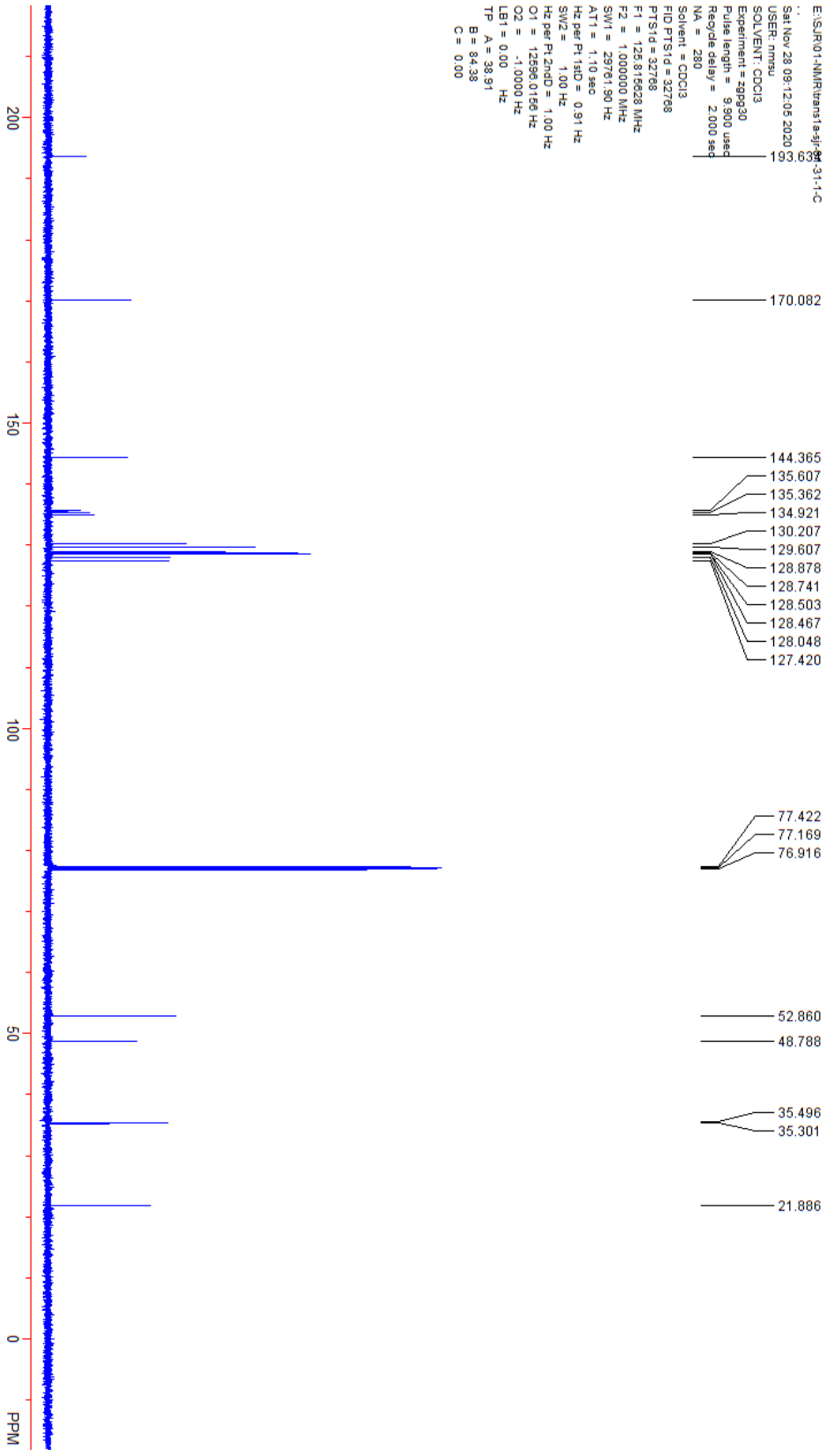
Ph
CO2Me
O
Ph

trans-**1a**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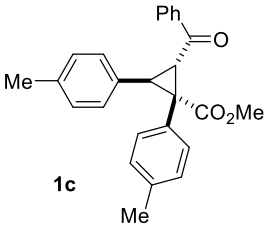
PPM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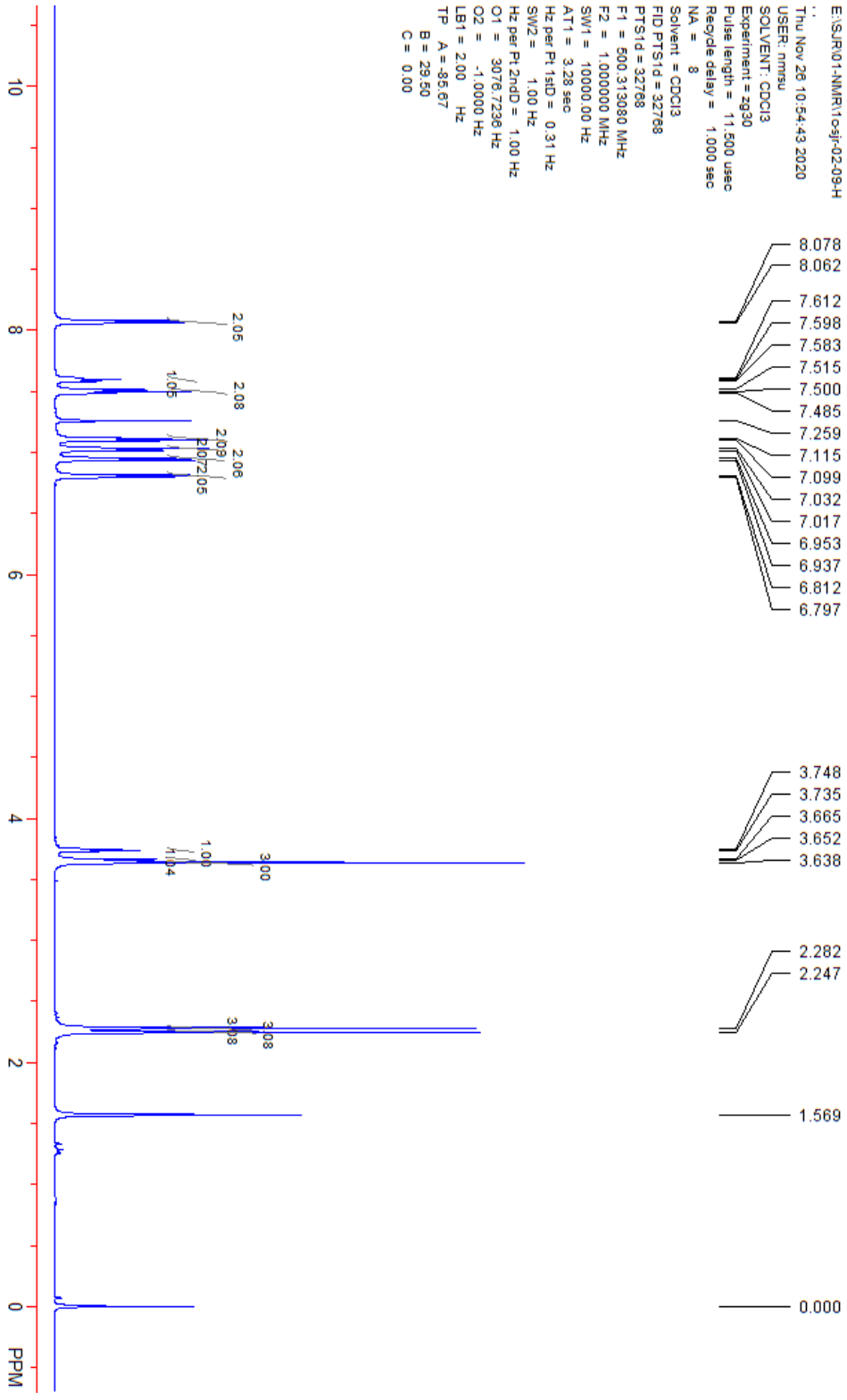
1c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3.665
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2.08
2.09
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10
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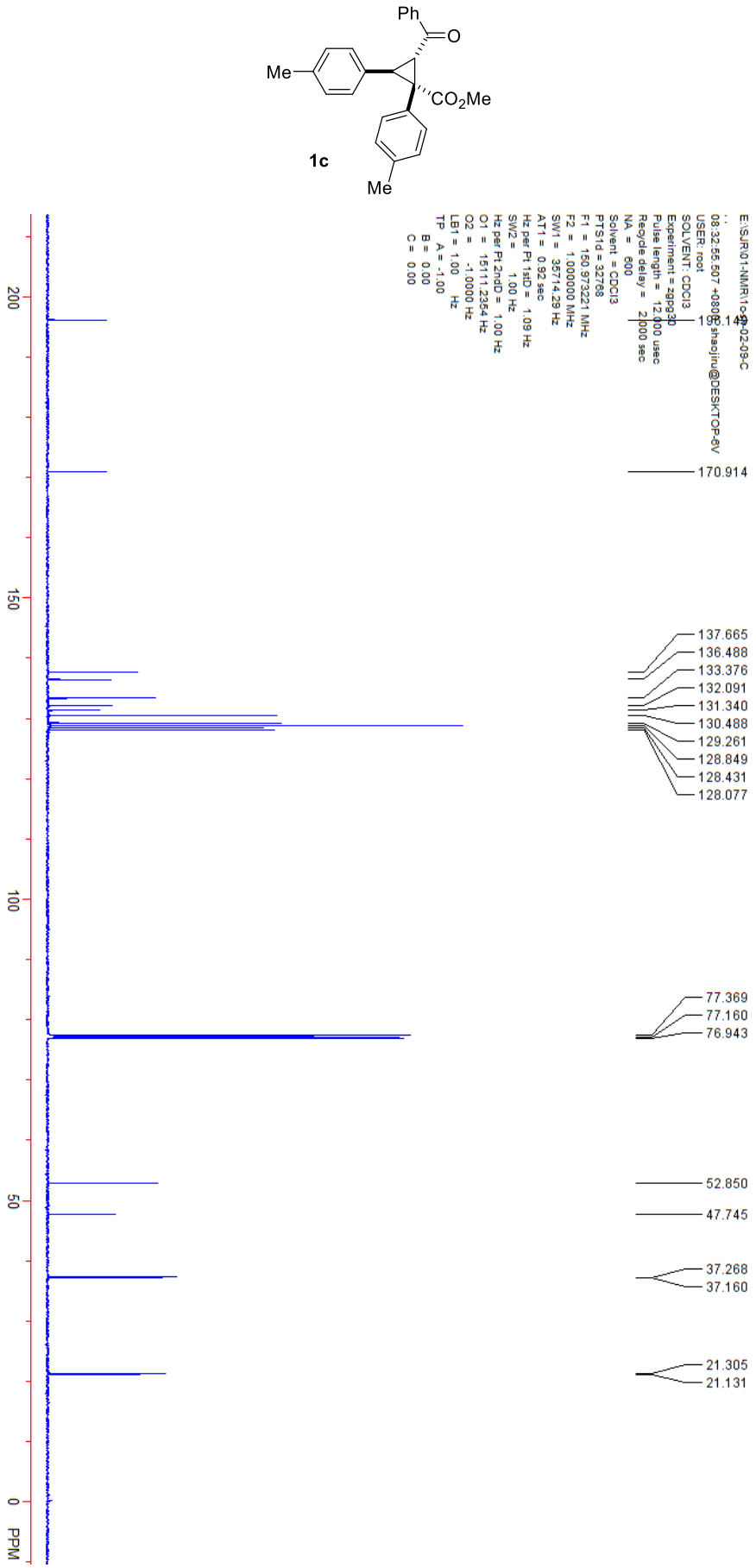
4
2
0
PPM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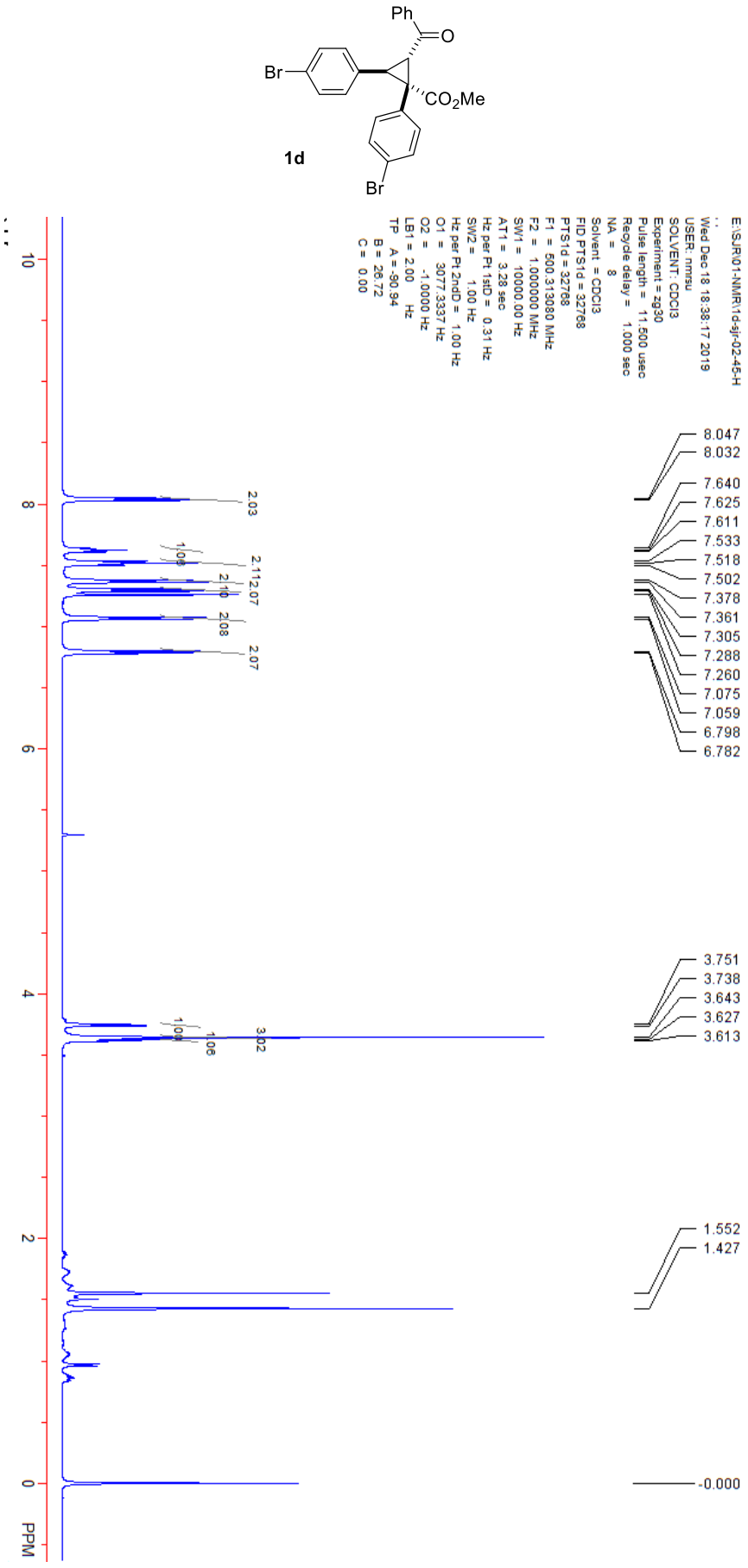
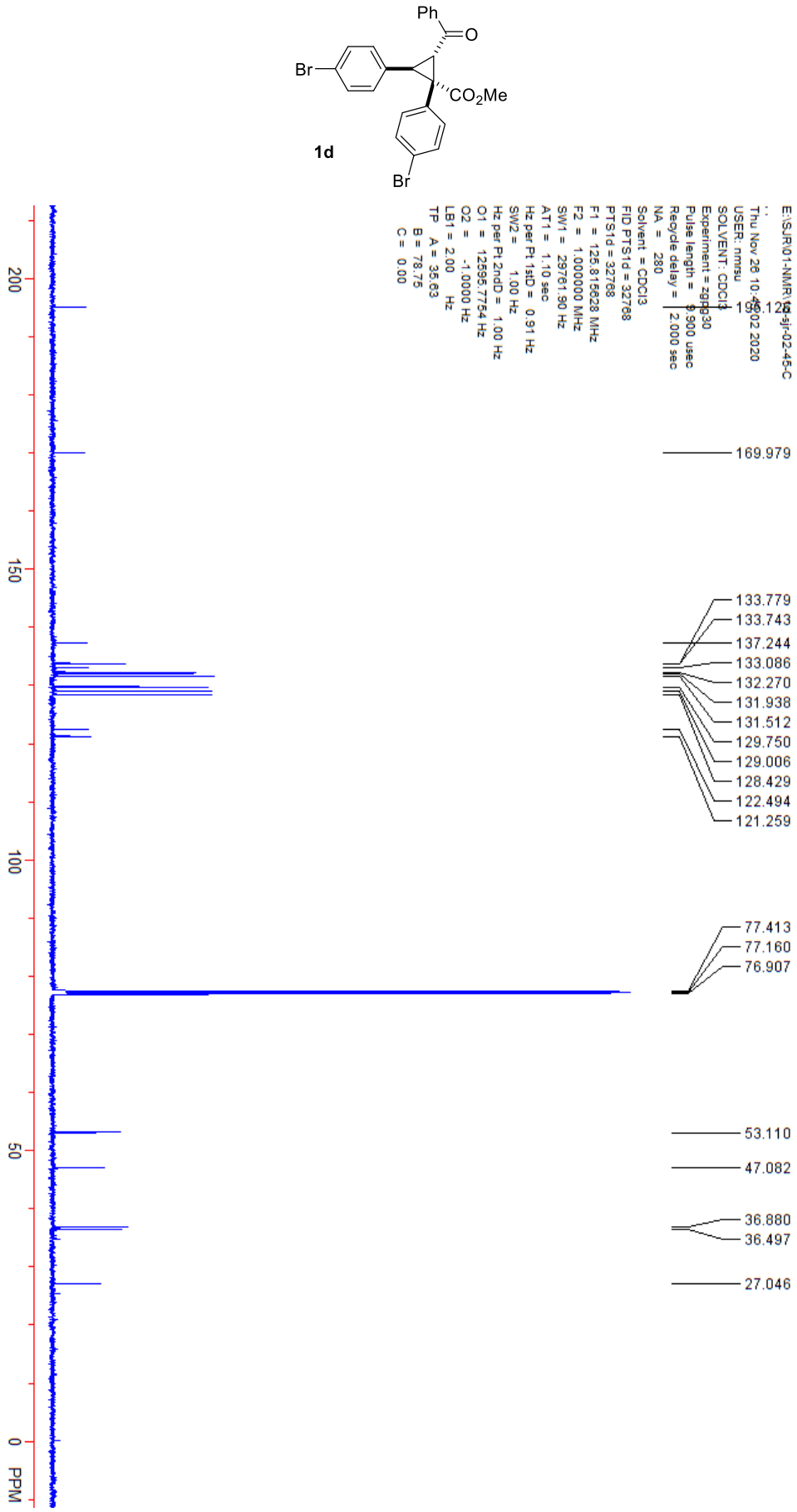
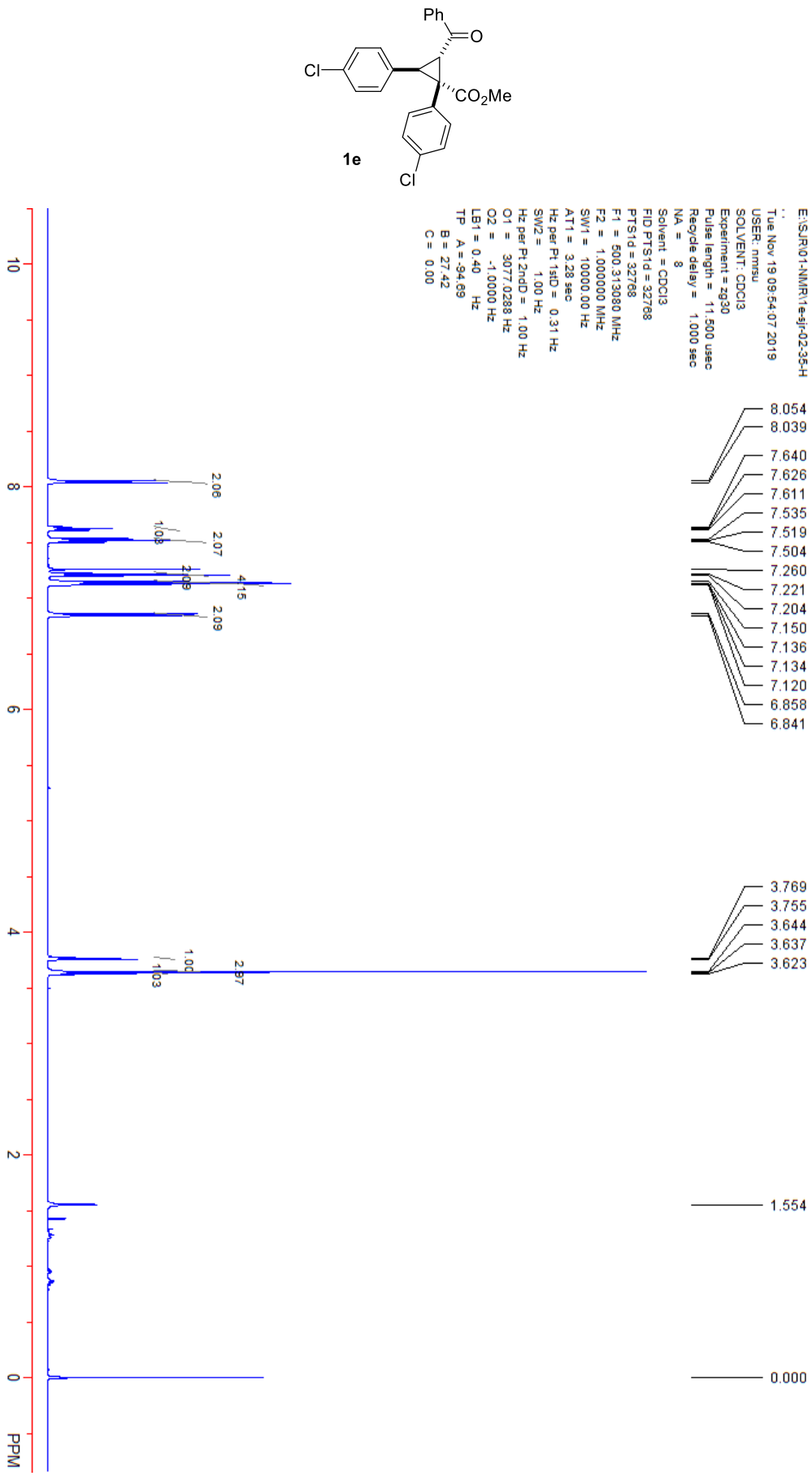
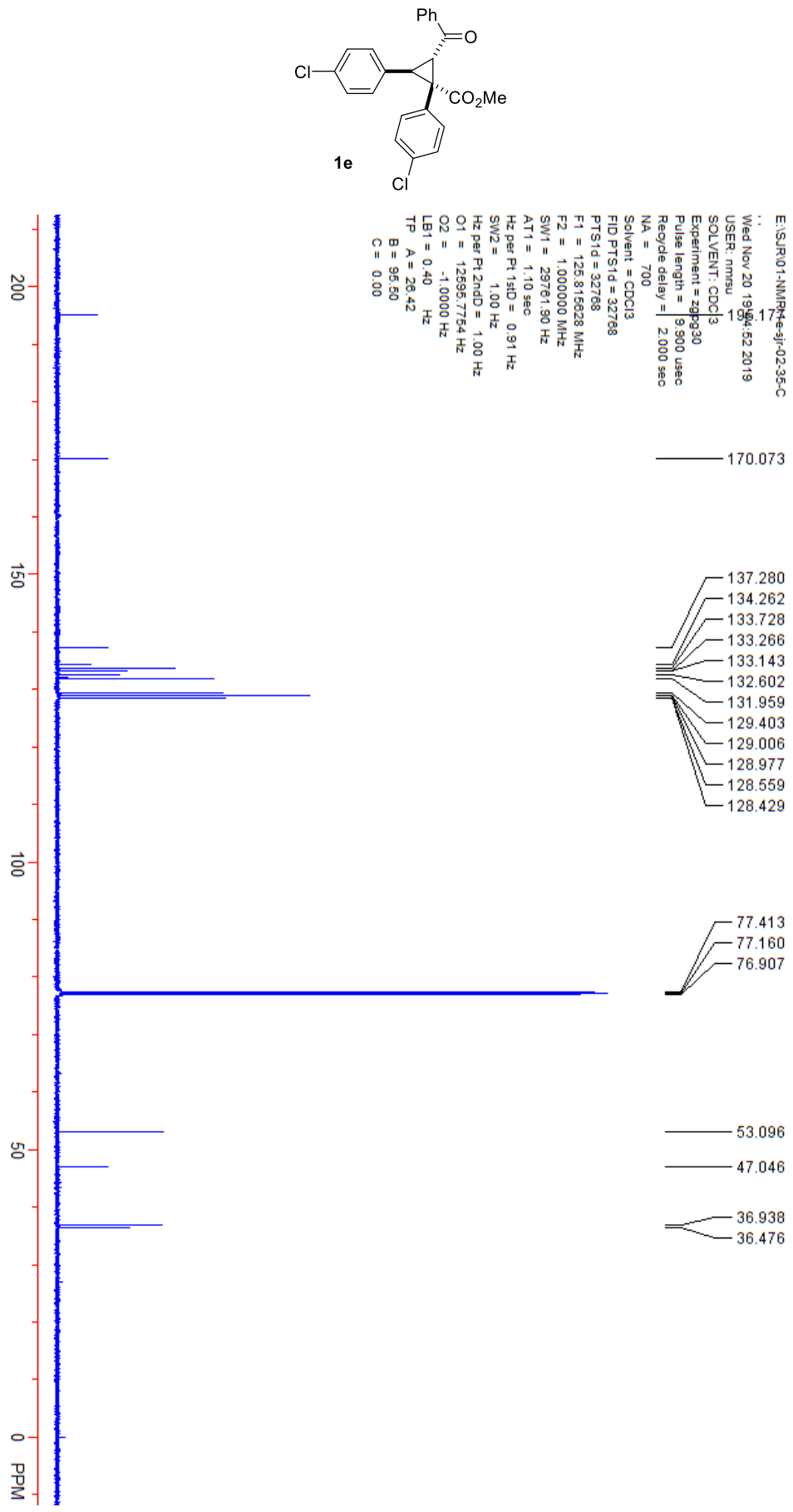
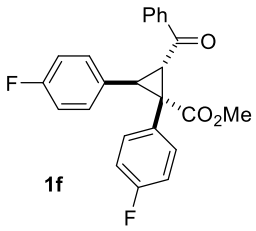
Me
CO2Me
Me
1c
E:\SJR\01-NMR\1c-SJR-02-09-C
08:32:55.507 +0800 shaojiru@DESKTOP-8V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15111.2354 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = -1.00
B = 0.00
C = 0.00
195.144
170.914
137.665
136.488
133.376
132.091
131.340
130.488
129.261
128.849
128.431
128.077
77.369
77.160
76.943
52.850
47.745
37.268
37.160
21.305
21.131
200
150
100
50
0
PPM


Ph
O
Br
CO2Me
Br
1d
E:\SJR\01-NMR\1d-sjr-02-45-H
Wed Dec 18 18:38:17 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.3130880 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3337 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -90.94
B = 26.72
C = 0.00
8.047
8.032
7.640
7.625
7.611
7.533
7.518
7.502
7.378
7.361
7.305
7.288
7.260
7.075
7.059
6.798
6.782
3.751
3.738
3.643
3.627
3.613
1.552
1.427
-0.000
2.03
1.08
2.11
2.07
2.10
2.08
2.07
1.00
1.06
3.02
10
8
6
4
2
0
PPM

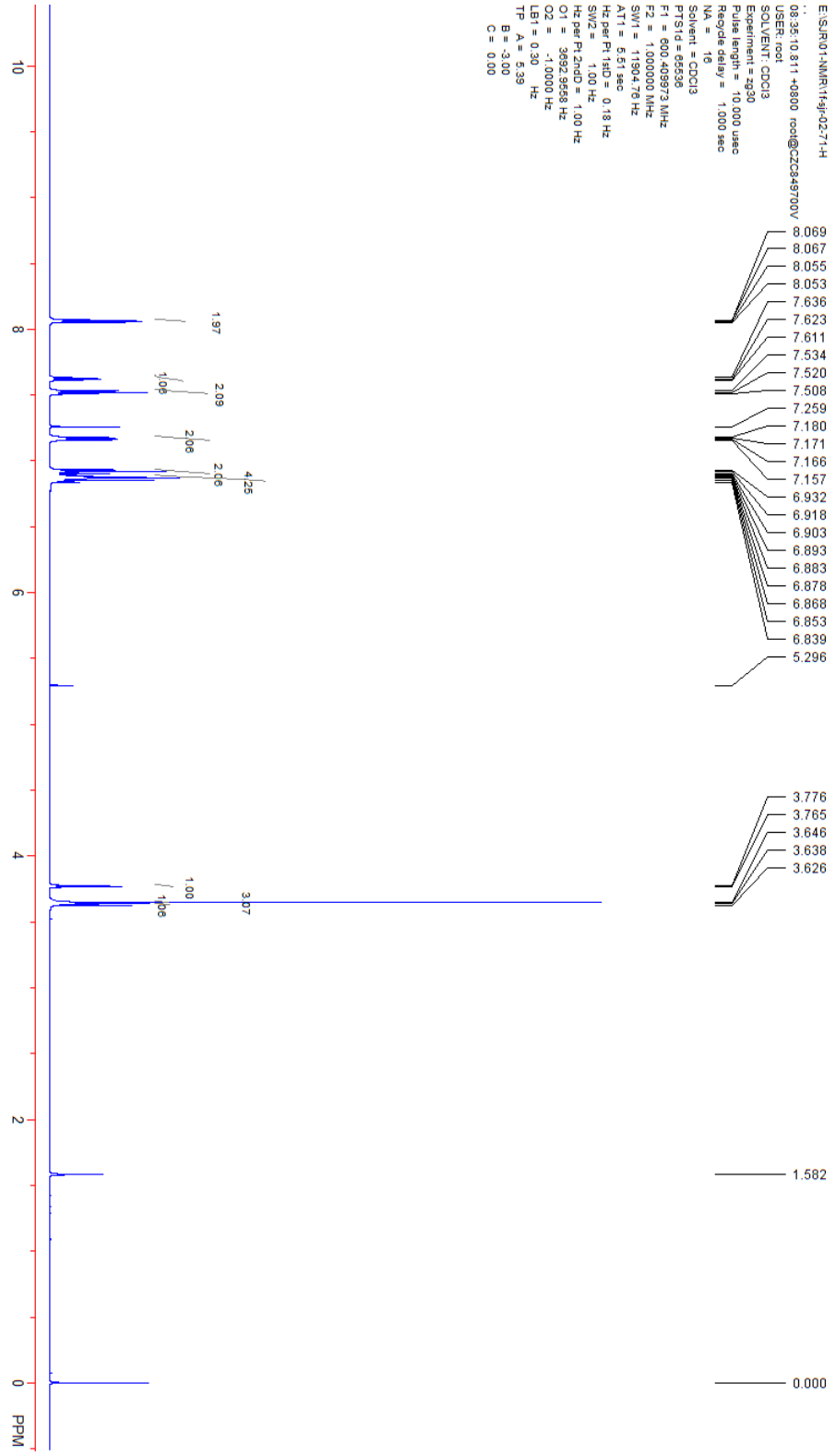

Ph
O
Br
CO2Me
Br
1d
E:\SJR\01-NMR\14-sjr-02-45-C
Thu Nov 26 10:49:02 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7764 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 35.83
B = 78.75
C = 0.00
169.979
133.779
133.743
137.244
133.086
132.270
131.938
131.512
129.750
129.006
128.429
122.494
121.259
77.413
77.160
76.907
53.110
47.082
36.880
36.497
27.046
200
150
100
50
0
PPM

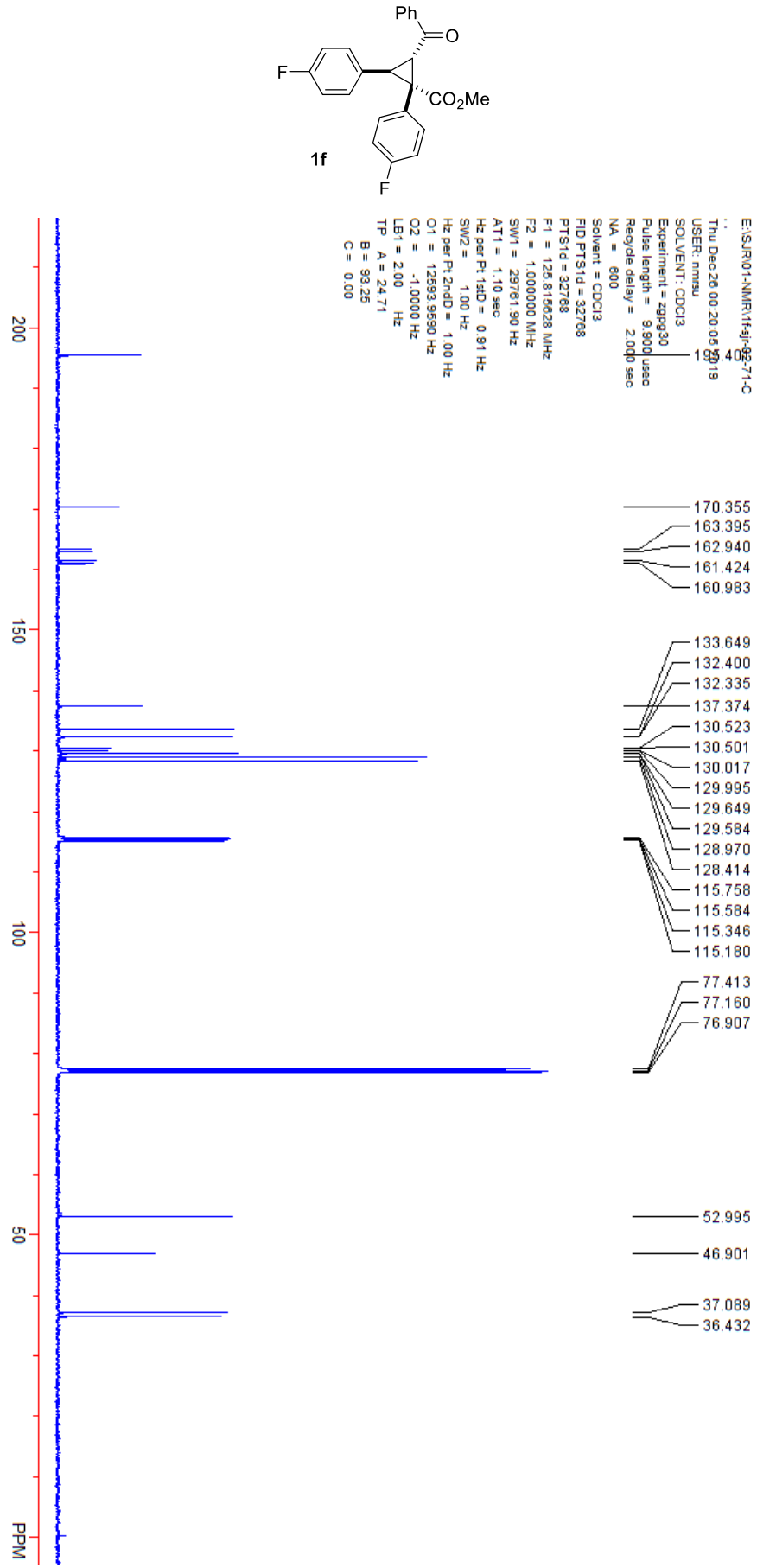

Ph
O
Cl
CO2Me
Cl
1e
E:\SJR\01-NMR\1e-sjr-02-35-H
Tue Nov 19 09:54:07 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 0.40 Hz
TP A = -94.69
B = 27.42
C = 0.00
8.054
8.039
7.640
7.626
7.611
7.535
7.519
7.504
7.260
7.221
7.204
7.150
7.136
7.134
7.120
6.858
6.841
3.769
3.755
3.644
3.637
3.623
1.554
0.000
2.06
1.08
2.07
2.09
4.15
2.09
1.00
1.03
2.87
10
8
6
4
2
0
PPM

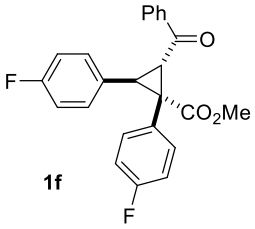

Ph
O
Cl
CO2Me
Cl
1e
E:\SJR\01-NMR\1e-sjr-02-35-C
Wed Nov 20 19:54:52 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 0.40 Hz
TP A = 26.42
B = 95.50
C = 0.00
196.177
170.073
137.280
134.262
133.728
133.266
133.143
132.602
131.959
129.403
129.006
128.977
128.559
128.429
77.413
77.160
76.907
53.096
47.046
36.938
36.476
200
150
100
50
0
PPM


Ph
O
F
CO2Me
F

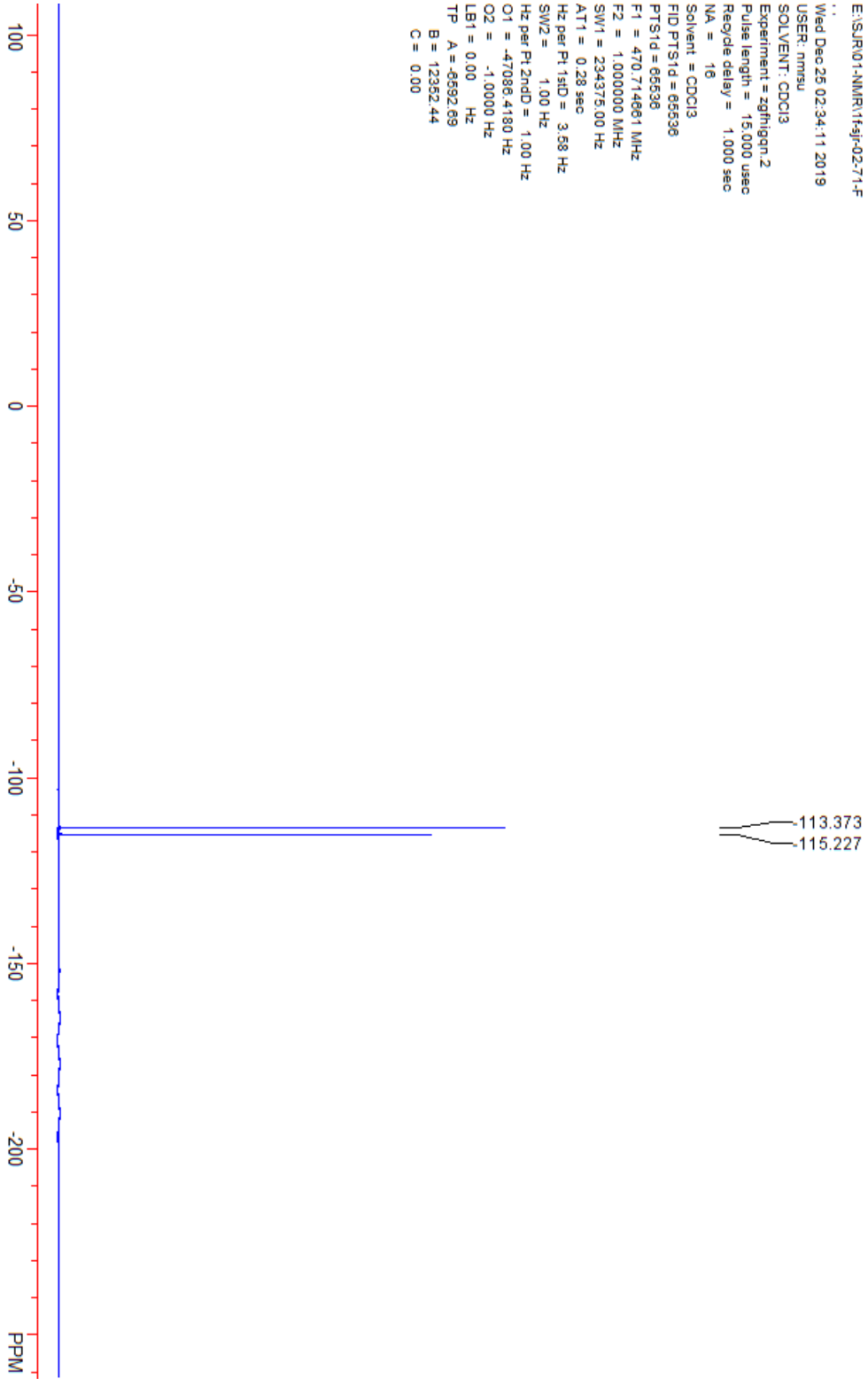
1f

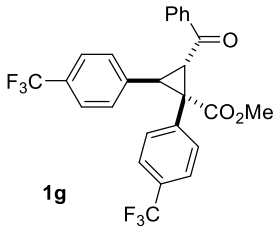

E:\SJR\01-NMR\1f-sj-02-71-H
08:35:10.811 +0800 root@CZC8497700V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3692.9568 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 5.39
B = -3.00
C = 0.00
8.069
8.067
8.055
8.053
7.636
7.623
7.611
7.534
7.520
7.508
7.259
7.180
7.171
7.166
7.157
6.932
6.918
6.903
6.893
6.883
6.878
6.868
6.853
6.839
5.296
3.776
3.765
3.646
3.638
3.626
1.582
0.000
1.97
1.08
2.09
2.06
2.06
4.25
1.00
1.06
3.07
10
8
6
4
2
0
PPM


Ph
O
F
CO2Me
1f
F
E:\SJR\01-NMR\1f-sjr-93-71-C
Thu Dec 28 00:20:05 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.9590 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 24.71
B = 93.25
C = 0.00
154.402
170.355
163.395
162.940
161.424
160.983
133.649
132.400
132.335
137.374
130.523
130.501
130.017
129.995
129.649
129.584
128.970
128.414
115.758
115.584
115.346
115.180
77.413
77.160
76.907
52.995
46.901
37.089
36.432
200
150
100
50
PPM

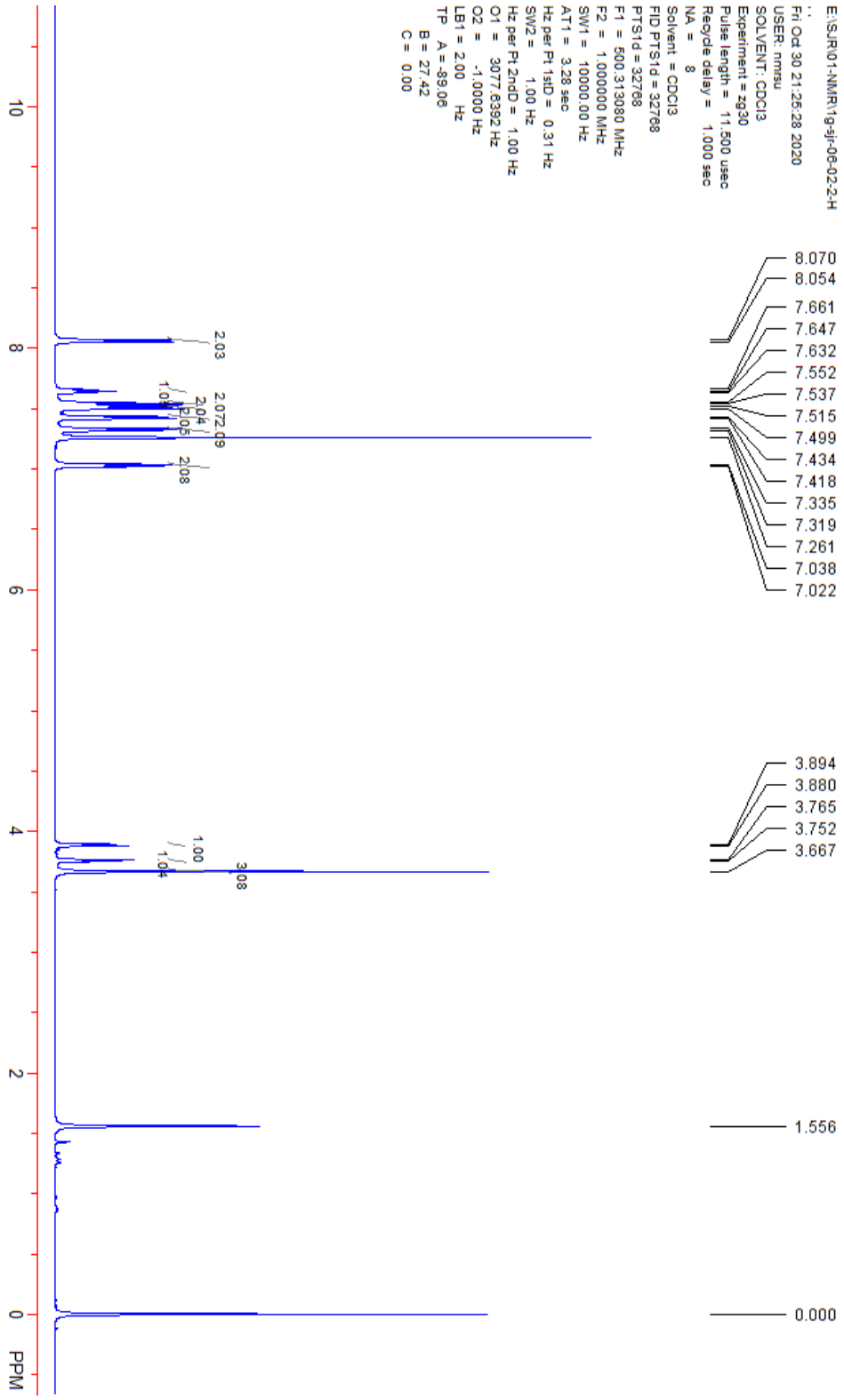

Ph
O
F
CO2Me
F

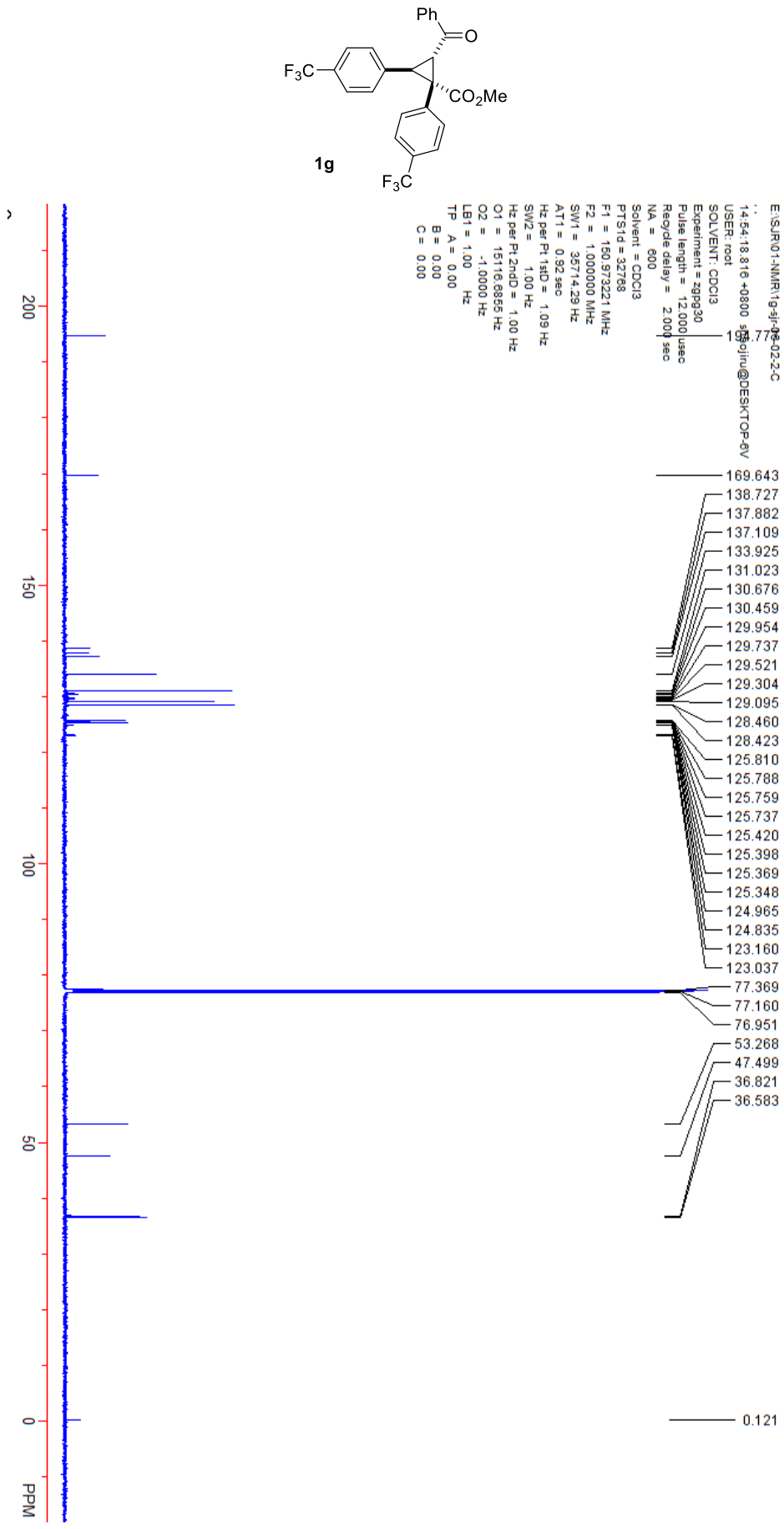
1f

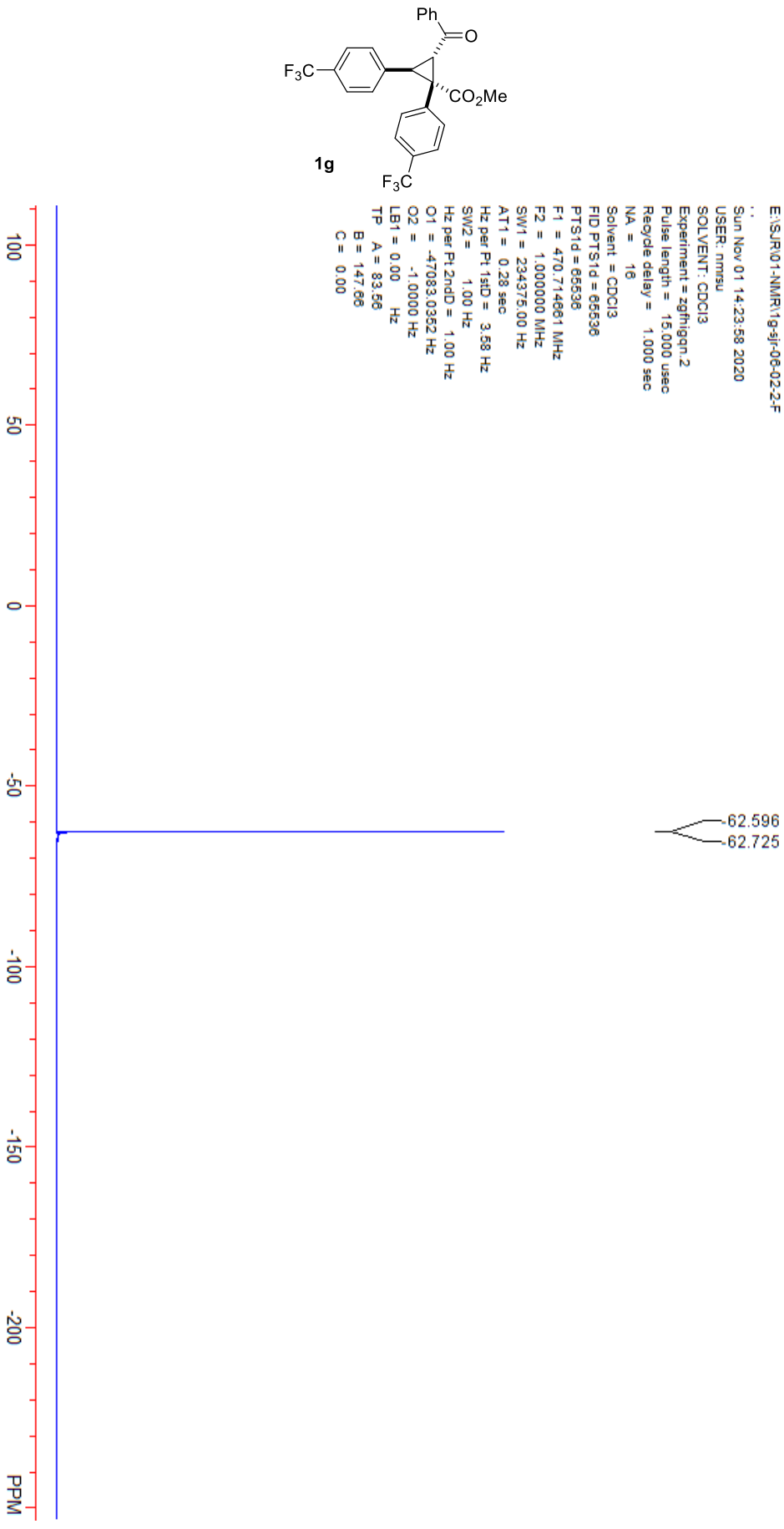

E:\SJR\01-NMR\1f-sjr-02-71-F
Wed Dec 25 02:34:11 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47086.4180 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -6592.69
B = 12352.44
C = 0.00
-113.373
-115.227
100
50
0
-50
-100
-150
-200
PPM

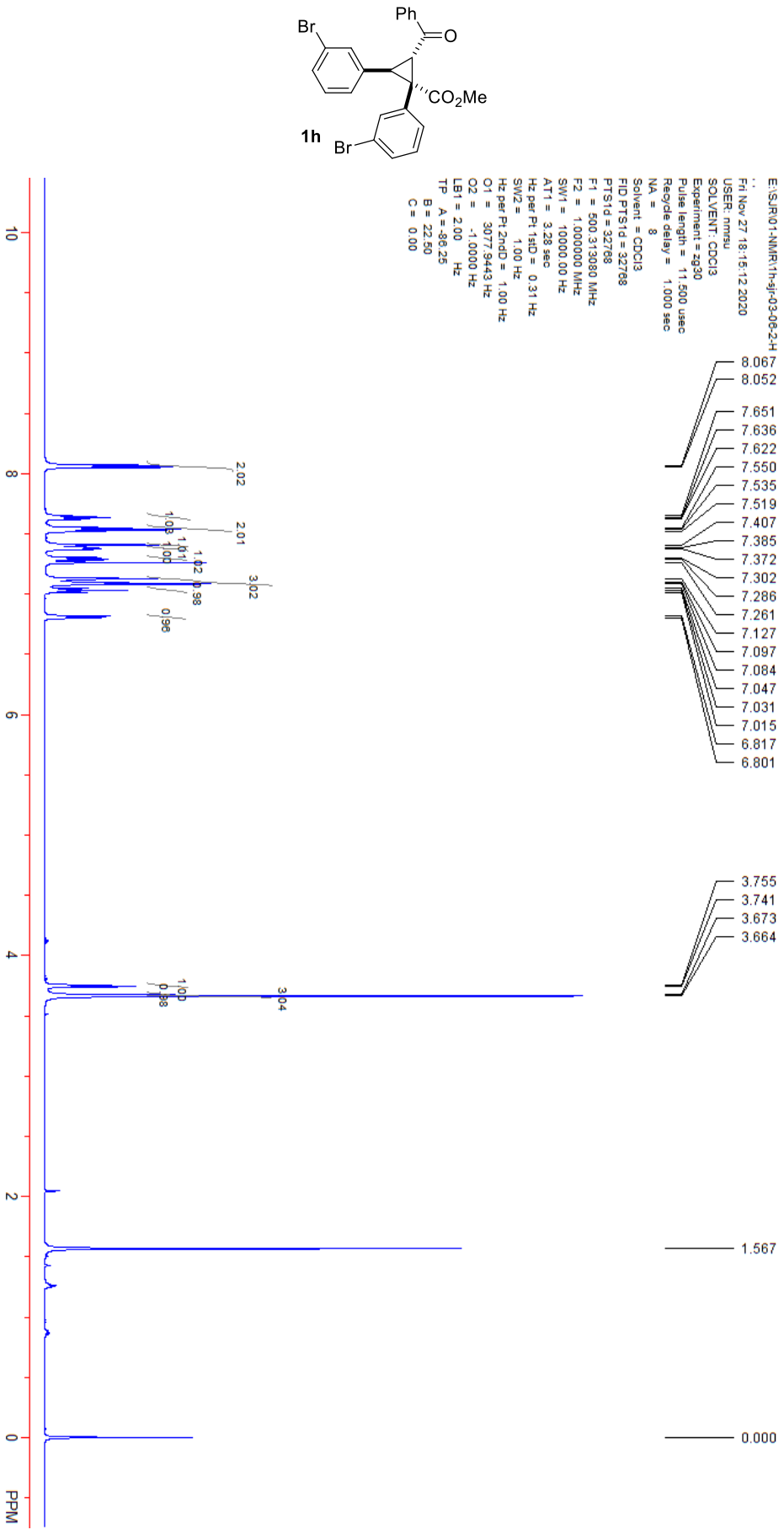

Ph
O
F3C
CO2Me
F3C

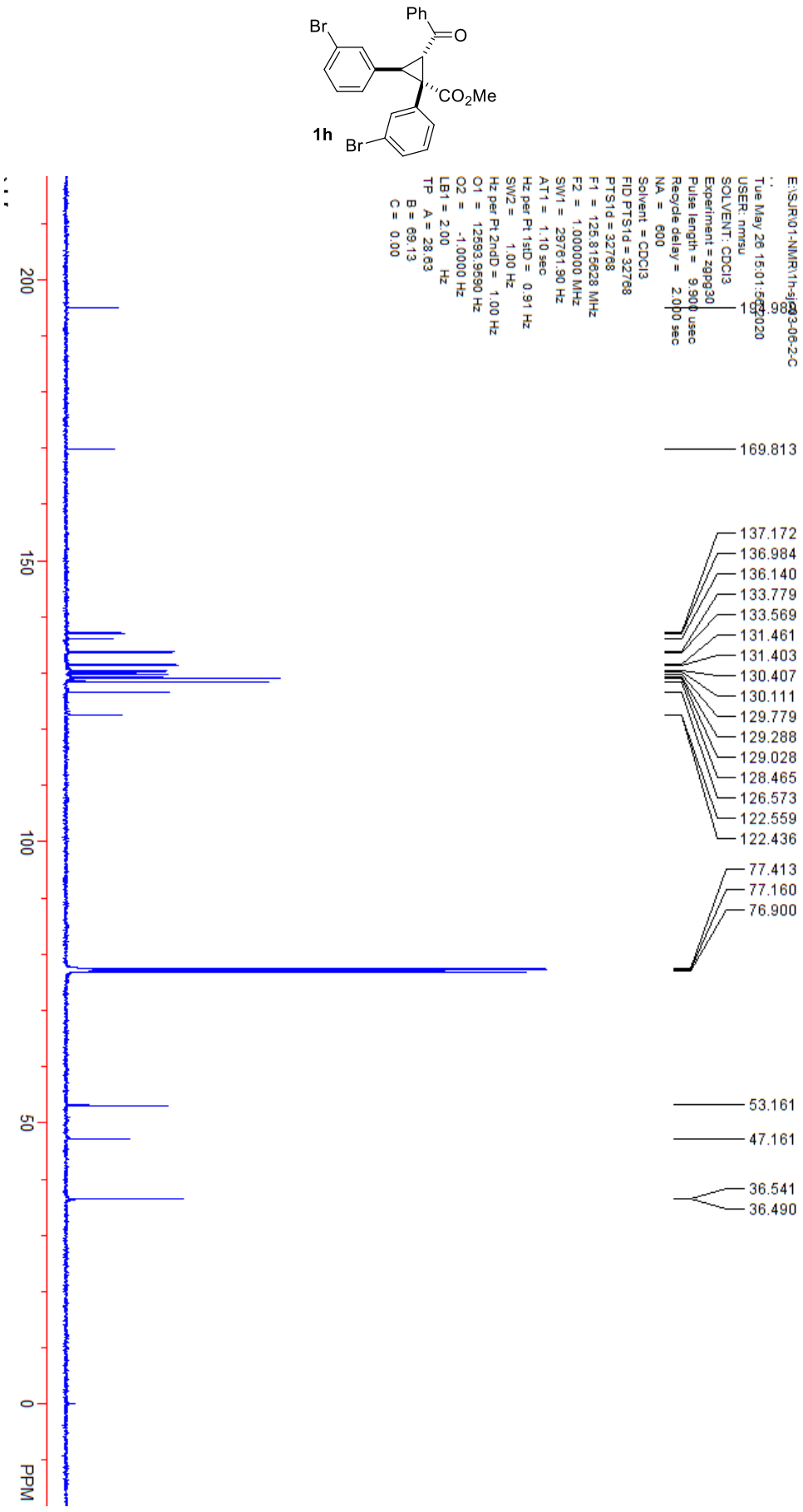
1g

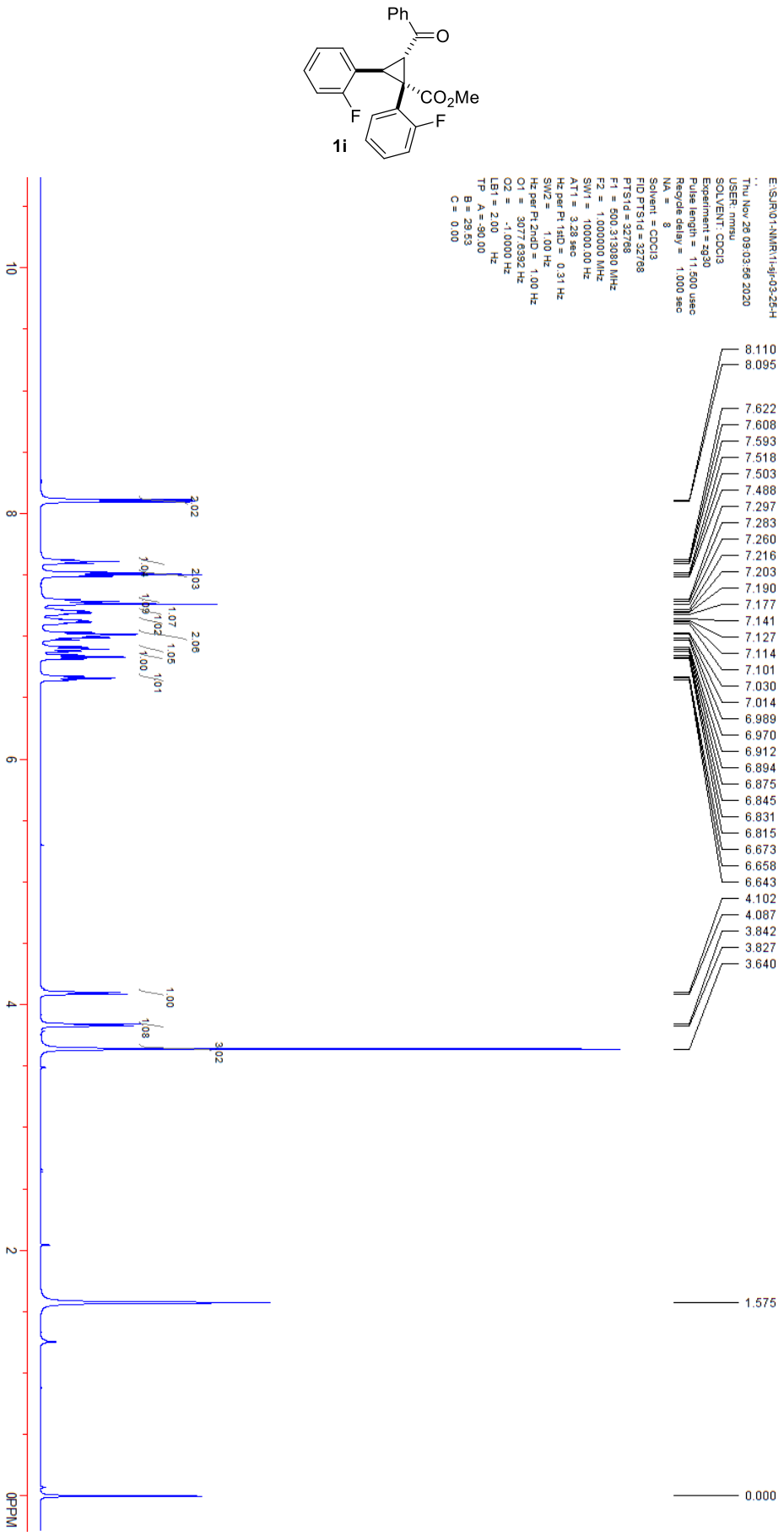

E:\SJR\01-NMR\1g-sjr-06-02-2-H
Fri Oct 30 21:25:28 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -89.06
B = 27.42
C = 0.00
8.070
8.054
7.661
7.647
7.632
7.552
7.537
7.515
7.499
7.434
7.418
7.335
7.319
7.261
7.038
7.022
3.894
3.880
3.765
3.752
3.667
1.556
0.000
2.03
2.07
2.09
1.03
2.04
2.05
2.08
1.00
1.04
3.08
10
8
6
4
2
0
PPM

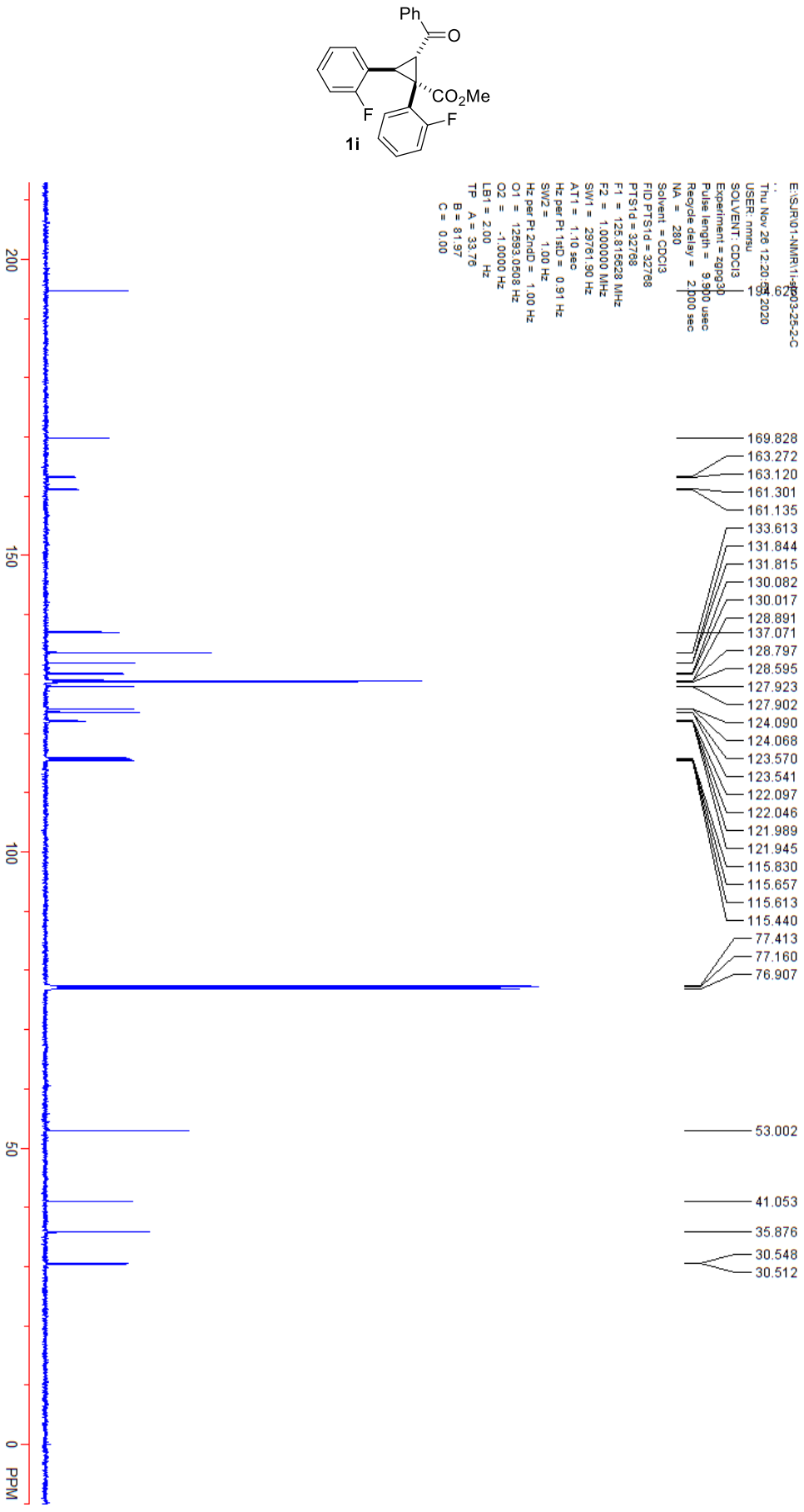

Ph
O
F3C
CO2Me
F3C
1g
E:\SJR\01-NMR\1g-sjr-08-02-2-C
14:54:18 816 +0800
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15116.6855 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
169.643
138.727
137.882
137.109
133.925
131.023
130.676
130.459
129.954
129.737
129.521
129.304
129.095
128.460
128.423
125.810
125.788
125.759
125.737
125.420
125.398
125.369
125.348
124.965
124.835
123.160
123.037
77.369
77.160
76.951
53.268
47.499
36.821
36.583
0.121
200
150
100
50
0
PPM

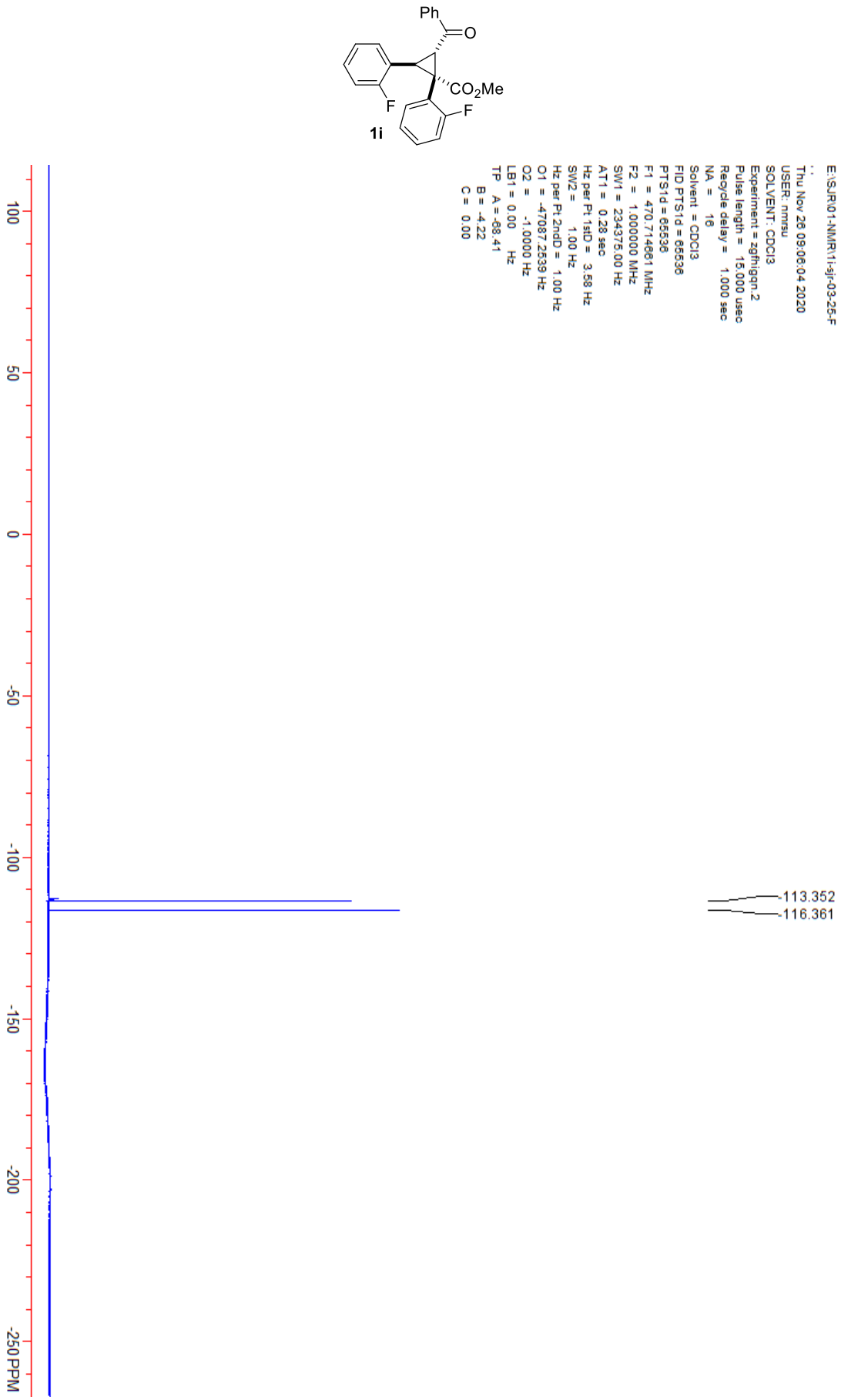

Ph
O
F3C
CO2Me
F3C
1g
E:\SJR\01-NMR\1g-sjr-06-02-2-F
Sun Nov 01 14:23:58 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47083.0352 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 83.56
B = 147.66
C = 0.00
-62.596
-62.725
100
50
0
-50
-100
-150
-200
PPM

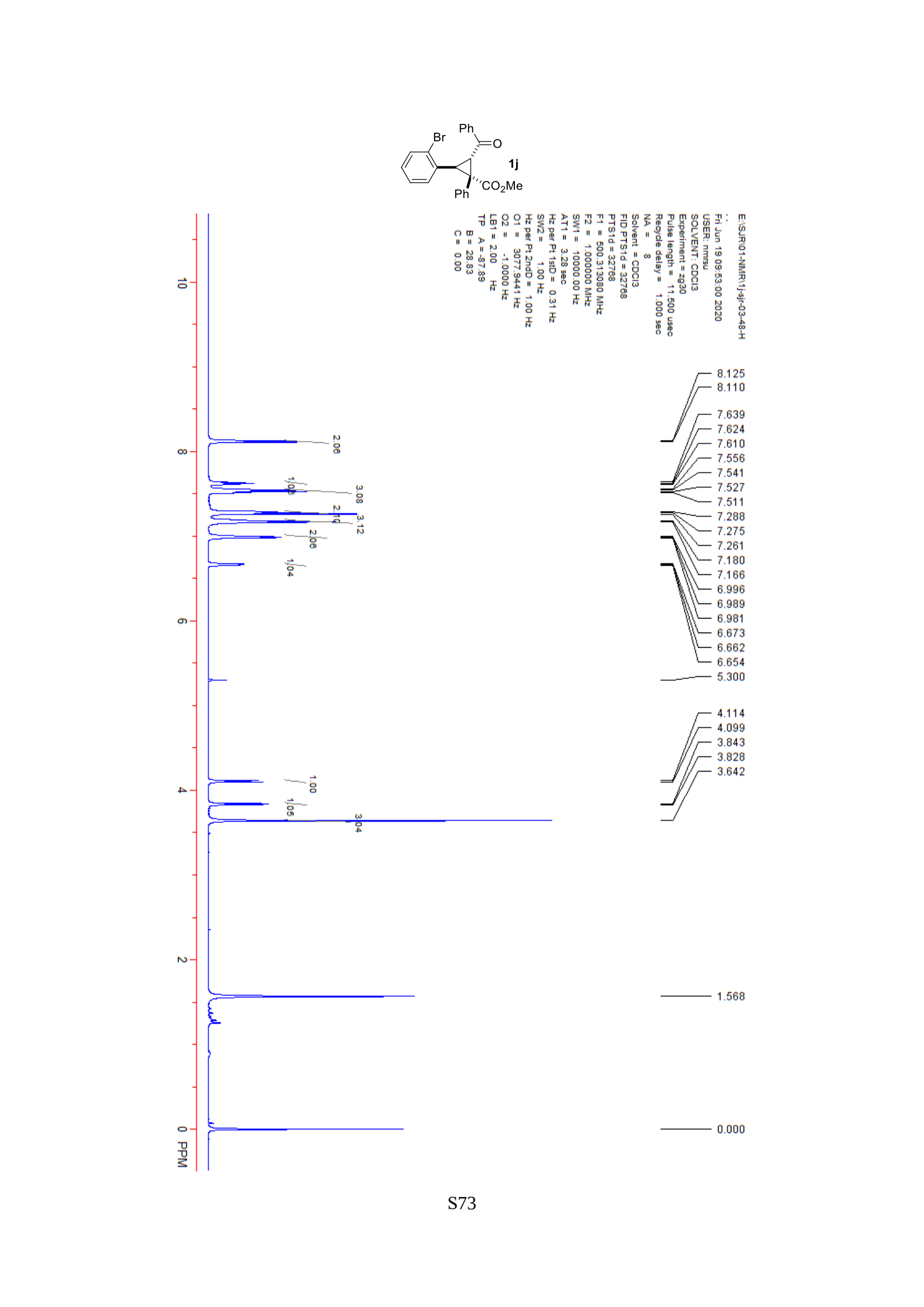

Br
Ph
O
CO2Me
1h
Br
E:\SJR\01-NMR\1h-sjr-03-06-2-H
Fri Nov 27 18:15:12 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.9443 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -86.25
B = 22.50
C = 0.00
8.067
8.052
7.651
7.636
7.622
7.550
7.535
7.519
7.407
7.385
7.372
7.302
7.286
7.261
7.127
7.097
7.084
7.047
7.031
7.015
6.817
6.801
3.755
3.741
3.673
3.664
1.567
0.000
2.02
2.01
1.03
1.01
1.00
1.02
0.98
3.02
0.96
1.00
0.88
3.04
10
8
6
4
2
0
PPM

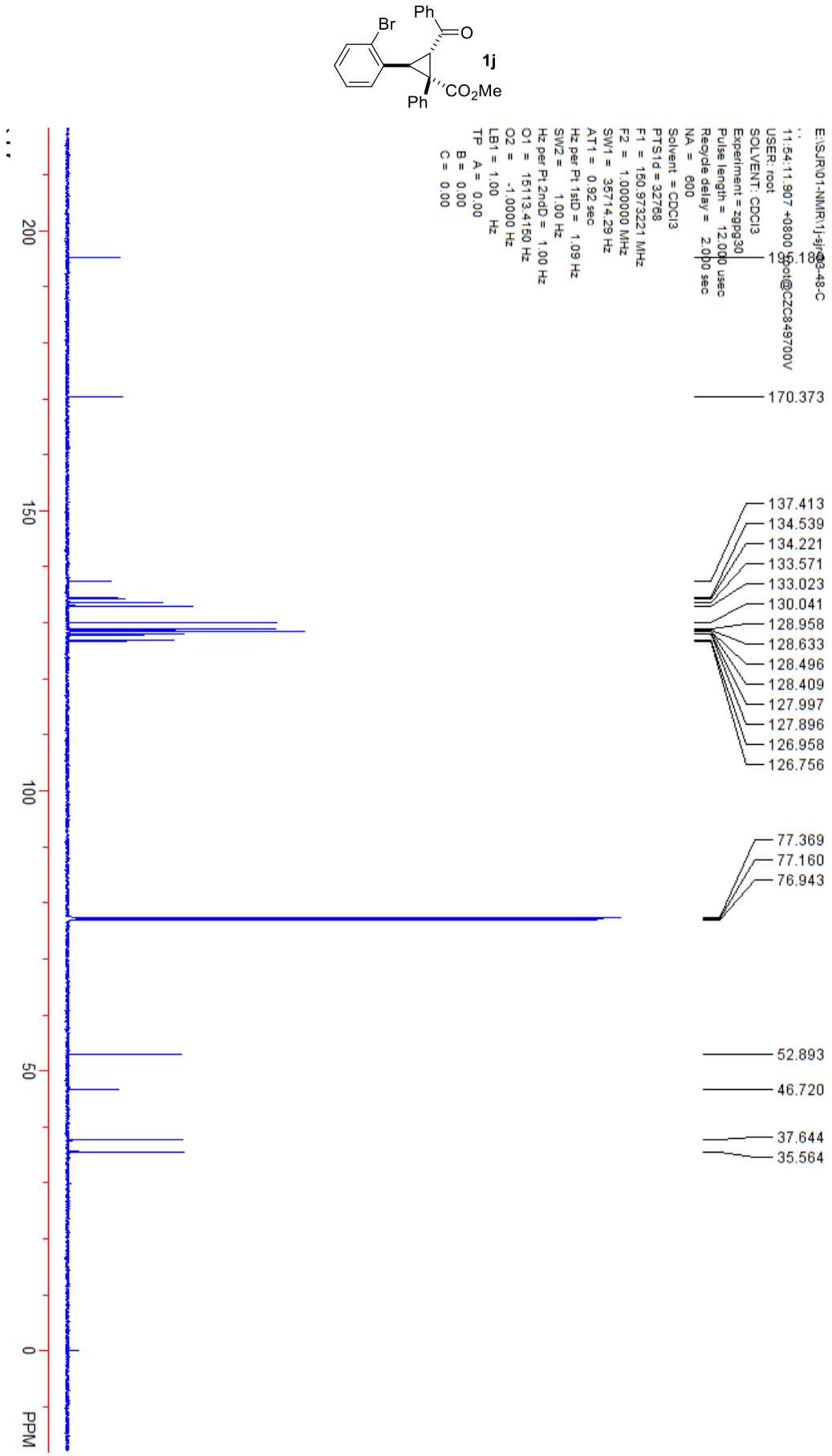

Br
Ph
O
CO2Me
1h
Br
E:\SJR\01-NMR\1h-sjr03-06-2-C
Tue May 26 15:01:56 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.9590 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 28.63
B = 69.13
C = 0.00
169.813
137.172
136.984
136.140
133.779
133.569
131.461
131.403
130.407
130.111
129.779
129.288
129.028
128.465
126.573
122.559
122.436
77.413
77.160
76.900
53.161
47.161
36.541
36.490
200
150
100
50
0
PPM

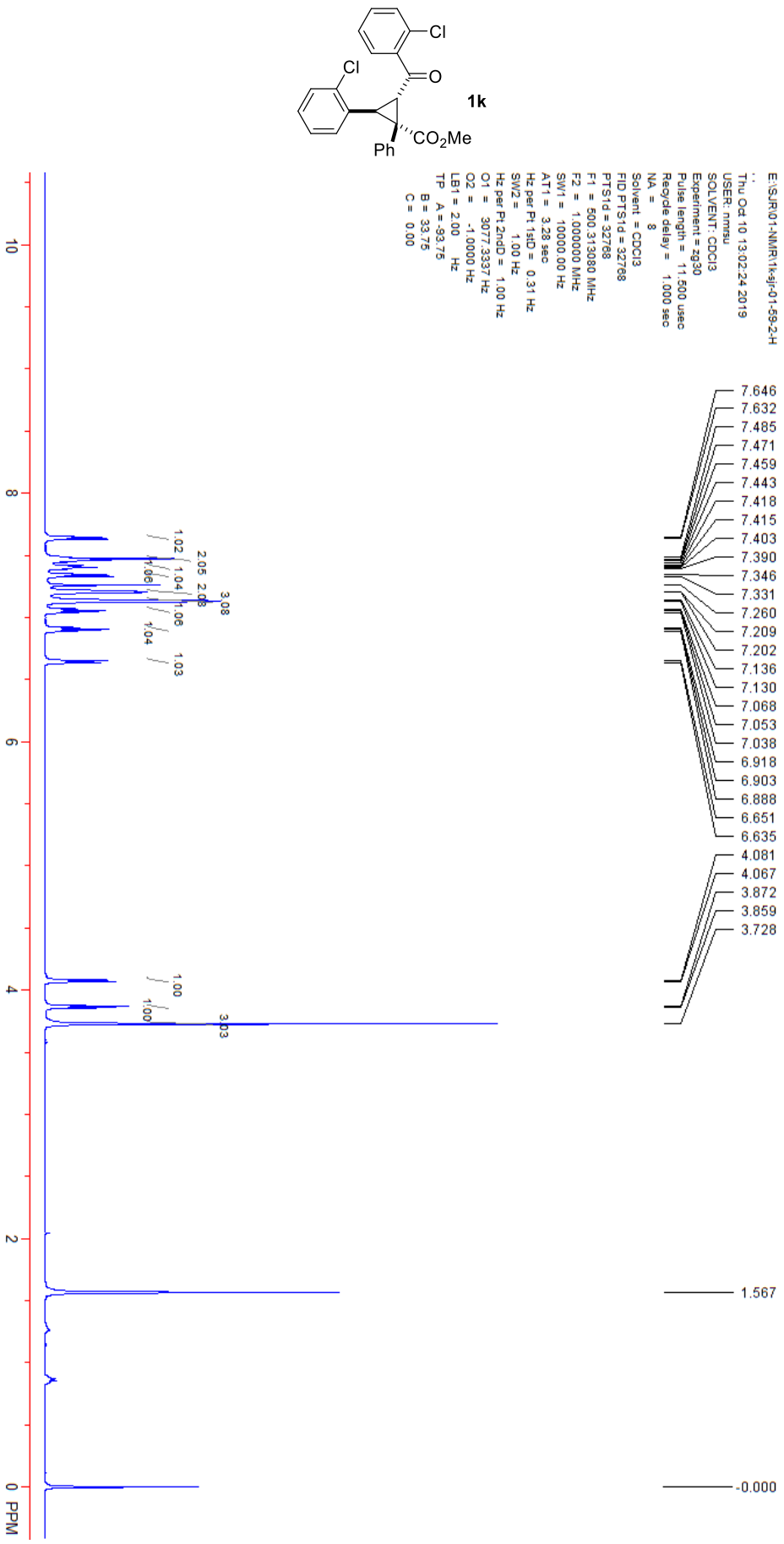

Ph
O
CO2Me
F
F
1i
E:\SJR\01-NMR\1\sjr-03-25-H
Thu Nov 26 09:03:56 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1fD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2nfD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -90.00
B = 29.53
C = 0.00
8.110
8.095
7.622
7.608
7.593
7.518
7.503
7.488
7.297
7.283
7.260
7.216
7.203
7.190
7.177
7.141
7.127
7.114
7.101
7.030
7.014
6.989
6.970
6.912
6.894
6.875
6.845
6.831
6.815
6.673
6.658
6.643
4.102
4.087
3.842
3.827
3.640
1.575
0.000
2.02
1.04
2.03
1.09
1.07
1.02
2.06
1.05
1.00
1.01
1.00
1.08
3.02
10
8
6
4
2
0PPM

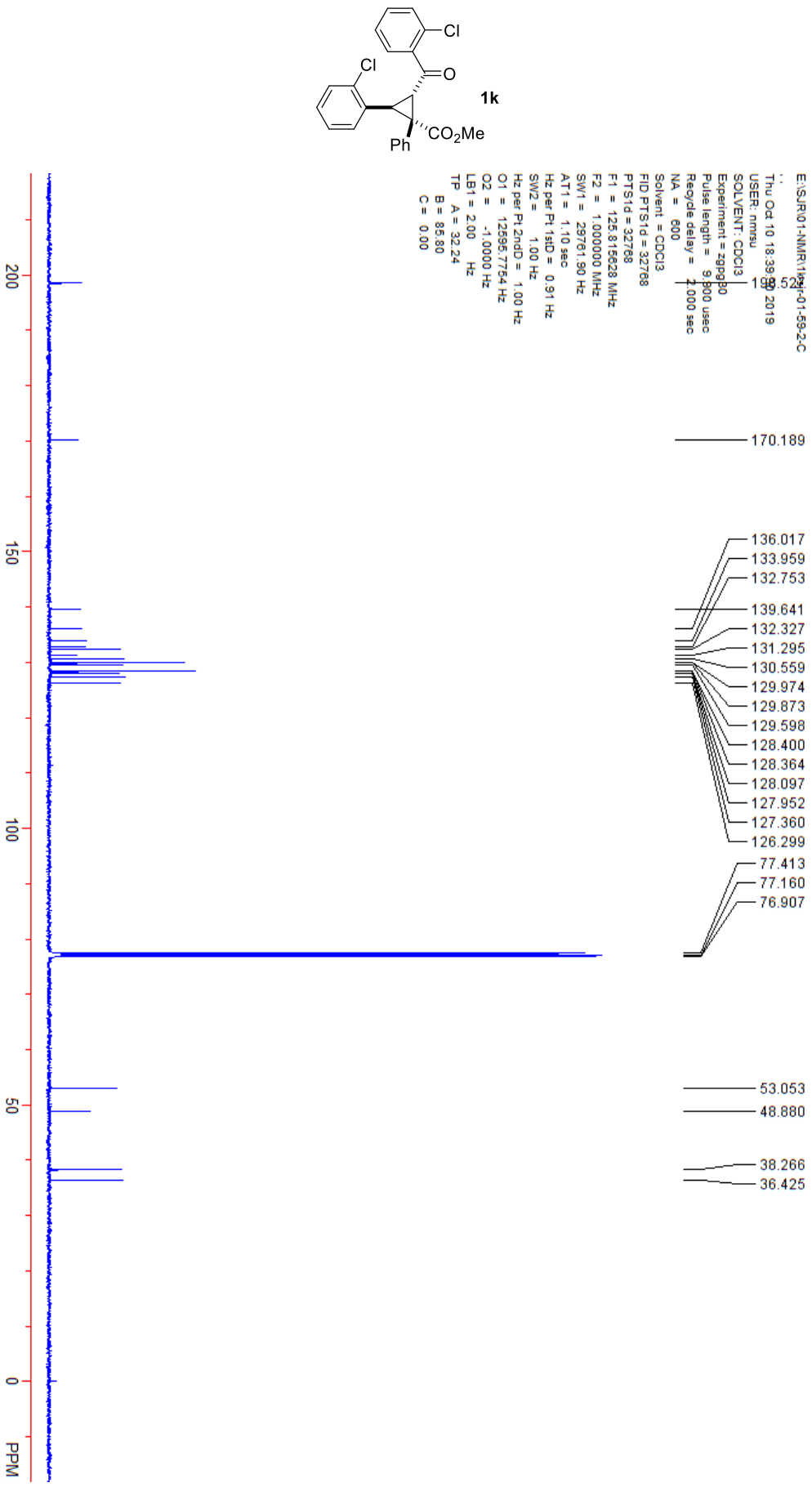

Ph
O
CO2Me
F
F
1i
E:\SJR\01-NMR\1H-PPD3-25-2-C
Thu Nov 26 12:20:54 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.0508 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 33.76
B = 81.97
C = 0.00
169.828
163.272
163.120
161.301
161.135
133.613
131.844
131.815
130.082
130.017
128.891
137.071
128.797
128.595
127.923
127.902
124.090
124.068
123.570
123.541
122.097
122.046
121.989
121.945
115.830
115.657
115.613
115.440
77.413
77.160
76.907
53.002
41.053
35.876
30.548
30.512
200
150
100
50
0
PPM

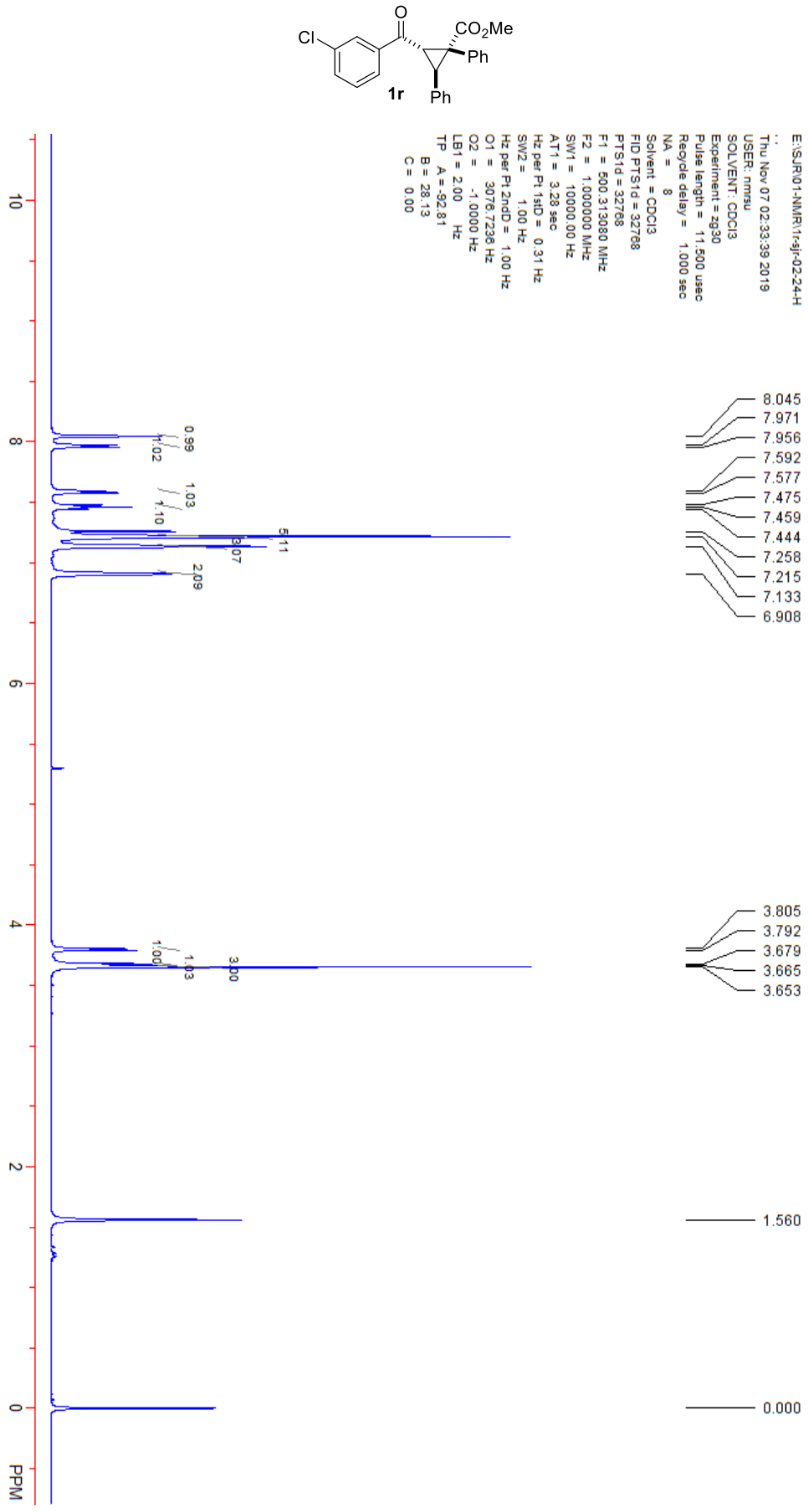

Ph
O
CO2Me
F
F
1i
E:\SJR\01-NMR\1-sjr-03-25-F
Thu Nov 26 09:06:04 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgflqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714681 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47087.2539 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -68.41
B = -4.22
C = 0.00
-113.352
-116.361
100
50
0
-50
-100
-150
-200
-250 PPM

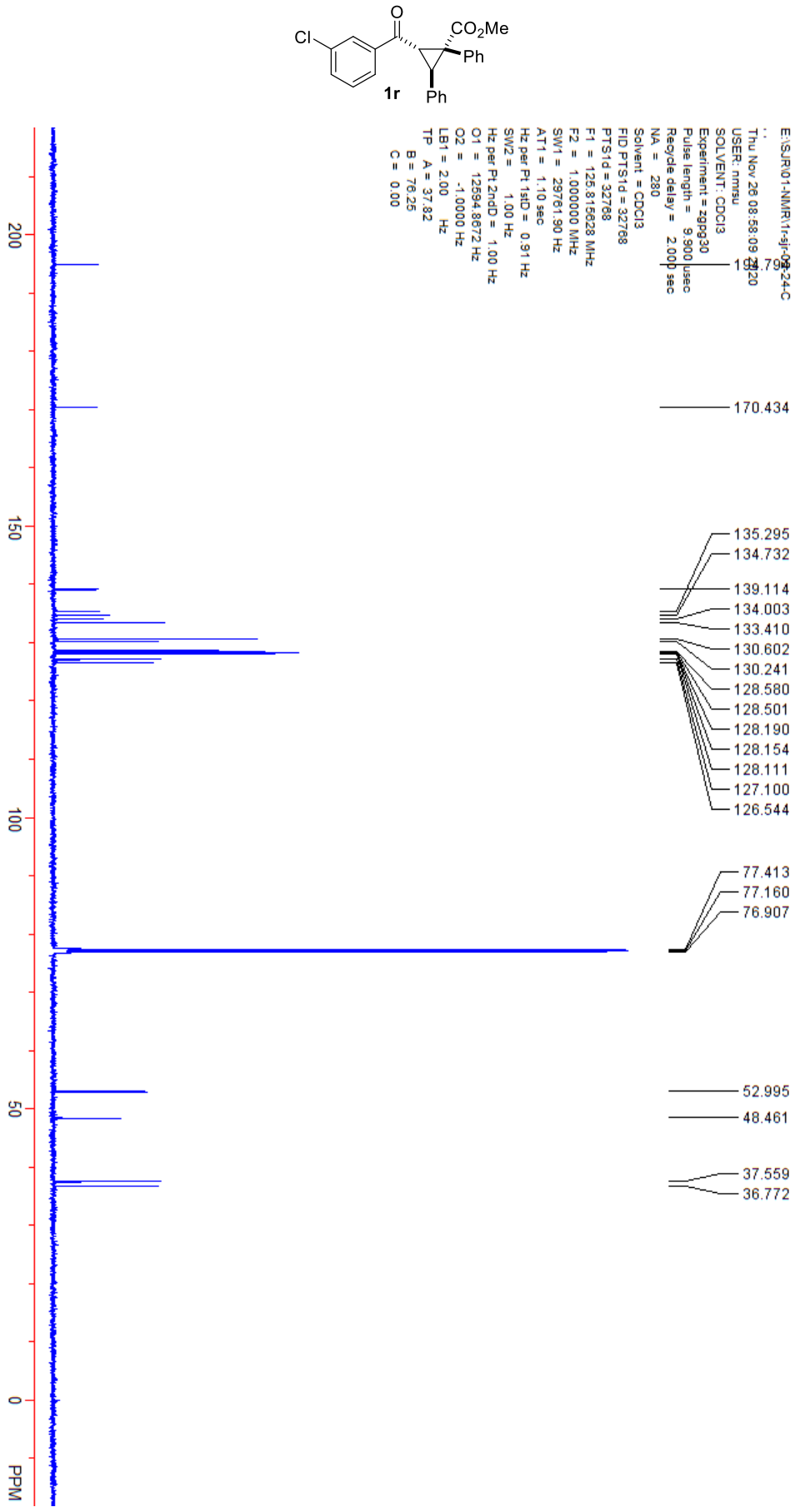

Br
Ph
O
1j
CO2Me
Ph
E:\SJR\01-NMR\1j-sjr-03-48-H
Fri Jun 19 09:53:00 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.9441 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -87.89
B = 28.83
C = 0.00
8.125
8.110
7.639
7.624
7.610
7.556
7.541
7.527
7.511
7.288
7.275
7.261
7.180
7.166
6.996
6.989
6.981
6.673
6.662
6.654
5.300
4.114
4.099
3.843
3.828
3.642
1.568
0.000
2.06
1.03
3.08
2.10
3.12
2.08
1.04
1.00
1.05
3.04
10
8
6
4
2
0 PPM

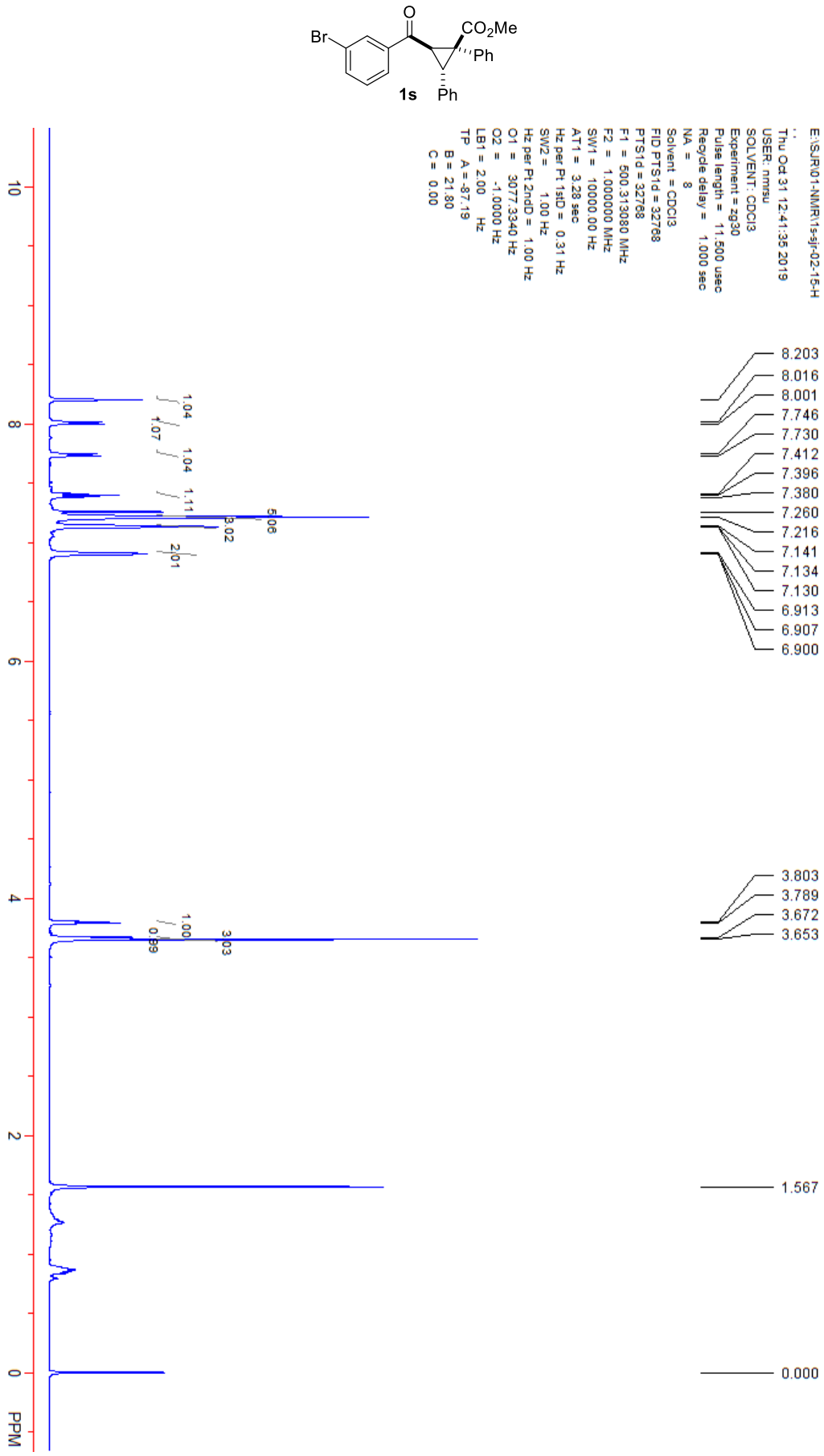

Br
Ph
O
1j
CO2Me
Ph
E:\SJR\01-NMR\1j-sjr-03-48-C
11:54:11 907 +0800 spot@CZC8497G0V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15113.4150 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
195.188
170.373
137.413
134.539
134.221
133.571
133.023
130.041
128.958
128.633
128.496
128.409
127.997
127.896
126.958
126.756
77.369
77.160
76.943
52.893
46.720
37.644
35.564
200
150
100
50
0
PPM

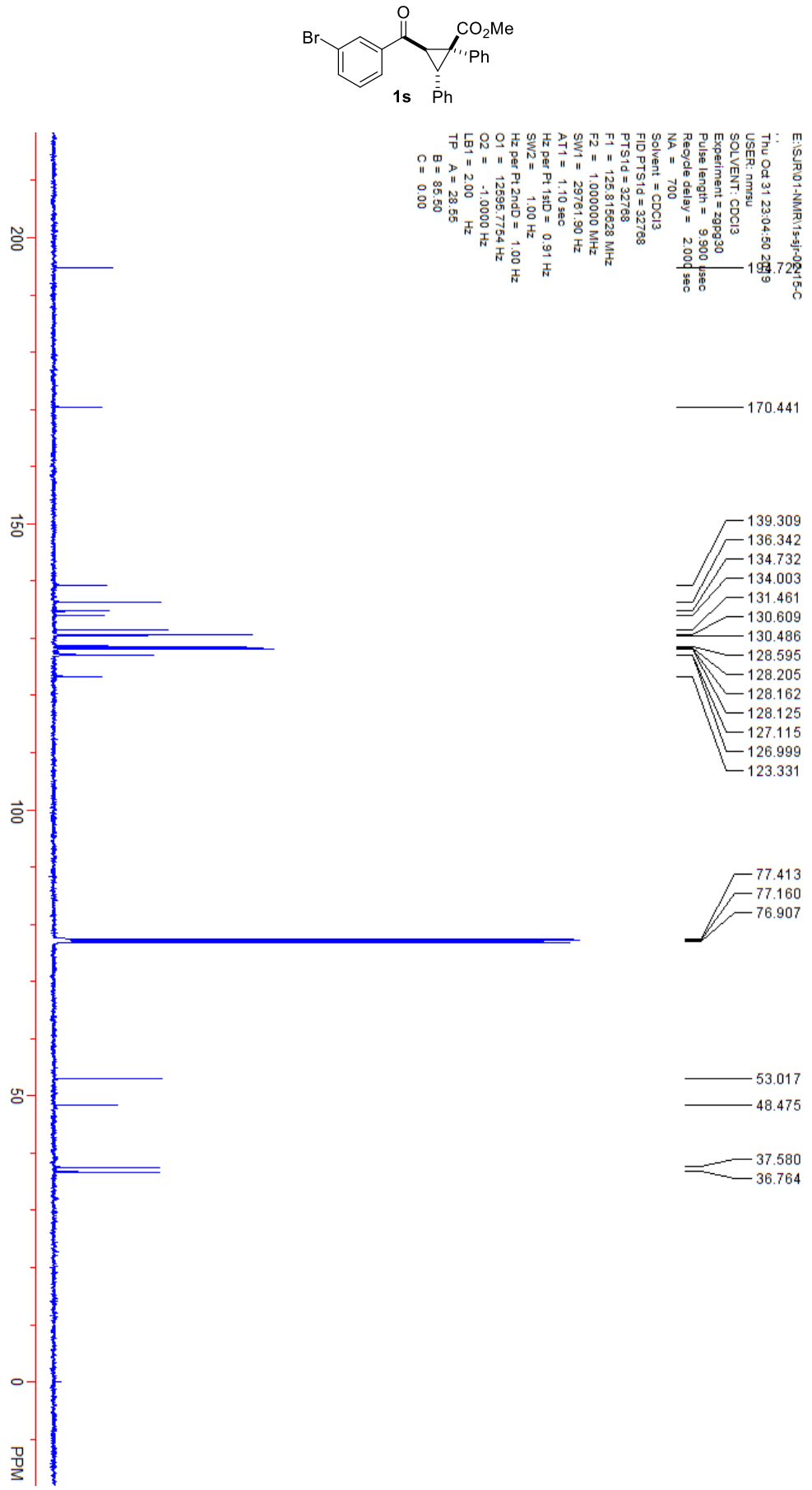

Cl
Cl
O
1k
CO2Me
Ph
E:\SJR\01-NMR\1k-sjr-01-59-2-H
Thu Oct 10 13:02:24 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3337 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -93.75
B = 33.75
C = 0.00
7.646
7.632
7.485
7.471
7.459
7.443
7.418
7.415
7.403
7.390
7.346
7.331
7.260
7.209
7.202
7.136
7.130
7.068
7.053
7.038
6.918
6.903
6.888
6.651
6.635
4.081
4.067
3.872
3.859
3.728
1.567
-0.000
1.02
1.04
1.06
2.05
2.08
3.08
1.06
1.04
1.03
1.00
1.00
3.03
10
8
6
4
2
0 PPM

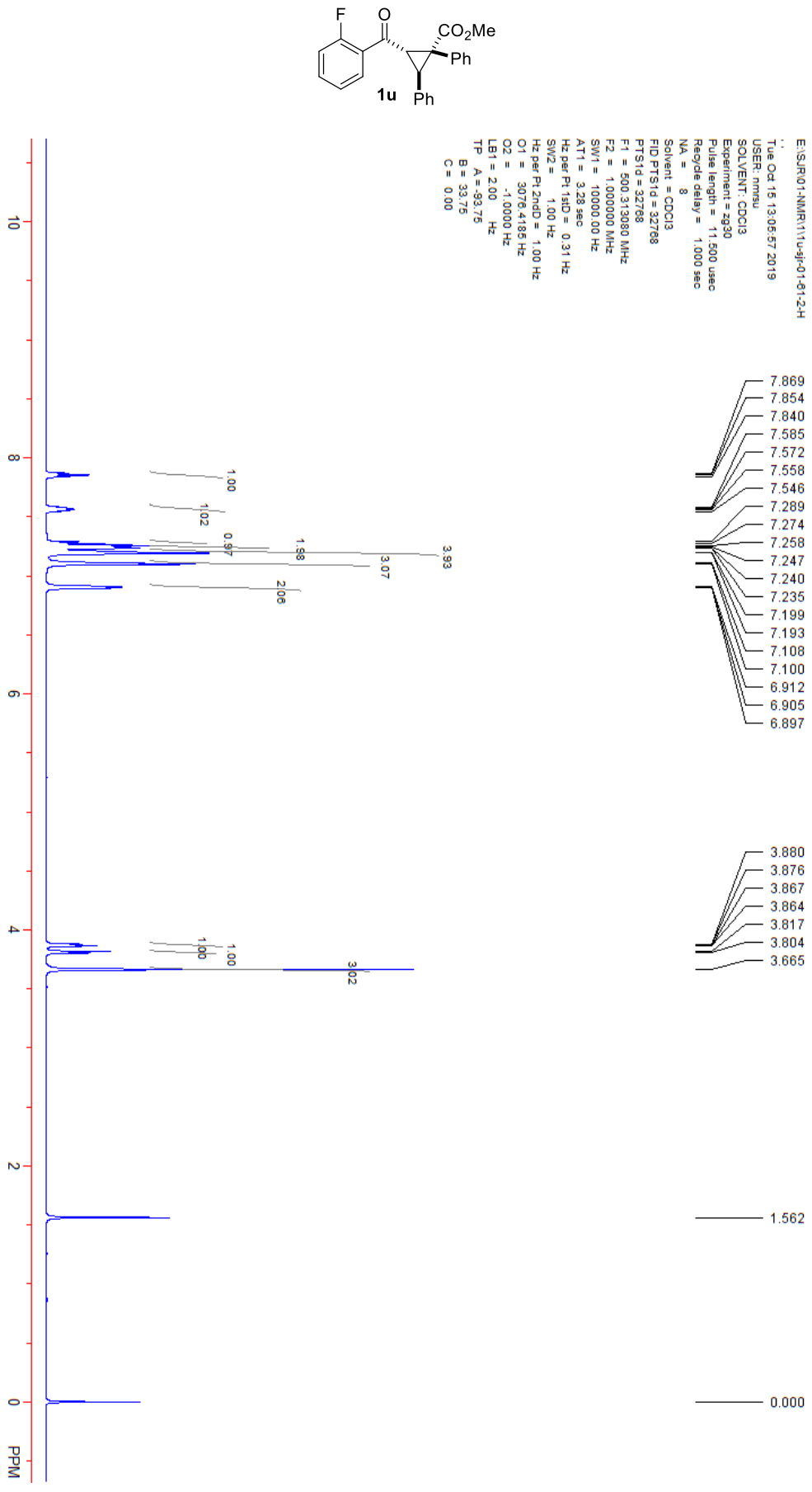

Cl
Cl
O
1k
Ph
CO2Me
E:\SJR\01-NMR\1Hnmr-01-59-2-C
Thu Oct 10 18:39:59 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.500 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 32.24
B = 85.80
C = 0.00
170.189
136.017
133.959
132.753
139.641
132.327
131.295
130.559
129.974
129.873
129.598
128.400
128.364
128.097
127.952
127.360
126.299
77.413
77.160
76.907
53.053
48.880
38.266
36.425
200
150
100
50
0
PPM

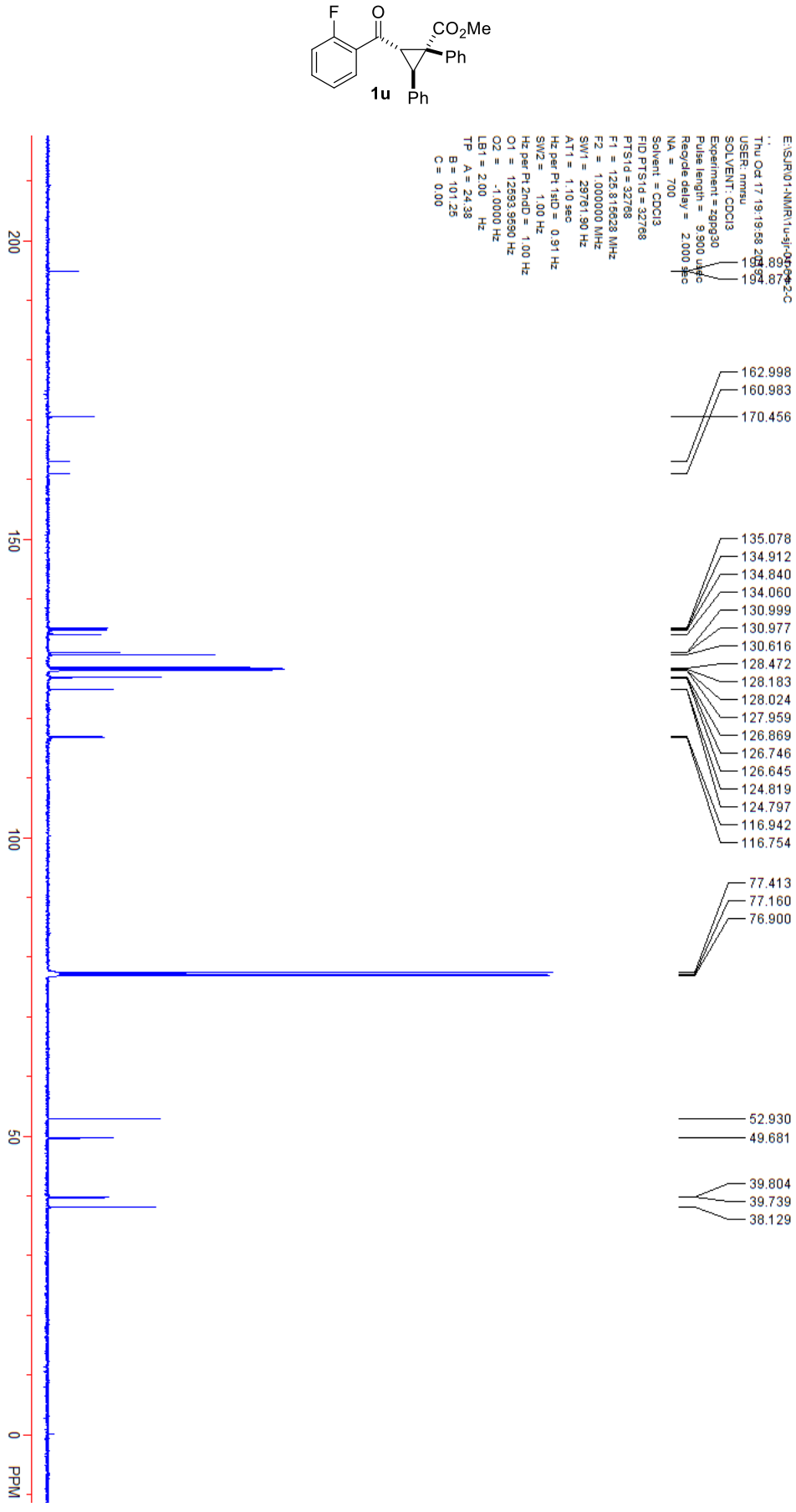

Cl
O
CO2Me
Ph
Ph
1r
E:\SJR\01-NMR\1r-sjr-02-24-H
Thu Nov 07 02:33:39 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.7236 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -92.81
B = 28.13
C = 0.00
8.045
7.971
7.956
7.592
7.577
7.475
7.459
7.444
7.258
7.215
7.133
6.908
3.805
3.792
3.679
3.665
3.653
1.560
0.000
0.99
1.02
1.03
1.10
5.11
3.07
2.09
1.00
1.03
3.00
10
8
6
4
2
0
PPM

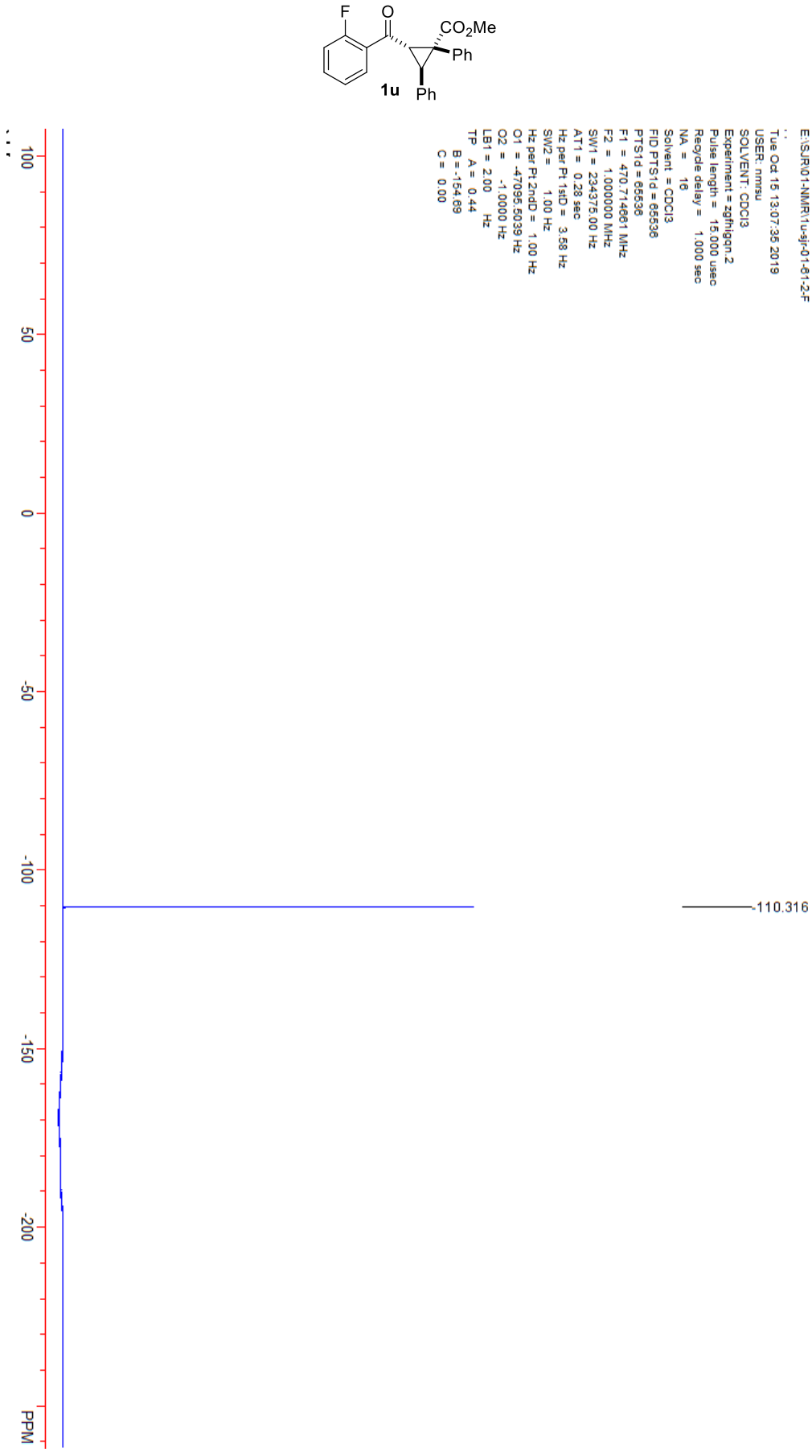

Cl
O
CO2Me
Ph
Ph
1r
E:\SJR\01-NMR\1r-sjr-09-24-C
Thu Nov 26 08:58:09 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8672 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 37.82
B = 76.25
C = 0.00
170.434
135.295
134.732
139.114
134.003
133.410
130.602
130.241
128.580
128.501
128.190
128.154
128.111
127.100
126.544
77.413
77.160
76.907
52.995
48.461
37.559
36.772
200
150
100
50
0
PPM

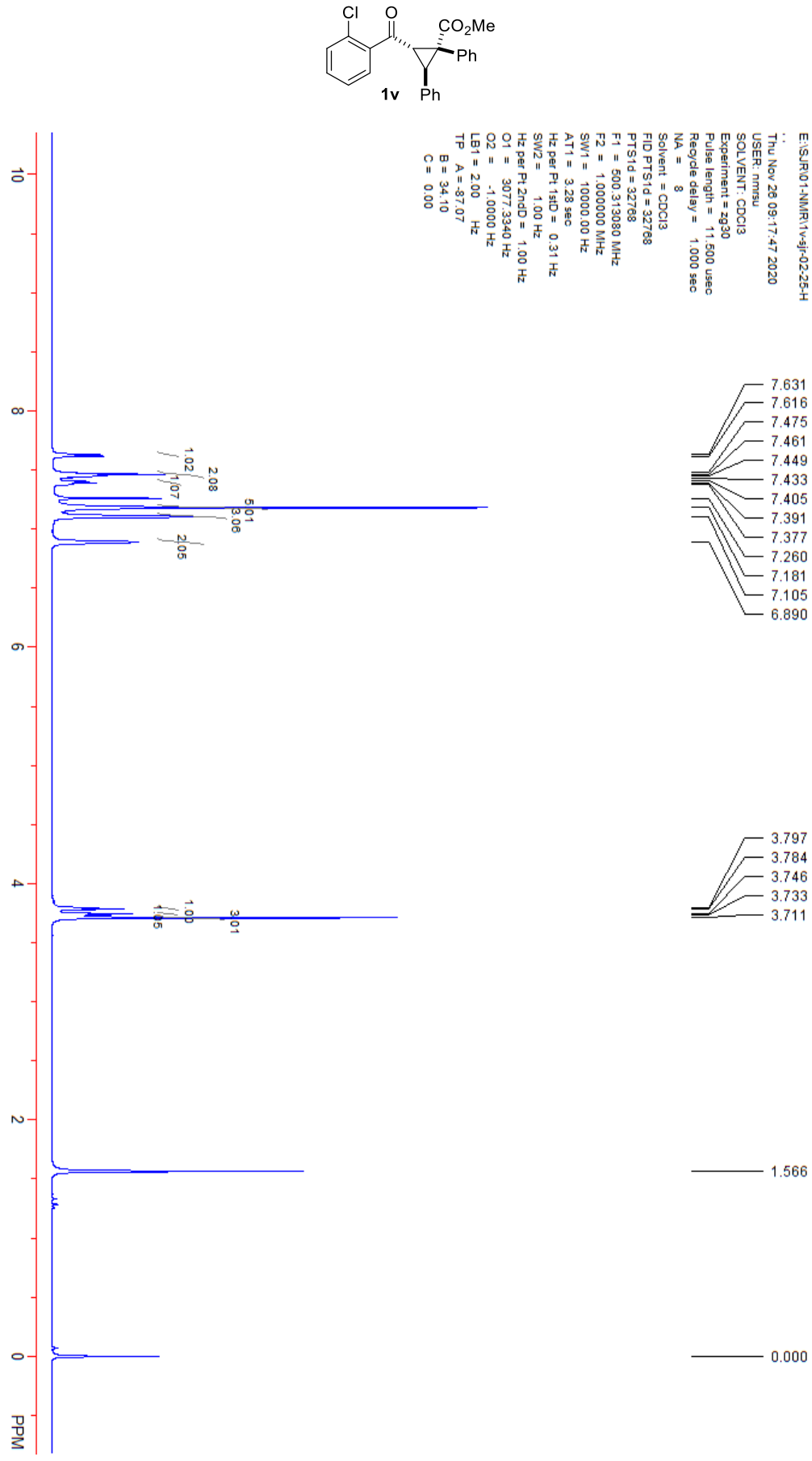

Br
O
CO2Me
Ph
Ph
1s
E:\SJR\01-NMR\1s-sjr-02-15-H
Thu Oct 31 12:41:35 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3340 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -87.19
B = 21.80
C = 0.00
8.203
8.016
8.001
7.746
7.730
7.412
7.396
7.380
7.260
7.216
7.141
7.134
7.130
6.913
6.907
6.900
3.803
3.789
3.672
3.653
1.567
0.000
1.04
1.07
1.04
1.11
5.06
3.02
2.01
1.00
0.99
3.03
10
8
6
4
2
0
PPM

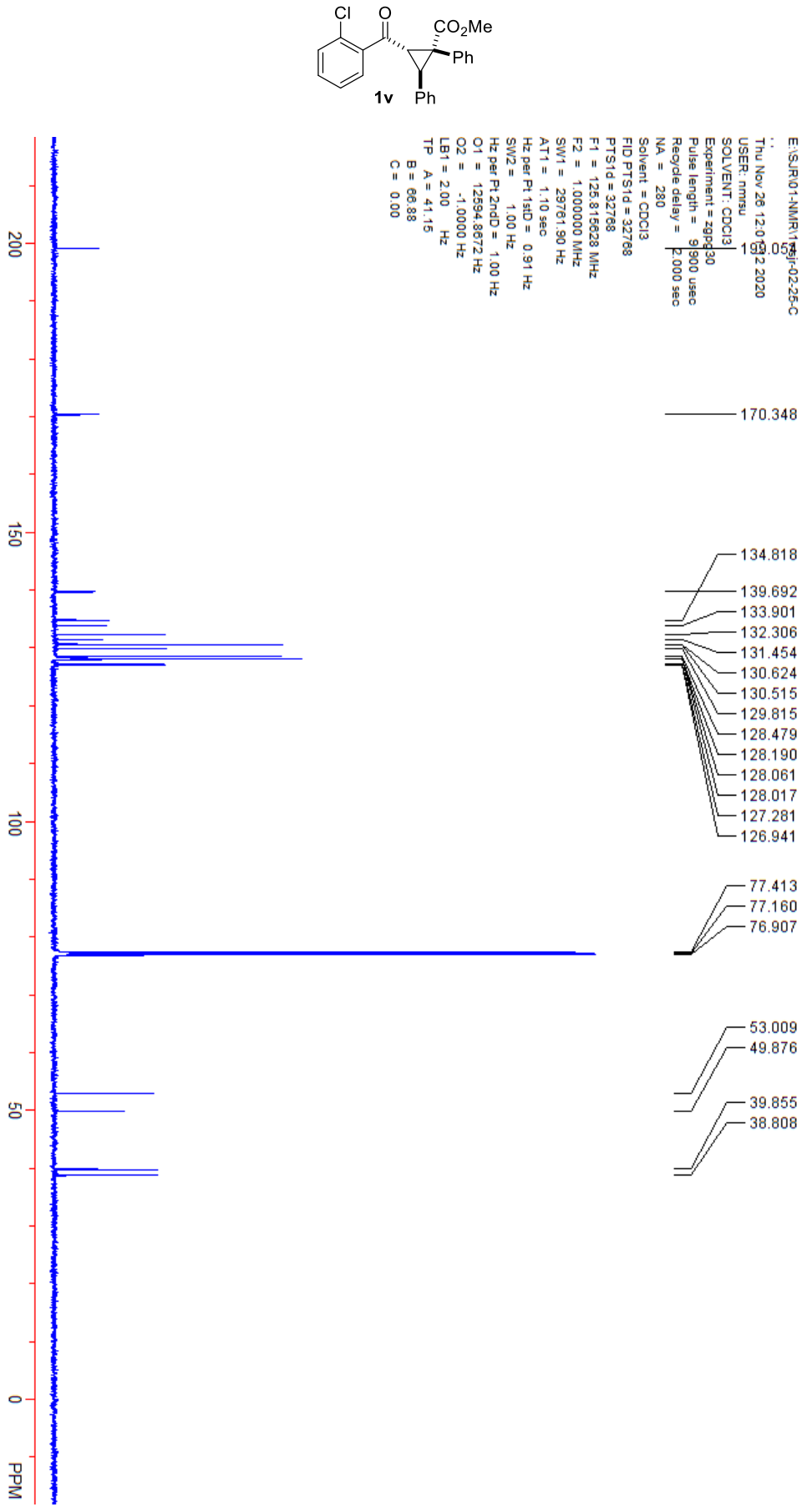

Br
O
CO2Me
Ph
Ph
1s
E:\SJR\01-NMR\1s-sjr-062115-C
Thu Oct 31 23:04:50 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7764 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 28.55
B = 85.50
C = 0.00
170.441
139.309
136.342
134.732
134.003
131.461
130.609
130.486
128.595
128.205
128.162
128.125
127.115
126.999
123.331
77.413
77.160
76.907
53.017
48.475
37.580
36.764
200
150
100
50
0
PPM

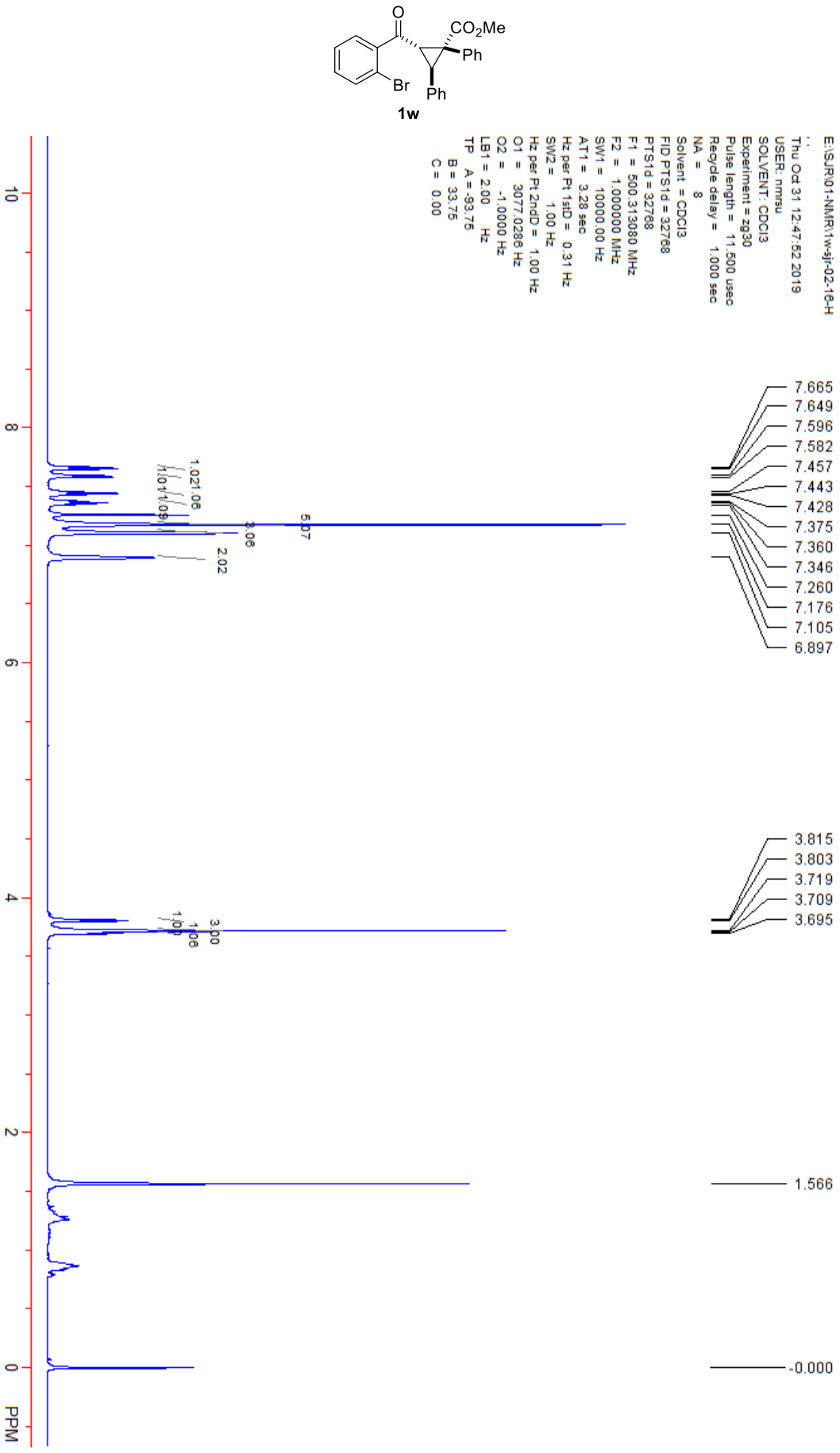

F
O
CO2Me
Ph
Ph
1u
E:\SJR\01-NMR\11\u-sjr-01-61-2-H
Tue Oct 15 13:05:57 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4185 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -93.75
B = 33.75
C = 0.00
7.869
7.854
7.840
7.585
7.572
7.558
7.546
7.289
7.274
7.258
7.247
7.240
7.235
7.199
7.193
7.108
7.100
6.912
6.905
6.897
3.880
3.876
3.867
3.864
3.817
3.804
3.665
1.562
0.000
1.00
1.02
0.97
1.98
3.07
3.93
2.08
1.00
1.00
3.02
10
8
6
4
2
0
PPM

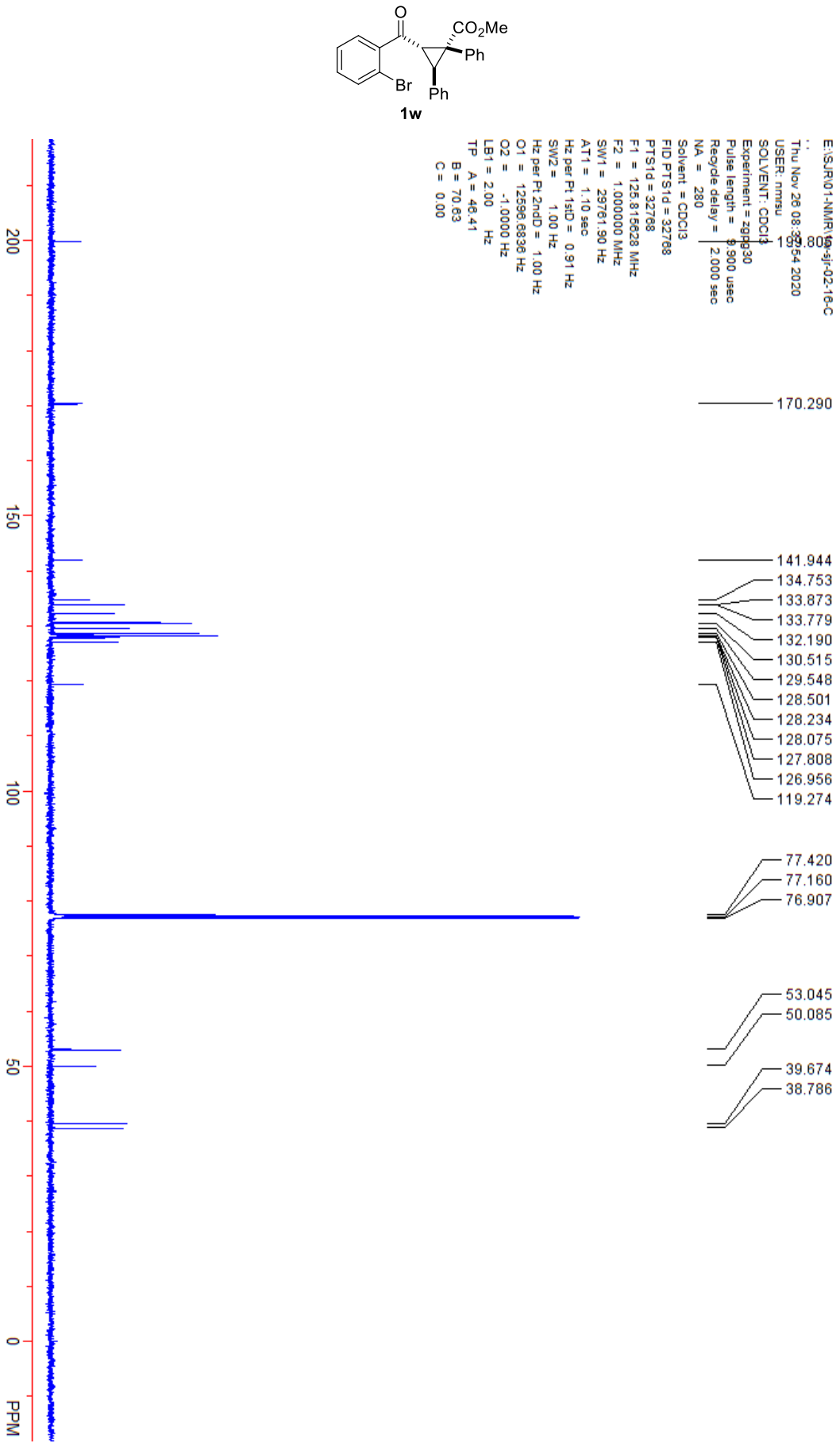

F
O
CO2Me
Ph
1u
Ph
200
150
100
50
0
PPM
162.998
160.983
170.456
135.078
134.912
134.840
134.060
130.999
130.977
130.616
128.472
128.183
128.024
127.959
126.869
126.746
126.645
124.819
124.797
116.942
116.754
77.413
77.160
76.900
52.930
49.681
39.804
39.739
38.129

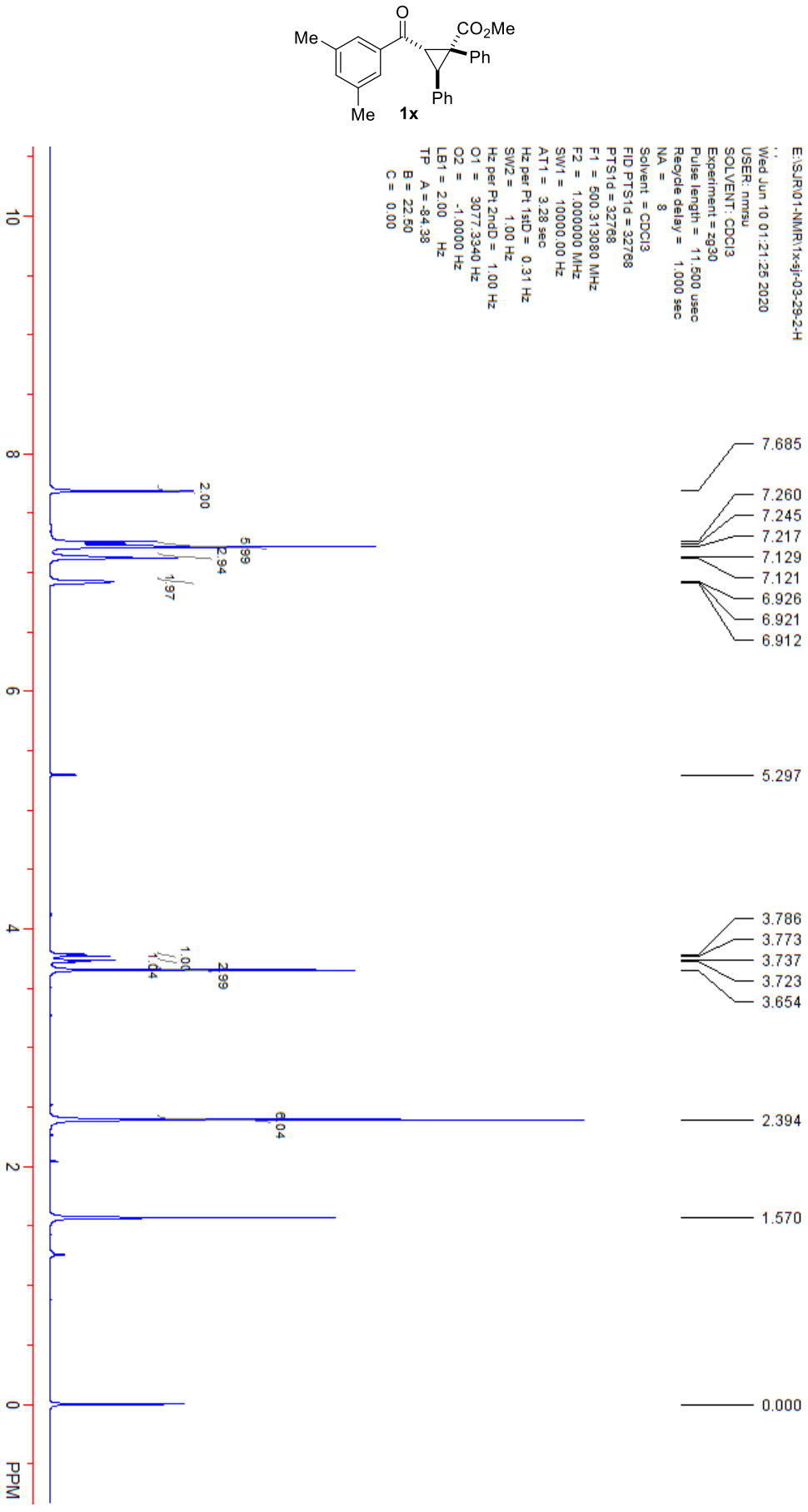

F
O
CO2Me
Ph
Ph
1u
E:\SJR\01-NMR\1u-sjr-01-81-2-F
Tue Oct 15 13:07:35 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.7148661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47095.5039 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 0.44
B = -154.69
C = 0.00
-110.316
100
50
0
-50
-100
-150
-200
PPM

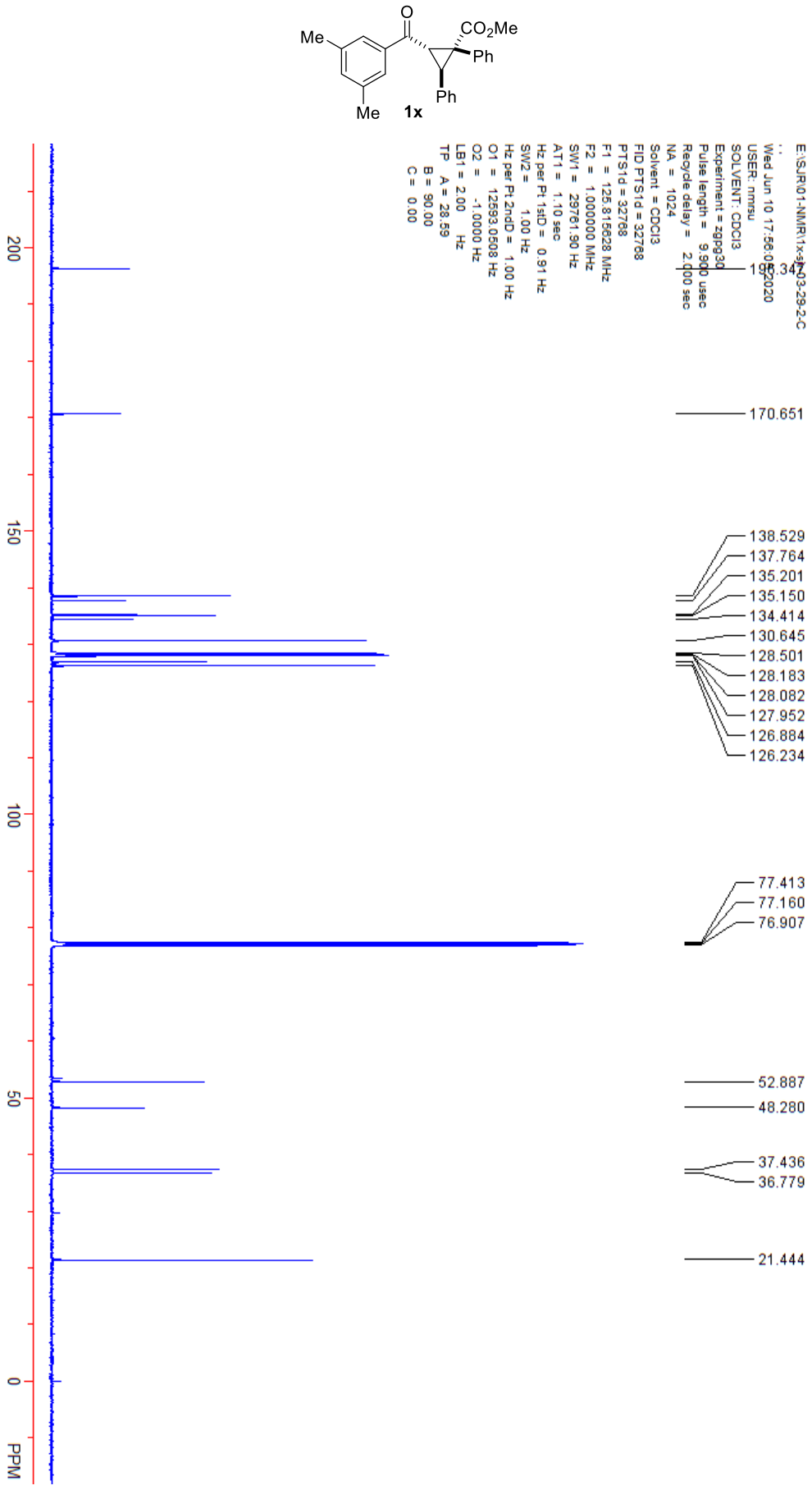

Cl
O
CO2Me
Ph
1v
Ph
E:\SJR\01-NMR\1v-sjr-02-25-H
Thu Nov 26 09:17:47 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3340 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -97.07
B = 34.10
C = 0.00
7.631
7.616
7.475
7.461
7.449
7.433
7.405
7.391
7.377
7.260
7.181
7.105
6.890
3.797
3.784
3.746
3.733
3.711
1.566
0.000
1.02
2.08
1.07
5.01
3.06
2.05
1.00
3.01
1.05
10
8
6
4
2
0
PPM

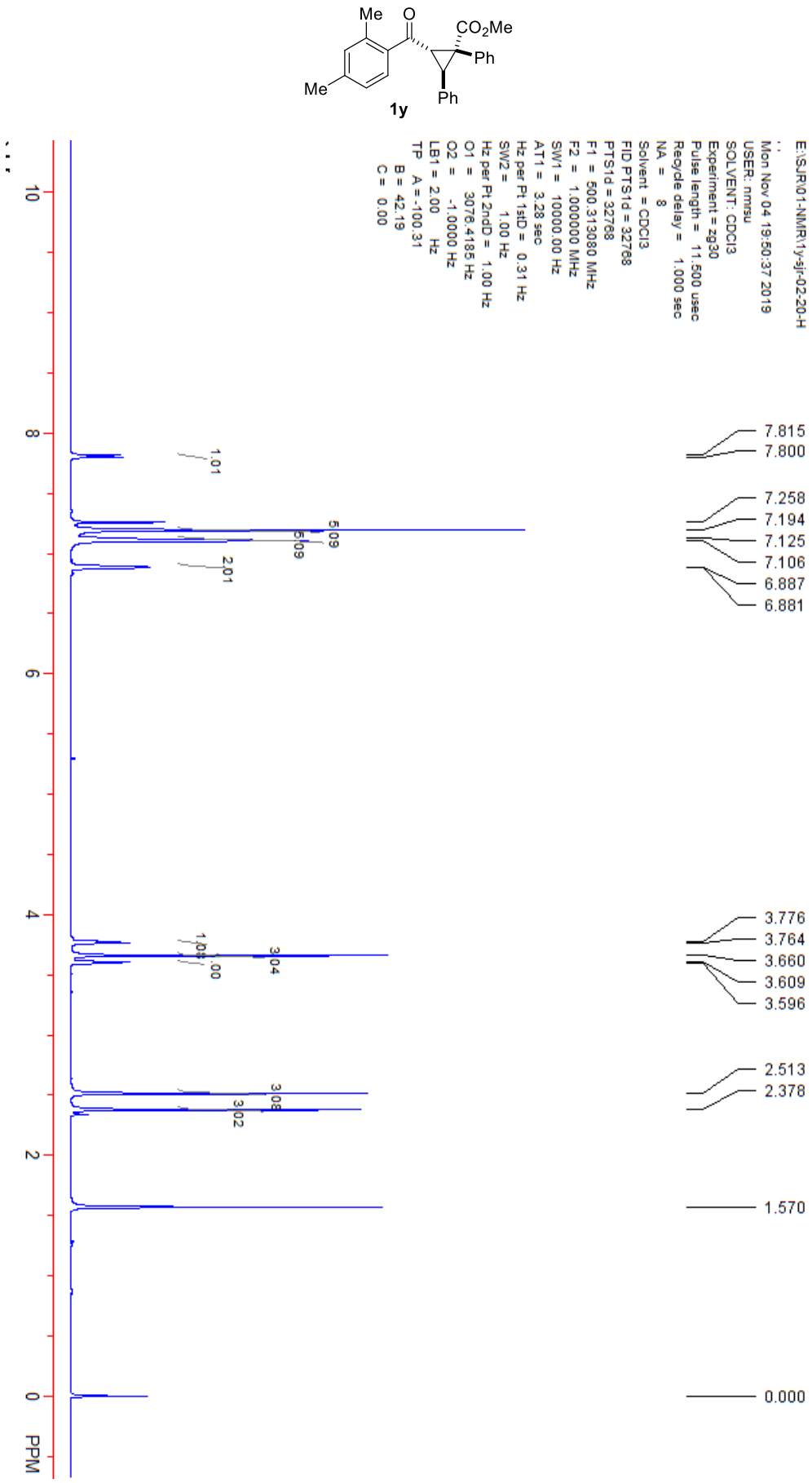

Cl
O
CO2Me
Ph
1v
Ph
E:\SJR\01-NMR\1-sji-02-25-C
Thu Nov 26 12:03:12 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8872 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 41.15
B = 66.88
C = 0.00
170.348
134.818
139.692
133.901
132.306
131.454
130.624
130.515
129.815
128.479
128.190
128.061
128.017
127.281
126.941
77.413
77.160
76.907
53.009
49.876
39.855
38.808
200
150
100
50
0
PPM

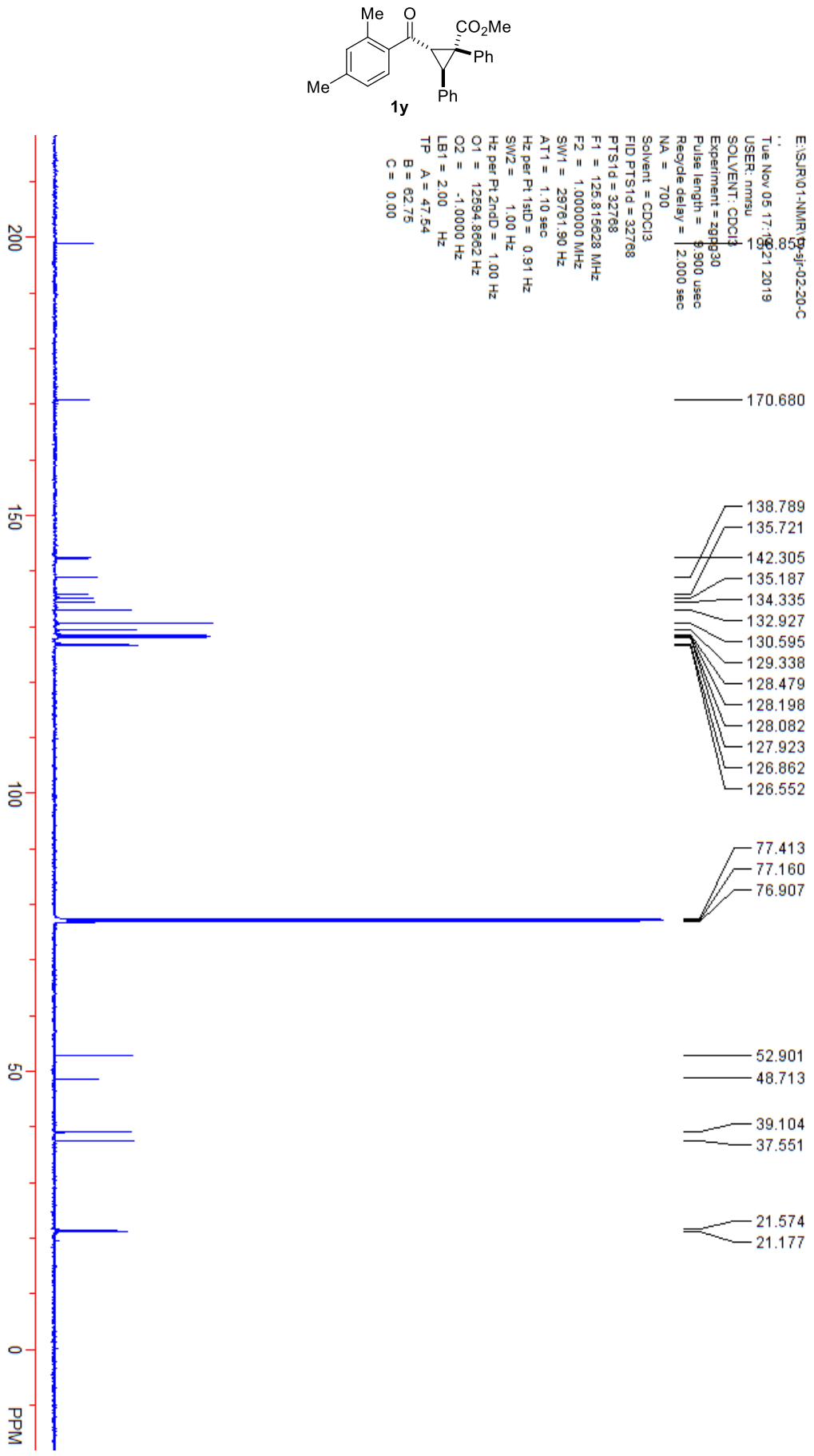

O
CO2Me
Ph
Br
Ph
1w
E:\SJR\01-NMR\1w-sjr-02-16-H
Thu Oct 31 12:47:52 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -93.75
B = 33.75
C = 0.00
7.665
7.649
7.596
7.582
7.457
7.443
7.428
7.375
7.360
7.346
7.260
7.176
7.105
6.897
3.815
3.803
3.719
3.709
3.695
1.566
-0.000
1.02
1.06
1.01
1.09
3.08
5.07
2.02
1.00
1.06
3.00
10
8
6
4
2
0
PPM

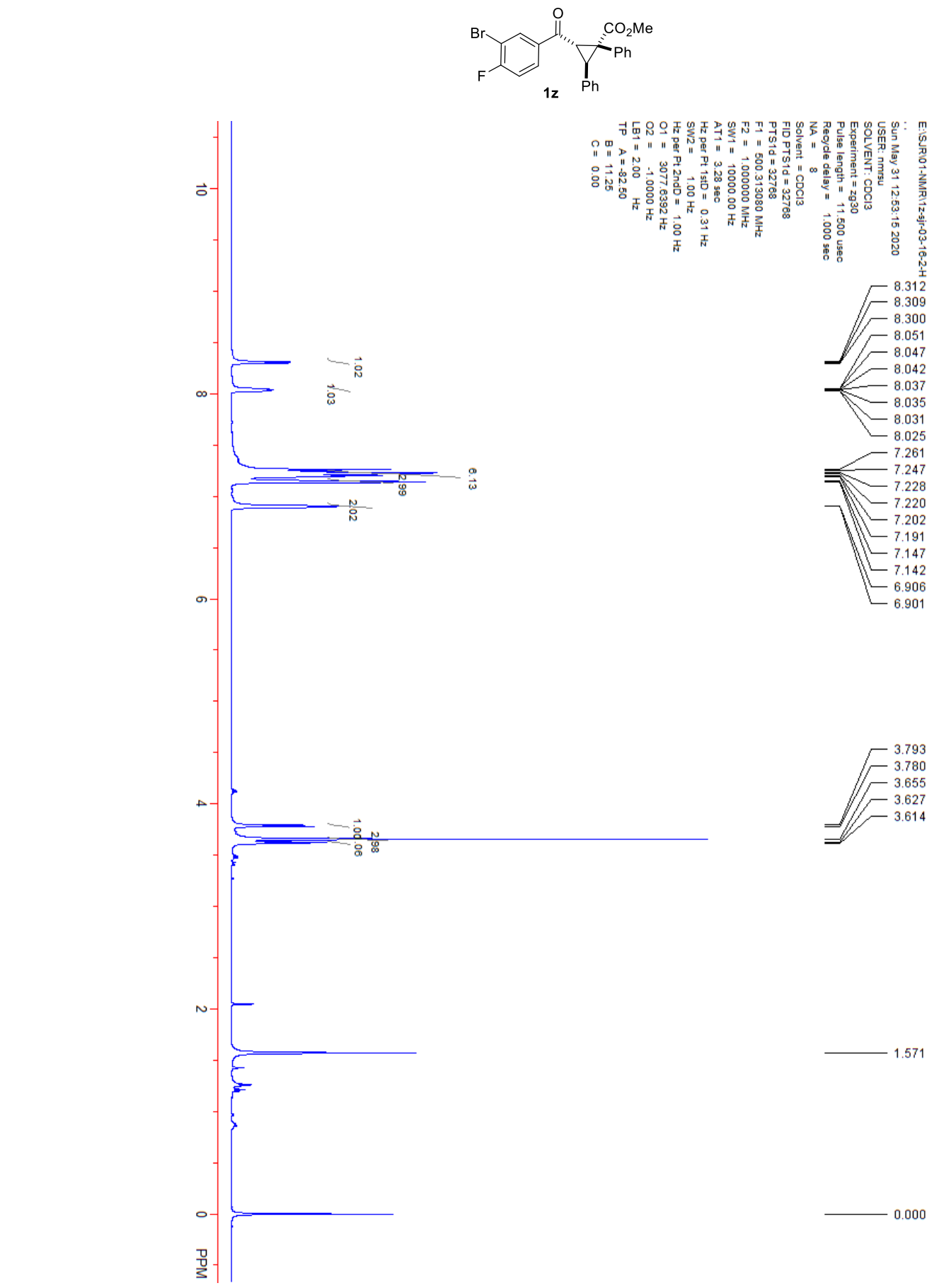

O
CO2Me
Ph
Br
Ph
1w
E:\SJR\01-NMR\19-sjr-02-18-C
Thu Nov 26 08:37:54 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.6836 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 46.41
B = 70.63
C = 0.00
170.290
141.944
134.753
133.873
133.779
132.190
130.515
129.548
128.501
128.234
128.075
127.808
126.956
119.274
77.420
77.160
76.907
53.045
50.085
39.674
38.786
200
150
100
50
0
PPM

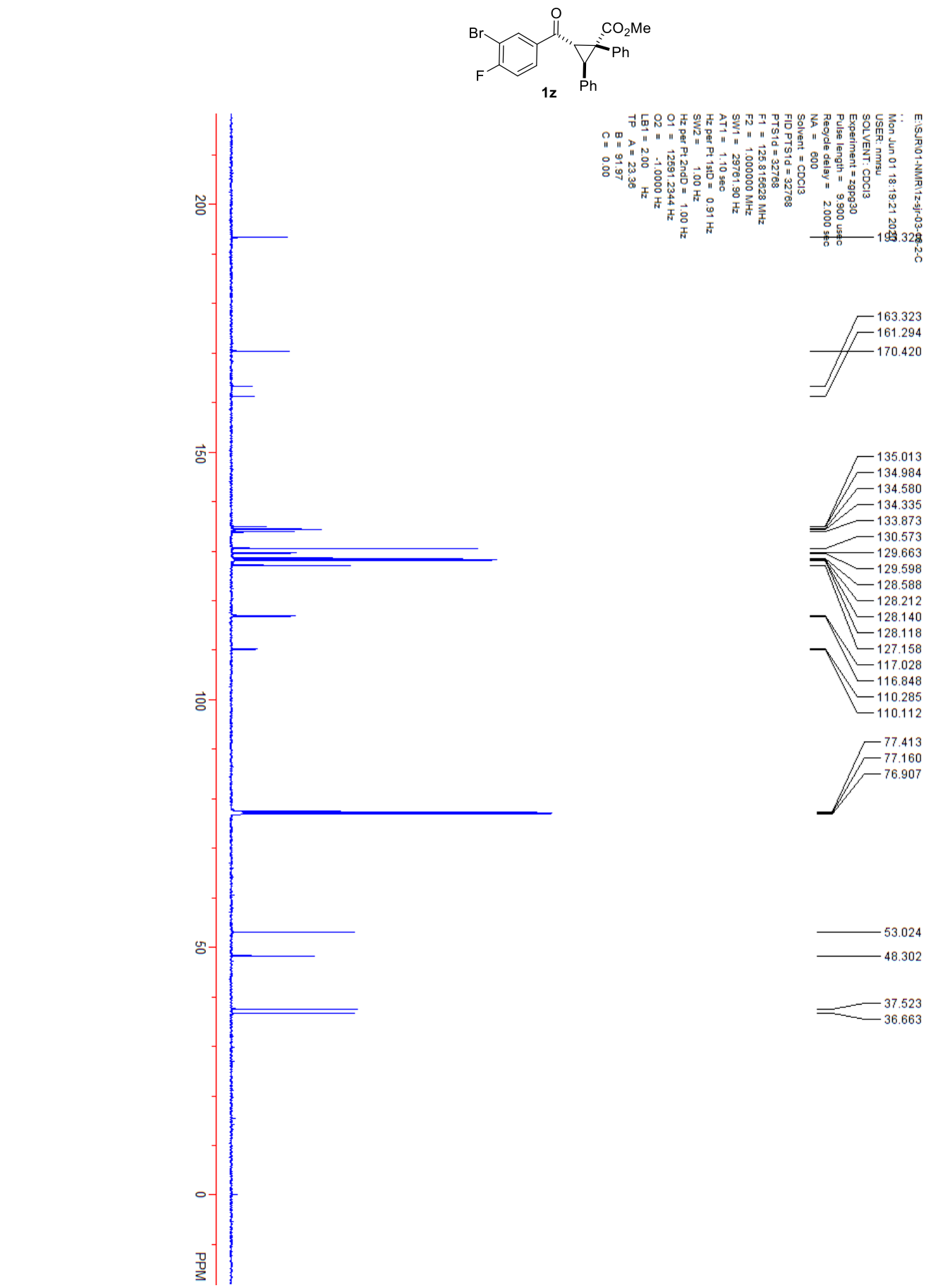

Me
O
CO2Me
Ph
Ph
Me
1x
E:\SJR\01-NMR\1x-sjr-03-29-2-H
Wed Jun 10 01:21:25 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3340 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -84.38
B = 22.50
C = 0.00
7.685
7.260
7.245
7.217
7.129
7.121
6.926
6.921
6.912
5.297
3.786
3.773
3.737
3.723
3.654
2.394
1.570
0.000
2.00
5.99
2.94
1.97
1.00
1.04
2.99
6.04
10
8
6
4
2
0
PPM

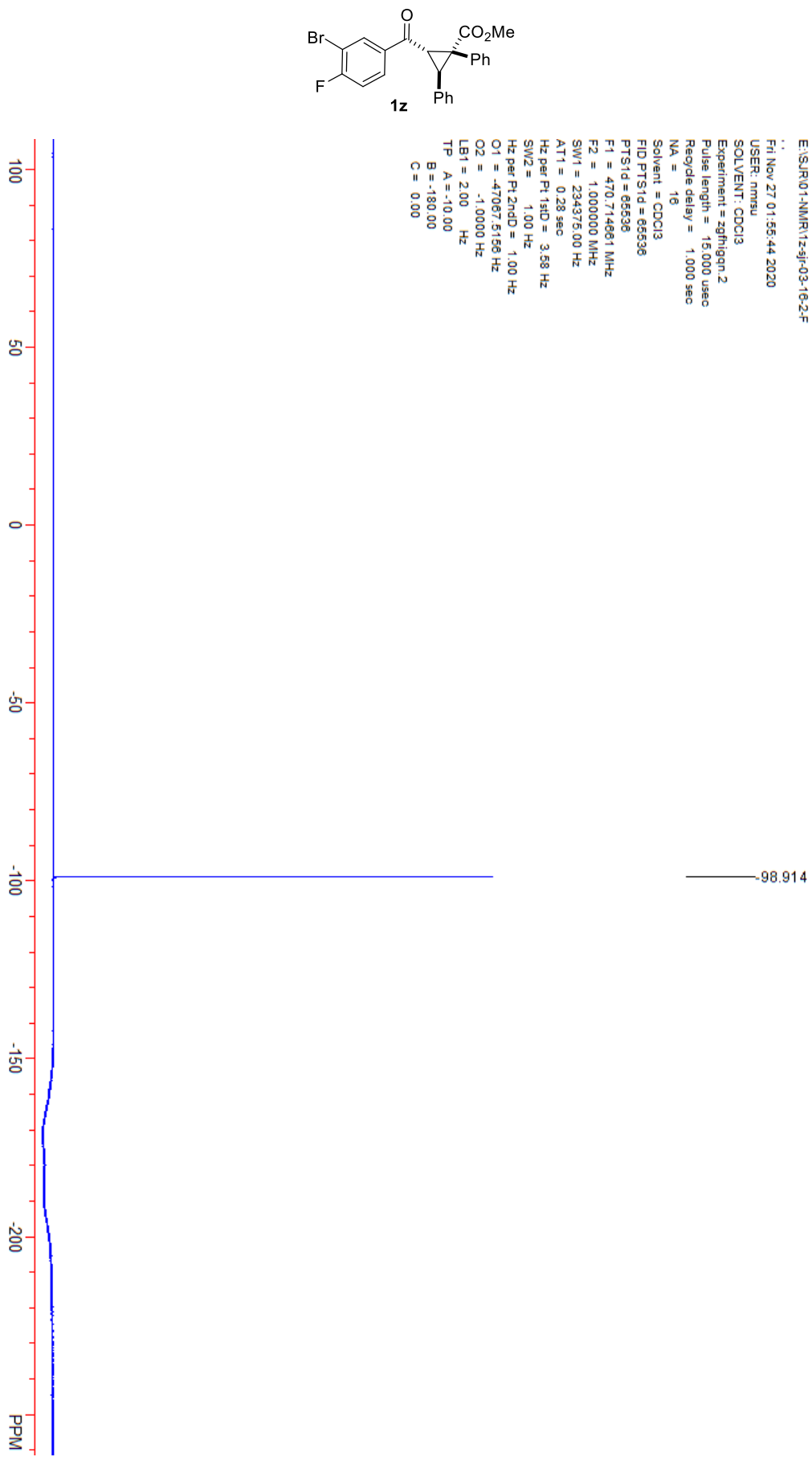

Me
O
CO2Me
Ph
Ph
Me
1x
E:\SJR\01-NMR\1x-sj-03-29-2-C
Wed Jun 10 17:56:05 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.0508 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 28.59
B = 90.00
C = 0.00
197.347
170.651
138.529
137.764
135.201
135.150
134.414
130.645
128.501
128.183
128.082
127.952
126.884
126.234
77.413
77.160
76.907
52.887
48.280
37.436
36.779
21.444
200
150
100
50
0
PPM

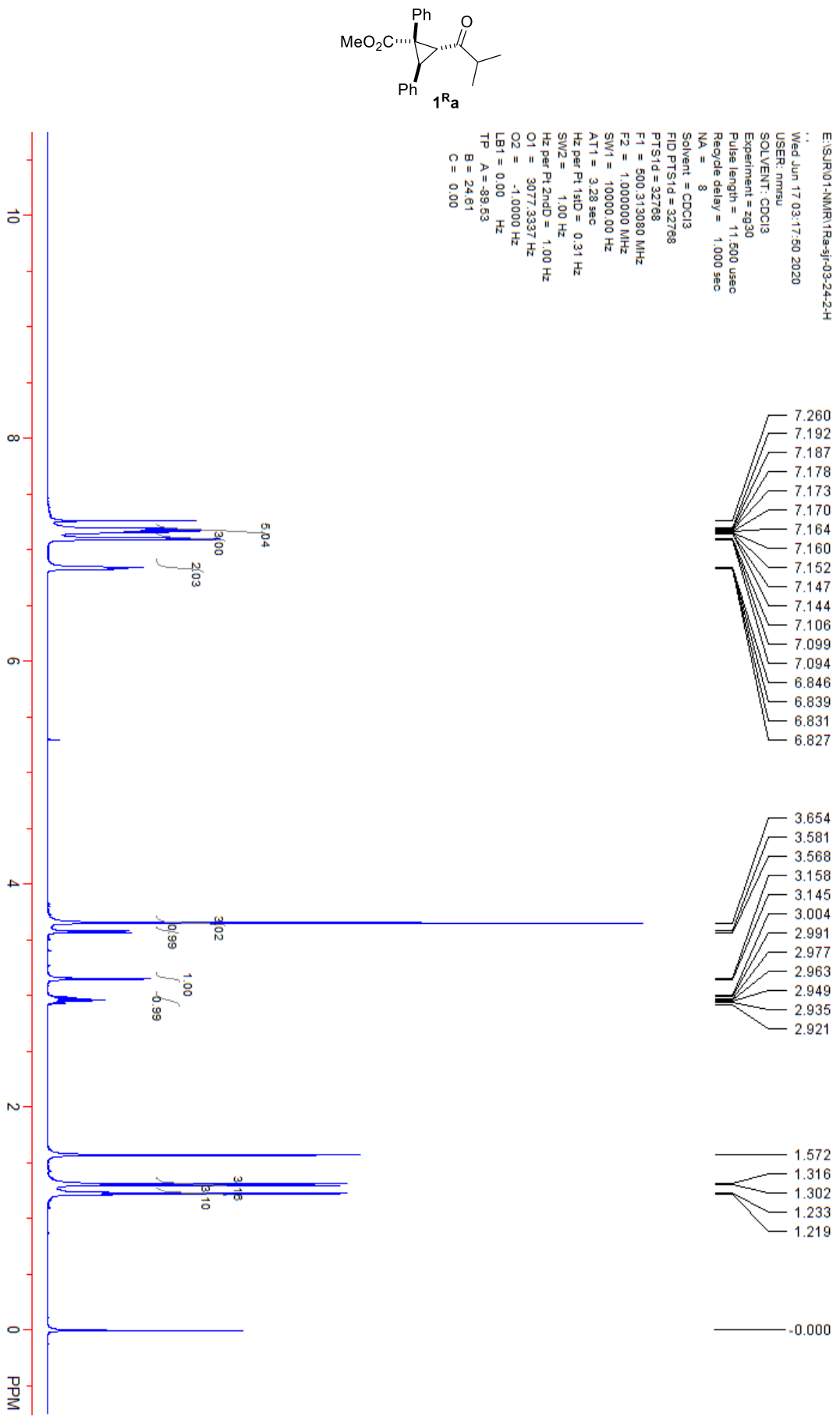

Me
O
CO2Me
Ph
Me
Ph
1y
E:\SJR\01-NMR\1y-sjr-02-20-H
Mon Nov 04 19:50:37 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4185 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -100.31
B = 42.19
C = 0.00
7.815
7.800
7.258
7.194
7.125
7.106
6.887
6.881
3.776
3.764
3.660
3.609
3.596
2.513
2.378
1.570
0.000
1.01
5.09
5.09
2.01
1.04
1.00
3.04
3.08
3.02
10
8
6
4
2
0
PPM

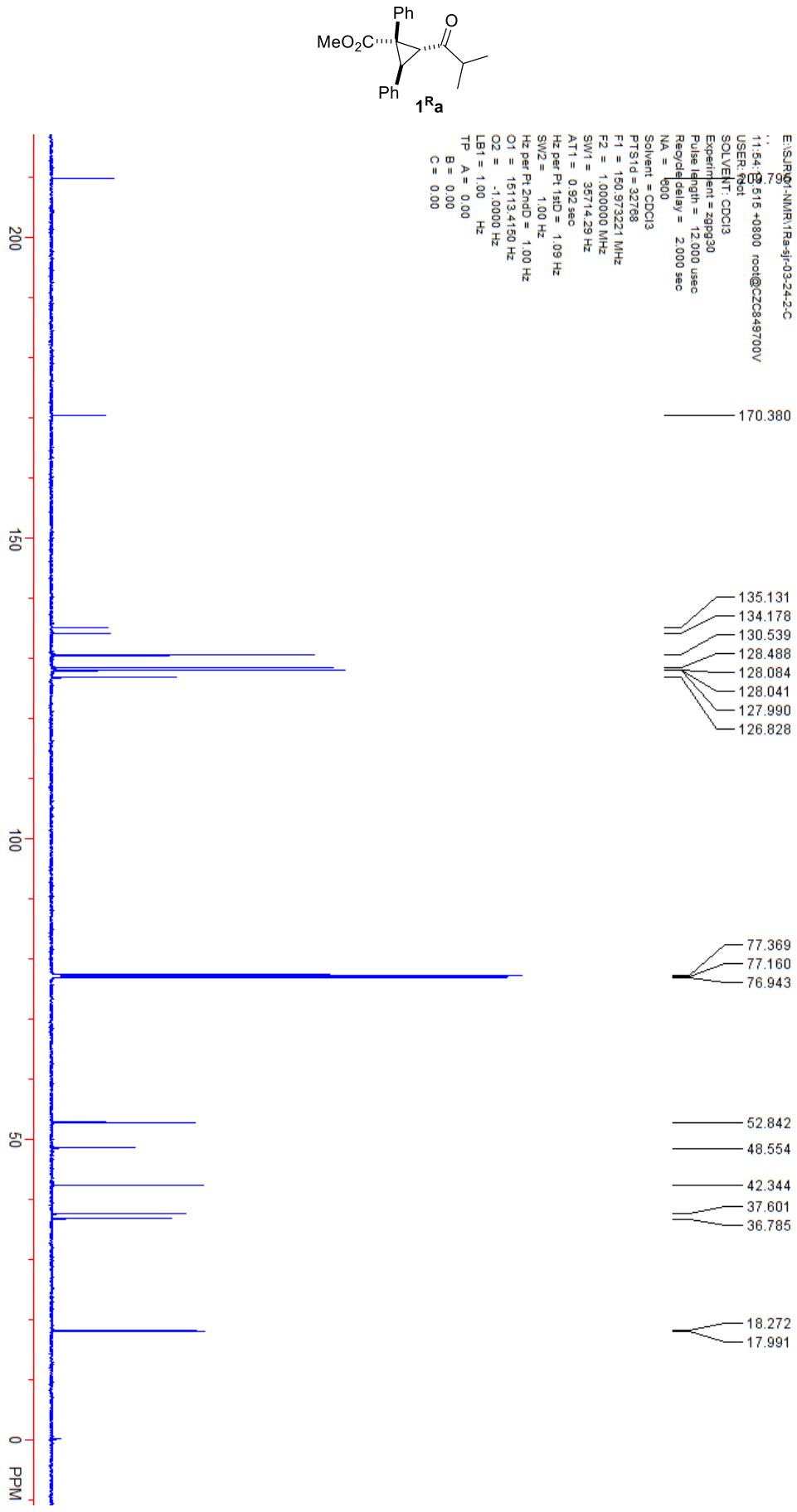

Me
O
CO2Me
Ph
Me
Ph
1y
E:\SJR\01-NMR\19-sjr-02-20-C
Tue Nov 05 17:19:21 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8662 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 47.54
B = 62.75
C = 0.00
196.859
170.680
138.789
135.721
142.305
135.187
134.335
132.927
130.595
129.338
128.479
128.198
128.082
127.923
126.862
126.552
77.413
77.160
76.907
52.901
48.713
39.104
37.551
21.574
21.177
200
150
100
50
0
PPM

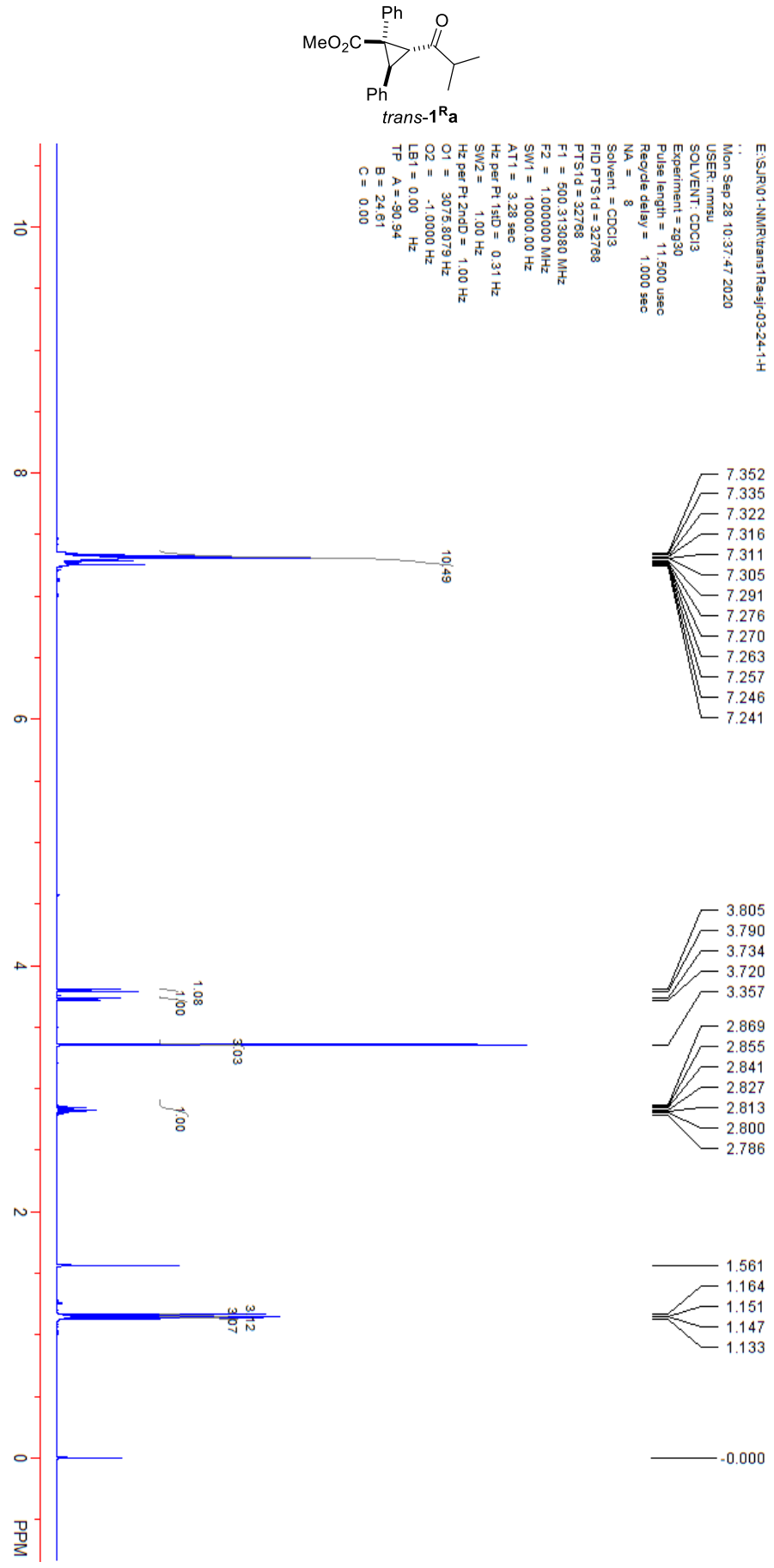

Br
F
O
CO2Me
Ph
Ph
1z
E:\SJR\01-NMR\1z-sji-03-16-2-H
Sun May 31 12:53:15 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -82.50
B = 11.25
C = 0.00
8.312
8.309
8.300
8.051
8.047
8.042
8.037
8.035
8.031
8.025
7.261
7.247
7.228
7.220
7.202
7.191
7.147
7.142
6.906
6.901
3.793
3.780
3.655
3.627
3.614
1.571
0.000
1.02
1.03
6.13
2.99
2.02
2.98
1.00
1.06
10
8
6
4
2
0
PPM

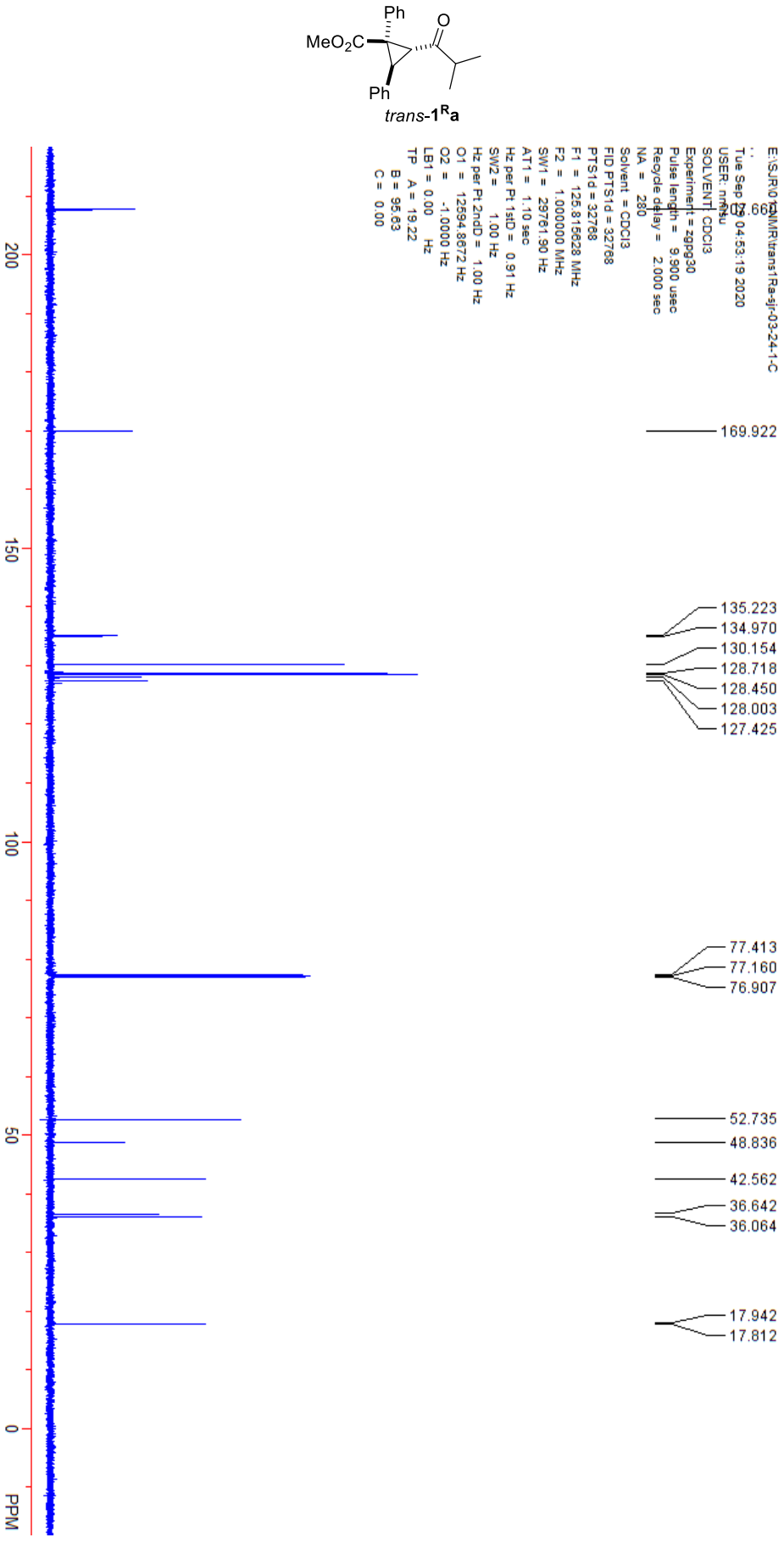

Br
F
O
CO2Me
Ph
Ph
1z
E:\SJR\01-NMR\1z-sjr-03-06-2-C
Mon Jun 01 18:19:21 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12591.2344 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 23.38
B = 91.97
C = 0.00
163.323
161.294
170.420
135.013
134.984
134.580
134.335
133.873
130.573
129.663
129.598
128.588
128.212
128.140
128.118
127.158
117.028
116.848
110.285
110.112
77.413
77.160
76.907
53.024
48.302
37.523
36.663
200
150
100
50
0
PPM

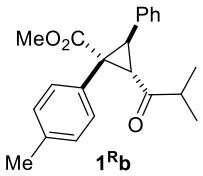

O
Br
CO2Me
Ph
F
Ph
1z
E:\SJR\01-NMR\1z-sjr-03-16-2-F
Fri Nov 27 01:55:44 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47067.5156 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -10.00
B = -180.00
C = 0.00
-98.914
100
50
0
-50
-100
-150
-200
PPM


Ph
O
MeO2C
Ph
1Ra
E:\SJR\01-NMR\1Ra-sji-03-24-2-H
Wed Jun 17 03:17:50 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3337 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -89.53
B = 24.61
C = 0.00
7.260
7.192
7.187
7.178
7.173
7.170
7.164
7.160
7.152
7.147
7.144
7.106
7.099
7.094
6.846
6.839
6.831
6.827
3.654
3.581
3.568
3.158
3.145
3.004
2.991
2.977
2.963
2.949
2.935
2.921
1.572
1.316
1.302
1.233
1.219
-0.000
5.04
3.00
2.03
3.02
0.99
1.00
0.99
3.18
3.10
10
8
6
4
2
0
PPM

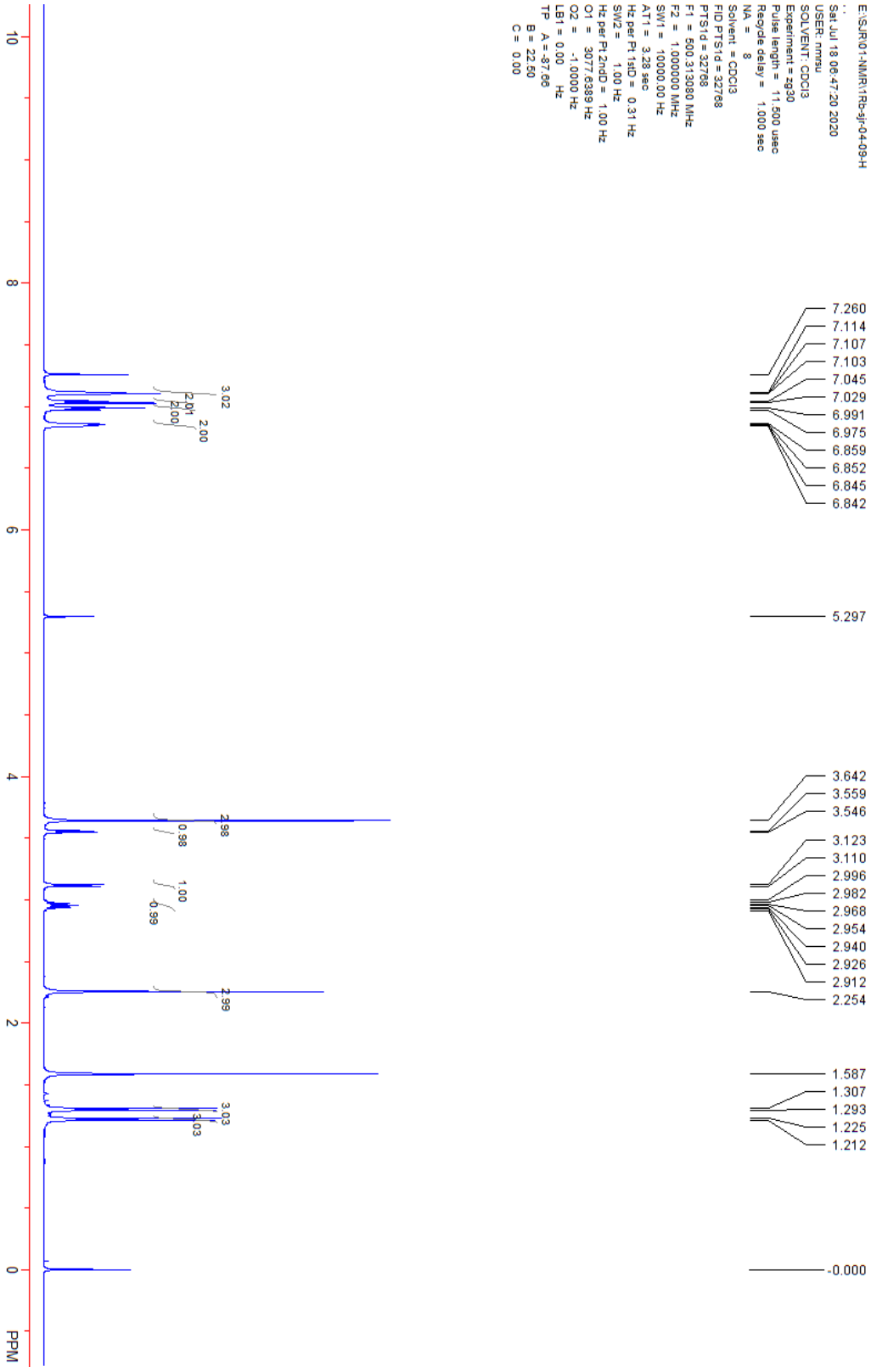

Ph
O
MeO2C
Ph
1Ra
E:\SURG1-NMR\1Ra-sjf-03-24-2-C
11.54:19.515 +0800 root@CZC8497007V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15113.4150 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
170.380
135.131
134.178
130.539
128.488
128.084
128.041
127.990
126.828
77.369
77.160
76.943
52.842
48.554
42.344
37.601
36.785
18.272
17.991
200
150
100
50
0
PPM

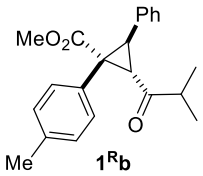

Ph
O
MeO2C
Ph
trans-1Ra
E:\SJR\01-NMR\trans1Ra-sjr-03-24-1-H
Mon Sep 28 10:37:47 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3075.8079 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -90.94
B = 24.61
C = 0.00
7.352
7.335
7.322
7.316
7.311
7.305
7.291
7.276
7.270
7.263
7.257
7.246
7.241
3.805
3.790
3.734
3.720
3.357
2.869
2.855
2.841
2.827
2.813
2.800
2.786
1.561
1.164
1.151
1.147
1.133
-0.000
10.49
1.08
1.00
3.03
1.00
3.12
3.07
10
8
6
4
2
0
PPM


Ph
O
MeO2C
Ph
trans-1Ra
E:\SJR\0 NMR\trans1Ra-sjr-03-24-1-C
Tue Sep 29 04:53:19 2020
SOLVENT CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8672 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 19.22
B = 95.63
C = 0.00
169.922
135.223
134.970
130.154
128.718
128.450
128.003
127.425
77.413
77.160
76.907
52.735
48.836
42.562
36.642
36.064
17.942
17.812
200
150
100
50
0
PPM

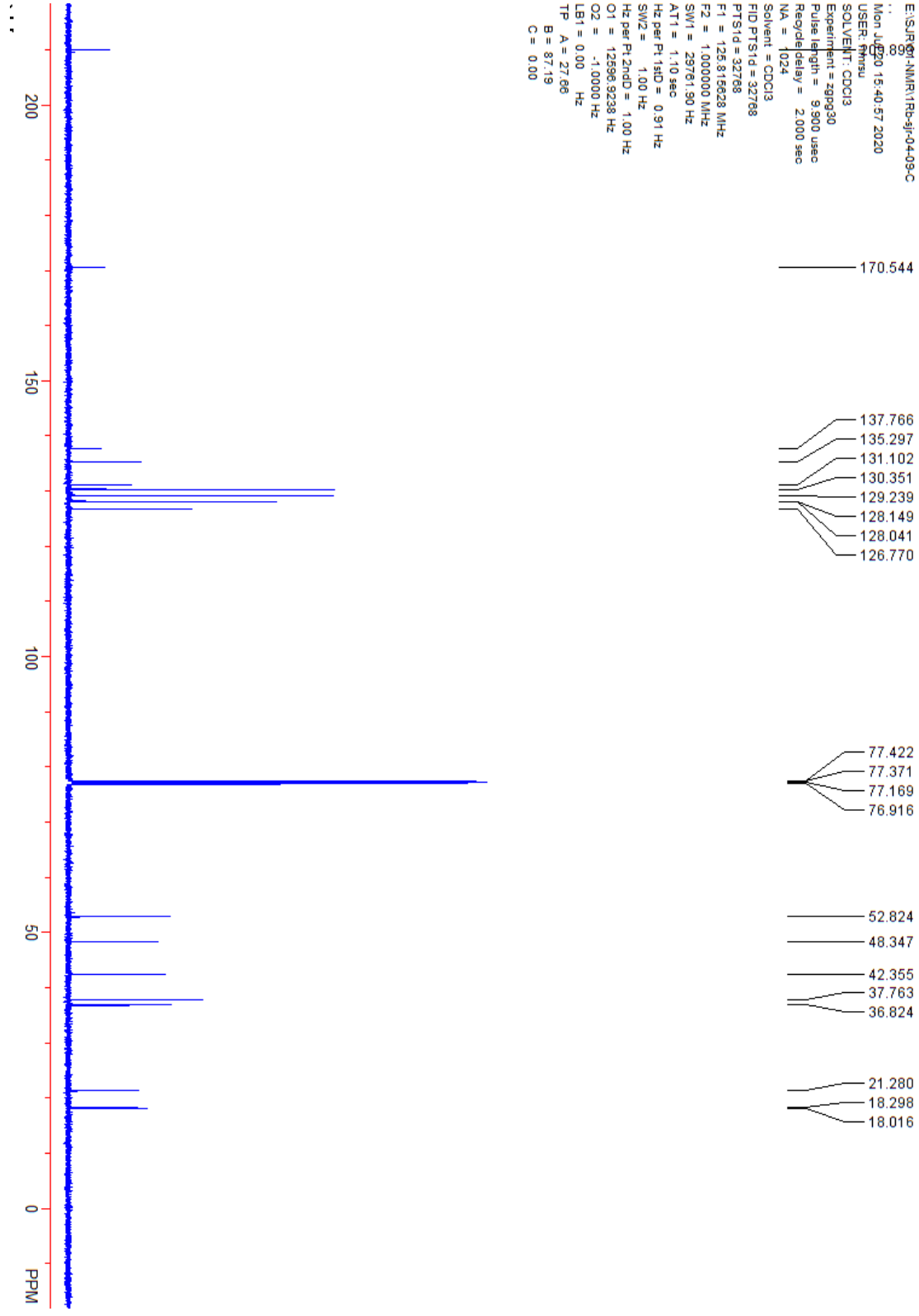

Ph
MeO2C
O
Me

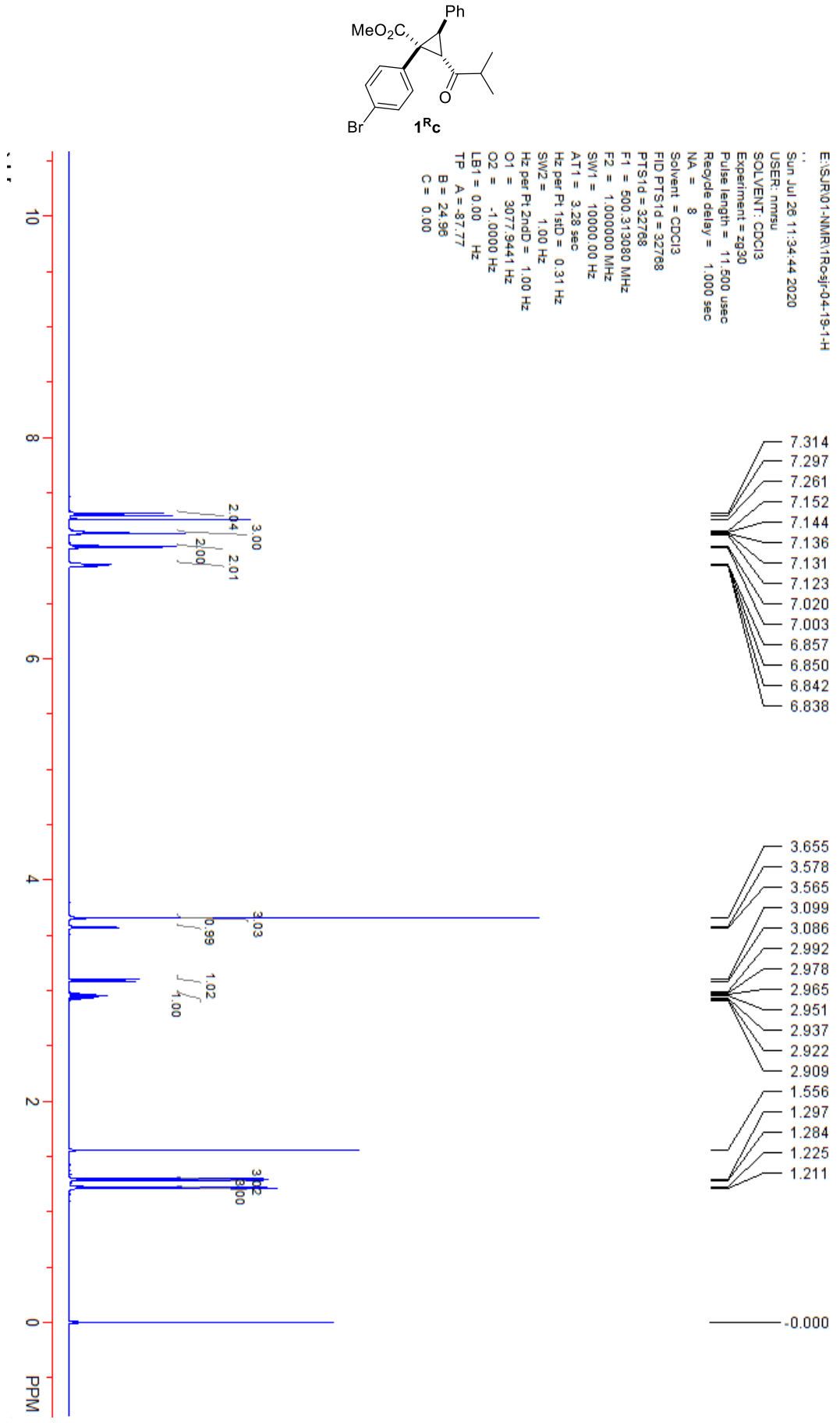
1^{R}b

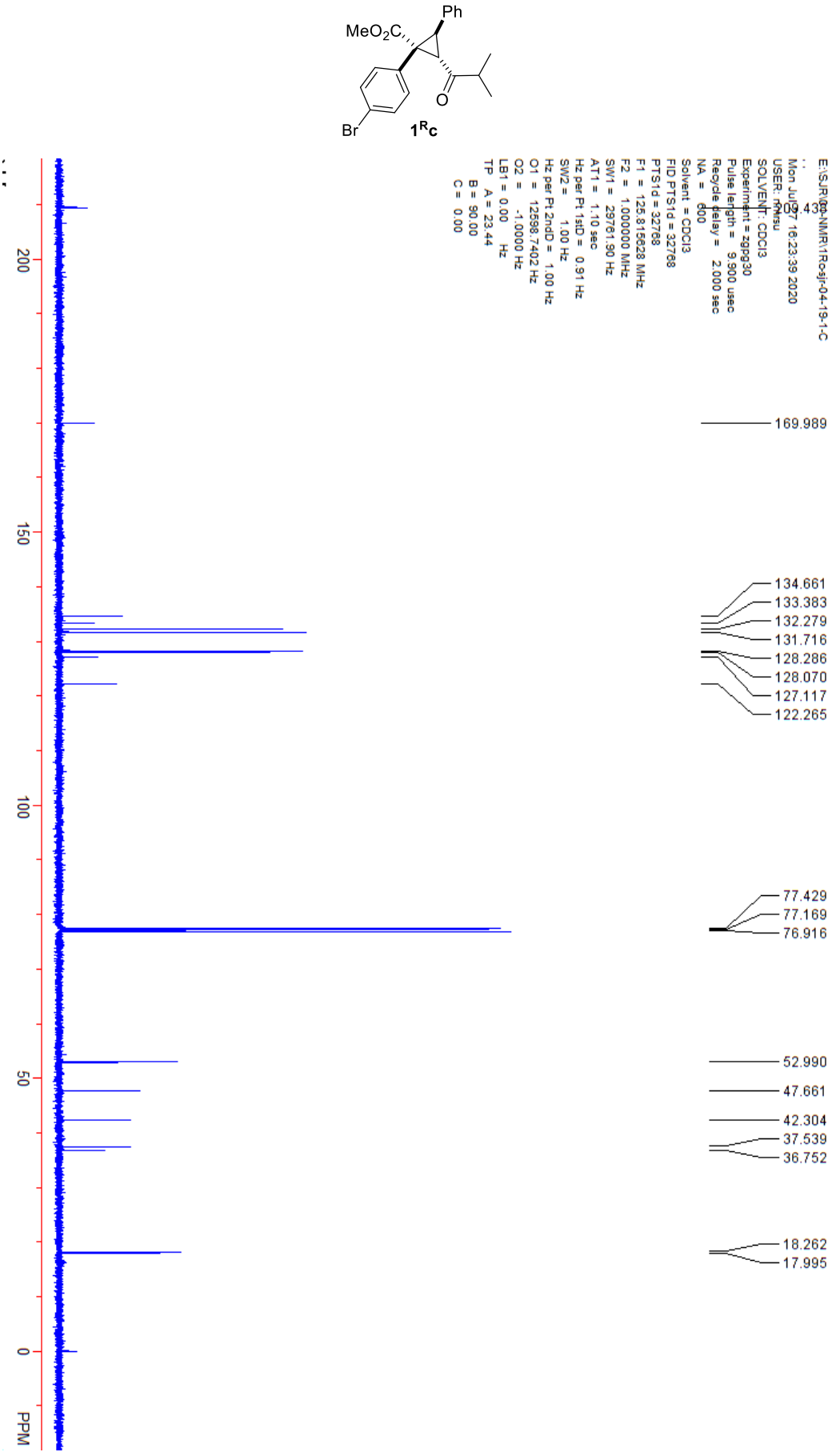

E:\SJR\01-NMR\1Rb-sjr-04-09-H
Sat Jul 18 06:47:20 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6389 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A=-97.66
B = 22.50
C = 0.00
7.260
7.114
7.107
7.103
7.045
7.029
6.991
6.975
6.859
6.852
6.845
6.842
5.297
3.642
3.559
3.546
3.123
3.110
2.996
2.982
2.968
2.954
2.940
2.926
2.912
2.254
1.587
1.307
1.293
1.225
1.212
-0.000
3.02
2.01
2.00
2.00
2.98
0.98
1.00
0.99
2.99
3.03
3.03
3.03
10
8
6
4
2
0
PPM

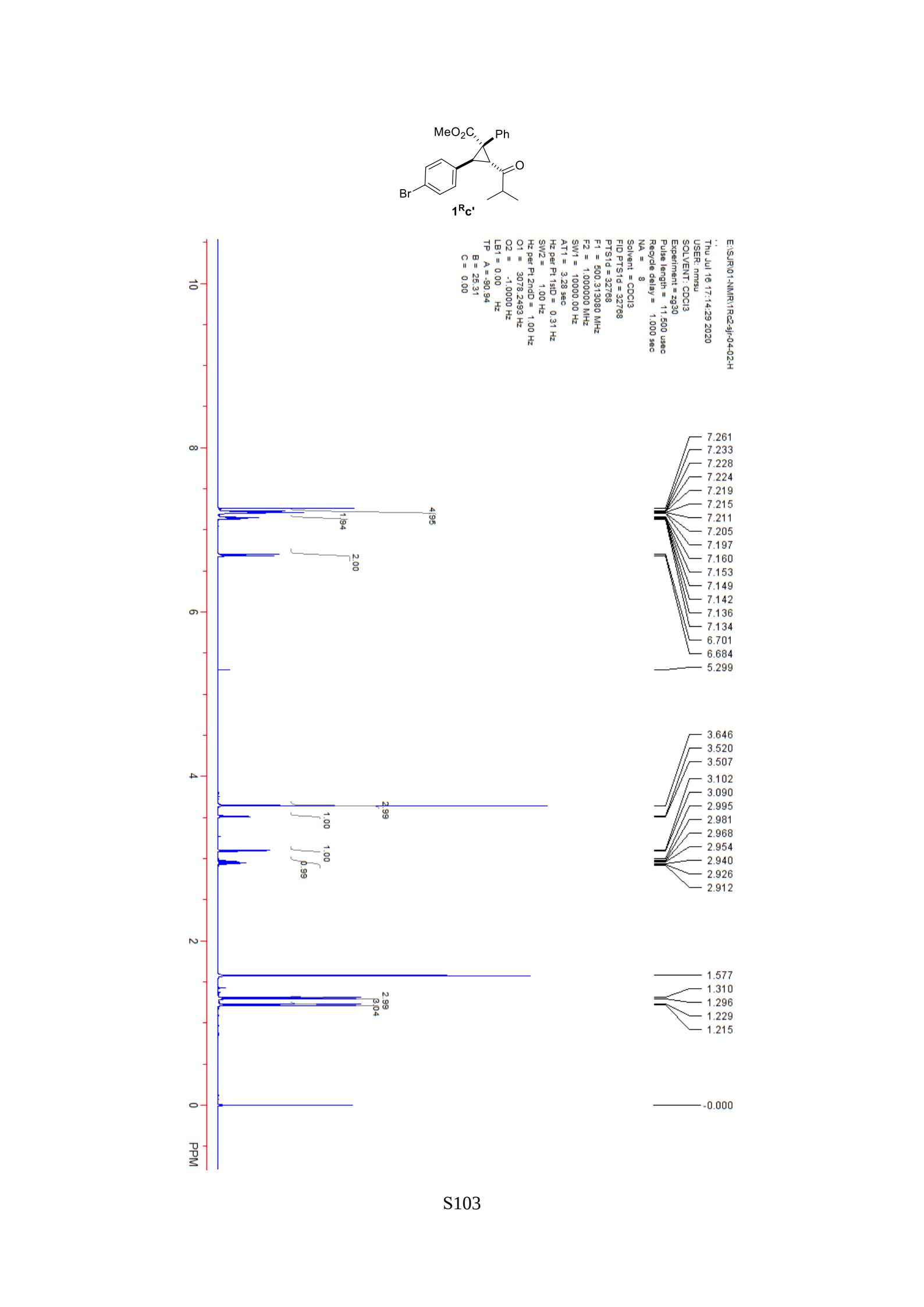

Ph
MeO2C
O
Me

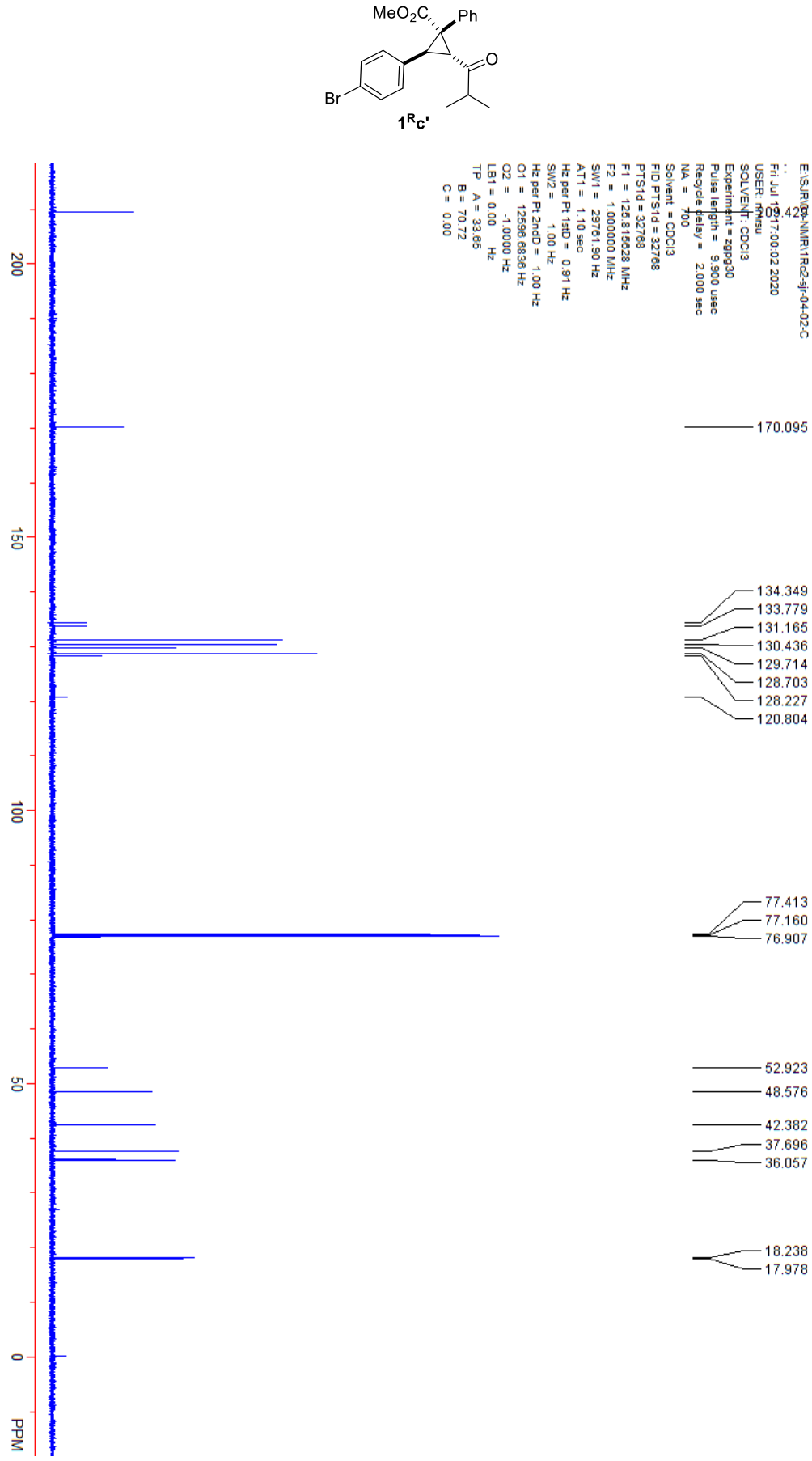
1^{R}b

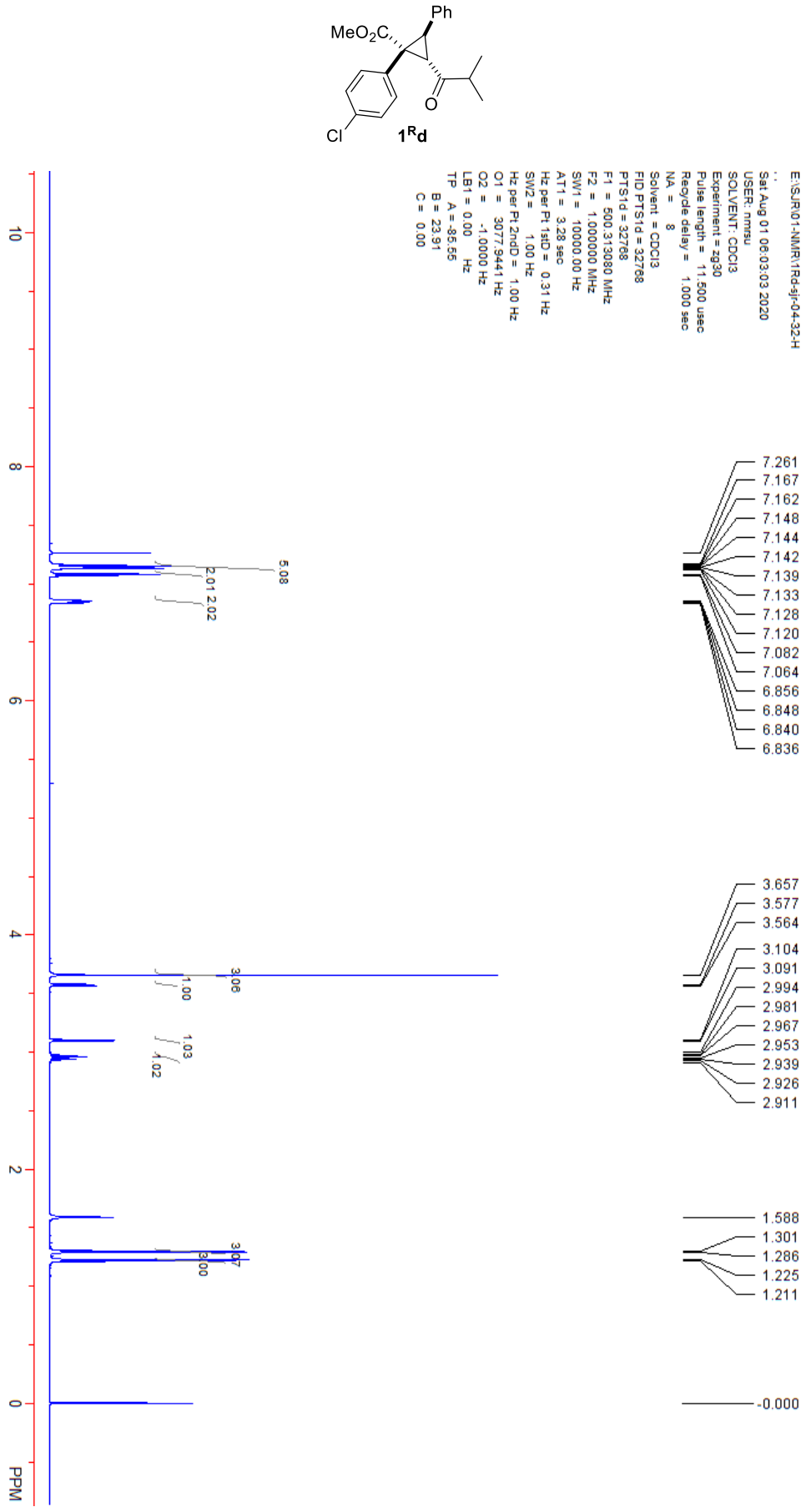

E:\SJR\Sji-NMR\1Rb-sji-04-09-C
Mon Jul 20 15:40:57 2020
USER: rhrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.9238 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 27.66
B = 87.19
C = 0.00
170.544
137.766
135.297
131.102
130.351
129.239
128.149
128.041
126.770
77.422
77.371
77.169
76.916
52.824
48.347
42.355
37.763
36.824
21.280
18.298
18.016
200
150
100
50
0
PPM

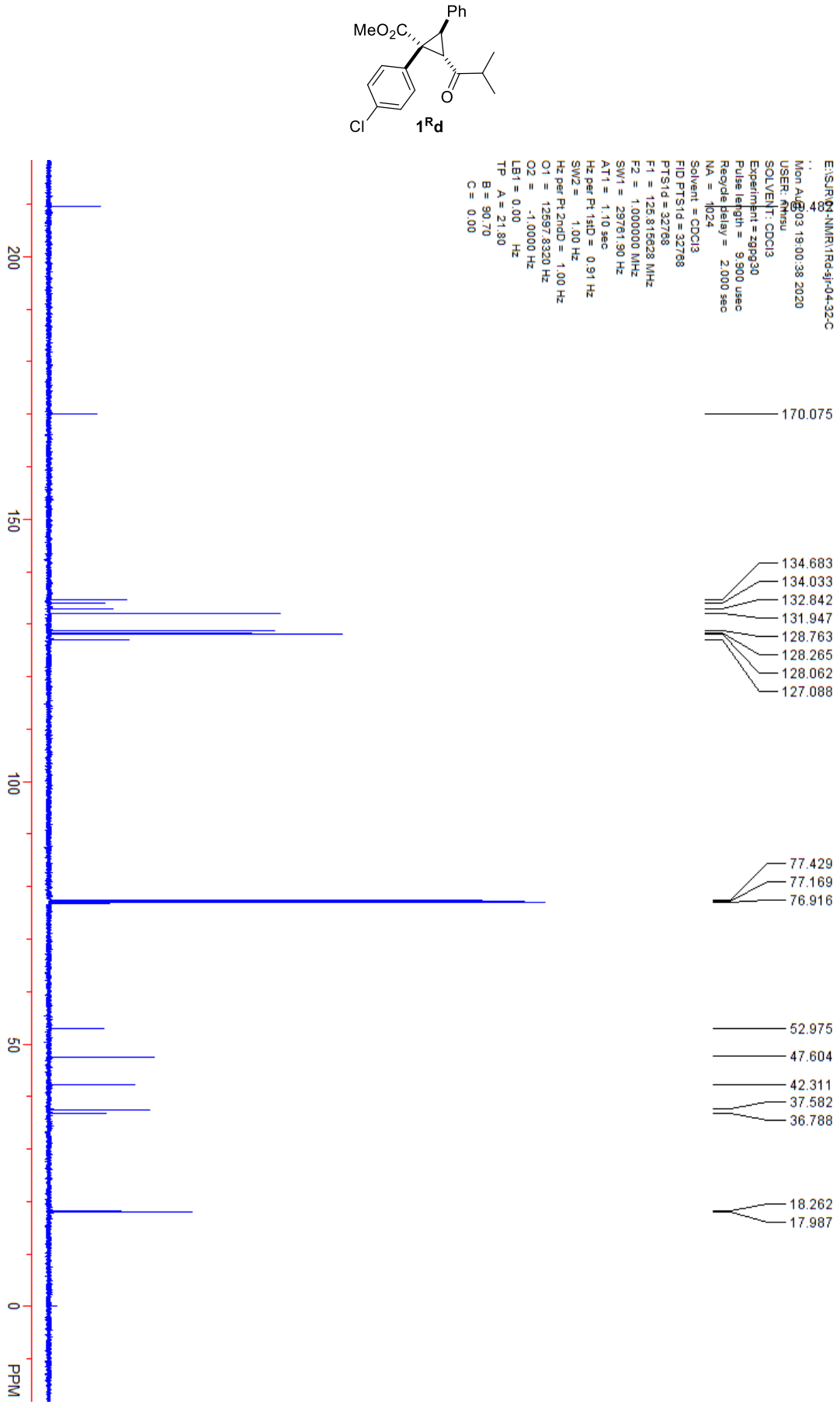

Ph
MeO2C
O
Br
1RC
E:\SJR\01-NMR\1Rcsjr-04-19-1-H
Sun Jul 26 11:34:44 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.9441 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -87.77
B = 24.98
C = 0.00
7.314
7.297
7.261
7.152
7.144
7.136
7.131
7.123
7.020
7.003
6.857
6.850
6.842
6.838
3.655
3.578
3.565
3.099
3.086
2.992
2.978
2.965
2.951
2.937
2.922
2.909
1.556
1.297
1.284
1.225
1.211
-0.000
2.04
3.00
2.01
2.00
3.03
0.99
1.02
1.00
3.02
3.00
PPM

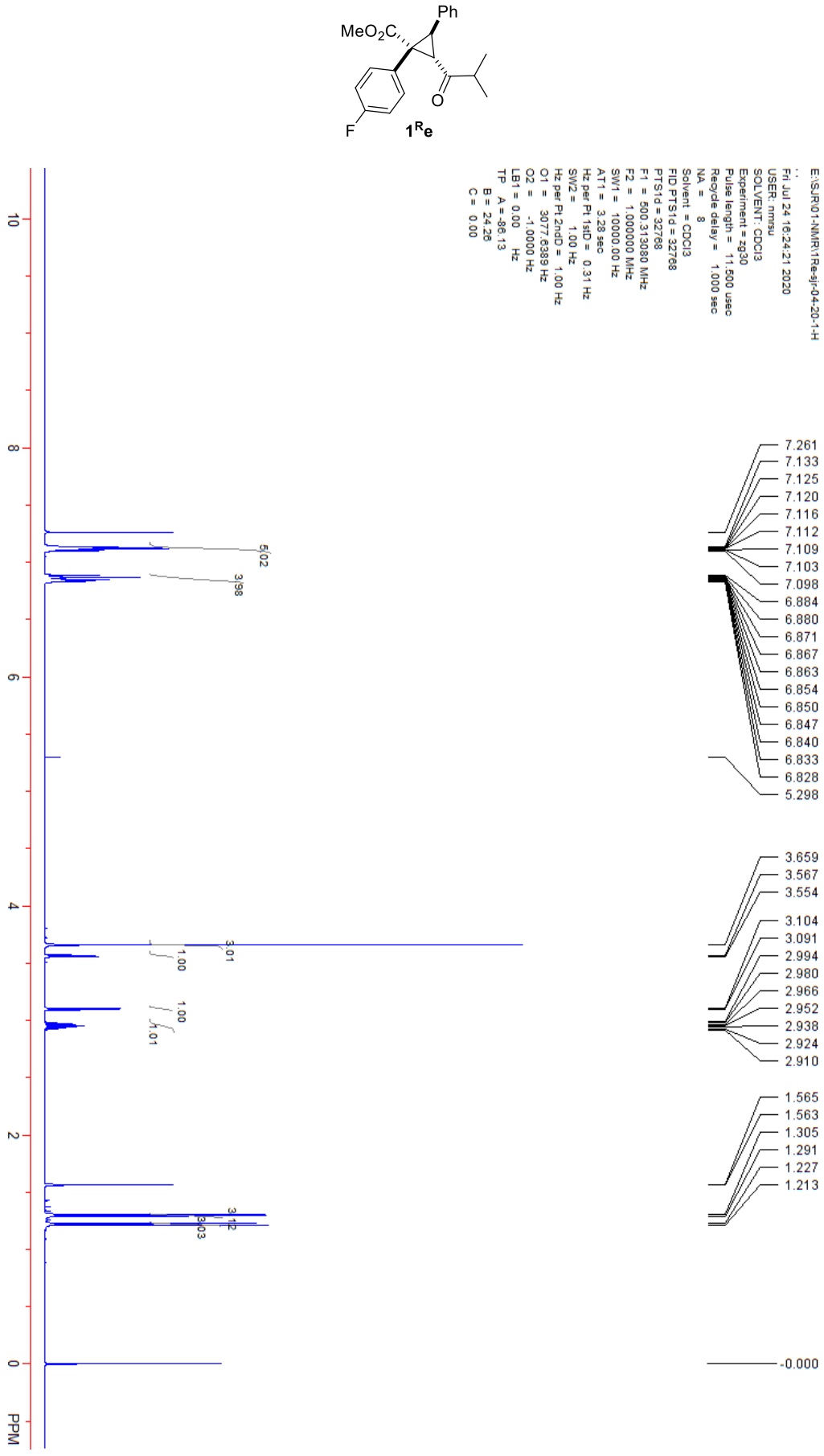

Ph
MeO2C
O
Br
1RC
E:\SJR\600-NMR\1Rc-sjr-04-19-1-C
Mon Jul 27 16:23:39 2020
USER: rmsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12598.7402 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 23.44
B = 90.00
C = 0.00
169.989
134.661
133.383
132.279
131.716
128.286
128.070
127.117
122.265
77.429
77.169
76.916
52.990
47.661
42.304
37.539
36.752
18.262
17.995
200
150
100
50
0
PPM

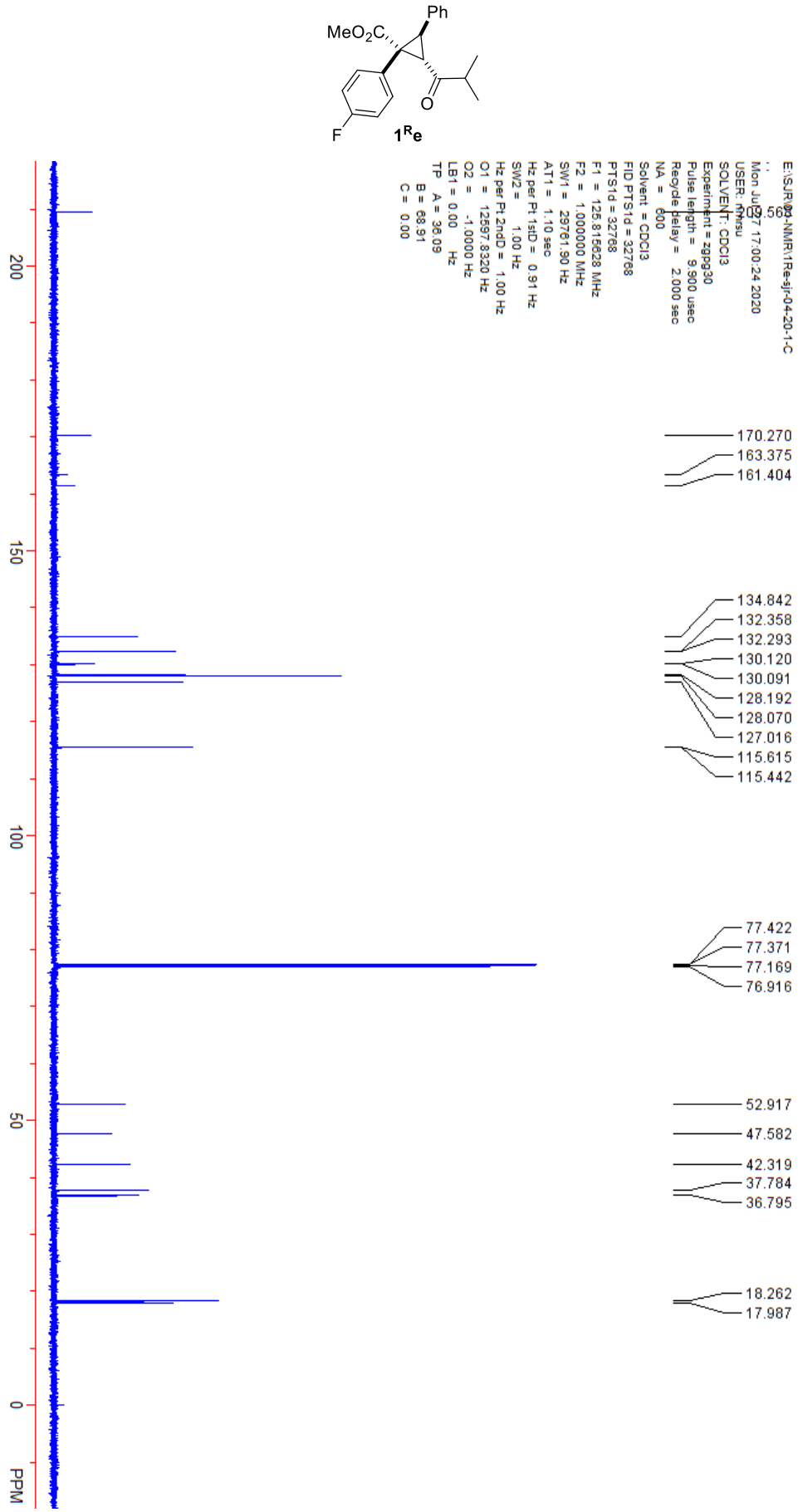

MeO2C
Ph
O
Br
1Rc'
E:\SJR\01-NMR\1Rc2-sjr-04-02-H
Thu Jul 16 17:14:29 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.2493 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -90.94
B = 25.31
C = 0.00
7.261
7.233
7.228
7.224
7.219
7.215
7.211
7.205
7.197
7.160
7.153
7.149
7.142
7.136
7.134
6.701
6.684
5.299
3.646
3.520
3.507
3.102
3.090
2.995
2.981
2.968
2.954
2.940
2.926
2.912
1.577
1.310
1.296
1.229
1.215
-0.000
4.95
1.94
2.00
2.99
1.00
1.00
0.99
2.99
3.04
10
8
6
4
2
0
PPM

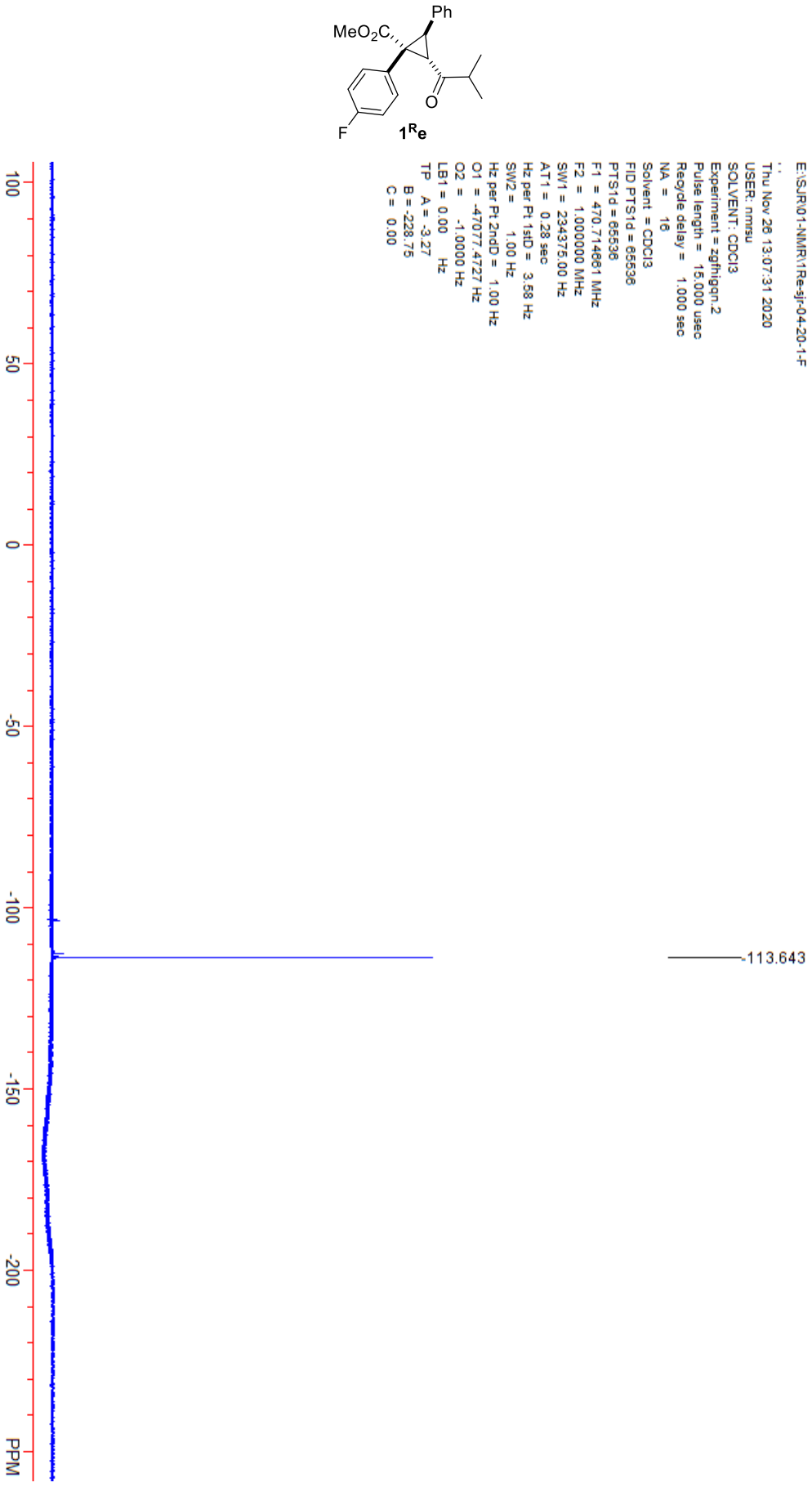

MeO2C
Ph
O
Br
1RC'
E:\SJR\03-NMR\1Rc2-sjr-04-02-C
Fri Jul 17 00:02 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.6836 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 33.65
B = 70.72
C = 0.00
200.420
170.095
134.349
133.779
131.165
130.436
129.714
128.703
128.227
120.804
77.413
77.160
76.907
52.923
48.576
42.382
37.696
36.057
18.238
17.978
200
150
100
50
0
PPM

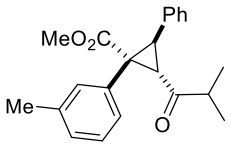

Ph
MeO2C
O
Cl
1Rd
E:\SJR\01-NMR\1Rd-sjr-04-32-H
Sat Aug 01 08:03:03 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.9441 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -85.55
B = 23.91
C = 0.00
7.261
7.167
7.162
7.148
7.144
7.142
7.139
7.133
7.128
7.120
7.082
7.064
6.856
6.848
6.840
6.836
3.657
3.577
3.564
3.104
3.091
2.994
2.981
2.967
2.953
2.939
2.926
2.911
1.588
1.301
1.286
1.225
1.211
-0.000
5.08
2.01
2.02
3.06
1.00
1.03
1.02
3.07
3.00
10
8
6
4
2
0
PPM


Ph
MeO2C
O
Cl
1Rd
E:\SJR\24-NMR\1Rd-sjr-04-32-C
Mon Aug 03 19:00:38 2020
USER: RMmsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle Delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.8320 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 21.80
B = 90.70
C = 0.00
170.075
134.683
134.033
132.842
131.947
128.763
128.265
128.062
127.088
77.429
77.169
76.916
52.975
47.604
42.311
37.582
36.788
18.262
17.987
200
150
100
50
0
PPM

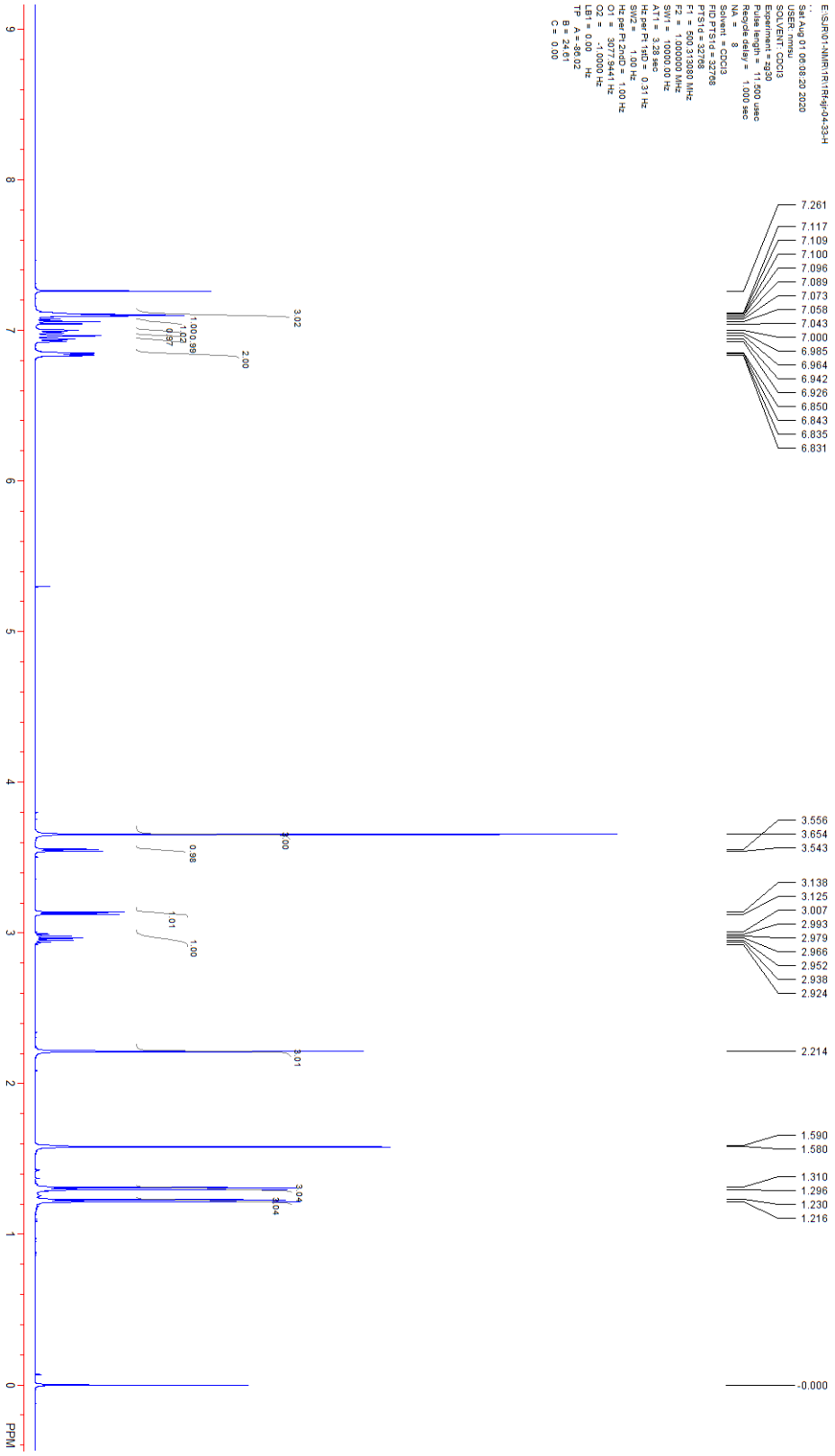

Ph
MeO2C
O
F
1Re
E:\SJR\01-NMR\1Re-sjr-04-20-1-H
Fri Jul 24 16:24:21 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6389 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -86.13
B = 24.28
C = 0.00
7.261
7.133
7.125
7.120
7.116
7.112
7.109
7.103
7.098
6.884
6.880
6.871
6.867
6.863
6.854
6.850
6.847
6.840
6.833
6.828
5.298
3.659
3.567
3.554
3.104
3.091
2.994
2.980
2.966
2.952
2.938
2.924
2.910
1.565
1.563
1.305
1.291
1.227
1.213
-0.000
5.02
3.98
3.01
1.00
1.00
1.01
3.12
3.03
PPM

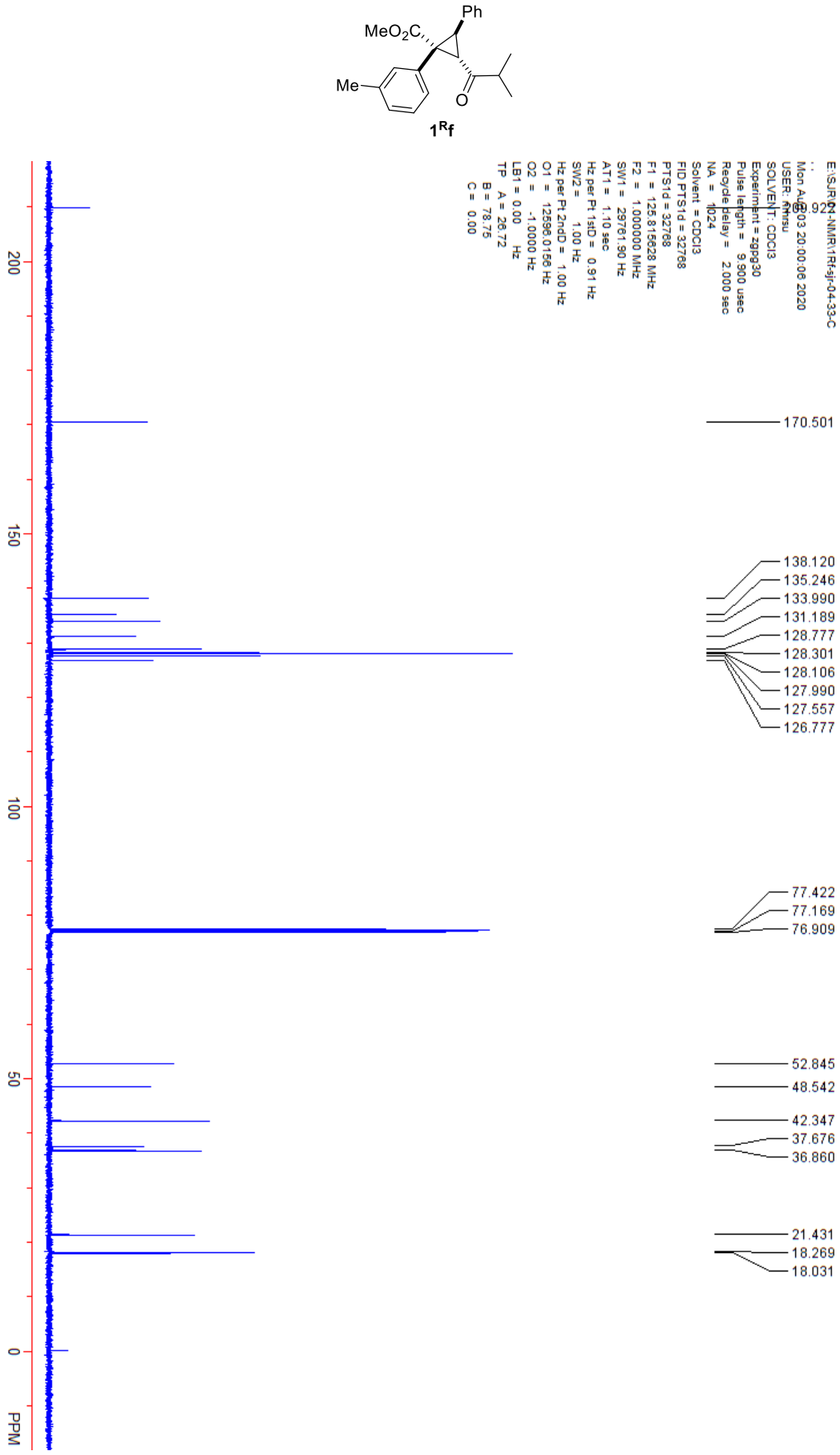

Ph
MeO2C
O
F
1Re
E:\SJR\00-NMR\1Re-sjr-04-20-1-C
Mon Jul 27 17:00:24 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle Delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.8320 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 36.09
B = 68.91
C = 0.00
170.270
163.375
161.404
134.842
132.358
132.293
130.120
130.091
128.192
128.070
127.016
115.615
115.442
77.422
77.371
77.169
76.916
52.917
47.582
42.319
37.784
36.795
18.262
17.987
200
150
100
50
0
PPM

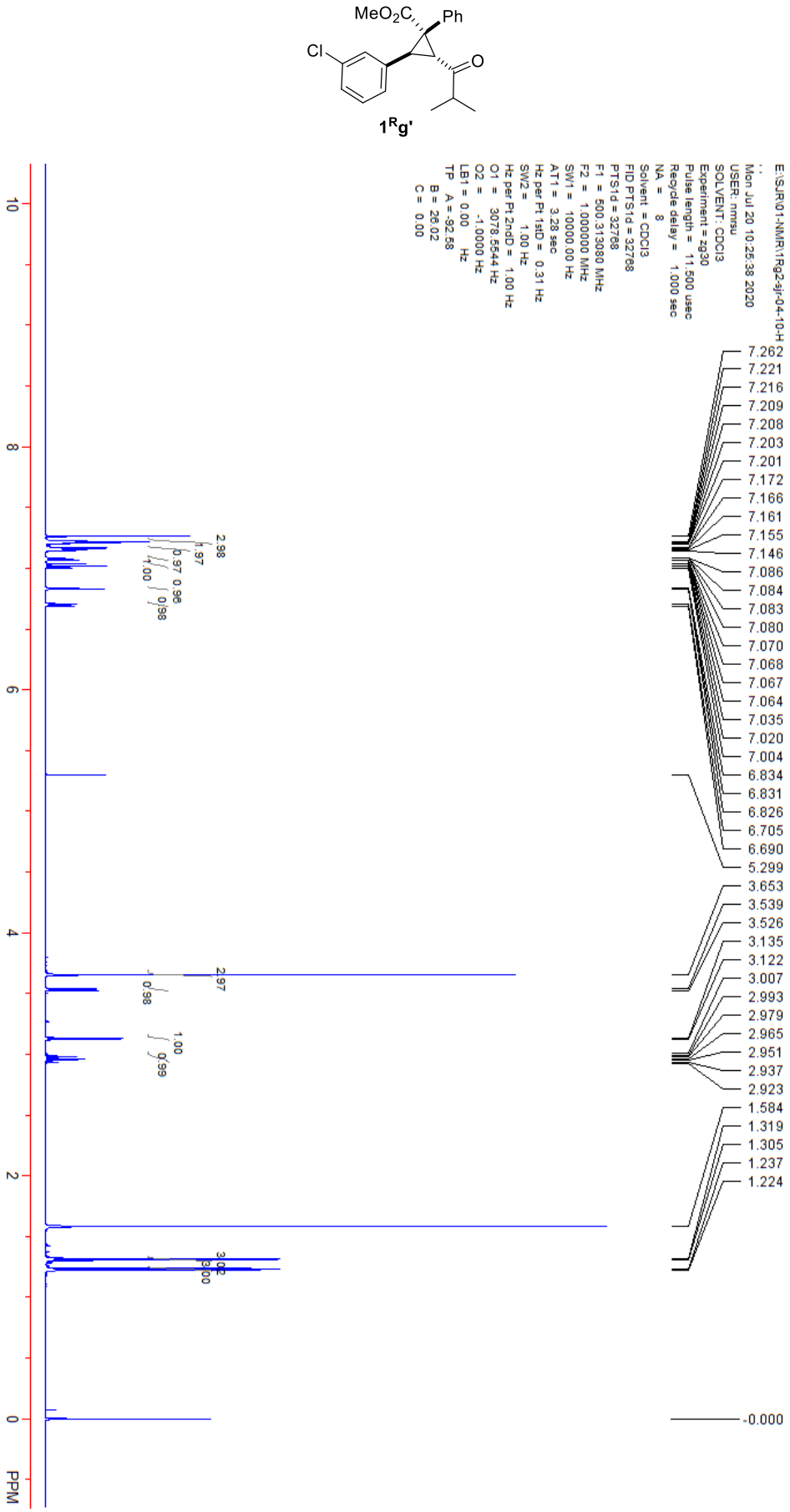

Ph
MeO2C
O
F
1Re
E:\SJR\01-NMR\1Re-sjr-04-20-1-F
Thu Nov 26 13:07:31 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47077.4727 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -3.27
B = -228.75
C = 0.00
-113.643
100
50
0
-50
-100
-150
-200
PPM

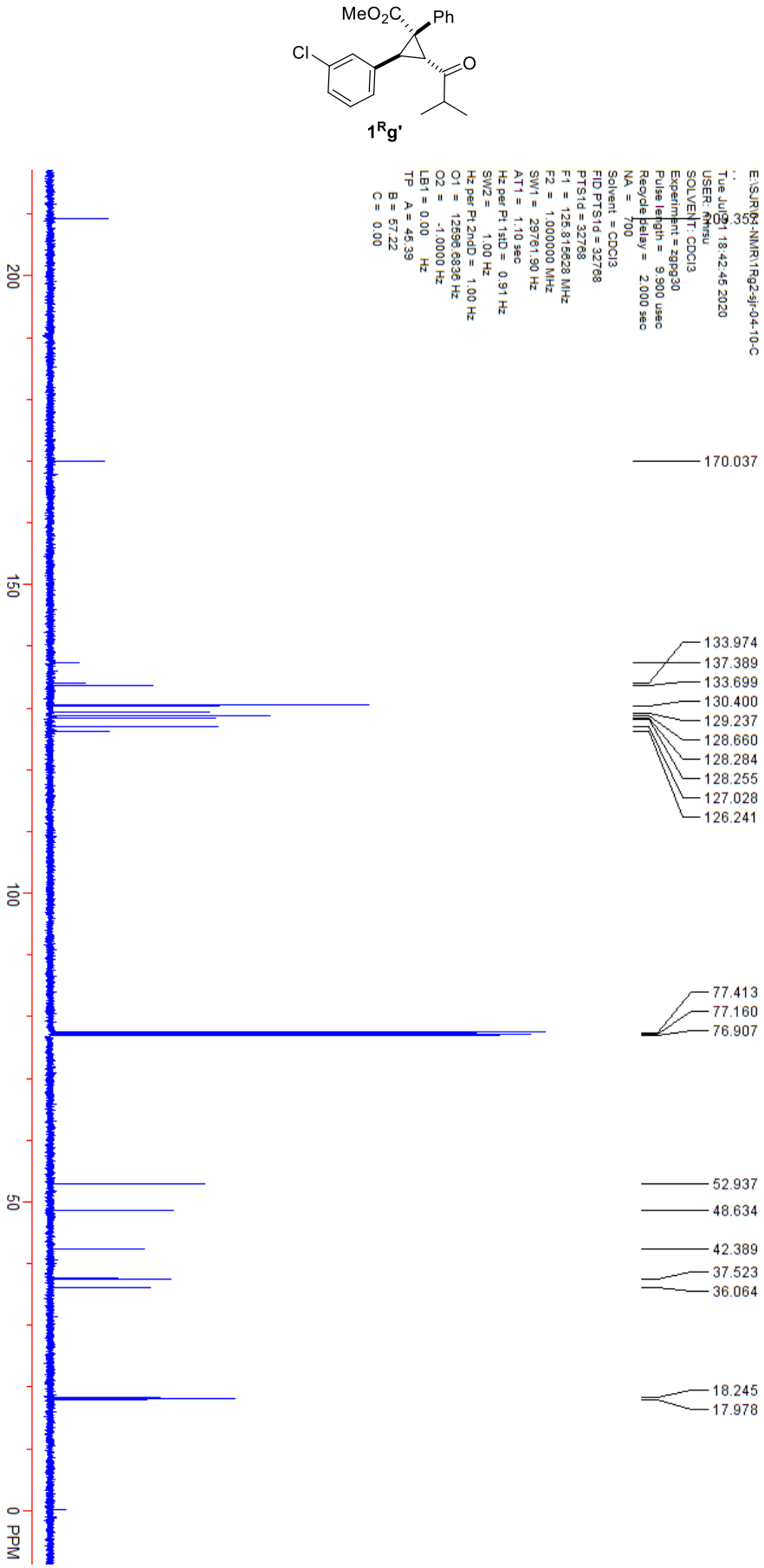

MeO2C
Ph
Me
O

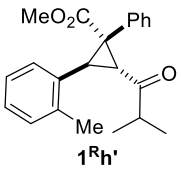
1^{R}f


E:\SJR\01-NMR\1R\1Rf-dp-04-33-H
Sat Aug 01 06:08:20 2020
USER: mmsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NS = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1sD = 0.31 Hz
SW2 = 10000.00 Hz
Hz per Pt = 1.00 Hz
O1 = 3077.9441 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -86.02
B = 24.61
C = 0.00
7.261
7.117
7.109
7.100
7.096
7.089
7.073
7.058
7.043
7.000
6.985
6.964
6.942
6.926
6.850
6.843
6.835
6.831
3.556
3.654
3.543
3.138
3.125
3.007
2.993
2.979
2.966
2.952
2.938
2.924
2.214
1.590
1.580
1.310
1.296
1.230
1.216
-0.000
PPM

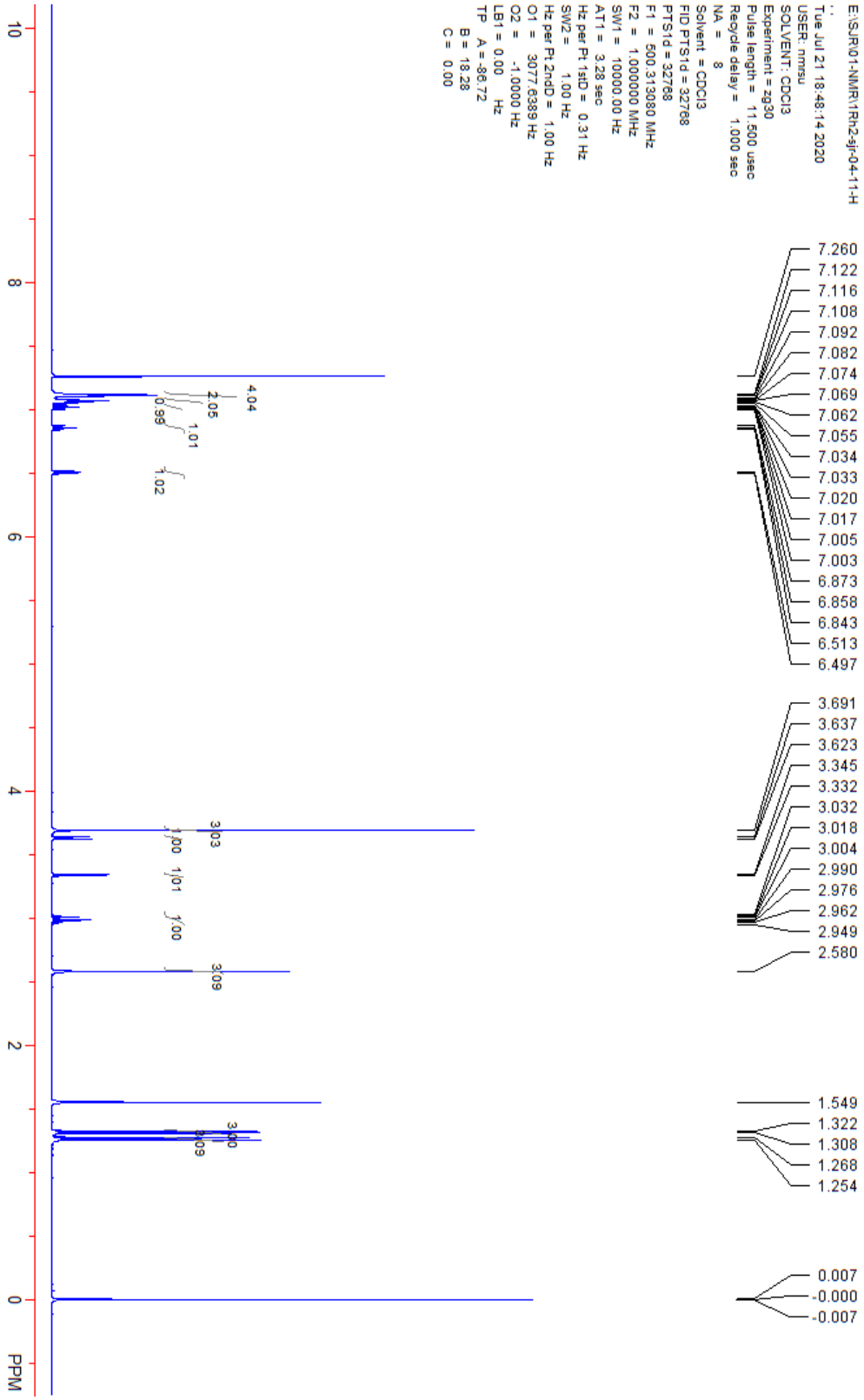

Ph
MeO2C
Me
O
1Rf
E:\SJR\24-NMR\1Rf-sjr-04-33-C
Mon Aug 03 20:00:06 2020
USER: rhnsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.0156 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 26.72
B = 78.75
C = 0.00
170.501
138.120
135.246
133.990
131.189
128.777
128.301
128.106
127.990
127.557
126.777
77.422
77.169
76.909
52.845
48.542
42.347
37.676
36.860
21.431
18.269
18.031
200
150
100
50
0
PPM

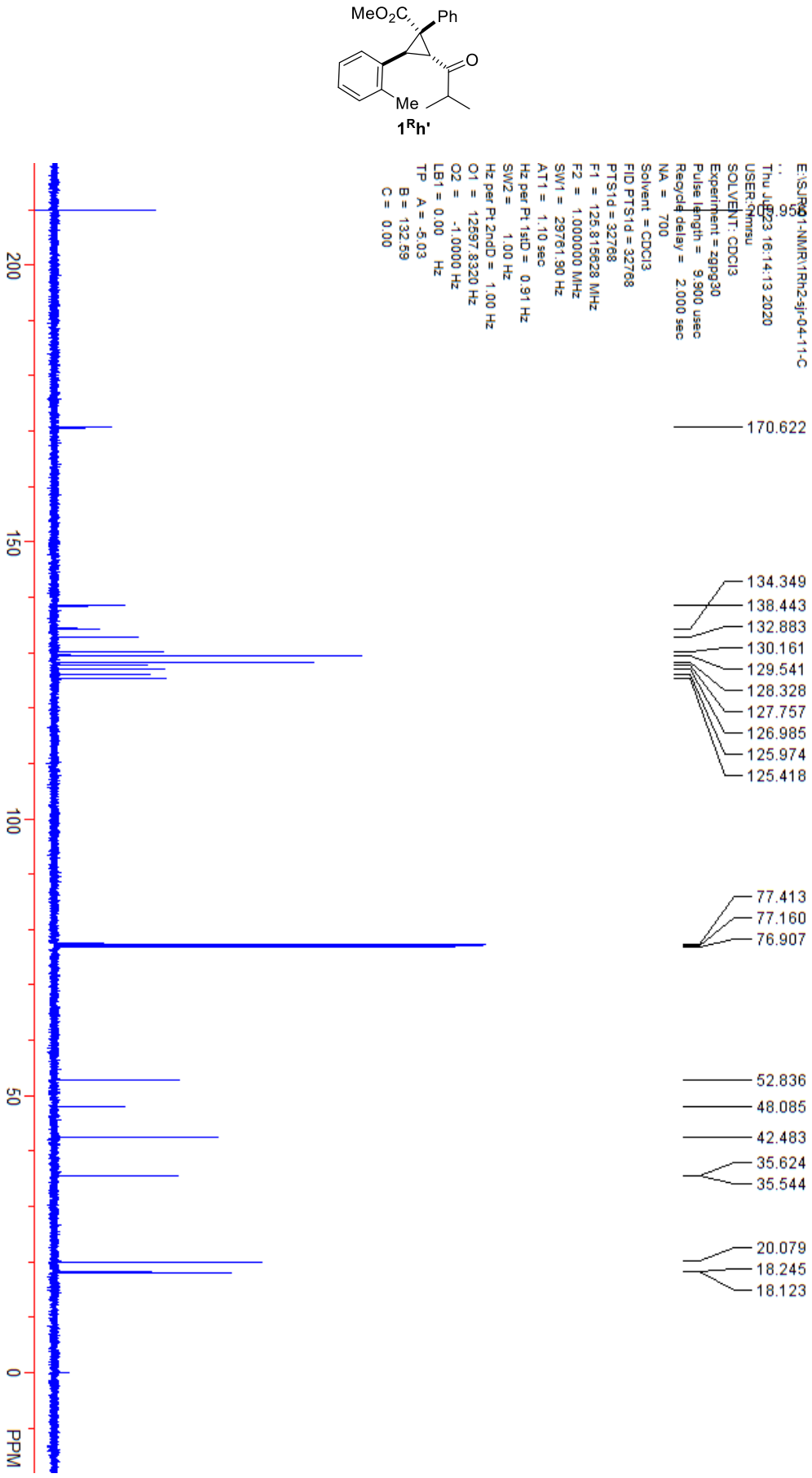

MeO2C
Ph
Cl
O
1Rg'
E:\SJR\01-NMR\1Rg2-sjr-04-10-H
Mon Jul 20 10:25:38 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.5544 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -92.58
B = 26.02
C = 0.00
7.262
7.221
7.216
7.209
7.208
7.203
7.201
7.172
7.166
7.161
7.155
7.146
7.086
7.084
7.083
7.080
7.070
7.068
7.067
7.064
7.035
7.020
7.004
6.834
6.831
6.826
6.705
6.690
5.299
3.653
3.539
3.526
3.135
3.122
3.007
2.993
2.979
2.965
2.951
2.937
2.923
1.584
1.319
1.305
1.237
1.224
-0.000
2.98
1.97
0.97
0.98
1.00
0.98
2.97
0.98
1.00
0.99
3.02
3.00
10
8
6
4
2
0
PPM

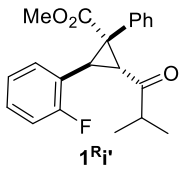

MeO2C
Ph
Cl
O
1Rg'
E:\SJR\64-NMR\1Rg2-sjr-04-10-C
9.351
Tue Jul 21 18:42:45 2020
USER: ANasu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.6836 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 45.39
B = 57.22
C = 0.00
170.037
133.974
137.389
133.699
130.400
129.237
128.660
128.284
128.255
127.028
126.241
77.413
77.160
76.907
52.937
48.634
42.389
37.523
36.064
18.245
17.978
200
150
100
50
0 PPM


MeO2C
Ph
O
Me

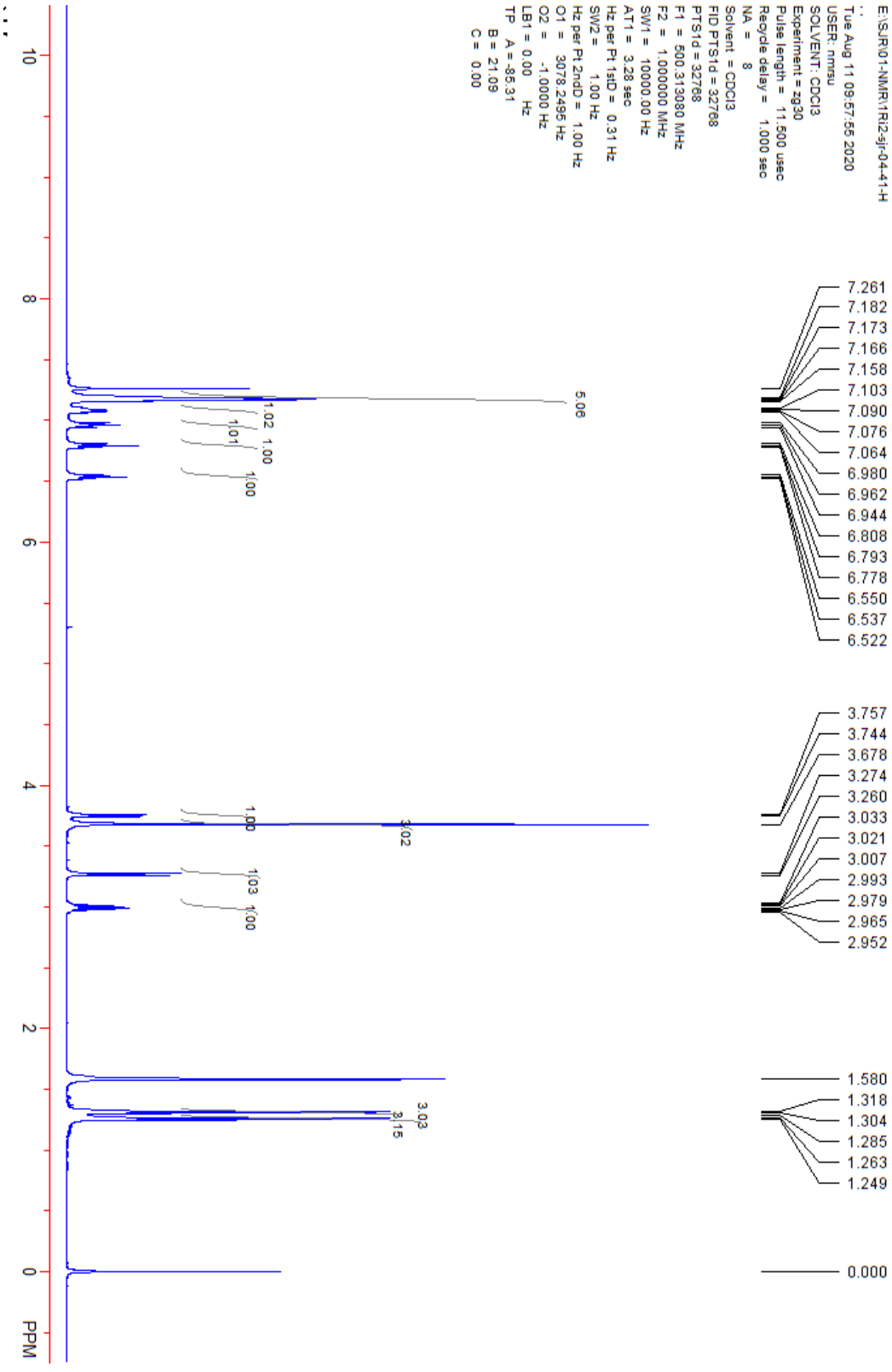
1^{R}h'

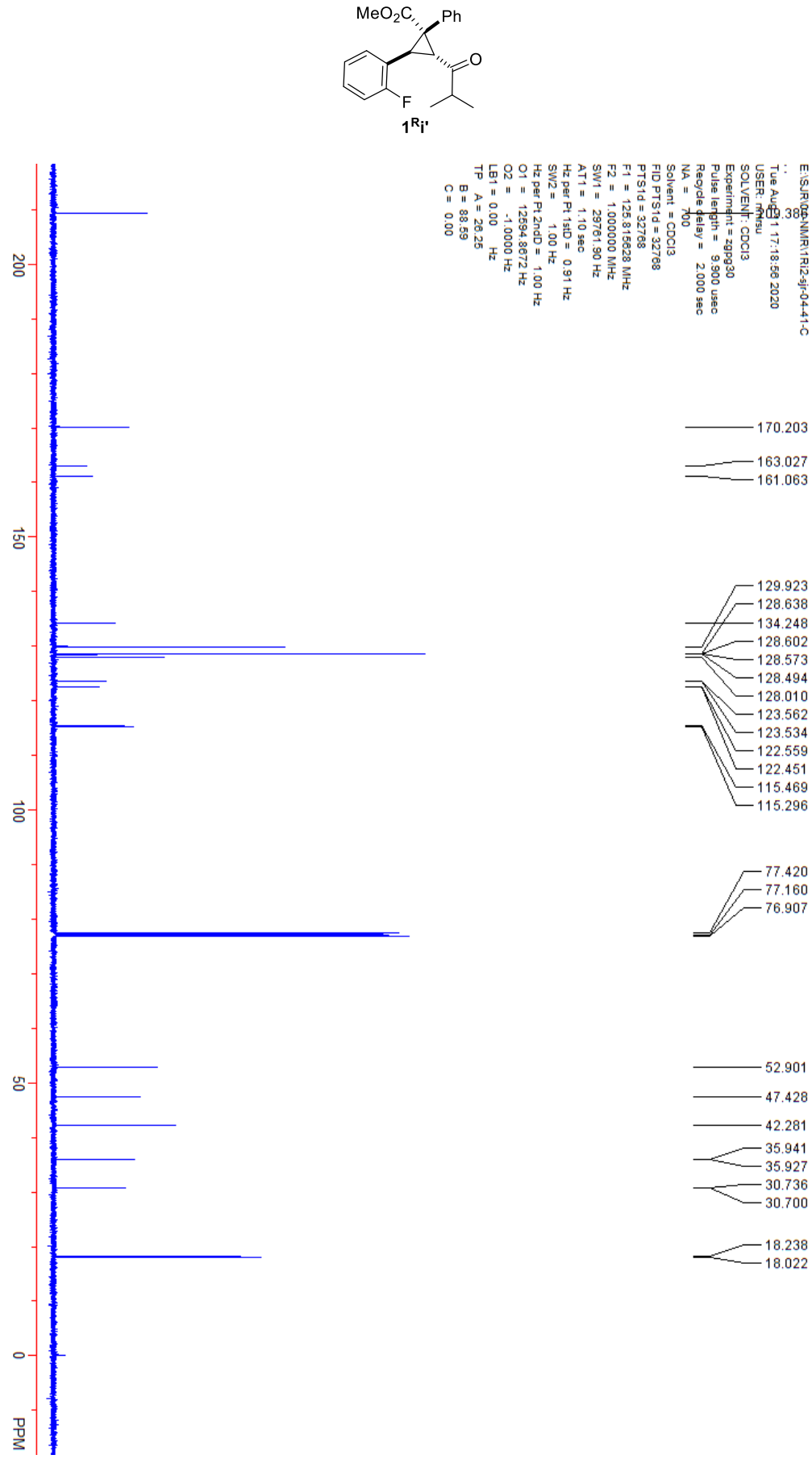

E:\SJR\01-NMR\1Rh2-sjr-04-11-H
Tue Jul 21 18:48:14 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6389 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -86.72
B = 18.28
C = 0.00
7.260
7.122
7.116
7.108
7.092
7.082
7.074
7.069
7.062
7.055
7.034
7.033
7.020
7.017
7.005
7.003
6.873
6.858
6.843
6.513
6.497
3.691
3.637
3.623
3.345
3.332
3.032
3.018
3.004
2.990
2.976
2.962
2.949
2.580
1.549
1.322
1.308
1.268
1.254
0.007
-0.000
-0.007
4.04
2.05
1.01
0.99
1.02
3.03
1.00
1.01
1.00
3.09
3.00
PPM

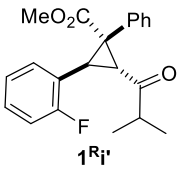

MeO2C
Ph
O
Me
1Rh'
E:\SJR\01-NMR\1Rh2-sjr-04-11-C
Thu Jul 23 16:14:13 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.8320 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -5.03
B = 132.59
C = 0.00
170.622
134.349
138.443
132.883
130.161
129.541
128.328
127.757
126.985
125.974
125.418
77.413
77.160
76.907
52.836
48.085
42.483
35.624
35.544
20.079
18.245
18.123
200
150
100
50
0
PPM


MeO2C
Ph
O
F

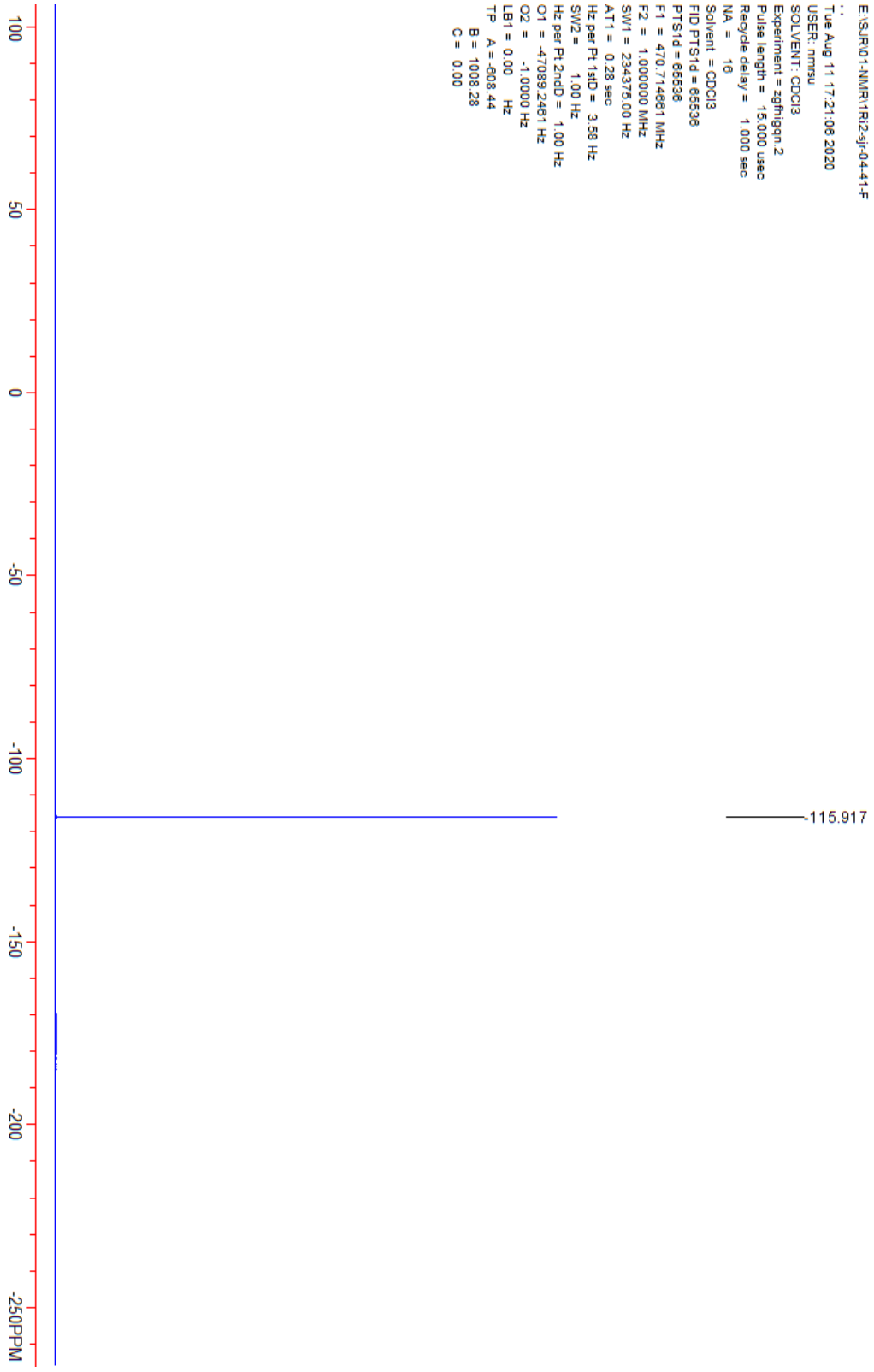
$1^{R}i'$

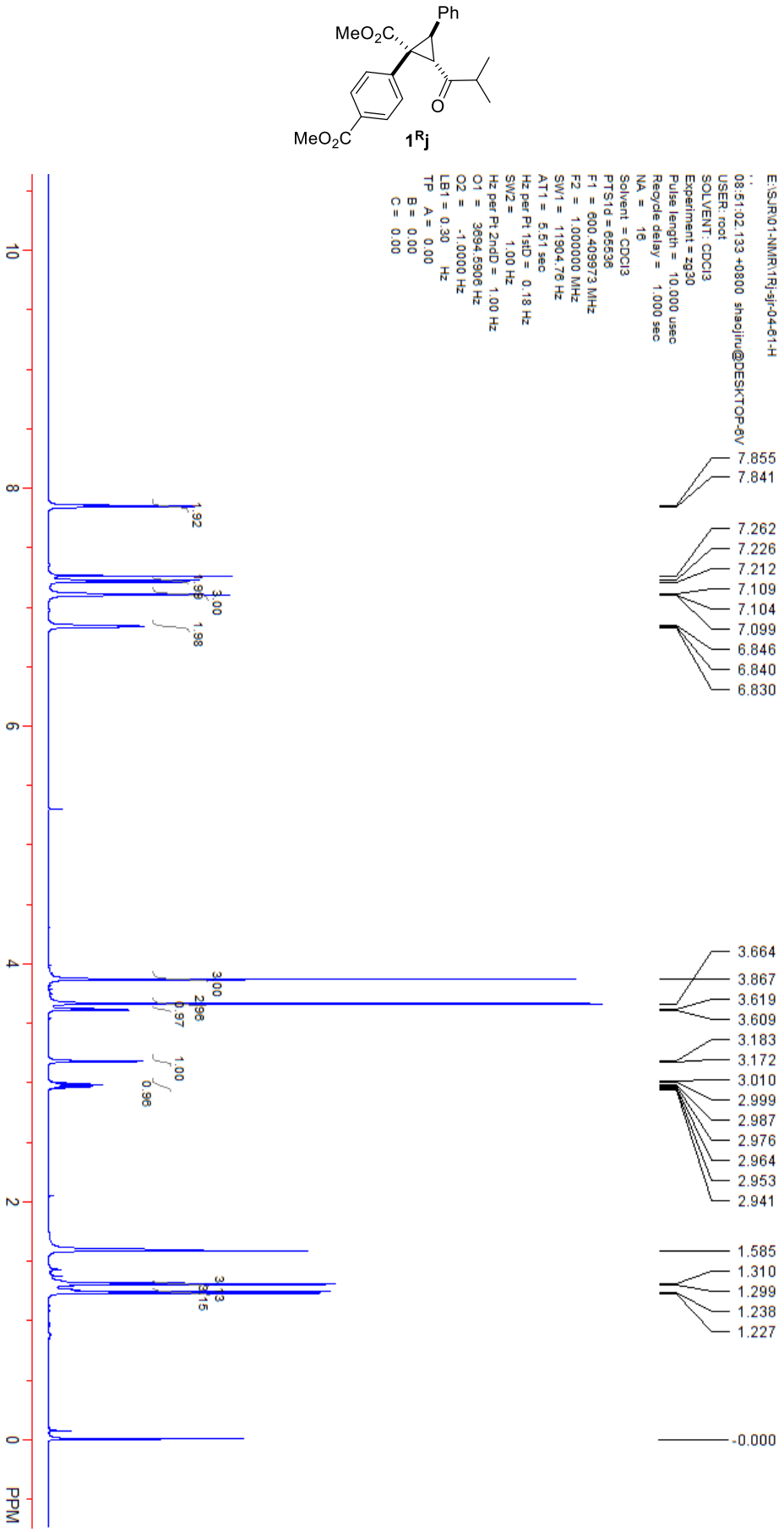

E:\SJR\01-NMR\1Ri2-sjr-04-41-H
Tue Aug 11 09:57:55 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.3130080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.2495 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -85.31
B = 21.09
C = 0.00
7.261
7.182
7.173
7.166
7.158
7.103
7.090
7.076
7.064
6.980
6.962
6.944
6.808
6.793
6.778
6.550
6.537
6.522
3.757
3.744
3.678
3.274
3.260
3.033
3.021
3.007
2.993
2.979
2.965
2.952
1.580
1.318
1.304
1.285
1.263
1.249
0.000
5.08
1.02
1.00
1.01
1.00
1.00
3.02
1.03
1.00
3.03
3.15
10
8
6
4
2
0
PPM

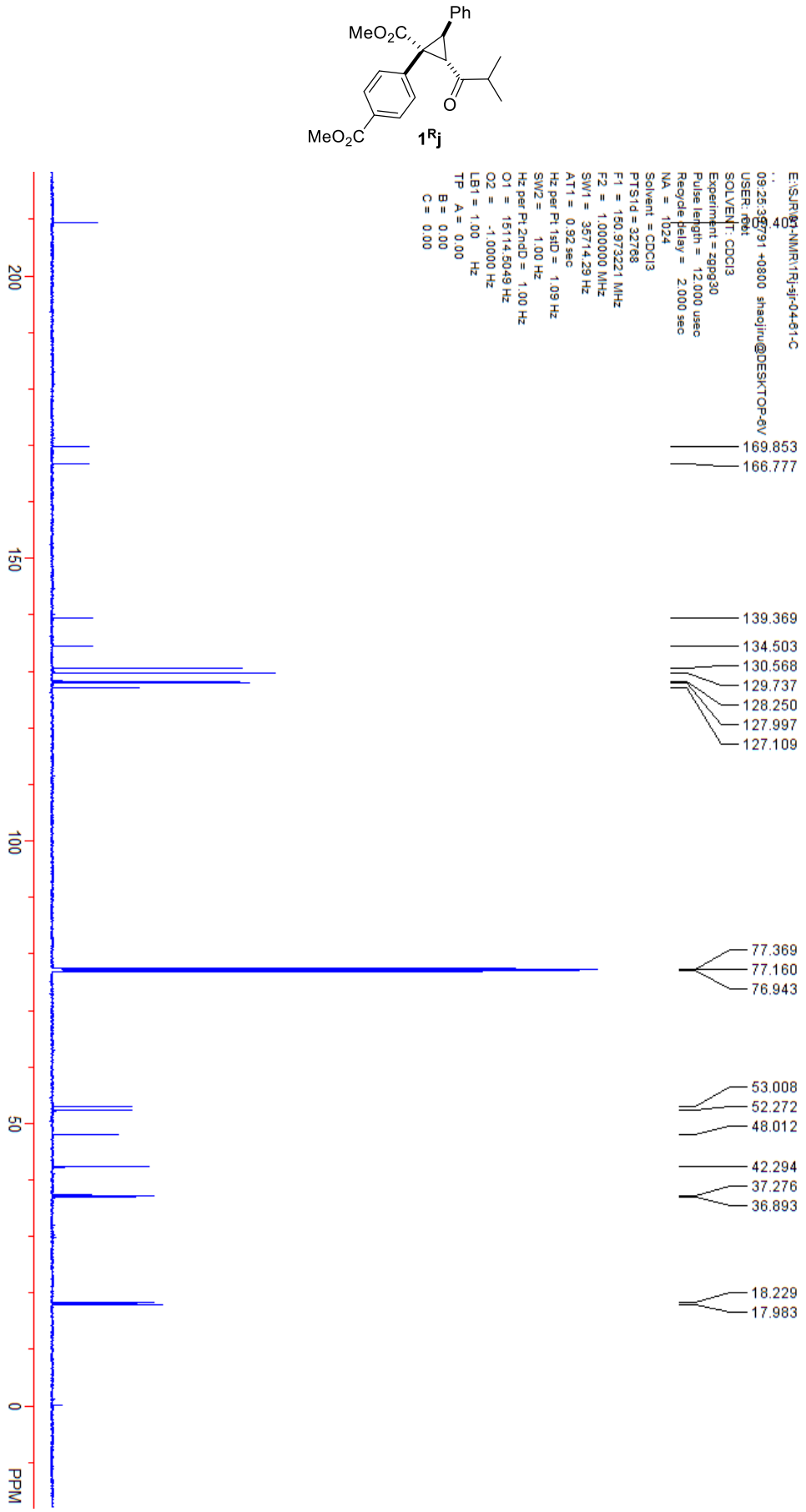

MeO2C
Ph
O
F
1Ri'
E:\SJR\data\NMR\1Ri2-sjr-04-41-C
CD3OD 38
Tue Aug 11 17:18:58 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1sD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8672 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 26.25
B = 88.59
C = 0.00
170.203
163.027
161.063
129.923
128.638
134.248
128.602
128.573
128.494
128.010
123.562
123.534
122.559
122.451
115.469
115.296
77.420
77.160
76.907
52.901
47.428
42.281
35.941
35.927
30.736
30.700
18.238
18.022
200
150
100
50
0
PPM

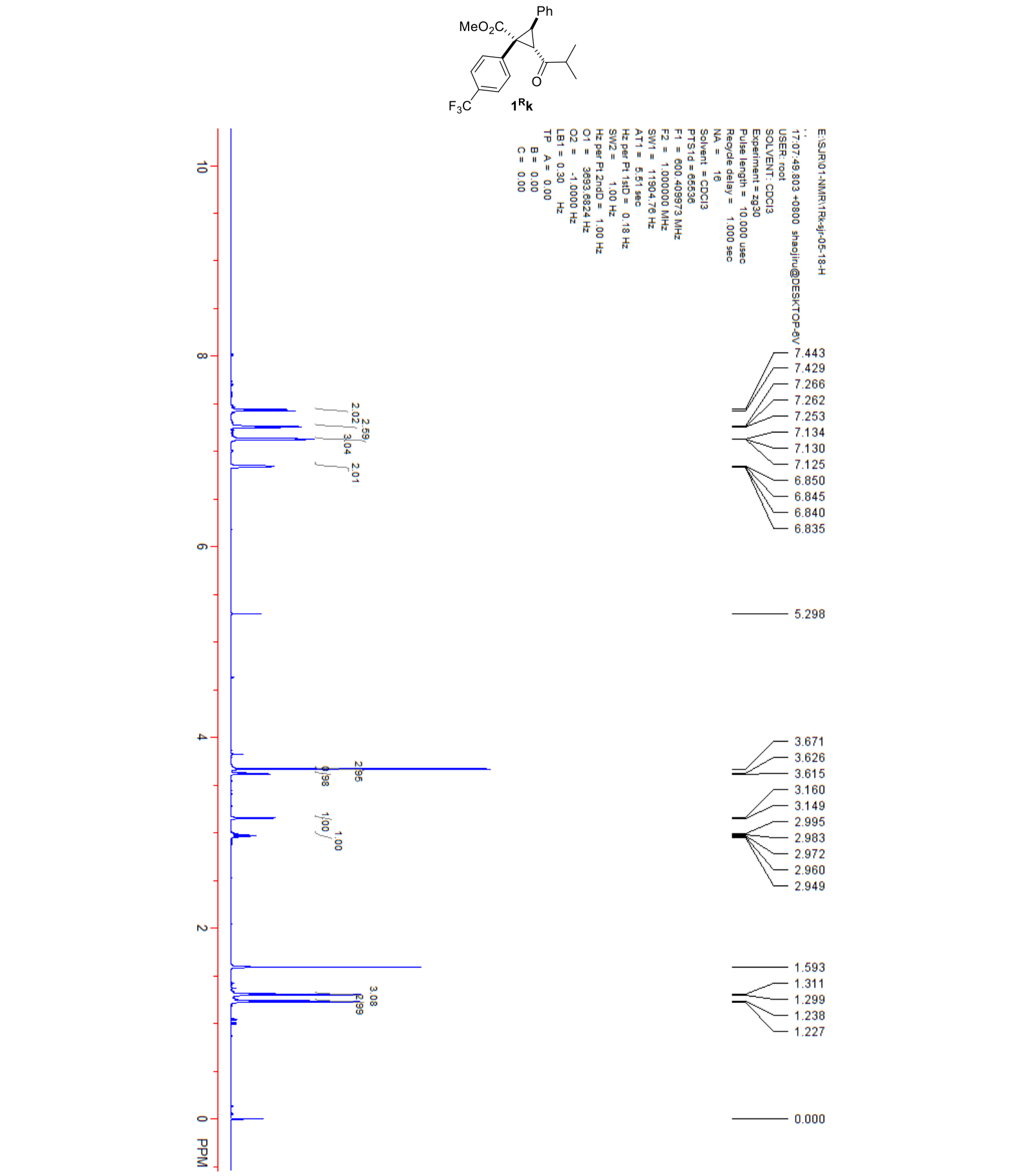

MeO2C
Ph
O
F

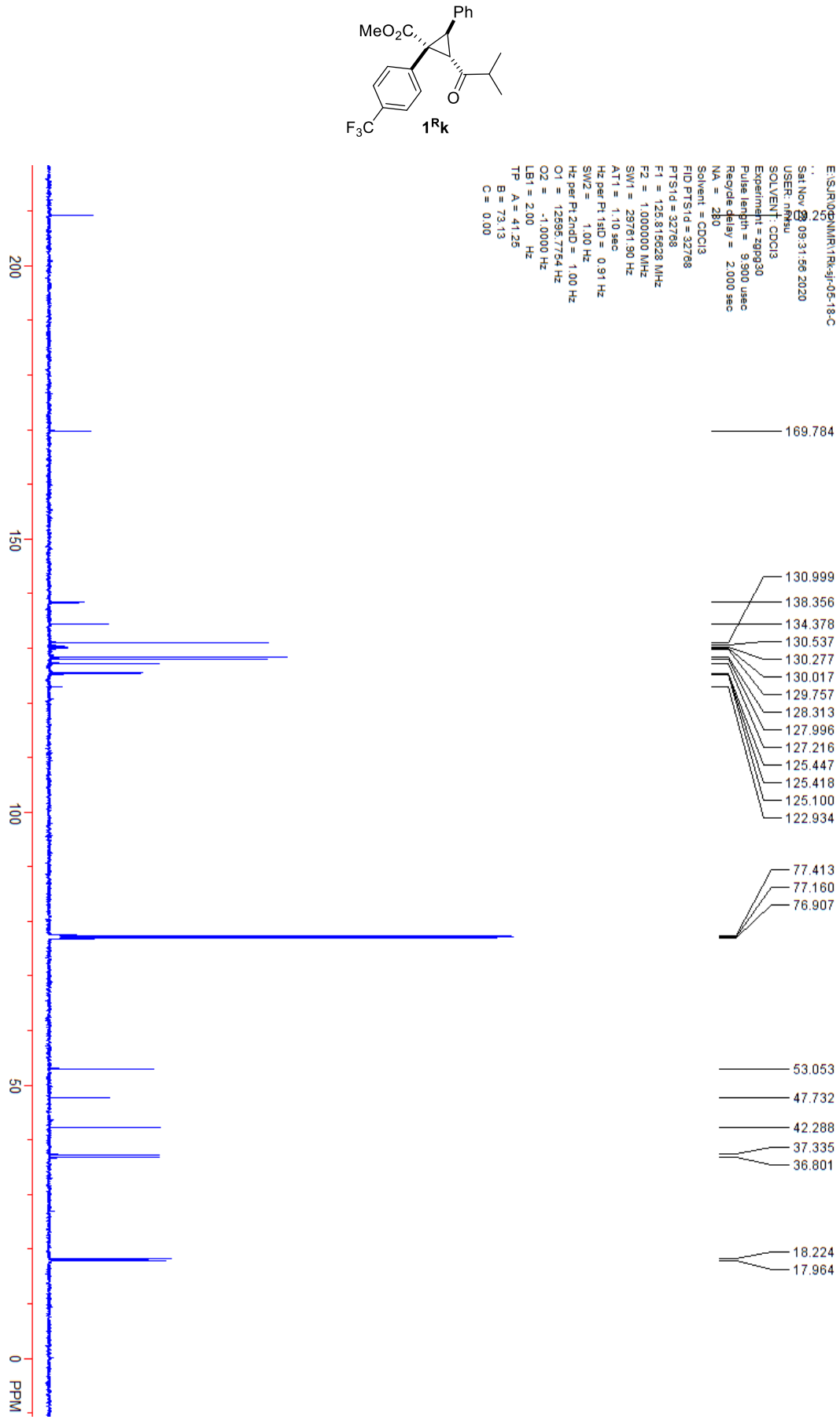
$1^{R}i'$

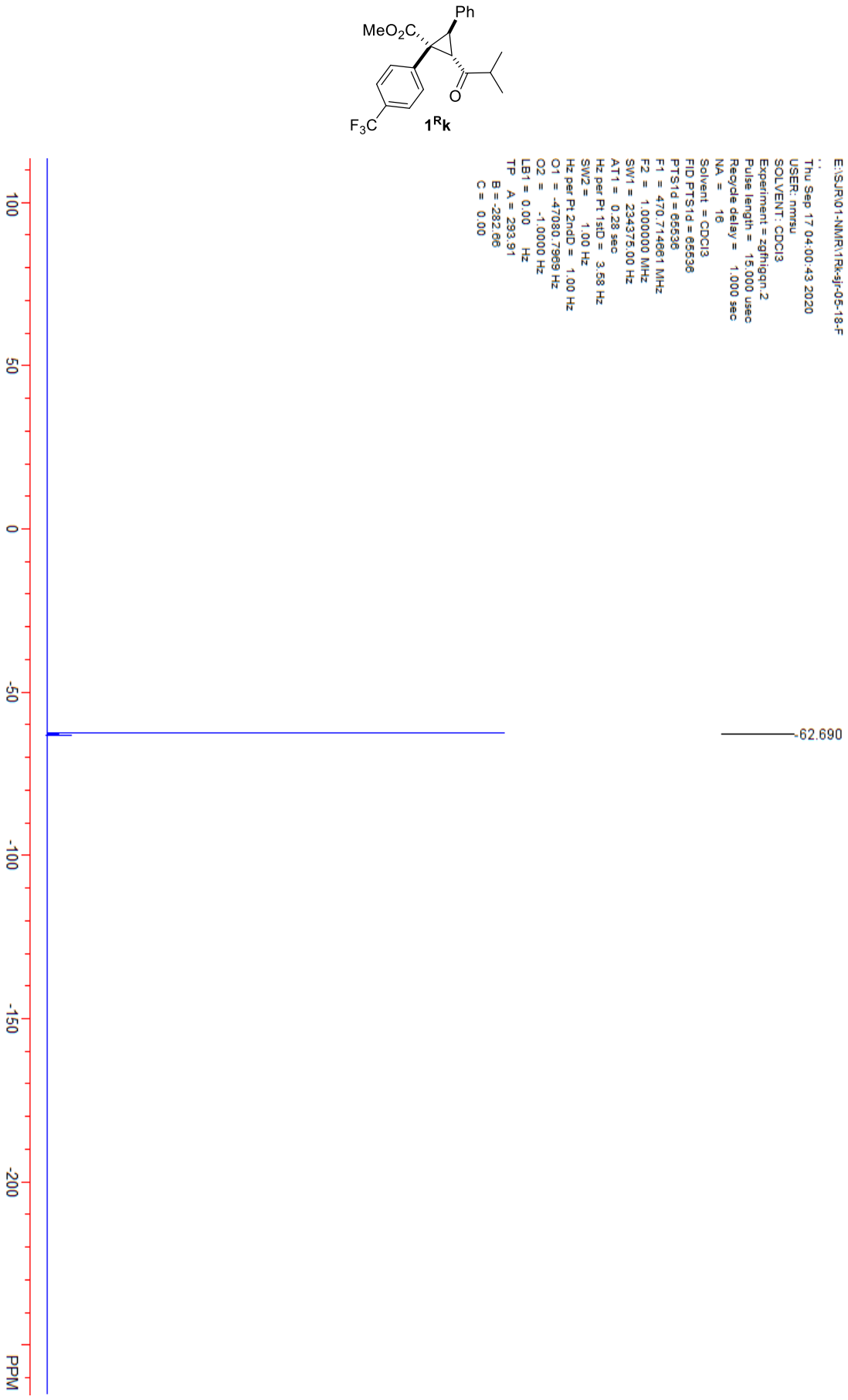

E:\SJR\01-NMR\1Ri2-sjr-04-41-F
Tue Aug 11 17:21:06 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgflqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714861 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47089.2461 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -608.44
B = 1008.28
C = 0.00
-115.917
100
50
0
-50
-100
-150
-200
-250PPM

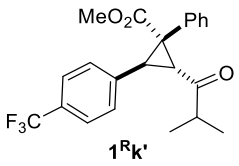

Ph
MeO2C
O
MeO2C
1Rj
E:\SJR\01-NMR\1Rj-sjr-04-61-H
08:51:02.133 +0800 shaojiru@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3694.5906 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.855
7.841
7.262
7.226
7.212
7.109
7.104
7.099
6.846
6.840
6.830
3.664
3.867
3.619
3.609
3.183
3.172
3.010
2.999
2.987
2.976
2.964
2.953
2.941
1.585
1.310
1.299
1.238
1.227
-0.000
1.92
3.00
1.96
1.98
3.00
2.96
0.97
1.00
0.96
3.13
3.15
10
8
6
4
2
0
PPM


Ph
MeO2C
O
MeO2C
1Rj
E:\SJR\04-NMR\1Rj-sjr-04-61-C
09:25:39 791 +0800 shaojiru@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.40
169.853
166.777
139.369
134.503
130.568
129.737
128.250
127.997
127.109
77.369
77.160
76.943
53.008
52.272
48.012
42.294
37.276
36.893
18.229
17.983
200
150
100
50
0
PPM

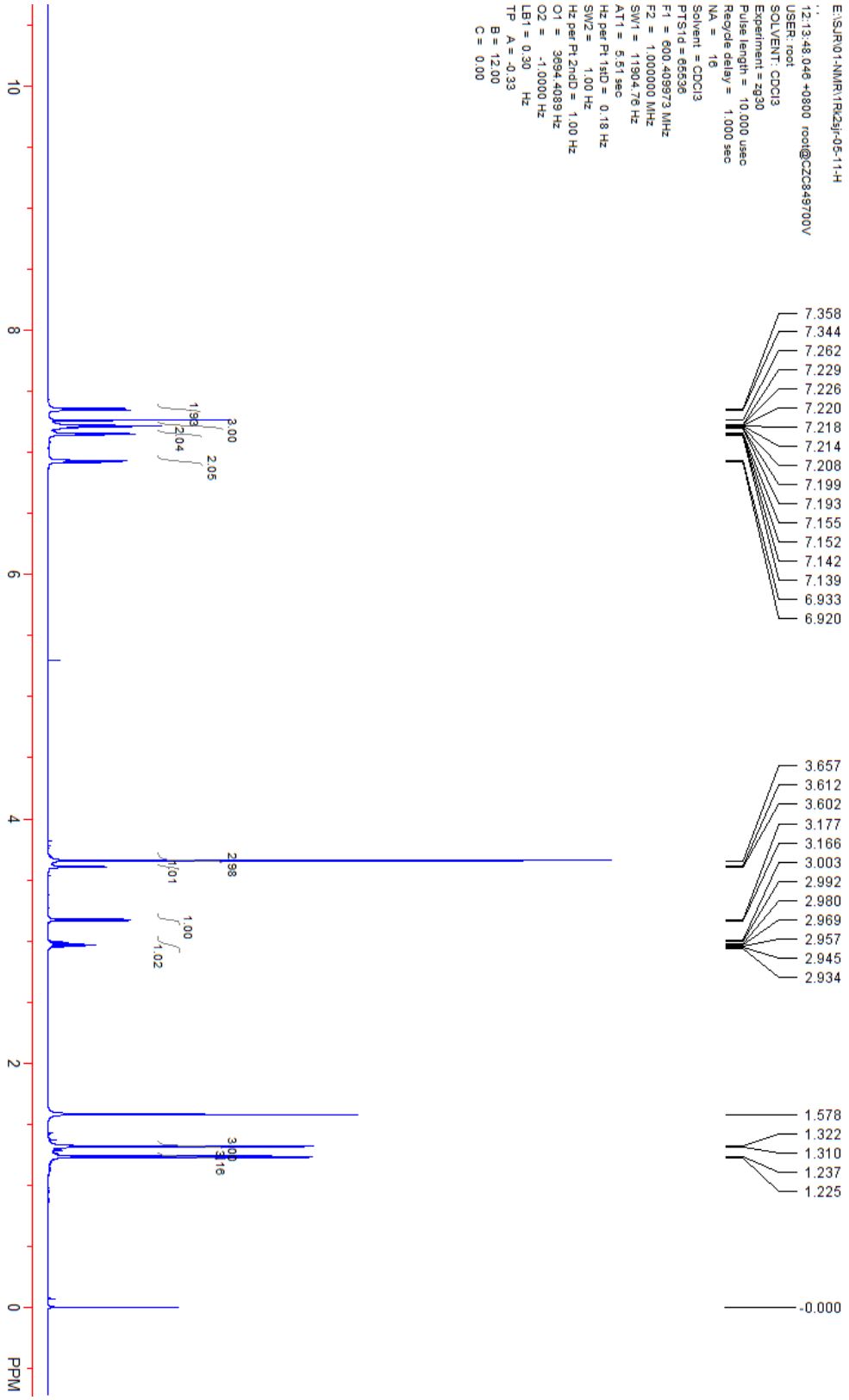

Ph
MeO2C
O
F3C
1Rk
E:\SJR\01-NMR\1Rk-sjr-05-18-H
17:07:49.803 +0800 shaojiru@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409873 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3693.6824 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.443
7.429
7.266
7.262
7.253
7.134
7.130
7.125
6.850
6.845
6.840
6.835
5.298
3.671
3.626
3.615
3.160
3.149
2.995
2.983
2.972
2.960
2.949
1.593
1.311
1.299
1.238
1.227
0.000
2.02
2.59
3.04
2.01
2.95
0.98
1.00
1.00
3.08
2.99
10
8
6
4
2
0
PPM

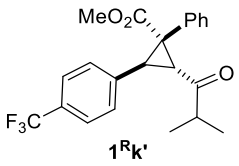

Ph
MeO2C
O
F3C
1Rk
E:\SJR\data\NMR\1Rk-sjr-05-18-C
Sat Nov 09 09:31:56 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment: zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 41.25
B = 73.13
C = 0.00
169.784
130.999
138.356
134.378
130.537
130.277
130.017
129.757
128.313
127.996
127.216
125.447
125.418
125.100
122.934
77.413
77.160
76.907
53.053
47.732
42.288
37.335
36.801
18.224
17.964
200
150
100
50
0
PPM


Ph
MeO2C
O
F3C
1Rk
E:\SJR\01-NMR\1Rk-sjr-05-18-F
Thu Sep 17 04:00:43 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgflqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47080.7969 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 293.91
B = -282.66
C = 0.00
-62.690
100
50
0
-50
-100
-150
-200
PPM

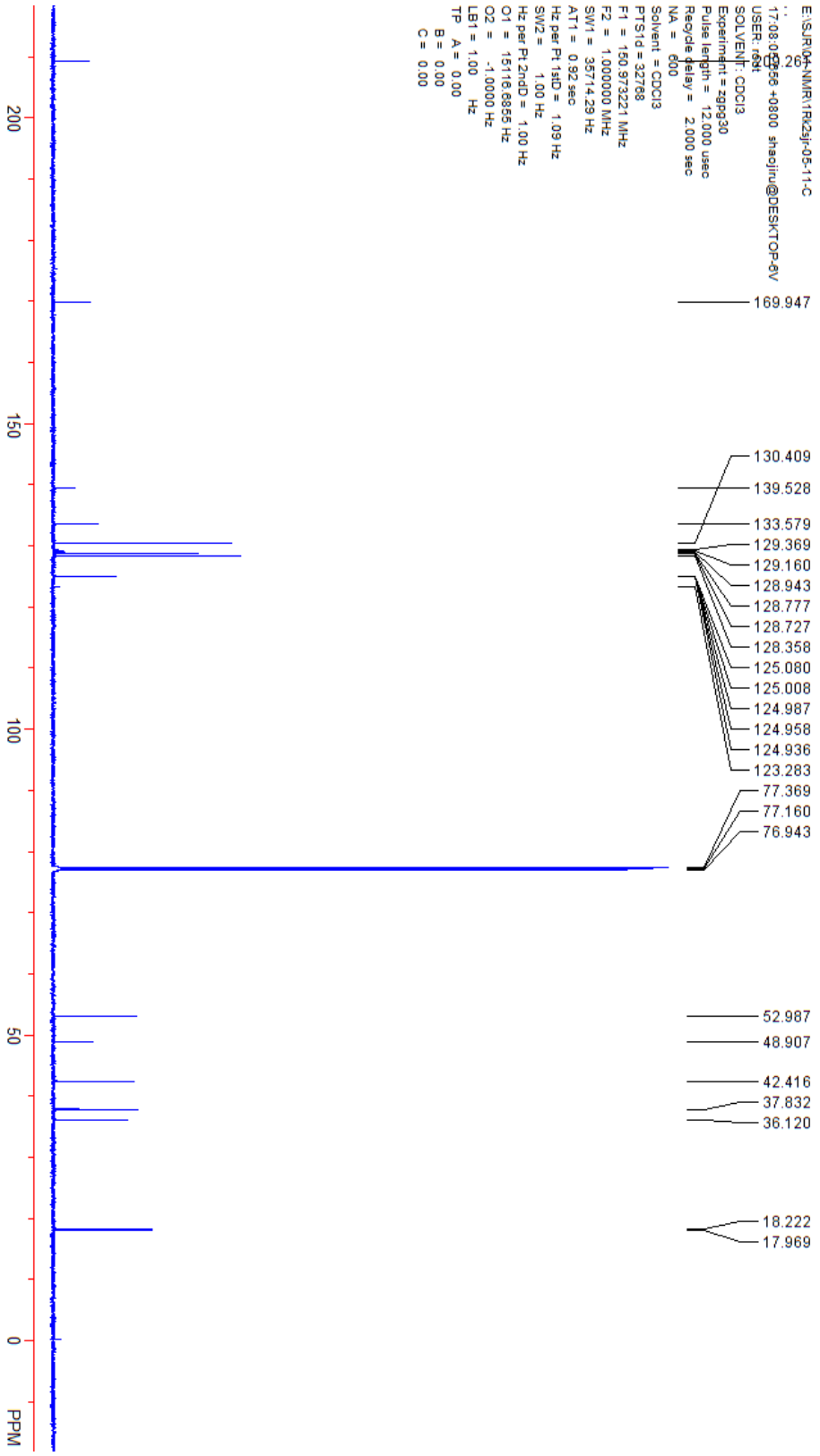

MeO2C
Ph
O
F3C

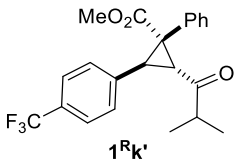
1^{R}k'


E:\SJR\01-NMR\1R\2sjr-05-11-H
12:13:48.046 +0800 root@CZC8497000V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3694.4089 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = -0.33
B = 12.00
C = 0.00
7.358
7.344
7.262
7.229
7.226
7.220
7.218
7.214
7.208
7.199
7.193
7.155
7.152
7.142
7.139
6.933
6.920
3.657
3.612
3.602
3.177
3.166
3.003
2.992
2.980
2.969
2.957
2.945
2.934
1.578
1.322
1.310
1.237
1.225
-0.000
1.93
3.00
2.04
2.05
2.98
1.01
1.00
1.02
3.00
3.16
10
8
6
4
2
0
PPM

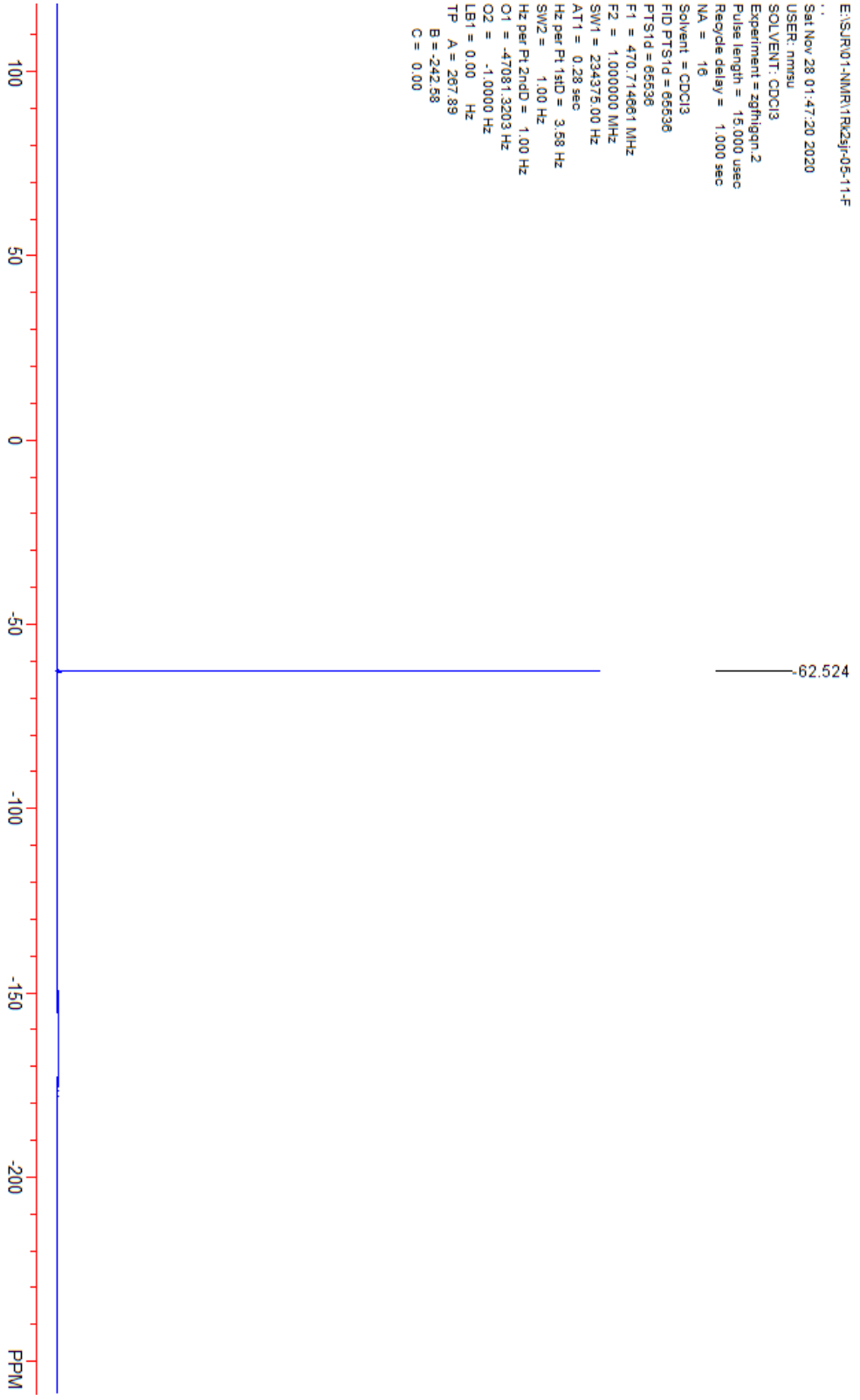

MeO2C
Ph
O
F3C

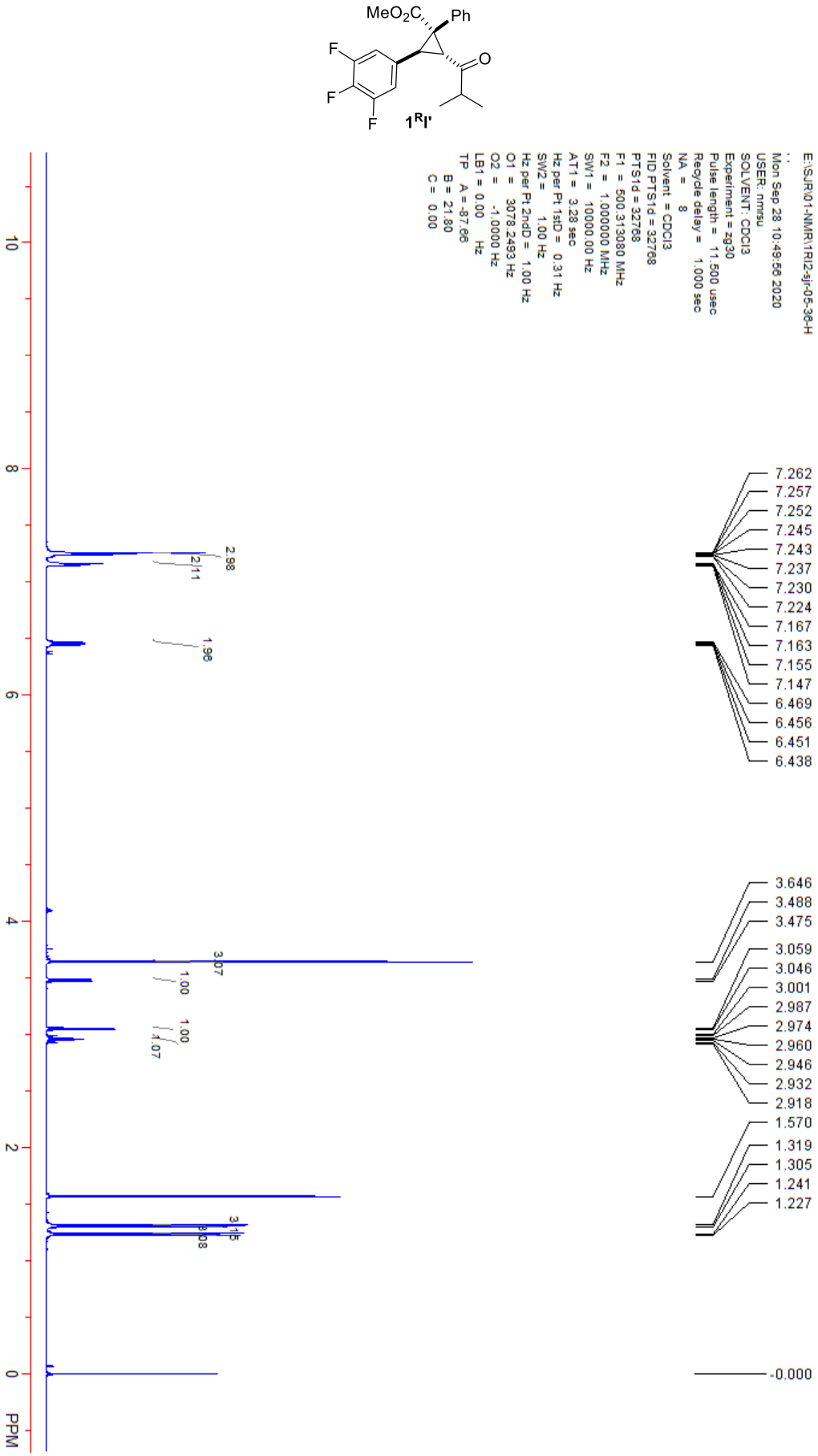
1^{R}k'

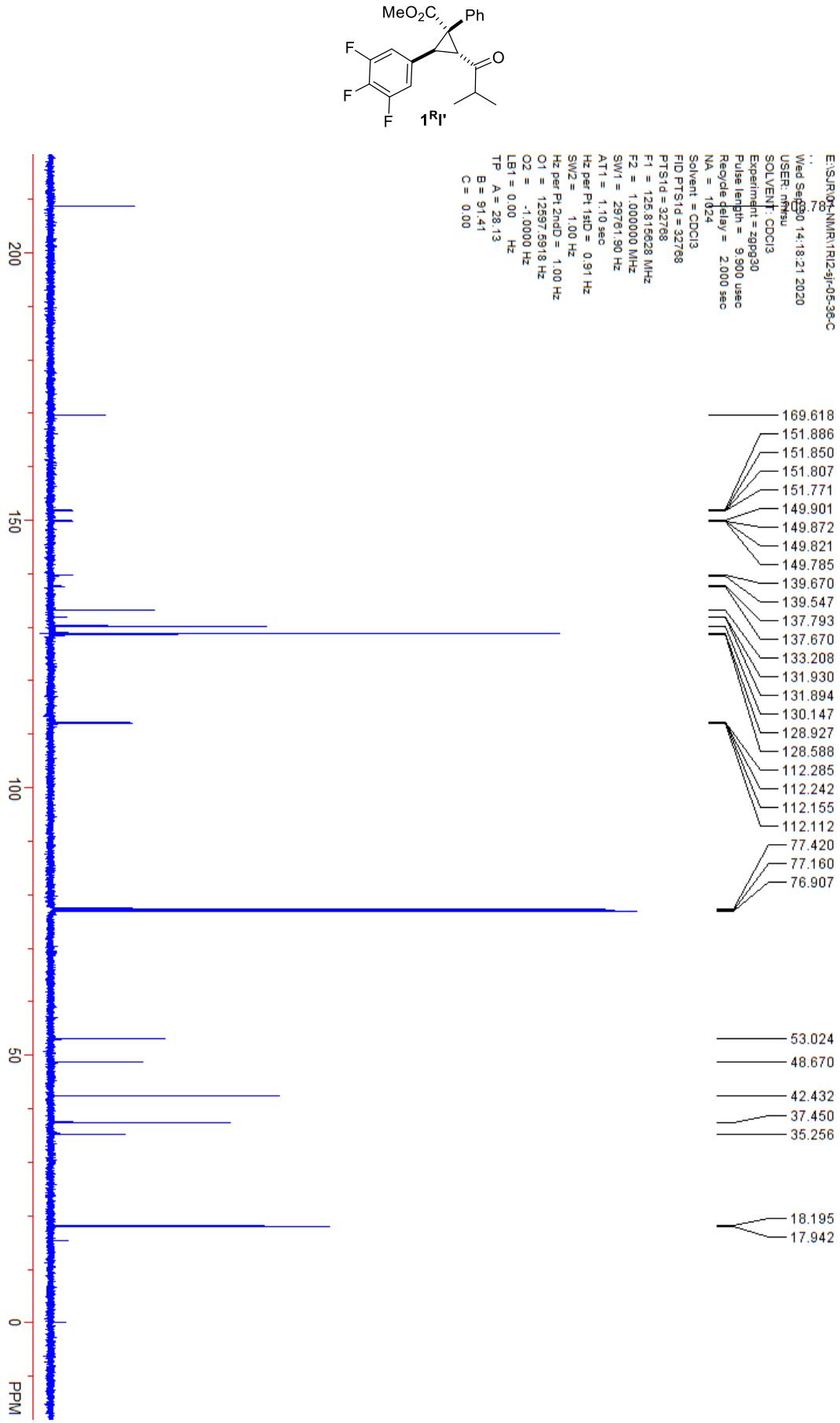

E:\SJR\04-NMR\1RK2sjr-05-11-C
17:08:05 2256 +0800 shaojiru@DESKTOP-6V
USER: rent
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15116.6855 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
169.947
130.409
139.528
133.579
129.369
129.160
128.943
128.777
128.727
128.358
125.080
125.008
124.987
124.958
124.936
123.283
77.369
77.160
76.943
52.987
48.907
42.416
37.832
36.120
18.222
17.969
200
150
100
50
0
PPM

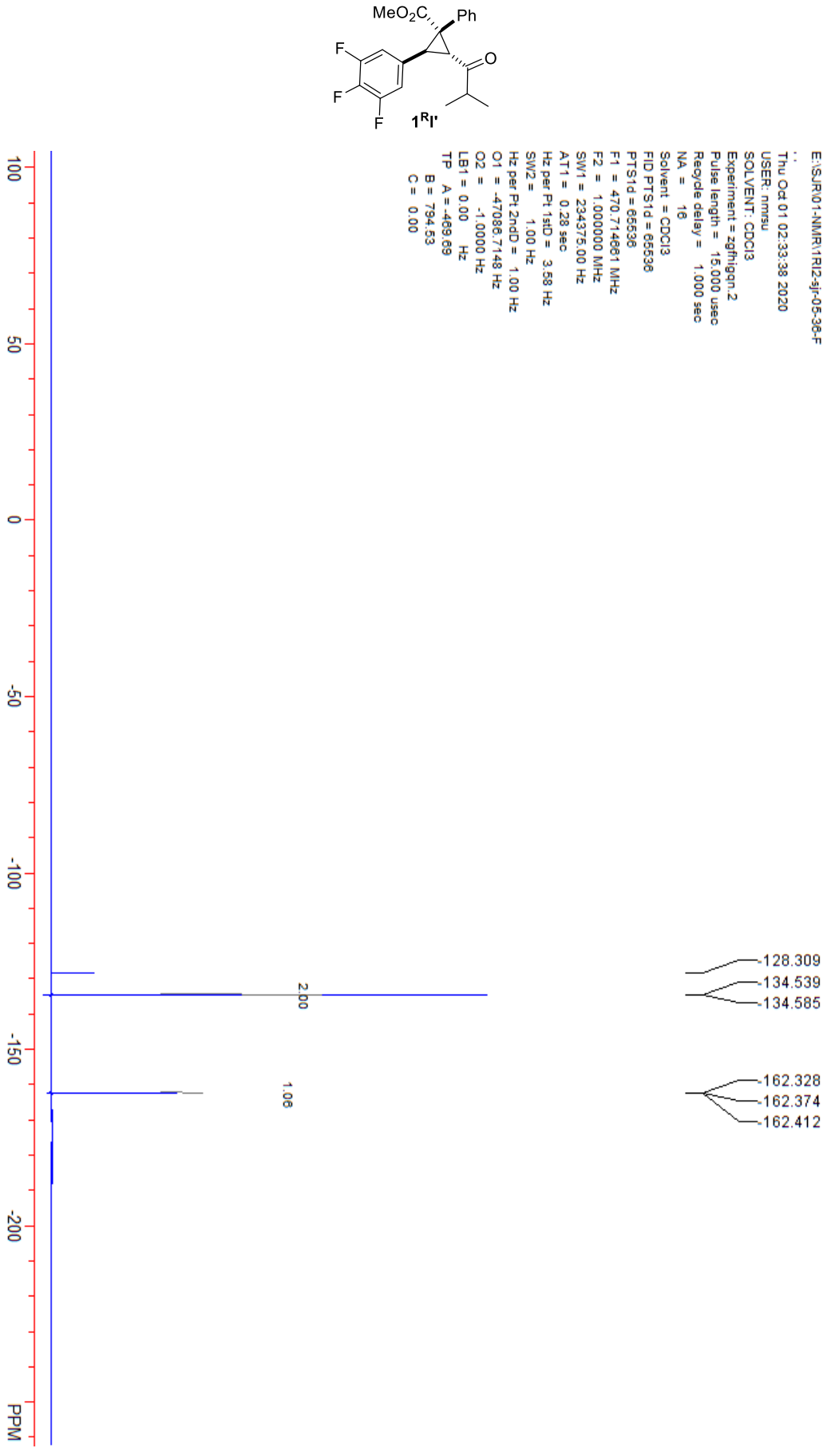

MeO2C
Ph
O
F3C

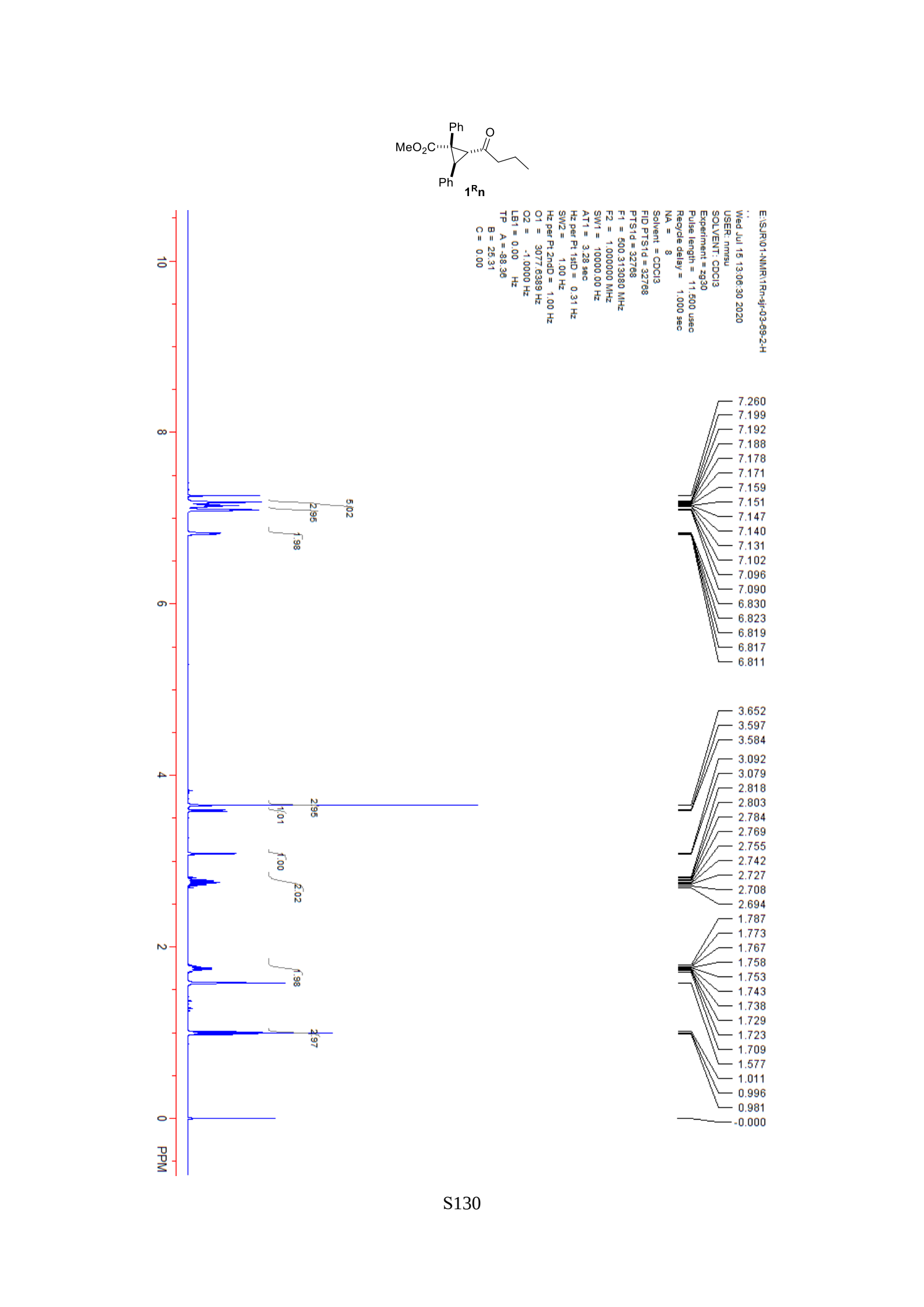
1^{R}k'

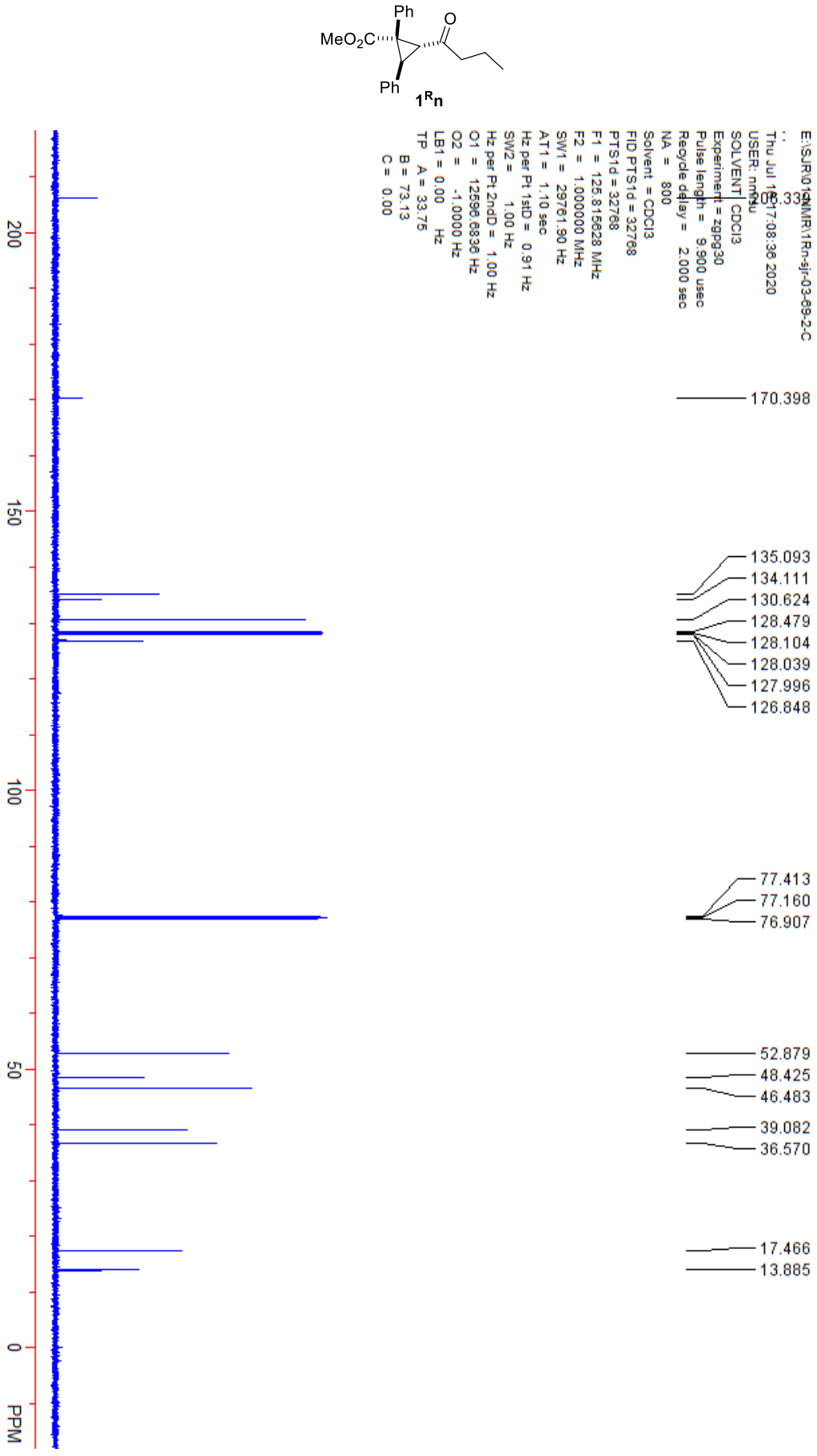

E:\SJR\01-NMR\1Rk2sjr-05-11-F
Sat Nov 28 01:47:20 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.7146861 MHz
F2 = 1.0000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47081.3203 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 287.89
B = -242.58
C = 0.00
-62.524
100
50
0
-50
-100
-150
-200
PPM

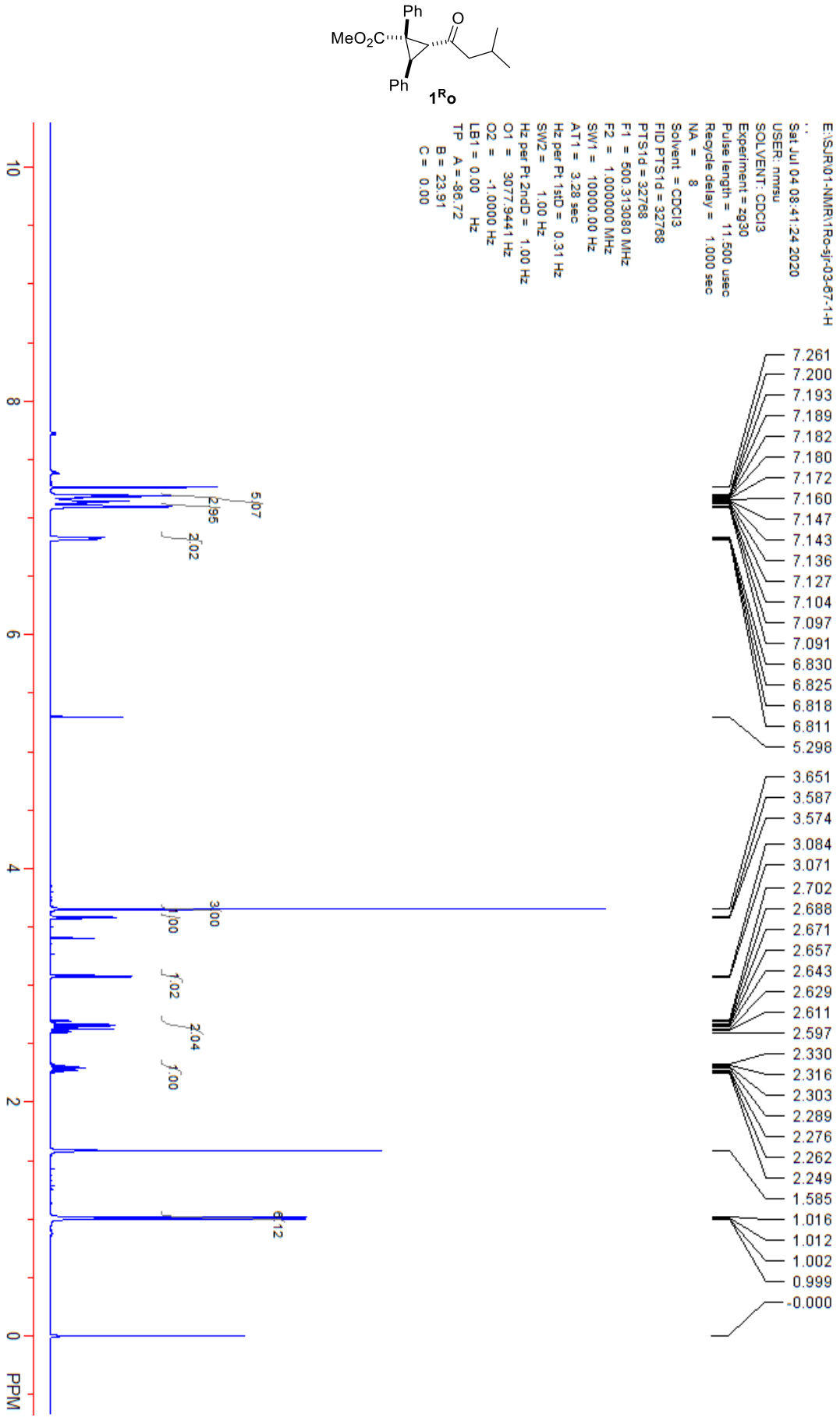

MeO2C
Ph
O
F
F
F
1RI'
E:\SJR\01-NMR\1RI2-sjr-05-36-H
Mon Sep 28 10:49:56 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.2493 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -87.66
B = 21.80
C = 0.00
7.262
7.257
7.252
7.245
7.243
7.237
7.230
7.224
7.167
7.163
7.155
7.147
6.469
6.456
6.451
6.438
3.646
3.488
3.475
3.059
3.046
3.001
2.987
2.974
2.960
2.946
2.932
2.918
1.570
1.319
1.305
1.241
1.227
-0.000
2.98
2.11
1.96
3.07
1.00
1.00
4.07
3.15
8.08
10
8
6
4
2
0
PPM

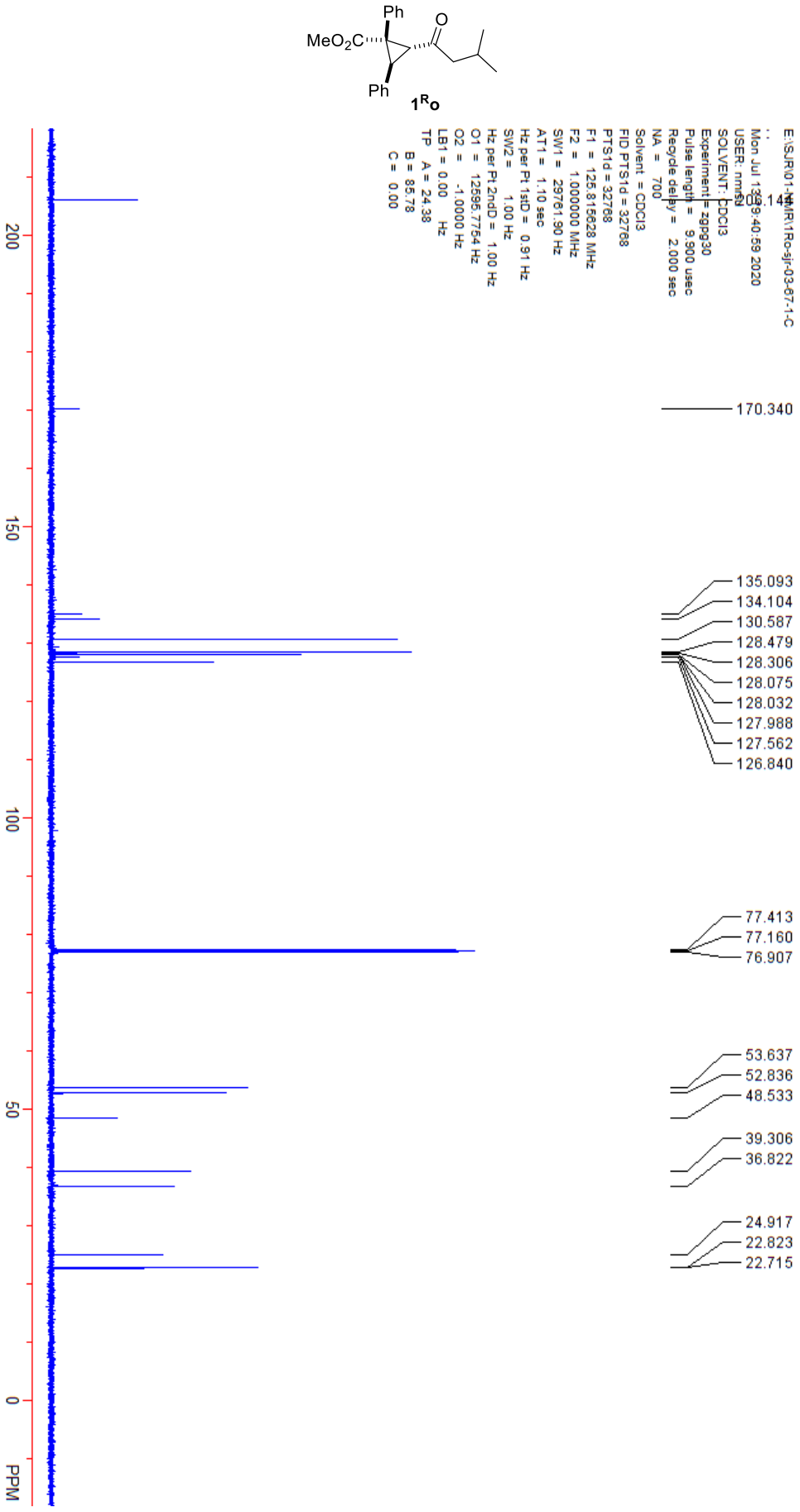

MeO2C
Ph
O
F
F
F
1RI'
E:\SJR\05-NMR\1RI2-sjr-05-36-C
78
Wed Sep 30 14:18:21 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.5918 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 28.13
B = 91.41
C = 0.00
169.618
151.886
151.850
151.807
151.771
149.901
149.872
149.821
149.785
139.670
139.547
137.793
137.670
133.208
131.930
131.894
130.147
128.927
128.588
112.285
112.242
112.155
112.112
77.420
77.160
76.907
53.024
48.670
42.432
37.450
35.256
18.195
17.942
200
150
100
50
0
PPM

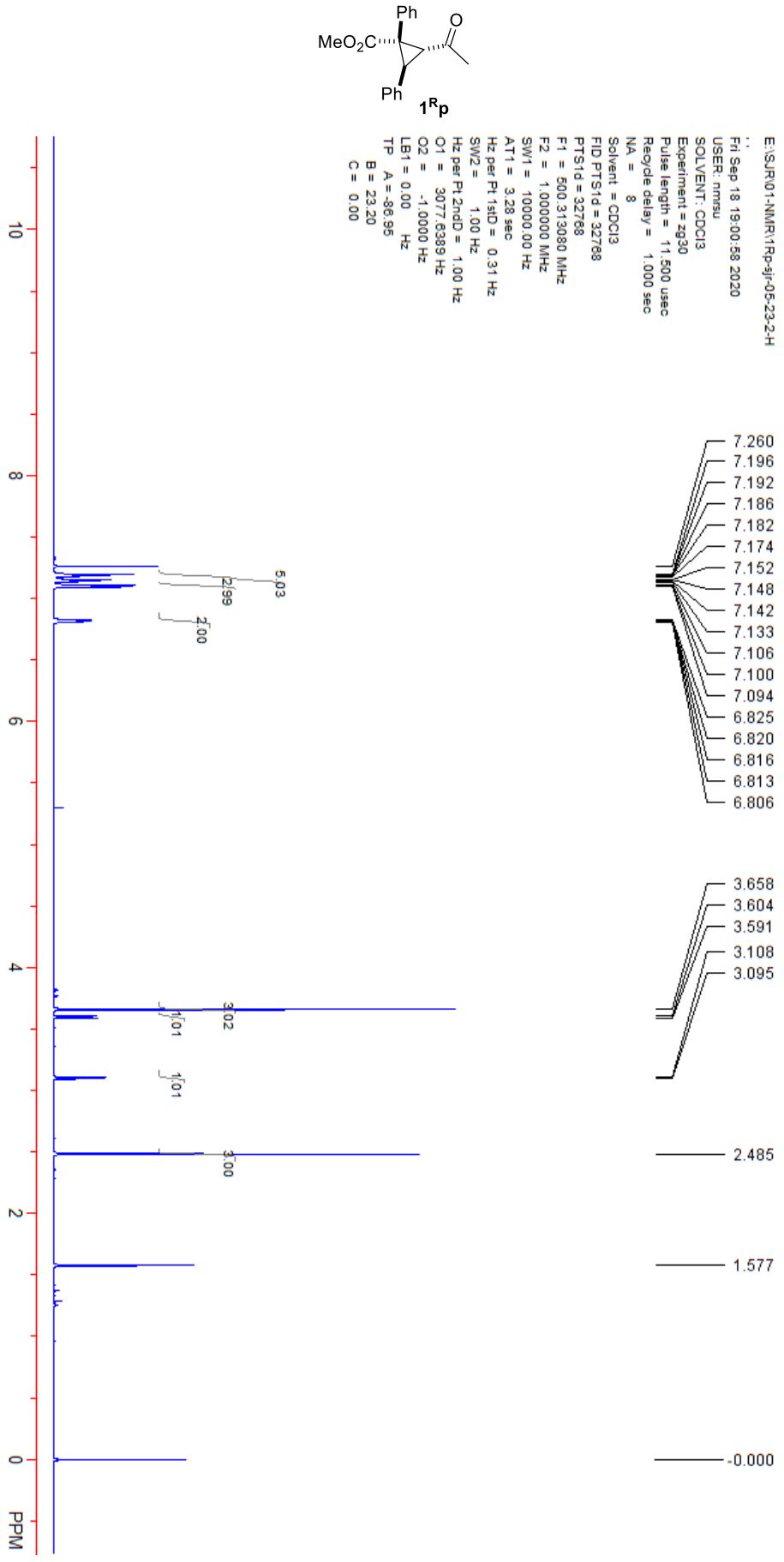

MeO2C
Ph
O
F
F
F
1RI'
E:\SJR\01-NMR\1RI2-sjr-05-36-F
Thu Oct 01 02:33:38 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.7146861 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47086.7148 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -469.69
B = 794.53
C = 0.00
100
50
0
-50
-100
-150
-200
PPM
2.00
1.08
128.309
134.539
134.585
162.328
162.374
162.412

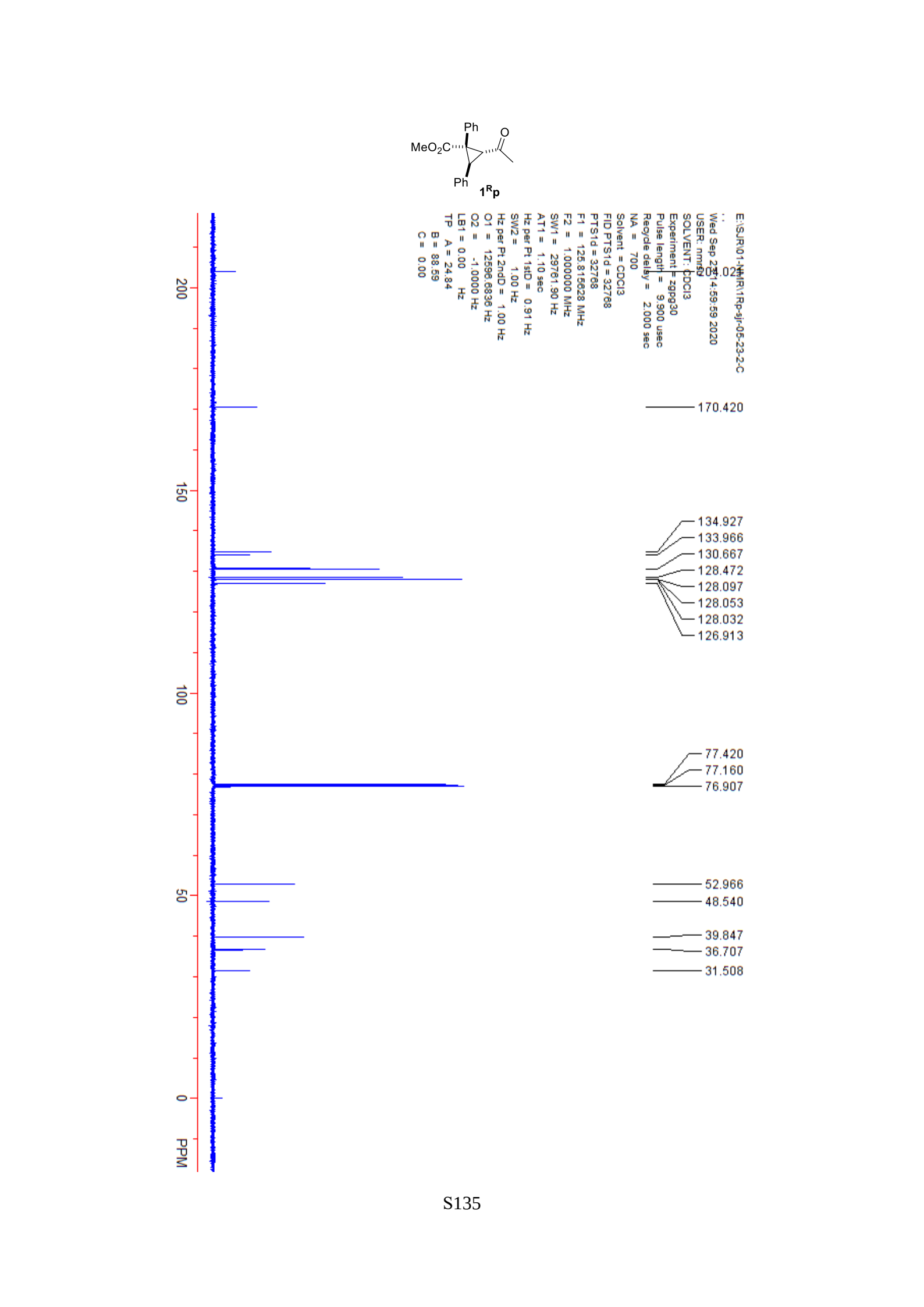

Ph
O
MeO2C
Ph
1Rn
E:\SJR\01-NMR\1Rn-sjr-03-69-2-H
Wed Jul 15 13:06:30 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6389 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -88.36
B = 25.31
C = 0.00
7.260
7.199
7.192
7.188
7.178
7.171
7.159
7.151
7.147
7.140
7.131
7.102
7.096
7.090
6.830
6.823
6.819
6.817
6.811
3.652
3.597
3.584
3.092
3.079
2.818
2.803
2.784
2.769
2.755
2.742
2.727
2.708
2.694
1.787
1.773
1.767
1.758
1.753
1.743
1.738
1.729
1.723
1.709
1.577
1.011
0.996
0.981
-0.000
5.02
2.95
1.98
2.95
1.01
1.00
2.02
1.98
2.97
10
8
6
4
2
0
PPM

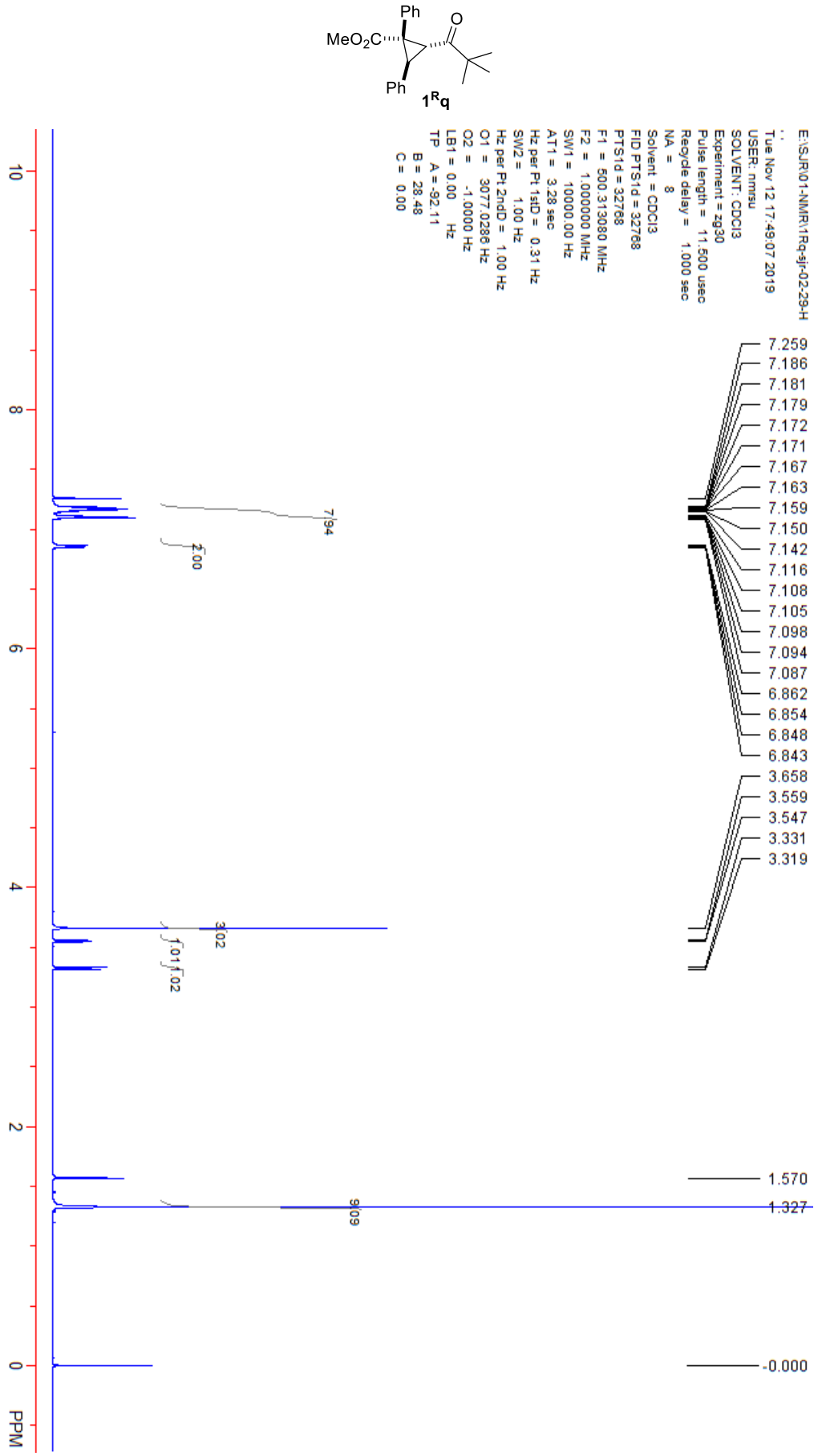

Ph
O
MeO2C
Ph
1Rn
E:\SJR\012\NMR\1Rn-sjr-03-69-2-C
Thu Jul 16 17:08:36 2020
USER: nmrsu
SOLVENT | CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 800
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.6838 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 33.75
B = 73.13
C = 0.00
170.398
135.093
134.111
130.624
128.479
128.104
128.039
127.996
126.848
77.413
77.160
76.907
52.879
48.425
46.483
39.082
36.570
17.466
13.885
200
150
100
50
0
PPM

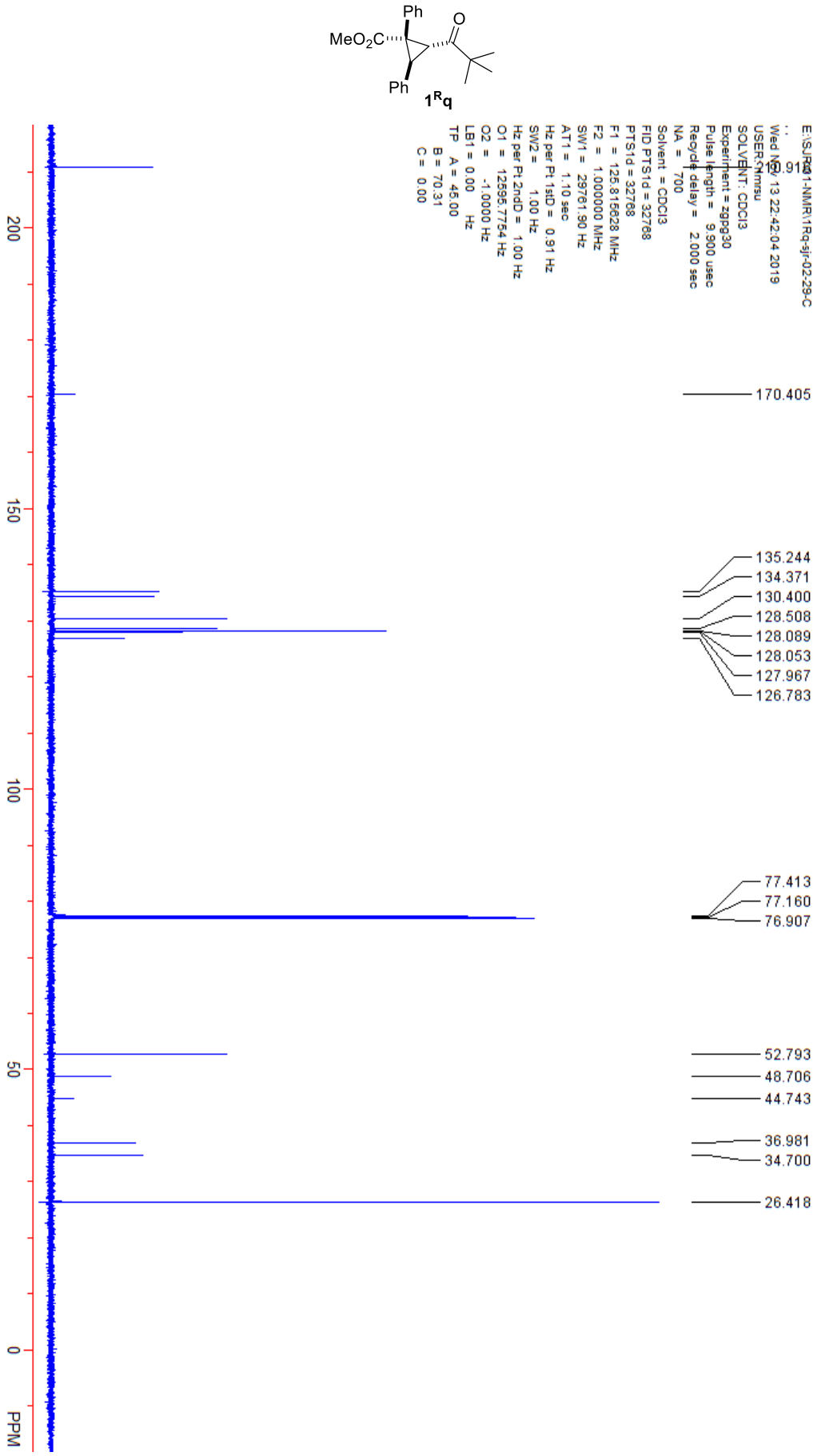

Ph
O
MeO2C
Ph
1RO
E:\SJR\01-NMR\1Ro-sjr-03-67-1-H
Sat Jul 04 08:41:24 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.3130080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.9441 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -86.72
B = 23.91
C = 0.00
7.261
7.200
7.193
7.189
7.182
7.180
7.172
7.160
7.147
7.143
7.136
7.127
7.104
7.097
7.091
6.830
6.825
6.818
6.811
5.298
3.651
3.587
3.574
3.084
3.071
2.702
2.688
2.671
2.657
2.643
2.629
2.611
2.597
2.330
2.316
2.303
2.289
2.276
2.262
2.249
1.585
1.016
1.012
1.002
0.999
-0.000
5.07
2.95
2.02
3.00
1.00
1.02
2.04
1.00
6.12
10
8
6
4
2
0
PPM

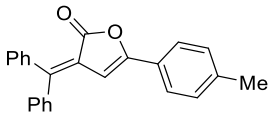

Ph
O
MeO2C
Ph
1RO
E:\SJR\01-NMR\1Ro-sjr-03-67-1-C
Mon Jul 13 09:40:59 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.816628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 24.38
B = 85.78
C = 0.00
206.144
170.340
135.093
134.104
130.587
128.479
128.306
128.075
128.032
127.988
127.562
126.840
77.413
77.160
76.907
53.637
52.836
48.533
39.306
36.822
24.917
22.823
22.715
200
150
100
50
0
PPM


Ph
O
MeO2C
Ph
1Rp
E:\SJR\01-NMR\1Rp-sjr-05-23-2-H
Fri Sep 18 19:00:58 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6389 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -86.95
B = 23.20
C = 0.00
7.260
7.196
7.192
7.186
7.182
7.174
7.152
7.148
7.142
7.133
7.106
7.100
7.094
6.825
6.820
6.816
6.813
6.806
3.658
3.604
3.591
3.108
3.095
2.485
1.577
-0.000
5.03
2.99
2.00
3.02
1.01
1.01
3.00
10
8
6
4
2
0
PPM

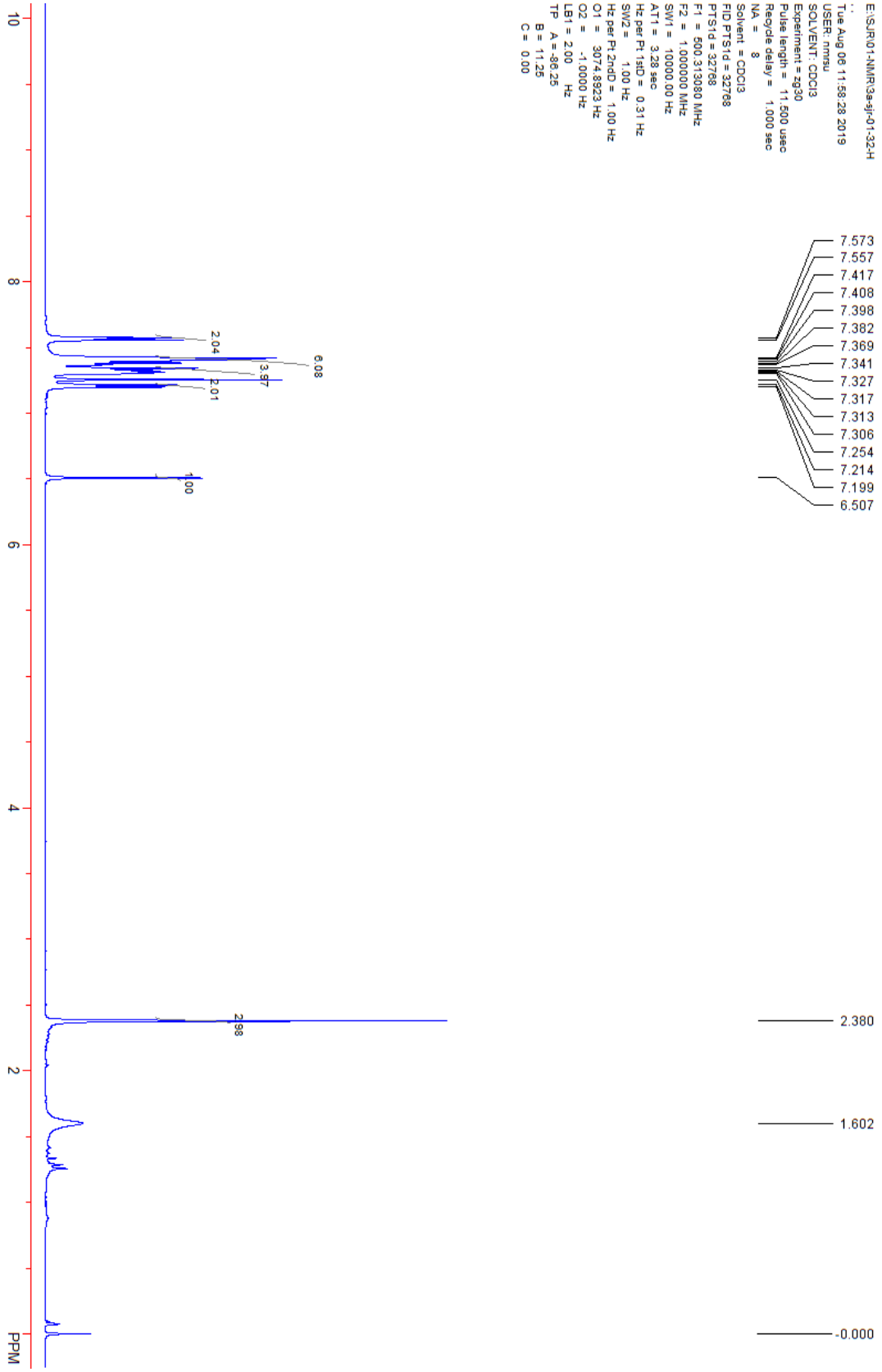

Ph
O
MeO2C
Ph
1Rp
E:\SJR\01-NMR\1Rp-sjr-05-23-2-C
Wed Sep 23 14:59:59 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12598.6836 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 24.84
B = 88.59
C = 0.00
200.021
170.420
134.927
133.966
130.667
128.472
128.097
128.053
128.032
126.913
77.420
77.160
76.907
52.966
48.540
39.847
36.707
31.508
200
150
100
50
0
PPM

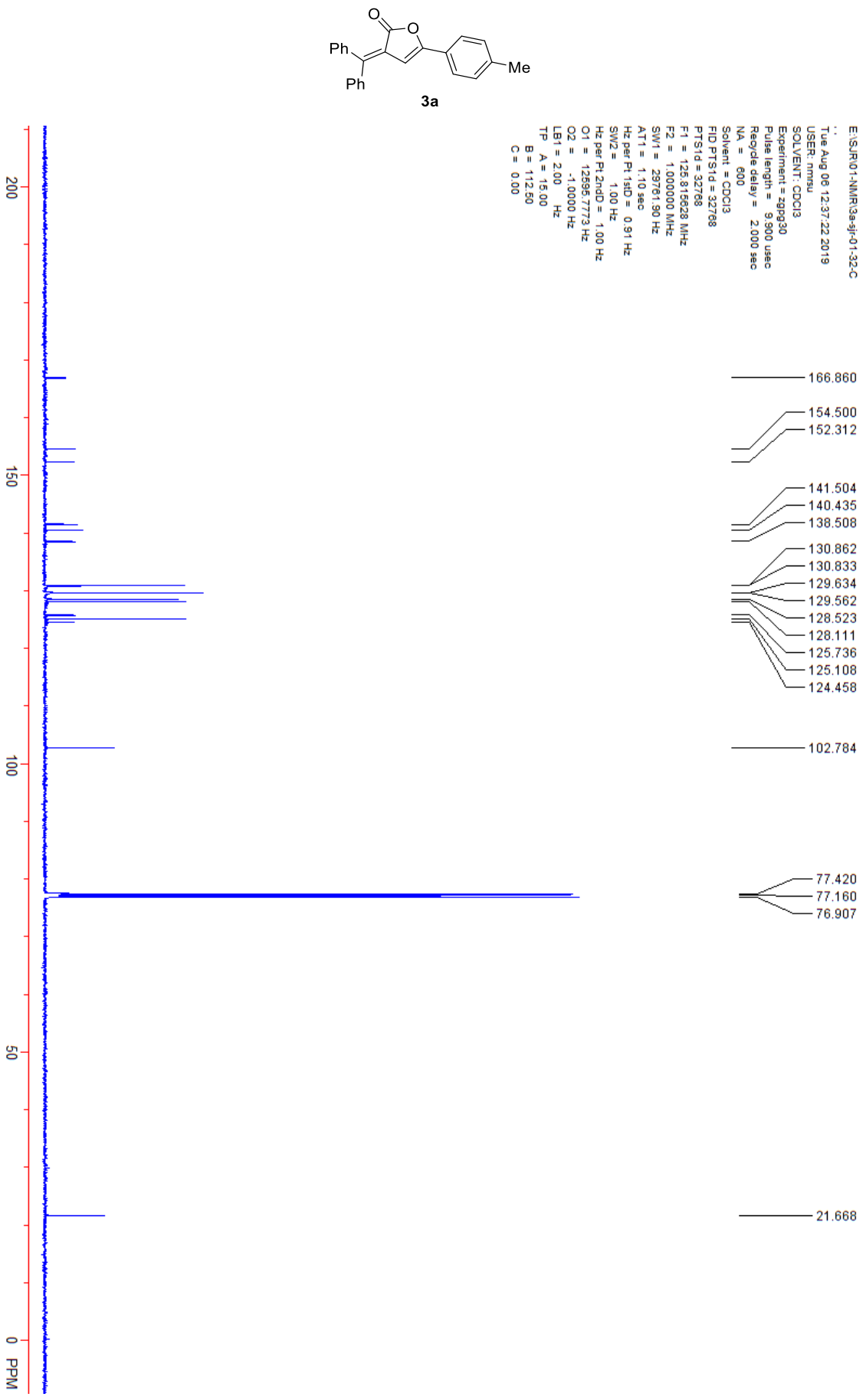

Ph
O
MeO2C
Ph
1Rq
E:\SJR\01-NMR\1Rq-sjr-02-29-H
Tue Nov 12 17:49:07 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -92.11
B = 28.48
C = 0.00
7.259
7.186
7.181
7.179
7.172
7.171
7.167
7.163
7.159
7.150
7.142
7.116
7.108
7.105
7.098
7.094
7.087
6.862
6.854
6.848
6.843
3.658
3.559
3.547
3.331
3.319
1.570
1.327
-0.000
7.94
2.00
3.02
1.01
1.02
9.09
10
8
6
4
2
0
PPM

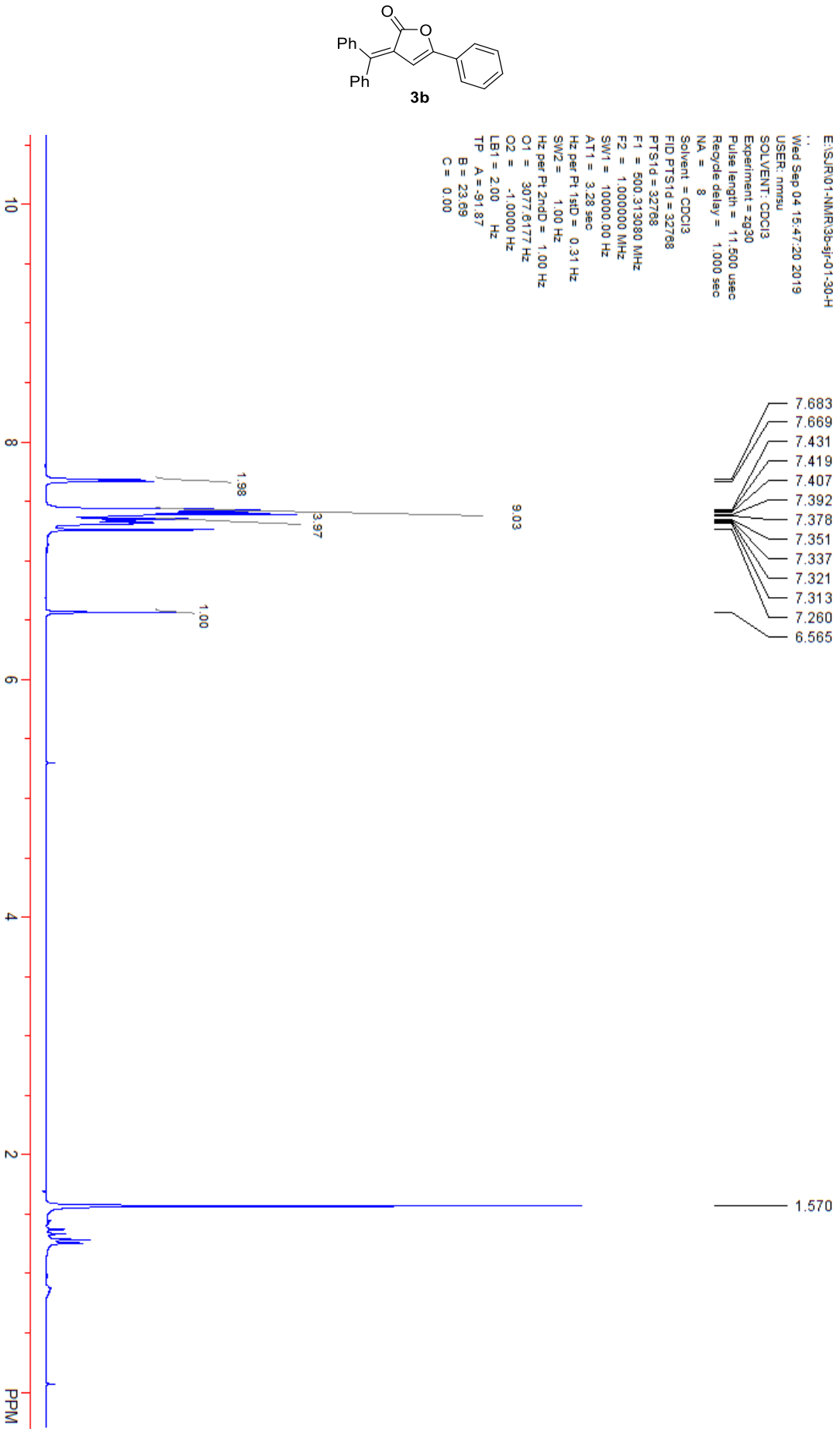

Ph
O
MeO2C
Ph
1Rq
E:\SJR\91-NMR\1Rq-sjr-02-29-C
Wed Nov 13 22:42:04 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 45.00
B = 70.31
C = 0.00
170.405
135.244
134.371
130.400
128.508
128.089
128.053
127.967
126.783
77.413
77.160
76.907
52.793
48.706
44.743
36.981
34.700
26.418
200
150
100
50
0
PPM

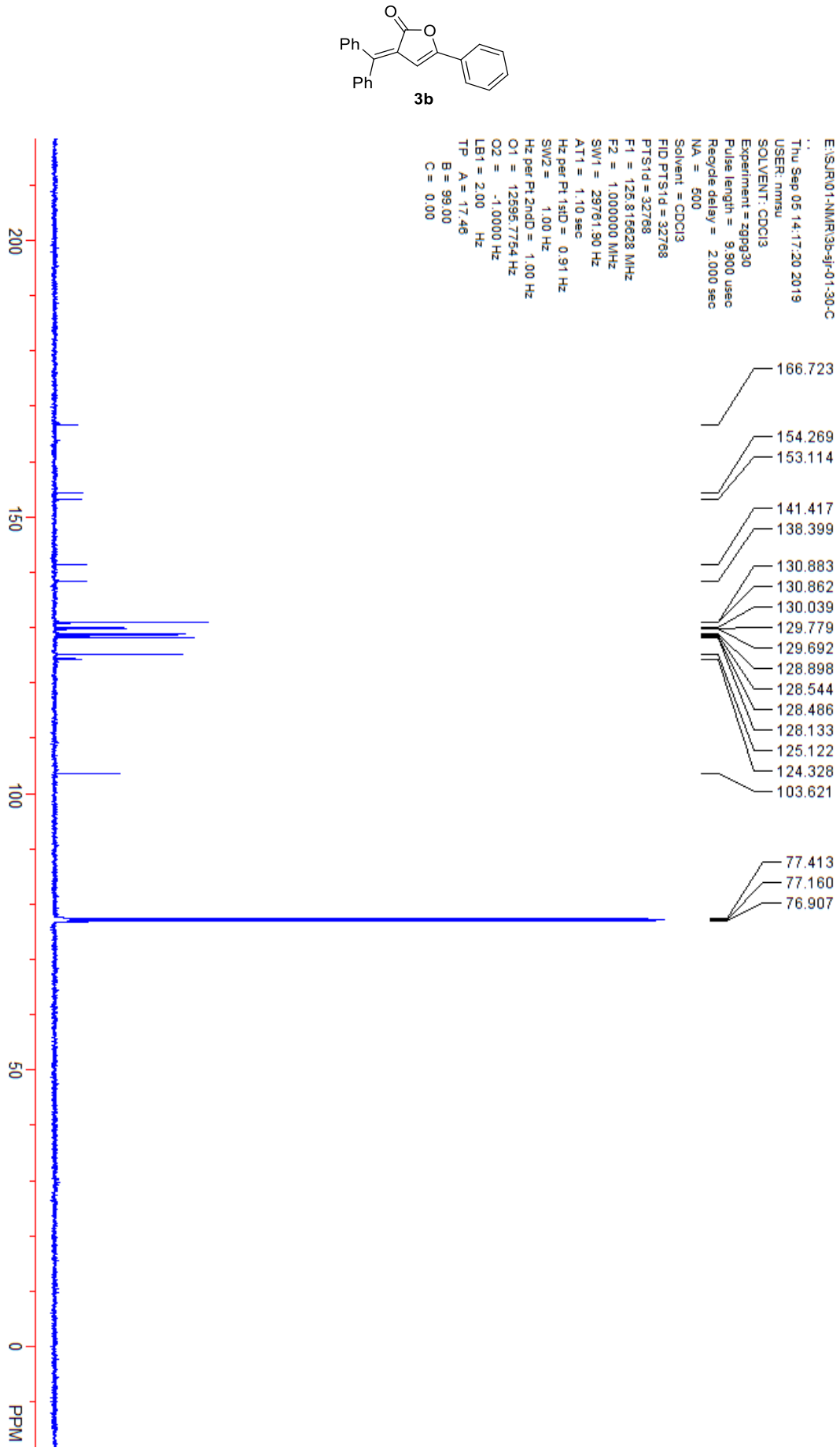

O
O
Ph
Ph
Me

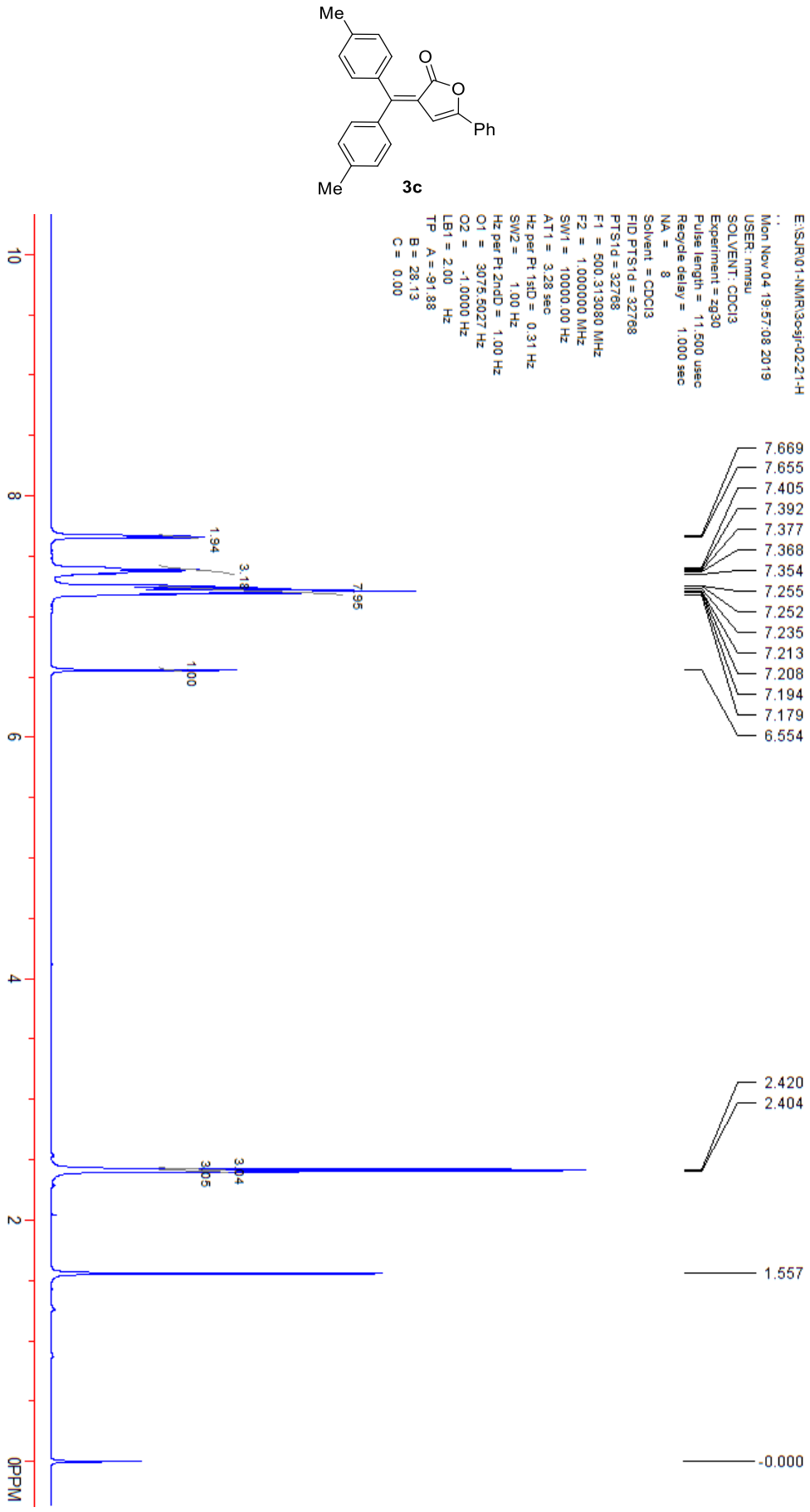
3a

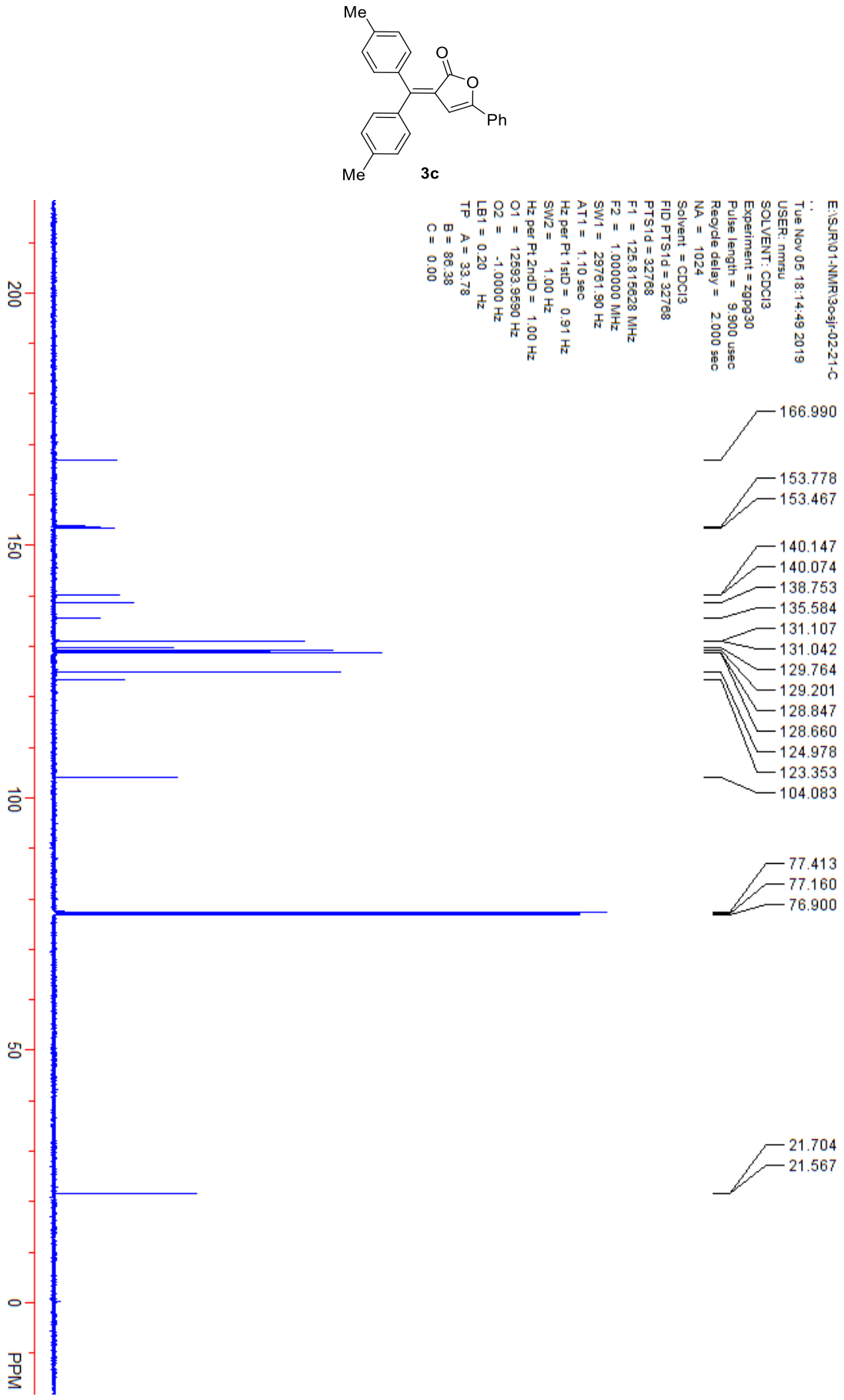

E:\SJR\01-NMR\3a-sjr-01-32-H
Tue Aug 06 11:58:28 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3074.8923 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -86.25
B = 11.25
C = 0.00
7.573
7.557
7.417
7.408
7.398
7.382
7.369
7.341
7.327
7.317
7.313
7.306
7.254
7.214
7.199
6.507
2.380
1.602
-0.000
2.04
6.08
3.97
2.01
1.00
2.98
10
8
6
4
2
PPM

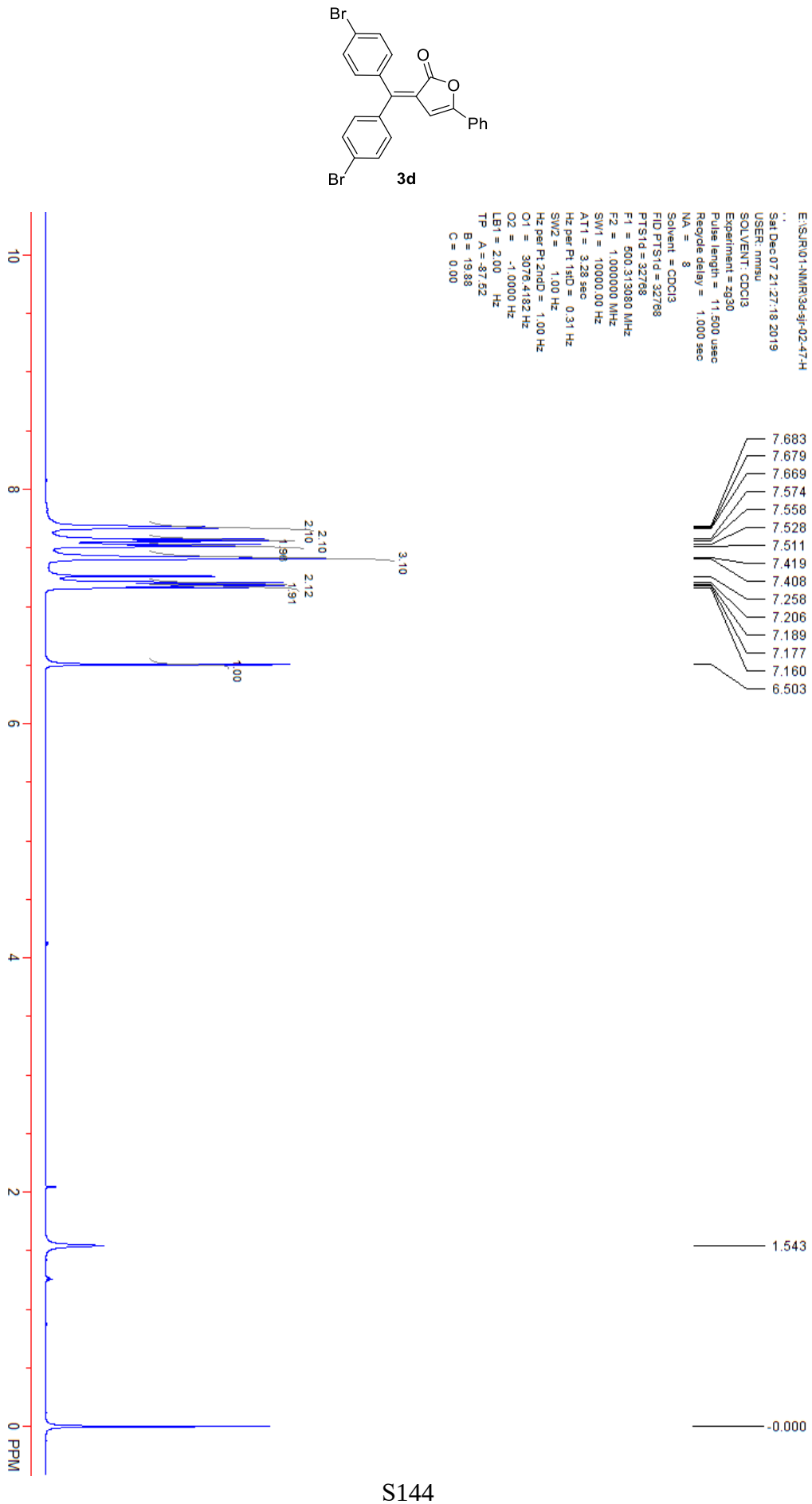

O
O
Ph
Ph
Me
3a
E:\SJR\01-NMR\3a-sjr-01-32-C
Tue Aug 06 12:37:22 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7773 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 15.00
B = 112.50
C = 0.00
166.860
154.500
152.312
141.504
140.435
138.508
130.862
130.833
129.634
129.562
128.523
128.111
125.736
125.108
124.458
102.784
77.420
77.160
76.907
21.668
200
150
100
50
0
PPM

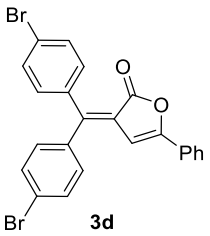

O
O
Ph
Ph
3b
E:\SJR\01-NMR\3b-sjr-01-30-H
Wed Sep 04 15:47:20 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6177 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -91.87
B = 23.69
C = 0.00
7.683
7.669
7.431
7.419
7.407
7.392
7.378
7.351
7.337
7.321
7.313
7.260
6.565
1.570
1.98
3.97
1.00
9.03
10
8
6
4
2
PPM


Ph
Ph
O
O
3b
E:\SJR\01-NMR\3b-sjr-01-30-C
Thu Sep 05 14:17:20 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 500
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 17.46
B = 99.00
C = 0.00
166.723
154.269
153.114
141.417
138.399
130.883
130.862
130.039
129.779
129.692
128.898
128.544
128.486
128.133
125.122
124.328
103.621
77.413
77.160
76.907
200
150
100
50
0
PPM

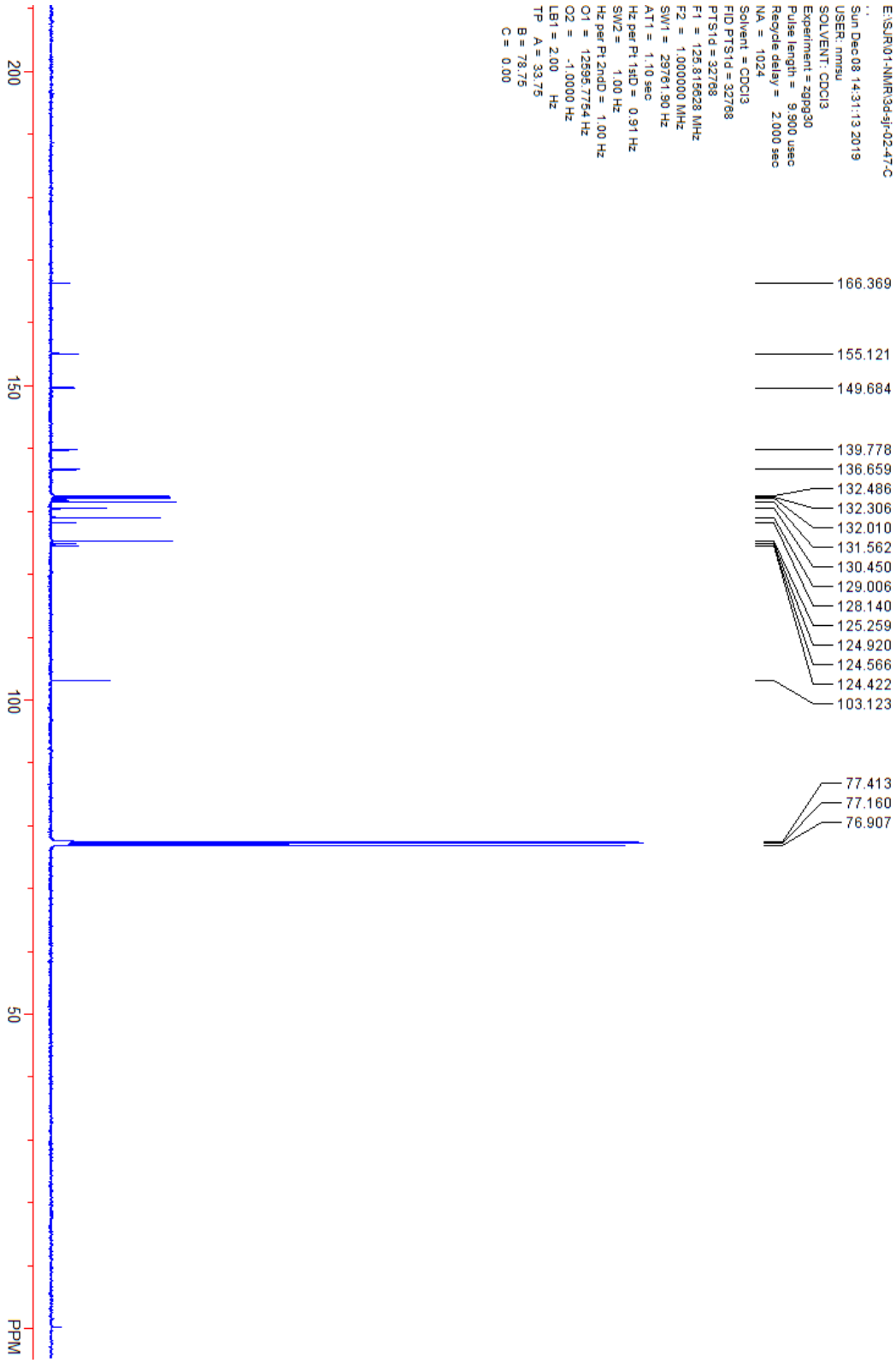

Me
O
O
Ph
Me
3c
E:\SJR\01-NMR\3c-sjr-02-21-H
Mon Nov 04 19:57:08 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3075.5027 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -91.88
B = 28.13
C = 0.00
7.669
7.655
7.405
7.392
7.377
7.368
7.354
7.255
7.252
7.235
7.213
7.208
7.194
7.179
6.554
2.420
2.404
1.557
-0.000
1.94
3.18
7.95
1.00
3.04
3.05
10
8
6
4
2
0PPM

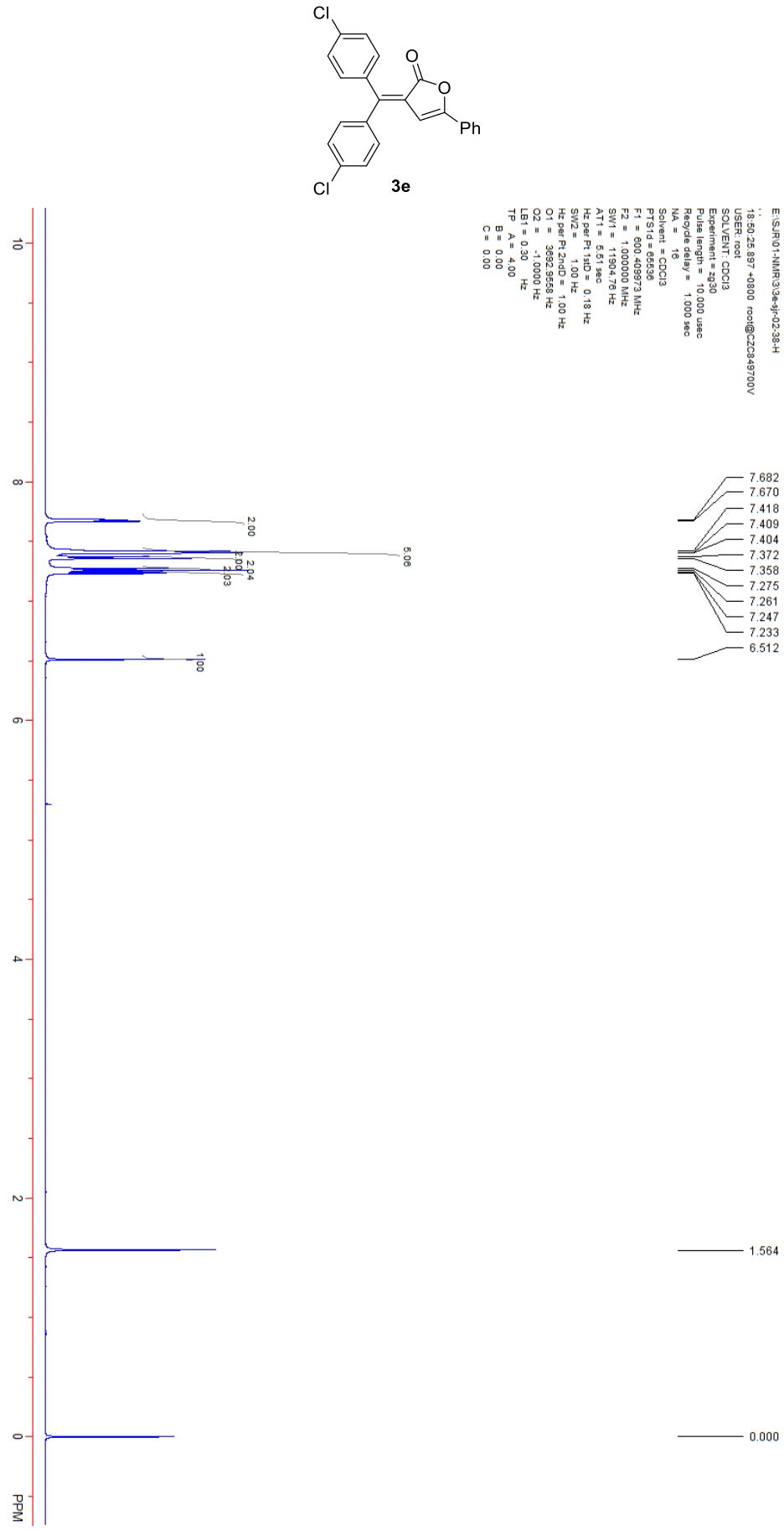

Me
O
O
Ph
Me
3c
E:\SJR\01-NMR\3c-sjr-02-21-C
Tue Nov 05 18:14:49 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.9590 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = 33.78
B = 86.38
C = 0.00
166.990
153.778
153.467
140.147
140.074
138.753
135.584
131.107
131.042
129.764
129.201
128.847
128.660
124.978
123.353
104.083
77.413
77.160
76.900
21.704
21.567
200
150
100
50
0
PPM

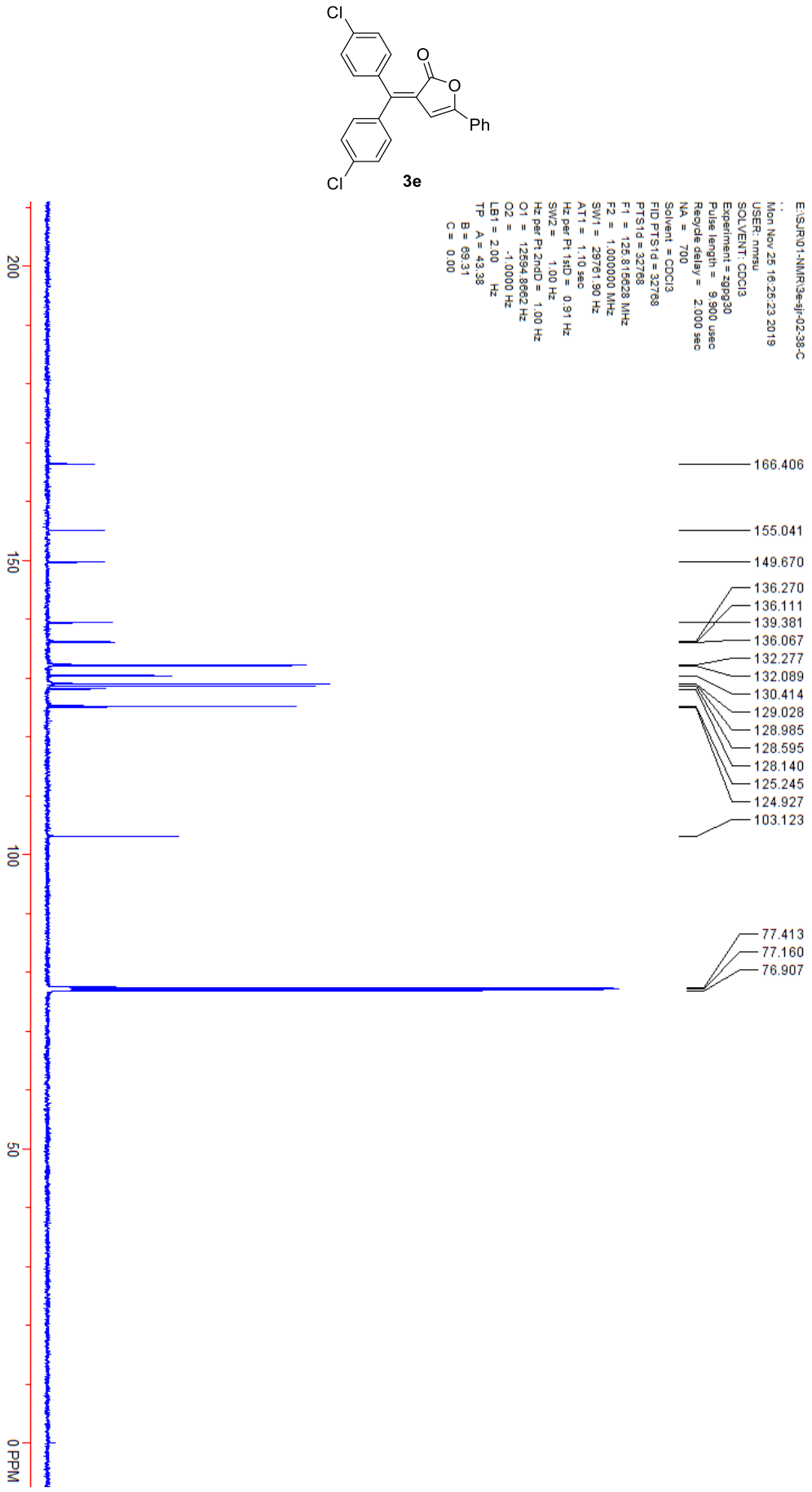

Br
O
O
Ph
Br
3d
E:\SJR\01-NMR\3d-sjr-02-47-H
Sat Dec 07 21:27:18 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4182 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -97.52
B = 19.88
C = 0.00
7.683
7.679
7.669
7.574
7.558
7.528
7.511
7.419
7.408
7.258
7.206
7.189
7.177
7.160
6.503
1.543
-0.000
2.10
2.10
1.94
3.10
2.12
1.91
1.00
10
8
6
4
2
0 PPM

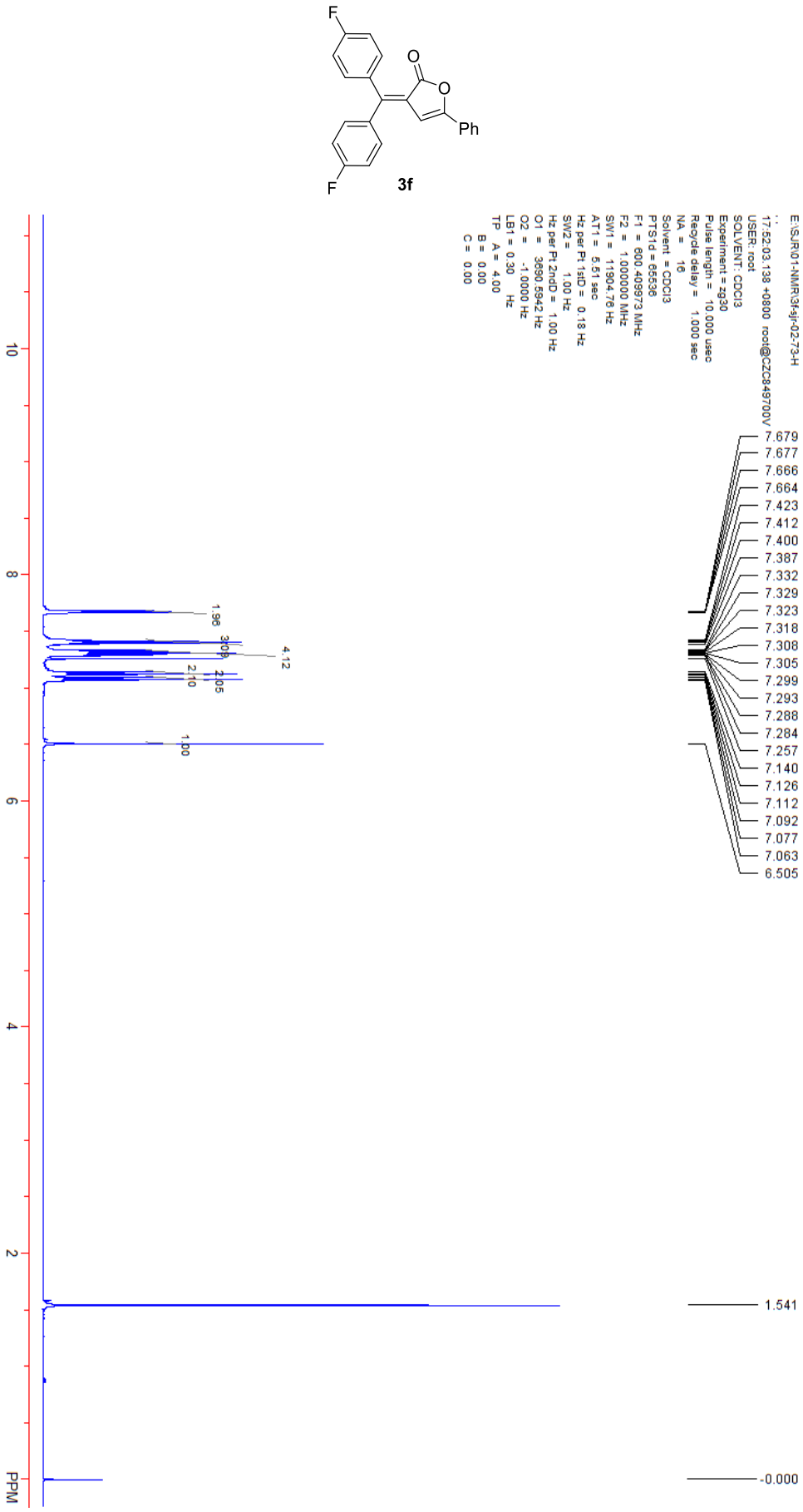

Br
O
O
Ph
Br

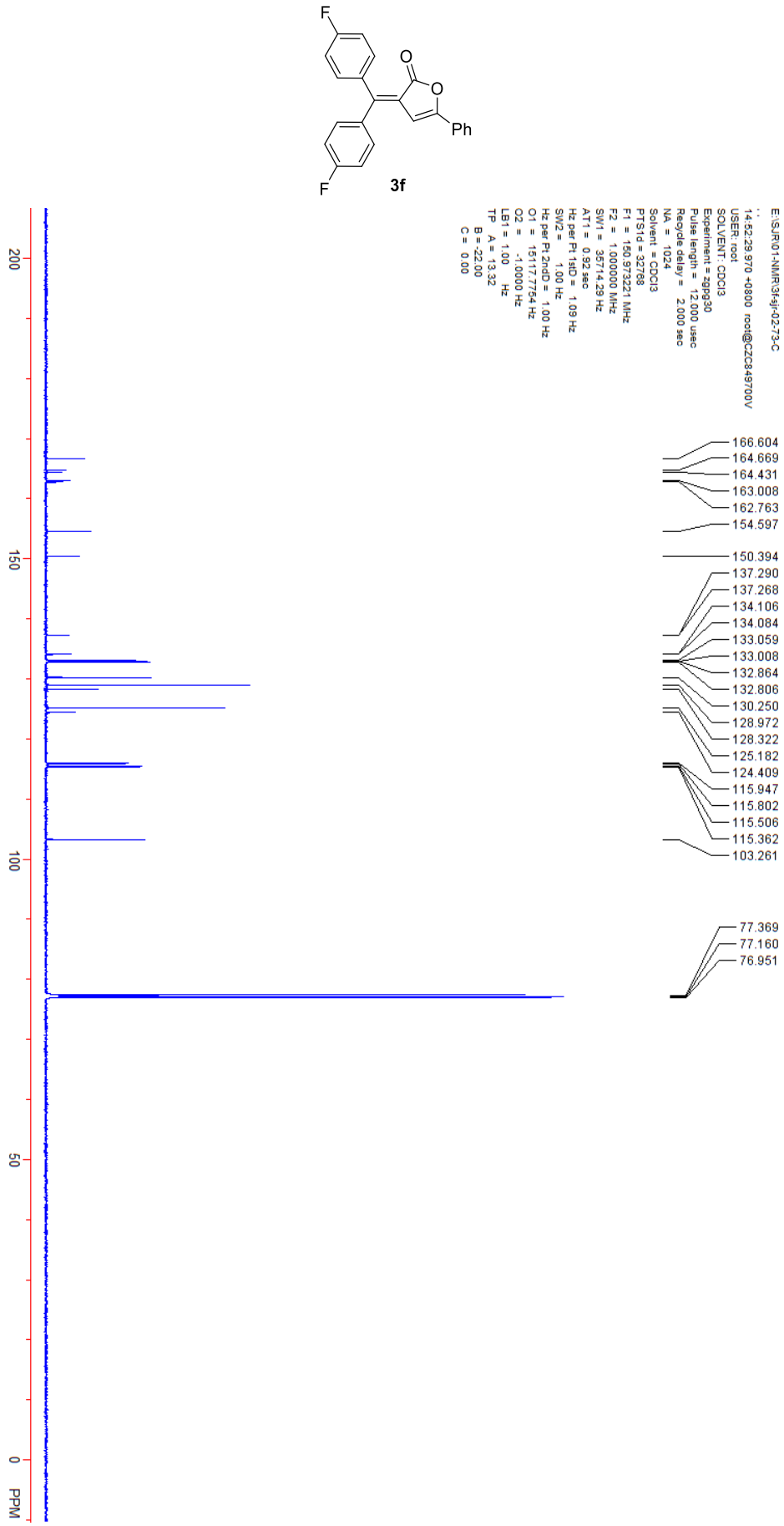
3d

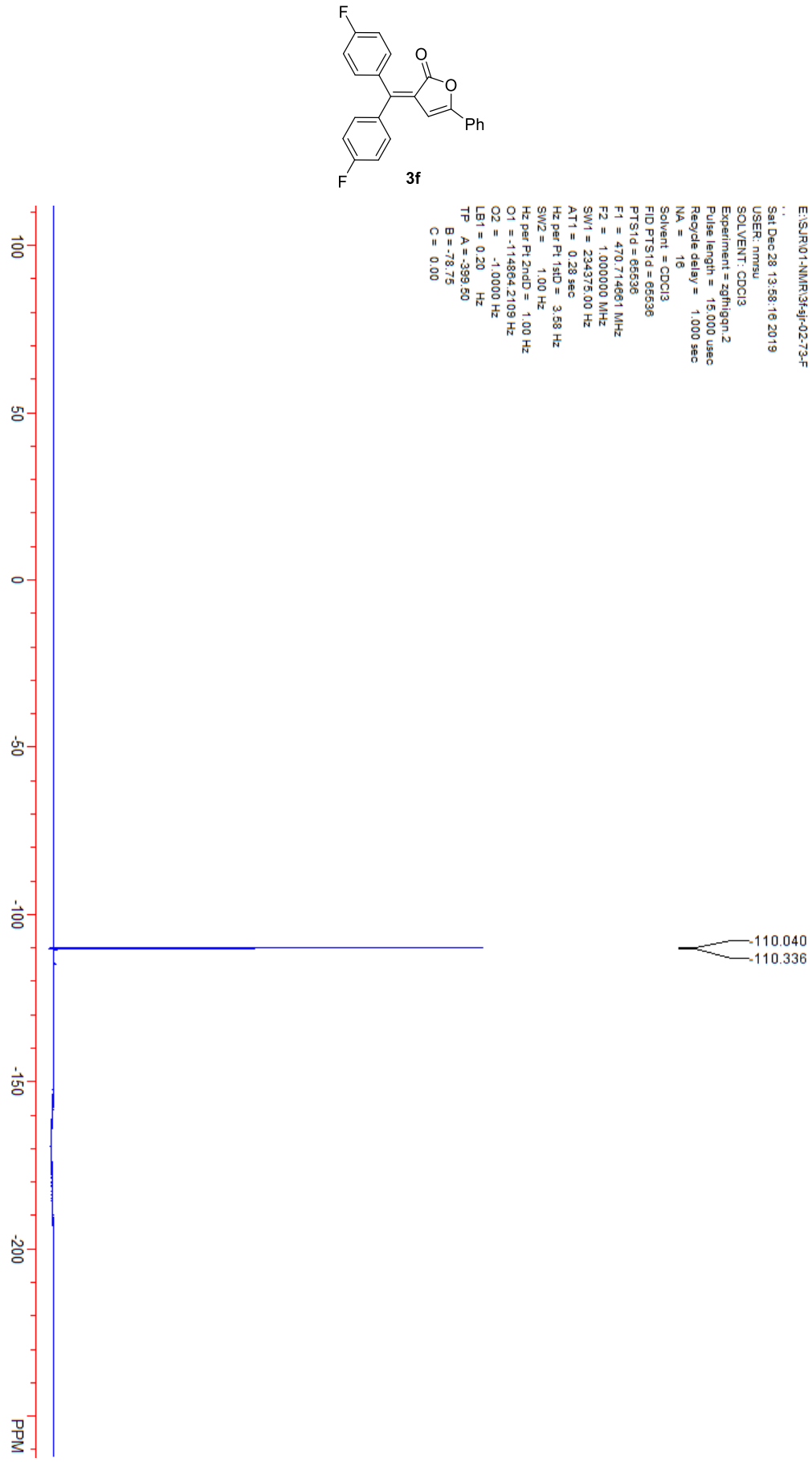

E:\SJR\01-NMR\3d-sjr-02-47-C
Sun Dec 08 14:31:13 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 33.75
B = 78.75
C = 0.00
166.369
155.121
149.684
139.778
136.659
132.486
132.306
132.010
131.562
130.450
129.006
128.140
125.259
124.920
124.566
124.422
103.123
77.413
77.160
76.907
200
150
100
50
PPM

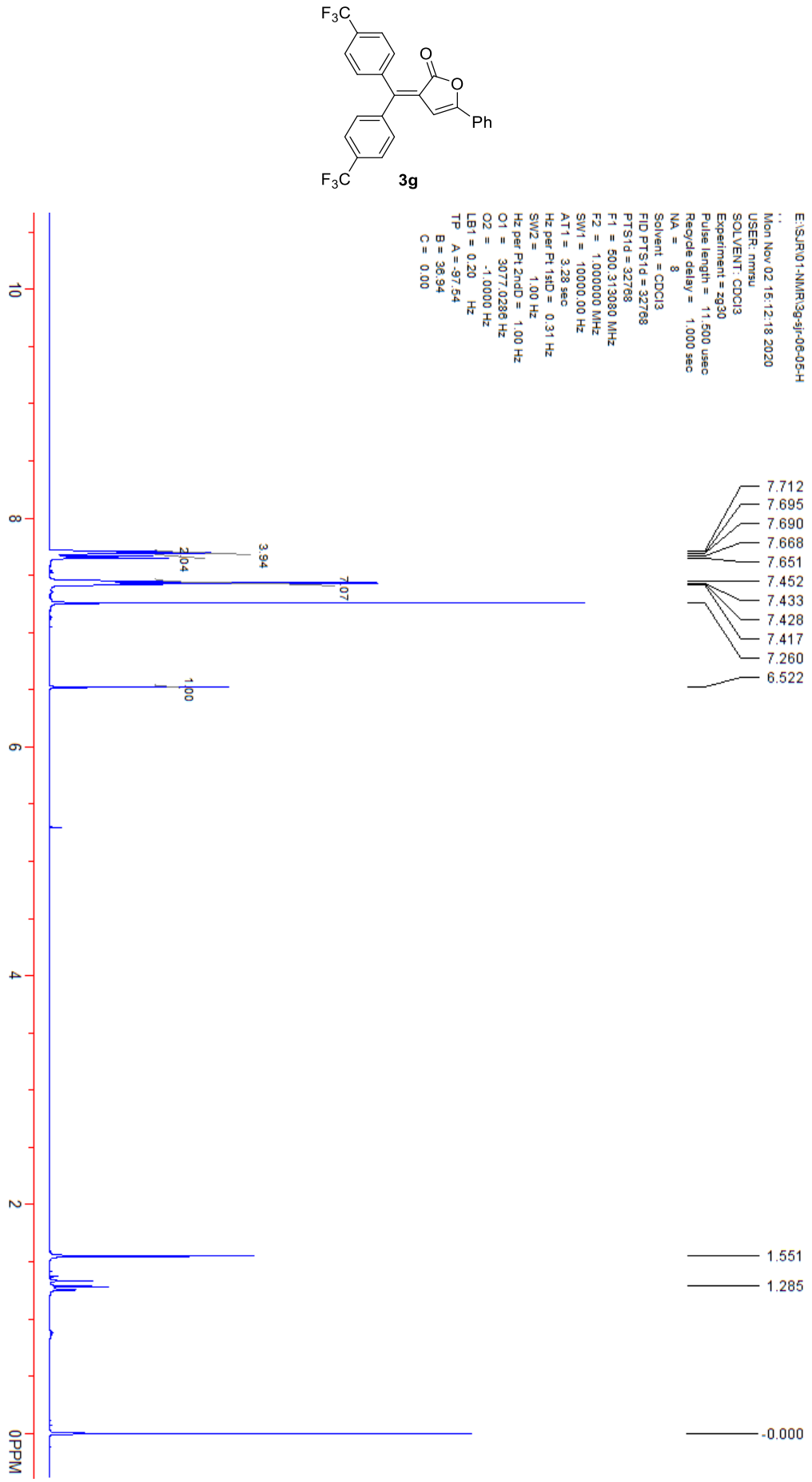

Cl
O
O
Ph
Cl
3e
E:\SJR\01-NMR\3\3e-jjr-02-38-H
18:50:26.897 +0800 root@CZC8349700V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409873 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3692.9568 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 4.00
B = 0.00
C = 0.00
7.682
7.670
7.418
7.409
7.404
7.372
7.358
7.275
7.261
7.247
7.233
6.512
1.564
0.000
2.00
5.06
2.04
2.03
1.00
10
8
6
4
2
0
PPM

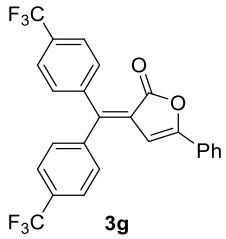

Cl
O
O
Ph
Cl
3e
E:\SJR\01-NMR\3e-sjr-02-38-C
Mon Nov 25 16:25:23 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8662 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 43.38
B = 69.31
C = 0.00
166.406
155.041
149.670
136.270
136.111
139.381
136.067
132.277
132.089
130.414
129.028
128.985
128.595
128.140
125.245
124.927
103.123
77.413
77.160
76.907
200
150
100
50
0 PPM


F
O
O
Ph
F
3f
E:\SJR\01-NMR\3f-sjr-02-73-H
17:52:03:138 +0800 root@CZC8497700V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3690.5942 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 4.00
B = 0.00
C = 0.00
7.679
7.677
7.666
7.664
7.423
7.412
7.400
7.387
7.332
7.329
7.323
7.318
7.308
7.305
7.299
7.293
7.288
7.284
7.257
7.140
7.126
7.112
7.092
7.077
7.063
6.505
1.541
-0.000
1.98
3.08
4.12
2.10
2.05
1.00
10
8
6
4
2
PPM

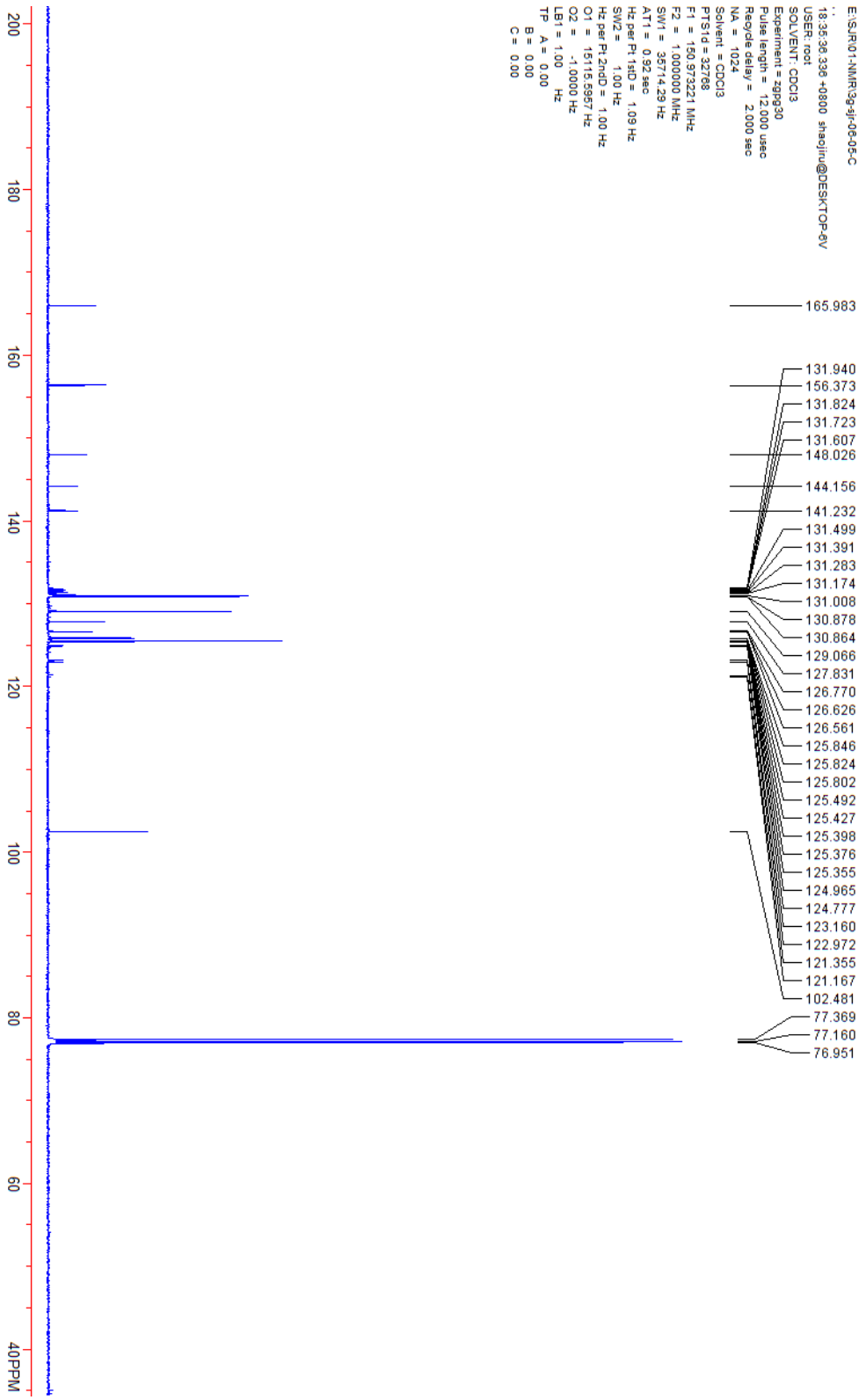

F
O
O
Ph
F
3f
E:\SJR\01-NMR\3f-sjr-02-73-C
14.52.29.970 +0800 root@CZC849700V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15117.7754 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 13.32
B = -22.00
C = 0.00
166.604
164.669
164.431
163.008
162.763
154.597
150.394
137.290
137.268
134.106
134.084
133.059
133.008
132.864
132.806
130.250
128.972
128.322
125.182
124.409
115.947
115.802
115.506
115.362
103.261
77.369
77.160
76.951
200
150
100
50
0
PPM

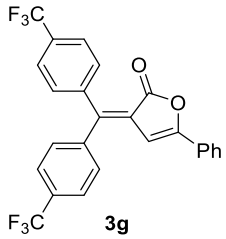

F
O
O
Ph
F
3f
E:\SJR\01-NMR\3f-sjr-02-73-F
Sat Dec 28 13:58:16 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgflqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -114864.2109 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -399.50
B = -78.75
C = 0.00
-110.040
-110.336
100
50
0
-50
-100
-150
-200
PPM


F3C
O
O
Ph
F3C
3g
E:\SJR\01-NMR\3g-sjr-06-05-H
Mon Nov 02 15:12:18 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0286 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -97.54
B = 36.94
C = 0.00
7.712
7.695
7.690
7.668
7.651
7.452
7.433
7.428
7.417
7.260
6.522
1.551
1.285
-0.000
3.94
2.04
7.07
1.00
10
8
6
4
2
0PPM

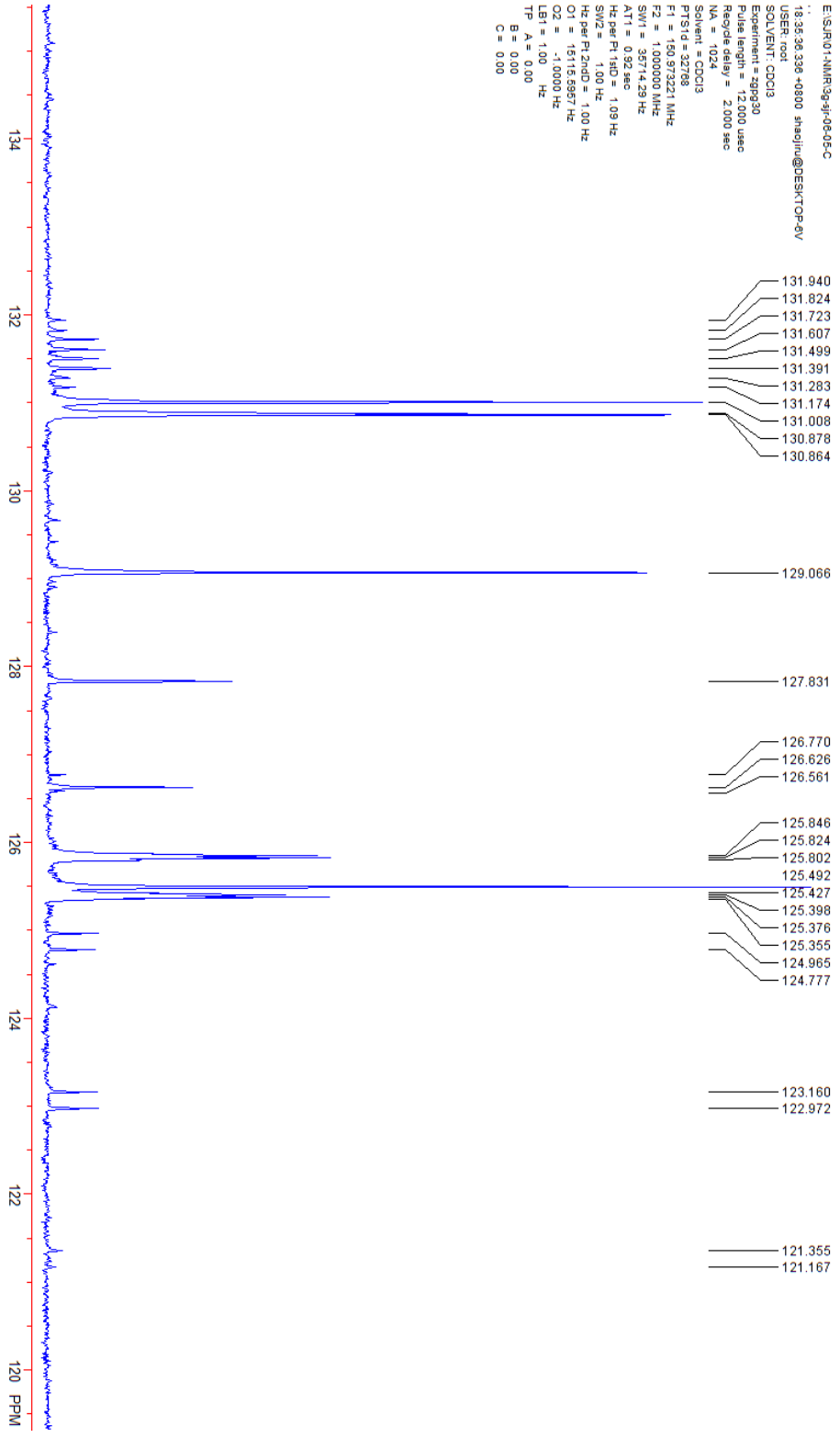

F3C
O
O
Ph
F3C

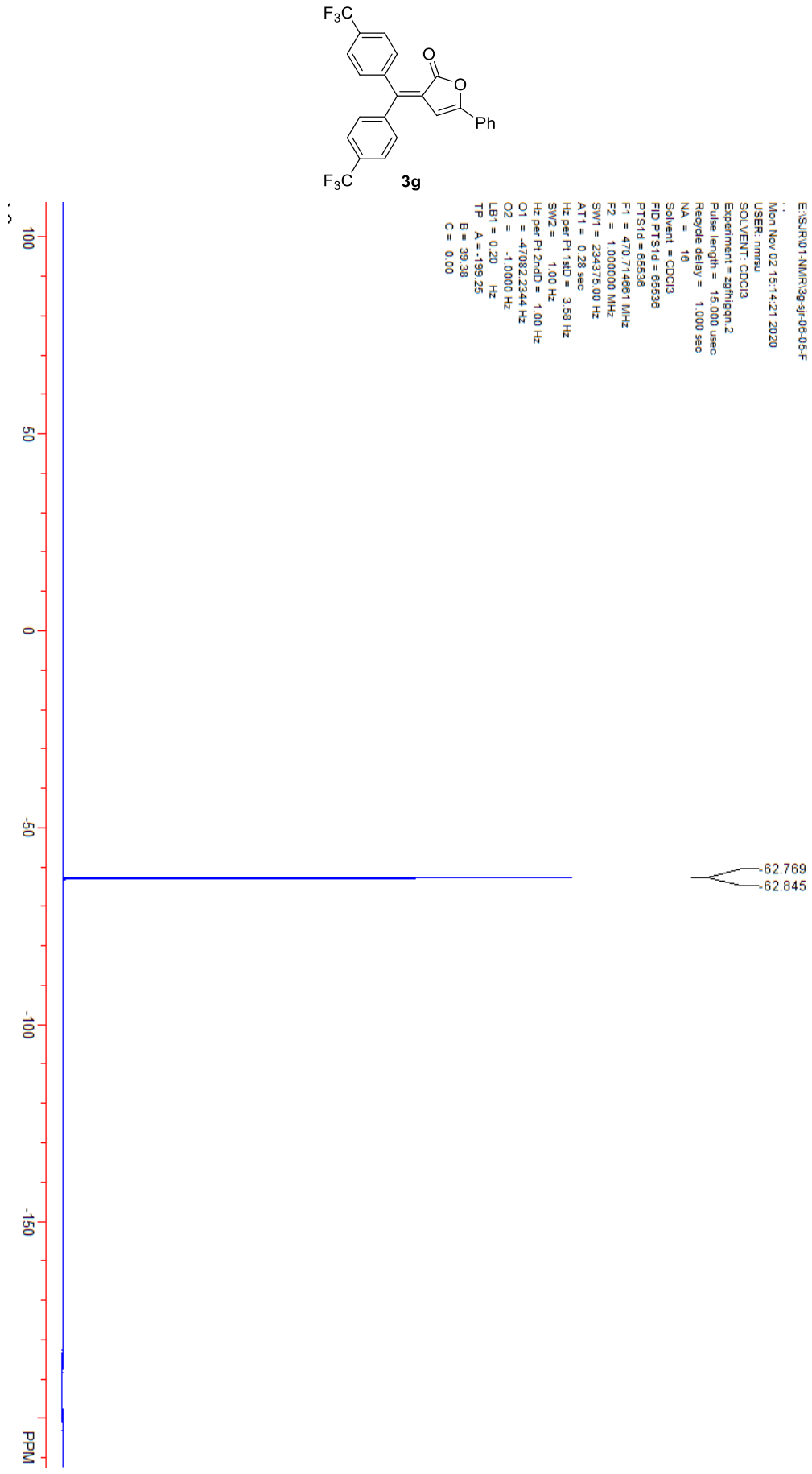
3g

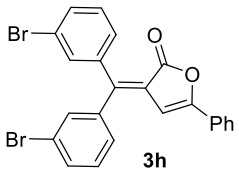

E:\SJR\01-NMR\3g-sjr-06-05-C
18:35:36 336 +0800 shaojiru@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
PTS1d = 32768
F1 = 150.9732221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15115.5957 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
165.983
131.940
156.373
131.824
131.723
131.607
148.026
144.156
141.232
131.499
131.391
131.283
131.174
131.008
130.878
130.864
129.066
127.831
126.770
126.626
126.561
125.846
125.824
125.802
125.492
125.427
125.398
125.376
125.355
124.965
124.777
123.160
122.972
121.355
121.167
102.481
77.369
77.160
76.951
200
180
160
140
120
100
80
60
40PPM


F3C
O
O
Ph
F3C

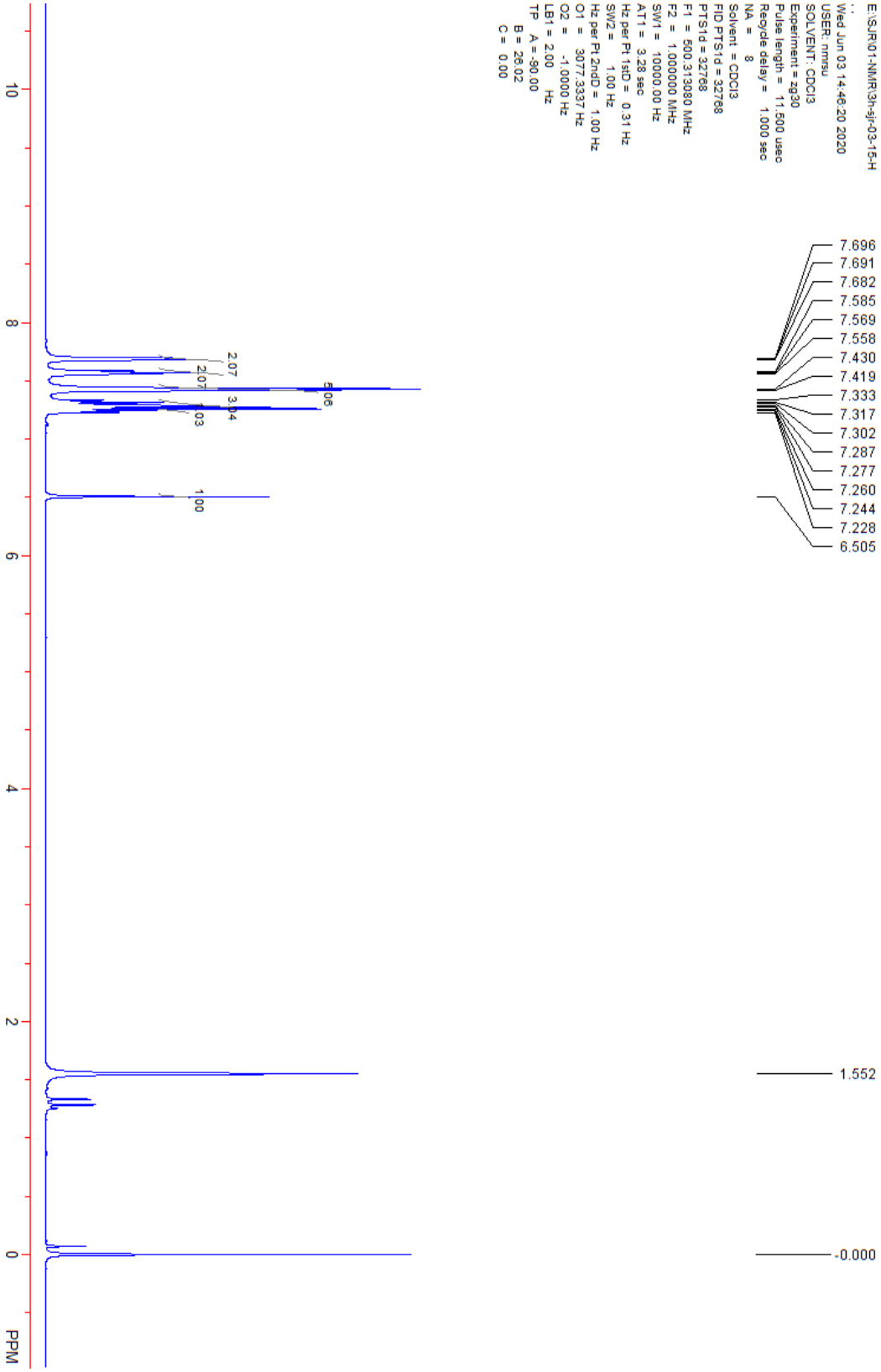
3g

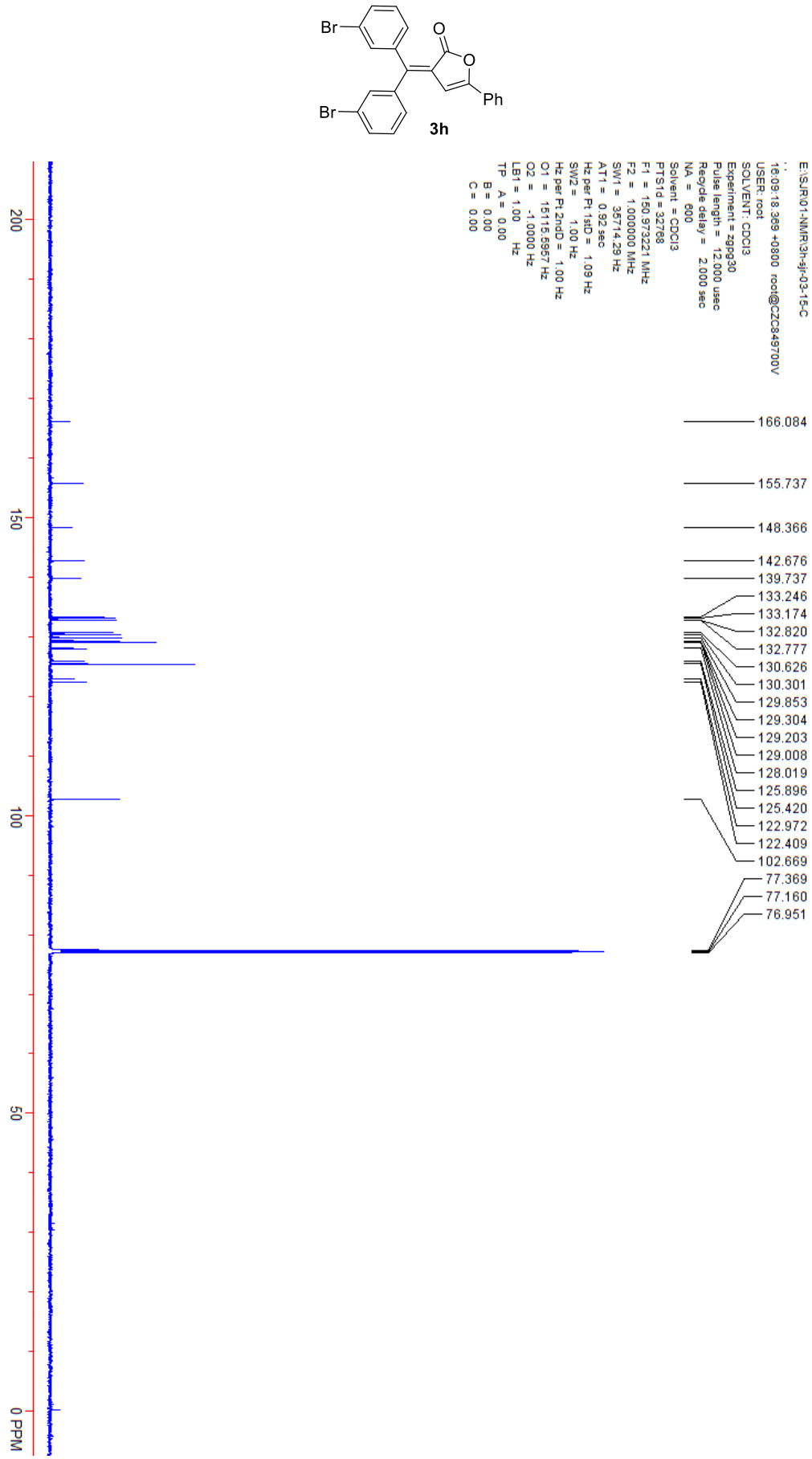

E:\SJR\01-NMR\3g-sjr-06-05-C
18:35:36.336 +0800 shaojinr@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1sD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15115.5957 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
131.940
131.824
131.723
131.607
131.499
131.391
131.283
131.174
131.008
130.878
130.864
129.066
127.831
126.770
126.626
126.561
125.846
125.824
125.802
125.492
125.427
125.398
125.376
125.355
124.965
124.777
123.160
122.972
121.355
121.167
134
132
130
128
126
124
122
120
PPM

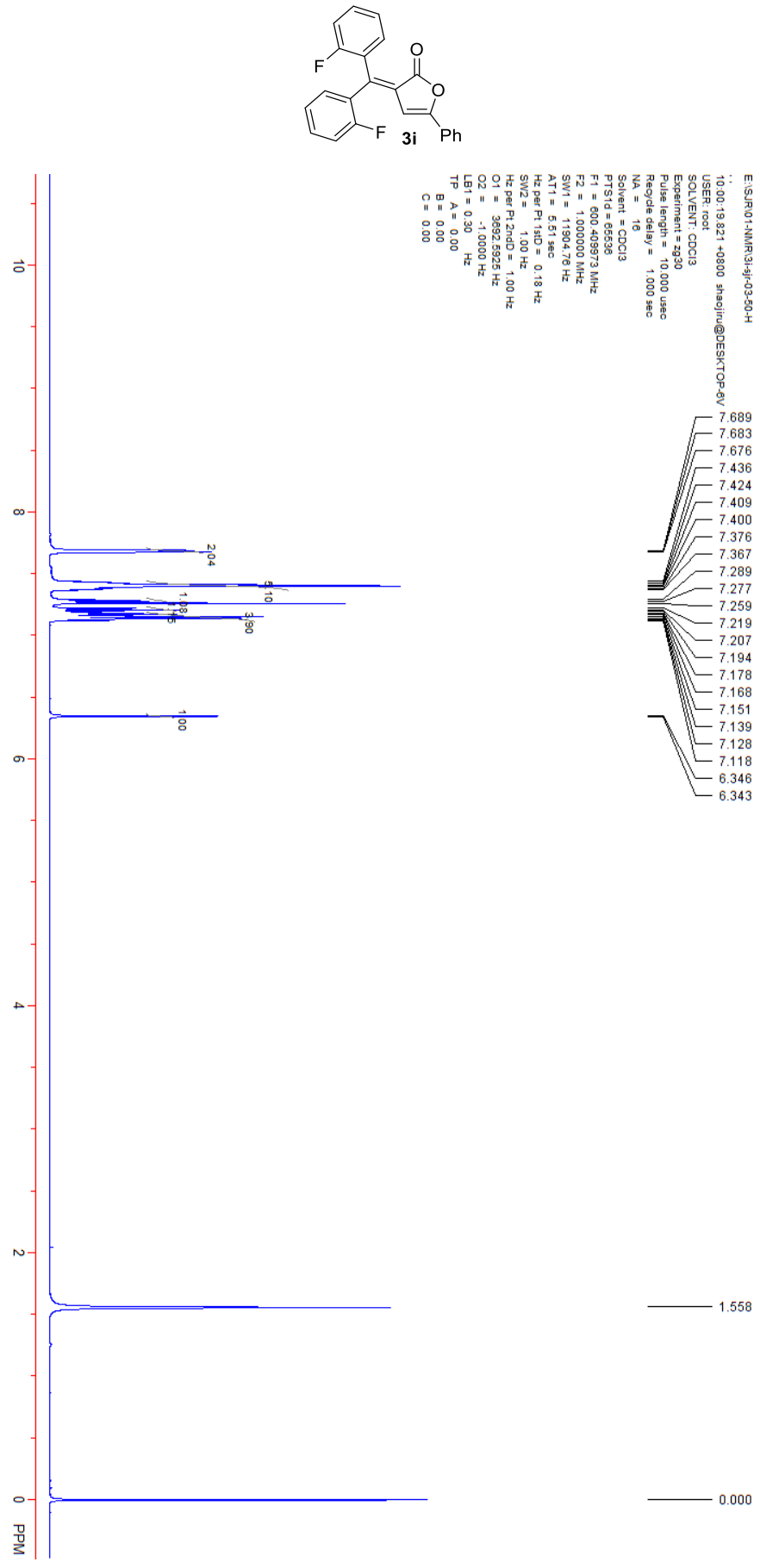

F3C
O
O
Ph
F3C
3g
E:\SJR\01-NMR\3g-sjr-06-05-F
Mon Nov 02 15:14:21 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234376.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47082.2344 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -199.25
B = 39.38
C = 0.00
-62.769
-62.845
100
50
0
-50
-100
-150
PPM

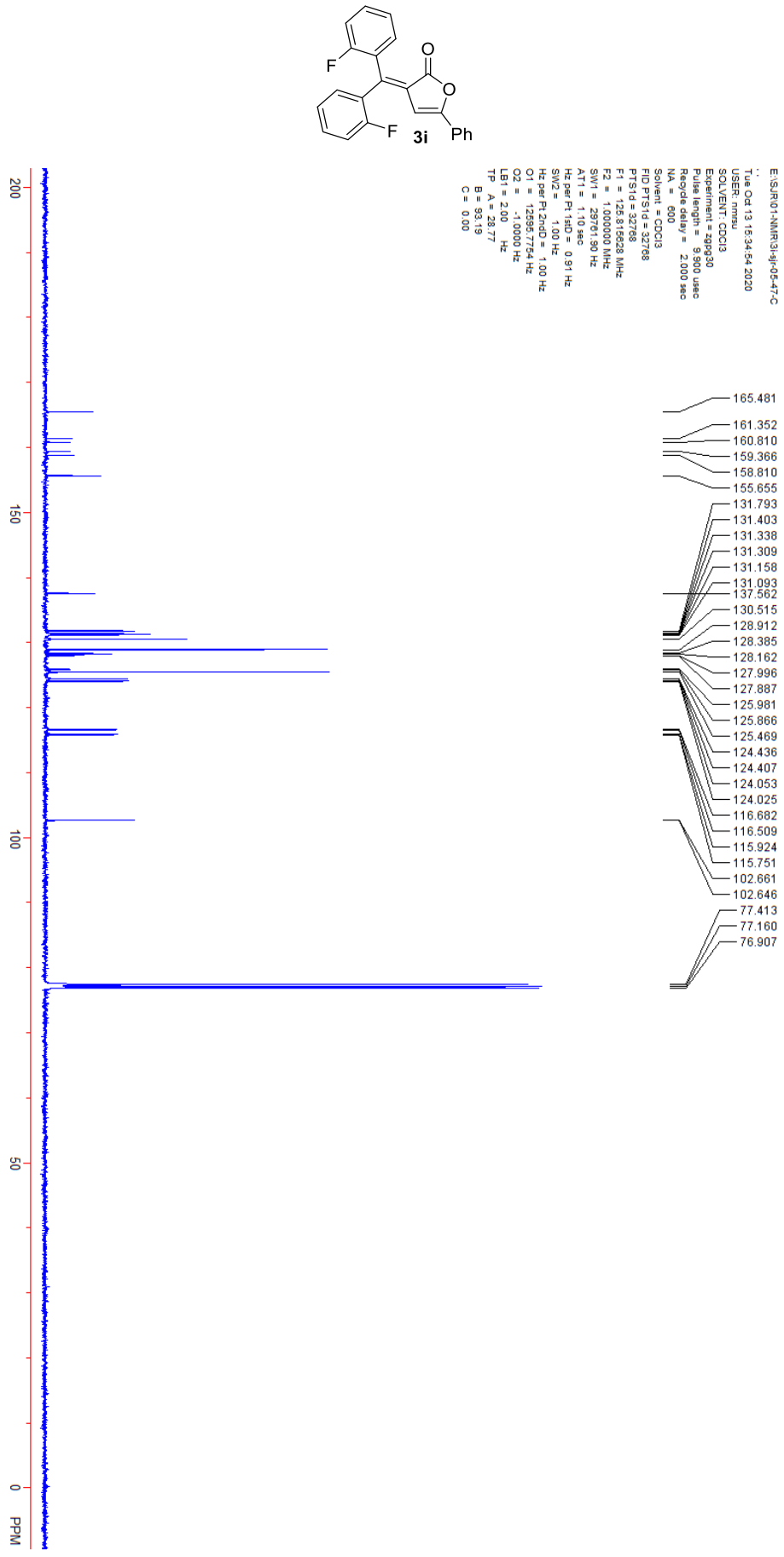

Br
O
O
Ph
Br

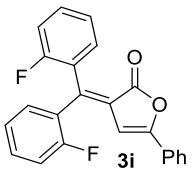
3h


E:\SJR\01-NMR\3h-sjr-03-15-H
Wed Jun 03 14:48:20 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3337 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -90.00
B = 26.02
C = 0.00
7.696
7.691
7.682
7.585
7.569
7.558
7.430
7.419
7.333
7.317
7.302
7.287
7.277
7.260
7.244
7.228
6.505
1.552
-0.000
2.07
2.07
5.08
3.04
1.03
1.00
10
8
6
4
2
0
PPM

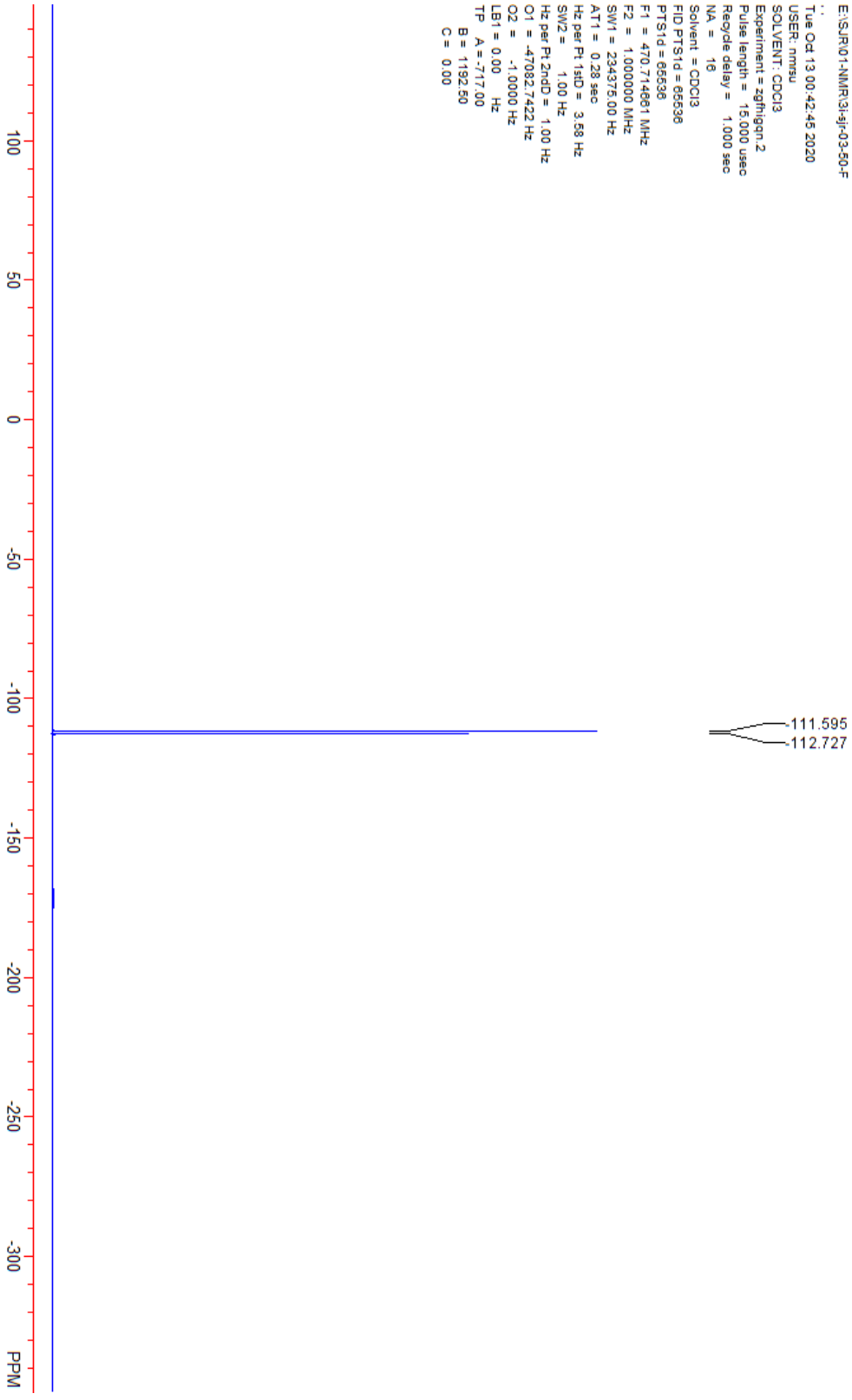

Br
O
O
Ph
Br
3h
E:\SJR\01-NMR\3h-sjr-03-15-C
16.09.18.369 +0800 root@CZC8497T00V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15115.6957 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
166.084
155.737
148.366
142.676
139.737
133.246
133.174
132.820
132.777
130.626
130.301
129.853
129.304
129.203
129.008
128.019
125.896
125.420
122.972
122.409
102.669
77.369
77.160
76.951
200
150
100
50
0 PPM

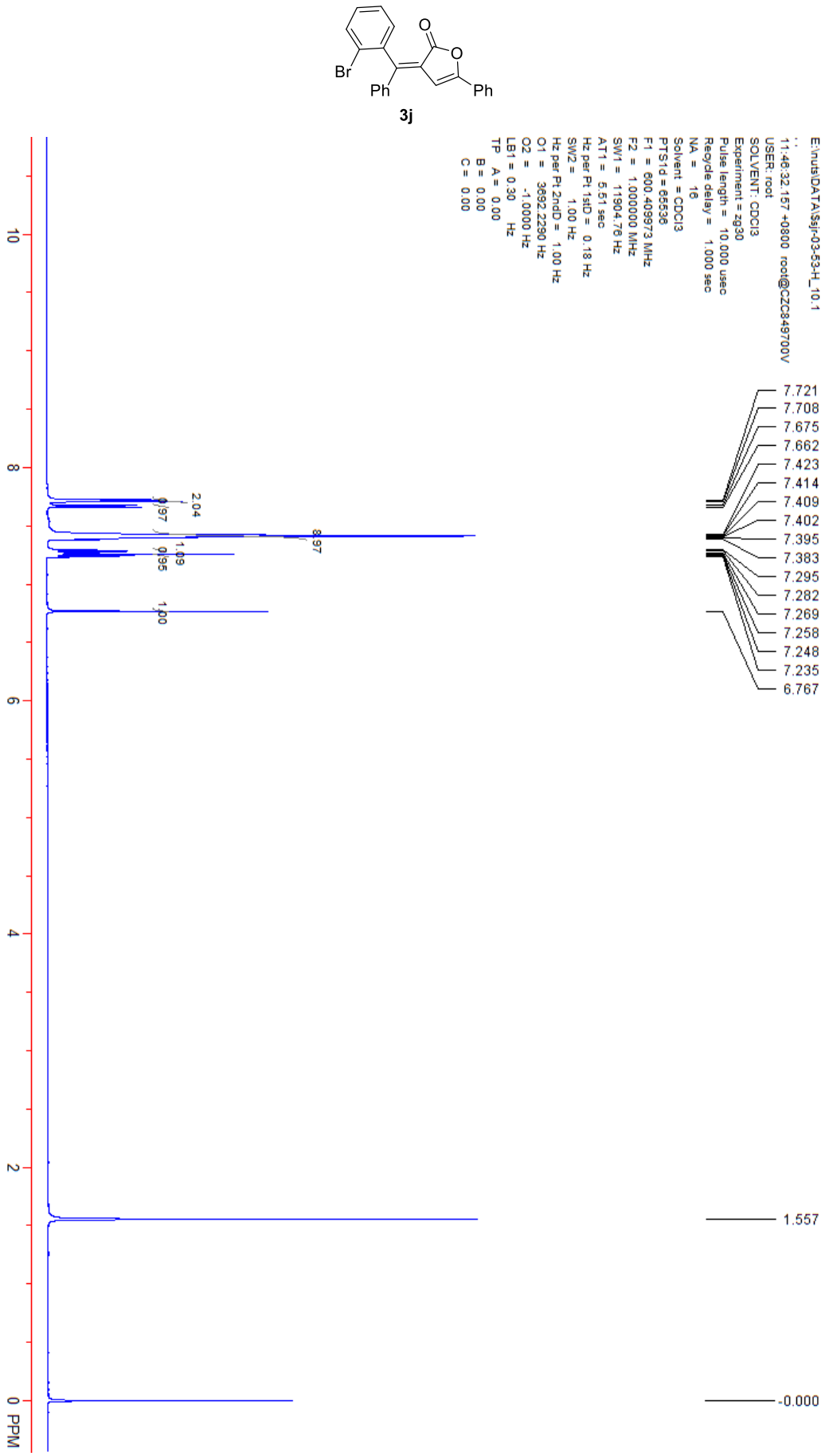

F
O
O
F
Ph
3i
E:\SJR\01-NMR\3i-sjr-03-50-H
10.00.19 821 +0800 shaojirui@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3692.5925 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.689
7.683
7.676
7.436
7.424
7.409
7.400
7.376
7.367
7.289
7.277
7.259
7.219
7.207
7.194
7.178
7.168
7.151
7.139
7.128
7.118
6.346
6.343
1.558
0.000
2.04
5.10
1.08
1.05
3.90
1.00
10
8
6
4
2
0
PPM

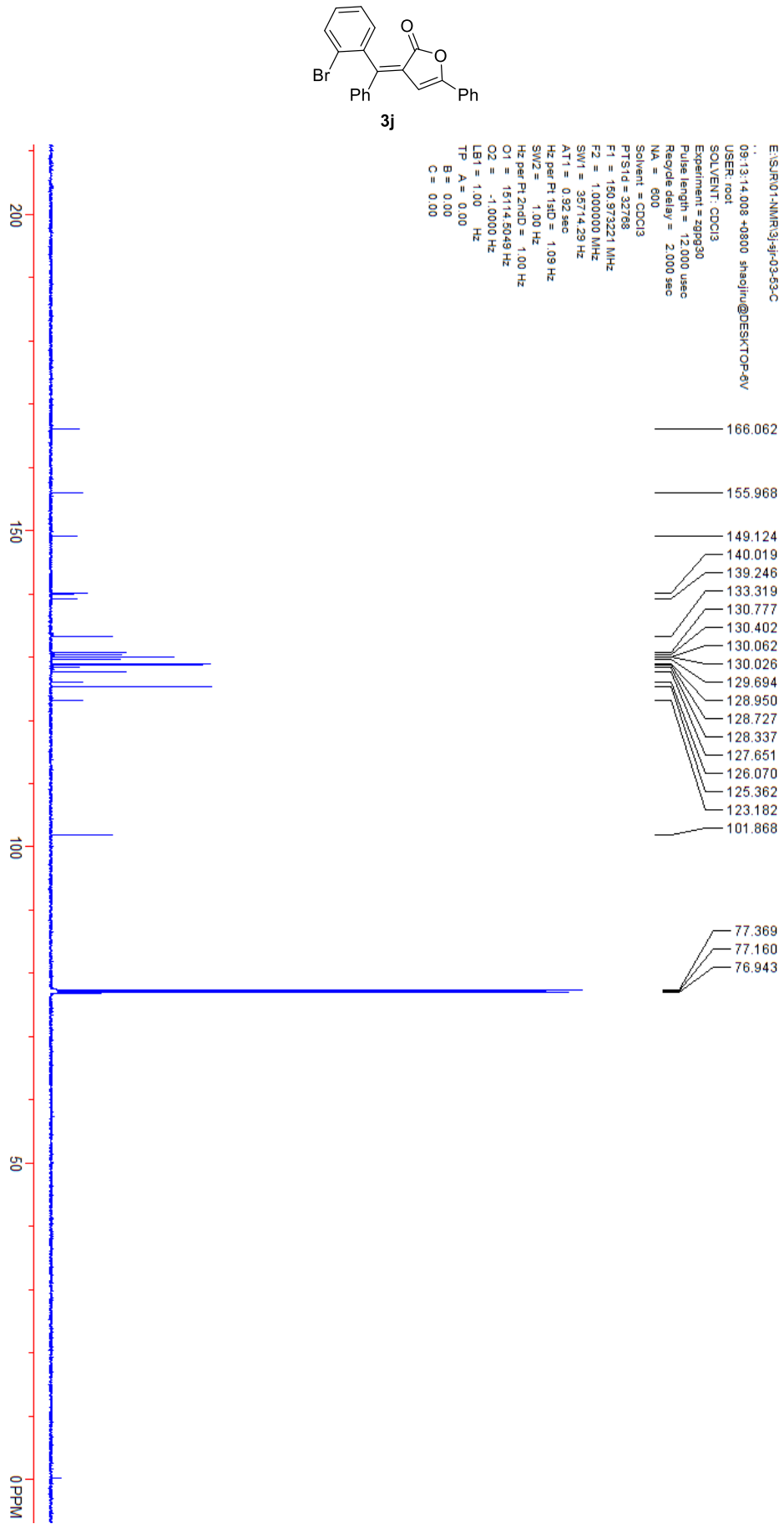

F
O
O
F
Ph
3i
E:\SJR\01-NMR\3i-sjr-05-47-C
Tue Oct 13 15:34:54 2020
USER: mmtu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1sD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 28.77
B = 93.19
C = 0.00
165.481
161.352
160.810
159.366
158.810
155.655
131.793
131.403
131.338
131.309
131.158
131.093
137.562
130.515
128.912
128.385
128.162
127.996
127.887
125.981
125.866
125.469
124.436
124.407
124.053
124.025
116.682
116.509
115.924
115.751
102.661
102.646
77.413
77.160
76.907
200
150
100
50
0
PPM

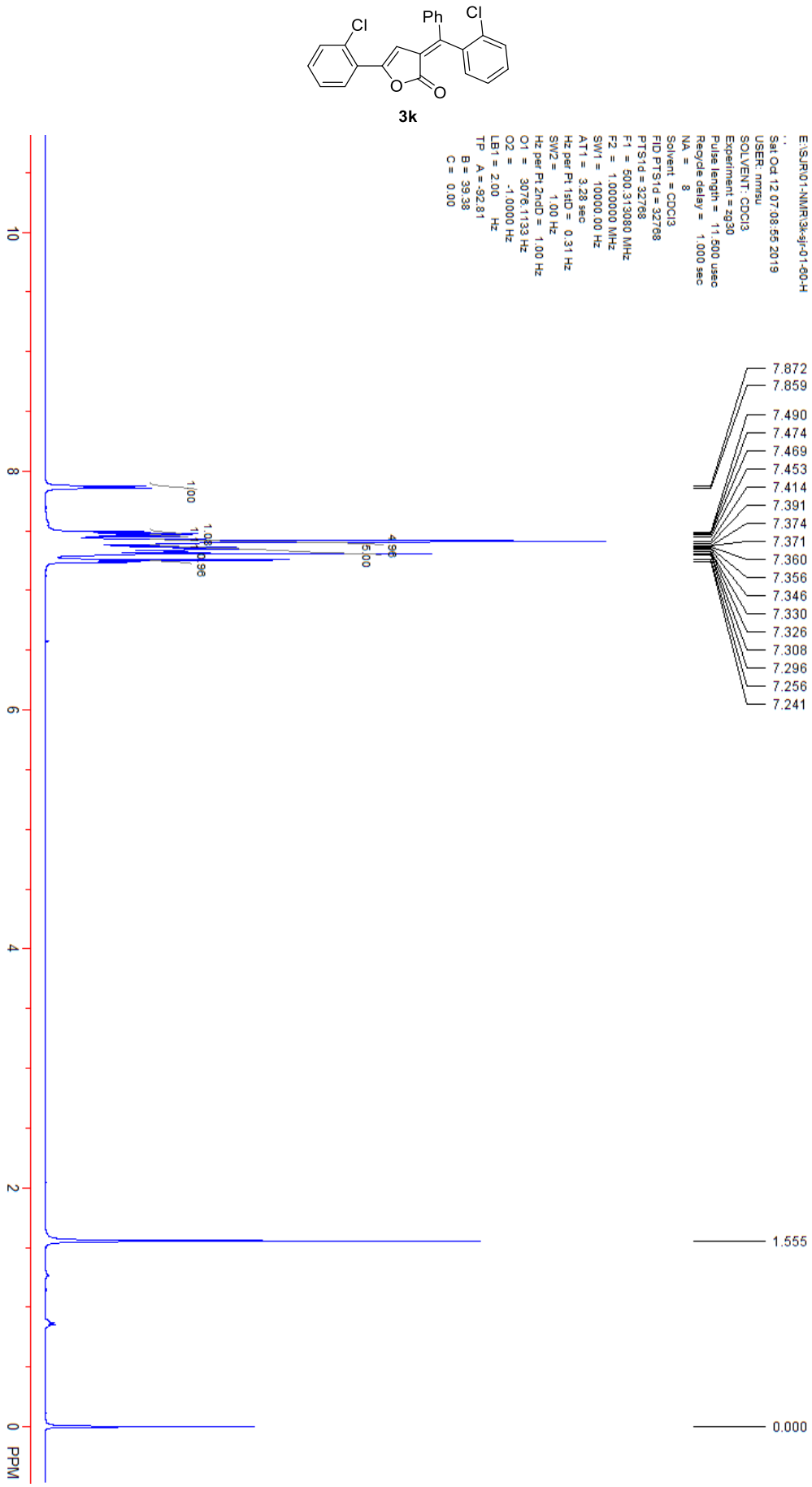

F
O
O
F
Ph

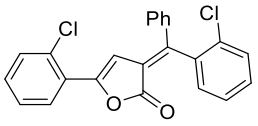
3i


E:\SJR\01-NMR\3i-sjr-03-50-F
Tue Oct 13 00:42:45 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgflqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47082.7422 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -717.00
B = 1192.50
C = 0.00
-111.595
-112.727
100
50
0
-50
-100
-150
-200
-250
-300
PPM

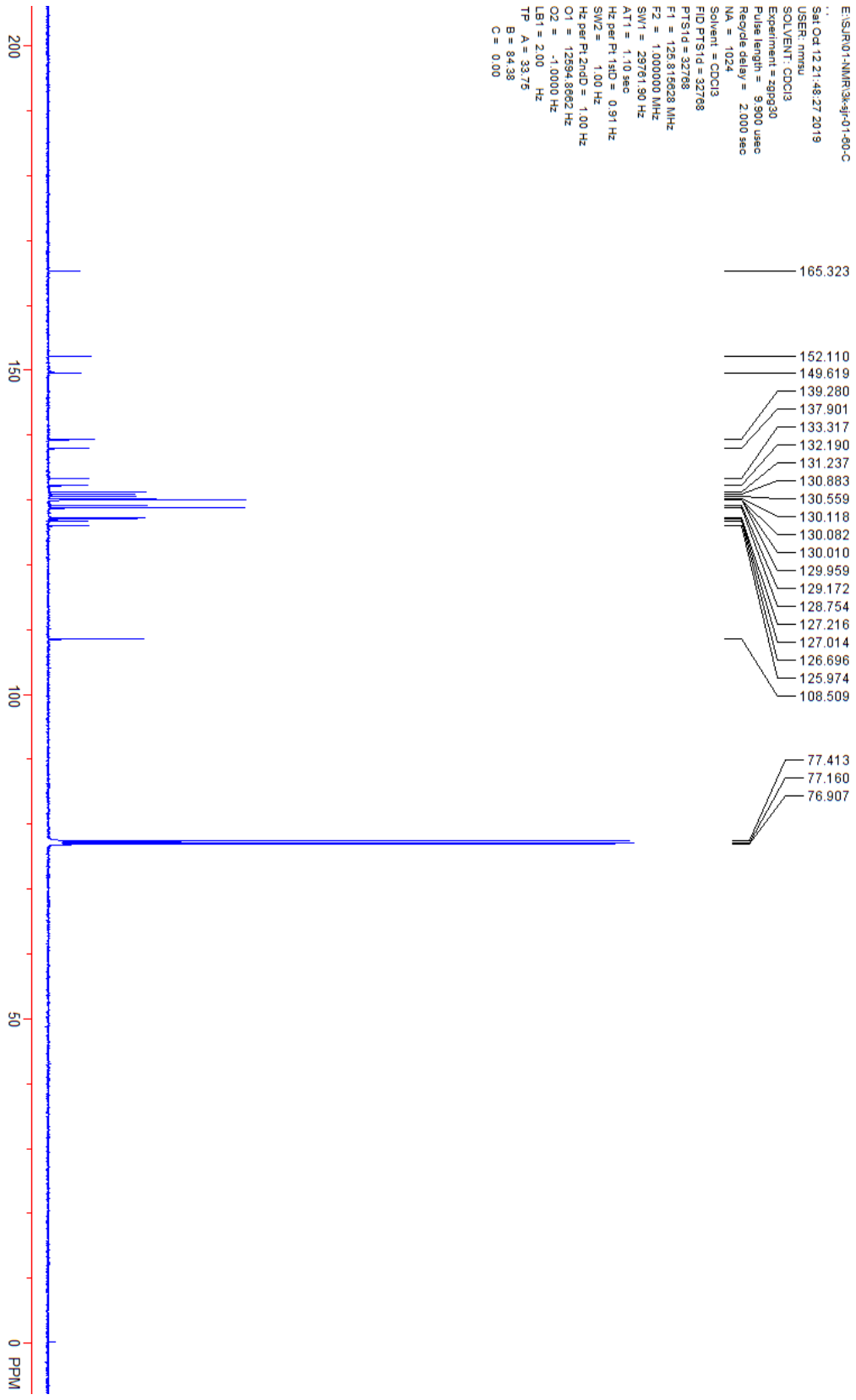

Br
Ph
O
O
Ph
3j
E:\nuts\DATA\sjr-03-53-H_10.1
11:46:32.157 +0800 root@CZC8497700V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3892.2290 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.721
7.708
7.675
7.662
7.423
7.414
7.409
7.402
7.395
7.383
7.295
7.282
7.269
7.258
7.248
7.235
6.767
2.04
0.97
1.09
0.95
8.97
1.00
1.557
-0.000
10
8
6
4
2
0 PPM

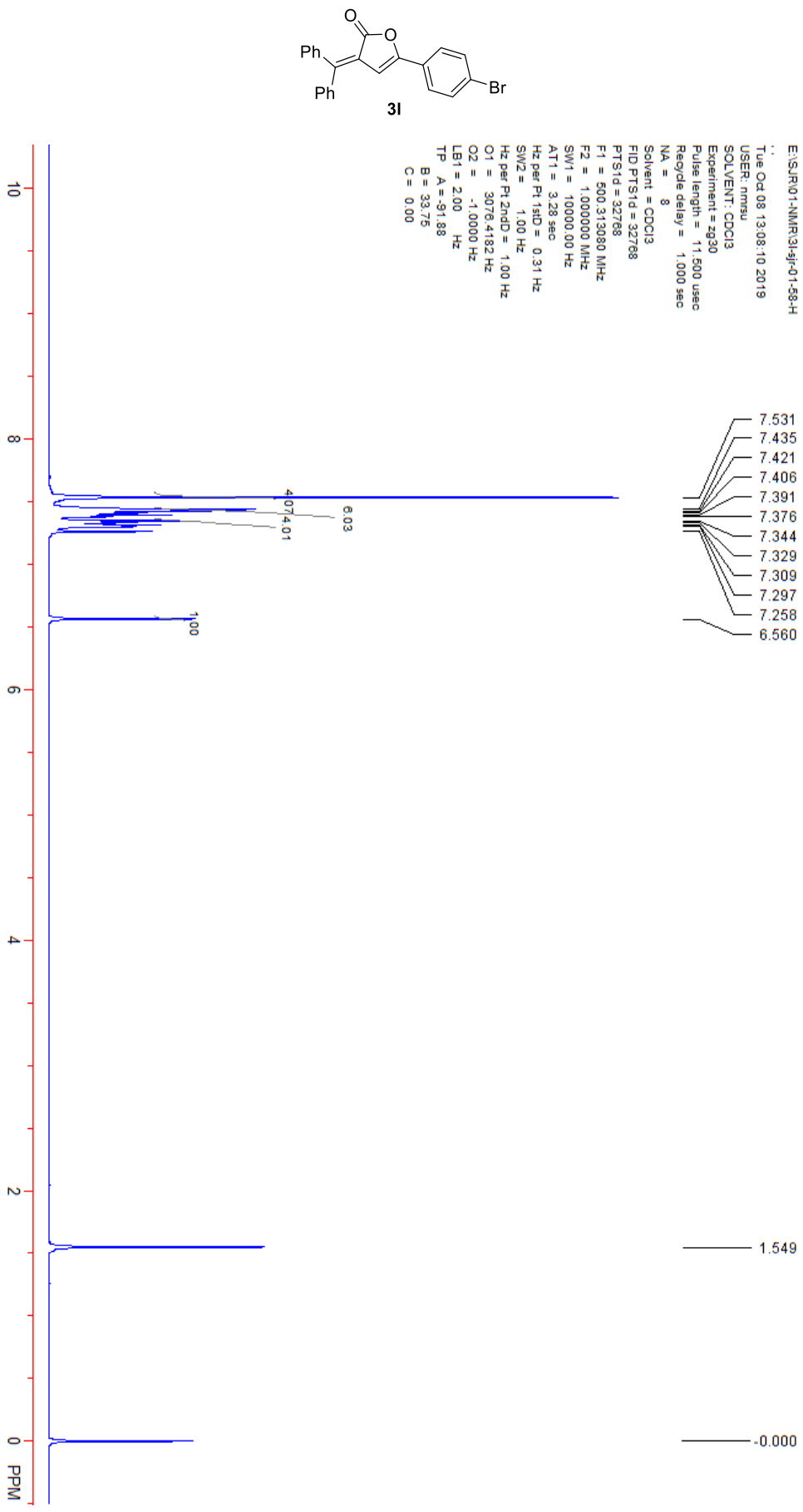

Br
Ph
O
O
Ph
3j
E:\SJR\01-NMR\3j-sjr-03-53-C
09:13:14.008 +0800 shaojiru@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
166.062
155.968
149.124
140.019
139.246
133.319
130.777
130.402
130.062
130.026
129.694
128.950
128.727
128.337
127.651
126.070
125.362
123.182
101.868
77.369
77.160
76.943
200
150
100
50
0 PPM

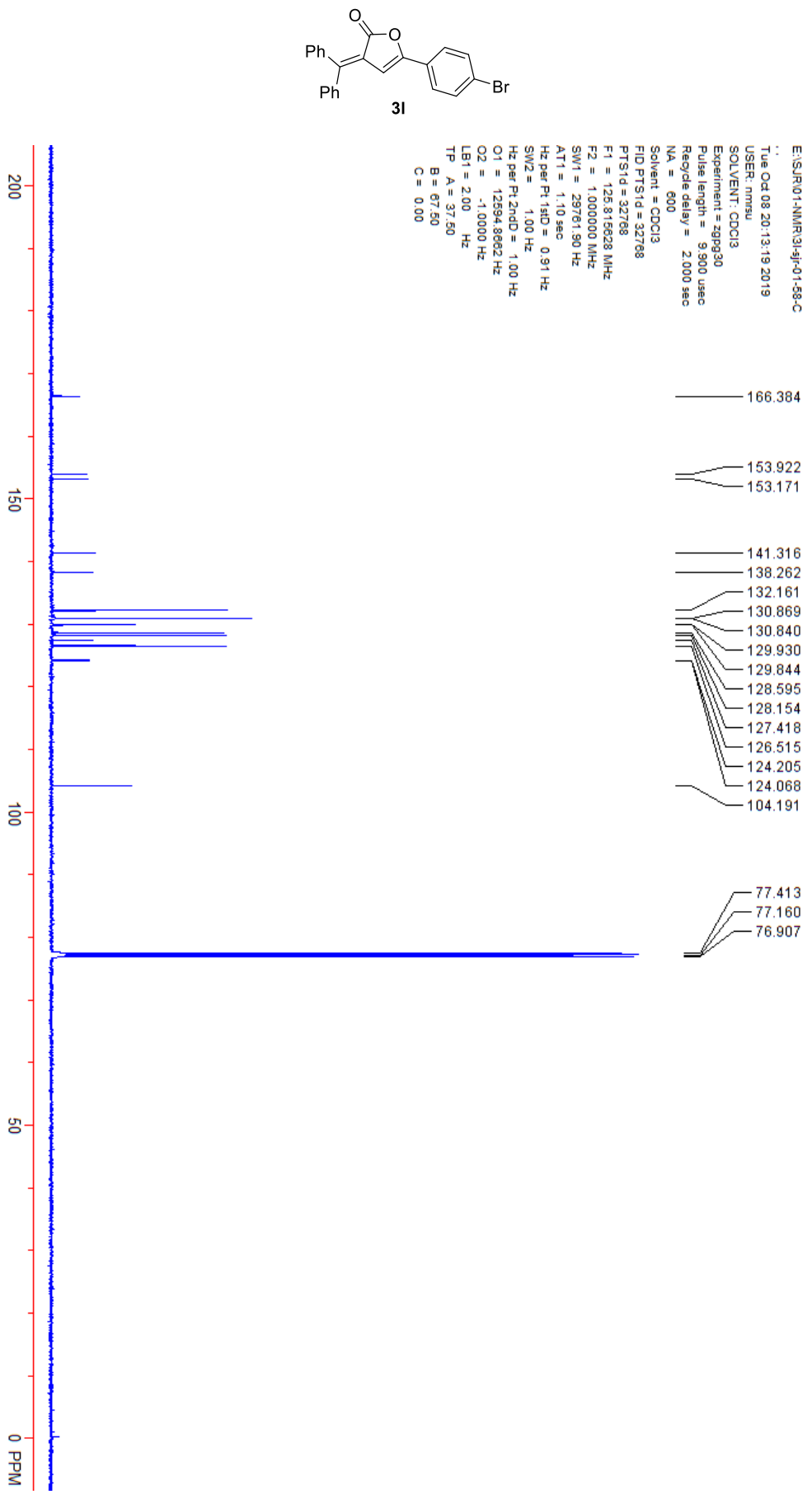

Cl
Ph
Cl
O
O
3k
E:\SJR\01-NMR\3k-sjr-01-60-H
Sat Oct 12 07:08:55 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.1133 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -92.81
B = 39.38
C = 0.00
7.872
7.859
7.490
7.474
7.469
7.453
7.414
7.391
7.374
7.371
7.360
7.356
7.346
7.330
7.326
7.308
7.296
7.256
7.241
1.555
0.000
1.00
1.08
0.96
4.98
5.00
10
8
6
4
2
0
PPM

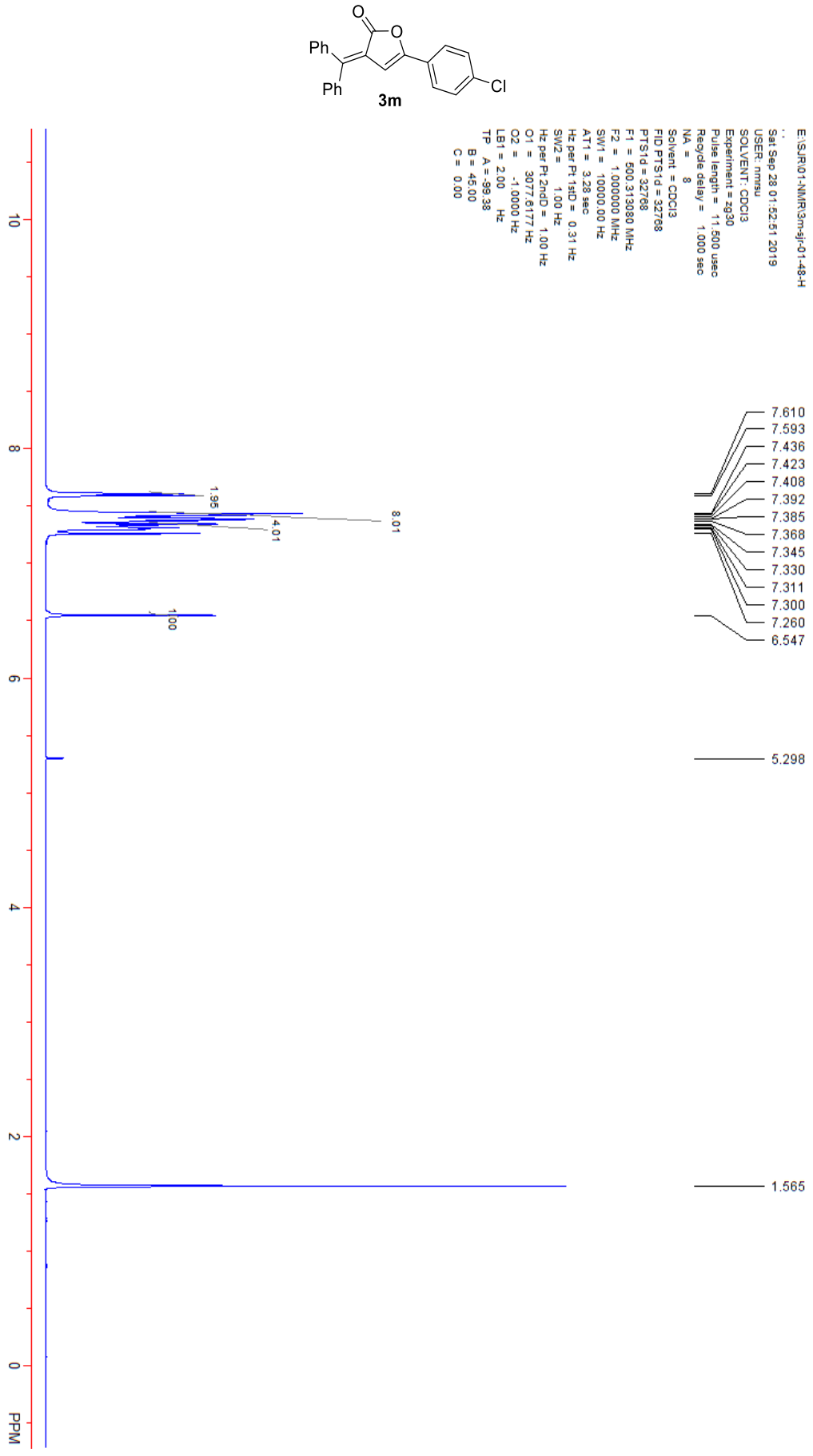

Cl
Ph
Cl
O
O

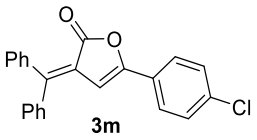
3k


E:\SJR\01-NMR\3k-sjr-01-60-C
Sat Oct 12 21:48:27 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8862 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 33.75
B = 84.38
C = 0.00
165.323
152.110
149.619
139.280
137.901
133.317
132.190
131.237
130.883
130.559
130.118
130.082
130.010
129.959
129.172
128.754
127.216
127.014
126.696
125.974
108.509
77.413
77.160
76.907
200
150
100
50
0 PPM

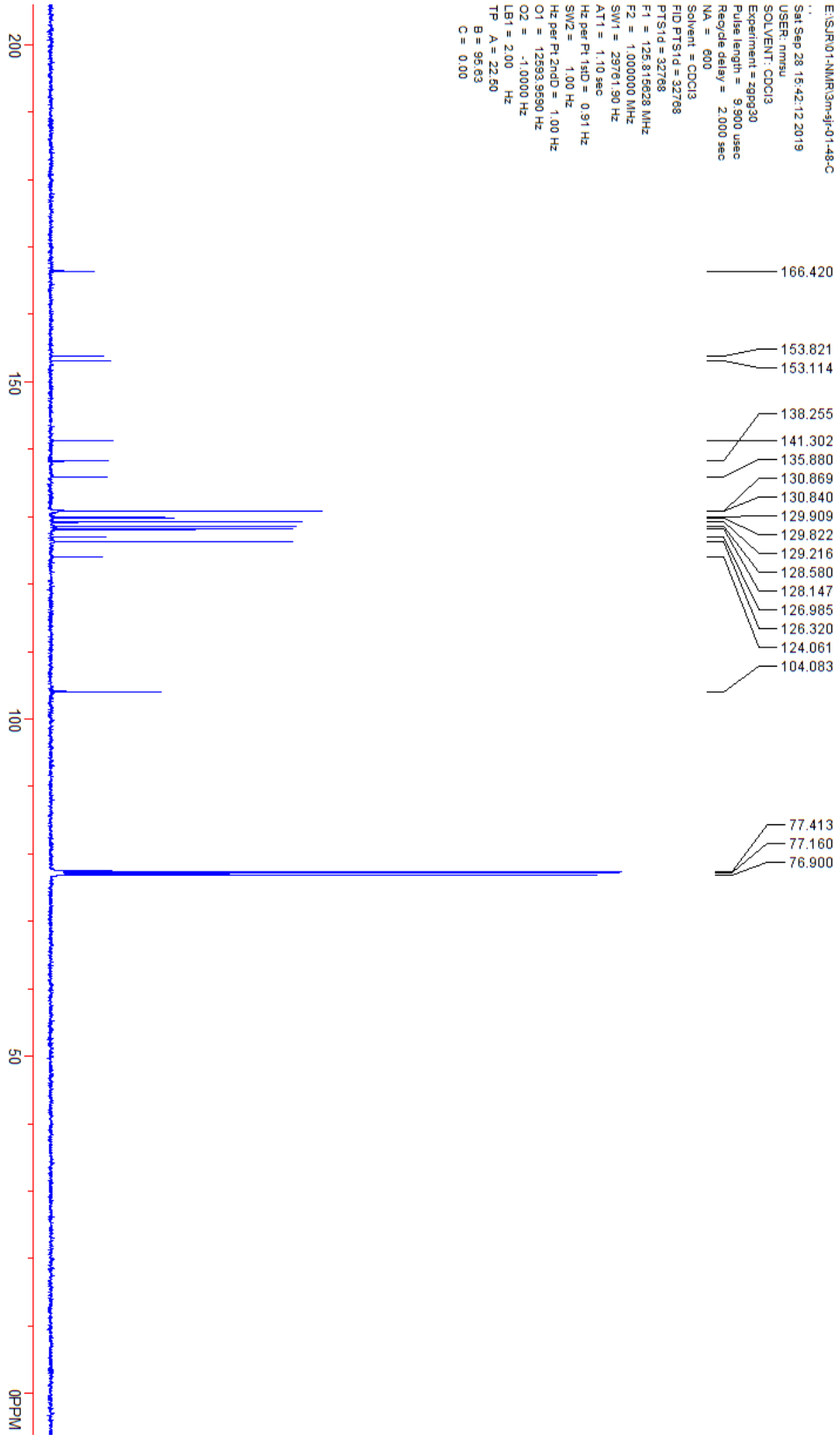

3l
E:\SJR\01-NMR\3l-sjr-01-58-H
Tue Oct 08 13:08:10 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4182 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -91.88
B = 33.75
C = 0.00
7.531
7.435
7.421
7.406
7.391
7.376
7.344
7.329
7.309
7.297
7.258
6.560
1.549
-0.000
4.07
4.01
6.03
1.00
10
8
6
4
2
0
PPM

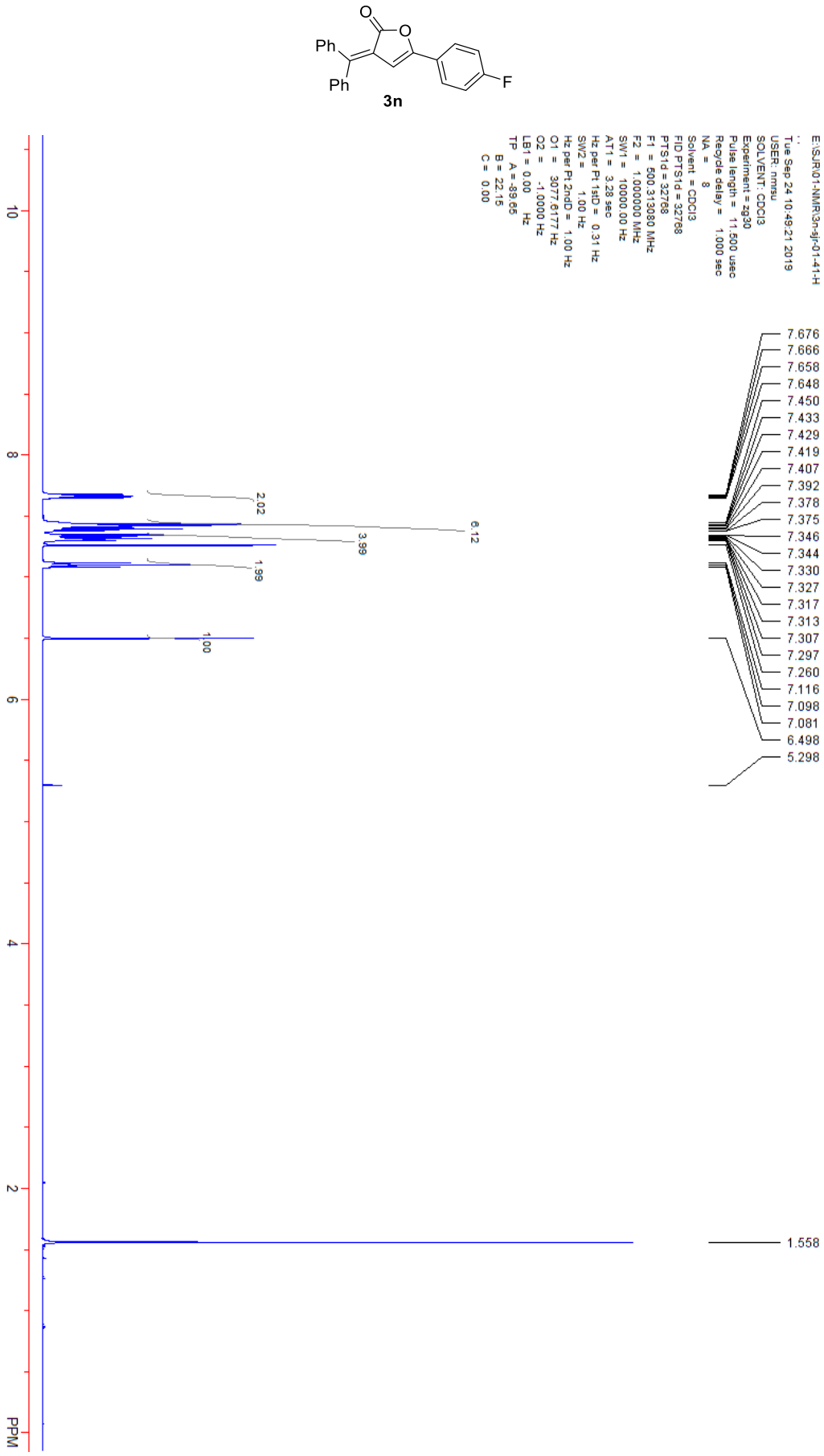

O
O
Ph
Ph
Br
3l
E:\SJR\01-NMR\3l-sjr-01-58-C
Tue Oct 08 20:13:19 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8862 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 37.50
B = 67.50
C = 0.00
166.384
153.922
153.171
141.316
138.262
132.161
130.869
130.840
129.930
129.844
128.595
128.154
127.418
126.515
124.205
124.068
104.191
77.413
77.160
76.907
200
150
100
50
0 PPM

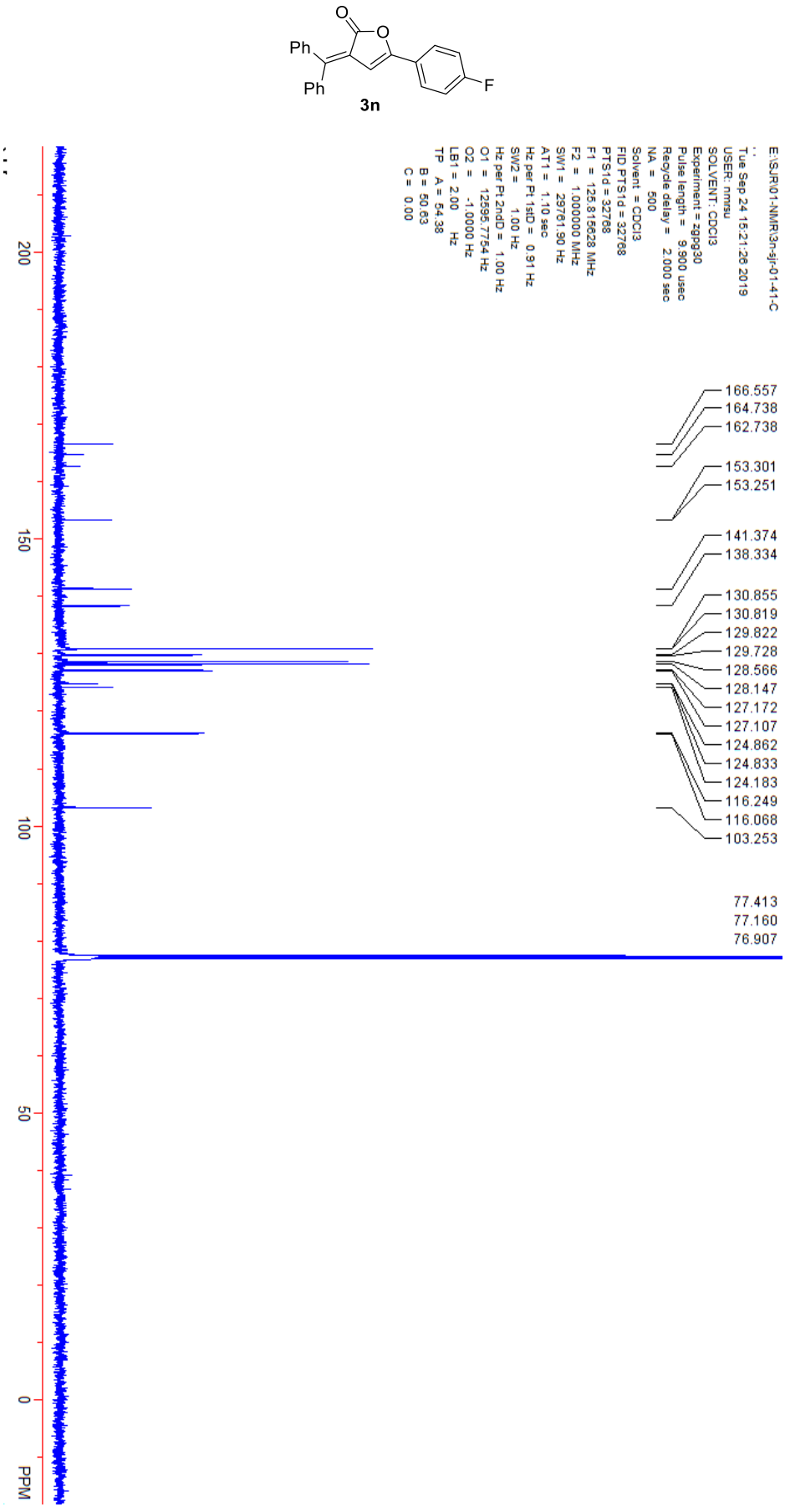

O
O
Ph
Ph
Cl
3m
E:\SJR\01-NMR\3m-sjr-01-48-H
Sat Sep 28 01:52:51 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6177 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -99.38
B = 45.00
C = 0.00
7.610
7.593
7.436
7.423
7.408
7.392
7.385
7.368
7.345
7.330
7.311
7.300
7.260
6.547
5.298
1.565
1.95
8.01
4.01
1.00
10
8
6
4
2
0
PPM

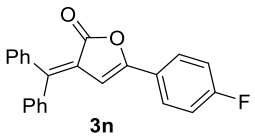

O
O
Ph
Ph
Cl

3m

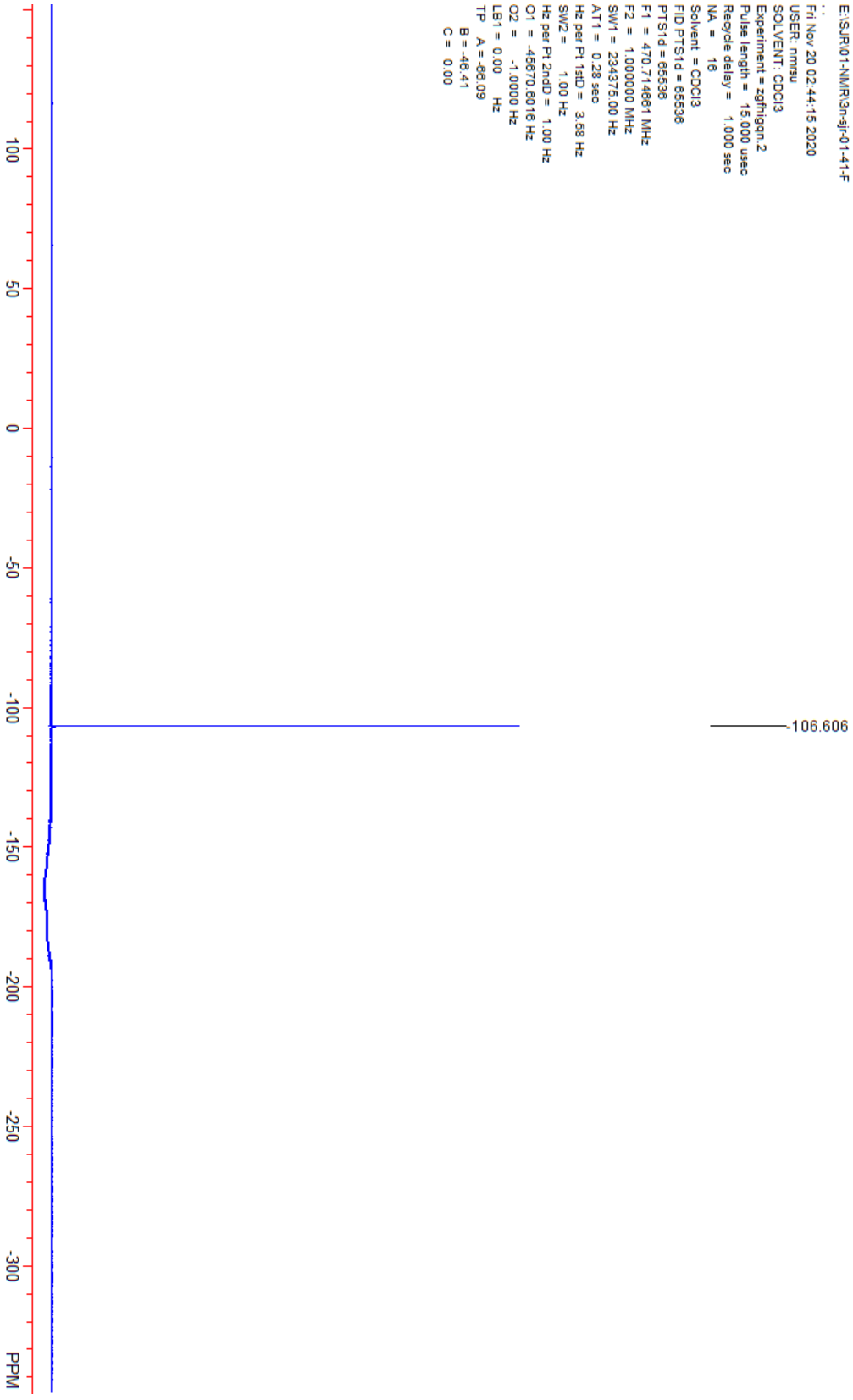

E:\SJR\01-NMR\3m-sjr-01-48-C
Sat Sep 28 15:42:12 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.9590 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 22.50
B = 95.63
C = 0.00
166.420
153.821
153.114
138.255
141.302
135.880
130.869
130.840
129.909
129.822
129.216
128.580
128.147
126.985
126.320
124.061
104.083
77.413
77.160
76.900
200
150
100
50
0PPM

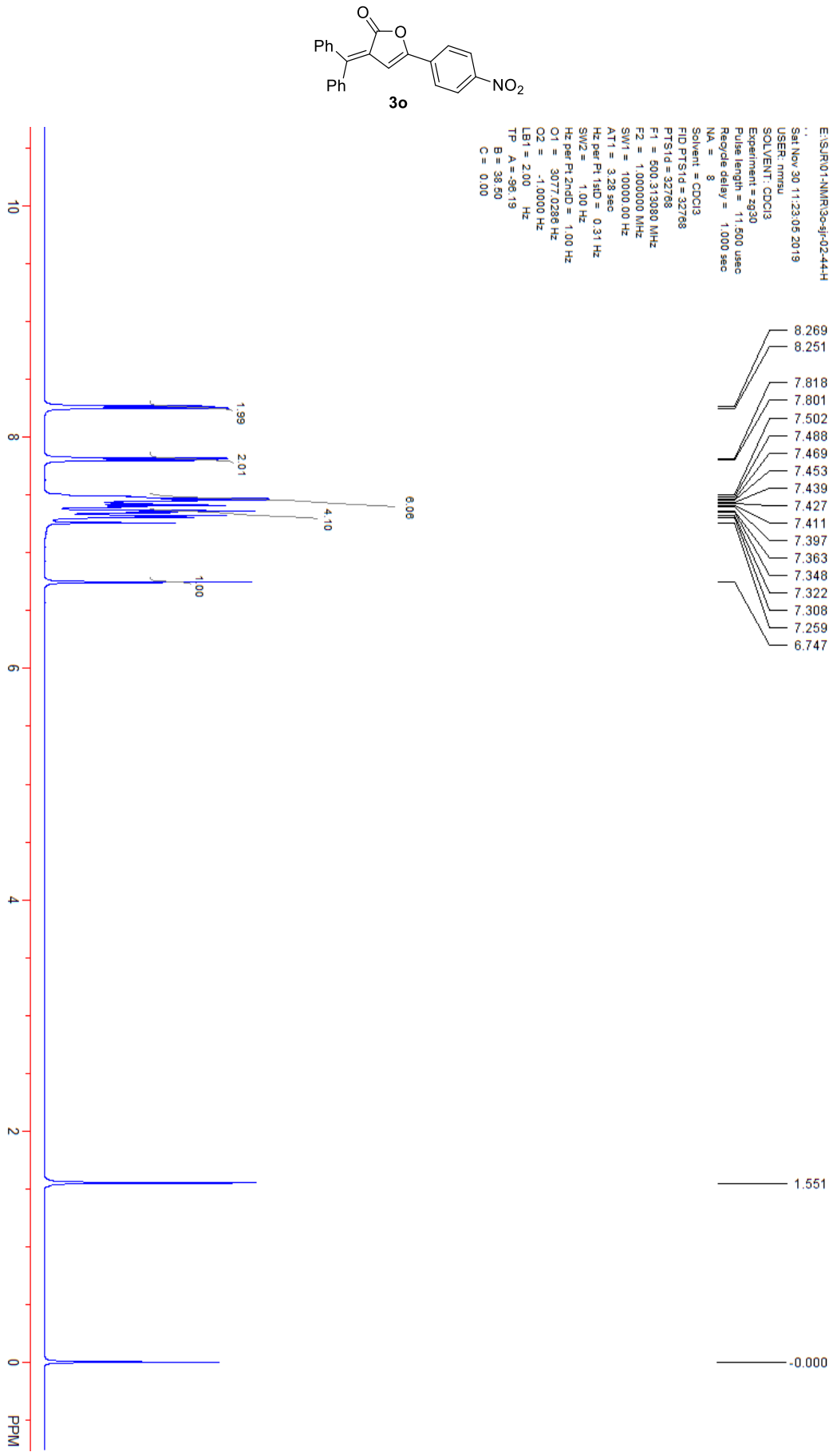

Ph
Ph
O
O
F
3n
E:\SJR\01-NMR\3n-sjr-01-41-H
Tue Sep 24 10:49:21 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.3130880 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.8177 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -89.65
B = 22.15
C = 0.00
7.676
7.666
7.658
7.648
7.450
7.433
7.429
7.419
7.407
7.392
7.378
7.375
7.346
7.344
7.330
7.327
7.317
7.313
7.307
7.297
7.260
7.116
7.098
7.081
6.498
5.298
1.558
2.02
6.12
3.99
1.99
1.00
10
8
6
4
2
PPM

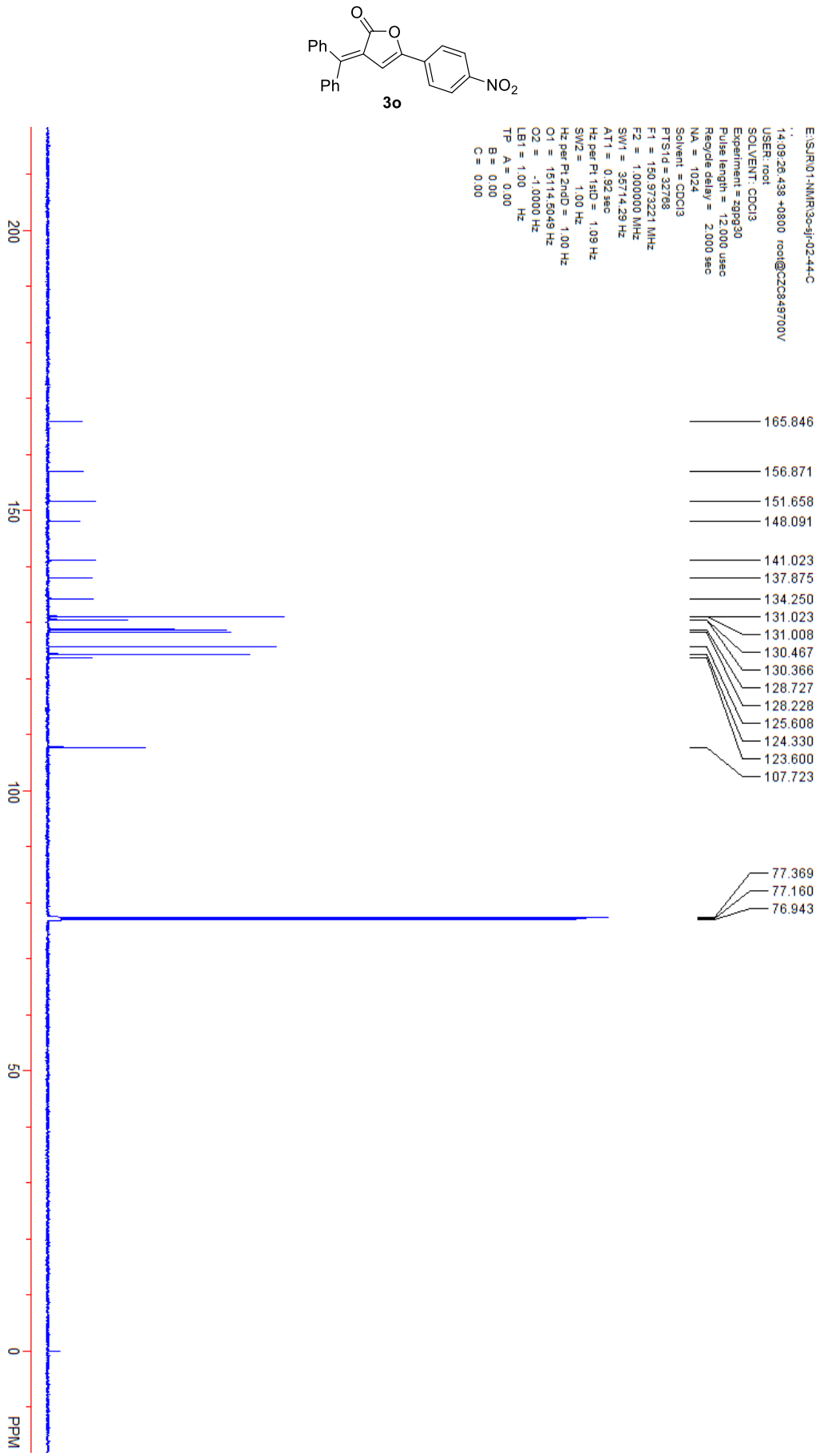

O
O
Ph
Ph
F
3n
E:\SJR\01-NMR\3n-sjr-01-41-C
Tue Sep 24 15:21:26 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.500 usec
Recycle delay = 2.000 sec
NA = 500
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8158628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 54.38
B = 50.63
C = 0.00
166.557
164.738
162.738
153.301
153.251
141.374
138.334
130.855
130.819
129.822
129.728
128.566
128.147
127.172
127.107
124.862
124.833
124.183
116.249
116.068
103.253
77.413
77.160
76.907
200
150
100
50
0
PPM

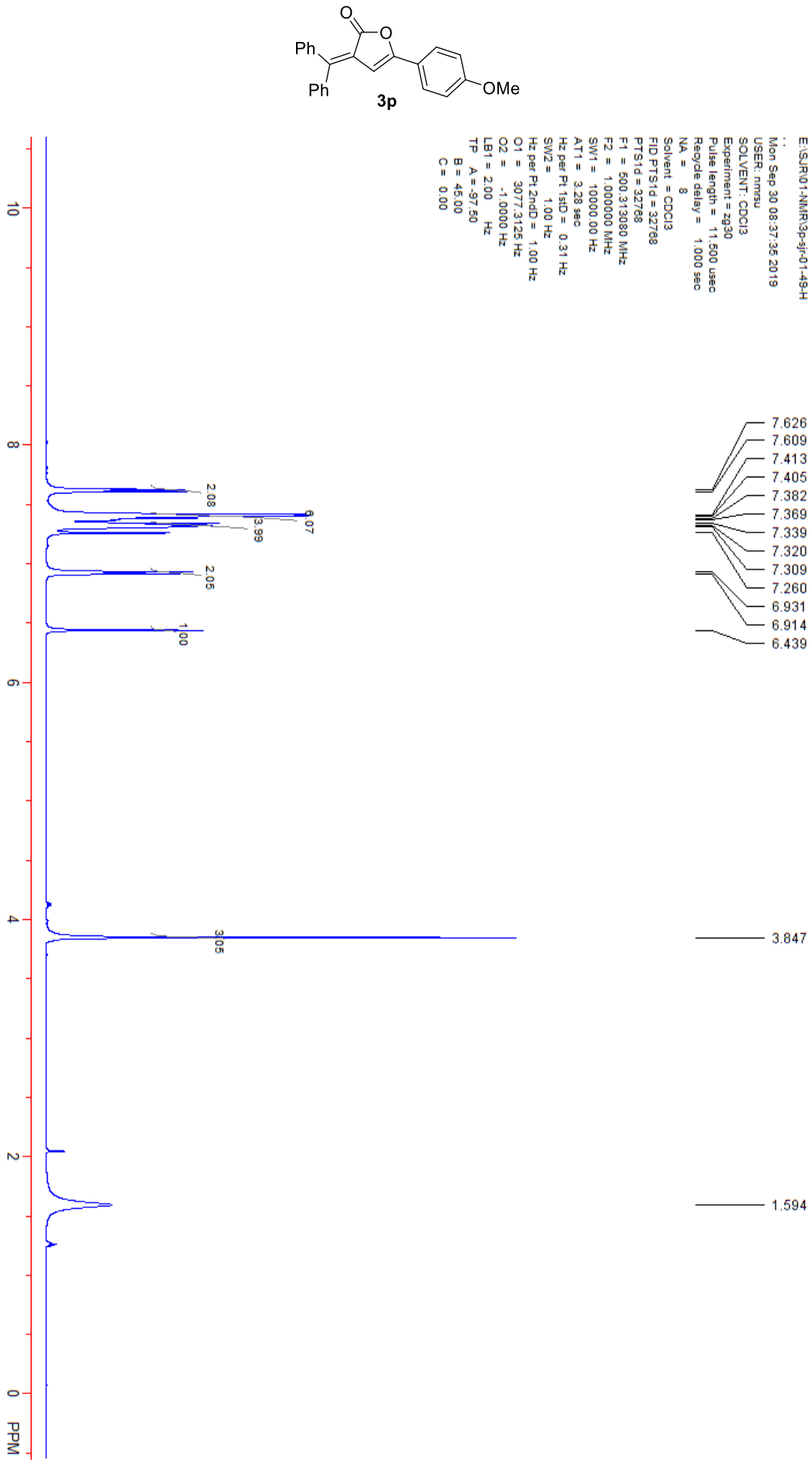

O
O
Ph
Ph
F

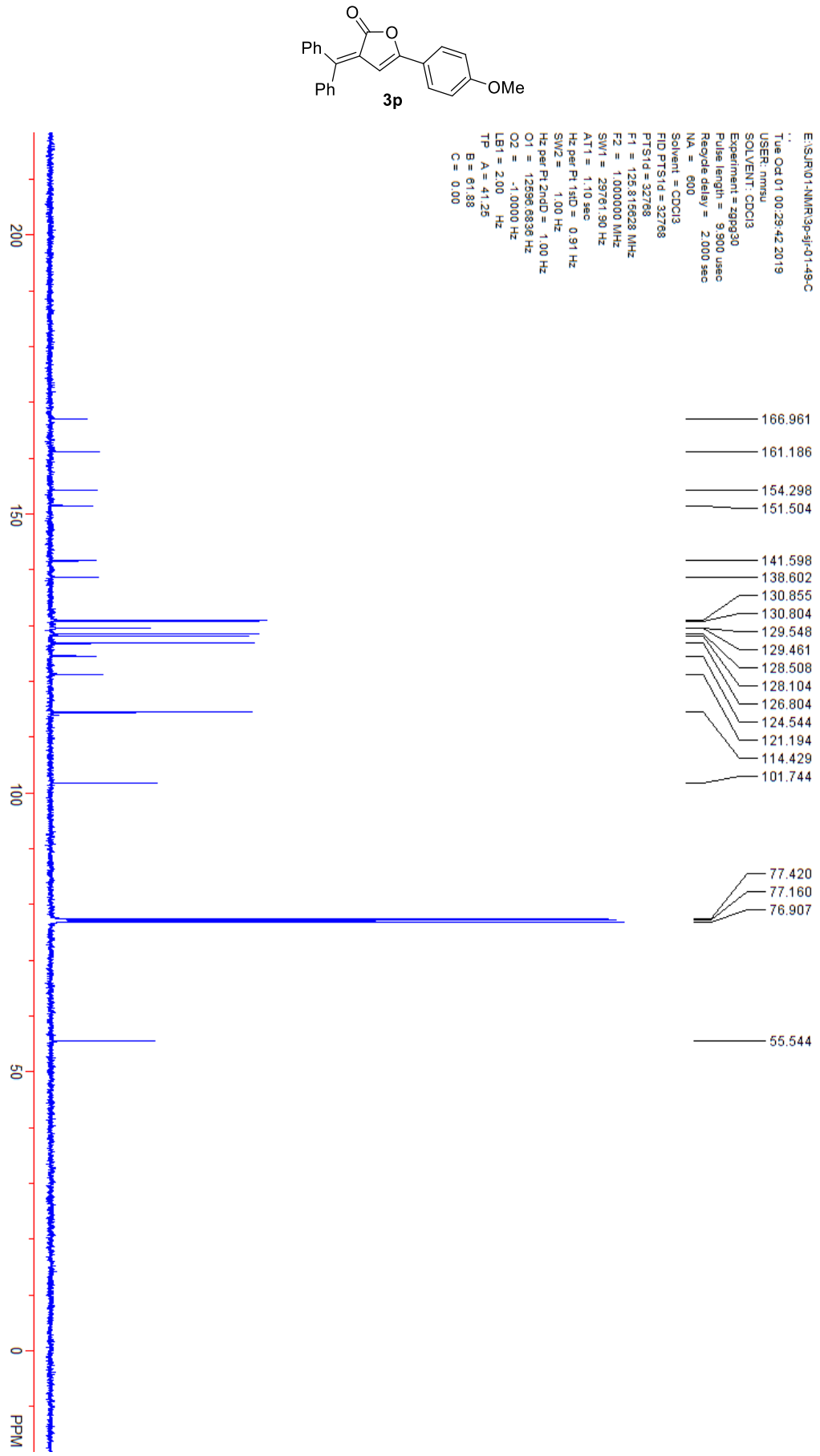
3n

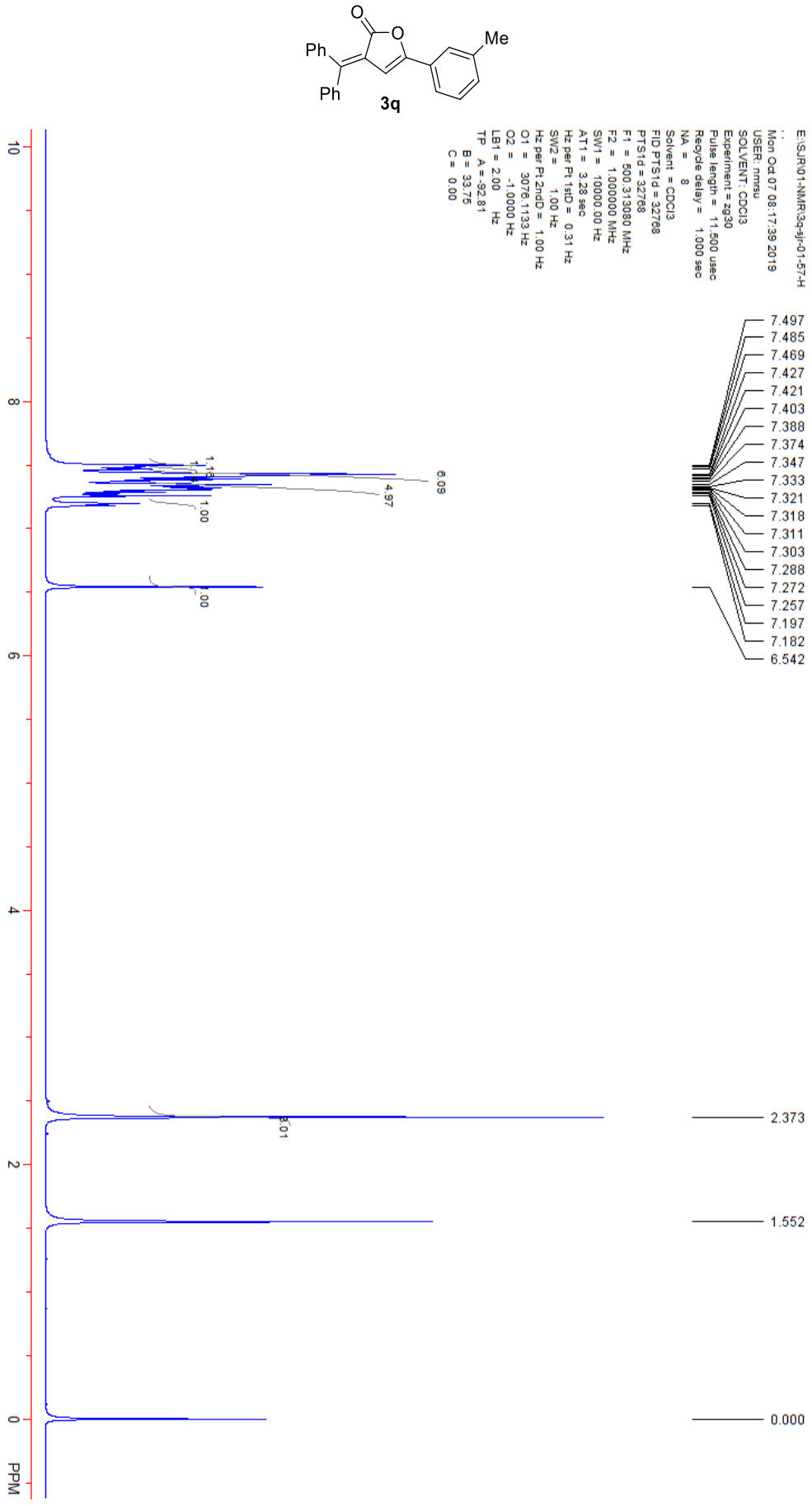

E:\SJR\01-NMR\3n-sjr-01-41-F
Fri Nov 20 02:44:15 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -45670.6016 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -66.09
B = -46.41
C = 0.00
-106.606
100
50
0
-50
-100
-150
-200
-250
-300
PPM

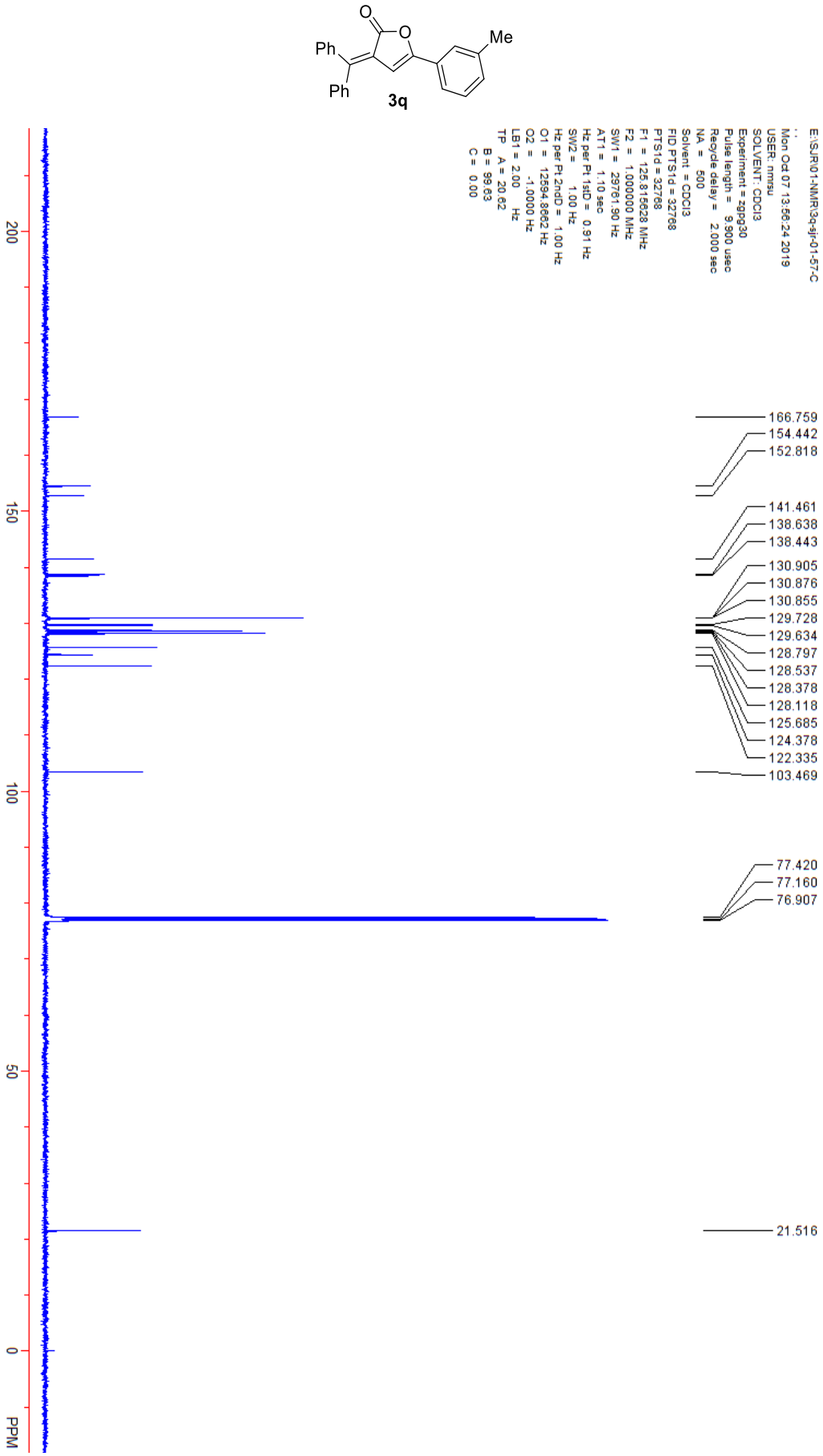

O
O
Ph
Ph
NO2
3o
E:\SJR\01-NMR\3o-sjr-02-44-H
Sat Nov 30 11:23:05 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -98.19
B = 38.50
C = 0.00
8.269
8.251
7.818
7.801
7.502
7.488
7.469
7.453
7.439
7.427
7.411
7.397
7.363
7.348
7.322
7.308
7.259
6.747
1.551
-0.000
1.99
2.01
6.06
4.10
1.00
10
8
6
4
2
0
PPM

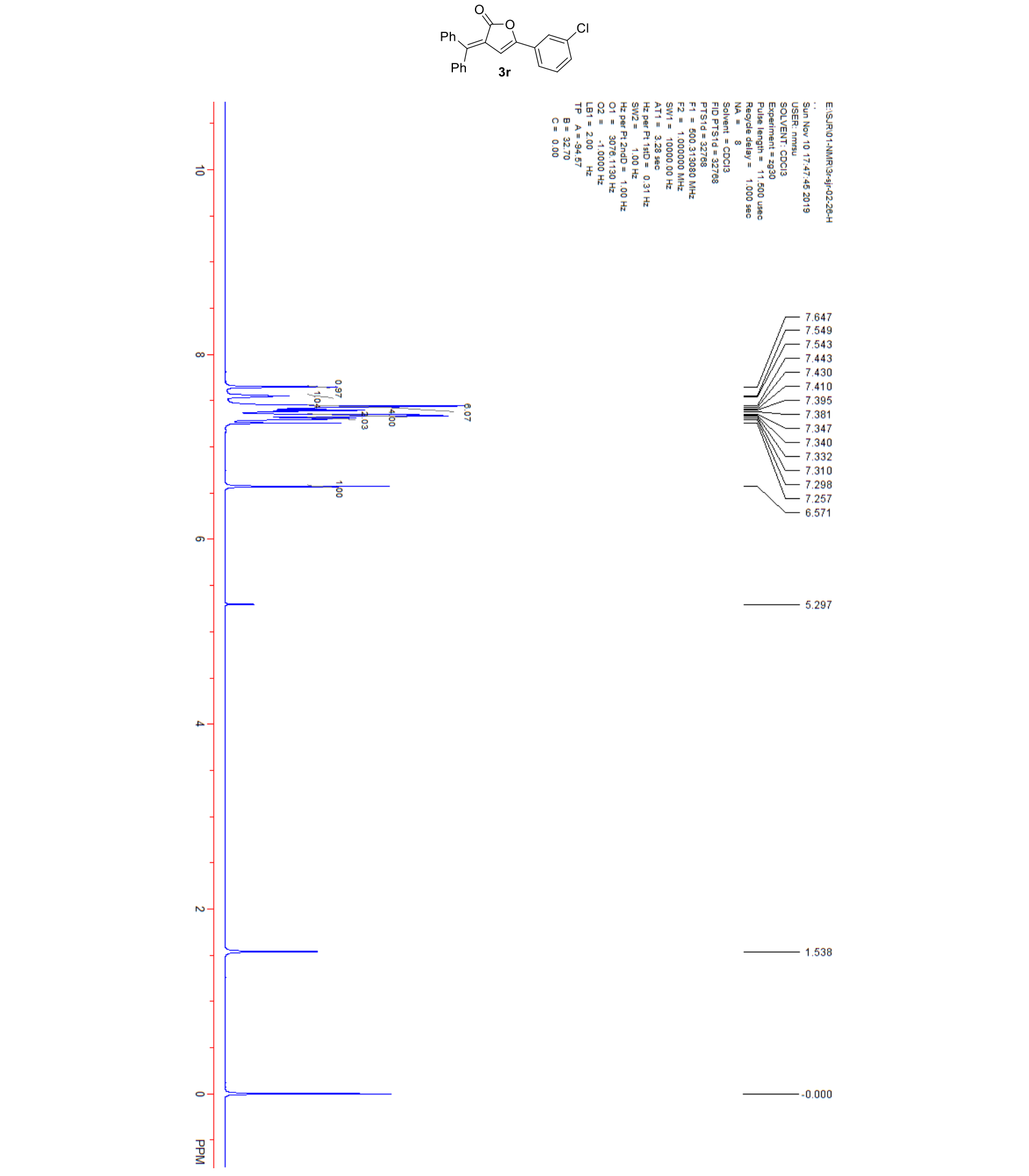

O
O
Ph
Ph
NO2
3o
E:\SJR\01-NMR\3o-sjr-02-44-C
14:09:26 438 +0800 root@CZC8497700V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
165.846
156.871
151.658
148.091
141.023
137.875
134.250
131.023
131.008
130.467
130.366
128.727
128.228
125.608
124.330
123.600
107.723
77.369
77.160
76.943
200
150
100
50
0
PPM

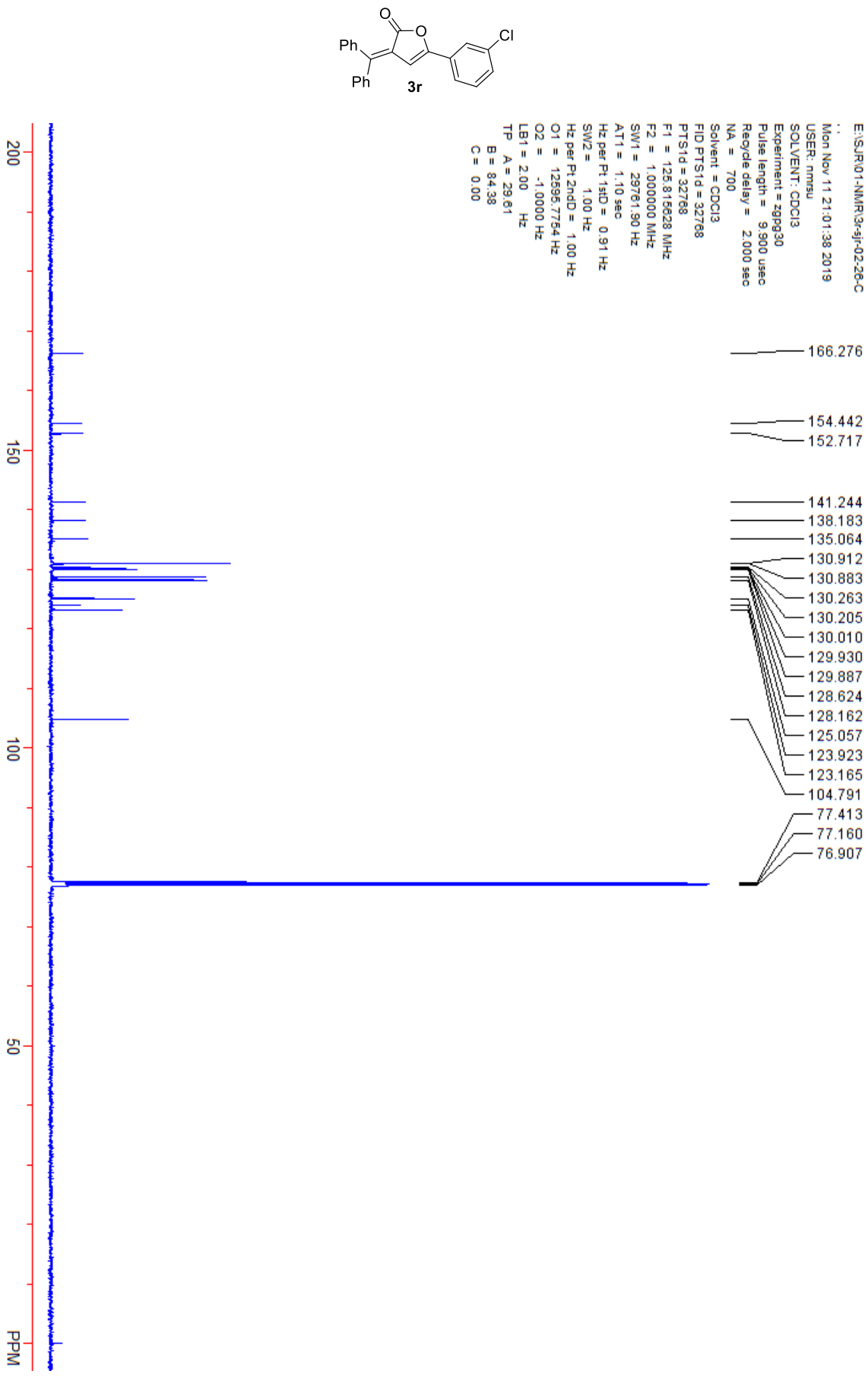

O
O
Ph
Ph
OMe
3p
E:\SJR\01-NMR\3p-sjr-01-49-H
Mon Sep 30 08:37:35 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3125 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -97.50
B = 45.00
C = 0.00
7.626
7.609
7.413
7.405
7.382
7.369
7.339
7.320
7.309
7.260
6.931
6.914
6.439
3.847
1.594
2.08
9.07
3.99
2.05
1.00
3.05
10
8
6
4
2
0
PPM

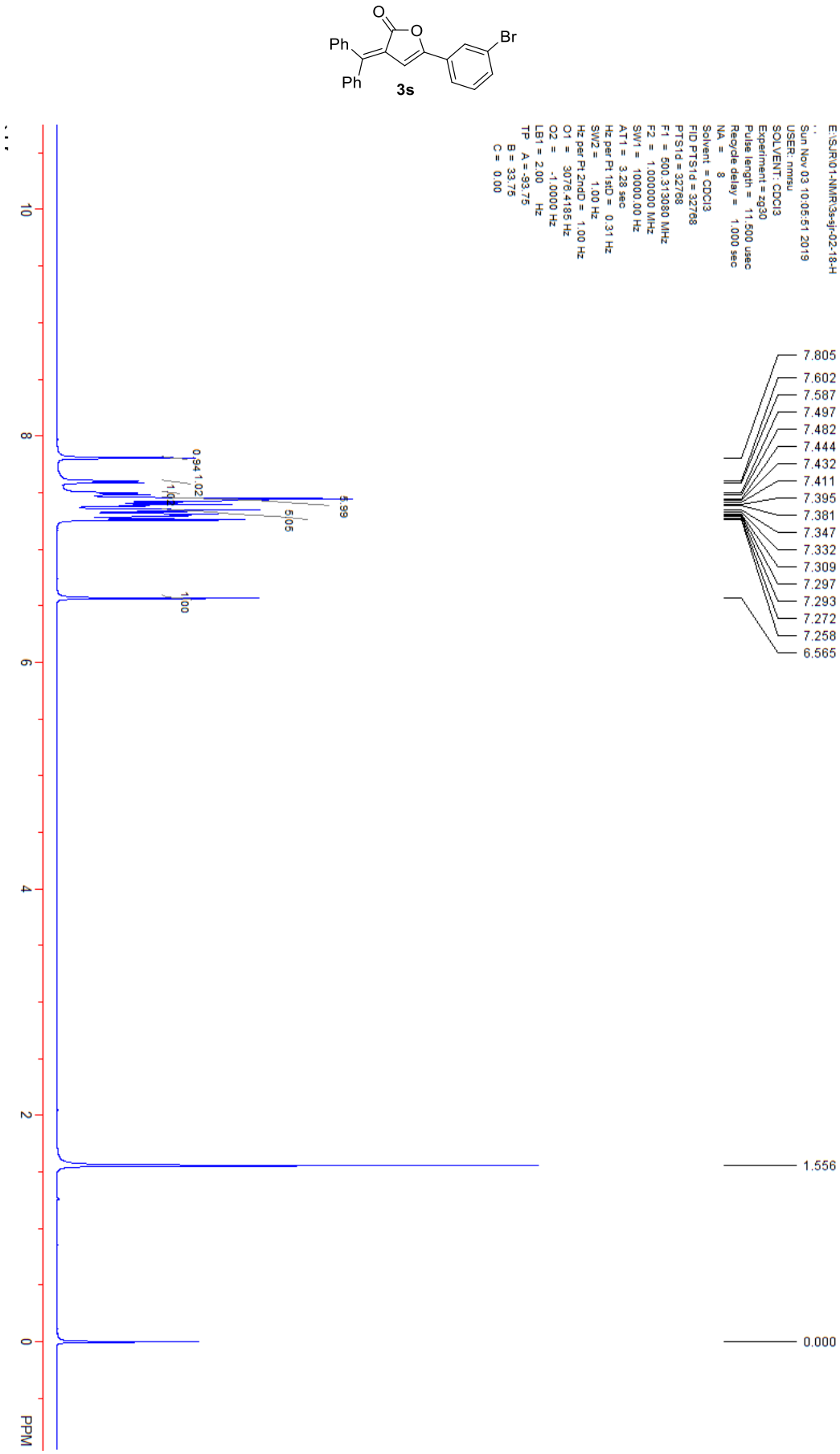

O
O
Ph
Ph
OMe
3p
E:\SJR\01-NMR\3p-sjr-01-49-C
Tue Oct 01 00:29:42 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12598.6836 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 41.25
B = 61.88
C = 0.00
166.961
161.186
154.298
151.504
141.598
138.602
130.855
130.804
129.548
129.461
128.508
128.104
126.804
124.544
121.194
114.429
101.744
77.420
77.160
76.907
55.544
200
150
100
50
0
PPM

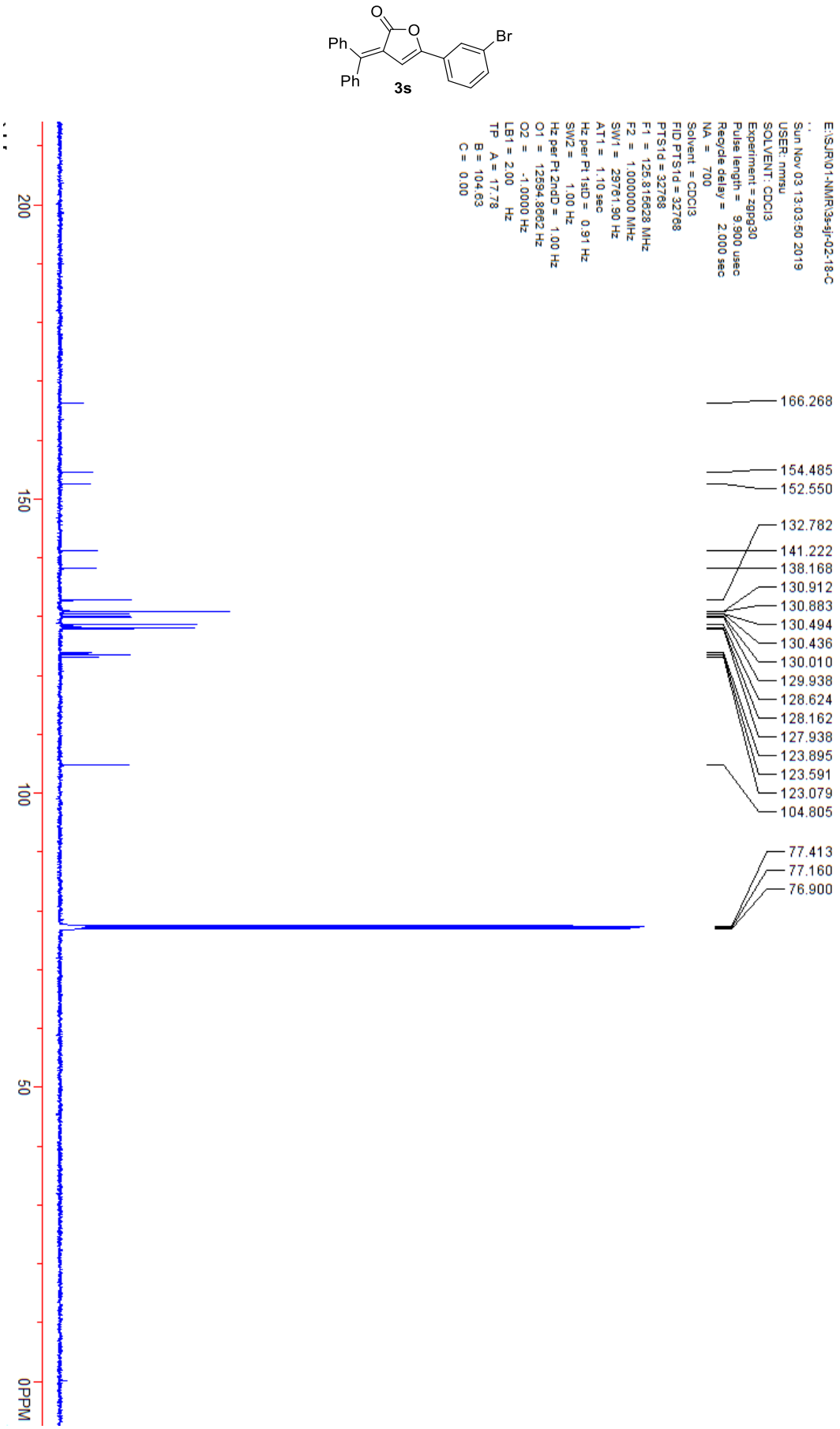

Ph
Ph
O
O
Me
3q
E:\SJR\01-NMR\3q-sjr-01-57-H
Mon Oct 07 08:17:39 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.1133 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -92.81
B = 33.75
C = 0.00
7.497
7.485
7.469
7.427
7.421
7.403
7.388
7.374
7.347
7.333
7.321
7.318
7.311
7.303
7.288
7.272
7.257
7.197
7.182
6.542
2.373
1.552
0.000
6.09
4.97
1.00
1.00
3.01
PPM

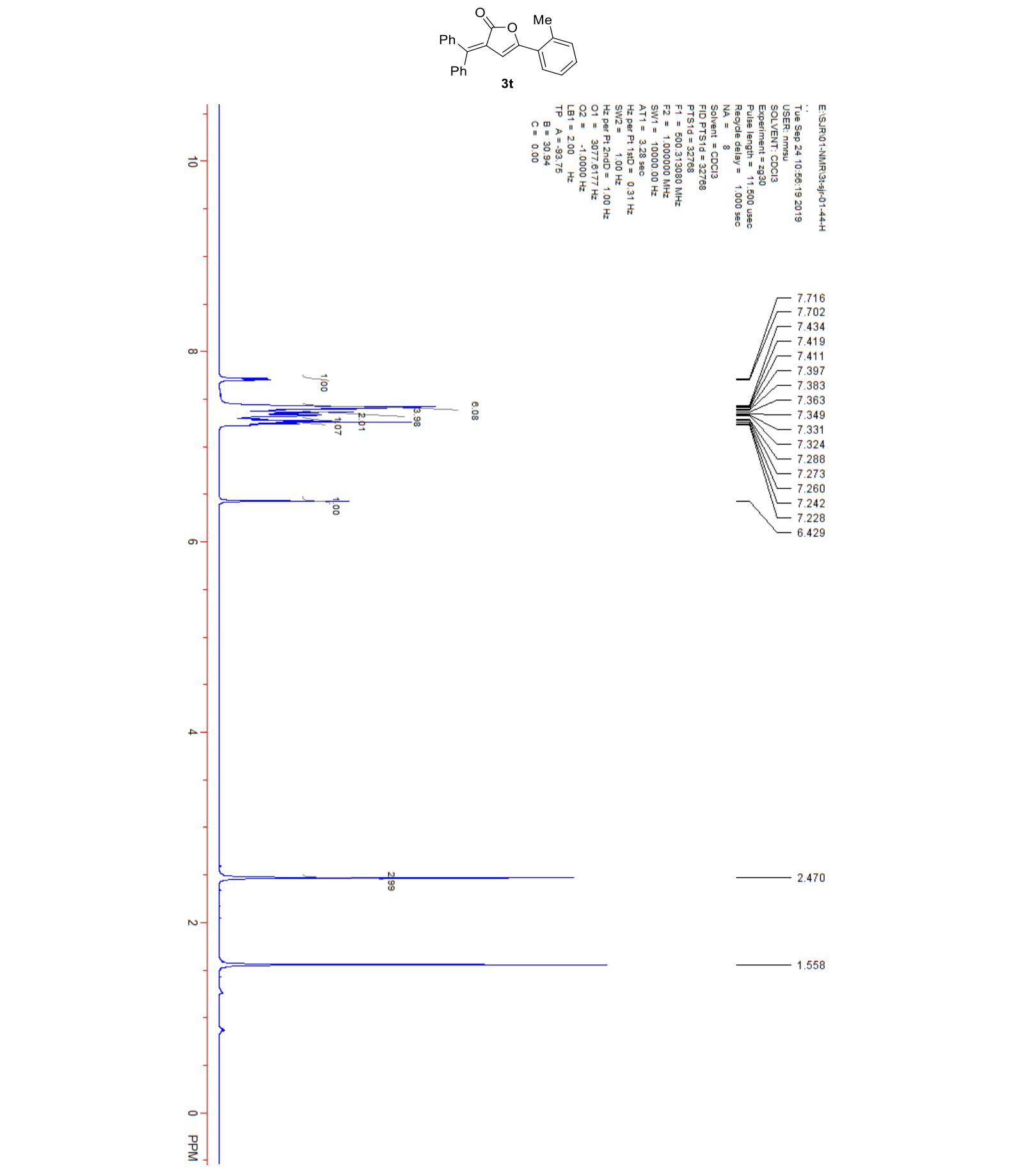

O
O
Ph
Ph
Me
3q
E:\SJR\01-NMR\3q-sjr-01-57-C
Mon Oct 07 13:58:24 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 500
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8662 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 20.62
B = 99.63
C = 0.00
166.759
154.442
152.818
141.461
138.638
138.443
130.905
130.876
130.855
129.728
129.634
128.797
128.537
128.378
128.118
125.685
124.378
122.335
103.469
77.420
77.160
76.907
21.516
200
150
100
50
0
PPM

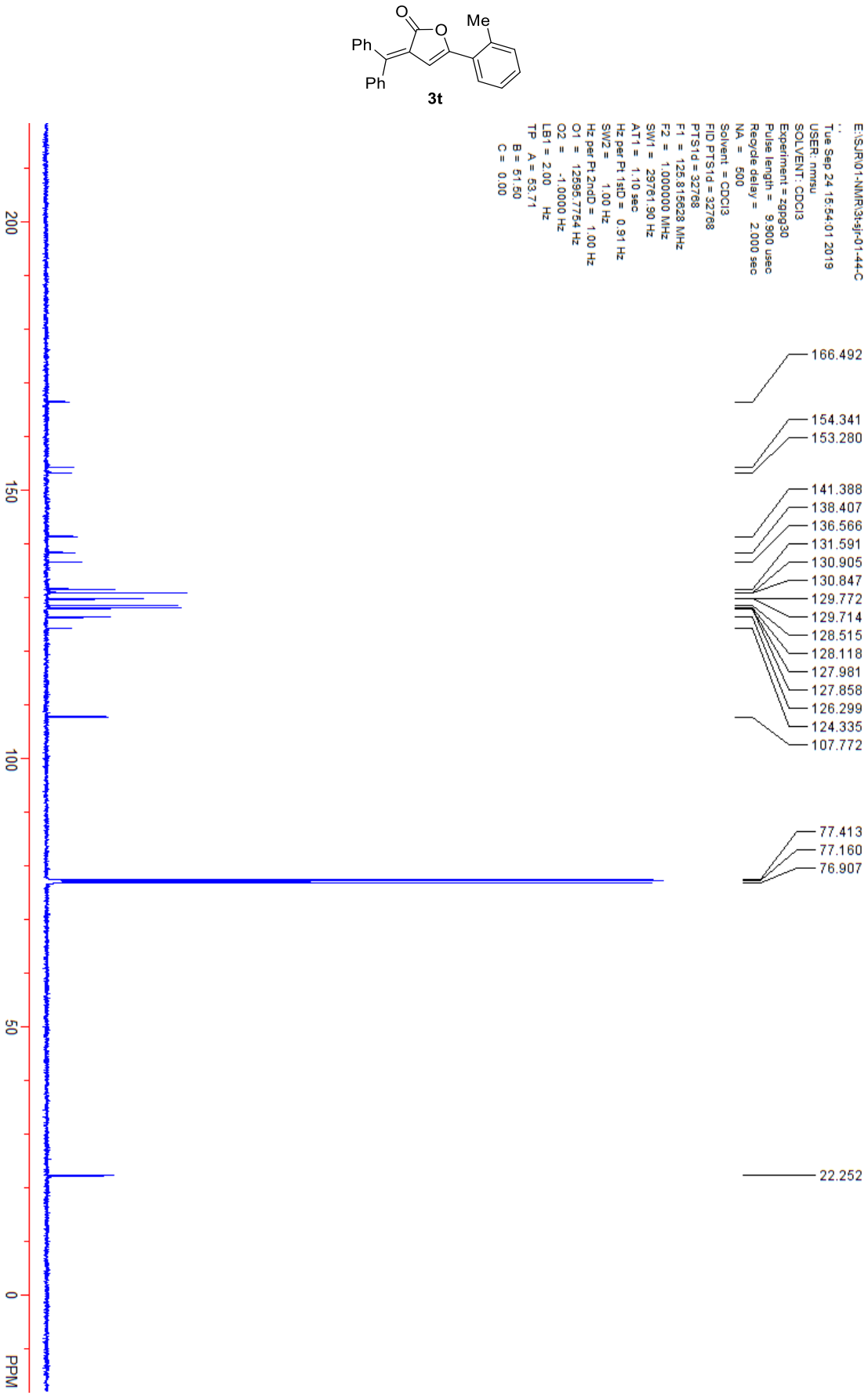

O
O
Cl
Ph
Ph
3r
E:\SJR\01-NMR\3r-sjr-02-28-H
Sun Nov 10 17:47:45 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.1130 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -94.57
B = 32.70
C = 0.00
7.647
7.549
7.543
7.443
7.430
7.410
7.395
7.381
7.347
7.340
7.332
7.310
7.298
7.257
6.571
5.297
1.538
-0.000
0.87
1.04
2.03
4.00
6.07
1.00
10
8
6
4
2
0
PPM

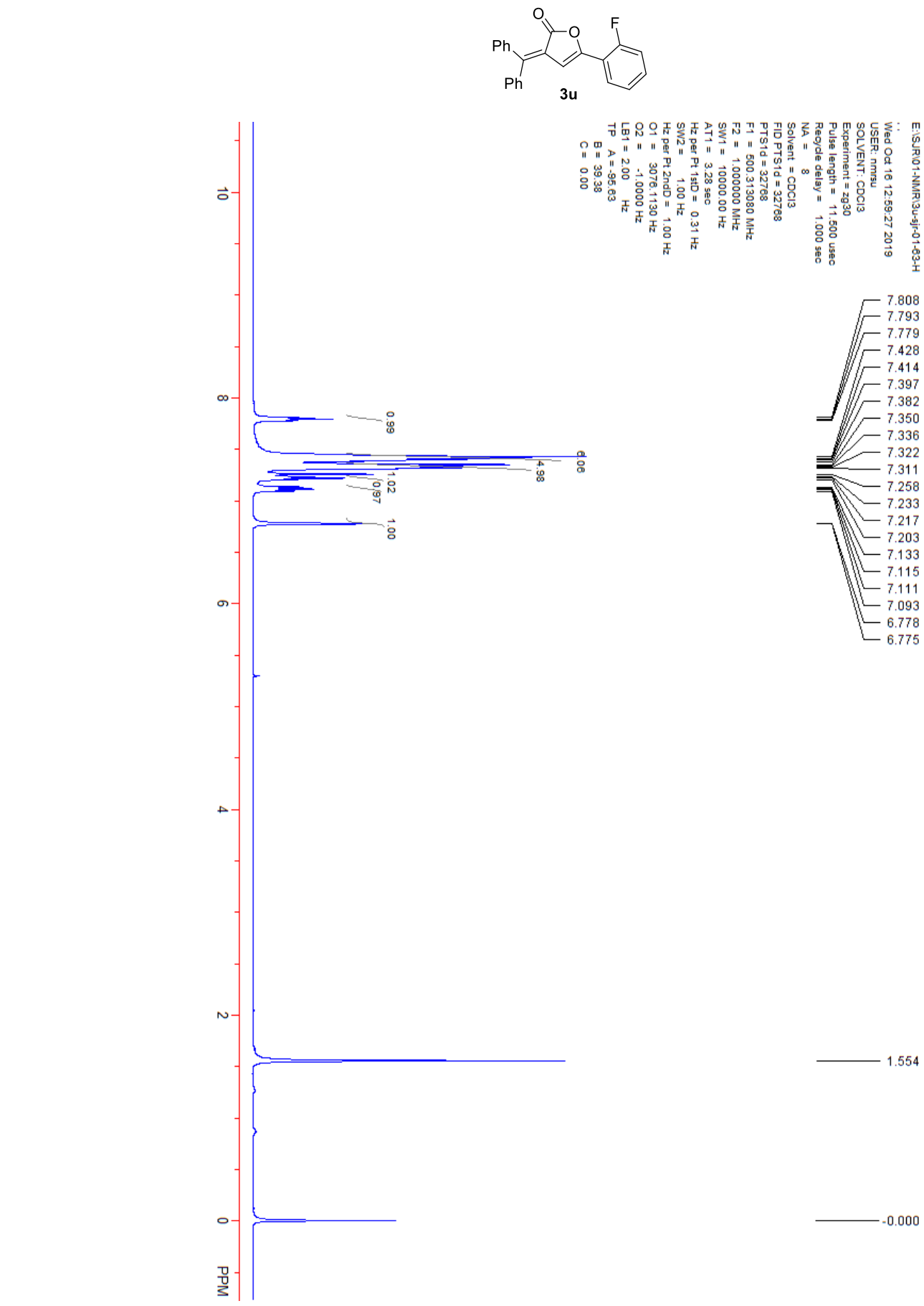

O
O
Ph
Ph
Cl
3r
E:\SJR\01-NMR\3r-sjr-02-28-C
Mon Nov 11 21:01:38 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 29.61
B = 84.38
C = 0.00
166.276
154.442
152.717
141.244
138.183
135.064
130.912
130.883
130.263
130.205
130.010
129.930
129.887
128.624
128.162
125.057
123.923
123.165
104.791
77.413
77.160
76.907
200
150
100
50
PPM

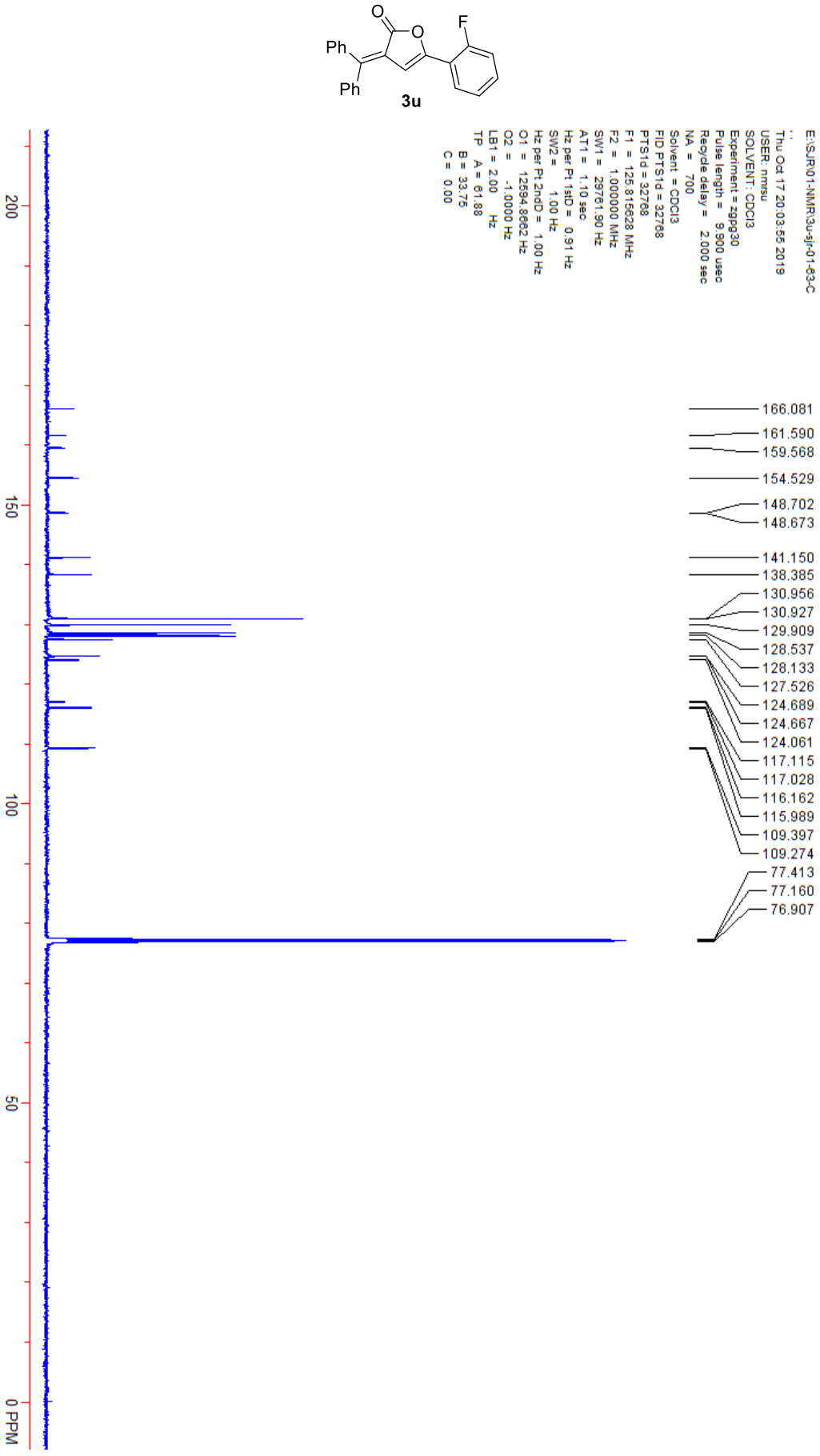

Ph
Ph
O
O
Br
3s
E:\SJR\01-NMR\3s-sjr-02-18-H
Sun Nov 03 10:05:51 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4185 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -93.75
B = 33.75
C = 0.00
7.805
7.602
7.587
7.497
7.482
7.444
7.432
7.411
7.395
7.381
7.347
7.332
7.309
7.297
7.293
7.272
7.258
6.565
1.556
0.000
0.94
1.02
1.01
5.99
5.05
1.00
10
8
6
4
2
0
PPM

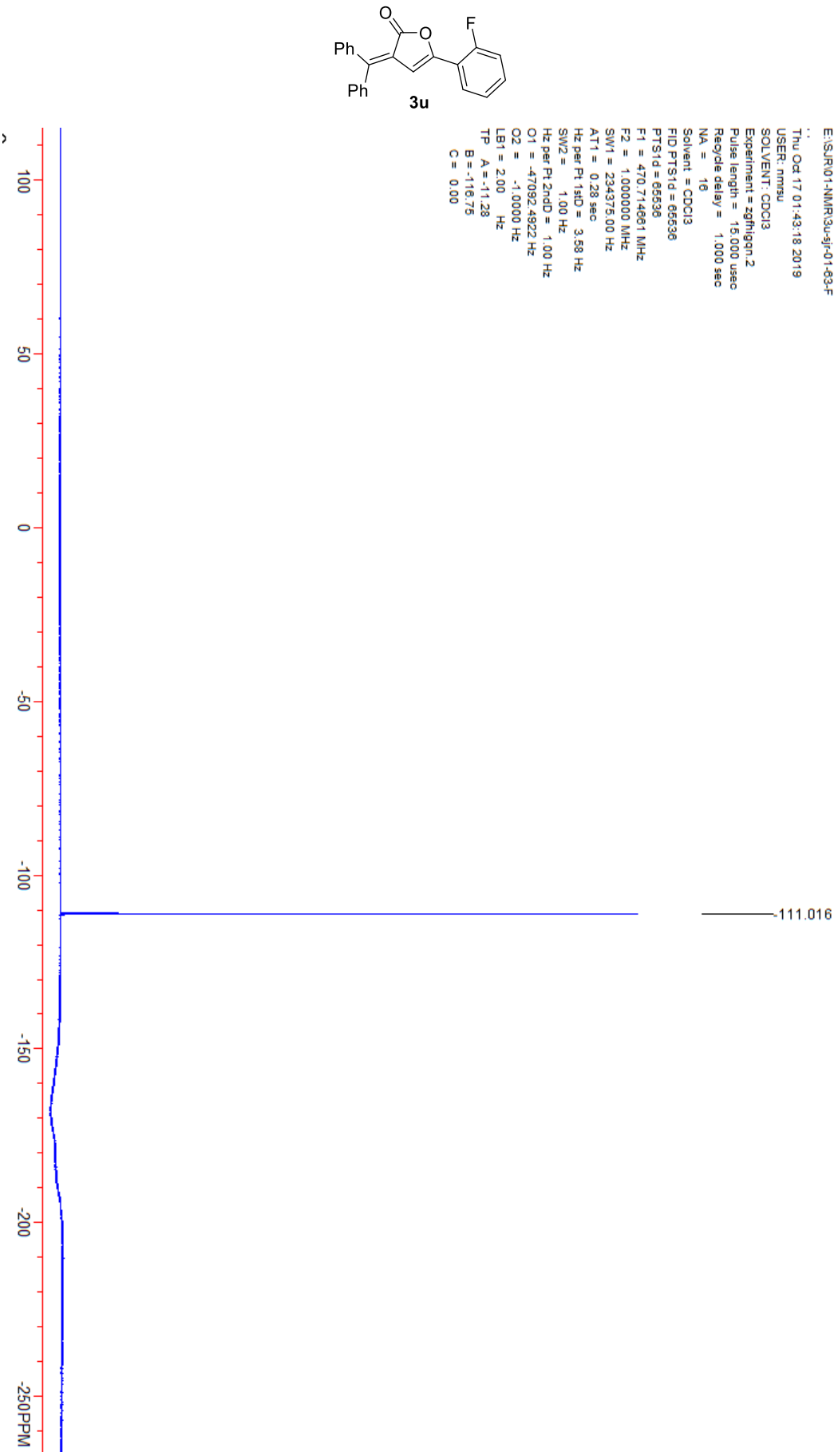

Ph
Ph
O
O
Br
3s
E:\SJR\01-NMR\3s-sjl-02-18-C
Sun Nov 03 13:03:50 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8662 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 17.78
B = 104.63
C = 0.00
166.268
154.485
152.550
132.782
141.222
138.168
130.912
130.883
130.494
130.436
130.010
129.938
128.624
128.162
127.938
123.895
123.591
123.079
104.805
77.413
77.160
76.900
200
150
100
50
0PPM

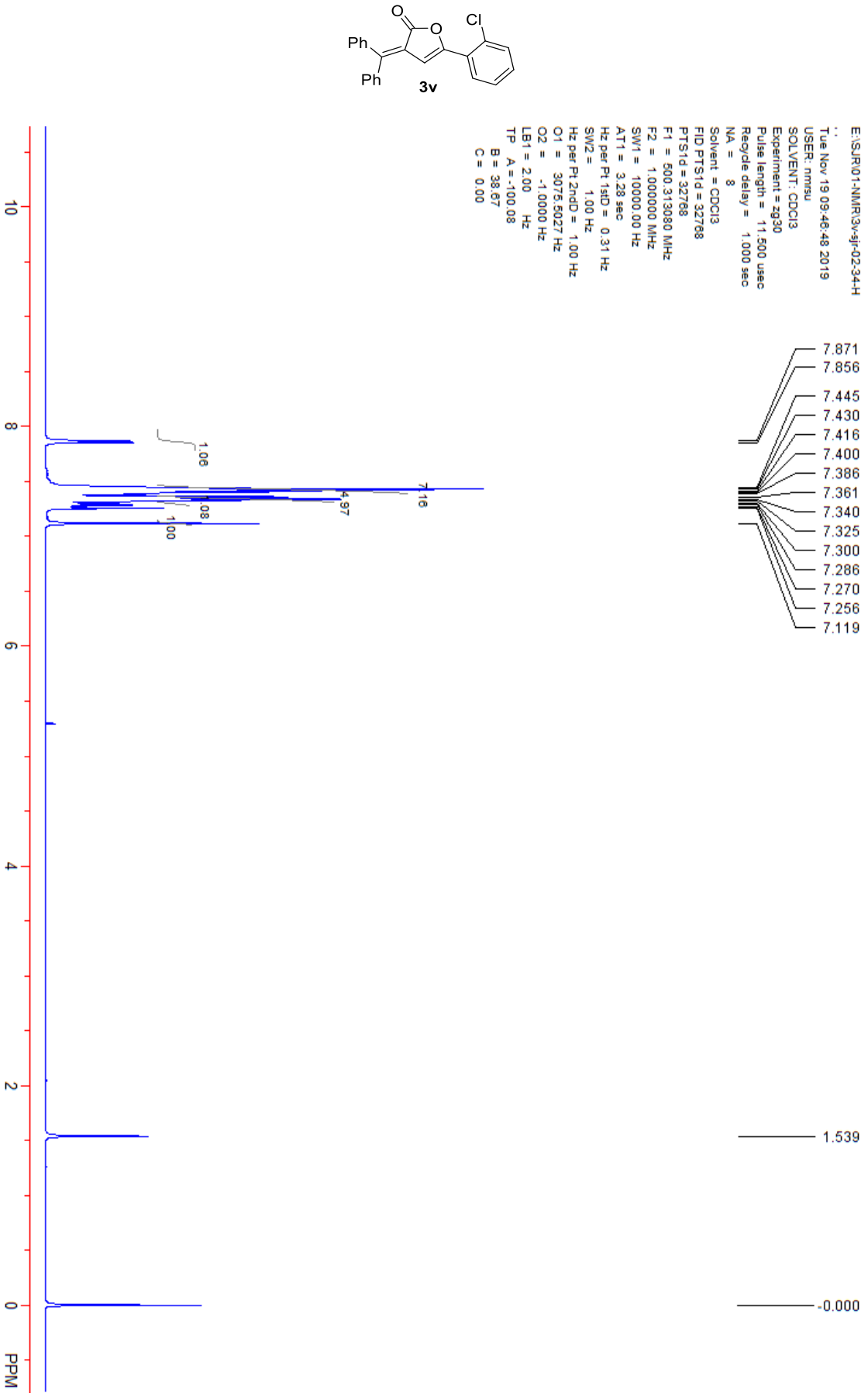

Ph
Ph
O
O
Me
3t
E:\SJR\01-NMR\3t-sjr-01-44-H
Tue Sep 24 10:56:19 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6177 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -93.75
B = 30.94
C = 0.00
7.716
7.702
7.434
7.419
7.411
7.397
7.383
7.363
7.349
7.331
7.324
7.288
7.273
7.260
7.242
7.228
6.429
2.470
1.558
1.00
6.08
3.98
2.01
1.07
1.00
2.99
10
8
6
4
2
0
PPM

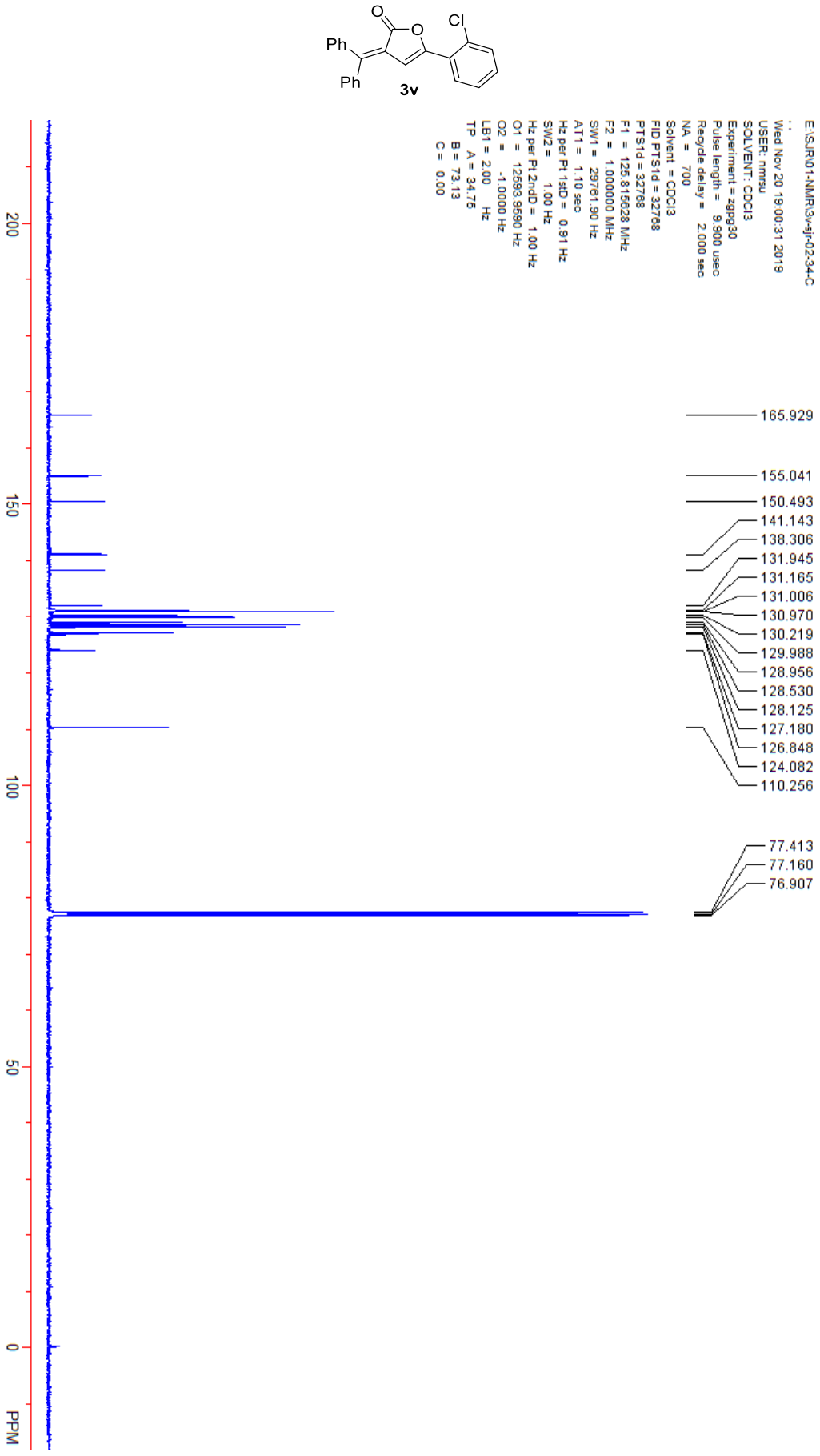

O
O
Me
Ph
Ph
3t
E:\SJR\01-NMR\3t-sjr-01-44-C
Tue Sep 24 15:54:01 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 500
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 53.71
B = 51.50
C = 0.00
166.492
154.341
153.280
141.388
138.407
136.566
131.591
130.905
130.847
129.772
129.714
128.515
128.118
127.981
127.858
126.299
124.335
107.772
77.413
77.160
76.907
22.252
200
150
100
50
0
PPM

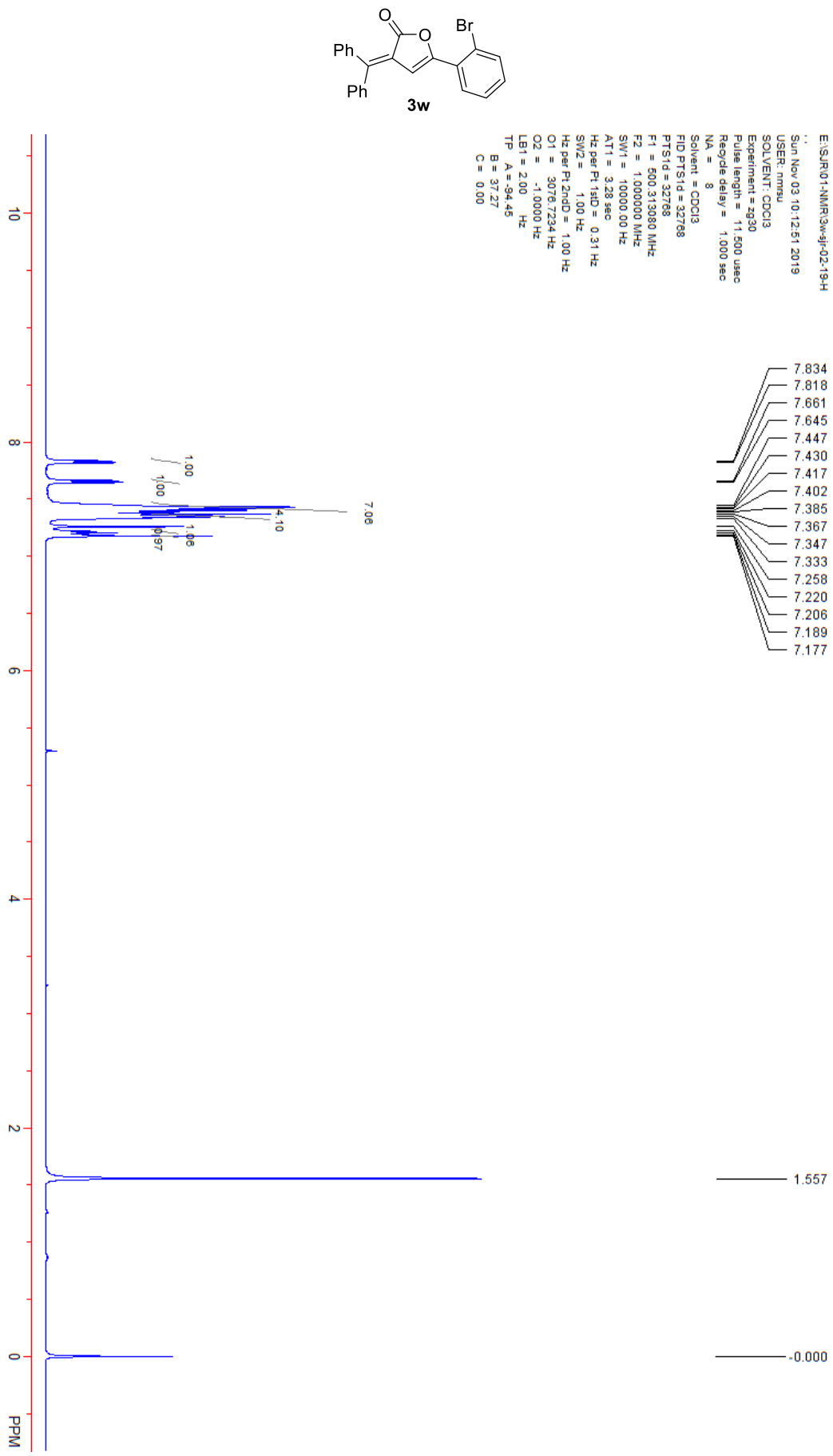

O
O
F
Ph
Ph
3u
E:\SJR\01-NMR\3u-sjr-01-63-H
Wed Oct 16 12:59:27 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.1130 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -95.63
B = 39.38
C = 0.00
7.808
7.793
7.779
7.428
7.414
7.397
7.382
7.350
7.336
7.322
7.311
7.258
7.233
7.217
7.203
7.133
7.115
7.111
7.093
6.778
6.775
1.554
-0.000
0.99
6.06
4.98
1.02
0.97
1.00
10
8
6
4
2
0
PPM

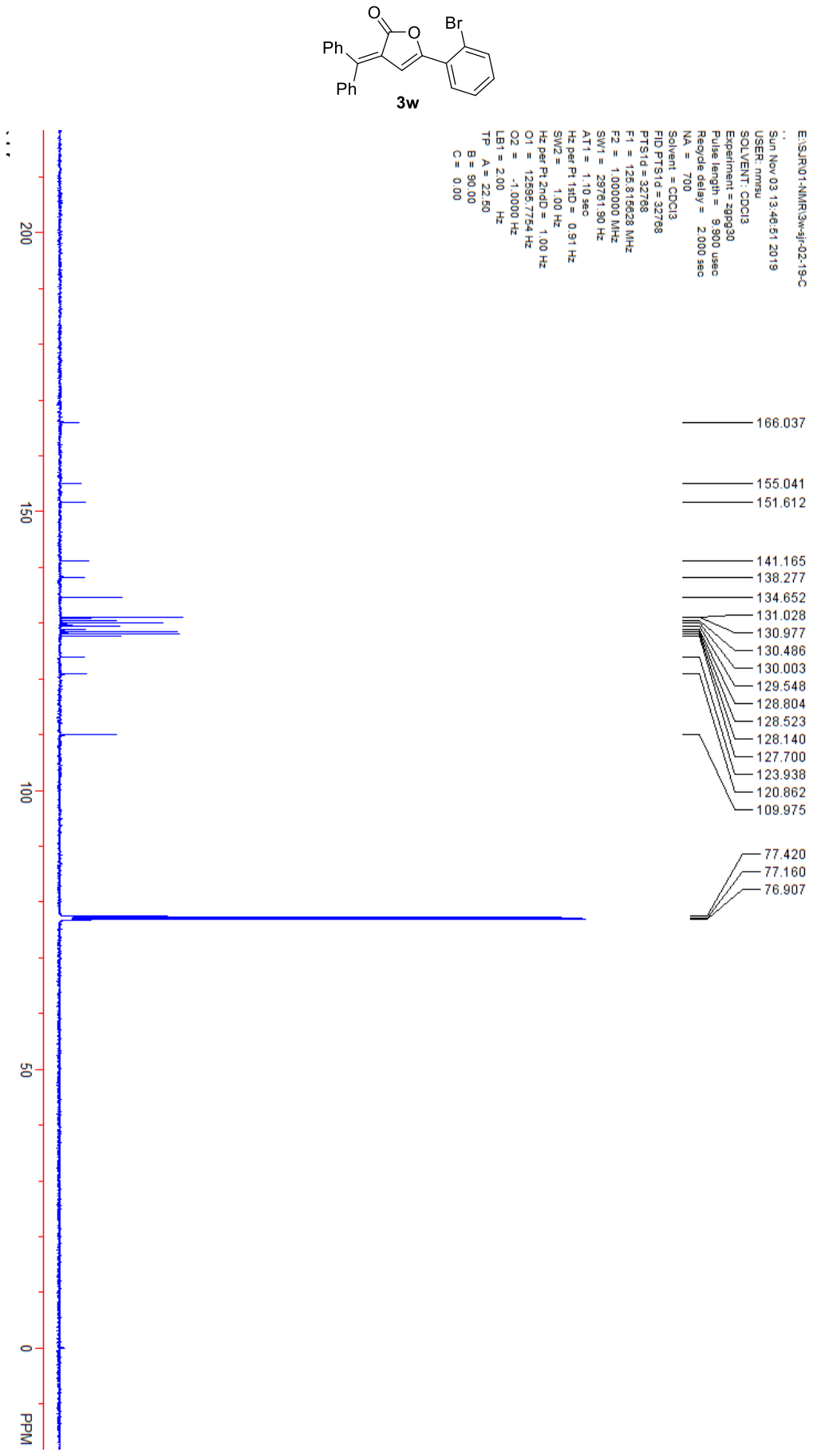

O
O
F
Ph
Ph
3u
E:\SJR\01-NMR\3u-sjr-01-63-C
Thu Oct 17 20:03:56 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.816628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8662 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 61.88
B = 33.75
C = 0.00
166.081
161.590
159.568
154.529
148.702
148.673
141.150
138.385
130.956
130.927
129.909
128.537
128.133
127.526
124.689
124.667
124.061
117.115
117.028
116.162
115.989
109.397
109.274
77.413
77.160
76.907
200
150
100
50
0 PPM

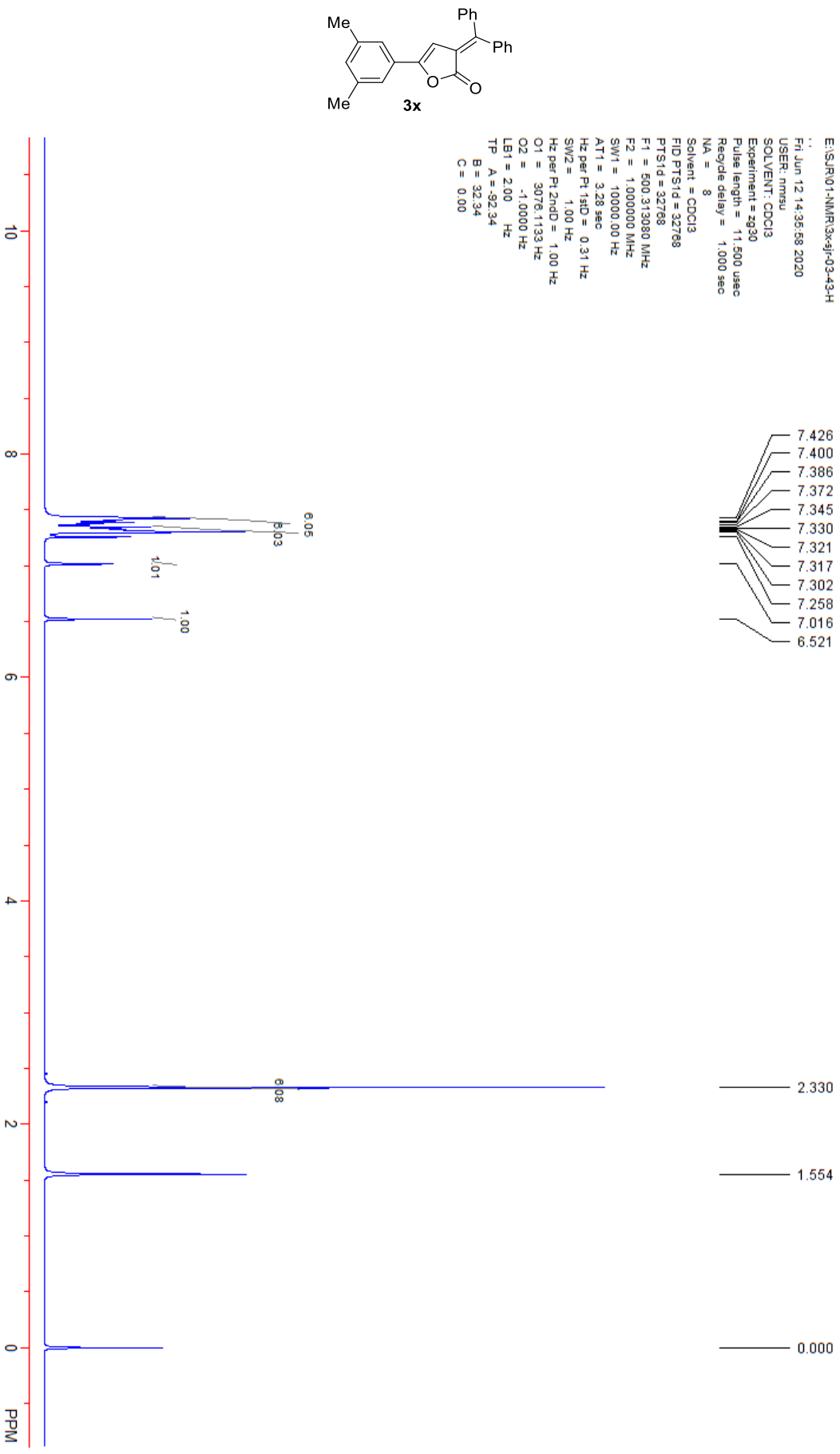

O
O
F
Ph
Ph
3u
E:\SJR\01-NMR\3u-sjr-01-63-F
Thu Oct 17 01:43:18 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.7146861 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47092.4922 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -11.28
B = -116.75
C = 0.00
-111.016
100
50
0
-50
-100
-150
-200
-250PPM

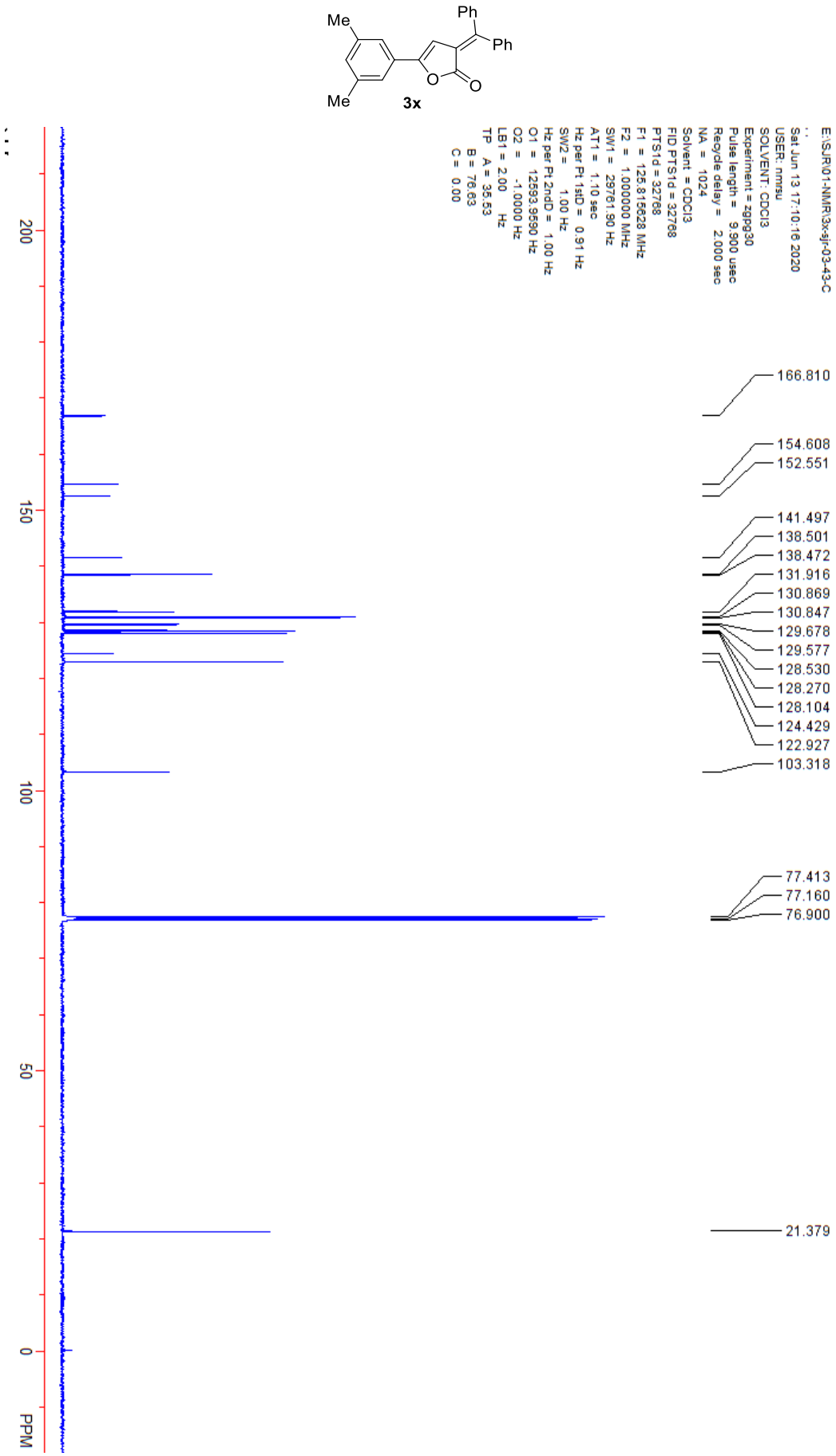

O
O
Cl
Ph
Ph
3v
E:\SJR\01-NMR\3v-sjr-02-34-H
Tue Nov 19 09:46:48 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3075.5027 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -100.08
B = 38.67
C = 0.00
7.871
7.856
7.445
7.430
7.416
7.400
7.386
7.361
7.340
7.325
7.300
7.286
7.270
7.256
7.119
1.539
-0.000
1.06
7.16
4.97
1.08
1.00
10
8
6
4
2
0
PPM

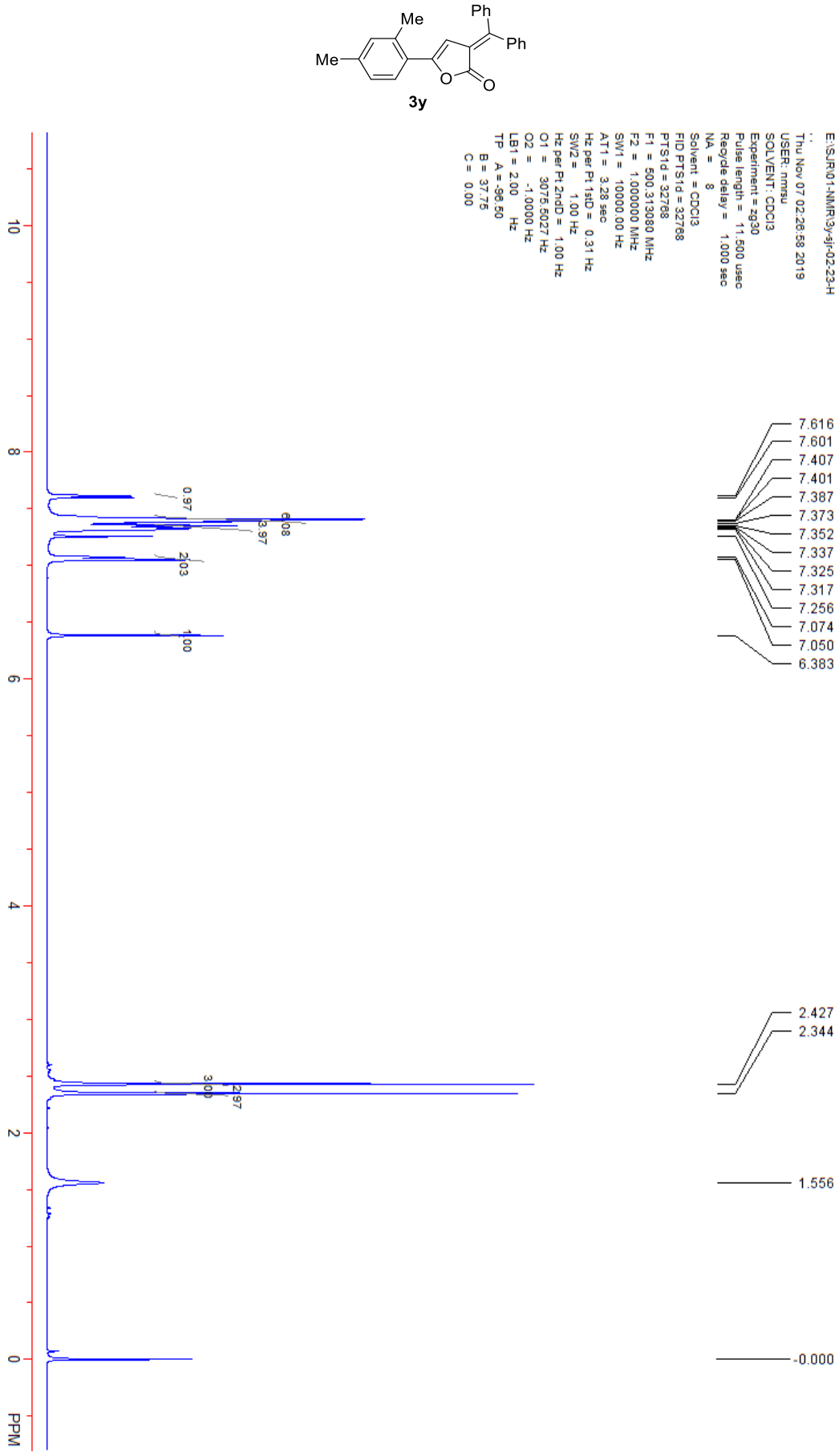

O
O
Cl
Ph
Ph
3v
E:\SJR\01-NMR\3v-sjr-02-34-C
Wed Nov 20 19:00:31 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.9590 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 34.75
B = 73.13
C = 0.00
165.929
155.041
150.493
141.143
138.306
131.945
131.165
131.006
130.970
130.219
129.988
128.956
128.530
128.125
127.180
126.848
124.082
110.256
77.413
77.160
76.907
200
150
100
50
0
PPM

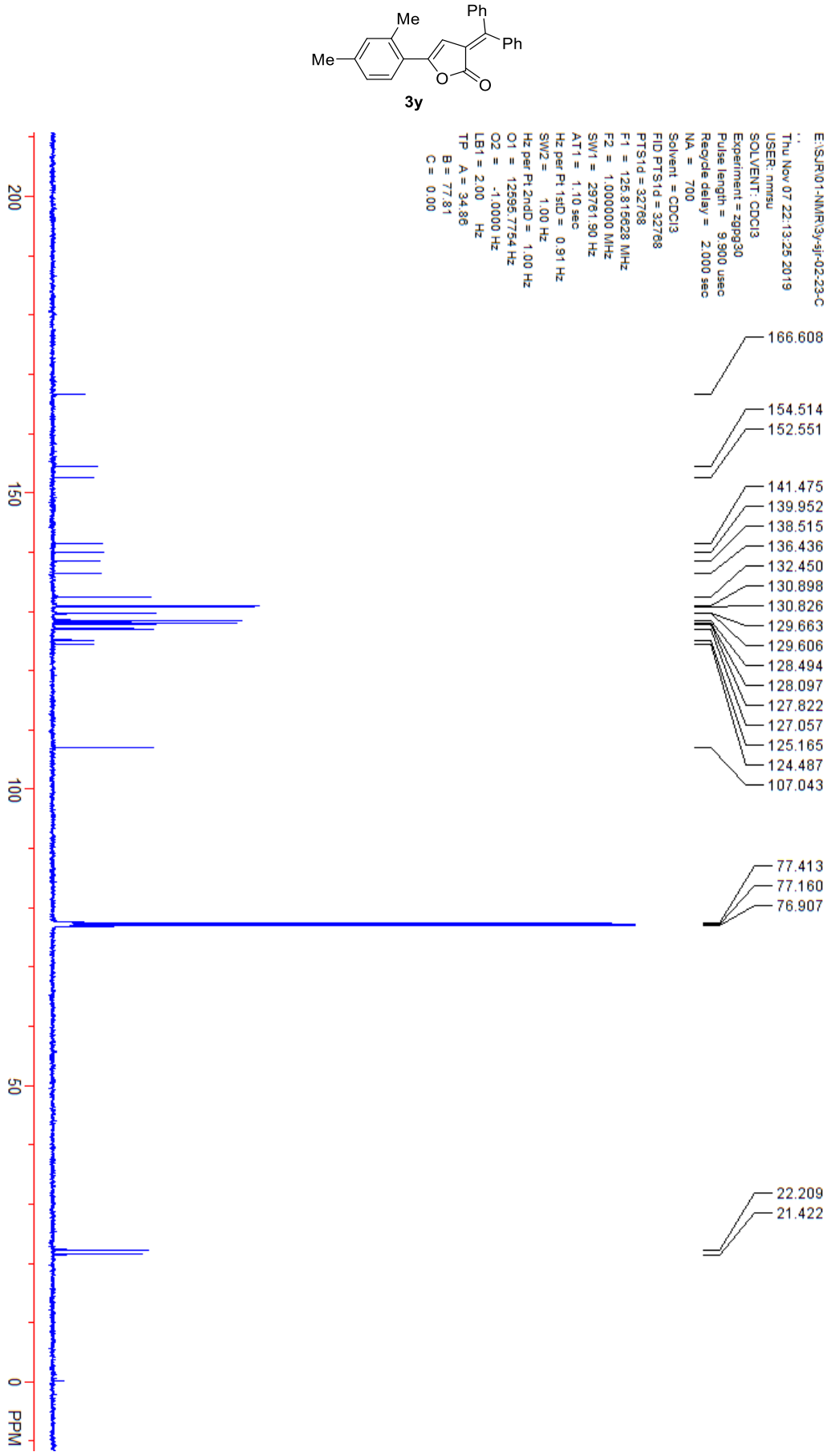

O
O
Br
Ph
Ph
3w
E:\SJR\01-NMR\3w-sjr-02-19-H
Sun Nov 03 10:12:51 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.7234 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -94.45
B = 37.27
C = 0.00
7.834
7.818
7.661
7.645
7.447
7.430
7.417
7.402
7.385
7.367
7.347
7.333
7.258
7.220
7.206
7.189
7.177
1.557
-0.000
1.00
1.00
4.10
7.06
1.06
0.97
10
8
6
4
2
0
PPM

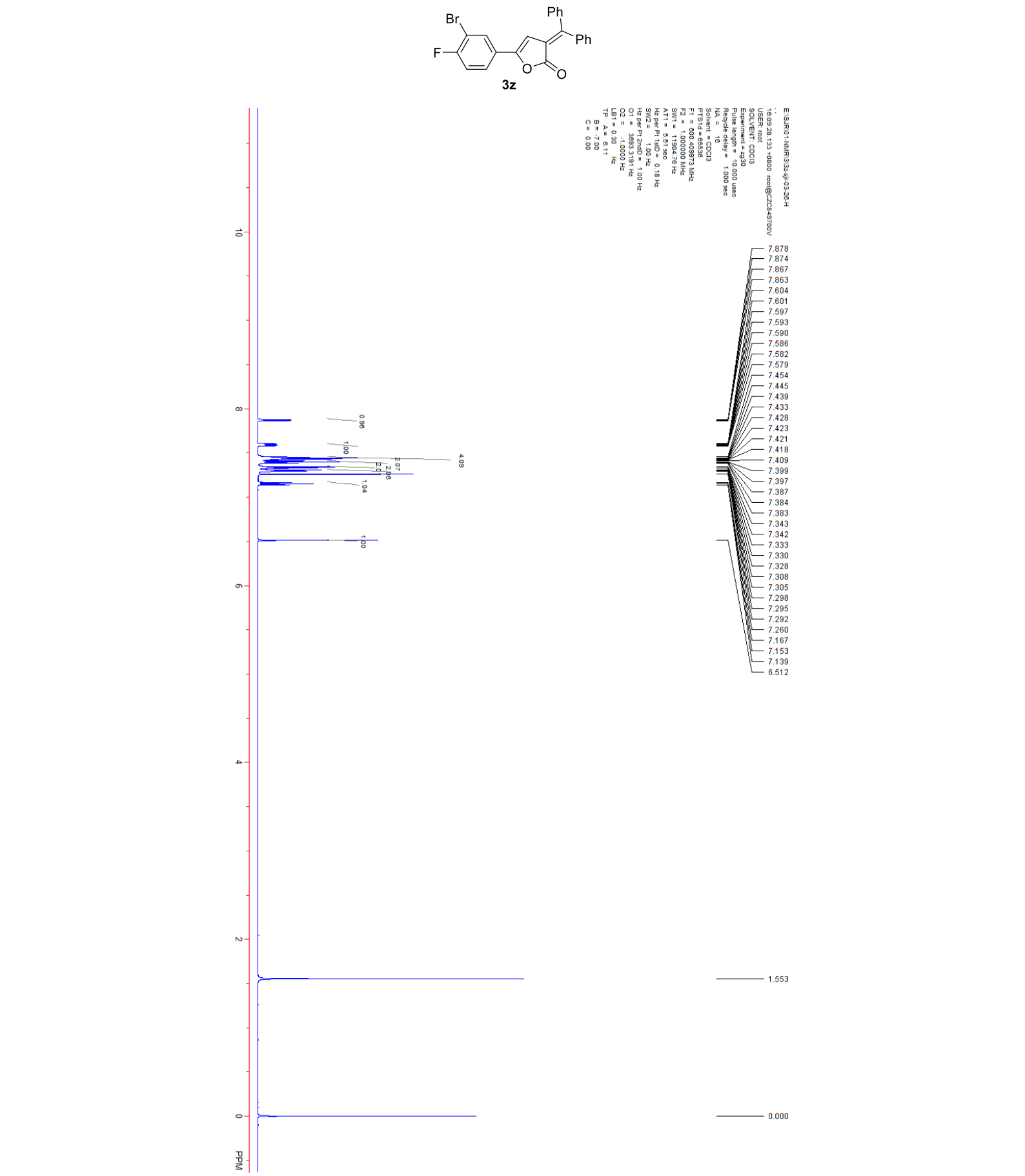

O
O
Br
Ph
Ph
3w
E:\SJR\01-NMR\3w-sji-02-19-C
Sun Nov 03 13:46:51 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 22.50
B = 90.00
C = 0.00
166.037
155.041
151.612
141.165
138.277
134.652
131.028
130.977
130.486
130.003
129.548
128.804
128.523
128.140
127.700
123.938
120.862
109.975
77.420
77.160
76.907
200
150
100
50
0
PPM

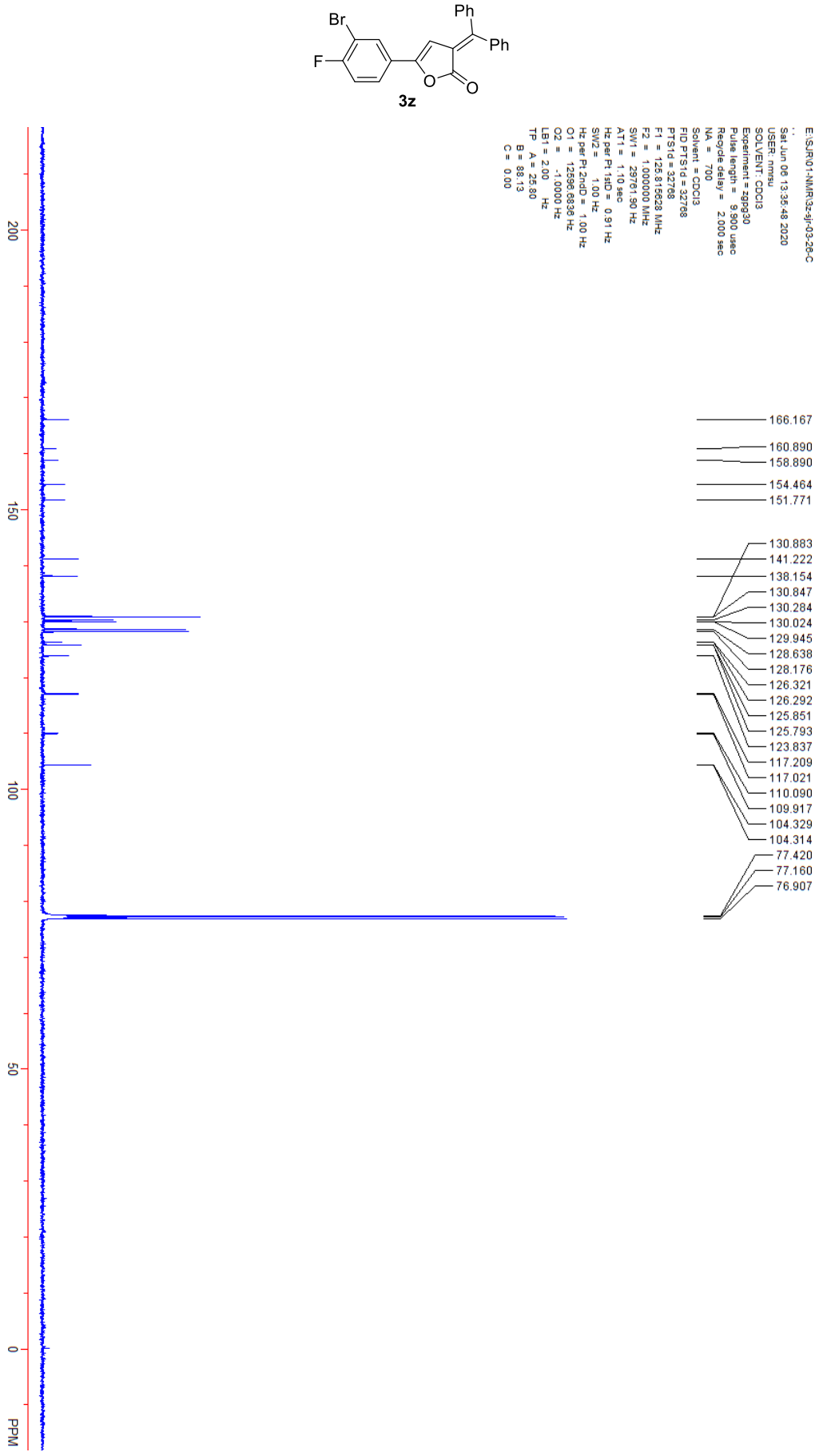

Me
Ph
Ph
O
O
Me
3x
E:\SJR\01-NMR\3x-sjr-03-43-H
Fri Jun 12 14:35:58 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.1133 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -92.34
B = 32.34
C = 0.00
7.426
7.400
7.386
7.372
7.345
7.330
7.321
7.317
7.302
7.258
7.016
6.521
2.330
1.554
0.000
6.05
6.03
1.01
1.00
6.08
10
8
6
4
2
0
PPM

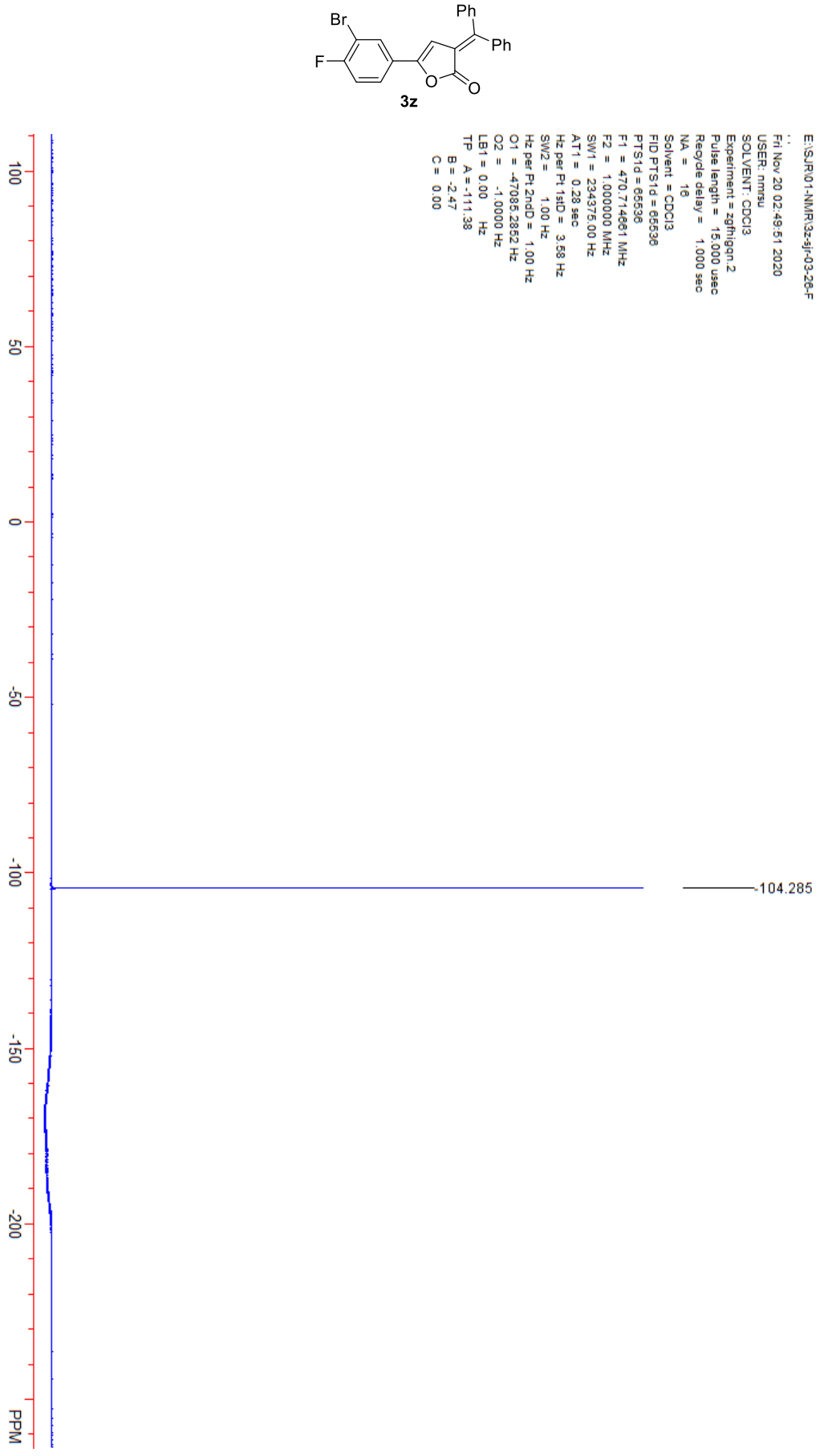

Me
Ph
Ph
O
O
Me
3x
E:\SJR\01-NMR\3x-sjr-03-43-C
Sat Jun 13 17:10:16 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12593.9590 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 35.53
B = 76.63
C = 0.00
166.810
154.608
152.551
141.497
138.501
138.472
131.916
130.869
130.847
129.678
129.577
128.530
128.270
128.104
124.429
122.927
103.318
77.413
77.160
76.900
21.379
200
150
100
50
0
PPM

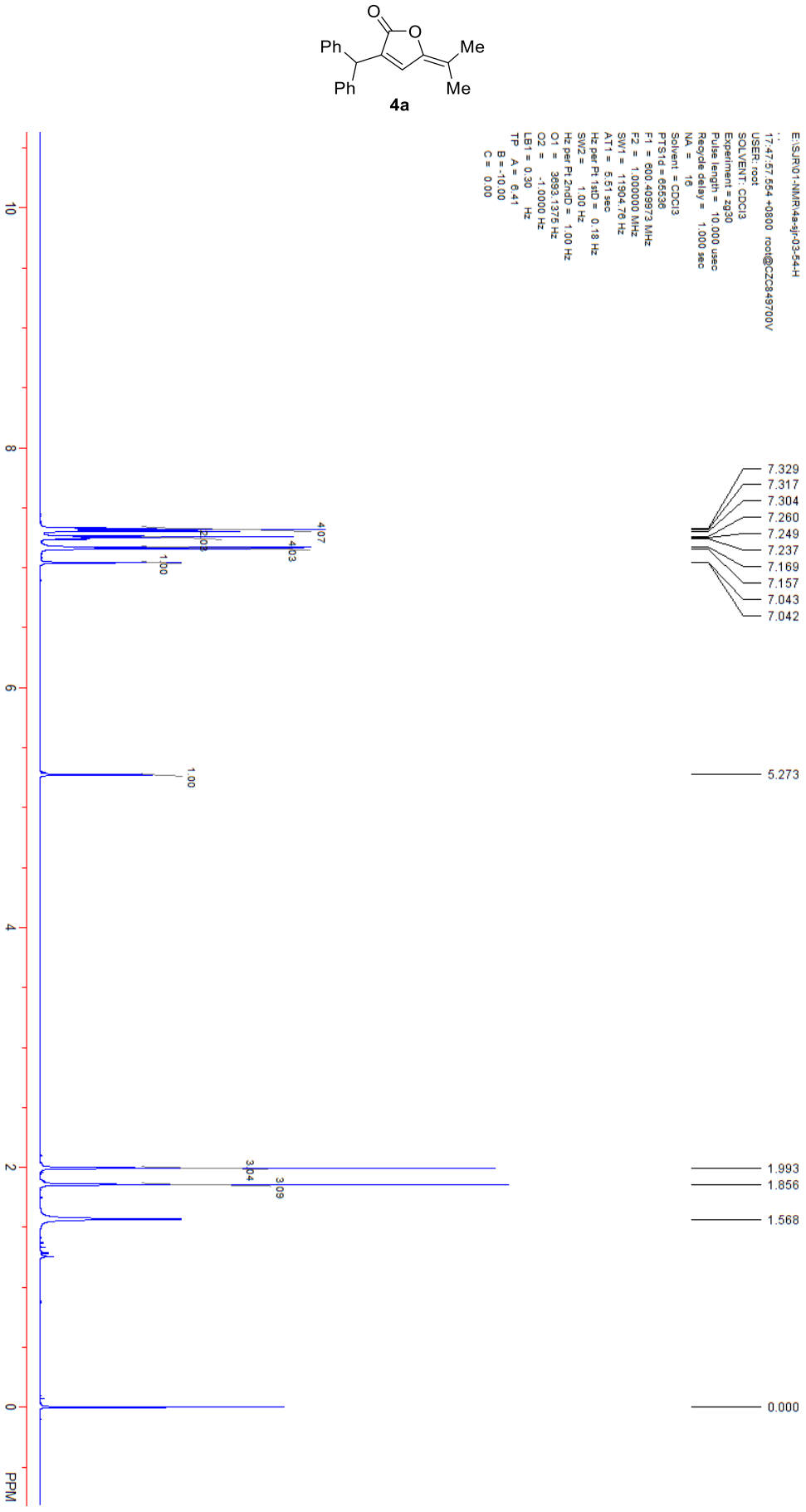

Me
Ph
Me
Ph
O
O
3y
E:\SJR\01-NMR\3y-sjr-02-23-H
Thu Nov 07 02:26:58 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3075.5027 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -96.50
B = 37.75
C = 0.00
7.616
7.601
7.407
7.401
7.387
7.373
7.352
7.337
7.325
7.317
7.256
7.074
7.050
6.383
2.427
2.344
1.556
-0.000
0.97
6.08
3.97
2.03
1.00
3.00
2.97
10
8
6
4
2
0
PPM

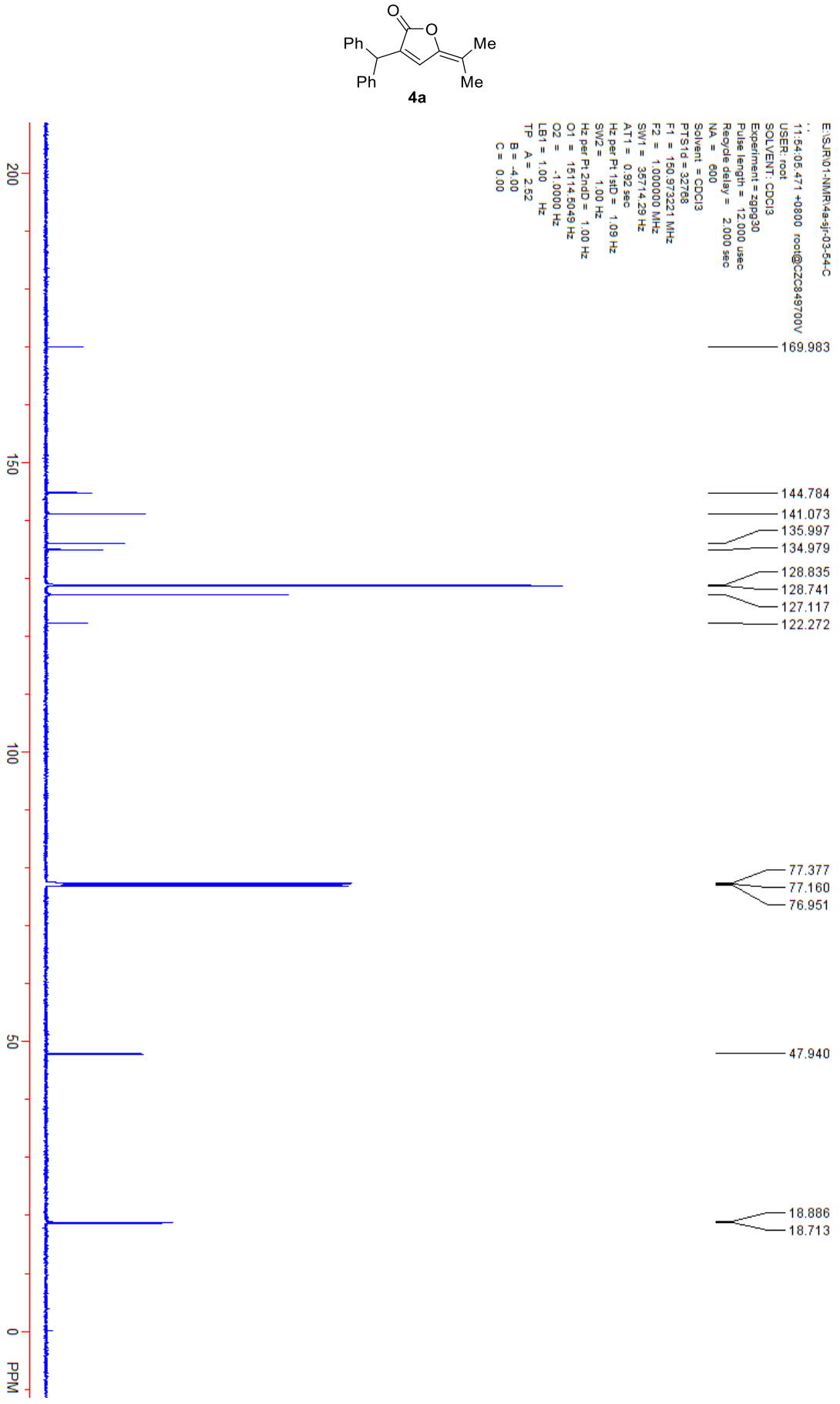

Me
Ph
Me
Ph
O
O
3y
E:\SJR\01-NMR\3y-sjr-02-23-C
Thu Nov 07 22:13:25 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 34.86
B = 77.81
C = 0.00
166.608
154.514
152.551
141.475
139.952
138.515
136.436
132.450
130.898
130.826
129.663
129.606
128.494
128.097
127.822
127.057
125.165
124.487
107.043
77.413
77.160
76.907
22.209
21.422
200
150
100
50
0
PPM

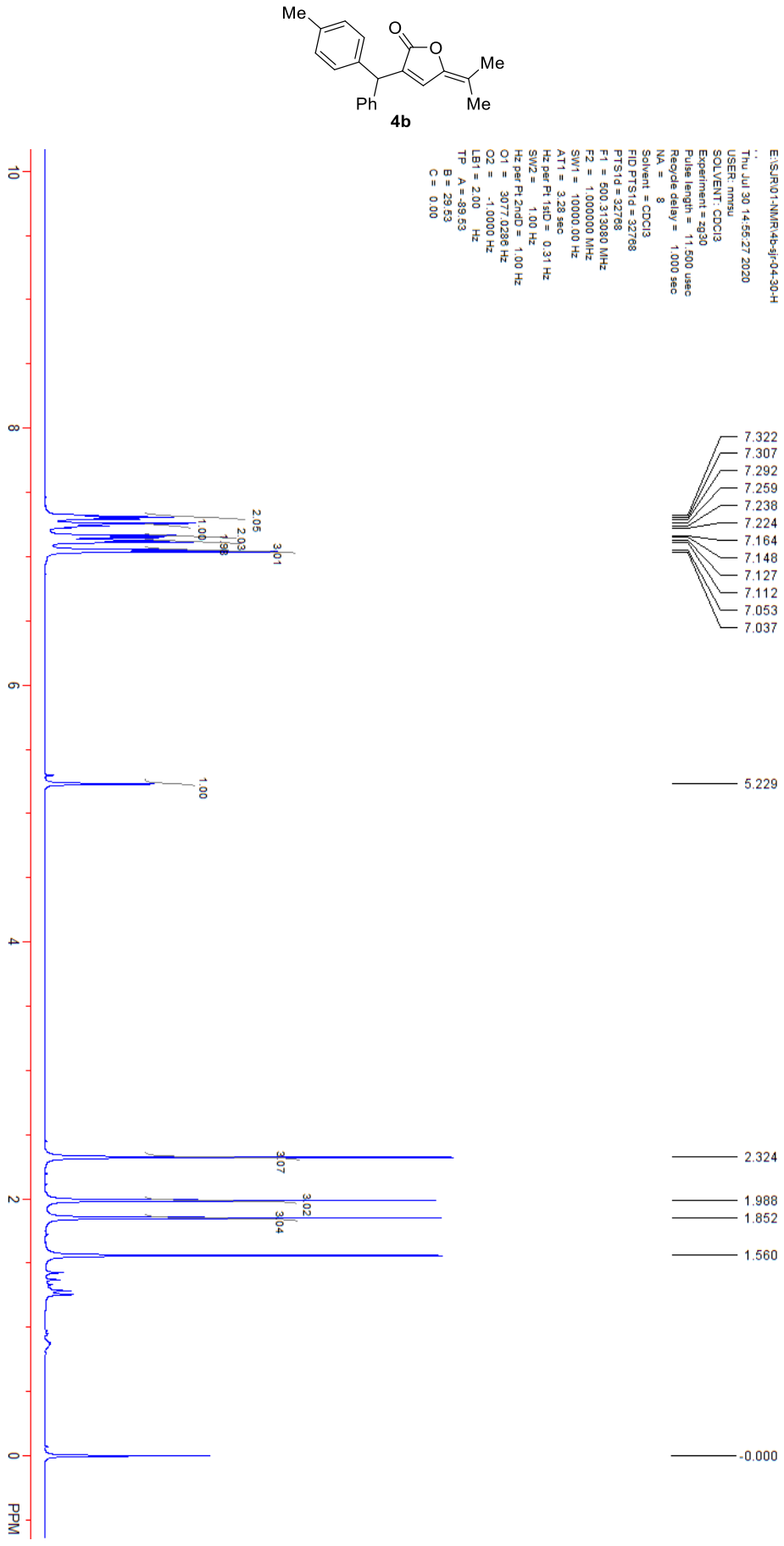

Br
F
Ph
Ph
O
O
3z
E:\SJR\01-NMR\33-sji-03-28-H
16.09.28.133 +0800 root@C2C8497D0V
USER root
SOLVENT CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3693.3191 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 6.11
B = 7.00
C = 0.00
7.878
7.874
7.867
7.863
7.604
7.601
7.597
7.593
7.590
7.586
7.582
7.579
7.454
7.445
7.439
7.433
7.428
7.423
7.421
7.418
7.409
7.399
7.397
7.387
7.384
7.383
7.343
7.342
7.333
7.330
7.328
7.308
7.305
7.298
7.295
7.292
7.260
7.167
7.153
7.139
6.512
1.553
0.000
0.96
1.00
4.09
2.07
2.08
2.01
1.04
1.00
10
8
6
4
2
0
PPM

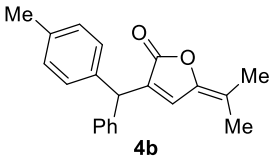

Br
F
Ph
Ph
O
O
3z
E:\SJR\01-NMR\3z-sjr-03-26-C
Sat Jun 08 13:35:48 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.6836 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 25.80
B = 88.13
C = 0.00
166.167
160.890
158.890
154.464
151.771
130.883
141.222
138.154
130.847
130.284
130.024
129.945
128.638
128.176
126.321
126.292
125.851
125.793
123.837
117.209
117.021
110.090
109.917
104.329
104.314
77.420
77.160
76.907
200
150
100
50
0
PPM


Br
F
Ph
Ph
O
O
3z
E:\SJR\01-NMR\3z-sji-03-26-F
Fri Nov 20 02:49:51 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47085.2852 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -111.38
B = -2.47
C = 0.00
-104.285
100
50
0
-50
-100
-150
-200
PPM

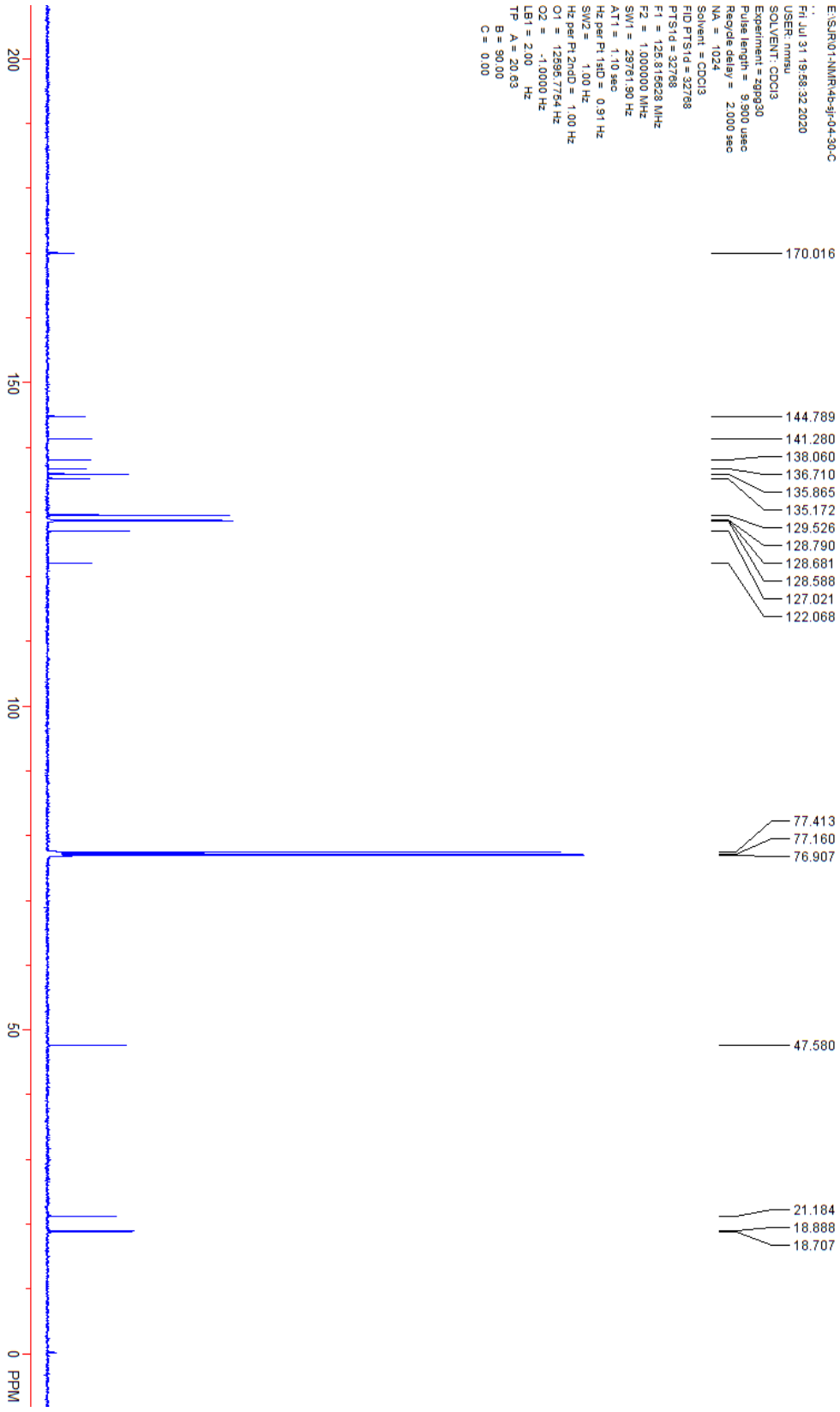

Ph
Ph
O
O
Me
Me
4a
E:\SJR\01-NMR\4a-sjr-03-54-H
17-47-57.564 +0800 root@CZC8497G0V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3693.1375 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 6.41
B = -10.00
C = 0.00
7.329
7.317
7.304
7.260
7.249
7.237
7.169
7.157
7.043
7.042
5.273
1.993
1.856
1.568
0.000
4.07
2.09
4.03
1.00
1.00
3.04
3.09
10
8
6
4
2
0
PPM

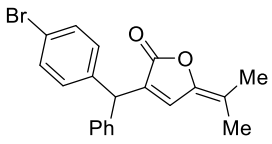

O
O
Ph
Ph
Me
Me
4a
E:\SJR\01-NMR\4a-sjr-03-54-C
11:54:05.471 +0800 root@CZC8497Q0V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 2.52
B = -4.00
C = 0.00
169.983
144.784
141.073
135.997
134.979
128.835
128.741
127.117
122.272
77.377
77.160
76.951
47.940
18.886
18.713
200
150
100
50
0
PPM


Me
O
O
Me
Ph
Me
4b
E:\SJR\01-NMR\4b-sjr-04-30-H
Thu Jul 30 14:56:27 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0286 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -89.53
B = 29.53
C = 0.00
7.322
7.307
7.292
7.259
7.238
7.224
7.164
7.148
7.127
7.112
7.053
7.037
5.229
2.324
1.988
1.852
1.560
-0.000
PPM

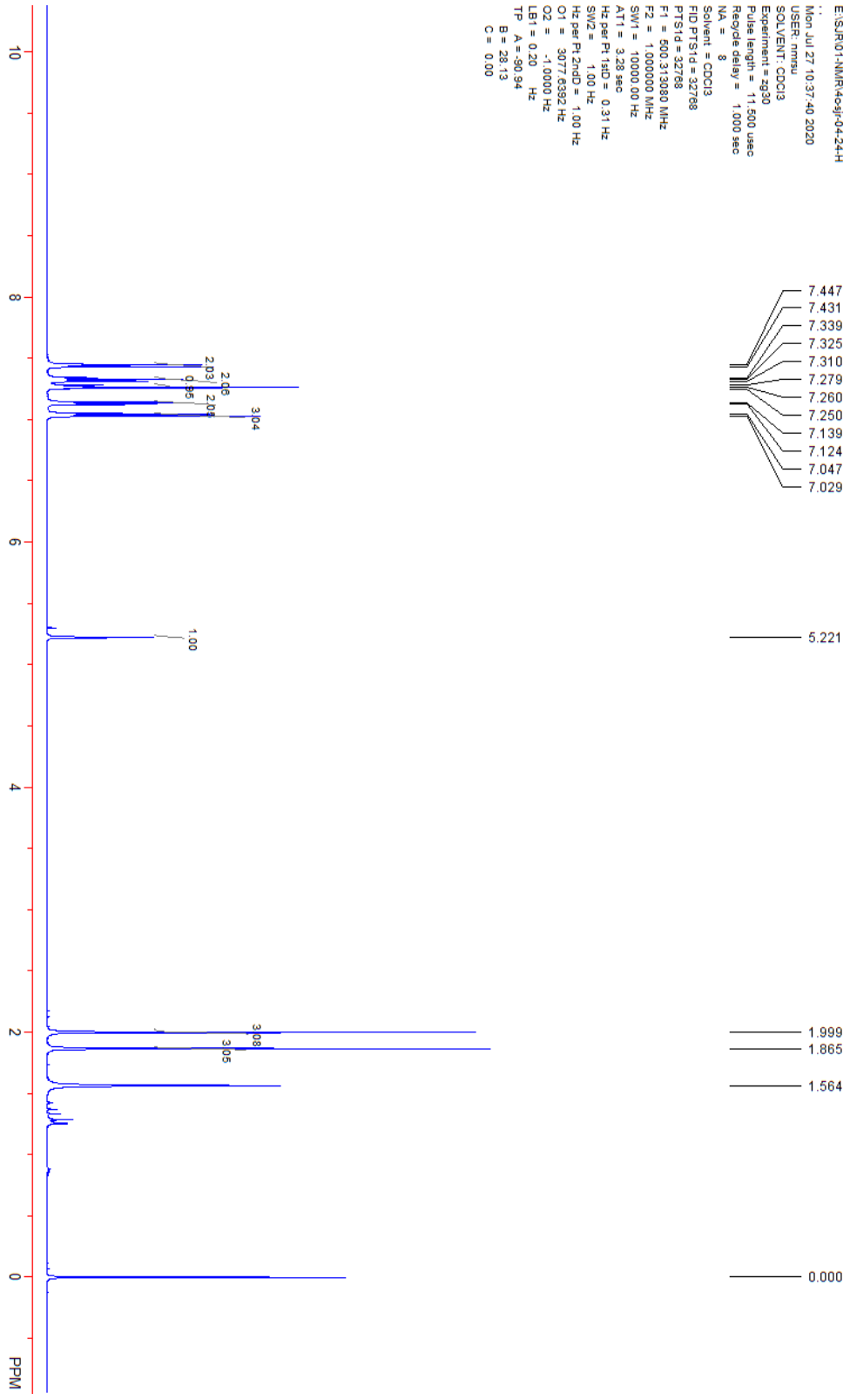

Me
O
O
Me
Ph
Me

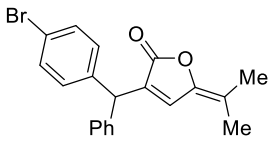
4b


E:\SJR\01-NMR\4b-sjr-04-30-C
Fri Jul 31 19:58:32 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 20.63
B = 90.00
C = 0.00
170.016
144.789
141.280
138.060
136.710
135.865
135.172
129.526
128.790
128.681
128.588
127.021
122.068
77.413
77.160
76.907
47.580
21.184
18.888
18.707
200
150
100
50
0 PPM

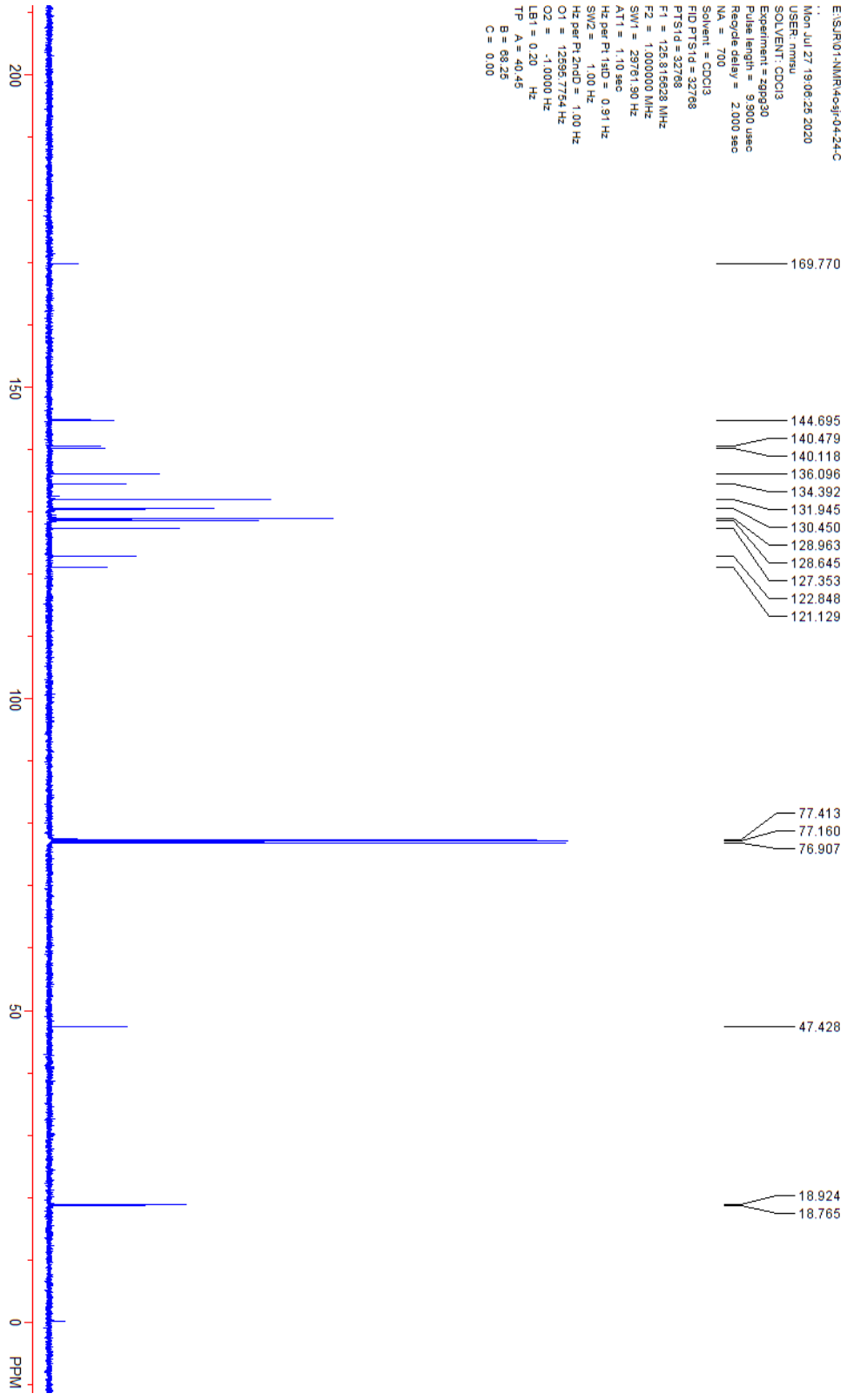

Br
O
O
Me
Ph
Me

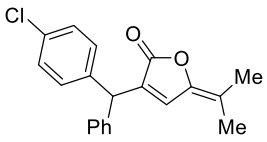
4c


E:\SJR\01-NMR\4osjr-04-24-H
Mon Jul 27 10:37:40 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -90.94
B = 28.13
C = 0.00
7.447
7.431
7.339
7.325
7.310
7.279
7.260
7.250
7.139
7.124
7.047
7.029
5.221
1.999
1.865
1.564
0.000
2.03
2.06
0.95
2.08
3.04
1.00
3.08
3.05
10
8
6
4
2
0
PPM

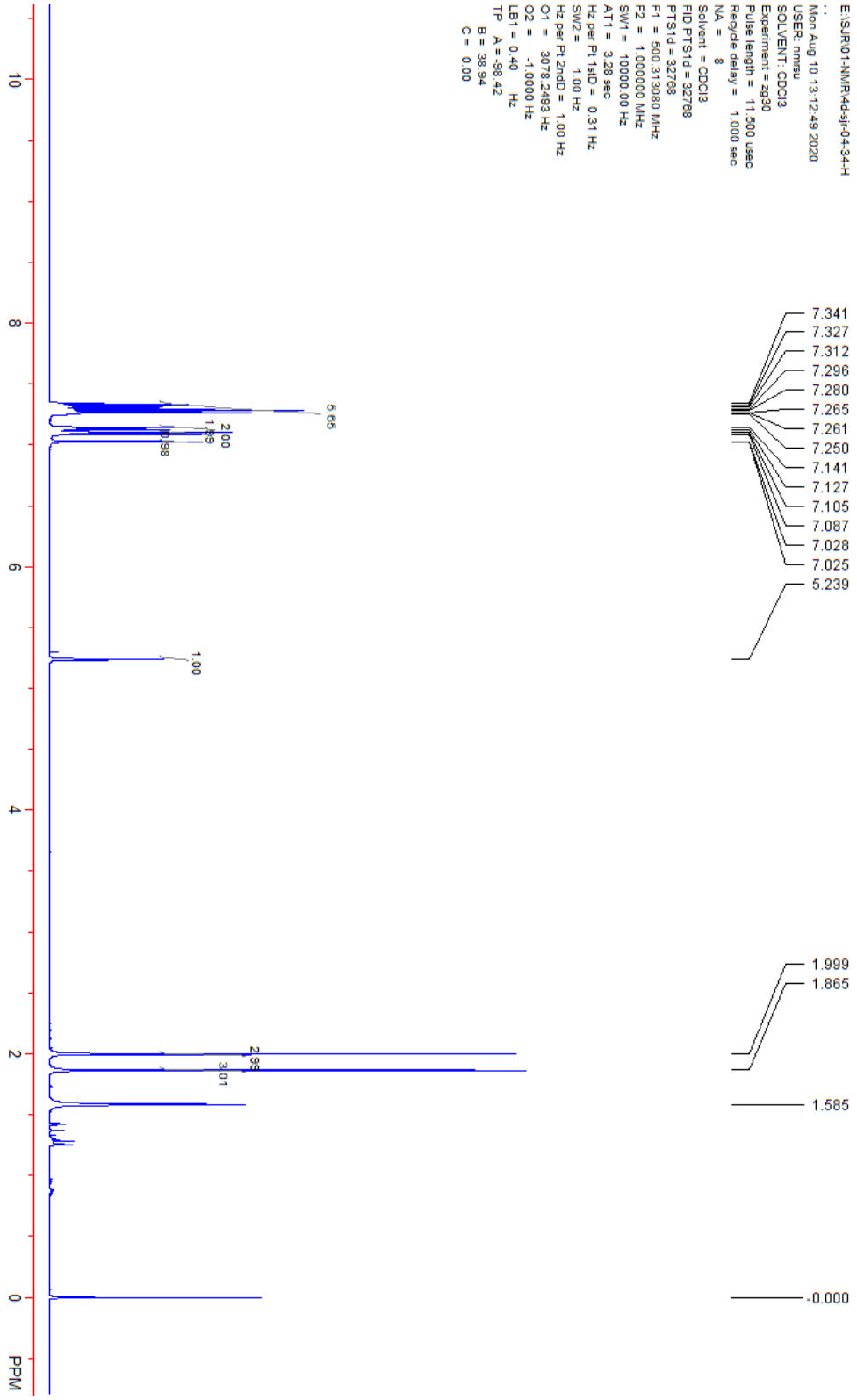

Br
O
O
Me
Ph
Me

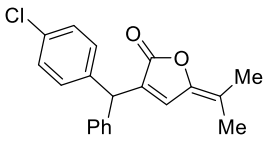
4c


E:\SJR\01-NMR\4osjr-04-24-C
Mon Jul 27 19:06:25 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = 40.45
B = 68.25
C = 0.00
169.770
144.695
140.479
140.118
136.096
134.392
131.945
130.450
128.963
128.645
127.353
122.848
121.129
77.413
77.160
76.907
47.428
18.924
18.765
200
150
100
50
0
PPM

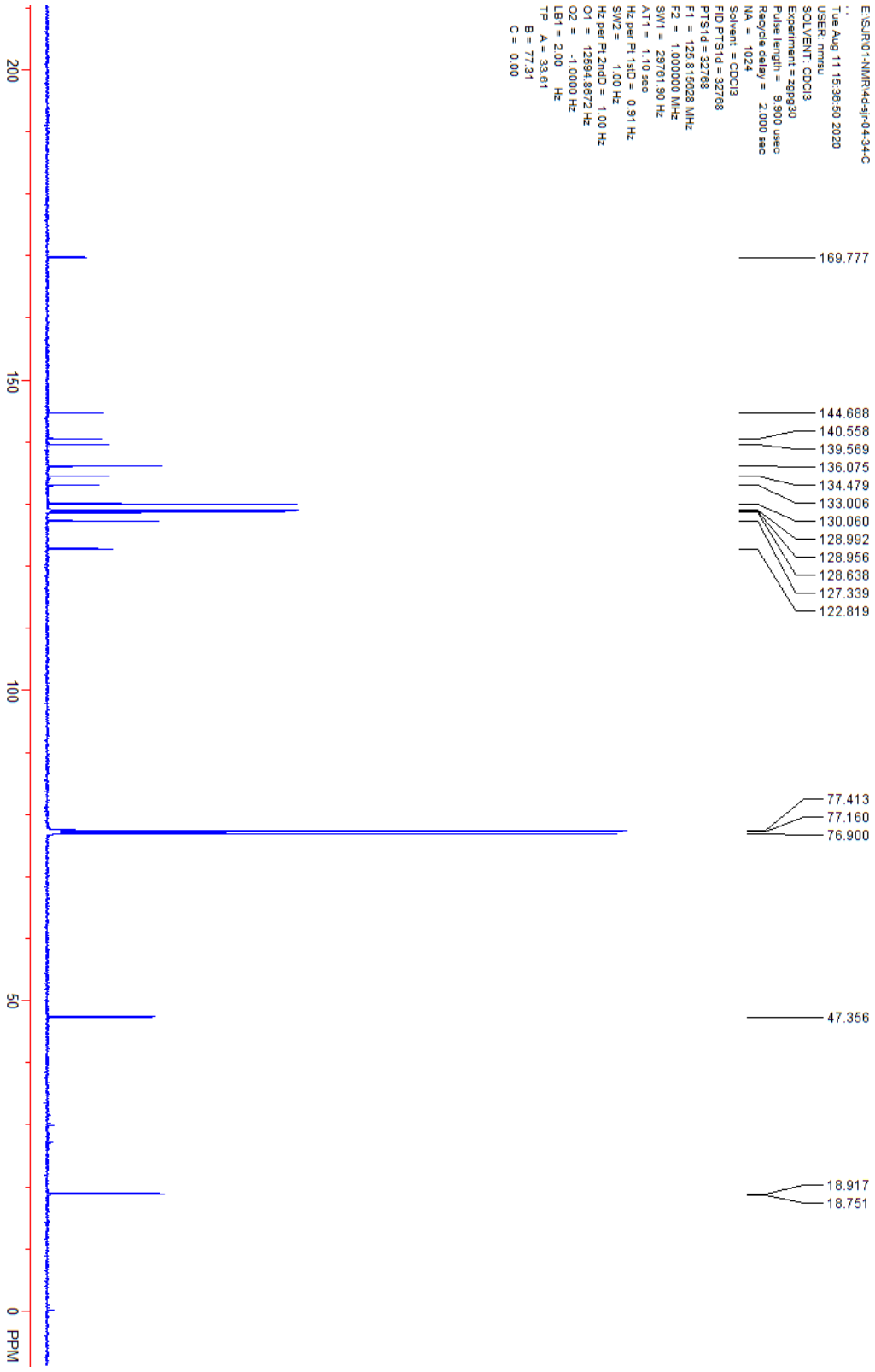

Cl
O
O
Me
Ph
Me

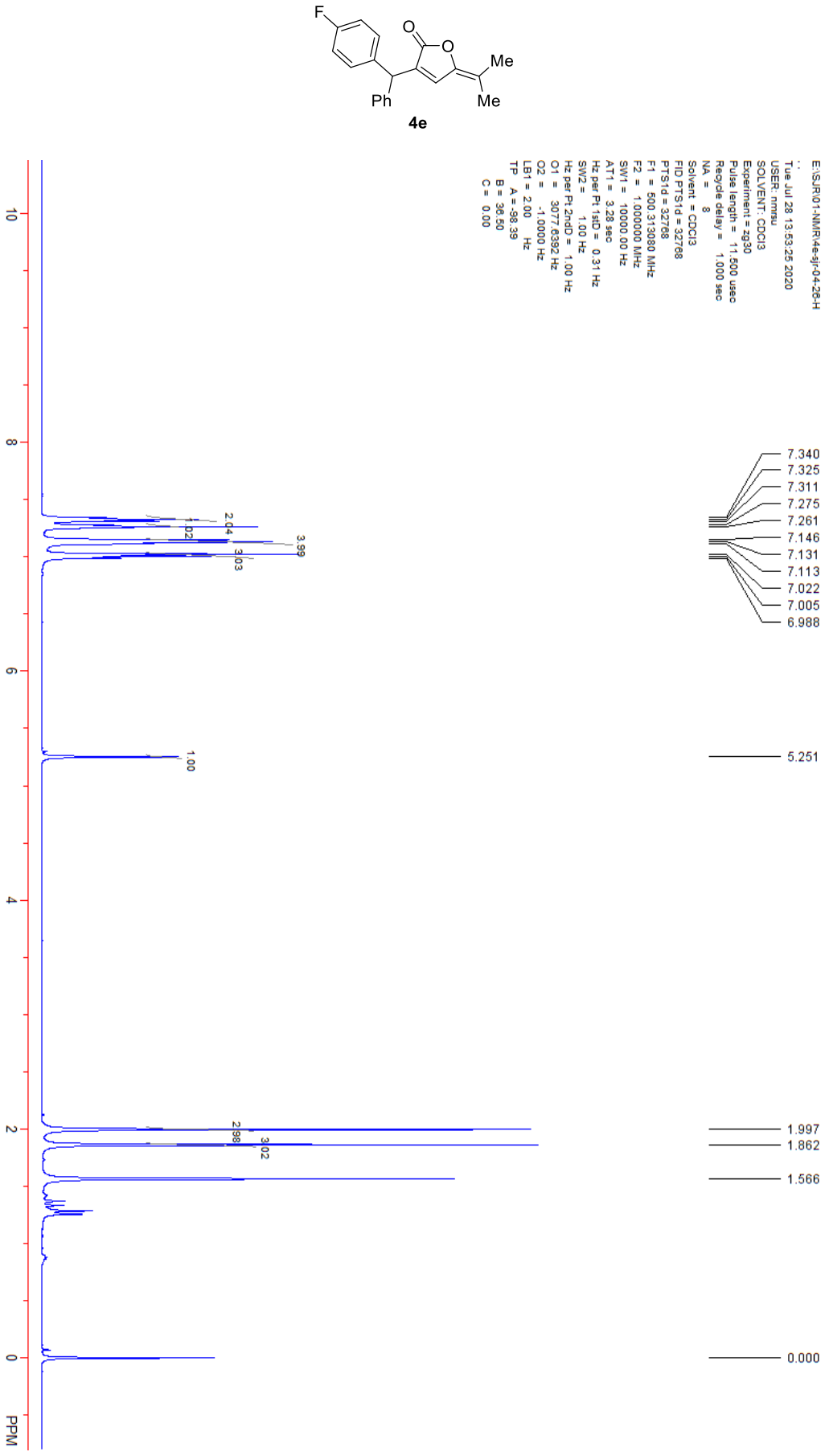
4d

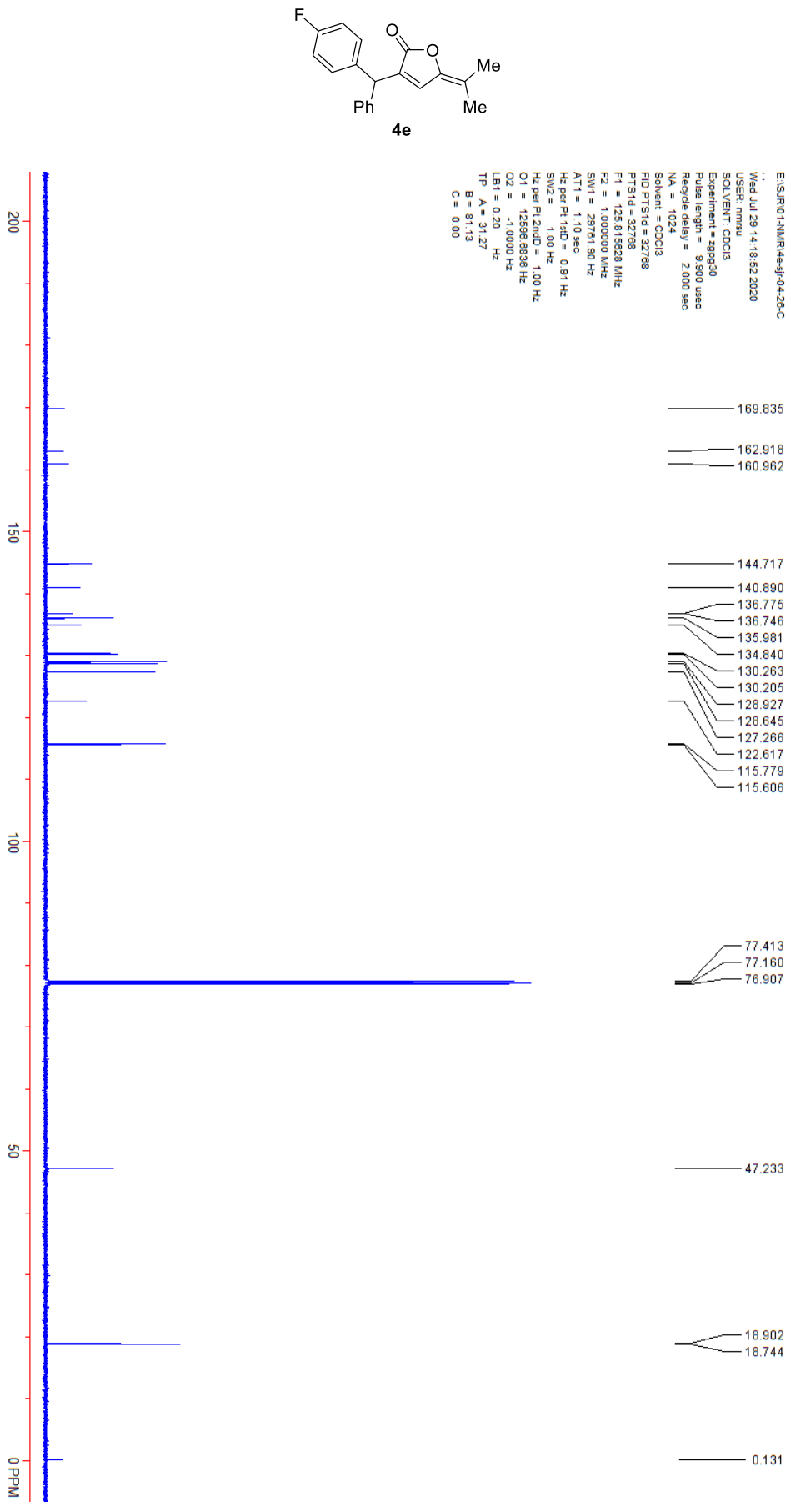

E:\SJR\01-NMR\4d-sjr-04-34-H
Mon Aug 10 13:12:49 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.2493 Hz
O2 = -1.0000 Hz
LB1 = 0.40 Hz
TP A = -98.42
B = 38.94
C = 0.00
7.341
7.327
7.312
7.296
7.280
7.265
7.261
7.250
7.141
7.127
7.105
7.087
7.028
7.025
5.239
1.999
1.865
1.585
-0.000
5.65
2.00
1.59
0.98
1.00
2.98
3.01
10
8
6
4
2
0
PPM

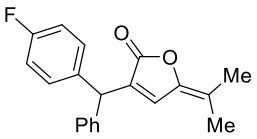

Cl
O
O
Me
Ph
Me

4d

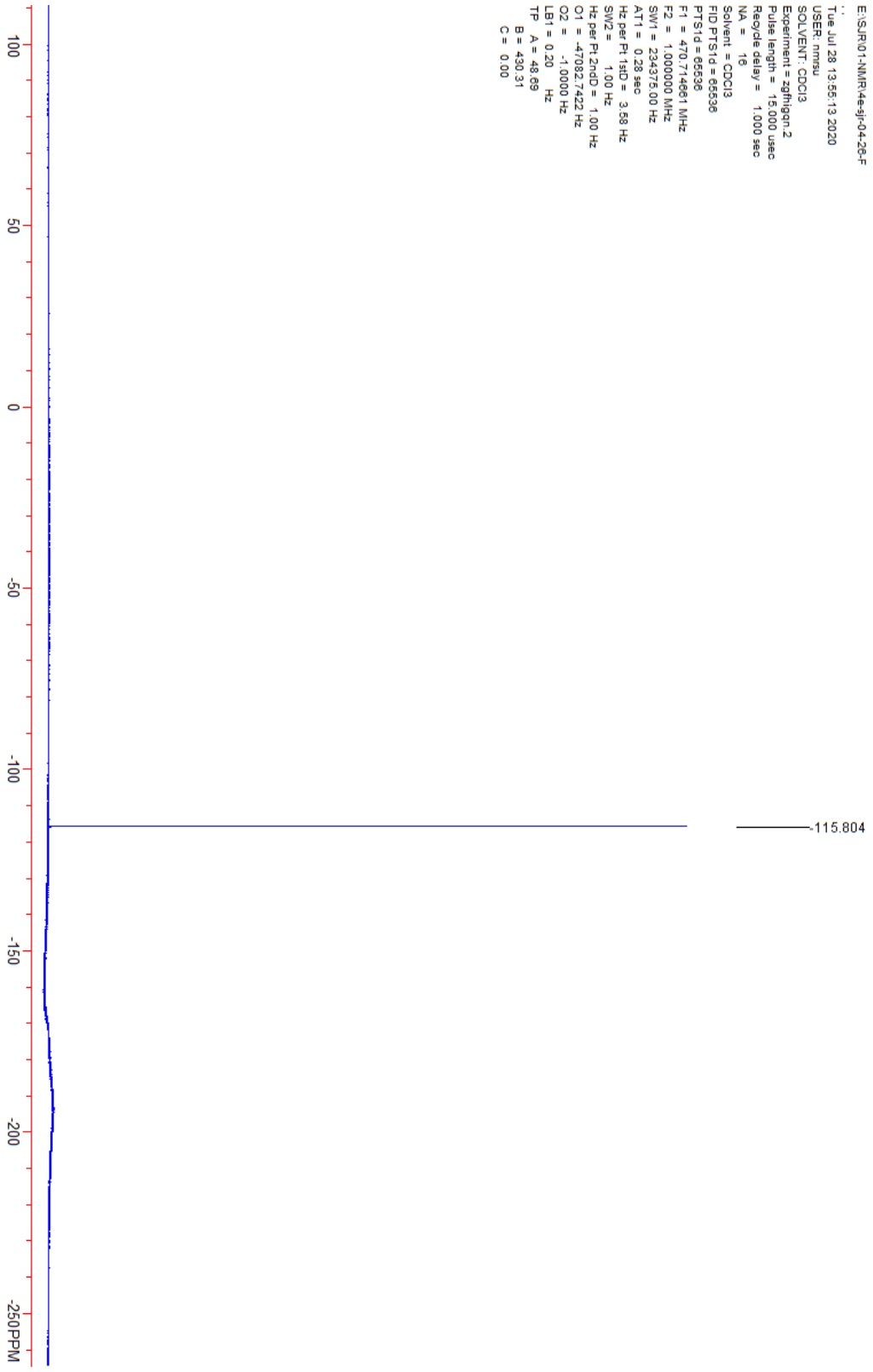

E:\SJR\01-NMR\4d-sjr-04-34-C
Tue Aug 11 15:36:50 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8672 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 33.61
B = 77.31
C = 0.00
169.777
144.688
140.558
139.569
136.075
134.479
133.006
130.060
128.992
128.956
128.638
127.339
122.819
77.413
77.160
76.900
47.356
18.917
18.751
200
150
100
50
0 PPM

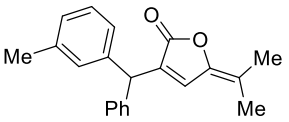

F
O
O
Me
Ph
Me
4e
E:\SJR\01-NMR\4e-sjr-04-28-H
Tue Jul 28 13:53:25 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID_PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -98.39
B = 36.50
C = 0.00
7.340
7.325
7.311
7.275
7.261
7.146
7.131
7.113
7.022
7.005
6.988
5.251
1.997
1.862
1.566
0.000
1.02
2.04
3.03
3.99
1.00
2.98
3.02
10
8
6
4
2
0
PPM


F
O
O
Me
Me
Ph
4e
E:\SJR\01-NMR\4e-sjr-04-26-C
Wed Jul 29 14:18:52 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12598.6836 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = 31.27
B = 81.13
C = 0.00
169.835
162.918
160.962
144.717
140.890
136.775
136.746
135.981
134.840
130.263
130.205
128.927
128.645
127.266
122.617
115.779
115.606
77.413
77.160
76.907
47.233
18.902
18.744
0.131
200
150
100
50
0 PPM

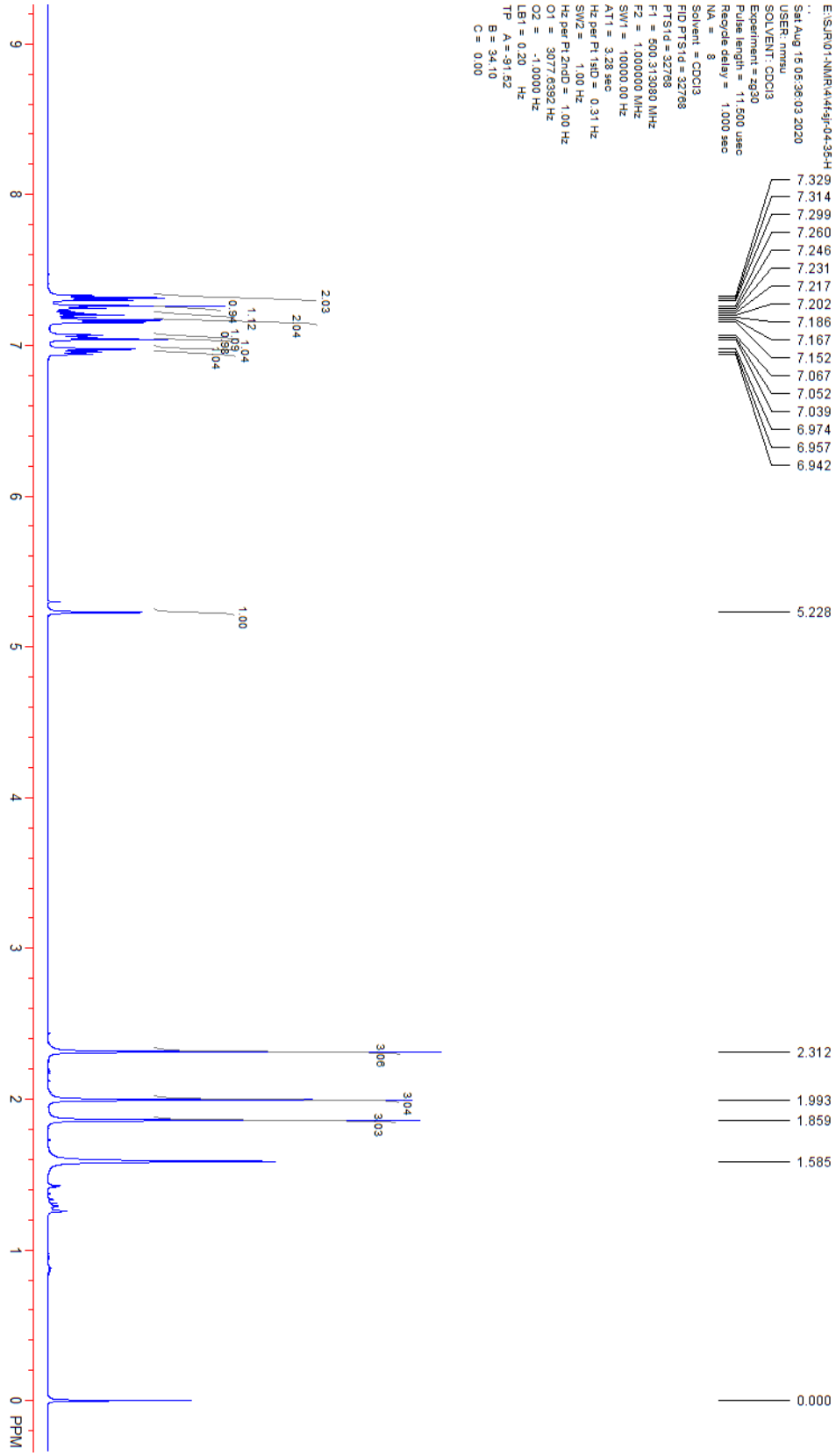

F
O
O
Me
Me
Ph

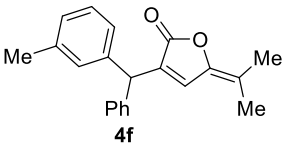
4e


E:\SJR\01-NMR\4e-sjr-04-26-F
Tue Jul 28 13:55:13 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgflqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714561 MHz
F2 = 1.000000 MHz
SW1 = 23437.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47082.7422 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = 48.69
B = 430.31
C = 0.00
-115.804
100
50
0
-50
-100
-150
-200
-250PPM

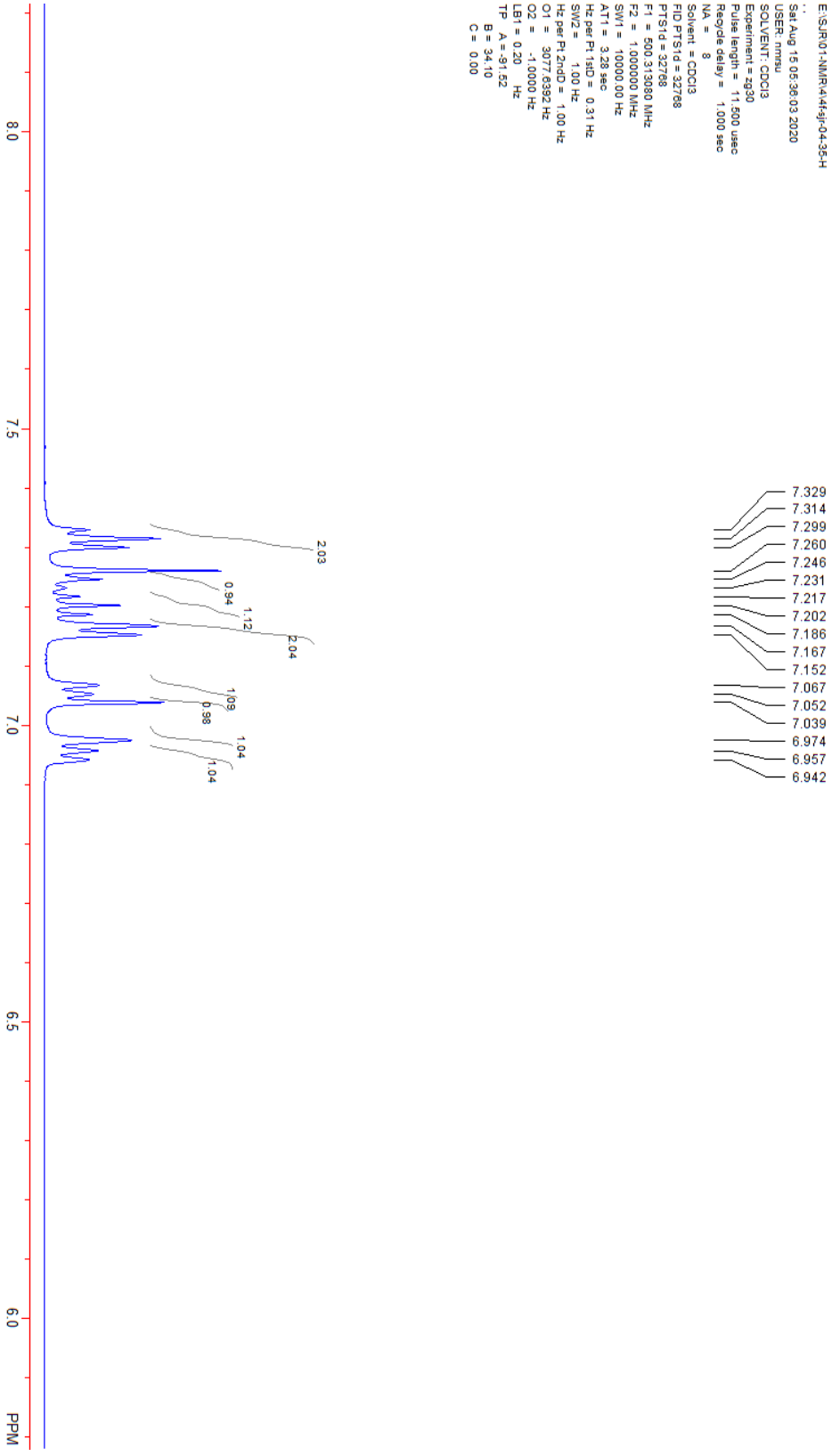

Me
O
O
Me
Ph
Me

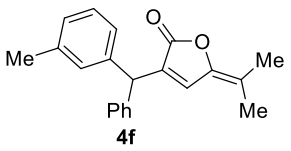
4f


E:\SJR\01-NMR\4\4f-sjr-04-35-H
Sat Aug 15 06:36:03 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -91.52
B = 34.10
C = 0.00
7.329
7.314
7.299
7.260
7.246
7.231
7.217
7.202
7.186
7.167
7.152
7.067
7.052
7.039
6.974
6.957
6.942
5.228
2.312
1.993
1.859
1.585
0.000
2.03
2.04
1.12
0.94
1.09
1.04
0.98
1.04
1.00
3.06
3.04
3.03
PPM

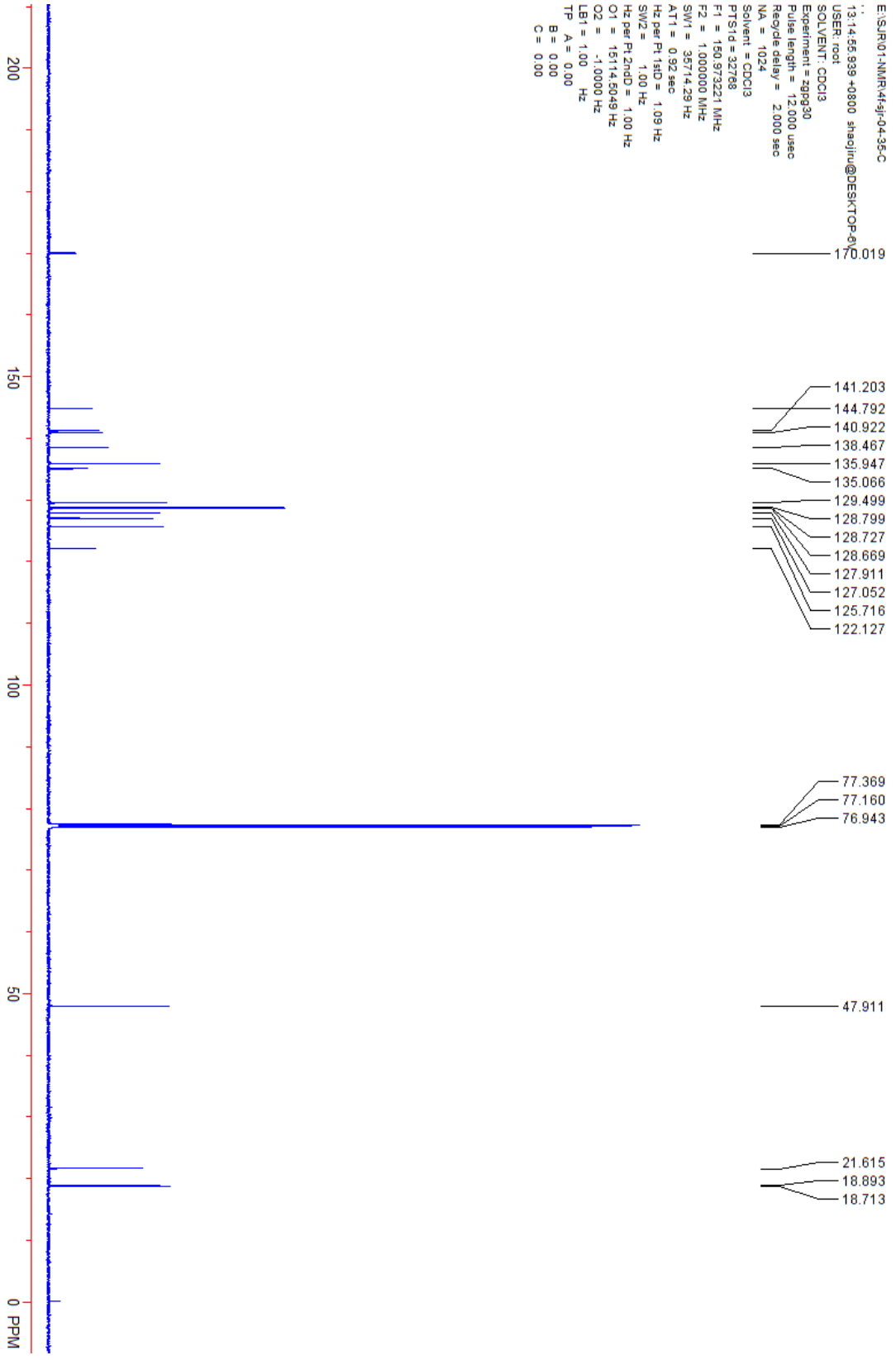

Me
O
O
Me
Ph
Me

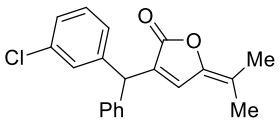
4f


E:\SJR\01-NMR\4\4f-sjr-04-35-H
Sat Aug 15 05:36:03 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6392 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -91.52
B = 34.10
C = 0.00
7.329
7.314
7.299
7.260
7.246
7.231
7.217
7.202
7.186
7.167
7.152
7.067
7.052
7.039
6.974
6.957
6.942
2.03
0.94
1.12
2.04
1.09
0.98
1.04
1.04
8.0
7.5
7.0
6.5
6.0
PPM

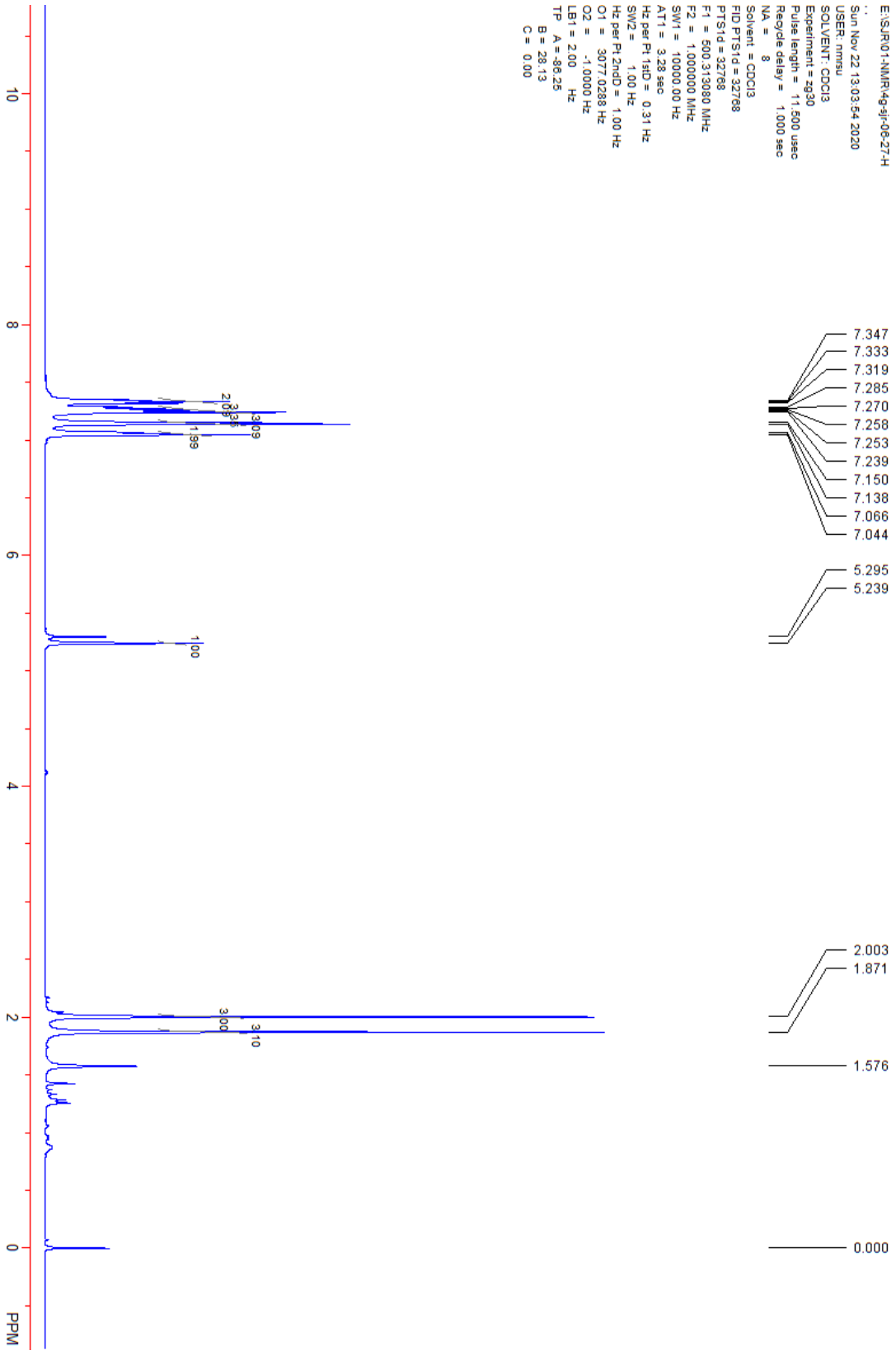

Me
O
O
Me
Ph
Me

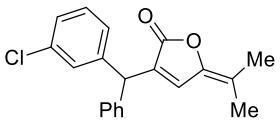
4f


E:\SJR\01-NMR\4f-sjr-04-35-C
13:14:56.939 +0800 shaojirui@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
170.019
141.203
144.792
140.922
138.467
135.947
135.066
129.499
128.799
128.727
128.669
127.911
127.052
125.716
122.127
77.369
77.160
76.943
47.911
21.615
18.893
18.713
200
150
100
50
0 PPM

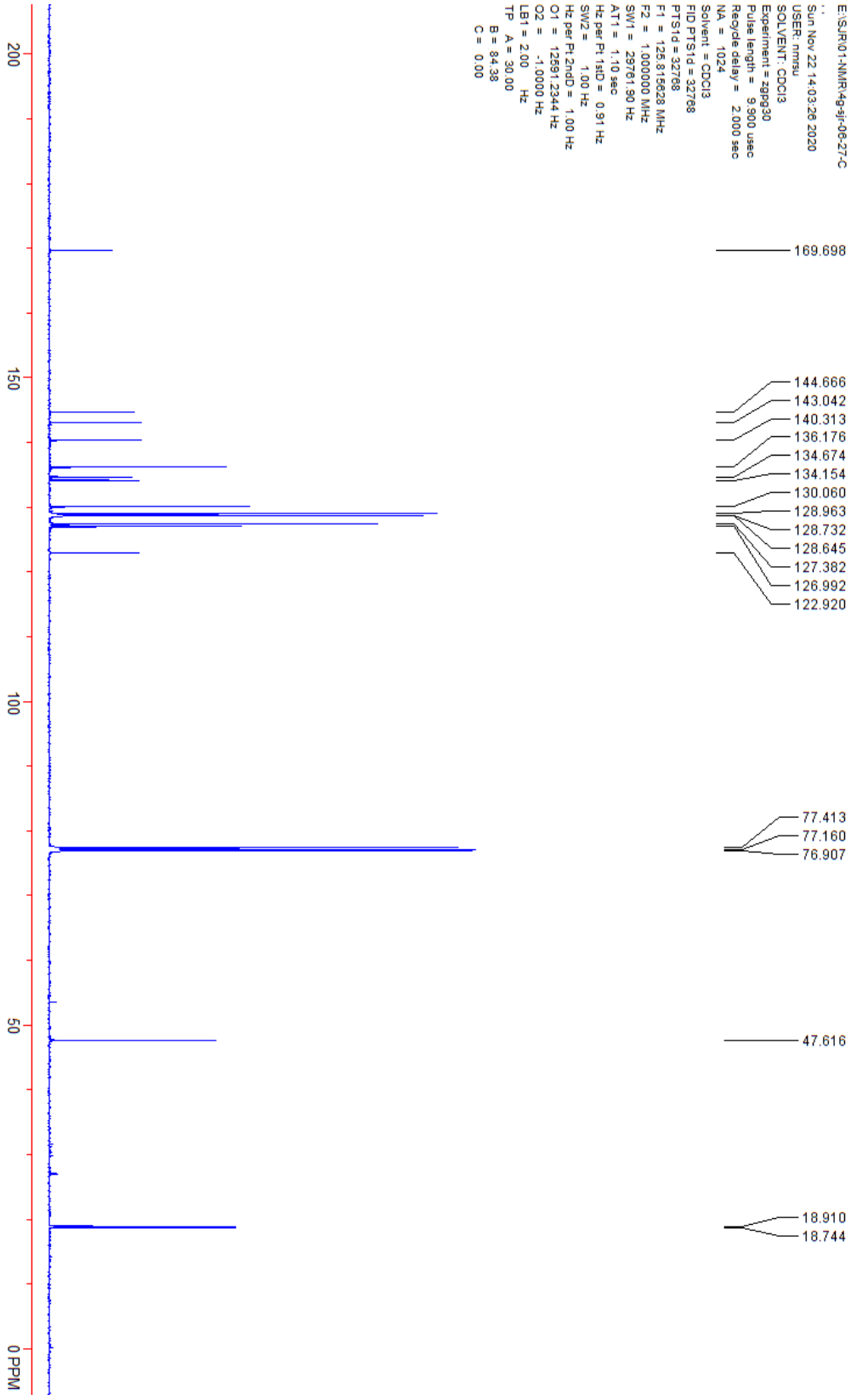

Cl
O
O
Me
Ph
Me

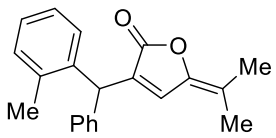
4g


E:\SJR\01-NMR\4g-sjr-06-27-H
Sun Nov 22 13:03:54 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -86.25
B = 28.13
C = 0.00
7.347
7.333
7.319
7.285
7.270
7.258
7.253
7.239
7.150
7.138
7.066
7.044
5.295
5.239
2.003
1.871
1.576
0.000
2.13
3.09
1.99
1.00
3.00
3.10
10
8
6
4
2
0
PPM

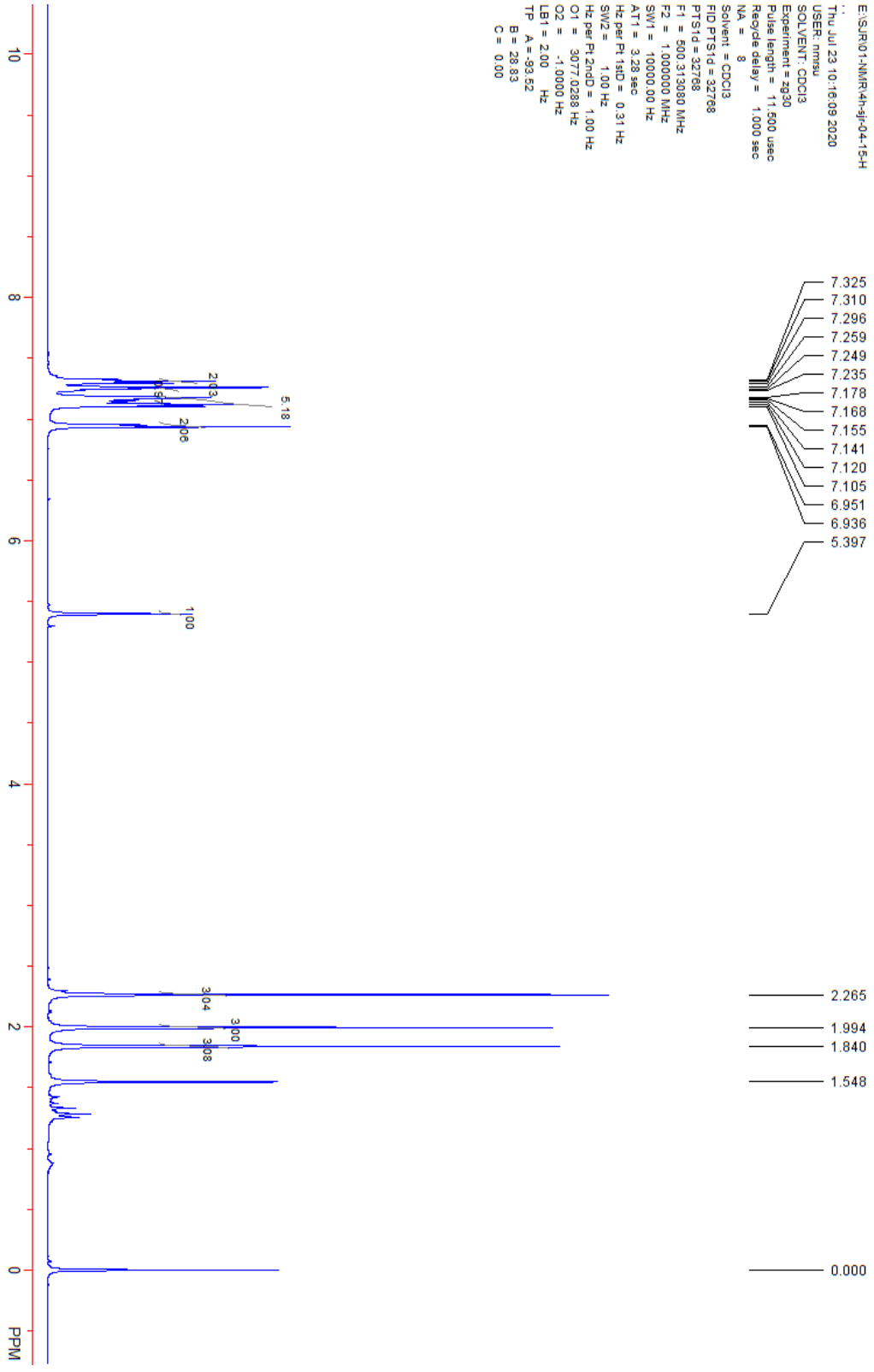

Cl
O
O
Me
Ph
Me

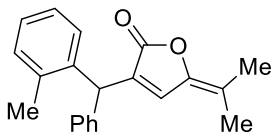
4g


E:\SJR\01-NMR\4g-sjr-06-27-C
Sun Nov 22 14:03:26 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12591.2344 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 30.00
B = 84.38
C = 0.00
169.698
144.666
143.042
140.313
136.176
134.674
134.154
130.060
128.963
128.732
128.645
127.382
126.992
122.920
77.413
77.160
76.907
47.616
18.910
18.744
200
150
100
50
0 PPM

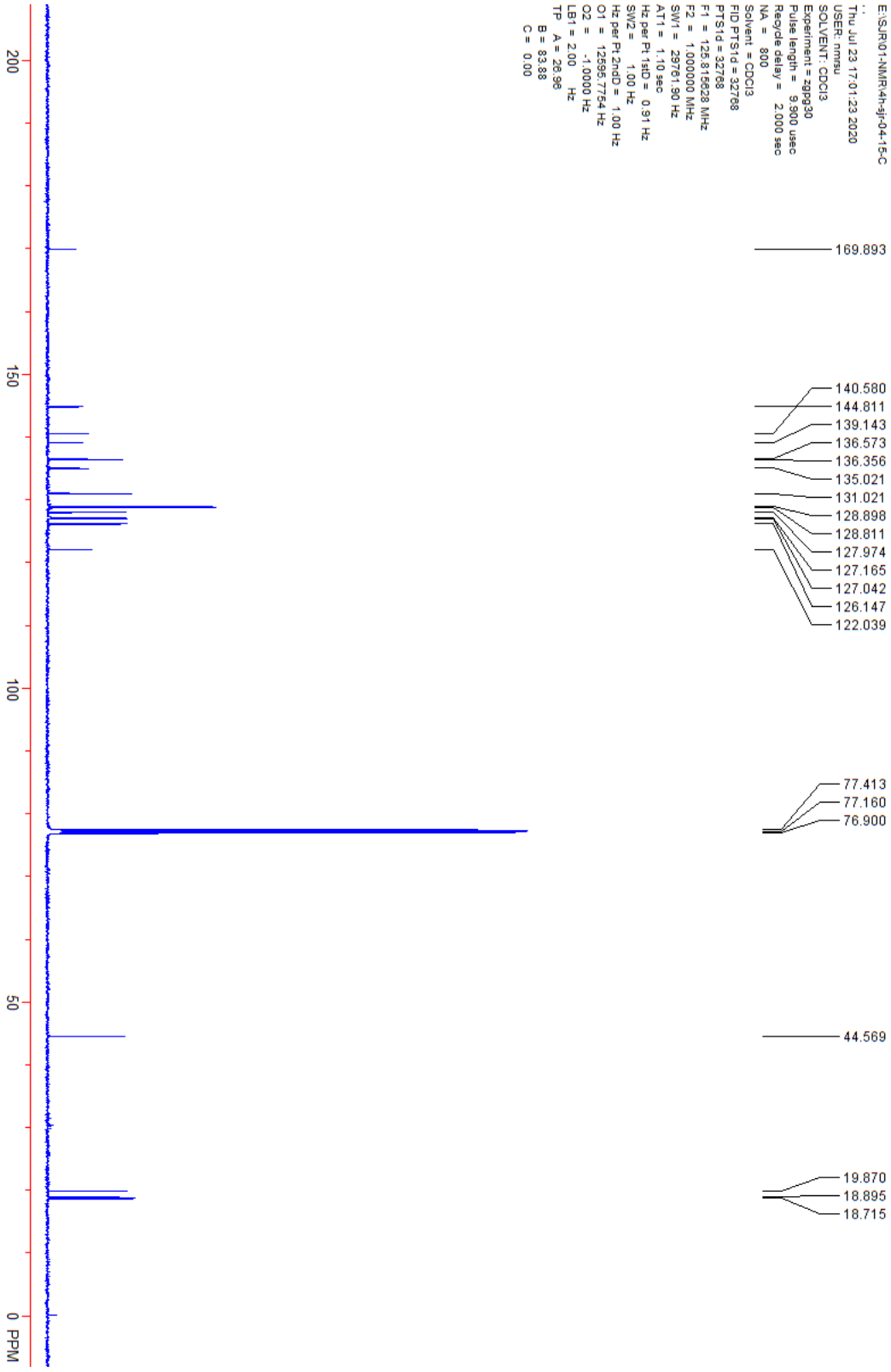

O
O
Me
Me
Ph
Me

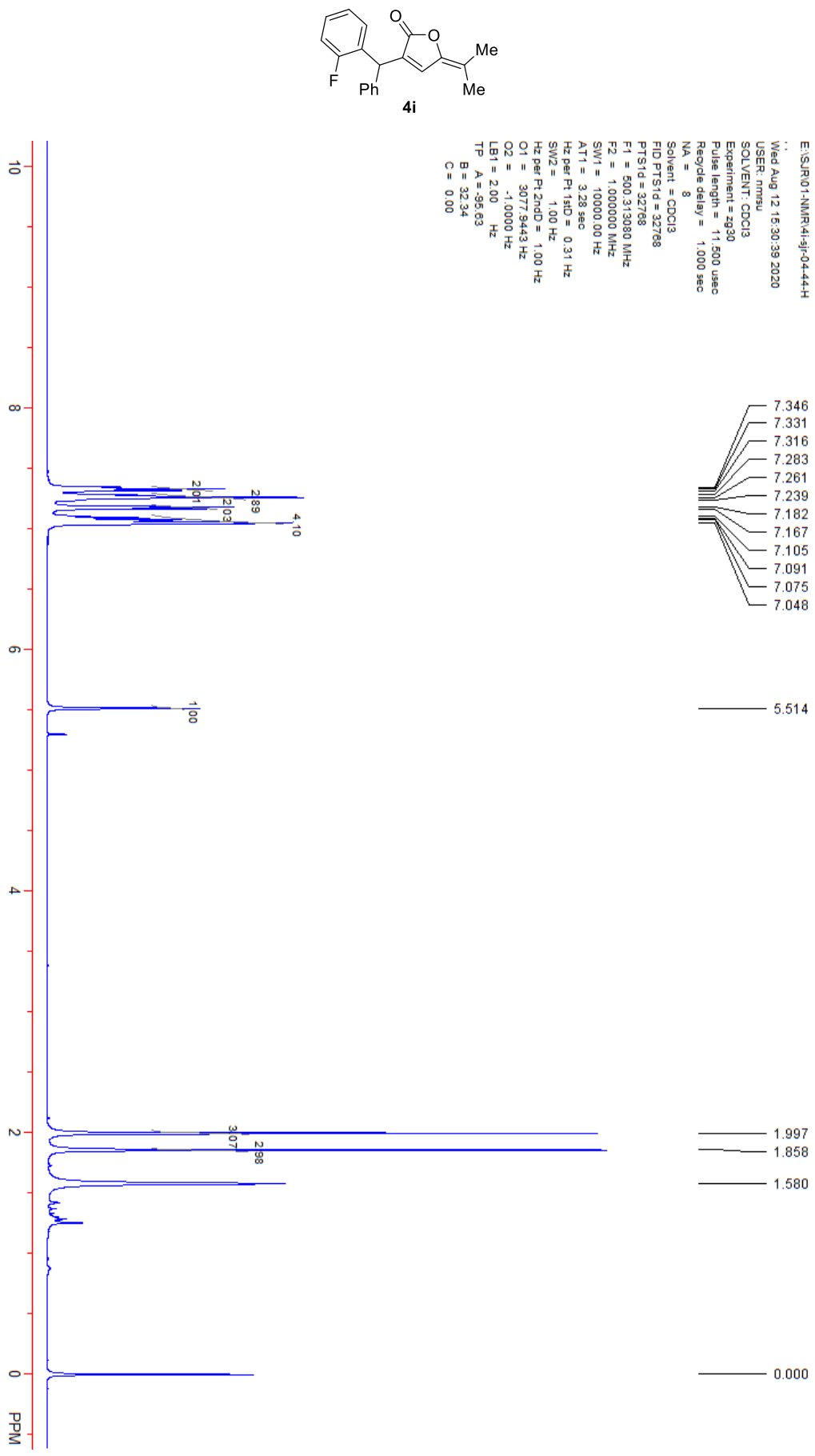
4h

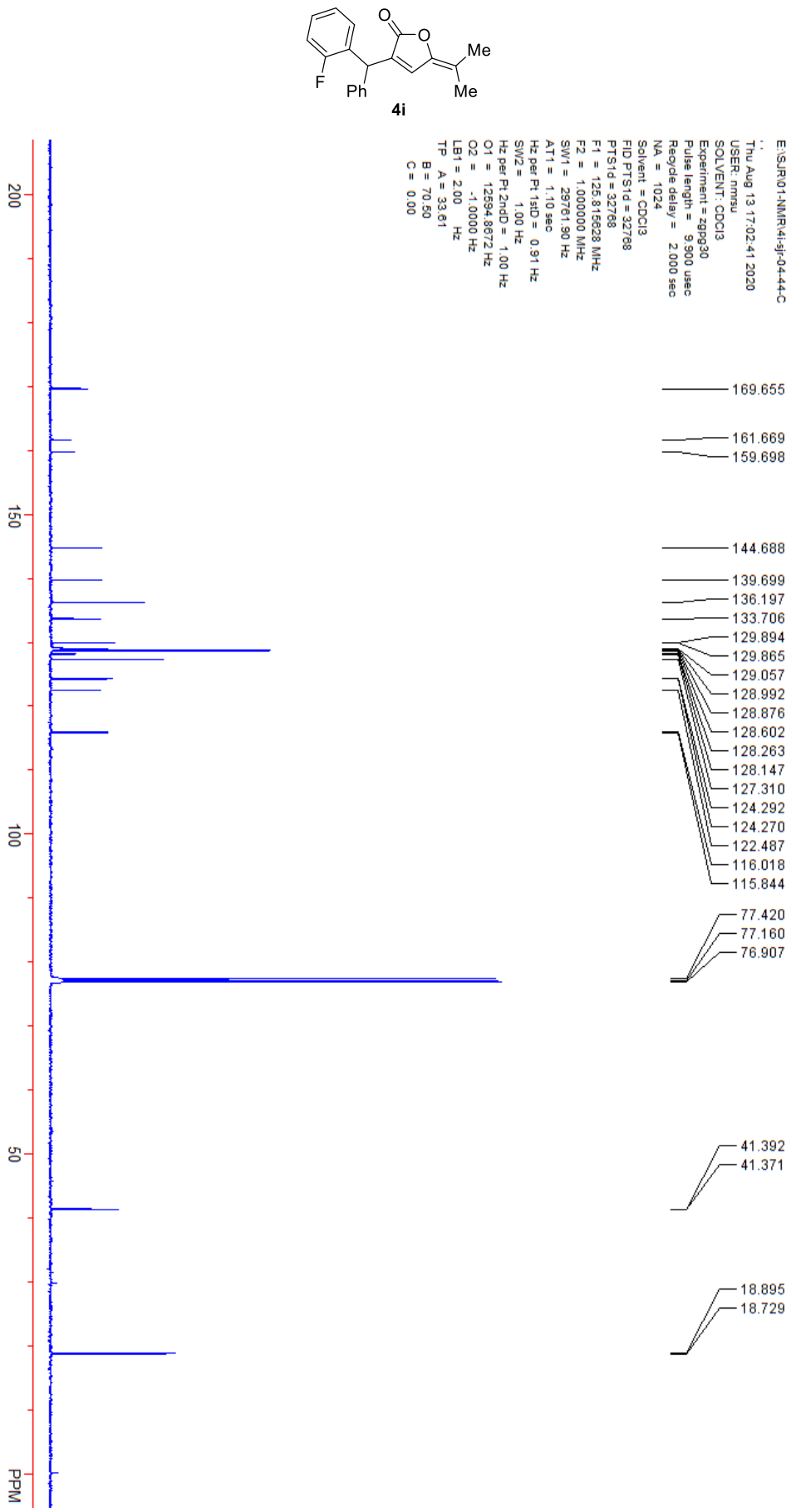

E:\SJR\01-NMR\4h-sjr-04-15-H
Thu Jul 23 10:16:09 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -93.52
B = 28.83
C = 0.00
7.325
7.310
7.296
7.259
7.249
7.235
7.178
7.168
7.155
7.141
7.120
7.105
6.951
6.936
5.397
2.265
1.994
1.840
1.548
0.000
5.18
2.03
2.05
2.06
1.00
3.04
3.00
3.08
10
8
6
4
2
0
PPM

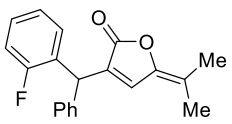

O
O
Me
Me
Ph
Me

4h

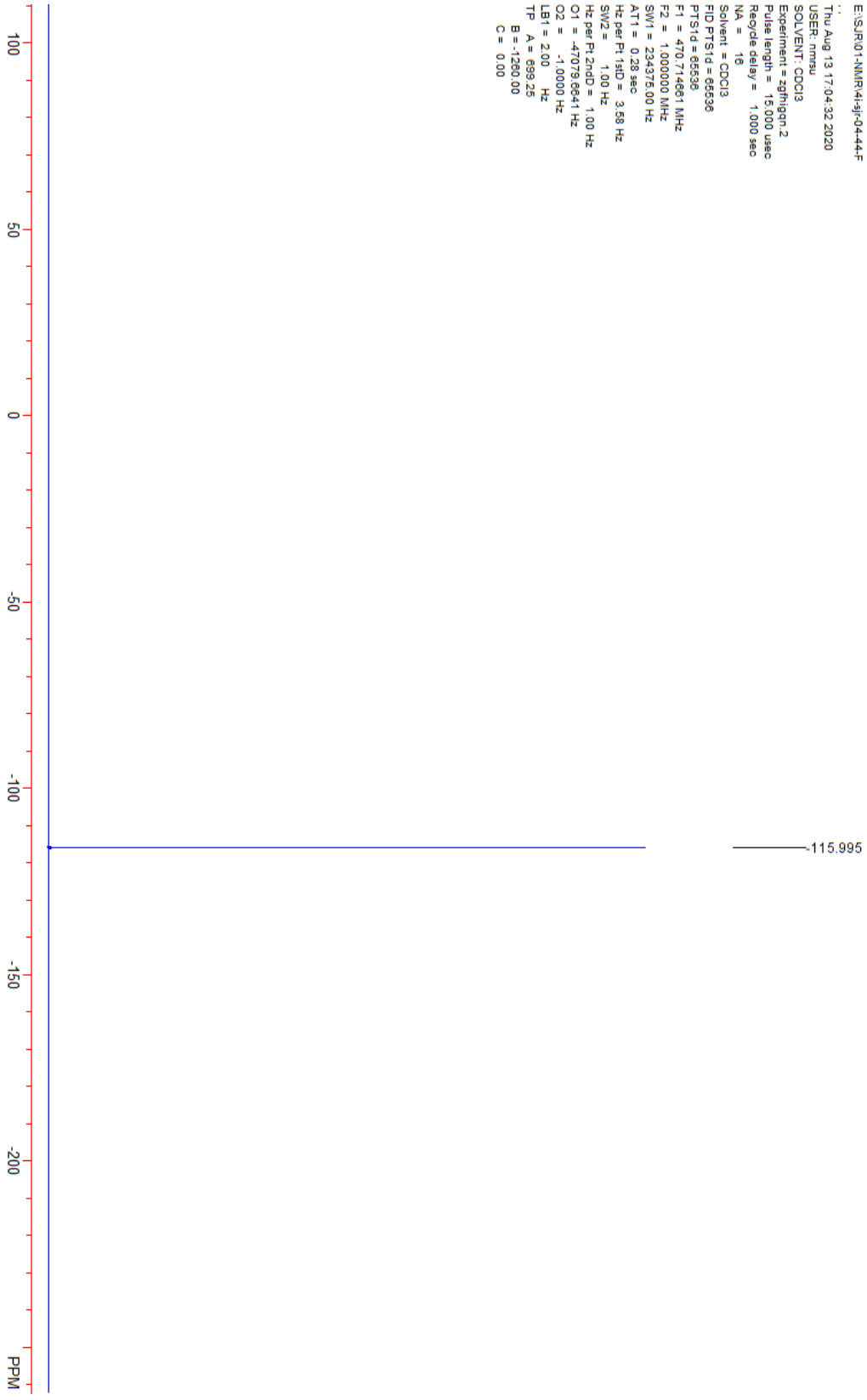

E:\SJR\01-NMR\4h-sjr-04-15-C
Thu Jul 23 17:01:23 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 800
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 26.96
B = 83.88
C = 0.00
169.893
140.580
144.811
139.143
136.573
136.356
135.021
131.021
128.898
128.811
127.974
127.165
127.042
126.147
122.039
77.413
77.160
76.900
44.569
19.870
18.895
18.715
200
150
100
50
0 PPM

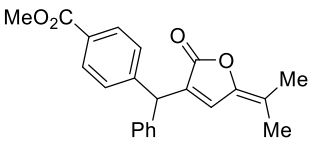

O
O
Me
F
Ph
Me
4i
E:\SJR\01-NMR\4i-sjr-04-44-H
Wed Aug 12 15:30:39 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.9443 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -95.63
B = 32.34
C = 0.00
7.346
7.331
7.316
7.283
7.261
7.239
7.182
7.167
7.105
7.091
7.075
7.048
5.514
1.997
1.858
1.580
0.000
10
8
6
4
2
0
PPM
2.01
2.03
2.89
4.10
1.00
3.07
2.98


O
O
Me
F
Ph
Me
4i
E:\SJR\01-NMR\4i-sjr-04-44-C
Thu Aug 13 17:02:41 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.8156628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8672 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 33.61
B = 70.50
C = 0.00
169.655
161.669
159.698
144.688
139.699
136.197
133.706
129.894
129.865
129.057
128.992
128.876
128.602
128.263
128.147
127.310
124.292
124.270
122.487
116.018
115.844
77.420
77.160
76.907
41.392
41.371
18.895
18.729
200
150
100
50
PPM

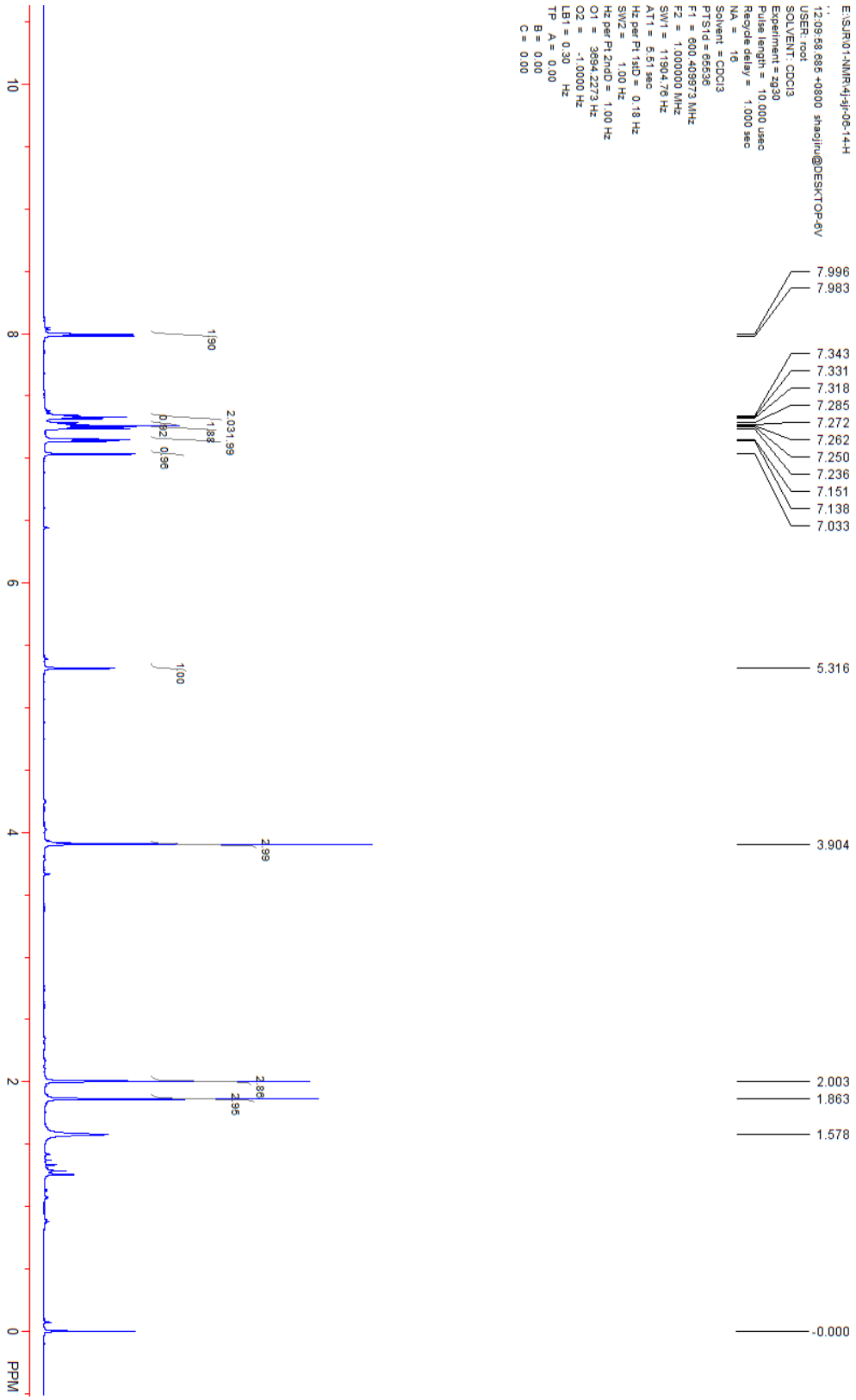

O
O
Me
F
Ph
Me

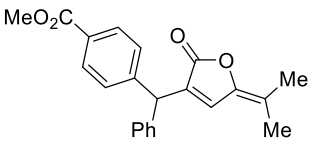
4i


E:\SJR\01-NMR\4i-sjr-04-44-F
Thu Aug 13 17:04:32 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47079.6641 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 699.25
B = -1260.00
C = 0.00
-115.995
100
50
0
-50
-100
-150
-200
PPM

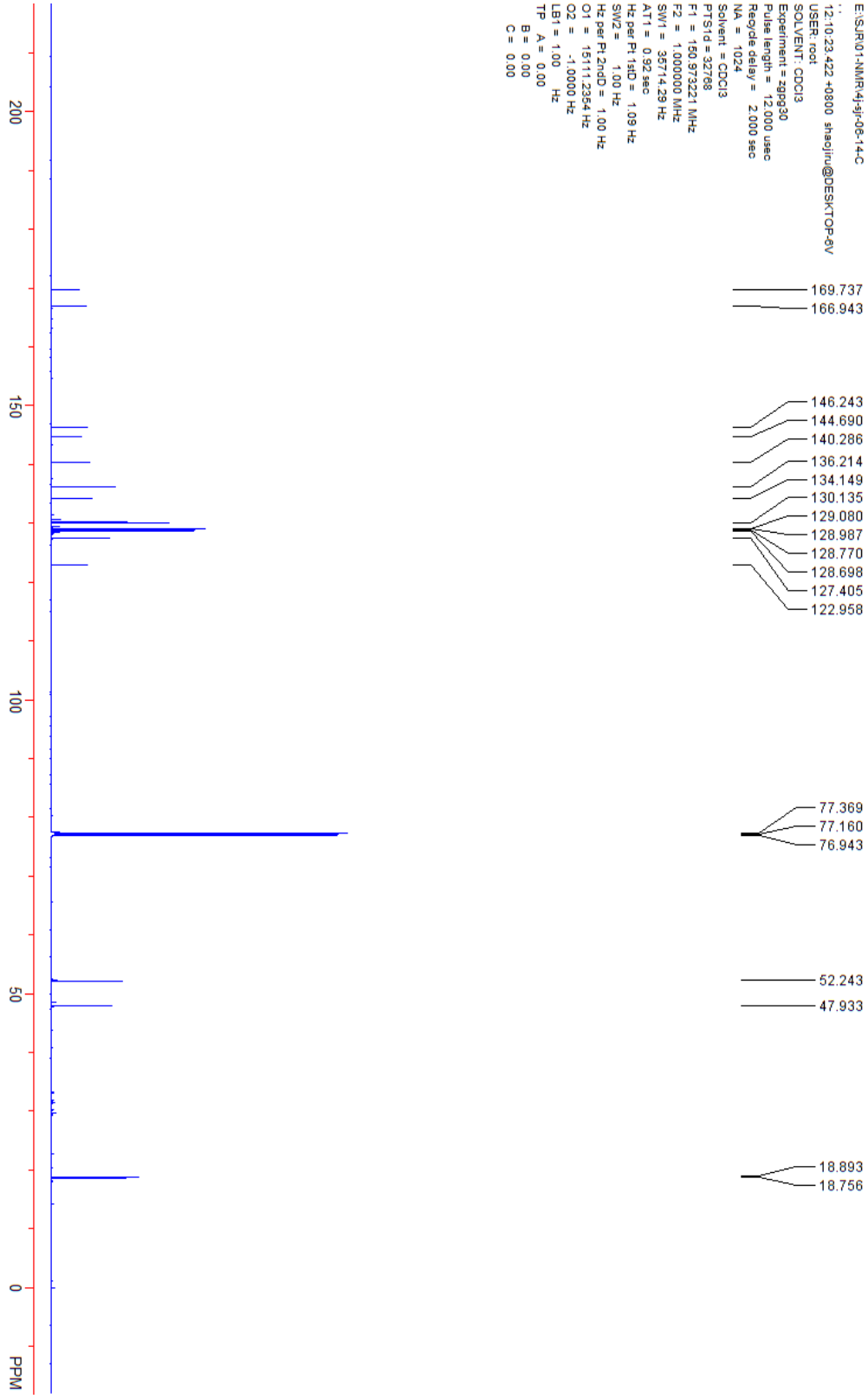

MeO2C
O
O
Me
Ph
Me

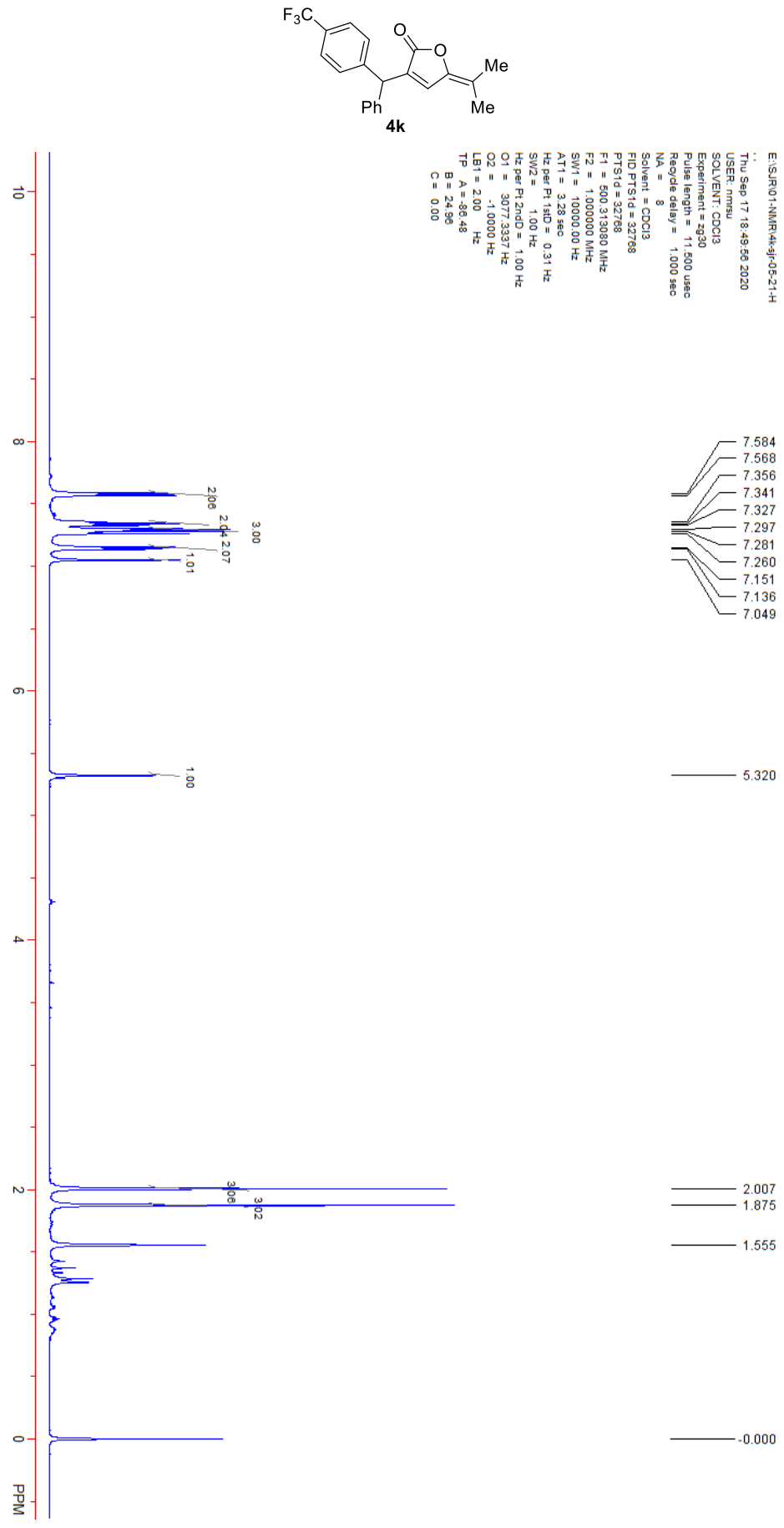
4j

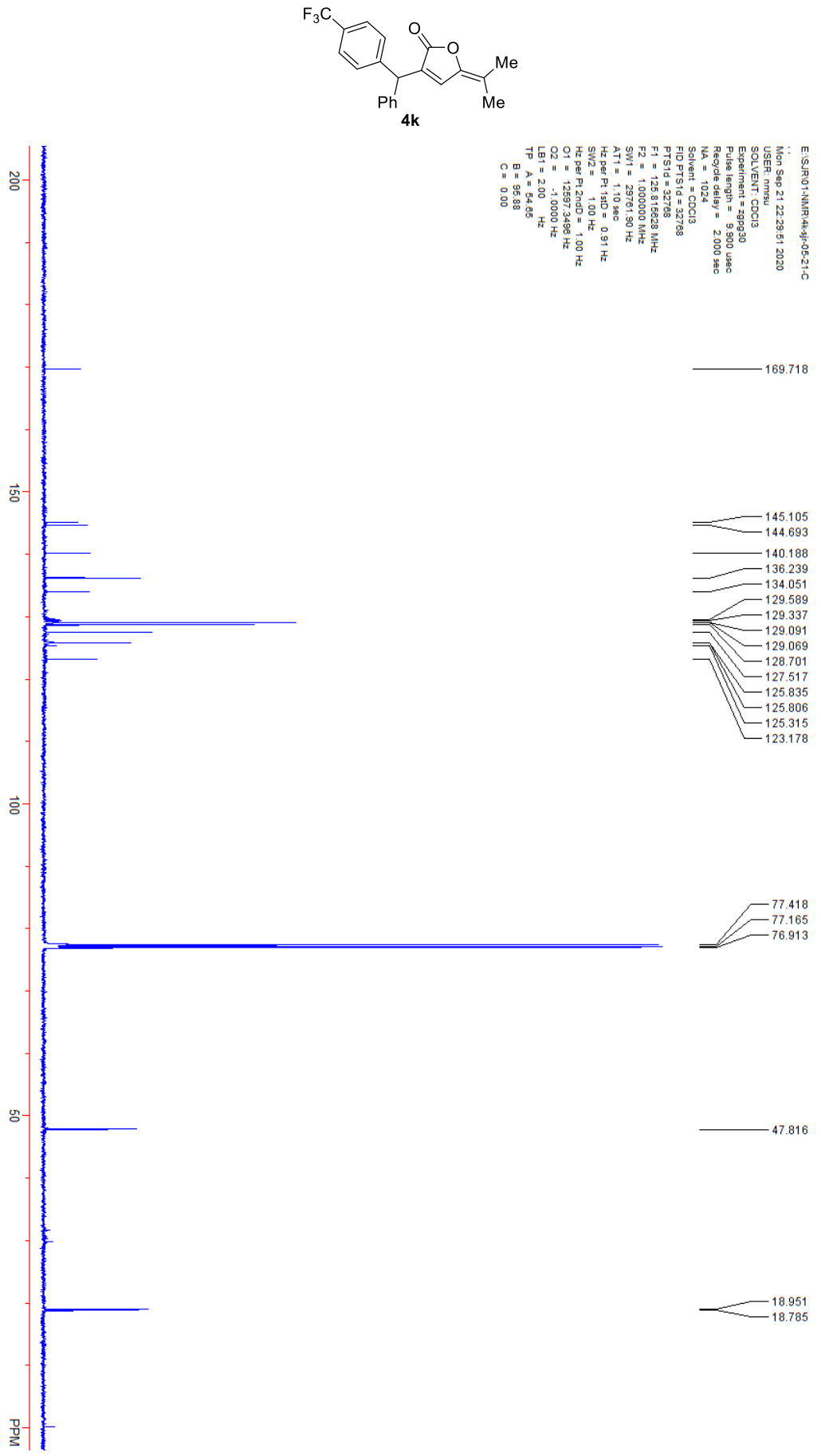

E:\SJR\01-NMR\4j-sjr-06-14-H
12:09:58.685 +0800 shaojin@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3894.2273 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.996
7.983
7.343
7.331
7.318
7.285
7.272
7.262
7.250
7.236
7.151
7.138
7.033
5.316
3.904
2.003
1.863
1.578
-0.000
1.90
2.03
1.88
0.82
0.96
1.00
2.99
2.86
2.95
10
8
6
4
2
0
PPM

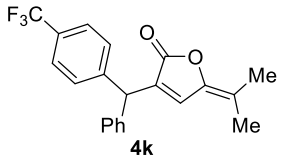

MeO2C
O
O
Me
Ph
Me

4j

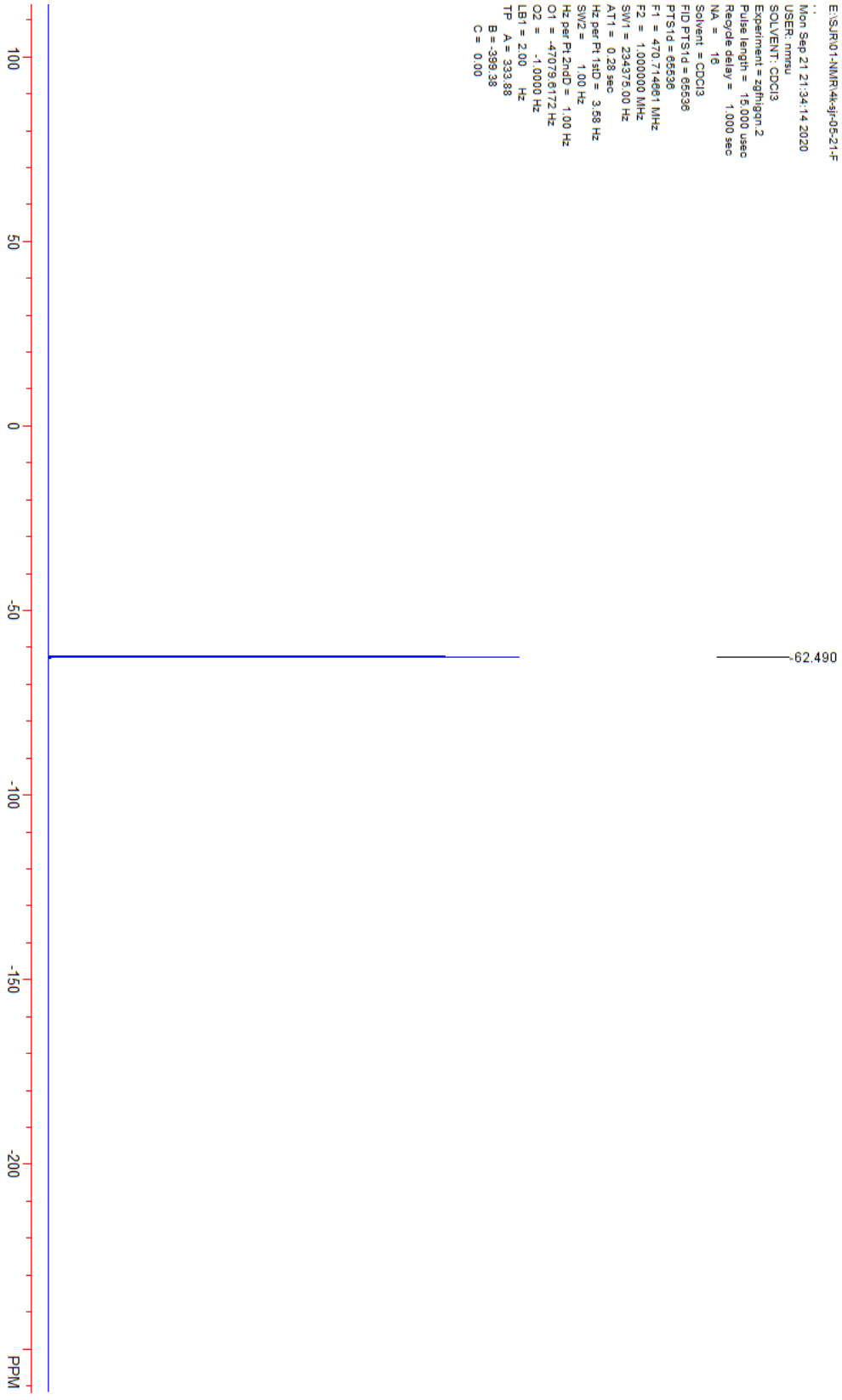

E:\SJR\01-NMR\4j-sjr-06-14-C
12:10:23.422 +0800 shaojirui@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15111.2354 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
169.737
166.943
146.243
144.690
140.286
136.214
134.149
130.135
129.080
128.987
128.770
128.698
127.405
122.958
77.369
77.160
76.943
52.243
47.933
18.893
18.756
200
150
100
50
0
PPM

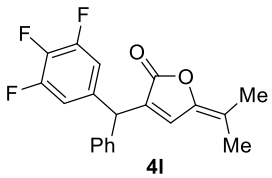

F3C
O
O
Me
Ph
Me
4k
E:\SJR\01-NMR\4k-sjr-05-21-H
Thu Sep 17 18:49:56 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3337 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -86.48
B = 24.96
C = 0.00
7.584
7.568
7.356
7.341
7.327
7.297
7.281
7.260
7.151
7.136
7.049
5.320
2.007
1.875
1.555
-0.000
2.06
2.04
2.07
3.00
1.01
1.00
3.06
3.02
10
8
6
4
2
0
PPM


F3C
O
O
Me
Ph
Me
4k
E:\SJR\01-NMR\4k-sji-05-21-C
Mon Sep 21 22:29:51 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 =
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.3496 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 54.65
B = 96.88
C = 0.00
169.718
145.105
144.693
140.188
136.239
134.051
129.589
129.337
129.091
129.069
128.701
127.517
125.835
125.806
125.315
123.178
77.418
77.165
76.913
47.816
18.951
18.785
200
150
100
50
PPM

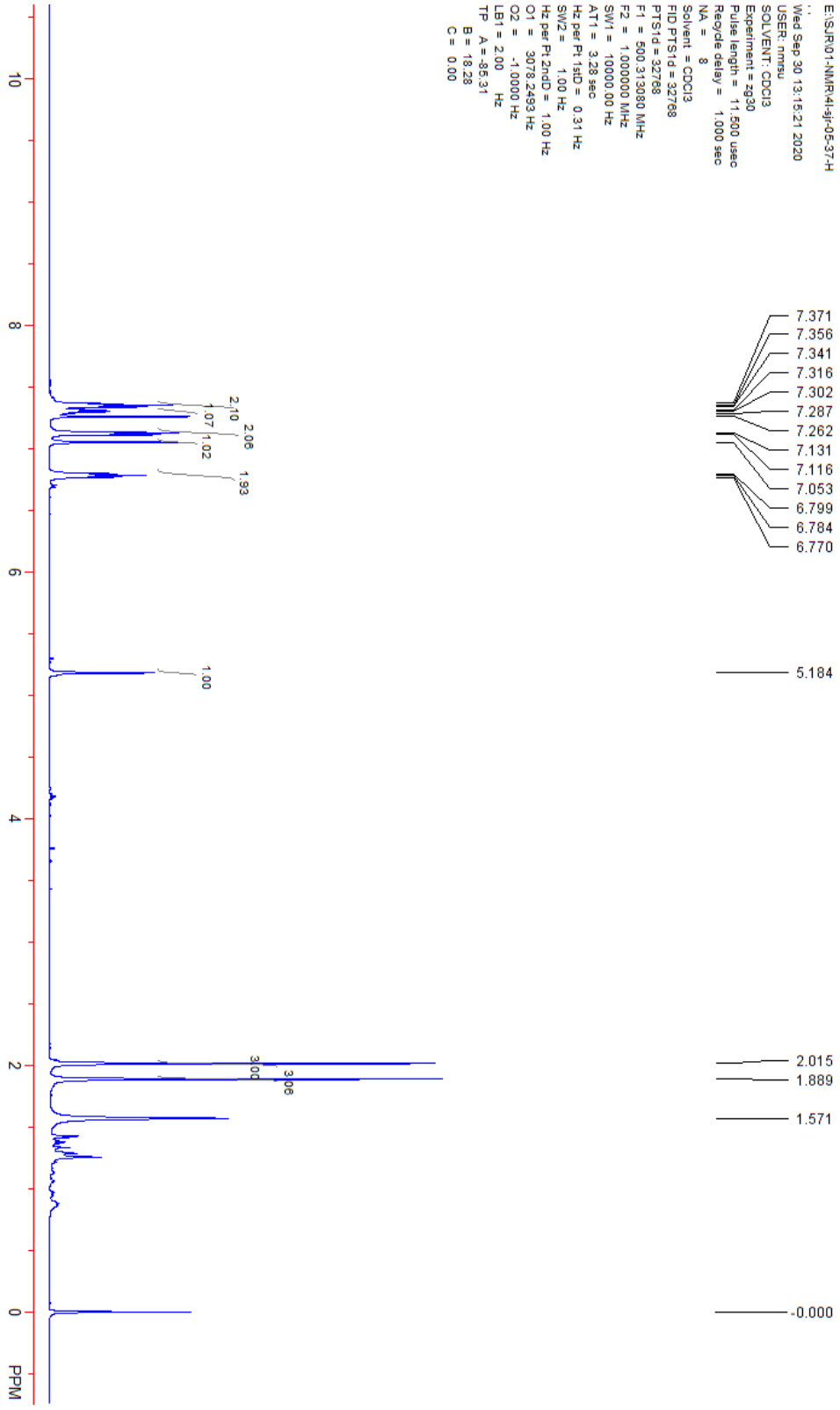

F3C
O
O
Me
Ph
Me

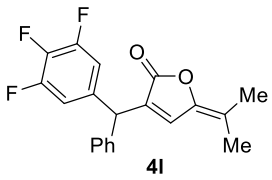
4k


E:\SJR\01-NMR\4kjr-05-21-F
Mon Sep 21 21:34:14 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714681 MHz
F2 = 1.000000 MHz
SW1 = 2343750.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47079.6172 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 333.88
B = -399.38
C = 0.00
-62.490
100
50
0
-50
-100
-150
-200
PPM

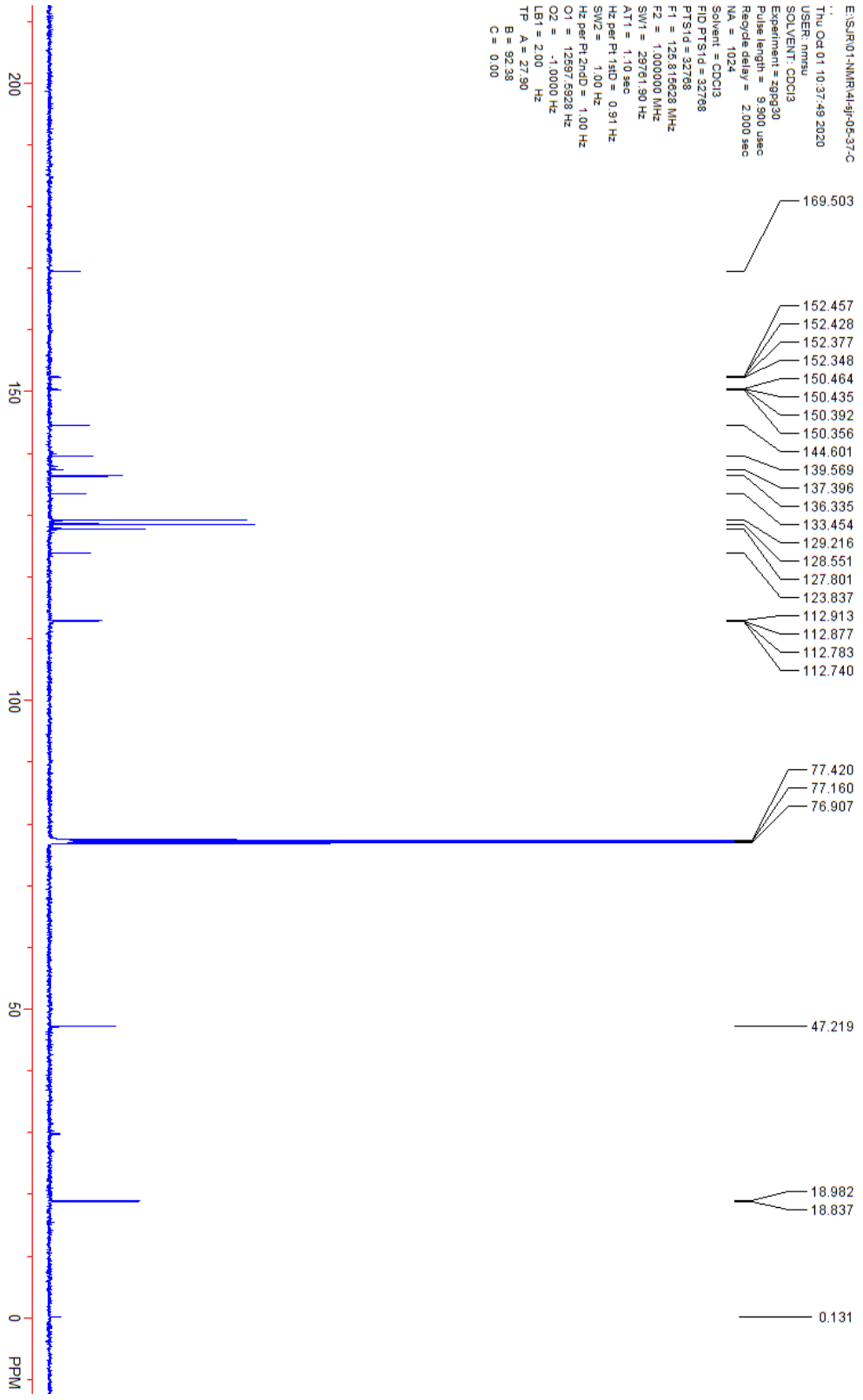

F
F
F
O
O
Me
Me
Ph

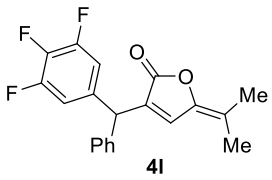
4l


E:\SJR\01-NMR\4l-sjr-05-37-H
Wed Sep 30 13:15:21 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.2493 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -85.31
B = 18.28
C = 0.00
7.371
7.356
7.341
7.316
7.302
7.287
7.262
7.131
7.116
7.053
6.799
6.784
6.770
5.184
2.015
1.889
1.571
-0.000
2.10
2.06
1.07
1.02
1.93
1.00
3.00
3.08
10
8
6
4
2
0
PPM

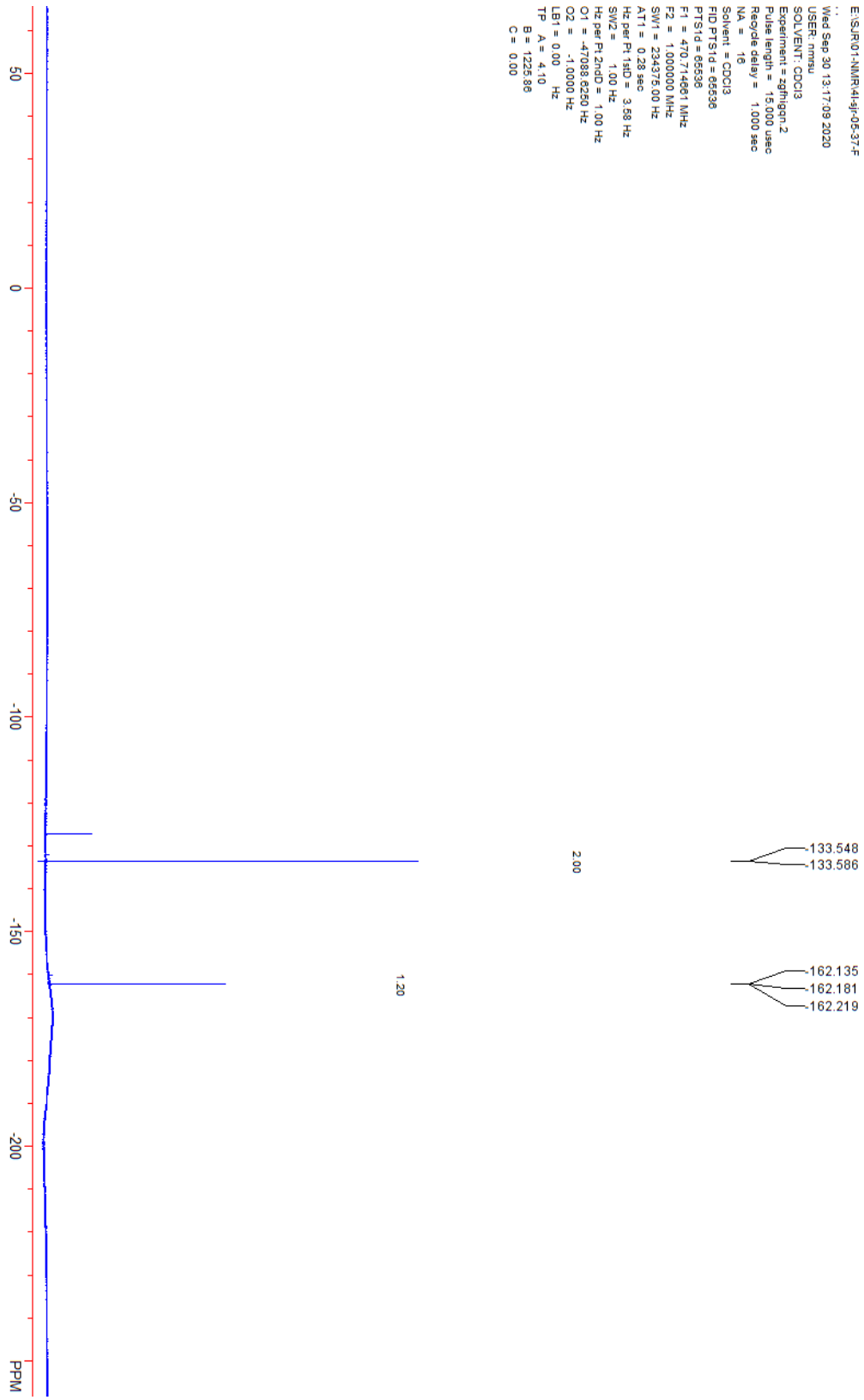

F
F
F
O
O
Me
Me
Ph

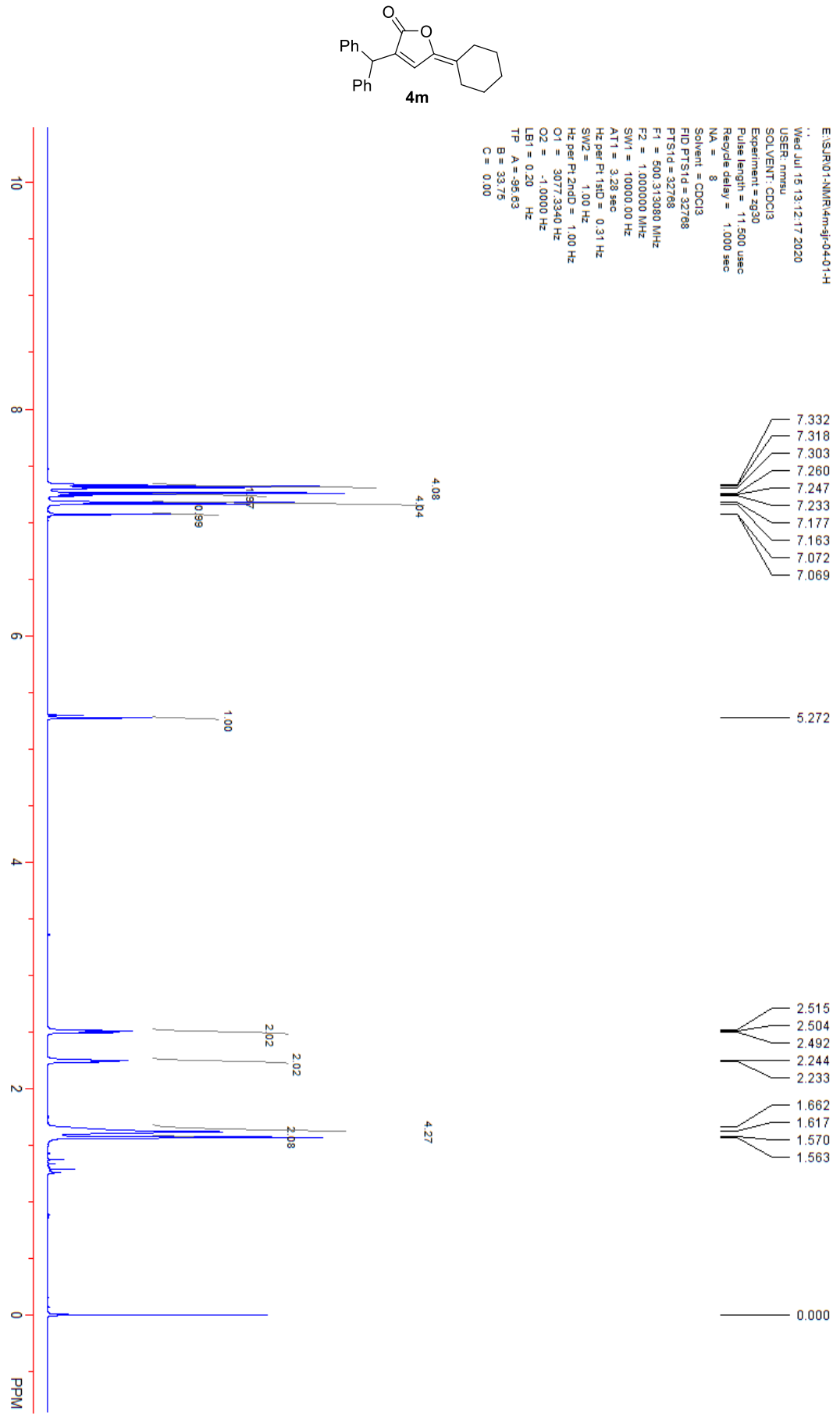
4l

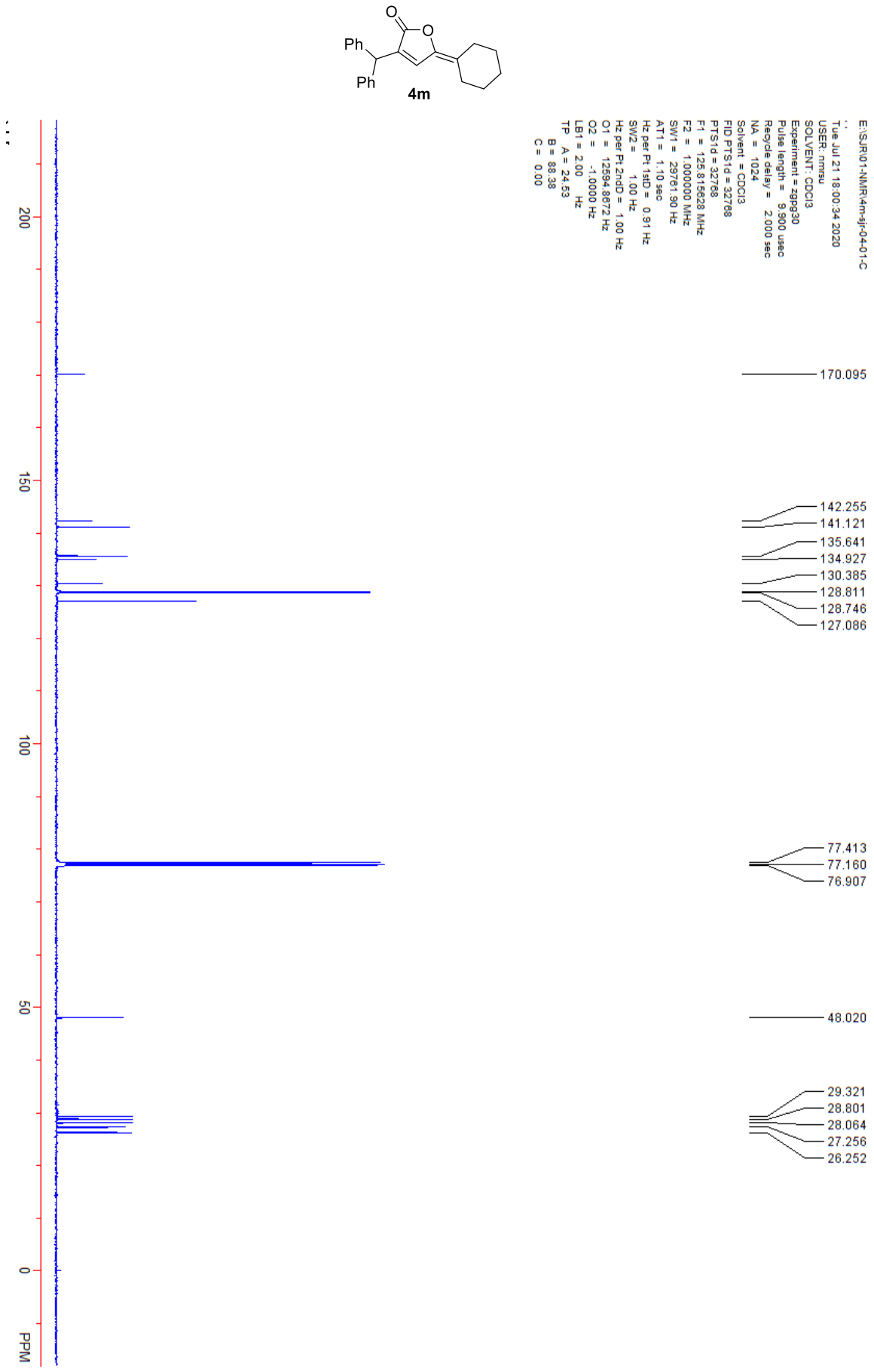

E:\SJR\01-NMR\4l-sjr-05-37-C
Thu Oct 01 10:37:49 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.5928 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 27.90
B = 92.38
C = 0.00
169.503
152.457
152.428
152.377
152.348
150.464
150.435
150.392
150.356
144.601
139.569
137.396
136.335
133.454
129.216
128.551
127.801
123.837
112.913
112.877
112.783
112.740
77.420
77.160
76.907
47.219
18.982
18.837
0.131
200
150
100
50
0
PPM

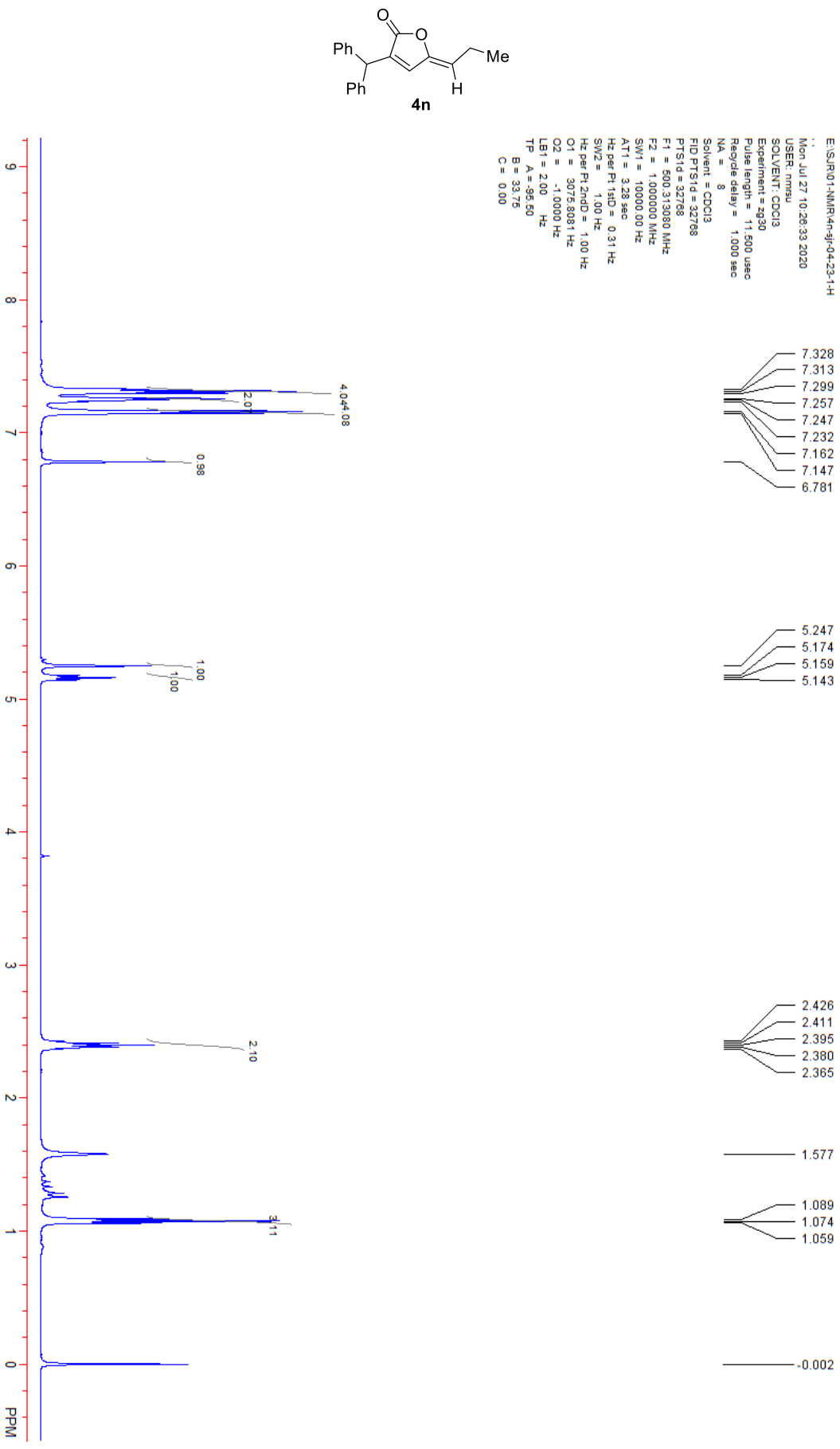

F
F
F
O
O
Me
Me
Ph

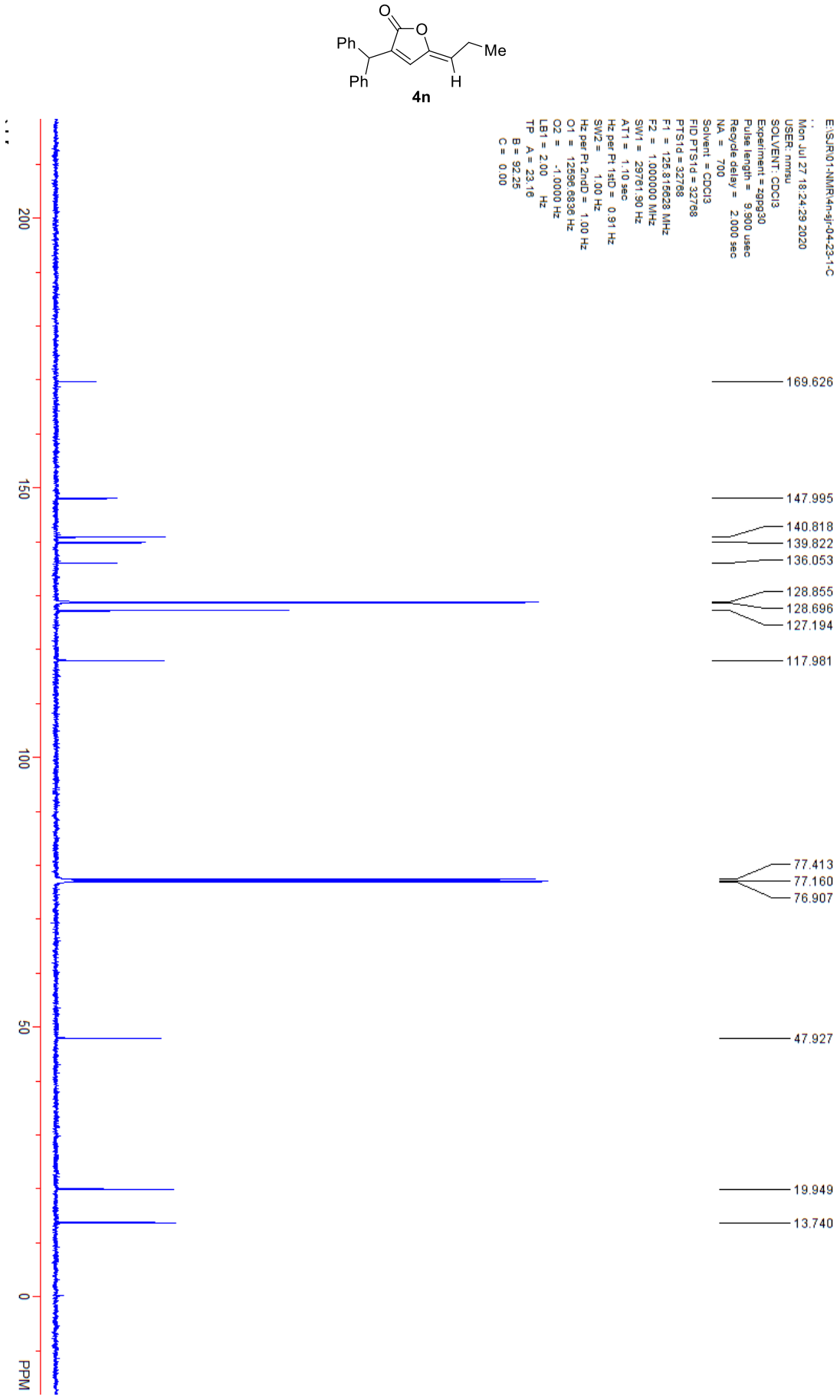
4l

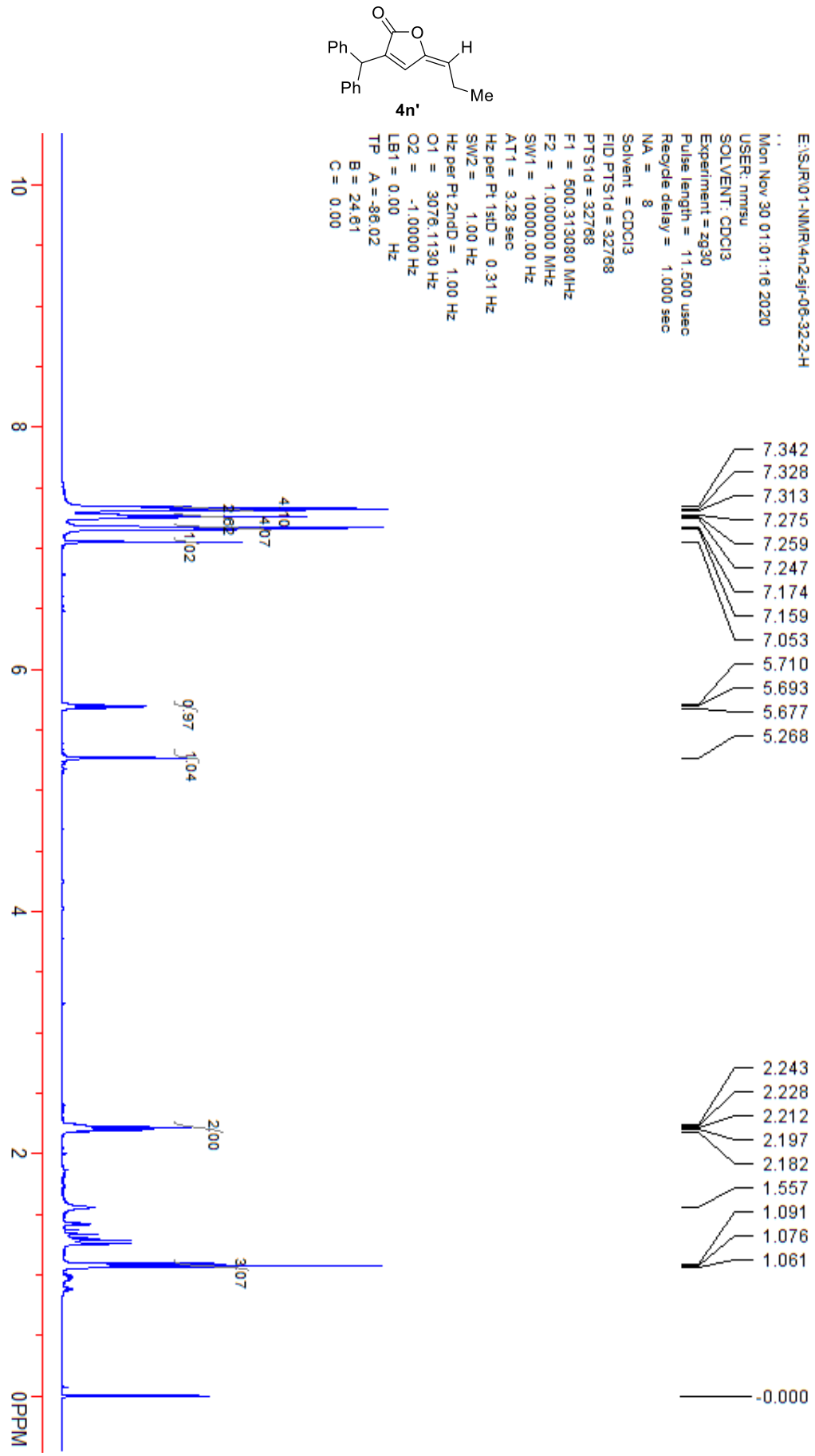

E:\SJR\01-NMR\4l-sjr-05-37-F
Wed Sep 30 13:17:09 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgfhigqn.2
Pulse length = 15.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
FID PTS1d = 65536
PTS1d = 65536
F1 = 470.714661 MHz
F2 = 1.000000 MHz
SW1 = 234375.00 Hz
AT1 = 0.28 sec
Hz per Pt 1stD = 3.58 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = -47088.6250 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 4.10
B = 1225.86
C = 0.00
50
0
-50
-100
-150
-200
PPM
2.00
1.20
-133.548
-133.586
-162.135
-162.181
-162.219

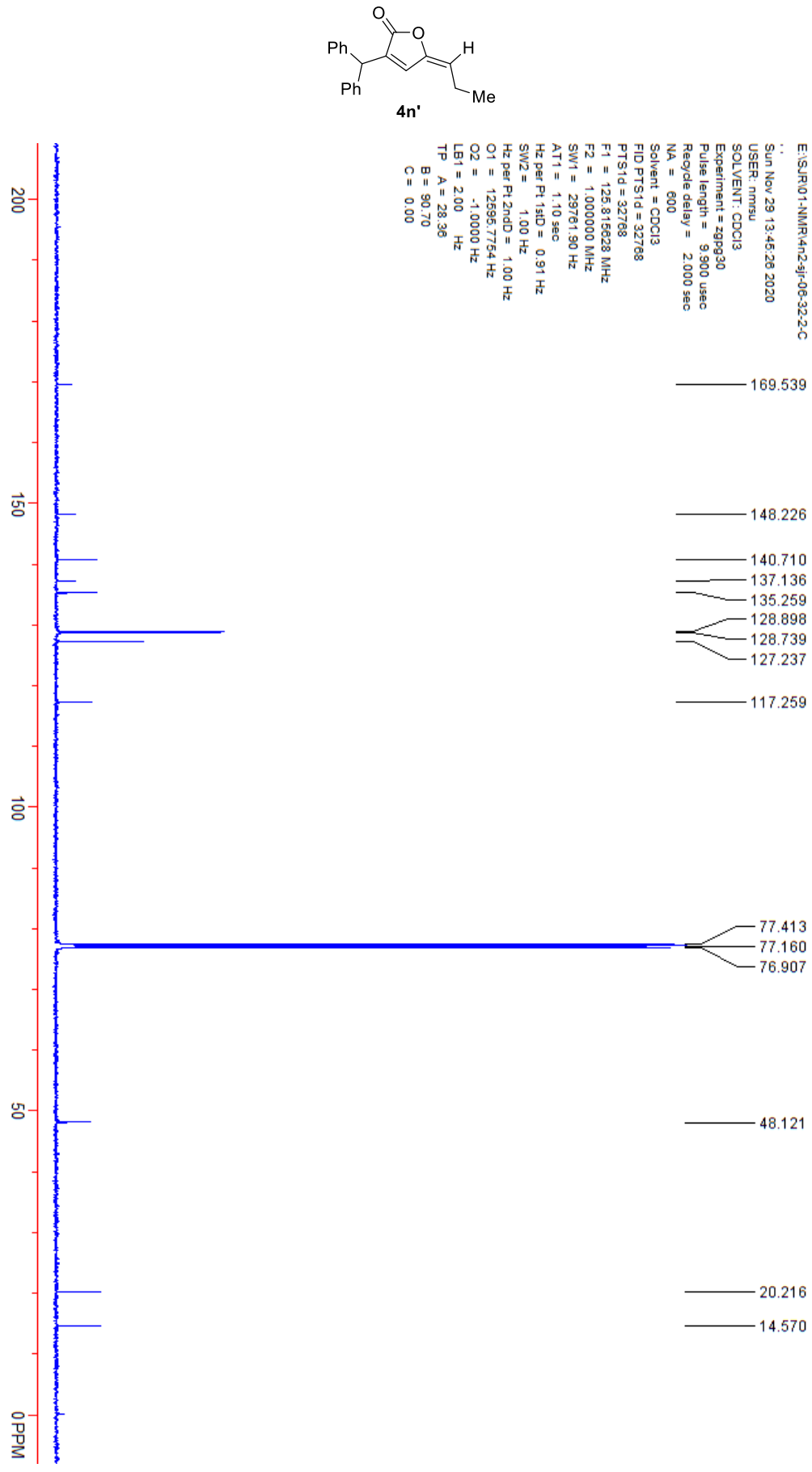

O
O
Ph
Ph
4m
E:\SJR\01-NMR\4m-sjr-04-01-H
Wed Jul 15 13:12:17 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.3340 Hz
O2 = -1.0000 Hz
LB1 = 0.20 Hz
TP A = -96.63
B = 33.75
C = 0.00
7.332
7.318
7.303
7.260
7.247
7.233
7.177
7.163
7.072
7.069
5.272
2.515
2.504
2.492
2.244
2.233
1.662
1.617
1.570
1.563
0.000
4.08
4.04
1.97
0.99
1.00
2.02
2.02
2.08
4.27
10
8
6
4
2
0
PPM

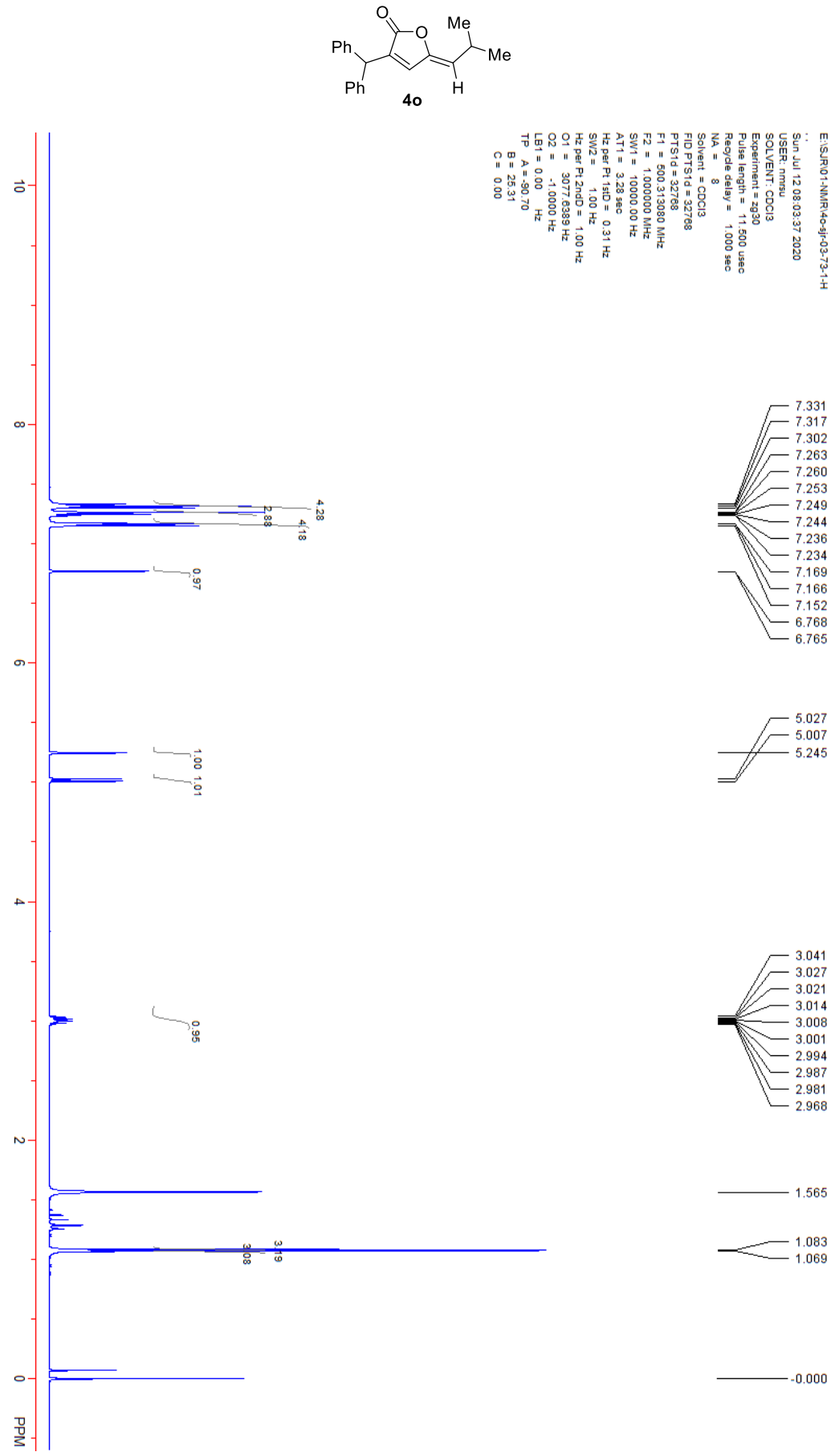

Ph
Ph
O
O
4m
E:\SJR\01-NMR\4m-sjf-04-01-C
Tue Jul 21 18:00:34 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.500 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12594.8872 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 24.53
B = 88.38
C = 0.00
170.095
142.255
141.121
135.641
134.927
130.385
128.811
128.746
127.086
77.413
77.160
76.907
48.020
29.321
28.801
28.064
27.256
26.252
200
150
100
50
0
PPM

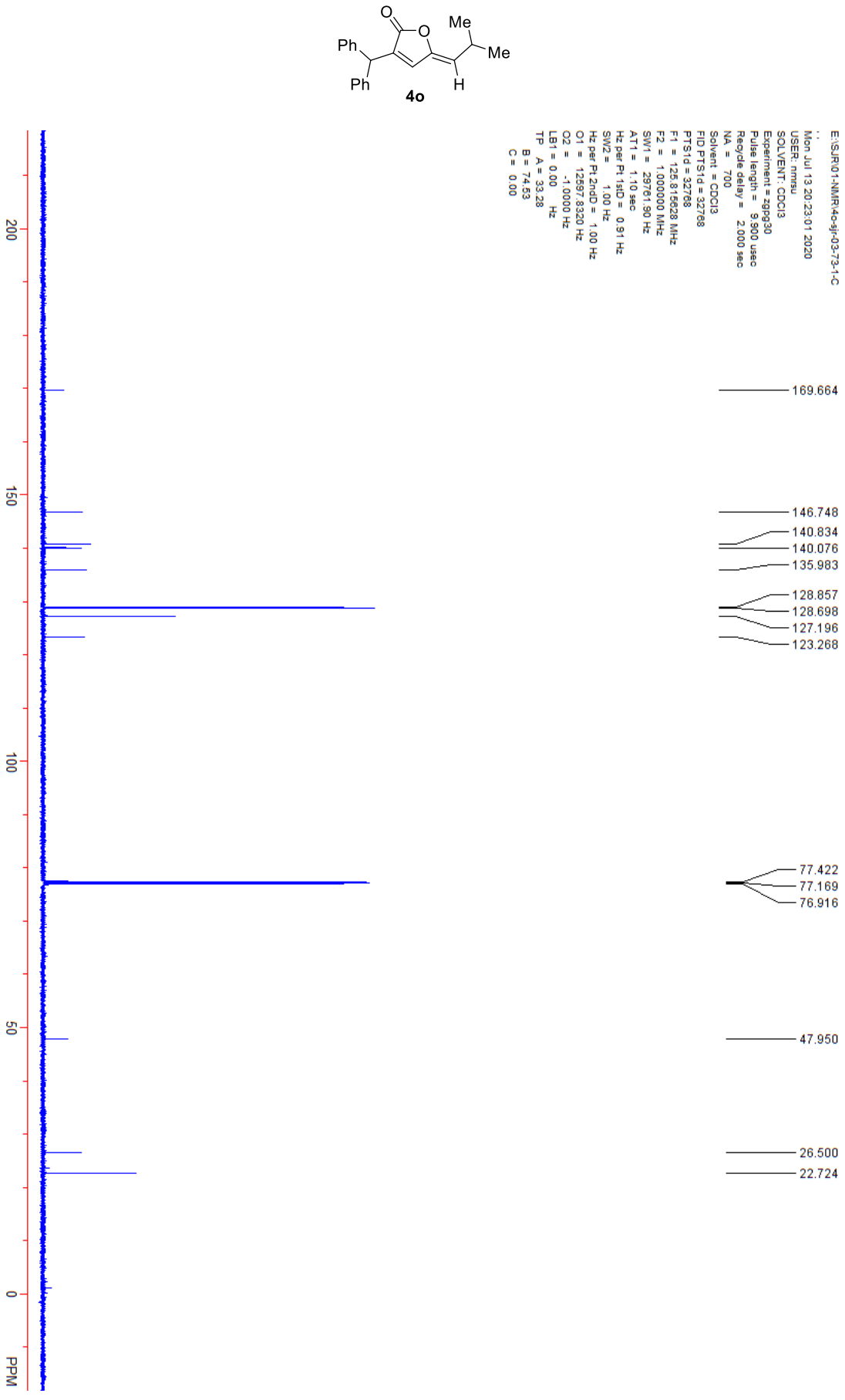

O
O
Ph
Ph
Me
H
4n
E:\SJR\01-NMR\4n-sjr-04-23-1-H
Mon Jul 27 10:28:33 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3075.8081 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = -95.50
B = 33.75
C = 0.00
7.328
7.313
7.299
7.257
7.247
7.232
7.162
7.147
6.781
5.247
5.174
5.159
5.143
2.426
2.411
2.395
2.380
2.365
1.577
1.089
1.074
1.059
-0.002
4.04
4.08
2.01
0.98
1.00
1.00
2.10
3.11
PPM

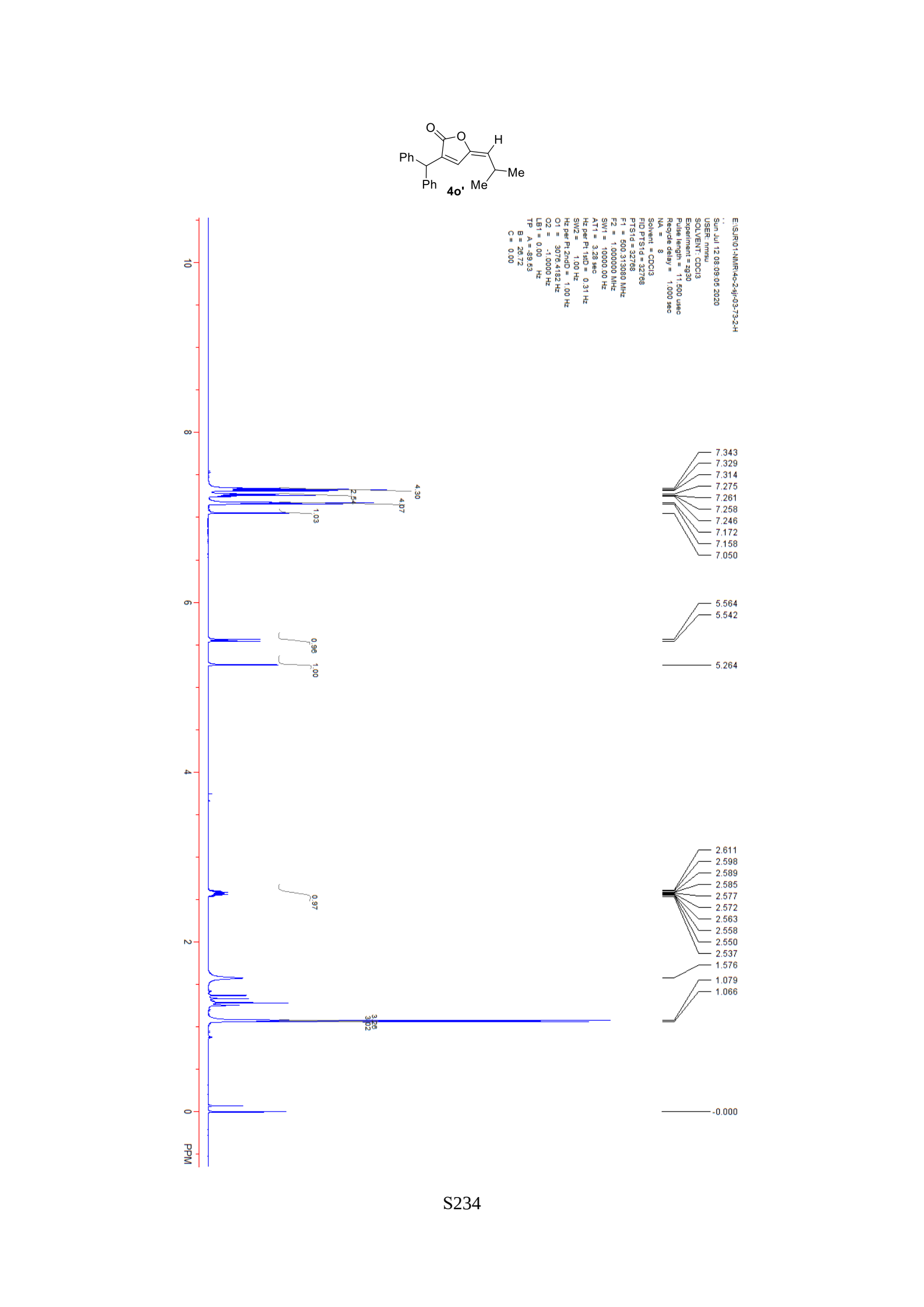

O
O
Ph
Ph
Me
H
4n
E:\SJR\01-NMR\4n-sjr-04-23-1-C
Mon Jul 27 18:24:29 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12596.6836 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 23.16
B = 92.25
C = 0.00
169.626
147.995
140.818
139.822
136.053
128.855
128.696
127.194
117.981
77.413
77.160
76.907
47.927
19.949
13.740
200
150
100
50
0
PPM

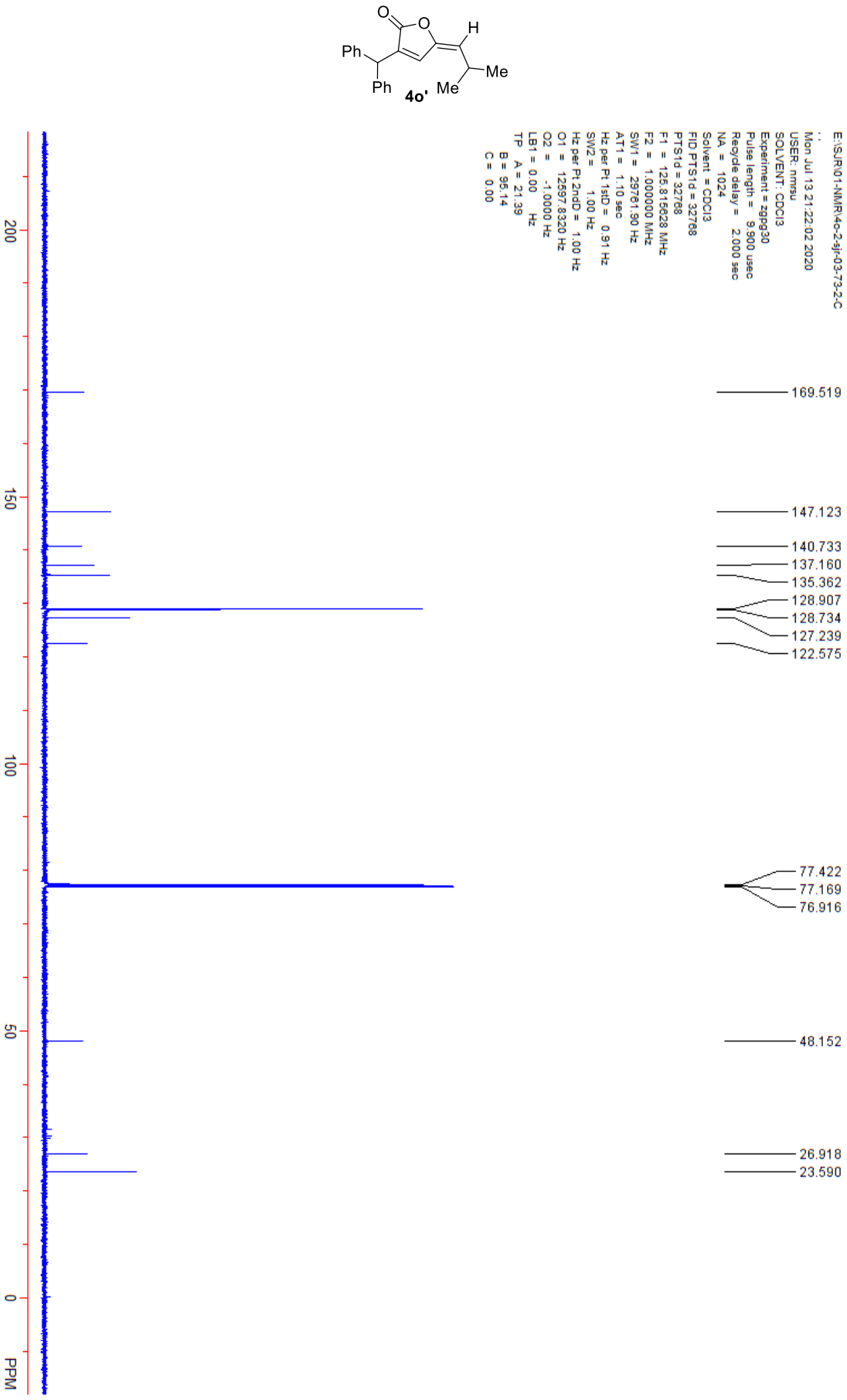

O
O
Ph
Ph
H
Me
4n'
E:\SJR\01-NMR\4n2-sjr-08-32-2-H
Mon Nov 30 01:01:16 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3078.1130 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -86.02
B = 24.61
C = 0.00
7.342
7.328
7.313
7.275
7.259
7.247
7.174
7.159
7.053
5.710
5.693
5.677
5.268
2.243
2.228
2.212
2.197
2.182
1.557
1.091
1.076
1.061
-0.000
4.10
2.03
4.07
1.02
0.97
1.04
2.00
3.07
10
8
6
4
2
0PPM

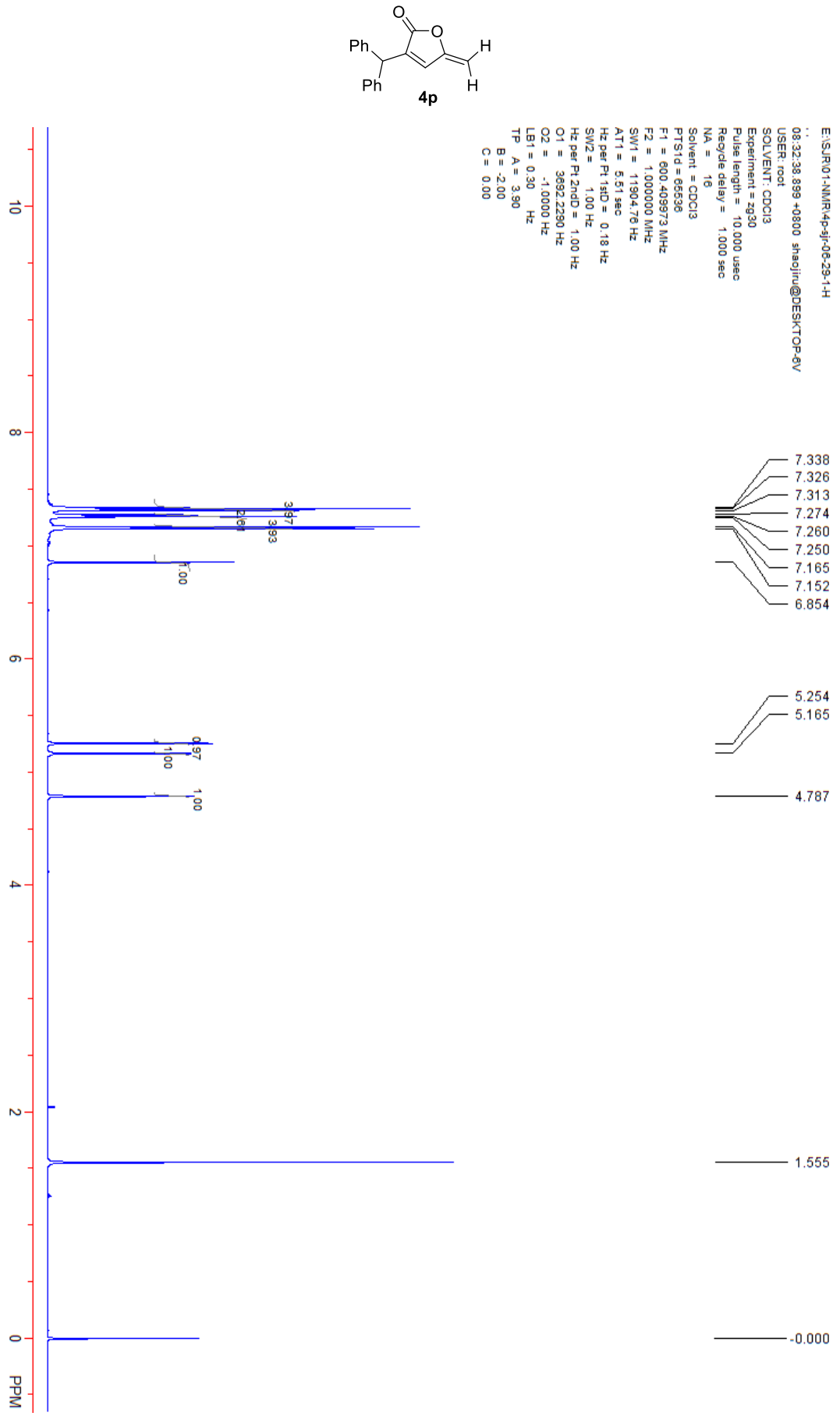

O
O
Ph
Ph
H
Me
4n'
E:\SJR\01-NMR\4n2-sjr-06-32-2-C
Sun Nov 29 13:45:26 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 600
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7764 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 28.36
B = 90.70
C = 0.00
169.539
148.226
140.710
137.136
135.259
128.898
128.739
127.237
117.259
77.413
77.160
76.907
48.121
20.216
14.570
200
150
100
50
0 PPM

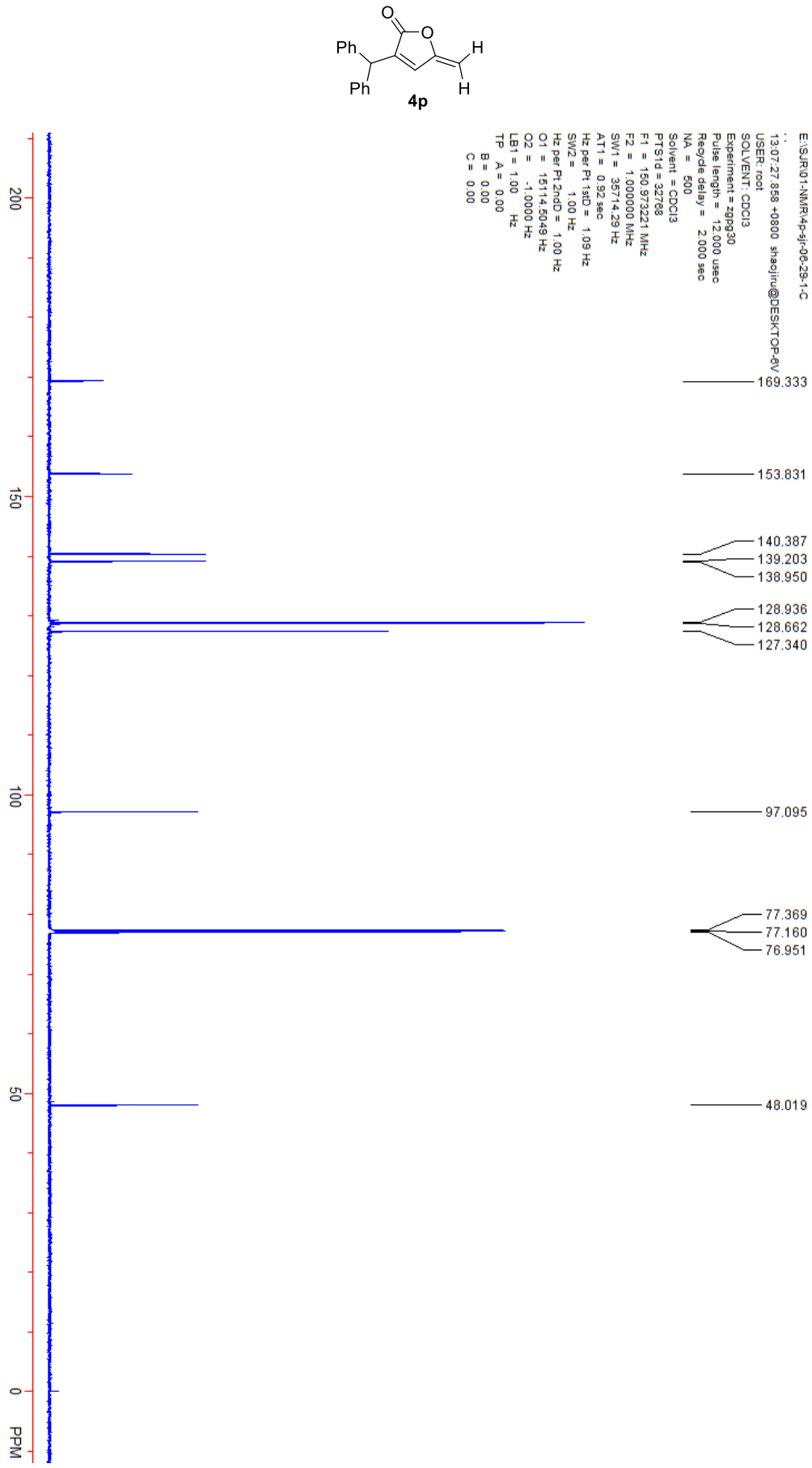

O
O
Me
Me
Ph
Ph
H
4o
E:\SJR\01-NMR\4o-sjr-03-73-1-H
Sun Jul 12 08:03:37 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.6389 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -90.70
B = 25.31
C = 0.00
7.331
7.317
7.302
7.263
7.260
7.253
7.249
7.244
7.236
7.234
7.169
7.166
7.152
6.768
6.765
5.027
5.007
5.245
3.041
3.027
3.021
3.014
3.008
3.001
2.994
2.987
2.981
2.968
1.565
1.083
1.069
-0.000
4.28
2.88
4.18
0.97
1.00
1.01
0.95
3.19
3.08
10
8
6
4
2
0
PPM

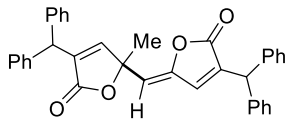

O
O
Me
Me
Ph
Ph
H
4o
E:\SJR01-NMR\4o-sjr-03-73-1-C
Mon Jul 13 20:23:01 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 700
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.8320 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 33.28
B = 74.53
C = 0.00
169.664
146.748
140.834
140.076
135.983
128.857
128.698
127.196
123.268
77.422
77.169
76.916
47.950
26.500
22.724
200
150
100
50
0
PPM


O
O
H
Ph
Me
Ph
Me
4o'
E:\SJR\01-NMR\4o-2-sjr-03-73-2-H
Sun Jul 12 08:09:05 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4182 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 89.53
B = 26.72
C = 0.00
7.343
7.329
7.314
7.275
7.261
7.258
7.246
7.172
7.158
7.050
5.564
5.542
5.264
2.611
2.598
2.589
2.585
2.577
2.572
2.563
2.558
2.550
2.537
1.576
1.079
1.066
-0.000
4.30
2.54
4.07
1.03
0.98
1.00
0.97
3.28
3.02
10
8
6
4
2
0
PPM

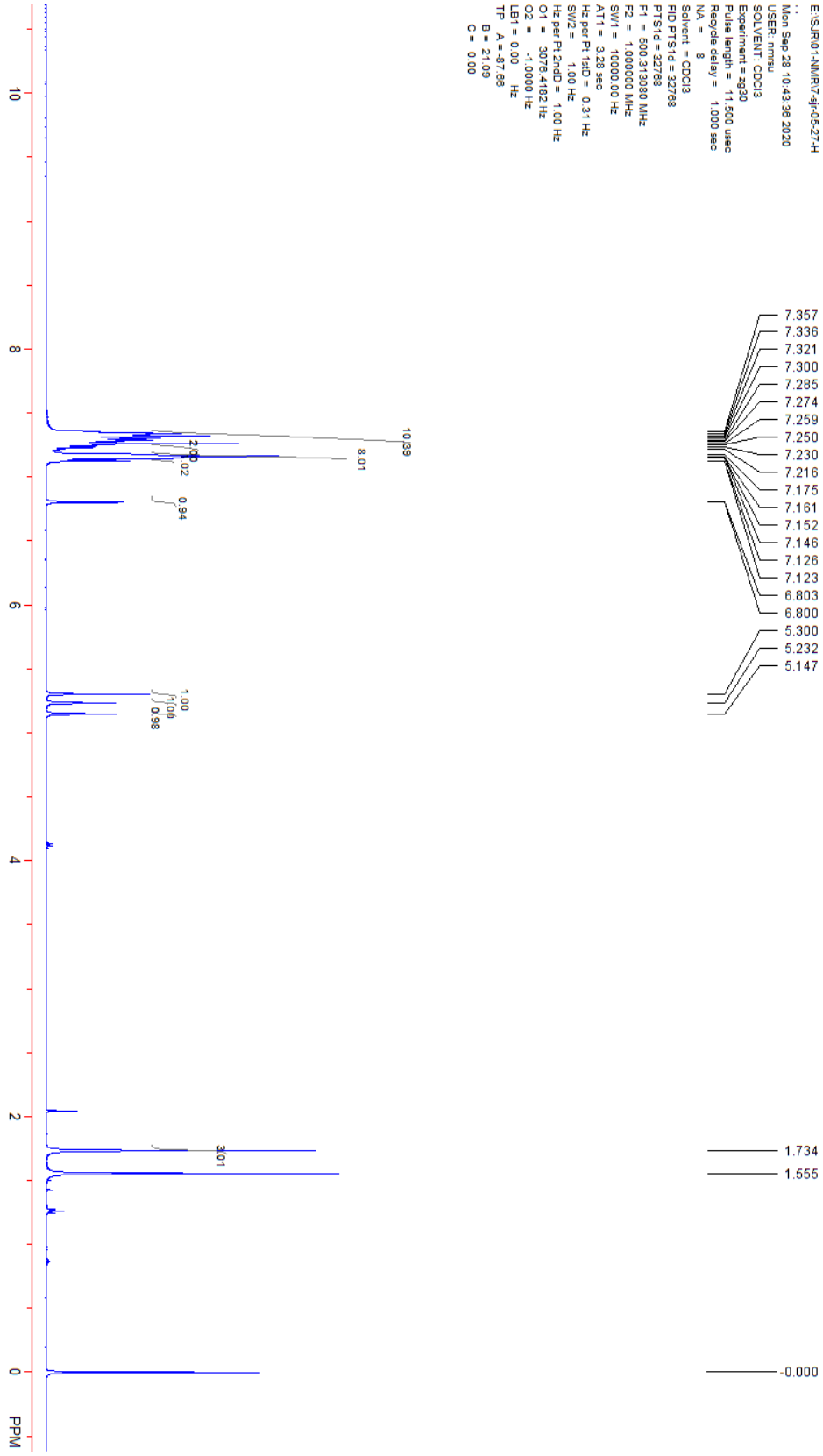

O
O
H
Ph
Me
Ph
Me
4o'
E:\SJR\01-NMR\4o-2-sjr-03-73-2-C
Mon Jul 13 21:22:02 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.8320 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 21.39
B = 95.14
C = 0.00
169.519
147.123
140.733
137.160
135.362
128.907
128.734
127.239
122.575
77.422
77.169
76.916
48.152
26.918
23.590
200
150
100
50
0
PPM

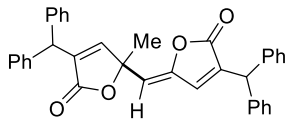

Ph
Ph
O
O
H
H
4p
E:\SJR\01-NMR\4p-sjr-08-29-1-H
08:32:38.899 +0800 shaojiru@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3892.2290 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 3.90
B = -2.00
C = 0.00
7.338
7.326
7.313
7.274
7.260
7.250
7.165
7.152
6.854
5.254
5.165
4.787
1.555
-0.000
3.97
2.04
3.93
1.00
0.97
1.00
1.00
10
8
6
4
2
0
PPM


Ph
Ph
O
O
H
H
4p
E:\SJR\01-NMR\4p-sjr-06-29-1-C
13:07:27.858 +0800 shaojirui@DESKTOP-8V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 500
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
169.333
153.831
140.387
139.203
138.950
128.936
128.662
127.340
97.095
77.369
77.160
76.951
48.019
200
150
100
50
0
PPM

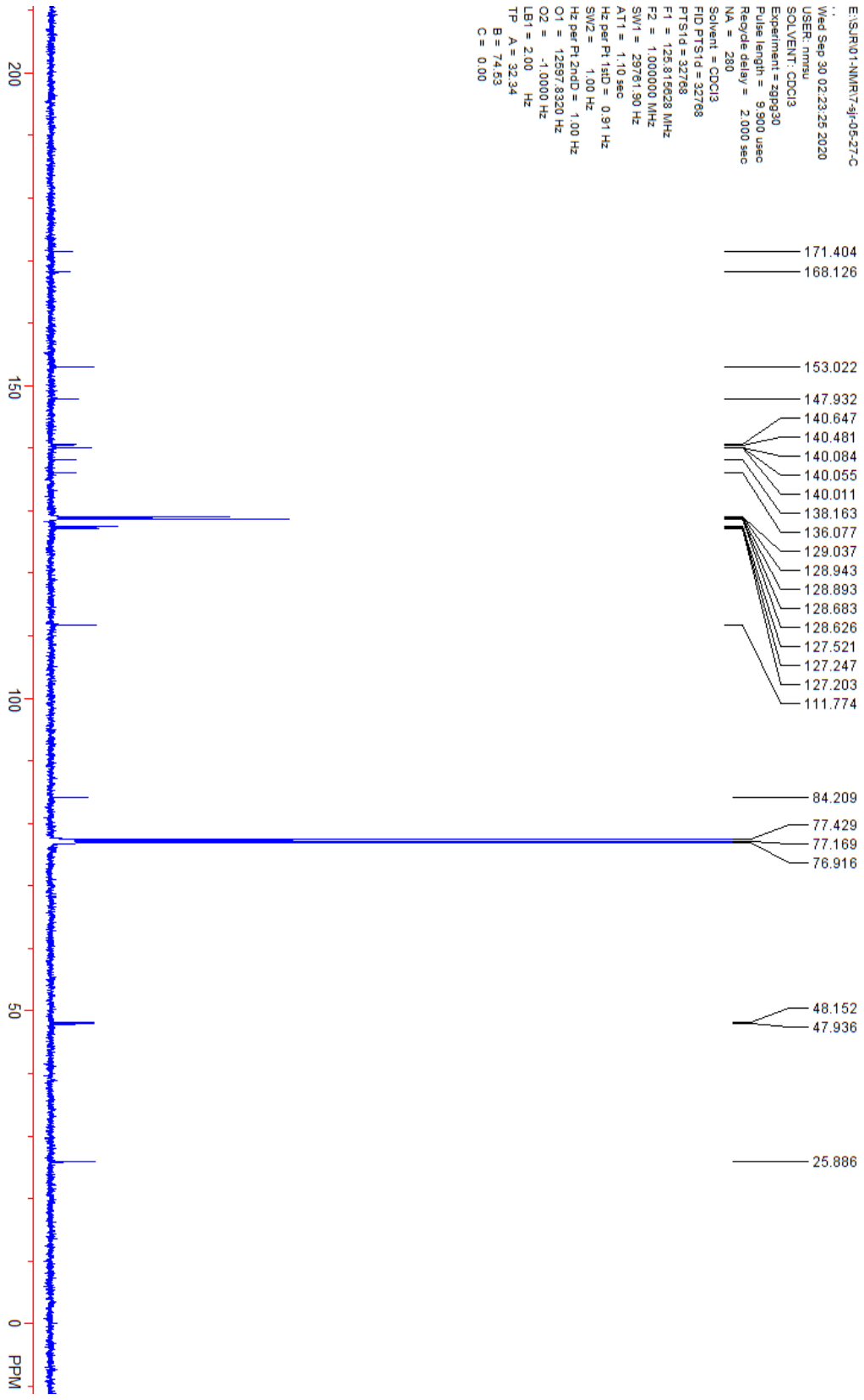

Ph
Ph
Me
O
O
Ph
O
O
H
Ph

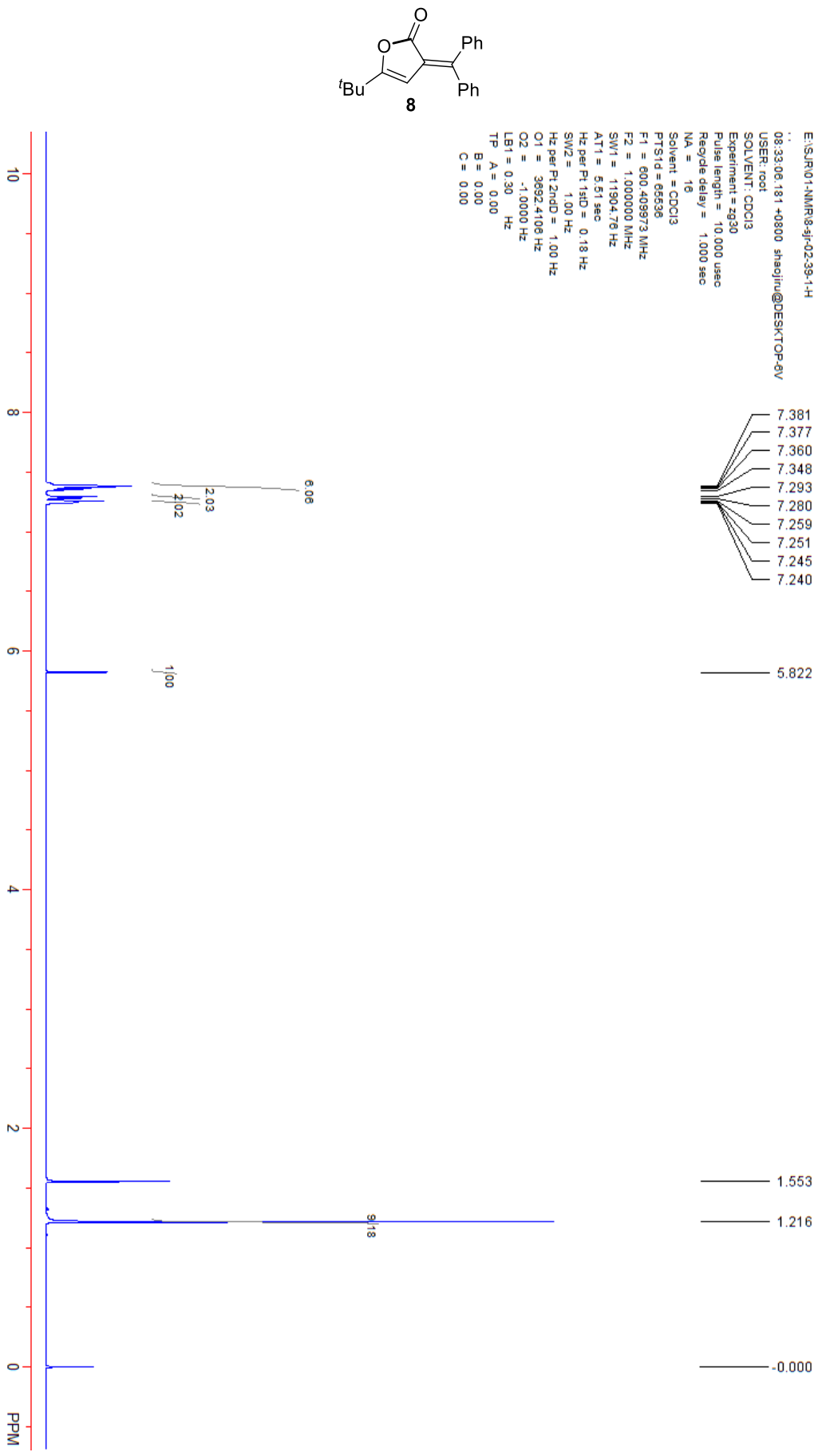
7

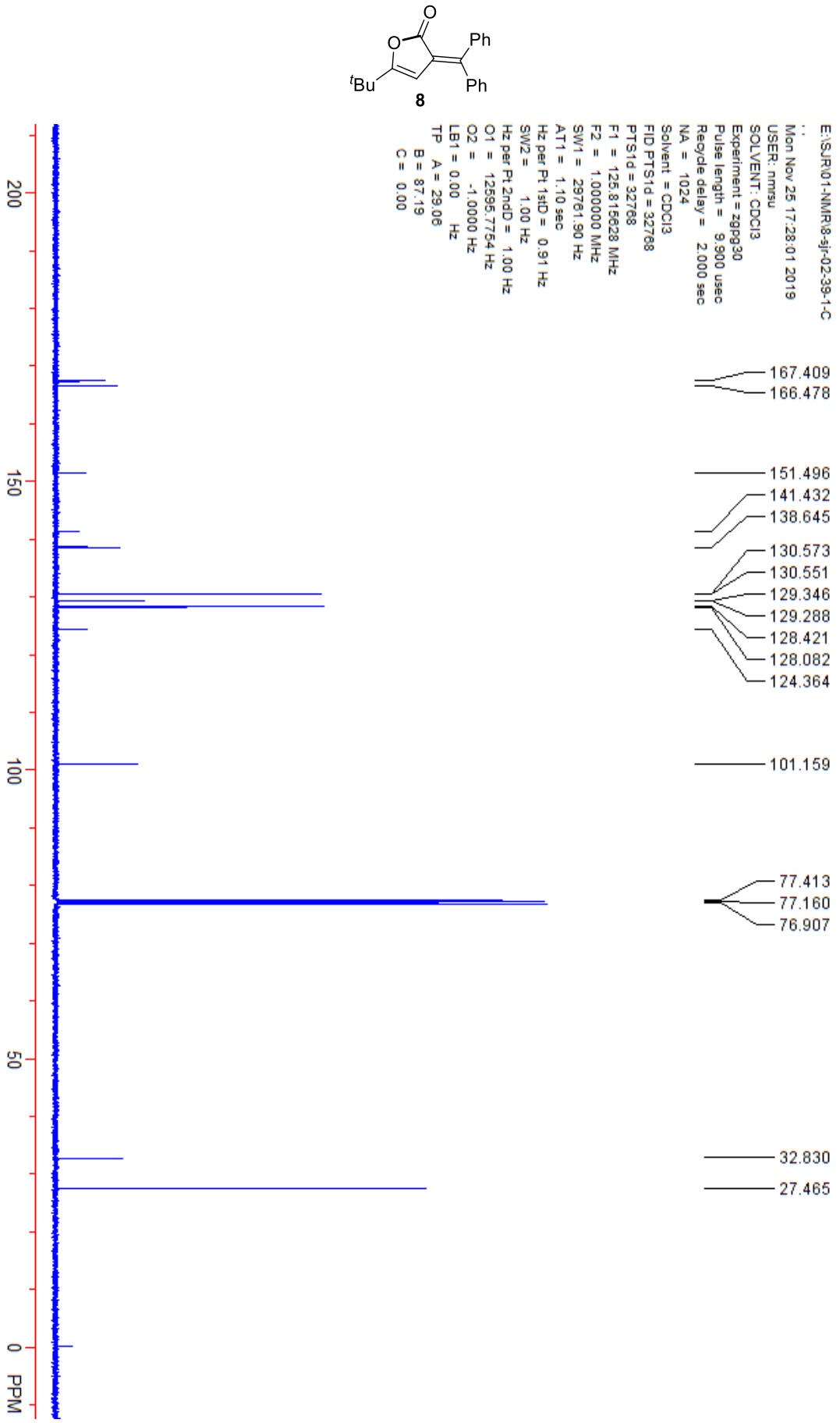

E:\SJR\01-NMR\7-sjr-05-27-H
Mon Sep 28 10:43:36 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1sID = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3076.4182 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -87.66
B = 21.09
C = 0.00
7.357
7.336
7.321
7.300
7.285
7.274
7.259
7.250
7.230
7.216
7.175
7.161
7.152
7.146
7.126
7.123
6.803
6.800
5.300
5.232
5.147
1.734
1.555
-0.000
10.39
8.01
2.00
2.02
0.94
1.00
1.00
0.98
3.01
10
8
6
4
2
0
PPM

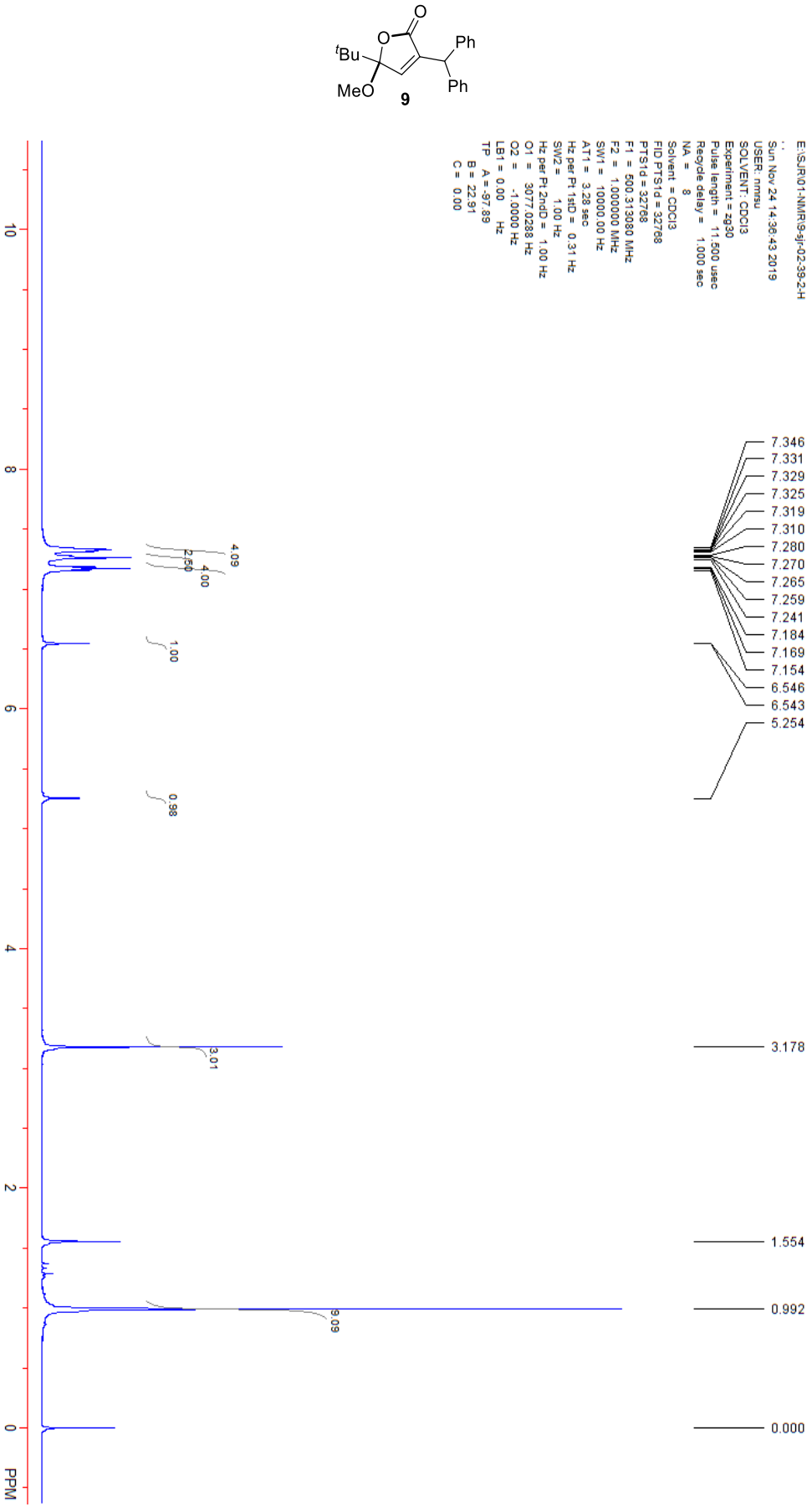

Ph
Ph
Me
O
O
Ph
O
O
H
Ph

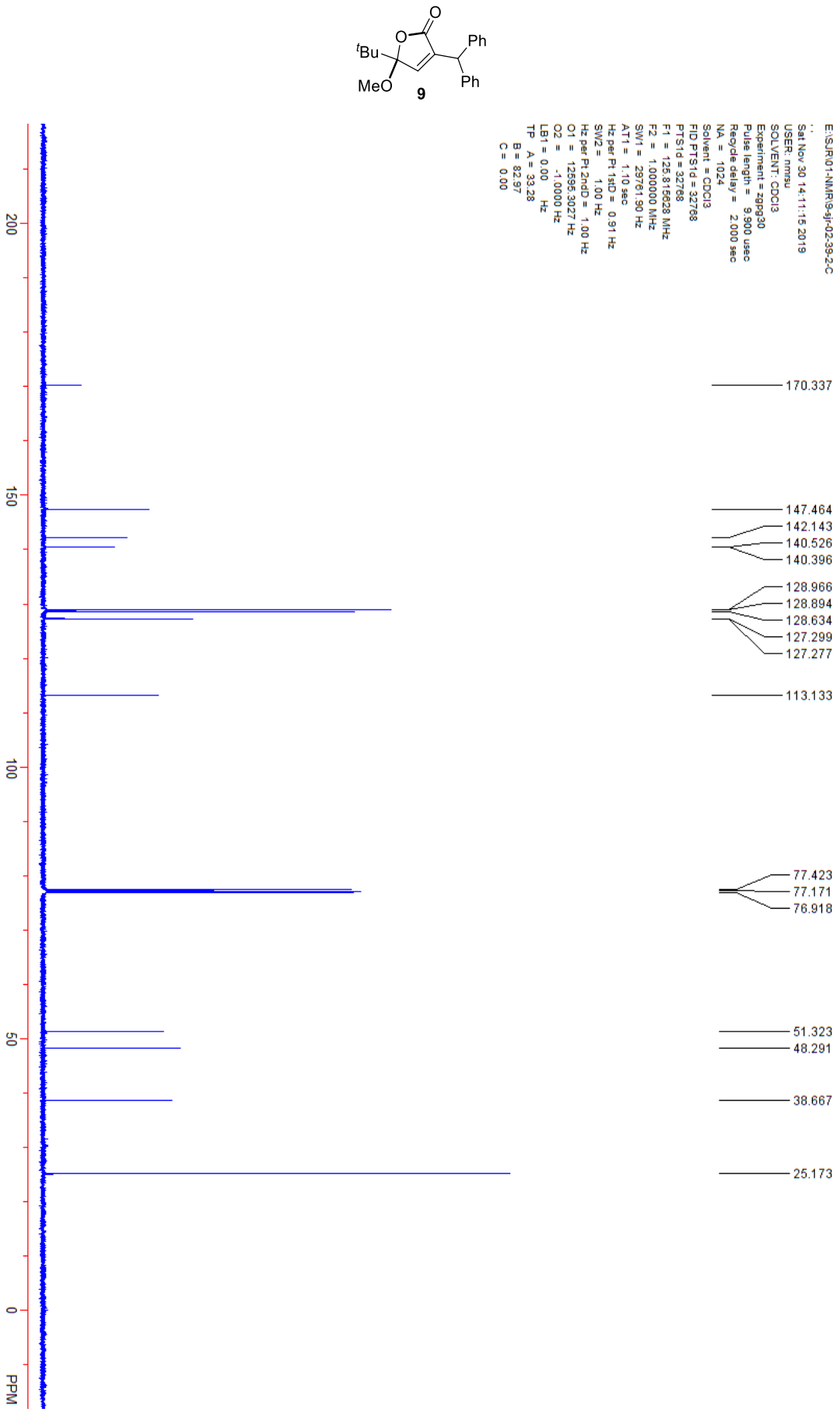
7

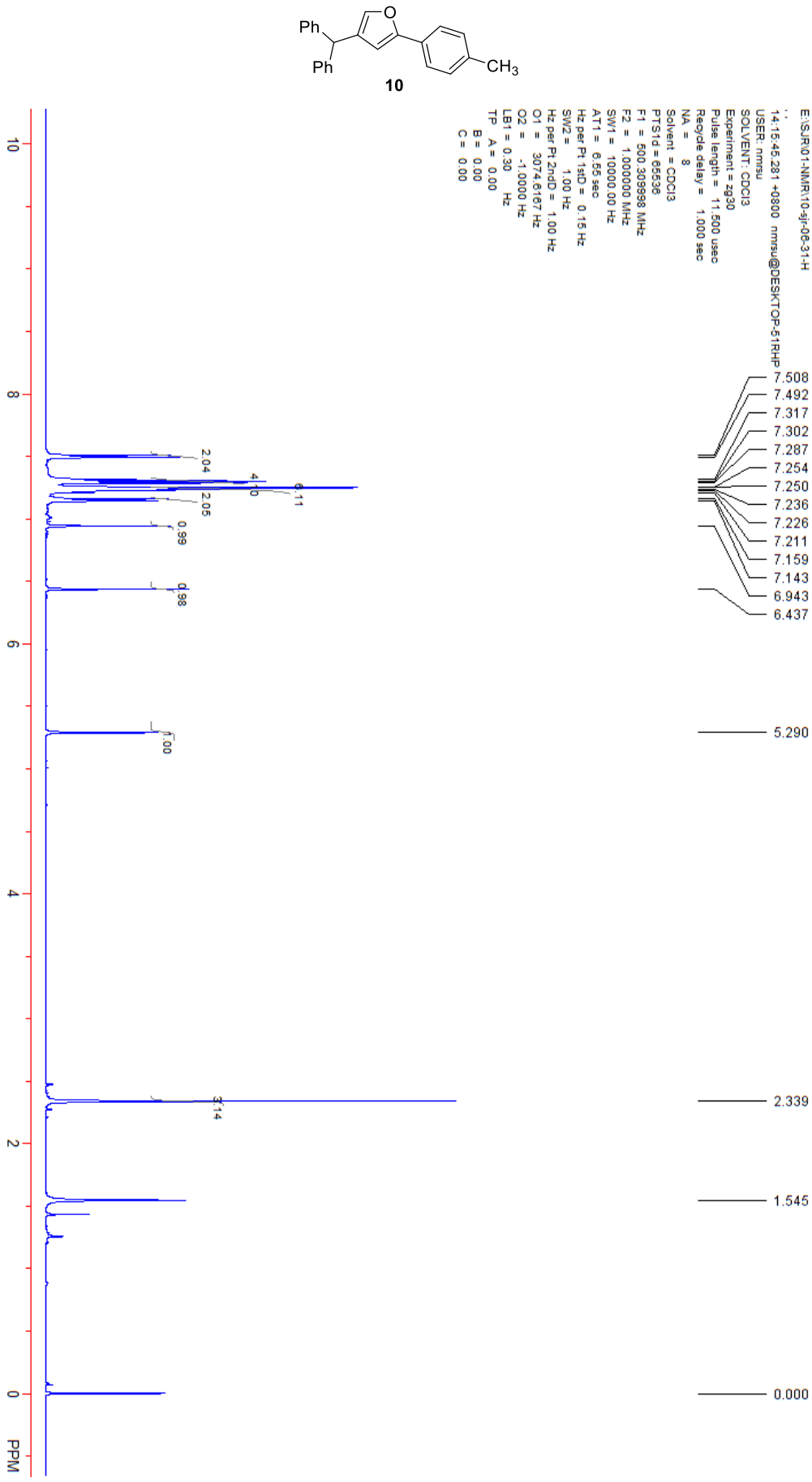

E:\SJR\01-NMR\7-sjr-05-27-C
Wed Sep 30 02:23:25 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 280
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12597.8320 Hz
O2 = -1.0000 Hz
LB1 = 2.00 Hz
TP A = 32.34
B = 74.53
C = 0.00
171.404
168.126
153.022
147.932
140.647
140.481
140.084
140.055
140.011
138.163
136.077
129.037
128.943
128.893
128.683
128.626
127.521
127.247
127.203
111.774
84.209
77.429
77.169
76.916
48.152
47.936
25.886
200
150
100
50
0
PPM

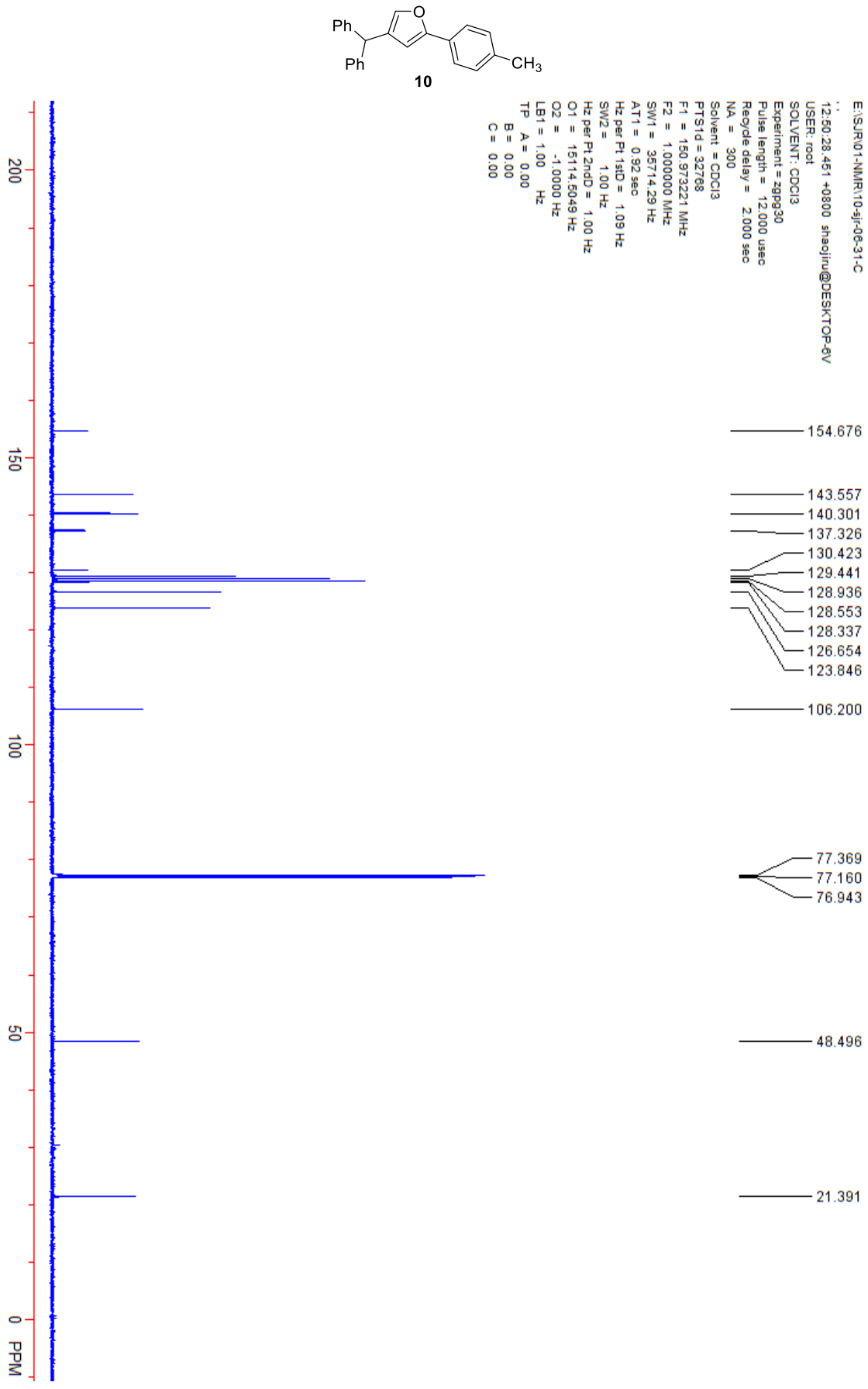

O
O
Ph
Ph
tBu
8
E:\SJR\01-NMR\8-sjr-02-39-1-H
08:33:08.181 +0800 shaojiru@DESKTOP-8V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.409973 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3692.4106 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.381
7.377
7.360
7.348
7.293
7.280
7.259
7.251
7.245
7.240
5.822
1.553
1.216
-0.000
6.08
2.03
2.02
1.00
9.18
10
8
6
4
2
0
PPM

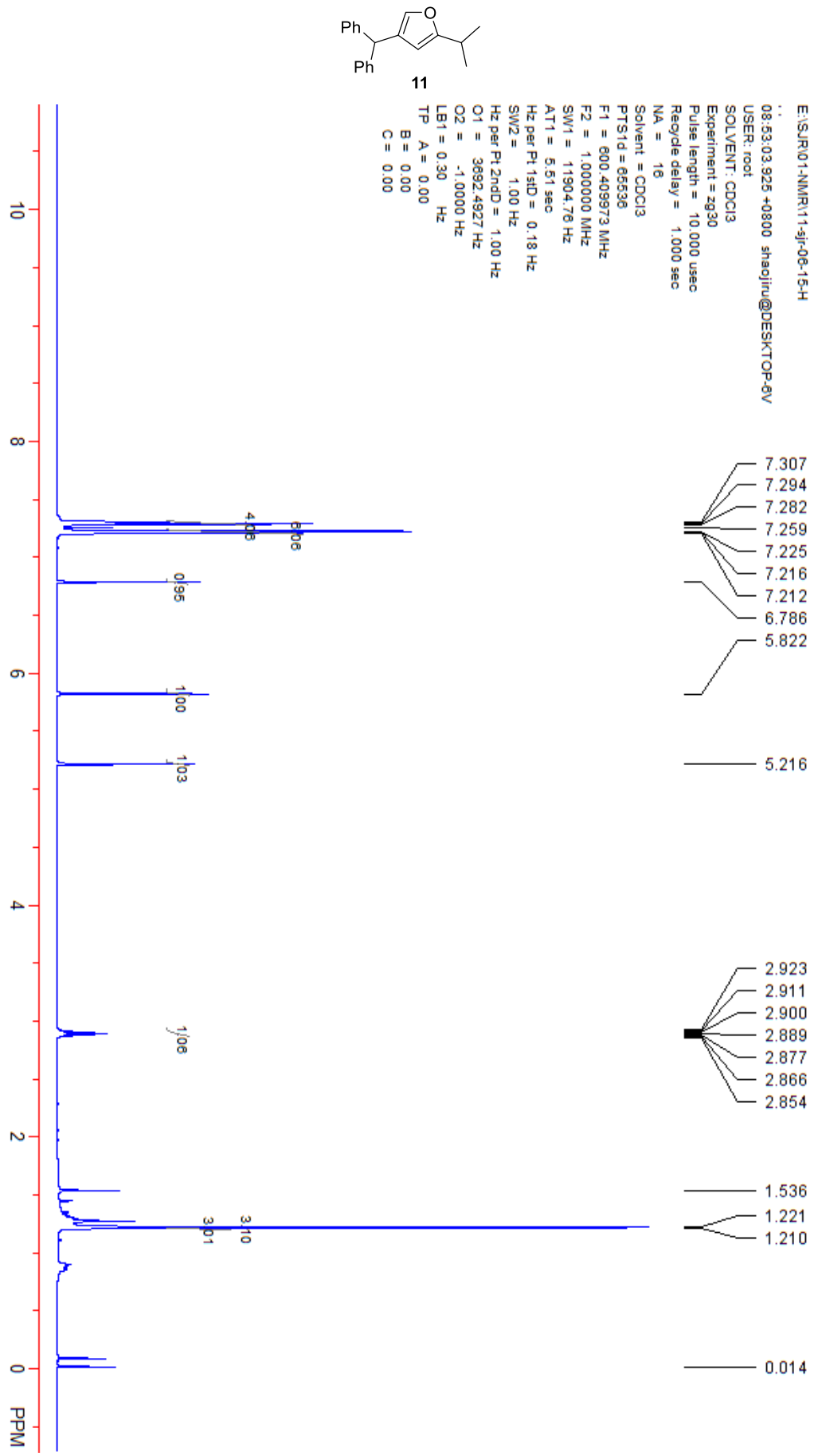

O
O
Ph
Ph
tBu
8
E:\SJR\01-NMR\8-sjr-02-39-1-C
Mon Nov 25 17:28:01 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 29.06
B = 87.19
C = 0.00
167.409
166.478
151.496
141.432
138.645
130.573
130.551
129.346
129.288
128.421
128.082
124.364
101.159
77.413
77.160
76.907
32.830
27.465
200
150
100
50
0
PPM

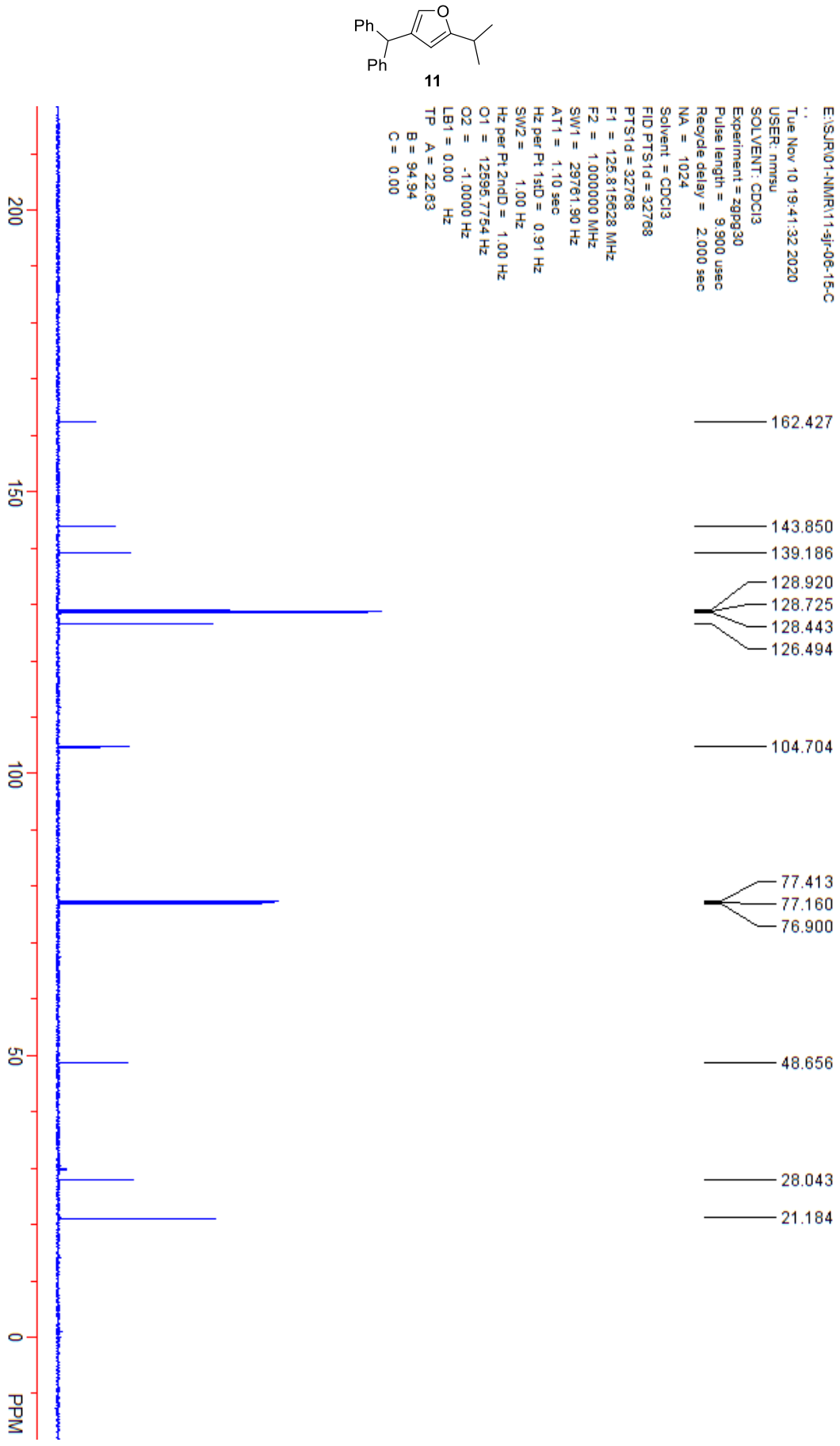

O
O
tBu
MeO
Ph
Ph
9
E:\SJR\01-NMR\9-sjr-02-39-2-H
Sun Nov 24 14:36:43 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 500.313080 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 3.28 sec
Hz per Pt 1stD = 0.31 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3077.0288 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = -97.89
B = 22.91
C = 0.00
7.346
7.331
7.329
7.325
7.319
7.310
7.280
7.270
7.265
7.259
7.241
7.184
7.169
7.154
6.546
6.543
5.254
3.178
1.554
0.992
0.000
4.09
2.50
4.00
1.00
0.98
3.01
9.09
10
8
6
4
2
0
PPM


O
O
tBu
MeO
Ph
Ph
9
E:\SJR\01-NMR\9-sjr-02-39-2-C
Sat Nov 30 14:11:15 2019
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815828 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12696.3027 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 33.28
B = 82.97
C = 0.00
170.337
147.464
142.143
140.526
140.396
128.966
128.894
128.634
127.299
127.277
113.133
77.423
77.171
76.918
51.323
48.291
38.667
25.173
200
150
100
50
0
PPM


Ph
Ph
O
CH3
10
E:\SJR\01-NMR\10-sjl-06-31-H
14:15:45.281 +0800 nmrsu@DESKTOP-51RHP
USER: nmrsu
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 11.500 usec
Recycle delay = 1.000 sec
NA = 8
Solvent = CDCl3
PTS1d = 65536
F1 = 500.309998 MHz
F2 = 1.000000 MHz
SW1 = 10000.00 Hz
AT1 = 6.55 sec
Hz per Pt 1stD = 0.15 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3074.6167 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
7.508
7.492
7.317
7.302
7.287
7.254
7.250
7.236
7.226
7.211
7.159
7.143
6.943
6.437
5.290
2.339
1.545
0.000
2.04
4.10
6.11
2.05
0.99
0.98
1.00
3.14
10
8
6
4
2
0
PPM


Ph
Ph
O
CH3
10
E:\SJR\01-NMR\10-sjr-06-31-C
12:50:28.451 +0800 shaojirui@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 12.000 usec
Recycle delay = 2.000 sec
NA = 300
Solvent = CDCl3
PTS1d = 32768
F1 = 150.973221 MHz
F2 = 1.000000 MHz
SW1 = 35714.29 Hz
AT1 = 0.92 sec
Hz per Pt 1stD = 1.09 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 15114.5049 Hz
O2 = -1.0000 Hz
LB1 = 1.00 Hz
TP A = 0.00
B = 0.00
C = 0.00
154.676
143.557
140.301
137.326
130.423
129.441
128.936
128.553
128.337
126.654
123.846
106.200
77.369
77.160
76.943
48.496
21.391
200
150
100
50
0 PPM


Ph
Ph
O
11
E:\SJR\01-NMR\11-sjr-06-15-H
08:53:03.925 +0800 shaojirui@DESKTOP-6V
USER: root
SOLVENT: CDCl3
Experiment = zg30
Pulse length = 10.000 usec
Recycle delay = 1.000 sec
NA = 16
Solvent = CDCl3
PTS1d = 65536
F1 = 600.4099773 MHz
F2 = 1.000000 MHz
SW1 = 11904.76 Hz
AT1 = 5.51 sec
Hz per Pt 1stD = 0.18 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 3692.4927 Hz
O2 = -1.0000 Hz
LB1 = 0.30 Hz
TP A = 0.00
B = 0.00
C = 0.00
4.08
6.06
0.95
1.00
1.03
1.06
3.01
3.10
7.307
7.294
7.282
7.259
7.225
7.216
7.212
6.786
5.822
5.216
2.923
2.911
2.900
2.889
2.877
2.866
2.854
1.536
1.221
1.210
0.014
10
8
6
4
2
0
PPM


Ph
Ph
O
11
E:\SJR\01-NMR\11-sjr-06-15-C
Tue Nov 10 19:41:32 2020
USER: nmrsu
SOLVENT: CDCl3
Experiment = zgpg30
Pulse length = 9.900 usec
Recycle delay = 2.000 sec
NA = 1024
Solvent = CDCl3
FID PTS1d = 32768
PTS1d = 32768
F1 = 125.815628 MHz
F2 = 1.000000 MHz
SW1 = 29761.90 Hz
AT1 = 1.10 sec
Hz per Pt 1stD = 0.91 Hz
SW2 = 1.00 Hz
Hz per Pt 2ndD = 1.00 Hz
O1 = 12595.7754 Hz
O2 = -1.0000 Hz
LB1 = 0.00 Hz
TP A = 22.63
B = 94.94
C = 0.00
162.427
143.850
139.186
128.920
128.725
128.443
126.494
104.704
77.413
77.160
76.900
48.656
28.043
21.184
200
150
100
50
0
PPM