

Supporting Information

Enantioselective Radical Process for Synthesis of Chiral Indolines by Co(II)-Based Metalloradical Alkylation of Diverse C(sp³)-H Bonds

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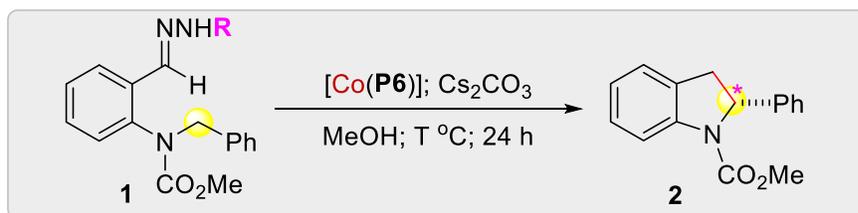
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I. General Considerations

^1H NMR spectra were recorded on a Varian INOVA 400 (400 MHz), 500 (500 MHz) or a 600 (600 MHz) spectrometer. Chemical shifts are internally referenced to residual CHCl_3 signal (δ 7.26 ppm). Data are reported as follows: chemical shift, integration, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, p = pentet, hept = heptet, br = broad, m = multiplet), and coupling constants (Hz). ^{13}C NMR spectra were recorded on a Varian INOVA 500 (125 MHz), or 600 (150 MHz) spectrometers with complete proton decoupling. Chemical shifts are reported in ppm with residual CHCl_3 as the internal standard (δ 77.0 ppm). High-resolution mass spectrometry was performed on a Micromass LCT ESI-MS and JEOL Accu TOF Dart at the Mass Spectrometry Facility, Boston College. The UV-Vis absorption spectra in the range 200-700 nm were measured with an Evolution 300 UV-VIS spectrophotometer using quartz cuvettes with 1.0 cm optical path length. HPLC measurements were carried out on a Shimadzu HPLC system with ChiralPak Immobilized columns: IA, IB and IC. Infrared (IR) spectra were recorded on a Thermo Scientific Nicolet Is5 System. Frequencies are reported in wavenumbers (cm^{-1}). HRMS data was obtained on an Agilent 6210 Time-of-Flight LC/MS with ESI as the ion source. Optical rotations were measured on a Rudolph Research Analytical AUTOPOL® IV digital polarimeter. The X-ray diffraction data were collected using Bruker Kappa APEX DUO diffractometer and a Rigaku HighFlux Homelab diffractometer. X-band EPR spectra were recorded on a Bruker EMX-Plus spectrometer (Bruker BioSpin). Spartan modelling was performed using Spartan'14 software from Wavefunction, Inc.

Unless otherwise noted, all C–H alkylation reactions were performed in oven-dried glassware under dry N_2 atmosphere with standard vacuum line techniques. Gastight syringes were used to transfer liquid reagents and solvents in catalytic reactions. Anhydrous solvents as well as other commercial reagents were purchased from Sigma-Aldrich, Acros, Alfa Aesar, Strem, Oakwood Products Inc., TCI, or Matrix Scientific and used as received unless otherwise stated. Thin layer chromatography was performed on Merck TLC plates (silica gel 60 F254). Flash column chromatography was performed with ICN silica gel (60 Å, 230-400 mesh, 32-63 μm).

II. Table S1. The Effect of Sulfonyl Group on Co(II)-Catalyzed Enantioselective Radical C–H Alkylation of Aryldiazomethanes^a



entry	R	T (°C)	yield	ee
1		60	95%	89%
2		40	92%	91%
3		RT	47%	93%
4		RT	92%	94%

[Co(P6)]

^a Carried out with **1** (0.1 mmol) in the presence of Cs₂CO₃ (2.0 equiv.) by [Co(P6)] (2 mol %) in methanol (1.0 mL). Yield refers to isolated yield. *ee* was determined by chiral HPLC.

III. Figures S1-S4

Figure S1. Examples of natural products and biologically active compounds containing indoline moiety

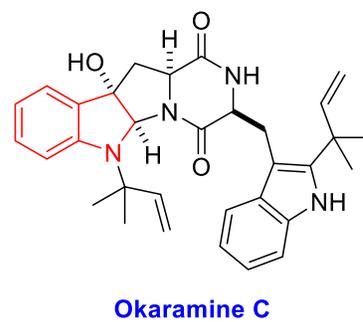
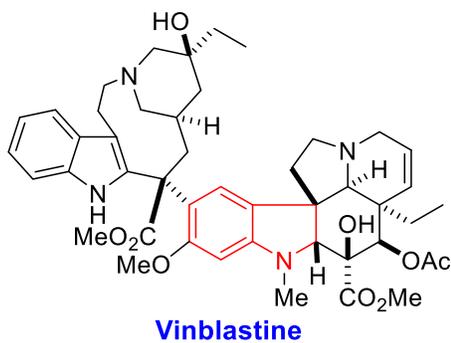
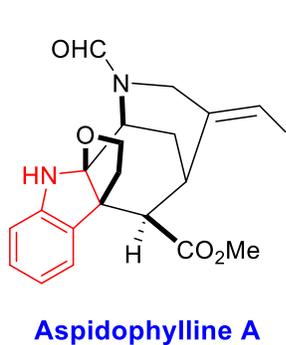
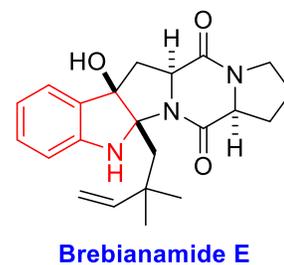
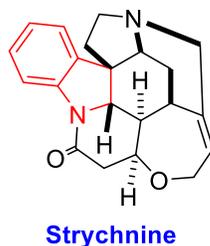
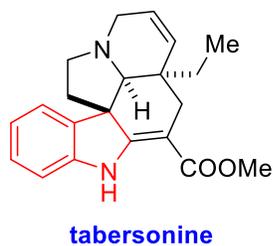
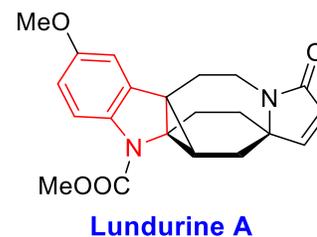
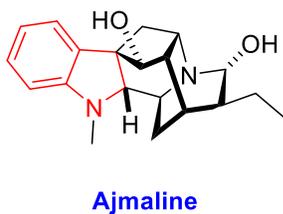
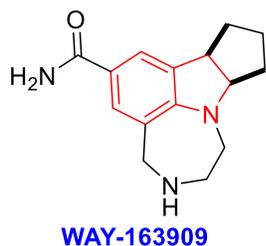
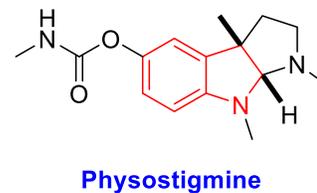
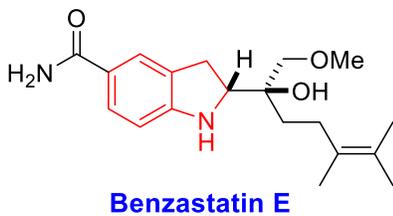
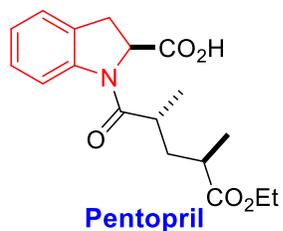
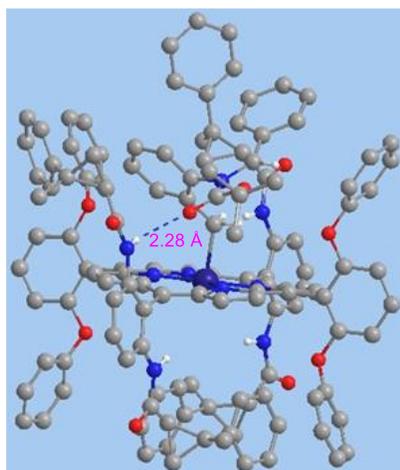
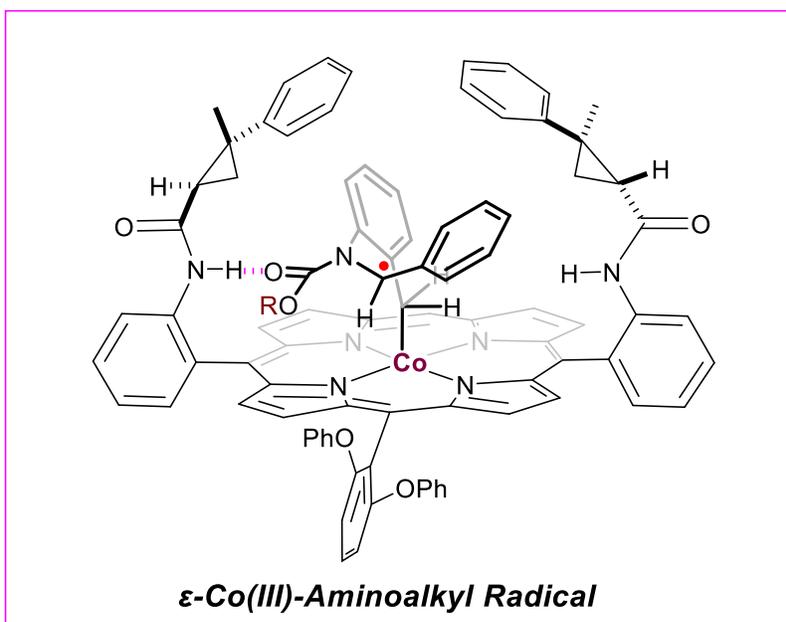
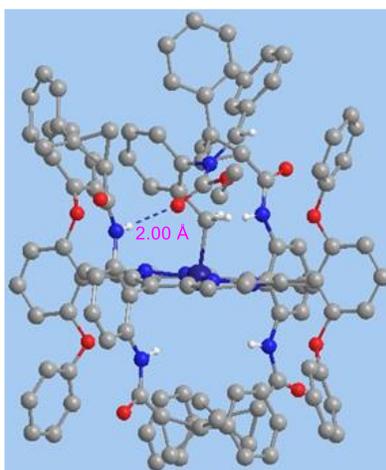


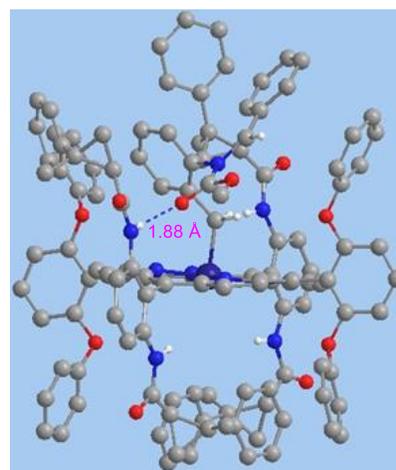
Figure S2. Molecular modeling of proposed ϵ -Co(III)-aminoalkyl radical intermediates showing potential hydrogen-bonding interactions.^[a]



R = tBu^[b]



R = Et^[c]



R = Me^[d]

[a] The molecular modelings were carried out using Spartan' 14 Software from Wavefunction, Inc.

[b] Corresponding ϵ -Co(III)-aminoalkyl radical intermediate from reaction of substrate **1a**.

[c] Corresponding ϵ -Co(III)-aminoalkyl radical intermediate from reaction of substrate **1b**.

[d] Corresponding ϵ -Co(III)-aminoalkyl radical intermediate from reaction of substrate **1c**.

Figure S3. High resolution mass spectroscopy (HRMS) spectrum for Co(III)-supported alkyl radical intermediate.

sCLIPS Report - F:\Agilent6220_1257.d\AcqData\MSPProfile.bin

Self-Calibration Mass Range (Da)
 Start: -0.43
 End: 0.43

RT Windows

Scan 29 at 0.466

sCLIPS Parameters

Accurate Mass: 1488.7350
 Charge: 1
 Mass Tolerance (mDa): 250.69
 Electron State: Both

Double Bond Equivalent Range
 Minimum: -200.00
 Maximum: 200.00

Profile Mass Range (Da)
 Start: -1.00
 End: 6.50

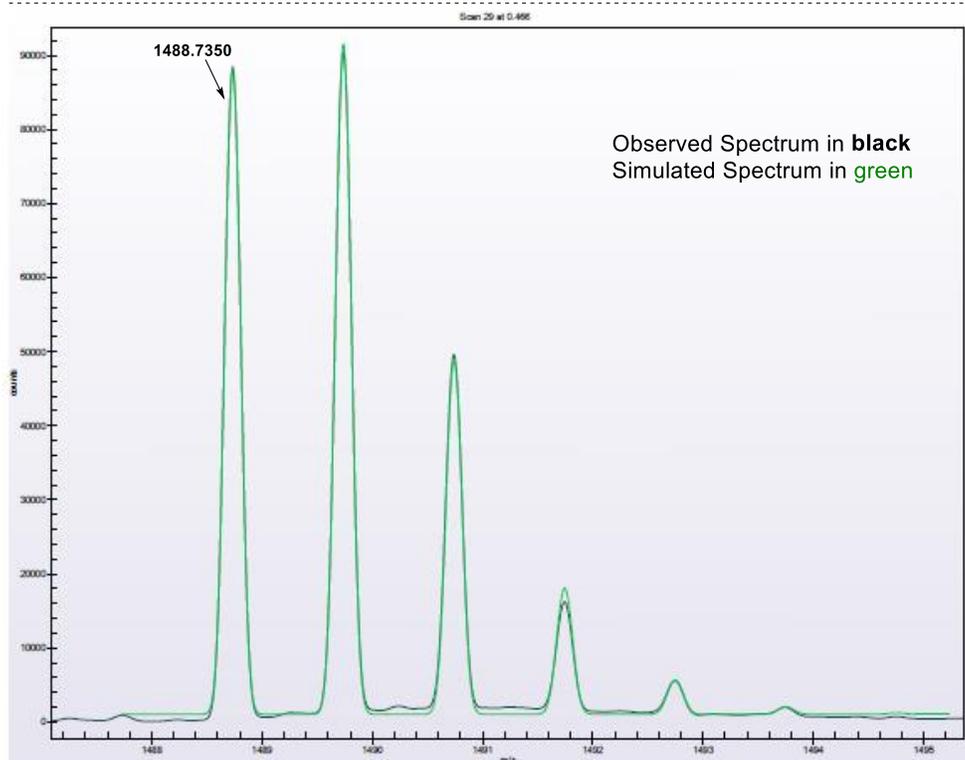
Empirical Rules: Enabled
 Empirical Elemental Limits: Wiley
 H/C Ratio: Extended
 Heteroatom Ratios: Extended

Chemical Formula: $C_{92}H_{103}CoN_9O_6^+$
 Calculated Mass: **1488.7358**
 Found Mass: **1488.7350**

Element	Minimum	Maximum
C	1	100
H	0	110
Co	1	1
N	0	9
O	0	6

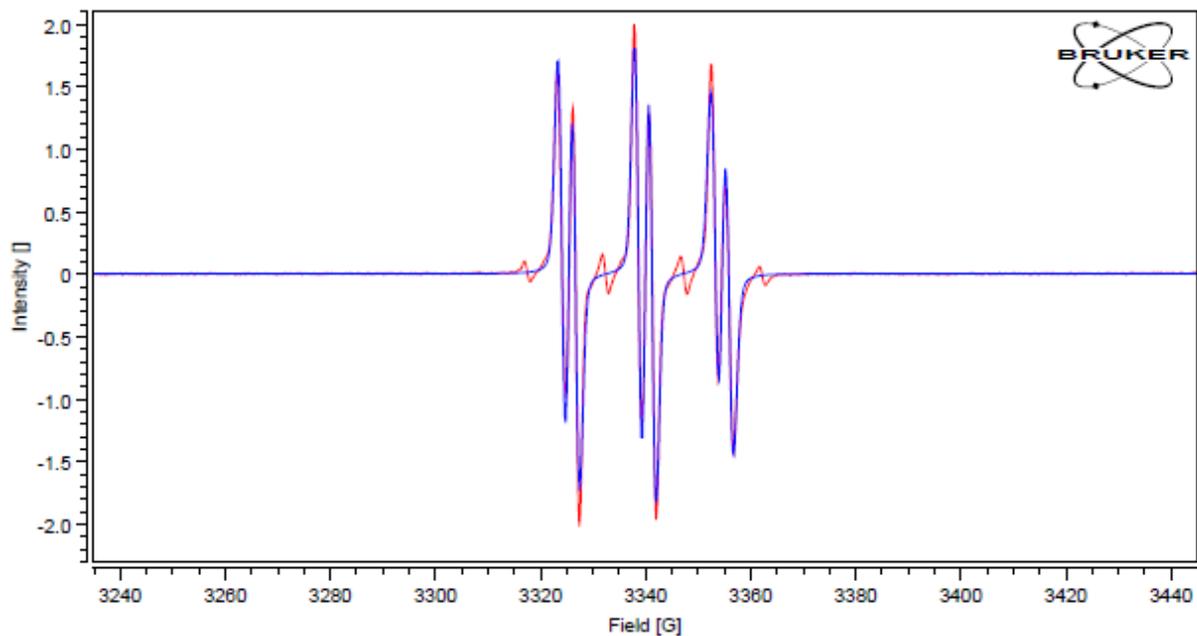
sCLIPS Search Results

	Formula	Mono Isotope Mass Error (mDa)	Mass Error (PPM)	Spectral Accuracy	RMSE	DBE	
1	C92H103CoN9O6	1,488.7358	-0.7837	-0.5264	96.6621	600	46.0
2	C93H105CoN8O6	1,488.7484	-13.3598	-8.9739	96.5953	612	45.5
3	C93H107CoN8O5	1,488.7722	-37.1692	-24.9670	96.5785	615	45.0



Procedure for HRMS Experiment: To an over-dried Schlenk tube, sulfonylhydrazone **1c** (0.05 mmol) and Cs₂CO₃ (2.0 equiv.) were added. The Schlenk tube was then evacuated and backfilled with nitrogen for 3 times. The Teflon screw cap was replaced with a rubber septum, and CH₃CN (0.5 mL) was added via a gastight syringe. The mixture was then stirred at 60 °C for 0.5 h. The resulting light yellow solution was then passed through a short pad of Celite (to get rid of base and salt) under the flow of nitrogen and the filtrate was collected in a HPLC vial (vial A, degassed and backfilled with argon). During the time, [Co(**P1**)] (2 mol %) was charged into another HPLC vial (vial B, degassed and backfilled with argon) and dissolved in CH₃CN (0.5 mL). After mixing equal amount of solutions from vial A (0.1 mL) and vial B (0.1 mL), the sample was further diluted with CH₃CN and immediately injected into HRMS instrument. The HRMS experiment was carried out in the absence of any additives such as formic acid, which commonly act as electron carriers for ionization, allowing for the detection of the molecular ion signals corresponding to Co(III)-alkyl radical (C₉₂H₁₀₃CoN₉O₆·) by the loss of one electron.

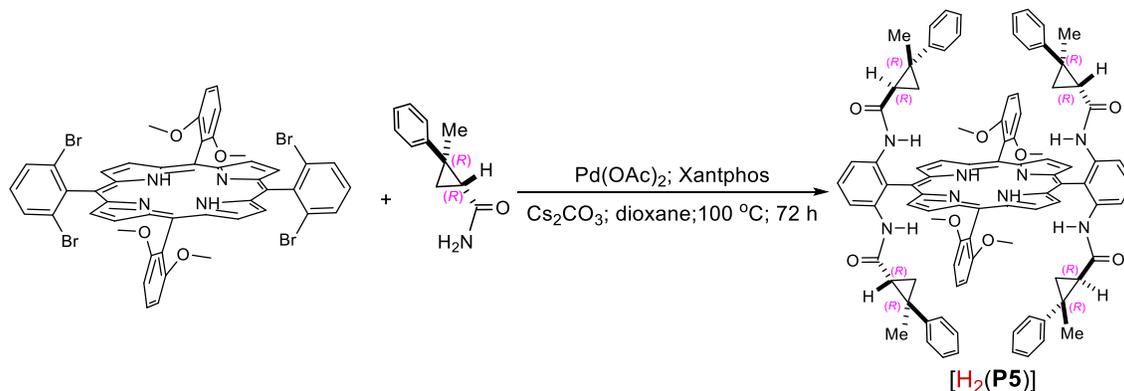
Figure S4. Isotropic X-band EPR spectrum of phenyl *N-tert*-butylnitrone (PBN)-trapped Co(III)-supported alkyl radical intermediate.



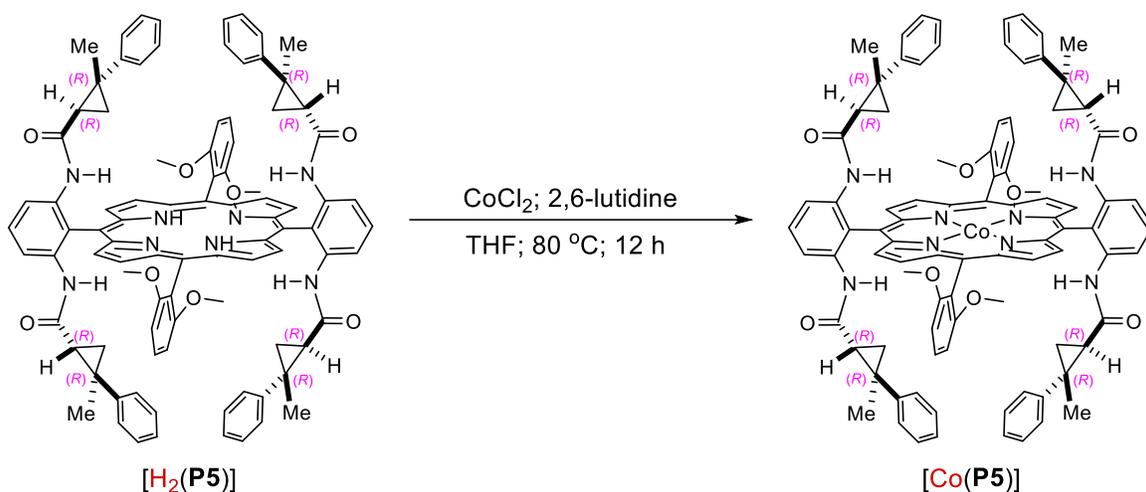
The resulting strong EPR signal (in red) has been simulated (in blue) with $g = 2.006$, $A_N = 14.6$ G, $A_H = 2.6$ G, which is assigned to PBN-trapped Co(III)-supported alkyl radical intermediate. The values are consistent with that of the reported similar species.^[1] [The simulation of the EPR spectrum was performed by iteration of the isotropic g -values and line widths using the EPR simulation program SpinFit Xenon]

Procedure for EPR Experiment: To an oven-dried Schlenk tube A, sulfonylhydrazone **1c** (0.05 mmol) and Cs_2CO_3 (2.0 equiv.) were added. The Schlenk tube was then evacuated and backfilled with nitrogen for 3 times. The Teflon screw cap was replaced with a rubber septum, and benzene (0.5 mL) was added via a gastight syringe. The mixture was then stirred at 60 °C for 0.5 h. During the time, [Co(**P1**)] (4 mol %) was charged into another oven-dried Schlenk tube B. The Schlenk tube B was then evacuated and backfilled with nitrogen for 3 times. After 0.5 h, the resulting light yellow solution from tube A was passed through a short pad of Celite (to get rid of base and salt) under the flow of nitrogen and transferred to Schlenk tube B. The mixture was stirred for 1 min, followed by the addition of phenyl *N-tert*-butylnitrone (PBN, 0.05 mmol). The reaction mixture was stirred for 3 min and transferred into a degassed EPR tube (filled with argon) through a gastight syringe. The sample was then carried out for EPR experiment at room temperature (EPR settings: $T = 298$ K; microwave frequency: 9.37762 GHz; power: 6.325 mW; modulation amplitude: 1.0 G).

IV. Synthesis of Catalyst [Co(P5)]

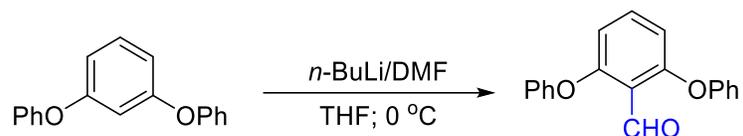


$[H_2(P5)]$ was synthesized according to our previous reported procedure^[1-2] with 58% yield. The 5,15-bis(2,6-dibromophenyl)-10,20-bis(2,6-dimethoxyphenyl)porphyrin (0.2 mmol), (1*R*, 2*R*)-2-methyl-2-phenylcyclopropane-1-carboxamide^[3] (3.2 mmol), $Pd(OAc)_2$ (0.08 mmol), Xantphos (0.16 mmol), and Cs_2CO_3 (3.2 mmol) were placed in an oven-dried, resealable Schlenk tube. The tube was capped with a Teflon screwcap, evacuated, and backfilled with nitrogen. The screwcap was replaced with a rubber septum, and dioxane (10 mL) was added via a gastight syringe. The tube was purged with nitrogen for 2 minutes, and then the septum was replaced with the Teflon screwcap. The tube was sealed and stirred at 100 °C for 72 h. The resulting mixture was cooled down to room temperature, diluted in ethyl acetate, filtrated through a silica pad and concentrated under vacuum. The pure compound was obtained as a purple solid after purification by flash column chromatography (hexanes/DCM/ethyl acetate: 10/10/2 to 10/10/3). 1H NMR (500 MHz, $CDCl_3$) δ 8.88 (s, 8H), 8.48 (d, $J = 5.9$ Hz, 4H), 7.89 (t, $J = 8.3$ Hz, 2H), 7.69 (t, $J = 8.5$ Hz, 2H), 6.90 (d, $J = 8.6$ Hz, 4H), 6.68 (s, 4H), 5.98 (s, 4H), 5.31 (br, 16H), 2.96 (s, 12H), 0.99 – 0.96 (m, 16H), 0.56 (br, 4H), 0.18 (br, 4H), -2.12 (s, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 168.60, 160.36, 144.50, 139.05, 132.77, 130.79, 130.28, 130.01, 126.81, 125.94, 124.97, 121.46, 117.81, 117.15, 114.78, 106.81, 103.80, 55.07, 30.01, 29.92, 19.42, 17.71. IR (neat, cm^{-1}): 3409.14, 3313.83, 2928.10, 2836.12, 1690.30, 1586.35, 1464.60, 1249.90, 1108.38, 731.66. HRMS (ESI) ($M+H^+$) Calcd. for $C_{92}H_{83}N_8O_8^+$: 1427.6328, found 1427.6301. UV-vis (CH_2Cl_2), λ_{max} nm (log ϵ): 421(5.43), 514(4.23), 588(3.74), 643(3.34).

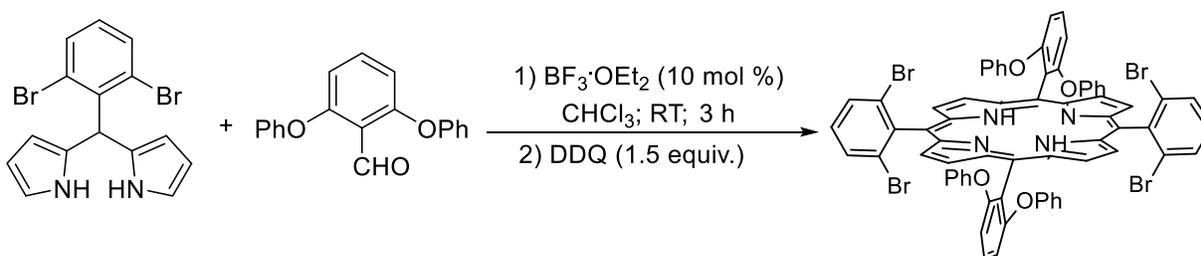


[Co(P5)] was synthesized according to our previous reported procedure^[2] with 92% yield. Free base porphyrin **[H₂(P5)]** and anhydrous CoCl₂ (8 equiv.) were placed in an oven-dried, resealable Schlenk tube. The tube was capped with a Teflon screwcap, evacuated, and backfilled with nitrogen. The screwcap was then replaced with a rubber septum, 2,6-lutidine (4 equiv.) and anhydrous THF were added via a gastight syringe. The tube was purged with nitrogen for 2 minutes, and then the septum was replaced with the Teflon screwcap. The reaction was conducted at 80 °C for 12 h. The resulting mixture was cooled down to room temperature, diluted with ethyl acetate, and transferred to a separatory funnel. The reaction mixture was washed with water 3 times and concentrated under vacuum. The target compound **[Co(P5)]** was isolated as a purple solid after purification by flash column chromatography with hexanes/ethyl acetate (2/1) as eluent. IR (neat, cm⁻¹): 3405.77, 2930.13, 1691.39, 1584.23, 1464.43, 1249.49, 1107.50, 997.65, 762.32. HRMS (ESI) (M⁺) Calcd. for C₉₂H₈₀CoN₈O₈: 1483.5426, found 1483.5488. UV-vis (CH₂Cl₂), λ_{max} nm (log ε): 413(4.90), 532(3.77).

V. Synthesis of Catalyst [Co(P6)]

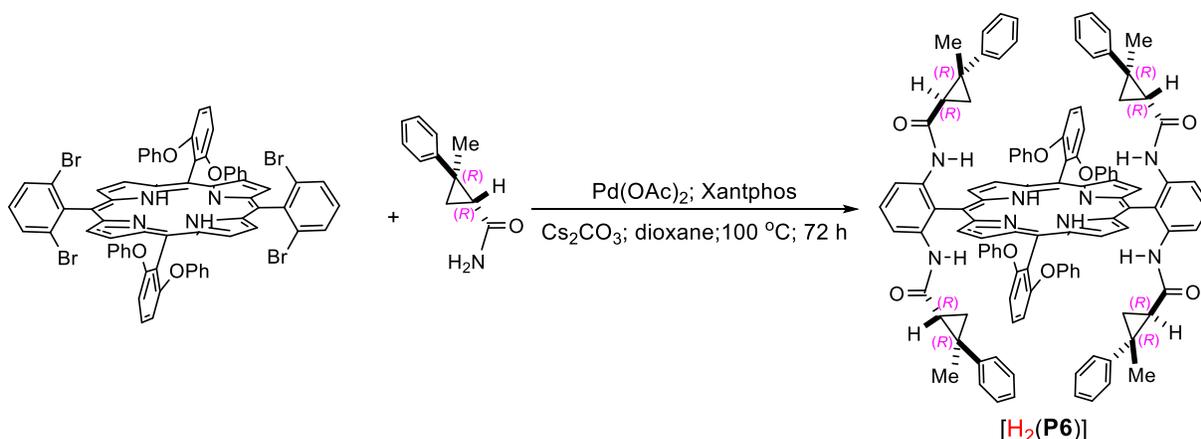


2, 6-diphenoxybenzaldehyde was synthesized according to previous reported procedure.^[4] To a stirred solution of 1,3-diphenoxybenzene (10 mmol) in dry THF (60 mL) at 0 °C, *n*-BuLi (8 mL, 1.5 M in hexanes) was added dropwise for 1 h. Then the mixture was stirred at room temperature for 2 h and followed by the slow addition of DMF (1.83 g, 25 mmol). After 2 h, the mixture was poured into ice water. The organic phase was separated and the aqueous phase was extracted with ether (3×30 mL). The combined organic layer was dried over anhydrous Na₂SO₄. After the removal of solvent under vacuum, the product was purified by column chromatography with hexanes/ethyl acetate (9:1 to 6:1) as eluent to afford 2, 6-diphenoxybenzaldehyde as a white solid in 70% yield. ¹H NMR (600 MHz, CDCl₃) δ 10.61 (s, 1H), 7.39 (t, *J* = 7.9 Hz, 4H), 7.32 (t, *J* = 8.4 Hz, 1H), 7.18 (t, *J* = 7.4 Hz, 2H), 7.10 – 7.08 (m, 4H), 6.58 (d, *J* = 8.4 Hz, 2H). ¹³C NMR (150 MHz, CDCl₃) δ 188.15, 159.85, 156.13, 135.09, 129.95, 124.31, 119.61, 118.47, 112.72. IR (neat, cm⁻¹): 2774.28, 1688.49, 1598.71, 1570.31, 1487.76, 1454.31, 1409.35, 1204.09, 1030.85, 772.93, 717.85, 685.53. HRMS (ESI) (M+H⁺) Calcd. for C₁₉H₁₅O₃⁺: 291.1021, found 291.1034.



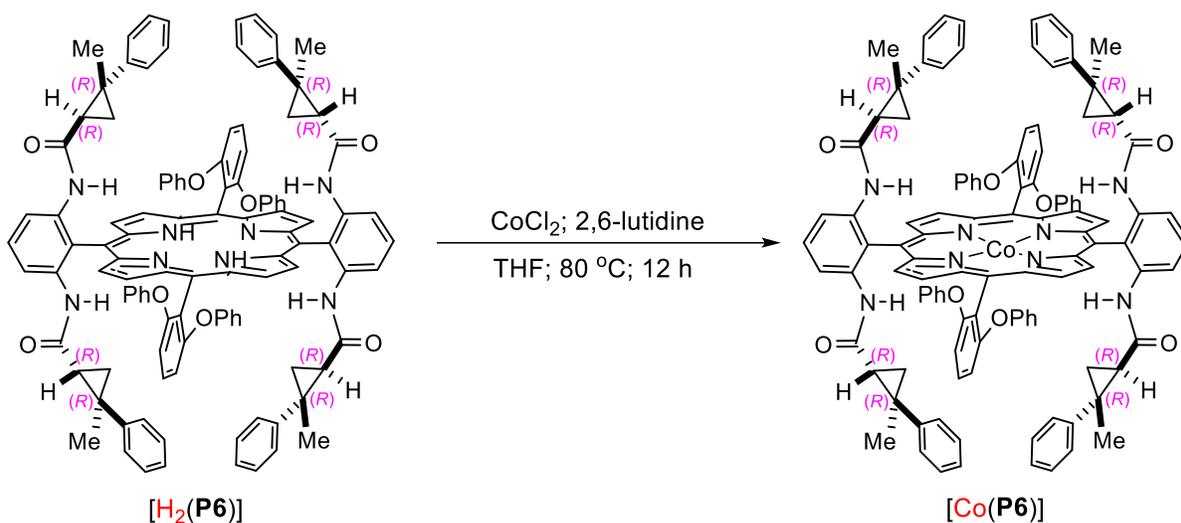
5,15-bis(2,6-dibromophenyl)-10,20-bis(2,6-diphenoxyphenyl)porphyrin was synthesized according to our previous reported procedure^[2] with 60% yield. A mixture of *meso*-(2,6-dibromophenyl)dipyrromethane (5 mmol), 2, 6-diphenoxybenzaldehyde (5 mmol) in chloroform (500 mL) was purged with nitrogen for 10 min. The flask was wrapped with aluminum foil to shield it from light. Then boron trifluoride diethyl etherate was added dropwise via a syringe. After the solution was stirred under the nitrogen atmosphere at room temperature for 3 h, 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) (7.5 mmol) was added at one time. After 1 h, triethylamine

(10 mL) was added. The reaction solution was then directly poured into a silica gel column that was rinsed with dichloromethane. The column was eluted with dichloromethane. The fractions containing the product were collected and concentrated under vacuum. The residue was washed several times with methanol to afford the pure compound. $^1\text{H NMR}$ (600 MHz, CD_2Cl_2) δ 9.00 (s, 4H), 8.62 (s, 4H), 8.06 (d, $J = 7.7$ Hz, 4H), 7.68 (t, $J = 7.7$ Hz, 2H), 7.57 (t, $J = 7.5$ Hz, 2H), 7.11 (d, $J = 8.0$ Hz, 4H), 6.89 (d, $J = 5.8$ Hz, 8H), 6.70 (d, $J = 6.5$ Hz, 12H), -2.73 (s, 2H). $^{13}\text{C NMR}$ (150 MHz, CD_2Cl_2) δ 159.40, 156.70, 143.47, 131.93, 131.61, 130.68, 129.58, 128.78, 124.59, 123.70, 119.58, 118.31, 113.27, 111.14. IR (neat, cm^{-1}): 3311.65, 1570.06, 1487.58, 1449.43, 1230.13, 1209.38, 1023.02, 1012.10, 979.66, 796.47, 721.44. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{68}\text{H}_{43}\text{Br}_4\text{N}_4\text{O}_4^+$: 1295.0012, found 1295.0050. UV-vis (CH_2Cl_2), λ_{max} nm ($\log \epsilon$): 422(5.63), 516(4.37), 592(3.87), 646(3.11).



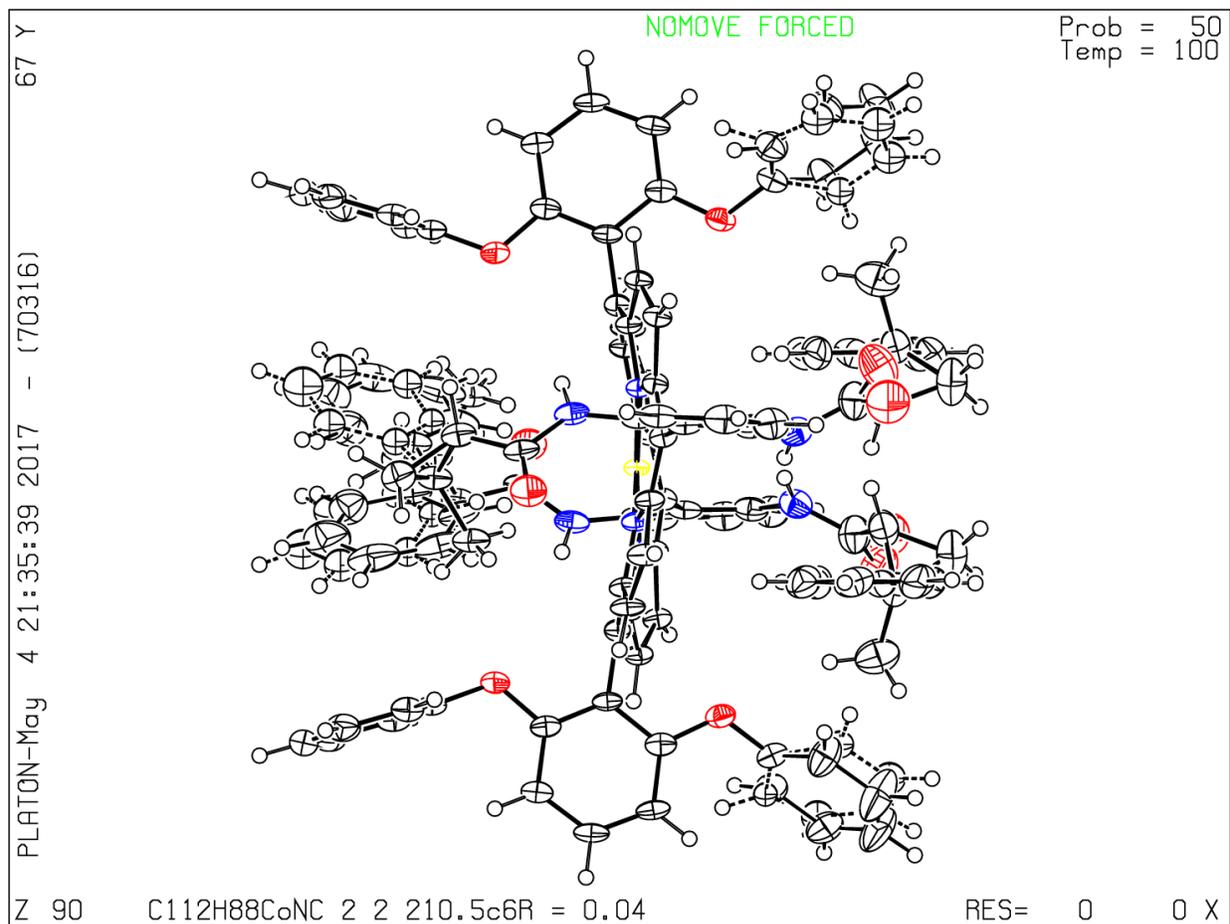
[H₂(P6)] was synthesized according to our previous reported procedure^[2] with 61% yield. The 5,15-bis(2,6-dibromophenyl)-10,20-bis(2,6-diphenoxyphenyl)porphyrin (0.2 mmol), (1*R*, 2*R*)-2-methyl-2-phenylcyclopropane-1-carboxamide^[3] (3.2 mmol), Pd(OAc)₂ (0.08 mmol), Xantphos (0.16 mmol), and Cs₂CO₃ (3.2 mmol) were placed in an oven-dried, resealable Schlenk tube. The tube was capped with a Teflon screwcap, evacuated, and backfilled with nitrogen. The screwcap was replaced with a rubber septum, and dioxane (10 mL) was added via a gastight syringe. The tube was purged with nitrogen for 2 minutes, and then the septum was replaced with the Teflon screwcap. The tube was sealed and stirred at 100 °C for 72 h. The resulting mixture was cooled down to room temperature, diluted in ethyl acetate, filtrated through a silica pad and concentrated under vacuum. The pure compound was obtained as a purple solid after purification by flash

column chromatography (hexanes/ethyl acetate: 3/1 to 2/1). ^1H NMR (600 MHz, CDCl_3) δ 9.18 (d, $J = 4.4$ Hz, 4H), 8.92 (d, $J = 4.4$ Hz, 4H), 8.49 (br, 4H), 7.89 (t, $J = 8.3$ Hz, 2H), 7.52 (t, $J = 8.6$ Hz, 2H), 6.87 (t, $J = 7.9$ Hz, 8H), 6.82 (d, $J = 8.5$ Hz, 4H), 6.74 (t, $J = 7.3$ Hz, 4H), 6.58 (br, 4H), 6.52 (d, $J = 7.9$ Hz, 8H), 6.04 (br, 4H), 5.60 (br, 8H), 5.44 (br, 8H), 0.77 (s, 12H), 0.60 (br, 4H), 0.22 (br, 4H), 0.09 (br, 4H), -2.27 (s, 2H). ^{13}C NMR (150 MHz, CDCl_3) δ 168.77, 159.50, 155.55, 144.27, 139.06, 132.58, 130.48, 130.35, 129.21, 126.92, 125.71, 125.07, 123.63, 121.64, 121.44, 119.90, 117.38, 113.00, 110.70, 107.55, 30.13, 29.36, 19.10, 18.31. IR (neat, cm^{-1}): 3409.85, 3009.75, 1686.60, 1686.60, 1488.40, 1450.74, 1208.39, 1160.10, 978.20, 749.56, 692.35. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{112}\text{H}_{91}\text{N}_8\text{O}_8^+$: 1675.6954, found 1675.6960. UV-vis (CH_2Cl_2), λ_{max} nm (log ϵ): 422(5.46), 515(4.25), 591(3.75), 645(3.12).

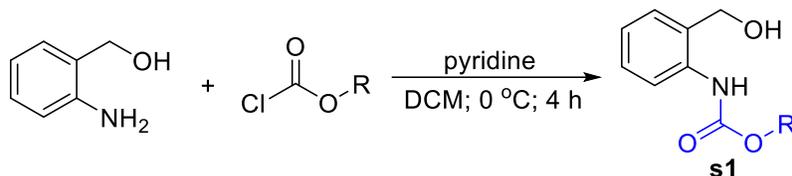


[Co(P6)] was synthesized according to our previous reported procedure^[2] with 92% yield. Free base porphyrin **[H₂(P6)]** and anhydrous CoCl_2 (8 equiv.) were placed in an oven-dried, resealable Schlenk tube. The tube was capped with a Teflon screwcap, evacuated, and backfilled with nitrogen. The screwcap was then replaced with a rubber septum, 2,6-lutidine (4 equiv.) and anhydrous THF were added via a gastight syringe. The tube was purged with nitrogen for 2 minutes, and then the septum was replaced with the Teflon screwcap. The reaction was conducted at 80 °C for 12 h. The resulting mixture was cooled down to room temperature, diluted with ethyl acetate, and transferred to a separatory funnel. The reaction mixture was washed with water for 3 times and concentrated under vacuum. The target compound **[Co(P6)]** was isolated as a purple solid after purification by flash column chromatography with hexanes/ethyl acetate (2/1) as eluent. IR (neat,

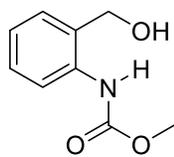
cm⁻¹): 3407.80, 1692.64, 1488.16, 1449.06, 1206.20, 1159.67, 998.09, 759.70, 690.98. HRMS (ESI) (M⁺) Calcd. for C₁₁₂H₈₈CoN₈O₈: 1731.6057, found 1731.6057. UV-vis (CH₂Cl₂), λ_{max} nm (log ε): 414(4.84), 534(3.67).



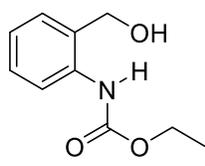
VI. The Synthetic Procedure for (2-(Hydroxymethyl)phenyl)carbamate **s1**



The compound **s1** was synthesized according to the previous reported procedure.^[5] To a solution of 2-aminobenzyl alcohol (20 mmol) and pyridine (26 mmol) in DCM (80.0 mL) at 0 °C, methyl chloroformate (or ethyl chloroformate) (22 mmol) was added dropwise. The reaction was then stirred at 0 °C for 4 h. After that, the reaction was quenched by the addition of 0.1 M HCl and extracted with DCM (80 mL) for 3 times. The combined organic layers were then dried over anhydrous Na₂SO₄ and concentrated under vacuum. The mixture was then purified by flash column chromatography.

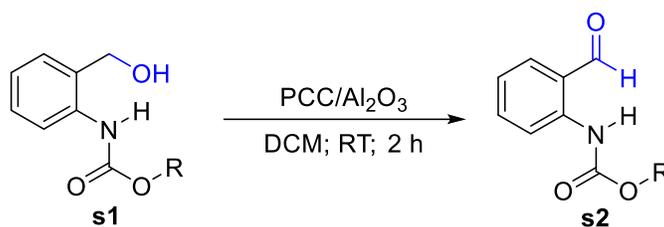


methyl (2-(hydroxymethyl)phenyl)carbamate s1-a White solid. Yield: 81%. Hexanes/ethyl acetate = 3/1. ¹H NMR (400 MHz, CDCl₃) δ 7.94 (d, *J* = 7.6 Hz, 1H), 7.90 (s, 1H), 7.34 (td, *J* = 8.0, 1.6 Hz, 1H), 7.17 (dd, *J* = 7.5, 1.6 Hz, 1H), 7.04 (td, *J* = 7.5, 1.1 Hz, 1H), 4.72 (d, *J* = 5.8 Hz, 2H), 3.78 (s, 3H), 1.96 (t, *J* = 5.8 Hz, 1H). ¹³C NMR (125 MHz, CDCl₃) δ 154.57, 137.61, 129.17, 128.89, 128.78, 123.42, 120.98, 64.22, 52.29. IR (neat, cm⁻¹): 3288.39, 1697.47, 1528.92, 1455.34, 1294.08, 1247.81, 1024.00, 664.01. HRMS (ESI) (M+H⁺) Calcd. for C₉H₁₂NO₃⁺: 182.0812, found 182.0810.

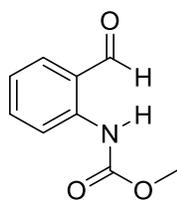


ethyl (2-(hydroxymethyl)phenyl)carbamate s1-b, known compound.^[6] White solid. Yield: 77%. Hexanes/ethyl acetate = 3/1. ¹H NMR (600 MHz, CDCl₃) δ 7.93 – 7.86 (m, 2H), 7.32 (t, *J* = 7.8 Hz, 1H), 7.16 (d, *J* = 7.1 Hz, 1H), 7.03 (t, *J* = 7.5 Hz, 1H), 4.69 (d, *J* = 5.7 Hz, 2H), 4.21 (q, *J* = 7.1 Hz, 2H), 2.25 (t, *J* = 5.7 Hz, 1H), 1.31 (t, *J* = 7.1 Hz, 3H). ¹³C NMR (150 MHz, CDCl₃) δ 154.16, 137.74, 129.21, 128.83, 123.31, 120.98, 64.29, 61.21, 14.52.

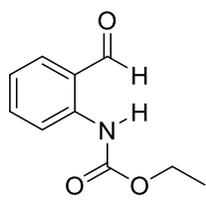
VII. The Synthetic Procedure for (2-Formylphenyl)carbamate **s2**



The compound **s2** was synthesized according to the previous reported procedure.^[7] To a solution of carbamate **s1** (15 mmol) in 150 mL of DCM was added pyridinium chlorochromate (PCC, 30 mmol) and Al₂O₃ (use same amount as PCC in order to ease the separation of the desired product from the PCC residue). The reaction mixture was stirred at room temperature for 2 h and then filtered through a pad of silica. The filtrate was concentrated under reduced pressure and purified by flash column chromatography with hexanes/ethyl acetate (4/1) as eluent.

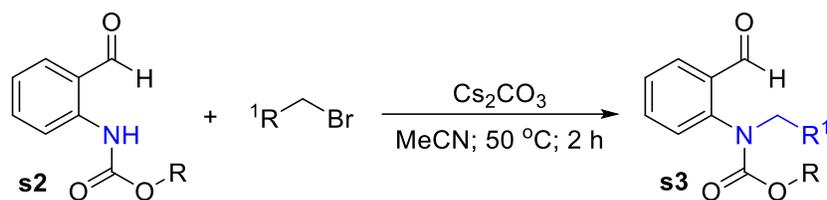


methyl (2-formylphenyl)carbamate s2-a White solid. Yield: 90%. ¹H NMR (500 MHz, CDCl₃) δ 10.61 (s, 1H), 9.90 (s, 1H), 8.45 (d, *J* = 8.5 Hz, 1H), 7.64 (d, *J* = 7.7 Hz, 1H), 7.59 (t, *J* = 7.9 Hz, 1H), 7.16 (t, *J* = 7.5 Hz, 1H), 3.80 (s, 3H). ¹³C NMR (125 MHz, CDCl₃) δ 195.03, 154.09, 141.22, 135.99, 135.97, 121.92, 121.31, 118.24, 52.39. IR (neat, cm⁻¹): 3277.15, 3023.56, 2957.46, 2843.22, 2764.22, 1731.62, 1522.48, 1455.43, 1214.36, 1058.89, 1044.52, 769.03, 695.17. HRMS (ESI) (M+H⁺) Calcd. for C₉H₁₀NO₃⁺: 180.0661, found 180.0666.

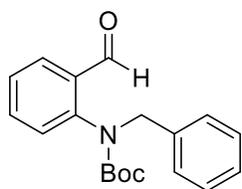


ethyl (2-formylphenyl)carbamate s2-b White solid. Yield: 85%. ¹H NMR (600 MHz, CDCl₃) δ 10.56 (s, 1H), 9.91 (s, 1H), 8.46 (d, *J* = 8.5 Hz, 1H), 7.64 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.61 – 7.58 (m, 1H), 7.16 (td, *J* = 7.6, 0.9 Hz, 1H), 4.24 (q, *J* = 7.1 Hz, 2H), 1.34 (t, *J* = 7.1 Hz, 3H). ¹³C NMR (150 MHz, CDCl₃) δ 195.03, 153.70, 141.37, 135.99, 121.80, 121.28, 118.27, 61.39, 14.46. IR (neat, cm⁻¹): 3278.69, 2985.48, 1729.45, 1654.96, 1585.28, 1522.65, 1451.42, 1242.86, 1191.63, 1058.03, 1042.13, 871.07, 764.43. HRMS (ESI) (M+H⁺) Calcd. for C₁₀H₁₂NO₃⁺: 194.0812, found 194.0809.

VIII. The Synthetic Procedure for Benzyl(2-formylphenyl)carbamate Derivatives s3

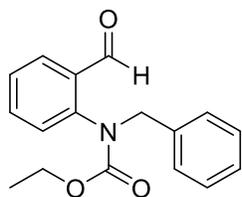


To a solution of **s2** (2 mmol) and Cs_2CO_3 (2.4 mmol) in MeCN (20 mL) was added alkyl bromide (2.4 mmol) at room temperature. The reaction was heated at 50 °C for 2 h. The resulting mixture was cooled down to room temperature and filtered through a short pad of silica. The combined organic mixture was concentrated under vacuum and purified by flash column chromatography.



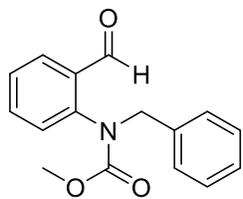
tert-butyl benzyl(2-formylphenyl)carbamate s3-a Yield: 95%.

Hexanes/ethyl acetate = 10/1. ^1H NMR (500 MHz, CDCl_3) δ 9.75 (s, 1H), 7.82 (d, $J = 6.5$ Hz, 1H), 7.57 – 7.54 (m, 1H), 7.36 (t, $J = 7.4$ Hz, 1H), 7.25 – 7.14 (m, 6H), 4.99 and 4.78 (br, 2H), 1.33 (br, 9H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.80, 154.58, 144.27, 136.99, 134.59, 132.88, 128.73, 128.55, 128.37, 128.15, 127.76, 127.36, 81.36, 54.29, 28.12. IR (neat, cm^{-1}): 2978.49, 2873.61, 1682.42, 1595.02, 1484.35, 1445.89, 1367.81, 1152.81, 1016.51, 861.22, 740.86. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{19}\text{H}_{22}\text{NO}_3^+$: 312.1594, found 312.1596.



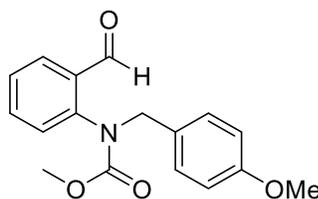
ethyl benzyl(2-formylphenyl)carbamate s3-b Yield: 94%. Hexanes/ethyl

acetate = 6/1. ^1H NMR (600 MHz, CDCl_3) δ 9.72 (br, 1H), 7.84 (d, $J = 7.2$ Hz, 1H), 7.56 (td, $J = 7.7, 1.6$ Hz, 1H), 7.40 (t, $J = 7.5$ Hz, 1H), 7.26 – 7.25 (m, 3H), 7.18 – 7.13 (m, 3H), 4.96 and 4.82 (br, 2H), 4.18 and 4.07 (br, 2H), 1.09 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.58, 155.64, 143.50, 136.48, 134.71, 132.87, 128.91, 128.59, 127.93, 127.77, 62.28, 54.92, 14.45. IR (neat, cm^{-1}): 2917.25, 2848.98, 1709.73, 1598.20, 1455.24, 1378.29, 1216.68, 1019.37, 701.86. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_3^+$: 284.1289, found 284.1287.



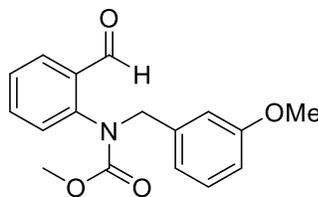
methyl benzyl(2-formylphenyl)carbamate s3-c Yield: 99%. Hexanes/ethyl

acetate = 6/1. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 9.72 (s, 1H), 7.84 (d, $J = 7.6$ Hz, 1H), 7.58 – 7.55 (m, 1H), 7.43 – 7.39 (m, 1H), 7.28 – 7.23 (m, 3H), 7.17 (d, $J = 3.3$ Hz, 2H), 7.12 (d, $J = 7.8$ Hz, 1H), 4.92 and 4.84 (br, 2H), 3.65 (br, 3H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 189.55, 156.13, 143.26, 134.78, 132.85, 129.16, 129.00, 128.80, 128.62, 128.00, 127.95, 127.76, 55.12, 53.38. IR (neat, cm^{-1}): 3030.97, 2954.16, 2855.87, 1713.47, 1598.69, 1454.69, 1382.03, 1270.69, 734.74. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{16}\text{NO}_3^+$: 270.1125, found 270.1126.



methyl (2-formylphenyl)(4-methoxybenzyl)carbamate s3-d Yield:

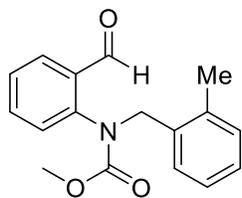
98%. Hexanes/ethyl acetate = 4/1. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 9.71 (s, 1H), 7.84 (d, $J = 7.6$ Hz, 1H), 7.57 (td, $J = 7.7, 1.5$ Hz, 1H), 7.41 (t, $J = 7.5$ Hz, 1H), 7.08 (d, $J = 8.0$ Hz, 3H), 6.77 (d, $J = 8.5$ Hz, 2H), 4.89 and 4.75 (br, 2H), 3.76 (s, 3H), 3.63 (s, 3H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 189.57, 159.31, 156.07, 143.30, 134.75, 132.91, 130.34, 128.89, 128.60, 128.44, 127.89, 113.92, 55.18, 54.51, 53.29. IR (neat, cm^{-1}): 2955.10, 2837.50, 2758.23, 1711.53, 1611.89, 1598.52, 1514.07, 1459.69, 1251.04, 1034.18. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_4^+$: 300.1230, found 300.1232.



methyl (2-formylphenyl)(3-methoxybenzyl)carbamate s3-e Yield:

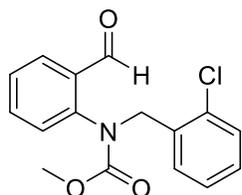
99%. Hexanes/ethyl acetate = 4/1. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 9.76 (s, 1H), 7.85 (d, $J = 7.5$ Hz, 1H), 7.59 – 7.54 (m, 1H), 7.41 (t, $J = 7.5$ Hz, 1H), 7.17 (t, $J = 7.8$ Hz, 1H), 7.14 (d, $J = 7.5$ Hz, 1H), 6.80 (dd, $J = 8.3, 2.5$ Hz, 1H), 6.75 (d, $J = 7.6$ Hz, 1H), 6.73 (s, 1H), 4.88 and 4.82 (br, 2H), 3.73 (s, 3H), 3.83 and 3.64 (br, 3H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 189.59, 159.70, 156.11, 143.25, 137.85, 134.75, 132.85, 129.63, 129.20, 128.72, 127.92, 121.20, 114.43, 113.50, 55.17, 55.02,

53.37. IR (neat, cm^{-1}): 3002.67, 2953.35, 2836.31, 1692.94, 1597.51, 1488.11, 1445.75, 1377.15, 1299.06, 1264.77, 1192.76, 1051.67, 769.19, 740.54. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_4^+$: 300.1230, found 300.1236.



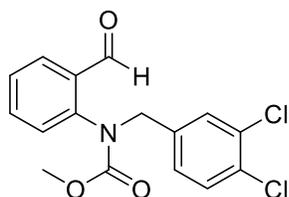
methyl (2-formylphenyl)(2-methylbenzyl)carbamate s3-f Yield: 99%.

Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.74 (s, 1H), 7.82 (d, $J = 7.6$ Hz, 1H), 7.55 – 7.53 (m, 1H), 7.40 (t, $J = 7.5$ Hz, 1H), 7.16 – 7.15 (m, 1H), 7.10 (t, $J = 8.0$ Hz, 2H), 7.05 (br, 2H), 4.98 and 4.90 (br, 2H), 3.66 (s, 3H), 2.13 (s, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.42, 156.06, 143.11, 136.59, 134.70, 134.24, 133.06, 130.54, 130.12, 129.23, 128.89, 128.06, 127.98, 126.07, 53.39, 52.16, 19.02. IR (neat, cm^{-1}): 3022.23, 2953.91, 2860.00, 1711.08, 1598.43, 1486.9, 1457.43, 1377.82, 1304.30, 1272.43, 1194.06, 743.36. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_3^+$: 284.1281, found 284.1284.



methyl (2-chlorobenzyl)(2-formylphenyl)carbamate s3-g Yield: 99%.

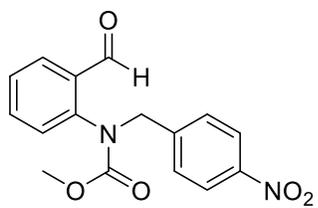
Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.88 (s, 1H), 7.83 (d, $J = 7.6$ Hz, 1H), 7.55 (td, $J = 7.8, 1.4$ Hz, 1H), 7.41 (t, $J = 7.5$ Hz, 2H), 7.29 – 7.27 (m, 1H), 7.21 – 7.18 (m, 2H), 7.16 (d, $J = 7.8$ Hz, 1H), 5.05 (br, 2H), 3.79 and 3.67 (s, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.61, 156.12, 143.00, 134.68, 134.04, 132.89, 131.34, 129.63, 129.31, 128.55, 127.96, 127.56, 127.02, 126.85, 53.47, 51.90. IR (neat, cm^{-1}): 3004.63, 2953.62, 2360.00, 1712.93, 1598.56, 1444.12, 1379.73, 1302.25, 1277.42, 765.24, 742.13. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{15}\text{ClNO}_3^+$: 304.0735, found 304.0739.



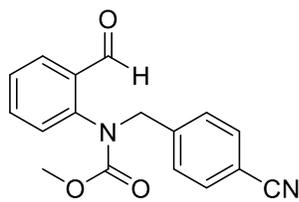
methyl (3,4-dichlorobenzyl)(2-formylphenyl)carbamate s3-h Yield:

98%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.87 (s, 1H), 7.88 (dd, $J = 7.7,$

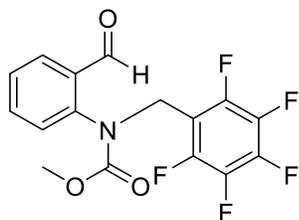
1.5 Hz, 1H), 7.59 (td, $J = 7.7, 1.7$ Hz, 1H), 7.46 (t, $J = 7.5$ Hz, 1H), 7.35 (d, $J = 8.2$ Hz, 1H), 7.32 (s, 1H), 7.06 (t, $J = 8.3$ Hz, 2H), 4.91 and 4.70 (br, 2H), 3.66 (s, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.46, 156.08, 142.69, 142.52, 136.88, 134.87, 134.69, 132.63, 132.46, 132.08, 130.75, 130.57, 128.82, 128.24, 53.94, 53.51. IR (neat, cm^{-1}): 3002.67, 2953.42, 2860.35, 2746.50, 1712.18, 1598.16, 1447.29, 1374.56, 1297.34, 1216.67, 1032.47, 738.51. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{14}\text{Cl}_2\text{NO}_3^+$: 338.0345, found 338.0347.



methyl (2-formylphenyl)(4-nitrobenzyl)carbamate s3-i Yield: 80%. Hexanes/ethyl acetate = 3/1. ^1H NMR (600 MHz, CDCl_3) δ 9.87 (s, 1H), 8.14 (d, $J = 8.2$ Hz, 2H), 7.87 (d, $J = 7.5$ Hz, 1H), 7.58 (t, $J = 7.6$ Hz, 1H), 7.47 (t, $J = 7.5$ Hz, 1H), 7.41 (d, $J = 8.1$ Hz, 2H), 7.09 (d, $J = 5.9$ Hz, 1H), 5.05 and 4.83 (br, 2H), 3.66 (s, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.44, 156.12, 147.57, 143.97, 142.31, 134.91, 132.37, 131.10, 129.60, 128.72, 128.33, 123.83, 54.33, 53.58. IR (neat, cm^{-1}): 3077.25, 2955.54, 2857.16, 2756.27, 1691.77, 1597.46, 1518.47, 1445.74, 1344.17, 1307.21, 1267.61, 1192.18, 732.85. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{15}\text{N}_2\text{O}_5^+$: 315.0975, found 315.0977.

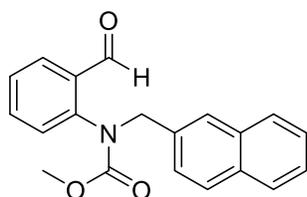


methyl (4-cyanobenzyl)(2-formylphenyl)carbamate s3-j Yield: 98%. Hexanes/ethyl acetate = 3/1. ^1H NMR (600 MHz, CDCl_3) δ 9.85 (s, 1H), 7.86 (d, $J = 7.6$ Hz, 1H), 7.59 – 7.56 (m, 3H), 7.46 (t, $J = 7.5$ Hz, 1H), 7.34 (d, $J = 7.9$ Hz, 2H), 7.07 (d, $J = 7.4$ Hz, 1H), 4.99 and 4.80 (br, 2H), 3.65 (br, 3H). ^{13}C NMR (125 MHz, CDCl_3) δ 189.40, 156.10, 142.41, 141.95, 134.88, 134.72, 132.39, 130.85, 129.44, 128.68, 128.27, 118.45, 111.86, 54.62, 53.53. IR (neat, cm^{-1}): 2954.98, 2851.81, 2751.36, 2228.37, 1708.46, 1598.31, 1456.80, 1379.91, 1316.36, 1269.35, 1193.78, 778.53, 735.44. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{15}\text{N}_2\text{O}_3^+$: 295.1077, found 295.1079.



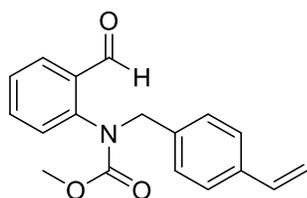
methyl (2-formylphenyl)((perfluorophenyl)methyl)carbamate s3-k

Yield: 97%. Hexanes/ethyl acetate = 4/1. ^1H NMR (500 MHz, CDCl_3) δ 9.94 (s, 1H), 7.87 (dd, $J = 7.7, 1.4$ Hz, 1H), 7.61 (td, $J = 7.7, 1.6$ Hz, 1H), 7.49 (t, $J = 7.6$ Hz, 1H), 7.18 (d, $J = 7.8$ Hz, 1H), 5.02 (br, 2H), 3.64 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.48, 155.50, 145.45 (md, $J = 250.0$ Hz), 141.50, 141.12 (md, $J = 255.3$ Hz), 137.31 (md, $J = 252.6$ Hz), 134.82, 132.69, 131.10, 129.04, 128.53, 109.95, 53.58, 41.88. IR (neat, cm^{-1}): 2957.90, 2838.25, 2751.54, 1706.21, 1526.90, 1503.64, 1456.77, 1439.58, 1383.57, 1278.56, 966.81, 945.34, 760.50. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{11}\text{F}_5\text{NO}_3^+$: 360.0654, found 360.0657.



methyl (2-formylphenyl)(naphthalen-2-ylmethyl)carbamate s3-l

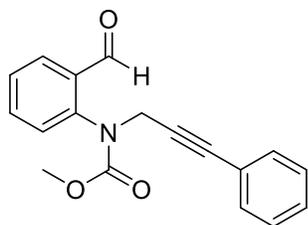
Yield: 99%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.83 (s, 1H), 7.84 – 7.70 (m, 3H), 7.73 – 7.72 (m, 1H), 7.57 (s, 1H), 7.53 (td, $J = 7.7, 1.5$ Hz, 1H), 7.47 – 7.44 (m, 2H), 7.41-7.38 (m, 2H), 7.11 (br, 1H), 5.08 and 5.02 (br, 2H), 3.67 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.58, 156.26, 143.16, 134.73, 133.93, 133.15, 132.87, 132.72, 129.46, 129.42, 128.81, 128.52, 127.94, 127.81, 127.67, 126.63, 126.22, 126.11, 55.20, 53.42. IR (neat, cm^{-1}): 3015.95, 2952.55, 2856.83, 2752.36, 1708.72, 1597.93, 1446.53, 1365.74, 755.23. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{20}\text{H}_{18}\text{NO}_3^+$: 320.1281, found 320.1282.



methyl (2-formylphenyl)(4-vinylbenzyl)carbamate s3-m Yield: 80%.

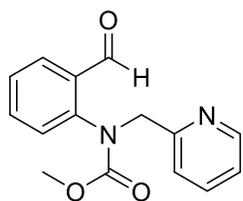
Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.78 (s, 1H), 7.85 (d, $J = 7.5$ Hz, 1H), 7.56 (td, $J = 7.6, 1.6$ Hz, 1H), 7.40 – 7.43 (m, 1H), 7.30 (d, $J = 8.0$ Hz, 2H), 7.17 – 7.07 (m, 3H), 6.66 (dd, $J = 17.6, 10.9$ Hz, 1H), 5.71 (d, $J = 17.6$ Hz, 1H), 5.23 (d, $J = 10.9$ Hz, 1H), 4.86 (s, 2H), 3.65 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.56, 156.13, 137.26, 136.26, 135.90, 134.75,

132.78, 129.33, 129.14, 128.79, 127.93, 126.42, 114.17, 54.80, 53.36. IR (neat, cm^{-1}): 2953.28, 2855.09, 2754.32, 1707.44, 1597.93, 1446.39, 1379.05, 1269.78, 1193.14, 990.30, 910.56, 779.90. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{18}\text{H}_{18}\text{NO}_3^+$: 296.1281, found 296.1282.



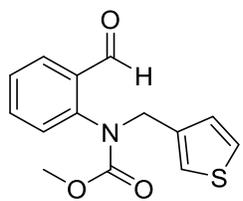
methyl (2-formylphenyl)(3-phenylprop-2-yn-1-yl)carbamate s3-n

Yield: 95%. Hexanes/ethyl acetate = 5/1. ^1H NMR (400 MHz, CDCl_3) δ 10.21 (s, 1H), 7.97 (dd, $J = 7.7, 1.7$ Hz, 1H), 7.70 – 7.66 (m, 1H), 7.50 (t, $J = 7.5$ Hz, 1H), 7.43 (d, $J = 7.6$ Hz, 1H), 7.31 – 7.27 (m, 5H), 4.85 and 4.67 (br, 2H), 3.67 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.77, 155.48, 142.56, 134.87, 133.24, 131.45, 129.18, 128.84, 128.44, 128.38, 128.19, 122.12, 85.46, 83.36, 53.51, 41.33. IR (neat, cm^{-1}): 2955.69, 2861.87, 1698.24, 1597.94, 1489.13, 1375.69, 1443.87, 1271.73, 758.84. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{18}\text{H}_{16}\text{NO}_3^+$: 294.1125, found 294.1126.



methyl (2-formylphenyl)(pyridin-2-ylmethyl)carbamate s3-o Yield: 50%.

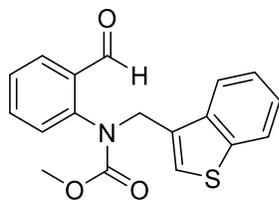
Hexanes/ethyl acetate = 1/1. ^1H NMR (600 MHz, CDCl_3) δ 10.03 (s, 1H), 8.49 (s, 1H), 7.85 (d, $J = 7.5$ Hz, 1H), 7.63 (td, $J = 7.7, 1.7$ Hz, 1H), 7.57 (t, $J = 7.8$ Hz, 1H), 7.41 – 7.37 (m, 2H), 7.31 (d, $J = 7.7$ Hz, 1H), 7.17 – 7.15 (m, 1H), 5.03 and 5.00 (br, 2H), 3.65 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 190.08, 156.50, 156.12, 149.36, 143.70, 136.64, 134.73, 132.67, 129.34, 128.23, 127.77, 122.95, 122.57, 56.45, 53.40. IR (neat, cm^{-1}): 2955.07, 2854.05, 2359.77, 2343.66, 1711.48, 1598.24, 1486.57, 1459.02, 1310.65, 1271.14, 1193.08, 779.37. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{15}\text{H}_{15}\text{N}_2\text{O}_3^+$: 271.1077, found 271.1081.



methyl (2-formylphenyl)(thiophen-3-ylmethyl)carbamate s3-p Yield: 99%.

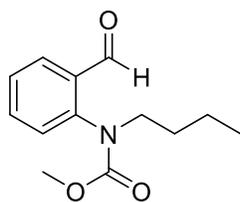
Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.69 (s, 1H), 7.86 (d, $J = 7.6$ Hz, 1H),

7.59 (td, $J = 7.7$, 1.4 Hz, 1H), 7.43 (t, $J = 7.5$ Hz, 1H), 7.25 – 7.24 (m, 1H), 7.13 (d, $J = 7.7$ Hz, 1H), 7.00 (d, $J = 1.5$ Hz, 1H), 6.97 (d, $J = 2.2$ Hz, 1H), 4.94 and 4.79 (br, 2H), 3.63 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.41, 155.90, 143.20, 136.85, 134.81, 132.96, 129.05, 128.82, 128.02, 126.42, 124.39, 53.32, 49.64. IR (neat, cm^{-1}): 2953.44, 2852.10, 2360.47, 2339.74, 1713.03, 1598.52, 1458.39, 1374.07, 1270.54, 1193.41, 738.61. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{14}\text{H}_{14}\text{NO}_3\text{S}^+$: 276.0689, found 276.0691.



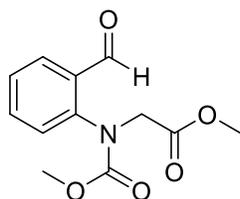
methyl (benzo[*b*]thiophen-3-ylmethyl)(2-formylphenyl)carbamate s3-q

Yield: 80%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 9.63 (s, 1H), 7.83 – 7.80 (m, 3H), 7.53 (td, $J = 7.5$, 1.3 Hz, 1H), 7.41 (t, $J = 7.4$ Hz, 1H), 7.37 – 7.33 (m, 2H), 7.05 (s, 2H), 5.19 and 5.11 (br, 2H), 3.67 (s, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.30, 156.02, 142.75, 140.34, 137.86, 134.70, 133.09, 131.19, 129.39, 129.01, 128.12, 126.74, 124.62, 124.45, 122.87, 122.04, 53.48, 48.07. IR (neat, cm^{-1}): 2952.77, 2852.10, 1692.59, 1597.84, 1446.29, 1268.88, 1193.07, 768.87, 734.65. HRMS (ESI) ($\text{M}+\text{Na}^+$) Calcd. for $\text{C}_{18}\text{H}_{15}\text{NNaO}_3\text{S}^+$: 348.0665, found 348.0666.



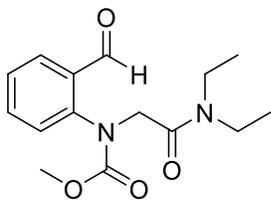
methyl butyl(2-formylphenyl)carbamate s3-r Yield: 50%. Hexanes/ethyl

acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 10.10 (s, 1H), 7.92 (d, $J = 7.7$ Hz, 1H), 7.63 (t, $J = 7.4$ Hz, 1H), 7.44 (t, $J = 7.5$ Hz, 1H), 7.25 (s, 1H), 3.70 and 3.61 (br, 5H), 1.55 – 1.52 (m, 2H), 1.34 – 1.27 (m, 2H), 0.89 (t, $J = 7.4$ Hz, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.82, 155.81, 143.92, 134.83, 132.79, 129.22, 128.63, 127.72, 53.12, 51.21, 30.13, 19.98, 13.70. IR (neat, cm^{-1}): 2958.28, 2934.23, 2863.57, 1715.49, 1599.16, 1459.51, 1388.38, 1305.41, 1193.94, 772.69, 739.25. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{13}\text{H}_{18}\text{NO}_3^+$: 236.1281, found 236.1283.



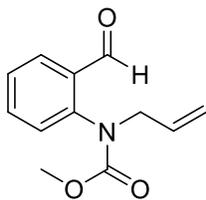
methyl *N*-(2-formylphenyl)-*N*-(methoxycarbonyl)glycinate s3-s Yield: 63%.

Hexanes/ethyl acetate = 2/1. ^1H NMR (600 MHz, CDCl_3) δ 10.27 (s, 1H), 7.92 (d, $J = 7.8$ Hz, 1H), 7.62 (t, $J = 7.7$, 1H), 7.47 – 7.43 (m, 2H), 4.53 (d, $J = 17.6$ Hz, 1H), 4.32 (d, $J = 17.6$ Hz, 1H), 3.75 (s, 3H), 3.81 and 3.67 (s, 3H). ^{13}C NMR (125 MHz, CDCl_3) δ 190.20, 169.60, 155.86, 143.16, 134.86, 132.55, 130.12, 129.51, 128.18, 53.65, 52.32, 52.22. IR (neat, cm^{-1}): 2955.86, 2854.05, 1749.40, 1714.17, 1694.29, 1599.00, 1486.45, 1447.36, 1375.33, 1271.26, 1214.81, 776.76. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{12}\text{H}_{14}\text{NO}_5^+$: 252.0866, found 252.0868.



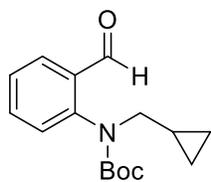
methyl (2-(diethylamino)-2-oxoethyl)(2-formylphenyl)carbamate s3-t

Yield: 78%. Hexanes/ethyl acetate = 2/1. ^1H NMR (500 MHz, CDCl_3) δ 10.30 (s, 1H), 7.87 (d, $J = 7.5$ Hz, 1H), 7.60 – 7.59 (m, 2H), 7.42 – 7.39 (m, 1H), 4.67 (d, $J = 16.2$ Hz, 1H), 4.21 (d, $J = 16.2$ Hz, 1H), 3.63 (s, 3H), 3.43 – 3.33 (br, m, 2H), 3.32 – 3.24 (br, m, 2H), 1.21 (t, $J = 7.1$ Hz, 3H), 1.10 (t, $J = 7.1$ Hz, 3H). ^{13}C NMR (125 MHz, CDCl_3) δ 190.61, 166.65, 155.98, 143.86, 134.67, 132.48, 129.23, 128.56, 127.70, 53.39, 52.20, 41.18, 40.63, 14.14, 12.97. IR (neat, cm^{-1}): 2975.98, 2934.23, 1712.52, 1693.54, 1654.68, 1485.49, 1459.82, 1379.82, 1265.69, 1195.86, 760.72. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{15}\text{H}_{21}\text{N}_2\text{O}_4^+$: 293.1496, found 293.1498.



methyl allyl(2-formylphenyl)carbamate s3-u Yield: 99%. Hexanes/ethyl

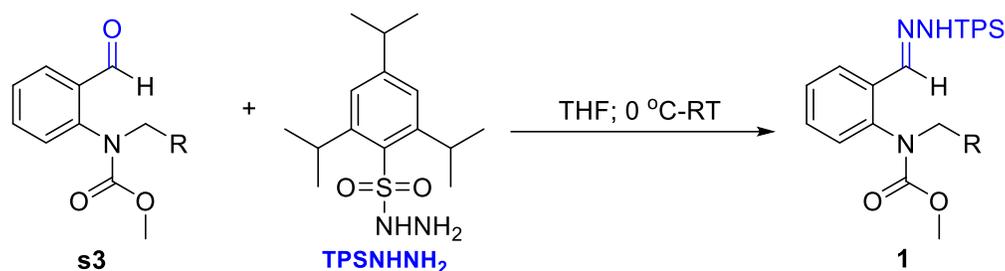
acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 10.06 (s, 1H), 7.88 (dd, $J = 7.7, 1.6$ Hz, 1H), 7.60 (t, $J = 7.7$, 1H), 7.42 (t, $J = 7.5$ Hz, 1H), 7.26 – 7.24 (m, 1H), 5.89 (ddt, $J = 16.8, 10.2, 6.6$ Hz, 1H), 5.12 – 5.07 (m, 2H), 4.28 (br, 2H), 3.61 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 189.84, 155.72, 143.38, 134.78, 132.67, 132.49, 129.44, 128.67, 127.86, 119.14, 54.01, 53.26. IR (neat, cm^{-1}): 2969.80, 1721.22, 1599.12, 1456.18, 1375.60, 1229.57. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{12}\text{H}_{14}\text{NO}_3^+$: 220.0968, found 220.0974.



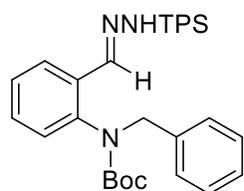
***tert*-butyl (cyclopropylmethyl)(2-formylphenyl)carbamate s3-v** Yield: 45%.

Hexanes/ethyl acetate = 6/1. ^1H NMR (600 MHz, CDCl_3) δ 10.22 (s, 1H), 7.91 (d, $J = 7.5$ Hz, 1H), 7.62 – 7.60 (m, 1H), 7.40 (t, $J = 7.5$ Hz, 1H), 7.26 (br, 1H), 3.81 (s, 1H), 3.38 (s, 1H), 1.59 – 1.31 (m, 9H), 0.97 (br, 1H), 0.43 (br, 2H), 0.15 (s, 1H), 0.03 (s, 1H). ^{13}C NMR (150 MHz, CDCl_3) major rotamer: δ 190.46, 154.43, 145.09, 134.70, 133.27, 129.82, 128.31, 127.31, 80.94, 54.87, 29.70, 28.15, 9.96, 3.73. IR (neat, cm^{-1}): 2979.07, 2929.87, 2855.13, 2760.04, 1684.56, 1596.35, 1429.78, 1369.43, 1291.66, 1149.82, 1129.13, 974.20, 760.89. HRMS (ESI) ($\text{M} + \text{Na}^+$) Calcd. for $\text{C}_{16}\text{H}_{21}\text{NNaO}_3^+$: 298.1414, found 298.1413.

IX. The Synthetic Procedure for Triisopropyl Sulfonylhydrazone Derivatives 1

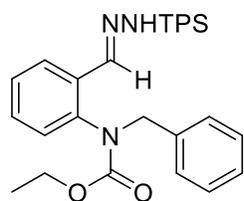


To a stirred solution of pure 2,4,6-triisopropylbenzenesulfonylhydrazide (TPSNHNH₂, 2 mmol) in THF (10.0 mL) at 0 °C, aldehyde **s3** (1 equiv.) was added dropwise (or portionwise if solid). The reaction was monitored by TLC. After the reaction was completed, the solvent was removed directly under reduced pressure, and the crude solid was further purified by flash column chromatography.



tert-butyl benzyl(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)

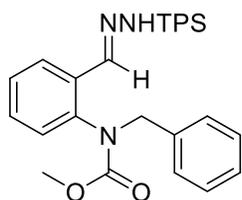
methyl)phenyl)carbamate 1-a Yield: 70%. Hexanes/ethyl acetate = 6/1. ¹H NMR (500 MHz, CDCl₃) δ 7.98 (s, 1H), 7.80 (d, *J* = 7.6 Hz, 1H), 7.47 (s, 1H), 7.33 (br, 1H), 7.24 – 7.14 (m, 8H), 6.89 (s, 1H), 4.76 (d, *J* = 14.7 Hz, 1H), 4.57 (d, *J* = 14.7 Hz, 1H), 4.26 (hept, *J* = 6.7 Hz, 2H), 2.90 (hept, *J* = 6.9 Hz, 1H), 1.33 – 1.25 (m, 27H). ¹³C NMR (125 MHz, CDCl₃) δ 154.82, 153.38, 151.36, 142.47, 141.10, 137.24, 131.38, 131.01, 130.54, 128.84, 128.48, 127.75, 127.49, 127.27, 126.38, 123.82, 80.86, 54.10, 34.17, 30.01, 28.20, 24.89, 23.53. IR (neat, cm⁻¹): 3178.54, 2963.62, 1669.48, 1600.75, 1399.42, 1315.89, 1157.20, 1071.86, 855.44, 757.16, 731.40. HRMS (ESI) (M+H⁺) Calcd. for C₃₄H₄₆N₃O₄S⁺: 592.3249, found 592.3274.



ethyl benzyl(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono) methyl)

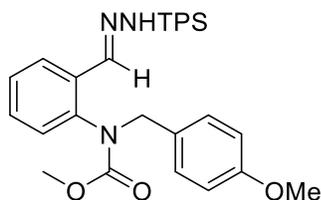
phenyl)carbamate 1-b Yield: 86%. Hexanes/ethyl acetate = 4/1. ¹H NMR (500 MHz, CDCl₃) δ 8.10 (s, 1H), 7.82 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.45 (s, 1H), 7.29 – 7.20 (m, 5H), 7.17 – 7.14 (m, 4H),

6.91 (s, 1H), 4.79 and 4.76 (br, 1H), 4.63 and 4.61 (br, 1H), 4.25 (hept, $J = 6.7$ Hz, 2H), 4.03 (br, 2H), 2.89 (hept, $J = 6.9$ Hz, 1H), 1.30 – 1.27 (m, 12H), 1.25 (d, $J = 6.9$ Hz, 6H), 0.99 (br, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 155.87, 153.38, 151.34, 141.87, 140.22, 136.72, 131.42, 131.14, 130.62, 129.05, 128.53, 127.94, 127.66, 126.52, 123.99, 123.81, 62.12, 54.74, 34.17, 30.00, 24.88, 23.52, 14.46. IR (neat, cm^{-1}): 2960.77, 2869.70, 1673.95, 1600.11, 1455.15, 1319.36, 1297.65, 1166.56, 1037.84, 942.18, 743.78, 657.99. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{32}\text{H}_{42}\text{N}_3\text{O}_4\text{S}^+$: 564.2891, found 564.2876.



methyl benzyl(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)

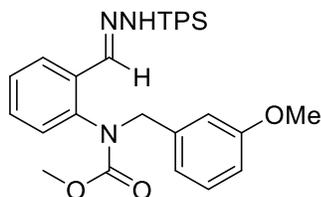
methylphenyl) carbamate 1-c Yield: 90%. Hexanes/ethyl acetate = 4/1. ^1H NMR (600 MHz, CDCl_3) δ 8.13 (s, 1H), 7.82 (d, $J = 7.8$ Hz, 1H), 7.46 (s, 1H), 7.28 (td, $J = 7.6, 1.4$ Hz, 1H), 7.25 – 7.22 (m, 4H), 7.18 (s, 2H), 7.15 (br, 2H), 6.91 (d, $J = 6.5$ Hz, 1H), 4.75 (d, $J = 14.5$ Hz, 1H), 4.65 (d, $J = 14.5$ Hz, 1H), 4.24 (hept, $J = 6.7$ Hz, 2H), 3.54 (s, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.30 – 1.28 (m, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.31, 153.41, 151.33, 141.80, 140.04, 136.54, 131.36, 131.18, 130.71, 129.12, 128.67, 128.56, 128.03, 127.83, 126.58, 123.82, 54.93, 53.26, 34.17, 30.00, 24.87, 23.52. IR (neat, cm^{-1}): 3213.94, 2958.2, 2869.64, 1696.82, 1601.14, 1321.40, 1166.54, 1152.04. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{31}\text{H}_{40}\text{N}_3\text{O}_4\text{S}^+$: 550.2734, found 550.2740.



methyl (4-methoxybenzyl)(2-((2,4,6-triisopropylphenyl)

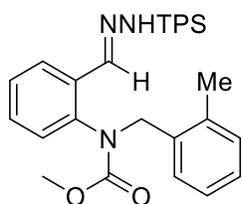
sulfonyl)hydrazono)methylphenyl)carbamate 1-d Yield: 87%. Hexanes/ethyl acetate = 3/1. ^1H NMR (600 MHz, CDCl_3) δ 8.24 (s, 1H), 7.82 (d, $J = 7.8$ Hz, 1H), 7.51 (s, 1H), 7.31 – 7.27 (m, 1H), 7.24 – 7.20 (m, 1H), 7.18 (s, 2H), 7.07 (d, $J = 7.5$ Hz, 2H), 6.90 – 6.86 (m, 1H), 6.78 (d, $J = 8.5$ Hz, 2H), 4.75 (d, $J = 14.3$ Hz, 1H), 4.51 (d, $J = 14.3$ Hz, 1H), 4.25 (hept, $J = 6.7$ Hz, 2H), 3.77 (s, 3H), 3.52 (s, 3H), 2.89 (hept, $J = 6.9$ Hz, 1H), 1.29 (d, $J = 6.7$ Hz, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 159.30, 156.29, 153.38, 151.33, 141.79, 140.01, 131.38,

131.15, 130.61, 130.44, 128.82, 128.64, 127.77, 126.52, 123.80, 113.87, 55.19, 54.29, 53.20, 34.16, 29.99, 24.85, 23.52. IR (neat, cm^{-1}): 3161.77, 2957.90, 2868.98, 2359.85, 2342.17, 1704.86, 1681.69, 1456.72. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{32}\text{H}_{42}\text{N}_3\text{O}_5\text{S}^+$: 580.2840, found 580.2839.



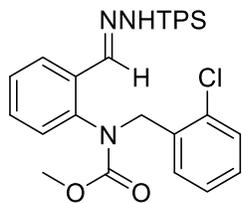
methyl (3-methoxybenzyl)(2-((2,4,6-triisopropylphenyl) sulfonyl)

hydrazono)methylphenyl)carbamate 1-e Yield: 94%. Hexanes/ethyl acetate = 4/1. ^1H NMR (600 MHz, CDCl_3) δ 8.18 (s, 1H), 7.82 (dd, $J = 7.8, 1.5$ Hz, 1H), 7.50 (s, 1H), 7.27 (ddd, $J = 5.8, 4.9, 1.6$ Hz, 1H), 7.23 (td, $J = 7.6, 0.9$ Hz, 1H), 7.18 – 7.15 (m, 3H), 6.91 (br, 1H), 6.79 (dd, $J = 8.2, 2.3$ Hz, 1H), 6.73 (d, $J = 7.0$ Hz, 1H), 6.69 (s, 1H), 4.76 (d, $J = 14.5$ Hz, 1H), 4.56 (d, $J = 14.5$ Hz, 1H), 4.24 (hept, $J = 6.7$ Hz, 2H), 3.72 (s, 3H), 3.53 (s, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.28 (d, $J = 6.7$ Hz, 12H), 1.24 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (125MHz, CDCl_3) δ 159.62, 156.32, 153.40, 151.33, 141.80, 140.03, 138.04, 131.40, 131.17, 130.67, 129.58, 128.68, 127.84, 126.56, 123.81, 121.30, 114.79, 113.31, 55.19, 54.85, 53.27, 34.17, 30.00, 24.86, 23.52. IR (neat, cm^{-1}): 3182.56, 2958.18, 2932.27, 2869.32, 2359.69, 2343.66, 1706.33, 1679.61, 1454.13, 1263.22, 1153.49, 735.74. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{32}\text{H}_{42}\text{N}_3\text{O}_5\text{S}^+$: 580.2840, found 580.2839.



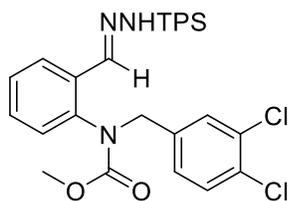
methyl (2-methylbenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)

hydrazono)methylphenyl)carbamate 1-f Yield: 94%. Hexanes/ethyl acetate = 5/1. ^1H NMR (500 MHz, CDCl_3) δ 8.06 (br, 1H), 7.80 (dd, $J = 7.4, 2.0$ Hz, 1H), 7.47 (s, 1H), 7.23 (td, $J = 7.6, 1.5$ Hz, 2H), 7.18 (s, 2H), 7.10 (t, $J = 7.3$ Hz, 2H), 7.04 (t, $J = 7.6$ Hz, 2H), 6.87 (br, 1H), 4.87 (d, $J = 14.4$ Hz, 1H), 4.69 (d, $J = 14.4$ Hz, 1H), 4.24 (hept, $J = 6.7$ Hz, 2H), 3.56 (br, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 2.01 (s, 3H), 1.28 (br, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (125 MHz, CDCl_3) δ 158.95, 156.05, 153.99, 144.33, 142.49, 139.24, 137.15, 134.05, 133.29, 133.11, 132.80, 131.38, 130.74, 130.50, 129.21, 128.72, 126.66, 126.48, 55.95, 54.43, 36.83, 32.66, 27.53, 26.19, 21.59. IR (neat, cm^{-1}): 3184.54, 2957.29, 2868.69, 2360.21, 2342.60, 1706.76, 1676.98, 1456.36, 1152.06, 746.98, 658.54. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{32}\text{H}_{42}\text{N}_3\text{O}_4\text{S}^+$: 564.2891, found 564.2895.



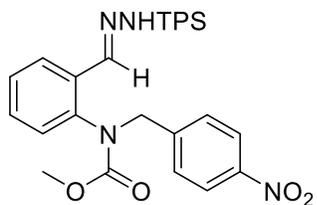
methyl (2-chlorobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)

hydrazono)methylphenylcarbamate 1-g Yield: 85%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 7.96 (s, 1H), 7.77 (d, $J = 7.8$ Hz, 1H), 7.60 (s, 1H), 7.28 – 7.25 (m, 1H), 7.21 (t, $J = 6.9$ Hz, 3H), 7.17 (s, 2H), 7.13 – 7.10 (m, 2H), 6.98 (br, 1H), 4.90 and 4.88 (br, 2H), 4.23 (hept, $J = 6.6$ Hz, 2H), 3.57 (s, 3H), 2.90 (hept, $J = 6.7$ Hz, 1H), 1.29 (br, 12H), 1.24 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.27, 153.36, 151.31, 141.58, 139.60, 133.99, 133.80, 131.44, 131.40, 131.24, 130.55, 129.54, 129.36, 128.31, 127.84, 126.88, 126.53, 123.82, 53.41, 51.72, 34.17, 30.00, 24.86, 23.52. IR (neat, cm^{-1}): 3162.51, 2958.56, 2929.17, 2868.95, 2360.16, 2342.85, 1684.03, 1599.56, 1456.61, 1383.67, 1166.61, 739.94. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{31}\text{H}_{39}\text{ClN}_3\text{O}_4\text{S}^+$: 584.2344, found 584.2347.

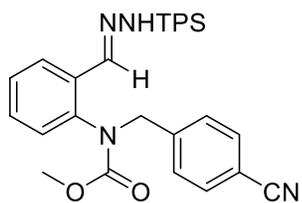


methyl (3,4-dichlorobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)

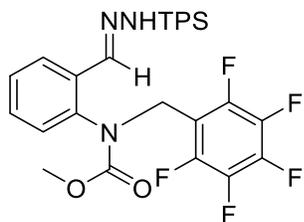
hydrazono)methylphenylcarbamate 1-h Yield: 85%. Hexanes/ethyl acetate = 4/1. ^1H NMR (600 MHz, CDCl_3) δ 7.99 (s, 1H), 7.83 (d, $J = 7.0$ Hz, 1H), 7.62 (s, 1H), 7.32 (d, $J = 8.2$ Hz, 1H), 7.30 – 7.27 (m, 3H), 7.19 (s, 2H), 6.98 (d, $J = 7.0$ Hz, 1H), 6.82 (br, 1H), 4.92 (d, $J = 14.3$ Hz, 1H), 4.38 – 4.22 (m, 3H), 3.56 (br, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.29 (d, $J = 6.5$ Hz, 12H), 1.24 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (125MHz, CDCl_3) δ 156.38, 153.53, 151.35, 141.26, 139.61, 136.89, 132.58, 132.10, 131.28, 130.83, 130.69, 130.53, 128.72, 128.21, 128.12, 127.11, 123.87, 53.69, 53.45, 34.18, 30.03, 24.85, 23.51. IR (neat, cm^{-1}): 3182.21, 2959.02, 2869.36, 1708.61, 1680.94, 1455.62, 1374.93, 1151.17, 1033.78. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{31}\text{H}_{38}\text{Cl}_2\text{N}_3\text{O}_4\text{S}^+$: 618.1955, found 618.1960.



methyl (4-nitrobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methylphenylcarbamate 1-i Yield: 50%. Hexanes/ethyl acetate = 4/1. ^1H NMR (600 MHz, CDCl_3) δ 8.46 (s, 1H), 8.12 (d, $J = 8.5$ Hz, 2H), 7.83 (br, 1H), 7.72 (s, 1H), 7.35 (d, $J = 8.0$ Hz, 2H), 7.27 – 7.25 (m, 2H), 7.19 (s, 2H), 6.80 (s, 1H), 5.10 (d, $J = 14.4$ Hz, 1H), 4.39 (d, $J = 14.4$ Hz, 1H), 4.25 (hept, $J = 6.7$ Hz, 2H), 3.58 (br, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.29 (d, $J = 6.7$ Hz, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.38, 153.63, 151.34, 147.57, 143.91, 141.15, 139.57, 131.17, 130.77, 130.75, 129.68, 128.59, 128.21, 127.23, 123.89, 123.80, 54.07, 53.53, 34.18, 30.02, 24.83, 23.51. IR (neat, cm^{-1}): 3218.81, 2960.23, 2359.80, 1670.43, 1519.94, 1346.84, 738.21. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{31}\text{H}_{39}\text{N}_4\text{O}_6\text{S}^+$: 595.2585, found 595.2587.

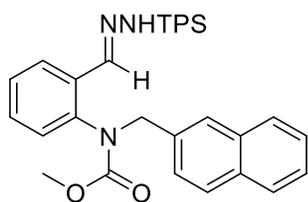


methyl (4-cyanobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methylphenylcarbamate 1-j Yield: 80%. Hexanes/ethyl acetate = 3/1. ^1H NMR (600 MHz, CDCl_3) 8.44 (br, 1H), 7.82 (br, 1H), 7.71 (s, 1H), 7.55 (d, $J = 8.3$ Hz, 2H), 7.29 – 7.24 (m, 4H), 7.19 (s, 2H), 6.79 (br, 1H), 5.05 (d, $J = 14.6$ Hz, 1H), 4.35 (d, $J = 14.6$ Hz, 1H), 4.26 (hept, $J = 6.7$ Hz, 2H), 3.57 (br, 3H), 2.91 (hept, $J = 6.9$ Hz, 1H), 1.30 (d, $J = 6.7$ Hz, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.42, 153.60, 151.34, 141.92, 141.17, 139.60, 132.37, 131.23, 130.81, 130.68, 129.51, 128.56, 128.15, 127.17, 123.88, 118.44, 111.87, 54.37, 53.50, 34.17, 30.02, 24.85, 23.51. IR (neat, cm^{-1}): 3190.41, 2959.79, 2870.26, 2360.11, 2343.40, 1706.75, 1684.15, 1265.40, 742.06. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{32}\text{H}_{39}\text{N}_4\text{O}_4\text{S}^+$: 575.2687, found 575.2691.



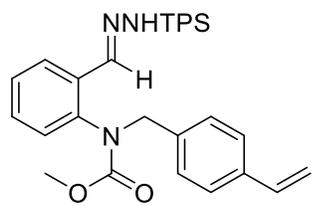
methyl ((perfluorophenyl)methyl)(2-((2,4,6-triisopropylphenyl)

sulfonyl)hydrazono)methylphenyl)carbamate 1-k Yield: 92%. Hexanes/ethyl acetate = 4/1. ^1H NMR (600 MHz, CDCl_3) δ 8.28 (s, 1H), 7.80 (d, $J = 7.6$ Hz, 1H), 7.71 (s, 1H), 7.31 (td, $J = 7.6$, 1.4 Hz, 1H), 7.27 – 7.25 (m, 1H), 7.18 (s, 2H), 6.98 (d, $J = 7.8$ Hz, 1H), 4.96 (d, $J = 14.3$ Hz, 1H), 4.84 (d, $J = 14.3$ Hz, 1H), 4.24 (hept, $J = 6.7$ Hz, 2H), 3.58 (br, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.29 (d, $J = 6.7$ Hz, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 155.78, 153.51, 151.36, 145.39 (md, $J = 253.0$ Hz), 141.12 (md, $J = 251.6$ Hz), 140.78, 138.56, 137.31 (md, $J = 253.7$ Hz), 131.32, 131.22, 130.73, 128.35, 128.04, 127.05, 123.85, 109.61, 53.61, 41.62, 34.18, 30.02, 24.80, 23.50. IR (neat, cm^{-1}): 3170.74, 2959.60, 2869.98, 1714.25, 1687.55, 1504.90, 1036.45, 738.86. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{31}\text{H}_{35}\text{F}_5\text{N}_3\text{O}_4\text{S}^+$: 640.2263, found 640.2264.



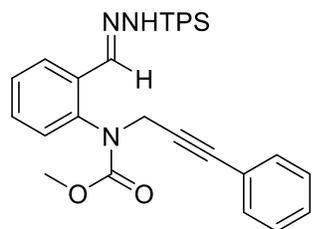
methyl (naphthalen-2-ylmethyl)(2-((2,4,6-triisopropylphenyl)

sulfonyl)hydrazono)methylphenyl)carbamate 1-l Yield: 96%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 8.04 (br, 1H), 7.83 – 7.82 (m, 1H), 7.80 – 7.79 (m, 1H), 7.76 (d, $J = 8.4$ Hz, 1H), 7.73 – 7.71 (m, 1H), 7.61 (s, 1H), 7.55 (s, 1H), 7.45 (p, $J = 7.6$ Hz, 2H), 7.34 (d, $J = 7.5$ Hz, 1H), 7.24 – 7.20 (m, 2H), 7.17 (s, 2H), 6.84 (br, 1H), 5.09 (d, $J = 14.6$ Hz, 1H), 4.59 (d, $J = 14.6$ Hz, 1H), 4.23 (hept, $J = 6.6$ Hz, 2H), 3.55 (br, 3H), 2.89 (hept, $J = 6.9$ Hz, 1H), 1.27 (d, $J = 6.6$ Hz, 12H), 1.24 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.53, 153.38, 151.32, 141.58, 139.98, 134.01, 133.12, 132.83, 131.40, 131.00, 130.56, 128.77, 128.40, 128.03, 127.84, 127.66, 126.66, 126.25, 126.14, 123.81, 54.99, 53.34, 34.16, 29.99, 24.84, 23.52. IR (neat, cm^{-1}): 3169.11, 2956.97, 2867.76, 2359.96, 1679.88, 1600.27, 1152.06, 751.50. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{35}\text{H}_{42}\text{N}_3\text{O}_4\text{S}^+$: 600.2891, found 600.2891.



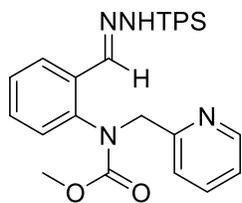
methyl (2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)(4-vinylbenzyl)carbamate 1-m

Yield: 85%. Hexanes/ethyl acetate = 4/1. ^1H NMR (500 MHz, CDCl_3) δ 7.90 (s, 1H), 7.82 (dd, $J = 7.7, 1.7$ Hz, 1H), 7.50 (s, 1H), 7.30 (d, $J = 8.0$ Hz, 2H), 7.27 – 7.22 (m, 2H), 7.17 (s, 2H), 7.11 (d, $J = 7.7$ Hz, 2H), 6.88 (d, $J = 7.5$ Hz, 1H), 6.67 (dd, $J = 17.6, 10.9$ Hz, 1H), 5.72 (d, $J = 17.6$ Hz, 1H), 5.25 (d, $J = 10.9$ Hz, 1H), 4.82 (d, $J = 14.5$ Hz, 1H), 4.51 (d, $J = 14.5$ Hz, 1H), 4.23 (hept, $J = 6.7$ Hz, 2H), 3.53 (br, 3H), 2.89 (hept, $J = 6.9$ Hz, 1H), 1.28 (d, $J = 6.7$ Hz, 12H), 1.24 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.37, 153.40, 151.79, 151.33, 141.65, 139.99, 137.26, 136.20, 131.37, 131.03, 130.60, 129.23, 128.73, 126.66, 126.37, 123.99, 123.81, 114.27, 54.58, 53.28, 34.16, 29.99, 24.85, 23.52. IR (neat, cm^{-1}): 3182.58, 2959.56, 2869.56, 1682.03, 1456.25, 1384.34, 1265.36, 742.69. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{33}\text{H}_{42}\text{N}_3\text{O}_4\text{S}^+$: 576.2891, found 576.2895.



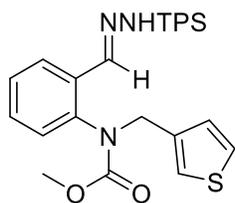
methyl (3-phenylprop-2-yn-1-yl)(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-n

Yield: 76%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 8.50 (s, 1H), 7.99 (s, 1H), 7.94 (d, $J = 7.4$ Hz, 1H), 7.40 (t, $J = 7.5$ Hz, 1H), 7.33 – 7.28 (m, 5H), 7.23 (d, $J = 6.5$ Hz, 2H), 7.18 (s, 2H), 4.60 (s, 2H), 4.27 (hept, $J = 6.7$ Hz, 2H), 3.56 (s, 3H), 2.91 (hept, $J = 6.9$ Hz, 1H), 1.29 (d, $J = 6.7$ Hz, 12H), 1.26 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (150 MHz, CDCl_3) δ 155.83, 153.36, 151.34, 141.74, 139.40, 131.70, 131.51, 130.78, 128.48, 128.39, 128.32, 128.27, 126.54, 123.83, 122.16, 85.33, 83.48, 53.52, 41.22, 34.18, 30.02, 24.82, 23.53. IR (neat, cm^{-1}): 3188.68, 2960.16, 2868.25, 1682.88, 1600.66, 1454.10, 1280.56, 1167.12, 755.85. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{33}\text{H}_{40}\text{N}_3\text{O}_4\text{S}^+$: 574.2734, found 574.2732.



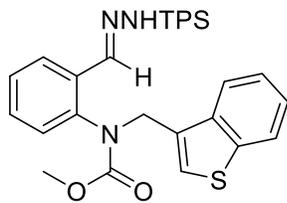
methyl (pyridin-2-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)

hydrazono)methylphenyl)carbamate 1-o Yield: 76%. Hexanes/ethyl acetate = 2/1. ¹H NMR (600 MHz, CDCl₃) δ 8.48 (s, 1H), 8.33 (s, 1H), 7.89 (s, 1H), 7.81 (d, *J* = 7.8 Hz, 1H), 7.57 (td, *J* = 7.7, 1.4 Hz, 1H), 7.28 (t, *J* = 7.6 Hz, 1H), 7.21 (t, *J* = 7.6 Hz, 2H), 7.17 (s, 2H), 7.13 – 7.08 (m, 2H), 4.86 (br, 2H), 4.27 (hept, *J* = 6.7 Hz, 2H), 3.55 (s, 3H), 2.89 (hept, *J* = 6.9 Hz, 1H), 1.29 (d, *J* = 6.7 Hz, 12H), 1.25 (d, *J* = 6.9 Hz, 6H). ¹³C NMR (150 MHz, CDCl₃) δ 156.30, 153.31, 151.31, 149.35, 142.27, 140.43, 136.62, 131.53, 131.26, 130.63, 128.09, 127.73, 126.56, 123.80, 123.68, 122.98, 122.65, 56.27, 53.34, 34.17, 30.00, 24.88, 23.53. IR (neat, cm⁻¹): 3208.37, 2957.41, 2867.81, 2359.66, 2341.70, 1683.12, 1596.95, 1445.71, 1375.62, 1164.31, 737.28. HRMS (ESI) (M+H⁺) Calcd. for C₃₀H₃₉N₄O₄S⁺: 551.2687, found 551.2693.

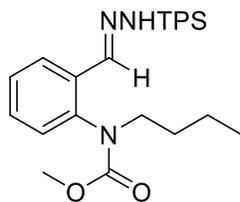


methyl (thiophen-3-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)

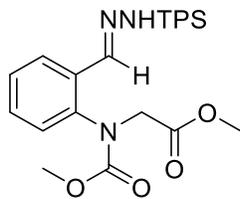
hydrazono)methylphenyl)carbamate 1-p Yield: 85%. Hexanes/ethyl acetate = 4/1. ¹H NMR (600 MHz, CDCl₃) δ 8.04 (s, 1H), 7.84 (d, *J* = 7.7 Hz, 1H), 7.39 (s, 1H), 7.31 (td, *J* = 7.6, 1.3 Hz, 1H), 7.26 – 7.24 (m, 1H), 7.21 – 7.20 (m, 1H), 7.18 (s, 2H), 7.00 – 6.92 (m, 3H), 4.73 – 4.65 (m, 2H), 4.25 (hept, *J* = 6.7 Hz, 2H), 3.53 (s, 3H), 2.90 (hept, *J* = 6.9 Hz, 1H), 1.29 (d, *J* = 6.7 Hz, 12H), 1.25 (d, *J* = 6.9 Hz, 6H). ¹³C NMR (150 MHz, CDCl₃) δ 156.12, 153.42, 151.35, 141.73, 139.99, 137.08, 131.39, 131.30, 130.75, 128.60, 128.30, 127.90, 126.53, 126.25, 124.57, 123.83, 53.24, 49.37, 34.18, 30.02, 24.89, 23.53. IR (neat, cm⁻¹): 3196.36, 2957.33, 2868.55, 1681.89, 1454.44, 1374.11, 1153.88, 768.53, 588.75. HRMS (ESI) (M+H⁺) Calcd. for C₂₉H₃₈N₃O₄S²⁺: 556.2298, found 556.2301.



methyl (benzo[*b*]thiophen-3-ylmethyl)((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-q Yield: 80%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 7.91 (br, 1H), 7.87 – 7.86 (m, 1H), 7.72 (d, $J = 7.8$ Hz, 1H), 7.40 (p, $J = 6.5$ Hz, 2H), 7.29 – 7.26 (m, 1H), 7.22 (t, $J = 7.5$ Hz, 1H), 7.15 (s, 2H), 7.08 (br, 2H), 6.94 (s, 1H), 6.91 (d, $J = 7.3$ Hz, 1H), 5.21 (d, $J = 14.7$ Hz, 1H), 4.82 (d, $J = 14.7$ Hz, 1H), 4.14 (hept, $J = 6.7$ Hz, 2H), 3.54 (br, 3H), 2.88 (hept, $J = 6.9$ Hz, 1H), 1.28 – 1.23 (m, 18H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.25, 153.32, 151.27, 141.60, 140.33, 139.41, 138.01, 131.55, 131.36, 131.01, 130.62, 128.67, 127.94, 127.09, 126.35, 124.58, 124.41, 123.75, 123.11, 122.07, 53.35, 47.86, 34.13, 29.93, 24.85, 23.50. IR (neat, cm^{-1}): 3170.74, 2959.60, 2869.98, 1714.25, 1687.55, 1521.47, 1504.90, 1122.65, 944.15, 738.86. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{33}\text{H}_{40}\text{N}_3\text{O}_4\text{S}_2^+$: 606.2455, found 606.2456.

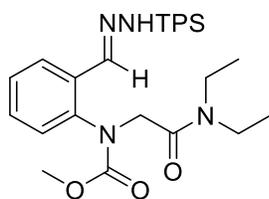


methyl butyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-r Yield: 67%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 8.91 (s, 1H), 7.90 (d, $J = 8.0$ Hz, 1H), 7.88 (s, 1H), 7.37 – 7.35 (m, 1H), 7.28 – 7.26 (m, 1H), 7.18 (s, 2H), 7.10 (d, $J = 7.8$ Hz, 1H), 4.30 (hept, $J = 6.7$ Hz, 2H), 3.67 (br, 1H), 3.54 (s, 3H), 3.41 (br, 1H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.48 – 1.43 (m, 2H), 1.30 (d, $J = 6.7$ Hz, 12H), 1.29 – 1.27 (m, 2H), 1.25 (d, $J = 6.9$ Hz, 6H), 0.84 (t, $J = 7.4$ Hz, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 156.18, 153.30, 151.27, 141.28, 140.26, 131.56, 131.18, 130.61, 128.50, 127.69, 126.48, 123.79, 53.14, 51.01, 34.17, 29.98, 29.78, 24.87, 23.52, 19.92, 13.68. IR (neat, cm^{-1}): 3155.25, 2956.43, 2868.74, 2359.98, 2342.85, 1682.72, 1601.37, 1456.82, 1315.52, 1152.59, 555.64. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{28}\text{H}_{42}\text{N}_3\text{O}_4\text{S}^+$: 516.2891, found 516.2898.



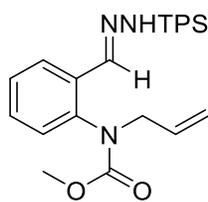
methyl *N*-(methoxycarbonyl)-*N*-(2-((2-((2,4,6-triisopropylphenyl) sulfonyl)

hydrazone)methyl)phenyl)glycinate 1-s Yield: 90%. Hexanes/ethyl acetate = 3/1. ¹H NMR (600 MHz, CDCl₃) δ 8.34(s, 1H), 8.17 (s, 1H), 7.88 (d, *J* = 7.8 Hz, 1H), 7.35 (td, *J* = 7.5, 1.1 Hz, 1H), 7.28 – 7.24 (m, 2H), 7.18 (s, 2H), 4.31 – 4.18 (m, 3H), 3.78 (d, *J* = 11.2 Hz, 1H), 3.70 (s, 3H), 3.56 (s, 3H), 2.89 (hept, *J* = 6.9 Hz, 1H), 1.30 (d, *J* = 6.7 Hz, 12H), 1.24 (d, *J* = 6.9 Hz, 6H). ¹³C NMR (150 MHz, CDCl₃) δ 169.56, 156.15, 153.32, 151.30, 142.46, 140.38, 131.52, 131.32, 130.83, 128.07, 127.84, 126.70, 123.80, 53.57, 52.28, 52.24, 34.16, 30.00, 24.85, 23.52. IR (neat, cm⁻¹): 3176.72, 3057.43, 2958.72, 1752.67, 1692.37, 1599.82, 1264.81, 1165.49, 734.33, 703.22. HRMS (ESI) (M+H⁺) Calcd. for C₂₇H₃₈N₃O₆S⁺: 532.2476, found 532.2479.



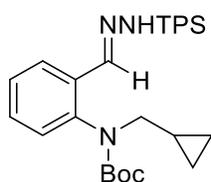
methyl (2-(diethylamino)-2-oxoethyl)(2-((2-((2,4,6-triisopropylphenyl)

sulfonyl)hydrazone)methyl)phenyl)carbamate 1-t Yield: 78%. Hexanes/ethyl acetate = 1/1. ¹H NMR (600 MHz, CDCl₃) δ 8.46 (s, 1H), 8.38 (s, 1H), 7.87 (d, *J* = 7.8 Hz, 1H), 7.38 – 7.32 (m, 2H), 7.24 – 7.23 (m, 1H), 7.17 (s, 2H), 4.36 – 4.28 (m, 4H), 3.52 (s, 3H), 3.38 – 3.30 (m, 2H), 3.26 – 3.18 (m, 2H), 2.89 (hept, *J* = 6.9 Hz, 1H), 1.30 (t, *J* = 6.7 Hz, 12H), 1.24 (d, *J* = 6.9 Hz, 6H), 1.16 (t, *J* = 7.1 Hz, 3H), 1.08 (t, *J* = 7.1 Hz, 3H). ¹³C NMR (150 MHz, CDCl₃) δ 166.43, 156.25, 153.19, 151.29, 143.43, 141.16, 131.68, 131.51, 130.64, 128.11, 127.67, 126.48, 123.76, 53.40, 52.33, 41.12, 40.67, 34.15, 29.98, 24.88, 23.52, 14.10, 12.99. IR (neat, cm⁻¹): 3159.61, 2958.54, 2869.40, 1694.41, 1651.06, 1455.46, 1153.45, 1036.92, 944.22, 757.98. HRMS (ESI) (M+H⁺) Calcd. for C₃₀H₄₅N₄O₅S⁺: 573.3105, found 573.3108.



methyl allyl(2-((2-((2,4,6-triisopropylphenyl) sulfonyl)hydrazone)methyl)phenyl)carbamate 1-u Yield: 90%. Hexanes/ethyl acetate = 5/1. ¹H NMR (500 MHz, CDCl₃) δ

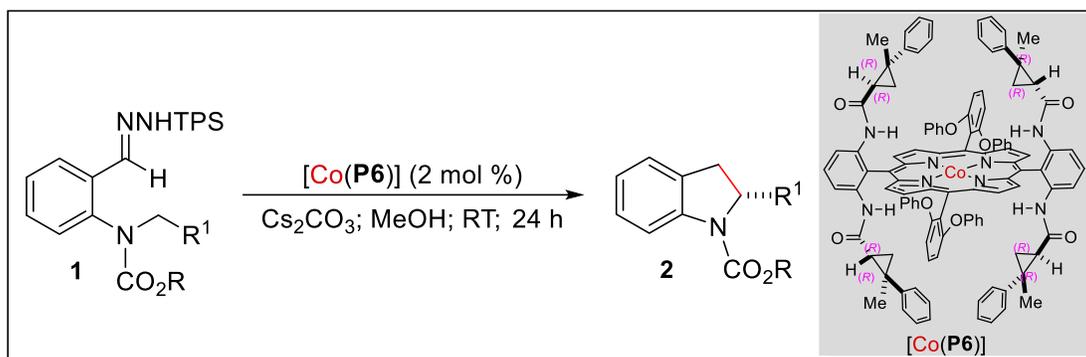
8.07 (br, 1H), 7.87 (d, $J = 7.9$ Hz, 1H), 7.76 (s, 1H), 7.35 (td, $J = 7.7, 1.6$ Hz, 1H), 7.28 – 7.25 (m, 1H), 7.18 (s, 2H), 7.09 (d, $J = 7.9$ Hz, 1H), 5.80 (ddt, $J = 16.8, 10.1, 6.6$ Hz, 1H), 5.08 – 5.02 (m, 2H), 4.30 – 4.21 (m, 3H), 4.02 (br, 1H), 3.54 (br, 3H), 2.90 (hept, $J = 6.9$ Hz, 1H), 1.30 (d, $J = 6.7$ Hz, 12H), 1.25 (d, $J = 6.9$ Hz, 6H). ^{13}C NMR (125 MHz, CDCl_3) δ 156.04, 153.37, 151.31, 141.63, 132.18, 131.48, 131.17, 130.64, 128.51, 127.82, 126.60, 124.00, 123.81, 119.20, 53.83, 53.23, 34.18, 30.00, 24.86, 23.52. IR (neat, cm^{-1}): 3146.27, 2959.08, 2869.15, 1675.25, 1601.09, 1455.41, 1376.42, 1278.58, 1058.74, 1038.32, 937.35, 751.55. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{27}\text{H}_{38}\text{N}_3\text{O}_4\text{S}^+$: 500.2578, found 500.2583.



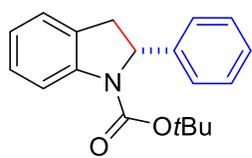
tert-butyl (cyclopropylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)

hydrazono)methylphenyl)carbamate 1-v Yield: 83%. Hexanes/ethyl acetate = 5/1. ^1H NMR (600 MHz, CDCl_3) δ 8.01 (s, 1H), 7.88 (s, 1H), 7.86 (d, $J = 7.9$ Hz, 1H), 7.34 (t, $J = 7.3$ Hz, 1H), 7.22 (t, $J = 7.6$ Hz, 1H), 7.17 (s, 2H), 7.12 (s, 1H), 4.31 – 4.25 (m, 2H), 3.37 – 3.34 (m, 2H), 2.93 – 2.86 (m, 1H), 1.48 (br, 2H), 1.30 – 1.24 (m, 25H), 0.86 (s, 1H), 0.35 and 0.29 (br, 2H), 0.10 – 0.03 (m, 1H), 0.01 – -0.05 (m, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 154.74, 153.32, 151.34, 142.51, 141.47, 131.43, 131.29, 130.41, 128.46, 127.12, 126.18, 123.78, 80.47, 54.69, 34.16, 29.99, 28.20, 24.87, 23.52, 9.90, 3.76, 3.44. IR (neat, cm^{-1}): 3163.62, 2961.96, 2867.56, 2359.83, 1670.21, 1601.26, 1154.31, 757.50, 590.96. HRMS (ESI) ($\text{M}+\text{Na}^+$) Calcd. for $\text{C}_{31}\text{H}_{45}\text{N}_3\text{NaO}_4\text{S}^+$: 578.3023, found 578.3021.

X. General Procedure for [Co(P6)]-Catalyzed Enantioselective Radical C–H Alkylation

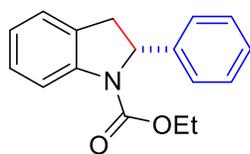


An oven-dried Schlenk tube was charged with sulfonamide **1** (0.1 mmol), [Co(P6)] (2 mol %) and Cs₂CO₃ (0.2 mmol). The Schlenk tube was then evacuated and back filled with nitrogen for 3 times. The Teflon screw cap was replaced with a rubber septum, methanol (1.0 mL) was added via a gastight syringe. The Schlenk tube was then purged with nitrogen for 30 s and the rubber septum was replaced with a Teflon screw cap. The mixture was then stirred at RT. After 24 h, the reaction mixture was filtrated through a short pad of silica gel, concentrated under vacuum and purified by flash column chromatography. The fractions containing product were collected and concentrated under vacuum to afford the desired compound **2**.



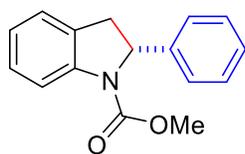
tert-butyl (R)-2-phenylindoline-1-carboxylate 2a Yield: 82%. *ee*: 66%.

Hexanes/ethyl acetate = 9/1, *R_f* = 0.50. ¹H NMR (600 MHz, CDCl₃) δ 7.93 (s, 1H), 7.28 – 7.17 (m, 6H), 7.11 (d, *J* = 7.3 Hz, 1H), 6.97 (t, *J* = 7.4 Hz, 1H), 5.36 (br, 1H), 3.66 (dd, *J* = 16.2, 10.7 Hz, 1H), 2.95 (d, *J* = 16.2 Hz, 1H), 1.30 (br, 9H). ¹³C NMR (150 MHz, CDCl₃) δ 152.34, 144.60, 143.00, 129.10, 128.47, 127.58, 127.10, 125.24, 124.75, 122.52, 114.62, 80.73, 62.58, 37.76, 28.13. IR (neat, cm⁻¹): 2977.25, 2929.13, 1693.35, 1482.59, 1387.15, 1139.31, 1015.13, 760.13, 701.62. HPLC analysis: *ee* = 66%. IA (99.7% hexanes: 0.3% isopropanol, 0.8 mL/min): *t*_{major} = 17.03 min, *t*_{minor} = 14.45 min. [α]²⁰_D = 29.6 (*c* = 0.5, CHCl₃). HRMS (ESI) (M+H⁺) Calcd. for C₁₉H₂₂NO₂⁺: 296.1645, found 296.1648.



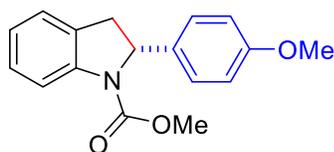
ethyl (R)-2-phenylindoline-1-carboxylate 2b Yield: 92%. *ee*: 86%.

Hexanes/ethyl acetate = 8/1, R_f = 0.55. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.91 (s, 1H), 7.28 – 7.18 (m, 6H), 7.14 (d, J = 7.3 Hz, 1H), 7.00 (t, J = 7.4 Hz, 1H), 5.43 (br, 1H), 4.13 (br, 2H), 3.70 (dd, J = 16.2, 10.6 Hz, 1H), 2.99 (d, J = 16.2 Hz, 1H), 1.08 (br, 3H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 153.28, 143.98, 129.25, 128.54, 127.67, 127.27, 125.36, 124.82, 122.88, 114.85, 62.36, 61.36, 37.84, 14.32. IR (neat, cm^{-1}): 2979.21, 2928.36, 1709.64, 1486.22, 1407.35, 1382.31, 1274.04, 1055.34, 755.99. HPLC analysis: *ee* = 86%. IA (99% hexanes: 1% isopropanol, 0.8 mL/min): t_{major} = 17.07 min, t_{minor} = 12.02 min. $[\alpha]_{\text{D}}^{20}$ = 50.8 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_2^+$: 268.1338, found 268.1342.



methyl (R)-2-phenylindoline-1-carboxylate 2c Yield: 92%. *ee*: 94%.

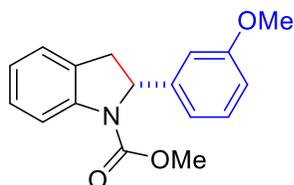
Hexanes/ethyl acetate = 8/1, R_f = 0.50. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.92 (s, 1H), 7.29 – 7.18 (m, 6H), 7.14 (d, J = 7.3 Hz, 1H), 7.00 (t, J = 7.4 Hz, 1H), 5.46 and 5.44 (br, 1H), 3.71 (dd, J = 16.2, 10.5 Hz, 1H), 3.70 (br, 3H), 2.98 (dd, J = 16.2, 2.7 Hz, 1H). $^{13}\text{C NMR}$ (125 MHz, CDCl_3) δ 153.72, 143.74, 142.55, 129.42, 128.60, 127.42, 127.30, 125.23, 124.86, 123.00, 114.88, 62.30, 52.51, 37.92. IR (neat, cm^{-1}): 2952.64, 2920.54, 1705.53, 1483.87, 1440.85, 1386.08, 1274.07, 1055.93, 753.68. HPLC analysis: *ee* = 94%. IA (99.5% hexanes: 0.5% isopropanol, 0.8 mL/min): t_{major} = 26.13 min, t_{minor} = 19.12 min. $[\alpha]_{\text{D}}^{20}$ = 52.8 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{16}\text{NO}_2^+$: 254.1176, found 254.1181.



methyl (R)-2-(4-methoxyphenyl)indoline-1-carboxylate 2d Yield:

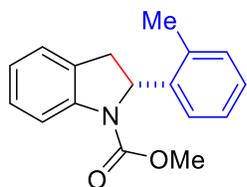
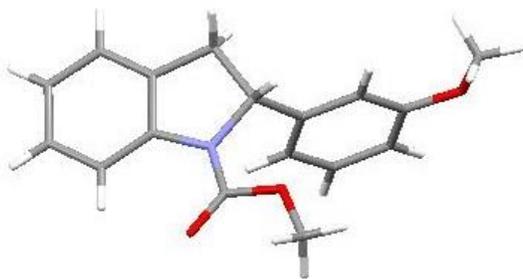
98%. *ee*: 94%. Hexanes/ethyl acetate = 5/1, R_f = 0.48. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.89 (s, 1H), 7.24 (t, J = 7.7 Hz, 1H), 7.16 – 7.12 (m, 3H), 7.01 (t, J = 7.4 Hz, 1H), 6.81 (d, J = 8.5 Hz, 2H), 5.42 and 5.40 (br, 1H), 3.77 (s, 3H), 3.71 (br, 3H), 3.69 (dd, J = 16.2, 10.4 Hz, 1H), 2.97 (dd, J = 16.2, 2.1 Hz, 1H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 158.81, 153.76, 142.51, 135.98, 129.91, 127.64,

126.56, 124.85, 122.95, 114.92, 113.92, 61.84, 55.21, 52.52, 37.93. IR (neat, cm^{-1}): 2951.72, 1704.02, 1612.04, 1512.83, 1459.71, 1247.99, 1051.36, 1025.76, 846.10, 742.09. HPLC analysis: $ee = 94\%$. IA (99% hexanes: 1% isopropanol, 1.0 mL/min): $t_{\text{major}} = 24.97$ min, $t_{\text{minor}} = 19.37$ min. $[\alpha]_{\text{D}}^{20} = 72.8$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_3^+$: 284.1281, found 284.1278.



methyl (*R*)-2-(3-methoxyphenyl)indoline-1-carboxylate 2e Yield: 98%.

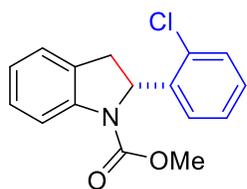
ee : 90%. Hexanes/ethyl acetate = 5/1, $R_f = 0.45$. ^1H NMR (600 MHz, CDCl_3) δ 7.91 (s, 1H), 7.26 – 7.23 (m, 1H), 7.20 (t, $J = 7.9$ Hz, 1H), 7.13 (d, $J = 7.3$ Hz, 1H), 7.00 (t, $J = 7.4$ Hz, 1H), 6.78 – 6.76 (m, 2H), 6.73 (s, 1H), 5.43 and 5.42 (br, 1H), 3.75 – 3.68 (m, 7H), 2.97 (dd, $J = 16.2, 2.7$ Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 159.77, 153.74, 145.48, 129.73, 127.69, 124.88, 123.03, 117.70, 117.48, 114.90, 113.20, 112.26, 111.26, 62.27, 55.14, 52.59, 37.93. IR (neat, cm^{-1}): 2955.13, 1701.26, 1599.57, 1483.93, 1440.81, 1385.47, 1264.11, 1134.70, 1056.34, 733.23. HPLC analysis: $ee = 90\%$. IA (99% hexanes: 1% isopropanol, 1.0 mL/min): $t_{\text{major}} = 24.61$ min, $t_{\text{minor}} = 15.78$ min. $[\alpha]_{\text{D}}^{20} = 47.2$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_3^+$: 284.1281, found 284.1282.



methyl (*R*)-2-(*o*-tolyl)indoline-1-carboxylate 2f Yield: 96%. ee : 94%.

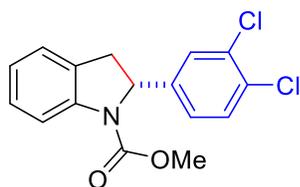
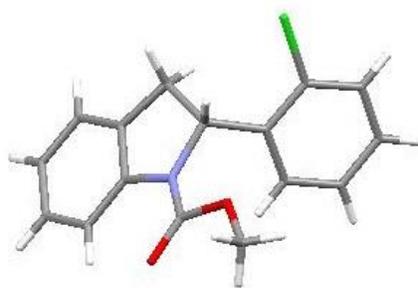
Hexanes/ethyl acetate = 6/1, $R_f = 0.5$. ^1H NMR (600 MHz, CDCl_3) δ 7.99 (s, 1H), 7.27 – 7.25 (m, 1H), 7.17 (d, $J = 7.4$ Hz, 1H), 7.14 – 7.10 (m, 2H), 7.06 (t, $J = 7.5$ Hz, 1H), 7.01 – 6.99 (m, 2H),

5.67 and 5.66 (br, 1H), 3.73 (dd, $J = 16.0, 10.6$ Hz, 1H), 3.67 (br, 3H), 2.84 (dd, $J = 16.0, 3.0$ Hz, 1H), 2.42 (s, 3H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.74, 142.81, 141.90, 133.67, 130.50, 129.33, 127.71, 126.97, 126.38, 125.07, 123.53, 123.03, 114.87, 59.16, 52.63, 37.03, 19.28. IR (neat, cm^{-1}): 2954.05, 1702.15, 1599.16, 1485.45, 1440.67, 1265.75, 1191.94, 1054.33, 737.90. HPLC analysis: $ee = 94\%$. IA (99.5% hexanes: 0.5% isopropanol, 0.8 mL/min): $t_{\text{major}} = 25.25$ min, $t_{\text{minor}} = 18.29$ min. $[\alpha]_{\text{D}}^{20} = 167.2$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{18}\text{NO}_2^+$: 268.1332, found 268.1336.



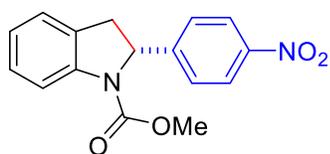
methyl (*R*)-2-(2-chlorophenyl)indoline-1-carboxylate 2g Yield: 92%. ee :

93%. Hexanes/ethyl acetate = 6/1, $R_f = 0.55$. ^1H NMR (600 MHz, CDCl_3) δ 7.99 (s, 1H), 7.39 (d, $J = 7.8$ Hz, 1H), 7.28 – 7.25 (m, 1H), 7.17 (t, $J = 7.4$ Hz, 1H), 7.15 – 7.11 (m, 2H), 7.06 (d, $J = 7.6$ Hz, 1H), 7.01 (t, $J = 7.4$ Hz, 1H), 5.86 and 5.84 (br, 1H), 3.79 (dd, $J = 16.3, 10.5$ Hz, 1H), 3.69 (s, 3H), 2.89 (dd, $J = 16.3, 2.3$ Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.60, 142.64, 140.88, 131.50, 129.73, 129.00, 128.22, 127.75, 127.10, 125.29, 125.08, 123.23, 114.93, 59.53, 52.70, 36.92. IR (neat, cm^{-1}): 2954.71, 1701.97, 1601.19, 1484.01, 1439.31, 1385.42, 1056.01, 744.34, 628.11. HPLC analysis: $ee = 93\%$. IA (99% hexanes: 1% isopropanol, 0.8 mL/min): $t_{\text{major}} = 15.71$ min, $t_{\text{minor}} = 12.04$ min. $[\alpha]_{\text{D}}^{20} = 77.6$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{15}\text{ClNO}_2^+$: 288.0786, found 288.0792.



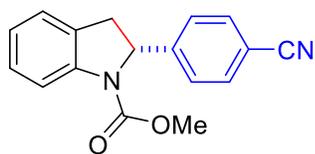
methyl (*R*)-2-(3,4-dichlorophenyl)indoline-1-carboxylate 2h Yield:

85%. *ee*: 96%. Hexanes/ethyl acetate = 6/1, R_f = 0.55. ^1H NMR (600 MHz, CDCl_3) δ 7.91 (s, 1H), 7.35 (d, J = 8.3 Hz, 1H), 7.29 – 7.25 (m, 2H), 7.15 (d, J = 7.3 Hz, 1H), 7.03 (t, J = 7.4 Hz, 2H), 5.40 and 5.38 (br, 1H), 3.73 (dd, J = 16.3, 10.6 Hz, 1H), 3.71 (br, 3H), 2.93 (dd, J = 16.3, 3.0 Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.44, 143.98, 132.69, 131.36, 130.72, 127.98, 127.46, 124.98, 124.71, 123.36, 115.00, 61.38, 52.77, 37.73. IR (neat, cm^{-1}): 2953.91, 1705.31, 1601.07, 1484.60, 1441.48, 1383.34, 1274.30, 1057.23, 1030.58, 738.80. HPLC analysis: *ee* = 96%. IB (99.5% hexanes: 0.5% isopropanol, 0.8 mL/min): t_{major} = 18.57 min, t_{minor} = 23.24 min. $[\alpha]_D^{20}$ = 58.0 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{14}\text{Cl}_2\text{NO}_2^+$: 322.0396, found 322.0393.



methyl (*R*)-2-(4-nitrophenyl)indoline-1-carboxylate 2i Yield: 96%.

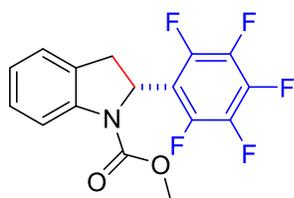
ee: 87%. Hexanes/ethyl acetate = 4/1, R_f = 0.38. ^1H NMR (600 MHz, CDCl_3) δ 8.16 (d, J = 8.6 Hz, 2H), 7.95 (br, 1H), 7.37 (d, J = 7.8 Hz, 2H), 7.28 (t, J = 7.8 Hz, 1H), 7.16 (d, J = 7.3 Hz, 1H), 7.04 (t, J = 7.5 Hz, 1H), 5.55 and 5.53 (br, 1H), 3.77 (dd, J = 16.3, 10.7 Hz, 1H), 3.71 (br, 3H), 2.95 (dd, J = 16.3, 3.0 Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 150.86, 147.28, 128.10, 126.20, 125.03, 124.13, 123.49, 115.00, 61.78, 52.82, 37.60. IR (neat, cm^{-1}): 2961.51, 2940.10, 1714.04, 1595.41, 1509.88, 1483.70, 1382.51, 1141.76, 1055.66, 762.06. HPLC analysis: *ee* = 87%. IA (98% hexanes: 2% isopropanol, 1.0 mL/min): t_{major} = 27.95 min, t_{minor} = 34.67 min. $[\alpha]_D^{20}$ = 43.2 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{15}\text{N}_2\text{O}_4^+$: 299.1026, found 299.1026.



methyl (*R*)-2-(4-cyanophenyl)indoline-1-carboxylate 2j Yield: 97%.

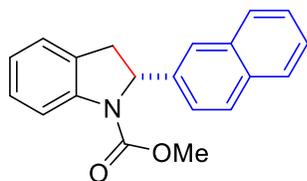
ee: 94%. Hexanes/ethyl acetate = 4/1, R_f = 0.40. ^1H NMR (600 MHz, CDCl_3) δ 7.94 (s, 1H), 7.59 (d, J = 8.2 Hz, 2H), 7.31 – 7.25 (m, 3H), 7.15 (d, J = 7.3 Hz, 1H), 7.03 (t, J = 7.4 Hz, 1H), 5.49 and 5.48 (br, 1H), 3.75 (dd, J = 16.3, 10.7 Hz, 1H), 3.71 (br, 3H), 2.93 (dd, J = 16.3, 3.0 Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.47, 148.89, 132.64, 128.57, 128.03, 126.09, 125.00, 123.42, 118.63, 114.96, 111.34, 61.96, 52.77, 37.63. IR (neat, cm^{-1}): 2954.50, 2228.06, 1701.14, 1607.61, 1483.90, 1463.55, 1384.31, 1272.02, 1055.25, 749.31. HPLC analysis: *ee* = 94%. IA (98% hexanes:

2% isopropanol, 1.0 mL/min): $t_{major} = 28.18$ min, $t_{minor} = 32.55$ min. $[\alpha]^{20}_D = 114.4$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{17}\text{H}_{15}\text{N}_2\text{O}_2^+$: 279.1128, found 279.1132.



methyl (*R*)-2-(perfluorophenyl)indoline-1-carboxylate 2k Yield: 90%.

ee: 95%. Hexanes/ethyl acetate = 7/1, $R_f = 0.6$. ^1H NMR (600 MHz, CDCl_3) δ 7.89 and 7.51 (br, 1H), 7.26 – 7.24 (m, 1H), 7.17 (d, $J = 7.4$ Hz, 1H), 7.04 (t, $J = 7.4$ Hz, 1H), 5.81 (br, 1H), 3.85 (br, 3H), 3.76 (dd, $J = 16.5, 11.4$ Hz, 1H), 3.12 (dd, $J = 16.5, 4.8$ Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 152.80, 144.97 (md, $J = 253.6$ Hz), 141.89, 140.94, 140.59 (md, $J = 254.0$ Hz), 137.51 (md, $J = 251.4$ Hz), 128.46, 127.92, 124.14, 123.26, 116.47, 52.84, 35.78, 35.20. IR (neat, cm^{-1}): 2961.76, 1713.96, 1503.70, 1484.98, 1602.15, 1442.06, 1387.29, 1282.30, 1193.43, 1123.53, 1011.90, 752.80. HPLC analysis: *ee* = 95%. IA (99.5% hexanes: 0.5% isopropanol, 0.8 mL/min): $t_{major} = 33.47$ min, $t_{minor} = 14.21$ min. $[\alpha]^{20}_D = -54.4$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{16}\text{H}_{11}\text{F}_5\text{NO}_2^+$: 344.0704, found 344.0708.



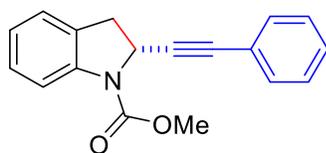
methyl (*R*)-2-(naphthalen-2-yl)indoline-1-carboxylate 2l Yield: 90%.

ee: 94%. Hexanes/ethyl acetate = 7/1, $R_f = 0.58$. ^1H NMR (600 MHz, CDCl_3) δ 7.99 (s, 1H), 7.80 – 7.77 (m, 3H), 7.64 (br, 1H), 7.46 – 7.43 (m, 2H), 7.31 – 7.28 (m, 2H), 7.16 (d, $J = 7.2$ Hz, 1H), 7.03 (td, $J = 7.5, 0.7$ Hz, 1H), 5.63 and 5.62 (br, 1H), 3.78 (dd, $J = 16.3, 10.6$ Hz, 1H), 3.68 (s, 3H), 3.05 (dd, $J = 16.3, 2.5$ Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.82, 141.06, 133.28, 132.79, 128.72, 127.92, 127.77, 127.61, 126.14, 125.74, 124.94, 123.77, 123.52, 123.10, 114.95, 62.48, 52.60, 37.99. IR (neat, cm^{-1}): 2917.63, 2849.15, 1701.58, 1598.18, 1485.44, 1440.01, 1274.59, 1152.34, 1054.00, 748.53. HPLC analysis: *ee* = 94%. IA (99% hexanes: 1% isopropanol, 0.8 mL/min): $t_{major} = 27.96$ min, $t_{minor} = 20.63$ min. $[\alpha]^{20}_D = 83.2$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{20}\text{H}_{18}\text{NO}_2^+$: 304.1332, found 304.1337.



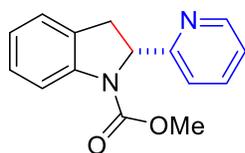
methyl (R)-2-(4-vinylphenyl)indoline-1-carboxylate 2m Yield: 57%. *ee*:

95%. Hexanes/ethyl acetate = 6/1, R_f = 0.50. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.92 (s, 1H), 7.32 (d, J = 8.1 Hz, 2H), 7.26 – 7.24 (m, 1H), 7.15 – 7.10 (m, 3H), 7.01 (t, J = 7.4 Hz, 1H), 6.67 (dd, J = 17.6, 10.9 Hz, 1H), 5.70 (d, J = 17.6 Hz, 1H), 5.45 and 5.43 (br, 1H), 5.21 (d, J = 10.9 Hz, 1H), 3.72 (br, 3H), 3.71 (dd, J = 16.1, 10.4 Hz, 1H), 2.97 (dd, J = 16.2, 2.6 Hz, 1H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 153.70, 145.14, 143.34, 136.76, 136.38, 128.06, 127.72, 126.50, 125.48, 124.89, 123.04, 114.91, 113.74, 62.12, 52.57, 37.94. IR (neat, cm^{-1}): 2952.07, 1705.42, 1483.20, 1439.26, 1382.70, 1271.60, 1136.01, 1053.63, 733.20. HPLC analysis: *ee* = 95%. IA (99.5% hexanes: 0.5% isopropanol, 0.8 mL/min): t_{major} = 30.74 min, t_{minor} = 22.49 min. $[\alpha]_D^{20}$ = 40.8 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{18}\text{H}_{18}\text{NO}_2^+$: 280.1332, found 280.1336.



methyl (R)-2-(phenylethynyl)indoline-1-carboxylate 2n Yield: 50%.

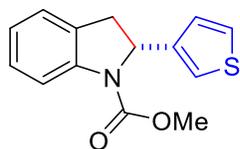
ee: 87%. Hexanes/ethyl acetate = 7/1, R_f = 0.60. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.82 (s, 1H), 7.38 (d, J = 7.6 Hz, 2H), 7.30 – 7.19 (m, 5H), 7.01 (t, J = 7.4 Hz, 1H), 5.35 and 5.33 (br, 1H), 3.91 (s, 3H), 3.58 (dd, J = 15.9, 10.2 Hz, 1H), 3.27 (dd, J = 15.9, 2.1 Hz, 1H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 153.38, 141.12, 131.77, 129.13, 128.31, 128.15, 127.76, 124.78, 122.96, 122.56, 115.21, 88.74, 82.65, 52.83, 50.74, 36.47. IR (neat, cm^{-1}): 2916.84, 2848.92, 1708.75, 1598.12, 1485.02, 1441.52, 1385.53, 1269.92, 1192.02, 1130.13, 1056.18, 755.55, 691.55. HPLC analysis: *ee* = 87%. IC (99% hexanes: 1% isopropanol, 0.8 mL/min): t_{major} = 30.67 min, t_{minor} = 34.95 min. $[\alpha]_D^{20}$ = 18.0 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{18}\text{H}_{16}\text{NO}_2^+$: 278.1176, found 278.1180.



methyl (R)-2-(pyridin-2-yl)indoline-1-carboxylate 2o Yield: 93%. *ee*: 90%.

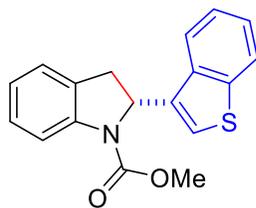
Hexanes/ethyl acetate = 2/1, R_f = 0.40. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 8.57 (d, J = 4.7 Hz, 1H), 7.97 (s, 1H), 7.59 (t, J = 7.7 Hz, 1H), 7.26 – 7.23 (m, 1H), 7.16 – 7.12 (m, 3H), 7.00 (t, J = 7.4 Hz, 1H), 5.60 and 5.58 (br, 1H), 3.74 (dd, J = 16.1, 10.9 Hz, 1H), 3.69 (s, 3H), 3.14 and 3.12 (br, 1H).

^{13}C NMR (150 MHz, CDCl_3) δ 162.18, 153.83, 149.53, 136.90, 129.08, 127.68, 124.93, 123.20, 122.21, 118.94, 118.83, 115.00, 63.64, 52.65, 36.55. IR (neat, cm^{-1}): 2922.76, 1709.13, 1591.33, 1484.77, 1465.88, 1265.66, 1058.53, 738.98. HPLC analysis: $ee = 90\%$. IC (95% hexanes: 5% isopropanol, 1.0 mL/min): $t_{\text{major}} = 36.35$ min, $t_{\text{minor}} = 29.75$ min. $[\alpha]_{\text{D}}^{20} = 130.4$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{15}\text{H}_{15}\text{N}_2\text{O}_2^+$: 255.1128, found 255.1133.



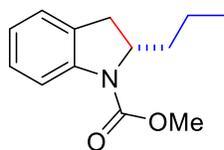
methyl (*R*)-2-(thiophen-3-yl)indoline-1-carboxylate 2p Yield: 97%. ee : 94%.

Hexanes/ethyl acetate = 6/1, $R_f = 0.60$. ^1H NMR (600 MHz, CDCl_3) δ 7.86 (br, 1H), 7.25 – 7.21 (m, 2H), 7.17 (d, $J = 7.4$ Hz, 1H), 7.08 (br, 1H), 7.01 (t, $J = 7.4$ Hz, 1H), 6.90 (d, $J = 4.7$ Hz, 1H), 5.58 and 5.57 (br, 1H), 3.77 (br, 3H), 3.64 (dd, $J = 16.0, 10.1$ Hz, 1H), 3.01 (dd, $J = 16.0, 2.1$ Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.76, 144.00, 141.89, 129.65, 127.68, 126.15, 125.36, 124.85, 123.02, 120.64, 115.19, 58.36, 52.56, 36.96. IR (neat, cm^{-1}): 2952.85, 1700.19, 1601.40, 1482.94, 1440.10, 1382.32, 1273.15, 1054.83, 736.24. HPLC analysis: $ee = 94\%$. IA (99.5% hexanes: 0.5% isopropanol, 0.8 mL/min): $t_{\text{major}} = 34.25$ min, $t_{\text{minor}} = 23.41$ min. $[\alpha]_{\text{D}}^{20} = 63.2$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{14}\text{H}_{14}\text{NO}_2\text{S}^+$: 260.0740, found 260.0741.



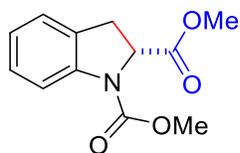
methyl (*R*)-2-(benzo[*b*]thiophen-3-yl)indoline-1-carboxylate 2q Yield:

97%. ee : 94%. Hexanes/ethyl acetate = 6/1, $R_f = 0.40$. ^1H NMR (600 MHz, CDCl_3) δ 7.95 (s, 1H), 7.86 (d, $J = 6.9$ Hz, 1H), 7.69 (d, $J = 6.9$ Hz, 1H), 7.38 – 7.36 (m, 2H), 7.28 (t, $J = 7.6$ Hz, 1H), 7.13 (d, $J = 7.3$ Hz, 1H), 7.10 (s, 1H), 7.02 (t, $J = 7.4$ Hz, 1H), 5.89 and 5.87 (br, 1H), 3.75 (dd, $J = 16.0, 10.4$ Hz, 1H), 3.73 (br, 3H), 3.07 (dd, $J = 16.0, 2.4$ Hz, 1H). ^{13}C NMR (150 MHz, CDCl_3) δ 153.73, 141.16, 137.54, 136.61, 127.81, 125.07, 124.41, 124.10, 123.21, 123.12, 121.53, 121.31, 115.21, 58.03, 52.70, 36.15. IR (neat, cm^{-1}): 2917.57, 2849.54, 1706.67, 1600.89, 1484.33, 1441.52, 1388.37, 1273.64, 761.73. HPLC analysis: $ee = 92\%$. IA (99% hexanes: 1% isopropanol, 0.8 mL/min): $t_{\text{major}} = 27.22$ min, $t_{\text{minor}} = 21.61$ min. $[\alpha]_{\text{D}}^{20} = 127.2$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{18}\text{H}_{16}\text{NO}_2\text{S}^+$: 310.0896, found 310.0896.



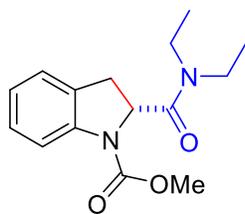
methyl (S)-2-propylindoline-1-carboxylate 2r Yield: 65%. *ee*: 87%.

Hexanes/ethyl acetate = 6/1, R_f = 0.65. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.78 (br, 1H), 7.17 (t, J = 7.7 Hz, 1H), 7.14 (d, J = 7.4 Hz, 1H), 6.96 (t, J = 7.4 Hz, 1H), 4.45 (br, 1H), 3.84 (s, 3H), 3.29 (dd, J = 16.0, 9.5 Hz, 1H), 2.75 (d, J = 16.0 Hz, 1H), 1.71 (br, 1H), 1.54 – 1.52 (m, 1H), 1.35 – 1.31 (m, 2H), 0.92 (t, J = 7.3 Hz, 3H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 153.77, 130.42, 127.33, 124.83, 124.66, 122.68, 115.34, 59.33, 52.42, 36.75, 33.42, 18.10, 13.98. IR (neat, cm^{-1}): 2956.18, 2871.65, 2359.34, 2341.70, 1711.07, 1602.79, 1487.15, 1443.56, 1393.64, 1291.74, 765.20. HPLC analysis: *ee* = 87%. IA (99.8% hexanes: 0.2% isopropanol, 0.8 mL/min): t_{major} = 25.18 min, t_{minor} = 18.77 min. $[\alpha]_D^{20}$ = 27.2 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{13}\text{H}_{18}\text{NO}_2^+$: 220.1332, found 220.1332.



dimethyl (R)-indoline-1,2-dicarboxylate 2s Yield: 49%. *ee*: 81%.

Hexanes/ethyl acetate = 5/1, R_f = 0.35. $^1\text{H NMR}$ (600 MHz, CDCl_3) δ 7.92 and 7.51 (s, br, 1H), 7.22 (br, 1H), 7.13 (d, J = 7.4 Hz, 1H), 6.98 (t, J = 7.4 Hz, 1H), 4.94 (br, 1H), 3.93 and 3.80 (br, 3H), 3.75 (s, 3H), 3.58 – 3.53 (m, 1H), 3.15 (d, J = 16.4 Hz, 1H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) δ 172.06, 152.93, 142.21, 127.98, 124.78, 124.36, 122.99, 114.79, 59.99, 52.76, 52.53, 32.96 and 32.11 (a pair of s). IR (neat, cm^{-1}): 2956.69, 1749.89, 1698.64, 1484.85, 1433.36, 1049.66, 1001.19, 751.73. HPLC analysis: *ee* = 81%. IA (95% hexanes: 5% isopropanol, 0.8 mL/min): t_{major} = 17.40 min, t_{minor} = 13.67 min. $[\alpha]_D^{20}$ = 20.0 (c = 0.5, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{12}\text{H}_{14}\text{NO}_4^+$: 236.0917, found 236.0925.



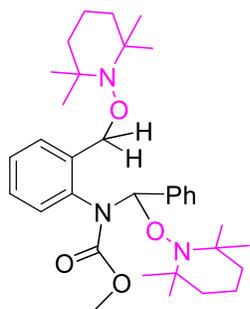
methyl (R)-2-(diethylcarbamoyl)indoline-1-carboxylate 2t Yield: 92%. *ee*:

68%. Hexanes/ethyl acetate = 1/1, R_f = 0.35. $^1\text{H NMR}$ (500 MHz, CDCl_3) δ 7.93 and 7.51 (d, J = 6.5 Hz, 1H), 7.20 – 7.16 (m, 1H), 7.09 (d, J = 7.1 Hz, 1H), 6.95 – 6.93 (m, 1H), 5.18 and 5.09 (d,

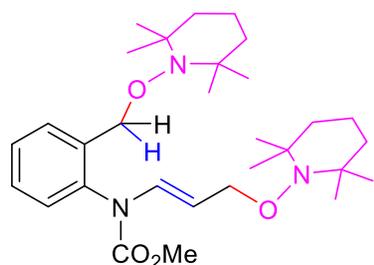
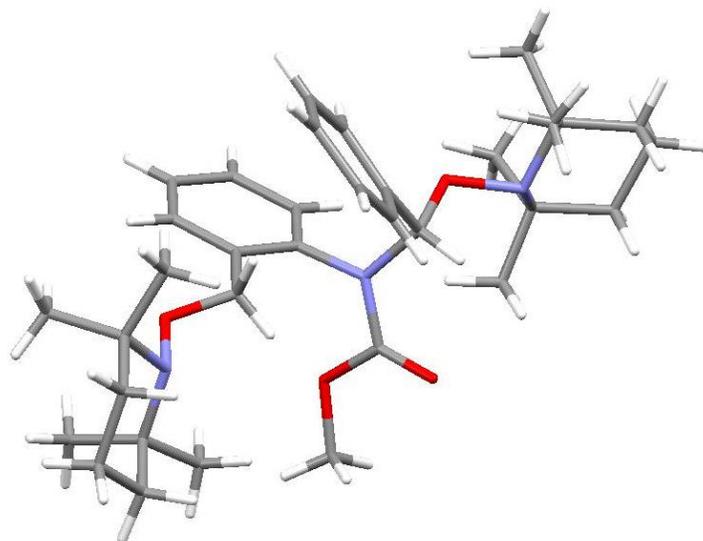
$J = 8.4$ Hz, 1H), 3.90 (s, 1H), 3.75 – 3.34 (m, 7H), 3.01 (d, $J = 11.4$ Hz, 1H), 1.33 – 1.25 (m, 3H), 1.13 (t, $J = 7.1$ Hz, 3H). ^{13}C NMR (150 MHz, CDCl_3) major rotamer: δ 170.42, 152.80, 143.04, 128.95, 127.89, 124.27, 122.60, 114.66, 57.94, 52.43, 41.58, 40.71, 33.43, 14.44, 12.91. IR (neat, cm^{-1}): 2976.38, 2936.18, 1715.66, 1652.06, 1488.71, 1445.25, 1392.19, 1266.04, 1138.22, 1063.88, 740.66. HPLC analysis: $ee = 68\%$. IA (92% hexanes: 8% isopropanol, 0.8 mL/min): $t_{\text{major}} = 38.78$ min, $t_{\text{minor}} = 36.22$ min. $[\alpha]_{\text{D}}^{20} = 91.6$ ($c = 0.5$, CHCl_3). HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{15}\text{H}_{21}\text{N}_2\text{O}_3^+$: 277.1547, found 277.1550.

XI. General Procedure for TEMPO Trapping Reactions

An oven-dried Schlenk tube was charged with 1.0 equivalent of sulfonyl hydrazone **1** (0.1 mmol), [Co(Por)] (2 mol %) and Cs₂CO₃ (0.2 mmol). The Schlenk tube was then evacuated and back filled with nitrogen for 3 times. The Teflon screw cap was replaced with a rubber septum, TEMPO (2.5 equiv.) was added under nitrogen flow and methanol (1.0 mL) was added via a gastight syringe. The Schlenk tube was then purged with nitrogen for 10 s and the rubber septum was replaced with a Teflon screw cap. The mixture was then stirred at RT or 40 °C. After 24 h, the reaction mixture was filtrated through a short pad of silica, concentrated under vacuum and purified by flash column chromatography. The fractions containing product were collected and concentrated under vacuum to afford the desired compound.



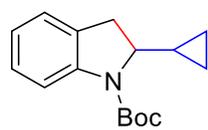
methyl (phenyl((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3c Yield: 90%. *ee*: 93%. Hexanes/ethyl acetate = 8/1, *R_f* = 0.70. ¹H NMR (600 MHz, CDCl₃) δ 7.83 (d, *J* = 7.6 Hz, 1H), 7.41 (d, *J* = 7.3 Hz, 1H), 7.32 – 7.28 (m, 2H), 7.17 (s, 1H), 7.08 – 7.05 (m, 5H), 4.30 (d, *J* = 13.7 Hz, 1H), 3.66 (d, *J* = 13.7 Hz, 1H), 3.87 and 3.64 (s, 3H), 1.65 – 1.34 (m, 18H), 1.12 – 1.01 (m, 12H), 0.89 – 0.77 (m, 6H). ¹³C NMR (150 MHz, CDCl₃) δ 155.40, 138.01, 137.54, 133.91, 128.13, 127.83, 126.97, 126.81, 126.51, 125.80, 125.48, 93.20, 72.79, 60.11, 59.31, 59.13, 52.60, 39.91, 39.64, 39.05, 32.98, 32.63, 32.49, 31.87, 20.17, 19.85, 19.53, 16.49. IR (neat, cm⁻¹): 2974.31, 2932.90, 1711.46, 1439.23, 1301.16, 1026.18, 732.55, 700.86. HPLC analysis: *ee* = 93%. IA (99.7% hexanes: 0.3% isopropanol, 0.8 mL/min): *t_{major}* = 8.05 min, *t_{minor}* = 9.15 min. [α]_D²⁰ = -116.4 (*c* = 0.5, CHCl₃). HRMS (ESI) (M+H⁺) Calcd. for C₃₄H₅₂N₃O₄⁺: 566.3952, found 566.3959.



methyl (2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)

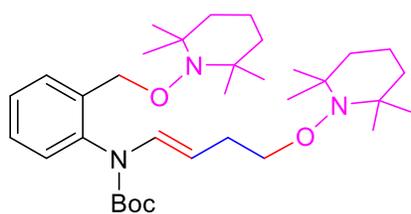
phenyl)(3-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)prop-1-en-1-yl)carbamate 3u Yield: 72%.

Hexanes/ethyl acetate = 8/1, $R_f = 0.70$. $^1\text{H NMR}$ (600 MHz, CDCl_3) (Contains both E/Z isomers of enamine) δ 7.67 and 7.62 (d, $J = 7.6$ Hz, 1H), 7.44 – 7.29 (m, 2.5 H), 7.18 and 7.12 (d, $J = 7.6$ Hz, and d, $J = 6.6$ Hz, 1H), 6.75 (br, 0.5 H), 4.82 – 4.78 (m, 0.5 H), 4.79 – 4.68 (m, 2H), 4.41 – 4.37 (m, 0.5 H), 4.17 (br, 1H), 3.67 (br, 3H), 3.47 (br, 1H), 1.61 – 0.86 (m, 36H). $^{13}\text{C NMR}$ (150 MHz, CDCl_3) (Contains both E/Z isomers of enamine) δ 154.29, 136.83, 136.34, 136.12, 134.86, 131.00, 128.65, 128.48, 128.37, 128.20, 128.12, 128.02, 127.92, 127.65, 125.07, 109.41, 106.26, 75.54, 73.98, 73.94, 71.71, 59.69, 59.62, 59.26, 58.90, 53.11, 53.06, 39.37, 39.28, 39.16, 32.64, 32.56, 32.45, 29.37, 20.03, 19.82, 19.60, 16.81, 16.76. IR (neat, cm^{-1}): 2977.25, 2930.79, 1715.52, 1661.25, 1442.54, 1314.88, 1215.86, 766.94. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{30}\text{H}_{50}\text{N}_3\text{O}_4^+$: 516.3796, found 516.3807.



***tert*-butyl 2-cyclopropylindoline-1-carboxylate 2v** Yield: 50%. Hexanes/ethyl

acetate = 8/1, R_f = 0.60. ^1H NMR (500 MHz, CDCl_3) δ 7.68 (s, 1H), 7.18 – 7.14 (m, 2H), 6.94 (t, J = 7.4 Hz, 1H), 4.00 (br, 1H), 3.29 (dd, J = 15.8, 9.4 Hz, 1H), 2.79 (d, J = 15.8 Hz, 1H), 1.57 (s, 9H), 1.10 – 1.04 (m, 1H), 0.65 – 0.60 (m, 1H), 0.53 – 0.48 (m, 1H), 0.44 – 0.38 (m, 1H), 0.23 – 0.18 (m, 1H). ^{13}C NMR (125 MHz, CDCl_3) δ 152.78, 142.28, 130.63, 127.20, 124.67, 122.32, 115.62, 80.67, 62.93, 34.14, 28.49, 16.43, 4.22, 1.29. IR (neat, cm^{-1}): 2976.54, 1695.12, 1603.06, 1482.27, 1387.98, 1167.23, 1138.53, 1012.96, 740.25. HRMS (Dart⁺) Calcd. for $\text{C}_{16}\text{H}_{22}\text{NO}_2^+$: 260.1645, found 260.1651.

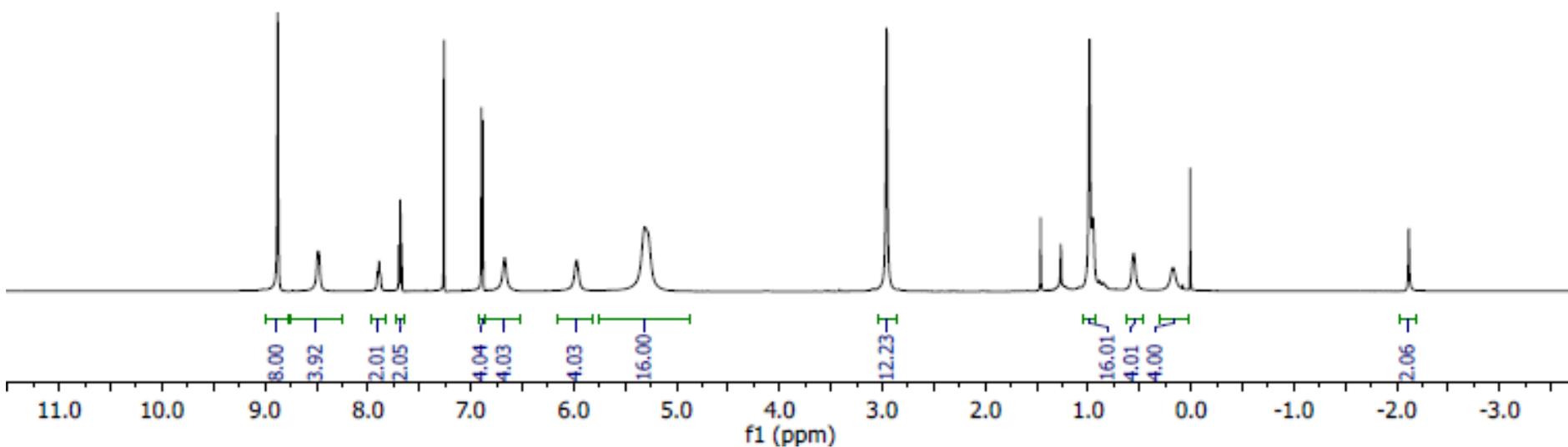
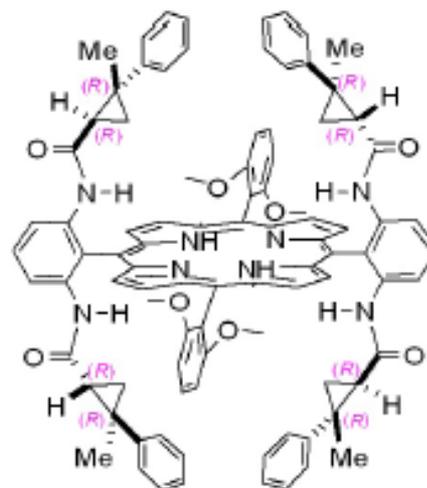


tert*-butyl (4-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)but-1-en-1-yl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate **3v* Yield: 40%. Hexanes/ethyl acetate = 9/1, R_f = 0.70. ^1H NMR (600 MHz, CDCl_3) δ 7.63 (d, J = 7.5 Hz, 1H), 7.34 (t, J = 7.4 Hz, 1H), 7.31 – 7.27 (m, 1H), 7.10 (d, J = 13.3 Hz, 1H), 6.99 (d, J = 6.6 Hz, 1H), 4.72 – 4.67 (m, 2H), 4.25 (dt, J = 14.4, 7.3 Hz, 1H), 3.59 (t, J = 7.0 Hz, 2H), 2.13 (br, 2H), 1.48 – 1.00 (m, 45H). ^{13}C NMR (150 MHz, CDCl_3) δ 152.41, 136.60, 135.91, 129.22, 128.69, 128.01, 127.73, 127.62, 107.54, 80.70, 74.11, 59.93, 59.57, 39.64, 39.59, 33.06, 32.89, 29.22, 28.08, 20.35, 20.00, 17.09. IR (neat, cm^{-1}): 2975.35, 2931.05, 1710.91, 1662.69, 1454.51, 1373.32, 1320.14, 1263.84, 1169.25, 1048.75, 741.49. HRMS (ESI) ($\text{M}+\text{H}^+$) Calcd. for $\text{C}_{34}\text{H}_{58}\text{N}_3\text{O}_4^+$: 572.4422, found 572.4424.

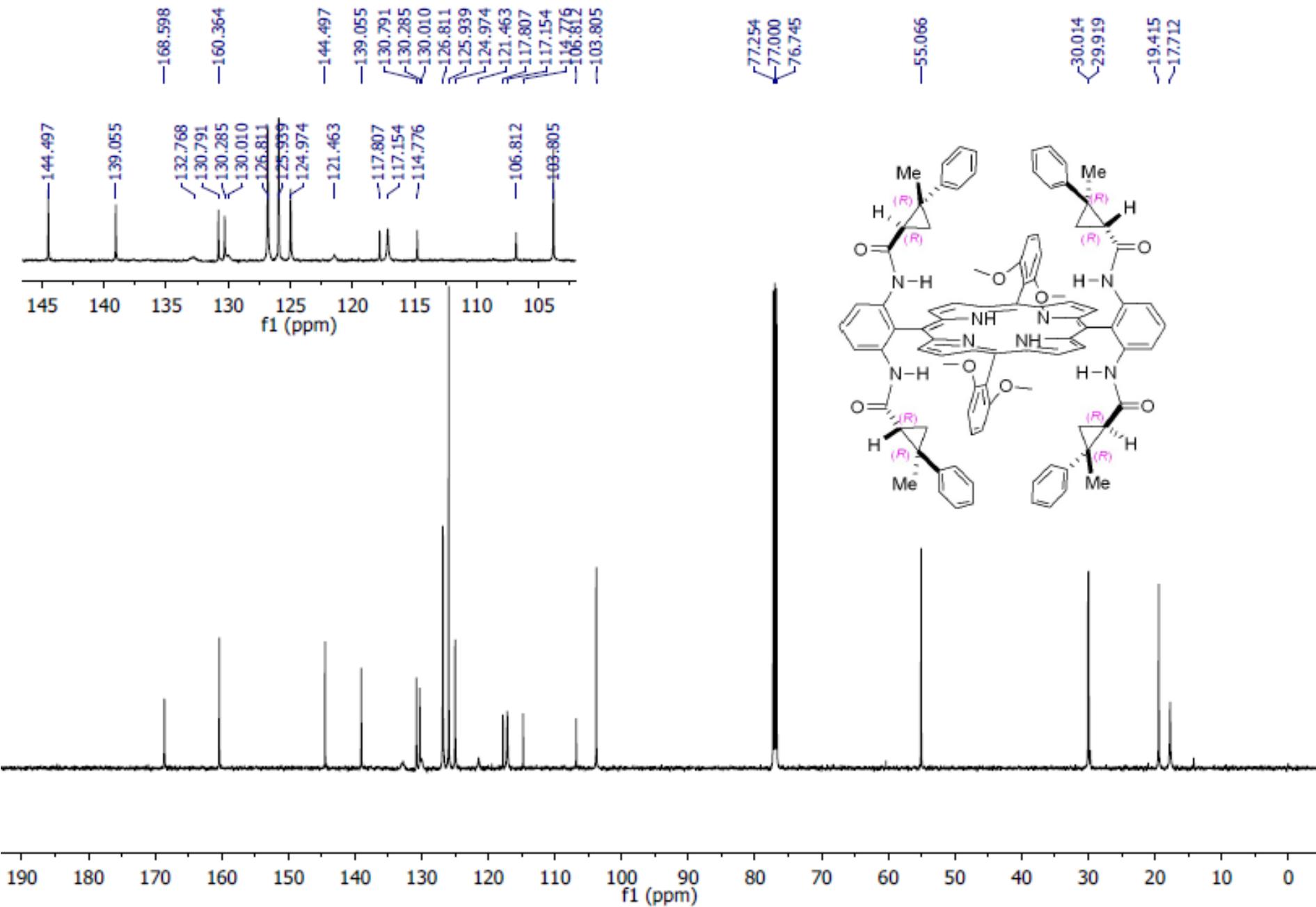
XII. References

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[H₂(2,6-DiMeO-QingPhyrin)] ([H₂(P5)])



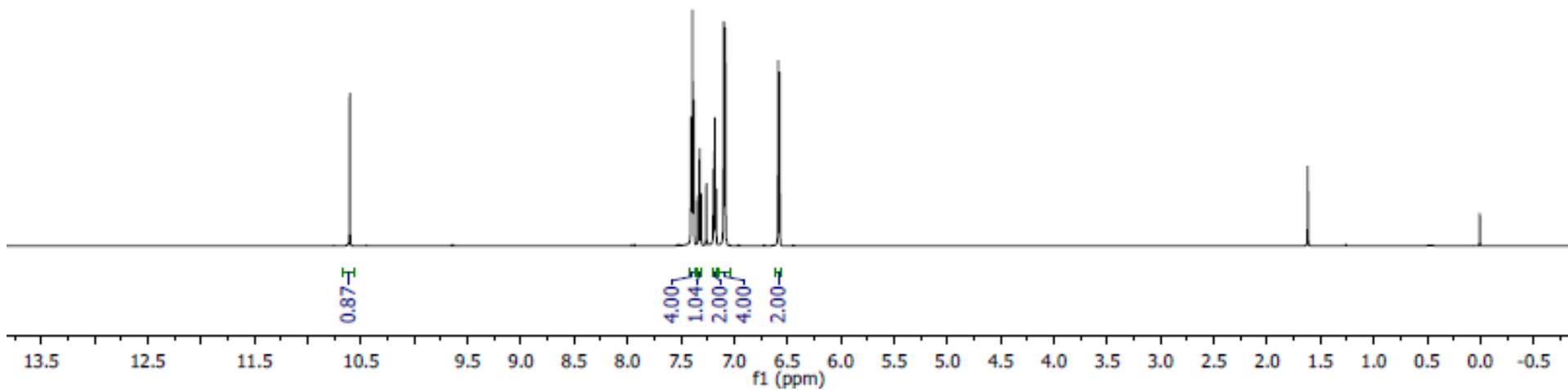
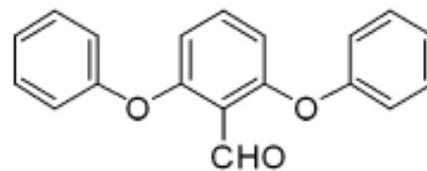
[H₂(2,6-DiMeO-QingPhyrin)] ([H₂(P5)])



2,6-diphenoxybenzaldehyde

10.605

7.404
7.391
7.377
7.338
7.324
7.310
7.260
7.193
7.181
7.169
7.097
7.096
7.083
6.587
6.573



2,6-diphenoxybenzaldehyde

188.155

159.848

156.126

135.093

129.949

124.310

119.606

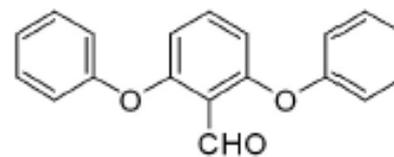
118.473

112.722

77.211

77.000

76.788



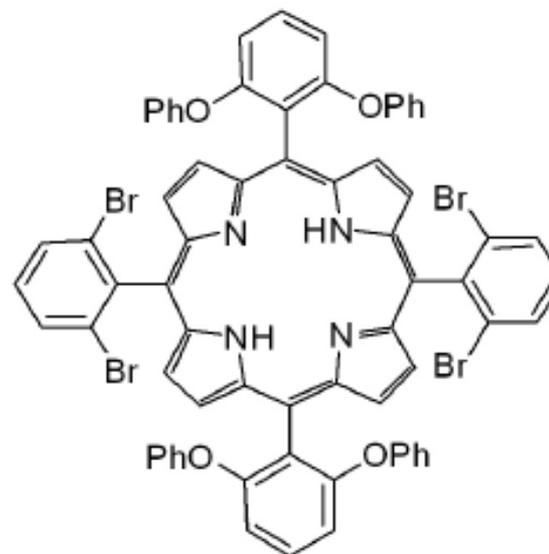
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

f1 (ppm)

5,15-bis(2,6-dibromophenyl)-10,20-bis(2,6-diphenoxyphenyl)porphyrin in CD₂Cl₂

9.002
8.621
8.066
8.054
7.692
7.679
7.666
7.587
7.575
7.563
7.115
7.101
6.895
6.885
6.703
6.693
5.320

-2.726

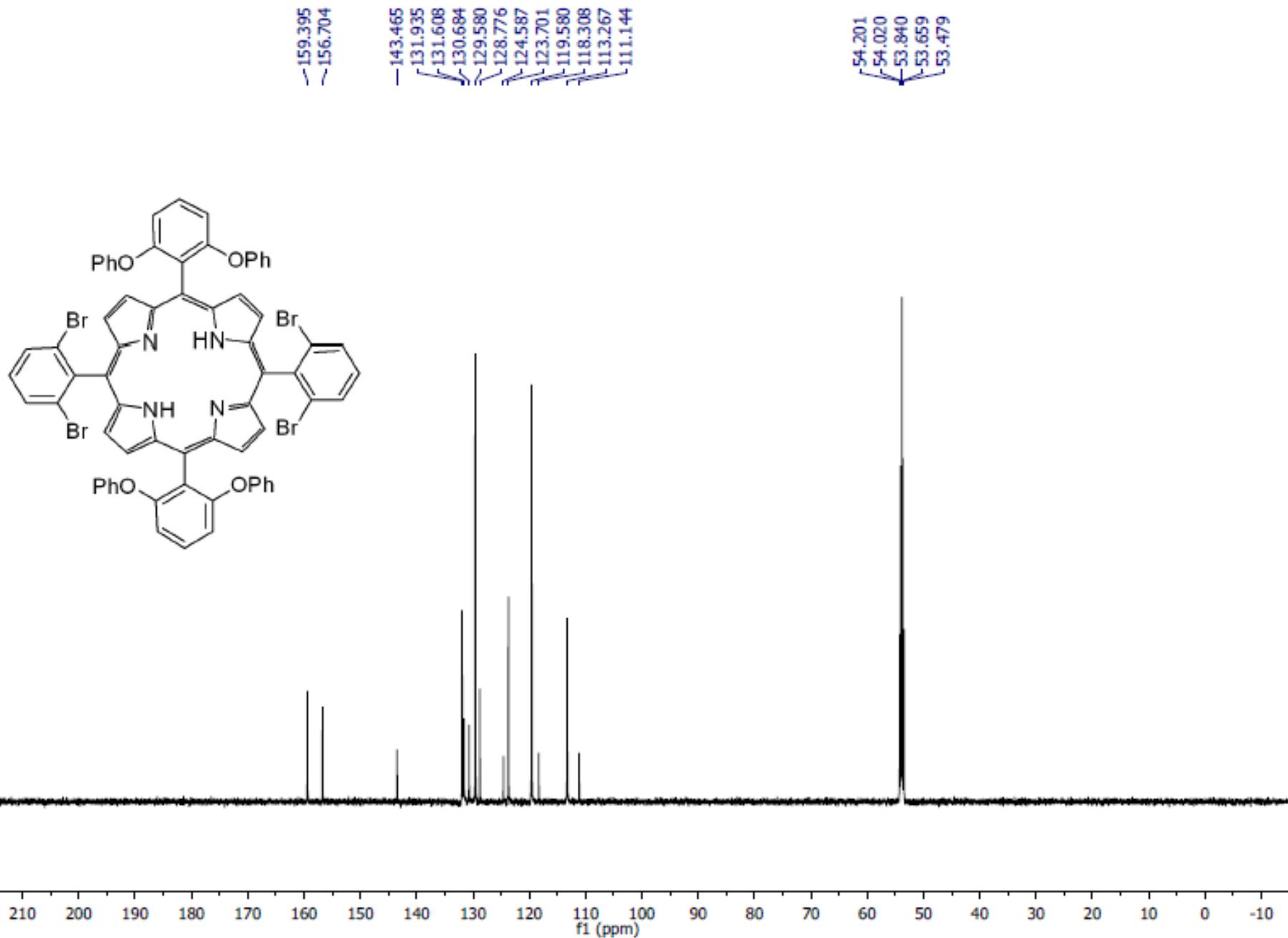


4.00
4.00
4.04
2.08
2.07
4.09
8.08
12.00

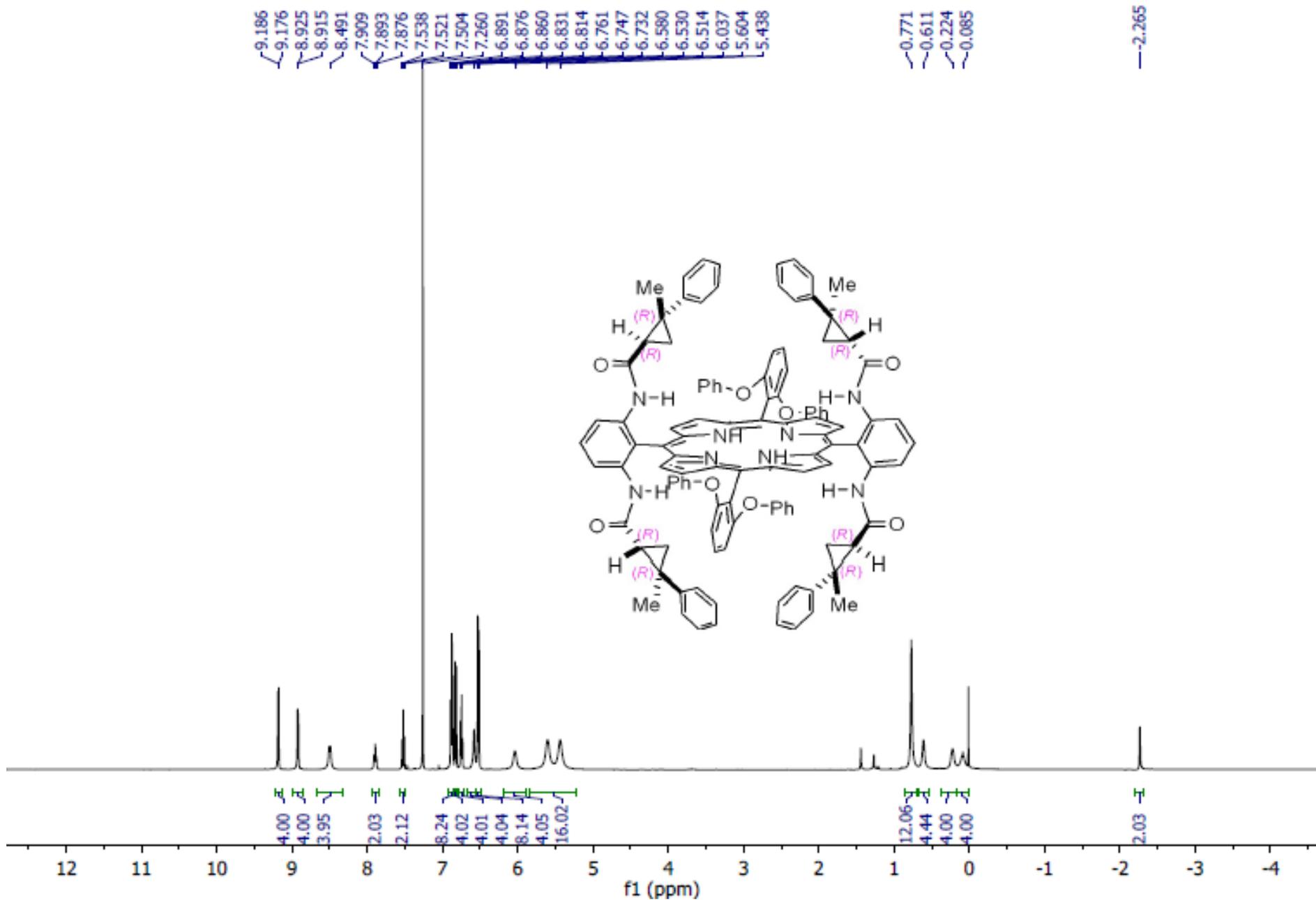
2.21

14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3 -4
f1 (ppm)

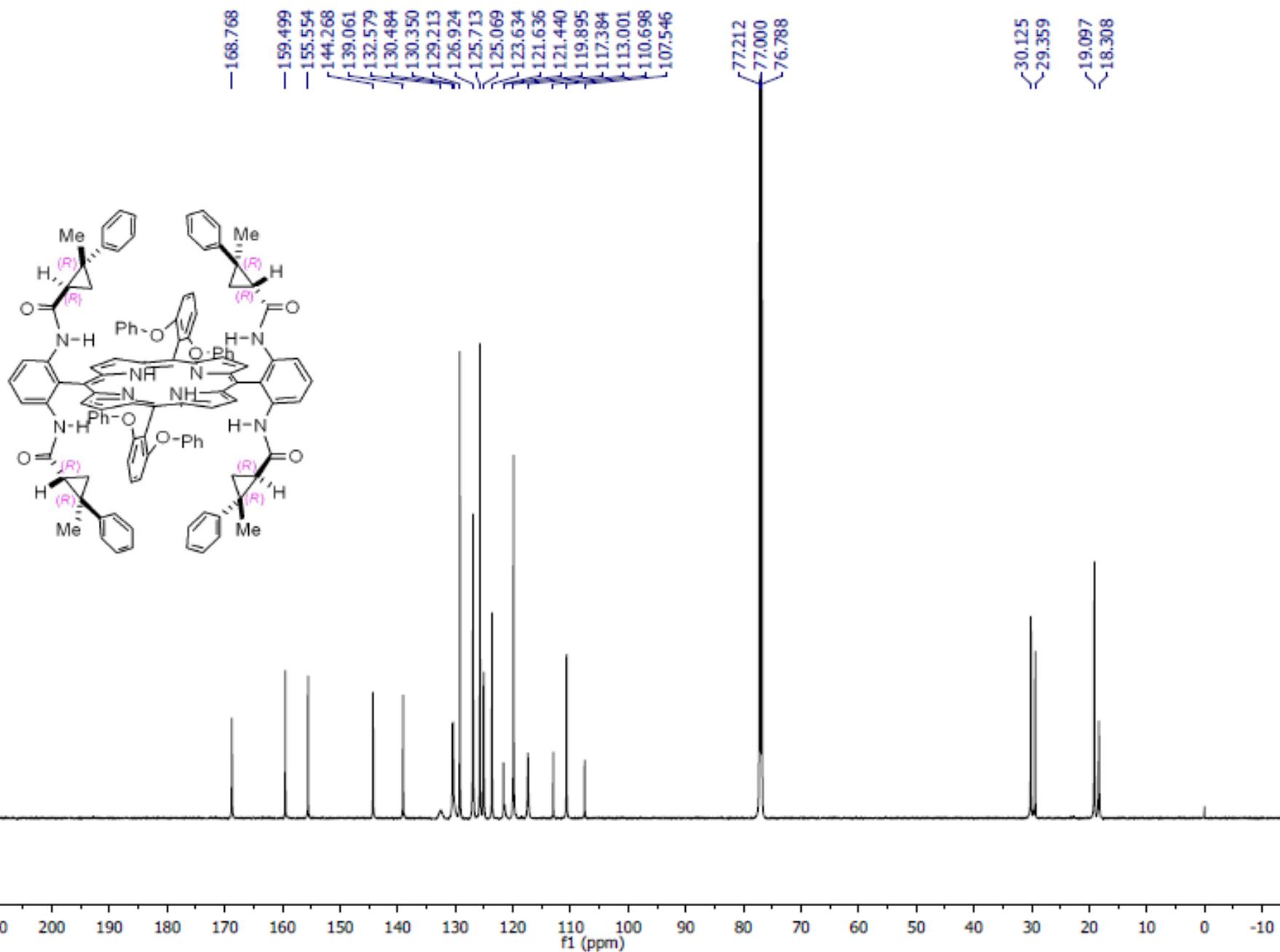
5,15-bis(2,6-dibromophenyl)-10,20-bis(2,6-diphenoxyphenyl)porphyrin in CD₂Cl₂



[H₂(2,6-DiPhO-QingPhyrin)] ([H₂(P6)])

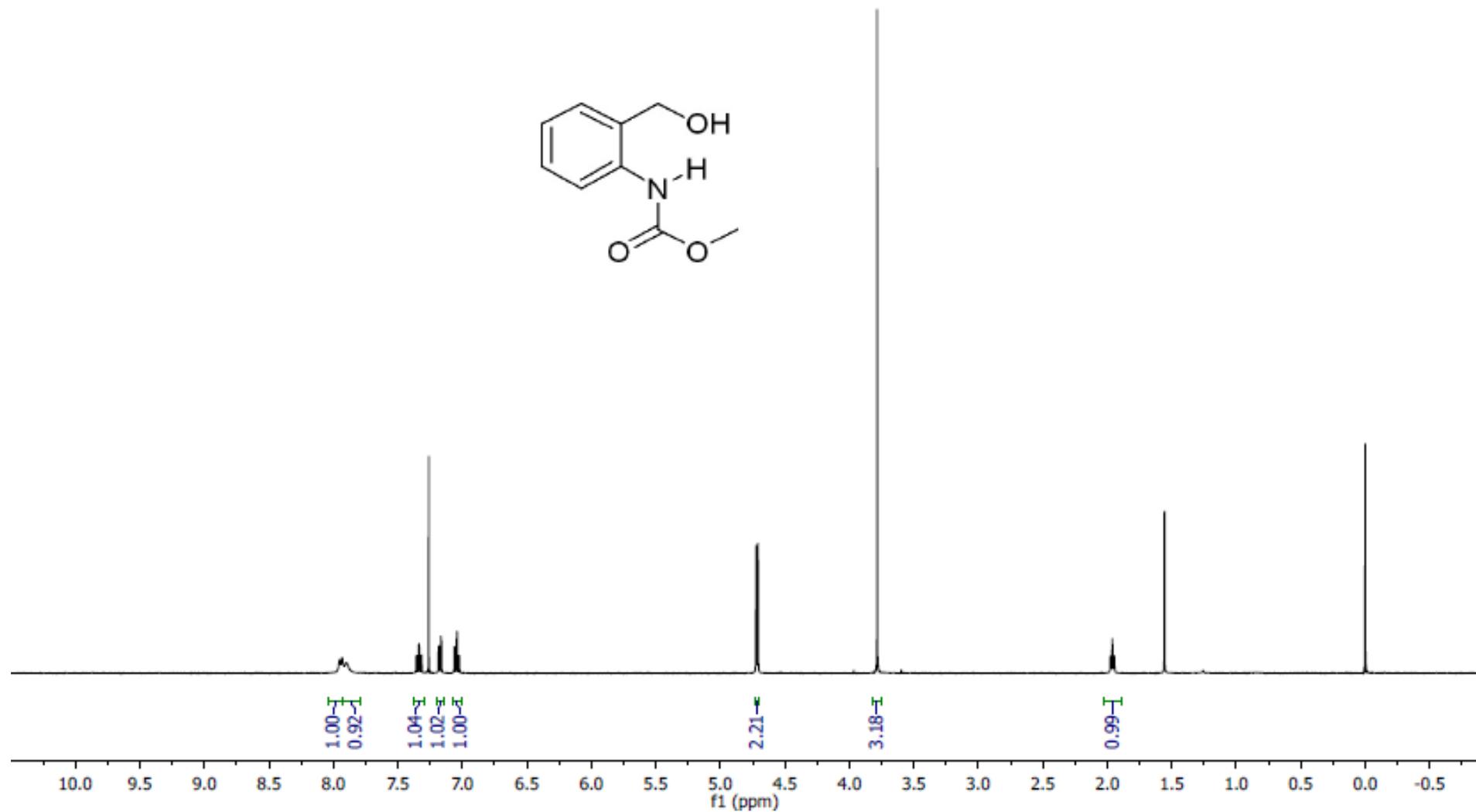
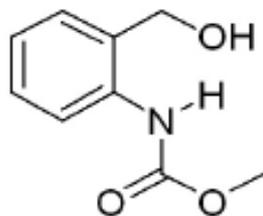


[H₂(2,6-DiPhO-QingPhyrin)] ([H₂(P6)])



methyl (2-(hydroxymethyl)phenyl)carbamate s1-a

7.95, 7.93, 7.90, 7.35, 7.34, 7.34, 7.32, 7.31, 7.26, 7.18, 7.18, 7.17, 7.16, 7.06, 7.06, 7.04, 7.04, 4.72, 4.71, 3.78, 1.98, 1.96, 1.95



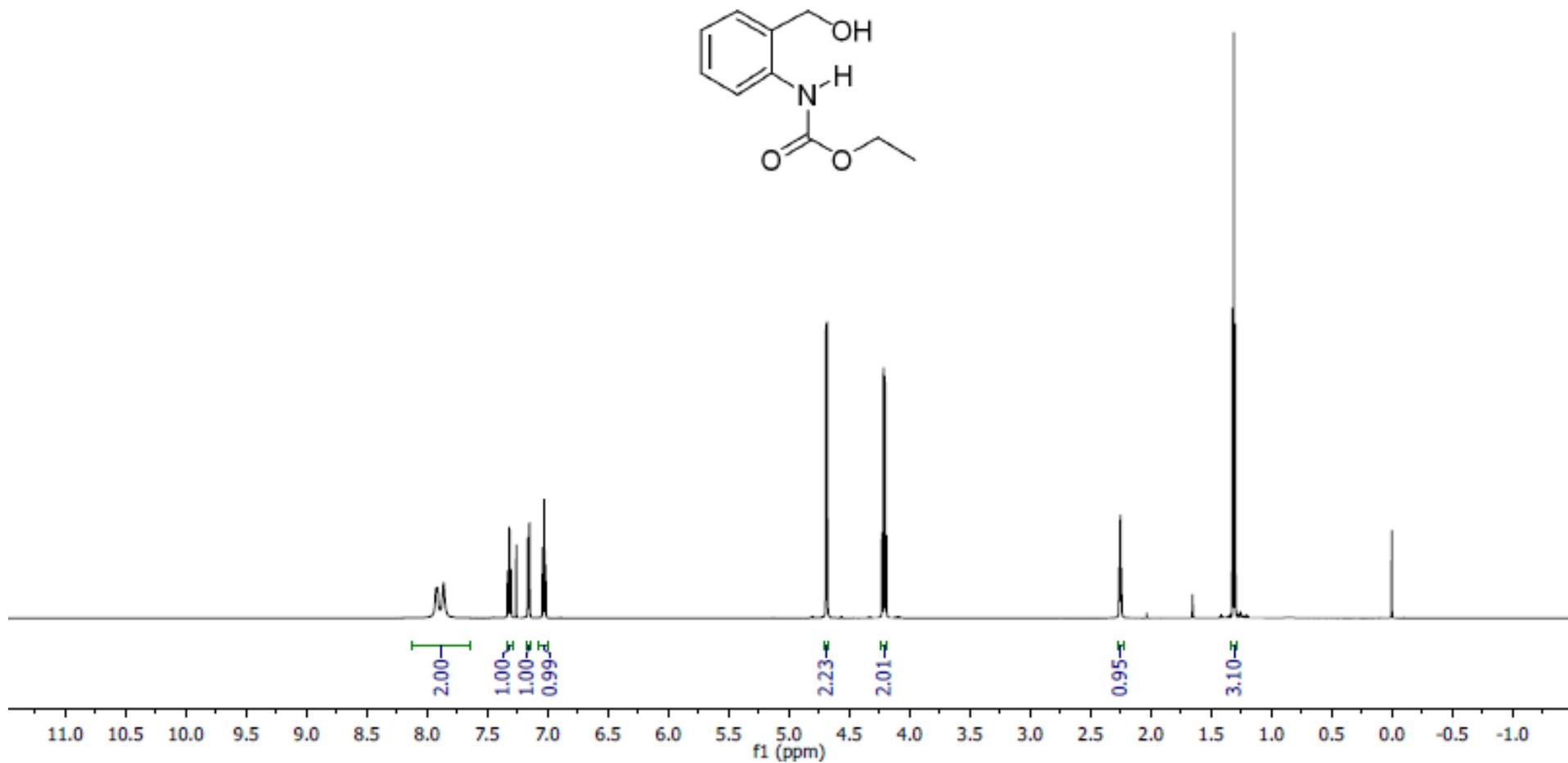
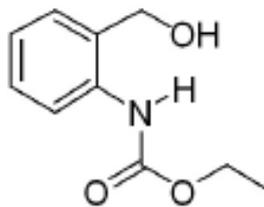
ethyl (2-(hydroxymethyl)phenyl)carbamate s1-b

7.926
7.914
7.862
7.330
7.318
7.304
7.260
7.163
7.151
7.041
7.029
7.016

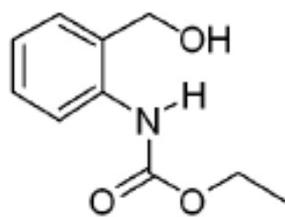
4.692
4.682
4.228
4.216
4.204
4.192

2.262
2.252
2.243

1.323
1.311
1.299



ethyl (2-(hydroxymethyl)phenyl)carbamate s1-b



154.155

137.737

129.207

128.831

123.314

120.980

77.211

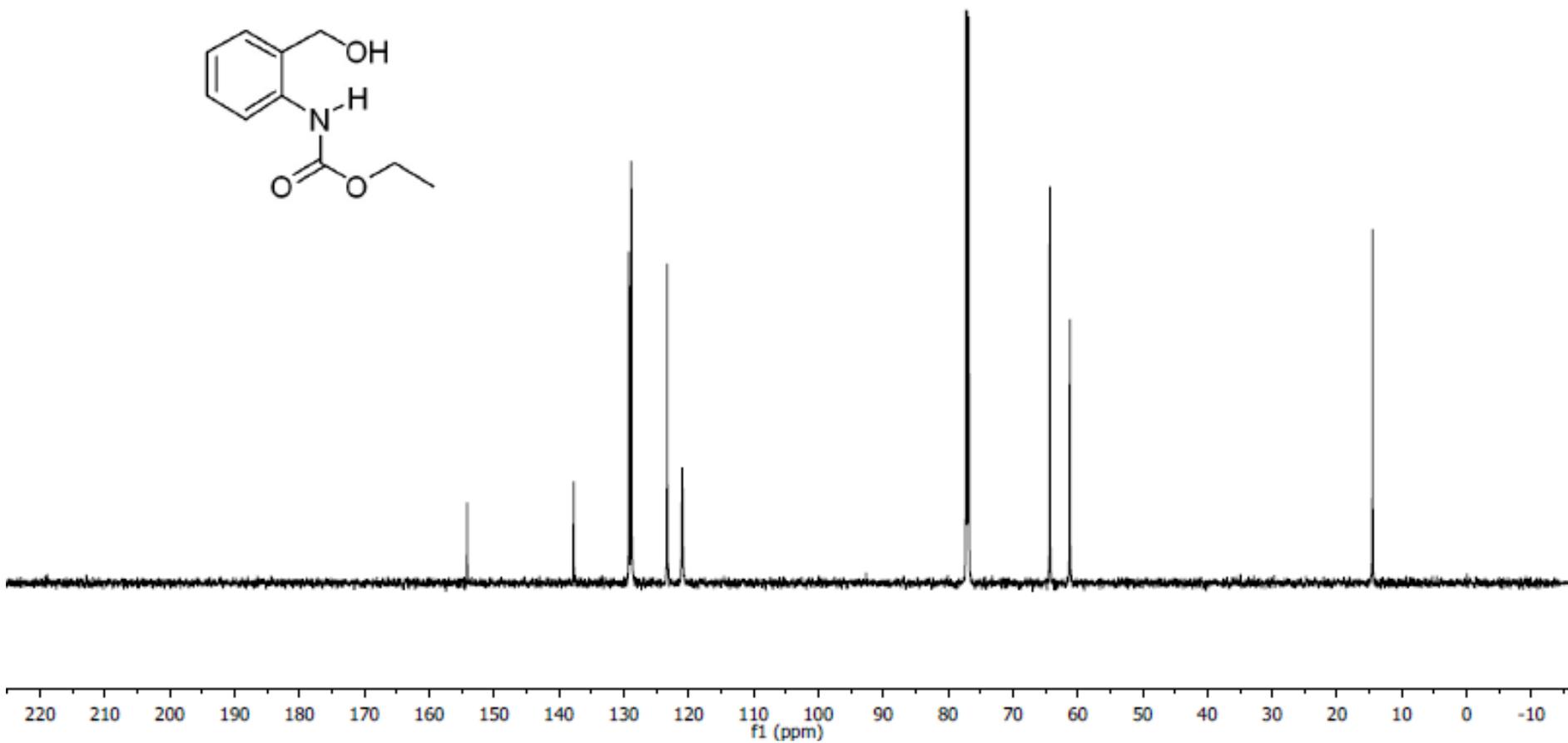
77.000

76.788

64.294

61.213

14.522



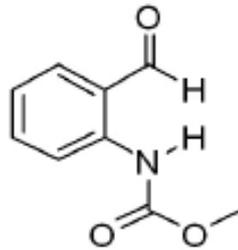
methyl (2-formylphenyl)carbamate s2-a

—10.61

—9.90

8.46
8.44
7.65
7.63
7.61
7.59
7.58
7.26
7.18
7.16
7.15

—3.80



1.00

1.04

1.00

1.09

1.07

1.05

3.36

12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

methyl (2-formylphenyl)carbamate s2-a

195.03

154.09

141.22

135.99

135.97

121.92

121.31

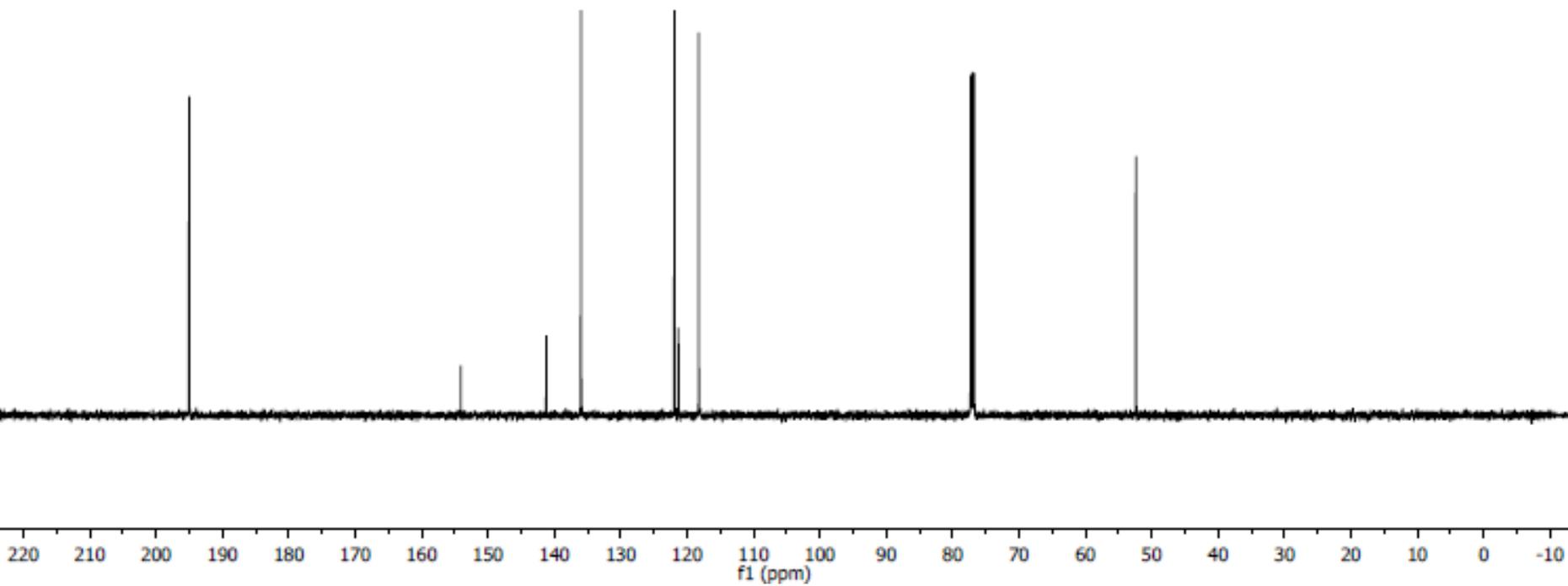
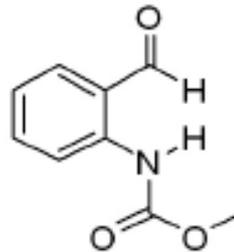
118.24

77.25

77.00

76.75

52.39



ethyl (2-formylphenyl)carbamate s2-b

10.565

9.907

8.471

8.457

7.647

7.644

7.634

7.632

7.605

7.602

7.590

7.578

7.576

7.260

7.174

7.172

7.161

7.160

7.149

7.147

4.263

4.251

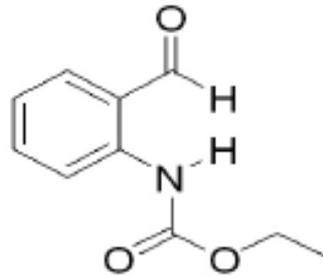
4.239

4.227

1.348

1.336

1.324



1.00

1.00

0.98

1.04

1.04

1.01

2.14

3.28

12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

ethyl (2-formylphenyl)carbamate s2-b

—195.026

—153.700

—141.368

—135.995

—121.803

—121.278

—118.269

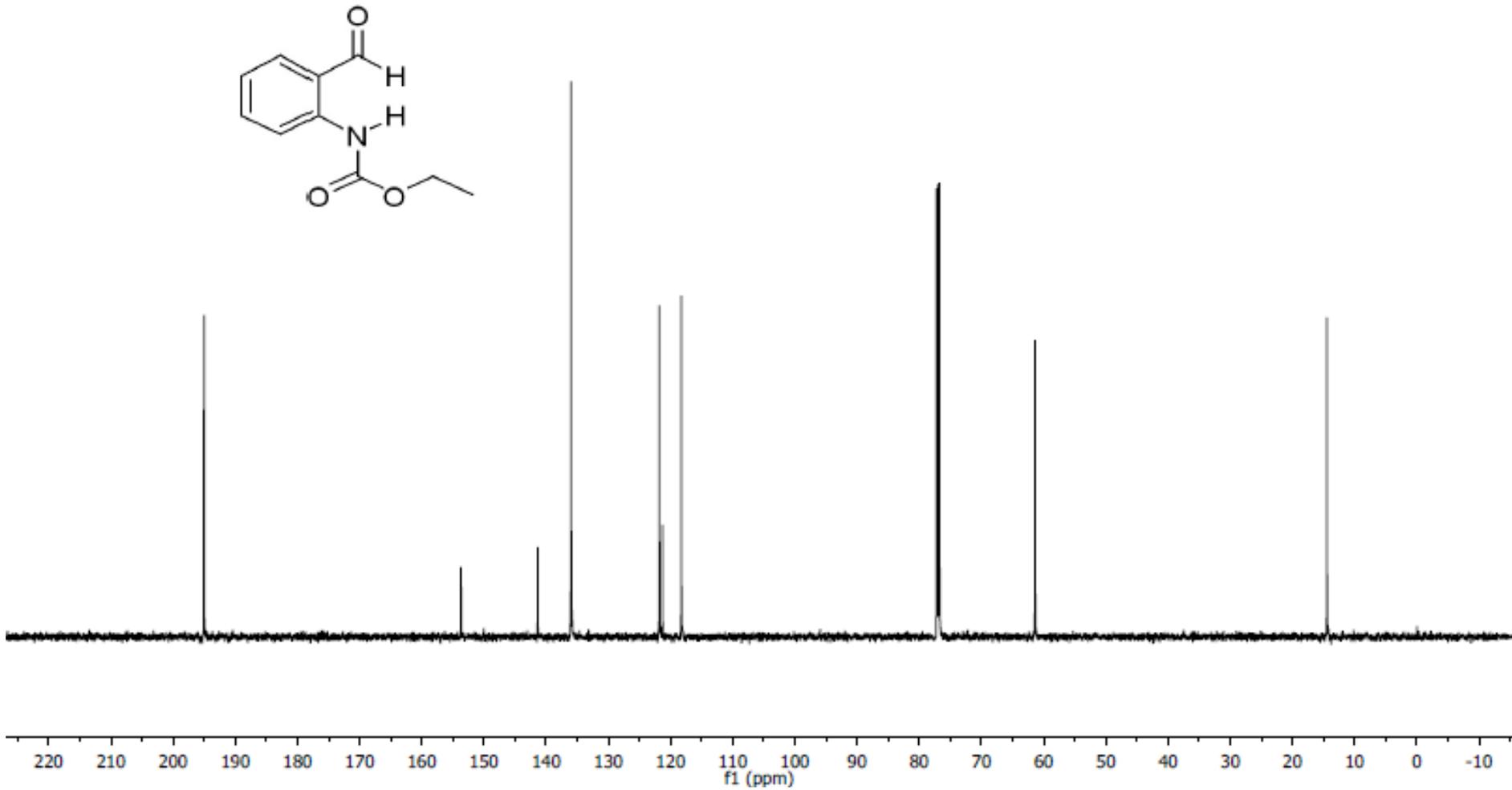
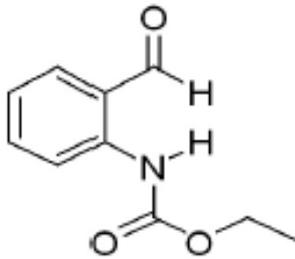
—77.211

—77.000

—76.788

—61.387

—14.457

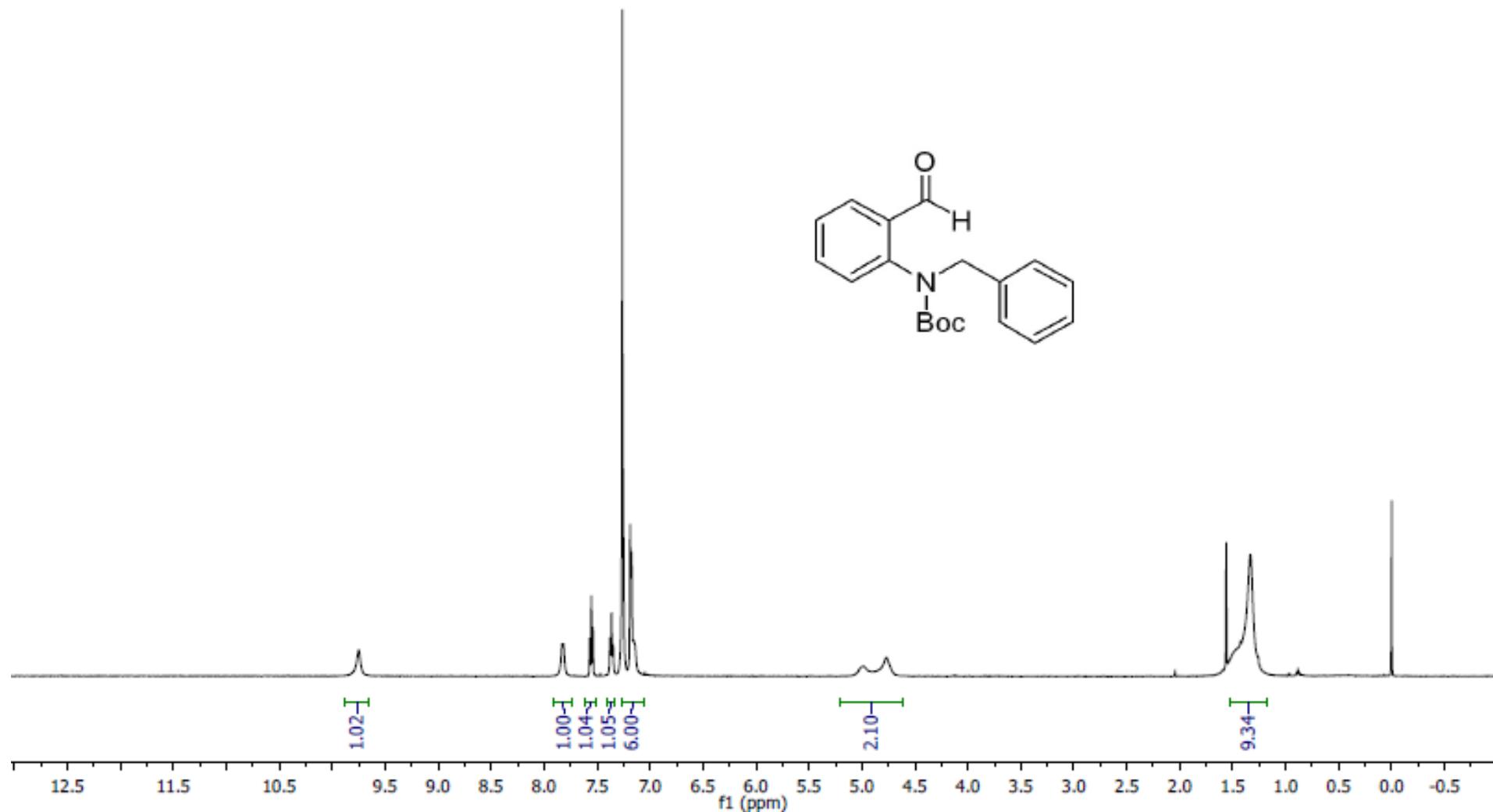
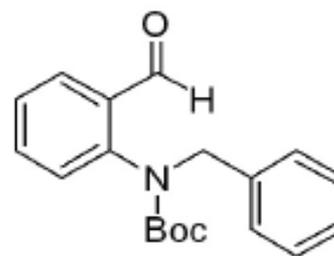


***tert*-butyl benzyl(2-formylphenyl)carbamate s3-a**

9.750
7.829
7.816
7.569
7.566
7.554
7.538
7.536
7.377
7.362
7.347
7.260
7.255
7.188
7.182
7.173
7.157
7.142

4.994
4.766

1.329



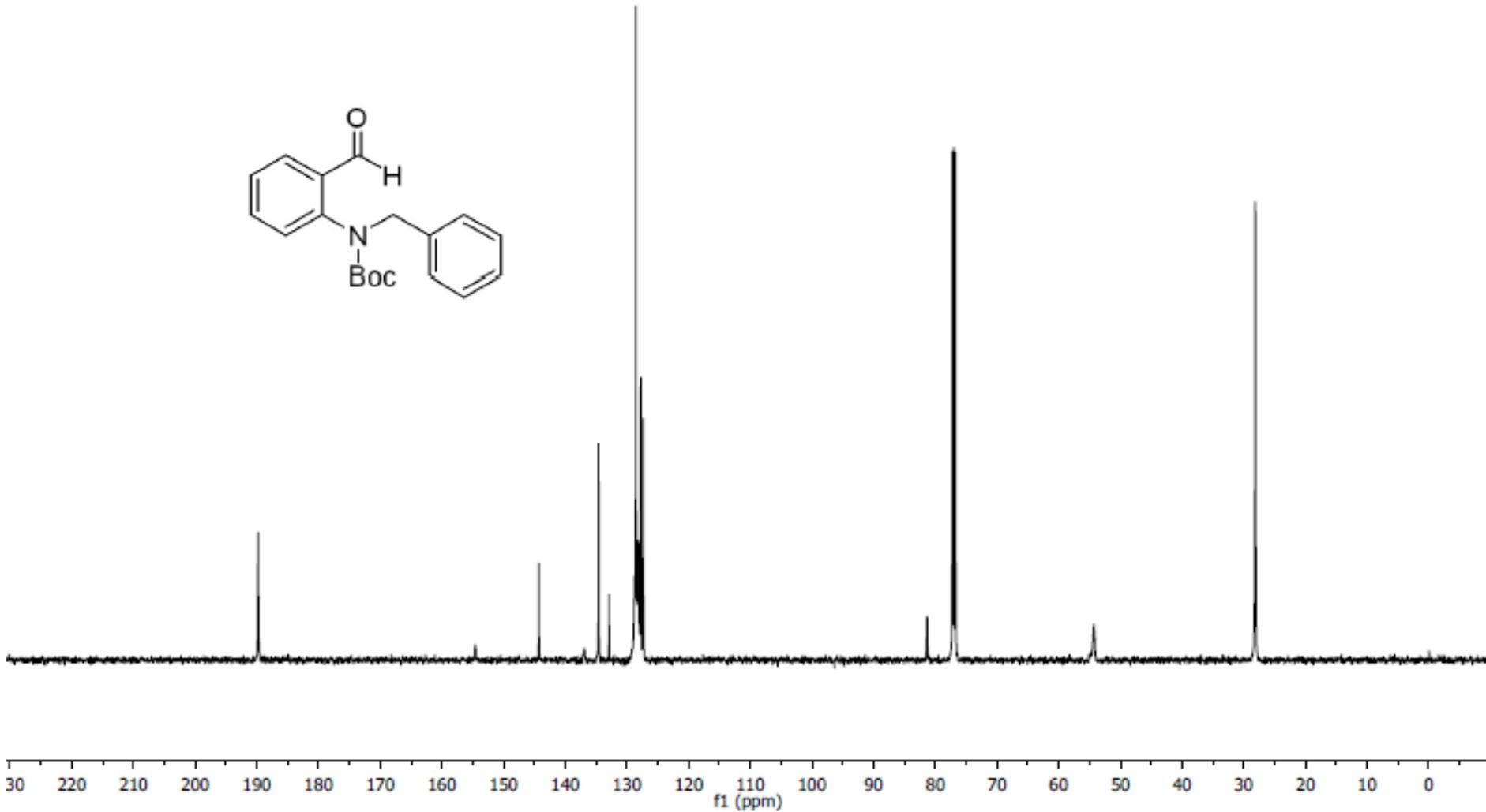
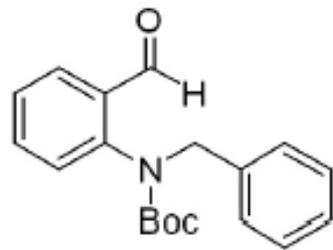
tert-butyl benzyl(2-formylphenyl)carbamate s3-a

189.804
154.583
144.269
136.986
134.590
132.881
128.727
128.551
128.370
128.155
127.761
127.358

81.356
77.254
77.000
76.746

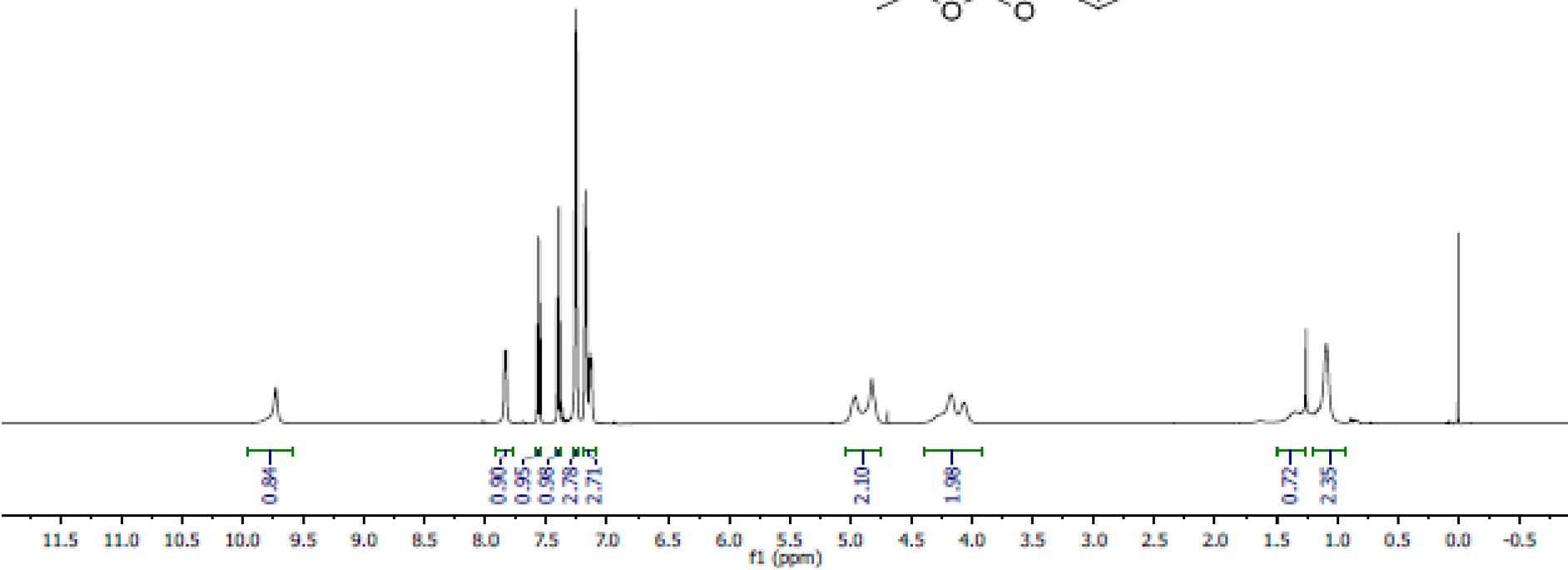
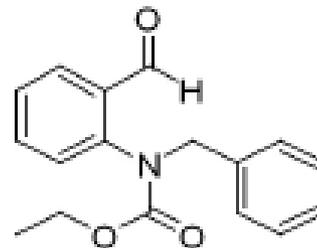
54.289

28.118



ethyl benzyl(2-formylphenyl)carbamate s3-b

9.772, 7.846, 7.834, 7.578, 7.576, 7.566, 7.563, 7.553, 7.550, 7.412, 7.399, 7.387, 7.260, 7.257, 7.253, 7.184, 7.178, 7.172, 7.168, 7.143, 7.131, 4.960, 4.822, 4.178, 4.069, 1.068



ethyl benzyl(2-formylphenyl)carbamate s3-b

—189.575

—155.641

143.503

136.475

134.713

132.871

128.914

128.585

127.928

127.769

77.212

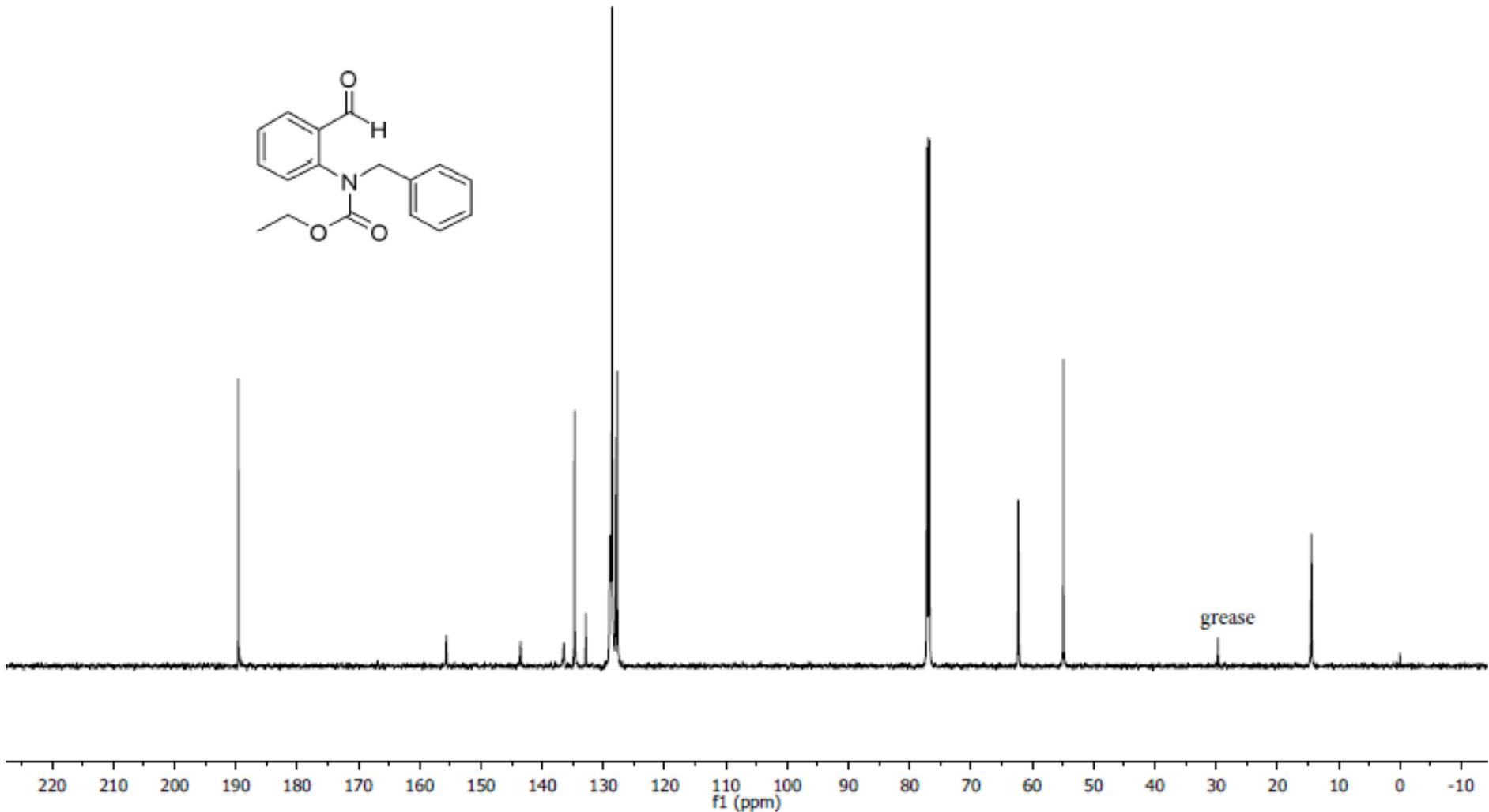
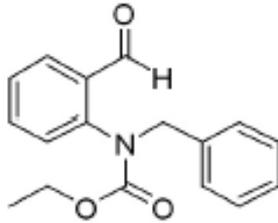
77.000

76.788

—62.282

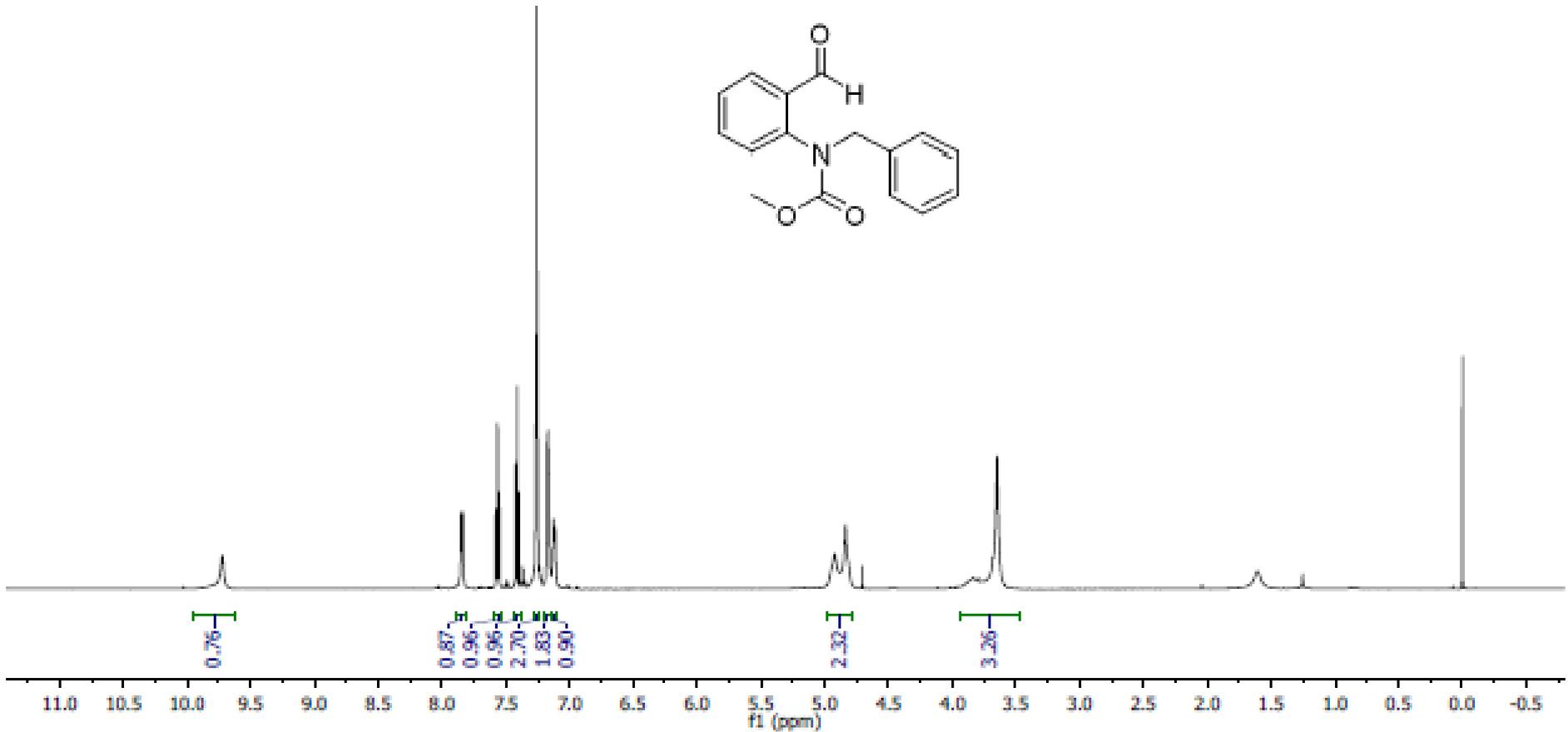
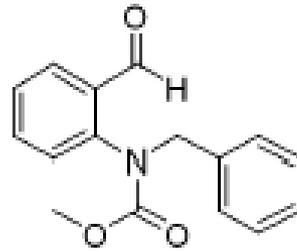
—54.917

—14.451



methyl benzyl(2-formylphenyl)carbamate s3-c

9.719
7.850
7.837
7.581
7.580
7.578
7.577
7.568
7.565
7.555
7.553
7.552
7.426
7.424
7.412
7.401
7.399
7.264
7.260
7.259
7.254
7.177
7.172
7.128
7.115
4.919
4.838
3.645



methyl benzyl(2-formylphenyl)carbamate s3-c

— 189.547

— 156.133

— 143.255

— 134.779

— 132.853

— 129.162

— 128.996

— 128.799

— 128.620

— 128.004

— 127.947

— 127.756

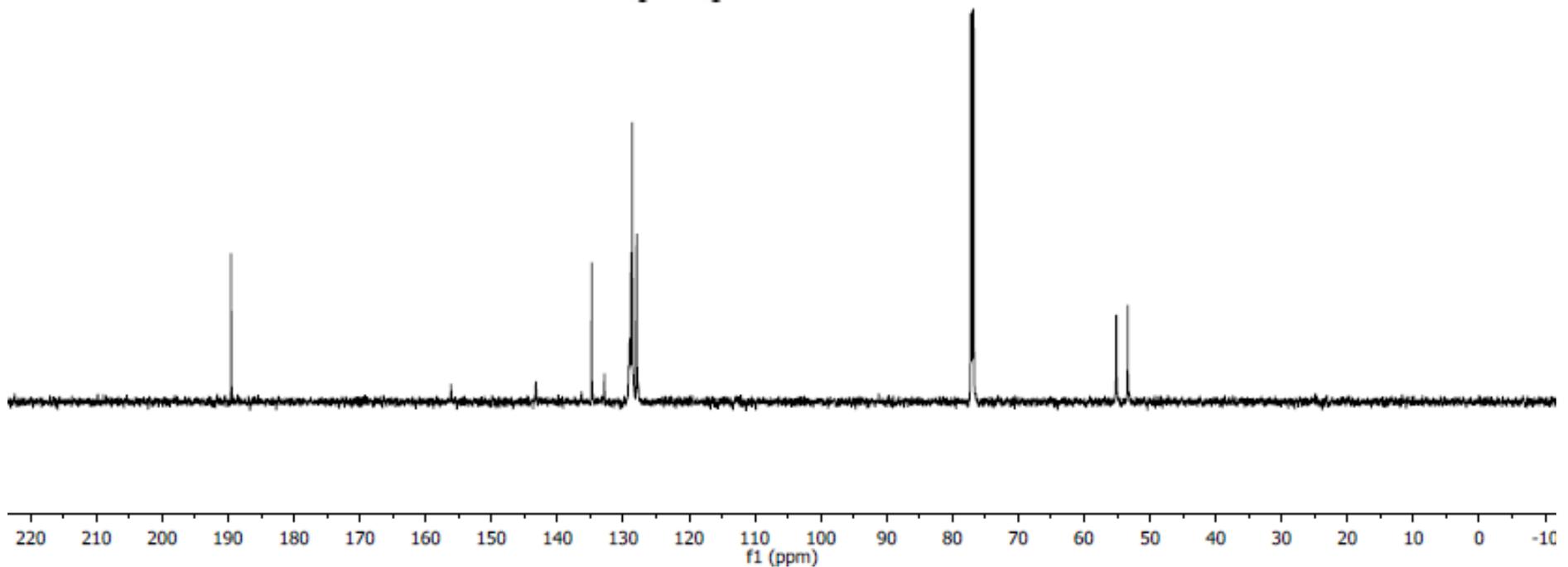
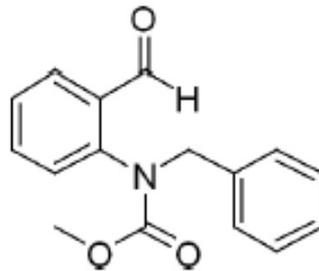
— 77.211

— 77.000

— 76.788

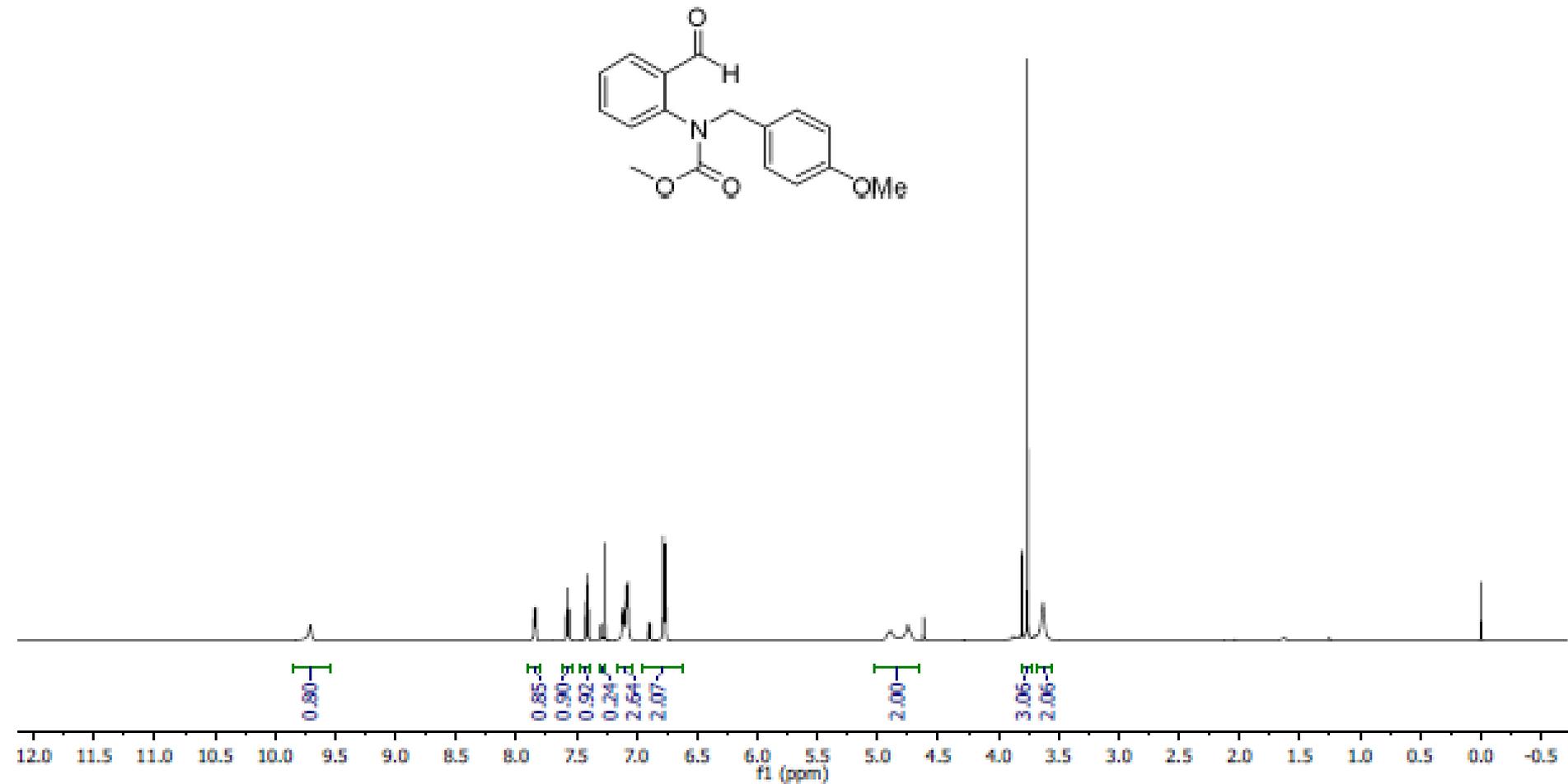
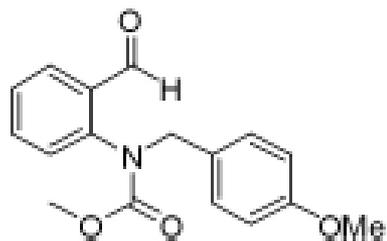
— 55.116

— 53.376



methyl (2-formylphenyl)(4-methoxybenzyl)carbamate s3-d

9.706
7.849
7.807
7.584
7.582
7.571
7.569
7.559
7.556
7.421
7.408
7.396
7.260
7.115
7.102
7.083
7.070
6.899
6.884
6.777
6.763
4.887
4.748
3.806
3.761
3.630



methyl (2-formylphenyl)(4-methoxybenzyl)carbamate s3-d

189.568

159.306

156.069

143.296

134.746

132.907

130.338

128.890

128.600

127.885

123.917

77.211

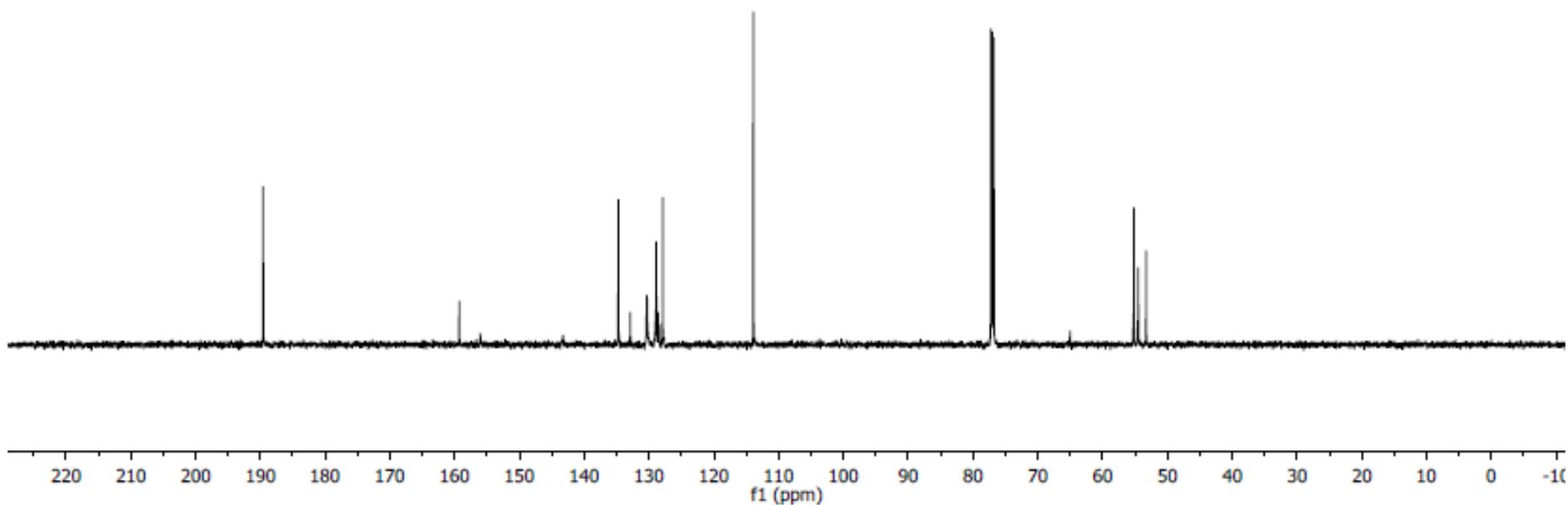
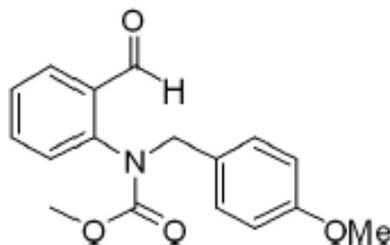
77.000

76.788

55.176

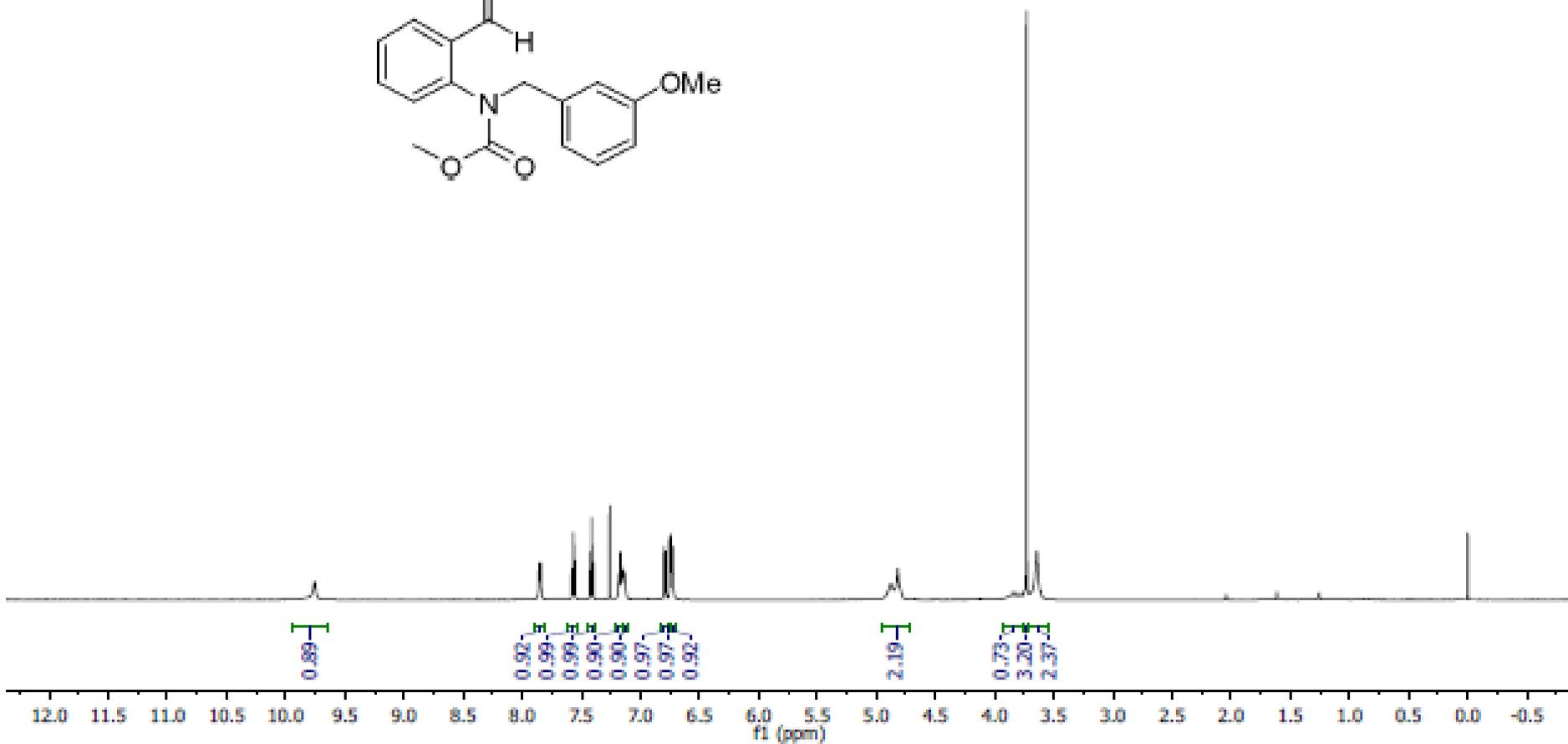
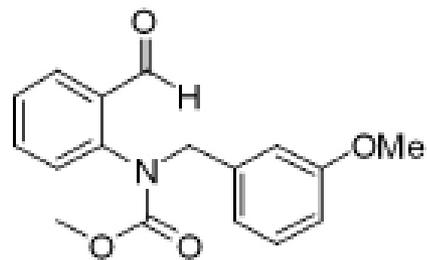
54.505

53.286



methyl (2-formylphenyl)(3-methoxybenzyl)carbamate s3-e

9.756
7.856
7.843
7.567
7.556
7.555
7.554
7.552
7.425
7.424
7.412
7.400
7.399
7.261
7.171
7.158
6.804
6.800
6.791
6.786
6.754
6.741
6.728
6.678
4.818
3.827
3.731
3.643



methyl (2-formylphenyl)(3-methoxybenzyl)carbamate s3-e

189.585

159.699

156.107

143.250

137.850

134.754

132.847

129.629

129.198

128.722

127.917

121.203

114.430

113.504

77.211

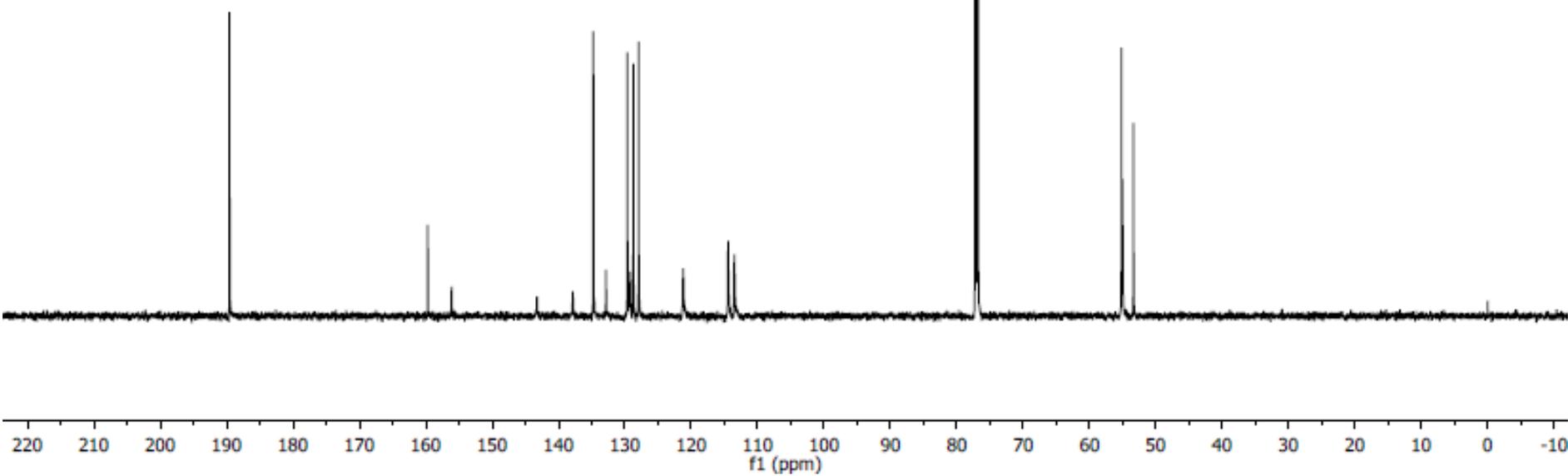
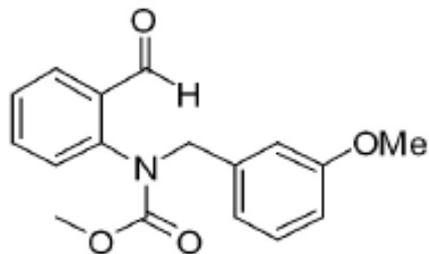
77.000

76.788

55.170

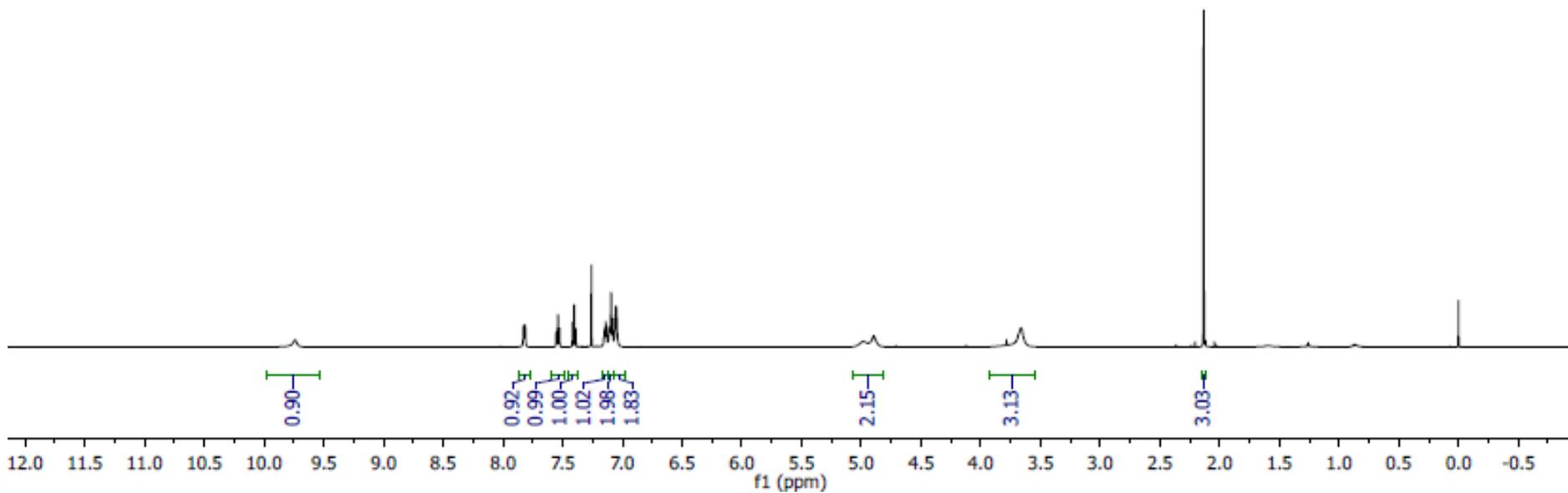
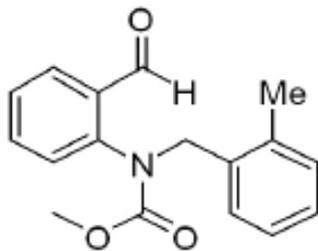
55.019

53.368



methyl (2-formylphenyl)(2-methylbenzyl)carbamate s3-f

9.742
7.827
7.814
7.554
7.552
7.539
7.528
7.526
7.416
7.404
7.391
7.260
7.158
7.151
7.145
7.109
7.095
7.082
7.054
4.979
4.896
3.663
2.134



methyl (2-formylphenyl)(2-methylbenzyl)carbamate s3-f

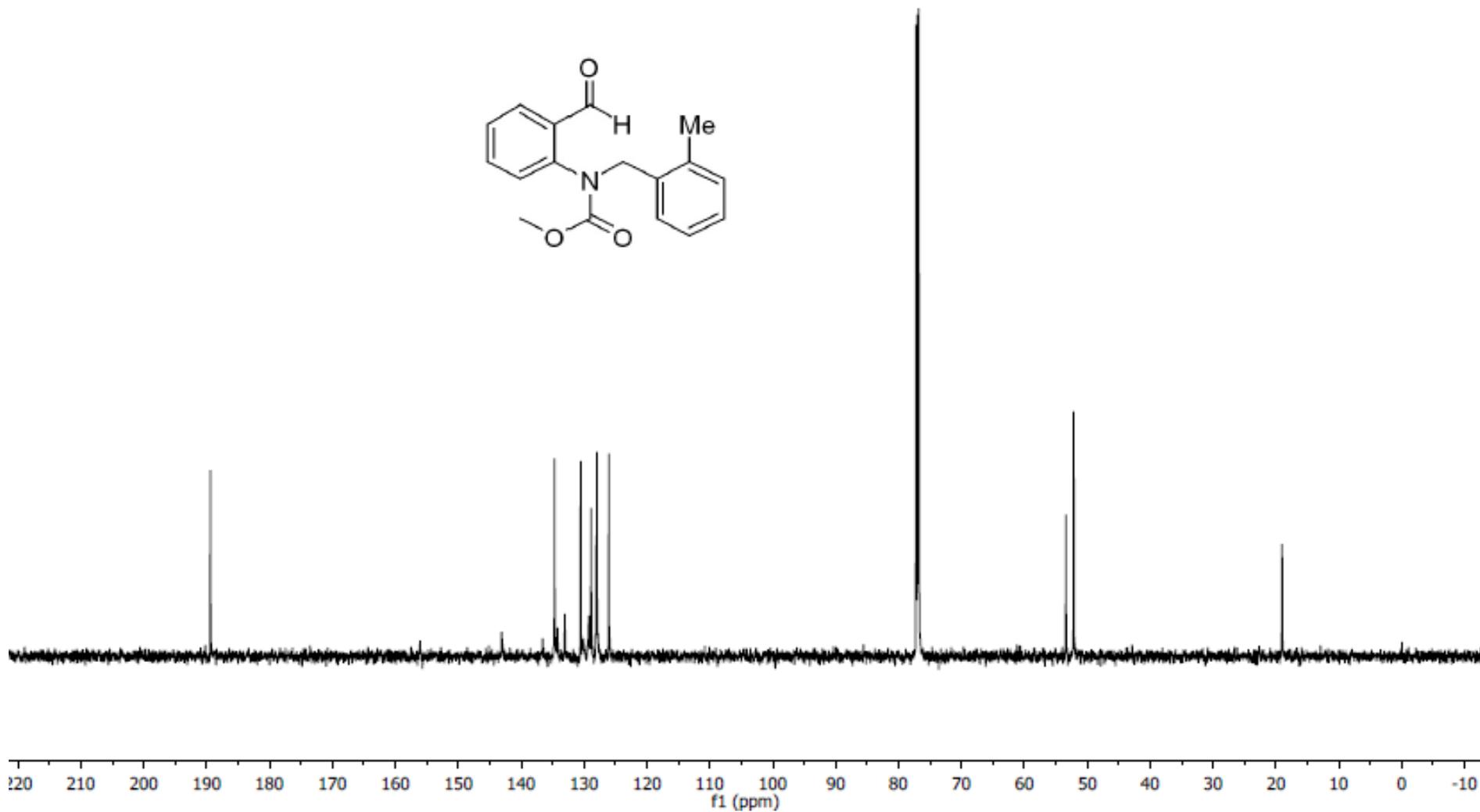
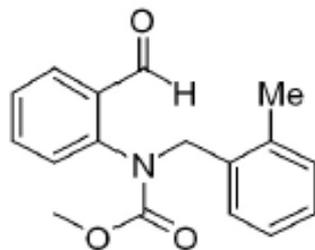
189.422

156.061
143.107
136.589
134.699
134.238
133.065
130.542
130.117
129.225
128.888
128.057
127.975
126.066

77.211
77.000
76.788

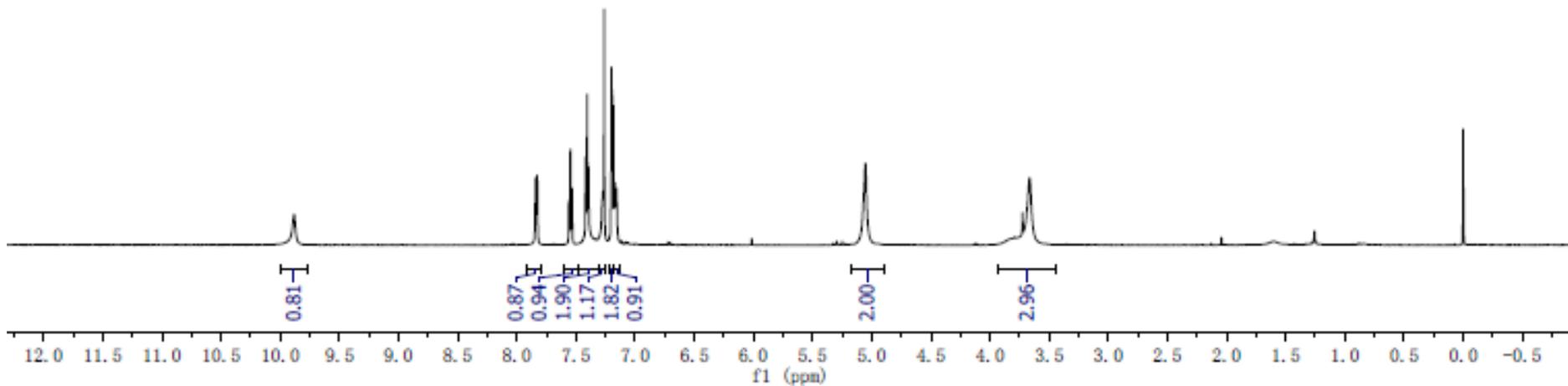
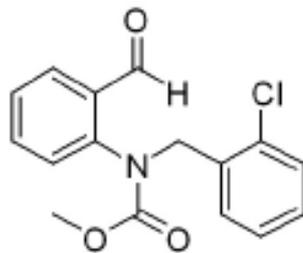
53.394
52.159

19.018



methyl (2-chlorobenzyl)(2-formylphenyl)carbamate s3-g

9.882
7.841
7.828
7.559
7.558
7.546
7.534
7.418
7.406
7.393
7.262
7.261
7.206
7.200
7.194
7.190
7.184
7.177
7.170
7.157
5.053
3.794
3.665



methyl (2-chlorobenzyl)(2-formylphenyl)carbamate s3-g

189.611

156.124

142.998

134.676

134.043

132.887

131.344

129.633

129.313

128.547

127.960

127.561

127.017

126.850

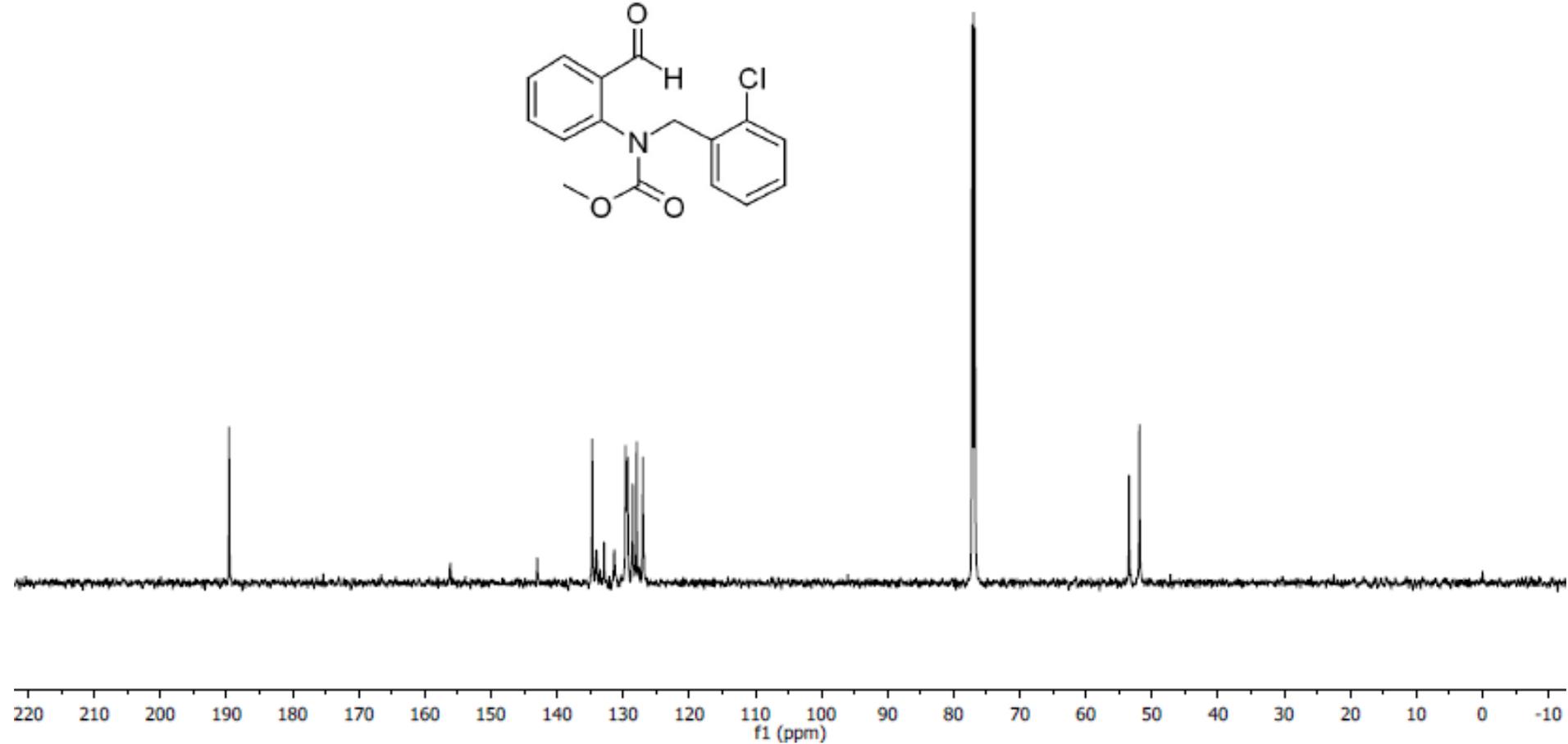
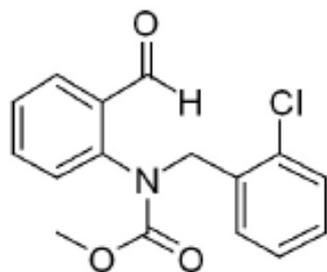
77.211

77.000

76.788

53.472

51.896

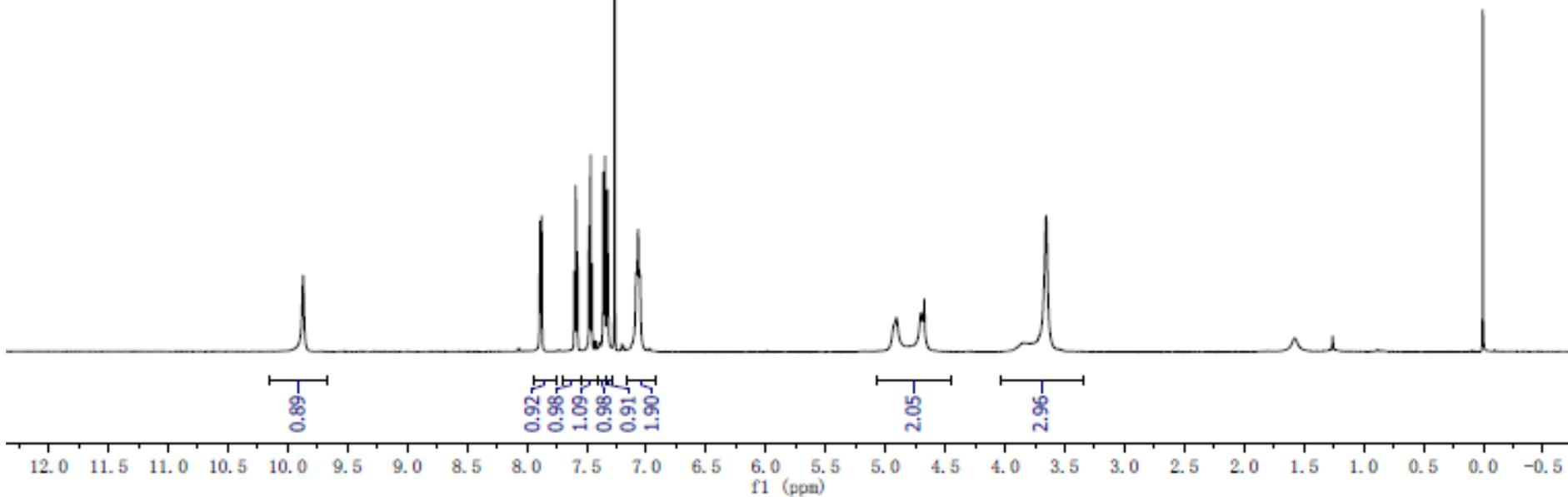
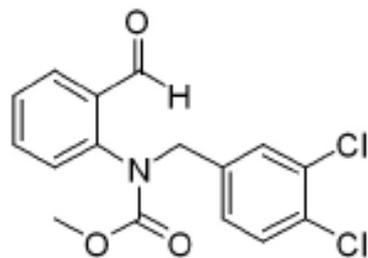


methyl (3,4-dichlorobenzyl)(2-formylphenyl)carbamate s3-h

9.871
7.889
7.876
7.603
7.590
7.577
7.575
7.480
7.467
7.455
7.360
7.346
7.325
7.264
7.083
7.069
7.054

4.909
4.702

3.656



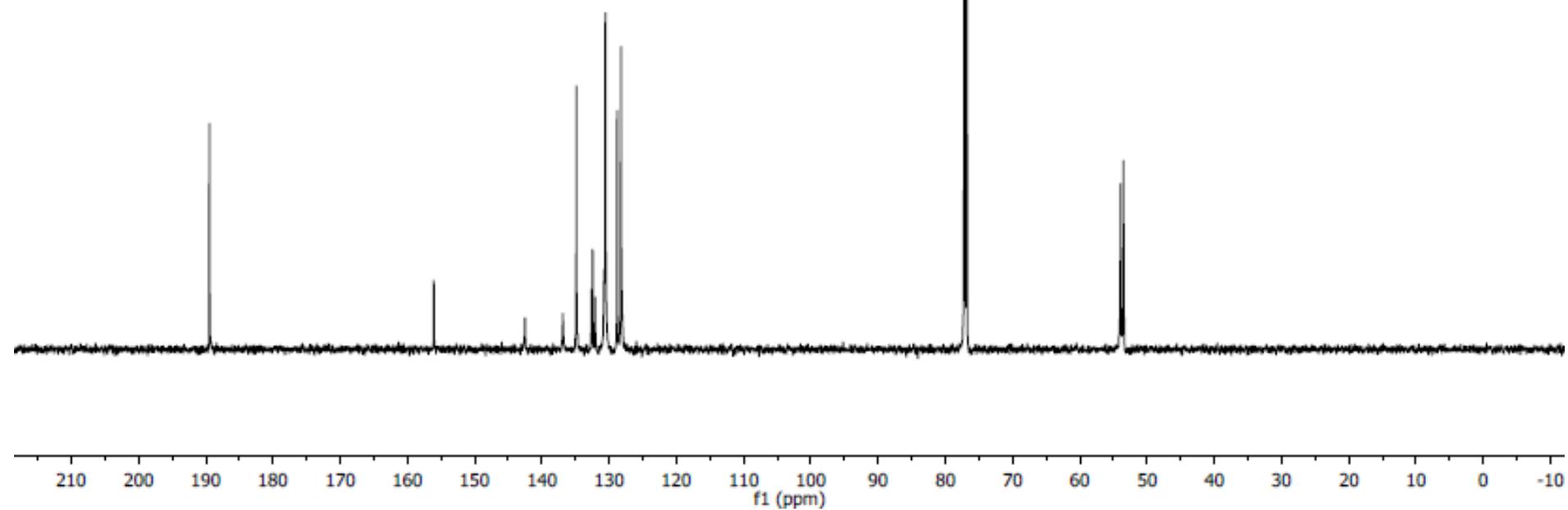
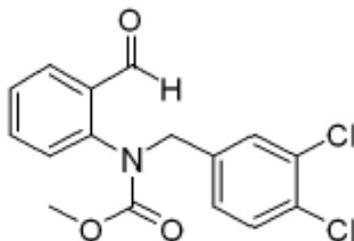
methyl (3,4-dichlorobenzyl)(2-formylphenyl)carbamate s3-h

189.462

156.078
142.686
142.520
136.885
134.875
134.694
132.629
132.457
132.080
130.749
130.566
128.819
128.245

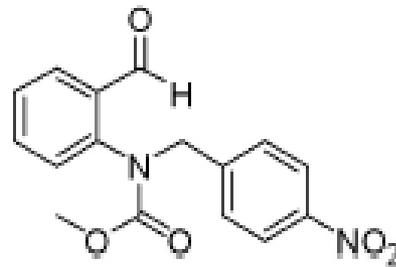
77.212
77.000
76.788

53.941
53.505



methy (2-formylphenyl)(4-nitrobenzyl)carbamate s3-i

9.874
8.149
8.136
7.872
7.859
7.591
7.578
7.565
7.480
7.468
7.455
7.417
7.403
7.260
7.093
7.083
5.050
4.831
3.656



0.82

1.88

0.86

0.91

0.96

1.80

0.94

2.08

3.05

12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

methy (2-formylphenyl)(4-nitrobenzyl)carbamate s3-i

189.439

156.118

147.566

143.972

142.312

134.912

132.372

131.103

129.599

128.717

128.331

123.827

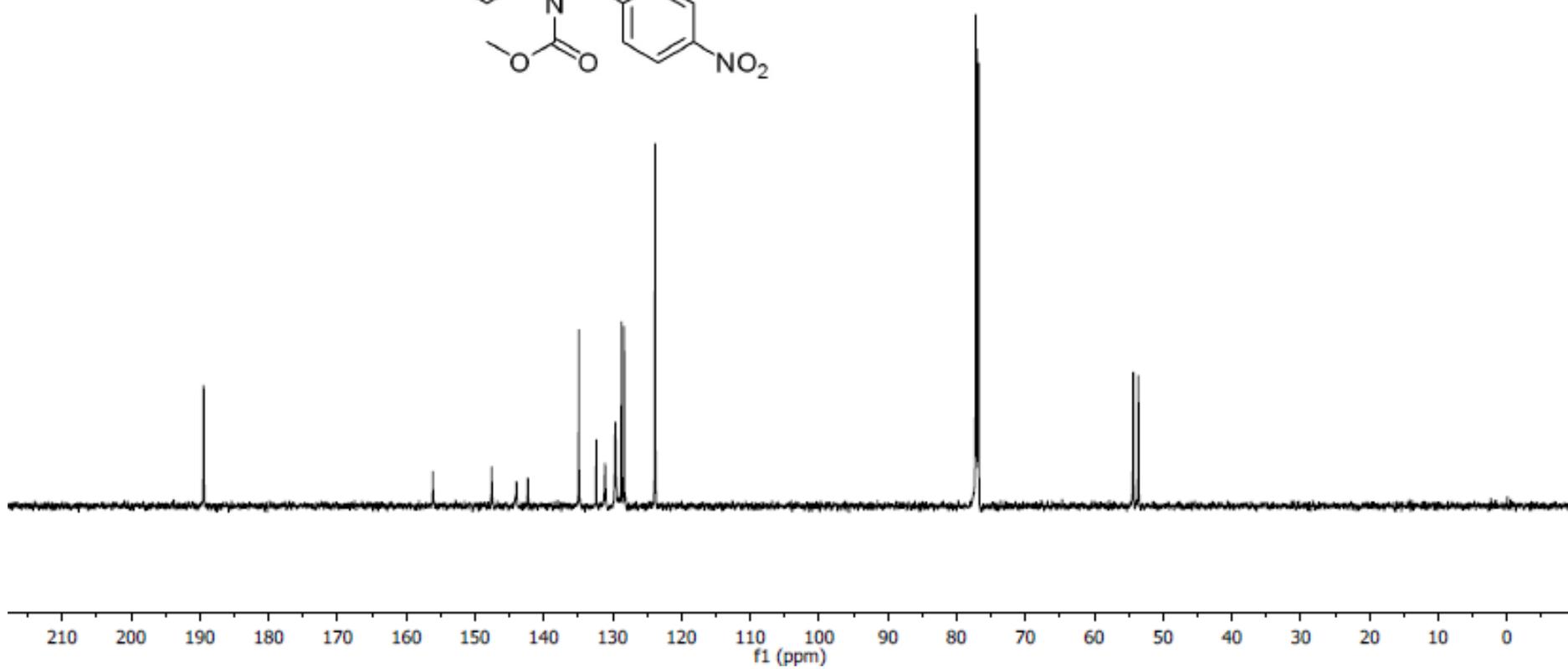
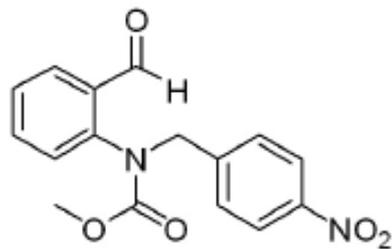
77.211

77.000

76.788

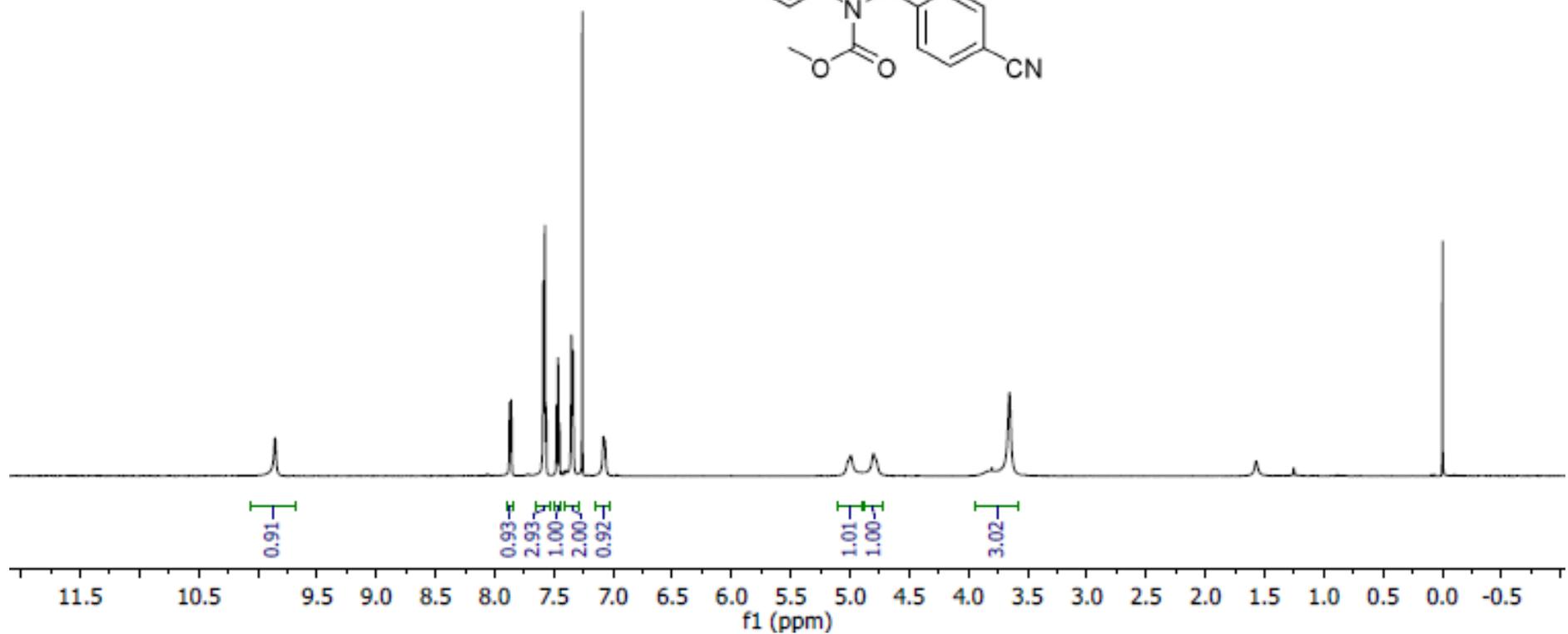
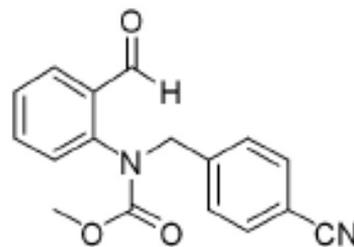
54.332

53.582



methyl (4-cyanobenzyl)(2-formylphenyl)carbamate s3-j

9.854
7.874
7.861
7.589
7.576
7.566
7.563
7.477
7.465
7.452
7.352
7.339
7.260
7.081
7.070
1.989
1.806
3.654



methyl (4-cyanobenzyl)(2-formylphenyl)carbamate s3-j

189.403

156.096

142.410

141.947

134.878

134.718

132.392

130.845

129.442

128.684

128.267

118.452

111.860

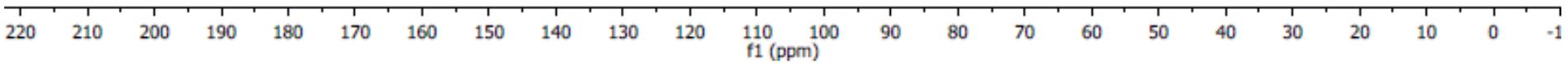
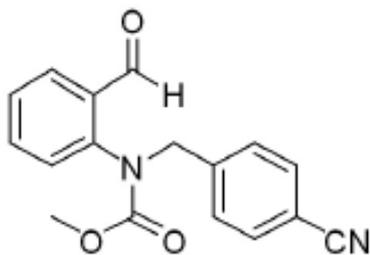
77.212

77.000

76.788

54.623

53.533



methyl (2-formylphenyl)((perfluorophenyl)methyl)carbamate s3-k

9.942

7.877

7.874

7.864

7.861

7.622

7.620

7.610

7.607

7.597

7.594

7.499

7.486

7.473

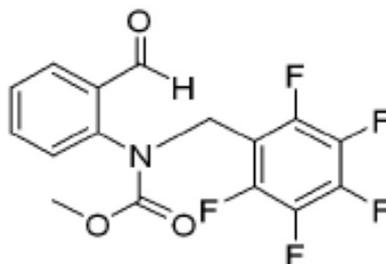
7.260

7.183

7.169

5.022

3.637



0.94

1.00

1.04

1.01

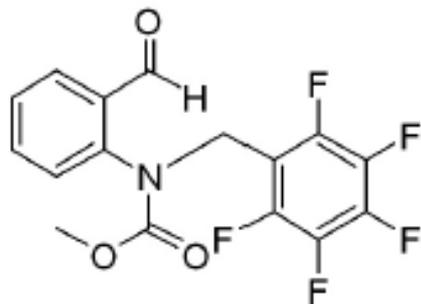
0.99

2.26

3.15

f1 (ppm)

methyl (2-formylphenyl)((perfluorophenyl)methyl)carbamate s3-k

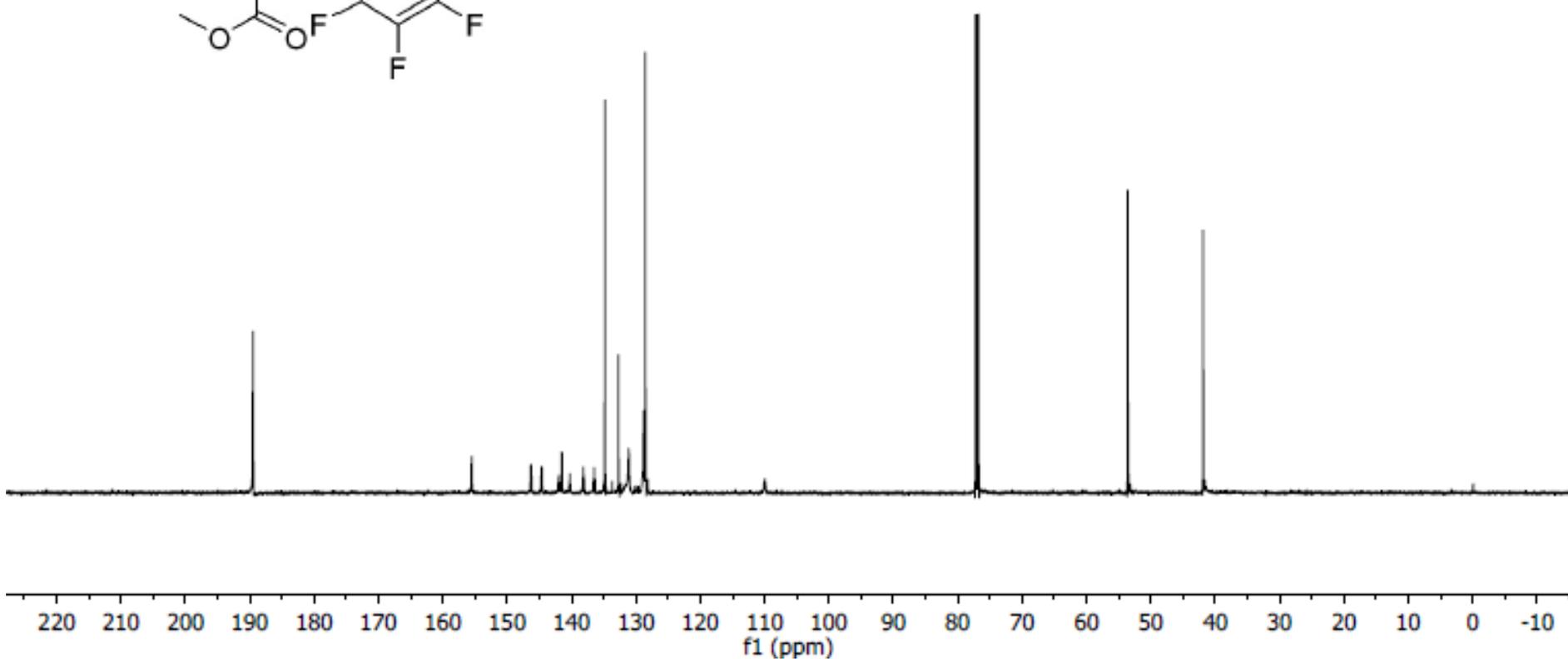


189.479
155.502
146.279
144.622
141.968
141.500
140.275
138.150
136.475
134.817
132.694
131.096
128.526
109.952

77.211
77.000
76.788

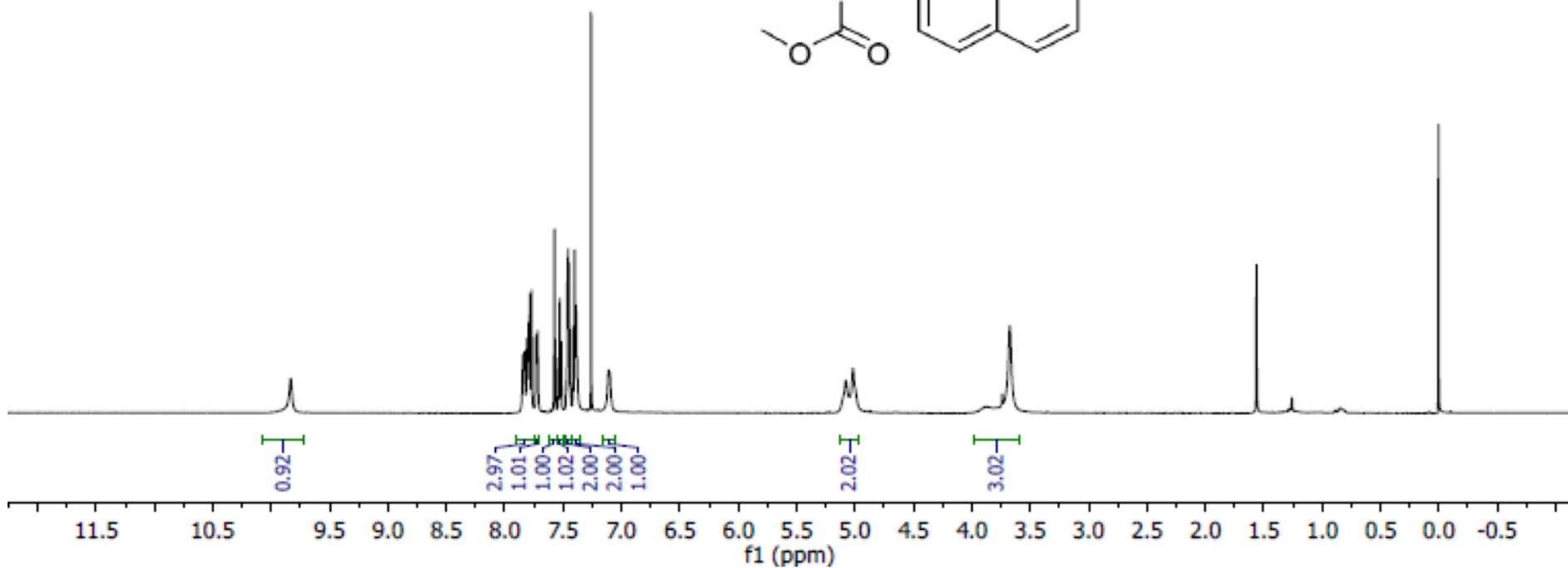
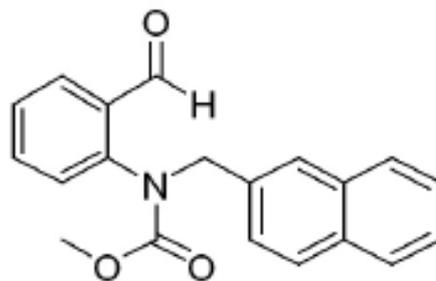
53.580

41.885



methyl (2-formylphenyl)(naphthalen-2-ylmethyl)carbamate s3-l

9.833
7.832
7.811
7.806
7.796
7.784
7.770
7.732
7.721
7.717
7.574
7.529
7.527
7.516
7.514
7.462
7.456
7.450
7.414
7.401
7.389
7.269
5.083
5.016
3.674



methyl (2-formylphenyl)(naphthalen-2-ylmethyl)carbamate s3-l

189.583

156.259

143.159

134.731

133.928

133.154

132.875

132.719

129.463

129.418

128.809

128.516

127.936

127.814

127.672

126.631

126.222

126.110

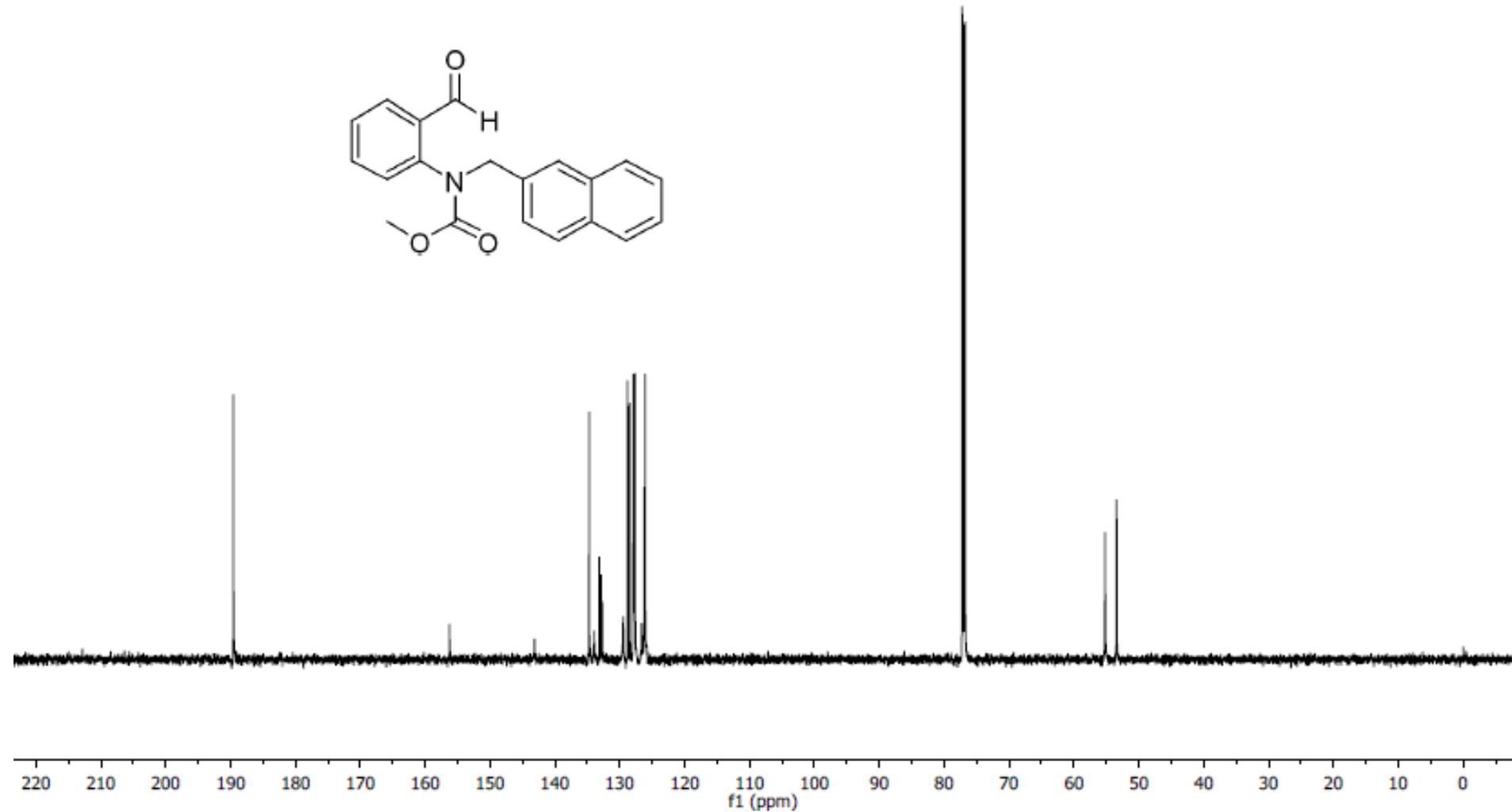
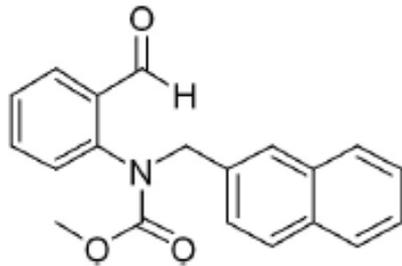
77.211

77.000

76.788

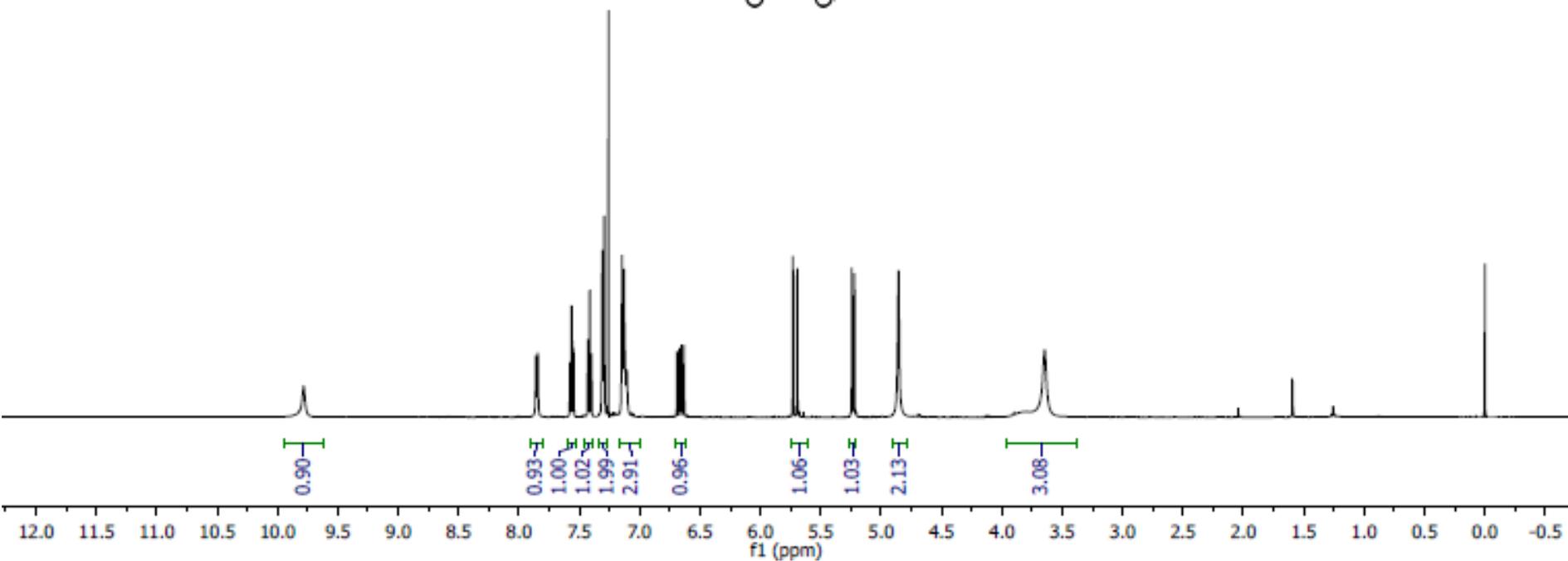
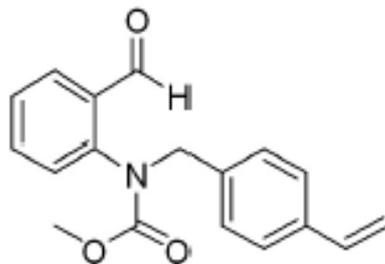
55.200

53.421



methyl (2-formylphenyl)(4-vinylbenzyl)carbamate s3-m

9.783
7.859
7.844
7.564
7.560
7.548
7.545
7.430
7.429
7.413
7.398
7.310
7.294
7.146
7.130
6.690
6.668
6.654
6.633
5.730
5.695
5.243
5.221
4.856
3.646



methyl (2-formylphenyl)(4-vinylbenzyl)carbamate s3-m

189.561

156.135

137.264

136.261

135.899

134.746

132.777

129.329

129.140

128.786

127.932

126.476

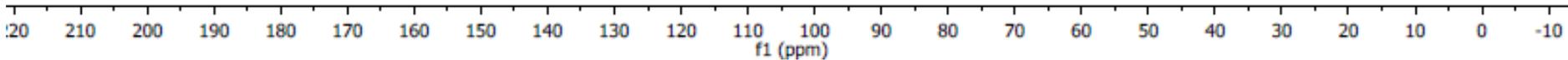
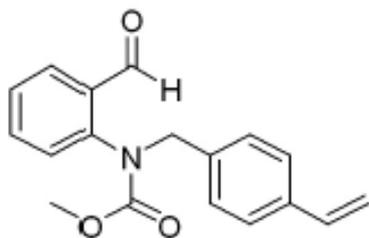
77.255

77.000

76.746

54.796

53.362



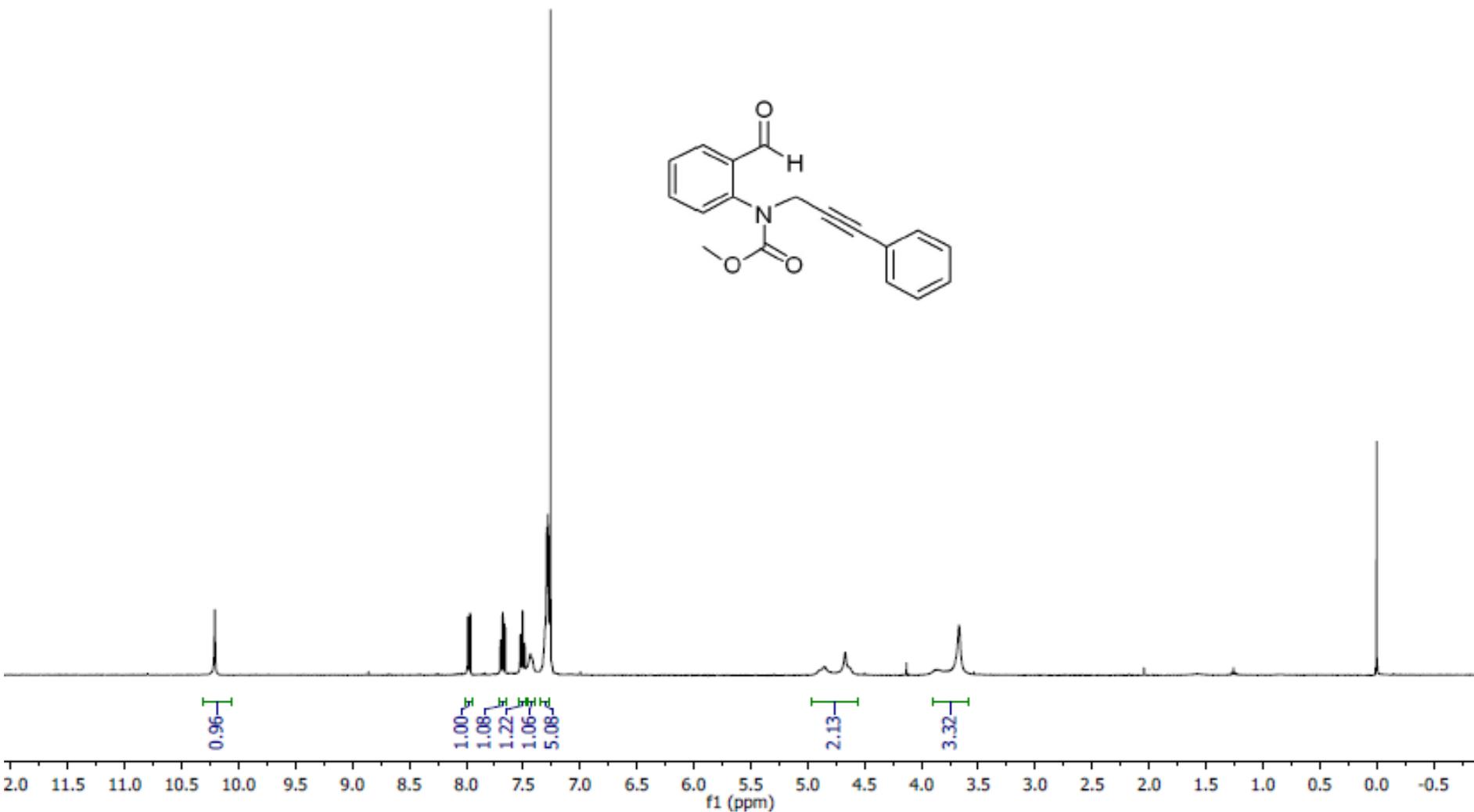
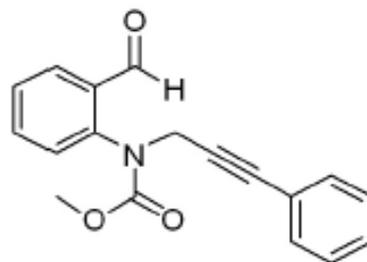
methyl (2-formylphenyl)(3-phenylprop-2-yn-1-yl)carbamate s3-n

10.210

7.987
7.982
7.967
7.963
7.700
7.696
7.680
7.676
7.662
7.657
7.524
7.505
7.486
7.438
7.419
7.306
7.291
7.287
7.282
7.270

4.850
4.672

3.667



methyl (2-formylphenyl)(3-phenylprop-2-yn-1-yl)carbamate s3-n

—189.77

—155.48

—142.56

—134.87

—133.24

—131.45

—129.18

—128.84

—128.44

—128.38

—128.19

—122.12

—85.46

—83.36

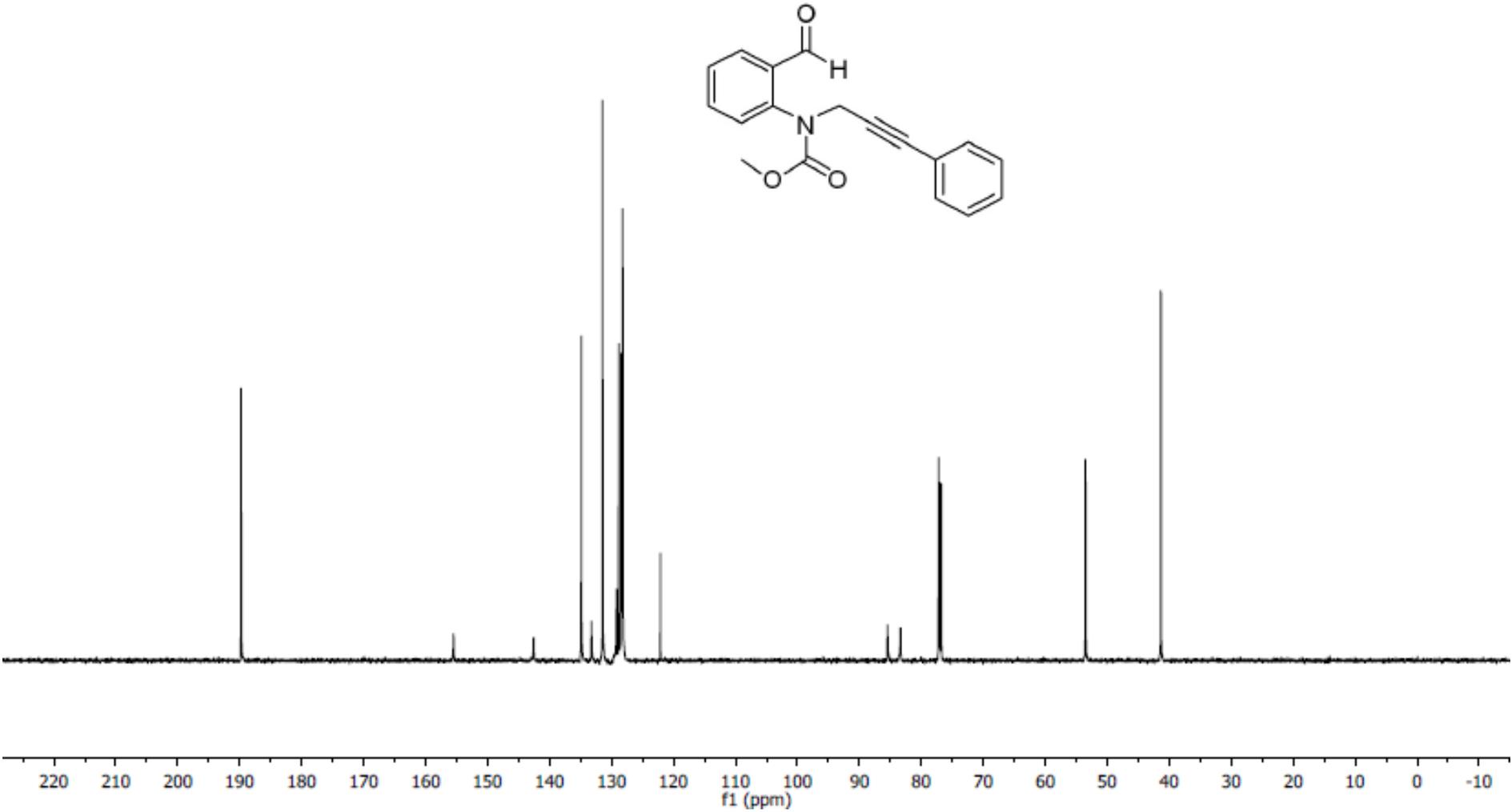
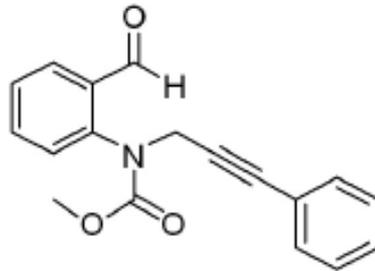
—77.21

—77.00

—76.79

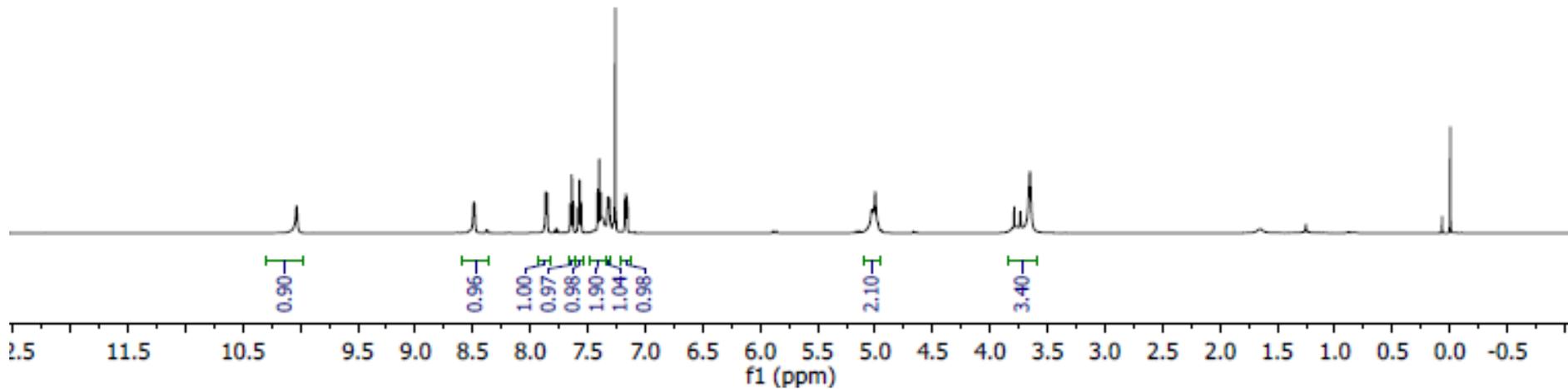
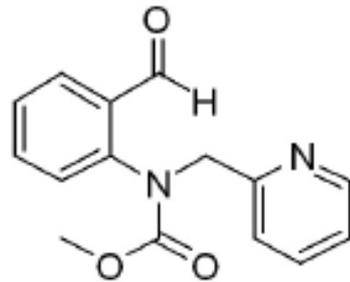
—53.51

—41.33



methyl (2-formylphenyl)(pyridin-2-ylmethyl)carbamate s3-o

10.033
8.491
7.865
7.853
7.640
7.637
7.627
7.571
7.413
7.400
7.387
7.324
7.312
7.260
7.175
7.167
5.026
4.999
3.654



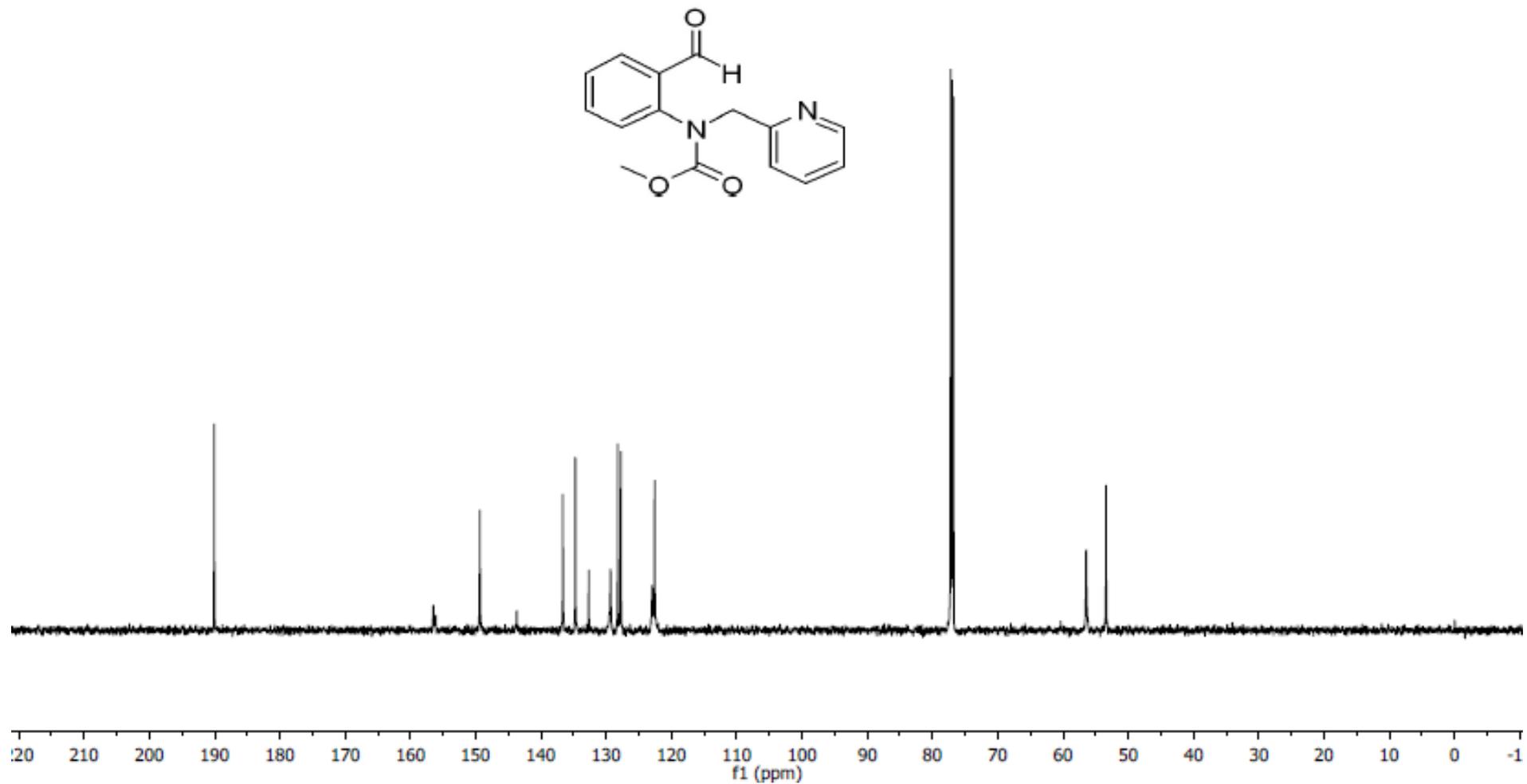
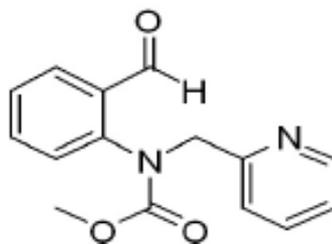
methyl (2-formylphenyl)(pyridin-2-ylmethyl)carbamate s3-o

190.075

156.503
156.120
149.360
143.700
136.643
134.729
132.672
129.338
128.229
127.766
122.952
122.572

77.212
77.000
76.788

56.454
53.403

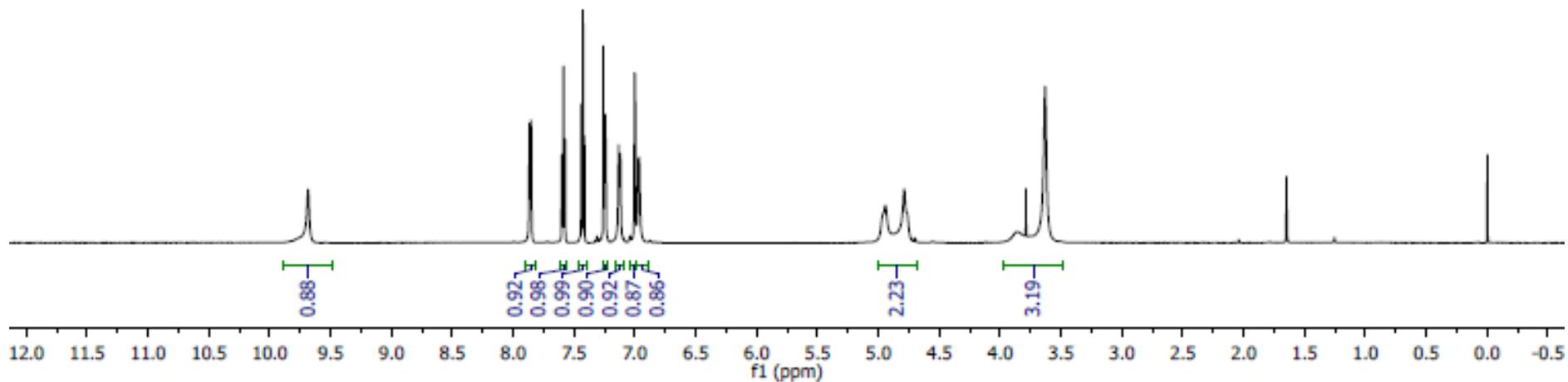
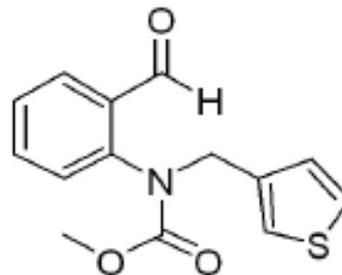


methyl (2-formylphenyl)(thiophen-3-ylmethyl)carbamate s3-p

9.685
7.866
7.854
7.602
7.600
7.589
7.587
7.576
7.574
7.440
7.428
7.415
7.260
7.252
7.247
7.245
7.240
7.133
7.121
7.002
7.000
6.970
6.966

4.941
4.788

3.631



methyl (2-formylphenyl)(thiophen-3-ylmethyl)carbamate s3-p

— 189.406

— 155.902

143.199

136.851

134.808

132.955

129.052

128.824

128.017

126.419

124.393

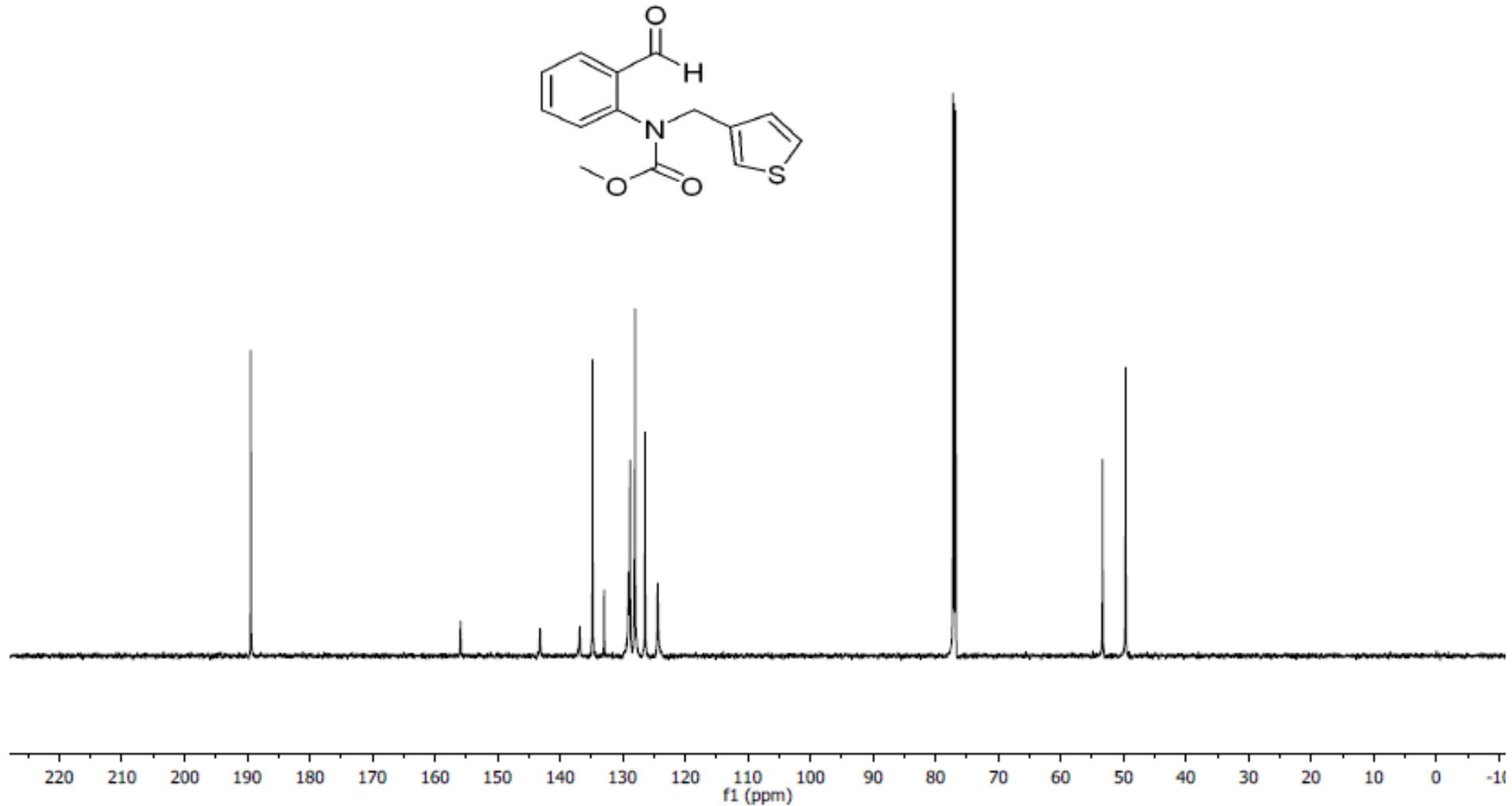
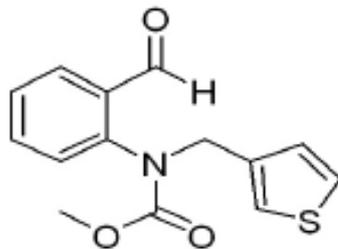
77.211

77.000

76.788

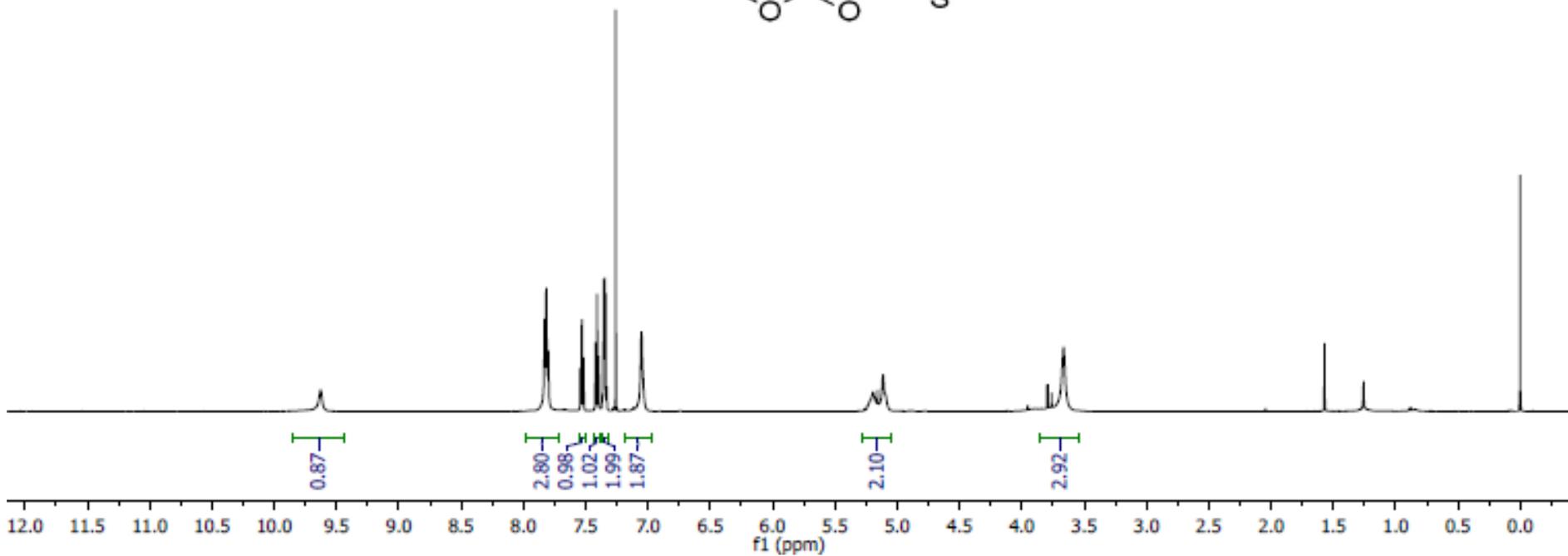
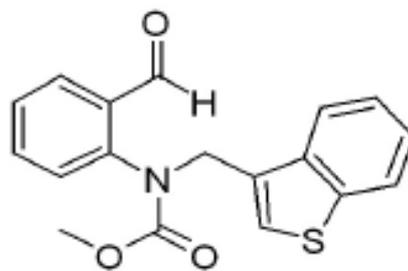
— 53.318

— 49.636



methyl (benzo[*b*]thiophen-3-ylmethyl)(2-formylphenyl)carbamate s3-q

9.628
7.832
7.829
7.824
7.821
7.817
7.801
7.542
7.532
7.529
7.519
7.517
7.421
7.408
7.397
7.396
7.355
7.348
7.343
7.340
7.260
5.195
5.114
3.665



methyl (benzo[*b*]thiophen-3-ylmethyl)(2-formylphenyl)carbamate s3-q

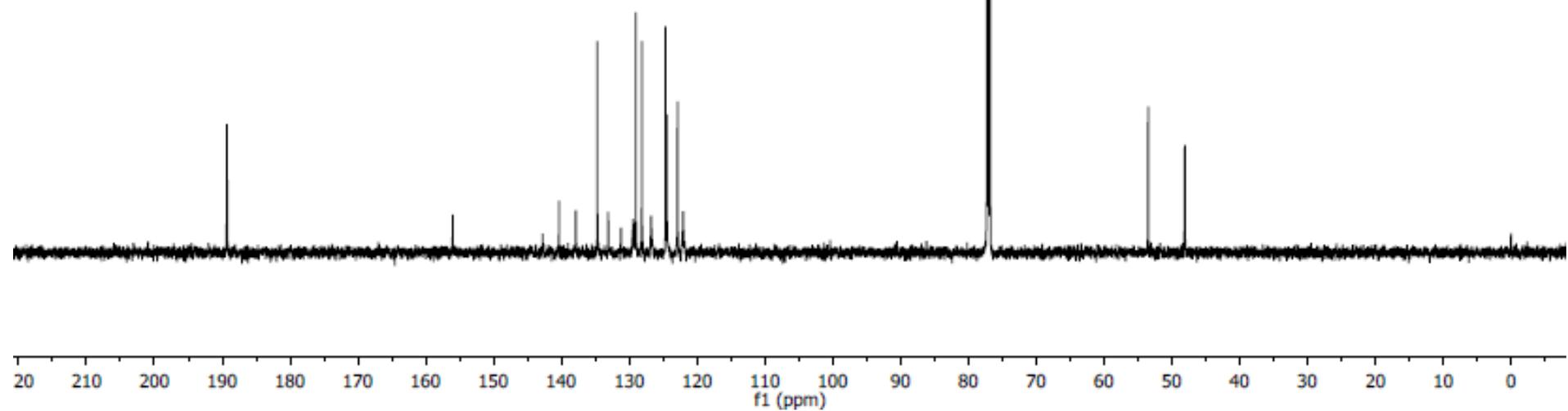
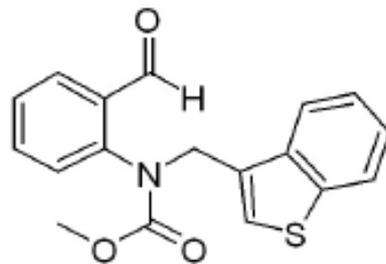
—189.300

—156.018
—142.746
—140.336
—137.861
—134.699
—133.087
—131.195
—129.388
—129.015
—128.119
—126.735
—124.619
—124.448
—122.866
—122.042

—77.212
—77.000
—76.788

—53.481

—48.059



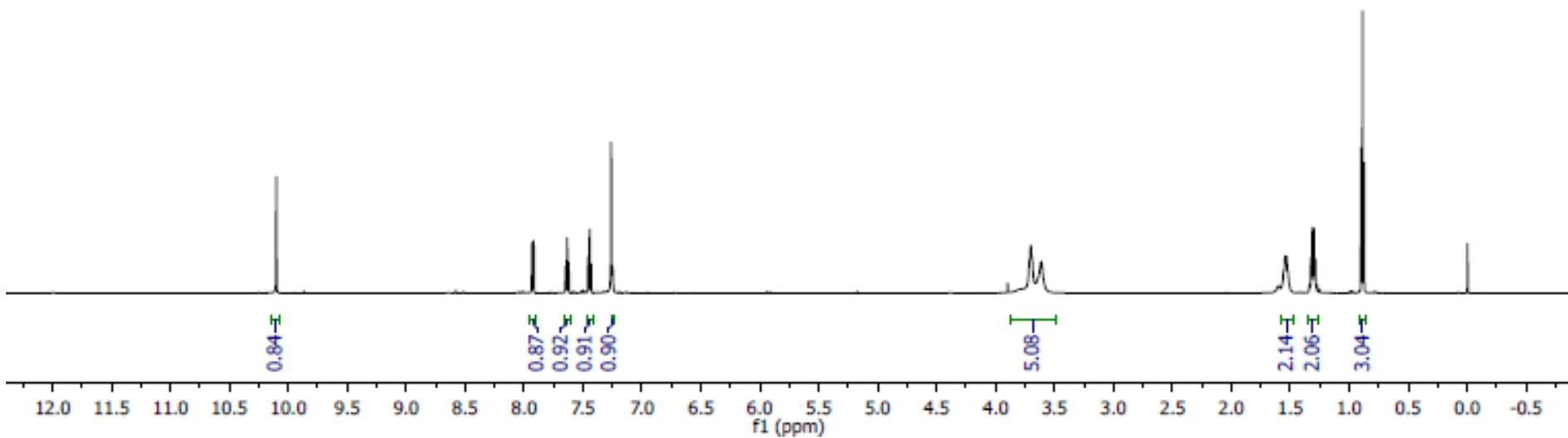
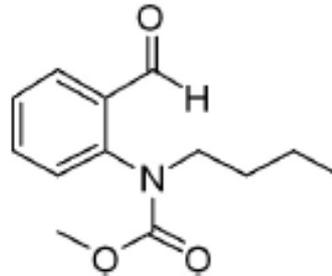
methyl butyl(2-formylphenyl)carbamate s3-r

10.10

7.93
7.92
7.65
7.63
7.62
7.62
7.46
7.44
7.43
7.26
7.25

3.70
3.61

1.55
1.54
1.53
1.52
1.34
1.32
1.31
1.30
1.29
1.27
0.90
0.89
0.87



methyl butyl(2-formylphenyl)carbamate s3-r

— 189.819

— 155.807

— 143.923

— 134.832

— 132.786

— 129.218

— 128.631

— 127.716

— 77.212

— 77.000

— 76.789

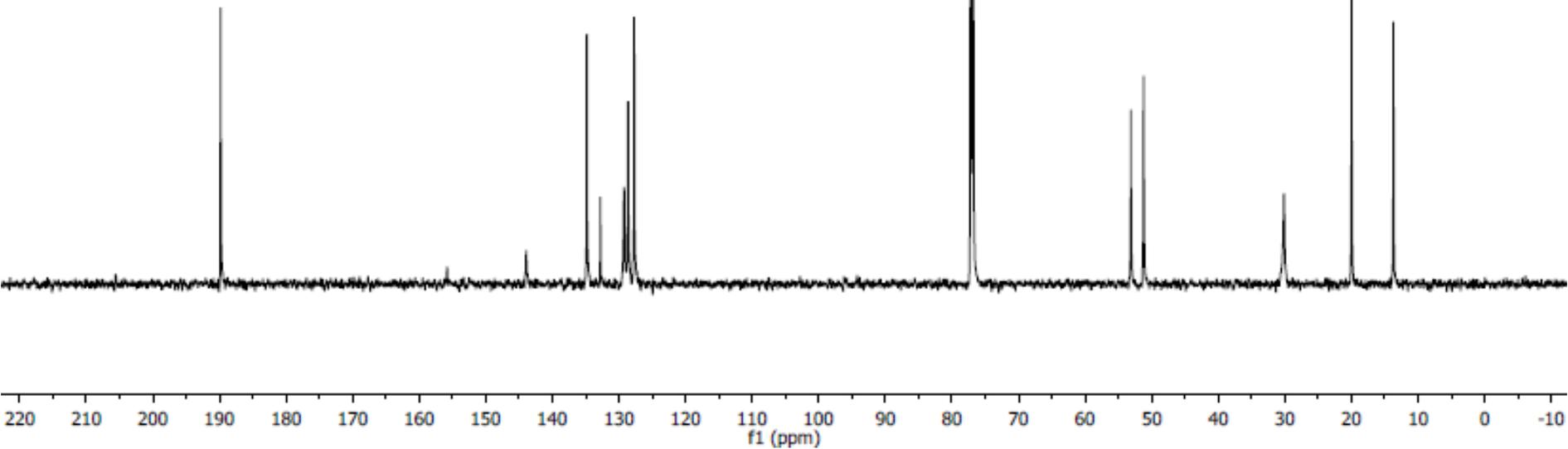
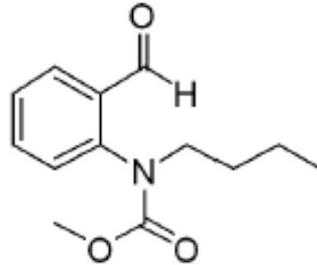
— 53.123

— 51.214

— 30.134

— 19.981

— 13.699

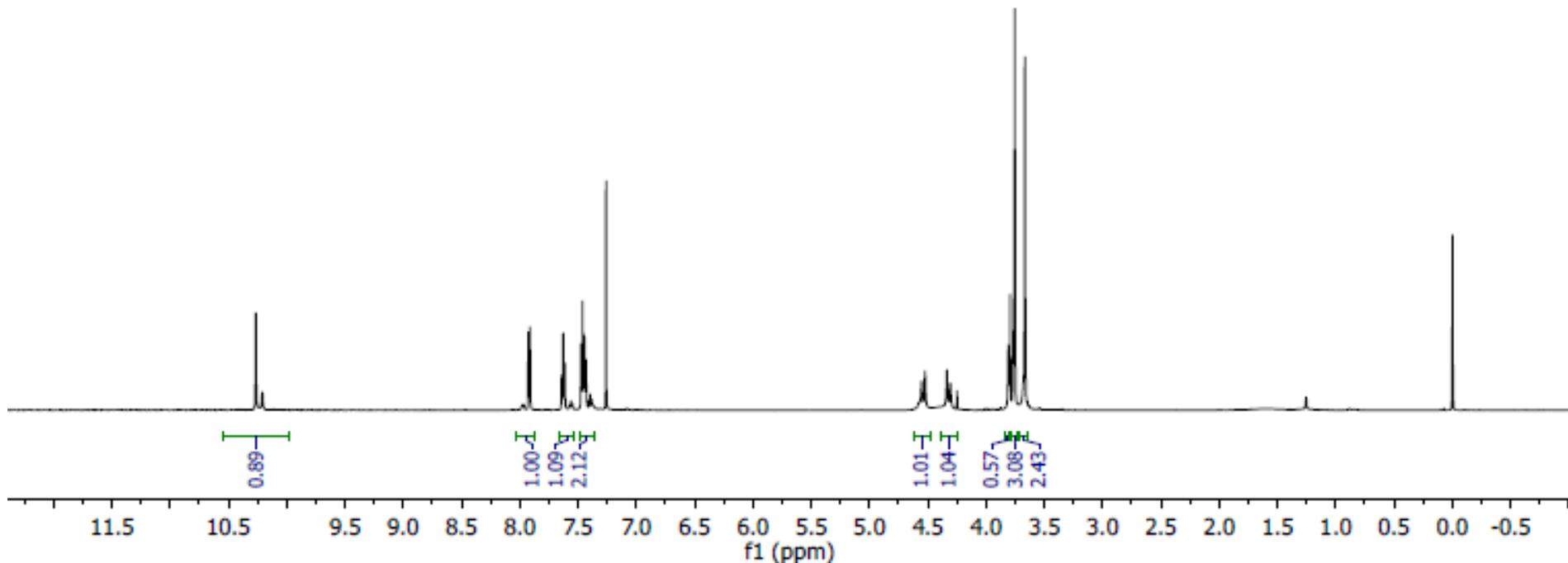
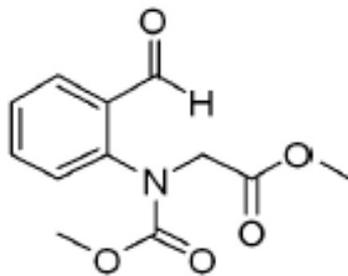


methyl *N*-(2-formylphenyl)-*N*-(methoxycarbonyl)glycinate s3-s

—10.265

7.926
7.913
7.640
7.627
7.614
7.474
7.461
7.448
7.432
7.260

4.553
4.523
4.335
4.306
3.807
3.793
3.754
3.667



methyl *N*-(2-formylphenyl)-*N*-(methoxycarbonyl)glycinate s3-s

—190.20

—169.60

—155.86

—143.16

134.86

132.55

130.12

129.51

128.18

77.25

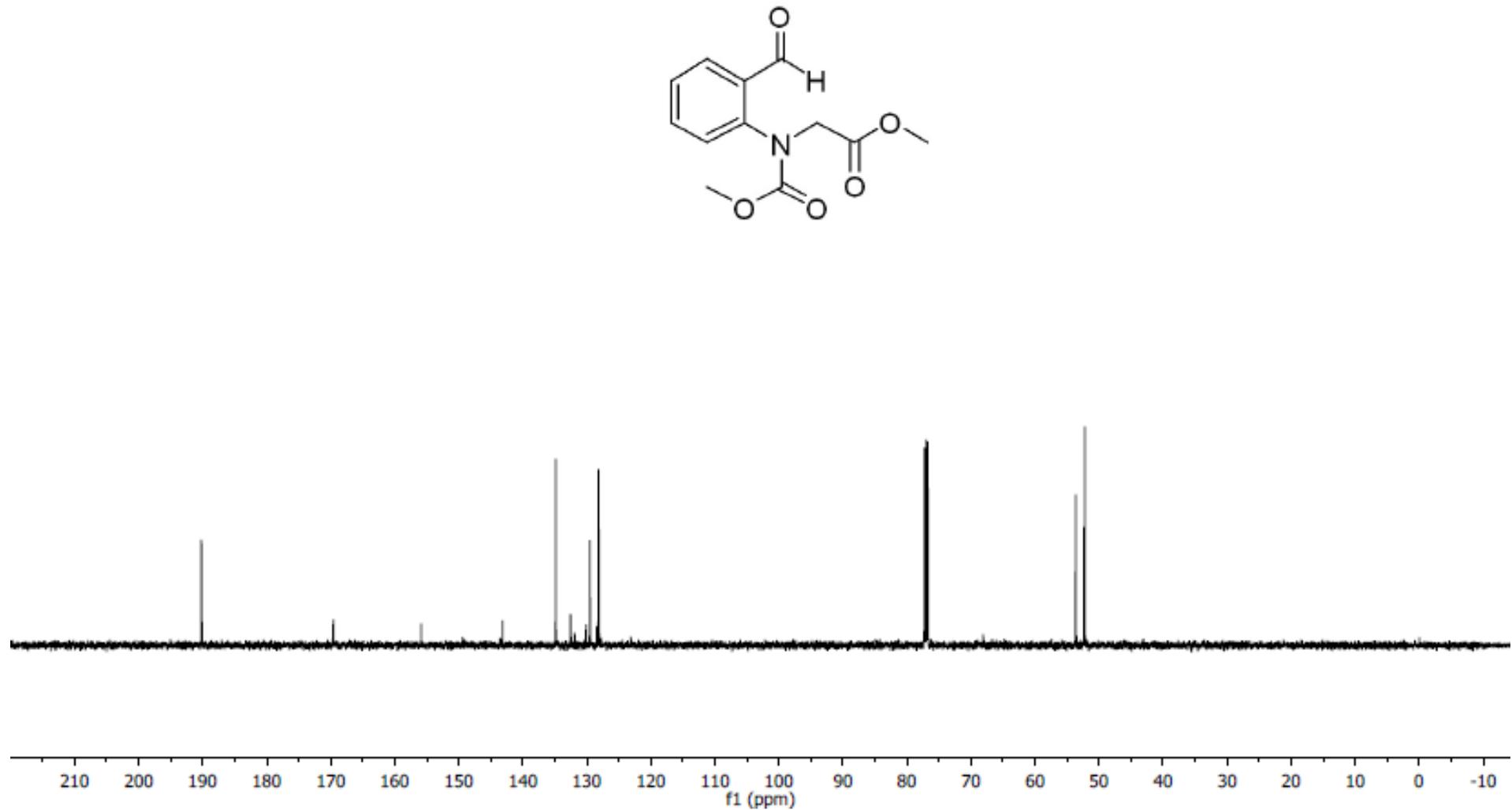
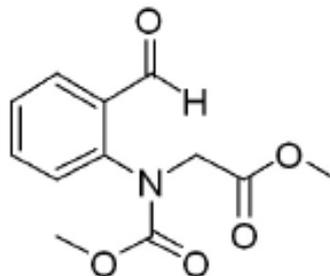
77.00

76.75

53.65

52.32

52.22



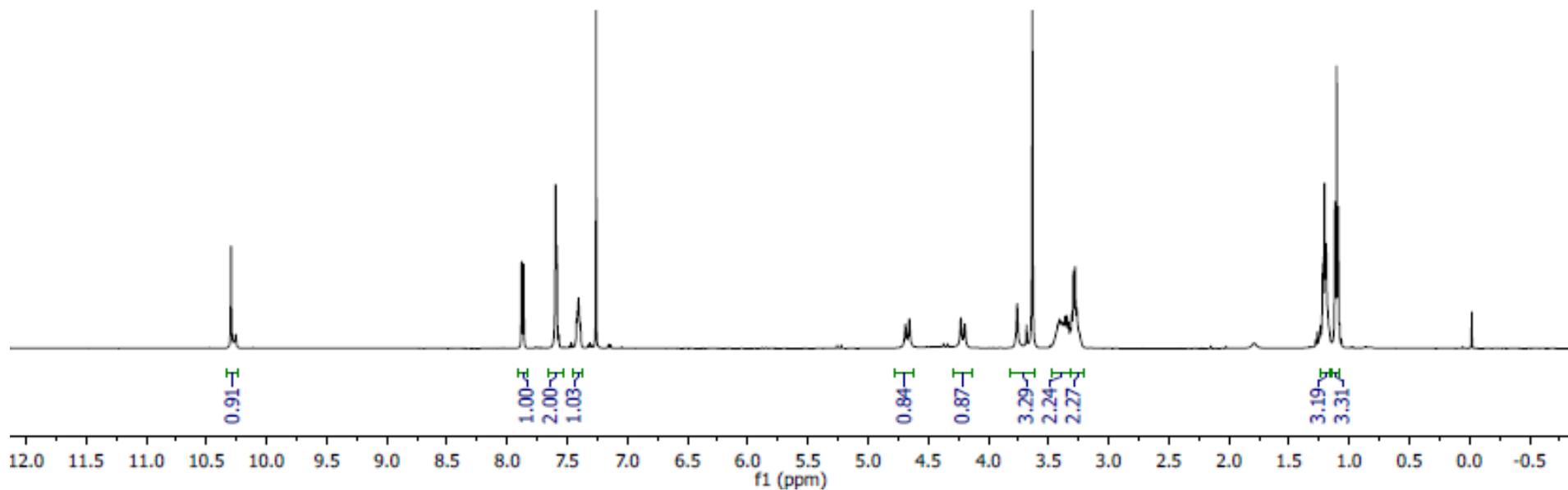
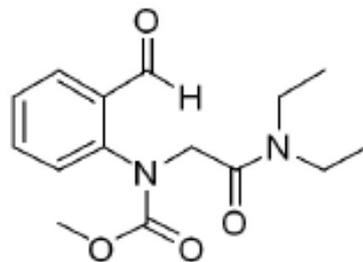
methyl (2-(diethylamino)-2-oxoethyl)(2-formylphenyl)carbamate s3-t

—10.295

7.880
7.865
7.597
7.591
7.423
7.416
7.407
7.397
7.391
7.260

4.689
4.657
4.228
4.195

3.633
3.407
3.394
3.377
3.361
3.347
3.333
3.307
3.293
3.279
3.254
3.220
1.206
1.191
1.118
1.104
1.090



methyl (2-(diethylamino)-2-oxoethyl)(2-formylphenyl)carbamate s3-t

— 190.612

— 166.652

— 155.975

— 143.859

134.670

132.479

129.229

128.561

127.704

77.254

77.000

76.746

53.389

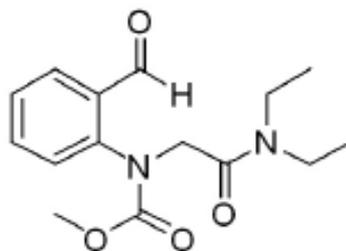
52.196

41.183

40.630

14.139

12.971

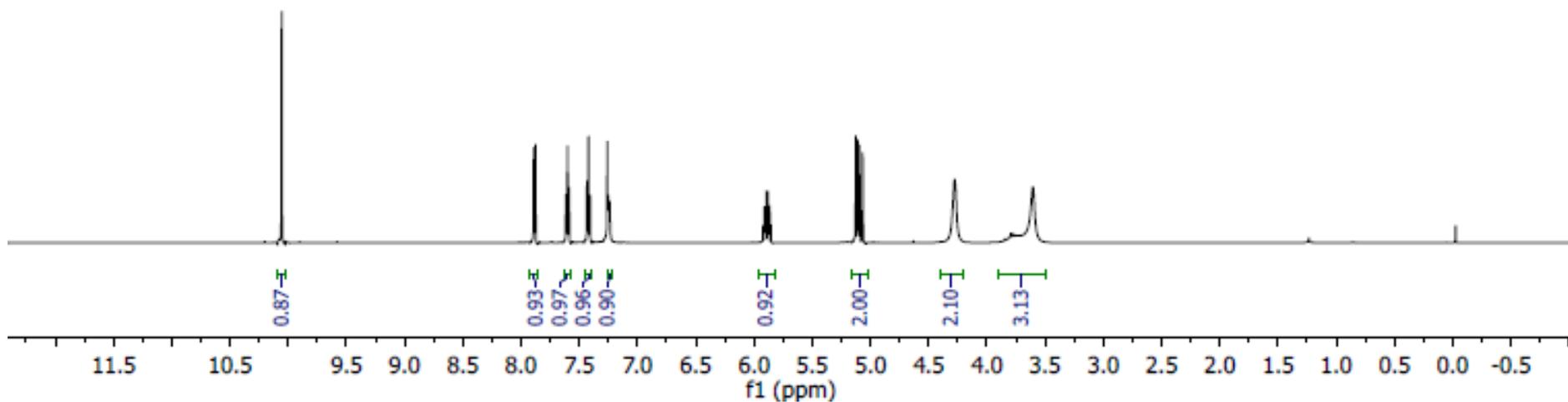
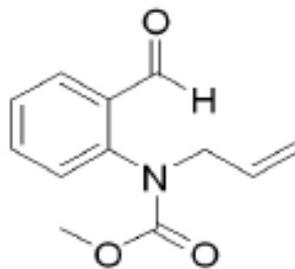


220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

methyl allyl(2-formylphenyl)carbamate s3-u

10.055

7.890 7.877 7.614 7.601 7.588 7.433 7.421 7.408 7.260 7.253 7.240 5.910 5.904 5.893 5.882 5.865 5.124 5.107 5.095 5.093 5.066 4.277 3.605



methyl allyl(2-formylphenyl)carbamate s3-u

189.841

155.722

143.379

134.778

132.674

129.441

128.673

117.892

116.140

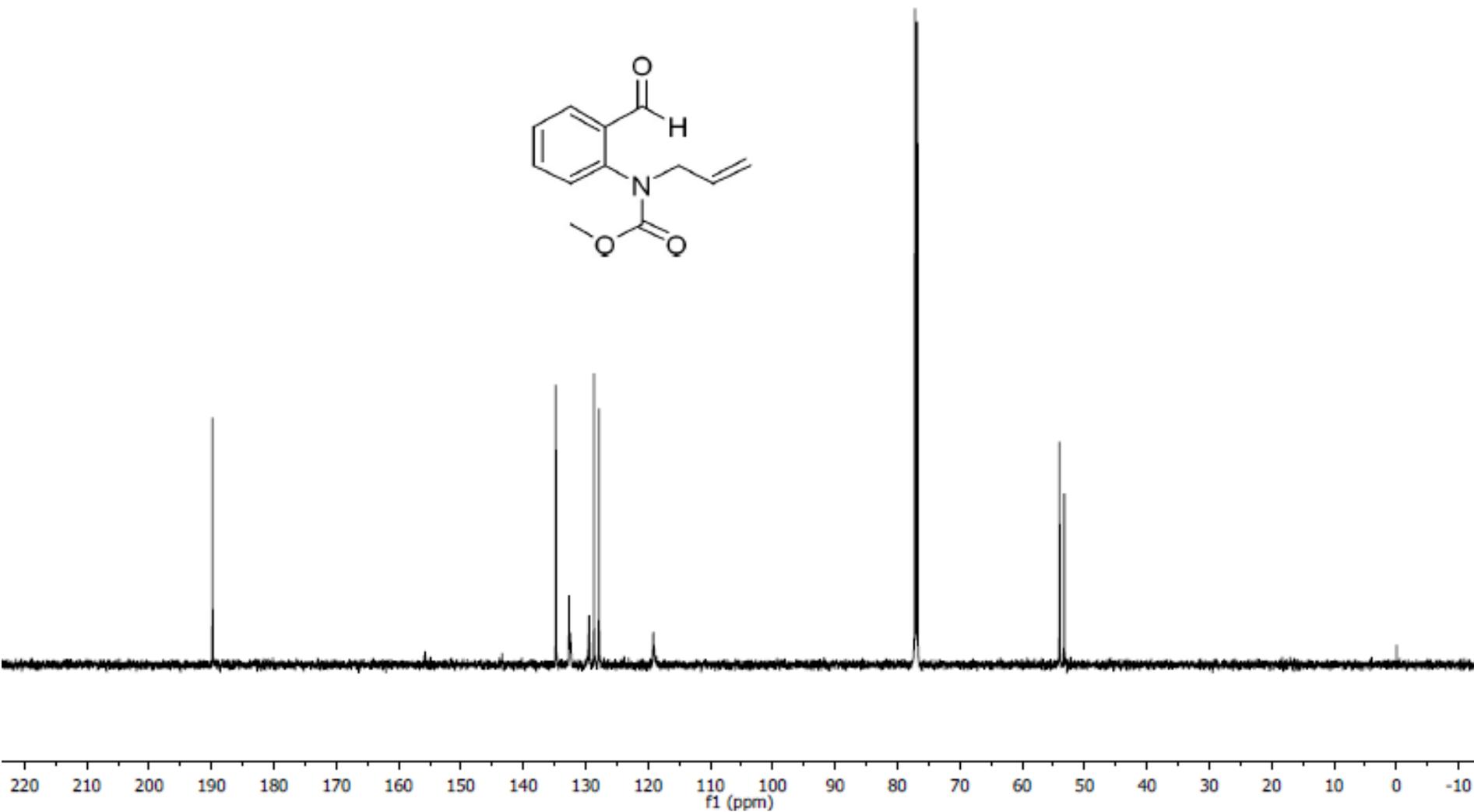
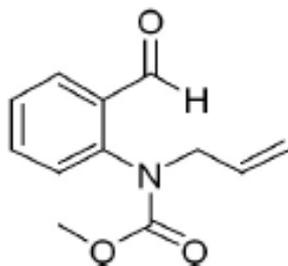
77.211

77.000

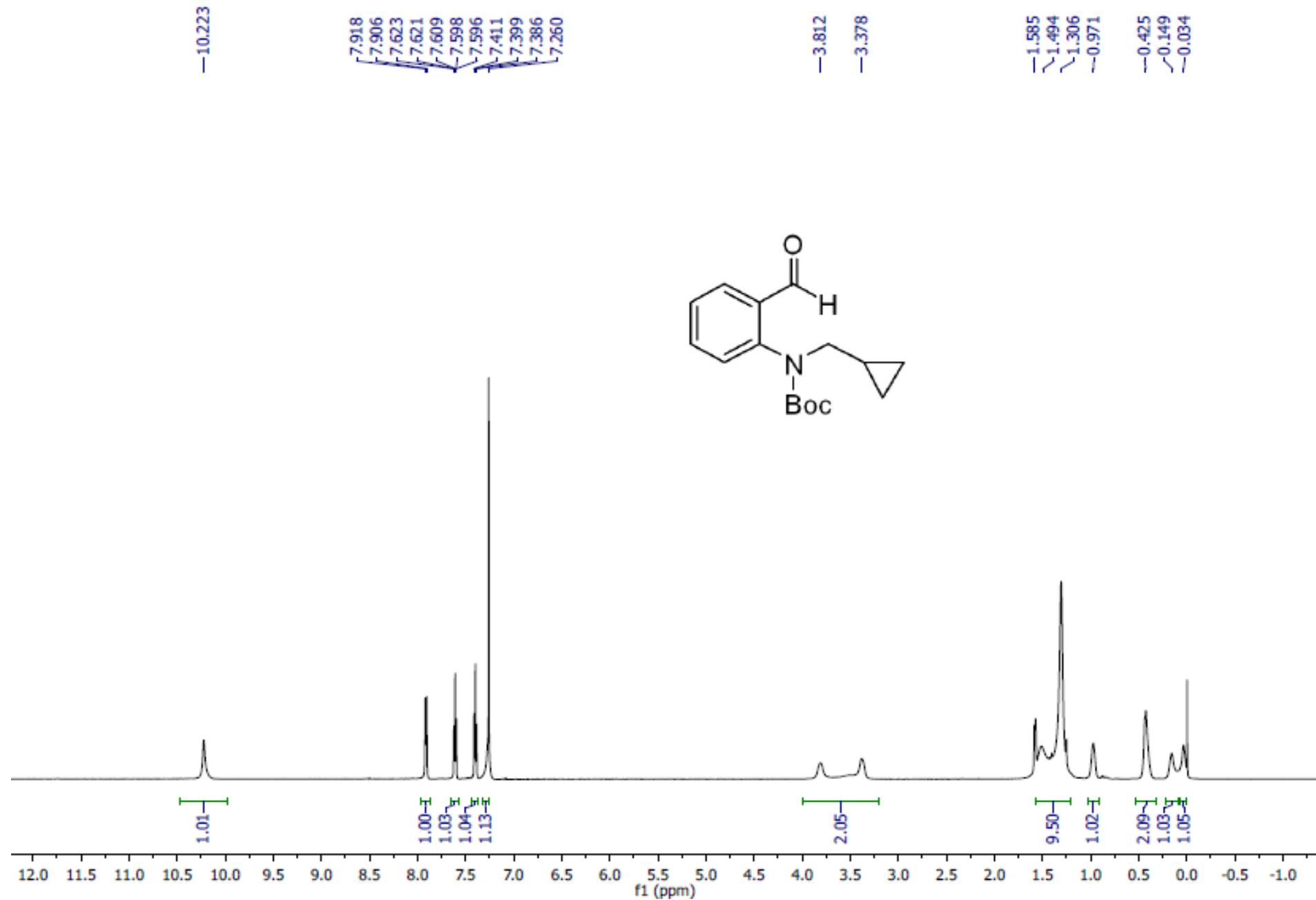
76.788

54.014

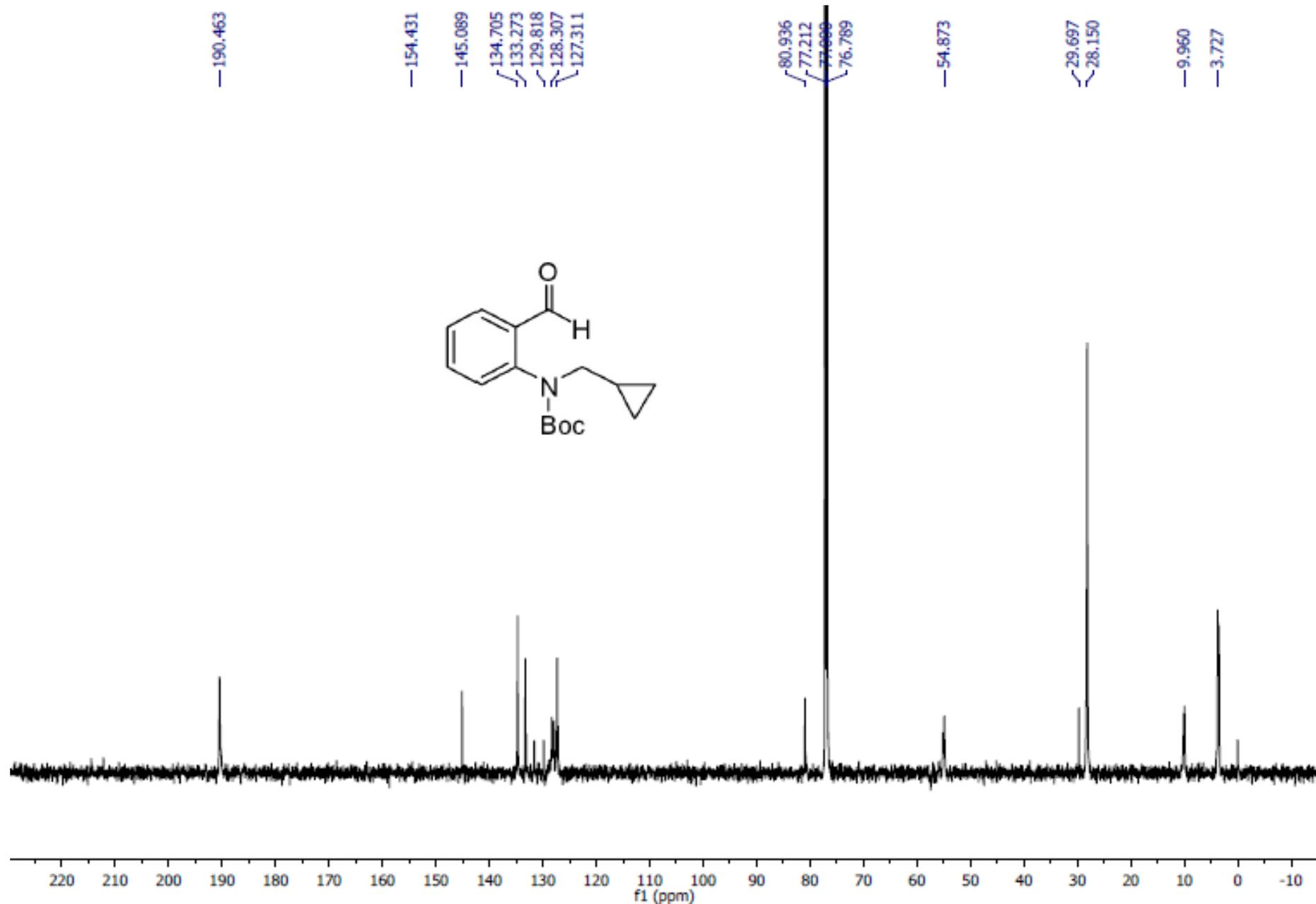
53.257



tert-butyl (cyclopropylmethyl)(2-formylphenyl)carbamate s3-v



tert-butyl (cyclopropylmethyl)(2-formylphenyl)carbamate s3-v



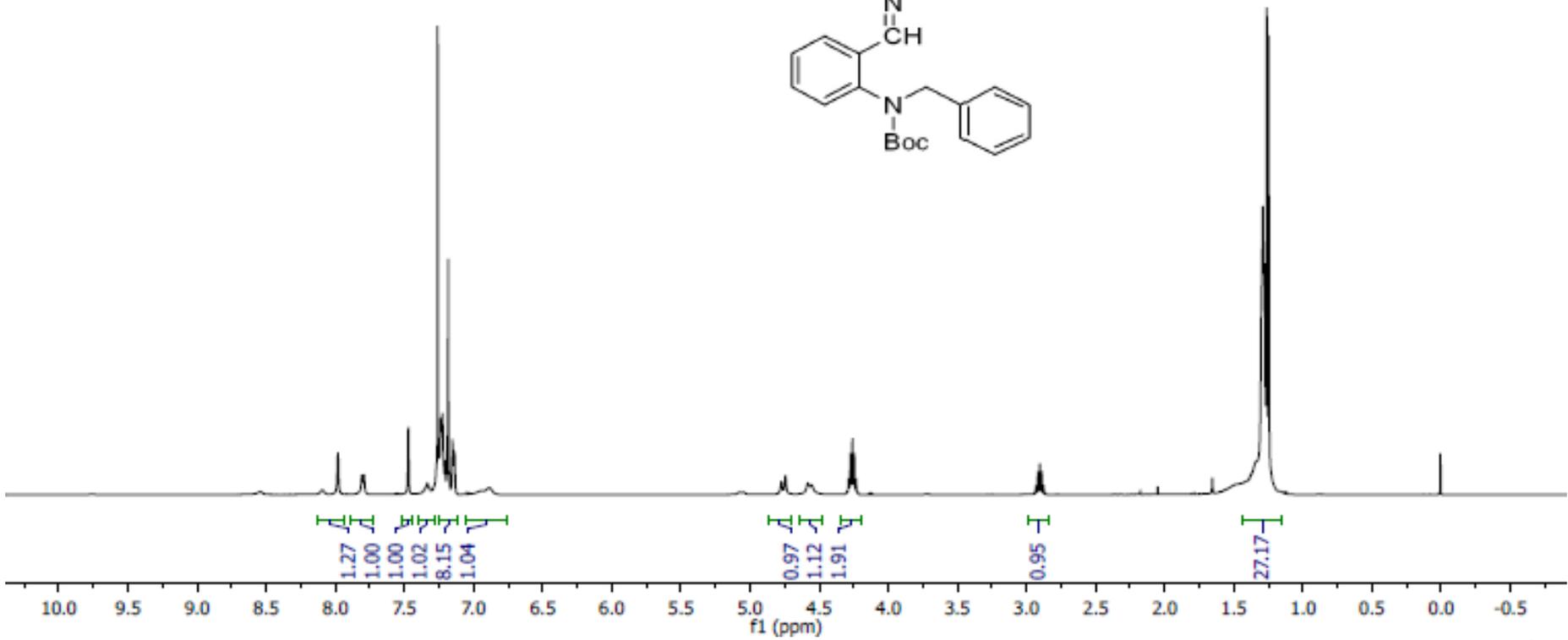
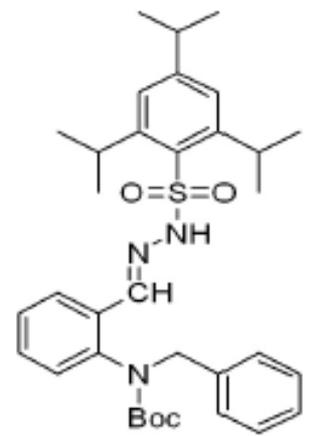
Note: The spectrum contains a mixture of amide rotamers and the major rotamer was labelled.

***tert*-butyl benzyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-a**

7.981
7.808
7.793
7.471
7.334
7.260
7.237
7.225
7.205
7.183
7.175
7.153
7.149
7.138
6.889

4.773
4.744
4.580
4.554
4.300
4.286
4.273
4.259
4.246
4.232
4.219
2.945
2.931
2.917
2.904
2.890
2.876
2.862

1.334
1.290
1.279
1.261
1.247



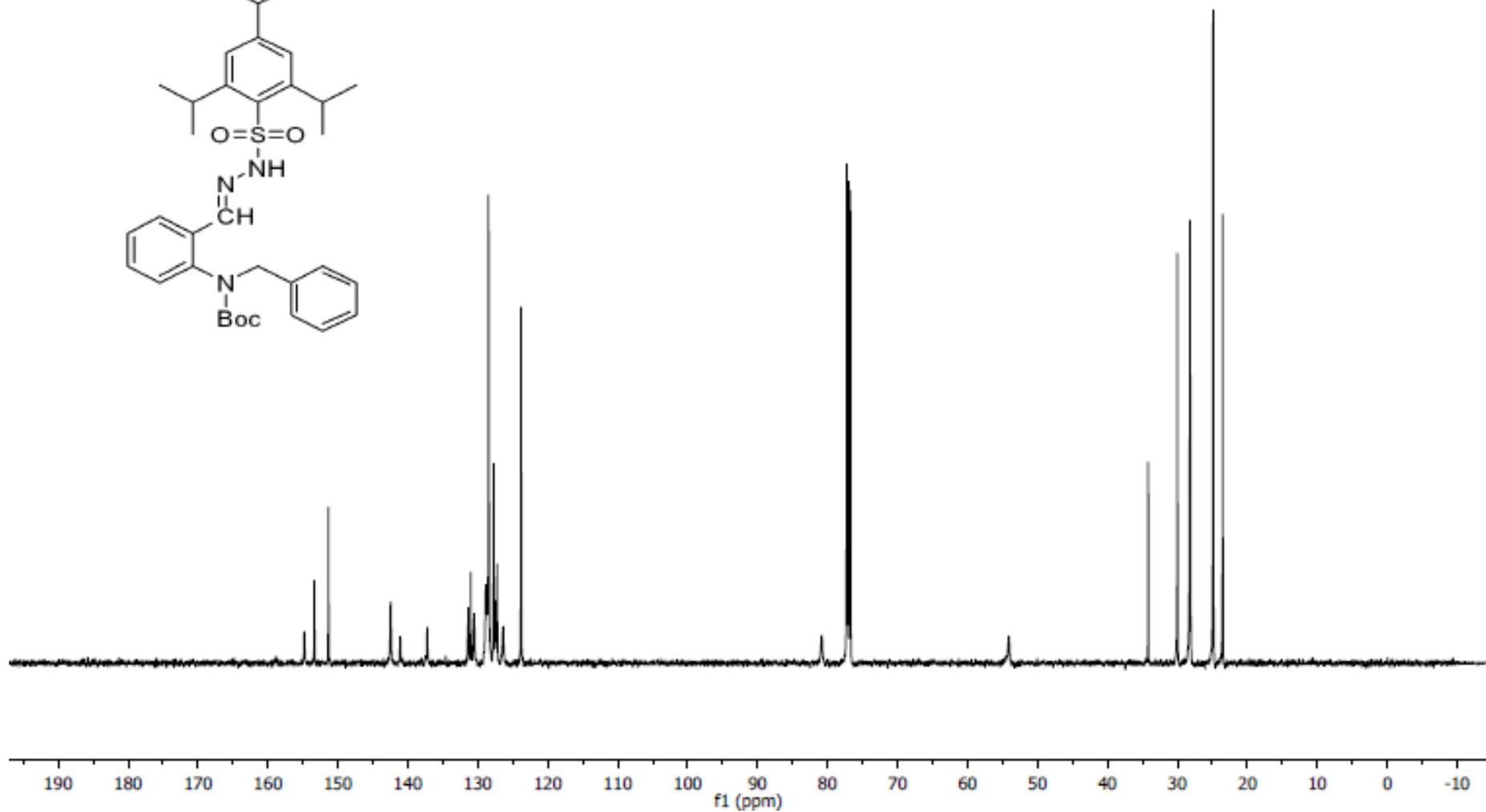
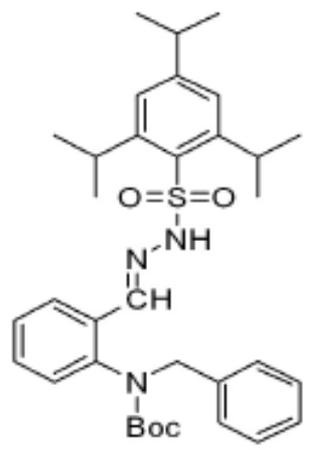
***tert*-butyl benzyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-a**

154.803
153.368
151.351
142.457
141.088
137.225
131.367
130.994
130.527
128.830
128.464
127.739
127.478
127.258
126.371
123.810

80.848
77.253
77.000
76.745

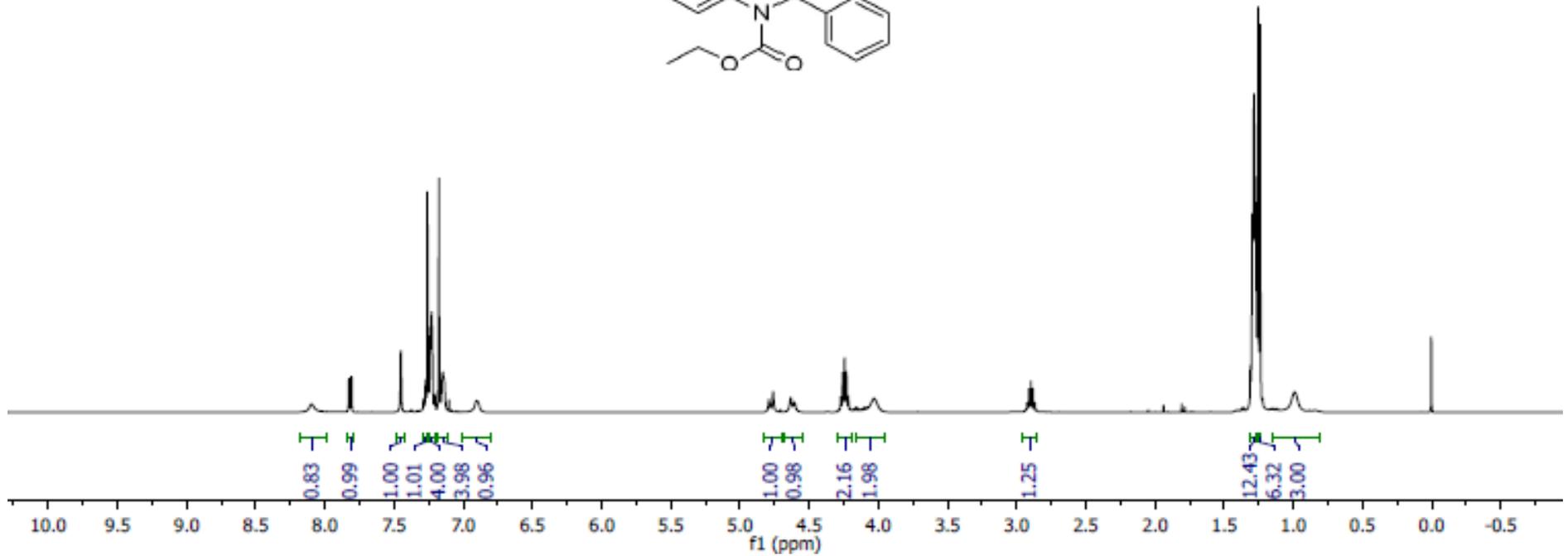
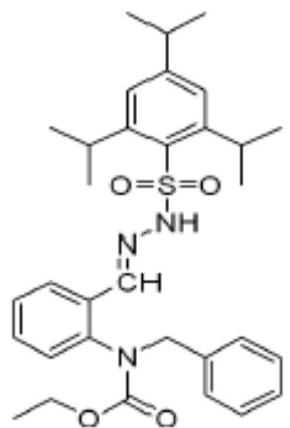
54.085

34.161
29.995
28.185
24.880
23.516



ethyl benzyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl) carbamate 1-b

8.096, 7.827, 7.824, 7.811, 7.808, 7.451, 7.285, 7.273, 7.270, 7.260, 7.239, 7.232, 7.228, 7.210, 7.203, 7.176, 7.148, 7.140, 4.761, 4.633, 4.605, 4.285, 4.271, 4.258, 4.244, 4.231, 4.217, 4.031, 2.938, 2.924, 2.911, 2.897, 2.883, 2.869, 2.855, 1.296, 1.284, 1.272, 1.254, 1.240, 0.990



ethyl benzyl(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl) carbamate 1-b

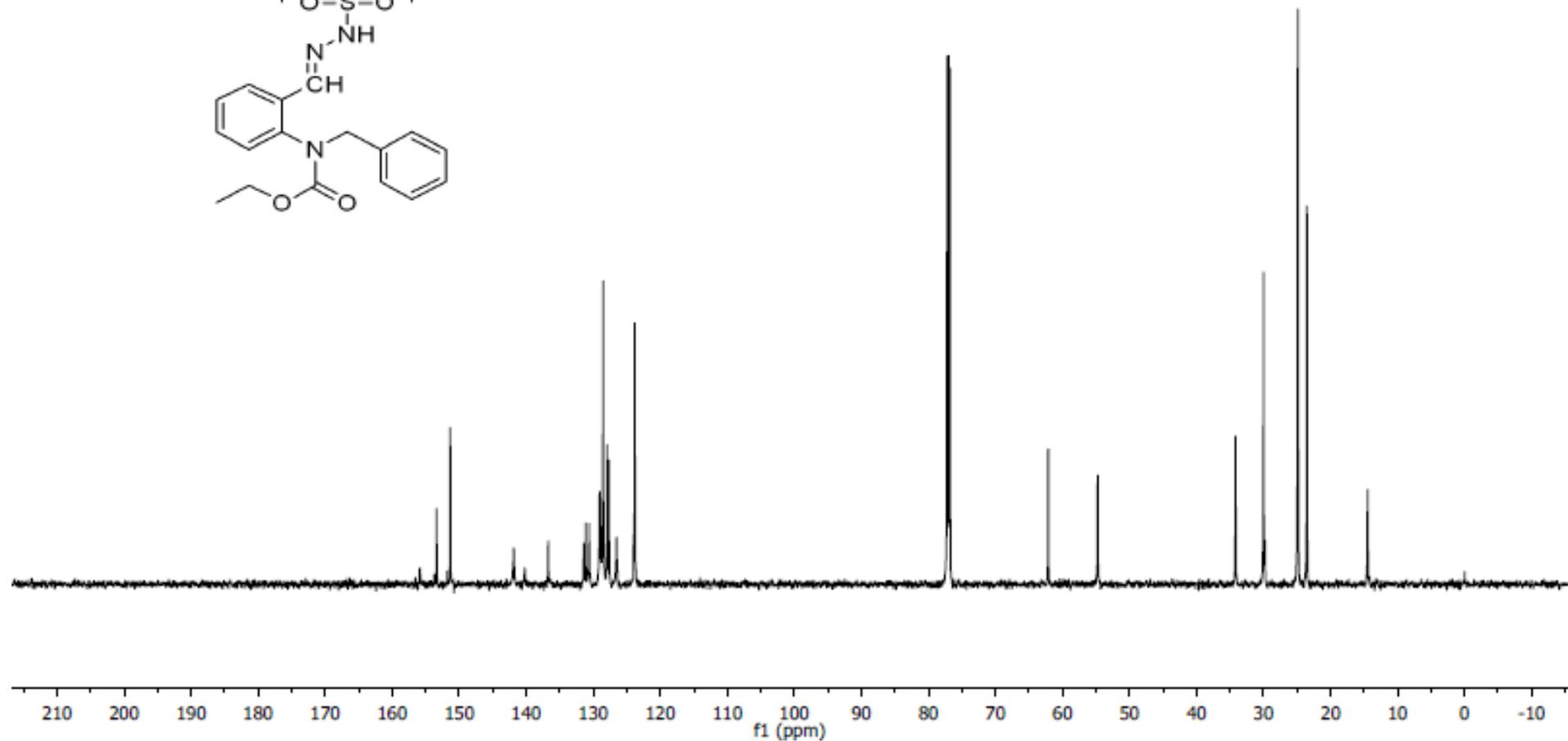
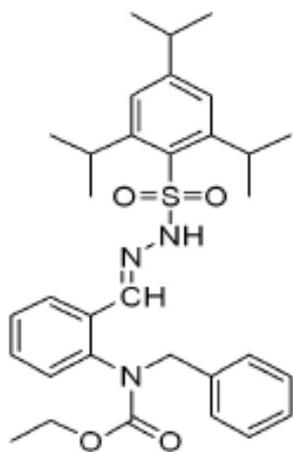
155.874
153.376
151.337
141.872
140.216
136.716
131.424
131.140
130.617
129.051
128.530
127.940
127.656
126.524
123.991
123.814

77.211
77.000
76.788

62.120
54.739

34.167
30.001
24.878
23.521

14.460



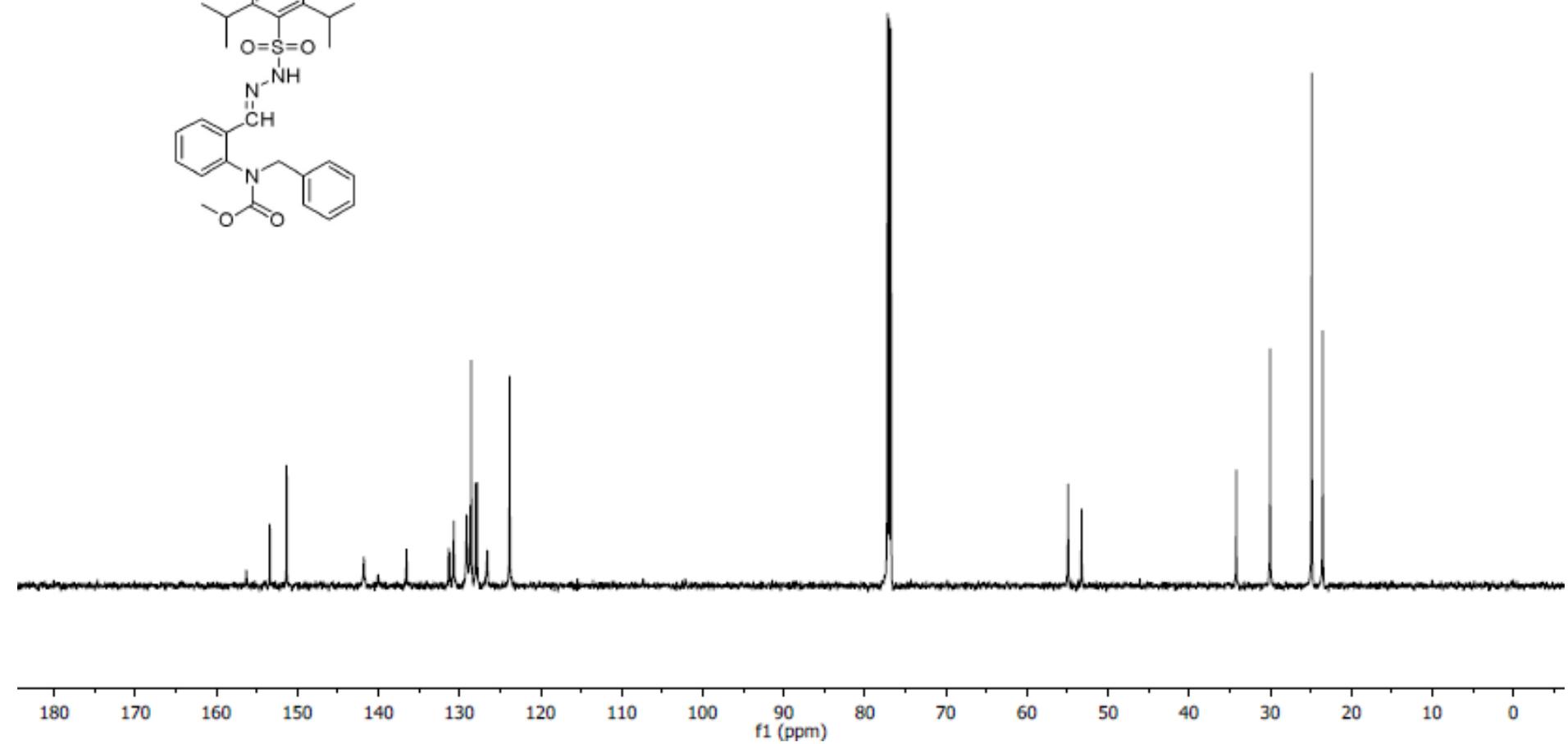
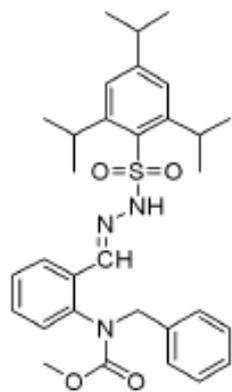
methyl benzyl(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-c

156.307
153.414
151.333
141.803
140.041
136.543
131.361
131.180
130.712
129.124
128.667
128.562
128.026
127.828
126.579
123.823

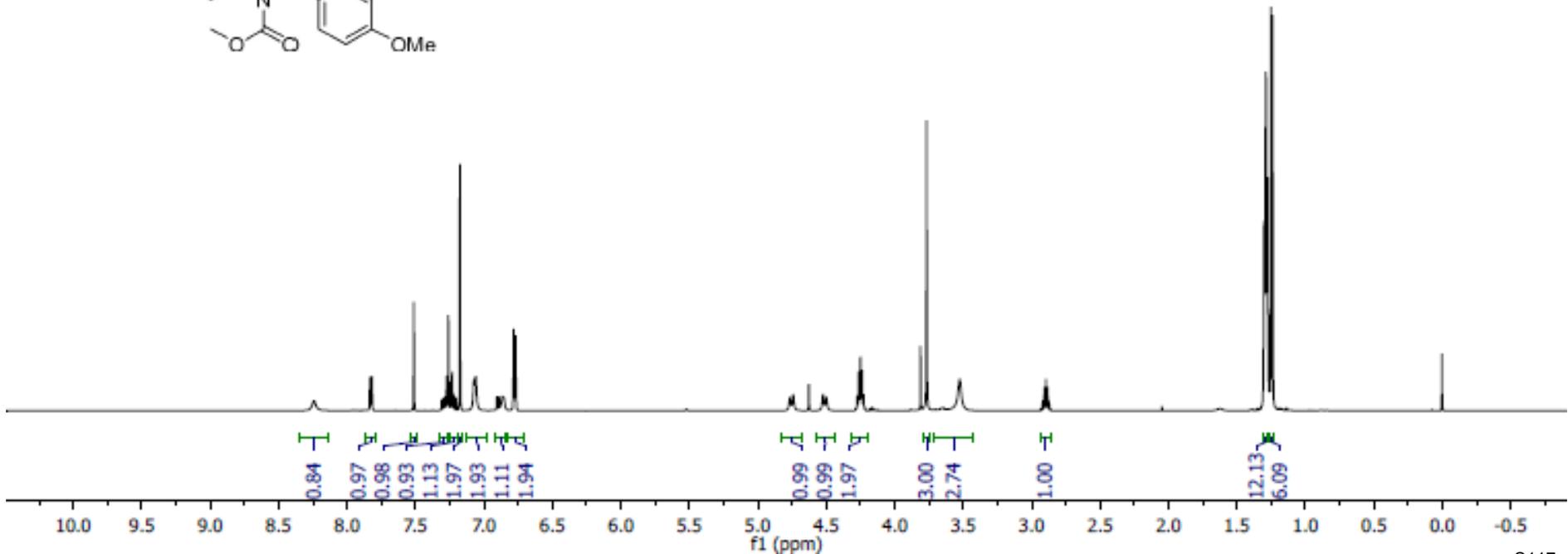
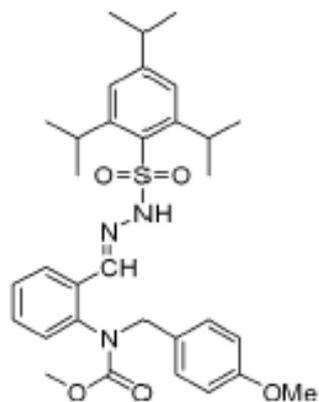
77.212
77.000
76.788

54.928
53.258

34.171
30.000
24.865
23.521



methyl (4-methoxybenzyl)(2-((2,4,6-triisopropylphenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-d



methyl (4-methoxybenzyl)(2-((2-((2,4,6-triisopropylphenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-d

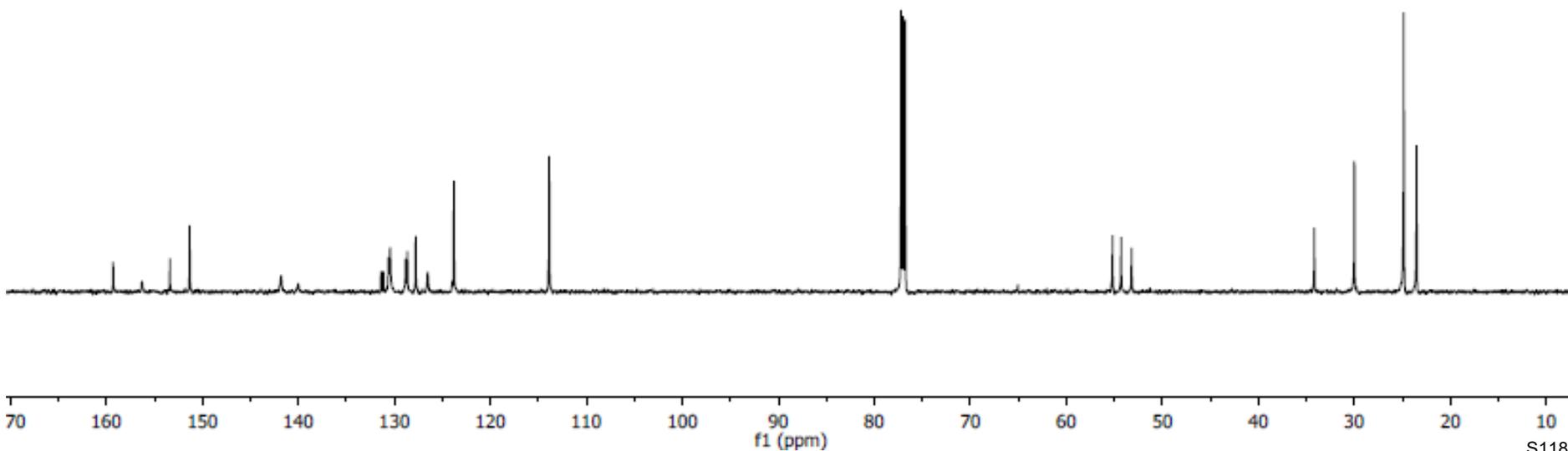
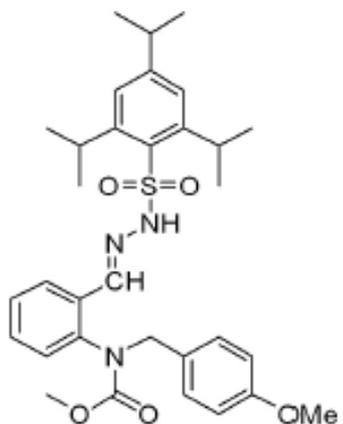
159.296
156.294
153.378
151.328

141.793
140.014
131.384
131.152
130.607
130.443
128.815
128.635
127.773
126.523
123.804
113.868

77.212
77.000
76.788

55.186
54.292
53.199

34.163
29.986
24.847
23.515

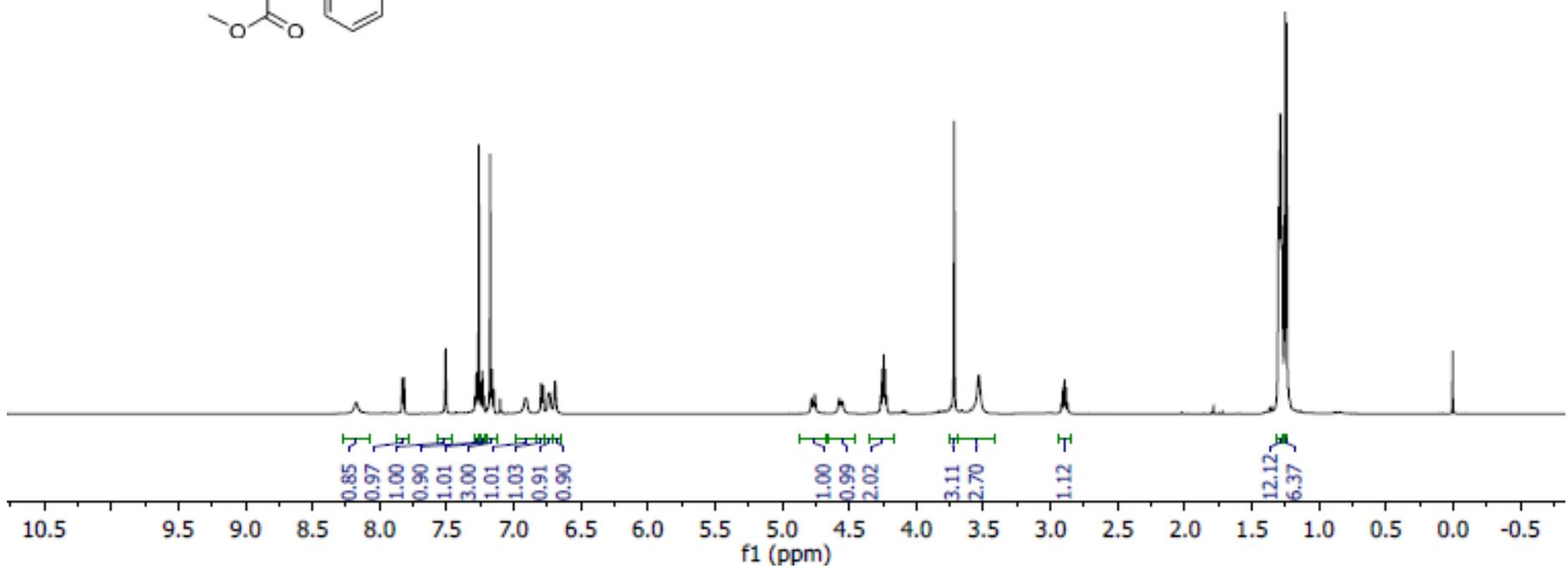
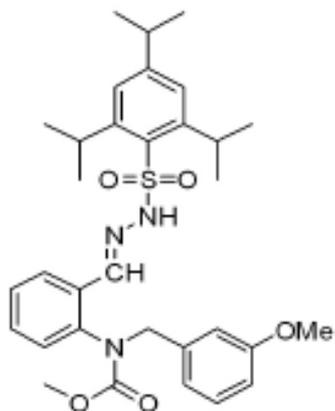


methyl (3-methoxybenzyl)(2-((2-((2,4,6-triisopropylphenyl) sulfonyl) hydrazono)methyl)phenyl)carbamate 1-e

8.175
7.831
7.818
7.508
7.290
7.278
7.260
7.247
7.234
7.222
7.176
7.162
7.149
6.914
6.783
6.780
6.742
6.731
6.692

4.781
4.757
4.574
4.551
4.277
4.266
4.255
4.243
4.232
4.221
3.718
3.534
2.930
2.919
2.907
2.896
2.884
2.873
2.861

1.288
1.274
1.251
1.239



methyl (3-methoxybenzyl)(2-((2-((2,4,6-triisopropylphenyl) sulfonyl) hydrazono)methyl)phenyl)carbamate 1-e

159.620
156.325
153.396
151.327

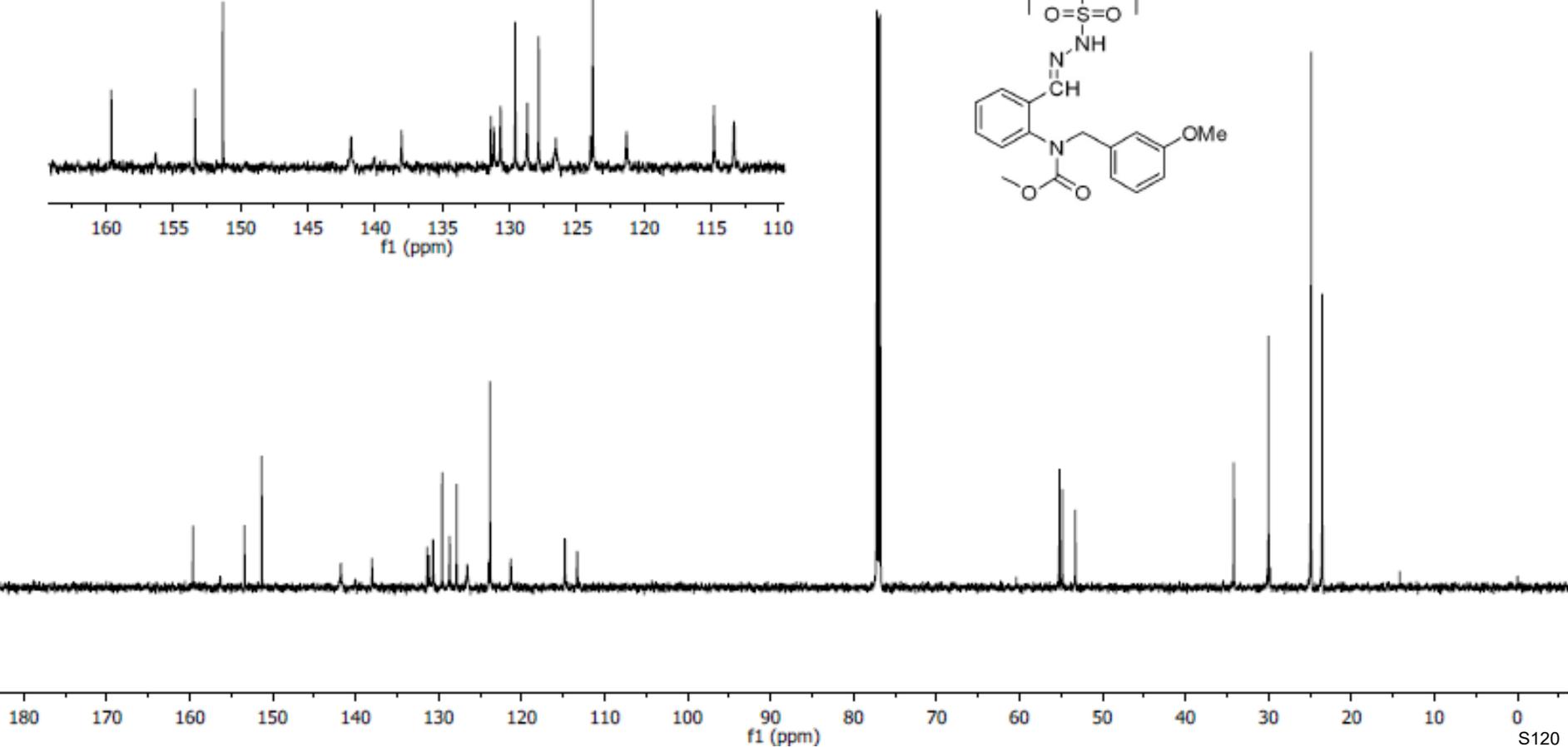
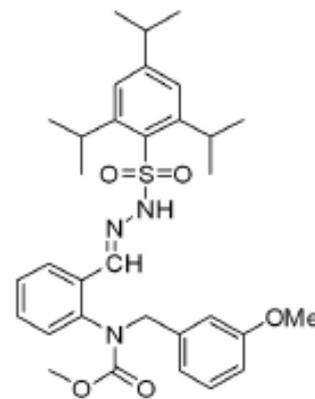
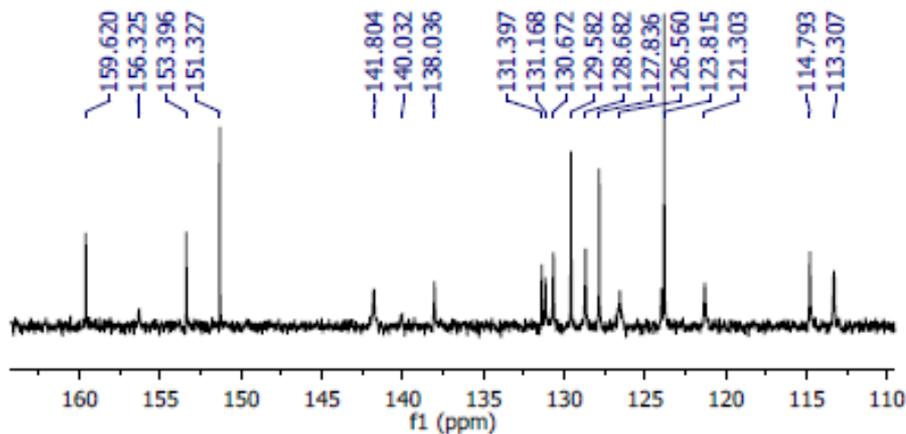
141.804
140.032
138.036

131.397
130.672
129.582
128.682
127.836
123.915
113.307

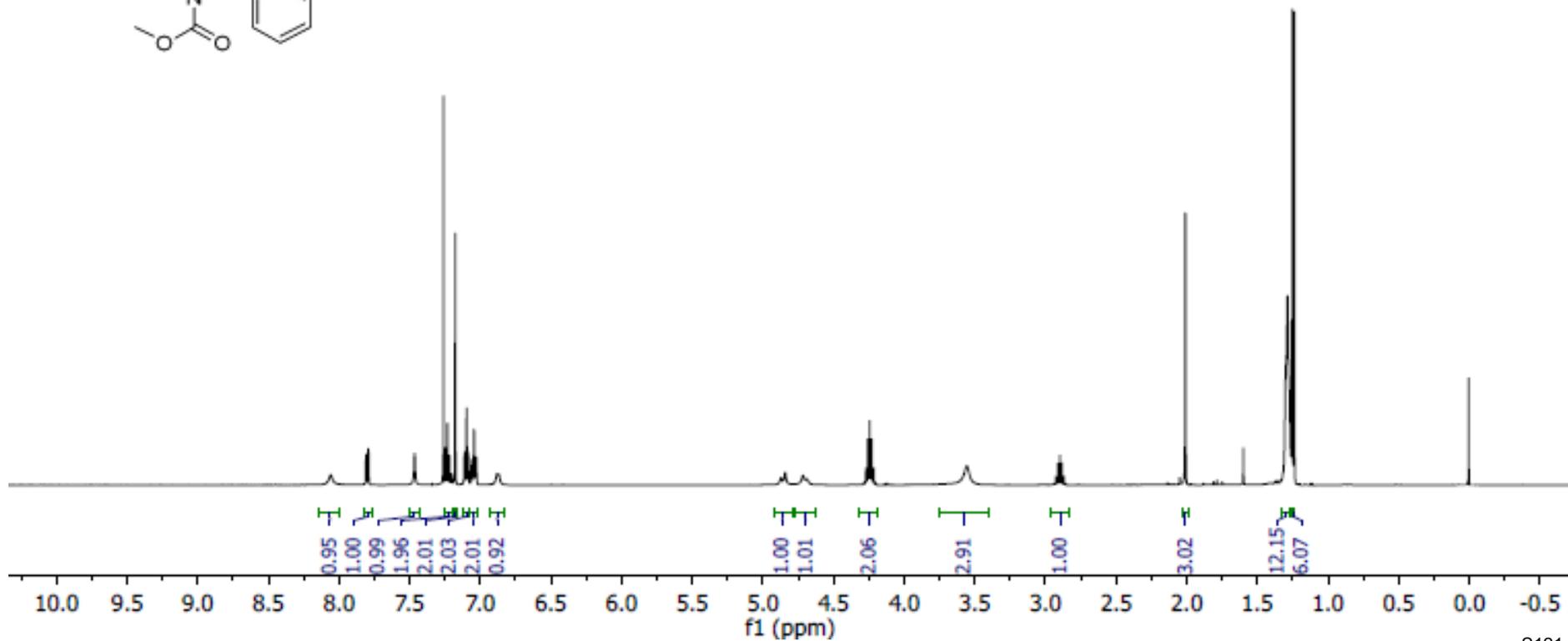
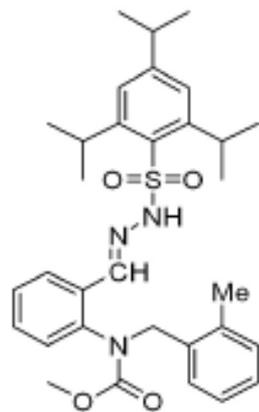
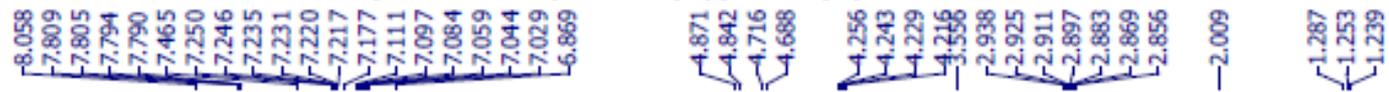
77.212
77.000
76.789

55.188
54.845
53.272

34.170
30.000
24.859
23.519



methyl (2-methylbenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-f



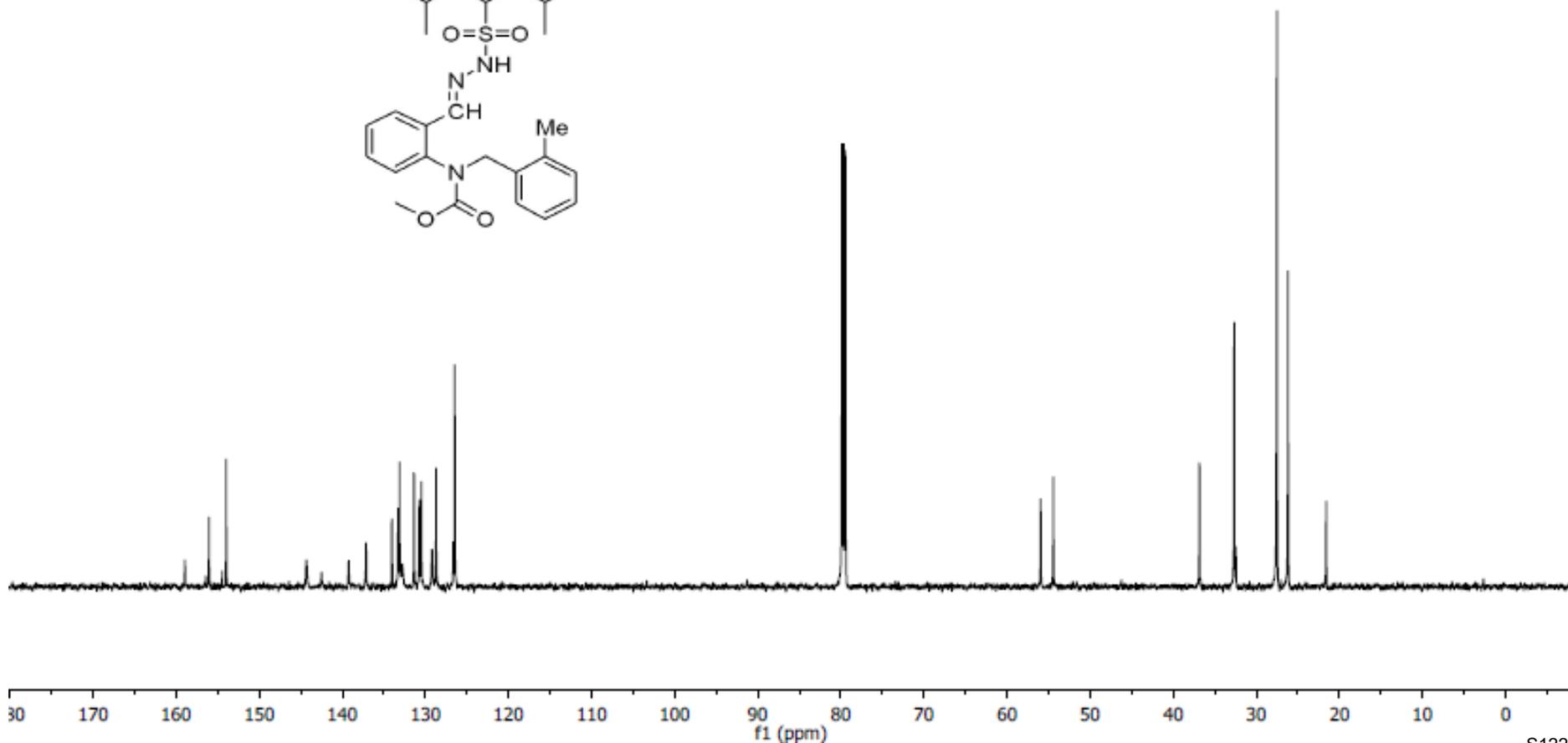
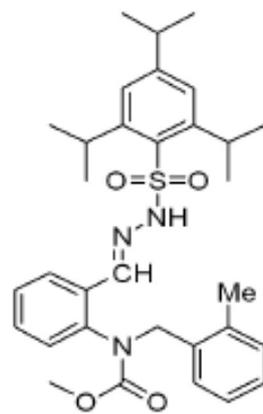
methyl (2-methylbenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-f

158.951
156.053
153.988
144.328
142.494
139.237
137.148
134.048
133.293
133.115
132.797
131.375
130.737
130.502
129.213
128.723
126.659
126.477

79.878
79.666
79.454

55.955
54.432

36.834
32.663
27.526
26.185
21.586

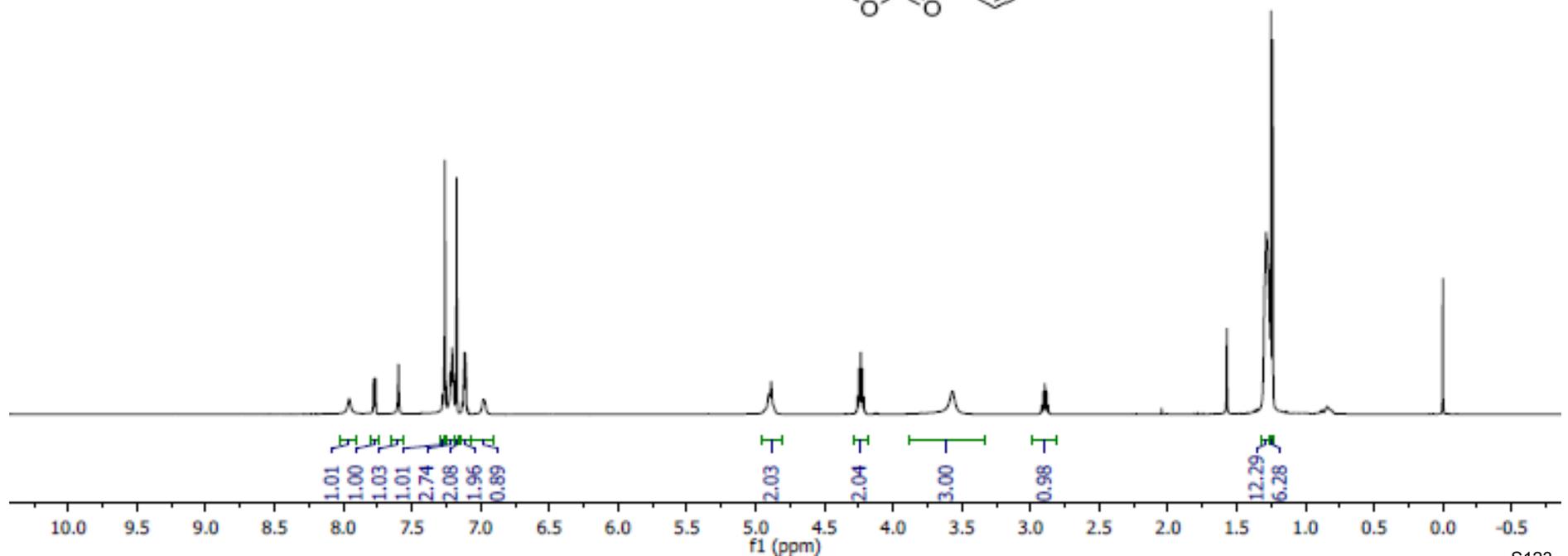
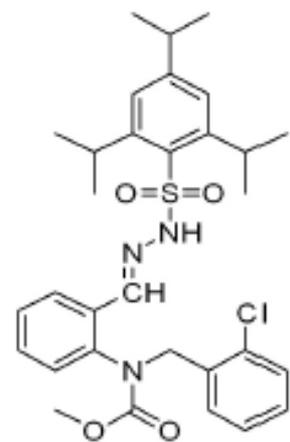


methyl (2-chlorobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-g

7.957
7.779
7.766
7.598
7.278
7.276
7.260
7.253
7.221
7.208
7.198
7.175
7.132
7.123
7.120
7.114
7.108
7.096
6.980

4.904
4.886
4.268
4.257
4.246
4.235
4.224
4.212
3.570
2.929
2.918
2.907
2.895
2.884
2.872
2.861

1.286
1.250
1.238



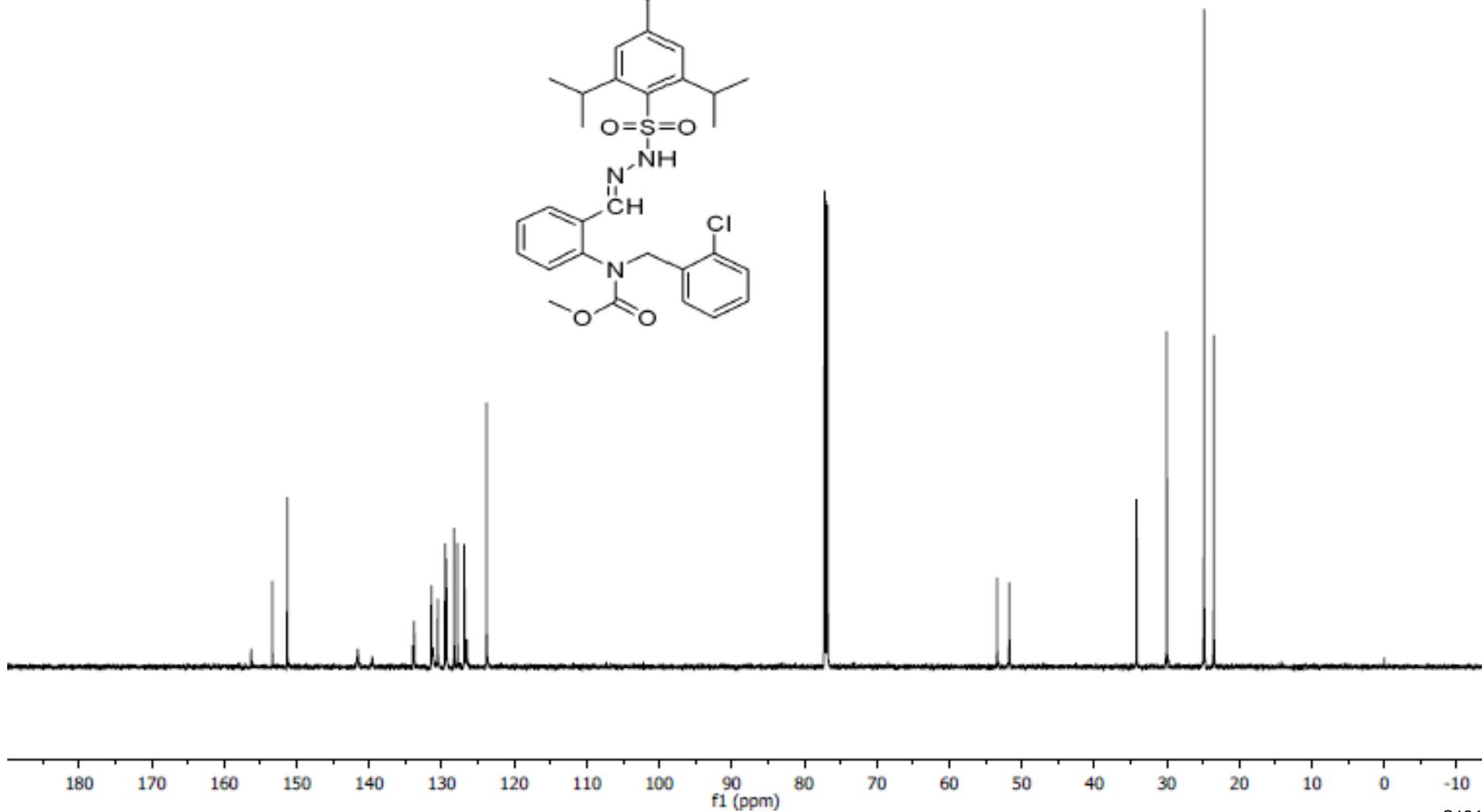
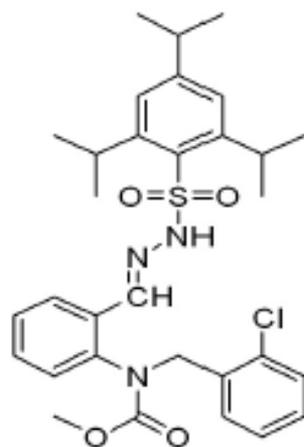
methyl (2-chlorobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-g

156.273
153.362
151.307
141.581
139.598
133.988
133.799
131.443
131.401
131.237
130.550
129.543
129.362
128.311
127.839
126.878
126.529
123.817

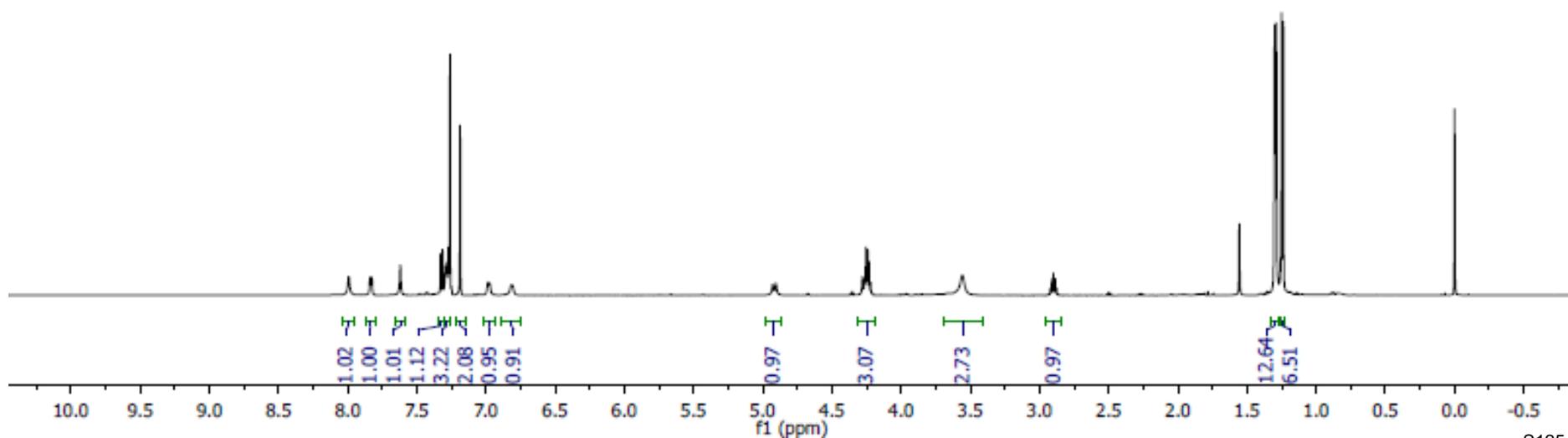
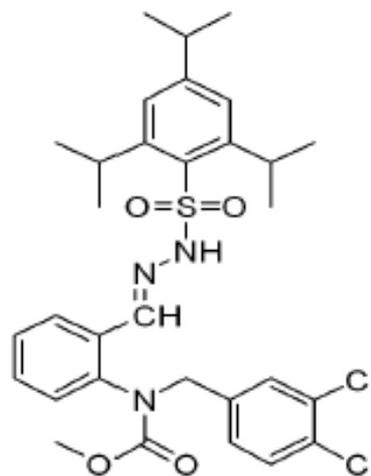
77.211
77.000
76.788

53.407
51.724

34.167
30.005
24.863
23.521



methyl (3,4-dichlorobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-h



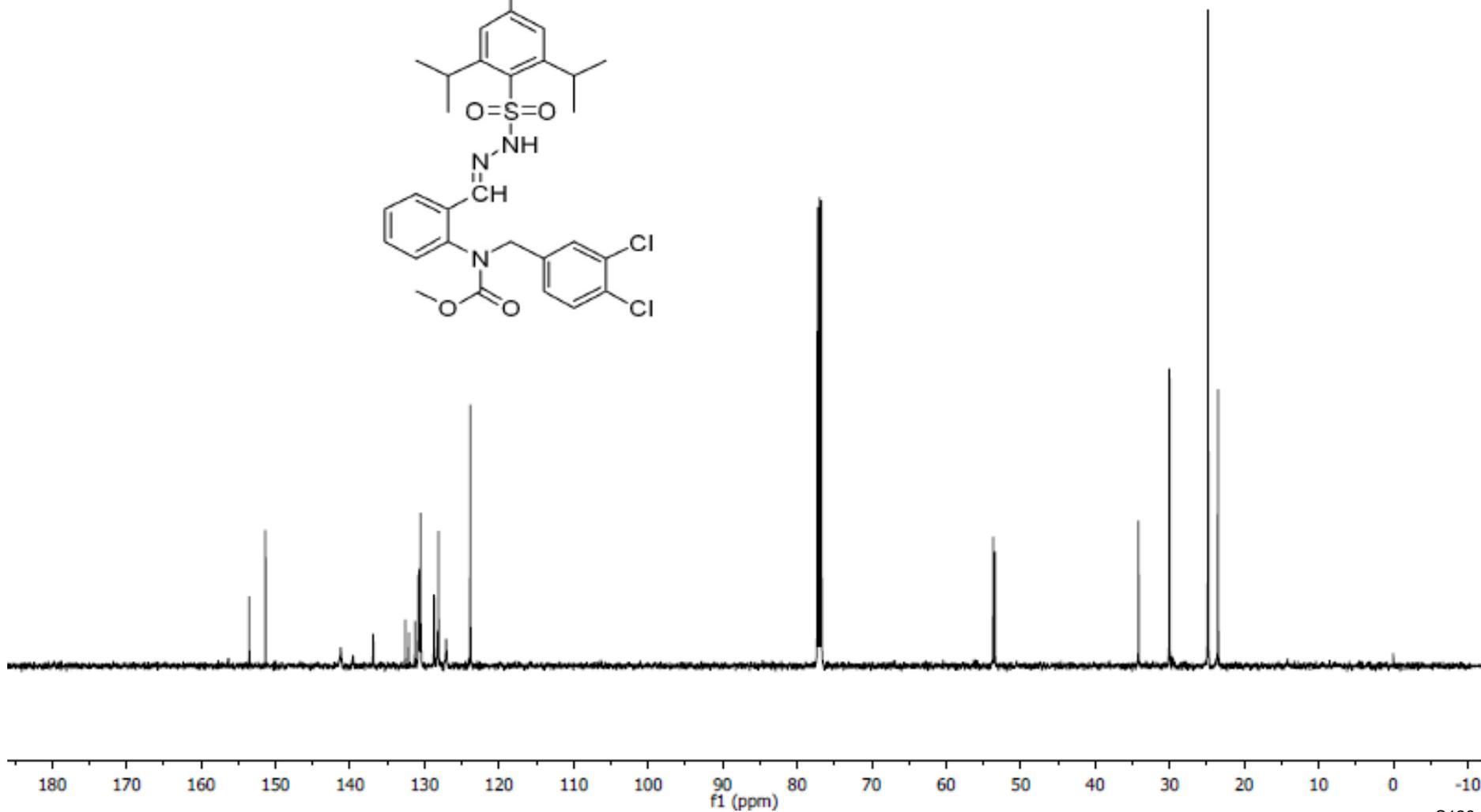
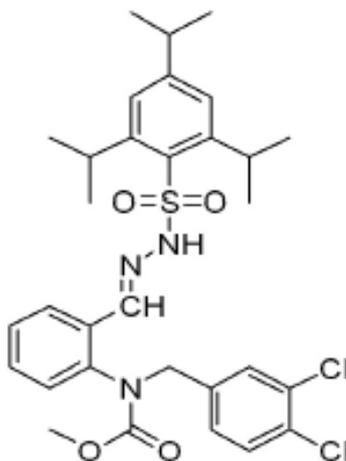
methyl (3,4-dichlorobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-h

156.382
153.535
151.351
141.262
139.614
136.891
132.575
132.098
131.284
130.825
130.691
130.531
128.717
128.214
128.118
127.107
123.866

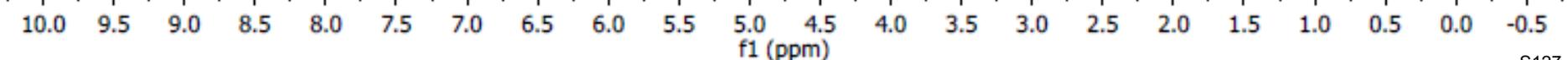
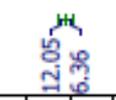
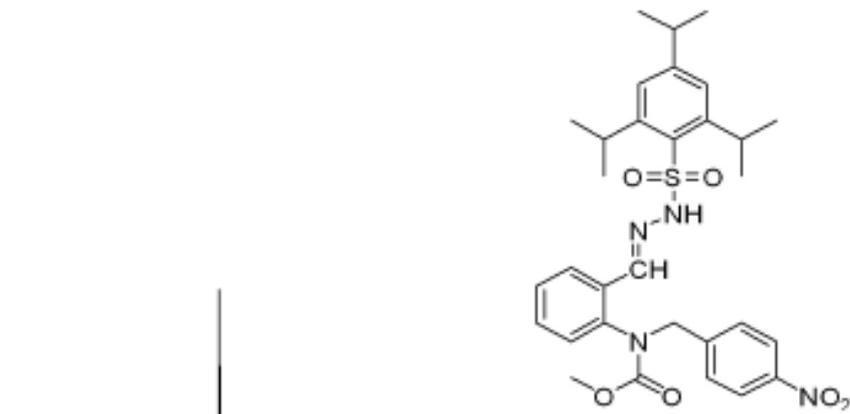
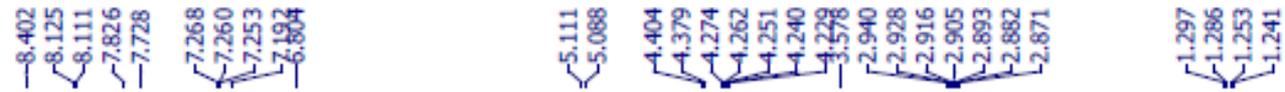
77.254
77.000
76.746

53.685
53.446

34.178
30.025
24.852
23.514



methyl (4-nitrobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-i



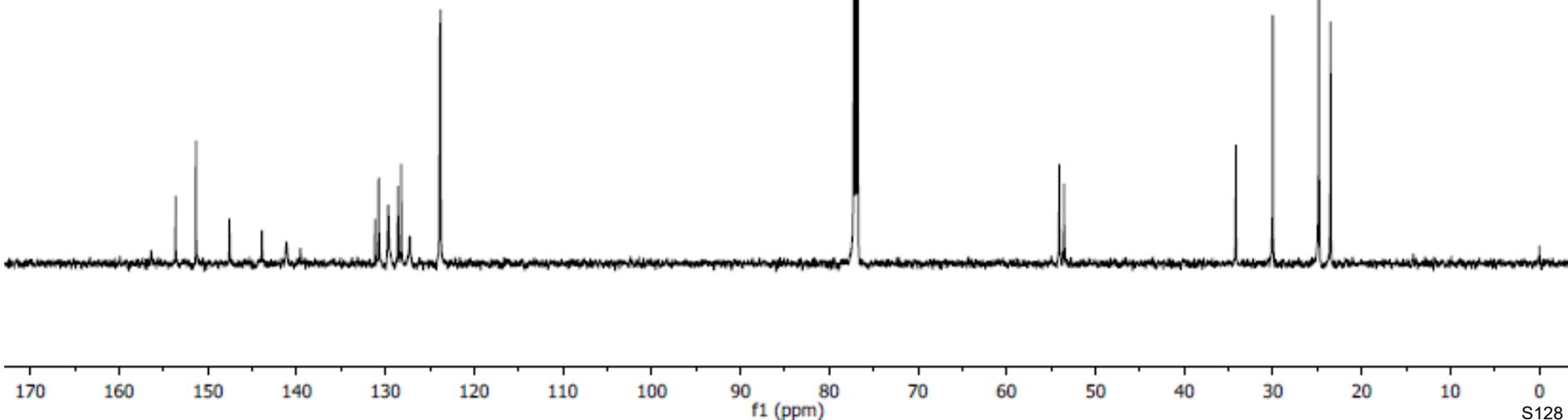
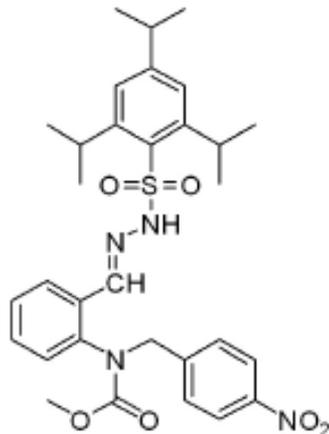
methyl (4-nitrobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-i

156.378
153.634
151.342
147.569
143.910
141.151
139.571
131.171
130.771
130.747
129.677
128.589
128.206
127.233
123.886
123.799

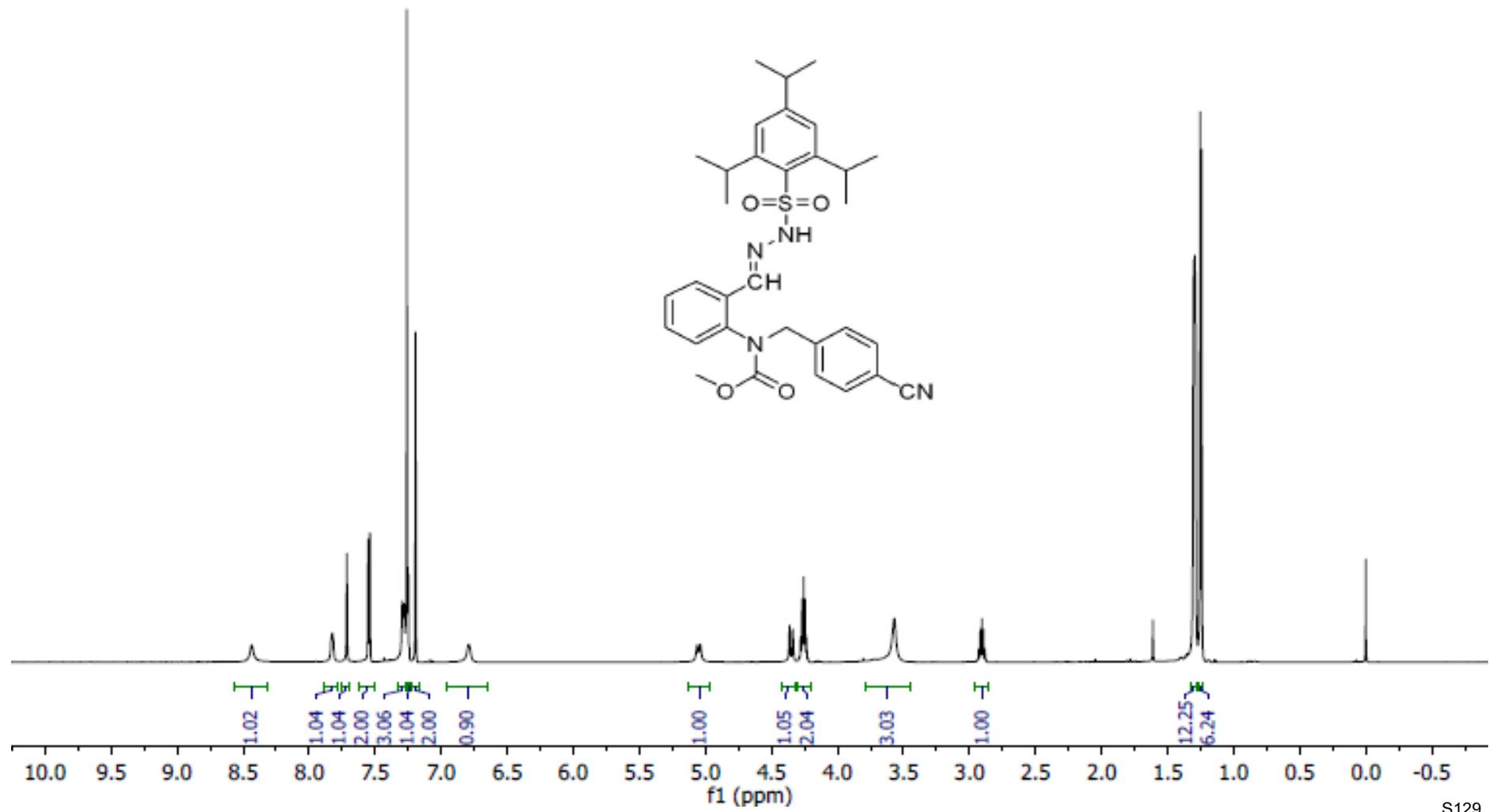
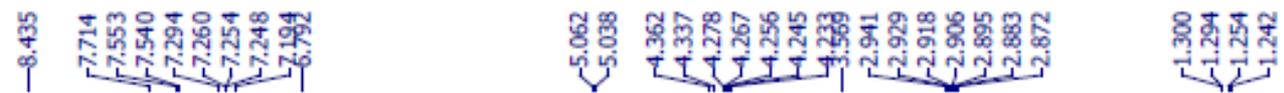
77.212
77.000
76.788

54.073
53.531

34.178
30.025
24.826
23.509



methyl (4-cyanobenzyl)(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-j



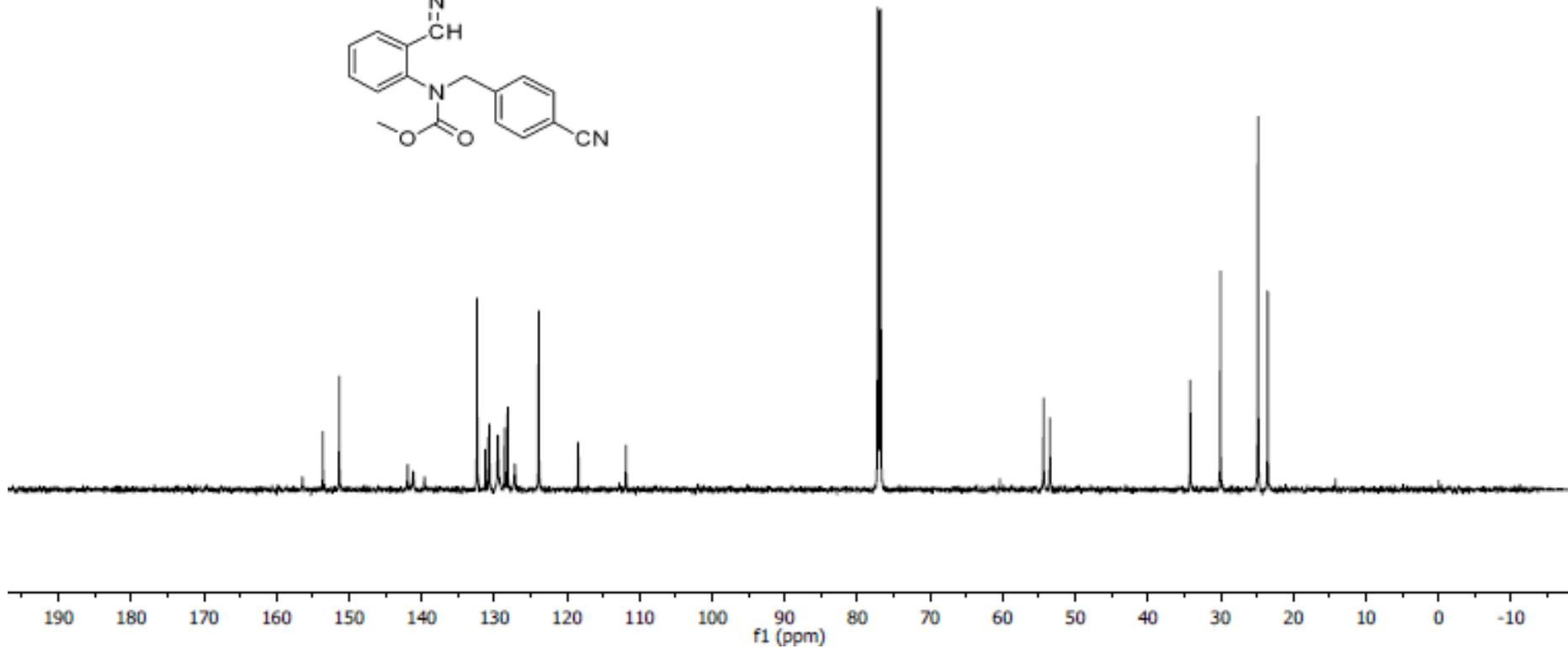
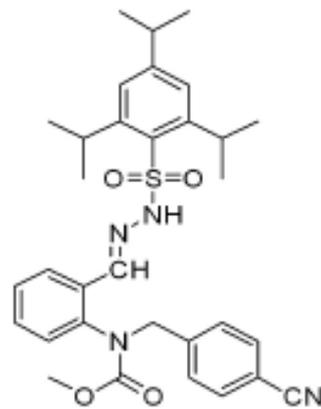
methyl (4-cyanobenzyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-j

156.425
153.600
151.343
141.925
141.170
139.596
132.372
131.228
130.806
130.678
129.512
128.562
128.149
127.171
123.882
118.443
111.866

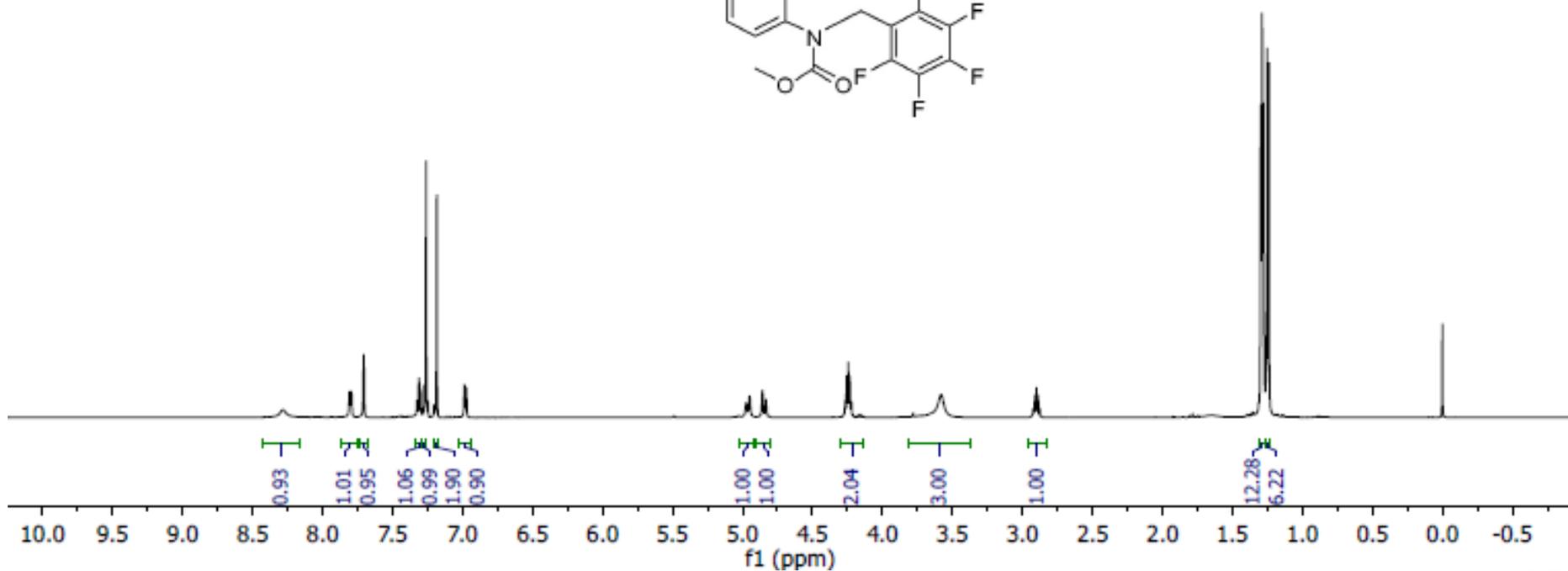
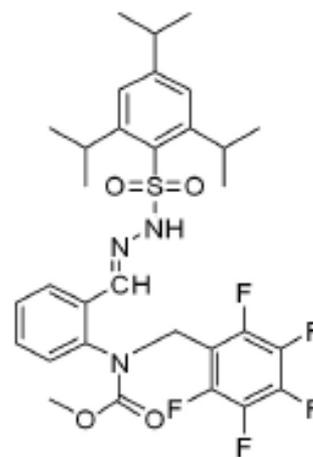
77.212
77.000
76.788

54.372
53.496

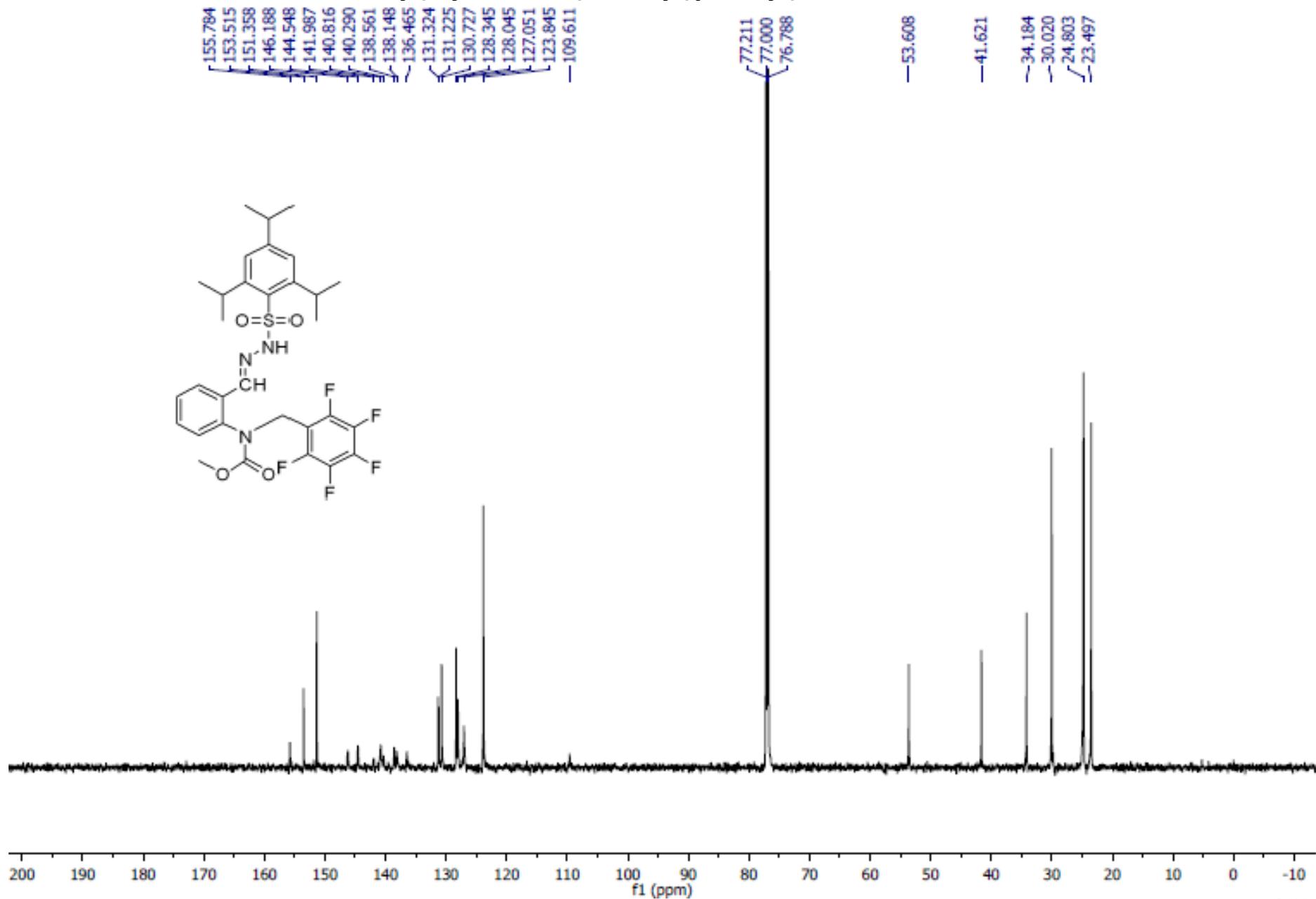
34.171
30.022
24.847
23.510



methyl ((perfluorophenyl)methyl)(2-((2,4,6-triisopropylphenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-k

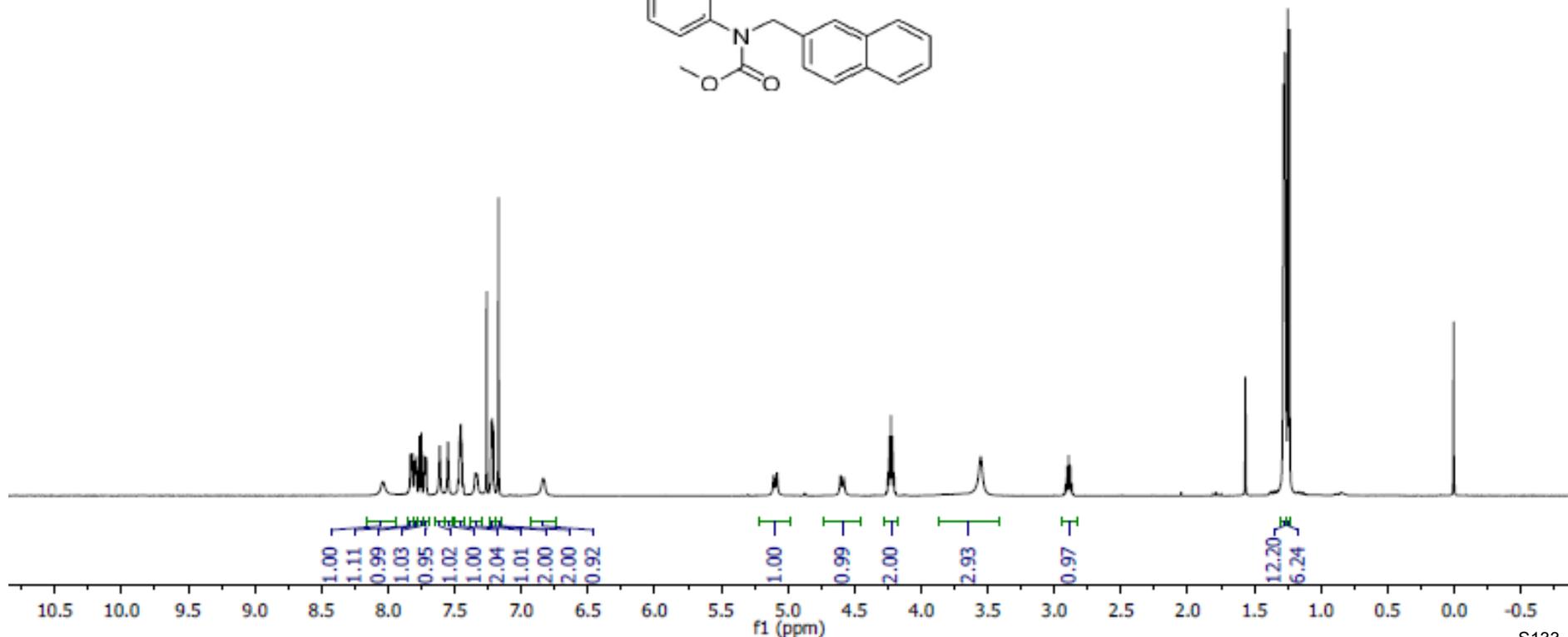
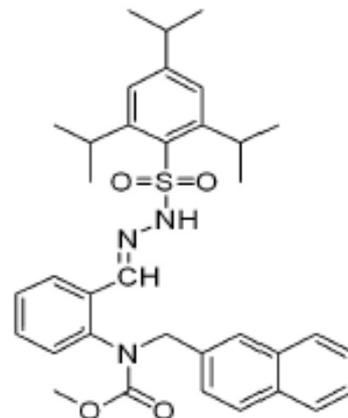


methyl ((perfluorophenyl)methyl)(2-((2,4,6-triisopropylphenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-k



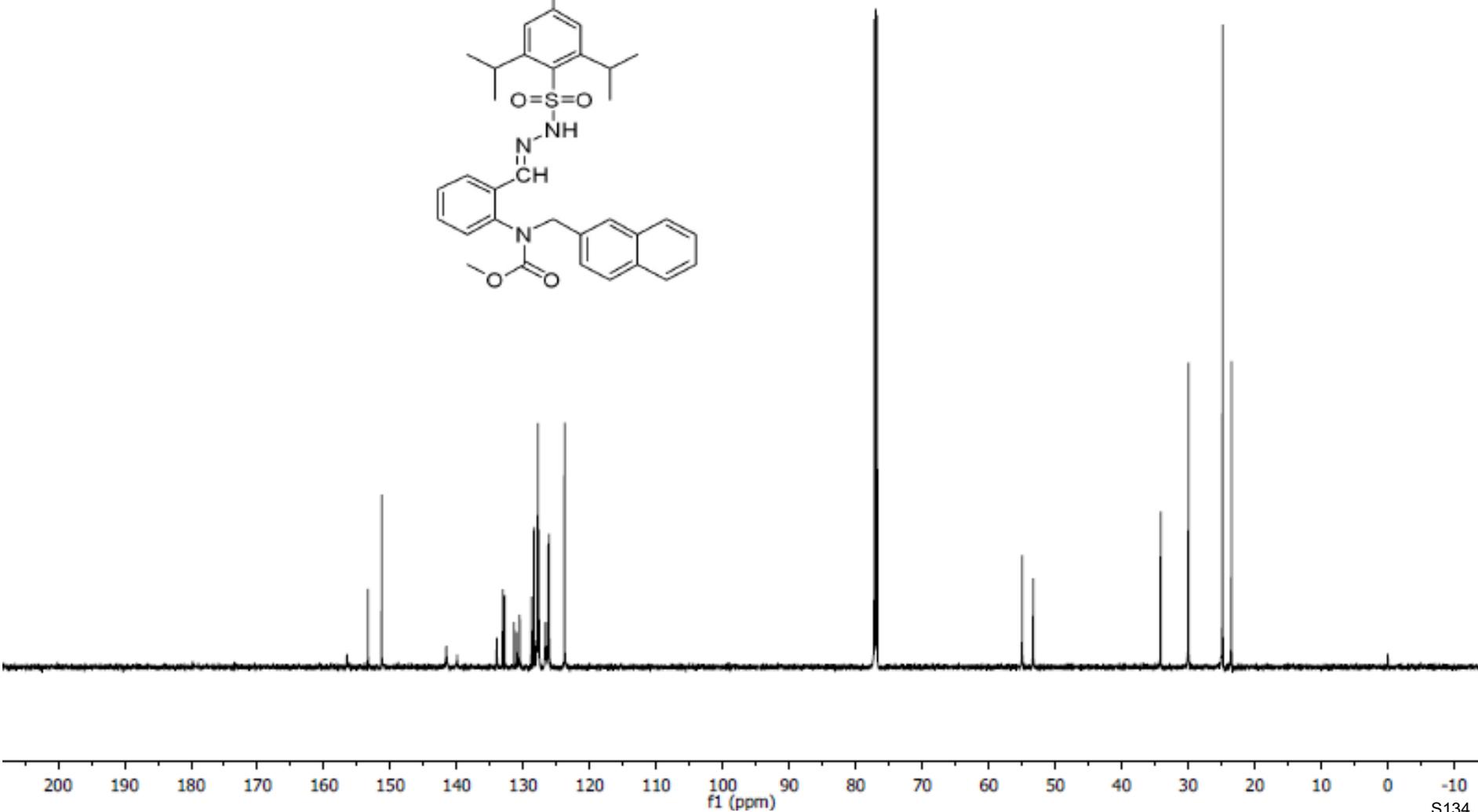
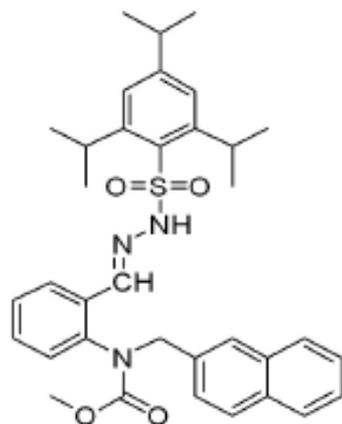
methyl (naphthalen-2-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-l

8.039 7.833 7.826 7.818 7.801 7.788 7.764 7.750 7.727 7.716 7.713 7.612 7.551 7.474 7.461 7.455 7.449 7.436 7.344 7.332 7.260 7.235 7.226 7.218 7.211 7.201 7.172 6.836 5.106 5.082 4.604 4.580 4.249 4.237 4.226 4.215 4.204 3.553 2.926 2.916 2.904 2.893 2.881 2.870 2.858 1.280 1.269 1.247 1.236

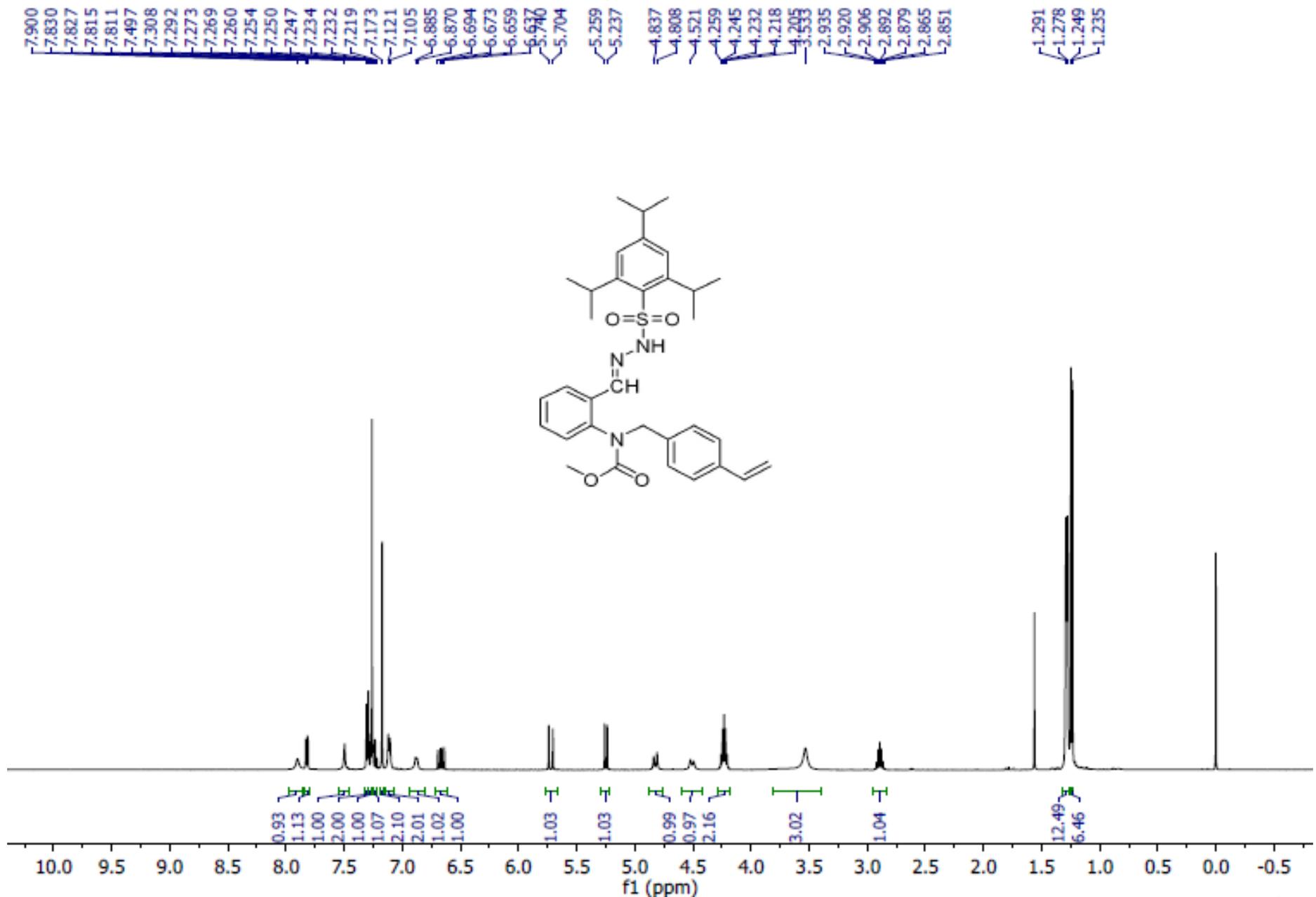


methyl (naphthalen-2-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-l

156.525
153.384
151.320
141.578
139.979
134.007
133.118
132.833
131.395
130.998
130.564
128.774
128.402
128.030
127.838
127.656
126.662
126.248
126.135
123.810
77.211
77.000
76.788
54.991
53.339
34.164
29.988
24.842
23.518



methyl (2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl) phenyl)(4-vinylbenzyl)carbamate 1-m



methyl (2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl) phenyl)(4-vinylbenzyl)carbamate 1-m

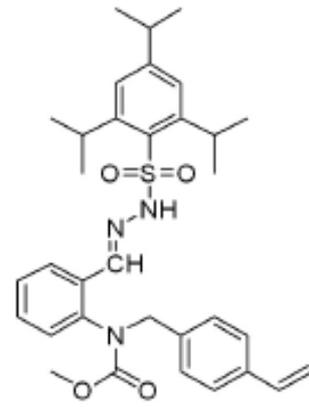
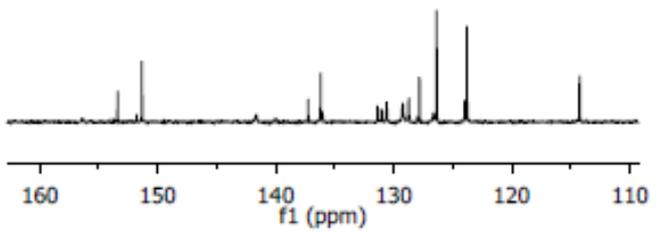
156.372
153.396
151.792
151.334
141.649
137.257
136.204
131.369
131.030
130.604
129.229
128.732
126.658
126.370
123.995
123.813
114.267

77.212
77.000
76.788

54.580
53.283

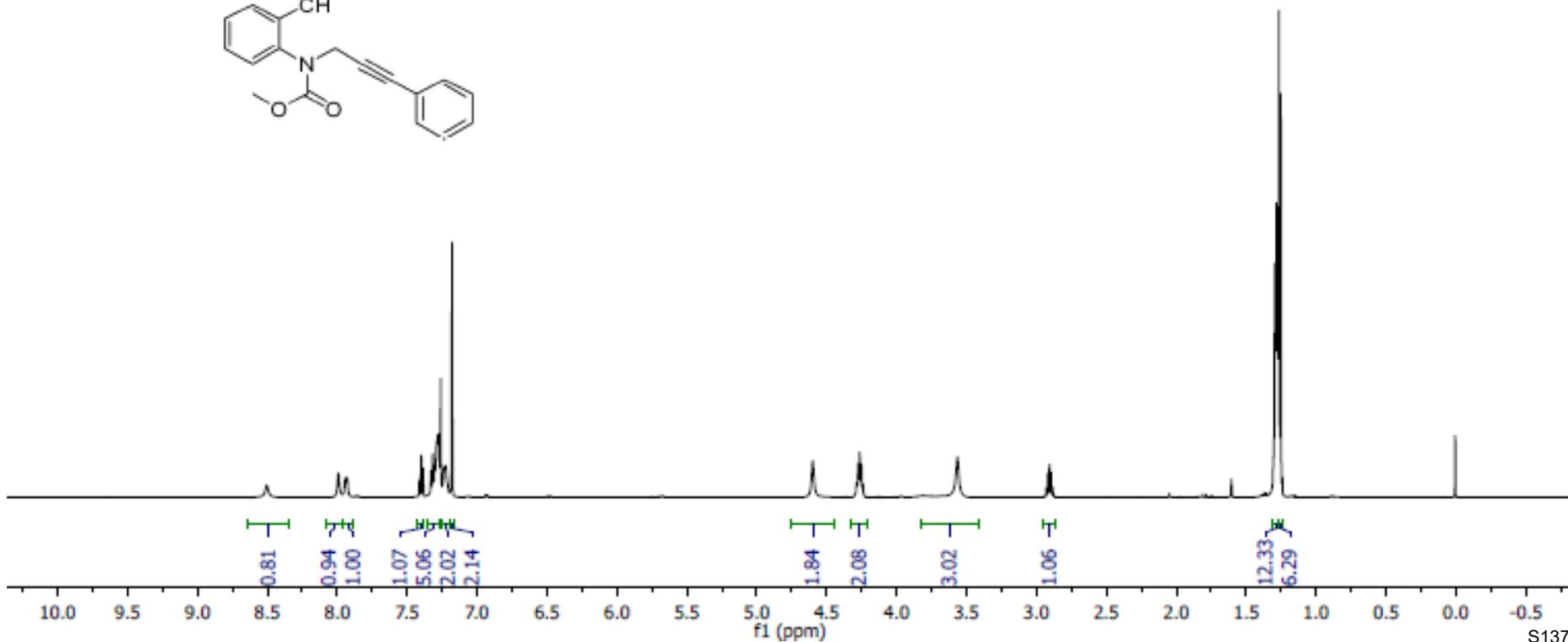
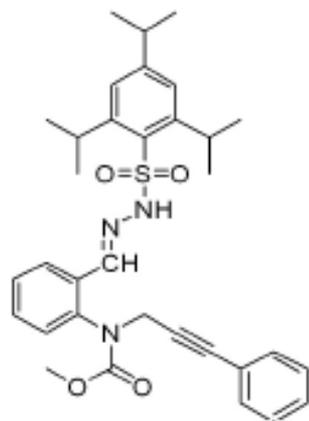
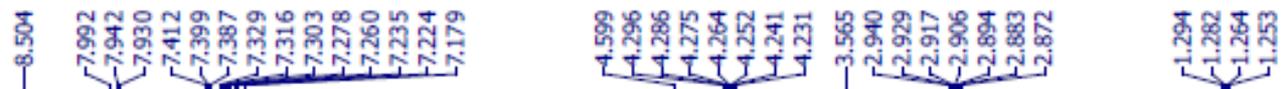
34.164
29.990
24.852
23.516

156.372
153.396
151.792
151.334
141.649
139.993
137.257
136.204
131.369
131.030
130.604
129.229
128.732
126.658
126.370
123.995
123.813
114.267



160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

methyl (3-phenylprop-2-yn-1-yl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-n



methyl (3-phenylprop-2-yn-1-yl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-n

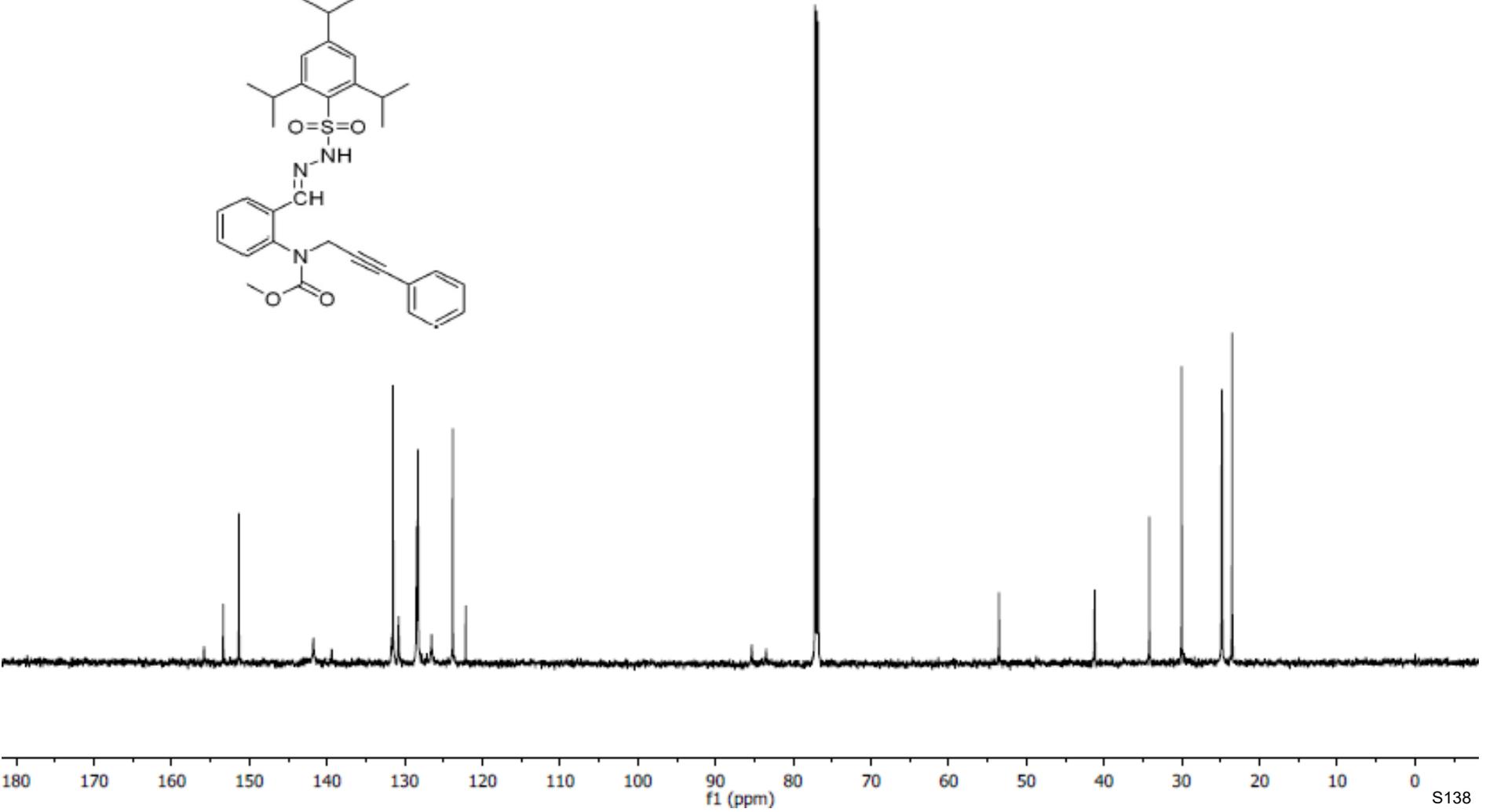
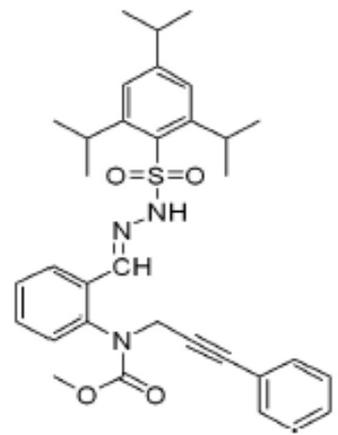
155.830
153.363
151.343
141.737
139.399
131.697
131.512
130.784
128.482
128.387
128.317
128.265
126.544
123.826
122.156

85.333
83.475
77.211
77.000
76.788

53.523

41.221

34.178
30.021
24.821
23.532



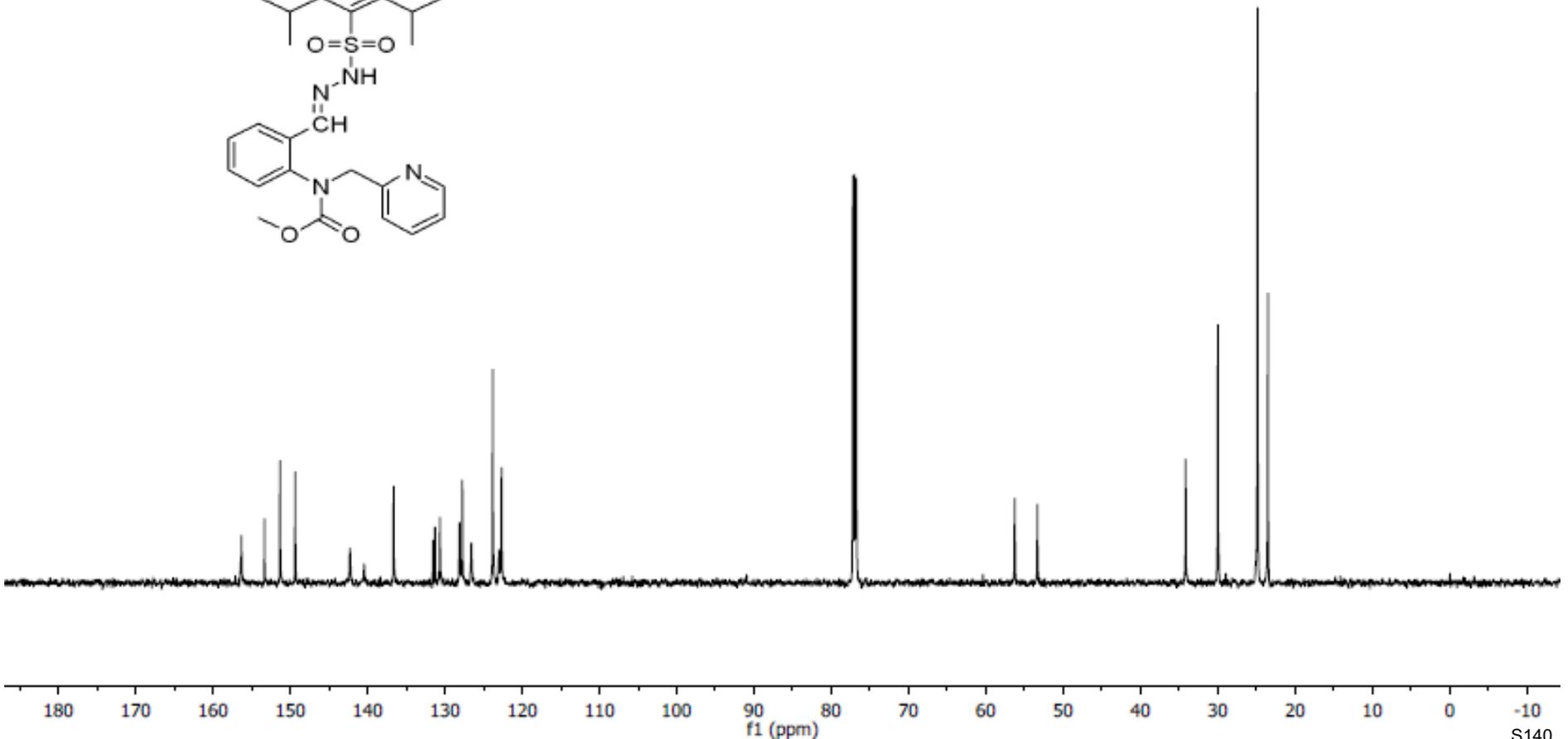
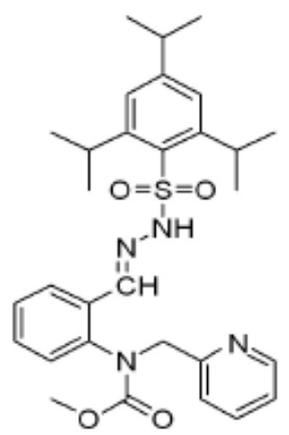
methyl (pyridin-2-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-o

156.296
153.312
151.312
149.351
142.269
140.426
136.615
131.528
131.260
130.628
128.086
127.729
126.561
123.798
123.679
122.980
122.650

77.211
77.000
76.788

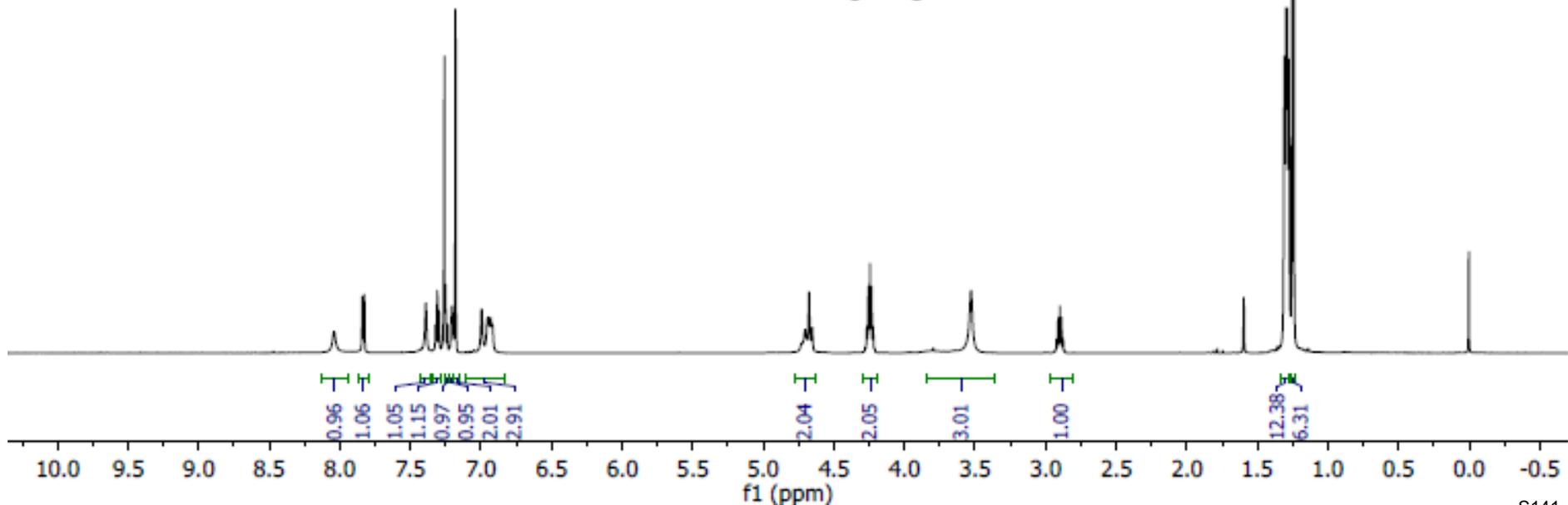
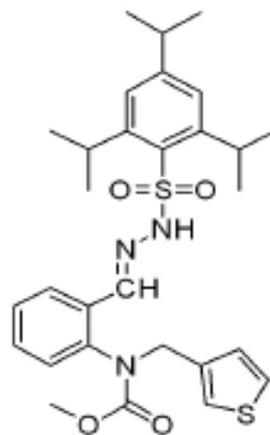
56.273
53.343

34.169
29.998
24.876
23.528



methyl (thiophen-3-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-p

8.041, 7.840, 7.827, 7.391, 7.323, 7.310, 7.297, 7.260, 7.252, 7.239, 7.211, 7.206, 7.199, 7.181, 6.996, 6.952, 6.932, 6.920, 6.727, 4.703, 4.676, 4.653, 4.267, 4.255, 4.244, 4.233, 4.225, 3.529, 2.933, 2.922, 2.910, 2.899, 2.887, 2.876, 2.865, 1.309, 1.298, 1.288, 1.277, 1.254, 1.242



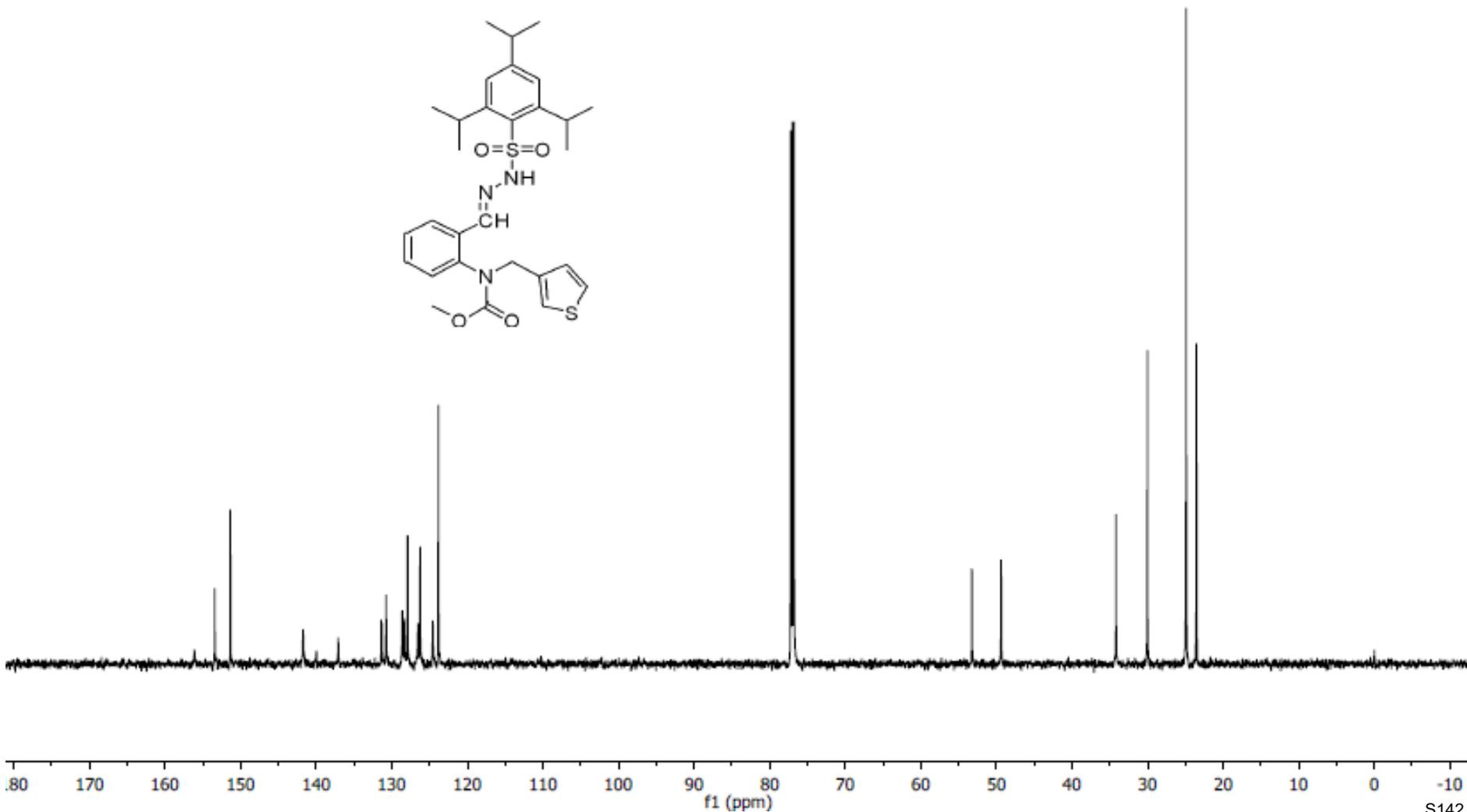
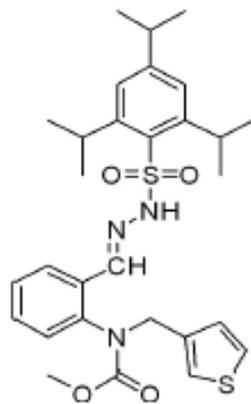
methyl (thiophen-3-ylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-p

156.118
153.418
151.353
141.731
139.986
137.083
131.389
131.301
130.747
128.605
128.295
127.904
126.527
126.251
124.572
123.833

77.211
77.000
76.788

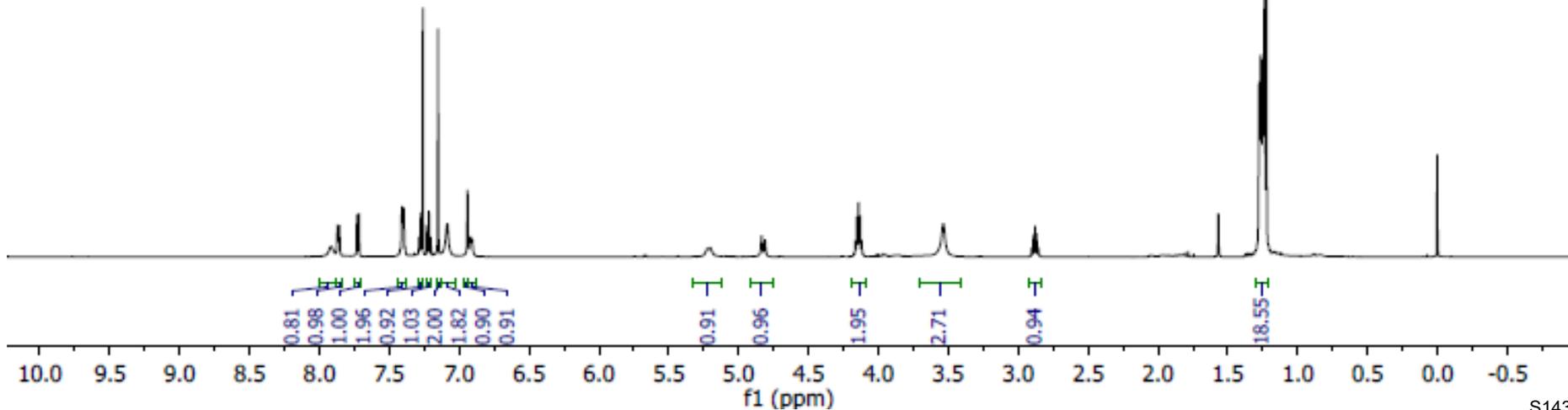
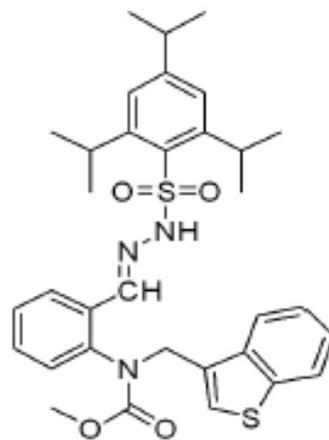
53.241
49.372

34.175
30.020
24.891
23.528



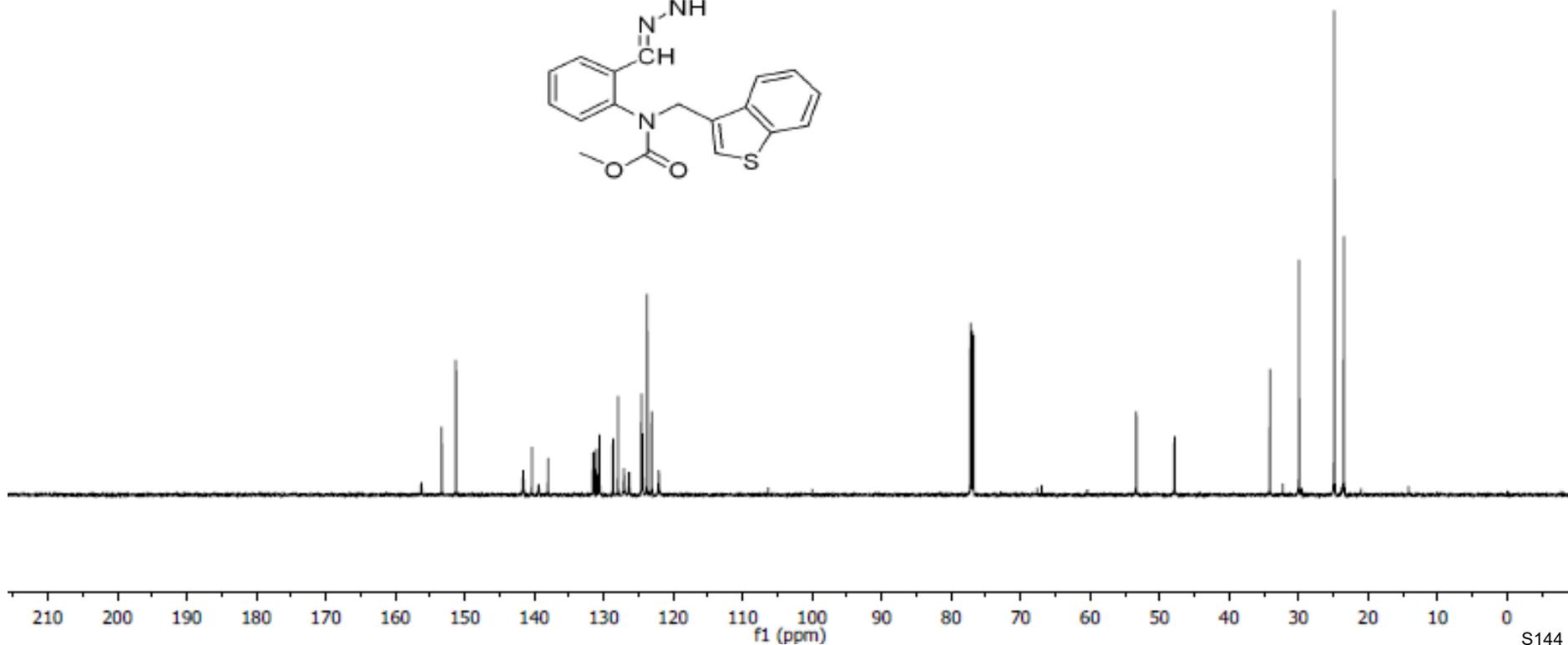
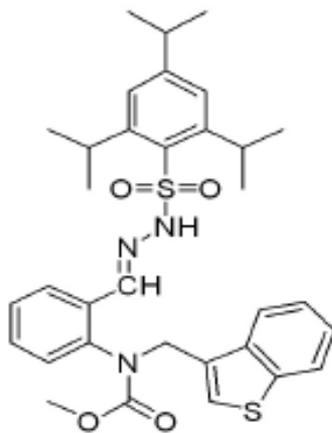
methyl (benzo[*b*]thiophen-3-ylmethyl)(2-((2,4,6-triisopropyl phenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-q

7.914, 7.871, 7.870, 7.863, 7.856, 7.731, 7.718, 7.421, 7.410, 7.404, 7.397, 7.386, 7.287, 7.274, 7.261, 7.260, 7.230, 7.217, 7.204, 7.151, 7.085, 6.940, 6.920, 6.908, 5.225, 5.202, 4.837, 4.812, 4.177, 4.165, 4.154, 4.143, 4.132, 4.120, 4.109, 3.537, 2.914, 2.903, 2.891, 2.880, 2.868, 2.857, 2.845, 1.276, 1.265, 1.250, 1.237, 1.225

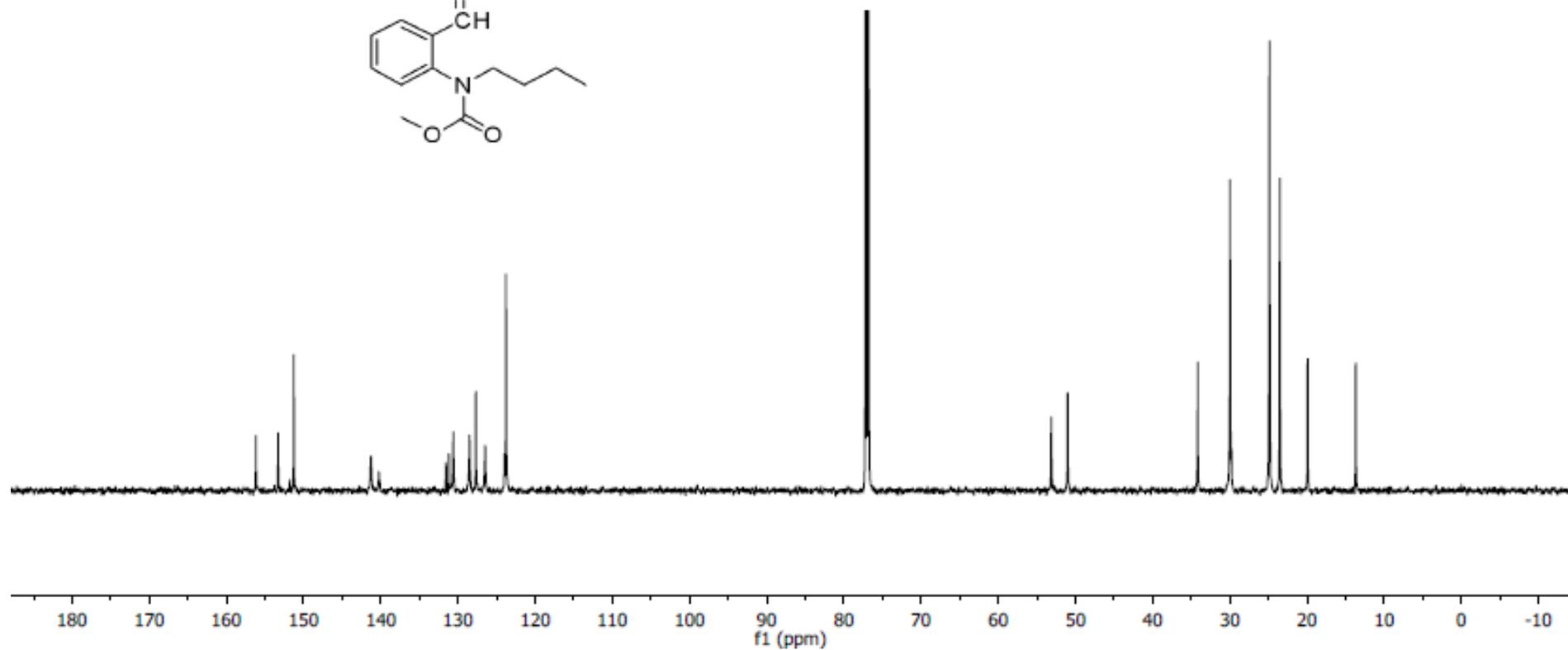
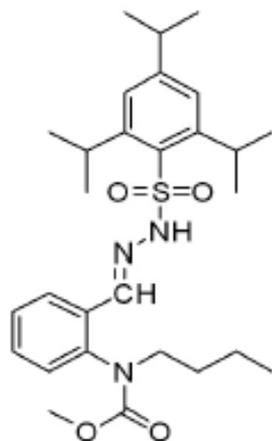


methyl (benzo[*b*]thiophen-3-ylmethyl)(2-((2,4,6-triisopropyl phenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-q

156.251
153.316
151.272
141.598
140.334
139.414
138.012
131.546
131.358
131.012
130.617
128.667
127.943
127.089
126.352
124.584
124.413
123.751
123.108
122.074
77.212
77.000
76.788
53.355
47.856
34.127
29.927
24.854
23.496

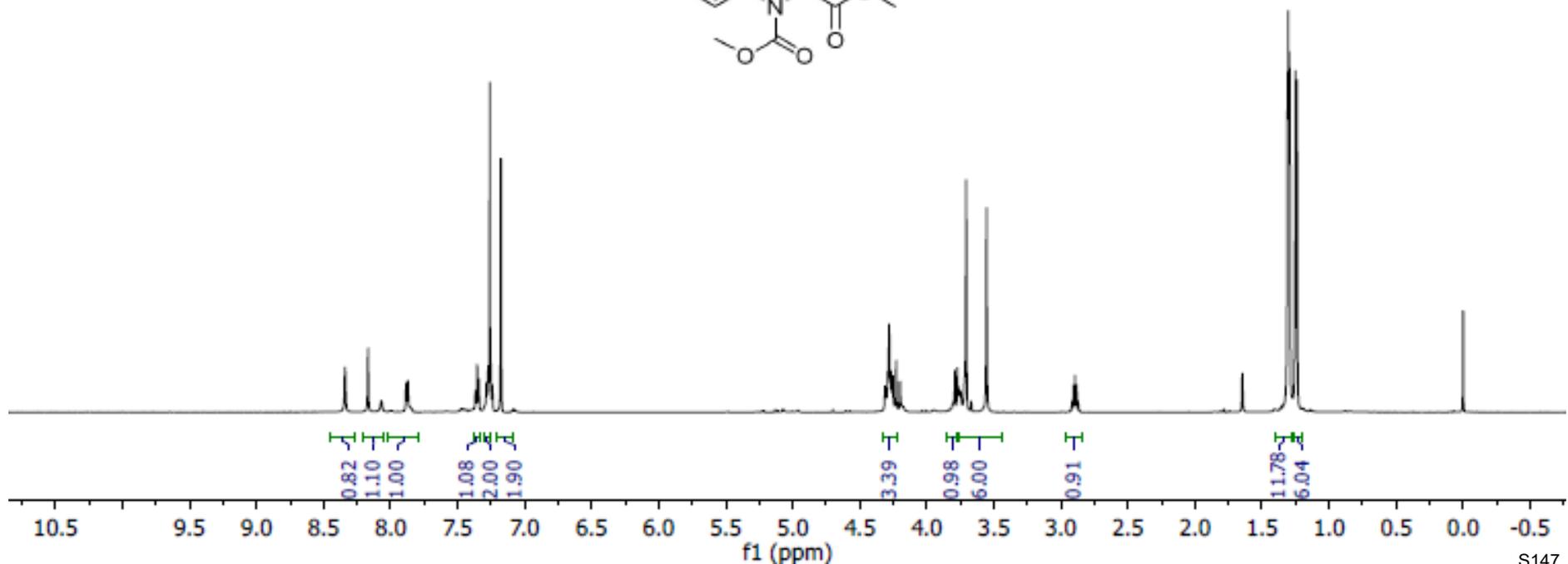
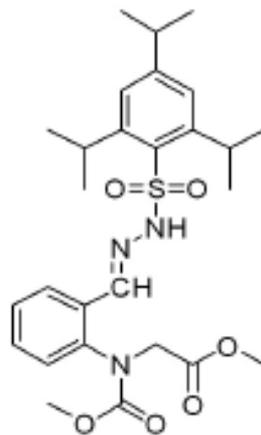


methyl butyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-r



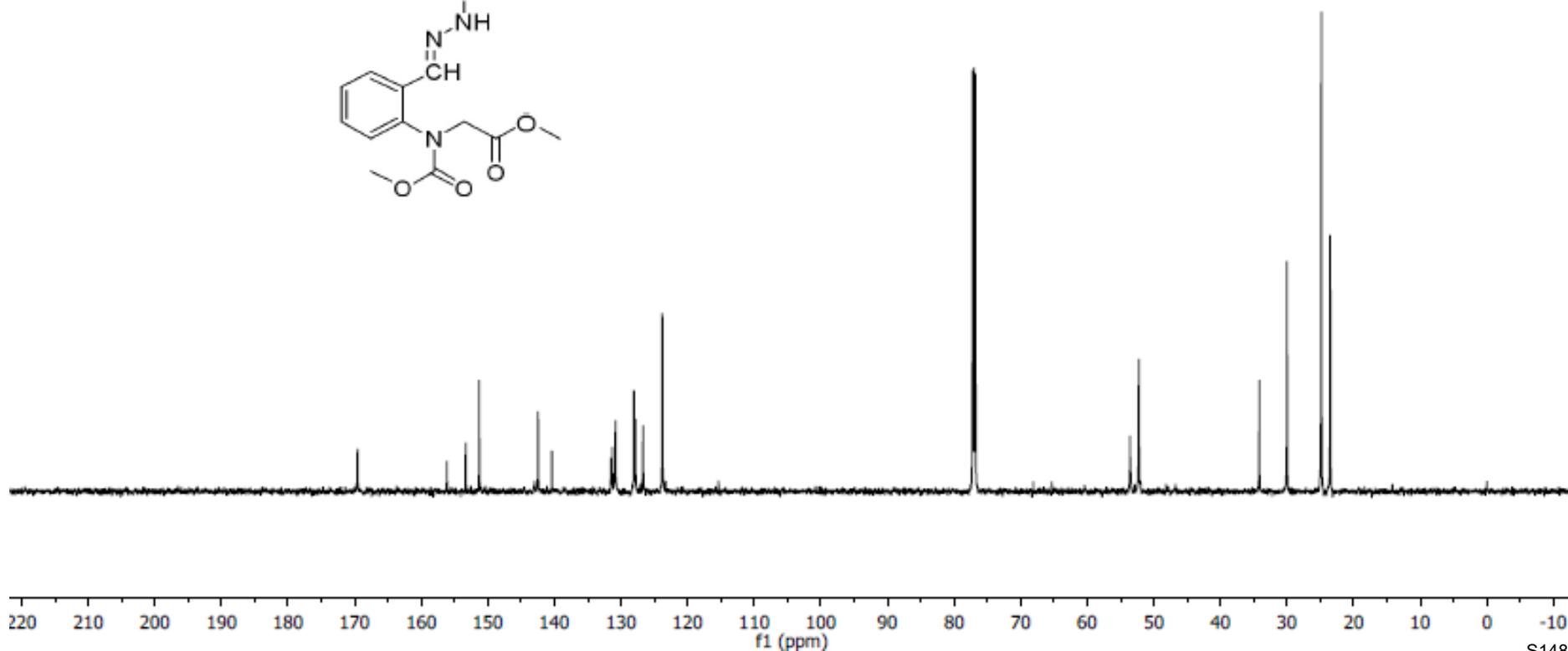
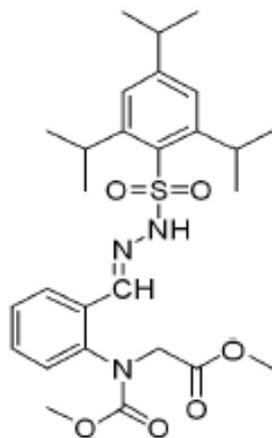
methyl *N*-(methoxycarbonyl)-*N*-(2-((2,4,6-triisopropylphenyl) sulfonyl) hydrazono)methyl)phenyl)glycinate 1-s

8.340 8.168 7.884 7.871 7.368 7.366 7.355 7.342 7.284 7.271 7.260 7.241 7.177 4.312 4.303 4.291 4.282 4.269 4.252 4.229 4.199 4.176 3.790 3.772 3.706 3.555 3.528 2.917 2.906 2.894 2.883 2.871 2.860 1.309 1.304 1.298 1.293 1.250 1.239



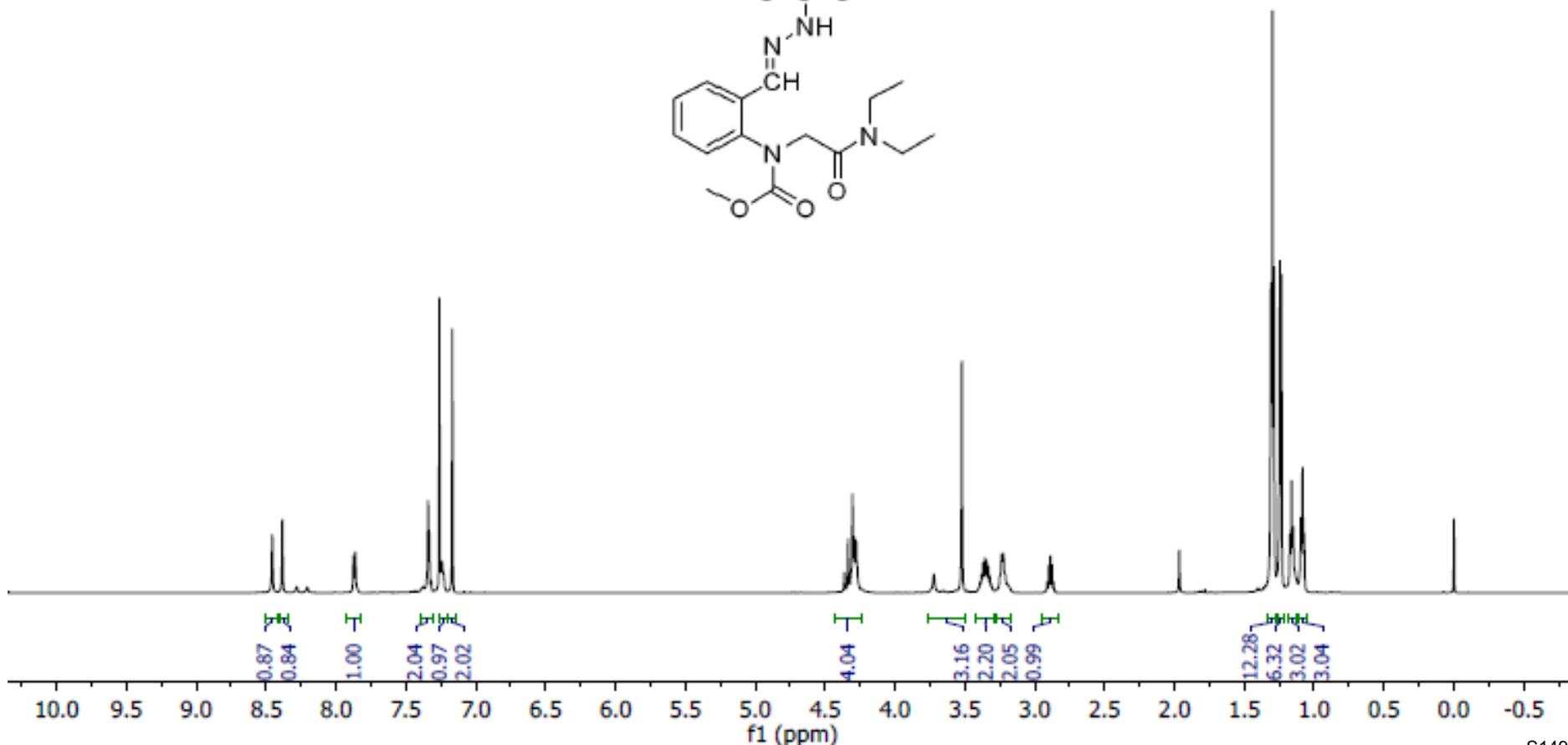
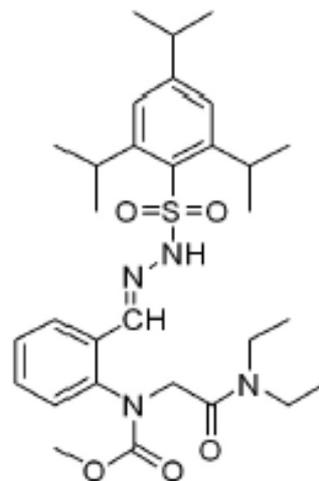
methyl *N*-(methoxycarbonyl)-*N*-(2-((2-((2,4,6-triisopropylphenyl) sulfonyl) hydrazono)methyl)phenyl)glycinate 1-s

169.559
156.152
153.323
151.302
142.456
140.382
131.525
131.317
130.834
128.069
127.843
126.701
123.800
77.211
77.000
76.788
53.572
52.276
52.236
34.163
30.003
24.851
23.517



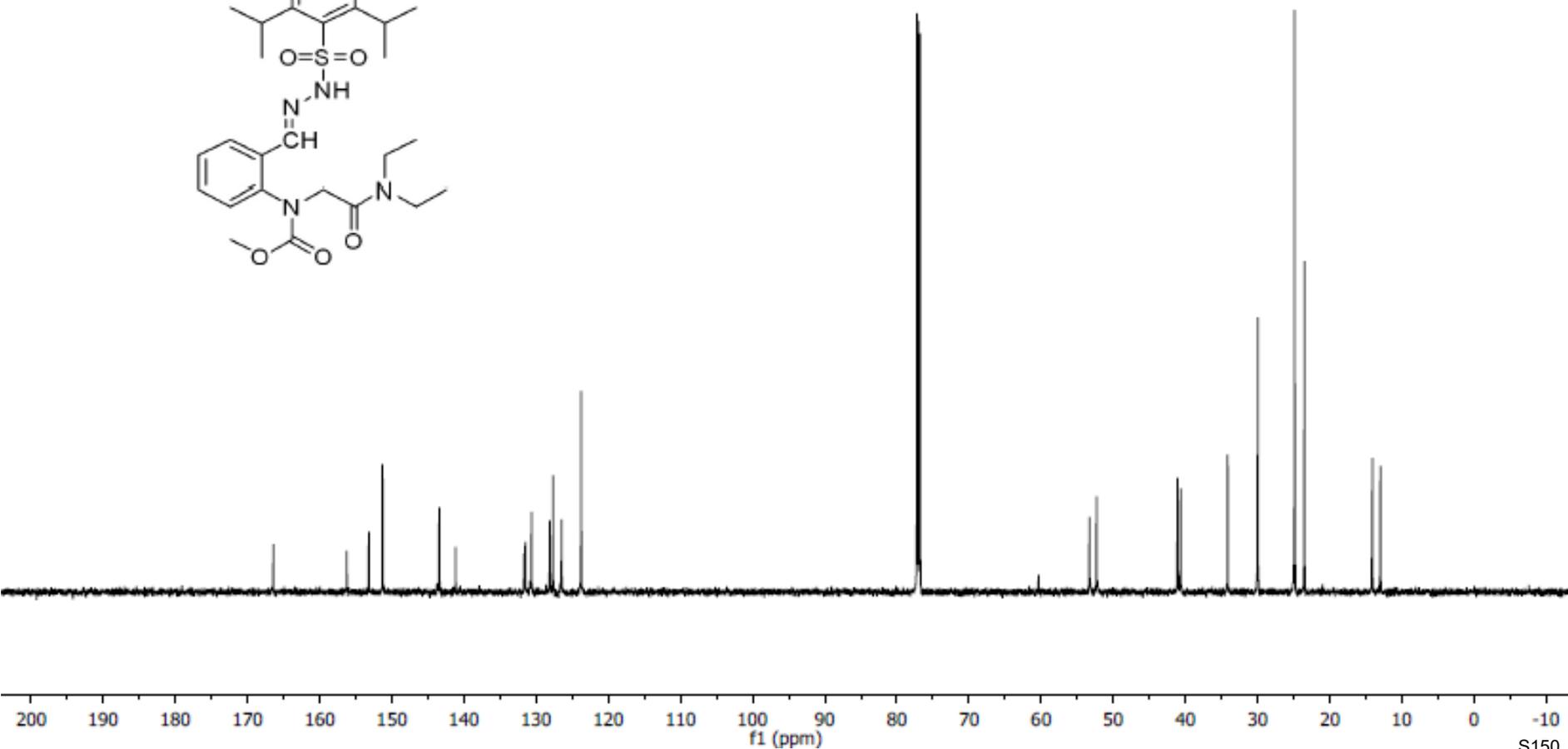
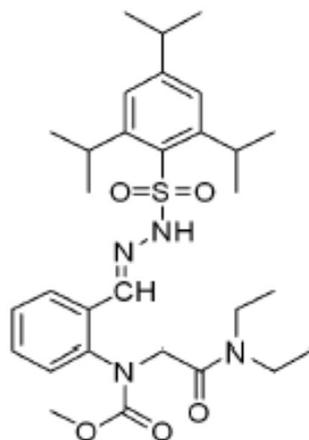
methyl (2-(diethylamino)-2-oxoethyl)(2-((2,4,6-triisopropylphenyl) sulfonyl)hydrazono)methyl)phenyl)carbamate 1-t

8.456
8.384
7.875
7.862
7.378
7.341
7.333
7.319
7.260
7.241
7.232
7.168
4.362
4.335
4.304
4.292
4.278
3.521
3.368
3.356
3.344
3.332
3.236
3.225
2.899
2.887
2.875
1.309
1.298
1.287
1.245
1.234
1.173
1.161
1.149
1.094
1.082
1.071

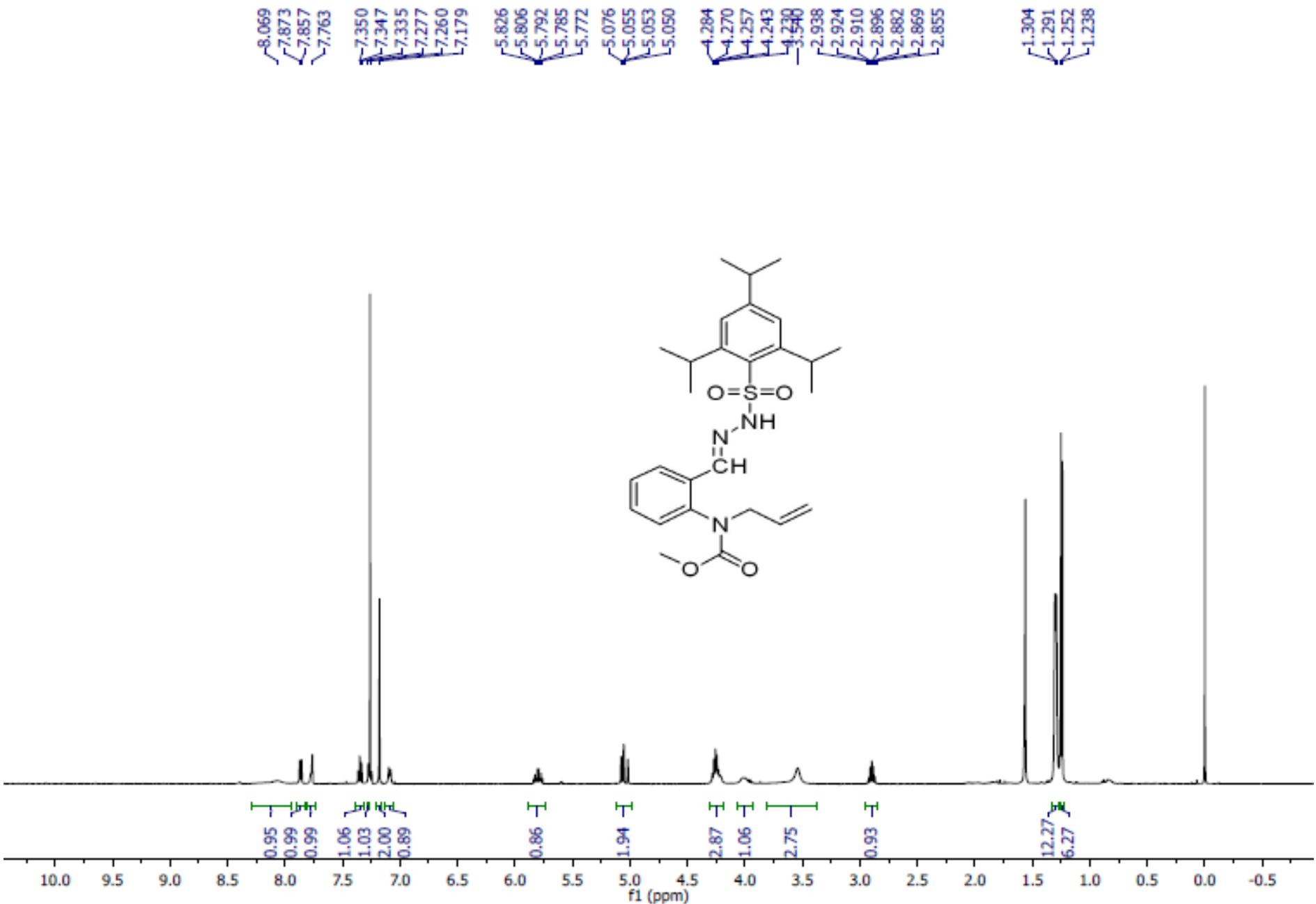


methyl (2-(diethylamino)-2-oxoethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-t

166.435
156.252
153.189
151.292
143.432
141.164
131.683
131.507
130.643
128.115
127.671
126.476
123.759
77.212
77.000
76.788
53.402
52.332
41.115
40.670
34.153
29.979
24.878
23.521
14.101
12.986



methyl allyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-u



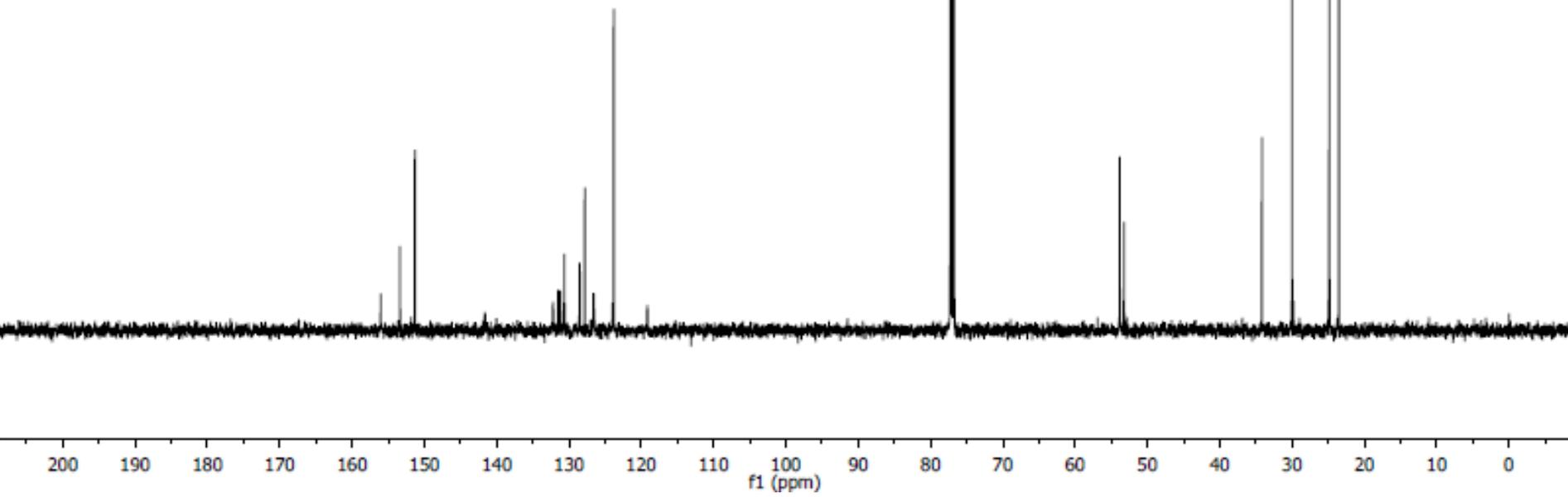
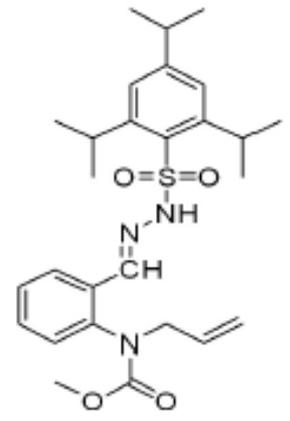
methyl allyl(2-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-u

156.042
153.373
151.310
141.625
132.183
131.483
131.165
130.636
128.512
127.815
126.600
123.997
123.811
119.199

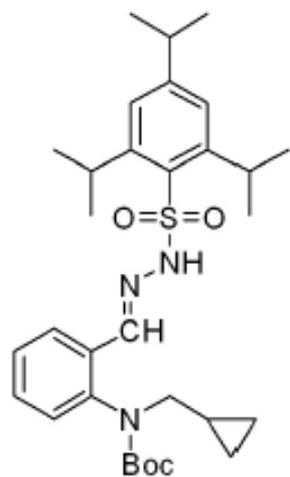
77.254
77.000
76.746

53.826
53.235

34.176
30.002
24.857
23.523



***tert*-butyl (cyclopropylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-v**

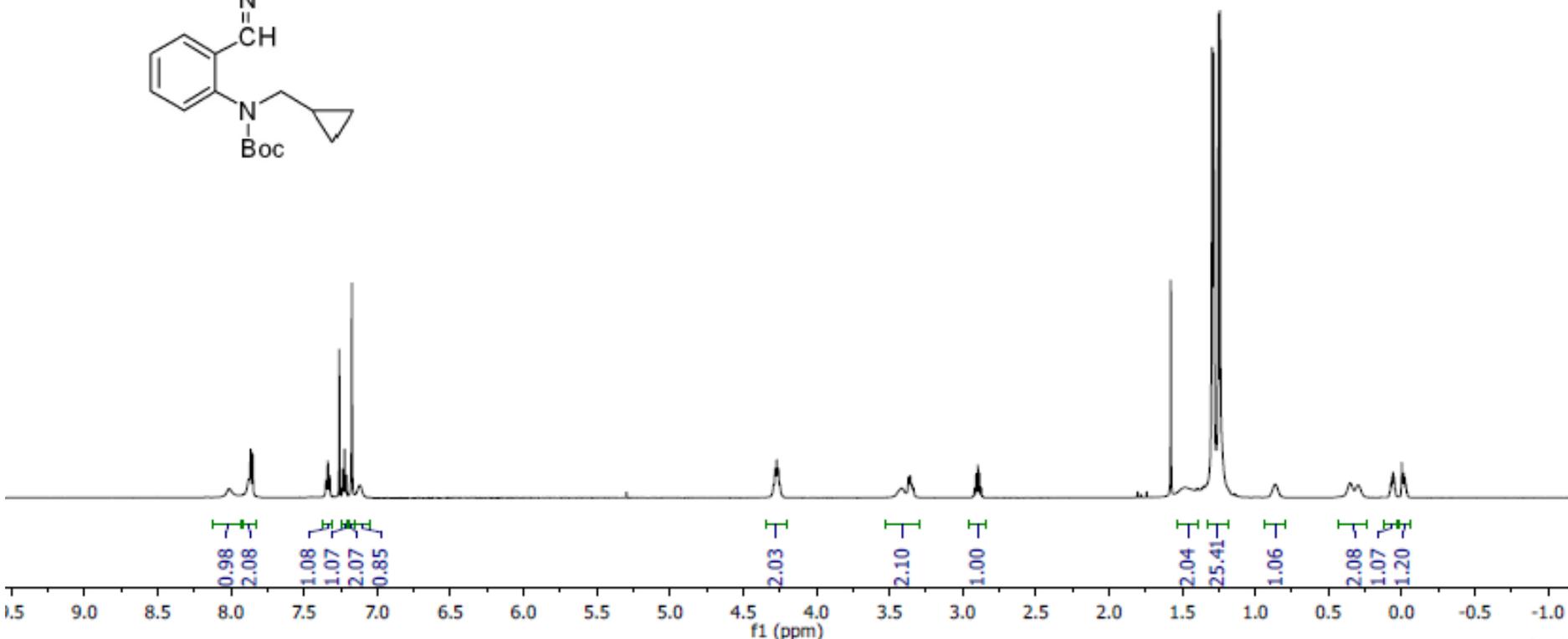


8.011
7.878
7.866
7.853
7.350
7.338
7.326
7.260
7.236
7.223
7.211
7.174
7.121

4.306
4.292
4.281
4.270
4.259
4.248
3.370
3.358
3.348
3.336
3.330
2.918
2.907
2.895
2.884
2.873
2.861

1.480
1.295
1.284
1.252
1.240
-0.862

0.349
0.295
0.074
0.066
0.058
0.051
0.001
0.006
0.014
0.022
0.020



***tert*-butyl (cyclopropylmethyl)(2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazono)methyl)phenyl)carbamate 1-v**

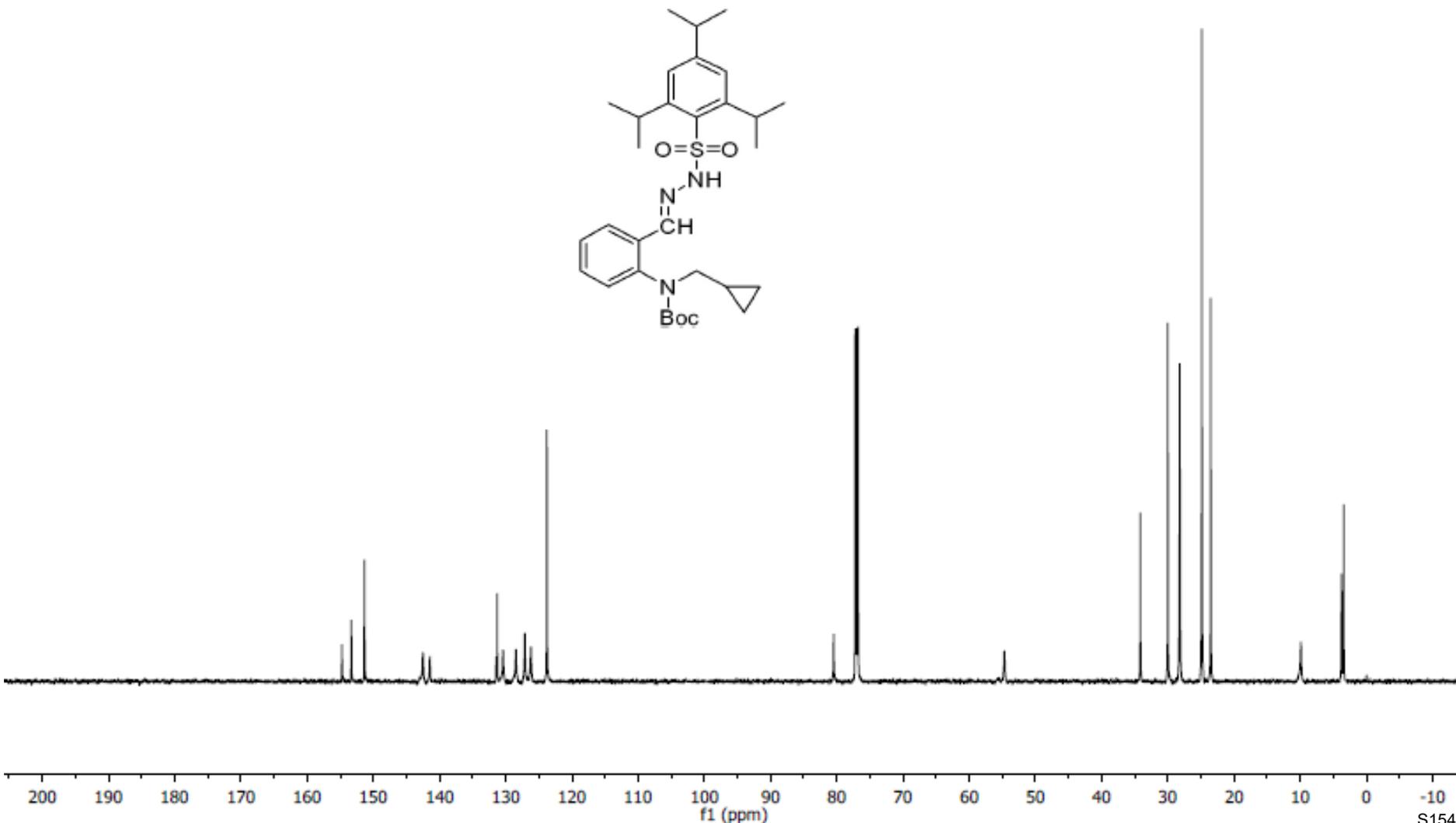
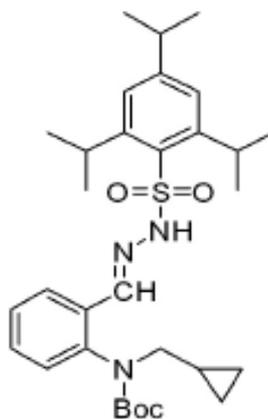
154.74
153.32
151.34
142.51
141.47
131.43
131.29
130.41
128.46
127.12
126.18
123.78

80.47
77.21
77.00
76.79

54.69

34.16
29.99
28.20
24.87
23.52

9.90
3.76
3.44

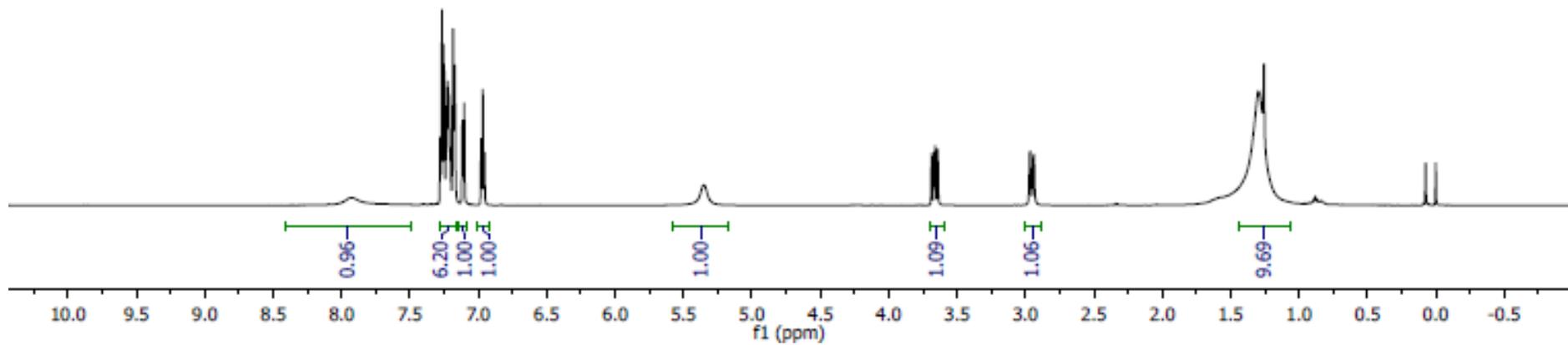
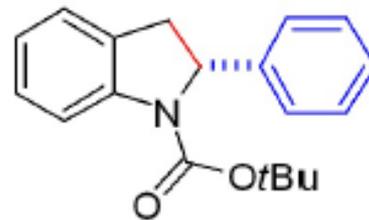


tert-butyl (*R*)-2-phenylindoline-1-carboxylate 2a

7.926
7.278
7.266
7.254
7.246
7.235
7.225
7.216
7.185
7.173
7.116
7.104
6.980
5.957

3.686
3.668
3.659
3.641
2.965
2.938

1.299



tert-butyl (*R*)-2-phenylindoline-1-carboxylate **2a**

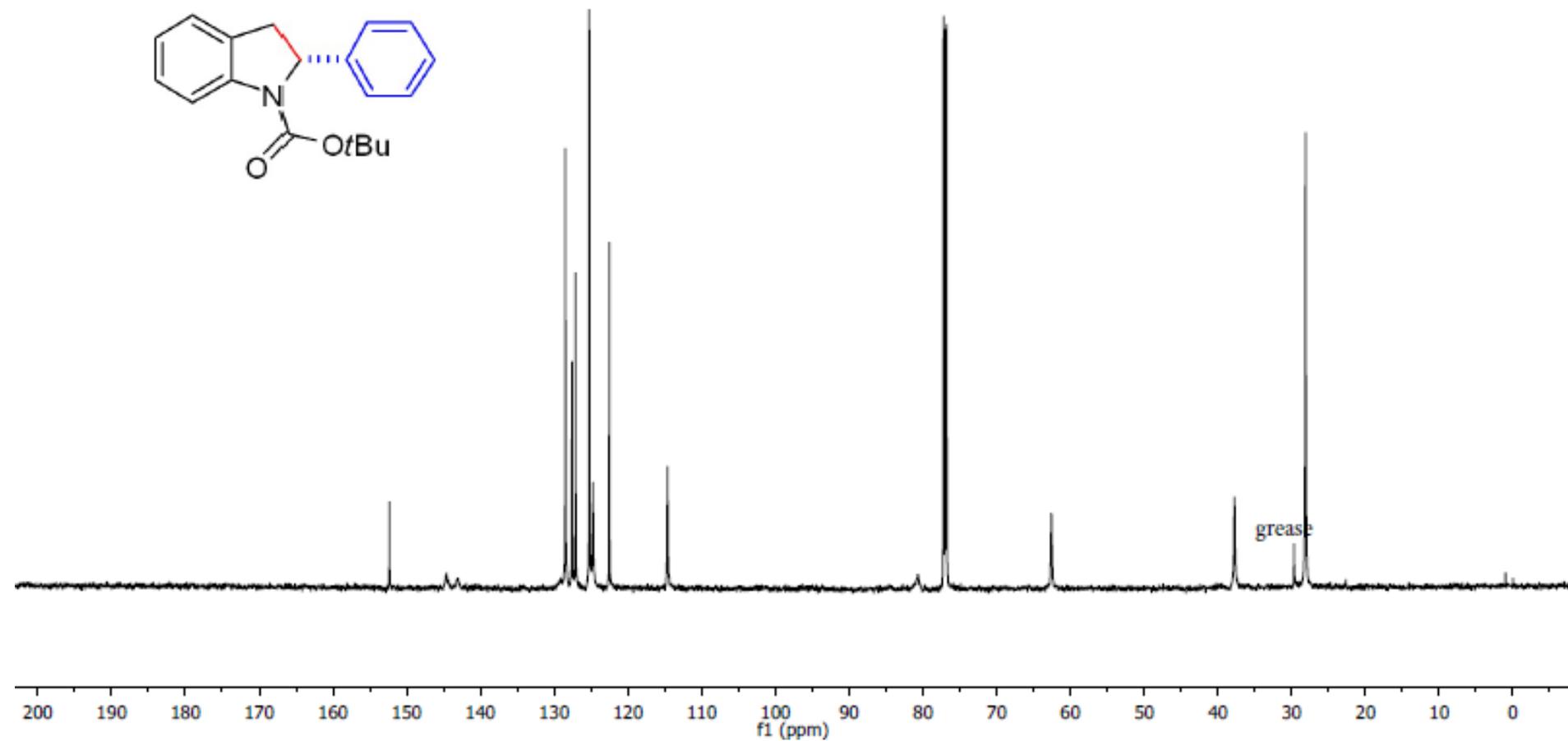
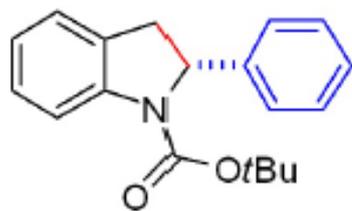
— 152.337
— 144.598
— 143.003
— 129.100
— 128.472
— 127.583
— 127.102
— 125.238
— 124.747
— 122.524
— 114.624

— 80.726
— 77.211
— 77.000
— 76.788

— 62.576

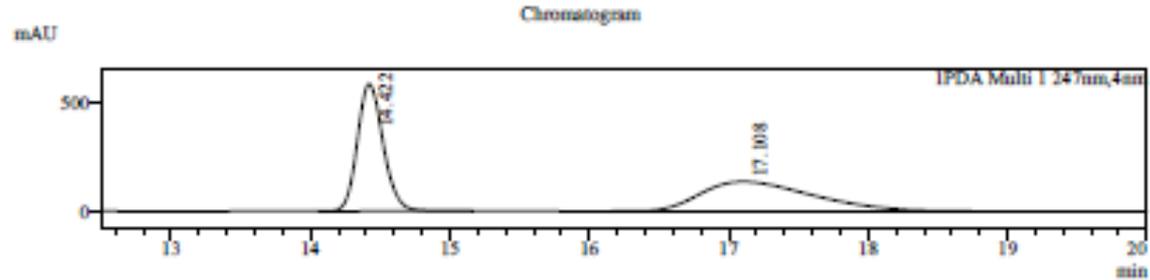
— 37.757

— 28.126

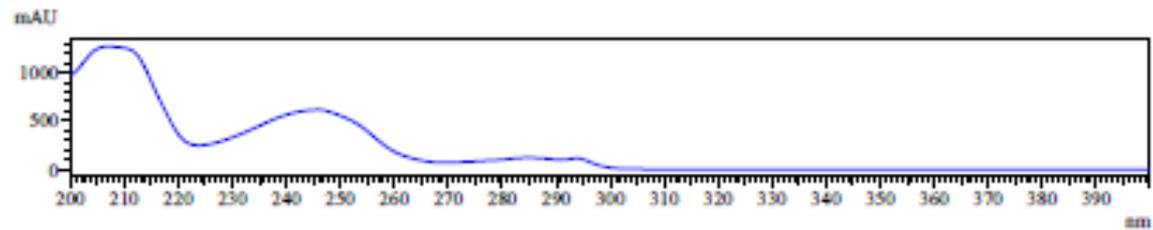


tert-butyl (*R*)-2-phenylindoline-1-carboxylate 2a

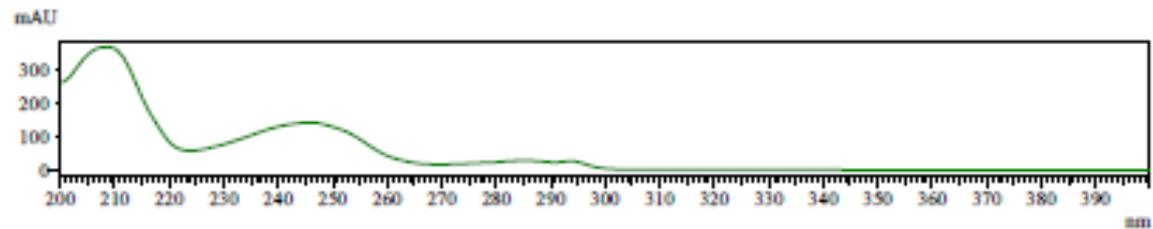
Sample Information
Sample Name : XW-IV-8-IA-0.3%0.8mL-1
Sample ID : XW-IV-8-IA-0.3%0.8mL-1
Data File : XW-IV-8-IA-0.3%0.8mL-1.lcd
Method File : XW-0.3%-0.8ml.lcm



UV Spectrum
Retention time = 14.422



UV Spectrum
Retention time = 17.108



Peak Table

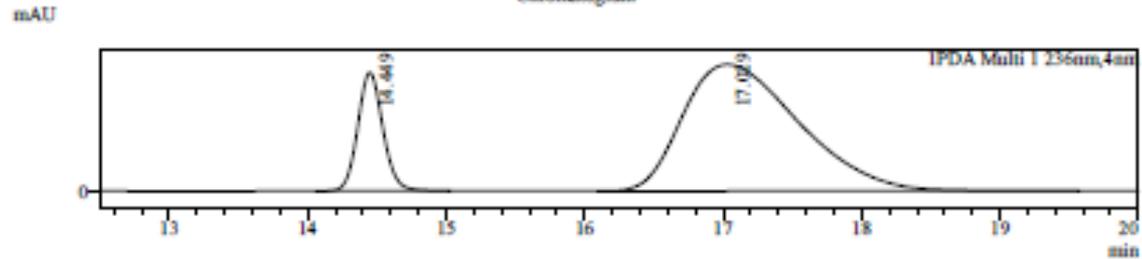
PDA Ch1 247nm

Peak#	Ret. Time	Area	Area%
1	14.422	7635869	49.725
2	17.108	7720233	50.275
Total		15356102	100.000

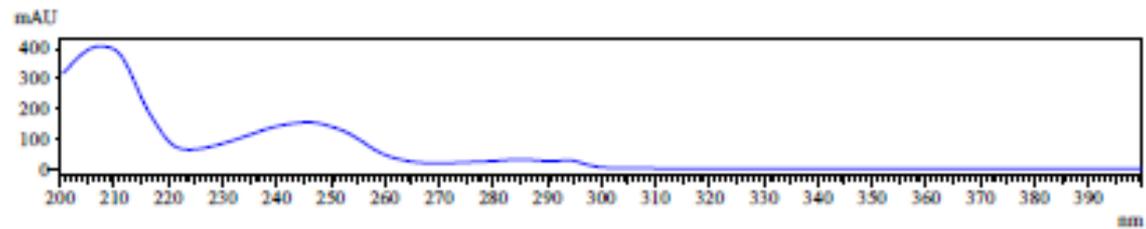
tert-butyl (*R*)-2-phenylindoline-1-carboxylate 2a

Sample Information
Sample Name : XW-IV-18-IA-0.3%0.8mL-1
Sample ID : XW-IV-18-IA-0.3%0.8mL-1
Data File : XW-IV-18-IA-0.3%0.8mL-1.lcd
Method File : XW-0.3%-0.8ml.lcm

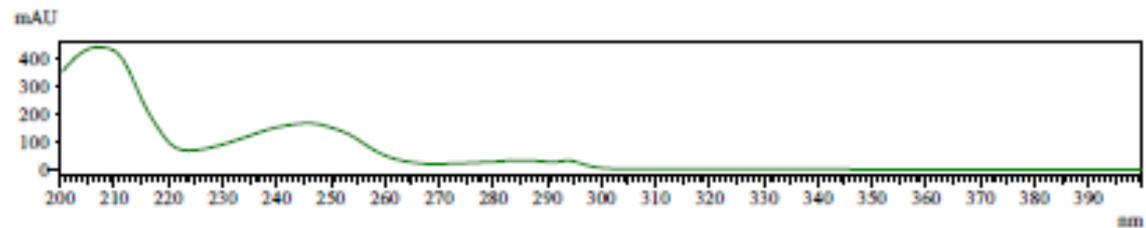
Chromatogram



UV Spectrum
Retention time = 14.449



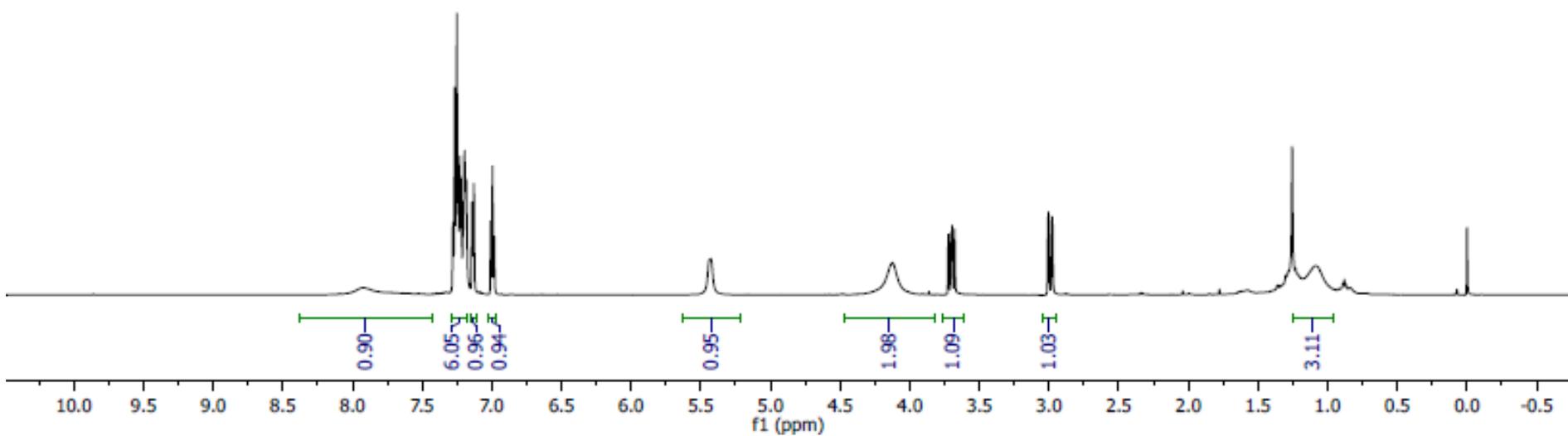
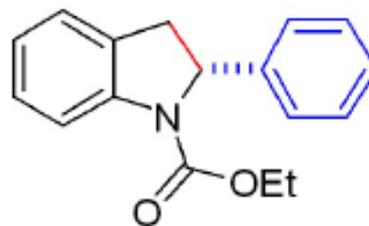
UV Spectrum
Retention time = 17.029



Peak Table

Peak#	Ret. Time	Area	Area%
1	14.449	1506306	16.837
2	17.029	7440359	83.163
Total		8946665	100.000

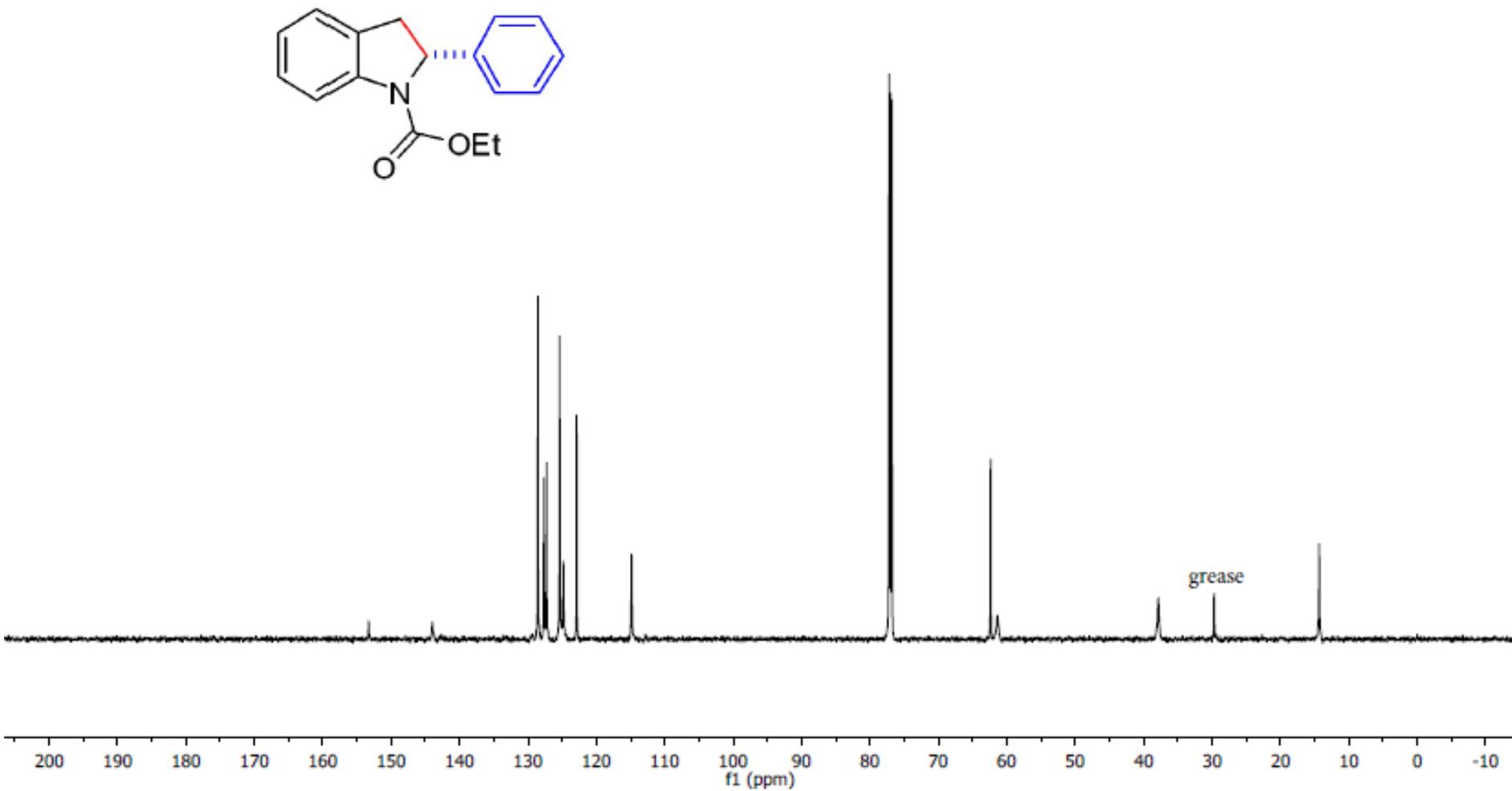
ethyl (*R*)-2-phenylindoline-1-carboxylate 2b



ethyl (*R*)-2-phenylindoline-1-carboxylate 2b



153.278
143.976
129.247
128.544
127.670
127.270
125.365
124.824
122.877
114.849
77.212
77.000
76.789
62.359
61.358
37.837
14.324

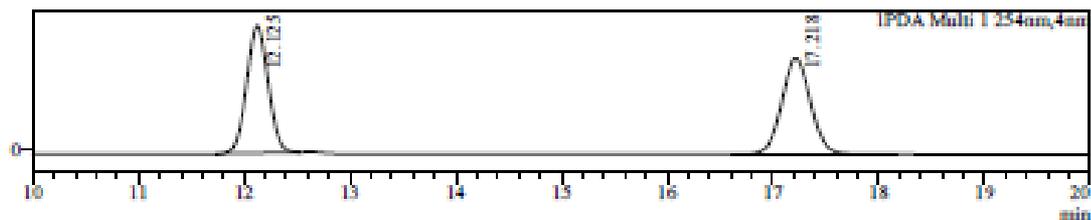


ethyl (R)-2-phenylindoline-1-carboxylate 2b

Sample Information
Sample Name : XW-IV-268-IA-2-1%0.8mL
Sample ID : XW-IV-268-IA-2-1%0.8mL
Data File : XW-IV-268-IA-2-1%0.8mL.lcd
Method File : XW-1%-0.8mL.kcm

Chromatogram

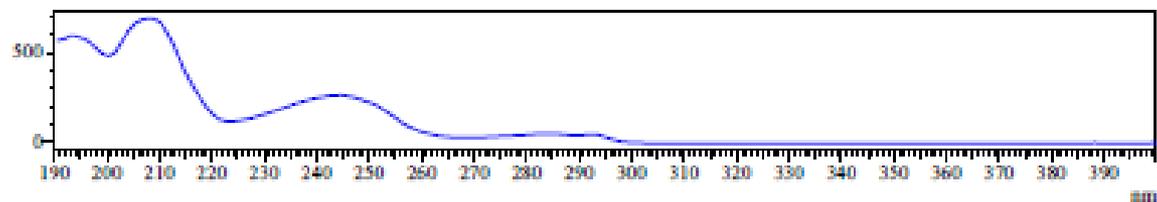
mAU



UV Spectrum

Retention time = 12.125

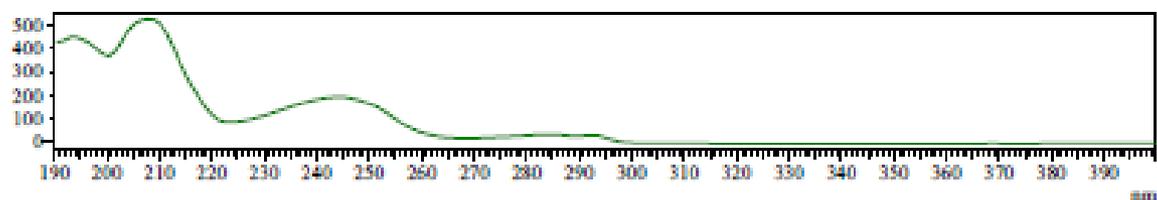
mAU



UV Spectrum

Retention time = 17.218

mAU



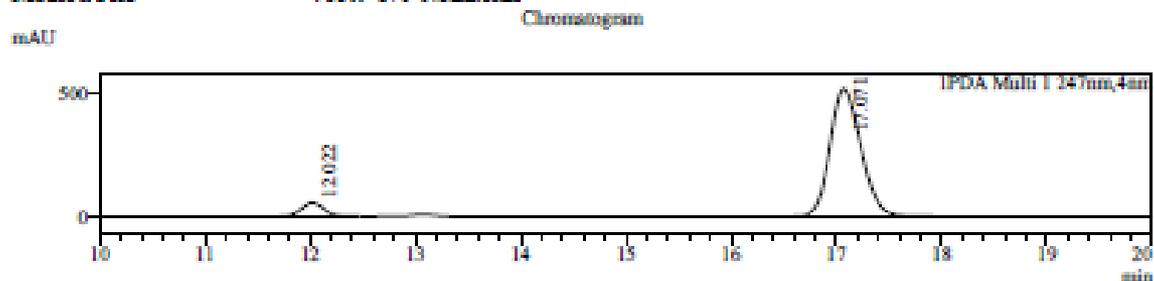
Peak Table

PDA Ch1 254nm

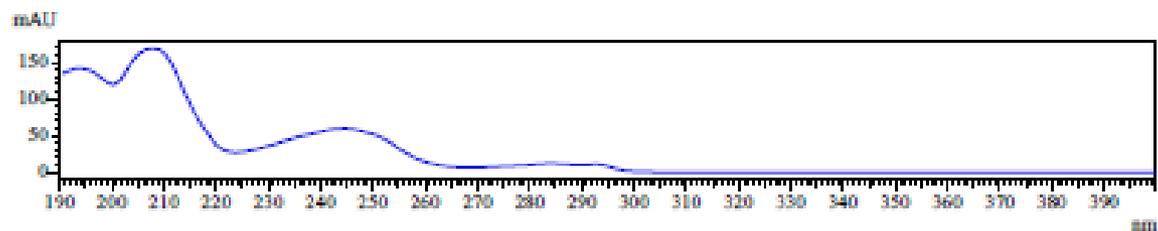
Peak#	Ret. Time	Area	Area%
1	12.125	2254333	49.762
2	17.218	2275872	50.238
Total		4530205	100.000

ethyl (R)-2-phenylindoline-1-carboxylate 2b

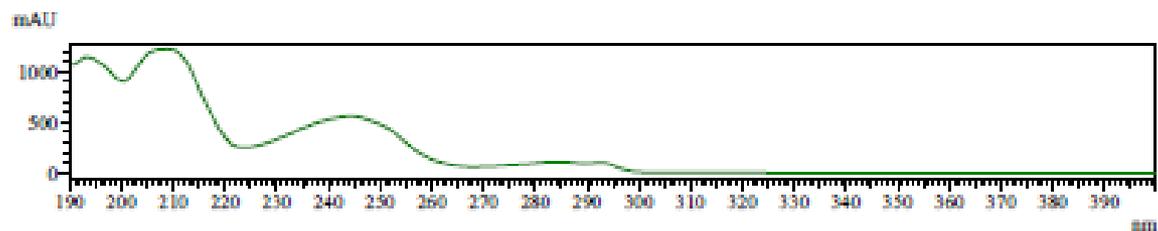
Sample Information
Sample Name : XW-IV-269-IA-1%0.8mL
Sample ID : XW-IV-269-IA-1%0.8mL
Data File : XW-IV-269-IA-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 12.022



UV Spectrum
Retention time = 17.071

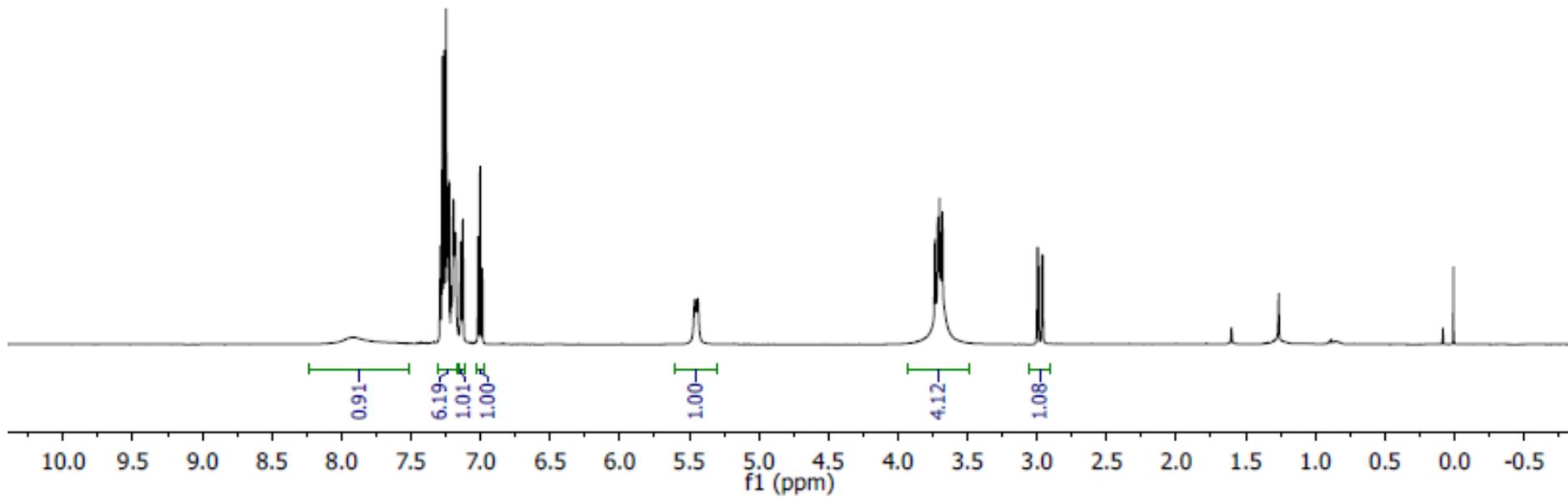
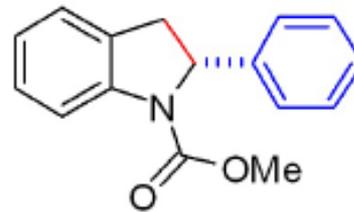


Peak Table

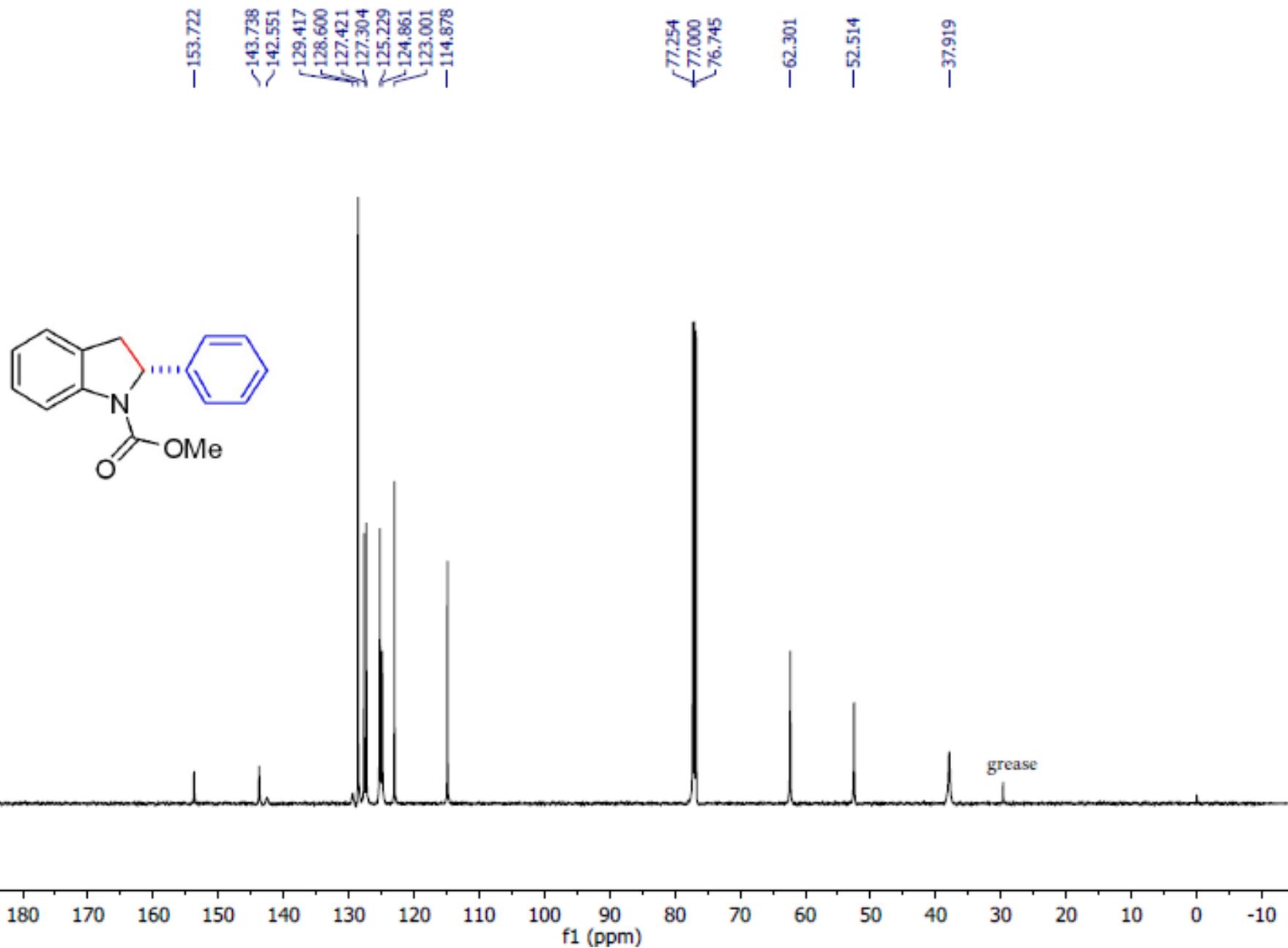
Peak#	Ret. Time	Area	Area%
1	12.022	837835	7.273
2	17.071	10682085	92.727
Total		11519920	100.000

methyl (*R*)-2-phenylindoline-1-carboxylate 2c

7.915
7.275
7.272
7.260
7.247
7.240
7.237
7.225
7.195
7.180
7.128
7.003
5.902
5.859
5.440
3.733
3.712
3.701
3.680
2.997
2.992
2.965
2.959

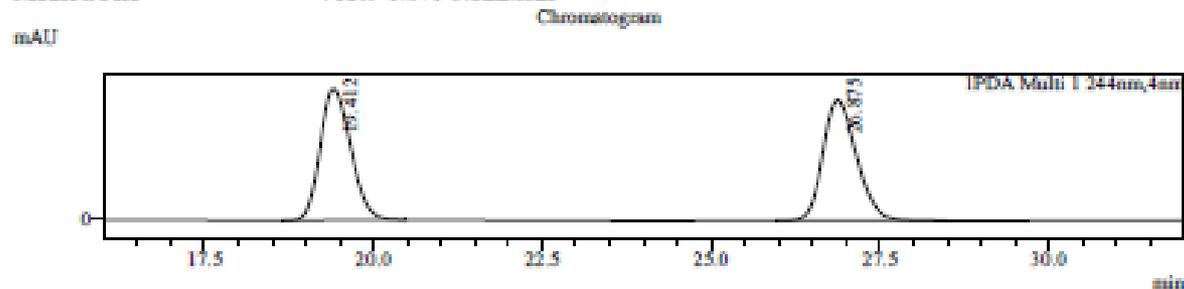


methyl (*R*)-2-phenylindoline-1-carboxylate 2c

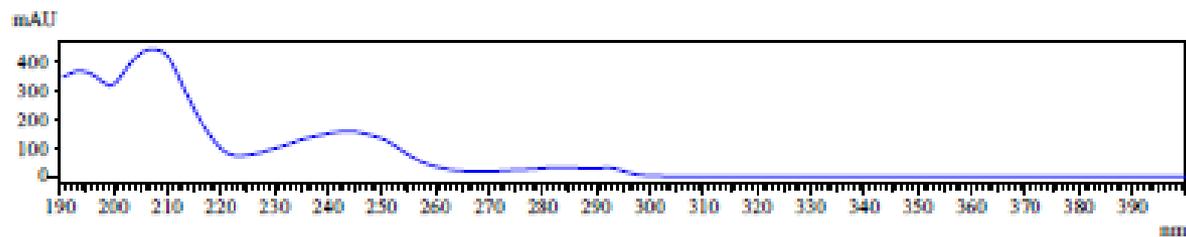


methyl (R)-2-phenylindoline-1-carboxylate 2c

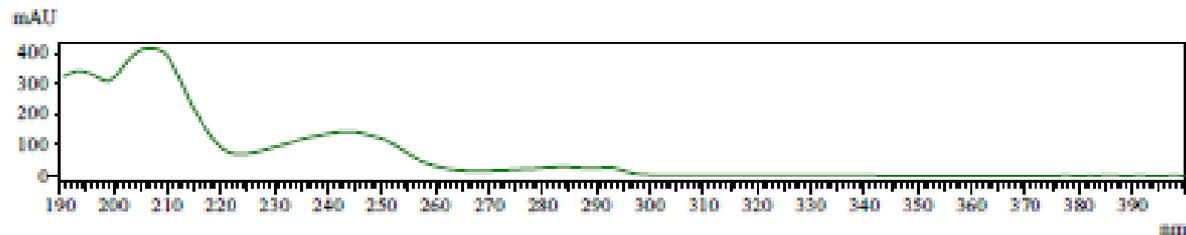
Sample Information
Sample Name : XW-IV-246-IA-0.5%0.8mL
Sample ID : XW-IV-246-IA-0.5%0.8mL
Data File : XW-IV-246-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8mL.lcm



UV Spectrum
Retention time = 19.412



UV Spectrum
Retention time = 26.875



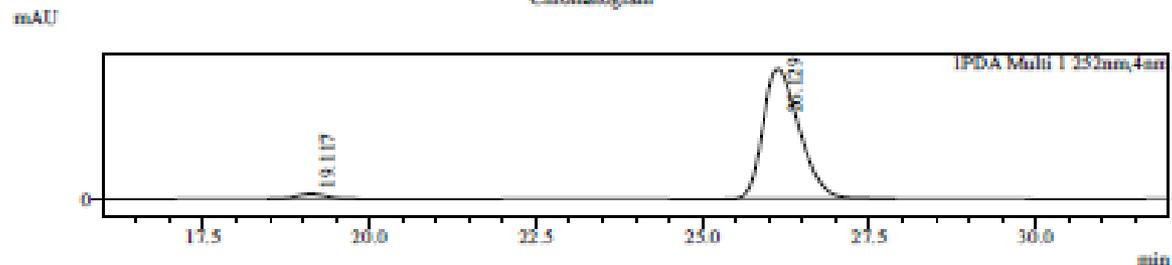
Peak Table

Peak#	Ret. Time	Area	Area%
1	19.412	4857504	49.571
2	26.875	4941667	50.429
Total		9799171	100.000

methyl (*R*)-2-phenylindoline-1-carboxylate 2c

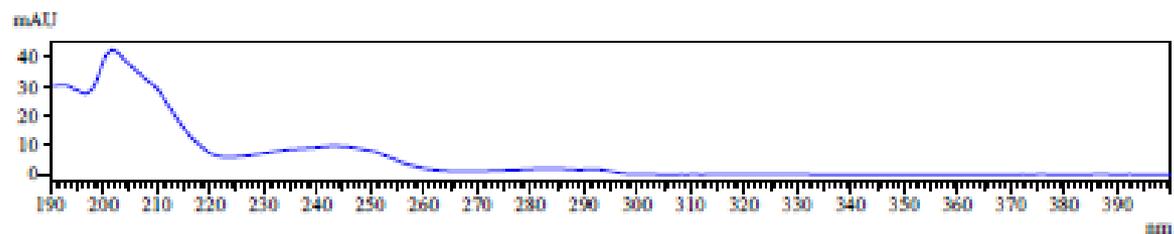
Sample Information
Sample Name : NW-IV-283-MeOH-IA-0.5%0.8mL
Sample ID : NW-IV-283-MeOH-IA-0.5%0.8mL
Data File : NW-IV-283-MeOH-IA-0.5%0.8mL.lcd
Method File : NW-0.5%-0.8ml.lcm

Chromatogram



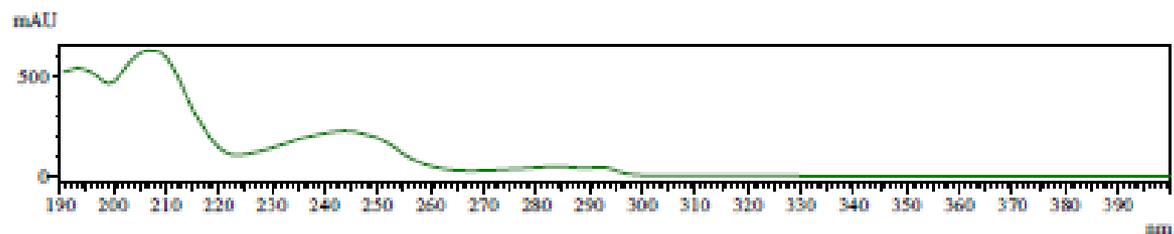
UV Spectrum

Retention time = 19.117



UV Spectrum

Retention time = 26.129



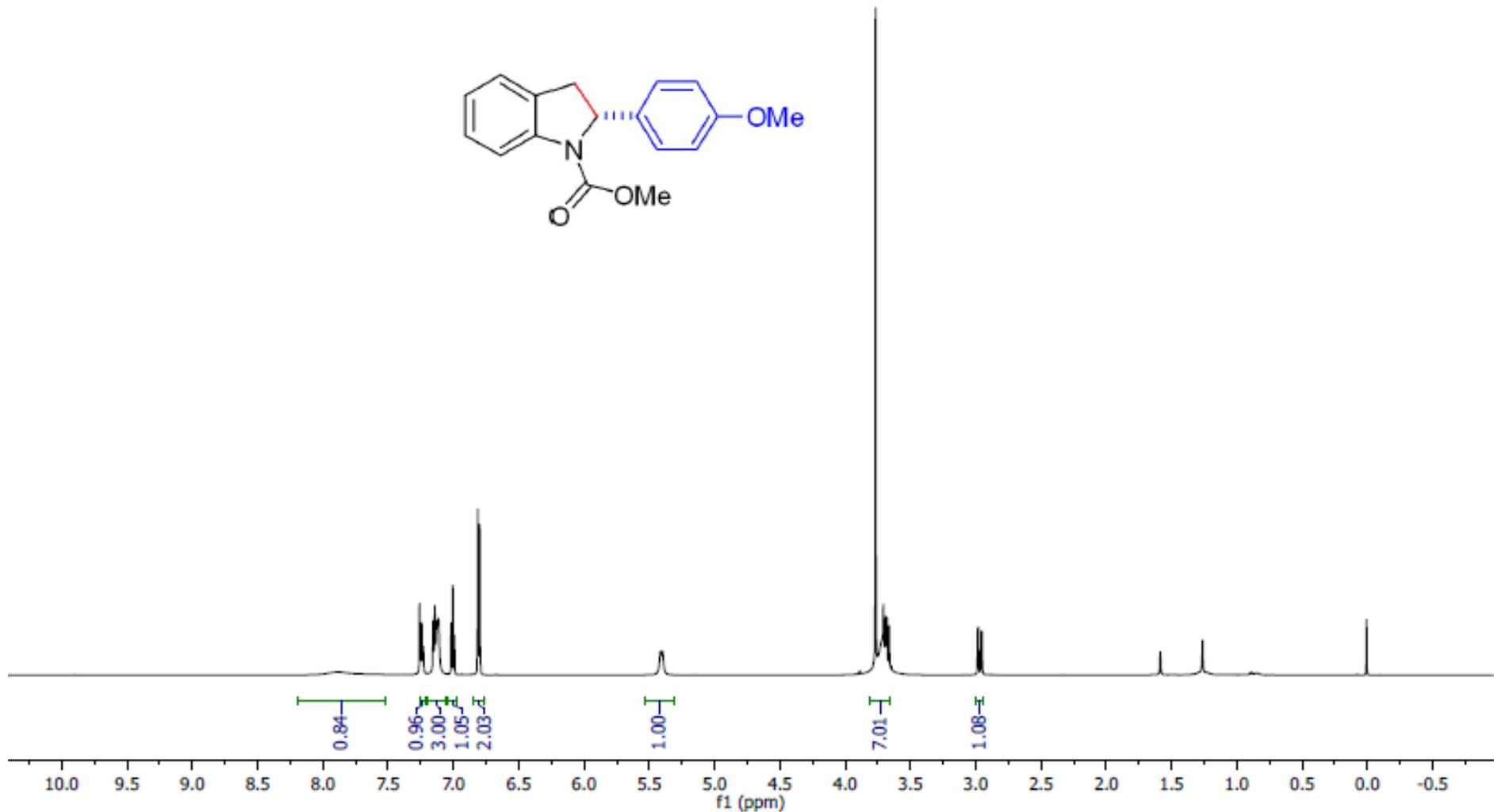
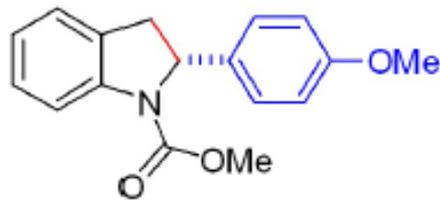
Peak Table

PDA Ch1 252nm

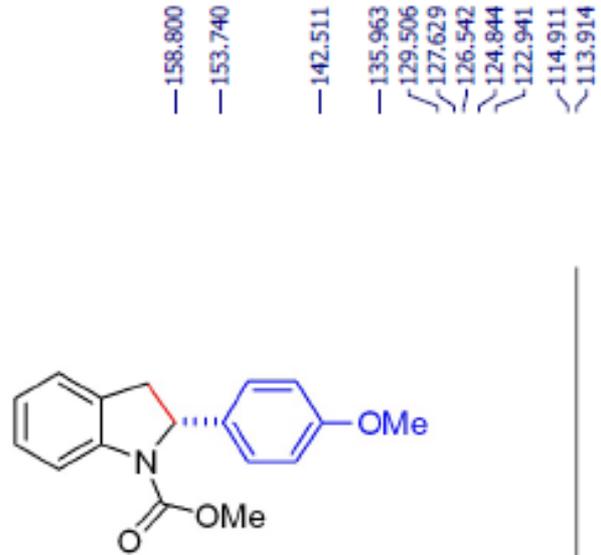
Peak#	Ret. Time	Area	Area%
1	19.117	190423	3.140
2	26.129	5873582	96.860
Total		6064005	100.000

methyl (*R*)-2-(4-methoxyphenyl)indoline-1-carboxylate 2d

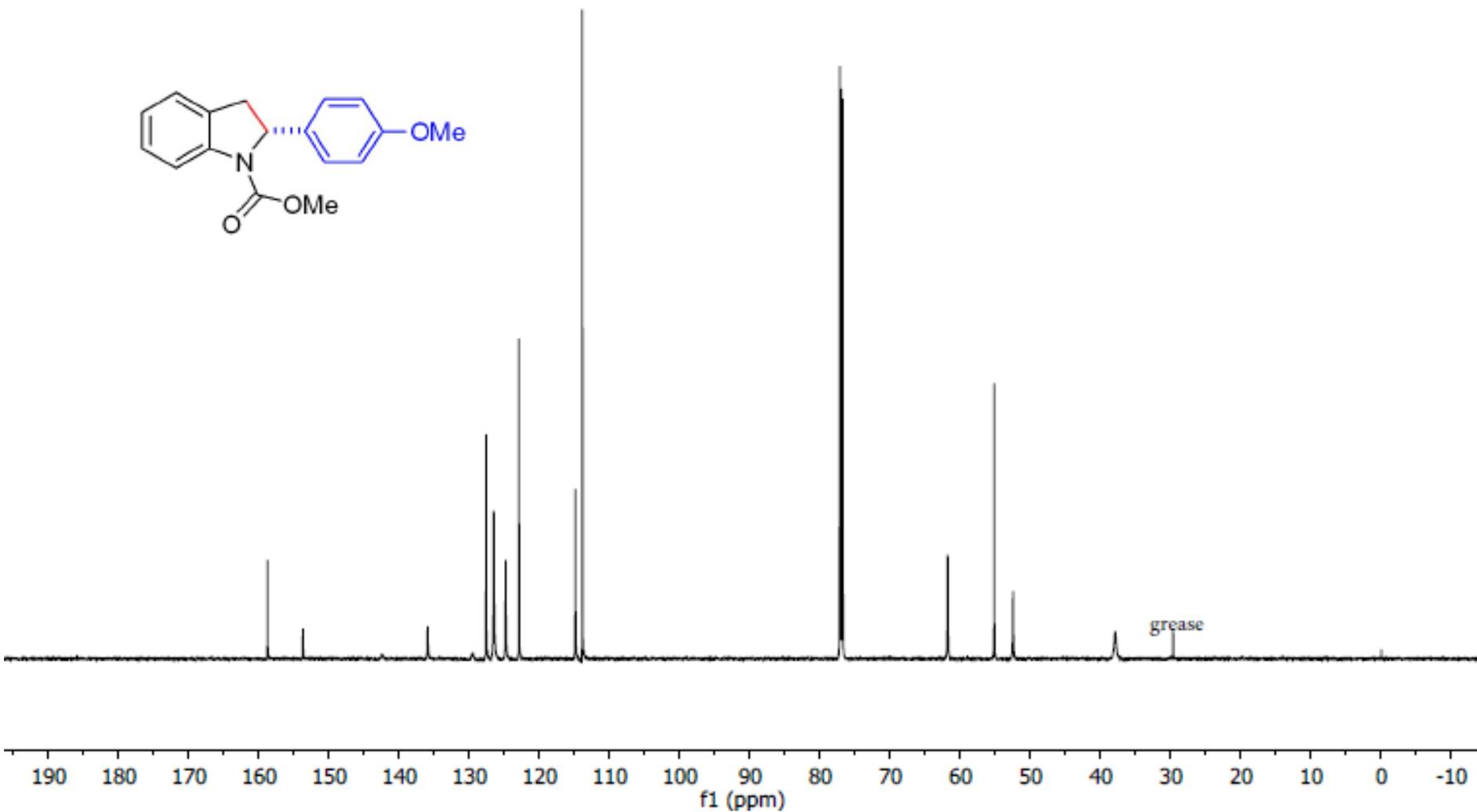
7.892, 7.260, 7.244, 7.231, 7.155, 7.143, 7.127, 7.115, 7.017, 7.005, 6.993, 6.813, 6.799, 5.415, 5.399, 3.768, 3.707, 3.690, 3.680, 3.663, 2.984, 2.980, 2.957, 2.953



methyl (*R*)-2-(4-methoxyphenyl)indoline-1-carboxylate 2d

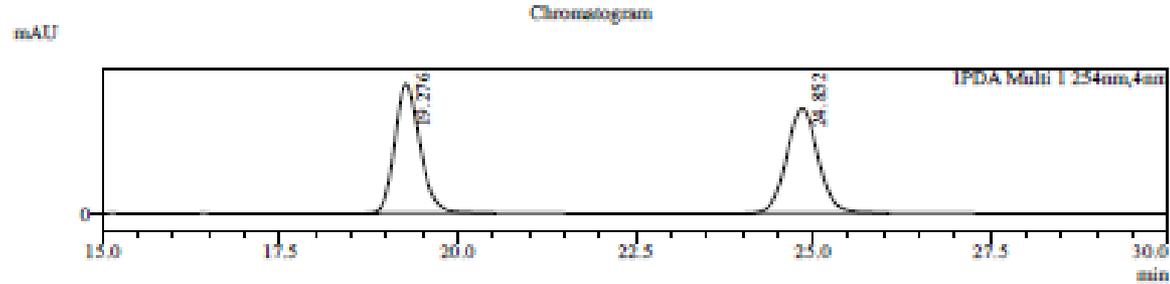


158.800
153.740
142.511
135.963
129.506
127.629
126.542
124.844
122.941
114.911
113.914
77.211
77.000
76.788
61.828
55.190
52.504
37.889

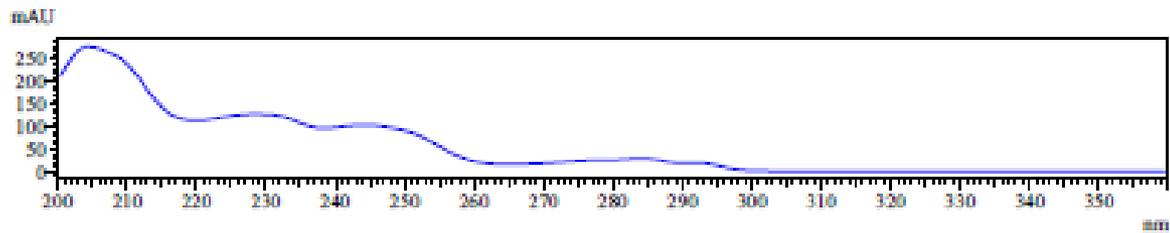


methyl (*R*)-2-(4-methoxyphenyl)indoline-1-carboxylate 2d

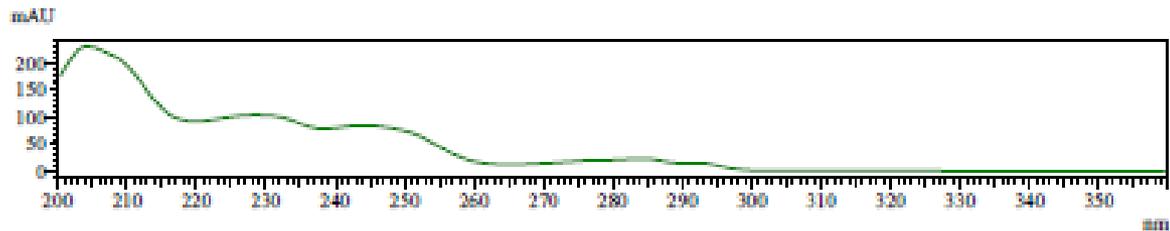
Sample Information
Sample Name : XW-V-17-2-IA-1%1.0mL
Sample ID : XW-V-17-2-IA-1%1.0mL
Data File : XW-V-17-2-IA-1%1.0mL.lcd
Method File : XW-1%-1.0mL.lcm



UV Spectrum
Retention time = 19.276



UV Spectrum
Retention time = 24.852



Peak Table

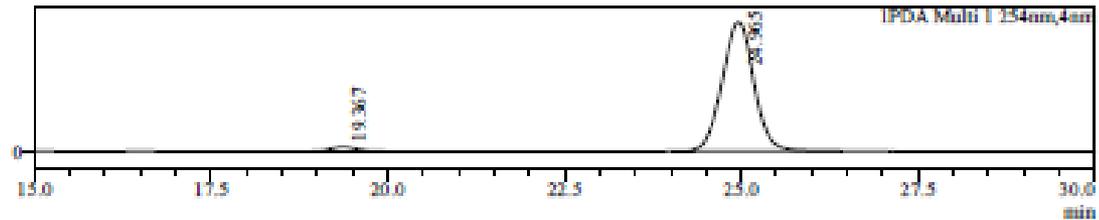
Peak#	Ret. Time	Area	Area%
1	19.276	1594697	49.760
2	24.852	1610066	50.240
Total		3204763	100.000

methyl (R)-2-(4-methoxyphenyl)indoline-1-carboxylate 2d

Sample Information
Sample Name : XW-V-18-new-IA-1%1.0mL
Sample ID : XW-V-18-new-IA-1%1.0mL
Data File : XW-V-18-new-IA-1%1.0mL.lcd
Method File : XW-1%-1.0ml.kcm

Chromatogram

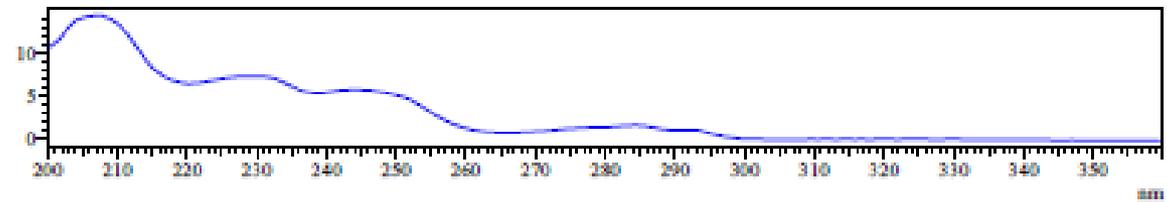
mAU



UV Spectrum

Retention time = 19.367

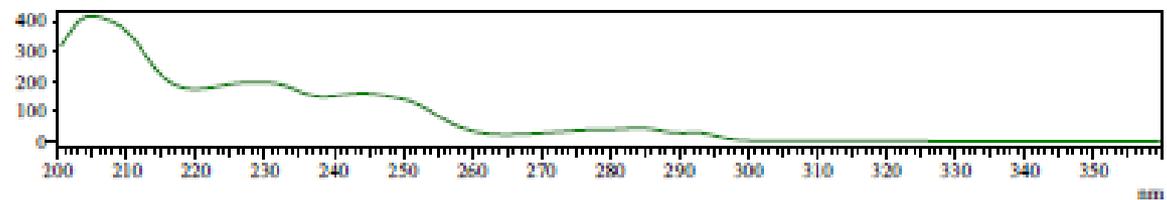
mAU



UV Spectrum

Retention time = 24.965

mAU



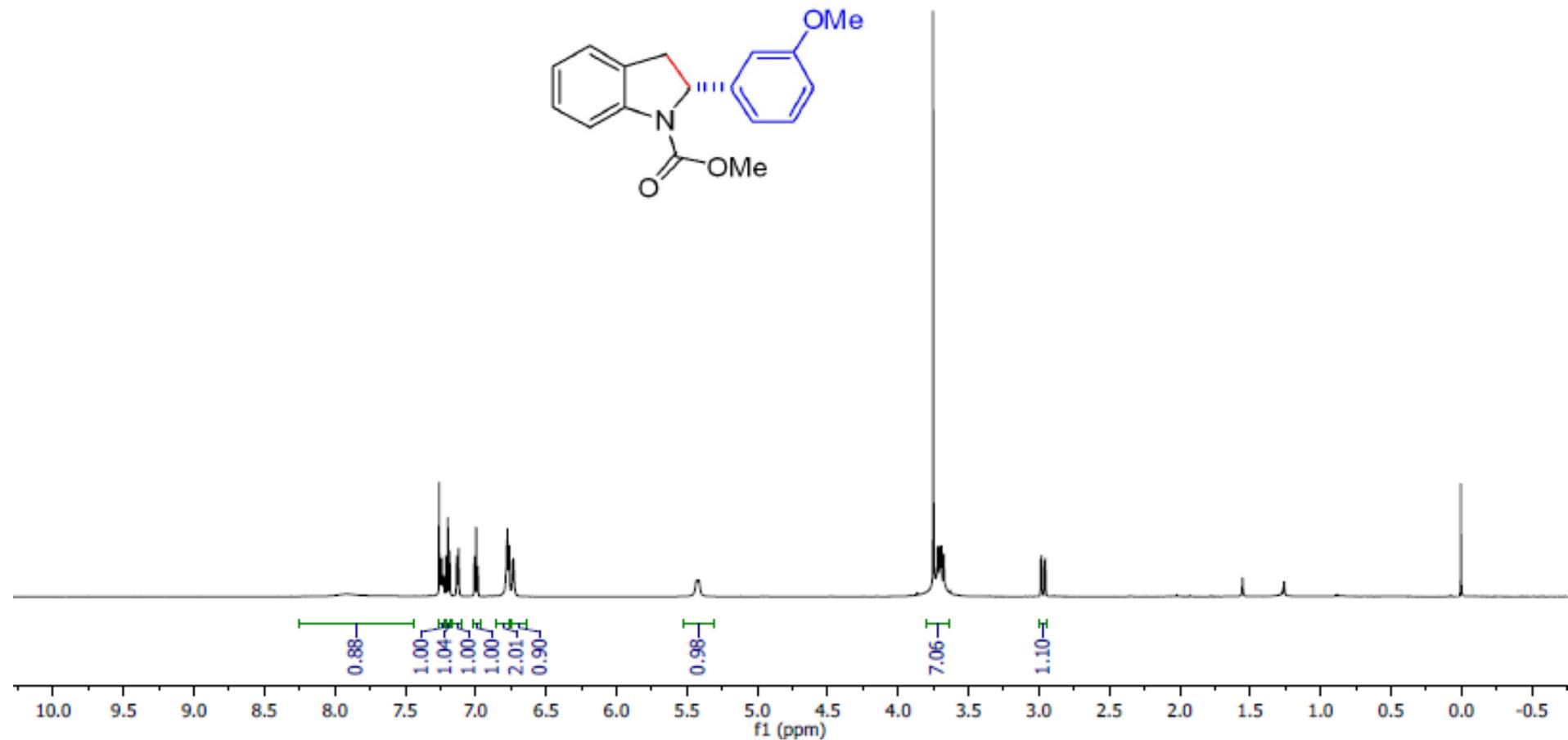
Peak Table

PDA Ch1 254nm

Peak#	Ret. Time	Area	Area%
1	19.367	89446	2.820
2	24.965	3082787	97.180
Total		3172233	100.000

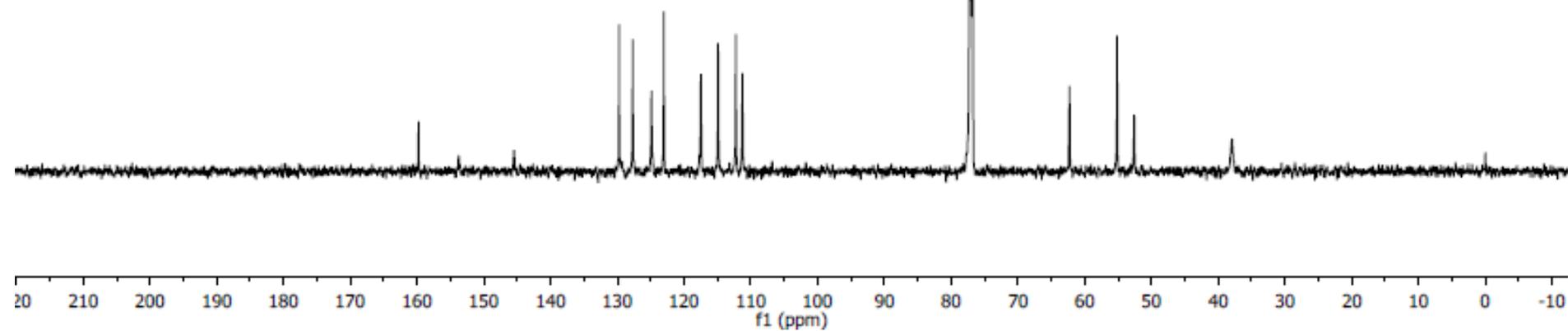
methyl (*R*)-2-(3-methoxyphenyl)indoline-1-carboxylate 2e

7.914
7.260
7.241
7.211
7.197
7.184
7.133
7.121
7.009
6.996
6.778
6.774
6.764
6.750
6.751
5.416
3.751
3.720
3.702
3.693
3.675
2.986
2.981
2.959
2.954



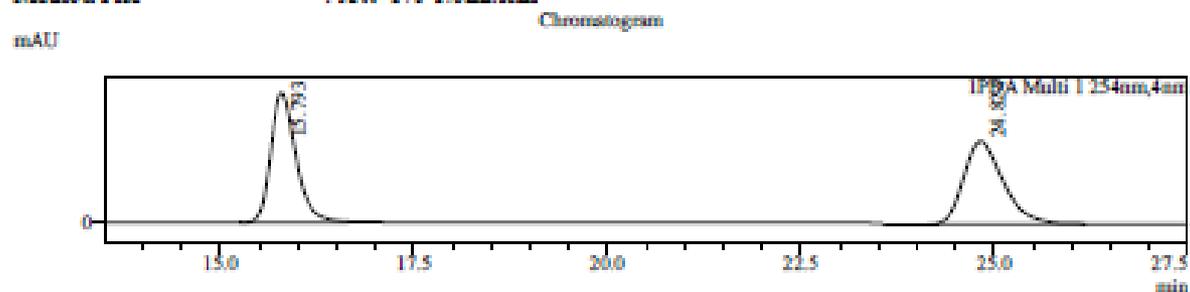
methyl (*R*)-2-(3-methoxyphenyl)indoline-1-carboxylate 2e

— 159.773 — 153.745 — 145.475 — 129.729 — 127.689 — 124.879 — 123.028 — 117.698 — 117.483 — 114.898 — 113.195 — 112.255 — 111.262 — 77.212 — 77.000 — 76.789 — 62.269 — 55.142 — 52.591 — 37.928

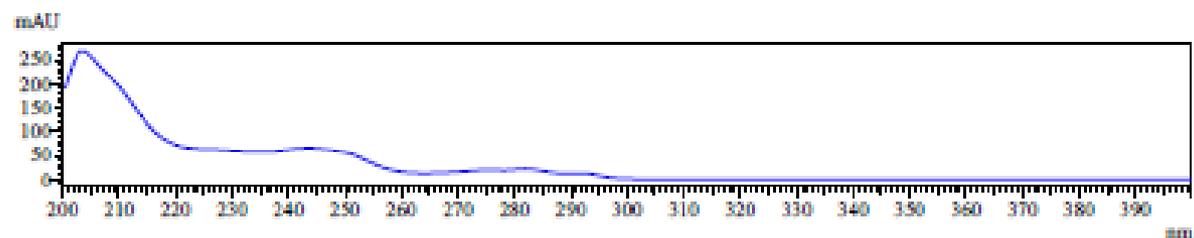


methyl (*R*)-2-(3-methoxyphenyl)indoline-1-carboxylate 2e

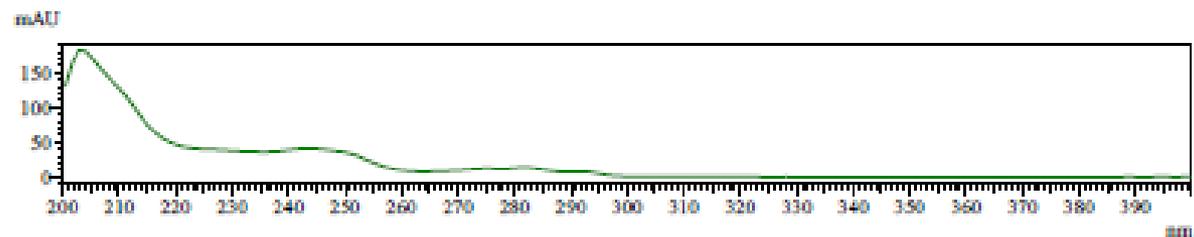
Sample Information
Sample Name : XW-V-7-IA-1%1.0mL
Sample ID : XW-V-7-IA-1%1.0mL
Data File : XW-V-7-IA-1%1.0mL.lcd
Method File : XW-1%-1.0ml.lcm



UV Spectrum
Retention time = 15.793



UV Spectrum
Retention time = 24.824



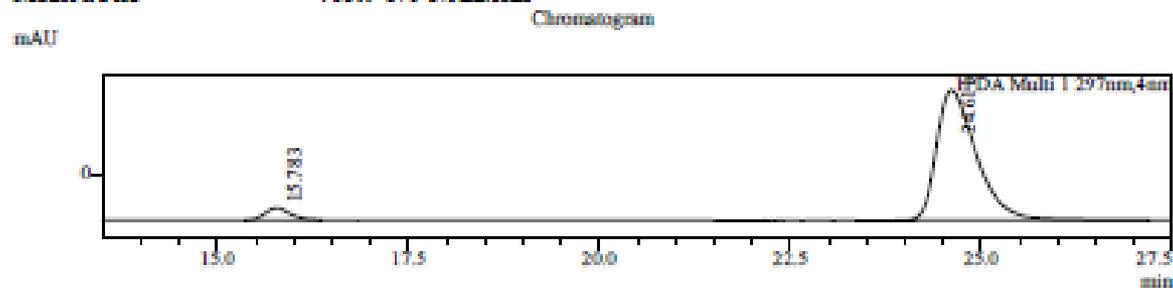
Peak Table

PDA Ch1 254nm

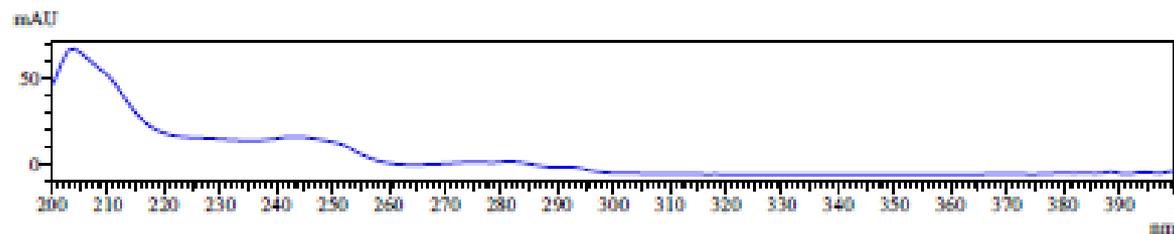
Peak#	Ret. Time	Area	Area%
1	15.793	875771	50.011
2	24.824	875394	49.989
Total		1751165	100.000

methyl (R)-2-(3-methoxyphenyl)indoline-1-carboxylate 2e

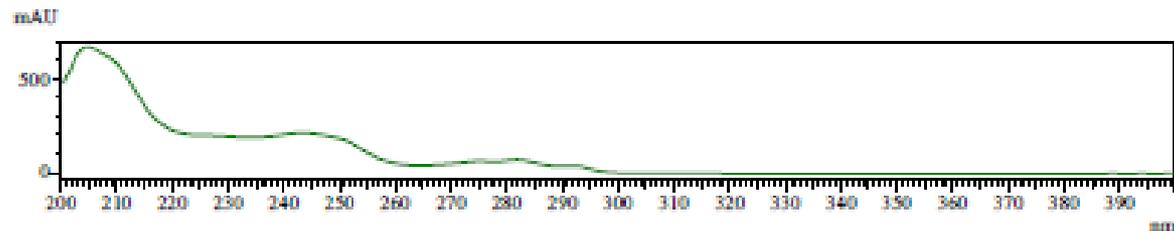
Sample Information
Sample Name : XW-V-8A-IA-1%1.0mL
Sample ID : XW-V-8A-IA-1%1.0mL
Data File : XW-V-8A-MeOH-IA-1%1.0mL.lcd
Method File : XW-1%-1.0ml.lcm



UV Spectrum
Retention time = 15.783



UV Spectrum
Retention time = 24.611



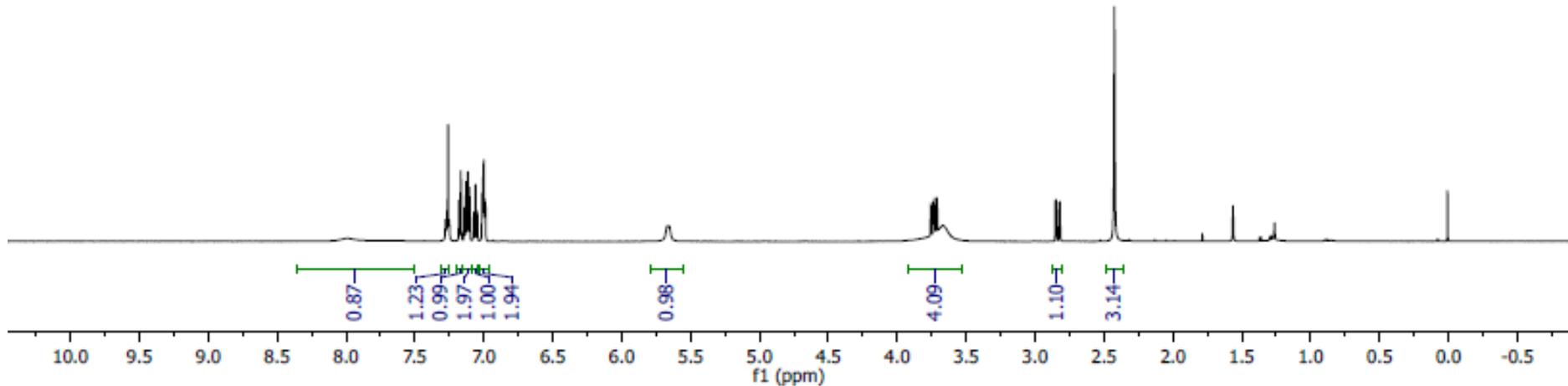
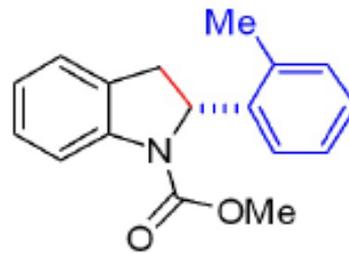
Peak Table

PDA Ch1 297nm

Peak#	Ret. Time	Area	Area%
1	15.783	34284	5.273
2	24.611	615910	94.727
Total		650195	100.000

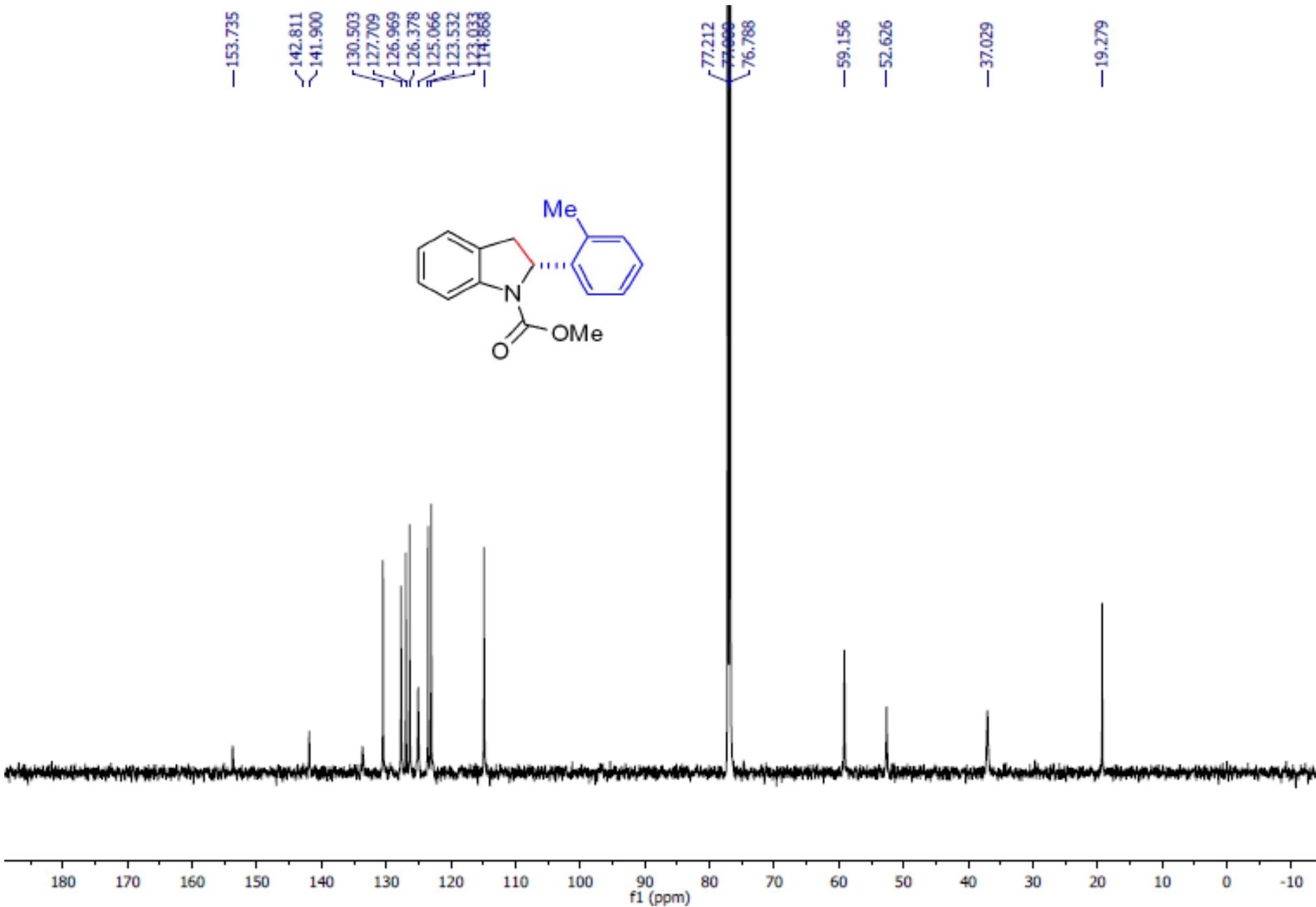
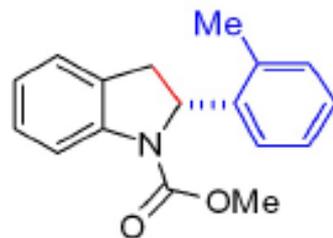
methyl (*R*)-2-(*o*-tolyl)indoline-1-carboxylate 2f

7.992
7.260
7.179
7.167
7.128
7.116
7.104
7.060
7.013
7.006
7.001
5.993
5.670
5.655
3.756
3.738
3.729
3.712
3.670
2.852
2.847
2.825
2.820
2.424



methyl (*R*)-2-(*o*-tolyl)indoline-1-carboxylate 2f

153.735
142.811
141.900
130.503
127.709
126.969
126.378
125.066
123.532
123.033
114.868
77.212
77.000
76.788
59.156
52.626
37.029
19.279



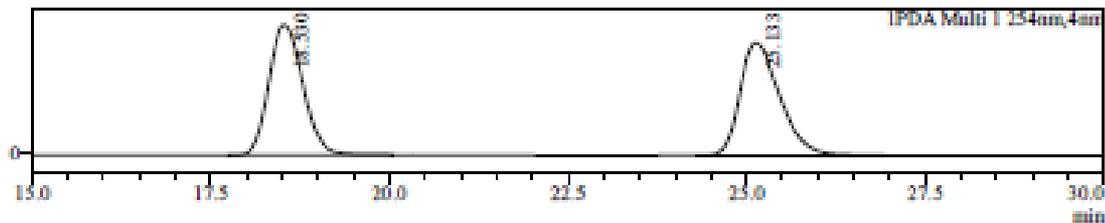
methyl (*R*)-2-(*o*-tolyl)indoline-1-carboxylate 2f

Sample Name : XW-V-46-IA-0.5%0.8mL
Sample ID : XW-V-46-IA-0.5%0.8mL
Data File : XW-V-46-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8mL.lcm

Sample Information

Chromatogram

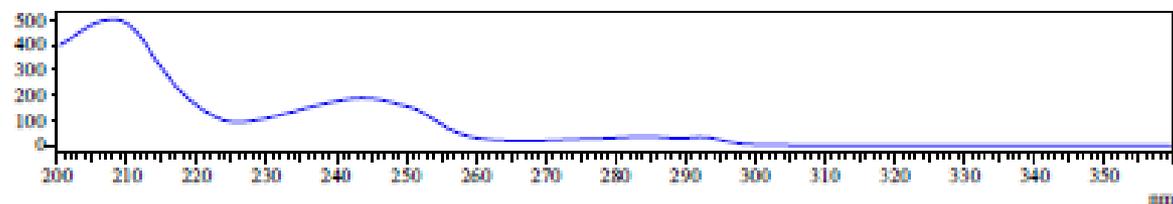
mAU



UV Spectrum

Retention time = 18.530

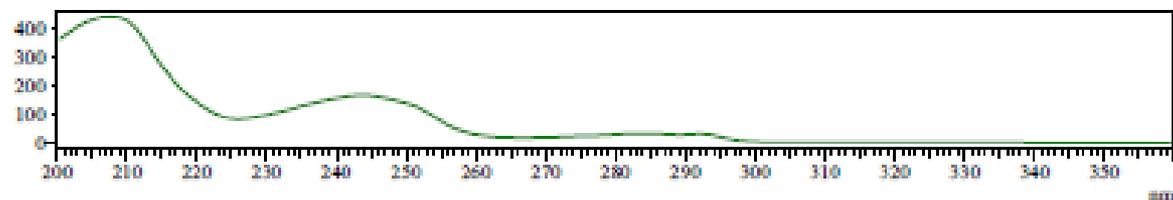
mAU



UV Spectrum

Retention time = 25.133

mAU



Peak Table

PDA Ch1 254nm

Peak#	Ret. Time	Area	Area%
1	18.530	3403363	49.929
2	25.133	3413071	50.071
Total		6816434	100.000

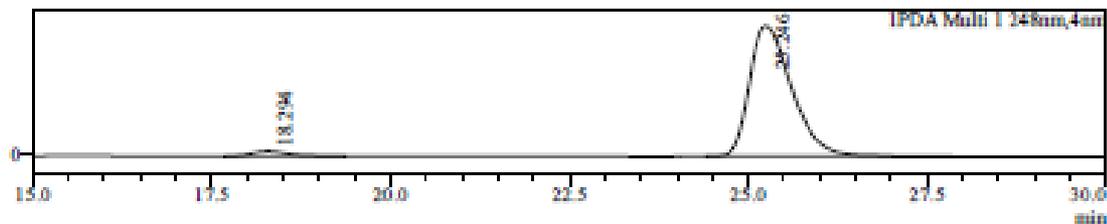
methyl (R)-2-(o-tolyl)indoline-1-carboxylate 2f

Sample Name : XW-V-47A-IA-0.5%0.8mL
Sample ID : XW-V-47A-IA-0.5%0.8mL
Data File : XW-V-47A-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8mL.lcm

Sample Information

Chromatogram

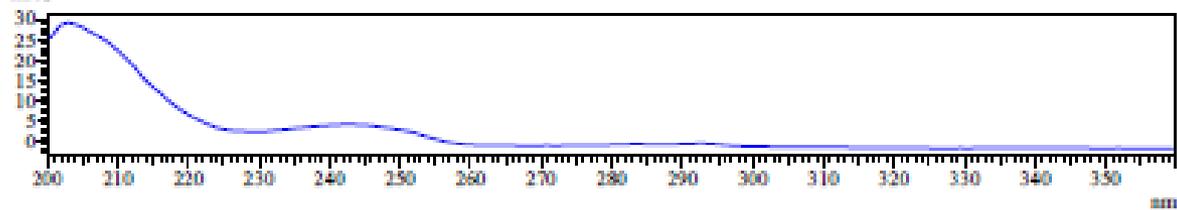
mAU



UV Spectrum

Retention time = 18.294

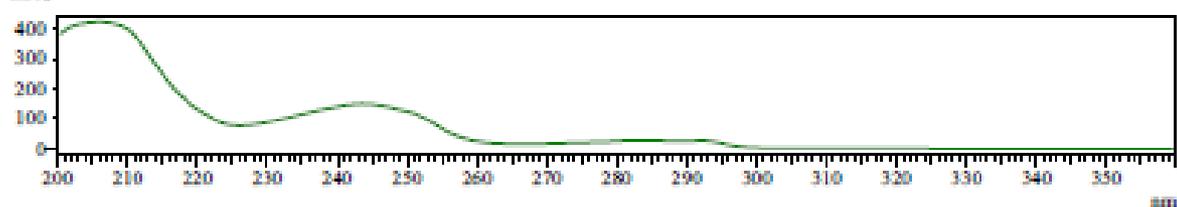
mAU



UV Spectrum

Retention time = 25.246

mAU

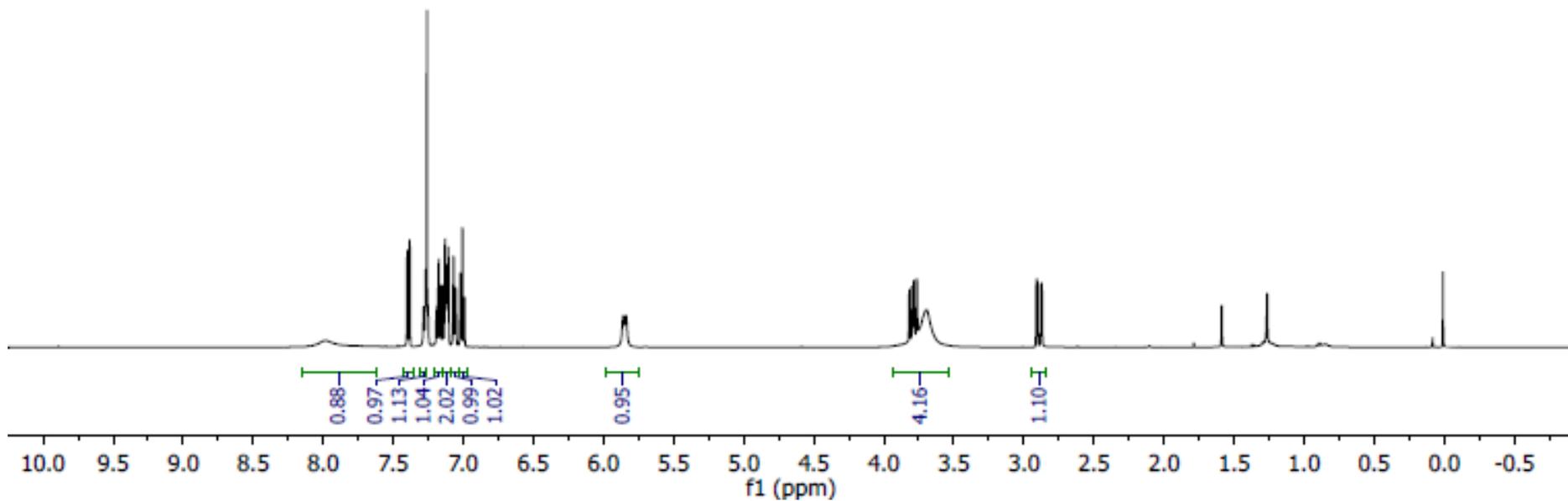


Peak Table

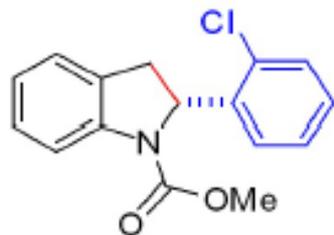
PDA Ch1 248nm

Peak#	Ret. Time	Area	Area%
1	18.294	164441	2.886
2	25.246	5533370	97.114
Total		5697811	100.000

methyl (*R*)-2-(2-chlorophenyl)indoline-1-carboxylate 2g



methyl (*R*)-2-(2-chlorophenyl)indoline-1-carboxylate 2g



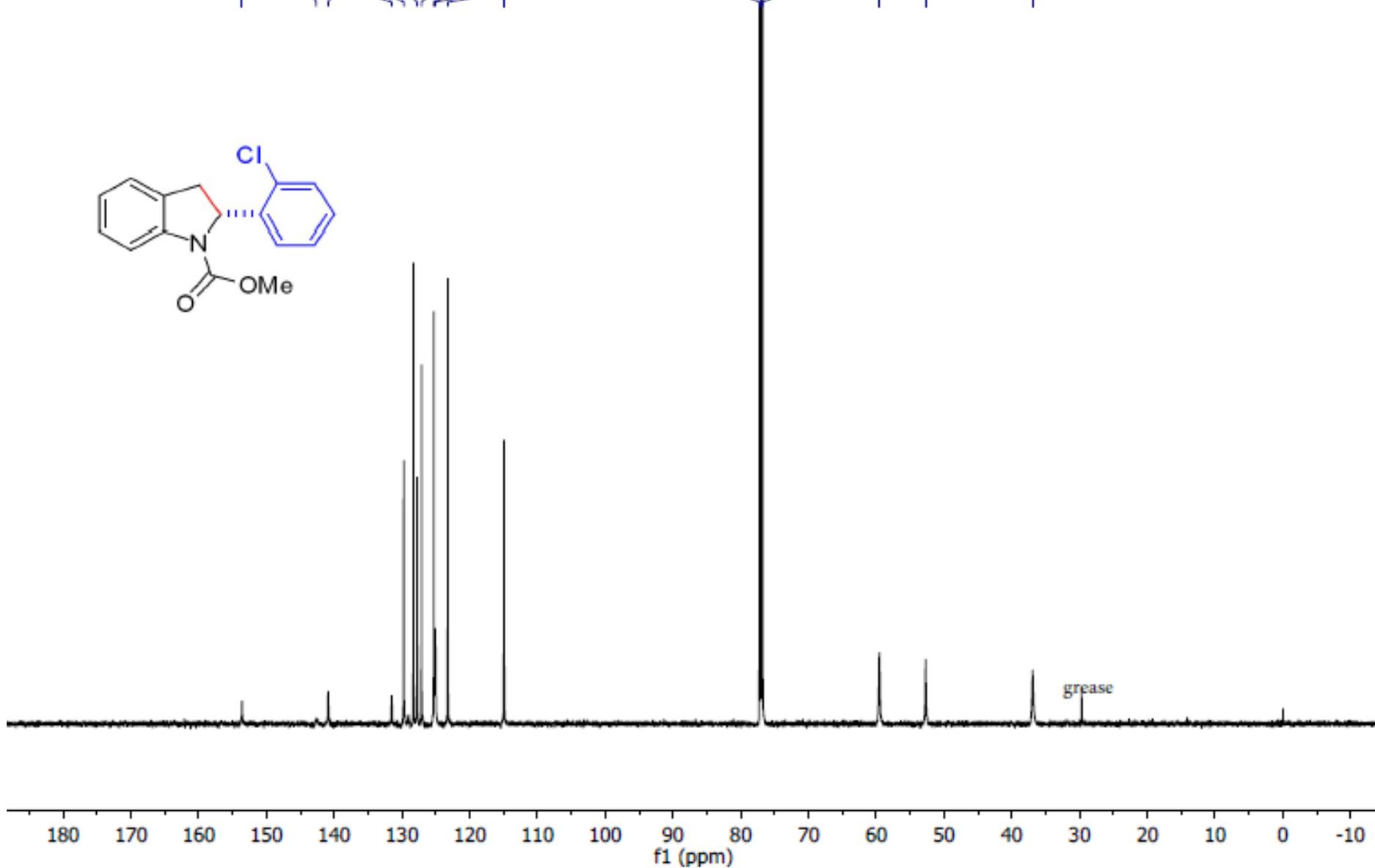
153.603
142.637
140.881
131.495
129.728
127.754
127.101
125.290
125.084
123.229
114.932

77.211
77.000
76.788

59.534

52.704

36.918

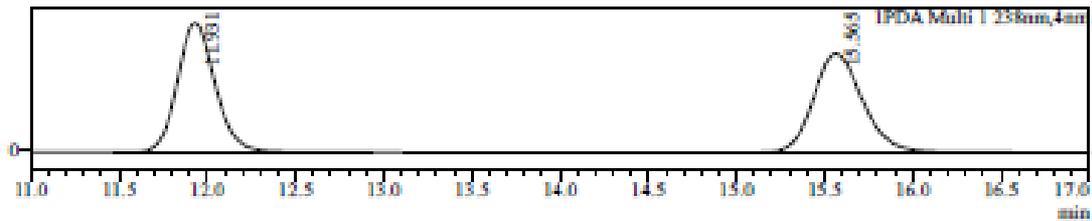


methyl (R)-2-(2-chlorophenyl)indoline-1-carboxylate 2g

Sample Information
Sample Name : XW-V-13-1A-1%0.8.0mL
Sample ID : XW-V-13-1A-1%0.8.0mL
Data File : XW-V-13-1A-1%0.8.0mL.lcd
Method File : XW-1%-0.8mL.lcm

Chromatogram

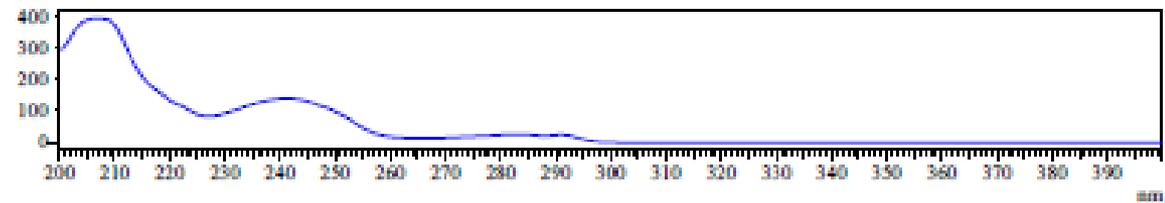
mAU



UV Spectrum

Retention time = 11.931

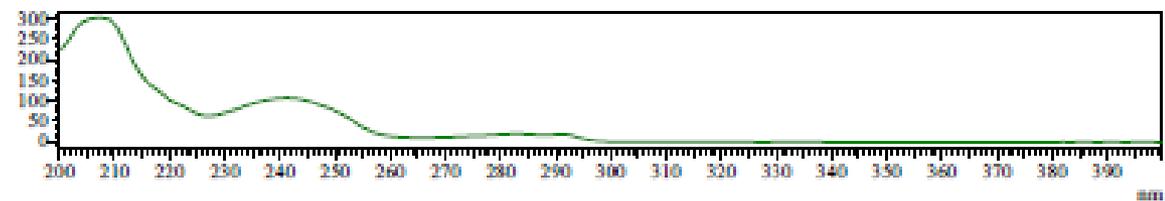
mAU



UV Spectrum

Retention time = 15.565

mAU



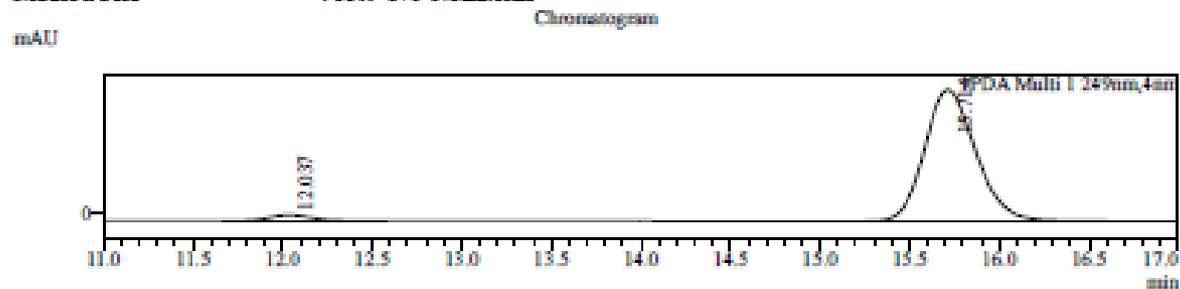
Peak Table

PDA Ch1 238nm

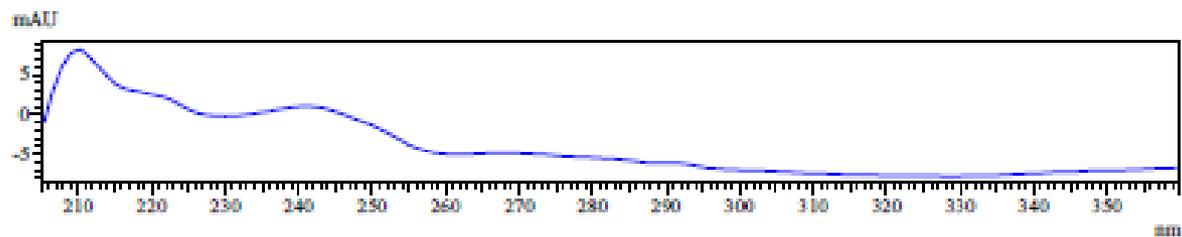
Peak#	Ret. Time	Area	Area%
1	11.931	2006931	50.175
2	15.565	1992922	49.825
Total		3999853	100.000

methyl (*R*)-2-(2-chlorophenyl)indoline-1-carboxylate 2g

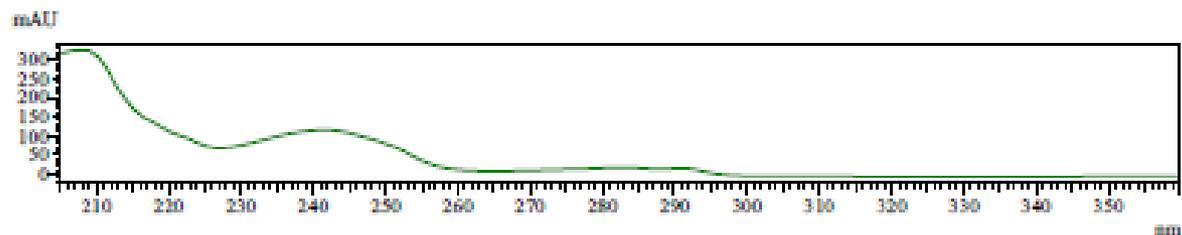
Sample Information
Sample Name : XW-V-11-MeOH-2-IA-1%0.8mL
Sample ID : XW-V-11-MeOH-2-IA-1%0.8mL
Data File : XW-V-11-MeOH-2-IA-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 12.037



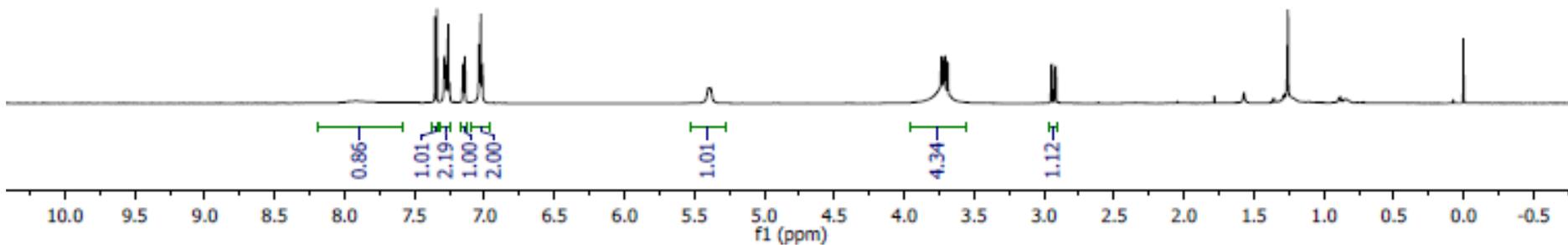
UV Spectrum
Retention time = 15.714



Peak Table

Peak#	Ret. Time	Area	Area%
1	12.037	64130	3.500
2	15.714	1768249	96.500
Total		1832379	100.000

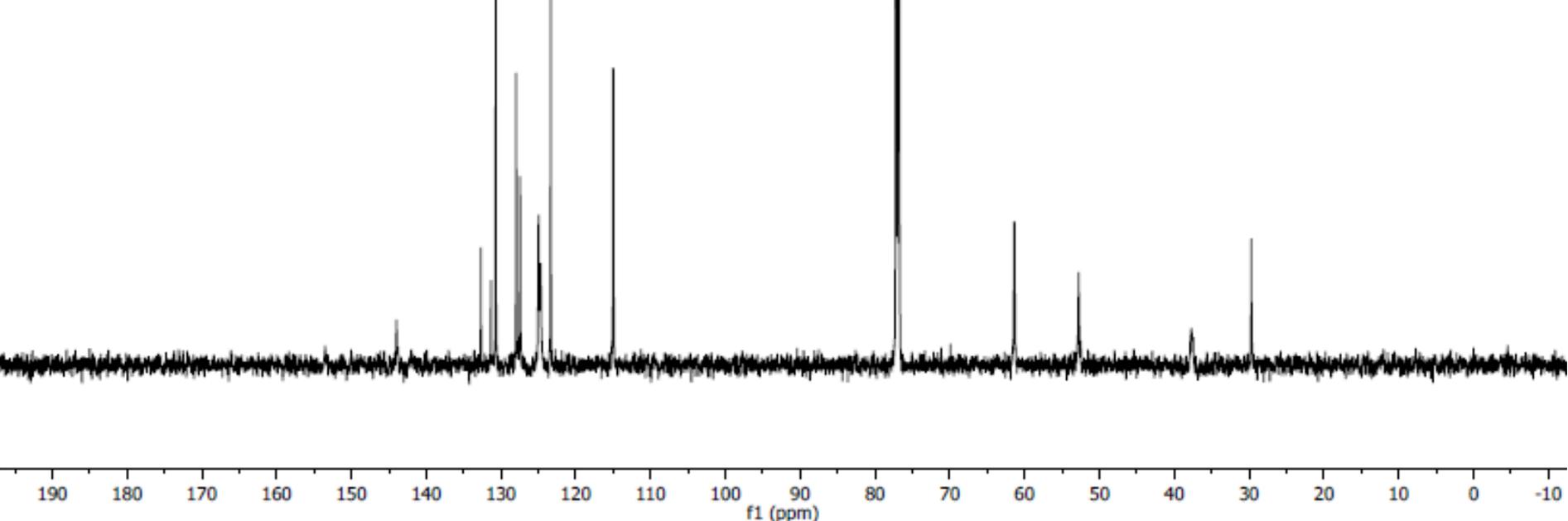
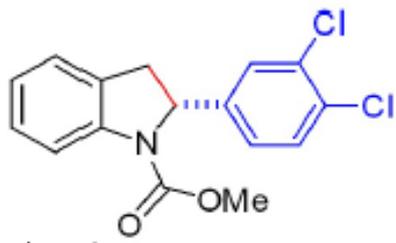
methyl (*R*)-2-(3,4-dichlorophenyl)indoline-1-carboxylate 2h



methyl (*R*)-2-(3,4-dichlorophenyl)indoline-1-carboxylate 2h

153.443
143.976
140.197
132.693
130.716
127.975
127.456
124.978
123.359
115.003

77.211
77.000
76.788
61.384
52.772
37.727

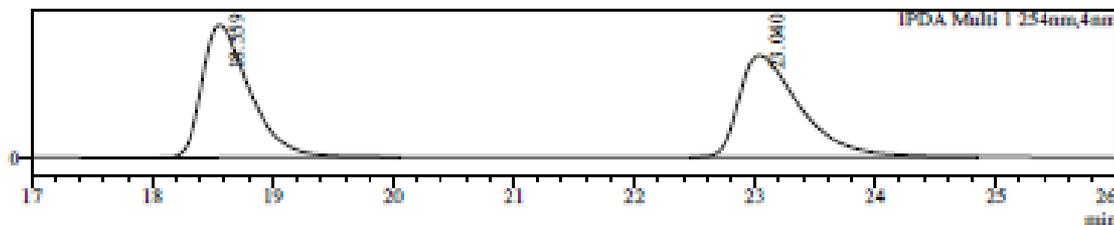


methyl (R)-2-(3,4-dichlorophenyl)indoline-1-carboxylate 2h

Sample Information
Sample Name : NW-IV-262-2-IB-0.5%0.8mL
Sample ID : NW-IV-262-2-IB-0.5%0.8mL
Data File : NW-IV-262-2-IB-0.5%0.8mL.lcd
Method File : NW-0.5%-0.8mL.lcm

Chromatogram

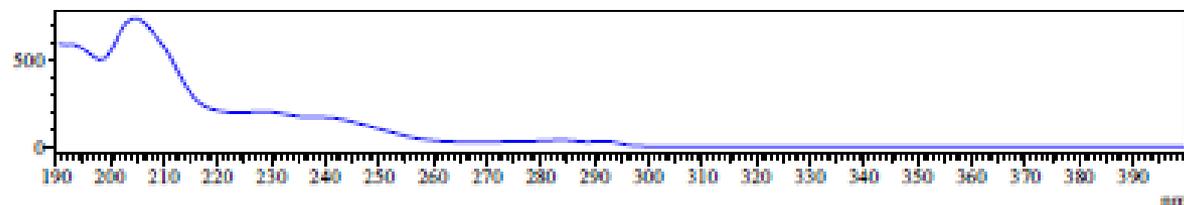
mAU



UV Spectrum

Retention time = 18.559

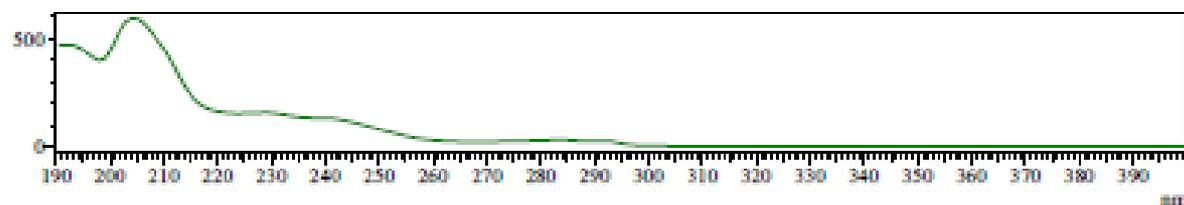
mAU



UV Spectrum

Retention time = 23.040

mAU



Peak Table

PDA Ch1 254nm

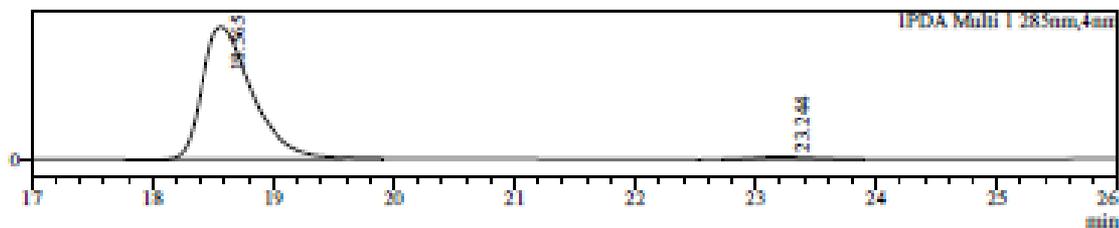
Peak#	Ret. Time	Area	Area%
1	18.559	1880586	50.371
2	23.040	1852905	49.629
Total		3733491	100.000

methyl (R)-2-(3,4-dichlorophenyl)indoline-1-carboxylate 2h

Sample Information
Sample Name : XW-IV-292B-MeOH-1-IB-0.5%0.8mL
Sample ID : XW-IV-292B-MeOH-1-IB-0.5%0.8mL
Data File : XW-IV-292B-MeOH-1-IB-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8ml.lcm

Chromatogram

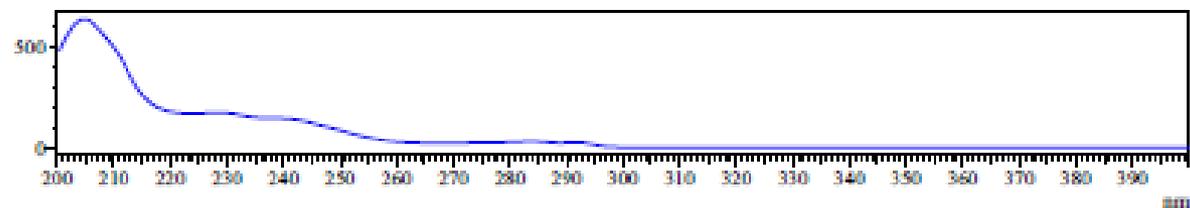
mAU



UV Spectrum

Retention time = 18.565

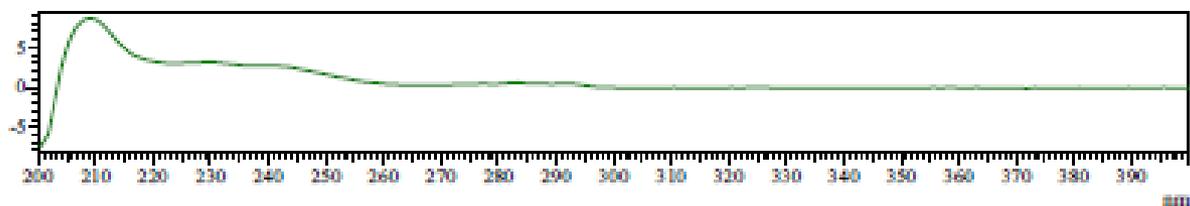
mAU



UV Spectrum

Retention time = 23.244

mAU



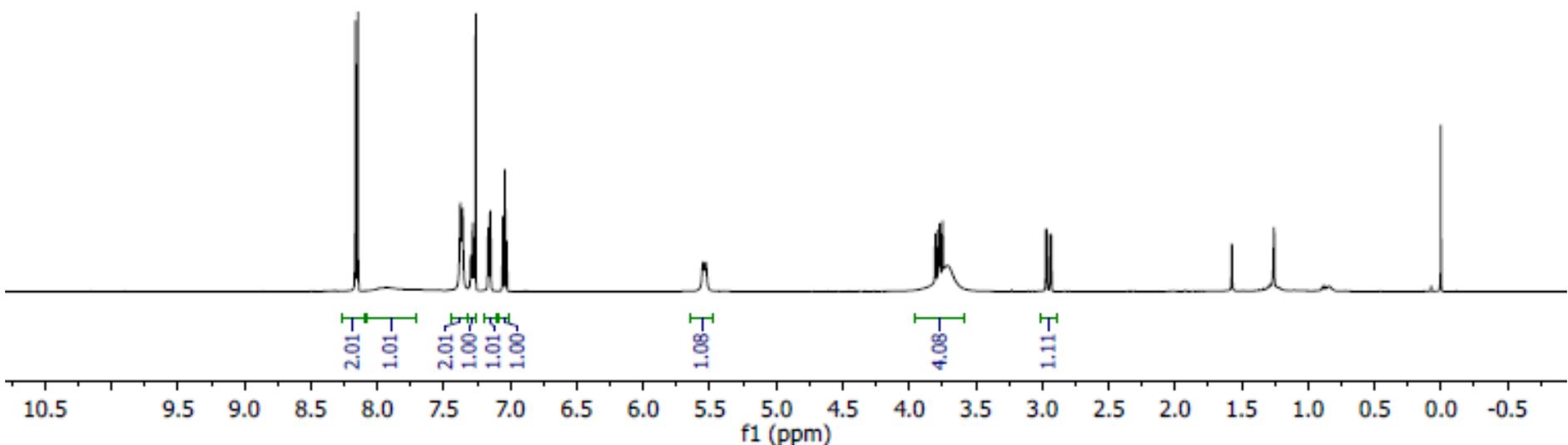
Peak Table

PDA Ch1 285nm

Peak#	Ret. Time	Area	Area%
1	18.565	849351	98.008
2	23.244	17267	1.992
Total		866618	100.000

methyl (*R*)-2-(4-nitrophenyl)indoline-1-carboxylate 2i

8.165 8.147 7.952 7.376 7.359 7.282 7.266 7.260 7.166 7.151 7.057 7.056 7.042 7.041 5.530 3.802 3.781 3.770 3.748 3.712 2.971 2.965 2.938 2.932



methyl (*R*)-2-(4-nitrophenyl)indoline-1-carboxylate 2i

150.86
147.28

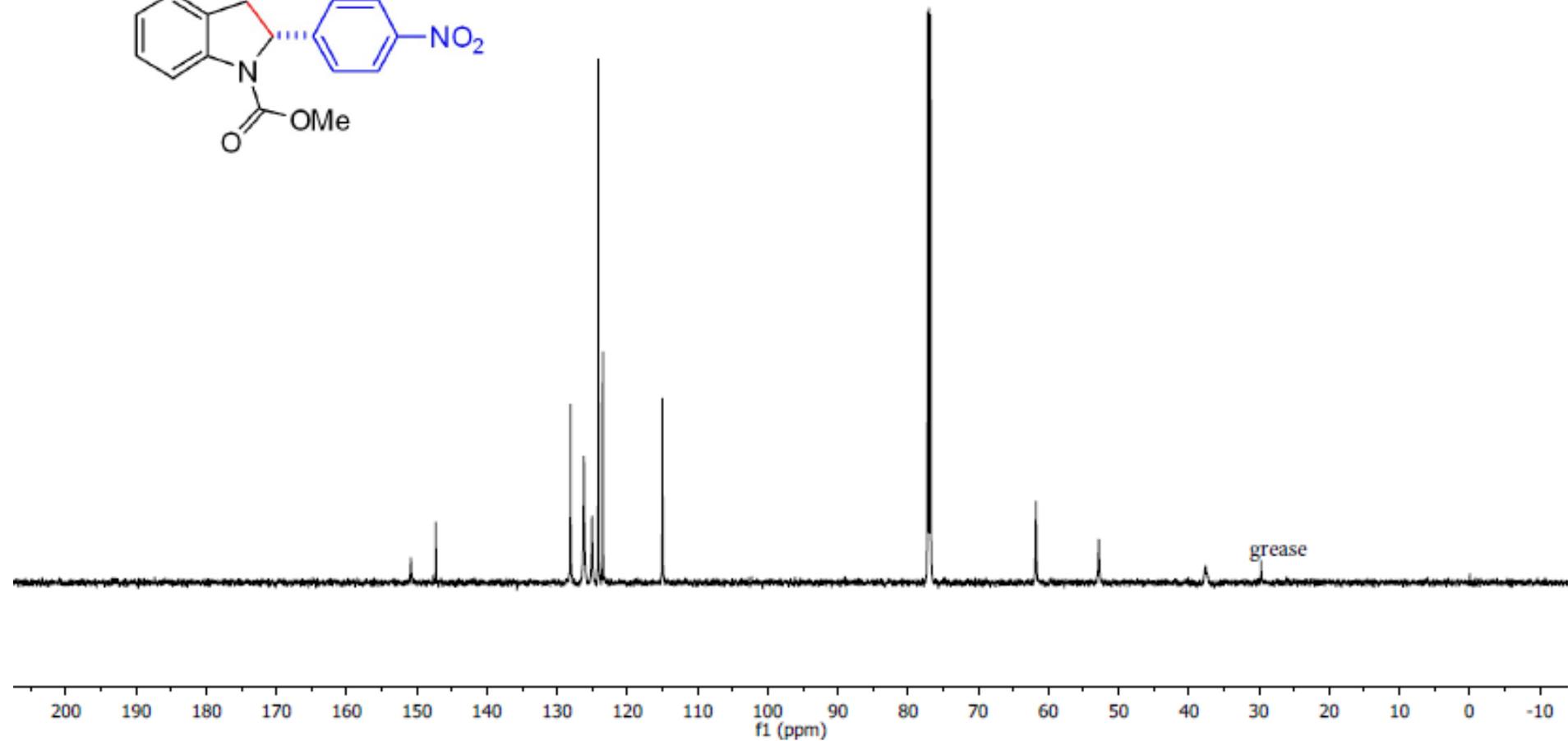
128.10
126.20
125.03
124.13
123.49
115.00

77.21
77.00
76.79

61.78

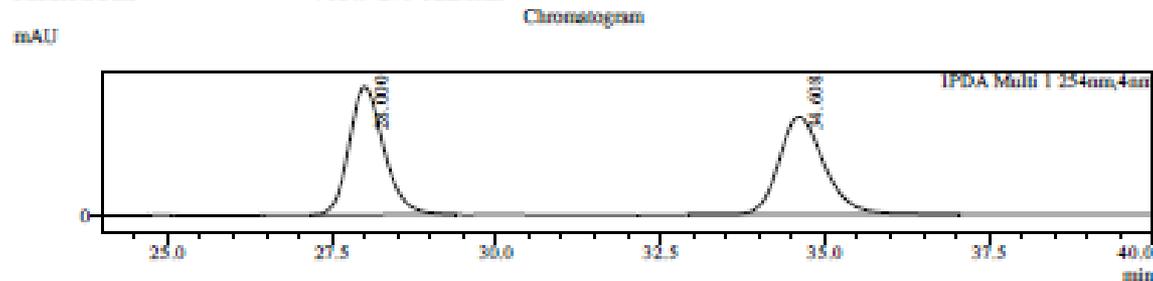
52.82

37.60

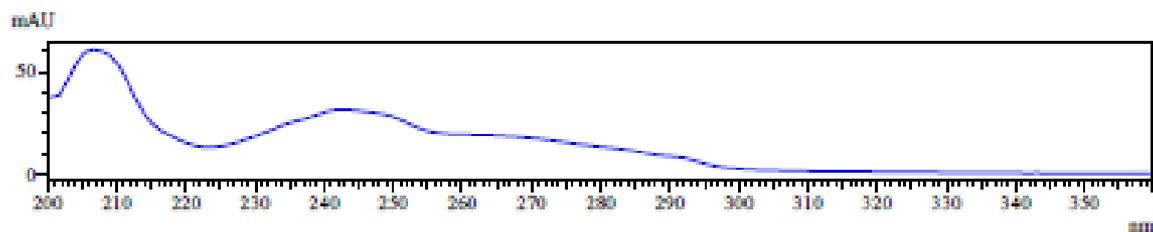


methyl (R)-2-(4-nitrophenyl)indoline-1-carboxylate 2i

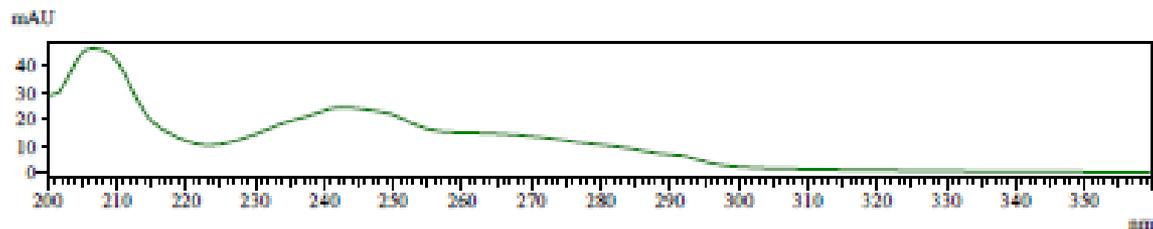
Sample Information
Sample Name : XW-V-31-2-IA-2%1.0mL
Sample ID : XW-V-31-2-IA-2%1.0mL
Data File : XW-V-31-2-IA-2%1.0mL.lcd
Method File : XW-2%-1ml.lcm



UV Spectrum
Retention time = 28.000



UV Spectrum
Retention time = 34.608

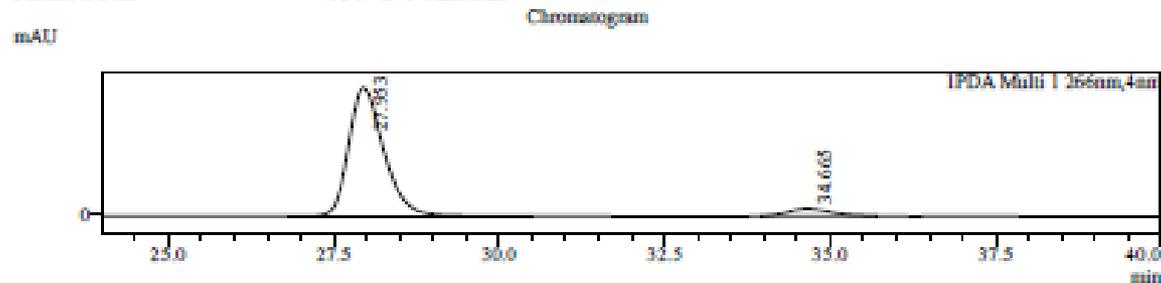


Peak Table

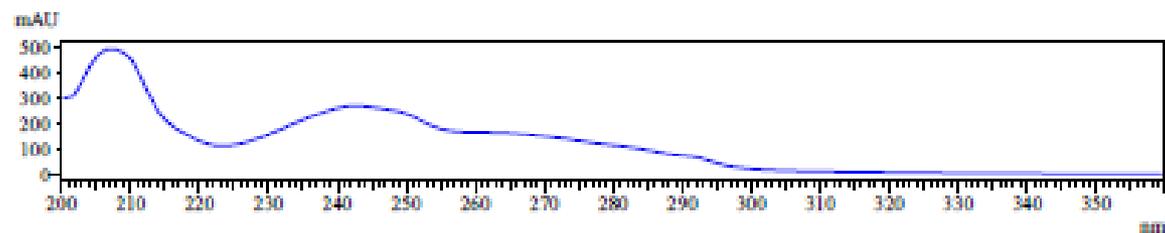
Peak#	Ret. Time	Area	Area%
1	28.000	824550	50.067
2	34.608	822338	49.933
Total		1646888	100.000

methyl (R)-2-(4-nitrophenyl)indoline-1-carboxylate 2i

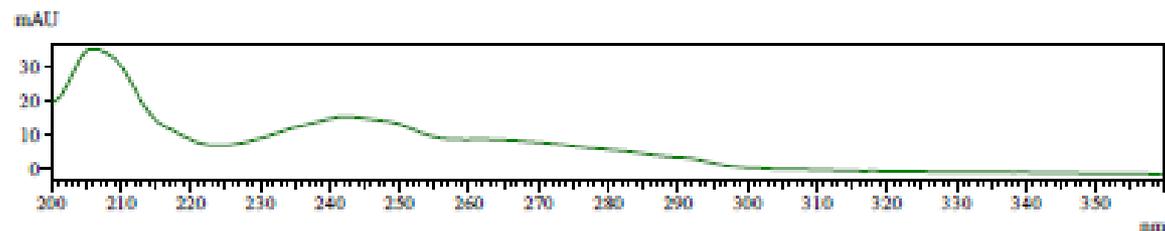
Sample Information
Sample Name : XW-V-32A-IA-2%1.0mL
Sample ID : XW-V-32A-IA-2%1.0mL
Data File : XW-V-32A-IA-2%1.0mL.lcd
Method File : XW-2%-1ml.lcm



UV Spectrum
Retention time = 27.953



UV Spectrum
Retention time = 34.665

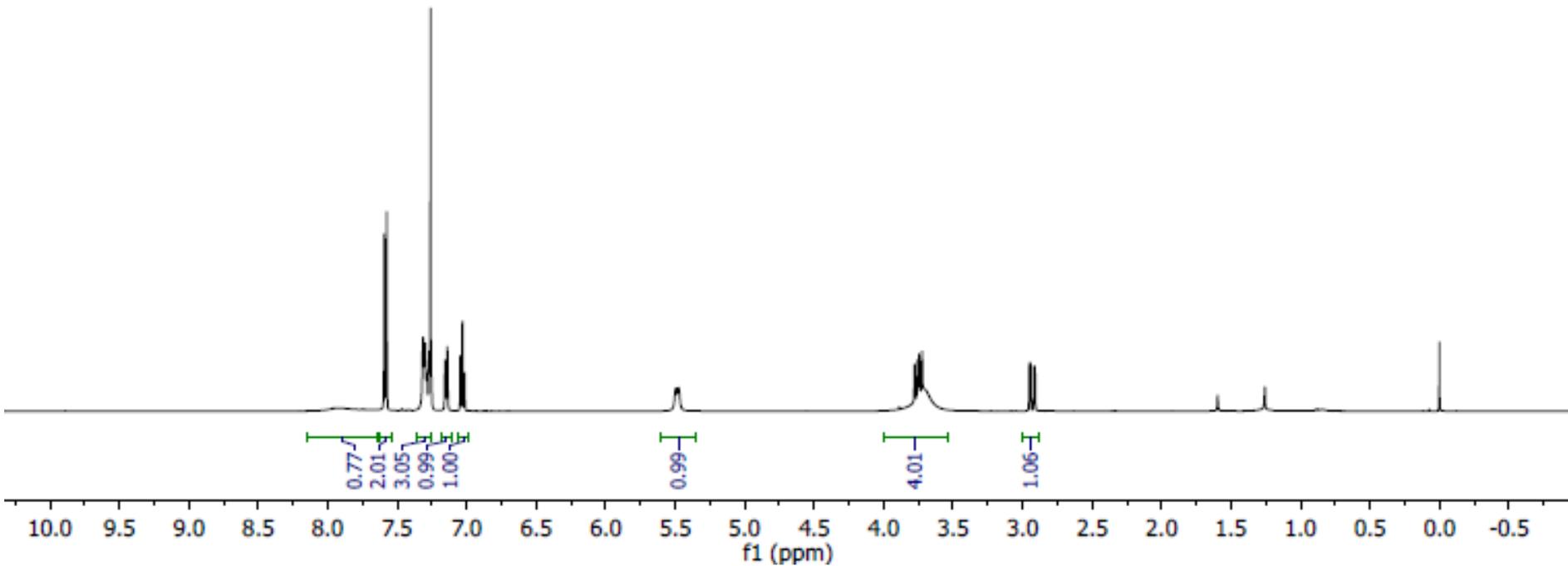


Peak Table

Peak#	Ret. Time	Area	Area%
1	27.953	5923290	93.377
2	34.665	420091	6.623
Total		6343381	100.000

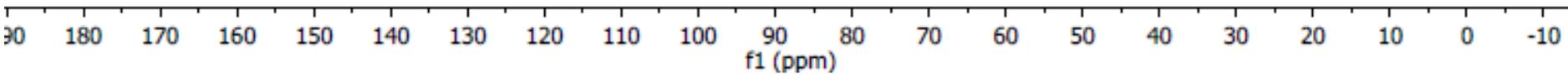
methyl (*R*)-2-(4-cyanophenyl)indoline-1-carboxylate 2j

7.941
7.593
7.576
7.314
7.299
7.285
7.269
7.260
7.155
7.140
7.046
7.031
7.015
5.965
5.476
3.777
3.756
3.744
3.723
3.711
2.951
2.944
2.918
2.912



methyl (*R*)-2-(4-cyanophenyl)indoline-1-carboxylate 2j

153.469
148.885
132.637
128.565
128.032
126.088
124.996
123.422
118.625
114.964
111.340
77.254
77.000
76.746
61.962
52.767
37.625

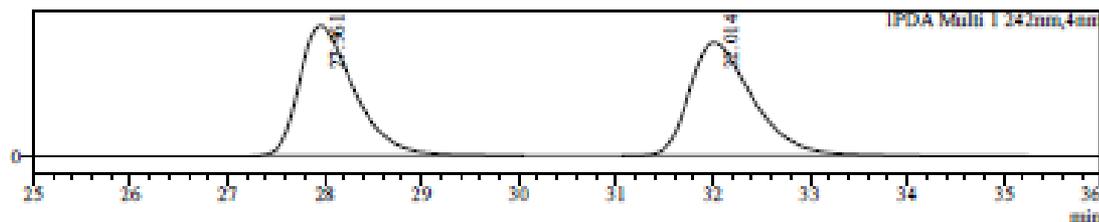


methyl (R)-2-(4-cyanophenyl)indoline-1-carboxylate 2j

Sample Information
Sample Name : XW-V-19-IA-2%1.0mL
Sample ID : XW-V-19-IA-2%1.0mL
Data File : XW-V-19-IA-2%1.0mL.lcd
Method File : XW-2%-1mL.lcm

Chromatogram

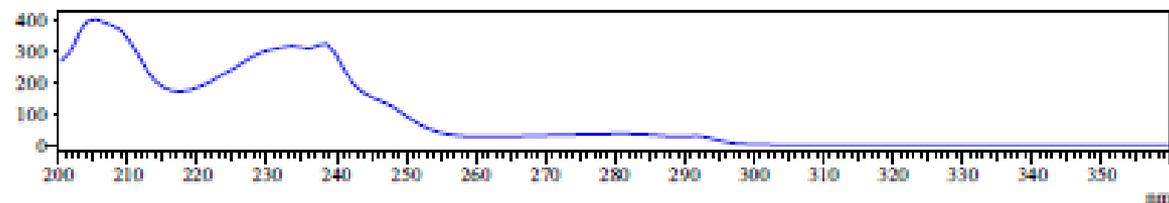
mAU



UV Spectrum

Retention time = 27.961

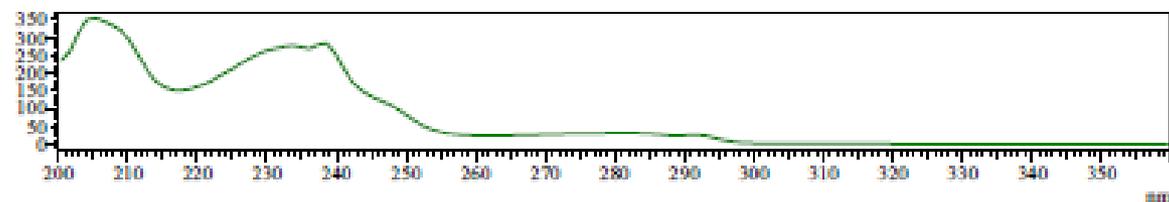
mAU



UV Spectrum

Retention time = 32.014

mAU



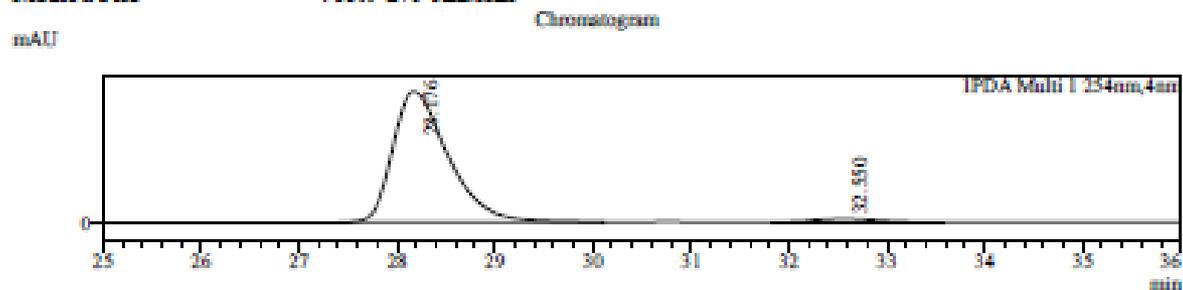
Peak Table

PDA Ch1 242nm

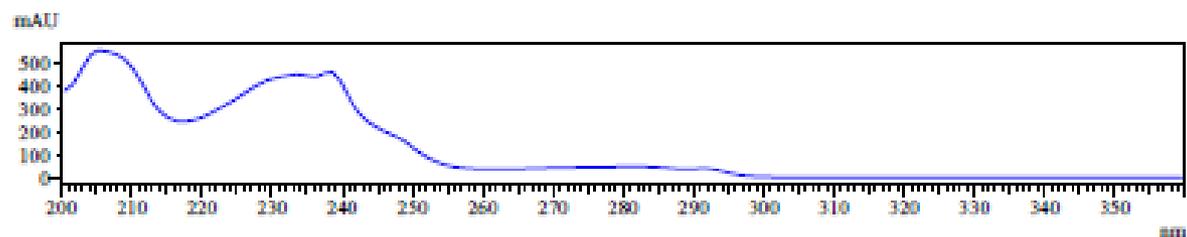
Peak#	Ret. Time	Area	Area%
1	27.961	9127467	49.823
2	32.014	9192143	50.177
Total		18319611	100.000

methyl (*R*)-2-(4-cyanophenyl)indoline-1-carboxylate 2j

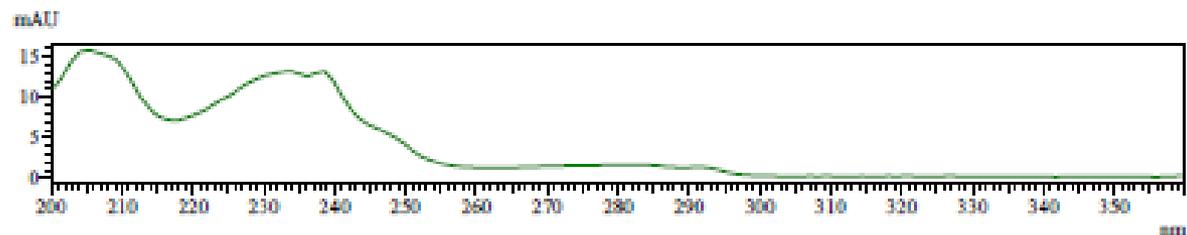
Sample Information
Sample Name : XW-V-20-new-IA-2%1.0mL
Sample ID : XW-V-20-new-IA-2%1.0mL
Data File : XW-V-20-new-IA-2%1.0mL.lcd
Method File : XW-2%-1ml.lcm



UV Spectrum
Retention time = 28.176



UV Spectrum
Retention time = 32.550



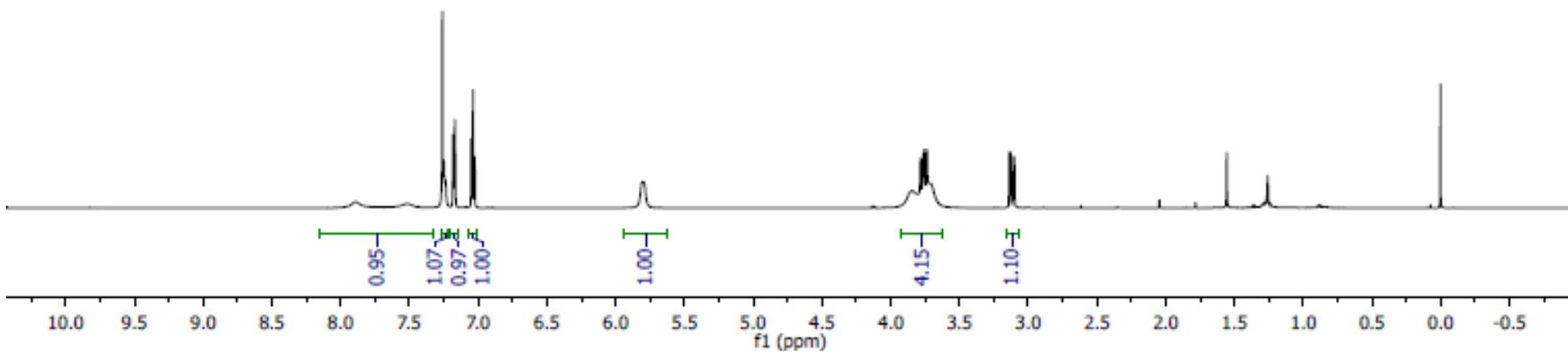
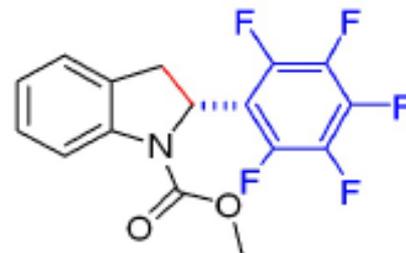
Peak Table

Peak#	Ret. Time	Area	Area%
1	28.176	2751841	97.097
2	32.550	82286	2.903
Total		2834127	100.000

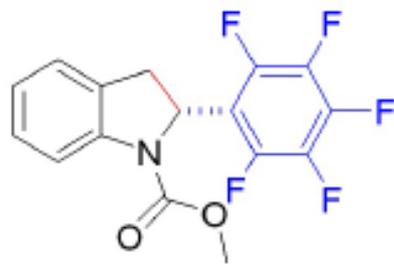
methyl (*R*)-2-(perfluorophenyl)indoline-1-carboxylate 2k

7.891
7.511
7.260
7.250
7.237
7.181
7.169
7.050
7.037
7.025
5.806

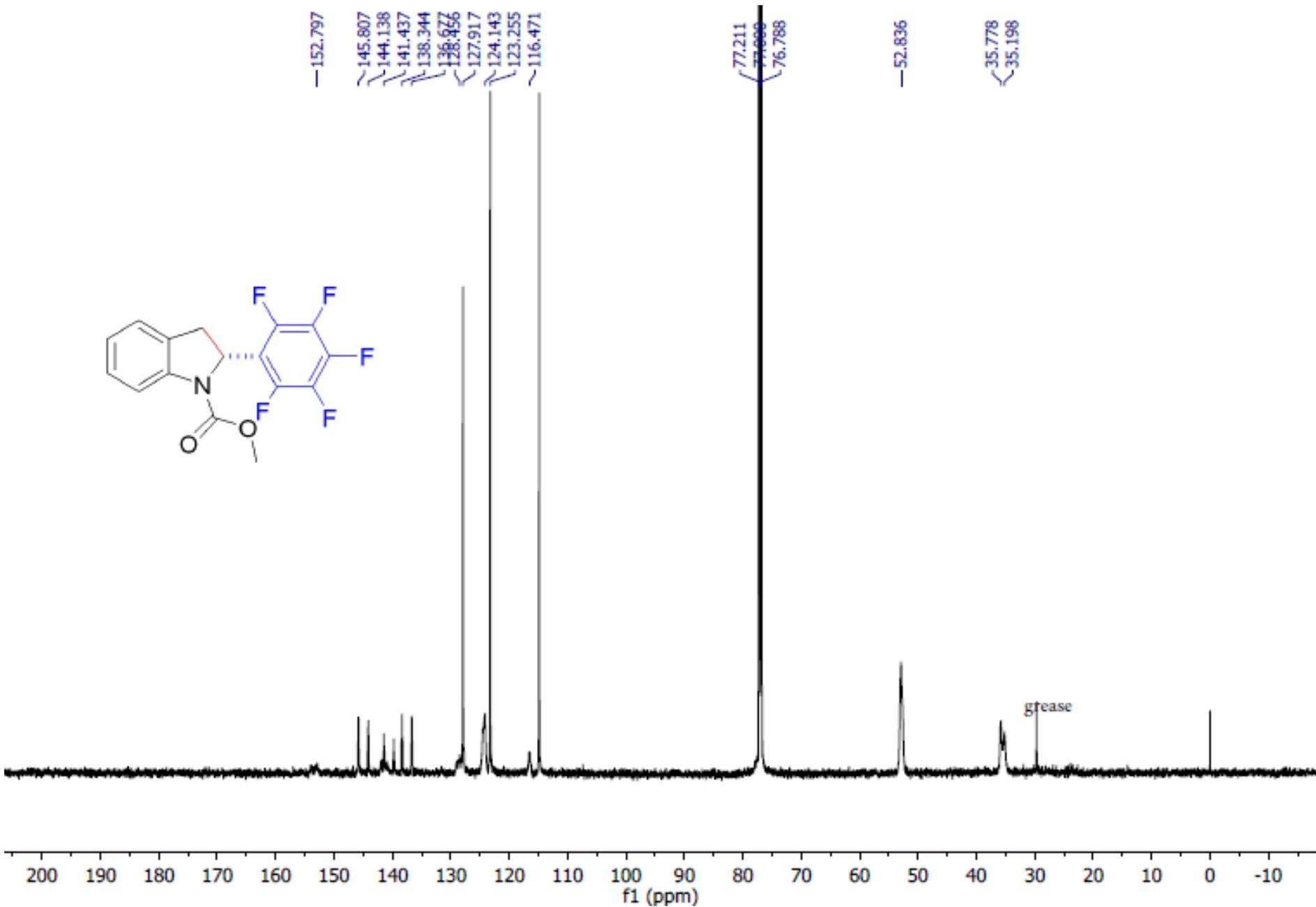
3.847
3.783
3.764
3.755
3.736
3.136
3.128
3.109
3.101



methyl (*R*)-2-(perfluorophenyl)indoline-1-carboxylate 2k

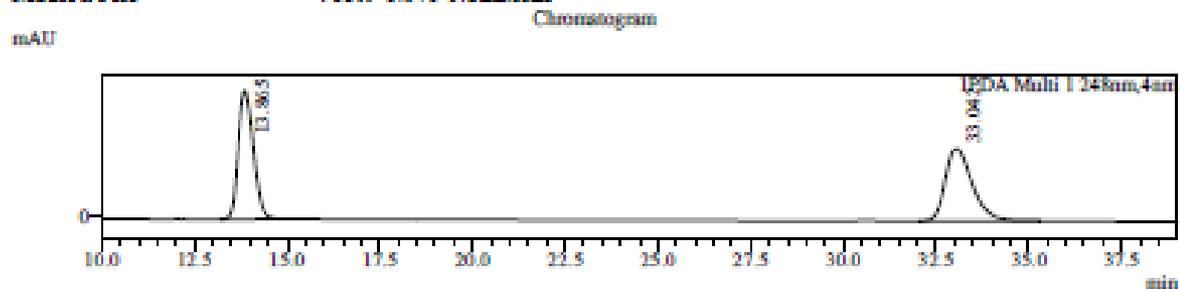


152.797
145.807
144.138
141.437
138.344
136.956
127.917
124.143
123.255
116.471
77.211
77.000
76.788
52.836
35.778
35.198

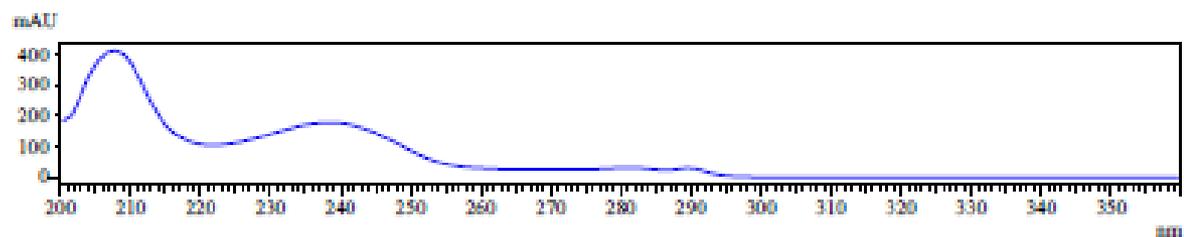


methyl (R)-2-(perfluorophenyl)indoline-1-carboxylate 2k

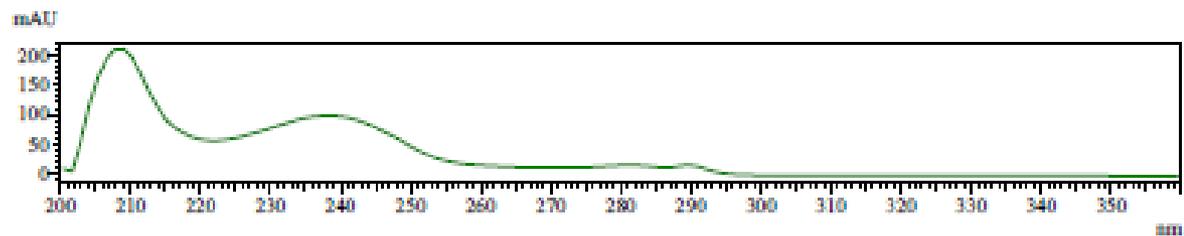
Sample Information
Sample Name : XW-V-103-IA-0.5%0.8mL
Sample ID : XW-V-103-IA-0.5%0.8mL
Data File : XW-V-103-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8mL.lcm



UV Spectrum
Retention time = 13.865



UV Spectrum
Retention time = 33.042

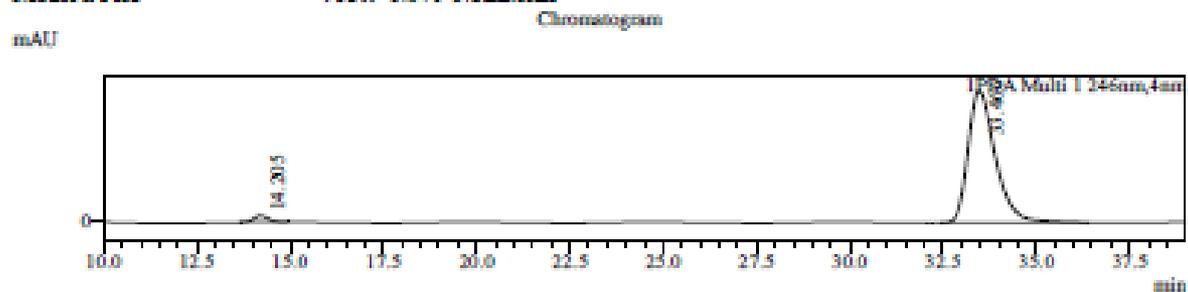


Peak Table

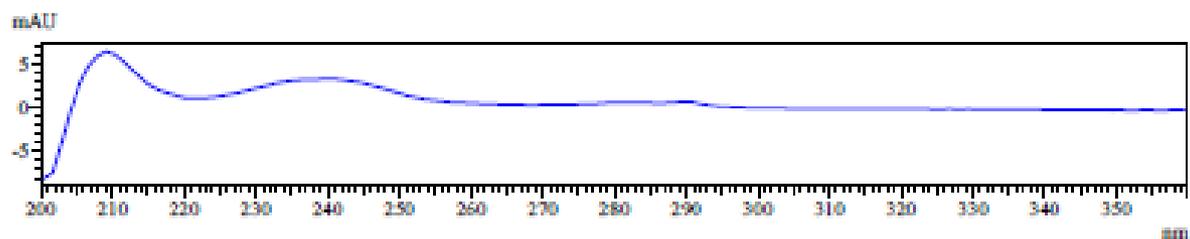
Peak#	Ret. Time	Area	Area%
1	13.865	3220132	50.366
2	33.042	3173293	49.634
Total		6393424	100.000

methyl (R)-2-(perfluorophenyl)indoline-1-carboxylate 2k

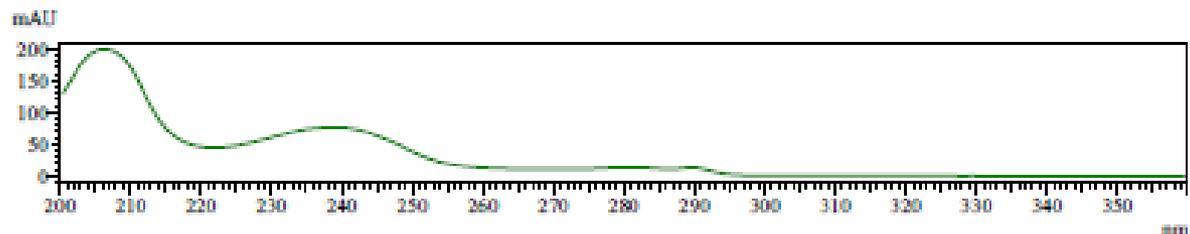
Sample Information
Sample Name : XW-V-104-old-IA-0.5%0.8mL
Sample ID : XW-V-104-old-IA-0.5%0.8mL
Data File : XW-V-104-old-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8ml.lcm



UV Spectrum
Retention time = 14.205



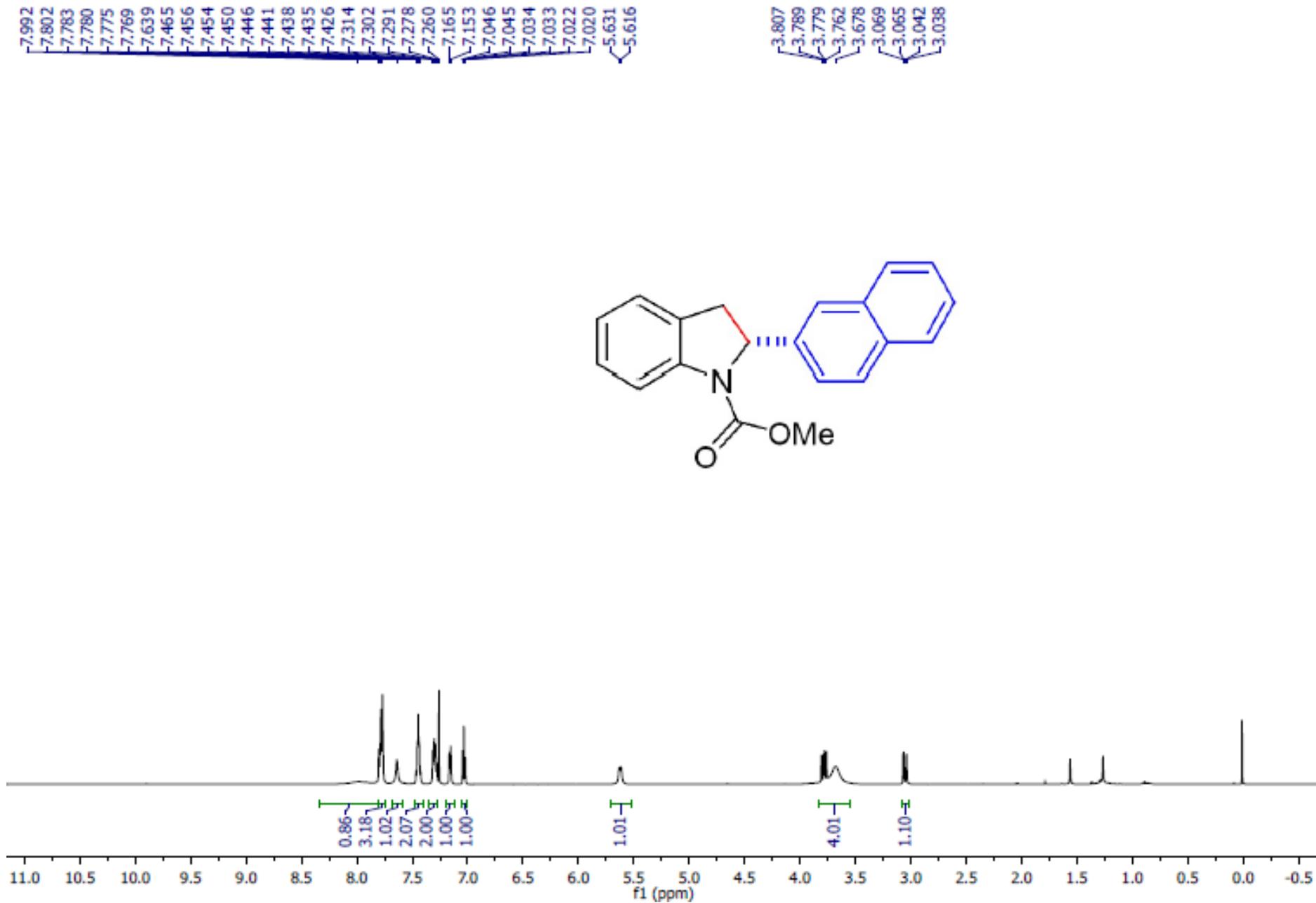
UV Spectrum
Retention time = 33.466



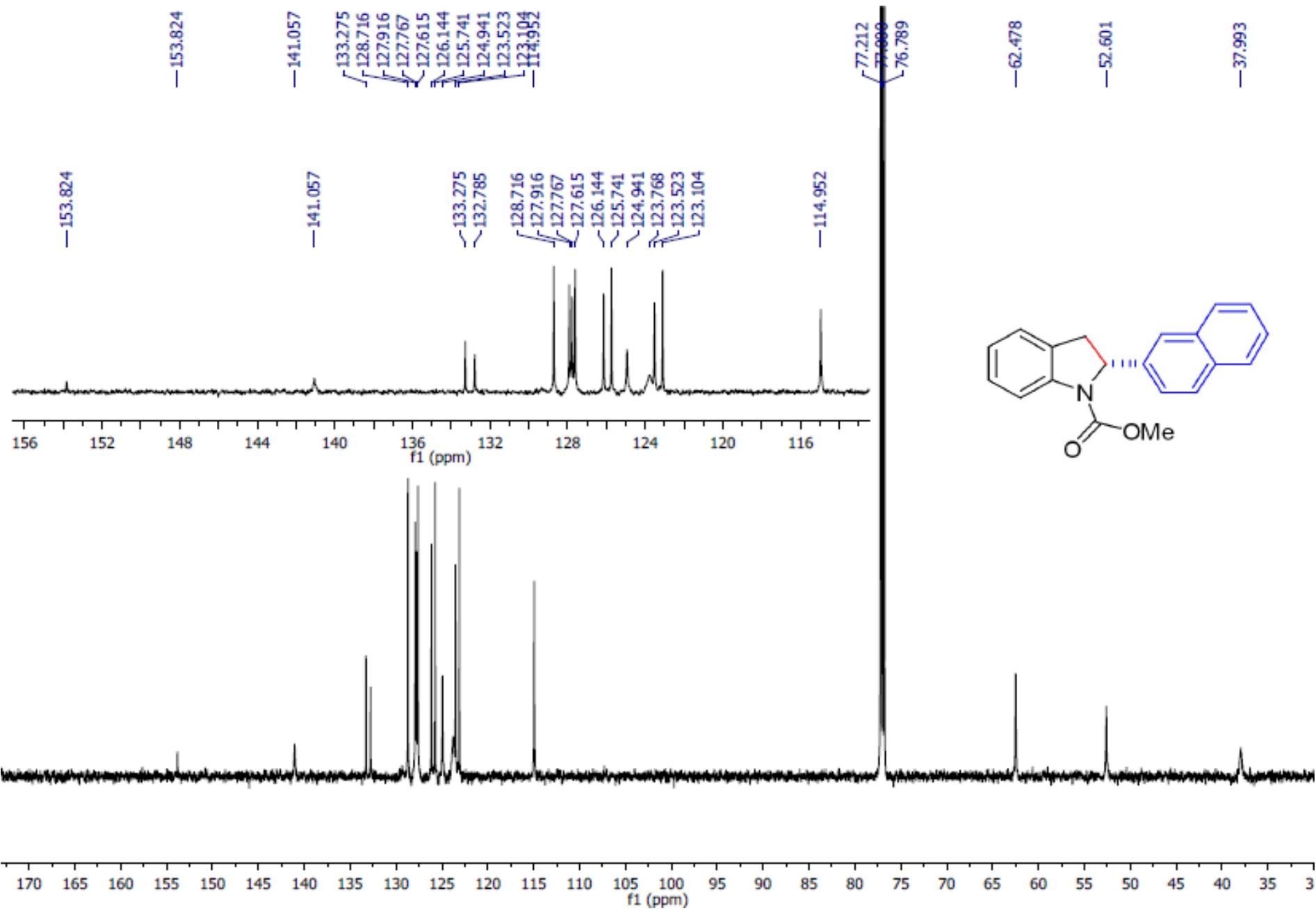
Peak Table

Peak#	Ret. Time	Area	Area%
1	14.205	79148	2.588
2	33.466	2979528	97.412
Total		3058675	100.000

methyl (*R*)-2-(naphthalen-2-yl)indoline-1-carboxylate 2l

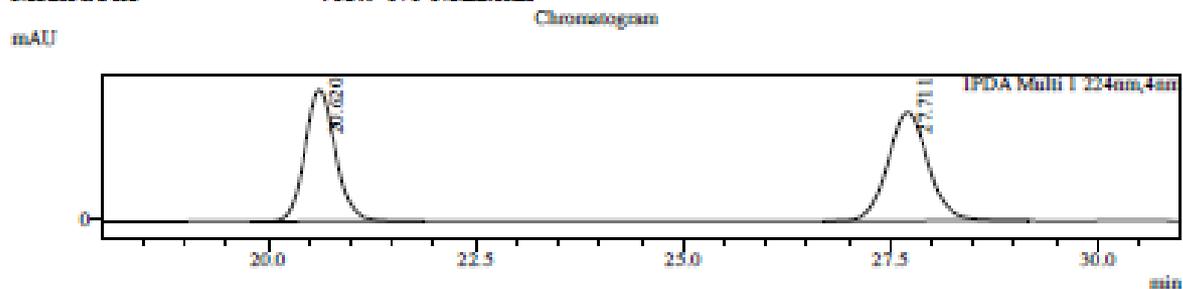


methyl (*R*)-2-(naphthalen-2-yl)indoline-1-carboxylate 2l

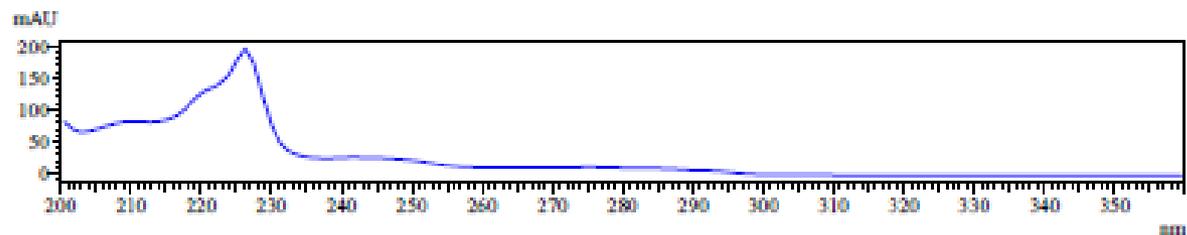


methyl (R)-2-(naphthalen-2-yl)indoline-1-carboxylate 2l

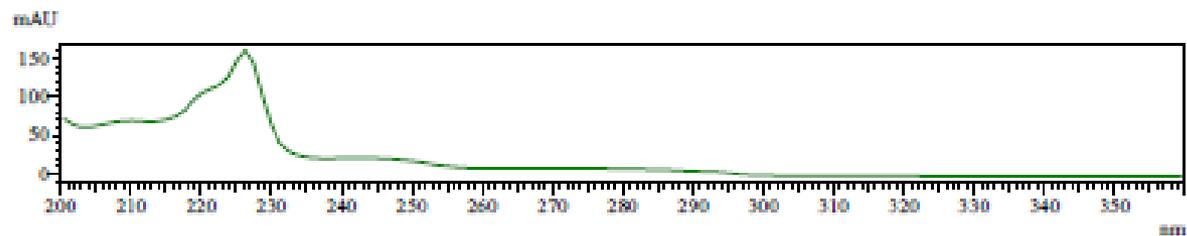
Sample Information
Sample Name : XW-V-98-1-IA-1%0.8mL
Sample ID : XW-V-98-1-IA-1%0.8mL
Data File : XW-V-98-1-IA-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 20.620



UV Spectrum
Retention time = 27.711



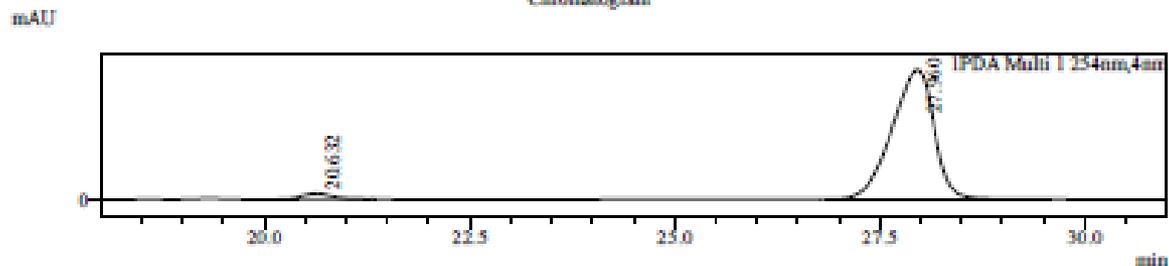
Peak Table

Peak#	Ret. Time	Area	Area%
1	20.620	4098843	48.021
2	27.711	4436621	51.979
Total		8535464	100.000

methyl (R)-2-(naphthalen-2-yl)indoline-1-carboxylate 2l

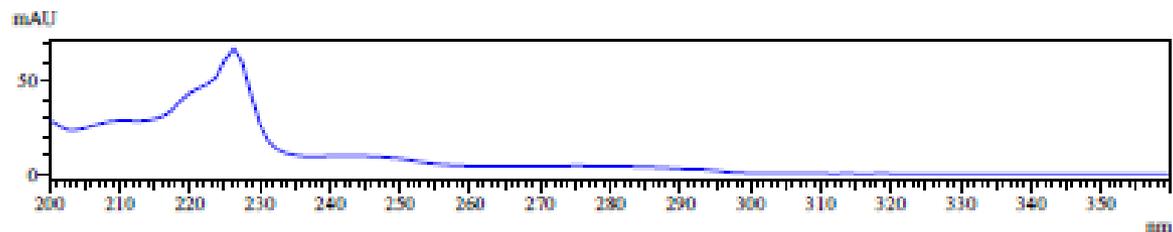
Sample Information
Sample Name : XW-V-99-Old-IA-1%0.8mL
Sample ID : XW-V-99-Old-IA-1%0.8mL
Data File : XW-V-99-Old-IA-1%0.8mL.lcd
Method File : XW-1%-0.8ml.lcm

Chromatogram



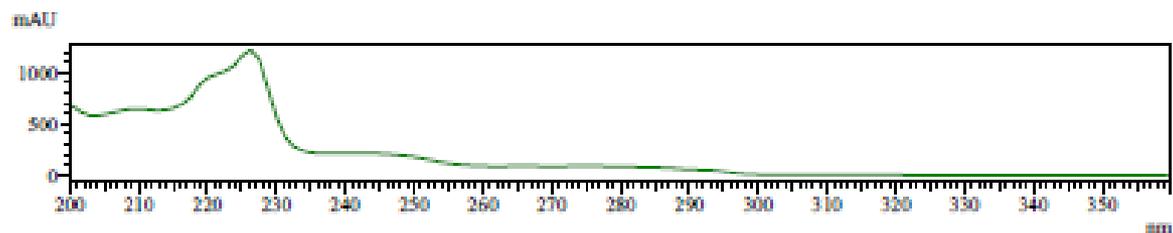
UV Spectrum

Retention time = 20.632



UV Spectrum

Retention time = 27.960



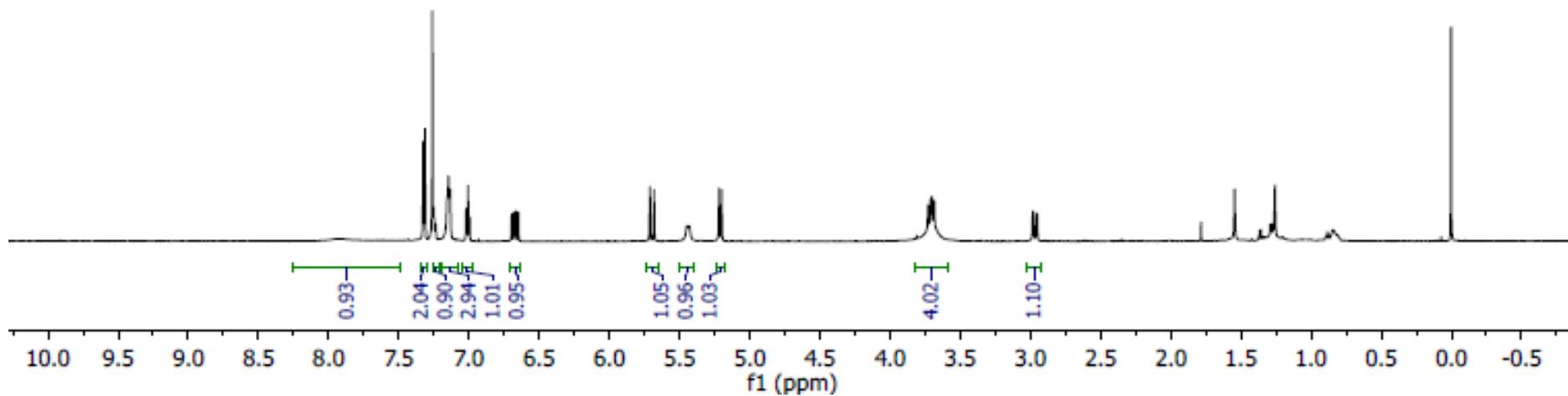
Peak Table

PDA Ch1 254nm

Peak#	Ret. Time	Area	Area%
1	20.632	145509	2.999
2	27.960	4706561	97.001
Total		4852070	100.000

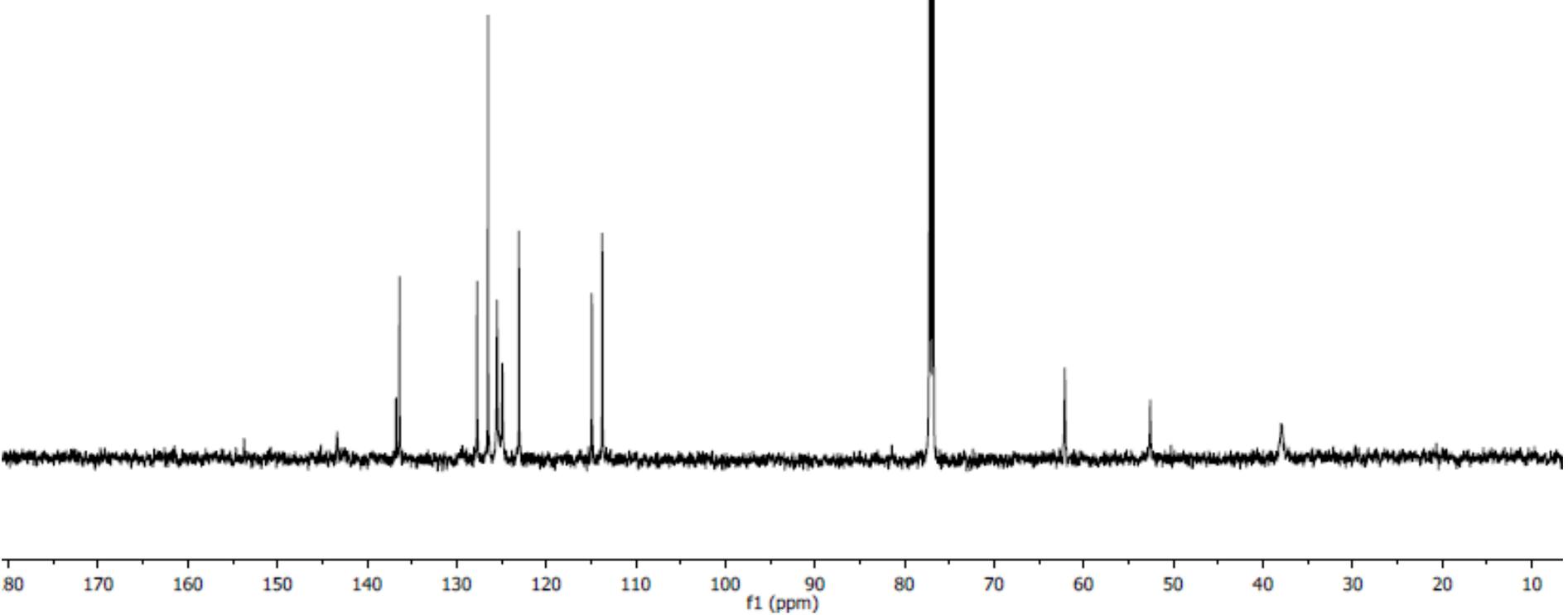
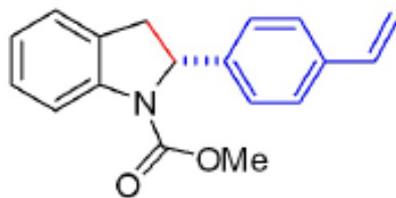
methyl (*R*)-2-(4-vinylphenyl)indoline-1-carboxylate 2m

7.919
7.326
7.313
7.260
7.252
7.154
7.146
7.135
7.020
7.007
5.666
5.711
5.681
5.447
5.430
5.218
5.200
3.729
3.711
3.702
3.685
2.983
2.979
2.956
2.952



methyl (*R*)-2-(4-vinylphenyl)indoline-1-carboxylate 2m

—153.695
—145.144
—143.338
—136.758
—136.378
—128.056
—127.721
—126.501
—125.484
—124.893
—123.039
—114.905
—113.742
—77.212
—76.989
—76.788
—62.116
—52.573
—37.944



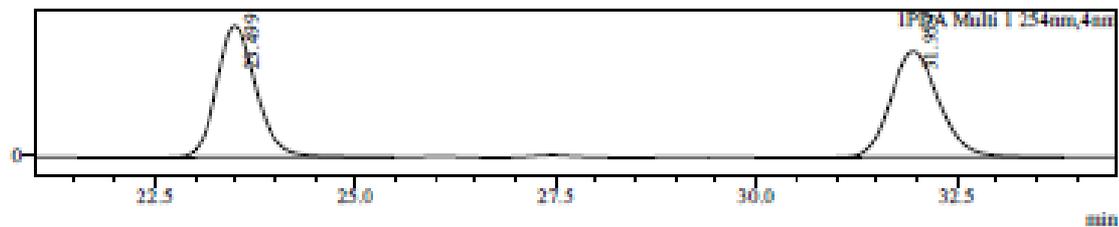
methyl (*R*)-2-(4-vinylphenyl)indoline-1-carboxylate 2m

Sample Name : XW-V-88-IA-0.5%0.8mL
 Sample ID : XW-V-88-IA-0.5%0.8mL
 Data File : XW-V-88-IA-0.5%0.8mL.lcd
 Method File : XW-0.5%-0.8ml.lcm

Sample Information

Chromatogram

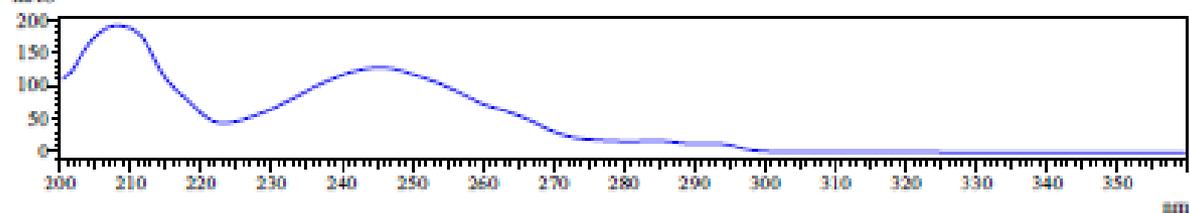
mAU



UV Spectrum

Retention time = 23.499

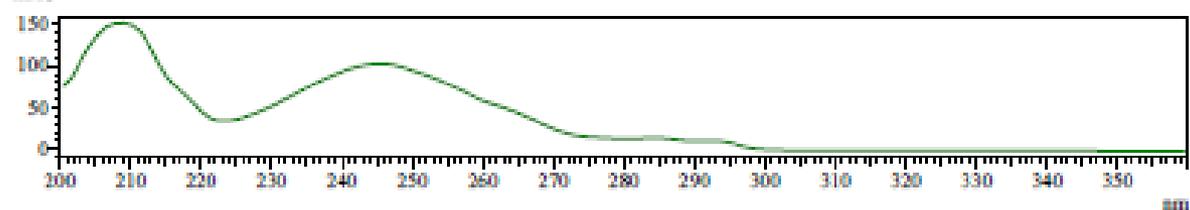
mAU



UV Spectrum

Retention time = 31.959

mAU



Peak Table

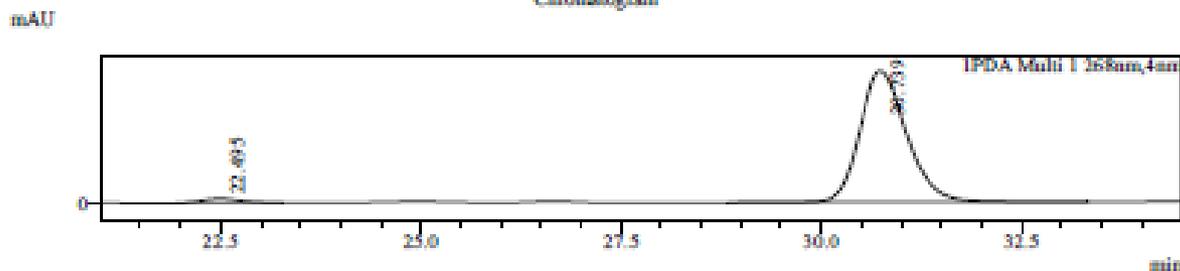
PDA Ch1 254nm

Peak#	Ret. Time	Area	Area%
1	23.499	3519407	50.275
2	31.959	3480837	49.725
Total		7000243	100.000

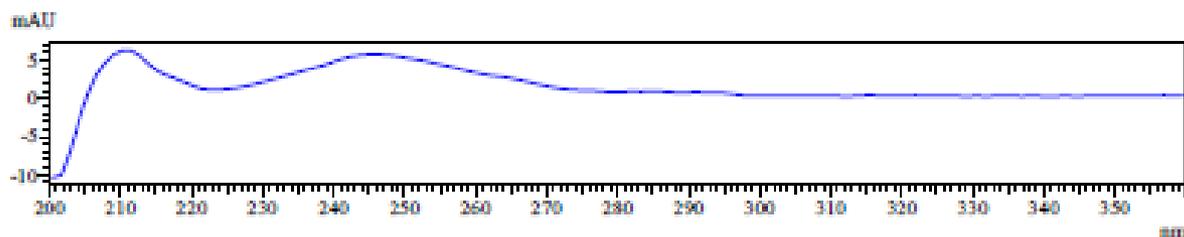
methyl (R)-2-(4-vinylphenyl)indoline-1-carboxylate 2m

Sample Information
Sample Name : XW-V-89-New-batch-IA-0.5%0.8mL
Sample ID : XW-V-89-New-batch-IA-0.5%0.8mL
Data File : XW-V-89-New-batch-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8ml.lcm

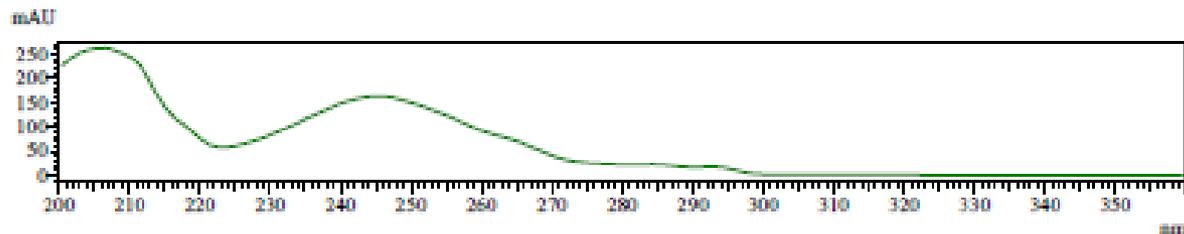
Chromatogram



UV Spectrum
Retention time = 22.495



UV Spectrum
Retention time = 30.739



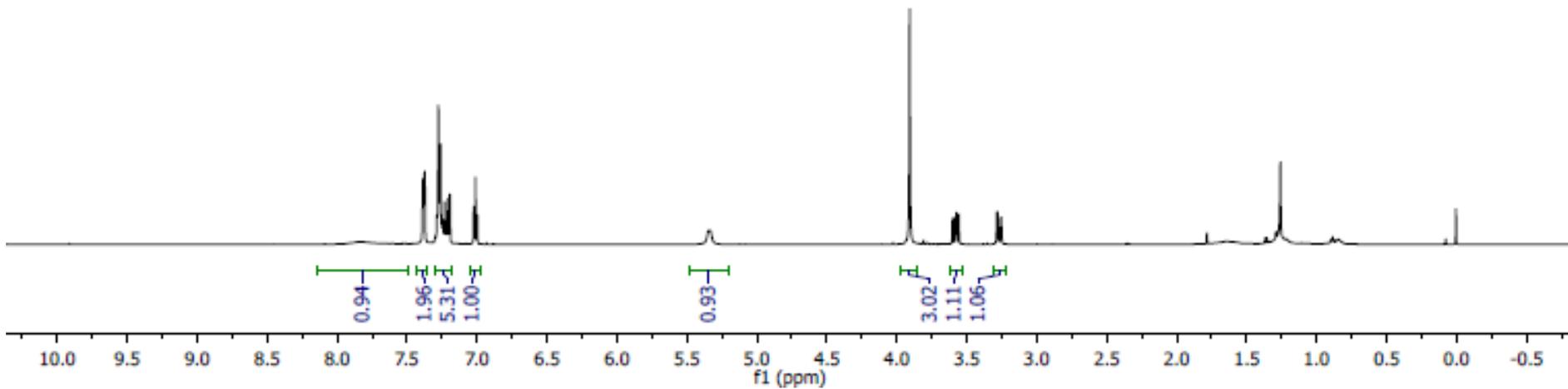
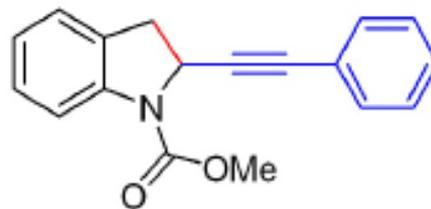
Peak Table

PDA Ch1 268nm

Peak#	Ret. Time	Area	Area%
1	22.495	62384	2.698
2	30.739	2250109	97.302
Total		2312493	100.000

methyl (R)-2-(phenylethynyl)indoline-1-carboxylate 2n

7.823
7.386
7.376
7.286
7.276
7.264
7.260
7.245
7.232
7.207
7.195
7.023
7.011
6.998
6.985
5.332
3.908
3.601
3.584
3.575
3.558
3.284
3.280
3.258
3.254



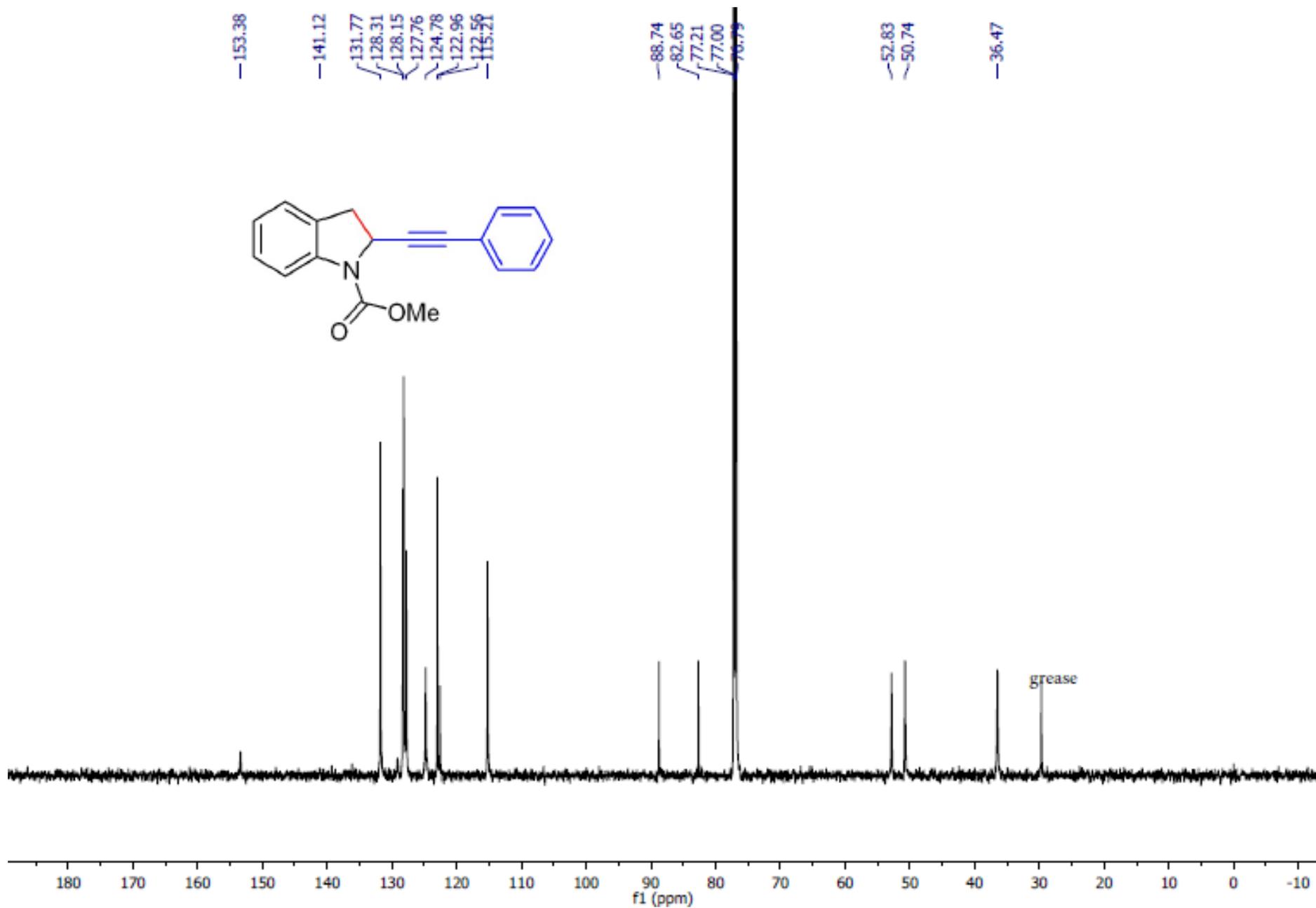
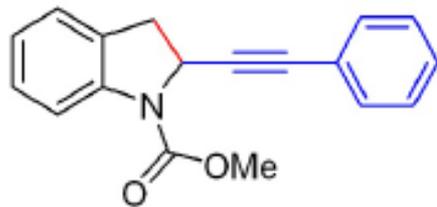
methyl (R)-2-(phenylethynyl)indoline-1-carboxylate 2n

153.38
141.12
131.77
128.31
128.15
127.76
124.78
122.96
115.21

88.74
82.65
77.21
77.00
76.79

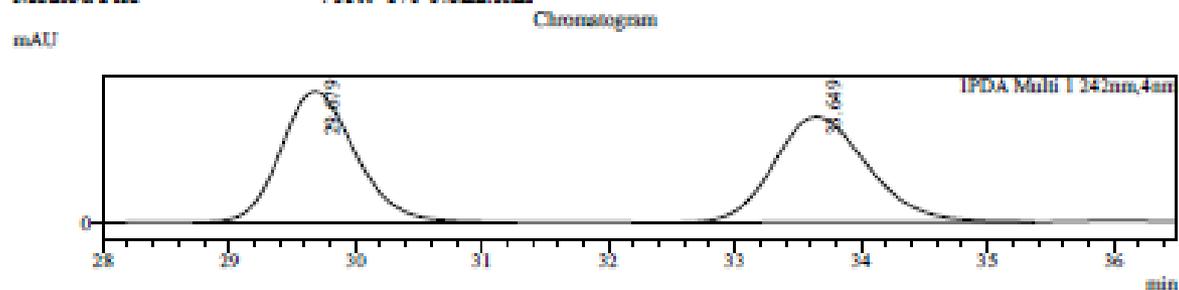
52.83
50.74

36.47

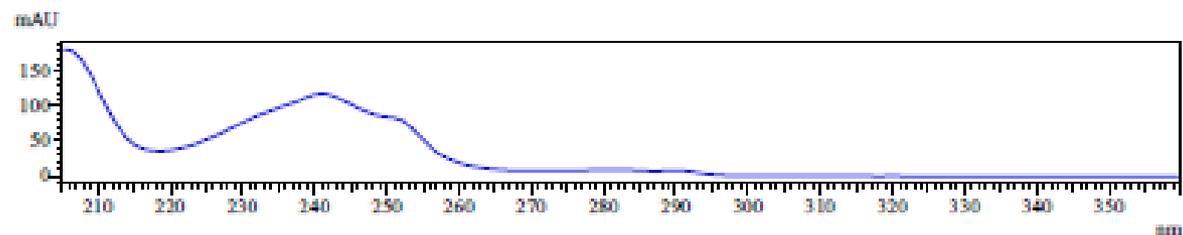


methyl (R)-2-(phenylethynyl)indoline-1-carboxylate 2n

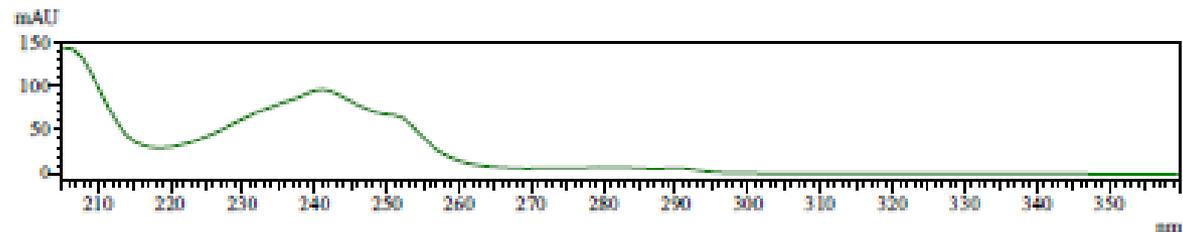
Sample Information
Sample Name : XW-V-132-IC-1%0.8mL
Sample ID : XW-V-132-IC-1%0.8mL
Data File : XW-V-132-IC-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 29.679



UV Spectrum
Retention time = 33.649

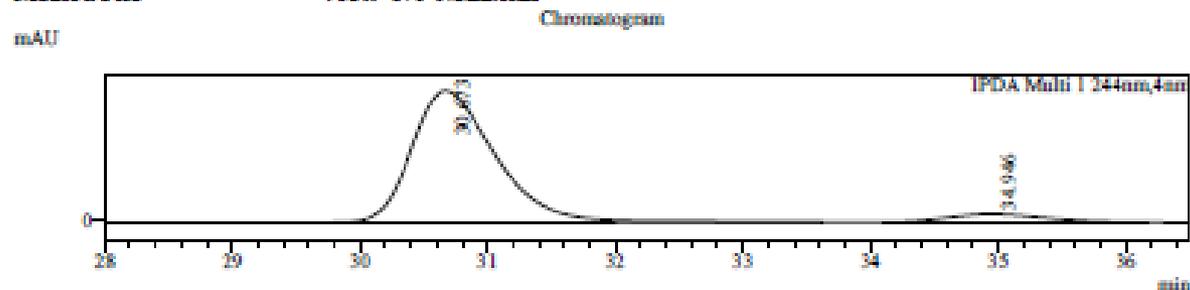


Peak Table

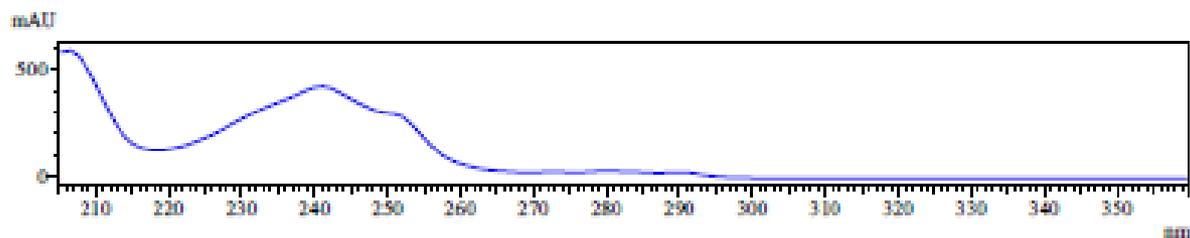
Peak#	Ret. Time	Area	Area%
1	29.679	4639557	49.555
2	33.649	4722845	50.445
Total		9362402	100.000

methyl (R)-2-(phenylethynyl)indoline-1-carboxylate 2n

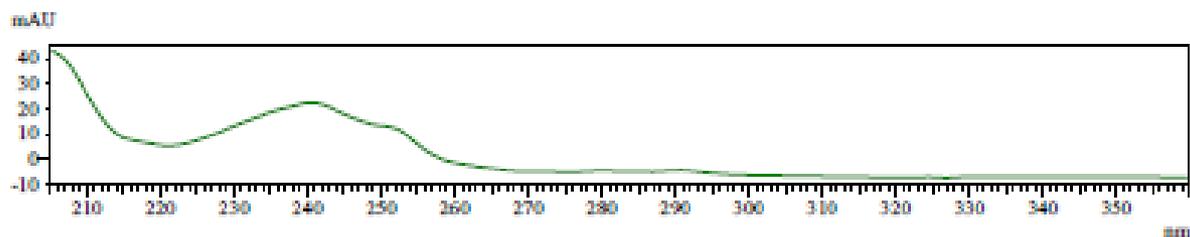
Sample Information
Sample Name : XW-V-129B-IC-1%0.8mL
Sample ID : XW-V-129B-IC-1%0.8mL
Data File : XW-V-129B-IC-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 30.673



UV Spectrum
Retention time = 34.946



Peak Table

PDA Ch1 244nm

Peak#	Ret. Time	Area	Area%
1	30.673	17400671	93.483
2	34.946	1213004	6.517
Total		18613675	100.000

methyl (R)-2-(pyridin-2-yl)indoline-1-carboxylate 2o

8.575
8.568

7.974

7.587

7.574

7.260

7.246

7.162

7.150

7.141

7.132

7.119

7.010

6.998

5.999

5.584

3.764

3.746

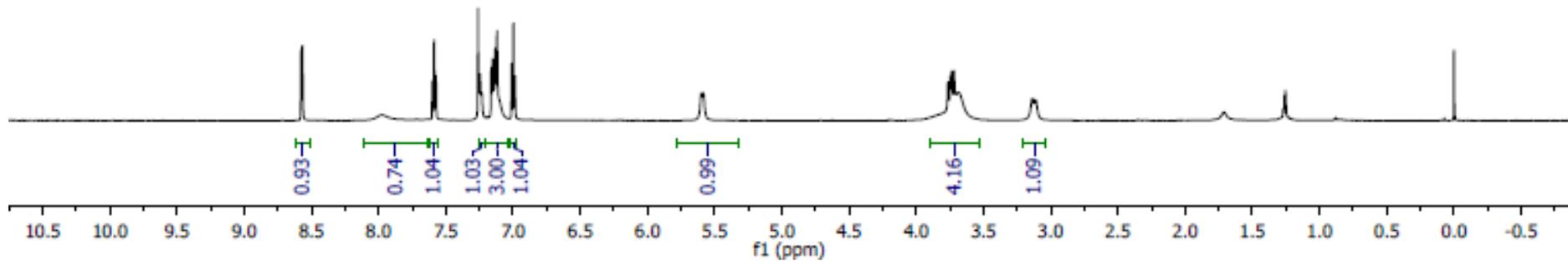
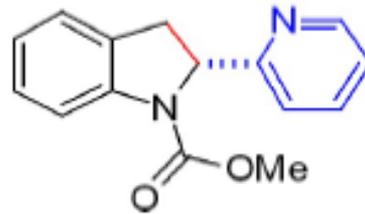
3.737

3.719

3.685

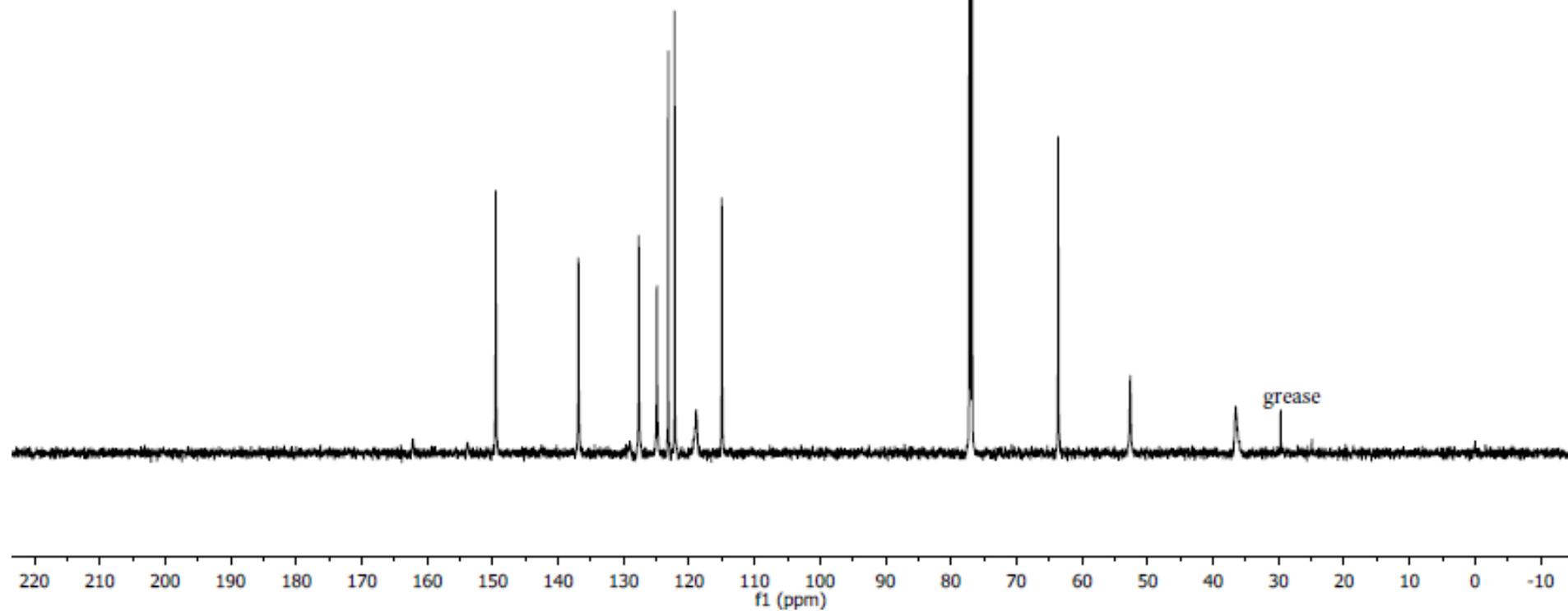
3.137

3.112



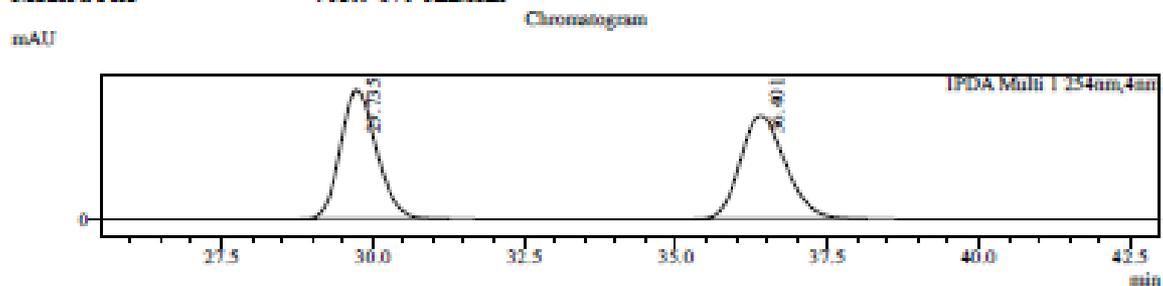
methyl (R)-2-(pyridin-2-yl)indoline-1-carboxylate 2o

—162.18 —153.83 —149.53 —136.90 —129.08 —127.68 —124.93 —123.20 —122.21 —118.94 —118.83 —115.00 {77.21 77.00 76.79} —63.64 —52.65 —36.55

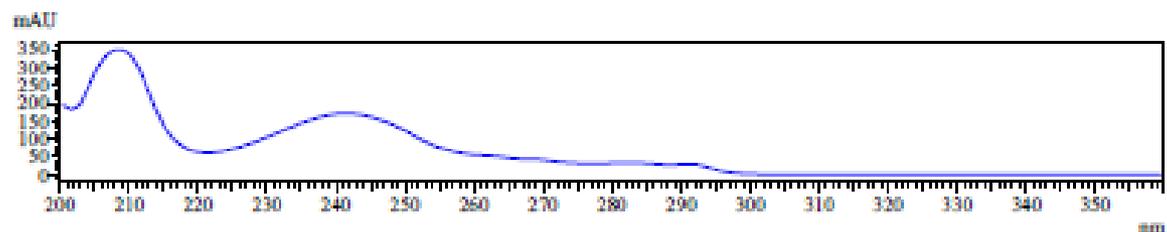


methyl (R)-2-(pyridin-2-yl)indoline-1-carboxylate 2o

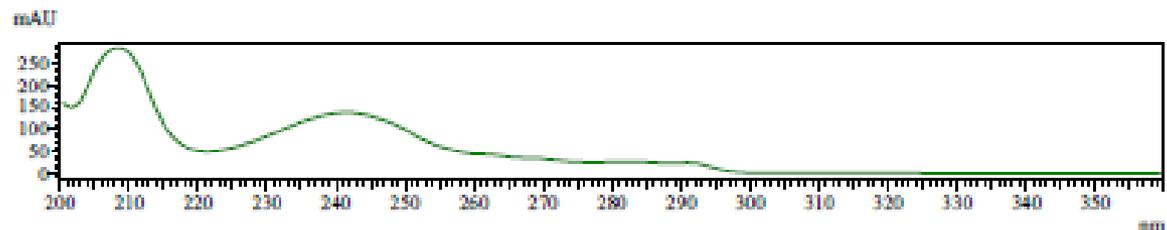
Sample Information
 Sample Name : XW-V-44-IC-5%1mL
 Sample ID : XW-V-44-IC-5%1mL
 Data File : XW-V-44-IC-5%1mL.lcd
 Method File : XW-5%-1mL.lcm



UV Spectrum
 Retention time = 29.735



UV Spectrum
 Retention time = 36.401

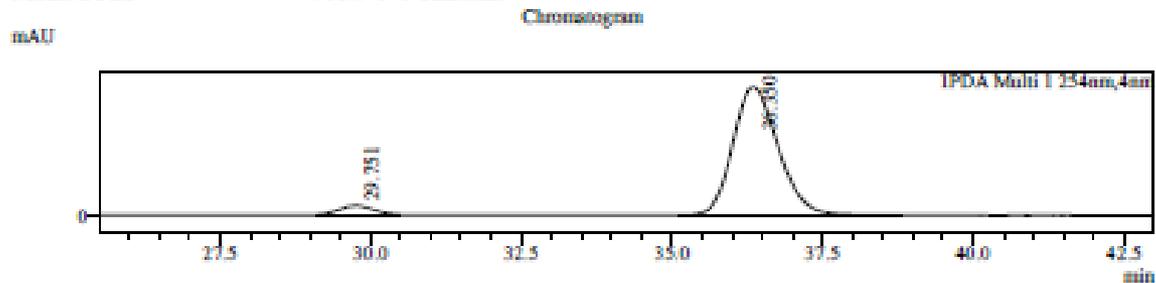


Peak Table

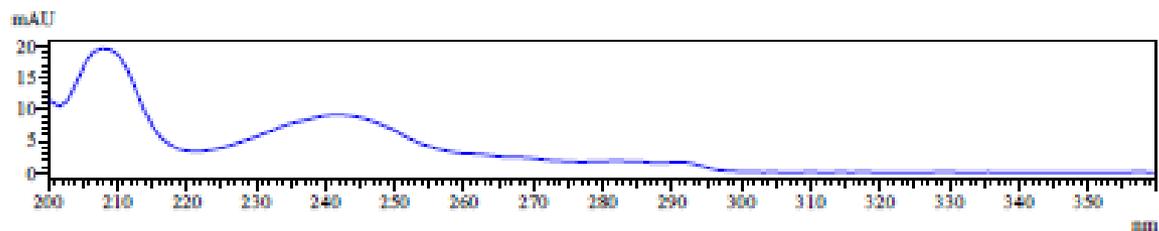
Peak#	Ret. Time	Area	Area%
1	29.735	3562726	50.034
2	36.401	3557929	49.966
Total		7120655	100.000

methyl (R)-2-(pyridin-2-yl)indoline-1-carboxylate 2o

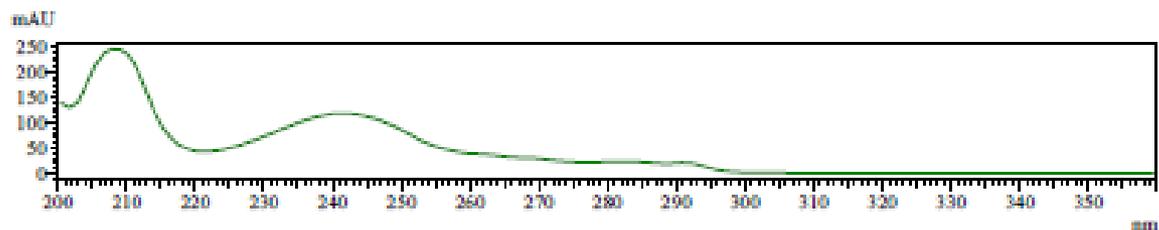
Sample Information
 Sample Name : XW-V-45B-IC-5%1mL
 Sample ID : XW-V-45B-IC-5%1mL
 Data File : XW-V-45B-IC-5%1mL.lcd
 Method File : XW-5%-1ml.lcm



UV Spectrum
 Retention time = 29.751



UV Spectrum
 Retention time = 36.350



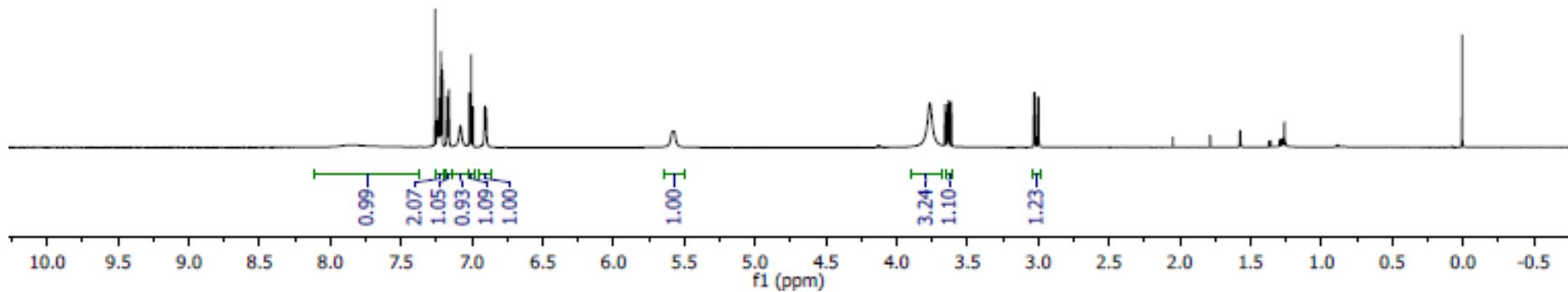
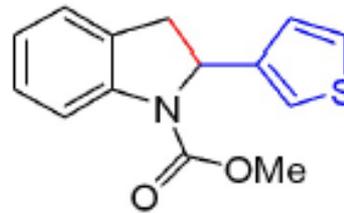
Peak Table

Peak#	Ret. Time	Area	Area%
1	29.751	165124	5.058
2	36.350	3099441	94.942
Total		3264565	100.000

methyl (*R*)-2-(thiophen-3-yl)indoline-1-carboxylate 2p

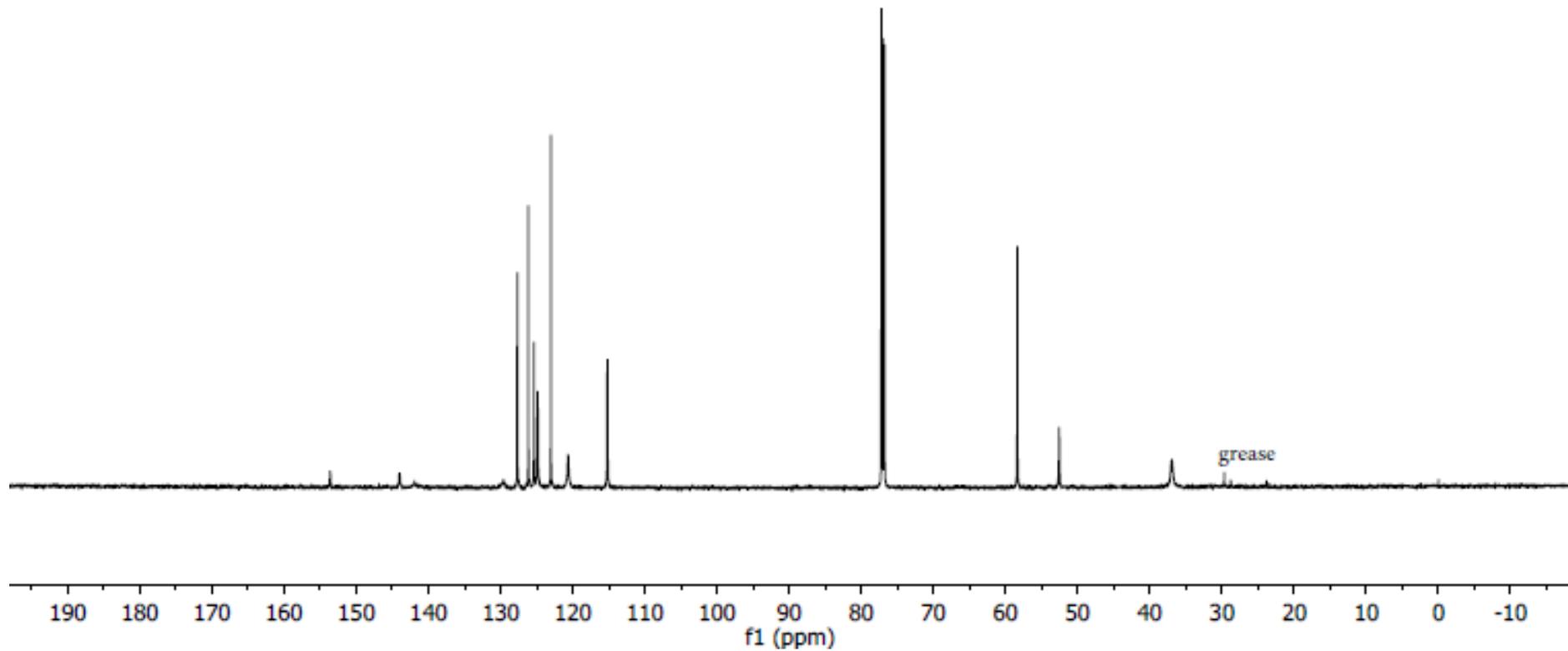
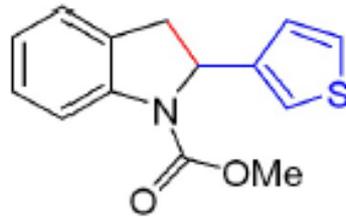
7.857
7.260
7.234
7.221
7.216
7.213
7.208
7.176
7.163
7.019
7.006
7.005
5.909
5.584
5.572

3.766
3.658
3.641
3.631
3.614
3.029
3.026
3.003
2.999



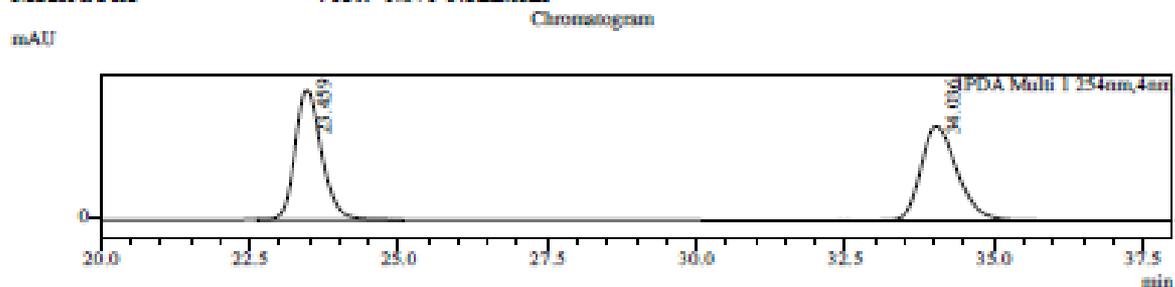
methyl (*R*)-2-(thiophen-3-yl)indoline-1-carboxylate 2p

153.763
144.001
141.893
129.651
127.676
126.146
125.355
124.849
123.020
120.636
115.189
77.211
77.000
76.788
58.364
52.561
36.963

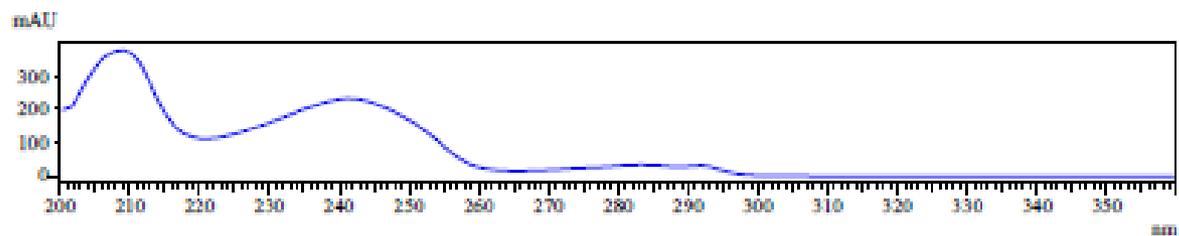


methyl (*R*)-2-(thiophen-3-yl)indoline-1-carboxylate 2p

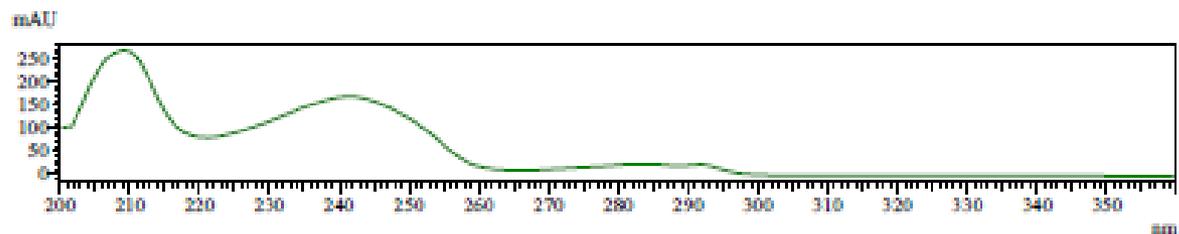
Sample Information
Sample Name : XW-V-68-IA-0.5%0.8mL
Sample ID : XW-V-68-IA-0.5%0.8mL
Data File : XW-V-68-IA-0.5%0.8mL.lcd
Method File : XW-0.5%-0.8ml.lcm



UV Spectrum
Retention time = 23.459



UV Spectrum
Retention time = 34.036



Peak Table

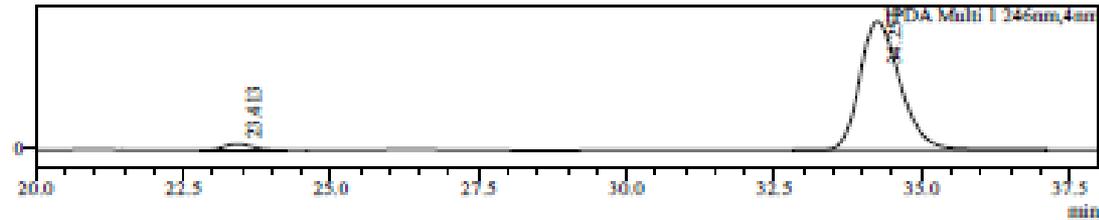
Peak#	Ret. Time	Area	Area%
1	23.459	3317129	50.079
2	34.036	3306717	49.921
Total		6623845	100.000

methyl (*R*)-2-(thiophen-3-yl)indoline-1-carboxylate 2p

Sample Information
 Sample Name : XW-V-69B-IA-0.5%0.8mL
 Sample ID : XW-V-69B-IA-0.5%0.8mL
 Data File : XW-V-69B-IA-0.5%0.8mL.lcd
 Method File : XW-0.5%-0.8mL.lcm

Chromatogram

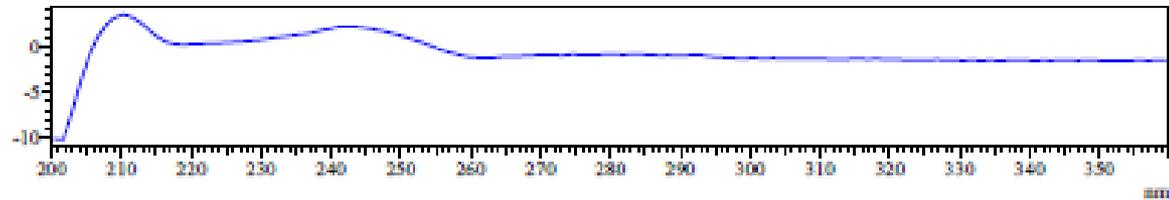
mAU



UV Spectrum

Retention time = 23.413

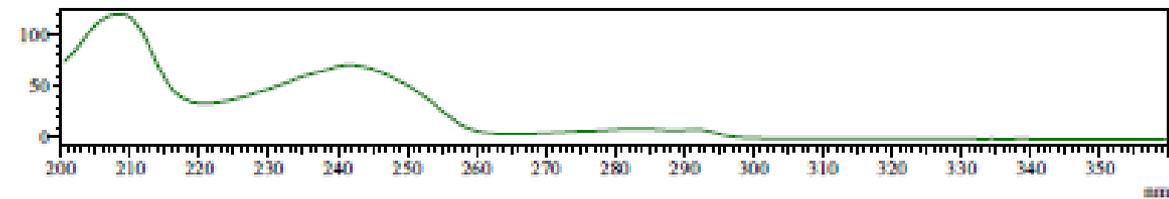
mAU



UV Spectrum

Retention time = 34.251

mAU



Peak Table

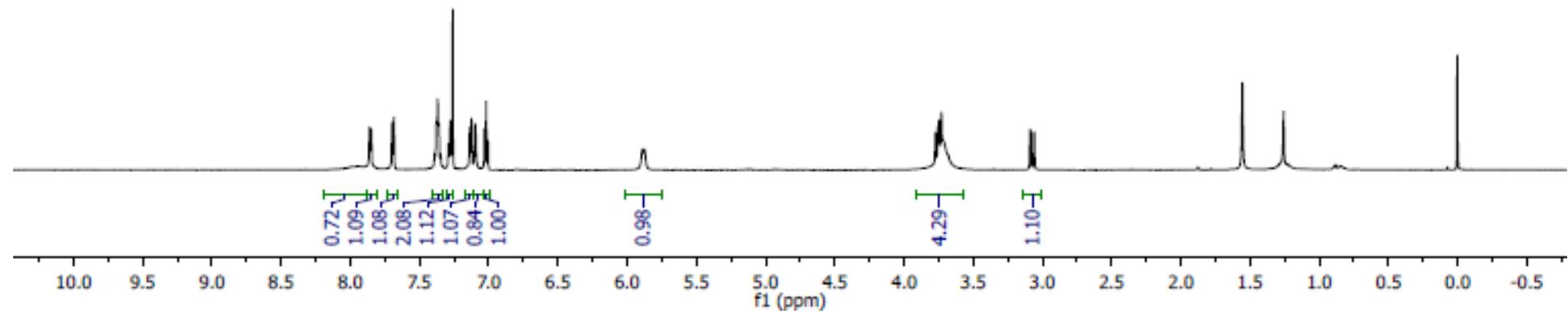
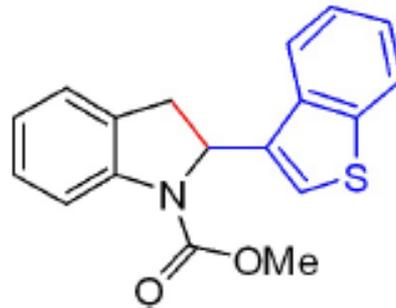
PDA Ch1 246nm

Peak#	Ret. Time	Area	Area%
1	23.413	99299	3.163
2	34.251	3040058	96.837
Total		3139357	100.000

methyl (*R*)-2-(benzo[*b*]thiophen-3-yl)indoline-1-carboxylate 2q

7.95
7.86
7.85
7.70
7.70
7.68
7.39
7.38
7.37
7.36
7.35
7.29
7.28
7.26
7.14
7.12
7.10
7.03
7.02
7.01
5.89
5.87

3.77
3.76
3.75
3.73
3.09
3.09
3.06
3.06



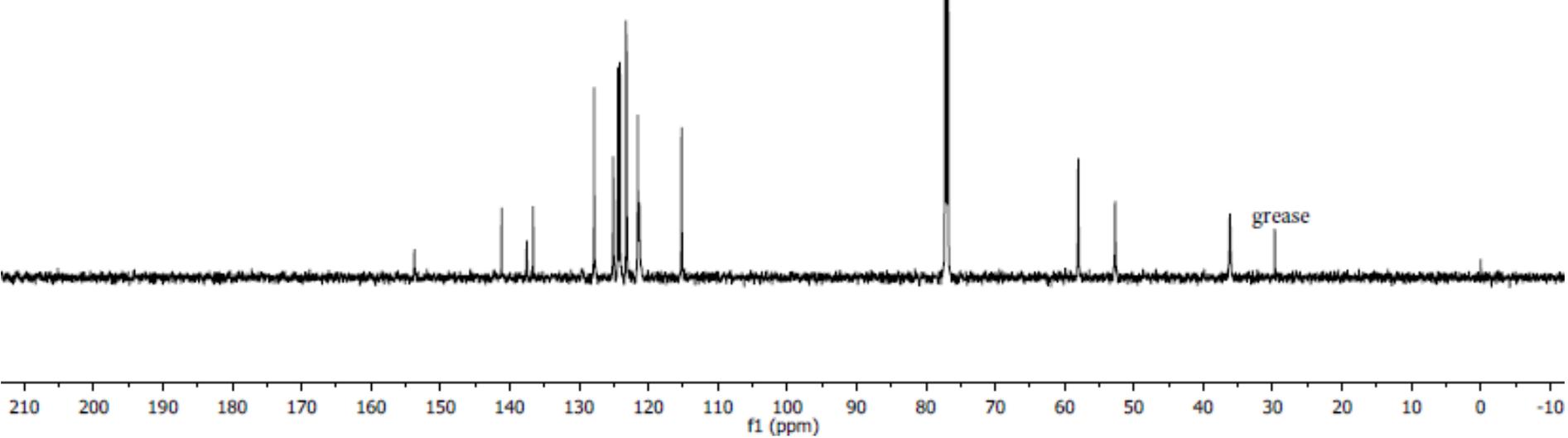
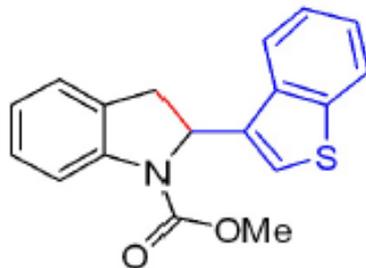
methyl (*R*)-2-(benzo[*b*]thiophen-3-yl)indoline-1-carboxylate 2q

153.73
141.16
137.54
136.61
127.81
125.07
124.41
124.10
123.21
123.12
121.53
121.31
115.21

77.21
77.00
76.79

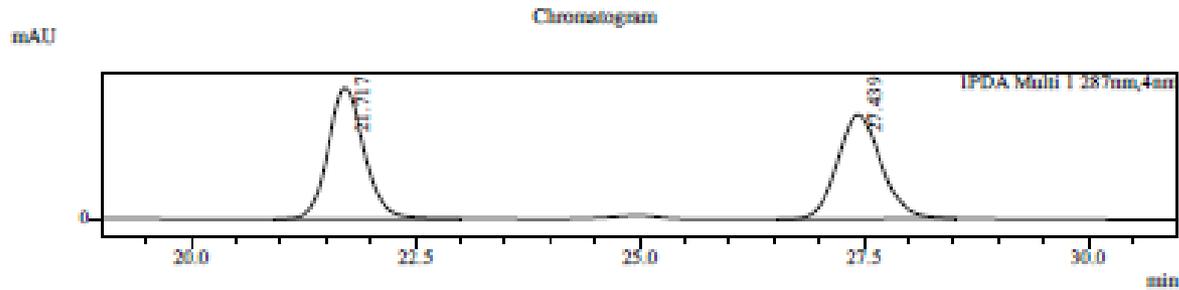
58.03
52.70

36.15

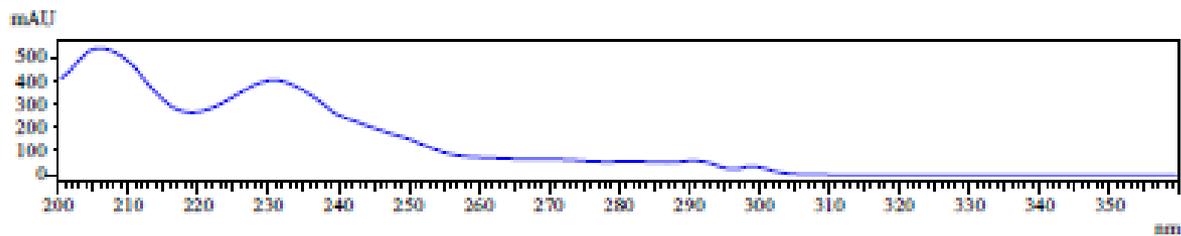


methyl (*R*)-2-(benzo[*b*]thiophen-3-yl)indoline-1-carboxylate 2q

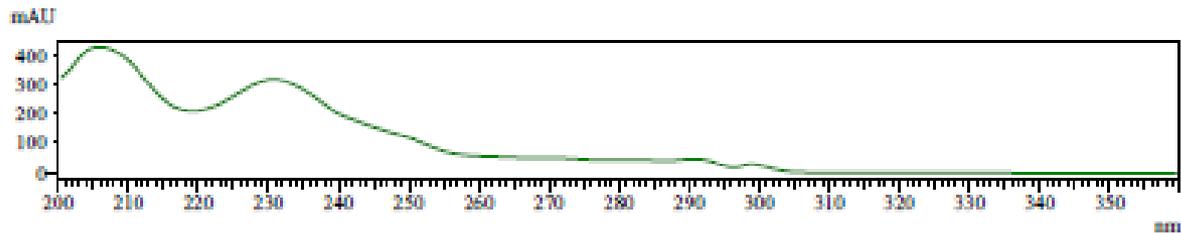
Sample Information
Sample Name : XW-V-116-IA-1%0.8mL
Sample ID : XW-V-116-IA-1%0.8mL
Data File : XW-V-116-IA-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 21.717



UV Spectrum
Retention time = 27.439

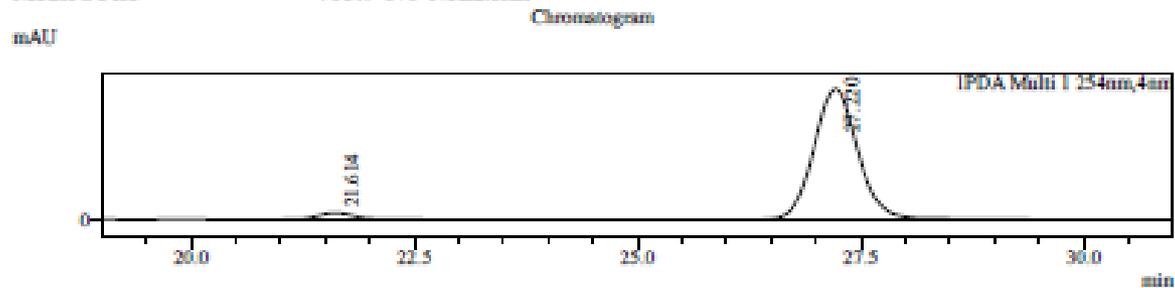


Peak Table

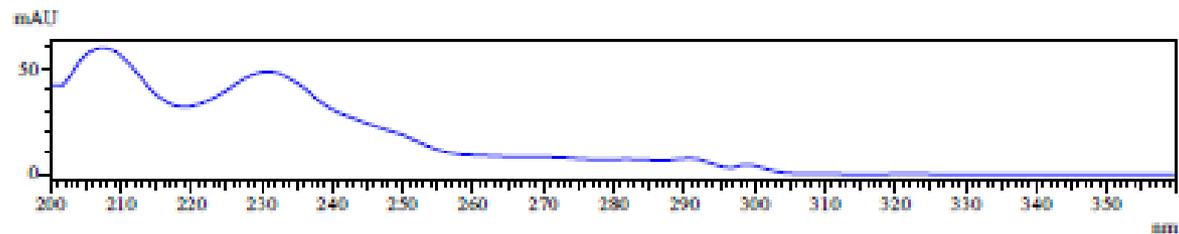
Peak#	Ret. Time	Area	Area%
1	21.717	1545390	50.918
2	27.439	1489687	49.082
Total		3035077	100.000

methyl (*R*)-2-(benzo[*b*]thiophen-3-yl)indoline-1-carboxylate 2q

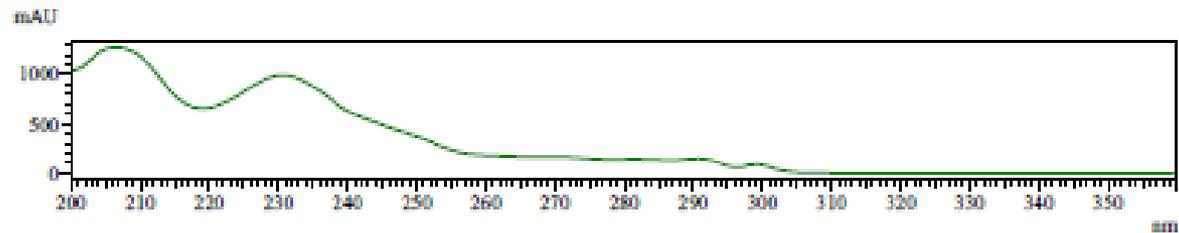
Sample Information
Sample Name : XW-V-117-old-IA-1%0.8mL
Sample ID : XW-V-117-old-IA-1%0.8mL
Data File : XW-V-117-old-IA-1%0.8mL.lcd
Method File : XW-1%-0.8mL.lcm



UV Spectrum
Retention time = 21.614



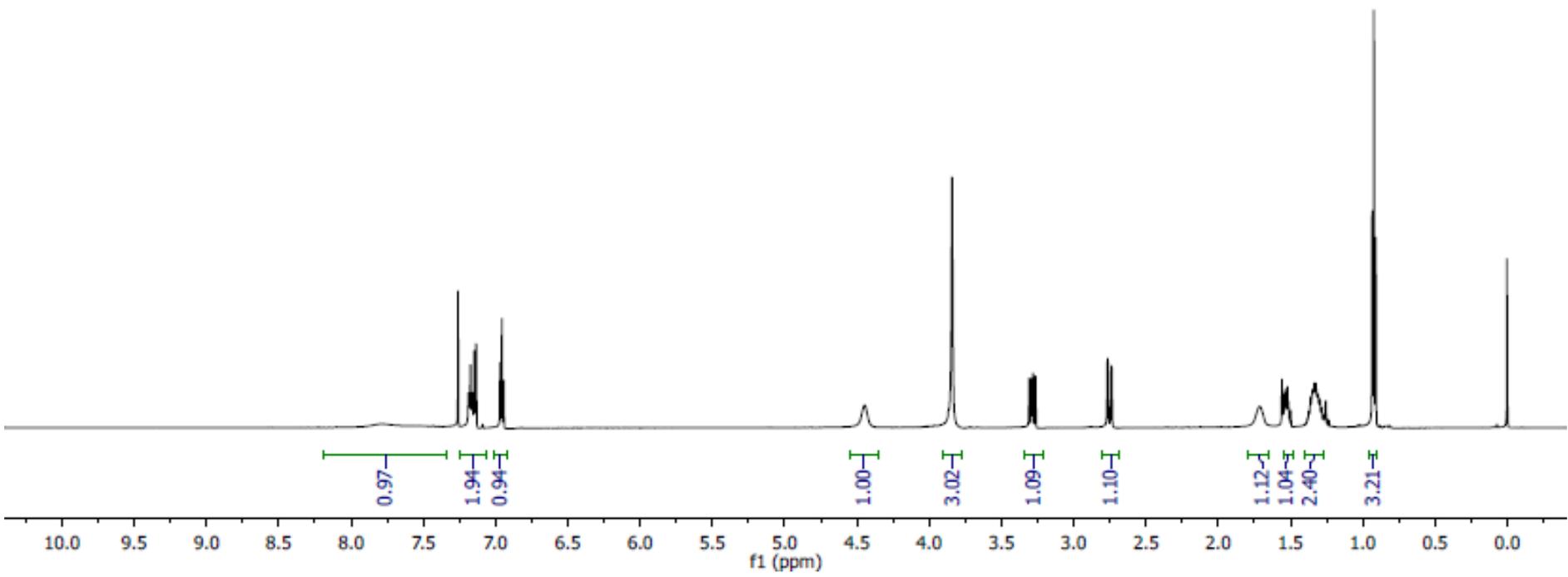
UV Spectrum
Retention time = 27.220



Peak Table

Peak#	Ret. Time	Area	Area%
1	21.614	376448	3.980
2	27.220	9082278	96.020
Total		9458726	100.000

methyl (*S*)-2-propylindoline-1-carboxylate 2r



methyl (*S*)-2-propylindoline-1-carboxylate 2r

—153.77

130.42

127.33

124.83

124.66

122.68

—115.34

77.21

77.00

76.79

—59.33

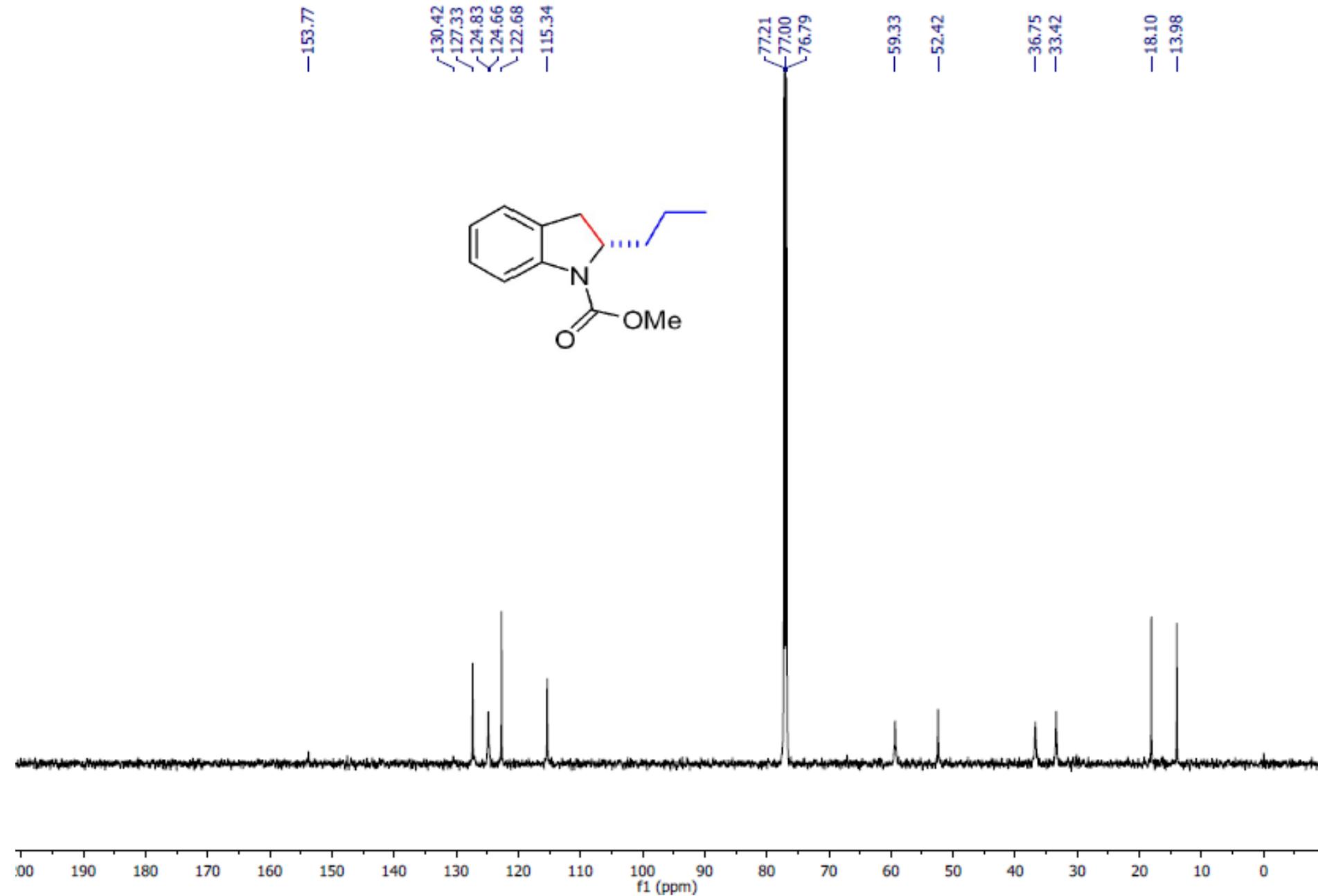
—52.42

—36.75

—33.42

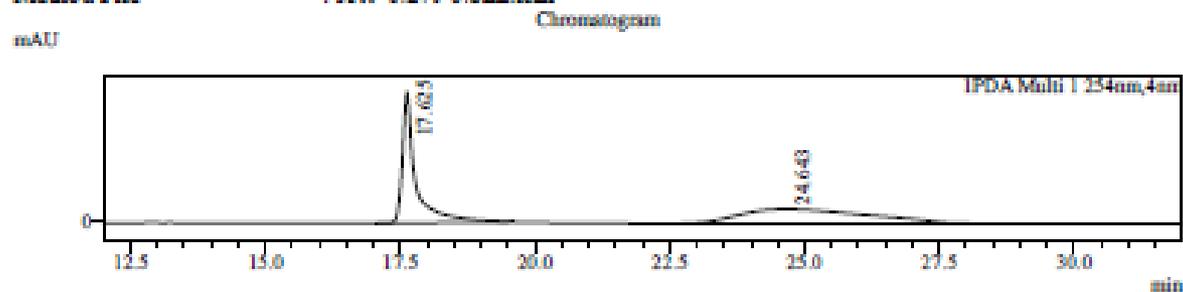
—18.10

—13.98

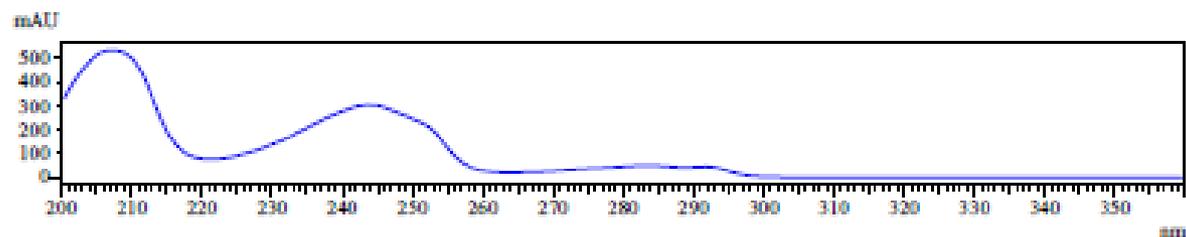


methyl (S)-2-propylindoline-1-carboxylate 2r

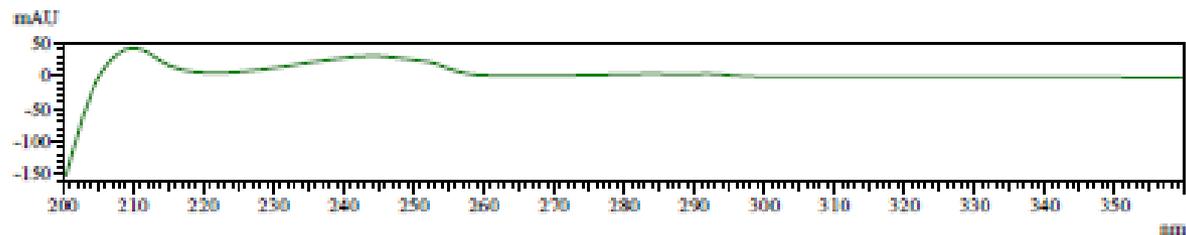
Sample Information
Sample Name : XW-V-52--2-IA-0.2%0.8mL
Sample ID : XW-V-52--2-IA-0.2%0.8mL
Data File : XW-V-52--2-IA-0.2%0.8mL.lcd
Method File : XW-0.2%-0.8mL.lcm



UV Spectrum
Retention time = 17.625



UV Spectrum
Retention time = 24.643

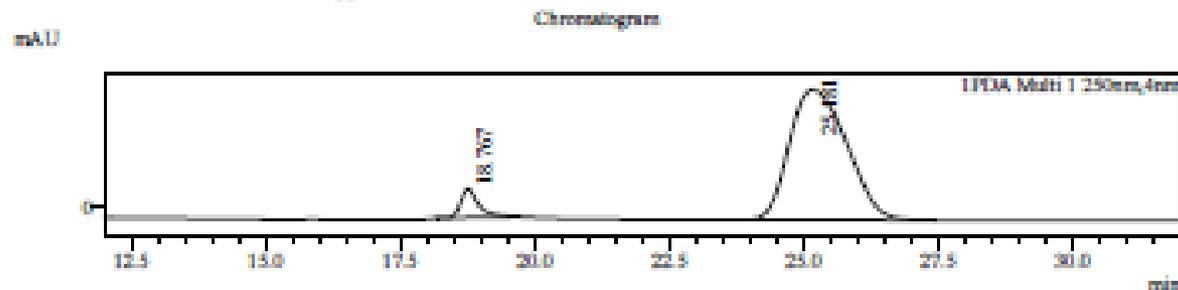


Peak Table

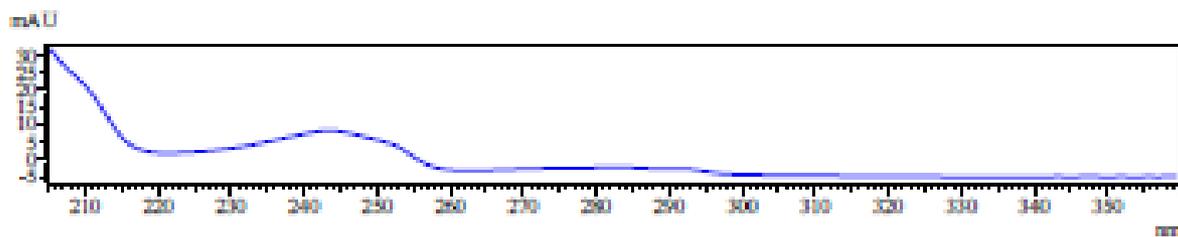
Peak#	Ret. Time	Area	Area%
1	17.625	2722739	50.278
2	24.643	2692668	49.722
Total		5415407	100.000

methyl (S)-2-propylindoline-1-carboxylate 2r

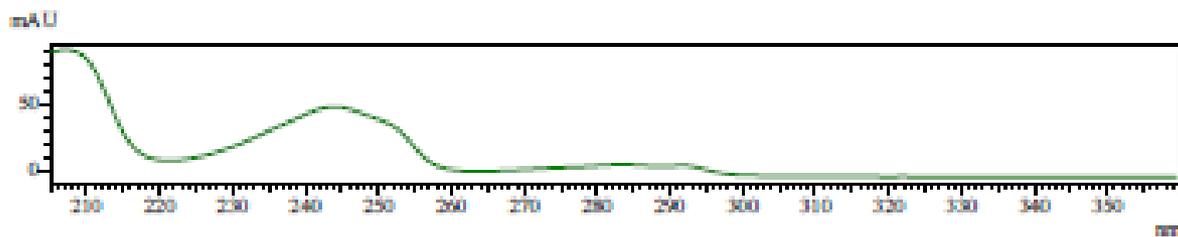
Sample Information
Sample Name : XW-V-53-60oC-2-IA-0.2%0.8ml
Sample ID : XW-V-53-60oC-2-IA-0.2%0.8ml
Data File : XW-V-53-60oC-2-IA-0.2%0.8ml.lcd
Method File : XW-0.2%-0.8ml.lcm



UV Spectrum
Retention time = 18.767



UV Spectrum
Retention time = 25.181



Peak Table

PDA Ch1 250nm

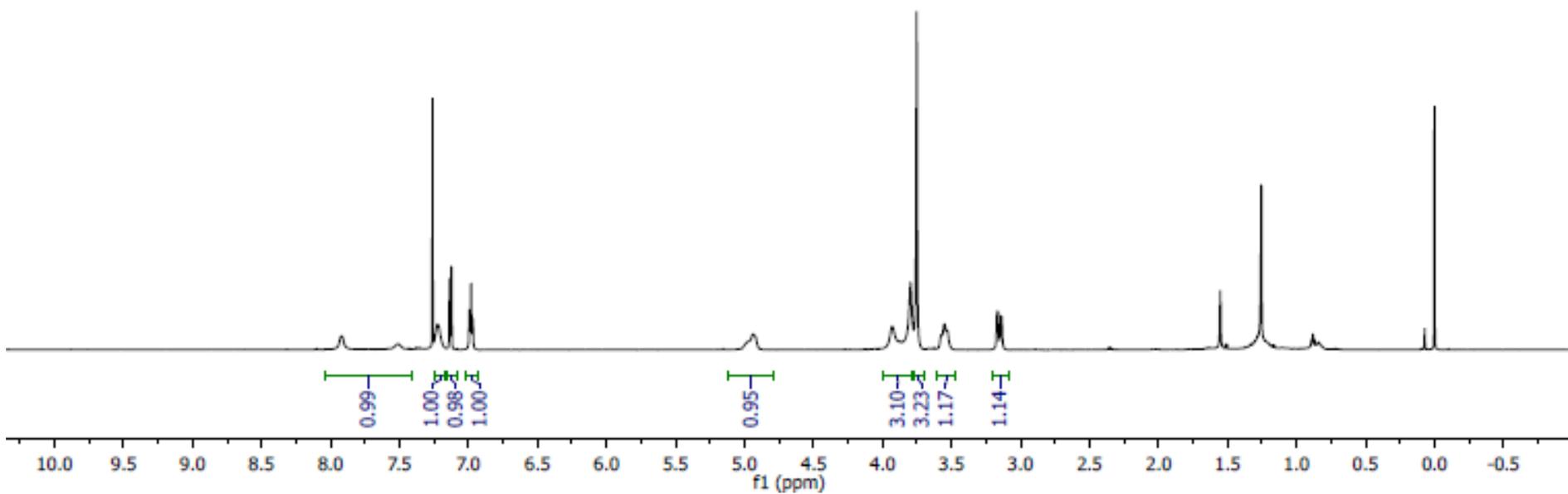
Peak#	Ret. Time	Area	Area%
1	18.767	213047	6.350
2	25.181	3142094	93.650
Total		3355141	100.000

dimethyl (*R*)-indoline-1,2-dicarboxylate 2s

7.919
7.510
7.260
7.224
7.136
7.124
6.993
6.981
6.969

1.943

3.928
3.797
3.752
3.576
3.550
3.533
3.165
3.137



dimethyl (*R*)-indoline-1,2-dicarboxylate 2s

—172.06

—152.93

—142.21

127.98

124.78

124.36

122.99

—114.79

77.21

77.00

76.79

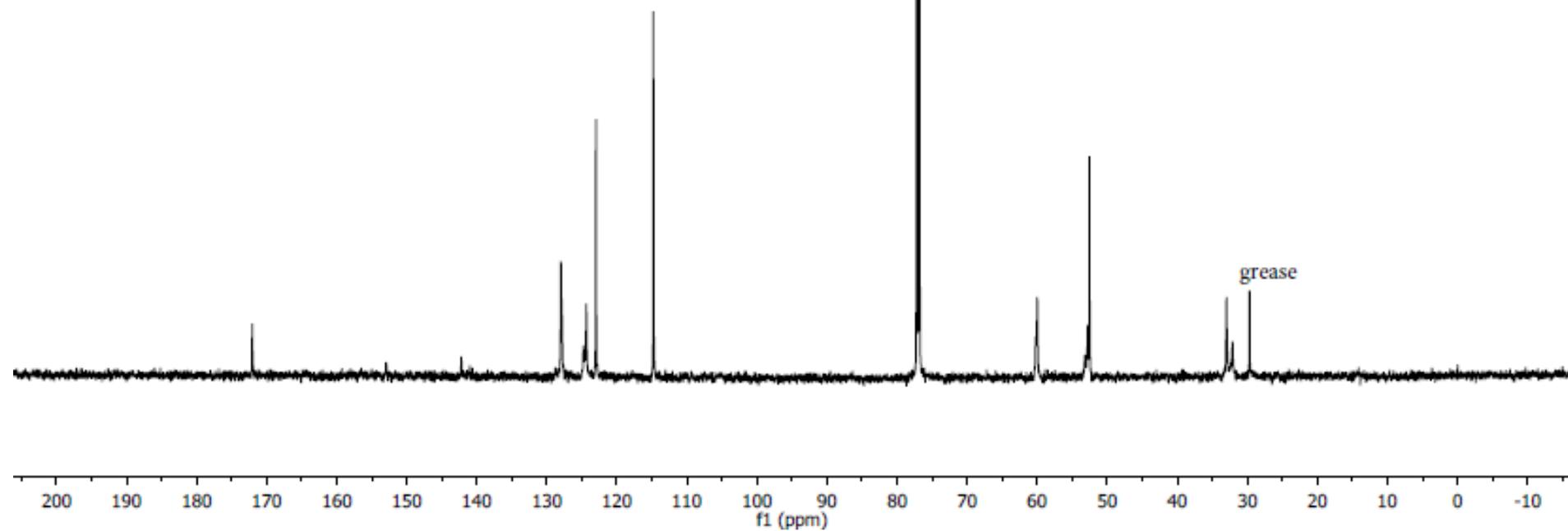
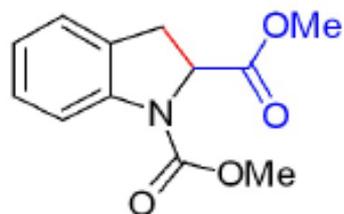
—59.99

52.76

52.53

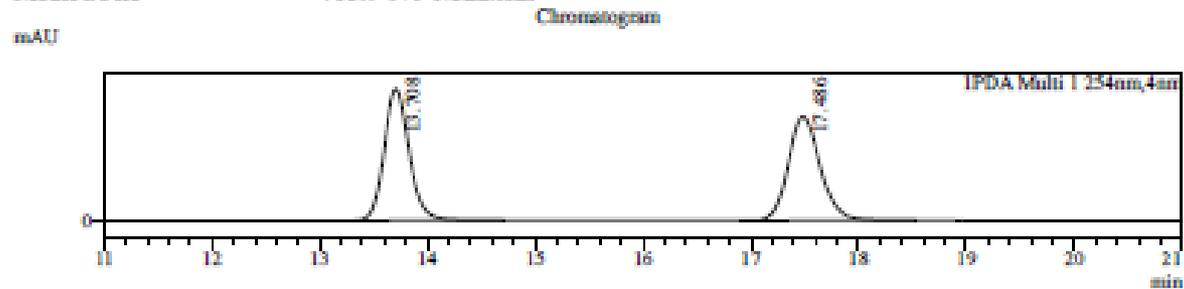
32.96

32.11

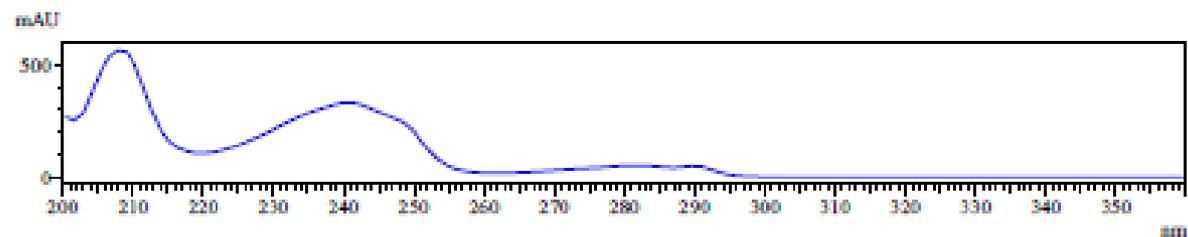


dimethyl (*R*)-indoline-1,2-dicarboxylate 2s

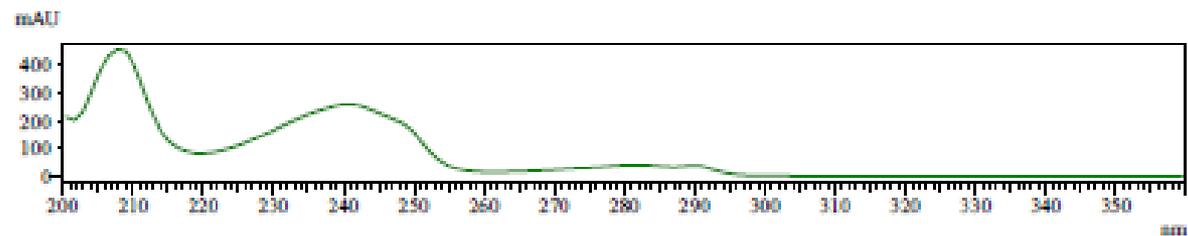
Sample Information
Sample Name : XW-V-86-2-LA-5%0.8mL
Sample ID : XW-V-86-2-LA-5%0.8mL
Data File : XW-V-86-2-LA-5%0.8mL.lcd
Method File : XW-5%-0.8mL.lcm



UV Spectrum
Retention time = 13.708



UV Spectrum
Retention time = 17.486

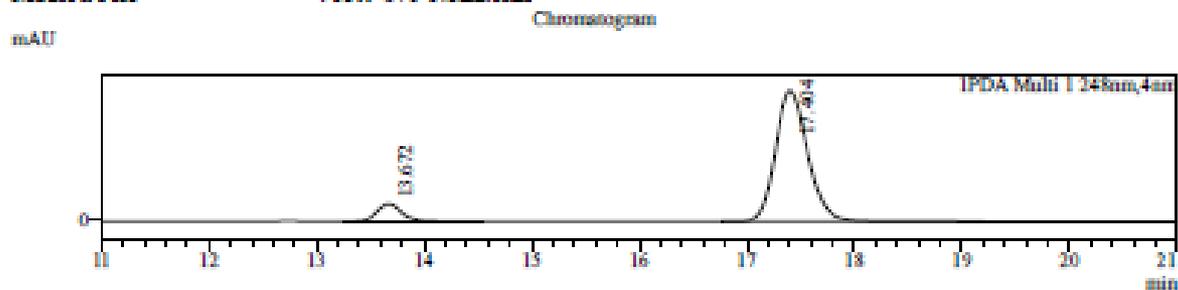


Peak Table

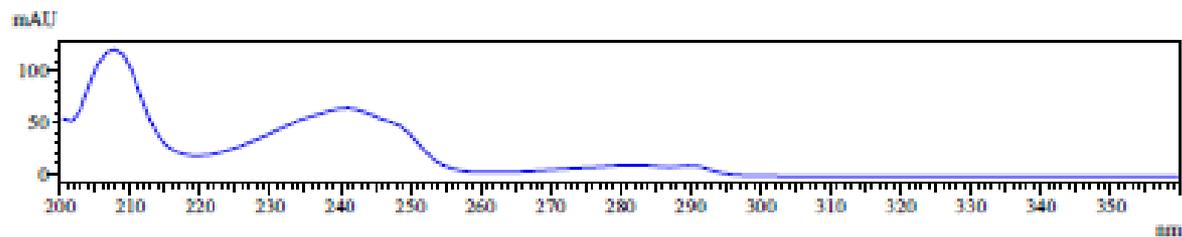
Peak#	Ret. Time	Area	Area%
1	13.708	1284010	49.832
2	17.486	1292669	50.168
Total		2576679	100.000

dimethyl (*R*)-indoline-1,2-dicarboxylate 2s

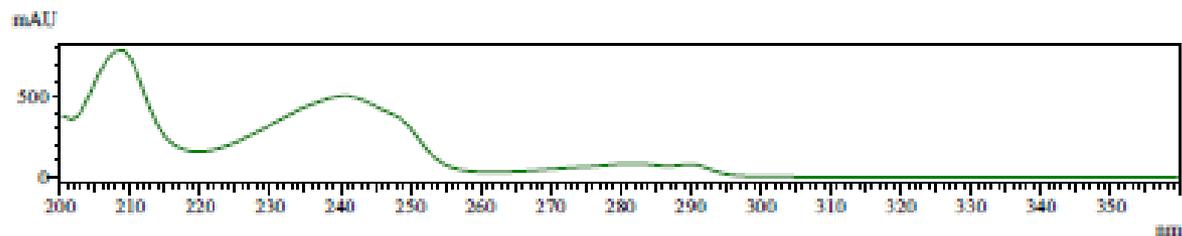
Sample Information
Sample Name : XW-V-87-40C-IA-5%0.8mL
Sample ID : XW-V-87-40C-IA-5%0.8mL
Data File : XW-V-87-40C-IA-5%0.8mL.lcd
Method File : XW-5%-0.8mL.lcm



UV Spectrum
Retention time = 13.672



UV Spectrum
Retention time = 17.404



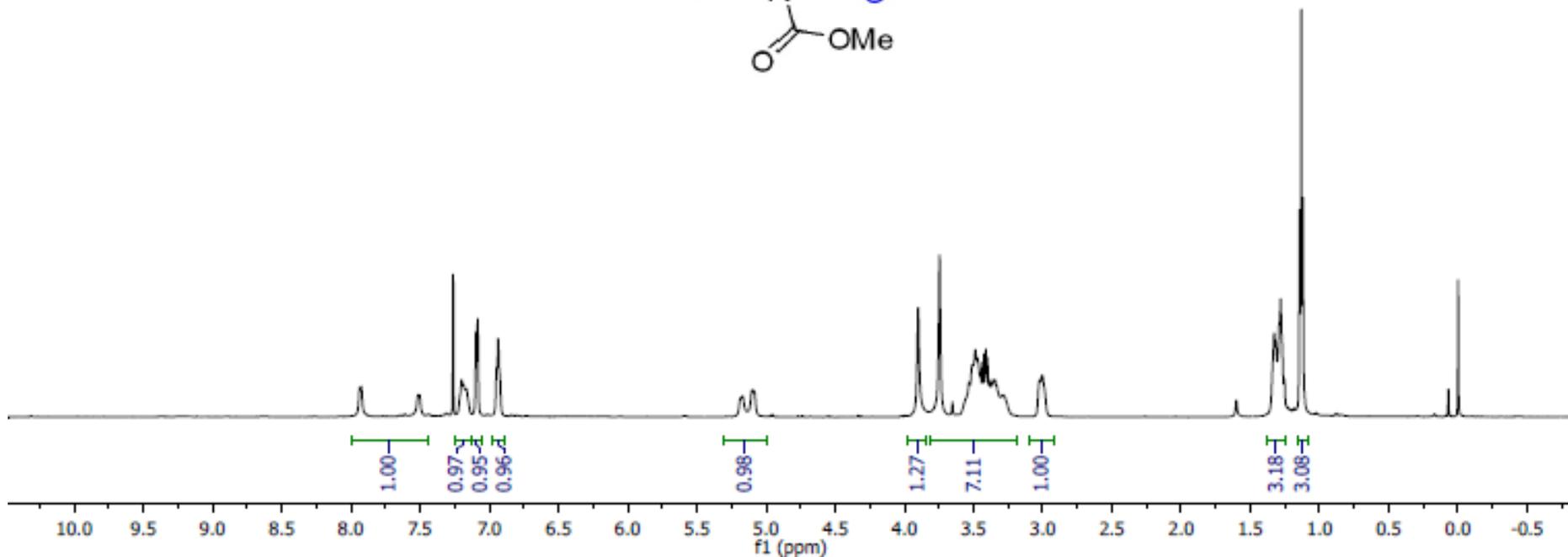
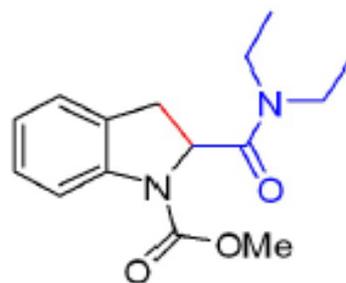
Peak Table

PDA Ch1 248nm

Peak#	Ret. Time	Area	Area%
1	13.672	799187	9.368
2	17.404	7731407	90.632
Total		8530593	100.000

methyl (*R*)-2-(diethylcarbamoyl)indoline-1-carboxylate 2t

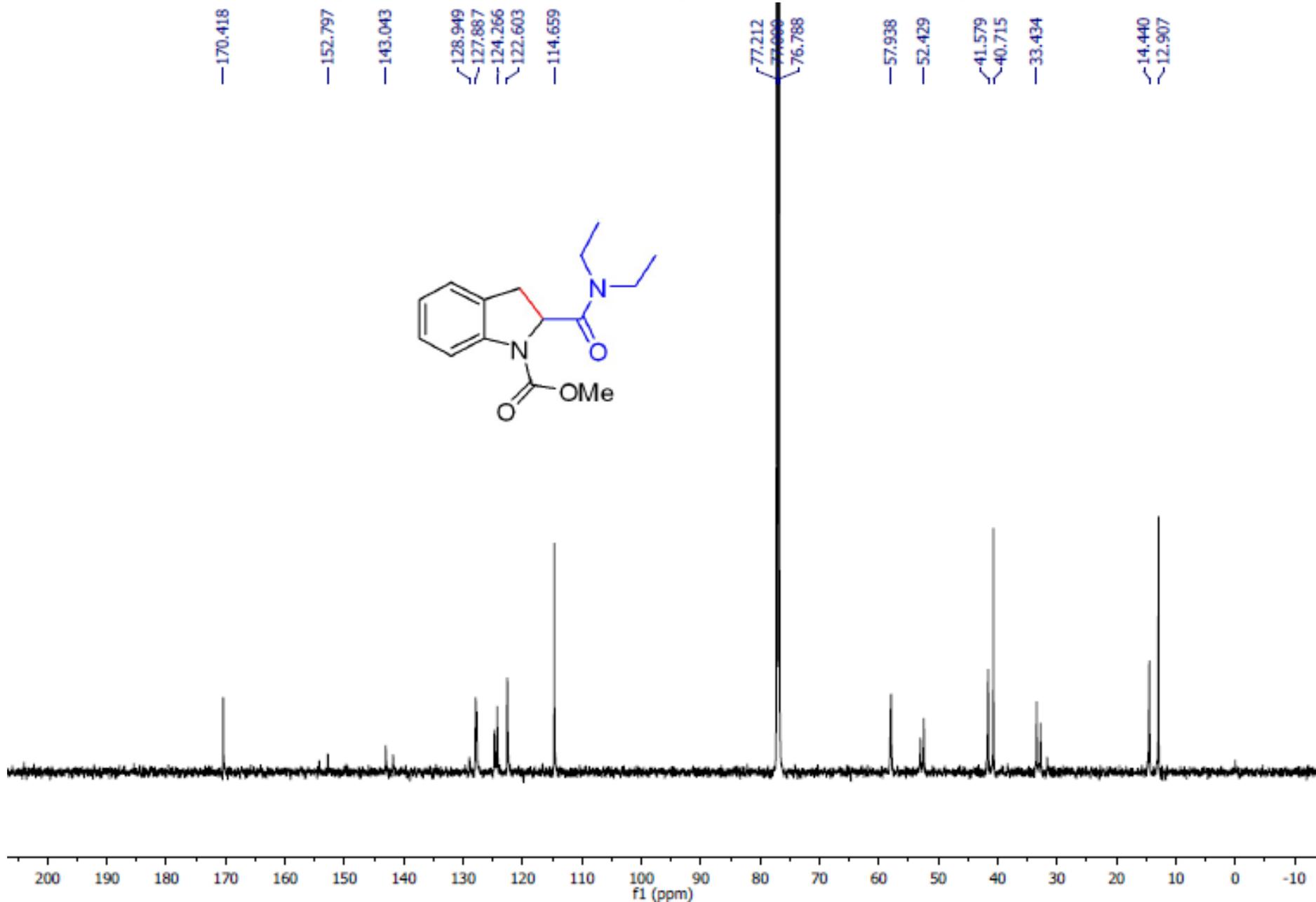
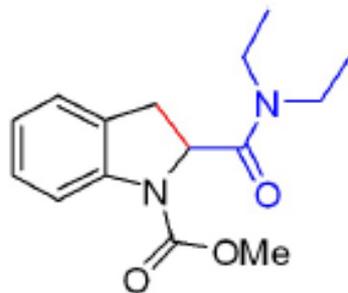
7.94 7.92 7.51 7.50 7.26 7.20 7.19 7.17 7.16 7.09 7.08 6.95 6.93 5.18 5.17 5.10 5.08 3.90 3.75 3.53 3.49 3.47 3.45 3.44 3.42 3.41 3.40 3.39 3.37 3.35 3.34 3.28 3.02 3.00 1.33 1.28 1.25 1.14 1.13 1.12



Note: The broad spectrum was due to the amide rotamers

methyl (*R*)-2-(diethylcarbamoyl)indoline-1-carboxylate 2t

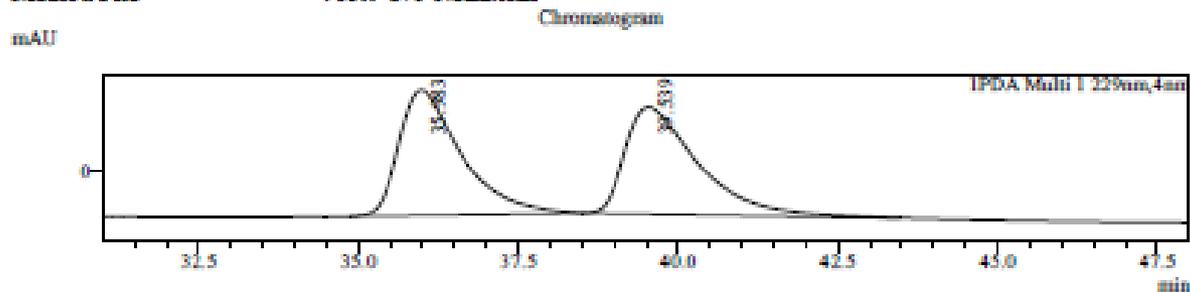
— 170.418
— 152.797
— 143.043
— 128.949
— 127.887
— 124.266
— 122.603
— 114.659
— 77.212
— 77.000
— 76.788
— 57.938
— 52.429
— 41.579
— 40.715
— 33.434
— 14.440
— 12.907



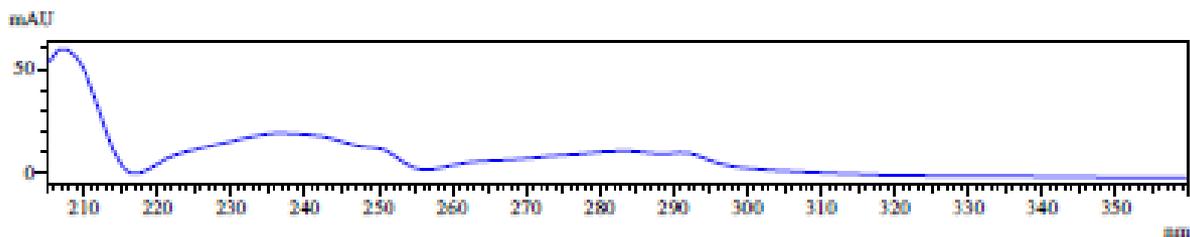
Note: The spectrum contains a mixture of amide rotamers and the major rotamer was labelled.

methyl (R)-2-(diethylcarbamoyl)indoline-1-carboxylate 2t

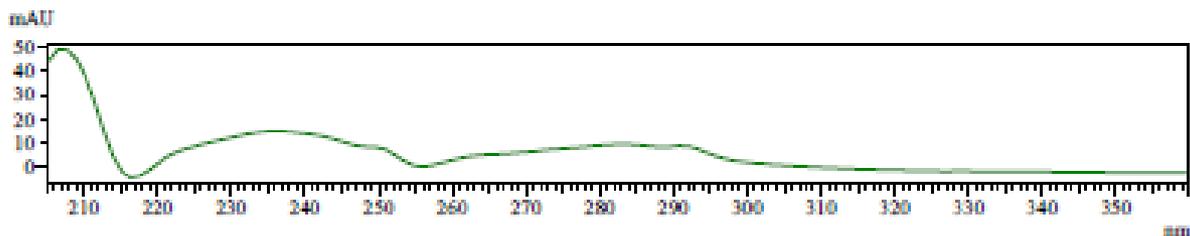
Sample Information
Sample Name : XW-V-111-1A-8%0.8mL
Sample ID : XW-V-111-1A-8%0.8mL
Data File : XW-V-111-1A-8%0.8mL001.lcd
Method File : XW-8%-0.8mL.lcm



UV Spectrum
Retention time = 35.983



UV Spectrum
Retention time = 39.539



Peak Table

PDA Ch1 229nm

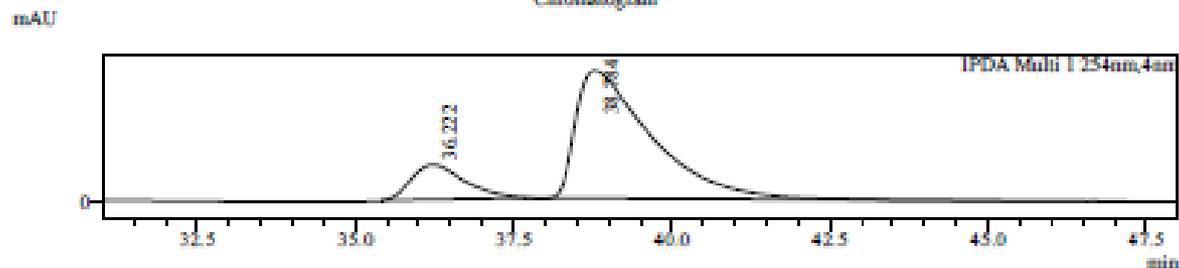
Peak#	Ret. Time	Area	Area%
1	35.983	1476682	49.895
2	39.539	1482878	50.105
Total		2959560	100.000

methyl (R)-2-(diethylcarbamoyl)indoline-1-carboxylate 2t

Sample Name : XW-V-113-40C-IA-8%0.8mL
Sample ID : XW-V-113-40C-IA-8%0.8mL
Data File : XW-V-113-40C-IA-8%0.8mL.lcd
Method File : XW-8%-0.8ml.lcm

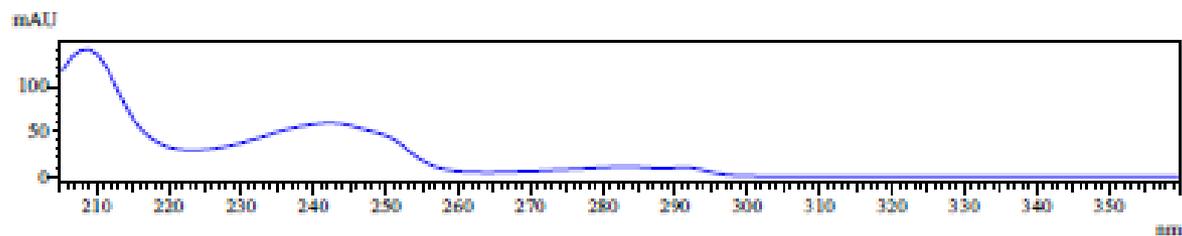
Sample Information

Chromatogram



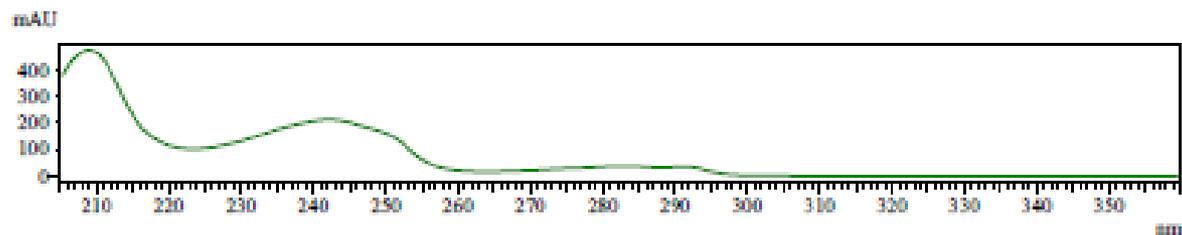
UV Spectrum

Retention time = 36.222



UV Spectrum

Retention time = 38.784

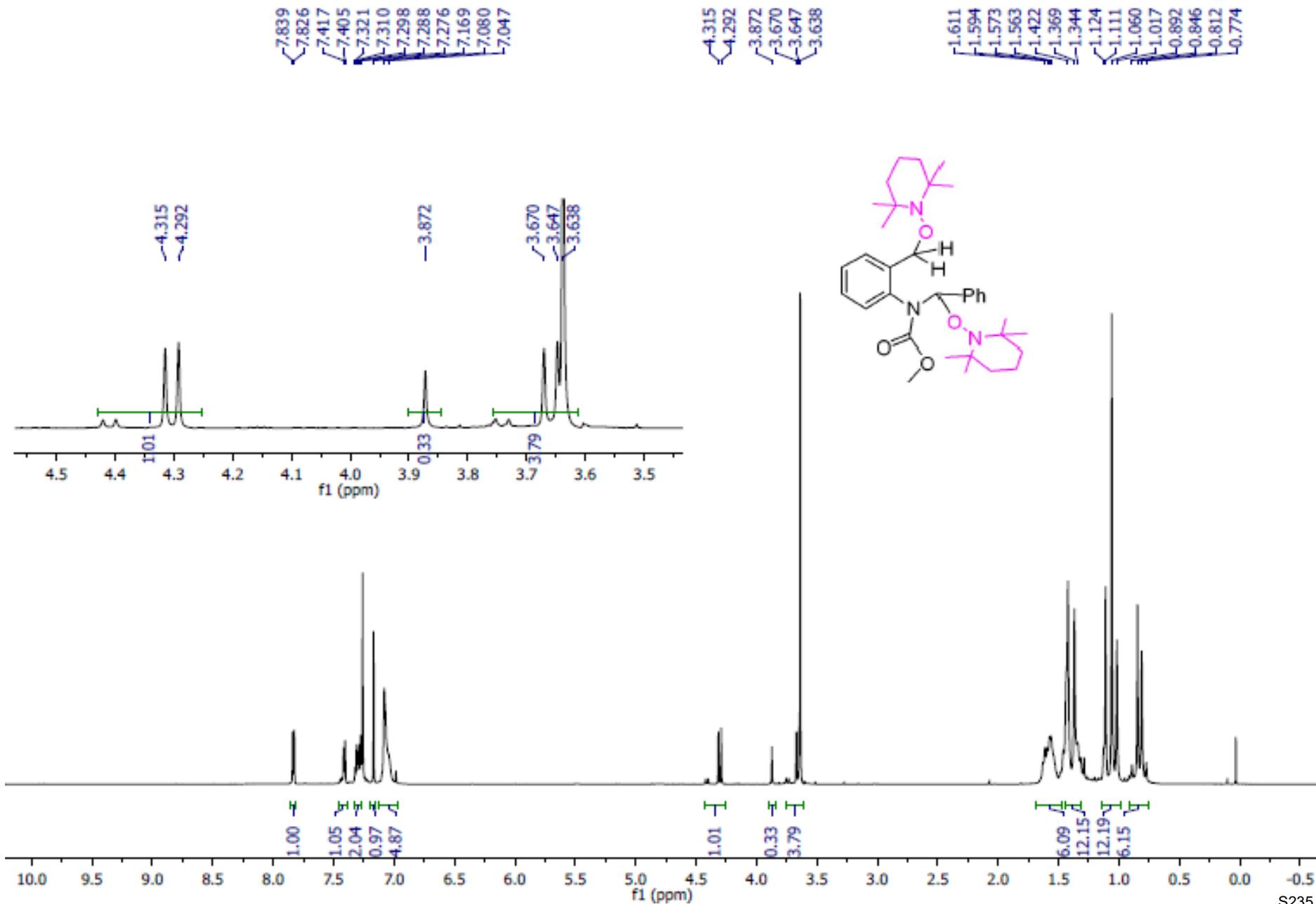


Peak Table

PDA Ch1 254nm

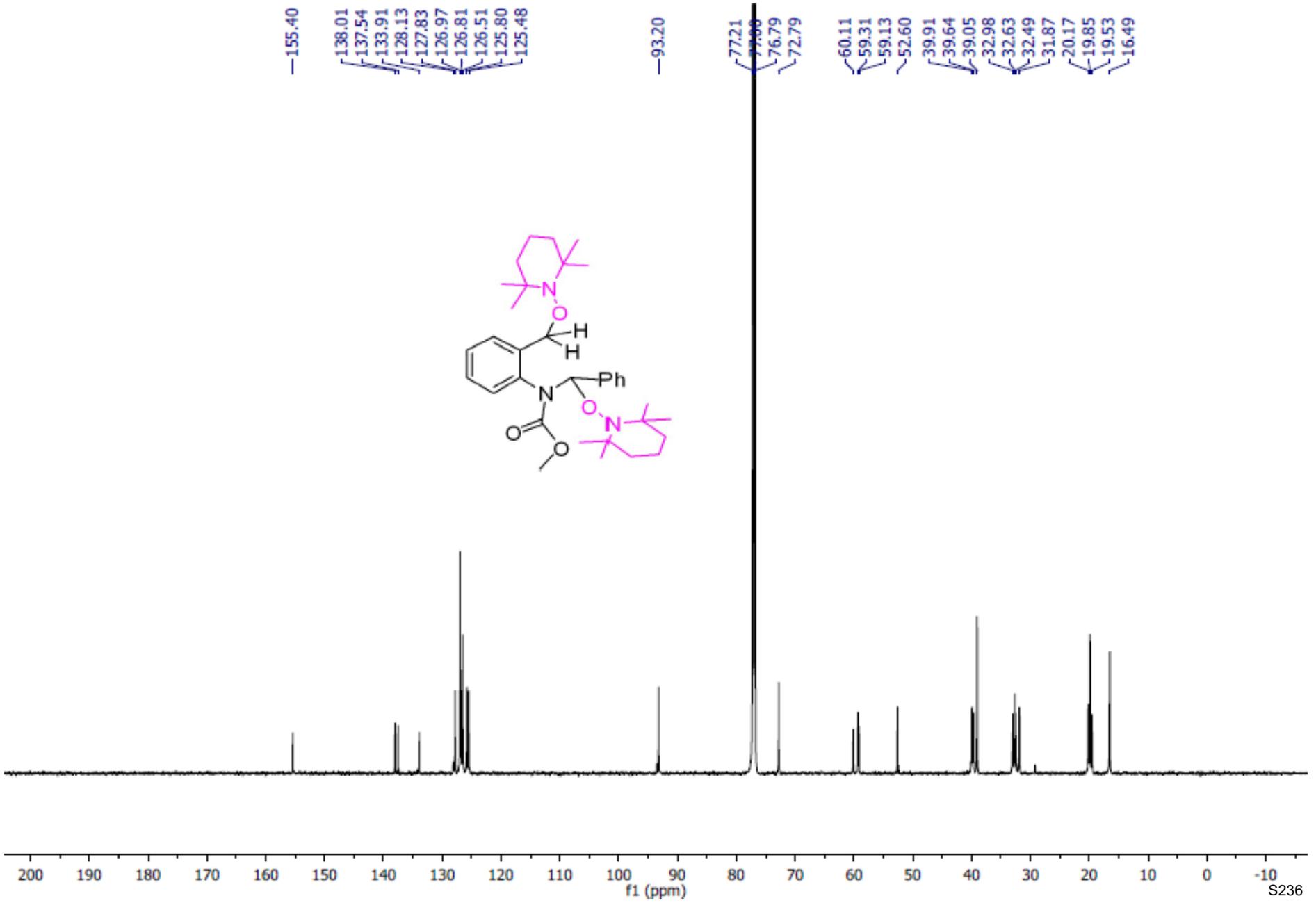
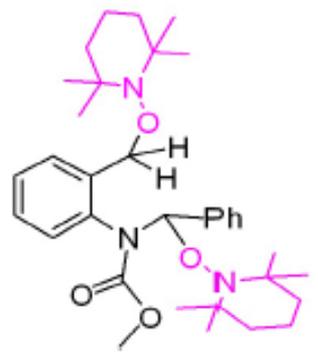
Peak#	Ret. Time	Area	Area%
1	36.222	1352139	16.203
2	38.784	6992618	83.797
Total		8344758	100.000

methyl (phenyl((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3c



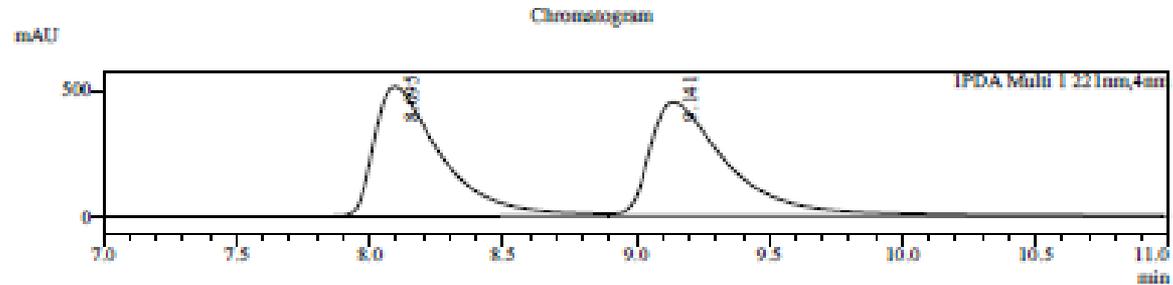
methyl (phenyl((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3c

155.40
138.01
137.54
133.91
128.13
127.83
126.97
126.81
126.51
125.80
125.48
93.20
77.21
77.00
76.79
72.79
60.11
59.31
59.13
52.60
39.91
39.64
39.05
32.98
32.63
32.49
31.87
20.17
19.85
19.53
16.49

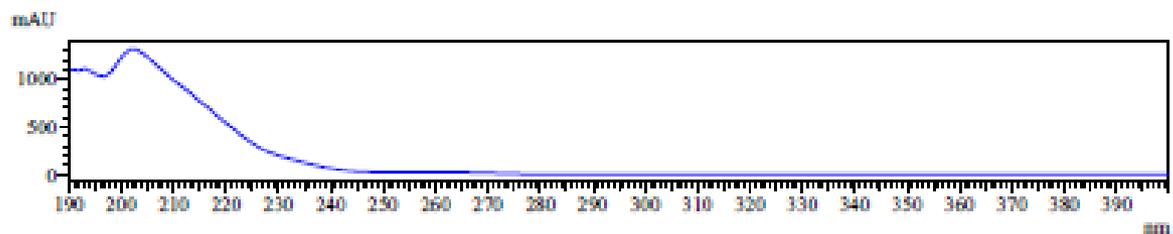


methyl (phenyl((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3c

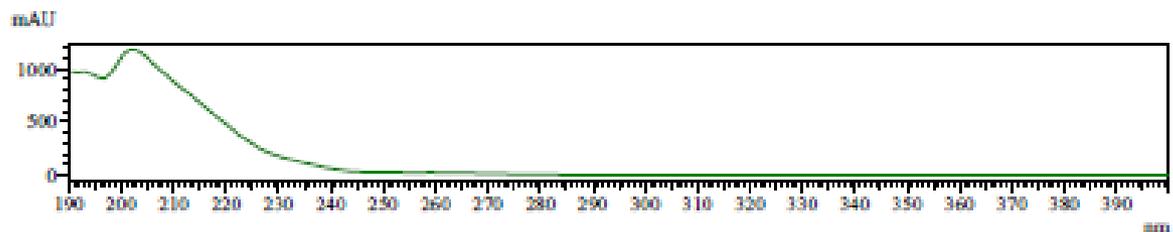
Sample Information
 Sample Name : XW-V-127-IA-0.3%0.8mL-1
 Sample ID : XW-V-127-IA-0.3%0.8mL-1
 Data File : XW-V-127-IA-0.3%0.8mL-1.lcd
 Method File : XW-0.3%-0.8ml.lcm



UV Spectrum
 Retention time = 8.095



UV Spectrum
 Retention time = 9.141



Peak Table

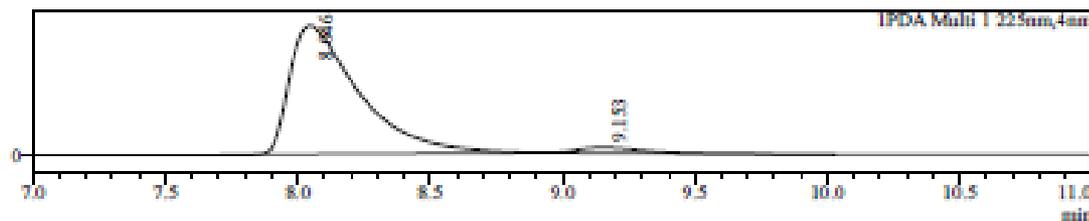
Peak#	Ret. Time	Area	Area%
1	8.095	9013766	49.278
2	9.141	9277793	50.722
Total		18291559	100.000

methyl (phenyl((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3c

Sample Name : XW-V-137-LA-0.3%0.8mL-1
 Sample ID : XW-V-137-LA-0.3%0.8mL-1
 Data File : XW-V-137-LA-0.3%0.8mL-1.lcd
 Method File : XW-0.3%-0.8mL1cm

Chromatogram

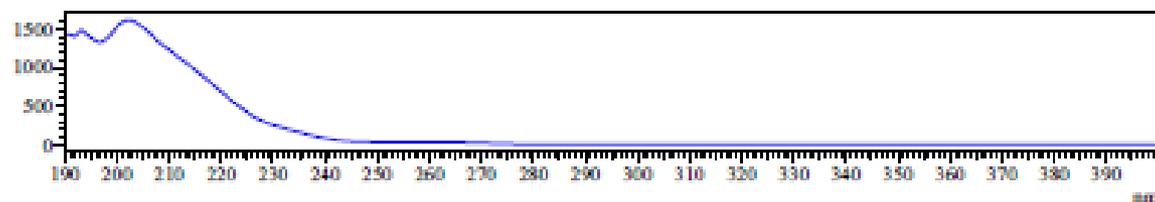
mAU



UV Spectrum

Retention time = 8.046

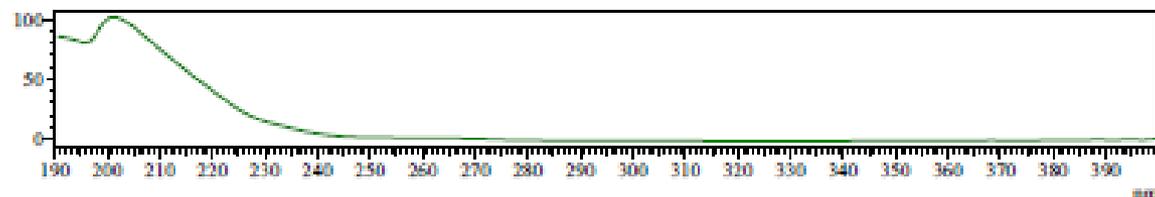
mAU



UV Spectrum

Retention time = 9.153

mAU

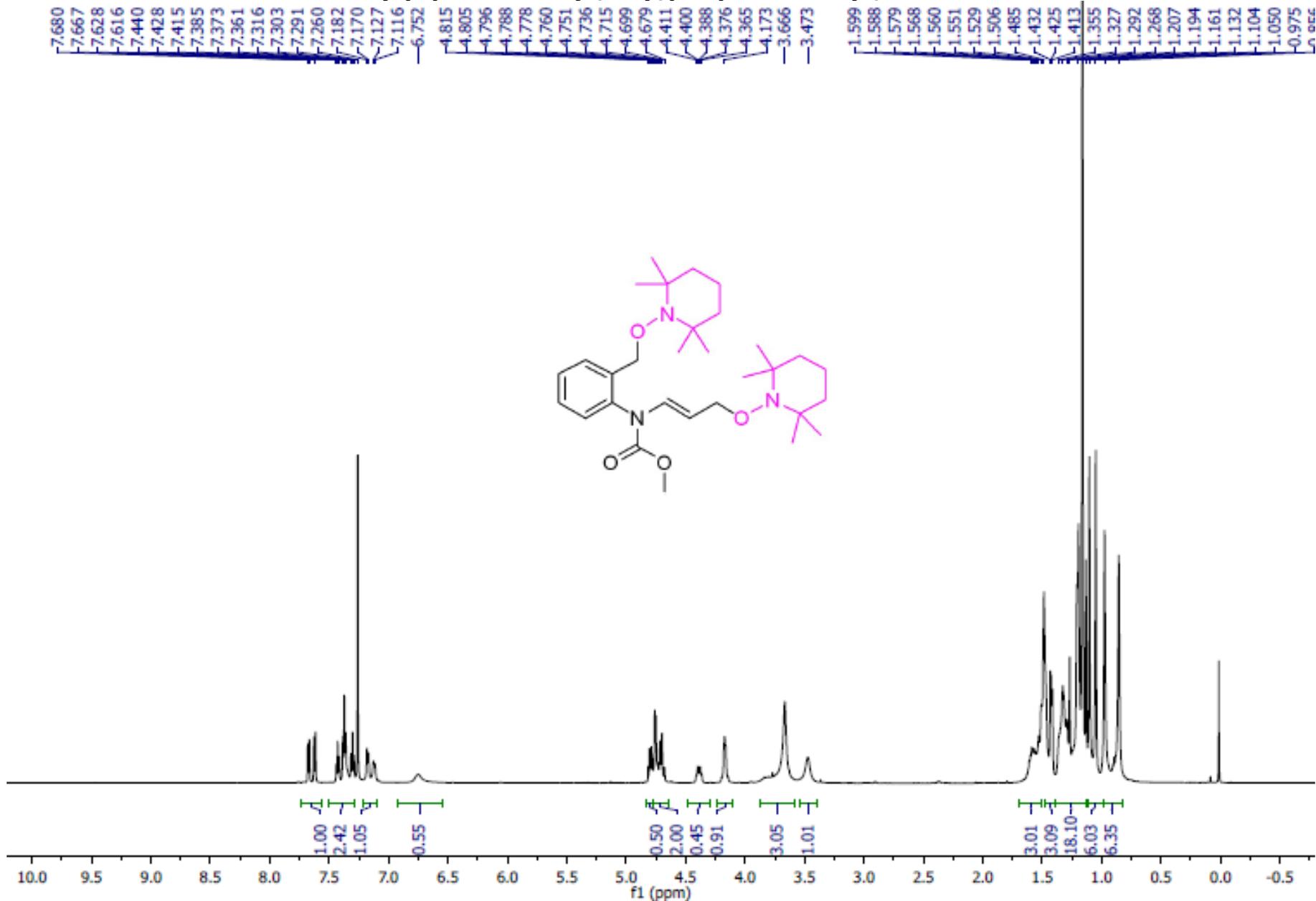


Peak Table

PDA Ch1 225nm

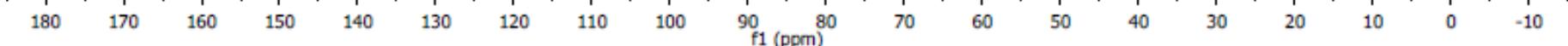
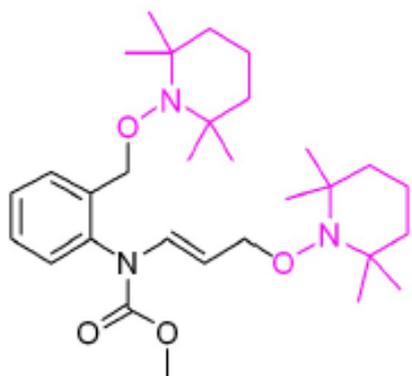
Peak#	Ret. Time	Area	Area%
1	8.046	7823322	96.446
2	9.153	288260	3.554
Total		8111582	100.000

methyl (2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl) phenyl)(3-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)prop-1-en-1-yl)carbamate 3u



Note: The spectrum contains E/Z isomers of C=C bond.

methyl (2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl) phenyl)(3-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)prop-1-en-1-yl)carbamate 3u



Note: The spectrum contains E/Z isomers of C=C bond.

tert-butyl 2-cyclopropylindoline-1-carboxylate 2v

7.679
7.260
7.177
7.162
7.149
7.135
6.951
6.937
6.922

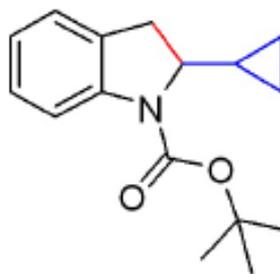
4.003

3.320
3.301
3.288
3.269
2.804
2.772

1.572

1.080
1.074
1.064

0.625
0.616
0.606
0.502
0.410
0.219
0.210
0.200



0.86

1.90

0.94

0.91

1.00

1.00

9.12

0.97

1.01

1.00

1.01

1.00

10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5

f1 (ppm)

***tert*-butyl 2-cyclopropylindoline-1-carboxylate 2v**

— 152.78

— 142.28

— 130.63

— 127.20

— 124.67

— 122.32

— 115.62

— 80.67

— 77.25

— 77.00

— 76.75

— 62.93

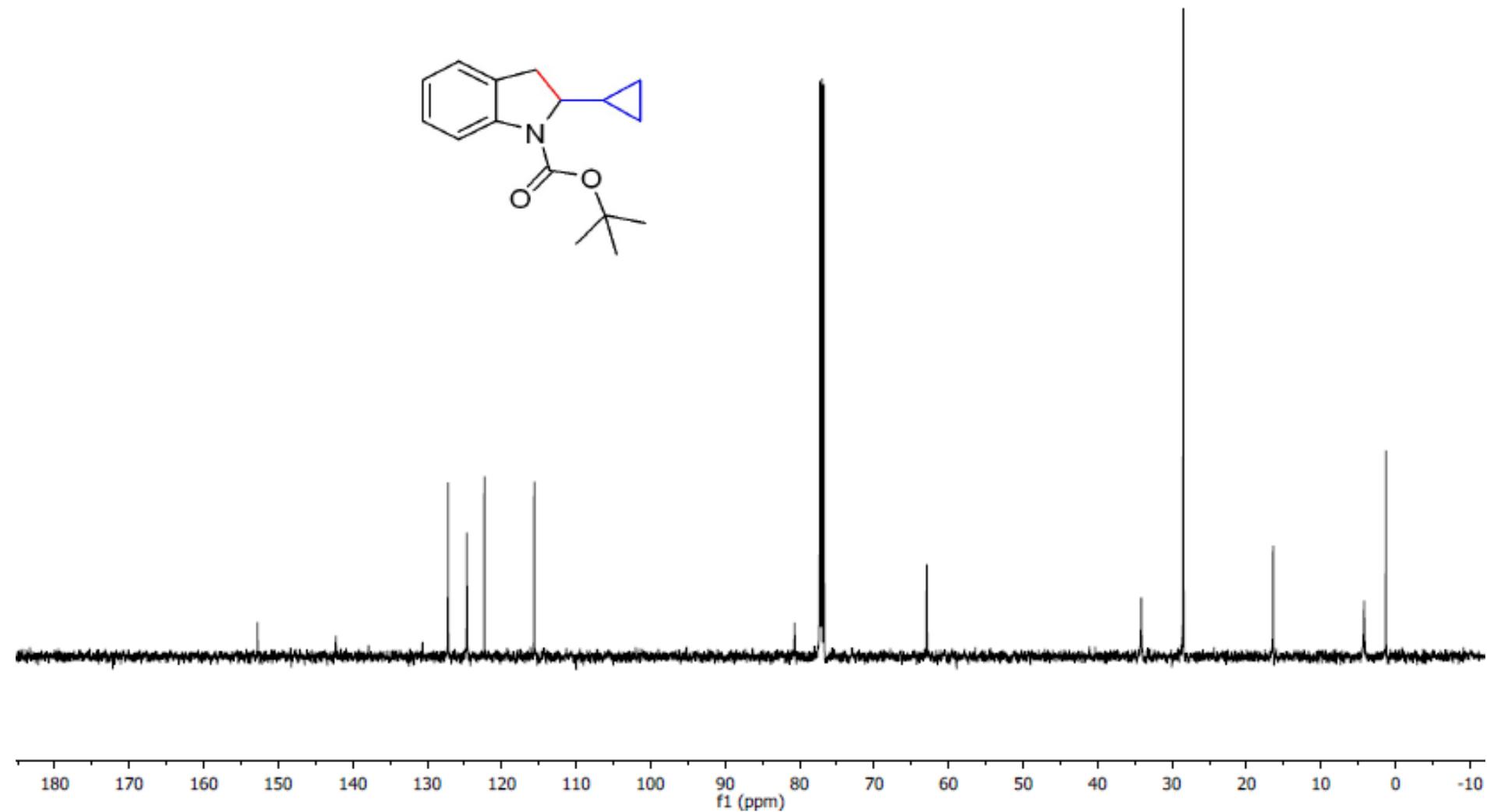
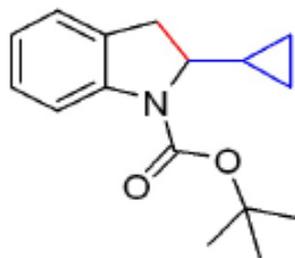
— 34.14

— 28.49

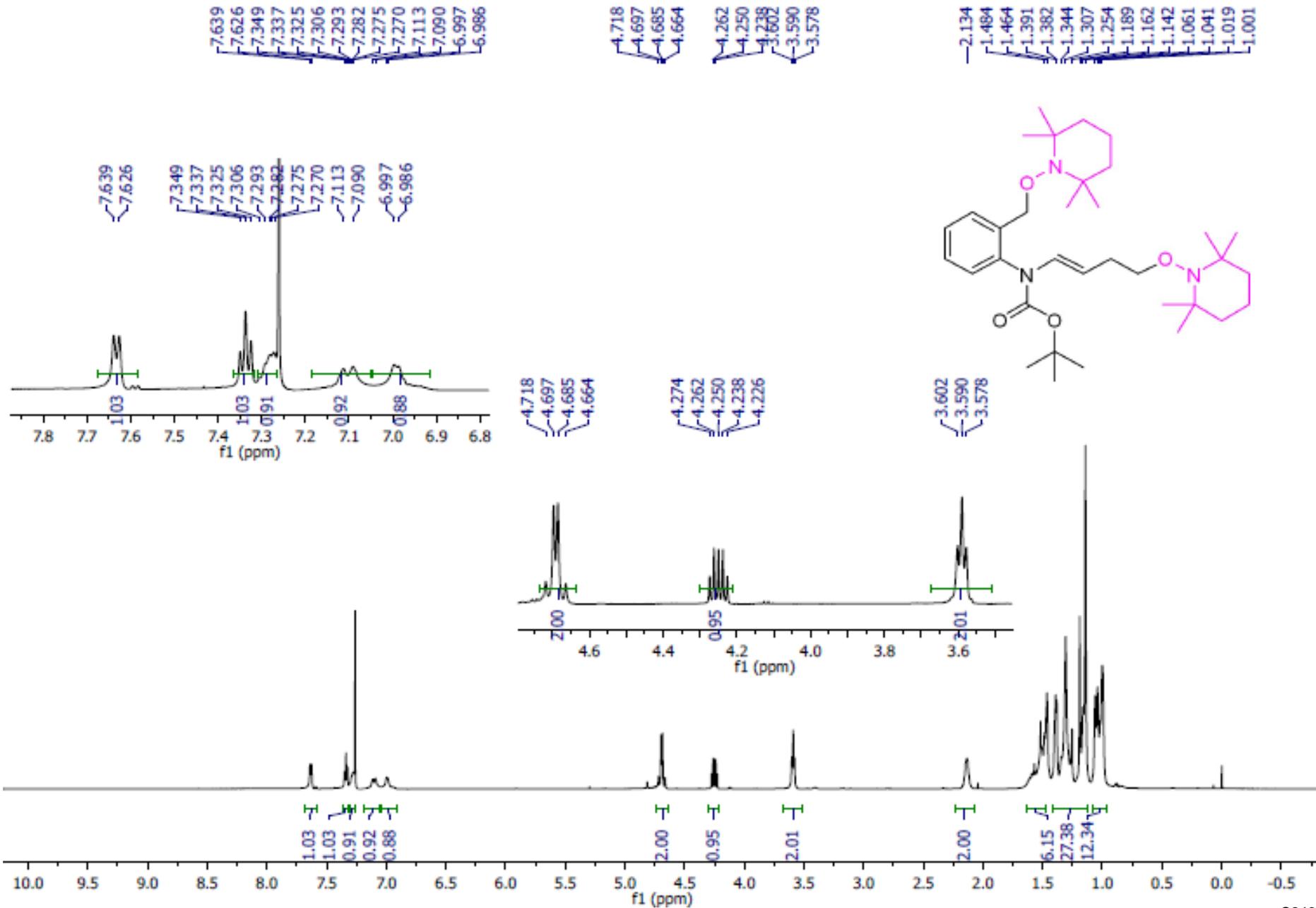
— 16.43

— 4.22

— 1.29



***tert*-butyl (4-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)but-1-en-1-yl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3v**

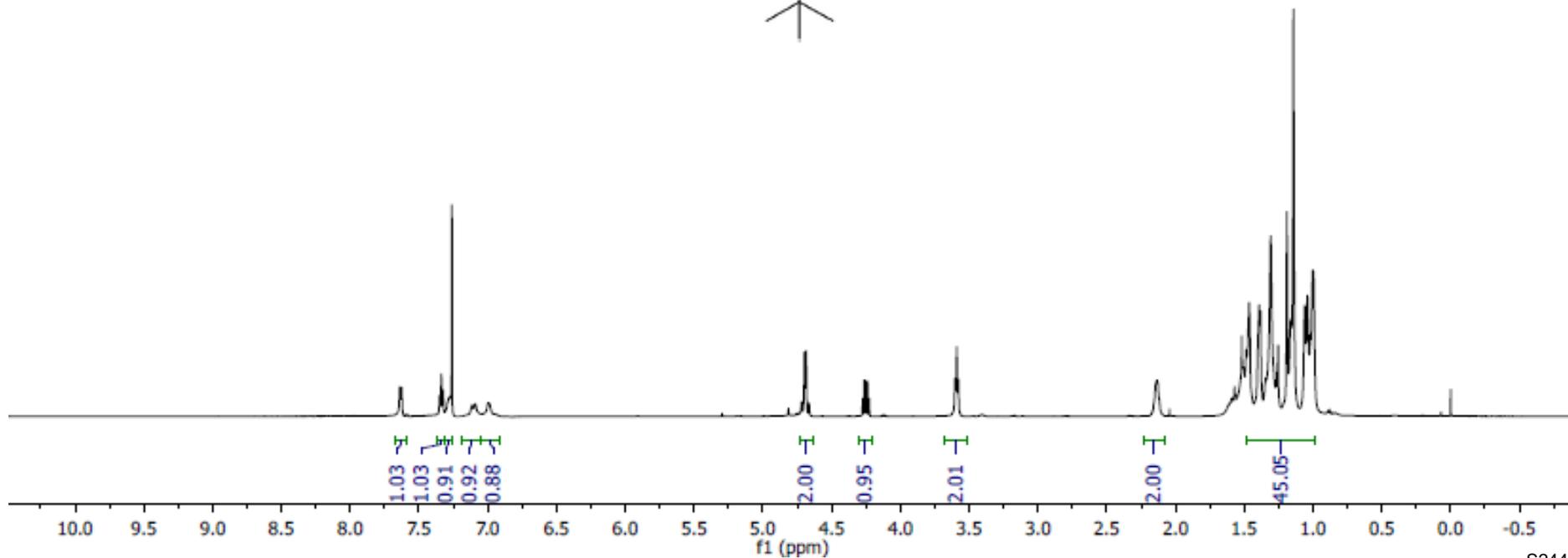
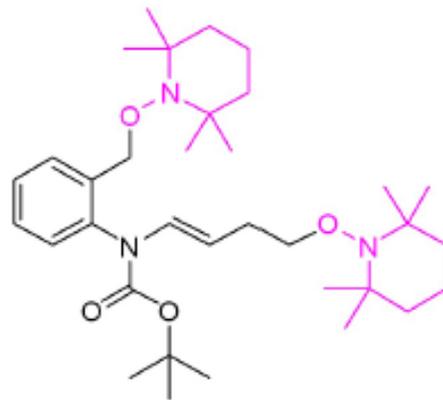


***tert*-butyl (4-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)but-1-en-1-yl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3v**

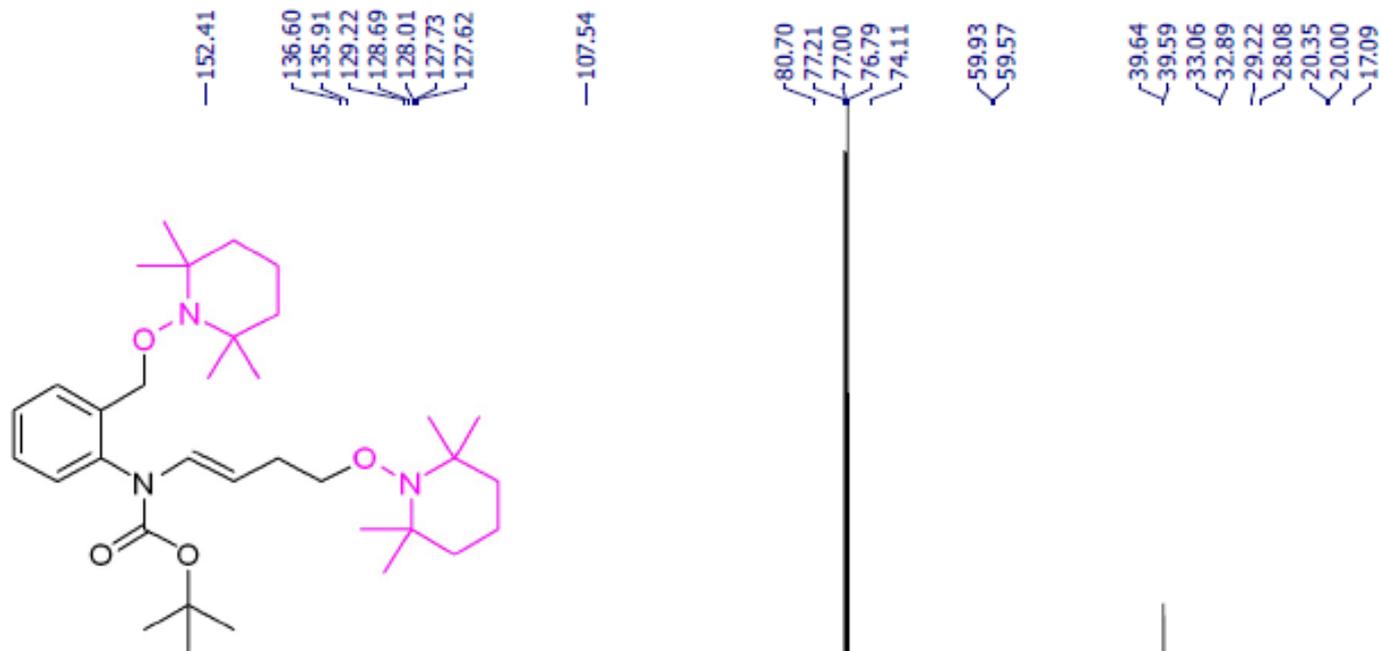
7.639
7.626
7.349
7.337
7.325
7.306
7.293
7.282
7.275
7.270
7.113
7.090
6.997
6.986

4.718
4.697
4.685
4.664
4.262
4.250
4.238
3.602
3.590
3.578

2.134
1.484
1.464
1.391
1.382
1.344
1.307
1.254
1.189
1.162
1.142
1.061
1.041
1.019
1.001



***tert*-butyl 4-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)but-1-en-1-yl)(2-(((2,2,6,6-tetramethylpiperidin-1-yl)oxy)methyl)phenyl)carbamate 3v**



152.41, 136.60, 135.91, 129.22, 128.69, 128.01, 127.73, 127.62, 107.54, 80.70, 77.21, 77.00, 76.79, 74.11, 59.93, 59.57, 39.64, 39.59, 33.06, 32.89, 29.22, 28.08, 20.35, 20.00, 17.09

