Supporting Information

Chemical Fixation of CO_2/CS_2 to Access Iodoallenyl Oxazolidinones and Allenyl Thiazolidine-Thiones

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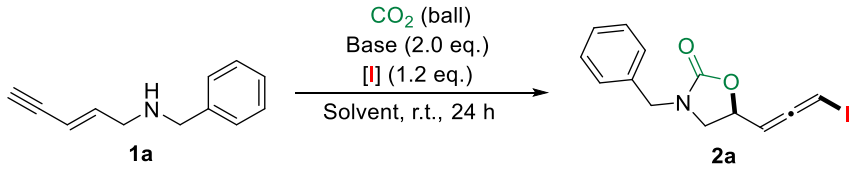
1 General Remarks

Unless otherwise noted, all commercially available reagents and solvents were used without further additional purification. Thin layer chromatography was performed using precoated silica gel plates and visualized with UV light at 254 nm. Flash column chromatography was performed with silica gel (40-60 μm). ^{1}H and ^{13}C nuclear magnetic resonance spectra (NMR) were obtained on a Bruker Avance II 400 MHz, Bruker Avance III 500 MHz or Bruker Avance NEO 600MHz recorded in ppm (δ) downfield of TMS (δ = 0) in $CDCl_3$ unless noted otherwise. Signal splitting patterns were described as singlet (s), doublet (d), triplet(t), quartet (q), quintet (quint), or multiplet (m), with coupling constants (*J*) in hertz (Hz). High resolution mass spectra (HRMS) were performed by an Agilent apparatus (TOF mass analyzer type) on an Electron Spray Injection (ESI) mass spectrometer. Melting points were determined by an XP-4 melting point apparatus.

2 Optimization Studies

Table S1. Optimization of reaction conditions for iodoallenyl oxazolidinone [a]

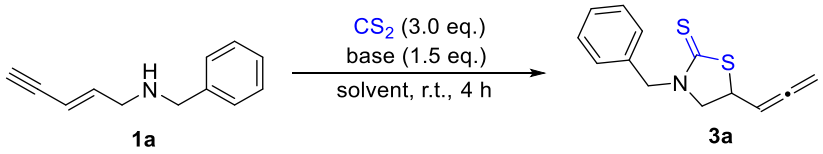


1a 2a

Entry	Base	Solvent	Yield[b] (%)	d.r.
1	DBU	$CHCl_3$	28	1:1
2	TBD	$CHCl_3$	48	3:1
3	DABCO	$CHCl_3$	n.d.	-
4	TMEDA	$CHCl_3$	n.d.	-
5	Cs_2CO_3	$CHCl_3$	12	4:1
6	^{t}BuOK	$CHCl_3$	n.d.	-
7	TBD	DCM	10	3:1
8	TBD	DCE	8	3:1
9	TBD	MeCN	8	3:1
10	TBD	DME	n.d.	-
11	TBD	THF	42	3:1
12	TBD	1,4-Dioxane	51	9:1
13	TBD	EtOH	43	1.6:1
14	TBD	DMF	mixture	-
15	TBD	DMSO	mixture	-
16	TBD	Toluene	70	13:1
17	TBD	*p*-xylene	72	10:1
18	TBD	*m*-xylene	65	11:1
19	TBD	*o*-xylene	68	8:1
20	TBD	PhCl	61	5:1
21	TBD	Tol/ *p*-xylene (1:1)	70	7:1
22	TBD	Tol/ *m*-xylene (1:1)	72	10:1
23	TBD	Tol/1,4-Dioxane (1:1)	71	13:1
24	TBD	Tol/1,4-Dioxane (2:1)	71	15:1
25	**TBD**	**Tol/1,4-Dioxane (4:1)**	**73[c]**	**16:1**
26	TBD	Tol/1,4-Dioxane (1:2)	70	13:1
27	TBD	Tol/1,4-Dioxane (1:4)	65	13:1
28[d]	TBD	Tol/1,4-Dioxane (4:1)	67	5:1
29[e]	TBD	Tol/1,4-Dioxane (4:1)	70	7:1

[a] Reaction conditions: **1a** (0.1 mmol), base (0.2 mmol) and solvent (2 mL) were stirred for 10 min under CO_2 atmosphere (1 atm), and then NIS (0.12 mmol) was added and the mixture was stirred for 24 h at room temperature with CO_2 ballon. [b] Yield was determined by ^{1}H NMR spectroscopy with dimethyl terephthalate as the internal standard, [c] Isolated yield, [d] I_2 instead of NIS, [e] DIH instead of NIS.

Table S2. Optimization of reaction conditions for allenyl thiazolidine-2-thione [a]

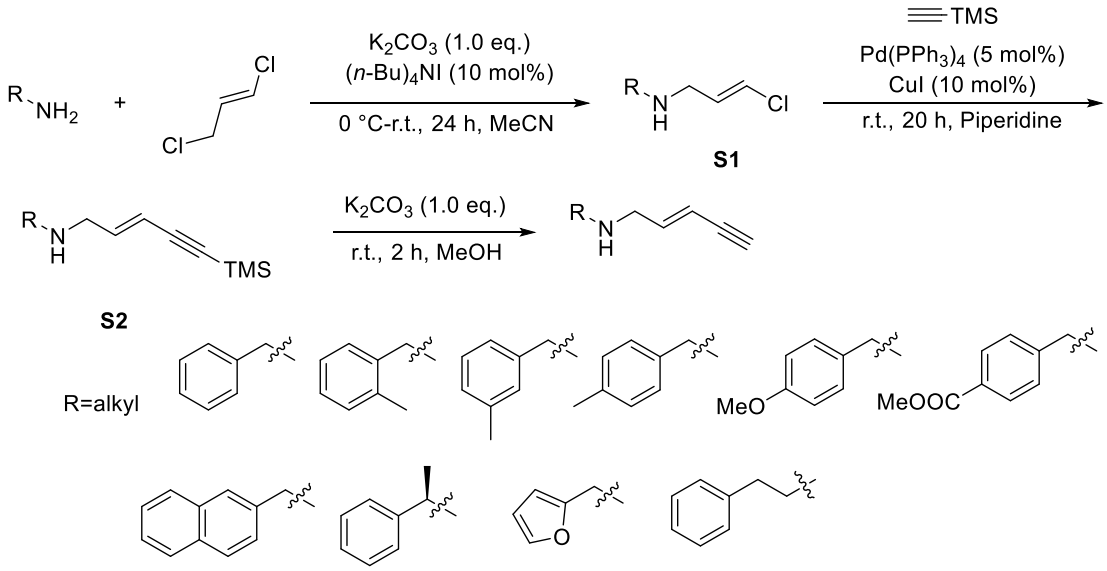


Entry	Base	Solvent	Yield[b] (%)
1	-	$CHCl_3$	Trace
2	DBU	$CHCl_3$	90
3	**TBD**	**$CHCl_3$**	**96(93 [e])**
4	DABCO	$CHCl_3$	78
5	Cs_2CO_3	$CHCl_3$	61
6	TBD	DCM	84
7	TBD	DCE	86
8	TBD	MeCN	68
9	TBD	THF	57
10	TBD	1,4-Dioxane	63
11	TBD	EtOH	65
12	TBD	DMF	81
13	TBD	DMSO	55
14	TBD	Toluene	73
15 [c]	TBD	$CHCl_3$	86
16 [d]	TBD	$CHCl_3$	68

[a] Reaction conditions: **1a** (0.1 mmol), base (0.15 mmol), CS_2 (0.3 mmol) and solvent (1 mL) were stirred for 4 h at room temperature, [b] Yield was determined by ^1H NMR spectroscopy with dimethyl terephthalate as the internal standard, [c] 1.0 eq. TBD was used, [d] 0.2 eq. TBD was used, [e] Isolated yield.

3 General procedure for the preparation of substrates

3.1 General procedure A [1]

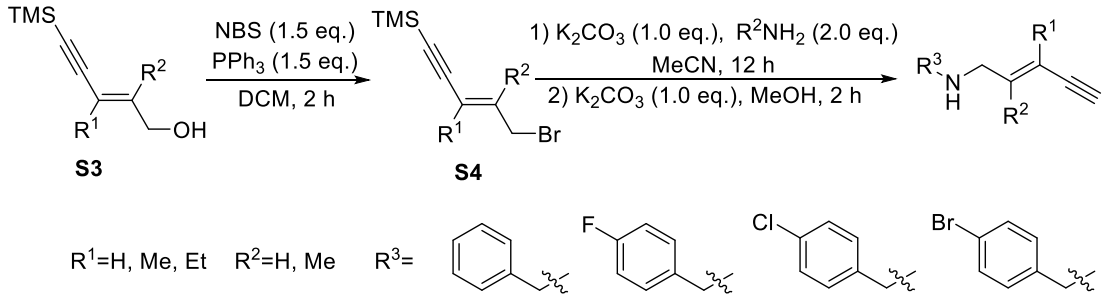


The amine (20 mmol, 2.0 eq.), K_2CO_3 (10 mmol, 1.0 eq.) and $(n\text{-}Bu)_4NI$ (1 mmol, 0.1 eq.) was added to MeCN (25 mL), and the solution was cooled to 0 ℃. 1,3-Dichloropropene (10 mmol, 1.0 eq.) was added dropwise over 10 minutes at the same temperature. The reaction mixture was allowed to warm to room temperature and stirred for 24 h. The mixture was filtered and concentrated in vacuo. The crude material was then purified by column chromatography on silica gel with petroleum ether/ethyl acetate to afford the expected product **S1**.

To a suspension of **S1** (3 mmol, 1.0 eq.) $Pd(PPh_3)_4$ (0.15 mmol, 0.05 eq.), CuI (0.3 mmol, 0.1 eq.) in piperidine (6 mL) was added alkyne (3.3 mmol, 1.1 eq.) and the mixture was stirred for 20 h at room temperature. Saturated NH_4Cl aqueous solution (50 mL) was added and the aqueous phase was extracted with EtOAc (3 x 30 mL). The combined organic phases were washed with brine, dried over Na_2SO_4 and concentrated under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded **S2**.

S2 (1 mmol, 1.0 eq.) was dissolved in MeOH and K_2CO_3 was added (1 mmol, 1.0 eq.). The reaction mixture was stirred for 2 h at room temperature, quenched with NH_4Cl and the layers were separated. The aqueous phase was extracted with EtOAc (3 x 15 mL) and the combined organic phases were washed with water, brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded the corresponding product.

3.2 General procedure B [2]



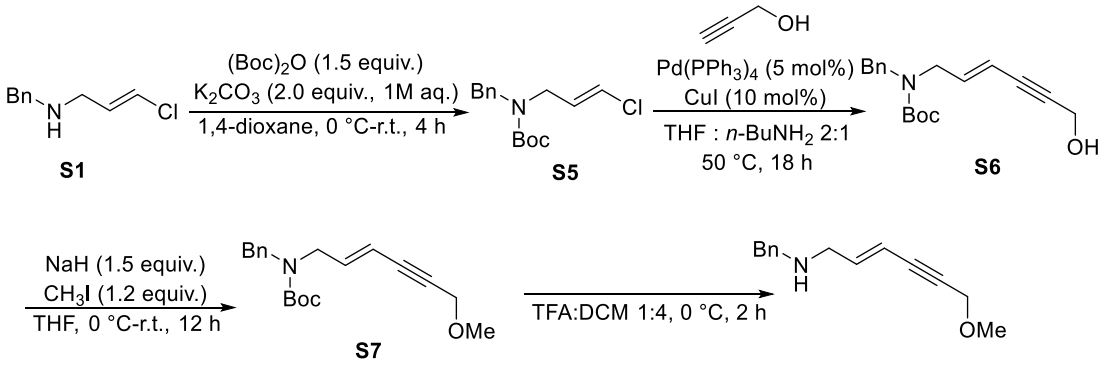
S3 (5 mmol, 1.0 eq.) and PPh_3 (7.5 mmol, 1.5 eq.) were dissolved in DCM (20 mL), and NBS (7.5 mmol, 1.5 eq.) was added and stirred at room temperature for 2 h. After filtration through a short pad of silica the solvent was removed *in vacuu* and the residue was purified by column chromatography with petroleum ether/ethyl acetate afforded **S4**.

The amine (4 mmol, 2.0 eq.) and K_2CO_3 (2 mmol, 1.0 eq.) were added to MeCN (20 mL), and the solution was cooled to 0 ℃. **S4** (2 mmol, 1.0 eq.) was added dropwise over 10 min at the same temperature. The reaction mixture was allowed to warm to room temperature and stirred for 12 h. The mixture was filtered and concentrated in vacuo. The crude material was then purified by column chromatography on silica gel with petroleum ether/ethyl acetate to afford the expected product **S2**.

S2 (1 mmol, 1.0 eq.) was dissolved in MeOH and K_2CO_3 was added (1 mmol, 1.0 eq.). The reaction mixture was stirred for 2 h at room temperature, quenched with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with

EtOAc (3 x 15 mL) and the combined organic phases were washed with water, brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded the corresponding product.

3.3 General procedure C



S1 (10 mmol, 1.0 eq.) was dissolved in 1,4-dioxane (30 mL) and K_2CO_3 (20 mL, 1 M aq.) was added. The solution was cooled to 0 ℃, $(Boc)_2O$ (15 mmol, 1.5 eq.) was added dropwise over 10 min at the same temperature. The reaction mixture was allowed to warm to room temperature and stirred for 4 h. Evaporate the solvent and add 30 mL of water to the reaction mixture. The aqueous phase was extracted with EtOAc (3 x 30 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded **S5**.

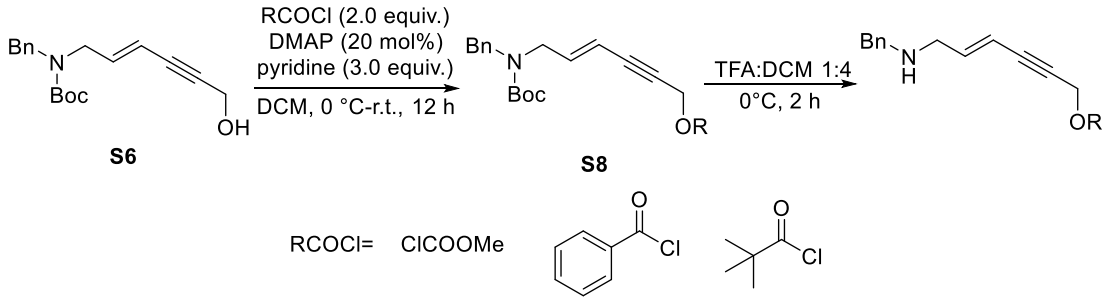
To a suspension of **S5** (3 mmol, 1 eq.) $Pd(PPh_3)_4$ (0.15 mmol, 0.05 eq.), CuI (0.3 mmol, 0.1 eq.) and *n*-$BuNH_2$ (6 mL) in THF (12 mL) was added propargyl alcohol (6 mmol, 2.0 eq.) and the mixture was stirred for 18 h at room temperature. Saturated NH_4Cl aqueous solution (40 mL) was added and the aqueous phase was extracted with EtOAc (3 x 30 mL). The combined organic phases were washed with H_2O, brine, dried over Na_2SO_4 and concentrated under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded the **S6**.

S6 (2 mmol, 1.0 eq.) was dissolved in THF (10 mL) and the solution was cooled to 0 ℃. Sodium hydride was added in portions and stirred for 30 min. CH_3I (2.4 mmol, 1.2 eq.) was added dropwise over 10 min at the same temperature and the reaction mixture was allowed to warm to room temperature and stirred for 12 h. Quenched with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with EtOAc (3 x 20 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded **S7**.

S7 (1 mmol, 1.0 eq.) was dissolved in DCM (8 mL) and the solution was cooled to 0 ℃. TFA (2 mL) was added and stirred for 2 h at the same temperature. Evaporate the solvent and add 15 mL of water to the reaction mixture and increase pH to 10 with saturated sodium carbonate aqueous. The aqueous phase was extracted with DCM (3 x 15 mL) and the combined organic phases were washed with brine and dried with

Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded the corresponding product.

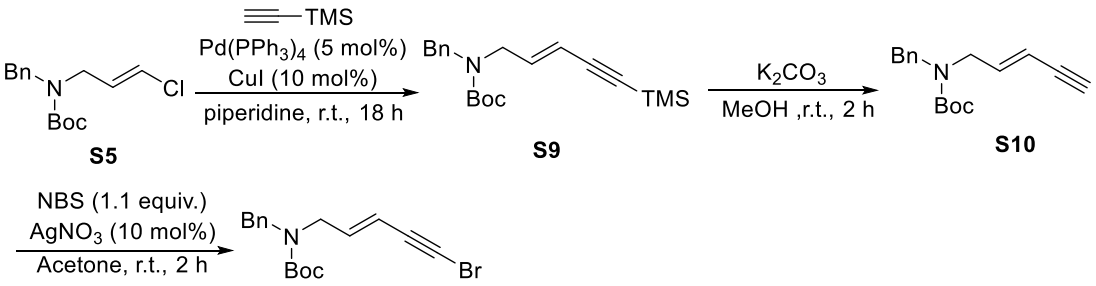
3.4 General procedure D



S6 (2 mmol, 1.0 eq.), pyridine (6 mmol, 3.0 eq.) and DMAP (0.4 mmol, 0.2 eq.) was dissolved in DCM (5 mL) and the solution was cooled to 0 ℃. Then Ac_2O (4 mmol, 2.0 eq.) was added, the reaction mixture was allowed to warm to room temperature and stirred for 12 h. Quenched with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with DCM (3 x 20 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded **S8**.

S8 (1 mmol, 1.0 eq.) was dissolved in DCM (8 mL) and the solution was cooled to 0 ℃. TFA (2 mL) was added and stirred for 2 h at the same temperature. Evaporate the solvent and add 15 mL of water to the reaction mixture and increase pH to 10 with saturated sodium carbonate aqueous. The aqueous phase was extracted with DCM (3 x 15 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded the corresponding product.

3.5 General procedure E



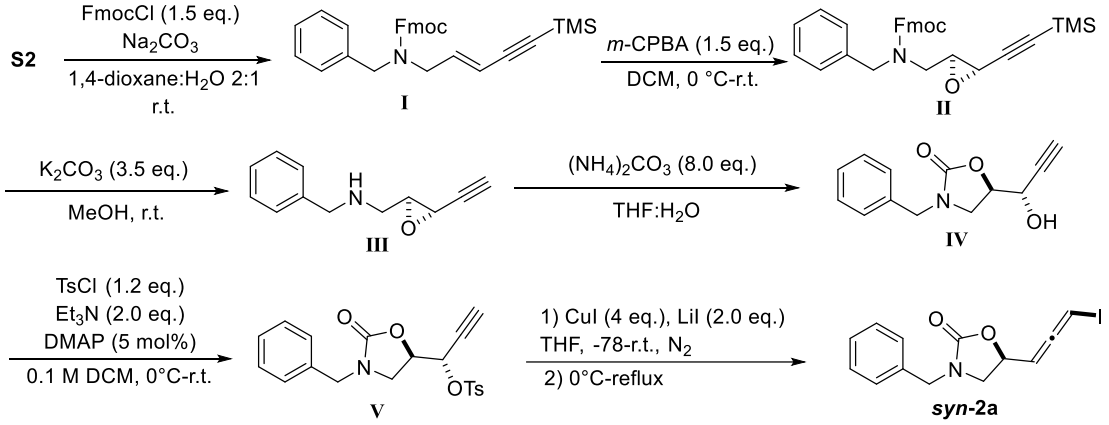
Synthesis of **S10** follows general procedure A.

S10 (1 mmol, 1.0 eq.) and $AgNO_3$ (0.1 mmol, 0.1 eq.) was dissolved in acetone and NBS was added (1.1 mmol, 1.1 eq.). The reaction mixture was stirred for 2 h at room temperature, quenched with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with EtOAc (3 x 15 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed

under reduced pressure. Purification by silica gel column chromatography with petroleum ether/ethyl acetate afforded the corresponding product.

4 Confirmation of the relative stereochemistry of 2a

To assign the relative stereochemistry of the products and hence the mode of 1,4-addition (i.e., *syn*- versus *anti*-), the *syn*-**2a** was synthesized based on slightly modified methods from the literature.[3-5] By comparing the results we concluded that (*E*)-enynes underwent highly selective *syn*-1,4-addition to give products.



S2 (2 mmol, 1.0 eq.) was dissolved in 1,4-dioxane (10 mL) and K_2CO_3 (5 mL, 1 M aq.) was added. The solution was cooled to 0 ℃, FmocCl (3 mmol, 1.5 eq.) was added over 10 min at the same temperature. The reaction mixture was allowed to warm to room temperature and stirred for 12 h. Evaporate the solvent and add 20 mL of water to the reaction mixture. The aqueous phase was extracted with EtOAc (3 x 20 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography (eluent: petroleum ether/ethyl acetate = 20: 1) afforded **I** (865 mg, 93%) as a yellow oil.

To a DCM solution (10 ml) of fmoc-protected substrate I (1.83 mmol, 1.0 eq.) was added *m*-chloroperbenzoic acid (2.74 mmol, 1.5 eq., 85% purity) at 0 ℃ and the mixtures were stirred at room temperature for 12 h. The resulting solution was quenched with $NaHCO_3$ solution, extracted with EtOAc (3 x 20 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by Et_3N-pretreated silica gel column chromatography (eluent: petroleum ether/ethyl acetate = 15: 1) afforded *trans*-epoxyamine **II** (554 mg, 63%) as a yellow oil.

II (1.1 mmol, 1 eq.) was dissolved in MeOH and K_2CO_3 (3.85 mmol, 3.5 eq.) was added. The reaction mixture was stirred for 8 h at room temperature, quenched with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with EtOAc (3 x 20 mL) and the combined organic phases were washed with water, brine and dried with Na_2SO_4. The solvent was removed under reduced

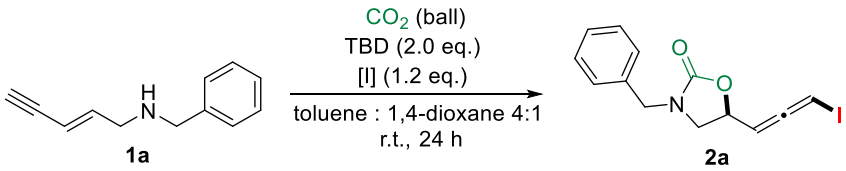
pressure. Purification by silica gel column chromatography (eluent: dichloromethane/ethyl acetate = 4: 1) afforded **III** (153 mg, 74%) as a yellow oil.

To a solution of *trans*-epoxyamine **III** (0.8 mmol, 1.0 eq.) in THF/water (4:1, 20 mL) was added $(NH_4)_2CO_3$ (6.4 mmol, 8.0 eq.), and the heterogeneous mixture was vigorously stirred at room temperature for 18 h. The THF was then evaporated under reduced pressure and the resulting aqueous phase extracted with EtOAc (3 x 30 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography (eluent: petroleum ether/ethyl acetate = 1: 1) afforded *anti*-**IV** (126 mg, 68%, dr 15:1) as a colorless oil.

IV (0.5 mmol, 1.0 eq.), Et_3N (1 mmol, 2.0 eq.) and DMAP (0.025 mmol, 0.05 eq.) was dissolved in DCM (3 mL) and the solution was cooled to 0 ℃. Then TsCl (0.6 mmol, 1.2 eq.) was added, the reaction mixture was allowed to warm to room temperature and stirred for 12 h. Quenched with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with DCM (3 x 15 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography (eluent: petroleum ether/ethyl acetate = 1: 1) afforded *anti*-**V** (181 mg, 94%) as a white solid.

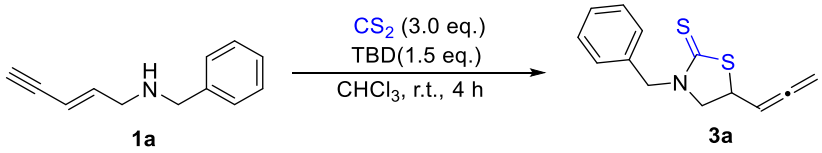
In a glovebox, to a Schlenk flask equipped with a stir bar and charged with CuI (1.8 mmol, 4 eq.) was added THF (1 M). LiI (0.9 mmol, 2 eq.) and THF (0.6 M) were added to a separate vial. The Schlenk flask and vial were sealed, removed from the glovebox, and placed under an N_2 atmosphere. The CuI suspension was cooled to -78 ℃. The LiI solution was transferred into the Schlenk flask. The mixture was stirred at -78 ℃ for 30 min and then stirred at room temperature for 30 min. The resulting cuprate solution was cooled to 0 ℃. A solution of *anti*-**V** (0.45 mmol, 1.0 eq.) in THF (0.3 M) was added dropwise *via* syringe to the cuprate solution. The reaction proceeded with stirring at reflux for 1.5 h. After cooling the resulting mixture to room temperature, quenched with saturated NH_4Cl aqueous/$NH_3 \cdot H_2O$ (1: 1) and the layers were separated. The aqueous phase was extracted with EtOAc (3 x 15 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography (eluent: dichloromethane/ethyl acetate = 20: 1) afforded *syn*-**2a** (70 mg, 46%) as a yellow oil.

5 Representative procedures for the synthesis of iodoallenyl oxazolidinone



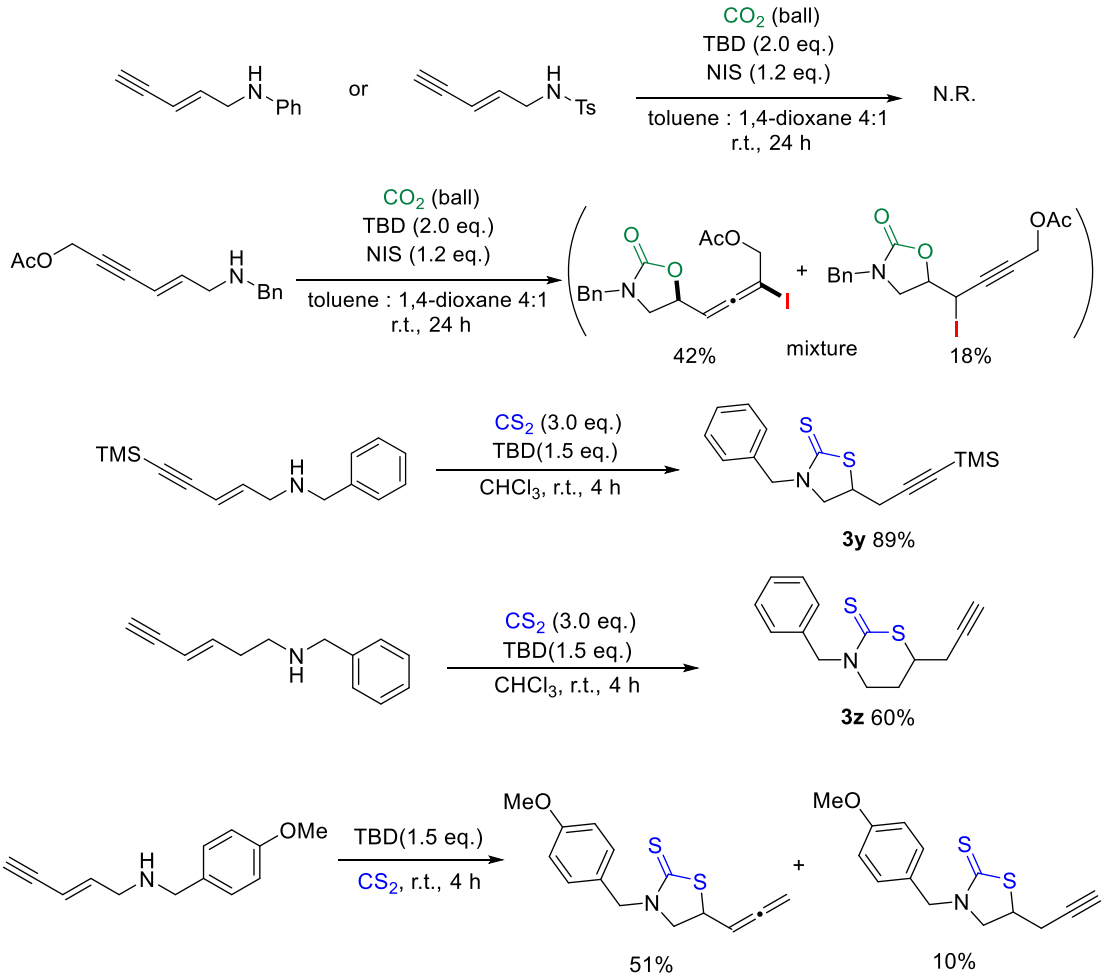
To an oven dried vial was added **1a** (17.1 mg, 0.1 mmol, 1.0 eq.uiv) and TBD (27.9 mg, 0.2 mmol, 2.0 eq.) in toluene:1,4-dioxane (2 mL, 4:1). The mixture was then stirred under CO_2 atmosphere (1 atm) at room temperature for 10 min. Then NIS (27 mg, 0.12 mmol, 1.2 eq.) was added and the mixture was stirred for 24 h with CO_2 ballon. The reaction was then quenched with saturated $Na_2S_2O_3$ (10 mL). The mixture was then extracted with EtOAc (3 × 10mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure and the residue was then purified by column chromatography (eluent: petroleum ether/ethyl acetate = 3: 1) to afford the pure product **2a** (24.9 mg, 73%) as a yellow sticky oil.

6 Representative procedures for the synthesis of allenyl thiazolidine-2-thione



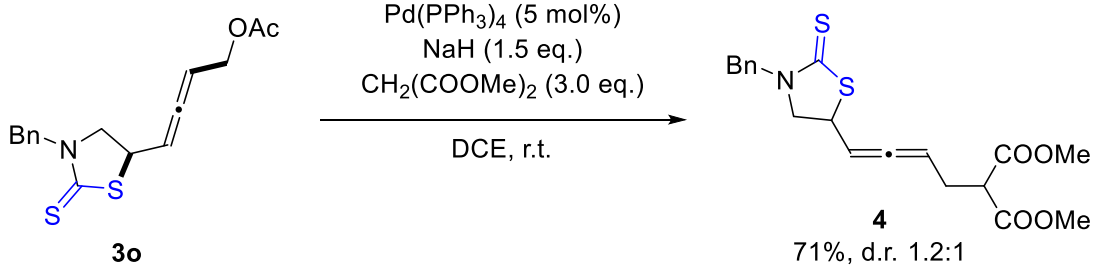
To an oven dried vial containing **1a** (17.1 mg, 0.1 mmol, 1.0 eq.uiv) and TBD (21.0 mg, 0.15 mmol, 1.5 eq.) in $CHCl_3$ (1 mL) was added CS_2 (22.8 mg, 0.3 mmol, 3.0 eq.). The mixture was stirred for 4 h at room temperature. The solvent was removed under reduced pressure and the residue was then purified by column chromatography (eluent: petroleum ether/ethyl acetate = 5: 1) to afford the pure product **3a** (23.0 mg, 93%) as a light yellow solid.

7 Examples of failed conversions



8 Procedures for the post-modification of products

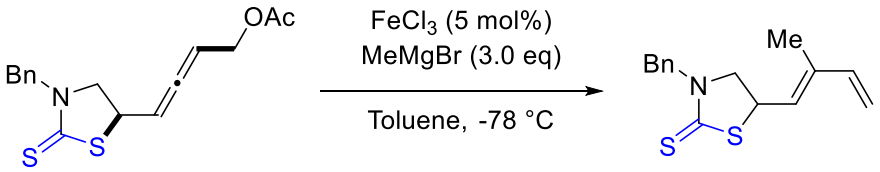
8.1 Preparation of dimethyl 2-(4-(3-benzyl-2-thioxothiazolidin-5-yl)-buta-2,3-dien-1-yl) malonate (4)[6]



To an oven dried Schlenk flask were added $Pd(PPh_3)_4$ (8.7 mg, 0.0075 mmol, 0.05 eq.uiv), **3o** (47.9 mg, 0.15 mmol, 1.0 eq.uiv), dimethyl malonate (59.4 mg, 0.45

mmol, 3.0 eq.uiv), DCE (2 mL), and NaH (60% dispersion in mineral oil, 9 mg, 0.225 mmol, 1.5 eq.uiv) seq.uentially under N_2. After 12 h, the reaction was complete as monitored by TLC and quenched subseq.uently by 10 mL of water, and the resulting mixture was extracted with EtOAc (10 mL × 3). The combined organic layer was washed with brine (10 mL), dried with $NaSO_4$, filtered, and concentrated under vacuum. The mixture was purified with chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 3: 1) to give the pure product **4** (41.6 mg, 71%) as a colorless oil.

8.2 Preparation of (E)-3-benzyl-5-(2-methylbuta-1,3-dien-1-yl)thiazolidine-2-thione (5)[7]

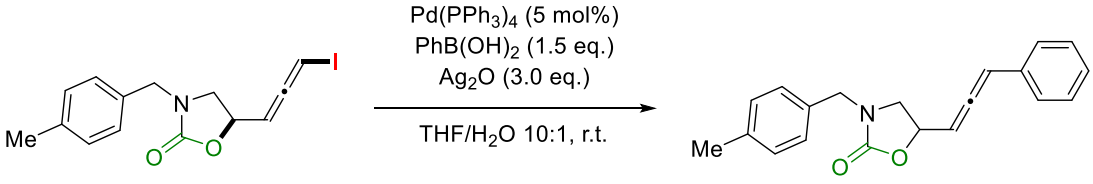


3o **5**

65%, d.r. 9:1

To an oven dried Schlenk flask were added $FeCl_3$ (1.2 mg, 0.0075 mmol, 0.05 eq.uiv), **3o** (47.9 mg, 0.15 mmol, 1.0 eq.uiv), and toluene (2 mL) seq.uentially under a N_2 atmosphere at room temperature. A solution of methyl magnesium bromide (1.0 M in THF, 0.45 mL, 3.0 eq.uiv) was then added with a syringe to the reaction mixture within 5 min at -78 °C. After 4 h, the reaction was complete as monitored by TLC and quenched subseq.uently by dropwise addition of saturated NH_4Cl aqueous (1 mL) at -78 °C. After warming up to room temperature and extraction with EtOAc (3 × 15 mL), the organic layer was washed seq.uentially with diluted HCl (5%, aq.), a saturated aqueous solution of water, $NaHCO_3$, and brine. After being dried over anhydrous Na_2SO_4, filtered, and concentrated under vacuum. The mixture was purified with chromatography on silica gel (eluent: petroleum ether/ethyl acetate = 5: 1) to give the pure product **5** (26.8 mg, 65%) as a light yellow solid.

8.3 Preparation of 3-(4-methylbenzyl)-5-(3-phenylpropa-1,2-dien-1-yl)oxazolidin-2-one (6)[8]



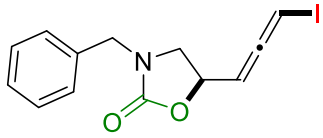
2d **6**

67%, d.r. 4.5:1

To an oven dried vial were added Ag_2O (88 mg, 0.41 mmol), $PhB(OH)_2$ (25.6 mg, 0.21 mmol) and **2d** (49.6 mg, 0.14 mmol) in THF (3.0 mL). Degassed DI H_2O (0.3 mL) was added and the solution was stirred at room temperature for 2 h. Quenched

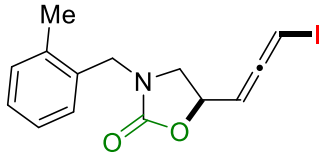
with saturated NH_4Cl aqueous and the layers were separated. The aqueous phase was extracted with EtOAc (3 x 20 mL) and the combined organic phases were washed with brine and dried with Na_2SO_4. The solvent was removed under reduced pressure. Purification by silica gel column chromatography with petroleum (eluent: petroleum ether/ethyl acetate = 5: 1) afforded **6** (28.6 mg, 67%) as a yellow sticky oil.

9 Characterization data of products



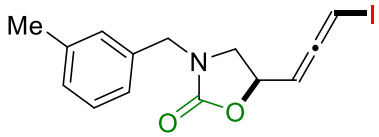
***syn*-3-Benzyl-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2a)**

25.1 mg, 73% yield, d.r. 16:1, yellow sticky oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.31 (m, 3H), 7.30 – 7.27 (m, 2H), 5.89 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.22 (t, *J* = 5.8 Hz, 1H), 5.09 – 4.99 (m, 1H), 4.46 (d, *J* = 15.0 Hz, 1H), 4.40 (d, *J* = 15.0 Hz, 1H), 3.58 (t, *J* = 8.7 Hz, 1H), 3.27 (dd, *J* = 8.9, 5.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.5, 157.2, 135.5, 128.9, 128.2, 128.1, 93.9, 68.9, 48.4, 48.3, 38.7. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{12}INNaO_2^+$ $(M+Na)^+$ 363.9805, found 363.9806.



***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-(2-methylbenzyl)oxazolidin-2-one (2b)**

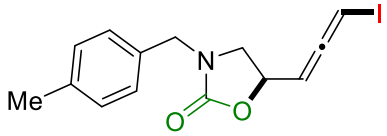
29.8 mg, 84% yield, d.r. >20:1, yellow sticky oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25 – 7.17 (m, 4H), 5.88 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.22 (t, *J* = 5.8 Hz, 1H), 5.08 – 4.98 (m, 1H), 4.48 (d, *J* = 14.9 Hz, 1H), 4.42 (d, *J* = 14.9 Hz, 1H), 3.53 (t, *J* = 8.7 Hz, 1H), 3.22 (dd, *J* = 9.0, 5.6 Hz, 1H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 204.4, 156.8, 136.9, 133.3, 130.8, 129.0, 128.3, 126.3, 94.0, 68.9, 48.5, 46.4, 38.6, 19.1. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9973.



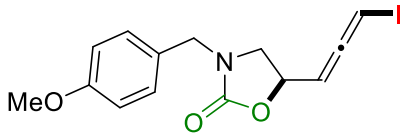
***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-(3-methylbenzyl)oxazolidin-2-one (2c)**

31.1 mg, 87% yield, d.r. 18:1, yellow sticky oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25 (t, *J* = 7.5 Hz, 1H), 7.15 – 7.05 (m, 3H), 5.89 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.23 (t, *J* = 5.8 Hz, 1H), 5.01 – 5.06 (m, 1H), 4.41 (d, *J* = 14.8, 1H), 4.37 (d, *J* = 14.8, 1H), 3.58 (t, *J* = 8.7 Hz, 1H), 3.27 (dd, *J* = 8.9, 5.6 Hz, 1H), 2.36 (s, 3H). 13C NMR (101 MHz,

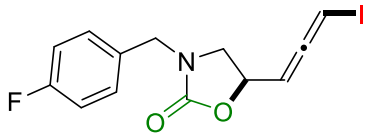
CDCl3) δ 204.5, 157.1, 138.7, 135.5, 128.9, 128.8(3), 128.7(8), 125.2, 94.0, 68.9, 48.4, 48.3, 38.6, 21.4. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9973.



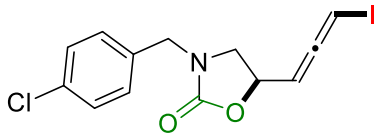
***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-(4-methylbenzyl)oxazolidin-2-one (2d)**
28.1 mg, 79% yield, d.r. >20:1, yellow sticky oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.17 (s, 4H), 5.89 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.22 (t, *J* = 5.8 Hz, 1H), 5.02 (dtd, *J* = 7.8, 5.7, 1.8 Hz, 1H), 4.41 (d, *J* = 14.8 Hz, 1H), 4.37 (d, *J* = 14.8 Hz, 1H), 3.56 (t, *J* = 8.7 Hz, 1H), 3.26 (dd, *J* = 9.0, 5.6 Hz, 1H), 2.35 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.5, 157.1, 137.8, 132.5, 129.6, 128.2, 94.0, 68.9, 48.3, 48.0, 38.6, 21.1. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9973.



***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-(4-methoxybenzyl)oxazolidin-2-one (2e)**
25.1 mg, 67% yield, d.r. >20:1, yellow sticky oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.21 (d, *J* = 8.6 Hz, 2H), 6.89 (d, *J* = 8.6 Hz, 2H), 5.90 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.22 (t, *J* = 5.8 Hz, 1H), 5.06 – 4.98 (m, 1H), 4.39 (d, *J* = 14.7 Hz, 1H), 4.35 (d, *J* = 14.7 Hz, 1H), 3.81 (s, 3H), 3.56 (t, *J* = 8.7 Hz, 1H), 3.25 (dd, *J* = 9.0, 5.6 Hz, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.5, 159.4, 157.1, 129.8, 129.6, 127.6, 114.3, 114.2, 94.0, 68.8, 55.3, 48.3, 47.7, 38.6. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_3^+$ $(M+Na)^+$ 393.9916, found 393.9920.

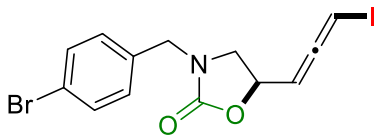


***syn*-3-(4-Fluorobenzyl)-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2f)**
31.9 mg, 89% yield, d.r. >20:1, yellow sticky oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.29 – 7.25 (m, 2H), 7.05 (t, *J* = 8.6 Hz, 2H), 5.93 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.23 (t, *J* = 5.8 Hz, 1H), 5.09 – 5.00 (m, 1H), 4.43 (d, *J* = 14.9 Hz, 1H), 4.38 (d, *J* = 14.9 Hz, 1H), 3.58 (t, *J* = 8.7 Hz, 1H), 3.27 (dd, *J* = 8.9, 5.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.5, 162.5 (d, *J* = 246.8 Hz), 157.1, 131.4 (d, *J* = 3.3 Hz), 129.9 (d, *J* = 8.1 Hz), 115.8 (d, *J* = 21.6 Hz), 93.9, 68.9, 48.4, 47.6, 38.7. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{11}IFNNaO_2^+$ $(M+Na)^+$ 381.9716, found 381.9720.



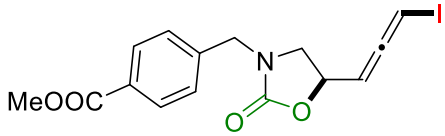
***syn*-3-(4-Chlorobenzyl)-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2g)**

33.7 mg, 90% yield, d.r. 15:1, yellow sticky oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.32 (m, 2H), 7.23 (d, *J* = 8.5 Hz, 2H), 5.94 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.23 (t, *J* = 5.8 Hz, 1H), 5.09 – 4.99 (m, 1H), 4.43 (d, *J* = 15.0 Hz, 1H), 4.37 (d, *J* = 15.0 Hz, 1H), 3.58 (t, *J* = 8.6 Hz, 1H), 3.26 (dd, *J* = 8.9, 5.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.5, 157.1, 134.1, 134.0, 129.5, 129.1, 93.9, 68.9, 48.5, 47.7, 38.8. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{11}ICINNaO_2^+$ $(M+Na)^+$ 397.9421, found 397.9424.



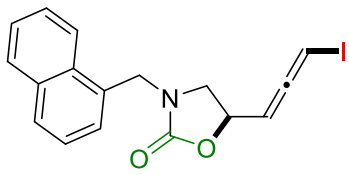
***syn*-3-(4-Bromobenzyl)-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2h)**

35.4 mg 90% yield, d.r. 13:1, yellow sticky oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.50 (d, *J* = 8.4 Hz, 2H), 7.17 (d, *J* = 8.4 Hz, 2H), 5.94 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.23 (t, *J* = 5.8 Hz, 1H), 5.08 – 5.01 (m, 1H), 4.41 (d, *J* = 15.0 Hz, 1H), 4.36 (d, *J* = 15.0 Hz, 1H), 3.58 (t, *J* = 8.7 Hz, 1H), 3.26 (dd, *J* = 8.9, 5.6 Hz, 1H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.5, 157.1, 134.6, 132.1, 129.9, 122.1, 93.8, 68.9, 48.5, 47.7, 38.8. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{11}IBrNNaO_2^+$ $(M+Na)^+$ 441.8916, found 441.8921.

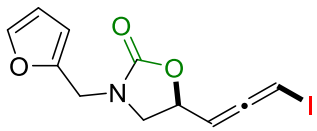


***syn*-Methyl 4-((5-(3-iodopropa-1,2-dien-1-yl)-2-oxooxazolidin-3-yl)methyl)benzoate (2i)**

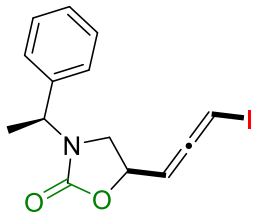
25.6 mg, 64% yield, d.r. 15:1, yellow sticky oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.04 (d, *J* = 8.2 Hz, 2H), 7.36 (d, *J* = 8.2 Hz, 2H), 5.94 (dd, *J* = 5.8, 1.7 Hz, 1H), 5.24 (t, *J* = 5.8 Hz, 1H), 5.10 – 5.03 (m, 1H), 4.52 (d, *J* = 15.3 Hz, 1H), 4.45 (d, *J* = 15.3 Hz, 1H), 3.92 (s, 3H), 3.60 (t, *J* = 8.6 Hz, 1H), 3.28 (dd, *J* = 8.8, 5.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.5, 166.6, 157.2, 140.6, 130.2, 130.0, 128.0, 93.8, 68.9, 52.2, 48.6, 48.0, 38.8. HRMS (ESI-TOF) m/z calcd for $C_{15}H_{14}INNaO_4^+$ $(M+Na)^+$ 421.9865, found 421.9870.



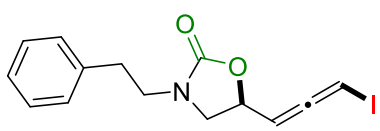
***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-(naphthalen-1-ylmethyl)oxazolidin-2-one (2j)**
35.6 mg, 90% yield, d.r. >20:1, yellow sticky oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.10 (d, *J* = 8.7 Hz, 1H), 7.93 – 7.84 (m, 2H), 7.61 – 7.50 (m, 2H), 7.48 – 7.39 (m, 2H), 5.36 (dd, *J* = 5.8, 1.7 Hz, 1H), 5.12 (t, *J* = 5.8 Hz, 1H), 4.98 (d, *J* = 14.6 Hz, 1H), 4.79 (d, *J* = 14.6 Hz, 1H), 3.48 (t, *J* = 8.7 Hz, 1H), 3.13 (dd, *J* = 9.1, 5.2 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 204.4, 156.7, 133.9, 131.5, 131.1, 129.4, 128.8, 127.7, 127.0, 126.3, 125.2, 123.7, 93.6, 69.0, 48.0, 46.7, 38.4. HRMS (ESI-TOF) m/z calcd for $C_{17}H_{14}INNaO_2^+$ $(M+Na)^+$ 413.9967, found 413.9971.



***syn*-3-(Furan-2-ylmethyl)-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2k)**
26.2 mg, 79% yield, d.r. 10:1, yellow solid, mp = 73.1-74.1 ℃. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 – 7.34 (m, 1H), 6.38 – 6.24 (m, 2H), 5.96 (dd, *J* = 5.9, 1.8 Hz, 1H), 5.24 (t, *J* = 5.9 Hz, 1H), 5.11 – 4.97 (m, 1H), 4.43 (s, 2H), 3.68 (t, *J* = 8.7 Hz, 1H), 3.39 (dd, *J* = 9.0, 5.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 204.7, 156.8, 149.3, 142.9, 110.6, 109.0, 93.8, 69.0, 48.8, 40.9, 38.6. HRMS (ESI-TOF) m/z calcd for $C_{11}H_{10}INNaO_3^+$ $(M+Na)^+$ 353.9598, found 353.9596.

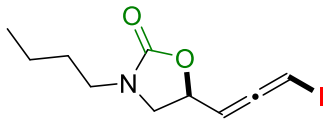


***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-((*S*)-1-phenylethyl)oxazolidin-2-one (2l)**
25.6 mg, 72% yield, d.r. 1.3:1, yellow sticky oil.
Major isomer: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 – 7.30 (m, 5H), 6.03 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.29 – 5.19 (m, 2H), 4.99 – 4.92 (m, 1H), 3.32 (dd, *J* = 7.1, 3.4 Hz, 2H), 1.59 (d, *J* = 7.1 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.6, 156.5, 139.3, 128.8, 128.0, 127.0, 94.1, 68.9, 51.6, 44.9, 38.4, 16.3. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9959.
Minor Isomer: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 – 7.31 (m, 5H), 5.66 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.23 (q, *J* = 7.1 Hz, 1H), 5.12 (t, *J* = 5.6 Hz, 1H), 5.07 – 5.00 (m, 1H), 3.65 (t, *J* = 8.6 Hz, 1H), 3.04 (dd, *J* = 8.9, 4.9 Hz, 1H), 1.59 (d, *J* = 7.1 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.2, 156.6, 139.4, 128.8, 127.9, 127.1, 93.9, 68.9, 51.4, 44.3, 38.6, 16.2. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9959.



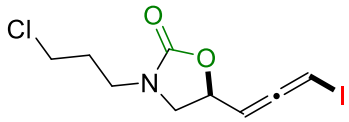
***syn*-5-(3-Iodopropa-1,2-dien-1-yl)-3-phenethyloxazolidin-2-one (2m)**

27.7 mg, 78% yield, d.r. 12:1, yellow sticky oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 – 7.29 (m, 2H), 7.26 – 7.19 (m, 3H), 5.95 (dd, *J* = 5.9, 1.7 Hz, 1H), 5.18 (t, *J* = 5.9 Hz, 1H), 5.02 – 4.92 (m, 1H), 3.58 – 3.50 (m, 3H), 3.25 (dd, *J* = 8.8, 5.8 Hz, 1H), 2.90 (t, *J* = 7.2 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.6, 157.0, 138.2, 128.7, 128.7, 126.7, 94.0, 68.8, 49.7, 45.4, 38.6, 34.0. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9971.



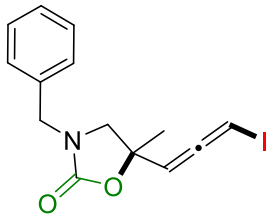
***syn*-3-Butyl-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2n)**

22.4 mg, 73% yield, d.r. >20:1, yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.03 (dd, *J* = 5.8, 1.8 Hz, 1H), 5.28 (t, *J* = 5.8 Hz, 1H), 5.11 – 5.00 (m, 1H), 3.70 (t, *J* = 8.7 Hz, 1H), 3.40 (dd, *J* = 8.9, 5.8 Hz, 1H), 3.26 (td, *J* = 7.1, 1.9 Hz, 2H), 1.59 – 1.49 (m, 2H), 1.40 – 1.30 (m, 2H), 0.94 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 204.6, 157.1, 94.1, 68.7, 49.0, 43.9, 38.6, 29.4, 19.8, 13.7. HRMS (ESI-TOF) m/z calcd for $C_{10}H_{14}INNaO_2^+$ $(M+Na)^+$ 329.9967, found 329.9969.



***syn*-3-(3-Chloropropyl)-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2o)**

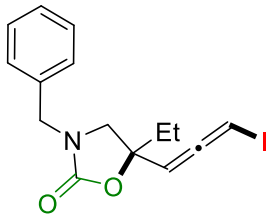
17.0 mg, 52% yield, d.r. >20:1, yellow stick oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 6.07 (dd, *J* = 5.8, 1.9 Hz, 1H), 5.28 (t, *J* = 5.8 Hz, 1H), 5.13 – 5.03 (m, 1H), 3.76 (t, *J* = 8.6 Hz, 1H), 3.59 (t, *J* = 6.4 Hz, 2H), 3.48 – 3.39 (m, 3H), 2.11 – 2.02 (m, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 204.6, 157.1, 93.9, 68.8, 49.7, 42.0, 41.9, 38.8, 30.3. HRMS (ESI-TOF) m/z calcd for $C_9H_{11}ClINNaO_2^+$ $(M+Na)^+$ 349.9416, found 349.9412.



***syn*-3-Benzyl-5-(3-iodopropa-1,2-dien-1-yl)-5-methyloxazolidin-2-one (2p)**

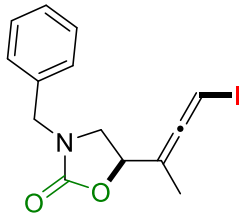
34.0 mg, 95% yield, d.r. >20:1, yellow solid, mp = 96.5-97.5 °C. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.39 – 7.31 (m, 3H), 7.28 (d, *J* = 6.7 Hz, 2H), 5.84 (d, *J* = 5.8 Hz, 1H), 5.21 (d, *J* = 5.8 Hz, 1H), 4.49 (d, *J* = 14.9 Hz, 1H), 4.37 (d, *J* = 14.9 Hz, 1H), 3.40 (d, *J* = 8.9 Hz, 1H), 3.22 (d, *J* = 8.9 Hz, 1H), 1.54 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 203.1, 156.8, 135.7, 128.9, 128.2, 128.0, 98.9, 76.1, 54.5, 48.2, 39.0, 25.7. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967,

found 377.9972.



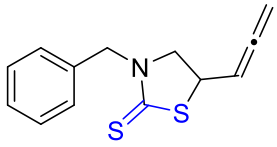
***syn*-3-Benzyl-5-ethyl-5-(3-iodopropa-1,2-dien-1-yl)oxazolidin-2-one (2q)**

32.8 mg, 89% yield, d.r. 18:1, yellow oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.40 – 7.27 (m, 5H), 5.80 (d, *J* = 5.8 Hz, 1H), 5.17 (d, *J* = 5.8 Hz, 1H), 4.50 (d, *J* = 14.9 Hz, 1H), 4.35 (d, *J* = 14.9 Hz, 1H), 3.36 (d, *J* = 9.0 Hz, 1H), 3.23 (d, *J* = 9.0 Hz, 1H), 1.89 – 1.77 (m, 2H), 0.94 (t, *J* = 7.5 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 203.2, 156.9, 135.7, 128.9, 128.2, 128.0, 98.0, 79.1, 52.2, 48.2, 39.0, 32.2, 7.4. HRMS (ESI-TOF) m/z calcd for $C_{15}H_{16}INNaO_2^+$ $(M+Na)^+$ 392.0118, found 392.0114.



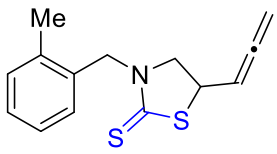
***syn*-3-Benzyl-5-(4-iodobuta-2,3-dien-2-yl)oxazolidin-2-one (2r)**

27.2 mg, 77% yield, d.r. 11:1, yellow oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.41 – 7.27 (m, 5H), 5.79 – 5.67 (m, 1H), 4.90 (t, *J* = 7.9 Hz, 1H), 4.47 (d, *J* = 14.8 Hz, 1H), 4.39 (d, *J* = 14.8 Hz, 1H), 3.55 (t, *J* = 9.0 Hz, 1H), 3.31 (dd, *J* = 9.0, 5.7 Hz, 1H), 1.86 (d, *J* = 2.4 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 202.5, 157.2, 135.5, 128.9, 128.2, 128.1, 103.6, 72.0, 48.3, 47.4, 38.1, 14.3. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{14}INNaO_2^+$ $(M+Na)^+$ 377.9967, found 377.9973.



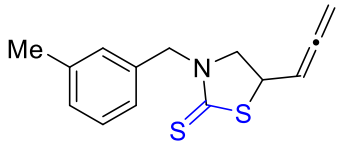
3-Benzyl-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3a)

23.0 mg, 93% yield, light yellow solid, mp = 71.6-72.4 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42 – 7.28 (m, 5H), 5.22 (q, *J* = 6.8 Hz, 1H), 5.02 (d, *J* = 14.5 Hz, 1H), 4.93 (d, *J* = 14.5 Hz, 1H), 4.90 – 4.82 (m, 1H), 4.80 – 4.71 (m, 1H), 4.24 – 4.15 (m, 1H), 4.02 (dd, *J* = 11.6, 7.6 Hz, 1H), 3.82 (dd, *J* = 11.6, 5.5 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.0, 196.1, 135.1, 128.9, 128.3, 128.2, 90.0, 79.0, 60.4, 52.6, 41.8. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{14}NS_2^+$ $(M+H)^+$ 248.0563, found 248.0566.



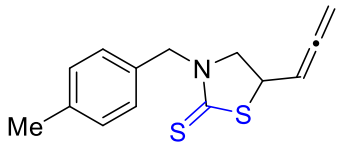
3-(2-Methylbenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3b)

25.0 mg, 96% yield, white solid, mp = 65.5-66.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41 – 7.09 (m, 4H), 5.22 (q, *J* = 6.8 Hz, 1H), 5.01 (d, *J* = 14.8 Hz, 1H), 4.91 (d, *J* = 14.8 Hz, 1H), 4.88 – 4.72 (m, 2H), 4.24 – 4.13 (m, 1H), 3.92 (dd, *J* = 11.6, 7.6 Hz, 1H), 3.73 (dd, *J* = 11.6, 5.5 Hz, 1H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 208.0, 195.6, 137.0, 133.0, 130.9, 129.2, 128.5, 126.4, 90.1, 79.1, 60.2, 51.0, 41.7, 19.5. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0724, found 262.0728.



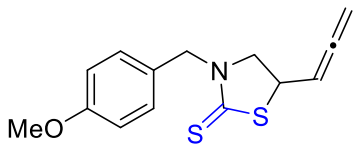
3-(3-Methylbenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3c)

25.6 mg, 98% yield, white solid, mp = 76.8-77.4 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24 (t, *J* = 7.6 Hz, 1H), 7.14 (s, 1H) 7.13 (d, *J* = 7.6 Hz, 2H), 5.23 (q, *J* = 6.8 Hz, 1H), 4.96 (d, *J* = 14.5 Hz, 2H), 4.91 (d, *J* = 14.3 Hz, 2H), 4.90 – 4.82 (m, 1H), 4.82 – 4.73 (m, 1H), 4.28 – 4.14 (m, 1H), 4.02 (dd, *J* = 11.6, 7.7 Hz, 1H), 3.82 (dd, *J* = 11.6, 5.5 Hz, 1H), 2.35 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 208.1, 195.9, 138.7, 134.9, 129.0, 129.0, 128.8, 125.4, 90.0, 78.9, 60.4, 52.6, 41.8, 21.4. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0724, found 262.0728.



3-(4-Methylbenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3d)

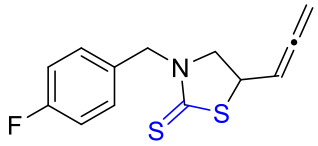
23.7 mg, 91% yield, white solid, mp = 111.6-112.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.23 (d, *J* = 7.9 Hz, 2H), 7.16 (d, *J* = 7.9 Hz, 2H), 5.22 (q, *J* = 6.8 Hz, 1H), 4.95 (d, *J* = 14.5 Hz, 1H), 4.91 (d, *J* = 14.5 Hz, 1H), 4.91 – 4.82 (m, 1H), 4.82 – 4.74 (m, 1H), 4.23 – 4.12 (m, 1H), 4.01 (dd, *J* = 11.6, 7.7 Hz, 1H), 3.80 (dd, *J* = 11.6, 5.6 Hz, 1H), 2.35 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.1, 195.8, 138.1, 132.0, 129.6, 128.3, 90.0, 78.9, 60.4, 52.4, 41.8, 21.2. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0724, found 262.0728.



3-(4-Methoxybenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3e)

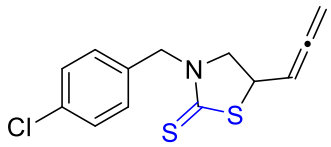
24.8 mg, 90% yield, light yellow solid, mp = 101.2-102.2 °C. ^{1}H NMR (400 MHz,

$CDCl_3$) δ 7.28 (d, *J* = 8.6 Hz, 2H), 6.87 (d, *J* = 8.6 Hz, 2H), 5.21 (q, *J* = 6.8 Hz, 1H), 4.93 (d, *J* = 14.4 Hz, 1H), 4.86 (d, *J* = 14.4 Hz, 1H), 4.87 – 4.83 (m, 1H), 4.82 – 4.74 (m, 1H), 4.21 – 4.14 (m, 1H), 4.00 (dd, *J* = 11.6, 7.7 Hz, 1H), 3.81 (s, 3H), 3.80 (dd, *J* = 11.6, 5.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.1, 195.6, 159.6, 129.8, 127.1, 114.3, 90.0, 78.9, 60.3, 55.3, 52.0, 41.8. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{15}NNaOS_2^+$ $(M+Na)^+$ 300.0493, found 300.0500.



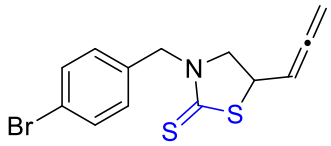
3-(4-Fluorobenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3f)

25.8 mg, 97% yield, white solid, mp = 112.5-113.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 (dd, *J* = 8.6, 5.4 Hz, 2H), 7.04 (t, *J* = 8.6 Hz, 2H), 5.22 (q, *J* = 6.7 Hz, 1H), 4.99 (d, *J* = 14.5 Hz, 1H), 4.89 (d, *J* = 14.5 Hz, 1H), 4.90 – 4.83 (m, 1H), 4.83 – 4.73 (m, 1H), 4.24 – 4.15 (m, 1H)., 4.02 (dd, *J* = 11.5, 7.6 Hz, 1H), 3.82 (dd, *J* = 11.5, 5.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.0, 196.1, 162.6 (d, *J* = 247.1 Hz), 130.9 (d, *J* = 3.4 Hz), 130.1 (d, *J* = 8.2 Hz), 115.9 (d, *J* = 21.5 Hz), 90.0, 79.1, 60.3, 51.8, 41.7. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{13}FNS_2^+$ $(M+H)^+$ 266.0473, found 262.0477.



3-(4-Chlorobenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3g)

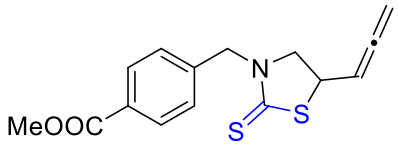
26.9 mg, 96% yield, light yellow solid, mp = 129.5-130.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.28 (m, 4H), 5.23 (q, *J* = 6.8 Hz, 1H), 4.99 (d, *J* = 14.7 Hz, 1H), 4.89 (d, *J* = 14.7 Hz, 1H), 4.91 – 4.83 (m, 1H), 4.83 – 4.73 (m, 1H), 4.25 – 4.16 (m, 1H), 4.02 (dd, *J* = 11.5, 7.6 Hz, 1H), 3.81 (dd, *J* = 11.5, 5.5 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.0, 196.3, 134.2, 133.5, 129.7, 129.1, 90.0, 79.1, 60.3, 51.8, 41.8. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{13}ClNS_2^+$ $(M+H)^+$ 283.0718, found 282.0180.



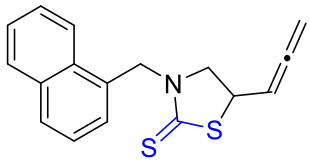
3-(4-Bromobenzyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3h)

30.8 mg, 94% yield, light yellow solid, mp = 132.7-133.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 (d, *J* = 8.4 Hz, 2H), 7.23 (d, *J* = 8.4 Hz, 2H), 5.23 (q, *J* = 6.8 Hz, 1H), 4.97 (d, *J* = 14.7 Hz, 1H), 4.88 (d, *J* = 14.7 Hz, 1H), 4.90 – 4.86 (m, 1H), 4.82 – 4.75 (m, 1H), 4.25 – 4.15 (m, 1H), 4.02 (dd, *J* = 11.5, 7.6 Hz, 1H), 3.81 (dd, *J* = 11.5, 5.5 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.0, 196.4,

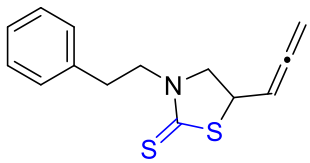
134.1, 132.1, 130.0, 122.3, 90.0, 79.1, 60.3, 51.9, 41.8. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{13}BrNS_2^+$ $(M+H)^+$ 325.9673, found 325.9670.



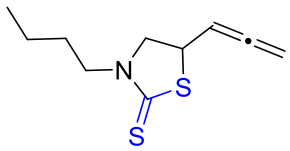
Methyl 4-((5-(propa-1,2-dien-1-yl)-2-thioxothiazolidin-3-yl)methyl)benzoate (3i)
19.1 mg, 63% yield, white solid, mp = 80.6-81.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (d, *J* = 8.2 Hz, 2H), 7.41 (d, *J* = 8.2 Hz, 2H), 5.23 (q, *J* = 6.8 Hz, 1H), 5.09 (d, *J* = 14.9 Hz, 1H), 4.97 (d, *J* = 14.9 Hz, 1H), 4.92 – 4.84 (m, 1H), 4.84 – 4.74 (m, 1H), 4.25 – 4.16 (m, 1H), 4.03 (dd, *J* = 11.5, 7.6 Hz, 1H), 3.92 (s, 3H), 3.82 (dd, *J* = 11.5, 5.4 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.0, 196.6, 166.6, 140.1, 130.2, 130.1, 128.1, 90.0, 79.2, 60.4, 52.2, 52.2, 41.7. HRMS (ESI-TOF) m/z calcd for $C_{115}H_{16}NO_2S_2^+$ $(M+H)^+$ 306.0622, found 306.0628.



3-(Naphthalen-1-ylmethyl)-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3j)
27.3 mg, 92% yield, white solid, mp = 113.4-114.3 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (d, *J* = 8.2 Hz, 1H), 7.95 – 7.82 (m, 2H), 7.65 – 7.50 (m, 2H), 7.46 (d, *J* = 4.8 Hz, 2H), 5.50 (d, *J* = 14.6 Hz, 1H), 5.24 (d, *J* = 14.6 Hz, 1H), 5.07 (q, *J* = 6.7 Hz, 1H), 4.68 – 4.59 (m, 1H), 4.44 – 4.32 (m, 1H), 4.11 – 4.02 (m, 1H), 3.85 (dd, *J* = 11.6, 7.6 Hz, 1H), 3.68 (dd, *J* = 11.7, 5.2 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 207.7, 195.4, 133.9, 131.7, 131.1, 129.5, 128.8, 128.1, 127.2, 126.4, 125.3, 124.0, 89.9, 78.8, 59.8, 51.4, 41.6. HRMS (ESI-TOF) m/z calcd for $C_{17}H_{16}NS_2^+$ $(M+H)^+$ 298.0724, found 298.0725.

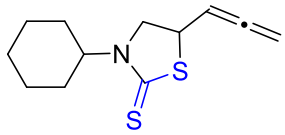


3-Phenethyl-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3k)
24.4 mg, 93% yield, yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38 – 7.24 (m, 5H), 5.20 (q, *J* = 6.9 Hz, 1H), 4.99 – 4.86 (m, 2H), 4.16 (q, *J* = 7.1 Hz, 1H), 4.05 – 3.91 (m, 3H), 3.79 (dd, *J* = 11.5, 5.7 Hz, 1H), 3.09 – 2.97 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 208.2, 195.2, 138.0, 128.9, 128.8, 126.9, 90.0, 78.9, 62.3, 50.9, 42.2, 32.8. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0724, found 262.0729.



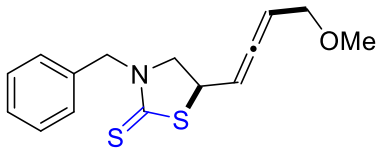
3-Butyl-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3l)

19.6 mg, 92% yield, yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.30 (q, *J* = 6.8 Hz, 1H), 5.05 – 4.85 (m, 2H), 4.29 – 4.18 (m, 1H), 4.14 (dd, *J* = 11.4, 7.5 Hz, 1H), 3.95 (dd, *J* = 11.4, 5.3 Hz, 1H), 3.85 – 3.65 (m, 2H), 1.64 (p, *J* = 7.5 Hz, 2H), 1.37 (h, *J* = 7.3 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 208.1, 195.0, 90.2, 79.0, 61.2, 49.0, 41.9, 28.9, 20.0, 13.8. HRMS (ESI-TOF) m/z calcd for $C_{10}H_{16}NS_2^+$ $(M+H)^+$ 214.0724, found 214.0728.



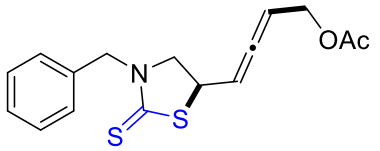
3-Cyclohexyl-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3m)

23.6 mg, 99% yield, light yellow solid, mp = 117.8-118.6 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.27 (q, *J* = 6.8 Hz, 1H), 5.05 – 4.87 (m, 2H), 4.78 – 4.67 (m, 1H), 4.25 – 4.13 (m, 1H), 4.04 (dd, *J* = 11.5, 7.3 Hz, 1H), 3.90 (dd, *J* = 11.5, 5.2 Hz, 1H), 1.92 – 1.79 (m, 4H), 1.70 (d, *J* = 13.6 Hz, 1H), 1.49 – 1.28 (m, 4H), 1.18 – 1.05 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 208.0, 194.0, 90.2, 79.1, 57.6, 56.7, 42.1, 30.1, 29.9, 25.4(4), 25.4, 25.3(6). HRMS (ESI-TOF) m/z calcd for $C_{12}H_{18}NS_2^+$ $(M+H)^+$ 240.0881, found 240.0883.



***syn*-3-Benzyl-5-(4-methoxybuta-1,2-dien-1-yl)thiazolidine-2-thione (3n)**

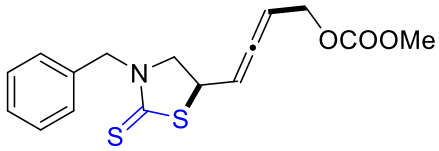
25.7 mg, 88% yield, d.r. 7:1, yellow oil. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.40 – 7.30 (m, 5H), 5.52 – 5.35 (m, 1H), 5.36 – 5.25 (m, 1H), 5.08 (d, *J* = 14.6 Hz, 1H), 4.87 (d, *J* = 14.6 Hz, 1H), 4.26 – 4.16 (m, 1H), 4.02 (dd, *J* = 11.6, 7.6 Hz, 1H), 3.87 (dd, *J* = 6.5, 2.4 Hz, 2H), 3.79 (dd, *J* = 11.6, 5.8 Hz, 1H), 3.31 (s, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.4, 196.0, 134.9, 129.0, 128.3, 128.3, 92.7, 91.7, 69.7, 60.8, 58.1, 52.6, 42.1. HRMS (ESI-TOF) m/z calcd for $C_{15}H_{17}NNaS_2^+$ $(M+Na)^+$ 314.0649, found 314.0655.



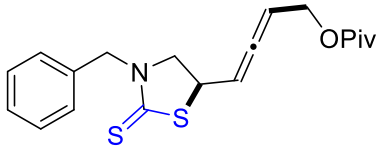
***syn*-4-(3-Benzyl-2-thioxothiazolidin-5-yl)buta-2,3-dien-1-yl acetate (3o)**

24.2 mg, 76% yield, d.r. >20:1, light yellow solid, mp = 64.5-65.4 °C. ^{1}H NMR (600

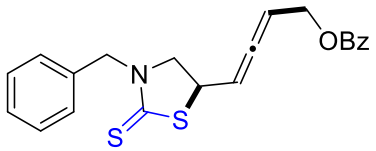
MHz, $CDCl_3$) δ 7.40 – 7.30 (m, 5H), 5.47 (q, *J* = 6.4, 5.9 Hz, 1H), 5.43 – 5.36 (m, 1H), 5.08 (d, *J* = 14.6 Hz, 1H), 4.88 (d, *J* = 14.6 Hz, 1H), 4.54 – 4.45 (m, 2H), 4.24 – 4.17 (m, 1H), 4.03 (dd, *J* = 11.7, 7.8 Hz, 1H), 3.80 (dd, *J* = 11.7, 5.5 Hz, 1H), 2.04 (s, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.6, 195.8, 170.6, 134.9, 129.0, 128.3, 128.3, 93.0, 91.4, 61.3, 60.5, 52.6, 41.7, 20.9. HRMS (ESI-TOF) m/z calcd for $C_{16}H_{17}NNaO_2S_2^+$ $(M+Na)^+$ 342.0598, found 342.0592.



***syn*-4-(3-Benzyl-2-thioxothiazolidin-5-yl)buta-2,3-dien-1-yl methyl carbonate (3p)**
23.2 mg, 69% yield, d.r. >20:1, yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41 – 7.28 (m, 5H), 5.50 (q, *J* = 6.4 Hz, 1H), 5.46 – 5.37 (m, 1H), 5.09 (d, *J* = 14.6 Hz, 1H), 4.88 (d, *J* = 14.6 Hz, 1H), 4.61 – 4.47 (m, 2H), 4.26 – 4.16 (m, 1H), 4.03 (dd, *J* = 11.6, 7.7 Hz, 1H), 3.84 – 3.77 (m, 1H), 3.76 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 205.1, 195.8, 155.4, 134.9, 129.0, 128.3, 128.3, 93.0, 90.7, 64.7, 60.6, 55.0, 52.6, 41.7. HRMS (ESI-TOF) m/z calcd for $C_{16}H_{17}NNaO_3S_2^+$ $(M+Na)^+$ 358.0538, found 358.0552.

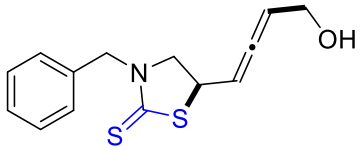


***syn*-4-(3-Benzyl-2-thioxothiazolidin-5-yl)buta-2,3-dien-1-yl pivalate (3q)**
33.5 mg, 93% yield, d.r. 12:1, yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 – 7.29 (m, 5H), 5.45 (q, *J* = 6.2 Hz, 1H), 5.41 – 5.34 (m, 1H), 5.05 (d, *J* = 14.6 Hz, 1H), 4.91 (d, *J* = 14.6 Hz, 1H), 4.53 – 4.44 (m, 2H), 4.26 – 4.16 (m, 1H), 4.03 (dd, *J* = 11.6, 7.7 Hz, 1H), 3.79 (dd, *J* = 11.6, 5.8 Hz, 1H), 1.17 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.6, 196.0, 178.1, 134.9, 129.0, 128.3, 128.3, 92.7, 91.5, 61.1, 60.7, 52.6, 42.0, 38.7, 27.2. HRMS (ESI-TOF) m/z calcd for $C_{19}H_{23}NNaO_2S_2^+$ $(M+Na)^+$ 384.1068, found 384.1071.



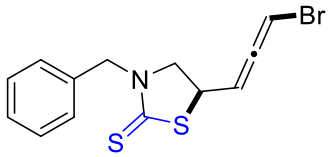
***syn*-4-(3-Benzyl-2-thioxothiazolidin-5-yl)buta-2,3-dien-1-yl benzoate (3r)**
32.3 mg, 85% yield, d.r. 14:1, light yellow solid, mp = 67.4-68.2 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 – 7.98 (m, 2H), 7.61 – 7.52 (m, 1H), 7.47 – 7.39 (m, 2H), 7.38 – 7.26 (m, 5H), 5.58 (qd, *J* = 6.1, 1.8 Hz, 1H), 5.45 – 5.36 (m, 1H), 5.03 (d, *J* = 14.5 Hz, 1H), 4.85 (d, *J* = 14.5 Hz, 1H), 4.75 (dd, *J* = 6.1, 2.6 Hz, 2H), 4.27 – 4.16 (m, 1H), 3.96 (dd, *J* = 11.7, 7.8 Hz, 1H), 3.71 (dd, *J* = 11.7, 5.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (four aromatic carbon missing) δ 204.7, 195.9, 166.1, 134.9, 133.2, 129.8,

129.7, 129.0, 128.5, 128.3, 128.2, 93.1, 91.4, 61.7, 60.6, 52.6, 41.9. HRMS (ESI-TOF) m/z calcd for $C_{21}H_{19}NNaO_2S_2^+$ $(M+Na)^+$ 404.0755, found 404.0760.



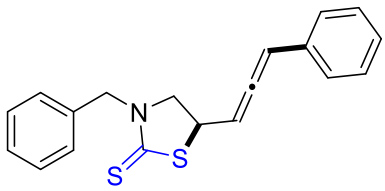
***syn*-3-Benzyl-5-(4-hydroxybuta-1,2-dien-1-yl)thiazolidine-2-thione (3s)**

18.6 mg, 67% yield, d.r. 4:1, yellow solid, mp = 103.2-104.2 °C. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.47 – 7.27 (m, 5H), 5.54 (q, *J* = 5.9, 1H), 5.46 – 5.34 (m, 1H), 5.06 (d, *J* = 14.6 Hz, 1H), 4.90 (d, *J* = 14.6 Hz, 1H), 4.22 – 4.14 (m, 1H), 4.12 – 4.02 (m, 3H), 3.86 – 3.79 (m, 1H), 1.59 (br s, 1H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 203.2, 195.9, 134.9, 128.9(9), 128.9(7), 128.4, 128.3(3), 128.3(1), 96.1, 93.4, 60.8, 59.9, 52.6, 42.0. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{15}NNaOS_2^+$ $(M+Na)^+$ 300.0493, found 300.0500.



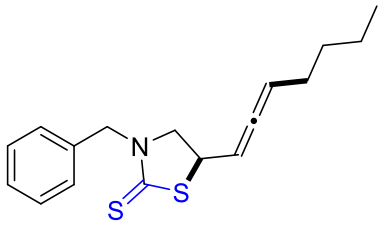
***syn*-3-Benzyl-5-(3-bromopropa-1,2-dien-1-yl)thiazolidine-2-thione (3t)**

20.5 mg, 63% yield, d.r. 3:1, light yellow solid, mp = 129.5-130.7 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.31 (m, 5H), 6.16 (dd, *J* = 5.6, 1.5 Hz, 1H), 5.48 – 5.40 (m, 1H), 5.14 (d, *J* = 14.6 Hz, 1H), 4.85 (d, *J* = 14.6 Hz, 1H), 4.34 – 4.22 (m, 1H), 4.14 – 4.02 (m, 1H), 3.82 (dd, *J* = 11.7, 4.8 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 202.2, 195.2, 134.8, 129.0, 128.4, 128.3, 98.7, 75.2, 60.3, 52.8, 41.1. HRMS (ESI-TOF) m/z calcd for $C_{13}H_{13}BrNS_2^+$ $(M+H)^+$ 325.9673, found 325.9672.



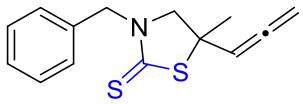
***syn*-3-Benzyl-5-(3-phenylpropa-1,2-dien-1-yl)thiazolidine-2-thione (3u)**

17.3 mg, 54% yield, d.r. 13:1, yellow solid, mp = 91.3-92.5 °C. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.36 – 7.28 (m, 5H), 7.29 – 7.26 (m, 2H), 7.26 – 7.20 (m, 3H), 6.38 (dd, *J* = 6.3, 2.2 Hz, 1H), 5.71 (t, *J* = 6.5 Hz, 1H), 5.13 (d, *J* = 14.7 Hz, 1H), 4.55 (d, *J* = 14.7 Hz, 1H), 4.29 – 4.22 (m, 1H), 4.03 (dd, *J* = 11.6, 7.4 Hz, 1H), 3.90 (dd, *J* = 11.6, 4.8 Hz, 1H). ^{13}C NMR (151 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.7, 195.5, 134.8, 132.7, 128.9(1), 128.8(9), 128.3, 128.2, 127.9, 127.1, 98.7, 94.9, 60.3, 52.8, 42.1. HRMS (ESI-TOF) m/z calcd for $C_{19}H_{18}NS_2^+$ $(M+H)^+$ 324.0881, found 324.0881.



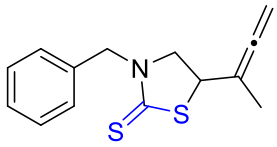
***syn*-3-Benzyl-5-(hepta-1,2-dien-1-yl)thiazolidine-2-thione (3v)**

12.1 mg, 40% yield, d.r. 9:1, yellow oil. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.40 – 7.30 (m, 5H), 5.35 – 5.31 (m, 1H), 5.23 – 5.16 (m, 1H), 5.10 (d, *J* = 14.6 Hz, 1H), 4.85 (d, *J* = 14.6 Hz, 1H), 4.25 – 4.13 (m, 1H), 4.00 (dd, *J* = 11.5, 7.8 Hz, 1H), 3.79 (dd, *J* = 11.5, 6.3 Hz, 1H), 2.03 – 1.87 (m, 2H), 1.35 – 1.28 (m, 4H), 0.88 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 203.9, 196.5, 135.1, 128.9, 128.2(2), 128.1(8), 95.4, 90.4, 60.8, 52.6, 42.7, 30.9, 28.1, 22.1, 13.7. HRMS (ESI-TOF) m/z calcd for $C_{17}H_{22}NS_2^+$ $(M+H)^+$ 304.1194, found 304.1198.



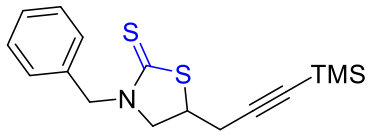
3-Benzyl-5-methyl-5-(propa-1,2-dien-1-yl)thiazolidine-2-thione (3w)

11.7 mg, 45% yield, yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47 – 7.33 (m, 5H), 5.38 (t, *J* = 6.6 Hz, 1H), 5.12 (d, *J* = 14.5 Hz, 1H), 5.02 – 4.81 (m, 3H), 3.89 (d, *J* = 11.4 Hz, 1H), 3.64 (d, *J* = 11.4 Hz, 1H), 1.56 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 207.1, 196.5, 135.1, 128.9, 128.4, 128.3, 95.5, 79.9, 66.4, 52.6, 50.9, 25.9. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0724, found 262.0728.



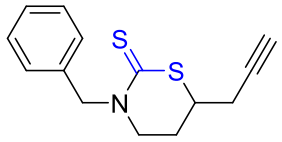
3-Benzyl-5-(buta-2,3-dien-2-yl)thiazolidine-2-thione (3x)

13.5 mg, 52% yield, yellow solid, mp = 86.6-87.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.50 – 7.28 (m, 5H), 4.99 (d, *J* = 14.4 Hz, 1H), 4.93 (d, *J* = 14.4 Hz, 1H), 4.75 – 4.68 (m, 1H), 4.66 – 4.57 (m, 1H), 4.10 – 4.05 (m, 1H), 4.01 (dd, *J* = 11.5, 7.8 Hz, 1H), 3.93 (dd, *J* = 11.5, 4.5 Hz, 1H), 1.69 (t, *J* = 3.1 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 205.4, 195.7, 134.9, 128.9, 128.5, 128.2, 97.7, 77.8, 59.4, 52.7, 45.6, 16.1. HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0724, found 262.0725.



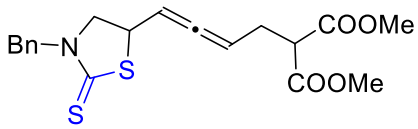
3-Benzyl-5-(3-(trimethylsilyl)prop-2-yn-1-yl)thiazolidine-2-thione (3y)

28.4 mg, 89% yield, white solid, mp = 116.7-117.4 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.50 – 7.29 (m, 5H), 5.04 (d, *J* = 14.6 Hz, 1H), 4.97 (d, *J* = 14.6 Hz, 1H), 4.02 (dd, *J* = 11.8, 7.6 Hz, 1H), 3.84 (dd, *J* = 11.8, 3.9 Hz, 1H), 3.79 – 3.63 (m, 1H), 2.65 – 2.46 (m, 2H), 0.14 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 195.9, 135.0, 129.0, 128.3, 128.2, 101.4, 88.1, 59.9, 52.6, 41.6, 26.4, 0.1. HRMS (ESI-TOF) m/z calcd for $C_{16}H_{22}NSiS_2^+$ $(M+H)^+$ 320.0967, found 320.0963.



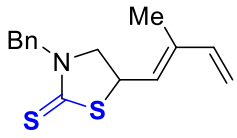
3-Benzyl-6-(prop-2-yn-1-yl)-1,3-thiazinane-2-thione (3z)

15.7 mg, 60% yield, light green solid, mp = 69.4-70.8 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 – 7.29 (m, 5H), 5.49 (t, *J* = 14.6 Hz, 1H), 5.29 (t, *J* = 15.1 Hz, 1H), 4.57 – 4.39 (m, 1H), 3.72 – 3.38 (m, 3H), 2.84 – 2.55 (m, 2H), 2.45 – 2.31 (m, 1H), 2.25 – 2.06 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 192.2 (192.0), 135.04 (135.01), 128.91 (128.93), 128.1(4), 128.11 (128.09), 81.2 (81.0), 76.0 (75.6), 64.5 (64.0), 57.7, 52.1 (51.2), 48.6 (48.4), 26.3 (25.2). HRMS (ESI-TOF) m/z calcd for $C_{14}H_{16}NS_2^+$ $(M+H)^+$ 262.0719, found 262.0724.



Dimethyl 2-(4-(3-benzyl-2-thioxothiazolidin-5-yl)buta-2,3-dien-1-yl)malonate (4)

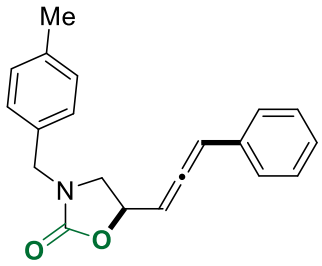
41.6 mg, 71% yield, d.r. 1.2:1, colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.31 (m, 5H), 5.39 – 5.15 (m, 2H), 5.09 – 4.97 (m, 1H), 4.90 (dd, *J* = 14.5, 6.3 Hz, 1H), 4.19 – 4.08 (m, 1H), 4.06 – 3.95 (m, 1H), 3.82 – 3.74 (m, 1H), 3.71 (d, *J* = 2.1 Hz, 6H), 3.45 – 3.37 (m, 1H), 2.58 – 2.51 (m, 2H). ^{13}C NMR (126 MHz, $CDCl_3$) (two aromatic carbon missing) δ 204.3 (203.6), 196.2 (195.8), 169.0 (168.9), 135.1 (135.0), 129.0 (128.9), 128.4, 128.3 (128.2), 92.4 (92.0), 91.6 (92.1), 60.8 (60.1), 52.71 (52.67), 52.6 (52.5), 50.8 (50.6), 42.6 (42.0), 27.5 (27.4). HRMS (ESI-TOF) m/z calcd for $C_{19}H_{22}NO_4S_2^+$ $(M+H)^+$ 392.0985, found 392.0982.



3-Benzyl-5-(2-methylbuta-1,3-dien-1-yl)thiazolidine-2-thione (5)

17.9 mg, 65% yield, d.r. 9:1, light yellow solid, mp = 83.8-84.6 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42 – 7.29 (m, 5H), 6.57 (dd, *J* = 17.1, 10.9 Hz, 1H), 5.41 – 5.27 (m, 2H), 5.27 – 5.18 (m, 1H), 5.02 (d, *J* = 14.6 Hz, 2H), 4.96 (d, *J* = 14.6 Hz, 2H), 4.86 – 4.74 (m, 1H), 3.98 (dd, *J* = 11.5, 7.8 Hz, 1H), 3.66 (dd, *J* = 11.4, 8.1 Hz, 1H), 1.81 (d,

J = 1.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 197.1, 137.4, 135.0, 132.0, 129.0, 128.2(9), 128.2(6), 124.9, 117.5, 61.3, 52.6, 40.7, 19.8. HRMS (ESI-TOF) m/z calcd for $C_{15}H_{18}NS_2^+$ $(M+H)^+$ 276.0876, found 276.0870.



***syn*-3-(4-Methylbenzyl)-5-((S)-3-phenylpropa-1,2-dien-1-yl)oxazolidin-2-one (6)**
19.5 mg, 67% yield, d.r. 4.5:1, yellow sticky oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.27 (m, 2H), 7.27 – 7.20 (m, 3H), 7.20 – 7.10 (m, 4H), 6.28 (dd, J = 6.4, 1.8 Hz, 1H), 5.93 – 5.72 (m, 1H), 5.10 – 5.00 (m, 1H), 4.39 (s, 2H), 3.61 – 3.50 (m, 1H), 3.35 – 3.22 (m, 1H), 2.35 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (two aromatic carbon missing) δ 205.8, 157.5, 137.8, 132.6, 132.4, 129.6, 129.5, 128.8, 128.2, 127.8, 127.1, 98.4, 94.5, 71.1, 48.6, 48.0, 21.1. HRMS (ESI-TOF) m/z calcd for $C_{20}H_{20}NO_2^+$ $(M+H)^+$ 306.1489, found 306.1485.

10 Single crystal X-ray diffraction data of 3o

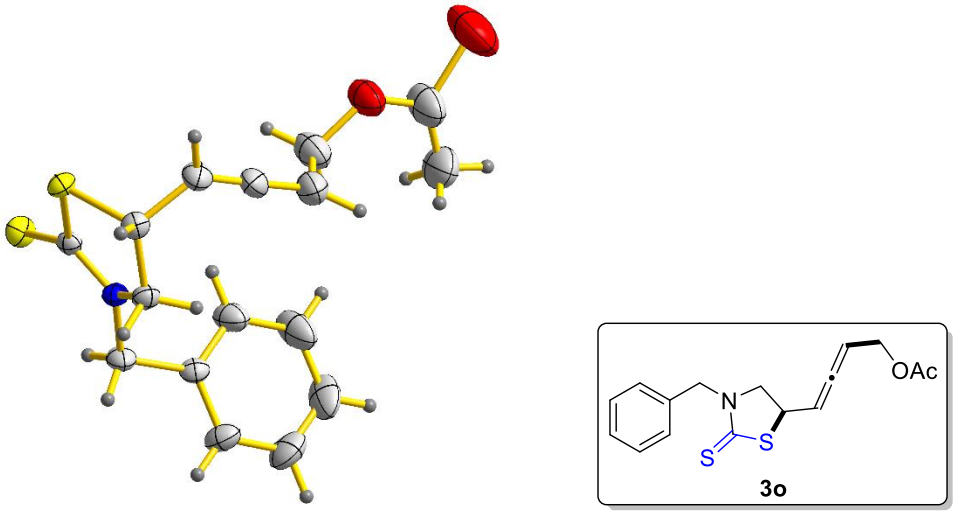


Figure S1. ORTEP diagram of **3o** (CCDC: 2348815). Thermal ellipsoids are shown at the 30% probability level.

Table S3. Crystal data and structure refinement for **3o**.

Identification code	**3o**
Empirical formula	$C_{16}H_{17}NO_2S_2$
Formula weight	319.42
Temperature [K]	273.00
Crystal system	monoclinic
Space group (number)	$P2_1/c$ (14)
a [Å]	18.822(3)
b [Å]	9.4151(14)
c [Å]	9.3683(14)
α [°]	90
β [°]	94.291(4)
γ [°]	90
Volume [Å^3]	1655.5(4)
Z	4
ρ_{calc} [gcm^{-3}]	1.282
μ [mm^{-1}]	0.325
F(000)	672
Crystal size [mm^3]	0.2×0.1×0.05
Crystal colour	colorless
Crystal shape	block
Radiation	MoK_α (λ=0.71073 Å)
2θ range [°]	4.34 to 51.30 (0.82 Å)
Index ranges	$-20 \le h \le 22$, $-10 \le k \le 11$, $-11 \le l \le 11$
Reflections collected	11489
Independent reflections	3101 [R_{int} = 0.0301, R_{sigma} = 0.0335]
Completeness to θ = 25.242°	98.7 %
Data / Restraints / Parameters	3101/192/242
Absorption correction T_{min}/T_{max}	0.6979/0.7453
Goodness-of-fit on F^2	1.061
Final R indexes [$I \ge 2\sigma(I)$]	R_1 = 0.0485, wR_2 = 0.1247
Final R indexes [all data]	R_1 = 0.0629, wR_2 = 0.1354
Largest peak/hole [eÅ^{-3}]	0.33/−0.31

11 Reference:

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[6] a) P. Lu, S. Ma, *Org. Lett.* **2007**, *9*, 2095-2097; b) Y. Tang, Q. Yu, S. Ma, *Org. Chem. Front.* **2017**, *4*, 1762-1767.

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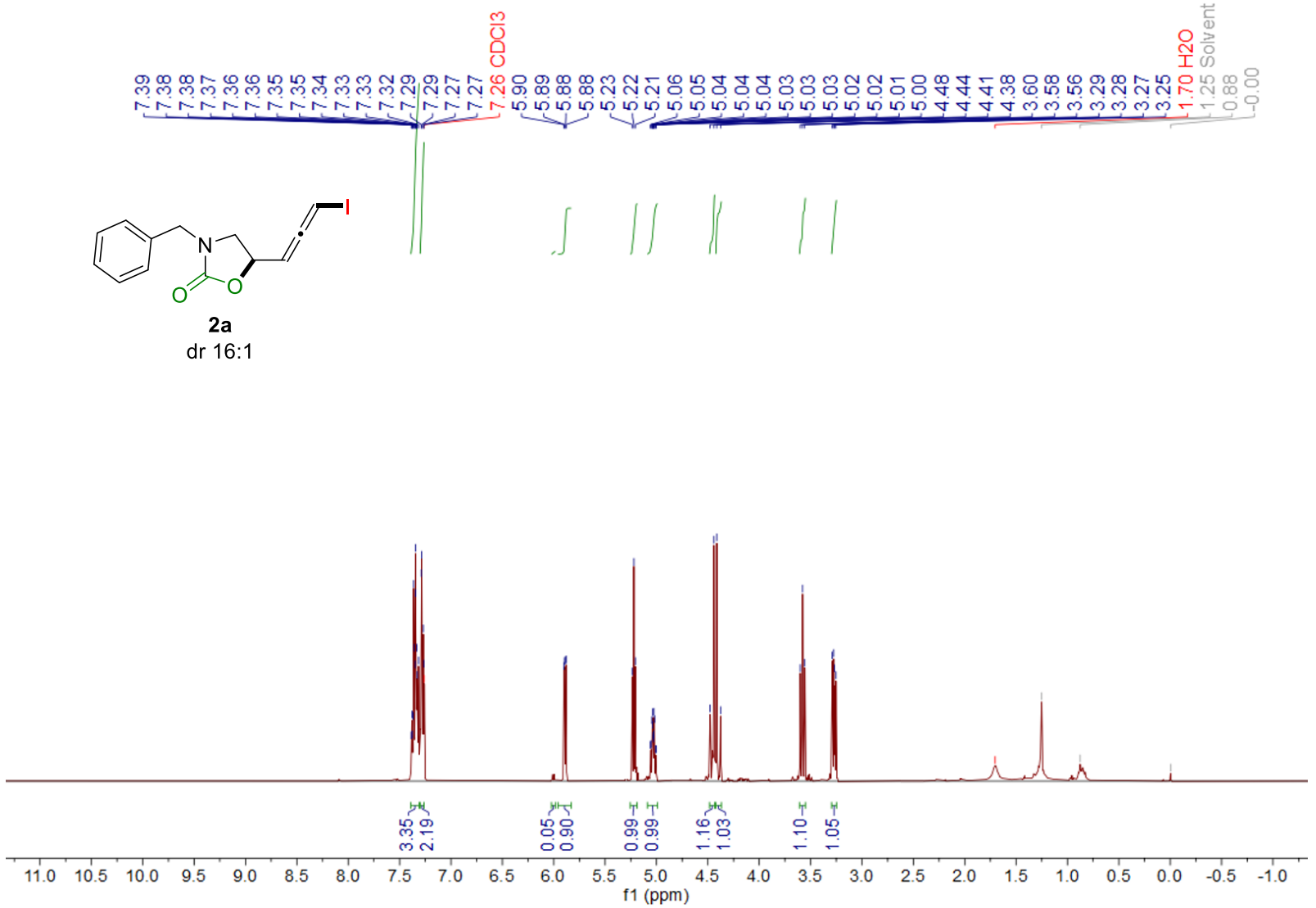
12 NMR Spectra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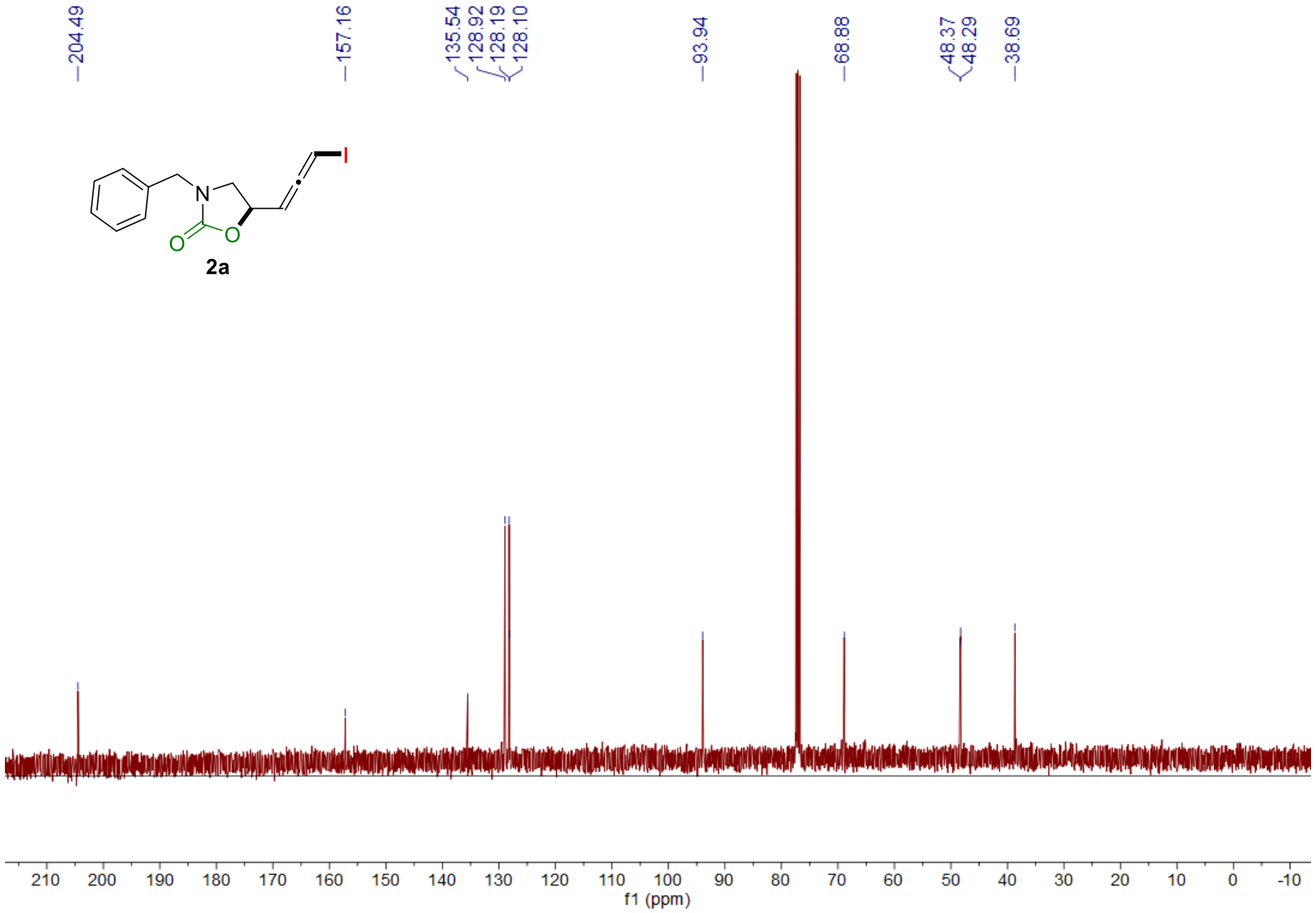
7.38
7.38
7.37
7.36
7.36
7.35
7.35
7.34
7.33
7.33
7.32
7.29
7.29
7.27
7.27
7.26 CDCl3
5.90
5.89
5.88
5.88
5.23
5.22
5.21
5.06
5.05
5.04
5.04
5.04
5.03
5.03
5.03
5.02
5.02
5.01
5.00
4.48
4.44
4.41
4.38
3.60
3.58
3.56
3.29
3.28
3.27
3.25
1.70 H2O
1.25 Solvent
0.88
-0.00
N
O
O
I
2a
dr 16:1
3.35
2.19
0.05
0.90
0.99
0.99
1.16
1.03
1.10
1.05
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 -1.0
f1 (ppm)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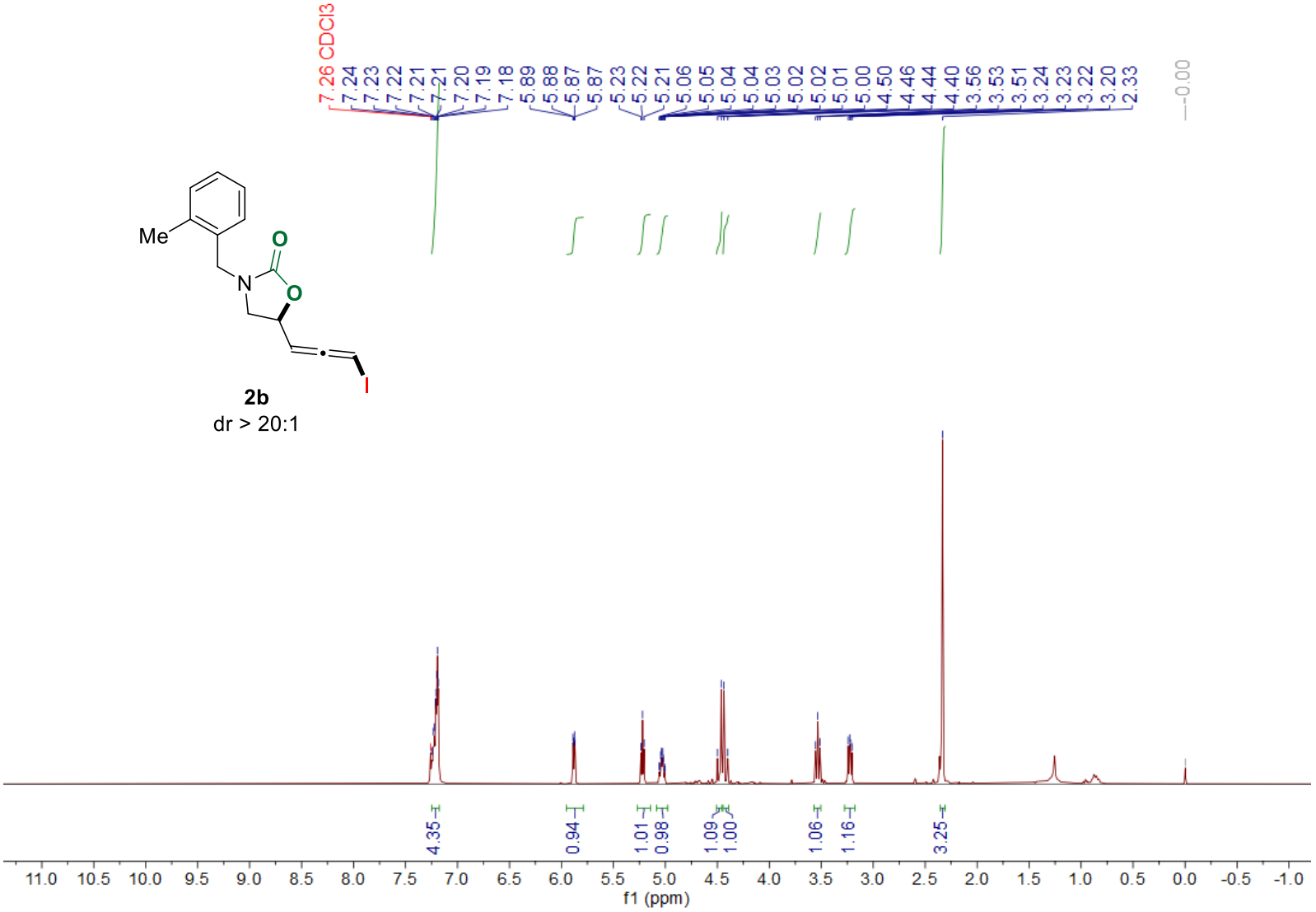
157.16
135.54
128.92
128.19
128.10
93.94
68.88
48.37
48.29
38.69
N
O
O
I
2a
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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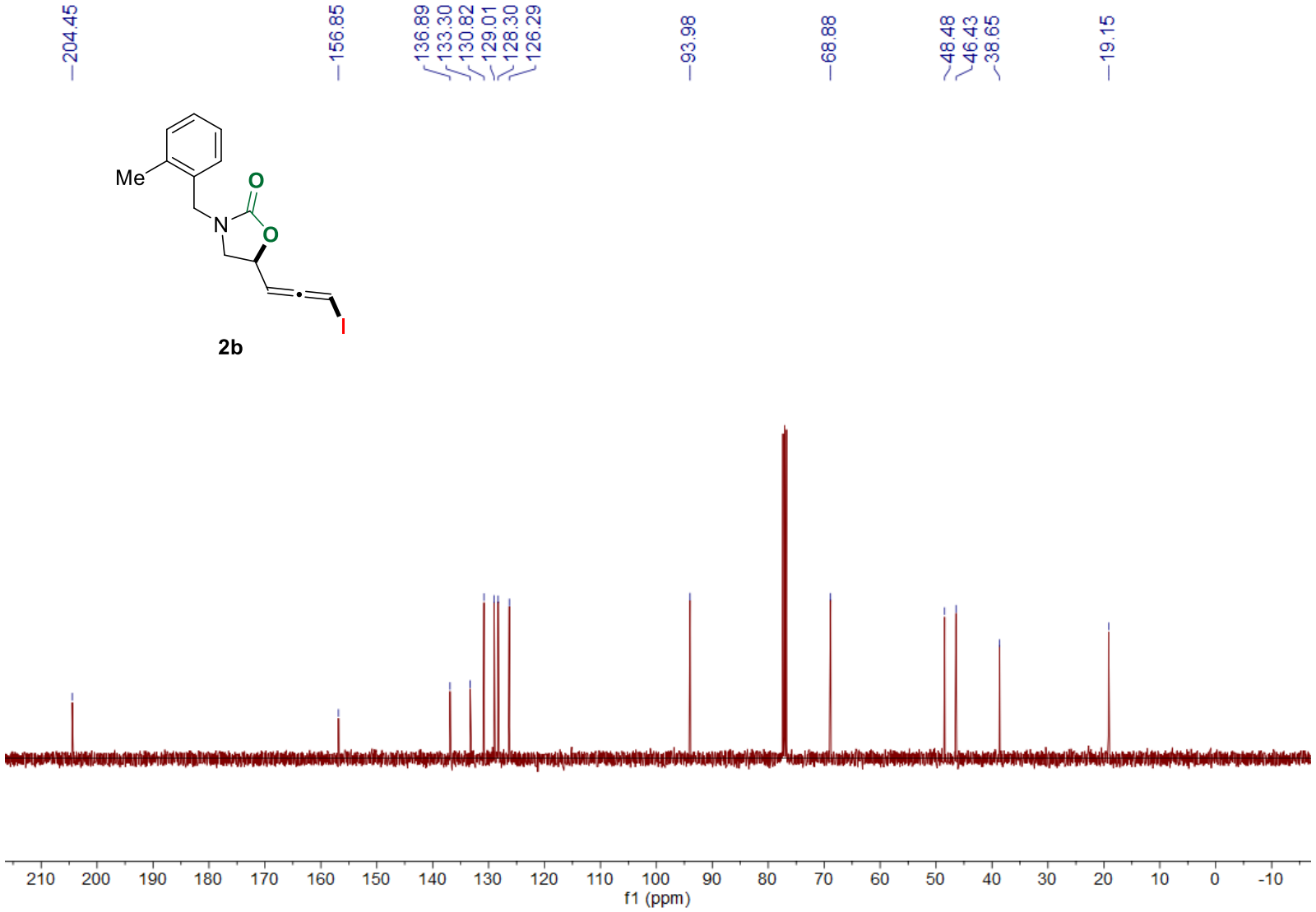
7.24
7.23
7.22
7.21
7.21
7.20
7.19
7.18
5.89
5.88
5.87
5.87
5.23
5.22
5.21
5.06
5.05
5.04
5.04
5.03
5.02
5.02
5.01
5.00
4.50
4.46
4.44
4.40
3.56
3.53
3.51
3.24
3.23
3.22
3.20
2.33
0.00
Me
O
N
O
I
4.35
0.94
1.01
0.98
1.09
1.00
1.06
1.16
3.25
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)

2b
dr > 20:1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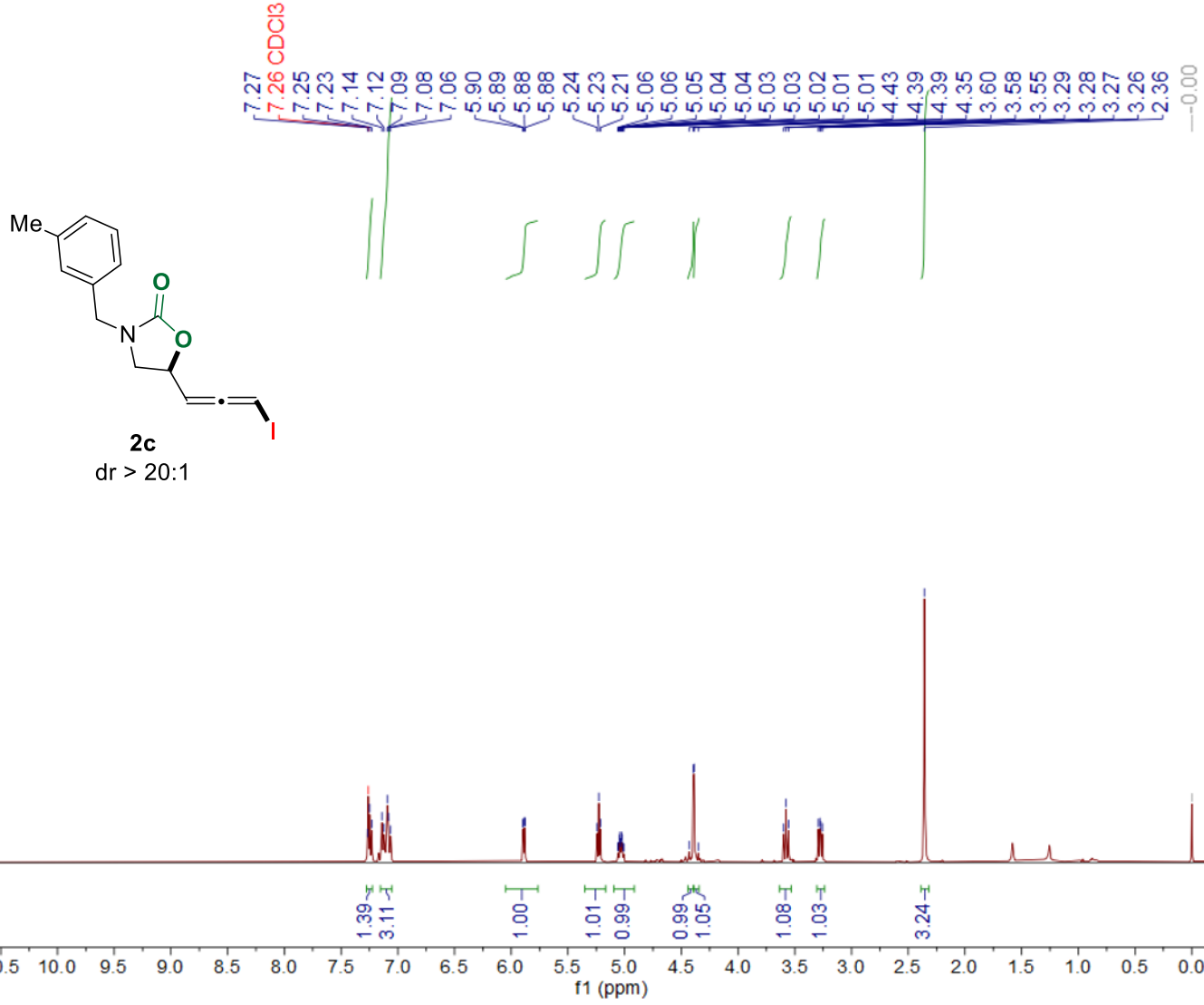
136.89
133.30
130.82
129.01
128.30
126.29
93.98
68.88
48.48
46.43
38.65
19.15
Me
O
N
O
2b
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)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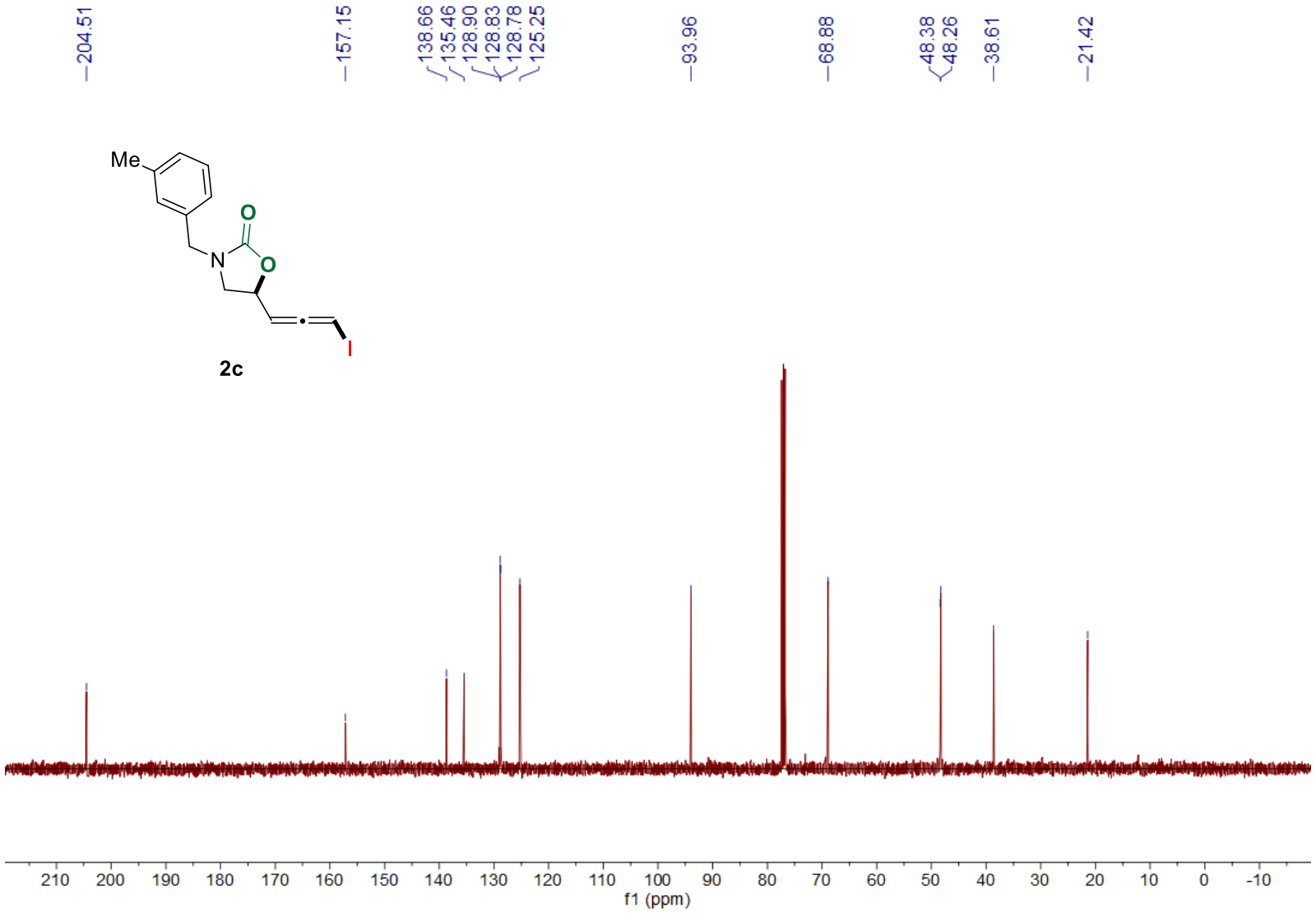
7.25
7.23
7.14
7.12
7.09
7.08
7.06
5.90
5.89
5.88
5.88
5.24
5.23
5.21
5.06
5.06
5.05
5.04
5.04
5.03
5.03
5.02
5.01
5.01
4.43
4.39
4.39
4.35
3.60
3.58
3.55
3.29
3.28
3.27
3.26
2.36
0.00
Me
O
N
O
I
1.39
3.11
1.00
1.01
0.99
0.99
1.05
1.08
1.03
3.24
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)

2c
dr > 20:1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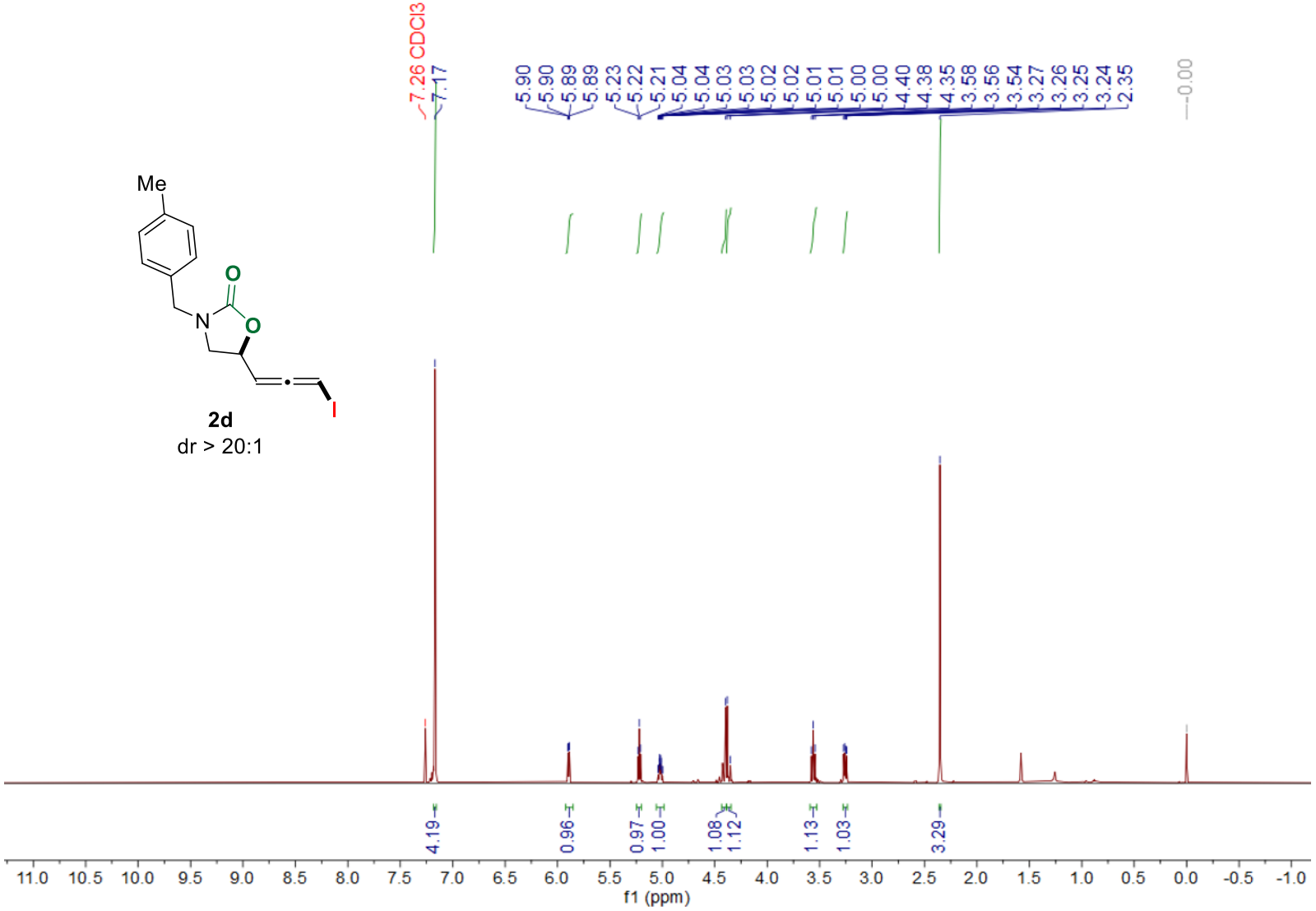
157.15
138.66
135.46
128.90
128.83
128.78
125.25
93.96
68.88
48.38
48.26
38.61
21.42
Me
O
N
O
2c
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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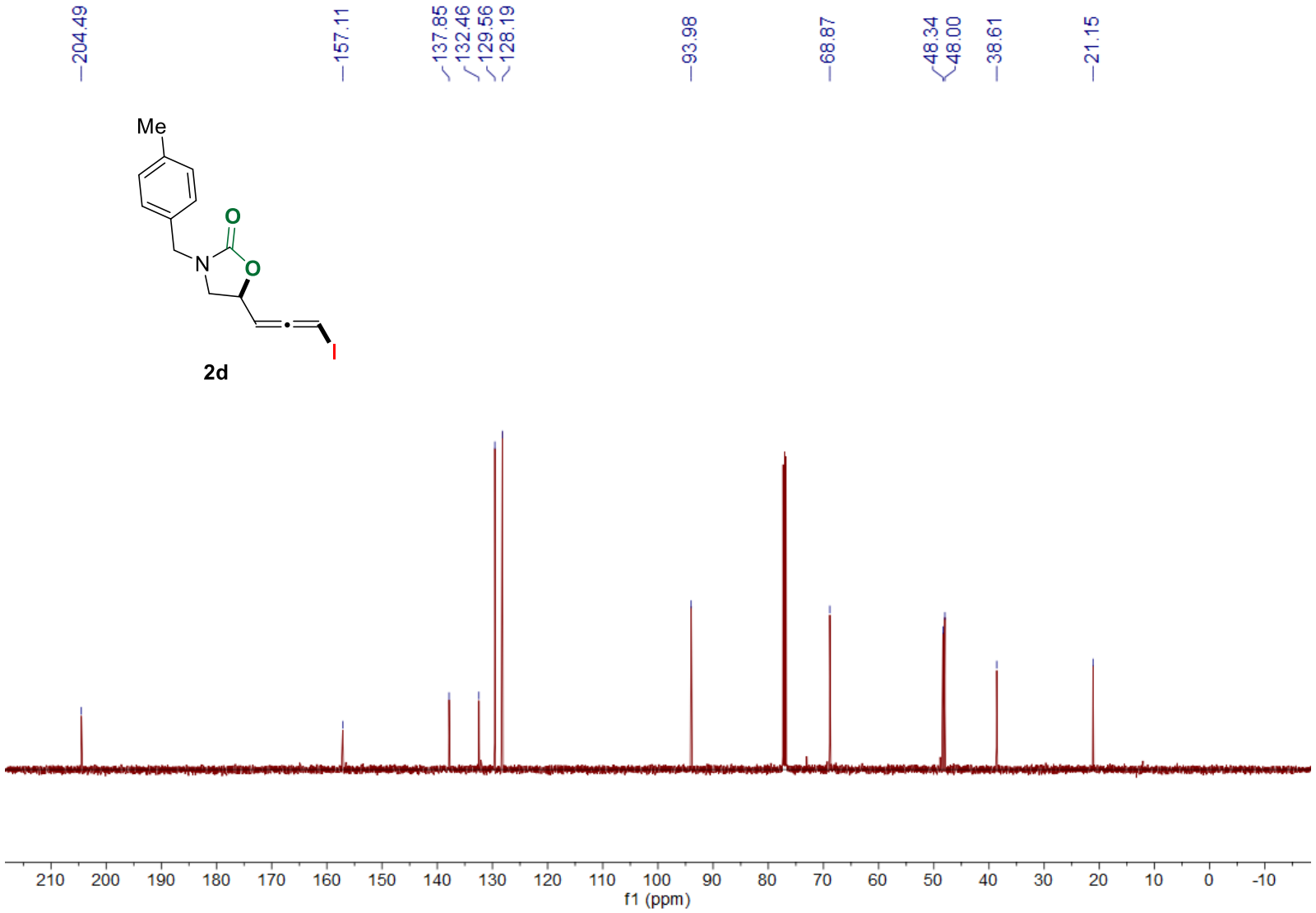
7.17
5.90
5.90
5.89
5.89
5.23
5.22
5.21
5.04
5.04
5.03
5.03
5.02
5.02
5.01
5.01
5.00
5.00
4.40
4.38
4.35
3.58
3.56
3.54
3.27
3.26
3.25
3.24
2.35
0.00
Me
O
N
O
I
2d
dr > 20:1
4.19
0.96
0.97
1.00
1.08
1.12
1.13
1.03
3.29
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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137.85
132.46
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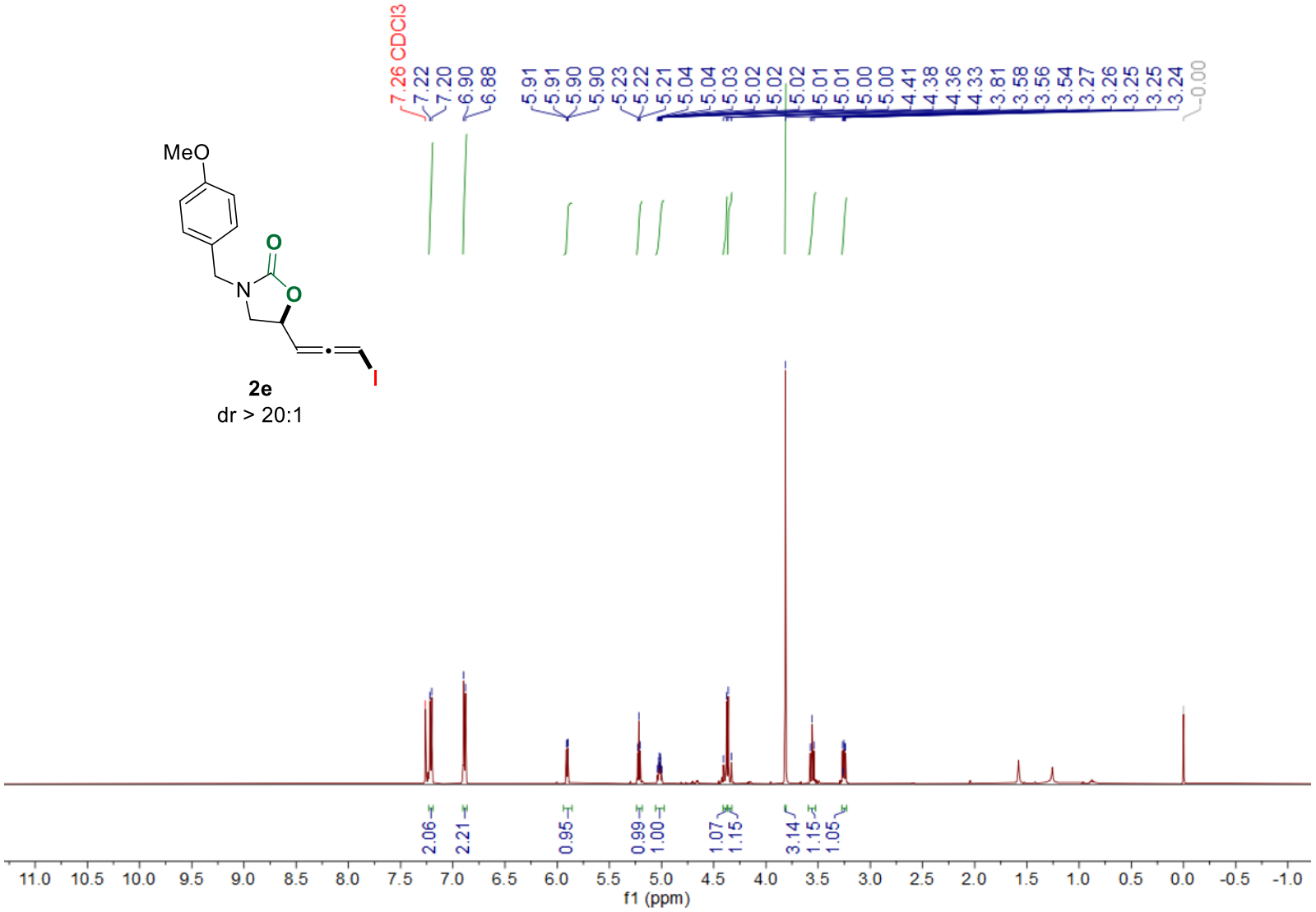
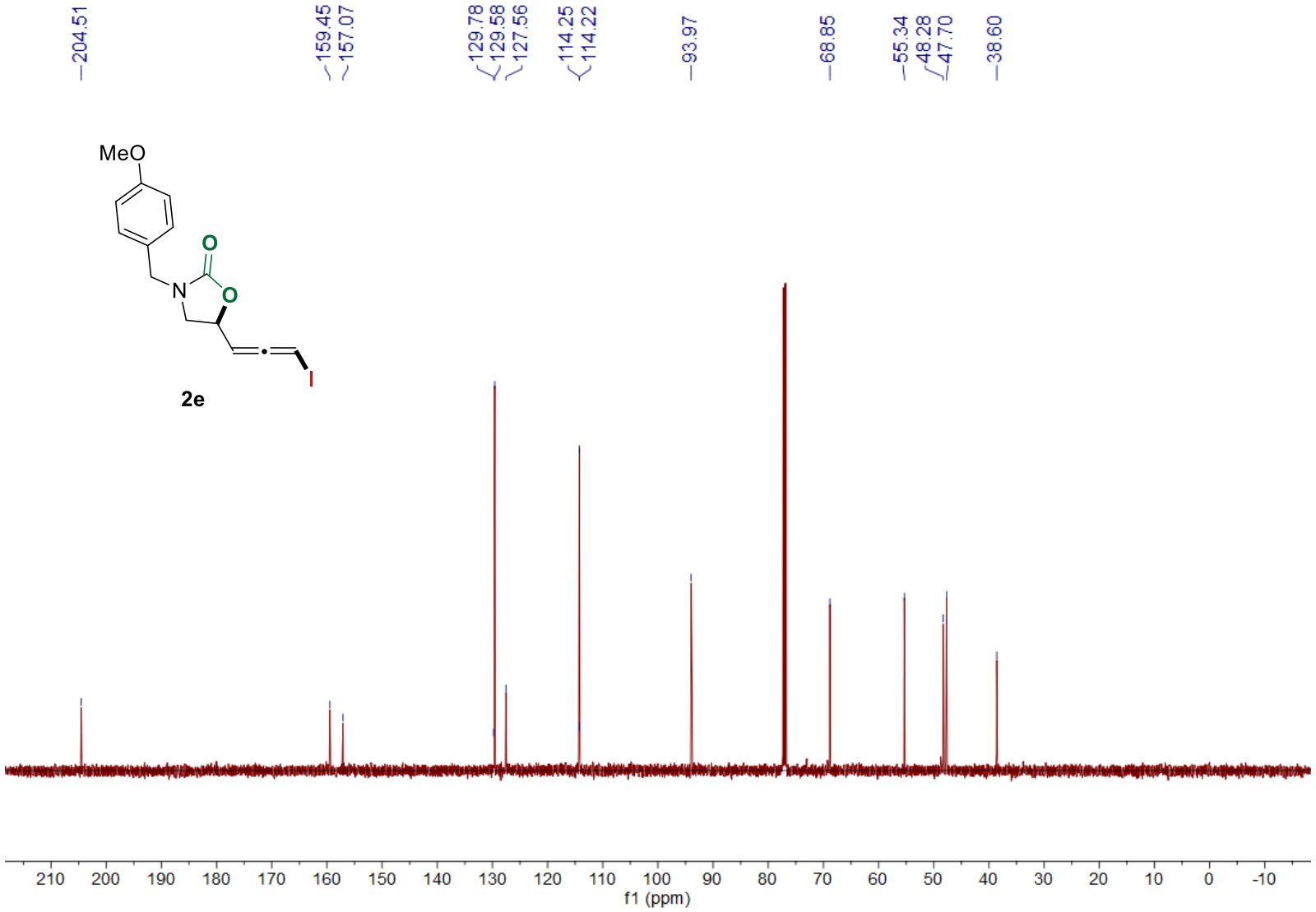
128.19
93.98
68.87
48.34
48.00
38.61
21.15
Me
O
N
O
I
2d
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


MeO
O
N
O
2e
dr > 20:1
7.26 CDCl3
7.22
7.20
6.90
6.88
5.91
5.91
5.90
5.90
5.23
5.22
5.21
5.04
5.04
5.03
5.02
5.02
5.02
5.01
5.01
5.00
5.00
4.41
4.38
4.36
4.33
3.81
3.58
3.56
3.54
3.27
3.26
3.25
3.25
3.24
-0.00
2.06
2.21
0.95
0.99
1.00
1.07
1.15
3.14
1.15
1.05
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 -1.0
f1 (ppm)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159.45
157.07
129.78
129.58
127.56
114.25
114.22
93.97
68.85
55.34
48.28
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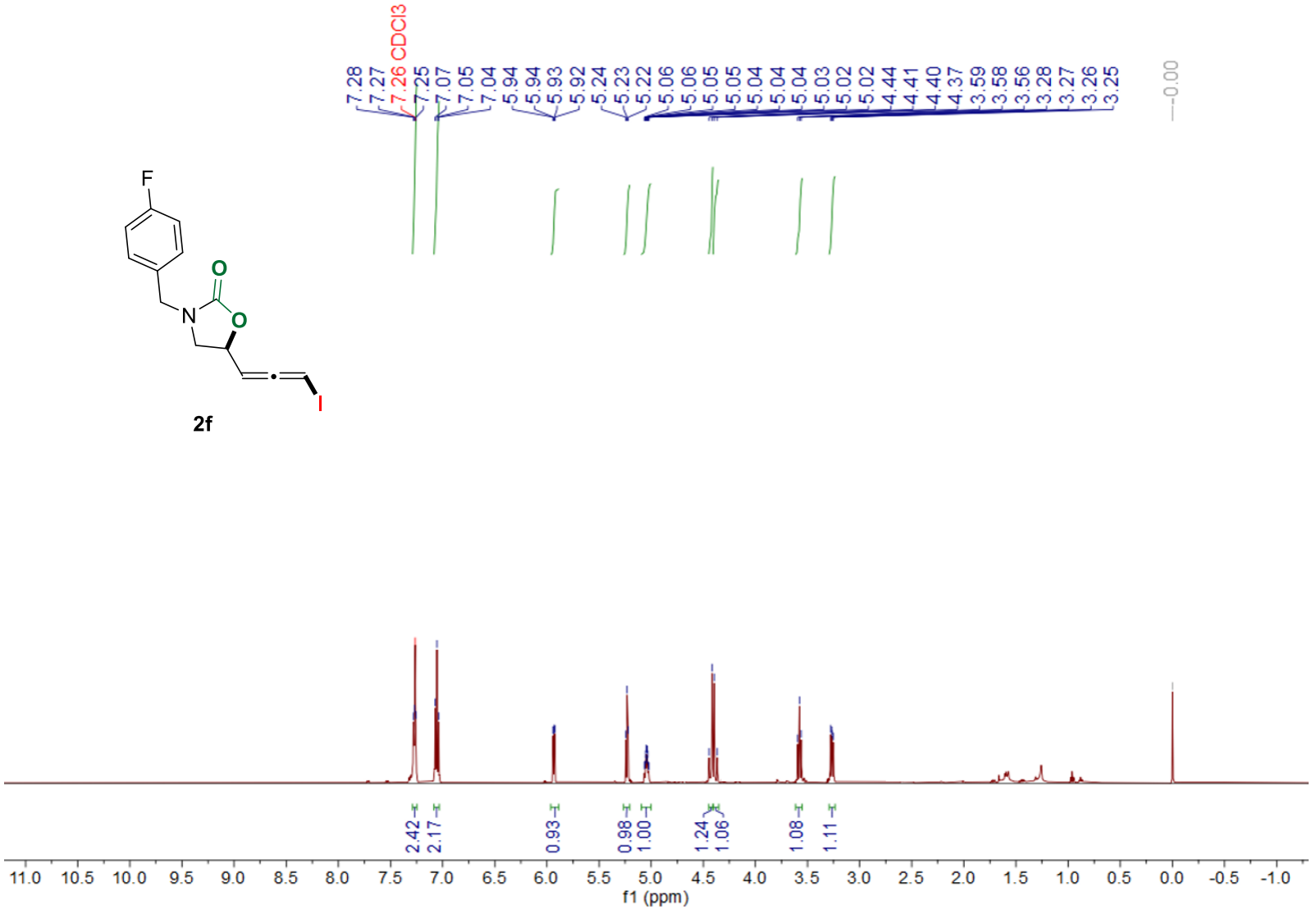
f1 (ppm)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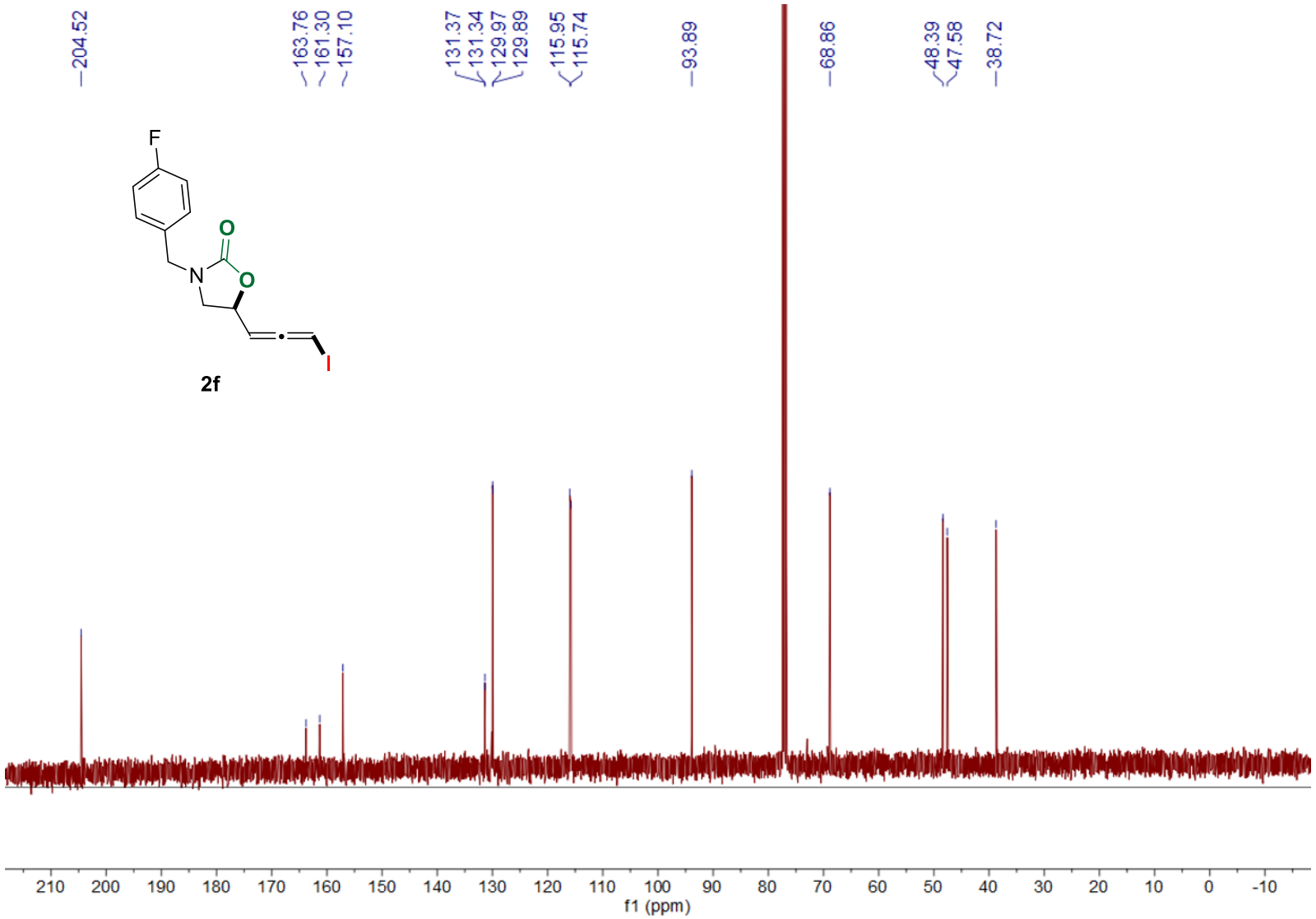
7.27
7.26 CDCl3
7.25
7.07
7.05
7.04
5.94
5.94
5.93
5.92
5.24
5.23
5.22
5.06
5.06
5.05
5.05
5.04
5.04
5.04
5.03
5.02
5.02
4.44
4.41
4.40
4.37
3.59
3.58
3.56
3.28
3.27
3.26
3.25
0.00
F
O
N
O
I
2f
2.42
2.17
0.93
0.98
1.00
1.24
1.06
1.08
1.11
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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157.10
131.37
131.34
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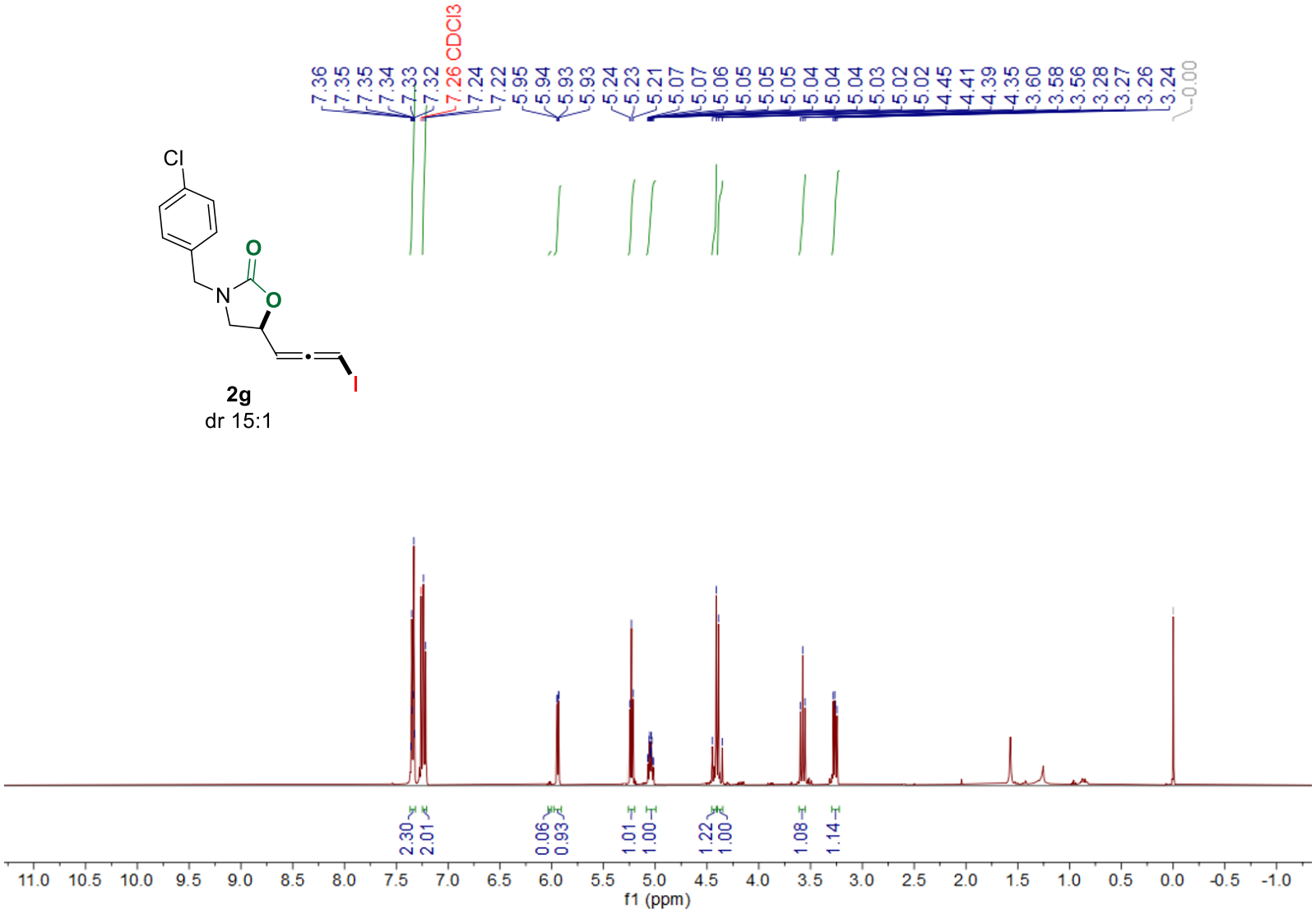
115.95
115.74
93.89
68.86
48.39
47.58
38.72
F
O
N
O
I
2f
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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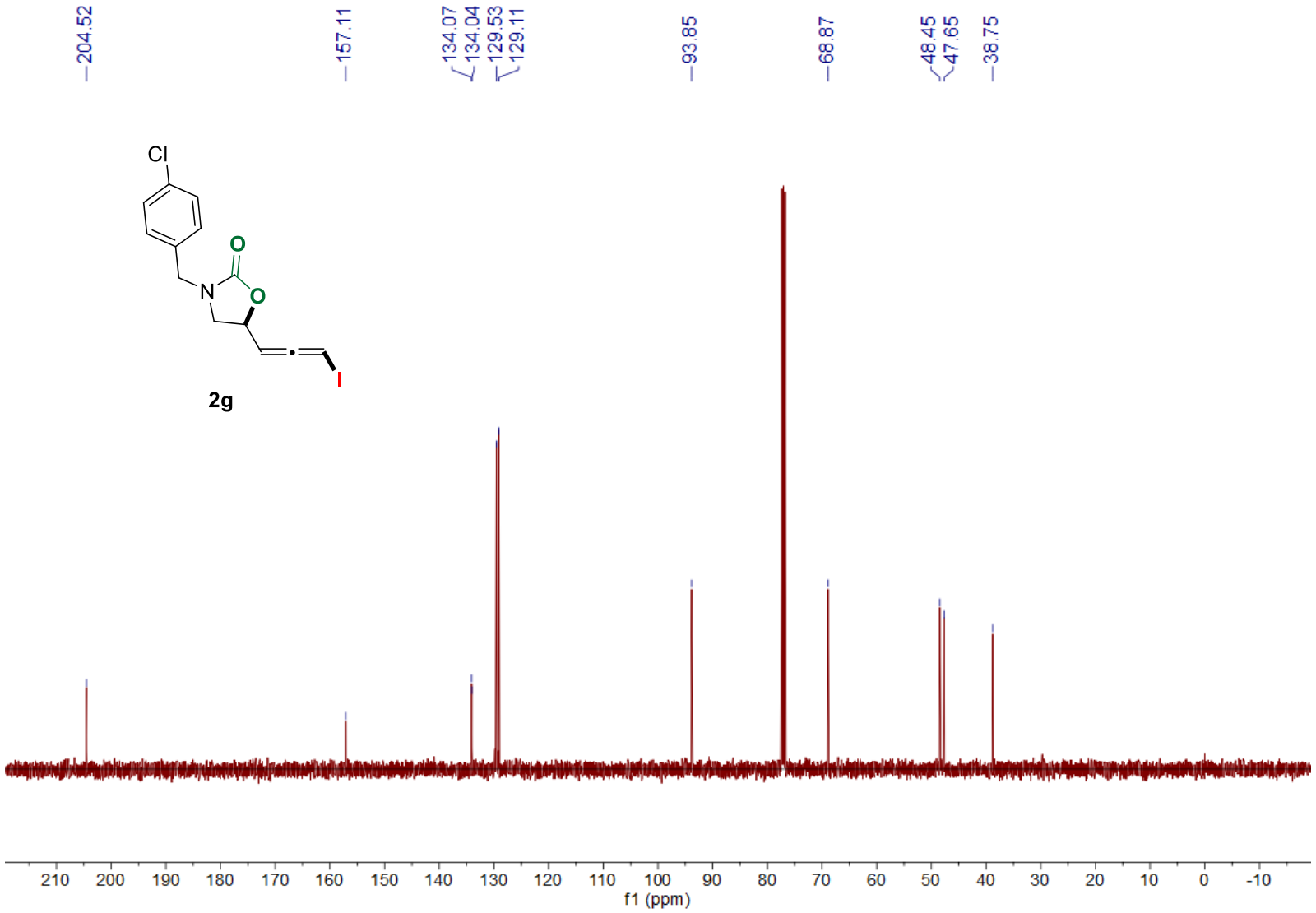
7.35
7.35
7.34
7.33
7.32
7.26 CDCl3
7.24
7.22
5.95
5.94
5.93
5.93
5.24
5.23
5.21
5.07
5.07
5.06
5.05
5.05
5.05
5.04
5.04
5.04
5.03
5.02
5.02
4.45
4.41
4.39
4.35
3.60
3.58
3.56
3.28
3.27
3.26
3.24
-0.00
Cl
O
N
O
I
2g
dr 15:1
2.30
2.01
0.06
0.93
1.01
1.00
1.22
1.00
1.08
1.14
11.0 10.5 10.0 9.5 9.0 8.5 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 -1.0
f1 (ppm)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68.87
48.45
47.65
38.75
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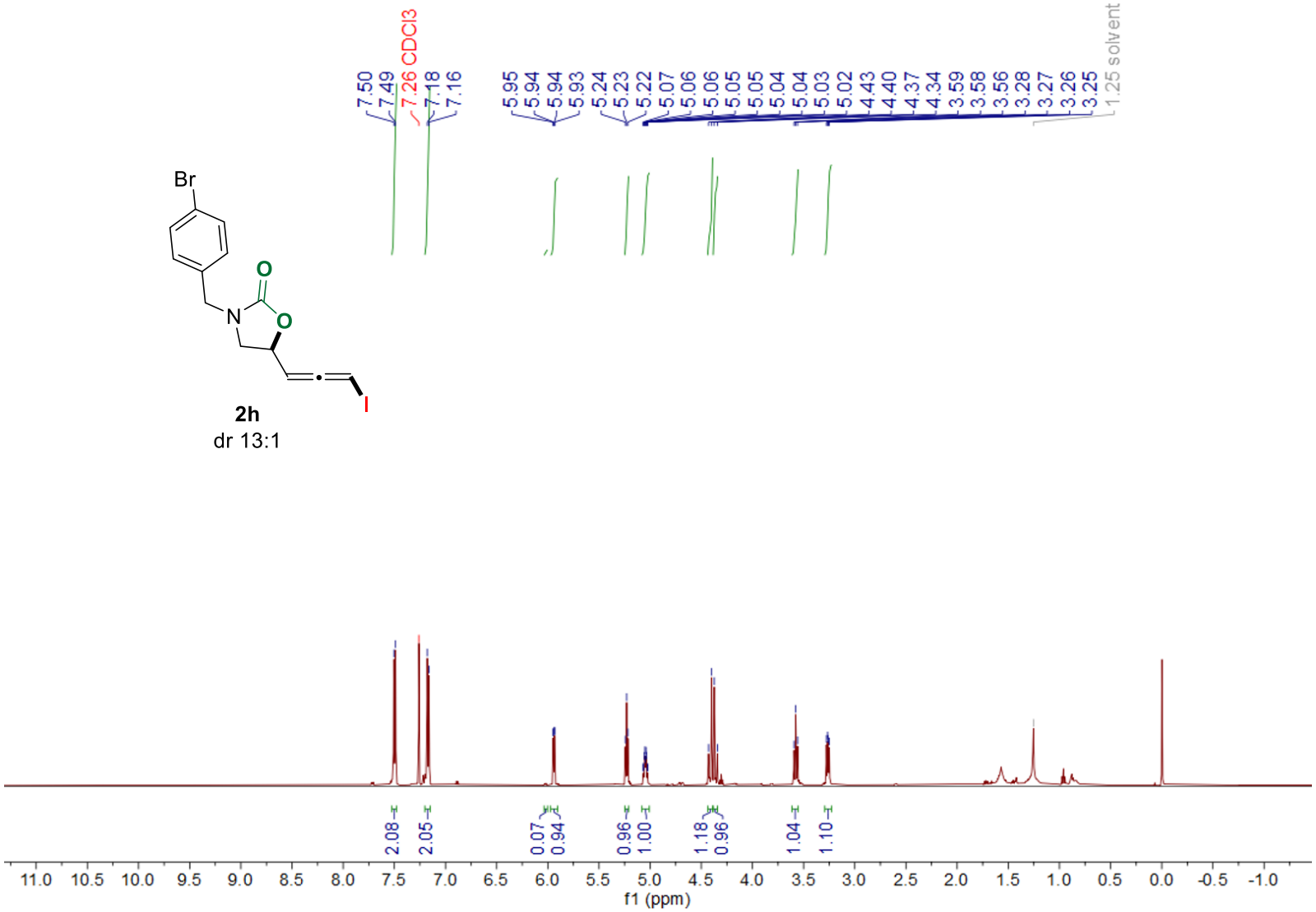
N
O
I
2g
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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7.49
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7.18
7.16
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5.94
5.93
5.24
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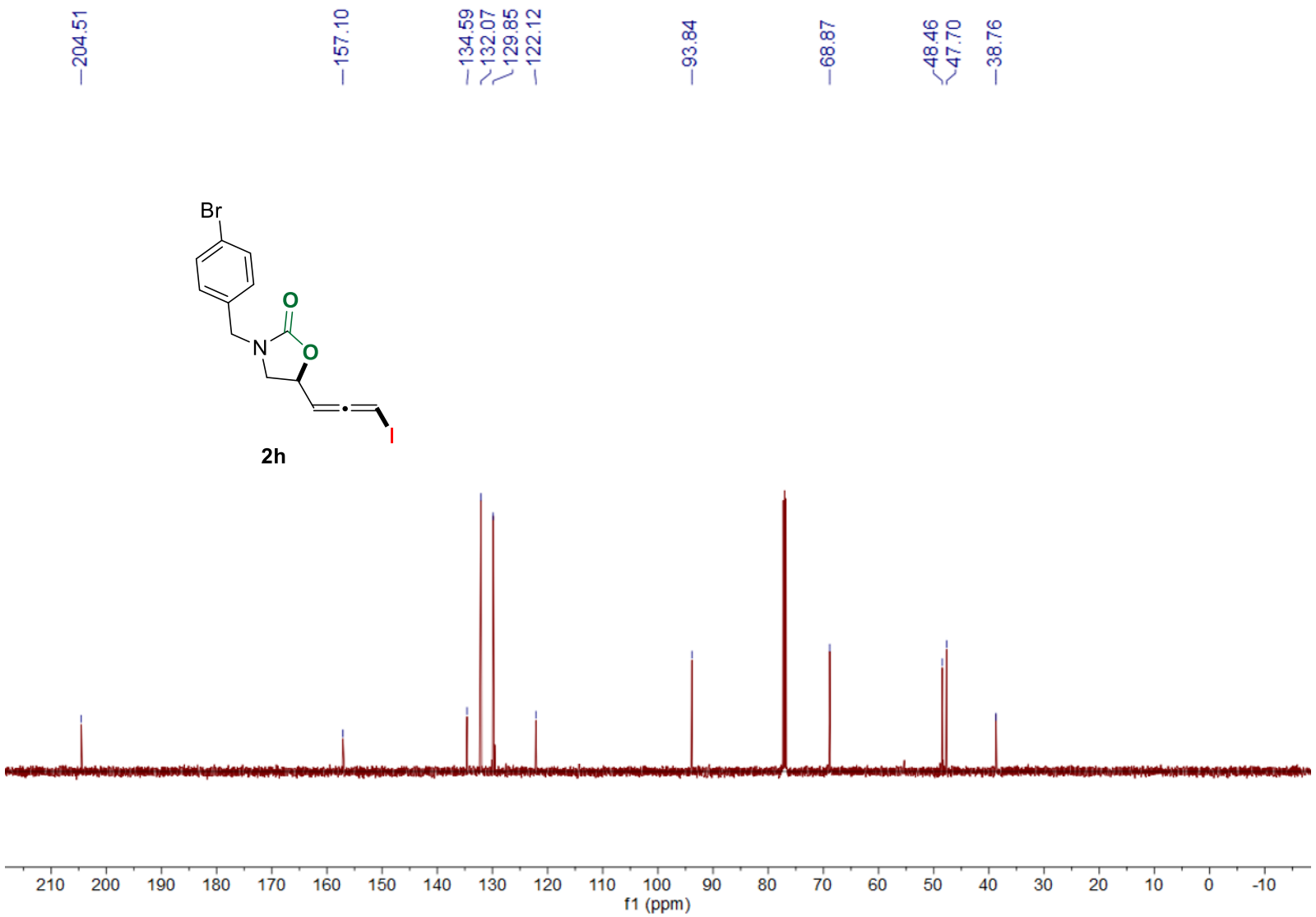
5.22
5.07
5.06
5.06
5.05
5.05
5.04
5.04
5.03
5.02
4.43
4.40
4.37
4.34
3.59
3.58
3.56
3.28
3.27
3.26
3.25
1.25 solvent
Br
O
N
O
2h
dr 13:1
2.08
2.05
0.07
0.94
0.96
1.00
1.18
0.96
1.04
1.10
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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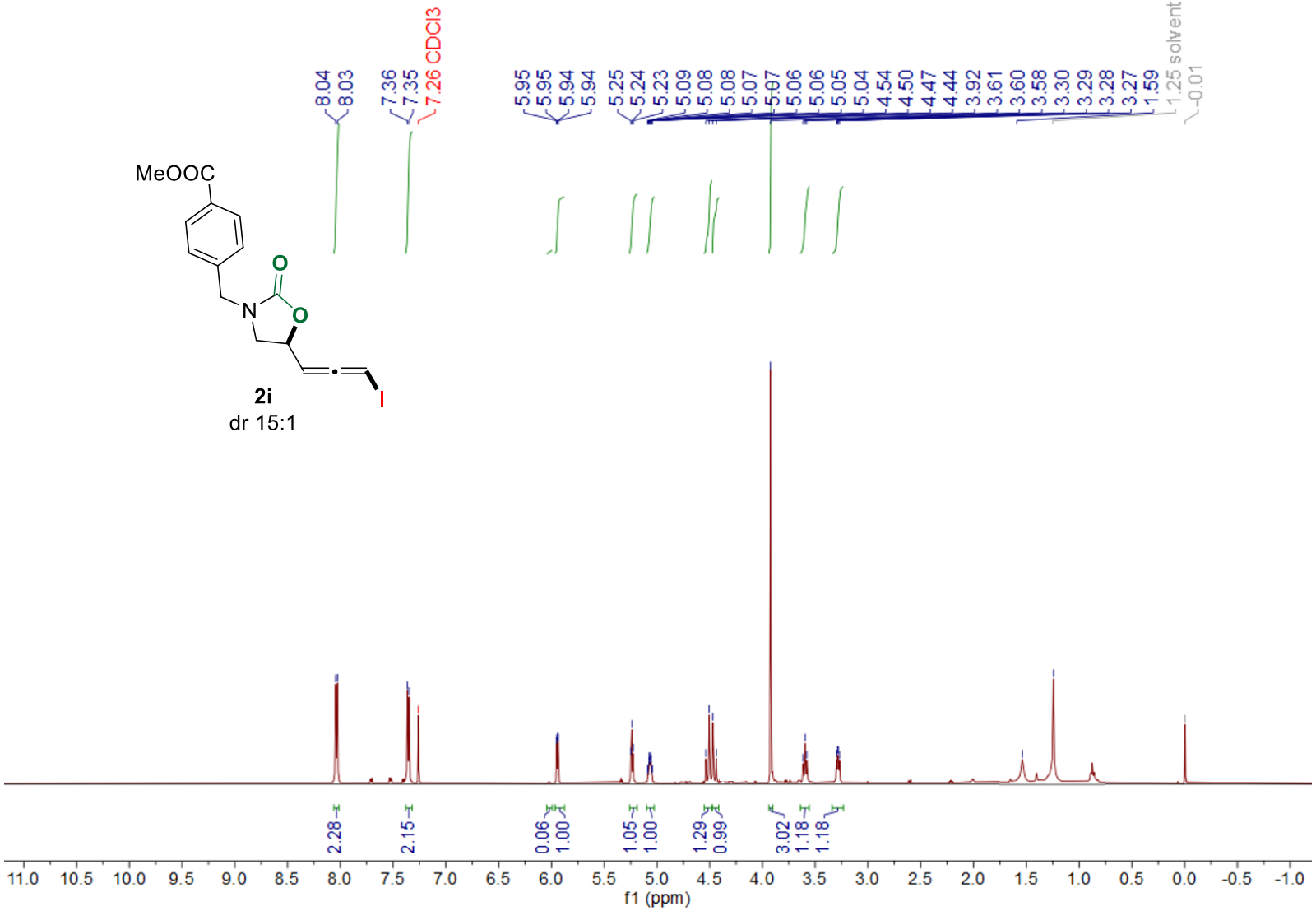
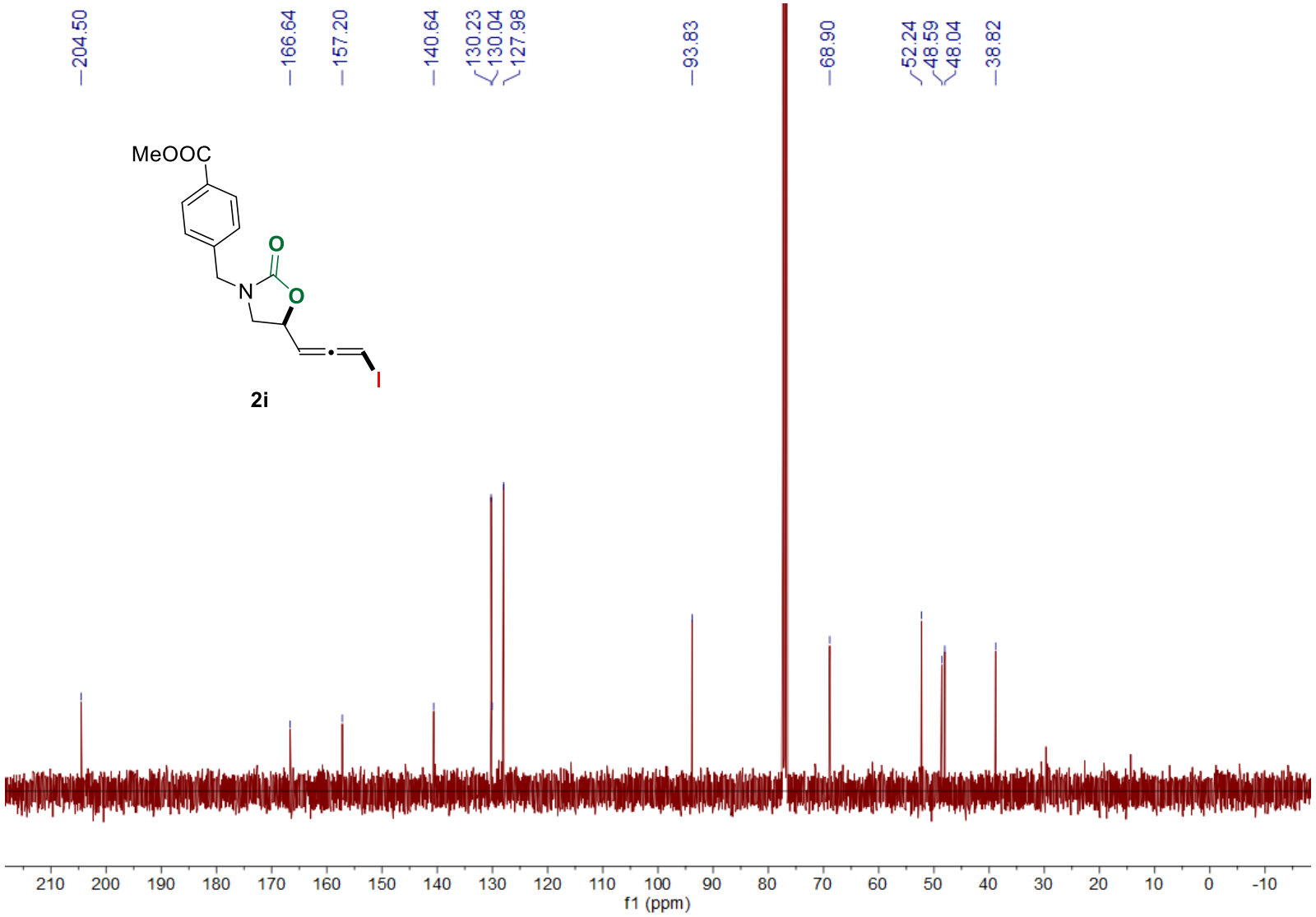
134.59
132.07
129.85
122.12
93.84
68.87
48.46
47.70
38.76
Br
O
N
O
I
2h
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


MeOOC
O
N
O
2i
dr 15:1
8.04
8.03
7.36
7.35
7.26 CDCl3
5.95
5.95
5.94
5.94
5.25
5.24
5.23
5.09
5.08
5.08
5.07
5.07
5.06
5.06
5.05
5.04
4.54
4.50
4.47
4.44
3.92
3.61
3.60
3.58
3.30
3.29
3.28
3.27
1.59
1.25 solvent
-0.01
2.28
2.15
0.06
1.00
1.05
1.00
1.29
0.99
3.02
1.18
1.18
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 -1.0
f1 (ppm)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130.23
130.04
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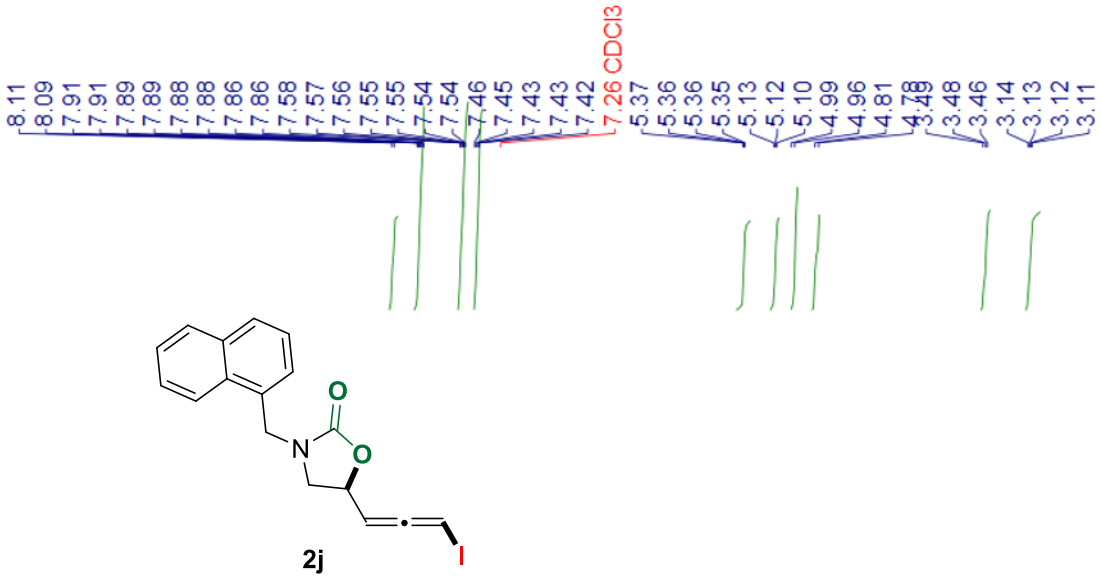
93.83
68.90
52.24
48.59
48.04
38.82
MeOOC
O
N
O
I
2i
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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7.89
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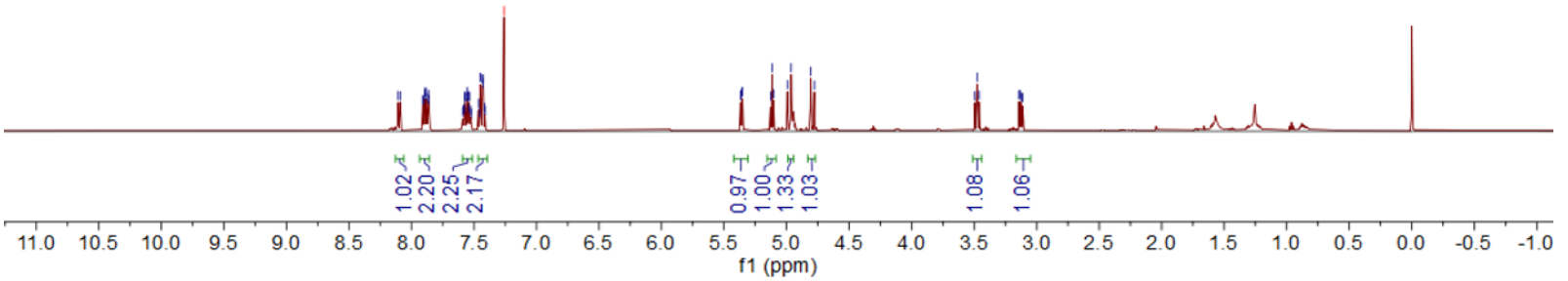
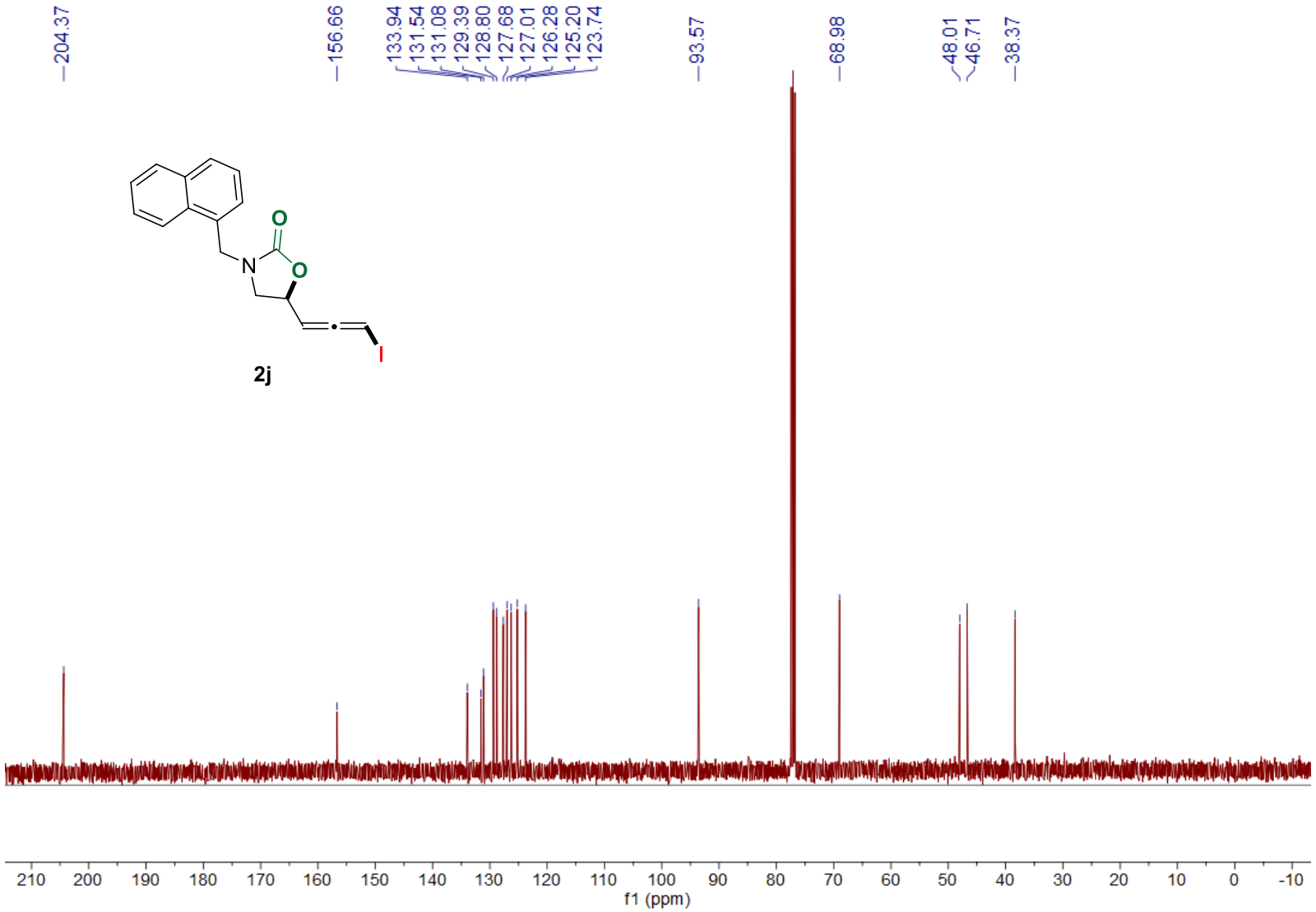
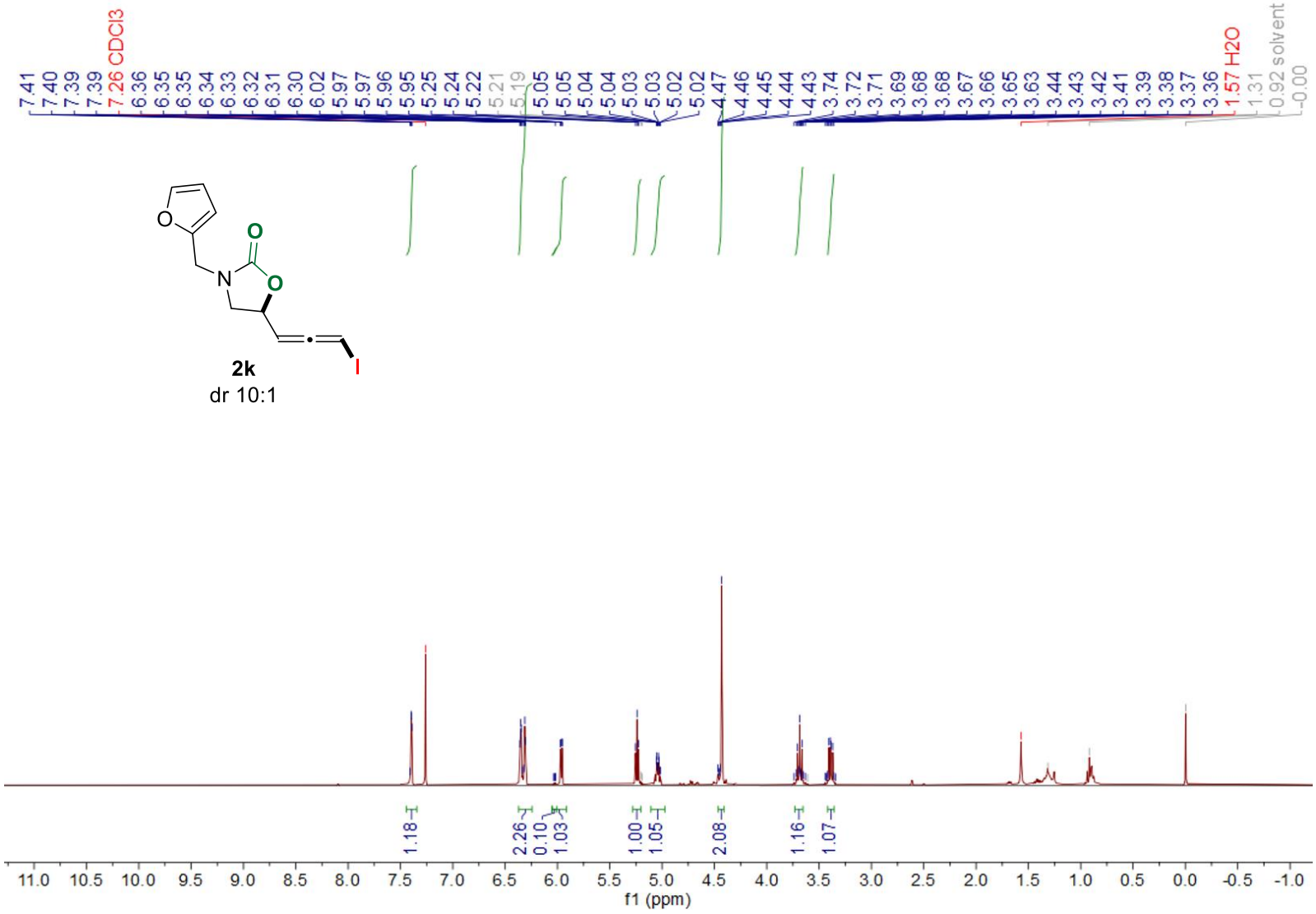
7.86
7.58
7.57
7.56
7.55
7.55
7.54
7.54
7.46
7.45
7.43
7.43
7.42
7.26 CDCl3
5.37
5.36
5.36
5.35
5.13
5.12
5.10
4.99
4.96
4.81
3.48
3.46
3.14
3.13
3.12
3.11
O
N
O
I

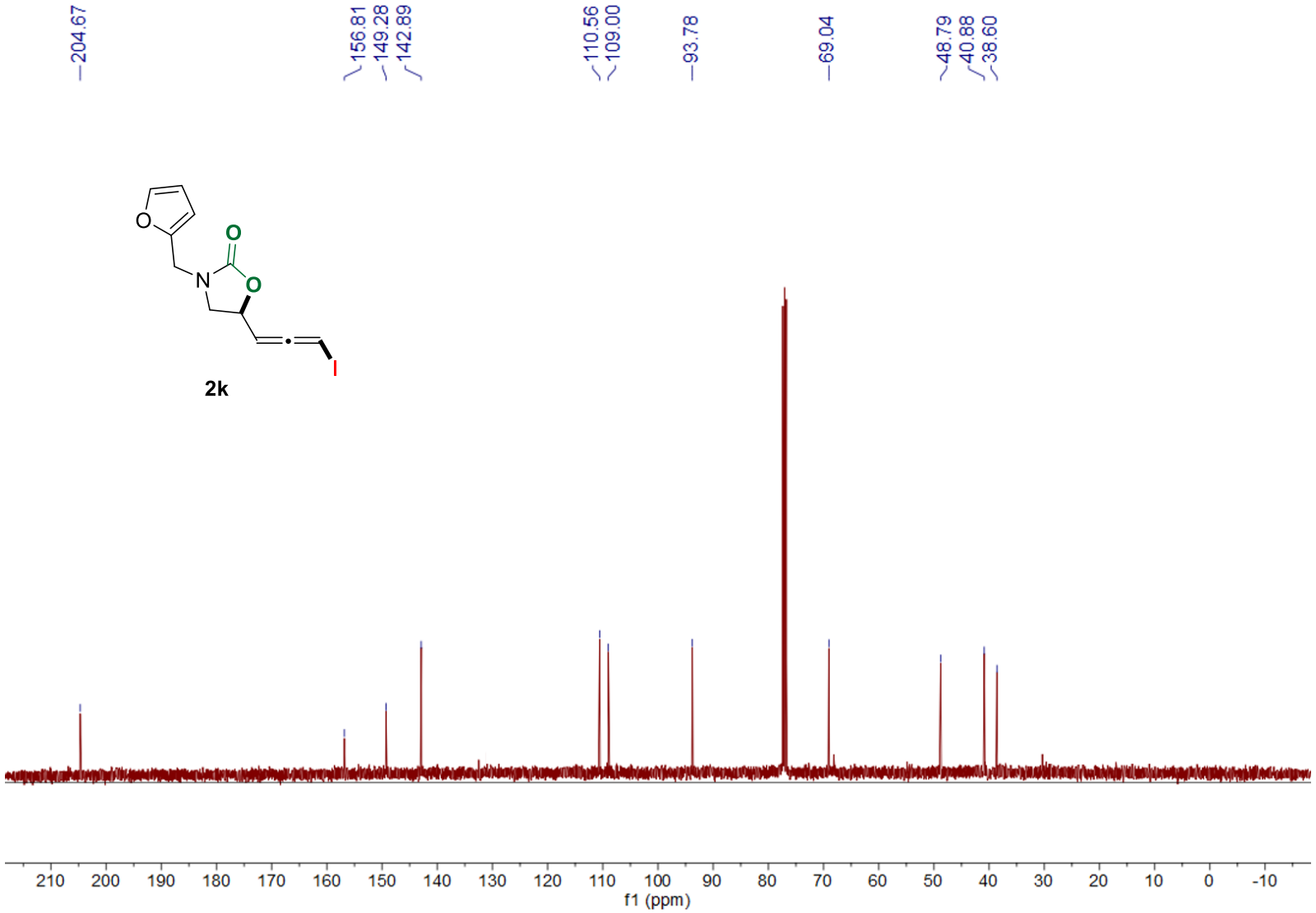
2j

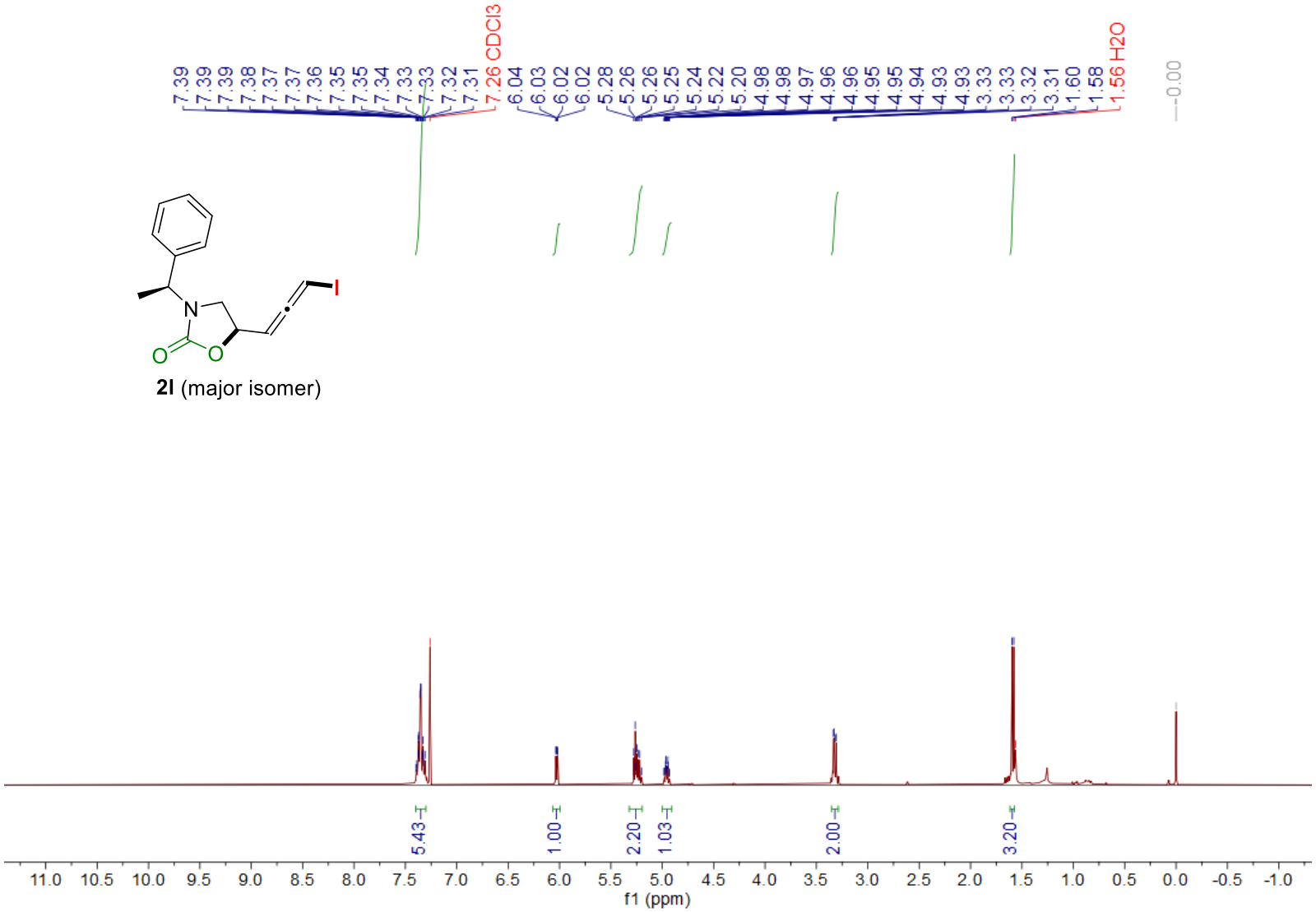
dr > 20:1


1.02
2.20
2.25
2.17
0.97
1.00
1.33
1.03
1.08
1.06
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 -1.0
f1 (ppm)

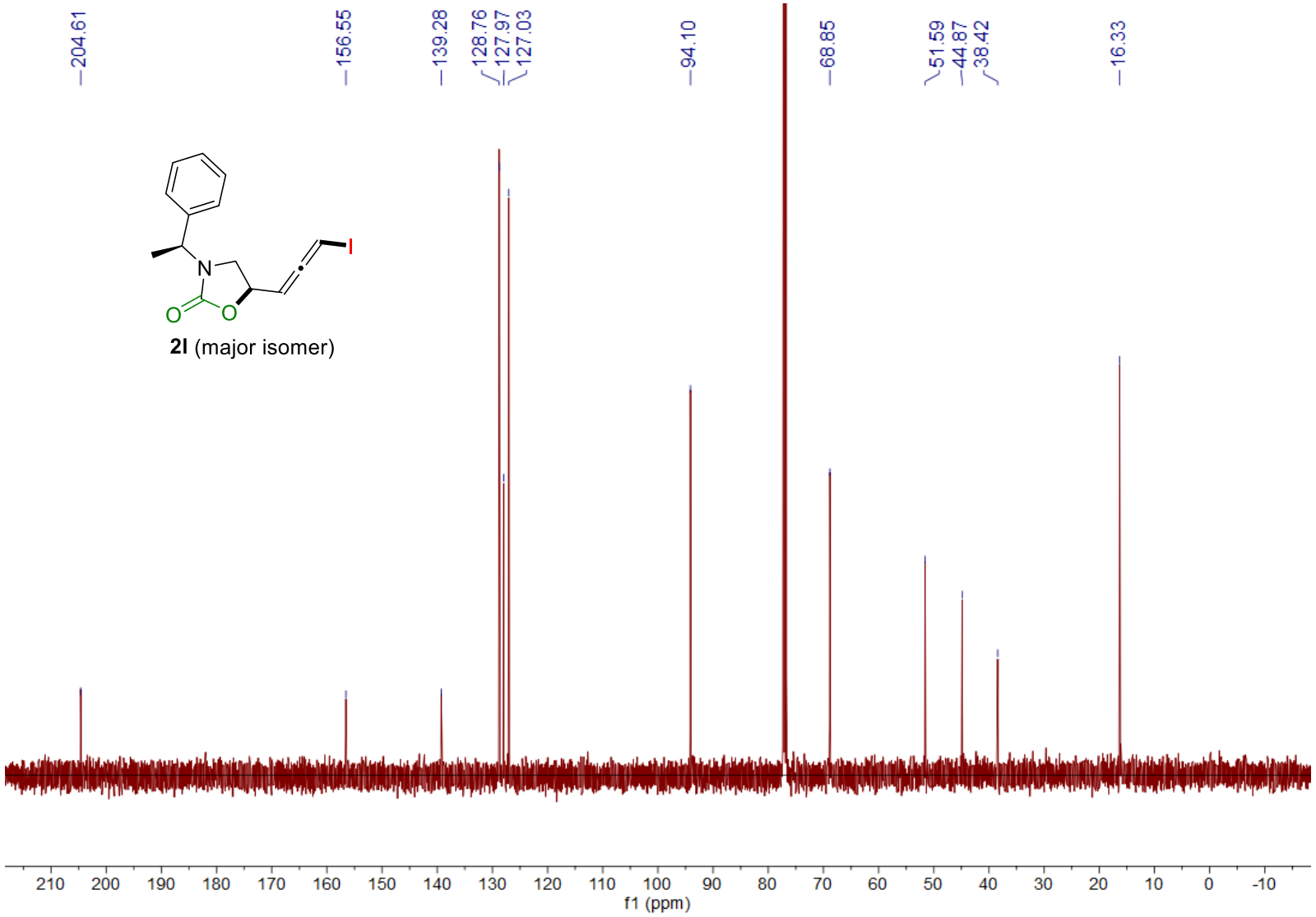

204.37
156.66
133.94
131.54
131.08
129.39
128.80
127.68
127.01
126.28
125.20
123.74
93.57
68.98
48.01
46.71
38.37
O
N
O
I
2j
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

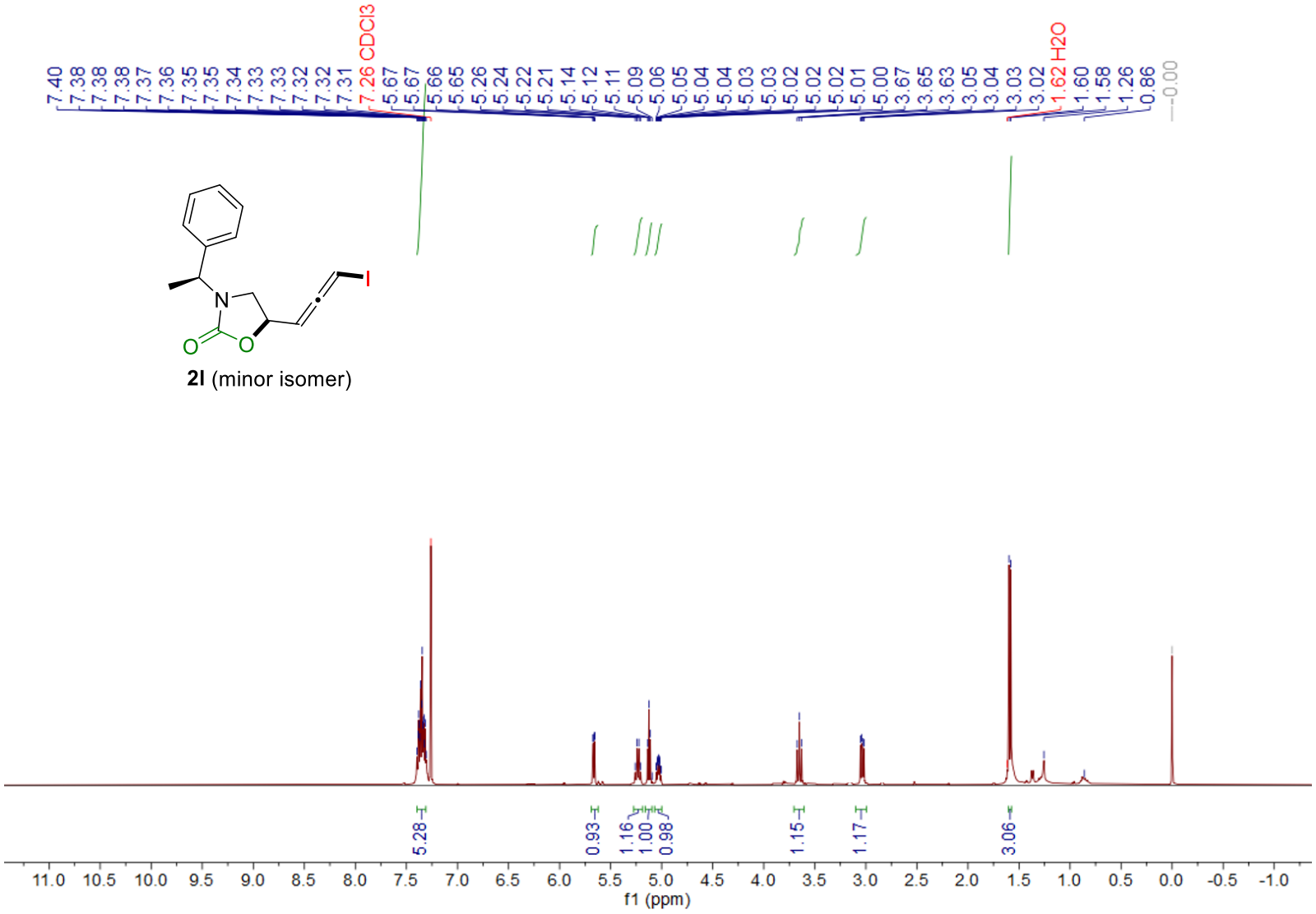

7.41
7.40
7.39
7.39
7.26 CDCl3
6.36
6.35
6.35
6.34
6.33
6.32
6.31
6.30
6.02
5.97
5.97
5.96
5.95
5.25
5.24
5.22
5.21
5.19
5.05
5.05
5.04
5.04
5.03
5.03
5.02
5.02
4.47
4.46
4.45
4.44
4.43
3.74
3.72
3.71
3.69
3.68
3.68
3.67
3.66
3.65
3.63
3.44
3.43
3.42
3.41
3.39
3.38
3.37
3.36
1.57 H2O
1.31
0.92 solvent
0.00
O
O
N
O
2k
dr 10:1
1.18
2.26
0.10
1.03
1.00
1.05
2.08
1.16
1.07
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
-1.0
f1 (ppm)


204.67
156.81
149.28
142.89
110.56
109.00
93.78
69.04
48.79
40.88
38.60
O
O
N
O
I
2k
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)

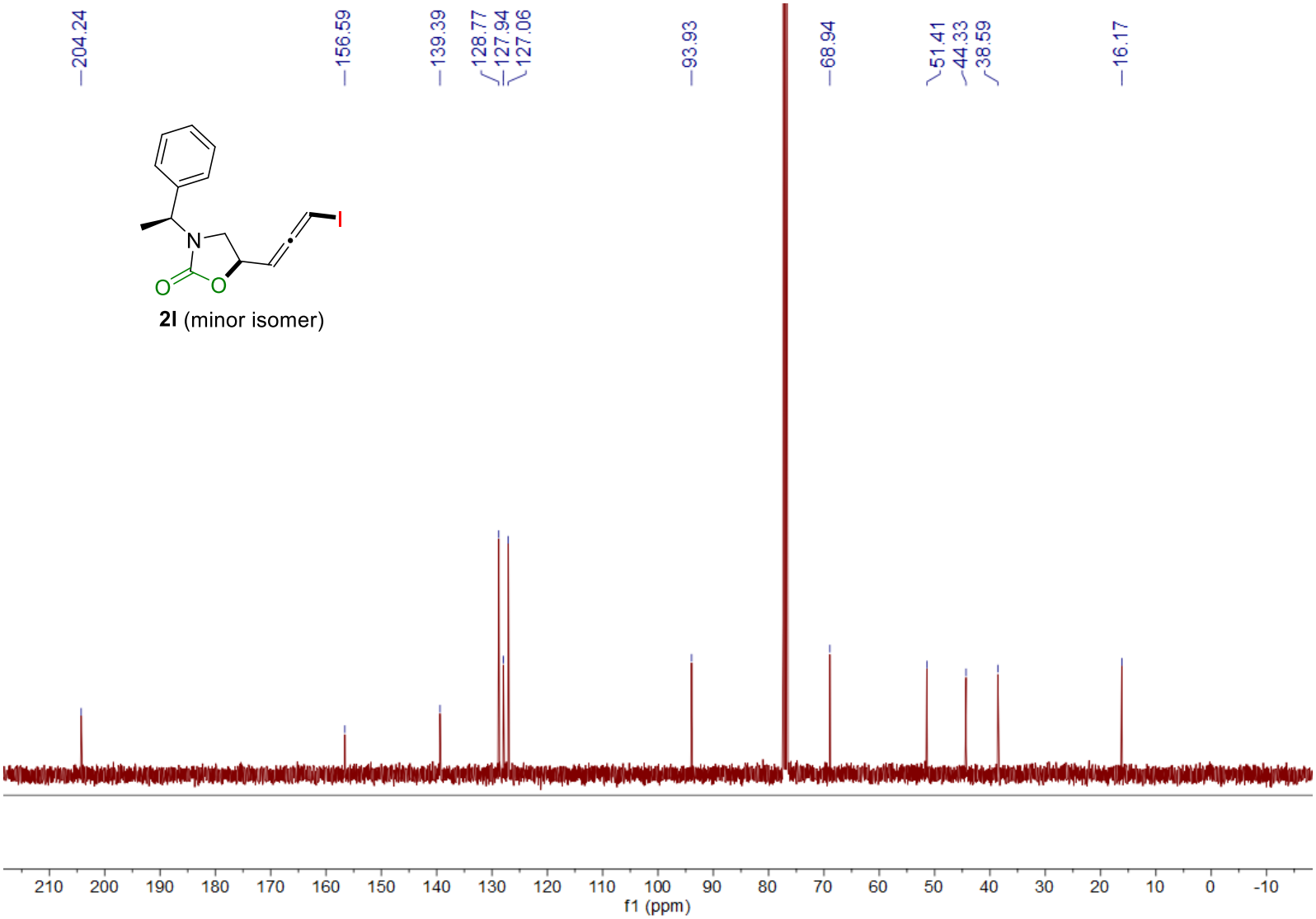


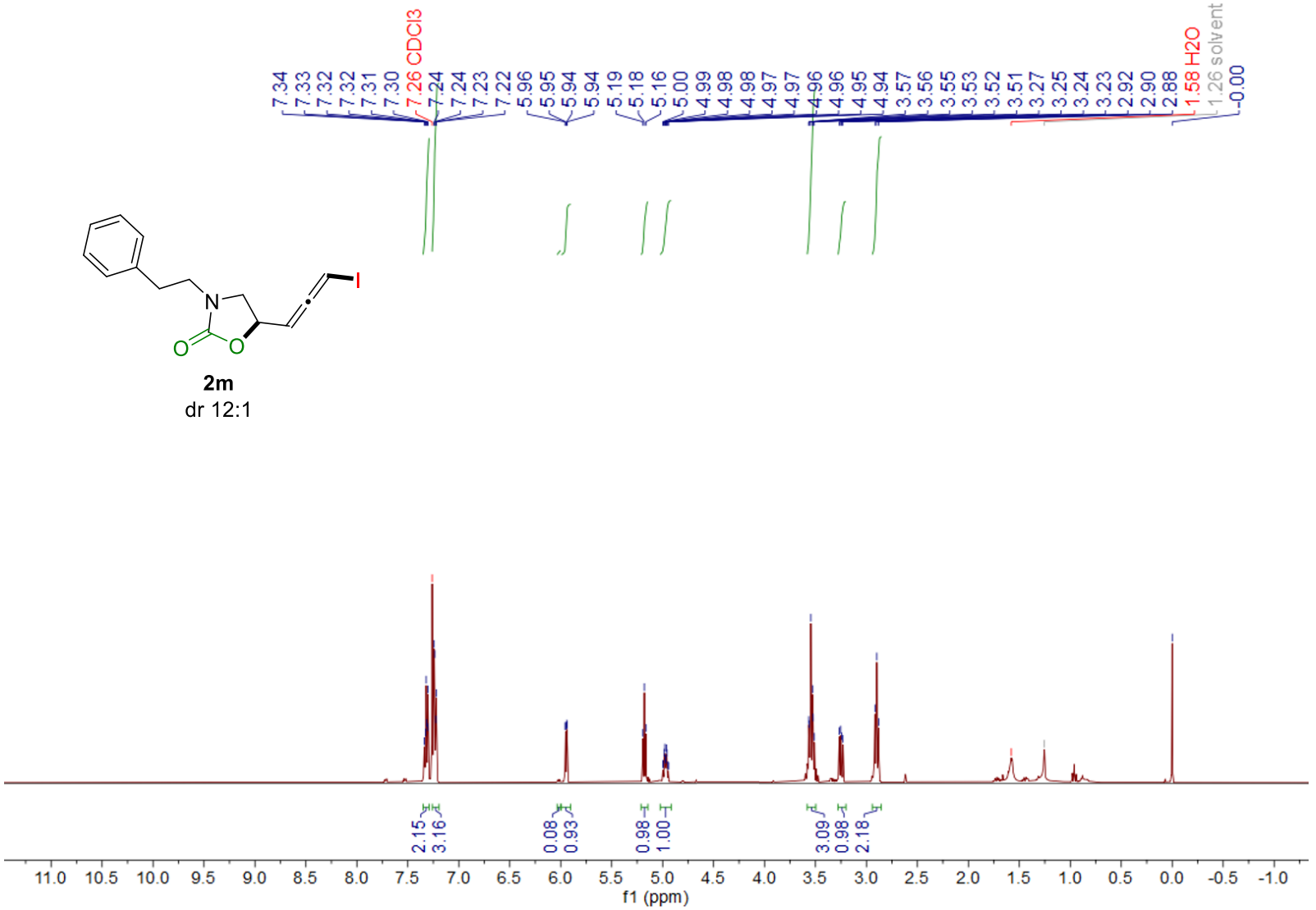
2l (major isomer)

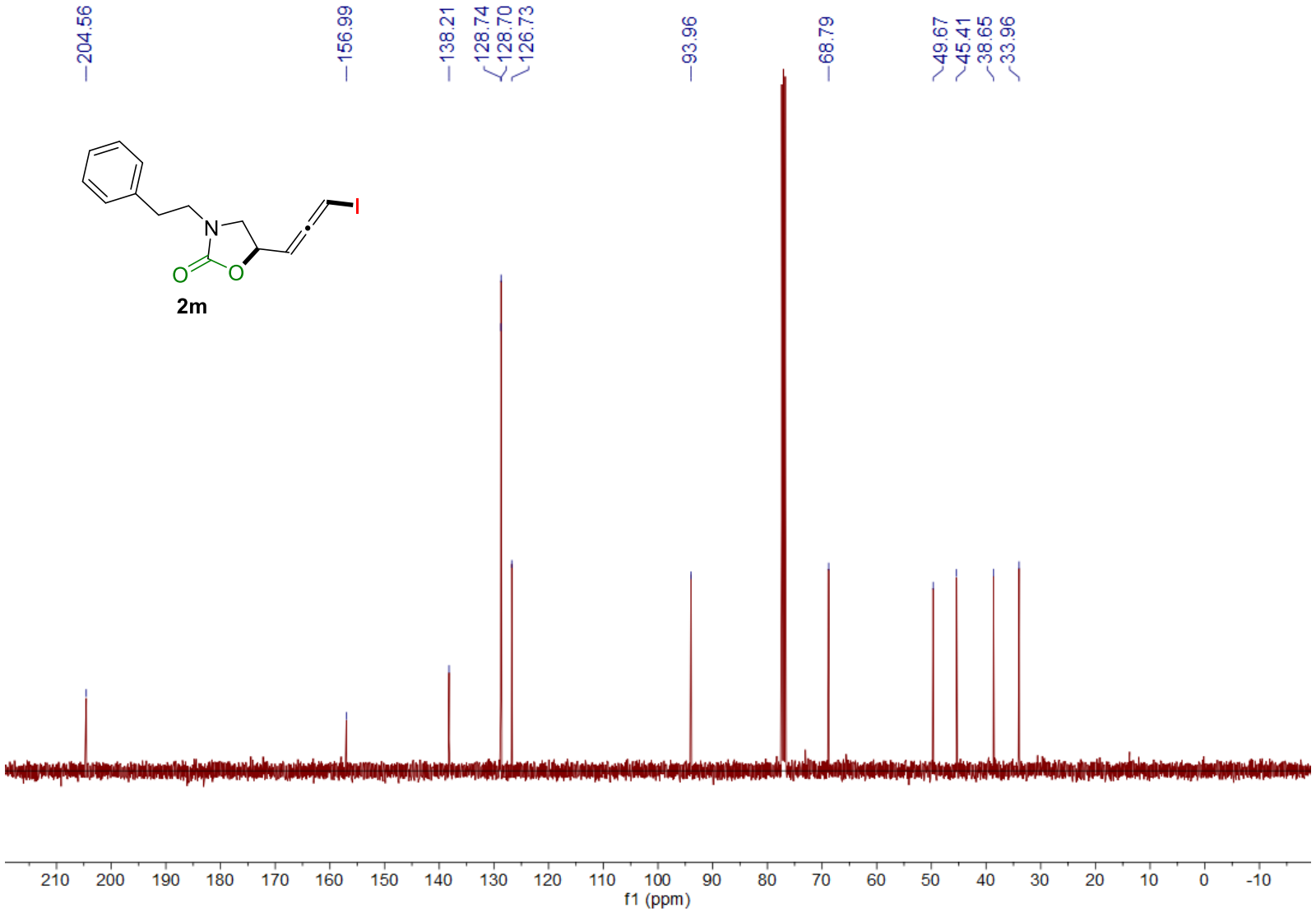

204.61
156.55
139.28
128.76
127.97
127.03
94.10
68.85
51.59
44.87
38.42
16.33
N
O
O
I
2l (major isomer)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

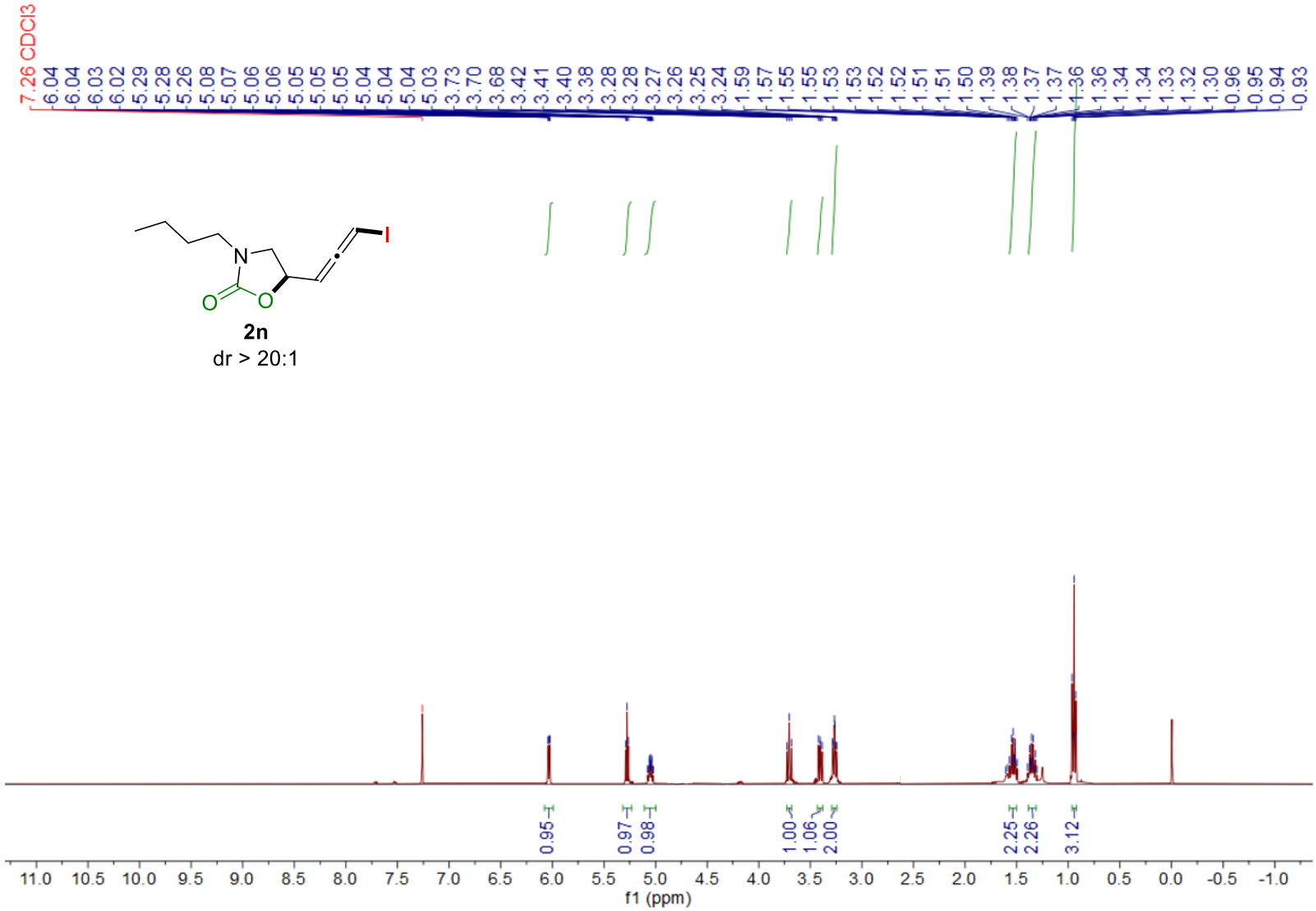


2l (minor isomer)


204.24
156.59
139.39
128.77
127.94
127.06
93.93
68.94
51.41
44.33
38.59
16.17
N
O
O
I
2l (minor isomer)
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)

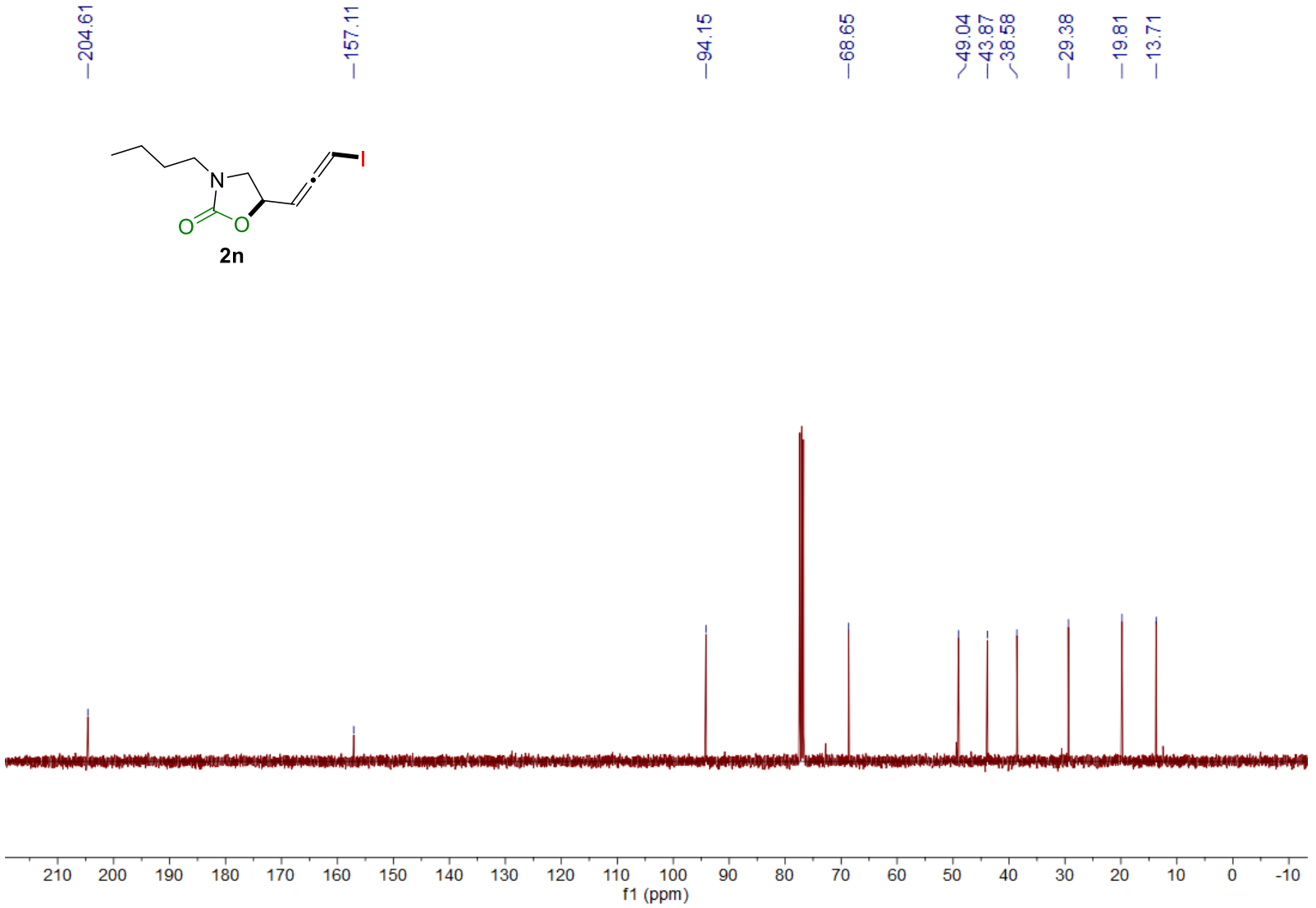

7.34
7.33
7.32
7.32
7.31
7.30
7.26 CDCl3
7.24
7.24
7.23
7.22
5.96
5.95
5.94
5.94
5.19
5.18
5.16
5.00
4.99
4.98
4.98
4.97
4.97
4.96
4.96
4.95
4.94
3.57
3.56
3.55
3.53
3.52
3.51
3.27
3.25
3.24
3.23
2.92
2.90
2.88
1.58 H2O
1.26 solvent
0.00
N
O
O
I
2m
dr 12:1
2.15
3.16
0.08
0.93
0.98
1.00
3.09
0.98
2.18
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 -1.0
f1 (ppm)

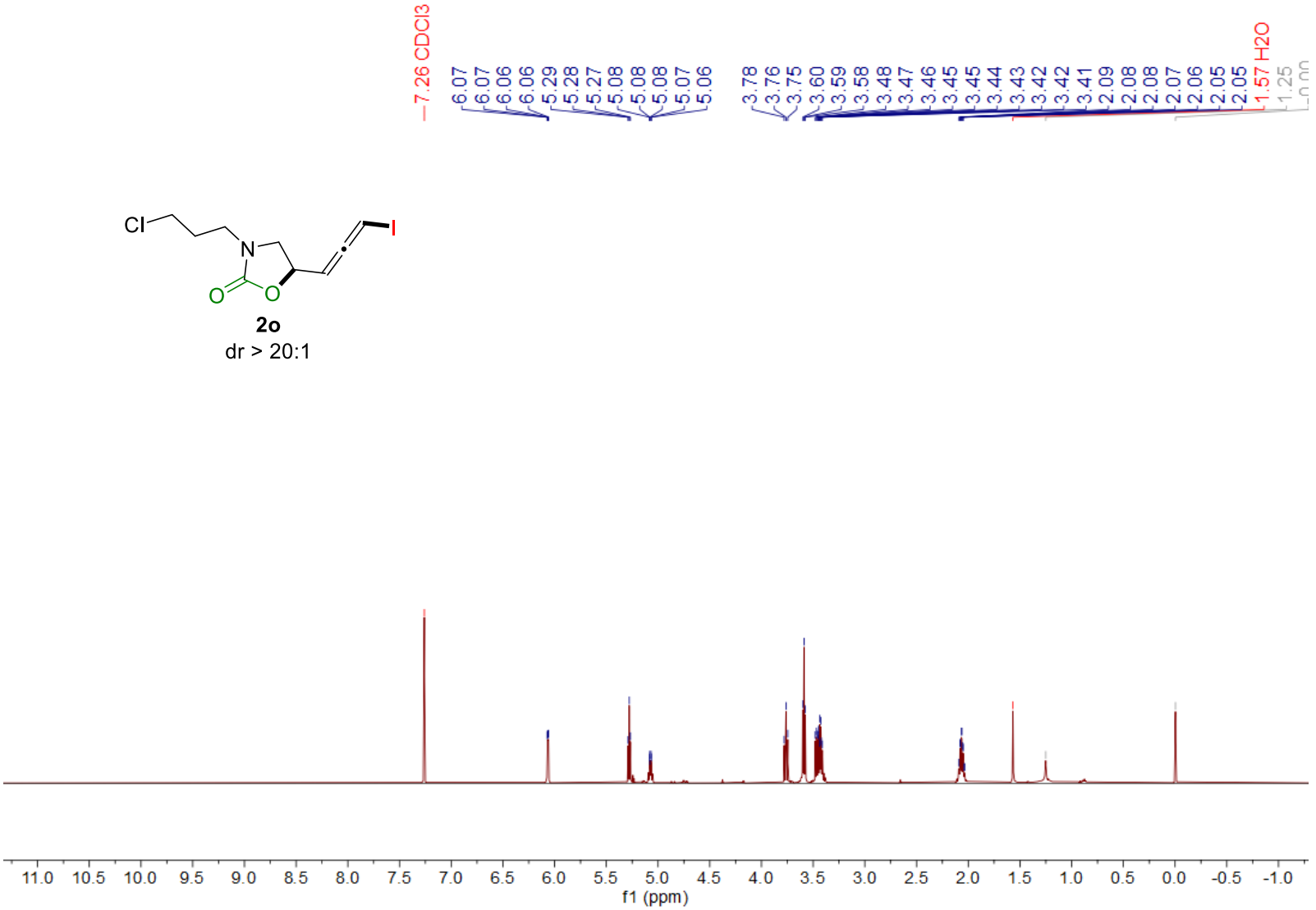

204.56
156.99
138.21
128.74
128.70
126.73
93.96
68.79
49.67
45.41
38.65
33.96
N
O
O
I
2m
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.26 CDCl3
6.04 6.04 6.03 6.02 5.29 5.28 5.26 5.08 5.07 5.06 5.06 5.05 5.05 5.05 5.04 5.04 5.04 5.03 3.73 3.70 3.68 3.42 3.41 3.40 3.38 3.28 3.28 3.27 3.26 3.25 3.24 1.59 1.57 1.55 1.55 1.53 1.53 1.52 1.52 1.51 1.51 1.50 1.39 1.38 1.37 1.37 1.36 1.36 1.34 1.34 1.33 1.32 1.30 0.96 0.95 0.94 0.93
N
O
O
I
0.95
0.97
0.98
1.00
1.06
2.00
2.25
2.26
3.12
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 -1.0
f1 (ppm)

2n

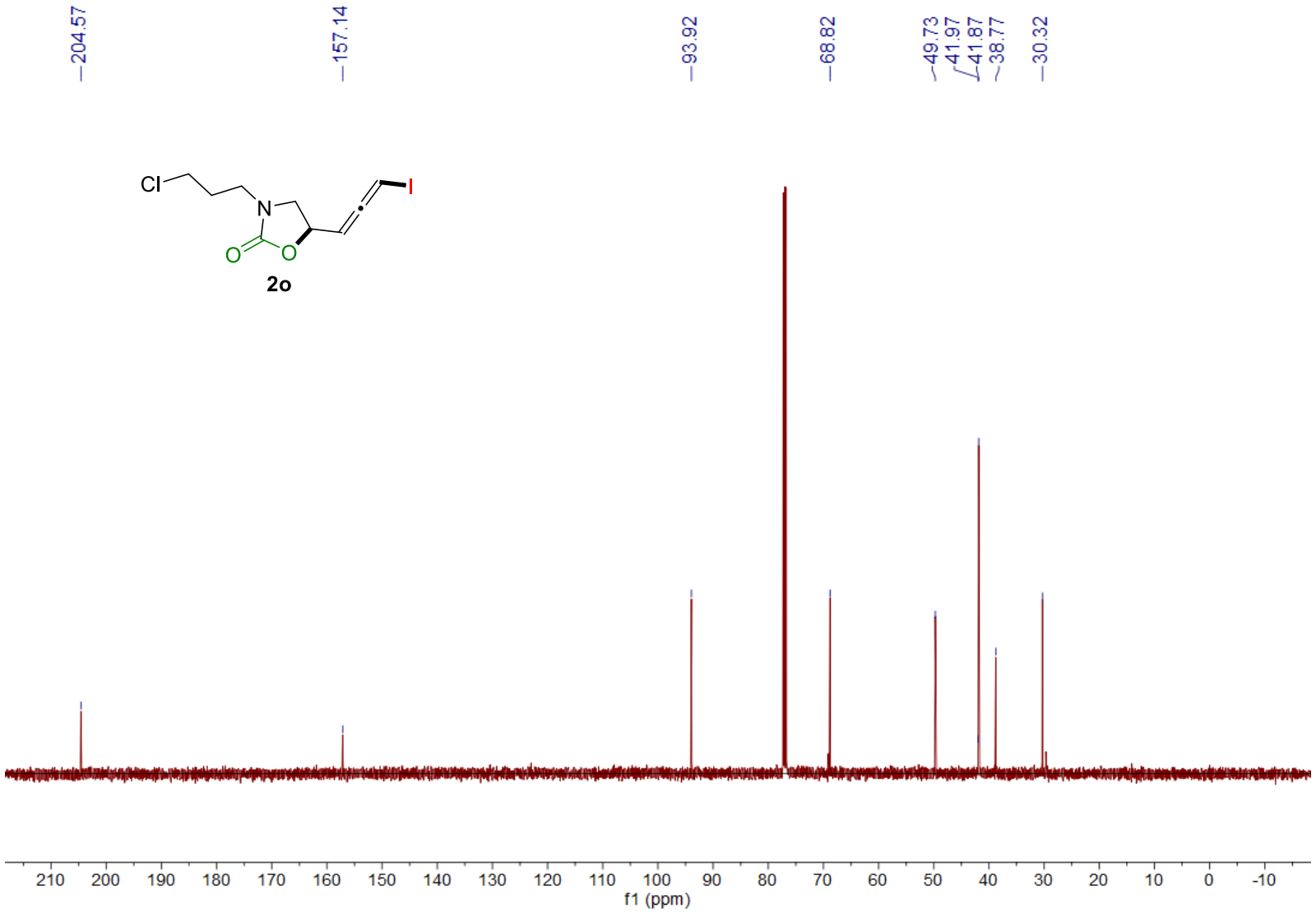
dr > 20:1

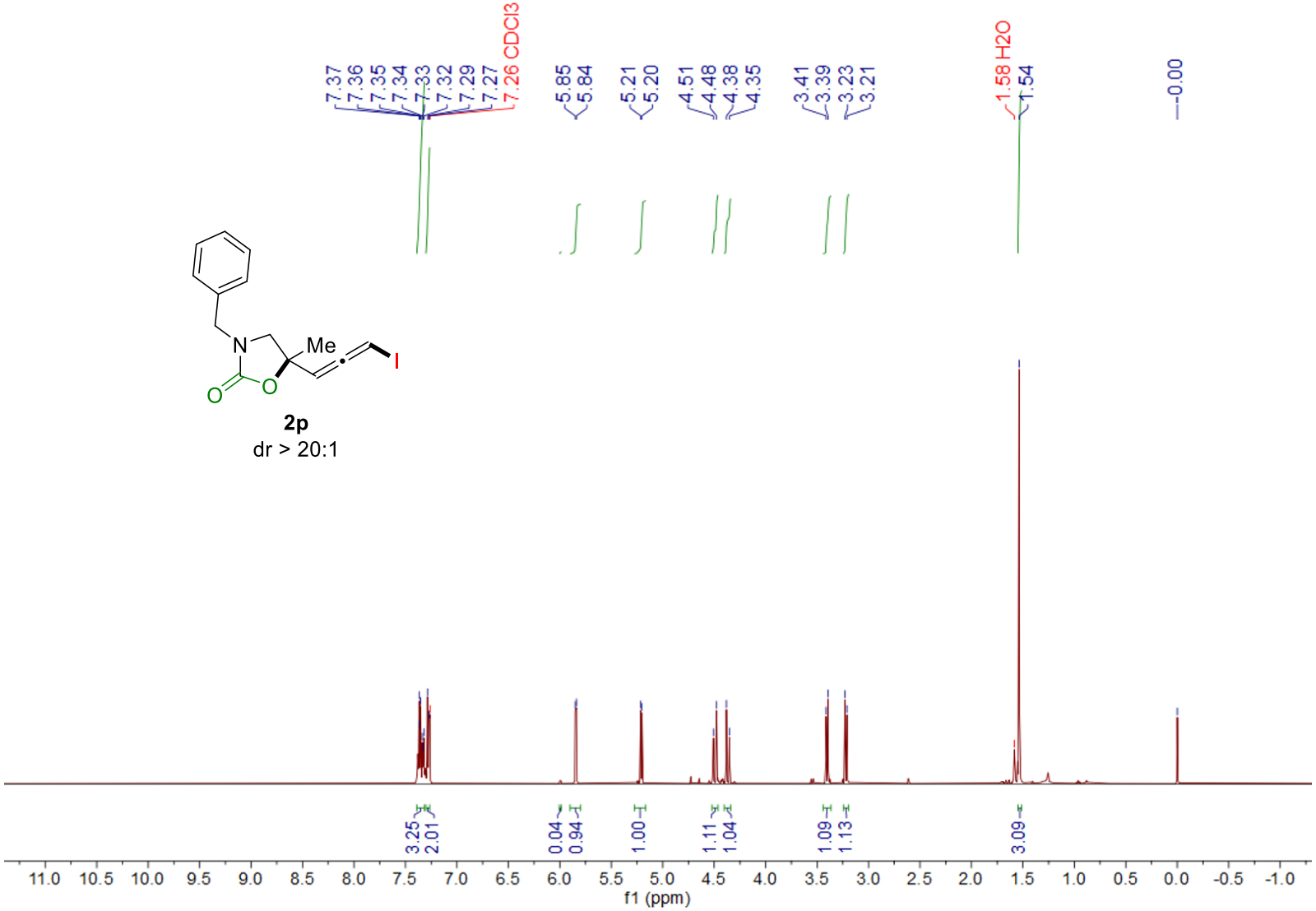

204.61
157.11
94.15
68.65
49.04
43.87
38.58
29.38
19.81
13.71
N
O
O
I
2n
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.26 CDCl3
6.07
6.07
6.06
6.06
5.29
5.28
5.27
5.08
5.08
5.08
5.07
5.06
3.78
3.76
3.75
3.60
3.59
3.58
3.48
3.47
3.46
3.45
3.45
3.44
3.43
3.42
3.42
3.41
2.09
2.08
2.08
2.07
2.06
2.05
2.05
1.57 H2O
1.25
Cl
N
O
O
I
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
-1.0
f1 (ppm)

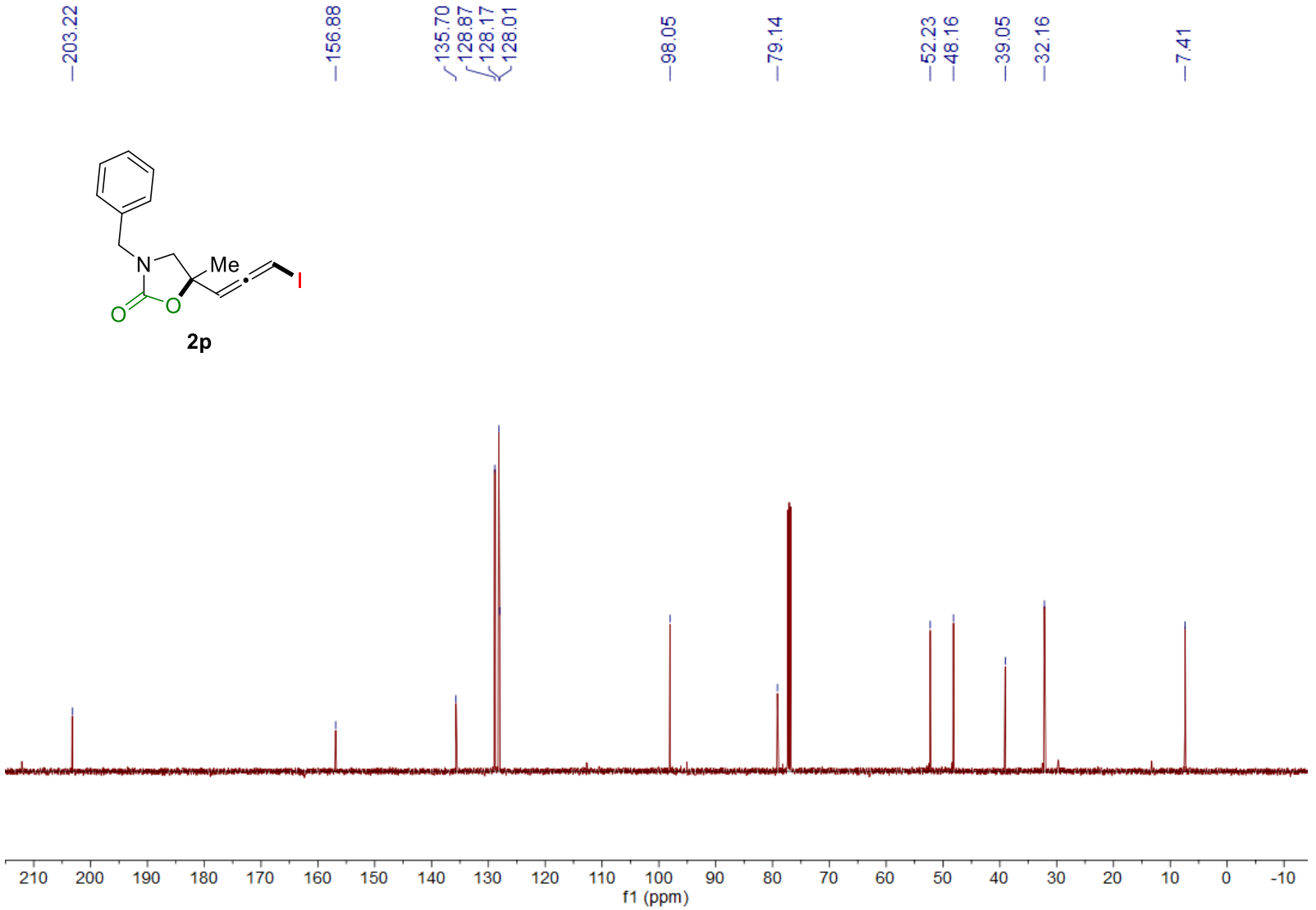
2o

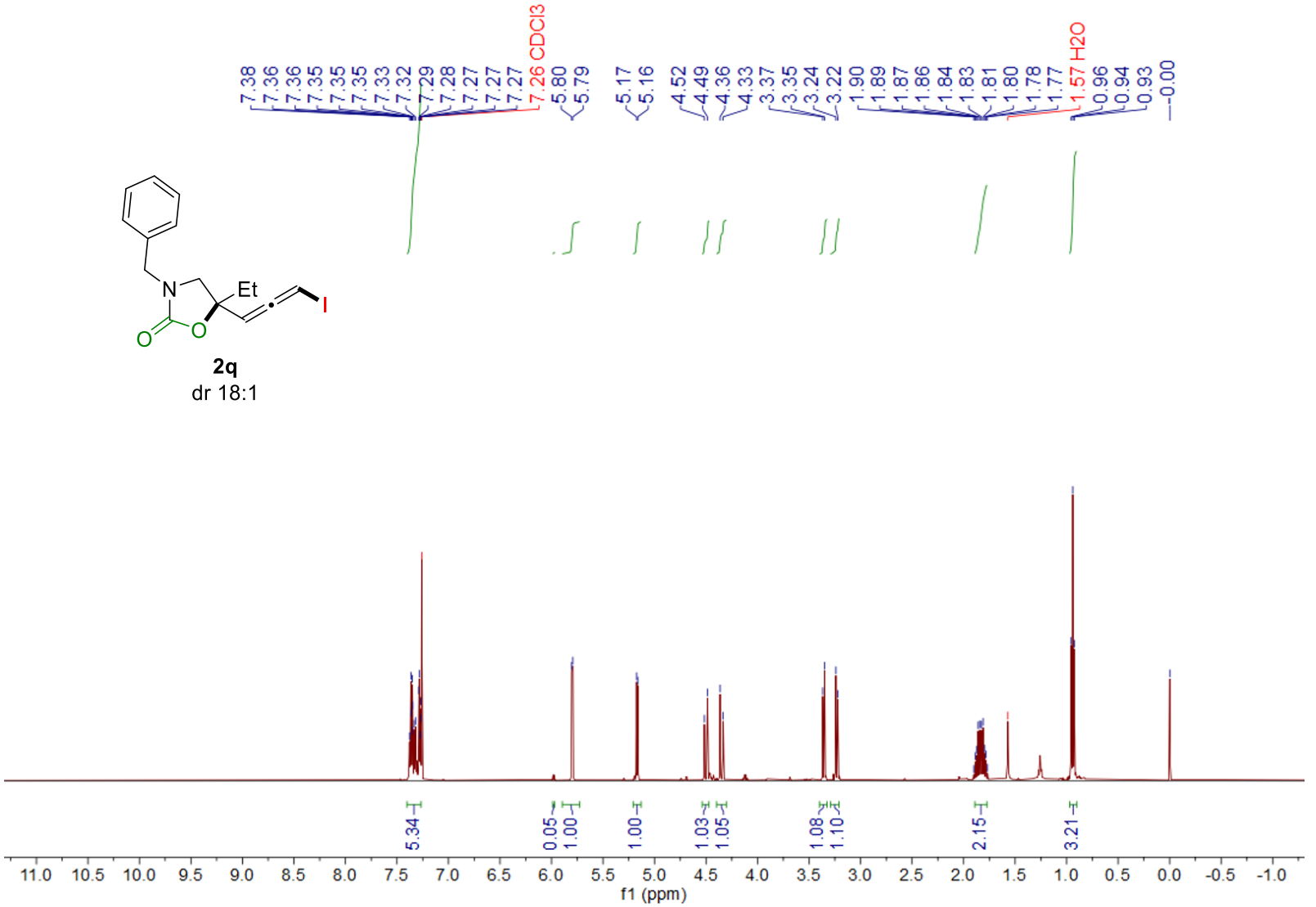
dr > 20:1

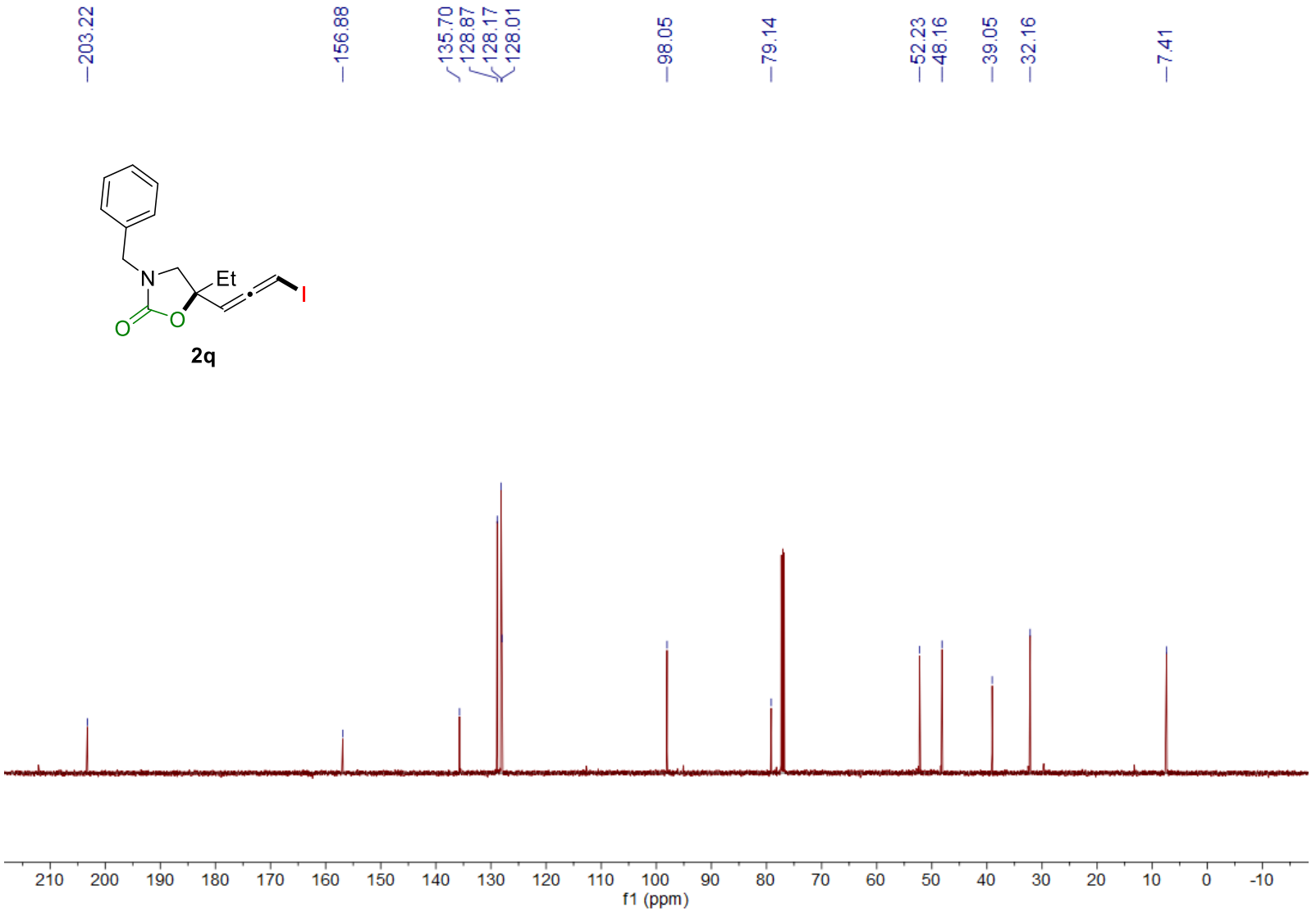

204.57
157.14
93.92
68.82
49.73
41.97
41.87
38.77
30.32
Cl
N
O
O
I
2o
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

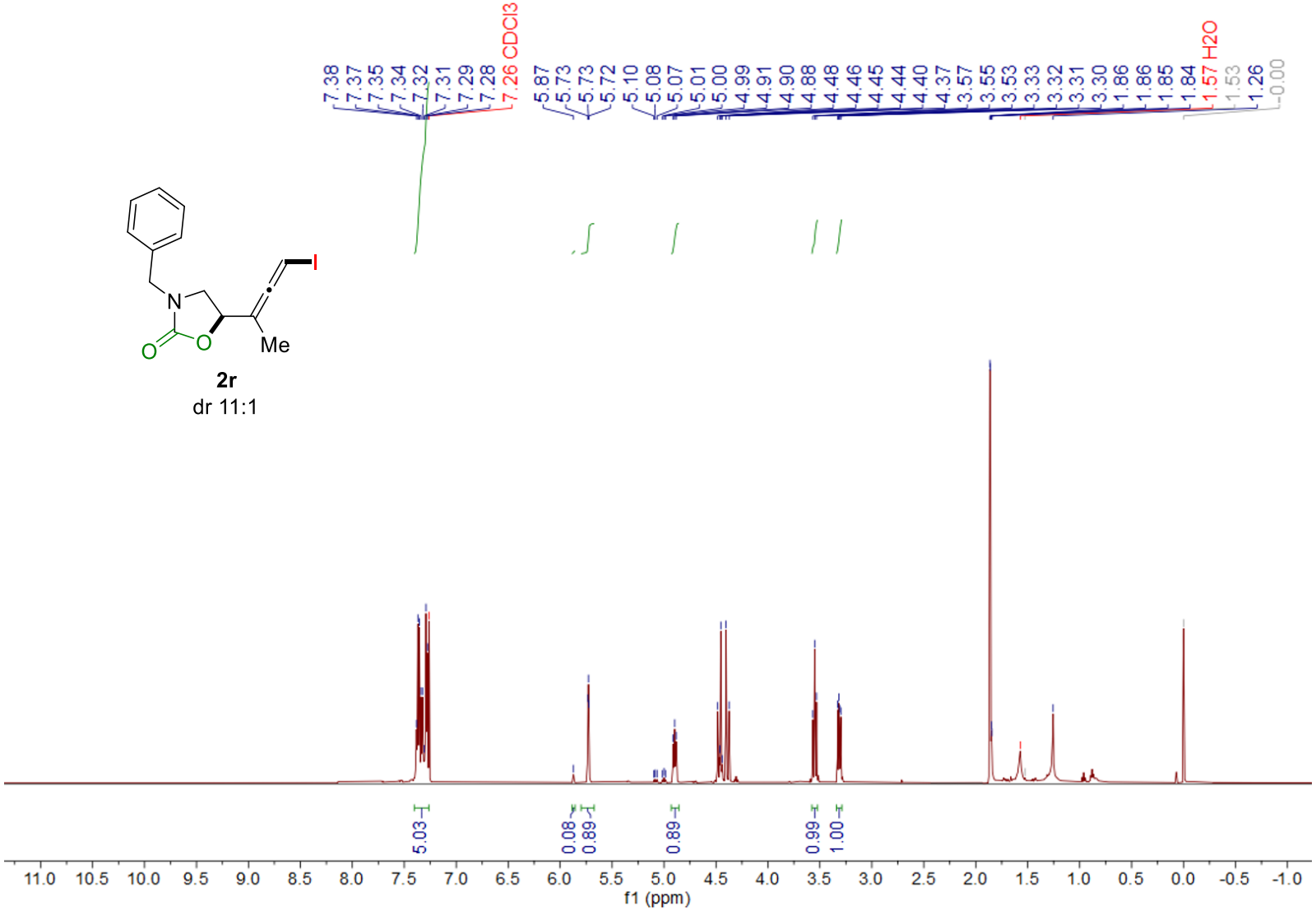

7.37
7.36
7.35
7.34
7.33
7.32
7.29
7.27
7.26 CDCl3
5.85
5.84
5.21
5.20
4.51
4.48
4.38
4.35
3.41
3.39
3.23
3.21
1.58 H2O
1.54
0.00
N
Me
O
O
I
3.25
2.01
0.04
0.94
1.00
1.11
1.04
1.09
1.13
3.09
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)

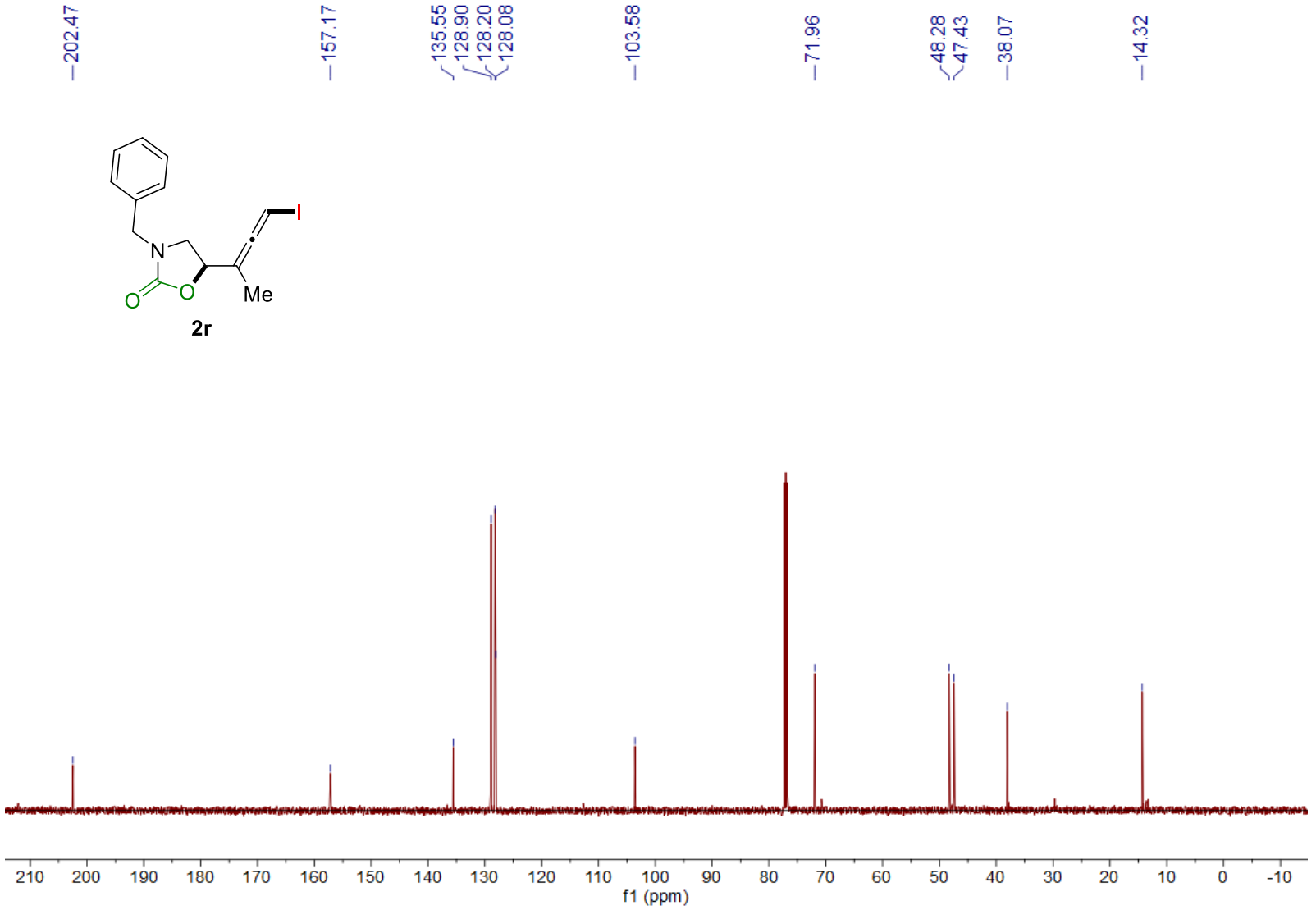
2p
dr > 20:1

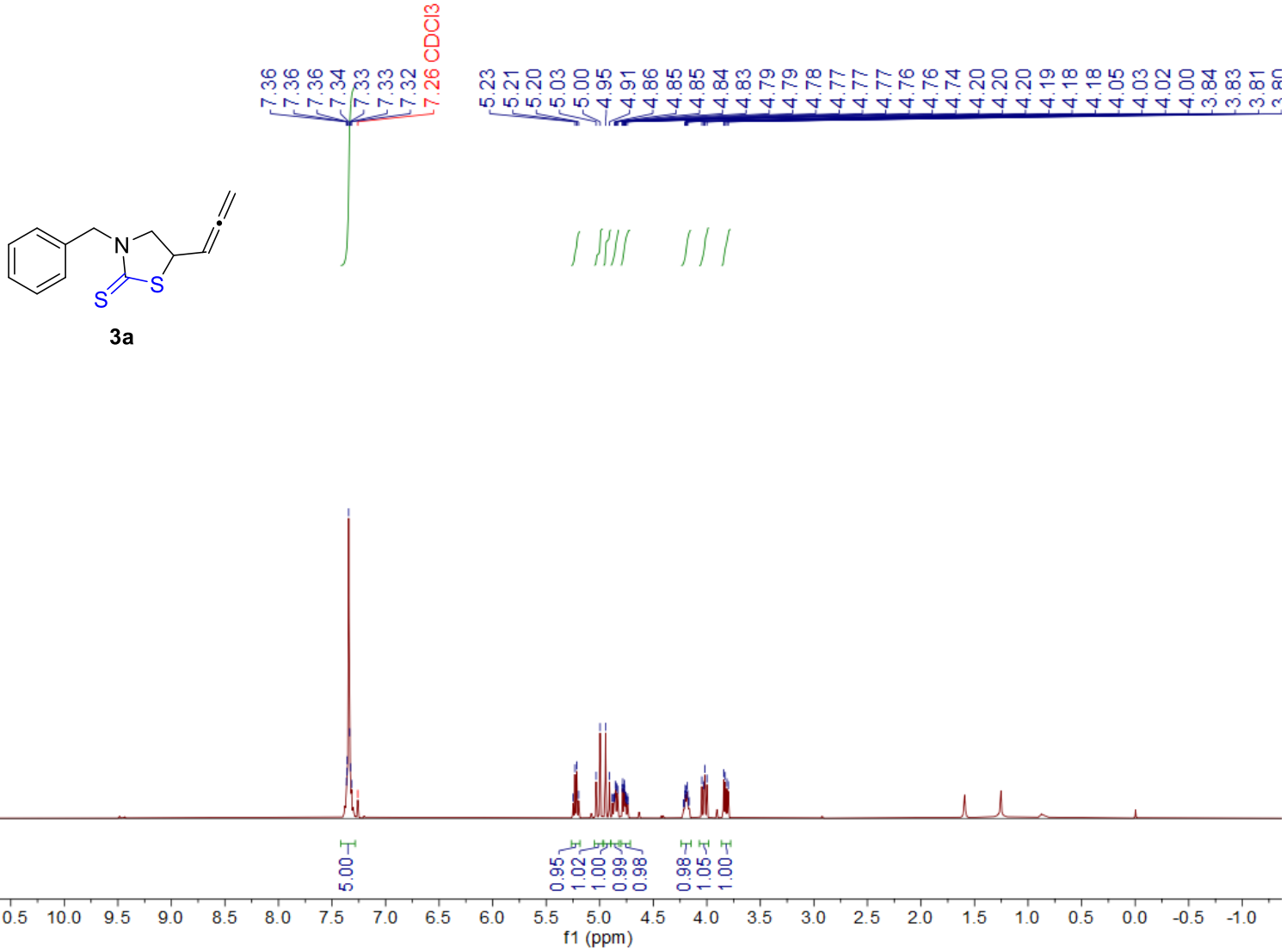

203.22
156.88
135.70
128.87
128.17
128.01
98.05
79.14
52.23
48.16
39.05
32.16
7.41
N
Me
O
O
I
2p
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

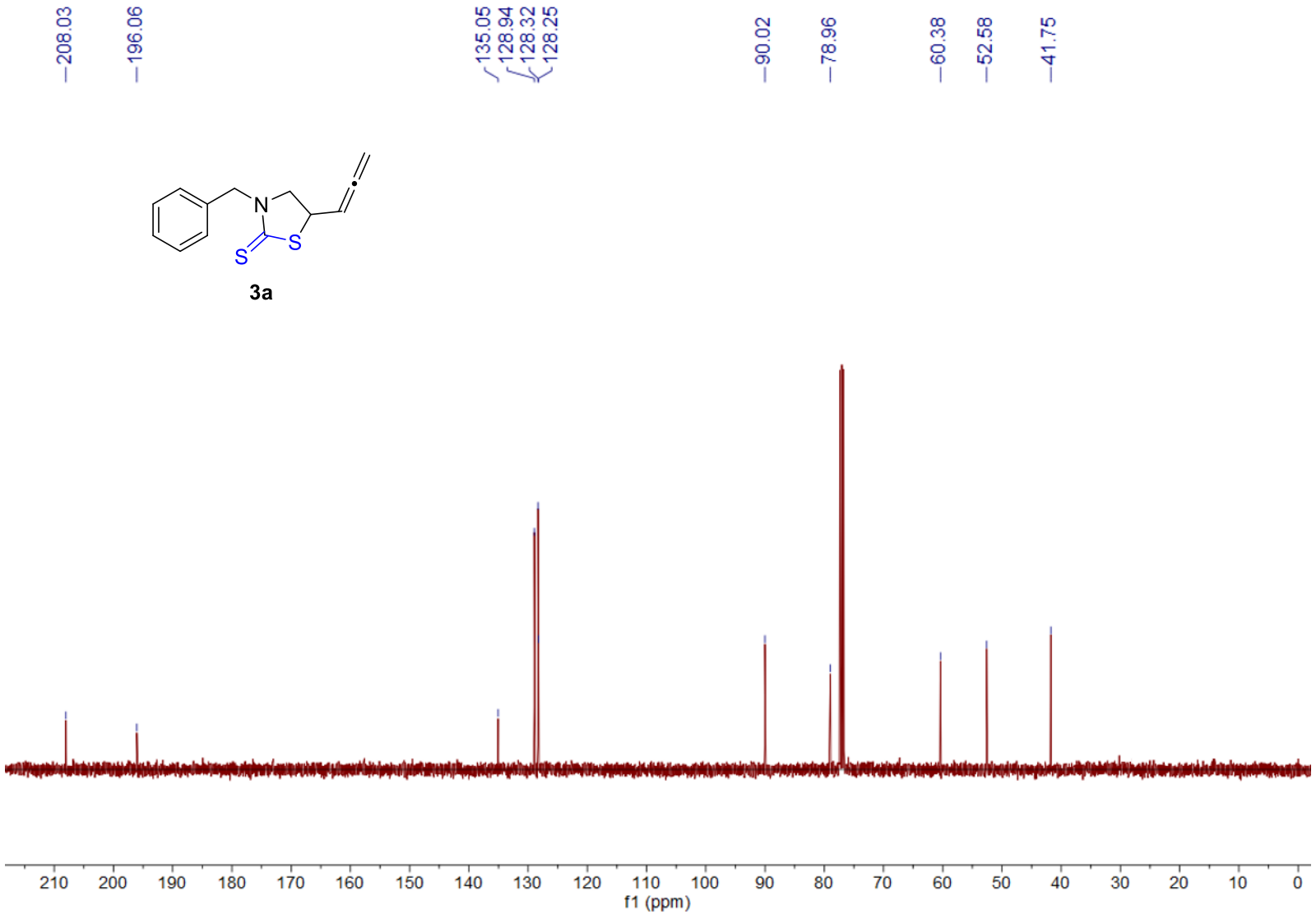

7.38
7.36
7.36
7.35
7.35
7.35
7.33
7.32
7.29
7.28
7.27
7.27
7.27
7.26 CDCl3
5.80
5.79
5.17
5.16
4.52
4.49
4.36
4.33
3.37
3.35
3.24
3.22
1.90
1.89
1.87
1.86
1.84
1.83
1.81
1.80
1.78
1.77
1.57 H2O
0.96
0.94
0.93
0.00
N
Et
O
O
I
2q
dr 18:1
5.34
0.05
1.00
1.00
1.03
1.05
1.08
1.10
2.15
3.21
11.0 10.5 10.0 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 -1.0
f1 (ppm)

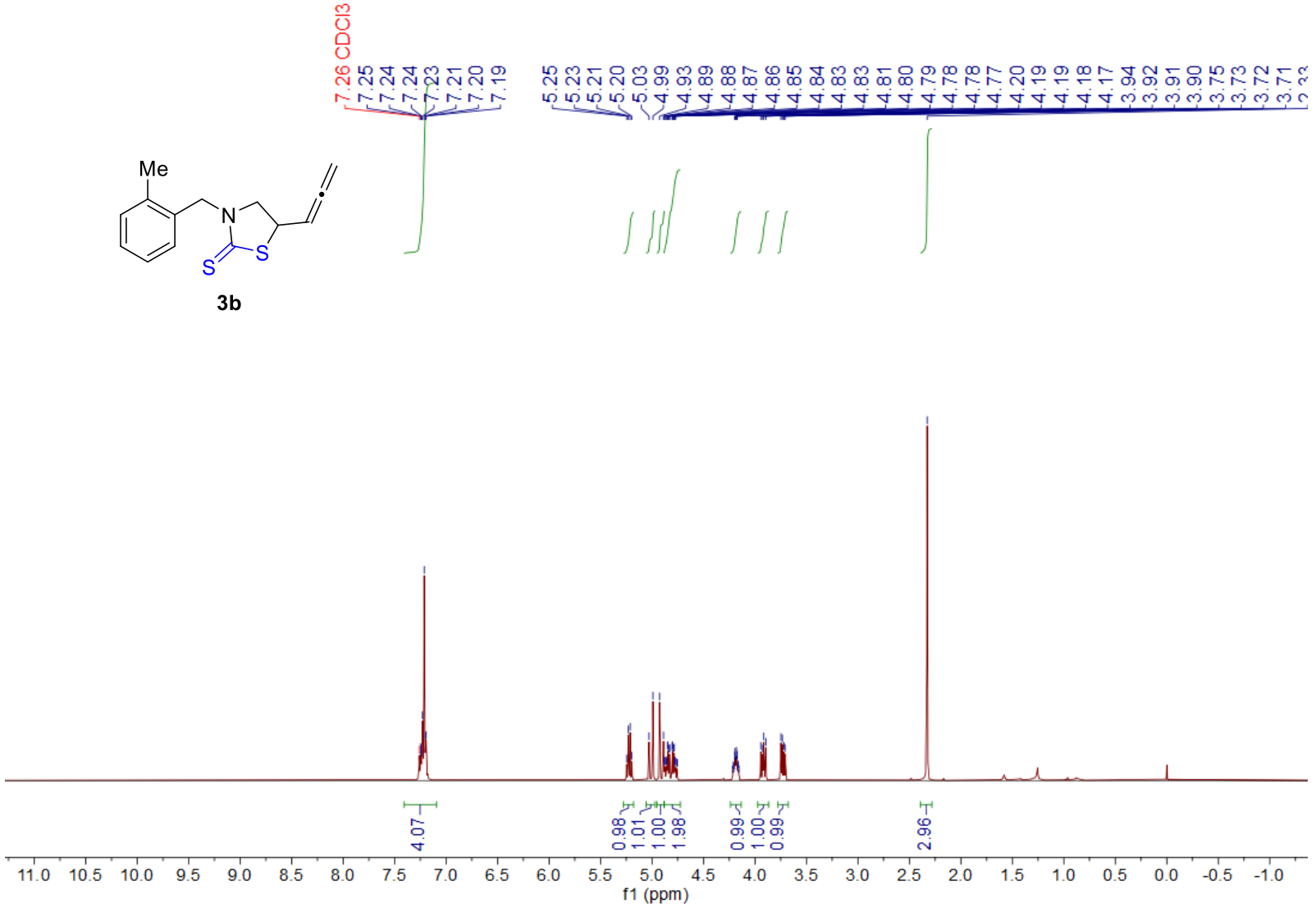

203.22
156.88
135.70
128.87
128.17
128.01
98.05
79.14
52.23
48.16
39.05
32.16
7.41
N
Et
O
O
I
2q
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

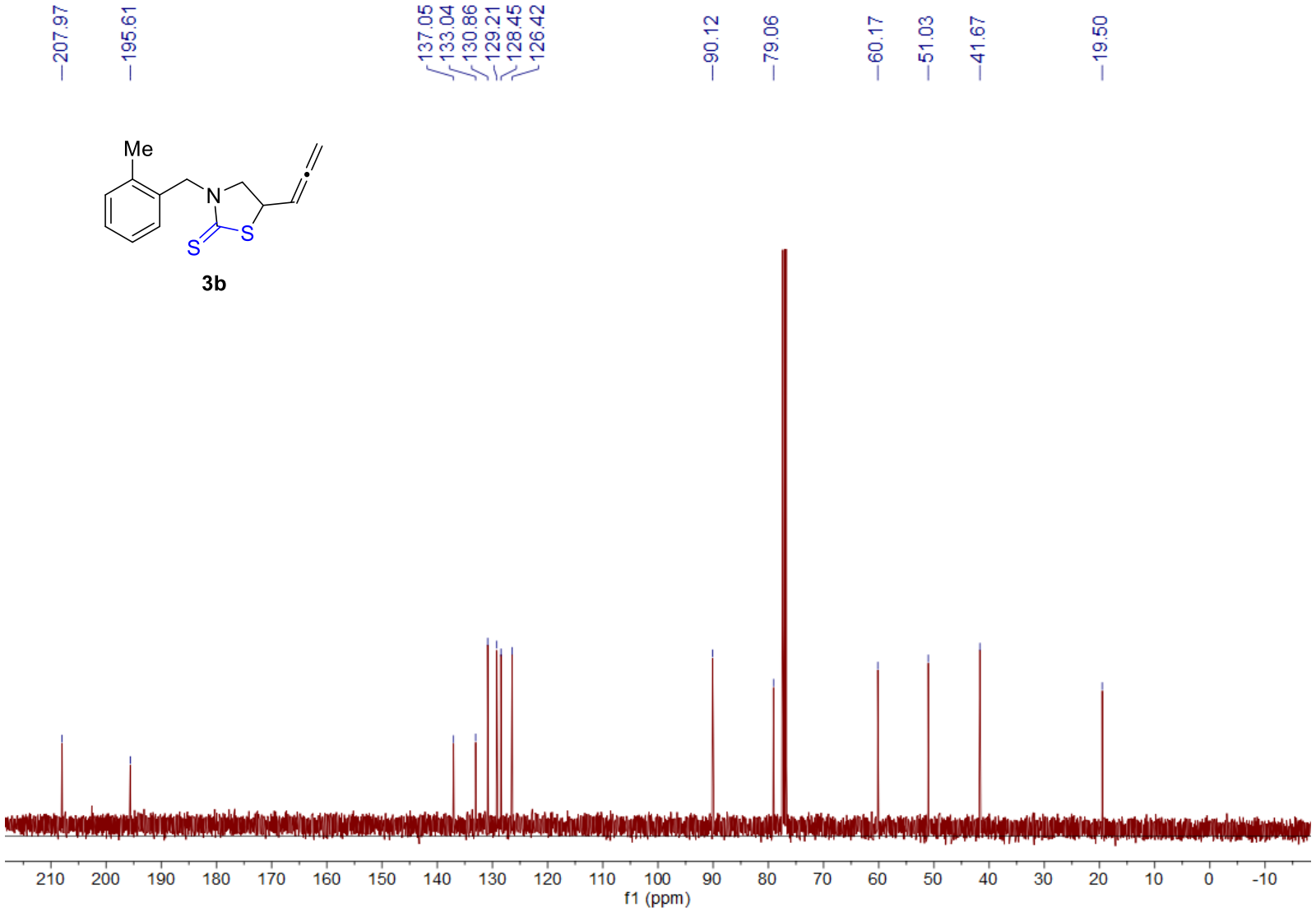

7.38
7.37
7.35
7.34
7.32
7.31
7.29
7.28
7.26 CDCl3
5.87
5.73
5.73
5.72
5.10
5.08
5.07
5.01
5.00
4.99
4.91
4.90
4.88
4.48
4.46
4.45
4.44
4.40
4.37
3.57
3.55
3.53
3.33
3.32
3.31
3.30
1.86
1.86
1.85
1.84
1.57 H2O
1.53
1.26
0.00
N
O
O
Me
I
2r
dr 11:1
5.03
0.08
0.89
0.89
0.99
1.00
11.0 10.5 10.0 9.5 9.0 8.5 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 -1.0
f1 (ppm)

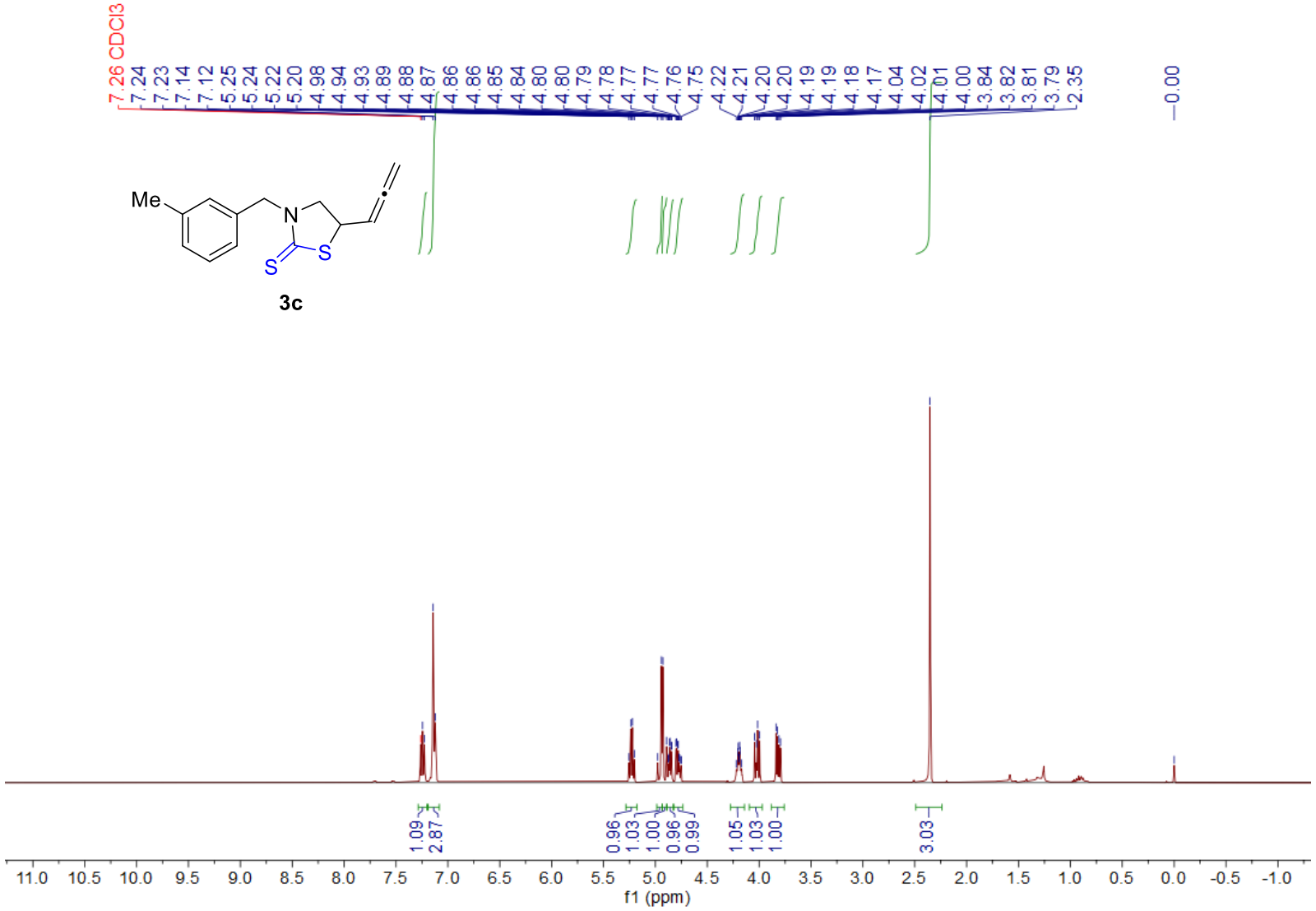

202.47
157.17
135.55
128.90
128.20
128.08
103.58
71.96
48.28
47.43
38.07
14.32
N
O
O
Me
I
2r
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


7.36
7.36
7.36
7.34
7.33
7.33
7.32
7.26 CDCl3
5.23
5.21
5.20
5.03
5.00
4.95
4.91
4.86
4.85
4.85
4.84
4.83
4.79
4.79
4.78
4.77
4.77
4.77
4.76
4.76
4.74
4.20
4.20
4.20
4.19
4.18
4.18
4.05
4.03
4.02
4.00
3.84
3.83
3.81
N
S
S
3a
5.00
0.95
1.02
1.00
0.99
0.98
0.98
1.05
1.00
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 -1.0
f1 (ppm)

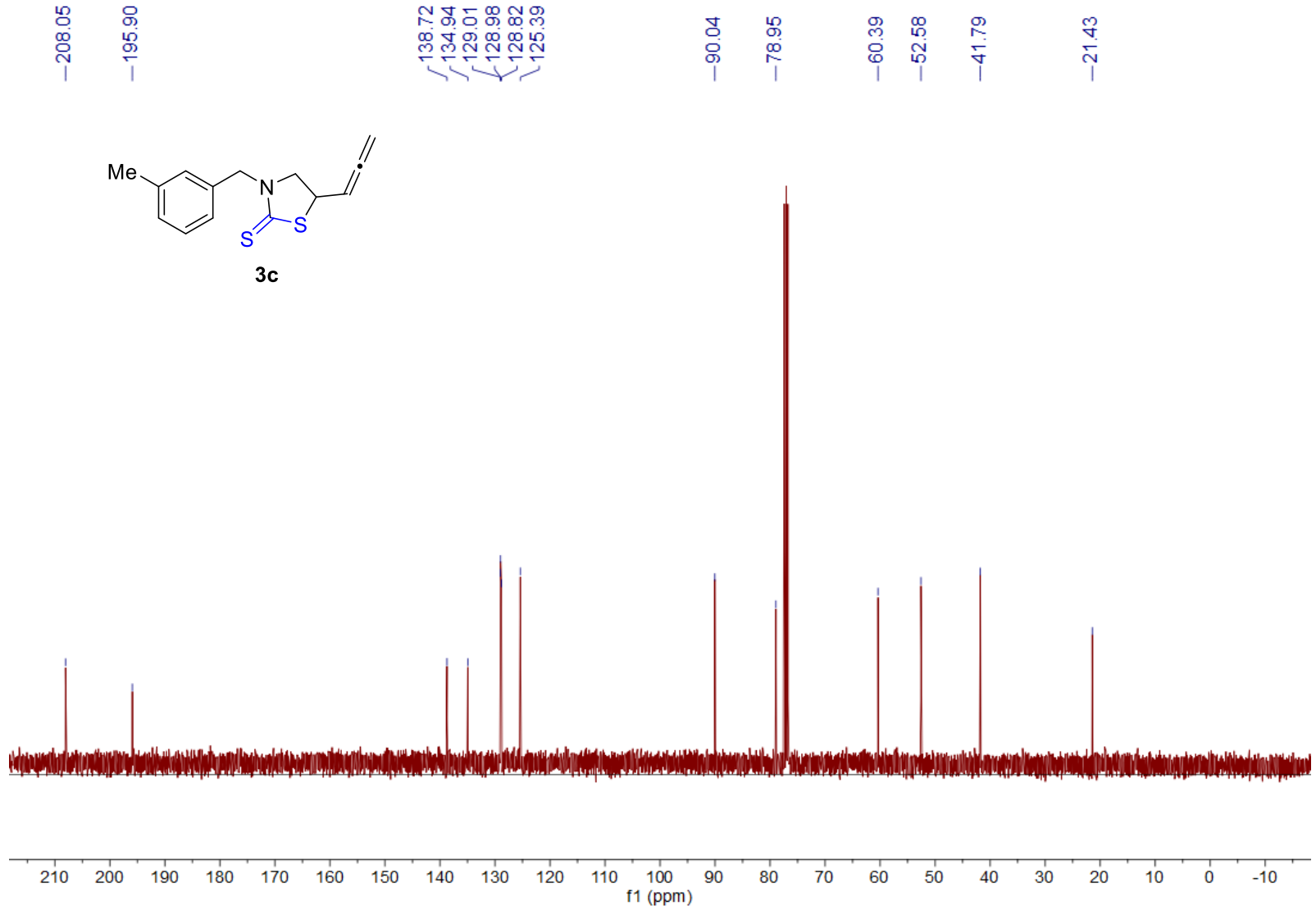

208.03
196.06
135.05
128.94
128.32
128.25
90.02
78.96
60.38
52.58
41.75
N
S
S
3a
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

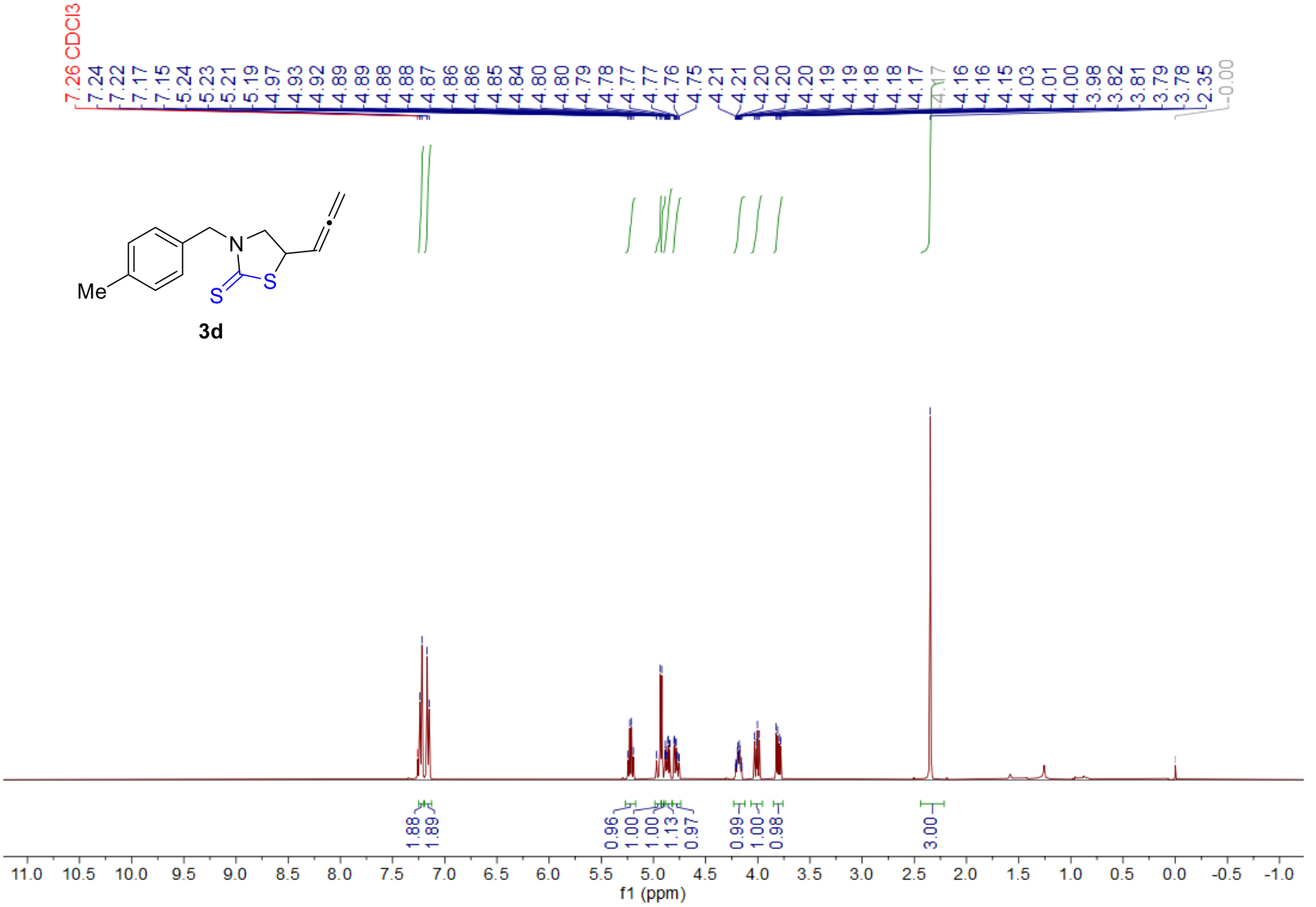

7.26 CDCl3
7.25
7.24
7.24
7.23
7.21
7.20
7.19
5.25
5.23
5.21
5.20
5.03
4.99
4.93
4.89
4.88
4.87
4.86
4.85
4.84
4.83
4.83
4.81
4.80
4.79
4.78
4.78
4.77
4.20
4.19
4.19
4.18
4.17
3.94
3.92
3.91
3.90
3.75
3.73
3.72
3.71
Me
N
S
S
3b
4.07
0.98
1.01
1.00
1.98
0.99
1.00
0.99
2.96
11.0
10.5
10.0
9.5
9.0
8.5
8.0
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
-1.0
f1 (ppm)

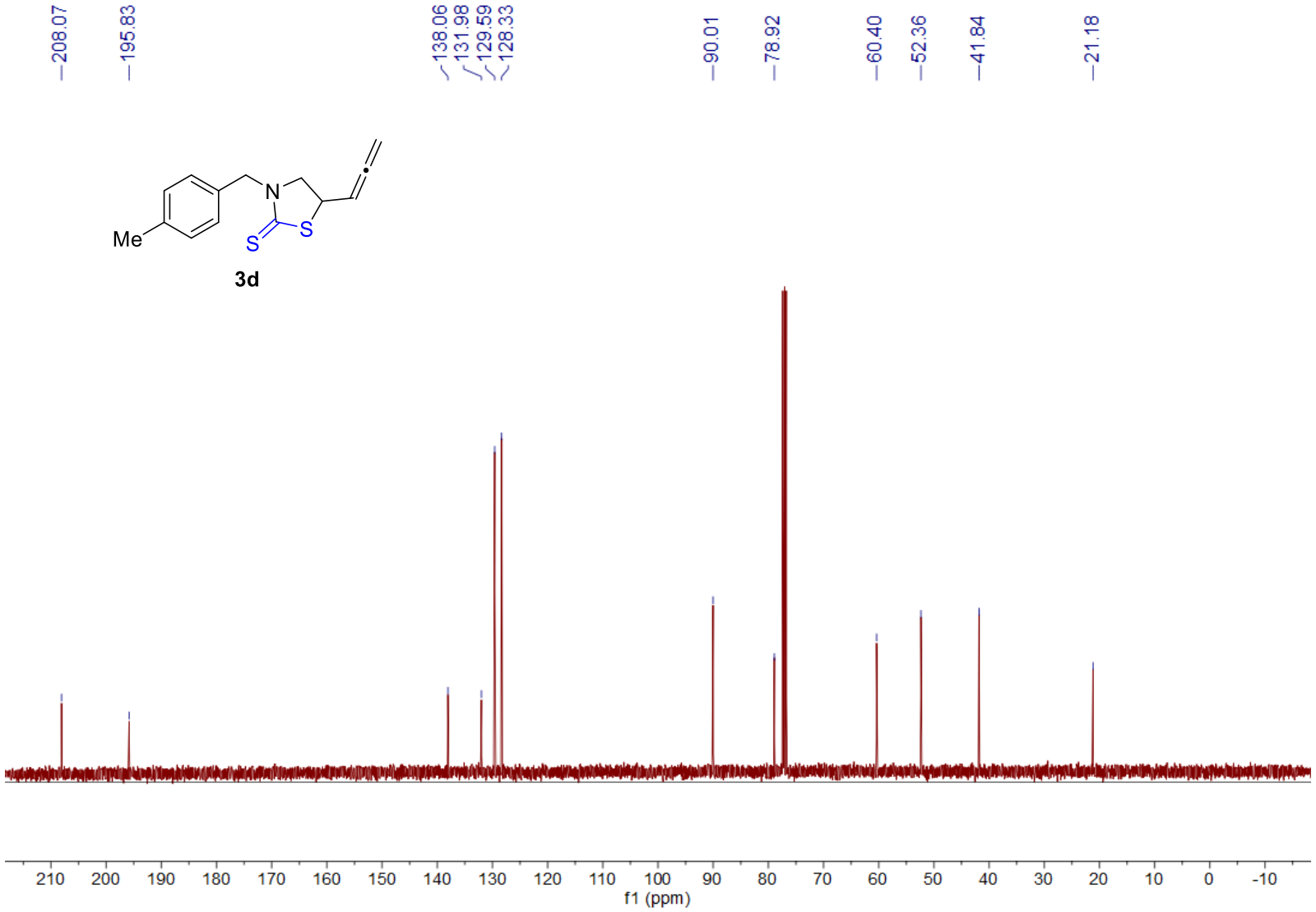

207.97
195.61
137.05
133.04
130.86
129.21
128.45
126.42
90.12
79.06
60.17
51.03
41.67
19.50
Me
N
S
S
3b
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

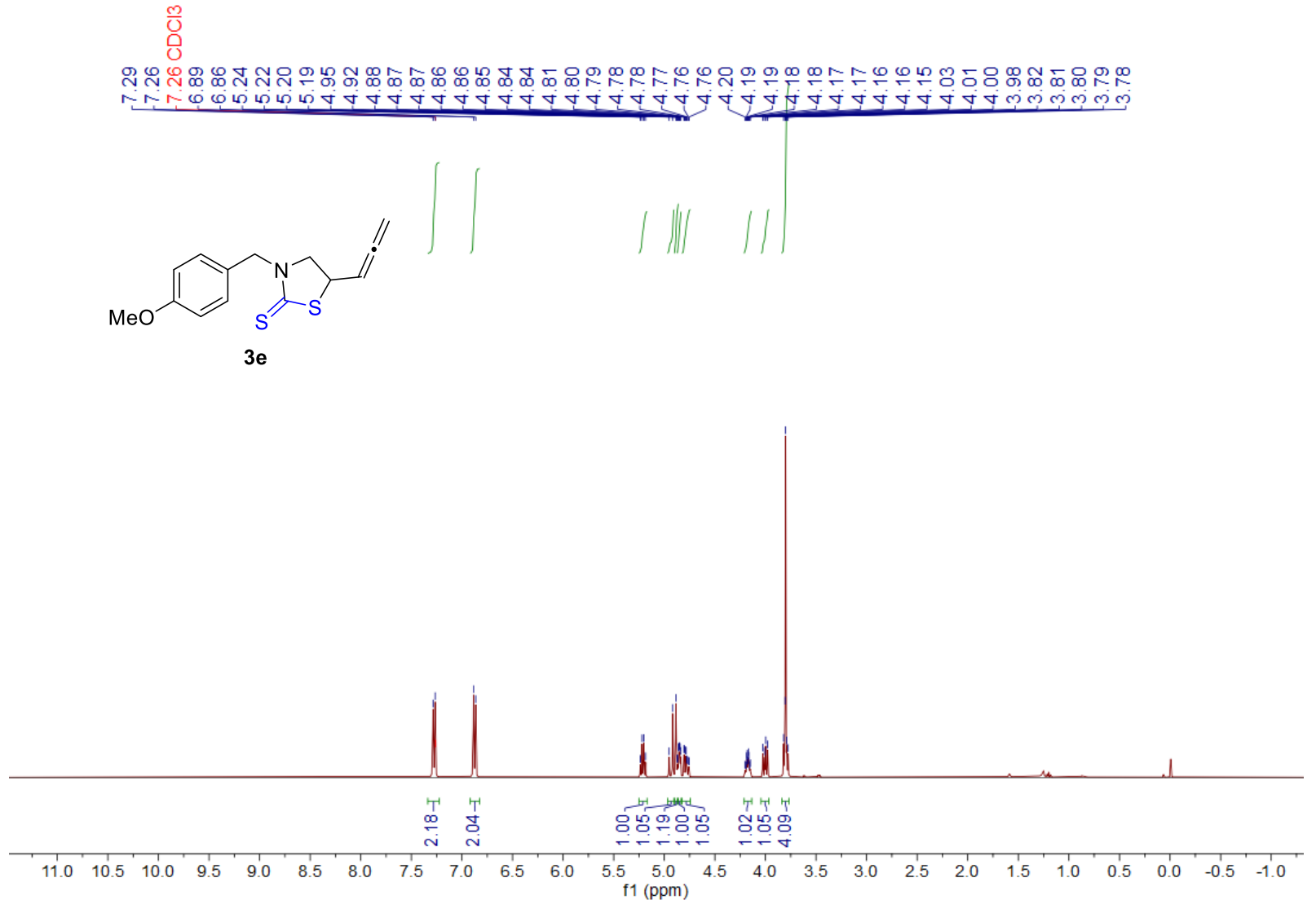

7.26 CDCl3
7.24
7.23
7.14
7.12
5.25
5.24
5.22
5.20
4.98
4.94
4.93
4.89
4.88
4.87
4.86
4.86
4.85
4.84
4.80
4.80
4.79
4.78
4.77
4.77
4.76
4.75
4.22
4.21
4.20
4.20
4.19
4.19
4.18
4.17
4.04
4.02
4.01
4.00
3.84
3.82
3.81
3.79
2.35
0.00
Me
N
S
S
1.09
2.87
0.96
1.03
1.00
0.96
0.99
1.05
1.03
1.00
3.03
11.0
10.5
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
-1.0
f1 (ppm)

3c

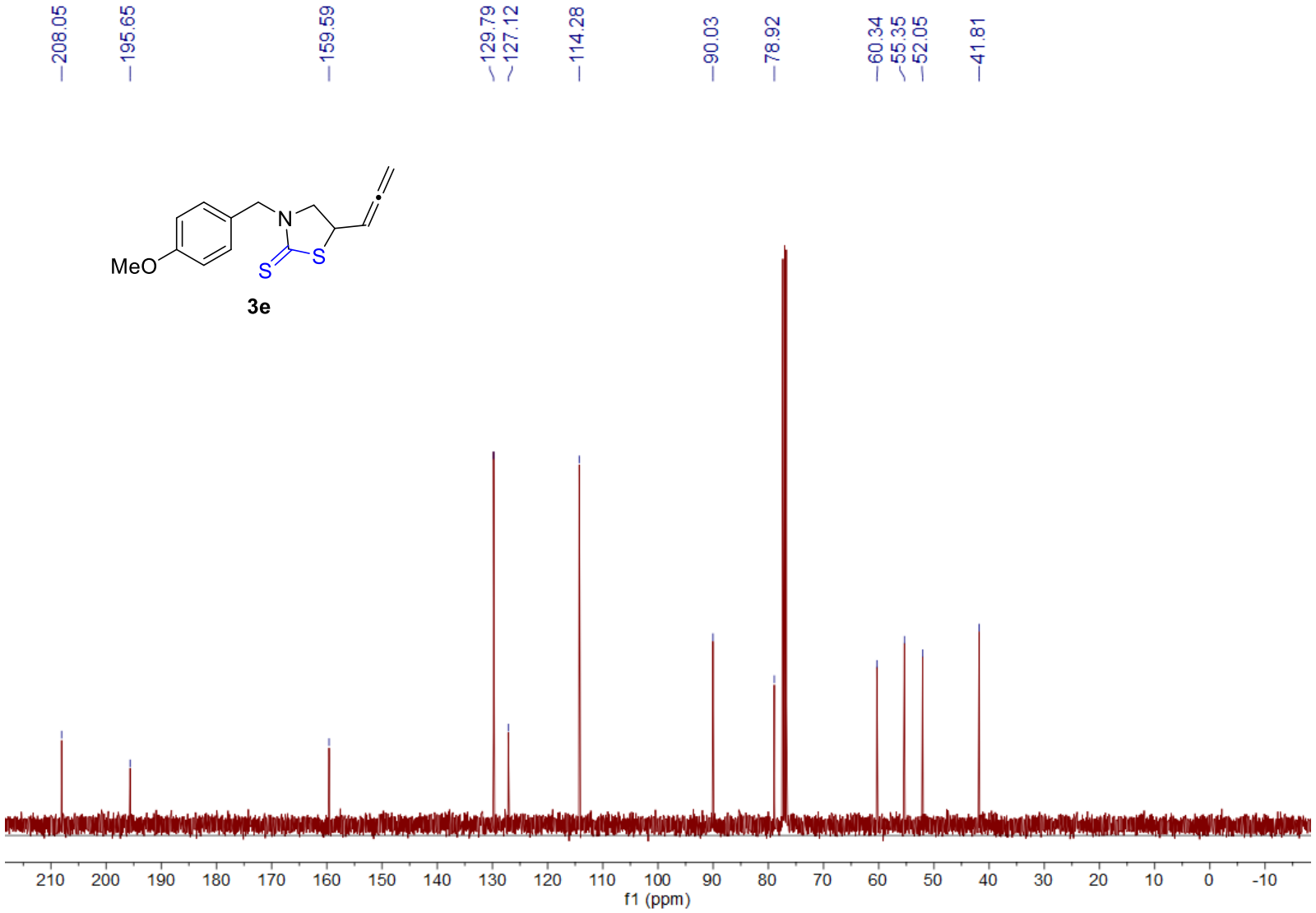

208.05
195.90
138.72
134.94
129.01
128.98
128.82
125.39
90.04
78.95
60.39
52.58
41.79
21.43
Me
N
S
S
3c
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

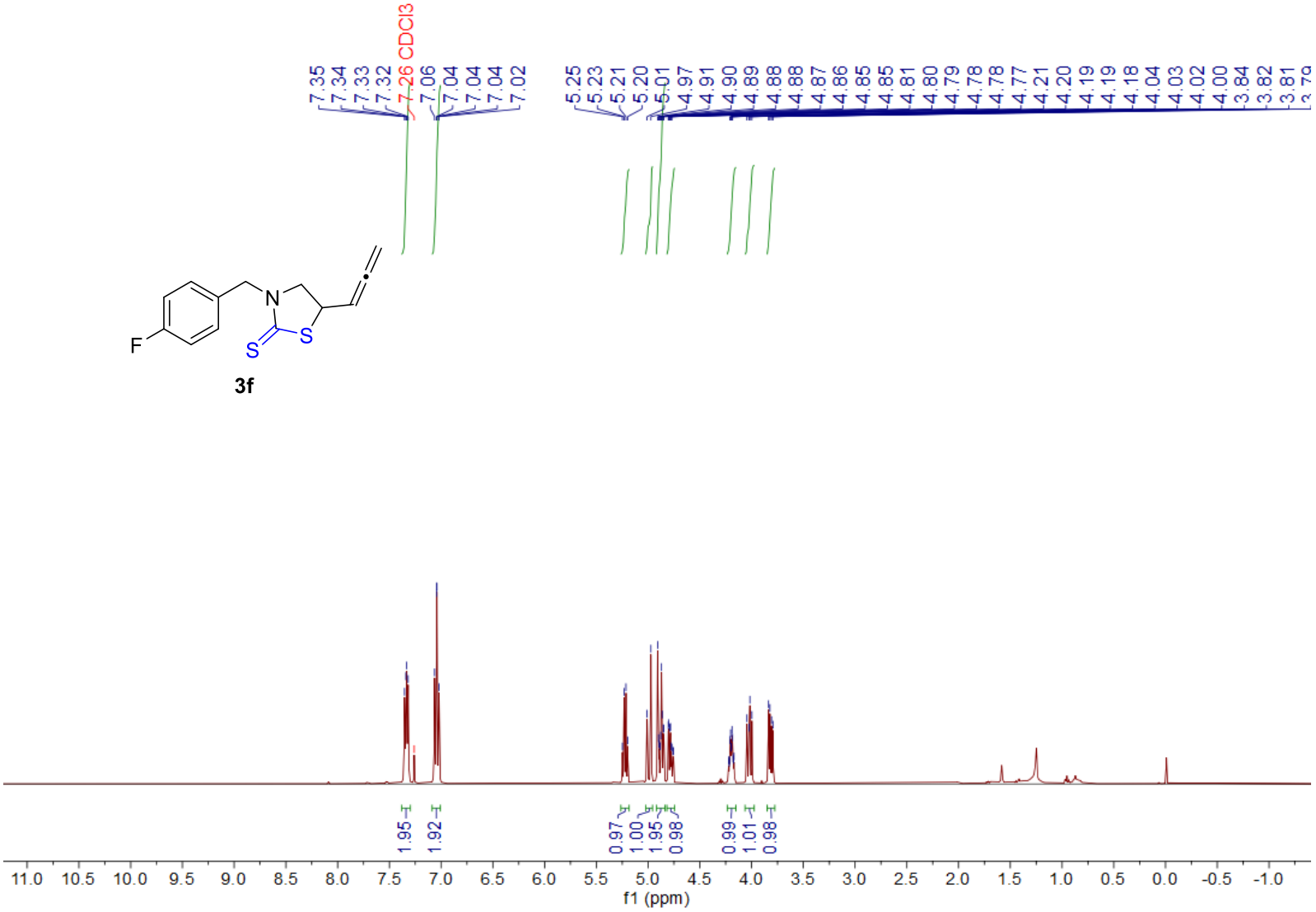

7.26 CDCl3
7.24
7.22
7.17
7.15
5.24
5.23
5.21
5.19
4.97
4.93
4.92
4.89
4.89
4.88
4.88
4.87
4.86
4.86
4.85
4.84
4.80
4.80
4.79
4.78
4.77
4.77
4.76
4.75
4.21
4.21
4.20
4.20
4.20
4.19
4.19
4.18
4.18
4.17
4.17
4.16
4.16
4.15
4.03
4.01
4.00
3.98
3.82
3.81
3.79
3.78
2.35
0.00
Me
N
S
S
3d
1.88
1.89
0.96
1.00
1.00
1.13
0.97
0.99
1.00
0.98
3.00
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
-1.0
f1 (ppm)


208.07
195.83
138.06
131.98
129.59
128.33
90.01
78.92
60.40
52.36
41.84
21.18
Me
N
S
S
3d
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)

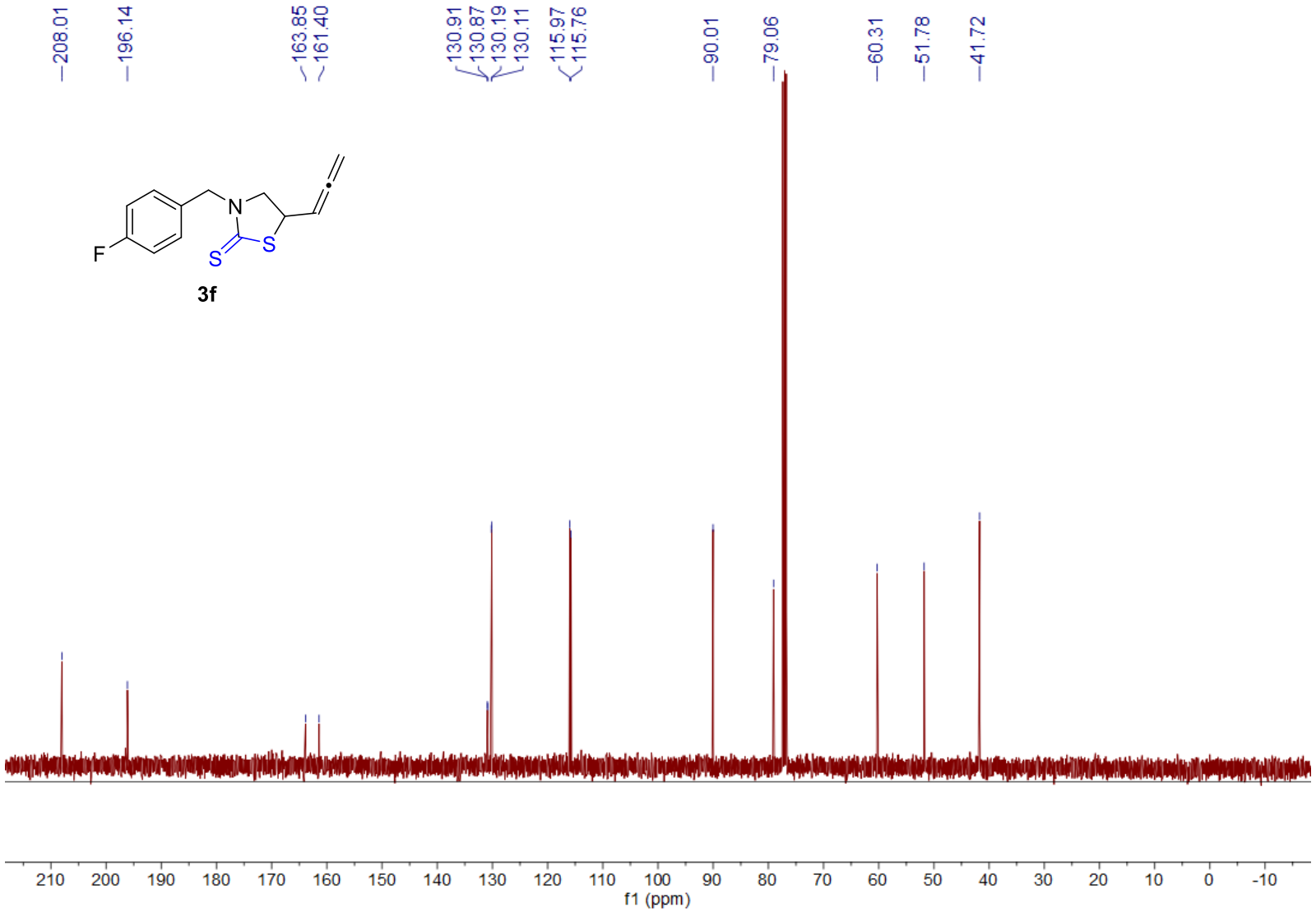

7.29
7.26
7.26 CDCl3
6.89
6.86
5.24
5.22
5.20
5.19
4.95
4.92
4.88
4.87
4.87
4.86
4.86
4.85
4.84
4.84
4.81
4.80
4.79
4.78
4.78
4.77
4.76
4.76
4.20
4.19
4.19
4.18
4.18
4.17
4.17
4.16
4.16
4.15
4.03
4.01
4.00
3.98
3.82
3.81
3.80
3.79
3.78
MeO
N
S
S
2.18
2.04
1.00
1.05
1.19
1.00
1.05
1.02
1.05
4.09
11.0 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 -1.0
f1 (ppm)

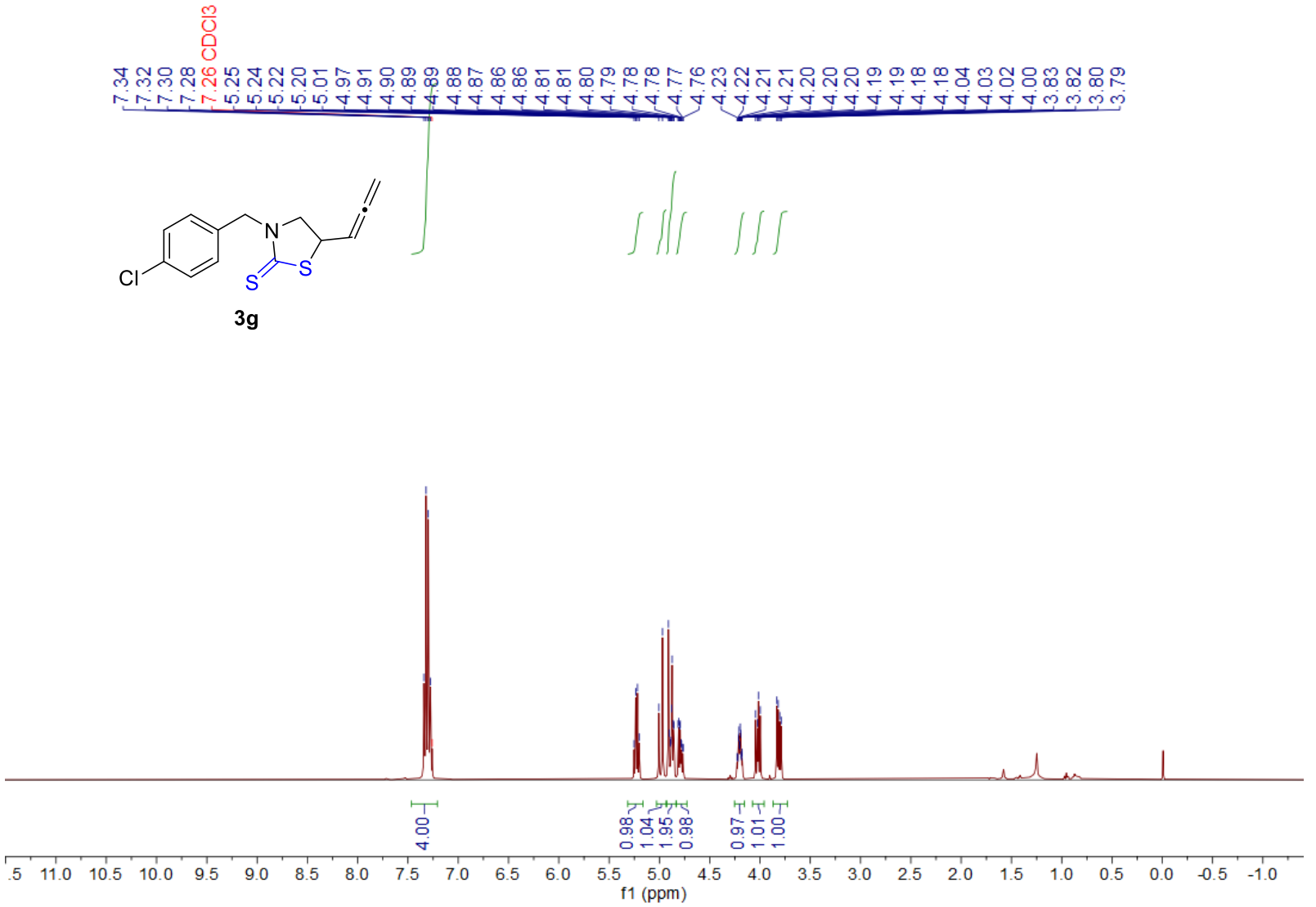
3e

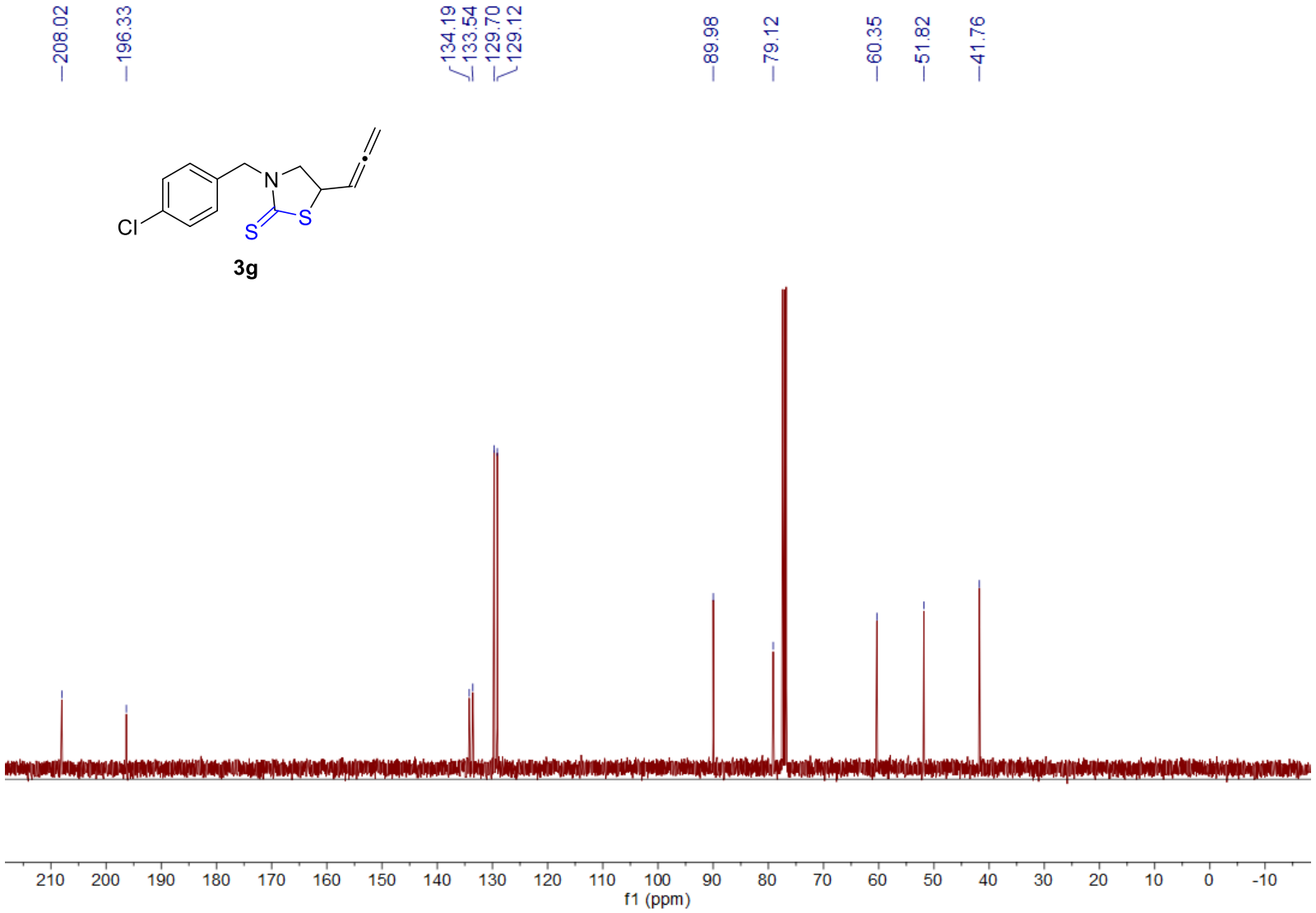

208.05
195.65
159.59
129.79
127.12
114.28
90.03
78.92
60.34
55.35
52.05
41.81
MeO
N
S
S
3e
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

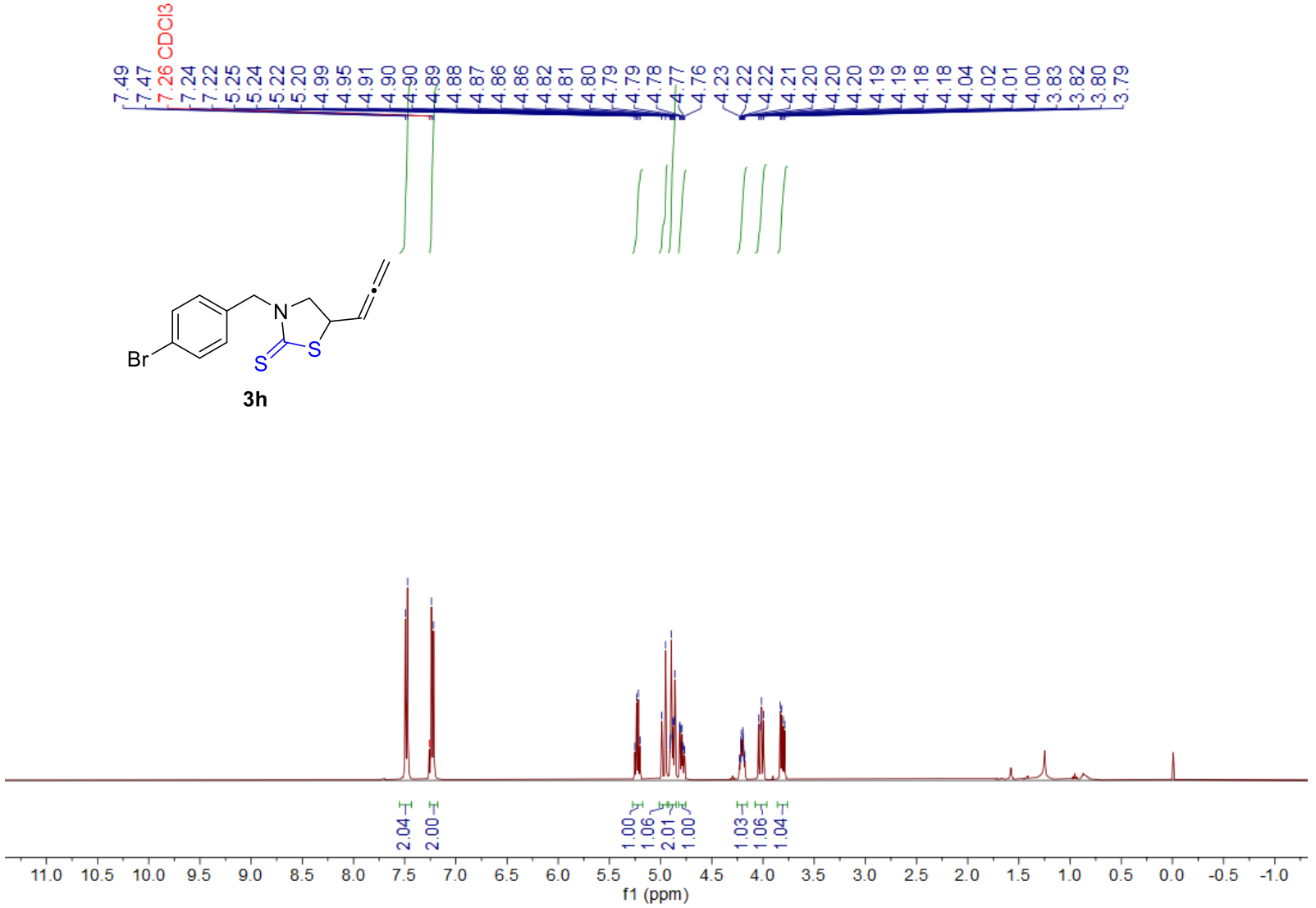

7.35
7.34
7.33
7.32
7.26 CDCl3
7.06
7.04
7.04
7.04
7.02
5.25
5.23
5.21
5.20
5.01
4.97
4.91
4.90
4.89
4.88
4.88
4.87
4.86
4.85
4.85
4.81
4.80
4.79
4.78
4.78
4.77
4.21
4.20
4.19
4.19
4.18
4.04
4.03
4.02
4.00
3.84
3.82
3.81
F
N
S
S
1.95
1.92
0.97
1.00
1.95
0.98
0.99
1.01
0.98
11.0 10.5 10.0 9.5 9.0 8.5 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 -1.0
f1 (ppm)

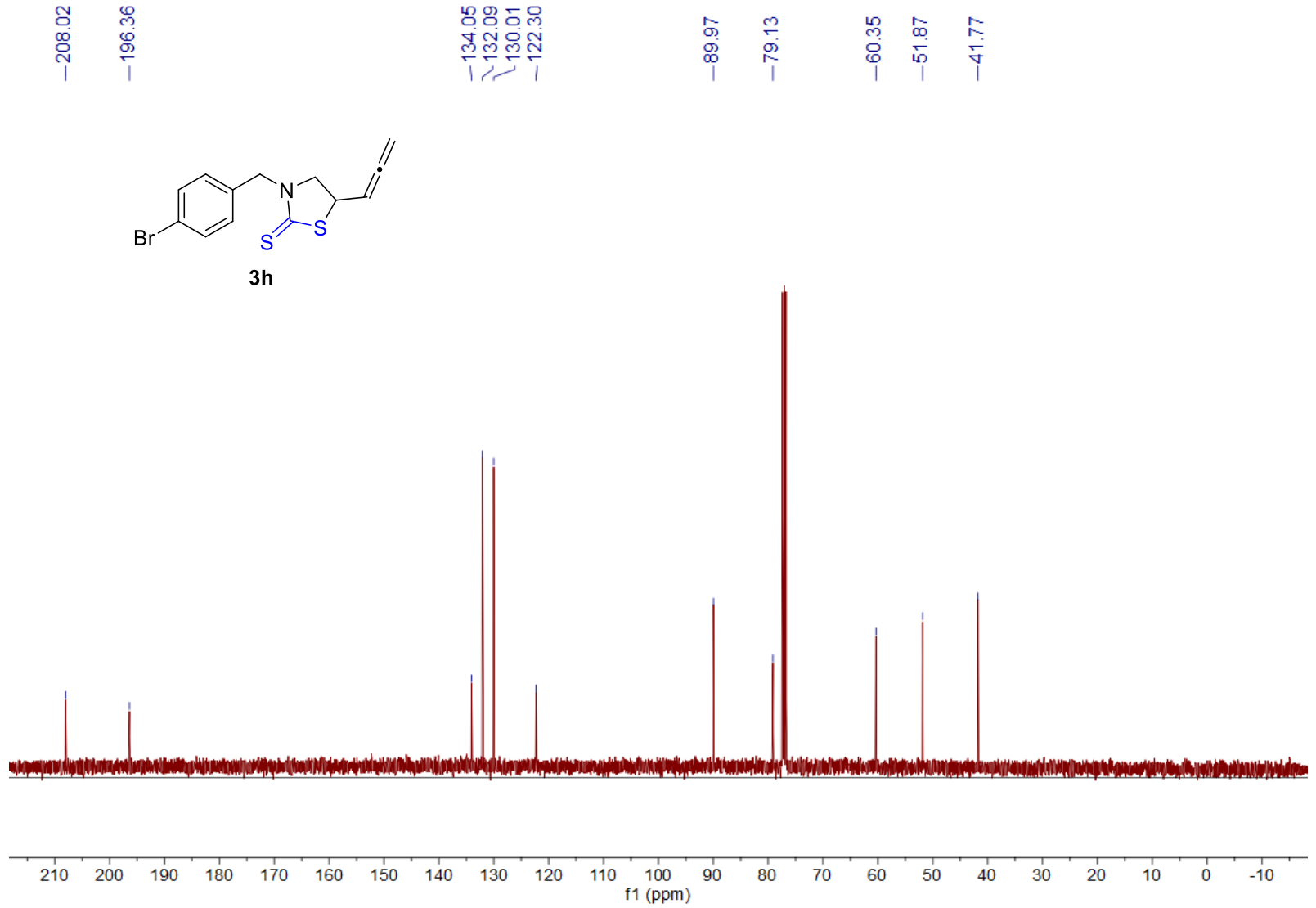
3f

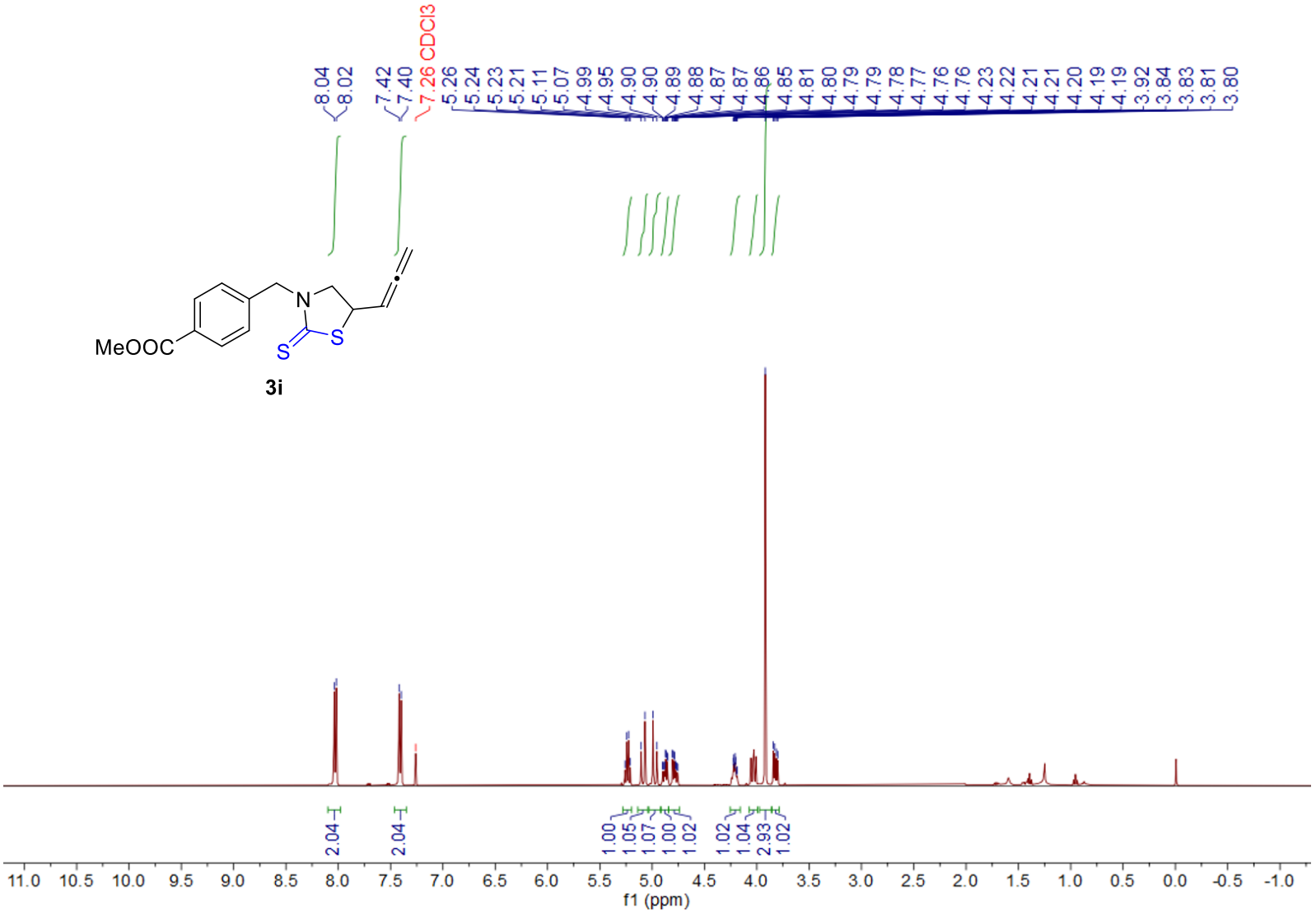

208.01
196.14
163.85
161.40
130.91
130.87
130.19
130.11
115.97
115.76
90.01
79.06
60.31
51.78
41.72
F
N
S
S
3f
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

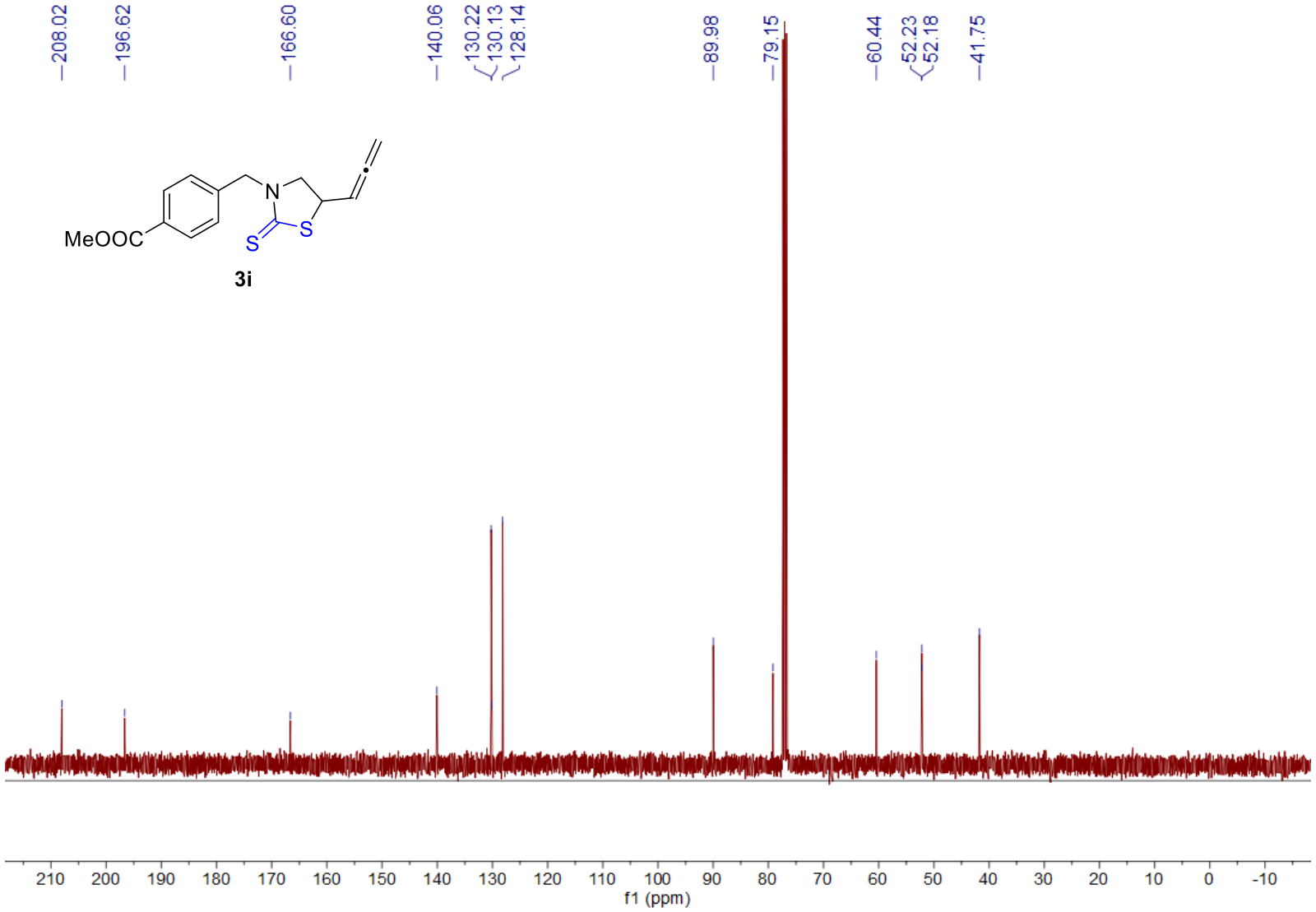

7.34
7.32
7.30
7.28
7.26 CDCl3
5.25
5.24
5.22
5.20
5.01
4.97
4.91
4.90
4.89
4.89
4.88
4.87
4.86
4.86
4.81
4.81
4.80
4.79
4.78
4.78
4.77
4.76
4.23
4.22
4.21
4.21
4.20
4.20
4.20
4.19
4.19
4.18
4.18
4.04
4.03
4.02
4.00
3.83
3.82
3.80
3.79
Cl
N
S
S
3g
4.00
0.98
1.04
1.95
0.98
0.97
1.01
1.00
f1 (ppm)

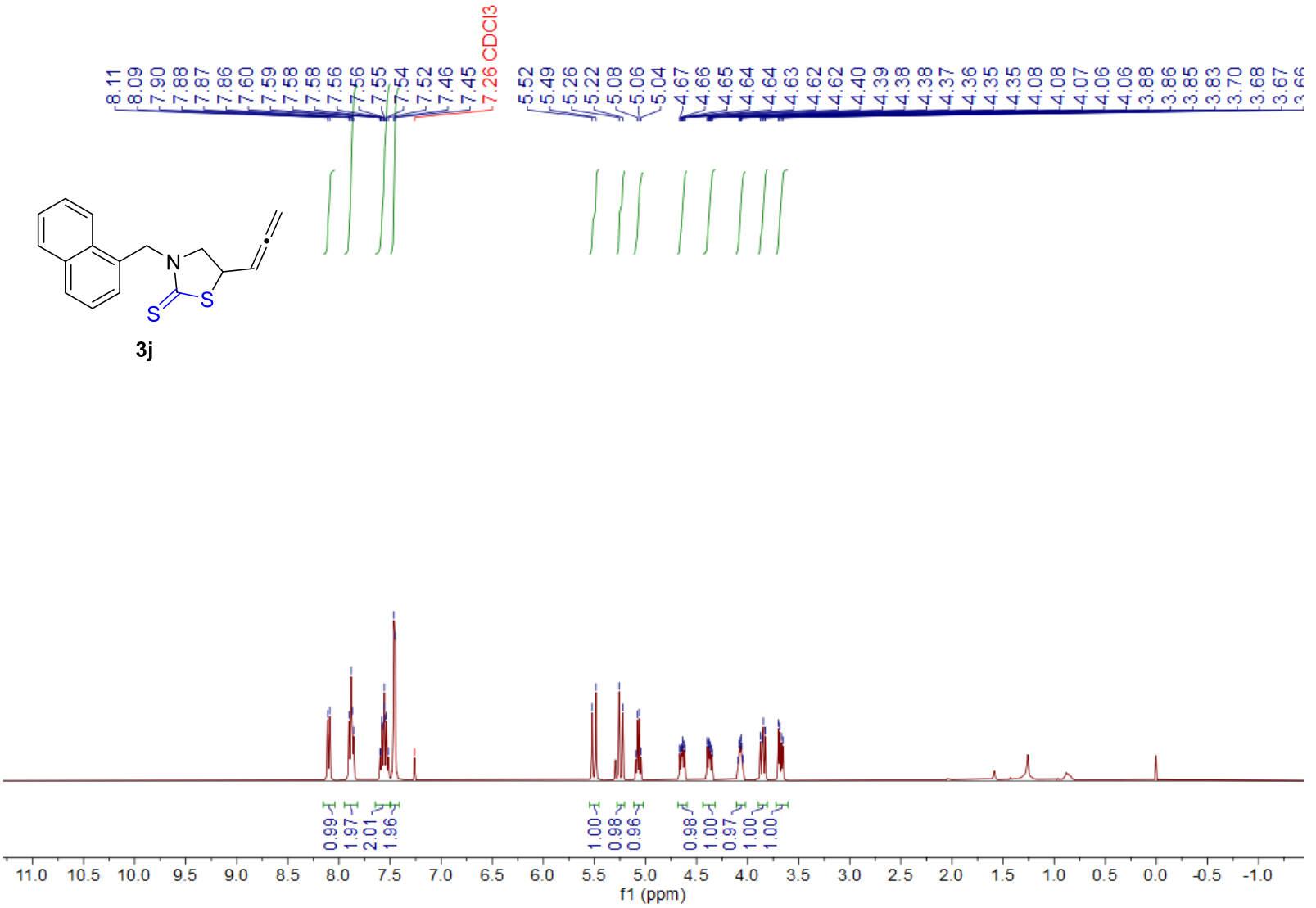

208.02
196.33
134.19
133.54
129.70
129.12
89.98
79.12
60.35
51.82
41.76
N
S
S
Cl
3g
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.49
7.47
7.26 CDCl3
7.24
7.22
5.25
5.24
5.22
5.20
4.99
4.95
4.91
4.90
4.90
4.89
4.88
4.87
4.86
4.86
4.82
4.81
4.80
4.79
4.79
4.78
4.77
4.76
4.23
4.22
4.22
4.21
4.20
4.20
4.20
4.19
4.19
4.18
4.18
4.04
4.02
4.01
4.00
3.83
3.82
3.80
3.79
Br
N
S
S
3h
2.04
2.00
1.00
1.06
2.01
1.00
1.03
1.06
1.04
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 -1.0
f1 (ppm)

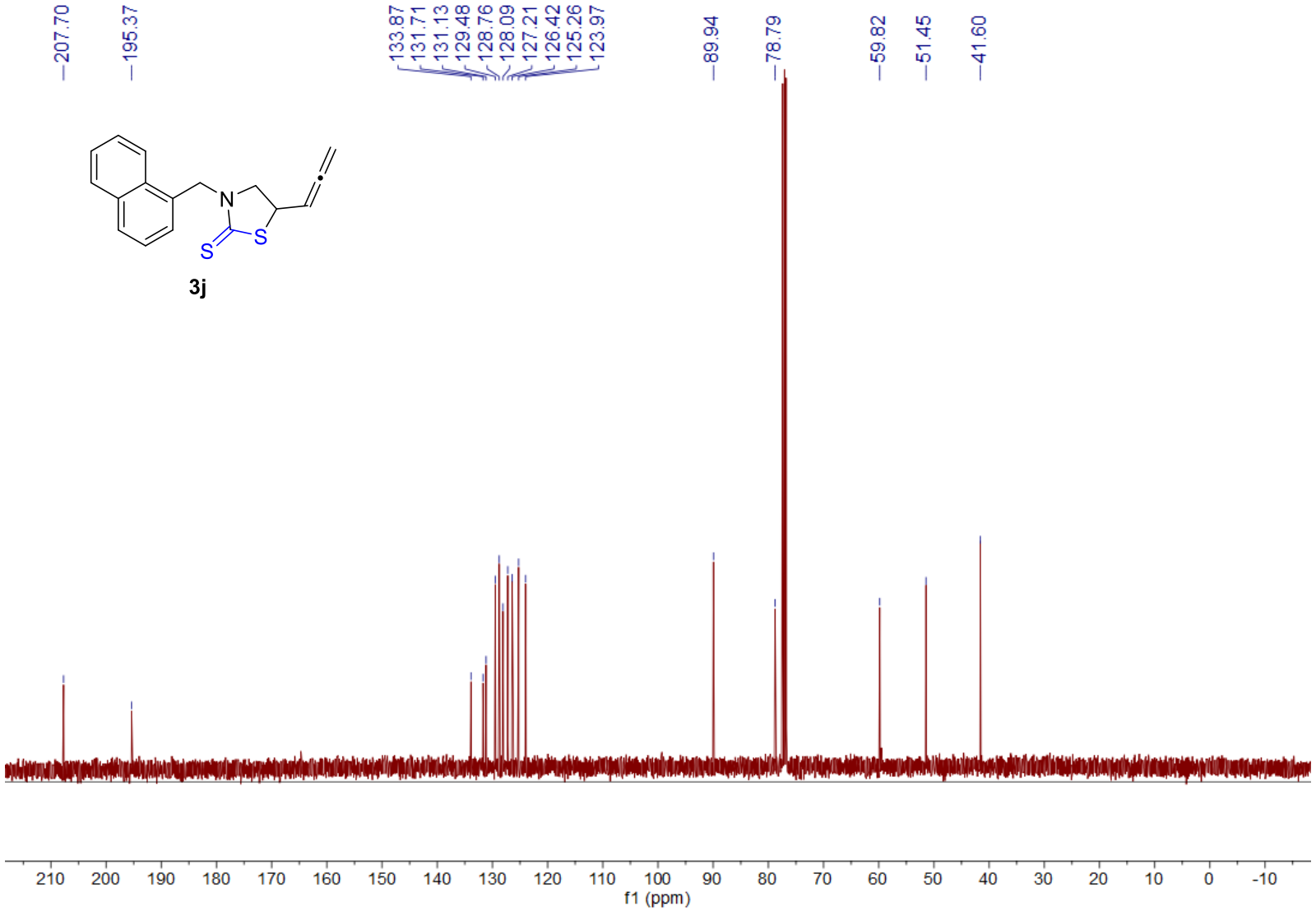

208.02
196.36
134.05
132.09
130.01
122.30
89.97
79.13
60.35
51.87
41.77
Br
N
S
S
3h
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

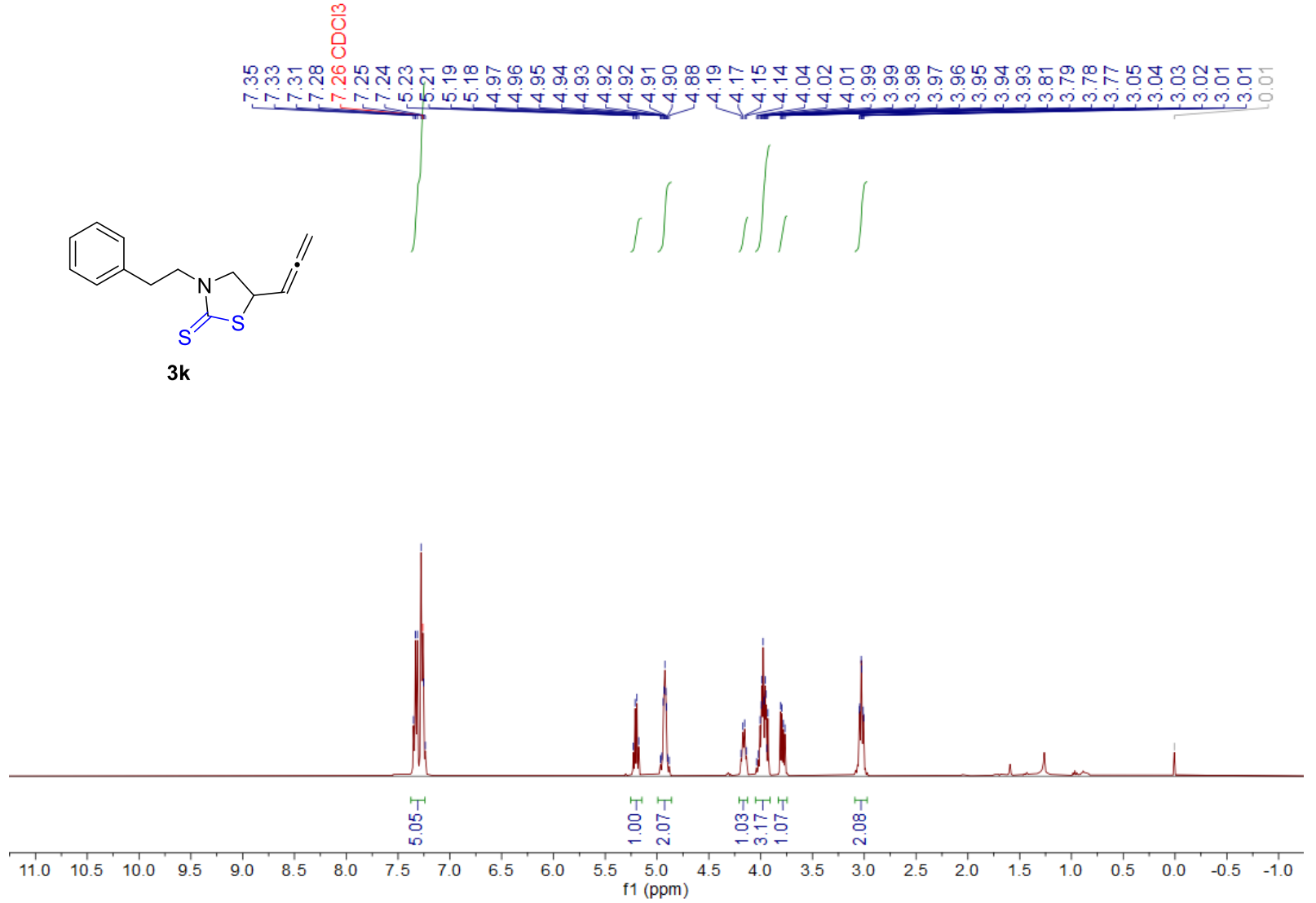

8.04
8.02
7.42
7.40
7.26 CDCl3
5.26
5.24
5.23
5.21
5.11
5.07
4.99
4.95
4.90
4.90
4.89
4.88
4.87
4.87
4.86
4.85
4.81
4.80
4.79
4.79
4.78
4.77
4.76
4.76
4.23
4.22
4.21
4.21
4.20
4.19
4.19
3.92
3.84
3.83
3.81
3.80
MeOOC
N
S
S
3i
2.04
2.04
1.00
1.05
1.07
1.00
1.02
1.02
1.04
2.93
1.02
11.0 10.5 10.0 9.5 9.0 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 -1.0
f1 (ppm)

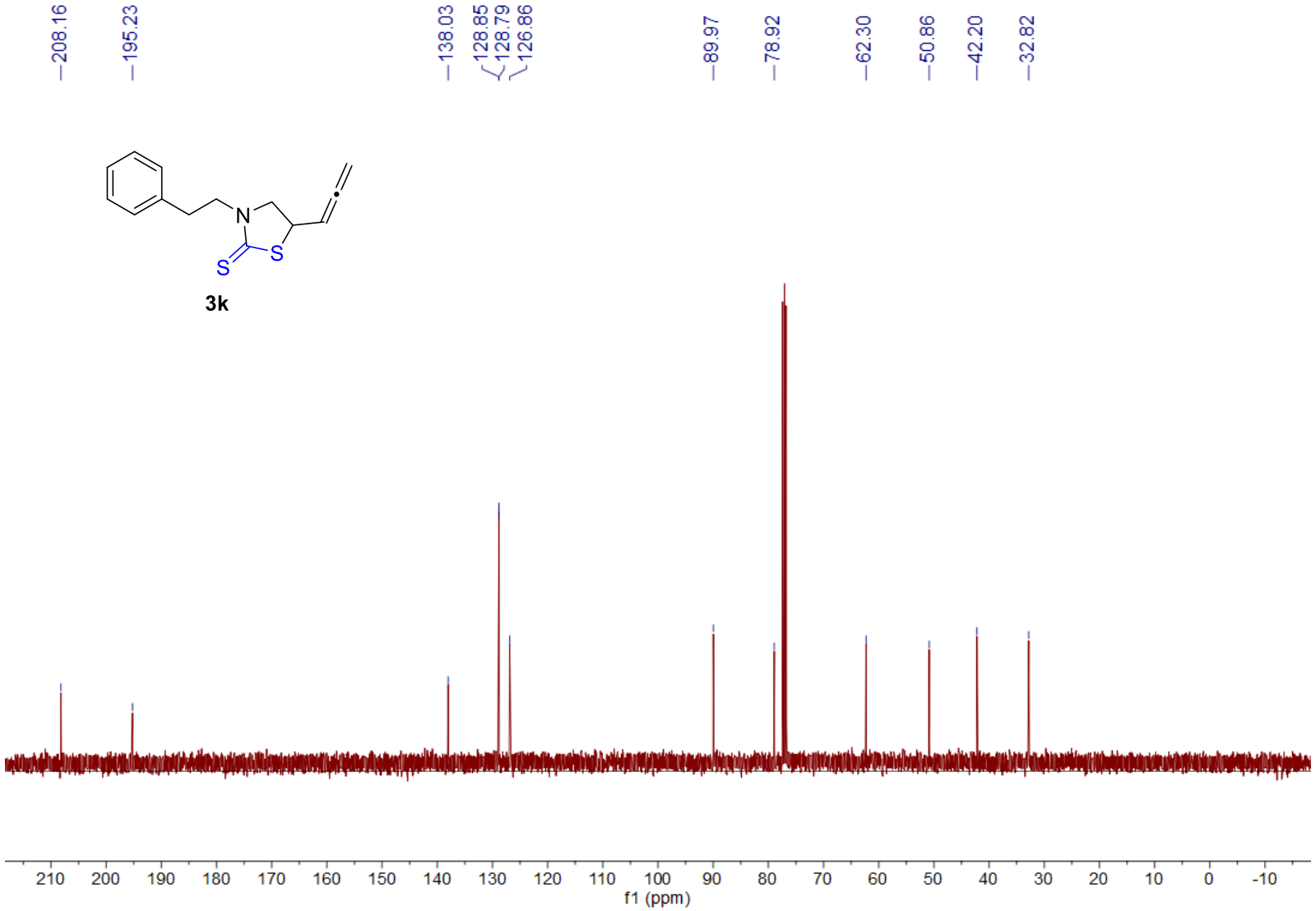

208.02
196.62
166.60
140.06
130.22
130.13
128.14
89.98
79.15
60.44
52.23
52.18
41.75
MeOOC
N
S
S
3i
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

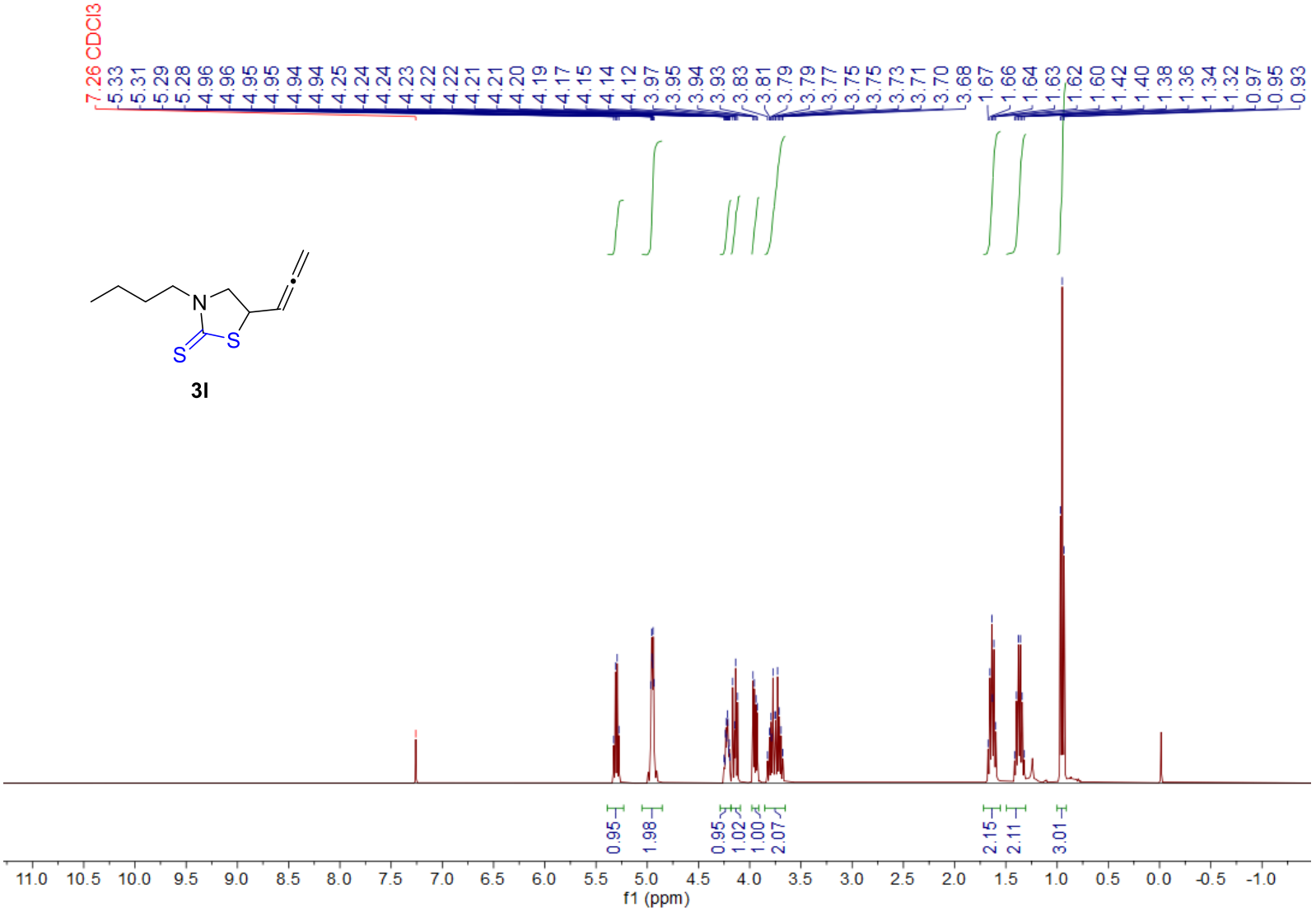

8.11
8.09
7.90
7.88
7.87
7.86
7.60
7.59
7.58
7.58
7.56
7.56
7.55
7.54
7.52
7.46
7.45
7.26 CDCl3
5.52
5.49
5.26
5.22
5.08
5.06
5.04
4.67
4.66
4.65
4.64
4.64
4.63
4.62
4.62
4.40
4.39
4.38
4.38
4.37
4.36
4.35
4.35
4.08
4.08
4.07
4.06
4.06
3.88
3.86
3.85
3.83
3.70
3.68
3.67
N
S
S
0.99
1.97
2.01
1.96
1.00
0.98
0.96
0.98
1.00
0.97
1.00
1.00
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
-1.0
f1 (ppm)

3j

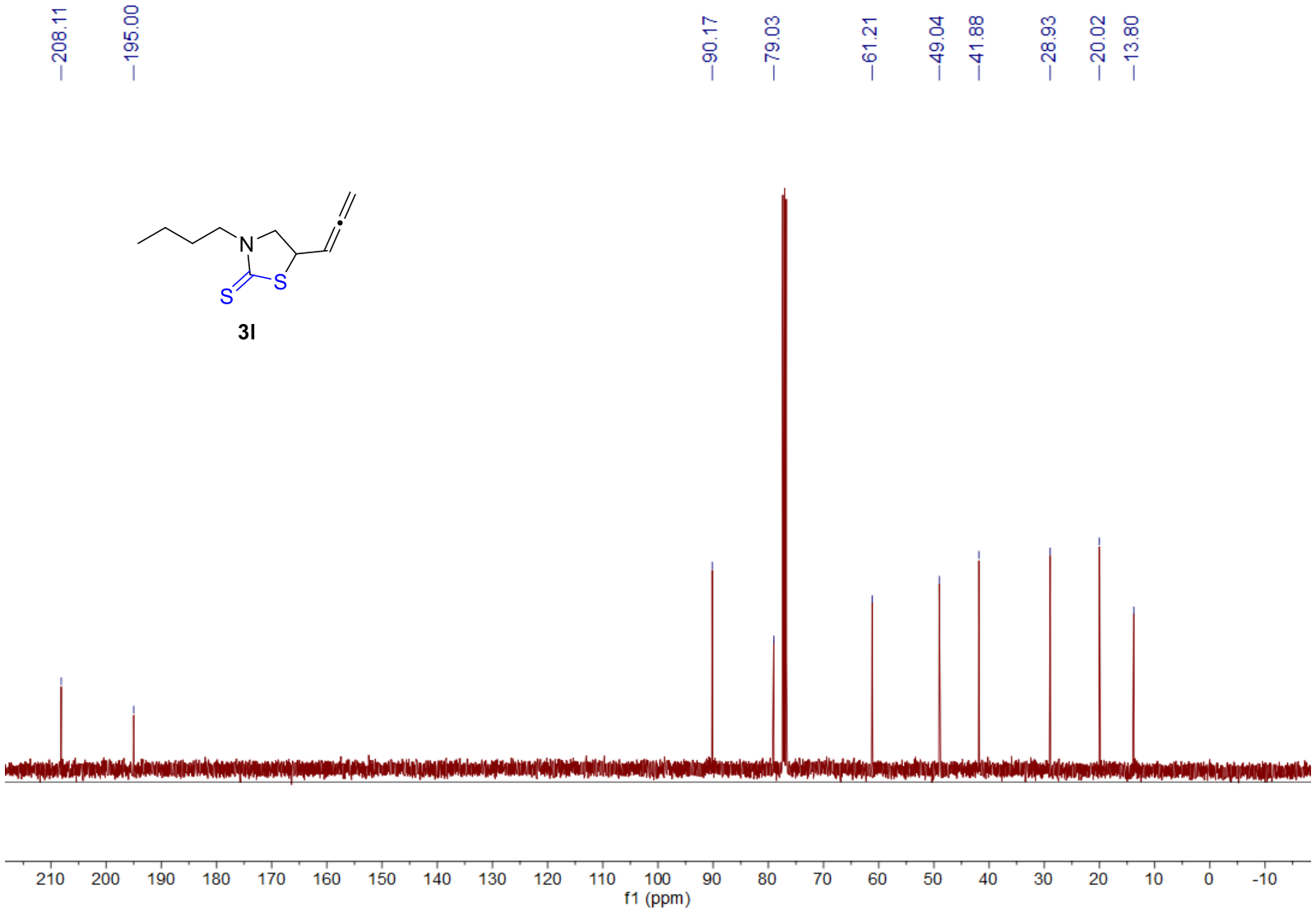

207.70
195.37
133.87
131.71
131.13
129.48
128.76
128.09
127.21
126.42
125.26
123.97
89.94
78.79
59.82
51.45
41.60
N
S
S
3j
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

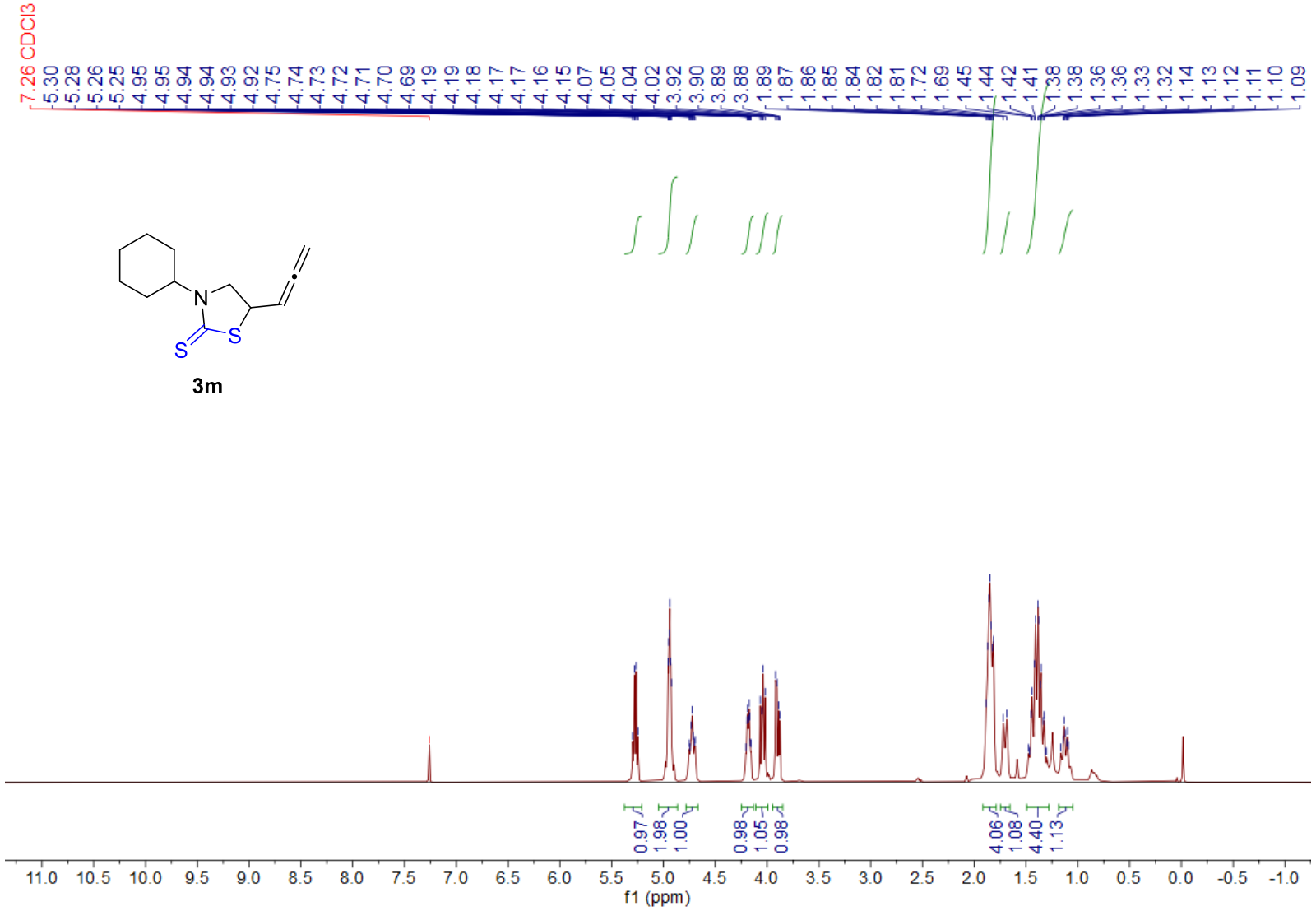

7.35
7.33
7.31
7.28
7.26 CDCl3
7.25
7.24
5.23
5.21
5.19
5.18
4.97
4.96
4.95
4.94
4.93
4.92
4.92
4.91
4.90
4.88
4.19
4.17
4.15
4.14
4.04
4.02
4.01
3.99
3.99
3.98
3.97
3.96
3.95
3.94
3.93
3.81
3.79
3.78
3.77
3.05
3.04
3.03
3.02
3.01
3.01
0.01
N
S
S
3k
5.05
1.00
2.07
1.03
3.17
1.07
2.08
11.0 10.5 10.0 9.5 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 -1.0
f1 (ppm)


208.16
195.23
138.03
128.85
128.79
126.86
89.97
78.92
62.30
50.86
42.20
32.82
N
S
S
3k
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)


7.26 CDCl3
5.33 5.31 5.29 5.28 4.96 4.96 4.95 4.95 4.94 4.94 4.25 4.24 4.24 4.23 4.22 4.22 4.21 4.21 4.20 4.19 4.17 4.15 4.14 4.12 3.97 3.95 3.94 3.93 3.83 3.81 3.79 3.79 3.77 3.75 3.75 3.73 3.71 3.70 3.68 1.67 1.66 1.64 1.63 1.62 1.60 1.42 1.40 1.38 1.36 1.34 1.32 0.97 0.95 0.93
N
S
S
0.95 1.98 0.95 1.02 1.00 2.07 2.15 2.11 3.01
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 -1.0
f1 (ppm)

3l


208.11
195.00
90.17
79.03
61.21
49.04
41.88
28.93
20.02
13.80
N
S
S
3l
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)


7.26 CDCl3
5.30
5.28
5.26
5.25
4.95
4.95
4.94
4.94
4.93
4.92
4.75
4.74
4.73
4.72
4.71
4.70
4.69
4.19
4.19
4.18
4.17
4.17
4.16
4.15
4.07
4.05
4.04
4.02
3.92
3.90
3.89
3.88
1.89
1.87
1.86
1.85
1.84
1.82
1.81
1.72
1.69
1.45
1.44
1.42
1.41
1.38
1.38
1.36
1.36
1.33
1.32
1.14
1.13
1.12
1.11
1.10
1.09
N
S
S
3m
0.97
1.98
1.00
0.98
1.05
0.98
4.06
1.08
4.40
1.13
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
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2.5
2.0
1.5
1.0
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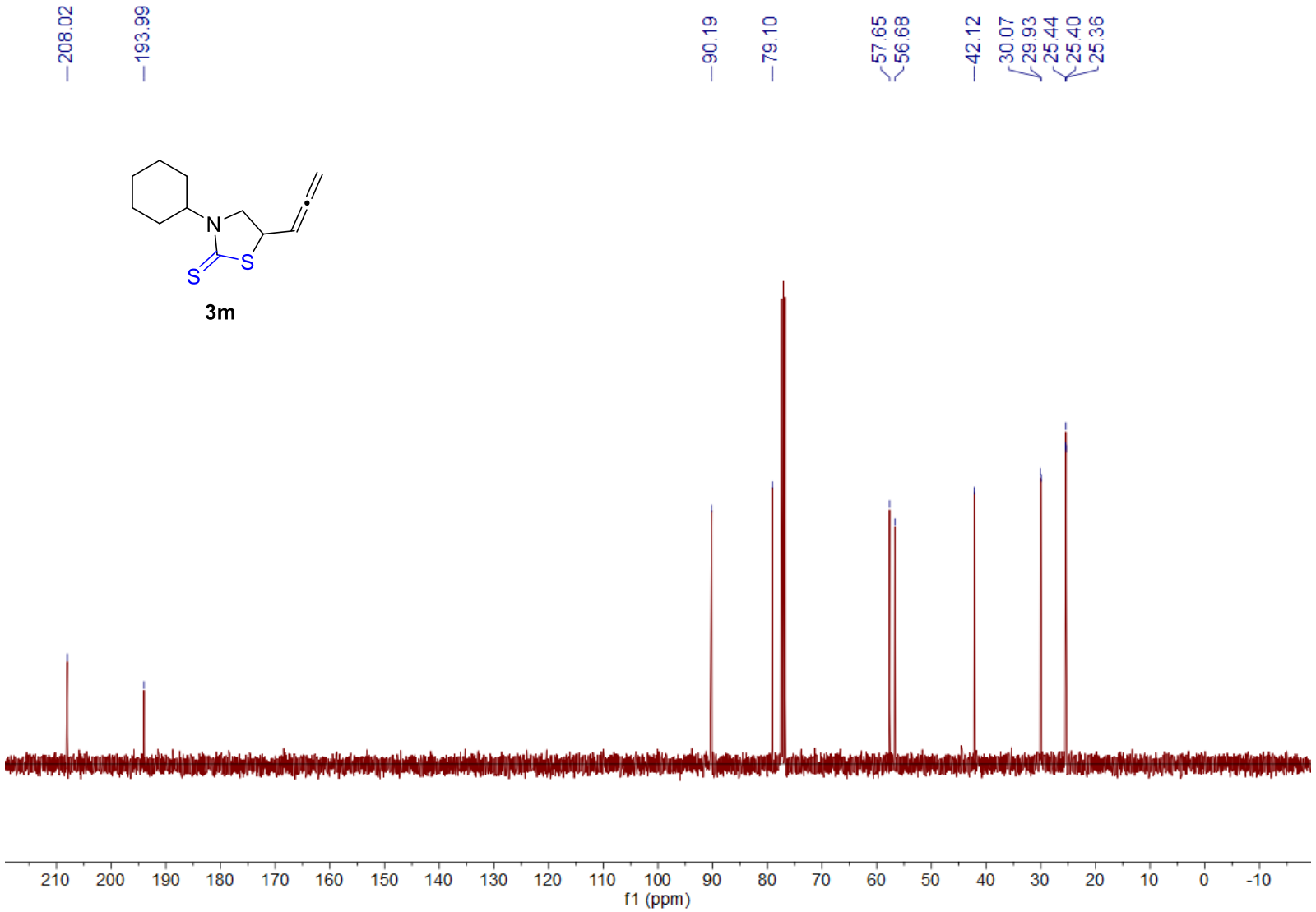
0.0
-0.5
-1.0
f1 (ppm)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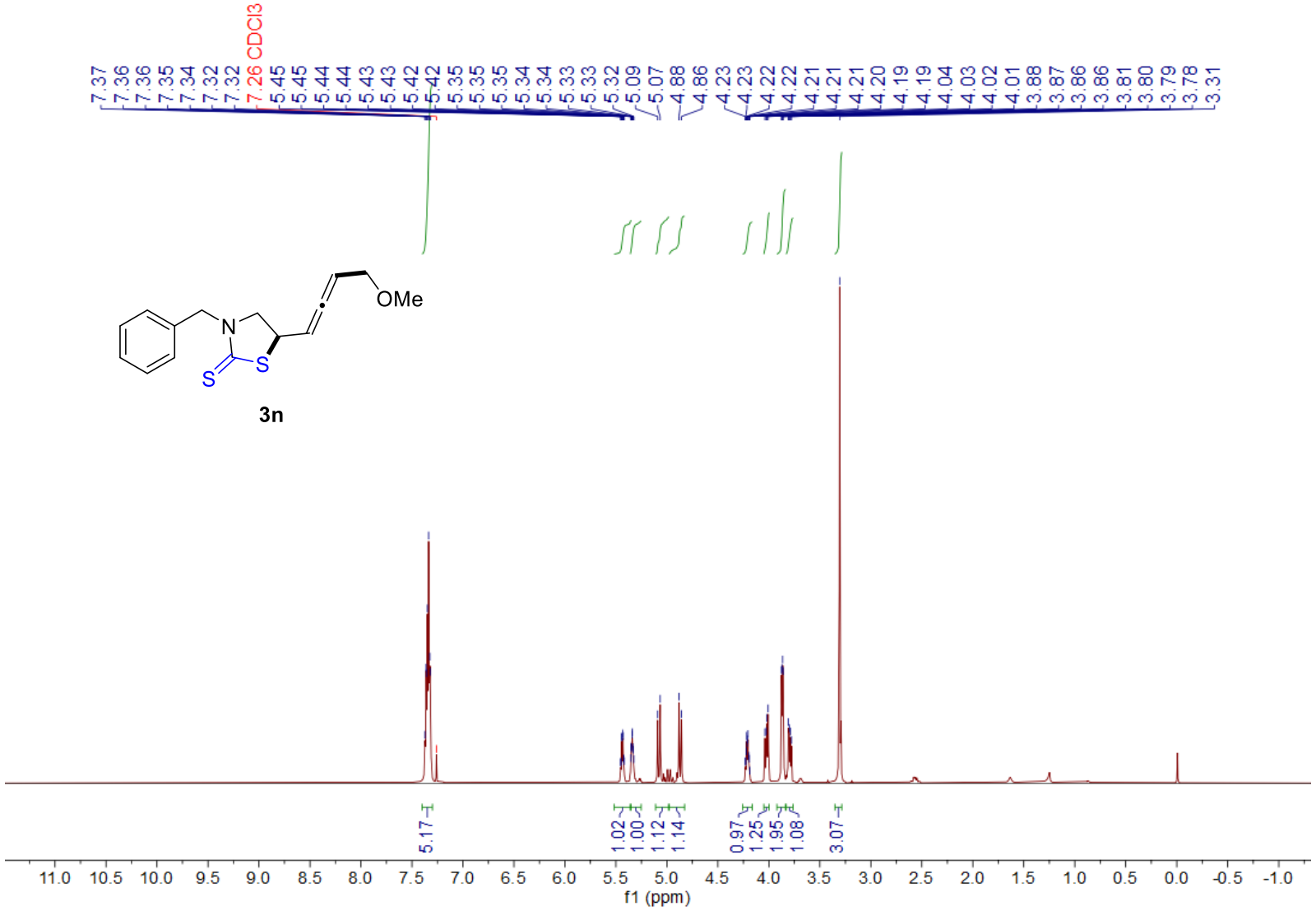
N
S
S
3m
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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7.26 CDCl3
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5.45
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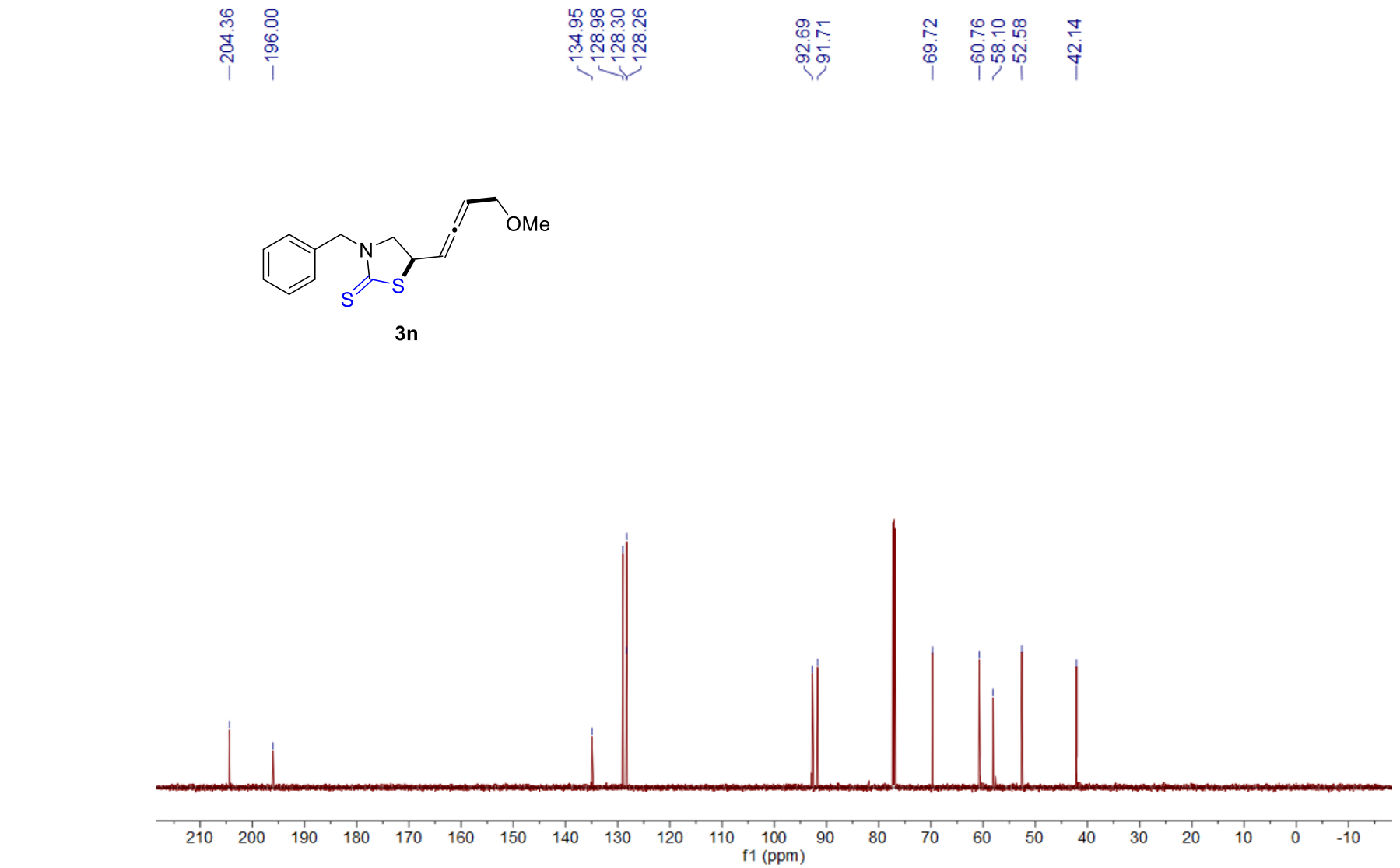
5.44
5.43
5.43
5.42
5.42
5.35
5.35
5.35
5.34
5.34
5.33
5.33
5.32
5.09
5.07
4.88
4.86
4.23
4.23
4.22
4.22
4.21
4.21
4.21
4.20
4.19
4.19
4.04
4.03
4.02
4.01
3.88
3.87
3.86
3.86
3.81
3.80
3.79
3.78
3.31
OMe
N
S
S
3n
5.17
1.02
1.00
1.12
1.14
0.97
1.25
1.95
1.08
3.07
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 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 -1.0
f1 (ppm)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91.71
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58.10
52.58
42.14
OMe
N
S
S
3n
210
200
190
180
170
160
150
140
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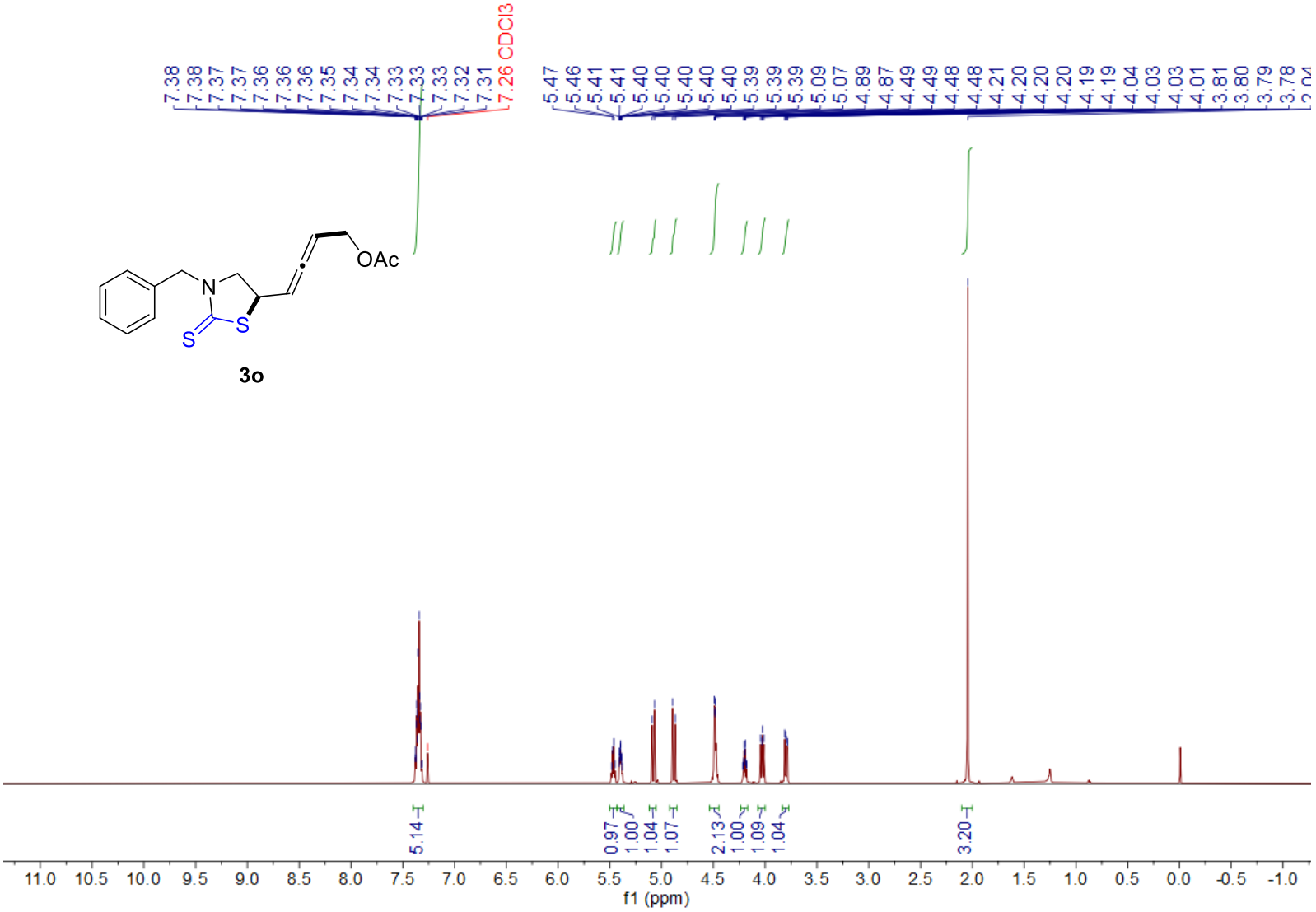
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)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7.38
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7.35
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7.34
7.33
7.33
7.33
7.32
7.31
7.26 CDCl3
5.47
5.46
5.41
5.41
5.40
5.40
5.40
5.40
5.39
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5.39
5.09
5.07
4.89
4.87
4.49
4.49
4.48
4.48
4.21
4.20
4.20
4.20
4.19
4.19
4.04
4.03
4.03
4.01
3.81
3.80
3.79
3.78
OAc
N
S
S
3o
5.14
0.97
1.00
1.04
1.07
2.13
1.00
1.09
1.04
3.20
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
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2.5
2.0
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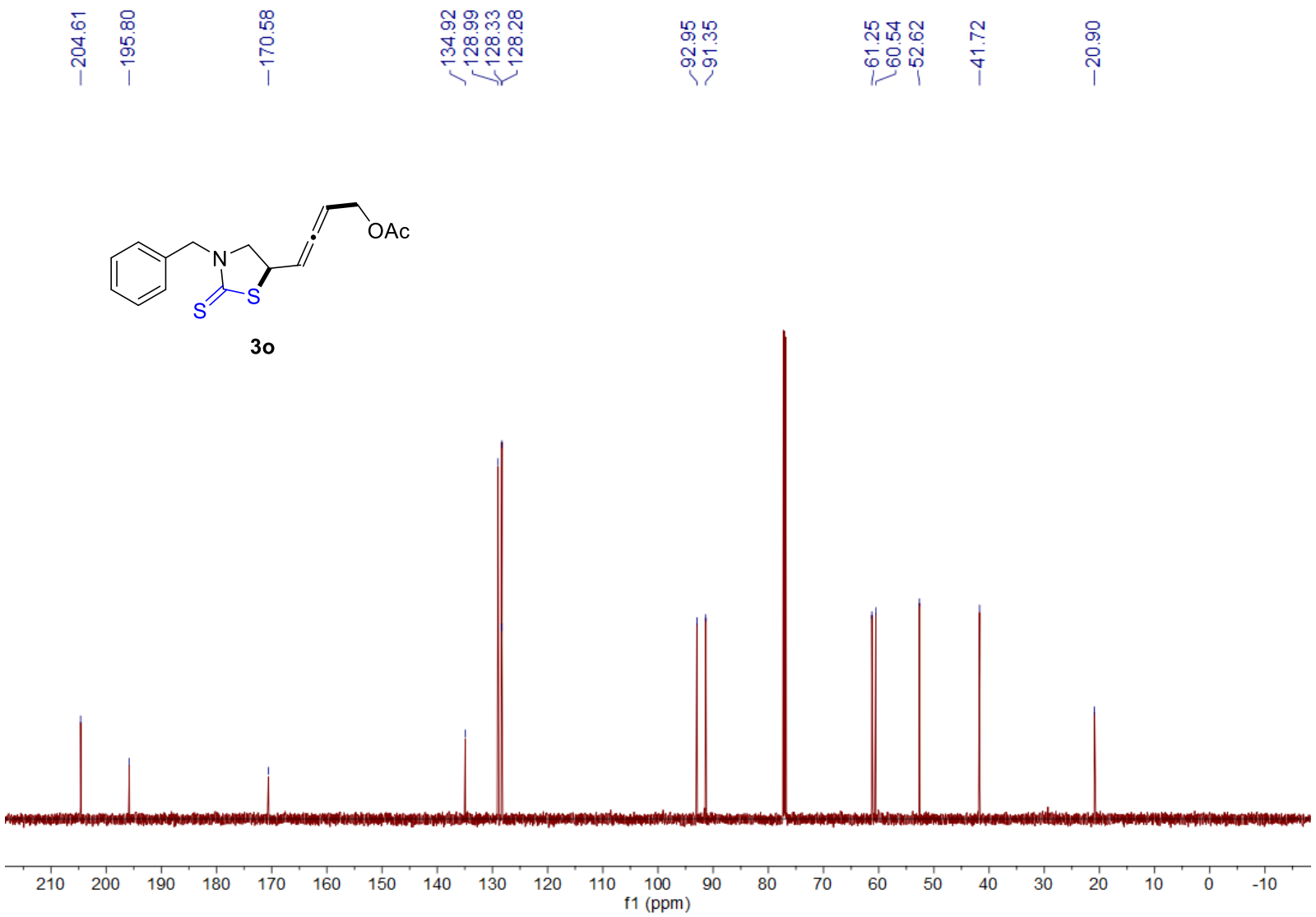
0.0
-0.5
-1.0
f1 (ppm)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61.25
60.54
52.62
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OAc
N
S
S
3o
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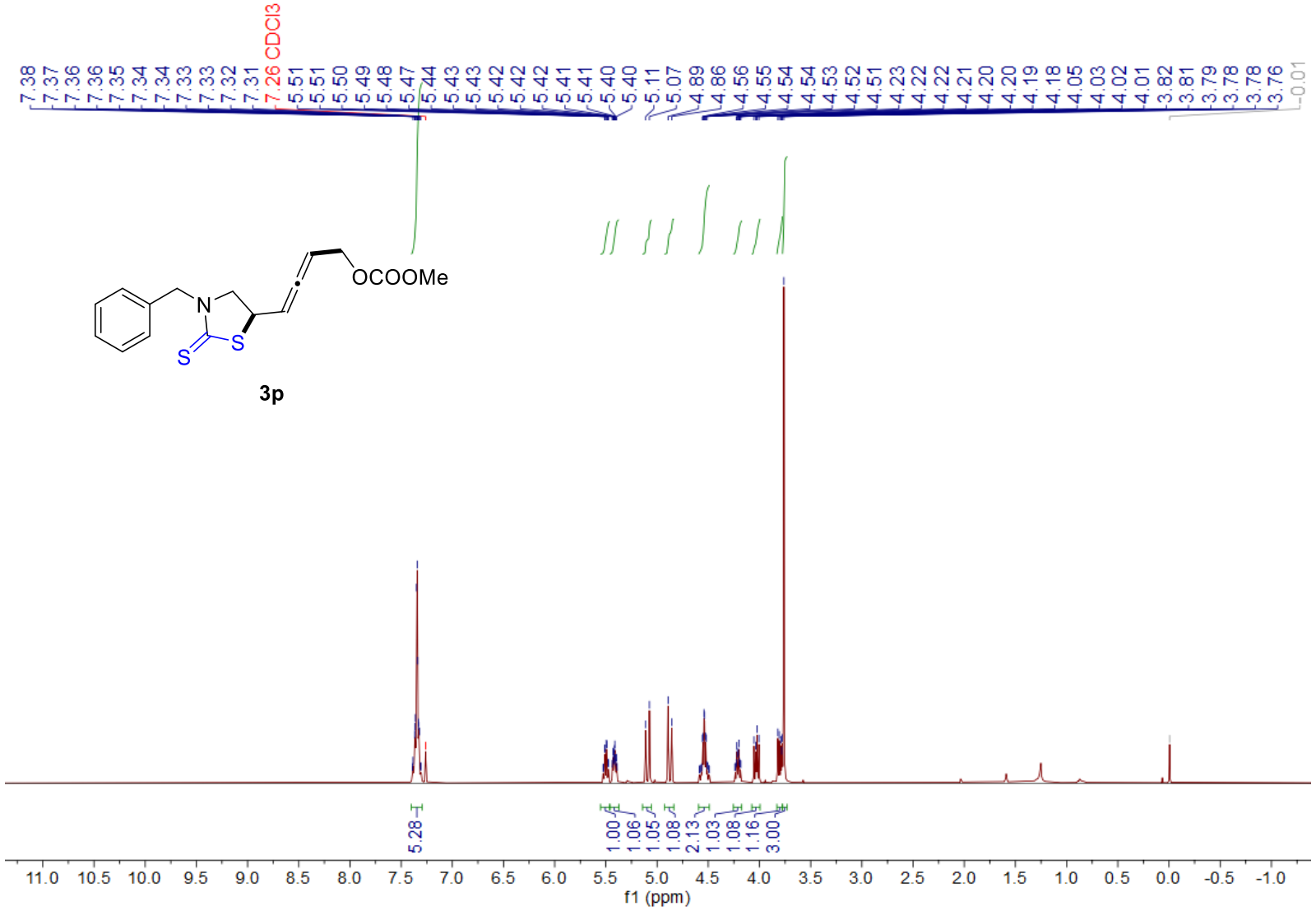
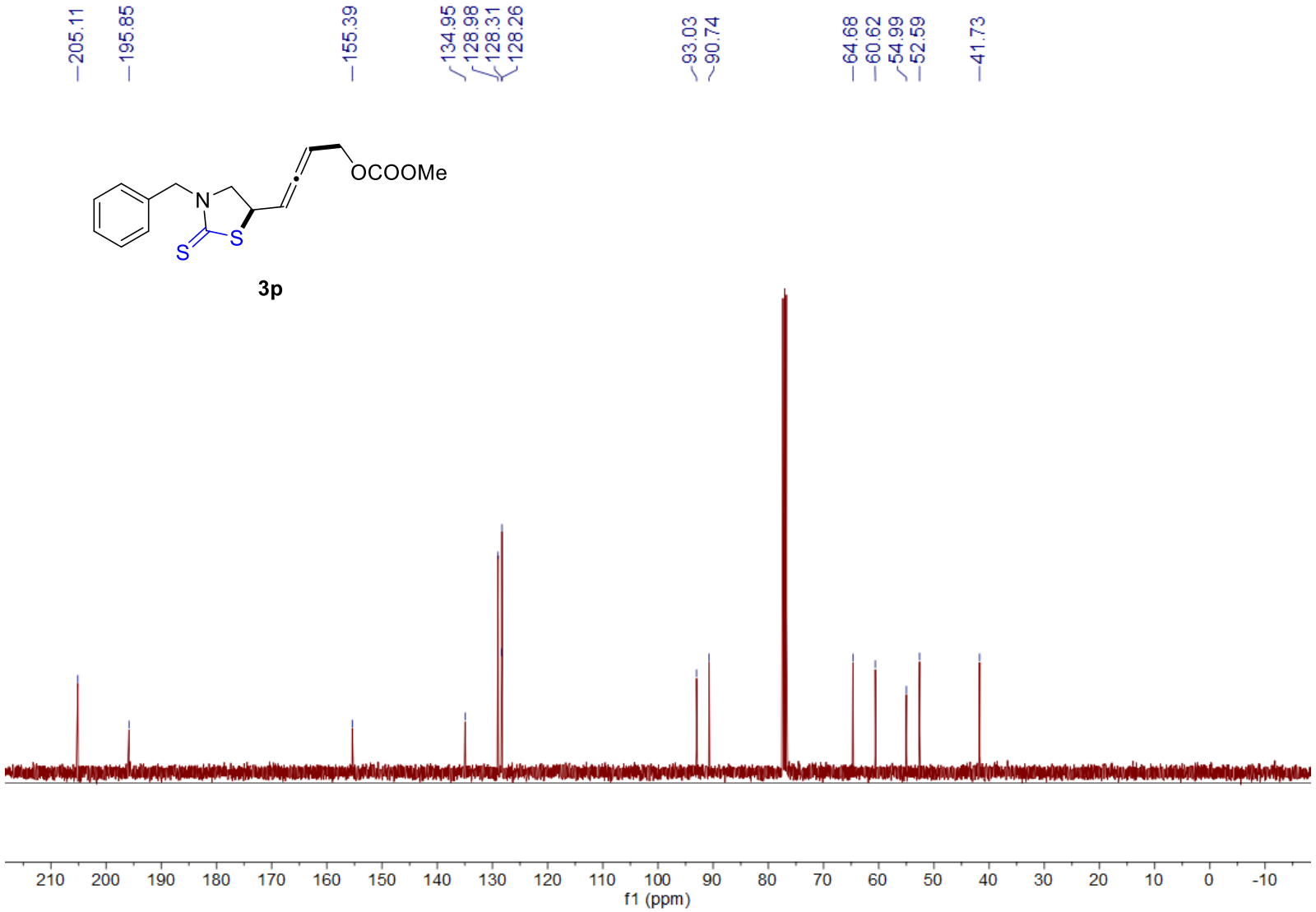
f1 (ppm)


7.38 7.37 7.36 7.36 7.35 7.34 7.34 7.33 7.33 7.32 7.31 7.26 CDCl3 5.51 5.51 5.50 5.49 5.48 5.47 5.44 5.43 5.43 5.42 5.42 5.42 5.41 5.41 5.40 5.40 5.11 5.07 4.89 4.86 4.56 4.55 4.54 4.54 4.53 4.52 4.51 4.23 4.22 4.22 4.21 4.20 4.20 4.19 4.18 4.05 4.03 4.02 4.01 3.82 3.81 3.79 3.78 3.78 3.76 0.01
OCOOMe
N
S
S
3p
5.28
1.00 1.06 1.05 1.08 2.13 1.03 1.08 1.16 3.00
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 -1.0
f1 (ppm)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155.39
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128.31
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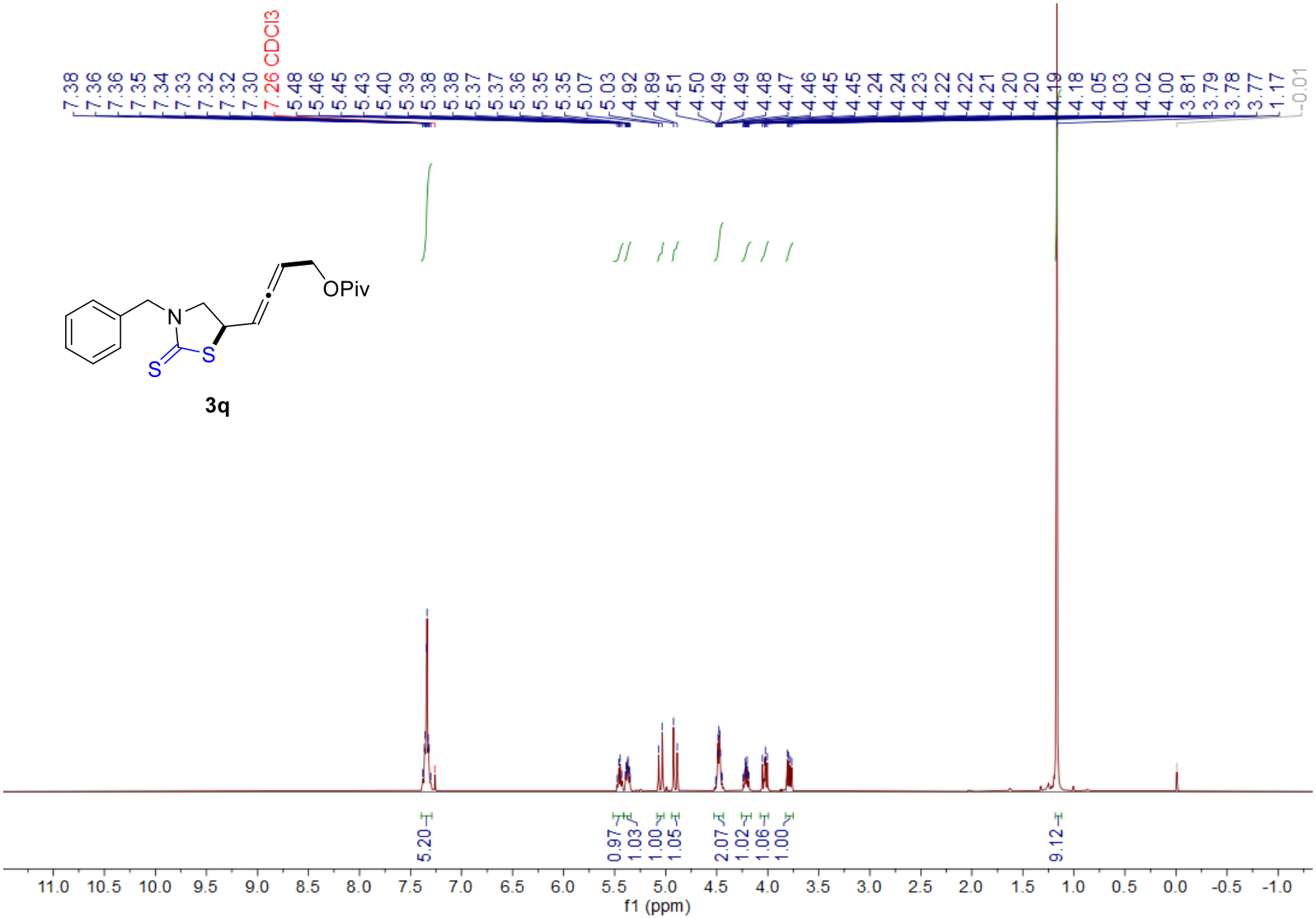
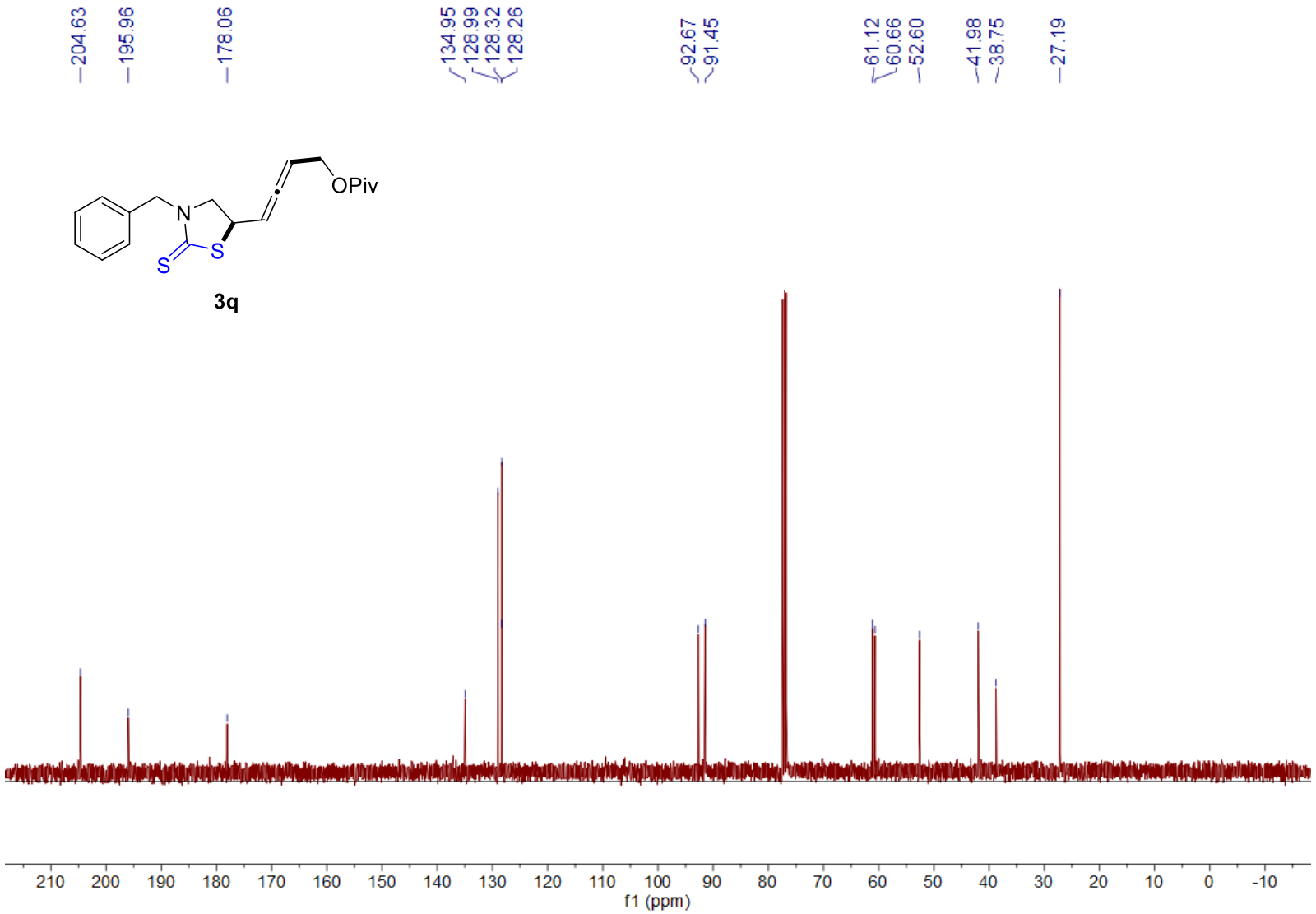
93.03
90.74
64.68
60.62
54.99
52.59
41.73
OCOOMe
N
S
S
3p
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.38
7.36
7.36
7.35
7.34
7.33
7.32
7.32
7.30
7.26 CDCl3
5.48
5.46
5.45
5.43
5.40
5.39
5.38
5.38
5.37
5.37
5.36
5.35
5.35
5.07
5.03
4.92
4.89
4.51
4.50
4.49
4.49
4.48
4.47
4.46
4.45
4.45
4.24
4.24
4.23
4.22
4.22
4.21
4.20
4.20
4.19
4.18
4.05
4.03
4.02
4.00
3.81
3.79
3.78
3.77
1.17
0.01
OPiv
N
S
S
5.20
0.97
1.03
1.00
1.05
2.07
1.02
1.06
1.00
9.12
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 -1.0
f1 (ppm)

3q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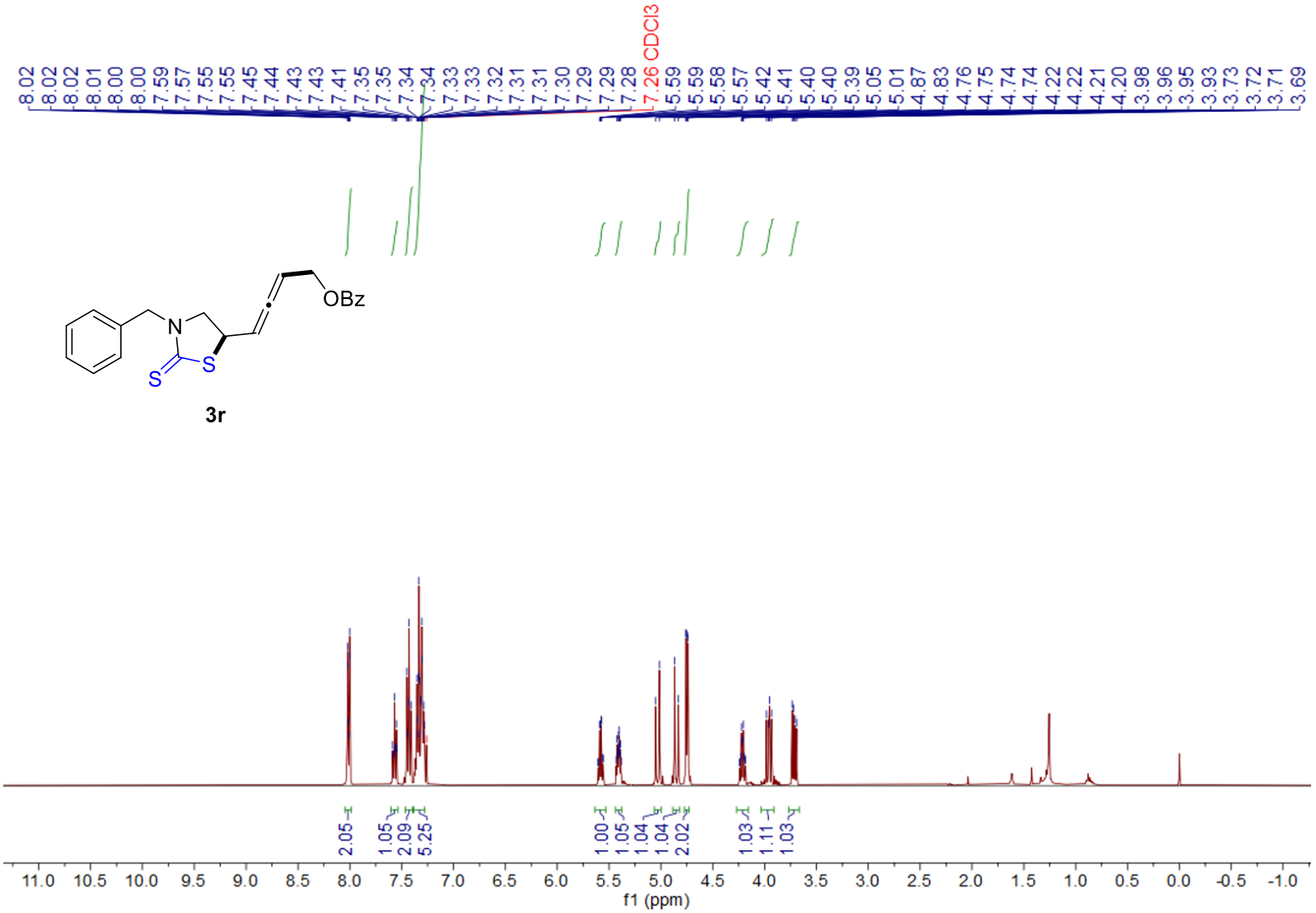
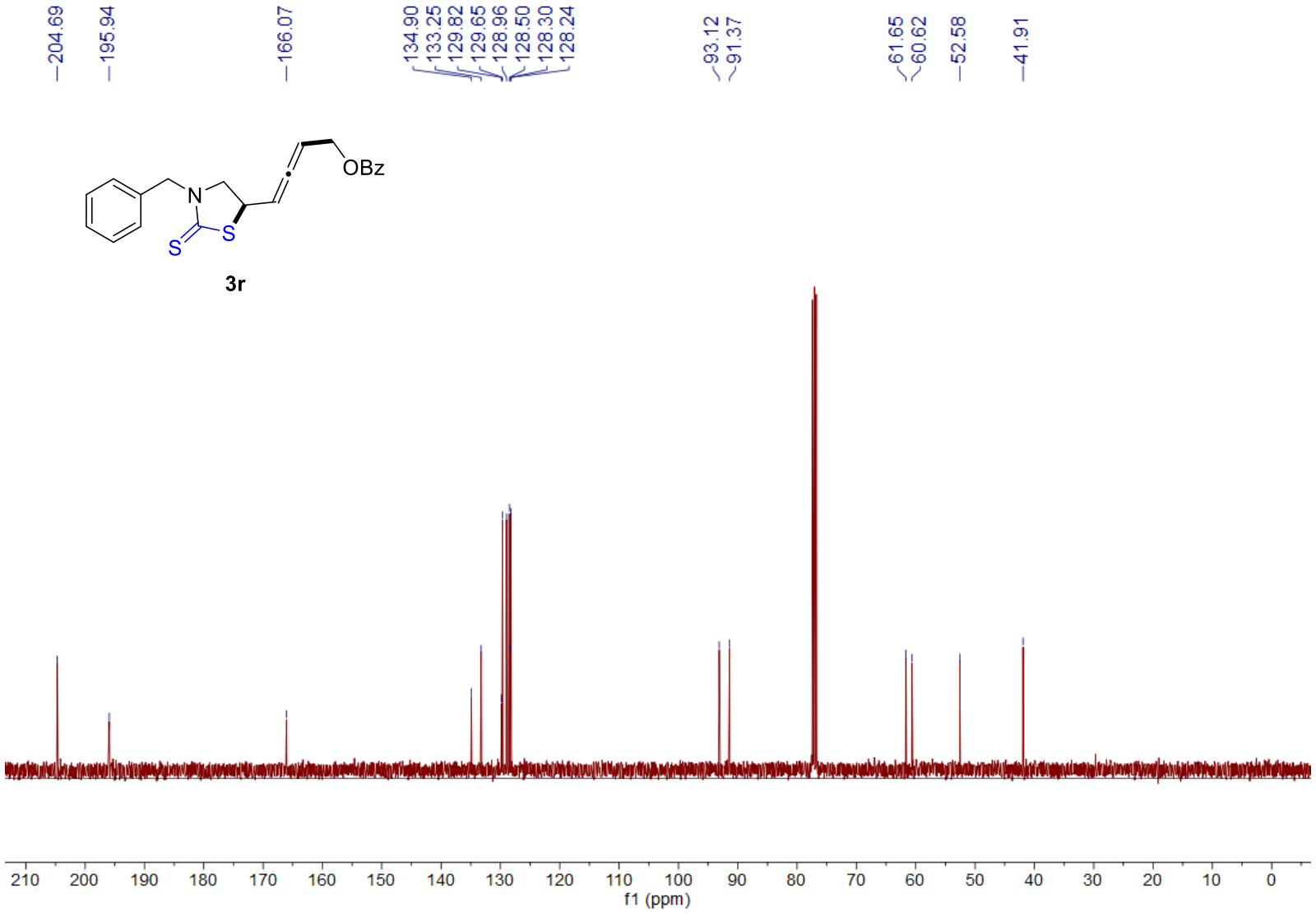
134.95
128.99
128.32
128.26
92.67
91.45
61.12
60.66
52.60
41.98
38.75
27.19
OPiv
N
S
S
3q
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


8.02 8.02 8.02 8.01 8.00 8.00 7.59 7.57 7.55 7.55 7.45 7.44 7.43 7.43 7.41 7.35 7.35 7.34 7.34 7.33 7.33 7.32 7.31 7.31 7.30 7.29 7.29 7.28 7.26 CDCl3 5.59 5.59 5.58 5.57 5.42 5.41 5.40 5.40 5.39 5.05 5.01 4.87 4.83 4.76 4.75 4.74 4.74 4.22 4.22 4.21 4.20 3.98 3.96 3.95 3.93 3.73 3.72 3.71 3.69
OBz
N
S
S
2.05 1.05 2.09 5.25 1.00 1.05 1.04 1.04 2.02 1.03 1.11 1.03
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 -1.0
f1 (ppm)

3r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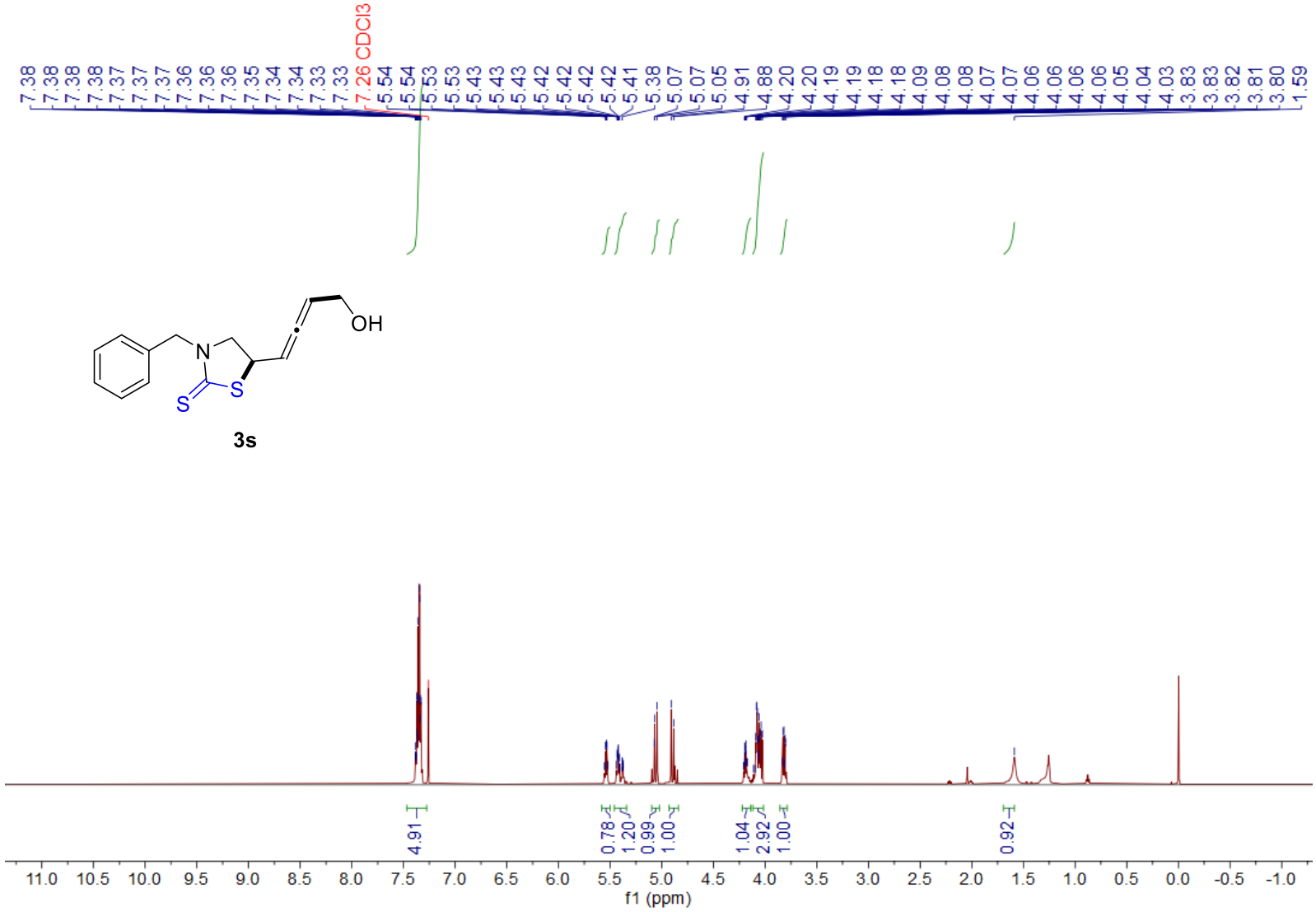
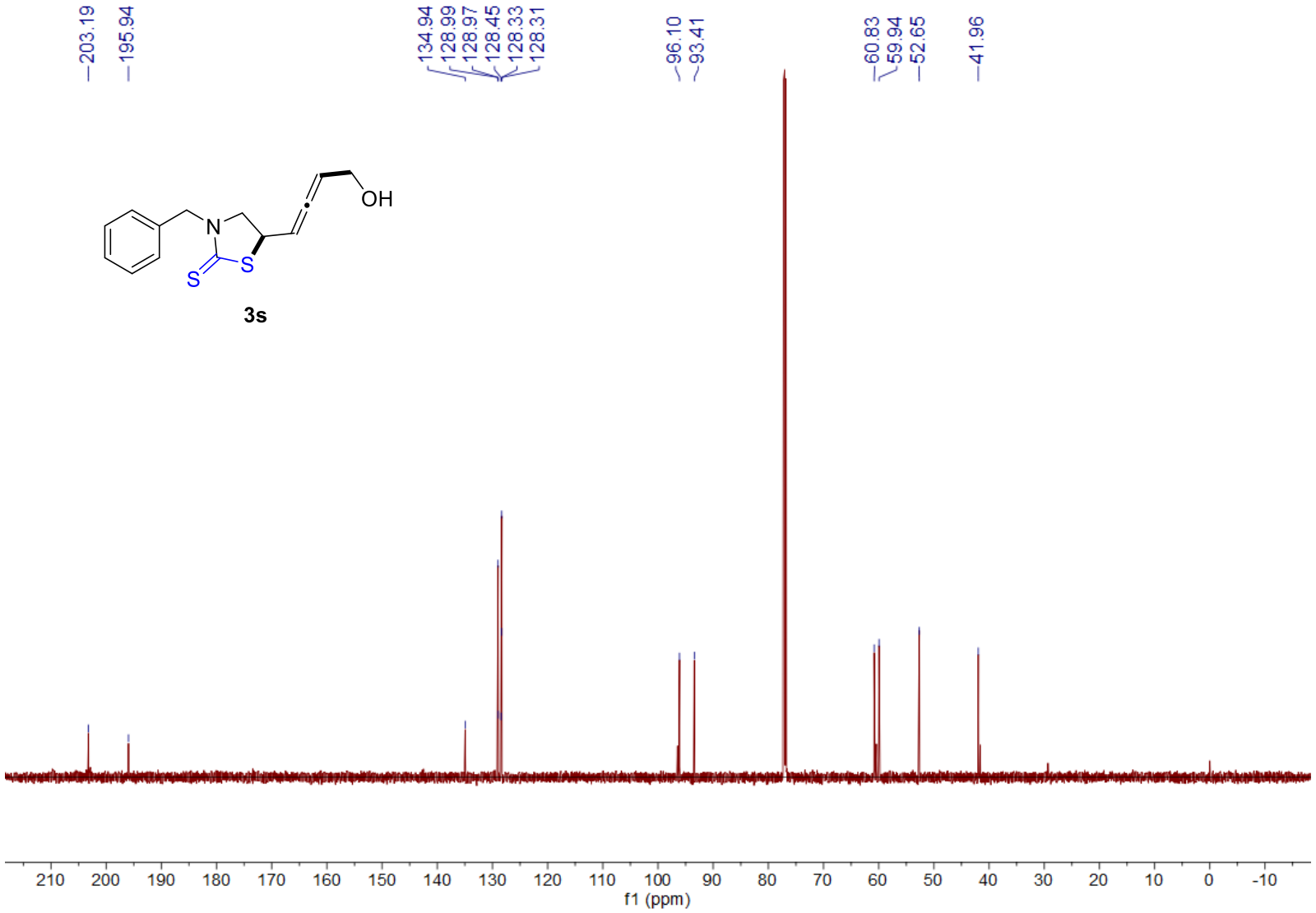
166.07
134.90
133.25
129.82
129.65
128.96
128.50
128.30
128.24
93.12
91.37
61.65
60.62
52.58
41.91
OBz
N
S
S
3r
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.38 7.38 7.38 7.38 7.37 7.37 7.37 7.36 7.36 7.36 7.35 7.34 7.34 7.33 7.33 7.26 CDCl3 5.54 5.54 5.53 5.53 5.43 5.43 5.43 5.42 5.42 5.42 5.42 5.41 5.38 5.07 5.07 5.05 4.91 4.88 4.20 4.20 4.19 4.19 4.18 4.18 4.09 4.08 4.08 4.07 4.07 4.06 4.06 4.06 4.06 4.05 4.04 4.03 3.83 3.83 3.82 3.81 3.80 1.59
OH
N
S
S
4.91
0.78
1.20
0.99
1.00
1.04
2.92
1.00
0.92
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 -1.0
f1 (ppm)

3s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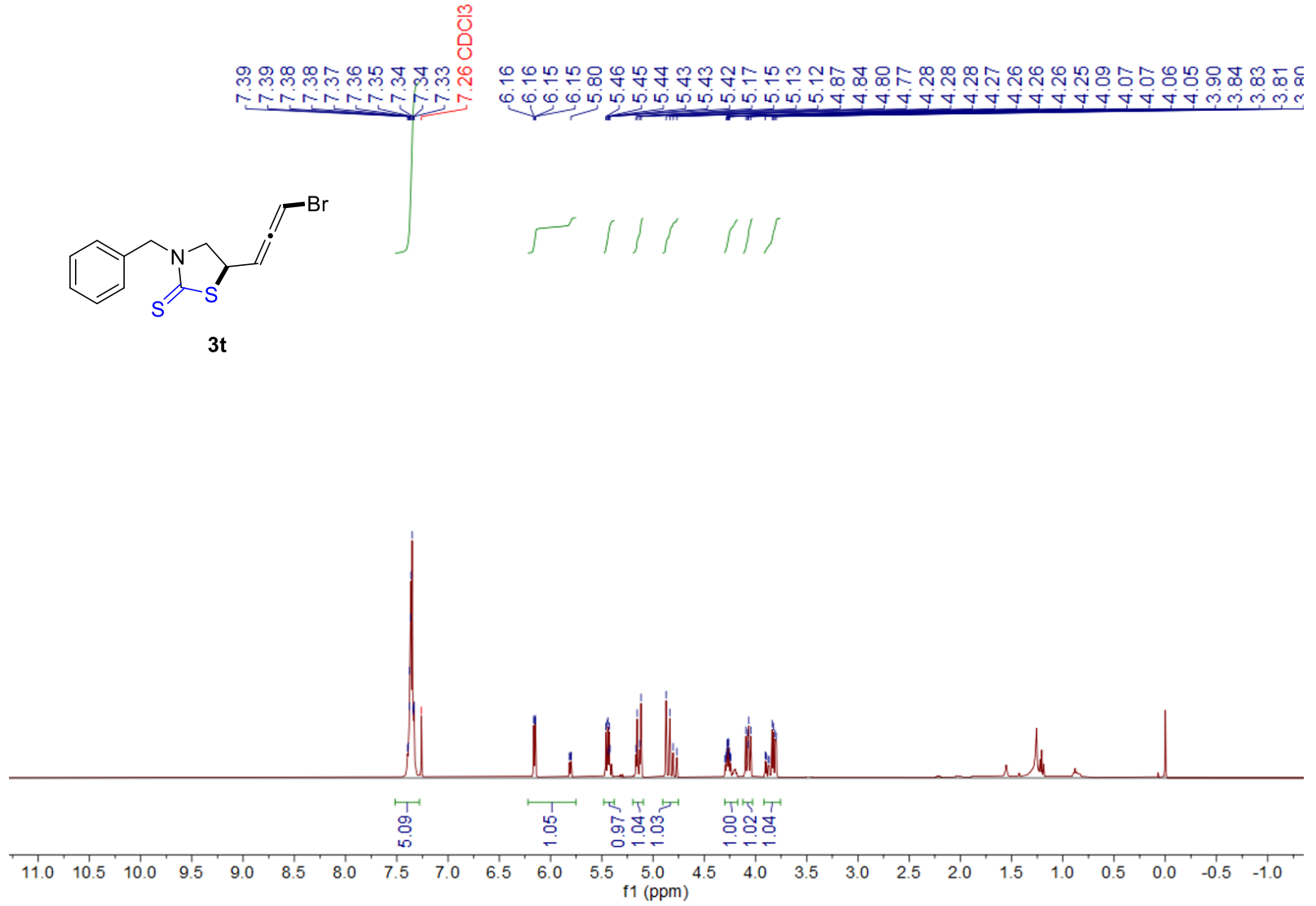
128.31
96.10
93.41
60.83
59.94
52.65
41.96
OH
N
S
S
3s
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)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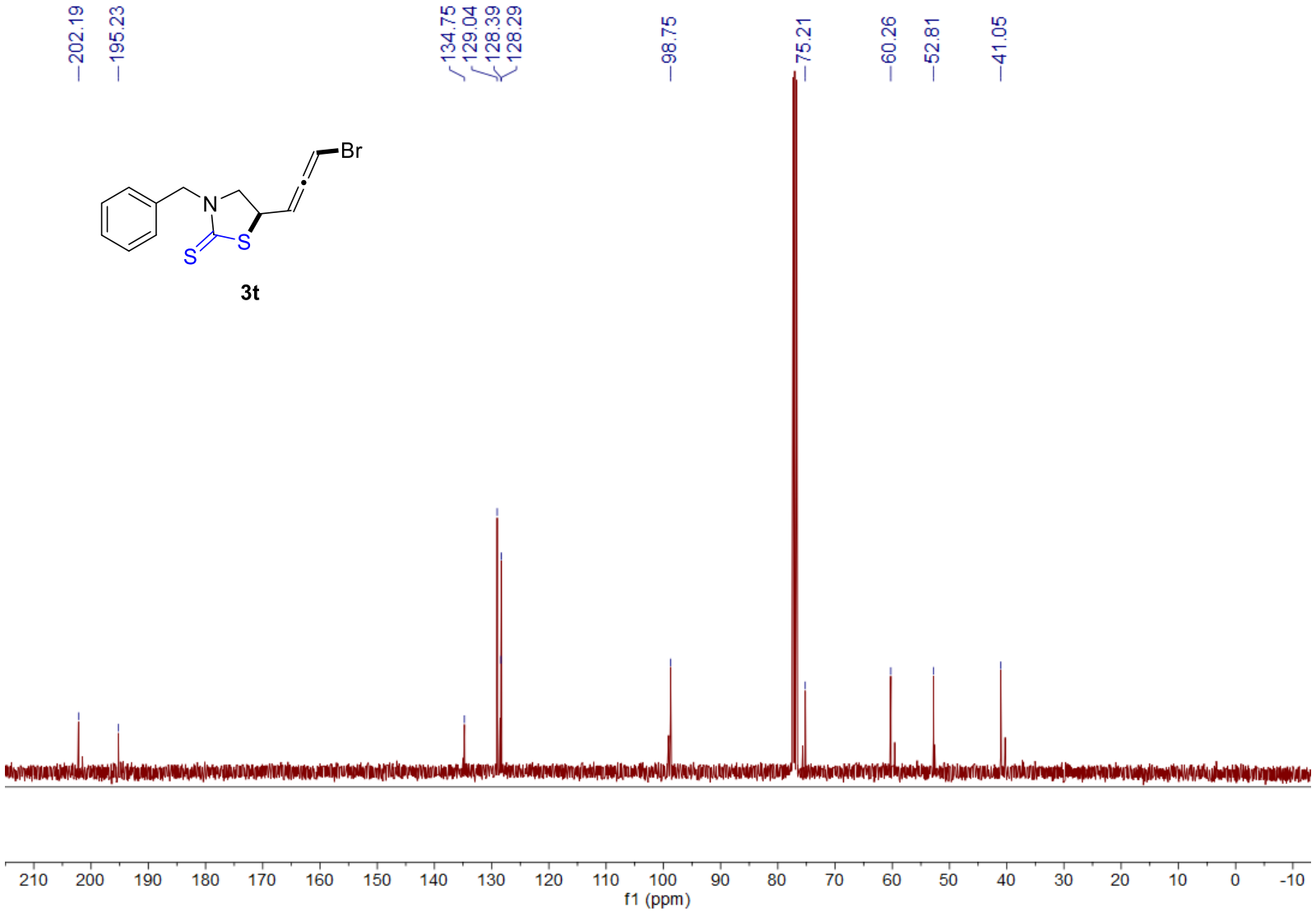
7.36
7.35
7.34
7.34
7.33
7.26 CDCl3
6.16
6.16
6.15
6.15
5.80
5.46
5.45
5.44
5.43
5.43
5.42
5.17
5.15
5.13
5.12
4.87
4.84
4.80
4.77
4.28
4.28
4.28
4.27
4.26
4.26
4.26
4.25
4.09
4.07
4.07
4.06
4.05
3.90
3.84
3.83
3.81
Br
N
S
S
5.09
1.05
0.97
1.04
1.03
1.00
1.02
1.04
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
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
-1.0
f1 (ppm)

3t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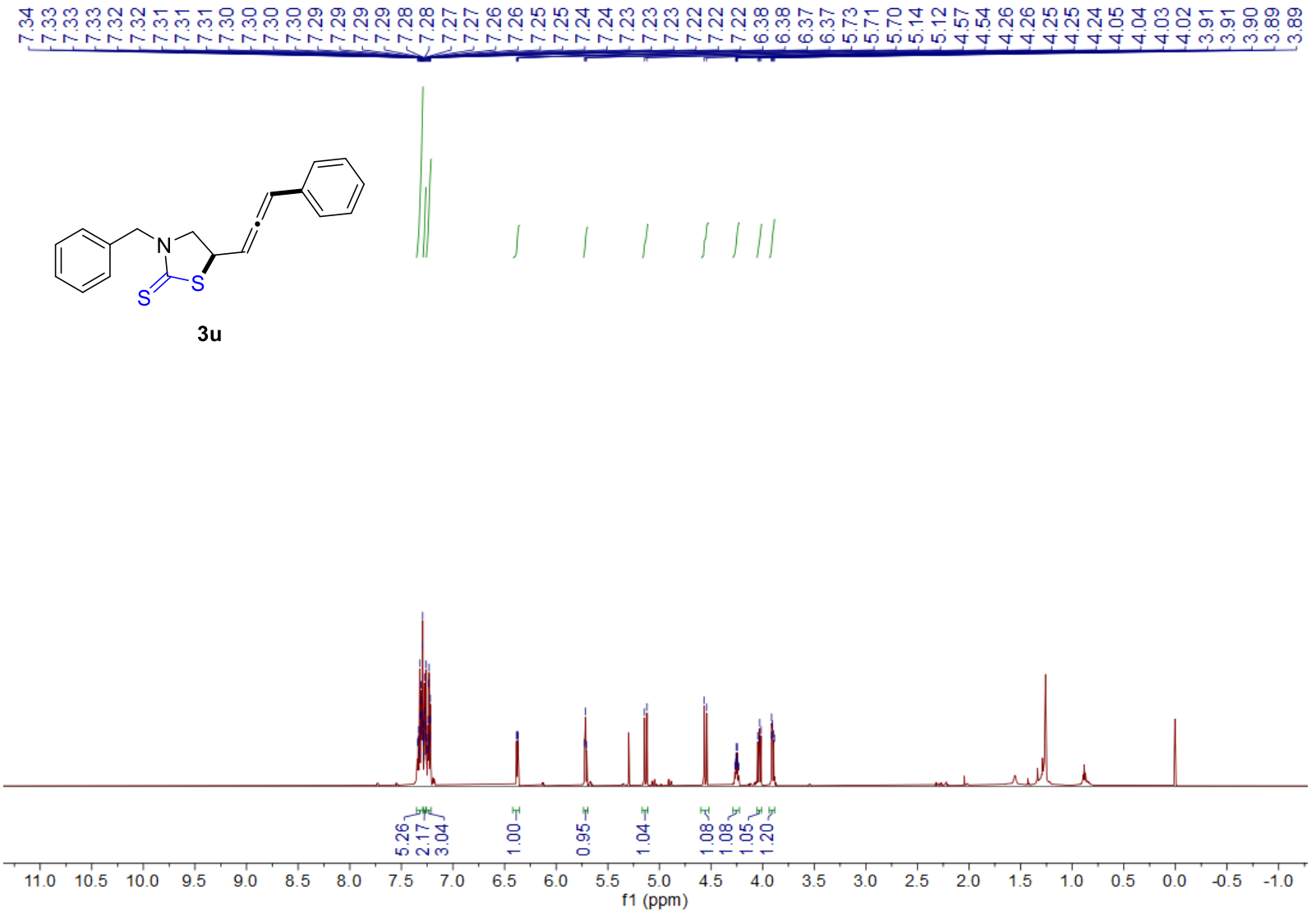
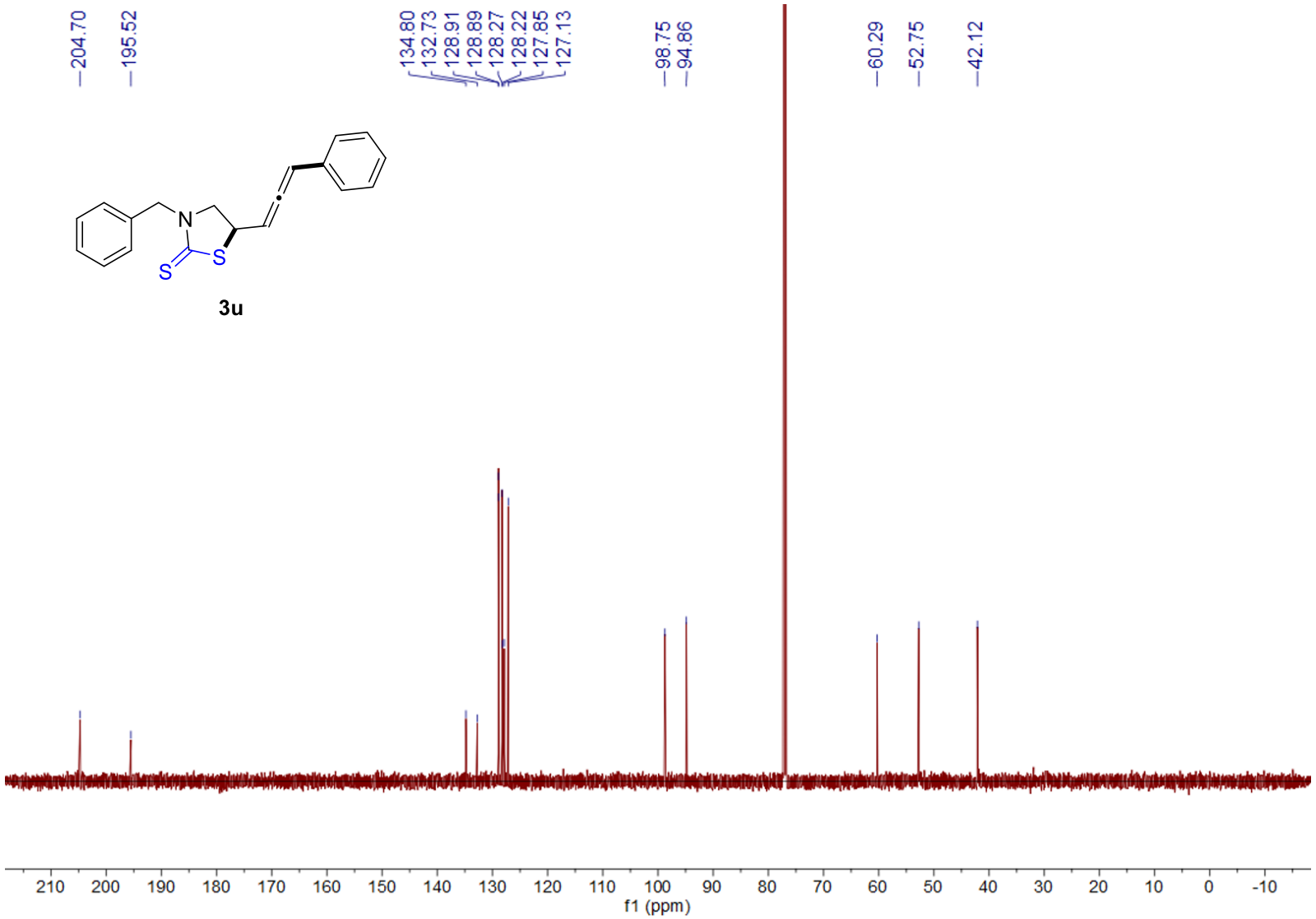
129.04
128.39
128.29
98.75
75.21
60.26
52.81
41.05
Br
N
S
S
3t
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.34 7.33 7.33 7.33 7.32 7.32 7.31 7.31 7.31 7.30 7.30 7.30 7.30 7.29 7.29 7.29 7.29 7.28 7.28 7.27 7.27 7.26 7.26 7.25 7.25 7.24 7.24 7.23 7.23 7.23 7.22 7.22 7.22 6.38 6.38 6.37 6.37 5.73 5.71 5.70 5.14 5.12 4.57 4.54 4.26 4.26 4.25 4.25 4.24 4.05 4.04 4.03 4.02 3.91 3.91 3.90 3.89 3.89
N
S
S
5.26
2.17
3.04
1.00
0.95
1.04
1.08
1.08
1.05
1.20
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 -1.0
f1 (ppm)

3u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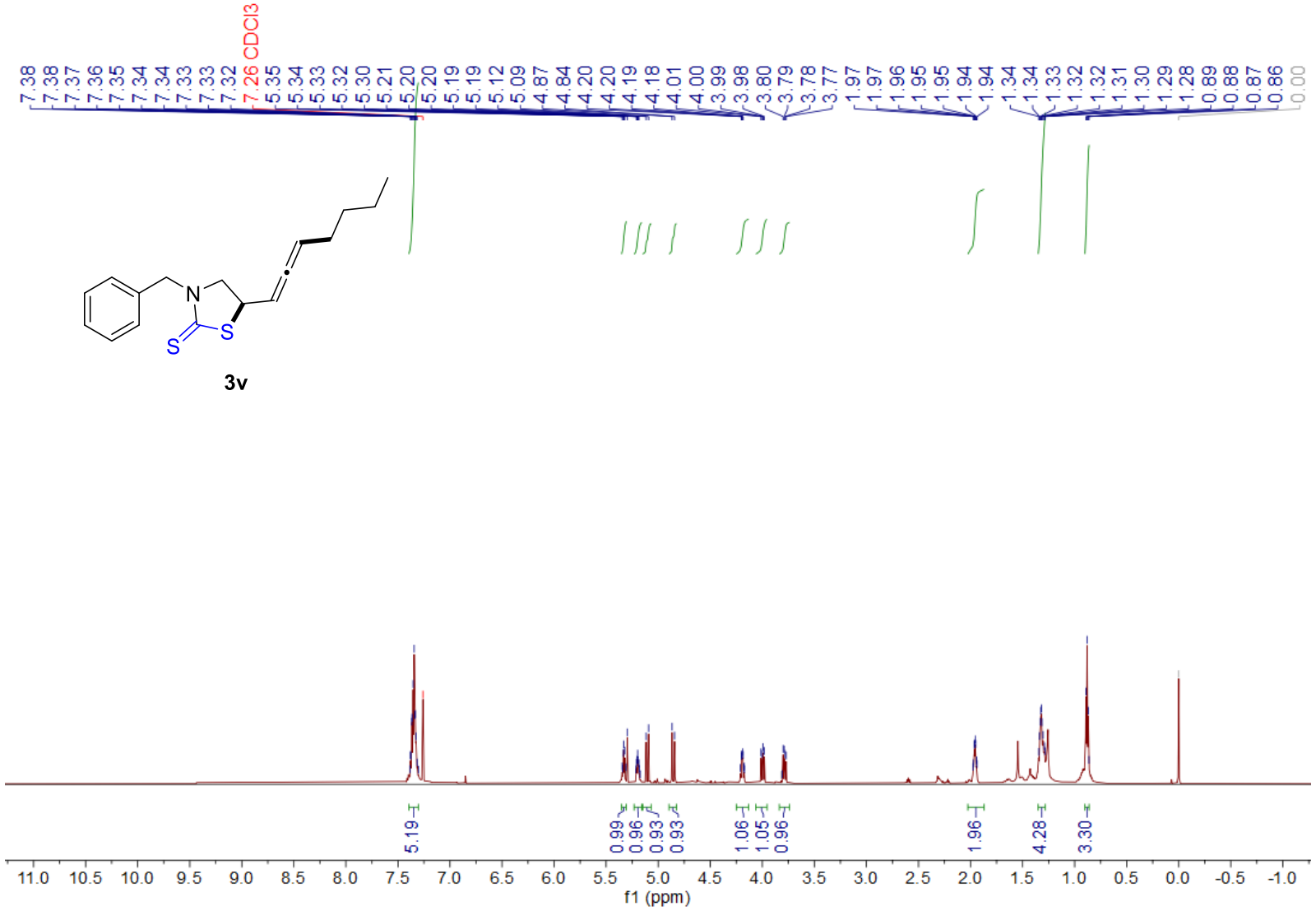
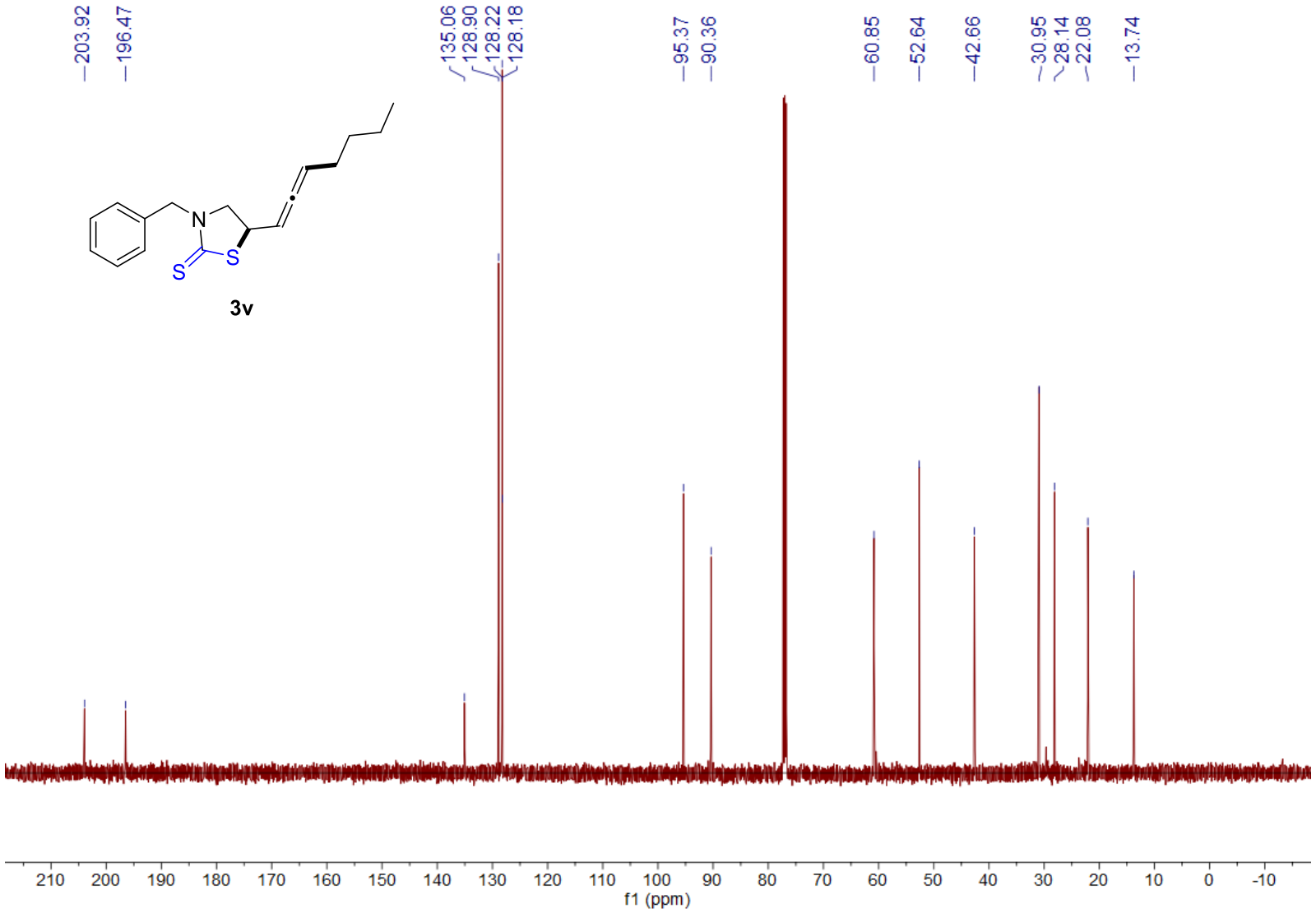
128.91
128.89
128.27
128.22
127.85
127.13
98.75
94.86
60.29
52.75
42.12
N
S
S
3u
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


7.38 7.38 7.37 7.36 7.35 7.34 7.34 7.33 7.33 7.32 7.26 CDCl3 5.35 5.34 5.33 5.32 5.30 5.21 5.20 5.20 5.19 5.19 5.12 5.09 4.87 4.84 4.20 4.20 4.19 4.18 4.01 4.00 3.99 3.98 3.80 3.79 3.78 3.77 1.97 1.97 1.96 1.95 1.95 1.94 1.94 1.34 1.34 1.33 1.32 1.32 1.31 1.30 1.29 1.28 0.89 0.88 0.87 0.86 0.00
N
S
S
3v
5.19
0.99
0.96
0.93
0.93
1.06
1.05
0.96
1.96
4.28
3.30
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 -1.0
f1 (ppm)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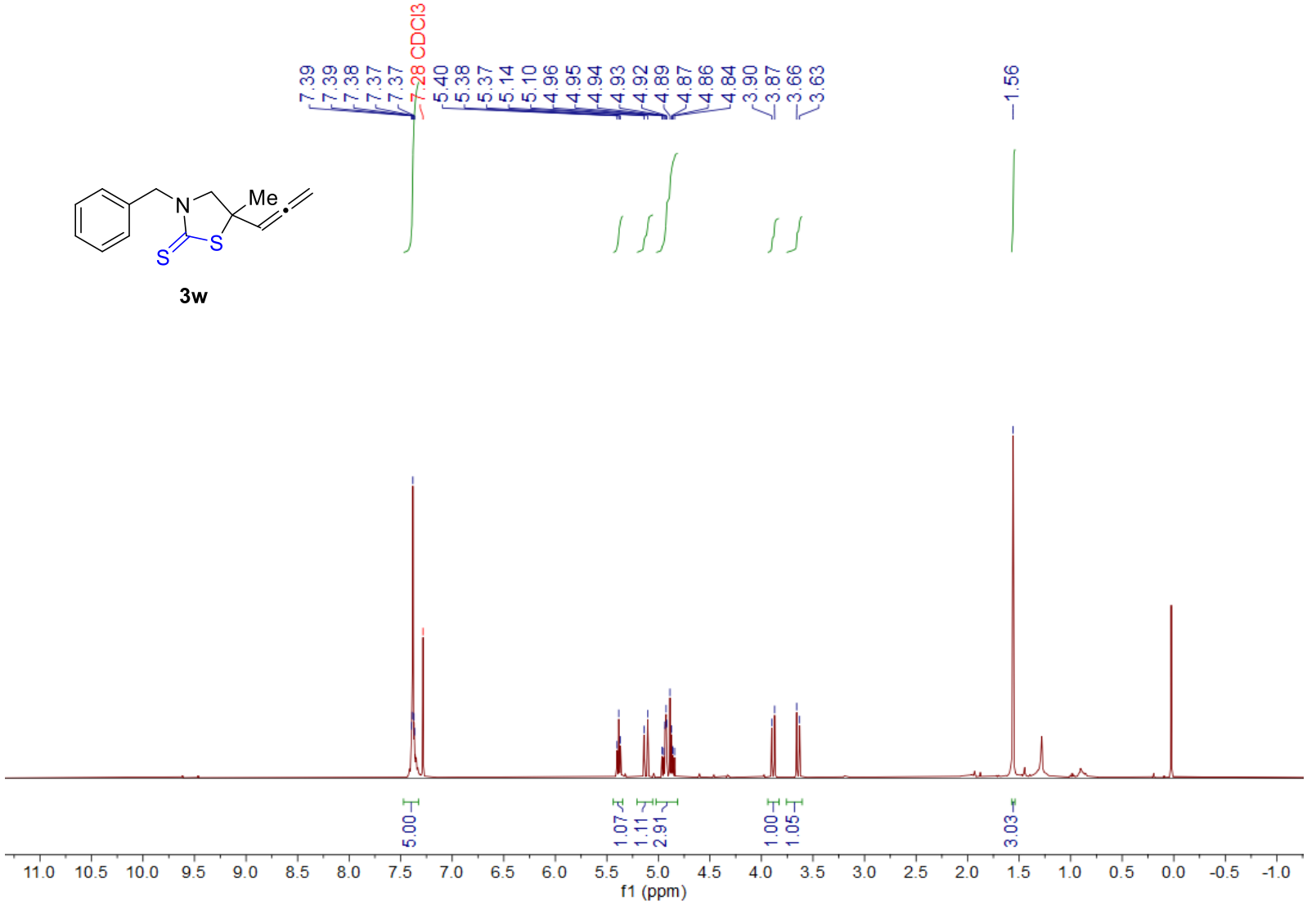
128.18
95.37
90.36
60.85
52.64
42.66
30.95
28.14
22.08
13.74
N
S
S
3v
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.39
7.39
7.38
7.37
7.37
7.28 CDCl3
5.40
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5.37
5.14
5.10
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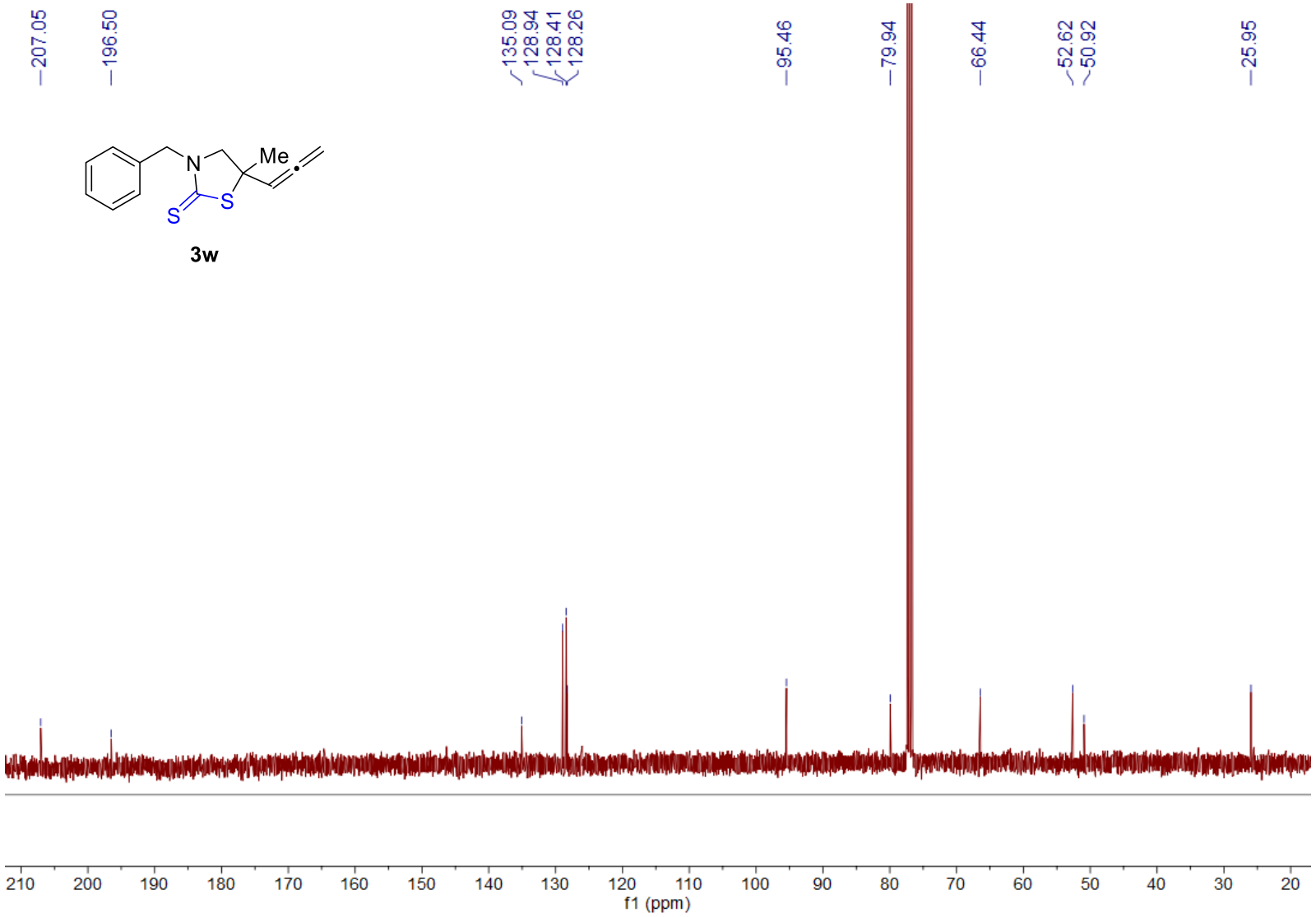
4.95
4.94
4.93
4.92
4.89
4.87
4.86
4.84
3.90
3.87
3.66
3.63
1.56
Me
N
S
S
3w
5.00
1.07
1.11
2.91
1.00
1.05
3.03
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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128.41
128.26
95.46
79.94
66.44
52.62
50.92
25.95
N
Me
S
S
3w
210
200
190
180
170
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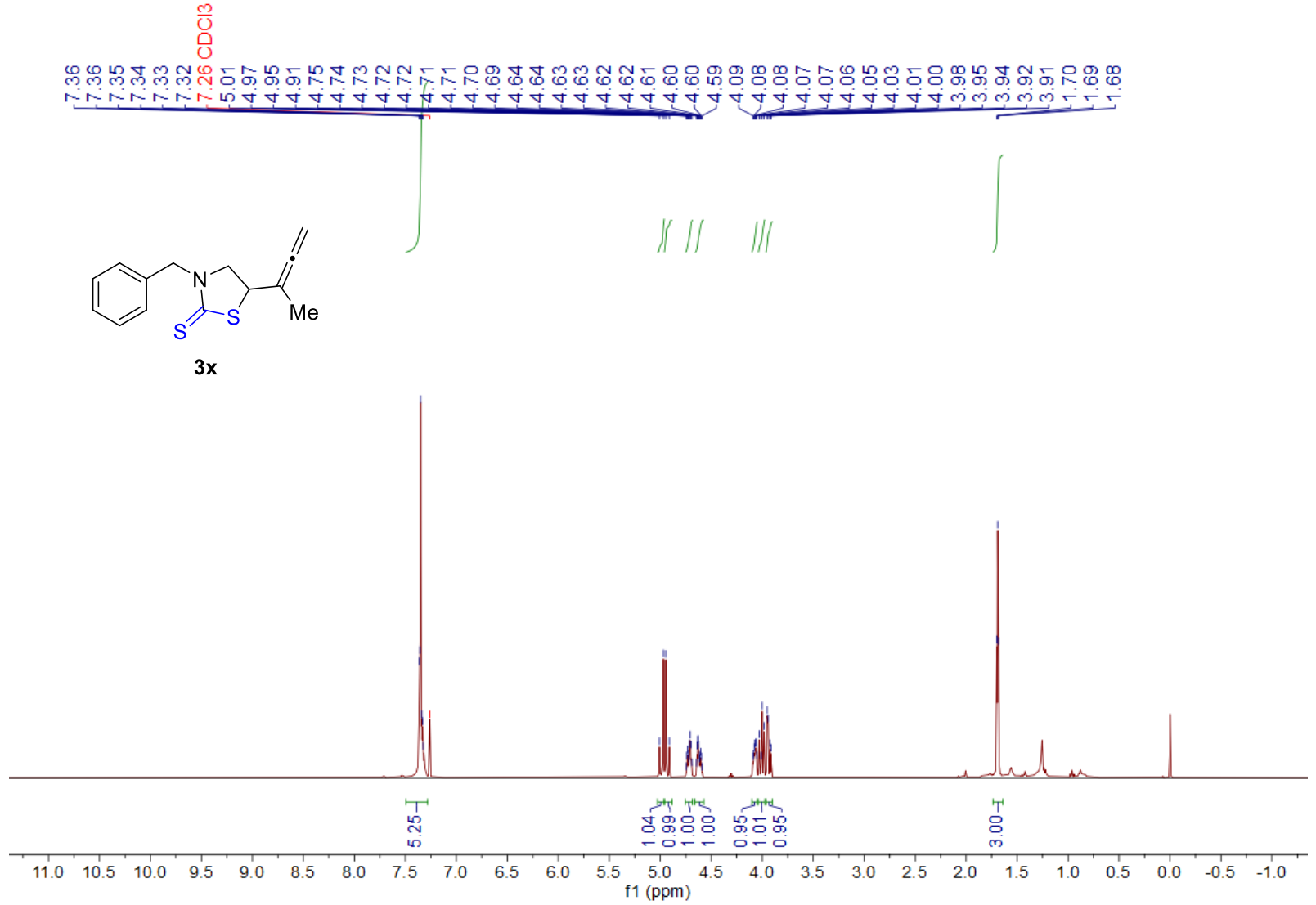
150
140
130
120
110
100
90
80
70
60
50
40
30
20
f1 (ppm)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7.36
7.35
7.34
7.33
7.32
7.26 CDCl3
5.01
4.97
4.95
4.91
4.75
4.74
4.73
4.72
4.72
4.71
4.71
4.70
4.69
4.64
4.64
4.63
4.63
4.62
4.62
4.61
4.60
4.60
4.59
4.09
4.08
4.08
4.07
4.07
4.06
4.05
4.03
4.01
4.00
3.98
3.95
3.94
3.92
3.91
1.70
1.69
1.68
N
S
S
Me
3x
5.25
1.04
0.99
1.00
1.00
0.95
1.01
0.95
3.00
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
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1.0
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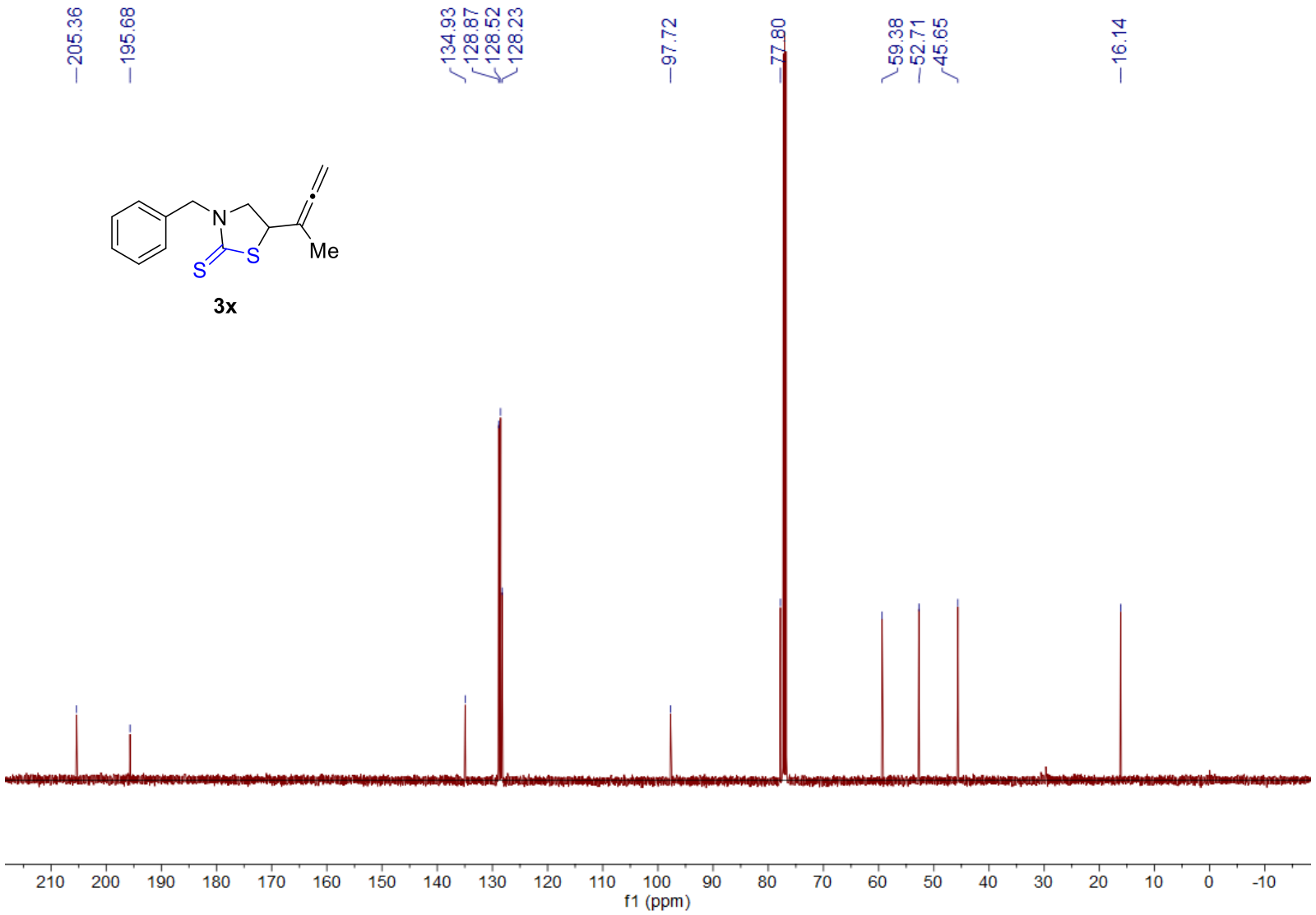
0.0
-0.5
-1.0
f1 (ppm)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195.68
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77.80
59.38
52.71
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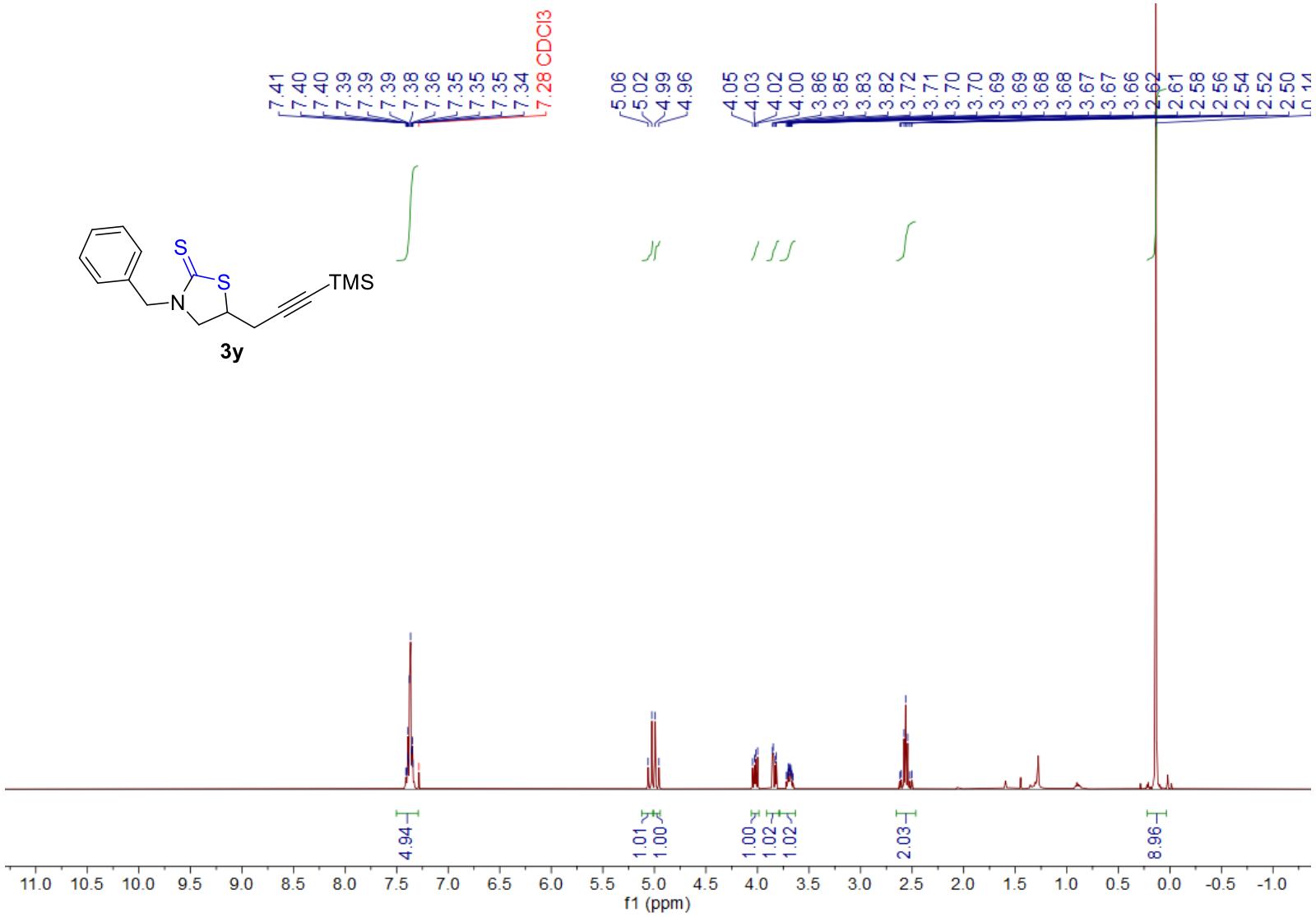
N
S
S
Me
3x
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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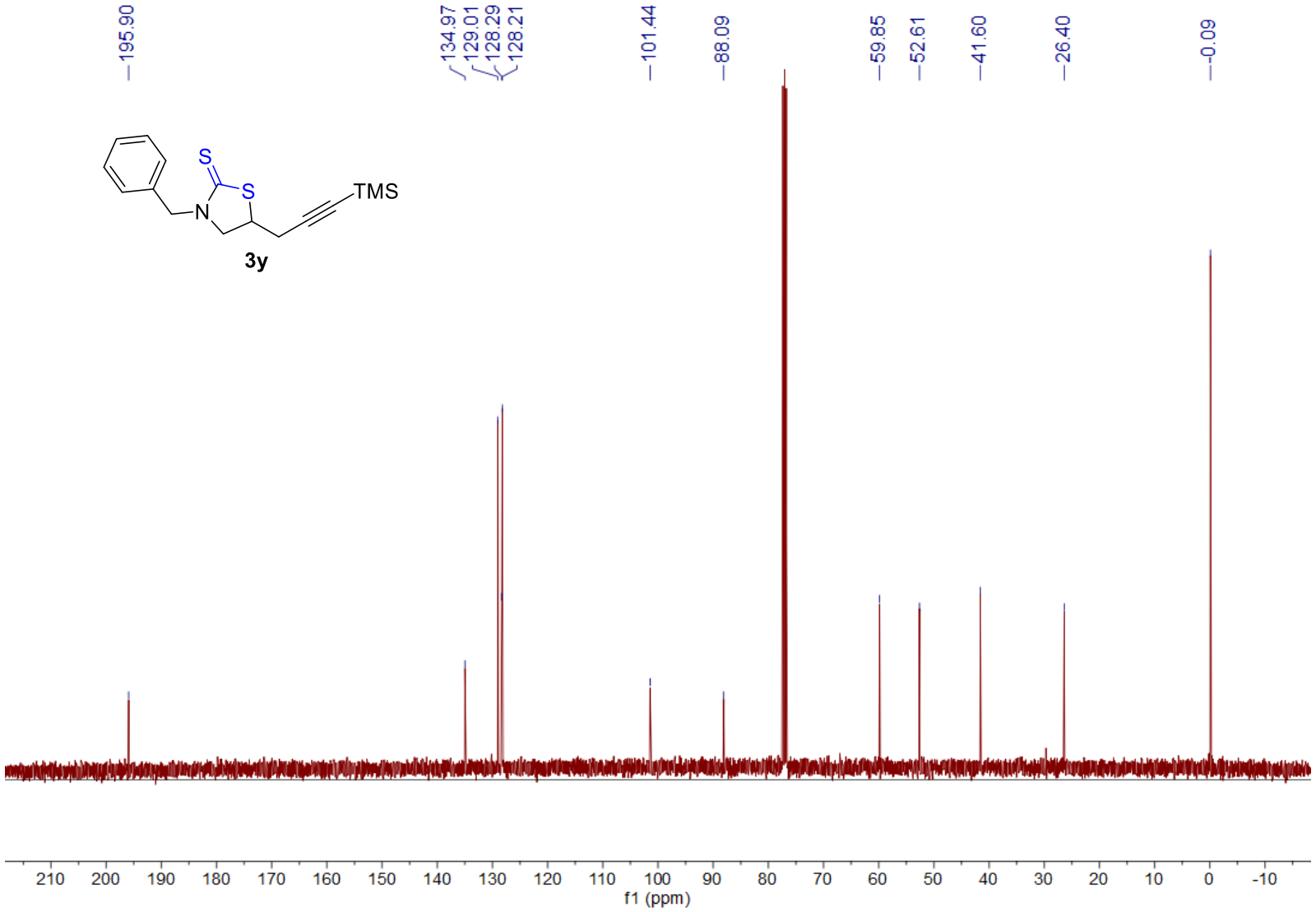
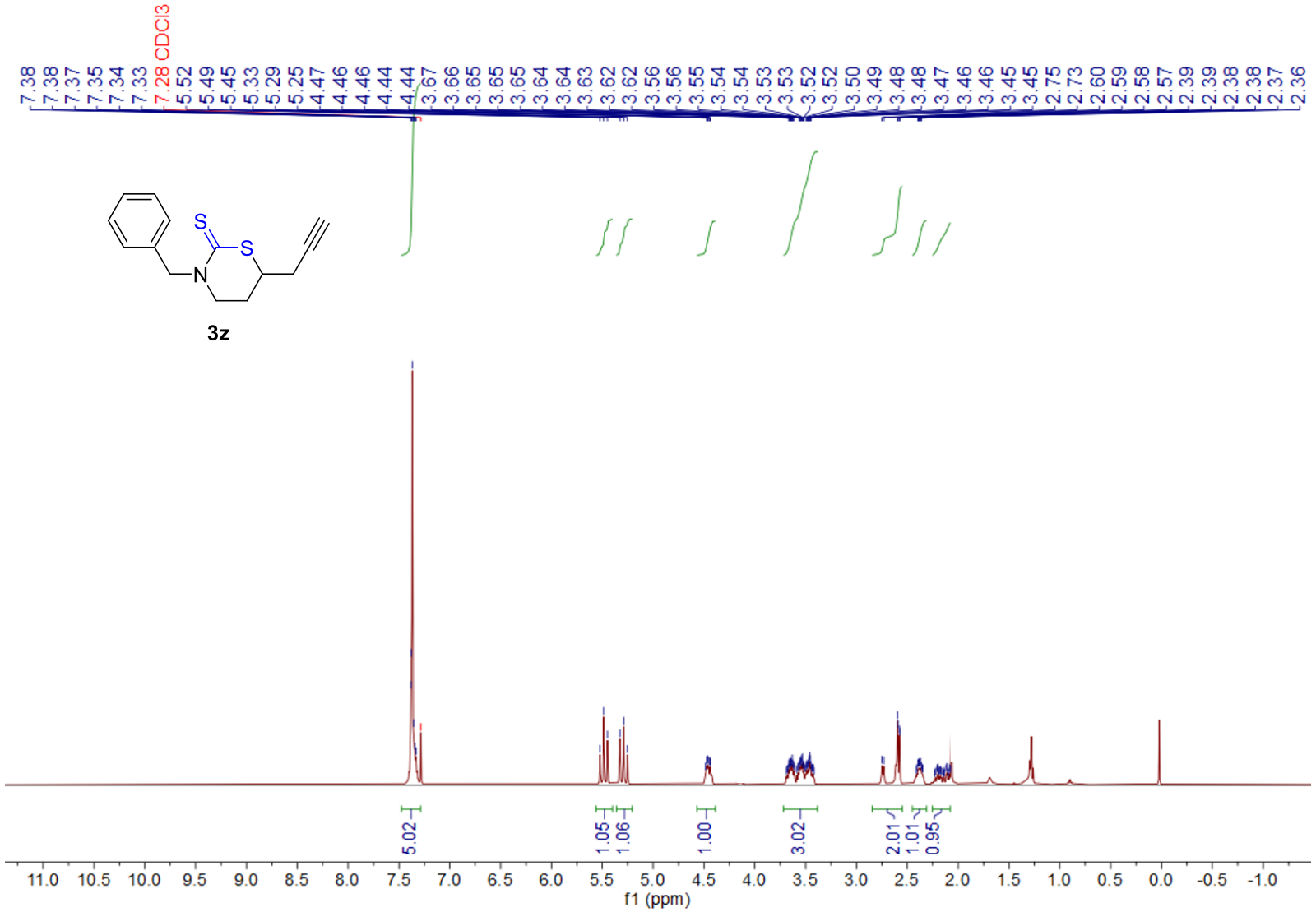
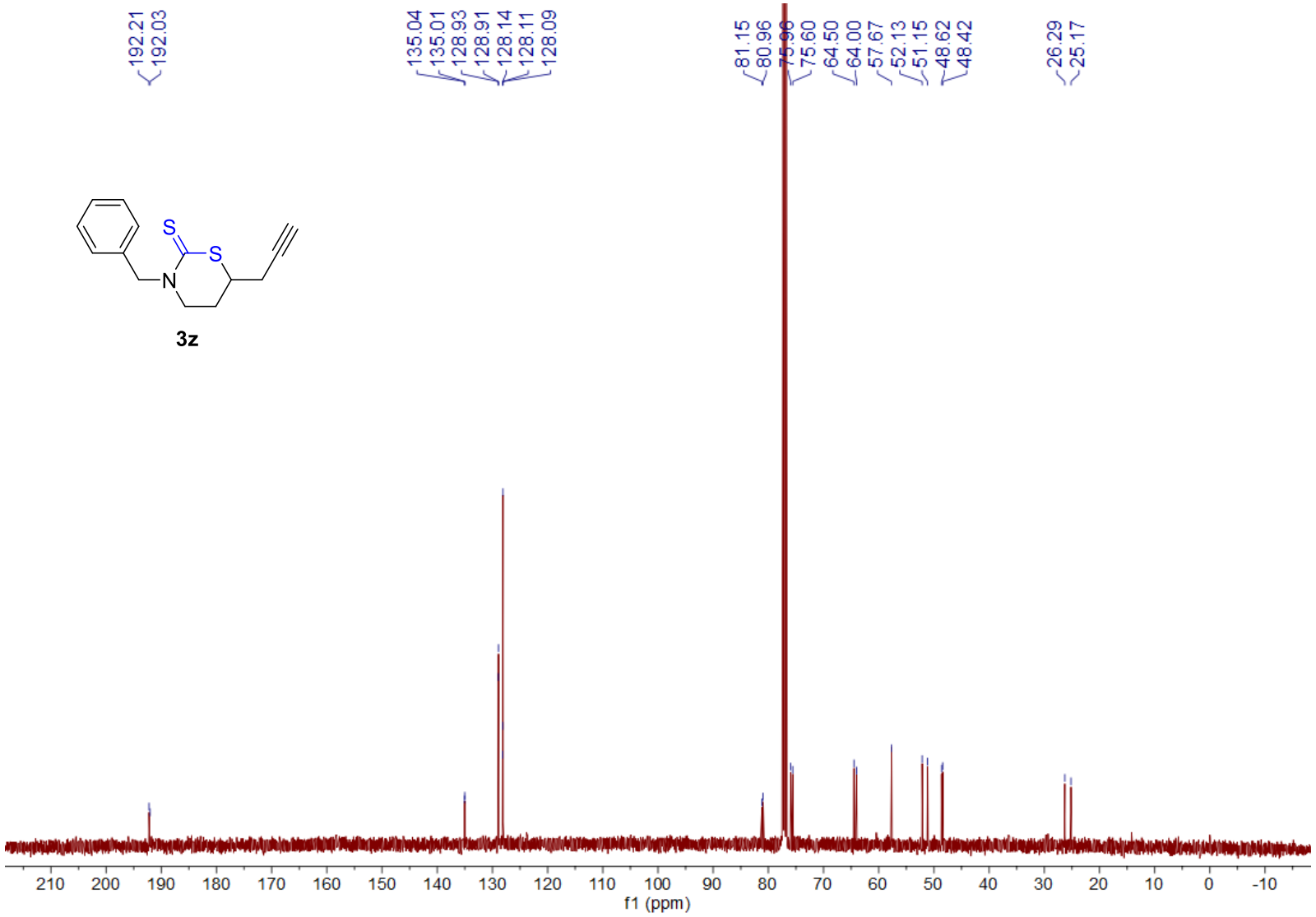
7.39
7.39
7.39
7.38
7.36
7.35
7.35
7.35
7.34
7.28 CDCl3
5.06
5.02
4.99
4.96
4.05
4.03
4.02
4.00
3.86
3.85
3.83
3.82
3.72
3.71
3.70
3.70
3.69
3.69
3.68
3.68
3.67
3.67
3.66
2.62
2.61
2.58
2.56
2.54
2.52
2.50
S
S
N
TMS
3y
4.94
1.01
1.00
1.00
1.02
1.02
2.03
8.96
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 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 -1.0
f1 (ppm)


195.90
134.97
129.01
128.29
128.21
101.44
88.09
59.85
52.61
41.60
26.40
0.09
S
S
N
TMS
3y
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)


7.38 7.38 7.37 7.35 7.34 7.33 7.28 CDCl3 5.52 5.49 5.45 5.33 5.29 5.25 4.47 4.46 4.46 4.44 4.44 3.67 3.66 3.65 3.65 3.65 3.64 3.64 3.63 3.62 3.62 3.56 3.56 3.55 3.54 3.54 3.53 3.53 3.52 3.52 3.50 3.49 3.48 3.48 3.47 3.46 3.46 3.45 3.45 2.75 2.73 2.60 2.59 2.58 2.57 2.39 2.39 2.38 2.38 2.37 2.36
S
S
N
3z
5.02
1.05
1.06
1.00
3.02
2.01
1.01
0.95
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 -1.0
f1 (ppm)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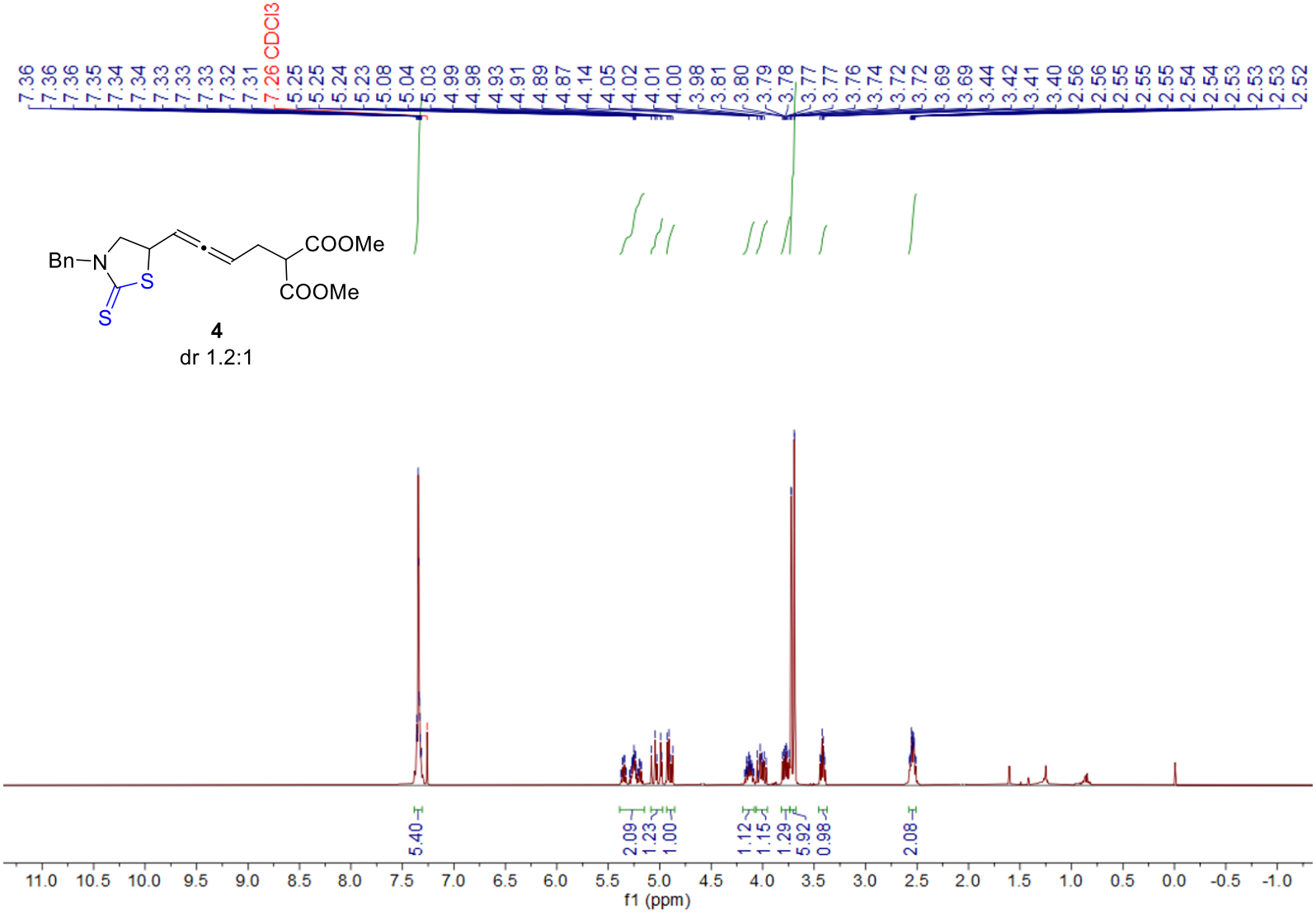
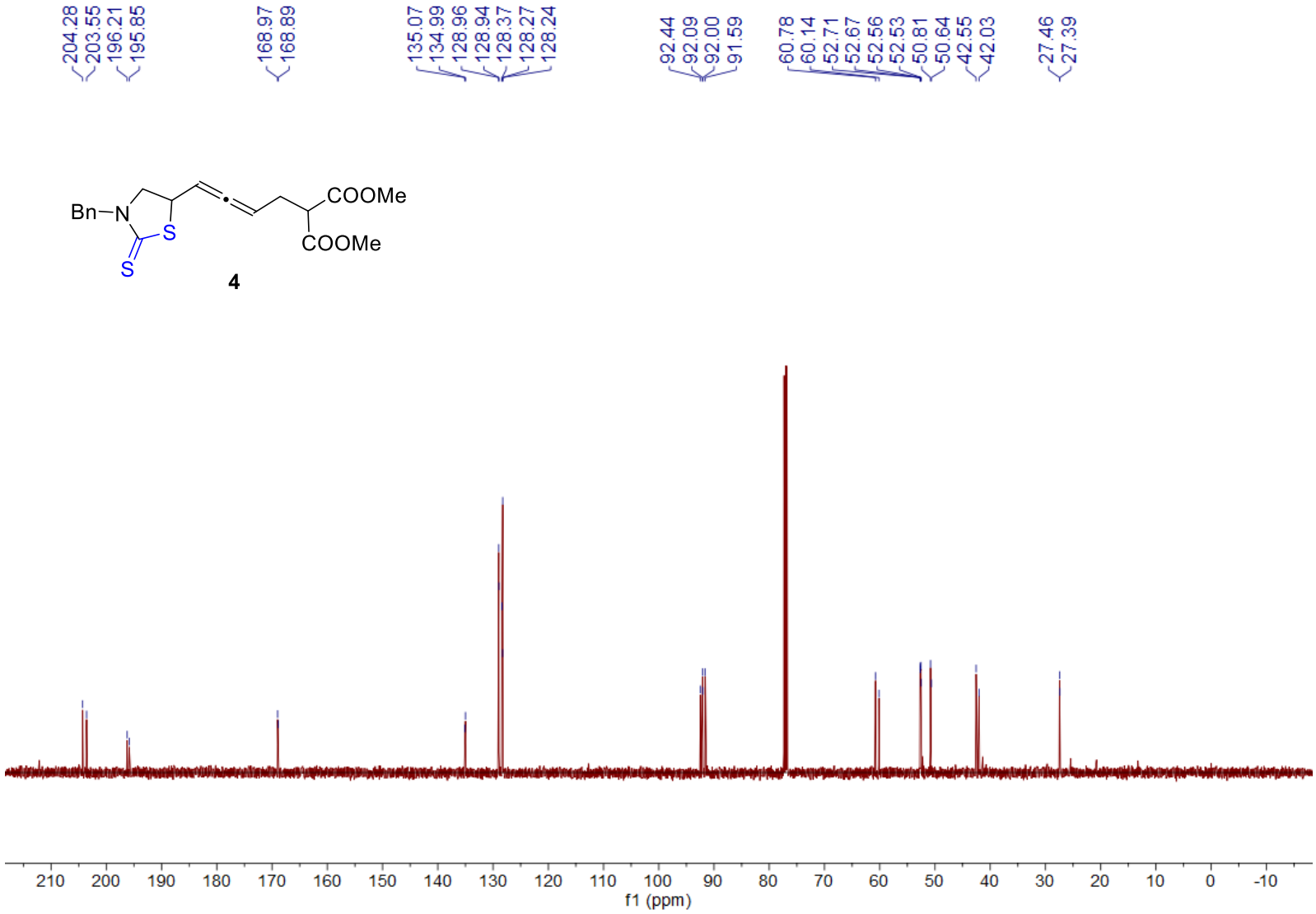
192.03
135.04
135.01
128.93
128.91
128.14
128.11
128.09
81.15
80.96
75.60
64.50
64.00
57.67
52.13
51.15
48.62
48.42
26.29
25.17
S
S
N
3z
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

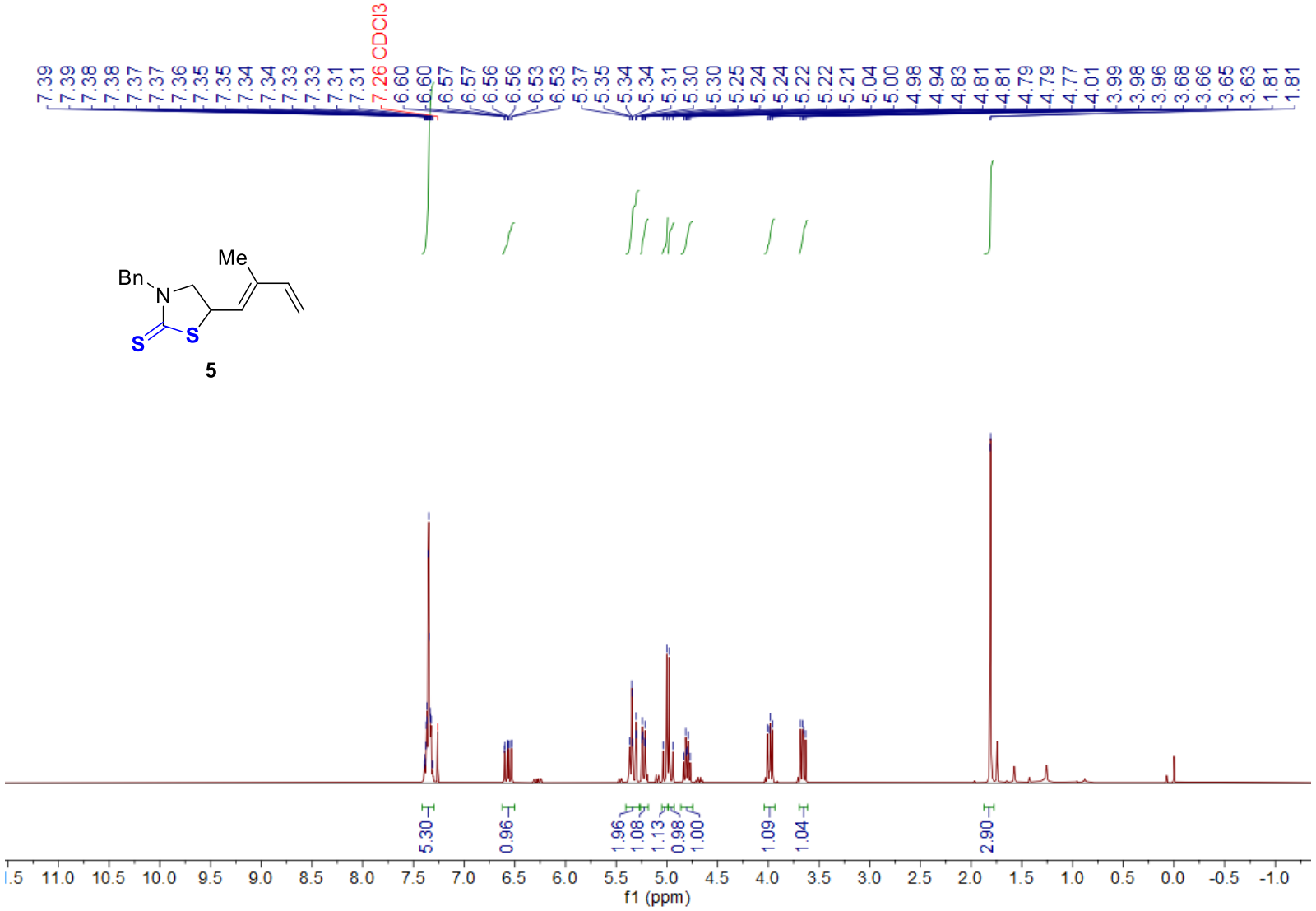

7.36 7.36 7.36 7.35 7.34 7.34 7.33 7.33 7.33 7.32 7.31 7.26 CDCl3 5.25 5.25 5.24 5.23 5.08 5.04 5.03 4.99 4.98 4.93 4.91 4.89 4.87 4.14 4.05 4.02 4.01 4.00 3.98 3.81 3.80 3.79 3.78 3.77 3.77 3.76 3.74 3.72 3.72 3.69 3.69 3.44 3.42 3.41 3.40 2.56 2.56 2.55 2.55 2.55 2.54 2.54 2.53 2.53 2.53 2.52
Bn
N
S
S
COOMe
COOMe
5.40
2.09
1.23
1.00
1.12
1.15
1.29
5.92
0.98
2.08
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 -1.0
f1 (ppm)

4

dr 1.2:1


204.28
203.55
196.21
195.85
168.97
168.89
135.07
134.99
128.96
128.94
128.37
128.27
128.24
92.44
92.09
92.00
91.59
60.78
60.14
52.71
52.67
52.56
52.53
50.81
50.64
42.55
42.03
27.46
27.39
Bn
N
S
S
COOMe
COOMe
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)

4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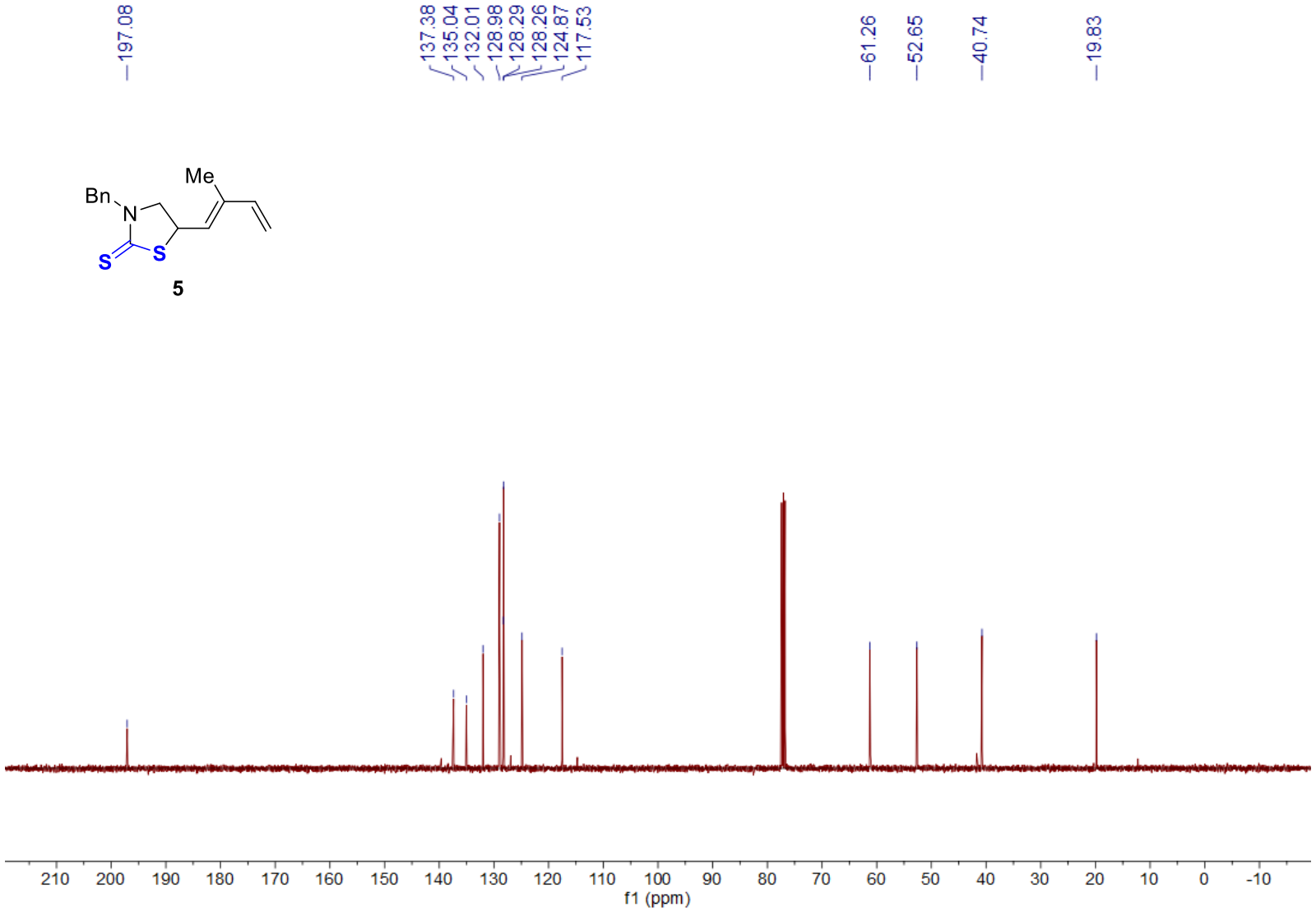
Bn
N
Me
S
S
5
5.30
0.96
1.96
1.08
1.13
0.98
1.00
1.09
1.04
2.90
f1 (ppm)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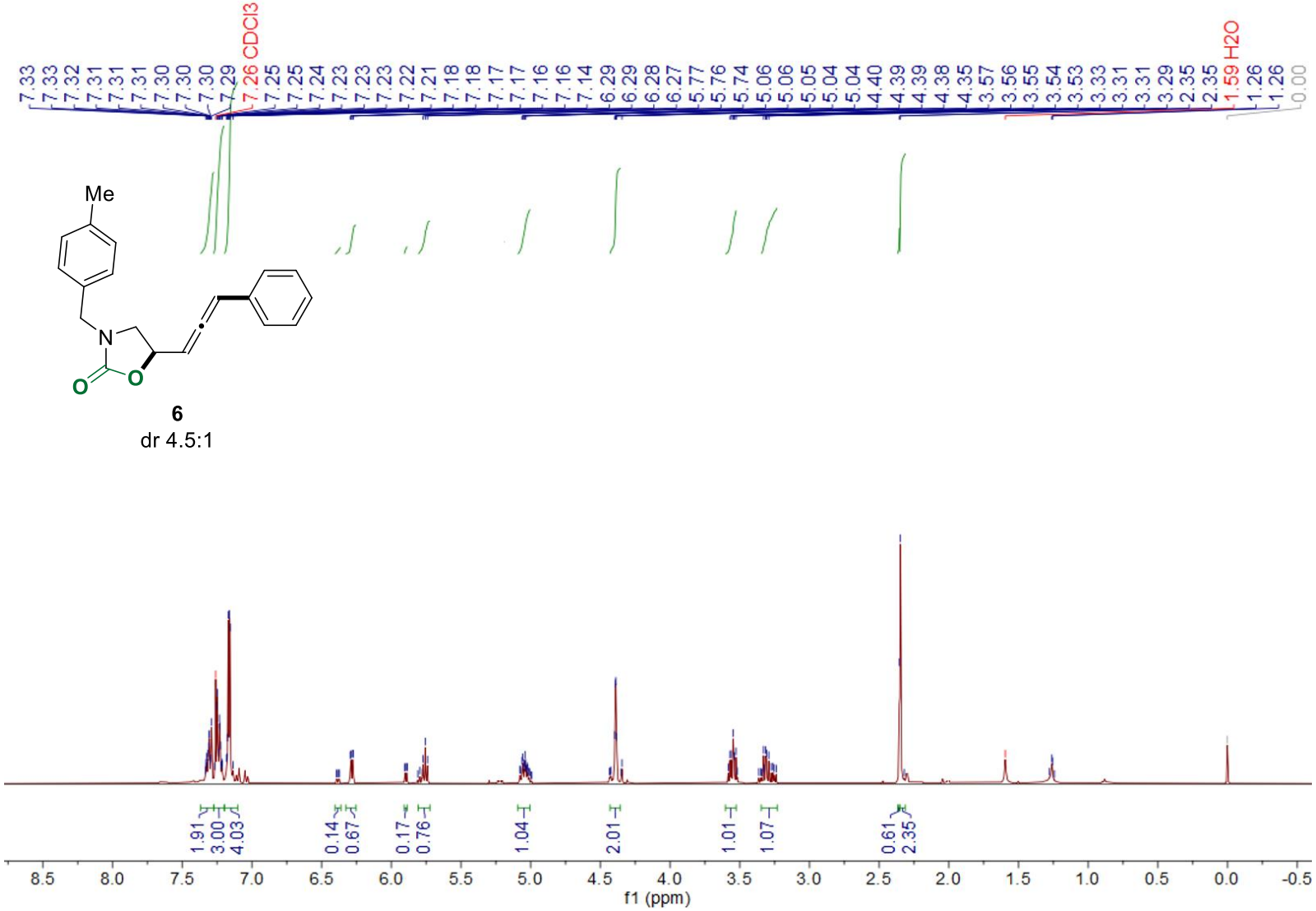
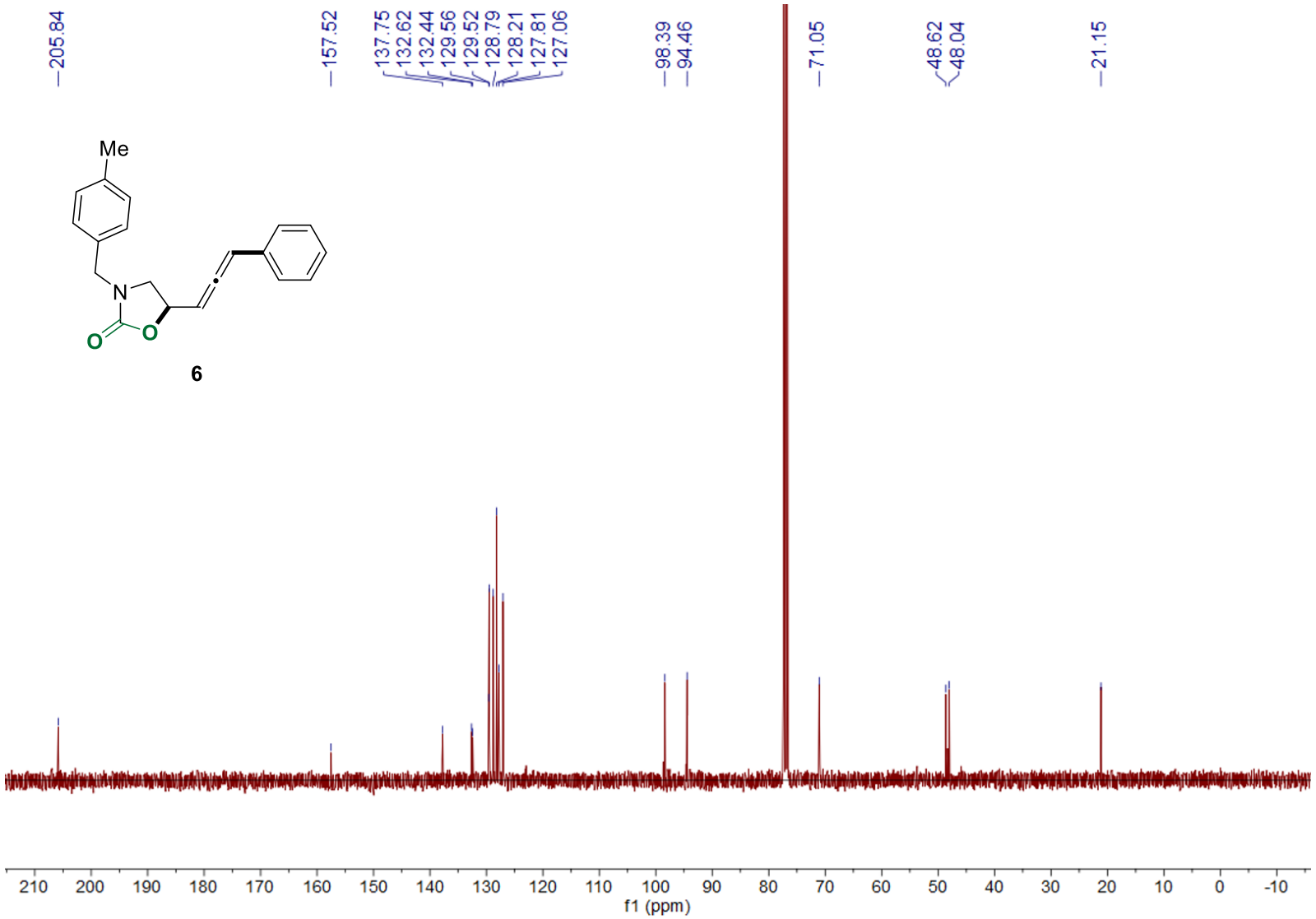
137.38
135.04
132.01
128.98
128.29
128.26
124.87
117.53
61.26
52.65
40.74
19.83
Bn
N
Me
S
S
5
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)


7.33 7.33 7.32 7.31 7.31 7.31 7.30 7.30 7.30 7.29 7.26 CDCl3 7.25 7.25 7.24 7.23 7.23 7.23 7.22 7.21 7.18 7.18 7.17 7.17 7.16 7.16 7.14 6.29 6.29 6.28 6.27 5.77 5.76 5.74 5.06 5.06 5.05 5.04 5.04 4.40 4.39 4.39 4.38 4.35 3.57 3.56 3.55 3.54 3.53 3.33 3.31 3.31 3.29 2.35 2.35 1.59 H2O 1.26 1.26 0.00
Me
N
O
O
1.91 3.00 4.03 0.14 0.67 0.17 0.76 1.04 2.01 1.01 1.07 0.61 2.35
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)

6
dr 4.5:1


205.84
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137.75
132.62
132.44
129.56
129.52
128.79
128.21
127.81
127.06
98.39
94.46
71.05
48.62
48.04
21.15
Me
N
O
O
6
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)