Supporting Information

TBHP-Mediated Photochemical Coupling/Cyclization of N-arylacrylamide via Thiyl Radical

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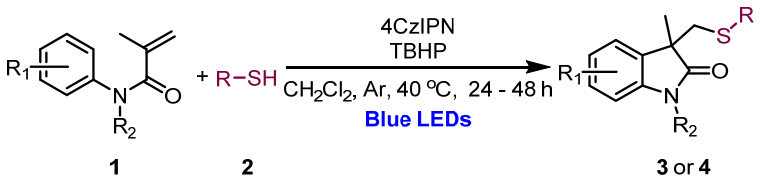
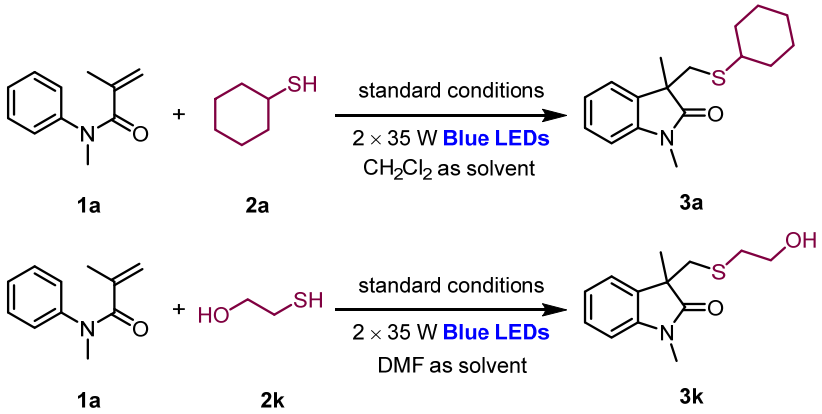
1. General Information

The reactions via general procedure was carried out under an atmosphere of argon unless otherwise noted. Column chromatography was performed using silica gel (200-300 mesh) or thin layer chromatography was performed using silica gel (GF254). ^{1}H NMR and ^{13}C NMR spectra were recorded on Bruker-AVANCE-III-HD (400 and 100 MHz, respectively) and processed using either MestReNova. ^{1}H NMR chemical shifts are given in ppm with respect to the residual $CDCl_3$ peak (δ 7.26 ppm), residual DMSO-d_6 (δ 2.50 ppm), or an internal TMS standard (δ 0.00 ppm), ^{13}C NMR shifts are given in ppm with respect to $CDCl_3$ (δ 77.00 ppm), DMSO-d_6 (δ 39.52 ppm). Mass spectra were measured on Agilent 5977 GC-MS instrument (EI). High-resolution mass spectra (ESI) were obtained with the Thermo Scientific LTQ Orbitrap XL mass spectrometer. The structures of known compounds were further corroborated by comparing their ^{1}H NMR, ^{13}C NMR data and MS data with those in literature. Melting points were measured with a YUHUA X-5 melting point instrument and were uncorrected. Fluorescence quenching experiments were recorded with PTI-QM40 spectrophotometer. A commercially available blue LED (35W, HIPAR30, luminous flux is not less than 3200 lm) was purchased from Shenzhen Jing Feng Times Lighting Technology Co., Ltd as the reaction light source. All irradiation reactions were carried out in borosilicate glass vessel. The distance from the light source to the irradiation vessel is around 2-3 cm. Unless otherwise noted, all other reagents were obtained from commercial suppliers and used without further purification.

2. General Procedure for Photoinduced Thiolation/Cyclization Reaction



General Procedure: A 20 mL reaction vessel was charged with photocatalyst 4CzIPN (3.2 mg, 0.004 mmol), *N*-arylacrylamide (**1**, 0.2 mmol, 1.0 equiv.), thiol (**2**, 0.28 mmol, 1.4 equiv.) and TBHP (70% in water, 42 μL, 0.3 mmol, 1.5 equiv.) in 2.0 mL CH_2Cl_2 under Ar atmosphere. The resulting mixture was stirred for 24 – 48 h under irradiation with a 35 W blue LEDs at 40 ºC. The reaction was monitored by TLC. The crude reaction mixture was quenched with saturated sodium carbonate and extracted with DCM (3×10 mL). The extracts were combined, dried over sodium sulfate, and filtered, and the volatiles were removed under reduced pressure. Column chromatography was performed using silica gel (200-300 mesh) or thin layer chromatography was performed using silica gel (GF254) to give product thionated oxindoles (**3** or **4**).



5 mmol scale reaction: A 20 mL reaction vessel was charged with photocatalyst 4CzIPN (20 mg, 0.025 mmol), *N*-methyl-*N*-phenylmethacrylamide **1a** (875 mg, 5.0 mmol, 1.0 equiv.), cyclohexanethiol **2a** (900 μL, 7.0 mmol, 1.4 equiv.) or 2-mercaptoethan-1-ol **2k** (525 μL, 7.0 mmol, 1.4 equiv.) and TBHP (70% in water, 1.1 mL, 7.5 mmol, 1.5 equiv.) in 50 mL CH_2Cl_2 or DMF under Ar atmosphere. The resulting mixture was stirred for 36 h or 48 h under irradiation with 2 × 35 W blue LEDs at 40 ºC. The reaction was monitored by TLC. The crude reaction mixture was quenched with saturated sodium carbonate and extracted with DCM (3×30 mL). The extracts were combined, dried over sodium sulfate, and filtered, and the volatiles were removed under reduced pressure. Column chromatography was performed using silica gel (200-300 mesh) or thin layer chromatography was performed using silica gel (GF254) to give product corresponding oxindoles **3a** (912 mg, 63% yield) or **3k** (565 mg, 45% yield), respectively.

3. Mechanistic Studies

3.1 Stern-Volmer Quenching

Formulation solution: *N*-methyl-*N*-phenylmethacrylamide (**1a**, 87.5 mg) was dissolved in CH_2Cl_2 in a 5 mL volumetric flask to set the concentration to be 0.1 M. cyclohexanethiol (**2a**, 312.0 μL) was dissolved in CH_2Cl_2 in a 25 mL volumetric flask to set the concentration to be 0.1 M. TBHP (341.0 mg) was dissolved in CH_2Cl_2 in a 25 mL volumetric flask to set the concentration to be 0.1 M. Photocatalyst 4CzIPN (2.0 mg) was dissolved in CH_2Cl_2 in a 25 mL volumetric flask to set the concentration to be 0.1 mM.

Experimental procedure: The resulting 0.1 mM solution (20 μL) was added to cuvette to obtain different concentrations of catalyst solution. This solution was then diluted to a volume of 2.0 mL by adding CH_2Cl_2 to prepare a 1.0 μM solution. The resulting mixture was sparged with argon for 3 minutes and then irradiated at 400 nm. Fluorescence emission spectra were recorded (3 trials per sample). Into this solution, 20.0 μL of a *N*-methyl-*N*-phenylmethacrylamide **1a** solution was successively added and uniformly stirred, and the resulting mixture was bubbled with argon for 3 minutes and irradiated at 400 nm. Fluorescence emission spectra of 0 μL, 20.0 μL, 40.0 μL, 60.0 μL, 80.0 μL 100.0 μL fluorescence intensity. Follow this method and make changes to the amount to obtain the Stern–Volmer relationship in turn. The results were shown in the following figures.

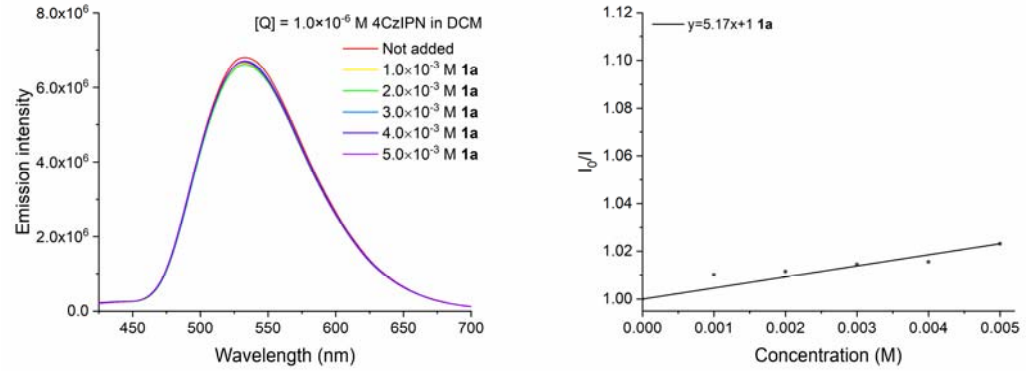


Figure S1 Emission quenching of 4CzIPN with **1a** in CH_2Cl_2

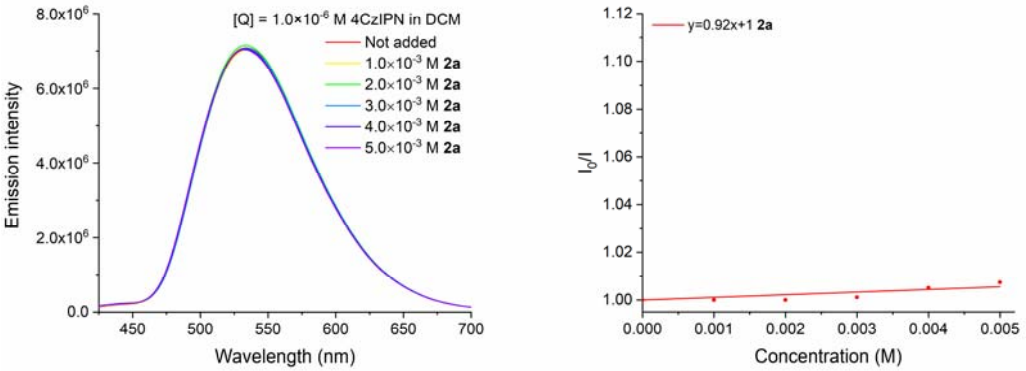


Figure S2 Emission quenching of 4CzIPN with **2a** in CH_2Cl_2

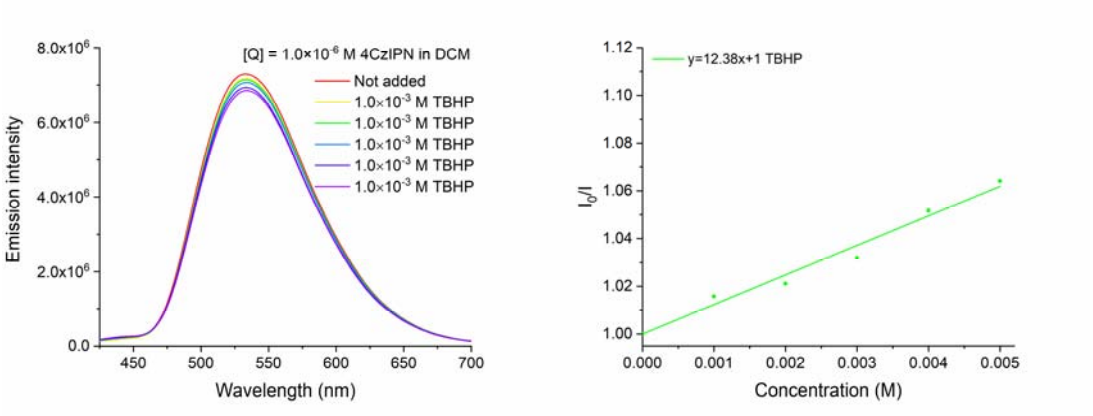


Figure S3 Emission quenching of 4CzIPN with TBHP in CH_2Cl_2

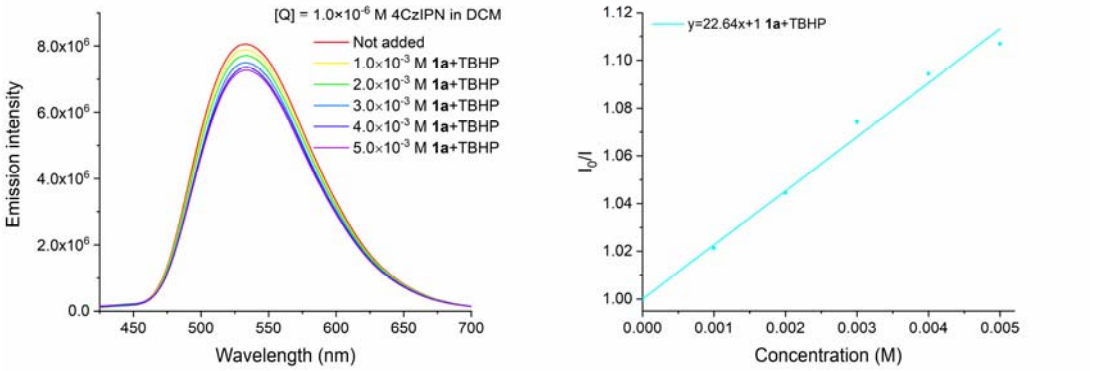


Figure S4 Emission quenching of 4CzIPN with **1a** + TBHP in CH_2Cl_2

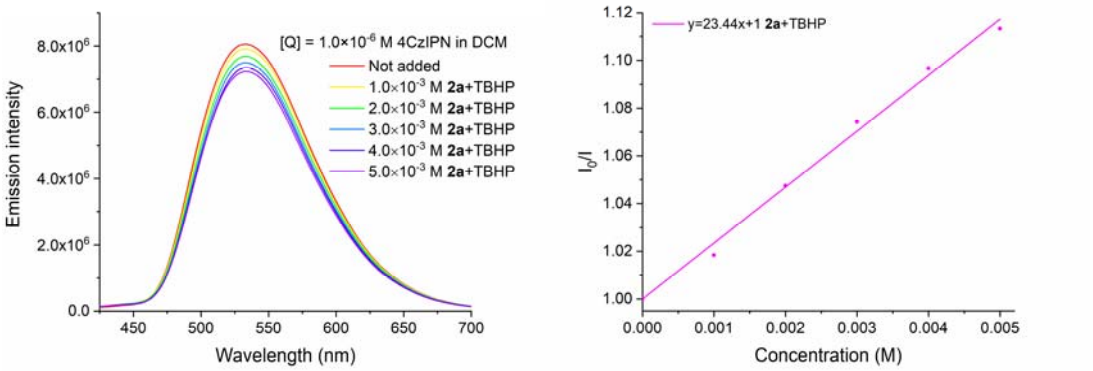


Figure S5 Emission quenching of 4CzIPN with **2a** + TBHP in CH_2Cl_2

3.2 Switch Light Experiments

Conducted the relationship of products with light on-off under standard conditions. Subsequent samples (each 20 μL) taken at regular time intervals and determined by GC. The corresponding experimental results were constructed in Figure S6.

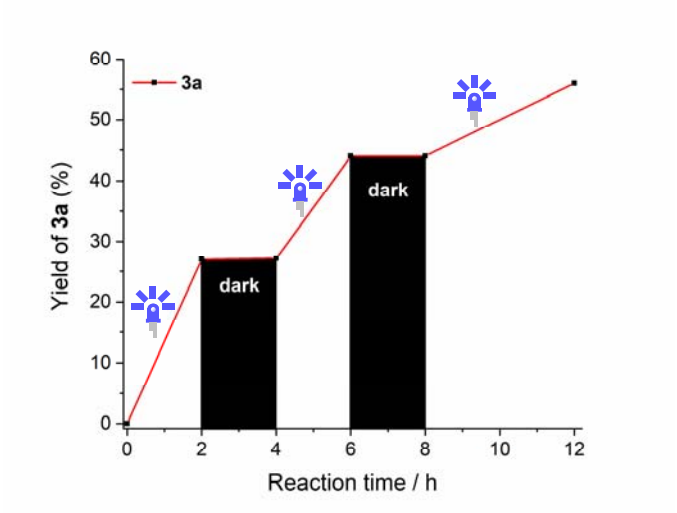
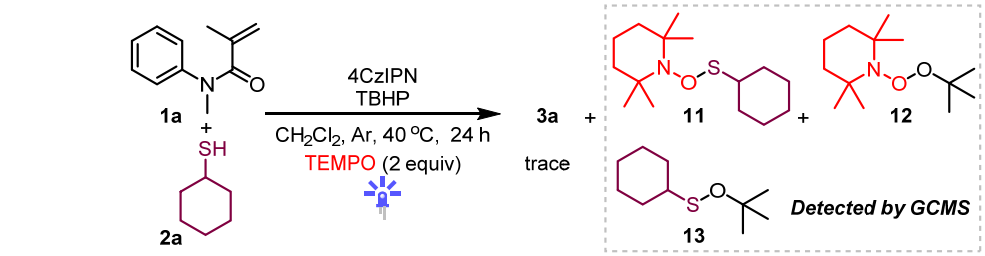
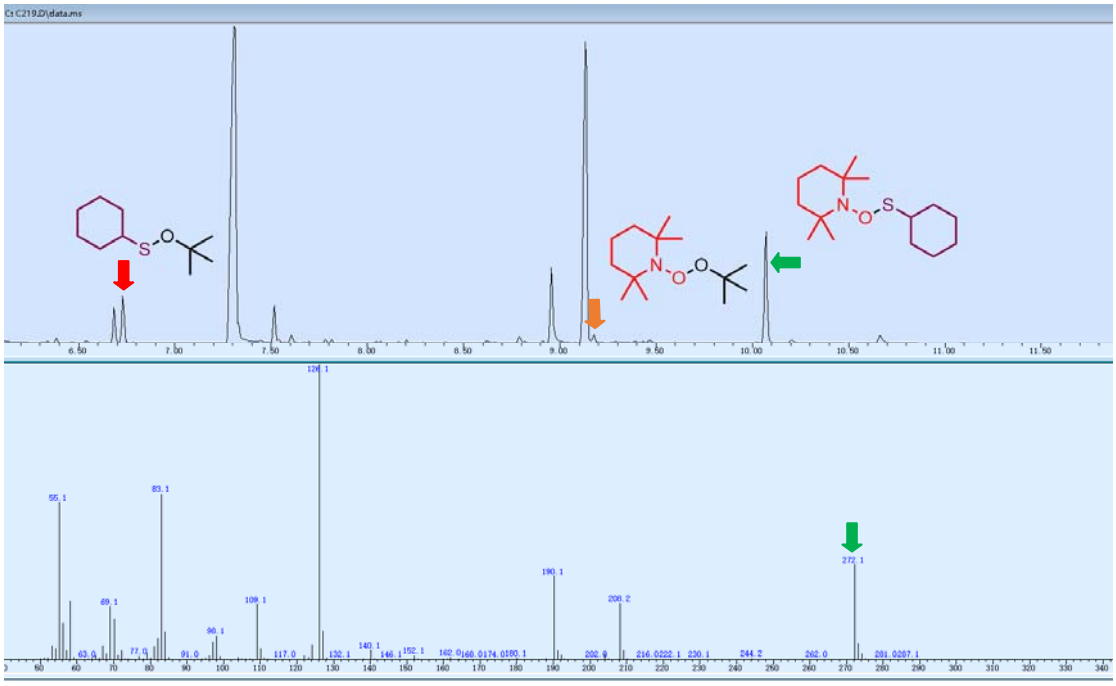


Figure S6 Plot of light on-off experiments

3.3 Radical Trapping Experiments

Radical trapping experiments of visible-light-mediated thiolation/cyclization of N-phenylmethacrylamide **1a** with thiol **2a** were performed under standard conditions. The corresponding experimental results were constructed in Figure S7.





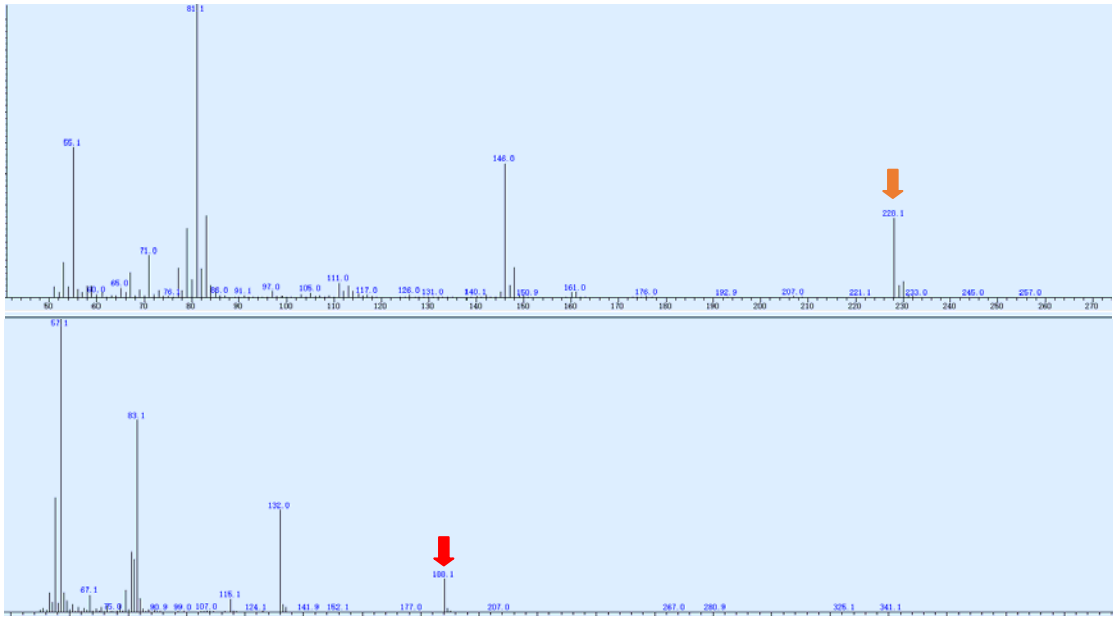
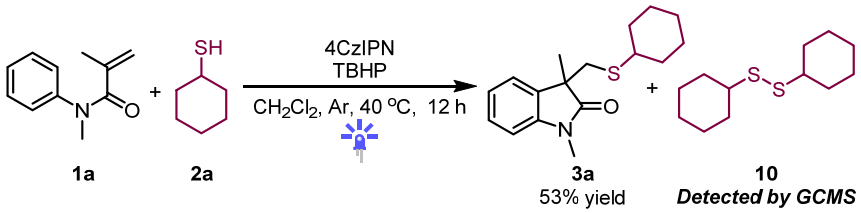


Figure S7

3.4 Control Experiments

(a) The following reaction was carried out under standard conditions: A 20 mL reaction vessel was charged with photocatalyst 4CzIPN (3.2 mg, 0.004 mmol), *N*-arylacrylamide **1a** (35 mg, 0.2 mmol, 1.0 equiv.), cyclohexanethiol **2a** (35 µL, 0.28 mmol, 1.4 equiv.) and TBHP (70% in water, 42 µL, 0.3 mmol, 1.5 equiv.) in 2.0 mL CH_2Cl_2 under Ar atmosphere. The resulting mixture was stirred for 12 h under irradiation with a 35 W blue LEDs at 40 ºC. After completion, the crude residues were analyzed by GC-MS. Cyclization product **3a** and 1,2-dicyclohexyldisulfane **10** was detected by GC-MS.



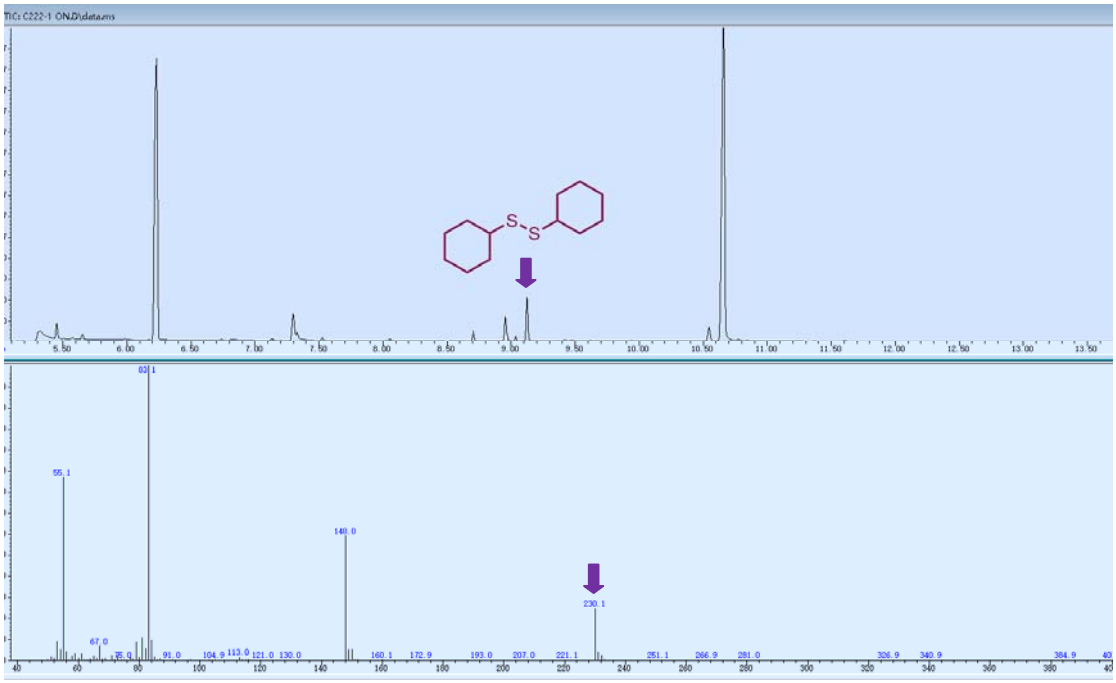


Figure S8

(b) The following reaction was carried out under standard conditions: A 20 mL reaction vessel was charged with photocatalyst 4CzIPN (3.2 mg, 0.004 mmol), *N*-arylacrylamide **1a** (35 mg, 0.2 mmol, 1.0 equiv.), 1,2-dicyclohexyldisulfane **10** (64.4 mg, 0.28 mmol, 1.4 equiv.) and TBHP (70% in water, 42 μL, 0.3 mmol, 1.5 equiv.) in 2.0 mL CH_2Cl_2 under Ar atmosphere. The resulting mixture was stirred for 24 h under irradiation with a 35 W blue LEDs at 40 ºC. After completion, the crude residues were analyzed by GC-MS. Product **3a** was detected by GC-MS in 29% yield.

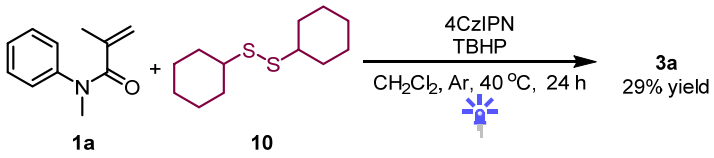


Figure S9

(c) The following reaction was carried out under standard conditions: A 20 mL reaction vessel was charged with photocatalyst 4CzIPN (3.2 mg, 0.004 mmol), *N*-arylacrylamide **1a** (35 mg, 0.2 mmol, 1.0 equiv.), 1,2-diphenyldisulfane **2r** (61.0 mg, 0.28 mmol, 1.4 equiv.) and TBHP (70% in water, 42 μL, 0.3 mmol, 1.5 equiv.) in 2.0 mL CH_2Cl_2 under Ar atmosphere. The resulting mixture was stirred for 48 h under irradiation with a 35 W blue LEDs at 40 ºC. After completion, the crude residues were analyzed by GC-MS. Product **3r** was detected by GC-MS in trace yield.

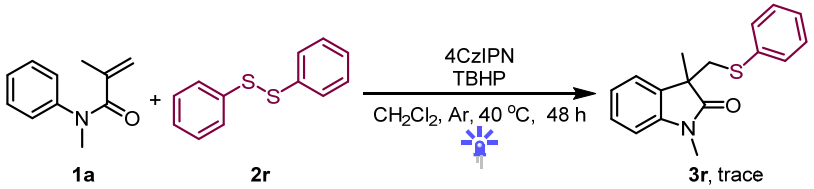
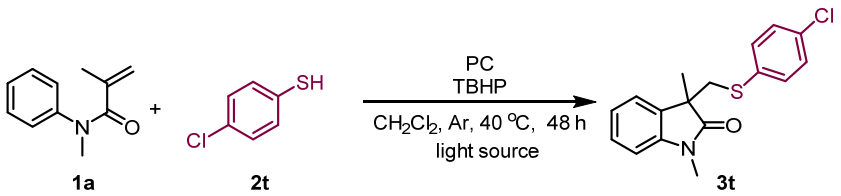


Figure S10

3.5 Checked the Reactivity of Thiophenols with N-arylacrylamide

The following reaction was carried out under standard conditions: A 20 mL reaction vessel was charged with photocatalyst (**PC**, 0.004 mmol), *N*-arylacrylamide (**1a**, 35.0 mg, 0.2 mmol, 1.0 equiv.), 4-chlorobenzenethiol (**2t**, 40.6 mg, 0.28 mmol, 1.4 equiv.) and TBHP (70% in water, 42 μL, 0.3 mmol, 1.5 equiv.) in 2.0 mL CH_2Cl_2 under Ar atmosphere. The resulting mixture was stirred for 48 h under irradiation with a 35 W light source at 40 ºC. The reaction was monitored by TLC. The yield was determined by GC analysis of the crude reaction mixture using dodecane as the internal standard.

Table S1. Investigating the reaction of the thiophenol with N-arylacrylamide

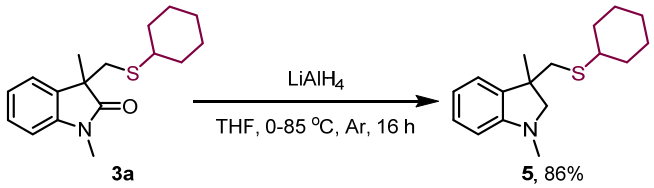


1a **2t** **3t**

entry	**PC**	light source	yield (%)
1	4CzIPN	blue LEDs	23
2	$[Ir]PF_6$	blue LEDs	20
3	*fac*-$Ir(ppy)_3$	blue LEDs	trace
4	$Ru(bpy)_3(PF_6)_2$	blue LEDs	11
5	Eosin B	blue LEDs	21
6	Rose Bengal	blue LEDs	trace
7	4CzIPN	purple LEDs	13
8	4CzIPN	green LEDs	19
9	4CzIPN	yellow LEDs	trace

4. Late-Stage Derivation and Application

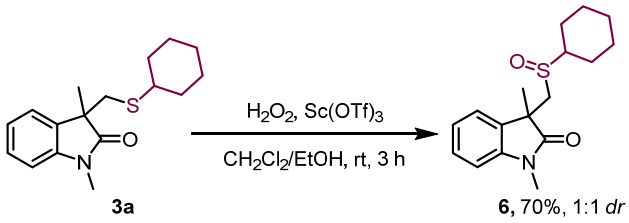
(a) Under argon atmosphere, to a stirred solution of the oxindole **3a** (57.8 mg, 0.2 mmol, 1.0 equiv.) in dry THF (3 mL) at 0 °C was added $LiAlH_4$ (32 mg, 0.8 mmol, 4.0 equiv.), and the mixture was stirred at 85 °C for 16 h.[1] The mixture was quenched by sat. aqueous $NaHCO_3$, and diluted by EtOAc. The organic phase was collected, and the aqueous phase was extracted with EtOAc. The combined organic layers were dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The crude product was purified by flash column chromatography (petroleum ether/ethyl acetate 40:1) to afford product **5** (47.3 mg, 86% yield) as colorless liquid.



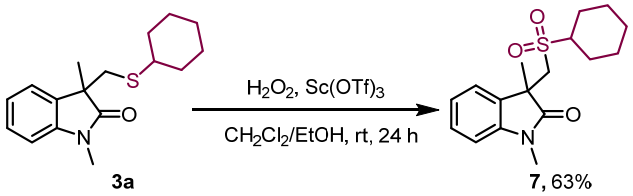
3a **5**, 86%

(b) A mixture of oxindole **3a** (57.8 mg, 0.2 mmol, 1.0 equiv.), H_2O_2 (30% in water, 60 μL, 2.0 mmol, 10 equiv.) and $Sc(OTf)_3$ (20 mg, 0.04 mmol, 20 mol%) in DCM/EtOH (1.0 mL/1.0 mL)

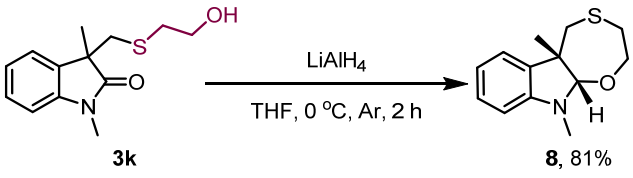
was stirred at room temperature for 3 h.[2] The mixture was quenched by water, and diluted by DCM. The organic phase was collected, and the aqueous phase was extracted with DCM. The combined organic layers were dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The crude product was purified by flash column chromatography (petroleum ether/ethyl acetate 2:1) to afford product **6** in 70% yield (42.7 mg, 1:1 *dr*) as colorless liquid.

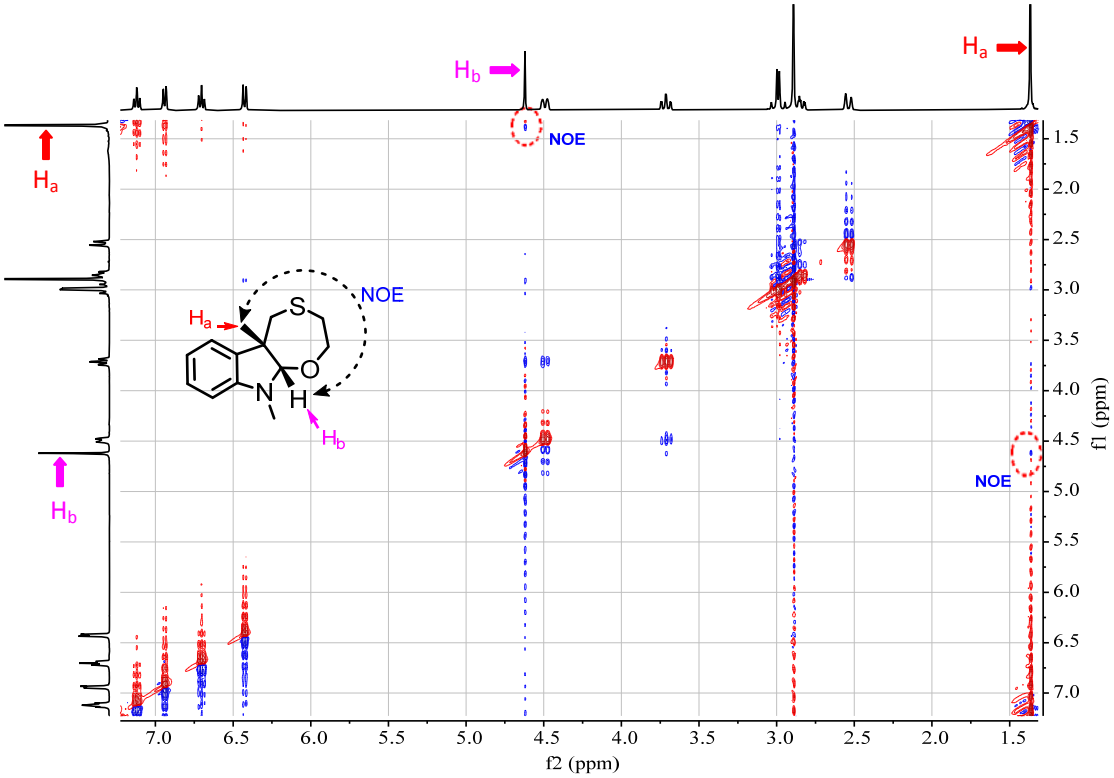


(c) A mixture of oxindole **3a** (57.8 mg, 0.2 mmol, 1.0 equiv.), H_2O_2 (30% in water, 60 μL, 2.0 mmol, 10 equiv.) and $Sc(OTf)_3$ (20 mg, 0.04 mmol, 20 mol%) in DCM/EtOH (1.0 mL/1.0 mL) was stirred at room temperature for 24 h.[2] The mixture was quenched by water, and diluted by DCM. The organic phase was collected, and the aqueous phase was extracted with DCM. The combined organic layers were dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The crude product was purified by flash column chromatography (petroleum ether/ethyl acetate 2:1) to afford product **6** in 63% yield (40.4 mg) as light yellow liquid.

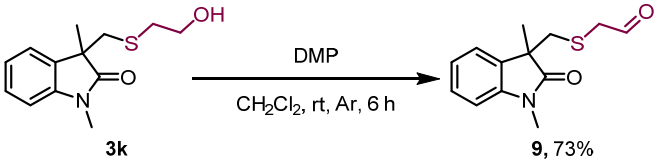


(d) To a stirred solution of the alcohol **3k** (47.4 mg, 0.2 mmol, 1.0 equiv.) in dry THF (4 mL) at 0 °C was added $LiAlH_4$ (32 mg, 0.8 mmol, 4.0 equiv.), and the mixture was stirred at this temperature for 2 h.[3] The mixture was quenched by sat. aqueous $NaHCO_3$, and diluted by EtOAc. The organic phase was collected, and the aqueous phase was extracted with EtOAc. The combined organic layers were dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The crude product was purified by flash column chromatography (petroleum ether/ethyl acetate 50:1) to afford cyclization product **8** (38.1 mg, 81% yield) as colorless liquid.





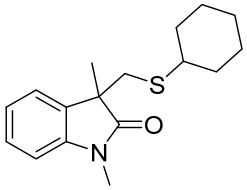
(e) Under argon atmosphere, to a stirred solution of the alcohol **3k** (47.4 mg, 0.2 mmol, 1.0 equiv.) in CH_2Cl_2 (3 mL) at room temperature was added Dess-Martin periodinane (DMP) (127 mg, 0.3 mmol, 1.5 equiv.), and the mixture was stirred for 6 h.[3] The mixture was quenched by sat. aqueous $Na_2S_2O_3$ and sat. aqueous $NaHCO_3$ successively, and diluted by CH_2Cl_2. The organic phase was collected, and the aqueous phase was extracted with CH_2Cl_2. The combined organic layers were dried over anhydrous Na_2SO_4, filtered, and concentrated under reduced pressure. The crude product was purified by flash column chromatography (petroleum ether/ethyl acetate 5:1) to afford product **9** (36.3 mg, 73% yield) as a colorless liquid.



3k **9,** 73%

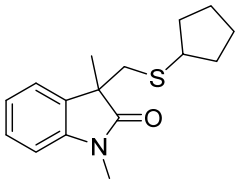
5. Characterization Data of all Products

3-((cyclohexylthio)methyl)-1,3-dimethylindolin-2-one (3a)



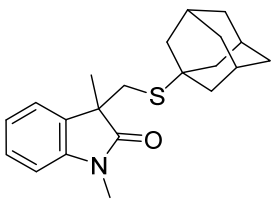
The desired compound **3a** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **3a** (41.1 mg) in 71% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.29 – 7.25 (m, 2H), 7.07 – 7.01 (m, 1H), 6.83 (d, *J* = 8.2 Hz, 1H), 3.21 (s, 3H), 3.04 (d, *J* = 12.6 Hz, 1H), 2.88 (d, *J* = 12.6 Hz, 1H), 2.43 – 2.35 (m, 1H), 1.86 – 1.75 (m, 2H), 1.70 – 1.60 (m, 2H), 1.55 – 1.48 (m, 1H), 1.40 (s, 3H), 1.20 – 1.08 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 143.4, 132.9, 128.1, 123.0, 122.3, 107.9, 48.9, 44.8, 38.0, 33.7, 33.5, 26.1, 26.0, 25.6, 22.8; HRMS (ESI) m/z calced for $C_{17}H_{24}NOS^+$ $(M+H)^+$ 290.1573, found 290.1575.

3-((cyclopentylthio)methyl)-1,3-dimethylindolin-2-one (3b)



The desired compound **3b** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and cyclopentanethiol (28.6 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:3) was performed to give **3b** (42.4 mg) in 77% yield; Light yellow liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.30 – 7.26 (m, 2H), 7.06 (t, *J* = 7.4 Hz, 1H), 6.85 (d, *J* = 7.9 Hz, 1H), 3.23 (s, 3H), 3.06 (d, *J* = 12.6 Hz, 1H), 2.93 – 2.86 (m, 2H), 1.89 – 1.83 (m, 2H), 1.68 – 1.58 (m, 2H), 1.49 – 1.45 (m, 2H), 1.42 (s, 3H), 1.40 – 1.32 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 143.3, 132.9, 128.1, 122.9, 122.4, 108.0, 48.9, 45.0, 39.5, 33.8, 33.5, 26.2, 24.6, 22.9; HRMS (ESI) m/z calced for $C_{16}H_{22}NOS^+$ $(M+H)^+$ 276.1417, found 276.1418.

3-((((3s,5s,7s)-adamantan-1-yl)thio)methyl)-1,3-dimethylindolin-2-one (3c)

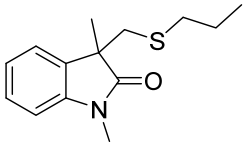


The desired compound **3c** was synthesized according to General Procedure using

N-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and (3*s*,5*s*,7*s*)-adamantane-1-thiol (47.1 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:2) was performed to give **3c** (51.9 mg) in 76% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.33 – 7.24 (m, 2H), 7.05 (t, *J* = 7.5 Hz, 1H), 6.84 (d, *J* = 7.8 Hz, 1H), 3.22 (s, 3H), 2.99 (d, *J* = 11.7 Hz, 1H), 2.89 (d, *J* = 11.7 Hz, 1H), 2.03 – 1.95 (m, 3H), 1.79 – 1.71 (m, 6H), 1.67 – 1.58 (m, 6H), 1.43 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 143.2, 132.9, 128.0, 123.2, 122.4, 107.9, 48.0, 44.3, 43.1, 36.2, 32.9, 29.6, 26.2, 23.0; HRMS (ESI) m/z calced for $C_{21}H_{28}NOS^+$ $(M+H)^+$ 342.1886, found 342.1887.

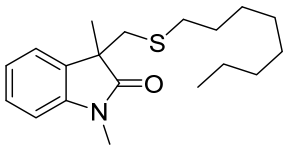
1,3-dimethyl-3-((propylthio)methyl)indolin-2-one (3d)



The desired compound **3d** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and propane-1-thiol (21.3 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:5) was performed to give **3d** (33.9 mg) in 68% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.32 – 7.26 (m, 2H), 7.07 (t, *J* = 7.5 Hz, 1H), 6.86 (d, *J* = 7.7 Hz, 1H), 3.24 (s, 3H), 3.03 (d, *J* = 12.8 Hz, 1H), 2.91 (d, *J* = 13.1 Hz, 1H), 2.31 (t, *J* = 7.3 Hz, 2H), 1.46 (q, *J* = 7.4 Hz, 2H), 1.42 (s, 3H), 0.86 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 143.5, 132.9, 128.2, 123.0, 122.4, 108.0, 49.2, 40.0, 35.7, 26.2, 22.9, 22.9, 13.2; HRMS (ESI) m/z calced for $C_{14}H_{20}NOS^+$ $(M+H)^+$ 250.1260, found 250.1262.

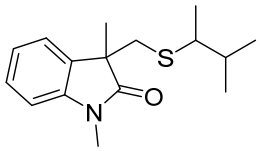
1,3-dimethyl-3-((octylthio)methyl)indolin-2-one (3e)



The desired compound **3e** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and octane-1-thiol (41.0 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **3e** (38.9 mg) in 61% yield; Colorless liquid.

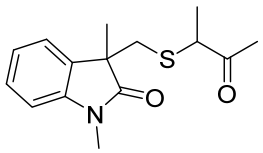
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.30 – 7.25 (m, 2H), 7.05 (t, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 7.4 Hz, 1H), 3.22 (s, 3H), 3.01 (d, *J* = 13.0 Hz, 1H), 2.90 (d, *J* = 13.0 Hz, 1H), 2.31 (t, *J* = 7.4 Hz, 2H), 1.42 – 1.39 (m, 5H), 1.28 – 1.20 (m, 10H), 0.85 (t, *J* = 6.9 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 143.5, 133.0, 128.2, 123.0, 122.4, 108.0, 49.2, 40.1, 33.8, 31.8, 29.6, 29.1, 29.1, 28.6, 26.2, 22.9, 22.6, 14.1; HRMS (ESI) m/z calced for $C_{19}H_{30}NOS^+$ $(M+H)^+$ 320.2043, found 320.2044.

1,3-dimethyl-3-(((3-methylbutan-2-yl)thio)methyl)indolin-2-one (3f, 1.38:1 *dr*)



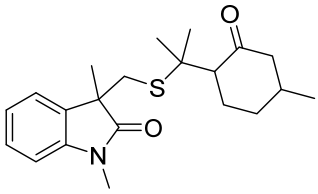
The desired compound **3f** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 3-methylbutane-2-thiol (29.2 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:3) was performed to give **3f** (36.0 mg) in 65% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.32 – 7.24 (m, 2H), 7.09 – 7.01 (m, 1H), 6.84 (d, *J* = 7.5 Hz, 1H), 3.22 (d, *J* = 3.9 Hz, 3H), 3.05 – 2.97 (m, 1H), 2.92 – 2.85 (m, 1H), 2.50 (qd, *J* = 6.9, 4.6 Hz, 0.42H), 2.40 (qd, *J* = 6.9, 4.6 Hz, 0.58H), 1.71 – 1.41 (m, 1H), 1.41 (s, 3H), 1.06 (t, *J* = 6.6 Hz, 3H), 0.84 – 0.77 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.6, 179.5, 143.5, 143.5, 133.0, 133.0, 128.1, 128.1, 122.9, 122.4, 122.3, 108.0, 107.9, 49.3, 49.2, 48.6, 48.5, 39.0, 39.0, 32.9, 32.7, 26.2, 26.1, 22.9, 22.8, 19.6, 19.6, 18.4, 18.4, 17.9, 17.7; HRMS (ESI) m/z calced for $C_{16}H_{24}NOS^+$ $(M+H)^+$ 278.1573, found 278.1574.

1,3-dimethyl-3-(((3-oxobutan-2-yl)thio)methyl)indolin-2-one (3g, 1.1:1 *dr*)



The desired compound **3g** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 3-mercaptobutan-2-one (29.2 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3g** (38.8 mg) in 70% yield; Light yellow liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.33 – 7.23 (m, 2H), 7.08 (t, *J* = 7.5 Hz, 1H), 6.87 (d, *J* = 7.8 Hz, 1H), 3.23 (s, 3H), 2.97 – 2.92 (m, 1H), 2.88 – 2.85 (m, 1H), 2.12 (s, 1.57H), 2.11 (s, 1.43H), 1.41 – 1.40 (m, 3H), 1.25 – 1.20 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 205.4, 205.3, 178.9, 143.4, 143.4, 132.2, 132.2, 128.4, 128.3, 123.0, 122.9, 122.5, 122.5, 108.1, 108.0, 49.1, 48.6, 48.4, 37.8, 37.1, 26.2, 25.5, 25.5, 23.1, 23.0, 15.9, 15.7; HRMS (ESI) m/z calced for $C_{15}H_{19}NNaO_2S^+$ $(M+Na)^+$ 300.1029, found 300.1030.

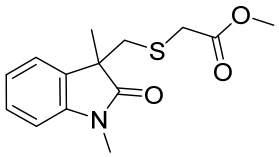
1,3-dimethyl-3-(((2-(4-methyl-2-oxocyclohexyl)propan-2-yl)thio)methyl)indolin-2-one (3h, 4:1 *dr*)



The desired compound **3h** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 2-(2-mercaptopropan-2-yl)-5-methylcyclohexan-1-one (52.2 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate

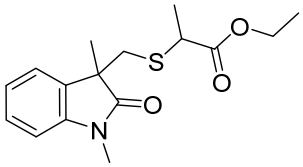
10:1) was performed to give **3h** (36.6 mg) in 51% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.30 – 7.26 (m, 2H), 7.06 (t, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 7.8 Hz, 1H), 3.22 (d, *J* = 6.3 Hz, 3H), 3.03 (d, *J* = 11.8 Hz, 0.2H), 2.95 (d, *J* = 11.6 Hz, 0.8H), 2.87 – 2.81 (m, 1H), 2.56 (dd, *J* = 12.6, 5.8 Hz, 0.2H), 2.48 (dd, *J* = 11.6, 5.1 Hz, 0.2H), 2.42 – 2.32 (m, 2H), 2.27 – 2.23 (m, 1H), 2.05 (t, *J* = 12.5 Hz, 1H), 1.88 – 1.81 (m, 2H), 1.72 – 1.66 (m, 1.6H), 1.44 – 1.40 (m, 6H), 1.26 (s, 2.4H), 1.22 (s, 0.6H), 1.00 (d, *J* = 6.2 Hz, 2.4H), 0.90 (d, *J* = 7.1 Hz, 0.6H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 210.6, 179.4, 143.2, 132.8, 128.2, 123.1, 122.4, 108.1, 57.2, 52.3, 48.0, 47.1, 36.7, 35.2, 34.6, 29.5, 27.2, 26.2, 24.2, 23.0, 22.2; HRMS (ESI) m/z calced for $C_{21}H_{29}NNaO_2S^+$ $(M+Na)^+$ 382.1811, found 282.1812.

methyl 2-(((1,3-dimethyl-2-oxoindolin-3-yl)methyl)thio)acetate (3i)



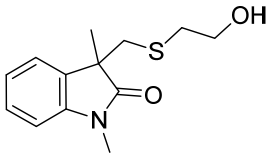
The desired compound **3i** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and methyl 2-mercaptoacetate (29.7 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3i** (45.2 mg) in 81% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.31 – 7.24 (m, 2H), 7.06 (t, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 7.8 Hz, 1H), 3.67 (s, 3H), 3.22 (s, 3H), 3.18 (d, *J* = 13.3 Hz, 1H), 3.07 – 3.02 (m, 2H), 2.92 (d, *J* = 14.9 Hz, 1H), 1.40 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.1, 170.6, 143.4, 132.2, 128.4, 122.9, 122.5, 108.1, 52.3, 49.1, 39.7, 34.2, 26.2, 23.0; HRMS (ESI) m/z calced for $C_{14}H_{17}NNaO_3S^+$ $(M+Na)^+$ 302.0821, found 302.0822.

ethyl 2-(((1,3-dimethyl-2-oxoindolin-3-yl)methyl)thio)propanoate (3j, 1.38:1 *dr*)



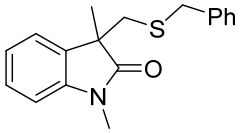
The desired compound **3j** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and ethyl 2-mercaptopropanoate (37.6 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/acetone 10:1) was performed to give **3j** (45.5 mg) in 74% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.32 – 7.25 (m, 2H), 7.07 (t, *J* = 7.5 Hz, 1H), 6.86 (d, *J* = 7.8 Hz, 1H), 4.20 – 4.11 (m, 2H), 3.36 – 3.32 (m, 1H), 3.23 (d, *J* = 2.3 Hz, 3H), 3.19 – 3.15 (m, 1H), 3.10 – 3.04 (m, 1H), 1.43 (d, *J* = 3.2 Hz, 3H), 1.30 – 1.20 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.1, 179.0, 172.9, 172.7, 143.5, 143.3, 132.3, 132.3, 128.3, 128.3, 123.1, 122.9, 122.5, 122.3, 108.0, 108.0, 61.0, 48.8, 48.6, 42.2, 41.4, 39.1, 38.3, 26.1, 22.8, 22.7, 17.0, 16.9, 14.1, 14.0; HRMS (ESI) m/z calced for $C_{16}H_{21}NNaO_3S^+$ $(M+Na)^+$ 330.1134, found 330.1136.

3-(((2-hydroxyethyl)thio)methyl)-1,3-dimethylindolin-2-one (3k)



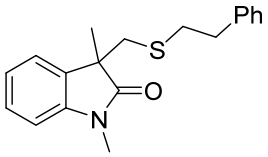
The desired compound **3k** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 2-mercaptoethan-1-ol (21.8 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/acetone 10:1) was performed to give **3k** (21.1 mg) in 42% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.32 (t, *J* = 7.7 Hz, 1H), 7.26 (d, *J* = 8.0 Hz, 1H), 7.10 (t, *J* = 7.5 Hz, 1H), 6.89 (d, *J* = 7.8 Hz, 1H), 3.63 (qt, *J* = 11.6, 5.7 Hz, 2H), 3.26 (s, 3H), 3.05 (q, *J* = 12.9 Hz, 2H), 2.55 (t, *J* = 5.7 Hz, 2H), 1.42 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.6, 143.4, 132.5, 128.4, 122.8, 122.7, 108.2, 60.8, 49.4, 39.1, 36.4, 26.3, 23.1; HRMS (ESI) m/z calced for $C_{13}H_{17}NNaO_2S^+$ $(M+Na)^+$ 274.0872, found 274.0874.

3-((benzylthio)methyl)-1,3-dimethylindolin-2-one (3l)



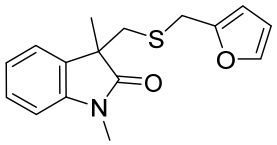
The desired compound **3l** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and phenylmethanethiol (34.8 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:2) was performed to give **3l** (39.8 mg) in 67% yield; Light yellow liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.33 – 7.19 (m, 7H), 7.08 (t, *J* = 7.5 Hz, 1H), 6.88 (d, *J* = 7.8 Hz, 1H), 3.52 (q, *J* = 13.2 Hz, 2H), 3.25 (s, 3H), 2.88 (s, 2H), 1.39 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 143.5, 138.0, 132.9, 128.9, 128.4, 128.3, 126.9, 123.0, 122.4, 108.1, 49.1, 39.0, 37.4, 26.2, 22.8; HRMS (ESI) m/z calced for $C_{18}H_{19}NNaOS^+$ $(M+Na)^+$ 320.1080, found 320.1082.

1,3-dimethyl-3-((phenethylthio)methyl)indolin-2-one (3m)



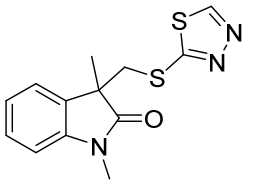
The desired compound **3m** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 2-phenylethane-1-thiol (38.7 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:2) was performed to give **3m** (42.9 mg) in 69% yield; Light yellow liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.33 – 7.24 (m, 4H), 7.19 (t, *J* = 7.3 Hz, 1H), 7.14 – 7.03 (m, 3H), 6.86 (d, *J* = 7.8 Hz, 1H), 3.23 (s, 3H), 3.04 (d, *J* = 13.1 Hz, 1H), 2.96 (d, *J* = 13.0 Hz, 1H), 2.75 – 2.71 (m, 2H), 2.59 (t, *J* = 7.6 Hz, 2H), 1.43 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.4, 143.5, 140.3, 132.8, 128.4, 128.3, 128.2, 126.2, 122.9, 122.4, 108.1, 49.2, 40.1, 36.2, 35.0, 26.2, 22.9; HRMS (ESI) m/z calced for $C_{19}H_{22}NOS^+$ $(M+H)^+$ 312.1417, found 312.1418.

3-(((furan-2-ylmethyl)thio)methyl)-1,3-dimethylindolin-2-one (3n)



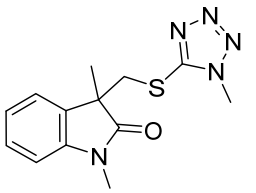
The desired compound **3n** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and furan-2-ylmethanethiol (32.0 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **3n** (24.7 mg) in 43% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.33 – 7.28 (m, 2H), 7.25 (d, *J* = 5.5 Hz, 1H), 7.07 (t, *J* = 7.2 Hz, 1H), 6.87 (d, *J* = 7.7 Hz, 1H), 6.28 (d, *J* = 3.1 Hz, 1H), 6.14 (d, *J* = 3.2 Hz, 1H), 3.55 (d, *J* = 14.7 Hz, 1H), 3.42 (d, *J* = 14.7 Hz, 1H), 3.25 (s, 3H), 3.01 – 2.89 (m, 2H), 1.40 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.4, 151.3, 143.5, 142.2, 132.8, 128.3, 123.0, 122.5, 110.3, 108.1, 107.8, 49.2, 39.0, 29.4, 26.3, 22.9; HRMS (ESI) m/z calced for $C_{16}H_{18}NO_2S^+$ $(M+H)^+$ 288.1053, found 288.1054.

3-(((1,3,4-thiadiazol-2-yl)thio)methyl)-1,3-dimethylindolin-2-one (3o)



The desired compound **3o** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 1,3,4-thiadiazole-2-thiol (33.1 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 2:1) was performed to give **3o** (41.4 mg) in 71% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 8.89 (s, 1H), 7.24 (t, *J* = 7.4 Hz, 1H), 7.17 (d, *J* = 7.3 Hz, 1H), 6.93 (t, *J* = 7.5 Hz, 1H), 6.84 (d, *J* = 7.8 Hz, 1H), 4.05 (d, *J* = 13.0 Hz, 1H), 3.82 (d, *J* = 13.1 Hz, 1H), 3.23 (s, 3H), 1.50 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.3, 165.3, 151.7, 143.3, 131.2, 128.6, 123.5, 122.5, 108.2, 48.6, 41.2, 26.3, 22.7; HRMS (ESI) m/z calced for $C_{13}H_{14}N_3OS_2^+$ $(M+H)^+$ 292.0573, found 292.0576.

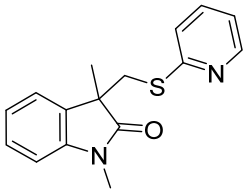
1,3-dimethyl-3-(((1-methyl-1H-tetrazol-5-yl)thio)methyl)indolin-2-one (3p)



The desired compound **3p** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 1-methyl-1*H*-tetrazole-5-thiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 3:1) was performed to give **3p** (44.5 mg) in 77% yield; Colorless solid; mp 94-96 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.22 (t, *J* = 7.7 Hz, 1H), 6.97 (d, *J* = 7.3 Hz, 1H), 6.88 (t, *J* = 8.0 Hz, 1H), 6.84 (d, *J* = 7.8 Hz, 1H), 3.90 (d, *J* = 13.3 Hz, 1H), 3.74 (d, *J* = 13.3 Hz, 1H), 3.52 (s, 3H), 3.22 (s, 3H), 1.44 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.1, 153.7, 143.2, 130.5, 128.6, 123.0, 122.6, 108.0, 48.8, 40.7, 33.1, 26.3, 22.7; HRMS (ESI) m/z calced for $C_{13}H_{16}N_5OS^+$ $(M+H)^+$ 290.1070, found 290.1072.

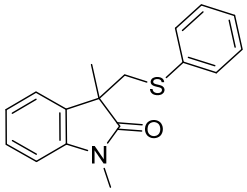
1,3-dimethyl-3-((pyridin-2-ylthio)methyl)indolin-2-one (3q)



The desired compound **3q** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and pyridine-2-thiol (31.0 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3q** (29.0 mg) in 51% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 8.37 (d, *J* = 4.2 Hz, 1H), 7.34 (td, *J* = 7.7, 1.9 Hz, 1H), 7.23 – 7.19 (m, 2H), 6.97 (d, *J* = 8.1 Hz, 1H), 6.94 – 6.87 (m, 2H), 6.82 (d, *J* = 8.2 Hz, 1H), 3.89 (d, *J* = 13.1 Hz, 1H), 3.64 (d, *J* = 13.1 Hz, 1H), 3.23 (s, 3H), 1.49 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.2, 157.9, 149.0, 143.2, 135.7, 132.4, 128.1, 123.4, 122.6, 122.2, 119.6, 107.8, 48.5, 36.8, 26.2, 22.7; HRMS (ESI) m/z calced for $C_{16}H_{17}N_2OS^+$ $(M+H)^+$ 285.1056, found 285.1058.

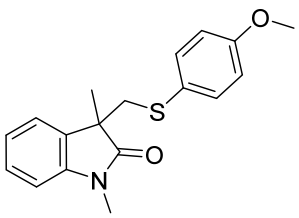
1,3-dimethyl-3-((phenylthio)methyl)indolin-2-one (3r)[4]



The desired compound **3r** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and benzenethiol (30.8 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3r** (9.6 mg) in 17% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.28 (t, *J* = 7.9 Hz, 1H), 7.23 – 7.10 (m, 6H), 6.98 (t, *J* = 7.5 Hz, 1H), 6.86 (d, *J* = 7.8 Hz, 1H), 3.45 – 3.34 (m, 2H), 3.21 (s, 3H), 1.45 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.0, 143.3, 136.1, 132.2, 130.5, 128.6, 128.2, 126.4, 123.2, 122.4, 108.0, 48.9, 42.7, 26.2, 22.9.

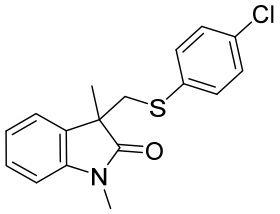
1,3-dimethyl-3-((pyridin-2-ylthio)methyl)indolin-2-one (3s)[4]



The desired compound **3s** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 4-methoxybenzenethiol (39.2 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3s** (9.4 mg) in 15% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.28 (t, *J* = 7.5 Hz, 1H), 7.13 (t, *J* = 8.5 Hz, 3H), 6.98 (t, *J* = 7.5 Hz, 1H), 6.86 (d, *J* = 7.8 Hz, 1H), 6.71 (d, *J* = 8.8 Hz, 2H), 3.75 (s, 3H), 3.31 (s, 2H), 3.21 (s, 3H), 1.41 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.0, 158.9, 143.4, 133.8, 132.3, 128.1, 126.4, 123.2, 122.4, 114.2, 107.9, 55.2, 49.2, 44.4, 26.2, 23.1.

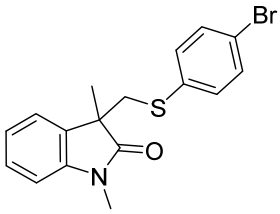
3-(((4-chlorophenyl)thio)methyl)-1,3-dimethylindolin-2-one (3t)[4]



The desired compound **3t** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 4-chlorobenzenethiol (40.3 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3t** (12.0 mg) in 19% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.28 (t, *J* = 7.1 Hz, 1H), 7.14 – 7.08 (m, 5H), 6.98 (t, *J* = 7.5 Hz, 1H), 6.86 (d, *J* = 7.8 Hz, 1H), 3.37 (dd, *J* = 12.8, 2.5 Hz, 2H), 3.21 (s, 3H), 1.43 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.8, 143.4, 134.5, 132.5, 132.0, 131.9, 128.7, 128.3, 123.2, 122.5, 108.1, 49.1, 42.9, 26.3, 23.1.

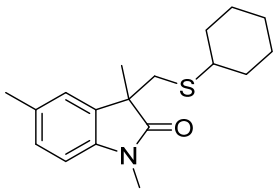
3-(((4-bromophenyl)thio)methyl)-1,3-dimethylindolin-2-one (3u)[5]



The desired compound **3u** was synthesized according to General Procedure using *N*-methyl-*N*-phenylmethacrylamide (35.0 mg, 0.2 mmol) and 4-bromobenzenethiol (39.2 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **3u** (14.5 mg) in 20% yield; Colorless liquid.

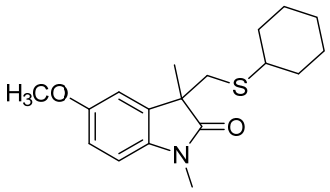
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.32 – 7.24 (m, 3H), 7.13 (d, *J* = 7.7 Hz, 1H), 7.07 – 6.95 (m, 3H), 6.86 (d, *J* = 7.8 Hz, 1H), 3.37 (dd, *J* = 12.8, 3.0 Hz, 2H), 3.21 (s, 3H), 1.44 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.8, 143.3, 135.2, 132.0, 132.0, 131.6, 128.3, 123.2, 122.5, 120.4, 108.1, 49.0, 42.7, 26.2, 23.0.

3-((cyclohexylthio)methyl)-1,3,5-trimethylindolin-2-one (4a)



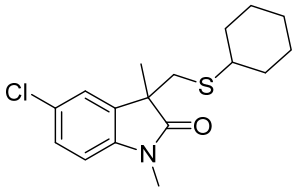
The desired compound **4a** was synthesized according to General Procedure using *N*-methyl-*N*-(*p*-tolyl)methacrylamide (37.8 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **4a** (50.3 mg) in 83% yield; Colorless liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.11 – 7.05 (m, 2H), 6.73 (d, *J* = 7.8 Hz, 1H), 3.20 (s, 3H), 3.04 (d, *J* = 12.7 Hz, 1H), 2.87 (d, *J* = 12.7 Hz, 1H), 2.43 – 2.37 (m, 1H), 2.33 (s, 3H), 1.88 – 1.75 (m, 2H), 1.71 – 1.61 (m, 2H), 1.56 – 1.51 (m, 1H), 1.40 (s, 3H), 1.20 – 1.13 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.4, 141.0, 132.9, 131.8, 128.3, 123.8, 107.6, 49.0, 44.8, 38.0, 33.7, 33.4, 26.2, 26.0, 25.6, 22.8, 21.1; HRMS (ESI) m/z calced for $C_{18}H_{26}NOS^+$ $(M+H)^+$ 304.1730, found 304.1732.

3-((cyclohexylthio)methyl)-5-methoxy-1,3-dimethylindolin-2-one (4b)



The desired compound **4b** was synthesized according to General Procedure using *N*-(4-methoxyphenyl)-*N*-methylmethacrylamide (41.0 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **4b** (50.4 mg) in 79% yield; Light yellow liquid.
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 6.92 (d, *J* = 2.5 Hz, 1H), 6.81 (d, *J* = 8.5 Hz, 1H), 6.75 (d, *J* = 8.4 Hz, 1H), 3.79 (s, 3H), 3.20 (s, 3H), 3.03 (d, *J* = 12.7 Hz, 1H), 2.88 (d, *J* = 12.7 Hz, 1H), 2.46 – 2.42 (m, 1H), 1.88 – 1.80 (m, 2H), 1.68 – 1.66 (m, 2H), 1.57 – 1.55 (m, 1H), 1.41 (s, 3H), 1.19 – 1.14 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.2, 155.9, 136.9, 134.3, 112.2, 110.7, 108.2, 55.8, 49.3, 44.9, 38.0, 33.8, 33.5, 26.3, 26.0, 25.7, 22.9; HRMS (ESI) m/z calced for $C_{18}H_{26}NO_2S^+$ $(M+H)^+$ 320.1679, found 320.1680.

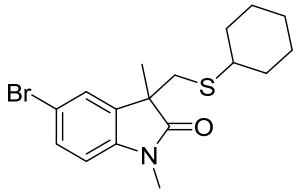
5-chloro-3-((cyclohexylthio)methyl)-1,3-dimethylindolin-2-one (4c)



The desired compound **4c** was synthesized according to General Procedure using *N*-(4-chlorophenyl)-*N*-methylmethacrylamide (41.9 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 24 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **4c** (45.3 mg) in 70% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.28 – 7.21 (m, 2H), 6.76 (d, *J* = 8.1 Hz, 1H), 3.20 (s, 3H), 3.01 (d, *J* = 12.7 Hz, 1H), 2.88 (s, 1H), 2.45 – 2.36 (m, 1H), 1.85 – 1.76 (m, 2H), 1.71 – 1.63 (m, 2H), 1.56 – 1.50 (m, 1H), 1.40 (s, 3H), 1.22 – 1.09 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.0, 142.0, 134.6, 128.0, 127.7, 123.6, 108.9, 49.2, 45.0, 37.8, 33.7, 33.4, 26.3, 25.9, 25.6, 22.7; HRMS (ESI) m/z calced for $C_{17}H_{23}ClNOS^+$ $(M+H)^+$ 324.1183, found 324.1187.

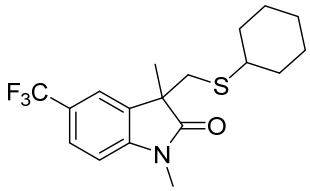
5-bromo-3-((cyclohexylthio)methyl)-1,3-dimethylindolin-2-one (4d)



The desired compound **4d** was synthesized according to General Procedure using *N*-(4-bromophenyl)-*N*-methylmethacrylamide (50.8 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4d** (59.6 mg) in 81% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.42 – 7.36 (m, 2H), 6.71 (d, *J* = 8.7 Hz, 1H), 3.19 (s, 3H), 3.01 (d, *J* = 12.9 Hz, 1H), 2.86 (d, *J* = 13.0 Hz, 1H), 2.44 – 2.33 (m, 1H), 1.85 – 1.76 (m, 2H), 1.70 – 1.63 (m, 2H), 1.55 – 1.52 (m, 1H), 1.39 (s, 3H), 1.21 – 1.09 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.9, 142.5, 135.0, 130.9, 126.3, 115.0, 109.4, 49.2, 45.1, 37.8, 33.7, 33.5, 26.2, 26.0, 25.6, 22.7; HRMS (ESI) m/z calced for $C_{17}H_{23}BrNOS^+$ $(M+H)^+$ 368.0678, found 368.0680.

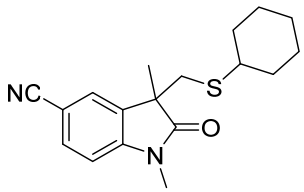
3-((cyclohexylthio)methyl)-1,3-dimethyl-5-(trifluoromethyl)indolin-2-one (4e)



The desired compound **4e** was synthesized according to General Procedure using *N*-methyl-*N*-(4-(trifluoromethyl)phenyl)methacrylamide (48.6 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:2) was performed to give **4e** (60.0 mg) in 84% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.56 (d, *J* = 8.1 Hz, 1H), 7.52 (s, 1H), 6.91 (d, *J* = 8.2 Hz, 1H), 3.25 (s, 3H), 3.05 (d, *J* = 13.0 Hz, 1H), 2.89 (d, *J* = 13.0 Hz, 1H), 2.39 – 2.28 (m, 1H), 1.86 – 1.79 (m, 1H), 1.75 – 1.71 (m, 1H), 1.69 – 1.60 (m, 2H), 1.55 – 1.49 (m, 1H), 1.43 (s, 3H), 1.19 – 1.12 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.5, 146.5, 133.5, 125.9 (q, *J* = 4.0 Hz), 124.5 (q, *J* = 32.4 Hz), 124.4 (q, *J* = 271.6 Hz), 120.1 (q, *J* = 3.7 Hz), 107.7, 49.1, 45.1, 37.8, 33.7, 33.5, 26.3, 25.9, 25.6, 22.6; ^{19}F NMR (376 MHz, $CDCl_3$-*d*) δ -61.33; HRMS (ESI) m/z calced for $C_{18}H_{22}F_3NNaOS^+$ $(M+Na)^+$ 380.1266, found 280.1268.

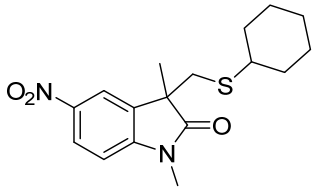
3-((cyclohexylthio)methyl)-1,3-dimethyl-2-oxoindoline-5-carbonitrile (4f)



The desired compound **4f** was synthesized according to General Procedure using *N*-(4-cyanophenyl)-*N*-methylmethacrylamide (40.0 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:2) was performed to give **4f** (39.6 mg) in 63% yield; Light yellow solid; mp 115-117 ^oC.

^1H NMR (400 MHz, $CDCl_3$-*d*) δ 7.61 (d, *J* = 8.1 Hz, 1H), 7.54 (s, 1H), 6.91 (d, *J* = 8.1 Hz, 1H), 3.25 (s, 3H), 3.04 (d, *J* = 12.8 Hz, 1H), 2.89 (d, *J* = 12.8 Hz, 1H), 2.47 – 2.37 (m, 1H), 1.86 – 1.76 (m, 2H), 1.70 – 1.66 (m, 2H), 1.54 (d, *J* = 9.8 Hz, 1H), 1.43 (s, 3H), 1.21 – 1.13 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.2, 147.3, 133.9, 133.5, 126.5, 119.2, 108.4, 105.4, 48.8, 45.2, 37.7, 33.7, 33.4, 26.4, 25.9, 25.6, 22.6; HRMS (ESI) m/z calced for $C_{18}H_{23}N_2OS^+$ $(M+H)^+$ 315.1526, found 315.1528.

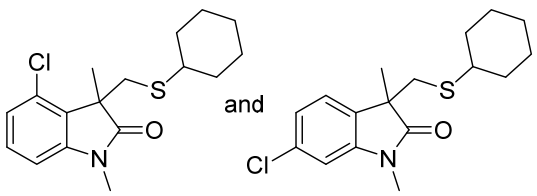
3-((cyclohexylthio)methyl)-1,3-dimethyl-5-nitroindolin-2-one (4g)



The desired compound **4g** was synthesized according to General Procedure using *N*-methyl-*N*-(4-nitrophenyl)methacrylamide (44.0 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4g** (34.1 mg) in 51% yield; Yellow liquid.

^1H NMR (400 MHz, $CDCl_3$-*d*) δ 8.27 (dd, *J* = 8.6, 2.3 Hz, 1H), 8.17 (s, 1H), 6.93 (d, *J* = 8.6 Hz, 1H), 3.29 (s, 3H), 3.09 (d, *J* = 12.8 Hz, 1H), 2.93 (d, *J* = 12.8 Hz, 1H), 2.47 – 2.42 (m, 1H), 1.86 – 1.75 (m, 2H), 1.71 – 1.65 (m, 2H), 1.55 – 1.52 (m, 1H), 1.47 (s, 3H), 1.21 – 1.11 m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.6, 149.2, 143.3, 133.7, 125.6, 118.9, 107.6, 49.1, 45.3, 37.7, 33.7, 33.4, 26.6, 25.9, 25.9, 25.5, 22.7; HRMS (ESI) m/z calced for $C_{17}H_{22}N_2NaO_3S^+$ $(M+Na)^+$ 357.1243, found 357.1246.

4-chloro-3-((cyclohexylthio)methyl)-1,3-dimethylindolin-2-one and 6-chloro-3-((cyclohexylthio)methyl)-1,3-dimethylindolin-2-one (4h, rr = 2.7:1)

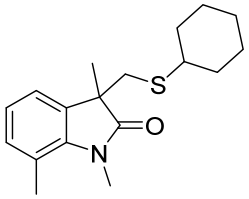


The desired compound **4h** was synthesized according to General Procedure using *N*-(3-chlorophenyl)-*N*-methylmethacrylamide (41.9 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg,

0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:3) was performed to give **4h** (49.8 mg) in 77% yield; Light yellow liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.23 – 7.17 (m, 1H), 7.01 (dd, *J* = 7.9, 1.9 Hz, 0.27H), 6.97 (d, *J* = 8.2 Hz, 0.73H), 6.83 (d, *J* = 1.9 Hz, 0.27H), 6.74 (d, *J* = 7.8 Hz, 0.73H), 3.53 (d, *J* = 12.7 Hz, 0.73H), 3.20 (d, *J* = 7.1 Hz, 3H), 3.02 (d, *J* = 12.6 Hz, 0.27H), 2.96 (d, *J* = 12.7 Hz, 0.73H), 2.86 (d, *J* = 12.7 Hz, 0.27H), 2.44 – 2.35 (m, 1H), 1.89 – 1.80 (m, 1.4H), 1.71 – 1.60 (m, 2.6H), 1.52 – 1.50 (m, 3.3H), 1.39 (s, 0.82H), 1.18 – 1.06 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.4, 178.8, 145.6, 144.6, 133.8, 131.2, 130.6, 129.4, 128.8, 123.9, 123.3, 122.1, 108.7, 106.5, 51.0, 48.7, 45.0, 44.4, 37.8, 34.9, 33.7, 33.7, 33.4, 26.3, 26.2, 26.0, 25.6, 22.7, 20.8; HRMS (ESI) m/z calced for $C_{17}H_{23}ClNOS^+$ $(M+H)^+$ 324.1183, found 324.1186.

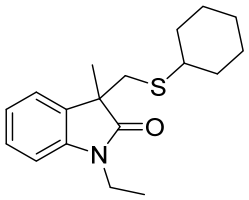
3-((cyclohexylthio)methyl)-1,3,7-trimethylindolin-2-one (4i)



The desired compound **4i** was synthesized according to General Procedure using *N*-methyl-*N*-(*o*-tolyl)methacrylamide (37.8 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **4i** (37.0 mg) in 61% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.10 (d, *J* = 7.2 Hz, 1H), 7.00 (d, *J* = 7.6 Hz, 1H), 6.94 (t, *J* = 7.5 Hz, 1H), 3.51 (s, 3H), 3.03 (d, *J* = 12.6 Hz, 1H), 2.89 (d, *J* = 12.6 Hz, 1H), 2.58 (s, 3H), 2.45 – 2.39 (m, 1H), 1.88 – 1.78 (m, 2H), 1.69 – 1.66 (m, 2H), 1.55 – 1.53 (m, 1H), 1.39 (s, 3H), 1.21 – 1.13 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 180.3, 141.2, 133.6, 131.9, 122.3, 120.8, 119.6, 48.3, 44.8, 38.3, 33.8, 33.5, 29.5, 26.0, 25.7, 23.3, 19.1; HRMS (ESI) m/z calced for $C_{18}H_{26}NOS^+$ $(M+H)^+$ 304.1730, found 304.1732.

3-((cyclohexylthio)methyl)-1-ethyl-3-methylindolin-2-one (4j)

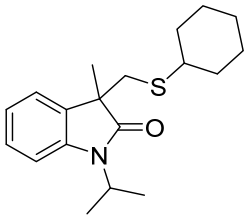


The desired compound **4j** was synthesized according to General Procedure using *N*-ethyl-*N*-phenylmethacrylamide (37.8 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **4j** (40.6 mg) in 67% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.30 – 7.23 (m, 2H), 7.04 (t, *J* = 7.5 Hz, 1H), 6.86 (d, *J* = 8.4 Hz, 1H), 3.90 – 3.81 (m, 1H), 3.74 – 3.65 (m, 1H), 3.05 (d, *J* = 12.8 Hz, 1H), 2.90 (d, *J* = 12.7 Hz, 1H), 2.45 – 2.34 (m, 1H), 1.87 – 1.75 (m, 2H), 1.69 – 1.64 (m, 2H), 1.53 – 1.49 (m, 1H), 1.40 (s, 3H), 1.27 (t, *J* = 7.2 Hz, 3H), 1.19 – 1.12 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.1, 142.5, 133.2, 128.0, 123.1, 122.1, 108.1, 48.8, 44.6, 37.9, 34.6, 33.7, 33.4, 25.9, 25.6, 22.8, 12.6; HRMS

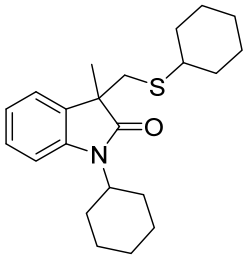
(ESI) m/z calced for $C_{18}H_{26}NOS^+$ $(M+H)^+$ 304.1730, found 304.1731.

3-((cyclohexylthio)methyl)-1-isopropyl-3-methylindolin-2-one (4k)



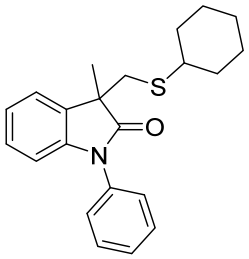
The desired compound **4k** was synthesized according to General Procedure using *N*-isopropyl-*N*-phenylmethacrylamide (40.6 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:3) was performed to give **4k** (54.6 mg) in 86% yield; Colorless liquid. ^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.24 (t, *J* = 7.6 Hz, 2H), 7.02 (t, *J* = 7.3 Hz, 2H), 4.71 – 4.66 (m, 1H), 3.03 (d, *J* = 12.7 Hz, 1H), 2.89 (d, *J* = 12.7 Hz, 1H), 2.40 – 2.33 (m, 1H), 1.87 – 1.72 (m, 2H), 1.68 – 1.64 (m, 2H), 1.56 – 1.50 (m, 1H), 1.48 (dd, *J* = 7.1, 2.1 Hz, 6H), 1.39 (s, 3H), 1.22 – 1.06 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.2, 142.2, 133.4, 127.8, 123.1, 121.7, 109.7, 48.6, 44.5, 43.6, 38.2, 33.7, 33.4, 25.9, 25.6, 22.9, 19.4, 19.4; HRMS (ESI) m/z calced for $C_{19}H_{28}NOS^+$ $(M+H)^+$ 318.1886, found 318.1891.

1-cyclohexyl-3-((cyclohexylthio)methyl)-3-methylindolin-2-one (4l)



The desired compound **4l** was synthesized according to General Procedure using *N*-cyclohexyl-*N*-phenylmethacrylamide (48.7 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:3) was performed to give **4l** (57.2 mg) in 80% yield; Colorless liquid. ^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.24 (t, *J* = 7.7 Hz, 2H), 7.09 – 6.98 (m, 2H), 4.24 – 4.15 (m, 1H), 3.03 (d, *J* = 12.7 Hz, 1H), 2.89 (d, *J* = 12.7 Hz, 1H), 2.39 – 2.32 (m, 1H), 2.22 – 2.10 (m, 2H), 1.92 – 1.71 (m, 8H), 1.68 – 1.65 (m, 2H), 1.54 – 1.49 (m, 1H), 1.45 – 1.42 (m, 1H), 1.39 (s, 3H), 1.29 – 1.23 (m, 1H), 1.19 – 1.04 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.3, 142.6, 133.4, 127.7, 123.1, 121.6, 109.9, 52.1, 48.5, 44.5, 38.2, 33.7, 33.4, 29.1, 26.0, 26.0, 25.7, 25.4, 24.5, 23.1; HRMS (ESI) m/z calced for $C_{22}H_{32}NOS^+$ $(M+H)^+$ 358.2199, found 358.2204.

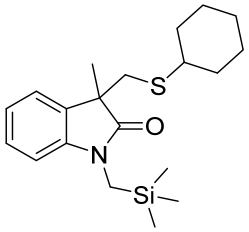
3-((cyclohexylthio)methyl)-3-methyl-1-phenylindolin-2-one (4m)



The desired compound **4m** was synthesized according to General Procedure using *N*,*N*-diphenylmethacrylamide (47.5 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:1) was performed to give **4m** (40.1 mg) in 57% yield; Colorless solid; mp 105-107 ^oC.

^1H NMR (400 MHz, $CDCl_3$-*d*) δ 7.53 (t, *J* = 7.7 Hz, 2H), 7.48 – 7.37 (m, 3H), 7.33 (d, *J* = 7.2 Hz, 1H), 7.21 (t, *J* = 8.4 Hz, 1H), 7.10 (t, *J* = 7.5 Hz, 1H), 6.82 (d, *J* = 7.8 Hz, 1H), 3.16 (d, *J* = 12.8 Hz, 1H), 3.04 (d, *J* = 12.8 Hz, 1H), 2.46 – 2.40 (m, 1H), 1.91 – 1.86 (m, 1H), 1.83 – 1.80 (m, 1H), 1.70 – 1.65 (m, 2H), 1.55 – 1.53 (m, 4H), 1.23 – 1.13 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.0, 143.6, 134.6, 132.6, 129.5, 128.0, 127.9, 126.7, 123.1, 122.8, 109.2, 49.2, 44.7, 38.5, 33.8, 33.5, 25.9, 25.6, 23.1; HRMS (ESI) m/z calced for $C_{22}H_{26}NOS^+$ $(M+H)^+$ 352.1730, found 352.1734.

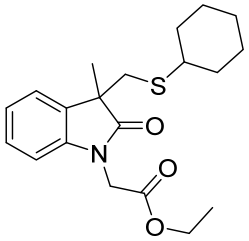
3-((cyclohexylthio)methyl)-3-methyl-1-((trimethylsilyl)methyl)indolin-2-one (4n)



The desired compound **4n** was synthesized according to General Procedure using *N*-phenyl-*N*-((trimethylsilyl)methyl)methacrylamide (49.5 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/CH_2Cl_2 1:4) was performed to give **4n** (19.5 mg) in 27% yield; Colorless liquid.

^1H NMR (400 MHz, $CDCl_3$-*d*) δ 7.28 – 7.23 (m, 2H), 7.02 (t, *J* = 7.5 Hz, 1H), 6.78 (d, *J* = 7.9 Hz, 1H), 3.26 (d, *J* = 15.4 Hz, 1H), 3.16 (d, *J* = 15.4 Hz, 1H), 3.06 (d, *J* = 12.6 Hz, 1H), 2.89 (d, *J* = 12.7 Hz, 1H), 2.47 – 2.38 (m, 1H), 1.87 – 1.78 (m, 2H), 1.73 – 1.67(m, 2H), 1.54 – 1.51 (m, 1H), 1.39 (s, 3H), 1.17 – 1.12 (m, 5H), 0.12 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.9, 143.9, 133.3, 127.9, 122.9, 121.9, 108.4, 48.7, 44.8, 37.8, 33.7, 33.4, 31.4, 26.0, 25.7, 23.3, -1.4; HRMS (ESI) m/z calced for $C_{20}H_{32}NOSSi^+$ $(M+H)^+$ 362.1968, found 362.1970.

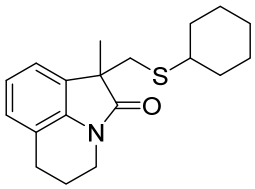
ethyl 2-(3-((cyclohexylthio)methyl)-3-methyl-2-oxoindolin-1-yl)acetate (4o)



The desired compound **4o** was synthesized according to General Procedure using ethyl *N*-methacryloyl-*N*-phenylglycinate (49.4 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4o** (34.7 mg) in 48% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.34 (d, *J* = 7.4 Hz, 1H), 7.28 – 7.24 (m, 1H), 7.08 (t, *J* = 7.5 Hz, 1H), 6.74 (d, *J* = 7.8 Hz, 1H), 4.58 (d, *J* = 17.5 Hz, 1H), 4.38 (d, *J* = 17.5 Hz, 1H), 4.21 (q, *J* = 6.9 Hz, 2H), 3.09 (d, *J* = 12.8 Hz, 1H), 2.92 (d, *J* = 12.7 Hz, 1H), 2.47 – 2.42 (m, 1H), 1.90 – 1.81 (m, 2H), 1.70 – 1.68 (m, 3H), 1.47 (s, 3H), 1.24 (t, *J* = 7.3 Hz, 3H), 1.18 – 1.12 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.6, 167.6, 142.0, 132.7, 128.1, 123.4, 122.7, 108.0, 61.6, 48.9, 44.9, 41.3, 37.7, 33.7, 33.5, 26.0, 25.7, 23.0, 14.1; HRMS (ESI) m/z calced for $C_{20}H_{28}NO_3S^+$ $(M+H)^+$ 362.1784, found 362.1786.

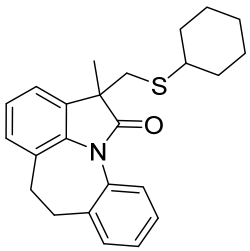
1-((cyclohexylthio)methyl)-1-methyl-5,6-dihydro-4*H*-pyrrolo[3,2,1-*ij*]quinolin-2(1*H*)-one (4p)



The desired compound **4p** was synthesized according to General Procedure using 1-(3,4-dihydroquinolin-1(2*H*)-yl)-2-methylprop-2-en-1-one (40.2 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4p** (46.0 mg) in 73% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.12 (d, *J* = 7.3 Hz, 1H), 7.03 (d, *J* = 7.1 Hz, 1H), 6.94 (t, *J* = 7.5 Hz, 1H), 3.72 (td, *J* = 5.6, 3.6 Hz, 2H), 3.05 (d, *J* = 12.7 Hz, 1H), 2.87 (d, *J* = 12.6 Hz, 1H), 2.81 − 2.77 (m, 2H), 2.47 – 2.41 (m, 1H), 2.00 (p, *J* = 6.2 Hz, 2H), 1.88 – 1.80 (m, 2H), 1.71 – 1.63 (m, 2H), 1.55 – 1.52 (m, 1H), 1.42 (s, 3H), 1.22 – 1.12 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.4, 139.1, 131.5, 126.9, 121.8, 120.9, 120.0, 50.2, 44.8, 38.8, 37.9, 33.8, 33.5, 26.0, 25.7, 24.6, 22.5, 21.2; HRMS (ESI) m/z calced for $C_{19}H_{26}NOS^+$ $(M+H)^+$ 316.1730, found 316.1733.

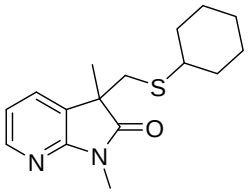
2-((cyclohexylthio)methyl)-2-methyl-6,7-dihydrobenzo[6,7]azepino[3,2,1-*hi*]indol-1(2*H*)-one (4q)



The desired compound **4q** was synthesized according to General Procedure using 1-(10,11-dihydro-5*H*-dibenzo[*b*,*f*]azepin-5-yl)-2-methylprop-2-en-1-one (52.6 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ CH_2Cl_2 1:1) was performed to give **4q** (65.7 mg) in 87% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.89 (d, *J* = 8.2 Hz, 1H), 7.30 (d, *J* = 6.8 Hz, 1H), 7.24 – 7.14 (m, 3H), 7.06 – 6.99 (m, 2H), 3.17 (d, *J* = 12.6 Hz, 1H), 3.11 – 3.00 (m, 5H), 2.48 – 2.39 (m, 1H), 1.93 – 1.79 (m, 2H), 1.70 – 1.65 (m, 2H), 1.55 – 1.49 (m, 4H), 1.20 – 1.13 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 180.1, 140.6, 136.7, 136.1, 133.1, 130.0, 129.4, 126.4, 126.3, 126.1, 125.0, 122.2, 120.6, 48.8, 44.7, 38.8, 33.8, 33.8, 33.6, 33.4, 25.9, 25.6, 23.8; HRMS (ESI) m/z calced for $C_{24}H_{28}NOS^+$ $(M+H)^+$ 378.1886, found 378.1888.

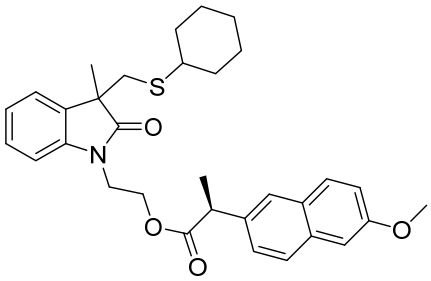
3-((cyclohexylthio)methyl)-1,3-dimethyl-1,3-dihydro-2*H*-pyrrolo[2,3-*b*]pyridin-2-one (4r)



The desired compound **4r** was synthesized according to General Procedure using *N*-methyl-*N*-(pyridin-2-yl)methacrylamide (35.2 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4r** (40.0 mg) in 69% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 8.17 (dd, *J* = 5.3, 1.6 Hz, 1H), 7.53 (dd, *J* = 7.2, 1.6 Hz, 1H), 6.93 (dd, *J* = 7.3, 5.3 Hz, 1H), 3.29 (s, 3H), 3.04 (d, *J* = 12.8 Hz, 1H), 2.86 (d, *J* = 12.8 Hz, 1H), 2.48 – 2.42 (m, 1H), 1.87 – 1.76 (m, 2H), 1.68 – 1.65 (m, 2H), 1.54 – 1.52 (m, 1H), 1.42 (s, 3H), 1.19 – 1.14 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.2, 156.8, 146.9, 130.6, 127.4, 117.9, 48.6, 45.1, 37.5, 33.7, 33.4, 25.9, 25.9, 25.6, 25.3, 22.1; HRMS (ESI) m/z calced for $C_{16}H_{23}N_2OS^+$ $(M+H)^+$ 291.1526, found 291.1527.

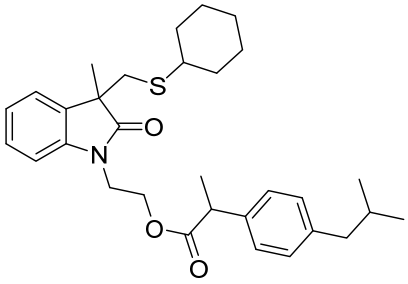
2-(3-((cyclohexylthio)methyl)-3-methyl-2-oxoindolin-1-yl)ethyl (2*S*)-2-(6-methoxynaphthalen-2-yl)propanoate (4s, 1.08:1 *dr*)



The desired compound **4s** was synthesized according to General Procedure using 2-(*N*-phenylmethacrylamido)ethyl (*S*)-2-(6-methoxynaphthalen-2-yl)propanoate (83.5 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 6:1) was performed to give **4s** (56.3 mg) in 53% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.68 – 7.62 (m, 2H), 7.58 – 7.56 (m, 1H), 7.32 – 7.28 (m, 1H), 7.24 (d, *J* = 7.6 Hz, 1H), 7.16 – 7.09 (m, 3H), 7.02 (td, *J* = 7.7, 2.4 Hz, 1H), 6.79 (d, *J* = 7.7 Hz, 1H), 4.42 – 4.34 (m, 1H), 4.30 – 4.24 (m, 1H), 4.03 – 3.94 (m, 1H), 3.91 (s, 3H), 3.90 – 3.84 (m, 1H), 3.81 – 3.70 (m, 1H), 3.03 (dd, *J* = 12.7, 4.1 Hz, 1H), 2.86 (dd, *J* = 12.7, 2.1 Hz, 1H), 2.38 – 2.34 (m, 1H), 1.87 – 1.73 (m, 3H), 1.69 – 1.61 (m, 2H), 1.49 (dd, *J* = 7.2, 2.9 Hz, 3H), 1.37 (s, 1.56H), 1.33 (s, 1.44H), 1.20 – 1.07 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.6, 179.6, 174.5, 174.4, 157.6, 142.7, 142.6, 135.2, 135.2, 133.6, 132.7, 132.7, 129.2, 128.8, 128.0, 128.0, 127.1, 126.1, 126.1, 126.0, 125.9, 123.0, 123.0, 122.3, 118.9, 108.4, 108.3, 105.5, 62.0, 61.8, 55.3, 48.8, 48.8, 45.3, 45.3, 44.8, 38.8, 37.9, 33.7, 33.4, 26.0, 25.6, 22.8, 22.8, 18.3, 18.3; HRMS (ESI) m/z calced for $C_{32}H_{38}NO_4S^+$ $(M+H)^+$ 532.2516, found 532.2517.

2-(3-((cyclohexylthio)methyl)-3-methyl-2-oxoindolin-1-yl)ethyl 2-(4-isobutylphenyl)propanoate (4t, 1:1 *dr*)

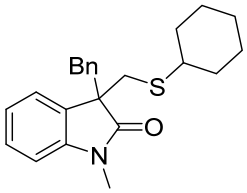


The desired compound **4t** was synthesized according to General Procedure using 2-(*N*-phenylmethacrylamido)ethyl 2-(4-isobutylphenyl)propanoate (78.7 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 36 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4r** (67.0 mg) in 66% yield; Colorless liquid.

^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.29 – 7.20 (m, 2H), 7.12 – 7.03 (m, 5H), 6.86 (d, *J* = 7.8 Hz, 1H), 4.41 – 4.30 (m, 1H), 4.28 – 4.22 (m, 1H), 4.06 – 3.95 (m, 1H), 3.96 – 3.83 (m, 1H), 3.60 (p, *J* = 7.2 Hz, 1H), 3.05 (dd, *J* = 12.7, 3.6 Hz, 1H), 2.88 (d, *J* = 12.7 Hz, 1H), 2.43 (d, *J* = 7.2 Hz, 2H), 2.41 – 2.30 (m, 1H), 1.86 – 1.76 (m, 3H), 1.69 – 1.60 (m, 2H), 1.54 – 1.51 (m, 1H), 1.43 – 1.35 (m, 6H), 1.20 – 1.07 (m, 5H), 0.89 (d, *J* = 6.6 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 179.6, 174.6, 174.5, 142.8, 142.7, 140.5, 137.4, 137.3, 132.8, 132.8, 129.3, 128.1, 127.1, 123.1, 123.1, 122.4, 108.5, 108.4, 61.8, 61.6, 48.9, 48.8, 45.0, 45.0, 44.8, 38.8, 38.8, 38.0, 37.9, 33.7, 33.5, 30.1, 26.0,

25.7, 22.9, 22.8, 22.4, 18.3, 18.3; HRMS (ESI) m/z calced for $C_{31}H_{42}NO_3S^+$ $(M+Na)^+$ 508.2880, found 508.2882.

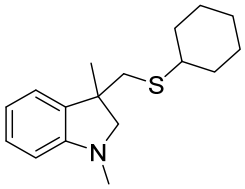
3-benzyl-3-((cyclohexylthio)methyl)-1-methylindolin-2-one (4u)



The desired compound **4u** was synthesized according to General Procedure using 2-benzyl-*N*-methyl-*N*-phenylacrylamide (50.2 mg, 0.2 mmol) and cyclohexanethiol (32.5 mg, 0.28 mmol) irradiated with blue LEDs for 48 h. Purification by column chromatography (silica gel, petroleum ether/ethyl acetate 10:1) was performed to give **4u** (46.0 mg) in 63% yield; Colorless liquid.

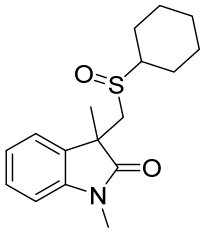
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.26 (d, *J* = 7.7 Hz, 1H), 7.19 (t, *J* = 7.7 Hz, 1H), 7.06 – 7.00 (m, 4H), 6.84 – 6.84 (m, 2H), 6.59 (d, *J* = 7.8 Hz, 1H), 3.21 (d, *J* = 12.6 Hz, 1H), 3.14 (s, 2H), 3.05 (d, *J* = 12.6 Hz, 1H), 2.97 (s, 3H), 2.51 – 2.43 (m, 1H), 1.91 – 1.80 (m, 2H), 1.73 – 1.64 (m, 2H), 1.57 – 1.52 (m, 1H), 1.20 – 1.15 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.0, 143.9, 135.4, 130.0, 129.8, 128.2, 127.4, 126.4, 123.9, 121.9, 107.7, 55.0, 44.9, 43.1, 36.7, 33.7, 33.4, 26.0, 25.8, 25.6; HRMS (ESI) m/z calced for $C_{23}H_{28}NOS^+$ $(M+H)^+$ 366.1886, found 366.1888.

3-((cyclohexylthio)methyl)-1,3-dimethylindoline (5)



^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.11 (t, *J* = 7.6 Hz, 1H), 7.06 (d, *J* = 7.5 Hz, 1H), 6.70 (t, *J* = 7.3 Hz, 1H), 6.49 (d, *J* = 7.8 Hz, 1H), 3.44 (d, *J* = 8.9 Hz, 1H), 2.97 (d, *J* = 8.9 Hz, 1H), 2.82 (d, *J* = 12.1 Hz, 1H), 2.76 – 2.73 (m, 4H), 2.53 – 2.47 (m, 1H), 1.99 – 1.89 (m, 2H), 1.77 – 1.70 (m, 2H), 1.60 – 1.56 (m, 2H), 1.38 (s, 3H), 1.31 – 1.18 (m, 7H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 137.0, 128.0, 122.3, 117.8, 107.5, 67.3, 45.1, 44.5, 40.7, 35.8, 33.8, 33.8, 26.1, 25.8, 24.0; HRMS (ESI) m/z calced for $C_{17}H_{26}NS^+$ $(M+H)^+$ 276.1780, found 276.1781.

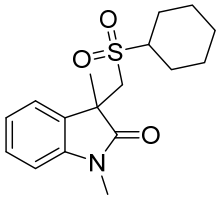
3-((cyclohexylsulfinyl)methyl)-1,3-dimethylindolin-2-one (6, 1:1 *dr*)



6′: ^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.42 (d, *J* = 7.4 Hz, 1H), 7.32 (t, *J* = 7.1 Hz, 1H), 7.11 (t, *J* = 8.0 Hz, 1H), 6.89 (d, *J* = 7.8 Hz, 1H), 3.24 (s, 3H), 3.17 (d, *J* = 13.5 Hz, 1H), 3.08 (d, *J* = 13.4 Hz, 1H), 2.53 – 2.45 (m, 1H), 2.03 – 2.01 (m, 1H), 1.89 – 1.84 (m, 1H), 1.81 – 1.79 (m, 2H), 1.67 –

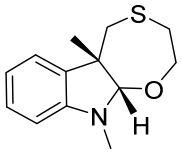
1.63 (m, 1H), 1.54 (s, 3H), 1.31 – 1.22 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.6, 142.7, 131.2, 128.7, 124.5, 123.0, 108.4, 60.0, 58.3, 46.7, 26.4, 26.3, 25.4, 25.3, 25.0, 24.0, 24.0. and **6″:** ^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.36 (d, *J* = 7.4 Hz, 1H), 7.32 (d, *J* = 9.0 Hz, 1H), 7.08 (t, *J* = 7.5 Hz, 1H), 6.87 (d, *J* = 7.7 Hz, 1H), 3.27 – 3.23 (m, 4H), 3.01 (d, *J* = 13.1 Hz, 1H), 2.58 – 2.48 (m, 1H), 2.09 – 2.04 (m, 1H), 1.89 – 1.79 (m, 3H), 1.69 – 1.64 (m, 1H), 1.53 (s, 3H), 1.32 – 1.23 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.8, 143.3, 131.3, 128.7, 123.8, 122.5, 108.5, 60.2, 56.7, 45.8, 26.5, 26.4, 25.4, 25.3, 25.0, 24.7, 24.0; HRMS (ESI) m/z calced for $C_{17}H_{24}NO_2S^+$ $(M+H)^+$ 306.1522, found 306.1524.

3-((cyclohexylsulfonyl)methyl)-1,3-dimethylindolin-2-one (7)



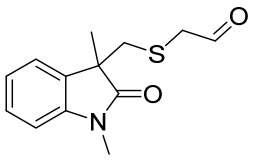
^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.39 (d, *J* = 7.4 Hz, 1H), 7.36 – 7.29 (m, 1H), 7.10 (t, *J* = 7.5 Hz, 1H), 6.89 (d, *J* = 7.8 Hz, 1H), 3.61 (d, *J* = 14.1 Hz, 1H), 3.47 (d, *J* = 14.0 Hz, 1H), 3.25 (s, 3H), 2.57 – 2.49 (m, 1H), 2.06 – 2.04 (m, 2H), 1.88 – 1.85 (m, 2H), 1.67 – 1.60 (m, 2H), 1.45 – 1.39 (m, 5H), 1.17 – 1.15 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 178.2, 143.3, 130.4, 128.8, 123.8, 122.5, 108.6, 62.9, 55.1, 45.2, 26.6, 25.1, 25.0, 24.9, 24.7; HRMS (ESI) m/z calced for $C_{17}H_{24}NO_3S^+$ $(M+H)^+$ 322.1471, found 322.1474.

5a,10-dimethyl-2,3,5,5a,10,10a-hexahydro-[1,4]oxathiepino[7,6-*b*]indole (8)



^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 7.12 (t, *J* = 7.0 Hz, 1H), 6.94 (d, *J* = 7.3 Hz, 1H), 6.70 (t, *J* = 7.4 Hz, 1H), 6.43 (d, *J* = 7.8 Hz, 1H), 4.62 (s, 1H), 4.50 (d, *J* = 12.4 Hz, 1H), 3.71 (t, *J* = 13.2 Hz, 1H), 3.05 – 2.94 (m, 2H), 2.89 (s, 3H), 2.88 – 2.81 (m, 1H), 2.54 (d, *J* = 14.3 Hz, 1H), 1.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 149.0, 134.9, 128.0, 121.6, 117.6, 108.4, 105.2, 75.0, 53.1, 40.0, 36.1, 30.3, 24.8; HRMS (ESI) m/z calced for $C_{13}H_{18}NOS^+$ $(M+H)^+$ 236.1104, found 236.1106.

2-(((1,3-dimethyl-2-oxoindolin-3-yl)methyl)thio)acetaldehyde (9)



^{1}H NMR (400 MHz, $CDCl_3$-*d*) δ 9.27 (t, *J* = 3.3 Hz, 1H), 7.30 (t, *J* = 7.7 Hz, 1H), 7.24 (d, *J* = 9.3 Hz, 1H), 7.08 (t, *J* = 7.5 Hz, 1H), 6.87 (d, *J* = 7.8 Hz, 1H), 3.23 (s, 3H), 3.02 (dd, *J* = 14.6, 3.1 Hz, 1H), 2.92 – 2.87 (m, 3H), 1.39 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$-*d*) δ 194.0, 178.9, 143.6, 132.0, 128.6, 123.0, 122.7, 108.3, 49.1, 42.2, 39.0, 26.3, 23.1; HRMS (ESI) m/z calced for $C_{13}H_{16}NO_2S^+$ $(M+H)^+$ 250.0896, found 250.0899.

6. References

(1) W. L. Jia, N. Westerveld, K. M. Wong, T. Morsch, M. Hakkennes, K. Naksomboon, M. A. Fernandez-Ibanez. *Org. Lett.* **2019,** *21*, 9339-9342.

(2) M. Teders, C. Henkel, L. Anhauser, F. Strieth-Kalthoff, A. Gomez-Suarez, R. Kleinmans, A. Kahnt, A. Rentmeister, D. Guldi, F. Glorius. *Nat. Chem.* **2018,** *10*, 981-988.

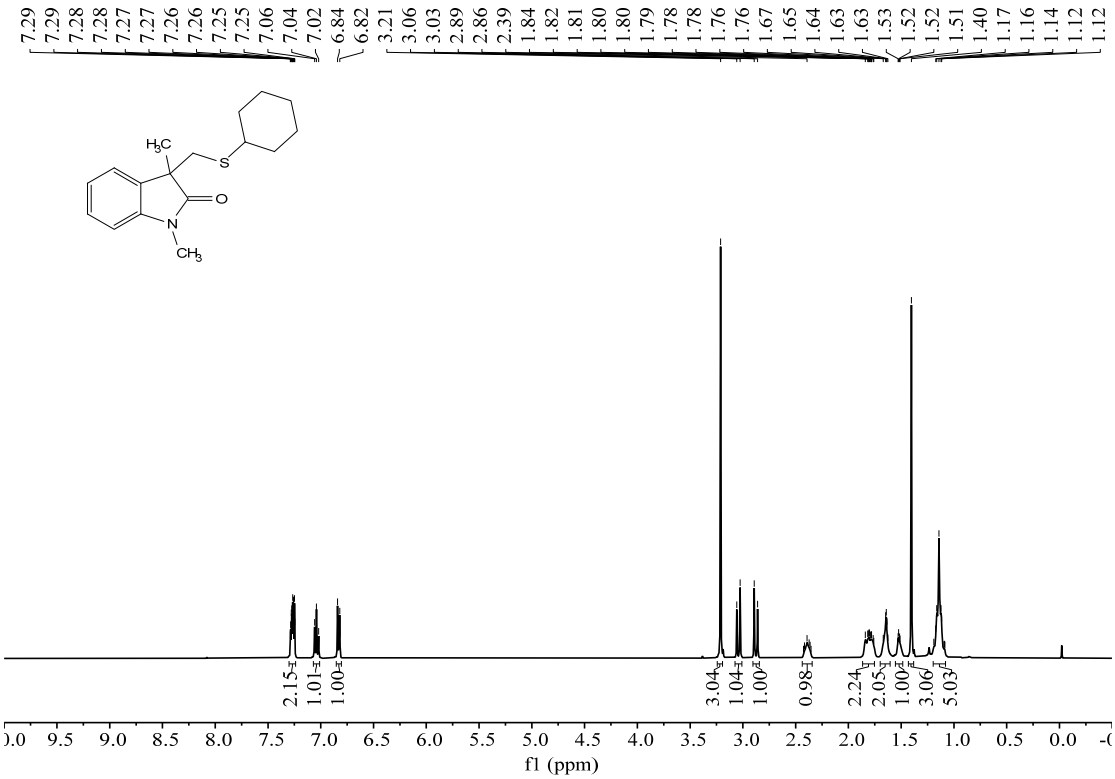
(3) Z. Qu, T. Tian, Y. Tan, X. Ji, G.-J. Deng, H. Huang. *Green Chem.* **2022,** *24*, 7403-7409.

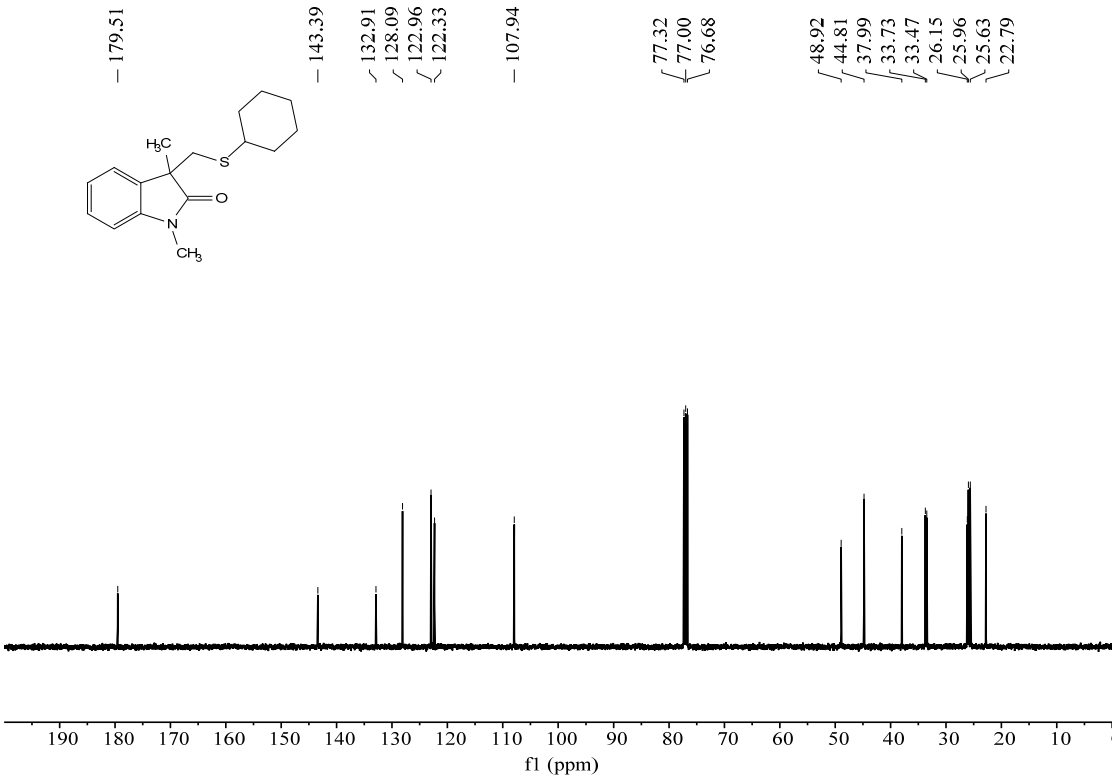
(4) F. Cheng, X. Bai, Q. W. Sun, G. F. Zhu, Y. X. Dong, Y. Y. Yang, X. L. Gao, B. Guo, L. Tang, J. Q. Zhang. *Org. Biomol. Chem.* **2022,** *20*, 6423-6431.

(5) F. X. Wang, S. K. Tian. *J. Org. Chem.* **2015,** *80*, 12697-703.

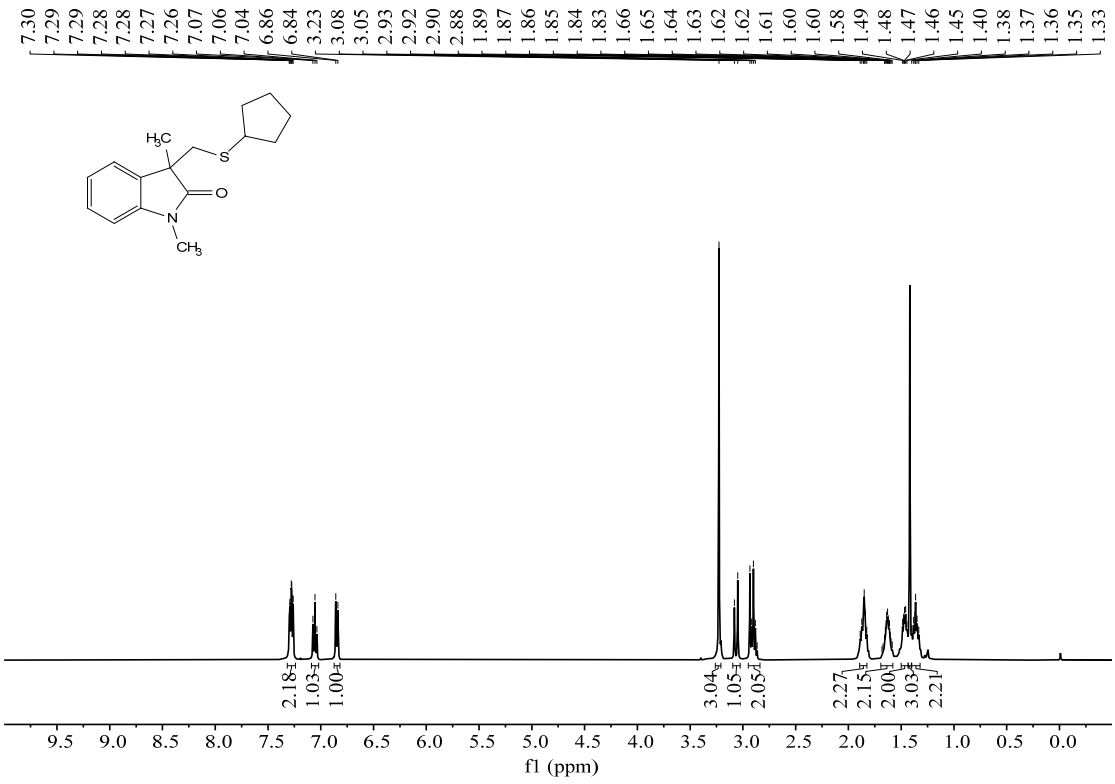
7. Copies of ^{1}H and ^{13}C NMR spectra of all Products

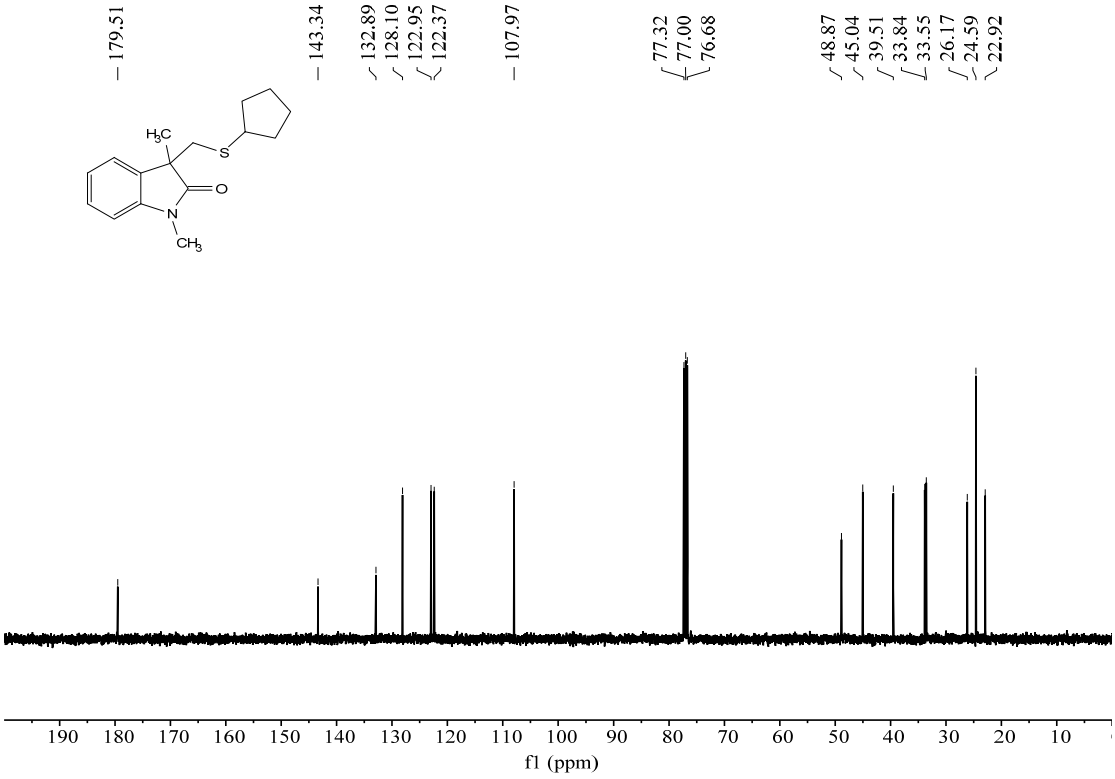
^{1}H and ^{13}C NMR spectra of 3a ($CDCl_3$)



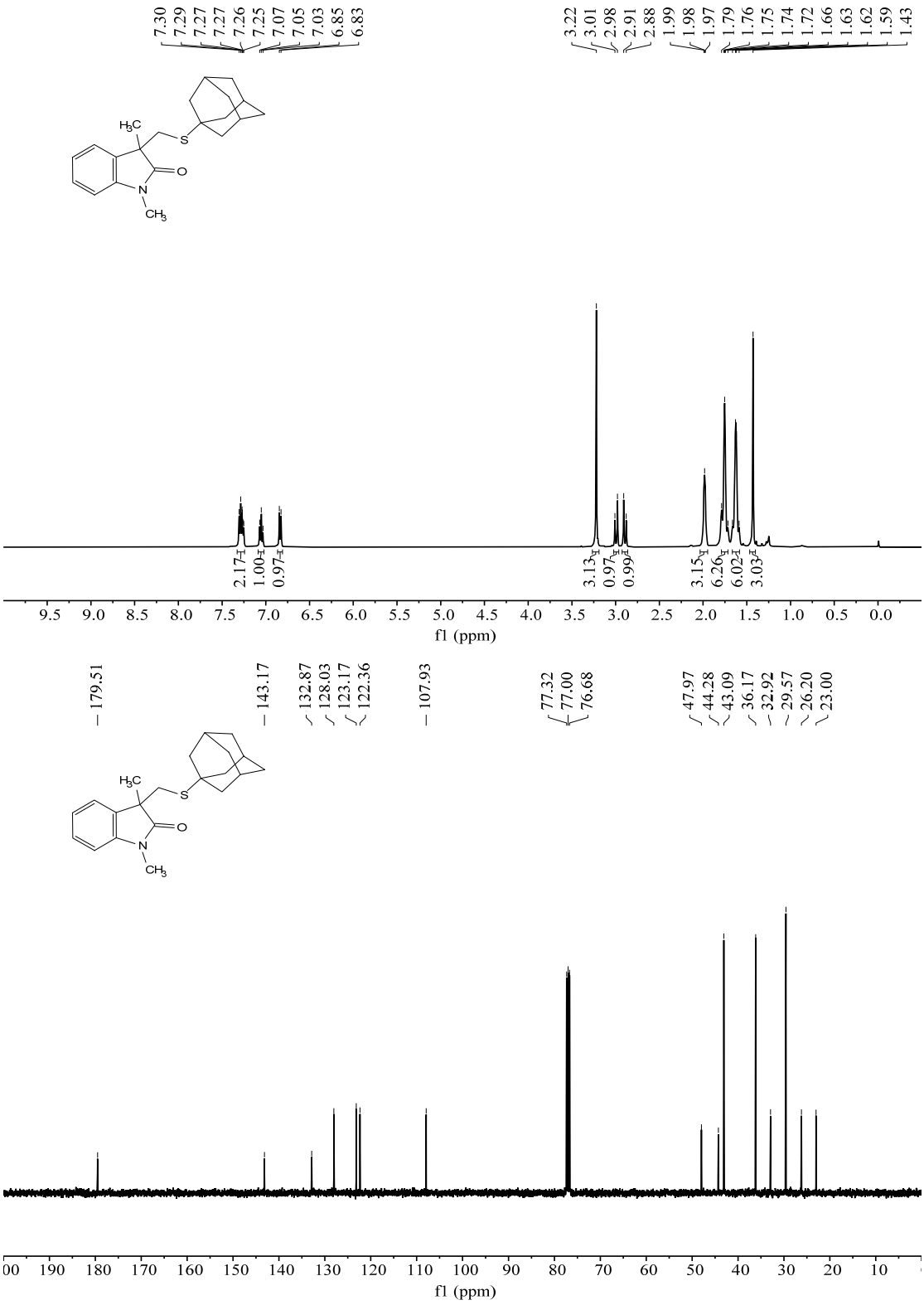


^{1}H and ^{13}C NMR spectra of 3b ($CDCl_3$)

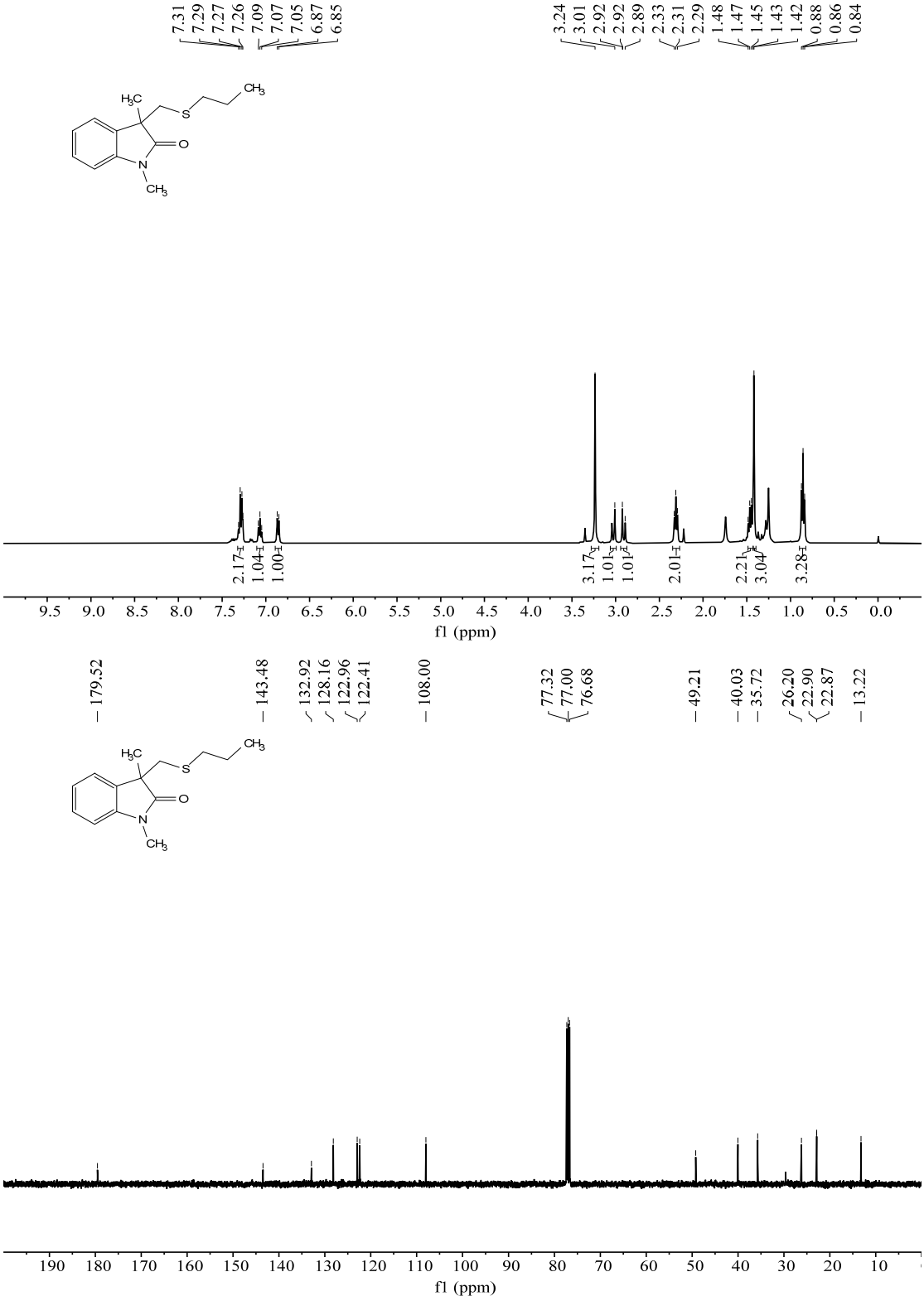




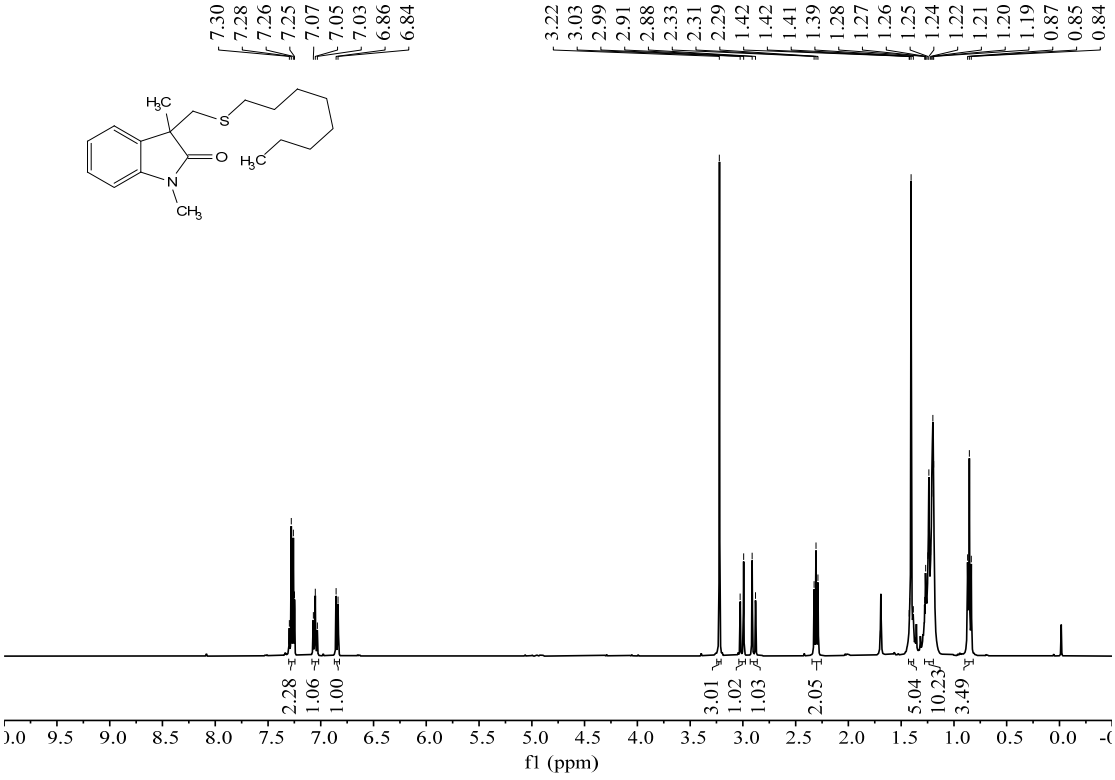
^{1}H and ^{13}C NMR spectra of 3c ($CDCl_3$)

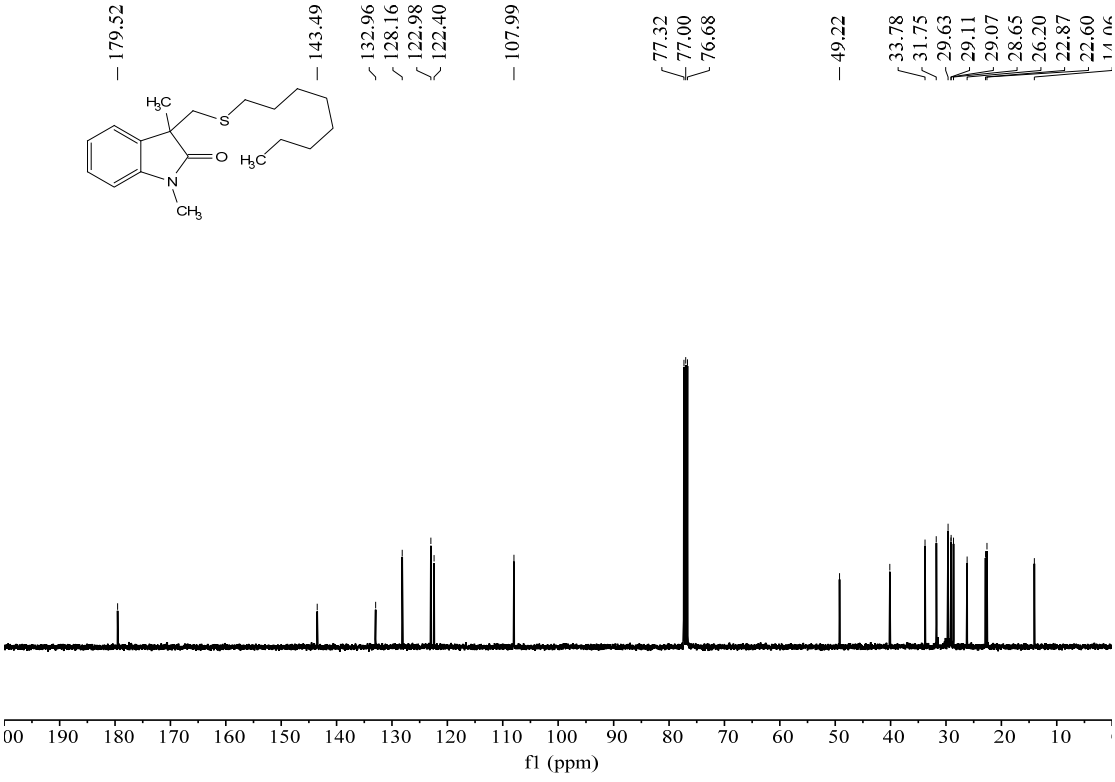


^{1}H and ^{13}C NMR spectra of 3d ($CDCl_3$)

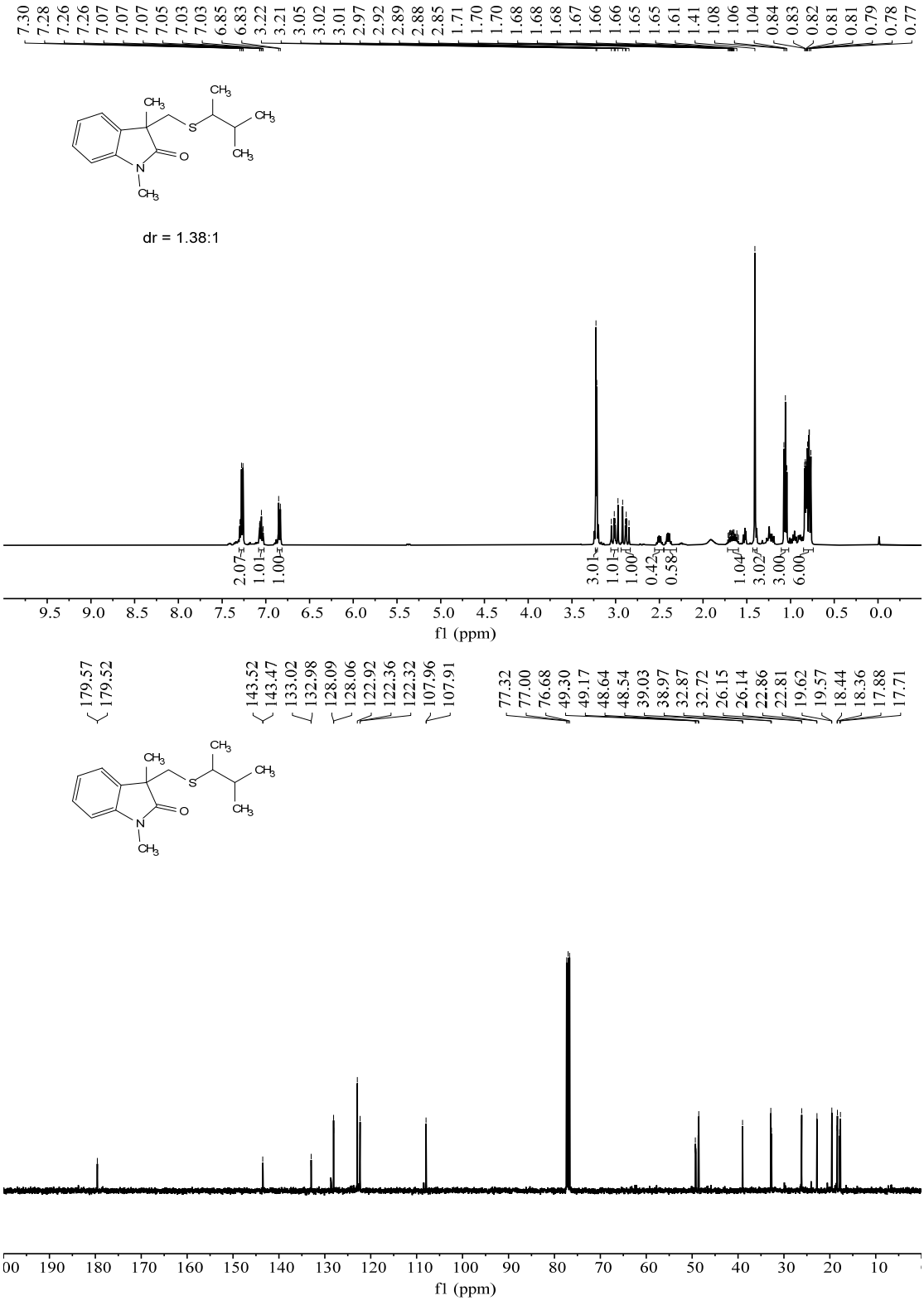


^{1}H and ^{13}C NMR spectra of 3e ($CDCl_3$)

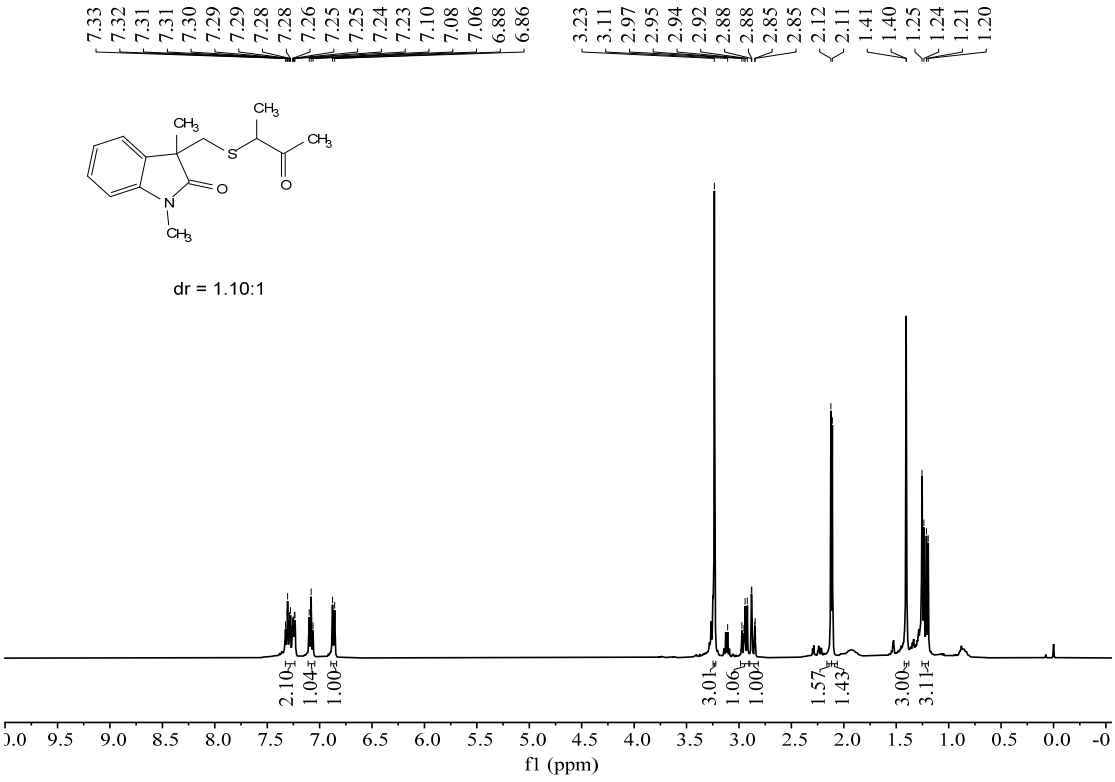


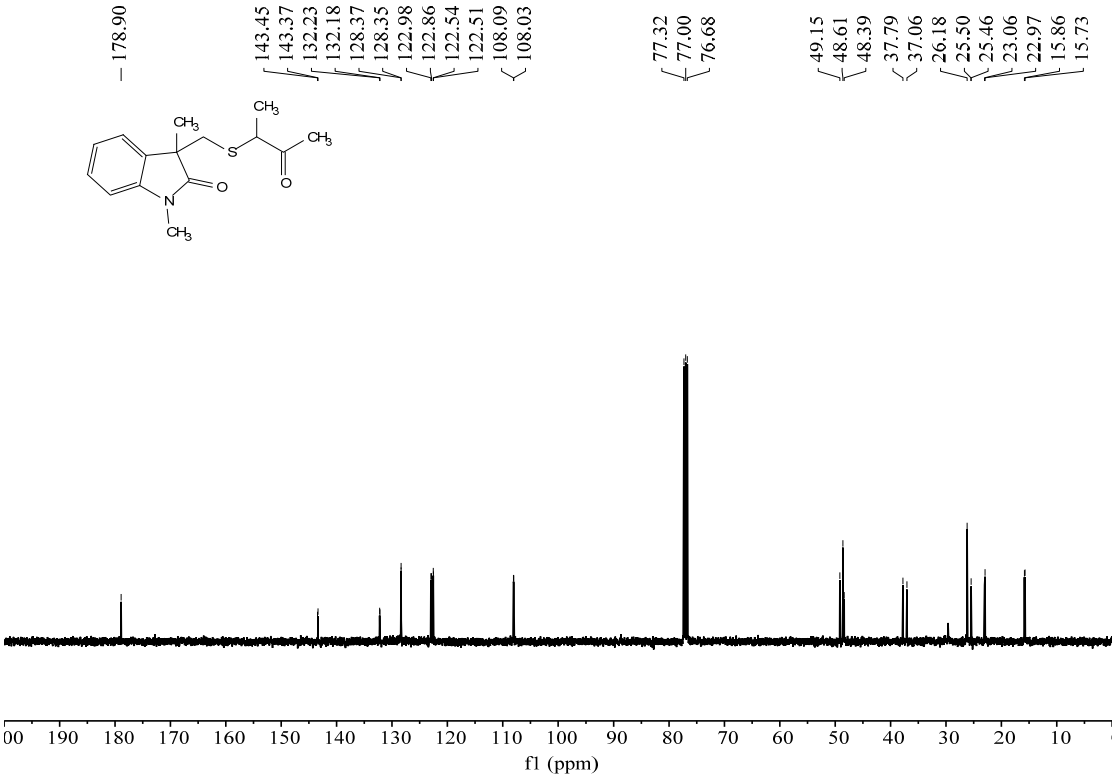


^{1}H and ^{13}C NMR spectra of 3f ($CDCl_3$)

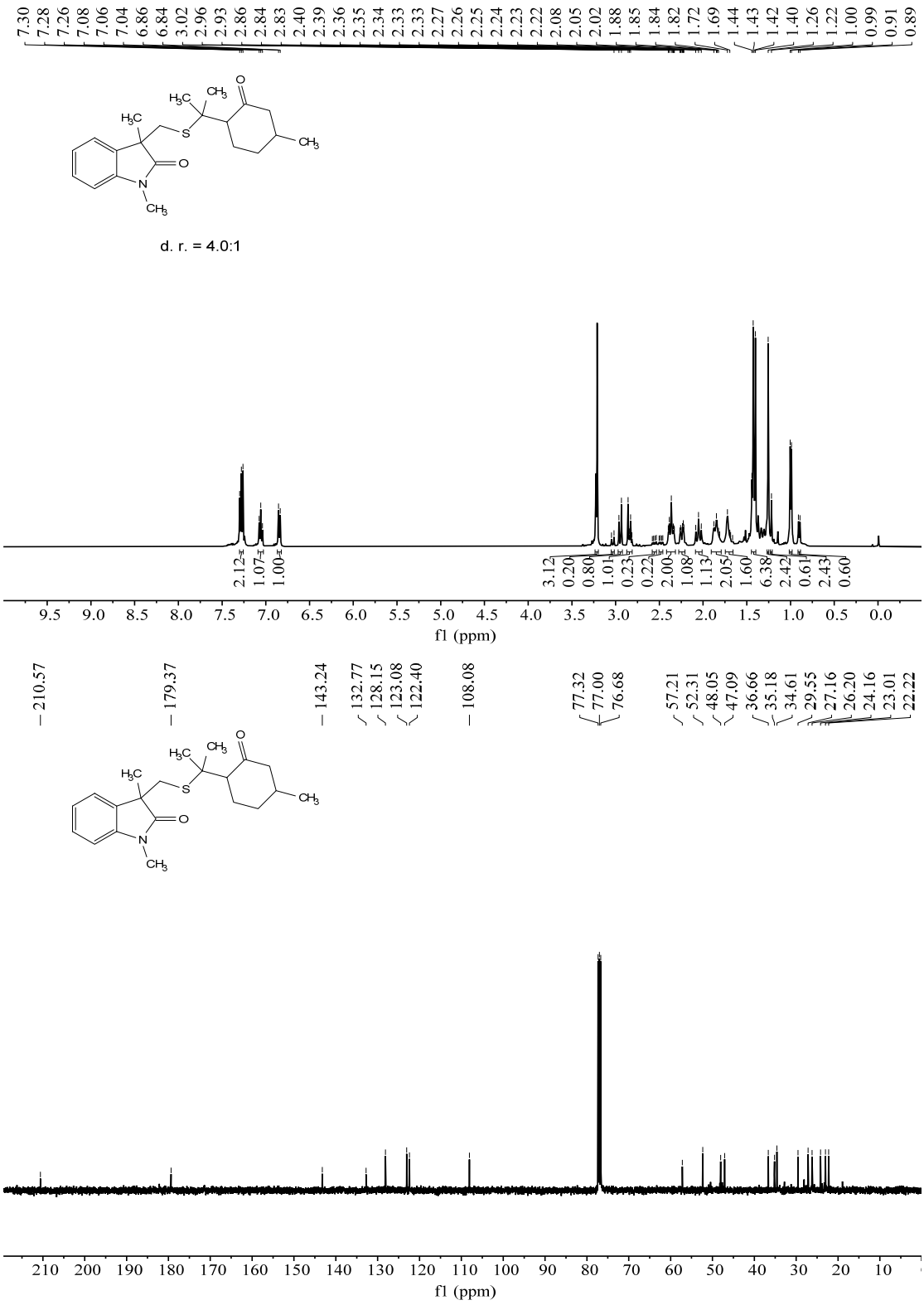


^{1}H and ^{13}C NMR spectra of 3g ($CDCl_3$)

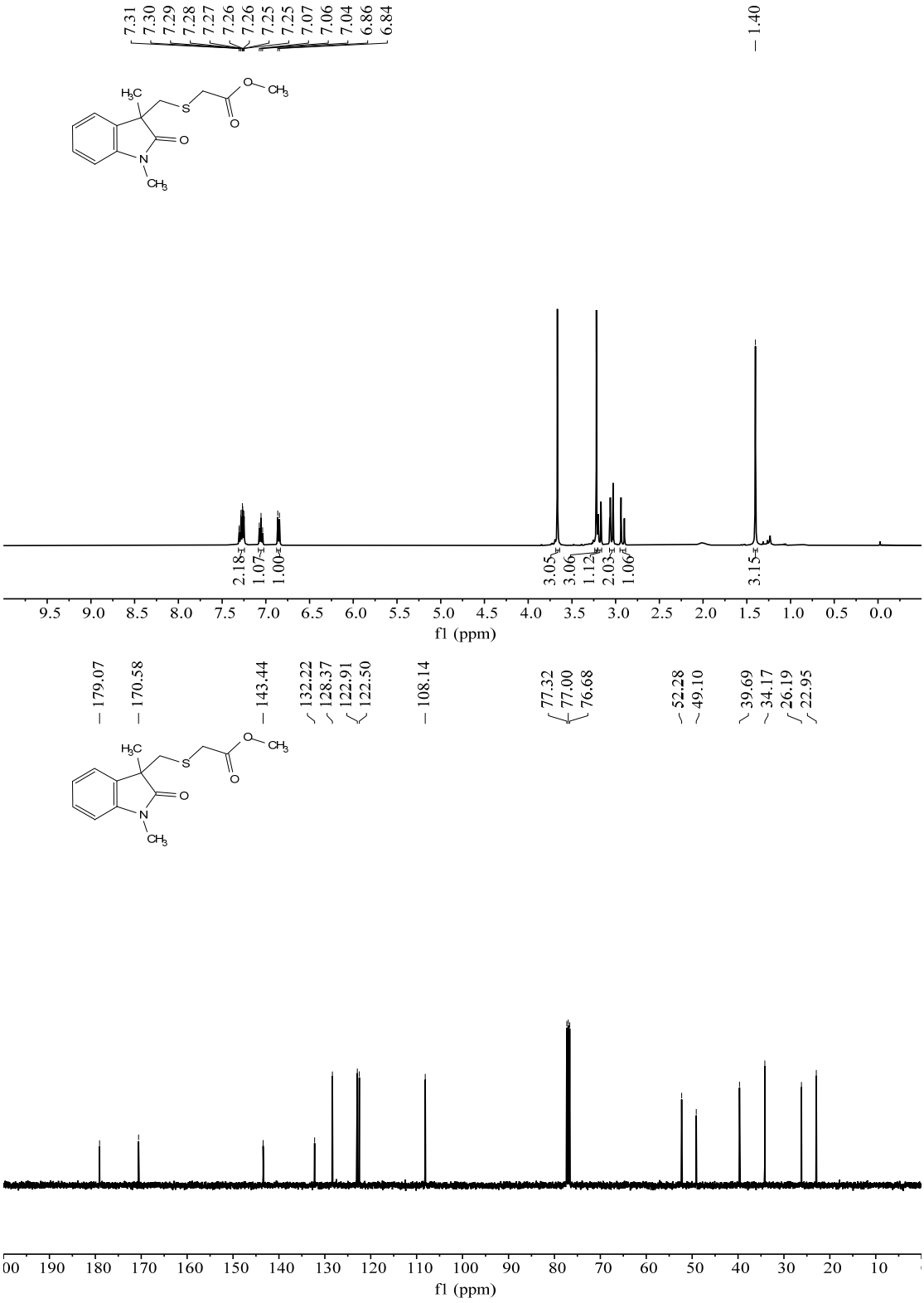




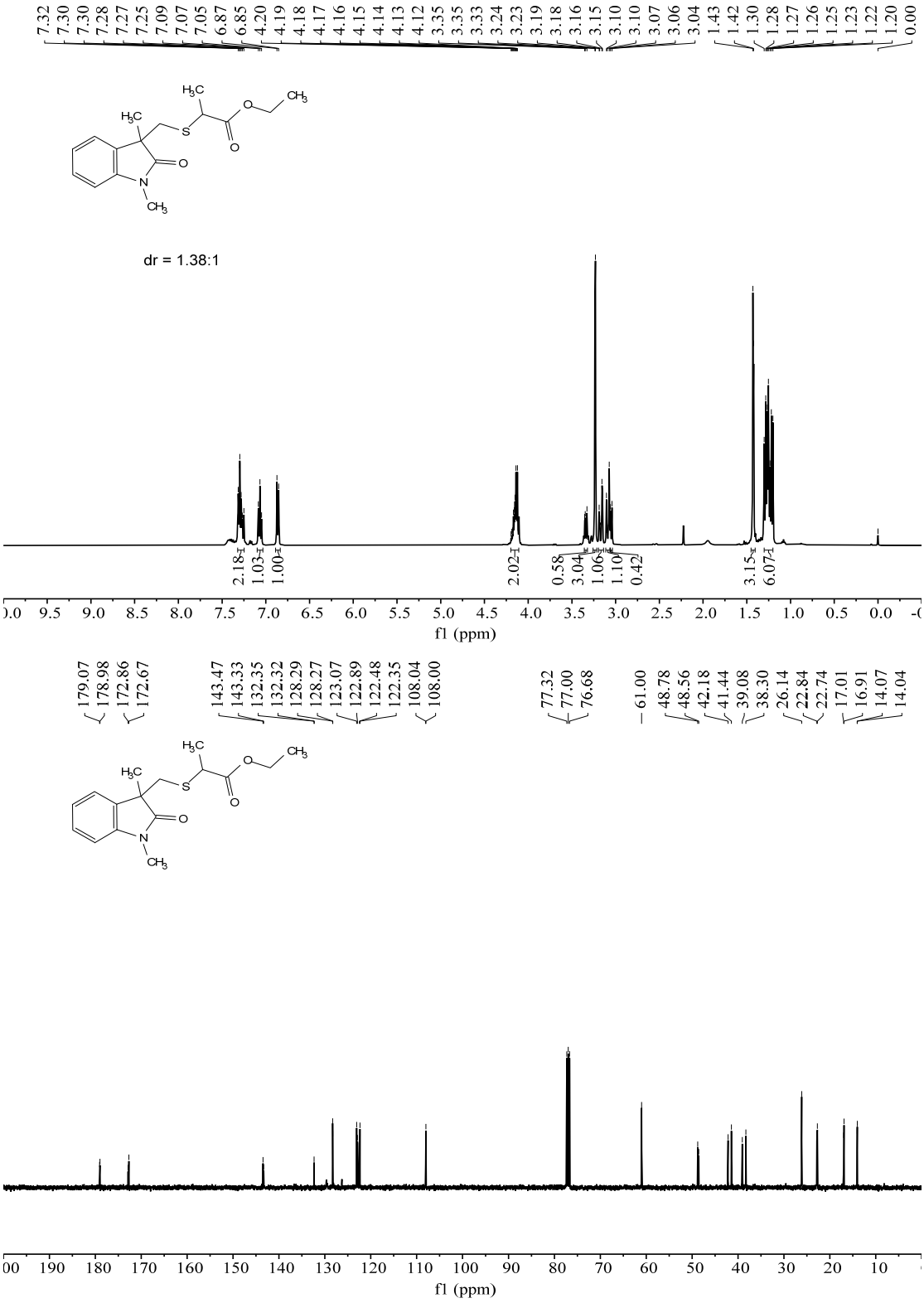
^{1}H and ^{13}C NMR spectra of 3h ($CDCl_3$)



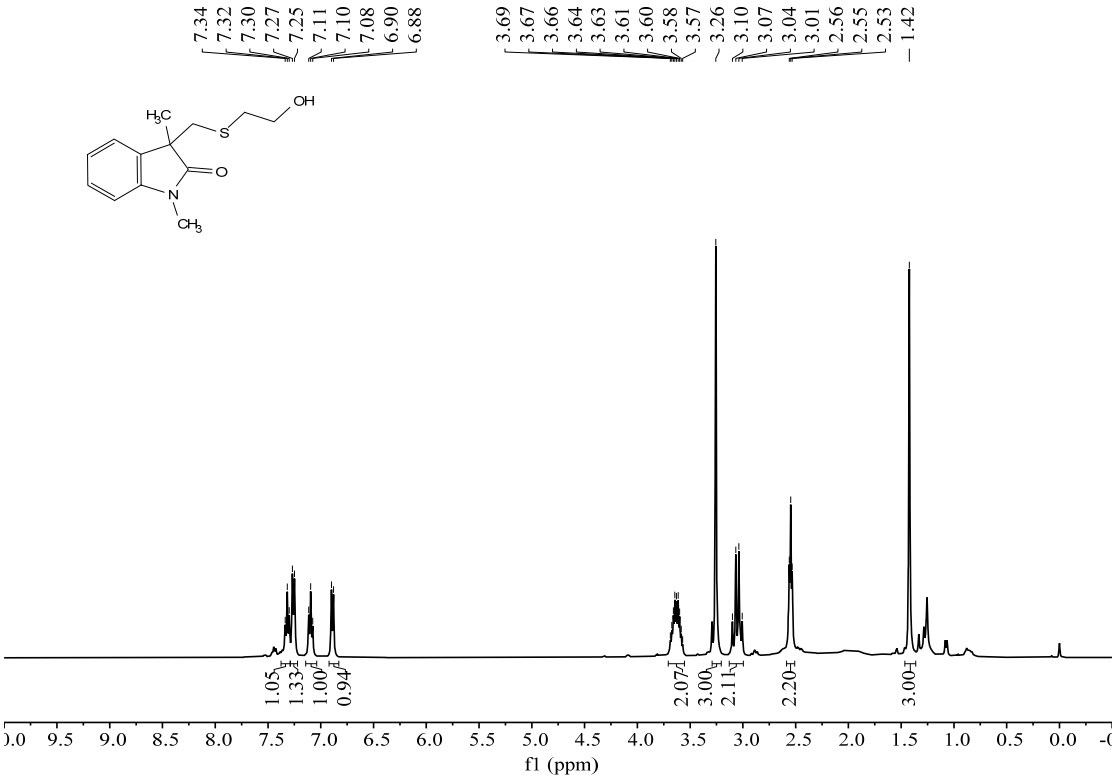
^{1}H and ^{13}C NMR spectra of 3i ($CDCl_3$)

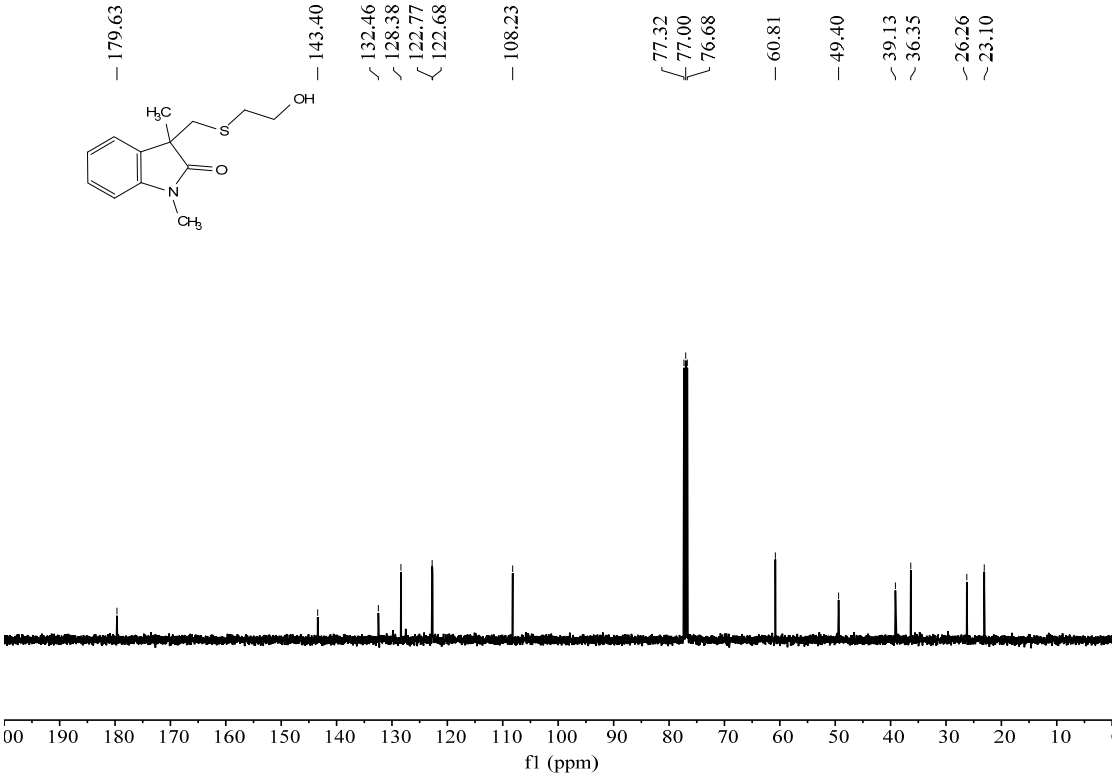


^{1}H and ^{13}C NMR spectra of 3j ($CDCl_3$)

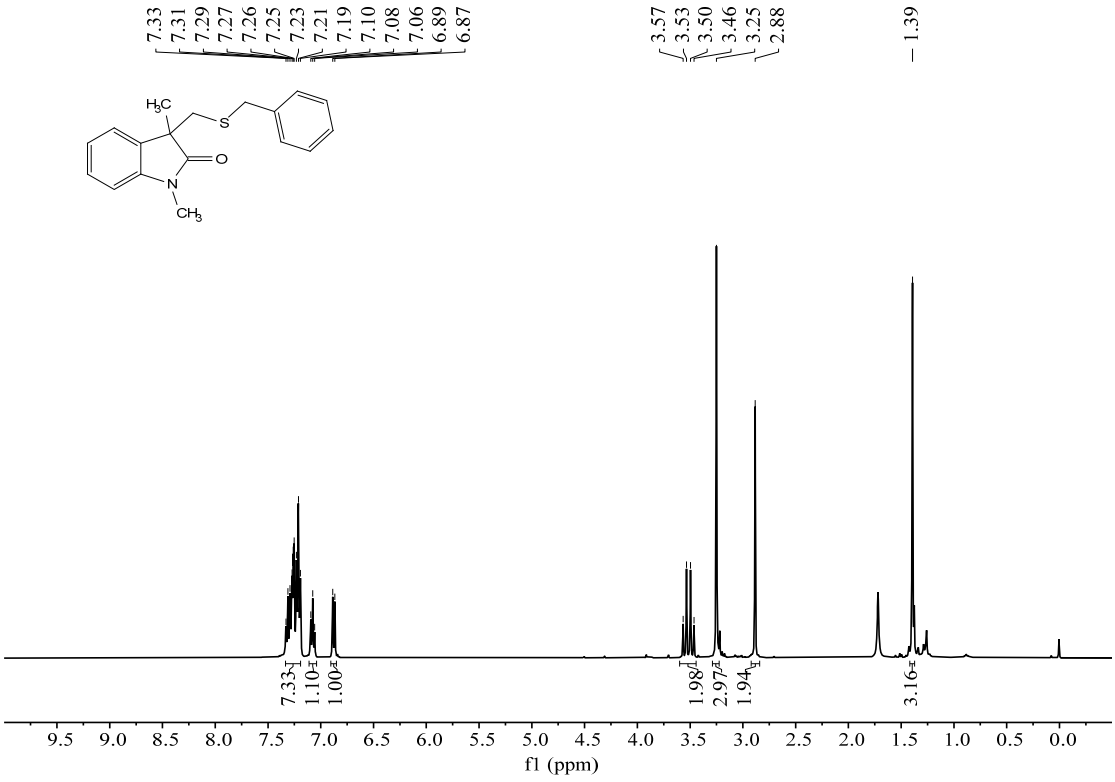


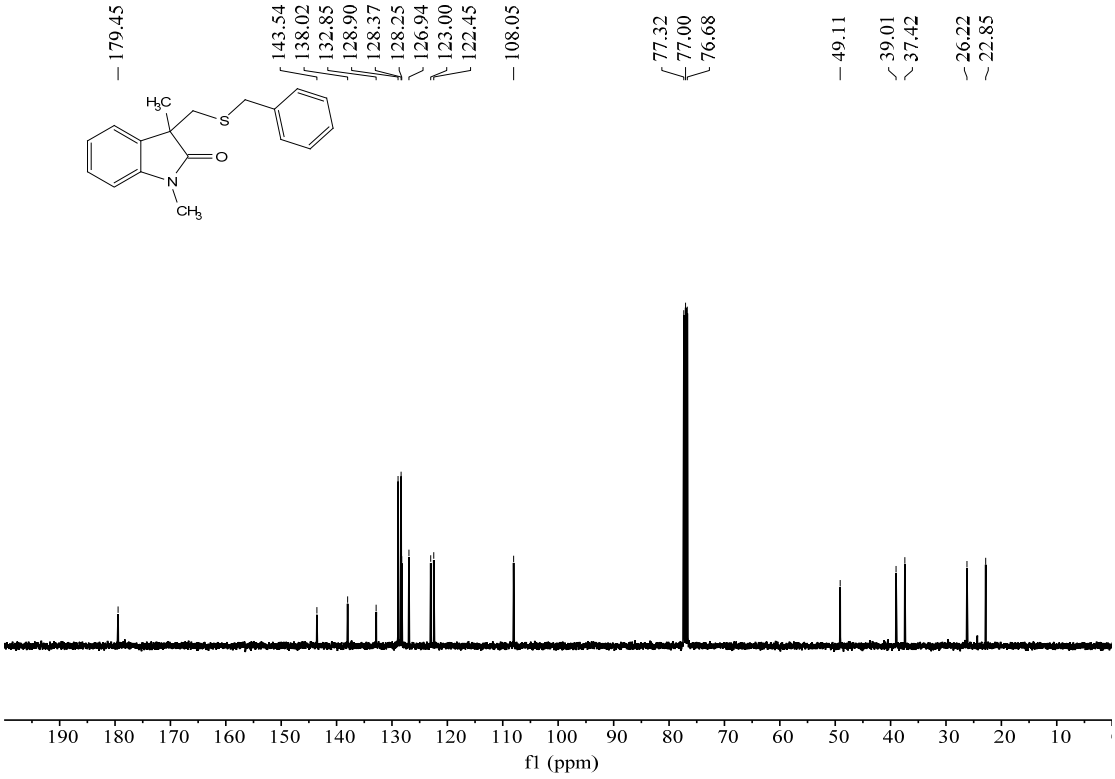
^{1}H and ^{13}C NMR spectra of 3k ($CDCl_3$)



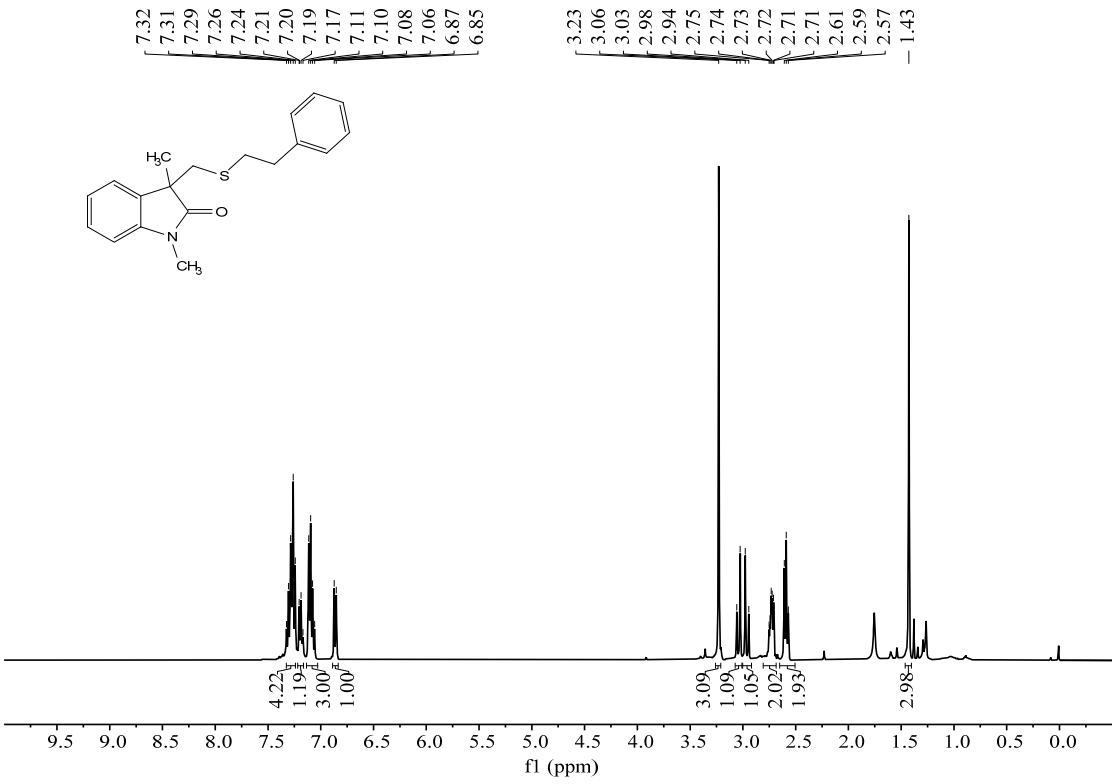


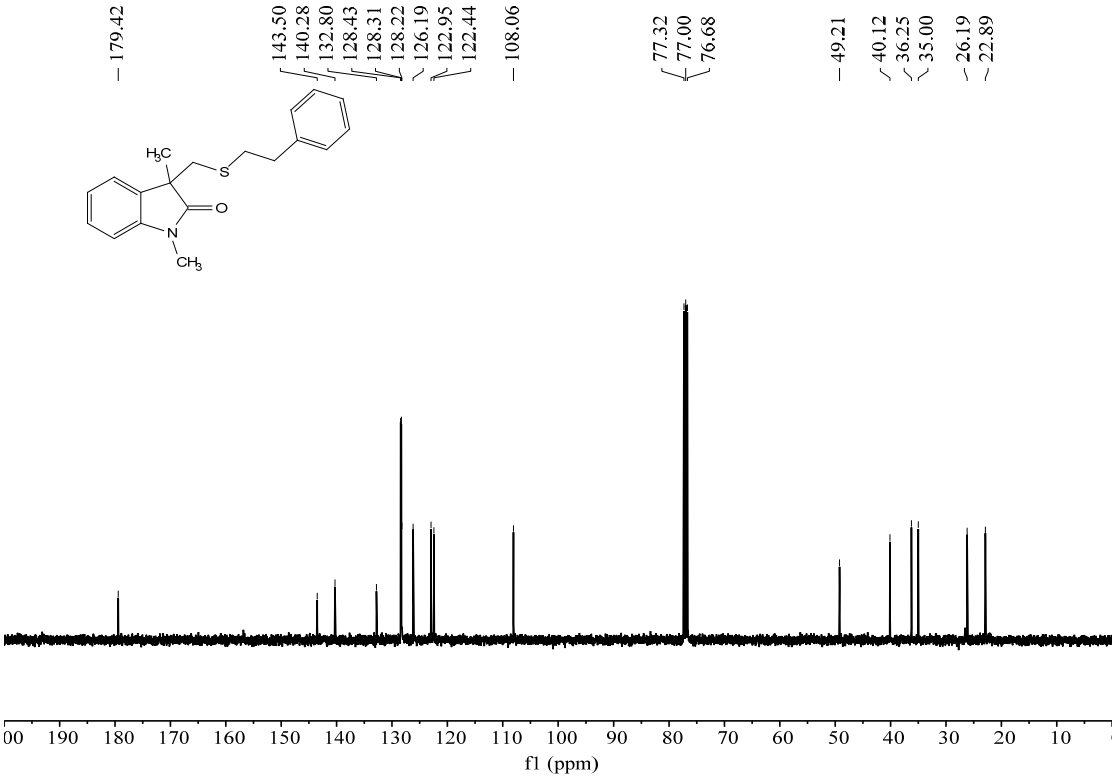
^{1}H and ^{13}C NMR spectra of 3l ($CDCl_3$)



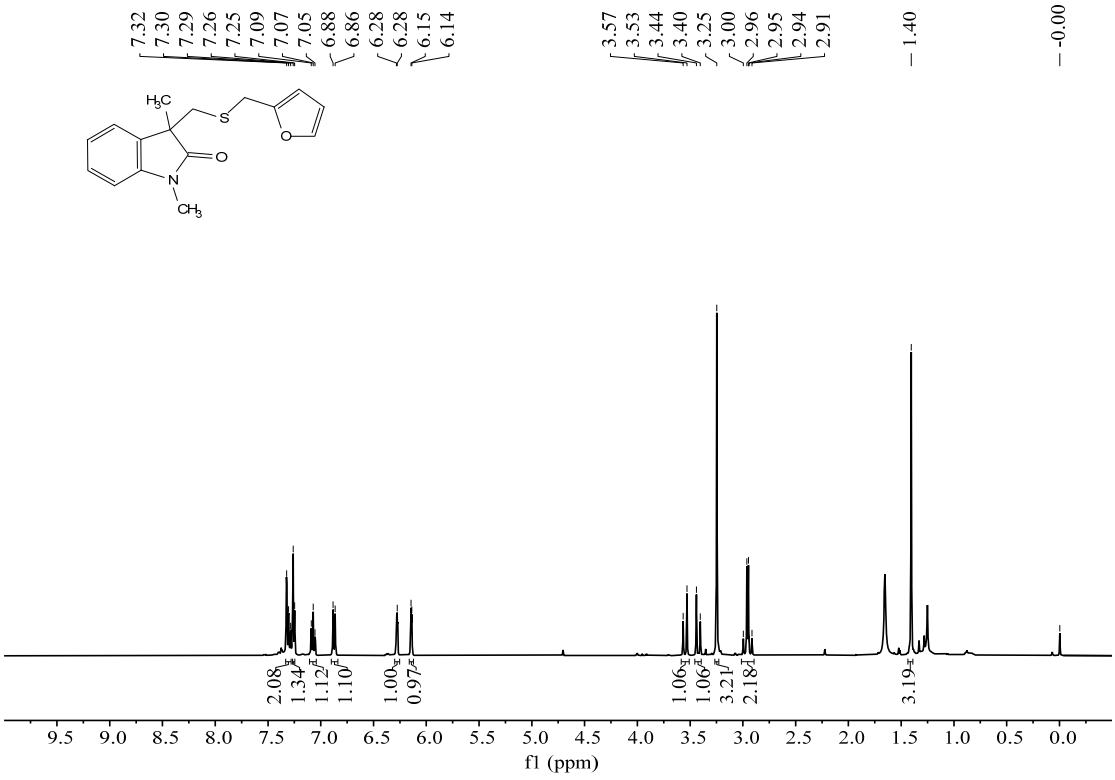


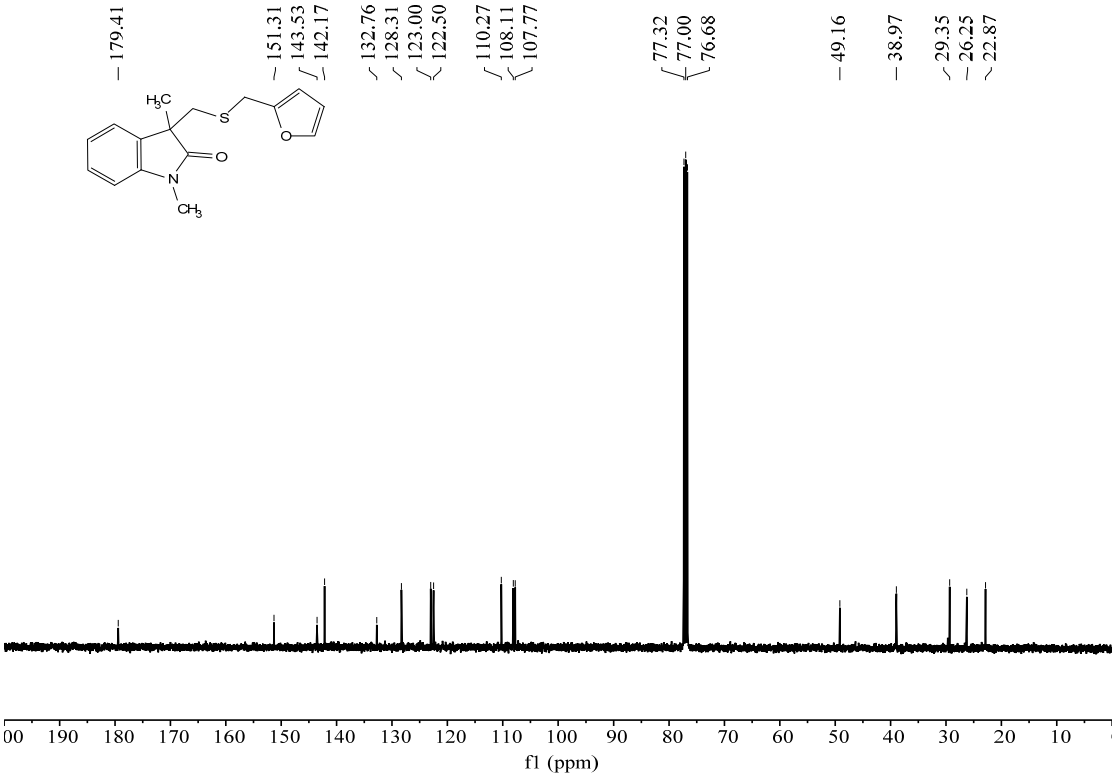
^{1}H and ^{13}C NMR spectra of 3m ($CDCl_3$)



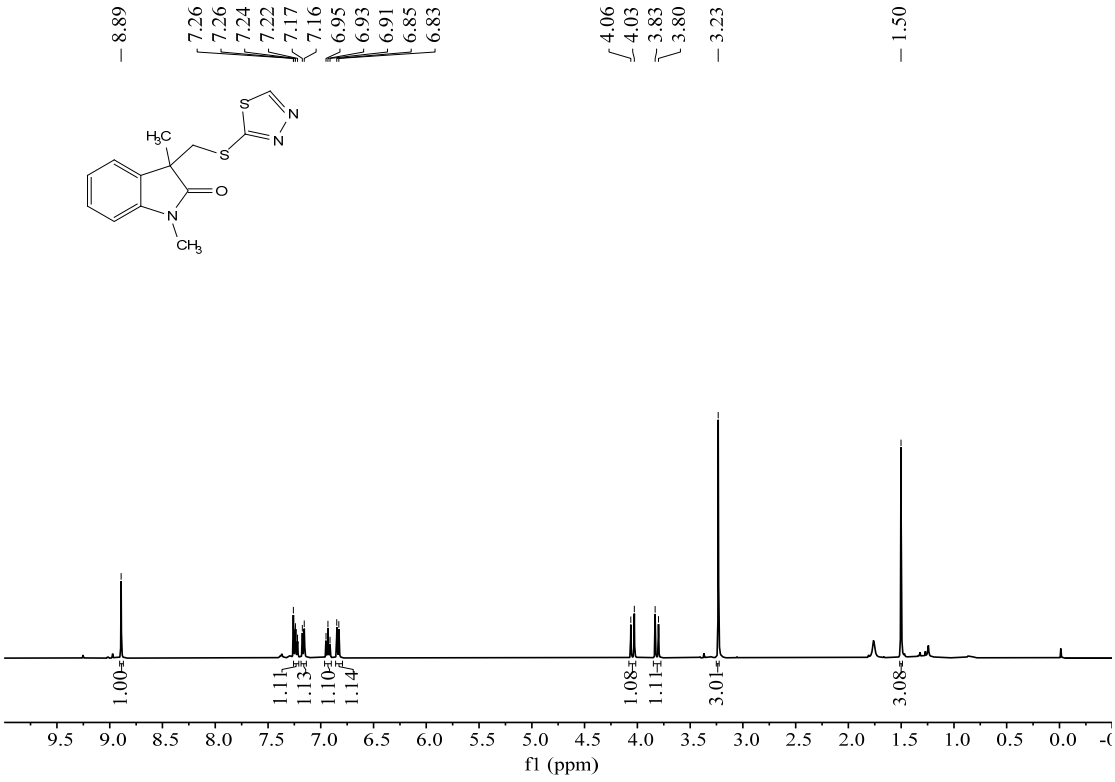


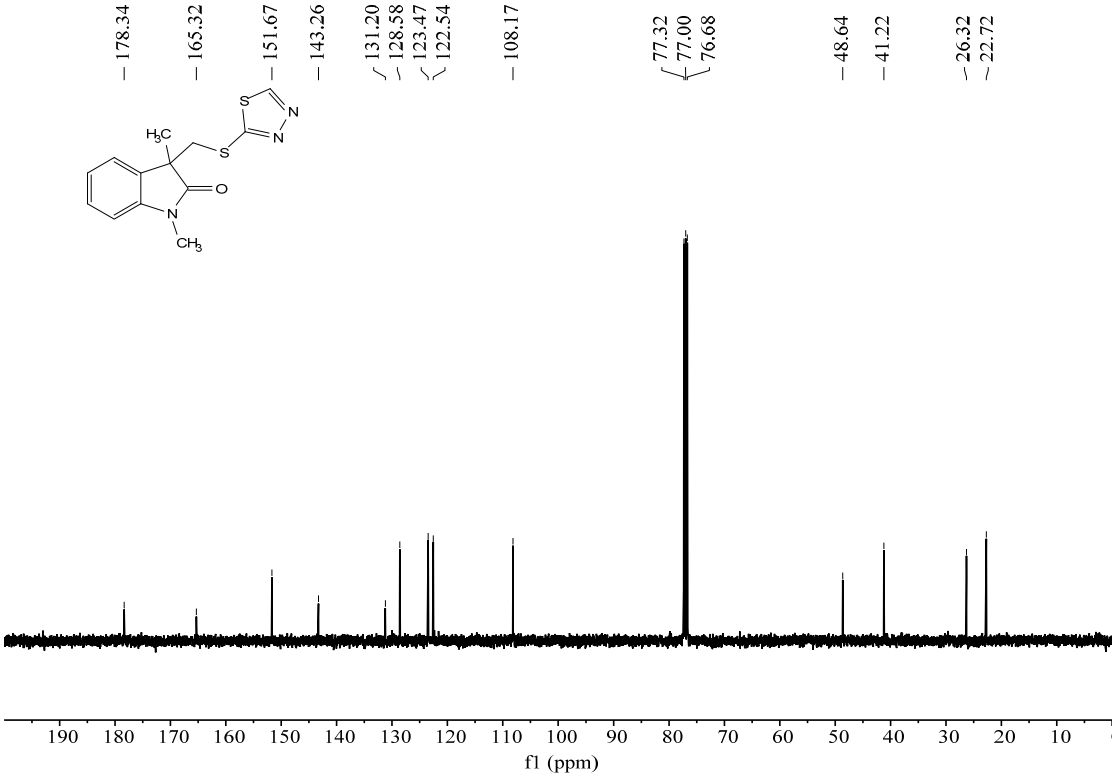
^{1}H and ^{13}C NMR spectra of 3n ($CDCl_3$)



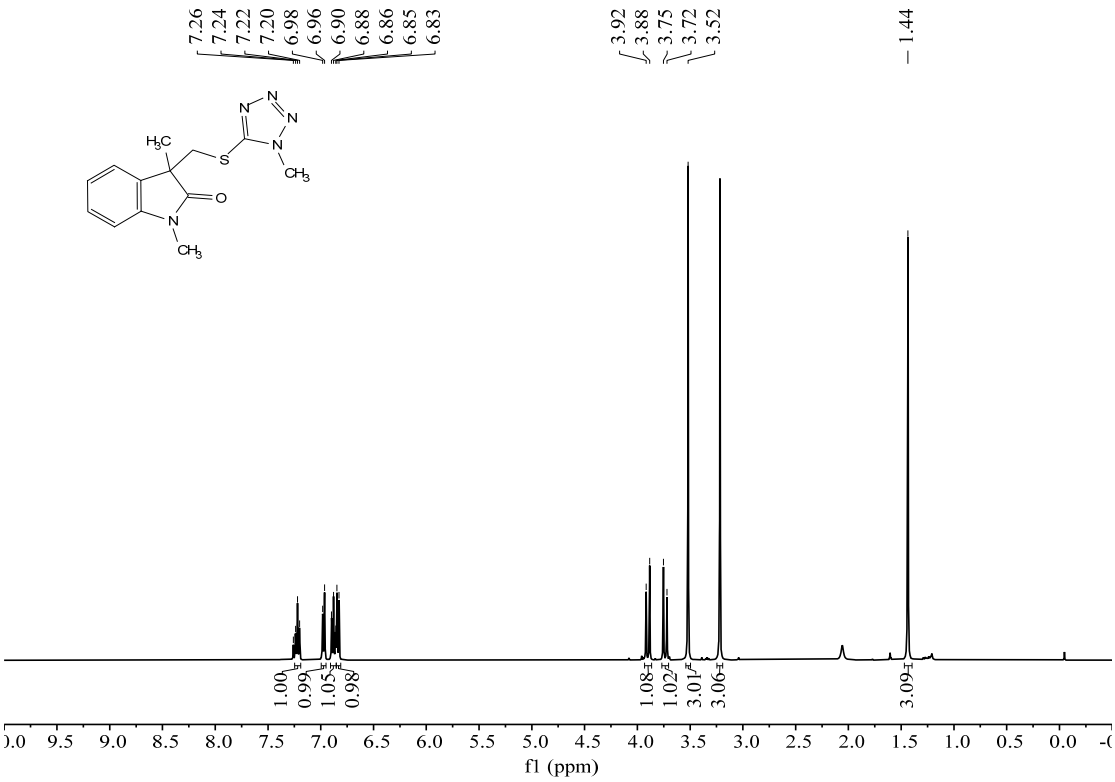


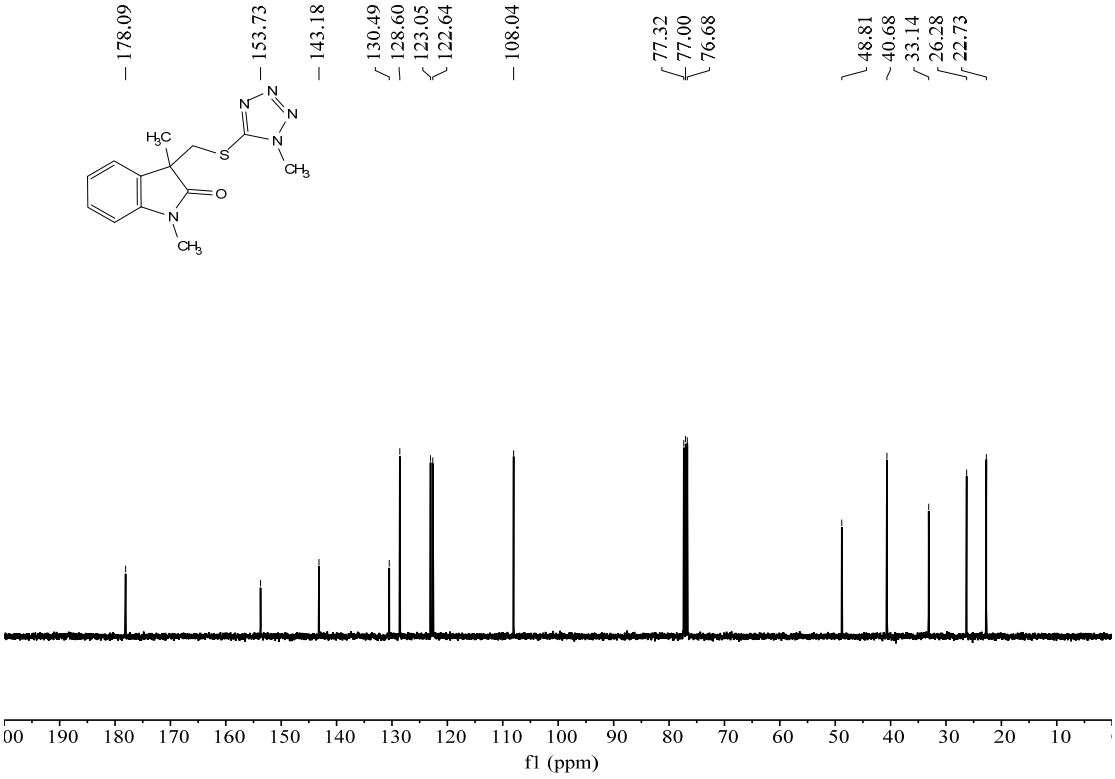
^{1}H and ^{13}C NMR spectra of 3o ($CDCl_3$)



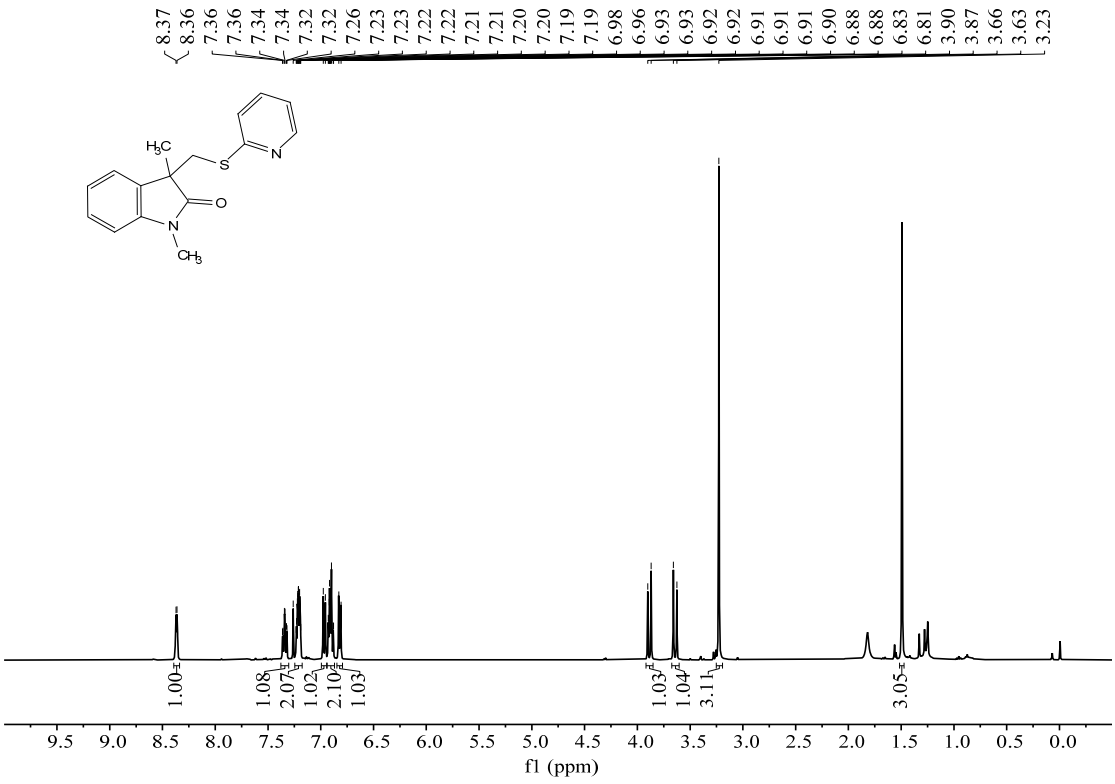


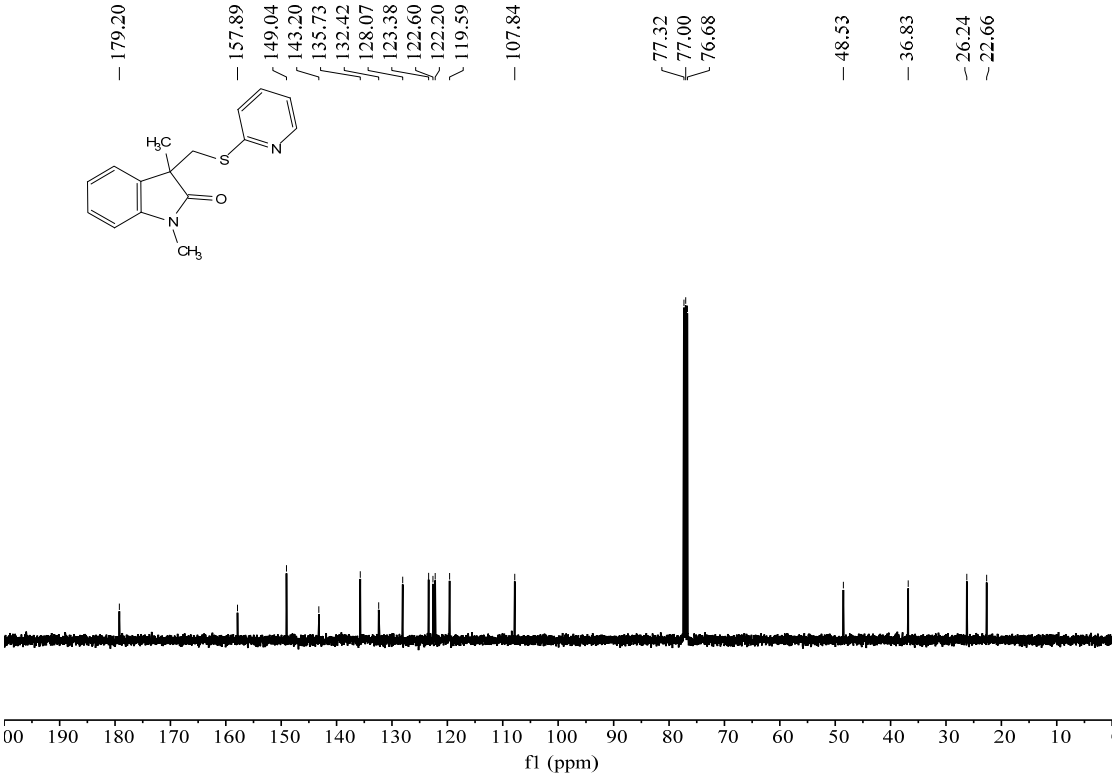
^{1}H and ^{13}C NMR spectra of 3p ($CDCl_3$)



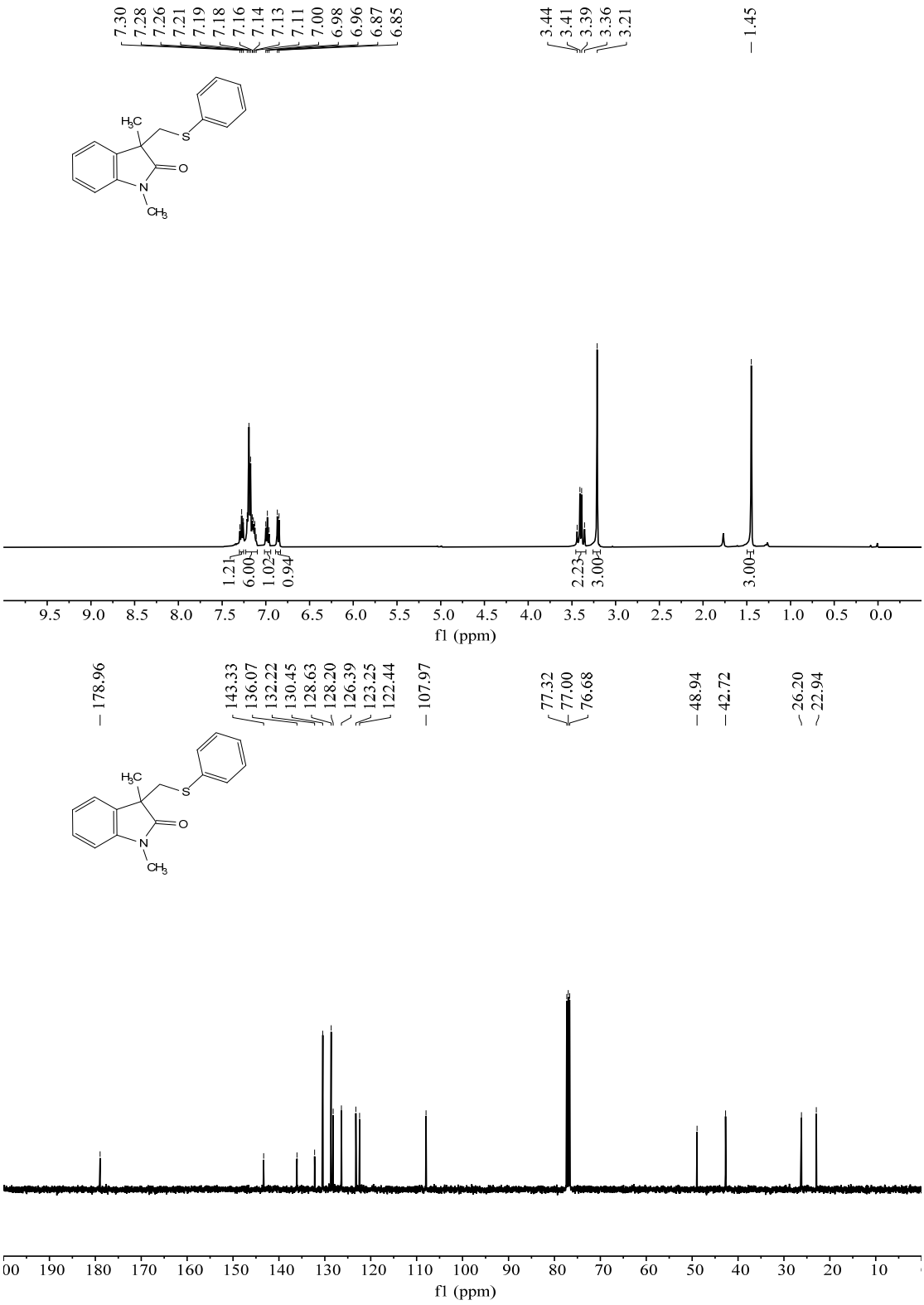


^{1}H and ^{13}C NMR spectra of 3q ($CDCl_3$)

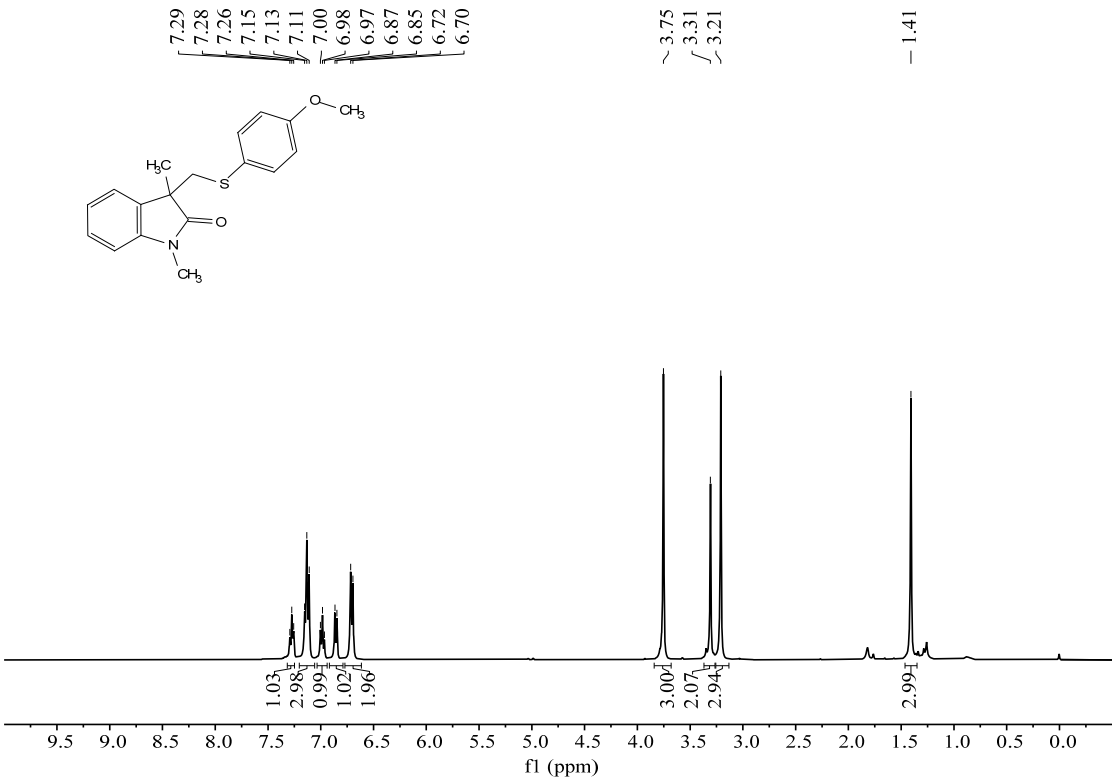


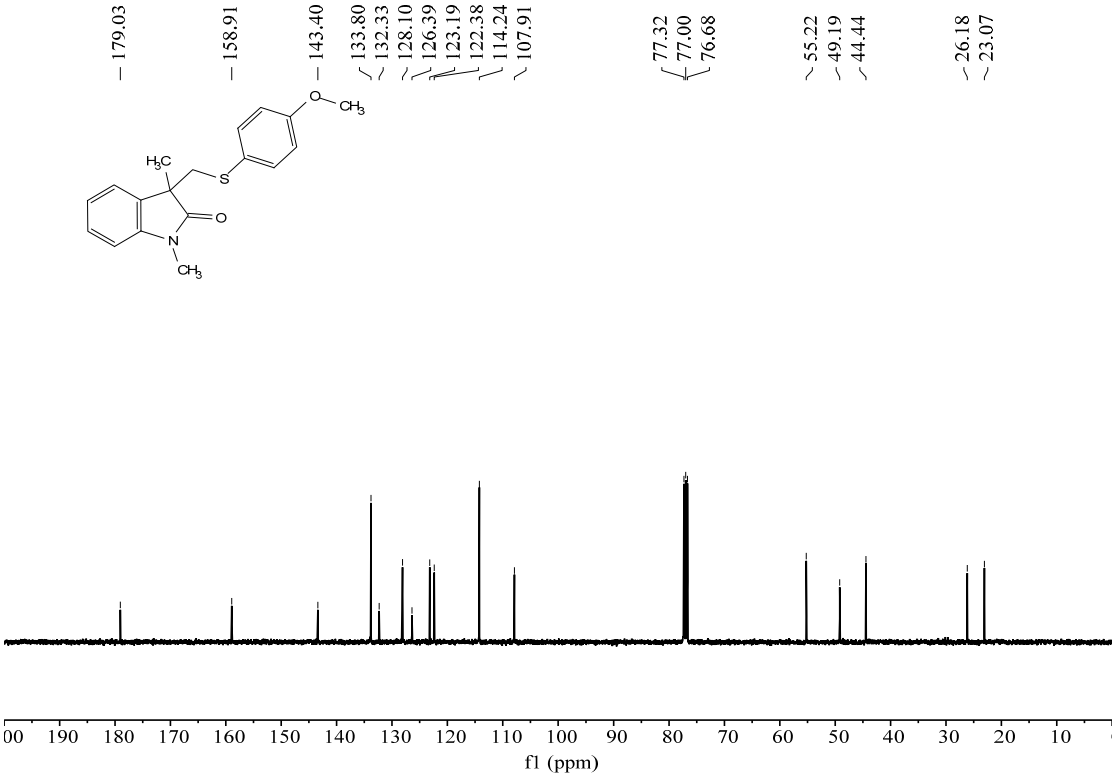


^{1}H and ^{13}C NMR spectra of 3r ($CDCl_3$)

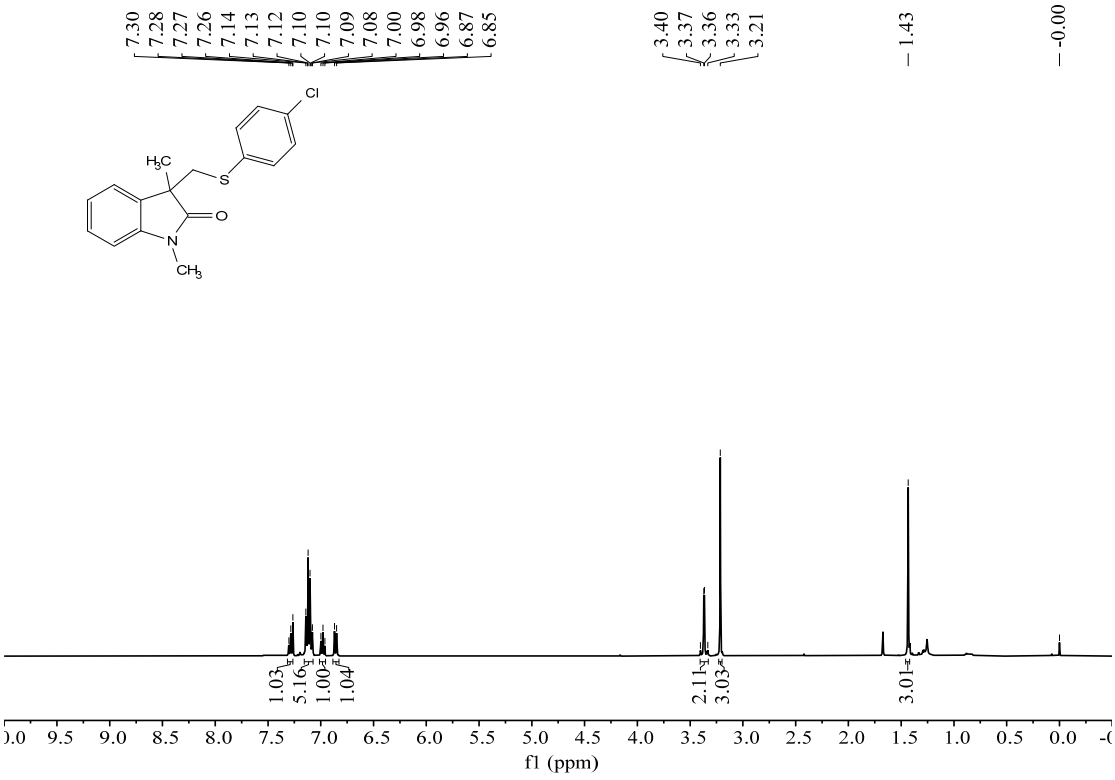


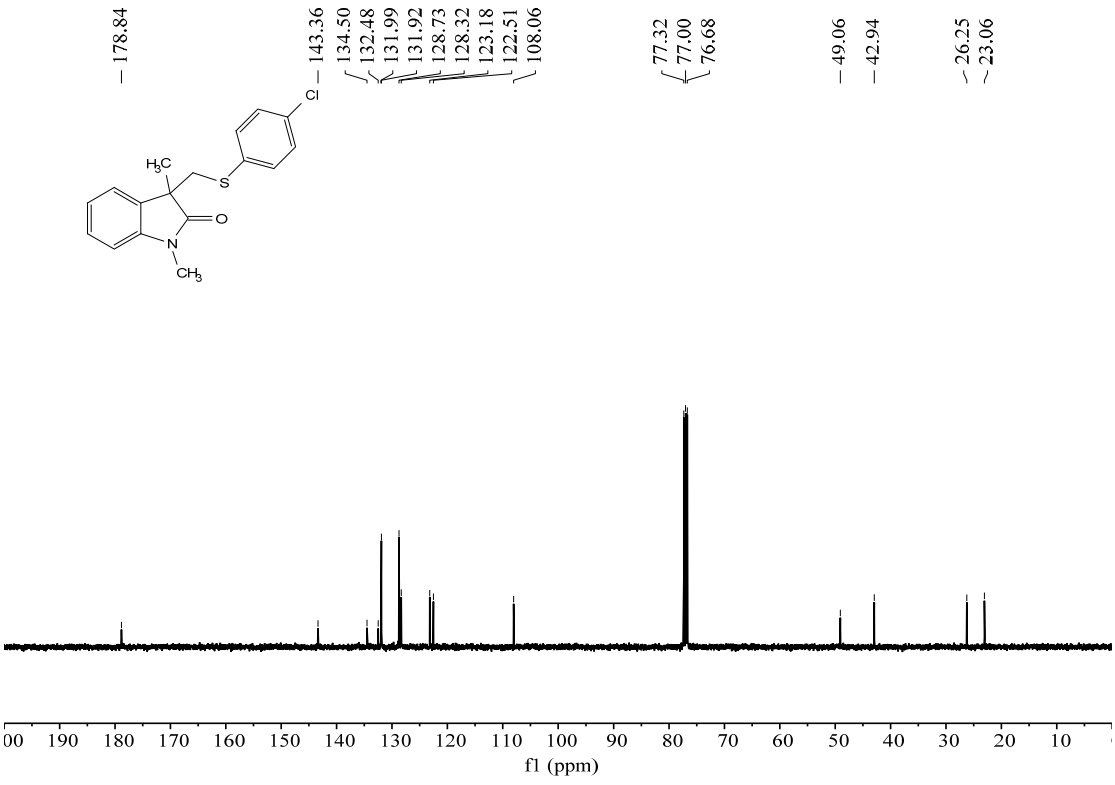
^{1}H and ^{13}C NMR spectra of 3s ($CDCl_3$)



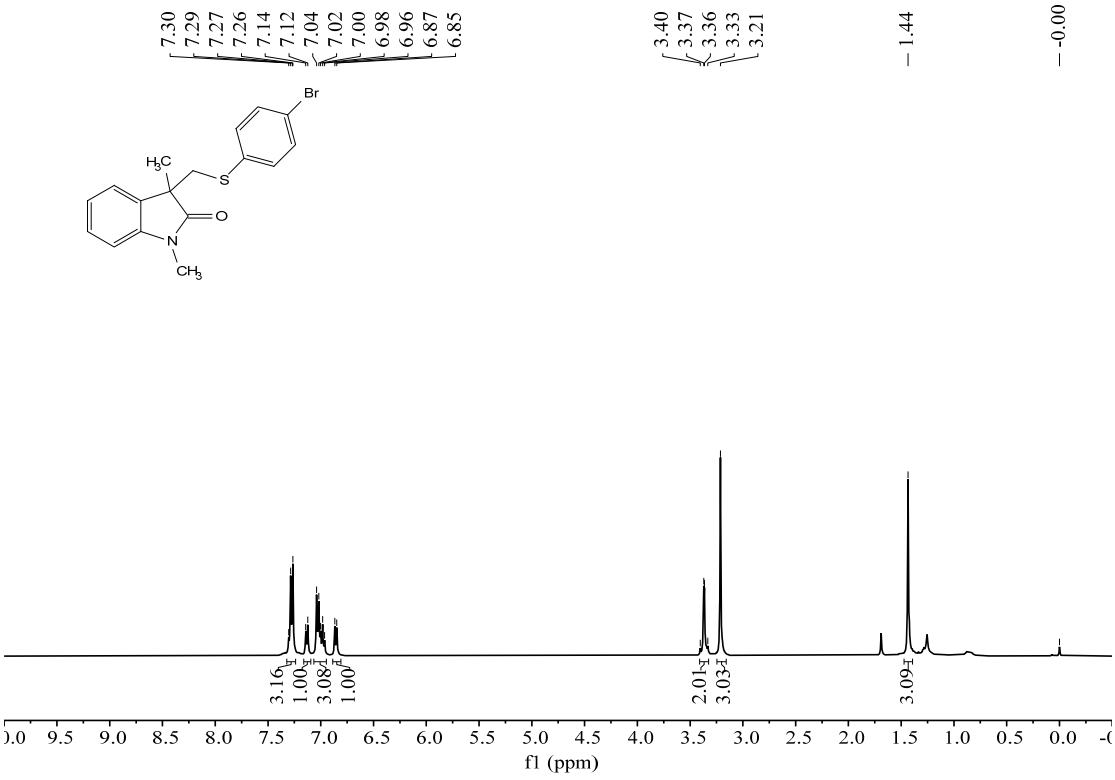


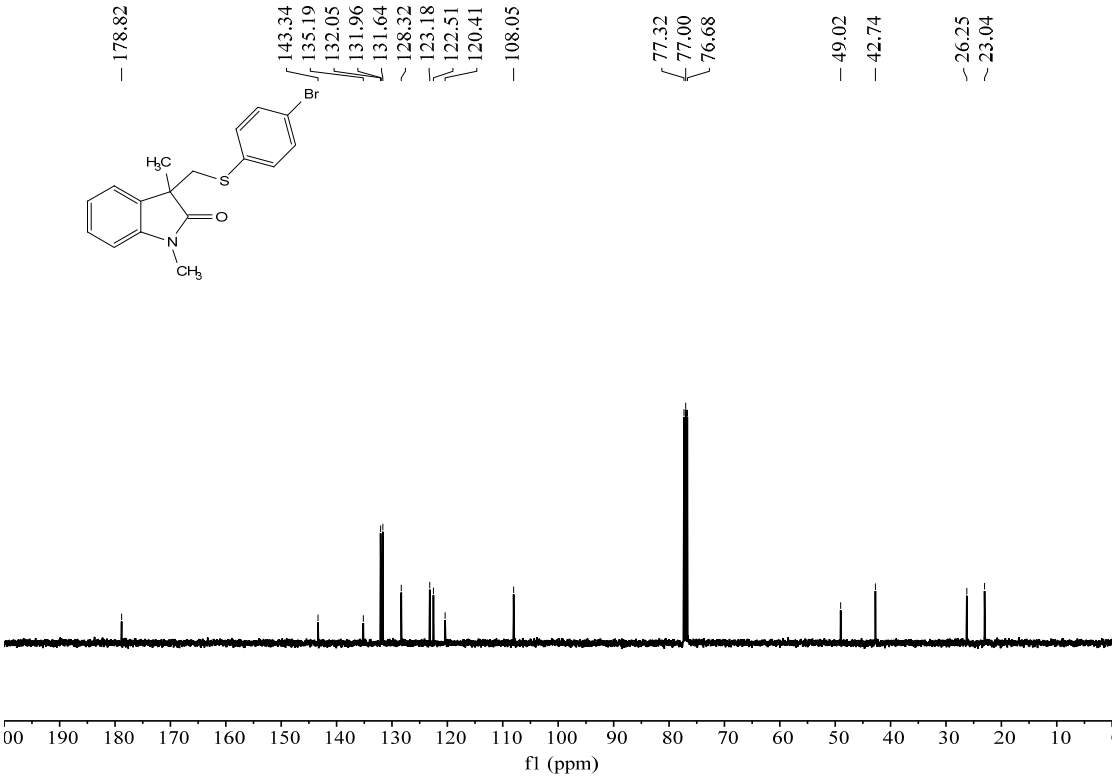
^{1}H and ^{13}C NMR spectra of 3t ($CDCl_3$)



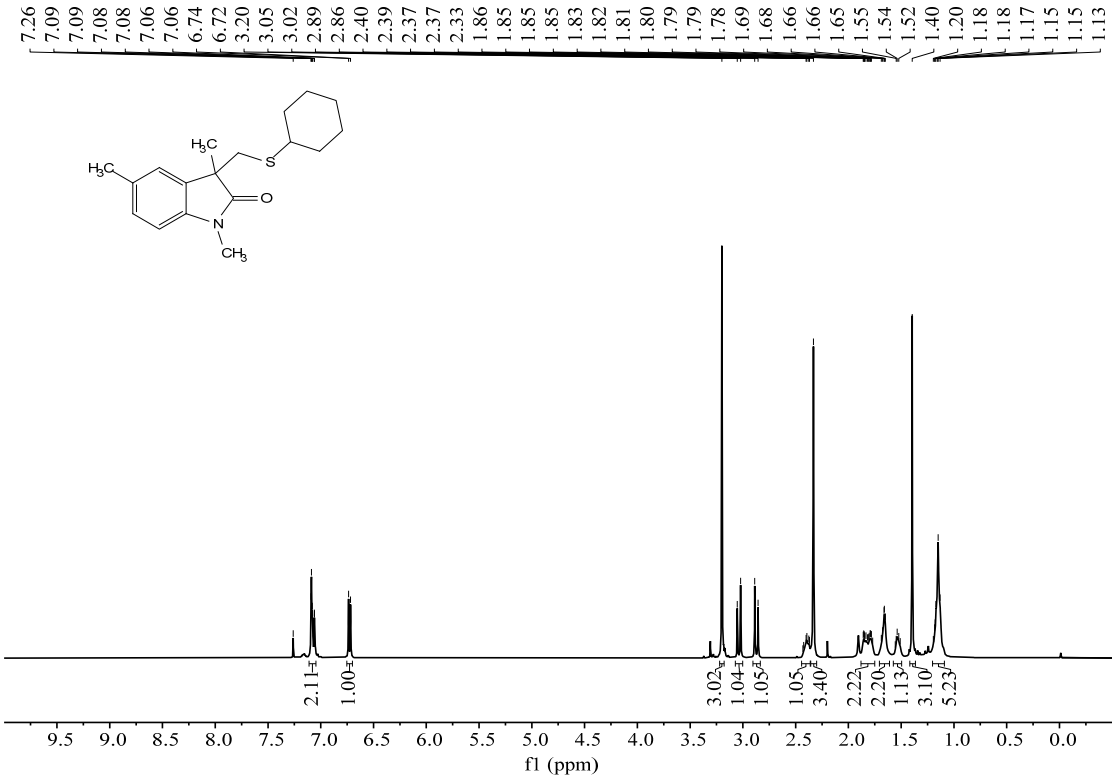


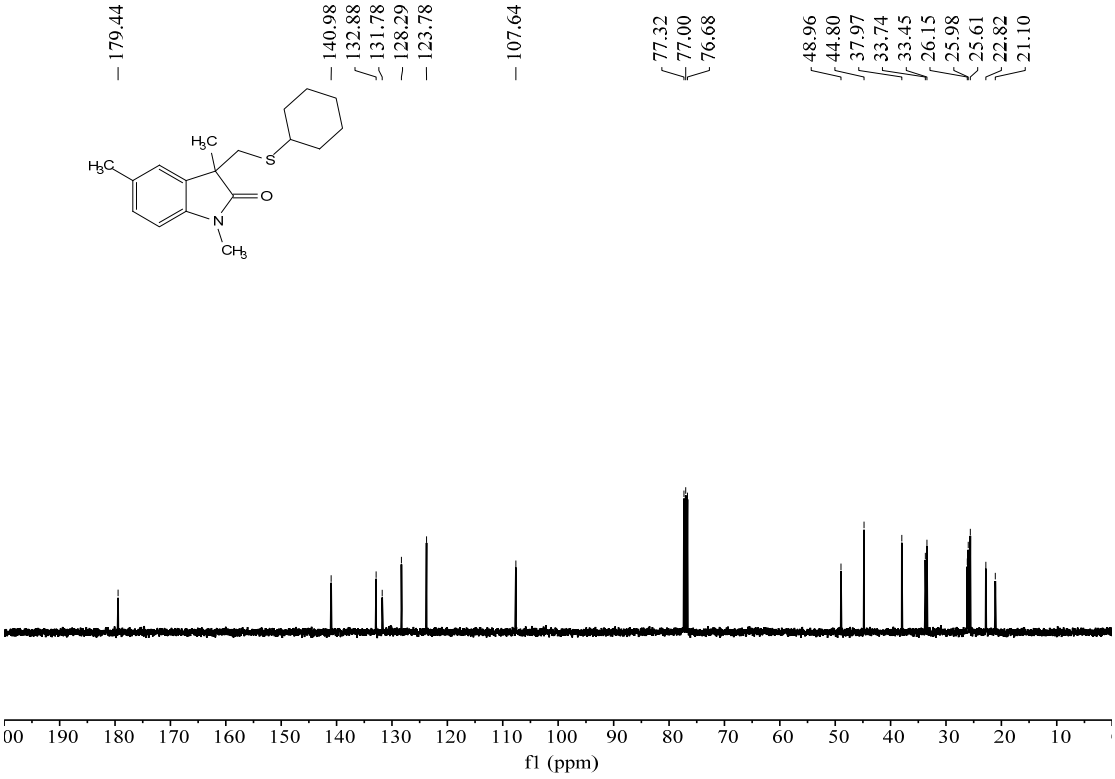
^{1}H and ^{13}C NMR spectra of 3u ($CDCl_3$)





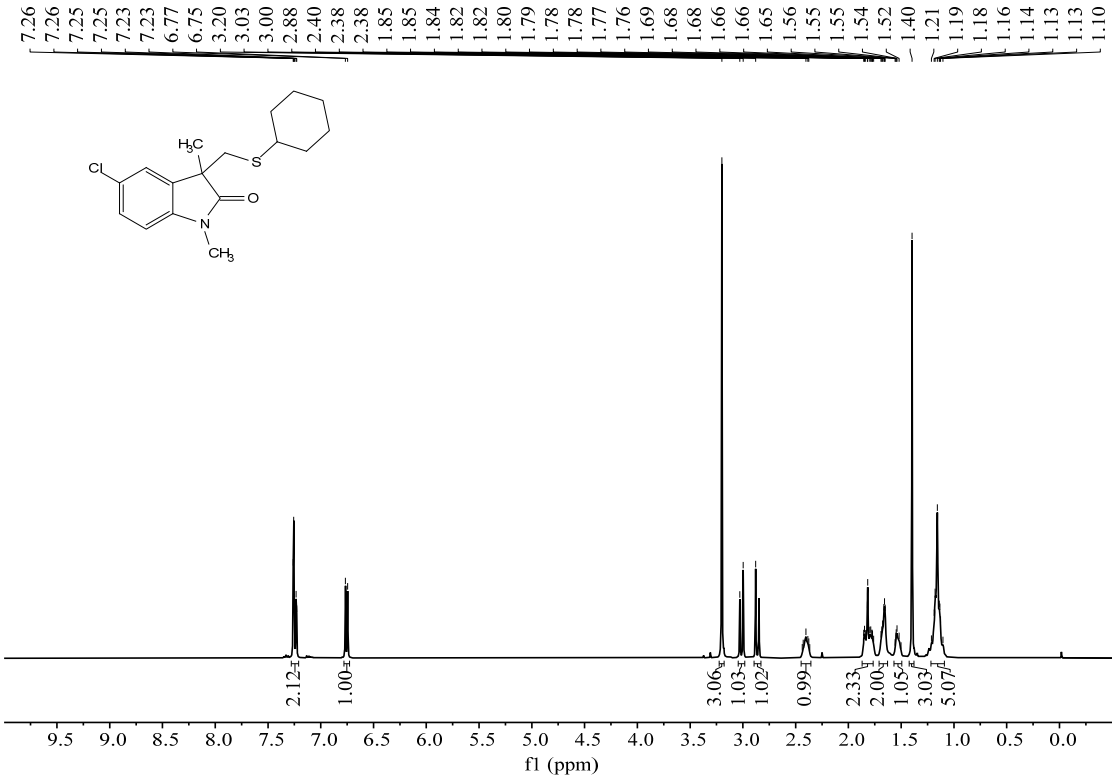
^{1}H and ^{13}C NMR spectra of 4a ($CDCl_3$)

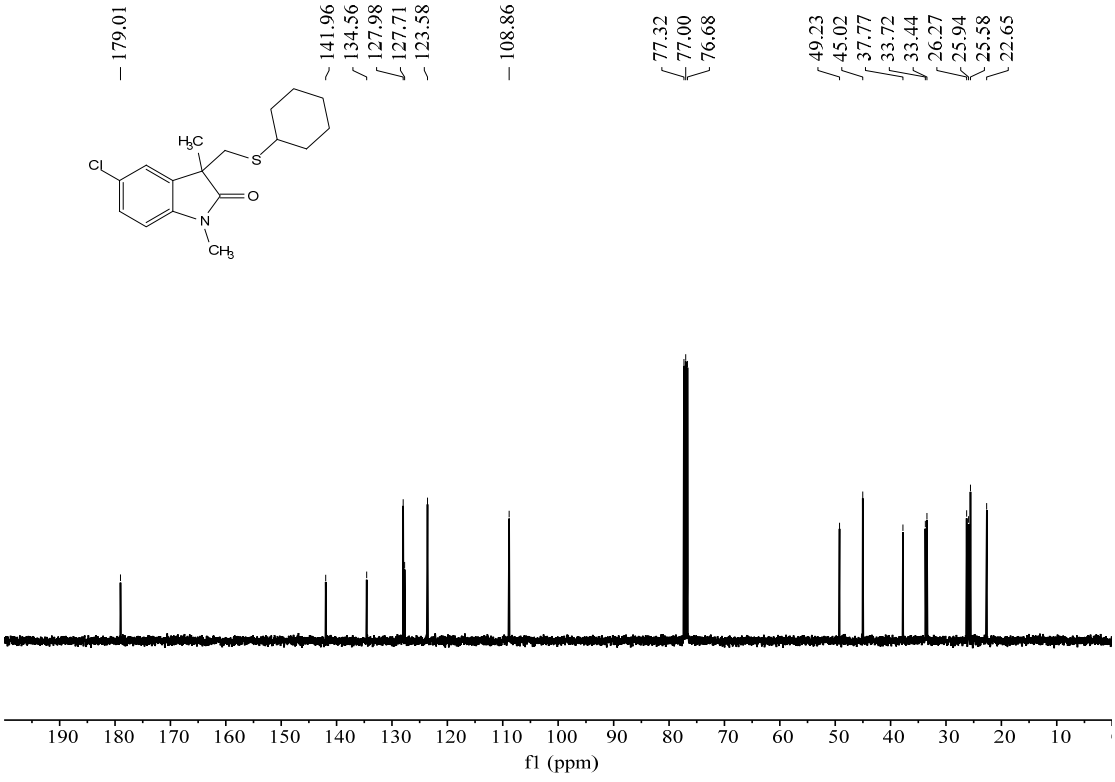




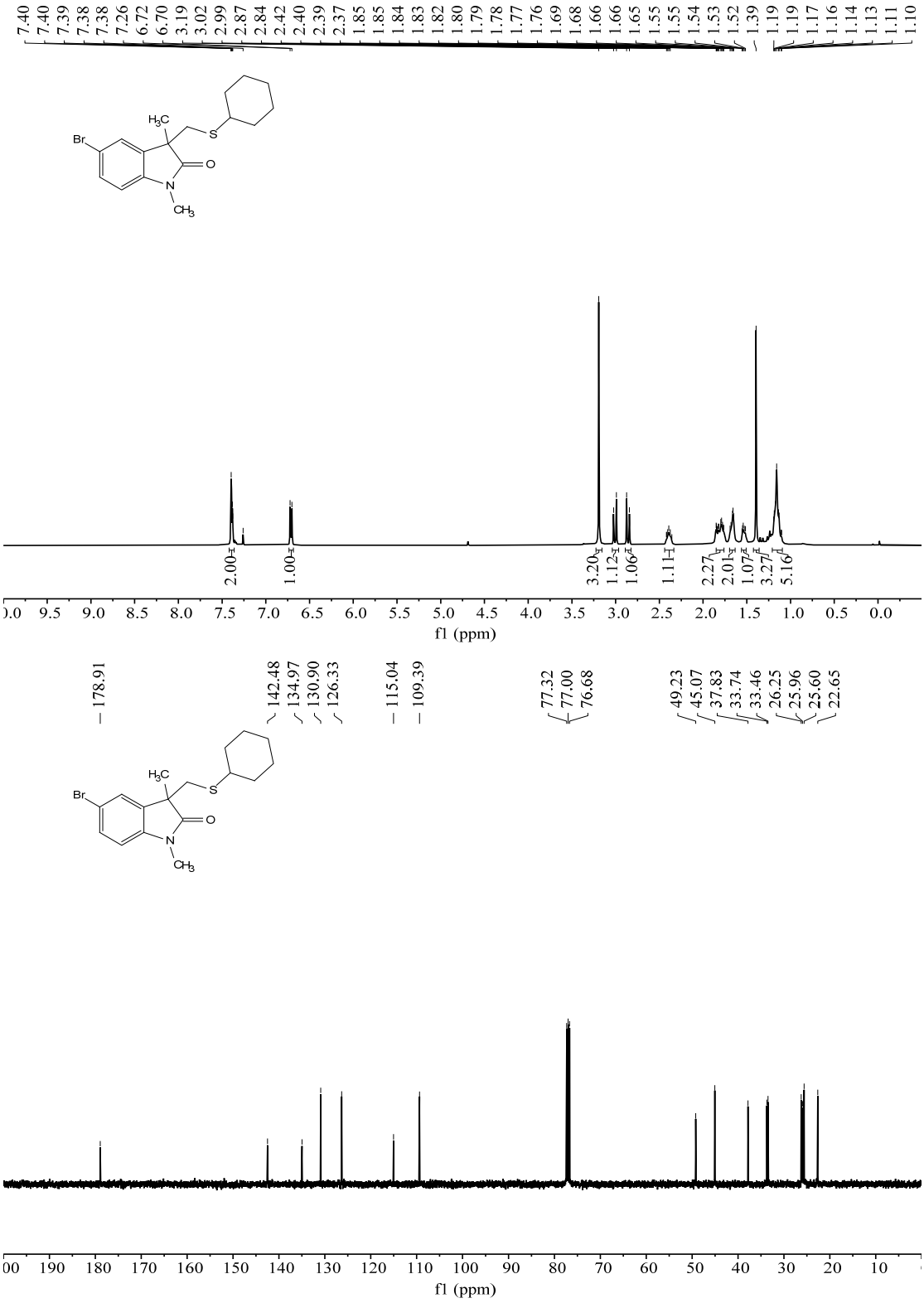
^{1}H and ^{13}C NMR spectra of 4b ($CDCl_3$)

^{1}H and ^{13}C NMR spectra of 4c ($CDCl_3$)

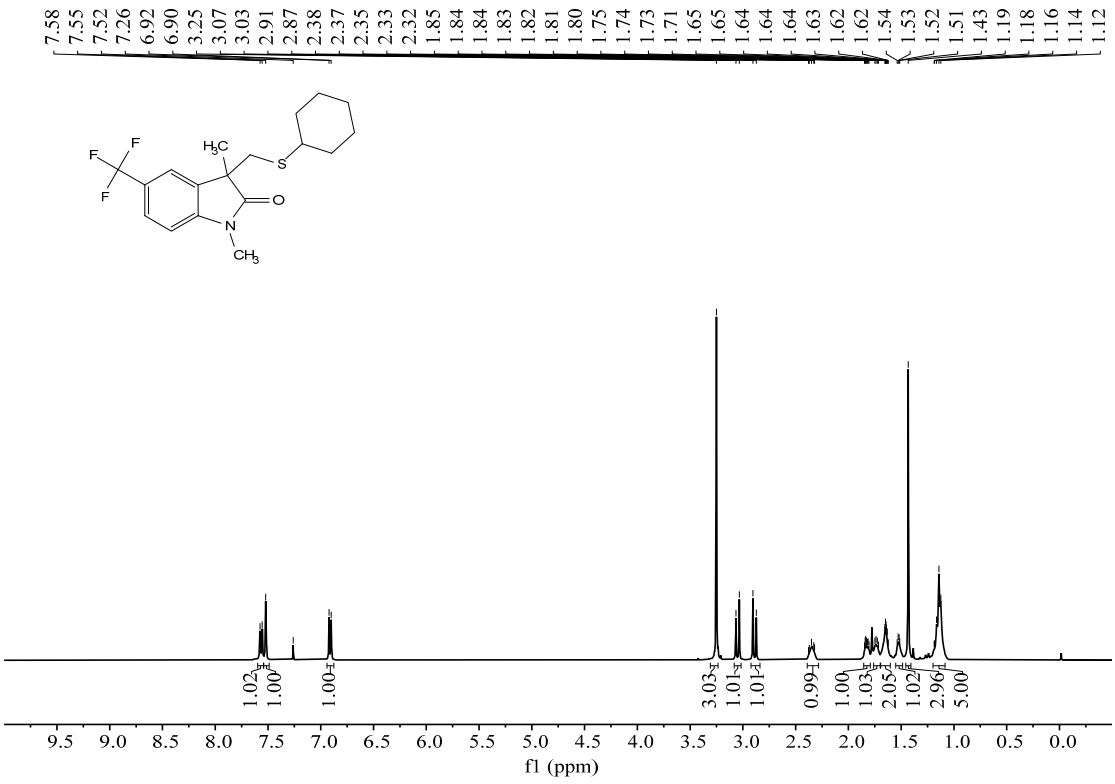


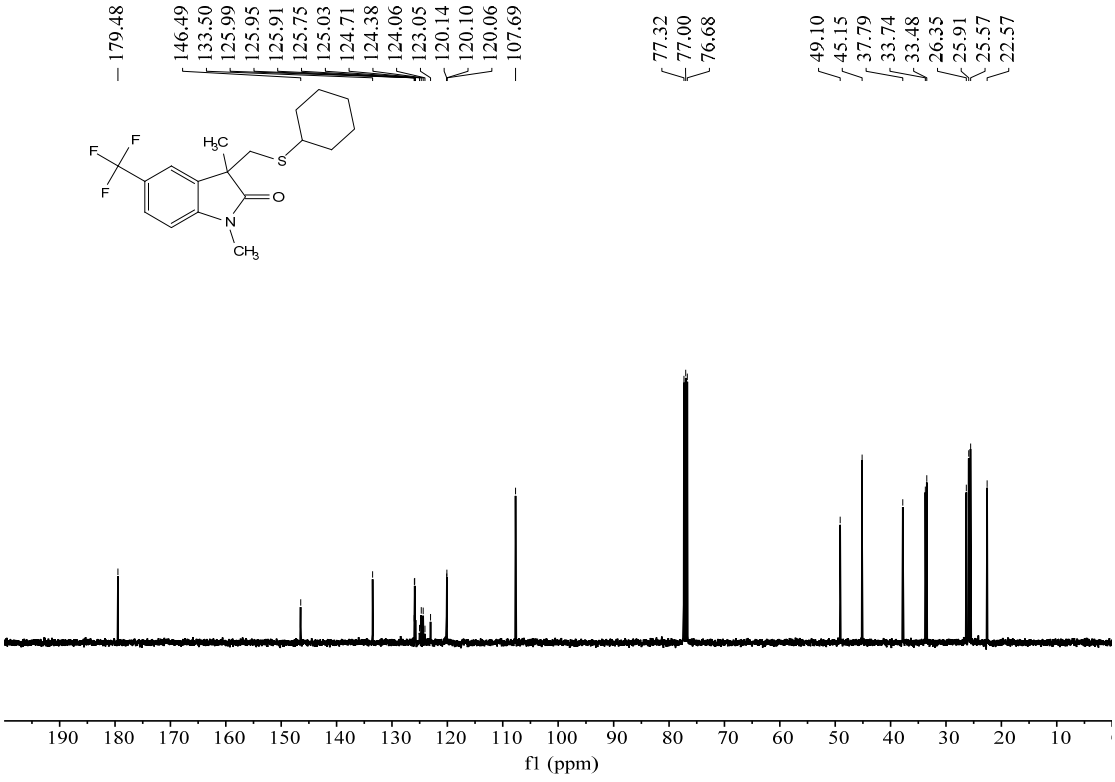


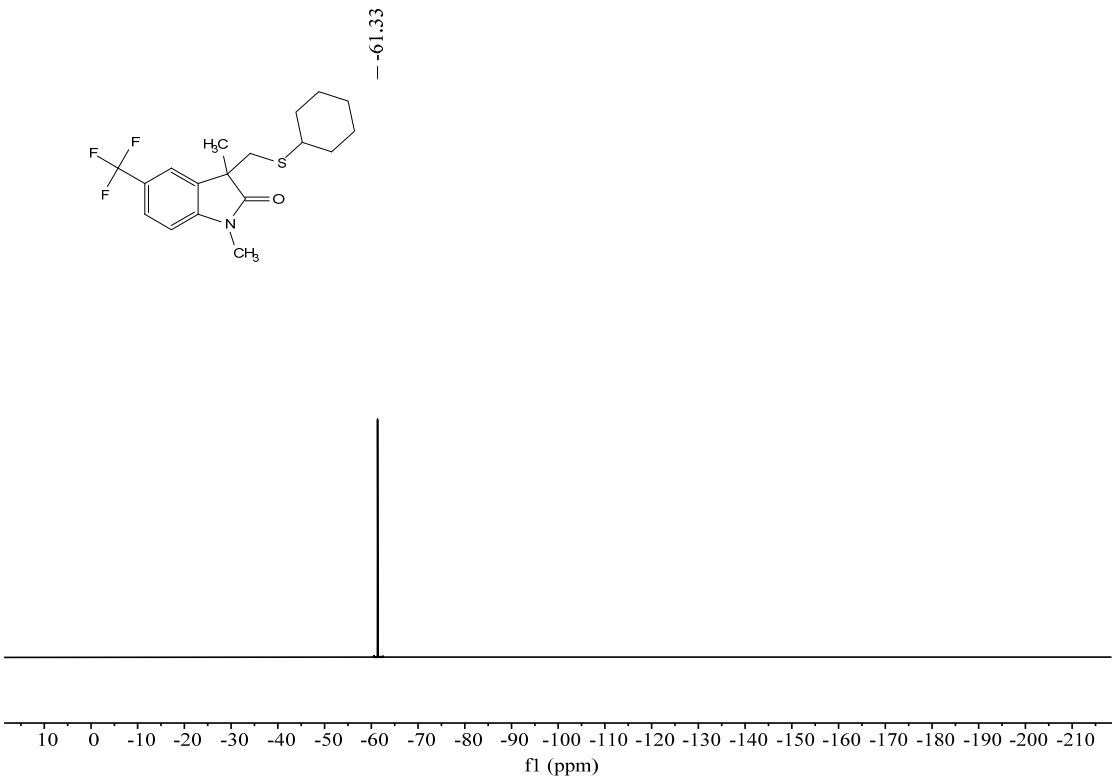
^{1}H and ^{13}C NMR spectra of 4d ($CDCl_3$)



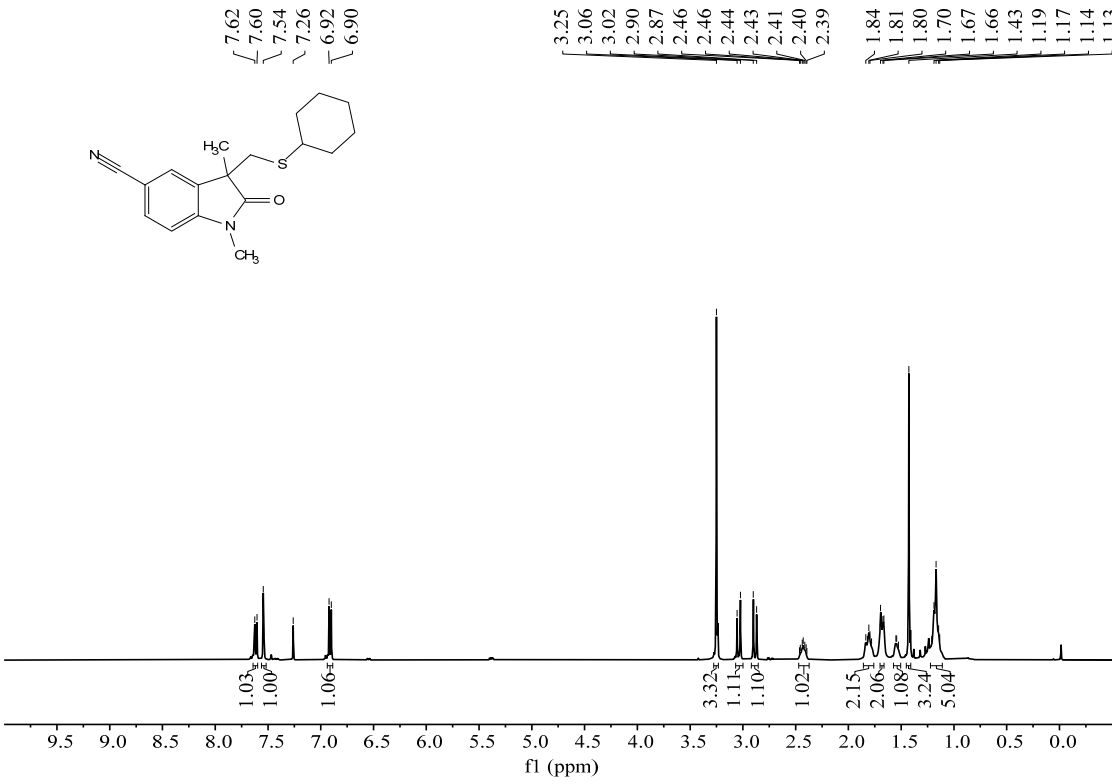
^{1}H, ^{13}C and ^{19}F NMR spectra of 4e ($CDCl_3$)

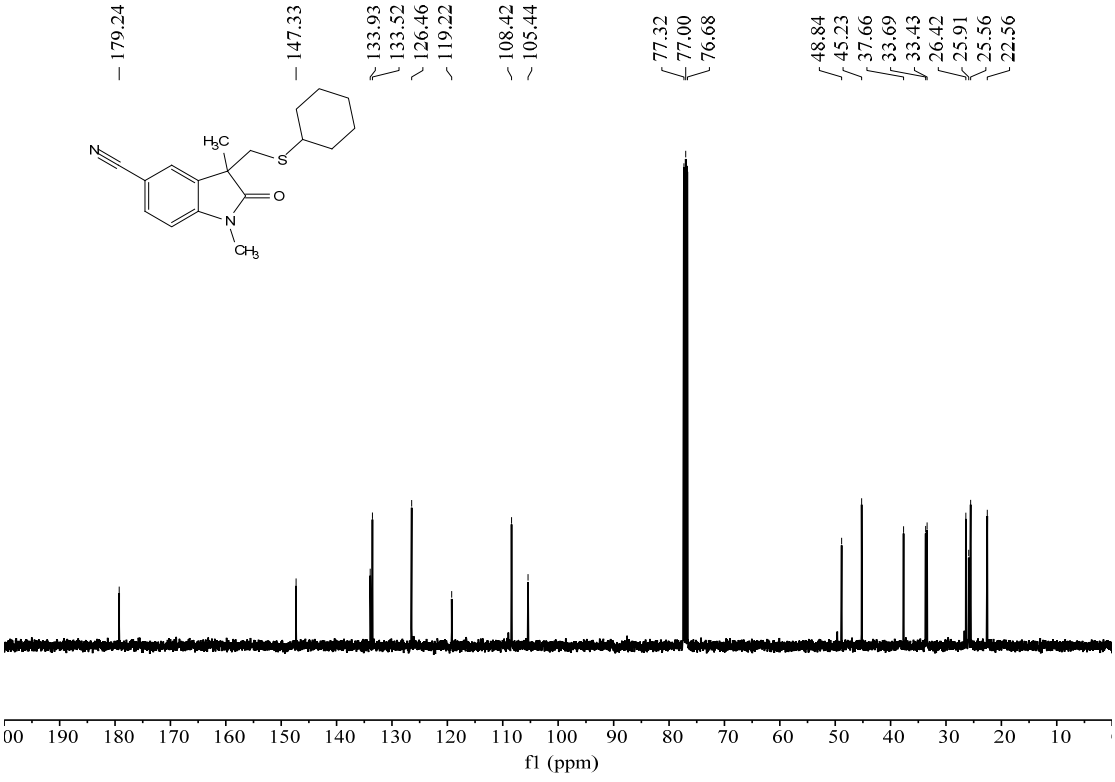





-61.33
F
F
F
H3C
S
O
N
CH3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

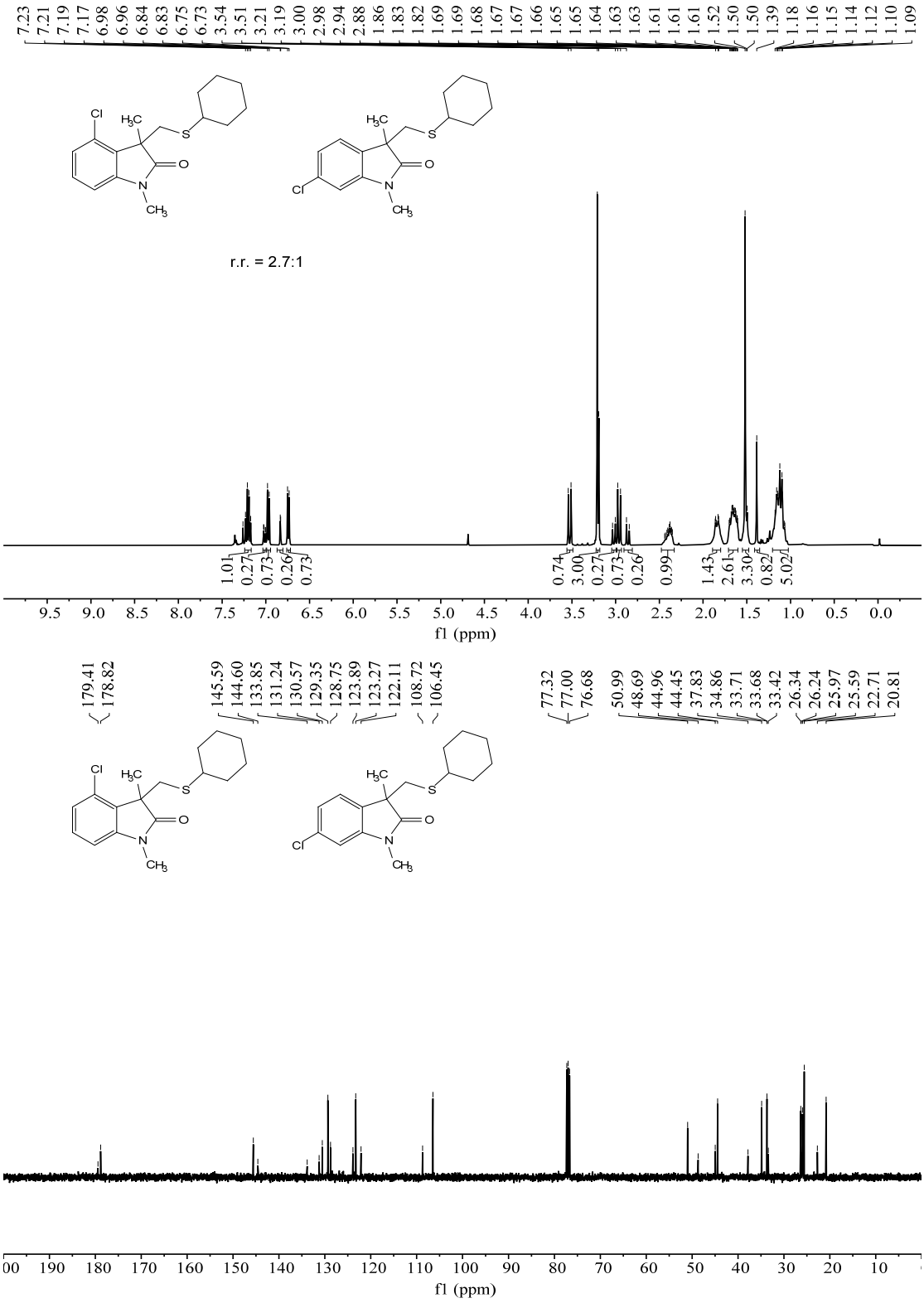
^{1}H and ^{13}C NMR spectra of 4f ($CDCl_3$)



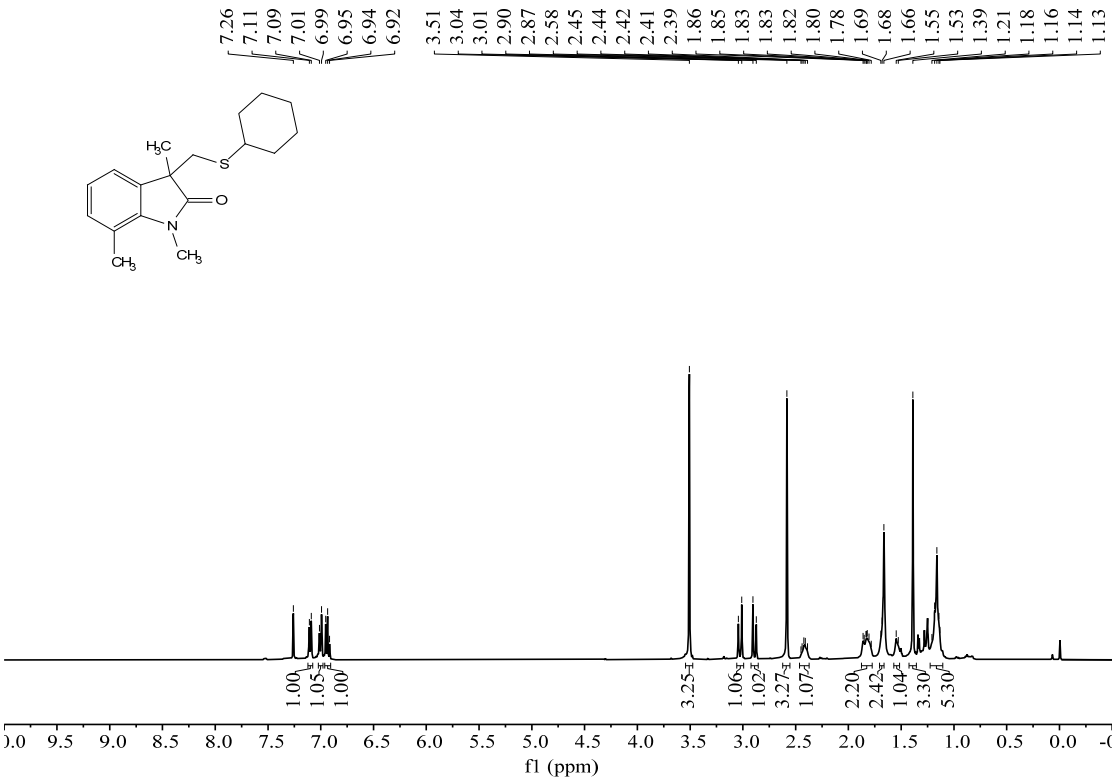


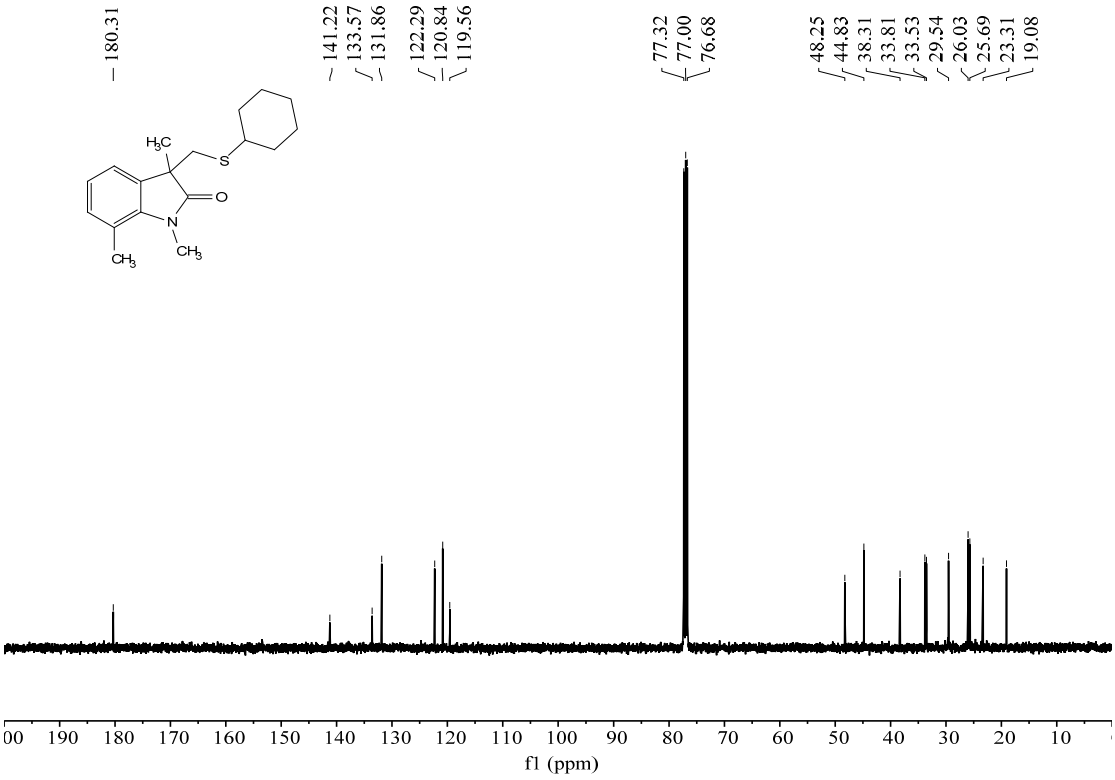
^{1}H and ^{13}C NMR spectra of 4g ($CDCl_3$)

^{1}H and ^{13}C NMR spectra of 4h ($CDCl_3$)

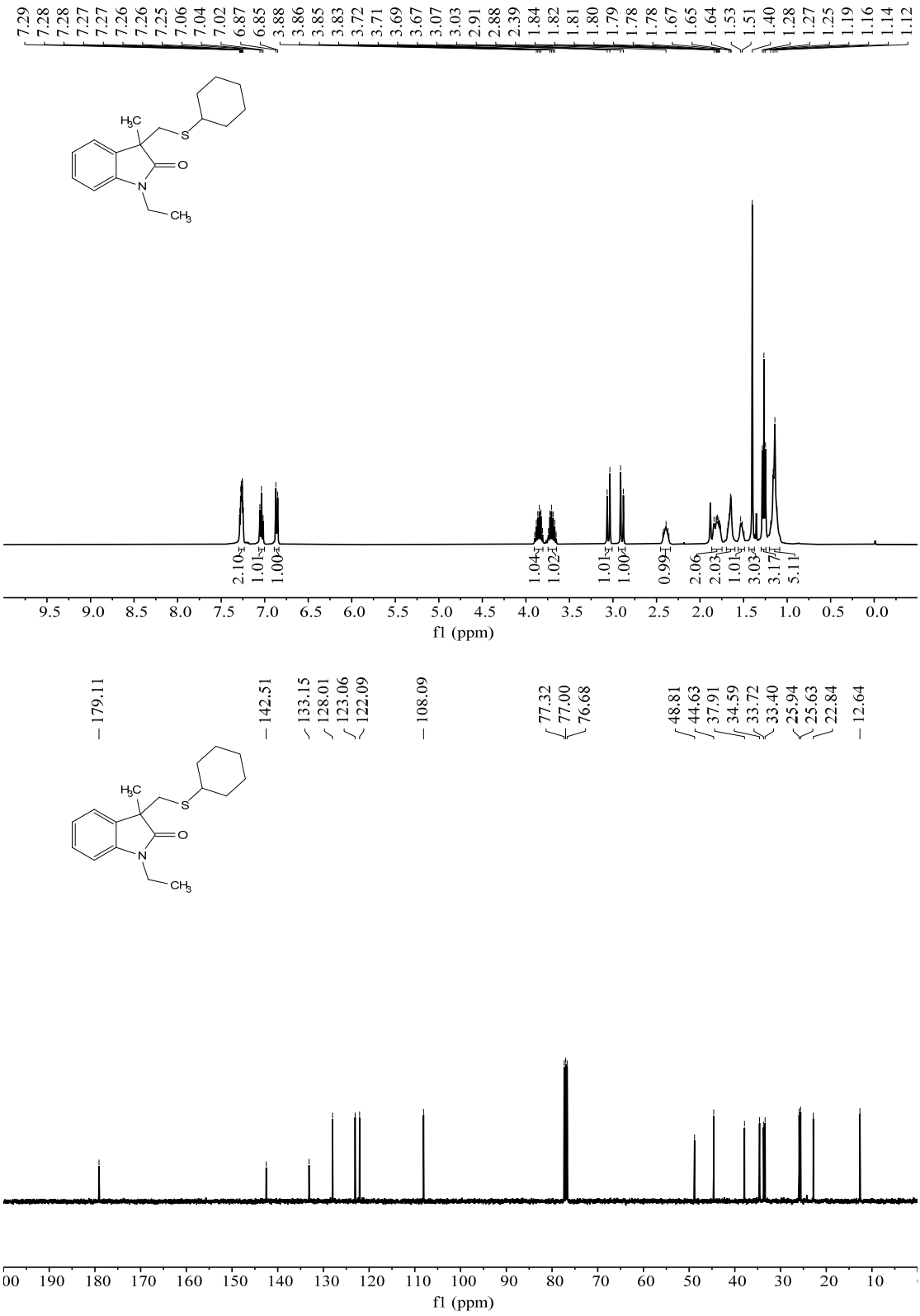


^{1}H and ^{13}C NMR spectra of 4i ($CDCl_3$)

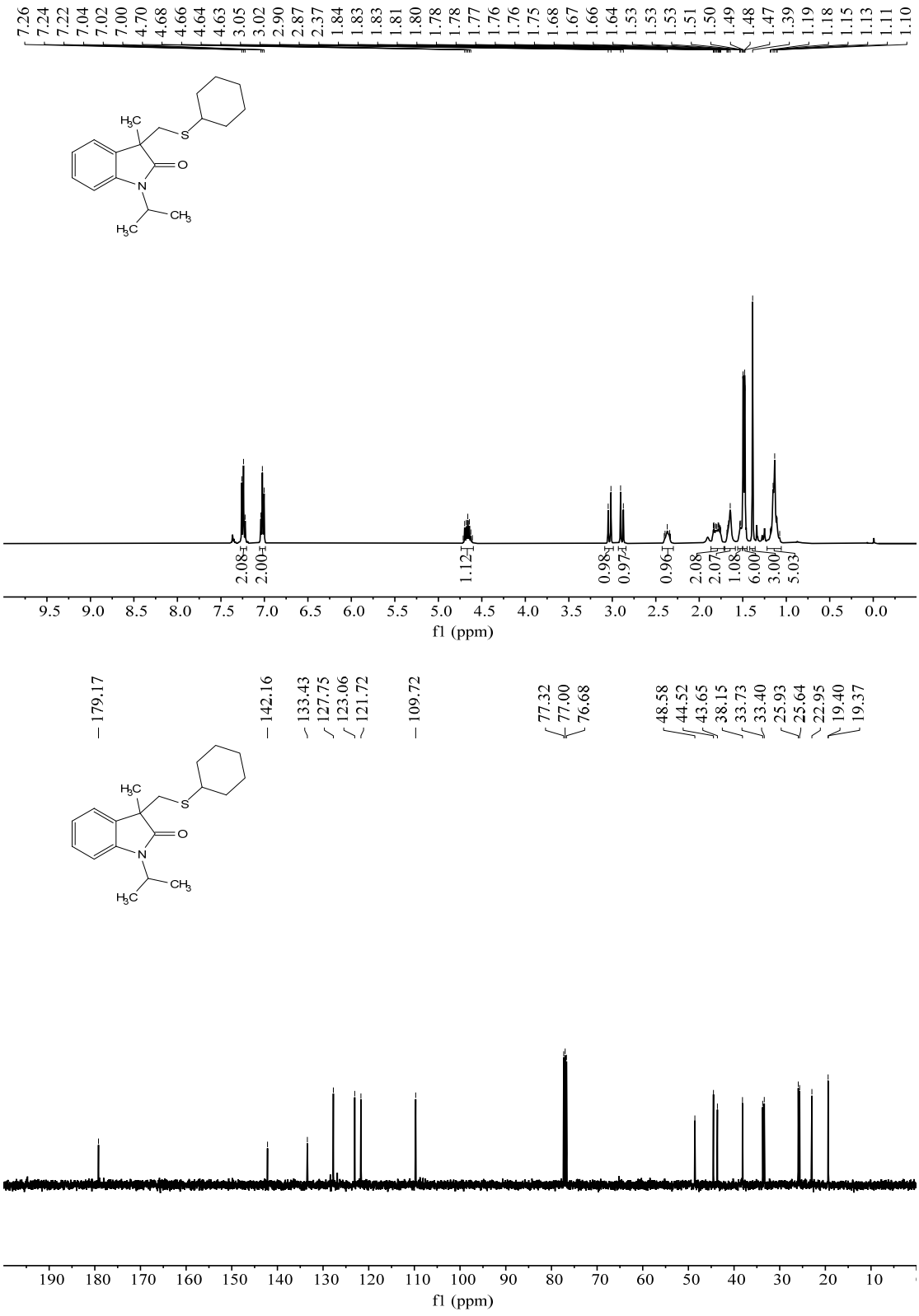




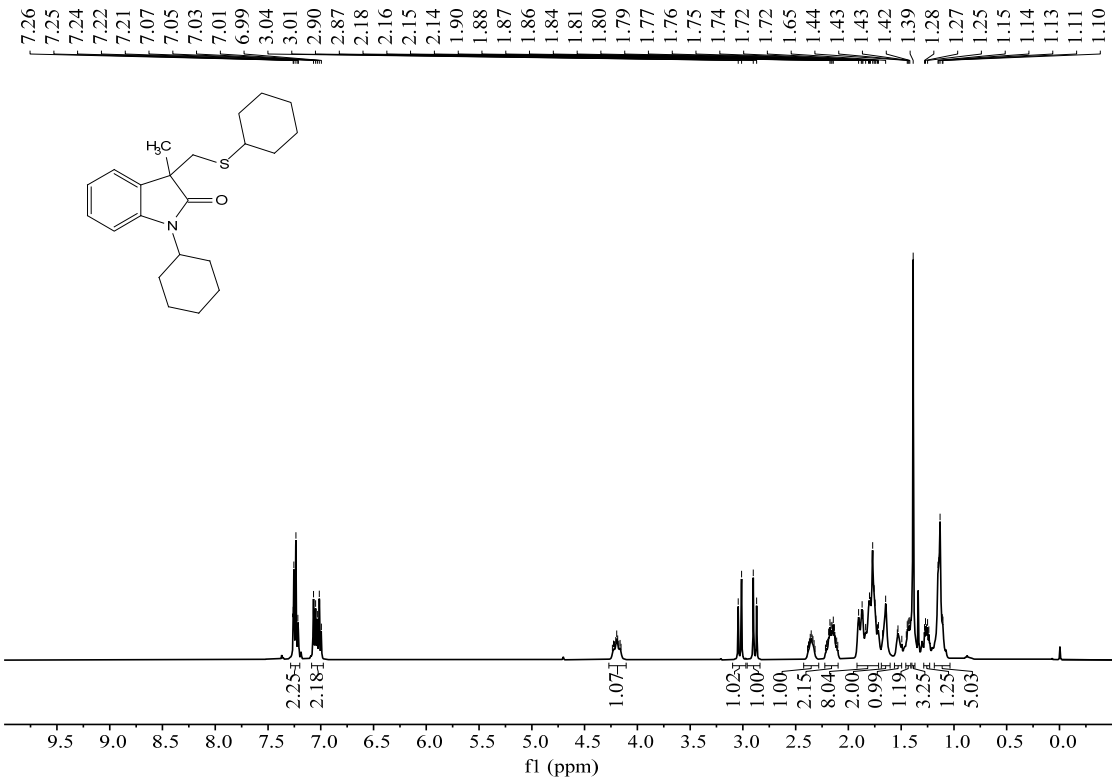
^{1}H and ^{13}C NMR spectra of 4j ($CDCl_3$)

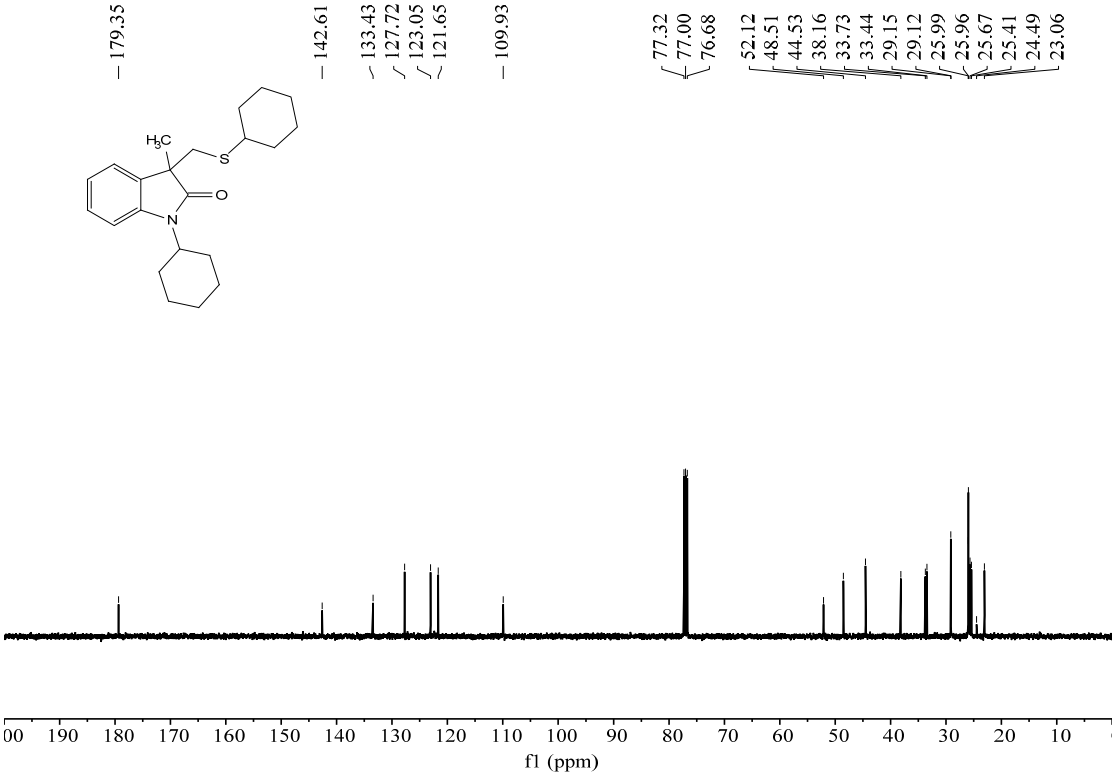


^{1}H and ^{13}C NMR spectra of 4k ($CDCl_3$)

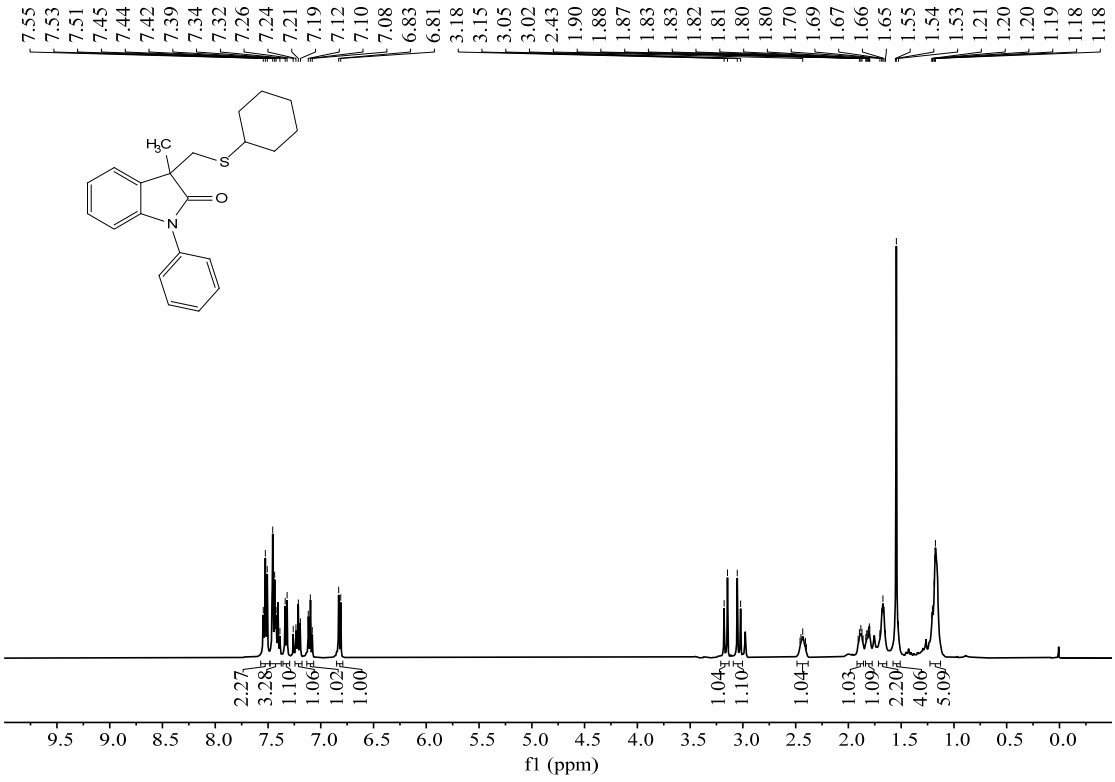


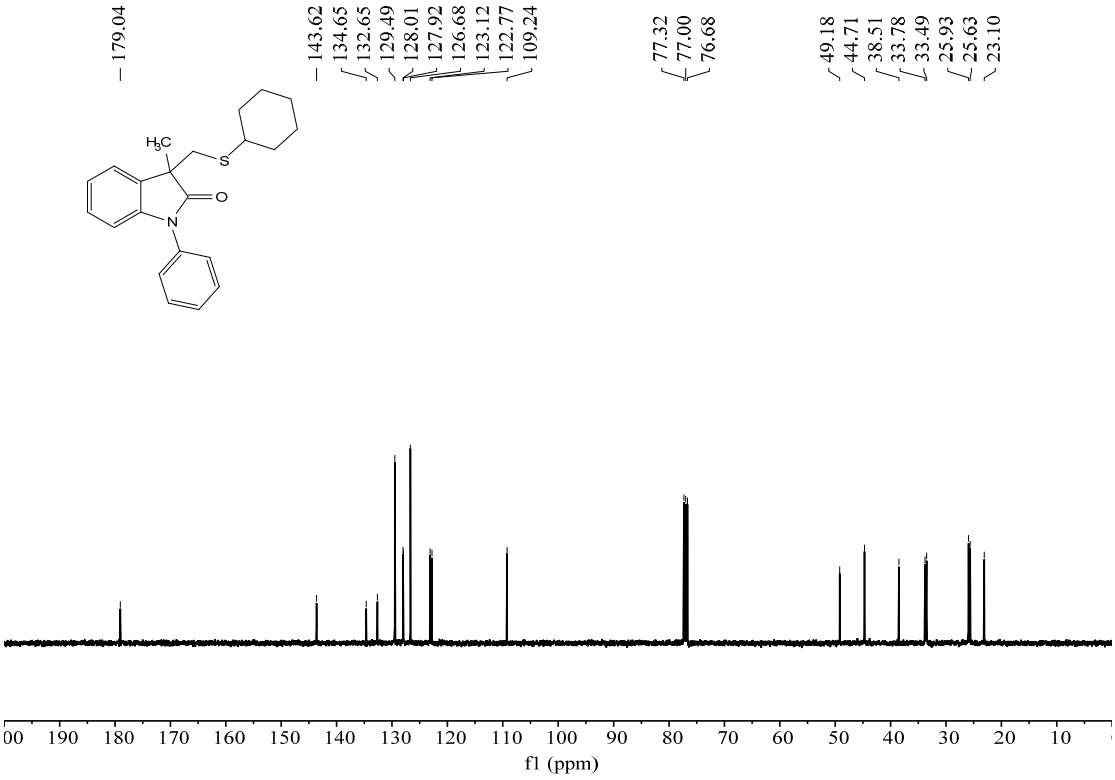
^{1}H and ^{13}C NMR spectra of 4l ($CDCl_3$)



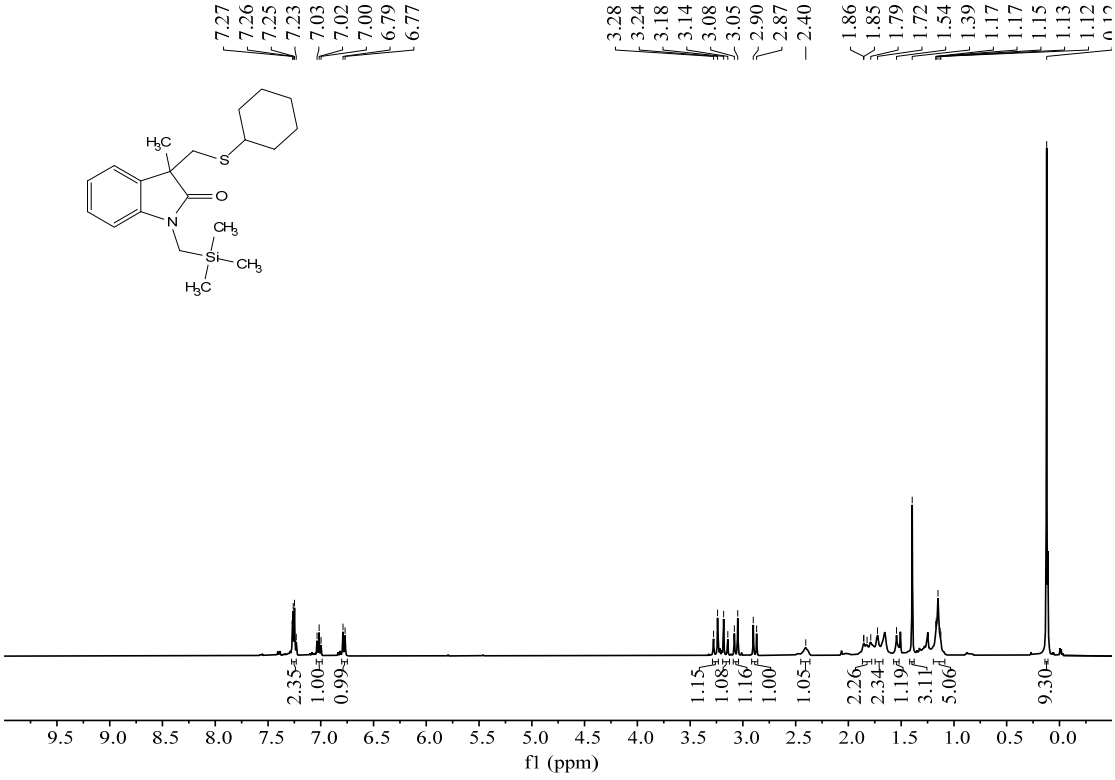


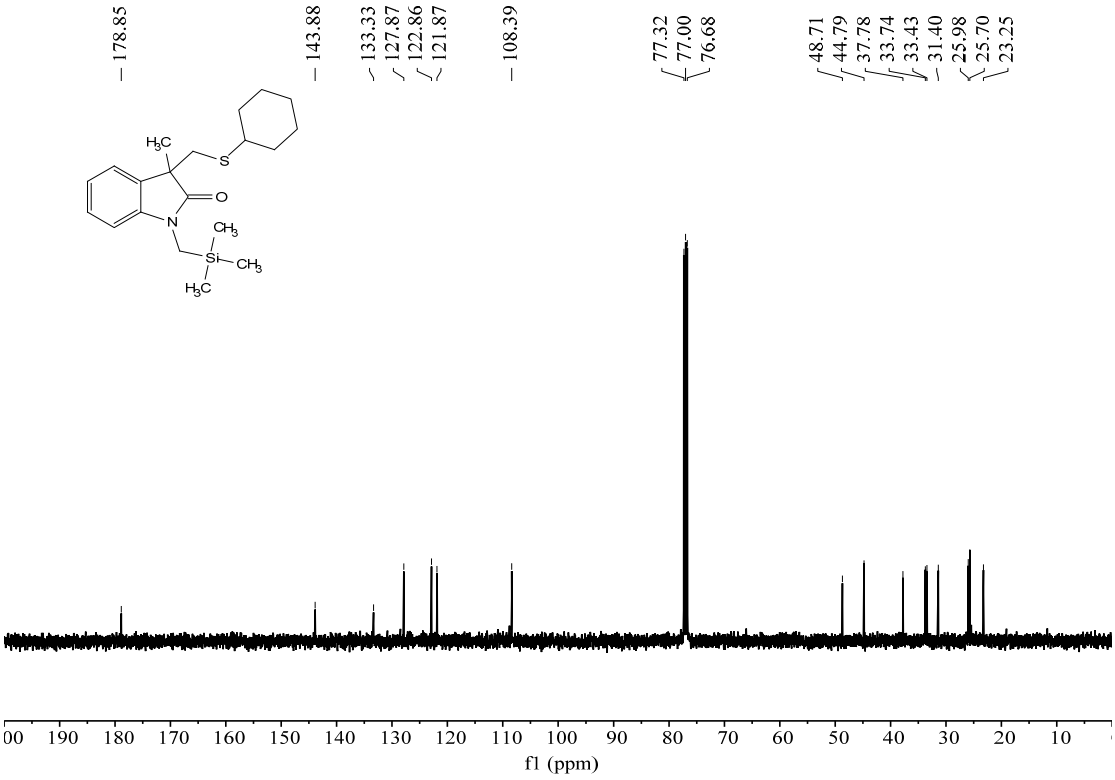
^{1}H and ^{13}C NMR spectra of 4m ($CDCl_3$)



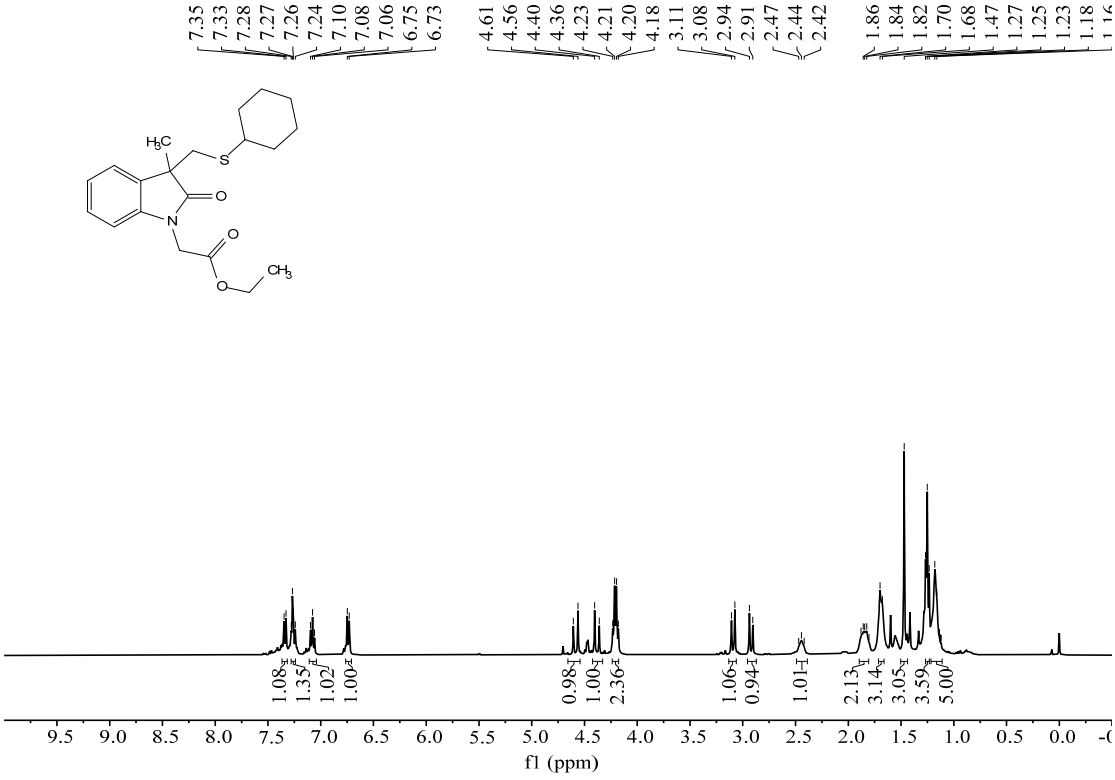


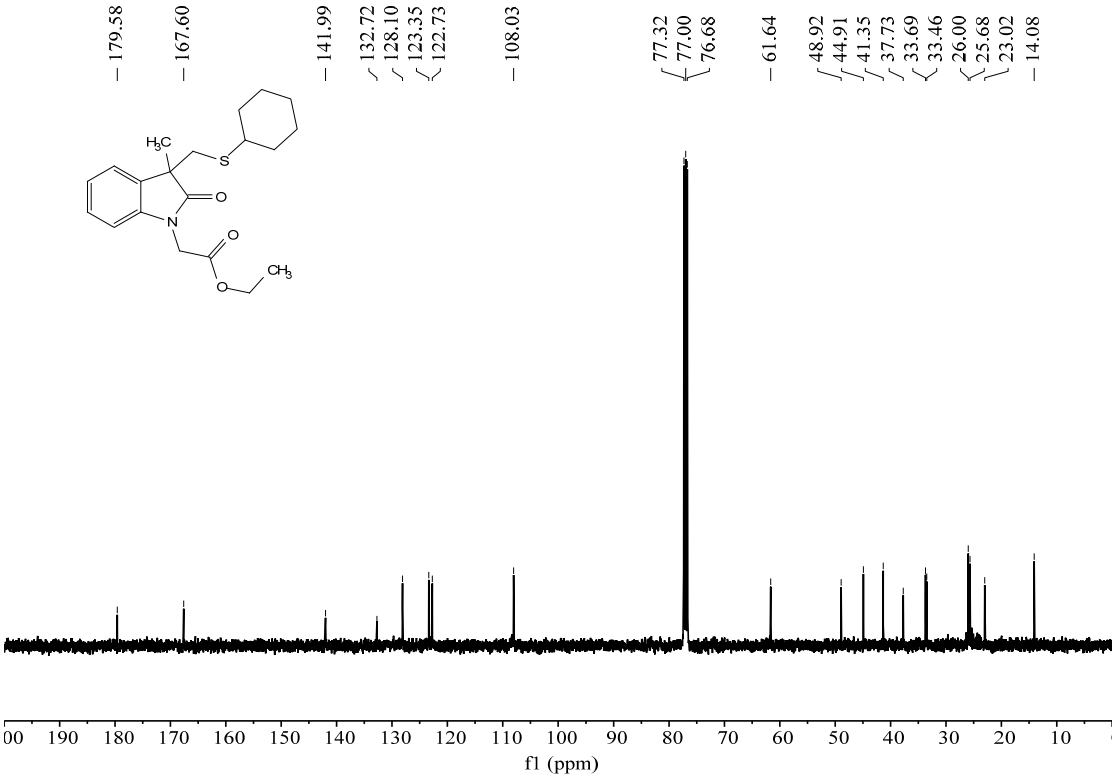
^{1}H and ^{13}C NMR spectra of 4n ($CDCl_3$)



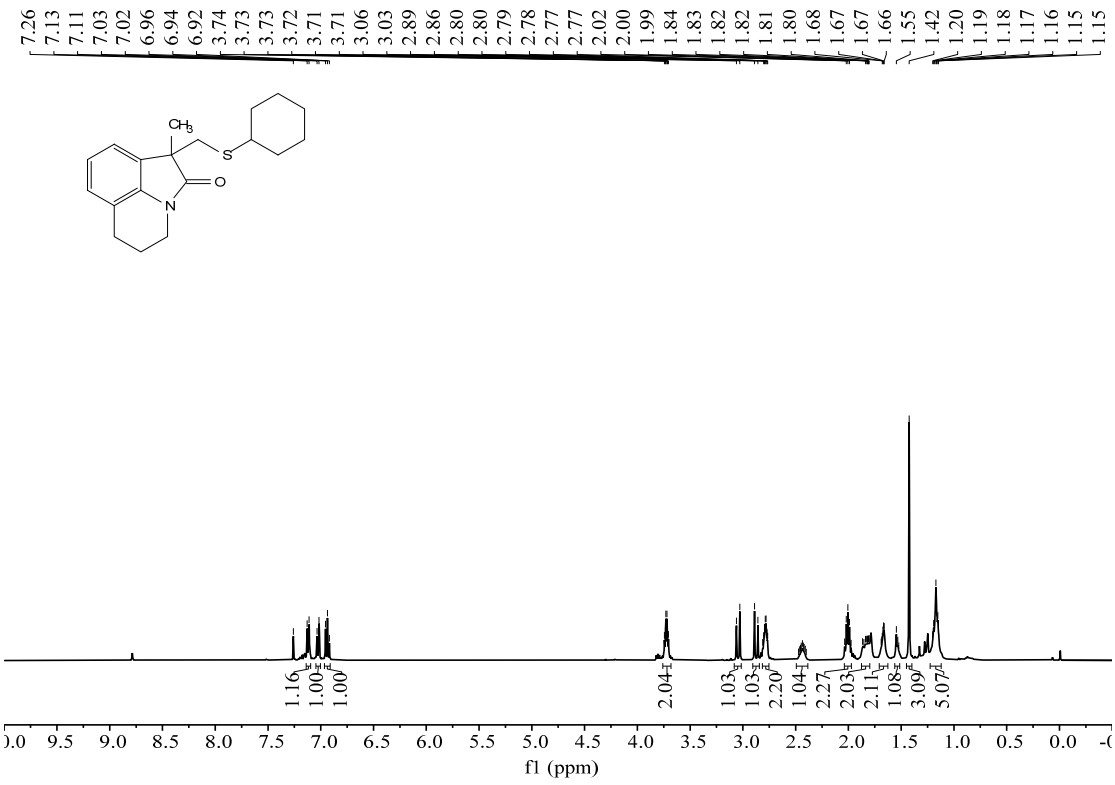


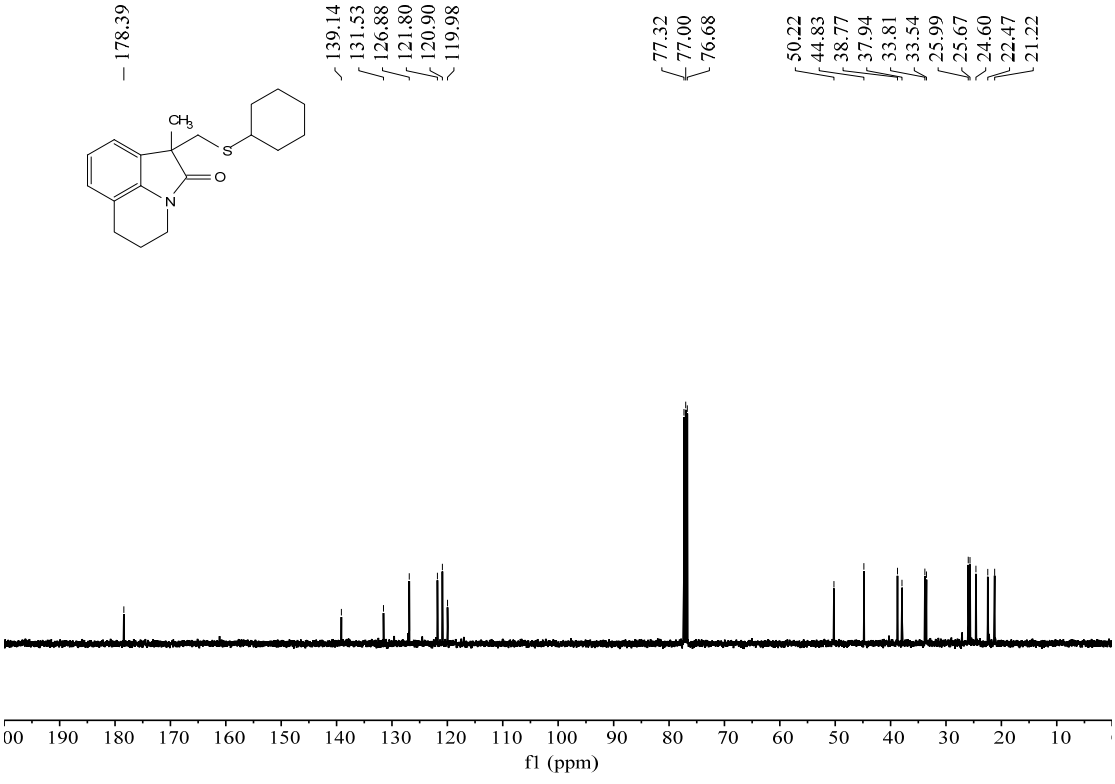
^{1}H and ^{13}C NMR spectra of 4o ($CDCl_3$)



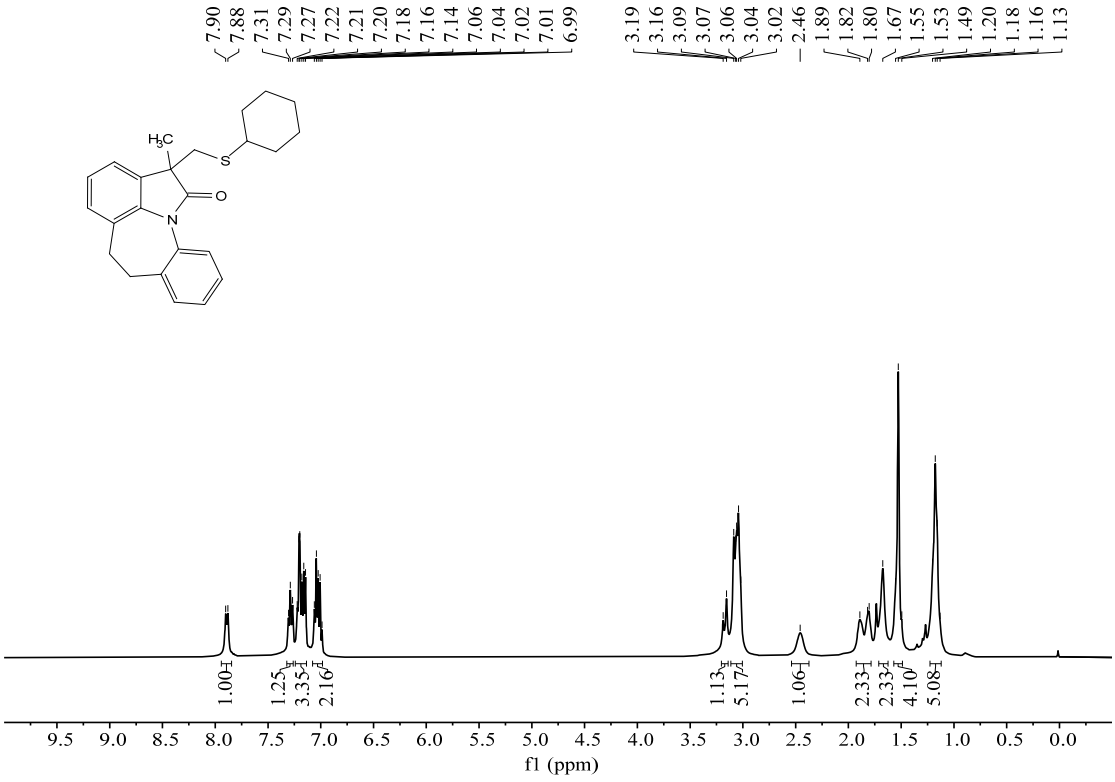


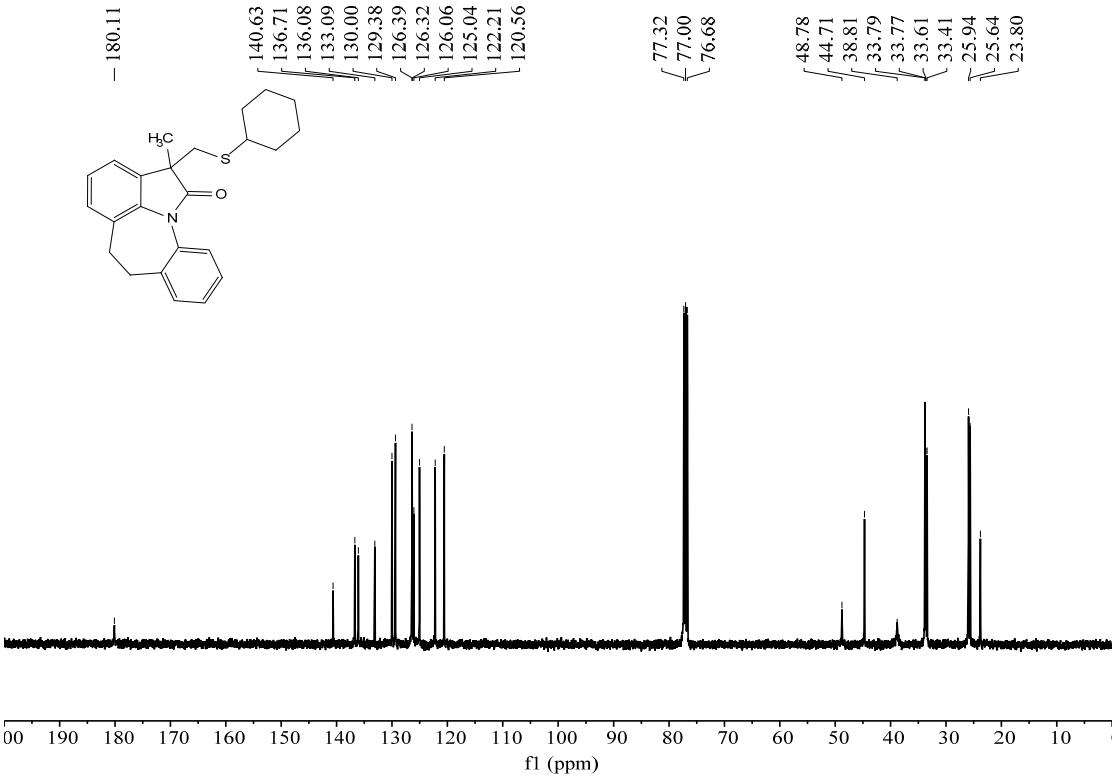
^{1}H and ^{13}C NMR spectra of 4p ($CDCl_3$)



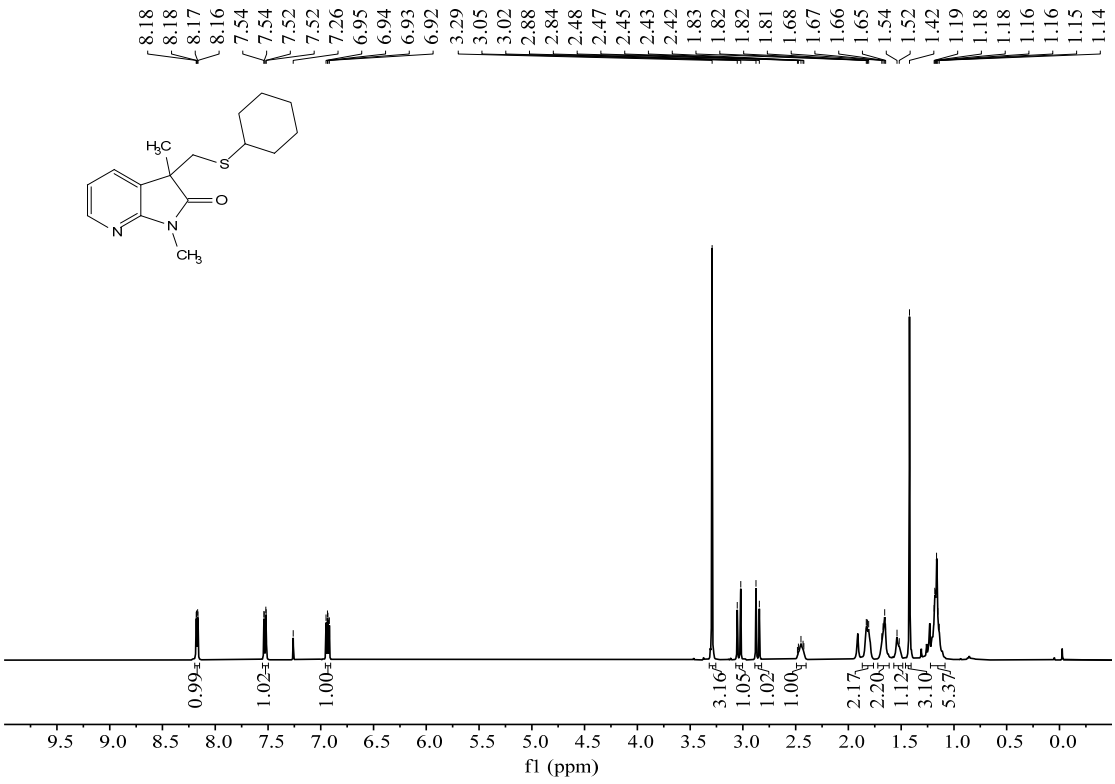


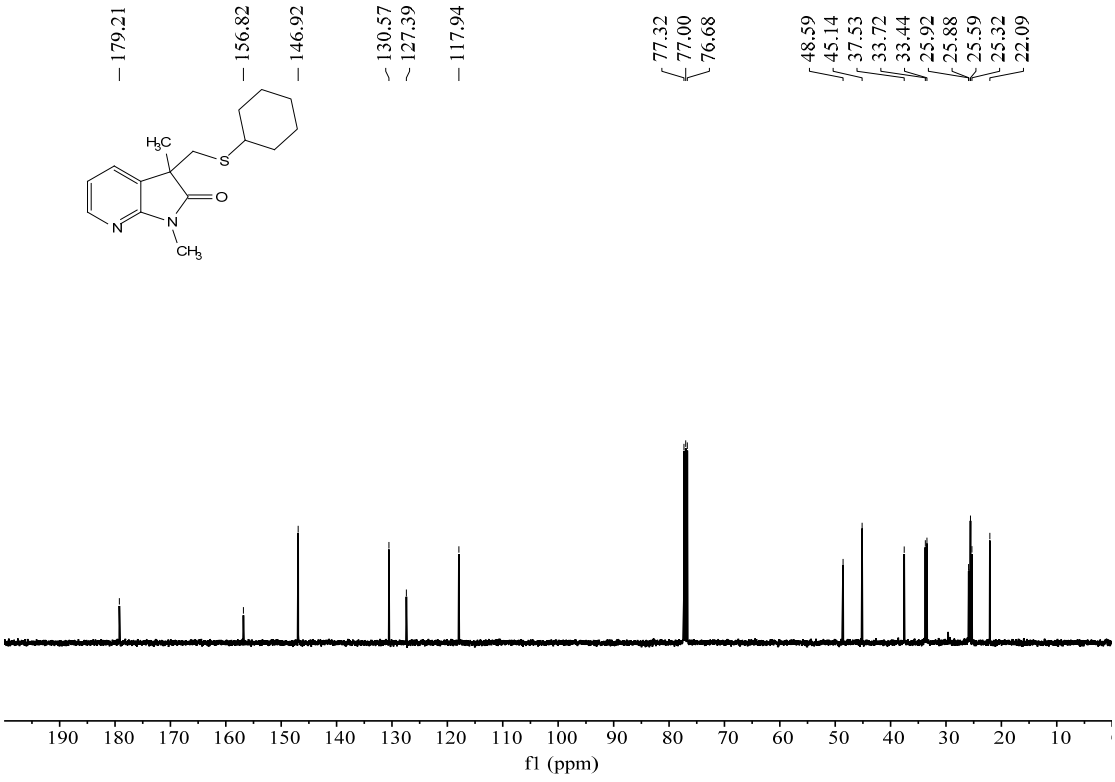
^{1}H and ^{13}C NMR spectra of 4q ($CDCl_3$)



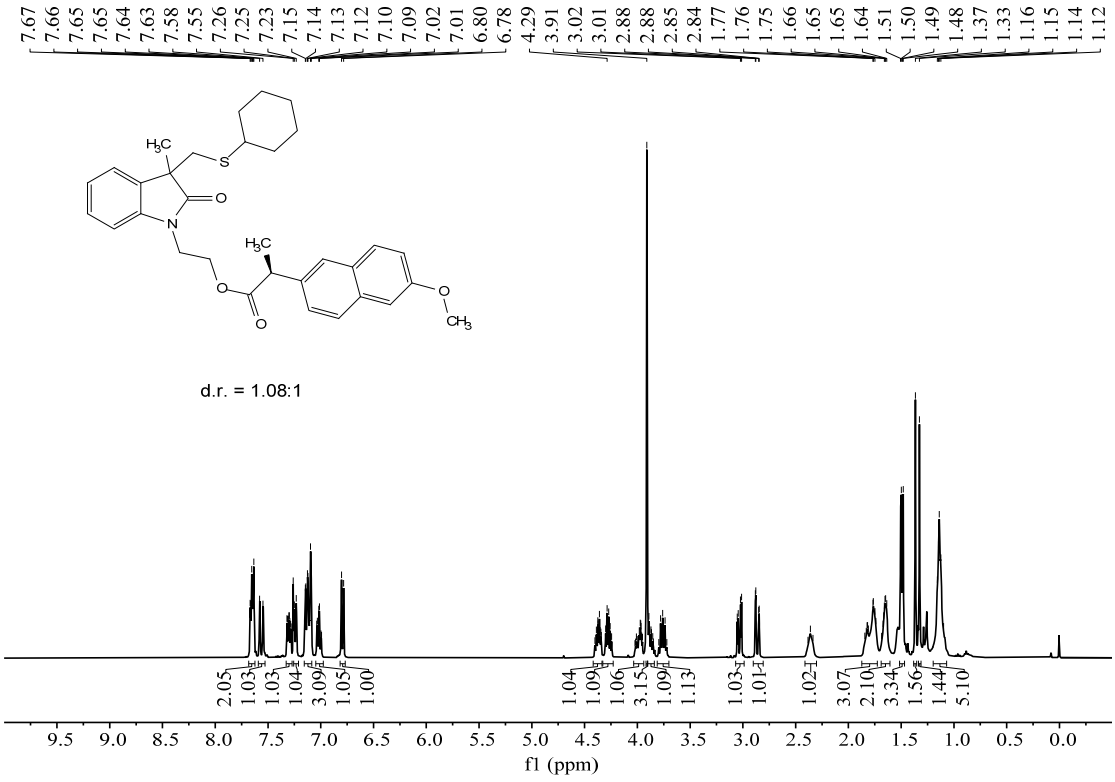


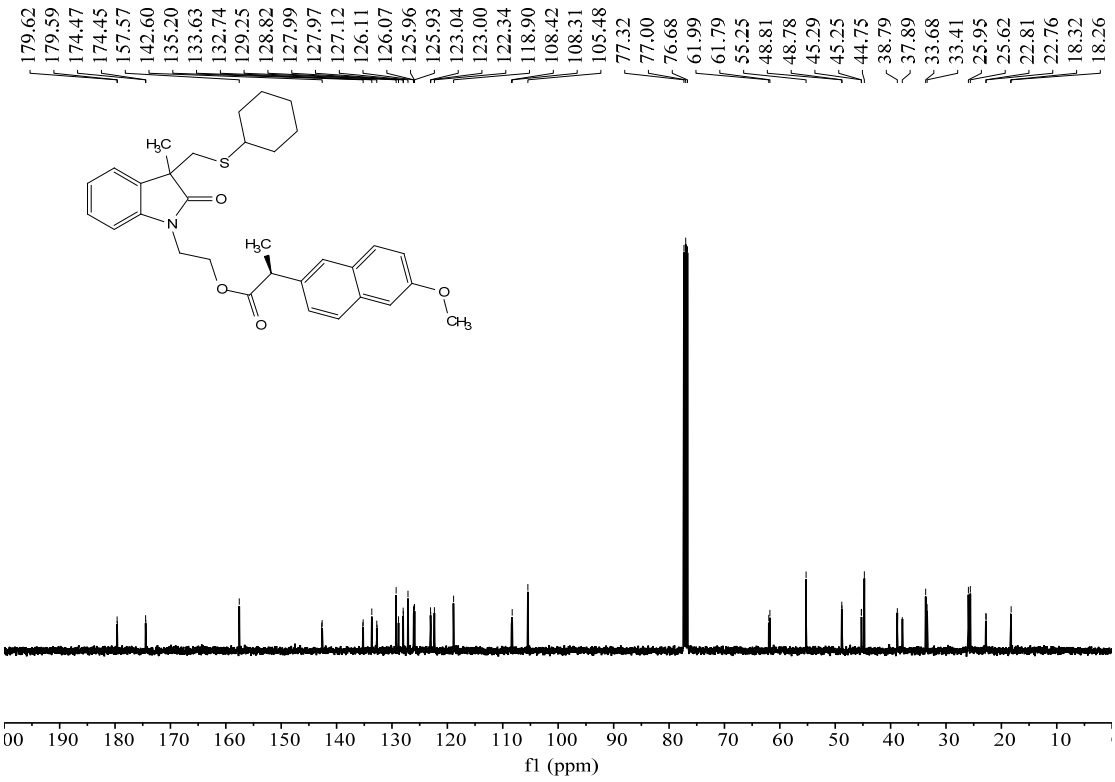
^{1}H and ^{13}C NMR spectra of 4r ($CDCl_3$)



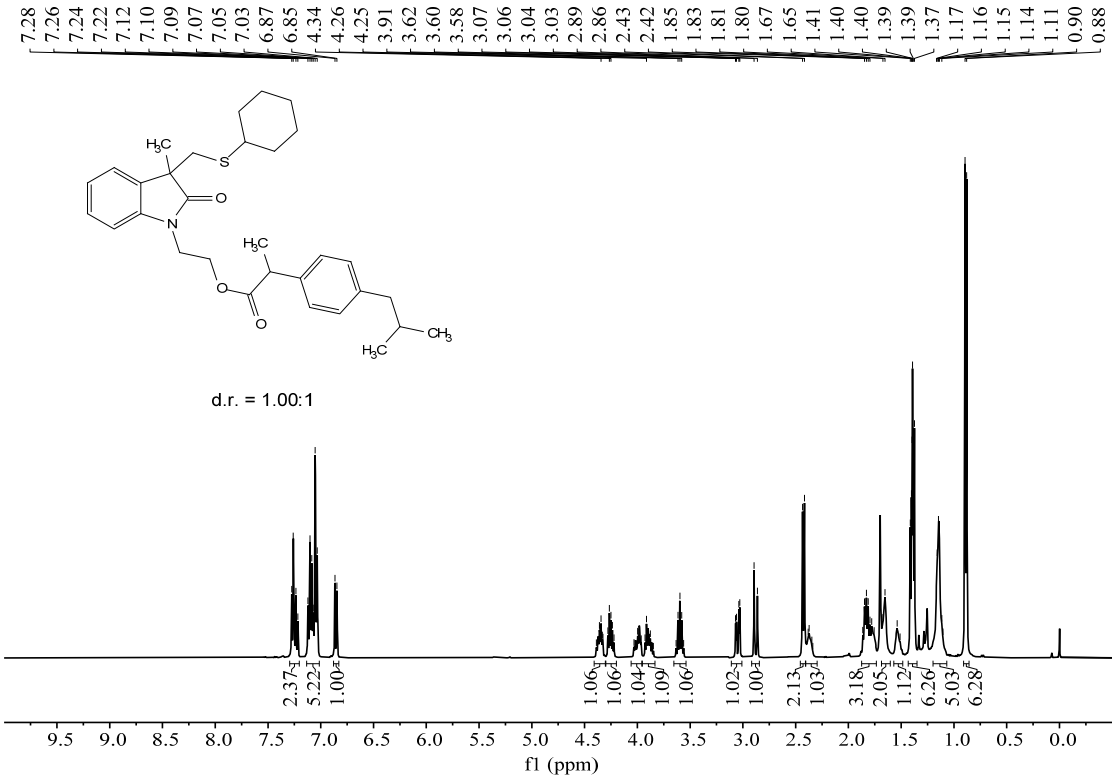


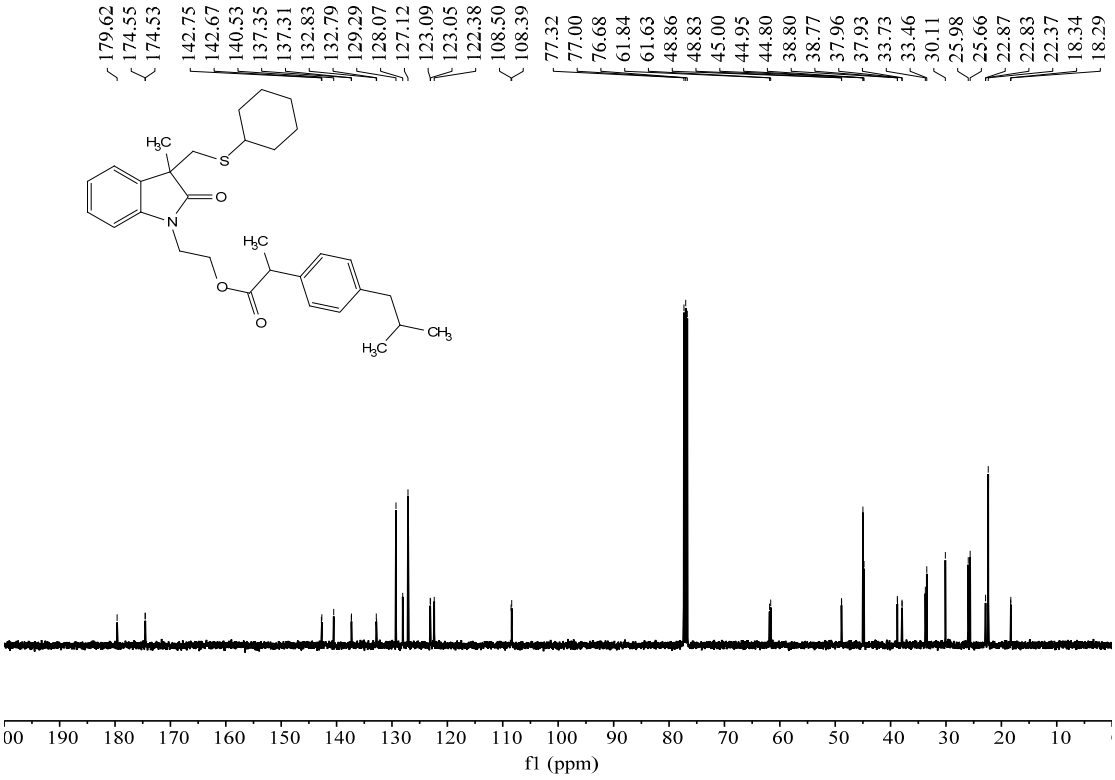
^{1}H and ^{13}C NMR spectra of 4s ($CDCl_3$)



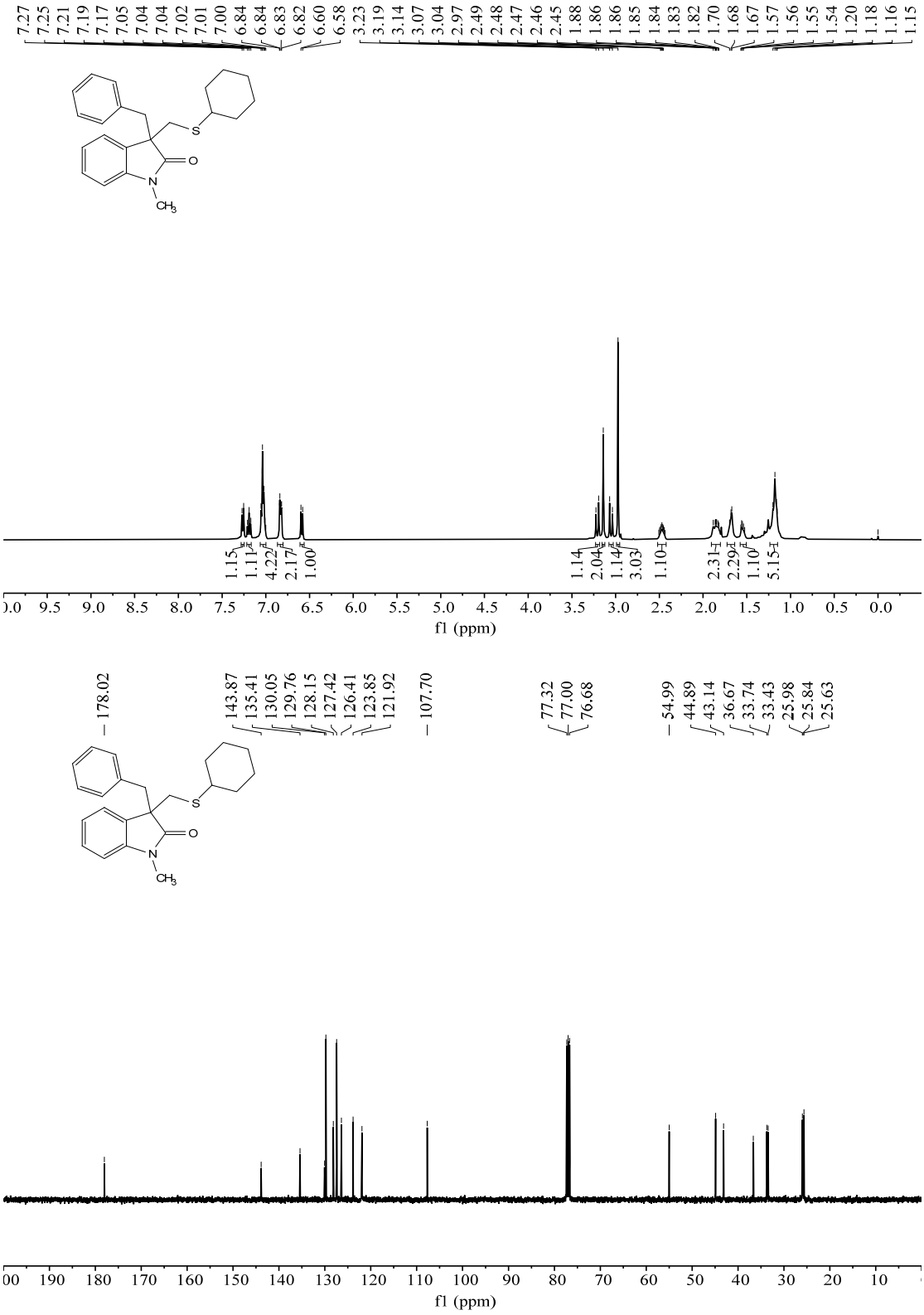


^{1}H and ^{13}C NMR spectra of 4t ($CDCl_3$)

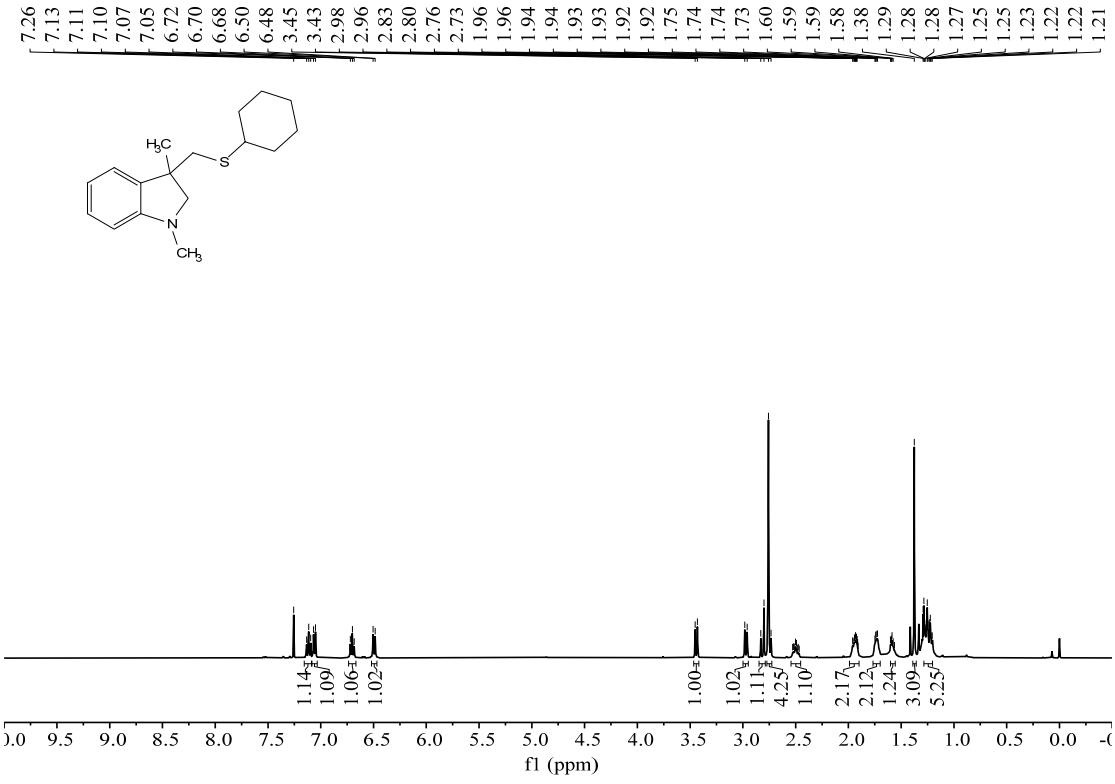


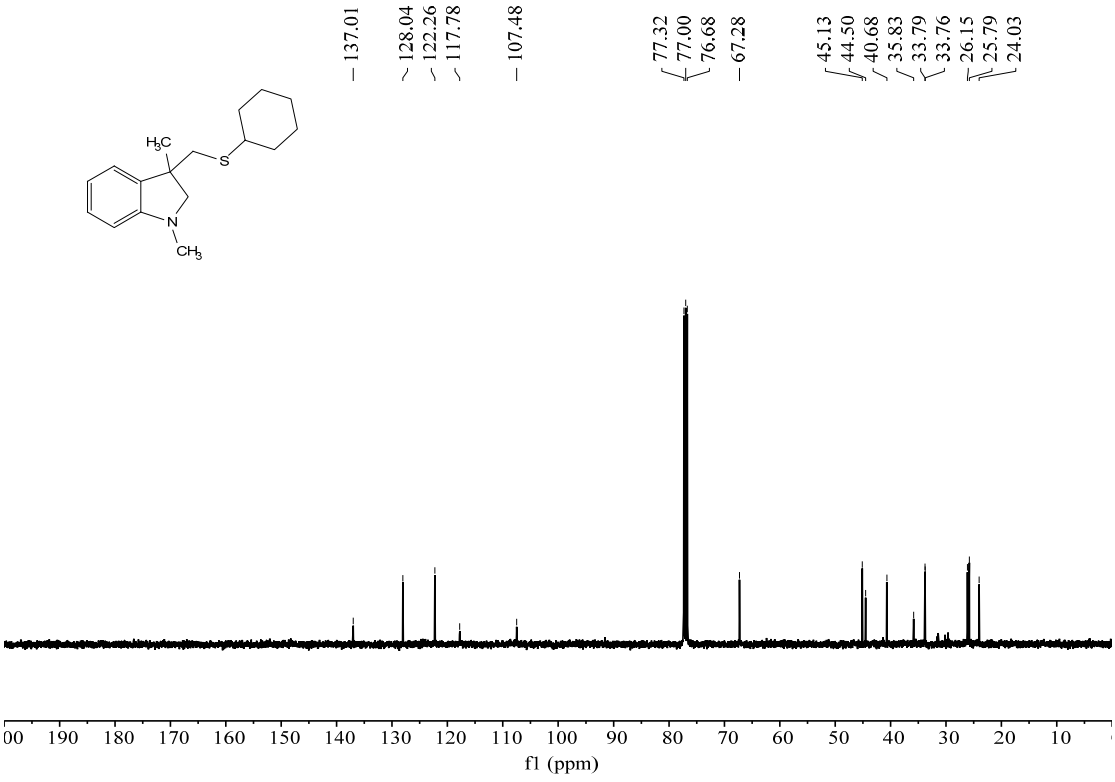


^{1}H and ^{13}C NMR spectra of 4u ($CDCl_3$)

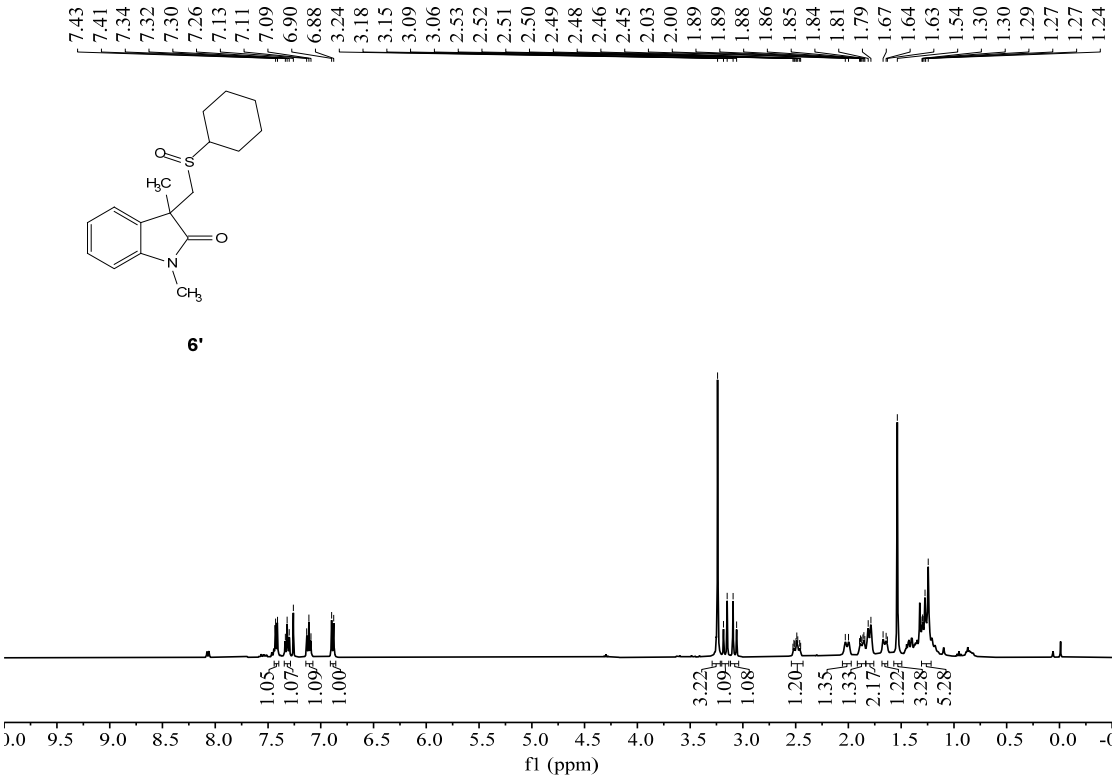


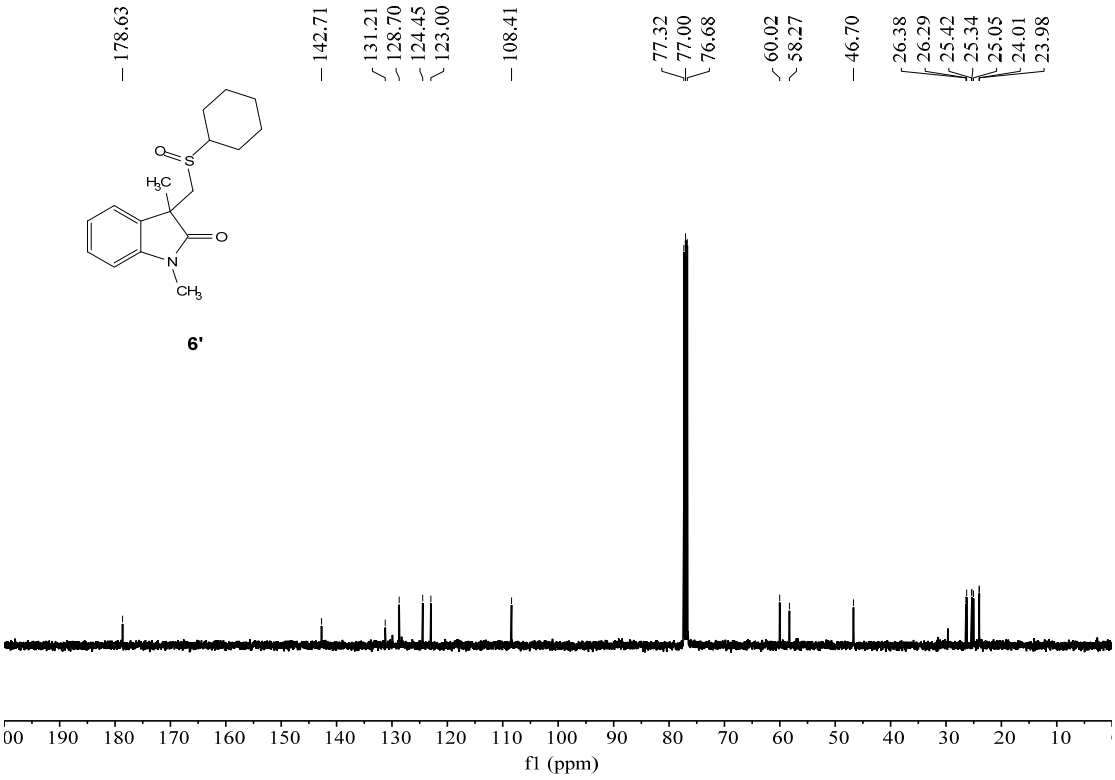
^{1}H and ^{13}C NMR spectra of 5 ($CDCl_3$)

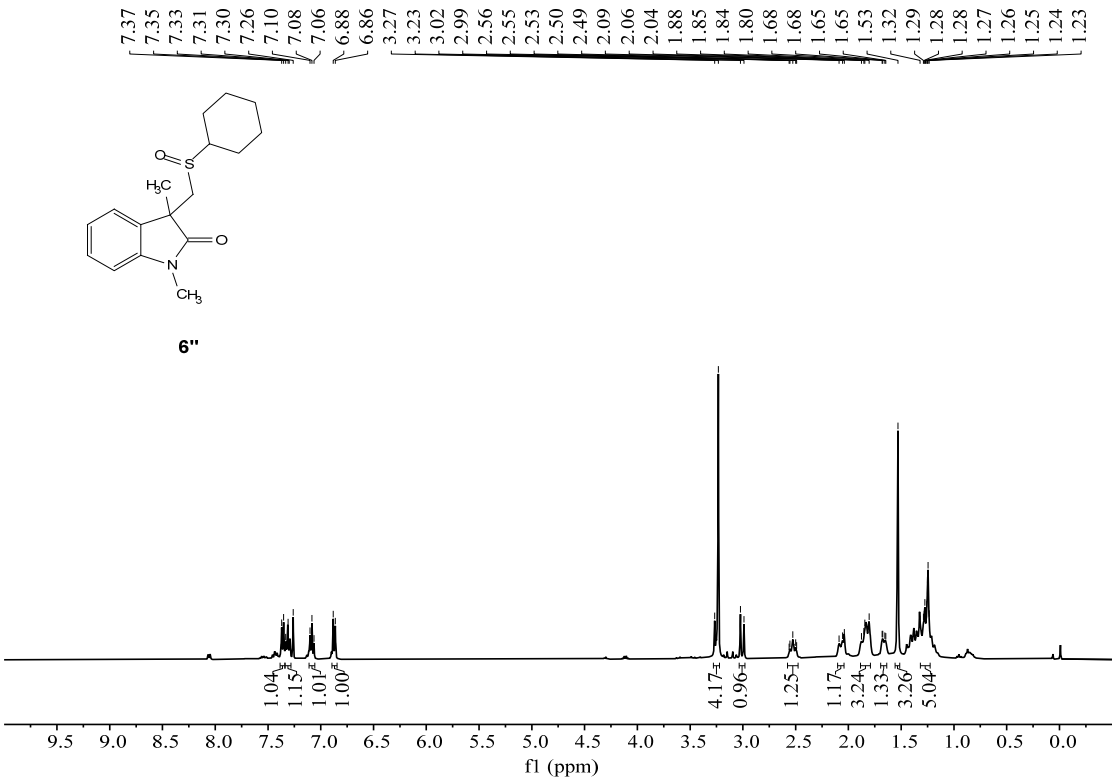




^{1}H and ^{13}C NMR spectra of 6 ($CDCl_3$)






7.37
7.35
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7.26
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7.08
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6.86
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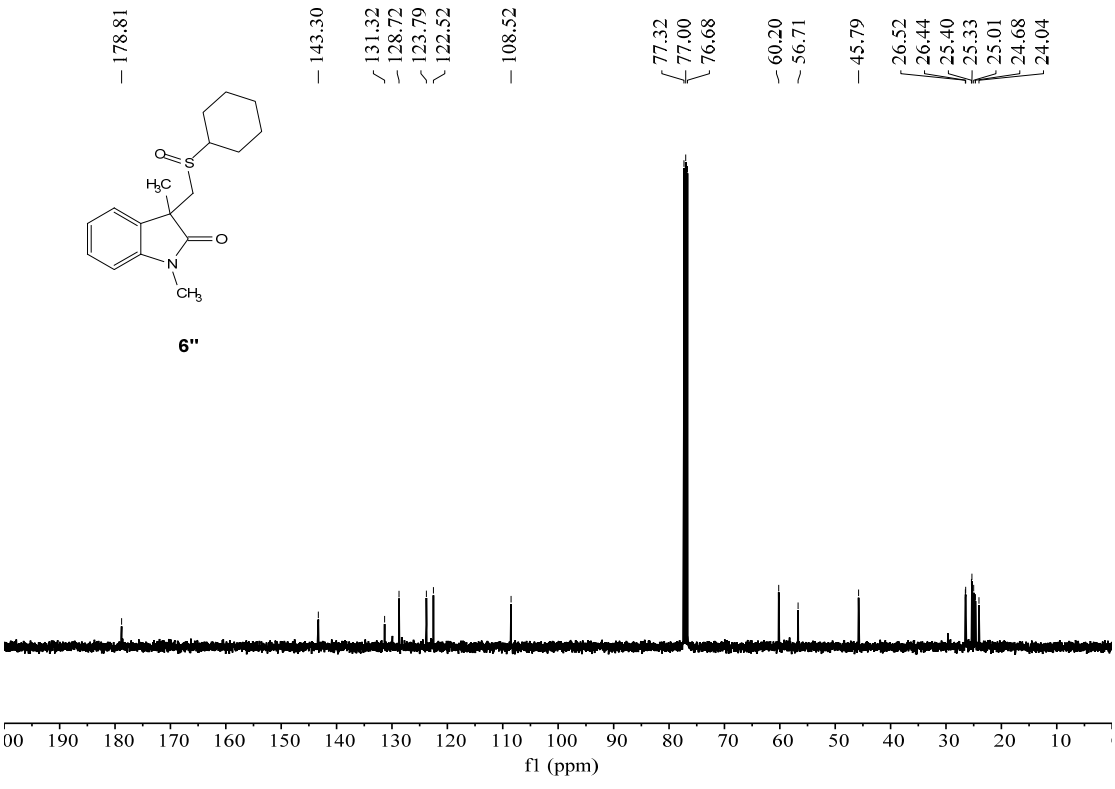
3.23
3.02
2.99
2.56
2.55
2.53
2.50
2.49
2.09
2.06
2.04
1.88
1.85
1.84
1.80
1.68
1.68
1.65
1.65
1.53
1.32
1.29
1.28
1.28
1.27
1.26
1.25
1.24
1.23
O
S
H3C
O
N
CH3
1.04
1.15
1.01
1.00
4.17
0.96
1.25
1.17
3.24
1.33
3.26
5.04
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

6"


178.81
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108.52
77.32
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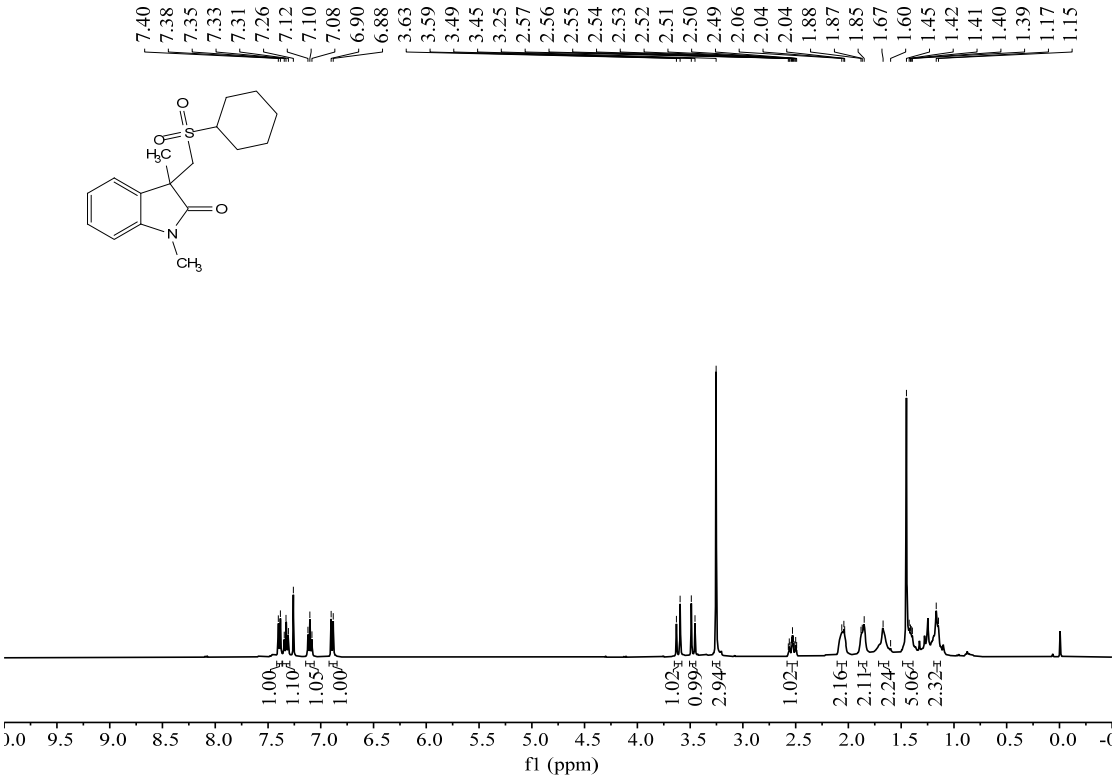
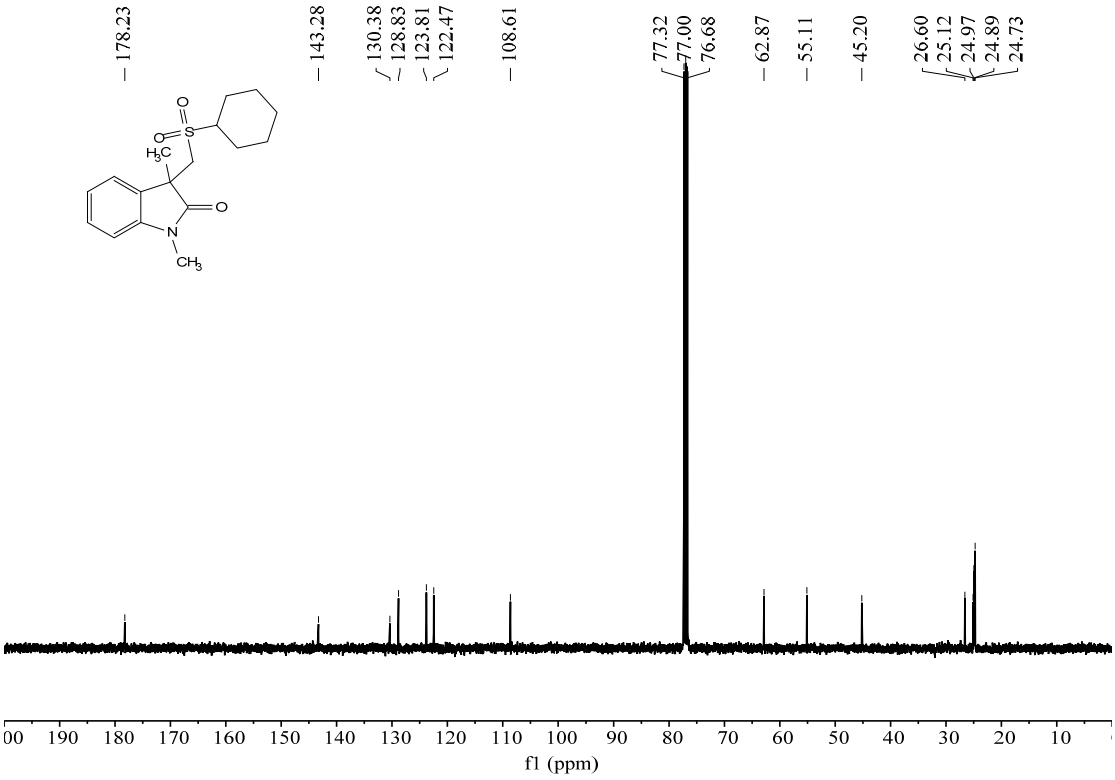
76.68
60.20
56.71
45.79
26.52
26.44
25.40
25.33
25.01
24.68
24.04
O
S
H3C
O
N
CH3
00 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

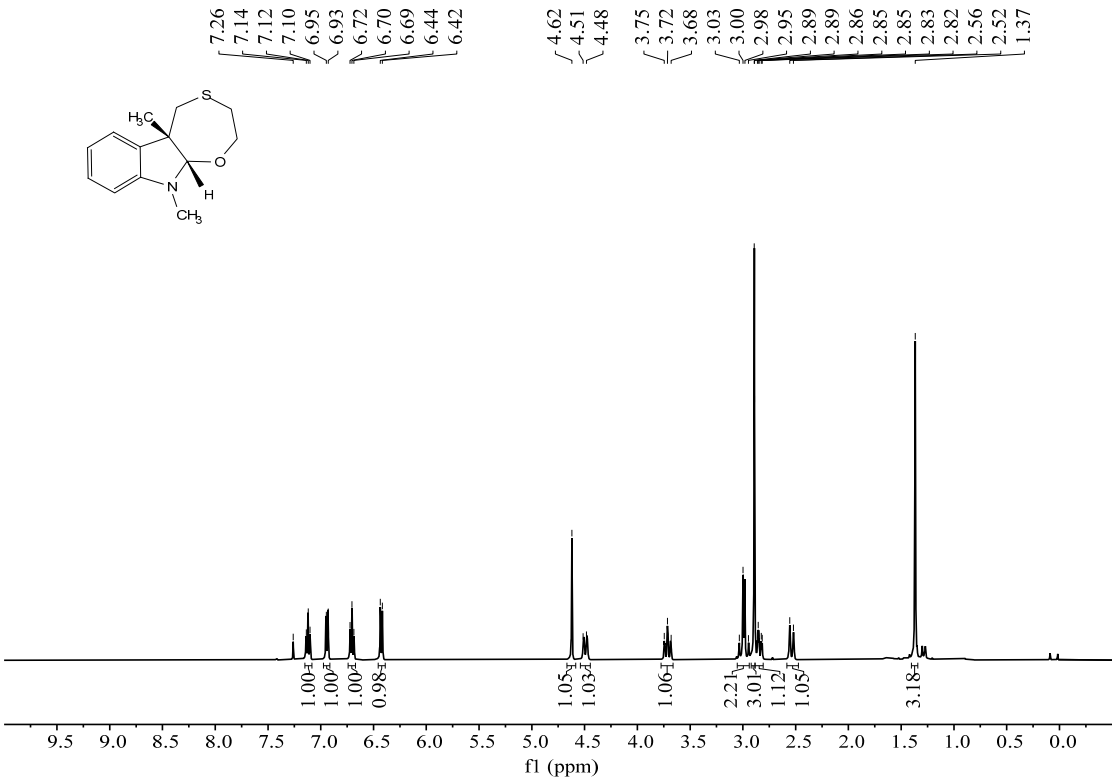
6"

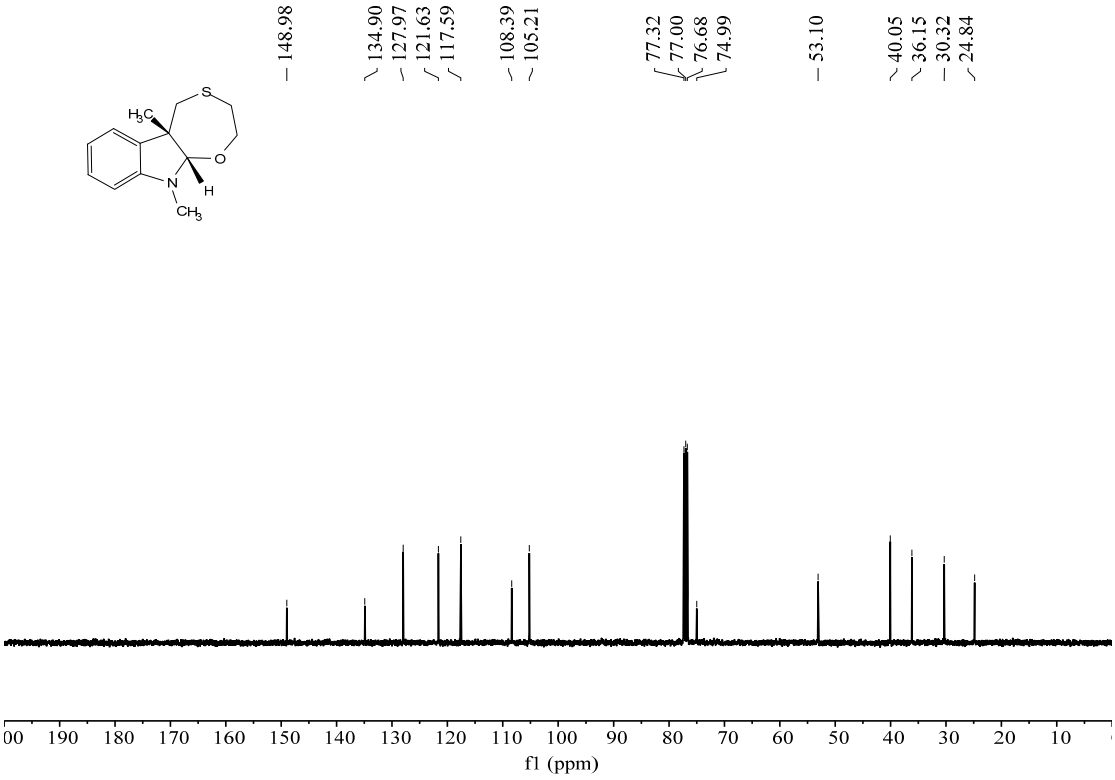
^{1}H and ^{13}C NMR spectra of 7 ($CDCl_3$)





^{1}H and ^{13}C NMR spectra of 8 ($CDCl_3$)





^{1}H and ^{13}C NMR spectra of 9 ($CDCl_3$)