Supplementary Information

For

A Novel Electrochemical Hofmann-Type Rearrangement Enables Facile Access to α-Oxoisocyanate for *N*-Carbamoylacetamides Synthesis

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Contents

1. General informations

All the reagents and solvents were purchased from commercial suppliers and used without purification unless otherwise noted. All the electrochemical reactions were performed in a Schlenk tube and monitored by TLC. Flash column chromatography was performed with silica gel (200–300 mesh). Cyclic voltammograms were recorded on a CHI 760E potentiostat (Shanghai Chenhua, China) in a three-electrode cell configuration with a glassy carbon working electrode (3 mm diameter) and a platinum wire counter electrode versus an Ag/AgCl reference electrode. The Bet surface area was studied on a Micromeritics 3Flex2038. NMR spectra were recorded on a Bruker AV-400 instrument. Data were reported as chemical shifts in ppm relative to TMS (0.00 ppm) for ^{1}H and $CDCl_3$ (77.2 ppm) or d^6-DMSO (40.0 pmm) for ^{13}C. The abbreviations used for explaining the multiplicities were as follows: s = singlet, d = doublet, t = triplet, q = quartet, p = pentet, m = multiplet. High-resolution mass spectra (HRMS) were recorded on a Bruker Esquire LC 6000 ion trap mass spectrometer using electrospray ionization.

2. Procedures for electrolysis

General Procedure A for the synthesis of *N*-carbamoylacetamides. To a magnetic stir bar-contained, 10 mL dry Schlenk tube was added α-oxoamides (0.2 mmol), amine nucleophiles (0.4 mmol, 2.0 equiv), TBAI (0.04 mmol, 20 mol%) and a mixed solvent of MeCN/THF (v/v =1:1, 5.0 mL). The tube was equipped with a graphite felt (GF) anode (0.3 cm x 1.0 cm x 1.5 cm, BET surface area: 1.9435 m^2/g) and a platinum cathode (Pt) (0.1 cm x 1.0 cm x 1.0 cm). The solution then electrolyzed at a constant current (20 mA) at room temperature and monitored by TLC until the completion (j_{anode} = 0.015 mA cm^{-2}). The reaction mixture was concentrated under reduced pressure and the resulting residue was chromatographed through silica gel eluting with petroleum ether/ethyl acetate to give the pure products.

General Procedure B for the synthesis of *N*-acetylcarbamates. To a magnetic stir bar-contained,10 mL dry Schlenk tube was added α-oxoamides (0.2 mmol), alcohols (5.0 equiv), TBAI (0.04 mmol, 20 mol%) and MeCN (5.0 mL). The tube was equipped with a graphite felt (GF) anode (0.3 cm x 1.0 cm x 1.5 cm, BET surface area: 1.9435 m^2/g) and a platinum cathode (Pt) (0.1 cm x 1.0 cm x 1.0 cm). The solution was then electrolyzed at a constant current (10 mA) at room temperature and monitored by TLC until the completion (j_{anode} = 0.007 mA cm^{-2}). The reaction mixture was concentrated under reduced pressure and the resulting residue was

purified by chromatography through silica gel eluting with petroleum ether/ethyl acetate to give the pure products.

Gram-scale synthesis of 1. To a dry 5.0 L beaker was added α-oxobenzeneamine (10 mmol, 1.49 g), cyclohexylamine (20 mmol, 2.3 mL), TBAI (20 mol%, 0.74 g), MeCN (150 mL), THF (150 mL). Then the beaker was equipped with three parallel electrodes that consist of two GF anodes (0.3 cm x 3.0 cm x 5.0 cm, BET surface area: 1.9435 m^2/g) and a sandwiched Pt cathode (0.1 cm x 2.0 cm x 2.0 cm). The solution was electrolyzed at a constant current of 200 mA for 2.75 h at room temperature (j_{anode} = 0.015 mA cm^{-2}, 2.1 F mol^{-1}). The reaction mixture was concentrated under reduced pressure the resulting residue was purified by column chromatography on silica gel eluting with petroleum ether/ethyl acetate (7/1) to give 1.85 g of pure *N*-(cyclohexylcarbamoyl)benzamide **1** (Yield = 75%).

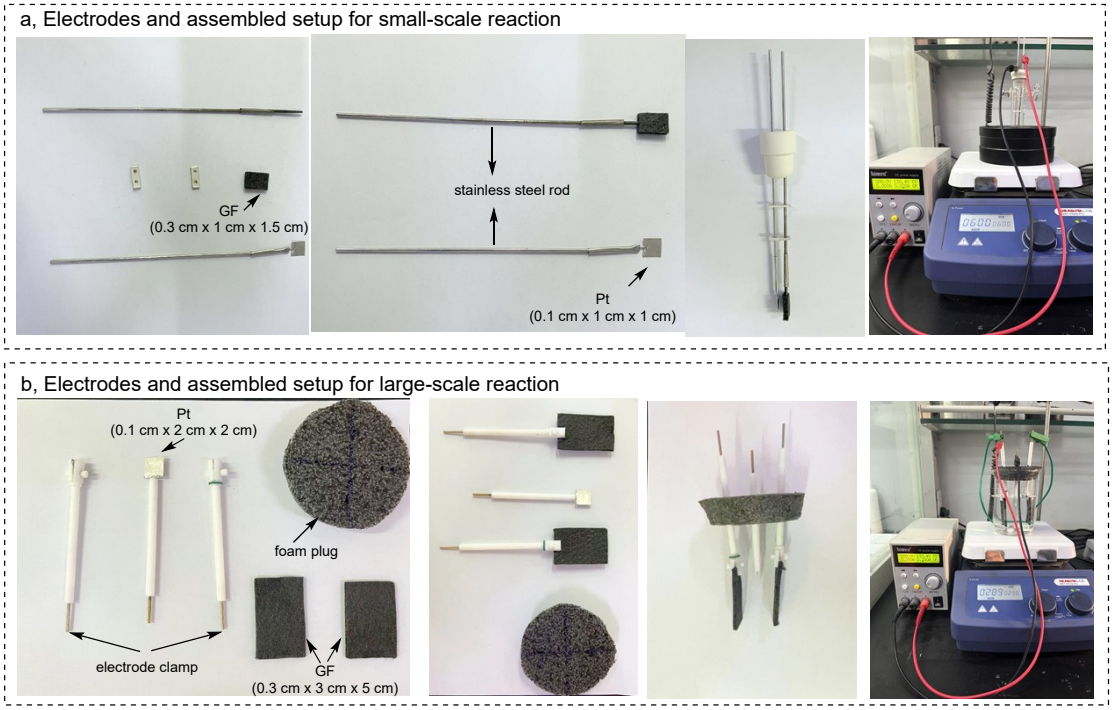
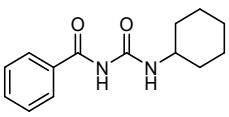


Figure S1. Reaction setup for electrolysis.

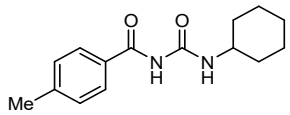
3. Characterization data for products



***N*-(cyclohexylcarbamoyl)benzamide (1).** The title product was prepared following general Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 79 % yield (38.8 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.72 (s, 1H), 8.69 (d, *J* = 7.6 Hz, 1H), 7.94 (d, *J* = 7.7 Hz, 2H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.40 (t, *J* = 7.7 Hz, 2H), 3.71 (qd, *J* = 9.7, 4.3 Hz, 1H), 1.92 (dd, *J* = 9.0, 4.4 Hz, 2H), 1.75 – 1.63 (m, 2H), 1.55 (dt, *J* = 13.1, 4.0 Hz, 1H), 1.41 – 1.16 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.46, 153.85, 133.10, 132.70, 128.82, 128.06, 49.14, 32.98, 25.73, 24.88.

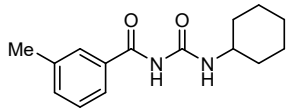
ESI HRMS *m/z* $(M+H)^+$ calcd 247.1441, obsd 247.1442.



***N*-(cyclohexylcarbamoyl)-4-methylbenzamide (2).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 70% yield (36.4 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.78 (s, 1H), 8.73 (d, *J* = 7.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 2H), 7.19 (d, *J* = 8.1 Hz, 2H), 3.71 (tdt, *J* = 11.0, 7.8, 3.9 Hz, 1H), 2.35 (s, 3H), 1.91 (dt, *J* = 8.4, 3.5 Hz, 2H), 1.69 (dt, *J* = 13.0, 3.8 Hz, 2H), 1.55 (dq, *J* = 12.9, 4.1 Hz, 1H), 1.41 – 1.15 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.43, 154.01, 143.81, 129.85, 129.48, 128.12, 49.06, 32.97, 25.73, 24.86, 21.77.

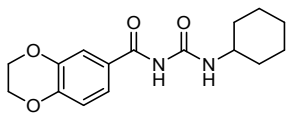
ESI HRMS *m/z* $(M+H)^+$ calcd 261.1598, obsd 261.1597.



***N*-(cyclohexylcarbamoyl)-3-methylbenzamide (3).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 60% yield (31.2 mg). White solid. Electricity = 4.4 F mol^{-1}.

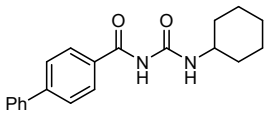
^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.81 (s, 1H), 8.74 (d, *J* = 7.8 Hz, 1H), 7.77 (s, 1H), 7.73 (d, *J* = 7.4 Hz, 1H), 7.36 – 7.23 (m, 2H), 3.82 – 3.62 (m, 1H), 2.36 (s, 3H), 1.90 (dt, *J* = 12.1, 3.7 Hz, 2H), 1.68 (dt, *J* = 13.2, 3.7 Hz, 2H), 1.54 (dt, *J* = 14.3, 3.8 Hz, 1H), 1.40 – 1.12 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.73, 153.91, 138.65, 133.81, 132.64, 128.66, 128.63, 125.24, 48.92, 33.01, 25.70, 24.83, 21.52.

ESI HRMS *m/z* $(M+H)^+$ calcd 261.1598, obsd 261.1598.



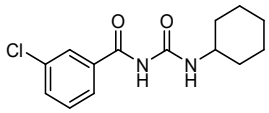
***N*-(cyclohexylcarbamoyl)-2,3-dihydrobenzo[b][1,4]dioxine-6-carboxamide (4)[1].** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/2) in 70% yield (42.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.94 – 9.60 (m, 1H), 8.72 (d, *J* = 7.7 Hz, 1H), 7.63 – 7.55 (m, 1H), 7.48 (dd, *J* = 8.4, 2.6 Hz, 1H), 6.83 (d, *J* = 8.5 Hz, 1H), 4.36 – 4.10 (m, 4H), 3.74 (tdt, *J* = 11.0, 7.8, 3.8 Hz, 1H), 1.93 (dt, *J* = 11.8, 3.9 Hz, 2H), 1.69 (dq, *J* = 13.1, 3.8 Hz, 2H), 1.55 (dt, *J* = 13.1, 4.1 Hz, 1H), 1.41 – 1.14 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.65, 154.07, 147.90, 143.62, 125.77, 121.92, 117.74, 117.49, 64.78, 64.25, 49.03, 33.07, 25.75, 24.96.
ESI HRMS *m/z* $(M+H)^+$ calcd 305.1496, obsd 305.1498.

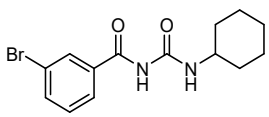


***N*-(cyclohexylcarbamoyl)-[1,1'-biphenyl]-4-carboxamide (5).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 63% yield (40.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.67 (s, 1H), 8.72 (d, *J* = 7.7 Hz, 1H), 8.01 (d, *J* = 8.0 Hz, 2H), 7.59 (dd, *J* = 26.9, 7.7 Hz, 4H), 7.48 – 7.28 (m, 3H), 3.88 – 3.48 (m, 1H), 2.06 – 1.83 (m, 2H), 1.79 – 1.63 (m, 2H), 1.59 – 1.48 (m, 1H), 1.43 – 1.05 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.13, 153.83, 145.89, 139.87, 131.29, 129.17, 128.60, 128.46, 127.49, 127.41, 49.14, 33.00, 25.74, 24.86.
ESI HRMS *m/z* $(M+H)^+$ calcd 323.1754, obsd 323.1757.



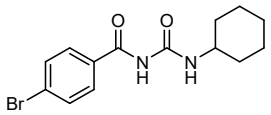
3-chloro-*N*-(cyclohexylcarbamoyl)benzamide (6). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 55% yield (30.8 mg). White solid. Electricity = 4.4 F mol^{-1}.
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.45 (s, 1H), 8.72 (d, *J* = 7.9 Hz, 1H), 8.21 (s, 1H), 7.92 (d, *J* = 7.9 Hz, 1H), 7.63 (d, *J* = 7.9 Hz, 1H), 7.27 (t, *J* = 7.9 Hz, 1H), 3.82 (dp, *J* = 14.2, 4.4 Hz, 1H), 2.05 – 1.81 (m, 2H), 1.67 (dd, *J* = 9.3, 4.3 Hz, 2H), 1.60 – 1.49 (m, 2H), 1.44 – 1.15 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.29, 153.97, 135.96, 134.70, 131.31, 130.26, 127.02, 122.94, 48.90, 33.03, 25.70, 24.83.
ESI HRMS *m/z* $(M+H)^+$ calcd 281.1051, obsd 281.1052.



3-bromo-*N*-(cyclohexylcarbamoyl)benzamide (7). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 57% yield (36.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ10.76 – 10.22 (m, 1H), 8.72 (s, 1H), 8.08 (s, 1H), 7.88 (d, *J* = 7.0 Hz, 1H), 7.48 (d, *J* = 8.0 Hz, 1H), 7.34 (t, *J* = 7.9 Hz, 1H), 4.02 – 3.53 (m, 1H), 2.02 – 1.85 (m, 2H), 1.68 (dt, *J* = 13.1, 3.9 Hz, 2H), 1.55 (dt, *J* = 13.2, 4.0 Hz, 1H), 1.41 – 1.11 (m, 5H);^{13}C NMR (101 MHz, $CDCl_3$) δ 167.41, 154.07, 134.98, 134.48, 133.02, 130.00, 128.46, 126.61, 48.98, 33.02, 25.70, 24.84.

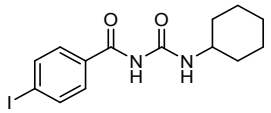
ESI HRMS *m/z* $(M+H)^+$ calcd 325.0546, obsd 325.0549.



4-bromo-*N*-(cyclohexylcarbamoyl)benzamide (8). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 83% yield (53.8 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.39 (s, 1H), 8.71 (d, *J* = 7.6 Hz, 1H), 7.88 (d, *J* = 8.3 Hz, 2H), 7.52 (d, *J* = 8.3 Hz, 2H), 3.68 (dtq, *J* = 10.8, 7.8, 3.9 Hz, 1H), 1.89 (dt, *J* = 12.2, 3.8 Hz, 2H), 1.76 – 1.65 (m, 2H), 1.57 (dt, *J* = 13.2, 4.0 Hz, 1H), 1.42 – 1.16 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.80, 154.16, 131.98, 131.55, 129.92, 128.11, 49.24, 32.87, 25.70, 24.82.

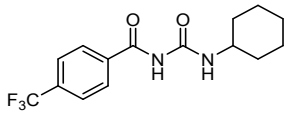
ESI HRMS *m/z* $(M+H)^+$ calcd 325.0546, obsd 325.0544.



***N*-(cyclohexylcarbamoyl)-4-iodobenzamide (9).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 75% yield (55.8 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.17 (s, 1H), 8.67 (d, *J* = 7.7 Hz, 1H), 7.91 – 7.62 (m, 4H), 3.67 (tdt, *J* = 11.3, 7.9, 3.9 Hz, 1H), 1.97 – 1.83 (m, 2H), 1.70 (dt, *J* = 13.5, 4.0 Hz, 2H), 1.57 (dt, *J* = 13.1, 4.0 Hz, 1H), 1.41 – 1.14 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.96, 153.98, 138.04, 132.14, 129.73, 100.77, 49.23, 32.90, 25.71, 24.83.

ESI HRMS *m/z* $(M+H)^+$ calcd 373.0407, obsd 373.0405.

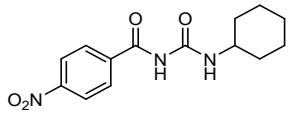


***N*-(cyclohexylcarbamoyl)-4-(trifluoromethyl)benzamide (10).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 50% yield (31.4 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.50 (s, 1H), 8.67 (d, *J* = 7.6 Hz, 1H), 8.11 (d, *J* = 8.1

Hz, 2H), 7.65 (d, *J* = 8.1 Hz, 2H), 3.97 – 3.21 (m, 1H), 1.90 (dt, *J* = 11.9, 3.6 Hz, 2H), 1.70 (dt, *J* = 13.2, 3.8 Hz, 2H), 1.58 (dt, *J* = 13.1, 4.0 Hz, 1H), 1.42 – 1.09 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.52, 154.05, 136.01, 134.51 (q, *J* = 33.0 Hz), 128.83, 125.70 (q, *J* = 3.8 Hz), 123.71 (q, *J* = 272.8 Hz), 49.40, 32.88, 25.70, 24.80.

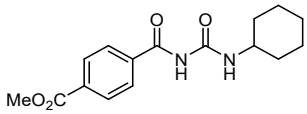
ESI HRMS *m/z* $(M+H)^+$ calcd 315.1315, obsd 315.1314.



***N*-(cyclohexylcarbamoyl)-4-nitrobenzamide (11).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 45% yield (26.2 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.72 (s, 1H), 8.66 (d, *J* = 7.5 Hz, 1H), 8.22 (q, *J* = 8.5 Hz, 4H), 3.68 (dq, *J* = 14.6, 5.4 Hz, 1H), 2.05 – 1.85 (m, 2H), 1.76 – 1.66 (m, 2H), 1.65 – 1.56 (m, 1H), 1.45 – 1.12 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.81, 153.98, 150.49, 138.18, 129.68, 123.79, 49.46, 32.82, 25.66, 24.75.

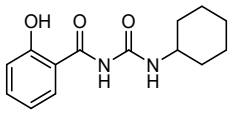
ESI HRMS *m/z* $(M+H)^+$ calcd 292.1292, obsd 292.1293.



Methyl 4-((cyclohexylcarbamoyl)carbamoyl)benzoate (12). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 57% yield (34.7 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.44 (s, 1H), 8.70 (d, *J* = 7.6 Hz, 1H), 8.05 (s, 4H), 3.88 (s, 3H), 3.69 (dt, *J* = 10.5, 4.7 Hz, 1H), 2.00 – 1.85 (m, 2H), 1.75 – 1.64 (m, 2H), 1.62 – 1.50 (m, 1H), 1.43 – 1.04 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.86, 166.29, 154.02, 136.51, 133.92, 129.83, 128.33, 52.65, 49.23, 32.85, 25.70, 24.73.

ESI HRMS *m/z* $(M+H)^+$ calcd 305.1496, obsd 305.1496.

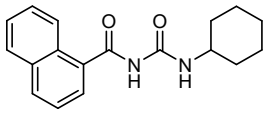


***N*-(cyclohexylcarbamoyl)-2-hydroxybenzamide (13).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 79% yield (41.4 mg). Brown oil. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 14.27 (s, 1H), 7.21 (d, *J* = 7.9 Hz, 2H), 6.84 (d, *J* = 8.3 Hz, 1H), 6.75 (t, *J* = 7.5 Hz, 1H), 6.49 (s, 1H), 6.26 (s, 1H), 3.44 (tt, *J* = 9.2, 3.8 Hz, 1H), 1.81 – 1.64 (m, 4H), 1.64 – 1.51 (m, 1H), 1.45 (q, *J* = 10.2, 9.5 Hz, 2H), 1.27 (h, *J* = 11.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.56, 165.40, 162.45, 132.96, 129.57, 118.62, 118.08, 115.80,

61.81, 34.12, 25.47, 24.13.

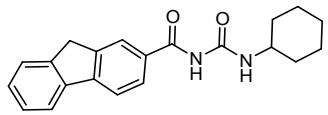
ESI HRMS *m/z* $(M+H)^+$ calcd 263.1390, obsd 263.1394.



***N*-(cyclohexylcarbamoyl)-1-naphthamide (14).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 62% yield (36.7 mg). White solid. Electricity = 4.4 F mol^{-1}.

^1H NMR (400 MHz, Chloroform-*d*) δ 9.54 (s, 1H), 8.55 (d, *J* = 7.7 Hz, 1H), 8.30 (d, *J* = 8.3 Hz, 1H), 7.90 (d, *J* = 8.2 Hz, 1H), 7.80 (d, *J* = 7.9 Hz, 1H), 7.71 (d, *J* = 7.1 Hz, 1H), 7.48 (dt, *J* = 18.3, 7.1 Hz, 2H), 7.39 (t, *J* = 7.7 Hz, 1H), 3.54 (qd, *J* = 10.3, 9.9, 4.3 Hz, 1H), 1.83 (dd, *J* = 11.1, 5.3 Hz, 2H), 1.73 – 1.61 (m, 2H), 1.52 (dd, *J* = 10.8, 6.3 Hz, 1H), 1.36 – 1.05 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.46, 153.49, 133.85, 132.38, 131.66, 130.20, 128.63, 127.70, 126.71, 125.22, 124.53, 49.04, 32.92, 25.67, 24.84.

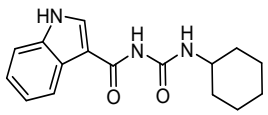
ESI HRMS *m/z* $(M+H)^+$ calcd 297.1598, obsd 297.1599.



***N*-(cyclohexylcarbamoyl)-9H-fluorene-2-carboxamide (15).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 51% yield (34.0 mg). White solid. Electricity = 4.4 F mol^{-1}.

^1H NMR (400 MHz, Chloroform-*d*) δ 9.51 (s, 1H), 8.75 (d, *J* = 7.7 Hz, 1H), 8.11 (s, 1H), 7.94 (d, *J* = 8.0 Hz, 1H), 7.77 (d, *J* = 7.7 Hz, 2H), 7.51 (d, *J* = 7.1 Hz, 1H), 7.33 (p, *J* = 7.4 Hz, 2H), 3.89 (s, 2H), 3.82 – 3.70 (m, 1H), 2.06 – 1.85 (m, 2H), 1.76 – 1.65 (m, 2H), 1.60 – 1.50 (m, 1H), 1.41 – 1.24 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.60, 153.83, 146.59, 144.46, 143.67, 140.54, 130.77, 128.30, 127.30, 127.15, 125.44, 124.73, 121.02, 120.02, 49.02, 37.07, 33.07, 25.76, 24.86.

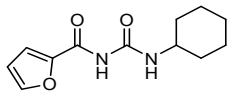
ESI HRMS *m/z* $(M+H)^+$ calcd 335.1754, obsd 335.1753.



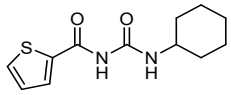
***N*-(cyclohexylcarbamoyl)-1H-indole-3-carboxamide (16).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/2) in 79% yield (45.0 mg). White solid. Electricity = 4.4 F mol^{-1}.

^1H NMR (400 MHz, Chloroform-*d*) δ 9.71 (s, 1H), 9.12 (s, 1H), 8.95 (d, *J* = 7.8 Hz, 1H), 8.25 – 8.14 (m, 2H), 7.34 (dd, *J* = 6.1, 3.2 Hz, 1H), 7.25 – 7.13 (m, 2H), 3.74 (dt, *J* = 9.1, 4.7 Hz, 1H), 1.90 (p, *J* = 5.1 Hz, 2H), 1.66 (t, *J* = 4.7 Hz, 2H), 1.55 – 1.44 (m, 1H), 1.29 (p, *J* = 9.4 Hz,

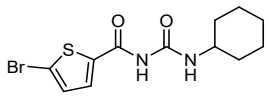
4H), 1.18 (td, *J* = 11.3, 5.7 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.08, 154.94, 136.43, 129.68, 126.12, 123.69, 122.50, 121.46, 111.88, 110.40, 49.00, 33.09, 25.69, 24.81.
ESI HRMS *m/z* $(M+H)^+$ calcd 286.1550, obsd 286.1554.



***N*-(cyclohexylcarbamoyl)furan-2-carboxamide (17).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (8/1) in 70% yield (33.0 mg). White solid. Electricity = 4.4 F mol^{-1}.
^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.56 (s, 1H), 8.29 (d, *J* = 7.9 Hz, 1H), 7.49 (s, 1H), 7.27 (d, *J* = 3.6 Hz, 1H), 6.51 (d, *J* = 3.5 Hz, 1H), 3.71 (qd, *J* = 9.4, 4.4 Hz, 1H), 1.99 – 1.83 (m, 2H), 1.74 – 1.61 (m, 2H), 1.59 – 1.46 (m, 1H), 1.27 (dp, *J* = 39.1, 12.6, 11.6 Hz, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 158.22, 152.42, 146.04, 146.01, 117.57, 113.02, 48.96, 33.01, 25.66, 24.72.
ESI HRMS *m/z* $(M+H)^+$ calcd 237.1234, obsd 237.1235.



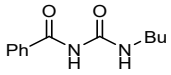
***N*-(cyclohexylcarbamoyl)thiophene-2-carboxamide (18).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (8/1) in 68% yield (34.3 mg). White solid. Electricity = 4.4 F mol^{-1}.
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.50 (s, 1H), 8.65 (d, *J* = 7.6 Hz, 1H), 8.11 (d, *J* = 3.9 Hz, 1H), 7.56 (d, *J* = 4.9 Hz, 1H), 7.04 (t, *J* = 4.5 Hz, 1H), 3.74 (qd, *J* = 10.1, 9.3, 4.2 Hz, 1H), 2.12 – 1.80 (m, 2H), 1.76 – 1.64 (m, 2H), 1.60 – 1.48 (m, 1H), 1.42 – 1.09 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 163.22, 154.23, 138.02, 133.37, 131.02, 128.24, 49.20, 32.90, 25.70, 24.77.
ESI HRMS *m/z* $(M+H)^+$ calcd 253.1005, obsd 253.1004.



5-bromo-*N*-(cyclohexylcarbamoyl)thiophene-2-carboxamide (19). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (8/1) in 66% yield (43.6 mg). White solid. Electricity = 4.4 F mol^{-1}.
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.63 (s, 1H), 8.56 (d, *J* = 7.6 Hz, 1H), 7.90 (d, *J* = 4.1 Hz, 1H), 7.00 (d, *J* = 4.1 Hz, 1H), 3.69 (hept, 1H), 2.04 – 1.79 (m, 2H), 1.75 – 1.64 (m, 2H), 1.59 – 1.50 (m, 1H), 1.43 – 1.09 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 162.15, 154.21,

139.36, 131.52, 131.33, 121.74, 49.36, 32.88, 25.68, 24.81.

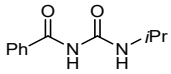
ESI HRMS *m/z* $(M+H)^+$ calcd 331.0110, obsd 331.0113.



***N*-(butylcarbamoyl)benzamide (20).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 70% yield (30.8 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.95 (s, 1H), 8.76 (t, *J* = 5.8 Hz, 1H), 8.06 – 7.83 (m, 2H), 7.56 – 7.46 (m, 1H), 7.40 (t, *J* = 7.6 Hz, 2H), 3.29 (td, *J* = 7.1, 5.7 Hz, 2H), 1.52 (p, *J* = 7.2 Hz, 2H), 1.34 (h, *J* = 7.3 Hz, 2H), 0.88 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.57, 154.88, 133.09, 132.66, 128.78, 128.14, 39.76, 31.77, 20.27, 13.90.

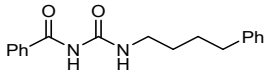
ESI HRMS *m/z* $(M+H)^+$ calcd 221.1285, obsd 221.1286.



***N*-(isopropylcarbamoyl)benzamide (21).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 53% yield (21.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.03 (s, 1H), 8.65 (d, *J* = 7.5 Hz, 1H), 7.96 (d, *J* = 7.3 Hz, 2H), 7.50 (t, *J* = 7.4 Hz, 1H), 7.40 (t, *J* = 7.6 Hz, 2H), 4.12 – 3.89 (m, *J* = 6.6 Hz, 1H), 1.20 (d, *J* = 6.6 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.59, 154.11, 133.06, 132.69, 128.78, 128.14, 42.38, 22.85.

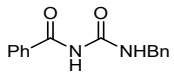
ESI HRMS *m/z* $(M+H)^+$ calcd 207.1128, obsd 207.1129.



***N*-((4-phenylbutyl)carbamoyl)benzamide (22).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 55% yield (32.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.72 (s, 1H), 8.74 (s, 1H), 7.91 (d, *J* = 7.7 Hz, 2H), 7.49 (t, *J* = 7.4 Hz, 1H), 7.39 (t, *J* = 7.6 Hz, 2H), 7.24 – 7.16 (m, 2H), 7.13 – 7.06 (m, 3H), 3.31 (q, *J* = 6.4 Hz, 2H), 2.58 (t, *J* = 7.3 Hz, 2H), 1.84 – 1.48 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.48, 154.72, 142.22, 133.14, 132.63, 128.84, 128.57, 128.51, 128.06, 125.98, 39.89, 35.67, 29.37, 28.86.

ESI HRMS *m/z* $(M+H)^+$ calcd 297.1598, obsd 297.1597.

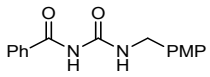


***N*-(benzylcarbamoyl)benzamide (23).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate

(7/1) in 61% yield (30.5 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.87 (s, 1H), 9.21 (s, 1H), 8.16 – 7.90 (m, 2H), 7.56 (t, *J* = 7.4 Hz, 1H), 7.43 (t, *J* = 7.7 Hz, 2H), 7.38 – 7.24 (m, 5H), 4.57 (d, *J* = 5.9 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.53, 154.85, 138.26, 133.23, 132.49, 128.89, 128.87, 128.07, 127.68, 127.62, 43.94.

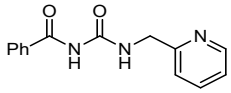
ESI HRMS *m/z* $(M+H)^+$ calcd 255.1128, obsd 255.1129.



***N*-((4-methoxybenzyl)carbamoyl)benzamide (24).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 56% yield (31.8 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.97 (s, 1H), 9.09 (s, 1H), 7.93 (d, *J* = 7.7 Hz, 2H), 7.49 (t, *J* = 7.4 Hz, 1H), 7.37 (t, *J* = 7.6 Hz, 2H), 7.20 (d, *J* = 8.5 Hz, 2H), 6.79 (d, *J* = 8.3 Hz, 2H), 4.42 (d, *J* = 5.8 Hz, 2H), 3.72 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.56, 159.12, 154.85, 133.17, 132.55, 130.42, 129.10, 128.84, 128.13, 114.21, 55.46, 43.40.

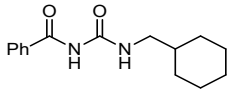
ESI HRMS *m/z* $(M+H)^+$ calcd 285.1234, obsd 285.1233.



***N*-((pyridin-2-ylmethyl)carbamoyl)benzamide (25).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (4/1) in 61% yield (31.1 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.32 (s, 1H), 9.54 (t, *J* = 5.5 Hz, 1H), 8.51 (d, *J* = 4.9 Hz, 1H), 7.95 (d, *J* = 7.8 Hz, 2H), 7.59 – 7.51 (m, 1H), 7.46 (t, *J* = 7.4 Hz, 1H), 7.32 (t, *J* = 7.6 Hz, 2H), 7.23 (d, *J* = 7.9 Hz, 1H), 7.10 (t, *J* = 6.2 Hz, 1H), 4.63 (d, *J* = 5.6 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.62, 157.22, 155.24, 149.50, 136.84, 133.06, 132.42, 128.68, 128.21, 122.37, 121.34, 45.41.

ESI HRMS *m/z* $(M+H)^+$ calcd 256.1081, obsd 256.1080.

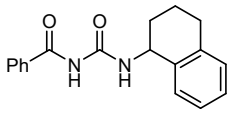


***N*-((cyclohexylmethyl)carbamoyl)benzamide (26).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 67% yield (34.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.92 (s, 1H), 8.82 (t, *J* = 5.9 Hz, 1H), 7.96 (dd, *J* = 7.9, 1.6 Hz, 2H), 7.57 – 7.47 (m, 1H), 7.41 (t, *J* = 7.7 Hz, 2H), 3.14 (t, *J* = 6.3 Hz, 2H), 1.76 – 1.64 (m, 4H), 1.63 – 1.57 (m, 1H), 1.50 (ttt, *J* = 10.4, 6.8, 3.4 Hz, 1H), 1.23 – 1.08 (m, 3H), 0.91

(qd, J = 11.9, 3.0 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.57, 154.91, 133.11, 132.64, 128.79, 128.14, 46.33, 38.06, 31.01, 26.54, 25.99.

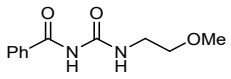
ESI HRMS m/z $(M+H)^+$ calcd 261.1598, obsd 261.1598.



***N*-((1,2,3,4-tetrahydronaphthalen-1-yl)carbamoyl)benzamide (27).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 67% yield (39.4 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.04 (s, 1H), 9.08 (s, 1H), 8.27 – 7.79 (m, 2H), 7.59 – 7.24 (m, 4H), 7.19 – 6.99 (m, 3H), 5.27 – 5.03 (m, 1H), 2.97 – 2.60 (m, 2H), 2.15 – 1.98 (m, 1H), 1.95 – 1.74 (m, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.48, 154.44, 137.49, 136.60, 133.17, 132.58, 129.34, 128.82, 128.14, 127.51, 126.47, 48.46, 30.31, 29.34, 20.16.

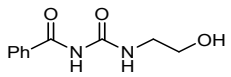
ESI HRMS m/z $(M+H)^+$ calcd 295.1441, obsd 295.1440.



***N*-((2-methoxyethyl)carbamoyl)benzamide (28).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 61% yield (27.1 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.76 (s, 1H), 8.92 (s, 1H), 8.03 – 7.84 (m, 2H), 7.54 – 7.47 (m, 1H), 7.40 (t, J = 7.7 Hz, 2H), 3.55 – 3.44 (m, 4H), 3.32 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.38, 154.89, 133.14, 132.62, 128.83, 128.09, 71.12, 59.06, 39.86.

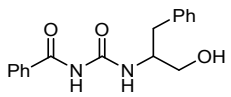
ESI HRMS m/z $(M+H)^+$ calcd 223.1077, obsd 223.1077.



***N*-((2-hydroxyethyl)carbamoyl)benzamide (29).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 79% yield (32.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.71 (s, 1H), 9.01 (t, J = 5.5 Hz, 1H), 7.86 (d, J = 7.7 Hz, 2H), 7.50 (t, J = 7.4 Hz, 1H), 7.38 (t, J = 7.5 Hz, 2H), 3.72 (t, J = 5.0 Hz, 2H), 3.45 (q, J = 5.4 Hz, 2H), 2.76 (s, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.56, 155.73, 133.28, 132.43, 128.91, 128.00, 62.32, 42.91.

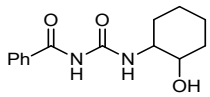
ESI HRMS m/z $(M+H)^+$ calcd 209.0921, obsd 209.0921.



***N*-((1-hydroxy-3-phenylpropan-2-yl)carbamoyl)benzamide (30).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 72% yield (42.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.51 (s, 1H), 9.03 (d, *J* = 7.6 Hz, 1H), 7.91 (d, *J* = 7.7 Hz, 2H), 7.57 (t, *J* = 7.4 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 2H), 7.25 (dp, *J* = 15.3, 7.3 Hz, 5H), 4.19 (ddd, *J* = 12.6, 6.6, 3.5 Hz, 1H), 3.76 (ddd, *J* = 10.0, 5.7, 3.8 Hz, 1H), 3.66 (dt, *J* = 10.9, 5.3 Hz, 1H), 3.07 – 2.88 (m, 2H), 2.59 (t, *J* = 5.5 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.44, 154.91, 137.80, 133.29, 132.50, 129.46, 128.97, 128.77, 127.96, 126.83, 64.45, 54.21, 37.55.

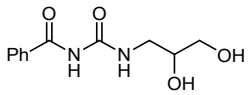
ESI HRMS *m/z* $(M+H)^+$ calcd 299.1390, obsd 299.1390.



***N*-((2-hydroxycyclohexyl)carbamoyl)benzamide (31).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 57% yield (29.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.59 (s, 1H), 8.79 (d, *J* = 7.5 Hz, 1H), 7.86 (d, *J* = 7.7 Hz, 2H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.41 (t, *J* = 7.6 Hz, 2H), 3.57 (td, *J* = 10.6, 7.0 Hz, 1H), 3.41 (td, *J* = 9.7, 4.2 Hz, 1H), 2.88 (s, 1H), 2.14 – 1.90 (m, 2H), 1.67 (td, *J* = 7.1, 3.8 Hz, 2H), 1.44 – 1.10 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.56, 155.68, 133.30, 132.45, 128.95, 127.99, 74.95, 56.35, 34.38, 31.57, 24.82, 24.15.

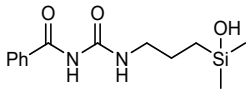
ESI HRMS *m/z* $(M+H)^+$ calcd 263.1390, obsd 263.1394.



***N*-((2,3-dihydroxypropyl)carbamoyl)benzamide (32).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 42% yield (20.0 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, DMSO-d_6) δ 10.71 (s, 1H), 8.83 (t, *J* = 5.4 Hz, 1H), 7.95 (d, *J* = 7.6 Hz, 2H), 7.60 (t, *J* = 7.4 Hz, 1H), 7.49 (t, *J* = 7.6 Hz, 2H), 5.00 (d, *J* = 5.0 Hz, 1H), 4.70 (t, *J* = 5.6 Hz, 1H), 3.56 (q, *J* = 5.7 Hz, 1H), 3.49 – 3.41 (m, 1H), 3.38 – 3.33 (m, 1H), 3.27 (dt, *J* = 11.2, 6.1 Hz, 1H), 3.14 – 3.02 (m, 1H); ^{13}C NMR (101 MHz, DMSO) δ 168.67, 154.18, 133.19, 133.10, 128.97, 128.58, 70.41, 64.19, 43.00.

ESI HRMS *m/z* $(M+H)^+$ calcd 239.1026, obsd 239.1028.

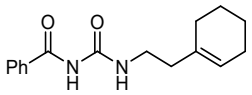


***N*-((3-(hydroxydimethylsilyl)propyl)carbamoyl)benzamide (33)**. The title product was

prepared with 3-Aminopropyldimethylethoxysilane (0.4 mmol) following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 44% yield (24.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.29 (s, 1H), 8.81 (d, *J* = 6.0 Hz, 1H), 7.92 (d, *J* = 7.7 Hz, 2H), 7.57 (t, *J* = 7.4 Hz, 1H), 7.45 (t, *J* = 7.6 Hz, 2H), 3.34 (q, *J* = 6.8 Hz, 2H), 1.71 (s, 1H), 1.68 – 1.55 (m, 2H), 0.73 – 0.48 (m, 2H), 0.07 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.27, 154.28, 133.14, 132.71, 128.95, 127.89, 43.12, 23.80, 15.71, 0.51.

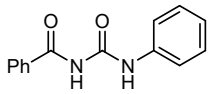
ESI HRMS *m/z* $(M+H)^+$ calcd 281.1316, obsd 281.1317.



***N*-((2-(cyclohex-1-en-1-yl)ethyl)carbamoyl)benzamide (34).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 45% yield (24.5 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.59 (s, 1H), 8.74 (t, *J* = 5.4 Hz, 1H), 7.98 (d, *J* = 7.2 Hz, 2H), 7.58 (t, *J* = 7.3 Hz, 1H), 7.48 (t, *J* = 7.6 Hz, 2H), 5.53 (s, 1H), 3.44 (q, *J* = 6.9 Hz, 2H), 2.23 (t, *J* = 7.1 Hz, 2H), 2.09 – 1.92 (m, 4H), 1.68 – 1.43 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.28, 154.49, 134.53, 133.09, 132.73, 128.88, 127.99, 123.92, 38.40, 37.86, 28.20, 25.43, 23.03, 22.52.

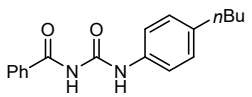
ESI HRMS *m/z* $(M+Na)^+$ calcd 295.1417, obsd 295.1416.



***N*-(phenylcarbamoyl)benzamide (35).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 70% yield (33.6 mg). White solid. Electricity = 4.4 F mol^{-1}. The 0.5 mmol scale was carried out at 0.1M concentration, delivering **35** in 67% yield (80.4 mg).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 11.05 (s, 1H), 10.16 (s, 1H), 8.13 (d, *J* = 7.7 Hz, 2H), 7.75 – 7.60 (m, 3H), 7.54 (t, *J* = 7.6 Hz, 2H), 7.39 (t, *J* = 7.8 Hz, 2H), 7.19 (t, *J* = 7.4 Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.90, 152.37, 137.43, 133.51, 132.34, 129.18, 129.01, 128.27, 124.61, 120.65.

ESI HRMS *m/z* $(M+H)^+$ calcd 241.0972, obsd 241.0970.

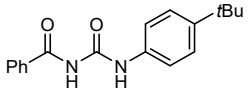


***N*-((4-butylphenyl)carbamoyl)benzamide (36).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum

ether/ethyl acetate (7/1) in 83% yield (49.2 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.02 (s, 1H), 10.78 (s, 1H), 8.02 (d, J = 7.7 Hz, 2H), 7.64 (t, J = 7.4 Hz, 1H), 7.53 (t, J = 7.6 Hz, 2H), 7.47 (d, J = 8.1 Hz, 2H), 7.15 (d, J = 8.1 Hz, 2H), 2.53 (t, J = 7.7 Hz, 2H), 1.52 (p, J = 7.4 Hz, 2H), 1.28 (h, J = 7.5 Hz, 2H), 0.88 (t, J = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, DMSO) δ 169.15, 151.56, 138.25, 135.69, 133.50, 132.75, 129.19, 129.03, 128.75, 120.33, 34.68, 33.69, 22.18, 14.26.

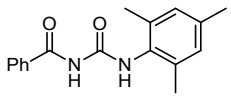
ESI HRMS m/z $(M+H)^+$ calcd 297.1598, obsd 297.1597.



***N*-((4-(tert-butyl)phenyl)carbamoyl)benzamide (37).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 77% yield (45.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-d) δ 10.91 (s, 1H), 10.30 (s, 1H), 8.05 (d, J = 7.5 Hz, 2H), 7.55 (t, J = 7.4 Hz, 1H), 7.47 – 7.38 (m, 4H), 7.29 (d, J = 8.3 Hz, 2H), 1.26 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.92, 152.59, 147.56, 134.72, 133.37, 132.36, 128.92, 128.37, 125.93, 120.47, 34.55, 31.56.

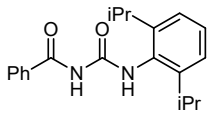
ESI HRMS m/z $(M+H)^+$ calcd 297.1598, obsd 297.1597.



***N*-(mesitylcarbamoyl)benzamide (38).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 63% yield (35.5 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-d) δ 10.09 (d, J = 7.3 Hz, 2H), 7.94 (d, J = 7.6 Hz, 2H), 7.56 – 7.44 (m, 1H), 7.28 (t, J = 7.8 Hz, 2H), 6.86 (s, 2H), 2.24 (s, 3H), 2.18 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.73, 153.27, 137.04, 135.34, 133.29, 132.11, 130.86, 128.95, 128.84, 128.19, 21.14, 18.61.

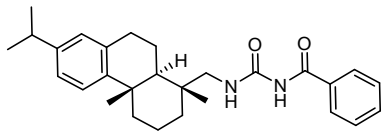
ESI HRMS m/z $(M+H)^+$ calcd 283.1441, obsd 283.1442.



***N*-((2,6-diisopropylphenyl)carbamoyl)benzamide (39).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 68% yield (44.1 mg). White solid. Electricity = 4.4 F mol^{-1}.

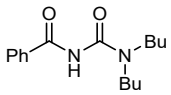
^{1}H NMR (400 MHz, Chloroform-d) δ 10.04 (s, 1H), 9.50 (s, 1H), 8.04 – 7.83 (m, 2H), 7.56 – 7.42 (m, 1H), 7.28 (t, J = 7.7 Hz, 3H), 7.15 (d, J = 7.7 Hz, 2H), 3.11 (h, J = 6.9 Hz, 2H), 1.15

(s, 6H), 1.13 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.55, 153.61, 146.41, 133.40, 132.05, 130.65, 128.99, 128.49, 128.02, 123.58, 29.03, 24.14.
ESI HRMS *m/z* $(M+H)^+$ calcd 325.1911, obsd 325.1910.



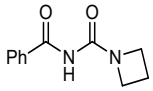
***N*-((((1R,4aS,10aR)-7-isopropyl-1,4a-dimethyl-1,2,3,4,4a,9,10,10a-octahydrophenanthren-1-yl)methyl)carbamoyl)benzamide (40).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 52% yield (45.0 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.82 (s, 1H), 8.99 (t, *J* = 6.4 Hz, 1H), 7.99 (d, *J* = 7.2 Hz, 2H), 7.57 (t, *J* = 7.3 Hz, 1H), 7.47 (t, *J* = 7.6 Hz, 2H), 7.17 (d, *J* = 8.2 Hz, 1H), 6.99 (dd, *J* = 8.2, 2.0 Hz, 1H), 6.87 (d, *J* = 1.9 Hz, 1H), 3.38 (dd, *J* = 13.5, 6.6 Hz, 1H), 3.18 (dd, *J* = 13.6, 6.3 Hz, 1H), 2.97 – 2.70 (m, 3H), 2.28 (dd, *J* = 12.8, 3.4 Hz, 1H), 1.95 (dt, *J* = 12.3, 4.0 Hz, 1H), 1.86 – 1.62 (m, 4H), 1.52 (ddd, *J* = 12.0, 9.3, 2.6 Hz, 2H), 1.40 (dq, *J* = 12.8, 7.5, 6.6 Hz, 2H), 1.29 – 1.16 (m, 8H), 0.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.69, 155.02, 147.28, 145.70, 135.00, 133.13, 132.69, 128.82, 128.11, 127.12, 124.47, 124.02, 50.71, 45.47, 38.38, 37.70, 36.40, 33.58, 30.56, 25.69, 24.15, 24.12, 19.30, 18.84, 18.81.
ESI HRMS *m/z* $(M+H)^+$ calcd 433.2850, obsd 433.2851.



***N*-(dibutylcarbamoyl)benzamide (41).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 80% yield (44.2 mg). White solid. Electricity = 4.4 F mol^{-1}.

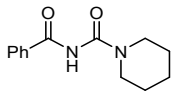
^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.83 (s, 1H), 7.80 (d, *J* = 7.7 Hz, 2H), 7.46 (t, *J* = 7.3 Hz, 1H), 7.37 (t, *J* = 7.5 Hz, 2H), 3.26 (t, *J* = 7.4 Hz, 4H), 1.51 (p, *J* = 7.4 Hz, 4H), 1.25 (q, *J* = 7.5 Hz, 4H), 0.84 (t, *J* = 7.3 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.77, 154.49, 133.35, 132.56, 128.65, 128.09, 47.70, 30.16, 20.14, 13.98.
ESI HRMS *m/z* $(M+H)^+$ calcd 277.1911, obsd 277.1910.



***N*-benzoylazetidine-1-carboxamide (42).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 52% yield (21.2 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.27 (s, 1H), 7.93 (d, *J* = 7.7 Hz, 2H), 7.55 (t, *J* = 7.4 Hz, 1H), 7.46 (t, *J* = 7.6 Hz, 2H), 4.20 (s, 4H), 2.30 (p, *J* = 7.8 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 154.88, 132.95, 132.80, 128.76, 128.22, 52.76, 49.21, 16.12.

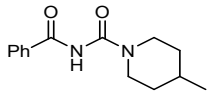
ESI HRMS *m/z* $(M+H)^+$ calcd 205.0972, obsd 205.0970.



***N*-benzoylpiperidine-1-carboxamide (43).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 66% yield (30.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.01 (s, 1H), 7.84 (d, *J* = 7.4 Hz, 2H), 7.46 (t, *J* = 7.4 Hz, 1H), 7.37 (t, *J* = 7.6 Hz, 2H), 3.56 – 3.23 (m, 4H), 1.65 – 1.45 (m, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.25, 153.73, 133.07, 132.66, 128.69, 128.15, 46.57, 25.82, 24.34.

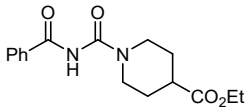
ESI HRMS *m/z* $(M+H)^+$ calcd 233.1285, obsd 233.1284.



***N*-benzoyl-4-methylpiperidine-1-carboxamide (44).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 69% yield (34.0 mg). Brown oil. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.92 (s, 1H), 7.83 (dd, *J* = 8.4, 1.3 Hz, 2H), 7.52 – 7.44 (m, 1H), 7.38 (t, *J* = 7.7 Hz, 2H), 4.29 – 3.54 (m, 2H), 3.03 – 2.69 (m, 2H), 1.66 – 1.56 (m, 2H), 1.56 – 1.46 (m, 1H), 1.27 – 1.11 (m, 2H), 0.89 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.22, 153.60, 133.07, 132.71, 128.74, 128.12, 46.43, 34.02, 30.90, 21.79.

ESI HRMS *m/z* $(M+H)^+$ calcd 247.1441, obsd 247.1442.

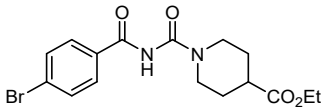


Ethyl 1-(benzoylcarbamoyl)piperidine-4-carboxylate (45). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 81% yield (49.3 mg). Colorless oil. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.07 (s, 1H), 7.84 (d, *J* = 7.4 Hz, 2H), 7.48 (t, *J* = 7.4 Hz, 1H), 7.42 – 7.34 (m, 2H), 4.08 (q, *J* = 7.1 Hz, 2H), 4.00 – 3.79 (m, 2H), 3.04 (t, *J* = 11.6 Hz, 2H), 2.46 (tt, *J* = 10.7, 4.0 Hz, 1H), 1.90 (dq, *J* = 12.2, 3.9 Hz, 2H), 1.74 (ddt, *J* = 13.7, 10.6,

5.5 Hz, 2H), 1.19 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.28, 166.28, 153.80, 132.83, 128.74, 128.15, 60.77, 45.36, 40.82, 27.96, 14.32.

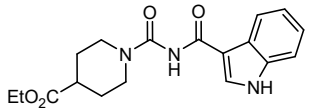
ESI HRMS *m/z* $(M+H)^+$ calcd 305.1496, obsd 305.1496.



Ethyl 1-((4-bromobenzoyl)carbamoyl)piperidine-4-carboxylate (46). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 98% yield (74.9 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.32 (s, 1H), 7.72 (d, *J* = 8.3 Hz, 2H), 7.51 (d, *J* = 8.3 Hz, 2H), 4.08 (q, *J* = 7.1 Hz, 2H), 3.96 – 3.79 (m, 2H), 3.04 (t, *J* = 11.3 Hz, 2H), 2.47 (t, *J* = 10.4 Hz, 1H), 1.90 (dd, *J* = 13.5, 4.1 Hz, 2H), 1.83 – 1.64 (m, 2H), 1.19 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.19, 165.55, 153.82, 131.98, 131.71, 129.88, 127.81, 60.82, 45.25, 40.77, 27.97, 14.35.

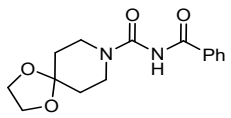
ESI HRMS *m/z* $(M+H)^+$ calcd 383.0601, obsd 383.0605.



Ethyl 1-((1H-indole-3-carbonyl)carbamoyl)piperidine-4-carboxylate (47). The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/2) in 86%yield (59.0 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.98 (s, 1H), 8.85 (s, 1H), 8.11 – 8.04 (m, 1H), 7.95 (s, 1H), 7.37 – 7.27 (m, 1H), 7.12 (p, *J* = 4.9 Hz, 2H), 4.04 (q, *J* = 7.2 Hz, 2H), 4.00 – 3.91 (m, 2H), 2.97 (t, *J* = 12.4 Hz, 2H), 2.39 (dt, *J* = 10.9, 6.3 Hz, 1H), 1.89 – 1.77 (m, 2H), 1.66 (q, *J* = 10.7 Hz, 2H), 1.15 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.50, 164.25, 154.23, 136.61, 130.40, 125.92, 123.34, 122.17, 120.97, 112.28, 110.15, 60.85, 45.08, 40.82, 28.02, 14.32.

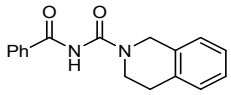
ESI HRMS *m/z* $(M+H)^+$ calcd 344.1605, obsd 344.1608.



***N*-benzoyl-1,4-dioxa-8-azaspiro[4.5]decane-8-carboxamide (48).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/2) in 64% yield (37.2 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.83 (s, 1H), 7.82 (d, *J* = 7.7 Hz, 2H), 7.48 (t, *J* = 7.3 Hz, 1H), 7.38 (t, *J* = 7.5 Hz, 2H), 3.91 (s, 4H), 3.69 – 3.39 (m, 4H), 1.72 (t, *J* = 5.8 Hz, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.33, 153.58, 133.00, 132.81, 128.79, 128.11, 106.96, 64.61, 43.87, 34.94.

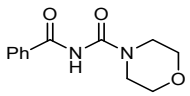
ESI HRMS *m/z* $(M+H)^+$ calcd 291.1339, obsd 291.1337.



***N*-benzoyl-3,4-dihydroisoquinoline-2(1H)-carboxamide (49).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 76% yield (42.6 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.25 (s, 1H), 7.88 (d, *J* = 7.6 Hz, 2H), 7.49 (t, *J* = 7.3 Hz, 1H), 7.39 (t, *J* = 7.6 Hz, 2H), 7.13 – 7.04 (m, 3H), 7.00 (s, 1H), 4.62 (s, 2H), 3.89 – 3.45 (m, 2H), 2.86 (t, *J* = 6.1 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.22, 154.33, 134.56, 132.89, 132.86, 128.91, 128.79, 128.28, 126.86, 126.56, 126.39, 50.39, 43.01, 28.79.

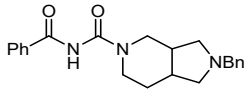
ESI HRMS *m/z* $(M+H)^+$ calcd 281.1285, obsd 281.1283.



***N*-benzoylmorpholine-4-carboxamide (50).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 63% yield (29.5 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.37 (s, 1H), 7.83 (d, *J* = 7.7 Hz, 2H), 7.46 (t, *J* = 7.4 Hz, 1H), 7.36 (t, *J* = 7.6 Hz, 2H), 3.64 (t, *J* = 4.7 Hz, 4H), 3.45 (t, *J* = 4.7 Hz, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.31, 154.13, 132.84, 132.68, 128.66, 128.18, 66.61, 46.18.

ESI HRMS *m/z* $(M+H)^+$ calcd 235.1077, obsd 235.1078.

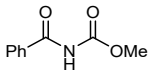


***N*-benzoyl-2-benzyloctahydro-5H-pyrrolo[3,4-c]pyridine-5-carboxamide (51).** The title product was prepared following General Procedure A and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/1) in 40% yield (28.6 mg). Brown oil. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.88 (s, 1H), 7.89 (d, *J* = 7.6 Hz, 2H), 7.56 (t, *J* = 7.4 Hz, 1H), 7.45 (t, *J* = 7.6 Hz, 2H), 7.38 – 7.31 (m, 4H), 7.30 – 7.23 (m, 1H), 4.80 (d, *J* = 41.2 Hz, 1H), 3.80 (s, 1H), 3.75 – 3.63 (m, 2H), 3.13 (t, *J* = 11.4 Hz, 1H), 2.93 – 2.81 (m, 2H), 2.75 (dd, *J* = 9.3, 5.8 Hz, 1H), 2.59 (dd, *J* = 9.2, 2.2 Hz, 1H), 2.29 (t, *J* = 7.9 Hz, 1H), 1.88 – 1.78 (m,

1H), 1.77 – 1.70 (m, 1H), 1.70 – 1.56 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.47, 154.75, 139.22, 133.08, 132.76, 128.76, 128.71, 128.42, 128.10, 127.11, 60.63, 58.80, 54.47, 54.07, 42.61, 35.69, 26.41, 23.28.

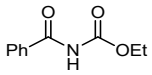
ESI HRMS *m/z* $(M+H)^+$ calcd 364.2020, obsd 364.2021.



Methyl benzoylcarbamate (52). The title product was prepared following General Procedure B with methanol (10.0 eq) and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 59% yield (21.1 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.50 (s, 1H), 7.78 (d, *J* = 7.9 Hz, 2H), 7.55 – 7.45 (m, 1H), 7.38 (t, *J* = 7.5 Hz, 2H), 3.73 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.23, 152.09, 133.10, 133.03, 128.91, 127.85, 53.23.

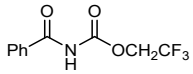
ESI HRMS *m/z* $(M+H)^+$ calcd 180.0655, obsd 180.0656.



Ethyl benzoylcarbamate (53). The title product was prepared following General Procedure B with ethanol (10.0 eq) and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 49% yield (19.0 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.34 (s, 1H), 7.78 (d, *J* = 7.7 Hz, 2H), 7.50 (t, *J* = 7.3 Hz, 1H), 7.40 (t, *J* = 7.7 Hz, 2H), 4.21 (q, *J* = 7.1 Hz, 2H), 1.24 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.19, 151.36, 133.09, 128.94, 127.79, 62.50, 14.35.

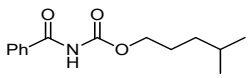
ESI HRMS *m/z* $(M+H)^+$ calcd 194.0812, obsd 194.0812.



2,2,2-trifluoroethyl benzoylcarbamate (54). The title product was prepared following General Procedure B with trifluoroethanol (10.0 eq) and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 75% yield (37.1 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.74 (s, 1H), 7.90 (d, *J* = 7.7 Hz, 2H), 7.60 (t, *J* = 7.3 Hz, 1H), 7.49 (t, *J* = 7.5 Hz, 2H), 4.57 (q, *J* = 8.3 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.97, 149.42, 133.57, 132.47, 129.10, 128.00, 122.81 (q, *J* = 277.2 Hz), 61.45 (q, *J* = 37.3 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -73.90.

ESI HRMS *m/z* $(M+Na)^+$ calcd 270.0348, obsd 270.0348.

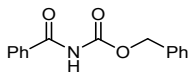


4-methylpentyl benzoylcarbamate (55). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate

(6/1) in 60% yield (29.9 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.32 (s, 1H), 7.85 (d, *J* = 7.7 Hz, 2H), 7.58 (t, *J* = 7.4 Hz, 1H), 7.47 (t, *J* = 7.6 Hz, 2H), 4.21 (t, *J* = 6.9 Hz, 2H), 1.75 – 1.64 (m, 2H), 1.57 (dq, *J* = 13.3, 6.7 Hz, 1H), 1.31 – 1.17 (m, 2H), 0.89 (d, *J* = 6.6 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 151.42, 133.19, 133.07, 128.95, 127.80, 66.92, 34.87, 27.83, 26.63, 22.58.

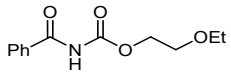
ESI HRMS *m/z* $(M+Na)^+$ calcd 250.1438, obsd 250.1437.



Benzyl benzoylcarbamate (56). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 51% yield (26.0 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.21 (s, 1H), 7.95 – 7.72 (m, 2H), 7.57 (td, *J* = 7.2, 1.3 Hz, 1H), 7.46 (td, *J* = 7.8, 7.3, 1.6 Hz, 2H), 7.42 – 7.33 (m, 5H), 5.24 (s, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.98, 151.00, 135.14, 133.20, 133.09, 129.04, 128.86, 128.84, 127.79, 68.14.

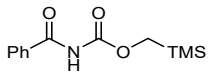
ESI HRMS *m/z* $(M+H)^+$ calcd 256.0968, obsd 256.0967.



2-ethoxyethyl benzoylcarbamate (57). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 61% yield (28.9 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.40 (s, 1H), 7.84 (dt, *J* = 7.0, 1.3 Hz, 2H), 7.64 – 7.55 (m, 1H), 7.52 – 7.44 (m, 2H), 4.46 – 4.30 (m, 2H), 3.76 – 3.65 (m, 2H), 3.55 (q, *J* = 7.0 Hz, 2H), 1.22 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.06, 150.88, 133.13, 133.03, 128.96, 127.76, 68.28, 66.79, 65.30, 15.19.

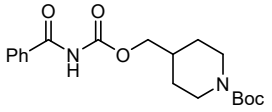
ESI HRMS *m/z* $(M+H)^+$ calcd 238.1074, obsd 238.1079.



(trimethylsilyl)methyl benzoylcarbamate (58). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 34% yield (17.1 mg). Colorless oil. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.17 (s, 1H), 7.88 – 7.73 (m, 2H), 7.60 – 7.51 (m, 1H), 7.44 (t, *J* = 7.6 Hz, 2H), 3.89 (s, 2H), 0.08 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 152.46, 133.31, 133.04, 128.97, 127.79, 60.04, -2.98.

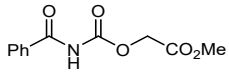
ESI HRMS *m/z* $(M+H)^+$ calcd 252.1050, obsd 252.1051.



tert-butyl 4-(((benzoylcarbamoyl)oxy)methyl)piperidine-1-carboxylate (59). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (5/2) in 55% yield (39.8 mg). Colorless oil. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.46 (s, 1H), 7.85 (d, *J* = 7.4 Hz, 2H), 7.58 (t, *J* = 7.1 Hz, 1H), 7.48 (t, *J* = 7.1 Hz, 2H), 4.25 – 3.99 (m, 4H), 2.67 (d, *J* = 13.3 Hz, 2H), 1.89 (s, 1H), 1.72 (d, *J* = 12.5 Hz, 2H), 1.45 (s, 9H), 1.33 – 1.11 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 154.91, 151.50, 133.14, 133.09, 128.96, 127.83, 79.65, 70.29, 43.36, 35.66, 28.63, 28.55.

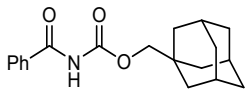
ESI HRMS *m/z* $(M+H)^+$ calcd 363.1914, obsd 363.1912.



Methyl 2-((benzoylcarbamoyl)oxy)acetate (60). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 57% yield (27.0 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.48 (s, 1H), 7.97 – 7.76 (m, 2H), 7.66 – 7.56 (m, 1H), 7.49 (dd, *J* = 8.3, 7.0 Hz, 2H), 4.75 (s, 2H), 3.78 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.07, 164.90, 150.42, 133.36, 132.80, 129.06, 127.92, 61.74, 52.62.

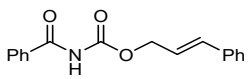
ESI HRMS *m/z* $(M+H)^+$ calcd 238.0710, obsd 238.0714.



((3r,5r,7r)-adamantan-1-yl)methyl benzoylcarbamate (61). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (6/1) in 48% yield (30.1 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.11 (s, 1H), 7.90 – 7.79 (m, 2H), 7.65 – 7.55 (m, 1H), 7.48 (dd, *J* = 8.4, 6.9 Hz, 2H), 3.85 (s, 2H), 2.00 (p, *J* = 3.1 Hz, 3H), 1.77 – 1.70 (m, 3H), 1.70 – 1.63 (m, 3H), 1.58 (d, *J* = 2.9 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.11, 151.68, 133.37, 133.10, 129.03, 127.81, 76.10, 39.27, 37.05, 33.49, 28.13.

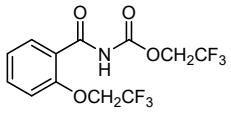
ESI HRMS *m/z* $(M+H)^+$ calcd 314.1751, obsd 314.1748.



Cinnamyl benzoylcarbamate (62). The title product was prepared following General Procedure B and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 52% yield (29.2 mg). White solid. Electricity = 4.7 F mol^{-1}.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.61 (s, 1H), 7.85 (d, *J* = 7.7 Hz, 2H), 7.54 (t, *J* = 7.4 Hz, 1H), 7.43 (t, *J* = 7.6 Hz, 2H), 7.38 – 7.22 (m, 5H), 6.66 (d, *J* = 15.8 Hz, 1H), 6.27 (dt, *J* = 15.8,

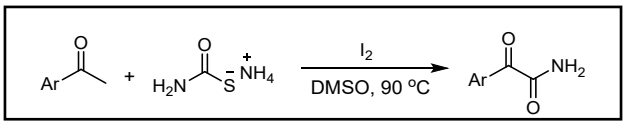
6.5 Hz, 1H), 4.83 (d, J = 6.7 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.25, 151.23, 135.97, 135.41, 133.09, 132.99, 128.90, 128.74, 128.39, 127.85, 126.79, 122.24, 66.82.
ESI HRMS *m/z* $(M+H)^+$ calcd 282.1125, obsd 282.1127.



2,2,2-trifluoroethyl (2-(2,2,2-trifluoroethoxy)benzoyl)carbamate (63). The title product was prepared following General Procedure B with isatin and purified by column chromatography eluting with petroleum ether/ethyl acetate (7/1) in 54% yield (38.0 mg). White solid. Electricity = 4.7 F mol^{-1}.
^{1}H NMR (400 MHz, Chloroform-*d*) δ 10.41 (s, 1H), 8.42 (d, J = 8.5 Hz, 1H), 8.08 (dd, J = 8.1, 1.6 Hz, 1H), 7.69 – 7.46 (m, 1H), 7.13 (t, J = 7.7 Hz, 1H), 4.71 (q, J = 8.2 Hz, 2H), 4.58 (q, J = 8.4 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.43, 151.62, 141.49, 135.97, 131.44, 123.13 (q, J = 277.4 Hz), 123.07 (q, J = 277.3 Hz), 122.85, 119.30, 113.60, 61.18 (q, J = 36.9 Hz), 61.11 (q, J = 37.0 Hz);^{19}F NMR (376 MHz, $CDCl_3$) δ -73.62, -74.11.
ESI HRMS *m/z* $(M+H)^+$ calcd 346.0509, obsd 346.0519.

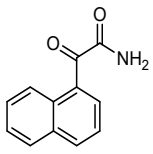
4. Synthesis of substrates

The α-oxobenzeneacetamide and all the amine and alcohol nucleophiles were purchased from commercial company and used without purification. Other α-oxoamides were synthesized from aryl methyl ketones according to a previously reported procedure.[2]

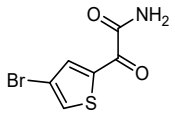


General procedure for the synthesis of α-oxoamides. To a round-bottom flask was added aryl methyl ketones (3.0 mmol), ammonium carbamodithioate (6.0 mmol), I_2 (6.0 mmol), DMSO (15 mL). The reaction was stirred at 90 °C for 4 h then poured into a separatory funnel. Then added water, extracted with EtOAc three times (3×20 mL), dried with anhydrous Na_2SO_4 overnight, followed by concentration under reduced pressure. The residue was purified by column chromatography on silica gel to afford the solid α-oxoamides.

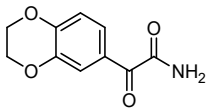
Characterization of Selected α-oxoamides.



2-(naphthalen-1-yl)-2-oxoacetamide.[2] ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.82 (d, J = 8.6 Hz, 1H), 8.45 (s, 1H), 8.28 (d, J = 8.2 Hz, 1H), 8.13 – 8.05 (m, 3H), 7.82 – 7.56 (m, 3H); ^{13}C NMR (101 MHz, DMSO) δ 194.22, 168.09, 135.25, 134.00, 133.77, 130.75, 129.41, 129.23, 127.29, 125.41, 125.36.

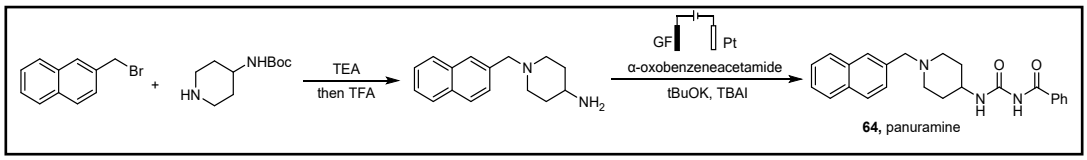


2-(4-bromothiophen-2-yl)-2-oxoacetamide. ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.40 (s, 1H), 8.12 (s, 1H), 7.92 (d, J = 4.2 Hz, 1H), 7.43 (d, J = 4.2 Hz, 1H); ^{13}C NMR (101 MHz, DMSO) δ 178.68, 163.83, 137.73, 137.53, 132.17, 126.97.



2-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)-2-oxoacetamide.[3] ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.26 (s, 1H), 7.92 (s, 1H), 7.53 (dd, J = 8.5, 2.1 Hz, 1H), 7.47 (d, J = 2.1 Hz, 1H), 7.04 (d, J = 8.5 Hz, 1H), 4.36 (dd, J = 5.9, 2.7 Hz, 2H), 4.31 (dd, J = 5.6, 2.8 Hz, 2H); ^{13}C NMR (101 MHz, DMSO) δ 189.63, 167.80, 149.62, 143.86, 126.69, 124.61, 118.84, 118.04, 65.23, 64.44.

5. Synthesis of bioactive molecules

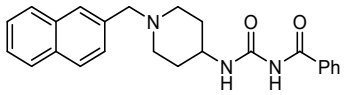


A. De novo synthesis of panuramine

Step 1: To a round-bottom flask was added 2-(bromomethyl)naphthalene (0.66 g, 3.0 mmol) tert-butyl piperidin-4-ylcarbamate (0.6 g, 3.0 mmol), Et_3N (0.6 g, 0.83 mL, 6.0 mmol) and DCM (10.0 mL). The solution was stirred at room temperature for 4.0 hours (monitored by TLC). Then the reaction system was cooled to 0 °C and slowly added trifluoroacetic acid (1.37 g, 0.9 mL, 12.0 mmol). The mixture was warmed to room temperature and stirred for 5.0 hours (monitored by TLC), then quenched with saturated aqueous sodium bicarbonate and extracted with dichloromethane, dried with anhydrous Na_2SO_4 overnight, concentrated under reduced pressure and the residue was purified by column chromatography on silica gel to give 1-(naphthalen-2-ylmethyl)piperidin-4-amine in 90% yield.

Step 2: To a 10 mL Schlenk tube was added α-oxobenzeneacetamide (29.8 mg, 0.2 mmol), 1-(naphthalen-2-ylmethyl)piperidin-4-amine (96.0 mg, 0.4 mmol), tBuOK (44.0 mg, 0.4 mmol), TBAI (14.7 mg, 0.04 mmol, 20 mol%) and a mixed solvent of MeCN/THF (1:1, 5.0 mL). The

solution was then electrolyzed at a constant current (20 mA) at room temperature for 1.2 hours (Electricity = 4.4 F mol^{-1}). The reaction mixture was concentrated under reduced pressure and the resulting residue was chromatographed through silica gel eluting with petroleum ether/ethyl acetate (2/1) to give the panuramine in 55% yield (42.6 mg).

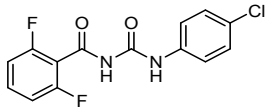


Panuramine (64). White solid.

^{1}H NMR (400 MHz, Chloroform-*d*) δ 9.84 (s, 1H), 8.84 (d, *J* = 7.5 Hz, 1H), 7.99 (d, *J* = 7.8 Hz, 2H), 7.82 (dd, *J* = 8.6, 3.7 Hz, 3H), 7.75 (s, 1H), 7.61 – 7.40 (m, 6H), 3.93 – 3.76 (m, 1H), 3.69 (s, 2H), 2.86 (d, *J* = 11.4 Hz, 2H), 2.26 (t, *J* = 11.0 Hz, 2H), 2.01 (dt, *J* = 13.3, 3.9 Hz, 2H), 1.79 – 1.58 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.48, 154.02, 136.11, 133.45, 133.15, 132.92, 132.60, 128.81, 128.08, 128.05, 127.86, 127.81, 127.75, 127.53, 126.14, 125.78, 63.35, 52.26, 47.38, 32.03.

ESI HRMS *m/z* $(M+H)^+$ calcd 388.2020, obsd 388.2021.

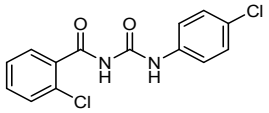
B. Synthesis of insecticides



Diflubenzuron (65).[4] The title product was prepared following the electrochemical procedure described for the synthesis of **64** and purified by column chromatography eluting with petroleum ether/ dichloromethane (1/1) in 48% yield (29.8 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.47 (s, 1H), 10.23 (s, 1H), 7.72 – 7.55 (m, 3H), 7.41 (d, *J* = 8.4 Hz, 2H), 7.26 (t, *J* = 8.4 Hz, 2H); ^{13}C NMR (101 MHz, DMSO) δ 162.59, 159.17 (dd, *J* = 250.3, 7.1 Hz), 150.48, 136.85, 133.78, 133.75, 129.30, 128.22, 122.28, 112.66 (d, *J* = 22.6 Hz); ^{19}F NMR (376 MHz, DMSO) δ -113.43.

ESI HRMS *m/z* $(M+H)^+$ calcd 311.0393, obsd 311.0397.

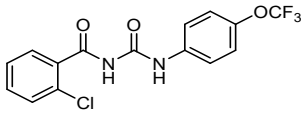


Dichlorbenzuron (66).[4] The title product was prepared following the electrochemical procedure described for the synthesis of **64** and purified by column chromatography eluting with petroleum ether/ dichloromethane (1/1) in 57% yield (35.1 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.27 (s, 1H), 10.47 (s, 1H), 7.62 (dd, *J* = 8.0, 5.6 Hz, 3H), 7.59 – 7.51 (m, 2H), 7.46 (t, *J* = 7.3 Hz, 1H), 7.41 (d, *J* = 8.5 Hz, 2H); ^{13}C NMR (101 MHz,

DMSO) δ 169.04, 150.91, 136.98, 135.09, 132.52, 130.28, 130.22, 129.58, 129.34, 128.04, 127.72, 122.04.

ESI HRMS *m/z* $(M+H)^+$ calcd 309.0192, obsd 309.0191.

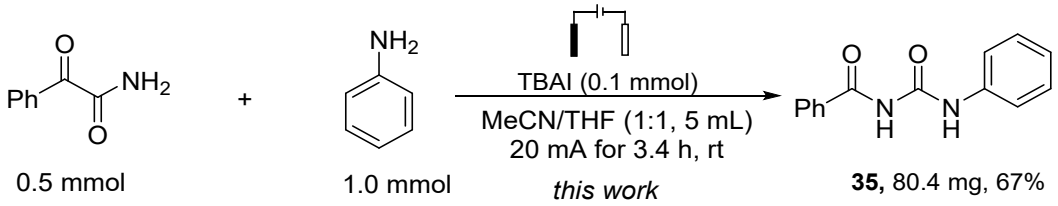


Triflumuron (67).[4] The title product was prepared following the electrochemical procedure described for the synthesis of **64** and purified by column chromatography eluting with petroleum ether/ dichloromethane (1/1) in 60% yield (43.0 mg). White solid. Electricity = 4.4 F mol^{-1}.

^{1}H NMR (400 MHz, DMSO-d_6) δ 11.29 (s, 1H), 10.52 (s, 1H), 7.72 (d, *J* = 8.8 Hz, 2H), 7.63 (dd, *J* = 7.5, 1.6 Hz, 1H), 7.60 – 7.52 (m, 2H), 7.47 (td, *J* = 7.3, 1.7 Hz, 1H), 7.36 (d, *J* = 8.6 Hz, 2H); ^{13}C NMR (101 MHz, DMSO) δ 169.06, 151.02, 144.57, 137.24, 135.10, 132.54, 130.31, 130.24, 129.61, 127.73, 122.30, 121.96, 120.65 (q, *J* = 255.9 Hz); 19F NMR (376 MHz, DMSO) δ -57.07.

ESI HRMS *m/z* $(M+H)^+$ calcd 359.0405, obsd 359.0405.

6. Green chemistry metrics analysis



Molecular weight of product: 240; Sum of molecular weight of reagent: 149 + 93

Atom economy = Molecular weight of product/Sum of molecular weight of reagent = 240/242 = 99.2%

Total mass in process: 74.5 + 93.0 + 37.0 + 2.5*0.78*1000 + 2.5*0.89*1000 = 4379.5 mg; Mass of product: 80.4 mg

PMI = Total mass in process/Mass of product = 4379.5/80.4 = 54.5

Green chemistry metrics for other protocols were calculated following the above procedures.

7. Mechanistic studies

A. Cyclic Voltammetry Studies

The cyclic voltammograms were recorded on a CHI 760E electrochemical workstation (Shanghai Chenhua, China) at room temperature in MeCN/THF (1:1, 5 mL). A glassy carbon disk (diameter, 1 mm) was used as working electrode, a Pt wire as auxiliary electrode and a SCE as reference electrode. The glass carbon electrode was polished by Al_2O_3 powder (0.05

μm) before cyclic voltammetry. The scan rate was 100 mV/s. The IUPAC convention was used for plotting the CV data.

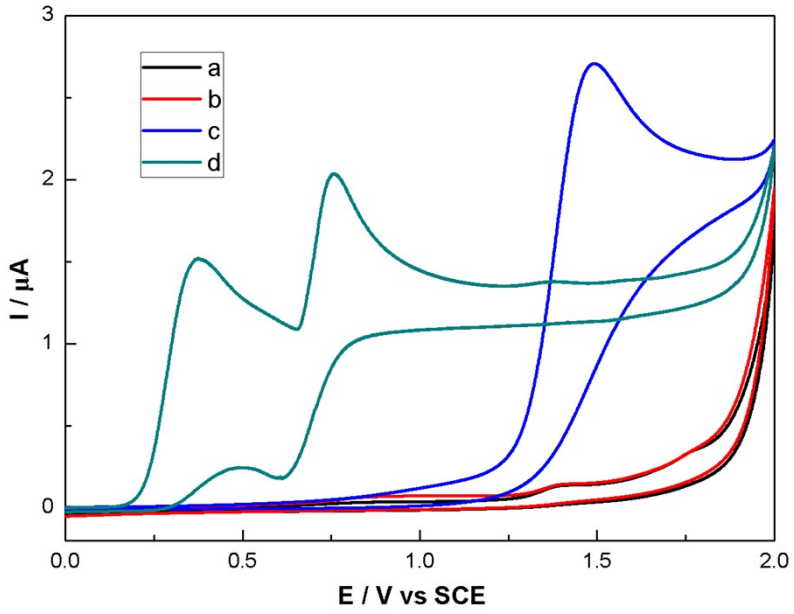


Figure S2. Cyclic voltammograms. a, Et_4NPF_6 (0.1 M); b, Et_4NPF_6 (0.1 M), α-oxobenzeneamine (10 mM); c, Et_4NPF_6 (0.1 M), cyclohexylmethanamine (10 mM); d, Et_4NPF_6 (0.1 M), TBAI (10 mM).

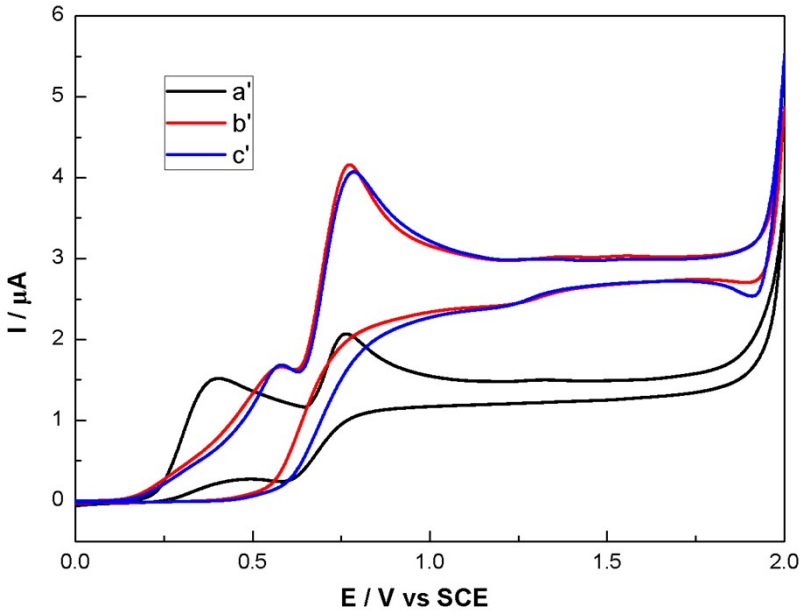
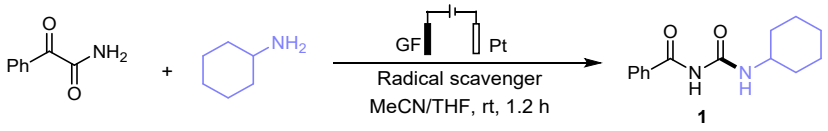


Figure S3. Cyclic voltammograms. a', Et_4NPF_6 (0.1 M), TBAI (10 mM), α-oxobenzeneamine (10

mM); b', Et_4NPF_6 (0.1 M), TBAI (10 mM), cyclohexylmethanamine (10 mM); c', Et_4NPF_6 (0.1 M), TBAI (10 mM), α-oxobenzeneamine (10 mM), cyclohexylmethanamine (10 mM).

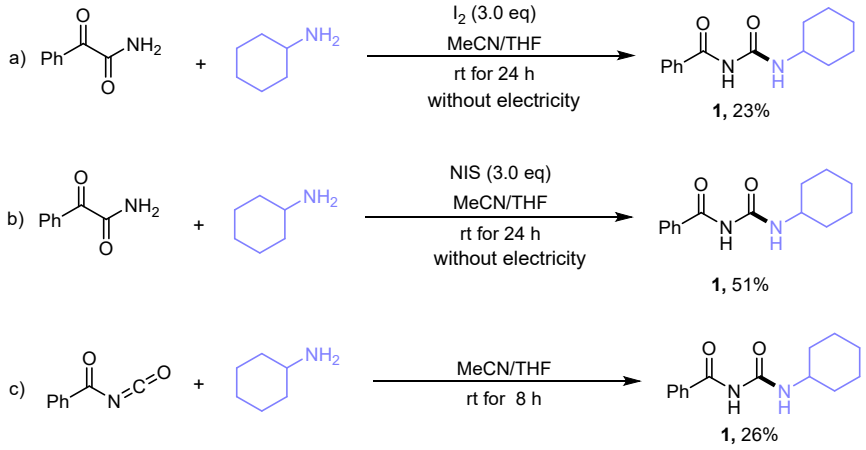
B. Radical quenching experiments



Radical scavenger (3.0 eq)	Yield of 1
TEMPO	15%
BHT	Trace
1,1-diphenyl ethylene	68%

Three sets of radical quenching experiments were carried out under the standard conditions for the electrosynthesis of **1** by using TEMPO, BHT or 1,1-diphenyl ethylene as the radical scavenger, respectively. After 1.2 h of electrolysis at a constant current of 20 mA, the TEMPO-added system gave **1** in 15% yield and only a trace of **1** was detected with BHT, while the 1,1-diphenyl ethylene did not effectively suppress the reaction. These results could not provide sufficient evidence for a radical pathway cause the low yield of **1** with TEMPO or BHT might be derived from the quenching of the in-situ generated hypervalent iodine species that is crucial for the transformation.

C. Control experiments



A series of control experiments were performed without passing electricity. The reactions produced product **1** when replacing the TBAI with 3.0 equivalent molecular iodine or NIS. Alternatively, according to a relevant method,[5] benzoyl isocyanate was prepared and then it was used in the reaction with cyclohexanamine in MeCN/THF (1:1, 5.0 mL) without purification, after stirring at room for 8.0 hours, the desired **1** was isolated in 26% yield. These results indicate molecular iodine

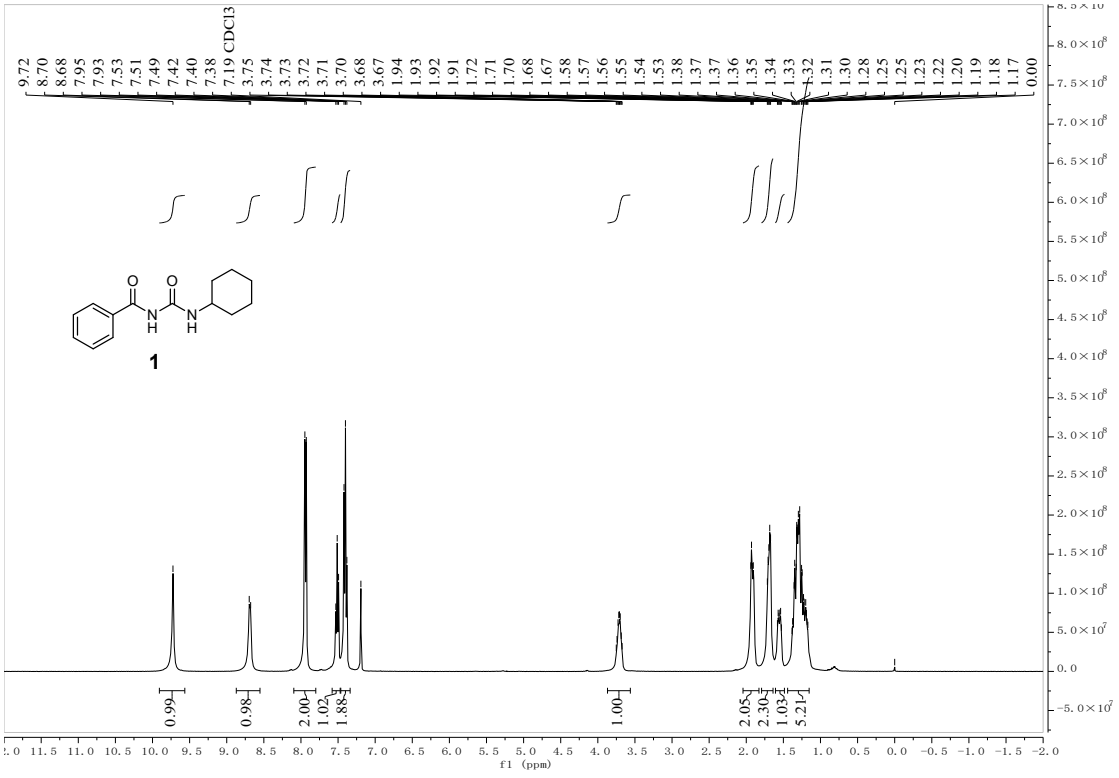
or iodine cation might be the promoter for the transformation and α-oxoisocyanate might be in-situ generated as the key intermediate.

8. Reference

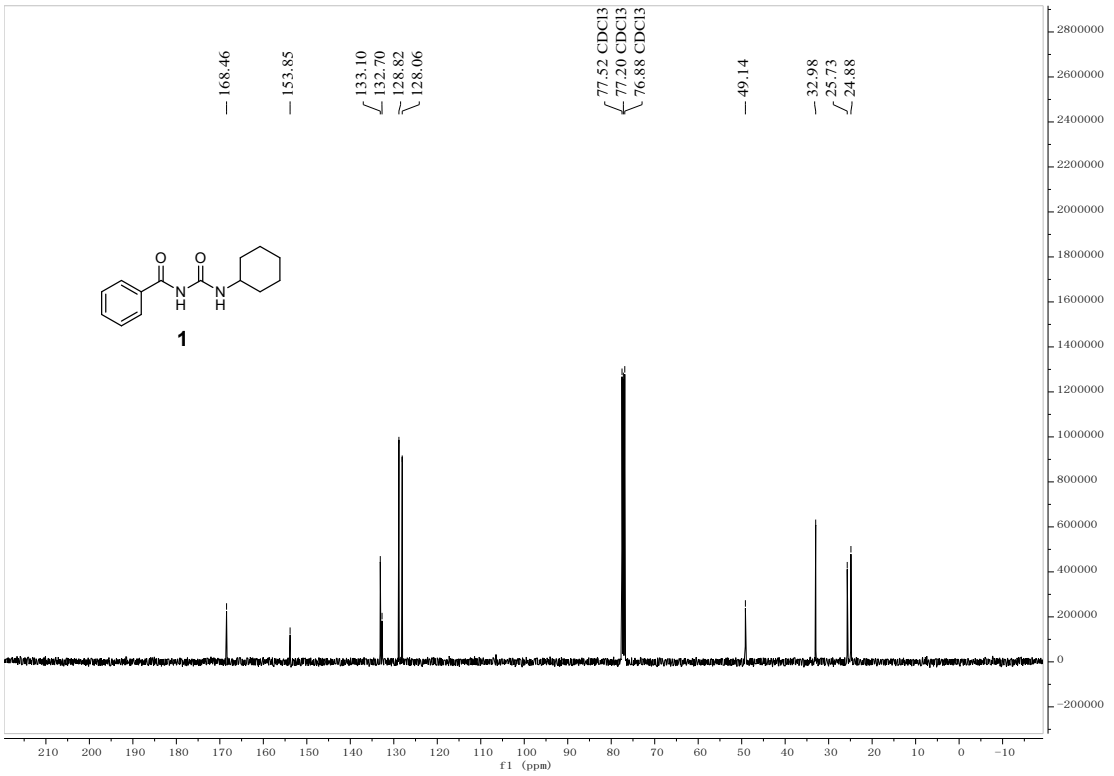
1. Mizar, P.; Niebuhr, R.; Hutchings, M.; Farooq, U.; Wirth, T., Thioamination of Alkenes with Hypervalent Iodine Reagents. *Chem. Eur. J.* **2016,** *22* (5), 1614-1617.
2. Wang, A.-J.; Zhang, Y.-D.; Nan, W.-J.; Liu, S.; Shu, W.-M.; Gong, Y.-X., I2-Mediated Oxidative Amidation of Aryl Methyl Ketones: Synthesis of Primary α-Ketoamides Using Ammonium Carbamodithioate as Amine Surrogate. *Eur. J. Org. Chem.* **2023,** *26* (19), e202300154.
3. Liu, S.; Gao, Q.; Wu, X.; Zhang, J.; Ding, K.; Wu, A., Formamidine hydrochloride as an amino surrogate: I2-catalyzed oxidative amidation of aryl methyl ketones leading to free (N–H) α-ketoamides. *Org. Biomol. Chem.* **2015,** *13* (8), 2239-2242.
4. Wang, H.; Man, Y.; Wang, K.; Wan, X.; Tong, L.; Li, N.; Tang, B., Hydrogen bond directed aerobic oxidation of amines via photoredox catalysis. *Chem. Commun.* **2018,** *54* (78), 10989-10992.
5. Nakagawa, Y.; Wheelock, C. E.; Morisseau, C.; Goodrow, M. H.; Hammock, B. G.; Hammock, B. D., 3-D QSAR analysis of inhibition of murine soluble epoxide hydrolase (MsEH) by benzoylureas, arylureas, and their analogues. *Bioorg. Med. Chem.* **2000,** *8* (11), 2663-2673.

9. NMR spectra

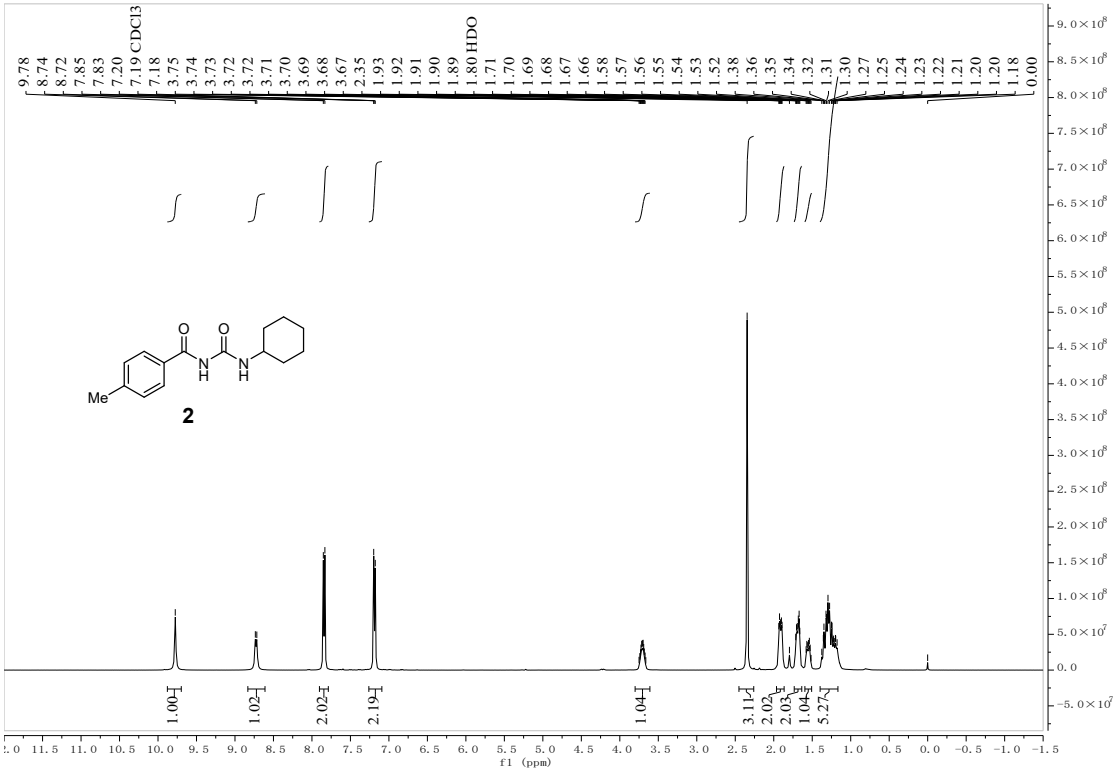
^{1}H NMR of **1**



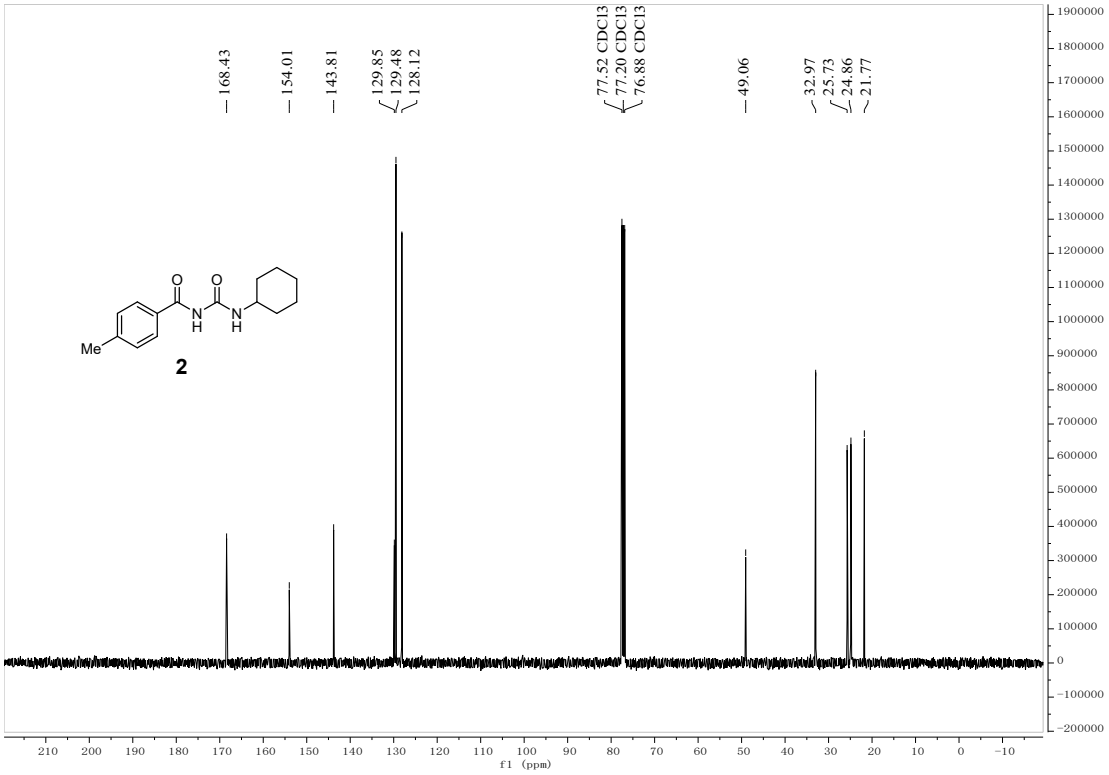
^{13}C NMR of **1**


168.46
153.85
133.10
132.70
128.82
128.06
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
49.14
32.98
25.73
24.88
1
f1 (ppm)

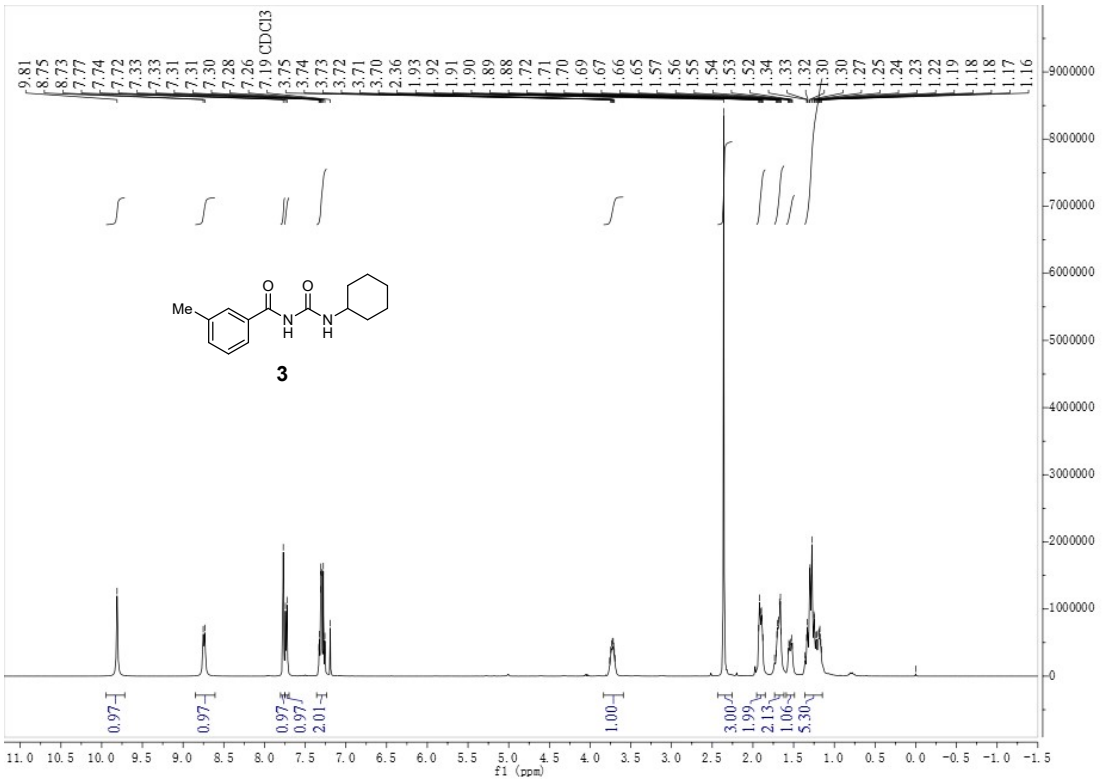
^{1}H NMR of **2**


9.78
8.74
8.72
7.85
7.83
7.20
7.19 CDCl3
7.18
3.75
3.74
3.73
3.72
3.72
3.71
3.70
3.69
3.68
3.67
2.35
1.93
1.92
1.91
1.90
1.89
1.80 HDO
1.71
1.70
1.69
1.68
1.67
1.66
1.58
1.57
1.56
1.55
1.54
1.53
1.52
1.38
1.36
1.35
1.34
1.32
1.31
1.30
1.27
1.25
1.24
1.23
1.22
1.21
1.20
1.20
1.18
0.00
Me
2
1.00
1.02
2.02
2.19
1.04
3.11
2.02
2.03
1.04
5.27
f1 (ppm)

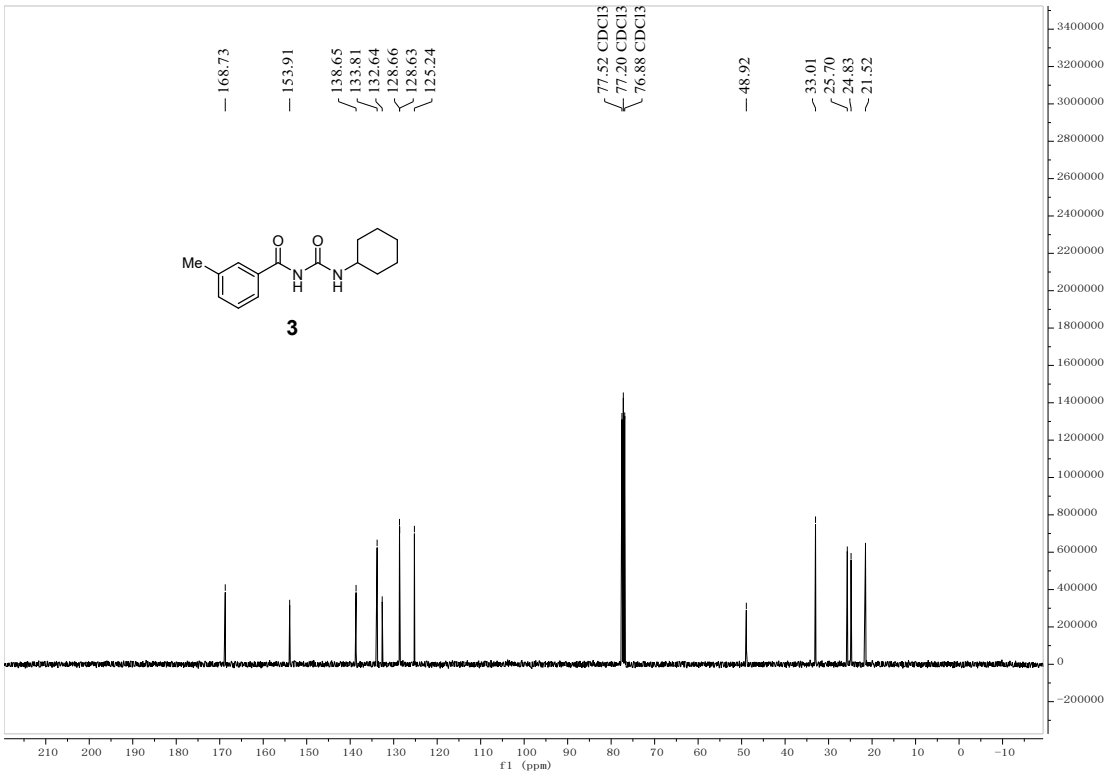
^{13}C NMR of **2**



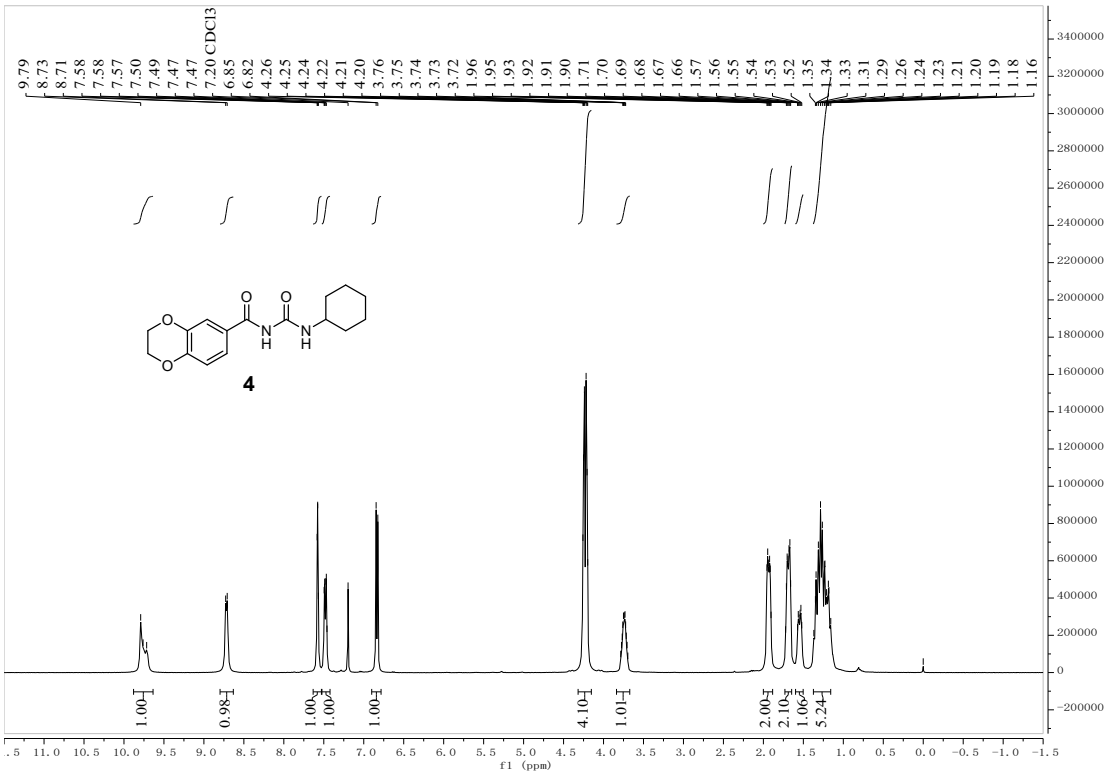
^{1}H NMR of **3**



^{13}C NMR of **3**



^{1}H NMR of **4**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7.58
7.57
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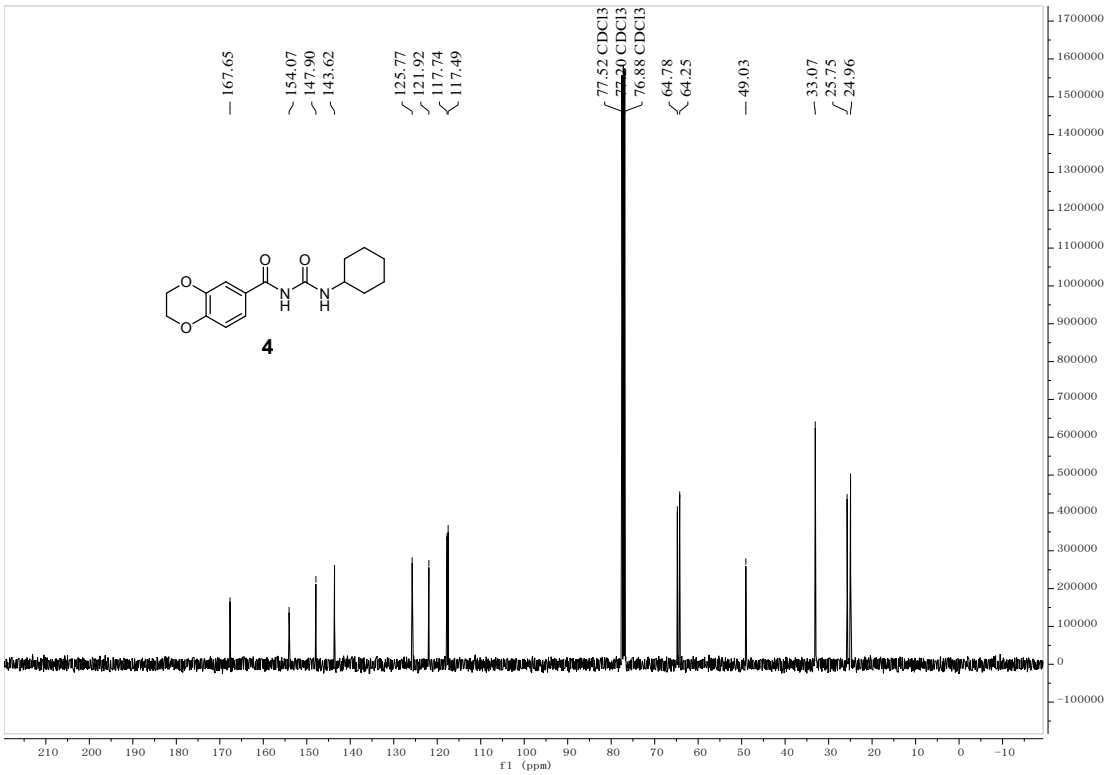
1.31
1.29
1.26
1.24
1.23
1.21
1.20
1.19
1.18
1.16
4
1.00
0.98
1.00
1.00
1.00
4.10
1.01
2.00
2.10
1.06
5.24
f1 (ppm)

^{13}C NMR of **4**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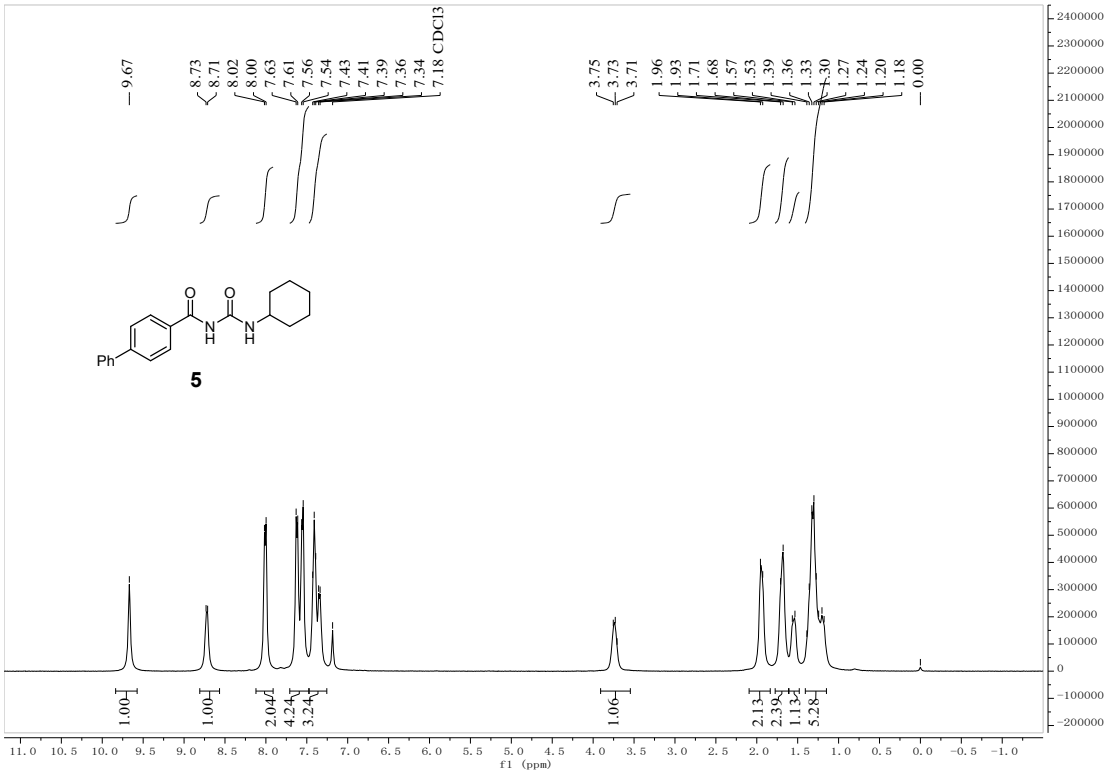
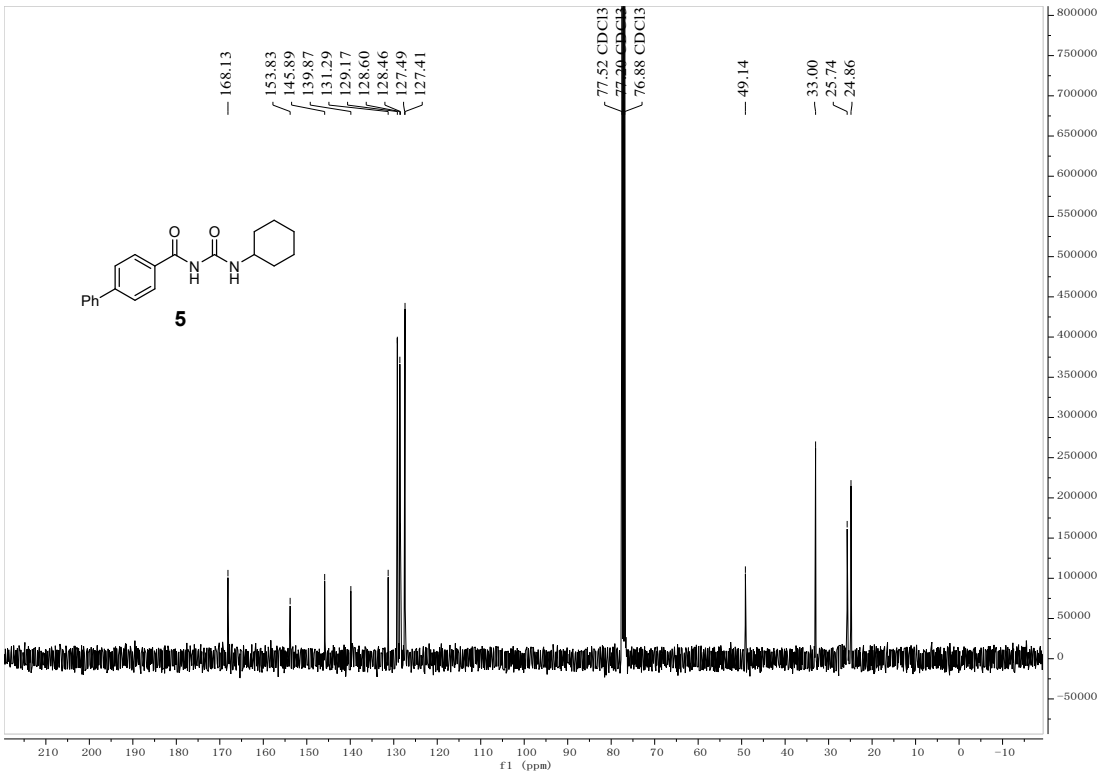
147.90
143.62
125.77
121.92
117.74
117.49
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
64.78
64.25
49.03
33.07
25.75
24.96
4
f1 (ppm)

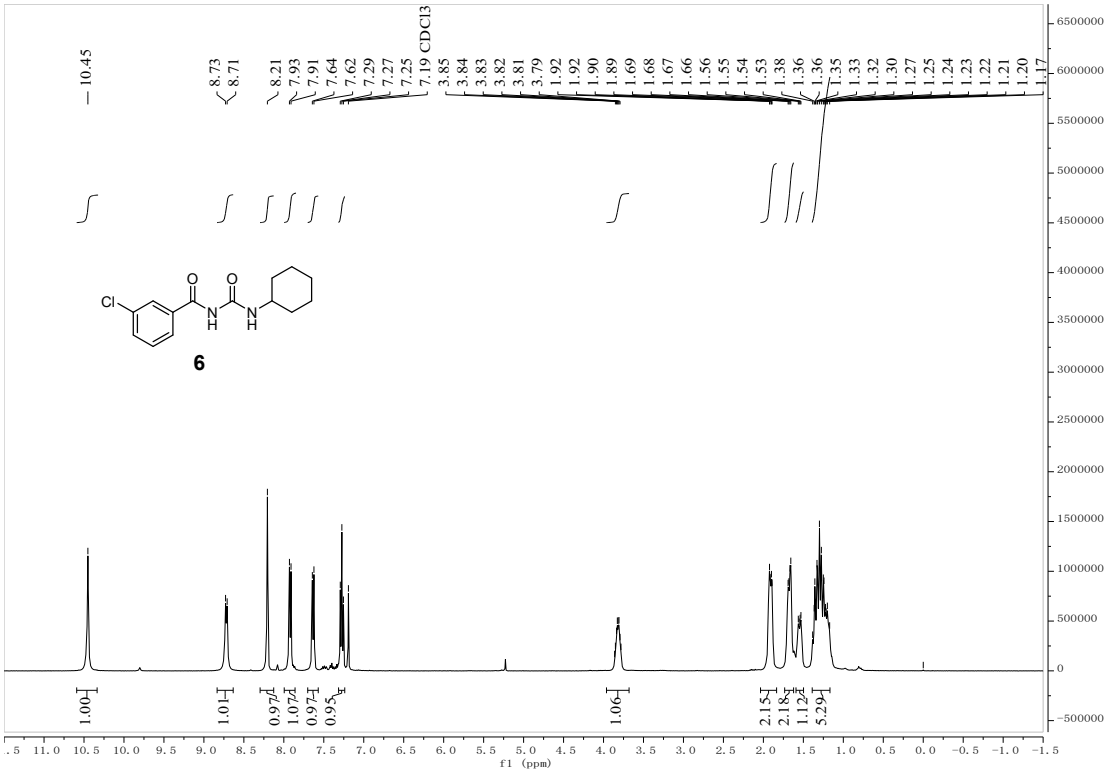
^{1}H NMR of **5**



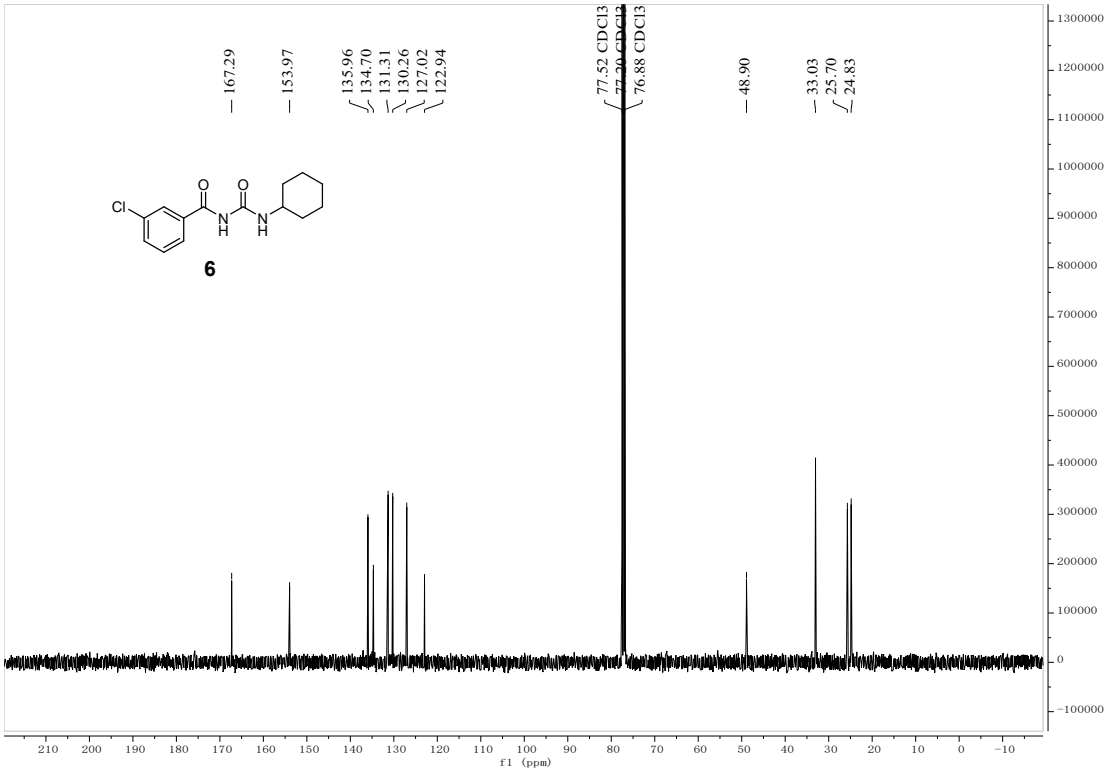
^{13}C NMR of **5**



^{1}H NMR of **6**



^{13}C NMR of **6**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134.70
131.31
130.26
127.02
122.94
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
48.90
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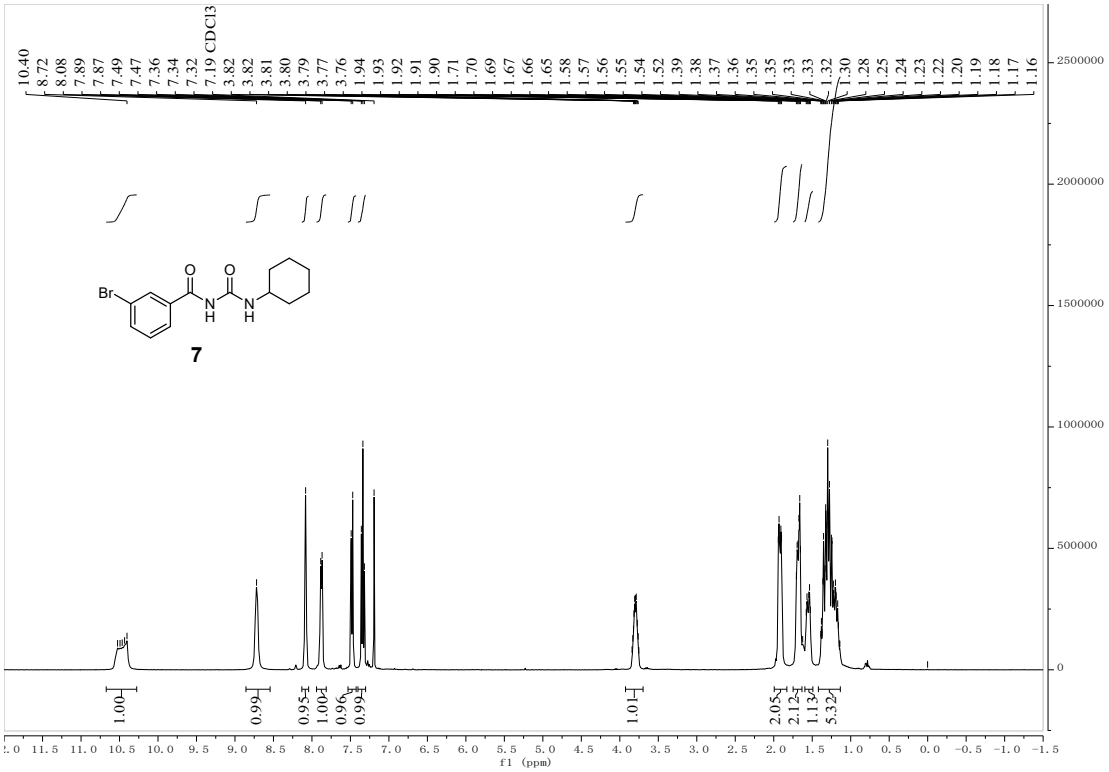
24.83
Cl
O
O
N
H
N
H
6
f1 (ppm)

^{1}H NMR of **7**


10.40
8.72
8.08
7.89
7.87
7.49
7.47
7.36
7.34
7.32
7.19 CDCl3
3.82
3.81
3.80
3.79
3.77
3.76
1.94
1.93
1.92
1.91
1.90
1.71
1.70
1.69
1.67
1.66
1.65
1.58
1.57
1.56
1.55
1.54
1.52
1.39
1.38
1.37
1.36
1.35
1.35
1.33
1.33
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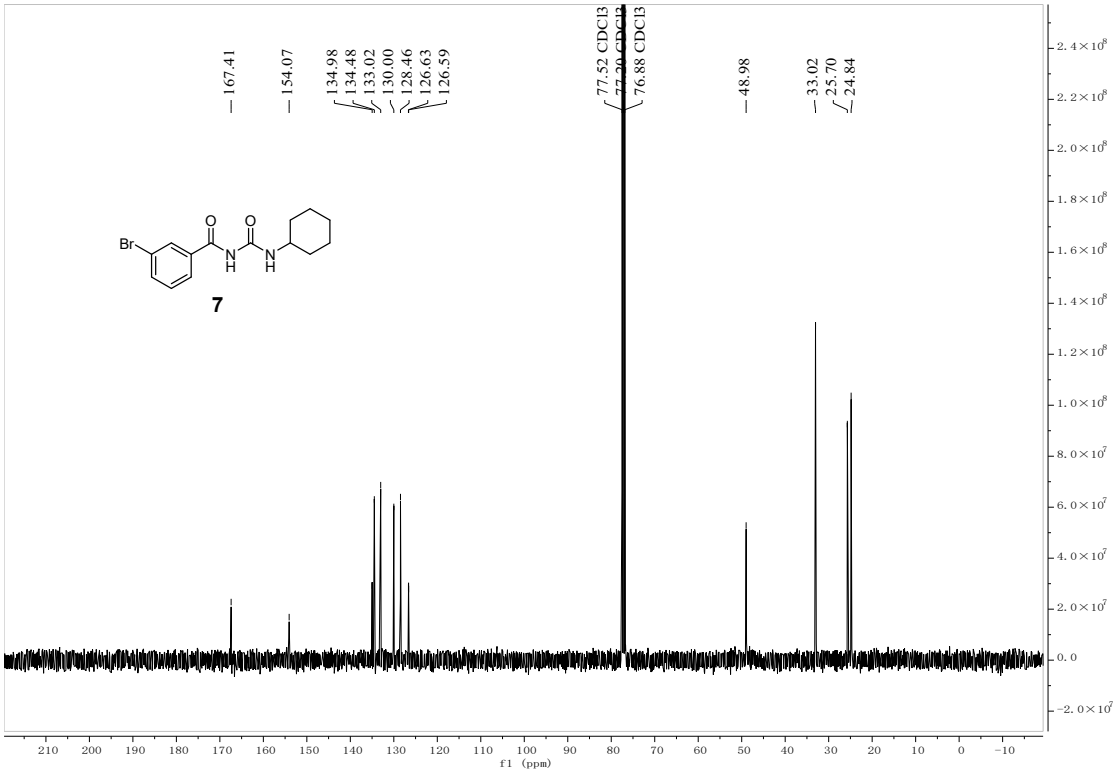
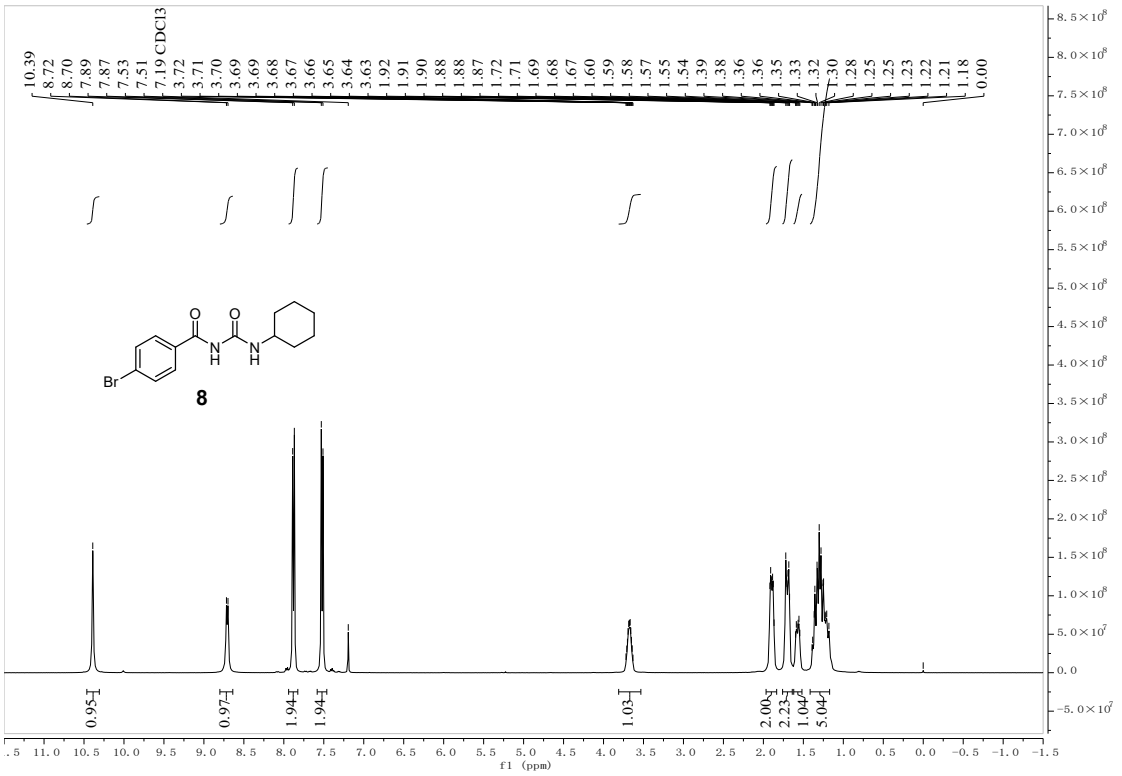
1.17
1.16
Br
O
O
N
H
N
H
7
1.00
0.99
0.95
1.00
0.96
0.99
1.01
2.05
2.12
1.13
5.32
f1 (ppm)

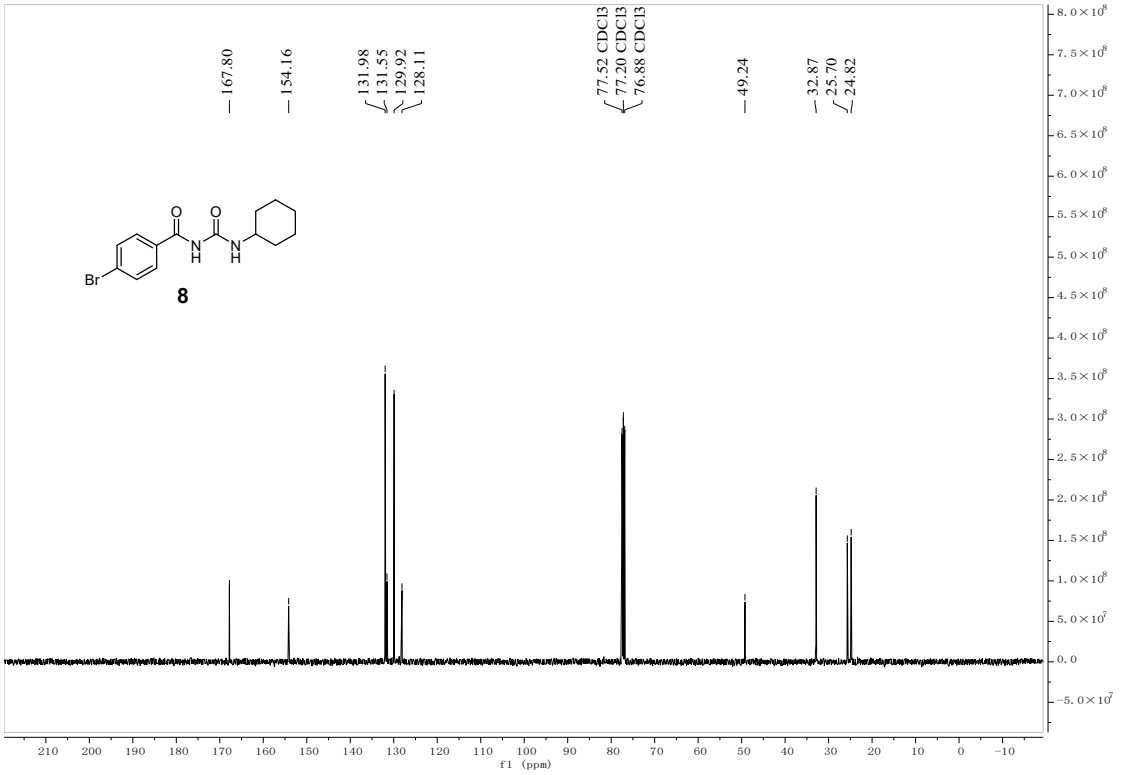
^{13}C NMR of **7**



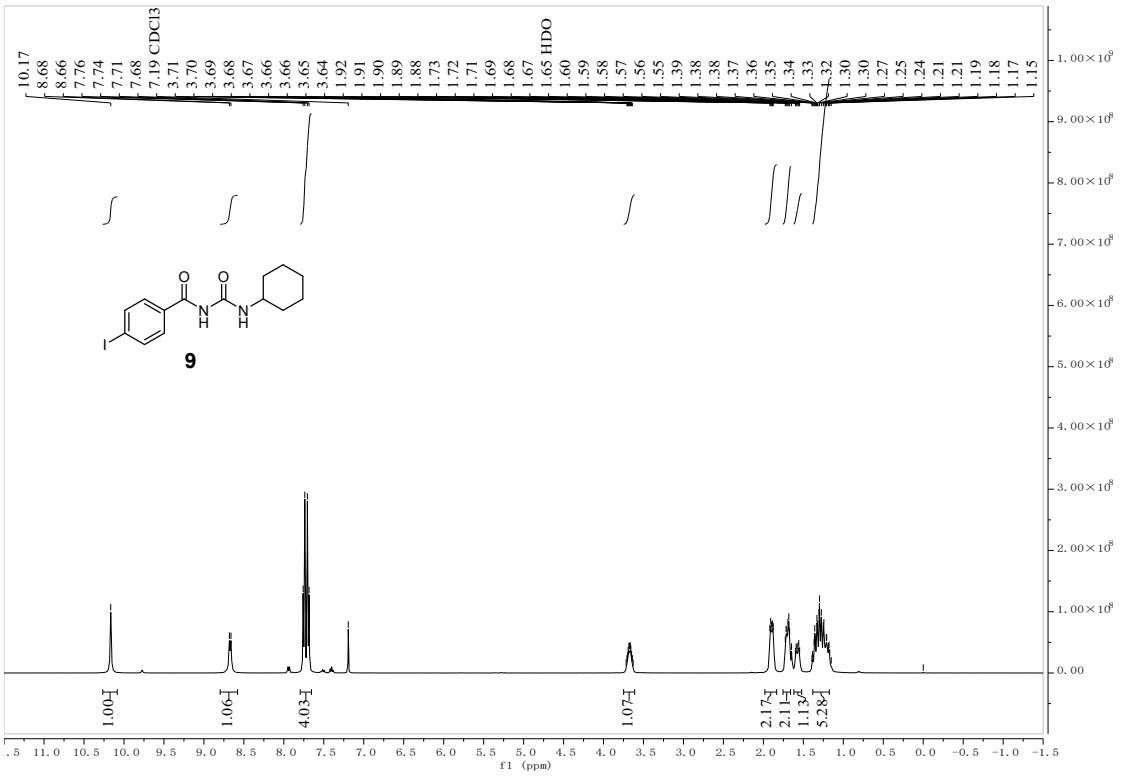
^{1}H NMR of **8**


10.39
8.72
8.70
7.89
7.87
7.53
7.51
7.19 CDCl3
3.72
3.71
3.70
3.69
3.69
3.68
3.67
3.66
3.65
3.64
3.63
1.92
1.91
1.90
1.88
1.88
1.87
1.72
1.71
1.69
1.68
1.67
1.60
1.59
1.58
1.57
1.55
1.54
1.39
1.38
1.36
1.36
1.35
1.33
1.32
1.30
1.28
1.25
1.25
1.23
1.22
1.21
1.18
0.00
Br
8
0.95
0.97
1.94
1.94
1.03
2.00
2.23
1.04
5.04
f1 (ppm)

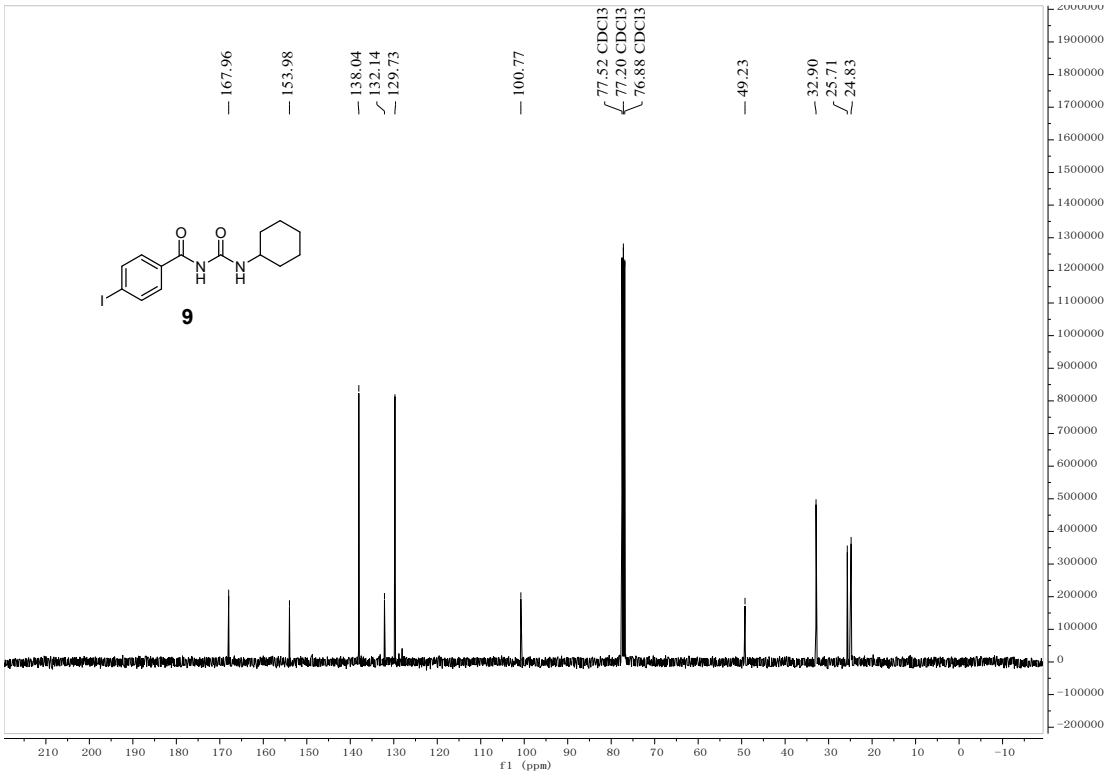
^{13}C NMR of **8**


167.80
154.16
131.98
131.55
129.92
128.11
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
49.24
32.87
25.70
24.82
Br
8
f1 (ppm)

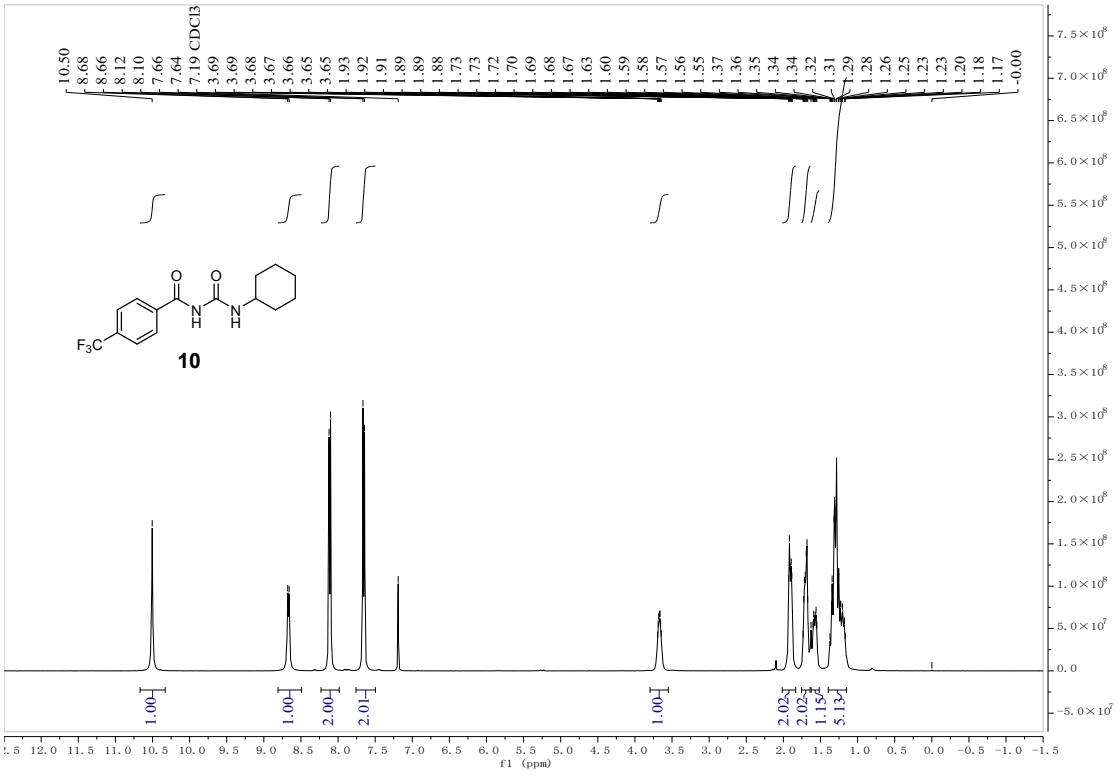
^{1}H NMR of **9**



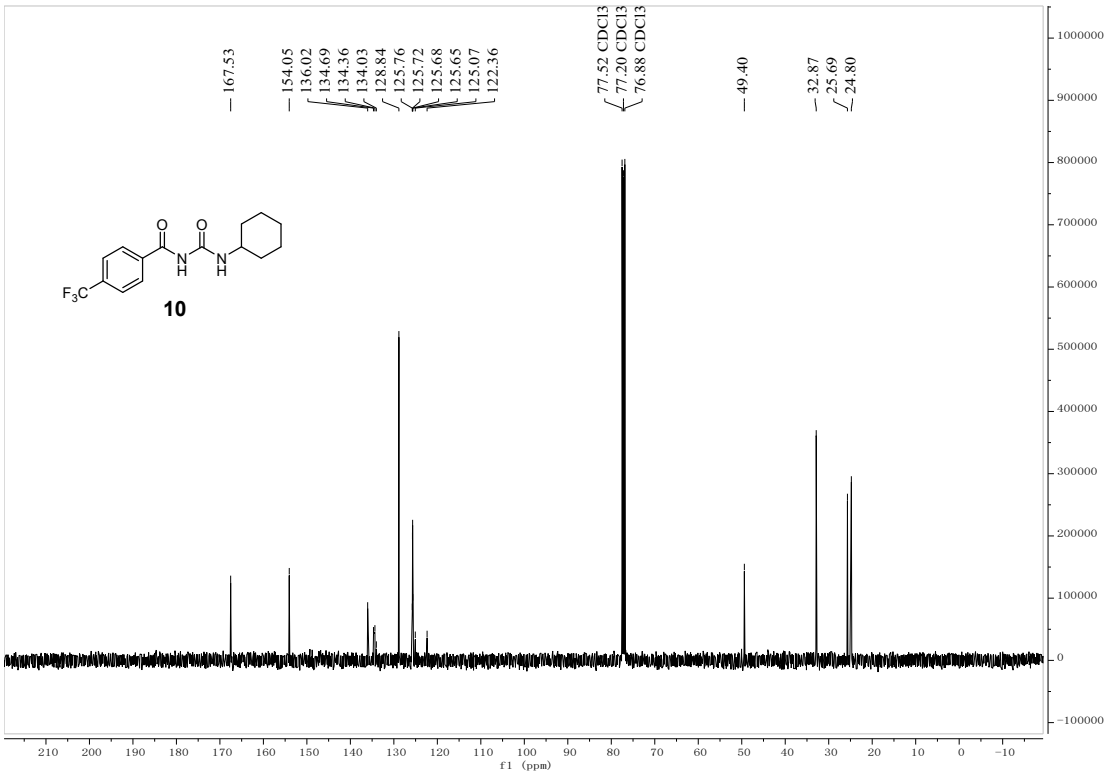
^{13}C NMR of **9**


167.96
153.98
138.04
132.14
129.73
100.77
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
49.23
32.90
25.71
24.83
9
f1 (ppm)

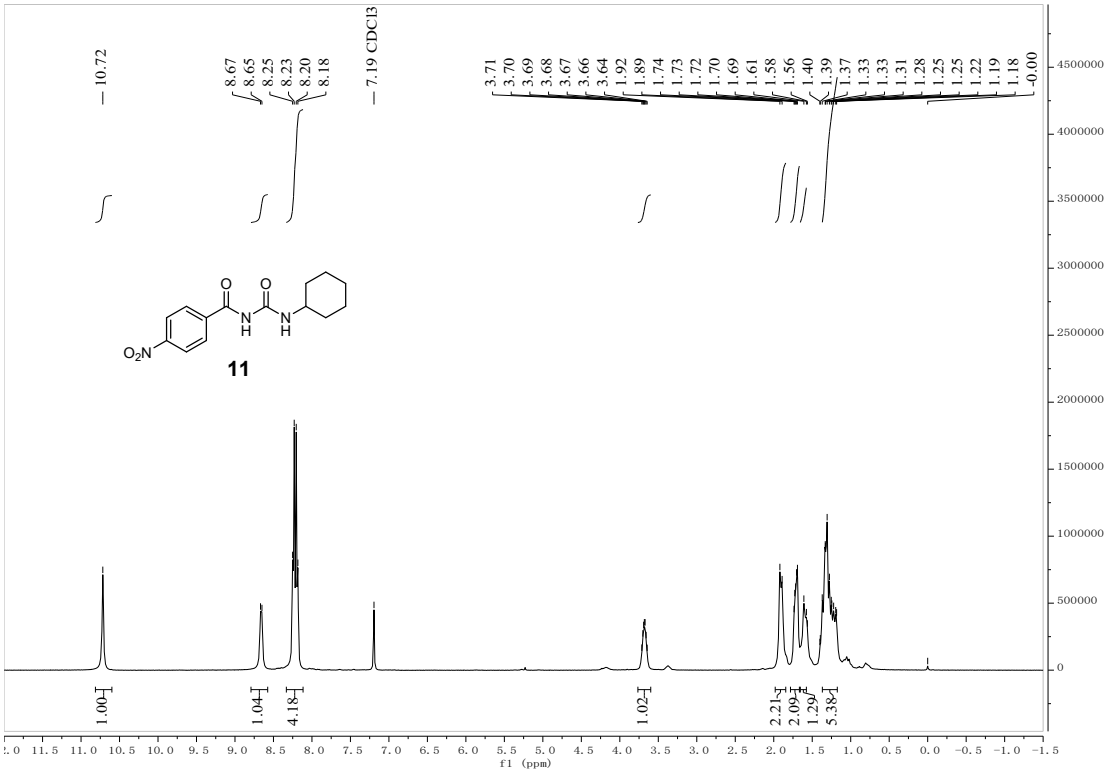
^{1}H NMR of **10**


10.50
8.68
8.66
8.12
8.10
7.66
7.64
7.19 CDCl3
3.69
3.68
3.67
3.66
3.65
1.93
1.92
1.91
1.89
1.88
1.73
1.72
1.70
1.69
1.68
1.67
1.63
1.60
1.59
1.58
1.57
1.56
1.55
1.37
1.36
1.35
1.34
1.32
1.31
1.29
1.28
1.26
1.25
1.23
1.20
1.18
1.17
-0.00
F3C
10
1.00
1.00
2.00
2.01
1.00
2.02
2.02
1.15
5.13
f1 (ppm)

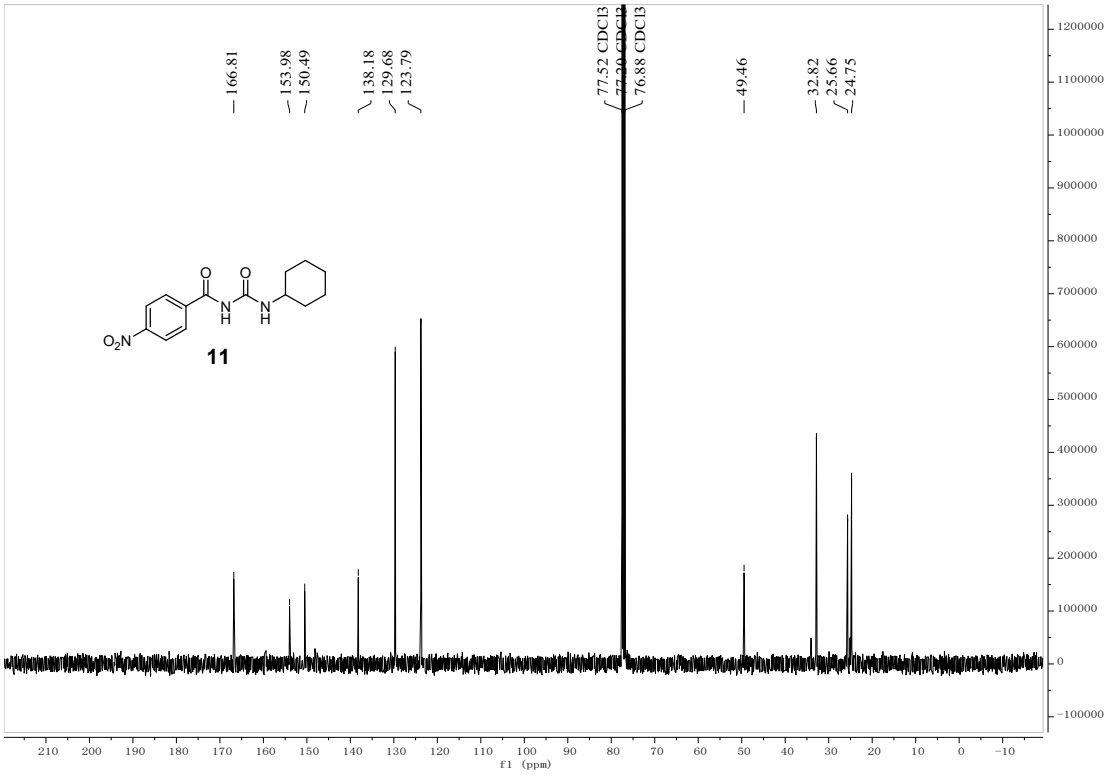
^{13}C NMR of **10**



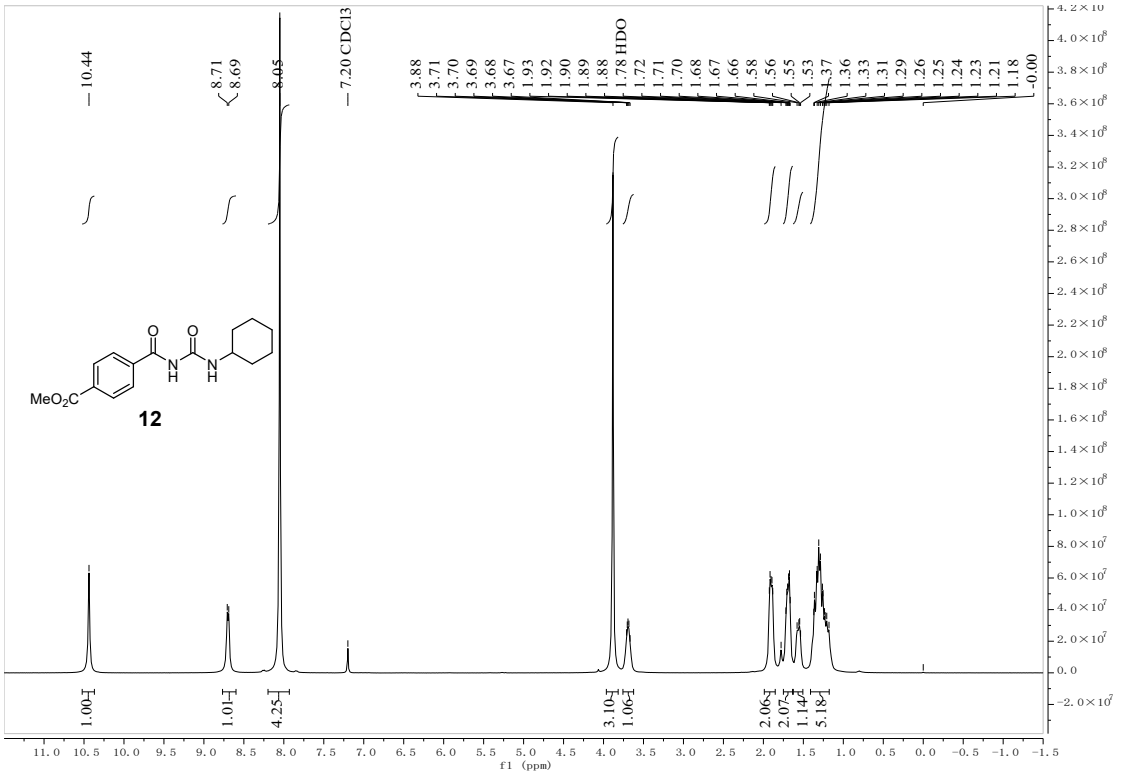
^{1}H NMR of **11**



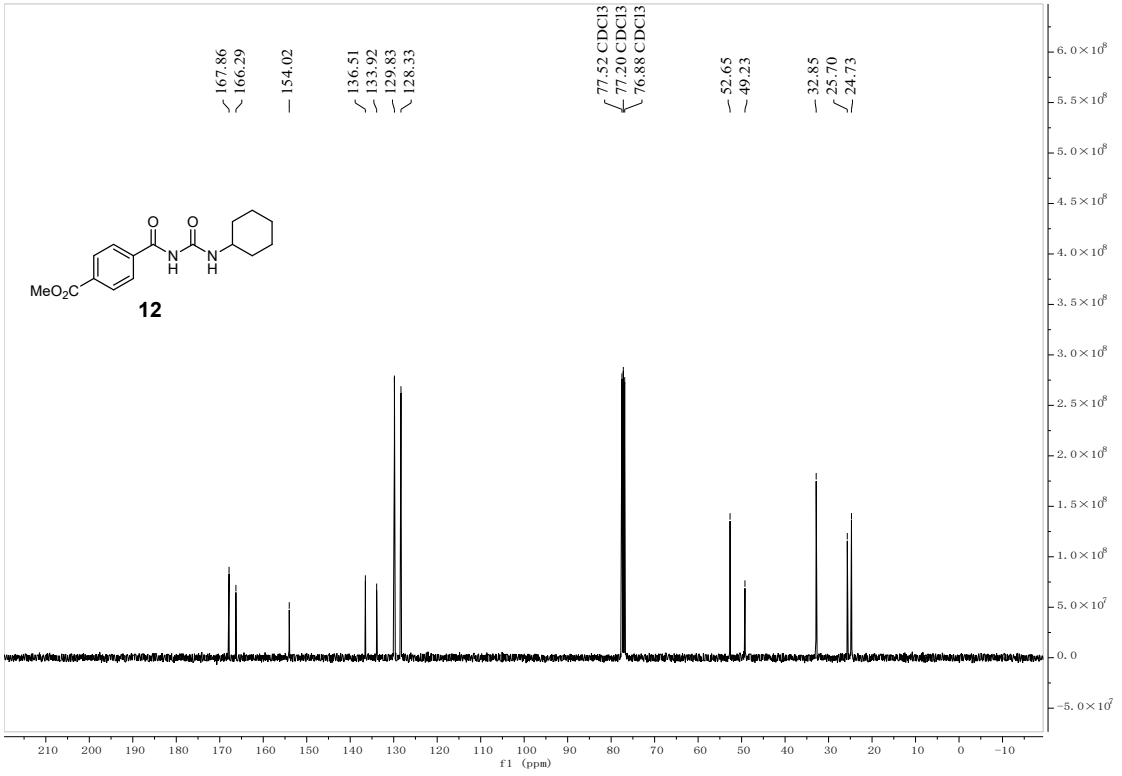
^{13}C NMR of **11**



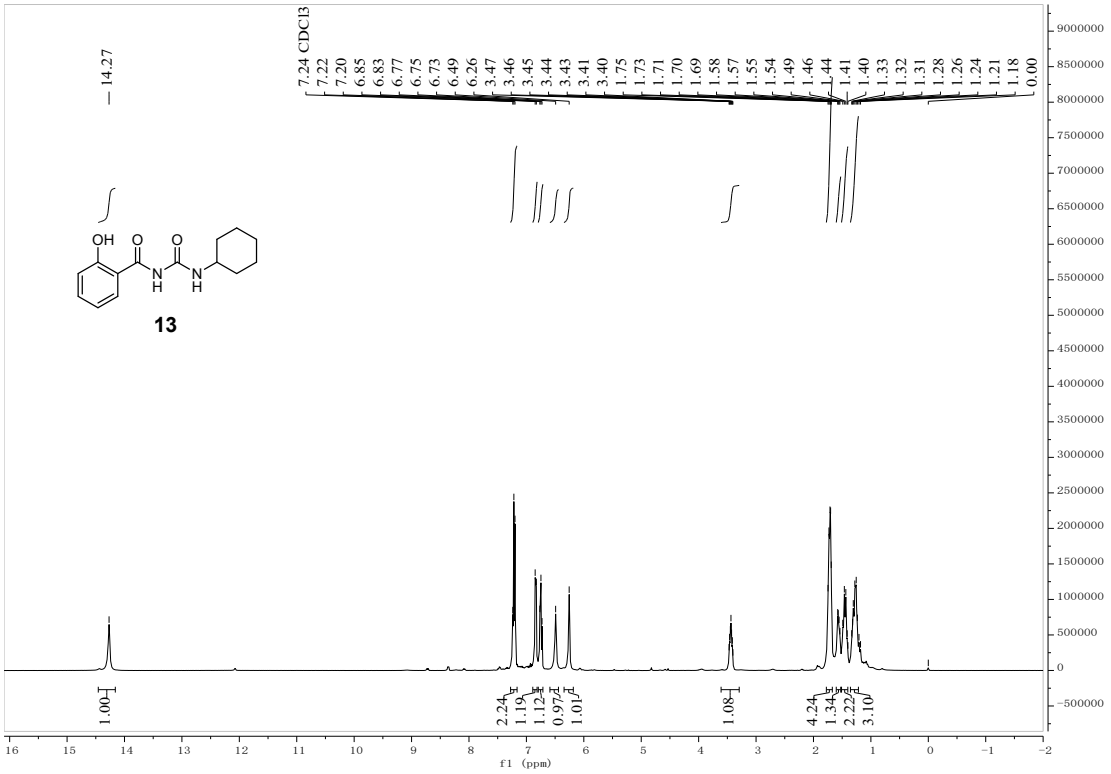
^{1}H NMR of **12**


10.44
8.71
8.69
8.05
7.20 CDCl3
3.88
3.71
3.70
3.69
3.68
3.67
1.93
1.92
1.90
1.89
1.88
1.78 HDO
1.72
1.71
1.70
1.68
1.67
1.66
1.58
1.56
1.55
1.53
1.37
1.36
1.33
1.31
1.29
1.26
1.25
1.24
1.23
1.21
1.18
0.00
MeO2C
12
1.00
1.01
4.25
3.10
1.06
2.06
2.07
1.14
5.18
f1 (ppm)

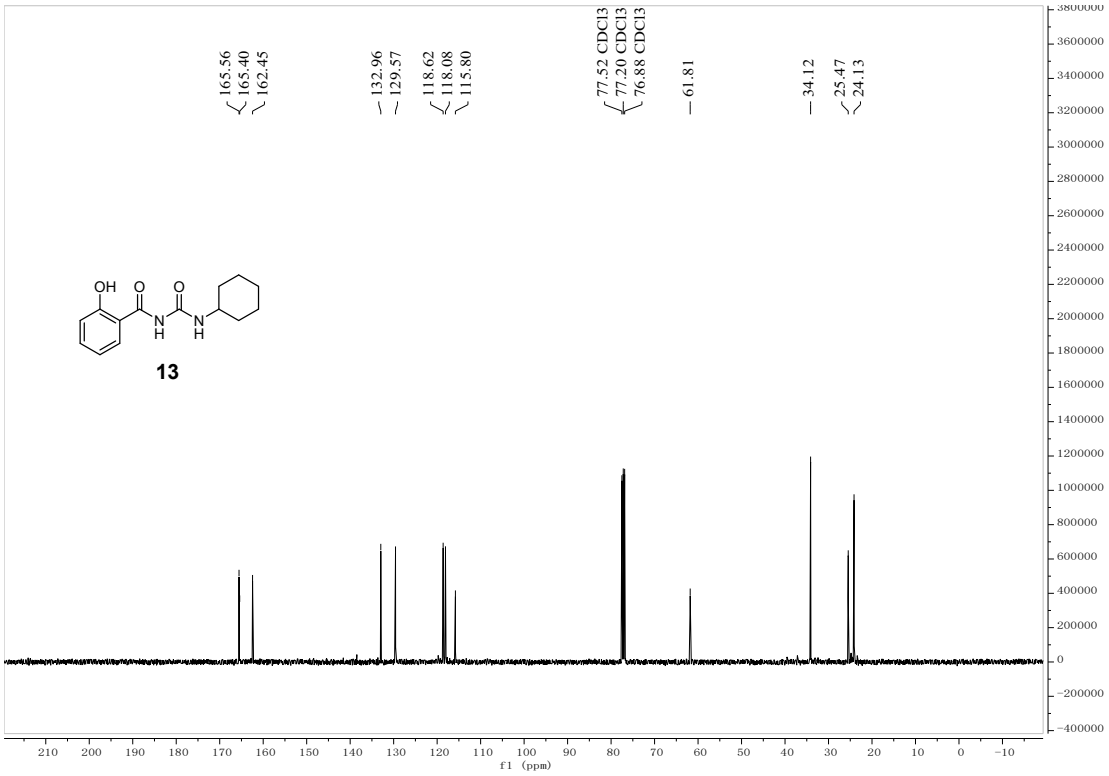
^{13}C NMR of **12**


167.86
166.29
154.02
136.51
133.92
129.83
128.33
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
52.65
49.23
32.85
25.70
24.73
MeO2C
12
f1 (ppm)

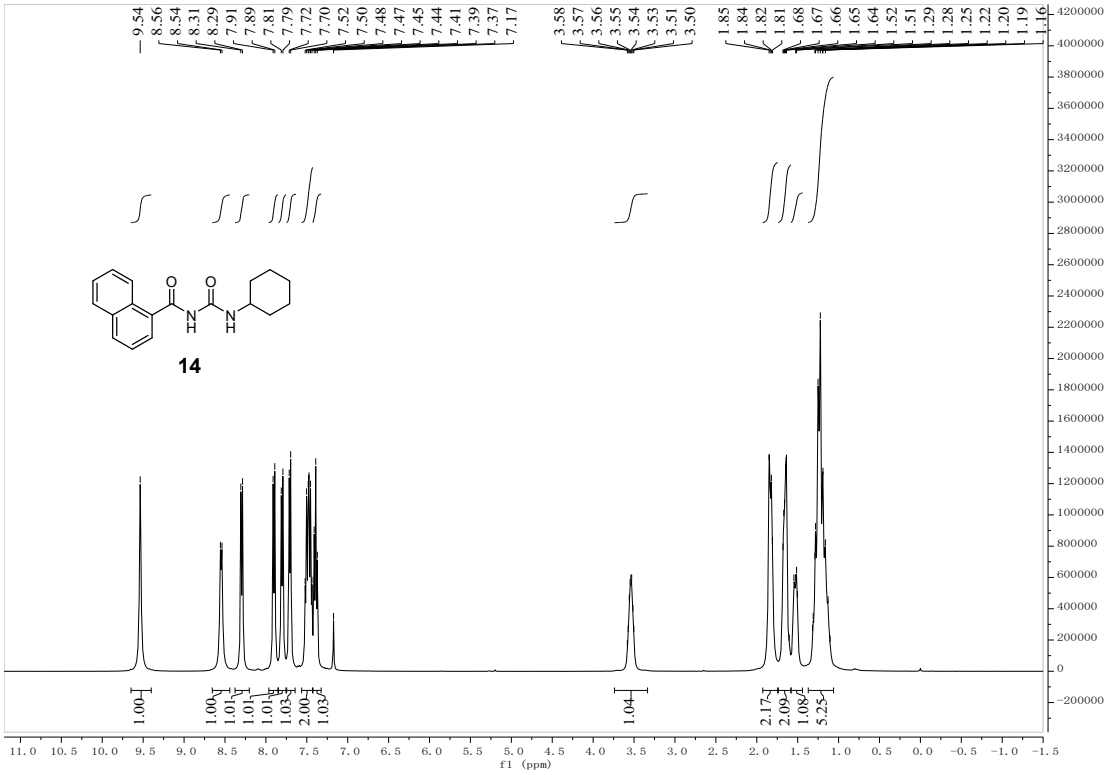
^{1}H NMR of **13**



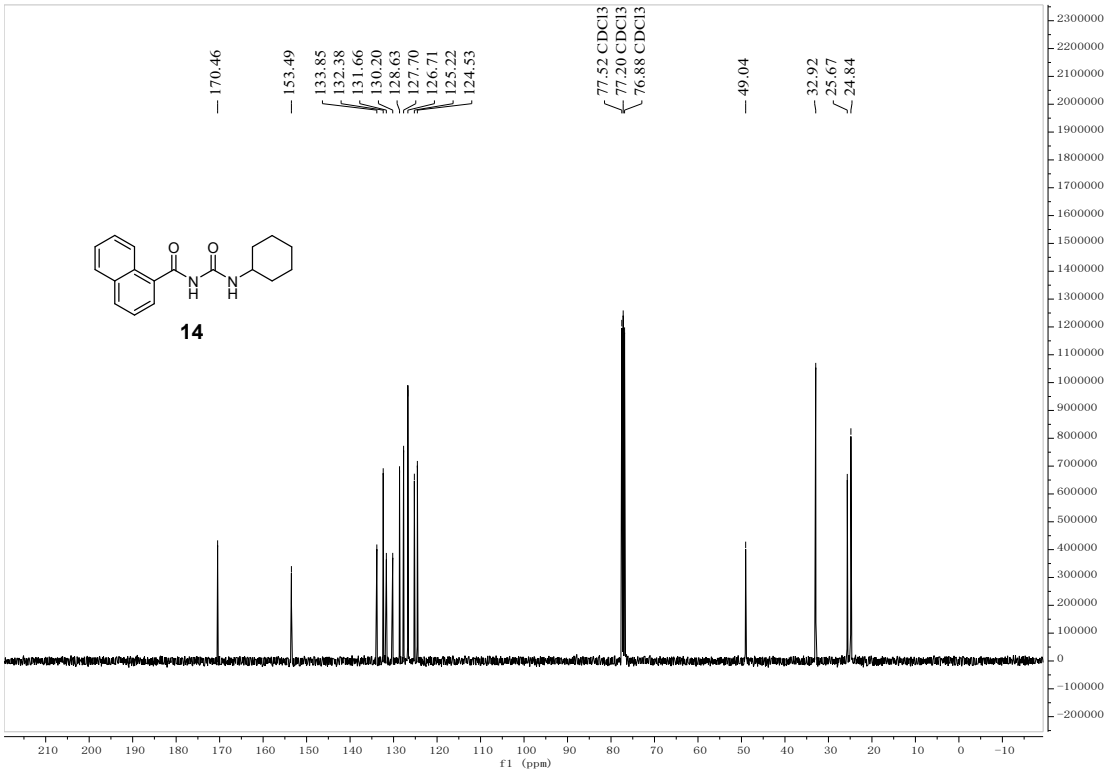
^{13}C NMR of **13**


165.56
165.40
162.45
132.96
129.57
118.62
118.08
115.80
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
61.81
34.12
25.47
24.13
OH
O
O
N
H
N
H
13
f1 (ppm)

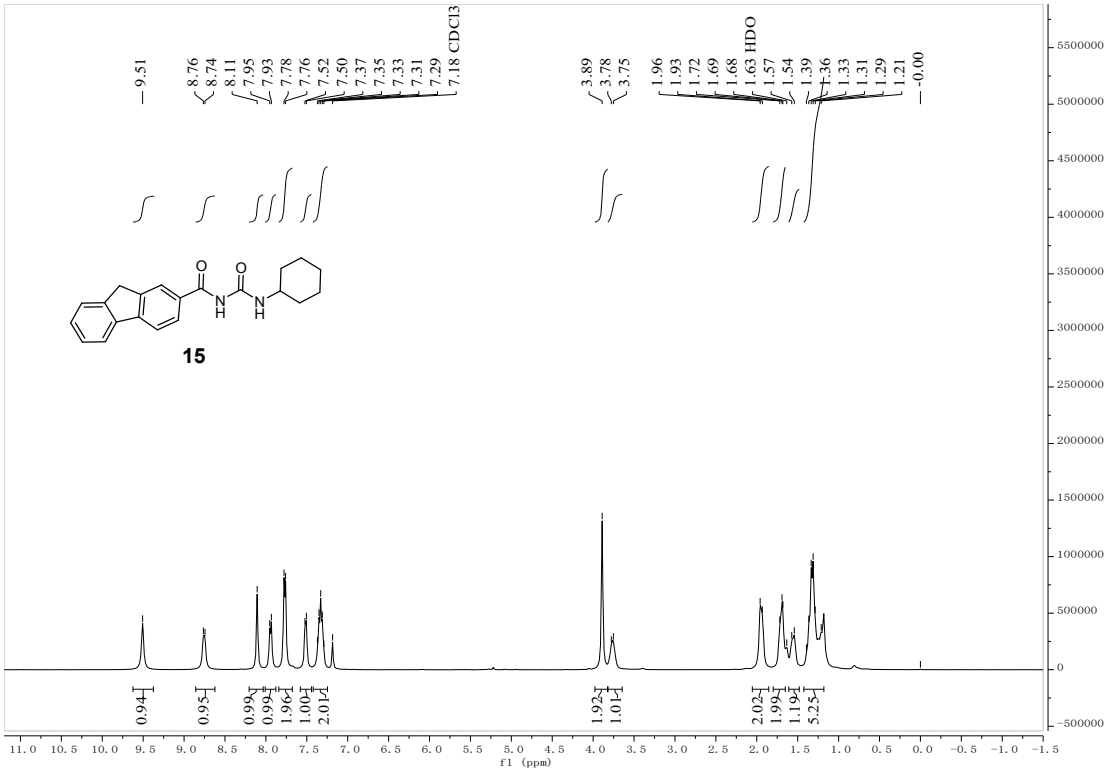
^{1}H NMR of **14**


9.54
8.56
8.54
8.31
8.29
7.91
7.89
7.81
7.79
7.72
7.70
7.52
7.50
7.48
7.47
7.45
7.44
7.41
7.39
7.37
7.17
3.58
3.57
3.56
3.55
3.54
3.53
3.51
3.50
1.85
1.84
1.82
1.81
1.68
1.67
1.66
1.65
1.64
1.52
1.51
1.29
1.28
1.25
1.22
1.20
1.19
1.16
O
O
N
H
N
H
14
1.00
1.00
1.01
1.01
1.01
1.03
2.00
1.03
1.04
2.17
2.09
1.08
5.25
f1 (ppm)

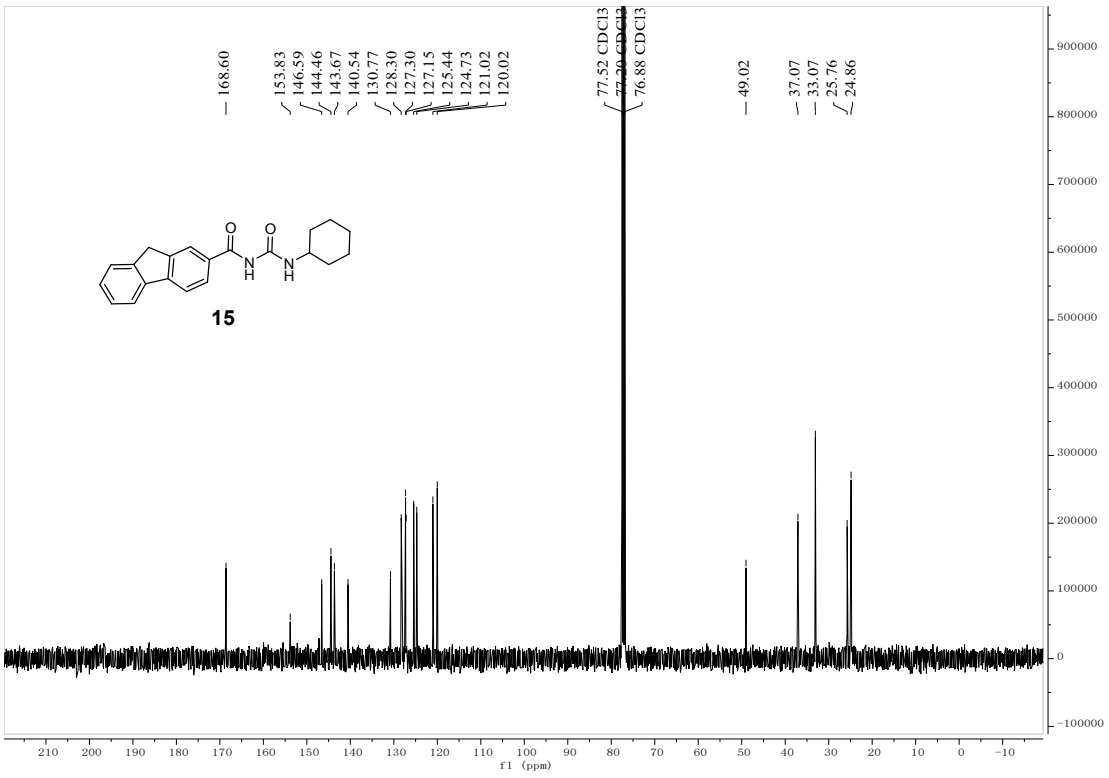
^{13}C NMR of **14**



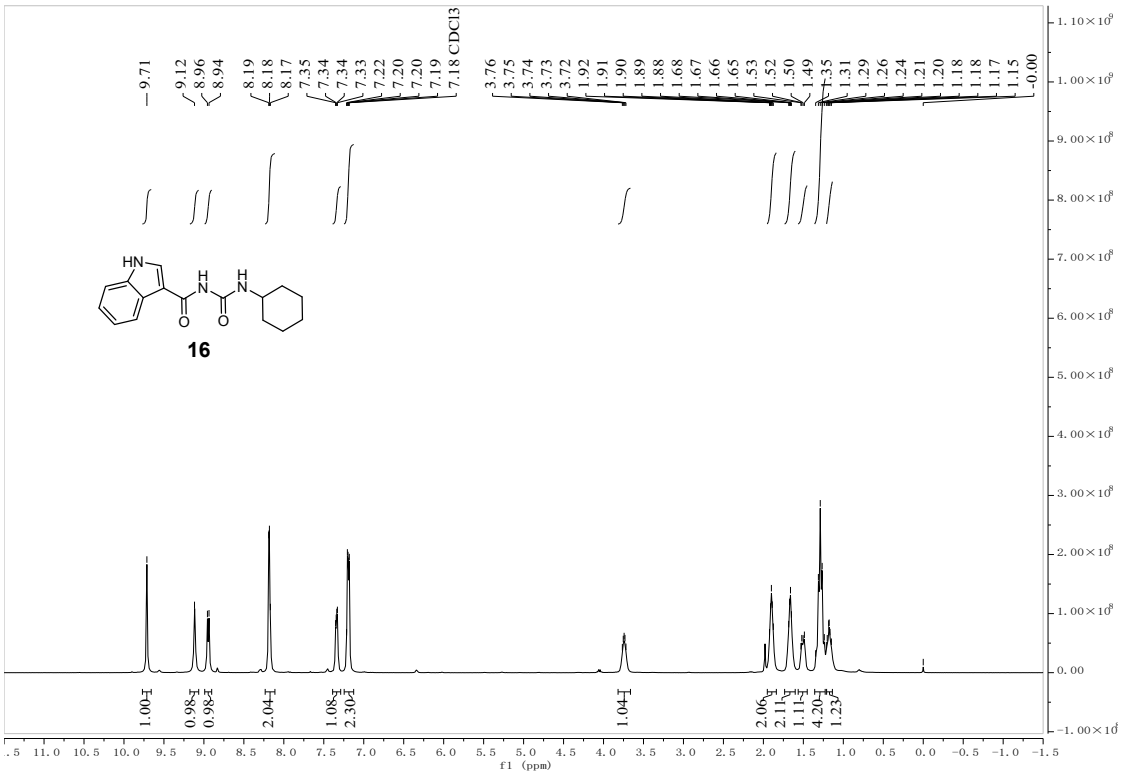
^{1}H NMR of **15**



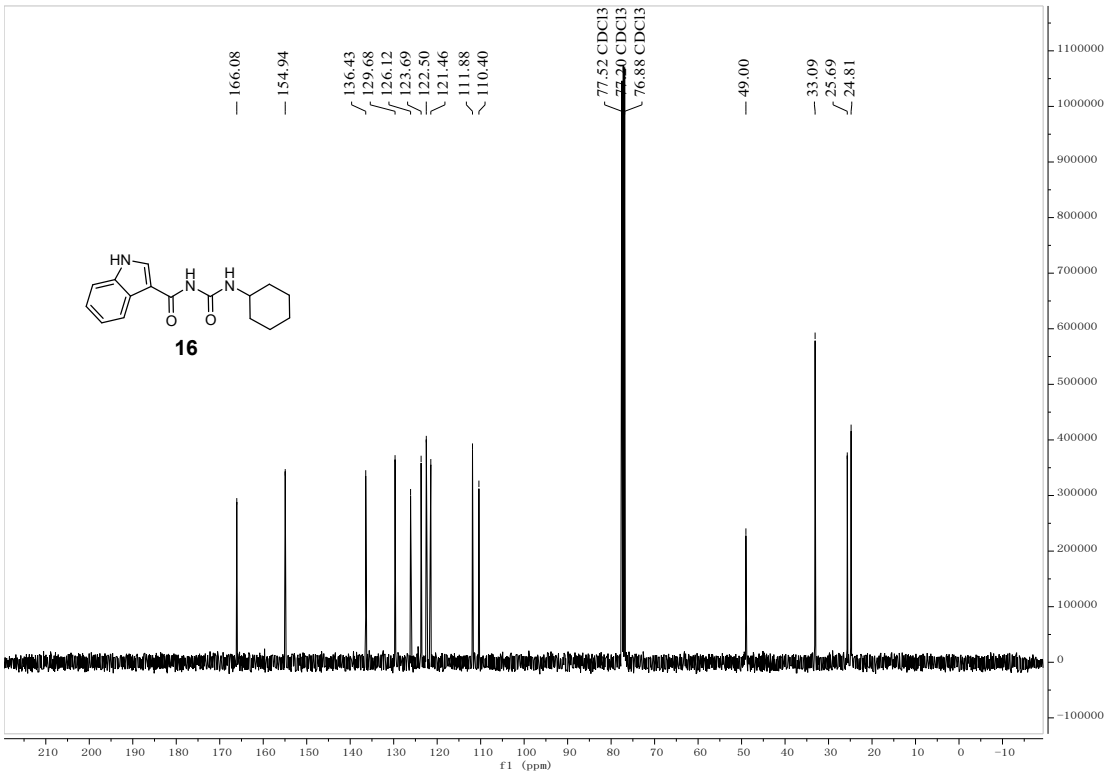
^{13}C NMR of **15**



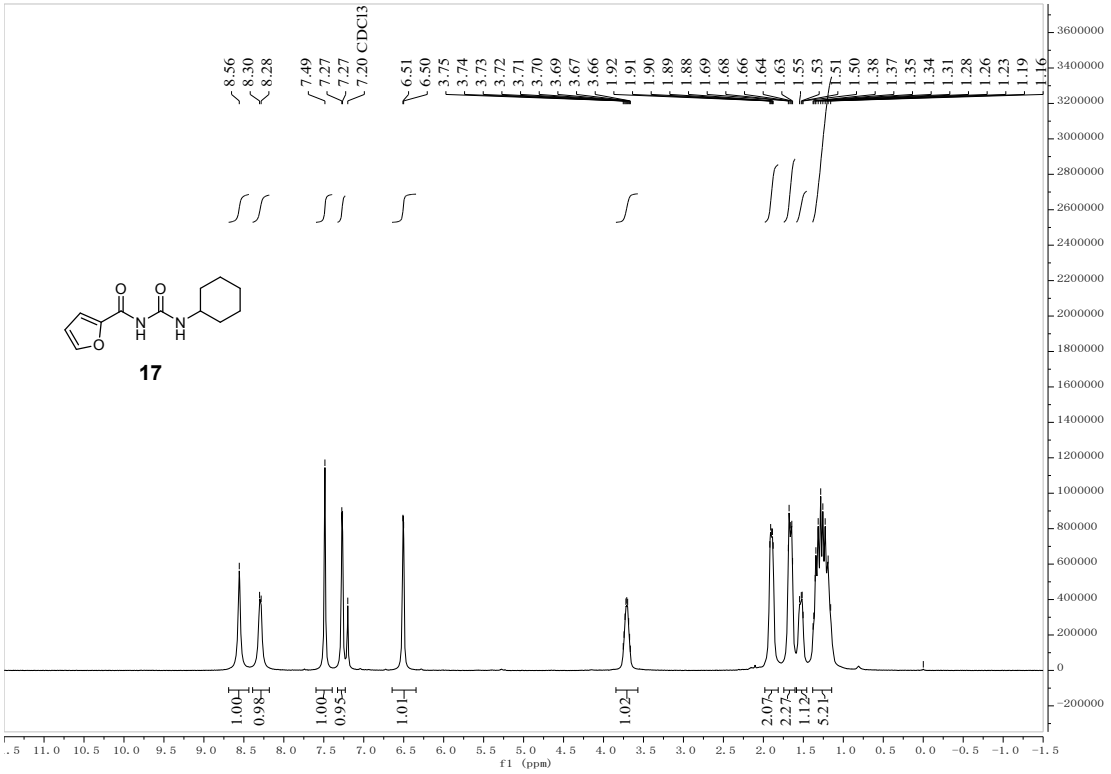
^{1}H NMR of **16**


9.71
9.12
8.96
8.94
8.19
8.18
8.17
7.35
7.34
7.34
7.33
7.22
7.20
7.20
7.19
7.18 CDCl3
3.76
3.75
3.74
3.73
3.72
1.92
1.91
1.90
1.89
1.88
1.68
1.67
1.66
1.65
1.53
1.52
1.50
1.49
1.35
1.31
1.29
1.26
1.24
1.21
1.20
1.18
1.18
1.17
1.15
0.00
1.00
0.98
0.98
2.04
1.08
2.30
1.04
2.06
2.11
1.11
4.20
1.23
f1 (ppm)
16

^{13}C NMR of **16**

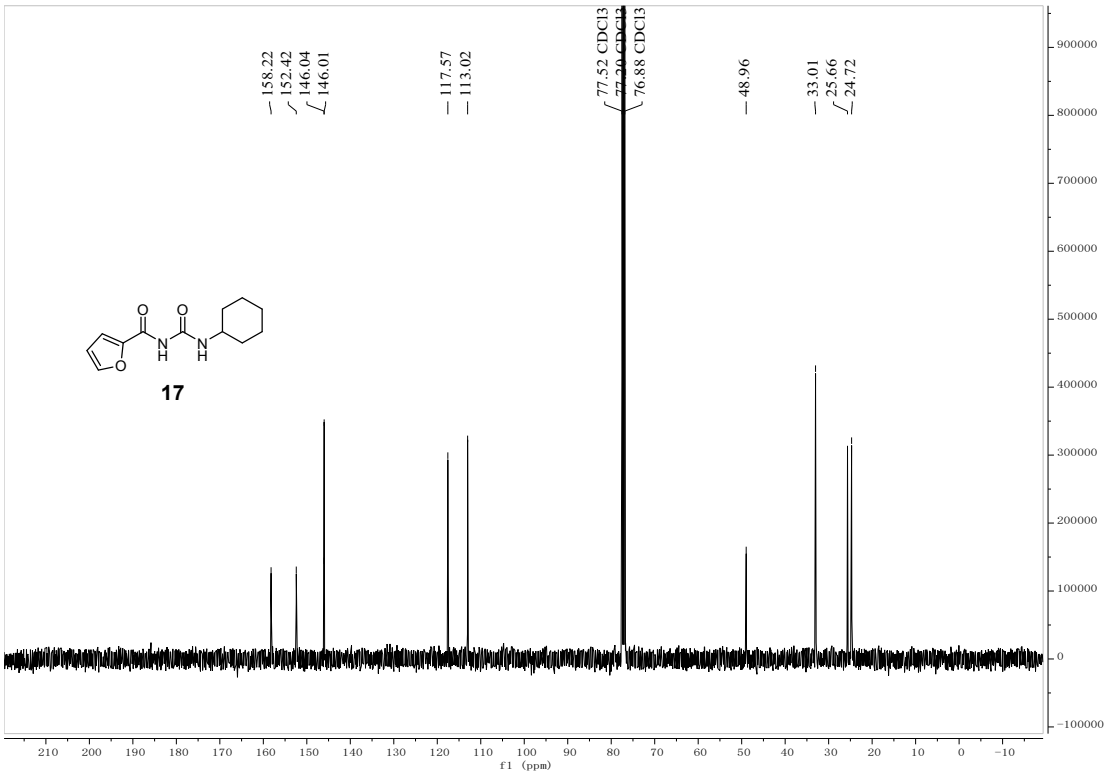

166.08
154.94
136.43
129.68
126.12
123.69
122.50
121.46
111.88
110.40
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
49.00
33.09
25.69
24.81
f1 (ppm)
16

^{1}H NMR of **17**

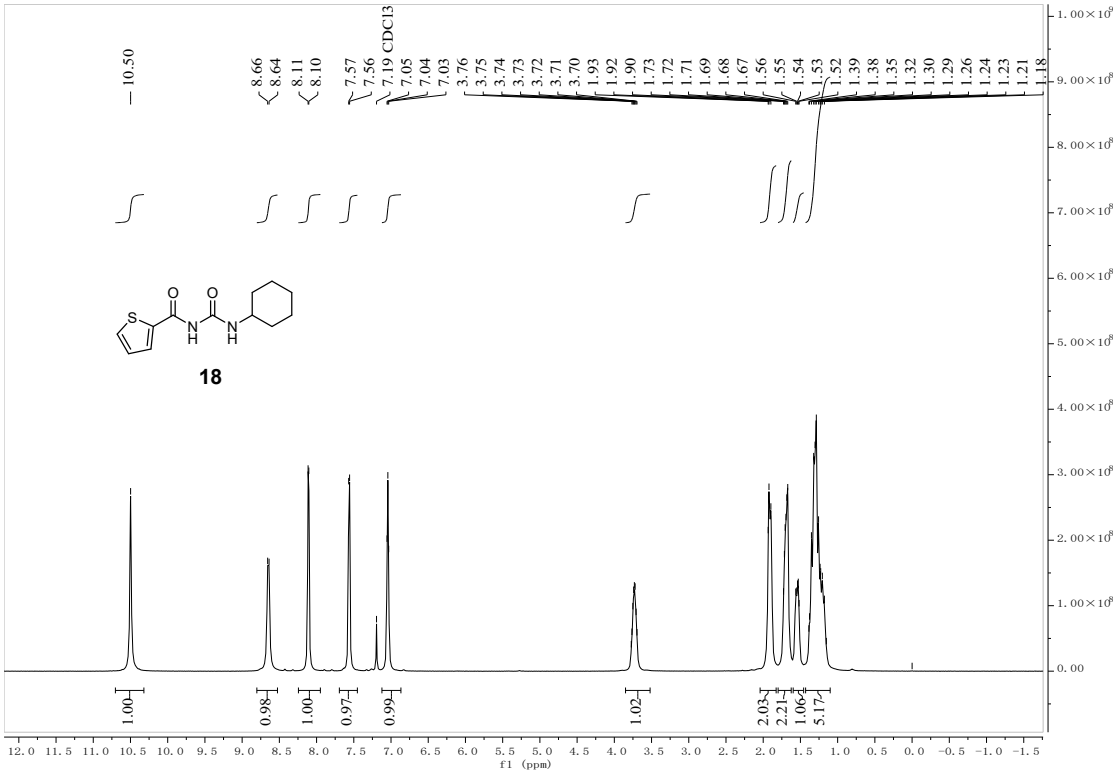


17

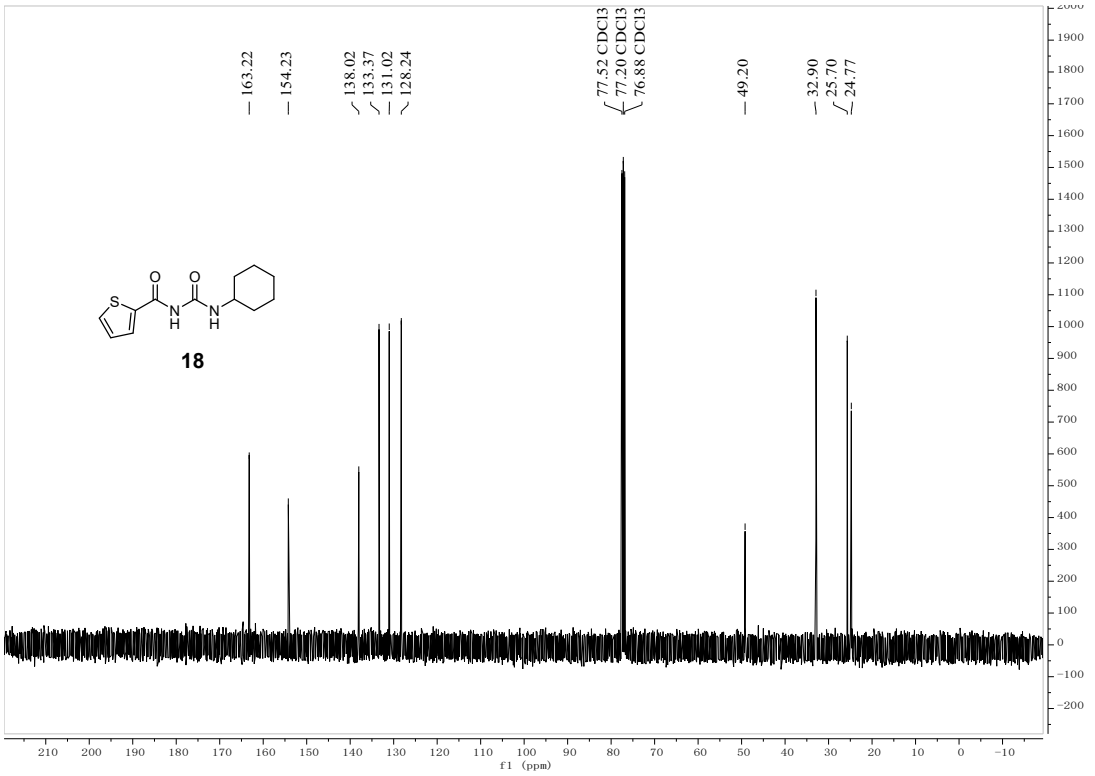
^{13}C NMR of **17**


158.22
152.42
146.04
146.01
117.57
113.02
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
48.96
33.01
25.66
24.72
17
f1 (ppm)

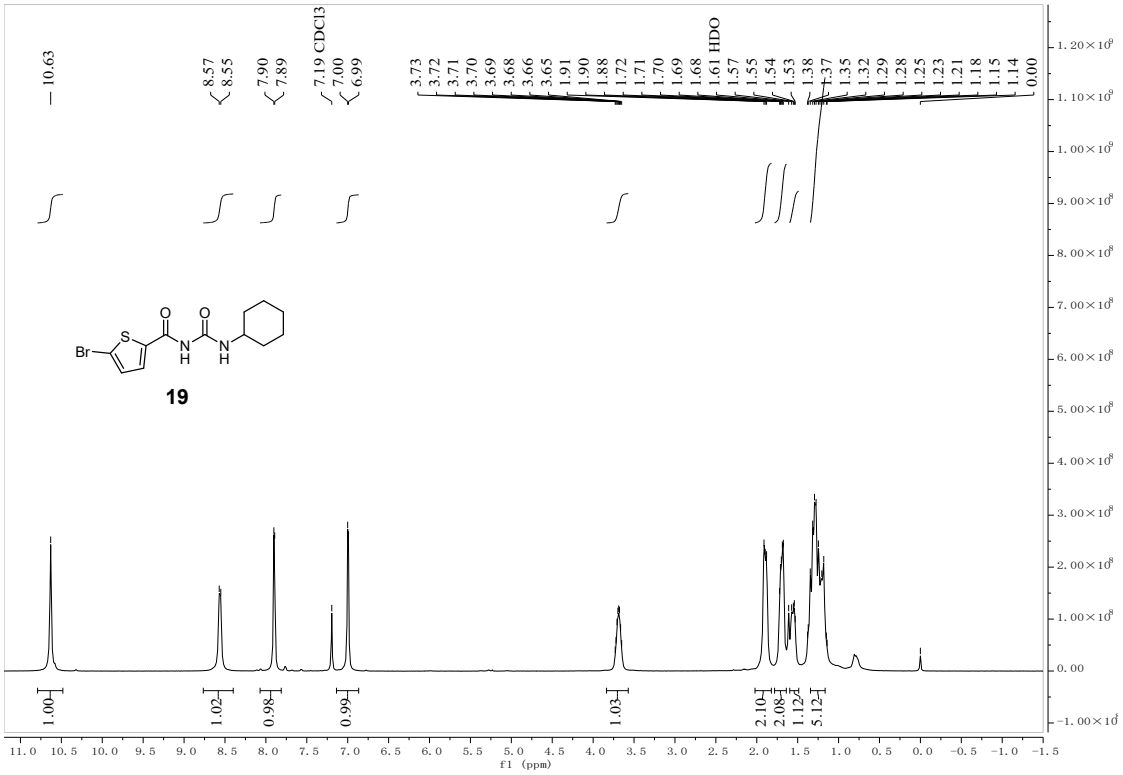
^{1}H NMR of **18**


10.50
8.66
8.64
8.11
8.10
7.57
7.56
7.19 CDCl3
7.05
7.04
7.03
3.76
3.75
3.74
3.73
3.72
3.71
3.70
1.93
1.92
1.90
1.73
1.72
1.71
1.69
1.68
1.67
1.56
1.55
1.54
1.53
1.52
1.39
1.38
1.35
1.32
1.30
1.29
1.26
1.24
1.23
1.21
1.18
18
1.00
0.98
1.00
0.97
0.99
1.02
2.03
2.21
1.06
5.17
f1 (ppm)

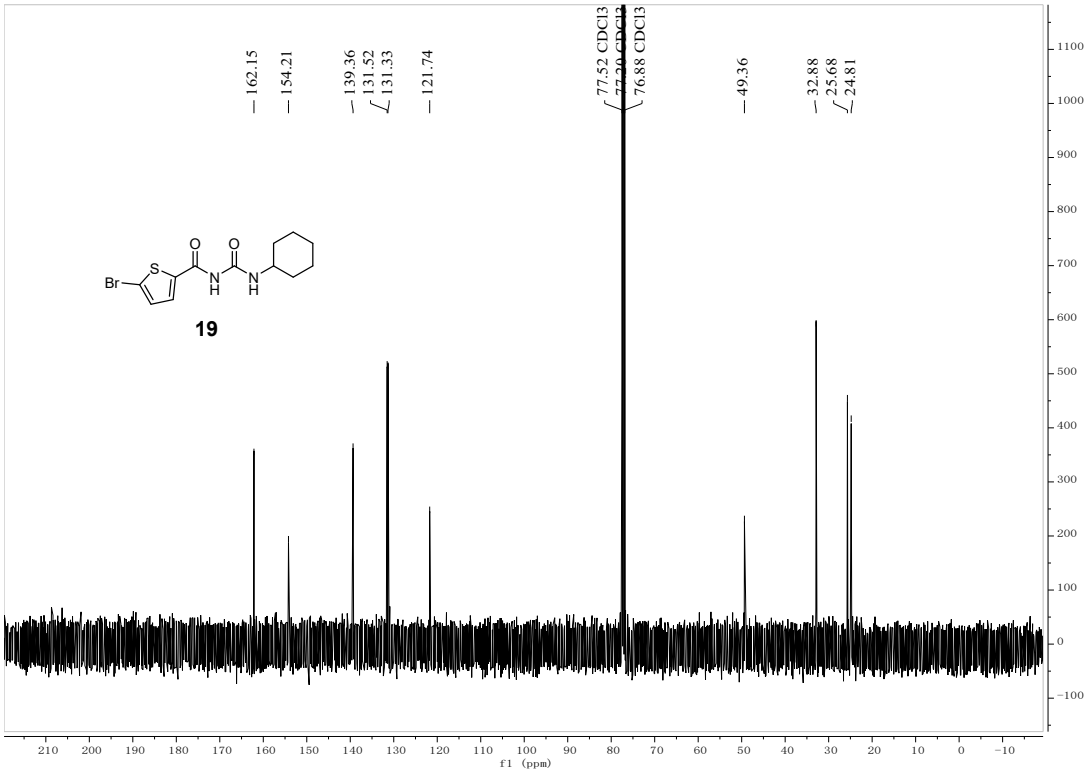
^{13}C NMR of **18**



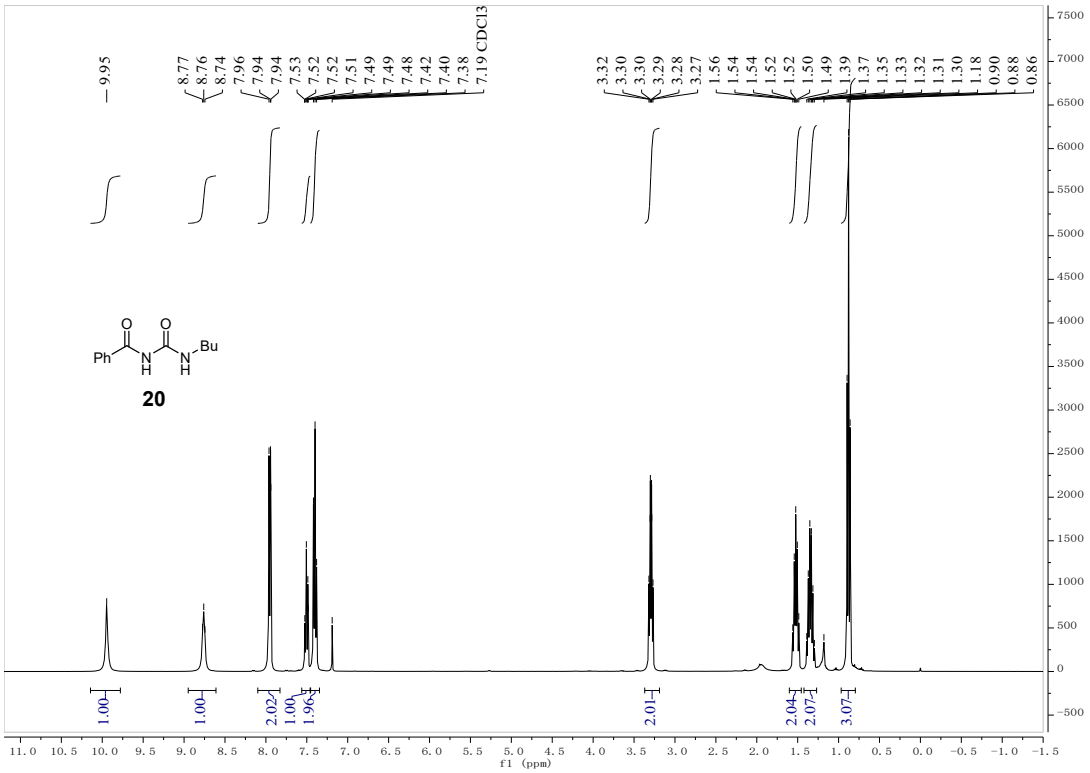
^{1}H NMR of **19**



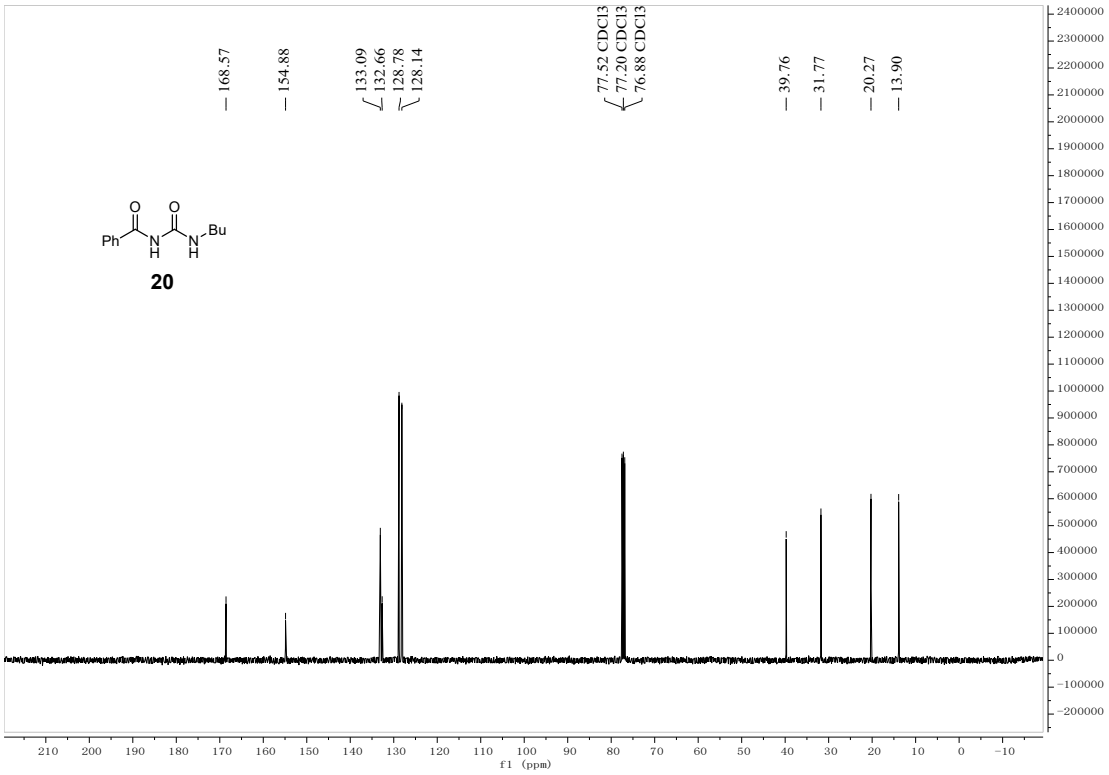
^{13}C NMR of **19**



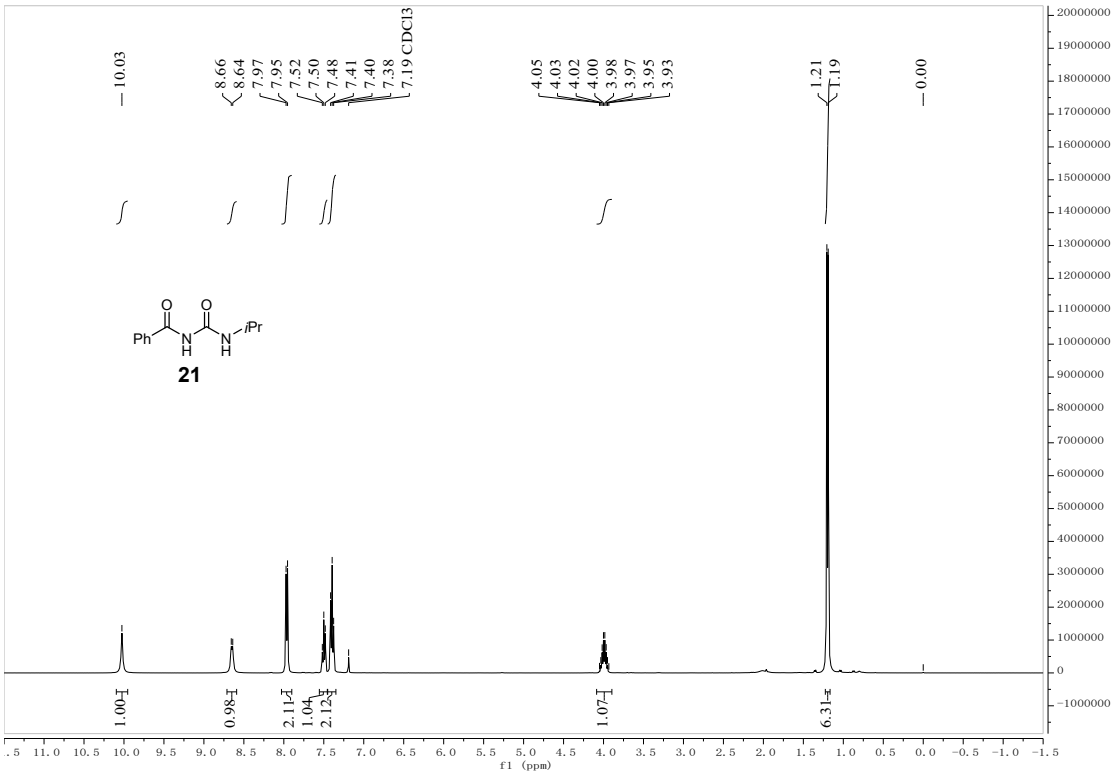
^{1}H NMR of **20**



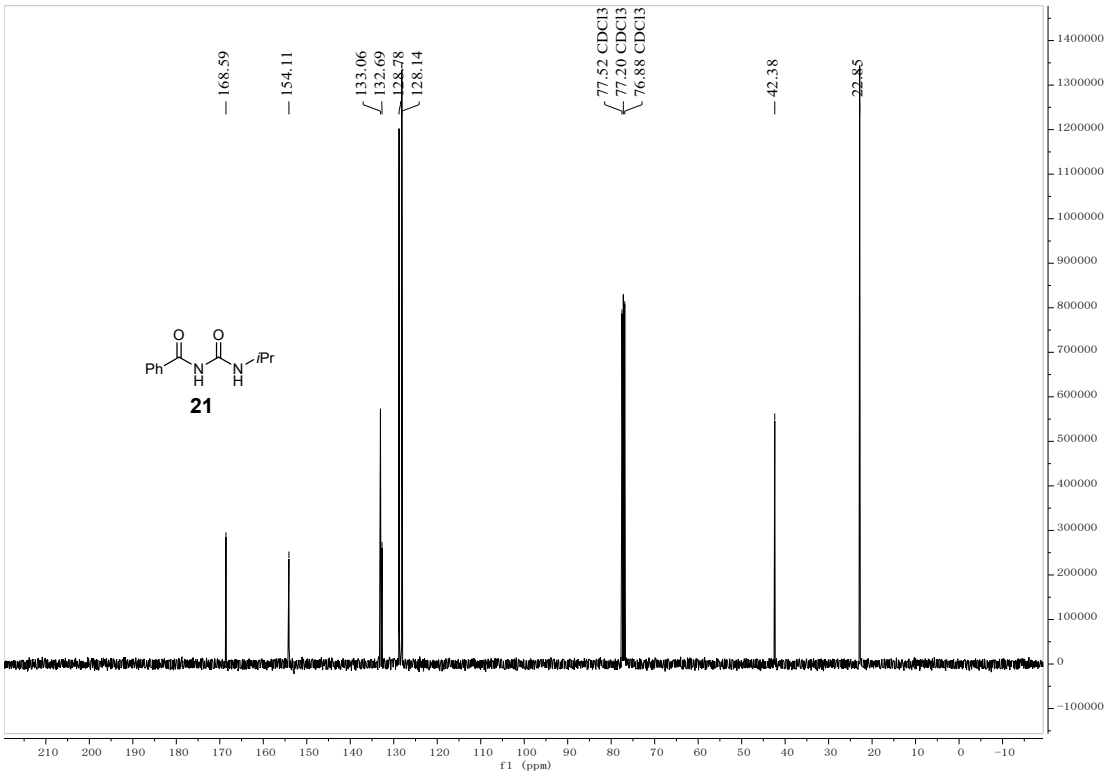
^{13}C NMR of **20**



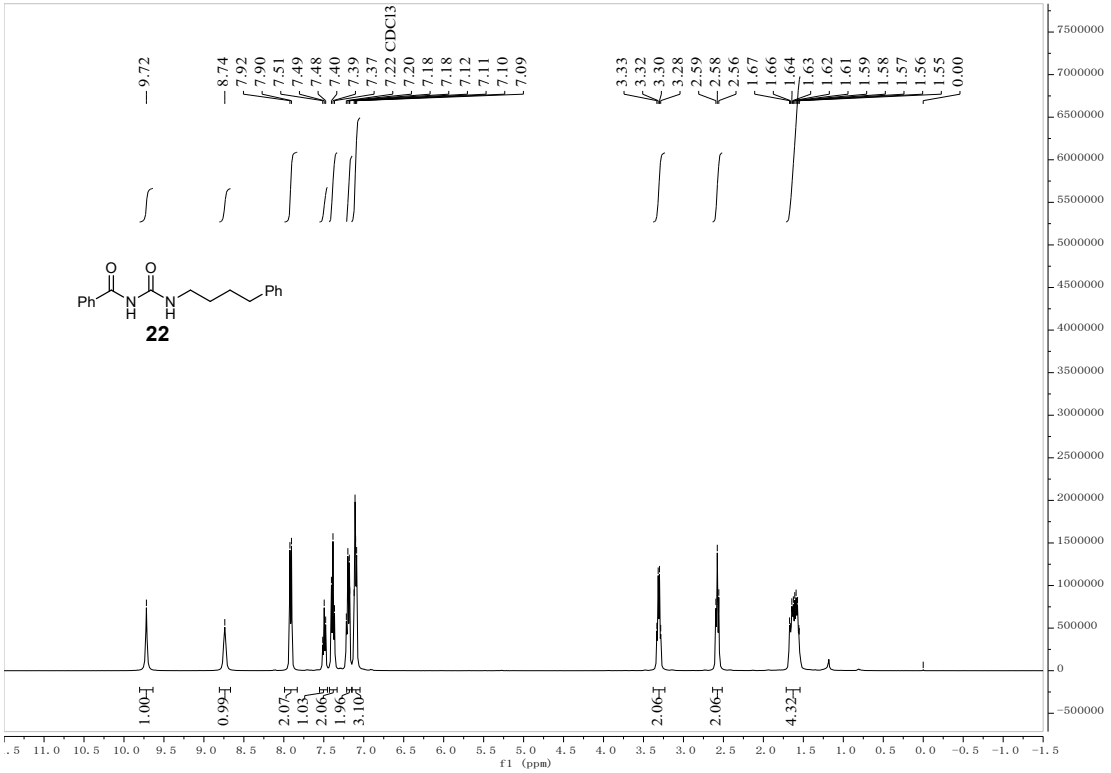
^{1}H NMR of **21**


10.03
8.66
8.64
7.97
7.95
7.52
7.50
7.48
7.41
7.40
7.38
7.19 CDCl3
4.05
4.03
4.02
4.00
3.98
3.97
3.95
3.93
1.21
1.19
0.00
Ph
N
H
N
H
iPr
21
1.00
0.98
2.11
1.04
2.12
1.07
6.31
f1 (ppm)

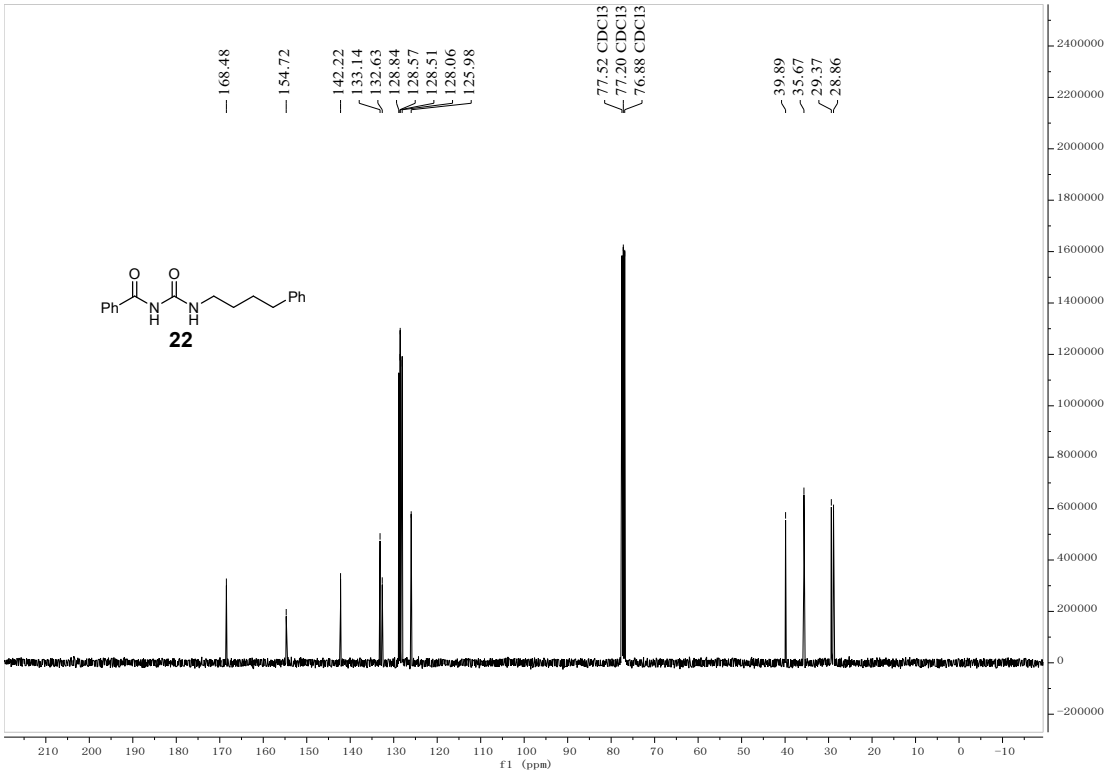
^{13}C NMR of **21**


168.59
154.11
133.06
132.69
128.78
128.14
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
42.38
22.85
Ph
N
H
O
N
H
iPr
21
f1 (ppm)

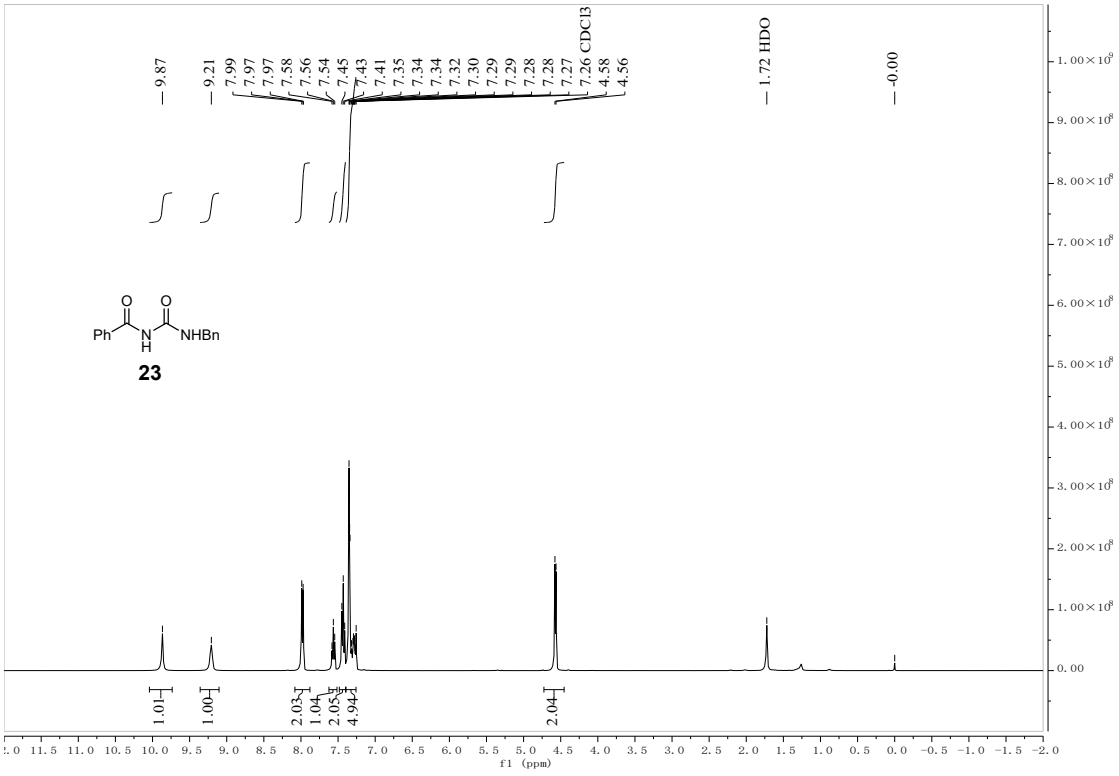
^{1}H NMR of **22**


9.72
8.74
7.92
7.90
7.51
7.49
7.48
7.40
7.39
7.37
7.22 CDCl3
7.20
7.18
7.18
7.12
7.11
7.10
7.09
3.33
3.32
3.30
3.28
2.59
2.58
2.56
1.67
1.66
1.64
1.63
1.62
1.61
1.59
1.58
1.57
1.56
1.55
0.00
Ph
N
H
O
N
H
Ph
22
1.00
0.99
2.07
1.03
2.06
1.96
3.10
2.06
2.06
4.32
f1 (ppm)

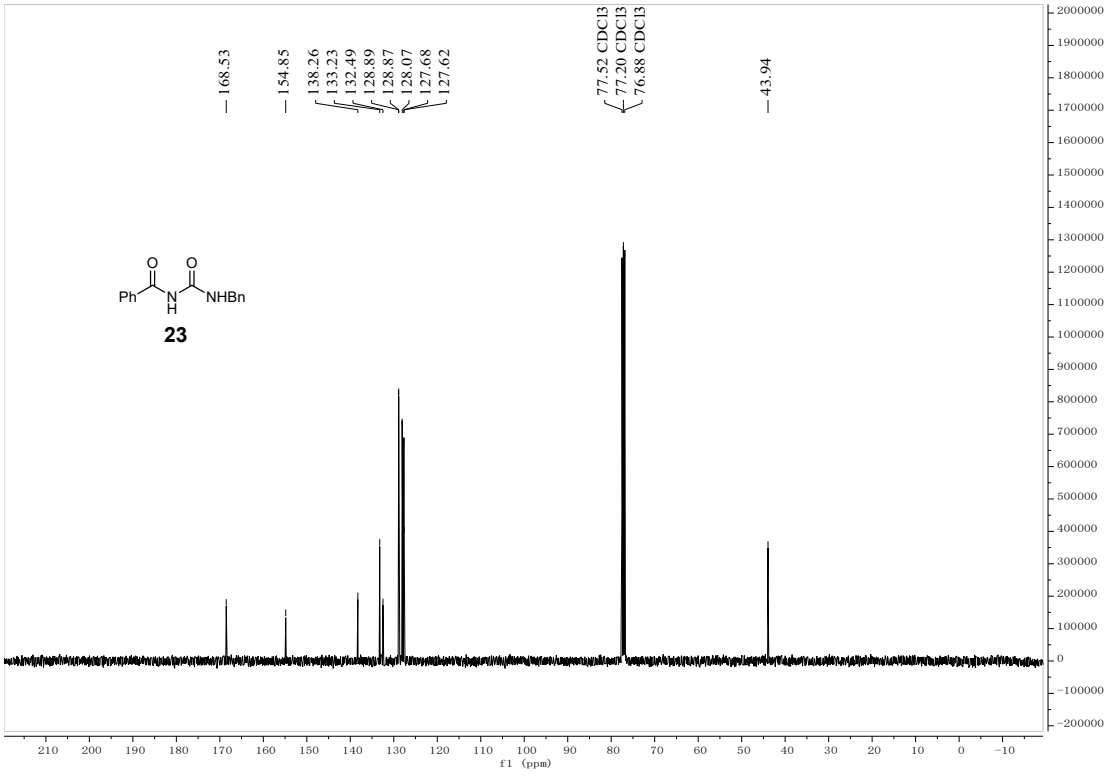
^{13}C NMR of **22**



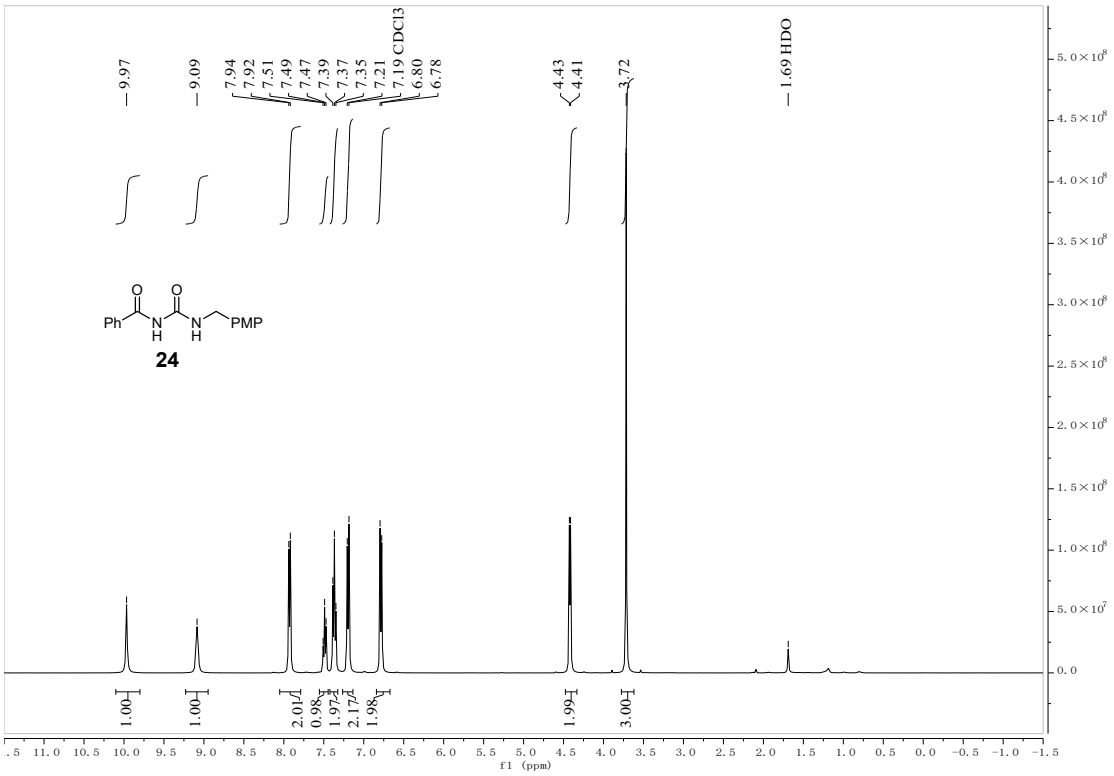
^{1}H NMR of **23**



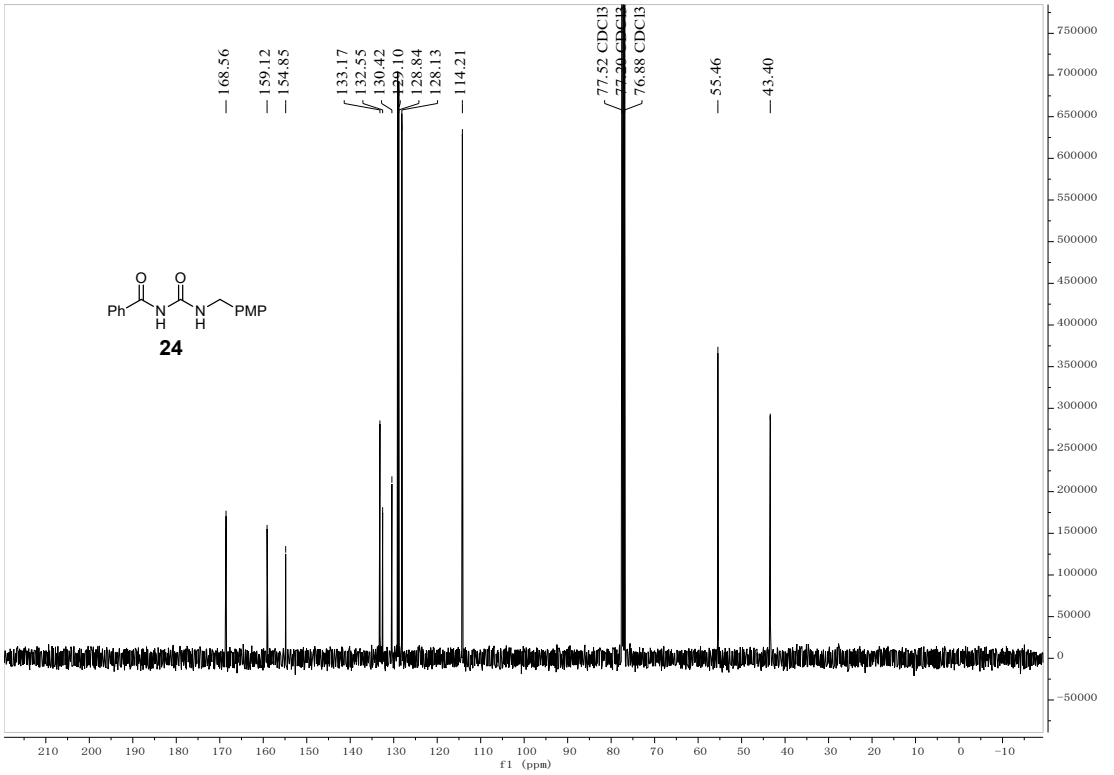
^{13}C NMR of **23**



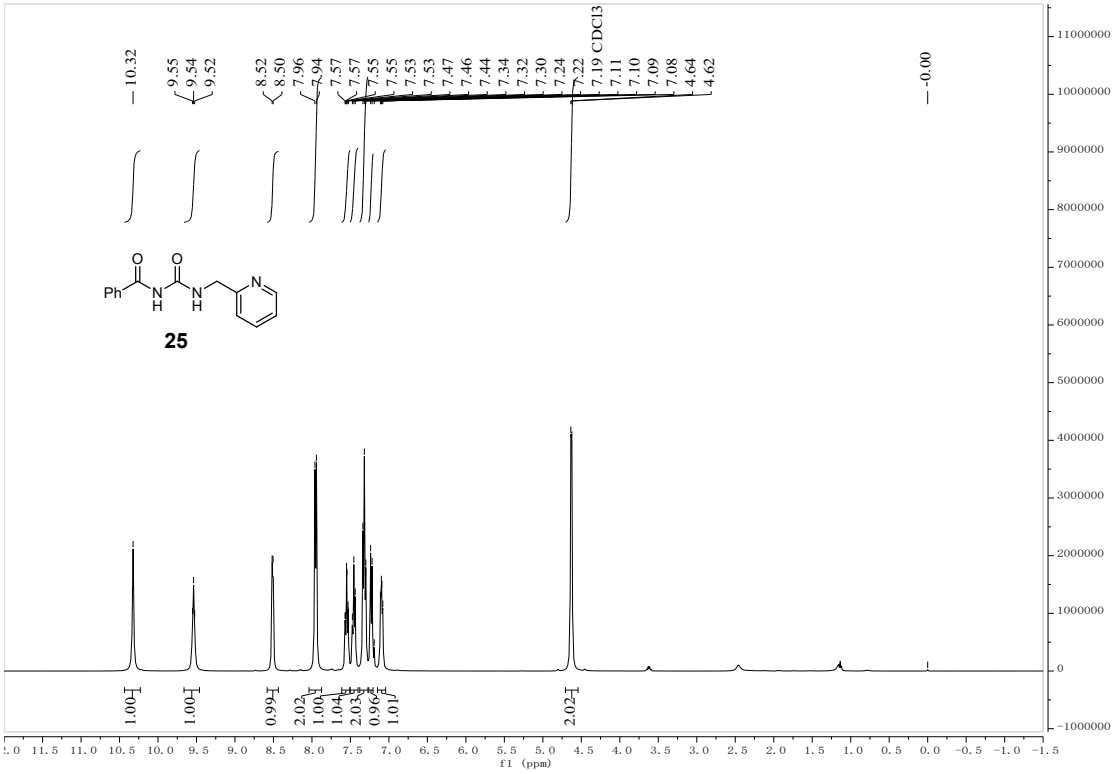
^{1}H NMR of **24**


9.97
9.09
7.94
7.92
7.51
7.49
7.47
7.39
7.37
7.35
7.21
7.19 CDCl3
6.80
6.78
4.43
4.41
3.72
1.69 HDO
Ph
PMP
24
1.00
1.00
2.01
0.98
1.97
2.17
1.98
1.99
3.00
f1 (ppm)

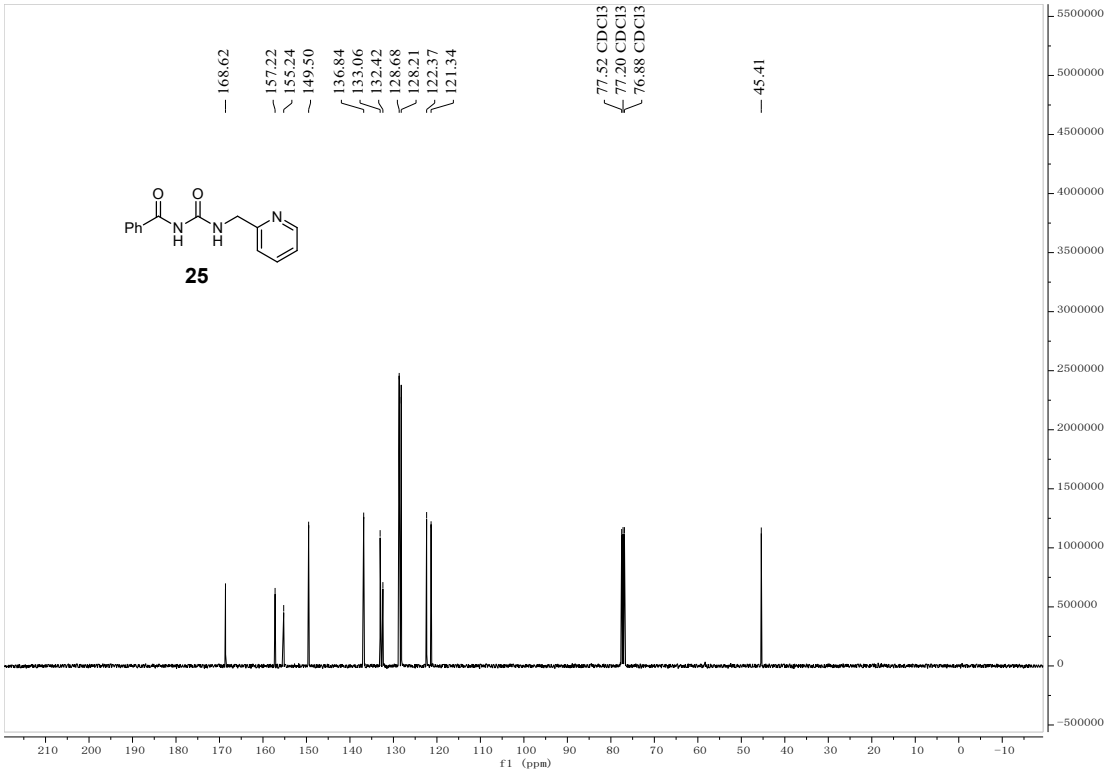
^{13}C NMR of **24**


168.56
159.12
154.85
133.17
132.55
130.42
129.10
128.84
128.13
114.21
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
55.46
43.40
Ph
PMP
24
f1 (ppm)

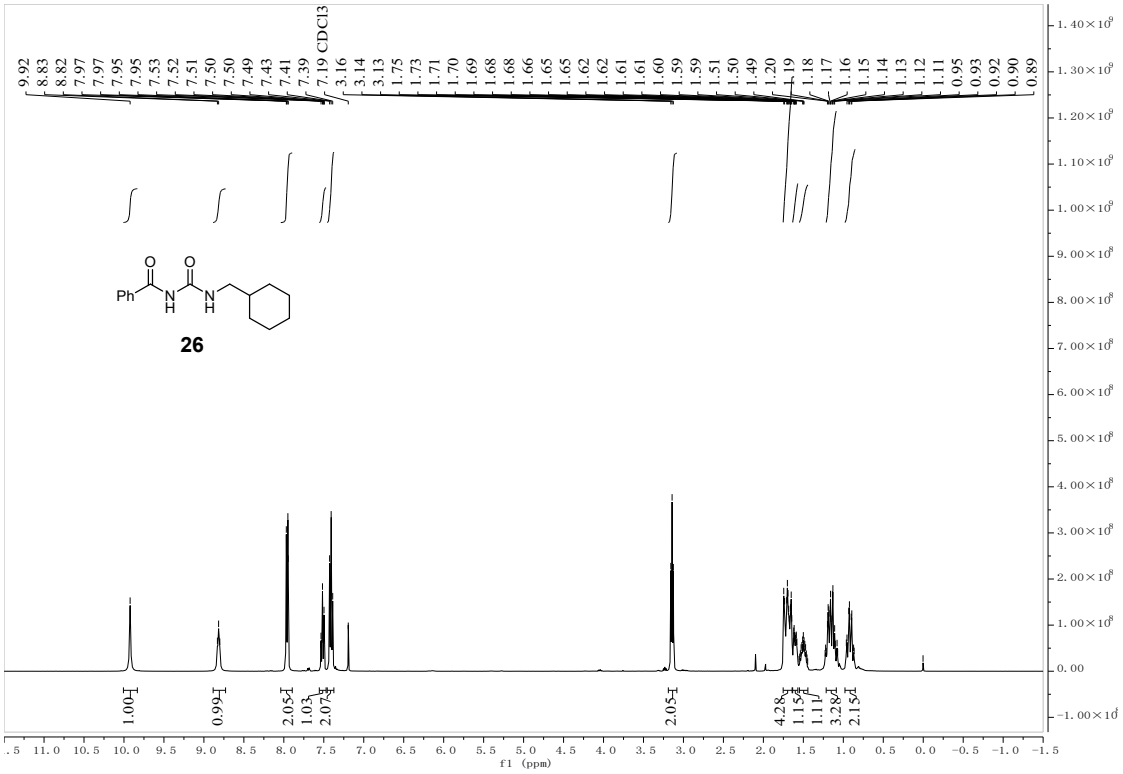
^{1}H NMR of **25**



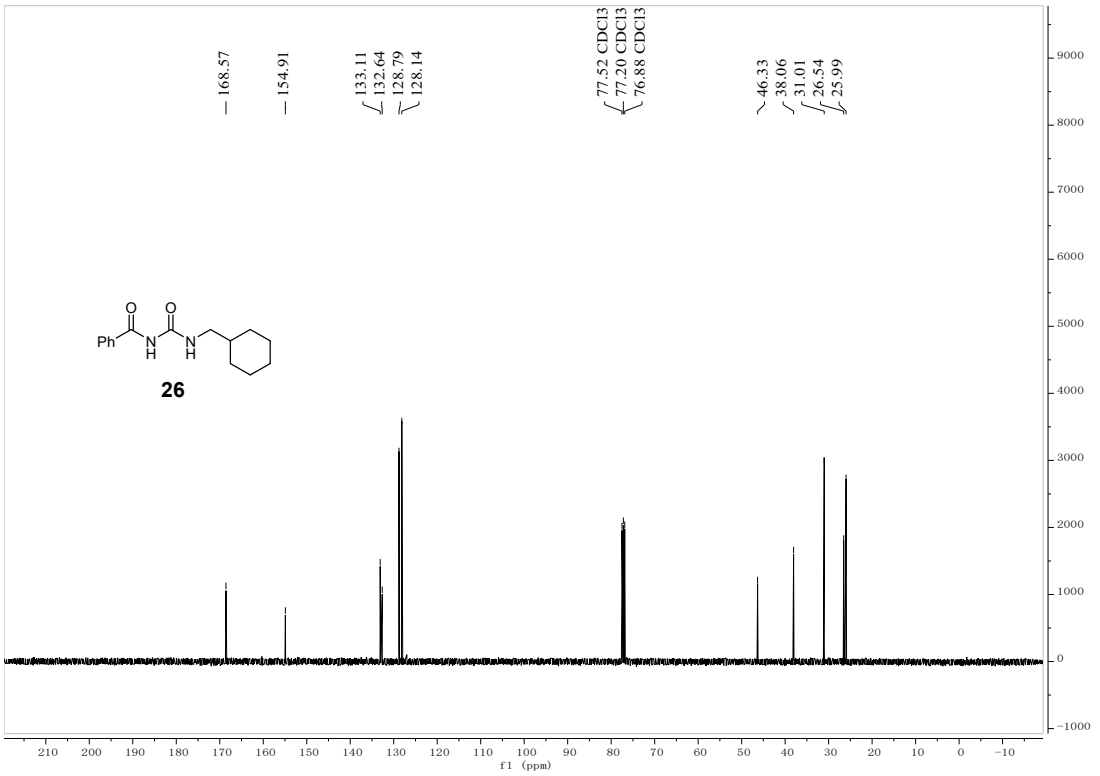
^{13}C NMR of **25**



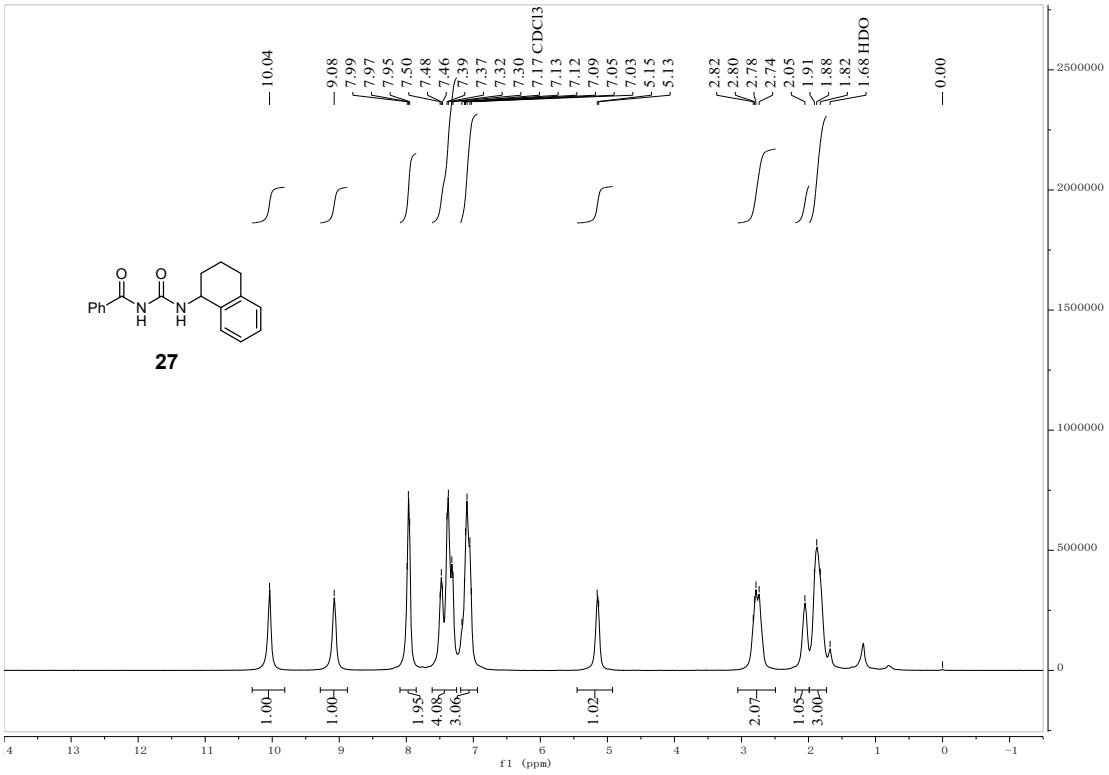
^{1}H NMR of **26**



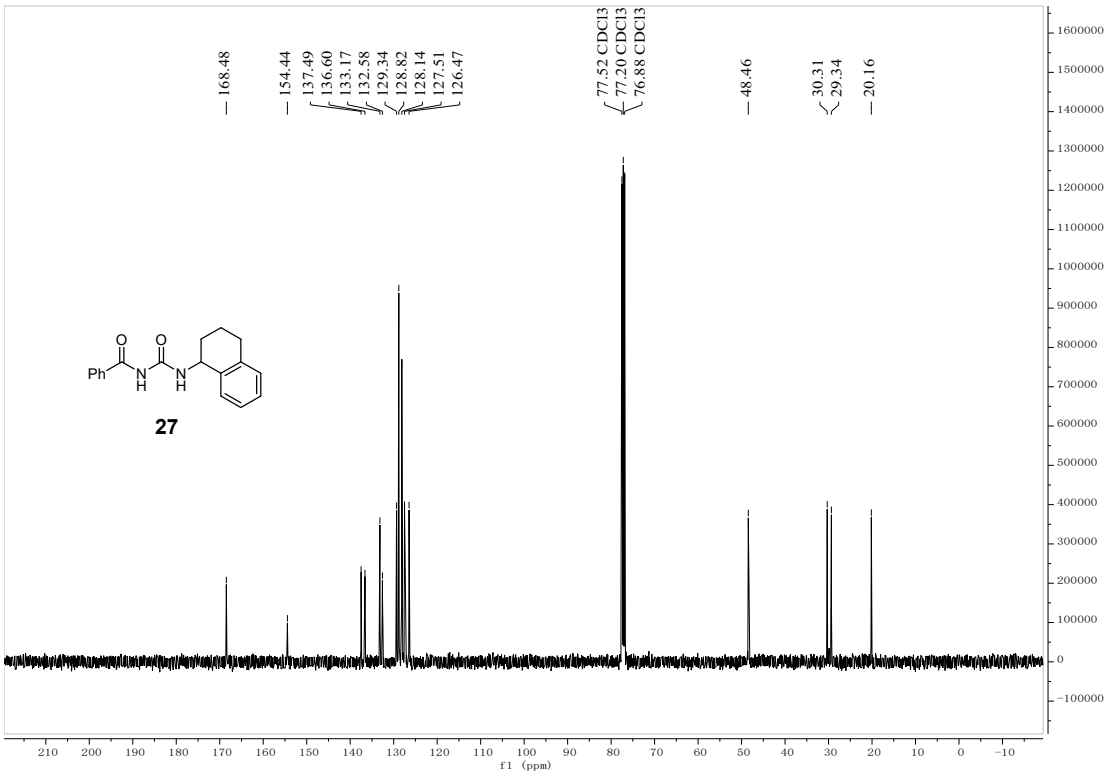
^{13}C NMR of **26**


168.57
154.91
133.11
132.64
128.79
128.14
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
46.33
38.06
31.01
26.54
25.99
Ph
O
N
H
O
N
H
26
f1 (ppm)

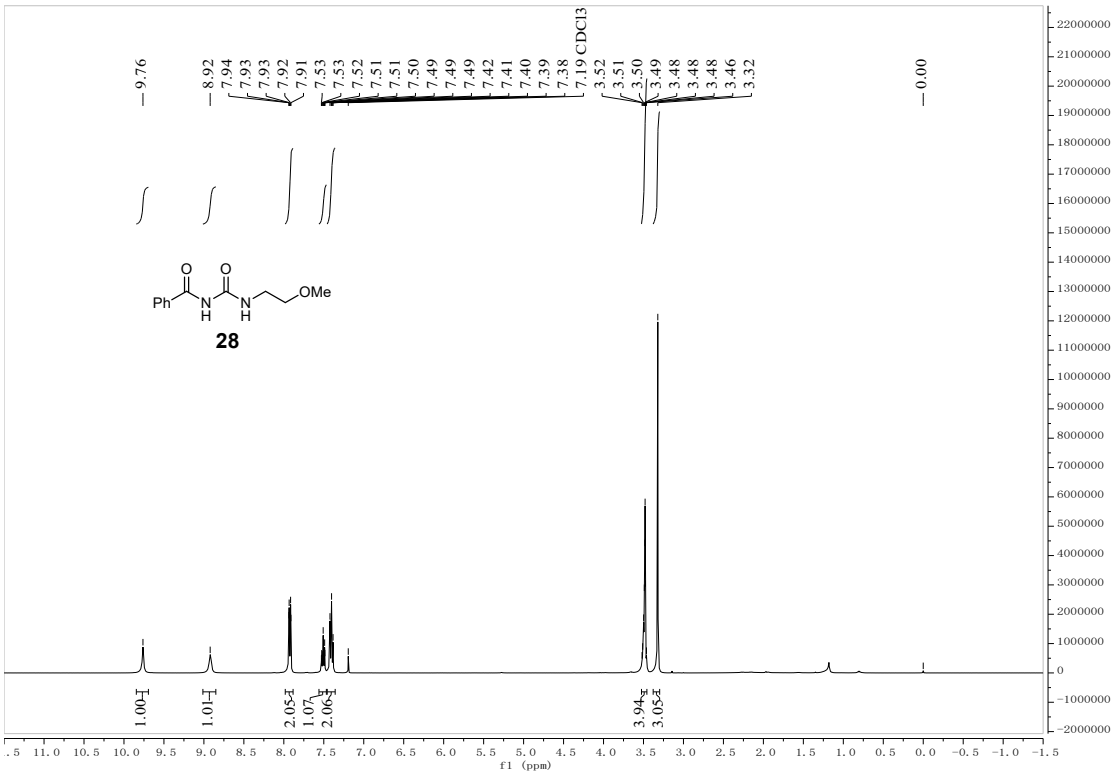
^{1}H NMR of **27**


10.04
9.08
7.99
7.97
7.95
7.50
7.48
7.46
7.39
7.37
7.32
7.30
7.17 CDCl3
7.13
7.12
7.09
7.05
7.03
5.15
5.13
2.82
2.80
2.78
2.74
2.05
1.91
1.88
1.82
1.68 HDO
0.00
Ph
O
N
H
O
N
H
27
1.00
1.00
1.95
4.08
3.06
1.02
2.07
1.05
3.00
f1 (ppm)

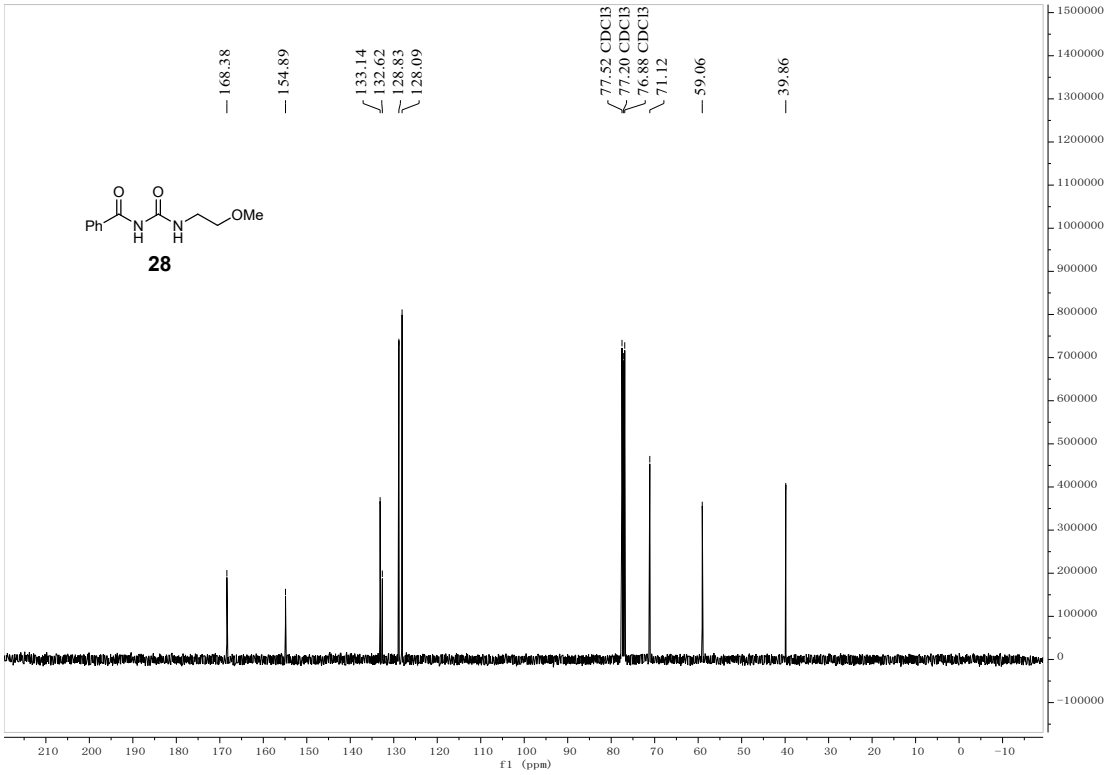
^{13}C NMR of **27**



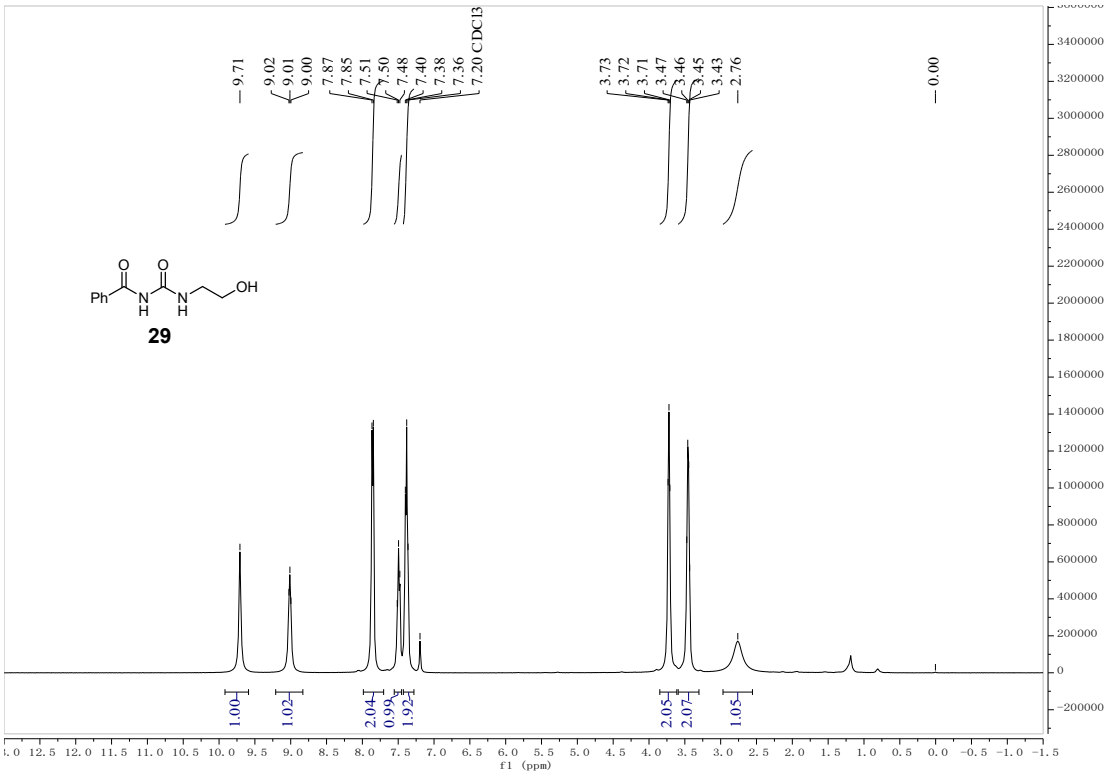
^{1}H NMR of **28**


9.76
8.92
7.94
7.93
7.93
7.92
7.91
7.53
7.53
7.52
7.51
7.51
7.50
7.49
7.49
7.49
7.42
7.41
7.40
7.39
7.38
7.19 CDCl3
3.52
3.51
3.50
3.49
3.48
3.48
3.46
3.32
0.00
Ph
N
H
O
N
H
O
OMe
28
1.00
1.01
2.05
1.07
2.06
3.94
3.05
f1 (ppm)

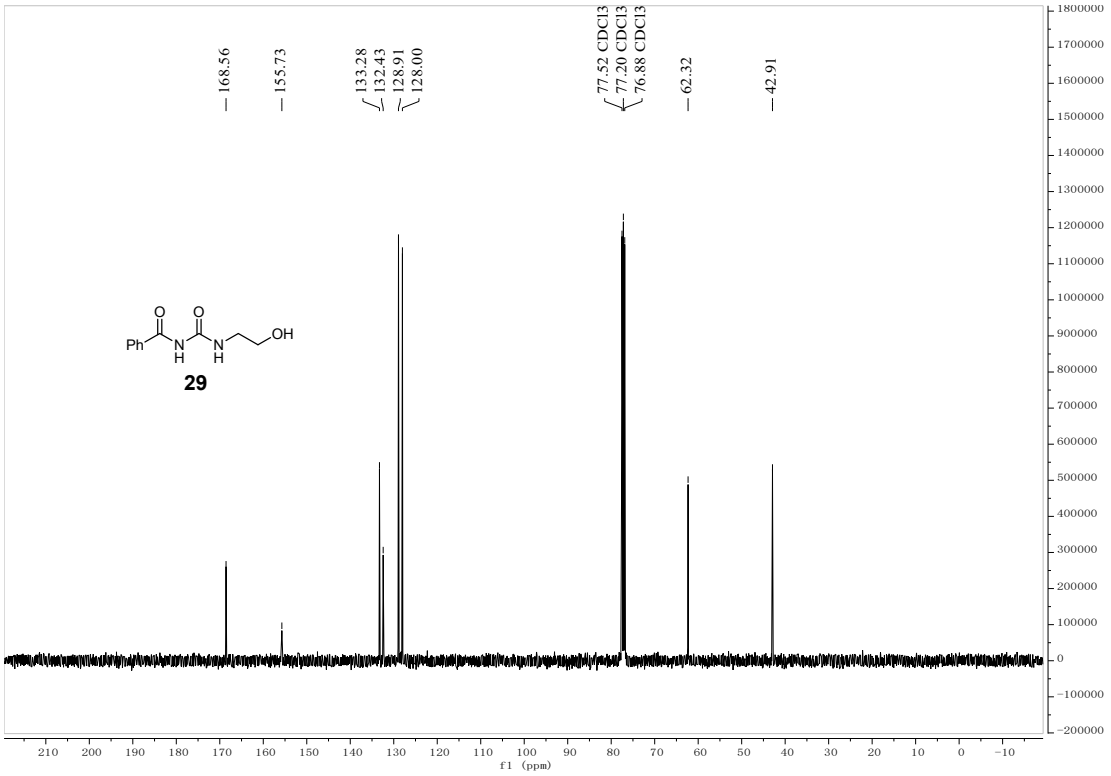
^{13}C NMR of **28**


168.38
154.89
133.14
132.62
128.83
128.09
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
71.12
59.06
39.86
Ph
N
H
O
N
H
O
OMe
28
f1 (ppm)

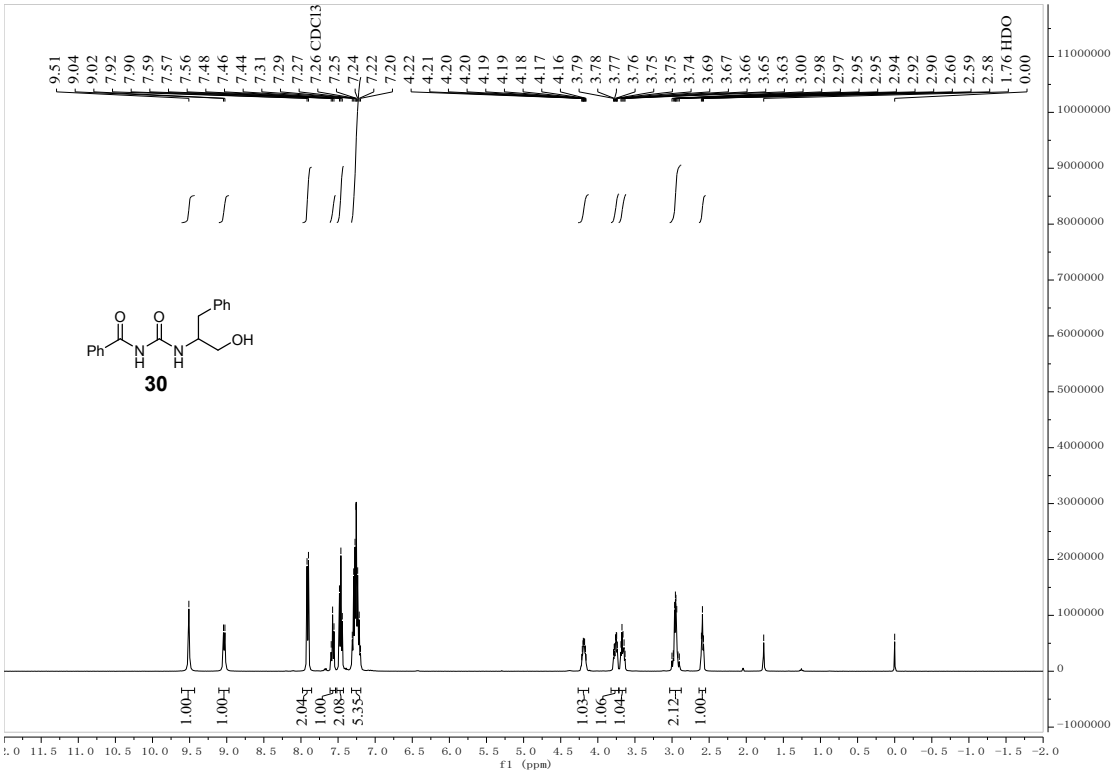
^{1}H NMR of **29**



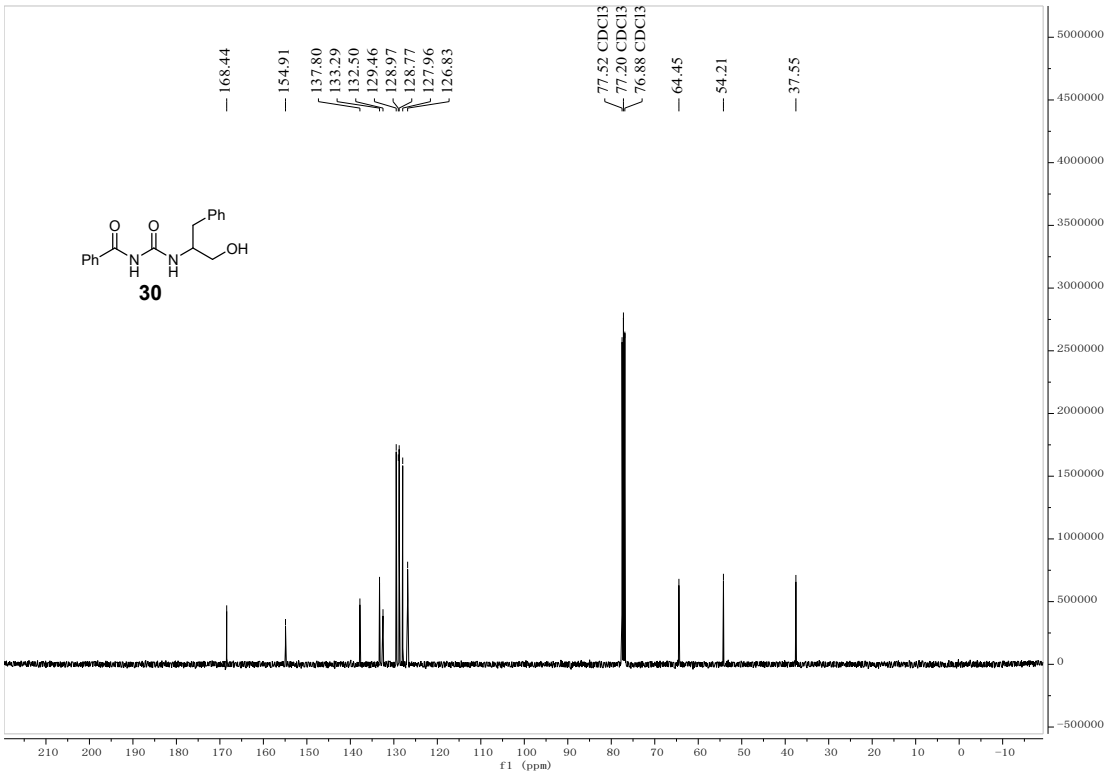
^{13}C NMR of **29**


168.56
155.73
133.28
132.43
128.91
128.00
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
62.32
42.91
Ph
O
N
H
O
N
H
OH
29
f1 (ppm)

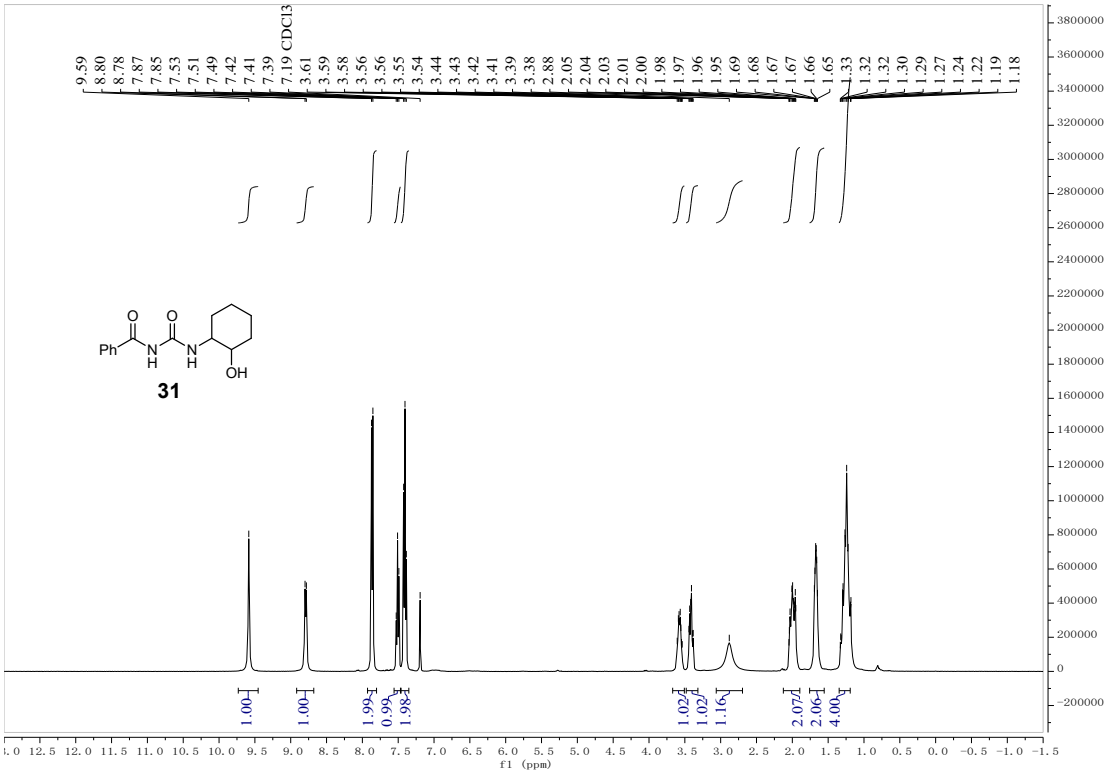
^{1}H NMR of **30**


9.51
9.04
9.02
7.92
7.90
7.59
7.57
7.56
7.48
7.46
7.44
7.31
7.29
7.27
7.26 CDCl3
7.25
7.24
7.22
7.20
4.22
4.21
4.20
4.20
4.19
4.19
4.18
4.17
4.16
3.79
3.78
3.77
3.76
3.75
3.75
3.74
3.69
3.67
3.66
3.65
3.63
3.00
2.98
2.97
2.95
2.95
2.94
2.92
2.90
2.60
2.59
2.58
1.76 HDO
0.00
Ph
O
N
H
O
N
H
OH
30
1.00
1.00
2.04
1.00
2.08
5.35
1.03
1.06
1.04
2.12
1.00
f1 (ppm)

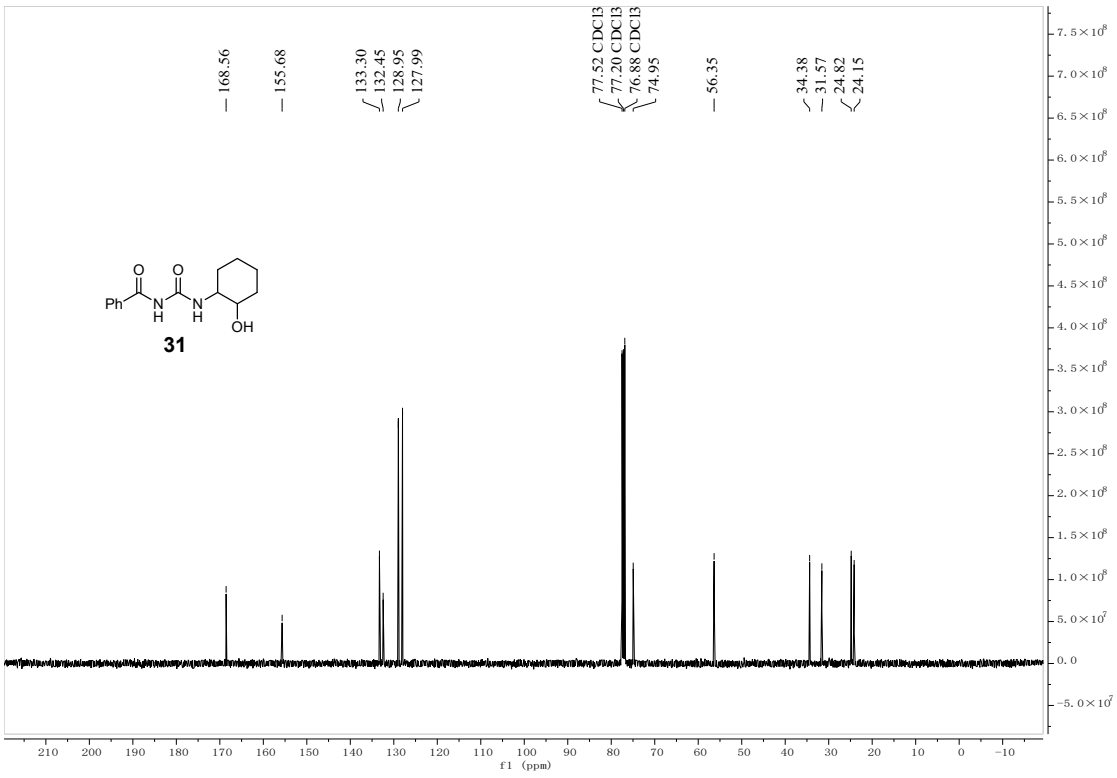
^{13}C NMR of **30**



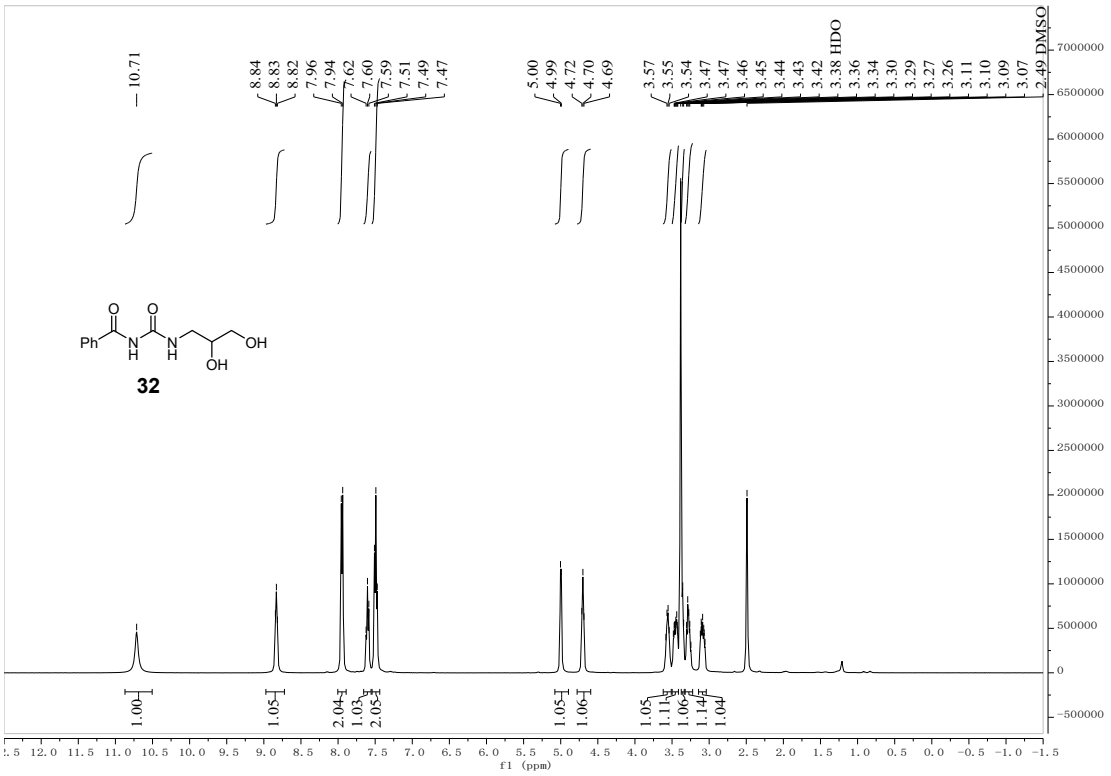
^{1}H NMR of **31**



^{13}C NMR of **31**

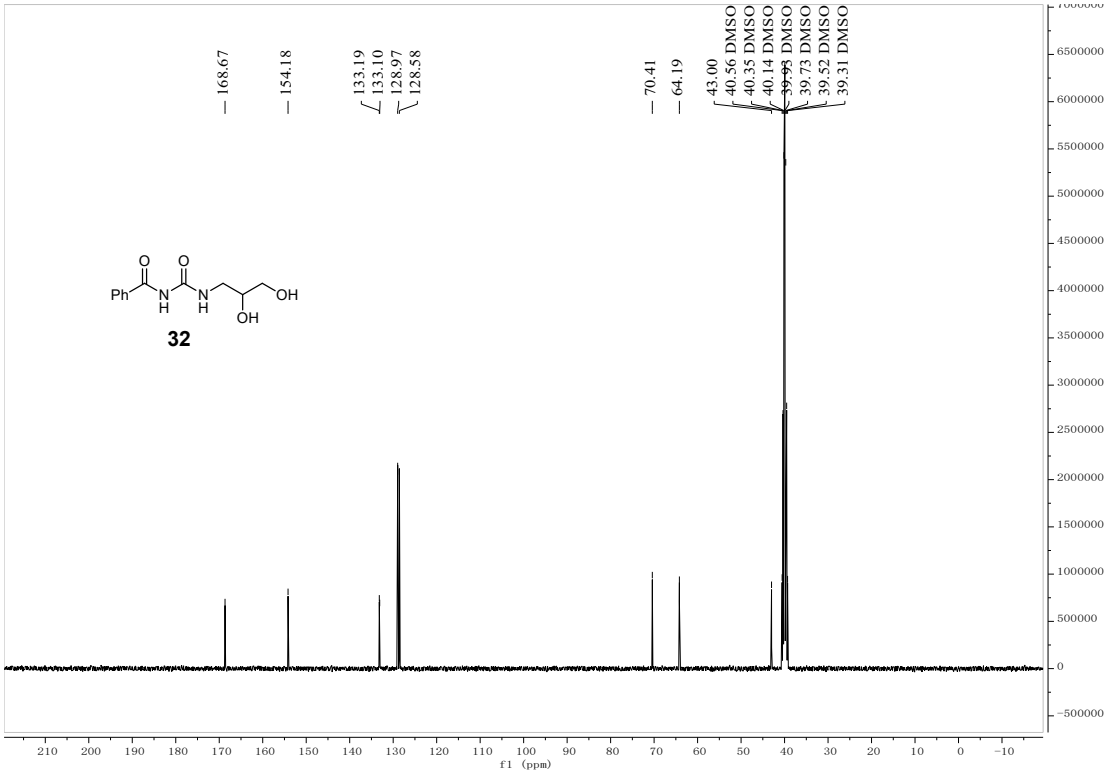


^{1}H NMR of **32**



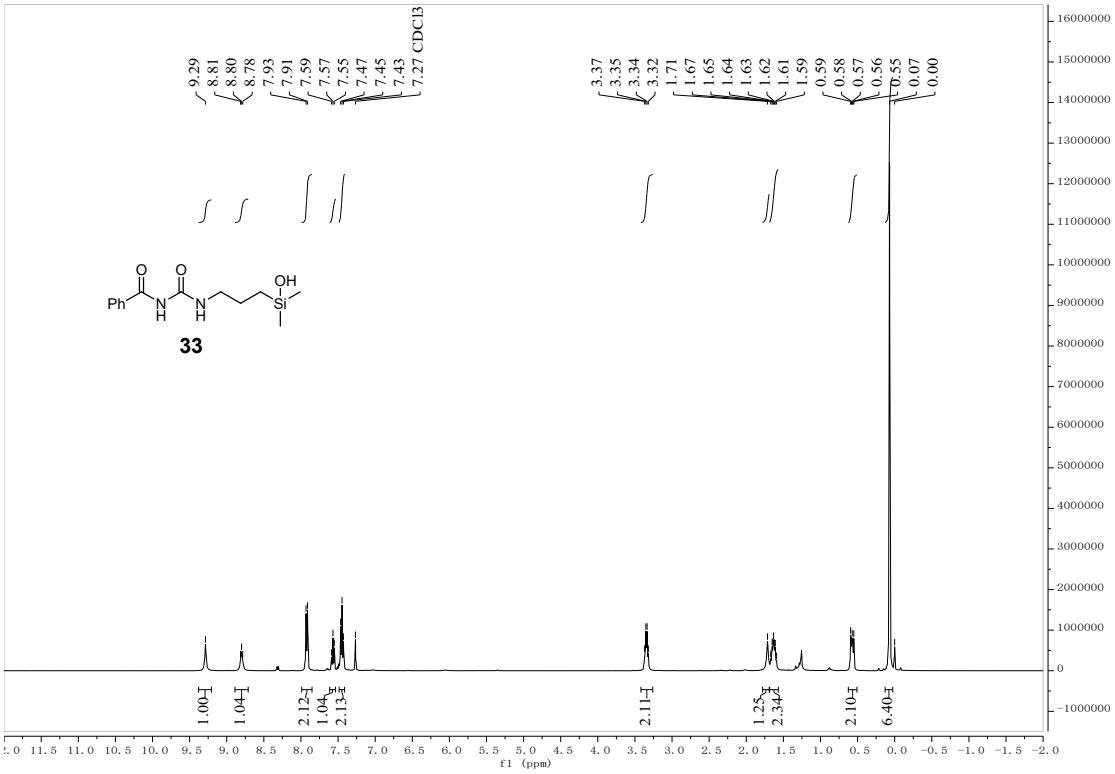
32

^{13}C NMR of **32**



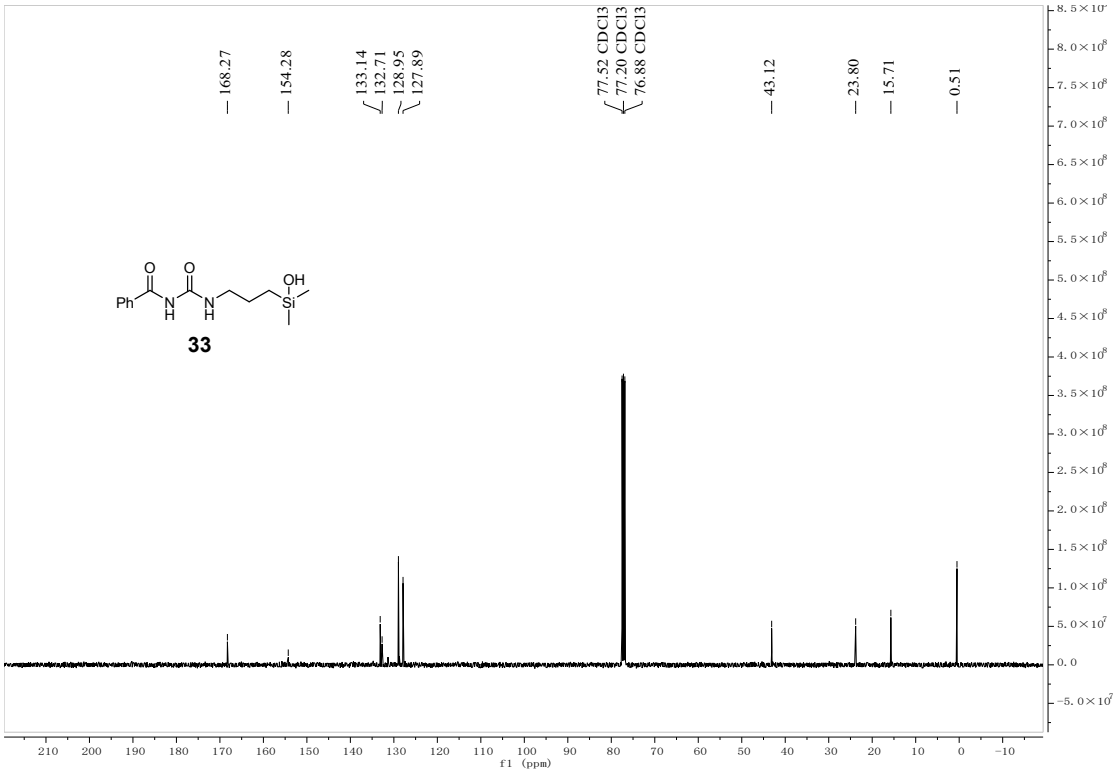
32

^{1}H NMR of **33**



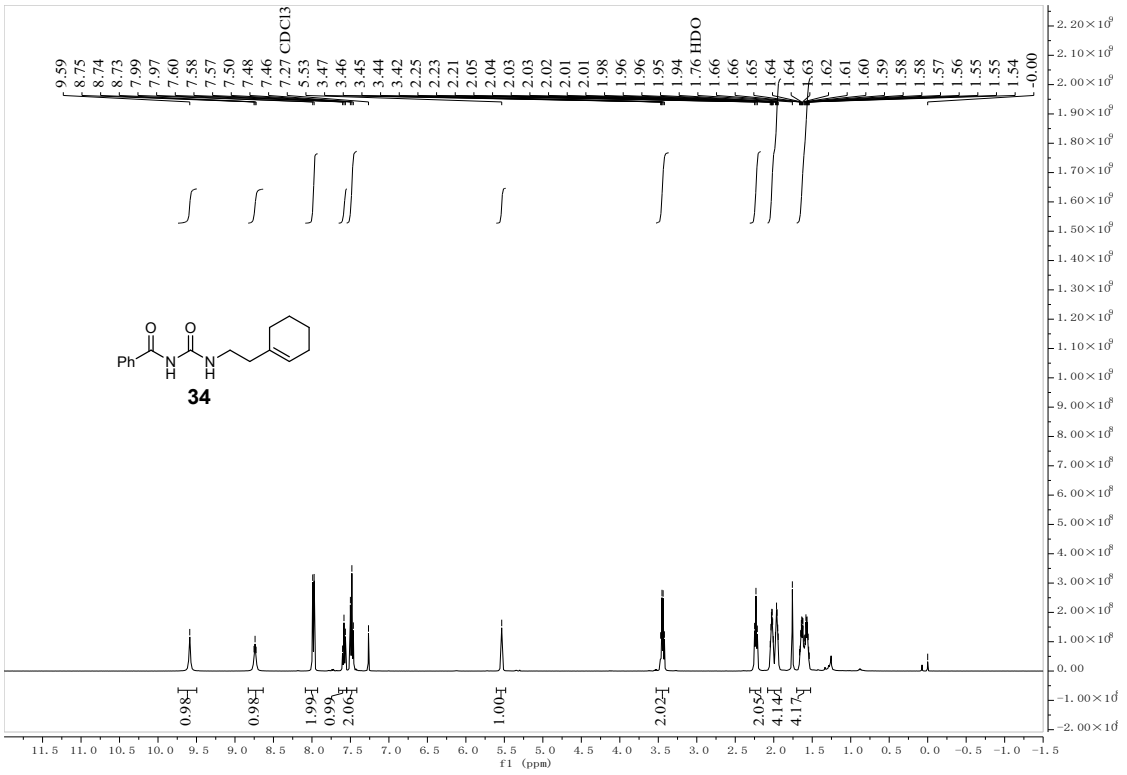
33

^{13}C NMR of **33**

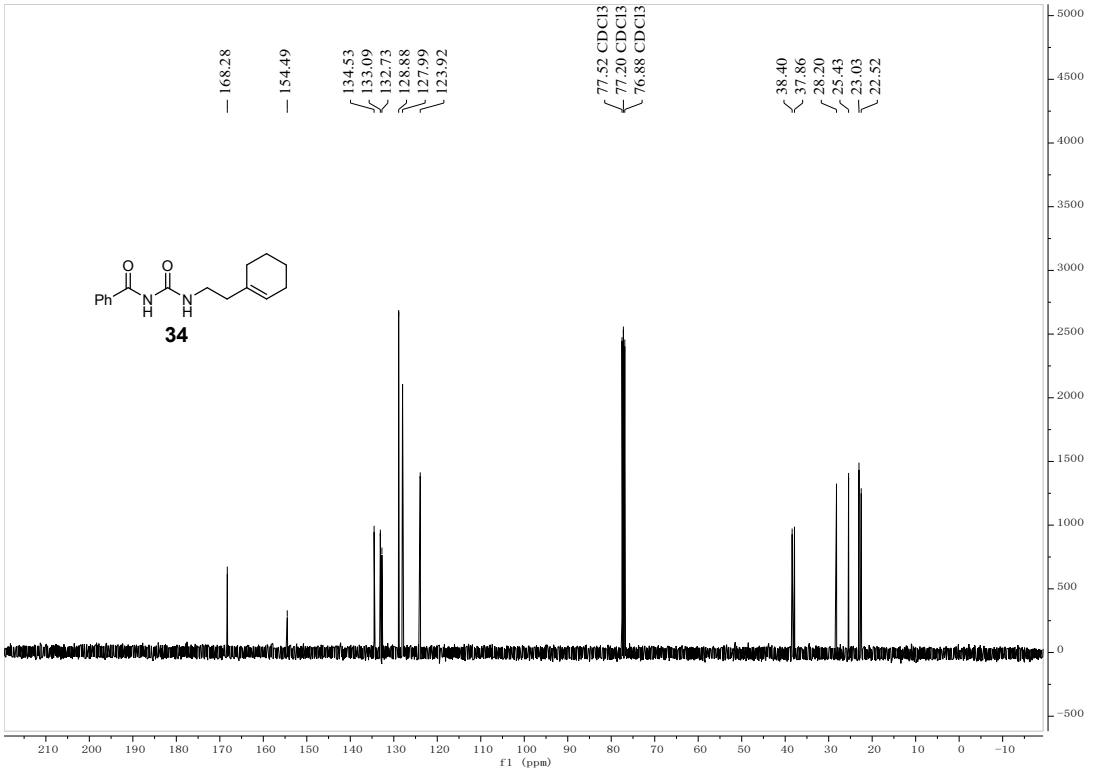


33

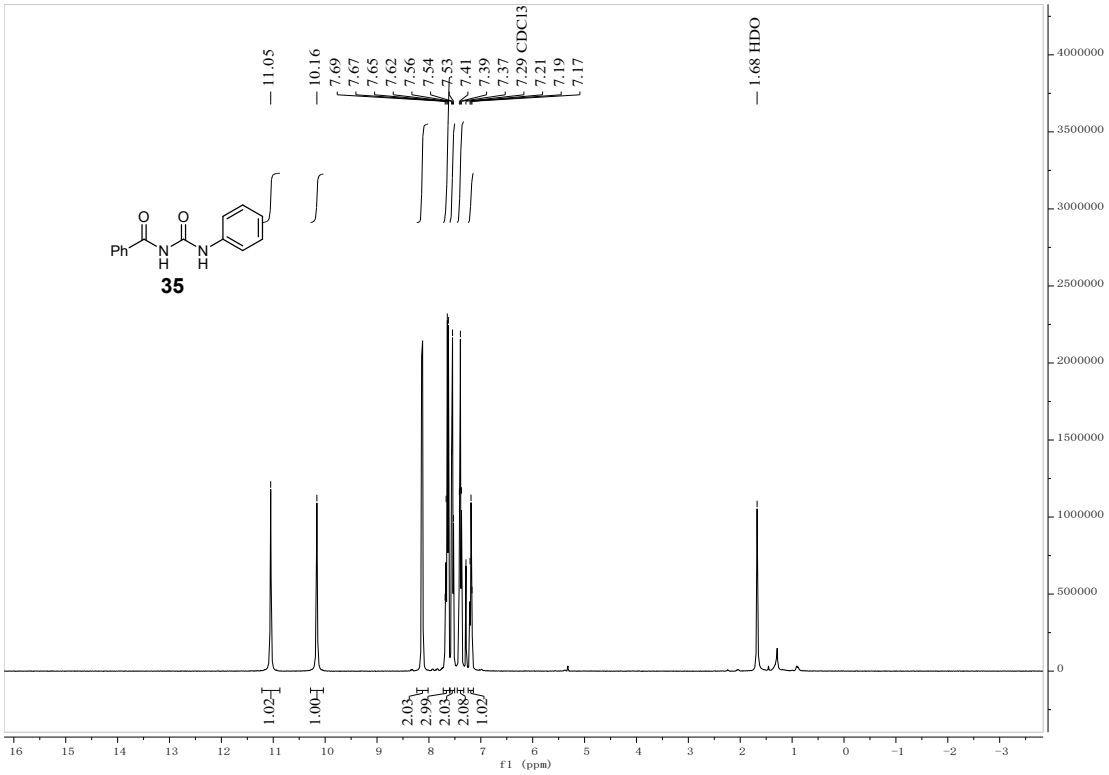
^{1}H NMR of **34**



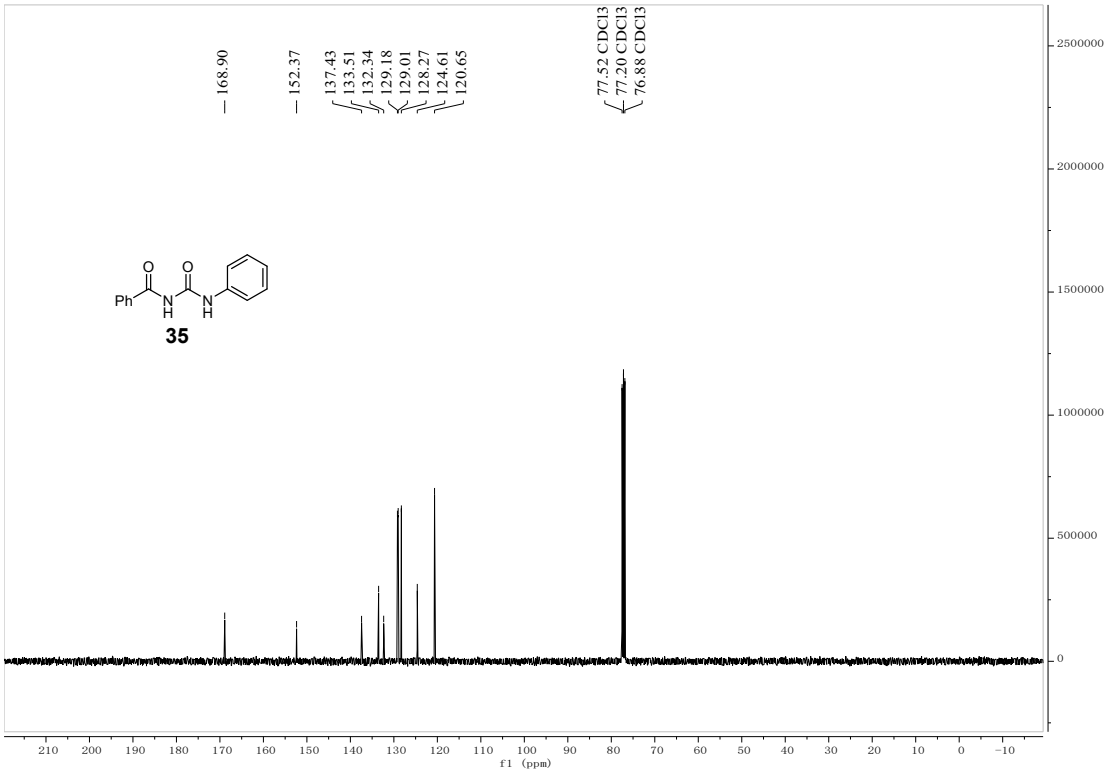
^{13}C NMR of **34**


168.28
154.49
134.53
133.09
132.73
128.88
127.99
123.92
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
38.40
37.86
28.20
25.43
23.03
22.52
Ph
N
H
O
34
f1 (ppm)

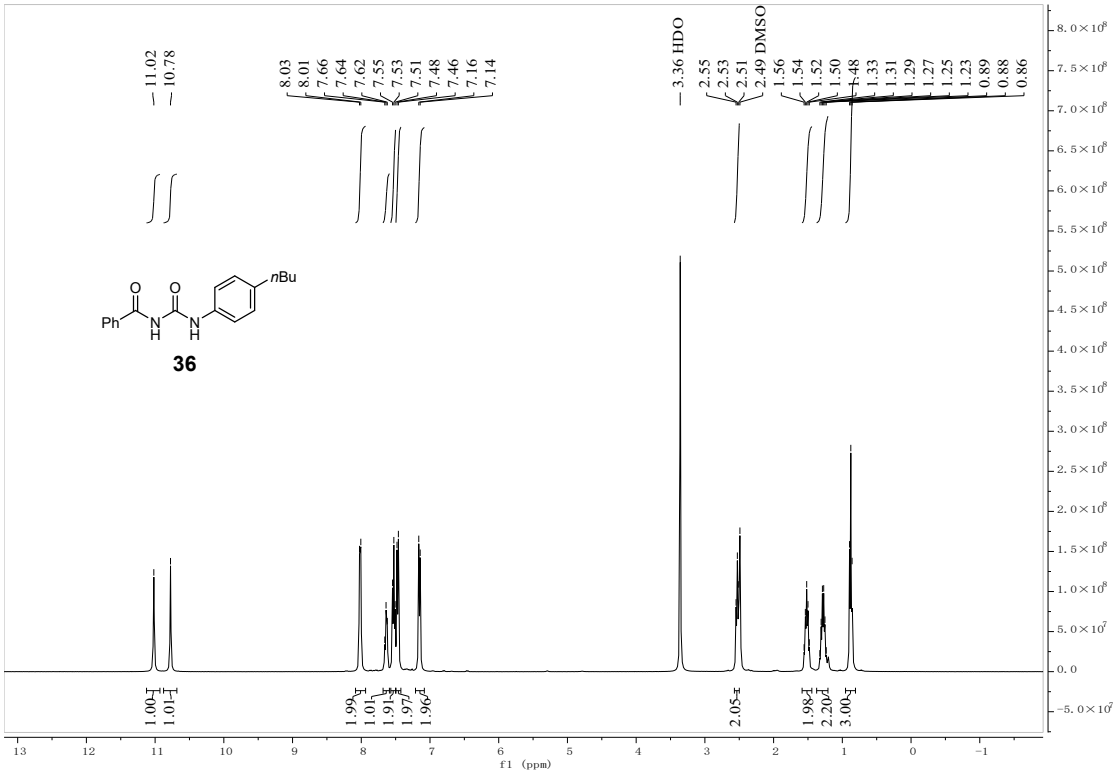
^{1}H NMR of **35**


11.05
10.16
7.69
7.67
7.65
7.62
7.56
7.54
7.53
7.41
7.39
7.37
7.29 CDCl3
7.21
7.19
7.17
1.68 HDO
1.02
1.00
2.03
2.99
2.03
2.08
1.02
Ph
N
H
O
35
f1 (ppm)

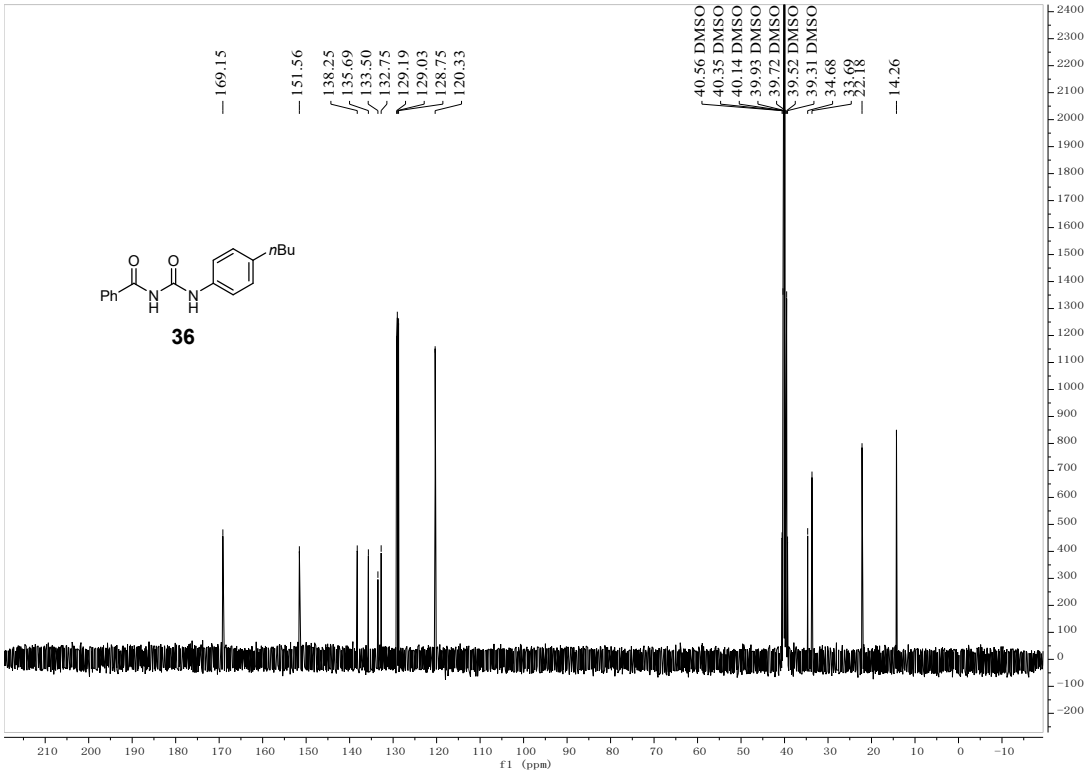
^{13}C NMR of **35**



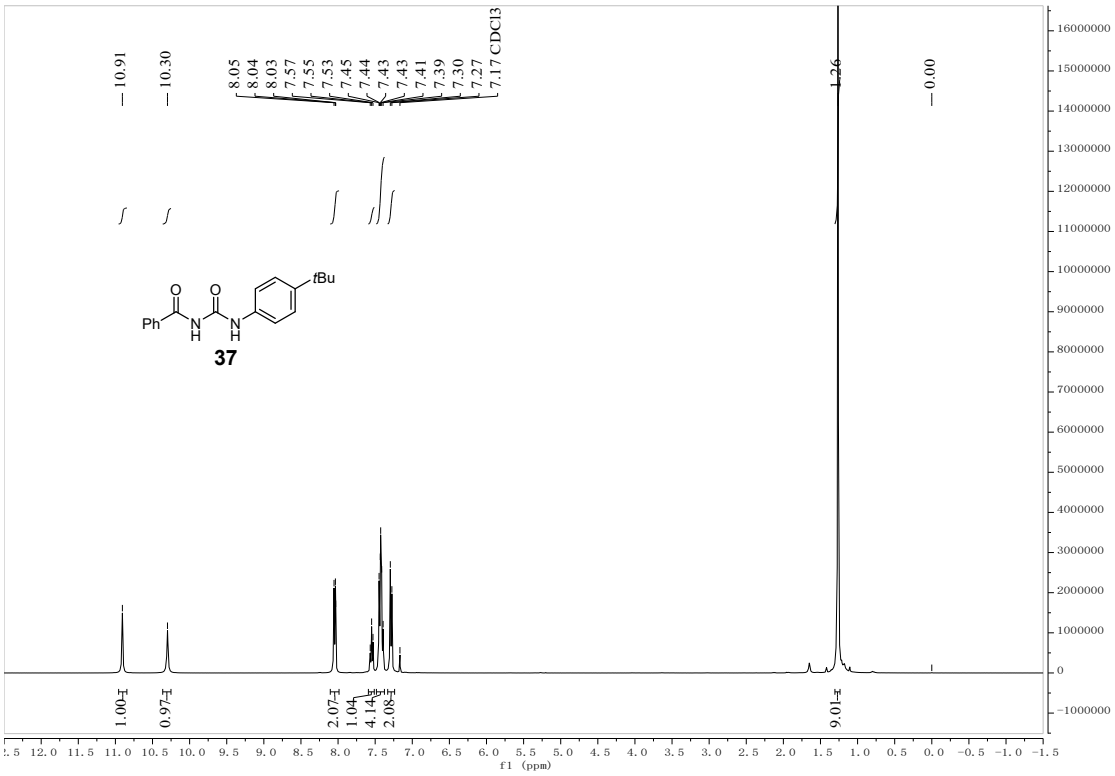
^{1}H NMR of **36**



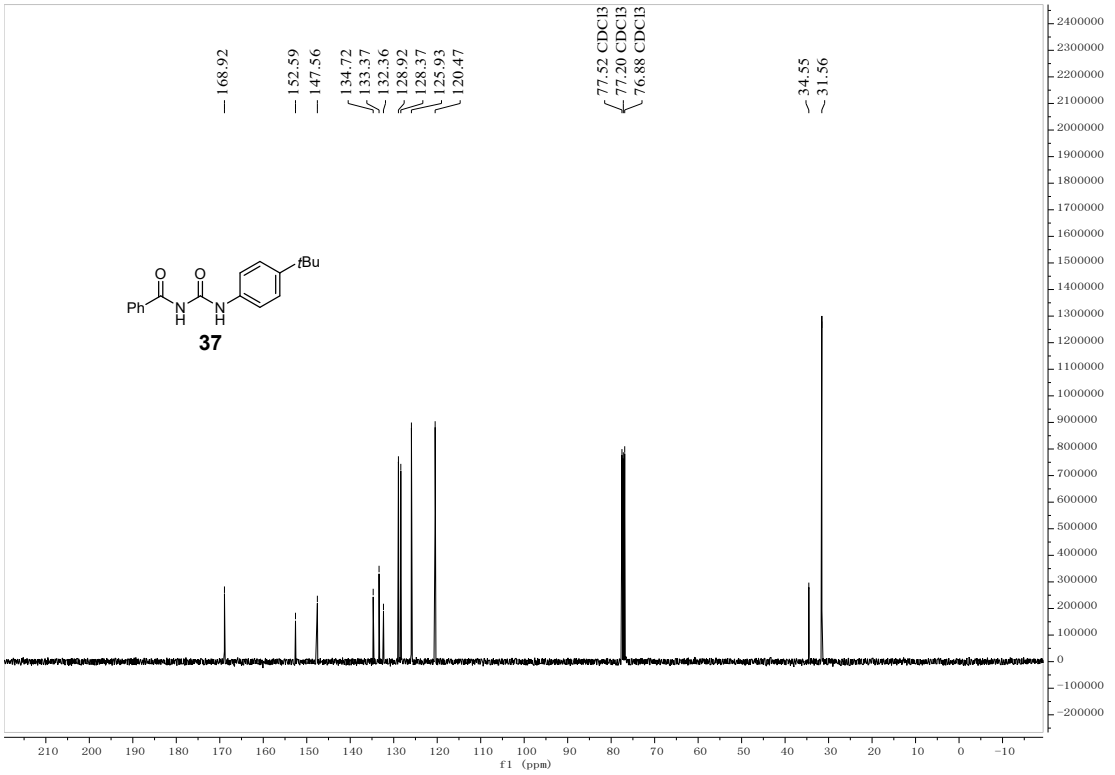
^{13}C NMR of **36**



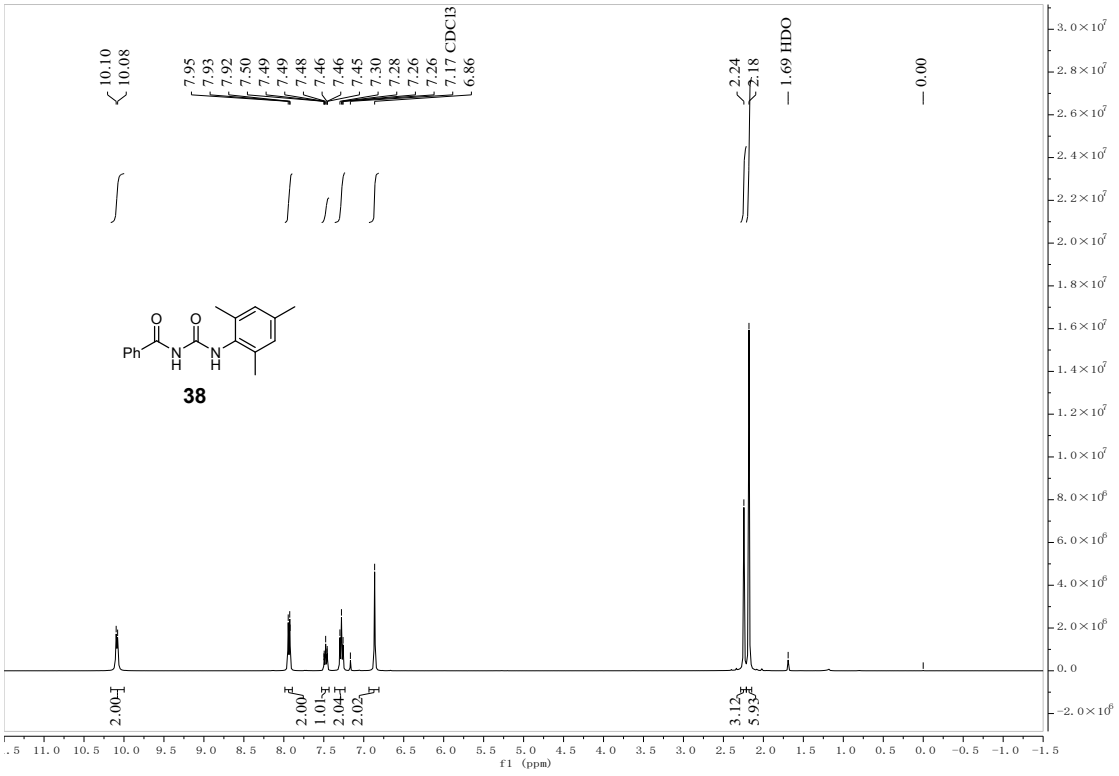
^{1}H NMR of **37**


10.91
10.30
8.05
8.04
8.03
7.57
7.55
7.53
7.45
7.44
7.43
7.43
7.41
7.39
7.30
7.27
7.17 CDCl3
1.26
0.00
tBu
Ph
37
1.00
0.97
2.07
1.04
4.14
2.08
9.01
f1 (ppm)

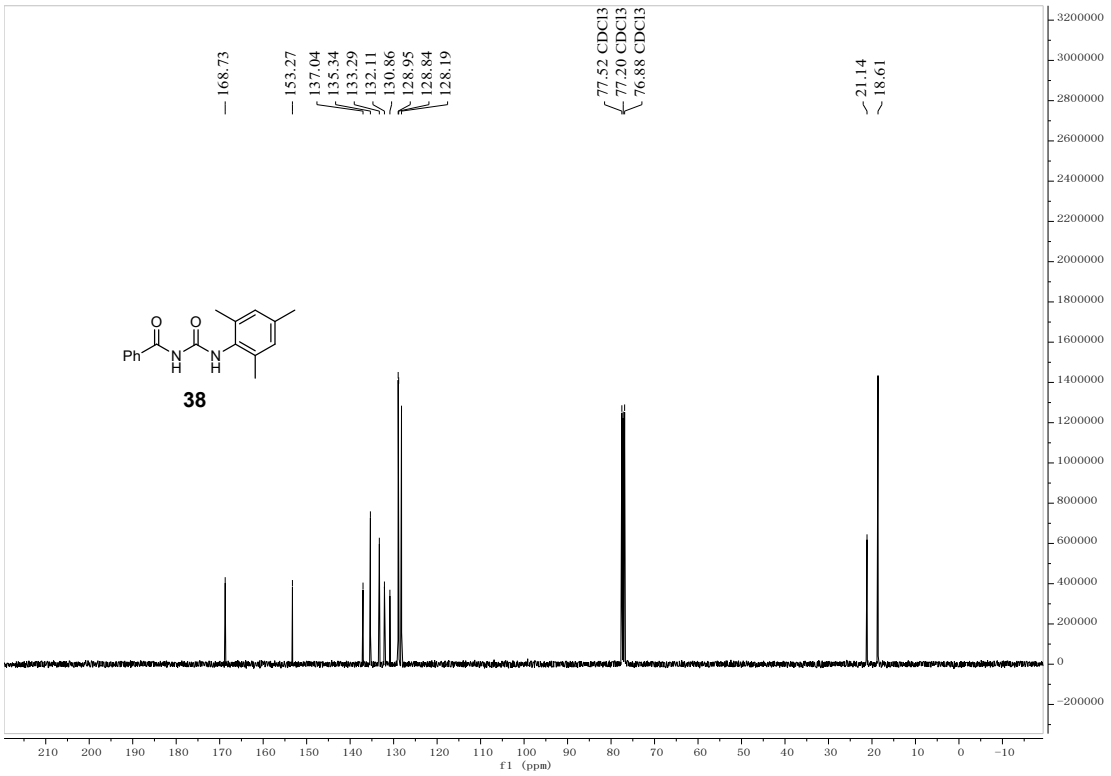
^{13}C NMR of **37**


168.92
152.59
147.56
134.72
133.37
132.36
128.92
128.37
125.93
120.47
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
34.55
31.56
tBu
Ph
37
f1 (ppm)

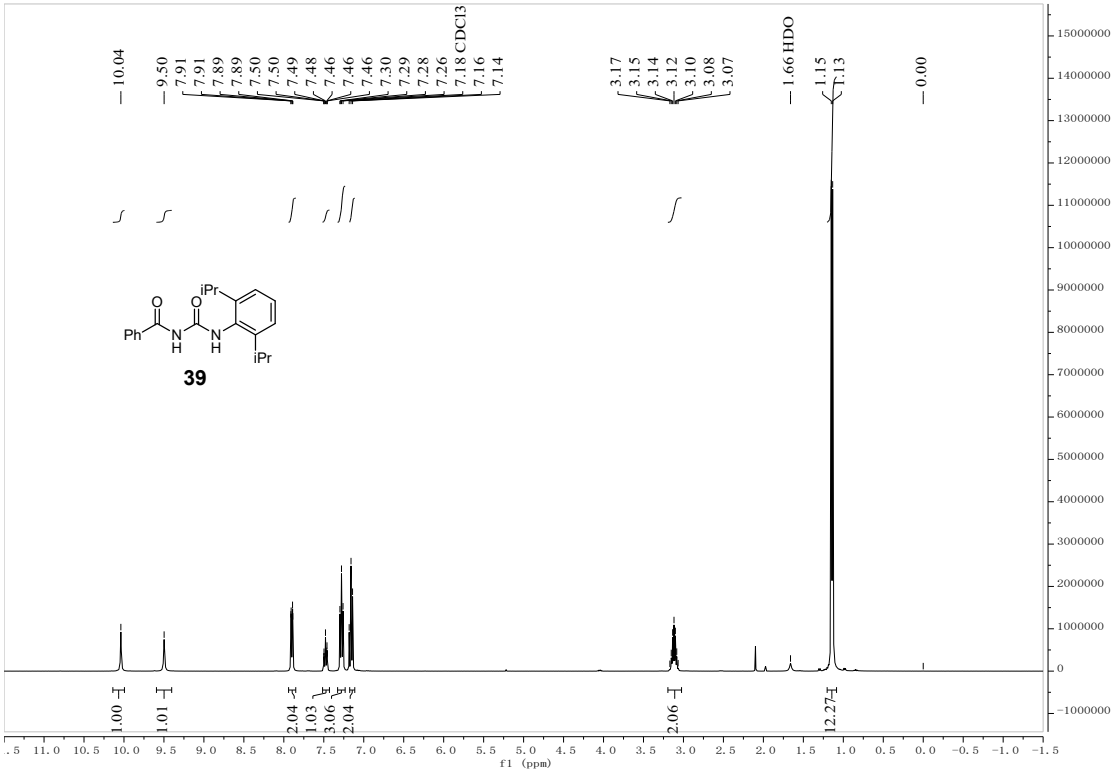
^{1}H NMR of **38**



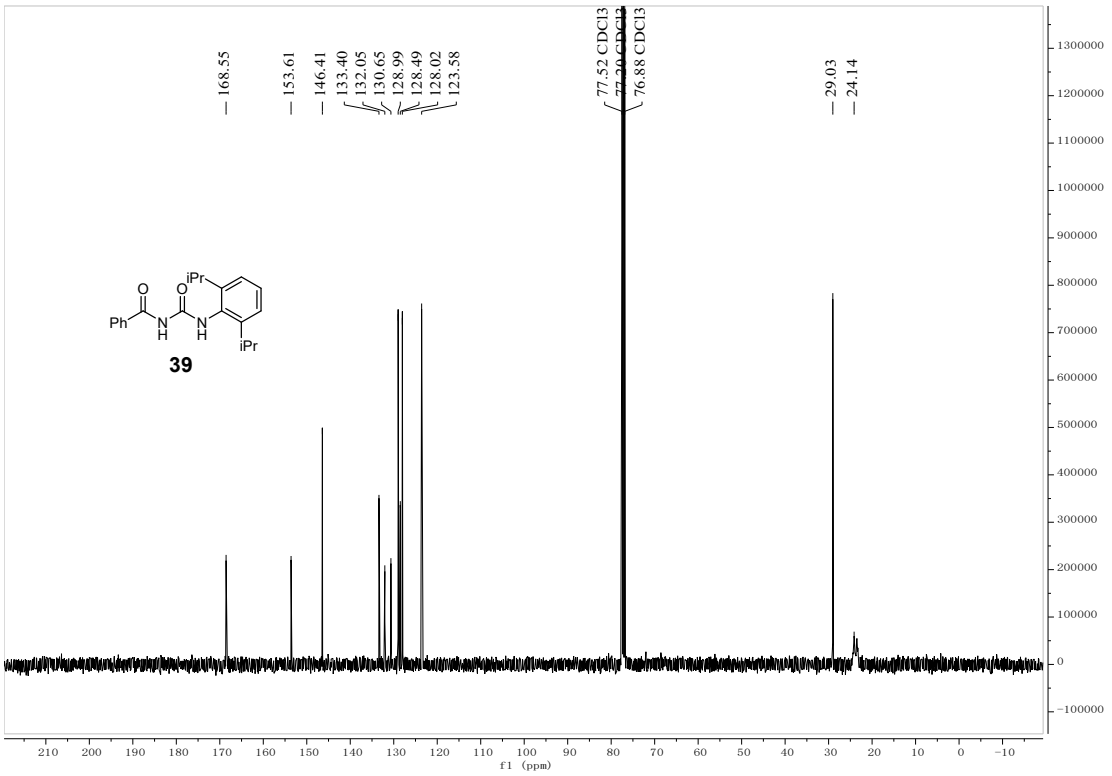
^{13}C NMR of **38**


168.73
153.27
137.04
135.34
133.29
132.11
130.86
128.95
128.84
128.19
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
21.14
18.61
38
f1 (ppm)

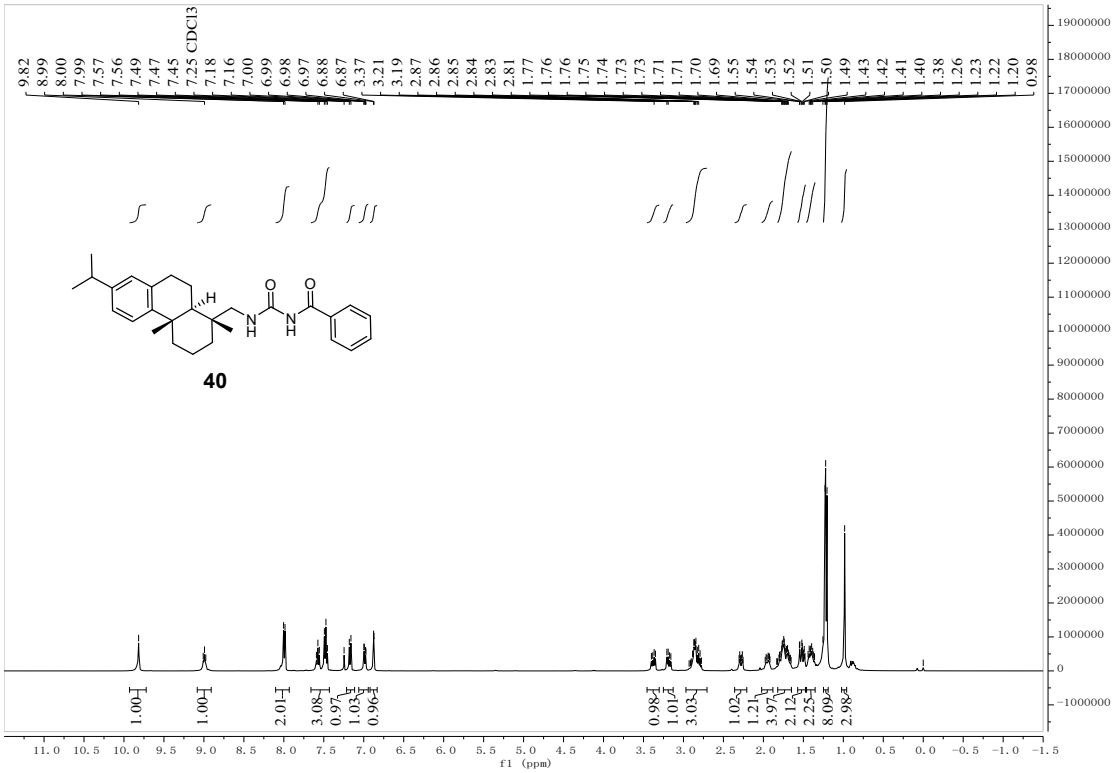
^{1}H NMR of **39**


10.04
9.50
7.91
7.91
7.89
7.89
7.50
7.50
7.49
7.48
7.46
7.46
7.46
7.30
7.29
7.28
7.26
7.18 CDCl3
7.16
7.14
3.17
3.15
3.14
3.12
3.10
3.08
3.07
1.66 HDO
1.15
1.13
0.00
1.00
1.01
2.04
1.03
3.06
2.04
2.06
12.27
39
f1 (ppm)

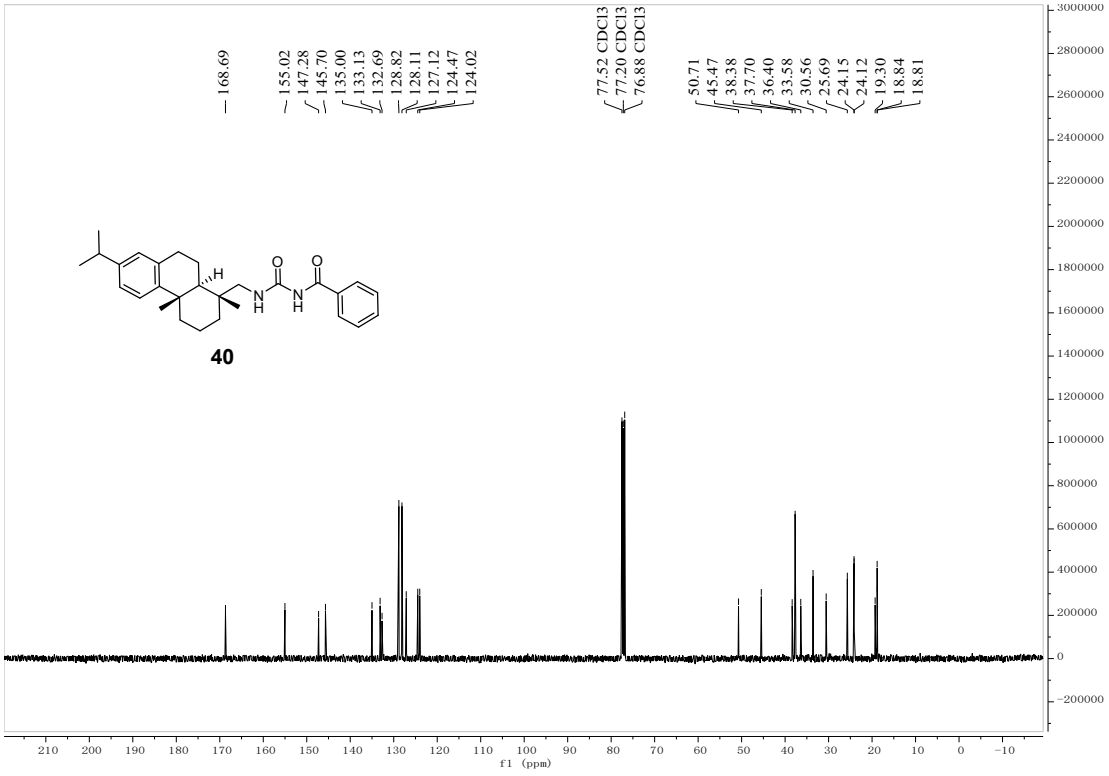
^{13}C NMR of **39**



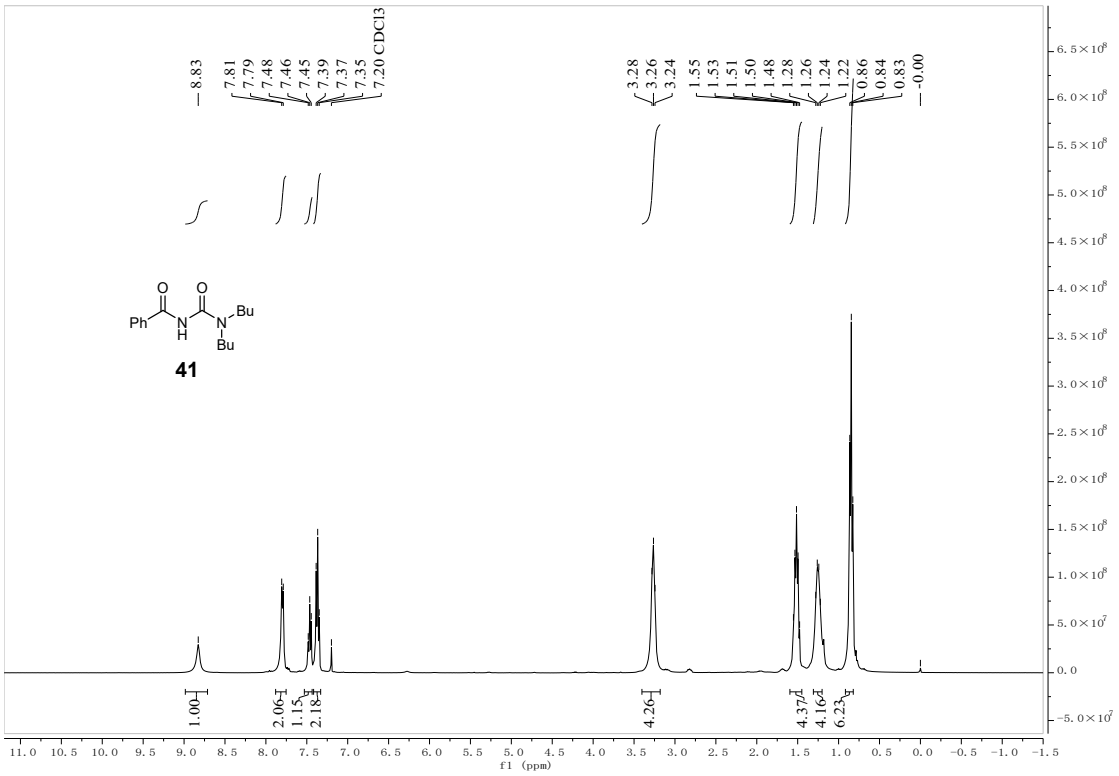
^{1}H NMR of **40**



^{13}C NMR of **40**

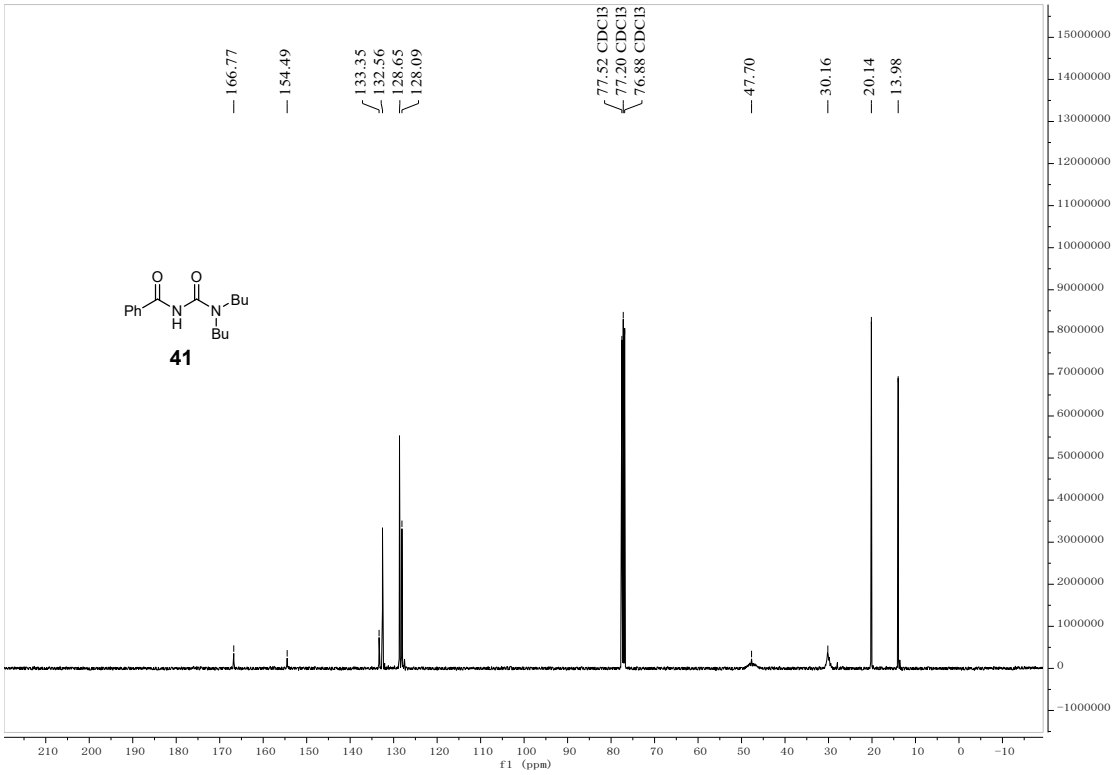


^{1}H NMR of **41**



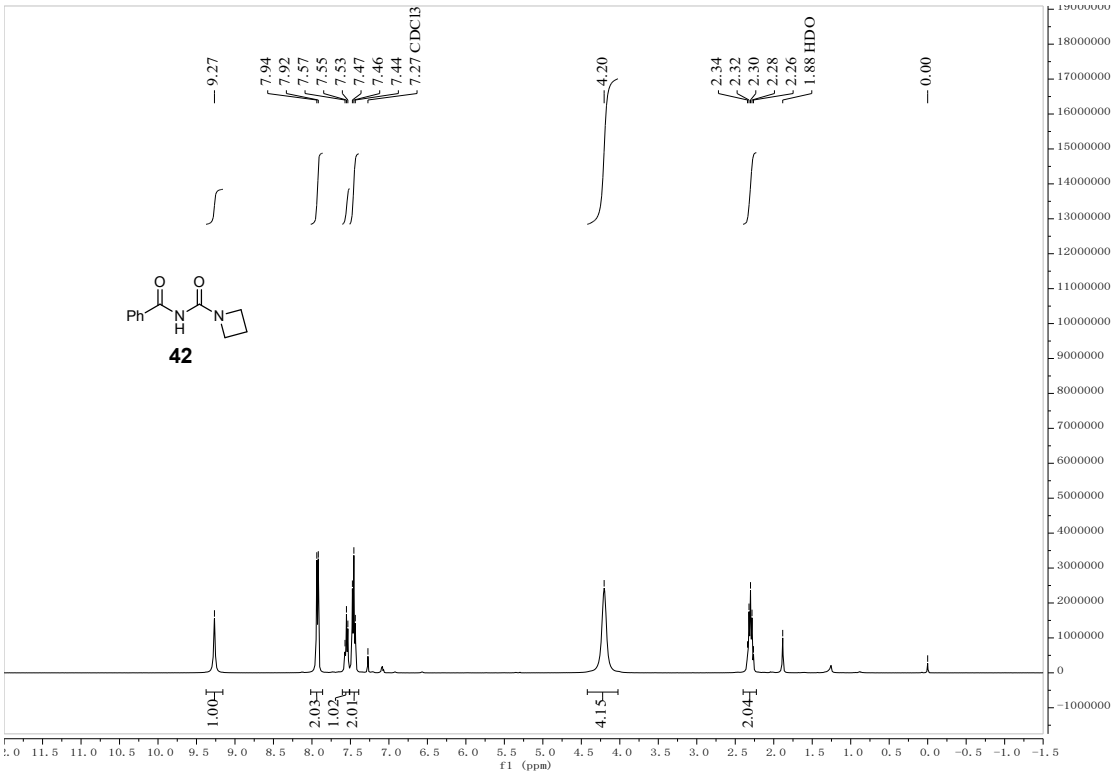
41

^{13}C NMR of **41**



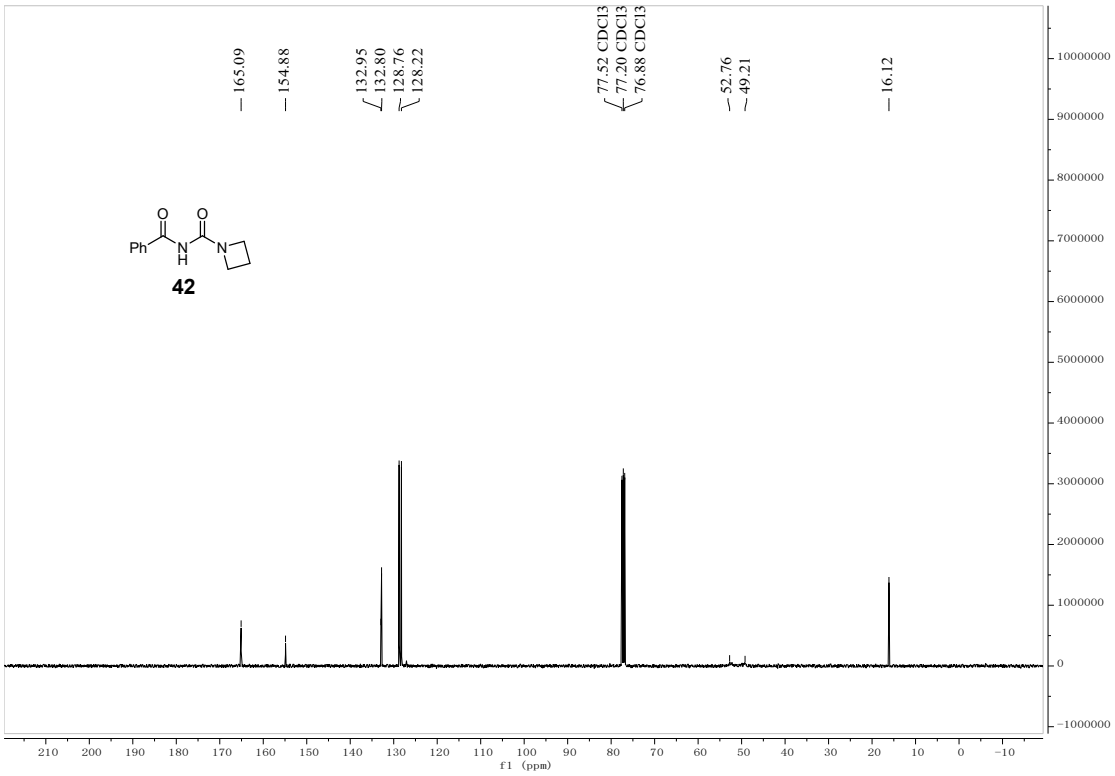
41

^{1}H NMR of **42**

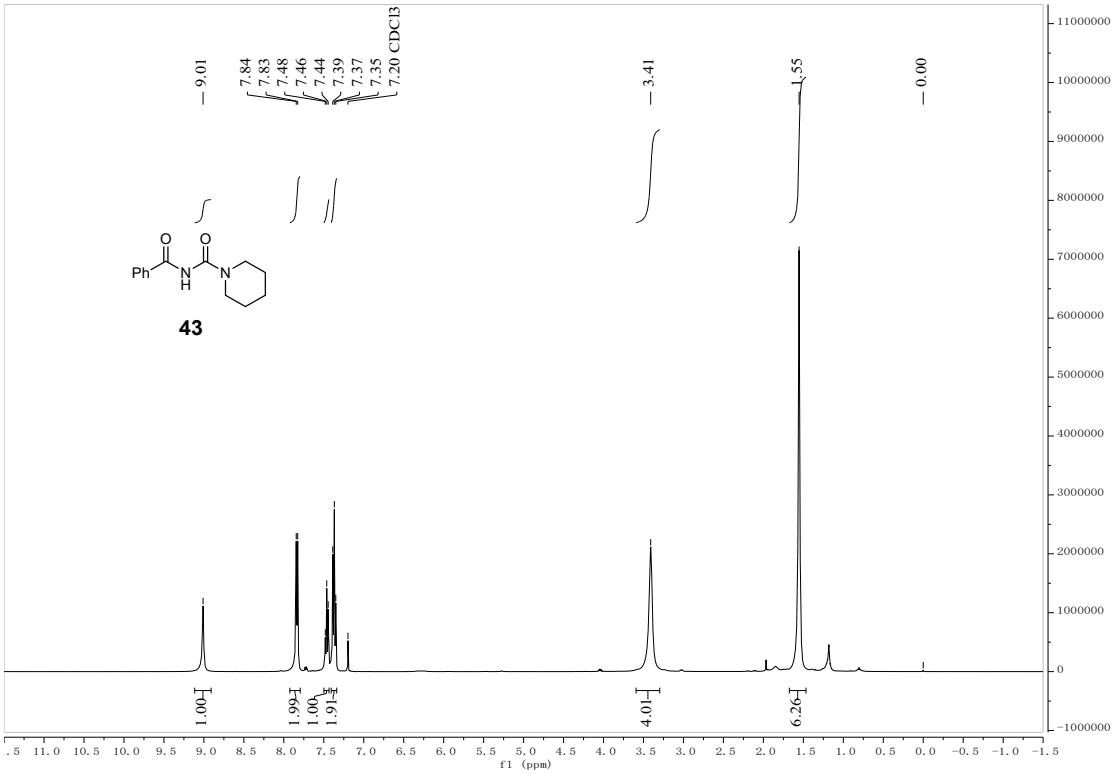


42

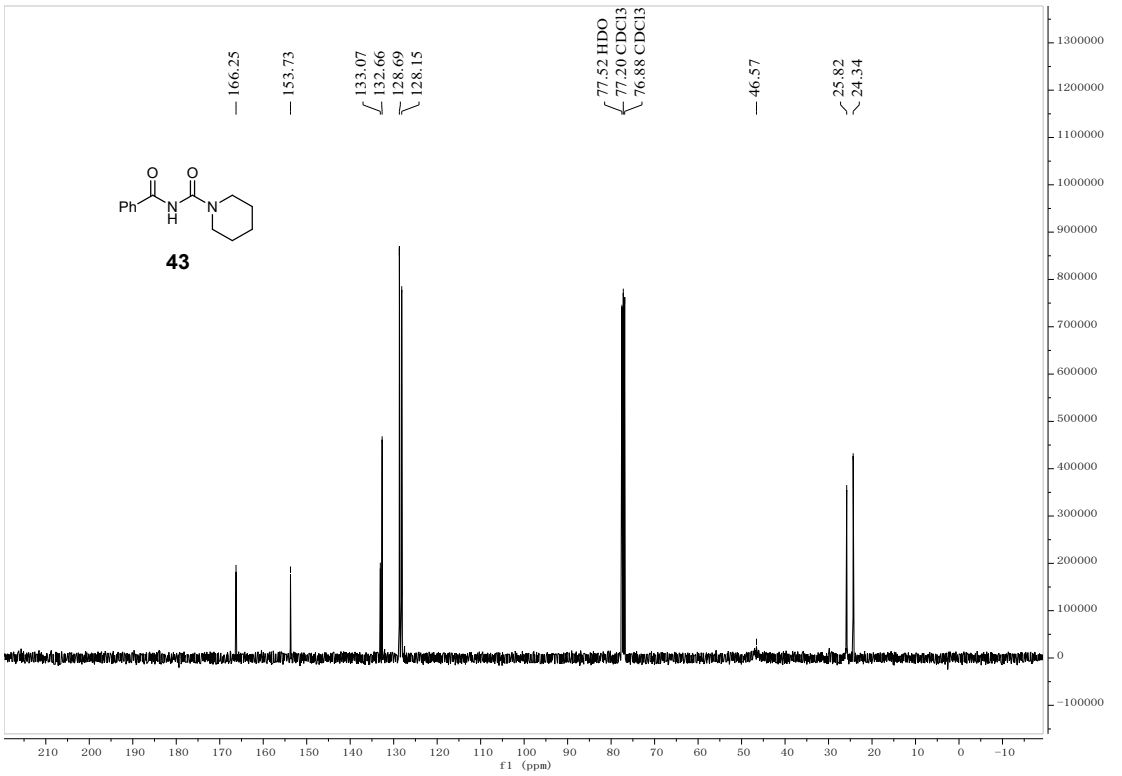
^{13}C NMR of **42**


165.09
154.88
132.95
132.80
128.76
128.22
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
52.76
49.21
16.12
Ph
O
N
H
42
f1 (ppm)

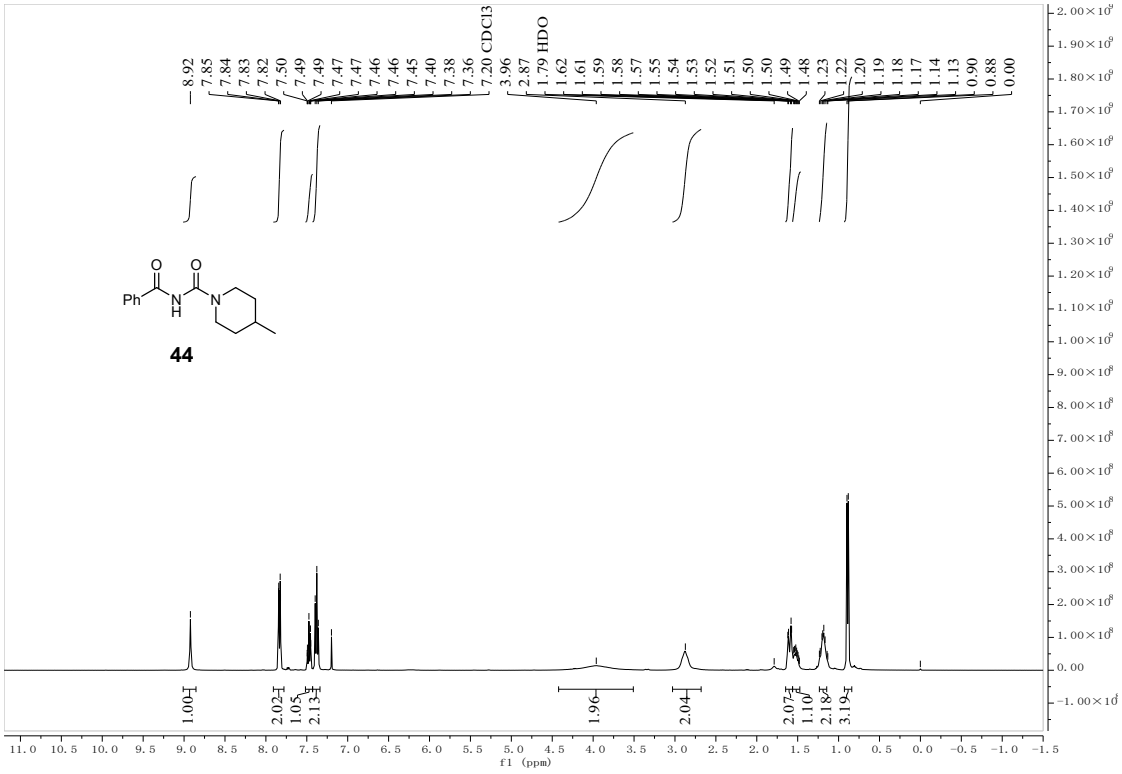
^{1}H NMR of **43**


9.01
7.84
7.83
7.48
7.46
7.44
7.39
7.37
7.35
7.20 CDCl3
3.41
1.55
0.00
1.00
1.99
1.00
1.91
4.01
6.26
Ph
O
N
H
43
f1 (ppm)

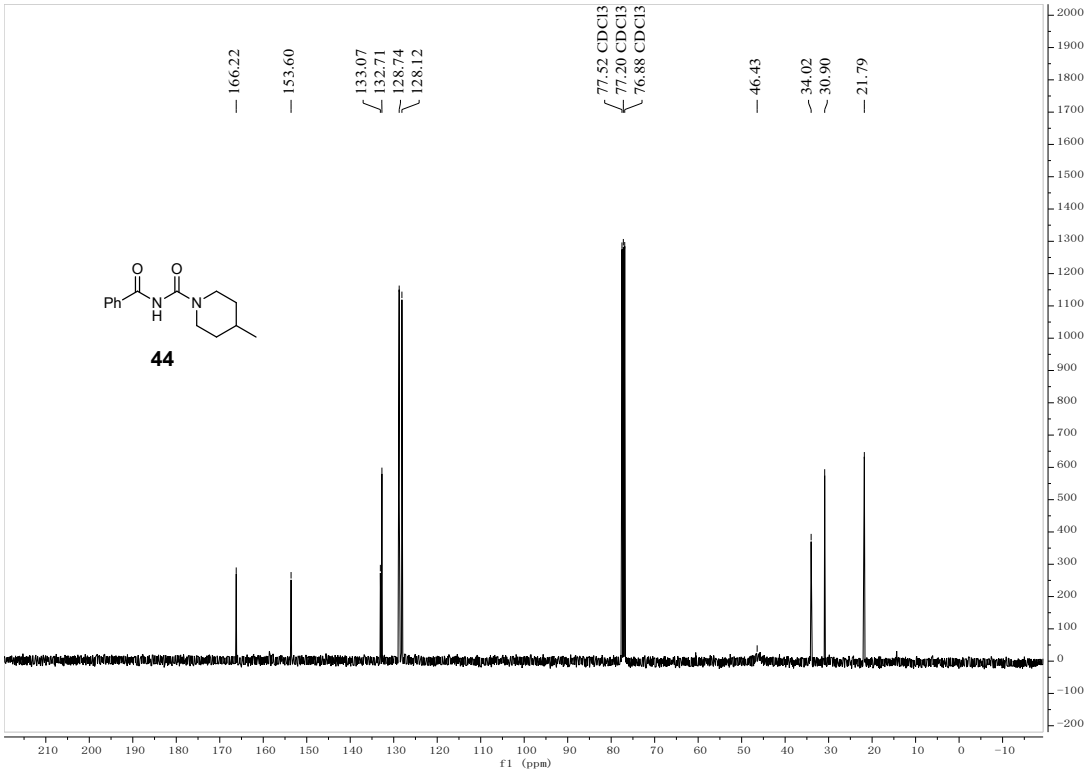
^{13}C NMR of **43**



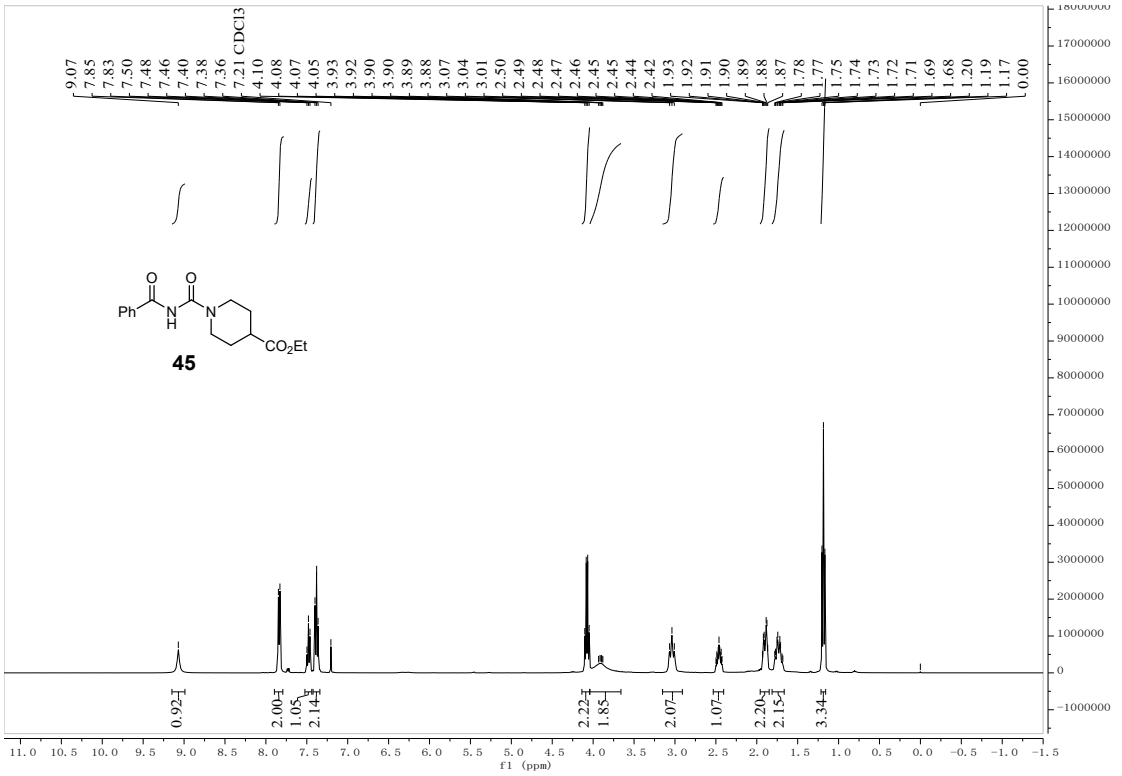
^{1}H NMR of **44**



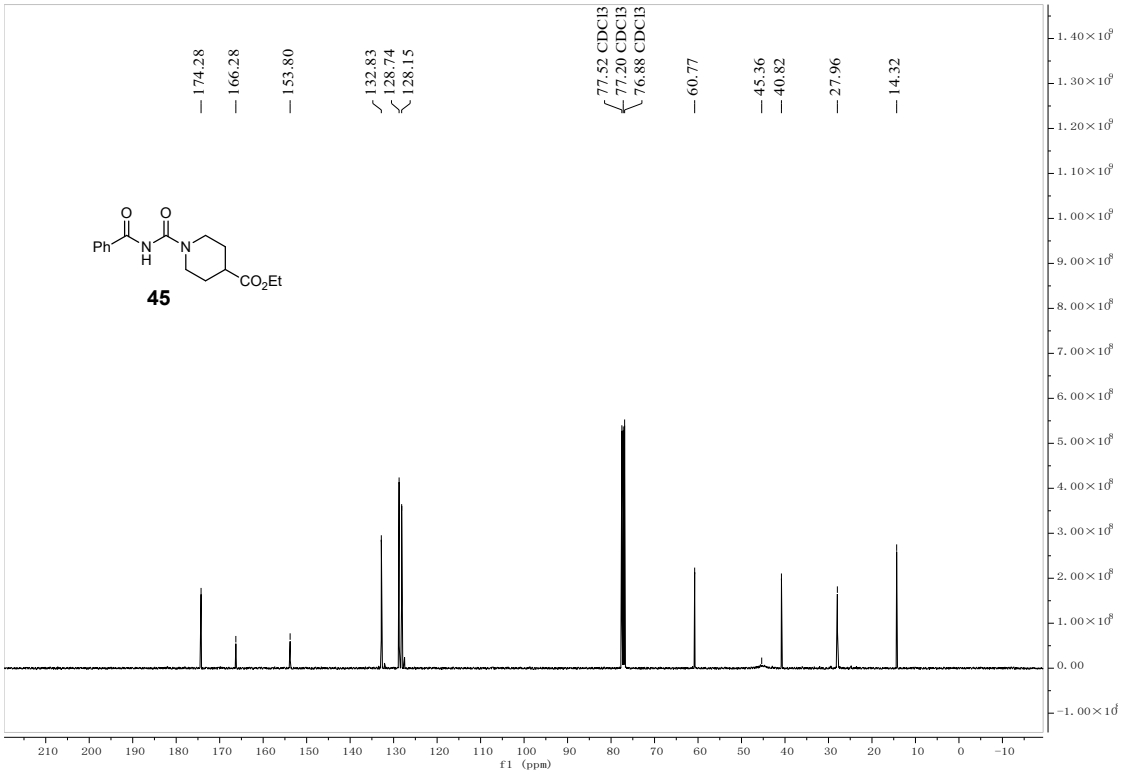
^{13}C NMR of **44**



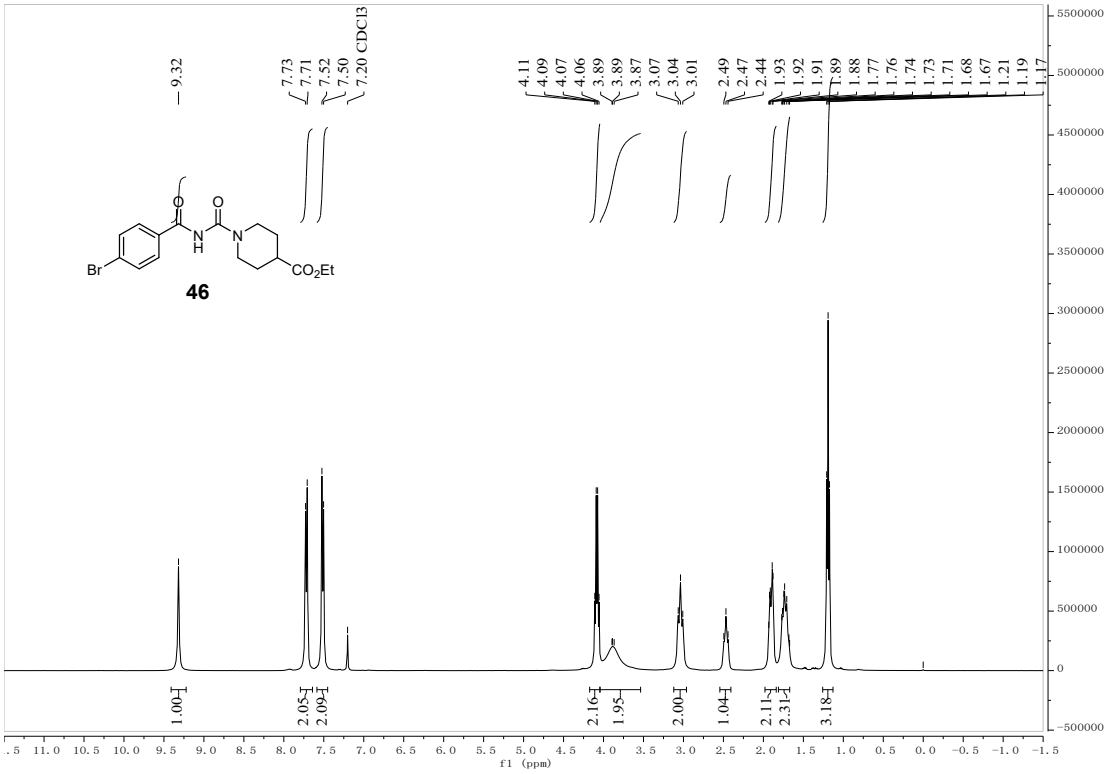
^{1}H NMR of **45**


9.07
7.85
7.83
7.50
7.48
7.46
7.40
7.38
7.36
7.21 CDCl3
4.10
4.08
4.07
4.05
3.93
3.92
3.90
3.90
3.89
3.88
3.07
3.04
3.01
2.50
2.49
2.48
2.47
2.46
2.45
2.45
2.44
2.42
1.93
1.92
1.91
1.90
1.89
1.88
1.87
1.78
1.77
1.75
1.74
1.73
1.72
1.71
1.69
1.68
1.20
1.19
1.17
0.00
Ph
N
H
O
O
N
CO2Et
45
0.92
2.00
1.05
2.14
2.22
1.85
2.07
1.07
2.20
2.15
3.34
f1 (ppm)

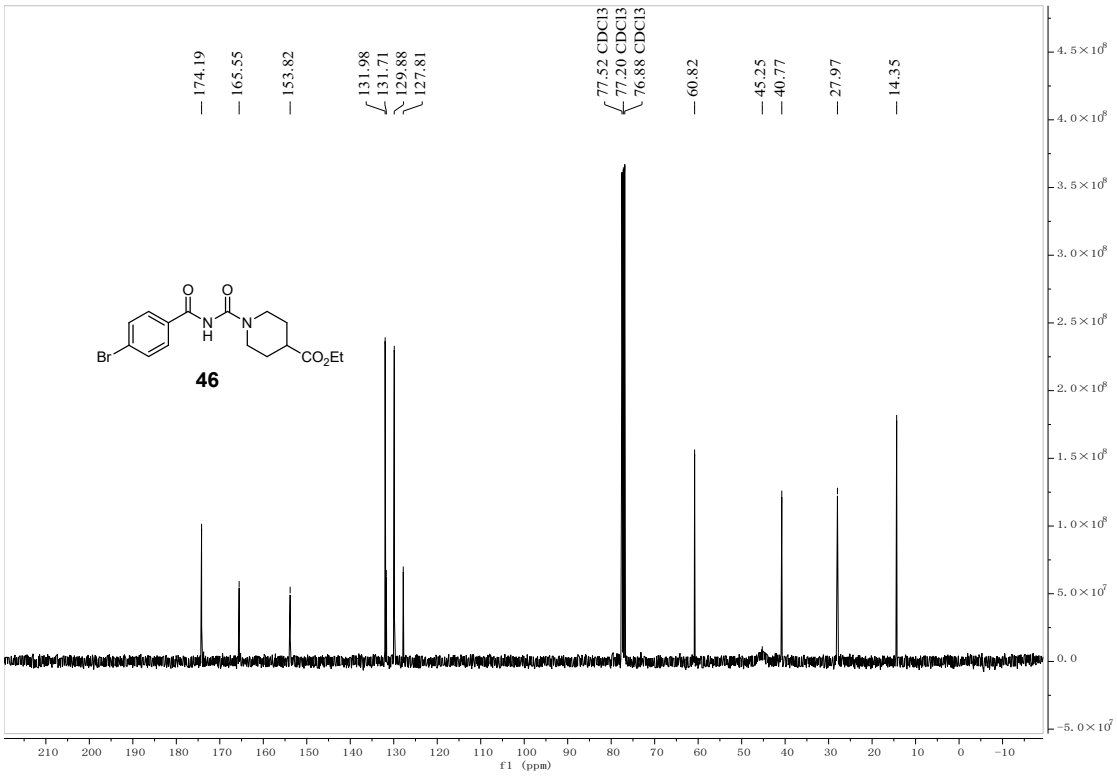
^{13}C NMR of **45**


174.28
166.28
153.80
132.83
128.74
128.15
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
60.77
45.36
40.82
27.96
14.32
Ph
N
H
O
O
N
CO2Et
45
f1 (ppm)

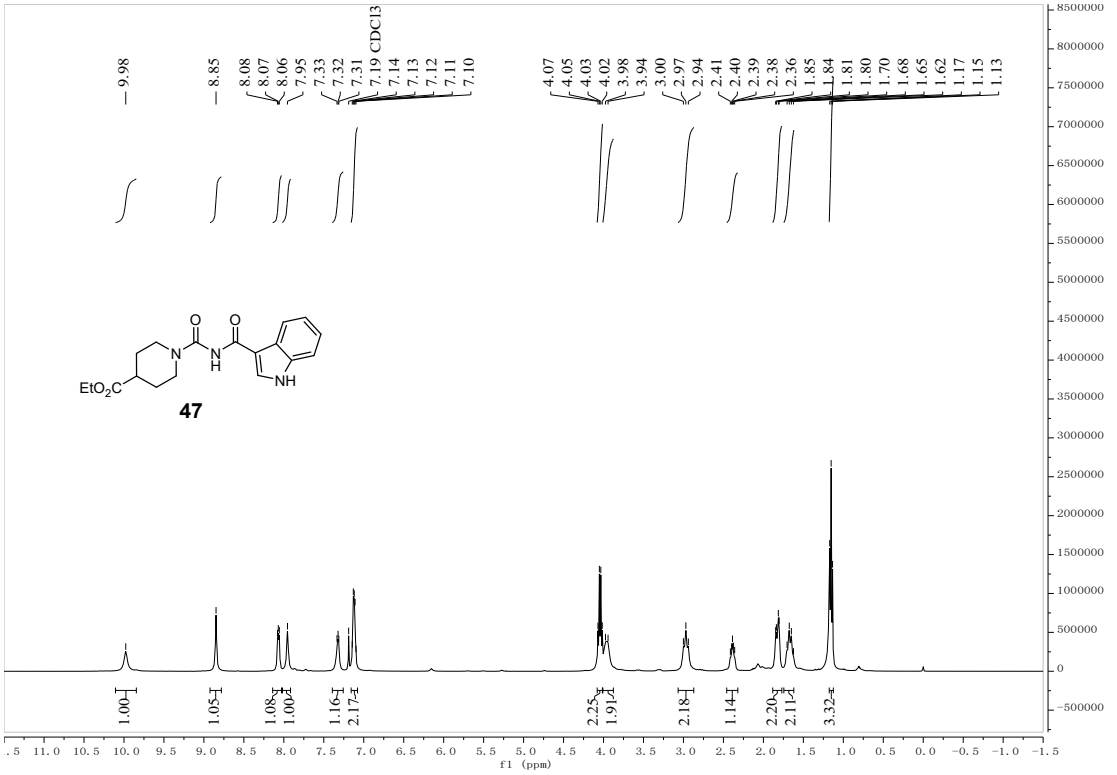
^{1}H NMR of **46**



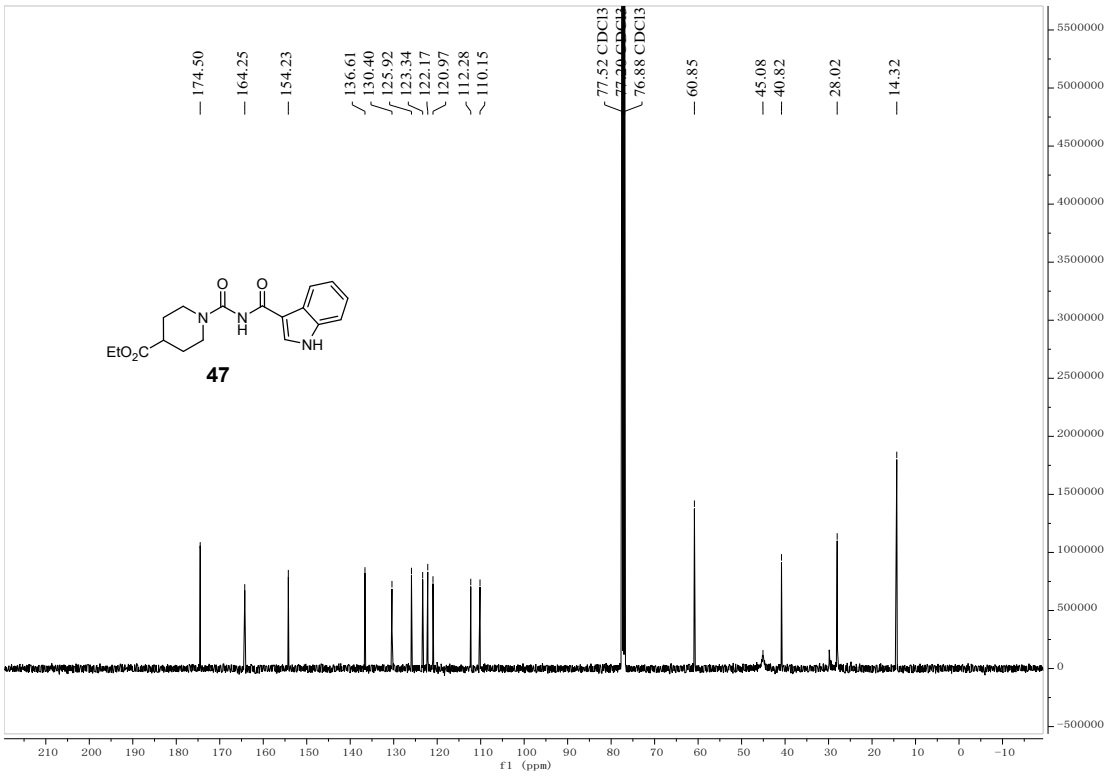
^{13}C NMR of **46**


174.19
165.55
153.82
131.98
131.71
129.88
127.81
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
60.82
45.25
40.77
27.97
14.35
Br
CO2Et
46
f1 (ppm)

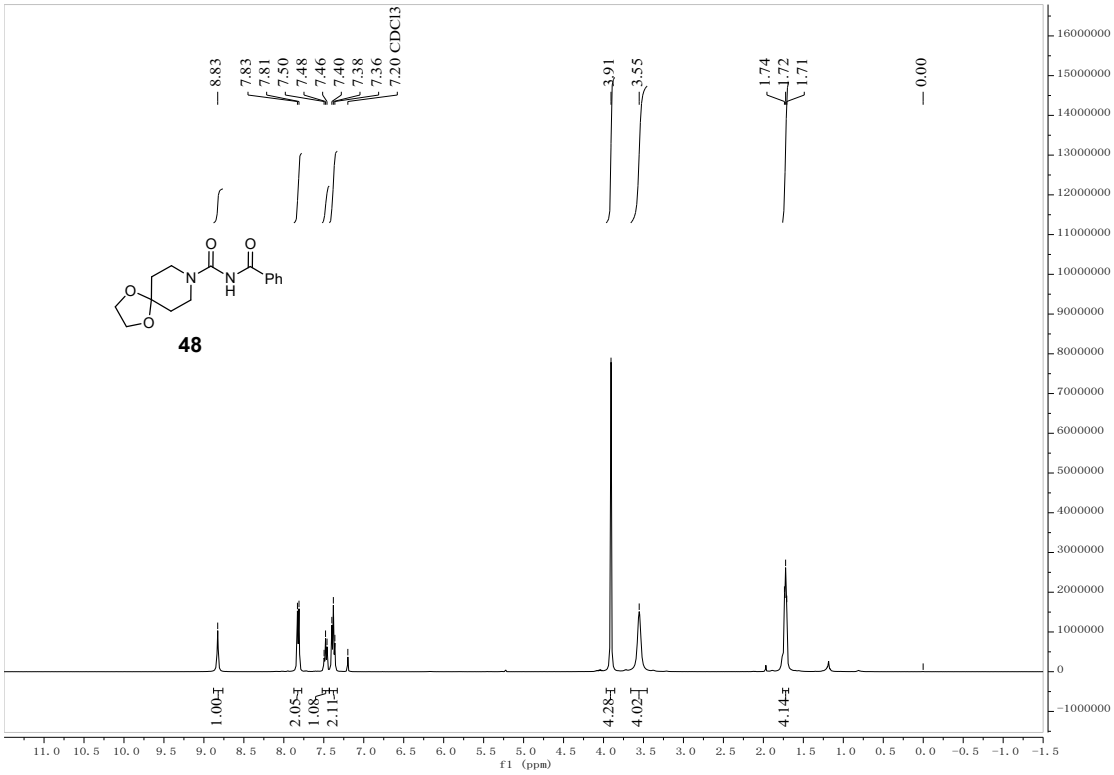
^{1}H NMR of **47**


9.98
8.85
8.08
8.07
8.06
7.95
7.33
7.32
7.31
7.19 CDCl3
7.14
7.13
7.12
7.11
7.10
4.07
4.05
4.03
4.02
3.98
3.94
3.00
2.97
2.94
2.41
2.40
2.39
2.38
2.36
1.85
1.84
1.81
1.80
1.70
1.68
1.65
1.62
1.17
1.15
1.13
EtO2C
NH
47
1.00
1.05
1.08
1.00
1.16
2.17
2.25
1.91
2.18
1.14
2.20
2.11
3.32
f1 (ppm)

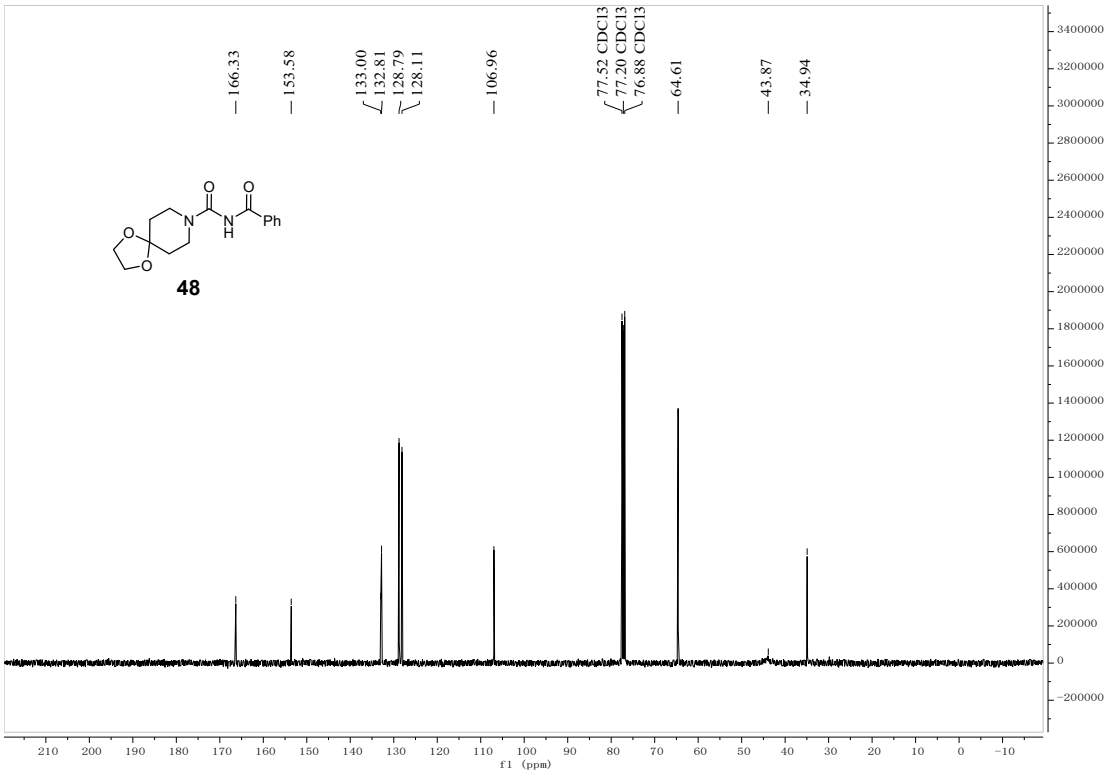
^{13}C NMR of **47**



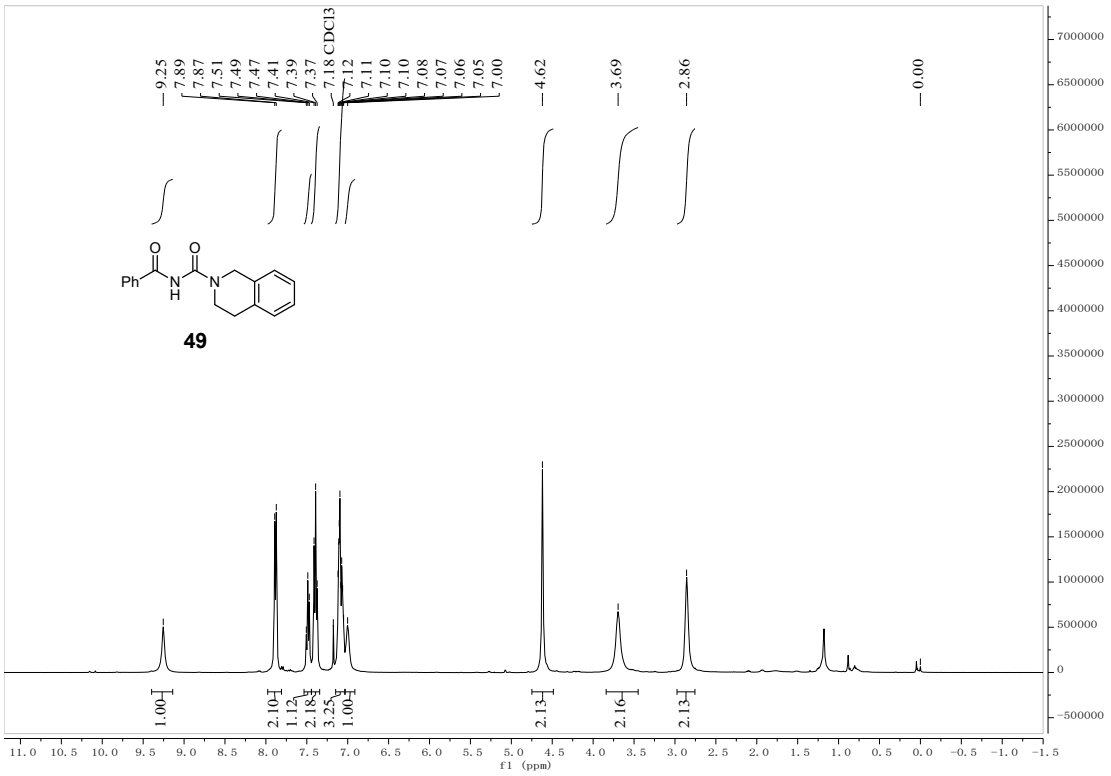
^{1}H NMR of **48**



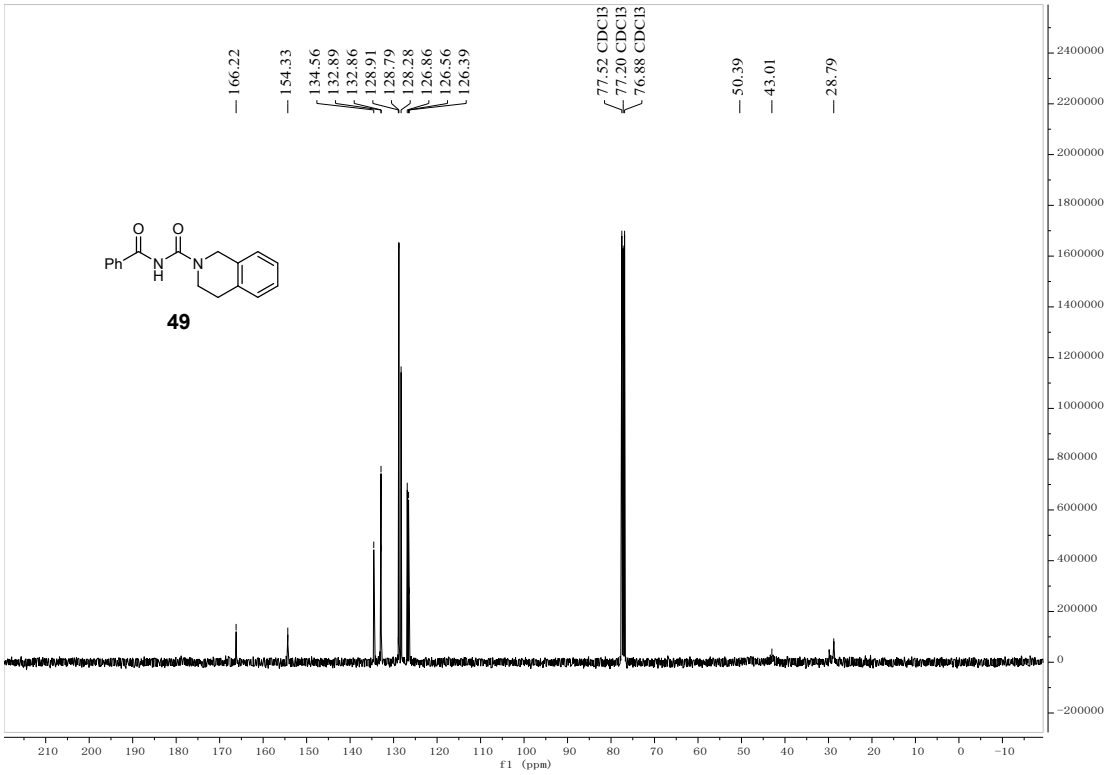
^{13}C NMR of **48**



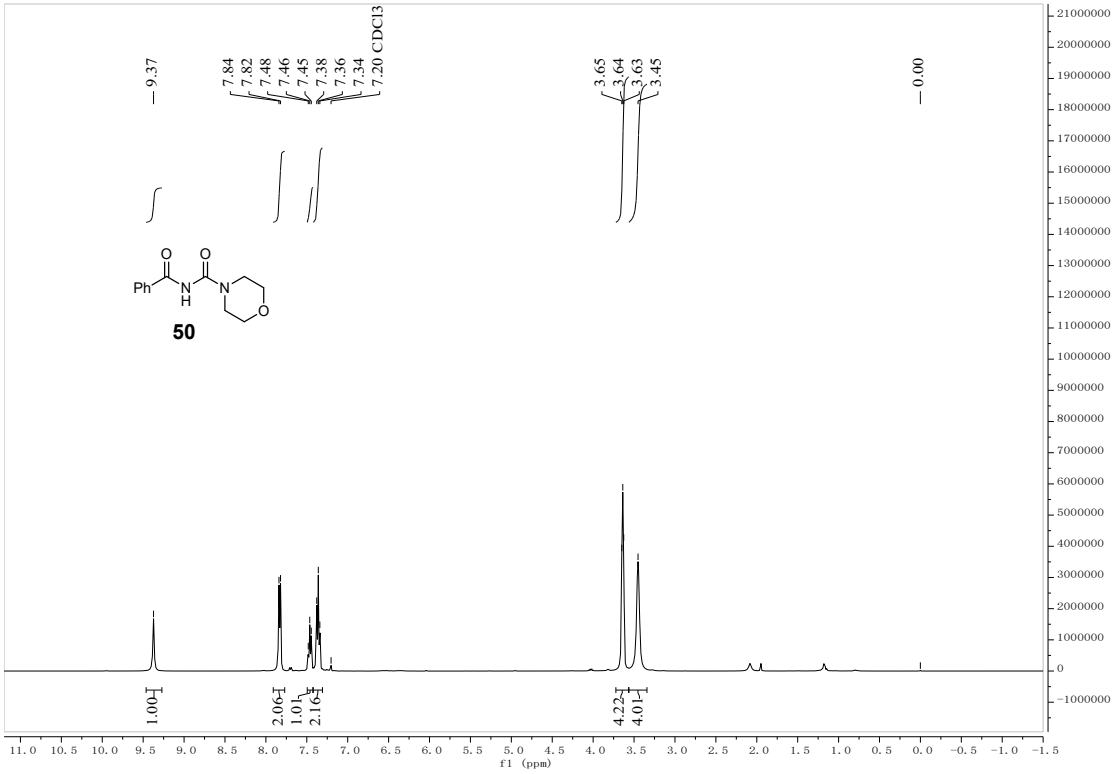
^{1}H NMR of **49**


9.25
7.89
7.87
7.51
7.49
7.47
7.41
7.39
7.37
7.18 CDCl3
7.12
7.11
7.10
7.10
7.08
7.07
7.06
7.05
7.00
4.62
3.69
2.86
0.00
Ph
N
H
O
O
N
49
1.00
2.10
1.12
2.18
3.25
1.00
2.13
2.16
2.13
f1 (ppm)

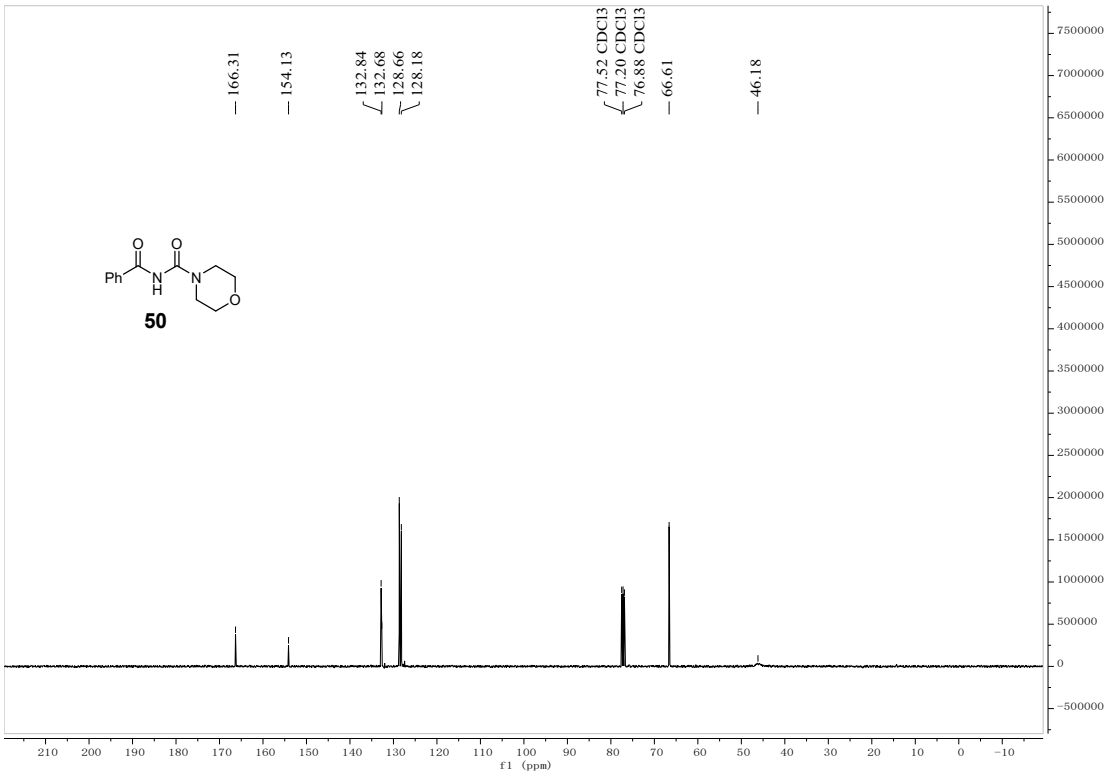
^{13}C NMR of **49**


166.22
154.33
134.56
132.89
132.86
128.91
128.79
128.28
126.86
126.56
126.39
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
50.39
43.01
28.79
Ph
N
H
O
O
N
49
f1 (ppm)

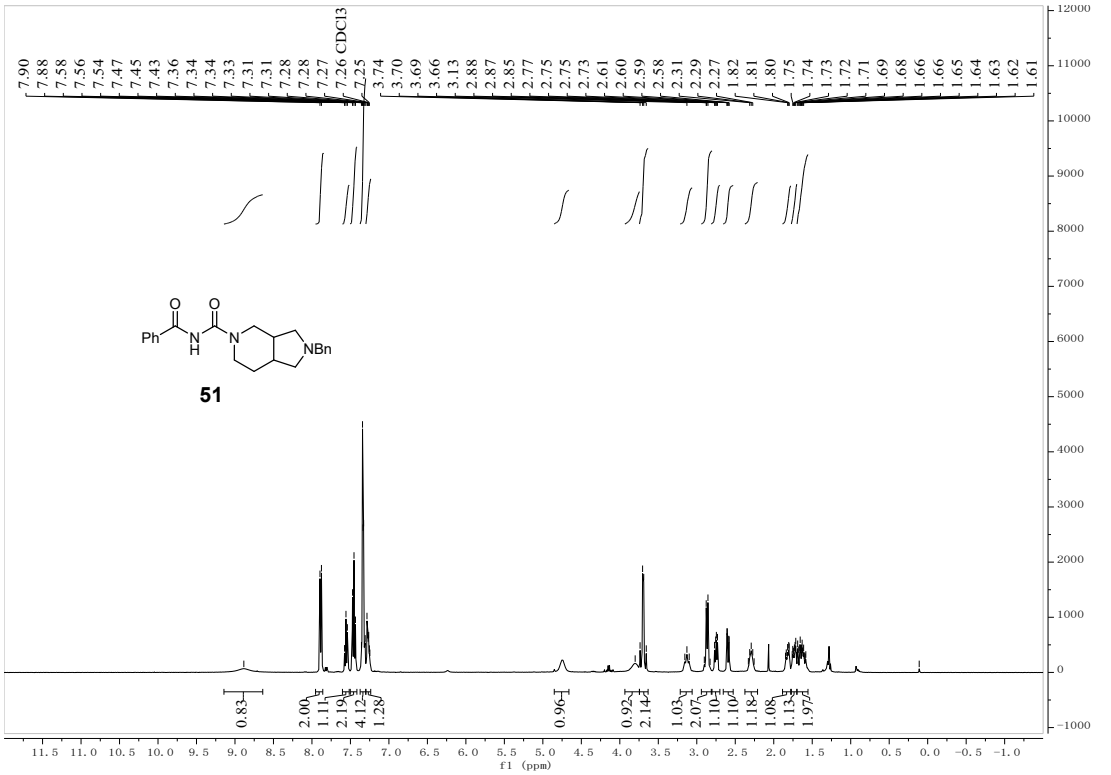
^{1}H NMR of **50**



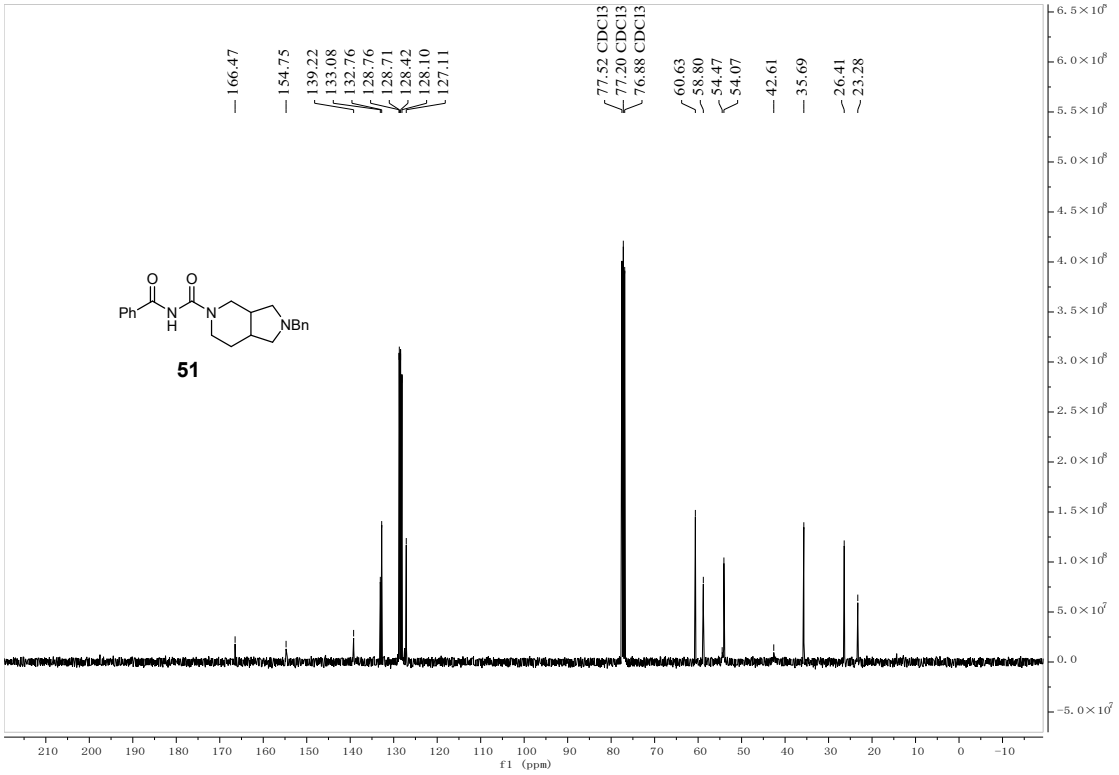
^{13}C NMR of **50**


166.31
154.13
132.84
132.68
128.66
128.18
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
66.61
46.18
Ph
O
N
H
O
N
O
50
f1 (ppm)

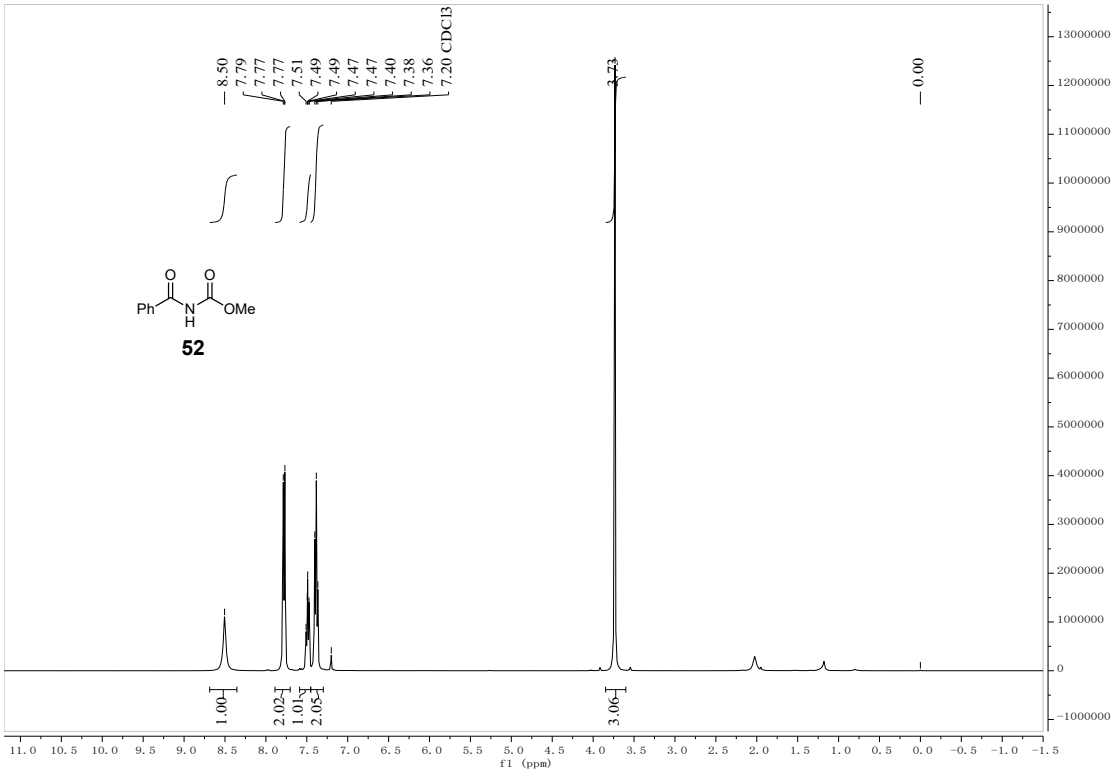
^{1}H NMR of **51**


7.90
7.88
7.58
7.56
7.54
7.47
7.45
7.43
7.36
7.34
7.34
7.33
7.31
7.31
7.28
7.28
7.27
7.26 CDCl3
7.25
3.74
3.70
3.69
3.66
3.13
2.88
2.87
2.85
2.77
2.75
2.75
2.73
2.61
2.60
2.59
2.58
2.31
2.29
2.27
1.82
1.81
1.80
1.75
1.74
1.73
1.72
1.71
1.69
1.68
1.66
1.66
1.65
1.64
1.63
1.62
1.61
Ph
O
N
H
O
N
NBn
51
0.83
2.00
1.11
2.19
4.12
1.28
0.96
0.92
2.14
1.03
2.07
1.10
1.10
1.18
1.08
1.13
1.97
f1 (ppm)

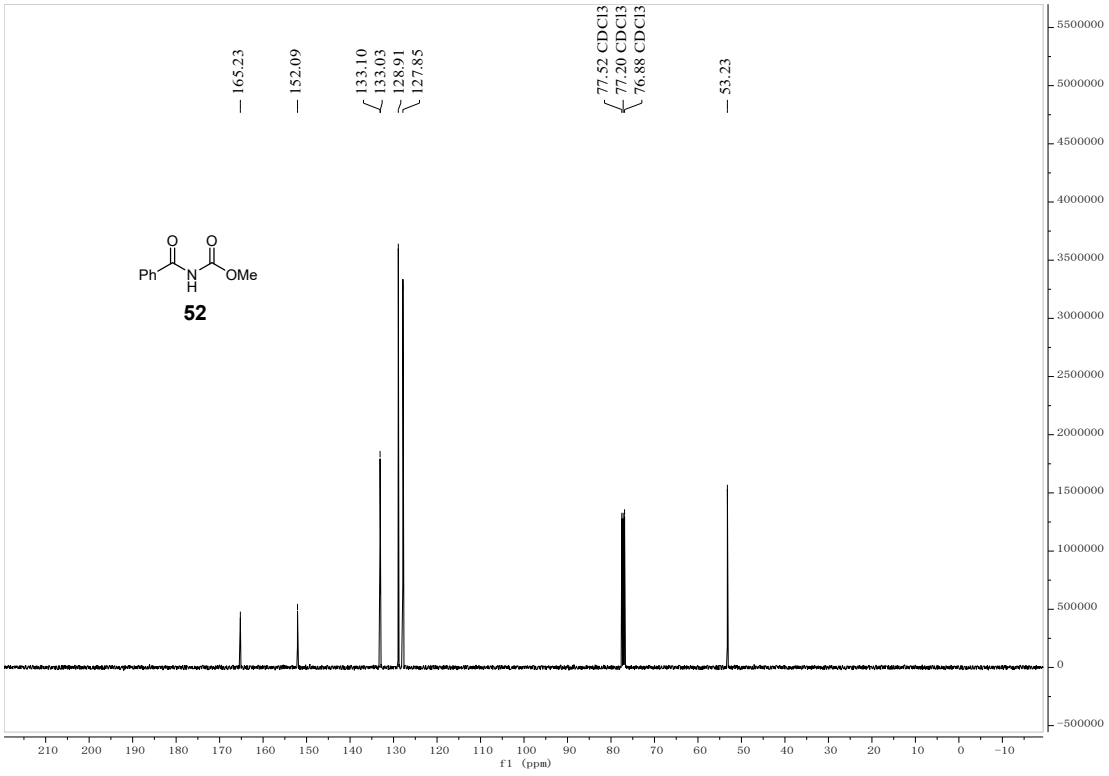
^{13}C NMR of **51**



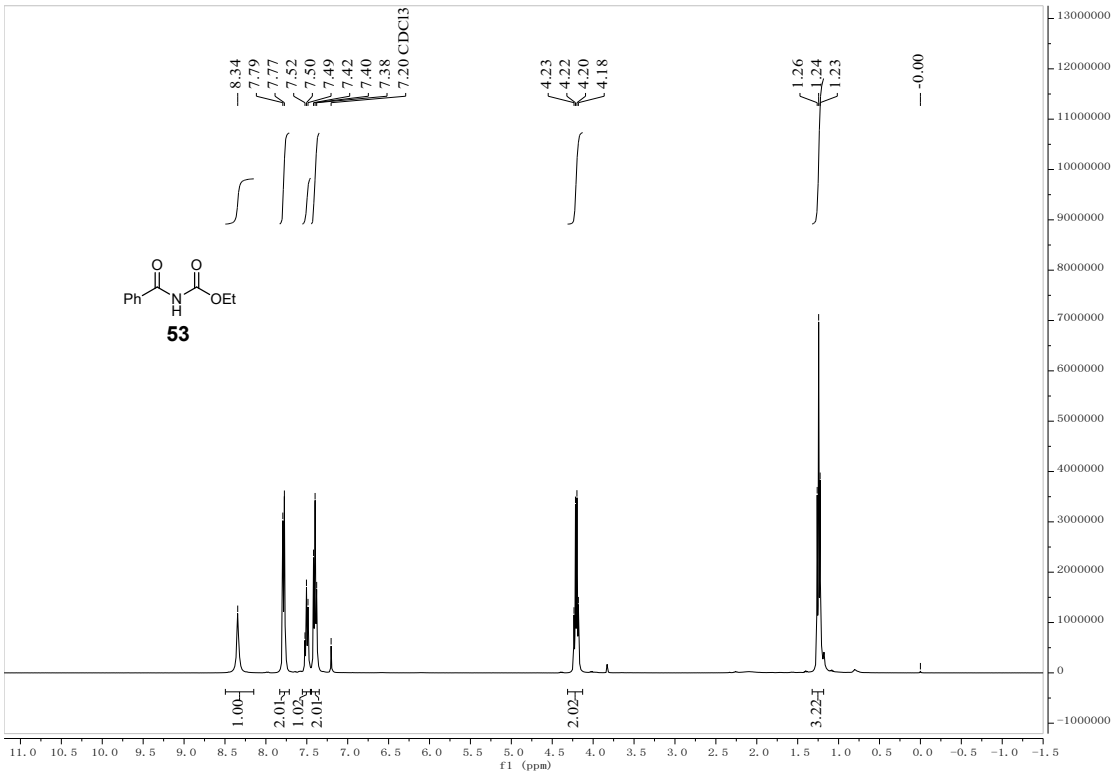
^{1}H NMR of **52**



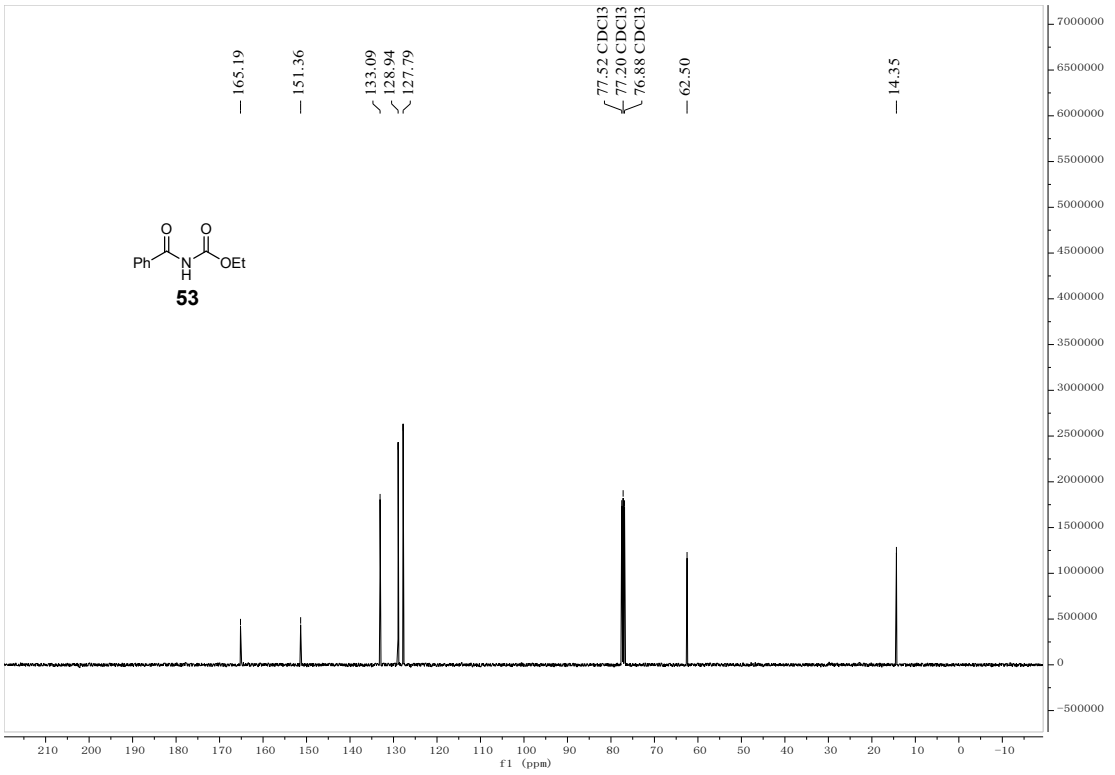
^{13}C NMR of **52**



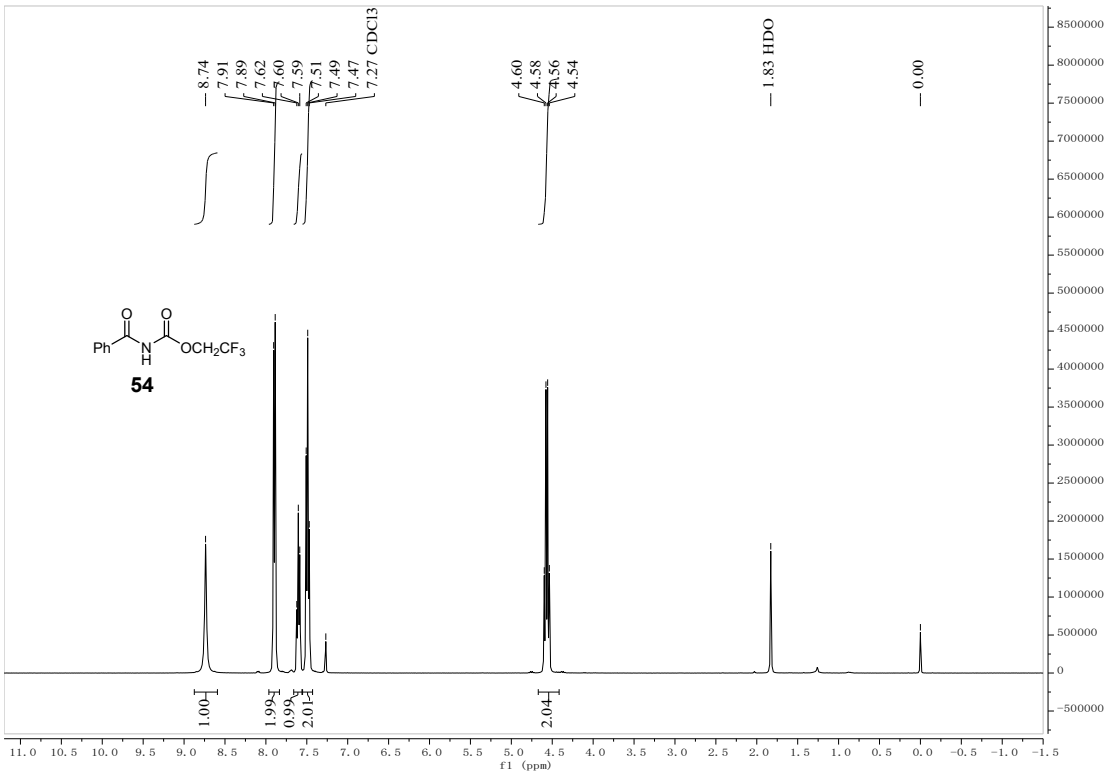
^{1}H NMR of **53**


8.34
7.79
7.77
7.52
7.50
7.49
7.42
7.40
7.38
7.20 CDCl3
4.23
4.22
4.20
4.18
1.26
1.24
1.23
-0.00
Ph
N
H
O
OEt
53
1.00
2.01
1.02
2.01
2.02
3.22
f1 (ppm)

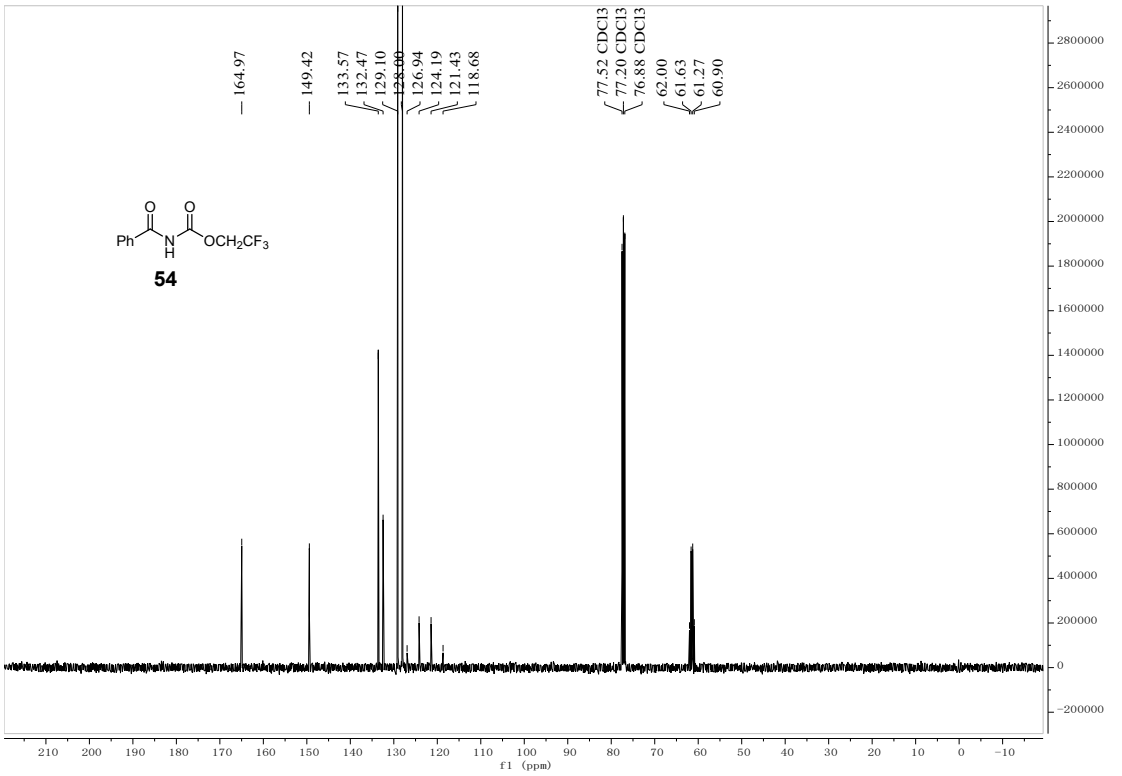
^{13}C NMR of **53**


165.19
151.36
133.09
128.94
127.79
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
62.50
14.35
Ph
N
H
O
OEt
53
f1 (ppm)

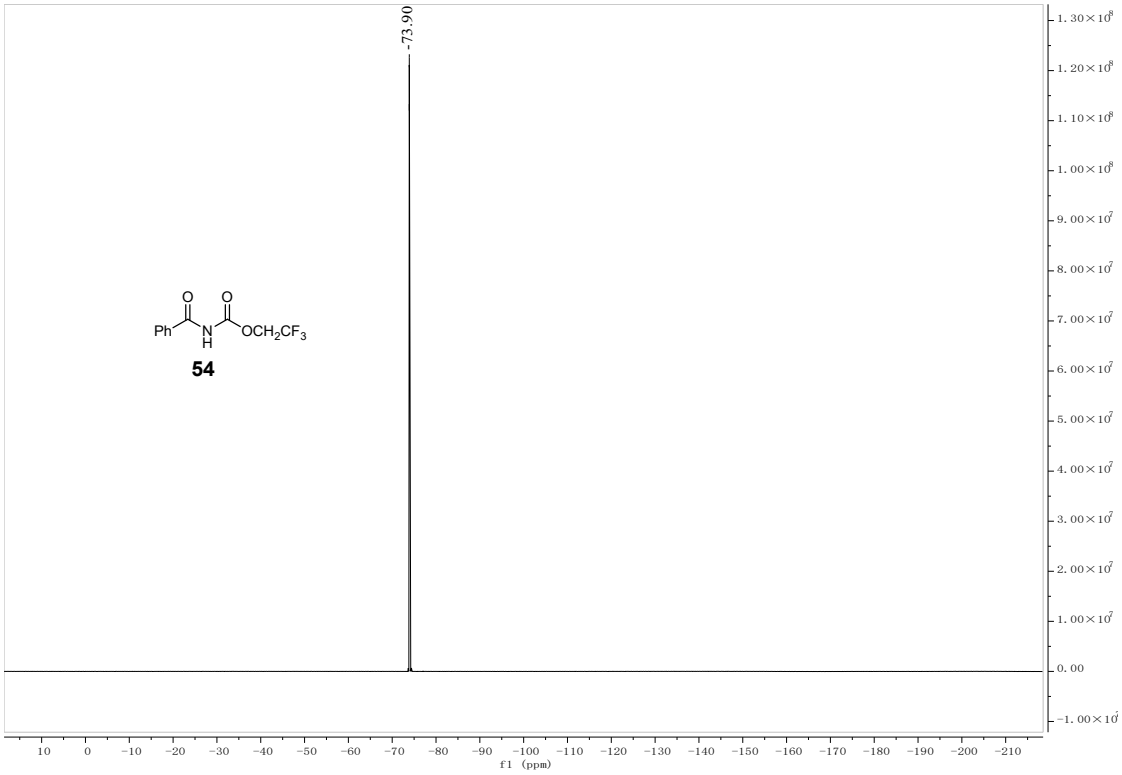
^{1}H NMR of **54**



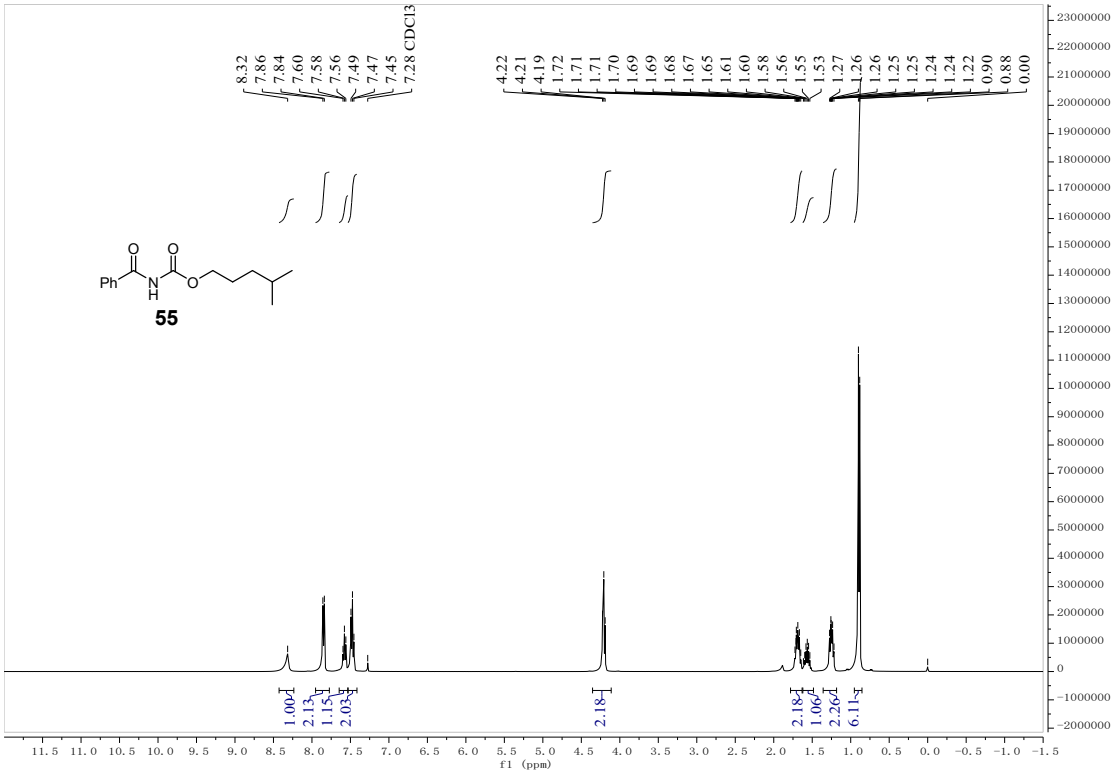
^{13}C NMR of **54**


164.97
149.42
133.57
132.47
129.10
128.60
126.94
124.19
121.43
118.68
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
62.00
61.63
61.27
60.90
Ph
N
H
O
O
OCH2CF3
54
f1 (ppm)

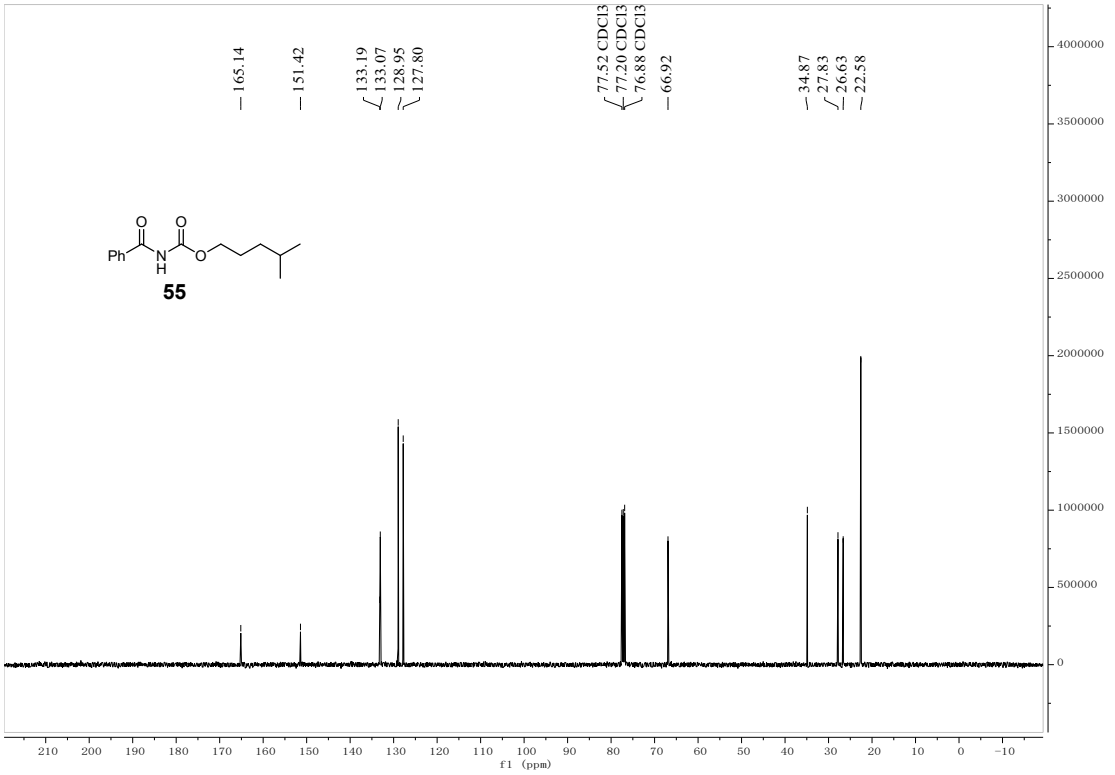
^{19}F NMR of **54**


-73.90
Ph
N
H
O
O
OCH2CF3
54
f1 (ppm)

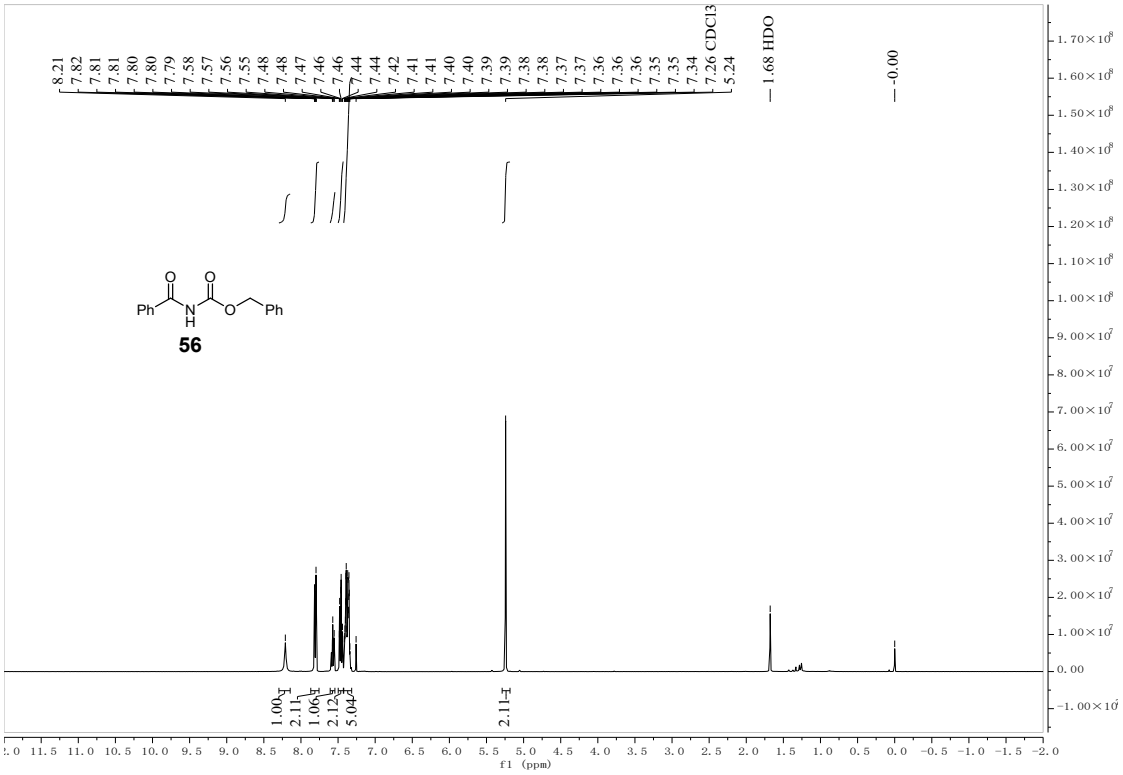
^{1}H NMR of **55**



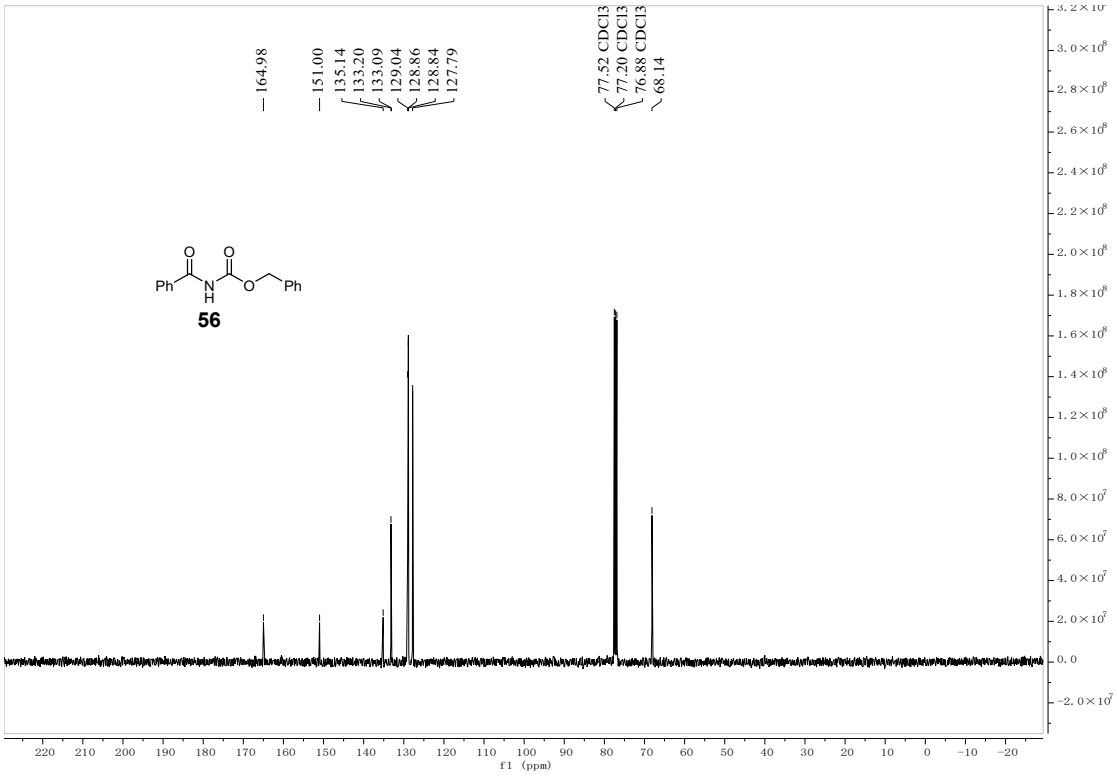
^{13}C NMR of **55**



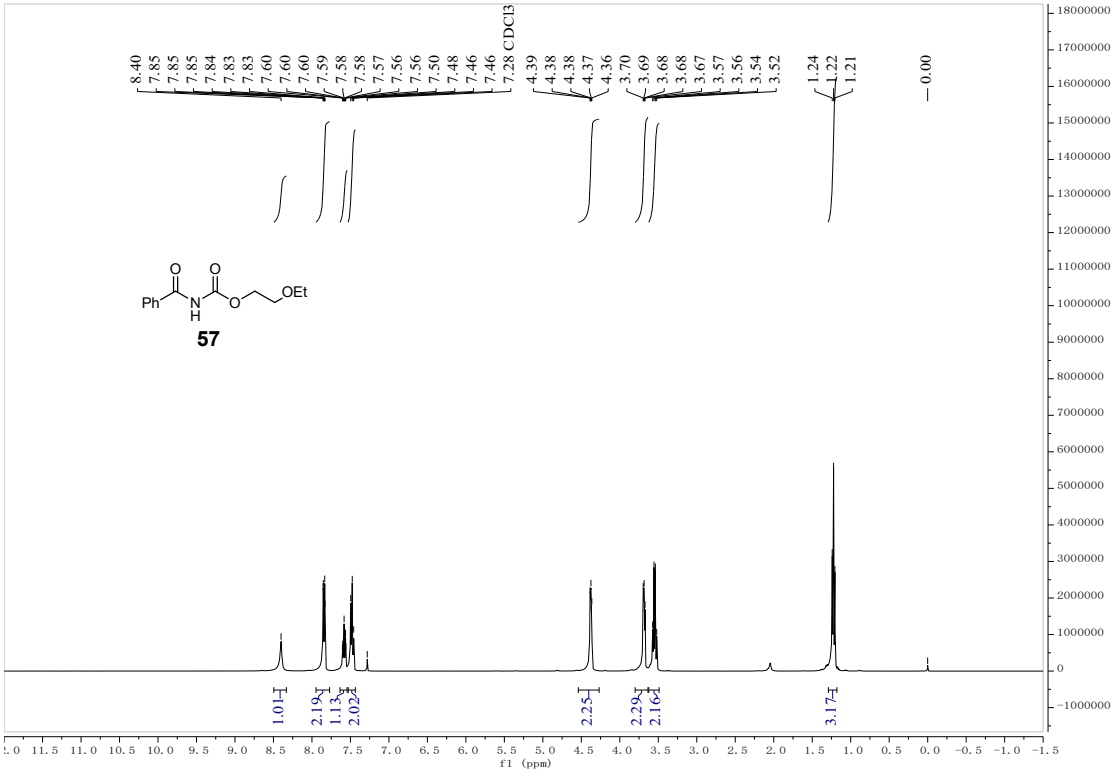
^{1}H NMR of **56**



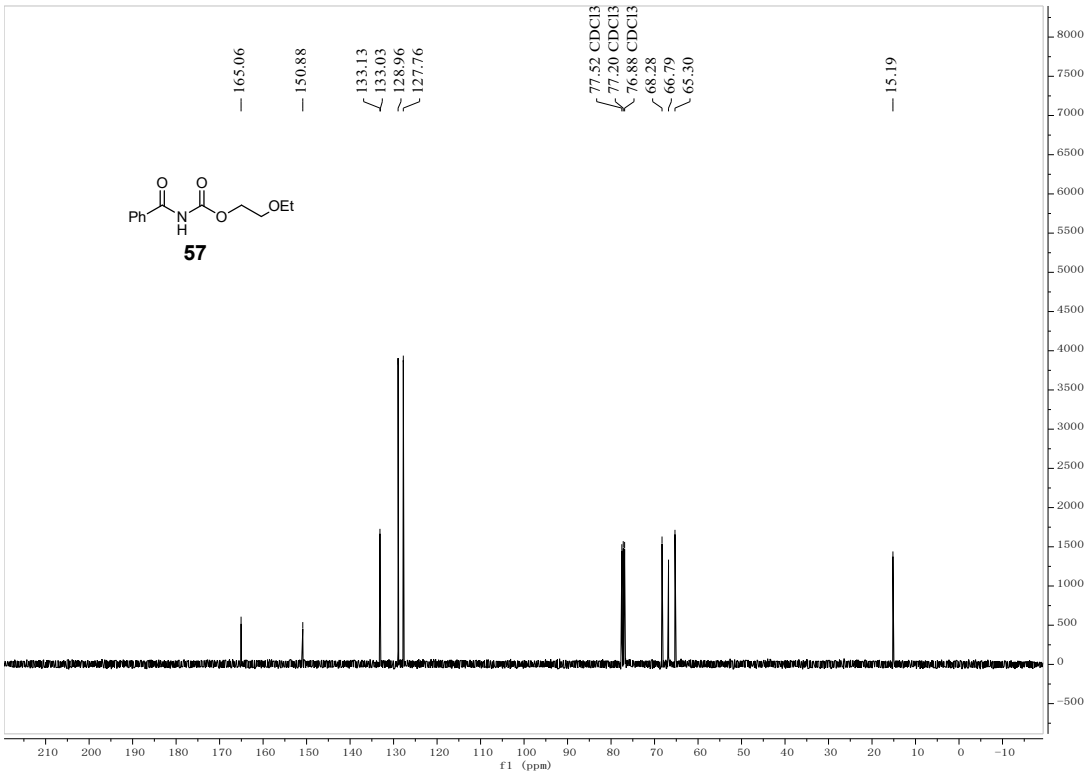
^{13}C NMR of **56**


164.98
151.00
135.14
133.20
133.09
129.04
128.86
128.84
127.79
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
68.14
Ph
N
H
O
O
Ph
56
f1 (ppm)

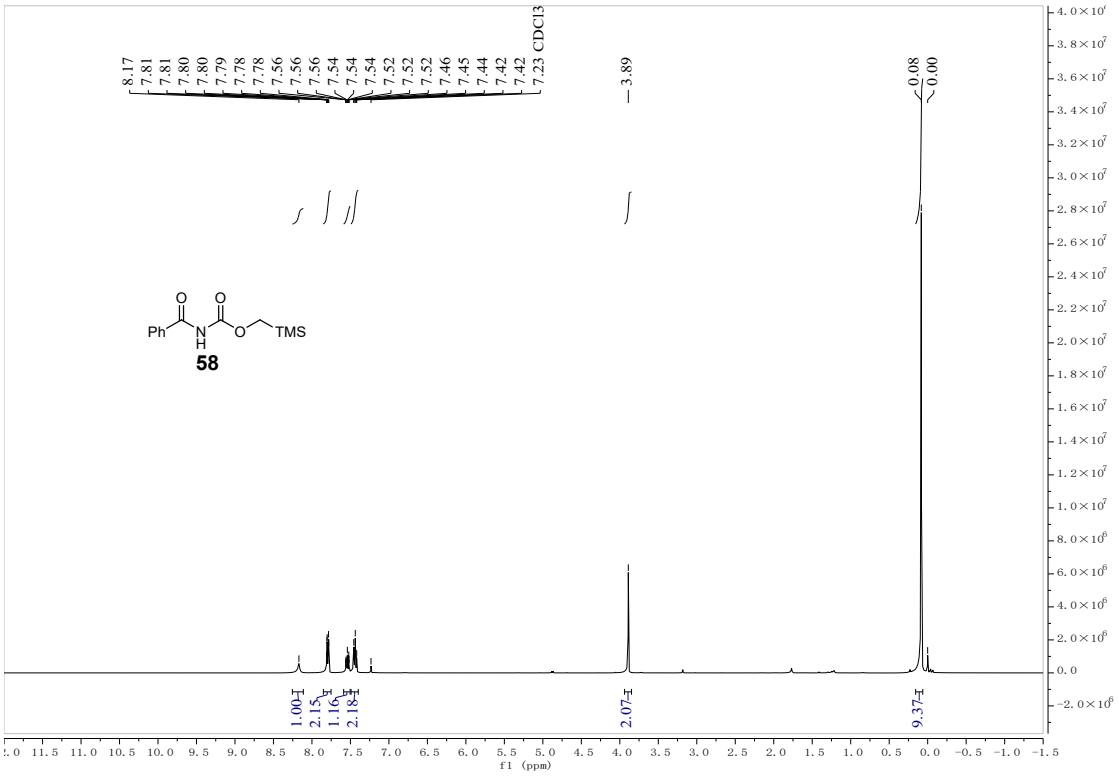
^{1}H NMR of **57**


8.40
7.85
7.85
7.85
7.84
7.83
7.83
7.60
7.60
7.60
7.59
7.58
7.58
7.57
7.56
7.56
7.50
7.48
7.46
7.46
7.28 CDCl3
4.39
4.38
4.38
4.37
4.36
3.70
3.69
3.68
3.68
3.67
3.57
3.56
3.54
3.52
1.24
1.22
1.21
0.00
1.01
2.19
1.13
2.02
2.25
2.29
2.16
3.17
Ph
N
H
O
O
OEt
57
f1 (ppm)

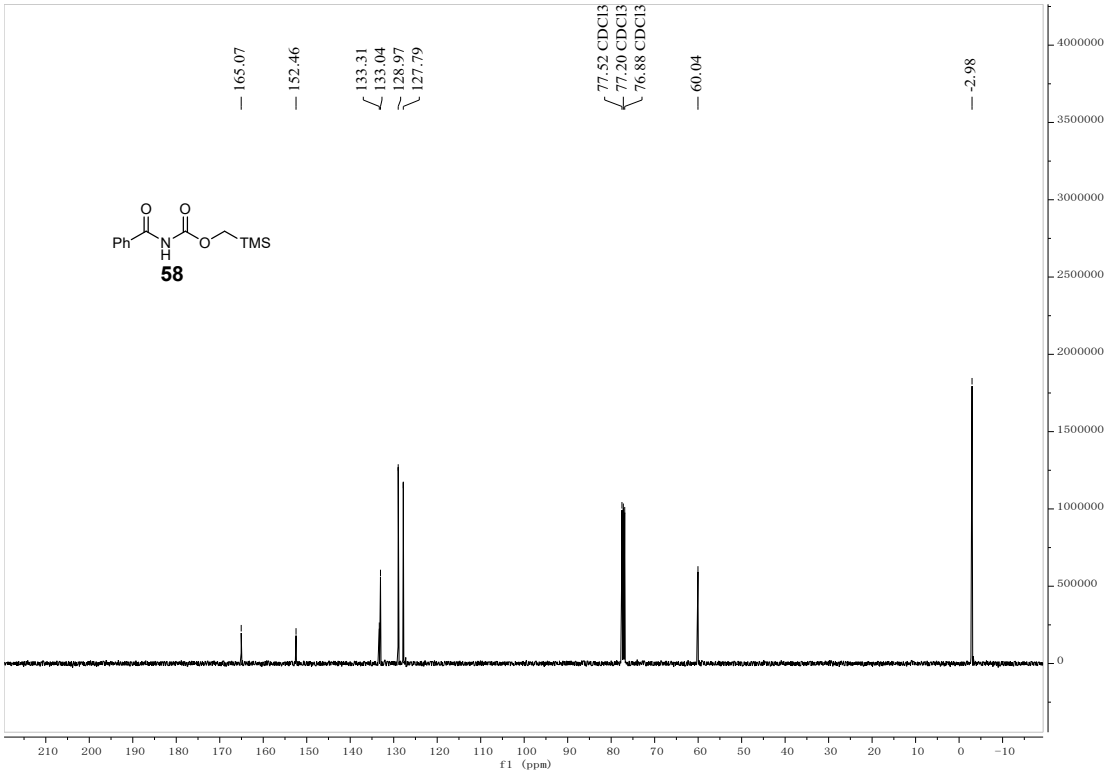
^{13}C NMR of **57**



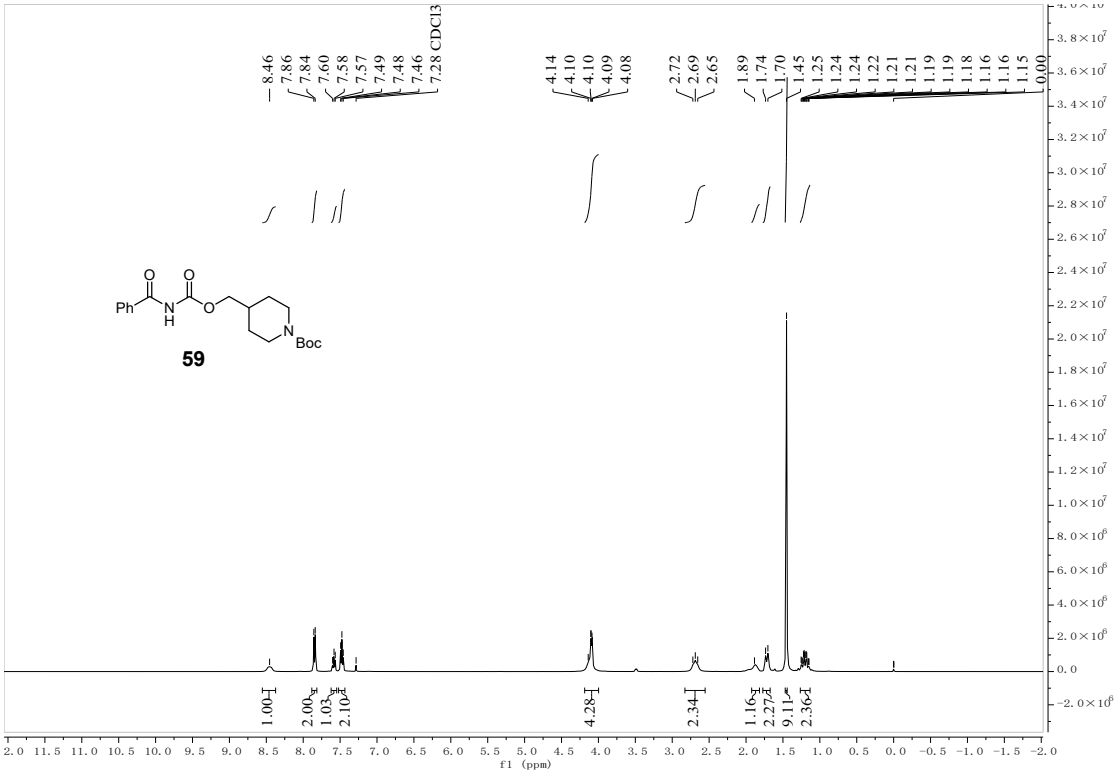
^{1}H NMR of **58**


8.17
7.81
7.81
7.80
7.80
7.79
7.78
7.78
7.56
7.56
7.56
7.54
7.54
7.54
7.52
7.52
7.52
7.46
7.45
7.44
7.42
7.42
7.23 CDCl3
3.89
0.08
0.00
Ph
N
H
O
O
O
TMS
58
1.00
2.15
1.16
2.18
2.07
9.37
f1 (ppm)

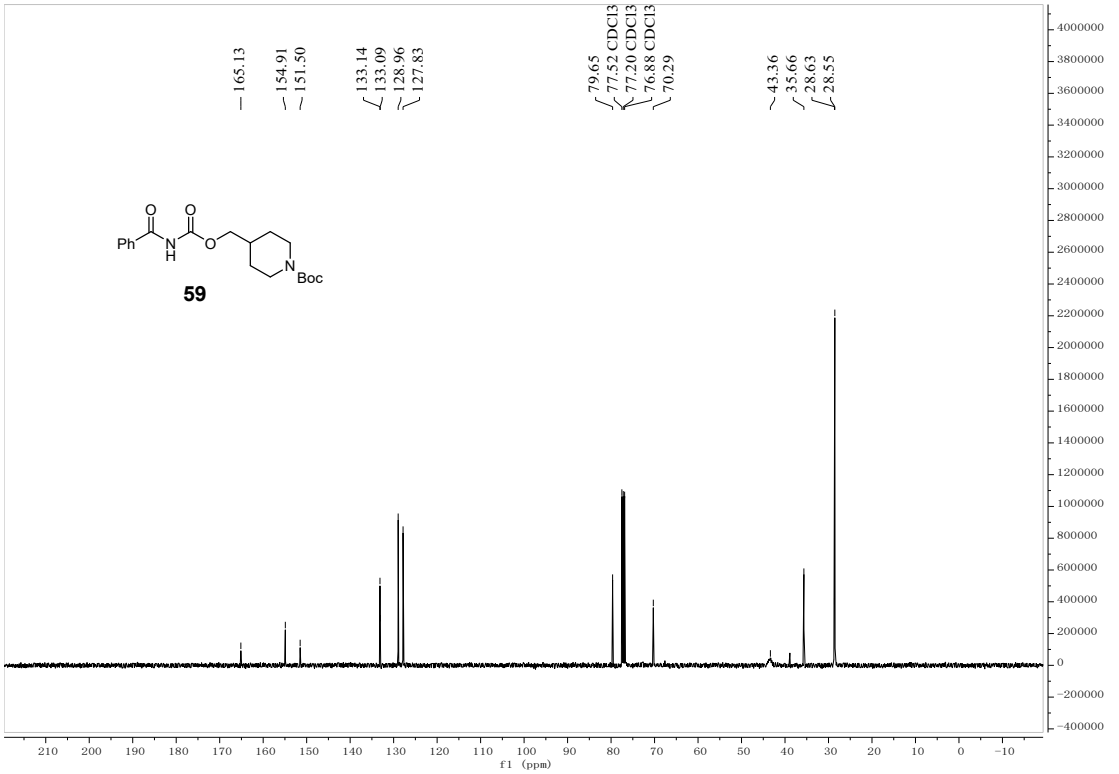
^{13}C NMR of **58**


165.07
152.46
133.31
133.04
128.97
127.79
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
60.04
-2.98
Ph
N
H
O
O
O
TMS
58
f1 (ppm)

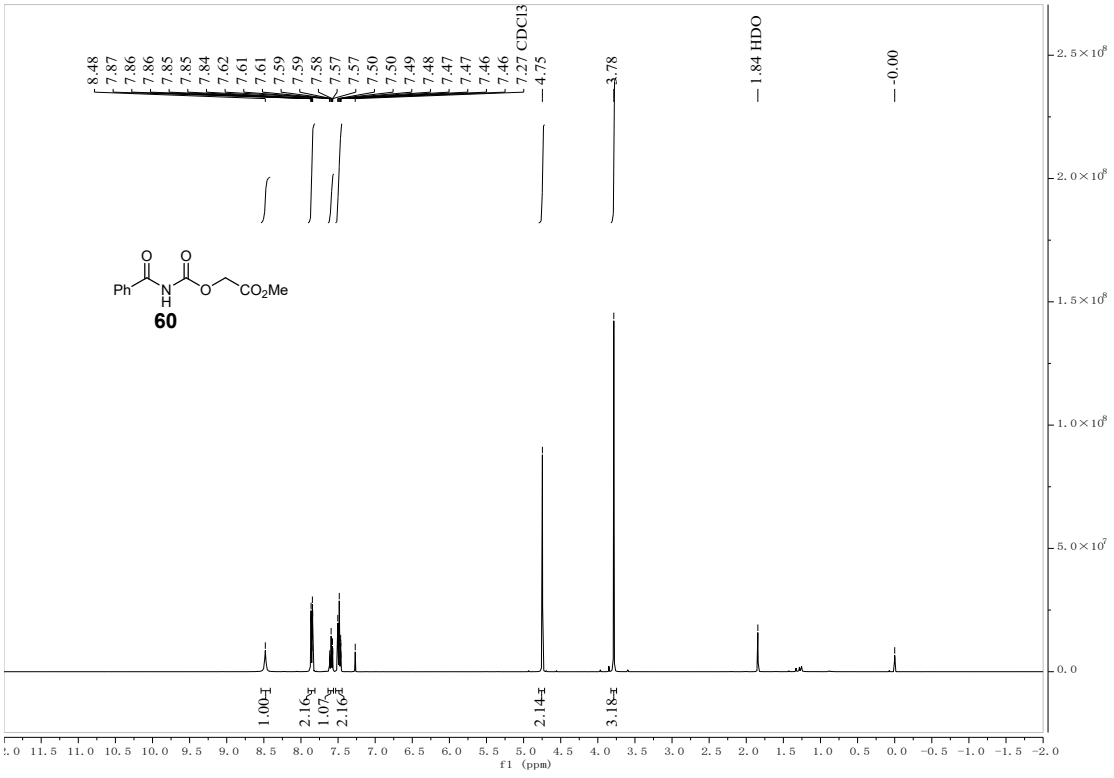
^{1}H NMR of **59**



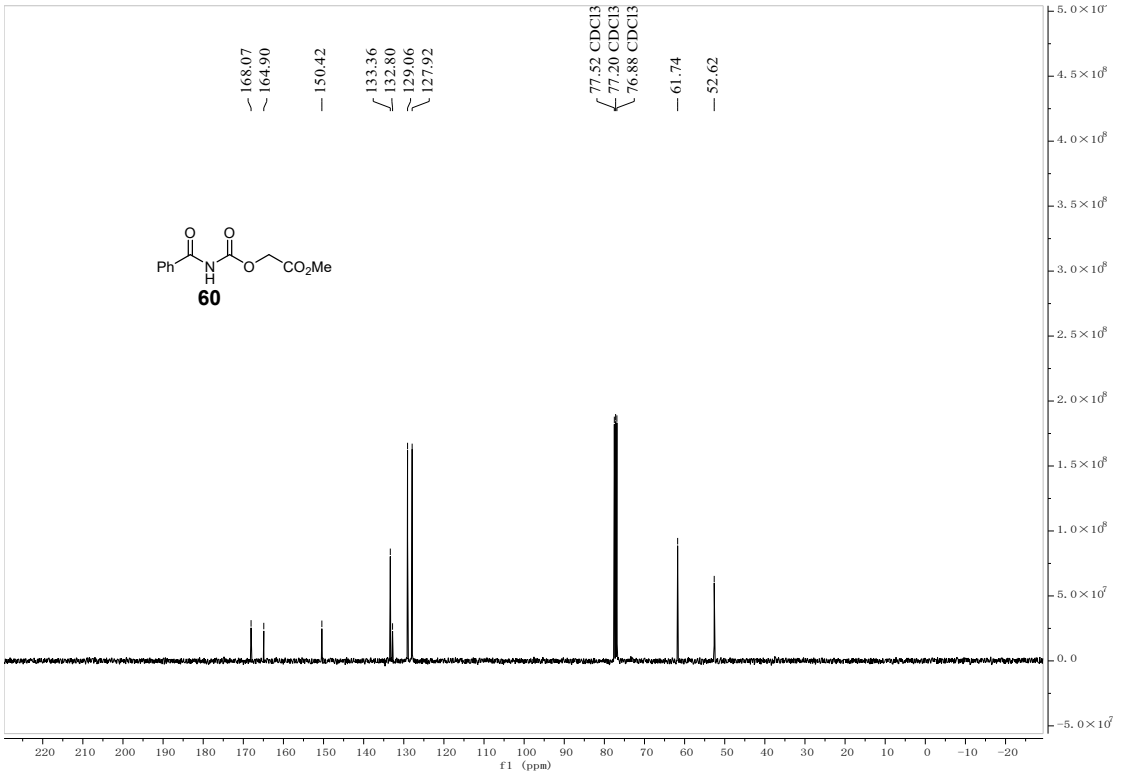
^{13}C NMR of **59**



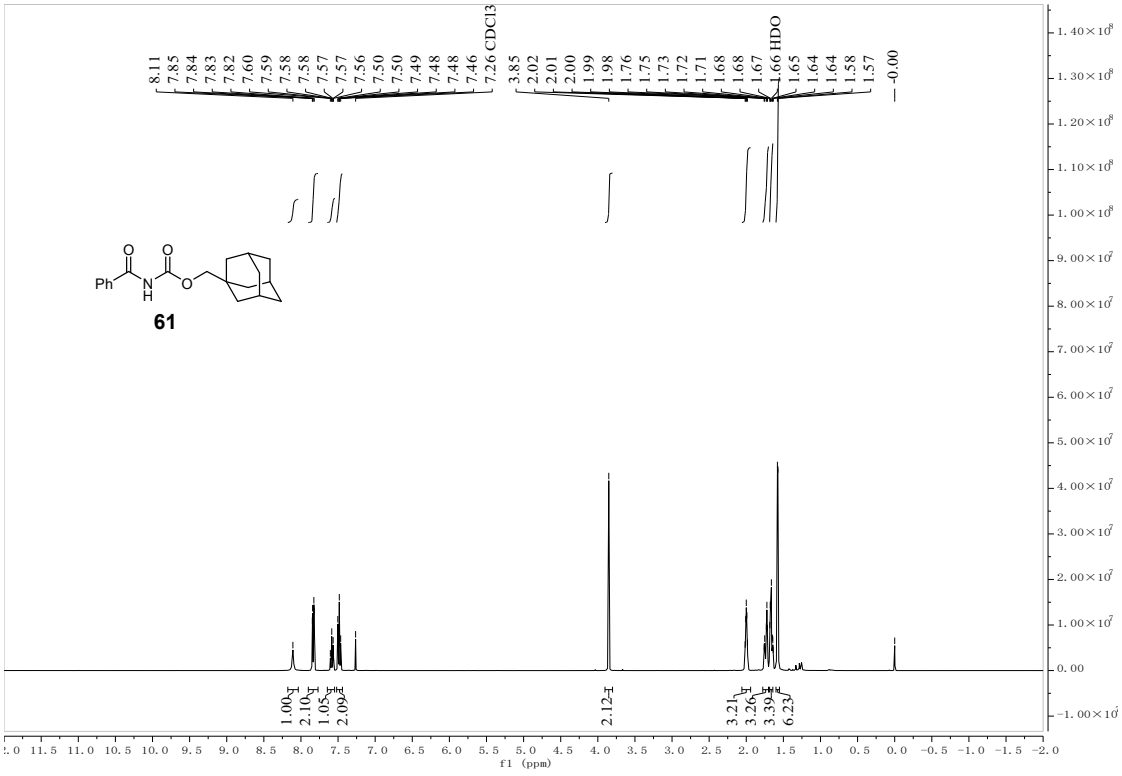
^{1}H NMR of **60**



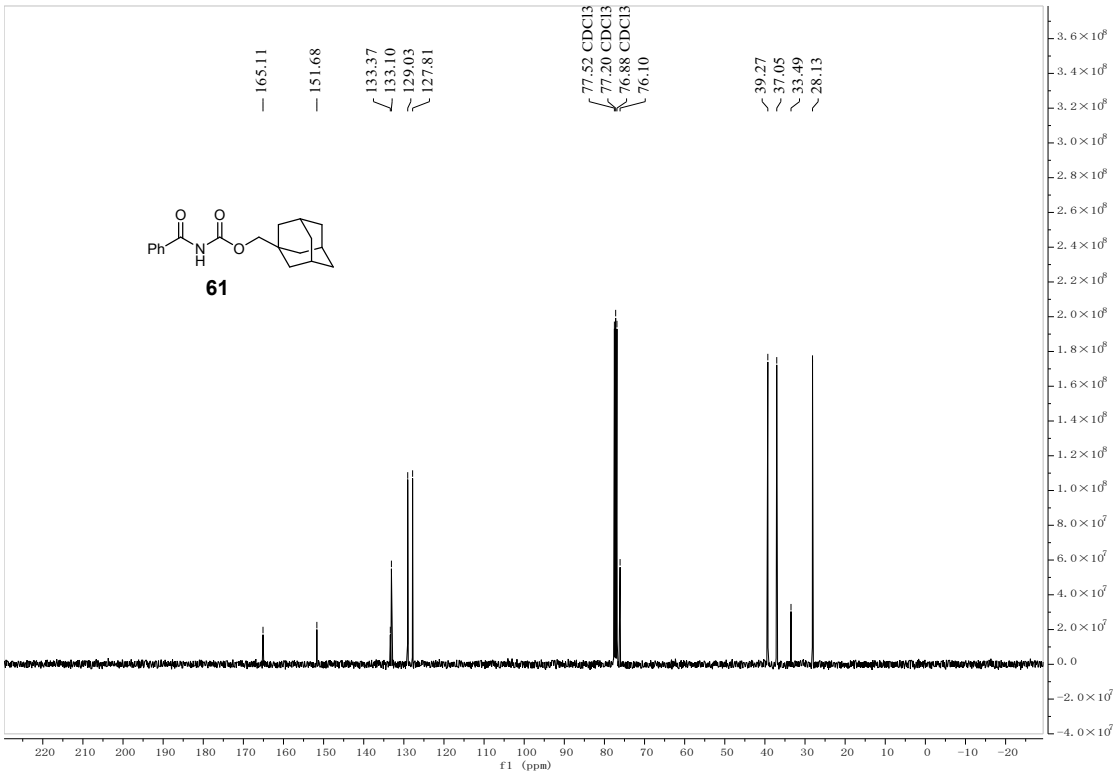
^{13}C NMR of **60**


168.07
164.90
150.42
133.36
132.80
129.06
127.92
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
61.74
52.62
Ph
N
H
O
O
O
CO2Me
60
f1 (ppm)

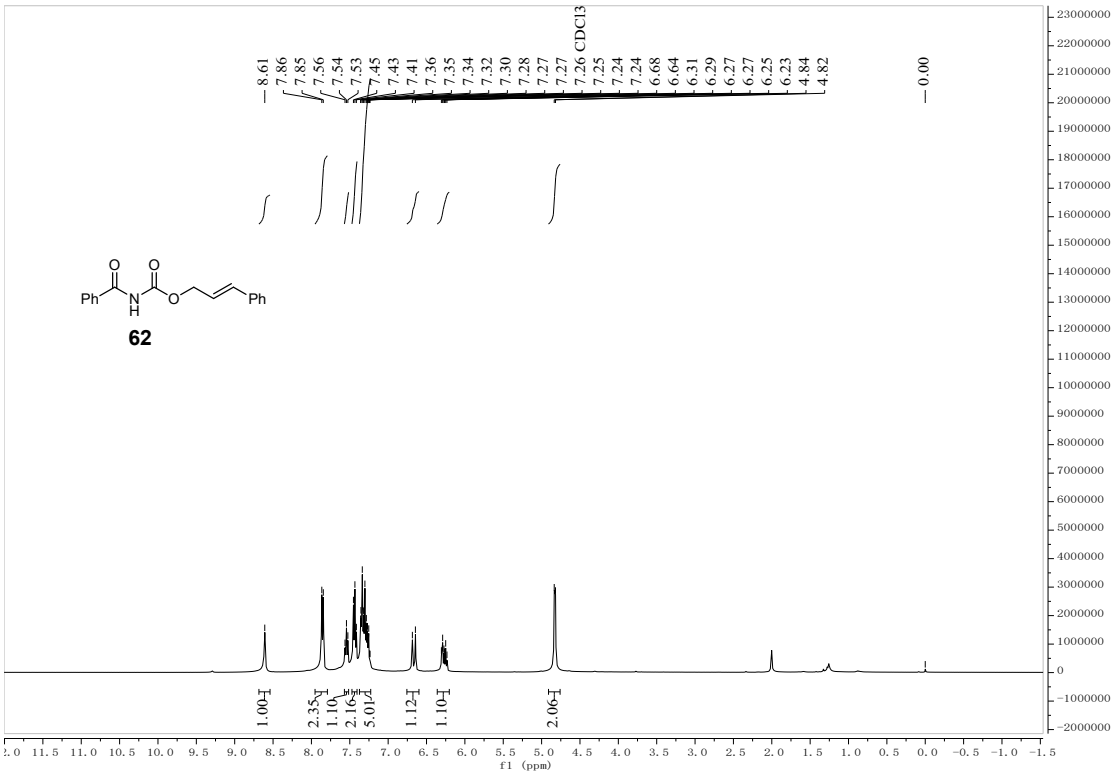
^{1}H NMR of **61**


8.11
7.85
7.84
7.83
7.82
7.60
7.59
7.58
7.58
7.57
7.57
7.56
7.50
7.50
7.49
7.48
7.48
7.46
7.26 CDCl3
3.85
2.02
2.01
2.00
1.99
1.98
1.76
1.75
1.73
1.72
1.71
1.68
1.68
1.67
1.66 HDO
1.65
1.64
1.64
1.58
1.57
-0.00
Ph
N
H
O
O
O
61
1.00
2.10
1.05
2.09
2.12
3.21
3.26
3.39
6.23
f1 (ppm)

^{13}C NMR of **61**

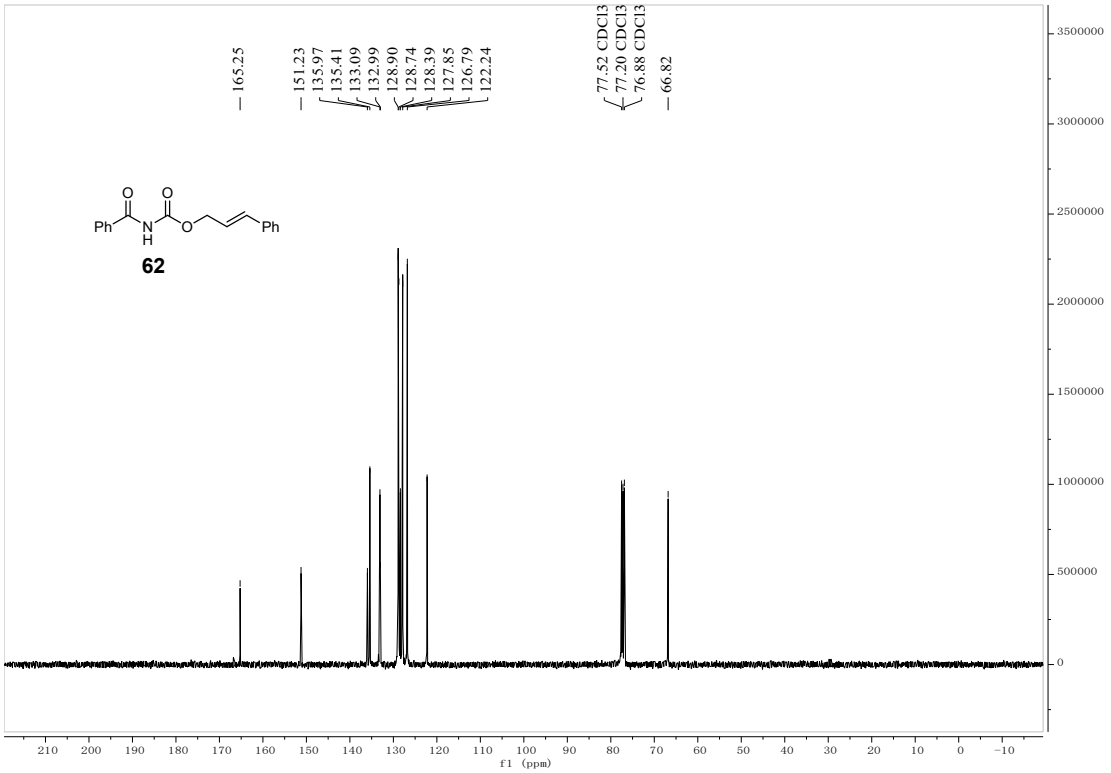


^{1}H NMR of **62**



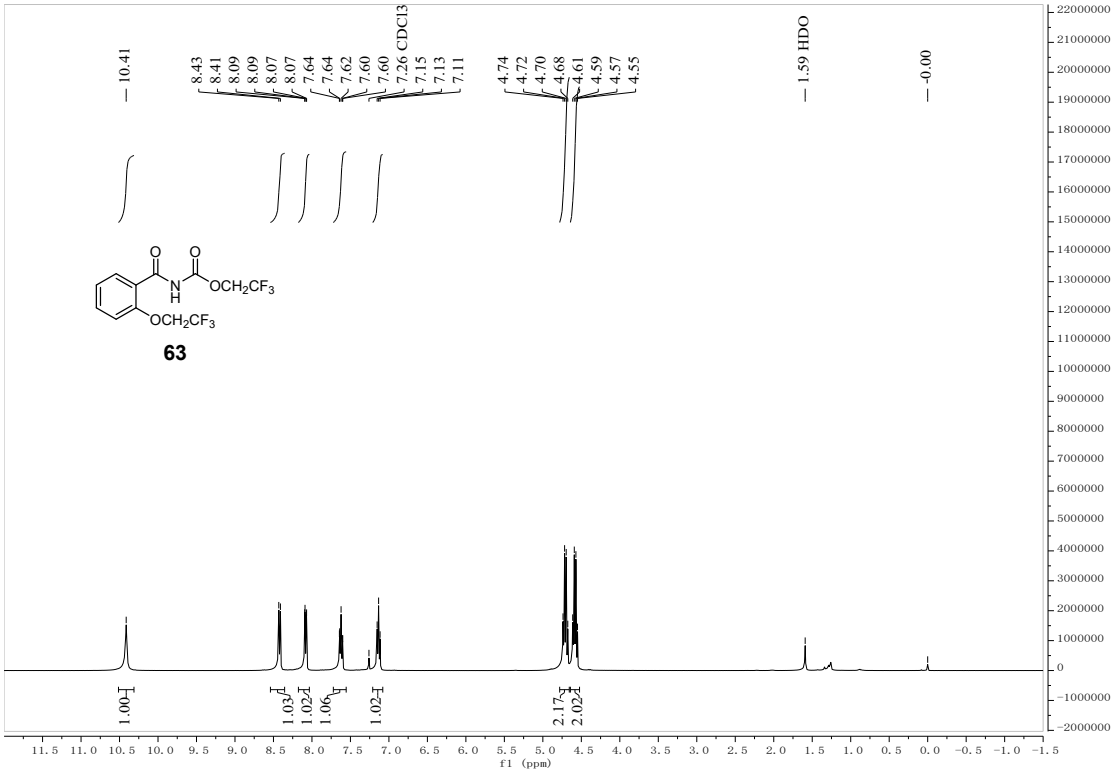
62

^{13}C NMR of **62**

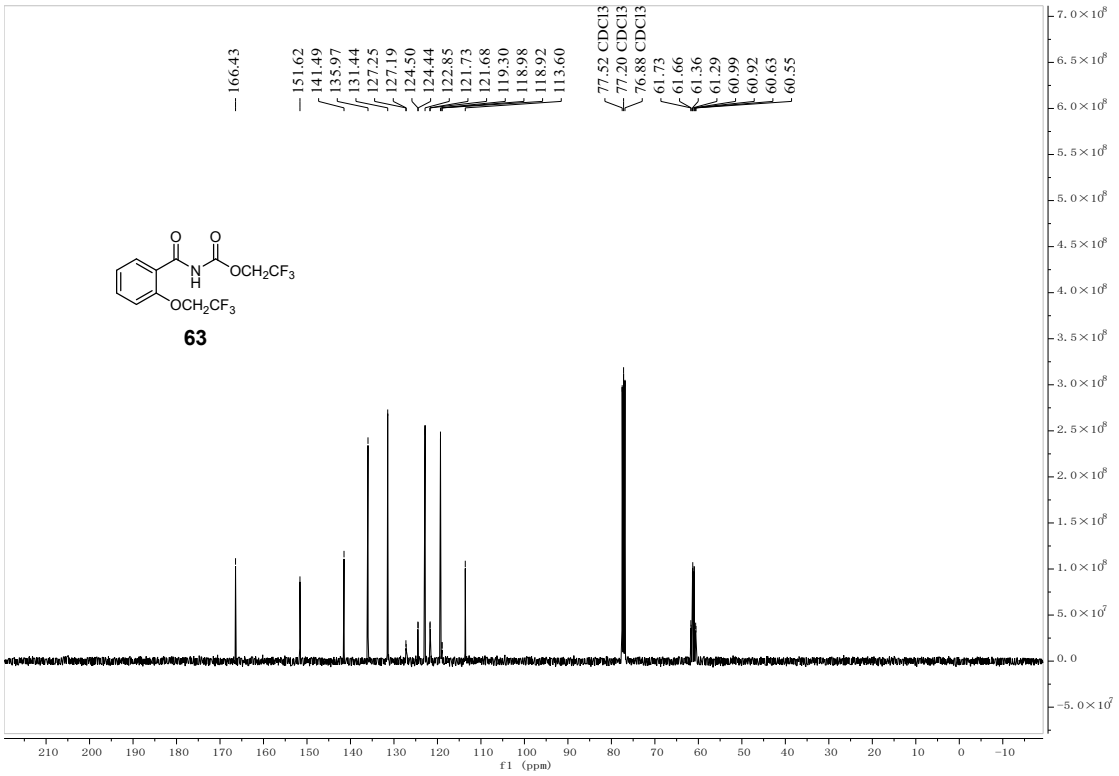


62

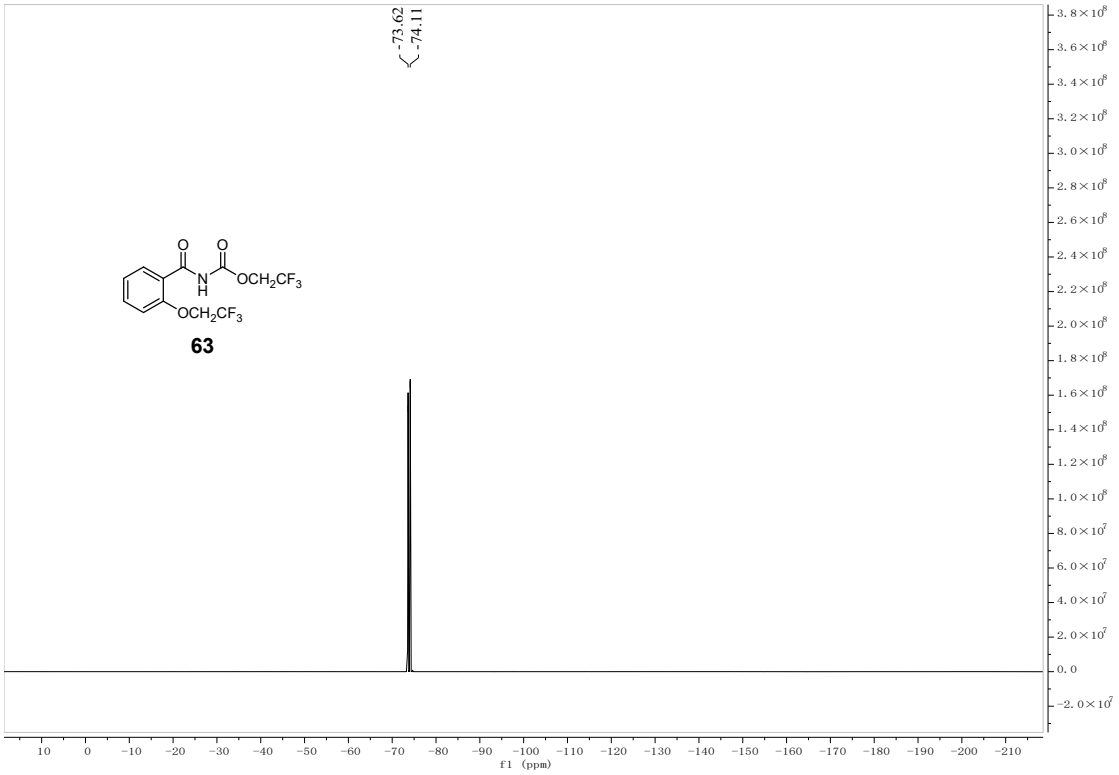
^{1}H NMR of **63**



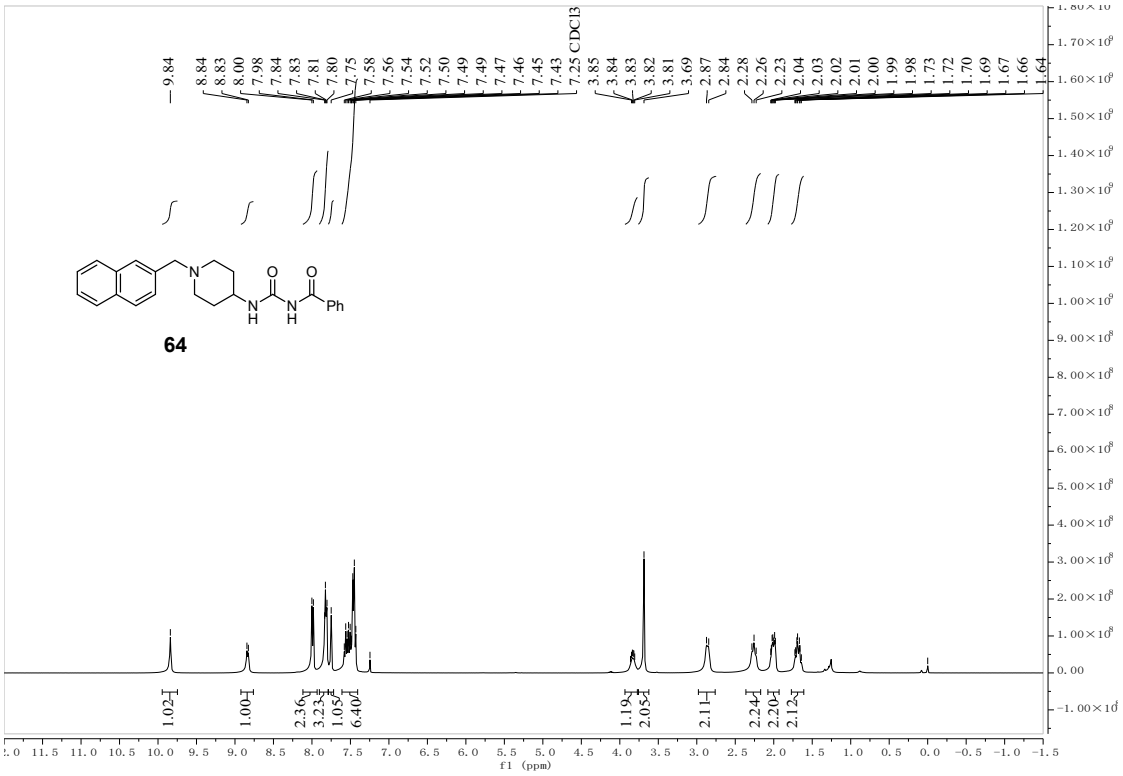
^{13}C NMR of **63**


166.43
151.62
141.49
135.97
131.44
127.25
127.19
124.50
124.44
122.85
121.73
121.68
119.30
118.98
118.92
113.60
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
61.73
61.66
61.36
61.29
60.99
60.92
60.63
60.55
OCH2CF3
OCH2CF3
63
f1 (ppm)

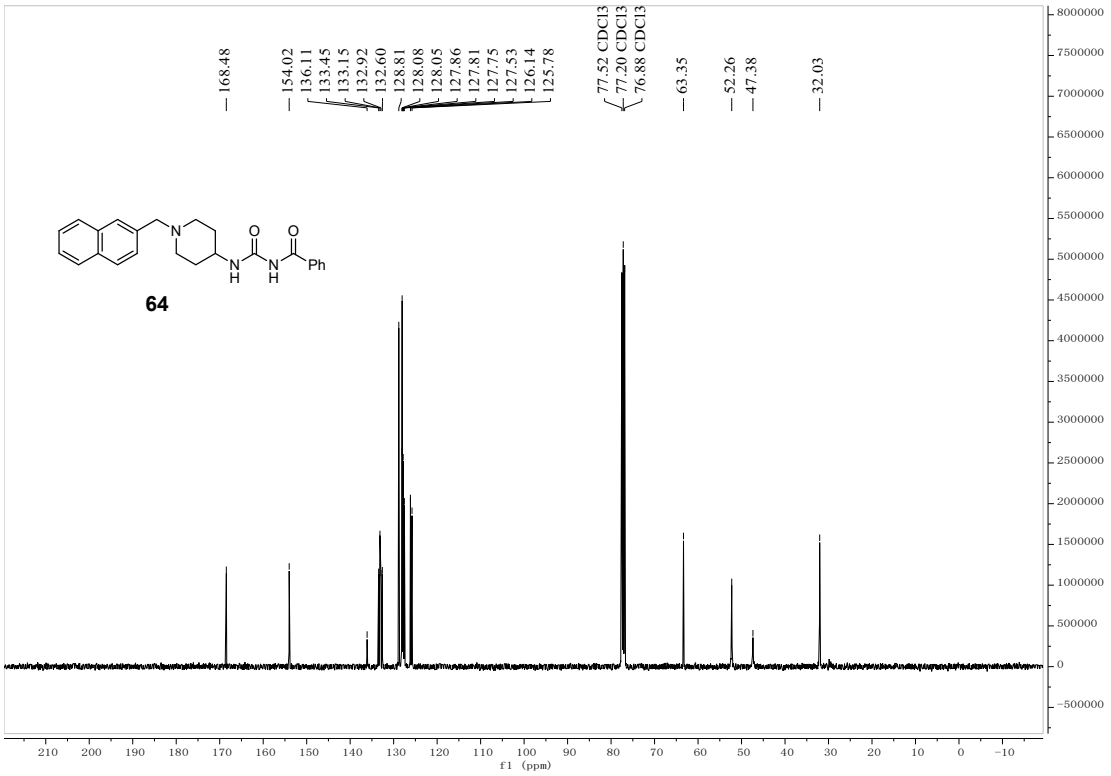
^{19}F NMR of **63**


-73.62
-74.11
OCH2CF3
OCH2CF3
63
f1 (ppm)

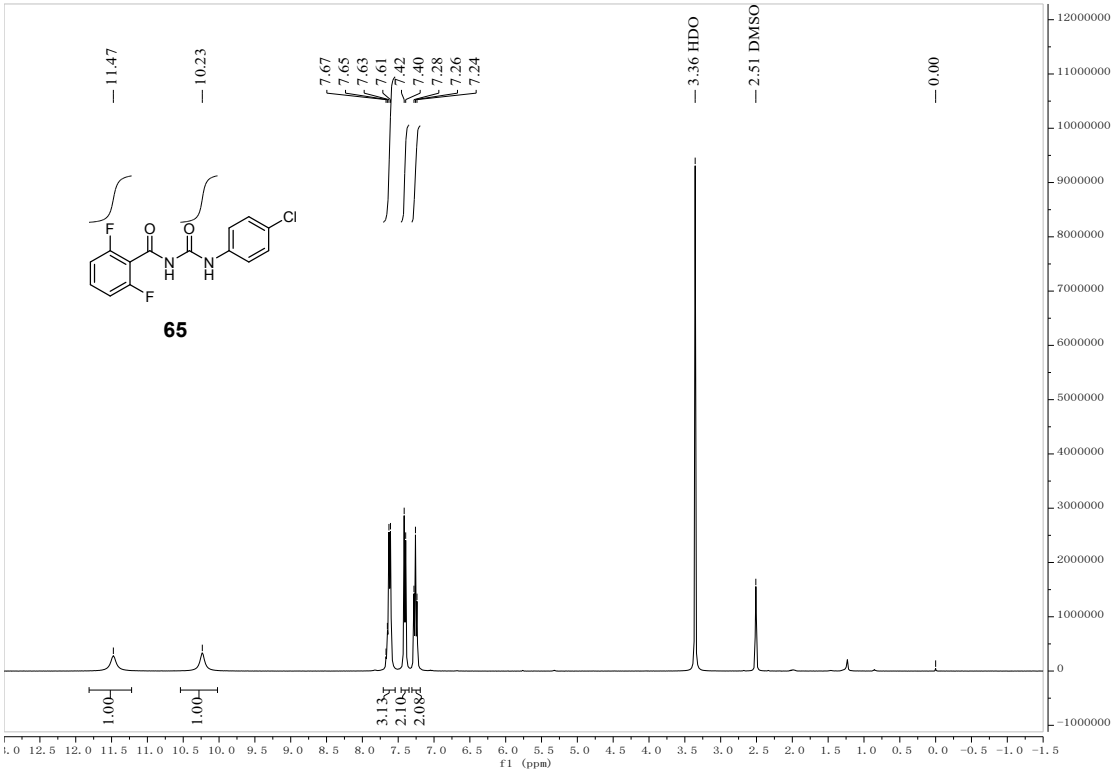
^{1}H NMR of **64**



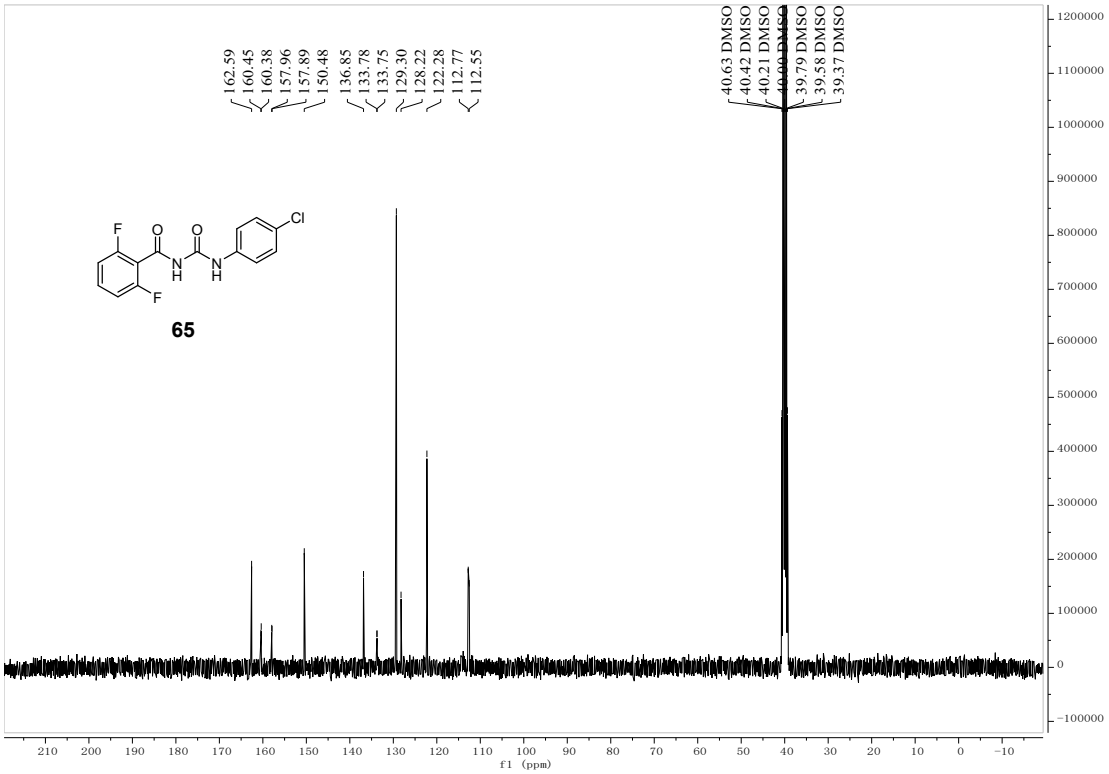
^{13}C NMR of **64**


168.48
154.02
136.11
133.45
133.15
132.92
132.60
128.81
128.08
128.05
127.86
127.81
127.75
127.53
126.14
125.78
77.52 CDCl3
77.20 CDCl3
76.88 CDCl3
63.35
52.26
47.38
32.03
64
f1 (ppm)

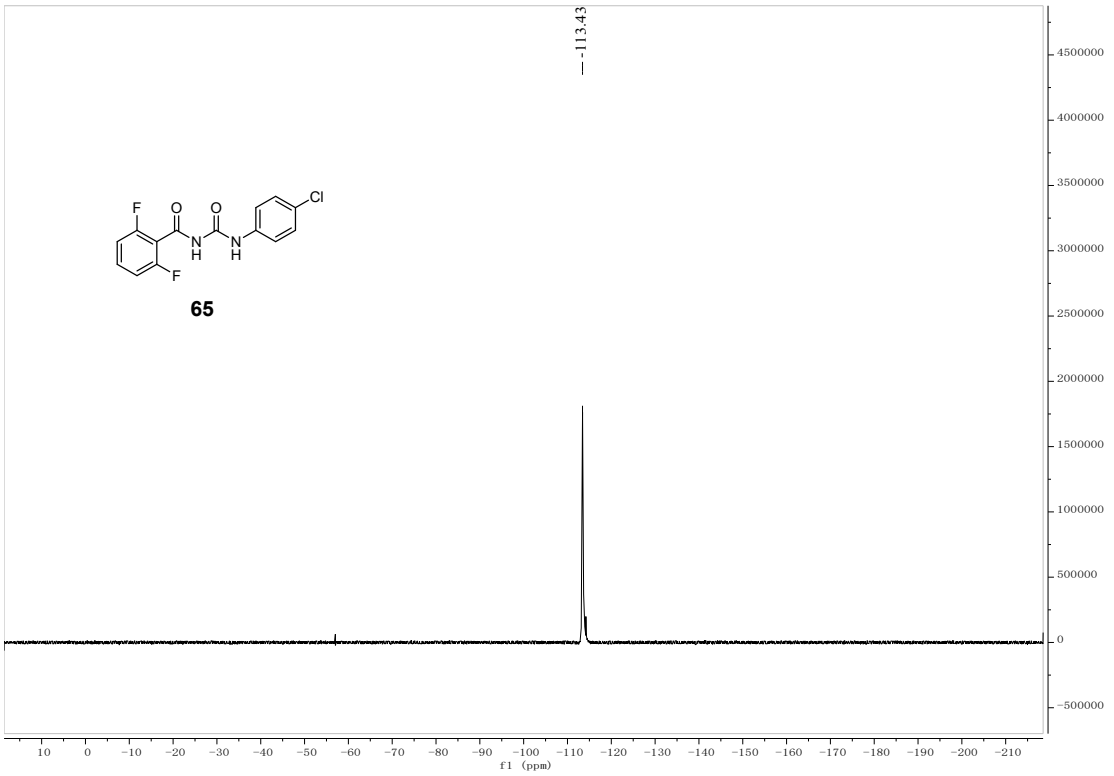
^{1}H NMR of **65**


11.47
10.23
7.67
7.65
7.63
7.61
7.42
7.40
7.28
7.26
7.24
3.36 HDO
2.51 DMSO
0.00
65
1.00
1.00
3.13
2.10
2.08
f1 (ppm)

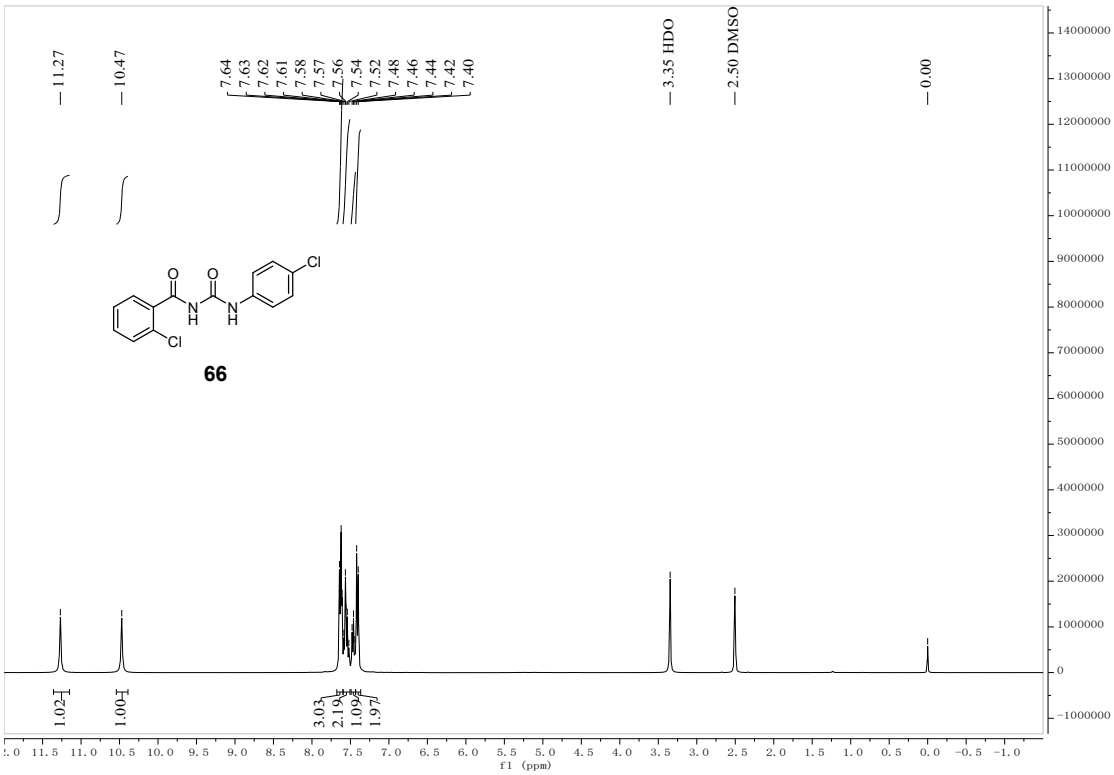
^{13}C NMR of **65**



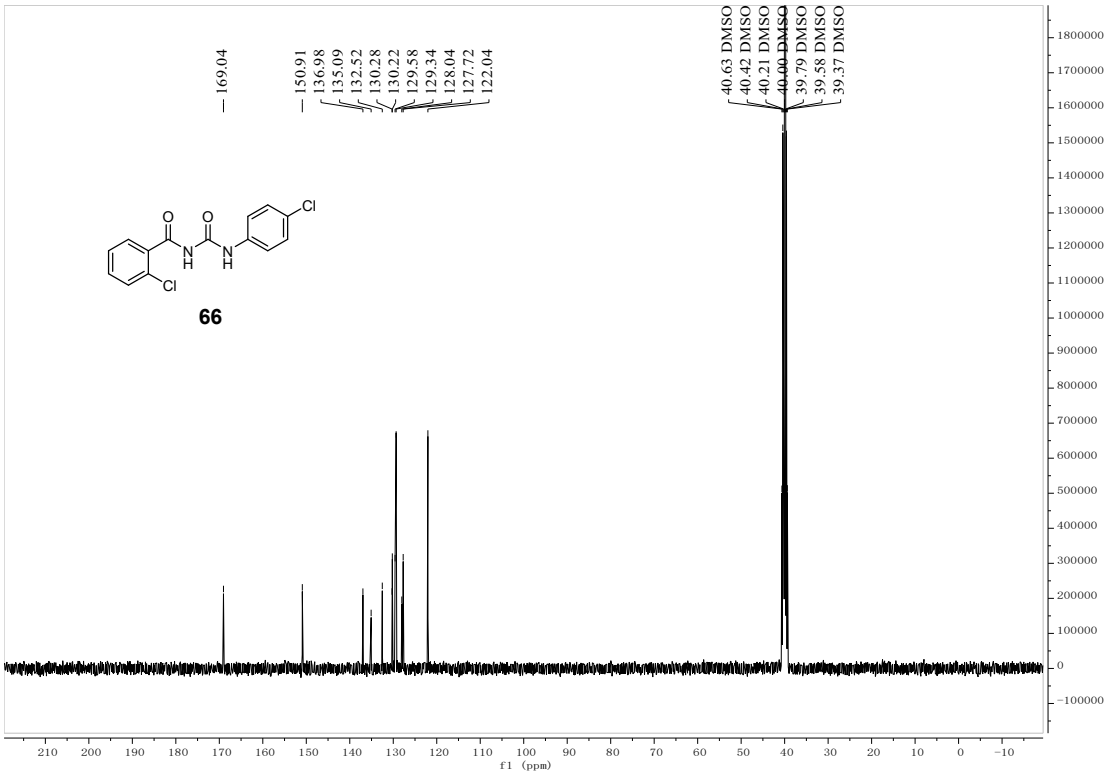
^{19}F NMR of **65**


-113.43
F
O
O
N
H
N
H
Cl
F
65
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
-500000
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)

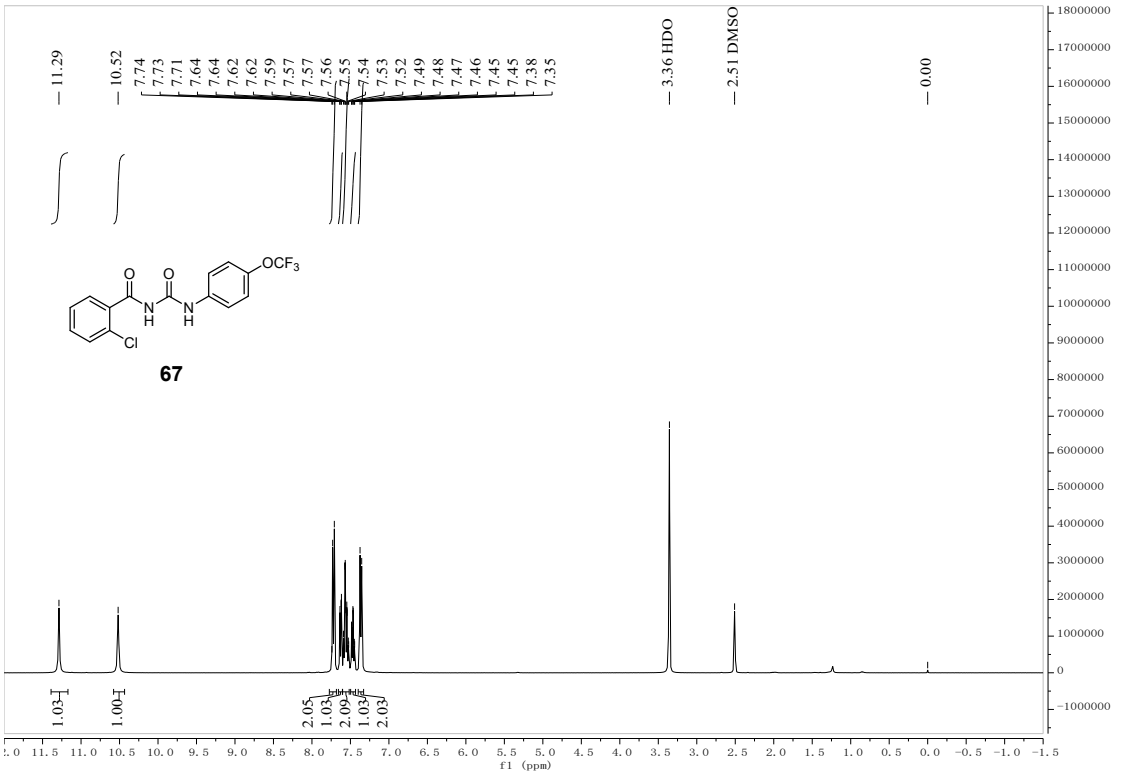
^{1}H NMR of **66**


11.27
10.47
7.64
7.63
7.62
7.61
7.58
7.57
7.56
7.54
7.52
7.48
7.46
7.44
7.42
7.40
3.35 HDO
2.50 DMSO
0.00
O
O
N
H
N
H
Cl
Cl
66
1.02
1.00
3.03
2.19
1.09
1.97
14000000
13000000
12000000
11000000
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
-1000000
11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)

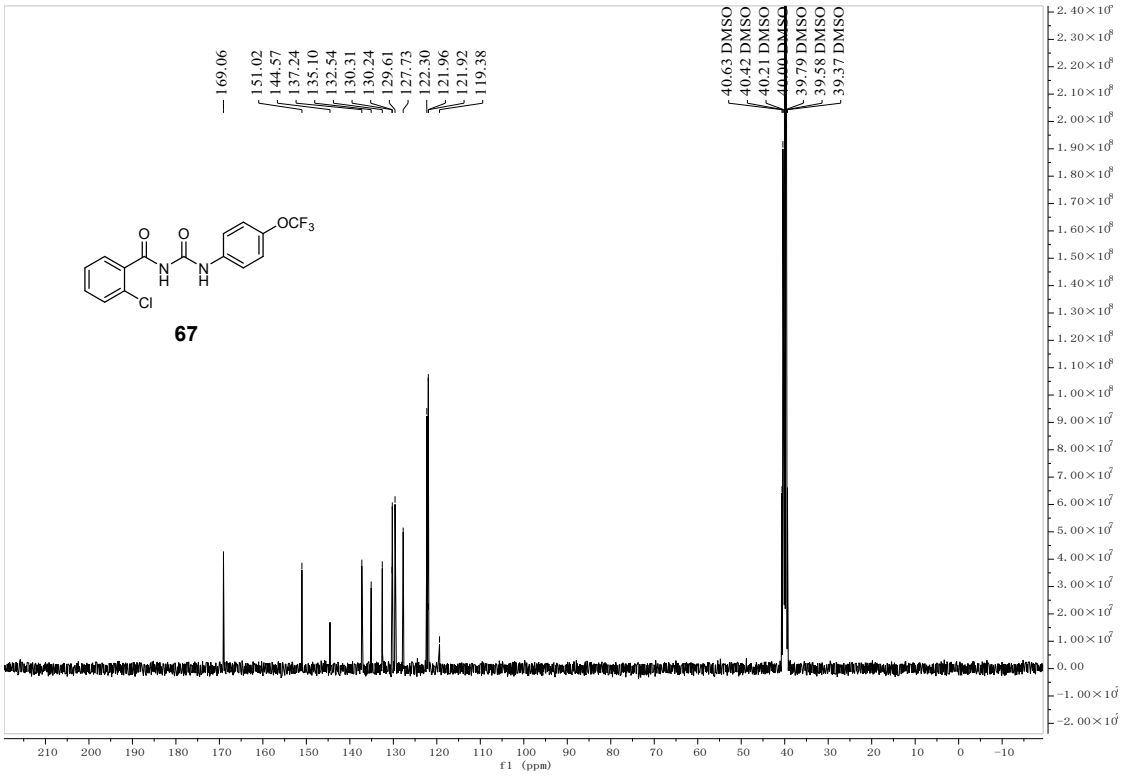
^{13}C NMR of **66**



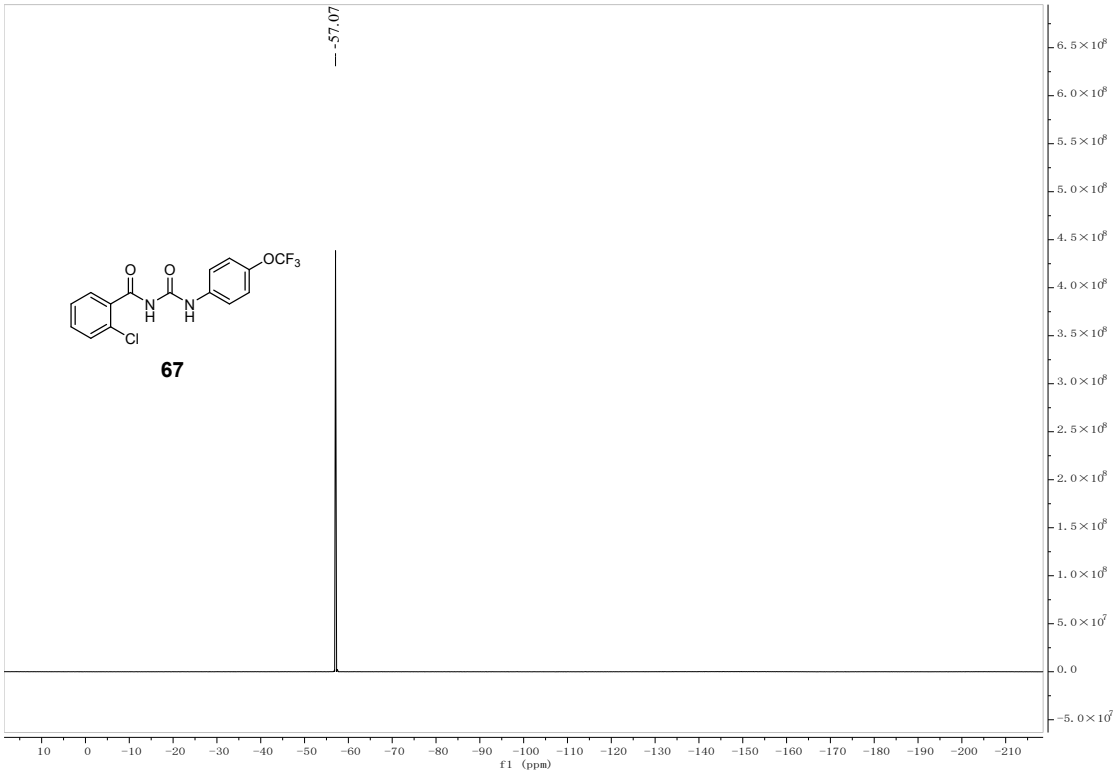
^{1}H NMR of **67**


11.29
10.52
7.74
7.73
7.71
7.64
7.64
7.62
7.62
7.59
7.57
7.57
7.56
7.55
7.54
7.53
7.52
7.49
7.48
7.47
7.46
7.45
7.45
7.38
7.35
3.36 HDO
2.51 DMSO
0.00
OCF3
O
O
N
H
N
H
Cl
67
1.03
1.00
2.05
1.03
2.09
1.03
2.03
f1 (ppm)

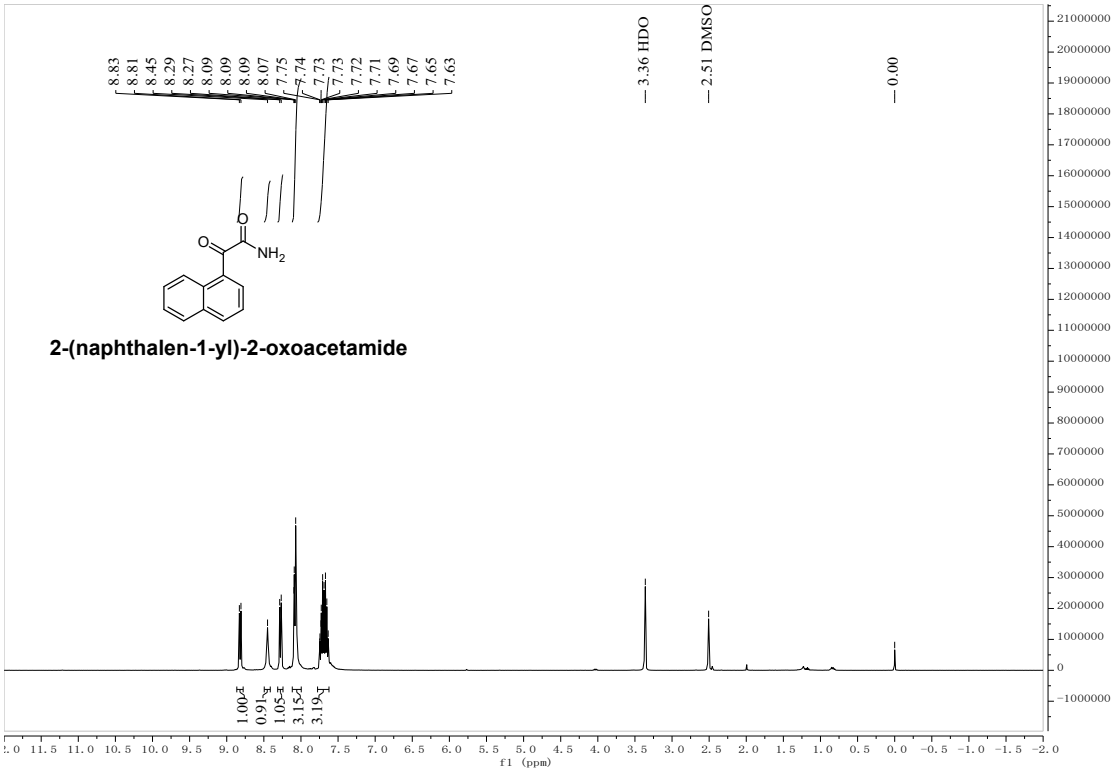
^{13}C NMR of **67**


169.06
151.02
144.57
137.24
135.10
132.54
130.31
130.24
129.61
127.73
122.30
121.96
121.92
119.38
40.63 DMSO
40.42 DMSO
40.21 DMSO
40.00 DMSO
39.79 DMSO
39.58 DMSO
39.37 DMSO
OCF3
O
O
N
H
N
H
Cl
67
f1 (ppm)

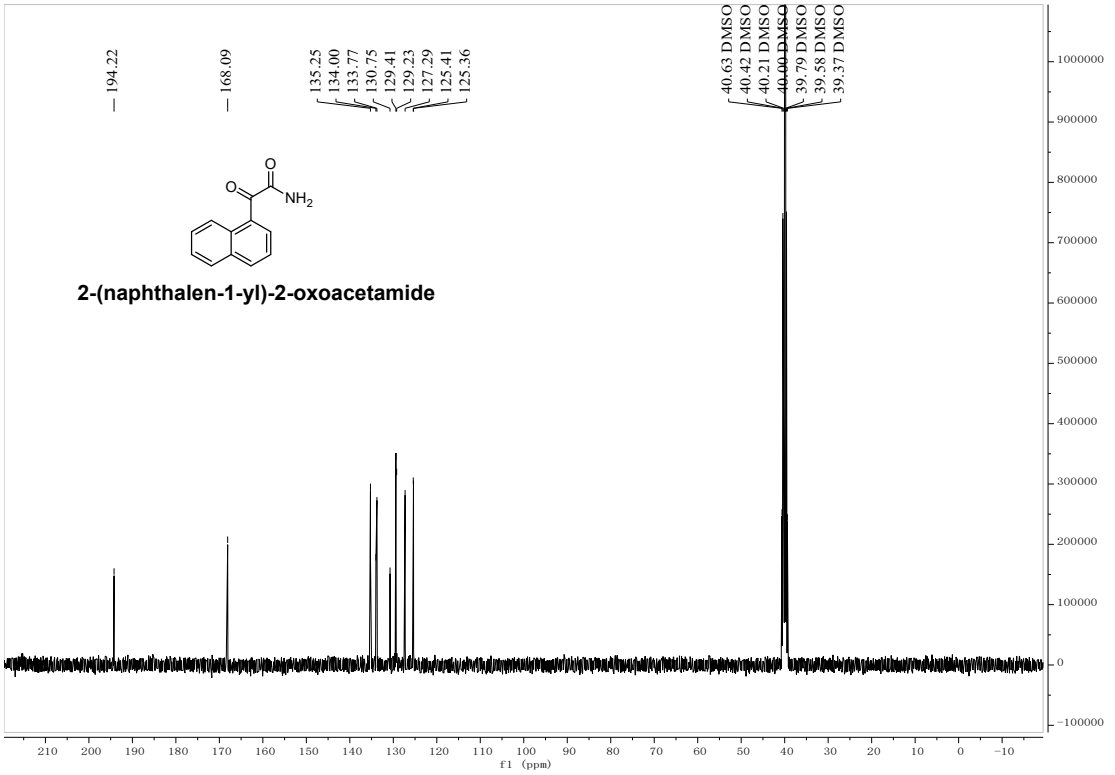
^{19}F NMR of **67**



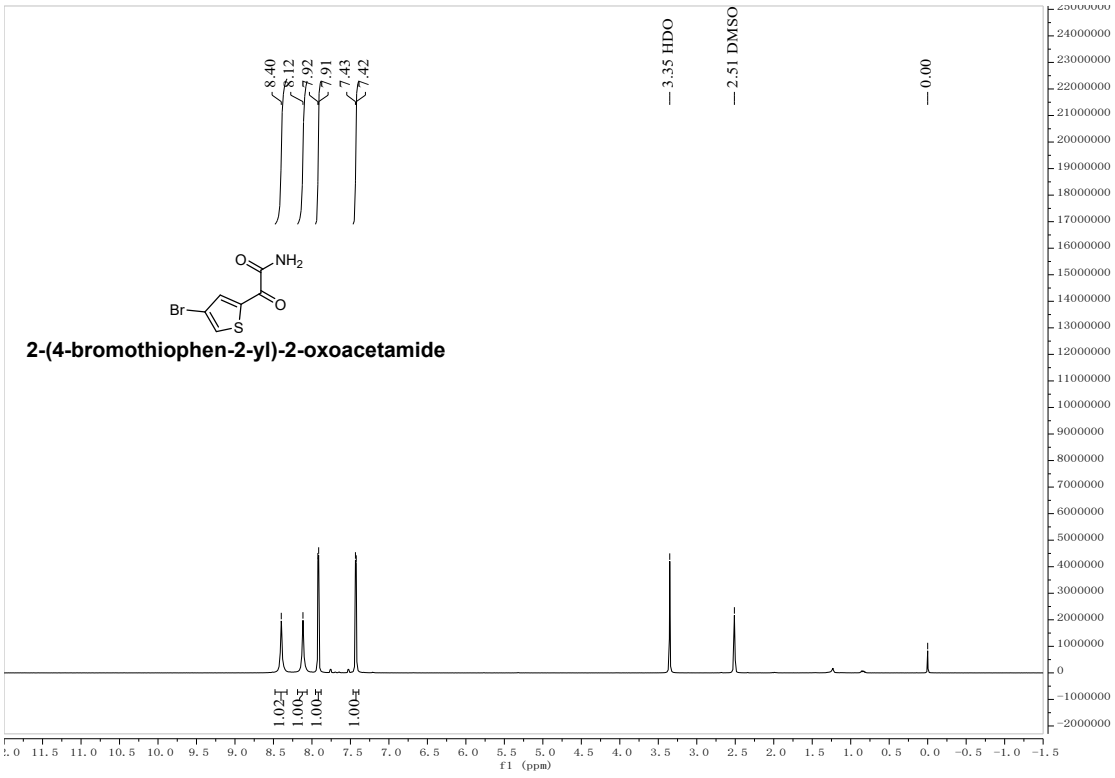
^{1}H NMR of **2-(naphthalen-1-yl)-2-oxoacetamide**



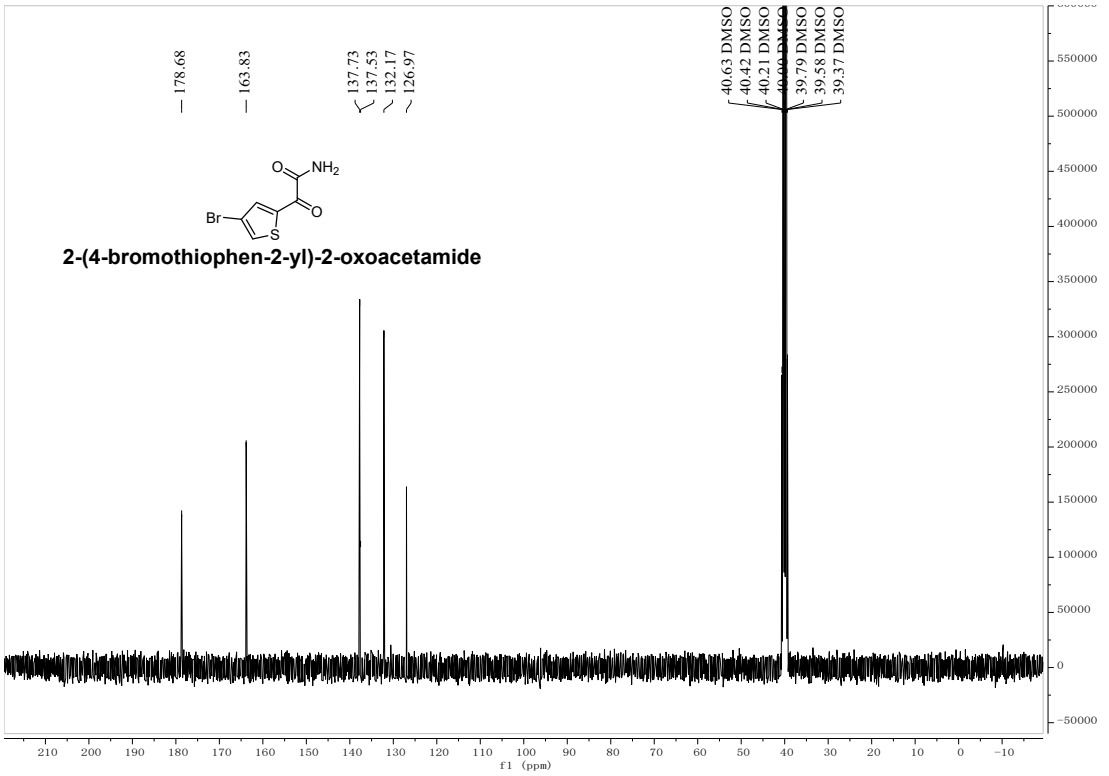
^{13}C NMR of compound **2-(naphthalen-1-yl)-2-oxoacetamide**



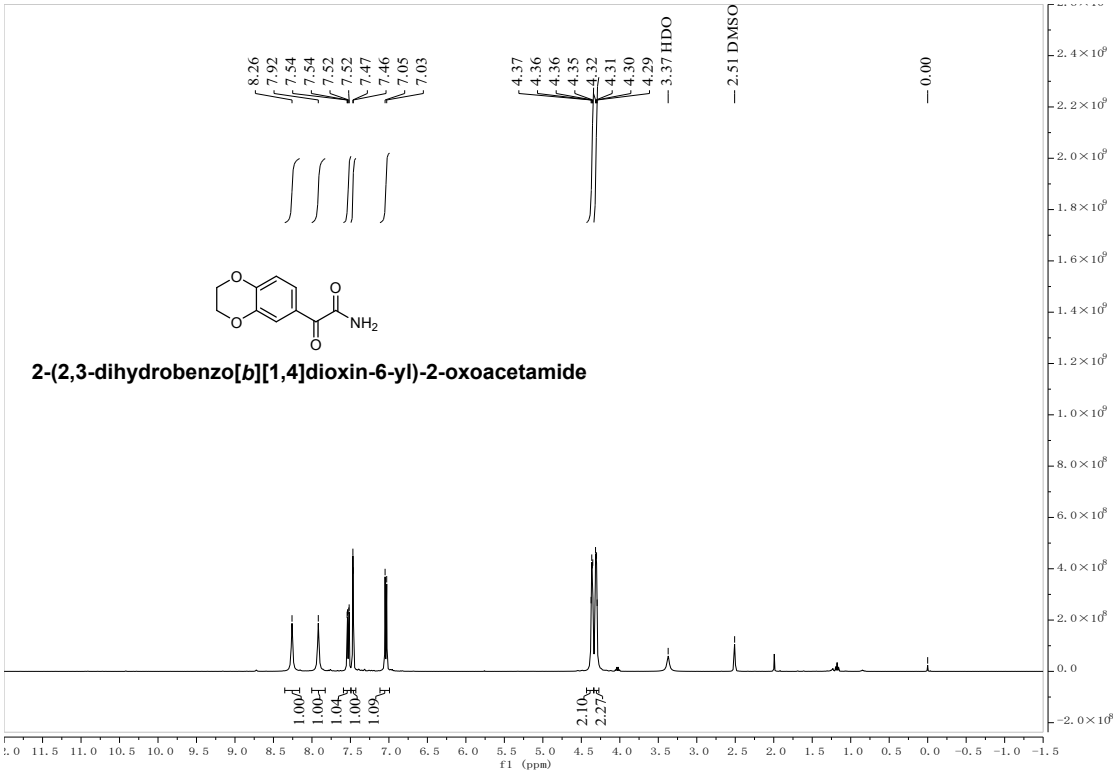
^{1}H NMR of **2-(4-bromothiophen-2-yl)-2-oxoacetamide**



^{13}C NMR of compound **2-(4-bromothiophen-2-yl)-2-oxoacetamide**



^{1}H NMR of **2-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)-2-oxoacetamide**



^{13}C NMR of compound **2-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)-2-oxoacetamide**