Electronic Supplementary Information (ESI)

Nickel-Catalyzed *C*-Alkylation of Thioamide, Amides and Esters by Primary Alcohols through Hydrogen Autotransfer Strategy

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1. General Information

All NMR spectra were acquired on Bruker 400 MHz NMR spectrometers. ^{1}H NMR chemical shifts were recorded relative to TMS (δ 0.00). Multiplicities were given as: s (singlet), d (doublet), t (triplet), q (quartet) and m (multiplet). The number of protons (n) for a given resonance was indicated by nH. Coupling constants were reported as a *J* value in Hz. ^{13}C NMR spectra were obtained at 100 MHz on 400 MHz NMR instruments and chemical shifts were recorded relative to solvent resonance ($CDCl_3$: δ 77.16). ^{19}F NMR spectra were recorded at 376 MHz on 400 MHz NMR spectrometers without any external standard. Proof of purity of new compounds was demonstrated with copies of ^{1}H, ^{13}C, and ^{19}F NMR spectra. High resolution mass spectral analyses (HRMS) were conducted on a Bruck micro-TOF mass spectrometer.

Glassware was dried at 120 °C for at least 3 h before use. Unless noted otherwise, commercially available chemicals were used as received without purification. All anhydrous solvents were stored in Schlenk tubes in the glove box. Flash column chromatography was performed using Qingdao Haiyang Chemical HG/T2354-92 silica gel (200-300 mesh) with the indicated solvent system according to standard techniques.

2. General procedures for the α-alkylation of thioamide, amides and esters.

(A) General procedure for the α-alkylation of thioamides (1 mmol scale). In a nitrogen-filled glove box, an oven dried 10-mL Schlenk tube was charged with $Ni(OAc)_2$ (3.6 mg, 0.02 mmol, 2 mol%), dioxane (1.5 mL), P(*t*-Bu)$_3$ (98.6 μL, 10%wt in toluene, 0.04 mmol, 4 mol%), *t*-BuOK (1.0 mmol, 112.2 mg), alcohol (1 mmol) and thioamide (1.5 mmol). The mixture was vigorously stirred in a preheated oil bath at 80 ℃ for 12 hours. After cooled to room temperature, the reaction mixture was subjected to silica gel column chromatography directly using PE/EA as eluent to give the pure product.

(B) General procedure for the α-alkylation of amides (1 mmol scale). In a nitrogen-filled glove box, an oven dried 10-mL Schlenk tube was charged with $Ni(OAc)_2$ (1.8 mg, 0.01 mmol, 1 mol%), dioxane (1.0 mL), P(*t*-Bu)$_3$ (29.6 μL, 10%wt in toluene, 0.012 mmol, 1.2 mol%), *t*-BuOK (1.0 mmol, 112.2 mg), alcohol (1 mmol) and amide (1.5 mmol). The mixture was vigorously stirred in a preheated oil bath at 80 ℃ for 12 hours. After cooled to room temperature, the reaction mixture was subjected to silica gel column chromatography directly using PE/EA as eluent to give the product.

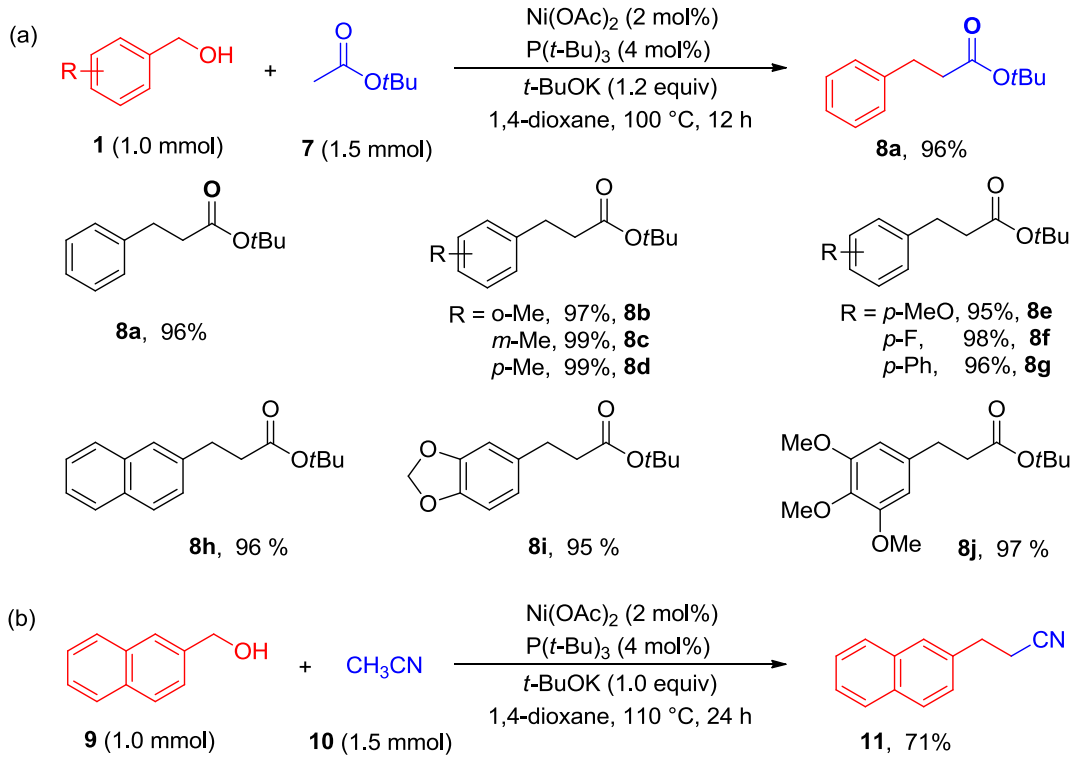
(C) Procedure for the α-alkylation of *N*, *N*-dimethylacetamide with benzyl alcohol on a 100 mmol scale. An oven dried 250 mL round-bottomed flask was fitted with a reflux condenser and a nitrogen balloon is connected to the top of the condenser. $Ni(OAc)_2$ (180.0 mg, 1 mmol, 1 mol %), dry dioxane (120 mL) and P(*t*-Bu)$_3$ (2.96 mL, 10%wt in toluene, 1.2 mmol, 1.2 mol%) were charged into the flask. After stirring at room temperature for 20 min, *t*-BuOK (100.0 mmol, 11.5 g), benzyl alcohol (10.8 g, 100.0 mmol) and *N*, *N*-dimethylacetamide (13.1 g, 150 mmol) was added to the flask. The mixture was vigorously stirred in a preheated oil bath at 100 ℃ for 24 hours. After cooled to room temperature, water (40 mL) and diethyl ether (100 mL) was added to flask. The mixture is transferred to a separatory funnel and the ether layer separated. The water layer is extracted with diethyl ether (2 × 100 mL). The combined organic phases were dried over Na_2SO_4, filtered and evaporated

the solvent, the crude amide product was purified with silica gel chromatography using PE/EA (1/1.5, v/v) as an eluent. 16.3 g of product was obtained in 92% yield.

(D) General procedure for the α-alkylation of esters (1 mmol scale). In a nitrogen-filled glove box, an oven dried 10-mL Schlenk tube was charged with $Ni(OAc)_2$ (3.6 mg, 0.02 mmol, 2 mol%), dioxane (1.5 mL), P(*t*-Bu)$_3$ (98.6 μL, 10%wt in toluene, 0.04 mmol, 4 mol%), *t*-BuOK (1.2 mmol, 134.7 mg), alcohol (1 mmol) and *tert*-butyl acetate (1.5 mmol). The mixture was vigorously stirred in a preheated oil bath at 100 ℃ for 12 hours. After cooled to room temperature, the reaction mixture was subjected to silica gel column chromatography directly using PE/EA as eluent to give the pure product.

(E) Procedure for the α-alkylation of acetonitrile with 2-naphthyl methanol (1 mmol scale)

In a nitrogen-filled glove box, an oven dried 10-mL Schlenk tube was charged with $Ni(OAc)_2$ (3.6 mg, 0.02 mmol, 2 mol%), dioxane (1.0 mL), P(*t*-Bu)$_3$ (98.6 μL, 10%wt in toluene, 0.04 mmol, 4 mol%), *t*-BuOK (1.0 mmol, 112.2 mg), 2-naphthyl methanol (1 mmol) and acetonitrile (1.5 mmol). The mixture was vigorously stirred in a preheated oil bath at 110 ℃ for 24 hours. After cooled to room temperature, the reaction mixture was subjected to silica gel column chromatography directly using PE/EA as eluent to give the pure product.

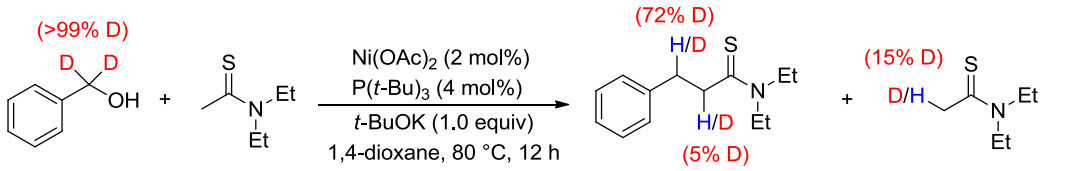


Scheme S1. The α-alkylation of esters and acetonitrile with primary alcohol

3. Deuterium labeling experiments

(a) The reaction of $C_6H_5CD_2OH$ **1a-D2** (1.0 equiv) and N,N-diethyl thioacetamide **2a** (2.0 equiv) was performed using the general procedure (**A**). The deuterium content of **3a-D** and recoverd **2a** was determined by ^{1}H NMR, and the ratio of mono- and di-deuterated product

was determined by HRMS.

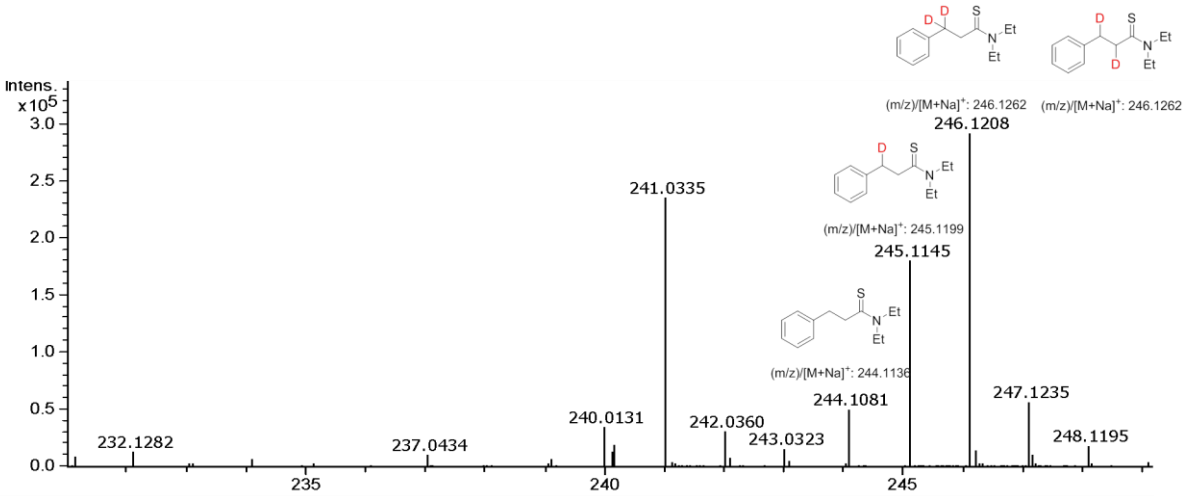


1a-D2 (1.0 equiv) **2a** (2.0 equiv)

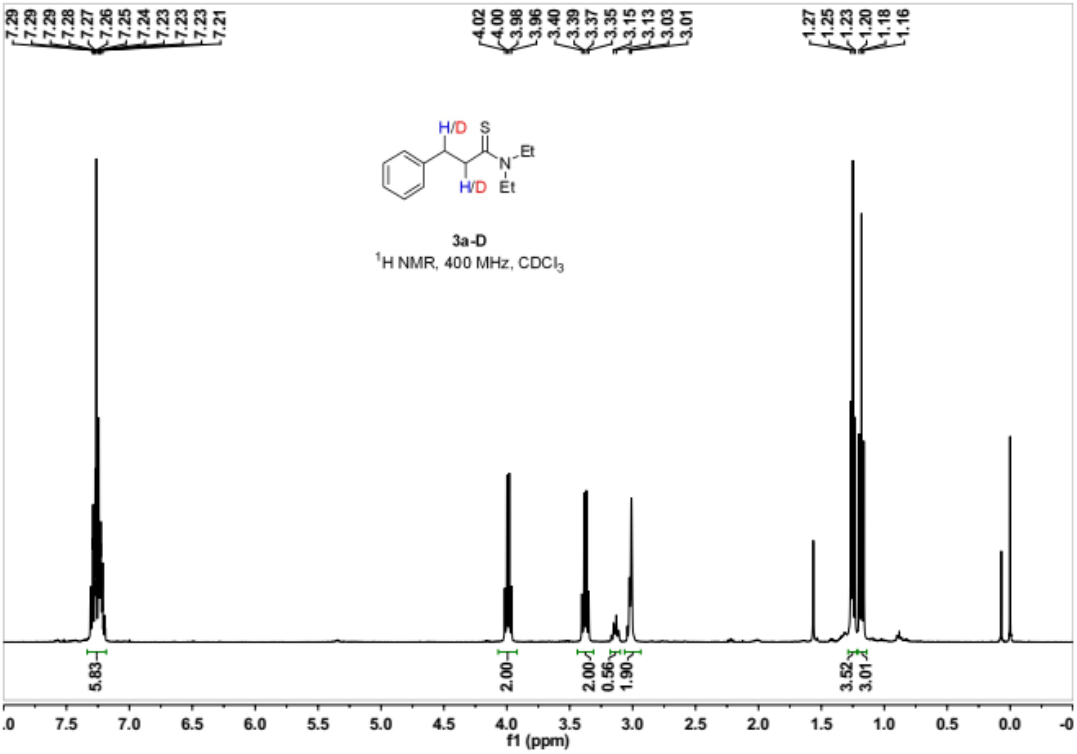
3a-D, 63% yield **2a** 0.8 equiv recovered

3a 10%, **3a-D1** 34%, **3a-D2** 56%

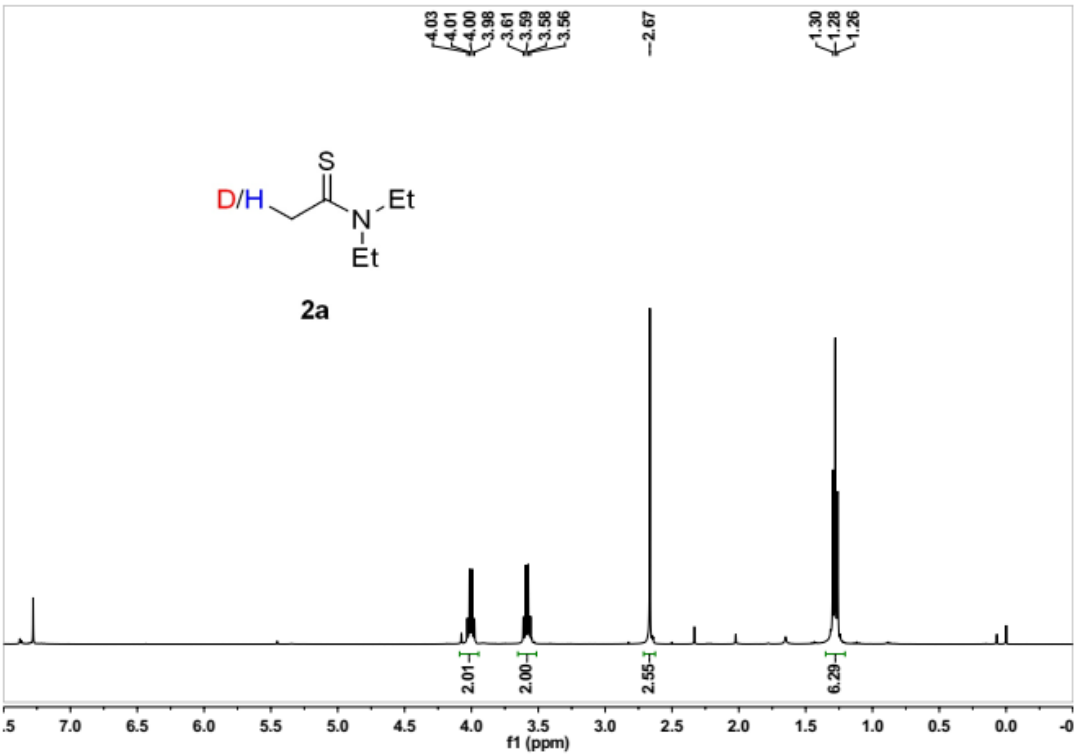
HRMS (ESI) of **3a-D**



^{1}H NMR ($CDCl_3$) of **3a-D**

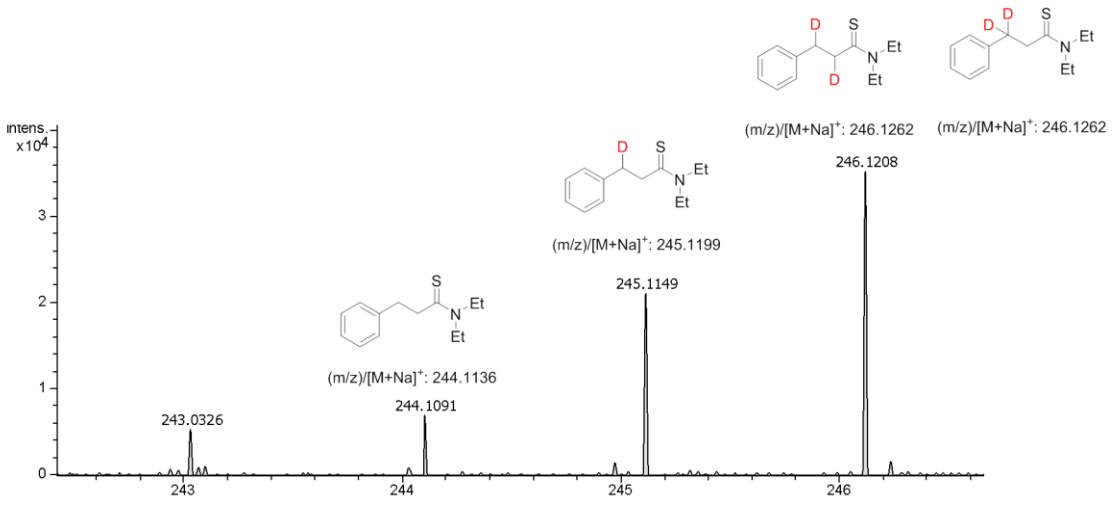


^{1}H NMR ($CDCl_3$) of recoverd **2a**

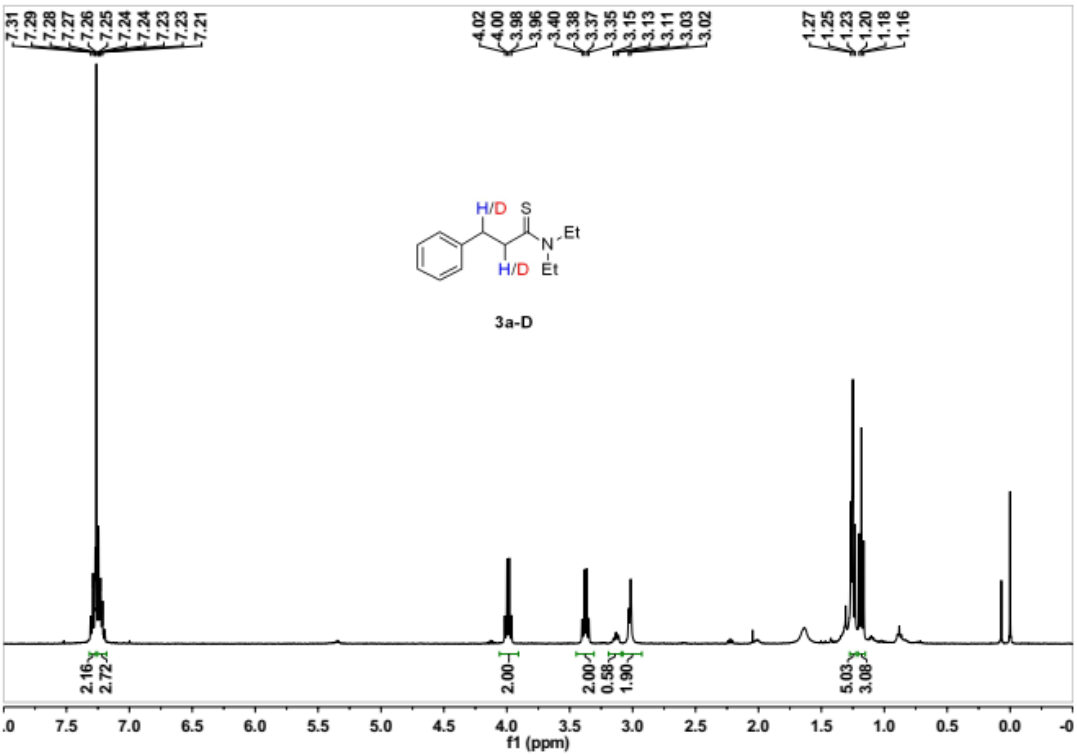


(b) The reaction of $C_6H_5CD_2OH$ **1a-D2** (2.0 equiv) and N,N-diethyl thioacetamide **2a** (1.0 equiv) was performed using the general procedure (**A**). The deuterium content of **3a-D** and recoverd **1a-D2** was determined by ^{1}H NMR, and the ratio of mono- and di-deuterated product was determined by HRMS.

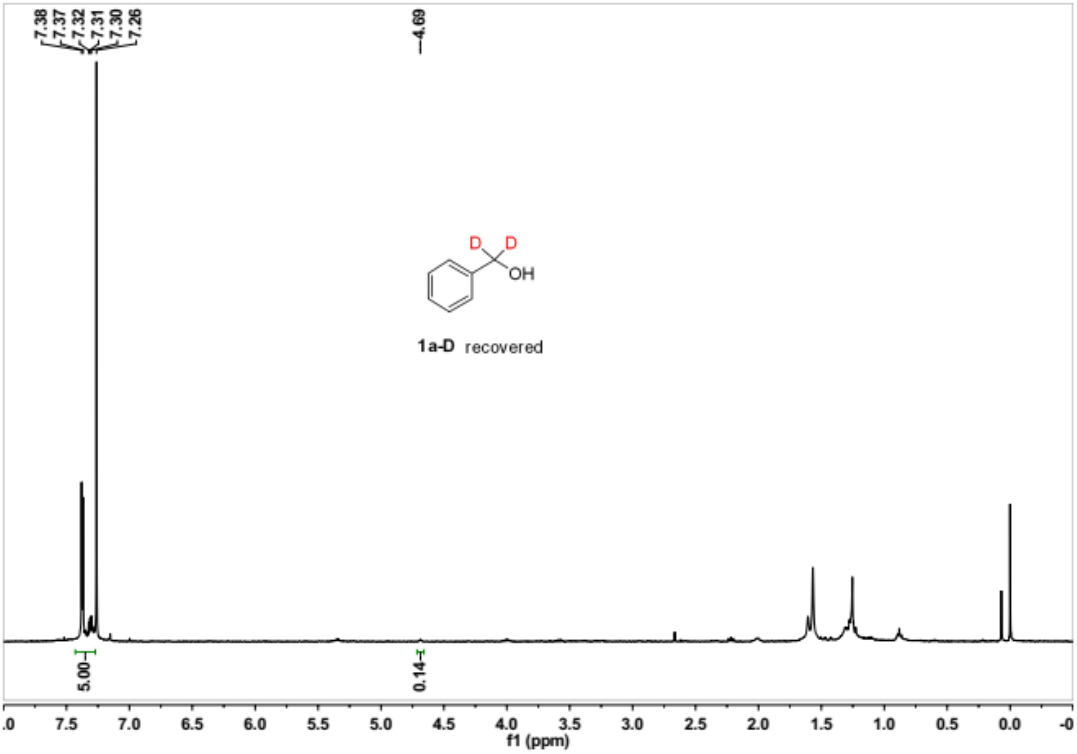
HRMS (ESI) of **3a-D**



^{1}H NMR ($CDCl_3$) of **3a-D**

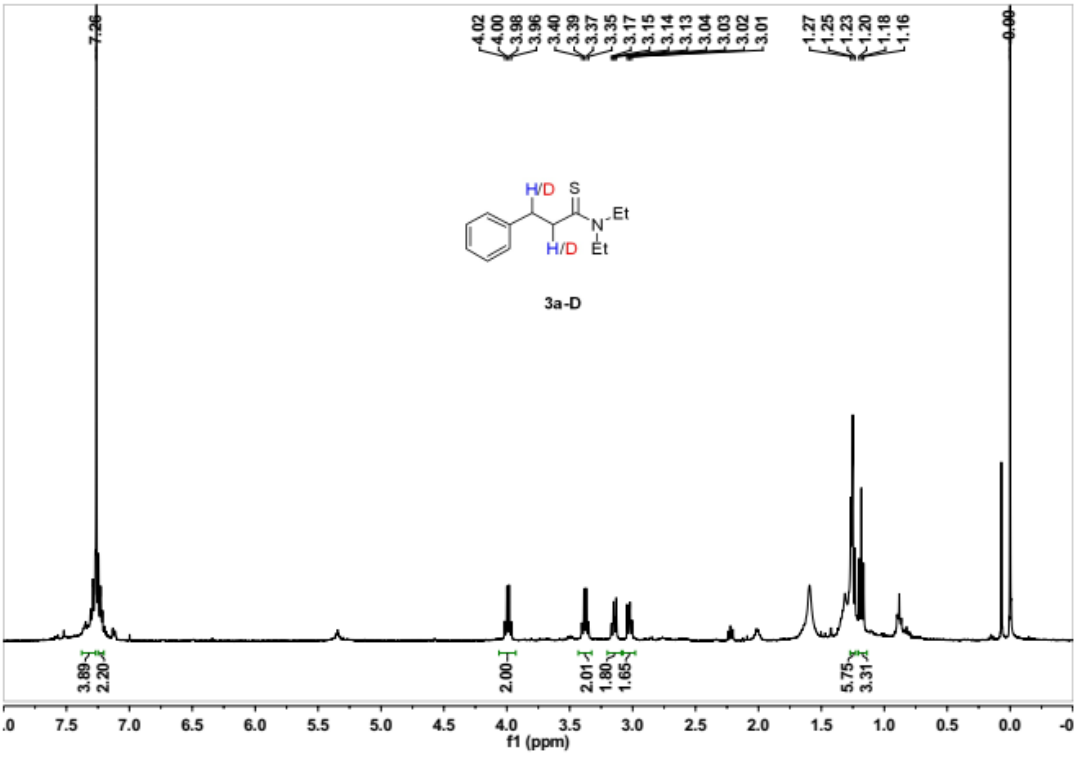


^{1}H NMR ($CDCl_3$) of recoverd **1a-D2**

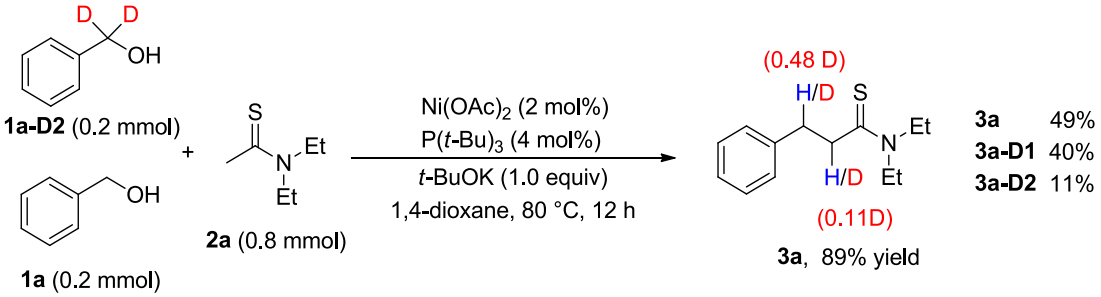


(c) The model reaction with 0.2 equivalent of added *t*-BuOD was performed using the general procedure (**A**). The deuterium content of **3a-D** was determined by ^{1}H NMR, and the ratio of mono- and di-deuterated product was determined by HRMS.

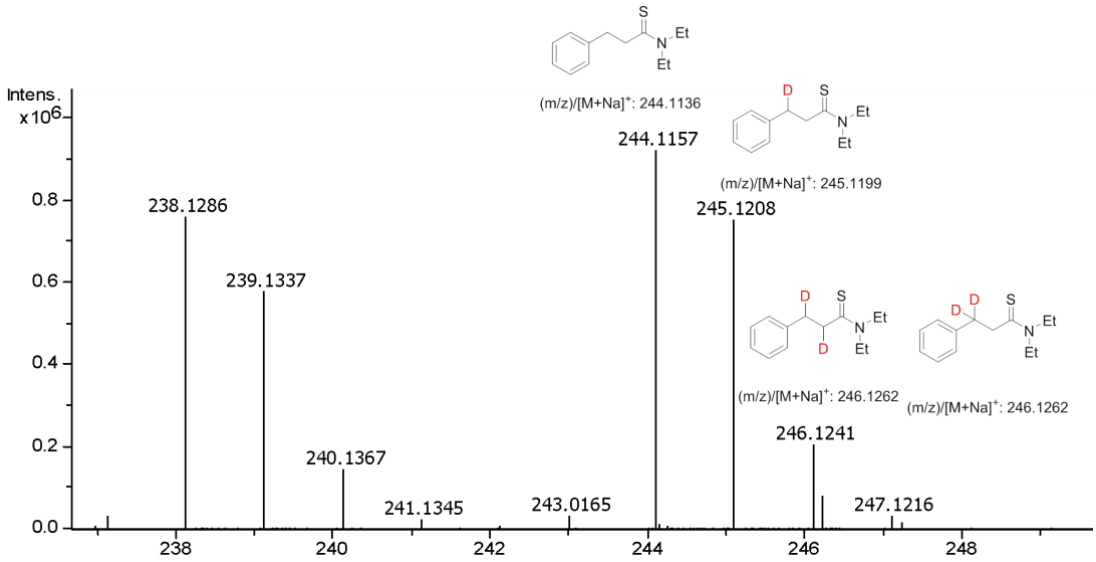
^{1}H NMR ($CDCl_3$) of **3a-D**



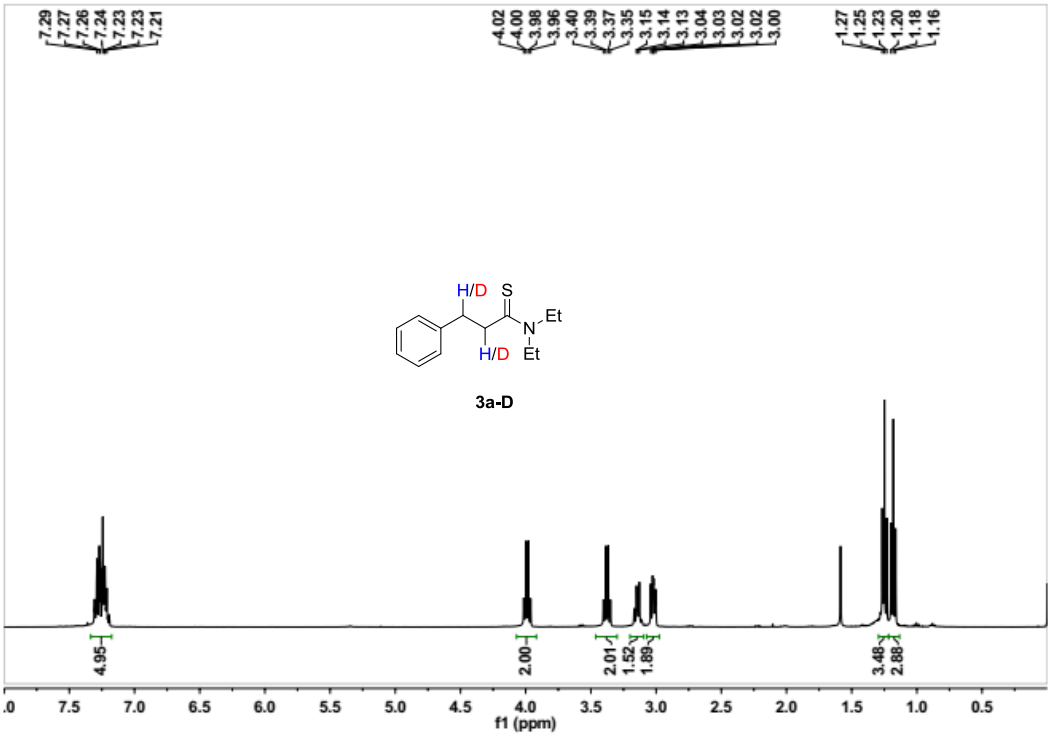
(d) The competition reaction of $C_6H_5CD_2OH$ **1a-D2** and $C_6H_5CH_2OH$ **1a** with N,N-diethyl thioacetamide **2a** was performed using the general procedure (**A**). The deuterium content of **3a-D** was determined by ^{1}H NMR, and the ratio of mono- and di-deuterated product was determined by HRMS.



HRMS (ESI) of **3a-D**

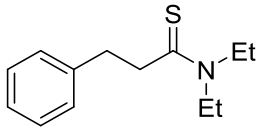


^{1}H NMR ($CDCl_3$) of **3a-D**



4. Analytical data of products

***N,N*-diethyl-3-phenylpropanethioamide (3a) [62785-82-4]**



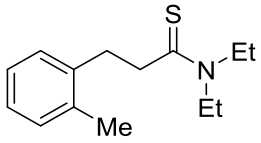
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 207.5 mg (0.94 mmol, 94%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.31-7.26 (m, 2H), 7.25-7.19 (m, 3H), 3.97 (q, *J* = 7.1 Hz, 2H), 3.38 (q, *J* = 7.2 Hz, 2H), 3.17-3.13 (m, 2H), 3.04-3.00 (m, 2H), 1.25 (t, *J* = 7.1 Hz, 3H), 1.18 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =201.8, 140.8, 128.61, 128.60, 126.5, 48.2, 45.9, 44.3, 36.5, 13.6, 11.2.

HRMS (ESI): Calcd for $C_{13}H_{19}NSNa$: $[M+Na]^+$: 244.1136; found: 244.1143.

***N*,*N*-diethyl-3-(*o*-tolyl)propanethioamide (3b)**



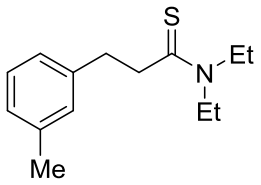
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 225.4 mg (0.96 mmol, 96%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.18-7.11 (m, 4H), 4.00 (q, *J* = 7.1 Hz, 2H), 3.42 (q, *J* = 7.2 Hz, 2H), 3.15-3.11 (m, 2H), 2.99-2.95 (m, 2H), 2.37 (s, 3H), 1.27 (t, *J* = 7.1 Hz, 3H), 1.21 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =202.1, 139.1, 136.1, 130.5, 129.2, 126.7, 126.2, 48.2, 45.9, 43.0, 33.9, 19.5, 13.7, 11.3.

HRMS (ESI): Calcd for $C_{14}H_{22}NS$: $[M+H]^+$: 236.1473; found: 236.1482.

***N*,*N*-diethyl-3-(m-tolyl)propanethioamide (3c)**



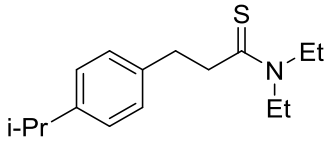
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 216.1 mg (0.92 mmol, 92%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.17 (t, *J* = 7.4 Hz, 1H), 7.05-7.01 (m, 3H), 3.98 (q, *J* = 7.1 Hz, 2H), 3.38 (q, *J* = 7.2 Hz, 2H), 3.12-3.07 (m, 2H), 3.03-2.98 (m, 2H), 2.32 (s, 3H), 1.25 (t, *J* = 7.1 Hz, 3H), 1.18 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 201.9, 140.7, 138.2, 129.4, 109.1, 108.4, 101.0, 48.2, 46.0, 44.5, 36.3, 13.7, 11.3.

HRMS (ESI): Calcd for $C_{14}H_{21}NSNa$: $[M+Na]^+$: 258.1293; found: 258.1355.

***N*,*N*-diethyl-3-(4-isopropylphenyl)propanethioamide (3d)**



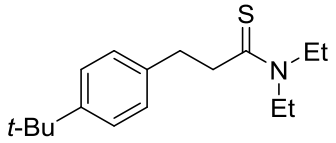
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 244.5 mg (0.93 mmol, 93%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.18-7.10 (m, 4H), 3.99 (q, *J* = 7.1 Hz, 2H), 3.40 (q, *J* = 7.2 Hz, 2H), 3.12-3.07 (m, 2H), 3.04-2.99 (m, 2H), 2.93-2.84 (m, 1H), 1.26-1.22 (m, 9H), 1.18 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 202.0, 147.1, 138.1, 128.5, 126.6, 48.1, 45.9, 44.5, 36.1, 33.8, 24.2, 13.6, 11.3.

HRMS (ESI): Calcd for $C_{16}H_{25}NSNa$: $[M+Na]^+$: 286.1606; found: 286.1648.

3-(4-(tert-butyl)phenyl)-*N*,*N*-diethylpropanethioamide (3e)



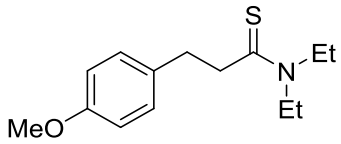
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 259.6 mg (0.96 mmol, 96%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.33-7.29 (m, 2H), 7.19-7.15 (m, 2H), 3.99 (q, *J* = 7.1 Hz, 2H), 3.41 (q, *J* = 7.2 Hz, 2H), 3.13-3.08 (m, 2H), 3.04-2.99 (m, 2H), 1.31 (s, 9H), 1.25 (t, *J* = 7.1 Hz, 3H), 1.18 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 202.0, 149.4, 137.7, 128.3, 125.5, 48.1, 45.9, 44.4, 35.9, 34.5, 31.5, 13.6, 11.2.

HRMS (ESI): Calcd for $C_{17}H_{27}NSNa$: $[M+Na]^+$: 300.1762; found: 300.1823.

***N*,*N*-diethyl-3-(4-methoxyphenyl)propanethioamide (3f)**



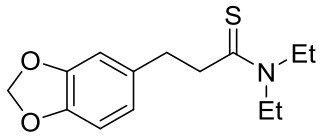
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 238.3 mg (0.95 mmol, 95%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.16-7.14 (m, 2H), 6.84-6.80 (m, 2H), 3.98 (q, *J* = 7.1 Hz, 2H), 3.78 (s, 3H), 3.37 (q, *J* = 7.2 Hz, 2H), 3.11-3.05 (m, 2H), 3.01-2.97 (m, 2H), 1.24 (t, *J* = 7.1 Hz, 3H), 1.18 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 201.9, 158.3, 132.8, 129.6, 114.0, 55.4, 48.1, 45.9, 44.6, 35.6, 13.6, 11.2.

HRMS (ESI): Calcd for $C_{14}H_{22}NOSNa$: $[M+Na]^+$: 252.1422; found: 252.1491.

3-(benzo[d][1,3]dioxol-5-yl)-*N*,*N*-diethylpropanethioamide (3g)



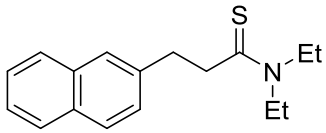
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 249.1 mg (0.94 mmol, 94%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.74-6.72 (m, 2H), 6.69-6.67 (m, 1H), 5.92 (s, 2H), 4.00 (q, *J* = 7.1 Hz, 2H), 3.40 (q, *J* = 7.2 Hz, 2H), 3.09-3.05 (m, 2H), 2.99-2.95 (m, 2H), 1.25 (t, *J* = 7.1 Hz, 3H), 1.19 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 201.8, 147.7, 146.2, 134.6, 121.5, 109.1, 108.4, 101.0, 48.2, 46.0, 44.5, 36.3, 13.7, 11.3.

HRMS (ESI): Calcd for $C_{17}H_{22}NSNa$: $[M+Na]^+$: 266.1214; found: 266.1267.

***N*,*N*-diethyl-3-(naphthalen-2-yl)propanethioamide (3h)**



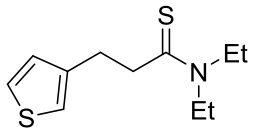
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 252.0 mg (0.93 mmol, 93%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.82-7.76 (m, 3H), 7.68-7.67 (m, 1H), 7.48-7.41 (m, 2H), 7.38 (dd, *J* = 8.4, 1.8 Hz, 1H), 3.99 (q, *J* = 7.1 Hz, 2H), 3.37-3.30 (m, 4H), 3.13-3.09 (m, 2H), 1.24 (t, *J* = 7.1 Hz, 3H), 1.17 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 201.8, 138.3, 133.6, 132.3, 128.3, 127.8, 127.6, 127.3, 126.8, 126.2, 125.6, 48.2, 46.0, 44.3, 36.7, 13.6, 11.3.

HRMS (ESI): Calcd for $C_{17}H_{22}NSNa$: $[M+Na]^+$: 272.1473; found: 272.1499.

***N, N*-diethyl-3-(thiophen-3-yl)propanethioamide (3i)**



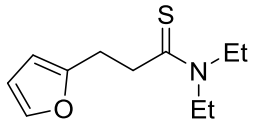
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 203.9 mg (0.90 mmol, 90%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.25-7.24 (m, 1H), 7.01-7.00 (m, 1H), 6.97 (dd, *J* = 4.9, 0.9 Hz, 1H), 3.98 (q, *J* = 7.1 Hz, 2H), 3.39 (q, *J* = 7.2 Hz, 2H), 3.20-3.16 (m, 2H), 3.03-2.99 (m, 2H), 1.25 (t, *J* = 7.1 Hz, 3H), 1.18 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 201.8, 141.0, 128.3, 125.7, 121.0, 48.2, 45.9, 43.3, 30.8, 13.6, 11.3.

HRMS (ESI): Calcd for $C_{11}H_{17}NS_2Na$: $[M+Na]^+$: 250.0700; found: 250.0717.

***N*,*N*-diethyl-3-(furan-2-yl)propanethioamide (3j)**



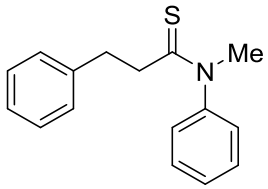
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 189.9 mg (0.91 mmol, 91%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.30-7.29 (m, 1H), 6.27 (dd, *J* = 3.1, 1.8 Hz, 1H), 6.05-6.04 (m, 1H), 3.98 (q, *J* = 7.1 Hz, 2H), 3.44 (q, *J* = 7.2 Hz, 2H), 3.19-3.16 (m, 2H), 3.05-3.01 (m, 2H), 1.25-1.24 (m, 3H), 1.22-1.20 (m, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 201.3, 154.3, 141.3, 110.5, 106.1, 48.2, 45.9, 40.8, 28.7, 13.7, 11.2.

HRMS (ESI): Calcd for $C_{11}H_{17}NOSNa$: $[M+Na]^+$: 234.0929; found: 234.0939.

***N*-methyl-*N*,3-diphenylpropanethioamide (3k)**



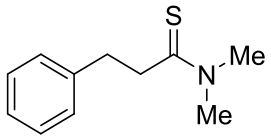
Purification by column chromatography (silica gel, PE/EA, 5:1). Yield: 219.1 mg (0.86 mmol, 86%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.44-7.35 (m, 3H), 7.22-7.15 (m, 3H), 7.00-6.94 (m, 4H), 3.71 (s, 3H), 3.05 (t, *J* = 7.9 Hz, 3H), 2.78 (t, *J* = 7.9 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 205.0, 145.6, 140.8, 130.1, 128.6, 128.5, 126.3, 125.7, 46.0, 45.7, 36.6.

HRMS (ESI): Calcd for $C_{16}H_{17}NSNa$: $[M+Na]^+$: 278.0980; found: 278.0983.

***N*,*N*-dimethyl-3-phenylpropanethioamide (3l) [22191-61-3]**



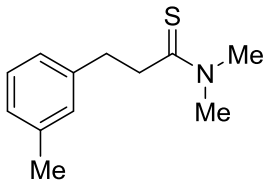
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 179.3 mg (0.93 mmol, 93%) yellow colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.31-7.27 (m, 2H), 7.24-7.21 (m, 3H), 3.45 (s, 3H), 3.14 (s, 3H), 3.13-3.10 (m, 2H), 3.08-3.04 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 203.3, 140.8, 128.7, 128.6, 126.5, 45.0, 44.7, 41.6, 35.8.

HRMS (ESI): Calcd for $C_{11}H_{15}NSNa$: $[M+Na]^+$: 216.0823; found: 216.0801.

***N*,*N*-dimethyl-3-(m-tolyl)propanethioamide (3m) [2408447-43-6]**



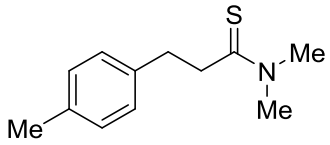
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 190.3 mg (0.92 mmol, 92 %) yellow colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.18 (t, *J* = 7.6 Hz, 1H), 7.05-7.02 (m, 3H), 3.49 (s, 3H), 3.16 (s, 3H), 3.09-3.05 (m, 4H), 2.33 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 203.4, 140.7, 138.3, 129.4, 128.6, 127.3, 125.6, 45.2, 44.8, 41.7, 35.7, 21.5.

HRMS (ESI): Calcd for $C_{12}H_{17}NSNa$: $[M+Na]^+$: 230.0980; found: 230.0975.

***N,N*-dimethyl-3-(*p*-tolyl)propanethioamide (3n) [409110-63-0]**



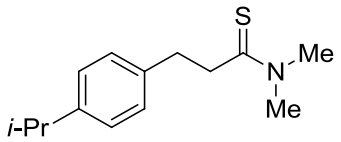
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 190.1 mg (0.92 mmol, 92%) yellow colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.13-7.08 (m, 4H), 3.48 (s, 3H), 3.15 (s, 3H), 3.10-3.01 (m, 4H), 2.32(s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 203.4, 137.7, 136.0, 129.3, 128.4, 45.2, 44.7, 41.7, 35.4, 21.1.

HRMS (ESI): Calcd for $C_{12}H_{17}NSNa$: $[M+Na]^+$: 230.0980; found: 230.0965.

***N,N*-dimethyl-3-(*p*-isopropylphenyl)propanethioamide (3o)**



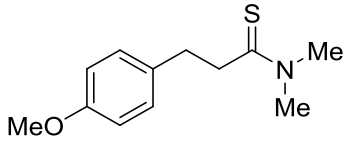
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 216.1 mg (0.92 mmol, 92 %) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.15 (m, 4H), 3.49 (s, 3H), 3.16 (s, 3H), 3.09-3.05 (m, 4H), 2.92-2.85 (m, 1H), 1.24 (d, *J* = 6.9 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =203.5, 147.2, 138.1, 128.5, 126.7, 45.2, 44.8, 41.7, 35.4, 33.9, 24.2.

HRMS (ESI): Calcd for $C_{14}H_{21}NSNa$: $[M+Na]^+$: 258.1293; found: 258.1287.

***N,N*-dimethyl-3-(4-methoxyphenyl)propanethioamide (3p) [22191-62-4]**



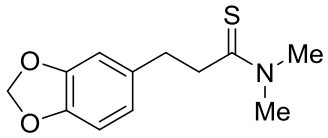
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 211.6 mg (0.95 mmol, 95 %) colorless yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.16-7.12 (m, 2H), 6.84-6.82 (m, 2H), 3.79 (s, 3H), 3.47 (s, 3H), 3.13 (s, 3H), 3.07-3.03 (m, 4H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =203.4, 158.3, 132.8, 129.5, 114.0, 55.4, 45.3, 44.7, 41.7, 35.0.

HRMS (ESI): Calcd for $C_{12}H_{17}NOSNa$: $[M+Na]^+$: 246.0929; found: 246.0923.

***N,N*-dimethyl-3-(benzo[d][1,3]dioxol-5-yl)propanethioamide (3q)**



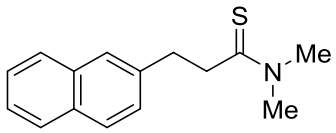
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 222.6 mg (0.94 mmol, 94%) yellow colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.74-6.66 (m, 3H), 5.92 (s, 3H), 3.48 (s, 3H), 3.17 (s, 3H), 3.05-3.00 (m, 4H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =203.2, 147.8, 146.2, 134.6, 121.4, 109.0, 108.4, 101.0, 45.2, 44.8, 41.7, 35.5.

HRMS (ESI): Calcd for $C_{12}H_{15}NO_2SNa$: $[M+Na]^+$: 260.0721; found: 260.0692.

***N,N*-dimethyl-3-(naphthalen-2-yl)propanethioamide (3r)**



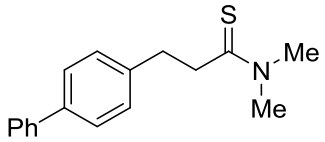
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 225.7 mg (0.93 mmol, 93%) yellow colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.82-7.77 (m, 3H), 7.68-7.67 (m, 1H), 7.48-7.42 (m, 2H), 7.37 (dd, *J* = 8.4, 1.8 Hz, 1H), 3.49 (s, 3H), 3.31-3.27 (m, 2H), 3.17-3.13 (m, 5H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 203.3, 138.3, 133.7, 128.3, 127.8, 127.6, 127.2, 126.7, 126.2, 125.6, 45.0, 44.8, 41.7, 36.0.

HRMS (ESI): Calcd for $C_{15}H_{17}NSNa$: $[M+Na]^+$: 266.0980; found: 266.0958.

***N,N*-dimethyl-3-([1,1'-biphenyl]-4-yl)propanethioamide (3s) [2408447-50-5]**



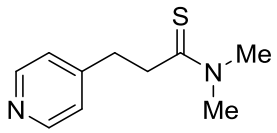
Purification by column chromatography (silica gel, PE/EA, 3:1). Yield: 255.4 mg (0.95 mmol, 95%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.59-7.57 (m, 2H), 7.54-7.52 (m, 2H), 7.45-7.41 (m, 2H), 7.36-7.33 (m, 1H), 7.32-7.30 (m, 2H), 3.50 (s, 3H), 3.19 (s, 3H), 3.18-3.15 (m, 2H), 3.12-3.07 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 203.3, 141.0, 140.0, 139.5, 129.0, 128.9, 127.4, 127.3, 127.1, 45.0, 44.8, 41.7, 35.4.

HRMS (ESI): Calcd for $C_{17}H_{19}NSNa$: $[M+Na]^+$: 292.1136; found: 292.1117.

***N,N*-dimethyl-3-(pyridin-4-yl)propanethioamide (3t)**



Purification by column chromatography (silica gel, CH_2Cl_2/MeOH, 20:1). Yield: 156.8 mg

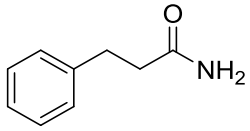
(0.81 mmol, 81%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.50 (d, *J* = 4.7 Hz, 2H), 7.17 (d, *J* = 4.7 Hz, 2H), 3.48 (s, 3H), 3.21 (s, 3H), 3.16-3.12 (m, 2H), 3.03-2.99 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =202.1, 150.0, 149.8, 124.0, 44.9, 42.9, 41.7, 34.8.

HRMS (ESI): Calcd for $C_{10}H_{15}N_2S$: $[M+H]^+$: 195.0956; found: 195.0958.

3-Phenylpropanamide (5a) [102-93-2]



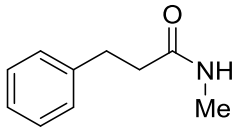
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 141.3 mg (0.95 mmol, 95%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.32-7.28 (m, 2H), 7.23-7.19 (m, 3H), 5.48 (s, 1H), 5.35 (s, 1H), 2.97 (t, *J* = 7.7 Hz, 2H), 2.53 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =174.6, 140.8, 128.7, 128.5, 126.5, 37.7, 31.5.

HRMS (ESI): Calcd for $C_9H_{11}NONa$: $[M+Na]^+$: 172.0739; found: 172.0739.

***N*-methyl-3-phenylpropanamide (5b) [940-43-2]**



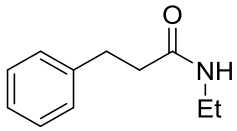
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 153.1 mg (0.94 mmol, 94%) pale yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.30-7.28 (m, 2H), 7.21-7.18 (m, 3H), 5.54 (s, 1H), 2.96 (t, *J* = 7.8 Hz, 2H), 2.76 (d, *J* = 4.9 Hz, 3H), 2.46 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.9, 141.0, 128.6, 128.4, 126.3, 38.5, 31.9, 26.4.

HRMS (ESI): Calcd for $C_{10}H_{13}NONa$: $[M+Na]^+$: 186.0895; found: 186.0904.

***N*-ethyl-3-phenylpropanamide (5c) [81256-39-5]**



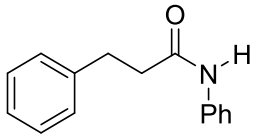
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield:168.1 mg (0.95 mmol, 95%) pale yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.31-7.28 (m, 3H), 7.24-7.18 (m, 2H), 5.38 (s, 1H), 3.26-3.23 (m, 2H), 2.96 (t, *J* = 7.7 Hz, 2H), 2.44 (t, *J* = 7.6 Hz, 2H), 1.06 (t, *J* = 7.3 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.0, 141.1, 128.6, 128.5, 126.3, 38.7, 34.5, 31.9, 14.9.

HRMS (ESI): Calcd for $C_{11}H_{15}NONa$: $[M+Na]^+$: 200.1052; found: 200.1067.

***N*,3-diphenylpropanamide (5d) [3271-81-6]**



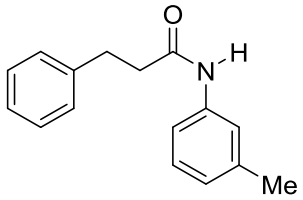
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 215.8 mg (0.96 mmol, 96%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.43 (d, *J* = 7.9 Hz, 2H), 7.32-7.27 (m, 4H), 7.25-7.20 (m, 3H), 7.11-7.07 (m, 2H), 3.05 (t, *J* = 7.6 Hz, 2H), 2.66 (t, *J* = 7.6 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.5, 140.8, 137.9, 129.1, 128.8, 128.5, 126.5, 124.4, 120.0, 39.6, 31.7.

HRMS (ESI): Calcd for $C_{15}H_{15}NONa$: $[M+Na]^+$: 248.1052; found: 248.1013.

***N*-(*m*-tolyl)-3-phenylpropenamide (5e) [299928-02-2]**



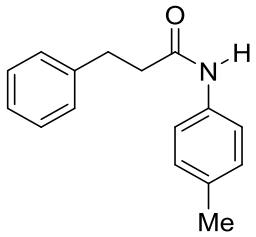
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 231.6 mg (0.97 mmol, 97%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.32-7.28 (m, 4H), 7.23-7.17 (m, 5H), 6.91 (d, *J* = 7.3 Hz, 1H), 3.04 (t, *J* = 7.6 Hz, 2H), 2.65 (t, *J* = 7.7 Hz, 2H), 2.31 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =170.6, 140.8, 139.0, 137.8, 128.8, 128.7, 128.5, 126.4, 125.2, 120.8, 117.2, 39.5, 31.7, 21.5.

HRMS (ESI): Calcd for $C_{16}H_{17}NONa$: $[M+Na]^+$: 262.1208; found: 262.1208.

***N*-(*p*-tolyl)-3-phenylpropenamide (5f) [71231-25-9]**



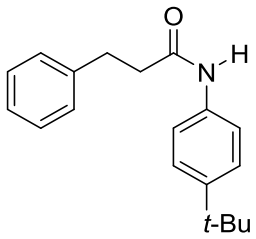
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 231.4 mg (0.97 mmol, 97%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.32-7.28 (m, 4H), 7.24-7.22 (m, 3H), 7.10-7.08 (m, 3H) , 3.05 (t, *J* = 7.6 Hz, 2H), 2.64 (t, *J* = 7.6 Hz, 2H), 2.30 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.4, 140.8, 135.3, 134.1, 129.6, 128.8, 128.5, 126.4, 120.2, 39.6, 31.2, 21.0.

HRMS (ESI): Calcd for $C_{16}H_{17}NONa$: $[M+Na]^+$: 262.1208; found: 262.1172.

***N*-(4-(tert-butyl)phenyl)-3-phenylpropanamide (5g) [1984971-21-2]**



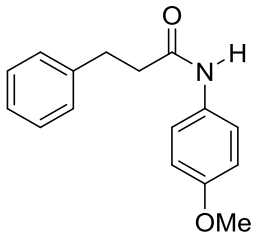
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 272.5 mg (0.97 mmol, 97%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.36-7.28 (m, 6H), 7.24-7.19 (m, 3H), 7.11 (s, 1H), 3.05 (t, *J* = 7.6 Hz, 2H), 2.65 (t, *J* = 7.6 Hz, 2H), 1.30 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =170.4, 147.4, 140.8, 135.2, 128.8, 128.5, 126.5, 125.9, 119.9, 39.5, 34.5, 31.8, 31.5.

HRMS (ESI): Calcd for $C_{19}H_{23}NONa$: $[M+Na]^+$: 304.1678; found: 304.1656.

***N*-(4-methoxyphenyl)-3-phenylpropanamide (5h) [97754-31-9]**



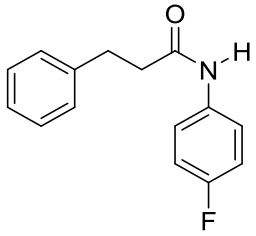
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 244.6 mg (0.96 mmol, 96%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.33-7.28 (m, 4H), 7.25-7.21 (m, 3H), 6.98 (s, 1H), 6.85-6.82 (m, 2H), 3.78 (s, 3H), 3.05 (t, *J* = 7.6 Hz, 2H), 2.63 (t, *J* = 7.6 Hz, 2H)

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.3, 156.6, 140.9, 130.9, 128.8, 128.6, 126.5, 122.1, 114.3, 55.6, 39.5, 31.8.

HRMS (ESI): Calcd for $C_{16}H_{17}NO_2Na$: $[M+Na]^+$: 278.1157; found: 278.1129.

***N*-(4-fluorophenyl)-3-phenylpropanamide (5i) [5298-86-2]**



Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 230.6 mg (0.95 mmol, 95%) white solid.

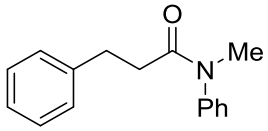
^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.38-7.35 (m, 2H), 7.32-7.29 (m, 2H), 7.24-7.22 (m, 3H), 7.05 (s, 1H), 7.00-6.96 (m, 2H), 3.05 (t, *J* = 7.6 Hz, 2H), 2.65 (t, *J* = 7.6 Hz, 2H).

^{19}F NMR (376 MHz, $CDCl_3$): δ -117.9.

^{13}C NMR (100 MHz, $CDCl_3$) δ =170.5, 159.5 (d, J_{C-F} = 242.2 Hz), 140.7, 133.8, 128.8, 128.5, 126.6, 122.0 (d, J_{C-F} = 8 Hz), 115.7 (d, J_{C-F} = 22.3 Hz), 39.4, 31.7, 29.8.

HRMS (ESI): Calcd for $C_{15}H_{14}FNONa$: $[M+Na]^+$: 266.0957; found: 266.0934.

***N*-methyl-*N*,3-diphenylpropanamide (5j) [18859-20-6]**



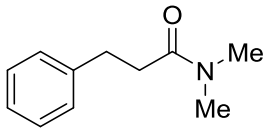
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 229.1 mg (0.96 mmol, 96%) yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.39-7.30 (m, 3H), 7.24-7.16 (m, 3H), 7.07-7.01 (m, 4H), 3.25 (s, 3H), 2.91 (t, *J* = 7.8 Hz, 2H), 2.37 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.3, 144.0, 141.3, 129.8, 128.5, 128.4, 127.8, 127.4, 126.1, 37.4, 36.1, 31.9.

HRMS (ESI): Calcd for $C_{16}H_{17}NONa$: $[M+Na]^+$: 262.1208; found: 262.1182.

***N*,*N*-dimethyl-3-phenylpropanamide (5k) [5830-31-9]**



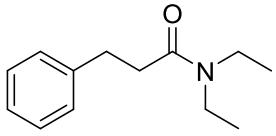
Purification by column chromatography (silica gel, Petroleum ether/ethyl acetate, 1:1.5). Yield: 175.2 mg (0.99 mmol, 99 %) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.30-7.26 (m, 2H), 7.23-7.17 (m, 3H), 3.00-2.92 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.61 (t, *J* = 8.0 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.3, 141.6, 128.54, 128.50, 126.2, 37.2, 35.5, 35.4, 31.5.

HRMS (ESI): Calcd for $C_{11}H_{16}NO$: $[M+H]^+$: 178.1232; found: 178.1197.

***N*,*N*-diethyl-3-phenylpropanamide (5l) [18859-19-3]**



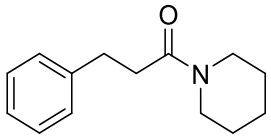
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 201.1 mg (0.98 mmol, 98%) pale yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.31-7.26 (m, 2H), 7.23-7.18 (m, 3H), 3.38 (q, *J* = 7.1 Hz, 2H), 3.22 (q, *J* = 7.2 Hz, 2H), 2.98 (t, *J* = 8.0 Hz, 2H), 2.59 (t, *J* = 8.0 Hz, 2H), 1.10 (m, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =171.4, 141.7, 128.59, 128.57, 126.2, 42.0, 40.3, 35.2, 31.8, 14.4, 13.2.

HRMS (ESI): Calcd for $C_{13}H_{19}NONa$: $[M+Na]^+$: 228.1365; found: 228.1351.

3-Phenyl-1-(piperidin-1-yl)propan-1-one (5m) [21924-11-8]



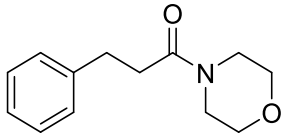
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 203.8 mg (0.94 mmol, 94%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.30-7.26 (m, 2H), 7.23-7.19 (m, 3H), 3.55 (t, *J* = 5.5 Hz, 2H), 3.32 (t, *J* = 5.5 Hz, 2H). 2.96 (t, *J* = 8.0 Hz, 2H), 2.61 (t, *J* = 8.0 Hz, 2H), 1.62-1.58 (m, 2H), 1.53-1.50 (m, 2H), 1.47-1.44 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.5, 141.6, 128.54, 128.51, 126.2, 46.7, 42.8, 35.3, 31.7, 26.5 25.6, 24.6.

HRMS (ESI): Calcd for $C_{14}H_{19}NONa$: $[M+Na]^+$: 240.1365; found: 240.1340.

1-Morpholino-3-phenylpropan-1-one (5n) [17077-46-2]



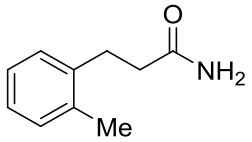
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 207.8 mg (0.95 mmol, 95 %) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.30-7.26 (m, 2H), 7.22-7.18 (m, 3H), 3.61 (m, 4H), 3.51-3.49 (m, 2H), 3.36-3.33 (m, 2 H), 2.97 (t, *J* = 7.8 Hz, 2H), 2.61 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.9, 141.2, 128.6, 128.5, 126.4, 46.1, 42.0, 34.9, 31.7.

HRMS (ESI): Calcd for $C_{13}H_{17}NO_2Na$: $[M+Na]^+$: 242.1157; found: 242.1136.

3-(*o*-Tolyl)propenamide [103028-79-1] (6a)



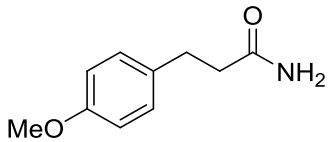
Purification by column chromatography (silica gel, PE/EA, 1:2). Yield: 157.8 mg (0.97 mmol, 97%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.17-7.12 (m, 4H), 5.69 (s, 1H), 5.44 (s, 1H), 2.96 (t, *J* = 7.8 Hz, 2H), 2.49 (t, *J* = 8.1 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 174.8, 138.9, 136.1, 130.5, 128.7, 126.6, 126.3, 36.3, 28.8, 19.4.

HRMS (ESI): Calcd for $C_{10}H_{13}NONa$: $[M+Na]^+$: 186.0895; found: 186.0918.

3-(4-Methoxyphenyl)propenamide (6b) [25413-27-8]



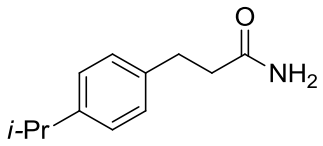
Purification by column chromatography (silica gel, PE/EA, 1:2). Yield: 168.1 mg (0.94 mmol, 94%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.14-7.12 (m, 2H), 6.84-6.82 (m, 2H), 5.53 (s, 1H), 5.37 (s, 1H), 2.91 (t, *J* = 7.6 Hz, 2H), 2.50 (t, *J* = 7.7 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 174.7, 158.2, 132.8, 129.4, 114.1, 55.4, 38.0, 30.7.

HRMS (ESI): Calcd for $C_{10}H_{13}NO_2Na$: $[M+Na]^+$: 202.0844; found: 202.0891.

3-(4-Isopropylphenyl)propenamide (6c) [857814-15-4]



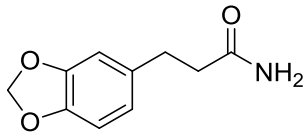
Purification by column chromatography (silica gel, PE/EA, 1:2). Yield: 175.6 mg (0.92 mmol, 92%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.17-7.13 (m, 4H), 5.46 (s, 1H), 5.37 (s, 1H), 2.94 (t, *J* = 7.6 Hz, 2H), 2.92-2.82 (m, 1H), 2.53 (t, *J* = 7.9 Hz, 2H), 1.23 (d, *J* = 6.9 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 174.7, 147.0, 138.0, 128.4, 126.8, 37.7, 33.8, 31.1, 24.2.

HRMS (ESI): Calcd for $C_{12}H_{17}NONa$: $[M+Na]^+$: 214.1208; found: 214.1231.

3-(Benzo[d][1,3]dioxol-5-yl)propenamide (6d) [20799-84-2]



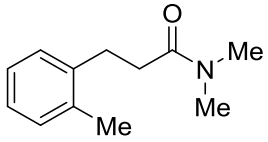
Purification by column chromatography (silica gel, PE/EA, 1:2). Yield: 177.3 mg (0.92 mmol, 92%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.74-6.70 (m, 2H), 6.66 (dd, *J* = 7.9, 1.7 Hz, 1H), 5.92 (s, 2H), 5.49-5.37 (m, 2H), 2.89 (t, *J* = 7.6 Hz, 2H), 2.48 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 174.5, 147.8, 146.1, 134.6, 121.3, 108.9, 108.5, 101.0, 37.9, 31.3.

HRMS (ESI): Calcd for $C_{10}H_{11}NO_3Na$: $[M+Na]^+$: 216.0637; found: 216.0654.

***N*,*N*-dimethyl-3-(*o*-tolyl)propenamide (6e) [105973-44-2]**



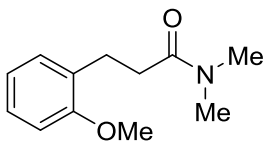
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 185.1 mg (0.97 mmol, 97 %) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.16-7.12 (m, 4H), 2.98-2.92 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.56 (t, *J* = 8.1 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.3, 139.5, 135.9, 130.3, 128.8, 126.3, 126.1, 37.1, 35.4, 33.9, 28.7, 19.3.

HRMS (ESI): Calcd for $C_{12}H_{18}NO$: $[M+H]^+$: 192.1388; found: 192.1355.

***N*,*N*-dimethyl-3-(*o*-methoxyphenyl)propanamide (6f) [1119424-69-9]**



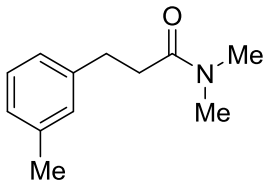
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 202.7 mg (0.98 mmol, 98%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.20-7.15 (m, 2H), 6.89-6.82 (m, 2H), 3.81 (s, 3H), 2.95-2.91 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.58 (t, *J* = 8.1 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.9, 157.5, 130.2, 129.7, 127.5, 120.6, 110.2, 55.2, 37.2, 35.4, 33.8, 26.7.

HRMS (ESI): Calcd for $C_{12}H_{17}NO_2Na$: $[M+Na]^+$: 230.1157; found: 230.1125.

***N,N*-dimethyl-3-(*m*-tolyl)propenamide (6g) [1457870-86-8]**



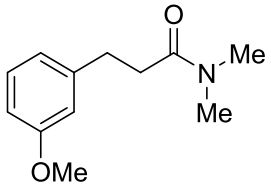
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 188.9 mg (0.99 mmol, 99 %) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.19-7.16 (m, 1H), 7.04-7.00 (m, 3H), 2.95-2.91 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.60 (t, *J* = 8.0 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (100 MHz, CDCl3) δ =172.4, 141.5, 138.1, 129.3, 128.5, 126.9, 125.5, 37.3, 35.6, 35.4, 31.4, 21.5.

HRMS (ESI): Calcd for $C_{12}H_{17}NONa$: $[M+Na]^+$: 214.1208; found: 214.1205.

***N,N*-dimethyl-3-(*m*-methoxyphenyl)propanamide (6h) [1236981-85-3]**



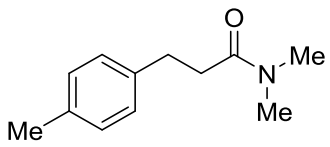
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 194.3 mg (0.94 mmol, 94%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.19 (t, *J* = 7.9 Hz, 2H), 6.81-6.72 (m, 4H), 3.78 (s, 3H), 2.95-2.91 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.60 (t, *J* = 8.0 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.2, 159.8, 143.2, 129.5, 120.8, 114.2, 111.5, 55.2, 37.2, 35.5, 35.3, 31.5.

HRMS (ESI): Calcd for $C_{12}H_{17}NO_2Na$: $[M+Na]^+$: 230.1157; found: 230.1154.

***N,N*-dimethyl-3-(*p*-tolyl)propenamide (6i) [842114-41-4]**



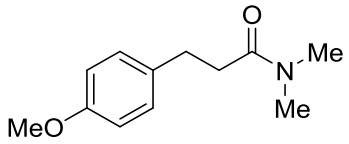
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 188.9 mg (0.99 mmol, 99%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.13-7.08 (m, 4H), 2.94-2.91 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.59 (t, *J* = 8.0 Hz, 2H), 2.31 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.3, 138.5, 135.6, 129.2, 128.3, 37.2, 35.5, 35.4, 31.0, 21.1.

HRMS (ESI): Calcd for $C_{12}H_{17}NONa$: $[M+Na]^+$: 214.1208; found: 214.1205.

***N*,*N*-dimethyl-3-(*p*-methoxyphenyl)propanamide (6j) [82966-21-0]**



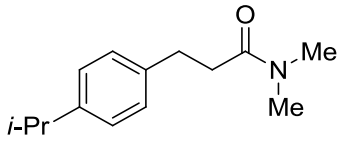
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 196.3 mg (0.95 mmol, 95 %) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.14-7.10 (m, 2H), 6.82-6.80 (m, 2H), 3.76 (s, 3H), 2.92-2.87 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.56 (t, *J* = 7.9 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.3, 158.0, 133.5, 129.4, 113.9, 55.3, 37.2, 35.6, 35.4, 30.5.

HRMS (ESI): Calcd for $C_{12}H_{17}NO_2Na$: $[M+Na]^+$: 230.1157; found: 230.1134.

***N*,*N*-dimethyl-3-(4-isopropylphenyl)-propanamide (6k) [932203-91-3]**



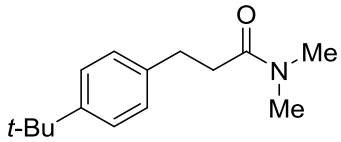
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 214.3 mg (0.98 mmol, 98 %) yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.15 (m, 4H), 2.96-2.92 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.87 (m, 1H), 2.60 (t, *J* = 8.0 Hz, 2H), 1.25 (s, 3H), 1.23 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.4, 146.7, 138.8, 128.4, 126.5, 37.2, 35.5, 33.8, 31.0, 24.1.

HRMS (ESI): Calcd for $C_{14}H_{21}NONa$: $[M+Na]^+$: 242.1521; found: 242.1525.

***N*,*N*-dimethyl-3-(4-(*tert*-butyl)phenyl)propanamide (6l) [932252-71-6]**



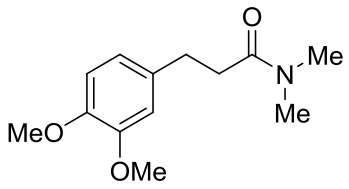
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 225.9 mg (0.97 mmol, 97 %) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.33-7.31 (m, 2H), 7.18-7.15 (m, 2H), 2.96-2.94 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.61 (t, *J* = 8.1 Hz, 2H), 1.31 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.4, 149.0, 138.5, 128.1, 125.4, 37.2, 35.5, 35.4, 34.4, 31.5, 30.9.

HRMS (ESI): Calcd for $C_{15}H_{23}NONa$: $[M+Na]^+$: 256.1678; found: 256.1655.

***N*,*N*-dimethyl-3-(3,4-dimethoxyphenyl)propanamide (6m) [59734-56-4]**



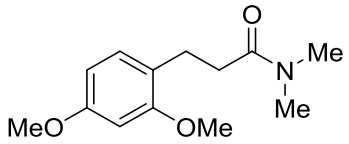
Purification by column chromatography (silica gel, PE/EA, 1:2). Yield: 232.1 mg (0.98 mmol, 98%) yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.79-6.73 (m, 3H), 3.85 (s, 3H), 3.83 (s, 3H), 2.93-2.88 (m, 8H, overlapping signals of NMe_2 and CH_2), 2.58 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.3, 149.0, 147.5, 134.2, 120.3, 112.0, 111.4, 56.0, 55.9, 37.3, 35.6, 35.5, 31.1.

HRMS (ESI): Calcd for $C_{13}H_{19}NO_3Na$: $[M+Na]^+$: 260.1263; found: 260.1269.

***N,N*-dimethyl-3-(2,4-dimethoxyphenyl)propanamide (6n)**



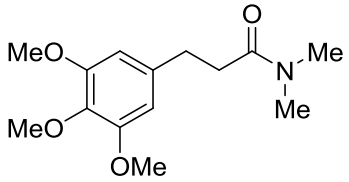
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 225.1 mg (0.95 mmol, 95%) yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.06 (d, *J* = 8.4 Hz, 1H), 6.43-6.38 (m, 2H), 3.79 (s, 3H), 3.77 (s, 3H), 2.94 (s, 3H), 2.92 (s, 3H), 2.86 (t, *J* = 8.0 Hz, 2H), 2.54 (t, *J* = 8.0 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =173.0, 159.5, 158.4, 130.4, 122.1, 104.0, 98.6, 55.4, 55.3, 37.2, 35.4, 34.0, 26.1.

HRMS (ESI): Calcd for $C_{13}H_{19}NO_3Na$: $[M+Na]^+$: 260.1263; found: 262.1270.

***N,N*-dimethyl-3-(3,4,5-trimethoxyphenyl)propenamide (6o) [92324-44-2]**



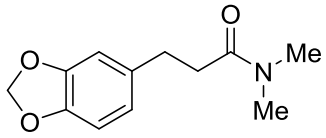
Purification by column chromatography (silica gel, PE/EA, 1:2). Yield: 256.1 mg (0.96 mmol, 96%) yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.42 (s, 2H), 3.82 (s, 6H), 3.79 (s, 3H), 2.93 (s, 3H), 2.92 (s, 3H), 2.88 (t, *J* = 7.8 Hz, 2H), 2.58 (t, *J* = 7.8 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.2, 153.2, 137.4, 136.4, 105.5, 60.9, 56.2, 37.3, 35.53, 35.45, 31.9.

HRMS (ESI): Calcd for $C_{14}H_{21}NO_4Na$: $[M+Na]^+$: 290.1369; found: 290.1374.

***N,N*-dimethyl-3-(benzo[*d*][1,3]dioxol-5-yl)propanamide (6p) [848349-09-7]**



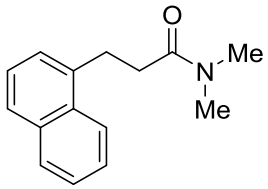
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 214.1 mg (0.97 mmol, 97%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.70-6.62 (m, 3H), 5.88 (s, 2H), 2.91 (s, 6H), 2.85 (t, *J* = 7.9 Hz, 2H), 2.54 (t, *J* = 7.9 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.1, 147.6, 145.8, 135.3, 121.2, 108.9, 108.2, 100.8, 37.2, 35.5, 35.4, 31.1.

HRMS (ESI): Calcd for $C_{12}H_{15}NO_3Na$: $[M+Na]^+$: 244.0950; found: 244.0930.

***N,N*-dimethyl-3-(naphthalen-1-yl)propenamide (6q) [27563-33-3]**



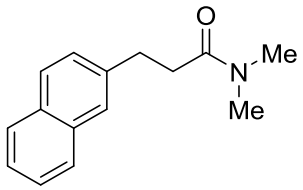
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 217.8 mg (0.96 mmol, 96%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.08-8.05 (m, 1H), 7.86 (dd, *J* = 7.8, 1.6 Hz, 1H), 7.73 (dd, *J* = 7.5, 1.9 Hz, 1H), 7.54-7.46 (m, 2H), 7.42-7.37 (m, 2H), 3.45 (t, *J* = 8.0 Hz, 2H), 2.96 (s, 3H), 2.83 (s, 3H), 2.73 (t, *J* = 8.0 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.3, 137.6, 133.9, 131.7, 128.9, 127.0, 126.2, 126.1, 125.7, 125.6, 123.6, 37.1, 35.5, 34.5, 28.5.

HRMS (ESI): Calcd for $C_{15}H_{18}NO$: $[M+H]^+$: 228.1388; found: 228.1346.

***N,N*-dimethyl-3-(naphthalen-2-yl)propenamide (6r) [25343-59-3]**



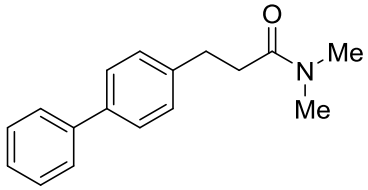
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 217.6 mg (0.96 mmol, 96 %) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.81-7.77 (m, 3H), 7.66 (s, 1H), 7.47-7.36 (m, 3H), 3.14 (t, *J* = 7.9 Hz, 2H), 2.95 (s, 3H), 2.91(s, 3H), 2.69 (t, *J* = 7.9 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.2, 139.1, 133.7, 132.1, 128.1, 127.7, 127.5, 127.3, 126.5, 126.0, 125.3, 37.2, 35.5, 35.2, 31.6.

HRMS (ESI): Calcd for $C_{15}H_{18}NO$: $[M+H]^+$: 228.1388; found: 228.1345.

***N,N*-dimethyl-3-((1,1'-biphenyl)-4-yl)propanamide (6s) [1621396-78-8]**

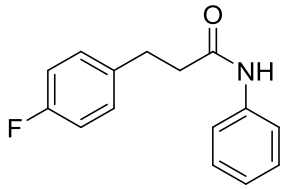


Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 247.9 mg (0.98 mmol, 98%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.60-7.57 (m, 2H), 7.55-7.53 (m, 2H), 7.45-7.42 (m, 2H),

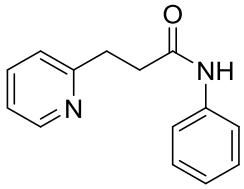
7.36-7.30 (m, 3H), 3.03 (t, *J* = 7.9 Hz, 2H), 2.97 (s, 3H), 2.94 (s, 3H), 2.66 (t, *J* = 7.9 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.1, 141.0, 140.7, 139.1, 128.9, 128.8, 127.2, 127.1, 127.0, 37.2, 35.5, 35.2, 31.0.
HRMS (ESI): Calcd for $C_{17}H_{19}NONa$: $[M+Na]^+$: 276.1365; found: 276.1326.

***N*-phenyl-3-(4-fluorophenyl)propanamide (6t) [1060805-39-1]**



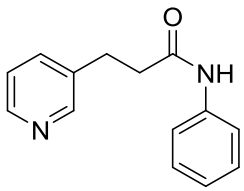
Purification by column chromatography (silica gel, PE/EA, 10:1). Yield: 233.2 mg (0.96 mmol, 96%) colorless oil.
^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.45-7.43 (m, 2H), 7.31-7.25 (m, 3H), 7.18-7.14 (m, 2H), 7.12-7.06 (m, 1H), 6.98-6.93(m, 2H), 3.00 (t, *J* = 7.6 Hz, 2H), 2.61 (t, *J* = 7.6 Hz, 2H).
^{19}F NMR (376 MHz, $CDCl_3$): δ -116.8.
^{13}C NMR (100 MHz, $CDCl_3$) δ =170.4, 161.6 (d, $J_{C\text{-}F}$ = 242.7 Hz), 137.8, 136.4 (d, $J_{C\text{-}F}$ = 3.2 Hz), 129.9 (d, $J_{C\text{-}F}$ = 7.9 Hz), 129.1, 124.5, 120.1, 115.5 (d, $J_{C\text{-}F}$ = 21.1 Hz), 39.6, 30.8.
HRMS (ESI): Calcd for $C_{15}H_{14}FNONa$: $[M+Na]^+$: 266.0957; found: 266.0975.

***N*-phenyl-3-(pyridin-2-yl)propenamide (6u) [20745-52-2]**



Purification by column chromatography (silica gel, CH_2Cl_2/MeOH, 20:1). Yield: 203.2 mg (0.90 mmol, 90%) yellow solid.
^{1}H NMR (400 MHz, $CDCl_3$) δ = 9.28 (s, 1H), 8.58-8.56 (m, 1H), 7.64 (td, *J* = 7.7, 1.9 Hz, 1H), 7.53-7.51 (m, 2H), 7.31-7.27 (m, 2H), 7.24 (d, *J* = 7.9 Hz, 1H), 7.20-7.17 (m, 1H), 7.06 (t, *J* = 7.4 Hz, 1H), 3.23 (t, *J* = 6.7 Hz, 2H), 2.87 (t, *J* = 6.7 Hz, 2H).
^{13}C NMR (100 MHz, $CDCl_3$) δ =171.3, 160.4, 148.8, 138.6, 137.2, 129.0, 123.9, 123.8, 121.9, 119.7, 36.8, 33.3.
HRMS (ESI): Calcd for $C_{14}H_{14}N_2ONa$: $[M+Na]^+$: 249.1004; found: 249.1045.

***N*-phenyl-3-(pyridin-3-yl)propenamide (6v) [20745-53-3]**



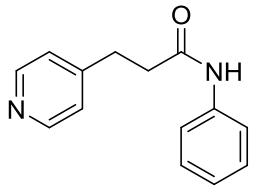
Purification by column chromatography (silica gel, CH_2Cl_2/MeOH, 20:1). Yield: 205.1 mg (0.91 mmol, 91%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.45 (dd, *J* = 4.9, 1.7 Hz, 1H), 8.40 (d, *J* = 2.2 Hz, 1H), 8.31 (s, 1H), 7.60-7.57 (m, 1H), 7.54 (d, *J* = 7.5 Hz, 2H), 7.29 (t, *J* = 7.1 Hz, 2H), 7.22 (dd, *J* = 7.9, 4.9Hz, 1H), 7.09 (t, *J* = 7. Hz, 1H), 3.04 (t, *J* = 7.5 Hz, 2H), 2.65 (t, *J* = 7.5 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =170.0, 149.6, 147.7, 138.2, 136.7, 129.1, 124.4, 123.8, 120.0, 38.9, 28.8.

HRMS (ESI): Calcd for $C_{14}H_{15}N_2O$: $[M+H]^+$: 227.1184 ; found: 227.1181.

***N*-phenyl-3-(pyridin-4-yl)propenamide (6w) [20745-54-4]**



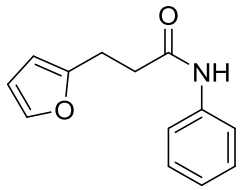
Purification by column chromatography (silica gel, CH_2Cl_2/MeOH, 20:1). Yield: 212.1 mg (0.94 mmol, 94%) yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.49 (s, 2H), 7.61 (s, 1H), 7.48 (d, *J* = 7.9 Hz, 2H), 7.30 (t, *J* = 7.8 Hz, 2H), 7.22-7.20 (m, 2H), 7.10 (t, *J* = 7.4 Hz, 1H), 3.06 (t, *J* = 7.4 Hz, 2H), 2.69 (t, *J* = 7.5 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =169.5, 151.0, 149.2, 137.8, 129.2, 124.6, 124.3, 120.1, 37.8, 30.7.

HRMS (ESI): Calcd for $C_{14}H_{14}N_2ONa$: $[M+Na]^+$: 249.1004; found: 249.0995.

***N*-phenyl-3-(furan-2-yl)propanamide (6x) [129196-80-1]**



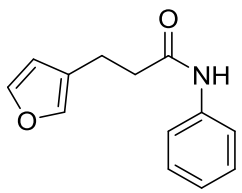
Purification by column chromatography (silica gel, chloroform/acetone, 30:1). Yield: 204.1 mg (0.95 mmol, 95%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.46 (d, *J* = 7.3 Hz, 2H), 7.33-7.29 (m, 3H), 7.18-7.15 (m, 1H), 7.10 (t, *J* = 7.4 Hz, 1H), 6.29 (dd, *J* = 3.3, 2.0 Hz, 1H), 6.08 (d, *J* = 3.1 Hz, 1H), 3.08 (t, *J* = 7.4 Hz, 2H), 2.70 (t, *J* = 7.4 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.2, 154.2, 141.4, 137.9, 129.1, 124.5, 120.1, 110.5, 105.9, 36.1, 24.0.

HRMS (ESI): Calcd for $C_{13}H_{13}NO_2Na$: $[M+Na]^+$: 238.0844; found: 238.0847.

***N*-phenyl-3-(furan-3-yl)propanamide (6y)**



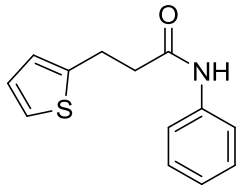
Purification by column chromatography (silica gel, chloroform/acetone, 30:1). Yield: 206.2 mg (0.96 mmol, 96%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.47 (d, *J* = 7.8 Hz, 2H), 7.36 (t, *J* = 1.7 Hz, 1H), 7.33-7.28 (m, 3H), 7.22 (s, 1H), 7.10 (t, *J* = 7.4 Hz, 1H), 6.31 (s, 1H), 2.87 (t, *J* = 7.4 Hz, 2H), 2.59 (t, *J* = 7.4 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.5, 143.2, 139.4, 137.8, 129.1, 124.5, 123.7, 120.0, 110.9, 38.4, 20.9.

HRMS (ESI): Calcd for $C_{13}H_{13}NO_2Na$: $[M+Na]^+$: 238.0844; found: 238.0838.

***N*-phenyl-3-(thiophen-2-yl)propenamide (6z) [853891-11-9]**



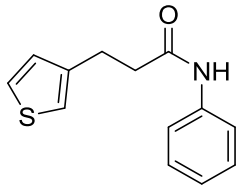
Variation from the standard conditions: $Ni(OAc)_2$ (9.0 mg, 0.05 mmol, 5 mol %) and P(*t*-Bu)$_3$ (12.1 mg, 0.06 mmol, 6 mol%) was used. Purification by column chromatography (silica gel, chloroform/acetone, 30:1). Yield: 191.5 mg (0.83 mmol, 83%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.45 (d, *J* = 7.9 Hz, 2H), 7.31 (t, *J* = 7.8 Hz, 2H), 7.15 (dd, *J* = 5.1, 1.2 Hz, 1H), 7.10 (t, *J* = 7.4 Hz, 1H), 6.94-6.92 (m, 1H), 6.88-6.87 (m, 1H), 3.28 (t, *J* = 7.4 Hz, 2H), 2.72 (t, *J* = 7.3 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.8, 143.3, 137.8, 129.1, 127.2, 125.2, 124.5, 123.8, 120.0, 39.8, 25.8.

HRMS (ESI): Calcd for $C_{13}H_{13}NOSNa$: $[M+Na]^+$: 254.0616; found: 254.0629.

***N*-phenyl-3-(thiophen-3-yl)propenamide (6aa) [1240751-50-1]**



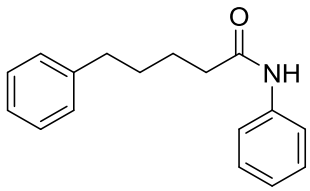
Variation from the standard conditions: $Ni(OAc)_2$ (9.0 mg, 0.05 mmol, 5 mol %) and P(*t*-Bu)$_3$ (12.1 mg, 0.06 mmol, 6 mol%) was used. Purification by column chromatography (silica gel, chloroform/acetone, 30:1). Yield: 186.7 mg (0.81 mmol, 81%) colorless viscous oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.44 (d, *J* = 7.3 Hz, 2H), 7.33-7.27 (m, 3H), 7.10 (t, *J* = 7.3 Hz, 1H), 7.04 (m, 2H), 7.00-6.98 (m, 1H), 3.09 (t, *J* = 7.4 Hz, 2H), 2.66 (t, *J* = 7.4 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 170.4, 141.0, 137.8, 129.1, 128.1, 126.1, 124.5, 121.1, 120.0, 38.9, 26.1.

HRMS (ESI): Calcd for $C_{13}H_{13}NOSNa$: $[M+Na]^+$: 254.0616; found: 254.0601.

***N*,5-diphenylpentanamide (6ab) [860574-69-2]**



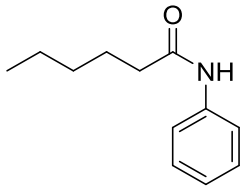
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 239.6 mg (0.95 mmol, 95%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ =7.49 (d, *J* = 7.8 Hz, 2H), 7.33-7.28 (m, 4H), 7.20-7.17 (m, 3H), 7.13-7.08 (m, 2H), 2.66 (t, *J* = 7.2 Hz, 2H), 2.37 (t, *J* = 7.2 Hz, 2H), 1.82-1.69 (m, 4H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 171.2, 142.2, 138.0, 129.1, 128.59, 128.56, 126.0, 124.4, 119.9, 37.8, 35.8, 31.1, 25.4.

HRMS (ESI): Calcd for $C_{17}H_{19}NONa$: $[M+Na]^+$: 276.1365; found: 276.1382.

***N*-phenylhexanamide (6ac) [621-15-8]**



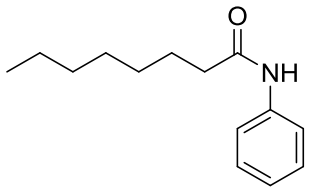
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 173.6 mg (0.91 mmol, 91%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.51 (d, *J* = 7.9 Hz, 2H), 7.31 (t, *J* = 7.8 Hz, 2H), 7.22 (s, 1H), 7.09 (t, *J* = 7.4 Hz, 1H), 2.35 (t, *J* = 7.6 Hz, 2H), 1.77-1.69 (m, 2H), 1.38-1.33 (m, 4H), 0.93-0.89 (m, 3H),.

^{13}C NMR (100 MHz, $CDCl_3$) δ =171.6, 138.1, 129.1, 124.3, 119.9, 38.0, 31.6, 25.5, 22.6, 14.1.

HRMS (ESI): Calcd for $C_{12}H_{17}NONa$: $[M+Na]^+$: 214.1208; found: 214.1196.

***N*-phenyloctanamide (6ad) [6998-10-3]**



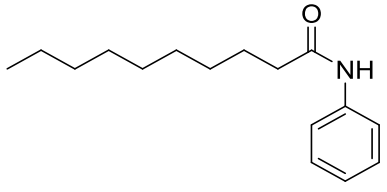
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 201.2 mg (0.92 mmol, 92 %) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.51 (d, *J* = 7.9 Hz, 2H), 7.31 (t, *J* = 7.7 Hz, 2H), 7.18 (s, 1H), 7.10 (t, *J* = 7.4 Hz, 1H), 2.35 (t, *J* = 7.3 Hz, 2H), 1.75-1.71 (m, 2H), 1.35-1.27 (m, 8H), 0.90-0.86 (m, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 171.5, 138.1, 129.1, 124.3, 119.9, 38.0, 31.8, 29.4, 29.2, 25.8, 22.8, 14.2.

HRMS (ESI): Calcd for $C_{14}H_{21}NONa$: $[M+Na]^+$: 242.1521; found: 242.1506.

***N*-phenyldecanamide (6ae) [15473-32-2]**



Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 232.1 mg (0.94 mmol,

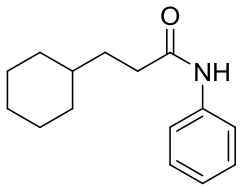
94%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.51 (d, *J* = 7.8 Hz, 2H), 7.31 (t, *J* = 7.9 Hz, 2H), 7.15 (s, 1H), 7.10 (t, *J* = 7.4 Hz, 1H), 2.35 (t, *J* = 7.6 Hz, 2H), 1.76-1.69 (m, 2H), 1.34-1.26 (m, 12H), 0.89-0.86 (m, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 171.5, 138.1, 129.1, 124.3, 119.9, 38.0, 32.0, 29.6, 29.5, 29.43, 29.42, 25.8, 22.8, 14.2.

HRMS (ESI): Calcd for $C_{16}H_{25}NONa$: $[M+Na]^+$: 270.1834; found: 270.1807.

***N*-phenyl-3-cyclohexylpropanamide (6af) [4361-30-2]**



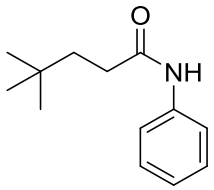
Purification by column chromatography (silica gel, PE/EA, 4:1). Yield: 212.3 mg (0.92 mmol, 92%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.51 (d, *J* = 7.5 Hz, 2H), 7.31 (t, *J* = 7.9 Hz, 2H), 7.15 (s, 1H), 7.09 (t, *J* = 7.4 Hz, 1H), 2.36 (t, *J* = 7.9 Hz, 2H), 1.75-1.66 (m, 5H), 1.64-1.60 (m, 2H), 1.31-1.16 (m, 4H), 0.95-0.88 (m, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 171.8, 138.1, 129.1, 124.3, 119.9, 37.5, 35.5, 33.2, 33.1, 26.7, 26.4.

HRMS (ESI): Calcd for $C_{15}H_{21}NONa$: $[M+Na]^+$: 254.1521; found: 254.1507.

***N*-phenyl-4,4-dimethylpentanamide (6ag) [74973-26-5]**



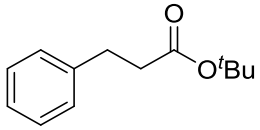
Purification by column chromatography (silica gel, PE/EA, 1:1). Yield: 186.2 mg (0.91 mmol, 91%) white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ =7.51 (d, *J* = 7.9 Hz, 2H), 7.31 (t, *J* = 8.0 Hz, 2H), 7.21 (s, 1H), 7.09 (t, *J* = 7.4 Hz, 1H), 2.35-2.31 (m, 2H), 1.67-1.64 (m, 2H), 0.93 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.1, 138.2, 129.1, 124.3, 119.9, 39.4, 33.6, 30.3, 29.3.

HRMS (ESI): Calcd for $C_{13}H_{19}NONa$: $[M+Na]^+$: 228.1365; found: 228.1348.

***Tert*-Butyl 3-phenylpropanoate (8a) [16537-10-3]**



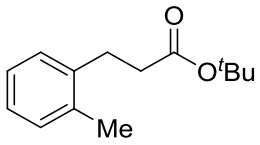
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 197.4 mg (0.96 mmol, 96%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.30-7.25 (m, 2H), 7.21-7.17 (m, 3H), 2.91 (t, *J* = 7.8 Hz, 2H), 2.44 (t, *J* = 7.8 Hz, 2H), 1.41 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.4, 140.9, 128.51, 128.45, 126.2, 80.5, 37.2, 31.3, 28.2.

HRMS (ESI): Calcd for $C_{13}H_{18}O_2Na$: $[M+Na]^+$: 229.1205; found: 229.1204.

***Tert*-Butyl 3-(*o*-tolyl)propanoate (8b) [780761-55-9]**



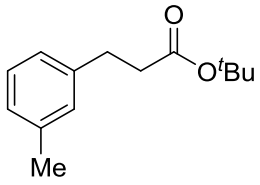
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 213.3 mg (0.97 mmol, 97%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.16-7.12 (m, 4H), 2.91 (t, *J* = 8.0 Hz, 2H), 2.51 (t, *J* = 8.0 Hz, 2H), 2.33 (s, 3H), 1.45 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.6, 139.0, 136.1, 130.3, 128.6, 126.4, 126.1, 80.5, 35.9, 28.6, 28.2,19.4.

HRMS (ESI): Calcd for $C_{14}H_{20}O_2Na$: $[M+Na]^+$: 243.1361; found: 243.1379.

***Tert*-Butyl 3-(*m*-tolyl)propanoate (8c) [1462242-85-8]**



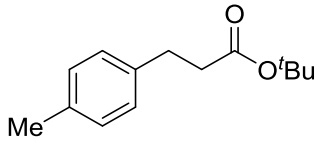
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 217.7 mg (0.99 mmol, 99%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.20-7.16 (m, 1H), 7.03-7.00 (m, 3H), 2.89 (t, *J* = 7.8 Hz, 2H), 2.54 (t, *J* = 7.8 Hz, 2H), 2.34 (s, 3H), 1.44 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.5, 140.8, 138.0, 129.3, 128.4, 126.9, 125.4, 80.4, 37.3, 31.2, 28.2, 21.5.

HRMS (ESI): Calcd for $C_{14}H_{20}O_2Na$: $[M+Na]^+$: 243.1361; found: 243.1381.

***Tert*-butyl 3-(*p*-tolyl)propanoate (8d) [479218-64-1]**



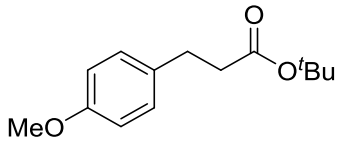
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 217.5 mg (0.99 mmol, 96%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.11-7.10 (m, 4H), 2.88 (t, *J* = 7.9 Hz, 2H), 2.53 (t, *J* = 7.9 Hz, 2H), 2.32 (s, 3H), 1.44 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.5, 137.8, 135.6, 129.2, 128.3, 80.4, 37.4, 30.8, 28.2, 21.1.

HRMS (ESI): Calcd for $C_{14}H_{20}O_2Na$: $[M+Na]^+$: 243.1361; found: 243.1374.

***Tert*-butyl 3-(4-methoxyphenyl)propanoate (8e) [85277-69-6]**



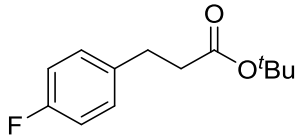
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 224.1 mg (0.95 mmol, 95%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.13-7.10 (m, 2H), 6.83-6.81 (m, 2H), 3.78 (s, 3H), 2.85 (t, *J* = 7.8 Hz, 2H), 2.50 (t, *J* = 7.8 Hz, 2H), 1.42 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.5, 158.1, 133.0, 129.4, 113.9, 80.4, 55.4, 37.5, 30.4, 28.2.

HRMS (ESI): Calcd for $C_{14}H_{20}O_3Na$: $[M+Na]^+$: 259.1310; found: 259.1330.

***Tert*-butyl 3-(4-fluorophenyl)propanoate (8f) [1049037-23-1]**



Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 219.3 mg (0.98 mmol, 98 %) colorless oil.

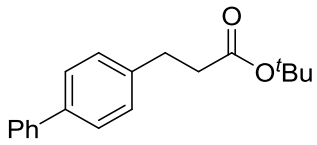
^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.17-7.13 (m, 2H), 6.98-6.93 (m, 2H), 2.87 (t, *J* = 7.7 Hz, 2H), 2.51 (t, *J* = 7.7 Hz, 2H), 1.41 (s, 9H).

^{19}F NMR (376 MHz, $CDCl_3$): δ -117.3.

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.2, 161.5 (d, $J_{C\text{-}F}$ = 242.2 Hz), 136.5 (d, $J_{C\text{-}F}$ = 3.3 Hz), 129.8 (d, $J_{C\text{-}F}$ = 7.7 Hz), 115.2 (d, $J_{C\text{-}F}$ = 21.1 Hz), 80.6, 37.3, 30.4, 28.2.

HRMS (ESI): Calcd for $C_{13}H_{17}FO_2Na$: $[M+Na]^+$: 247.1111; found: 247.1107.

***Tert*-butyl 3-([1,1'-biphenyl]-4-yl)propanoate (8g) [1049037-21-9]**



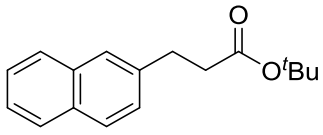
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 270.6 mg (0.96 mmol, 96%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.61-7.59 (m, 2H), 7.56-7.52 (m, 2H), 7.47-7.43 (m, 2H), 7.37-7.35 (m, 1H), 7.31-7.25 (m, 2H), 2.98 (s, 3H), 2.60 (t, *J* = 7.8 Hz, 2H), 2.50 (t, *J* = 7.8 Hz, 2H), 1.45 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ = 172.4, 141.1, 140.0, 139.2, 128.9, 128.8, 127.24, 127.2, 127.1, 80.5, 37.1, 30.9, 28.2.

HRMS (ESI): Calcd for $C_{19}H_{22}O_2Na$: $[M+Na]^+$: 305.1518; found: 305.1525.

***Tert*-butyl 3-(naphthalen-2-yl)propanoate (8h) [672958-70-2]**



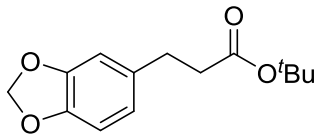
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 245.6 mg (0.96 mmol, 96%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.82-7.77 (m, 3H), 7.65 (s, 1H), 7.48-7.41 (m, 2H), 7.35 (dd, *J* = 8.4, 1.7 Hz, 1H), 3.09 (t, *J* = 7.8 Hz, 2H), 2.64 (t, *J* = 7.8 Hz, 2H), 1.43 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.4, 138.4, 133.7, 132.2, 128.1, 127.7, 127.6, 127.2, 126.6, 126.1, 125.4, 80.5, 37.2, 31.4, 28.2.

HRMS (ESI): Calcd for $C_{17}H_{20}O_2Na$: $[M+Na]^+$: 279.1361; found: 279.1375.

***Tert*-butyl 3-(benzo[d][1,3]dioxol-5-yl)propanoate (8i) [1105026-80-9]**



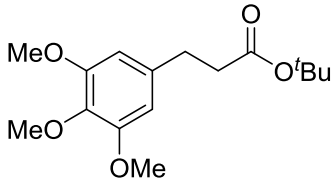
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 237.3 mg (0.95 mmol, 95%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.73-6.69 (m, 2H), 6.74 (dd, *J* = 7.6, 1.6 Hz, 1H), 5.91 (s, 2H), 2.82 (t, *J* = 7.7 Hz, 2H), 2.48 (t, *J* = 7.7 Hz, 2H), 1.42 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.3, 147.7, 145.9, 134.7, 121.2, 108.9, 108.3, 100.9, 80.5, 37.5, 31.0, 28.2.

HRMS (ESI): Calcd for $C_{14}H_{18}O_4Na$: $[M+Na]^+$: 273.1103; found: 273.1108.

***Tert*-butyl 3-(3,4,5-trimethoxyphenyl)propanoate (8j) [587840-36-6]**



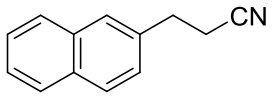
Purification by column chromatography (silica gel, PE/EA, 40:1). Yield: 287.1 mg (0.97 mmol, 97%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 6.40 (s, 2H), 3.82 (s, 6H), 3.80 (s, 3H), 2.84 (t, *J* = 7.7 Hz, 2H), 2.51 (t, *J* = 7.7 Hz, 2H), 1.41 (s, 9H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =172.3, 153.2, 136.7, 136.4, 105.3, 80.5, 60.9, 56.1, 37.3, 31.6, 28.2.

HRMS (ESI): Calcd for $C_{16}H_{24}O_5Na$: $[M+Na]^+$: 319.1522; found: 319.1518.

3-(Naphthalen-2-yl)propanenitrile (11) [95104-51-1]



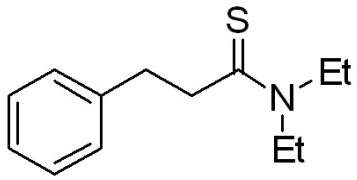
Purification by column chromatography (silica gel, PE/EA, 10:1). Yield: 128.3 mg (0.71 mmol, 71%) colorless oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.84-7.80 (m, 3H), 7.69 (s, 1H), 7.52-7.45 (m, 2H), 7.35 (dd, *J* = 8.4, 1.8 Hz, 1H), 3.14 (t, *J* = 7.4 Hz, 2H), 2.72 (t, *J* = 7.4 Hz, 2H).

^{13}C NMR (100 MHz, $CDCl_3$) δ =135.6, 133.6, 132.7, 128.8, 127.84, 127.78, 127.0, 126.5, 126.4, 126.1, 119.3, 31.9, 19.5.
HRMS (ESI): Calcd for $C_{13}H_{11}NNa$: $[M+Na]^+$: 204.0789; found: 204.0779.

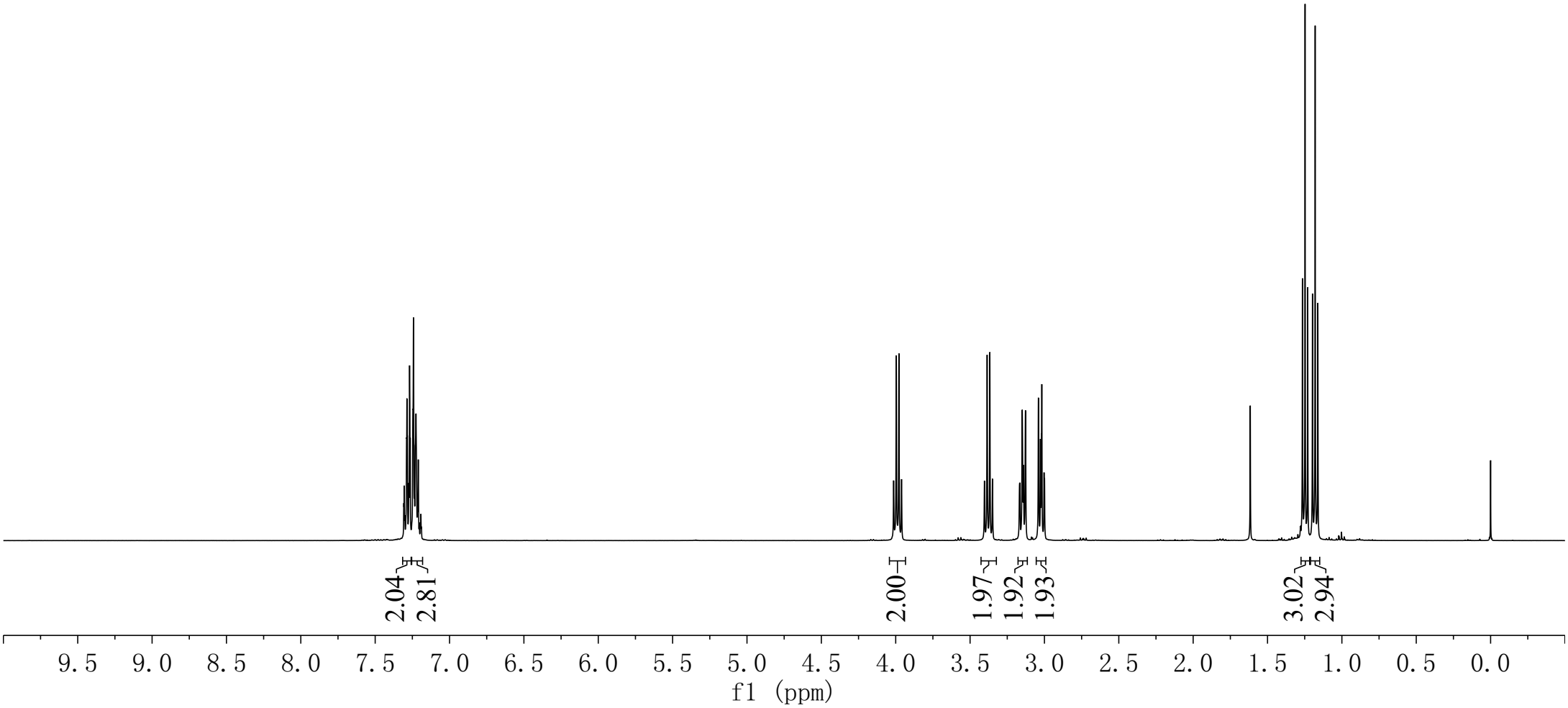
5. NMR spectra of products

wxh20200718.207511.fid



3a

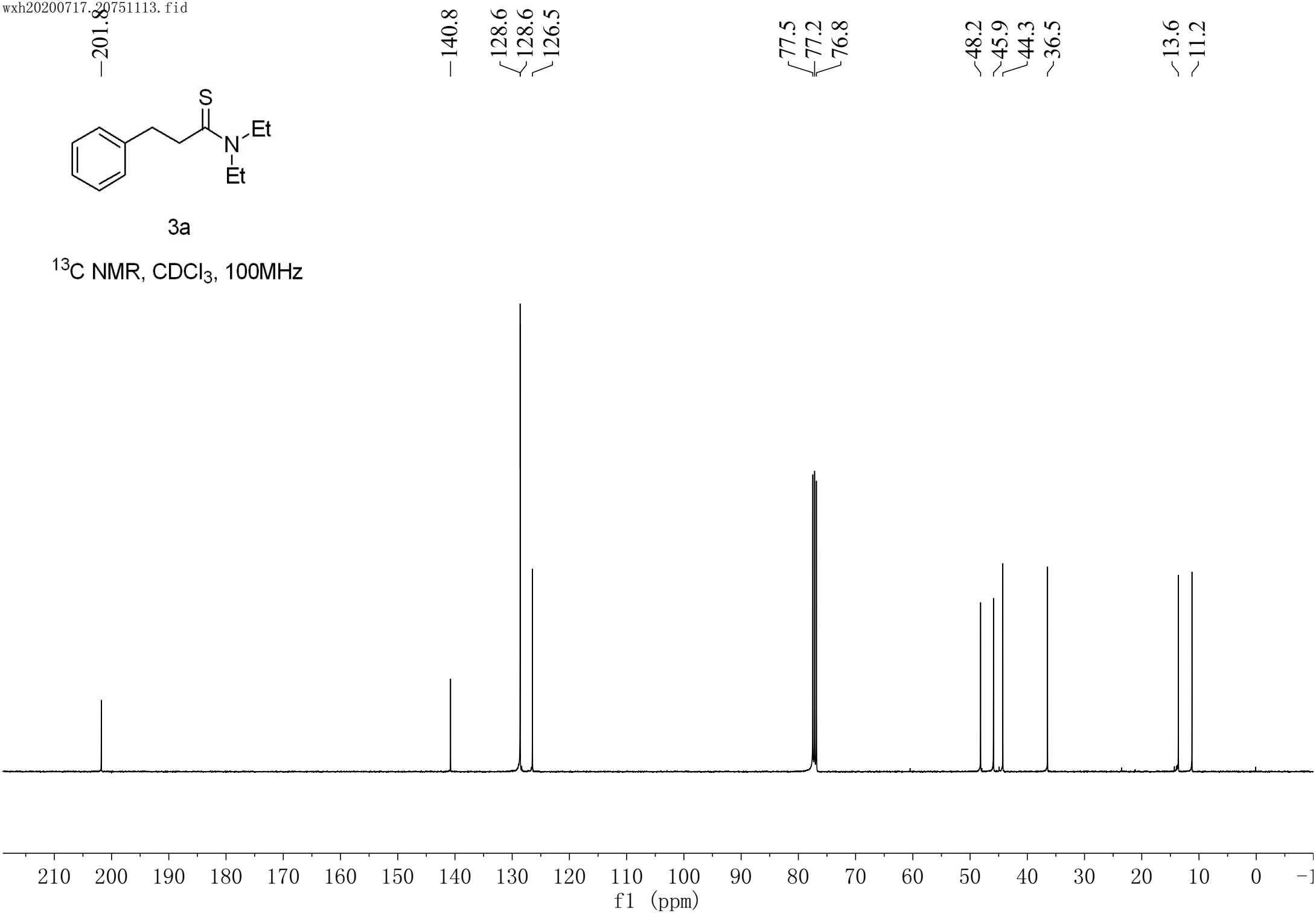
^{1}H NMR, $CDCl_3$, 400MHz



wxh20200717.20751113.fid

3a

^{13}C NMR, $CDCl_3$, 100MHz



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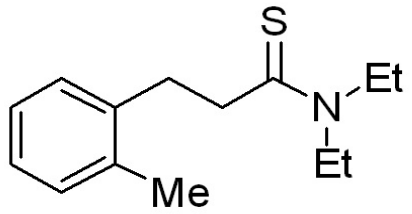
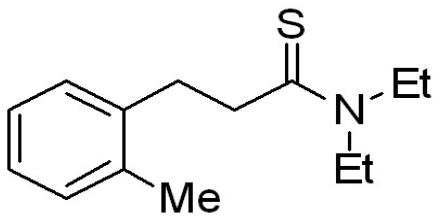


3b

^{1}H NMR, $CDCl_3$, 400MHz

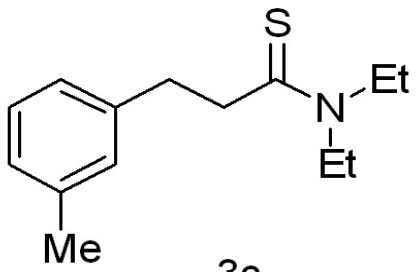
wxh20200809. 2080213. fid



3b

^{13}C NMR, $CDCl_3$, 100MHz

wxh20200908.20944.fid



3c

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200908_2094413.fid

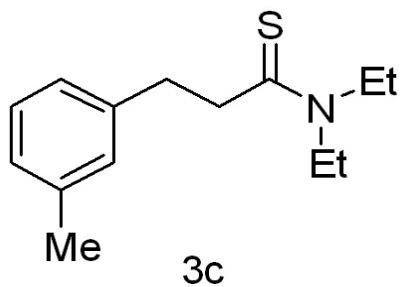
201.9

140.7
138.2
129.4
128.5
127.2
125.6

77.5
77.2
76.8

48.1
45.9
44.4
36.4

21.5
13.6
11.2



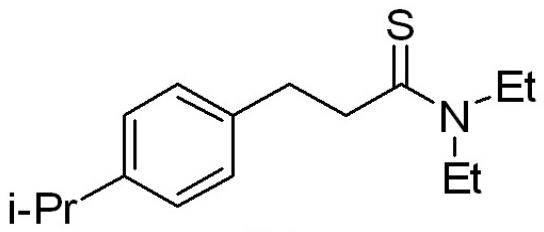
3c

^{13}C NMR, $CDCl_3$, 100MHz

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

wxh20200908.20942.fid

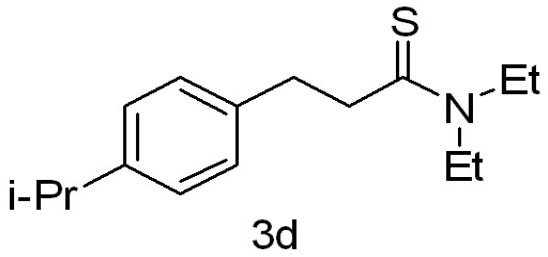


3d

^{1}H NMR, $CDCl_3$, 400MHz

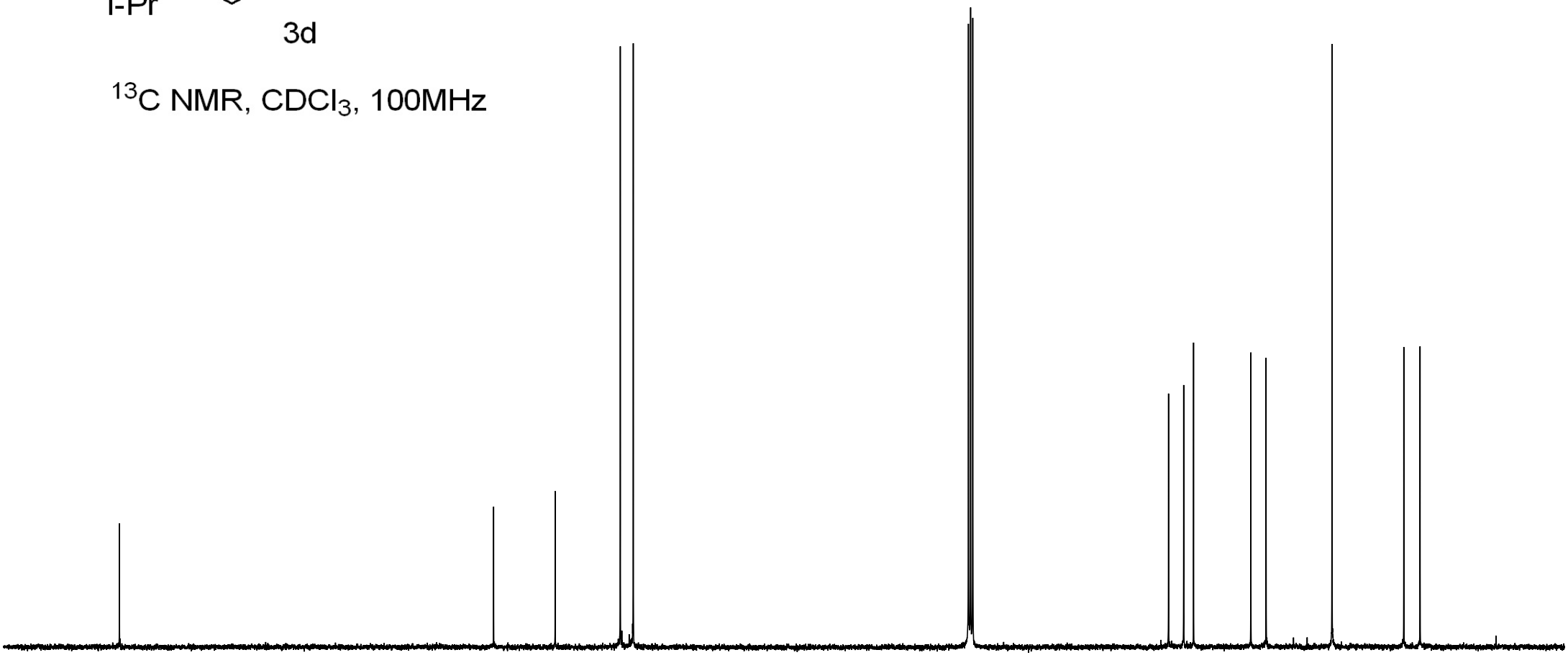
wxh20200908.2094213.fid

202.0
147.1
138.1
128.5
126.6
77.5
77.2
76.8
48.1
45.9
44.5
36.1
33.8
24.2
13.6
11.2



3d

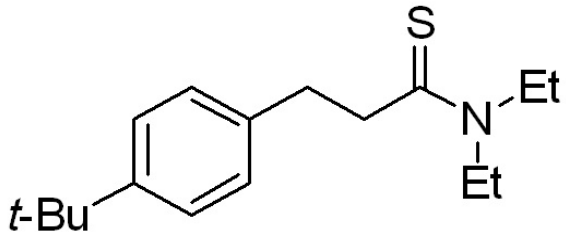
^{13}C NMR, $CDCl_3$, 100MHz



210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

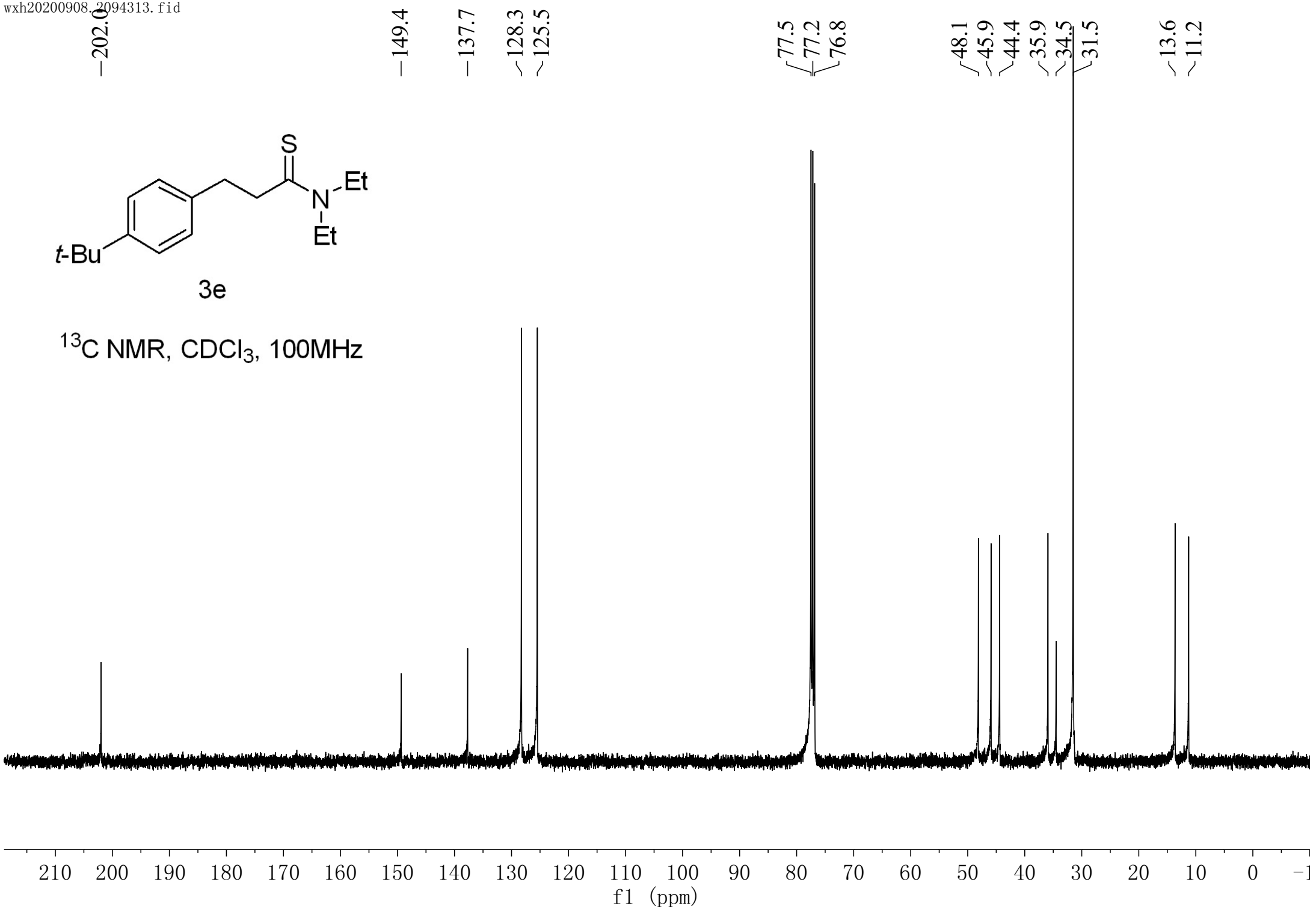
wxh20200908.20943.fid



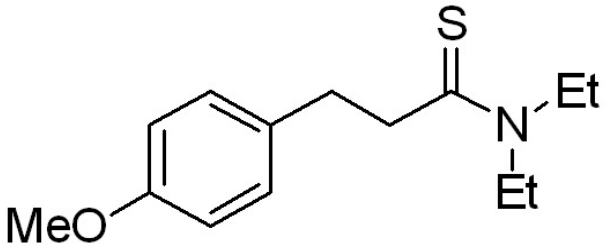
3e

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200908_2094313.fid



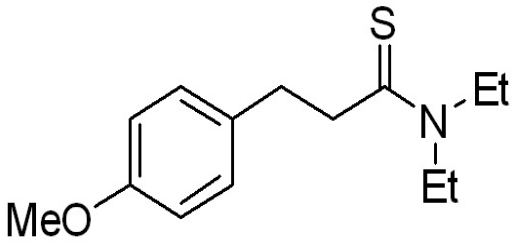
wxh20200909.20941.fid



3f

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200908_2094113.fid



3f

^{13}C NMR, $CDCl_3$, 100MHz

201.9
158.3
132.8
129.6
114.0
77.5
77.2
76.8
55.4
48.1
45.9
44.6
35.6
13.6
11.2

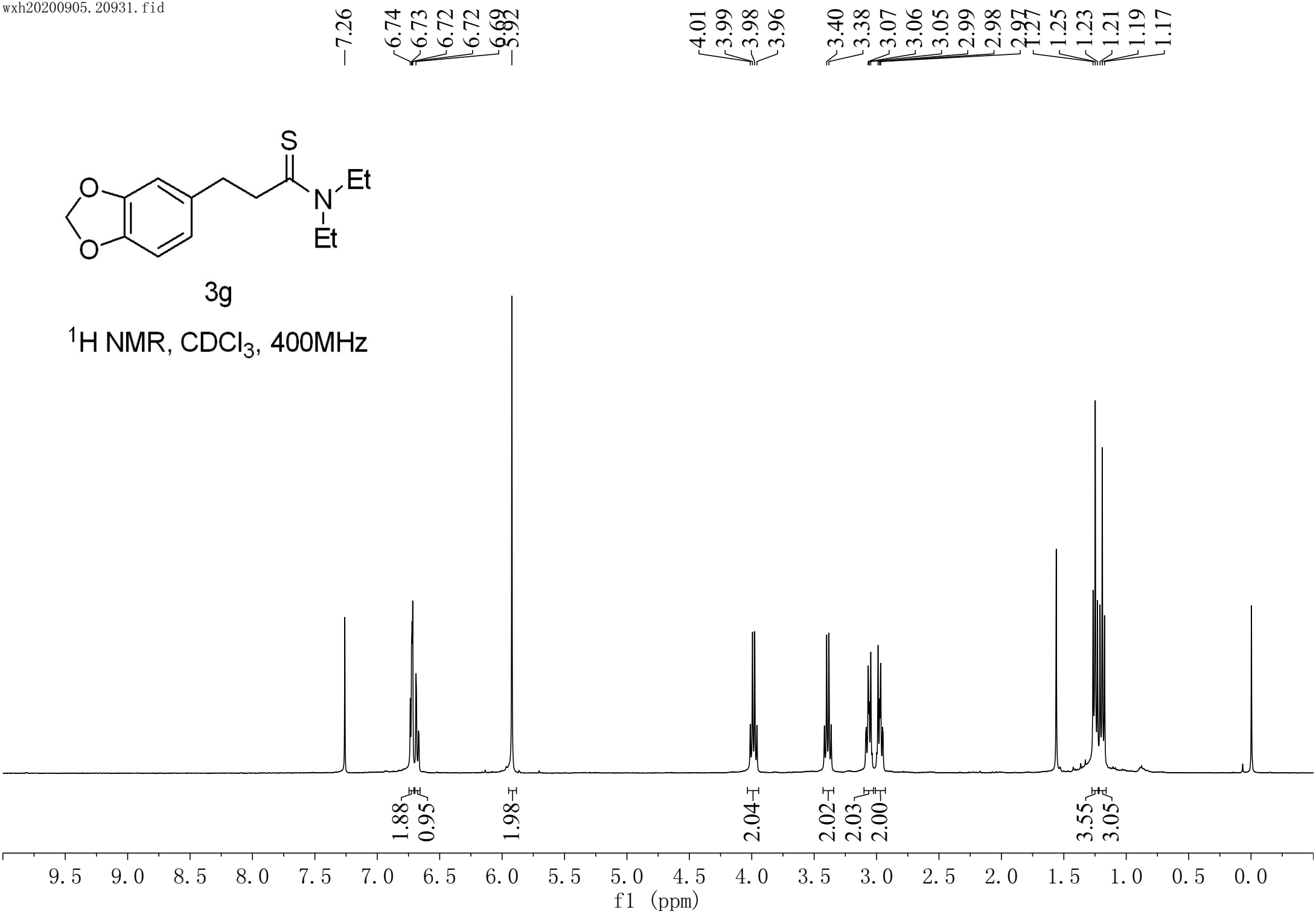
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

wxh20200905.20931.fid

3g

^{1}H NMR, $CDCl_3$, 400MHz



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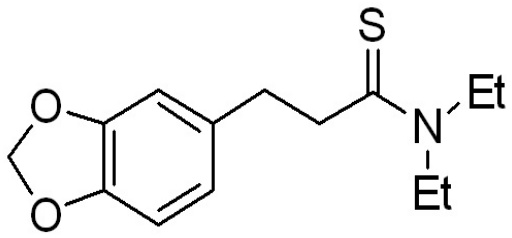
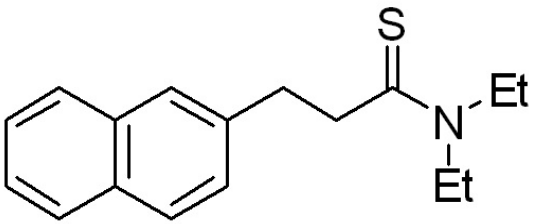


3g

^{13}C NMR, $CDCl_3$, 100MHz

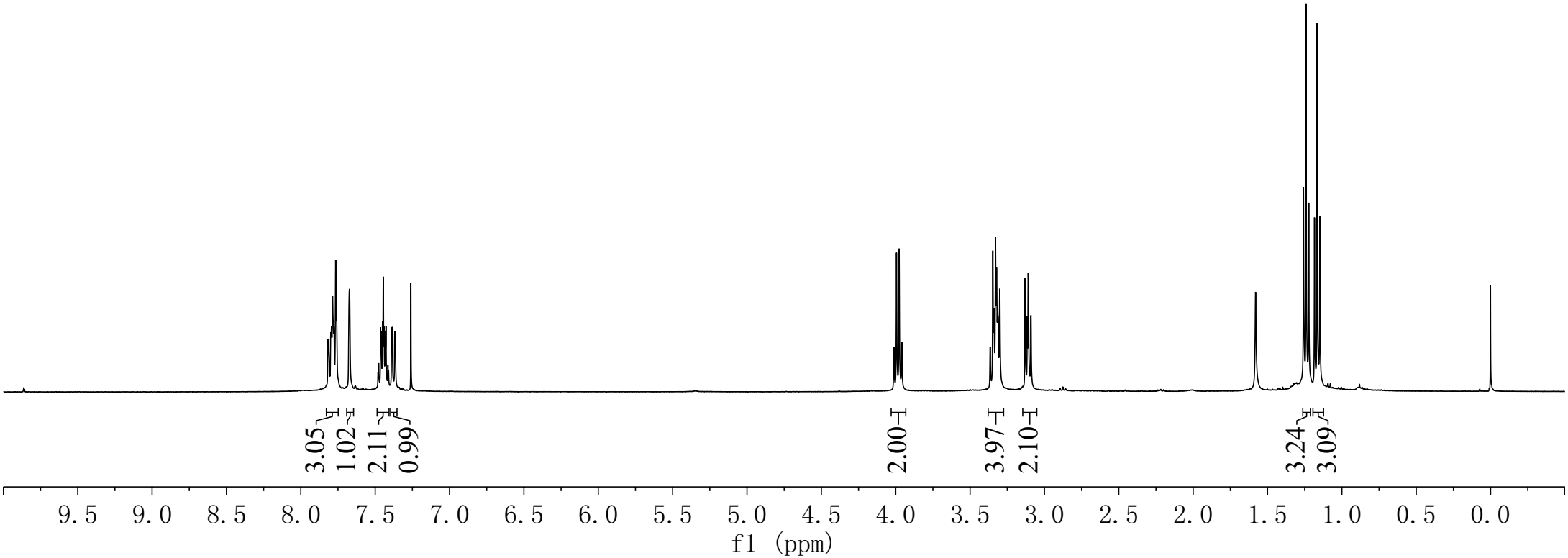
wxh20200907_20932.fid

7.82 7.81 7.80 7.79 7.79 7.78 7.78 7.77 7.76 7.68 7.67 7.48 7.48 7.46 7.46 7.45 7.45 7.44 7.43 7.43 7.41 7.41 7.39 7.39 7.37 7.36 7.26 4.01 3.99 3.98 3.96 3.36 3.35 3.34 3.33 3.32 3.31 3.31 3.30 3.13 3.12 3.11 3.11 3.09 1.26 1.24 1.22 1.18 1.17 1.15



3h

^{1}H NMR, $CDCl_3$, 400MHz



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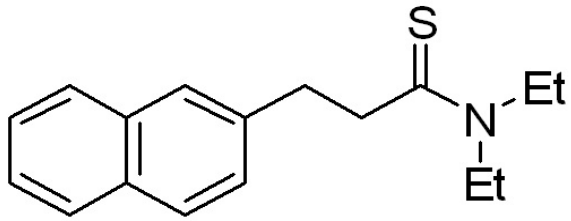
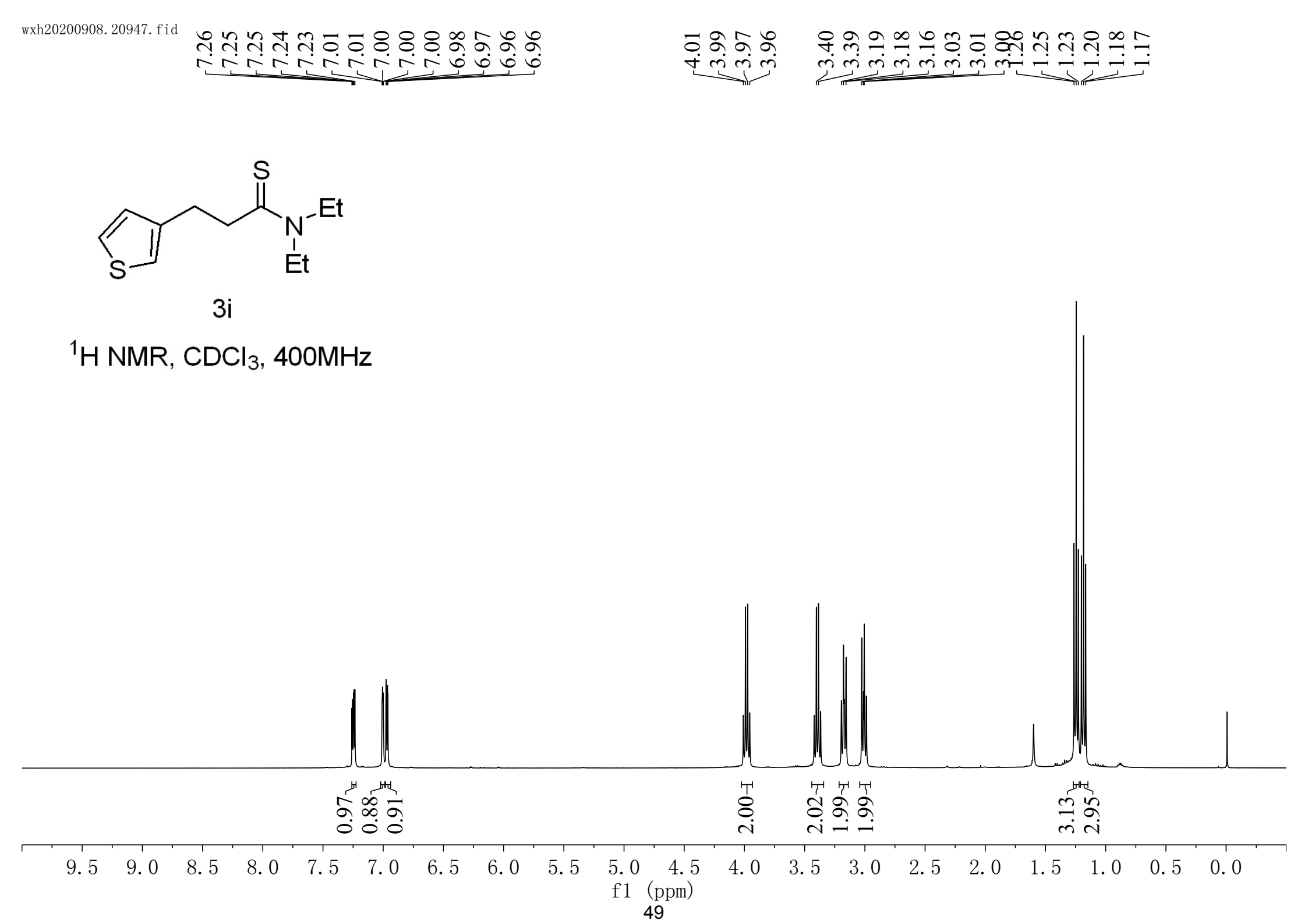


3h

^{13}C NMR, $CDCl_3$, 100MHz

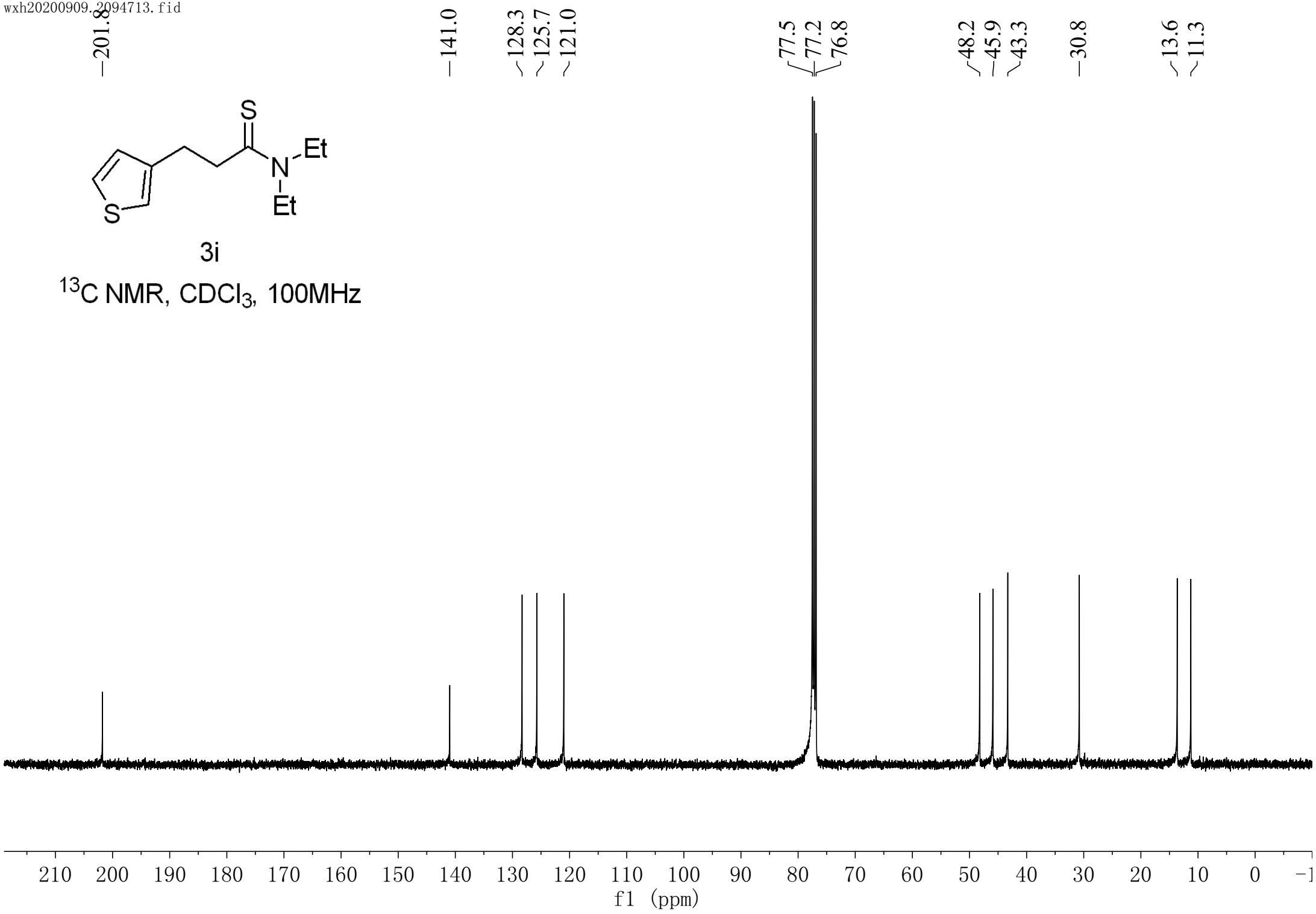
wxh20200908.20947.fid



wxh20200909.2094713.fid

3i

^{13}C NMR, $CDCl_3$, 100MHz



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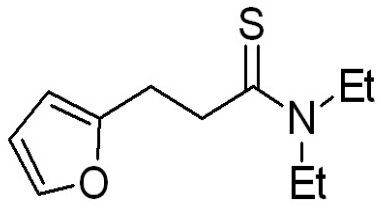
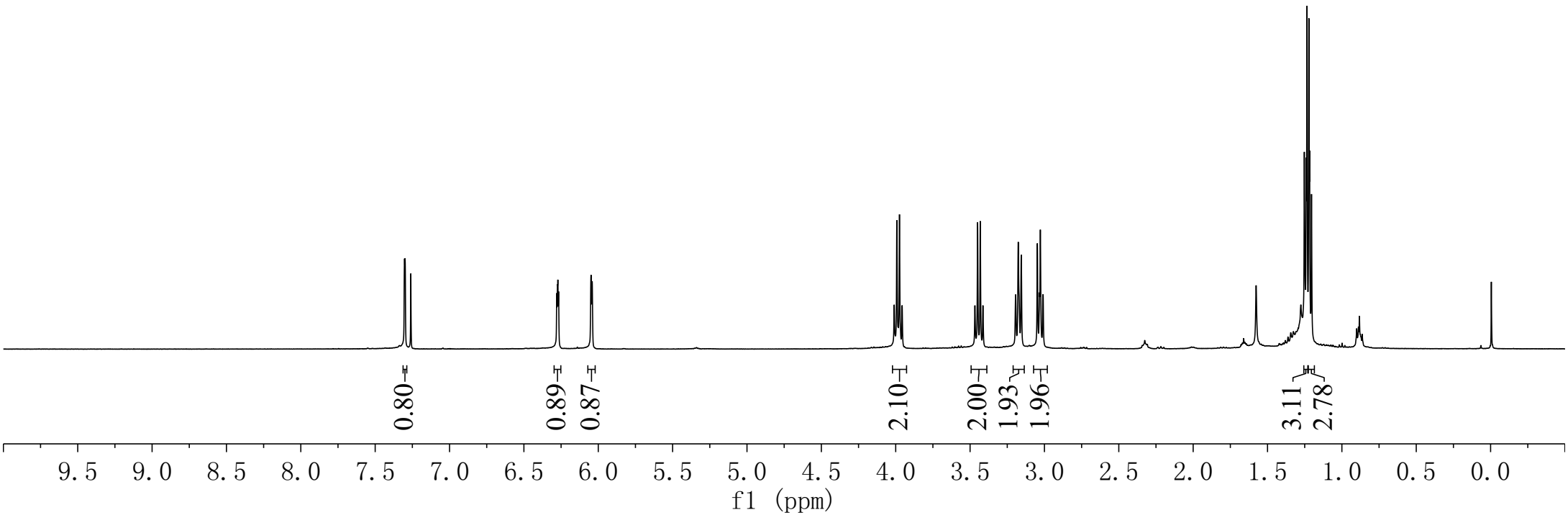
7.30 7.30 7.26 6.28 6.27 6.27 6.27 6.05 6.04 4.01 3.99 3.97 3.96 3.45 3.43 3.41 3.19 3.18 3.16 3.05 3.03 1.25 1.24 1.23 1.22 1.22 1.20



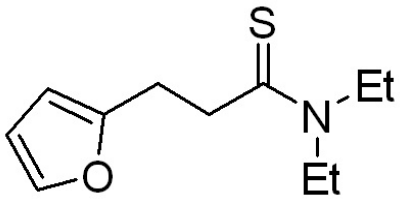
3j

^{1}H NMR, $CDCl_3$, 400MHz



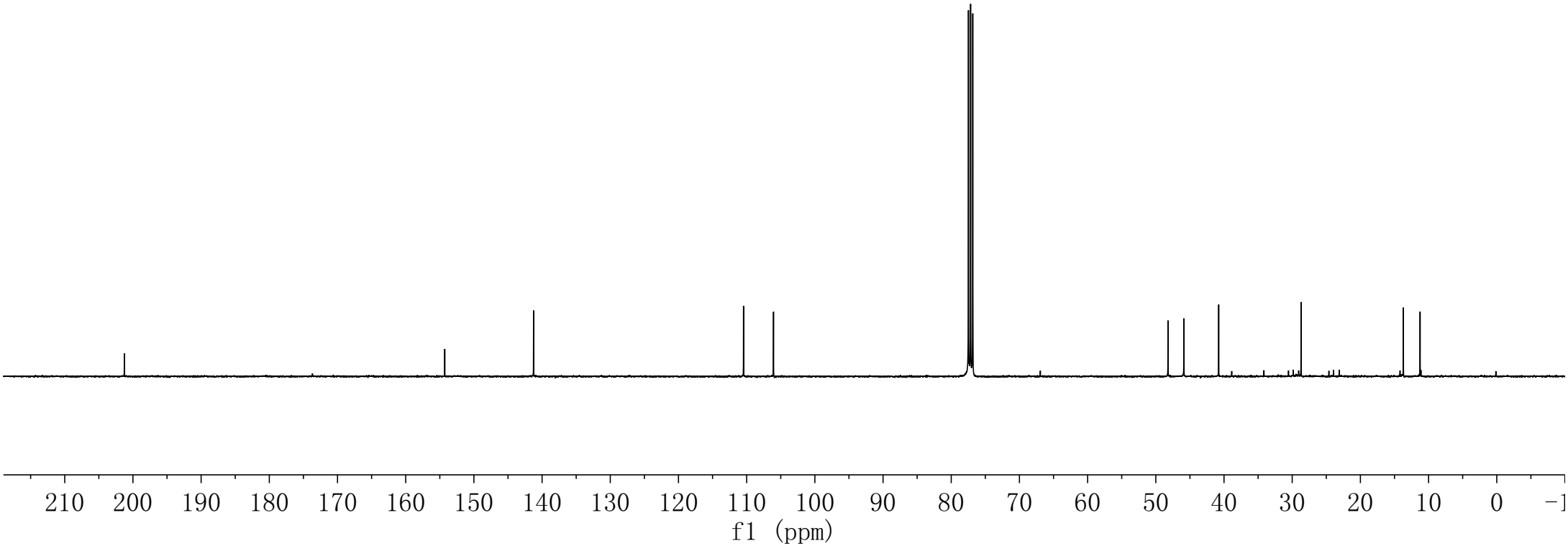
wxh20200910.2094513.fid

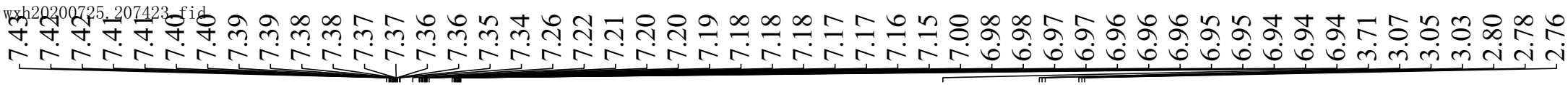
201.3
154.3
141.3
110.5
106.1
77.5
77.2
76.8
48.2
45.9
40.8
28.7
13.7
11.2

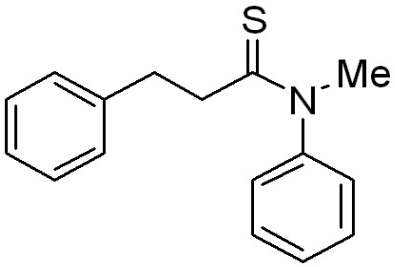


3j

^{13}C NMR, $CDCl_3$, 100MHz

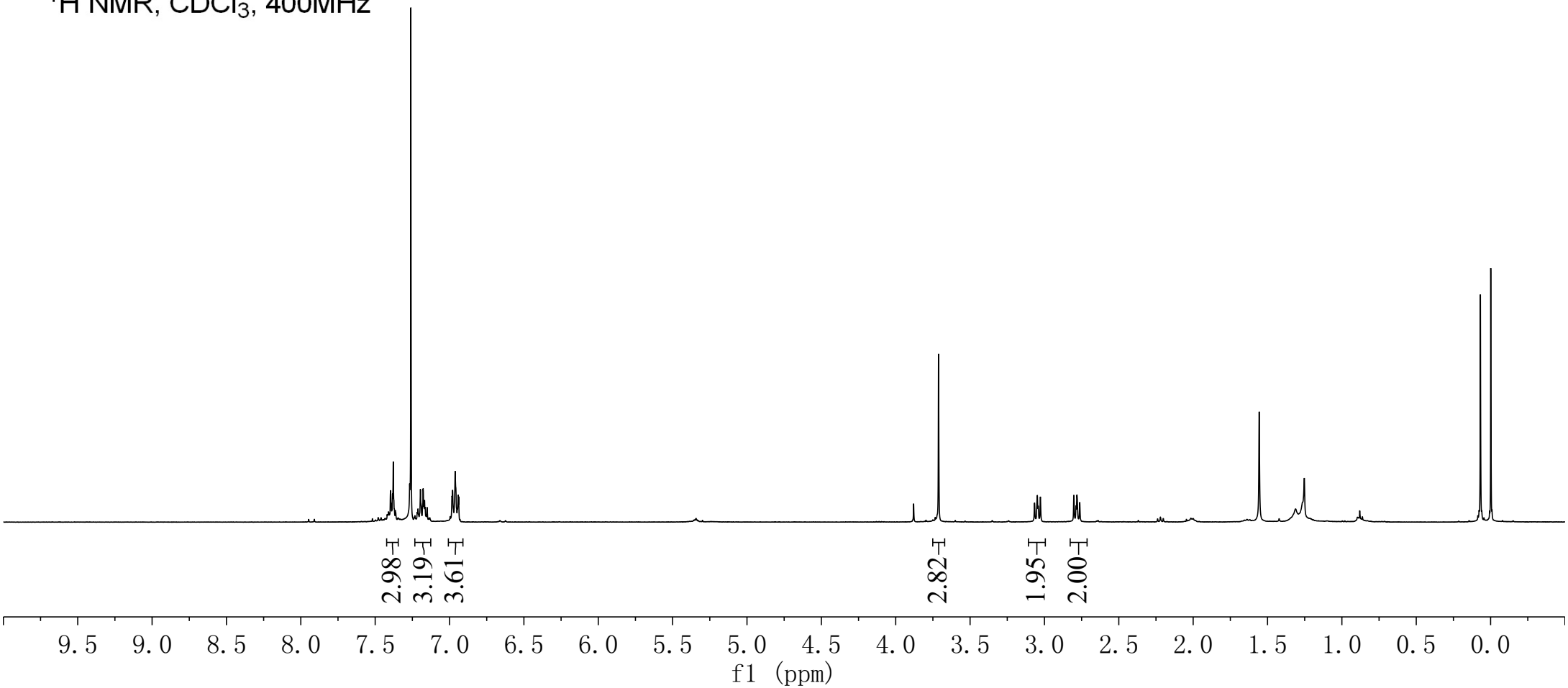






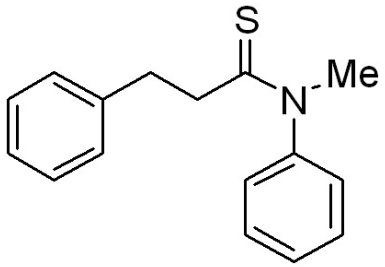
3k

^{1}H NMR, $CDCl_3$, 400MHz



wxh20200807 2079213.fid

205.0
145.6
140.8
130.1
128.6
128.5
126.3
125.7
77.5
77.2
76.8
46.0
45.7
36.6



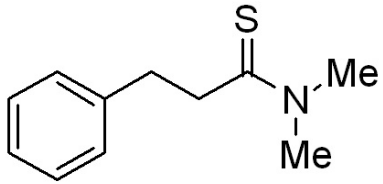
3k

^{13}C NMR, $CDCl_3$, 100MHz

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −1

f1 (ppm)

wxh20200610.20426.fid

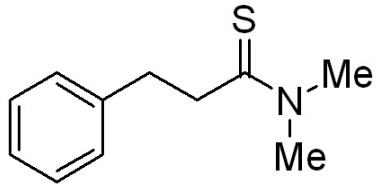


3l

^{1}H NMR, $CDCl_3$, 400MHz

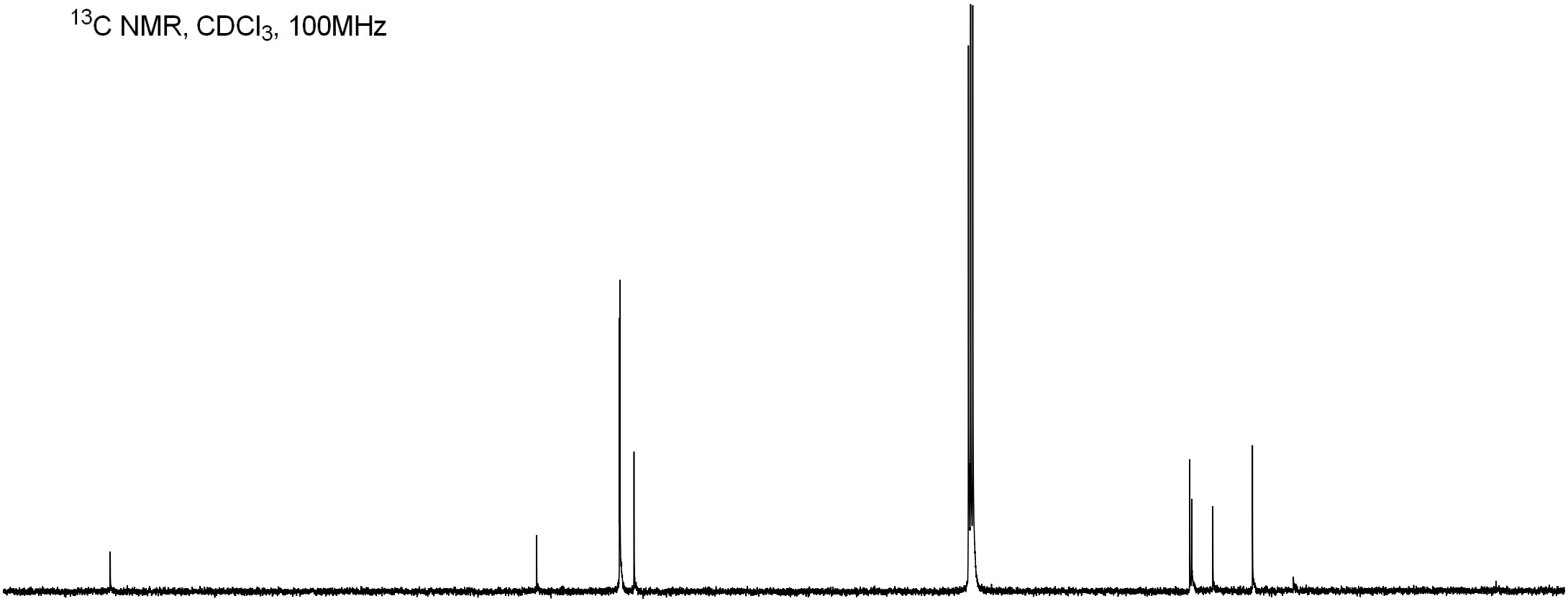
wxh20200611_2042613.fid

203.3
140.8
128.7
128.6
126.5
77.5
77.2
76.8
45.0
44.7
41.6
35.8



3l

^{13}C NMR, $CDCl_3$, 100MHz



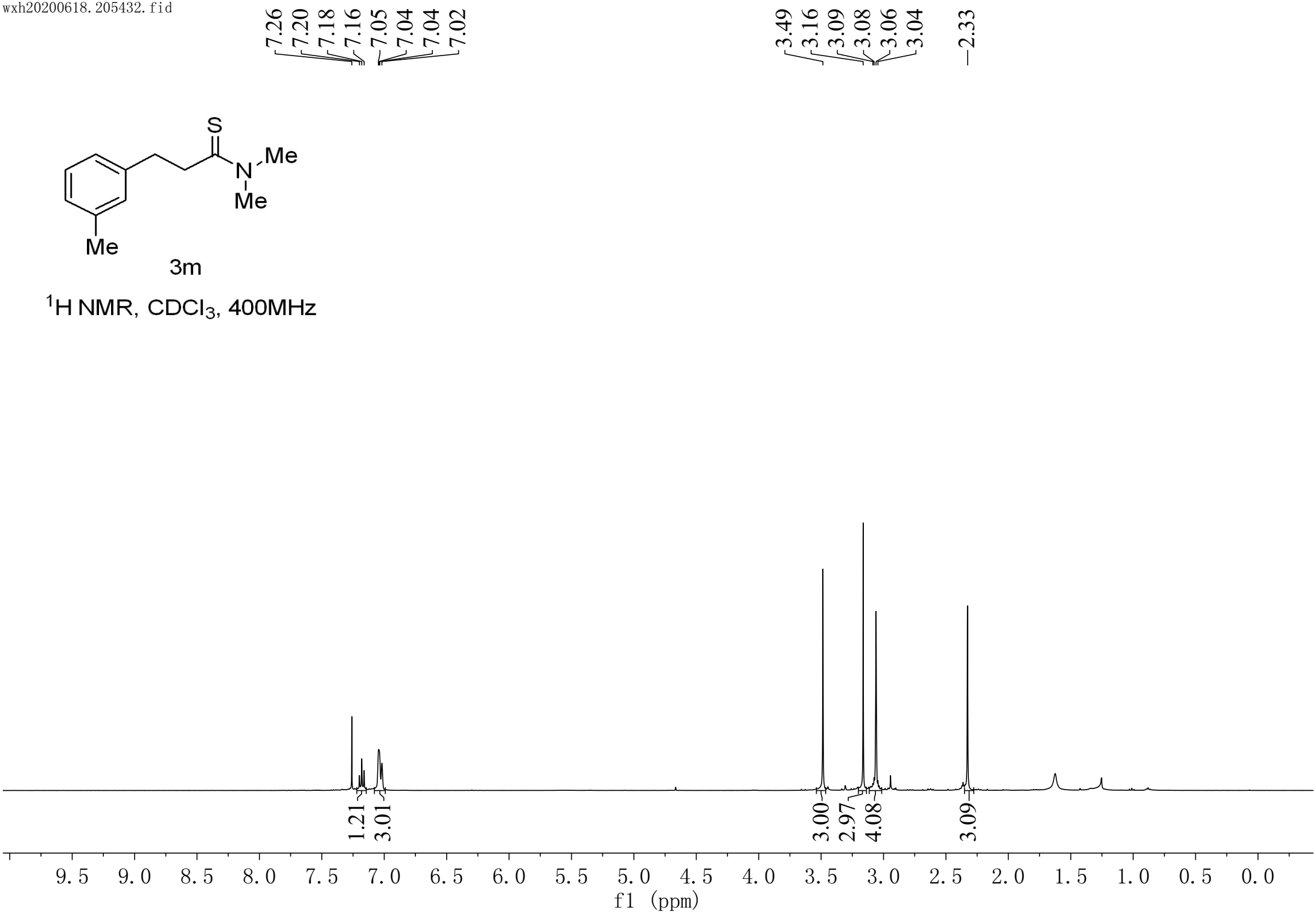
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

wxh20200618.205432.fid

3m

^{1}H NMR, $CDCl_3$, 400MHz



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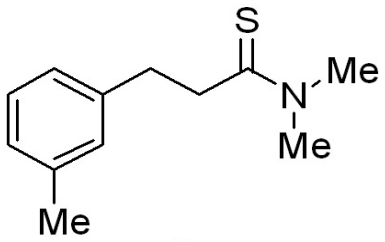
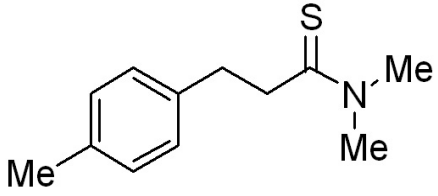


3m

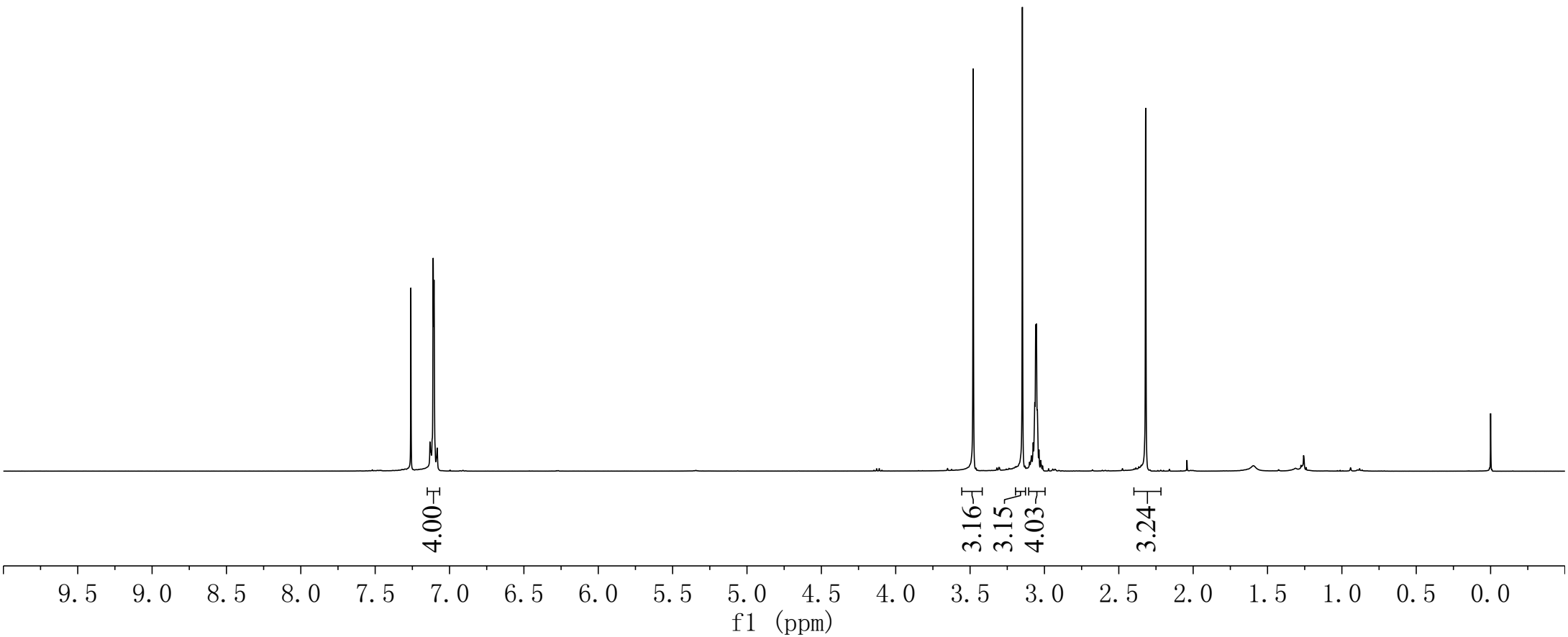
^{13}C NMR, $CDCl_3$, 100MHz

wxh20200614.20481.fid



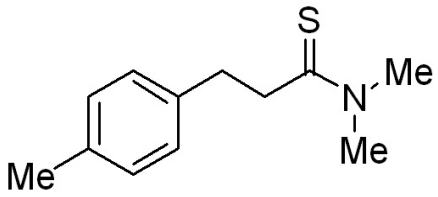
3n

^{1}H NMR, $CDCl_3$, 400MHz



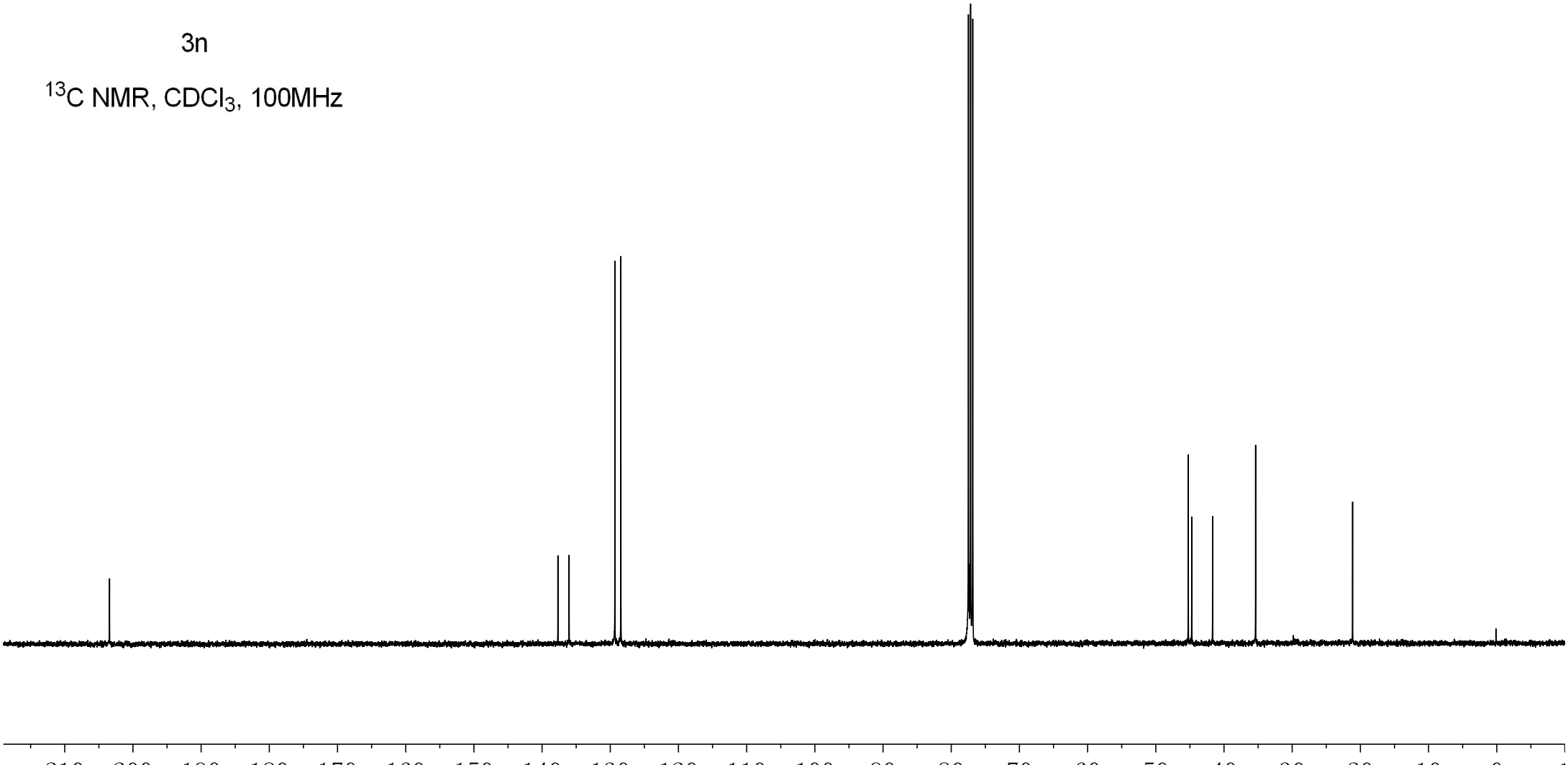
wxh20200614_2048113.fid

203.4
137.7
136.0
129.3
128.4
77.5
77.2
76.8
45.2
44.7
41.7
35.4
21.1



3n

^{13}C NMR, $CDCl_3$, 100MHz



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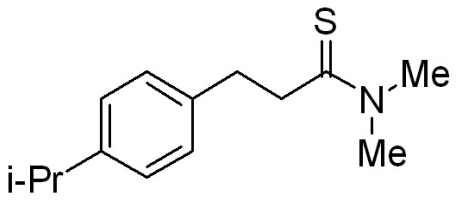
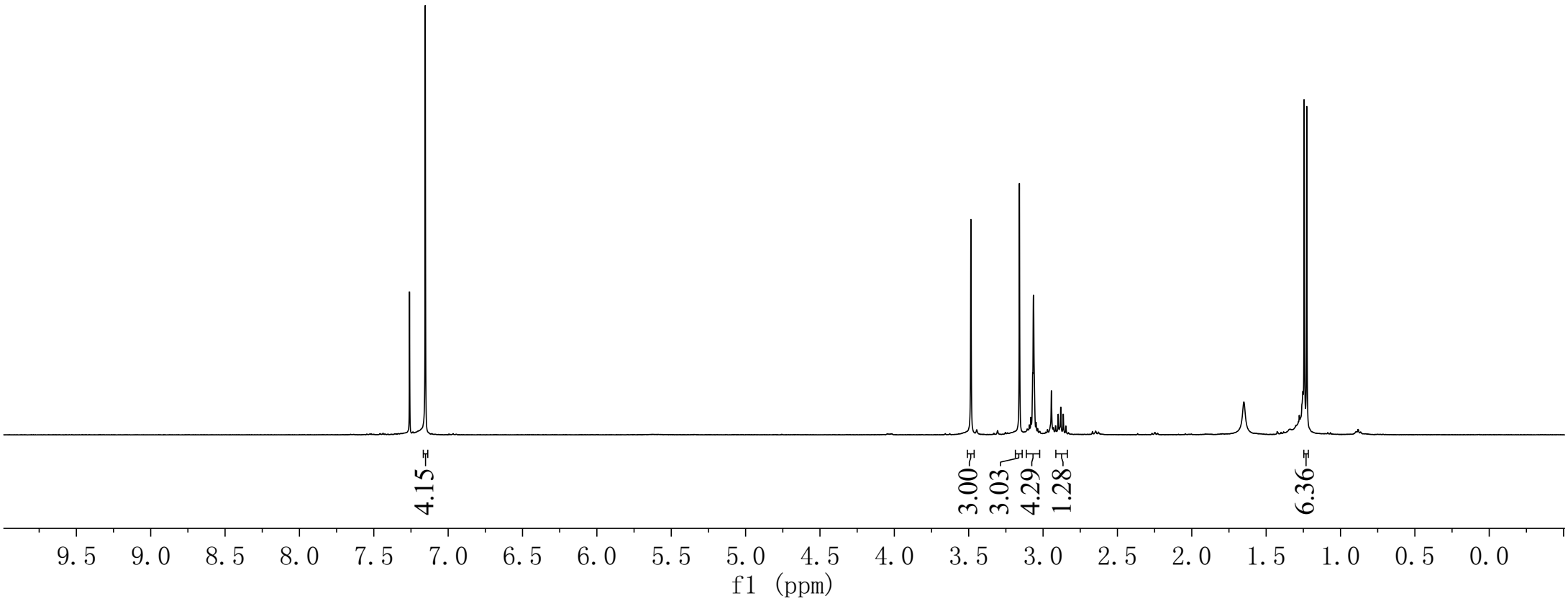


3o

^{1}H NMR, $CDCl_3$, 400MHz

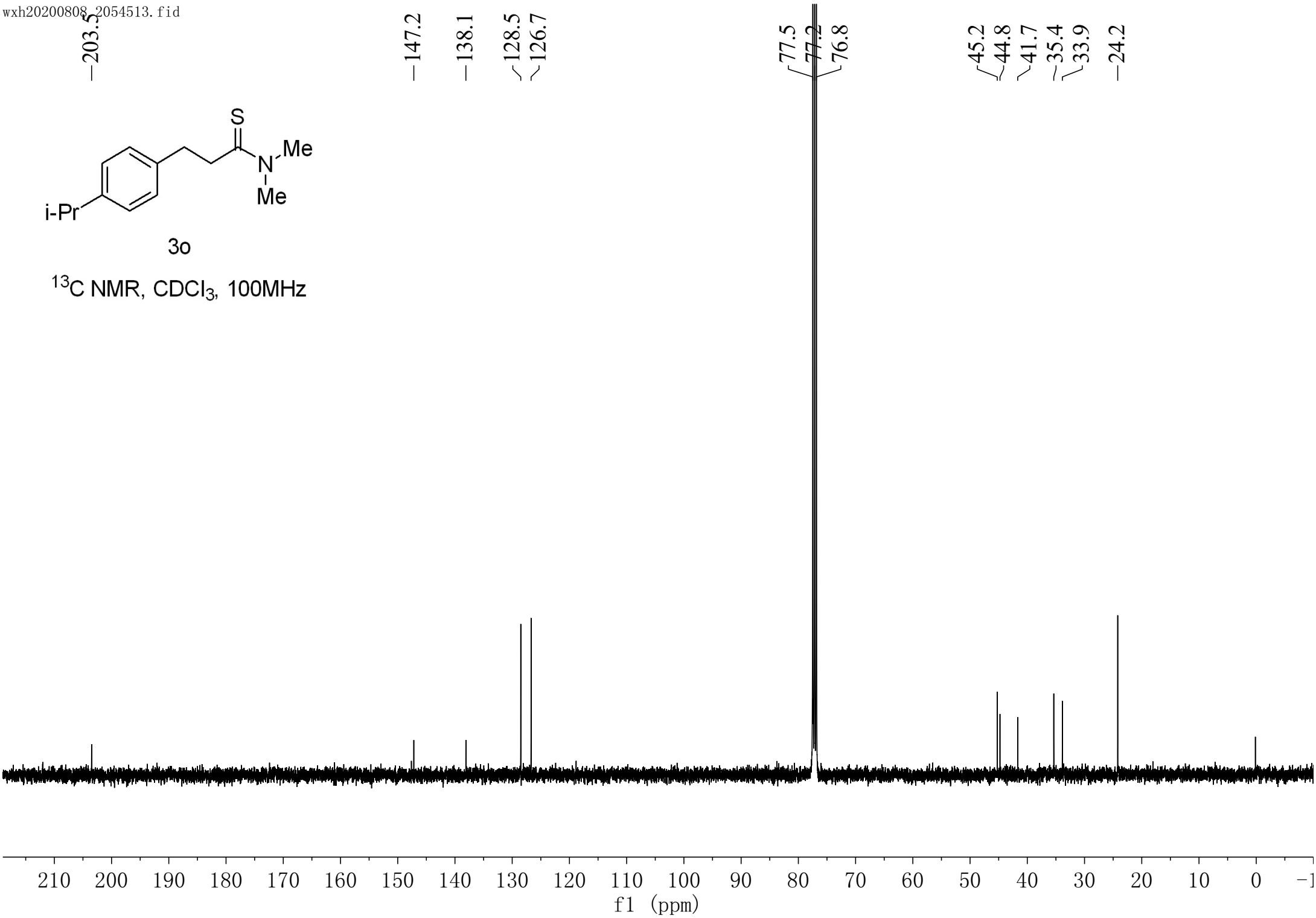


wxh20200808_2054513.fid

203.5
147.2
138.1
128.5
126.7
77.5
77.2
76.8
45.2
44.8
41.7
35.4
33.9
24.2

3o

^{13}C NMR, $CDCl_3$, 100MHz



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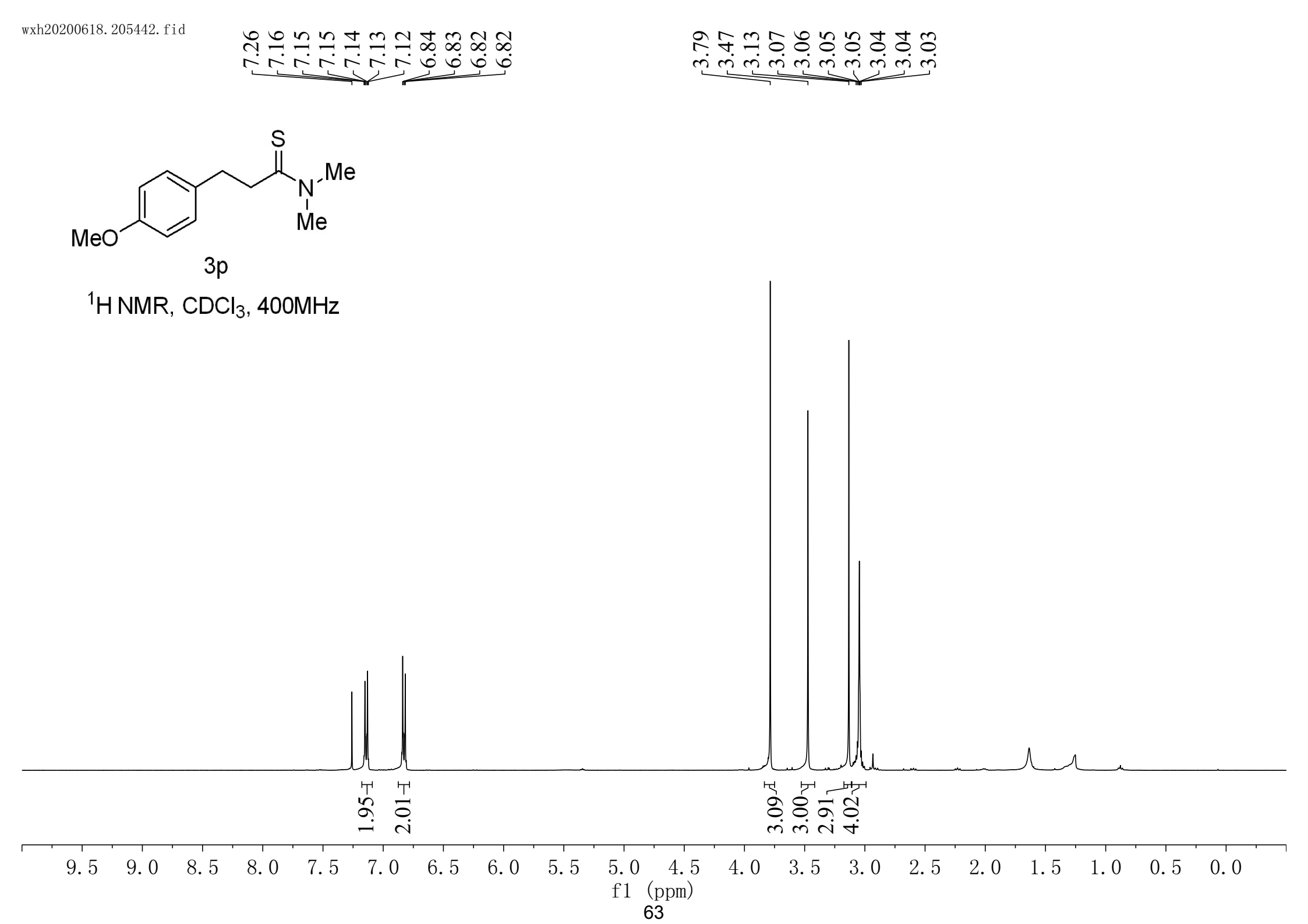

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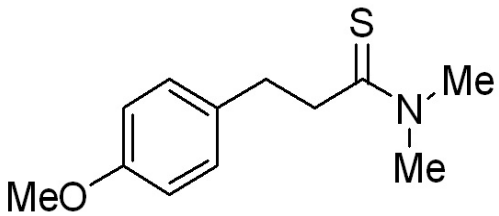
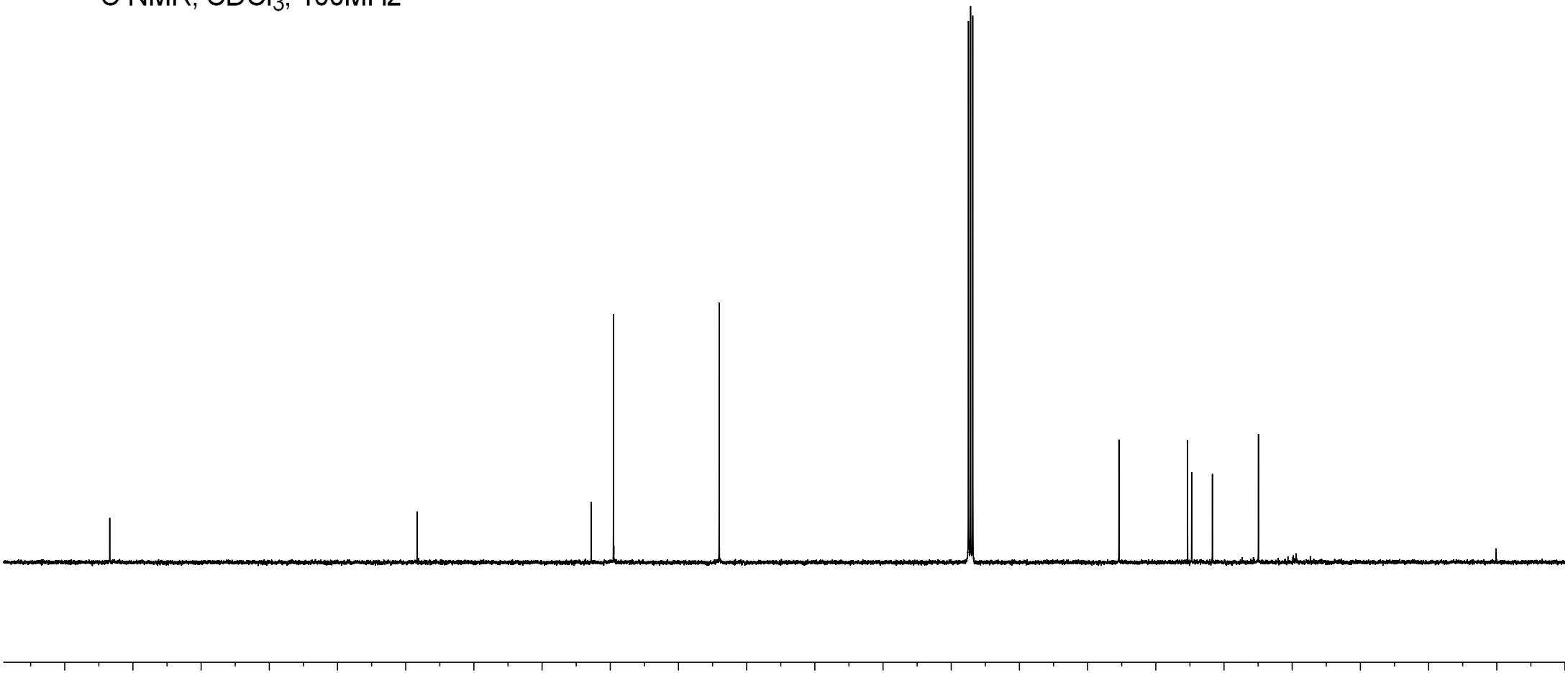
203.4
158.3
132.8
129.5
114.0
77.5
77.2
76.8
55.4
45.3
44.7
41.7
35.0



3p

^{13}C NMR, $CDCl_3$, 100MHz



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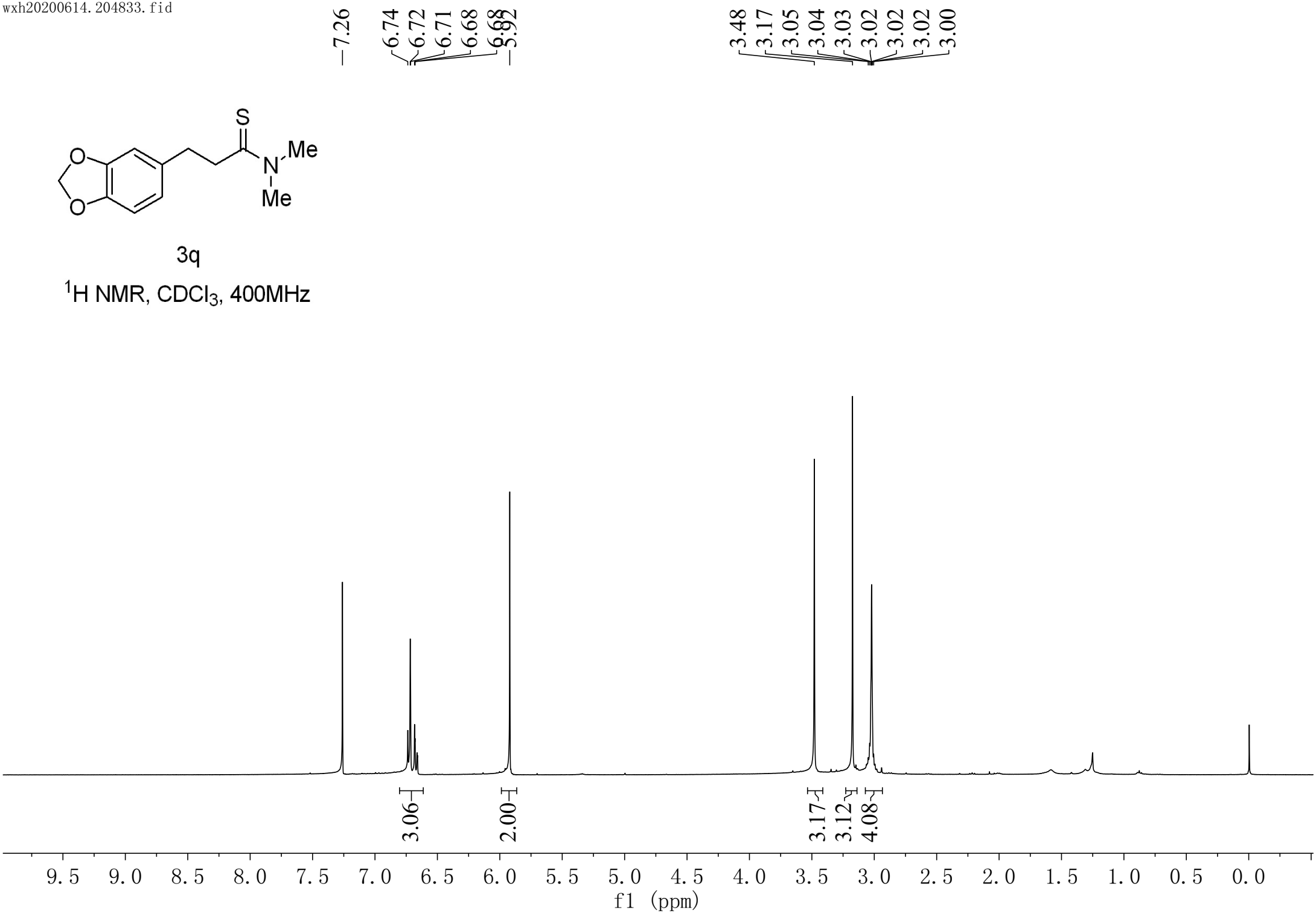
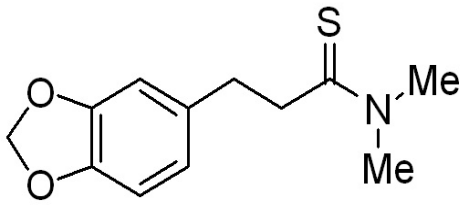
3q

^{1}H NMR, $CDCl_3$, 400MHz



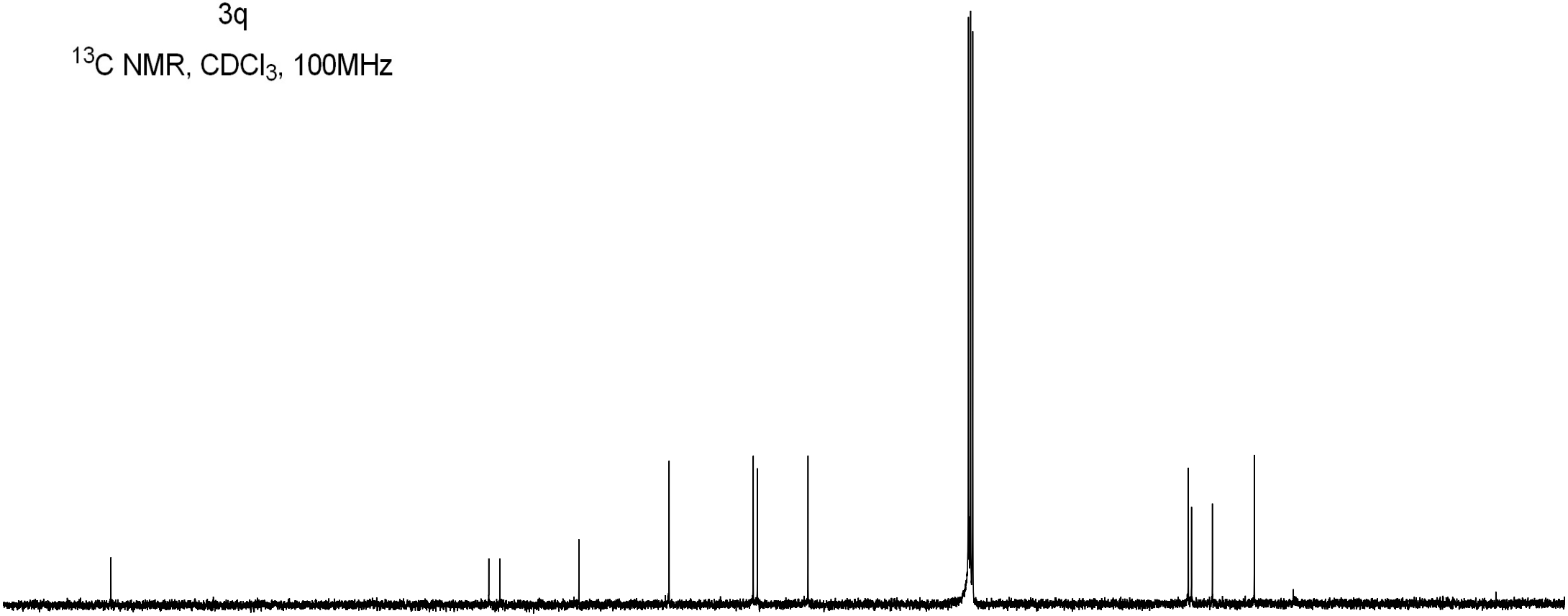
wxh20200614_20483313.fid

203.2
147.8
146.2
134.6
121.4
109.0
108.4
101.0
77.5
77.2
76.8
45.2
44.8
41.7
35.5



3q

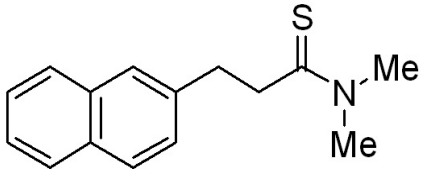
^{13}C NMR, $CDCl_3$, 100MHz



210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −1

f1 (ppm)

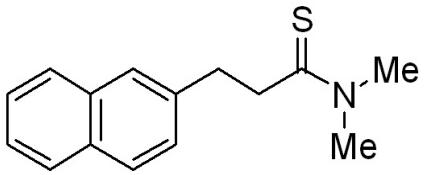
wxh20200615_204853.fid



3r

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200614_20485313.fid

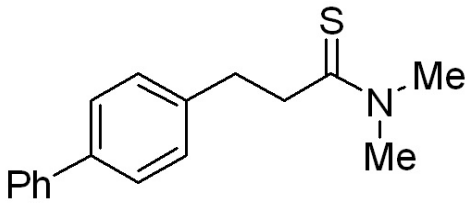


3r

^{13}C NMR, $CDCl_3$, 100MHz

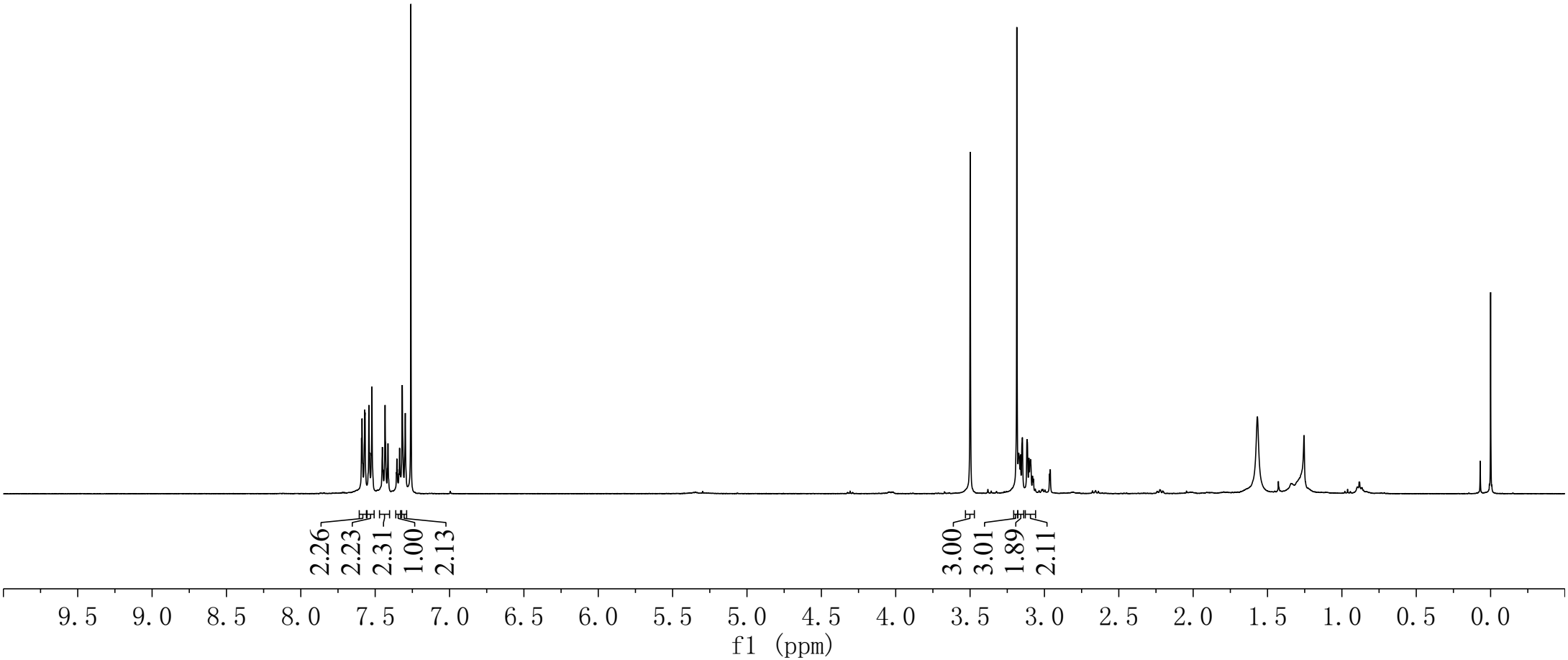
wxh20200619_20488_fid

7.59 7.59 7.58 7.57 7.57 7.57 7.54 7.54 7.53 7.52 7.45 7.45 7.43 7.43 7.41 7.36 7.35 7.35 7.34 7.32 7.31 7.30 7.30 7.26 3.50 3.19 3.18 3.17 3.17 3.16 3.15 3.15 3.12 3.11 3.10 3.10 3.09 3.08 3.07



3s

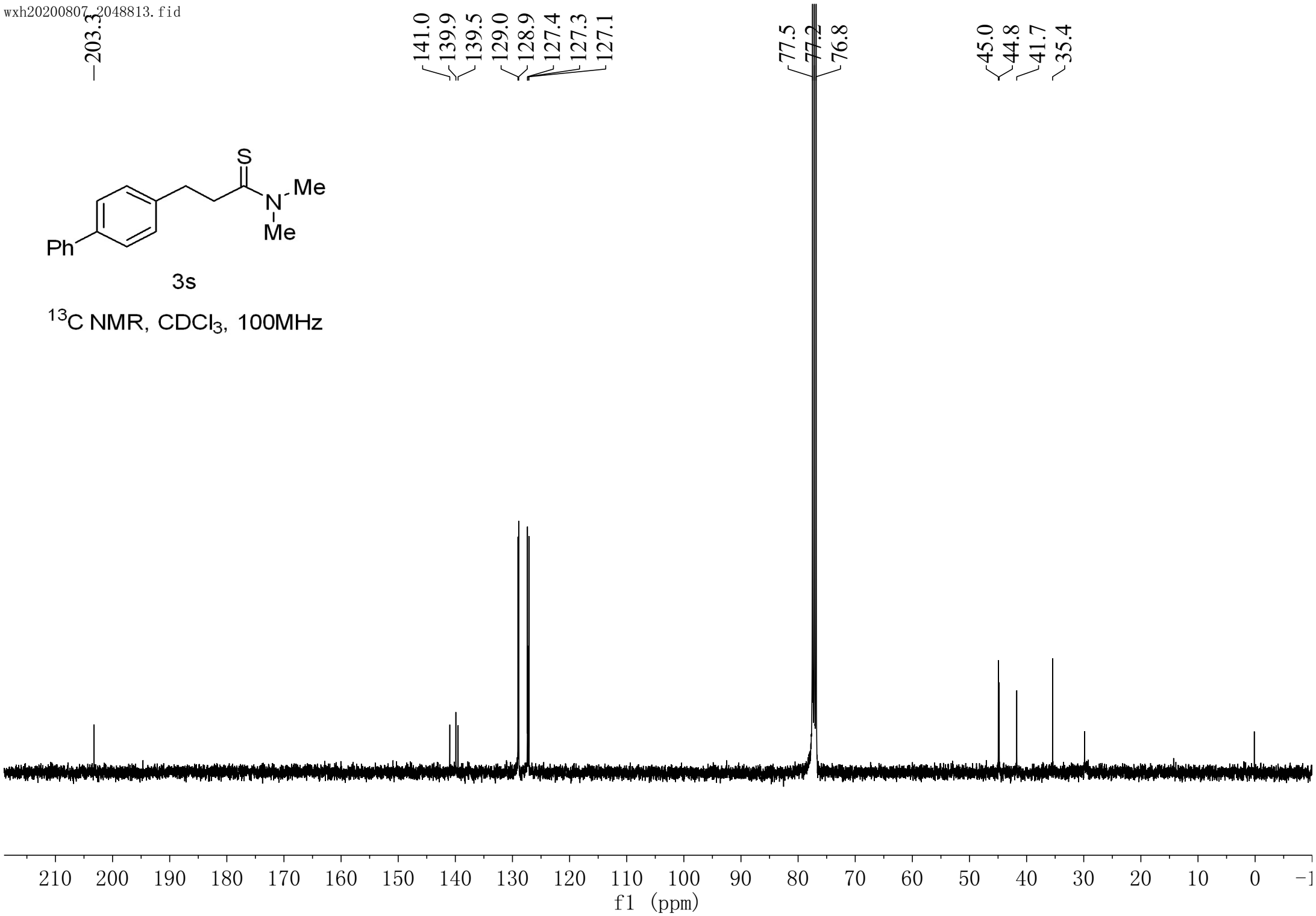
^{1}H NMR, $CDCl_3$, 400MHz



wxh20200807_2048813.fid

3s

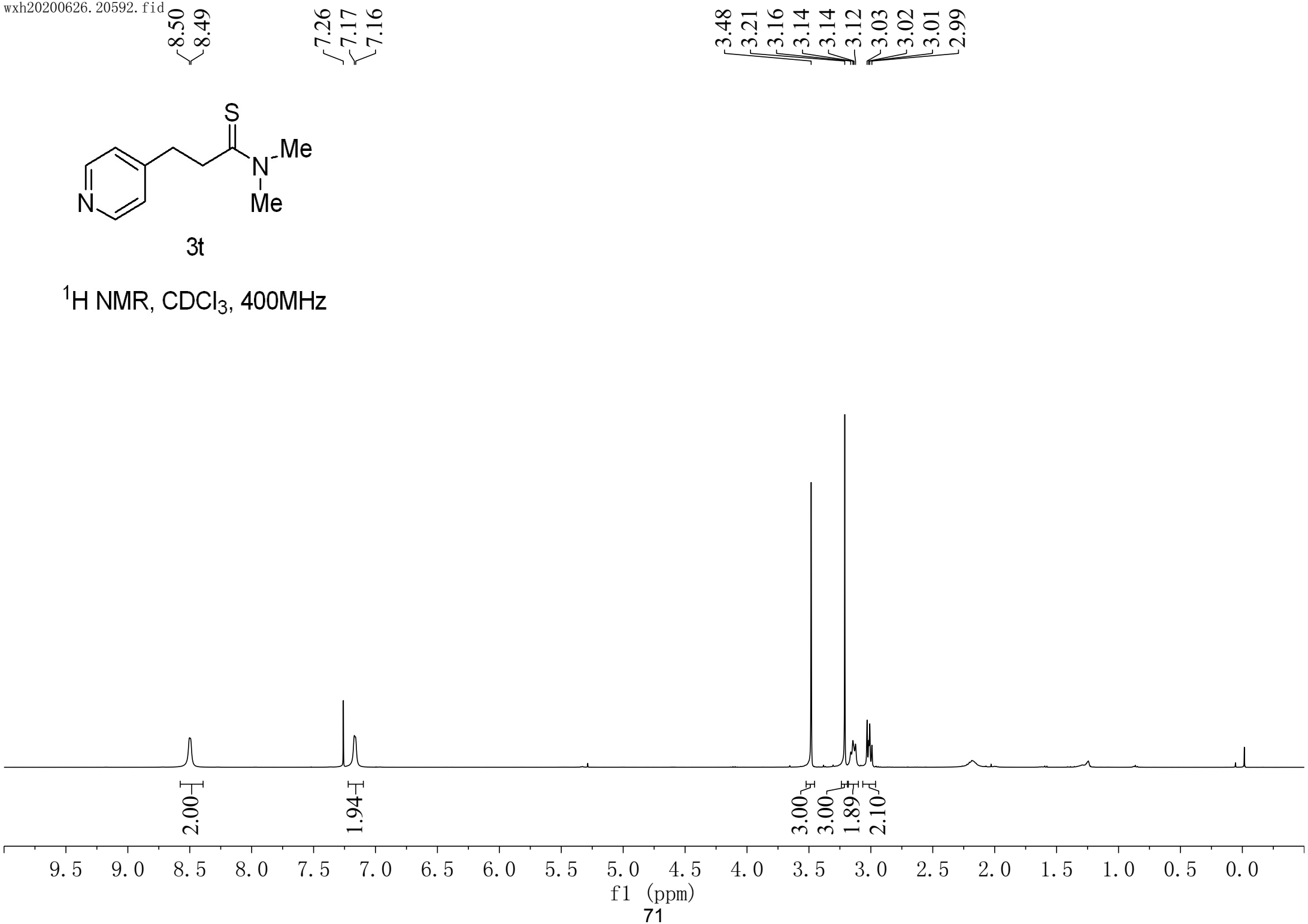
^{13}C NMR, $CDCl_3$, 100MHz



wxh20200626.20592.fid

3t

^{1}H NMR, $CDCl_3$, 400MHz



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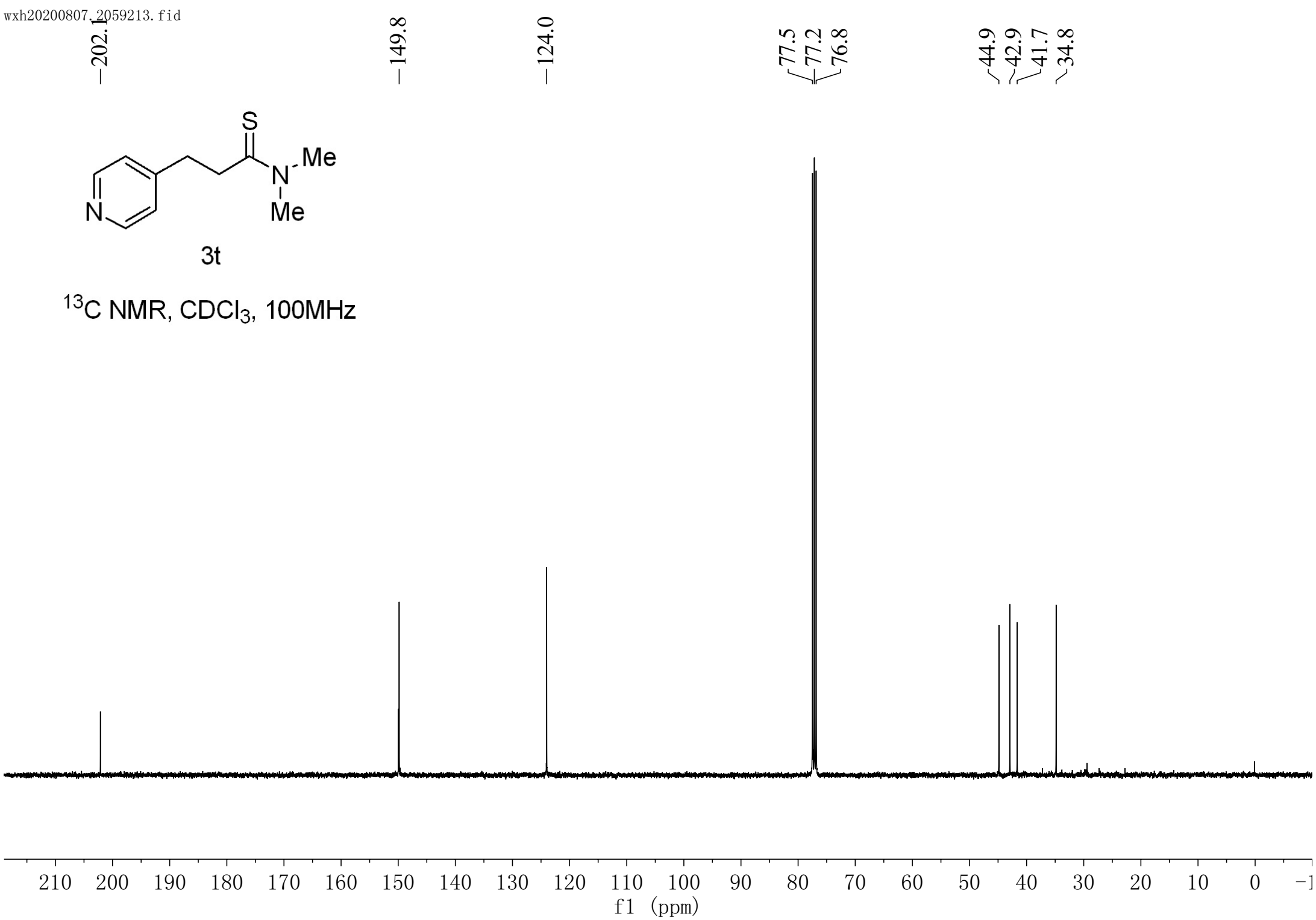
3t

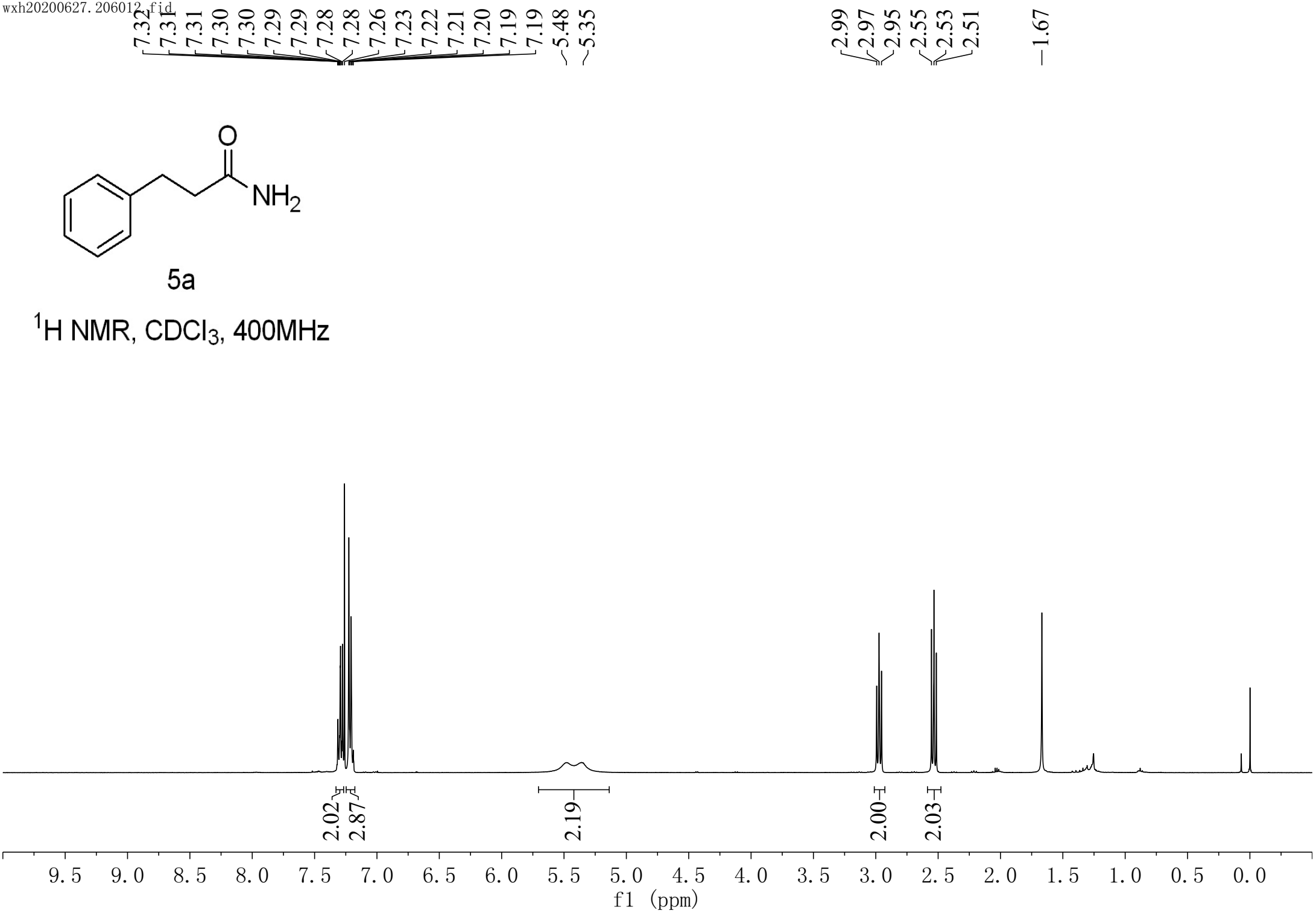
^{13}C NMR, $CDCl_3$, 100MHz



wxh20200627.206012.fid

5a

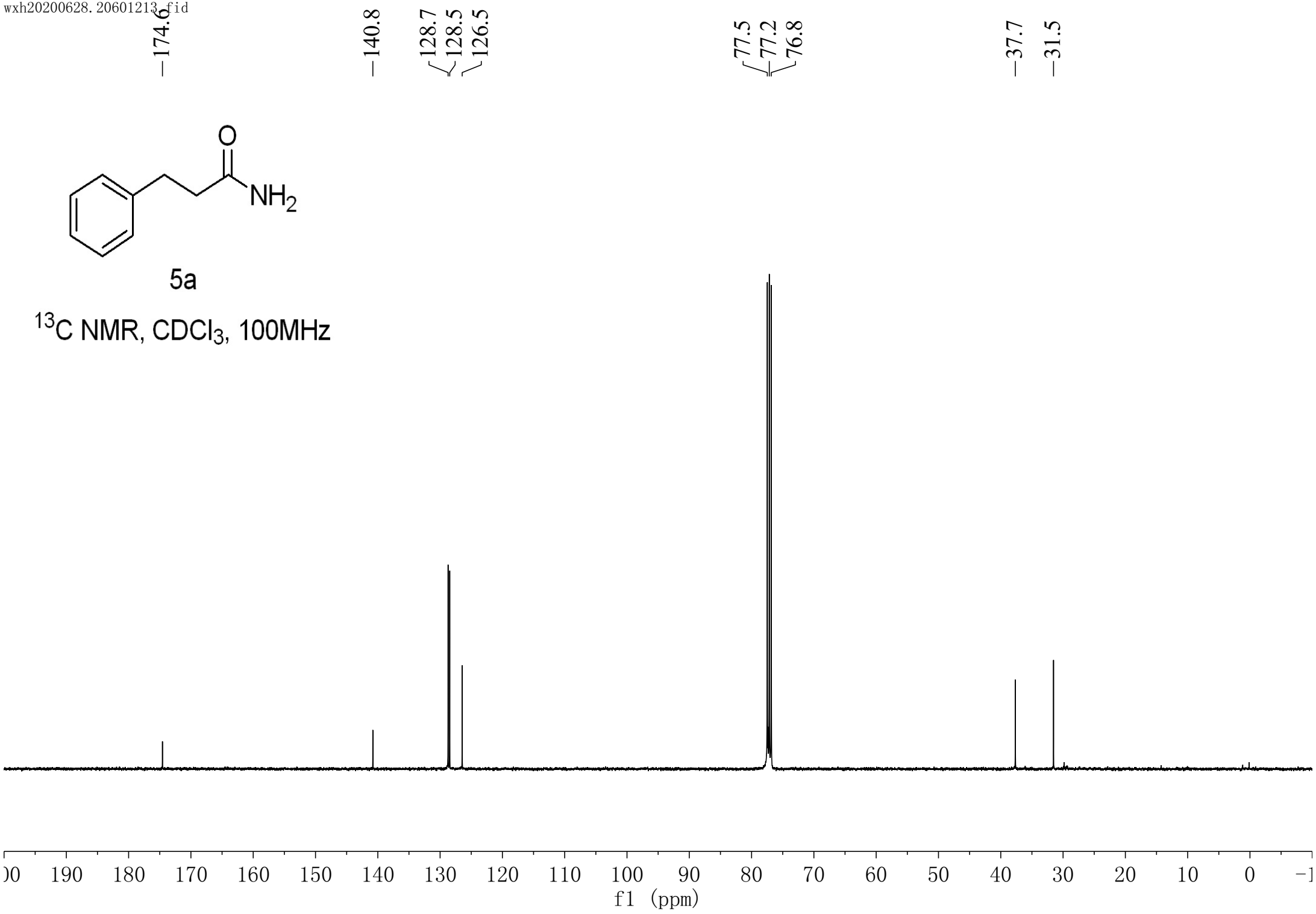
^{1}H NMR, $CDCl_3$, 400MHz



wxh20200628.20601213.fid

5a

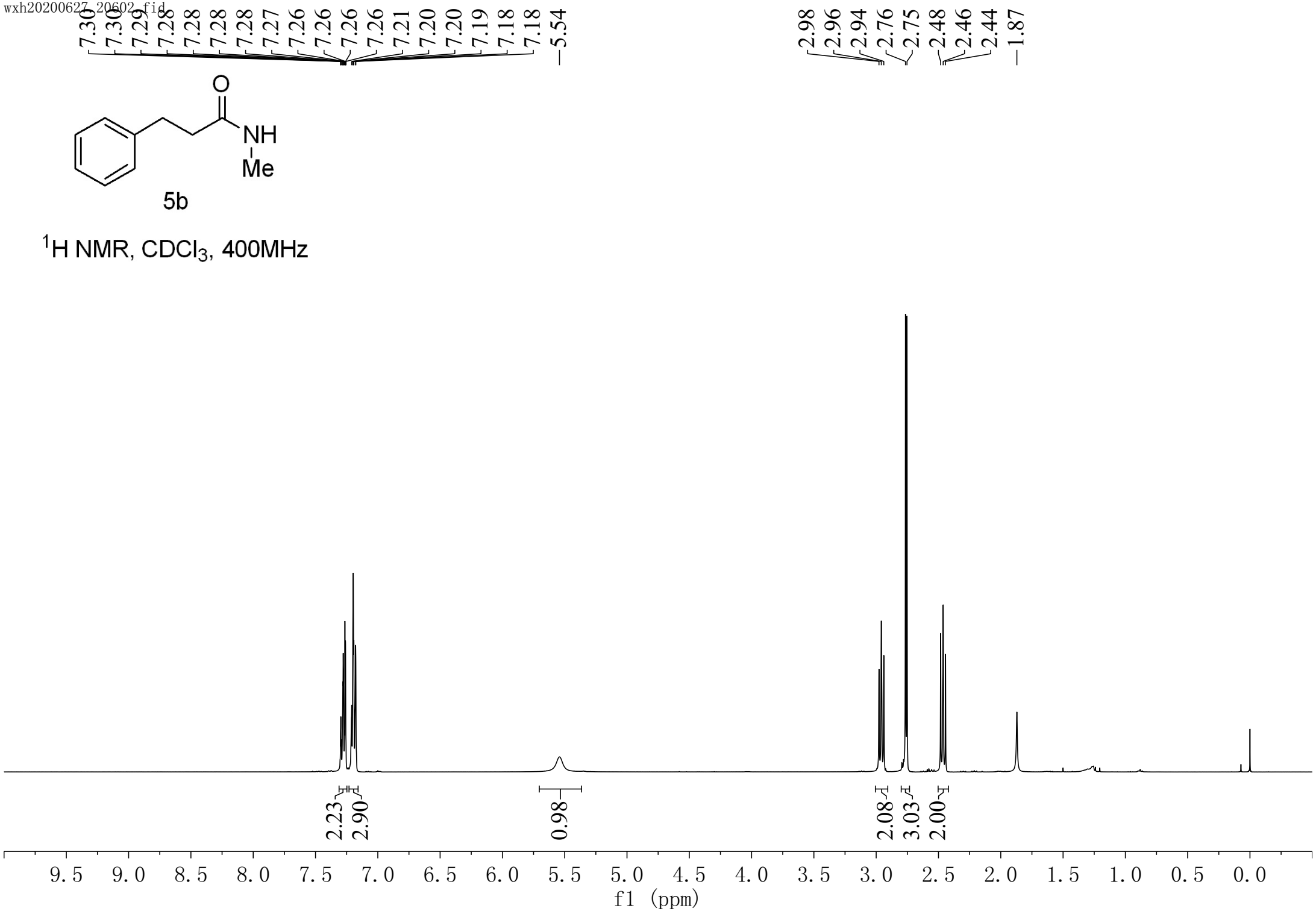
^{13}C NMR, $CDCl_3$, 100MHz



wxh20200627-20602-fid

5b

^{1}H NMR, $CDCl_3$, 400MHz



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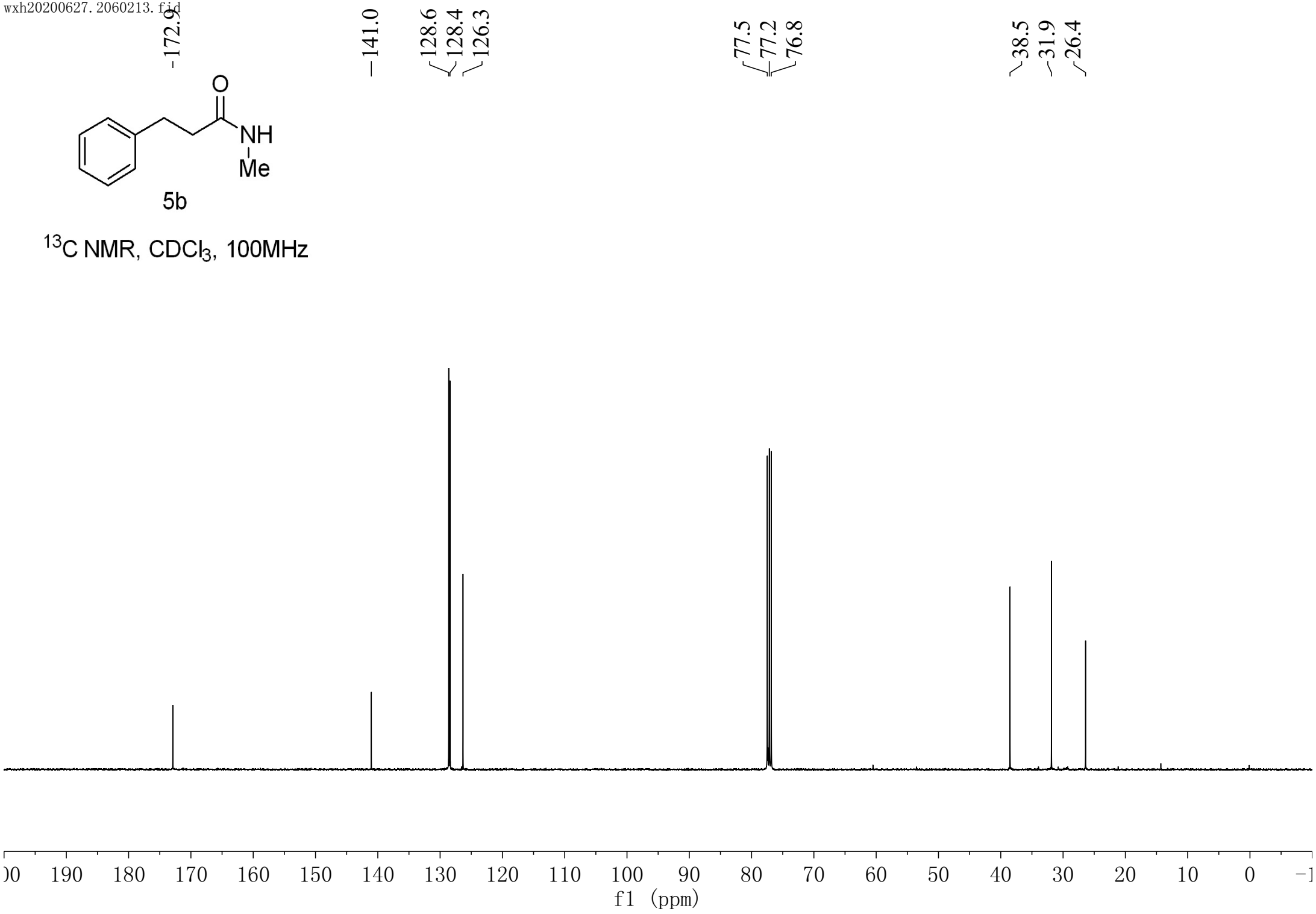
5b

^{13}C NMR, $CDCl_3$, 100MHz



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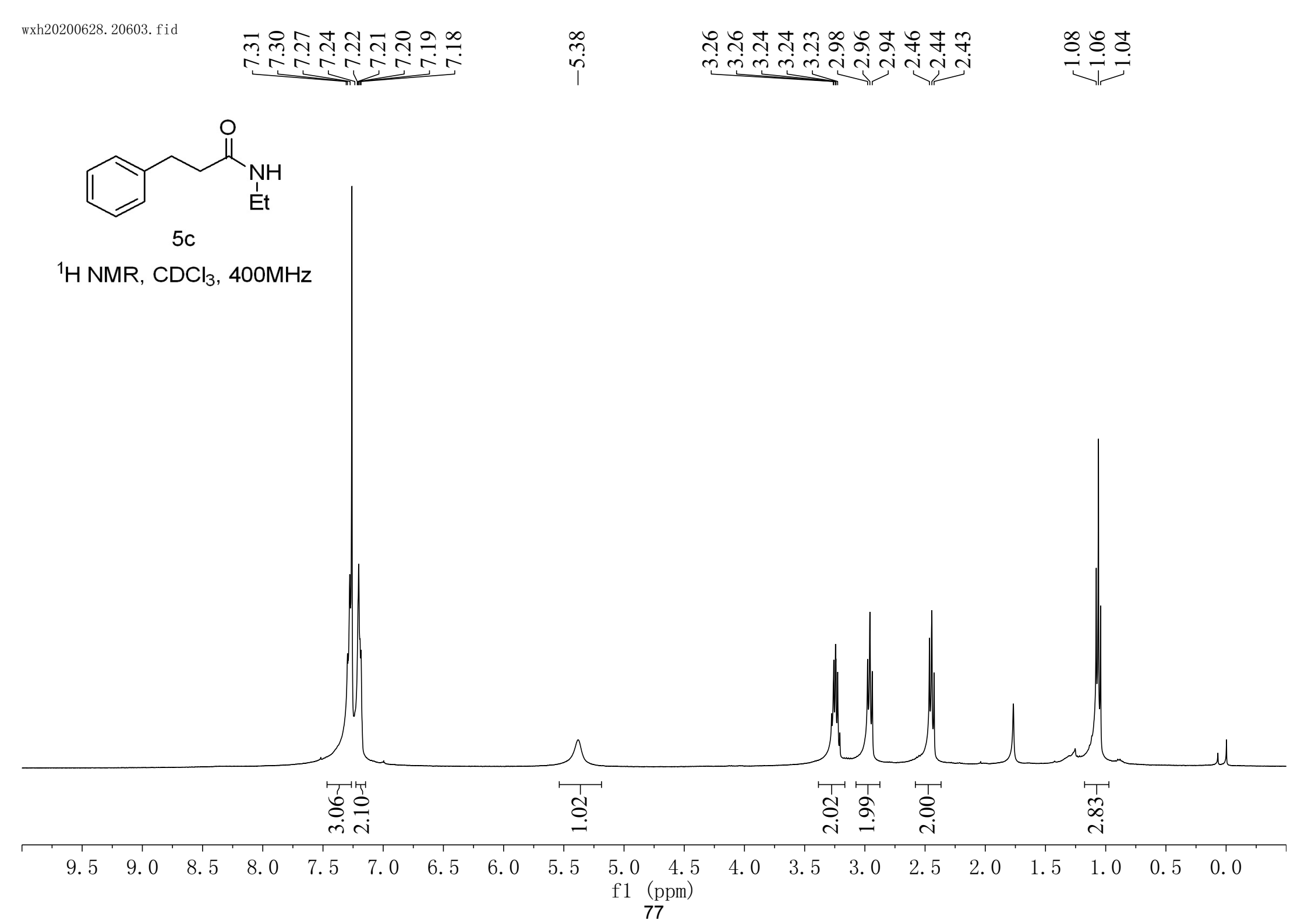

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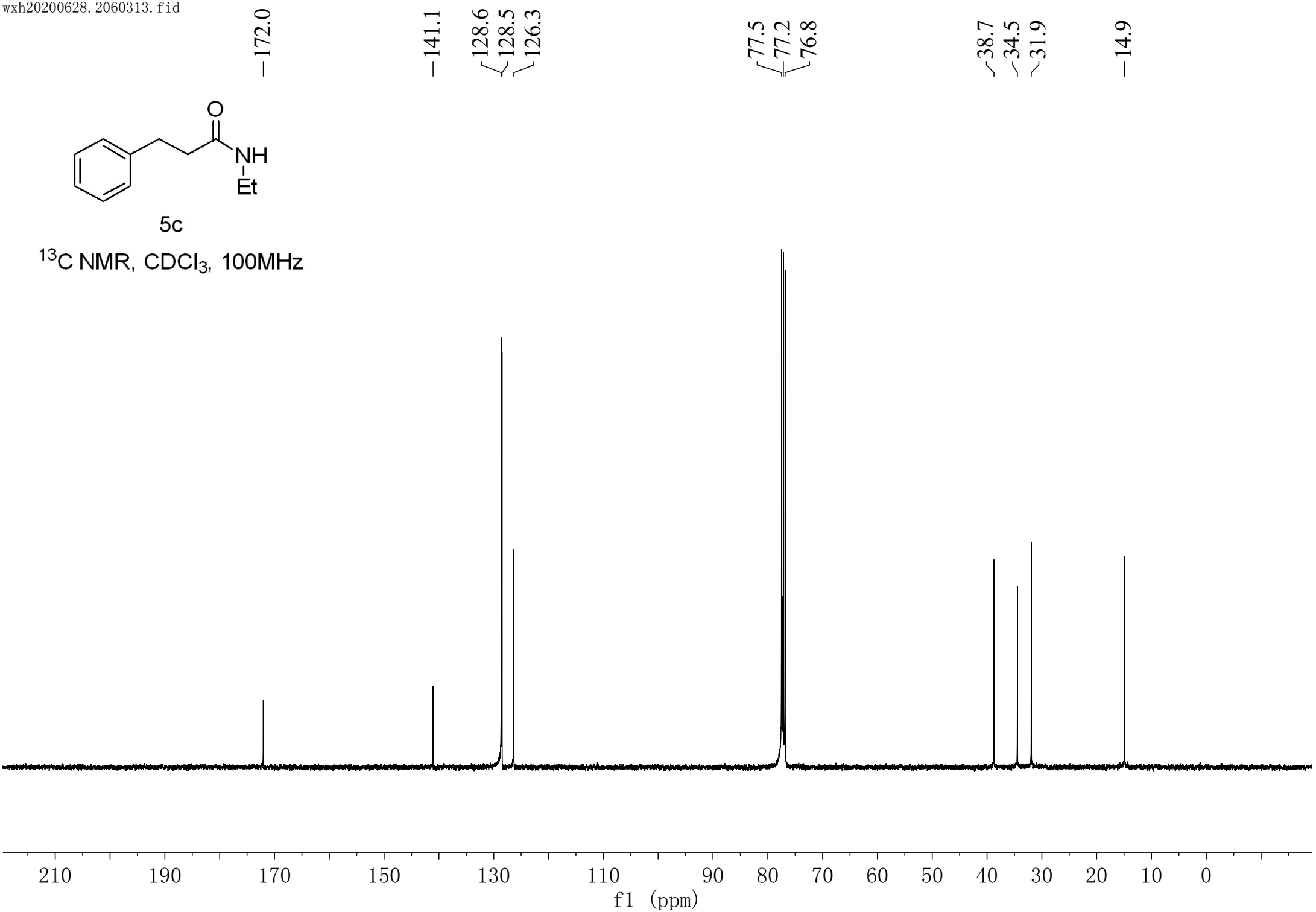
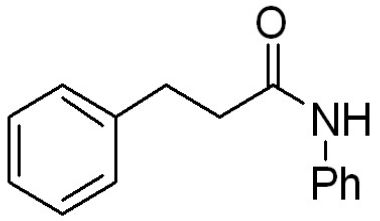
5c

^{13}C NMR, $CDCl_3$, 100MHz



wxh20200625.20574.fid

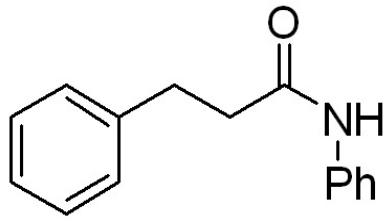


5d

^{1}H NMR, $CDCl_3$, 400MHz

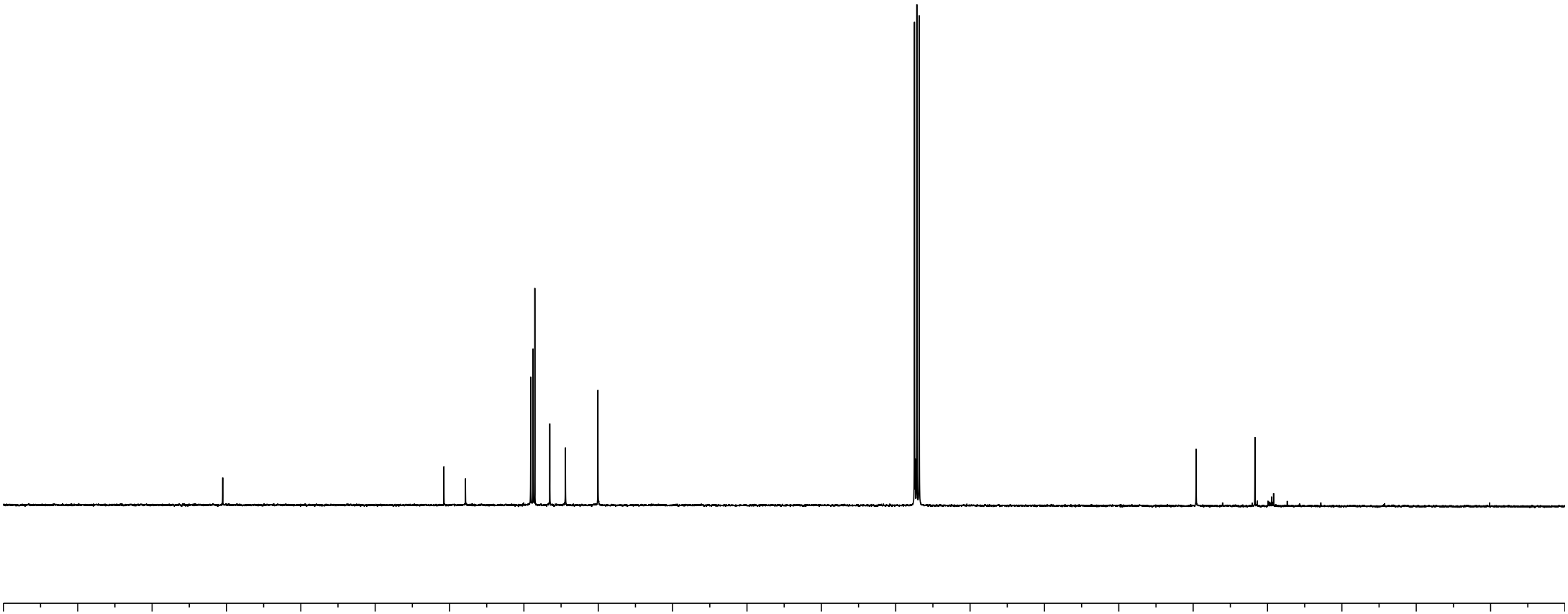
20155 13C.2.fid
SZPKU Bruker 400
Sample name:21155 13C

170.5
140.8
137.9
129.1
128.8
128.5
126.5
124.4
120.0
77.5
77.2
76.8
39.6
31.7

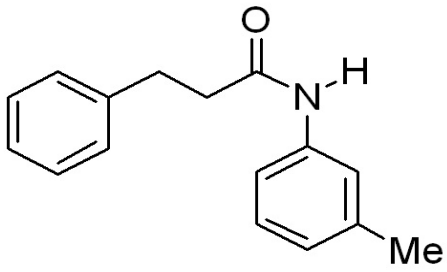


5d

^{13}C NMR, $CDCl_3$, 100MHz



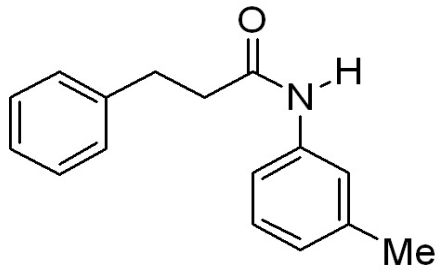
wxh20200613.204313.fid



5e

^{1}H NMR, $CDCl_3$, 400MHz

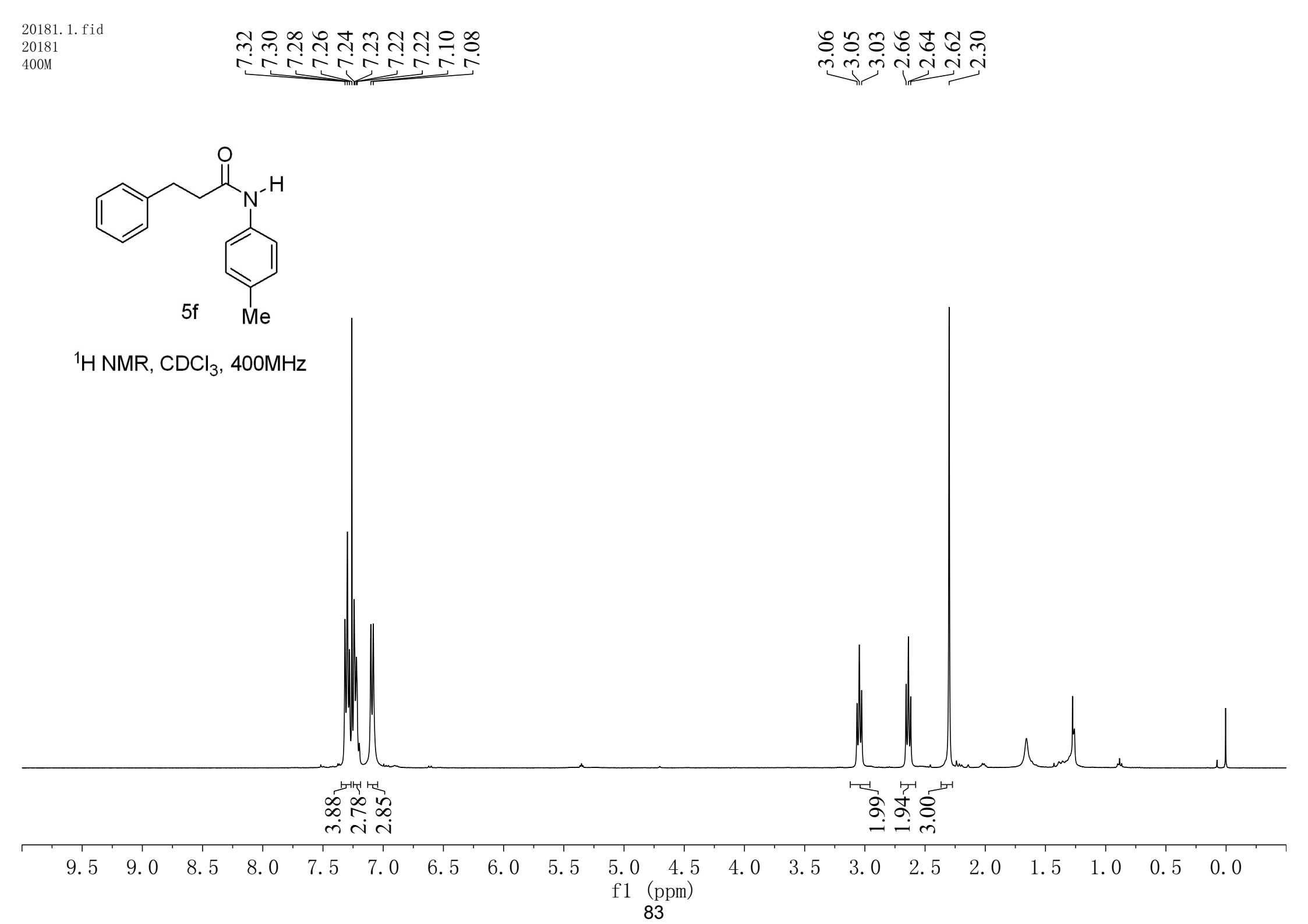
wxh20200613.20431313.fid

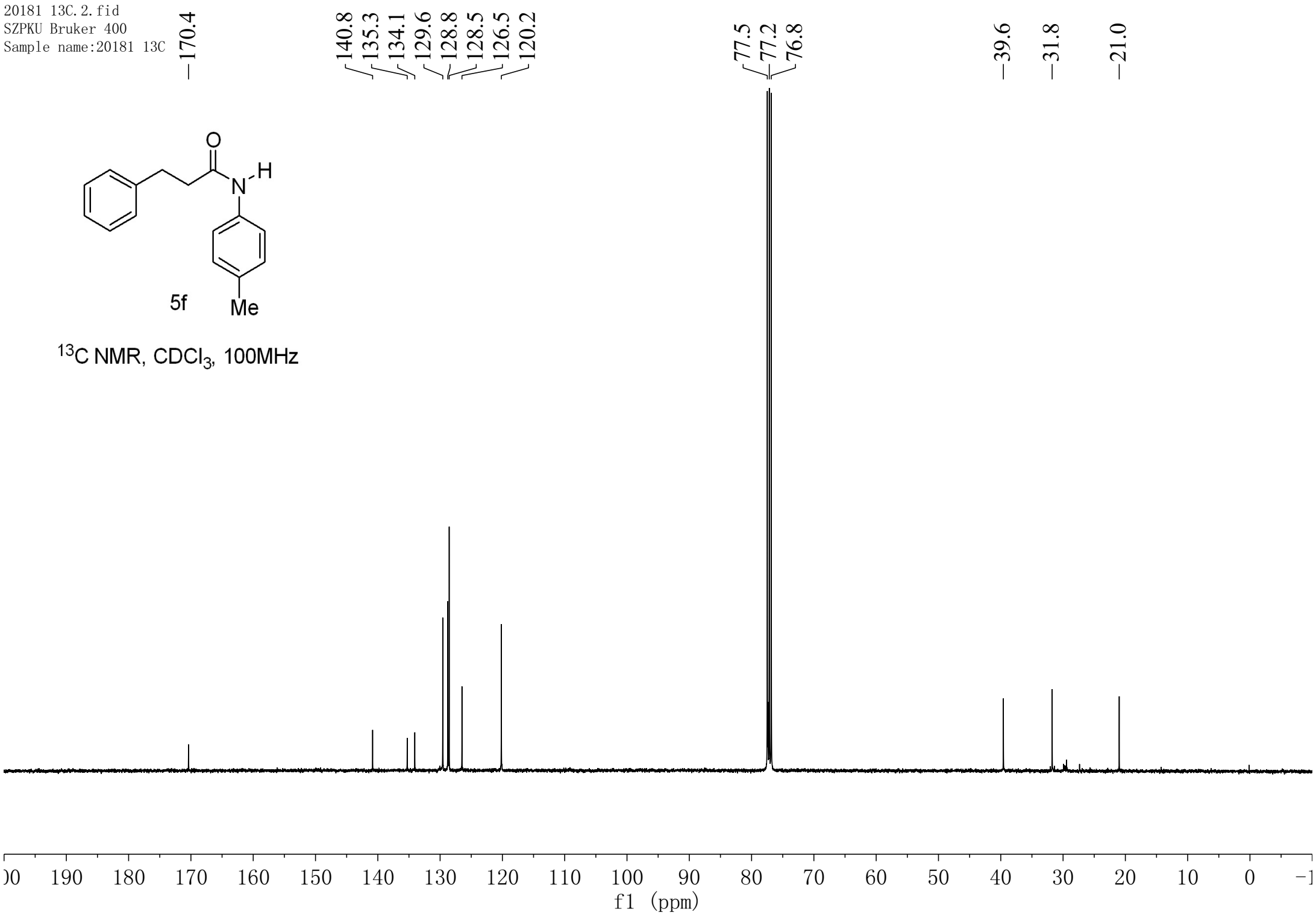


5e

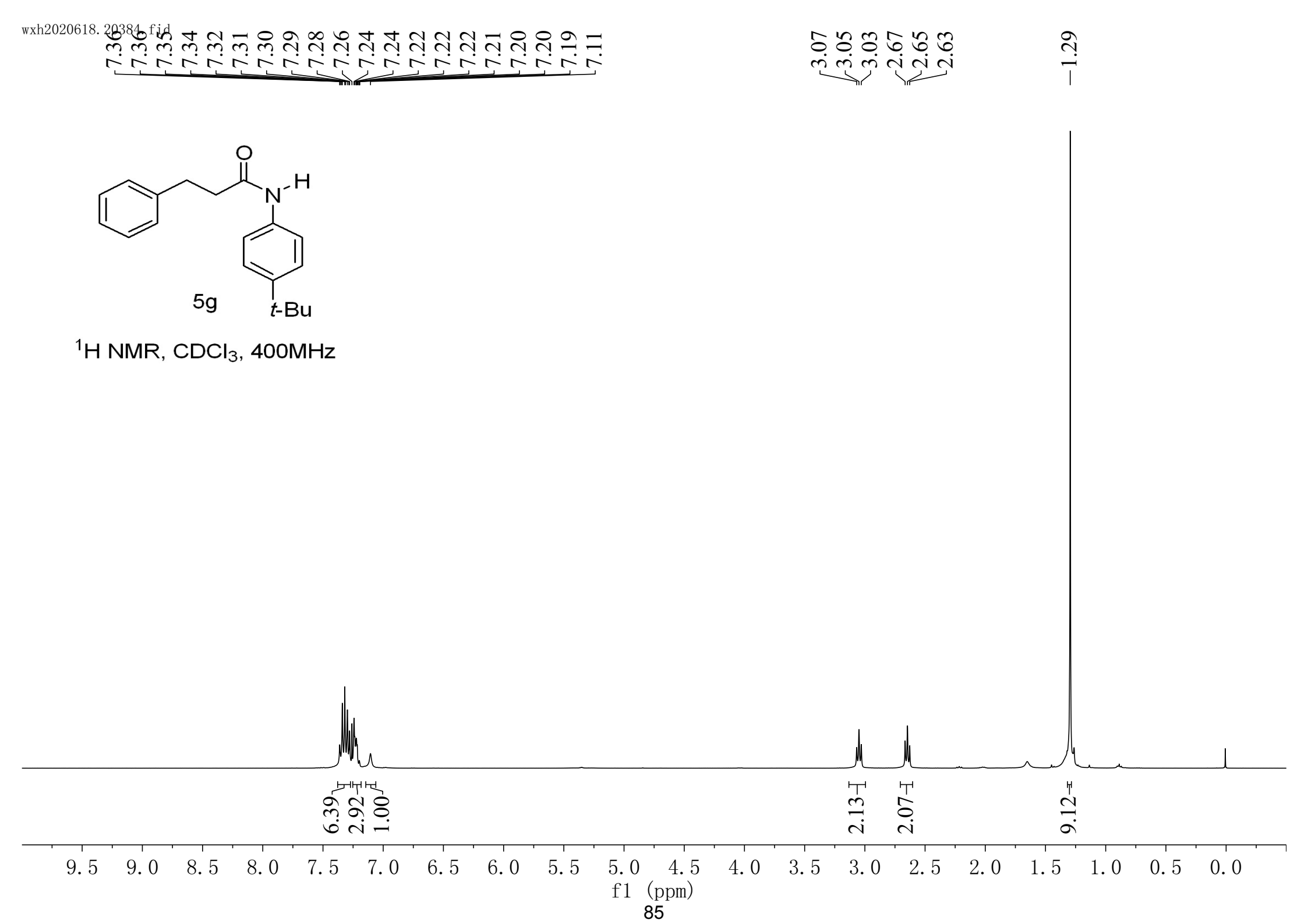
^{13}C NMR, $CDCl_3$, 100MHz

20181.1.fid
20181
400M




20181 13C.2.fid
SZPKU Bruker 400
Sample name:20181 13C
170.4
140.8
135.3
134.1
129.6
128.8
128.5
126.5
120.2
77.5
77.2
76.8
39.6
31.8
21.0
O
N
H
5f
Me
13C NMR, CDCl3, 100MHz
f1 (ppm)

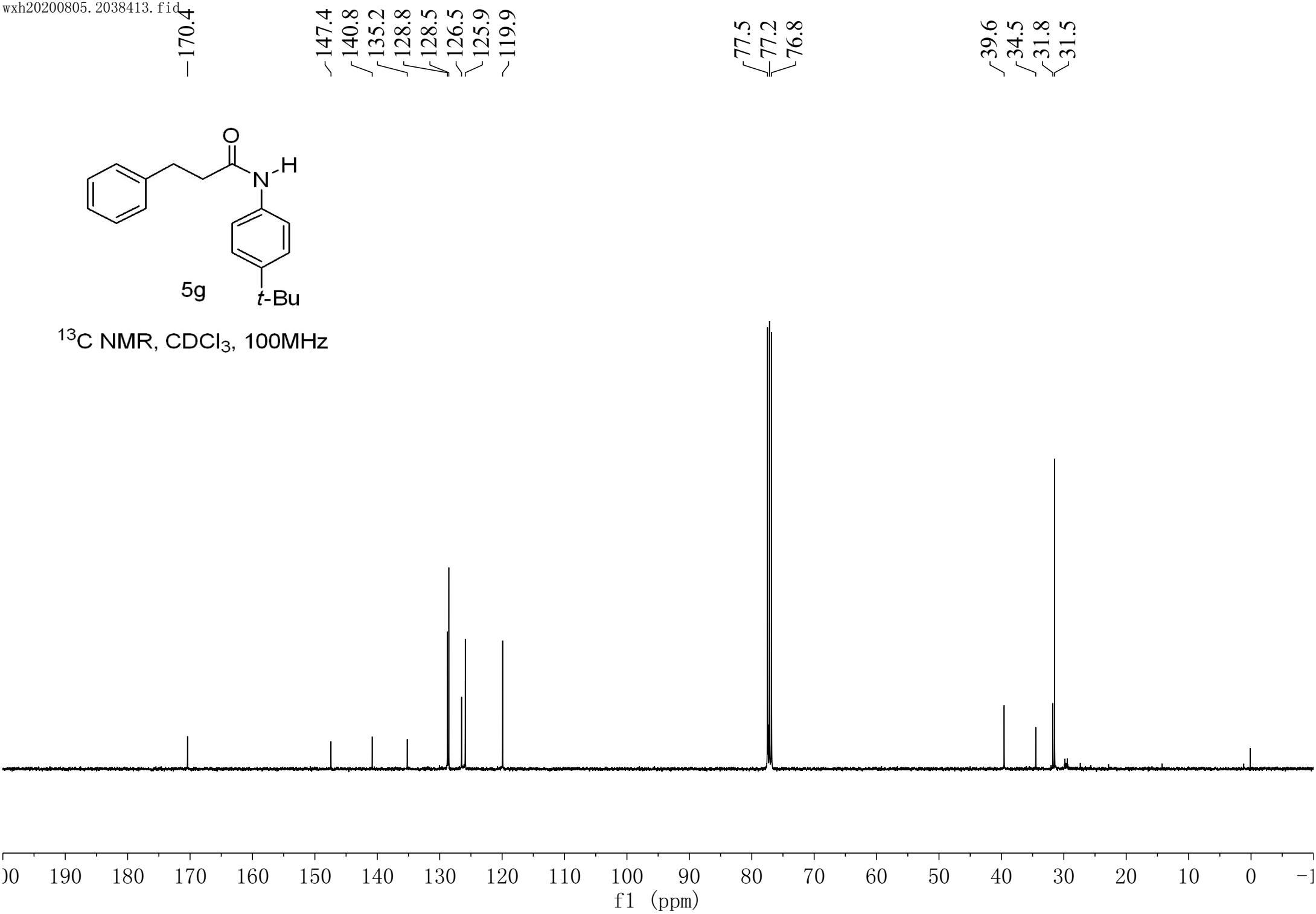
wxh2020618.20384.fid



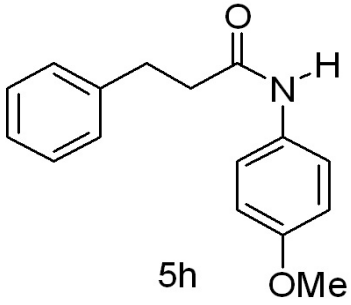
wxh20200805.2038413.fid

5g *t*-Bu

^{13}C NMR, $CDCl_3$, 100MHz



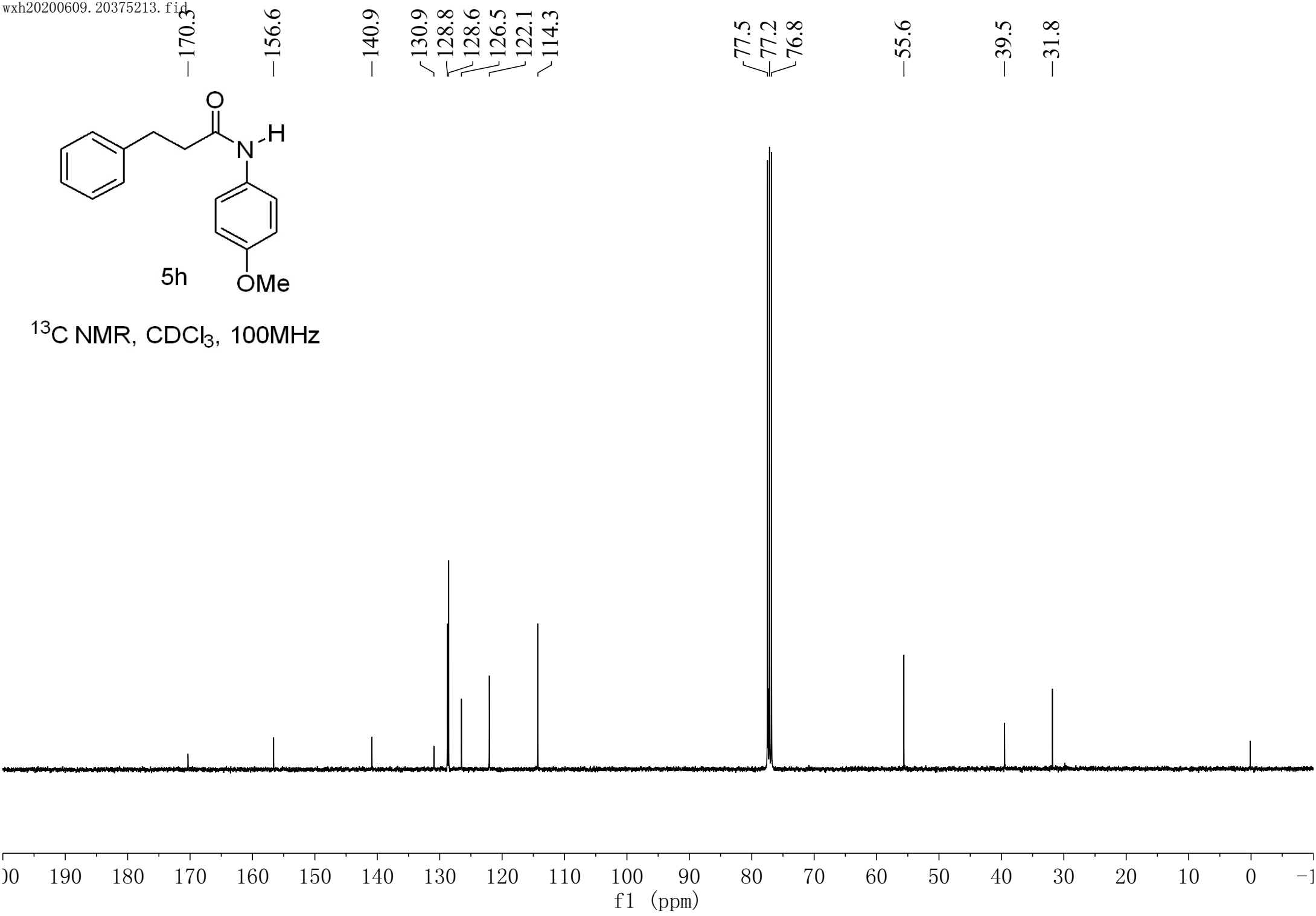
wxh20200616.203752.fid



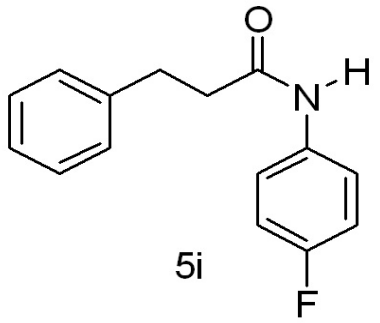
5h

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200609.20375213.fid



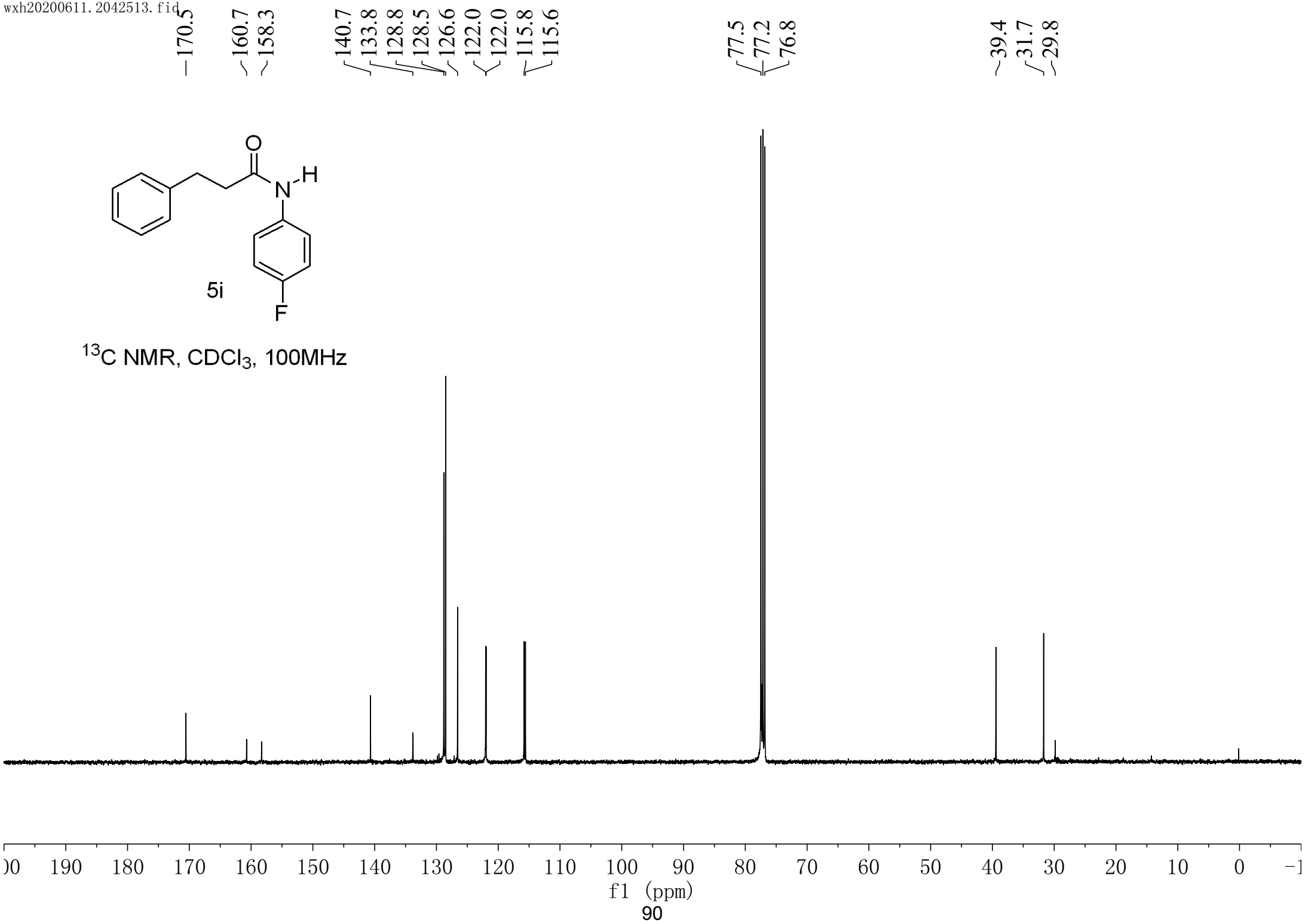
wxh20200624.20425.fid



5i

^{1}H NMR, $CDCl_3$, 400MHz

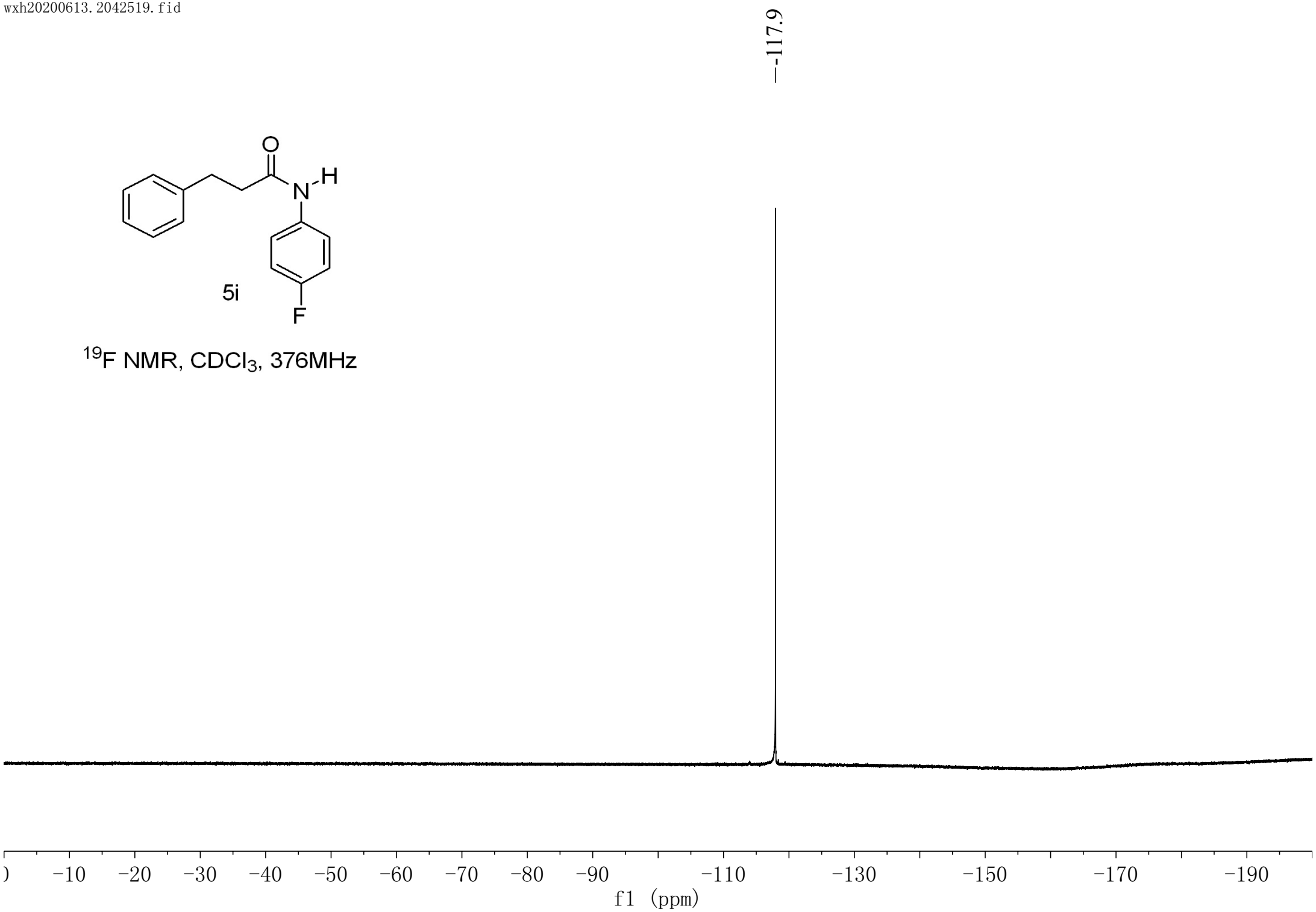
wxh20200611.2042513.fid



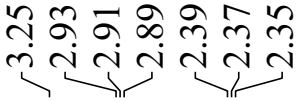
wxh20200613.2042519.fid

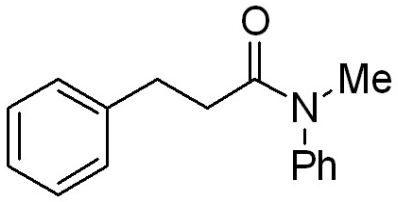
5i

^{19}F NMR, $CDCl_3$, 376MHz



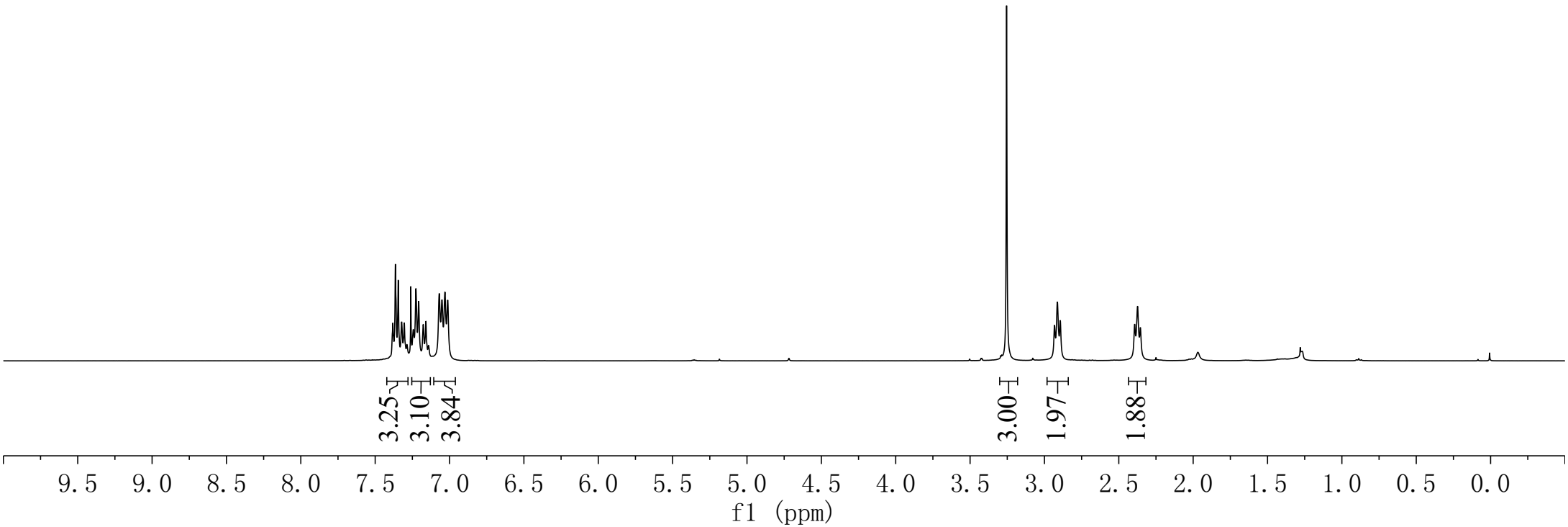
20183.1.fid
20183
400M



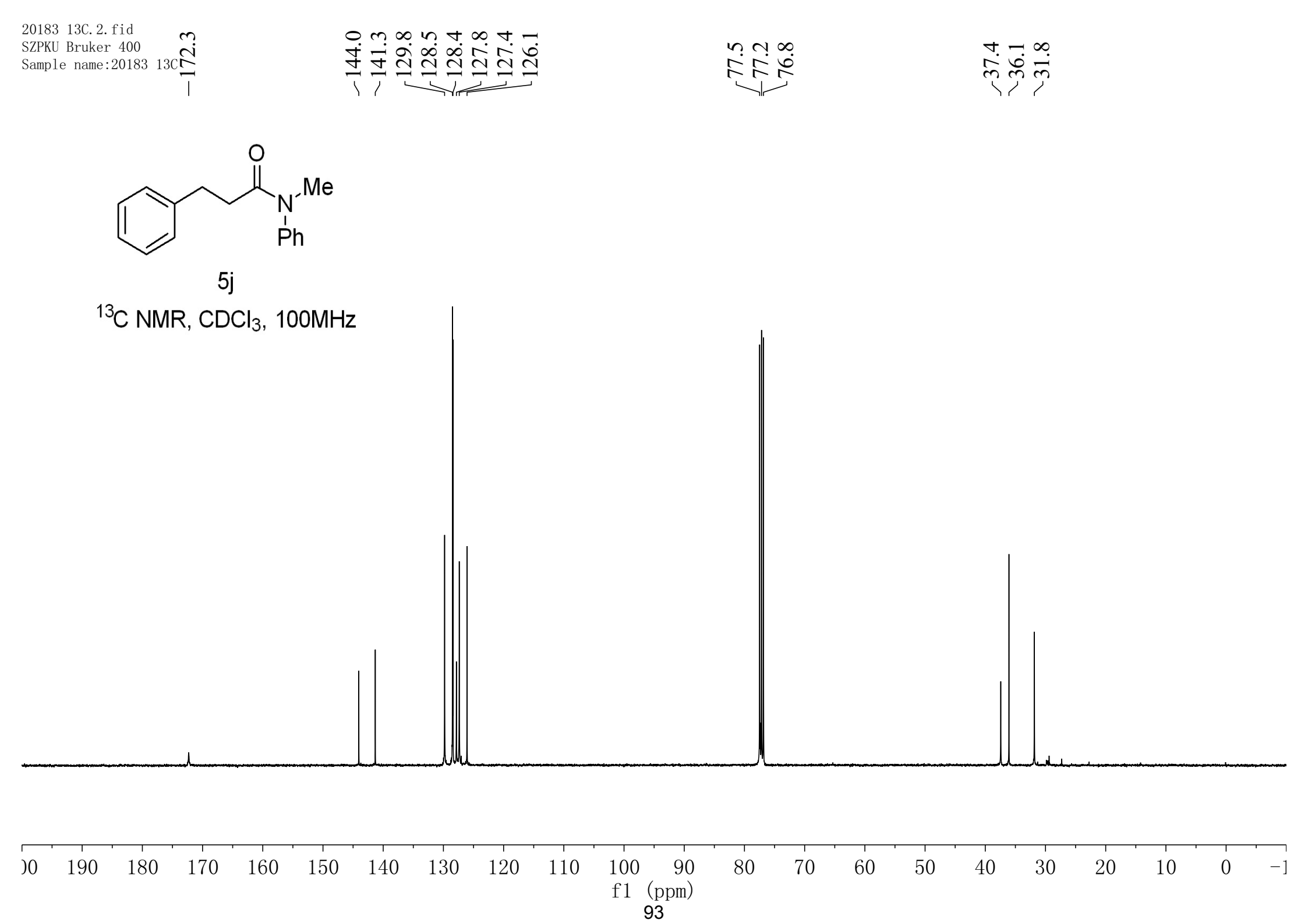


5j

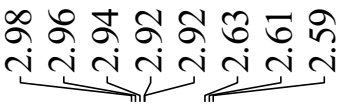
^{1}H NMR, $CDCl_3$, 400MHz

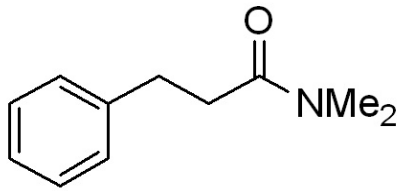


20183 13C.2.fid
SZPKU Bruker 400
Sample name:20183 13C



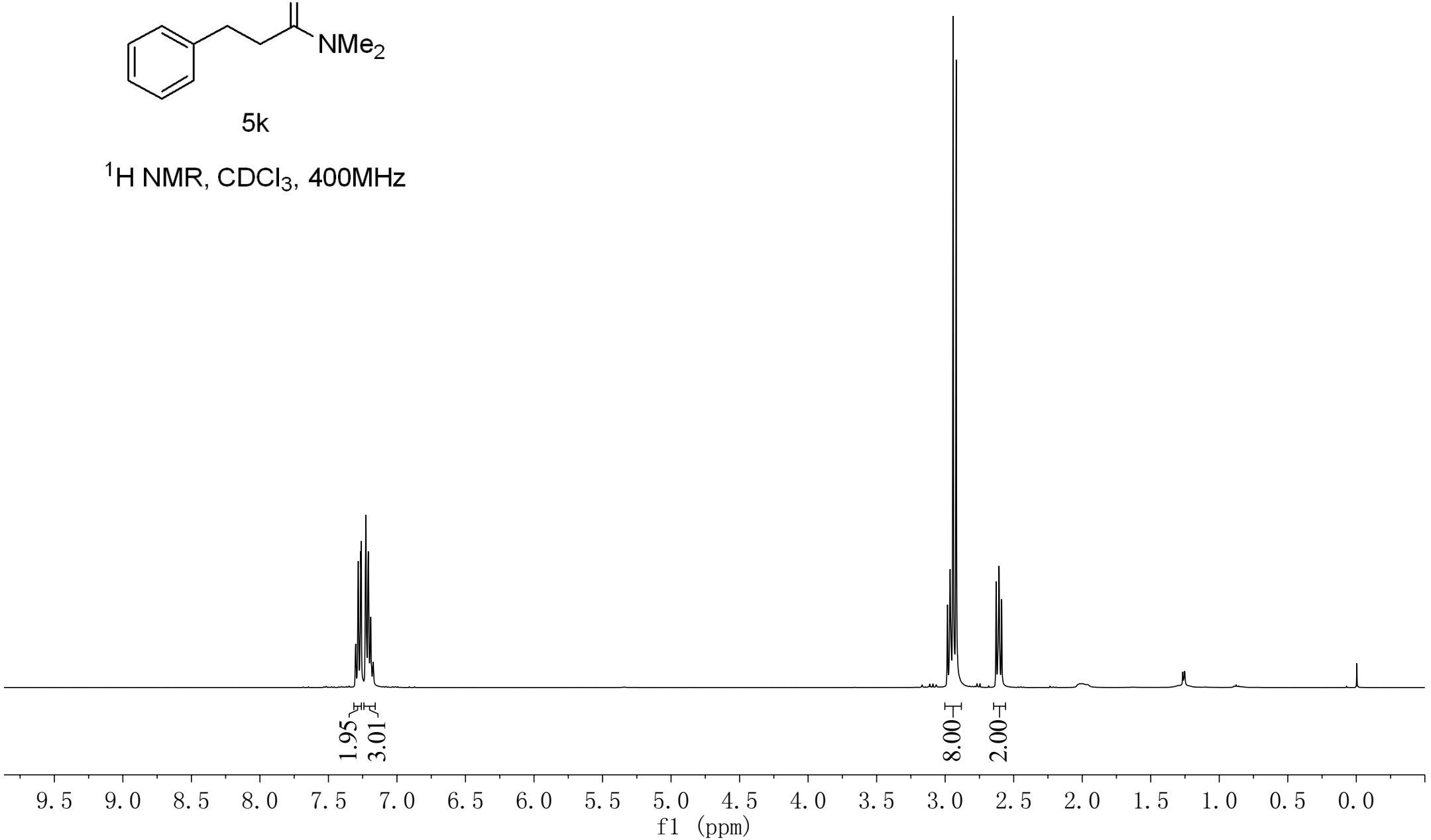
011.1.11d
011
OM



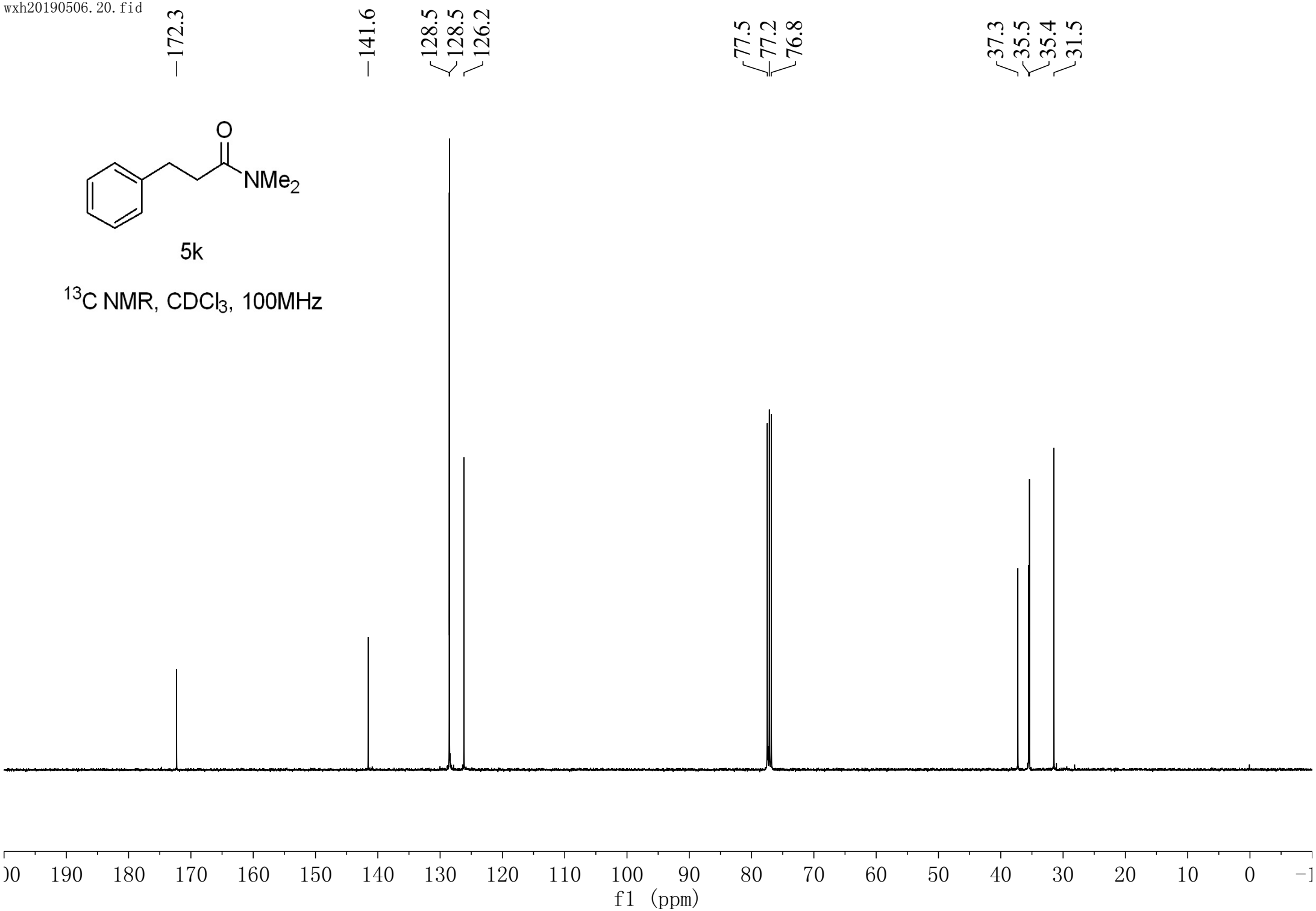


5k

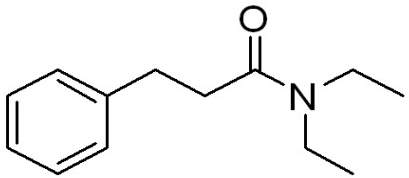
^{1}H NMR, $CDCl_3$, 400MHz



wxh20190506.20.fid

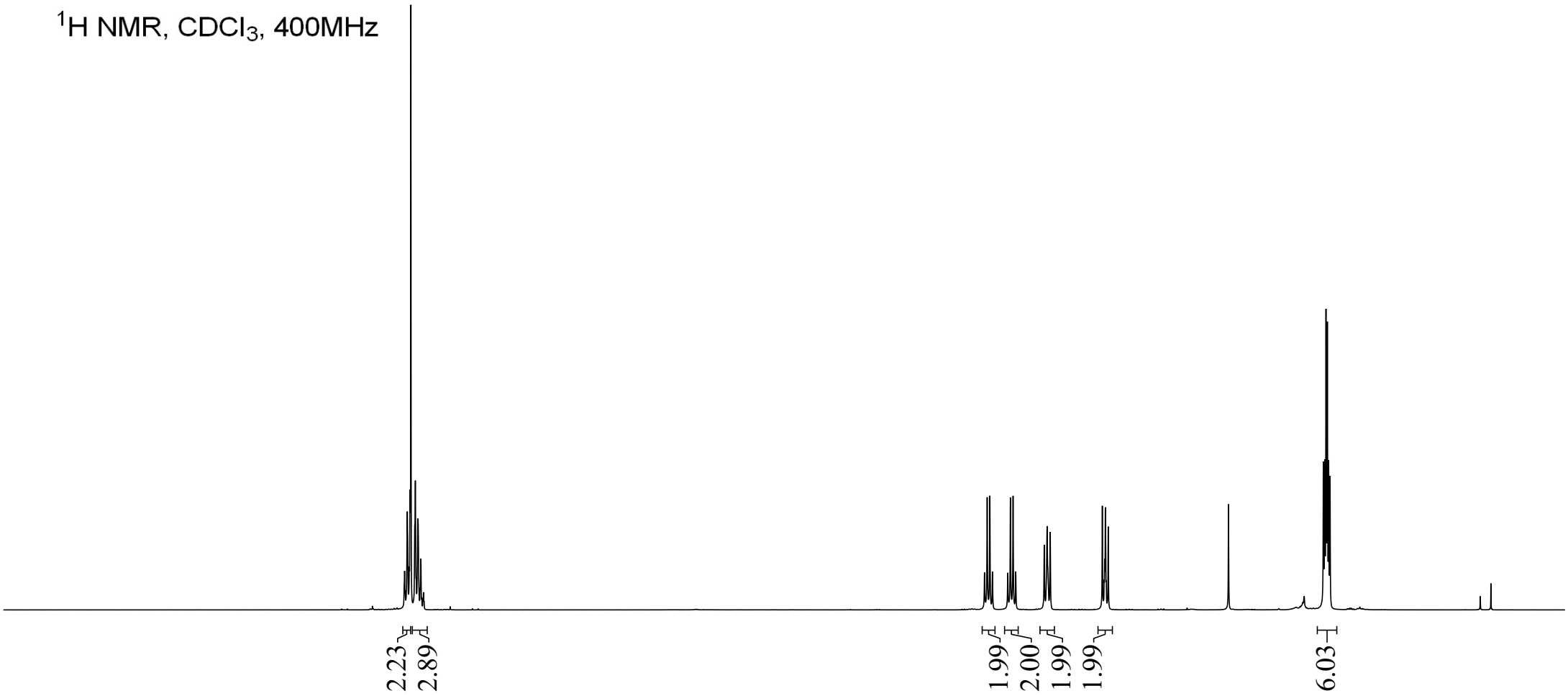


wxh20200628-20604.fid



5l

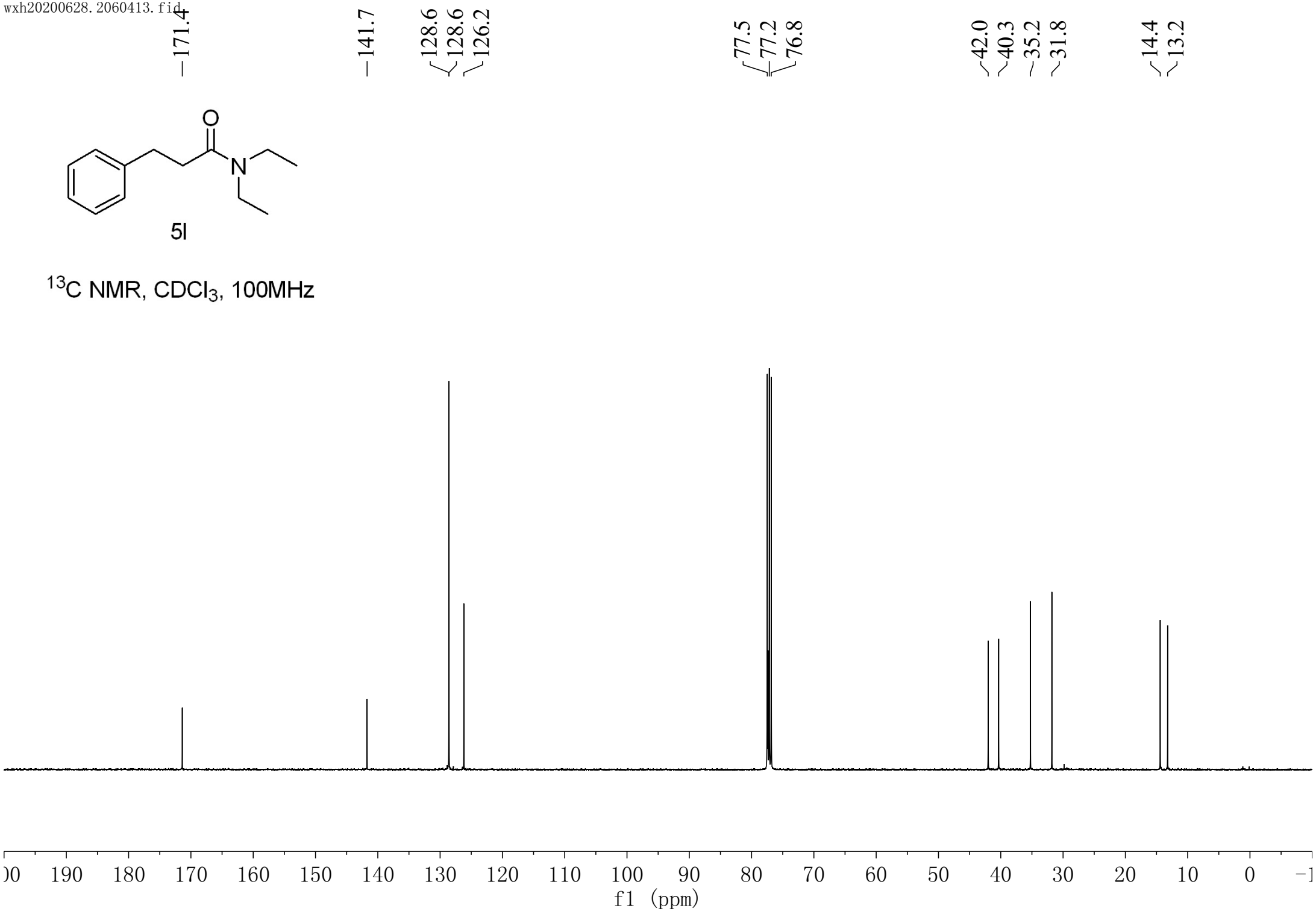
^{1}H NMR, $CDCl_3$, 400MHz



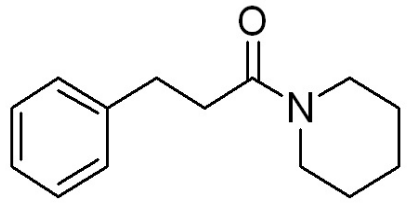
wxh20200628.2060413.fid

5l

^{13}C NMR, $CDCl_3$, 100MHz

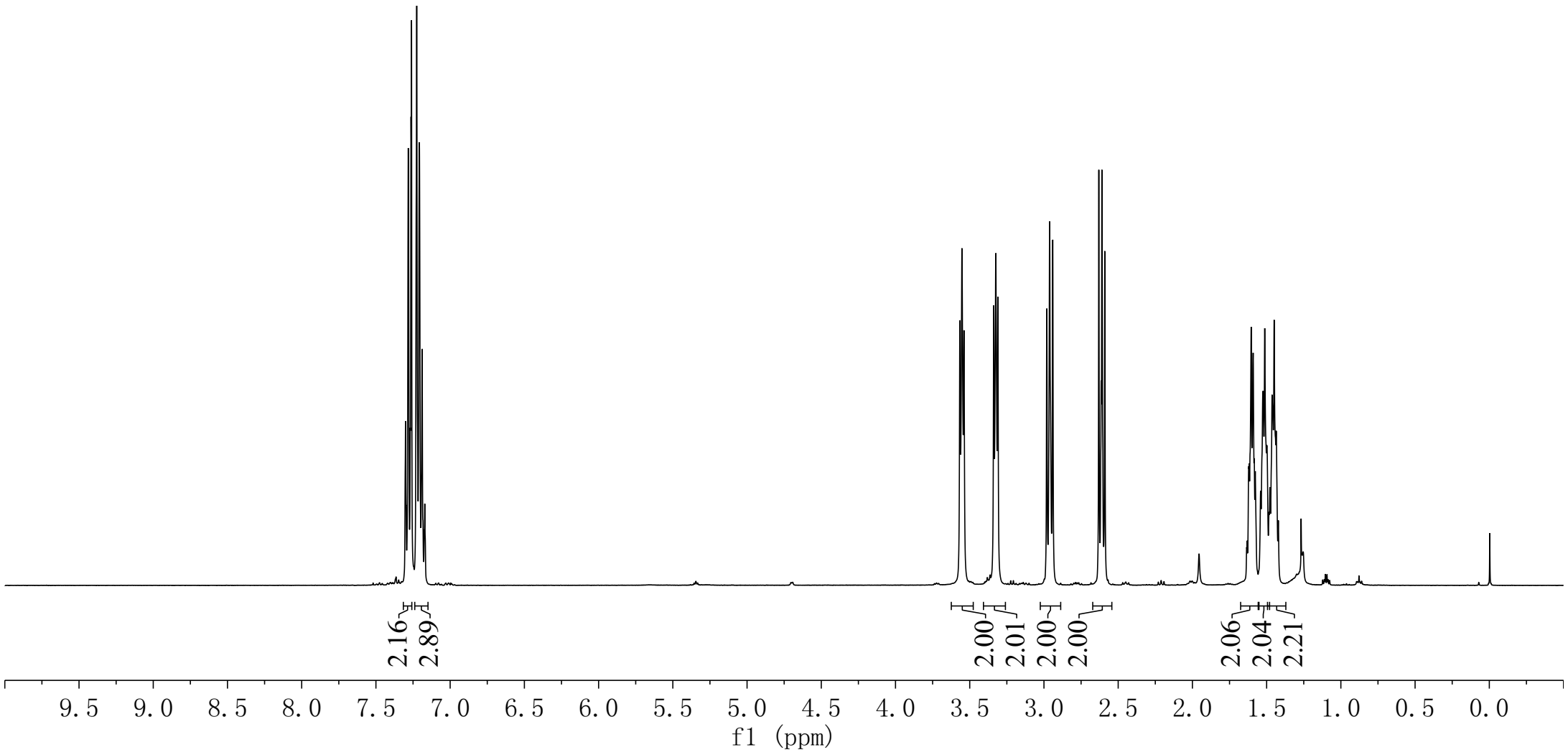


21154.1.fid
21154
400M

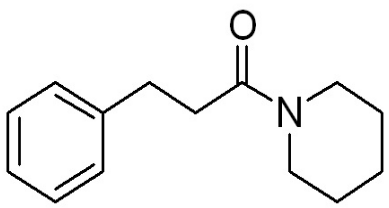


5m

^{1}H NMR, $CDCl_3$, 400MHz

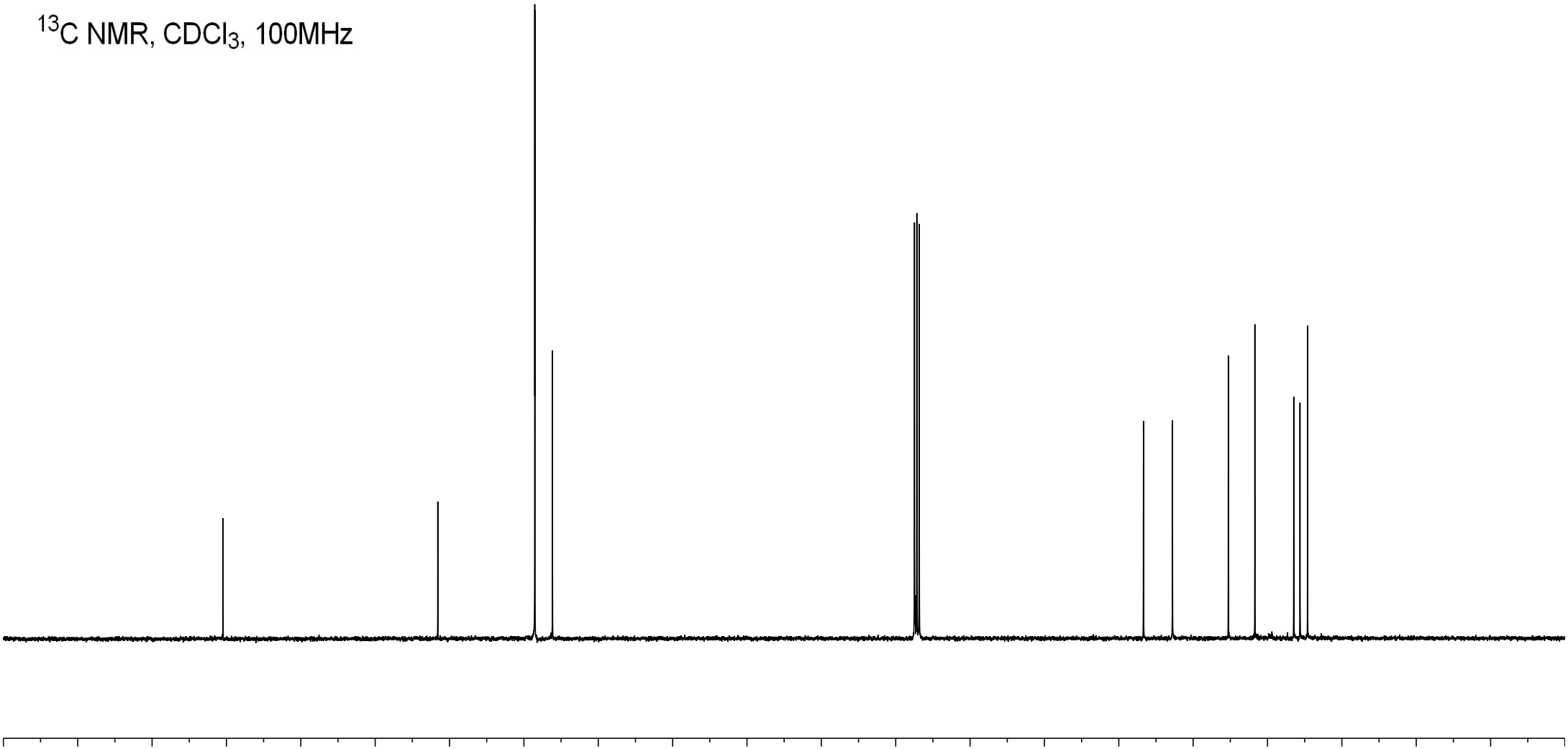


20154 13C.2.fid
SZPKU Bruker 400
Sample name:21154 13C



5m

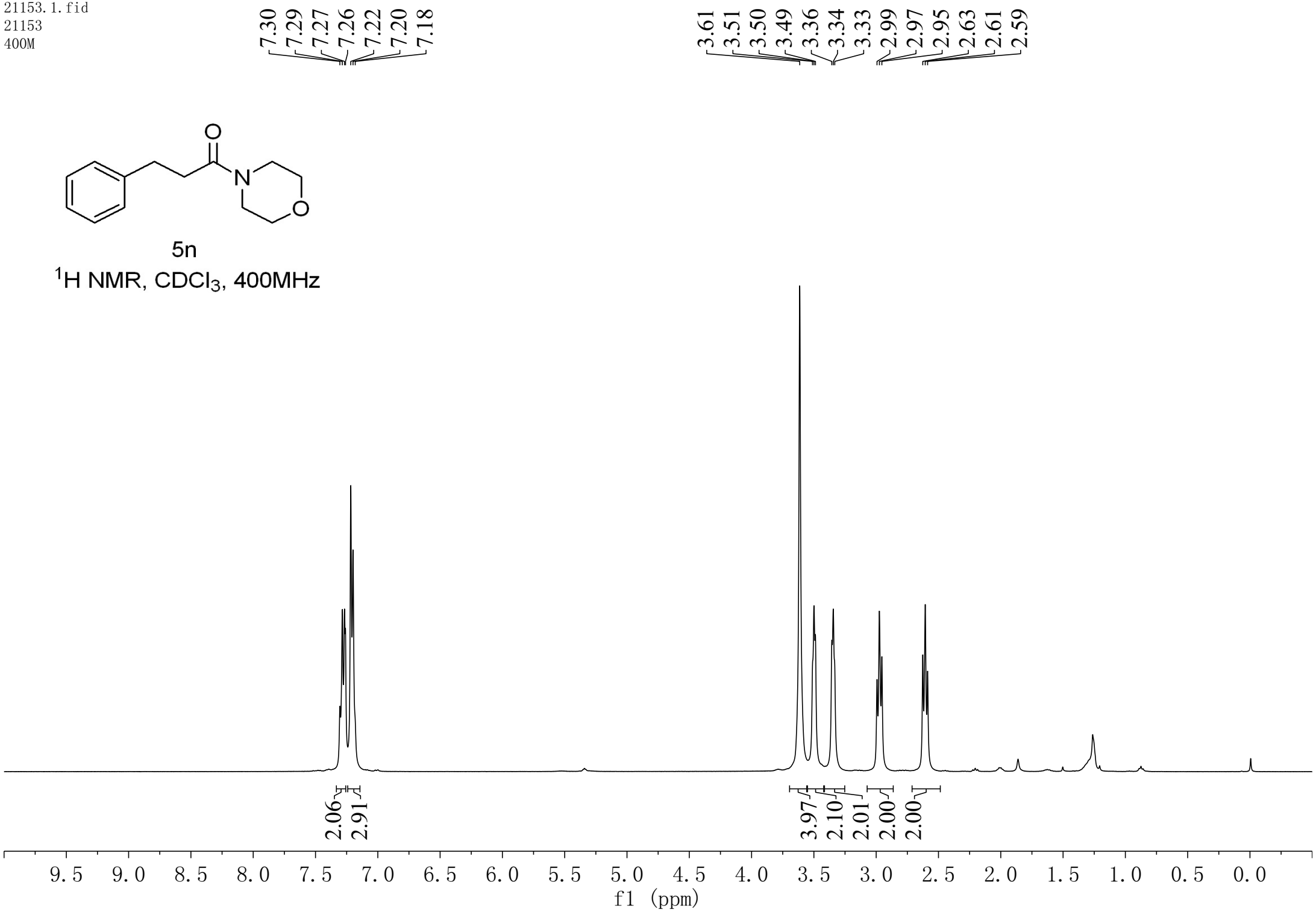
^{13}C NMR, $CDCl_3$, 100MHz



21153.1.fid
21153
400M

5n

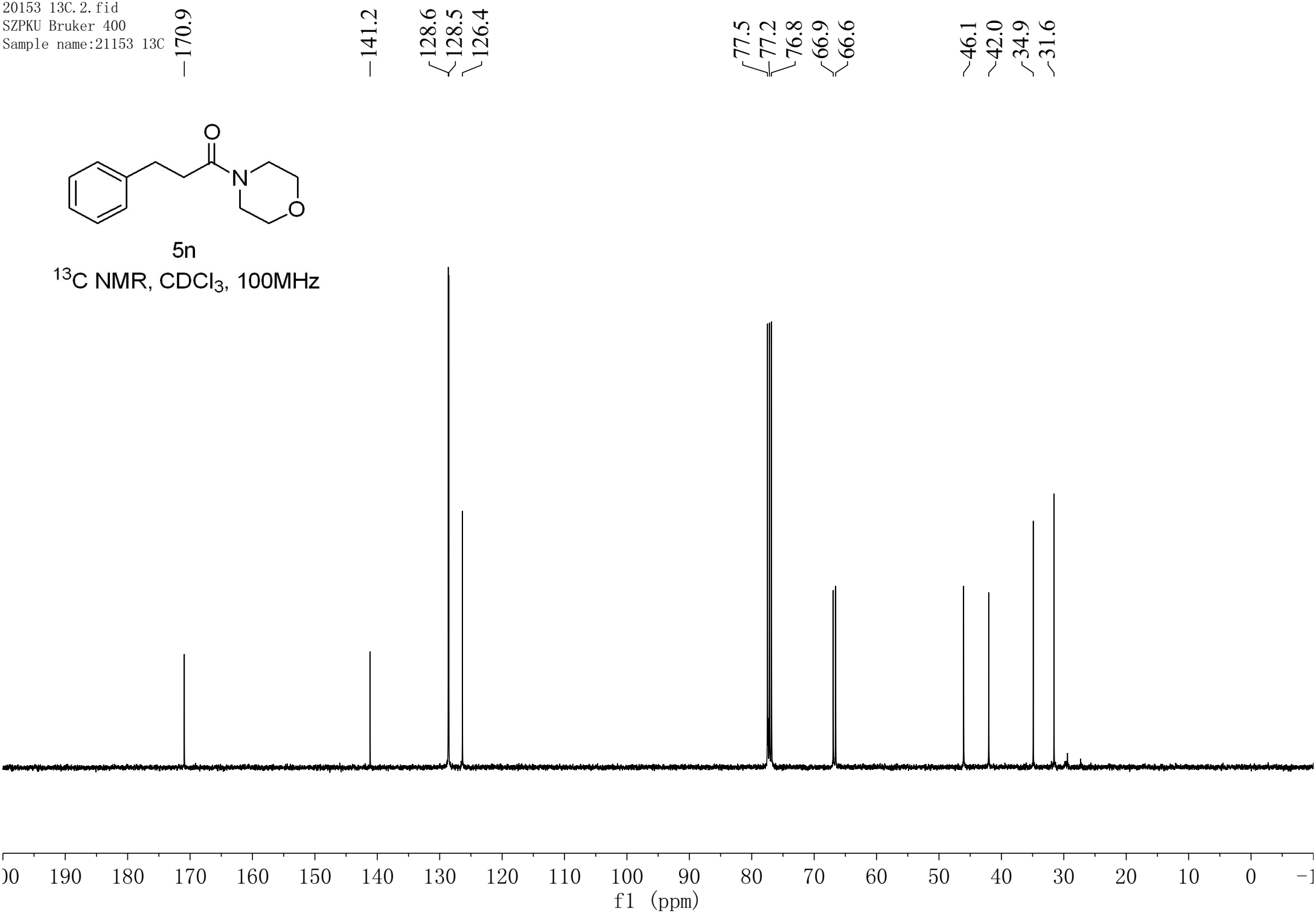
^{1}H NMR, $CDCl_3$, 400MHz



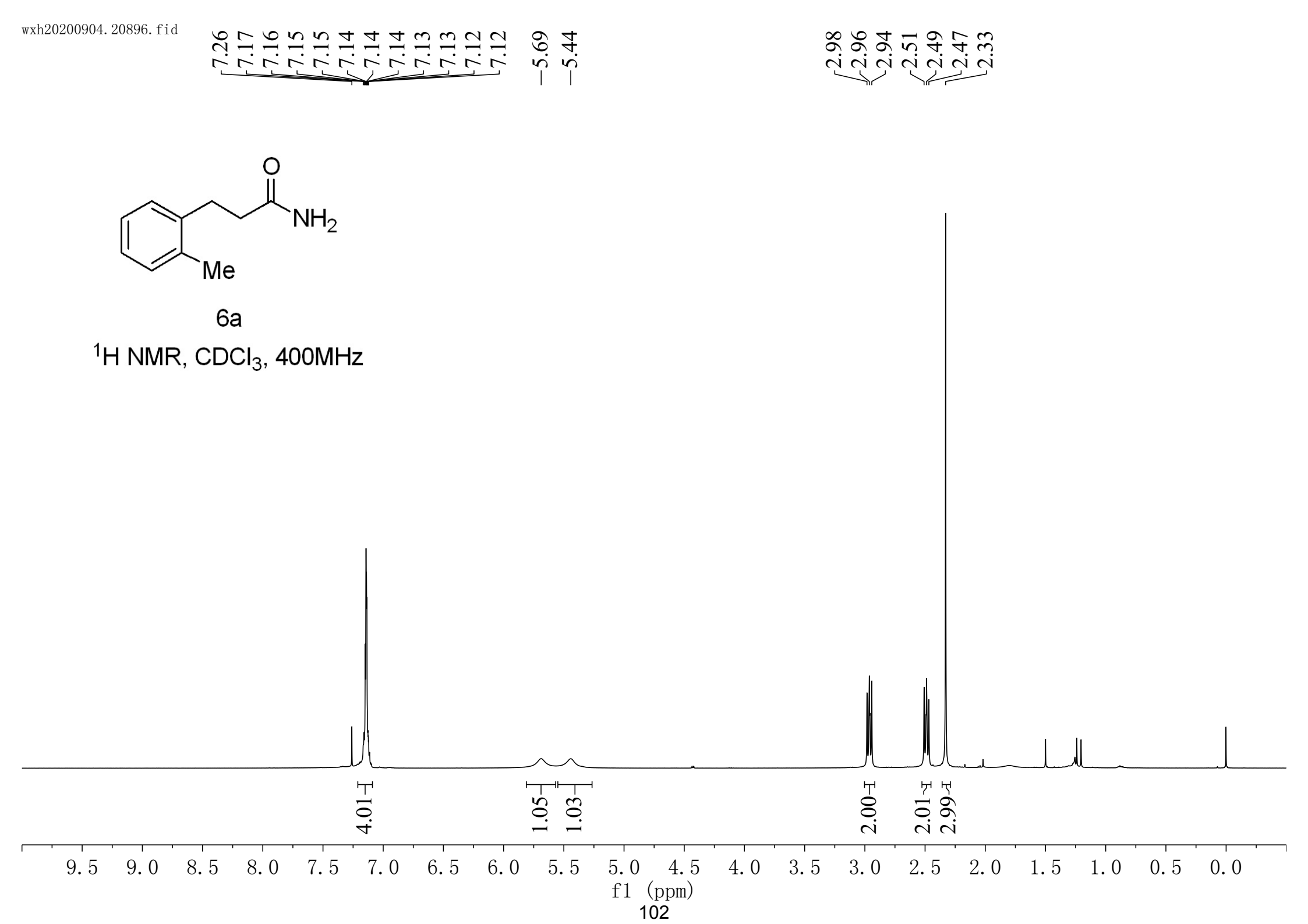
20153 13C.2.fid
SZPKU Bruker 400
Sample name:21153 13C

5n

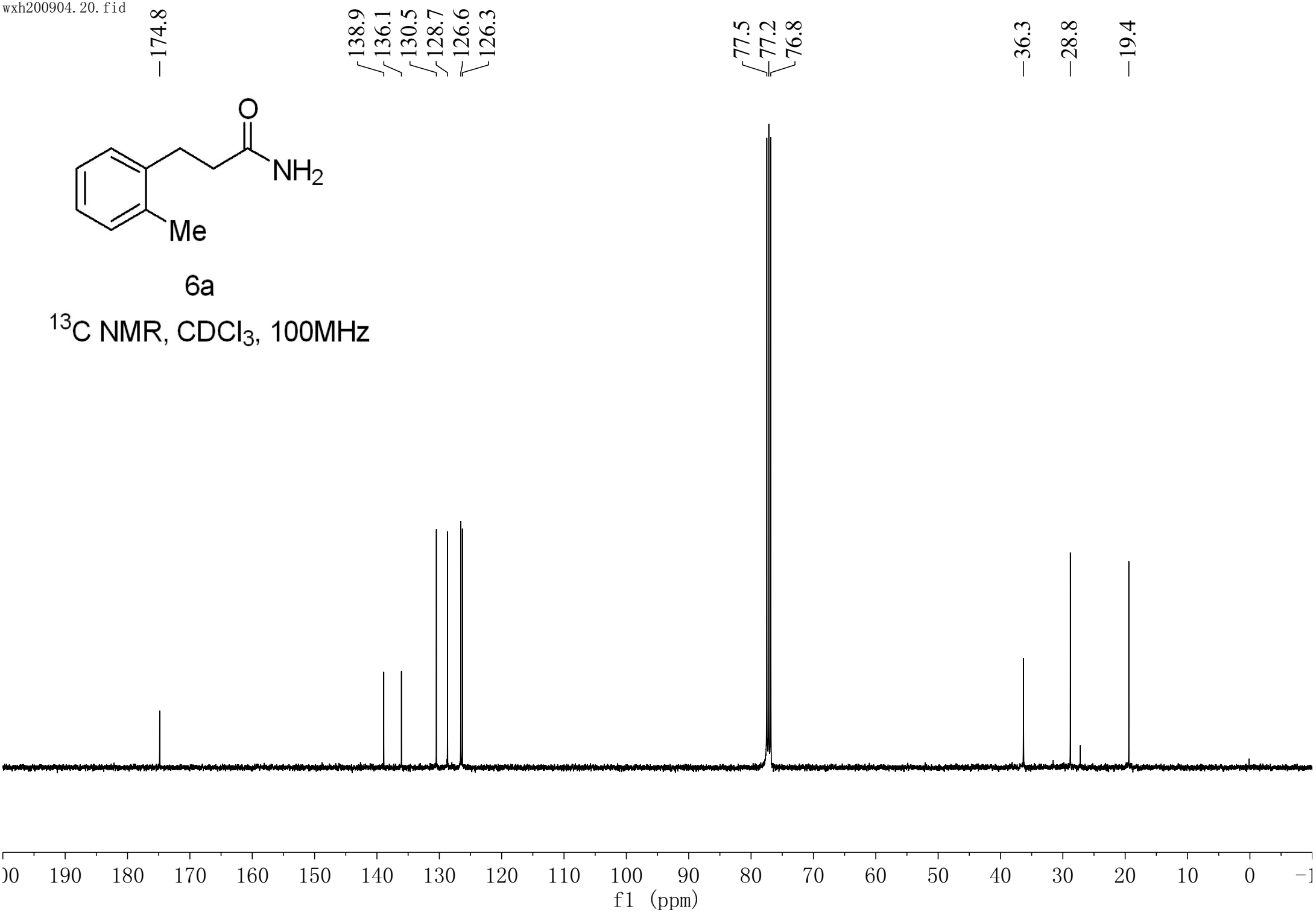
^{13}C NMR, $CDCl_3$, 100MHz



wxh20200904.20896.fid



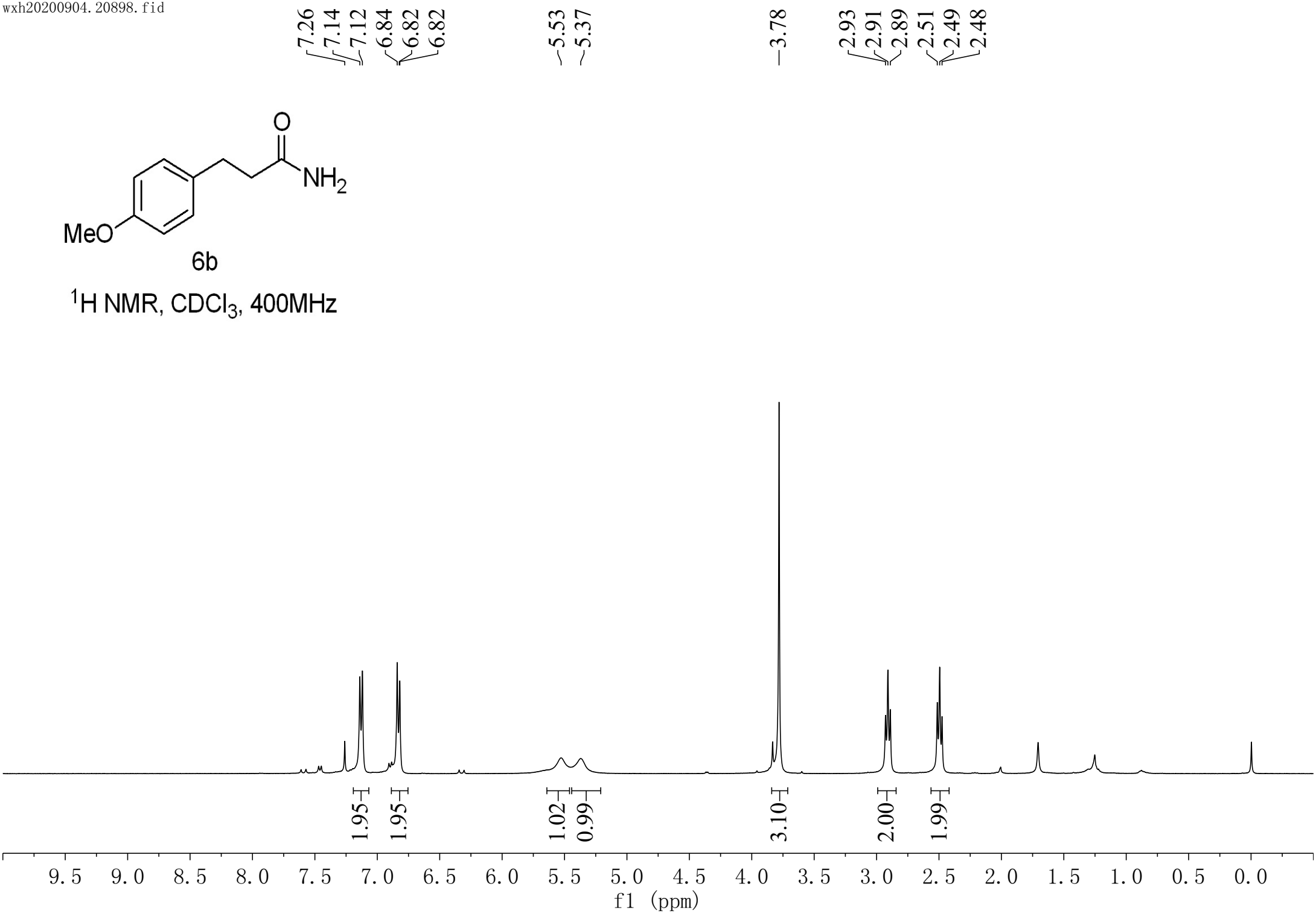
wxh200904.20.fid



wxh20200904.20898.fid

6b

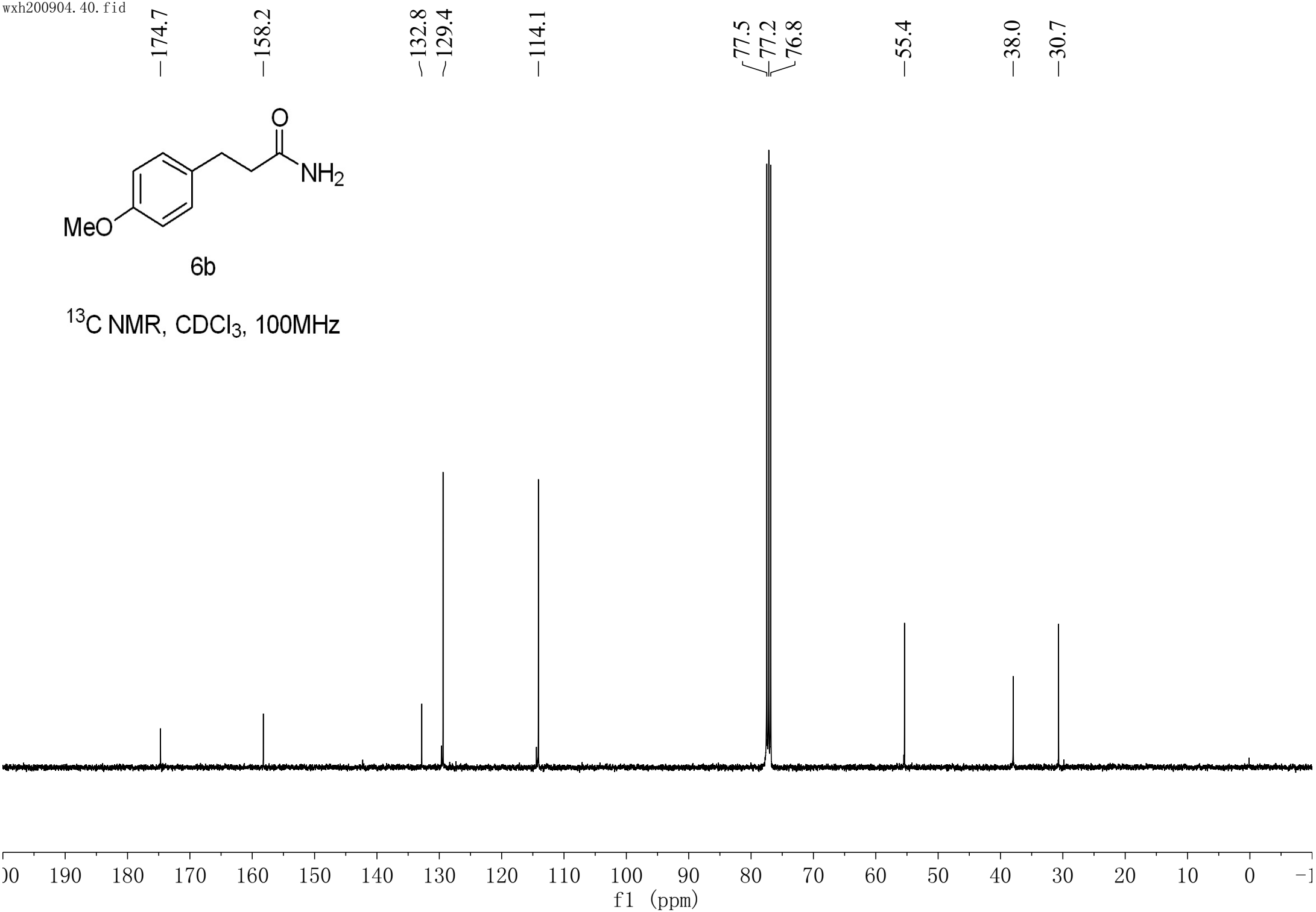
^{1}H NMR, $CDCl_3$, 400MHz



wxh200904.40.fid

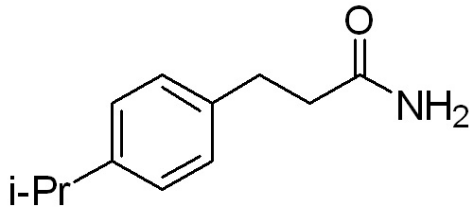
6b

^{13}C NMR, $CDCl_3$, 100MHz



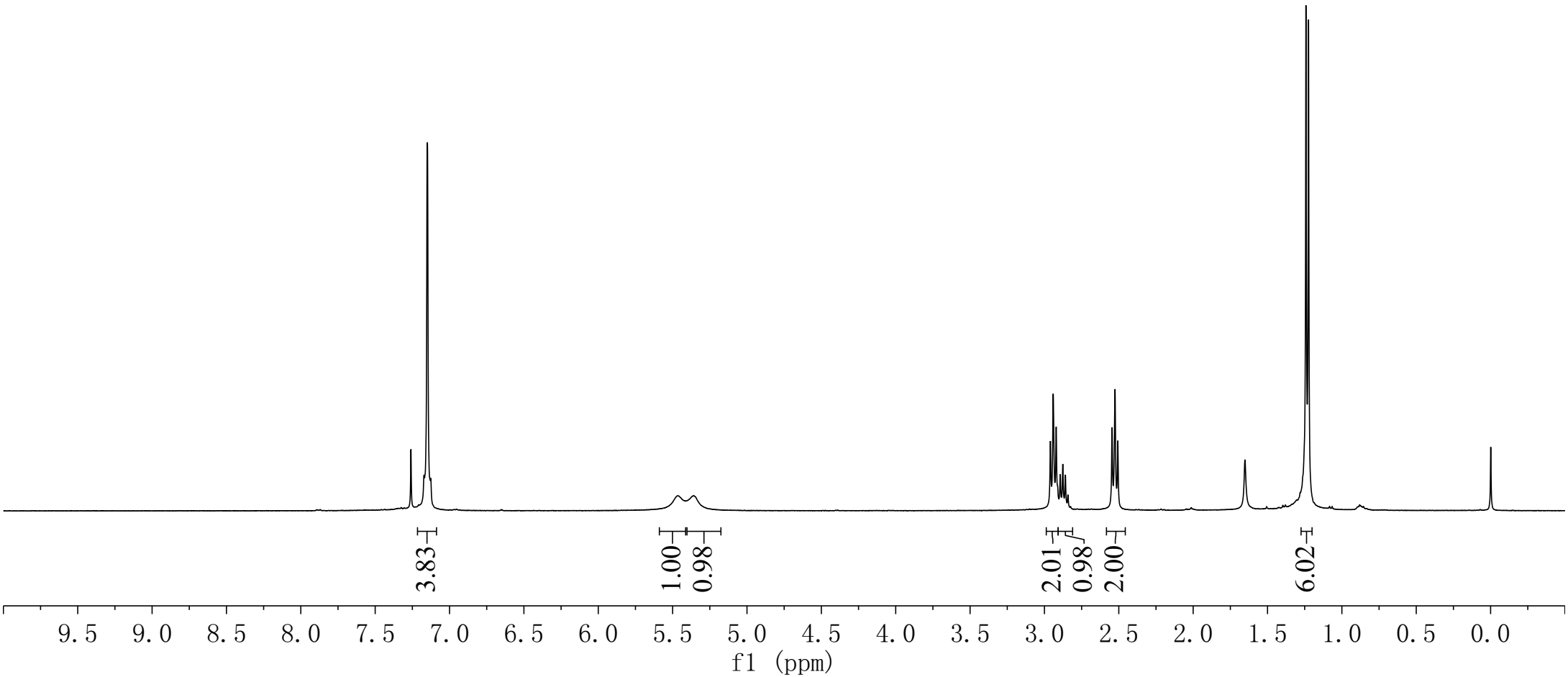
wxh20200904.20897.fid

7.26 7.17 7.17 7.15 7.15 7.13 7.13 5.46 5.37 2.96 2.94 2.92 2.92 2.89 2.88 2.86 2.84 2.82 2.55 2.53 2.51 1.24 1.22



6c

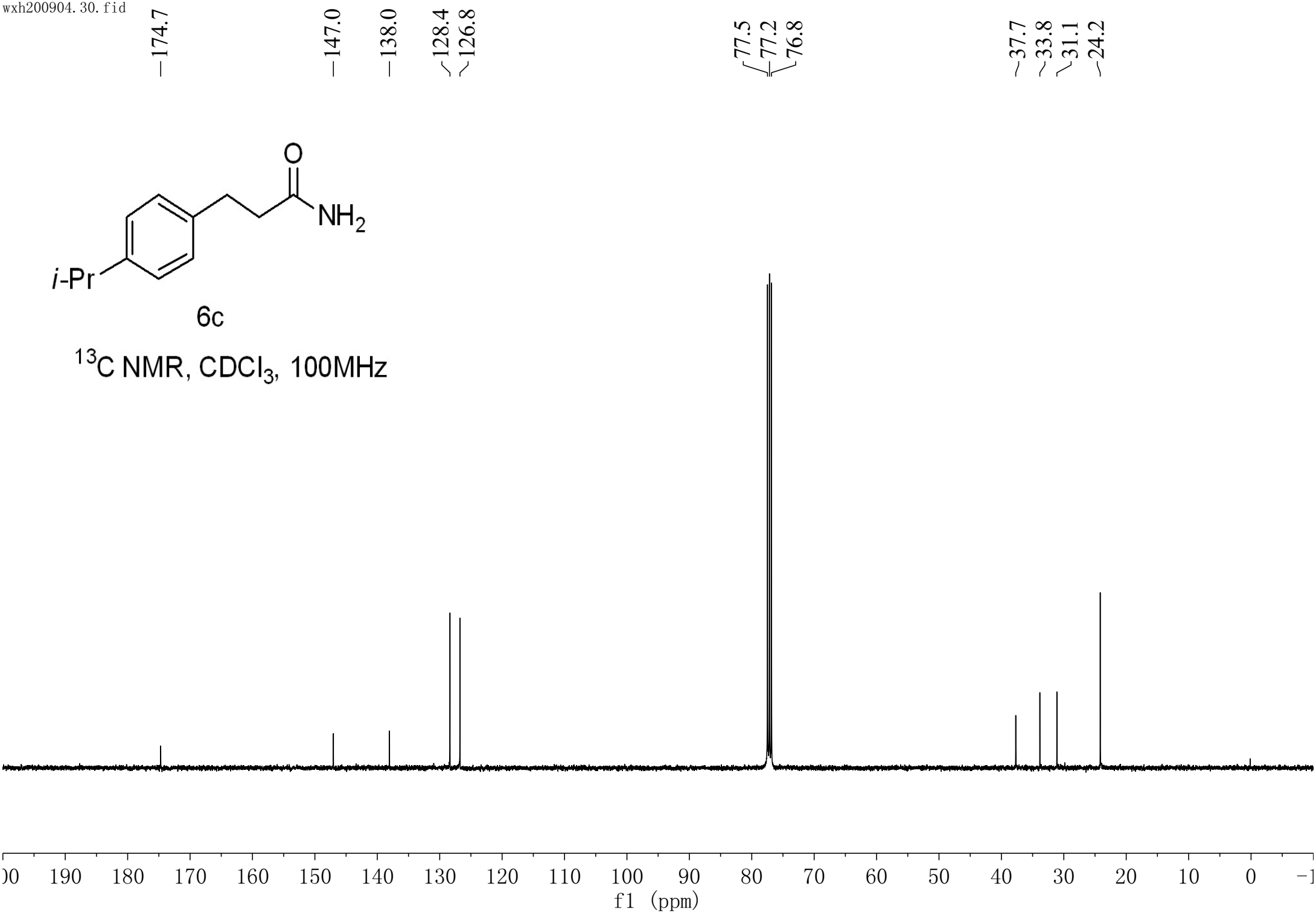
^{1}H NMR, $CDCl_3$, 400MHz



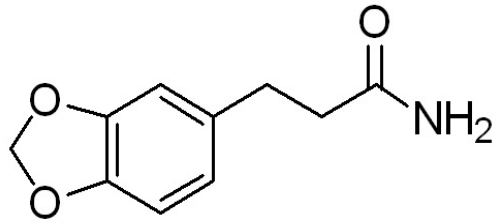
wxh200904.30.fid

6c

^{13}C NMR, $CDCl_3$, 100MHz



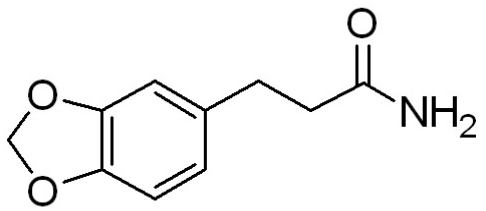
wxh20200904.20892.fid



6d

^{1}H NMR, $CDCl_3$, 400MHz

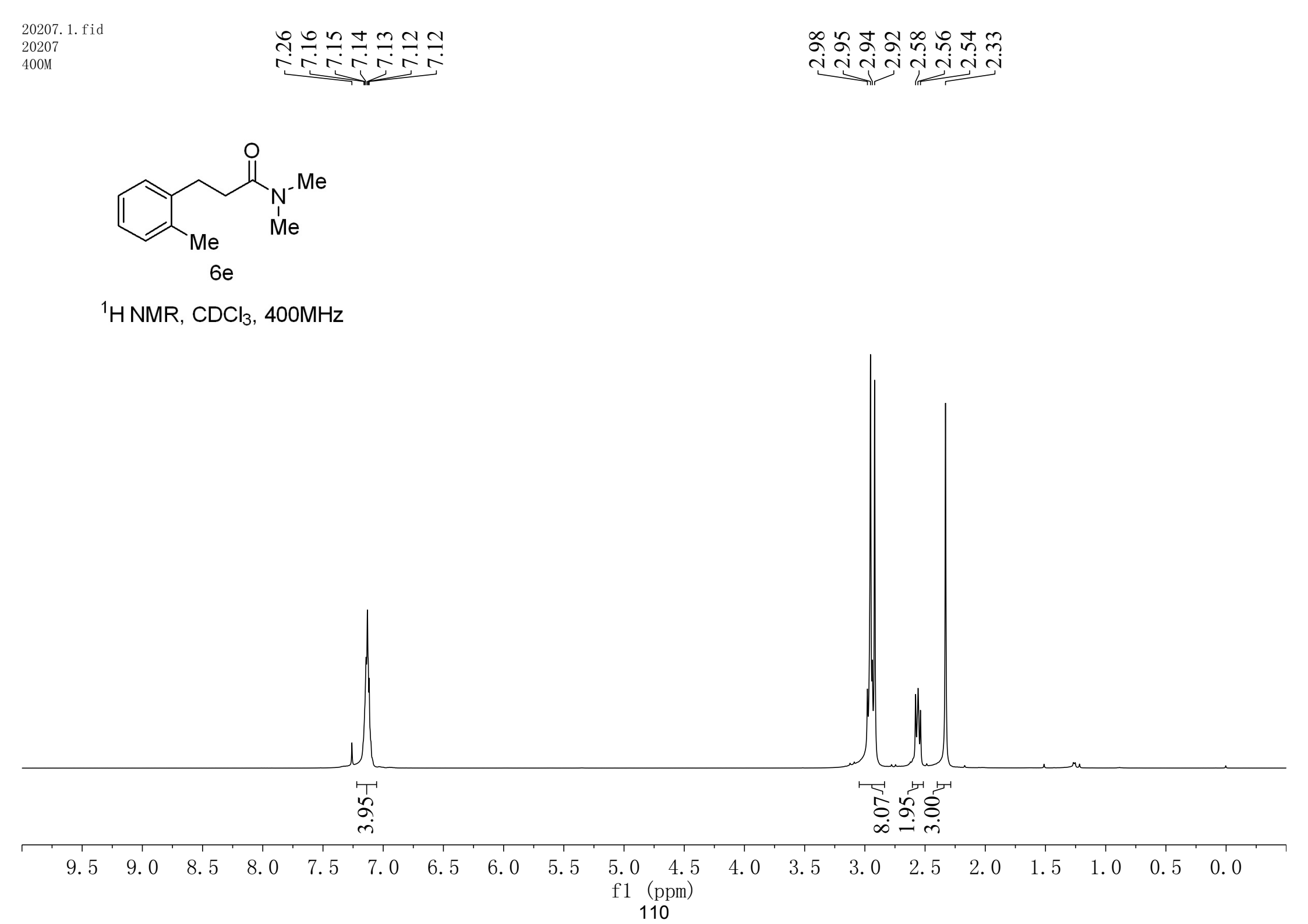
wxh200904.10.fid



6d

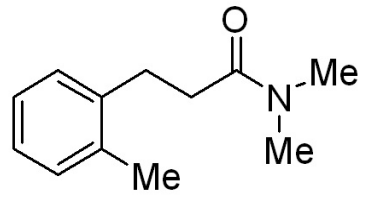
^{13}C NMR, $CDCl_3$, 100MHz

20207.1.fid
20207
400M



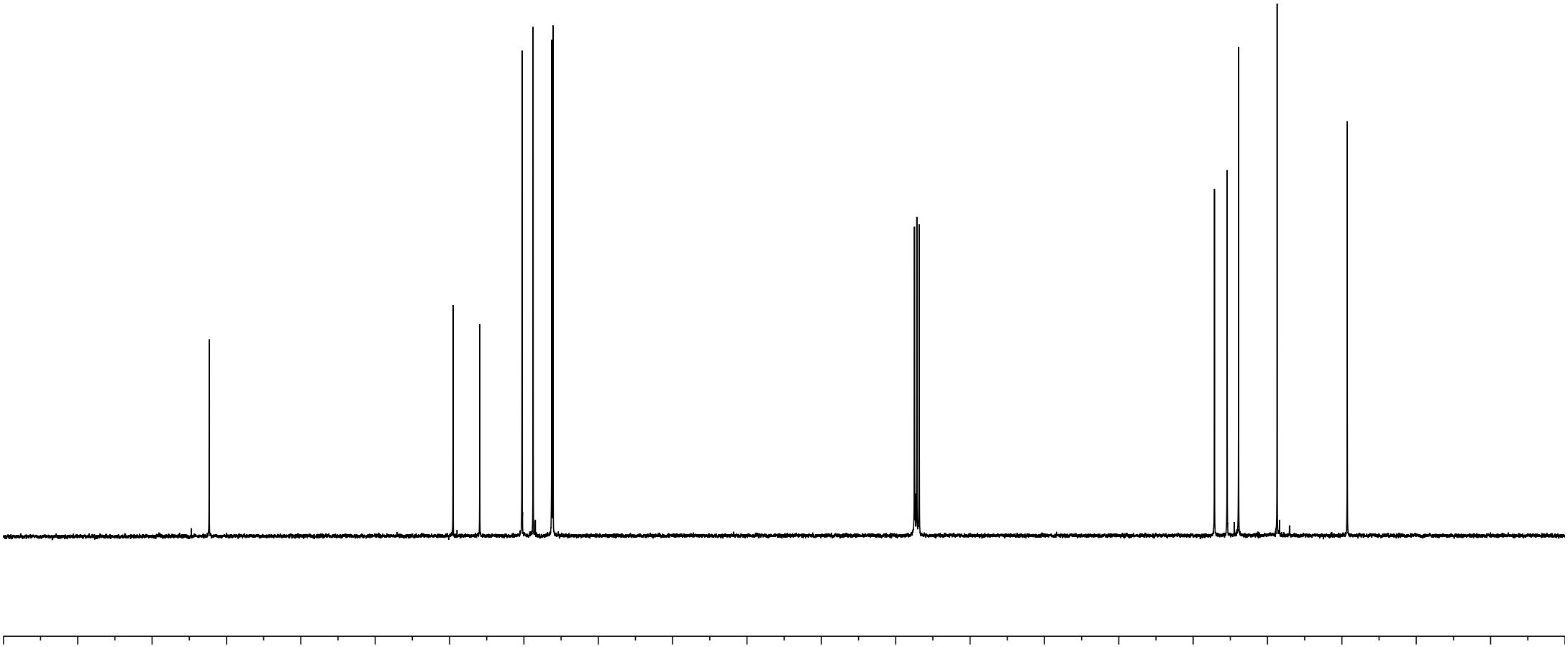
20207 13C.2.fid
SZPKU Bruker 400
Sample name:20207 13C

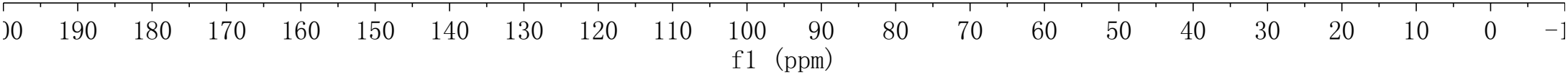
172.3
139.5
135.9
130.3
128.8
126.3
126.1
77.5
77.2
76.8
37.1
35.4
33.9
28.7
19.3



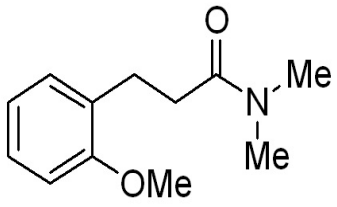
6e

^{13}C NMR, $CDCl_3$, 100MHz





20208.1.fid
20208
400M

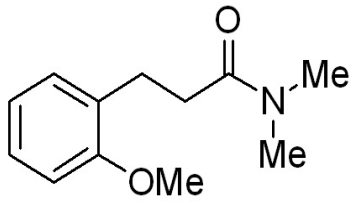


6f

^{1}H NMR, $CDCl_3$, 400MHz

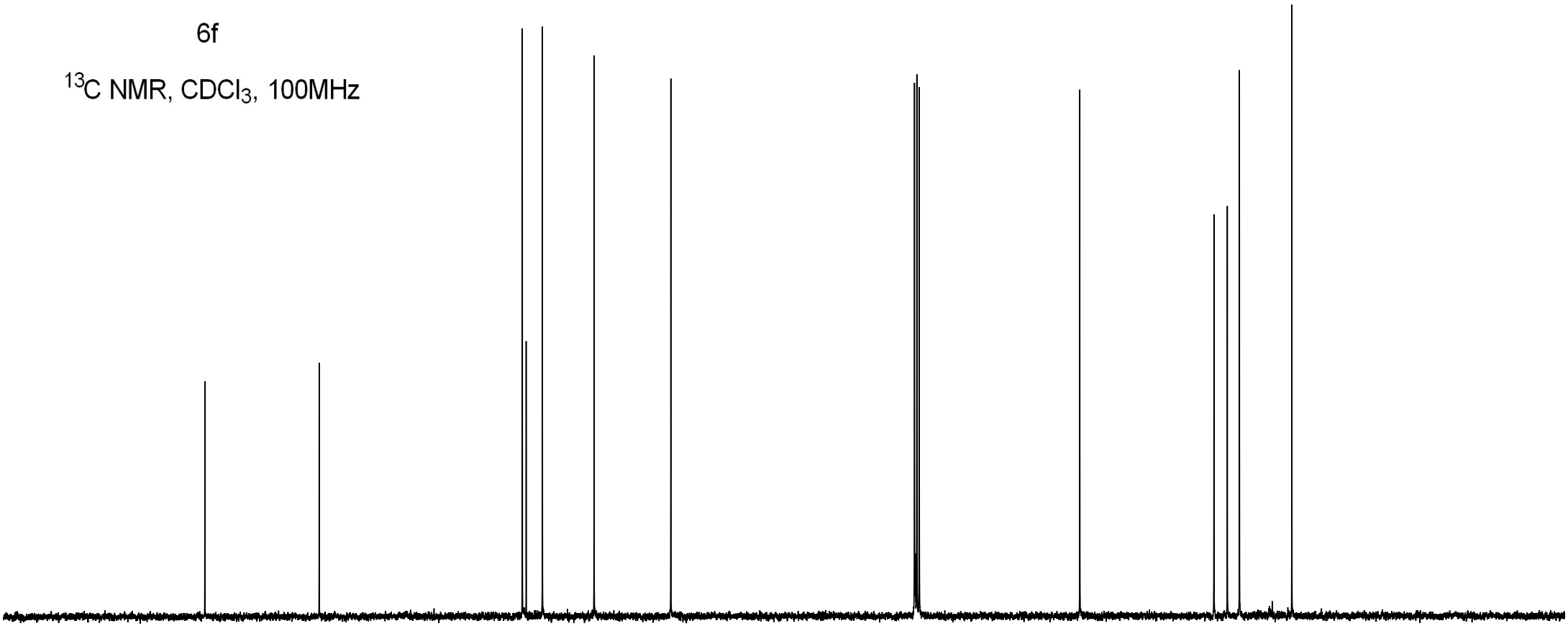
20208 13C.2.fid
SZPKU Bruker 400
Sample name:20208 13C

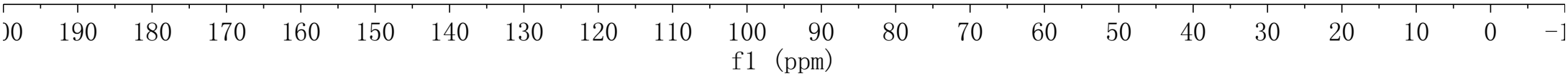
172.9
157.5
130.2
129.7
127.5
120.6
110.2
77.5
77.2
76.8
55.2
37.2
35.4
33.8
26.7



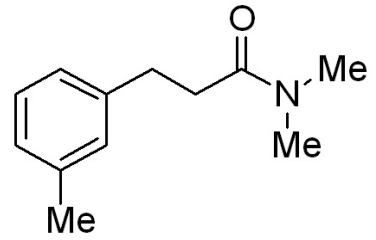
6f

^{13}C NMR, $CDCl_3$, 100MHz





wxh20200607.203401.fid



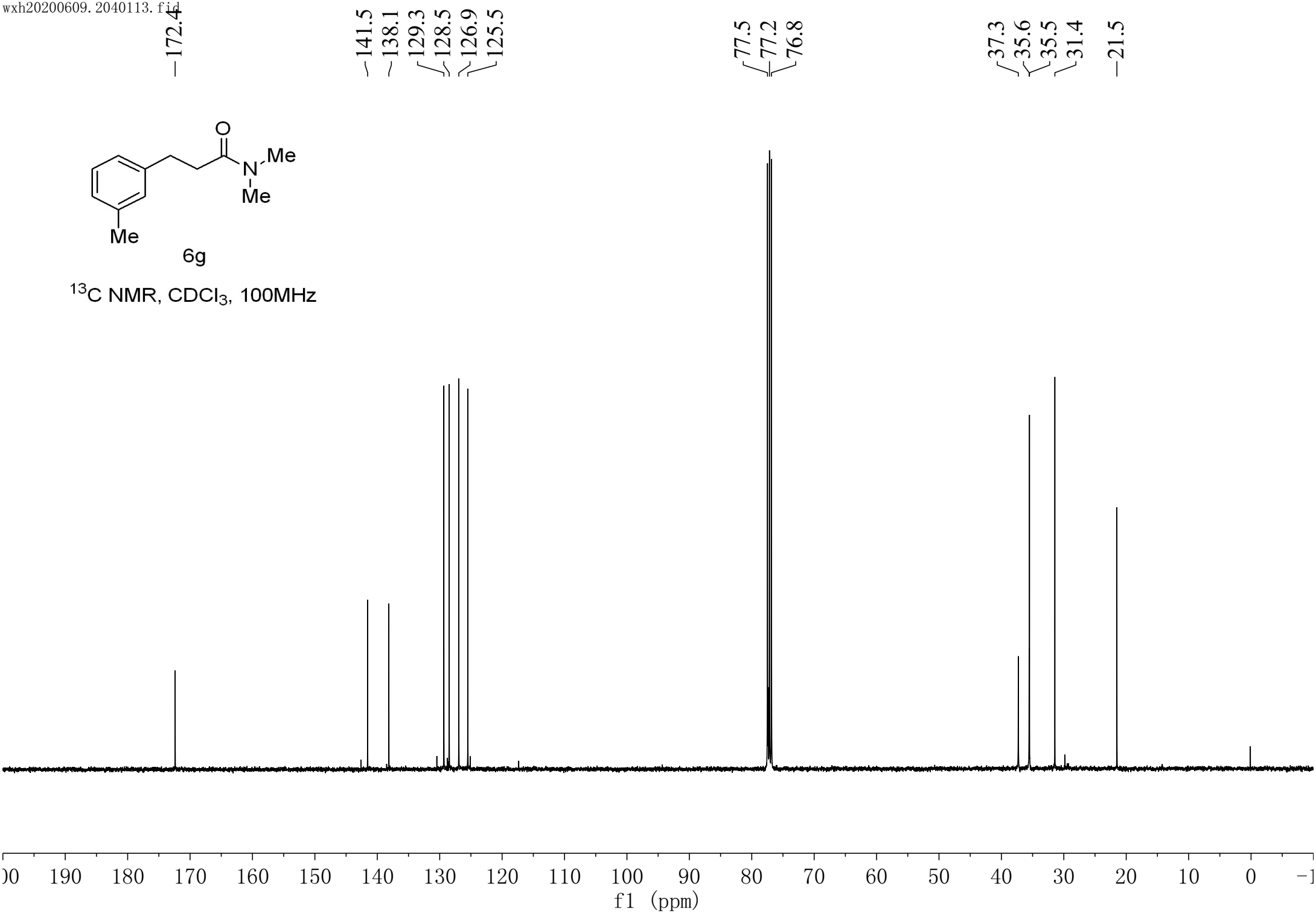
6g

^{1}H NMR, $CDCl_3$, 400MHz

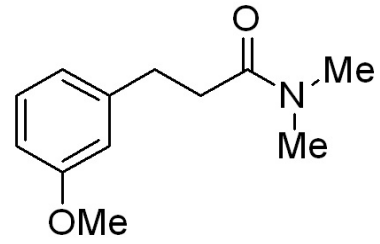
wxh20200609.2040113.fid

6g

^{13}C NMR, $CDCl_3$, 100MHz



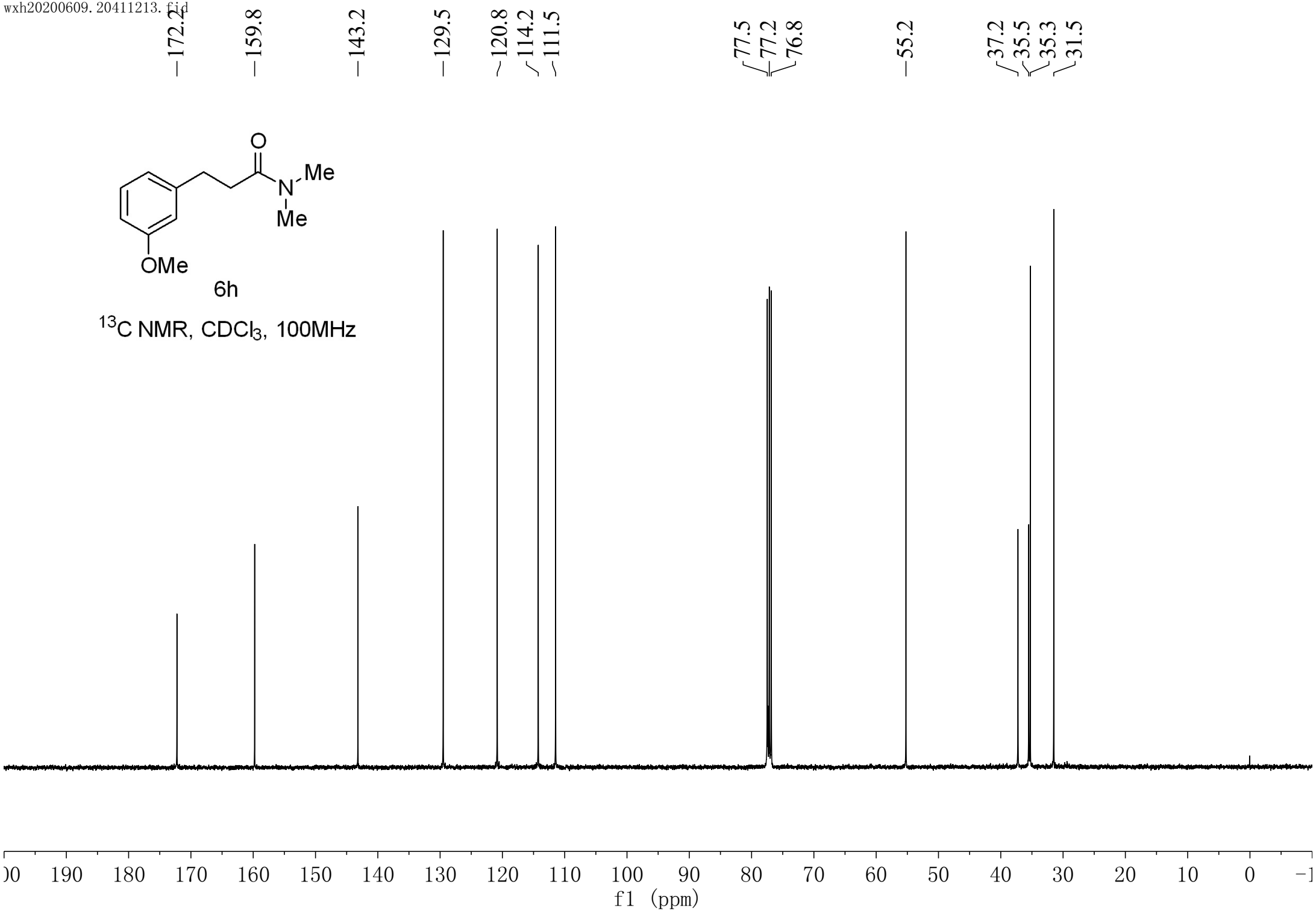
wxh20200609.204112.fid



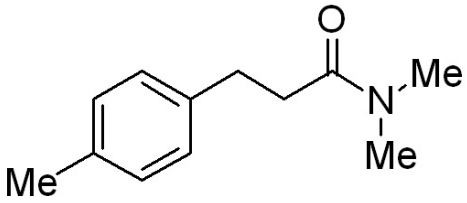
6h

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200609.20411213.fid

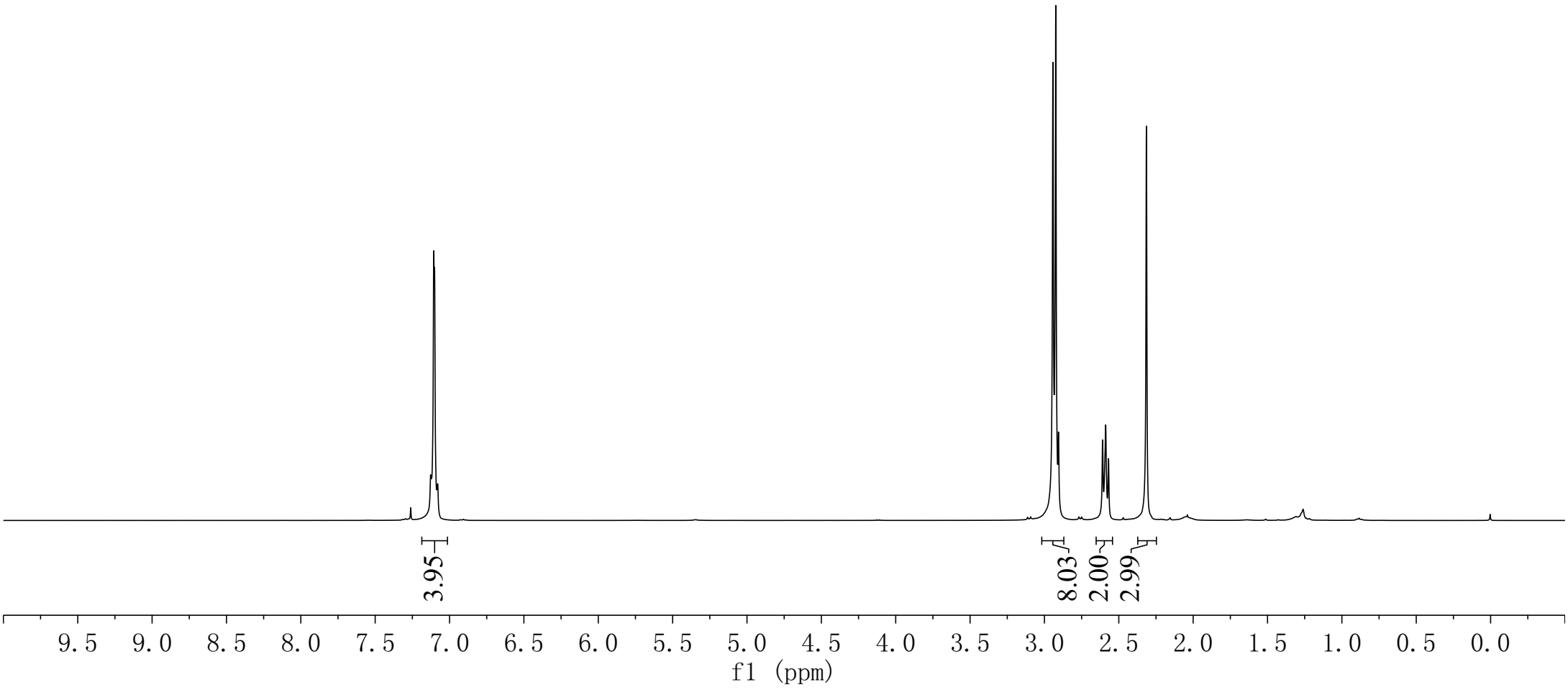


wxh20200607.20402.fid



6i

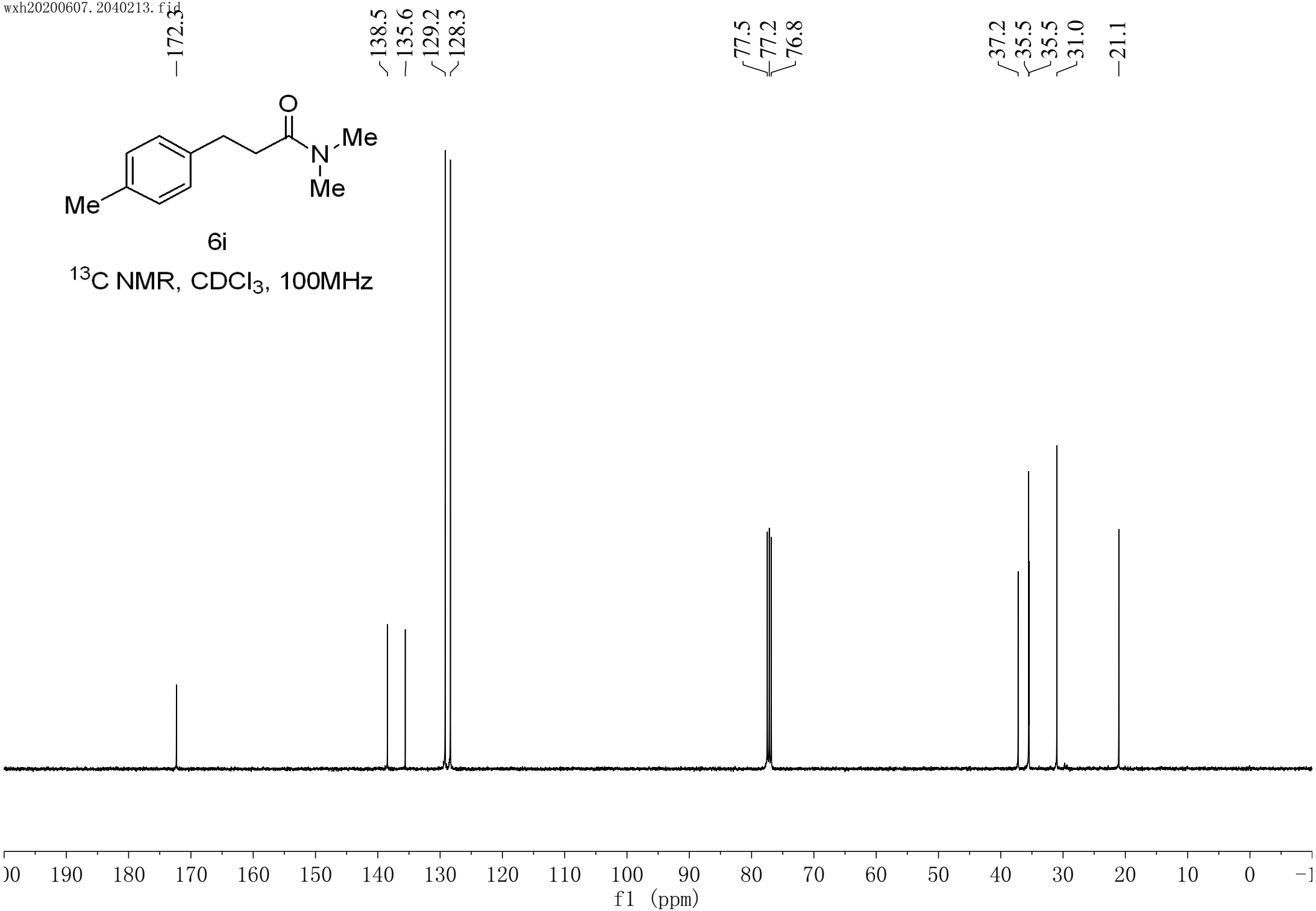
^{1}H NMR, $CDCl_3$, 400MHz



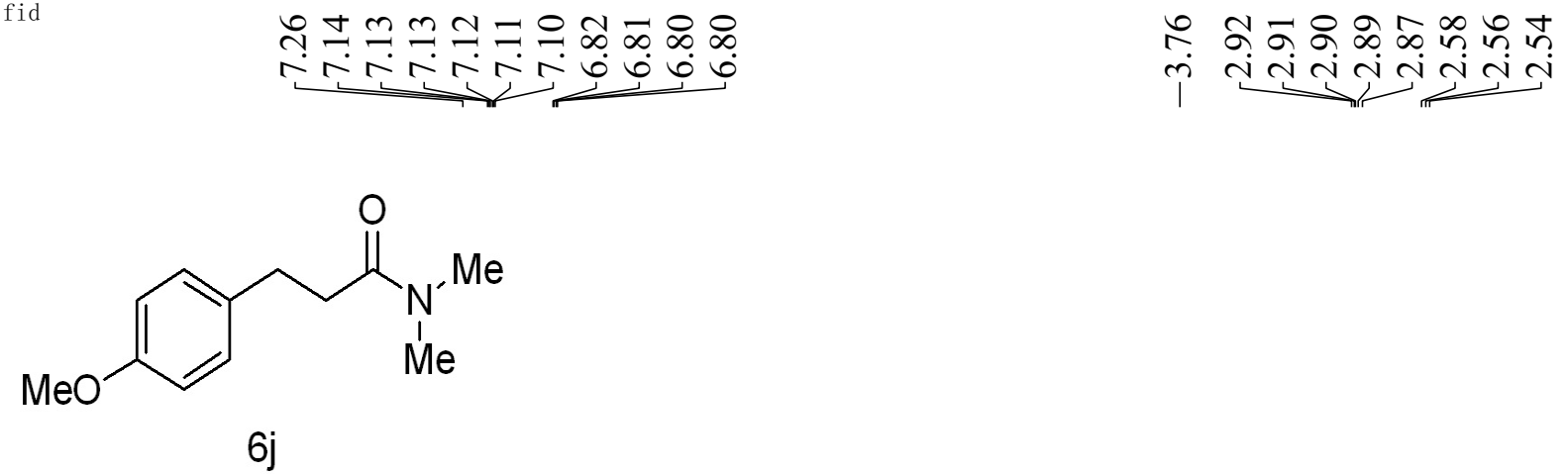
wxh20200607.2040213.fid

6i

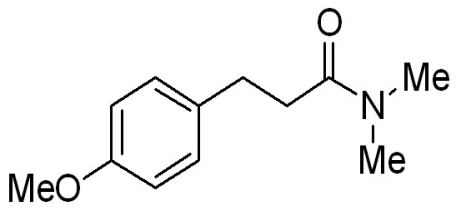
^{13}C NMR, $CDCl_3$, 100MHz



20145.1.fid
20145
400M

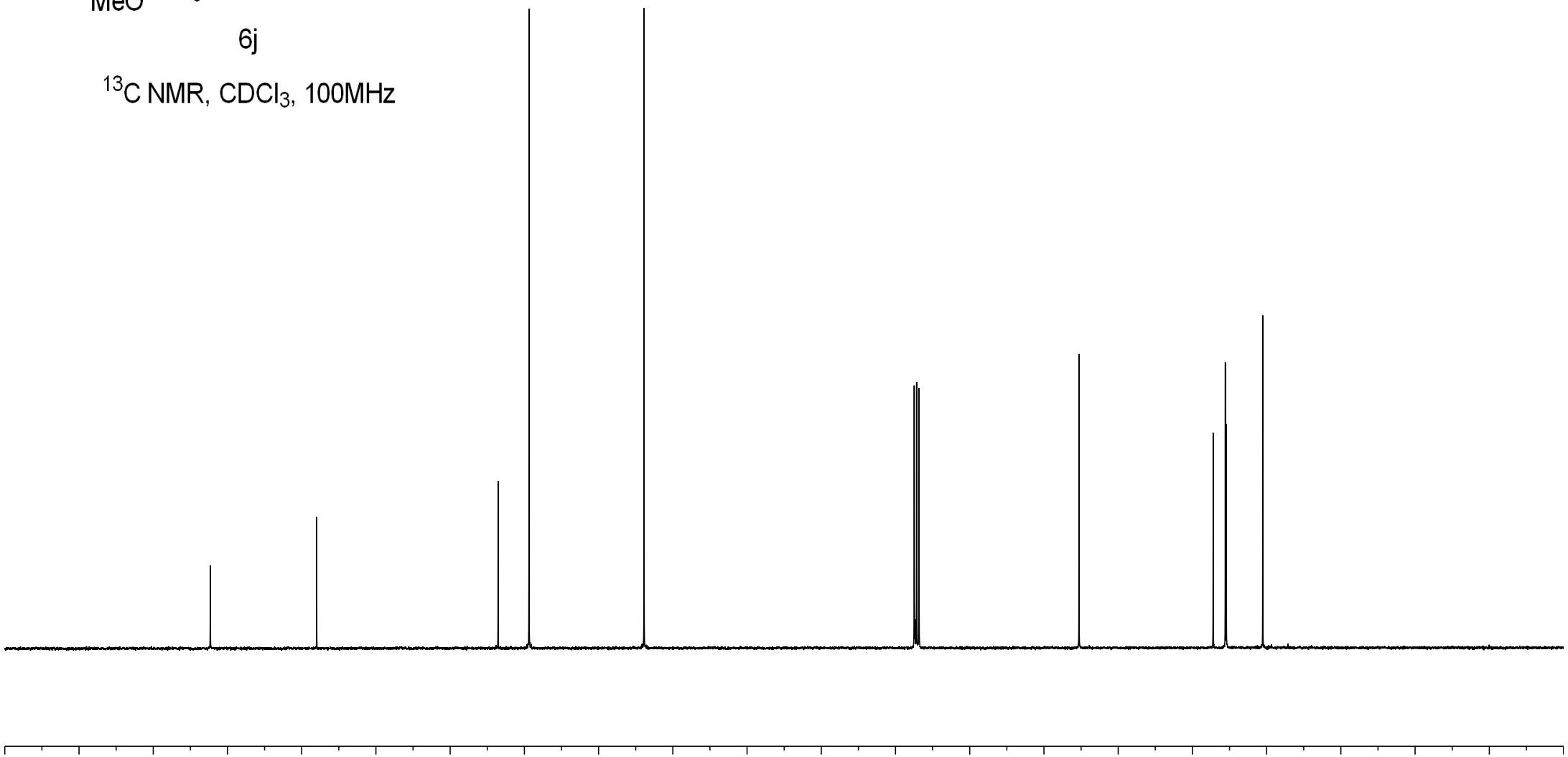


20145 13C.2.fid
SZPKU Bruker 400
Sample name:20145 13C

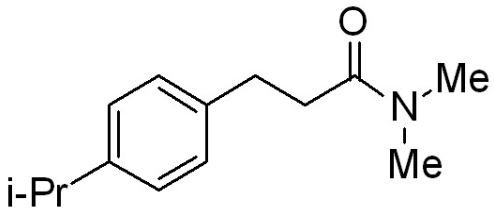


6j

^{13}C NMR, $CDCl_3$, 100MHz



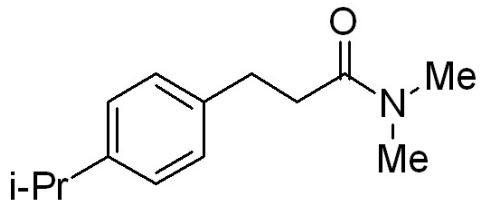
wxh20200614.20491.fid



6k

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200614.2049113.fid



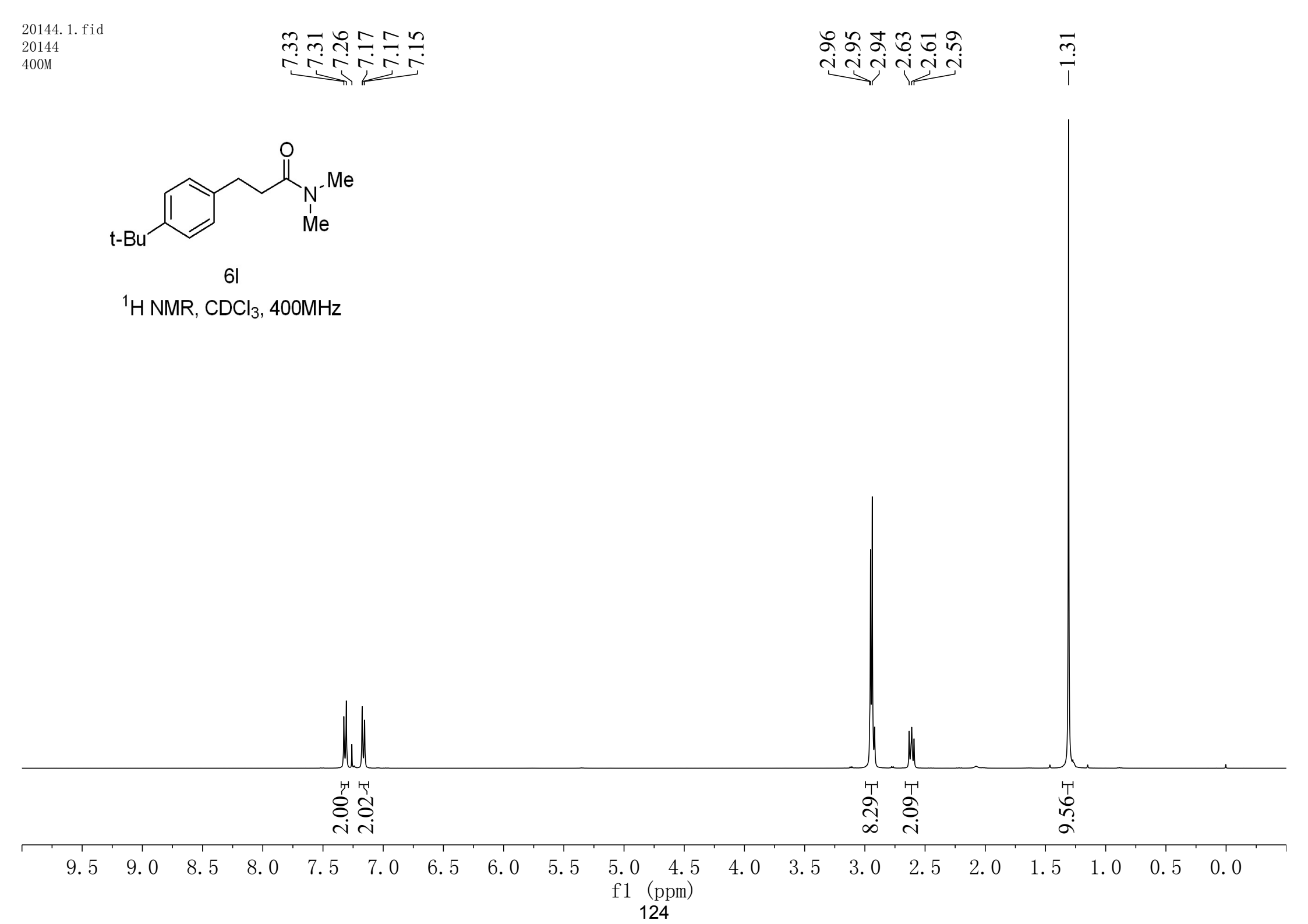
6k

^{13}C NMR, $CDCl_3$, 100MHz

172.4
146.7
138.8
128.4
126.5
77.5
77.2
76.8
37.2
35.5
35.5
33.8
31.0
24.1

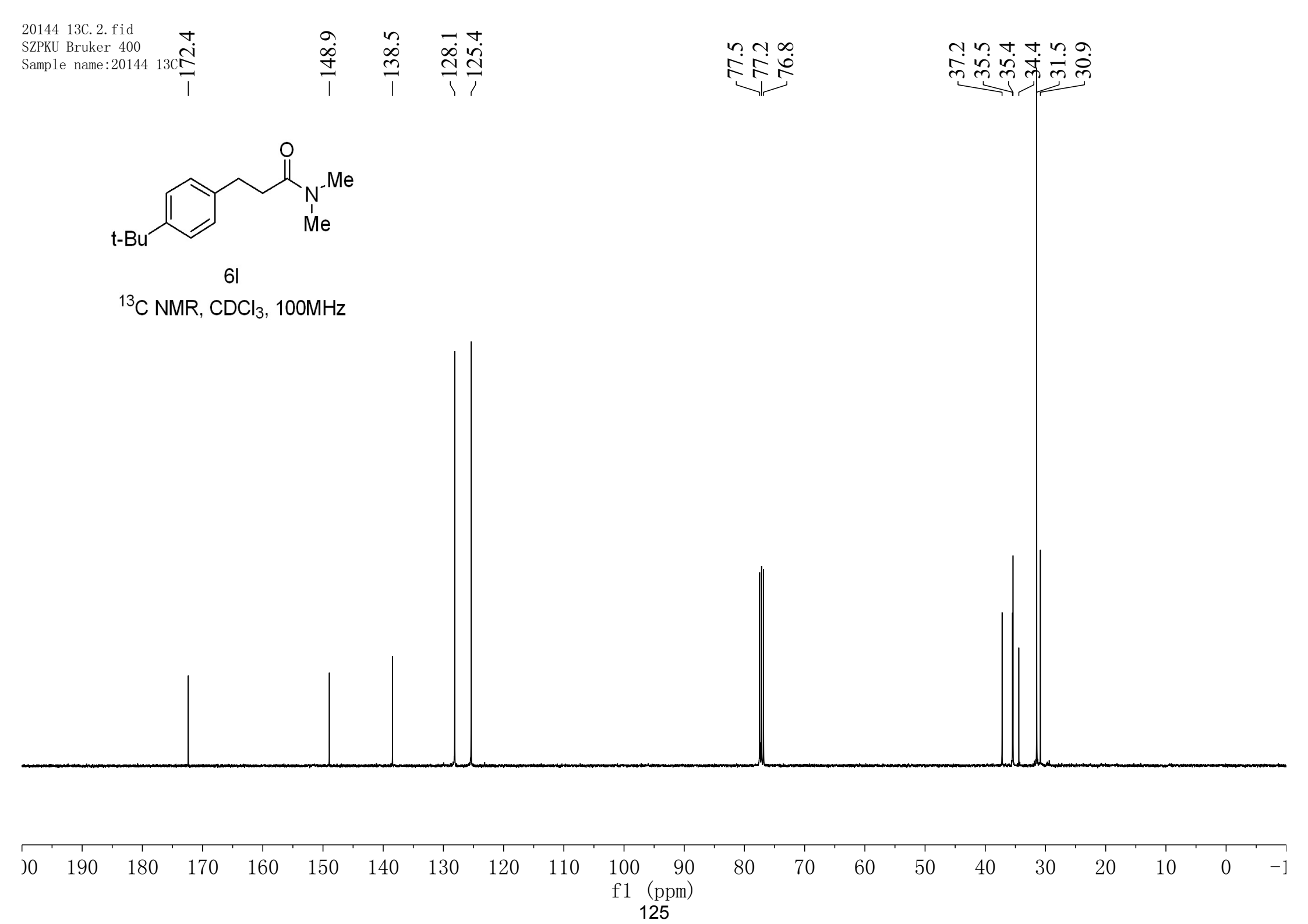
f1 (ppm)

20144.1.fid
20144
400M

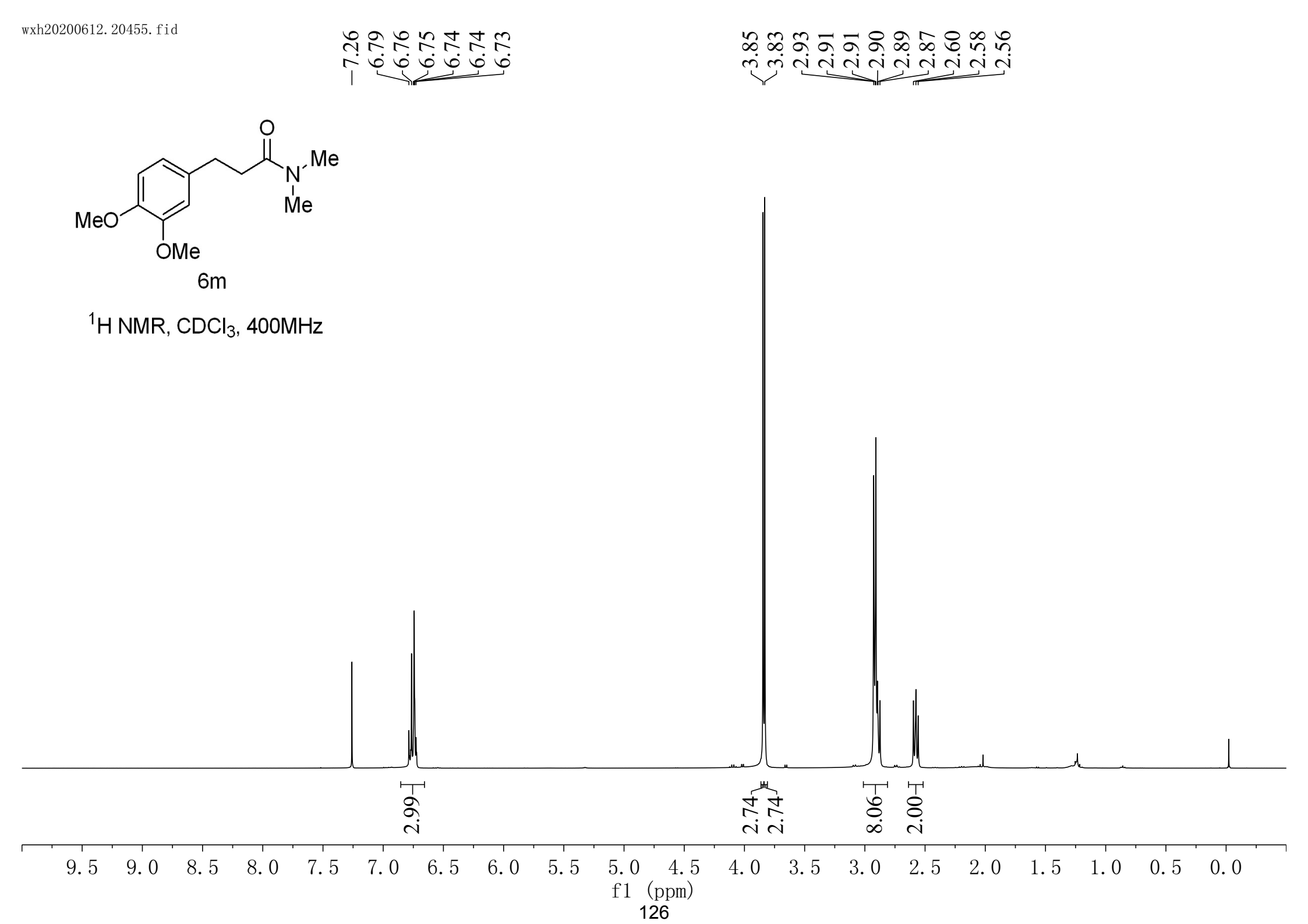


6l

^{1}H NMR, $CDCl_3$, 400MHz


20144 13C.2.fid
SZPKU Bruker 400
Sample name:20144 13C
172.4
148.9
138.5
128.1
125.4
77.5
77.2
76.8
37.2
35.5
35.4
34.4
31.5
30.9
O
N
Me
Me
t-Bu
6l
13C NMR, CDCl3, 100MHz
f1 (ppm)

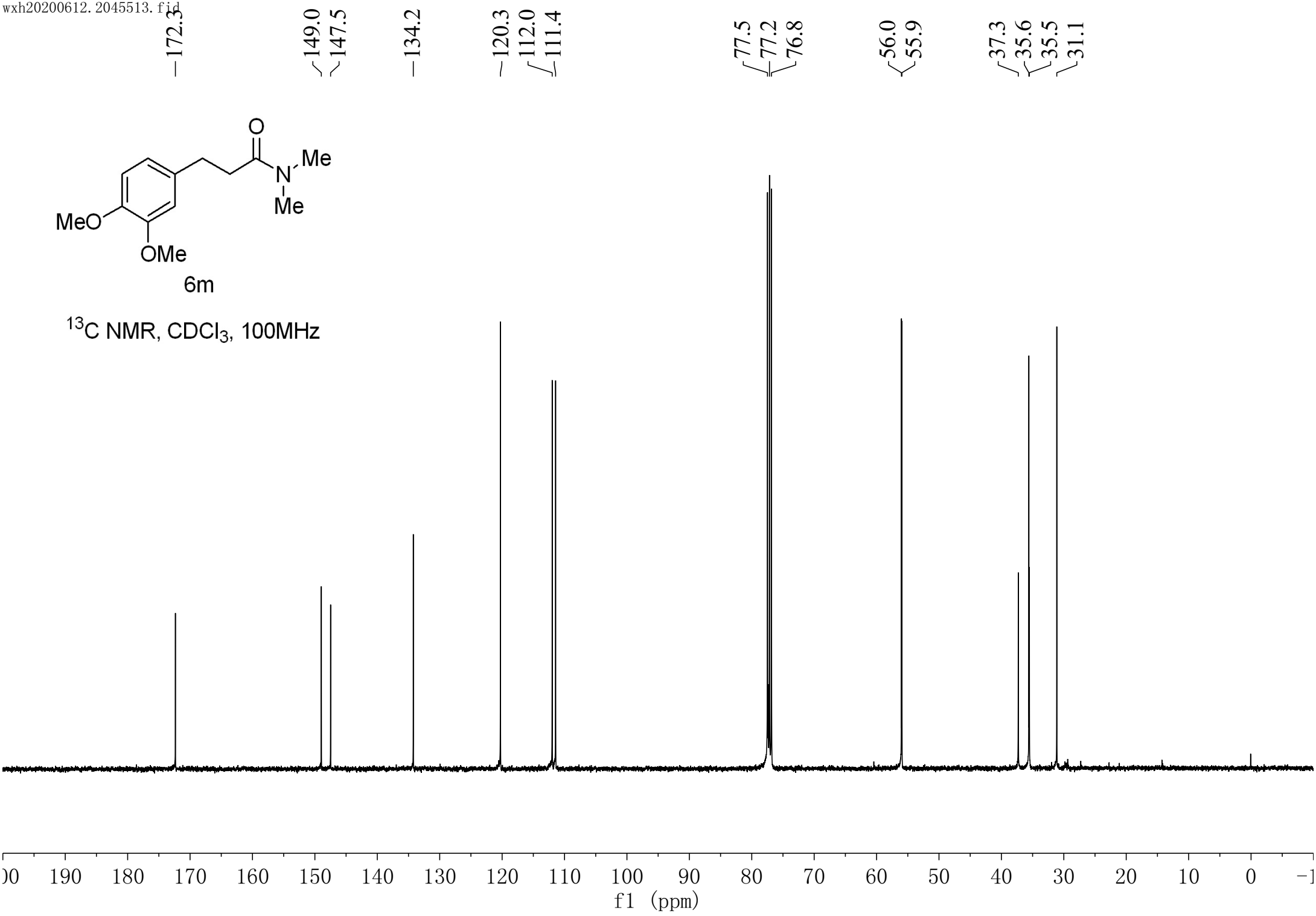
wxh20200612.20455.fid



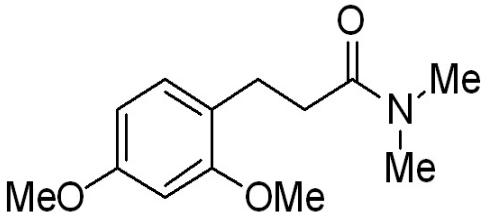
wxh20200612.2045513.fid

6m

^{13}C NMR, $CDCl_3$, 100MHz



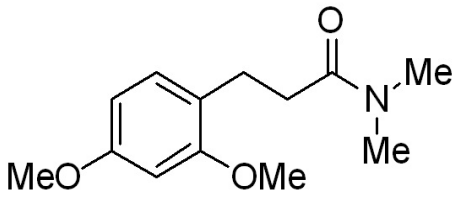
wxh20200614.20492.fid



6n

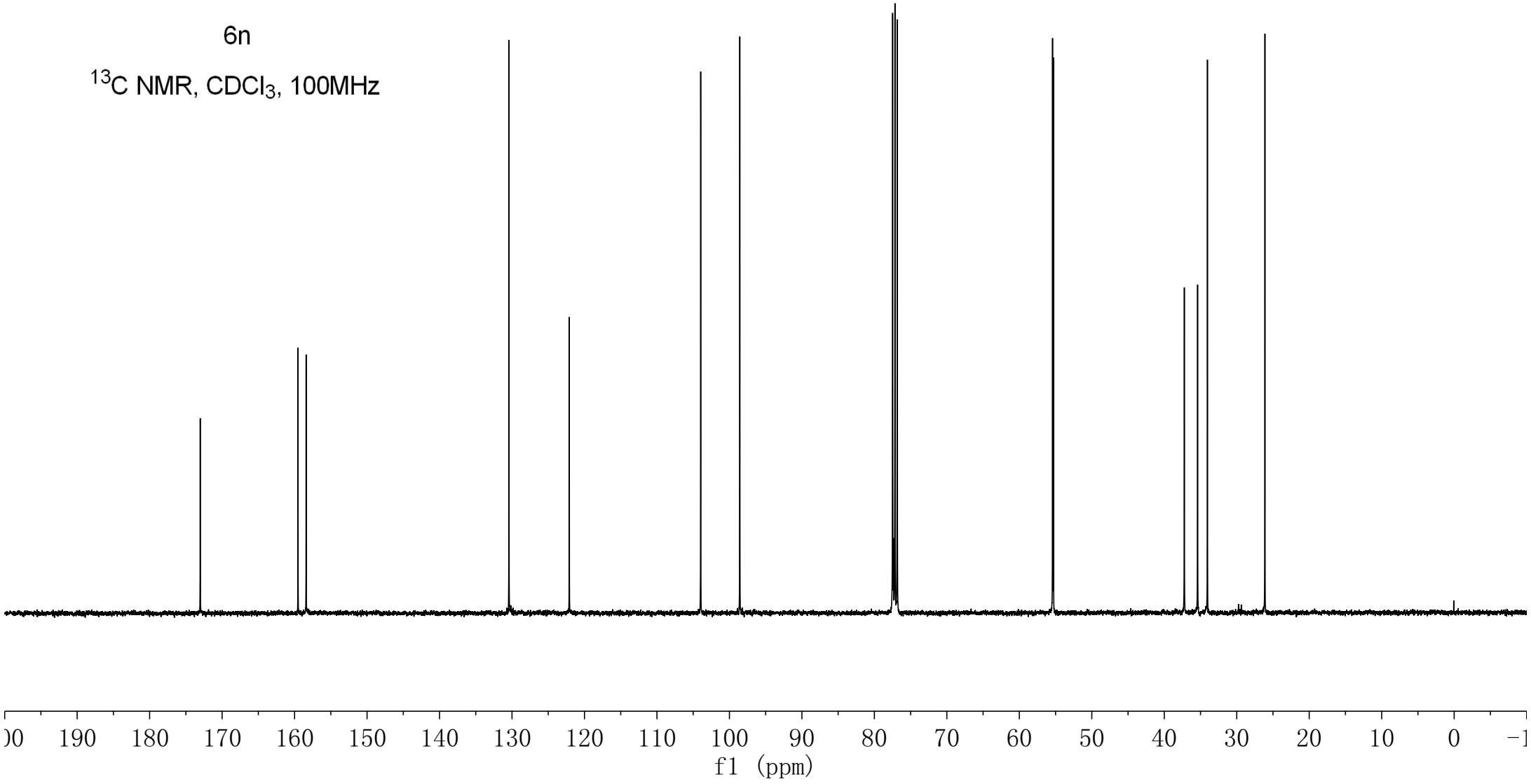
^{1}H NMR, $CDCl_3$, 400MHz

wxh20200616.2049213.fid



6n

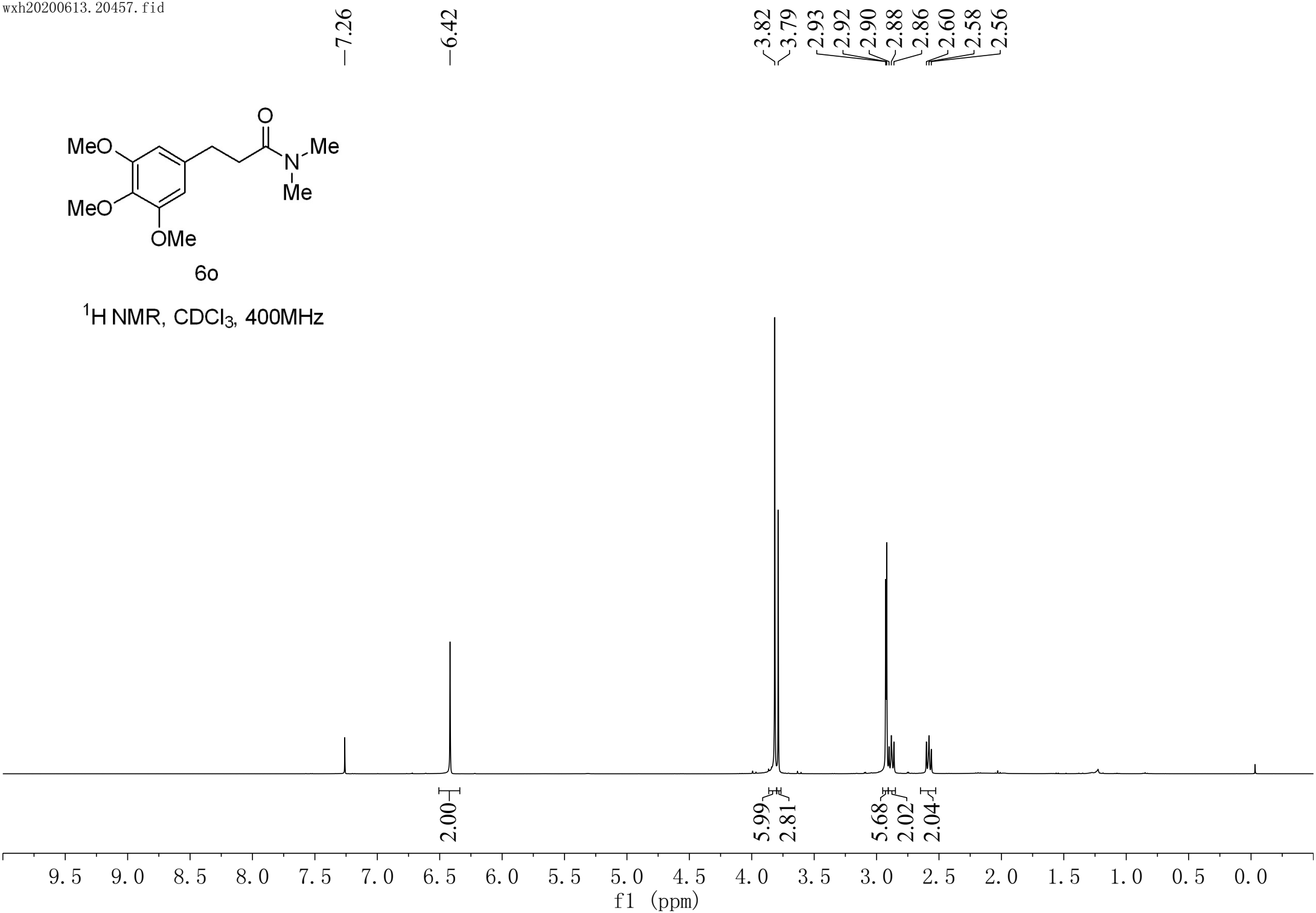
^{13}C NMR, $CDCl_3$, 100MHz



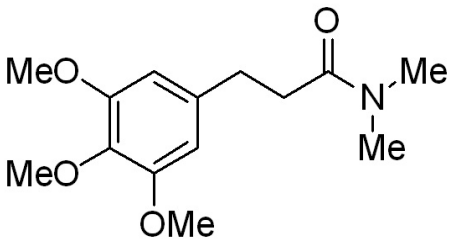
wxh20200613.20457.fid

6o

^{1}H NMR, $CDCl_3$, 400MHz



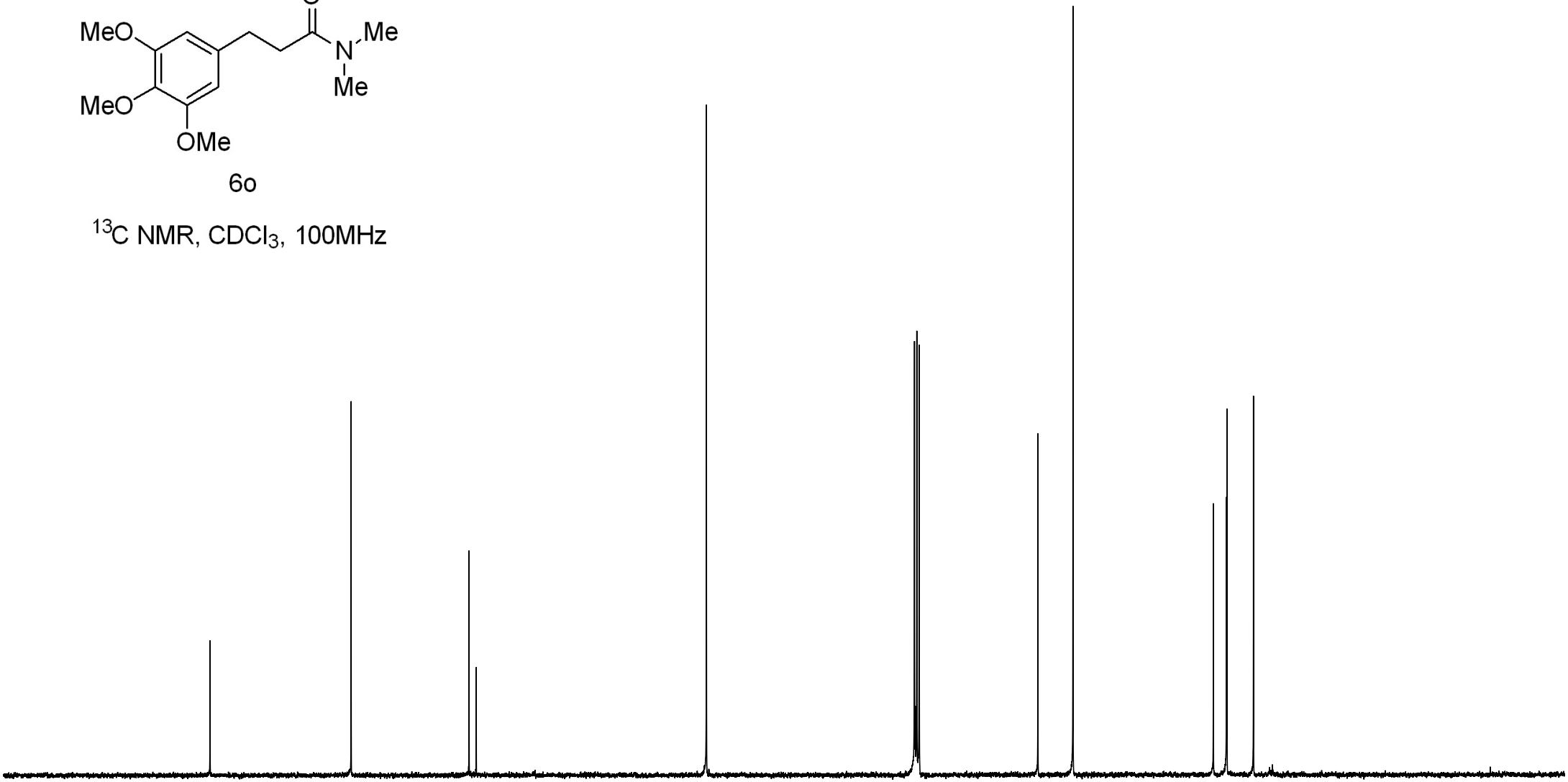
wxh20200613.2045713.fid



6o

^{13}C NMR, $CDCl_3$, 100MHz

172.2
153.2
137.4
136.4
105.5
77.5
77.2
76.8
60.9
56.2
37.3
35.5
35.5
31.9



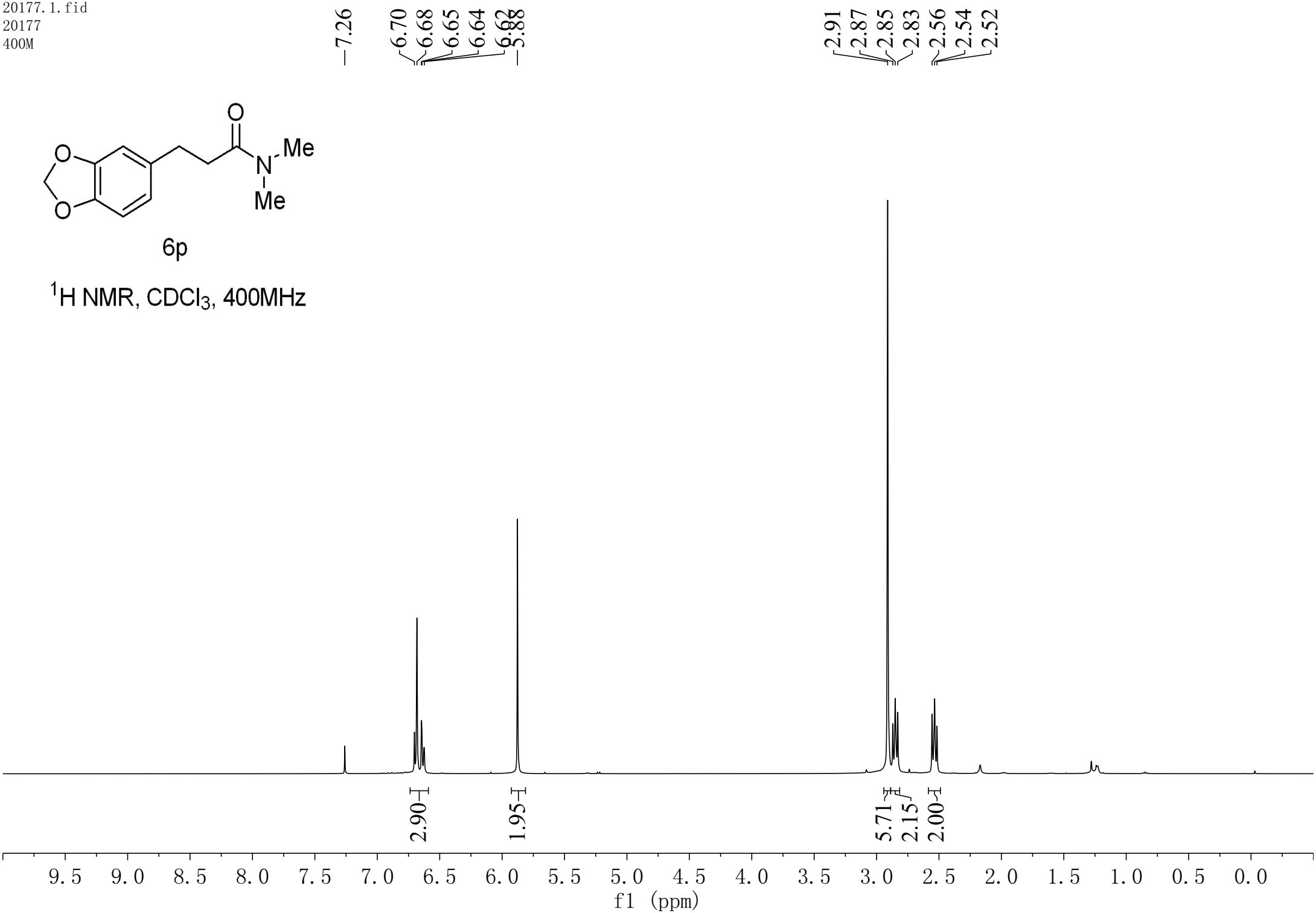
)0 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

20177.1.fid
20177
400M

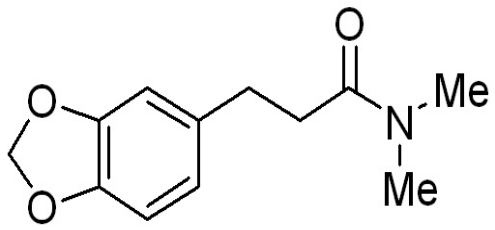
6p

^{1}H NMR, $CDCl_3$, 400MHz



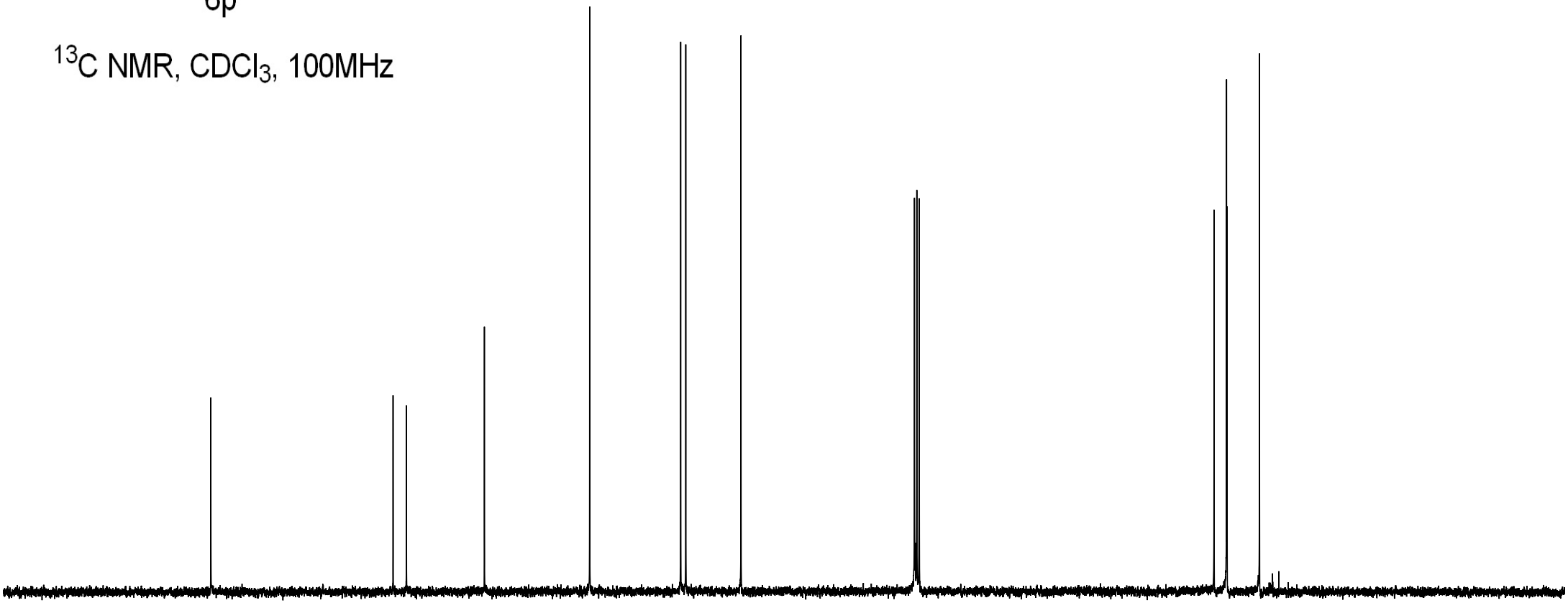
20177 13C.2.fid
SZPKU Bruker 400
Sample name:20177 13C

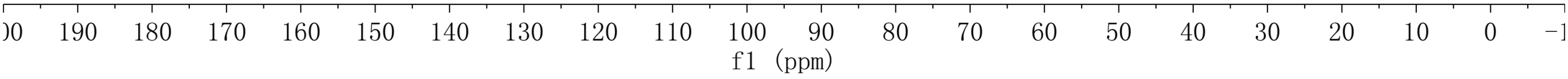
172.1
147.6
145.8
135.3
121.2
108.9
108.2
100.8
77.5
77.2
76.8
37.2
35.5
35.4
31.1



6p

^{13}C NMR, $CDCl_3$, 100MHz

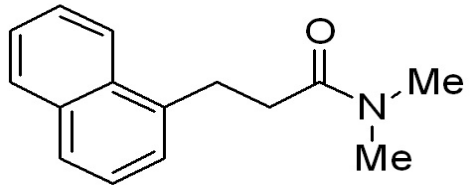




20205_1.fid

8.07 8.06 8.05 7.87 7.86 7.85 7.85 7.74 7.73 7.72 7.72 7.54 7.53 7.52 7.52 7.51 7.50 7.50 7.49 7.48 7.48 7.47 7.46 7.40 7.38 7.38 7.26

3.47 3.45 3.43 2.96 2.82 2.75 2.73 2.71



6q

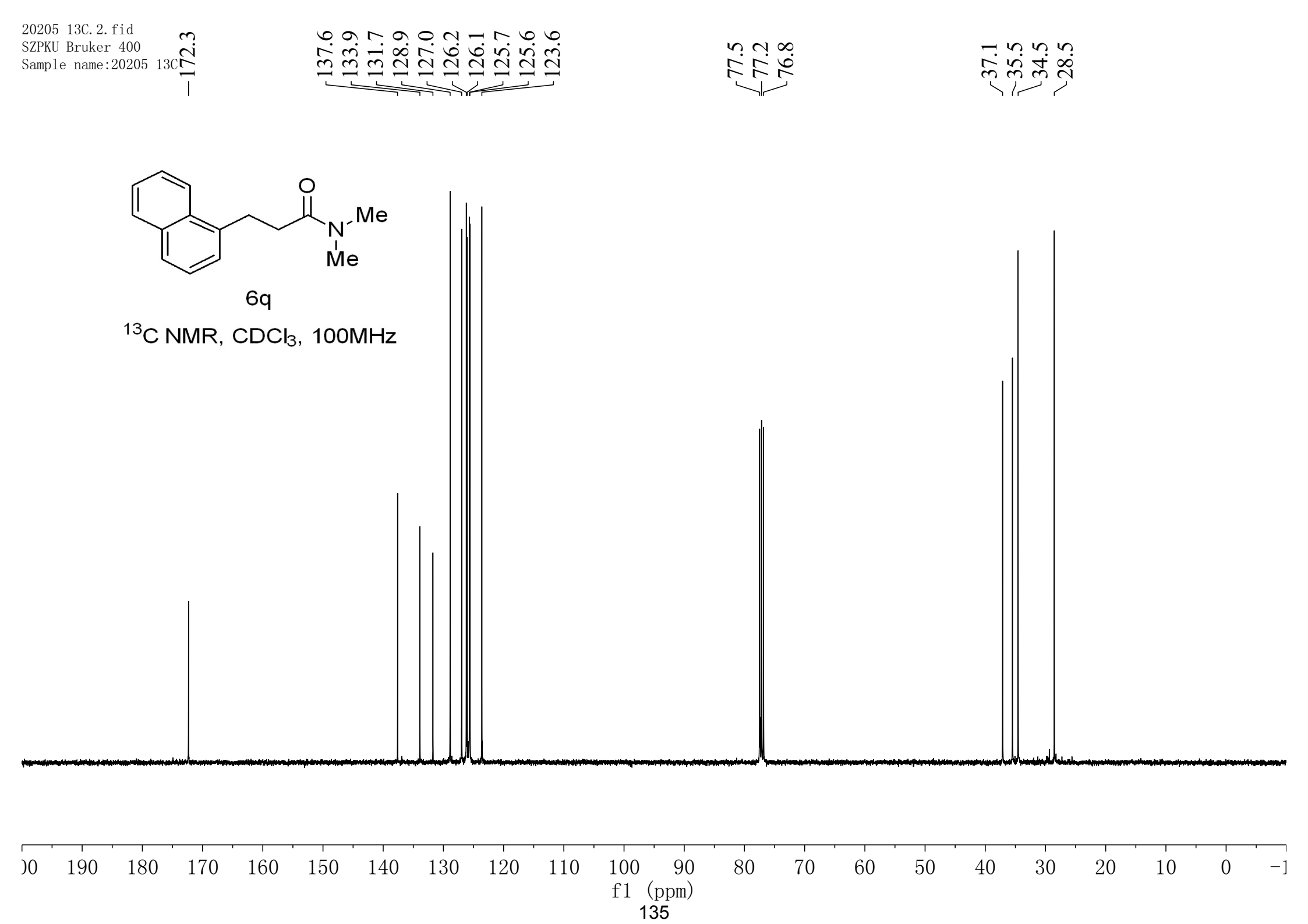
^{1}H NMR, $CDCl_3$, 400MHz

1.00 0.98 0.99 1.99 1.99 2.03 2.88 2.95 2.00

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

f1 (ppm)

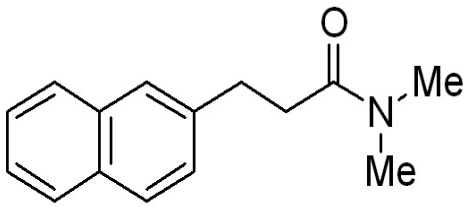
20205 13C.2.fid
SZPKU Bruker 400
Sample name:20205 13C



20143.1.fid
20143
400M

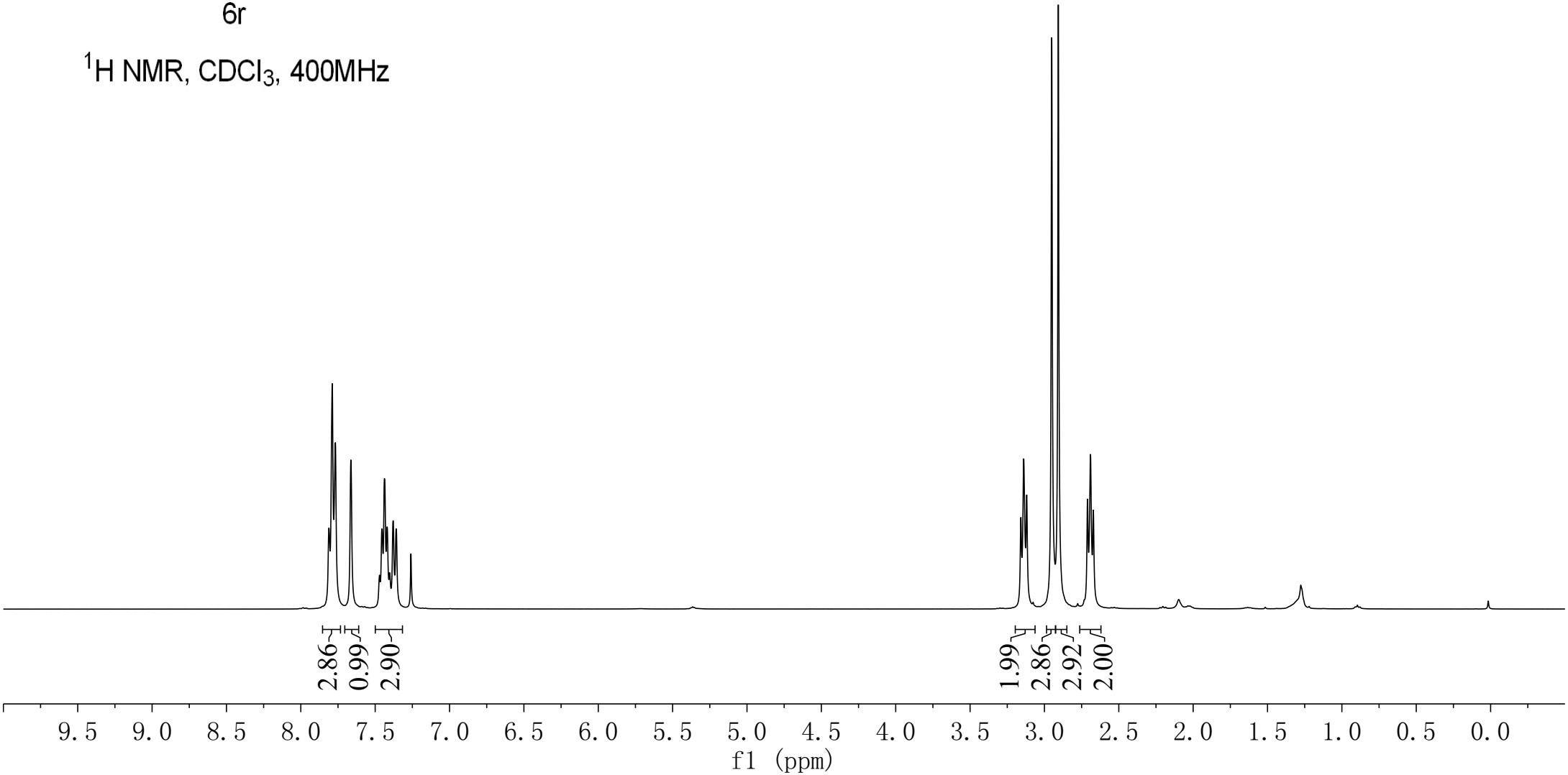
7.81 7.79 7.79 7.77 7.66 7.47 7.47 7.46 7.45 7.44 7.43 7.42 7.40 7.38 7.38 7.36 7.36 7.26

3.16 3.14 3.12 2.95 2.91 2.71 2.69 2.67

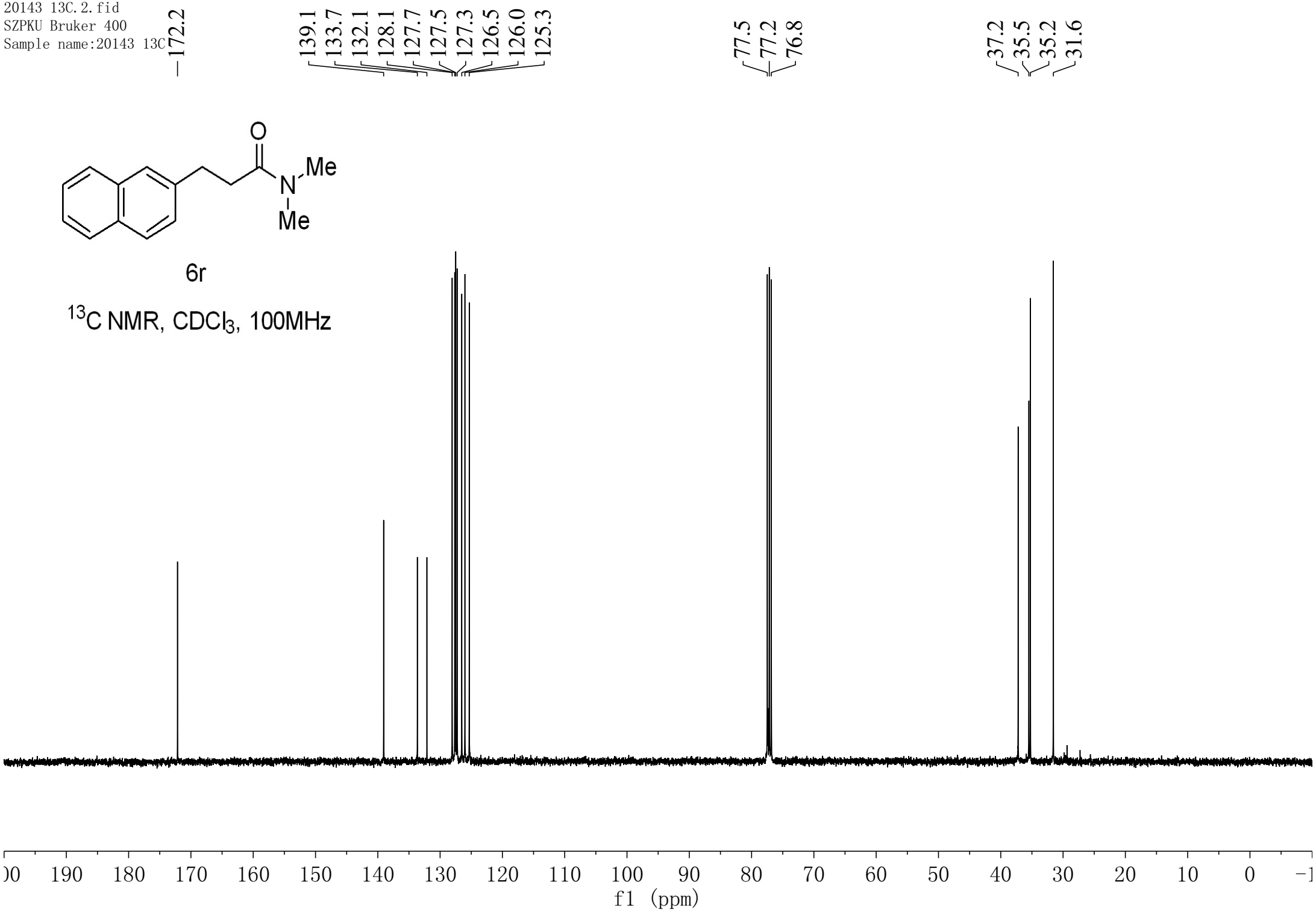


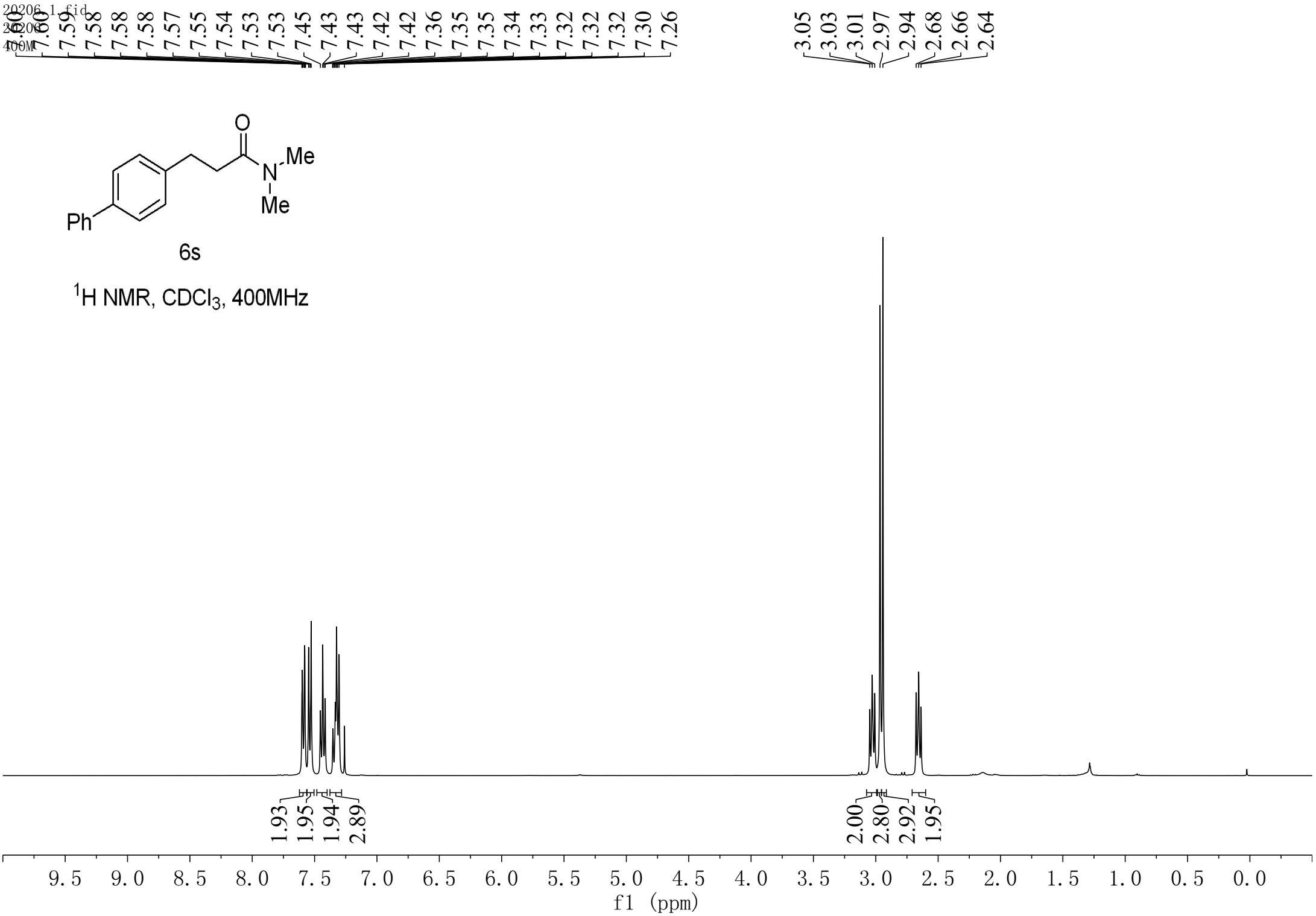
6r

^{1}H NMR, $CDCl_3$, 400MHz



20143 13C.2.fid
SZPKU Bruker 400
Sample name:20143 13C

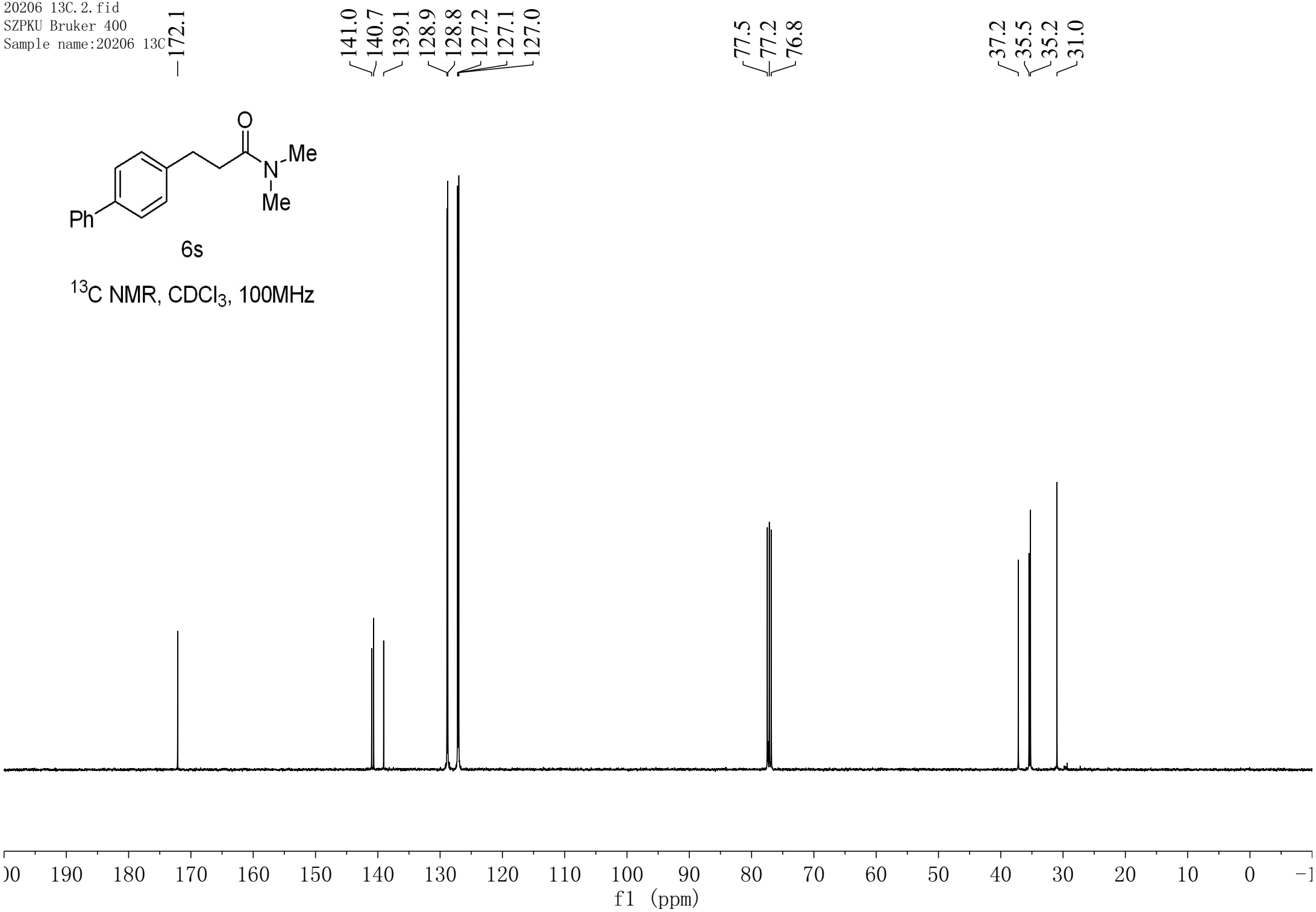



20206_1.fid
20206
400M
7.60
7.60
7.59
7.58
7.58
7.58
7.57
7.55
7.54
7.53
7.53
7.45
7.43
7.43
7.42
7.42
7.36
7.35
7.35
7.34
7.33
7.32
7.32
7.32
7.30
7.26
3.05
3.03
3.01
2.97
2.94
2.68
2.66
2.64
O
N
Me
Me
Ph
6s
1H NMR, CDCl3, 400MHz
1.93
1.95
1.94
2.89
2.00
2.80
2.92
1.95
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

20206 13C.2.fid
SZPKU Bruker 400
Sample name:20206 13C

6s

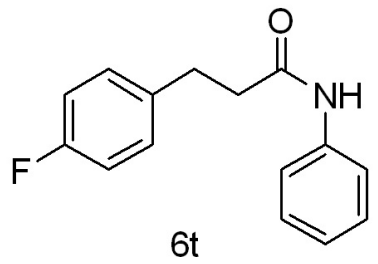
^{13}C NMR, $CDCl_3$, 100MHz



wxh20200715_20714.fid

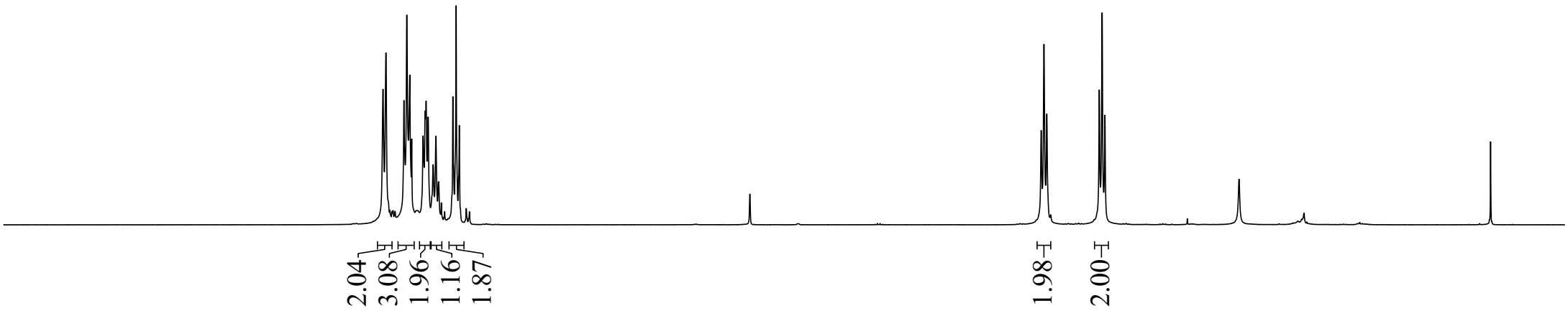
7.45 7.43 7.31 7.30 7.29 7.27 7.27 7.25 7.18 7.17 7.16 7.16 7.15 7.14 7.12 7.11 7.09 7.08 7.07 7.05 6.98 6.97 6.96 6.96 6.95 6.94 6.93

3.02 3.00 2.98 2.63 2.61 2.59



6t

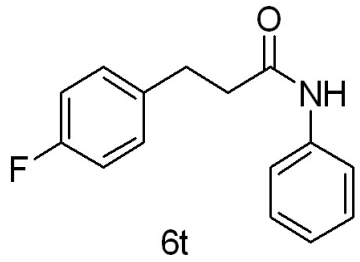
^{1}H NMR, $CDCl_3$, 400MHz



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

f1 (ppm)

wxh20200723.20714113.fid



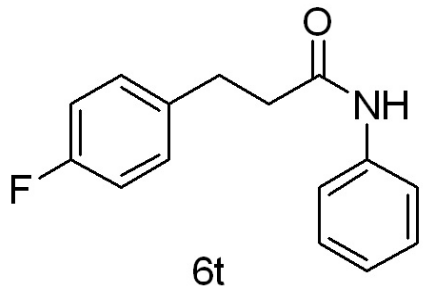
6t

^{13}C NMR, $CDCl_3$, 100MHz

170.4
162.8
160.4
137.8
136.4
136.4
130.0
129.9
129.1
124.5
120.1
115.6
115.4
77.5
77.2
76.8
39.6
30.8

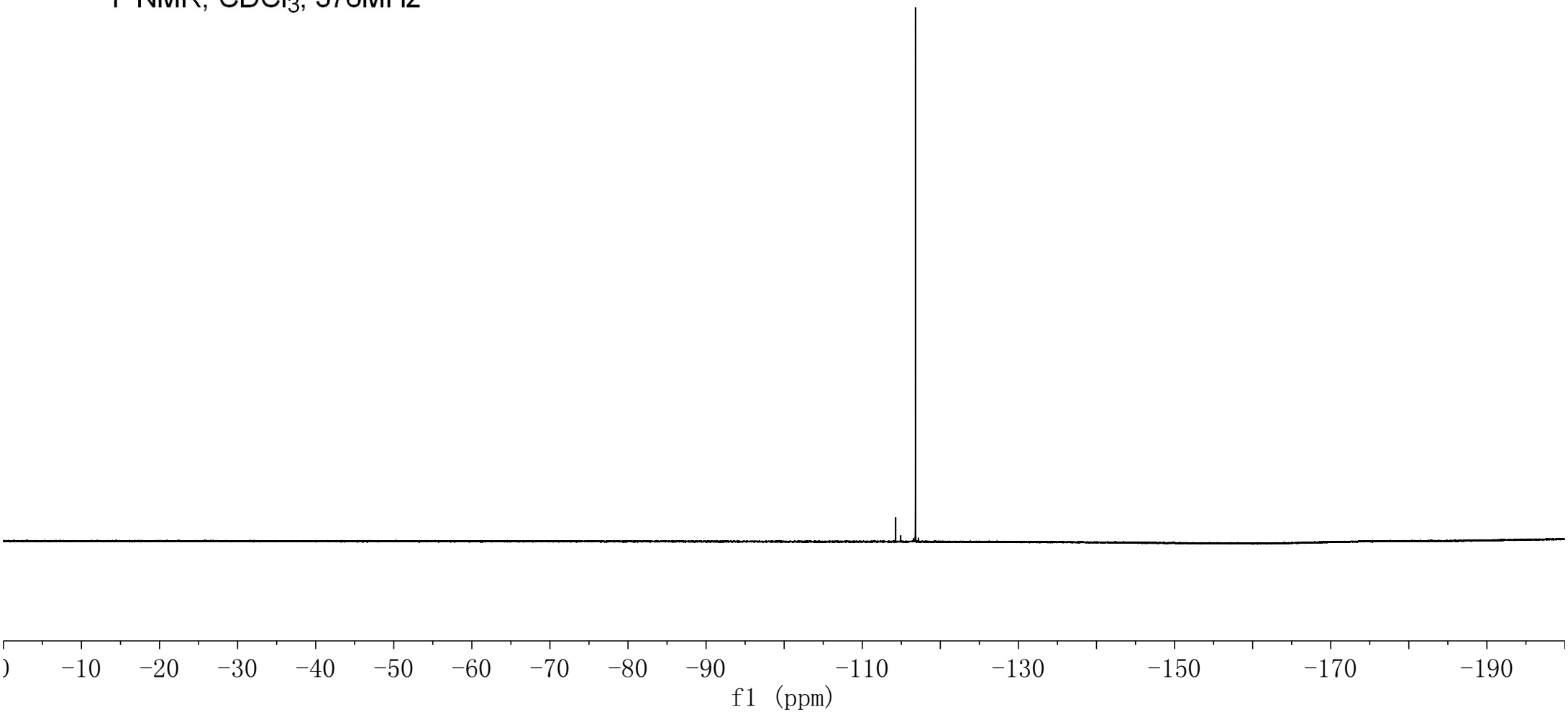
f1 (ppm)

wxh20200706.2065319.fid



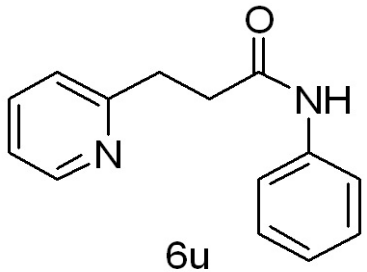
6t

^{19}F NMR, $CDCl_3$, 376MHz



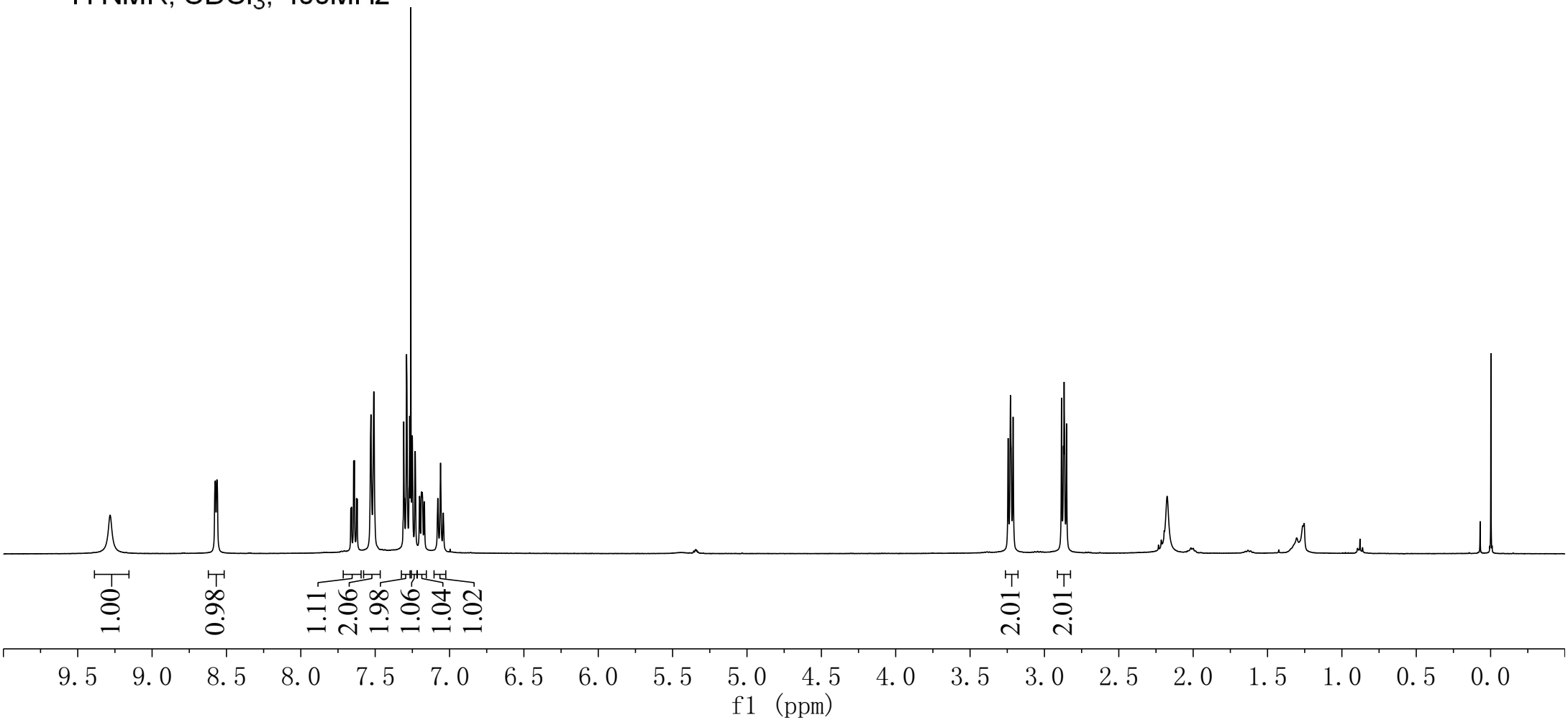
wxh20200702_20613.fid

9.28 8.58 8.57 8.57 8.56 8.56 7.66 7.66 7.64 7.64 7.63 7.62 7.53 7.53 7.51 7.51 7.31 7.29 7.29 7.27 7.26 7.25 7.23 7.20 7.19 7.08 7.06 3.24 3.23 3.21 2.88 2.87 2.85



6u

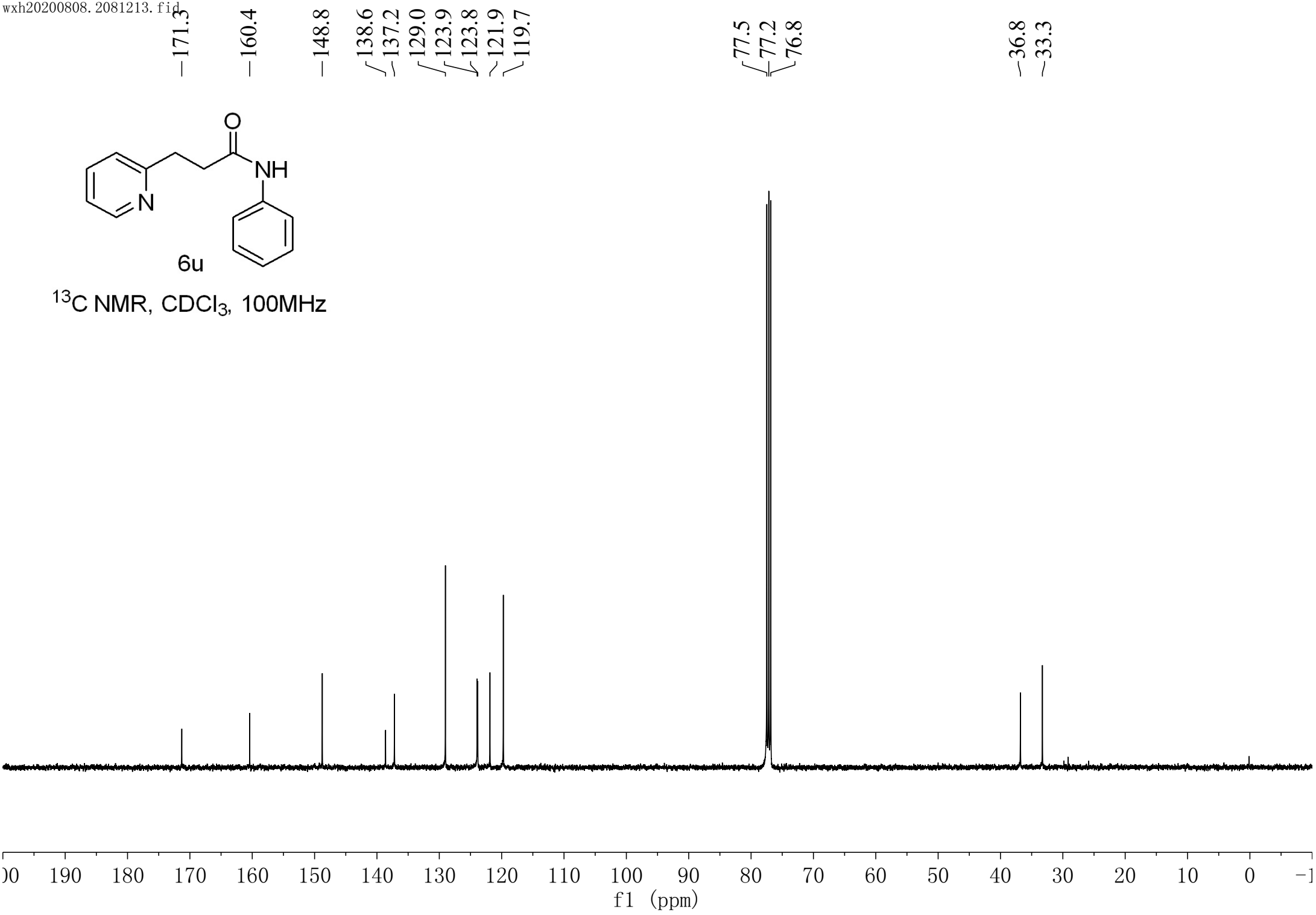
^{1}H NMR, $CDCl_3$, 400MHz



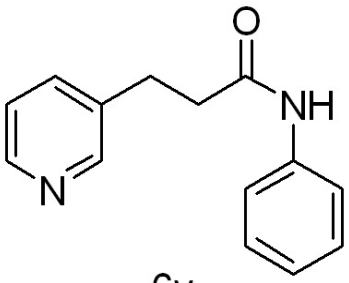
wxh20200808.2081213.fid

6u

^{13}C NMR, $CDCl_3$, 100MHz



wxh20200620_205552.fid



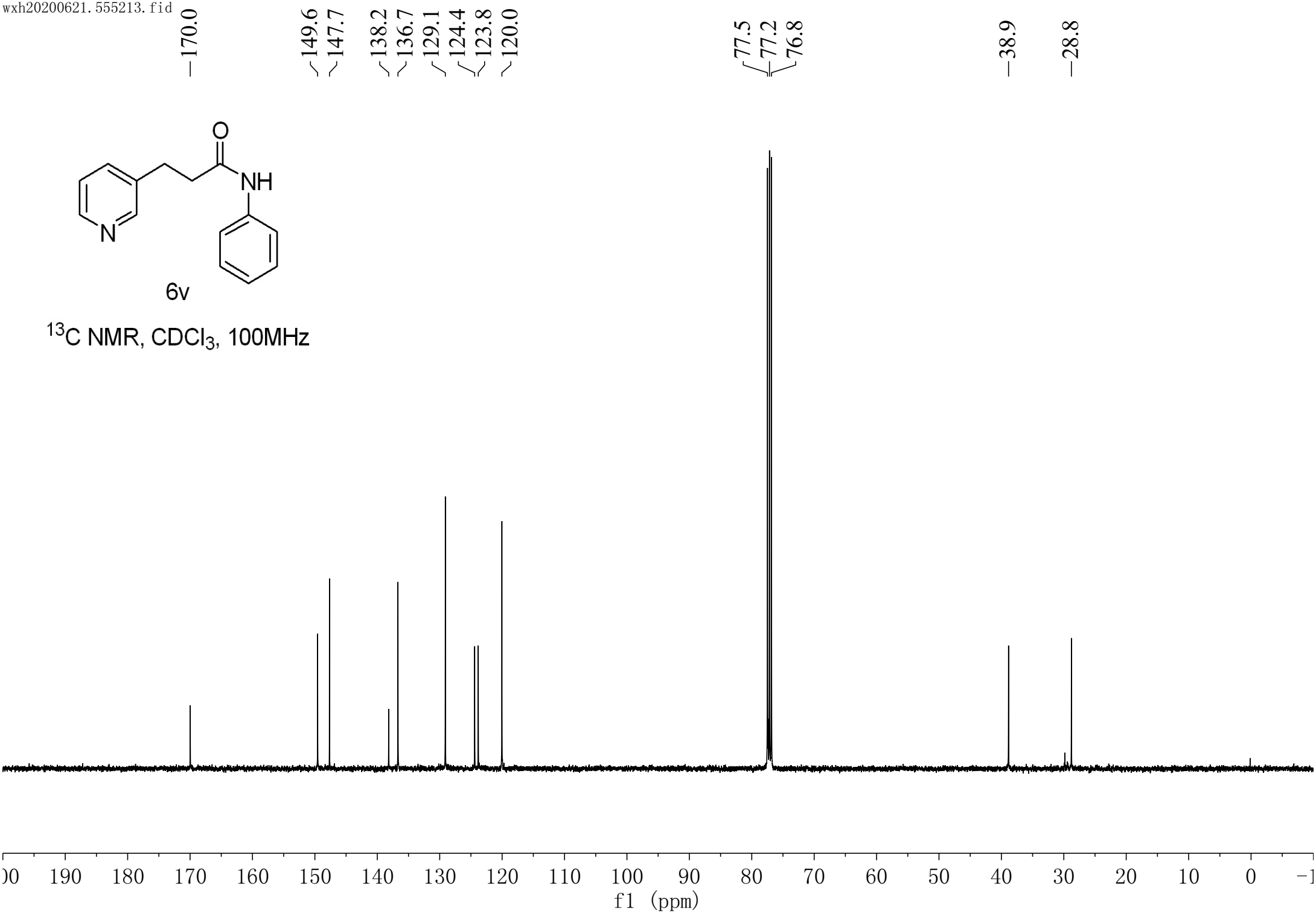
6v

^{1}H NMR, $CDCl_3$, 400MHz

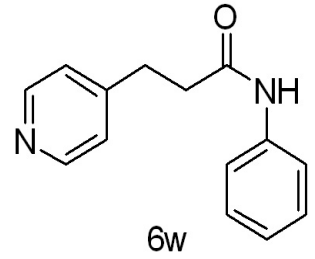
wxh20200621.555213.fid

6v

^{13}C NMR, $CDCl_3$, 100MHz



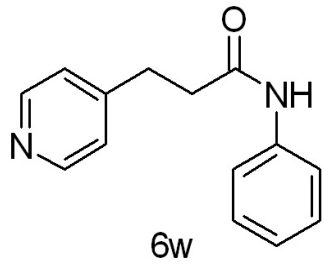
wxh20200617.20441.fid



6w

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200617.2044113.fid



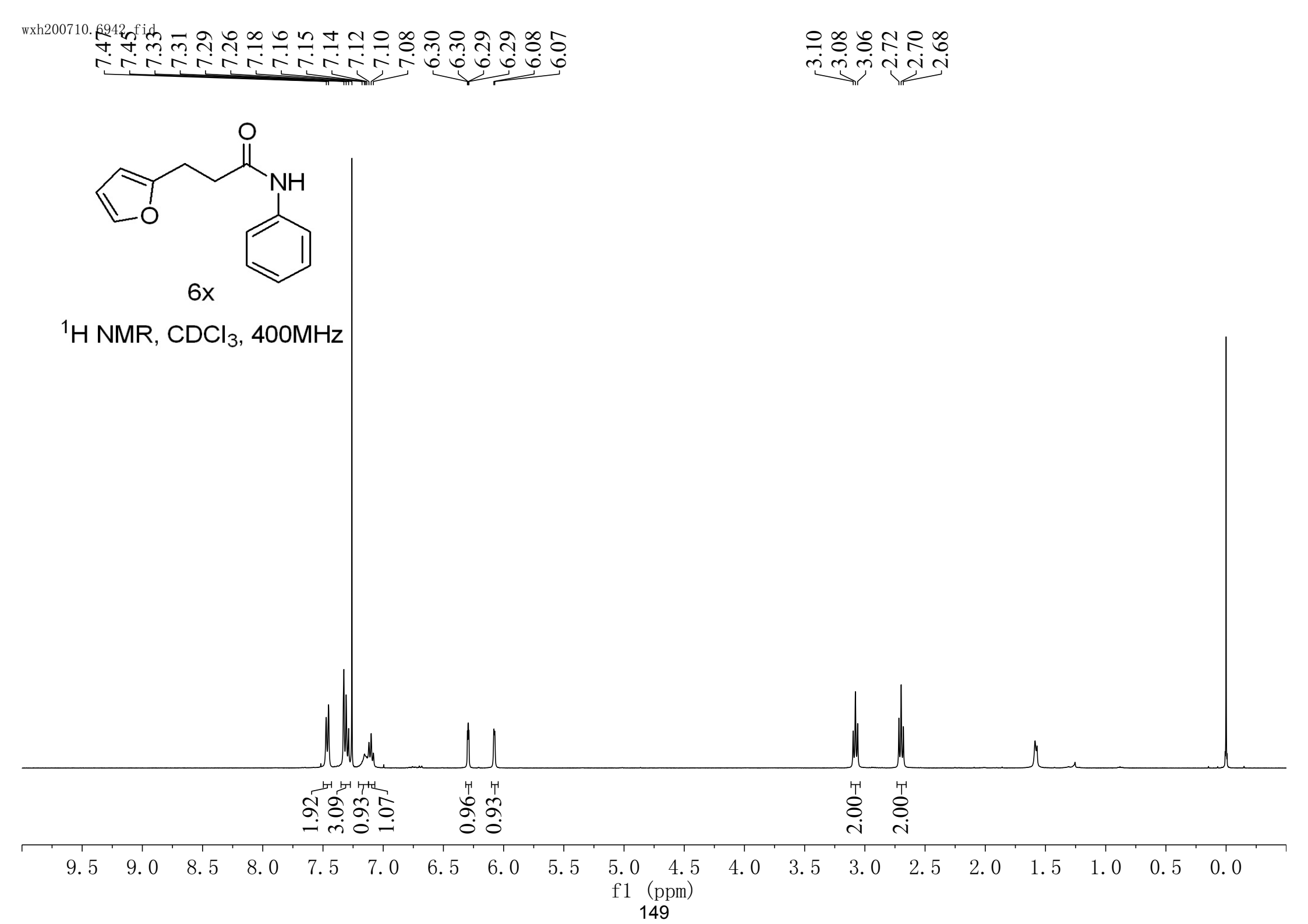
6w

^{13}C NMR, $CDCl_3$, 100MHz

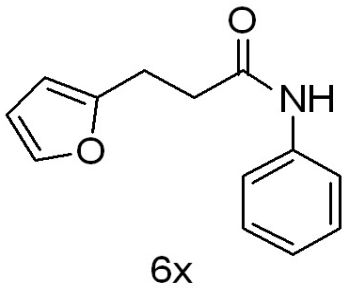
169.5
151.0
149.2
137.8
129.2
124.6
124.3
120.1
77.5
77.2
76.8
37.8
30.7

f1 (ppm)

wxh200710.6942.fid



wxh20200709.20694213.fid



6x

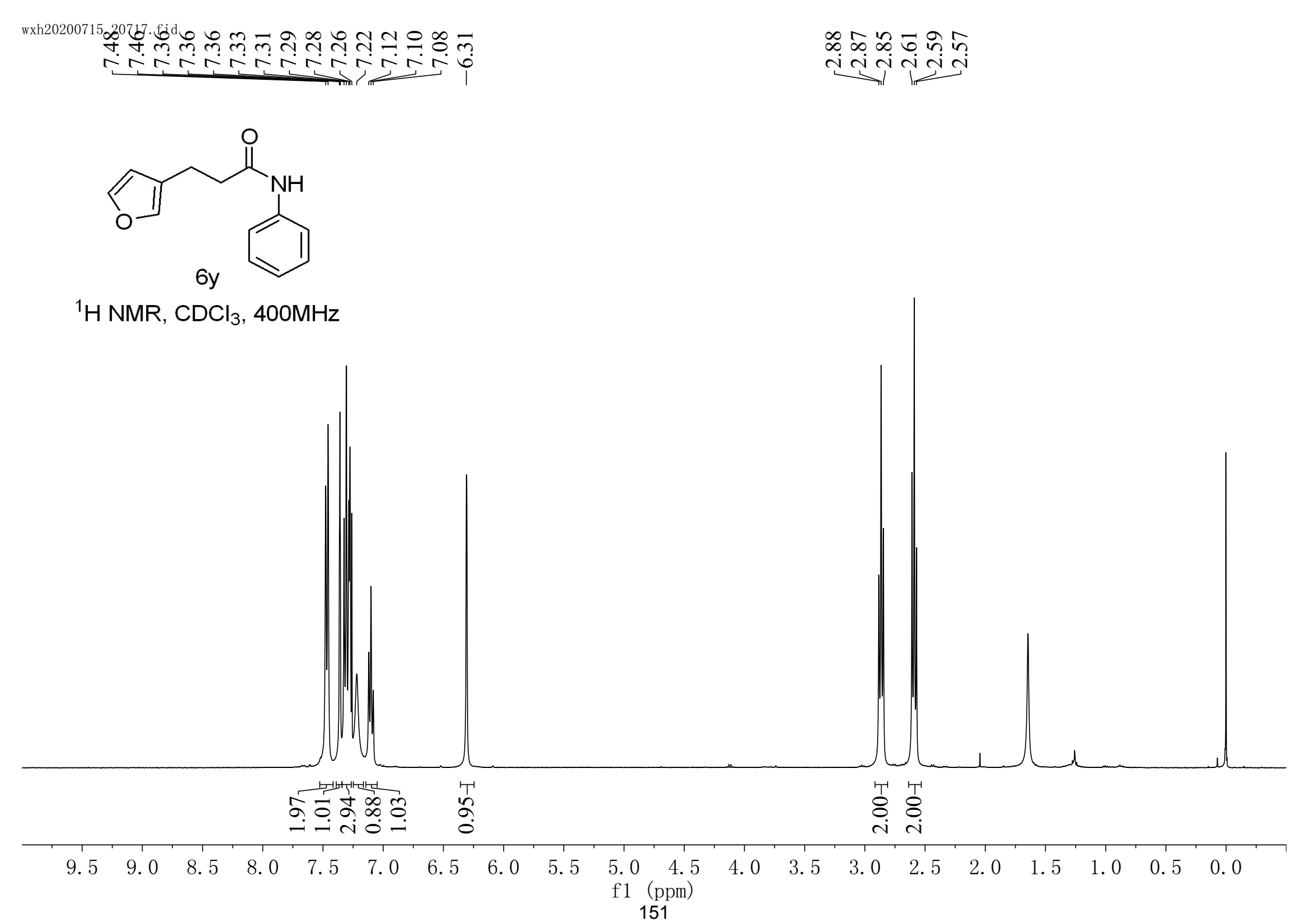
^{13}C NMR, $CDCl_3$, 100MHz

170.2
154.2
141.4
137.9
129.1
124.5
120.1
110.5
105.9
77.5
77.2
76.8
36.1
24.0

190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

wxh20200715_20717.fid



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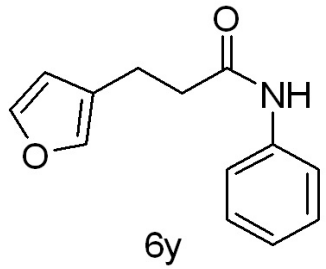


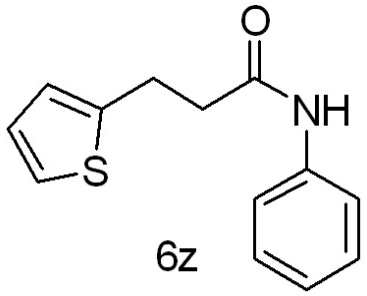
6y

^{13}C NMR, $CDCl_3$, 100MHz

170.5
143.2
139.4
137.8
129.1
124.5
123.7
120.0
110.9
77.5
77.2
76.8
38.4
20.9

f1 (ppm)

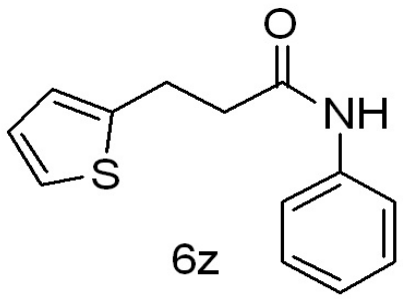
wxh20200712.20651.fid



6z

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200712.651.fid



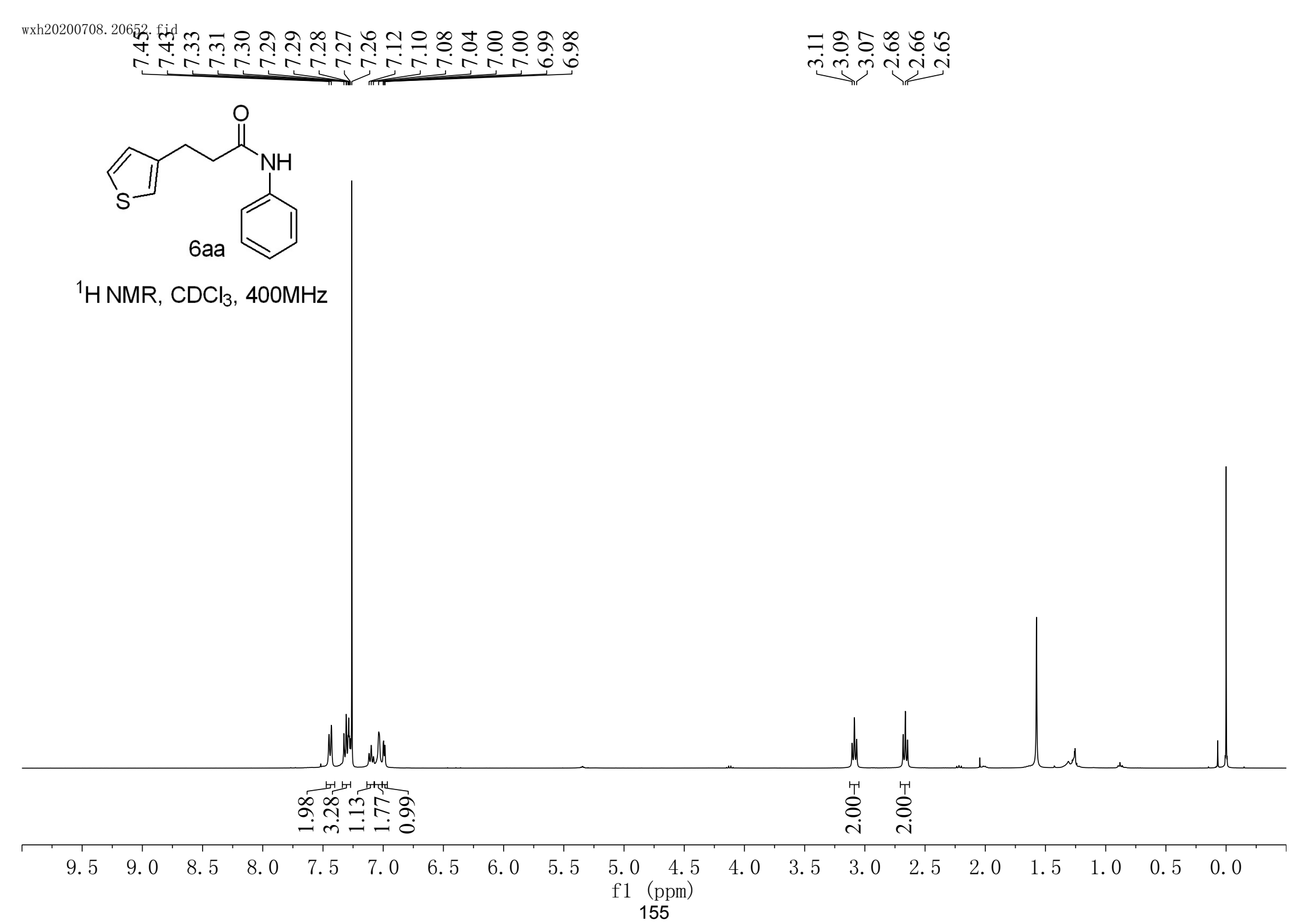
6z

^{13}C NMR, $CDCl_3$, 100MHz

169.8
143.3
137.8
129.1
127.2
125.2
124.5
123.8
120.0
77.5
77.2
76.8
39.8
25.8

f1 (ppm)

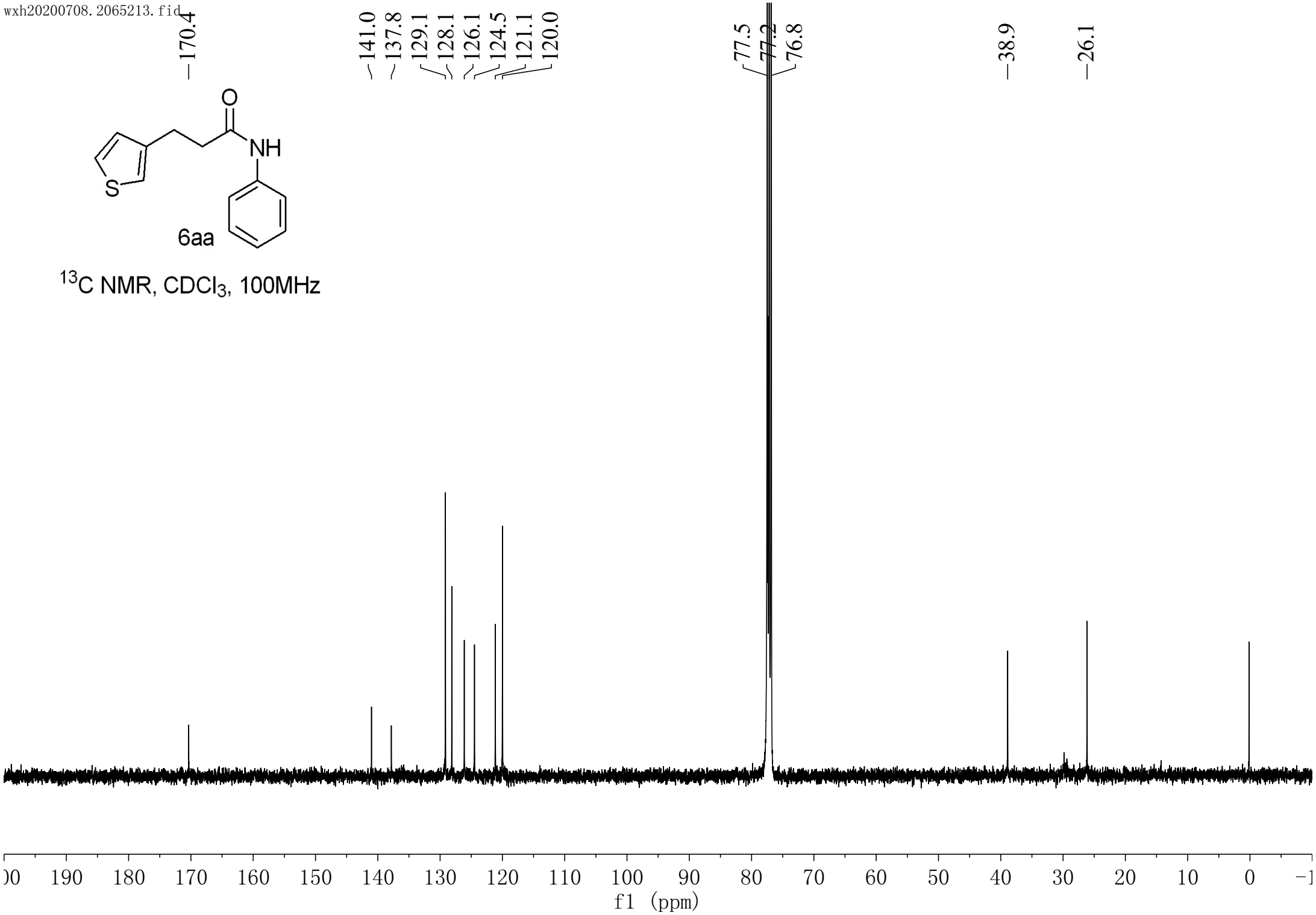
wxh20200708.20652.fid



wxh20200708.2065213.fid

6aa

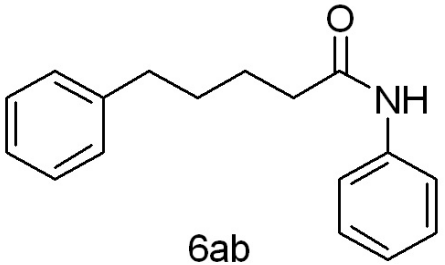
^{13}C NMR, $CDCl_3$, 100MHz



wxh20200703_20624.fid

7.50 7.48 7.33 7.31 7.30 7.29 7.29 7.28 7.28 7.28 7.28 7.26 7.20 7.19 7.19 7.18 7.17 7.17 7.13 7.12 7.10 7.08

2.68 2.66 2.64 2.38 2.36 2.35 1.82 1.80 1.80 1.78 1.77 1.77 1.76 1.75 1.73 1.72 1.71 1.69



6ab

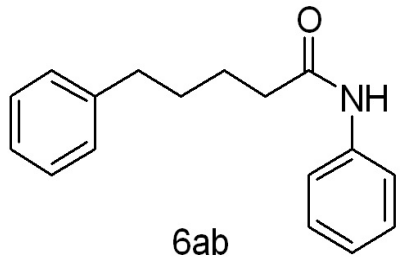
^{1}H NMR, $CDCl_3$, 400MHz

1.87 3.89 3.00 1.76 2.00 2.02 4.06

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

f1 (ppm)

wxh20200809.2081313.fid



6ab

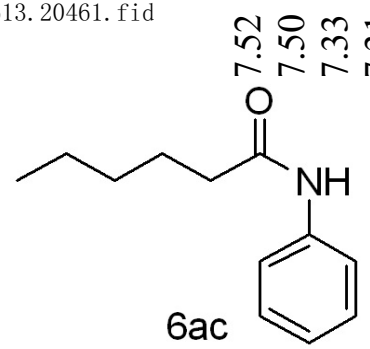
^{13}C NMR, $CDCl_3$, 100MHz

171.2
142.2
138.0
129.1
128.6
128.6
128.5
126.0
124.4
119.9
77.5
77.2
76.8
37.8
35.8
31.1
25.4

190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1

f1 (ppm)

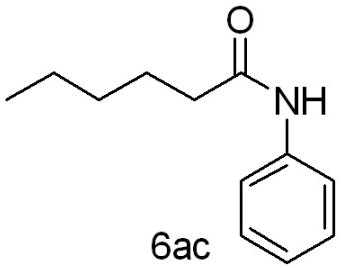
wxh20200613.20461.fid



6ac

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200613.2046113.fid



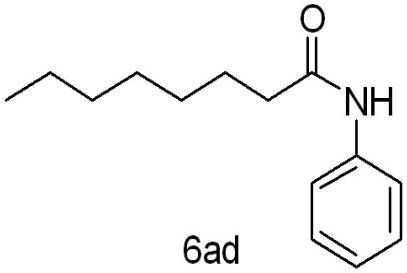
6ac

^{13}C NMR, $CDCl_3$, 100MHz

171.6
138.1
129.1
124.3
119.9
77.5
77.2
76.8
38.0
31.6
25.5
22.6
14.1

f1 (ppm)

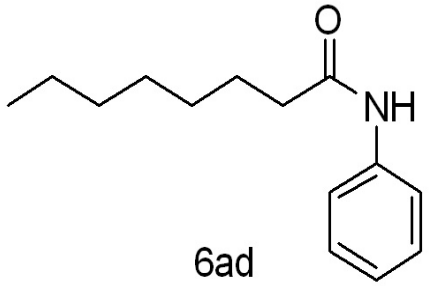
wxh20200614.20462.fid



6ad

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200614.2046213.fid



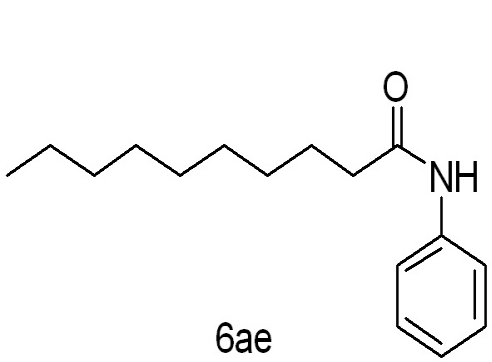
6ad

^{13}C NMR, $CDCl_3$, 100MHz

171.5
138.1
129.1
124.3
119.9
77.5
77.2
76.8
38.0
31.8
29.4
29.2
25.8
22.8
14.2

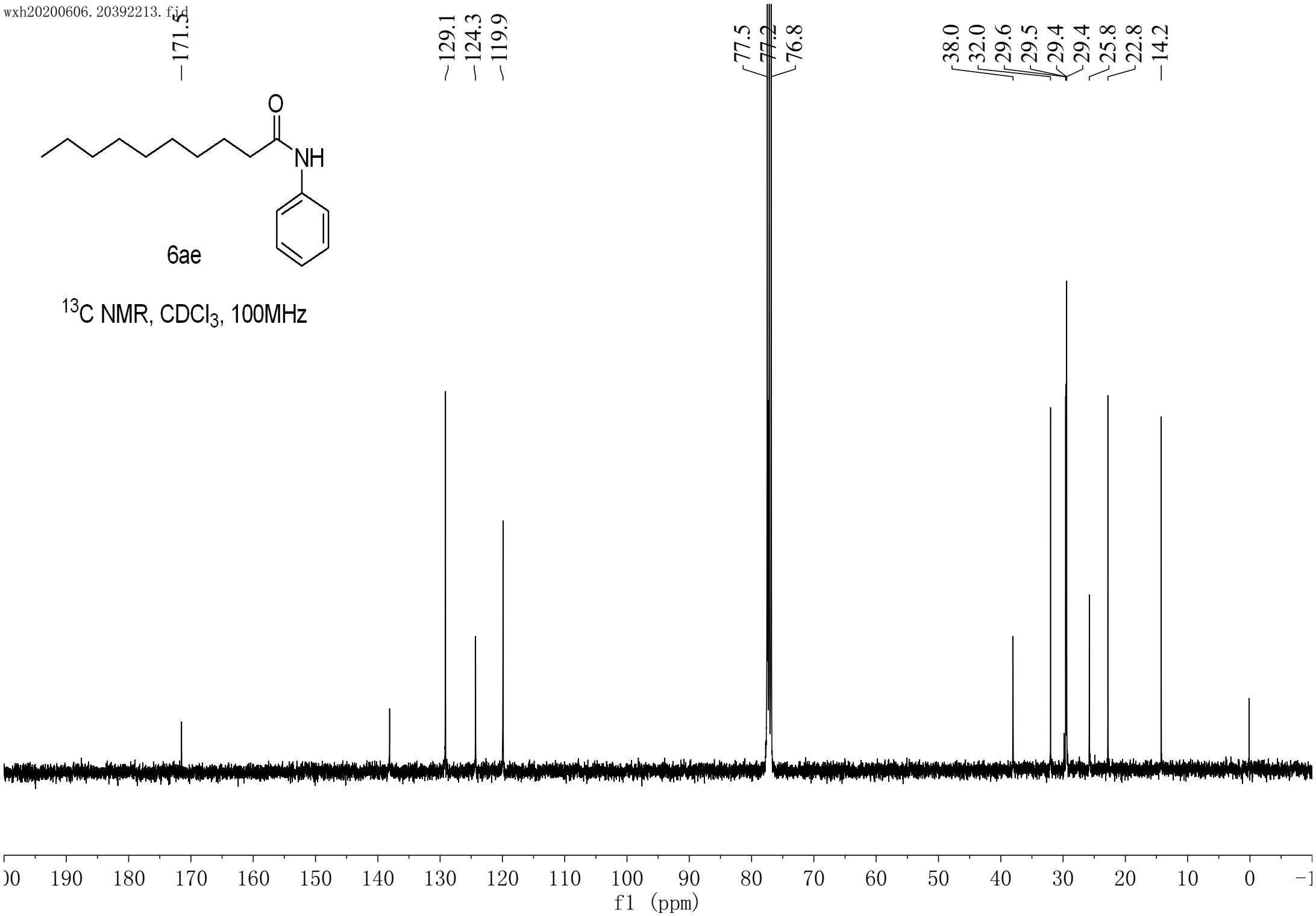
f1 (ppm)

wxh2020606.203922.fid

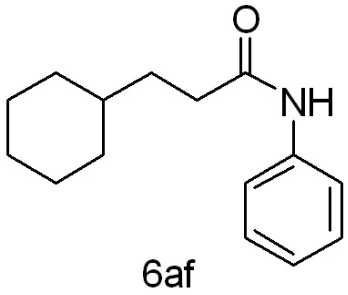


6ae

^{1}H NMR, $CDCl_3$, 400MHz


wxh20200606.20392213.fid
171.5
129.1
124.3
119.9
77.5
77.2
76.8
38.0
32.0
29.6
29.5
29.4
29.4
25.8
22.8
14.2
O
NH
6ae
13C NMR, CDCl3, 100MHz
f1 (ppm)

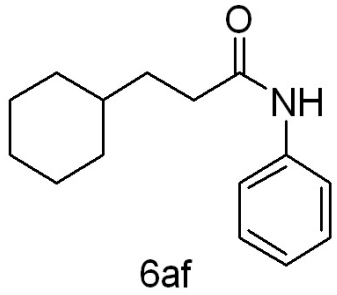
wxh20200626.20466.fid



6af

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200807.2046613.fid



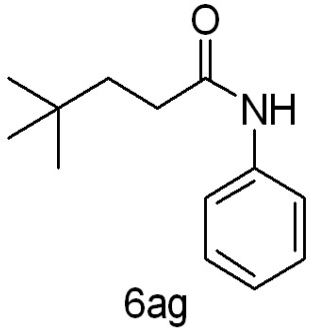
6af

^{13}C NMR, $CDCl_3$, 100MHz

171.8
138.1
129.1
124.3
119.9
77.5
77.2
76.8
37.5
35.5
33.2
33.1
26.7
26.4

f1 (ppm)

wxh20200627.205841.fid



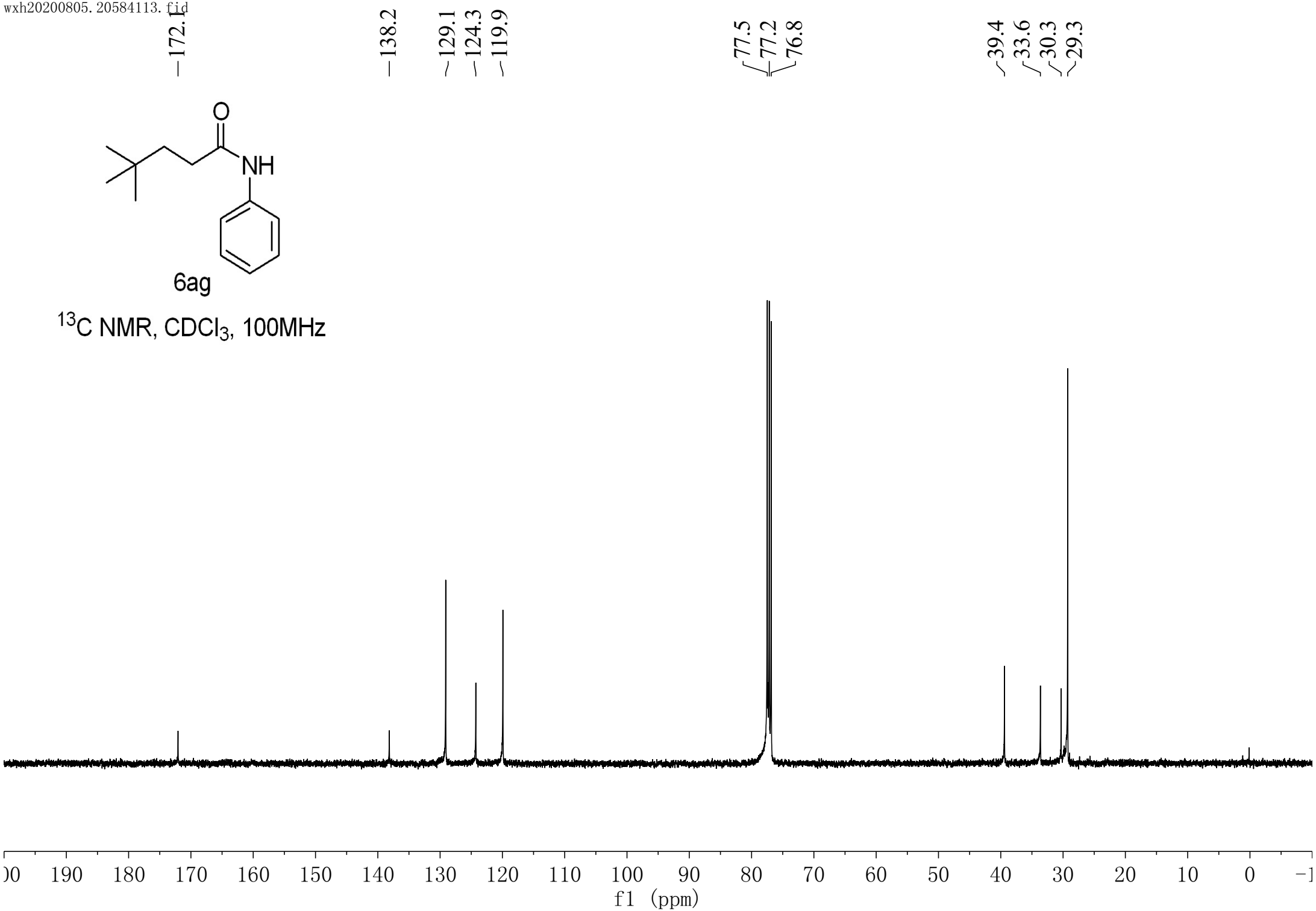
6ag

^{1}H NMR, $CDCl_3$, 400MHz

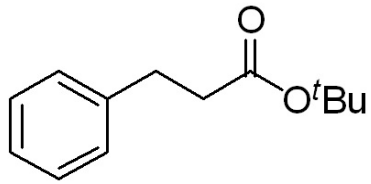
wxh20200805.20584113.fid

6ag

^{13}C NMR, $CDCl_3$, 100MHz



wxh20200717.20761.fid



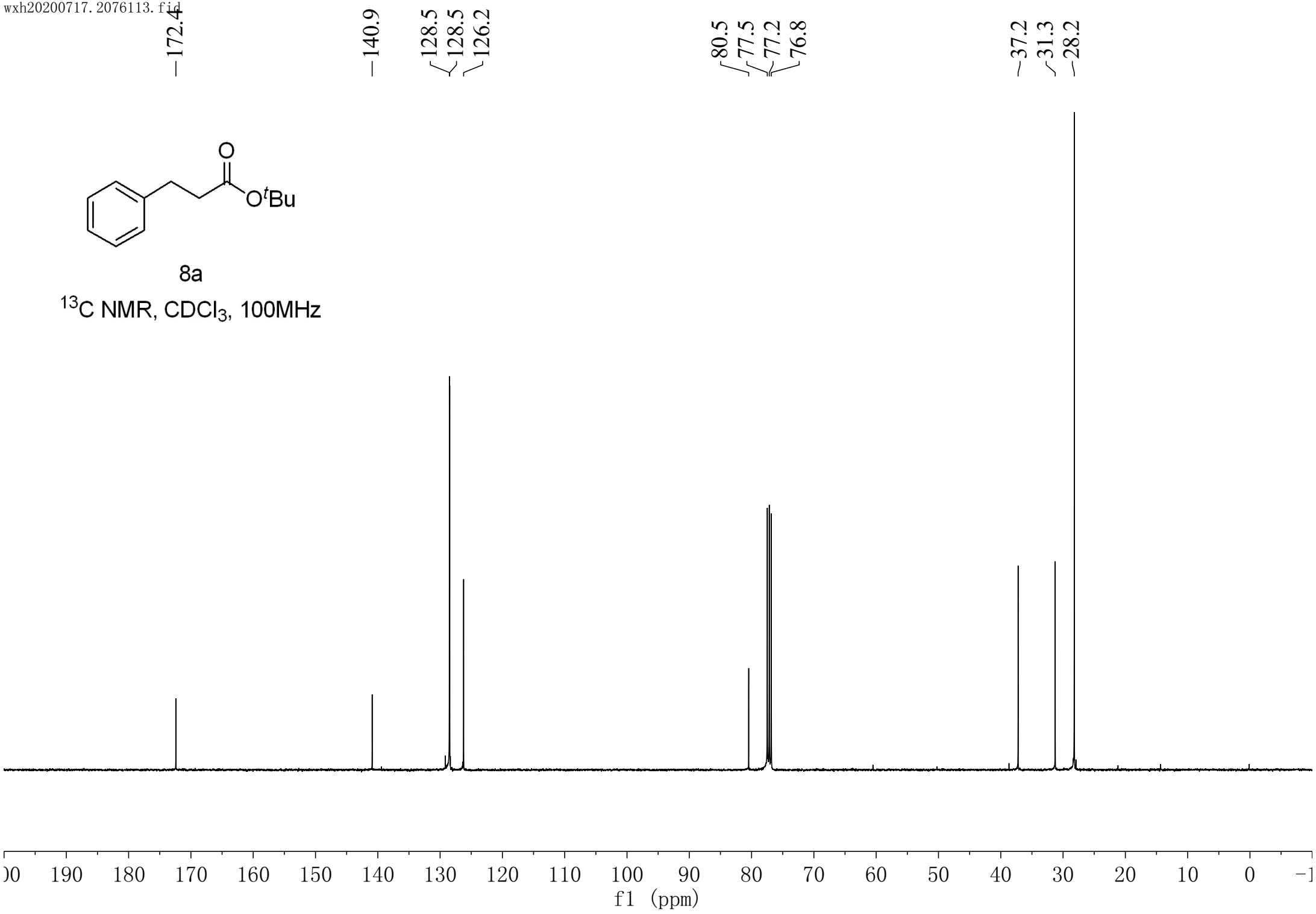
8a

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200717.2076113.fid

8a

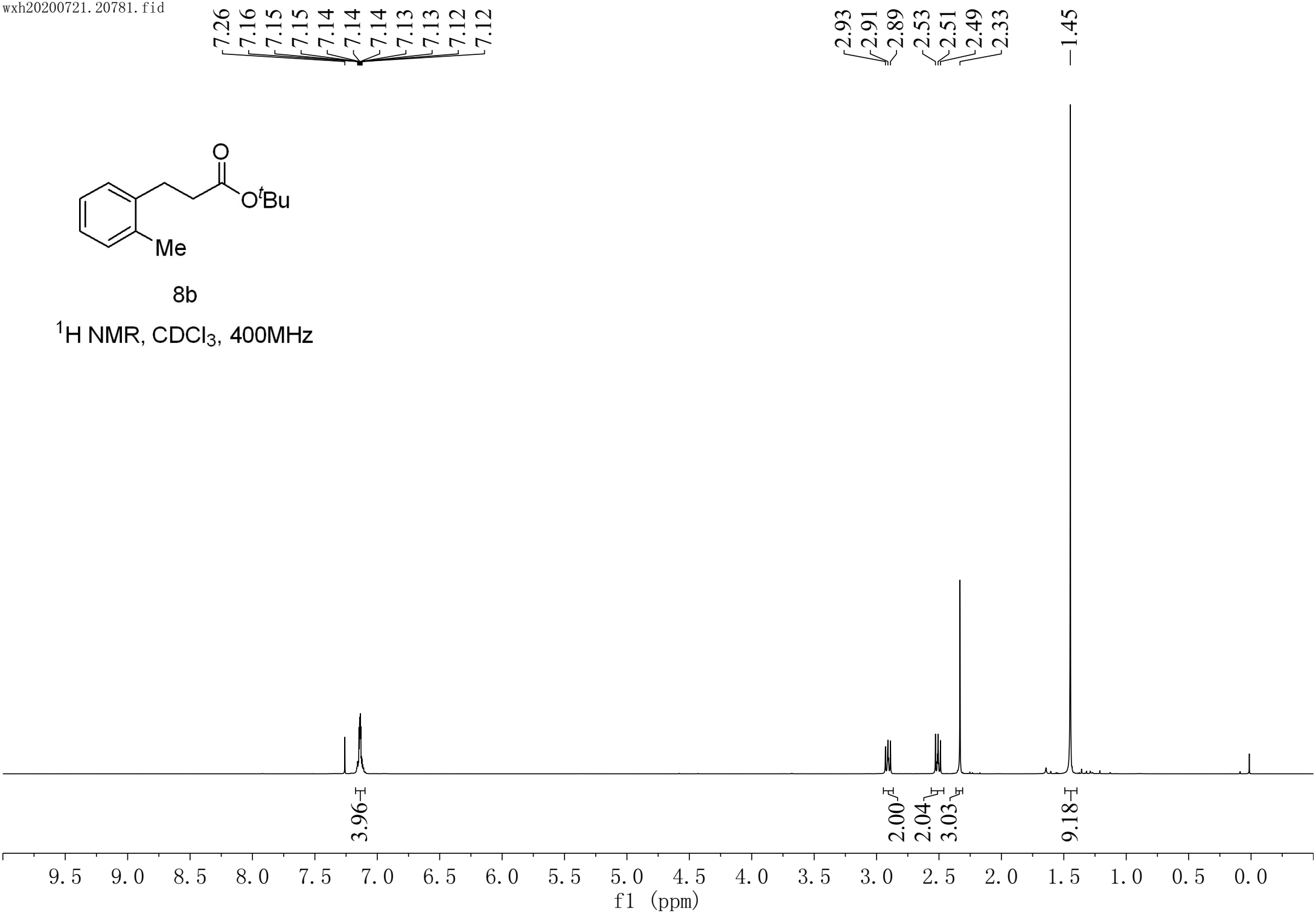
^{13}C NMR, $CDCl_3$, 100MHz



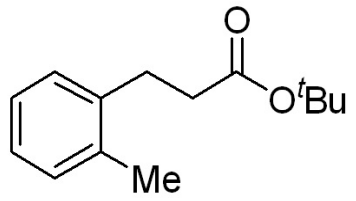
wxh20200721.20781.fid

8b

^{1}H NMR, $CDCl_3$, 400MHz



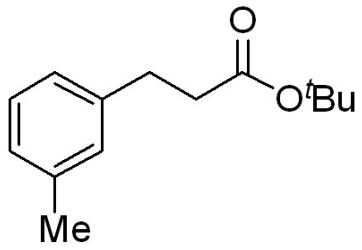
wxh20200722.2078113.fid



8b

^{13}C NMR, $CDCl_3$, 100MHz

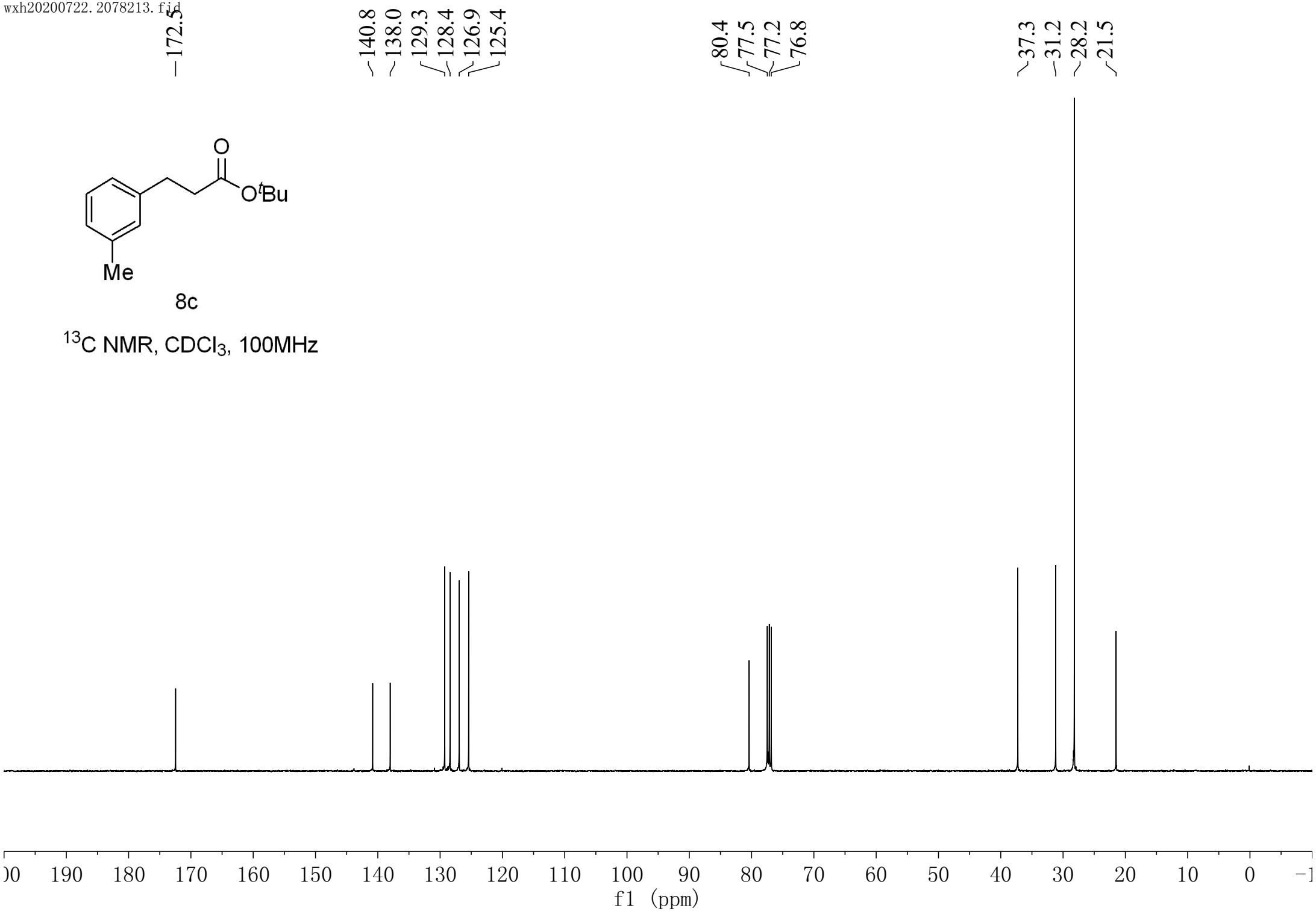
wxh20200721. 20782. fid



8c

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200722.2078213.fid



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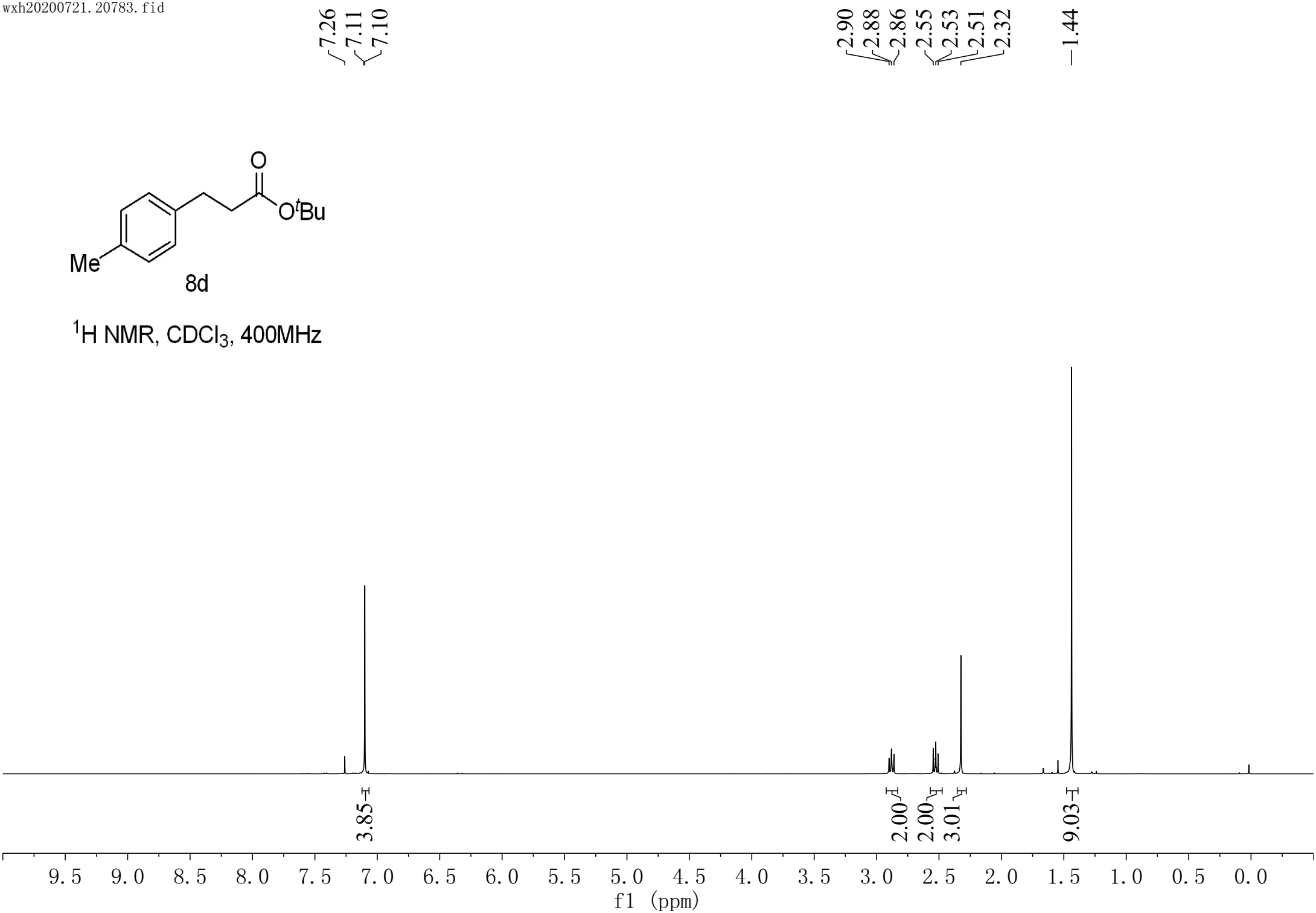
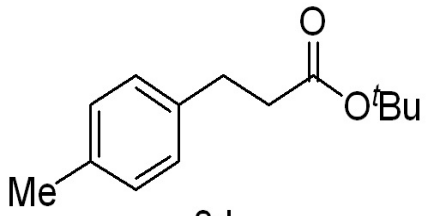
8d

^{1}H NMR, $CDCl_3$, 400MHz



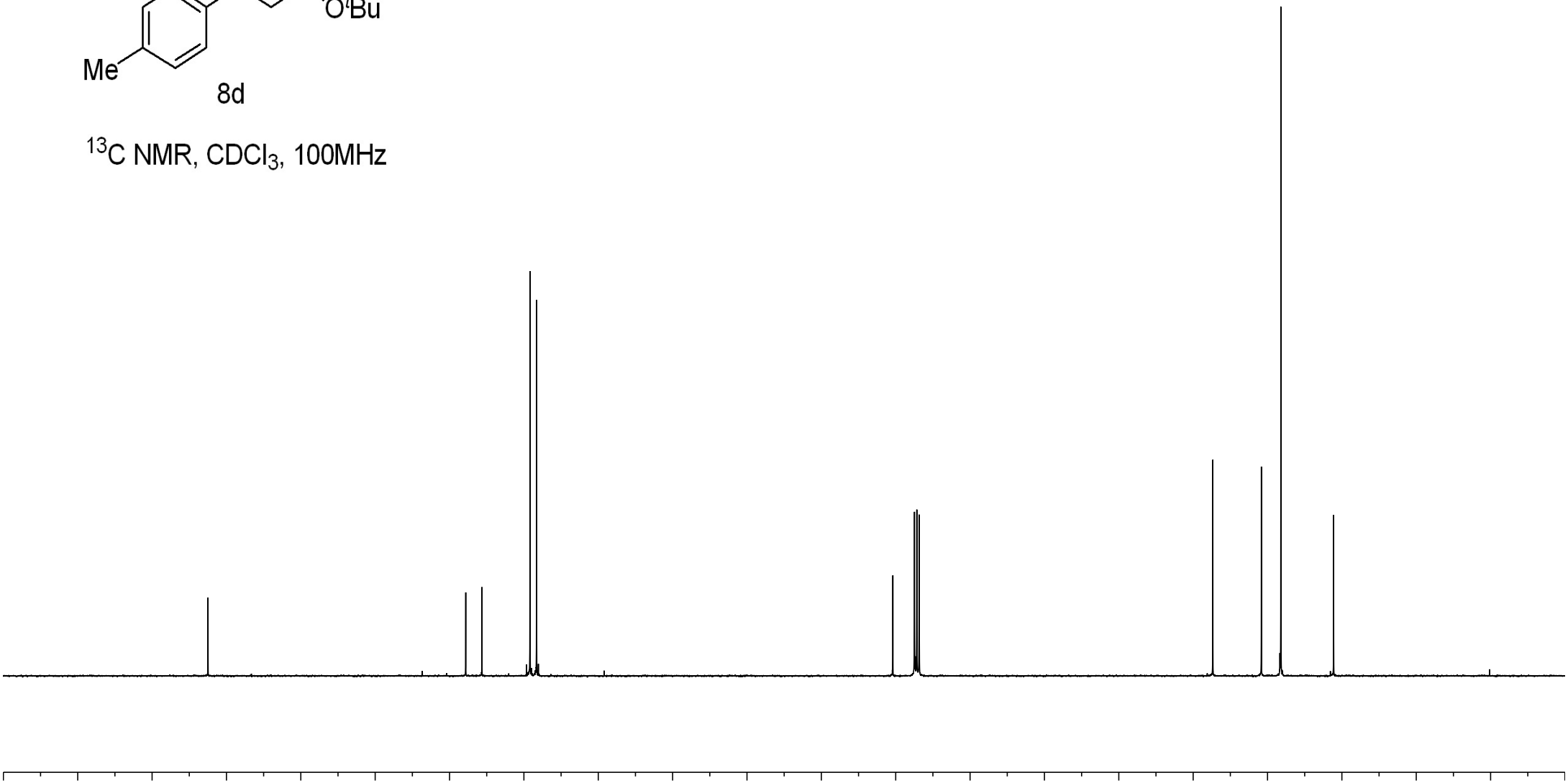
wxh20200722.2078313.fid

172.5
137.8
135.6
129.2
128.3
80.4
77.5
77.2
76.8
37.4
30.8
28.2
21.1



8d

^{13}C NMR, $CDCl_3$, 100MHz



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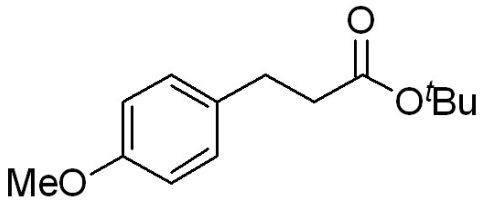
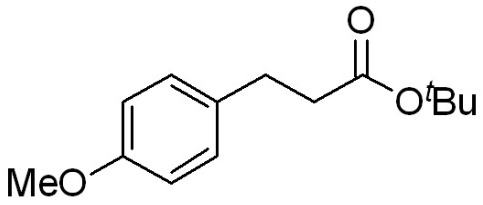


8e

^{1}H NMR, $CDCl_3$, 400MHz

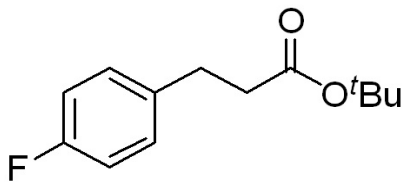
wxh20200719.2077313.fid



8e

^{13}C NMR, $CDCl_3$, 100MHz

wxh20200719.20778.fid



8f

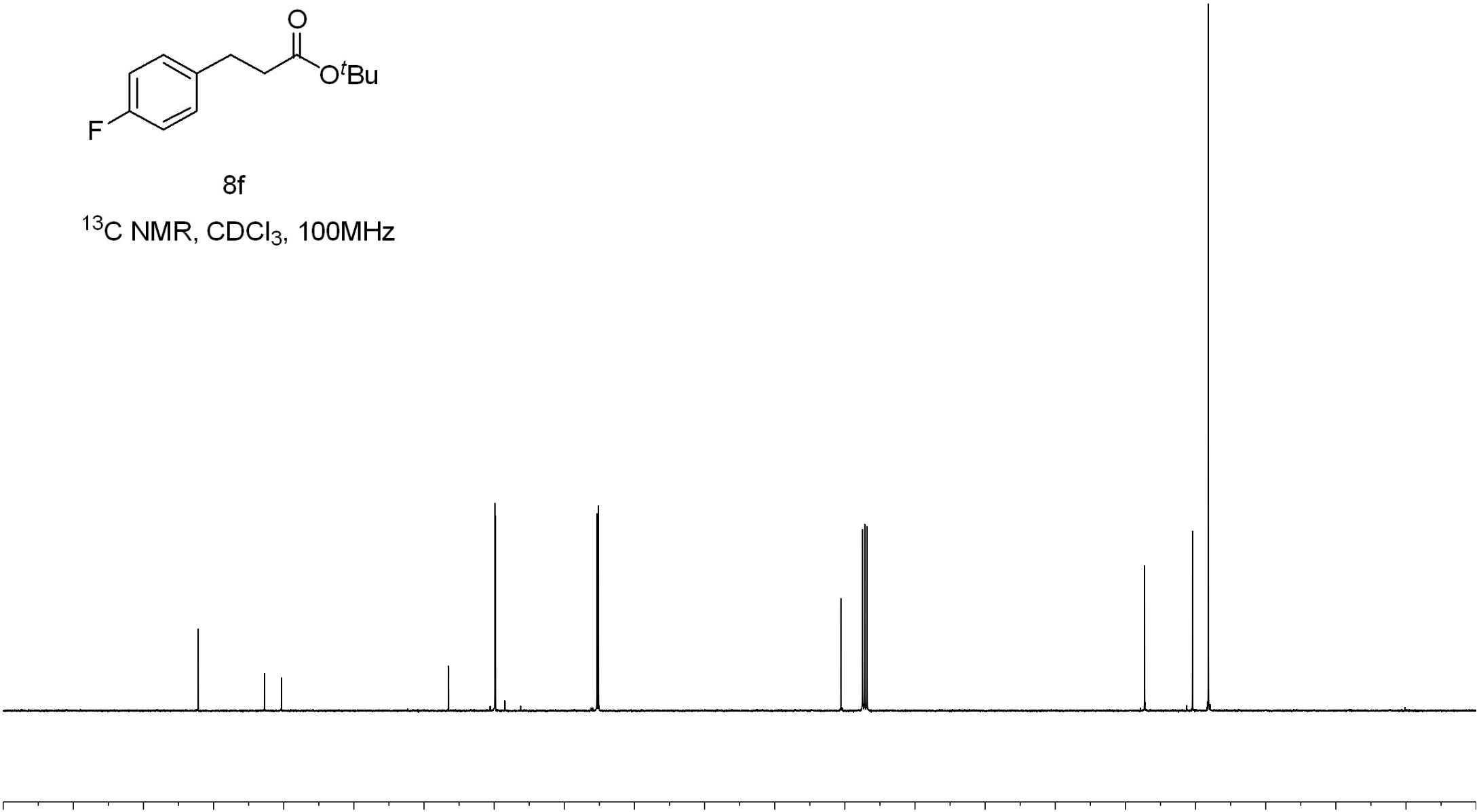
^{1}H NMR, $CDCl_3$, 400MHz

wxh20200719.2077813.fid

172.2
162.7
160.3
136.5
136.5
129.9
129.8
115.3
115.1
80.6
77.5
77.2
76.8
37.3
30.4
28.2

8f

^{13}C NMR, $CDCl_3$, 100MHz



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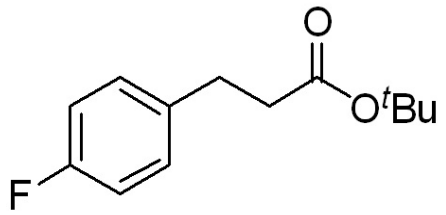
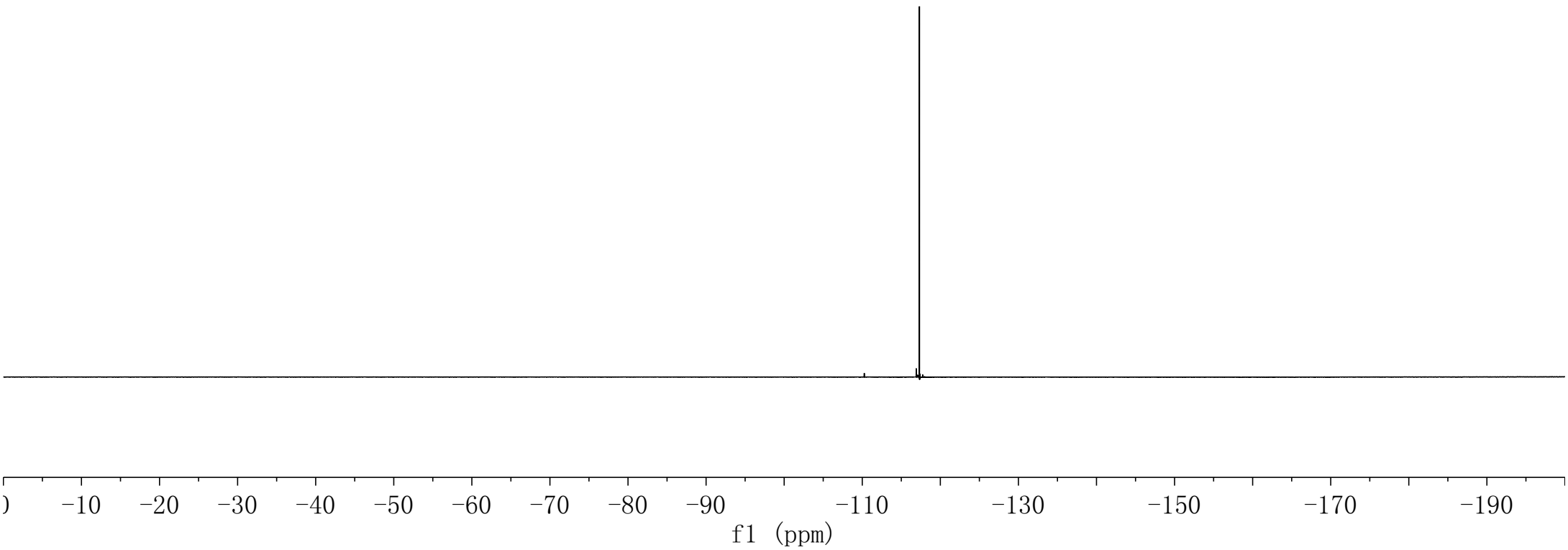


8f

^{19}F NMR, $CDCl_3$, 376MHz



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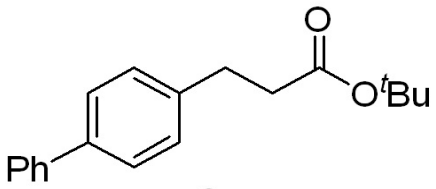
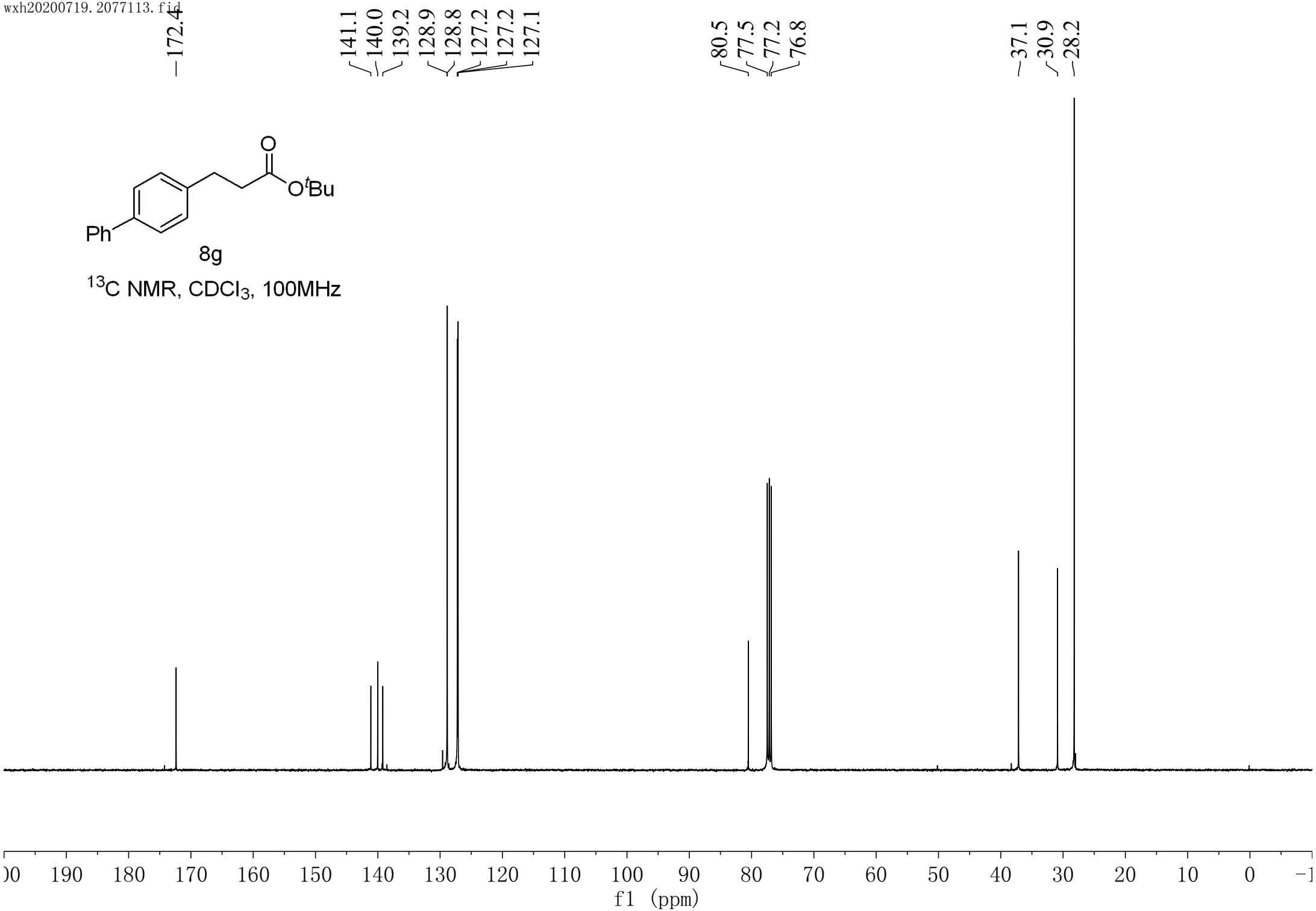


8g

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200719.2077113.fid



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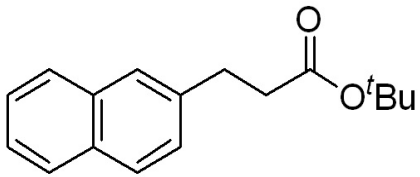
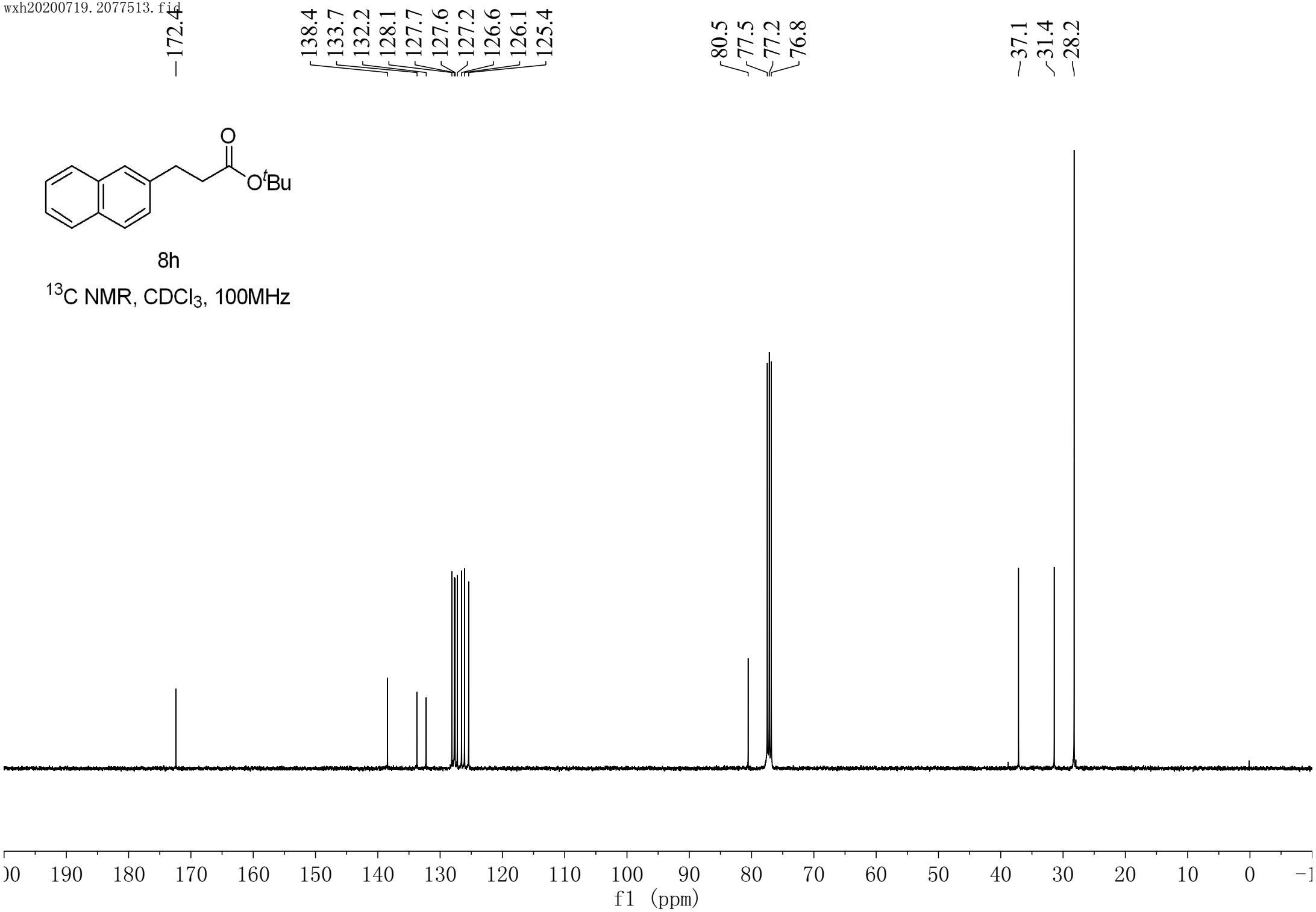


8h

^{1}H NMR, $CDCl_3$, 400MHz

wxh20200719.2077513.fid



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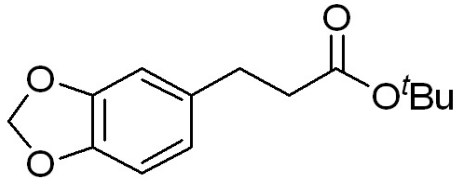
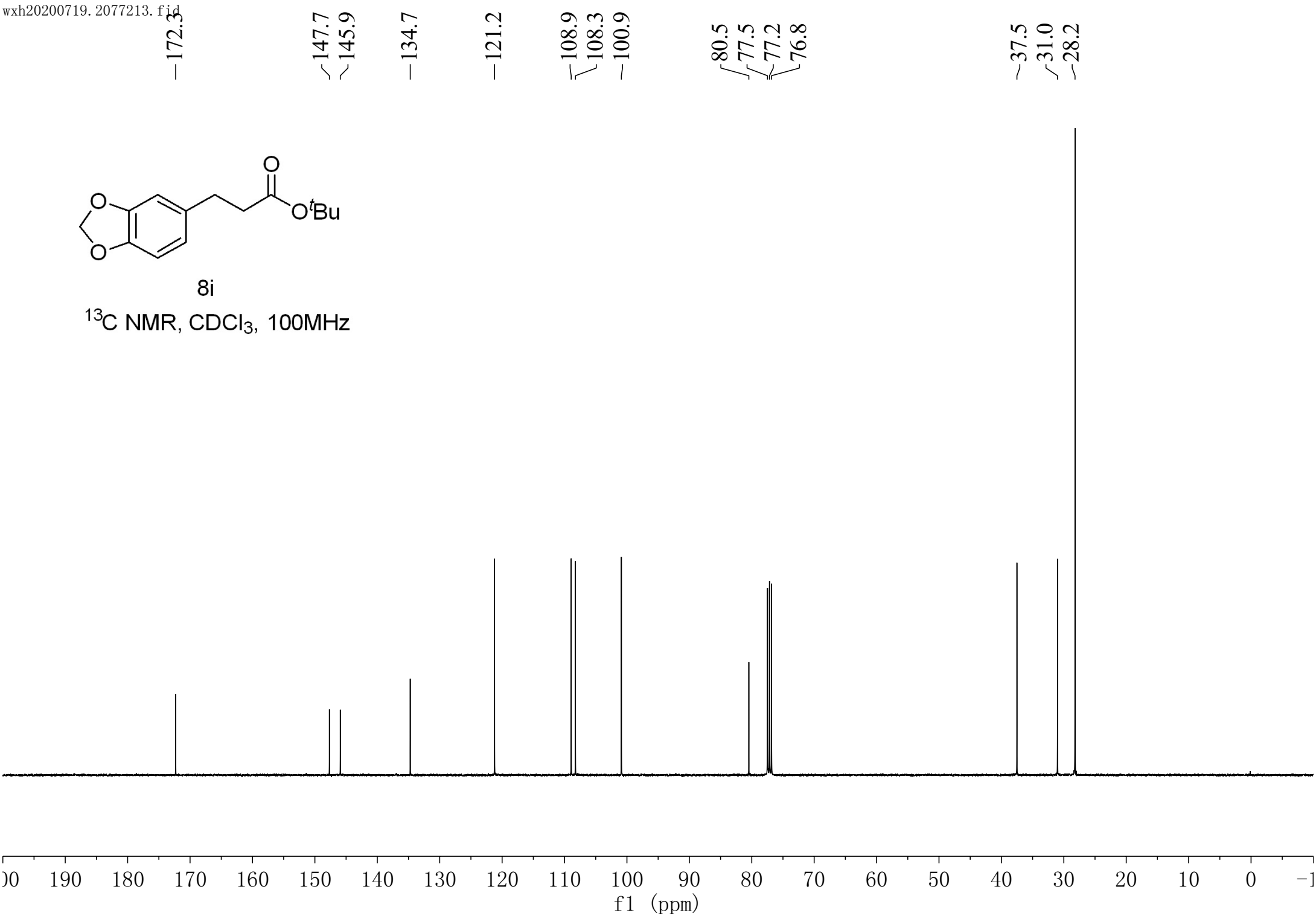


8i

^{1}H NMR, $CDCl_3$, 400MHz

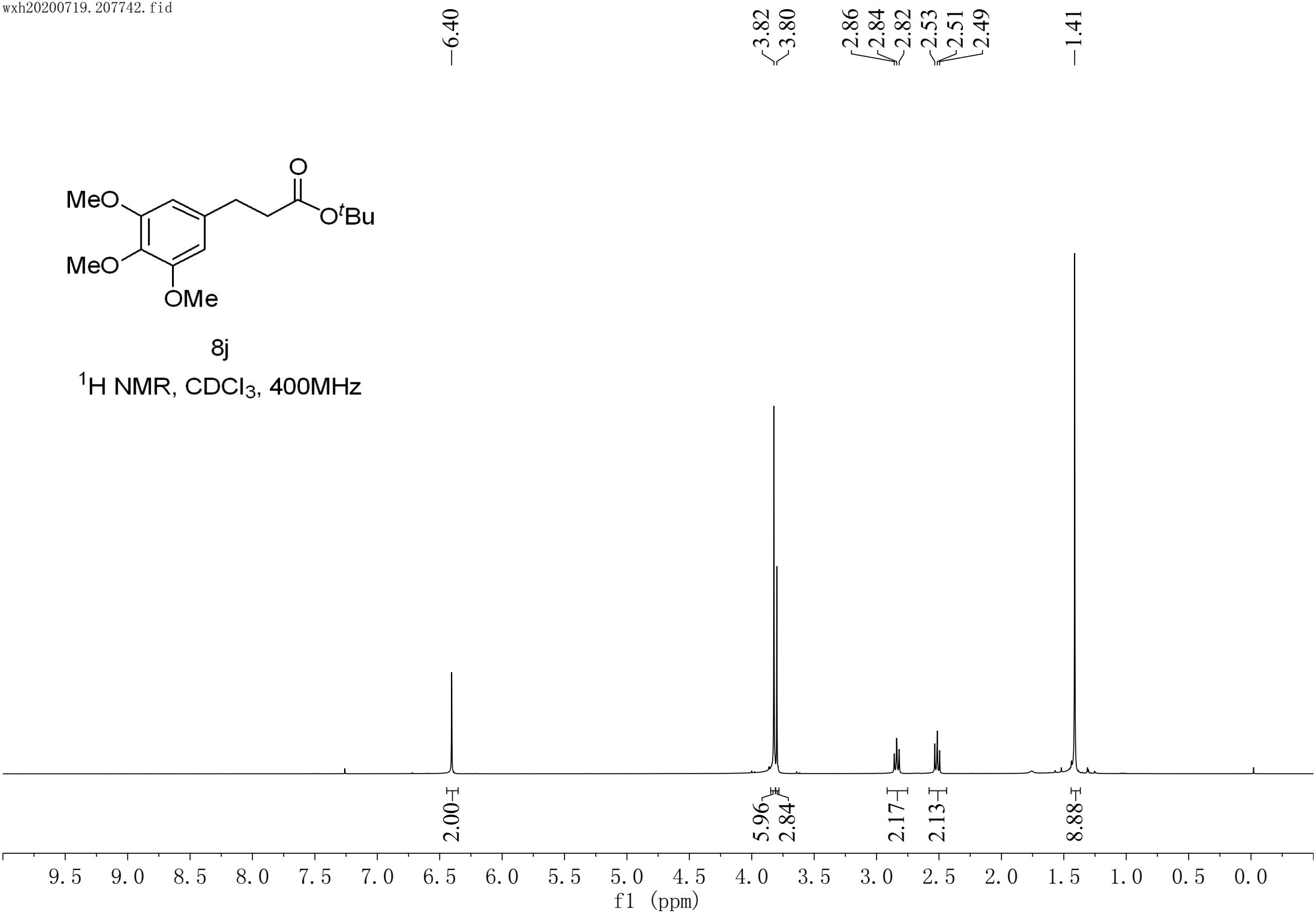
wxh20200719.2077213.fid



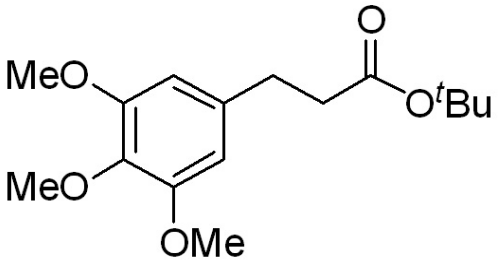
wxh20200719.207742.fid

8j

^{1}H NMR, $CDCl_3$, 400MHz



wxh20200719.20774213.fid



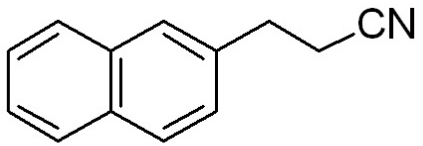
8j

^{13}C NMR, $CDCl_3$, 100MHz

wxh20200709_206811.fid

7.84 7.83 7.82 7.82 7.81 7.80 7.69 7.52 7.51 7.51 7.50 7.49 7.49 7.48 7.47 7.47 7.47 7.45 7.45 7.36 7.35 7.34 7.33 7.26

3.15 3.14 3.12 2.74 2.72 2.70



11

^{1}H NMR, $CDCl_3$, 400MHz

2.96 1.00 2.02 1.01 1.97 2.00

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

f1 (ppm)

wxh20200709.20681113.fid

11

^{13}C NMR, $CDCl_3$, 100MHz