Supporting Information

Catalytic N-methyl Amidation of Carboxylic Acids under Cooperative Conditions

Li Yingxian,[‡,†] Chen Wei,[‡,†] Zhao Linchun,[†] Zhang Ji-Quan,[†] Zhao Yonglong,[†] Li Chun,[†] Guo Bing,[#] Tang Lei, [*,†] Yang Yuan-Yong [*,†]

†State Key Laboratory of Functions and Applications of Medicinal Plants, School of Pharmacy, Guizhou Provincial Engineering Technology Research Center for Chemical Drug R&D, Guizhou Medical University, 550014 Guiyang (P. R. China)

#Guizhou Provincial Key Laboratory of Pathogenesis and Drug Research on Common Chronic Diseases, Guizhou Medical University, 550004 Guiyang (P. R. China)

E-mail: yangyuanyong@gmc.edu.cn; 2317972657@qq.com

Table of contents

1. General Information S2

2. General Procedure for Synthesis of **3** S3

3. The recovery of Fe_3O_4 S3

4. Comparison Table S4

4. Spectroscopic Data for Products S6

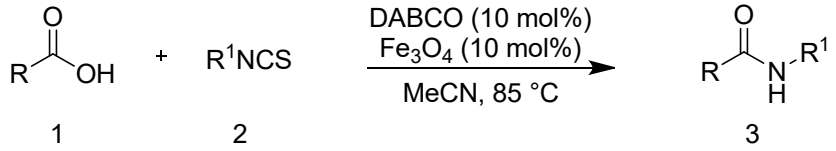
5. ^{1}H and ^{13}C NMR Spectra S22

General Information:

Proton nuclear magnetic resonance (^{1}H NMR) spectra and carbon nuclear magnetic resonance (^{13}C NMR) spectra were recorded on Bruker 400, 600 MHz spectrometer (400, 600 MHz and 100, 150 MHz). Chemical shifts (δ) for protons are reported in parts per million downfield from tetramethylsilane and are referenced to residual protium in the NMR solvent ($CDCl_3$: 7.26, DMSO: 2.50). Chemical shifts (δ) for carbon are reported in parts per million downfield from tetramethylsilane and are referenced to the carbon resonances of the solvent ($CDCl_3$: 77.0, DMSO: 39.51). Data are represented as follows: chemical shift, integration, multiplicity (br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constants in Hertz (Hz). All high resolution mass spectra were obtained on a Waters G2-XSQTof mass spectrometer. Melting points were determined on a Tektronix X-4 melting point apparatus. Analytical TLC was performed using EM separations percolated silica gel 0.2 mm layer UV 254 fluorescent sheets.

Starting Materials. All solvents and inorganic reagents were from commercial sources and used without purification unless otherwise noted, Fe_3O_4 powder was purchased from Shanghai Macklin Biochemical Co., Ltd and directly used for reaction.

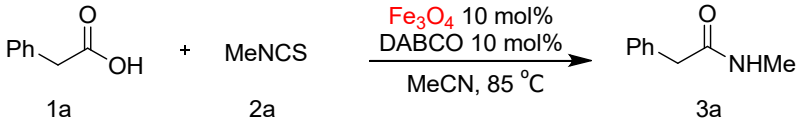
General Procedure for Synthesis of 3:



1 2 3

A solution of **1** (1 mmol, 1 eq), **2** (1.1 eq), DABCO (11.2 mg , 0.1 mmol) and Fe_3O_4 (23.2 mg, 0.1 mmol) in 1 mL of MeCN for 48 hours at 85 °C until **1** was completely consumed (monitored by TLC). Upon completion, saturated aqueous NH_4Cl solution was added, and the mixture was extracted with EtOAc. The organic layers were combined, washed with brine, dried over anhydrous Na_2SO_4 and concentrated and purification by flash column chromatography on SiO_2 to give the final product.

The recovery of Fe_3O_4:

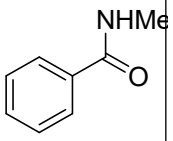


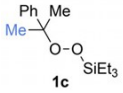
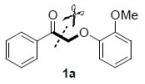
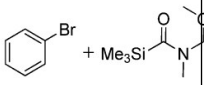
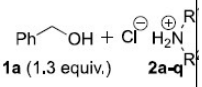
1a 2a 3a

cycles	additive	time（h）	catalyst	yield	TON	TOF
1	Fe_3O_4	48	DABCO	97.7%	9.77	0.20
2	Fe_3O_4	48	DABCO	98.1%	9.81	0.20
3	Fe_3O_4	48	DABCO	97.2%	9.72	0.20
4	Fe_3O_4	48	DABCO	92.5%	9.25	0.19
5	Fe_3O_4	48	DABCO	88.6%	8.86	0.18
6	Fe_3O_4	48	DABCO	86.3%	8.63	0.18
7	Fe_3O_4	48	DABCO	88.8%	8.88	0.19
8	Fe_3O_4	48	DABCO	88.9%	8.89	0.19
9	Fe_3O_4	48	DABCO	89.2%	8.92	0.19
10	Fe_3O_4	48	DABCO	86.6%	8.66	0.18

[a] Reactions were run on 1 mmol 1a and 1.1 mmol 2a with 10 mol % DABCO and 10 mol % Fe_3O_4 in 1 mL of MeCN at 85 °C for 48 hours unless otherwise noted.

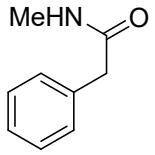
comparison table

entry	substrate	conditions	Yield for % 	ref	comparison
1	Phenylacetic acid	Phenylacetic acid 55 mmol, toluene 25 ML, thionyl chloride (66 mmol, 1.2 equiv), DMF(63 mmol, 1.14 equiv) , methylamine solution (275 mmol, 5.0 equiv)	96	5, 9	Additional $SOCl_2$, TsCl
2	benzotrichloride	[B12-TiO2]=10 mg (B12, 2.28Ö10¢5m), [benzotrichloride]=3.0 mm, [amine]=90 mm, solvent=MeOH 6 mL under air at RT by UV light irradiation (black light, lmax=365 nm, 1.5 mWcm¢2 at 10 Cm distance).	90	10	Generate HCl, UV irradiation
3	PhCN	nitrile (0.5 mmol), CoBr2 (7.5 mol %), tris[2-(diphenylphosphino)ethyl]phosphine (PP3) (7.5 mol %), Cs_2CO_3 (0.5 mmol), KOtBu (0.25 mmol) and water (5.0 mmol) in methanol/m-xylene (2.5 mL, 1:1 v/v).	89	11	Higher tempersture
4	Benzaldehyde	1b (2mmol), 2n (0.5 mmol), TBHP (7.5 equiv), 120 °C, 48 h.	71	12	External oxidant
5	Benzaldehyde	N-Methylformamide (3.0 mmol), KO^{t}Bu (3.0 mmol), THF (2.0 mL). benzaldehyde (1.0 mmol), 50 ^{o}C	39	13	Low yield
6	Phenylacetonitrile	10mg of Ru/C and 10 mL of THF, nitriles (1 mmol), amines (1 mmol). stirred at 25-180 oC for 15-30 h in open air.	91	14	HCN as byproduct
7	benzamide	1c (1.5 equiv), benzamide (0.2 mmol), CuI (5 mol%), and L1	90	15	

		(5 mol%), benzene.  1c			
8	 1a	lignin model (0.125 mmol), copper acetate (0.0125 mmol), amine or ammonia (5 equiv), and DMSO (1 mL), at 25 °C, under air.	89	16	
9		Aryl halides (0.5 mmol), carbamoylsilane 2 (5, 6 or 7) (0.60mmol) , 0.01 mmol of [(Ph)3P]4Pd(0), 100 °C	81	17	
10		$FeCl_2.4H_2O$ (9.9 mg, 0.05 mmol, 10 mol%), methylamine.HCl (67.8 mg, 0.5 mmol, 1 equiv.) and $CaCO_3$ (50.1 mg, 0.5 mmol, 1 equiv.). 1 mL of CH3CN, benzyl alcohol (67 µL, 0.65 mmol, 1.3 equiv) and tertbutylhydroperoxide (70% in H2O, 140 µL, 2 equiv.)	70	18	
11	Benzoic acid	benzoic acid (1 mmol, 122 mg) and amine (1 mmol, 0.09 mL) nano-MgO (5 mmol%), 70 ◦C	98	19	
12	Benzoic acid	carboxylic acid (3 mmol), urea (6 mmol), $Mg(NO_3)_2$$6$$H_2O$ (10 mol%), octane (3 mL), 130 C, 24 h.	0	20	
13	Benzoic acid	Benzoic acid (1 mmol), heterogeneous catalyst (10 mg) ,1 mL anhydrous toluene, amine (1.2 mmol) , ultrasound 15–60 min at room temperature	78	21	

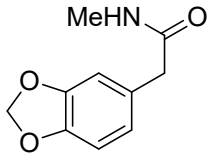
Spectroscopic Data for Products:

N-methyl-2-phenylacetamide (3a):



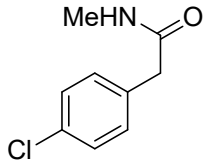
white solid, 133 mg, 89% yield, mp 60−61 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.35 (t, *J* = 7.4 Hz, 2H), 7.29 (t, *J* = 7.4 Hz, 1H), 7.25 (d, *J* = 7.1 Hz, 2H), 5.43 (s, 1H), 3.57 (s, 2H), 2.75 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.6, 134.9, 129.5, 129.0, 127.3, 43.7, 26.5; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{12}NO$ 150.0919, found 150.0925..

2-(benzo[d][1,3]dioxol-5-yl)-N-methylacetamide (3b):



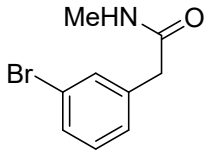
white solid, 170 mg, 88% yield, mp 131.4−132.3 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.78 (d, *J* = 7.8 Hz, 1H), 6.73 (d, *J* = 1.4 Hz, 1H), 6.69 (d, *J* = 7.9 Hz, 1H), 5.96 (s, 2H), 5.45 (s, 1H), 3.47 (s, 2H), 2.76 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.7, 148.1, 146.9, 128.4, 122.7, 109.8, 108.7, 101.1, 43.3, 26.5; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{10}H_{12}NO_3$ 194.0817, found 194.0822.

2-(4-chlorophenyl)-N-methylacetamide (3c):



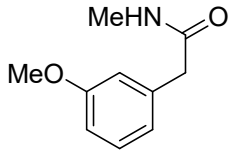
white solid, 137 mg, 84% yield, mp 113− 114 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.33 – 7.30 (m, 2H), 7.20 – 7.18 (m, 2H), 5.45 (s, 1H), 3.52 (s, 2H), 2.76 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.0, 133.4, 133.3, 130.8, 129.1, 43.0, 26.6; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{11}ClNO$ 184.0529, found 184.0534.

2-(3-bromophenyl)-N-methylacetamide (3d):



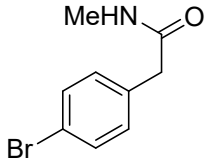
white solid, 181.6 mg, 80% yield, mp 102−104 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.42 (dd, *J* = 6.6, 1.5 Hz, 2H), 7.21 (qd, *J* = 7.7, 1.5 Hz, 2H), 5.46 (s, 1H), 3.52 (s, 2H), 2.78 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.7, 137.1, 132.4, 130.5, 128.1, 122.9, 43.2, 26.6; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{11}BrNO$ 228.0024, found 228.0030.

2-(3-methoxyphenyl)-N-methylacetamide (3e):



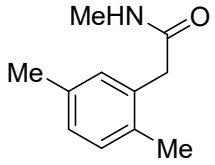
white solid, 161 mg, 90% yield, mp 120−121 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.27 (t, *J* = 7.9 Hz, 1H), 6.84 (dd, *J* = 6.9, 4.2 Hz, 2H), 6.80 (d, *J* = 1.6 Hz, 1H), 5.46 (s, 1H), 3.81 (s, 3H), 3.55 (s, 2H), 2.76 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.4, 160.0, 136.4, 130.1, 121.8, 115.1, 112.8, 55.2, 43.8, 26.5; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{10}H_{14}NO_2$ 180.1025, found 180.1028.

2-(4-bromophenyl)-N-methylacetamide (3f):



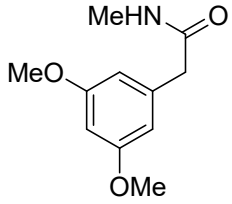
white solid, 182 mg, 80% yield, mp 118−120 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.47 (d, *J* = 8.3 Hz, 2H), 7.13 (d, *J* = 8.2 Hz, 2H), 5.44 (s, 1H), 3.50 (s, 2H), 2.76 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.9, 133.9, 132.1, 131.1, 121.4, 42.9, 26.5; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{11}BrNO$ 228.0024, found 228.0035.

2-(2,5-dimethylphenyl)-N-methylacetamide (3g):



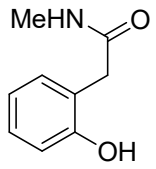
white solid, 171 mg, 96% yield, mp 86−88 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.09 (d, *J* = 7.7 Hz, 1H), 7.03 (d, *J* = 7.7 Hz, 1H), 6.98 (s, 1H), 5.31 (s, 1H), 3.55 (s, 2H), 2.74 (d, *J* = 4.9 Hz, 3H), 2.31 (s, 3H), 2.23 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.6, 136.2, 134.1, 133.2, 131.4, 130.7, 128.5, 41.7, 26.5, 20.9, 19.0; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{11}H_{16}NO$ 178.1232, found 178.1239.

2-(3,5-dimethoxyphenyl)-N-methylacetamide (3h):



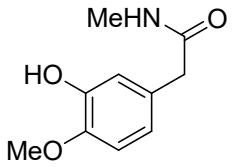
white solid, 184 mg, 88% yield, mp 85−87 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.83 (d, *J* = 7.9 Hz, 1H), 6.78 – 6.75 (m, 2H), 5.47 (s, 1H), 3.86 (s, 8H), 3.50 (s, 2H), 2.74 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 172.0, 149.3, 148.4, 127.4, 121.7, 112.6, 111.6, 55.9, 55.9, 43.3, 26.5; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{11}H_{16}NO_3$ 210.1130, found 210.1138.

2-(2-hydroxyphenyl)-N-methylacetamide(3i):



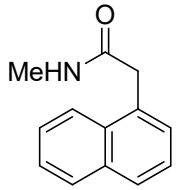
white solid, 117 mg, 71% yield, mp 104−105 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 9.88 (s, 1H), 7.18 – 7.14 (m, 1H), 7.02 (dd, *J* = 7.4, 1.1 Hz, 1H), 6.96 (d, *J* = 8.0 Hz, 1H), 6.84 – 6.80 (m, 1H), 6.57 (s, 1H), 3.57 (s, 2H), 2.78 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 174.2, 155.9, 130.7, 129.2, 121.6, 120.4, 117.6, 40.5, 26.7; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{12}NO_2$ 166.0868, found 166.0868.

2-(3-hydroxy-4-methoxyphenyl)-N-methylacetamide(3j):



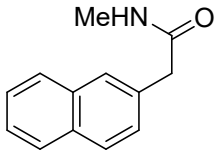
brown oil, 168 mg, 86% yield; ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.78 (t, *J* = 4.9 Hz, 2H), 6.67 (dd, *J* = 8.2, 2.0 Hz, 1H), 6.62 (s, 1H), 5.79 (s, 1H), 3.83 (s, 3H), 3.43 (s, 2H), 2.71 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.5, 145.3, 145.2, 126.7, 120.0, 115.0, 110.3, 54.9, 41.9, 25.5; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_{10}H_{14}NO_3$ 196.0974, found 196.0976.

N-methyl-2-(naphthalen-1-yl)acetamide (3k):



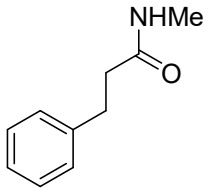
white solid, 159 mg, 80% yield, mp 123−124 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.95 (d, *J* = 8.2 Hz, 1H), 7.92 – 7.86 (m, 1H), 7.83 (d, *J* = 8.2 Hz, 1H), 7.58 – 7.49 (m, 2H), 7.48 – 7.42 (m, 1H), 7.39 (d, *J* = 6.8 Hz, 1H), 5.32 (s, 1H), 4.02 (s, 2H), 2.66 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.4, 133.9, 132.0, 131.1, 128.8, 128.5, 128.4, 126.8, 126.2, 125.6, 123.8, 41.6, 26.4; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_{13}H_{14}NO$ 200.1075, found 200.1087.

N-methyl-2-(naphthalen-2-yl)acetamide (3l):



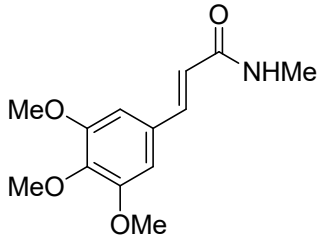
white solid, 163 mg, 82% yield, mp 117−120 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.88 – 7.78 (m, 3H), 7.70 (s, 1H), 7.53 – 7.45 (m, 2H), 7.36 (dd, *J* = 8.4, 1.7 Hz, 1H), 5.48 (s, 1H), 3.73 (s, 2H), 2.74 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.6, 133.5, 132.5, 132.4, 128.8, 128.3, 127.7, 127.6, 127.4, 126.5, 126.1, 43.8, 26.5; HRMS (ESI-TOF) m/z [M + H]$^+$ calcd for $C_{13}H_{14}NO$ 200.1075, found 200.1084.

N-methyl-3-phenylpropanamide (3m):



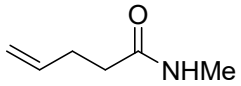
white solid, 156 mg, 96% yield, mp 55−57 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.30 – 7.25 (m, 2H), 7.20 (dd, *J* = 10.2, 4.5 Hz, 3H), 5.49 (s, 1H), 2.98 – 2.94 (m, 2H), 2.76 (d, *J* = 4.8 Hz, 3H), 2.49 – 2.43 (m, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 172.7, 140.9, 128.5, 128.3, 126.2, 38.4, 31.7, 26.2; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{10}H_{14}NO$ 164.1075, found 164.1087.

(E)-N-methyl-3-(3,4,5-trimethoxyphenyl)acrylamide(3n):



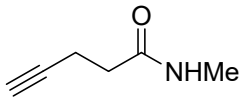
white solid, 191 mg, 76% yield, mp 136−138 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.52 (d, *J* = 15.5 Hz, 1H), 6.71 (s, 2H), 6.31 (d, *J* = 15.5 Hz, 1H), 5.78 (s, 1H), 3.86 (d, *J* = 1.2 Hz, 9H), 2.94 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 166.5, 153.4, 140.7, 139.5, 130.4, 119.9, 104.9, 60.9, 56.1, 26.5; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{13}H_{18}NO_4$ 252.1236, found 252.1239.

N-methylpent-4-enamide(3o):



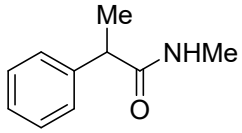
blandtaste, 79 mg, 70% yield; ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.58 (s, 1H), 5.73 (tdd, *J* = 16.8, 8.7, 4.0 Hz, 1H), 4.96 (d, *J* = 17.1 Hz, 1H), 4.90 (dd, *J* = 10.2, 0.7 Hz, 1H), 2.69 (d, *J* = 4.8 Hz, 3H), 2.29 (dd, *J* = 14.1, 6.7 Hz, 2H), 2.20 (t, *J* = 7.6 Hz, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 172.5, 136.1, 114.4, 34.6, 28.7, 25.2; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{10}H_{12}NO$ 114.0919, found114.0932.

N-methylpent-4-ynamide(3p):



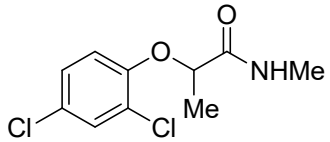
white solid, 97 mg, 87% yield, mp 56−57 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.14 (s, 1H), 2.78 (d, *J* = 4.8 Hz, 3H), 2.49 (td, *J* = 7.2, 2.6 Hz, 2H), 2.37 (t, *J* = 7.2 Hz, 2H), 1.97 (t, *J* = 2.5 Hz, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.8, 82.02, 68.2, 34.2, 25.3, 13.9; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_6H_{10}NO$ 112.0762, found 112.0762.

N-methyl-2-phenylpropanamide(3q):



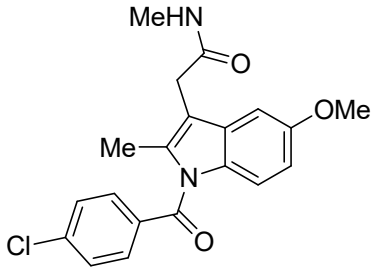
white solid, 155 mg 95% yield, White solid, mp:121-123 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.36 – 7.32 (m, 2H), 7.29 (dd, *J* = 5.7, 3.7 Hz, 2H), 7.26 (ddd, *J* = 5.4, 3.4, 1.6 Hz, 1H), 5.41 (s, 1H), 3.55 (q, *J* = 7.2 Hz, 1H), 2.73 (d, *J* = 4.9 Hz, 3H), 1.52 (d, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 174.8, 141.4, 128.9, 127.7, 127.2, 47.0, 26.5, 18.5; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_{10}H_{13}NO$ 164.1075, found 164.1077.

2-(2,4-dichlorophenoxy)-N-methylpropanamide(3r):



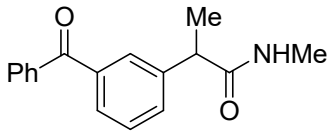
white solid, 217 mg, 88% yield, mp 121−124 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.40 (d, *J* = 2.5 Hz, 1H), 7.19 (dd, *J* = 8.8, 2.5 Hz, 1H), 6.83 (d, *J* = 8.8 Hz, 1H), 6.67 (s, 1H), 4.68 (q, *J* = 6.7 Hz, 1H), 2.87 (d, *J* = 5.0 Hz, 3H), 1.60 (d, *J* = 6.7 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.6, 151.3, 130.3, 128.0, 127.3, 124.4, 115.9, 76.6, 25.9, 18.4; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_{10}H_{12}Cl_2NO_2$ 248.0245, found 248.0251.

2-(1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1H-indol-3-yl)-N-methylacetamide(3s):



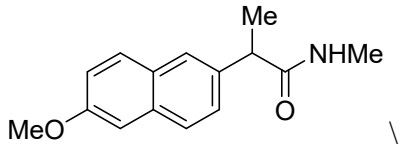
white solid, 333 mg, 90% yield, mp 168−170 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.66 (d, *J* = 8.6 Hz, 2H), 7.51 – 7.46 (m, 2H), 6.88 (d, *J* = 2.5 Hz, 1H), 6.85 (d, *J* = 9.0 Hz, 1H), 6.69 (dd, *J* = 9.0, 2.5 Hz, 1H), 5.60 (d, *J* = 3.7 Hz, 1H), 3.82 (s, 3H), 3.64 (s, 2H), 2.75 (d, *J* = 4.9 Hz, 3H), 2.38 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.5, 168.3, 156.3, 139.6, 136.4, 133.5, 131.2, 130.9, 130.3, 129.2, 115.1, 112.8, 112.3, 100.8, 55.7, 32.0, 26.5, 13.2; HRMS (ESI-TOF) *m/z* [M + H]$^{+}$ calcd for $C_{20}H_{20}ClN_2O_3$ 371.1162, found 371.1163.

2-(3-benzoylphenyl)-N-methylpropanamide(3t):



white solid, 254 mg, 95% yield, mp 94−96 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.82 – 7.76 (m, 2H), 7.74 (t, *J* = 1.6 Hz, 1H), 7.67 – 7.63 (m, 1H), 7.63 – 7.57 (m, 2H), 7.52 – 7.42 (m, 3H), 5.56 (s, 1H), 3.61 (q, *J* = 7.1 Hz, 1H), 2.75 (d, *J* = 4.8 Hz, 3H), 1.54 (d, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 196.5, 174.1, 141.9, 138.0, 137.4, 132.6, 131.6, 130.0, 129.1, 128.7, 128.3, 46.9, 26.5, 18.6; HRMS (ESI-TOF) *m/z* [M + H]$^{+}$ calcd for $C_{17}H_{18}NO_2$ 268.1338, found 268.1339.

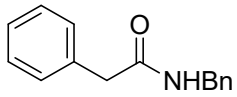
2-(6-methoxynaphthalen-2-yl)-N-methylpropanamide(3u):



\

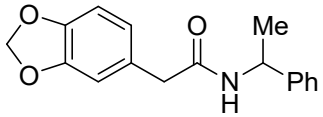
white solid, 214 mg, 88% yield, mp 133−135 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.71 (t, *J* = 8.9 Hz, 2H), 7.66 (s, 1H), 7.37 (dd, *J* = 8.4, 1.8 Hz, 1H), 7.18 – 7.07 (m, 2H), 5.40 (s, 1H), 3.92 (s, 3H), 3.69 (q, *J* = 7.2 Hz, 1H), 2.72 (d, *J* = 4.9 Hz, 3H), 1.60 (d, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 174.9, 157.7, 136.4, 133.7, 129.2, 128.9, 127.5, 126.4, 126.2, 119.2, 105.6, 55.3, 47.0, 26.5, 18.4; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{15}H_{18}NO_3$ 244.1338, found 244.1339.

N-benzyl-2-phenylacetamide (3v):



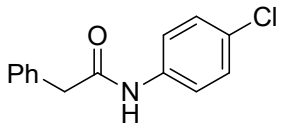
white solid, 185 mg, 82% yield, mp 118−119 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.36 (t, *J* = 7.1 Hz, 2H), 7.33 – 7.27 (m, 5H), 7.19 (d, *J* = 7.6 Hz, 2H), 5.75 (s, 1H), 4.42 (d, *J* = 5.7 Hz, 2H), 3.64 (s, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.8, 138.1, 134.8, 129.4, 129.0, 128.6, 127.5, 127.4, 127.4, 43.8, 43.6. HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{15}H_{16}NO$ 226.1232, found 226.1241.

2-(benzo[d][1,3]dioxol-5-yl)-N-(1-phenylethyl)acetamide (3w):



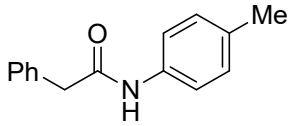
white solid, 226 mg 80% yield, mp: 95-96 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.31 (t, *J* = 7.5 Hz, 2H), 7.26 – 7.22 (m, 1H), 7.22 – 7.18 (m, 2H), 6.78 (d, *J* = 7.9 Hz, 1H), 6.74 (d, *J* = 1.6 Hz, 1H), 6.69 (dd, *J* = 7.9, 1.7 Hz, 1H), 5.96 (s, 2H), 5.69 (d, *J* = 6.7 Hz, 1H), 5.12 (p, *J* = 7.0 Hz, 1H), 3.53 – 3.43 (m, 2H), 1.41 (d, *J* = 6.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.1, 148.1, 146.9, 143.0, 128.6, 128.4, 127.3, 126.0, 122.5, 109.7, 108.6, 101.1, 48.7, 43.4, 21.7; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{17}H_{17}NO_3$ 284.1287, found 284.1285.

N-(4-chlorophenyl)-2-phenylacetamide (3x):



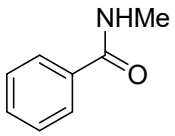
white solid, 198 mg, 81% yield, mp 158−160 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.31 (ddd, *J* = 20.6, 16.2, 7.5 Hz, 6H), 7.18 (dd, *J* = 8.3, 7.4 Hz, 3H), 3.86 – 3.53 (m, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 169.1, 136.2, 134.2, 129.5, 129.4, 129.3, 128.9, 127.8, 121.1, 44.7; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{14}H_{13}ClNO$ 246.0686, found 246.0695.

2-phenyl-N-(p-tolyl)acetamide (3y):



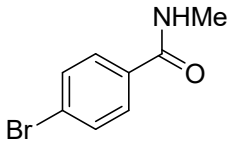
white solid, 187 mg, 83% yield, mp 122−123 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.42 – 7.37 (m, 2H), 7.33 (dd, *J* = 7.1, 3.6 Hz, 3H), 7.29 (d, *J* = 8.4 Hz, 2H), 7.11 (s, 1H), 7.08 (d, *J* = 8.3 Hz, 2H), 3.72 (s, 2H), 2.29 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 169.0, 135.0, 134.5, 134.1, 129.5, 129.4, 129.2, 127.6, 119.9, 44.8, 20.8; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{15}H_{16}NO$ 226.1232, found 226.1241.

N-methylbenzamide (3aa):



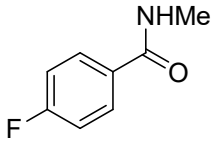
white solid, 115 mg, 85% yield, mp 73−74 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.79 – 7.74 (m, 2H), 7.49 (t, *J* = 7.4 Hz, 1H), 7.42 (dd, *J* = 10.4, 4.7 Hz, 2H), 6.16 (s, 1H), 3.02 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 168.2, 134.7, 131.4, 128.6, 126.8, 26.9; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_8H_{10}NO$ 136.0762, found 136.0761.

4-bromo-N-methylbenzamide (3ab):



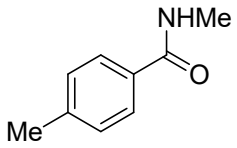
white solid, 170 mg, 80% yield, mp 157−159 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.62 (d, *J* = 8.6 Hz, 2H), 7.55 (d, *J* = 8.6 Hz, 2H), 6.25 (s, 1H), 2.99 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 167.3, 133.4, 131.8, 128.5, 126.0, 26.9; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for C_8H_9BrNO 213.9868, found 213.9879.

4-fluoro-N-methylbenzamide (3ac):



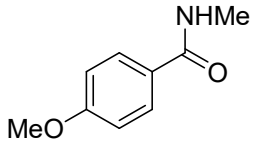
white solid, 122 mg, 80% yield, mp 111−113 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.87 – 7.71 (m, 2H), 7.13 – 7.04 (m, 2H), 6.33 (s, 1H), 2.99 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 167.3, 165.4, 130.7(d, *J* = 3.1 Hz), 129. (d, *J* = 8.8 Hz), 115.5 (d, *J* = 21.8 Hz), 26.9; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for C_8H_9FNO 154.0668, found 154.0678.

N,4-dimethylbenzamide (3ad):



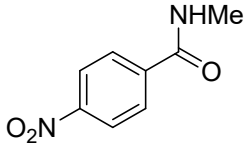
white solid, 127 mg, 85% yield, mp 136−138 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.66 (d, *J* = 8.1 Hz, 2H), 7.20 (d, *J* = 8.3 Hz, 2H), 6.31 (s, 1H), 2.98 (d, *J* = 4.8 Hz, 3H), 2.37 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 168.2, 141.6, 131.7, 129.1, 126.8, 26.7, 21.4; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{12}NO$ 150.0919, found 150.0930.

4-methoxy-N-methylbenzamide (3ae):



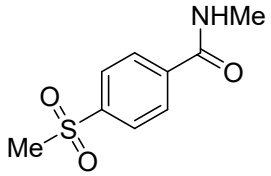
white solid, 142 mg, 86% yield, mp 114−116 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.9 Hz, 2H), 6.90 (d, *J* = 8.9 Hz, 2H), 6.24 (s, 1H), 3.84 (s, 3H), 2.99 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 167.8, 162.0, 128.6, 126.9, 113.7, 55.3, 26.7; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{12}NO_2$ 166.0868, found 166.0882.

N-methyl-4-nitrobenzamide (3af):



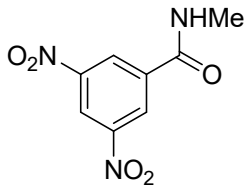
white solid, 144 mg, 80% yield, mp 225−227 °C; ^{1}H NMR (600 MHz, DMSO) δ 8.76 (d, *J* = 3.6 Hz, 1H), 8.34 – 8.25 (m, 2H), 8.11 – 7.99 (m, 2H), 2.81 (d, *J* = 4.6 Hz, 3H); ^{13}C NMR (150 MHz, DMSO) δ 165.0, 148.9, 140.1, 128.6, 123.5, 26.4; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_8H_9N_2O_3$ 181.0613, found 181.0624.

N-methyl-4-(methylsulfonyl)benzamide (3ag):



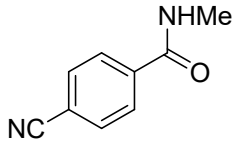
white solid, 160 mg, 75% yield, mp 196−198 °C; ^{1}H NMR (600 MHz, DMSO) δ 8.70 (d, *J* = 4.3 Hz, 1H), 8.07 – 7.98 (m, 4H), 3.26 (s, 3H), 2.81 (d, *J* = 4.6 Hz, 3H); ^{13}C NMR (150 MHz, DMSO) δ 165.4, 142.8, 139.0, 128.1, 127.1, 43.3, 26.4; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_{12}NO_3S$ 214.0538, found 214.0545.

N-methyl-3,5-dinitrobenzamide (3ah):



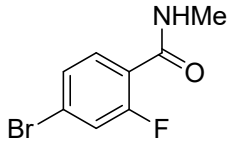
white solid, 135 mg, 60% yield, mp 147−150 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 9.15 (t, *J* = 2.1 Hz, 1H), 8.97 (d, *J* = 2.0 Hz, 2H), 6.72 (s, 1H), 3.11 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 163.4, 148.6, 137.9, 127.1, 121.0, 27.3; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_8H_8N_3O_5$ 226.0464, found 226.0472.

4-cyano-N-methylbenzamide (3ai):



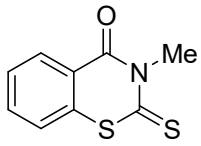
white solid, 112 mg, 70% yield, mp 205−206 °C; ^{1}H NMR (600 MHz, DMSO) δ 8.70 (s, 1H), 8.03 – 7.88 (m, 4H), 2.80 (d, *J* = 4.6 Hz, 3H); ^{13}C NMR (150 MHz, DMSO) δ 165.6, 138.9, 132.9, 128.4, 118.8, 113.9, 26.8; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_9H_9N_2O$ 161.0715, found 161.0717.

4-bromo-2-fluoro-N-methylbenzamide: (3aj):



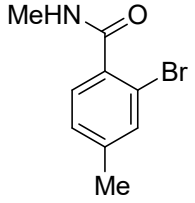
white solid, 207 mg, 95% yield, mp 112−113 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.99 (t, *J* = 8.5 Hz, 1H), 7.41 (dd, *J* = 8.4, 1.7 Hz, 1H), 7.31 (dd, *J* = 11.3, 1.8 Hz, 1H), 6.67 (s, 1H), 3.02 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 163.0 (d, J = 3.2 Hz), 160.1 (d, *J* = 250.9 Hz), 133.21 (d, *J* = 2.6 Hz), 128.3 (d, *J* = 3.2 Hz), 126.2 (d, *J* = 10.5 Hz), 120.0 (d, *J* = 11.9 Hz), 119.5 (d, *J* = 28.3 Hz).26.9; HRMS (ESI-TOF) *m/z* [M + H]+ calcd for C_8H_8BrFNO 231.9773, found 231.9773.

3-methyl-2-thioxo-2H-benzo[e][1,3]thiazin-4(3H)-one (3ak):



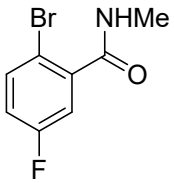
white solid, 207 mg, 99% yield, mp 142−143 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.33 (dd, *J* = 8.1, 0.9 Hz, 1H), 7.63 – 7.59 (m, 1H), 7.44 (t, *J* = 7.7 Hz, 1H), 7.18 (d, *J* = 8.0 Hz, 1H), 3.92 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 192.4, 160.5, 136.3, 134.0, 131.8, 127.9, 122.9, 121.8, 35.0; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_9H_8NOS_2$ 210.0047, found 210.0038.

2-bromo-N,4-dimethylbenzamide (3al):



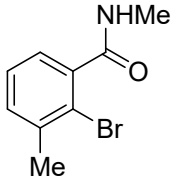
white solid, 175 mg, 77% yield, mp 95.6−98 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.44 (d, *J* = 7.8 Hz, 1H), 7.42 – 7.38 (m, 1H), 7.13 (dd, *J* = 7.8, 0.7 Hz, 1H), 6.07 (s, 1H), 3.00 (d, *J* = 4.9 Hz, 3H), 2.33 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 168.2, 141.9, 134.7, 133.8, 129.7, 128.3, 119.0, 26.7, 20.9. HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_9H_{11}BrNO$ 228.0024, found 228.0035.

2-bromo-5-fluoro-N-methylbenzamide (3am):



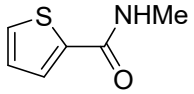
white solid, 193 mg, 84% yield, mp 132− 134 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.49 (dt, *J* = 16.4, 5.2 Hz, 2H), 7.30 – 7.18 (m, 1H), 6.05 (s, 1H), 3.00 (dt, *J* = 7.9, 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 166.9, 139.1, 134.5, 133.9, 131.3, 129.7, 117.2, 26.8; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for C_8H_8BrFNO 231.9773, found 231.9769.

2-bromo-N,3-dimethylbenzamide (3an):



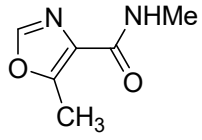
white solid, 193 mg, 85% yield, mp 115−117 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.33 – 7.31 (m, 1H), 7.29 (dt, *J* = 9.1, 4.7 Hz, 2H), 5.93 (s, 1H), 3.06 (d, *J* = 4.9 Hz, 3H), 2.49 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 169.3, 139.2, 139.2, 131.8, 127.2, 126.3, 121.6, 26.7, 23.6; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_9H_{11}BrNO$ 228.0024, found 228.0033.

N-methylthiophene-2-carboxamide (3ao):



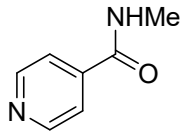
white solid, 120 mg, 85% yield, mp 98−100 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.50 (dd, *J* = 3.7, 0.9 Hz, 1H), 7.44 (dd, *J* = 5.0, 1.0 Hz, 1H), 7.06 (dd, *J* = 4.9, 3.7 Hz, 1H), 6.16 (s, 1H), 2.99 (d, *J* = 4.9 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 162.6, 138.9, 129.7, 127.9, 127.6, 26.7; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for C_6H_8NOS 142.0327, found 142.0339.

N,5-dimethyloxazole-4-carboxamide (3ap):



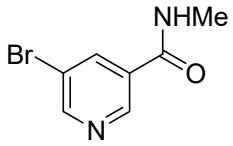
white solid, 127 mg, 91% yield, mp 104−105 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.64 (s, 1H), 6.94 (s, 1H), 2.92 (d, *J* = 5.1 Hz, 3H), 2.63 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 162.3, 152.9, 147.8, 128.8, 25.5, 11.4; HRMS (ESI-TOF) *m/z* [M + H]$^+$ calcd for $C_6H_9N_2O_2$ 141.0664, found 141.0664.

N-methylisonicotinamide (3aq):



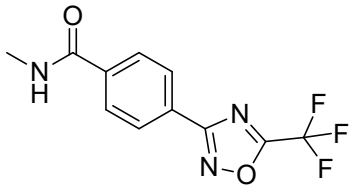
white solid, 123 mg, 90% yield, mp 107−108 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.69 (d, *J* = 5.4 Hz, 2H), 7.60 (d, *J* = 5.7 Hz, 2H), 6.77 (s, 1H), 3.00 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 166.3, 150.4, 141.7, 120.9, 26.9; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_7H_9N_2O$ 137.0715, found 137.0733.

5-bromo-N-methylnicotinamide (3ar):



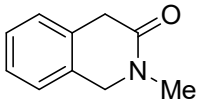
white solid, 143 mg, 67% yield, mp 145−146 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.86 (d, *J* = 1.5 Hz, 1H), 8.76 (d, *J* = 2.0 Hz, 1H), 8.25 (t, *J* = 2.0 Hz, 1H), 6.59 (s, 1H), 3.02 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 165.0, 153.2, 145.8, 137.8, 131.6, 121.0, 27.0; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_7H_8BrN_2O$ 214.9841, found 214.9841.

N-methyl-4-(5-(trifluoromethyl)-1,2,4-oxadiazol-3-yl)benzamide (3as):



white solid, 249 mg, 92% yield, mp 160−161 °C; ^{1}H NMR (600 MHz, CDCl3) δ 8.17 (d, *J* = 8.4 Hz, 2H), 7.90 (d, *J* = 8.4 Hz, 2H), 6.36 (s, 1H), 3.05 (d, *J* = 4.8 Hz, 3H); ^{13}C NMR (150 MHz, CDCl3) δ 168.5, 167.1, 166.1 (q, J = 44.7 Hz), 138.0, 128.0, 127.7, 127.5, 115.9 (q, J = 273.7 Hz), 27.0; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{11}H_9F_3N_3O_2$ 272.0647, found 272.0646.

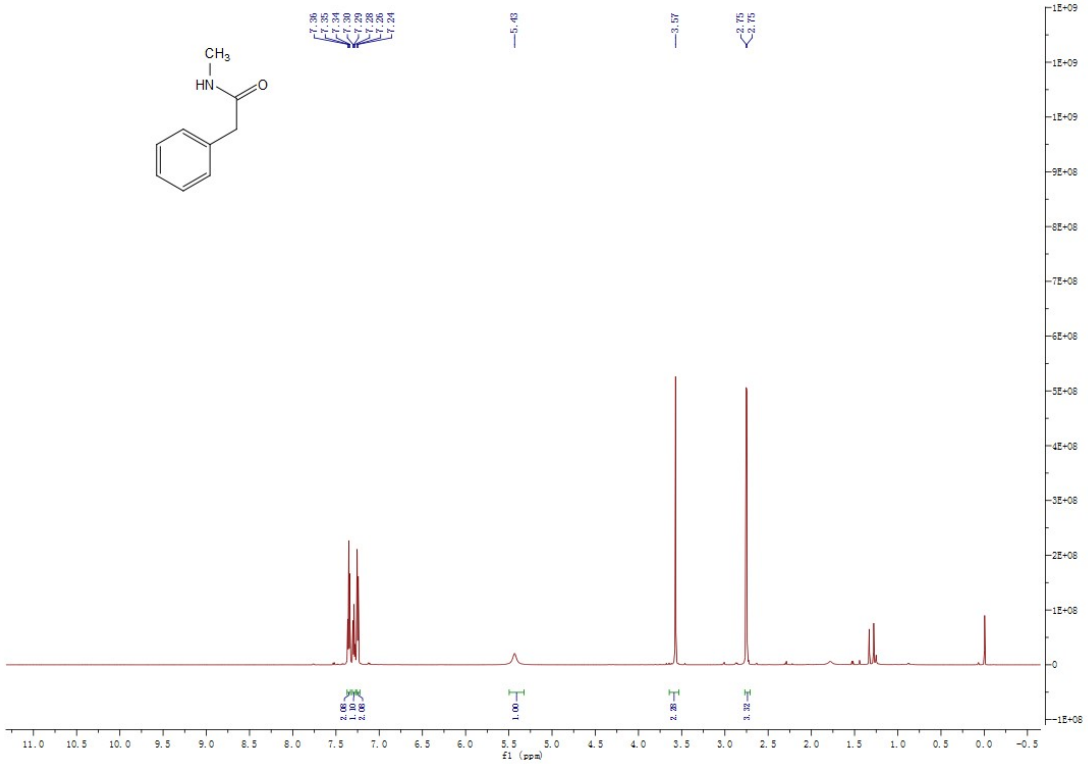
2-methyl-1,2-dihydroisoquinolin-3(4H)-one (4a):



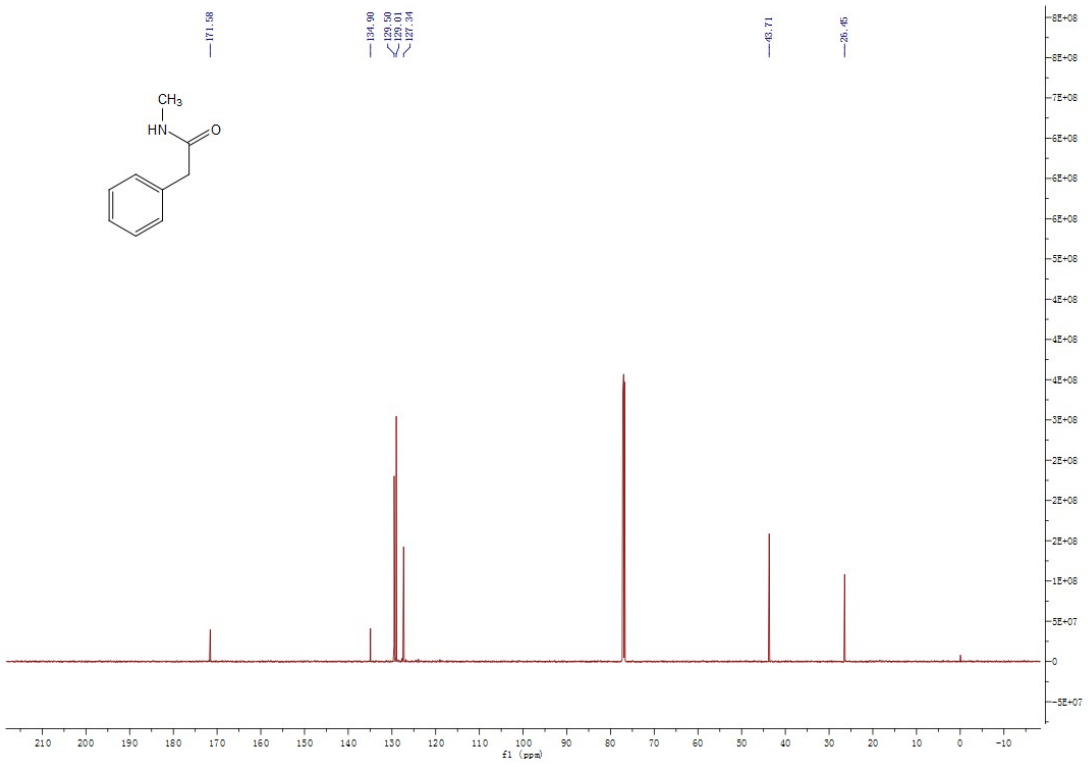
white solid, 132.0 mg, 82% yield, mp 107−108 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.24 (dd, *J* = 13.8, 7.1 Hz, 2H), 7.15 (t, *J* = 8.2 Hz, 2H), 4.50 (s, 2H), 3.62 (s, 2H), 3.11 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 168.9, 132.0 130.7, 127.4, 127.2, 126.5, 125.0, 52.8, 36.7, 34.3; HRMS (ESI-TOF) *m/z* $[M + H]^+$ calcd for $C_{10}H_{12}NO$ 162.0919, found 162.0921.

^{1}H and ^{13}C NMR Spectra:

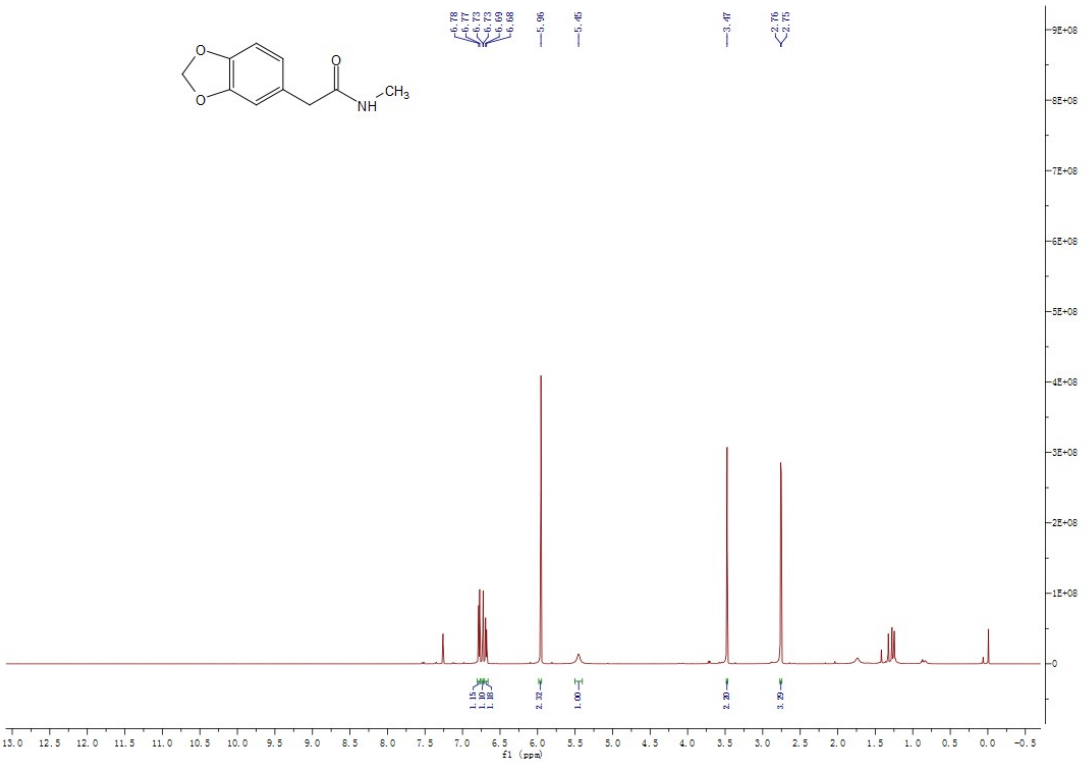
^{1}H NMR of N-methyl-2-phenylacetamide (3a)



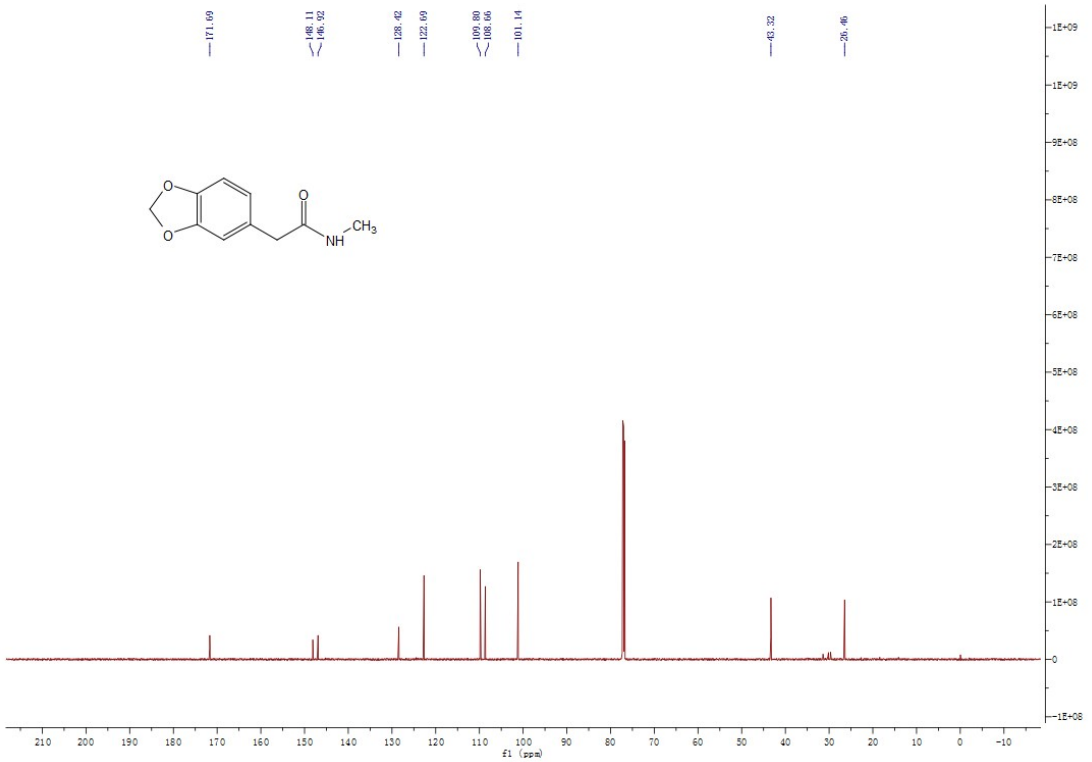
^{13}C NMR of N-methyl-2-phenylacetamide (3a)



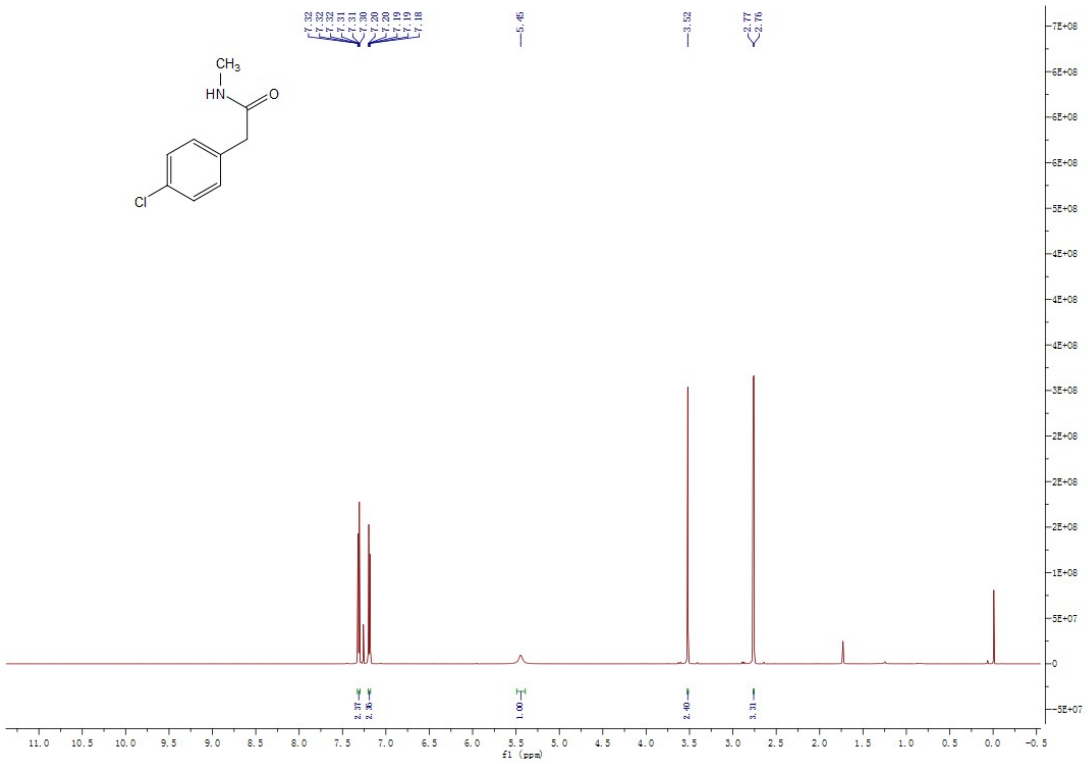
^{1}H NMR of 2-(benzo[d][1,3]dioxol-5-yl)-N-methylacetamide (3b)



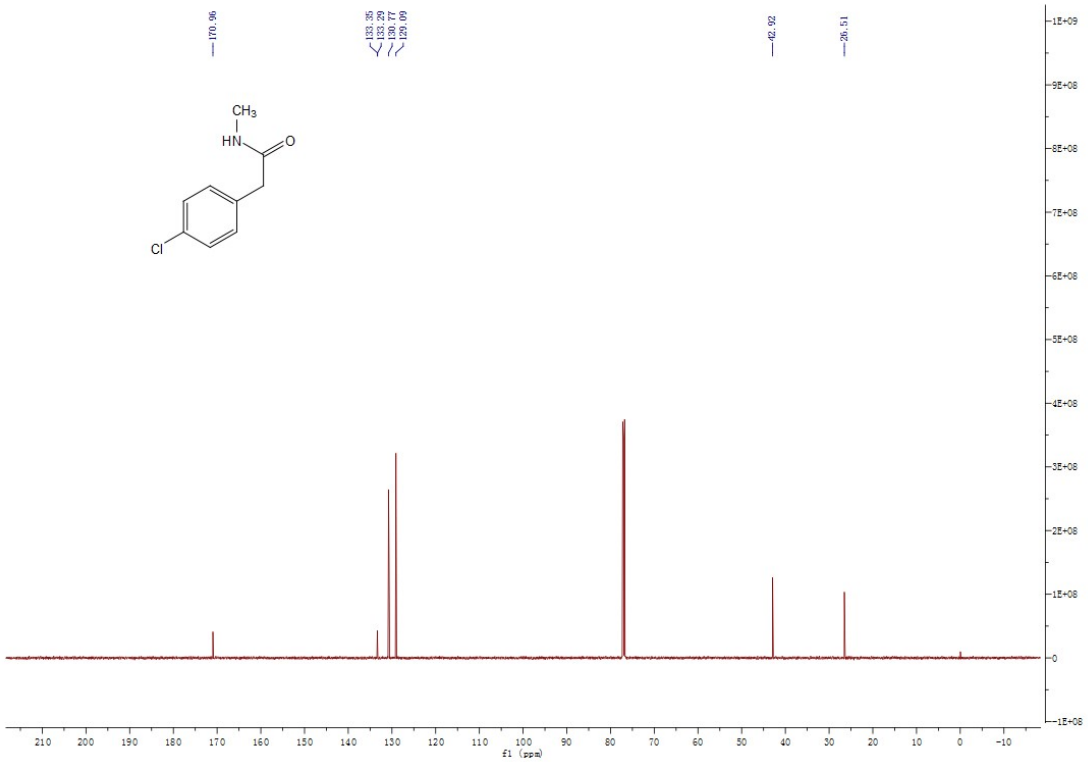
^{13}C NMR of 2-(benzo[d][1,3]dioxol-5-yl)-N-methylacetamide (3b)



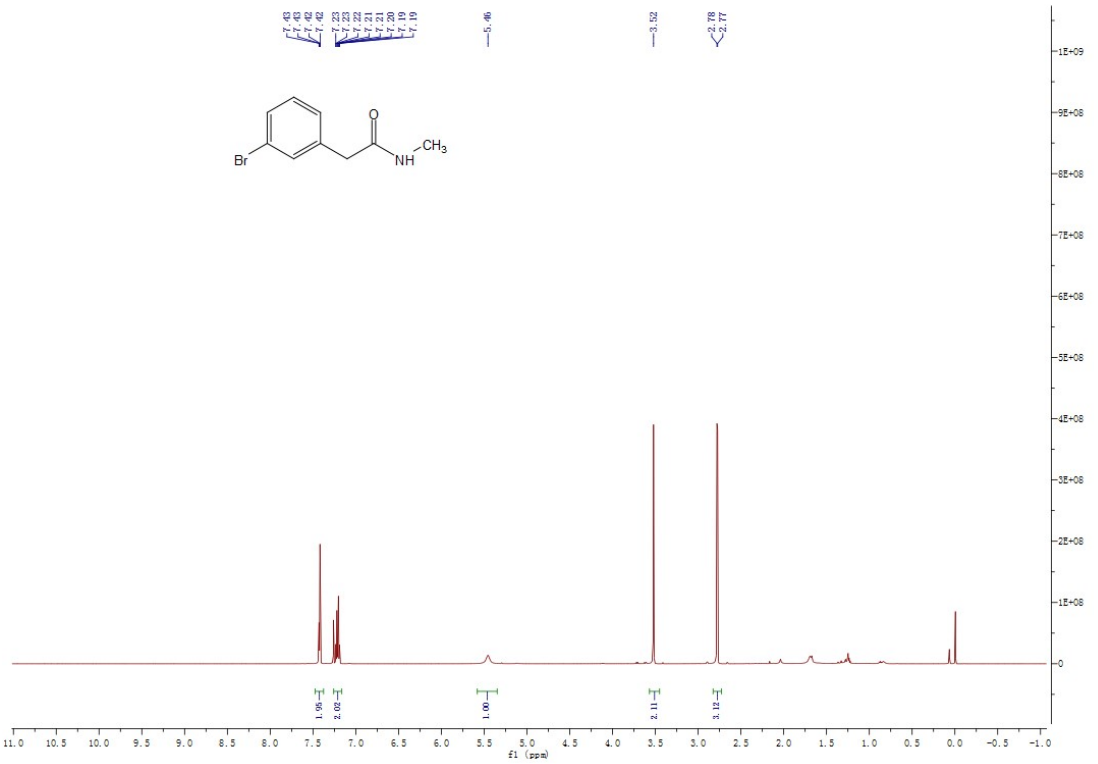
^{1}H NMR of 2-(4-chlorophenyl)-N-methylacetamide (3c)



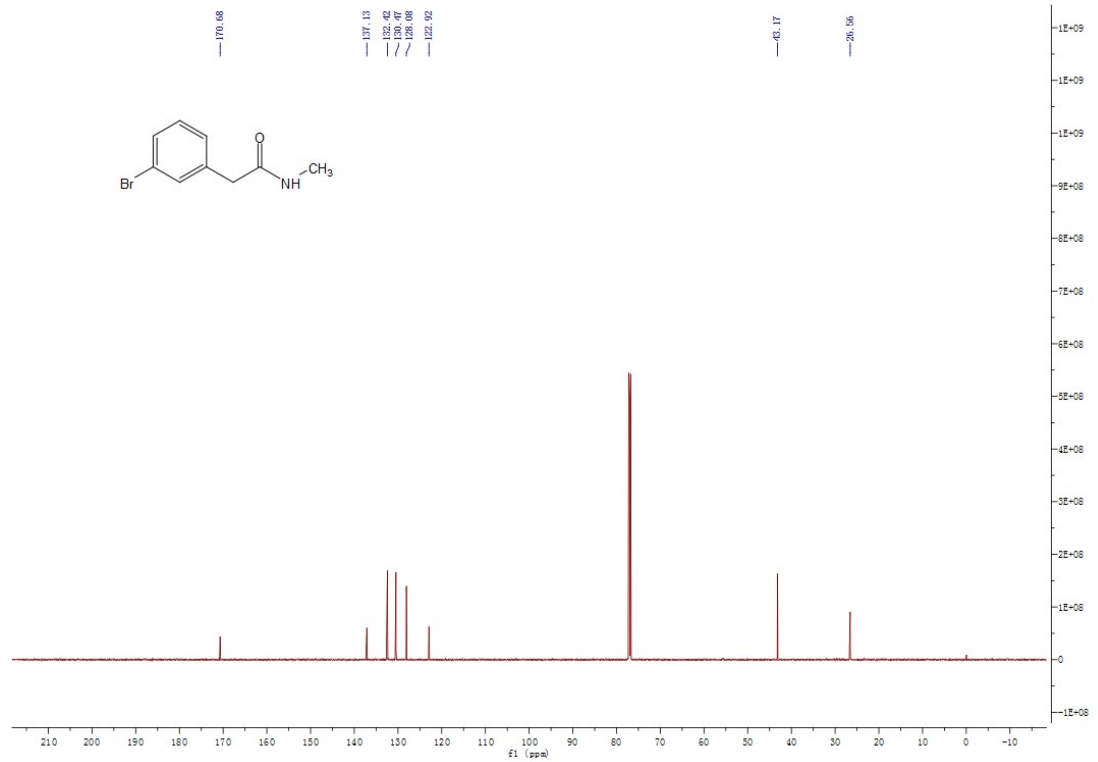
^{13}C NMR of 2-(4-chlorophenyl)-N-methylacetamide (3c)



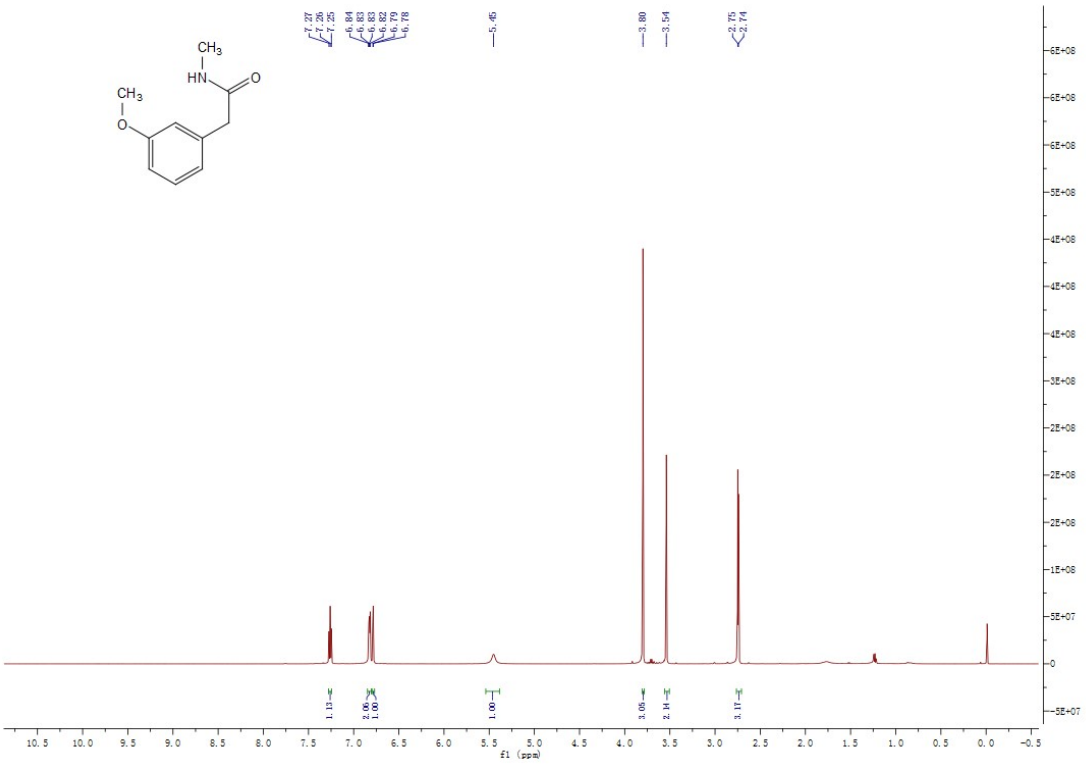
^{1}H NMR of 2-(3-bromophenyl)-N-methylacetamide (3d)



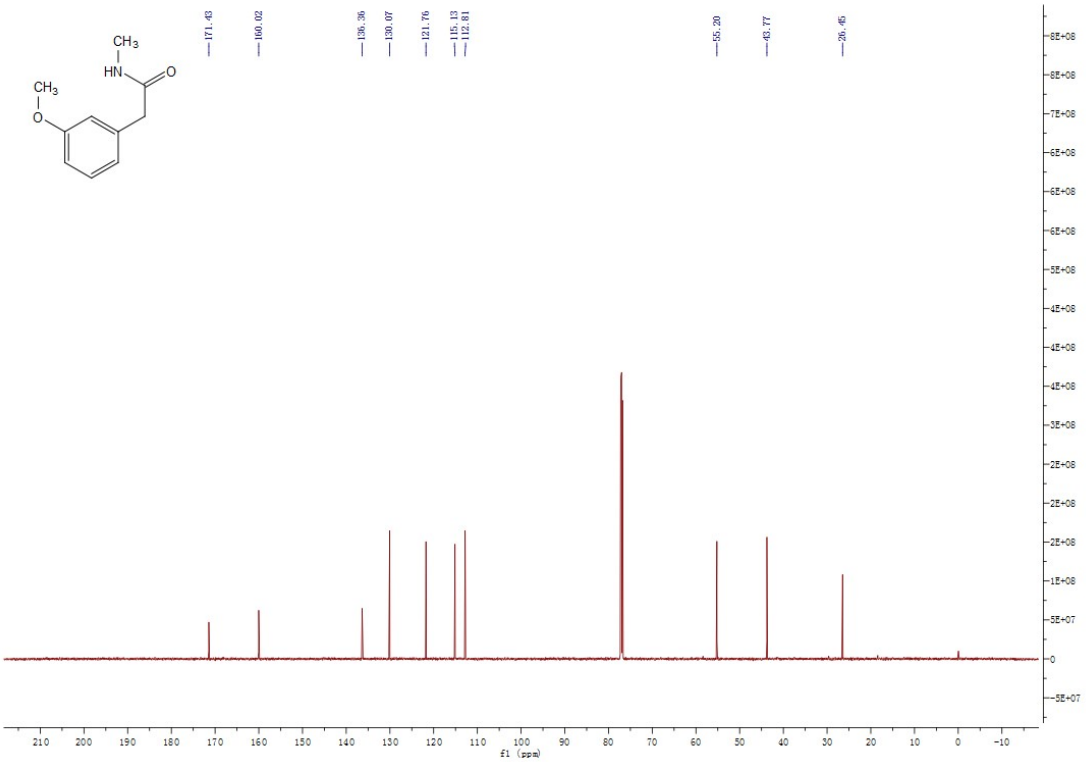
^{13}C NMR of 2-(3-bromophenyl)-N-methylacetamide (3d)



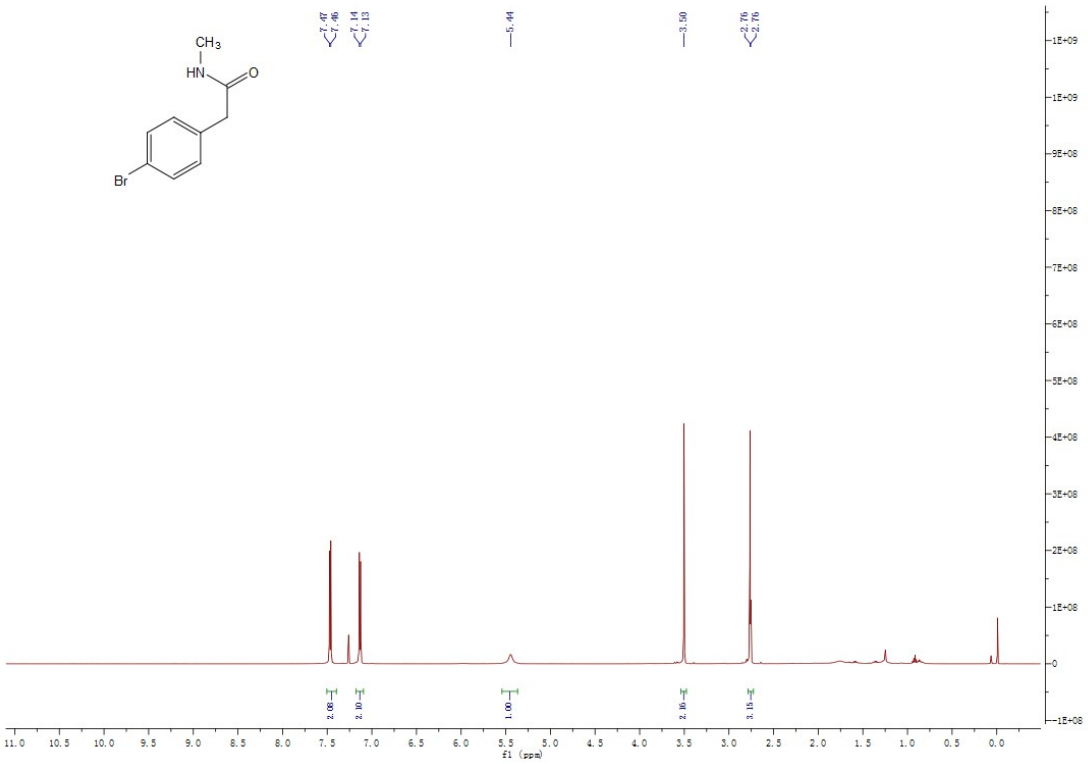
^{1}H NMR of 2-(3-methoxyphenyl)-N-methylacetamide (3e)



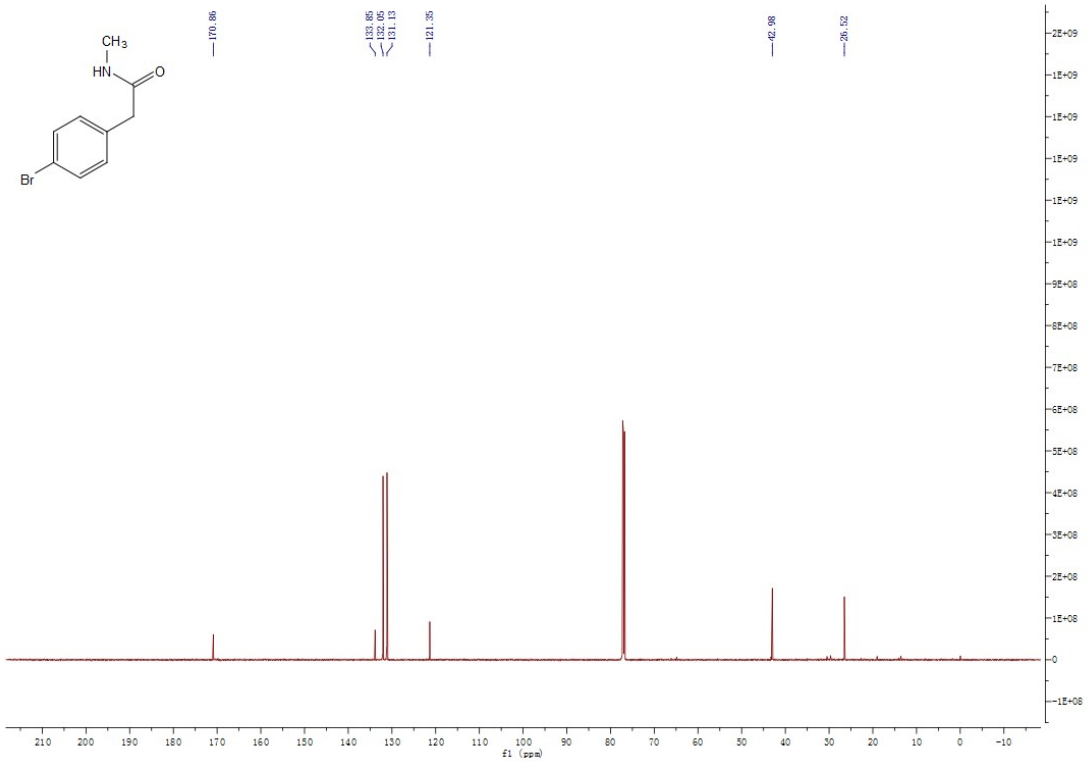
^{13}C NMR of 2-(3-methoxyphenyl)-N-methylacetamide (3e)



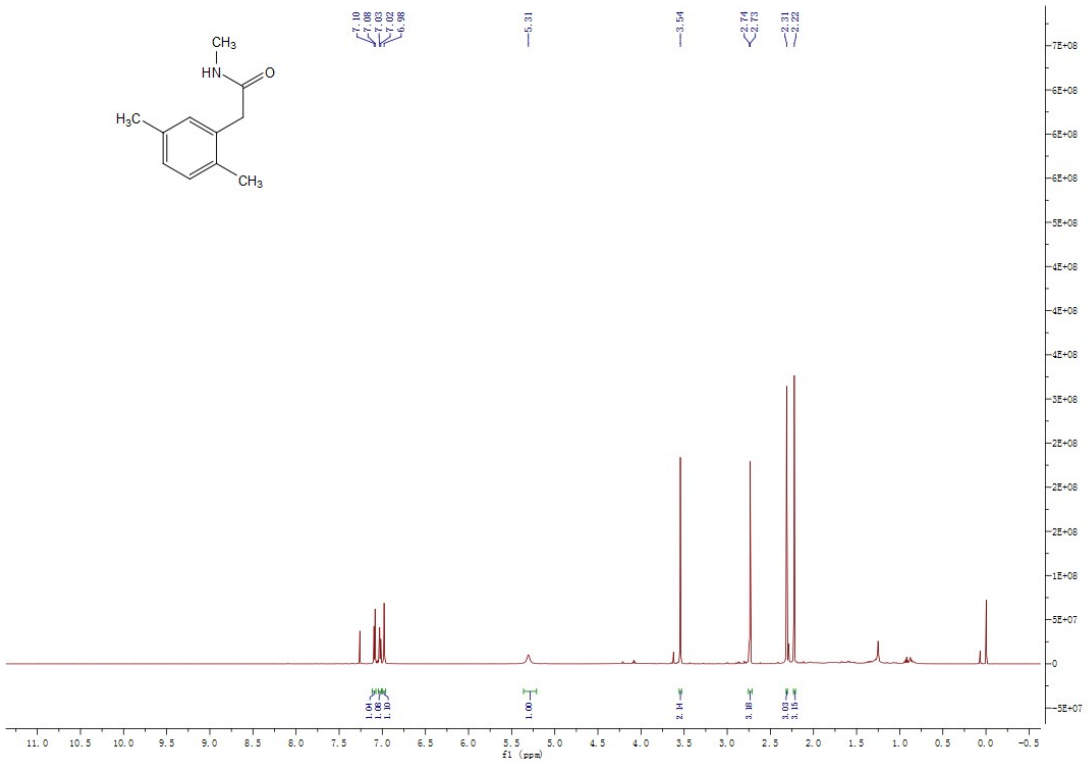
^{1}H NMR of 2-(4-bromophenyl)-N-methylacetamide (3f)



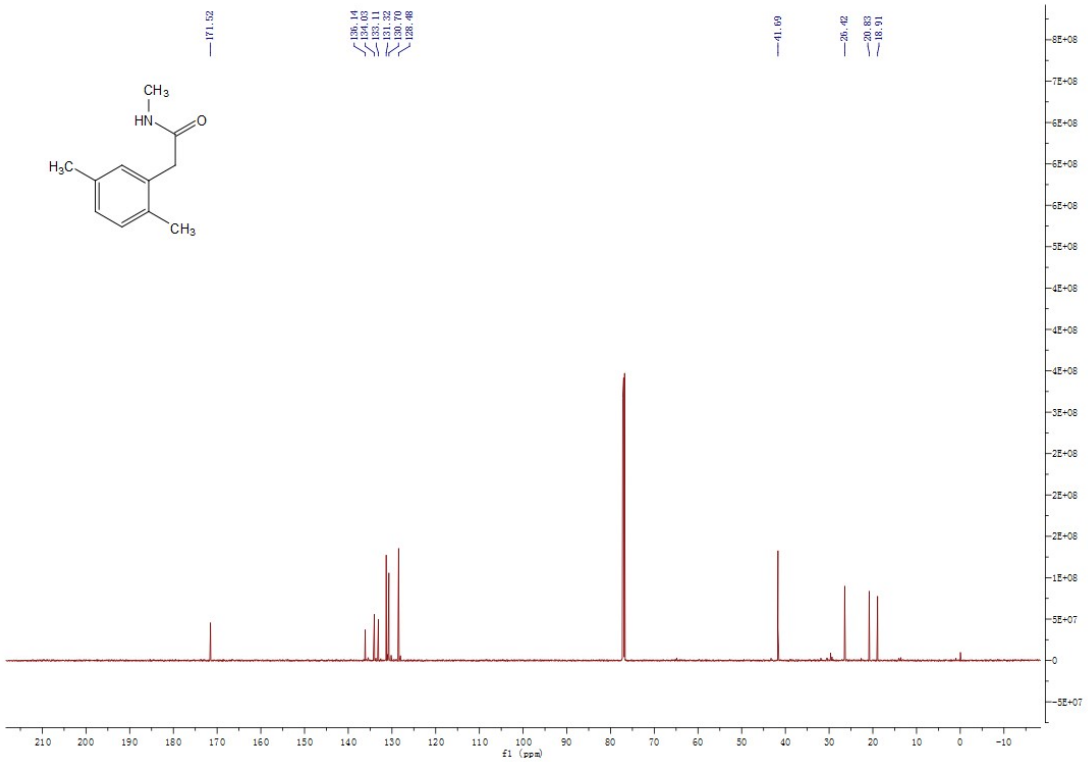
^{13}C NMR of 2-(4-bromophenyl)-N-methylacetamide (3f)



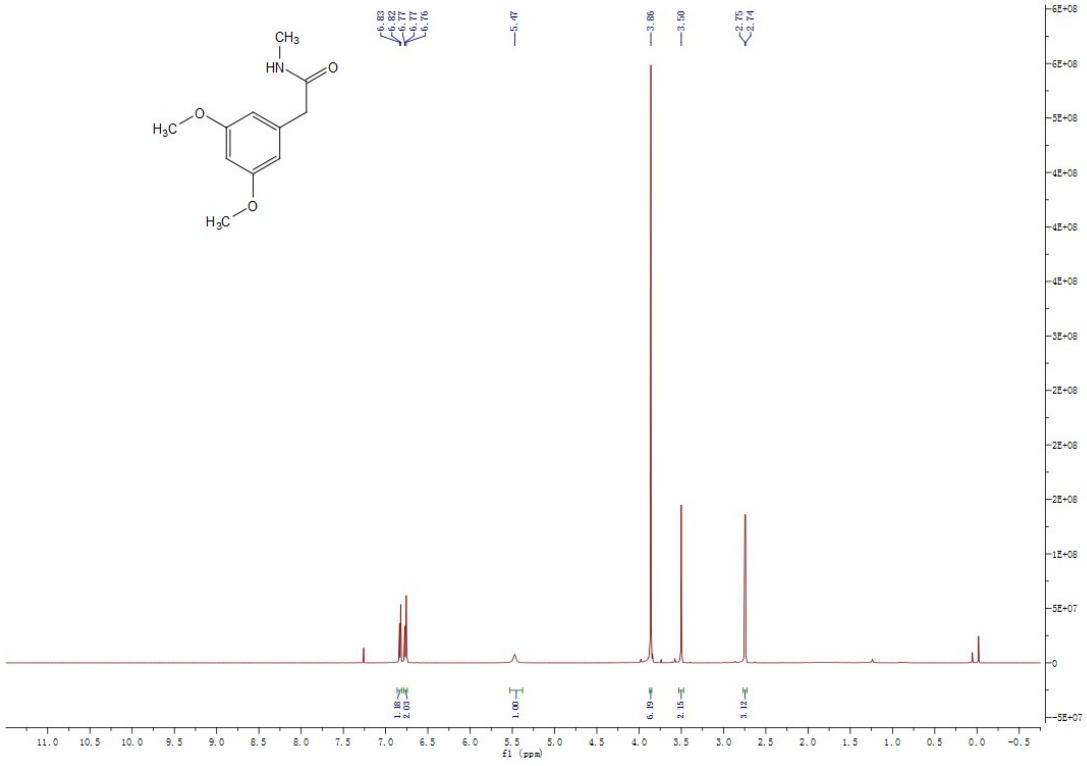
^{1}H NMR of 2-(2,5-dimethylphenyl)-N-methylacetamide (3g)



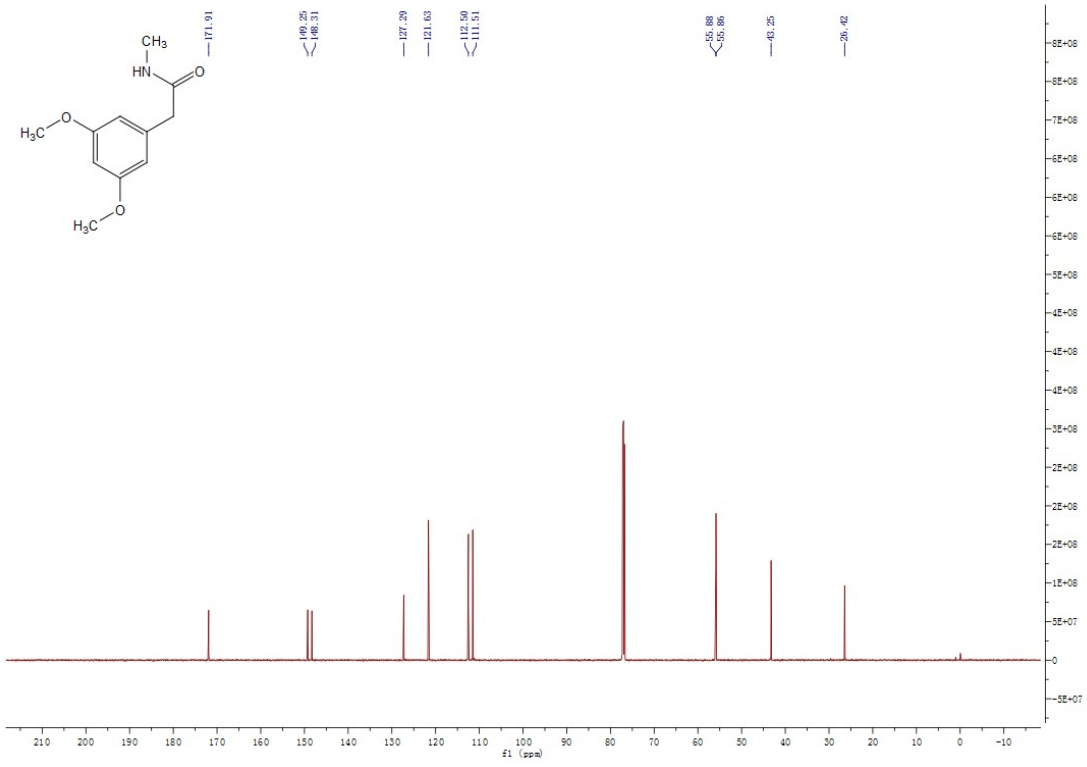
^{13}C NMR of 2-(2,5-dimethylphenyl)-N-methylacetamide (3g)



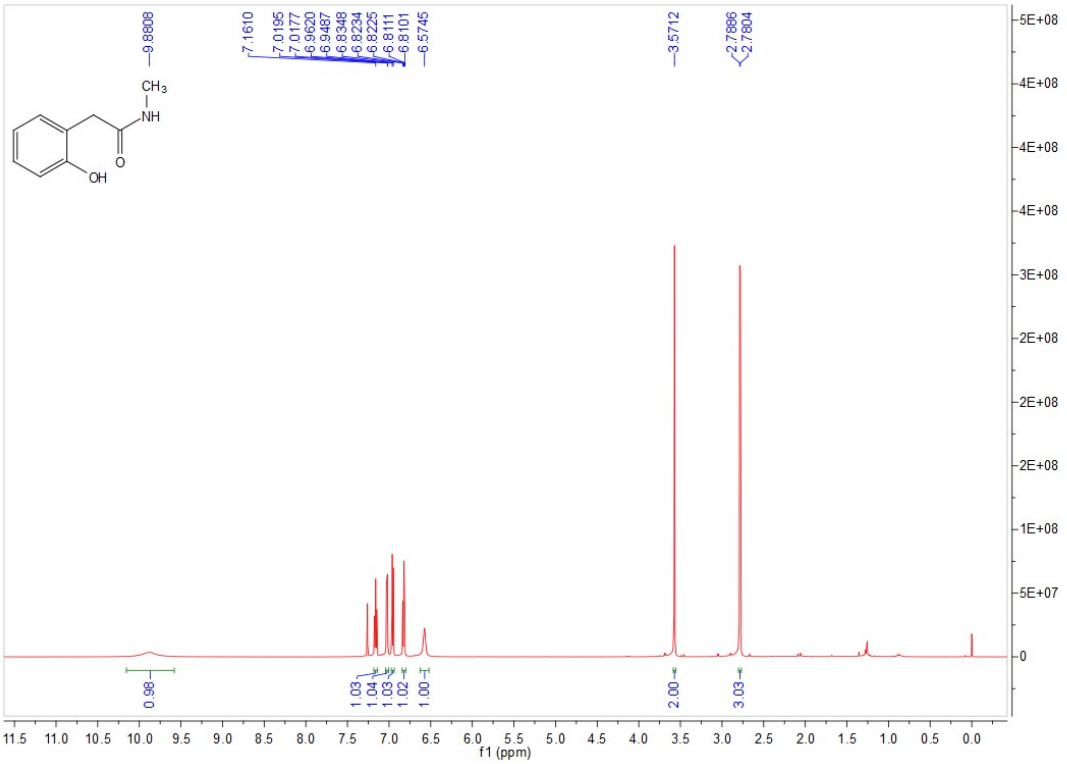
^{1}H NMR of 2-(3,5-dimethoxyphenyl)-N-methylacetamide (3h)



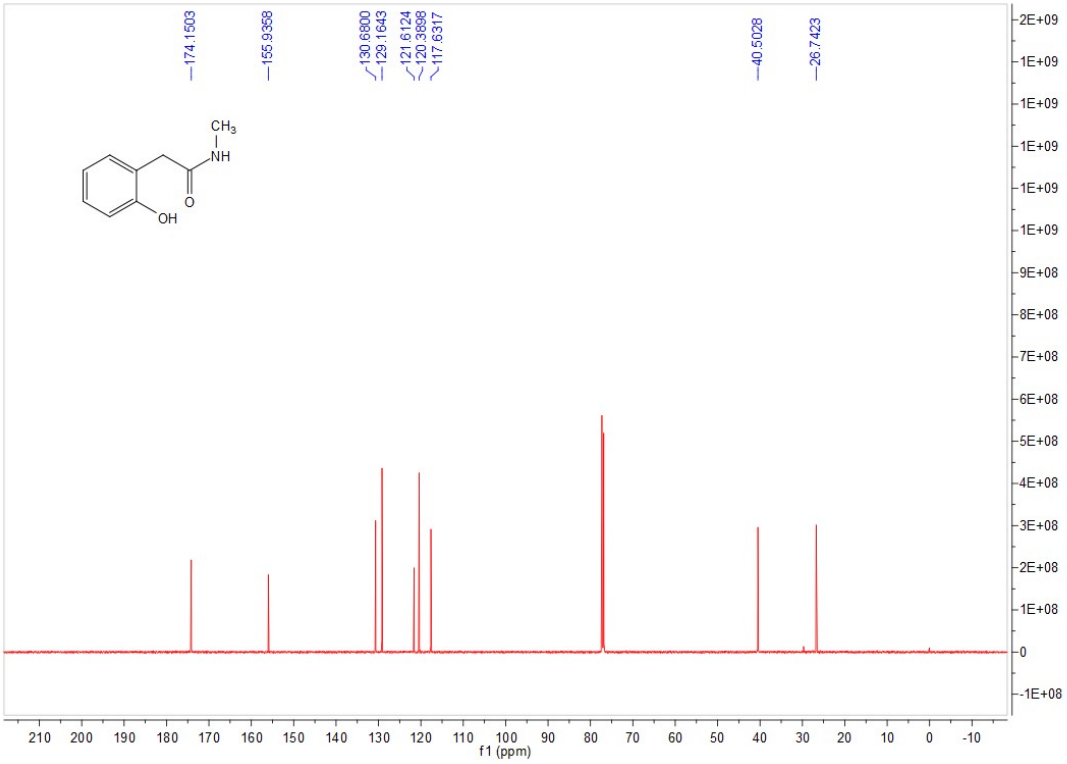
^{13}C NMR of 2-(3,5-dimethoxyphenyl)-N-methylacetamide (3h)



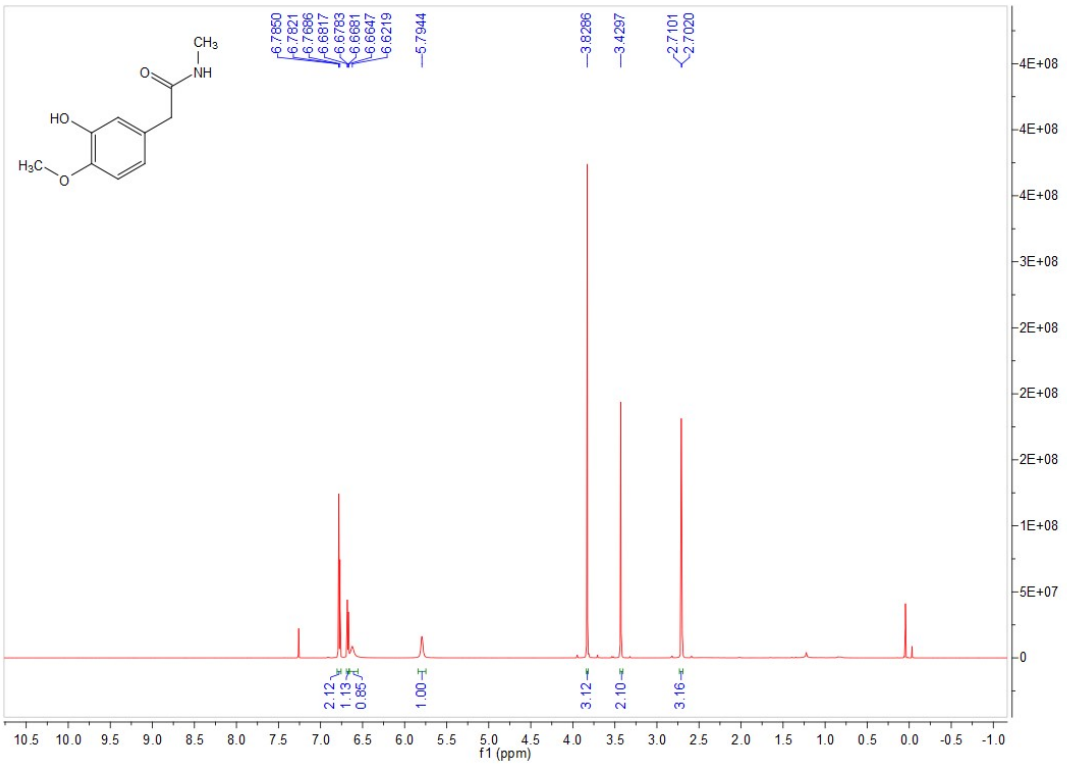
^{1}H NMR of 2-(2-hydroxyphenyl)-N-methylacetamide(3i)



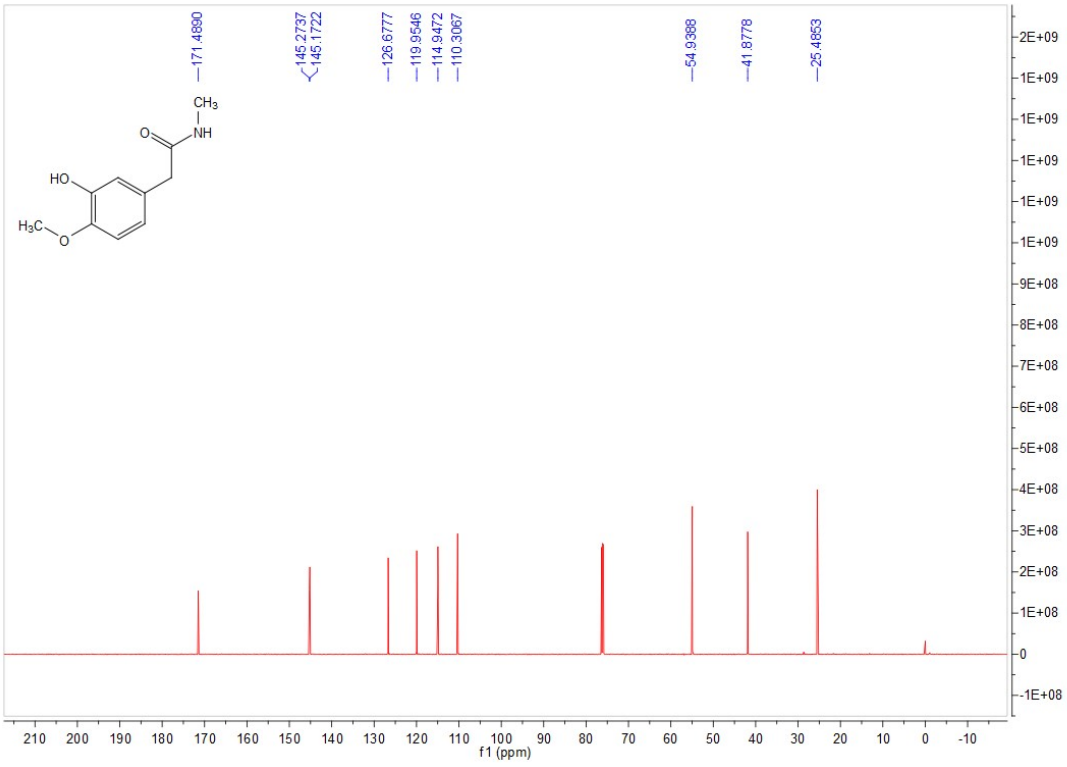
^{13}C NMR of 2-(2-hydroxyphenyl)-N-methylacetamide(3i)



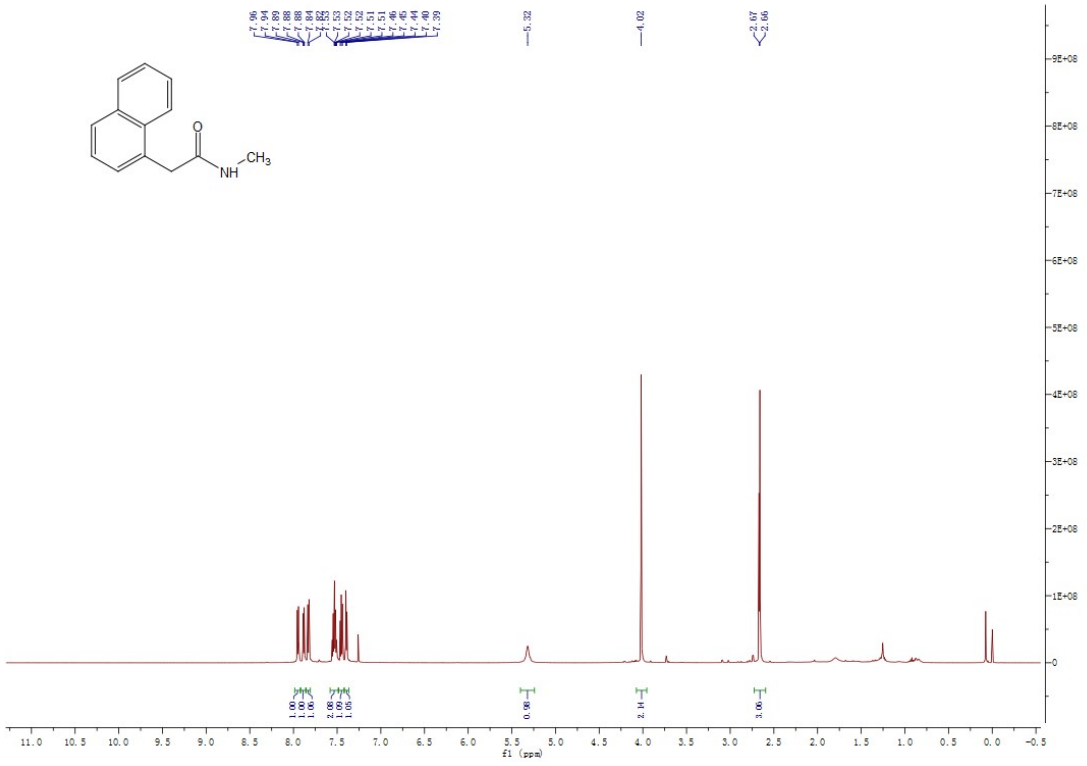
^{1}H NMR of 2-(3-hydroxy-4-methoxyphenyl)-N-methylacetamide(3j)



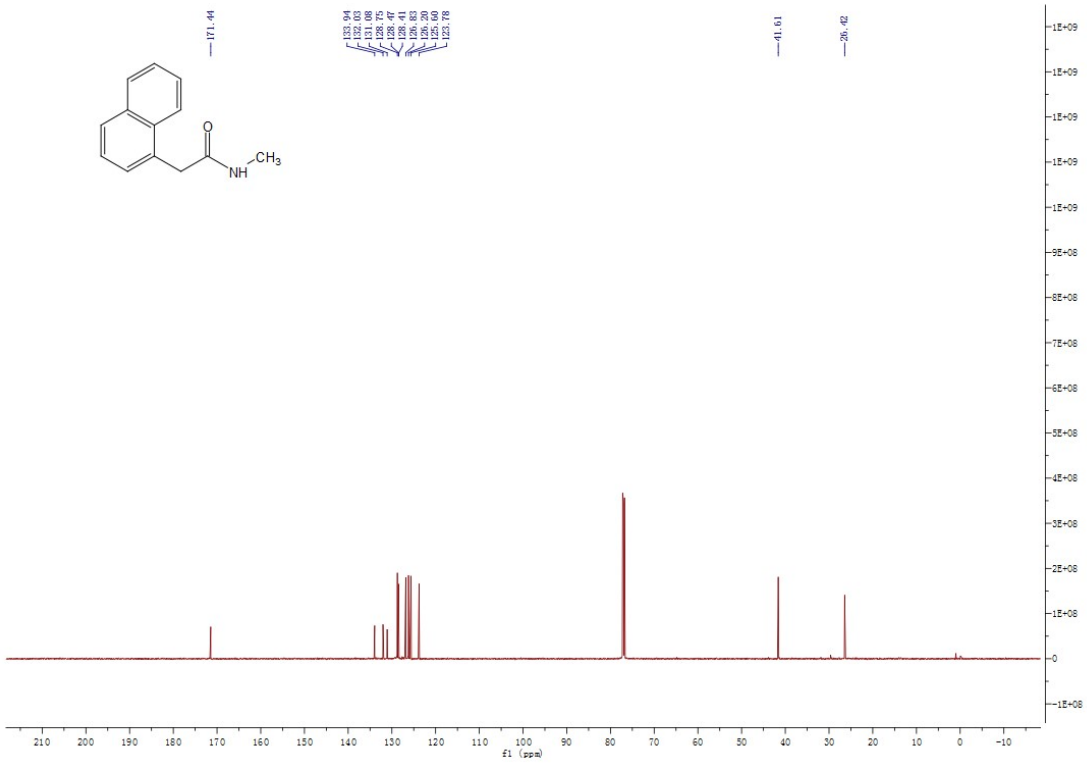
^{13}C NMR of 2-(3-hydroxy-4-methoxyphenyl)-N-methylacetamide(3j)



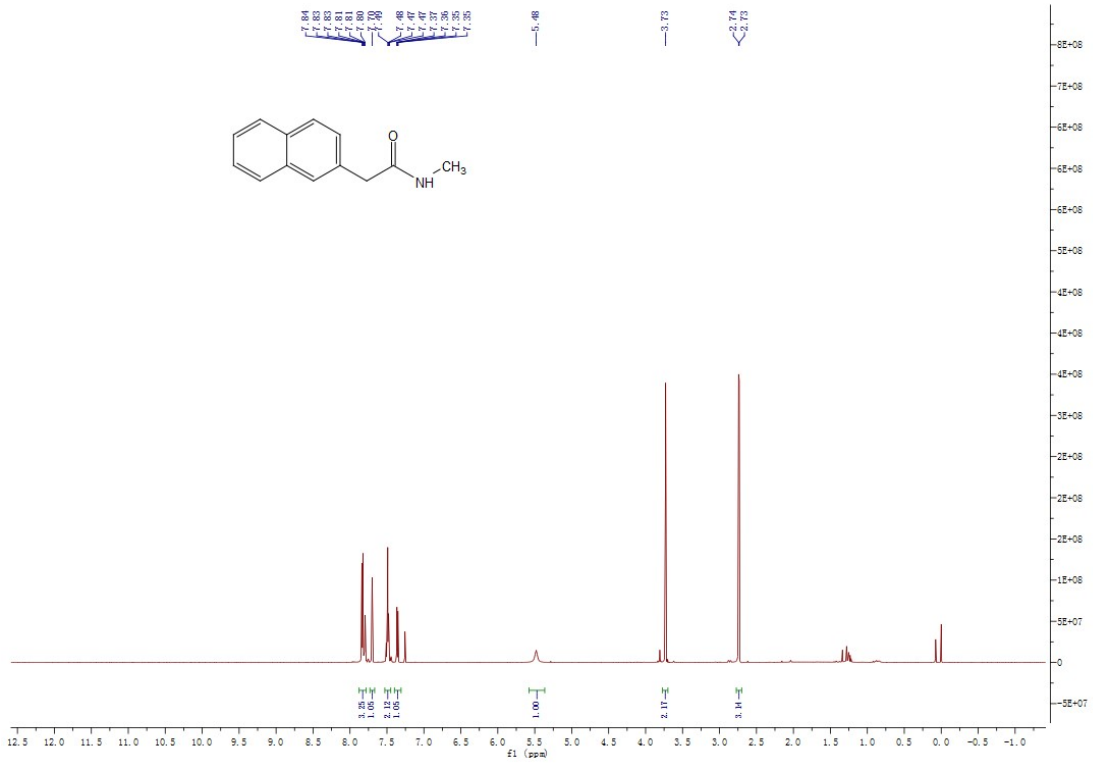
^{1}H NMR of N-methyl-2-(naphthalen-1-yl)acetamide (3k)



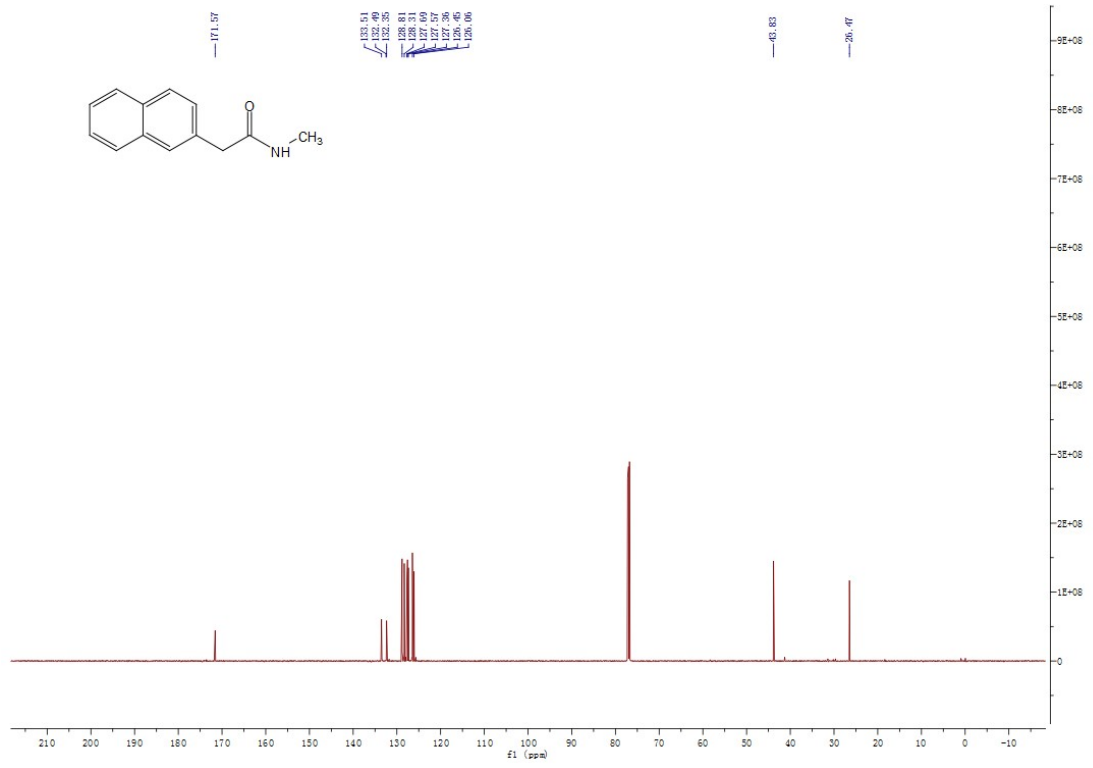
^{13}C NMR of N-methyl-2-(naphthalen-1-yl)acetamide (3k)



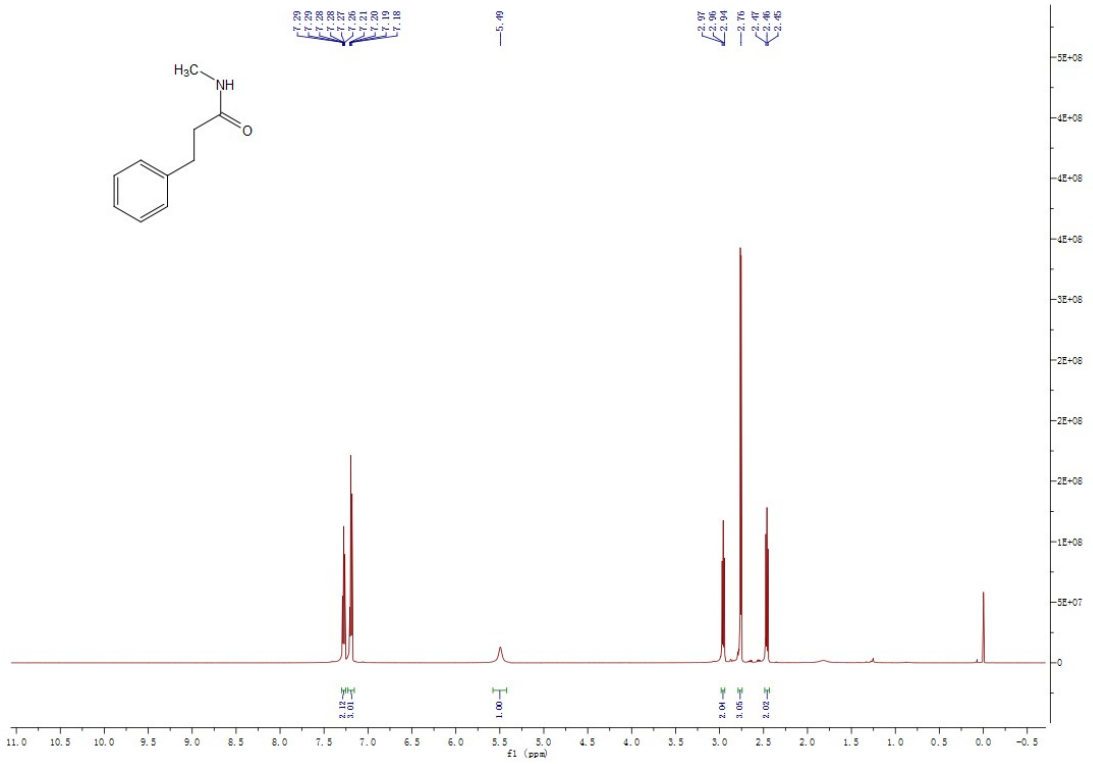
^{1}H NMR of N-methyl-2-(naphthalen-2-yl)acetamide (3l)



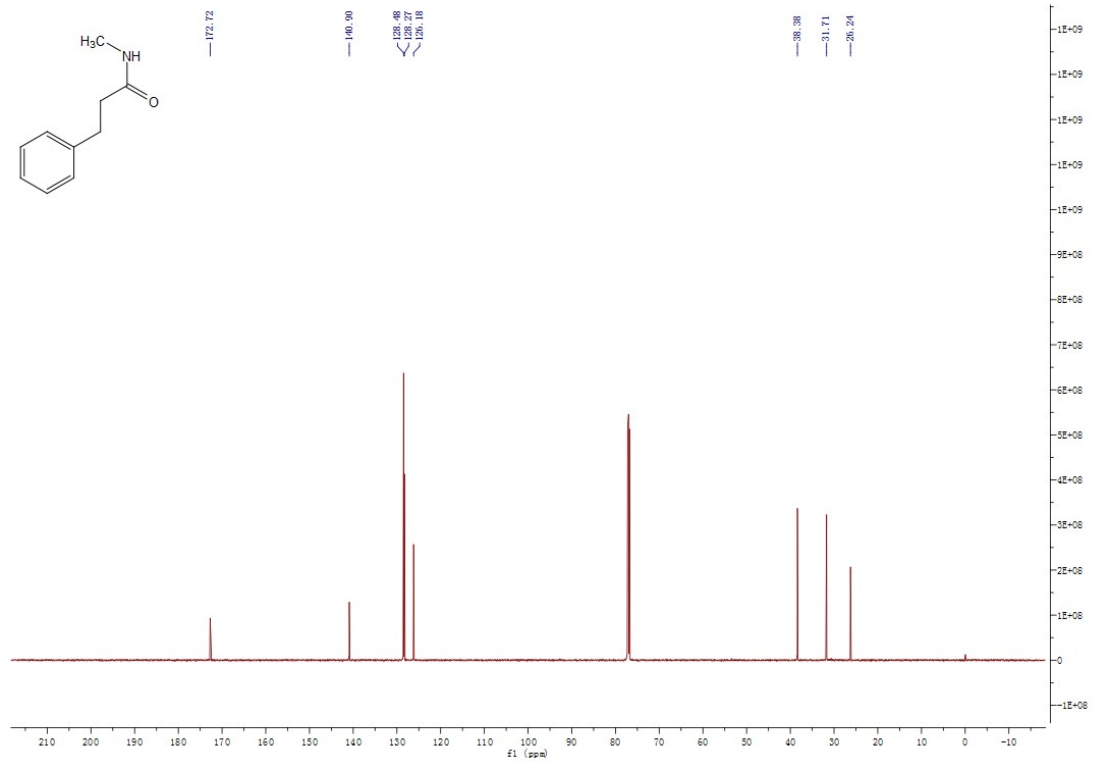
^{13}C NMR of N-methyl-2-(naphthalen-2-yl)acetamide (3l)



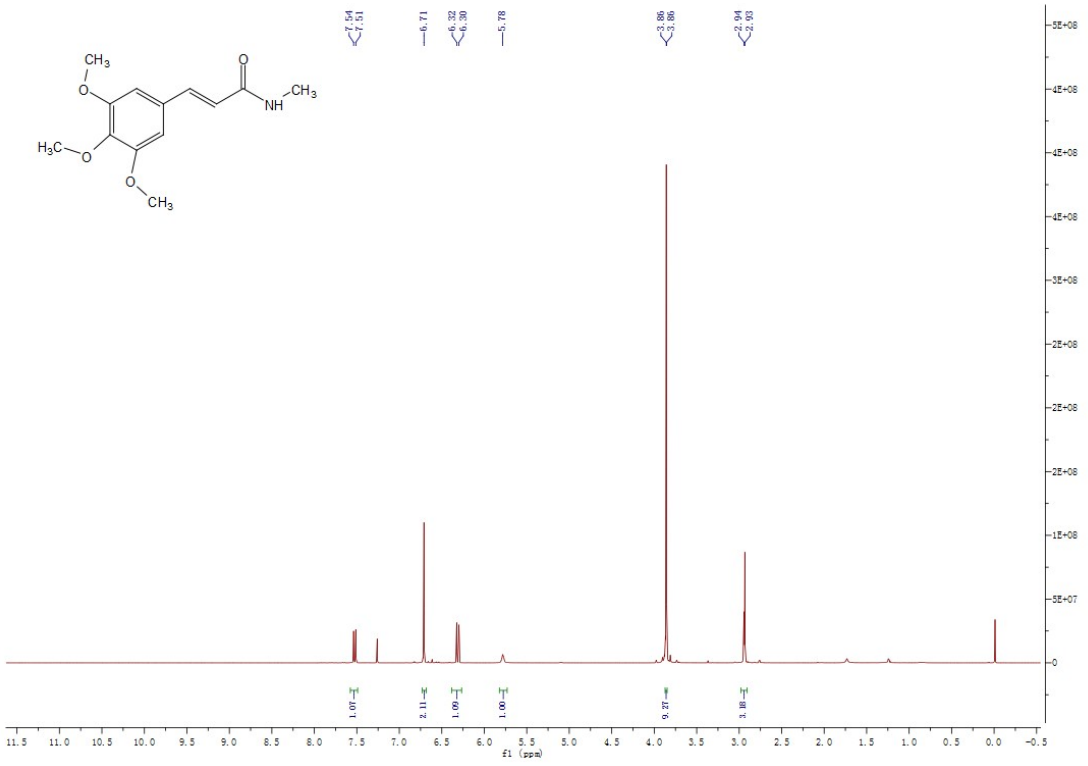
^{1}H NMR of N-methyl-3-phenylpropanamide (3m)



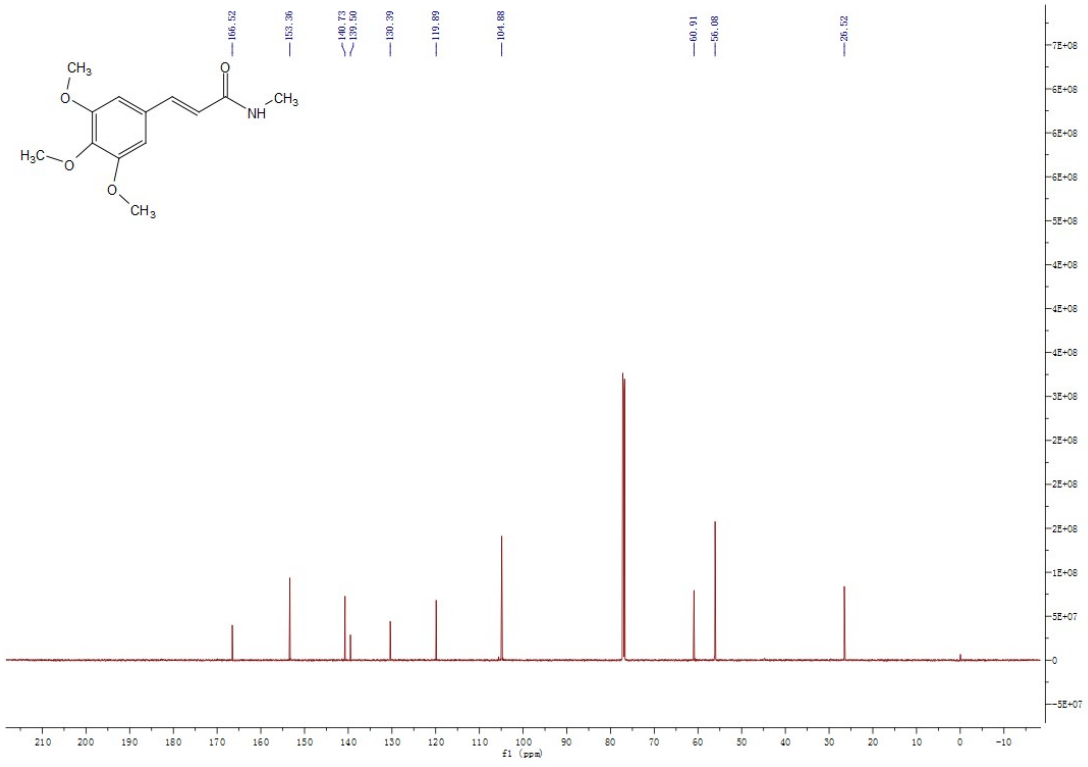
^{13}C NMR of N-methyl-3-phenylpropanamide (3m)



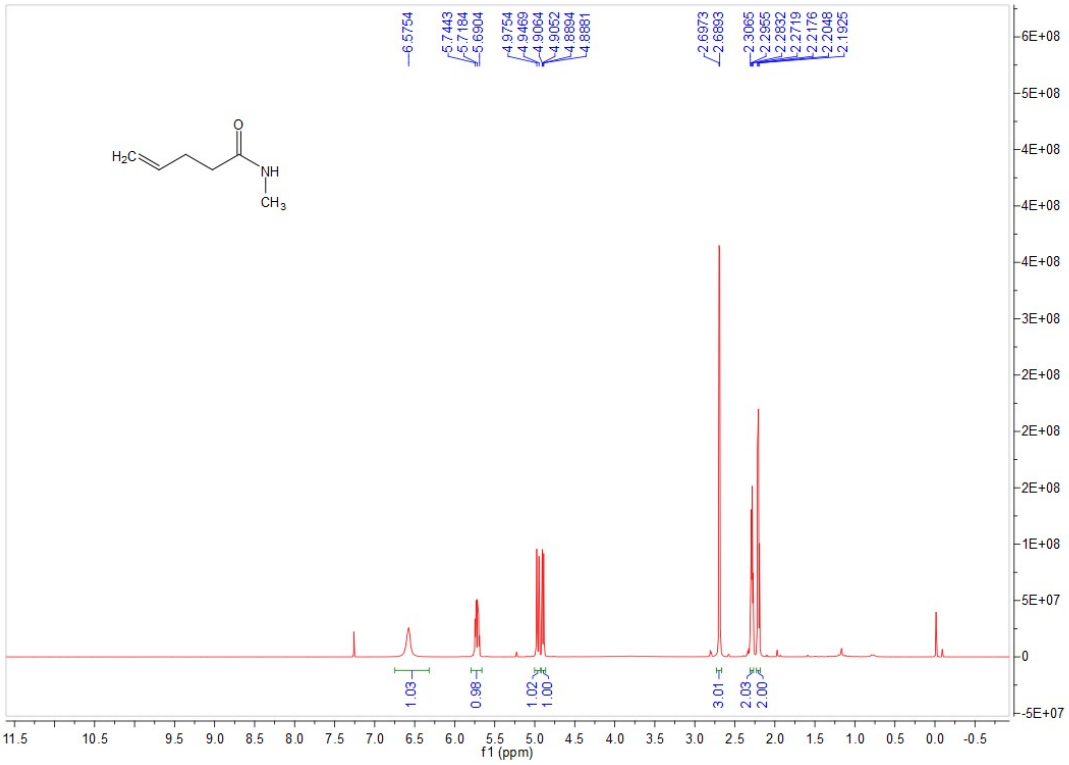
^{1}H NMR of (E)-N-methyl-3-(3,4,5-trimethoxyphenyl)acrylamide(3n)



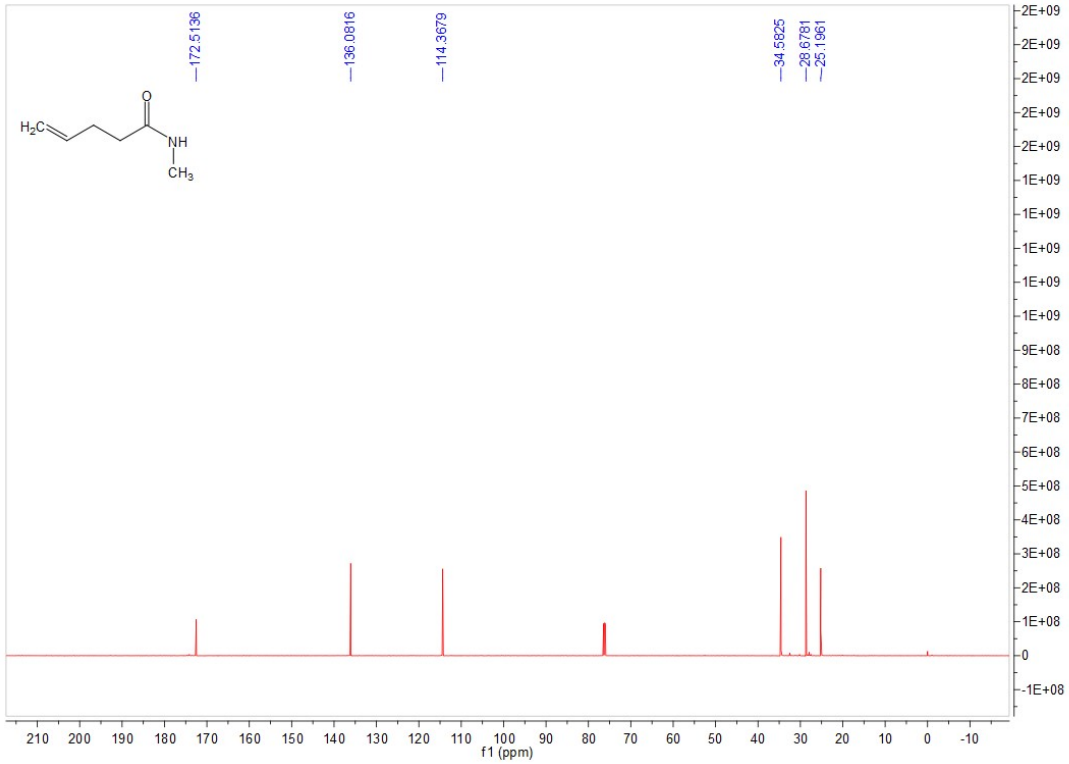
^{13}C NMR of (E)-N-methyl-3-(3,4,5-trimethoxyphenyl)acrylamide(3n)



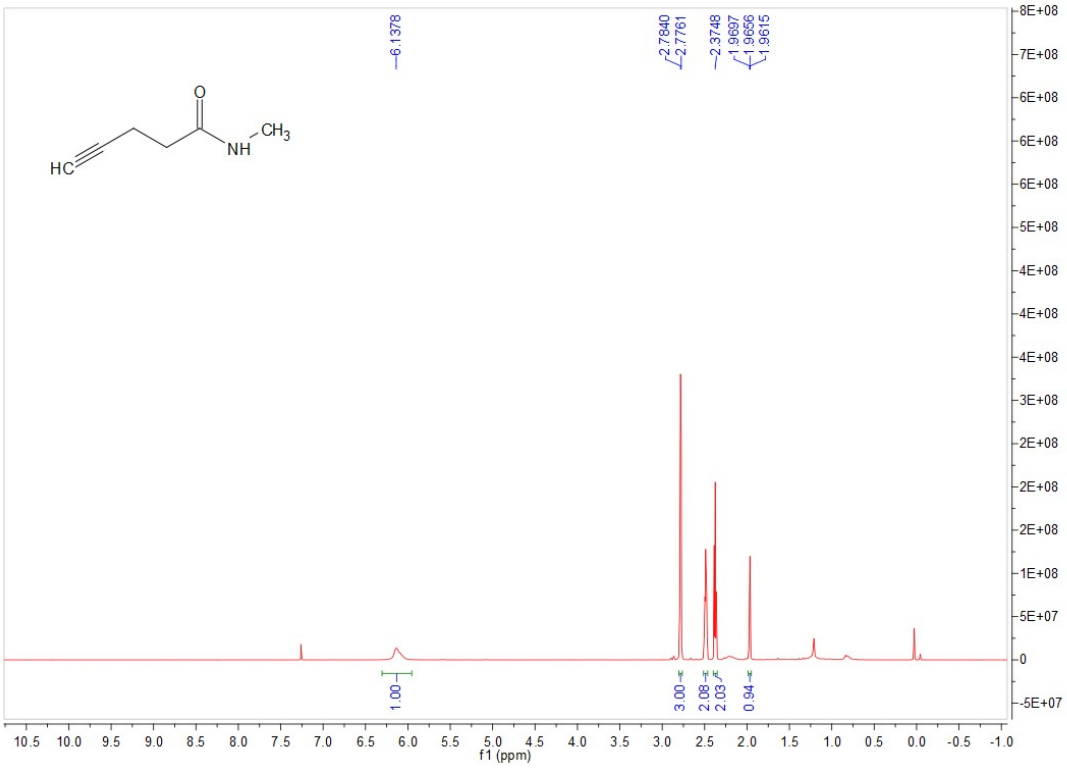
^{1}H NMR of N-methylpent-4-enamide(3o)



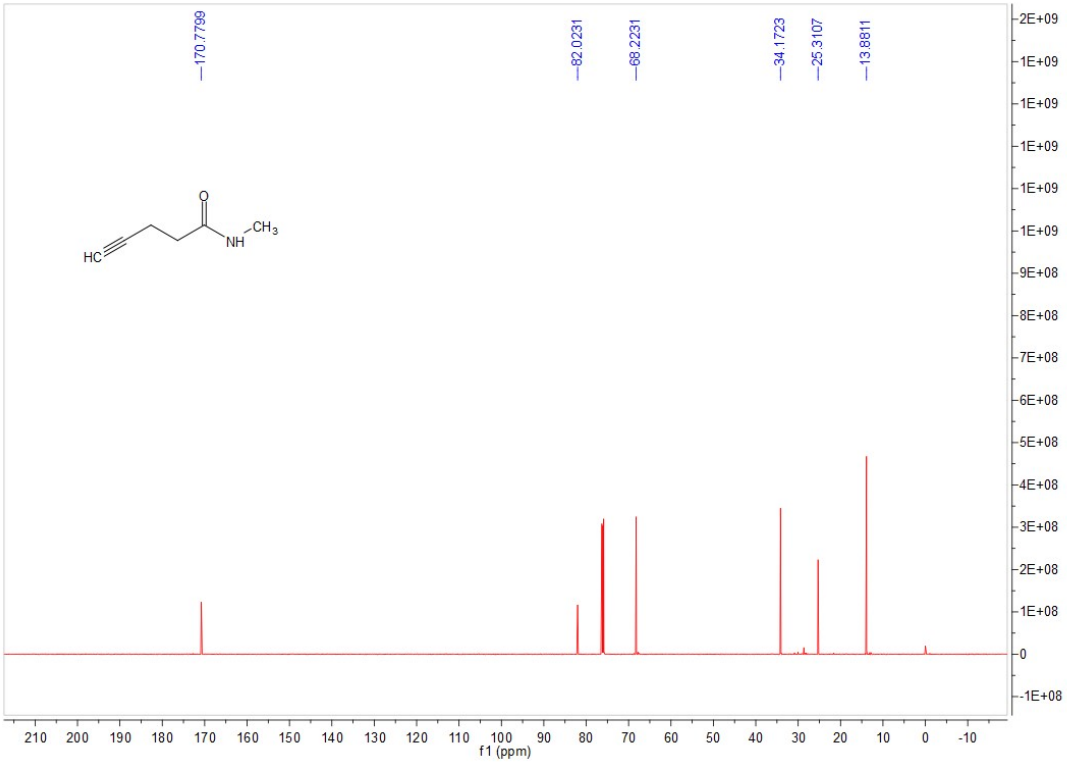
^{13}C NMR of N-methylpent-4-enamide(3o)



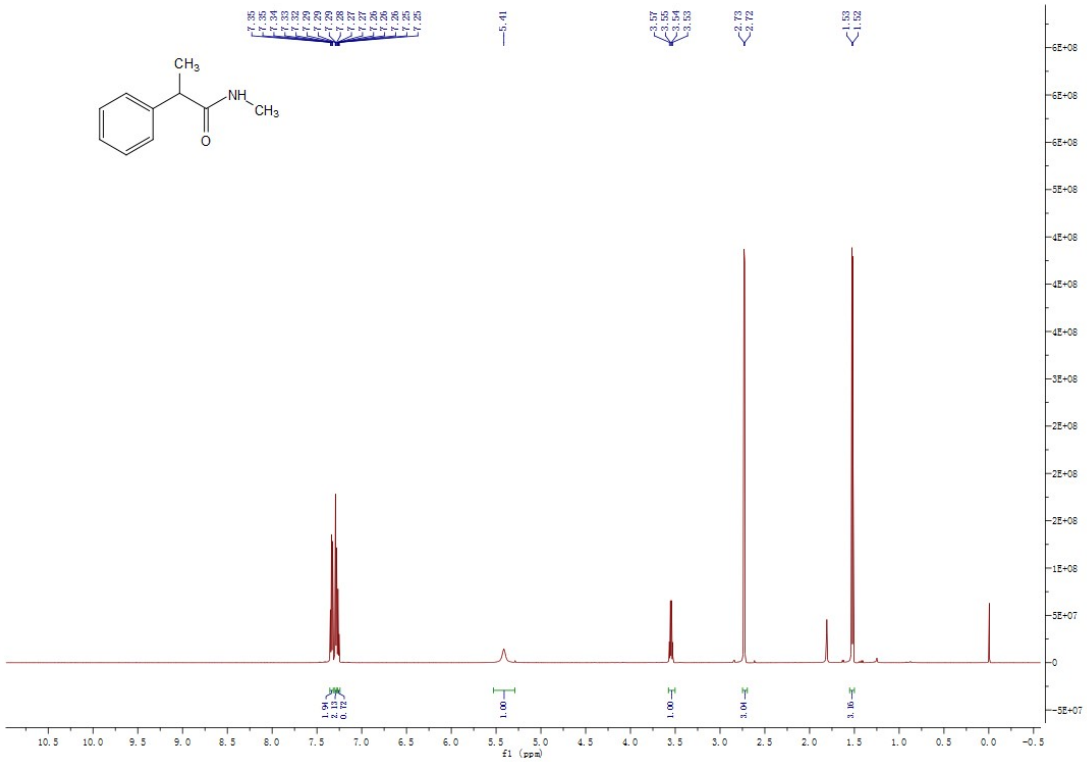
^{1}H NMR of N-methylpent-4-ynamide(3p)



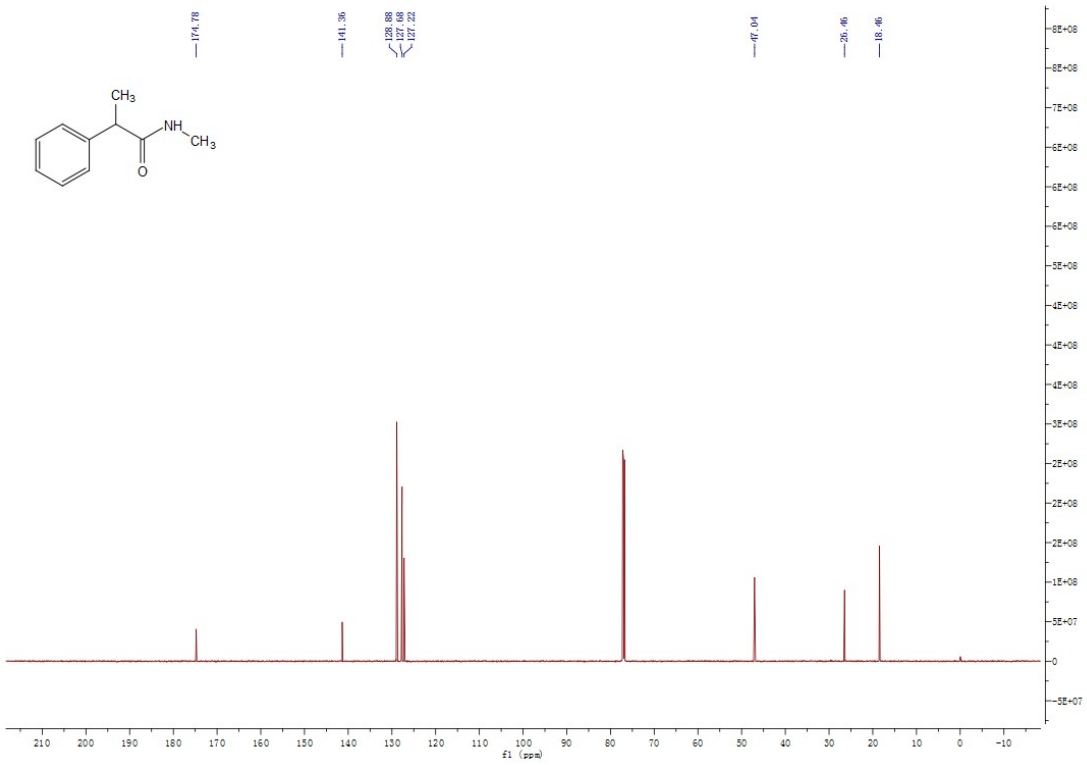
^{13}C NMR of N-methylpent-4-ynamide(3p)



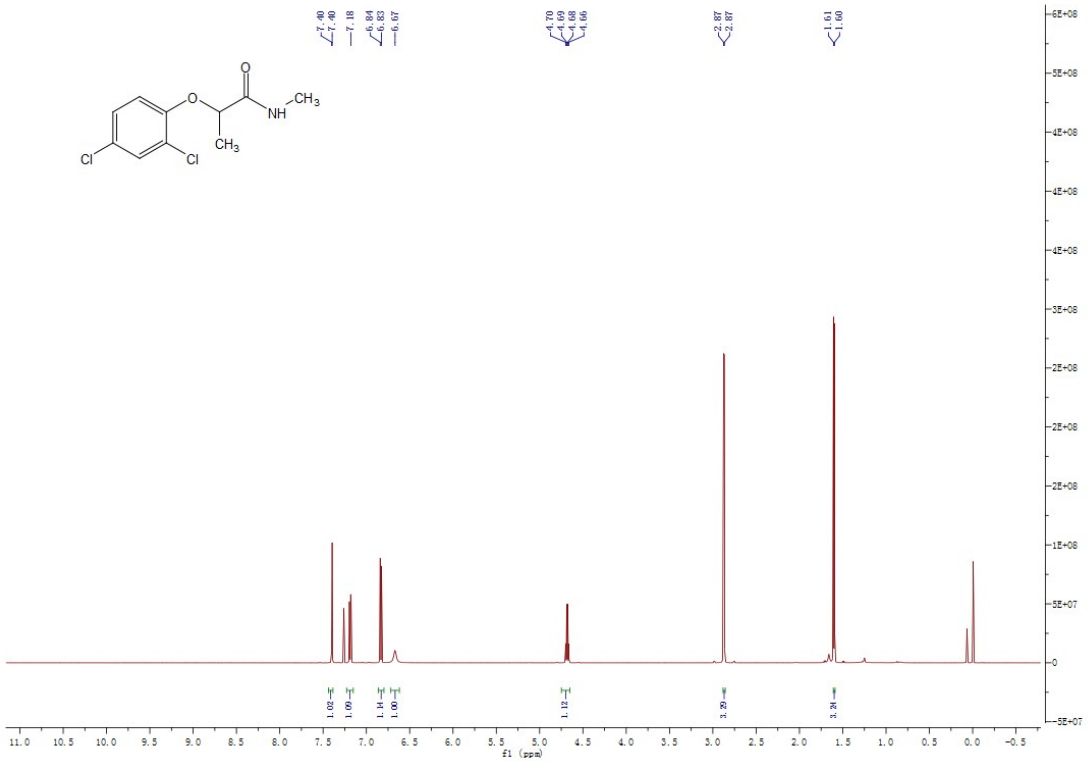
^{1}H NMR of N-methyl-2-phenylpropanamide(3q)



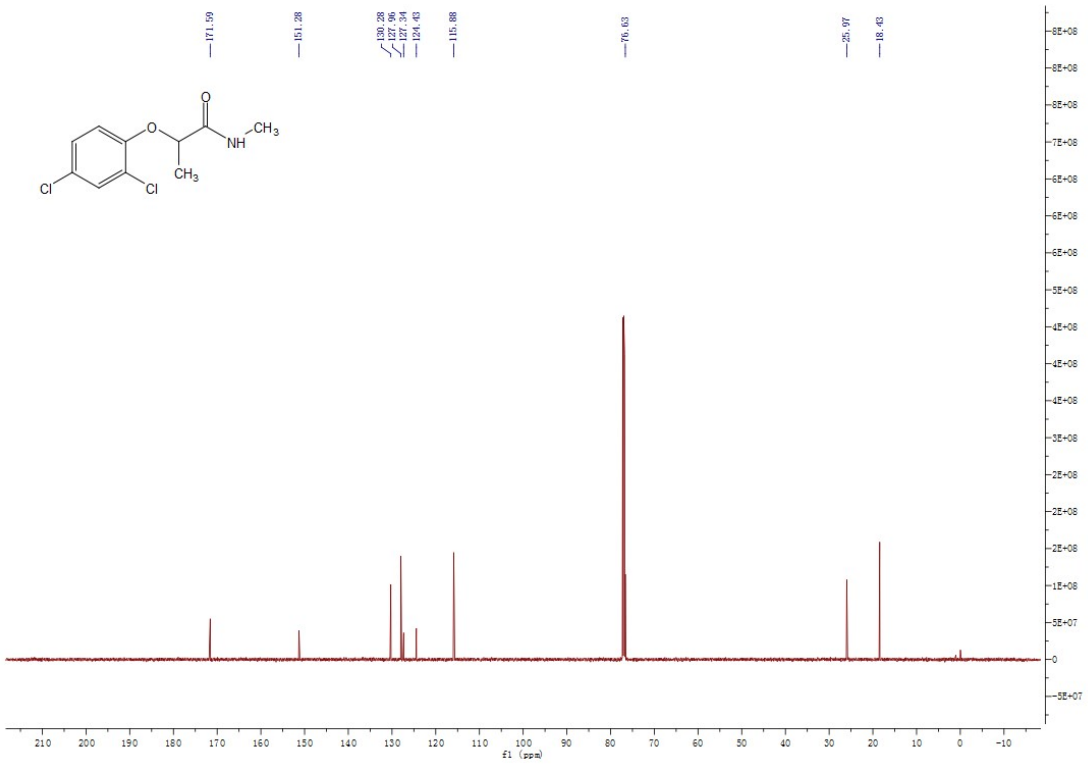
^{13}C NMR of N-methyl-2-phenylpropanamide(3q)



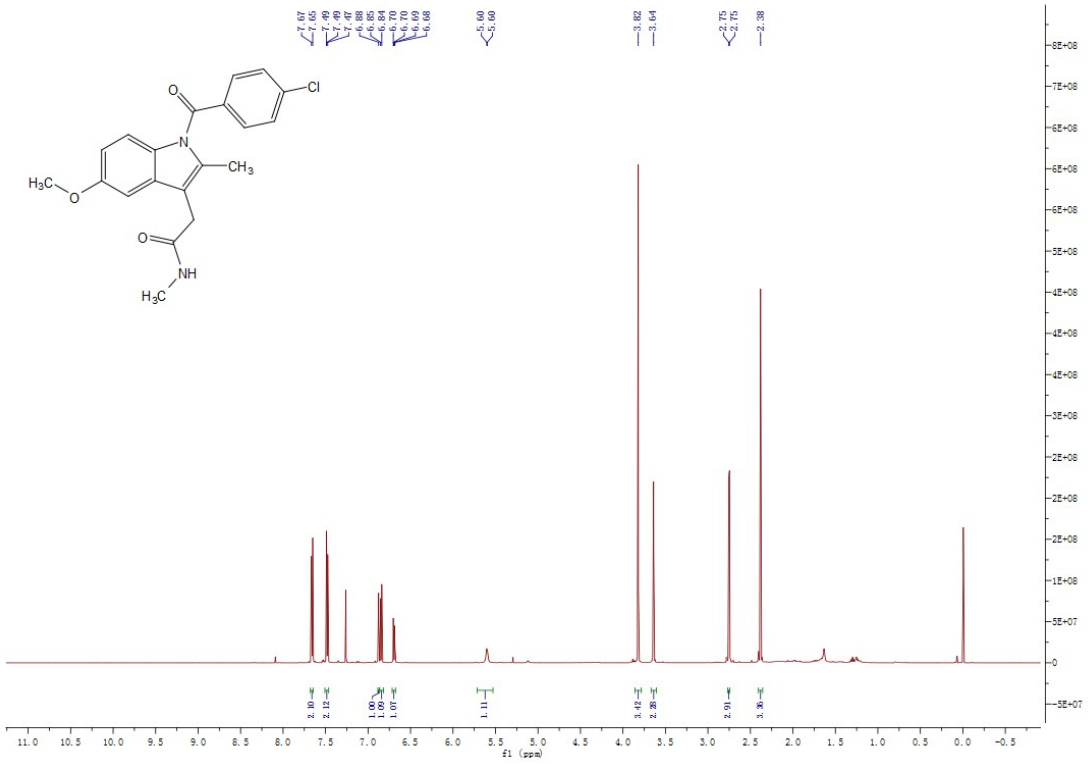
^{1}H NMR of 2-(2,4-dichlorophenoxy)-N-methylpropanamide(3r)



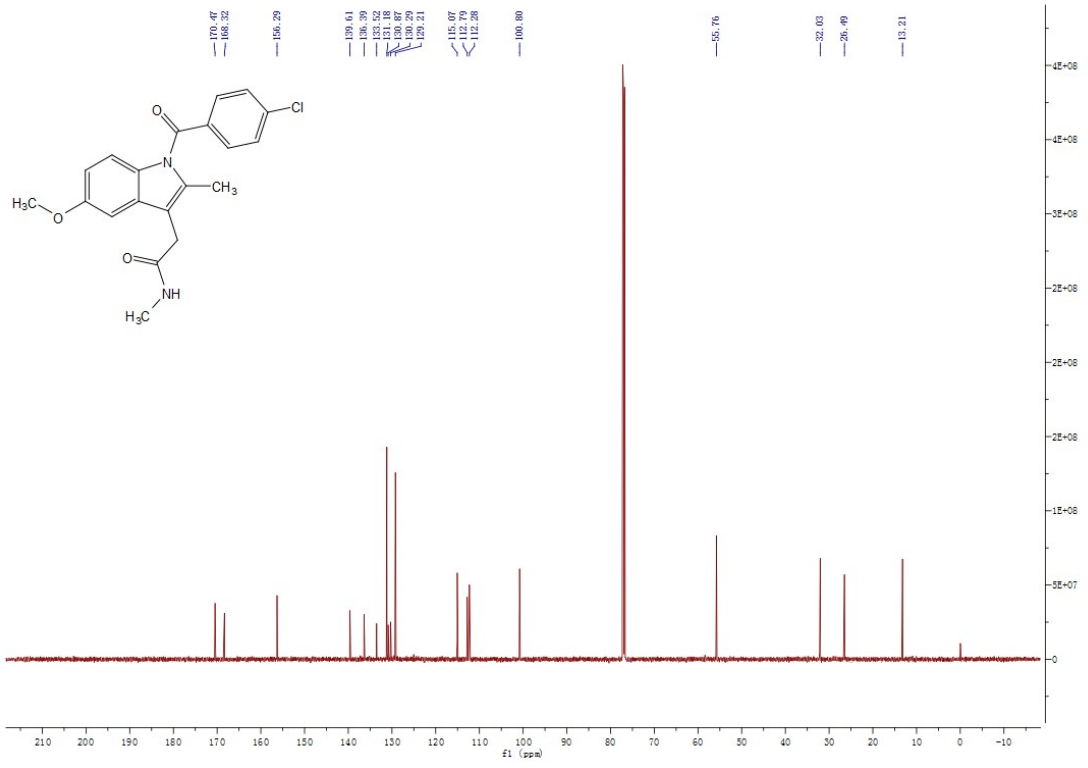
^{13}C NMR of 2-(2,4-dichlorophenoxy)-N-methylpropanamide(3r)



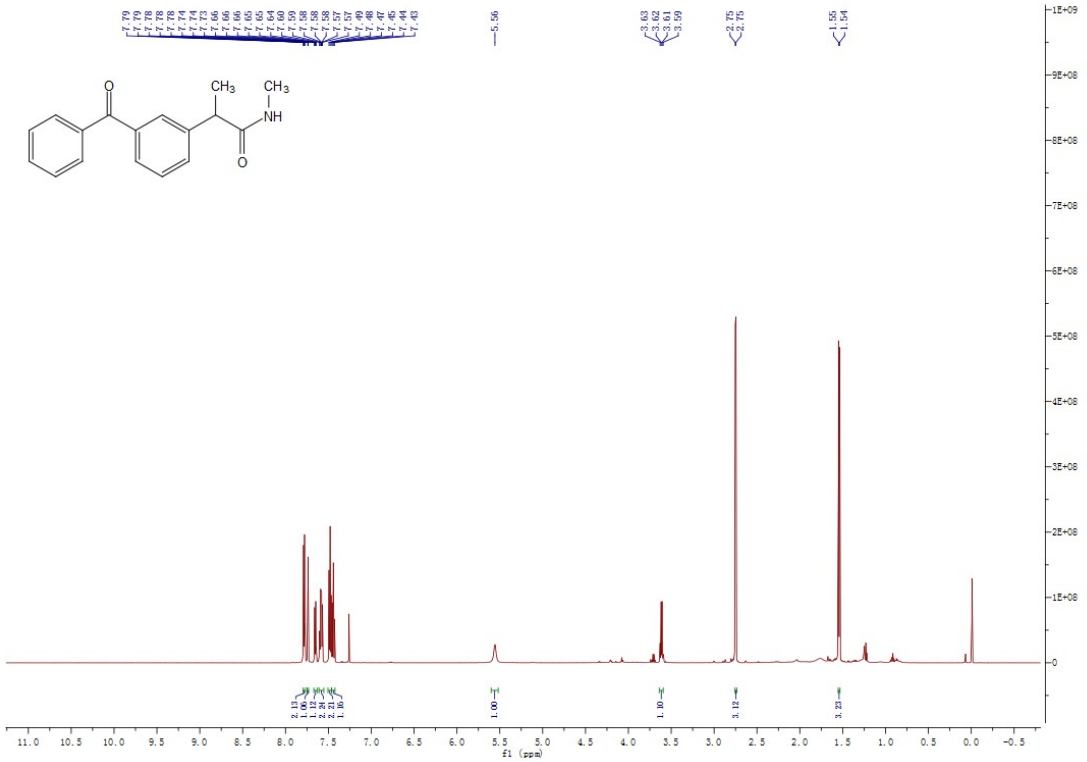
^{1}H NMR of 2-(1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1H-indol-3-yl)-N-methylacetamide(3s):



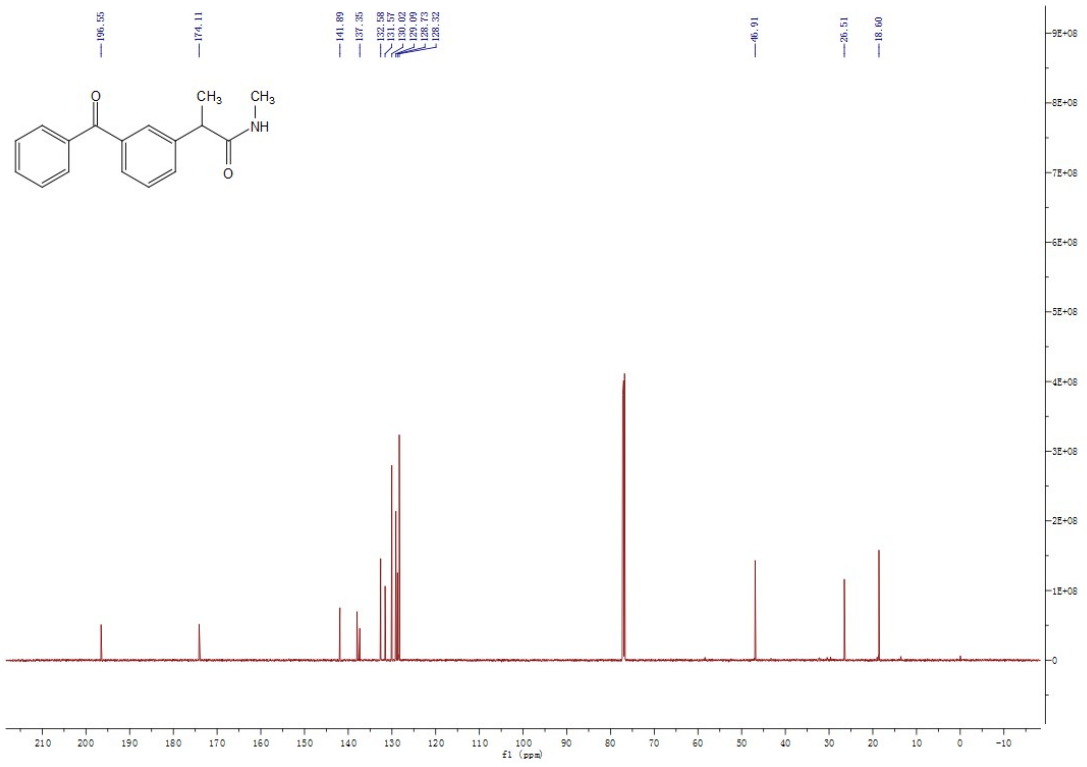
^{13}C NMR of 2-(1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1H-indol-3-yl)-N-methylacetamide(3s):



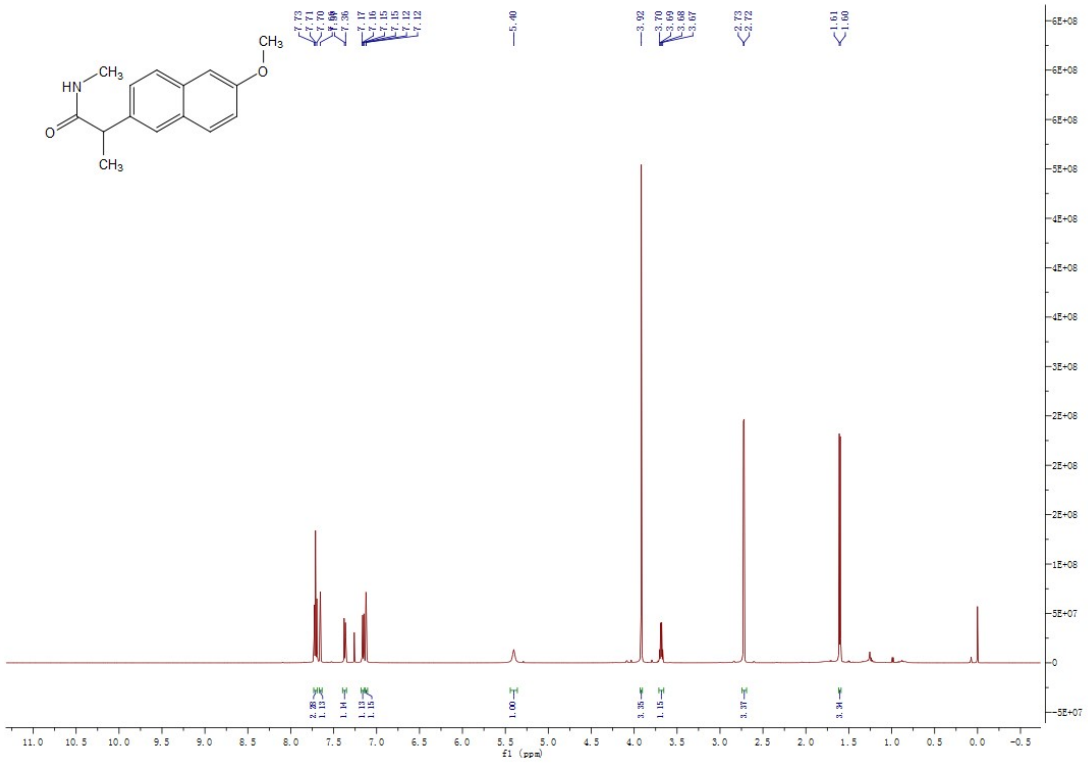
^{1}H NMR of 2-(3-benzoylphenyl)-N-methylpropanamide(3t)



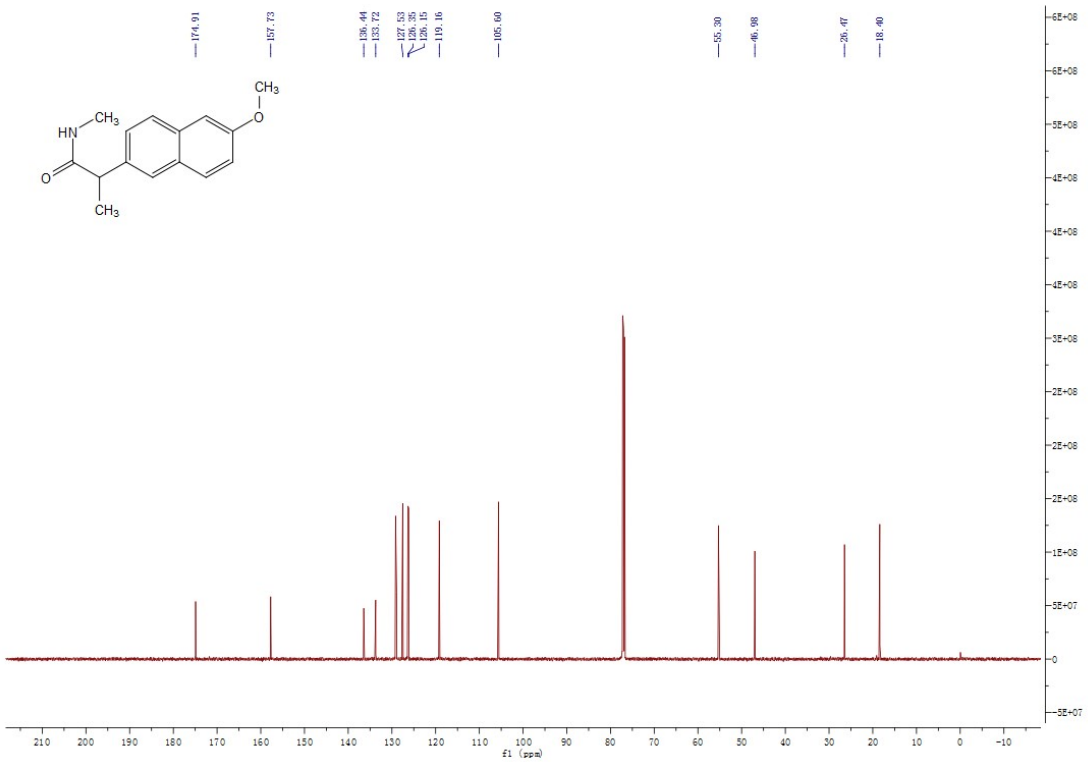
^{13}C NMR of 2-(3-benzoylphenyl)-N-methylpropanamide(3t)



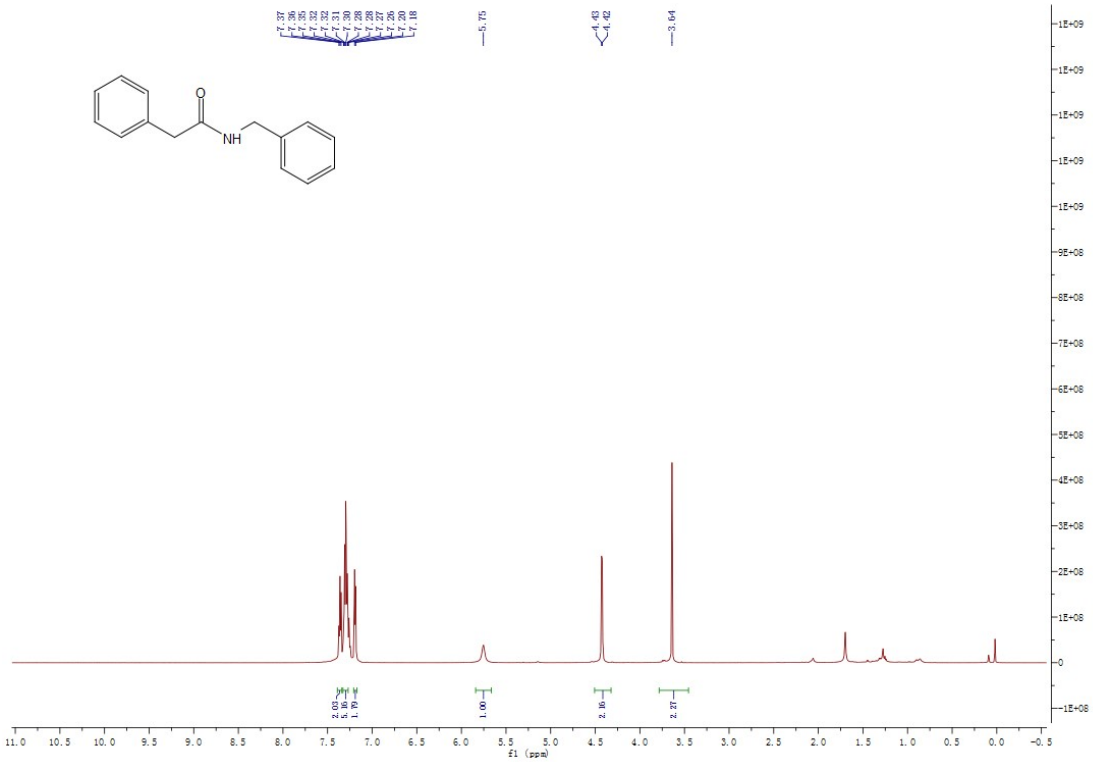
^{1}H NMR of 2-(6-methoxynaphthalen-2-yl)-N-methylpropanamide(3u)



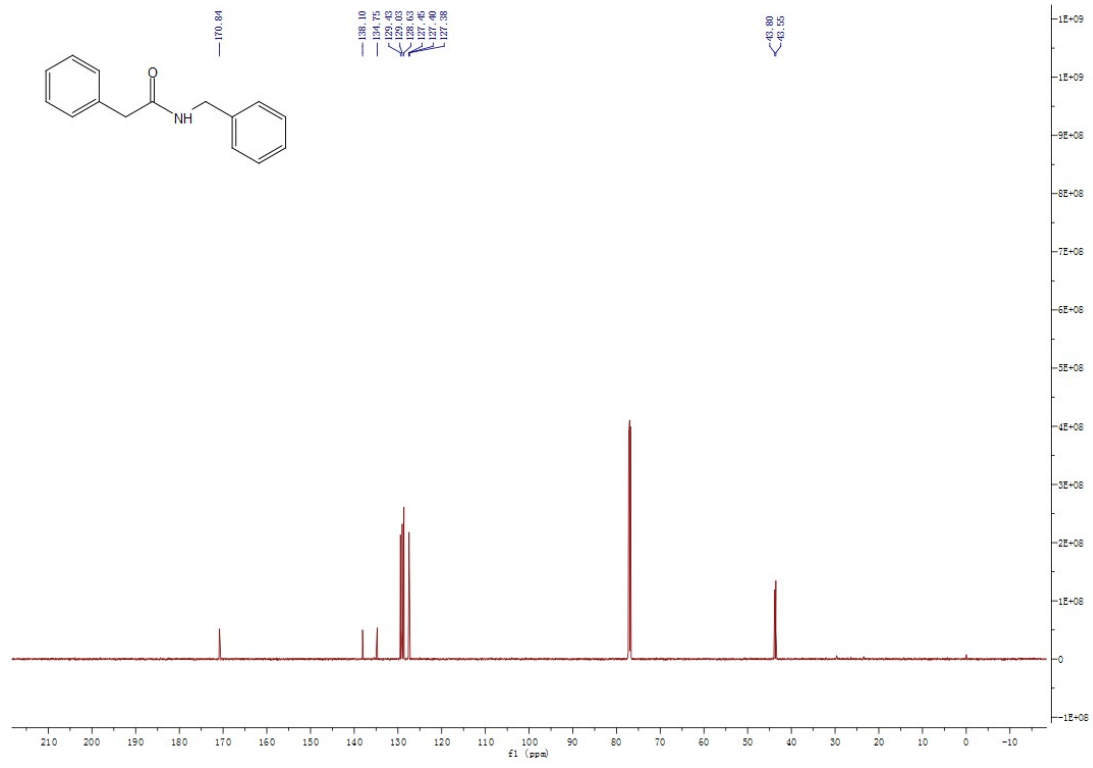
^{13}C NMR of 2-(6-methoxynaphthalen-2-yl)-N-methylpropanamide(3u)



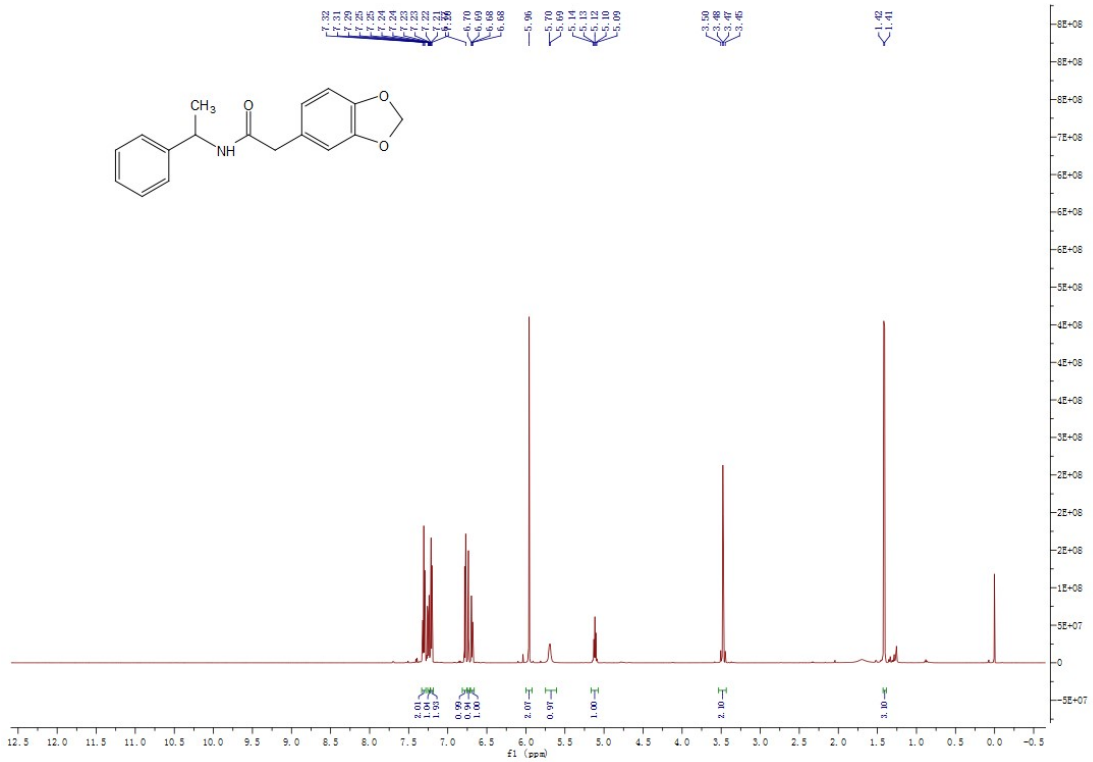
^{1}H NMR of N-benzyl-2-phenylacetamide (3v)



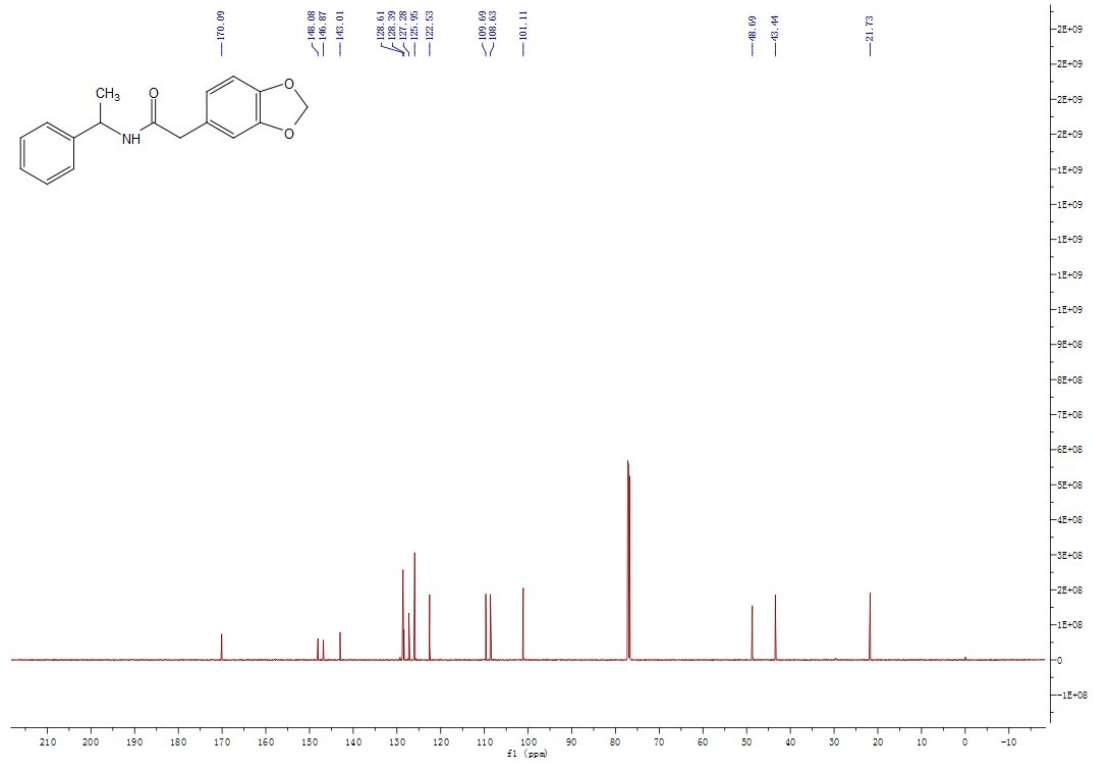
^{13}C NMR of N-benzyl-2-phenylacetamide (3v)



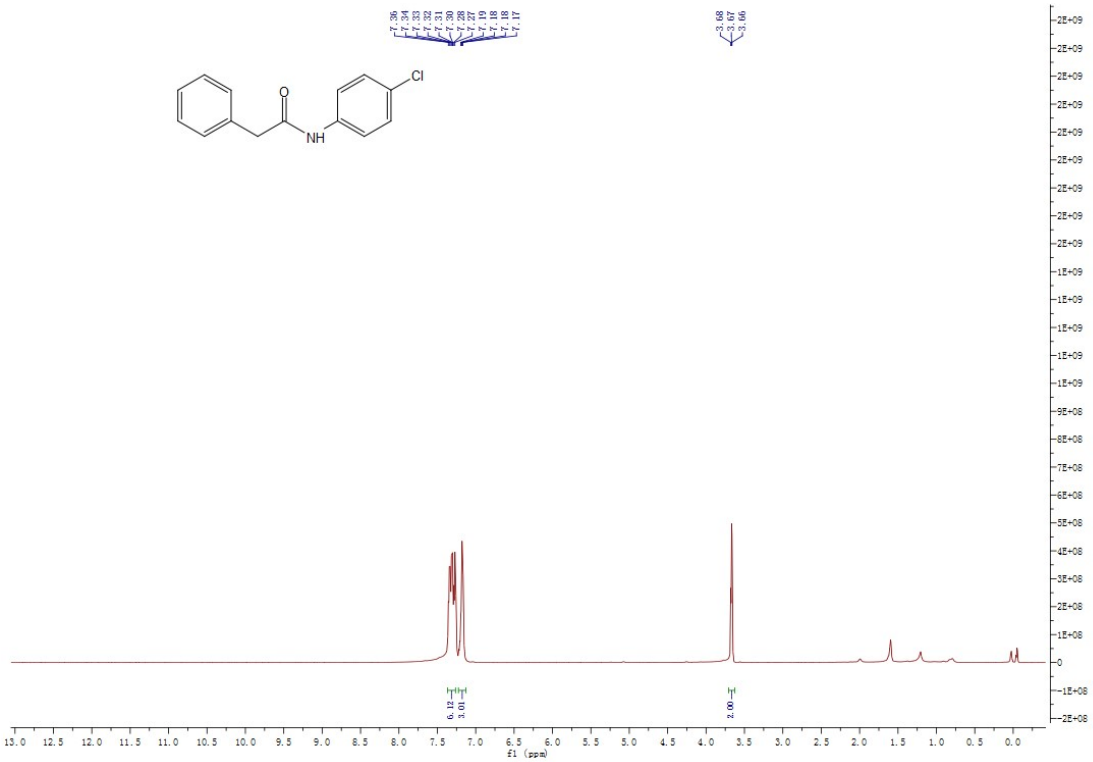
^{1}H NMR of 2-(benzo[d][1,3]dioxol-5-yl)-N-(1-phenylethyl)acetamide (3w)



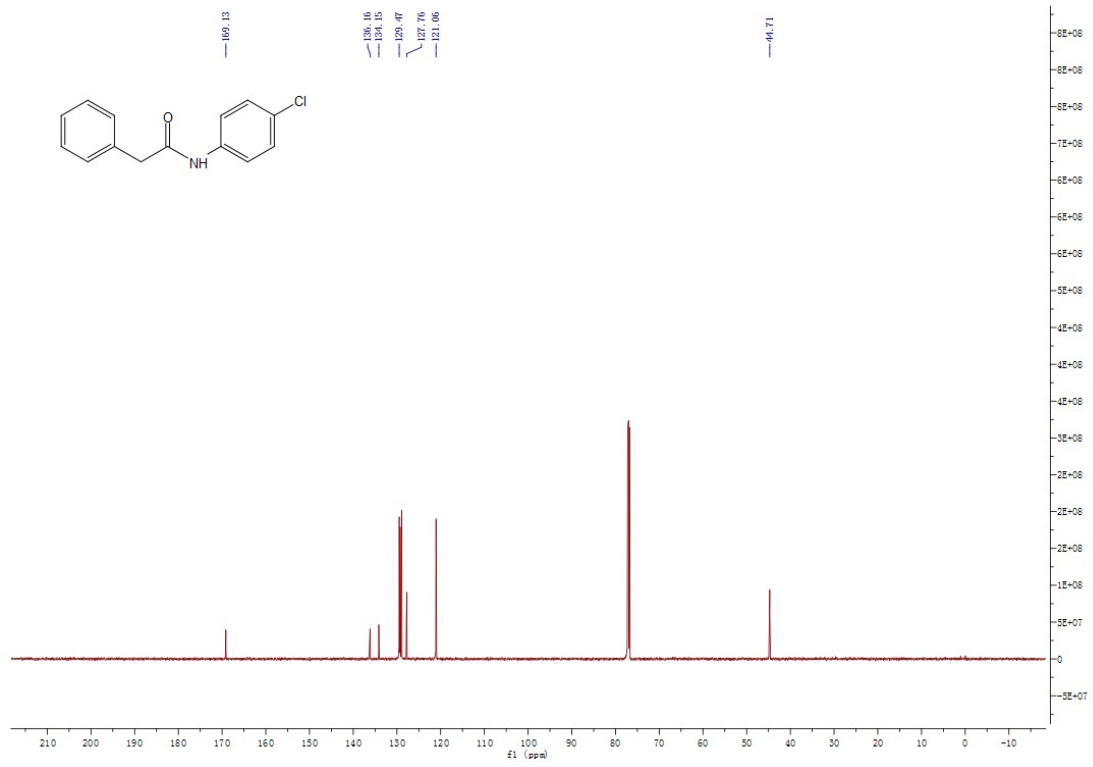
^{13}C NMR of 2-(benzo[d][1,3]dioxol-5-yl)-N-(1-phenylethyl)acetamide (3w)



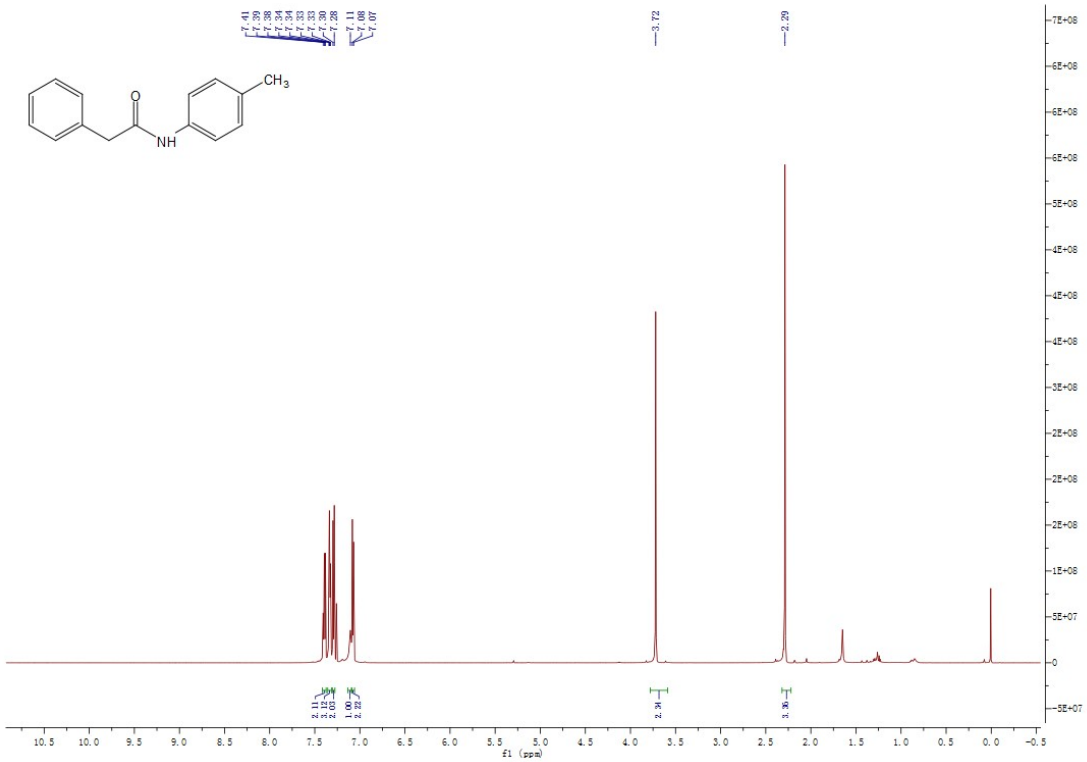
^{1}H NMR of N-(4-chlorophenyl)-2-phenylacetamide (3x)



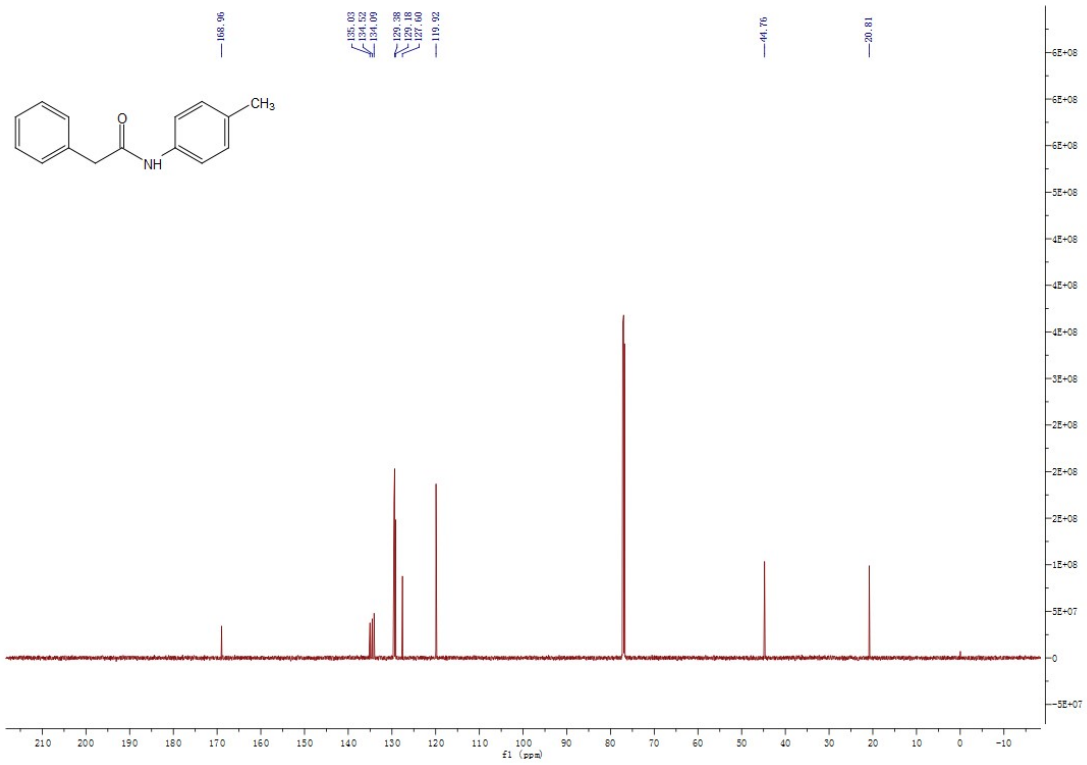
^{13}C NMR of N-(4-chlorophenyl)-2-phenylacetamide (3x)



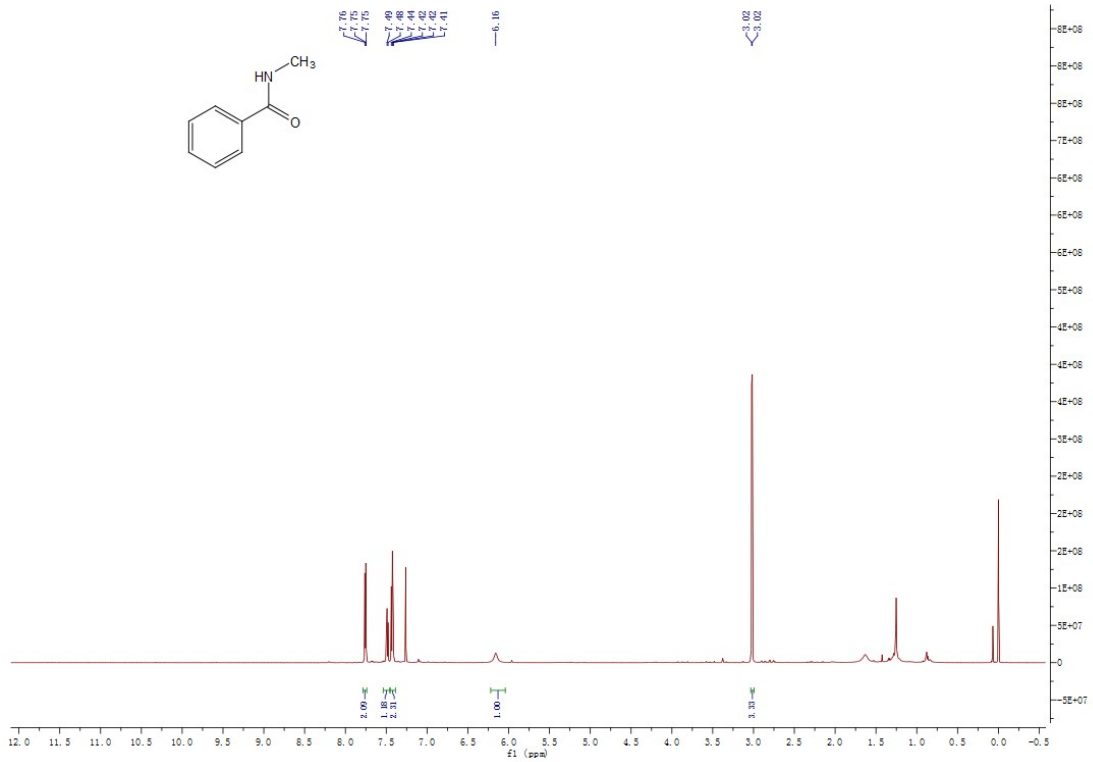
^{1}H NMR of 2-phenyl-N-(p-tolyl)acetamide (3y)



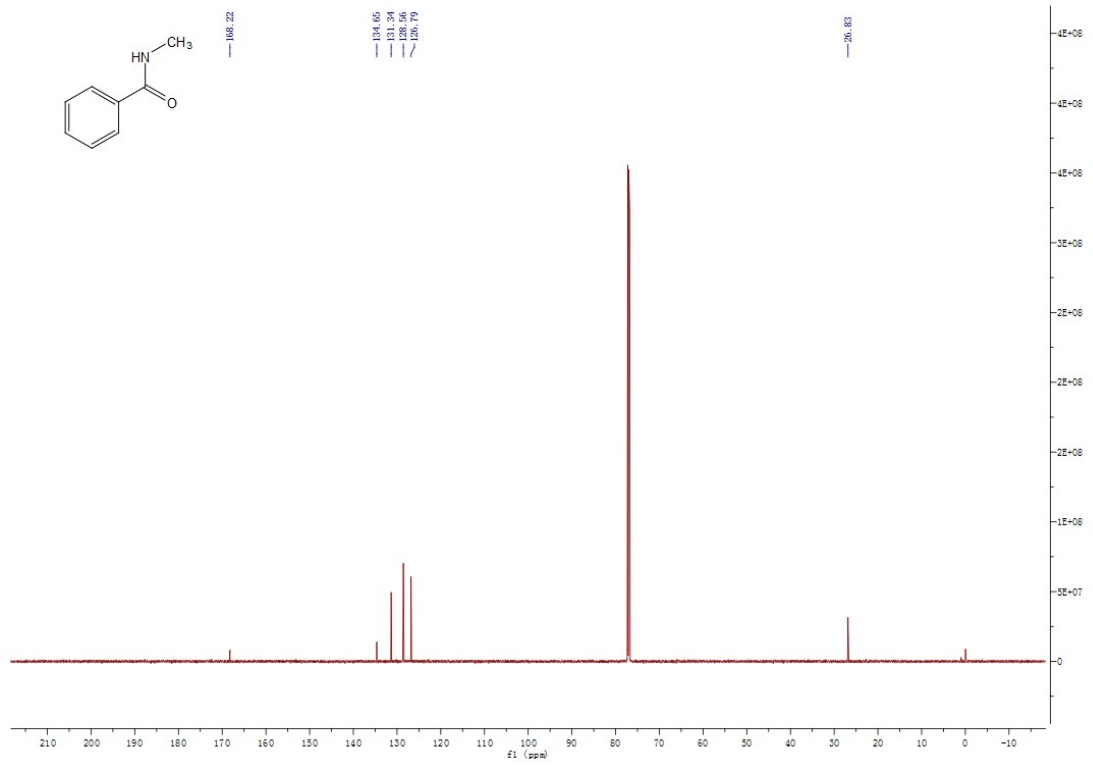
^{13}C NMR of 2-phenyl-N-(p-tolyl)acetamide (3y)



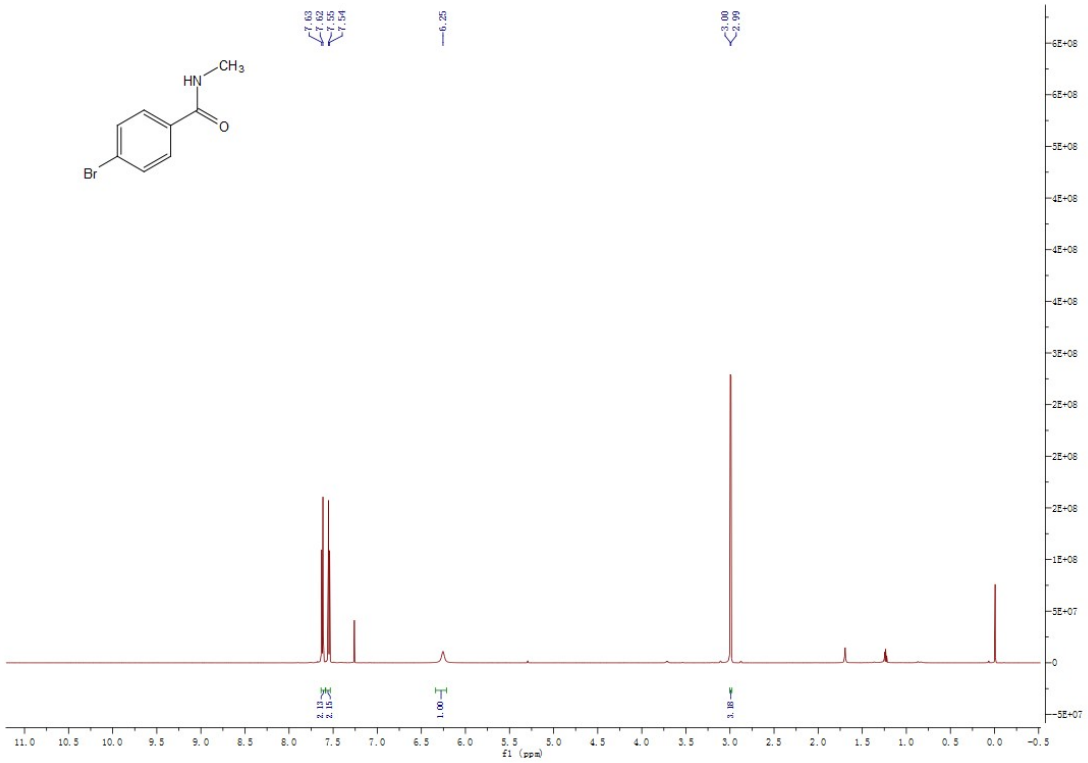
^{1}H NMR of N-methylbenzamide (3aa)



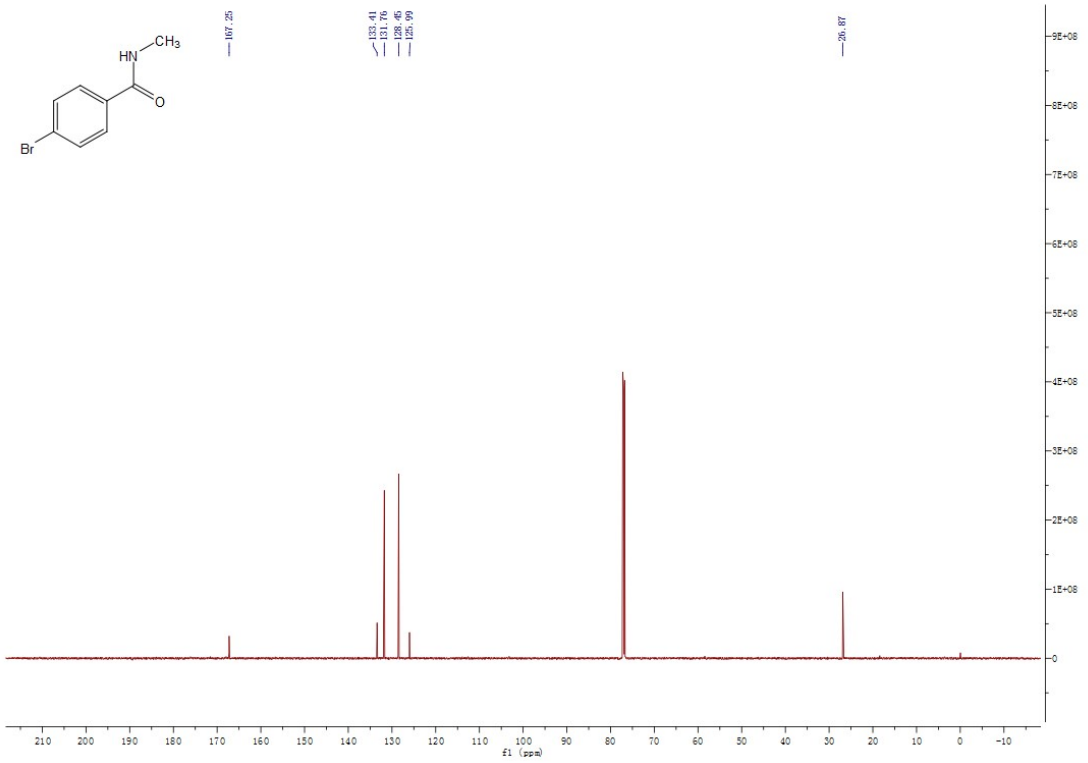
^{13}C NMR of N-methylbenzamide (3aa)



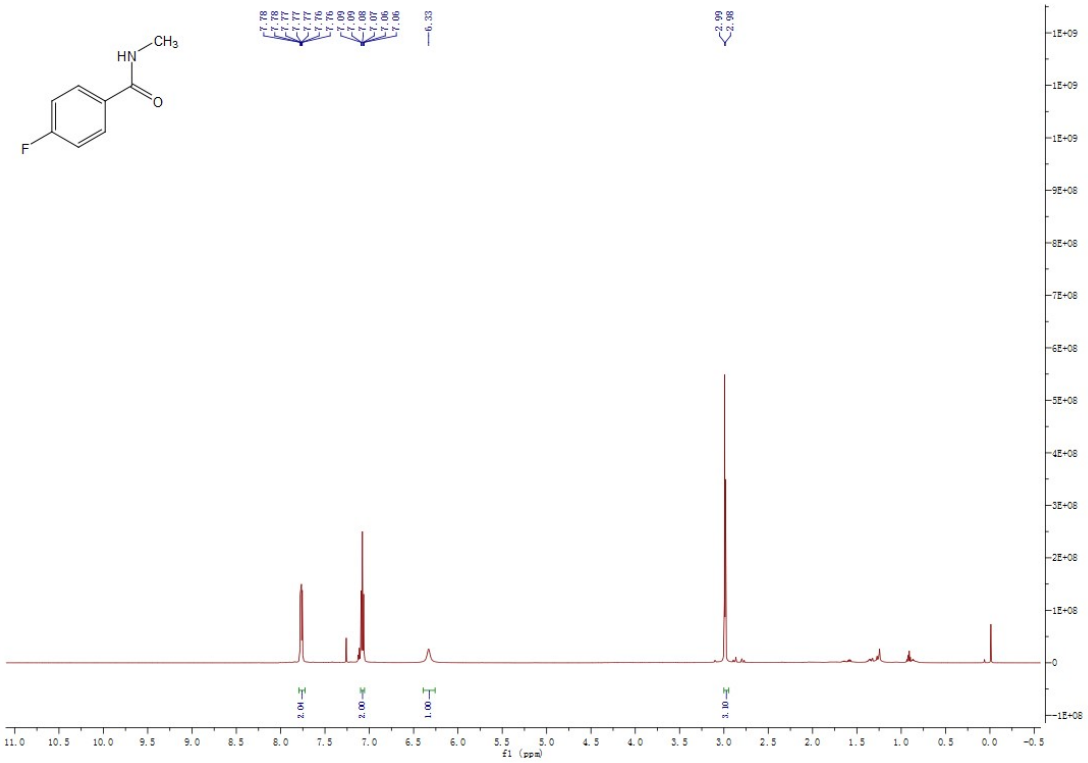
^{1}H NMR of 4-bromo-N-methylbenzamide (3ab)



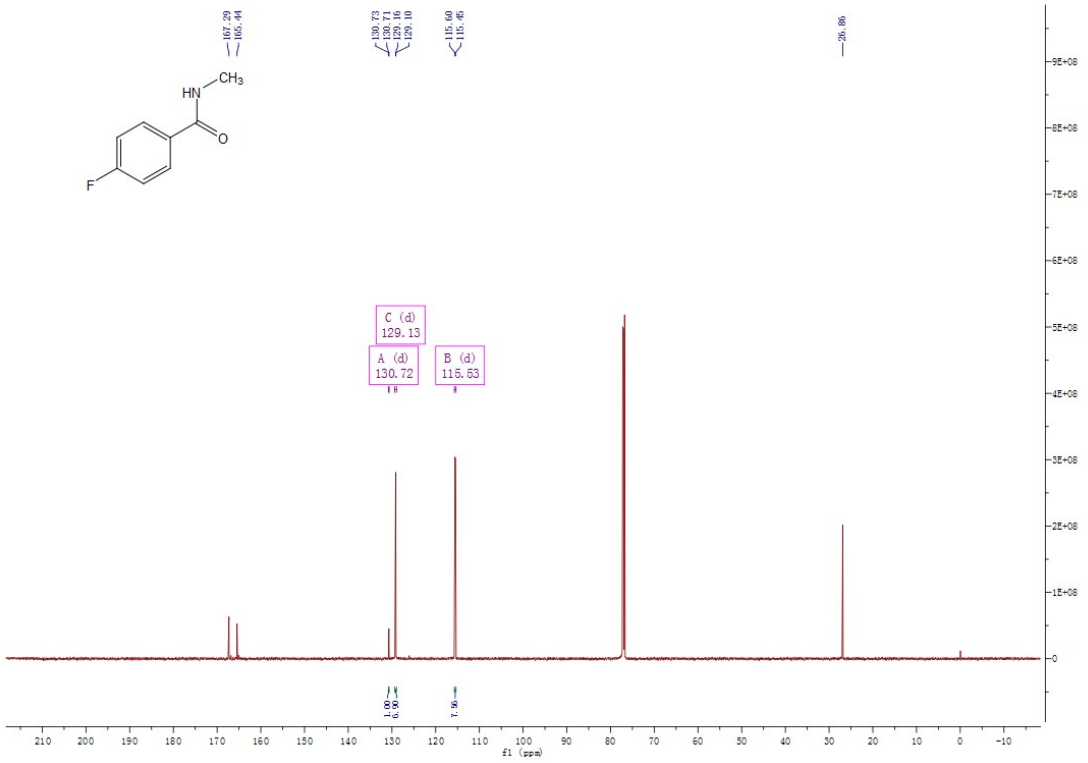
^{13}C NMR of 4-bromo-N-methylbenzamide (3ab)



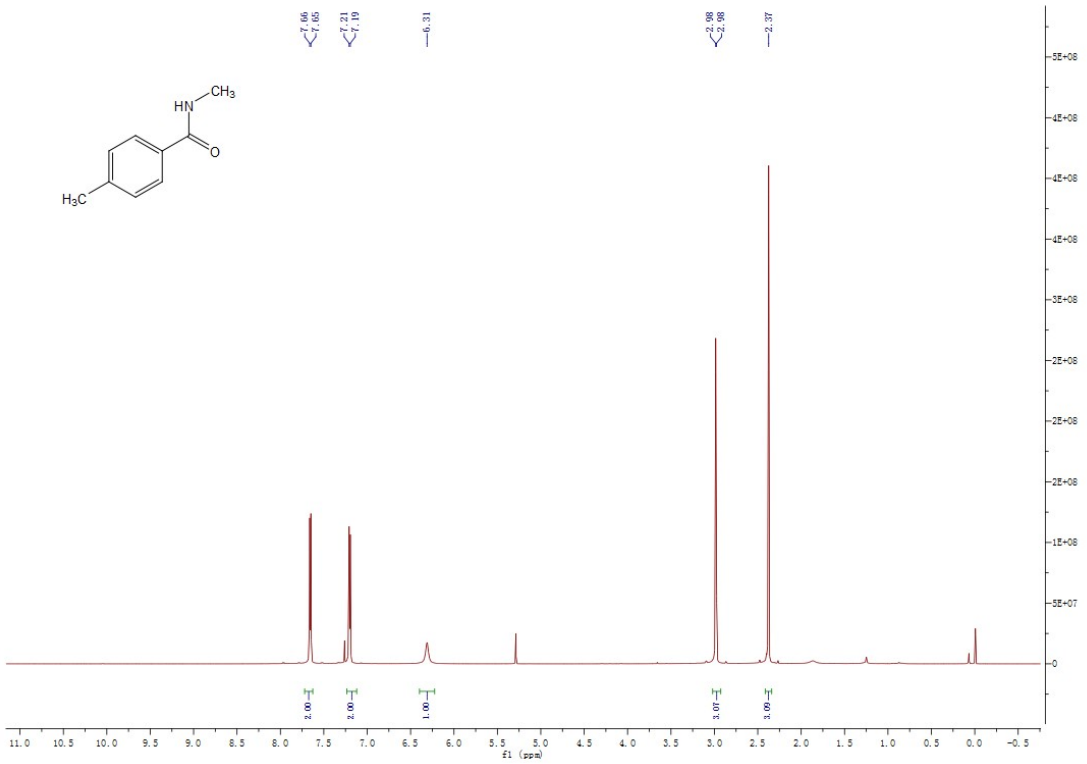
^{1}H NMR of 4-fluoro-N-methylbenzamide (3ac)



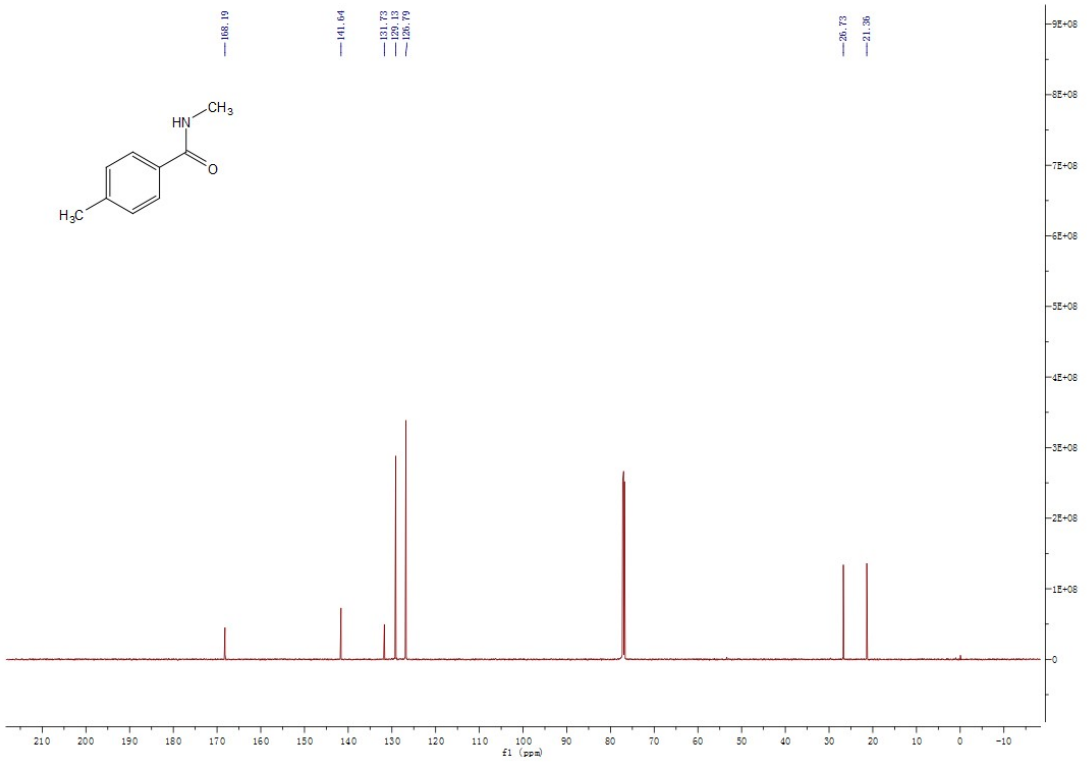
^{13}C NMR of 4-fluoro-N-methylbenzamide (3ac)



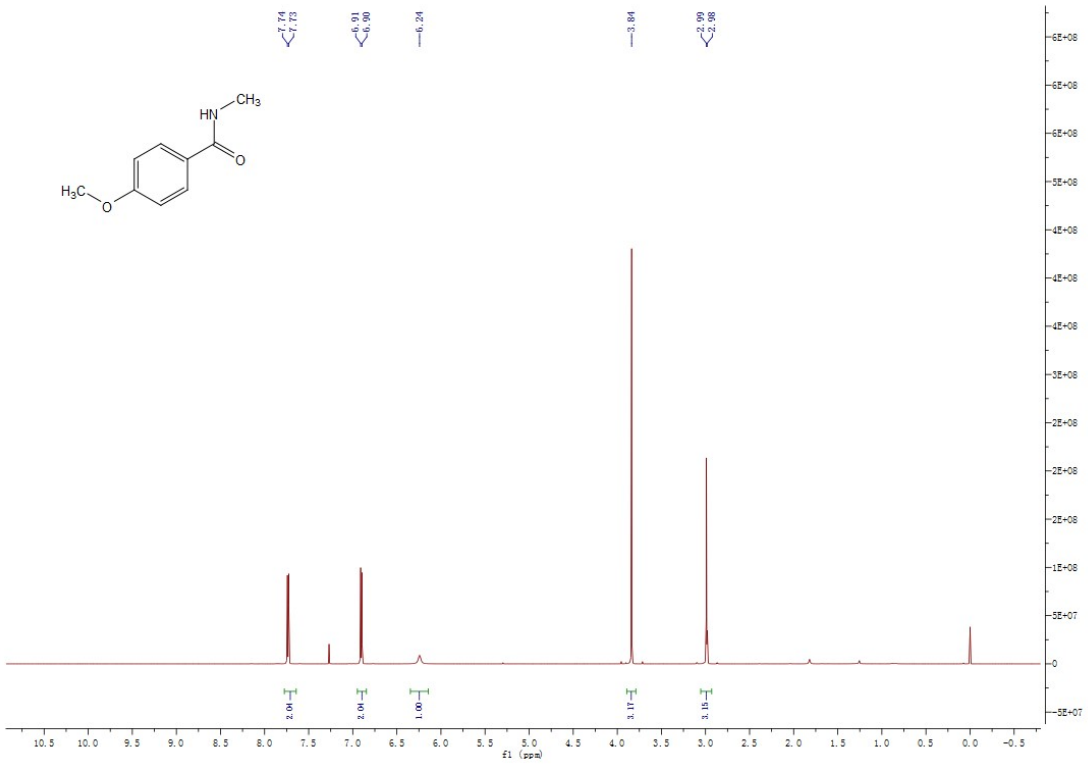
^{1}H NMR of N,4-dimethylbenzamide (3ad)



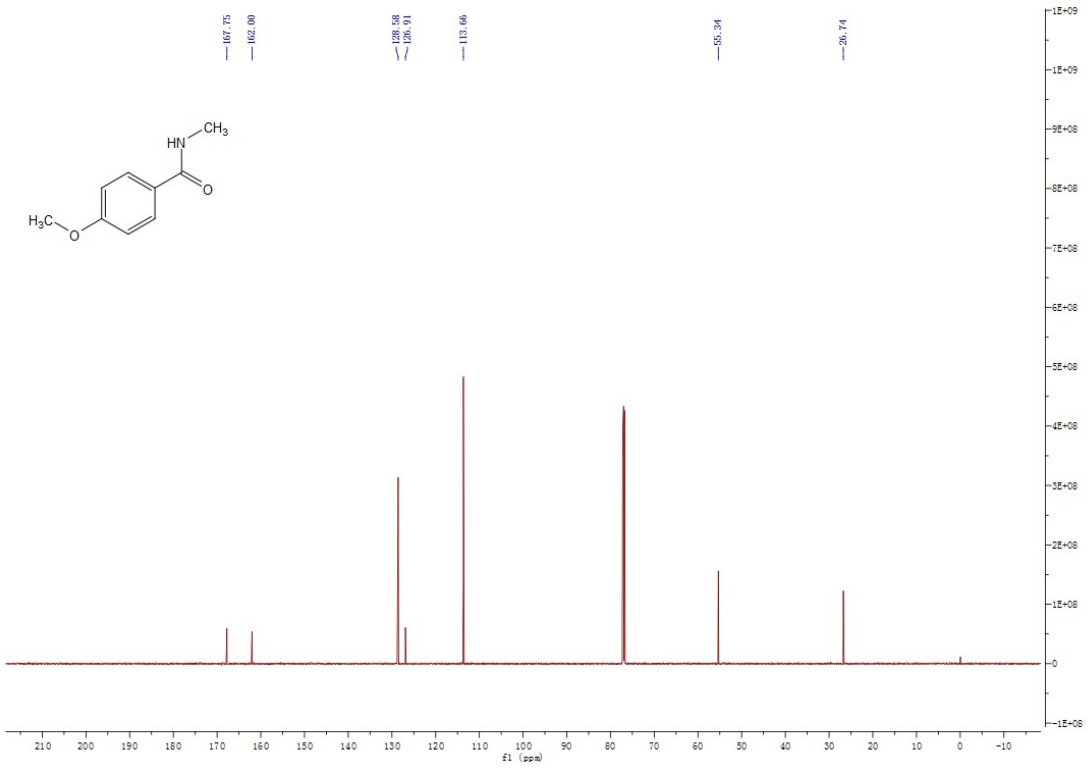
^{13}C NMR of N,4-dimethylbenzamide (3ad)



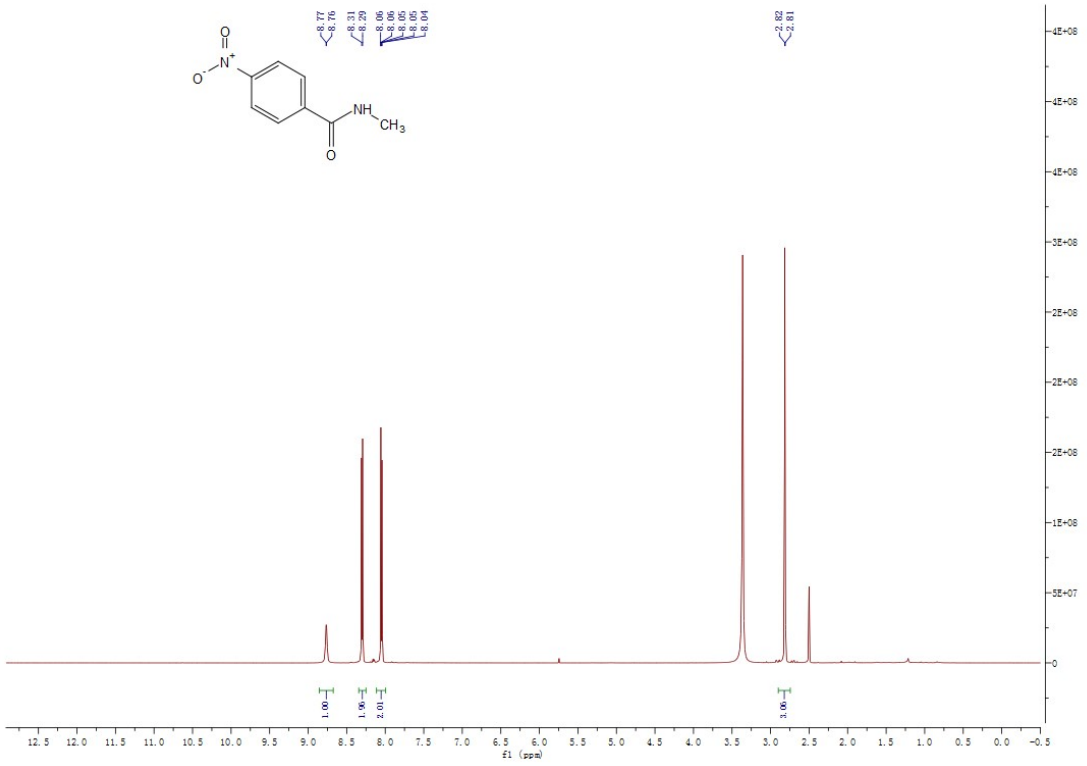
^{1}H NMR of 4-methoxy-N-methylbenzamide (3ae)



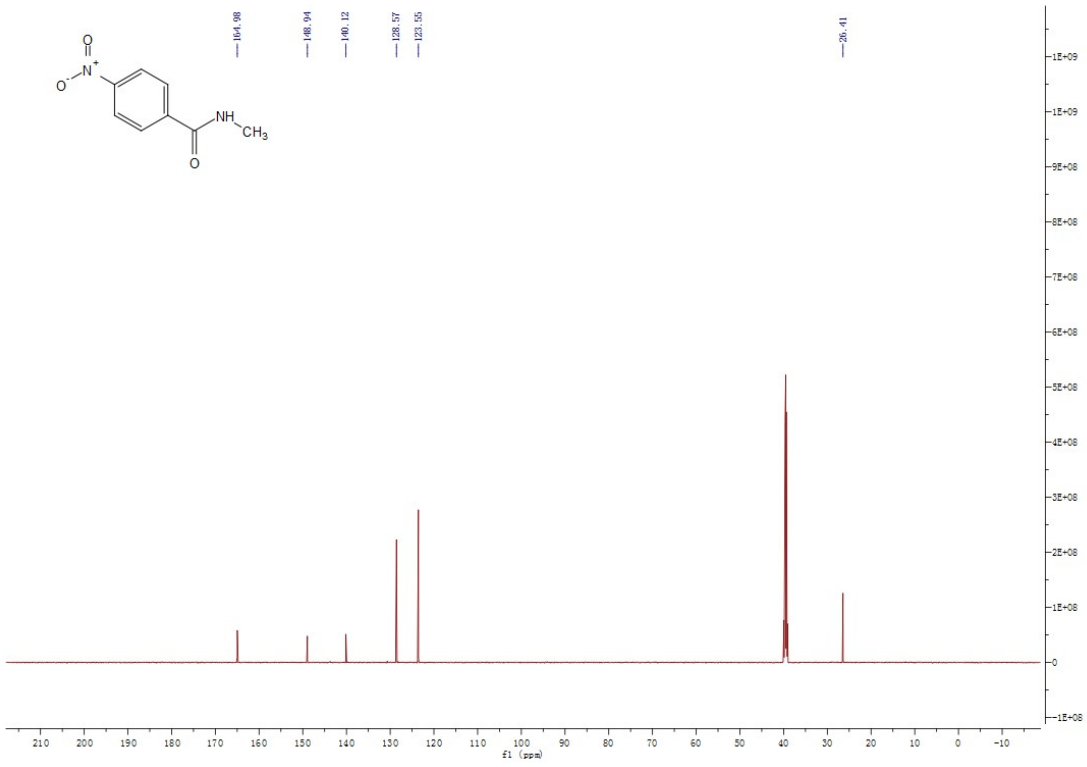
^{13}C NMR of 4-methoxy-N-methylbenzamide (3ae)



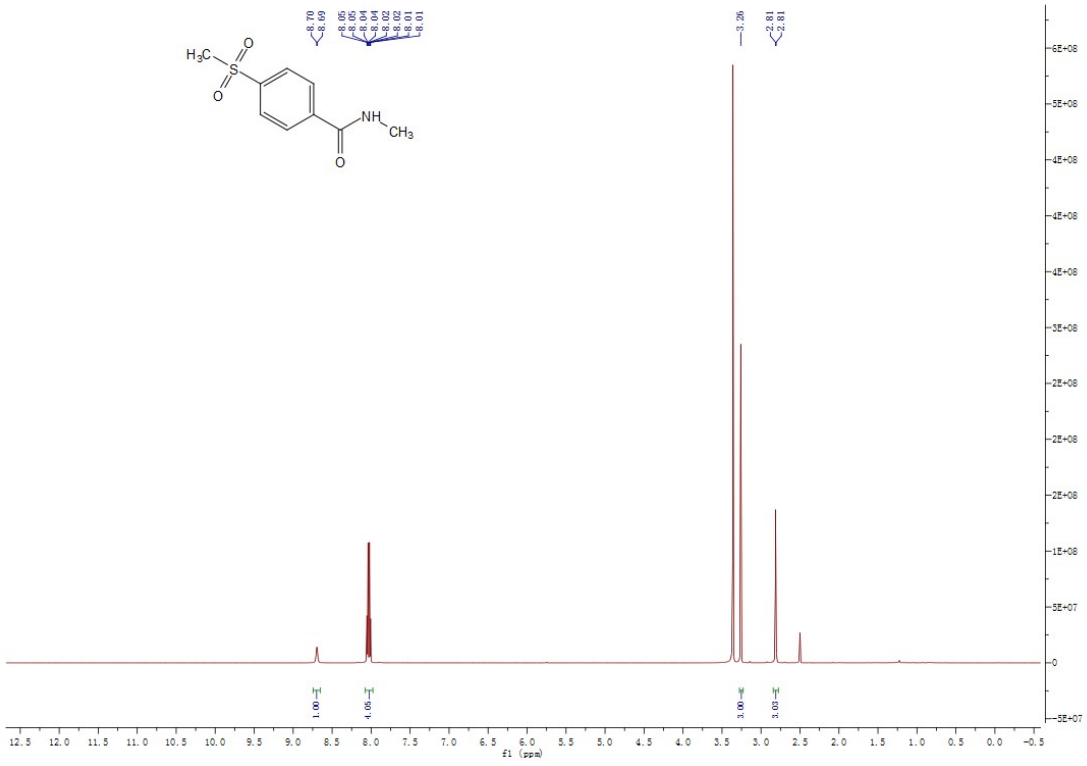
^{1}H NMR of N-methyl-4-nitrobenzamide (3af)



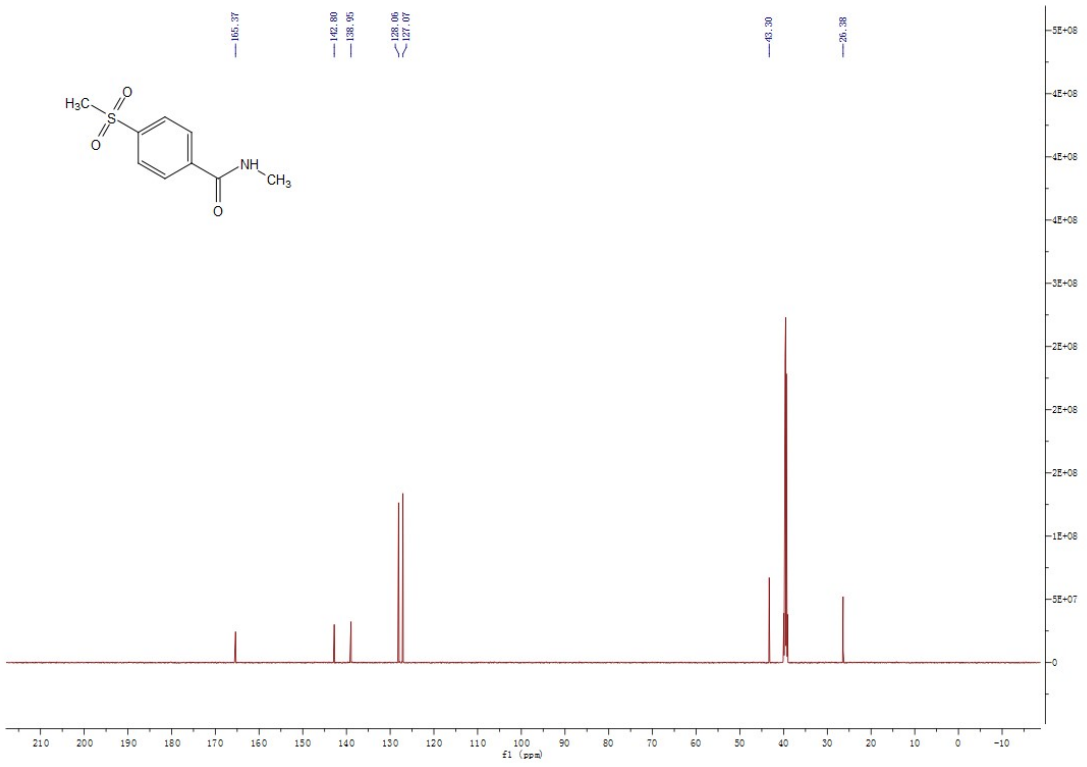
^{13}C NMR of N-methyl-4-nitrobenzamide (3af)



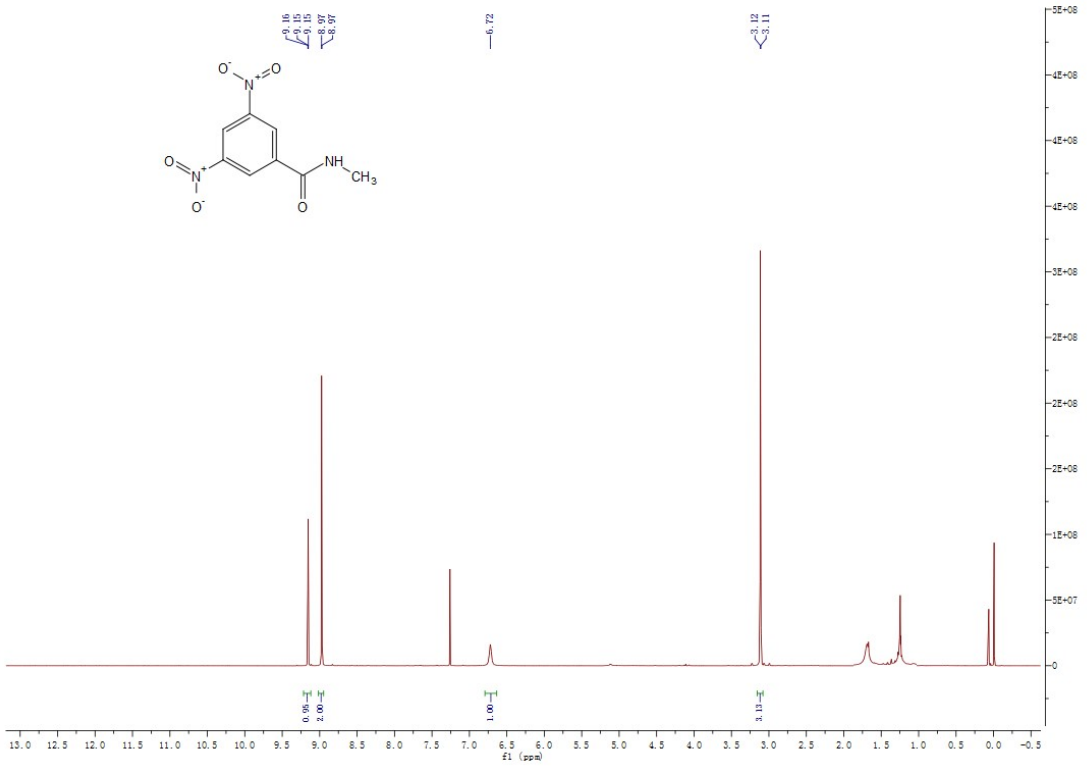
^{1}H NMR of N-methyl-4-(methylsulfonyl)benzamide (3ag)



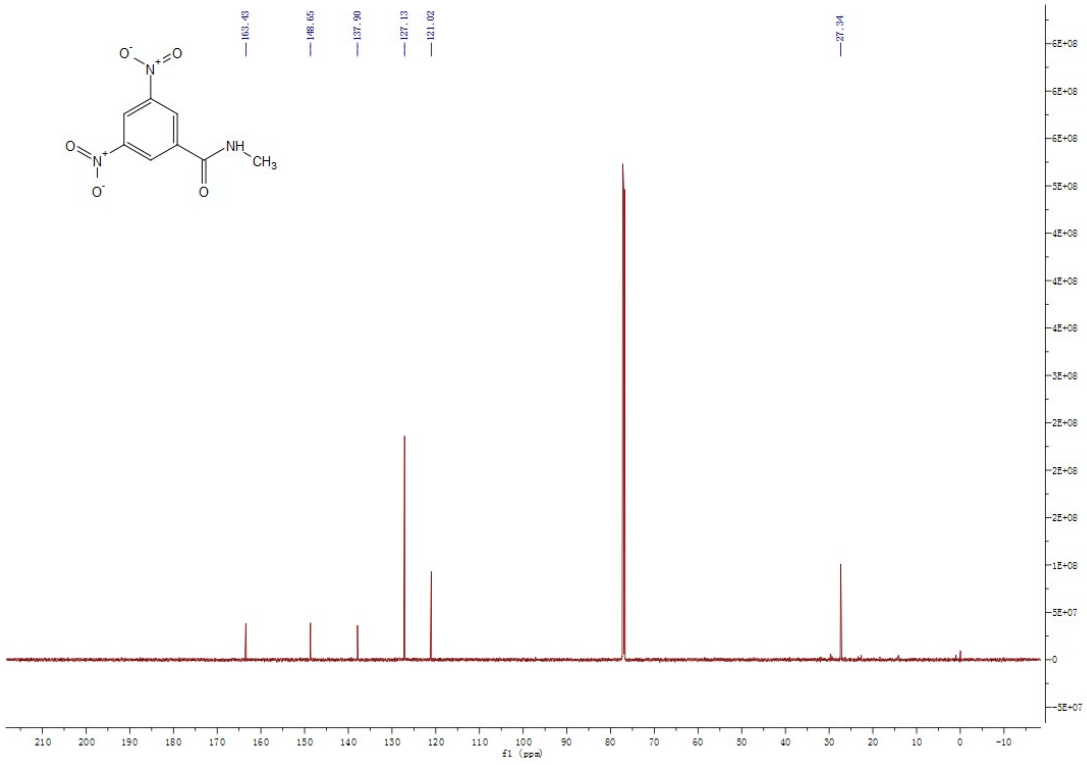
^{13}C NMR of N-methyl-4-(methylsulfonyl)benzamide (3ag)



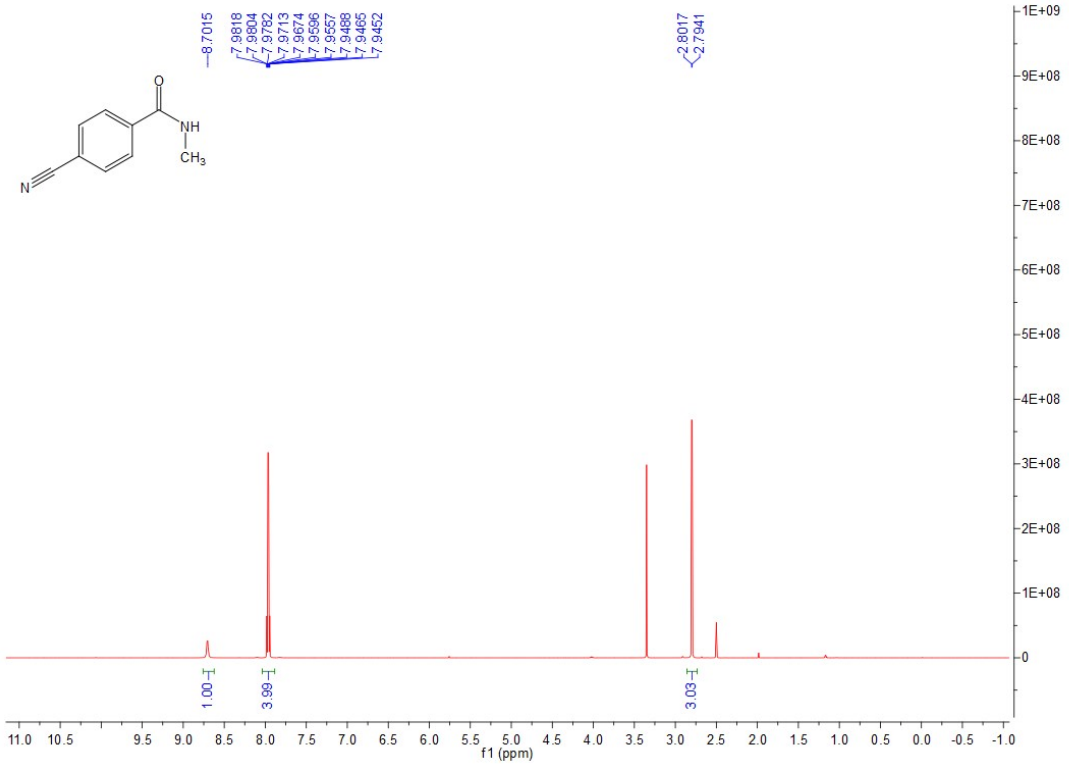
^{1}H NMR of N-methyl-3,5-dinitrobenzamide (3ah)



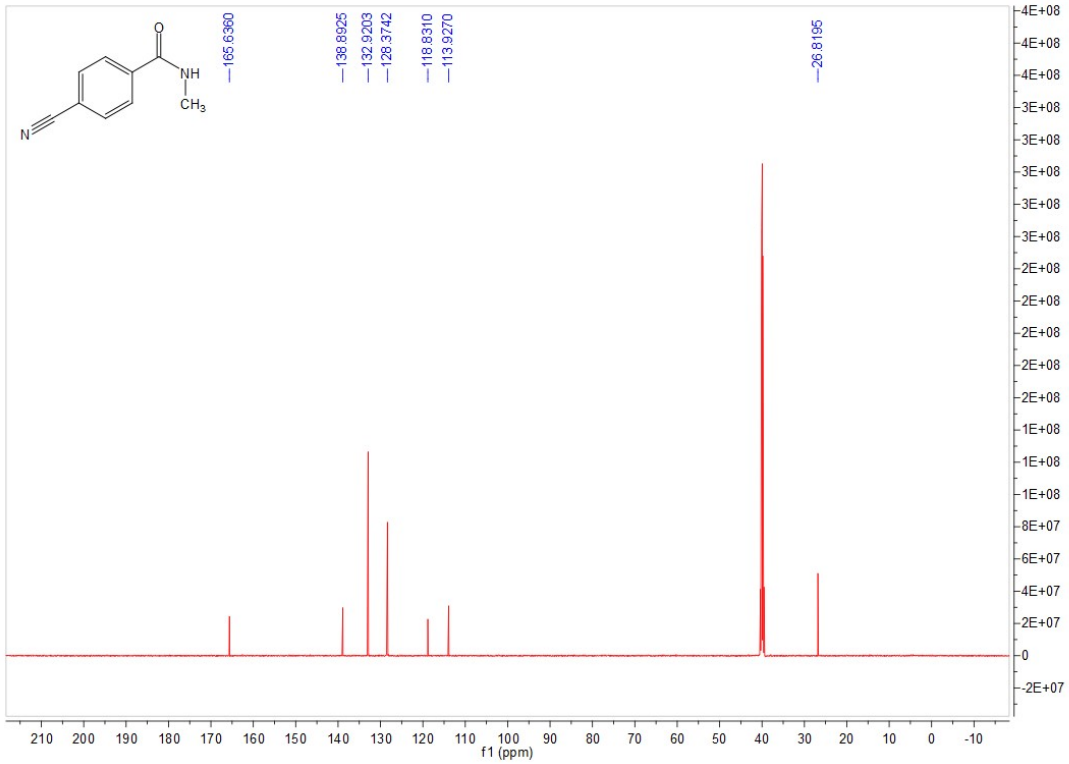
^{13}C NMR of N-methyl-3,5-dinitrobenzamide (3ah)



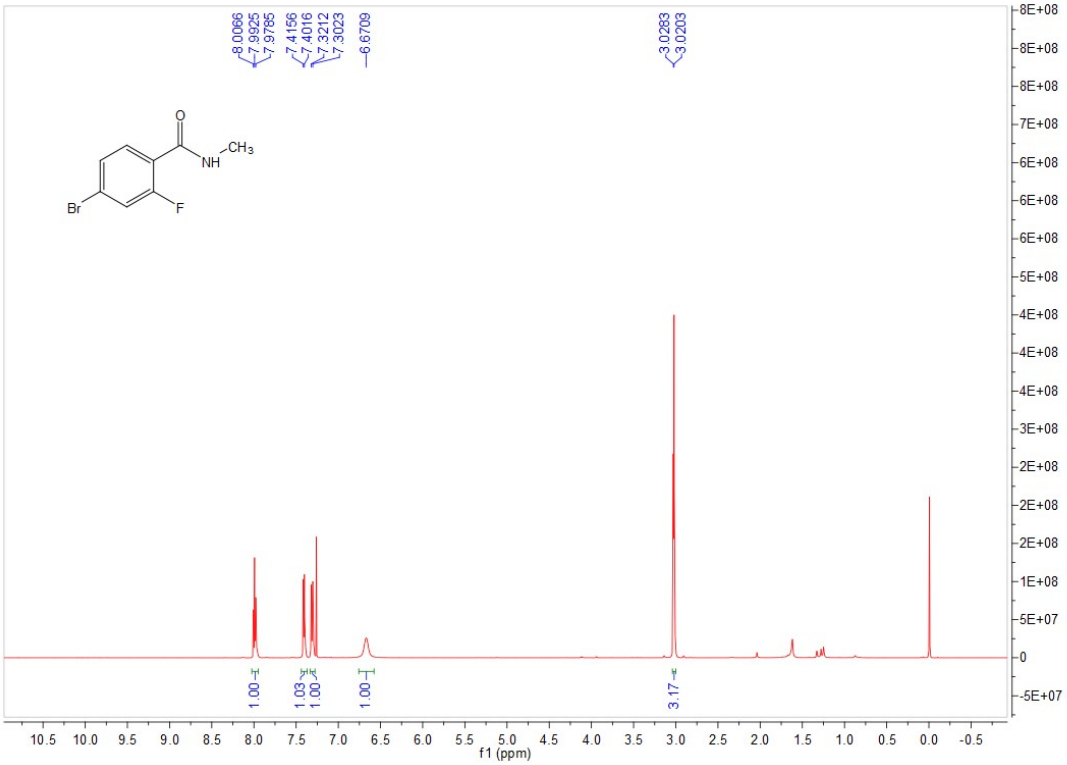
^{1}H NMR of 4-cyano-N-methylbenzamide (3ai)



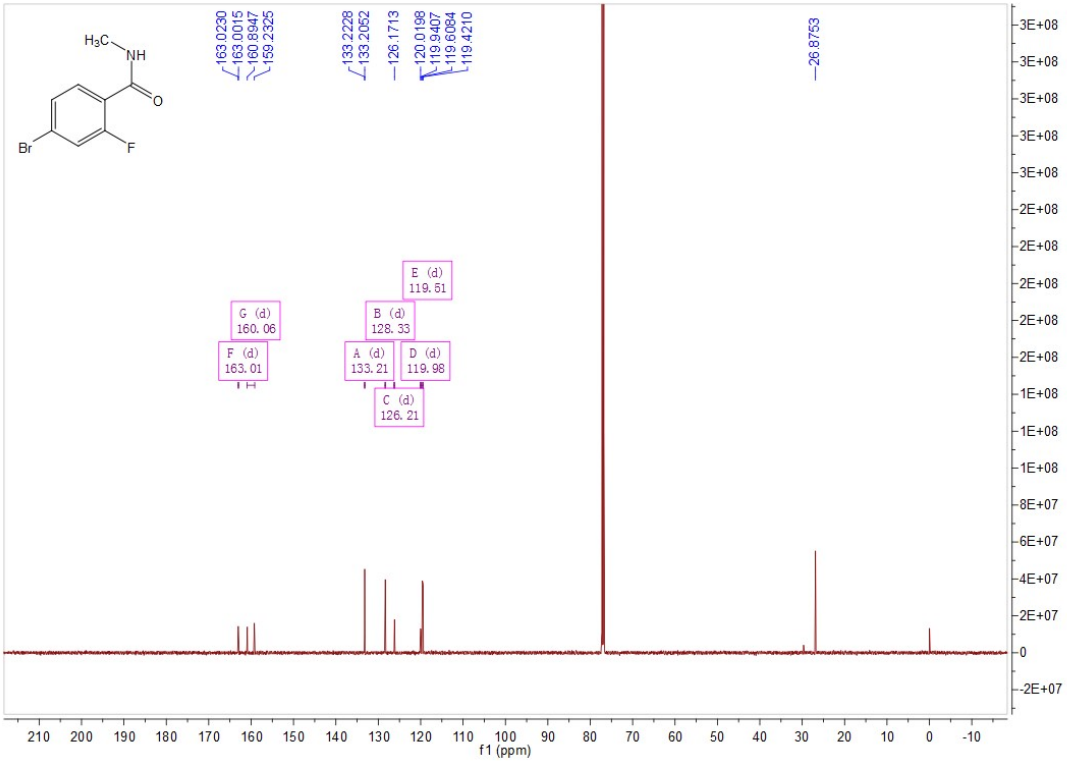
^{13}C NMR of 4-cyano-N-methylbenzamide (3ai)



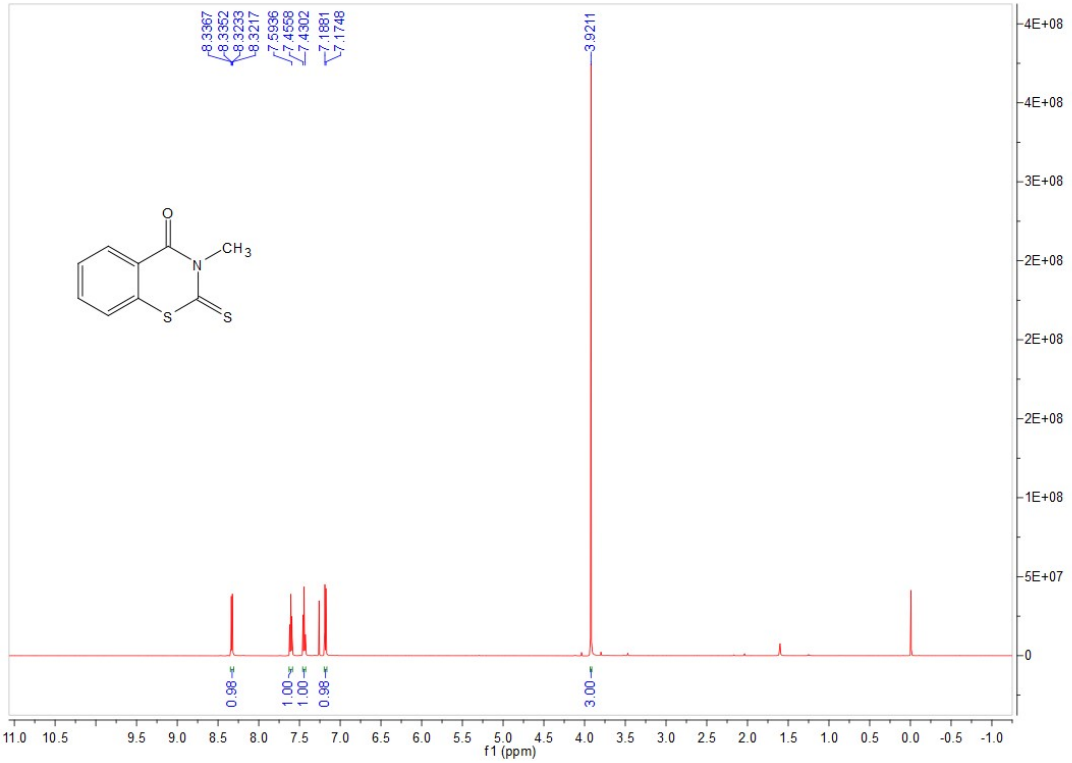
^{1}H NMR of 4-bromo-2-fluoro-N-methylbenzamide:: (3aj)



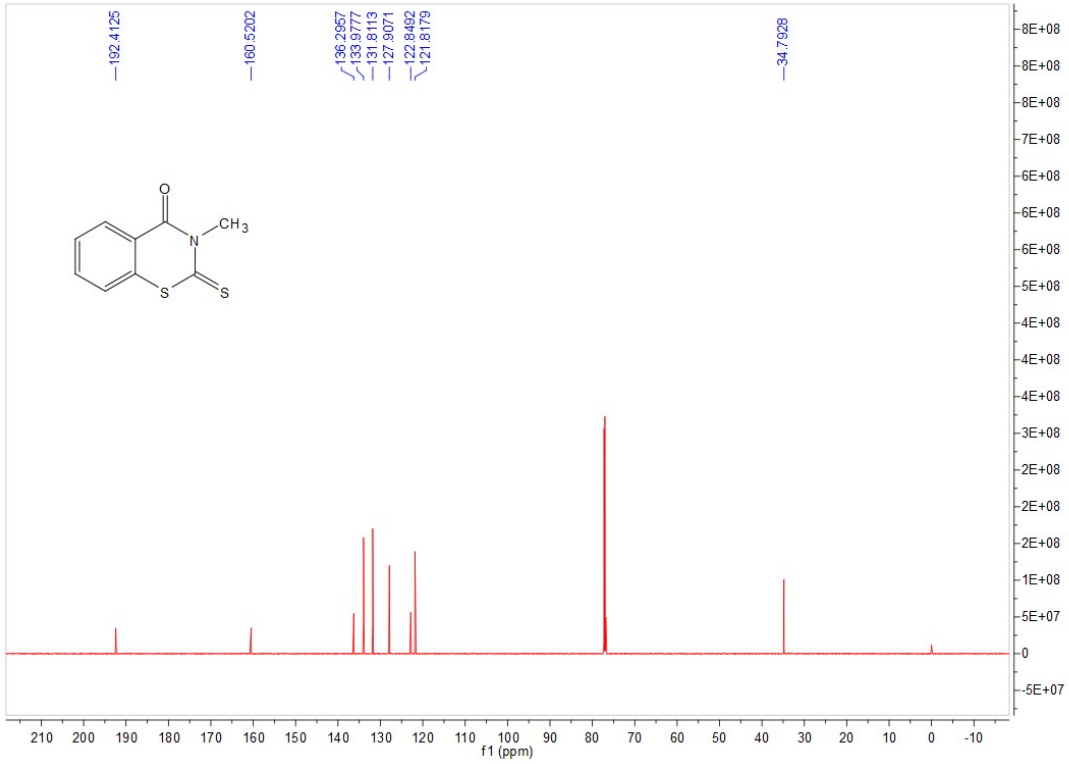
^{13}C NMR of 4-bromo-2-fluoro-N-methylbenzamide:: (3aj)



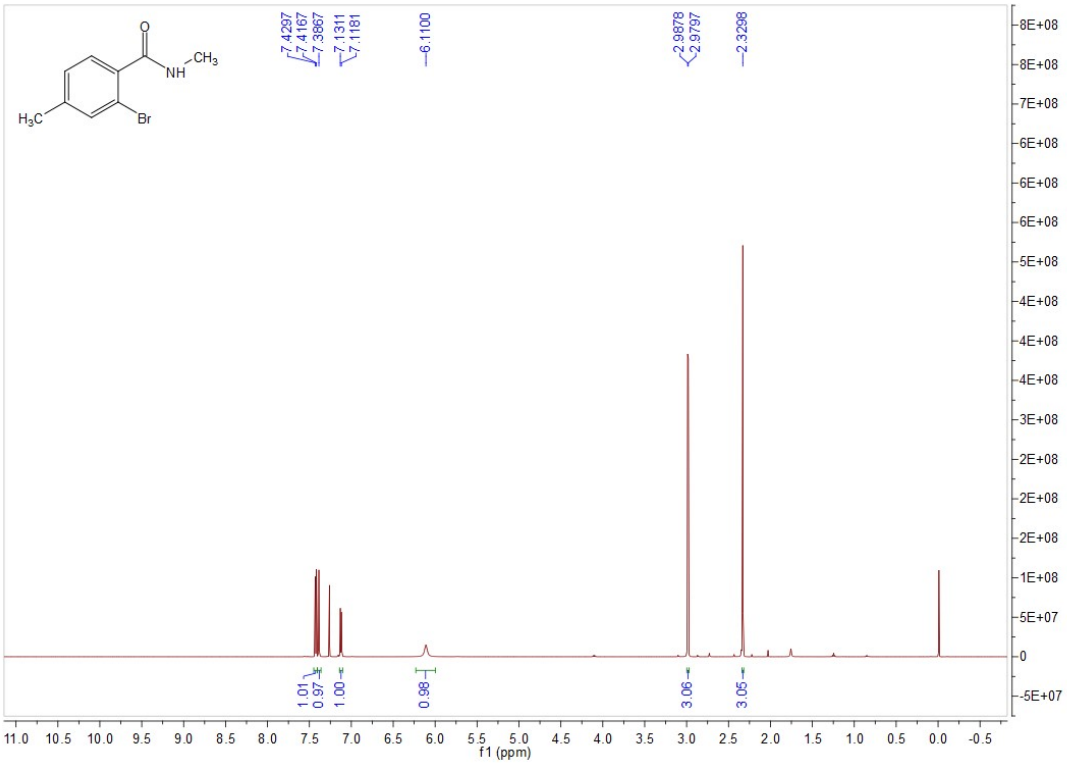
^{1}H NMR of 3-methyl-2-thioxo-2H-benzo[e][1,3]thiazin-4(3H)-one (3ak)



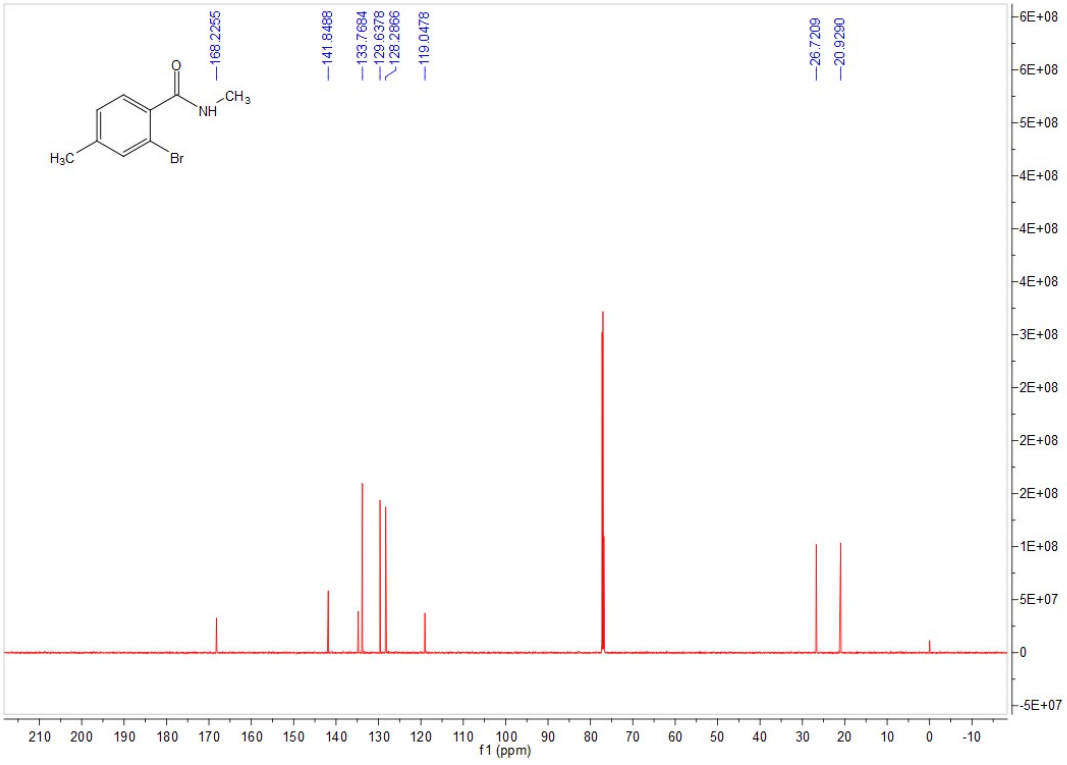
^{13}C NMR of 3-methyl-2-thioxo-2H-benzo[e][1,3]thiazin-4(3H)-one (3ak)



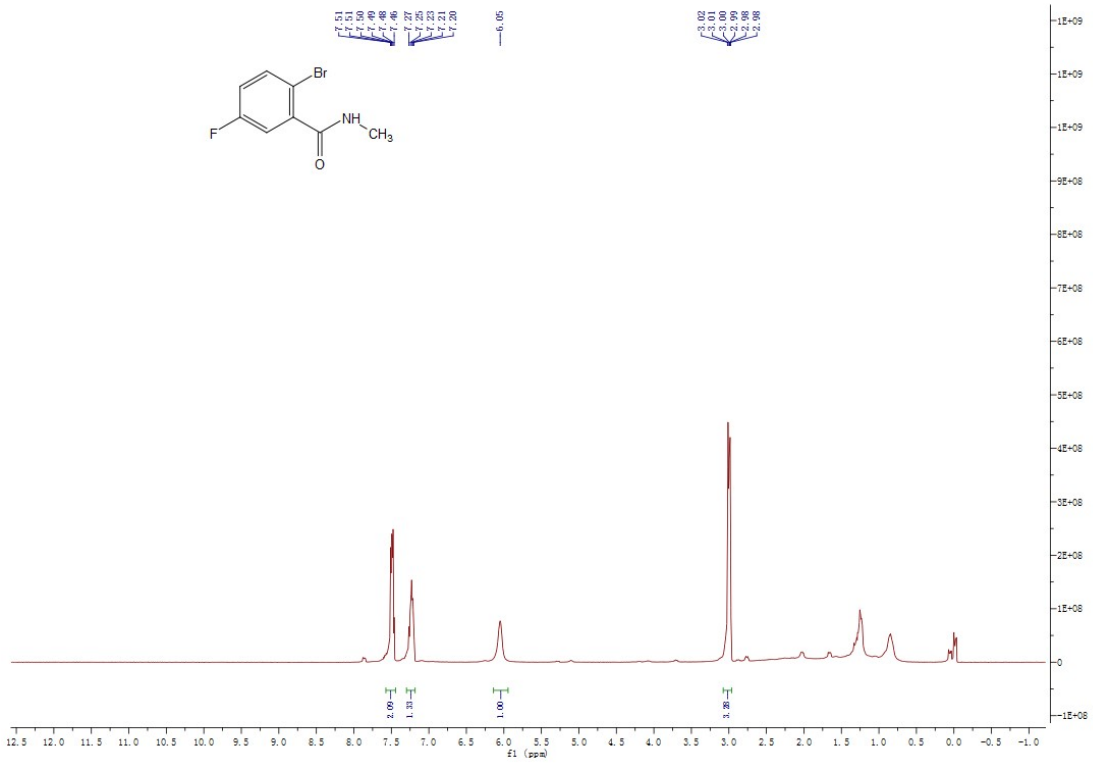
^{1}H NMR of 2-bromo-N,4-dimethylbenzamide (3al)



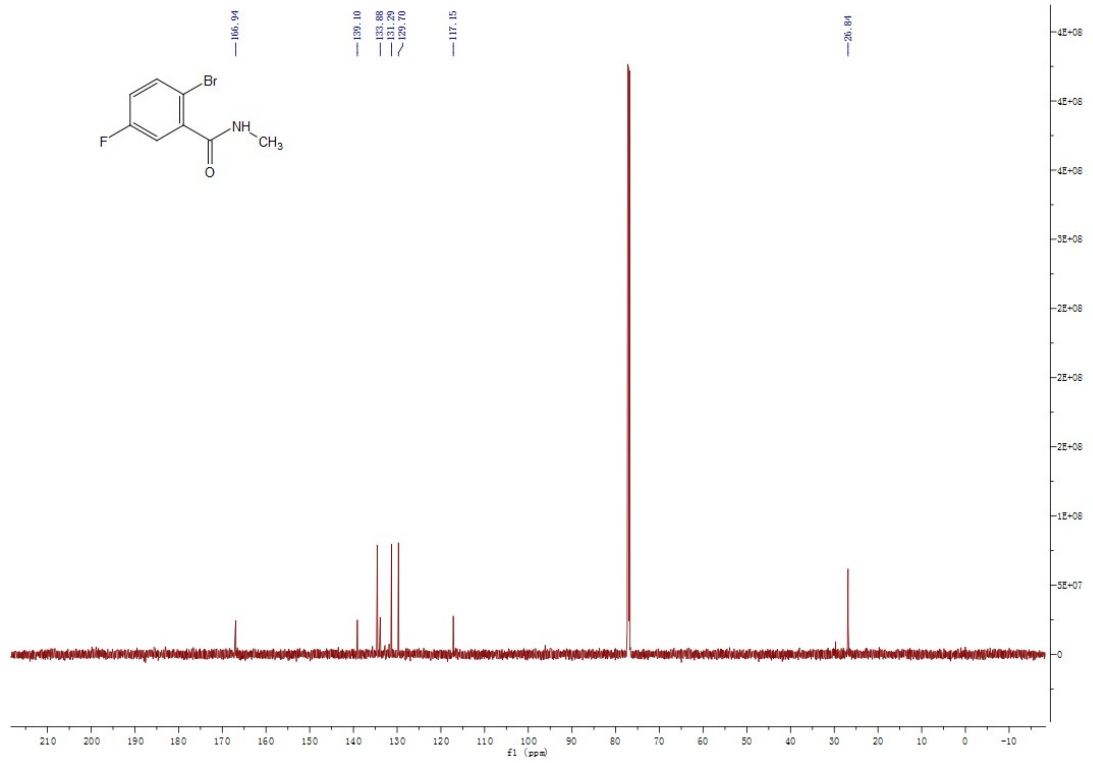
^{13}C NMR of 2-bromo-N,4-dimethylbenzamide (3al)



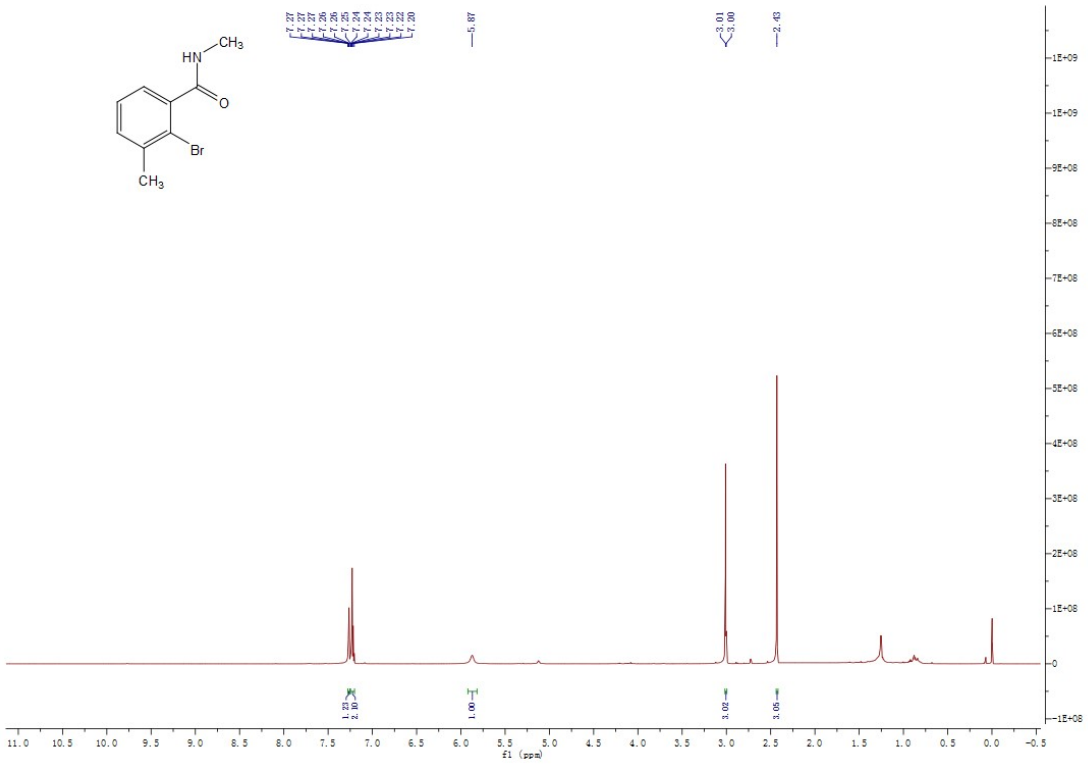
^{1}H NMR of 2-bromo-5-fluoro-N-methylbenzamide (3am)



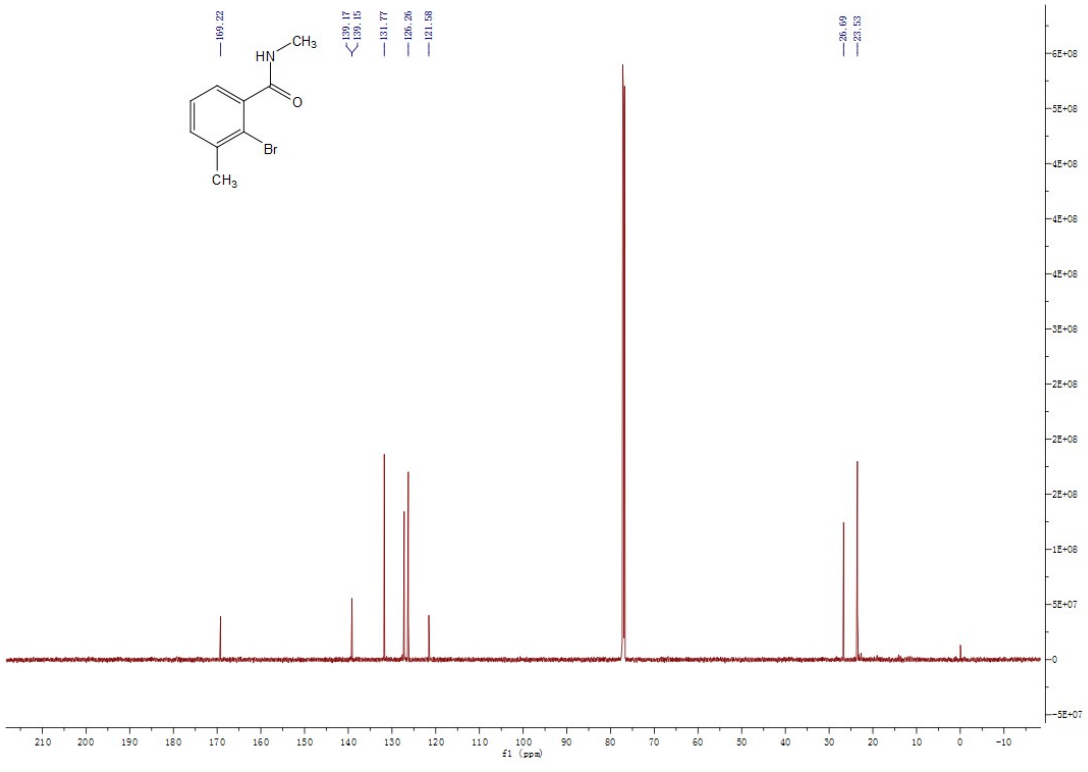
^{13}C NMR of 2-bromo-5-fluoro-N-methylbenzamide (3am)



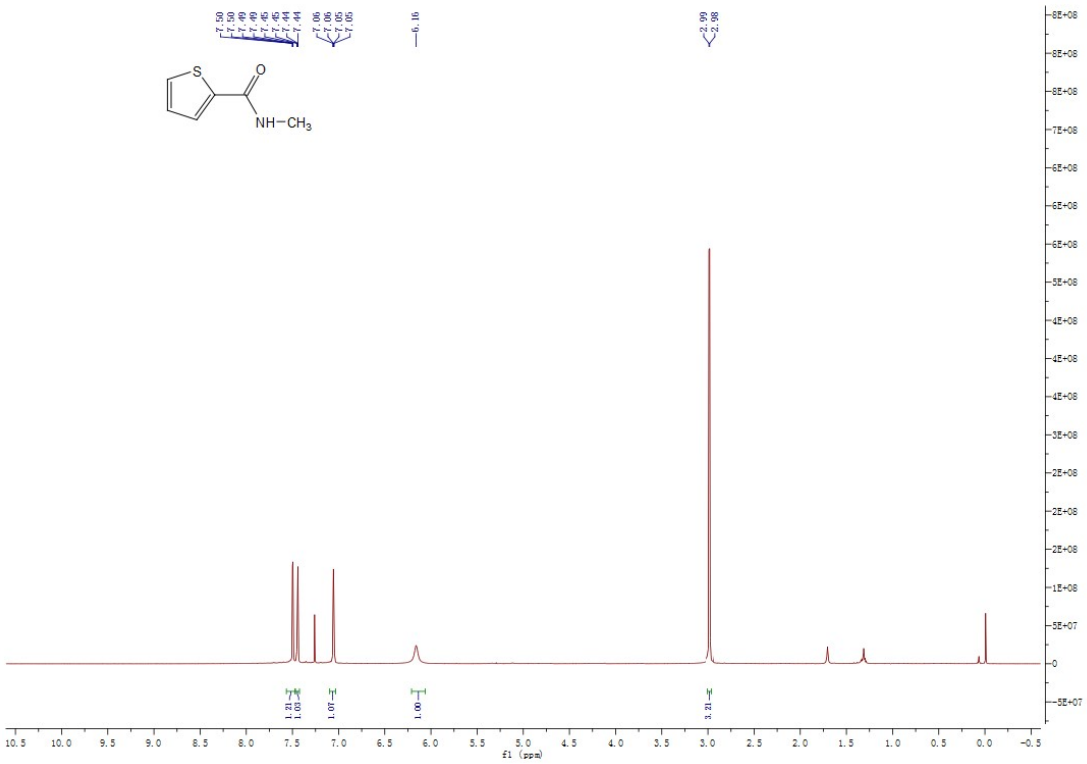
^{1}H NMR of 2-bromo-N,3-dimethylbenzamide (3an)



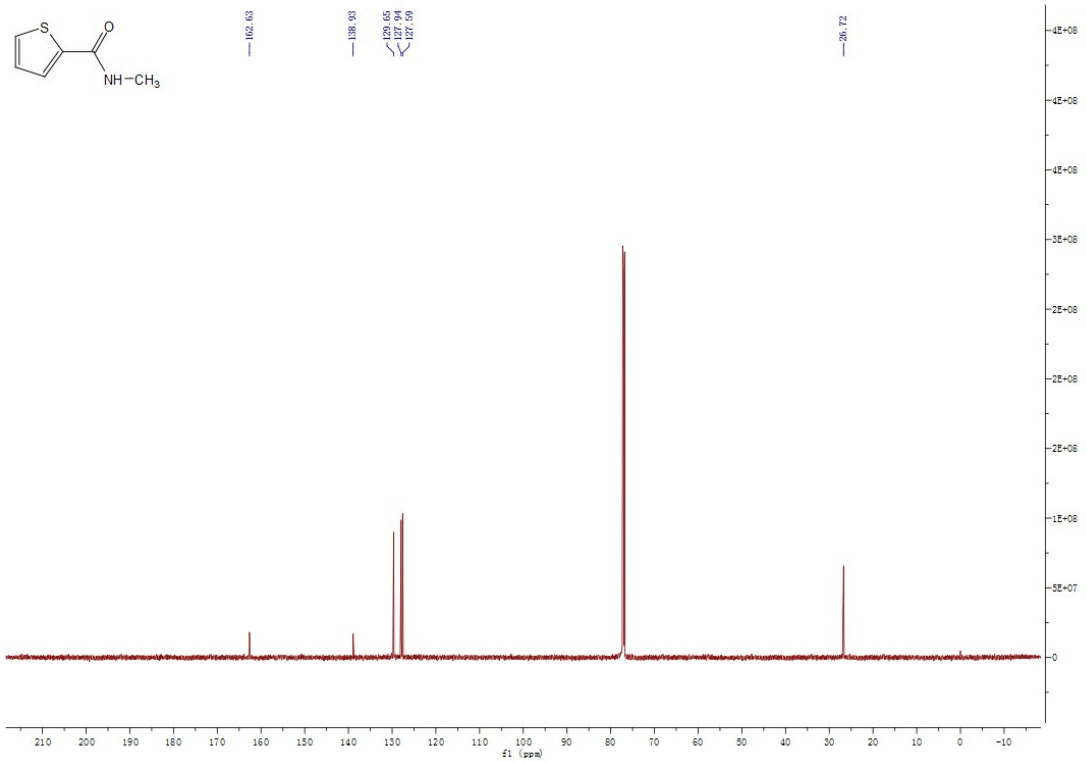
^{13}C NMR of 2-bromo-N,3-dimethylbenzamide (3an)



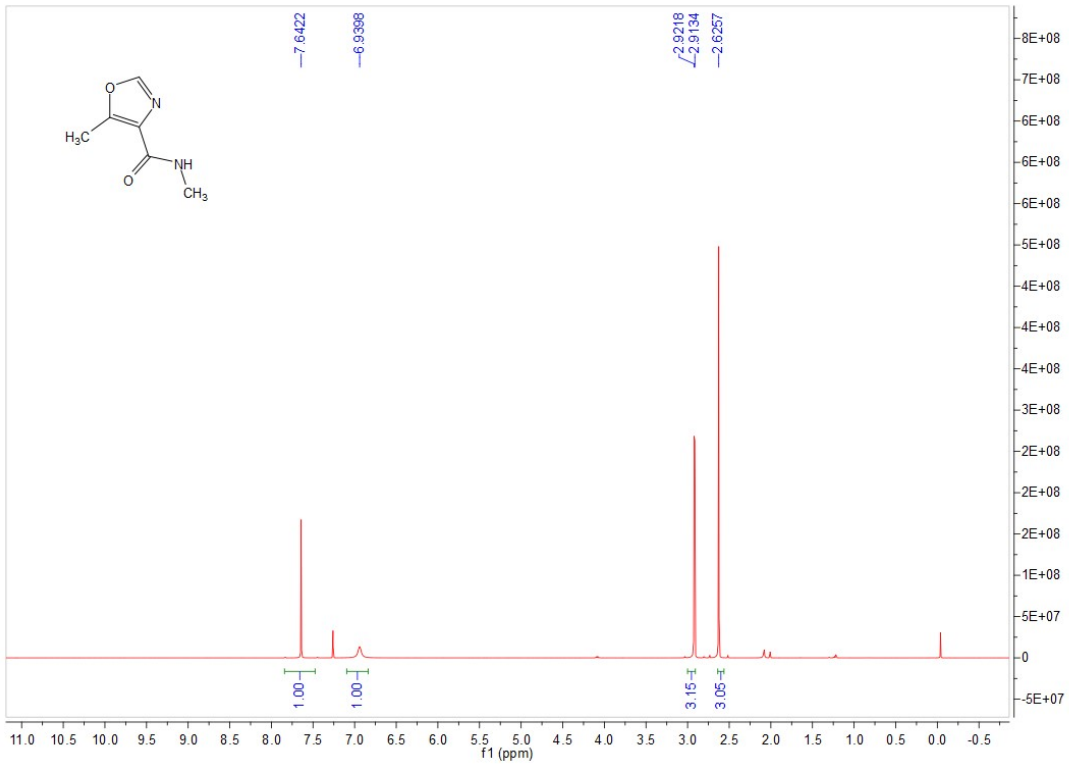
^{1}H NMR of N-methylthiophene-2-carboxamide (3ao)



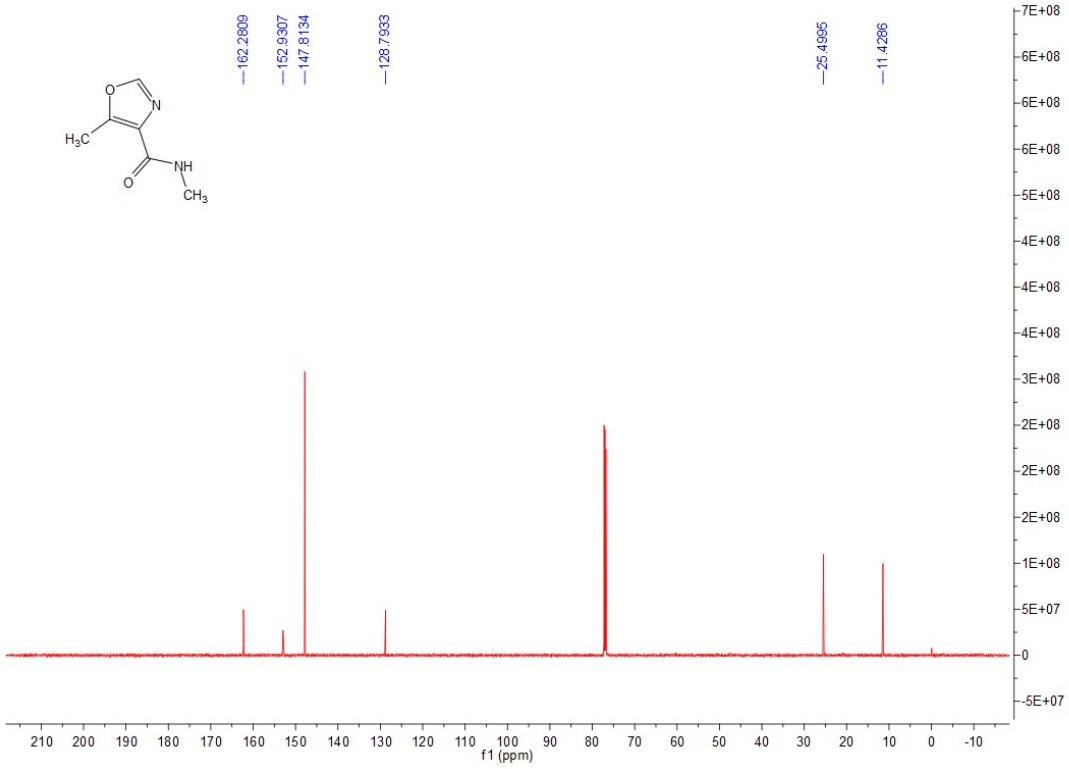
^{13}C NMR of N-methylthiophene-2-carboxamide (3ao)



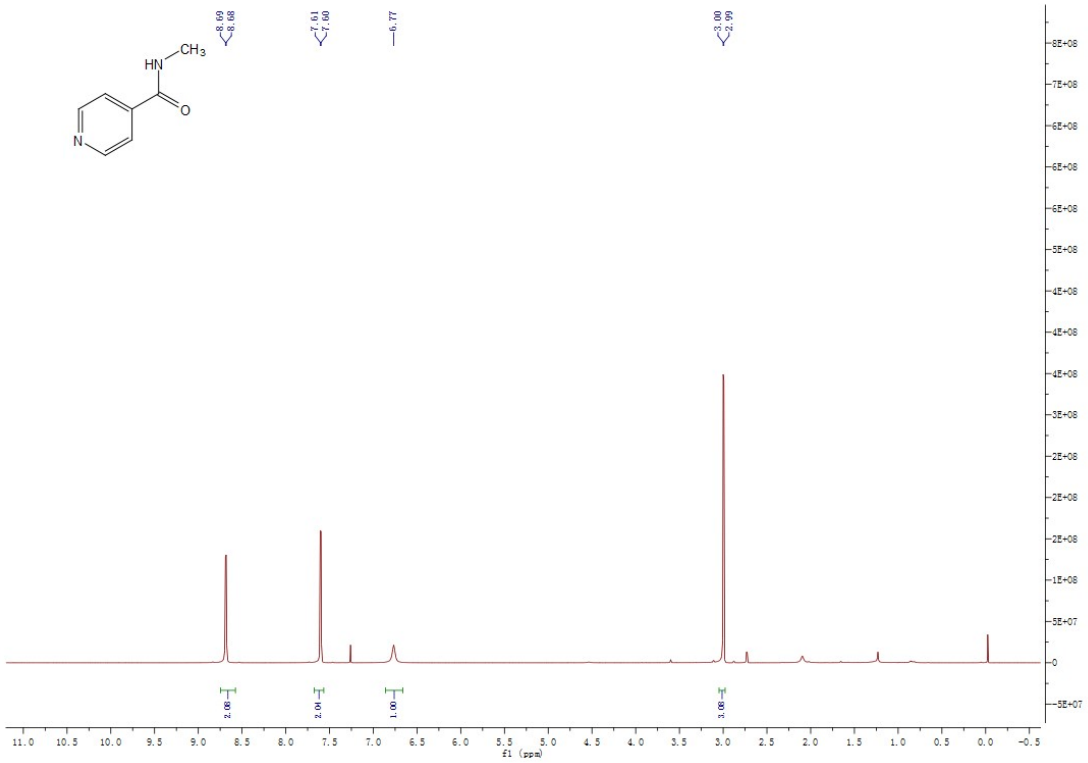
^{1}H NMR of N,5-dimethyloxazole-4-carboxamide (3ap)



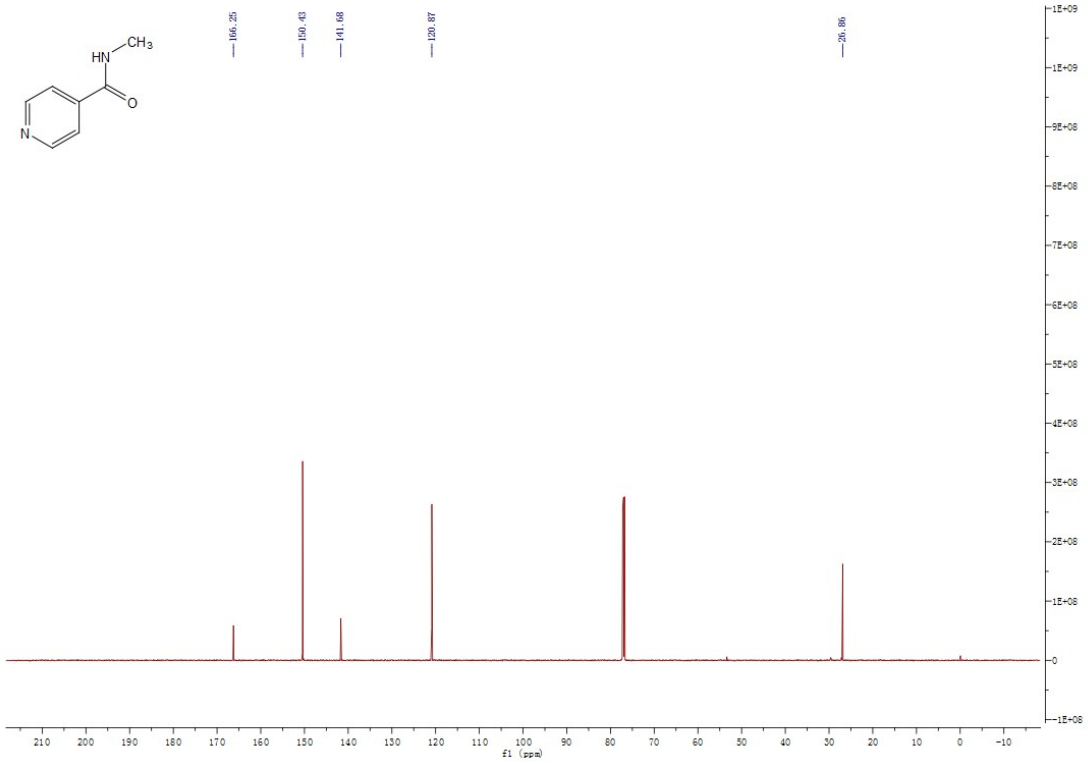
^{13}C NMR of N,5-dimethyloxazole-4-carboxamide (3ap)



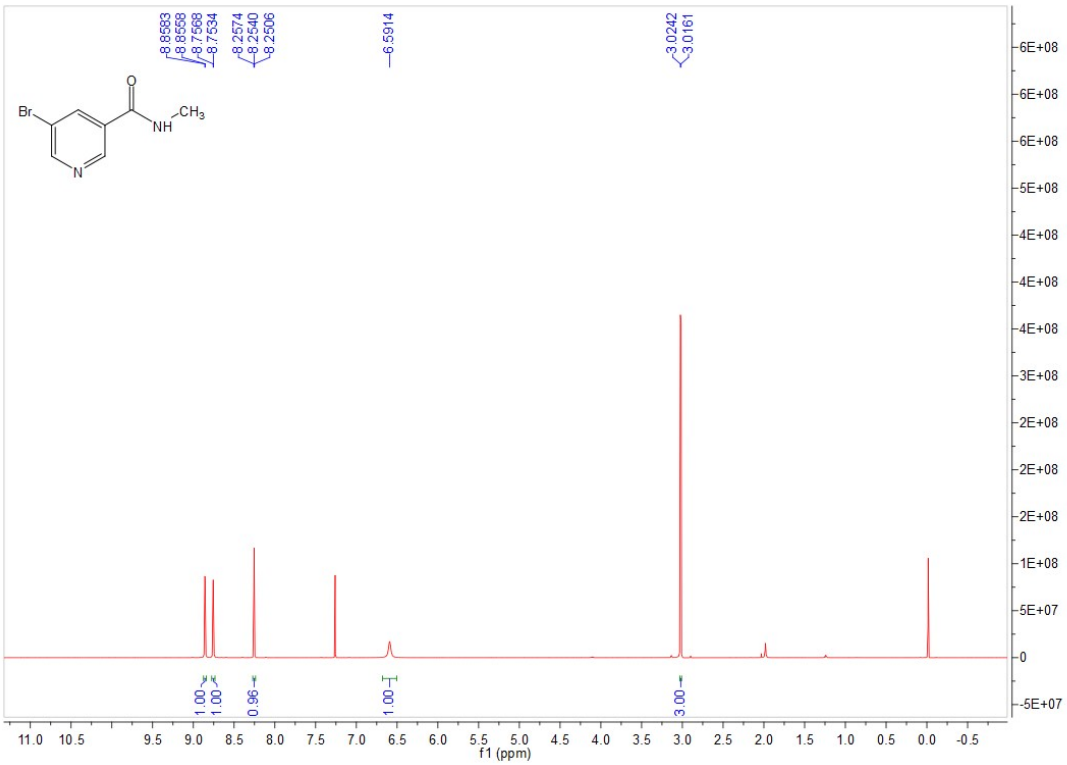
^{1}H NMR of N-methylisonicotinamide (3aq)



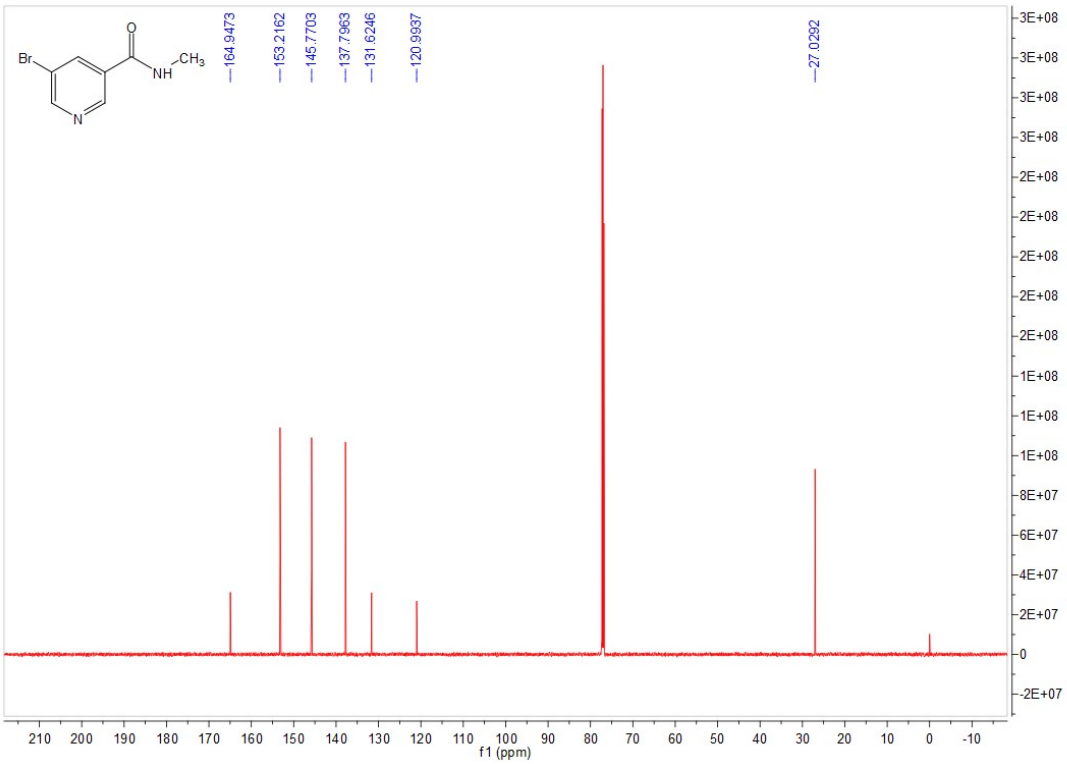
^{13}C NMR of N-methylisonicotinamide (3aq)



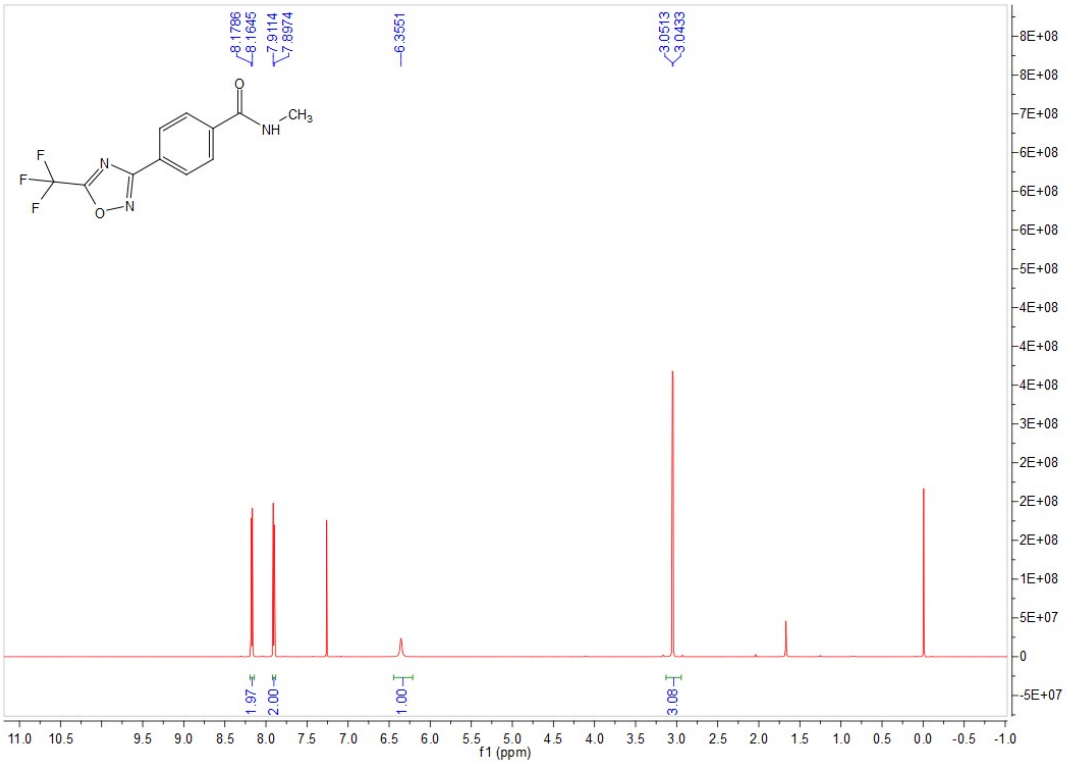
^{1}H NMR of 5-bromo-N-methylnicotinamide (3ar)



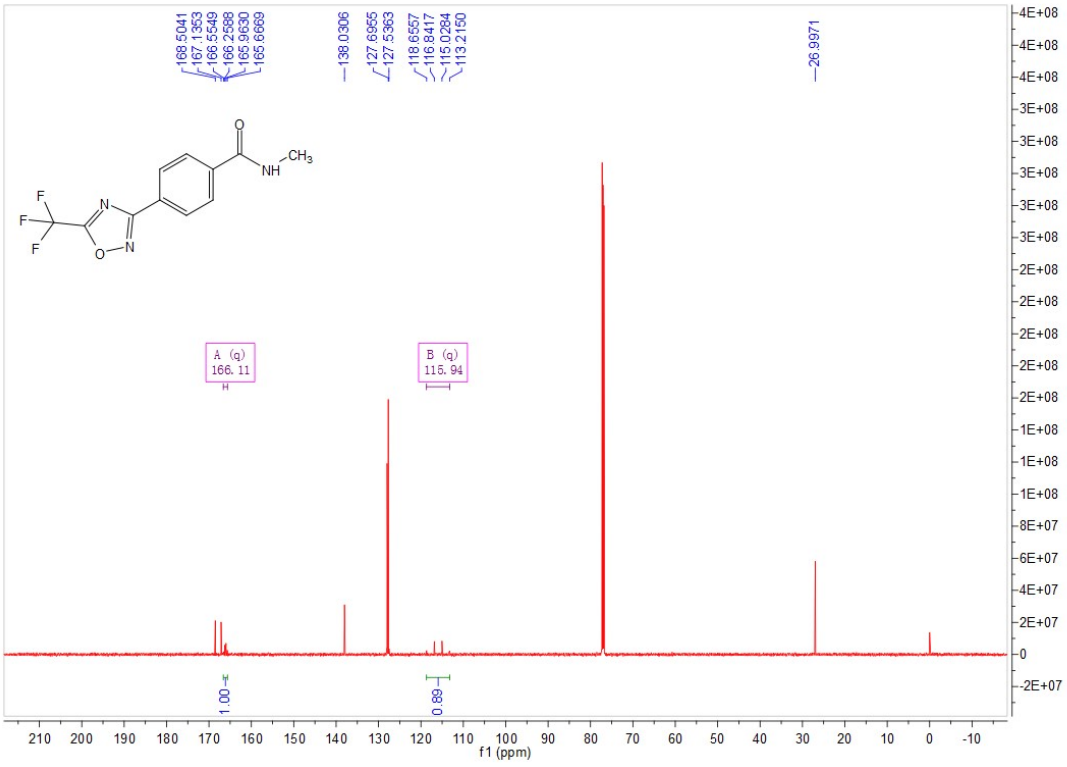
^{13}C NMR of 5-bromo-N-methylnicotinamide (3ar)



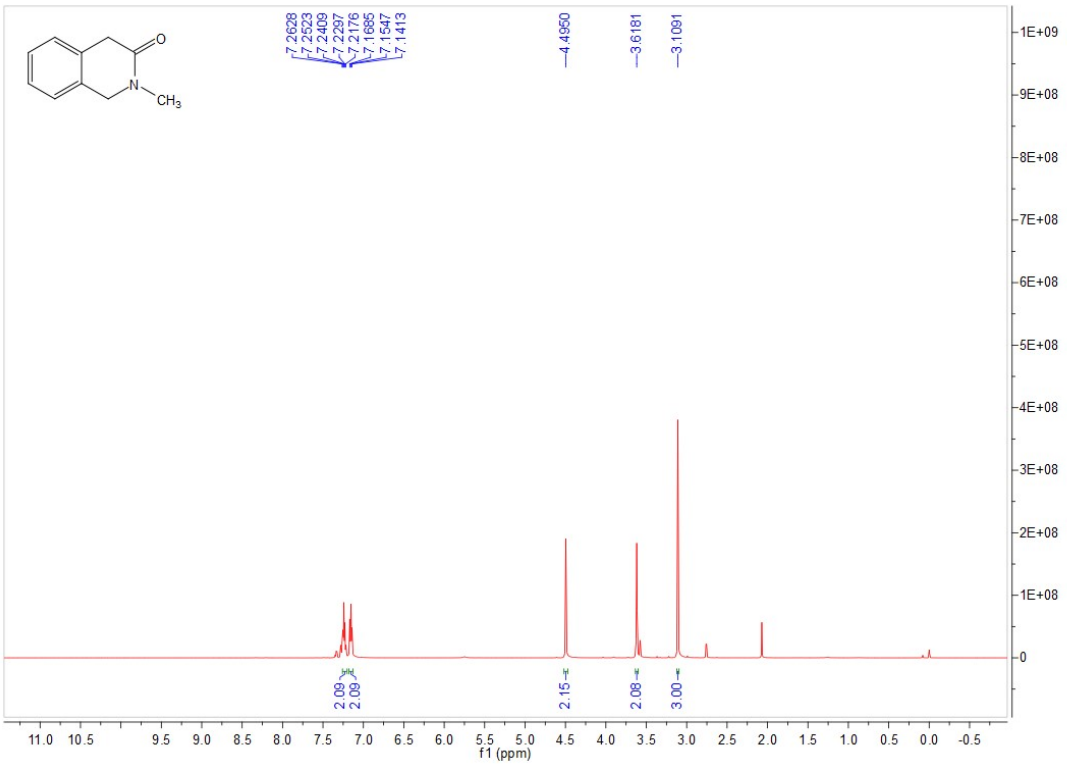
^{1}H NMR of N-methyl-4-(5-(trifluoromethyl)-1,2,4-oxadiazol-3-yl)benzamide (3as)



^{13}C NMR of N-methyl-4-(5-(trifluoromethyl)-1,2,4-oxadiazol-3-yl)benzamide (3as)



^{1}H NMR of 2-methyl-1,2-dihydroisoquinolin-3(4H)-one (4a)



^{13}C NMR of 2-methyl-1,2-dihydroisoquinolin-3(4H)-one (4a)