Supporting Information

I_2-DMSO Mediated Oxidative Amidation of Methyl Ketones With Anthranils for the Synthesis of *α*-Ketoamides

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1. General

All of the substrates and reagents were commercially available and used without further purification unless otherwise noted. TLC analysis was performed using pre-coated glass plates. Flash column chromatography was performed on silica gel (200–300 mesh). ^{1}H NMR spectra was determined at 25 °C on a Varian Mercury 600 MHz spectrometer. Chemical shifts were provided in ppm relative to the internal standard of tetramethylsilane (TMS). ^{13}C NMR spectra was recorded in $CDCl_3$ or DMSO-d_6 on 150 MHz NMR spectrometers and resonances (δ) in ppm. The data is being reported as s=singlet, d=doublet, t=triplet, m=multiplet or unresolved coupling constant(s) in Hz, integration. HRMS were obtained on Bruker 7-tesla FT-ICR MS equipped with an electrospray source. Melting points were determined by using an electrothermal capillary melting point apparatus and not corrected. The X-ray crystal-structures were obtained on a Bruker APEX DUO CCD system.

2. Experimental procedures

2.1 General procedure for the synthesis of 2 (2a as an example)

General procedure: A round-bottom flask equipped with a magnetic stirring bar was charged with 2-nitrobenzaldehyde (1.51g, 10 mmol) and $SnCl_2$ dihydrate (6.75g, 30 mmol) at room temperature, and solvent (methanol/ EtOAc=1:1, 20 mL) was added. The resulting mixture was stirred at room temperature for 24 h. After the reaction completed, the mixture was concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 20:1) to give the desired product **2a** as colorless oil in quantitive yield.

2.2 General procedure for the synthesis of 3 and 4 (3a as an example)

General procedure: A sealed tube equipped with a magnetic stirring bar was charged with acetophenone (**1a**) (60 mg, 0.5 mmol), anthranil (**2a**) (59.5 mg, 0.5 mmol), iodine (2 mg, 0.8 mmol) and TfOH (37.5 mg, 0.25 mmol) at room temperature, and DMSO (2 mL) was added. The resulting mixture was stirred at 140 °C for 4h. After the reaction completed, the mixture was quenched with saturation $Na_2S_2O_3$ solution (50 mL), extracted with EtOAc (3 × 50 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 20:1) to yield the desired product **3a** as a yellow solid.

2.3 Procedure for the synthesis of 6

A 25 ml Schlenk tube equipped with a magnetic stirring bar was charged with a mixture of anthranil **2a** (71.4 mg, 0.6 mmol), phenylglyoxylic acid (180 mg, 1.2 mmol), $CuBr_2$ (6.6 mg, 0.03 mmol) and PPh_3 (31 mg, 0.12 mmol). Under reduced pressure, the tube was filled with argon for three times. After the addition of DCE (4 mL), the reaction was stirred at 110 °C for 12 h. The reaction mixture was concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 20:1) to yield the desired product **6** (121mg, 0.48 mmol) as a yellow solid in 80% yield.

2.4 Procedure for the synthesis of 7

A 25 ml Schlenk tube equipped with a magnetic stirring bar was charged with a mixture of **3a** (75.8 mg, 0.2 mmol), CuCN (21.6 mg, 0.24 mmol). Under reduced pressure, the tube was filled with

argon for three times. After the addition of DMF (2 mL), the reaction was stirred at 150 °C for 5 h. After the reaction completed, the mixture was quenched with saturation NaCl solution (50 mL), extracted with EtOAc (3 × 50 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 8:1) to yield the desired product **7** (33.4 mg, 0.12 mmol) as a purple solid in 60% yield.

2.5 Procedure for the synthesis of 9

A 25 ml Schlenk tube equipped with a magnetic stirring bar was charged with a mixture of **3a** (75.8 mg, 0.2 mmol), **8** (30.4 mg, 0.2 mmol), $Pd(PPh_3)_2Cl_2$ (14.0 mg, 0.02 mmol), K_2CO_3 (82.8 mg, 0.6 mmol). Under reduced pressure, the tube was filled with argon for three times. After the addition of THF (2 mL), the reaction was stirred at 60 °C for 12 h. After the reaction completed, the mixture was quenched with saturation NaCl solution (50 mL), extracted with EtOAc (3 × 50 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 10:1) to yield the desired product **9** (66.1 mg, 0.184 mmol) as a yellow solid in 92% yield.

2.6 Procedure for the synthesis of 11

A 25 ml Schlenk tube equipped with a magnetic stirring bar was charged with a mixture of **3a** (75.8 mg, 0.2 mmol), **10** (31.7 mg, 0.24 mmol), $Pd(PPh_3)_2Cl_2$ (7.0 mg, 0.01 mmol), CuI (3.8 mg, 0.02 mmol). Under reduced pressure, the tube was filled with argon for three times. After the addition of DMF (1 mL) and Et_3N (2 mL), the reaction was stirred at room temperature for 12 h. After the reaction completed, the mixture was quenched with saturation NaCl solution (50 mL), extracted with EtOAc (3 × 50 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 10:1) to yield the desired product **9** (64.3 mg, 0.168 mmol) as a yellow solid in 84% yield.

2.7 Procedure for the synthesis of 13

A sealed tube equipped with a magnetic stirring bar was charged with **3a** (189.5 mg, 0.5 mmol), K_2CO_3 (138.2 mg, 1 mmol) at room temperature, and dry methanol (5 mL) was added. Bestmann-Ohira reagent (115.2 mg, 0.6 mmol) was added to the solution and stirred at room temperature for

4h. After the reaction completed, the mixture was quenched with an aqueous solution of $NaHCO_3$ (5%, 50 mL), extracted with EtOAc (3 × 50 mL). The combined organic layers were washed with brine, dried over anhydrous Na_2SO_4 and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (petroleum ether/EtOAc = 10:1) to yield the desired product **13** (108.7 mg, 0.29 mmol) as a yellow solid in 58% yield.

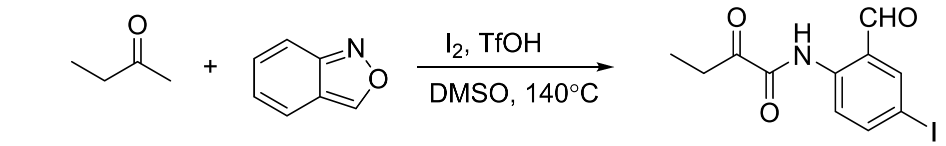
3. Optimization of the Standard Conditions

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

entry	acid (equiv.)	I_2 (equiv.)	solvent	temp (°C)	yield (%)
1	TfOH (0.5)	1.6	DMF	140	ND
2	TfOH (0.5)	1.6	Toluene	110	ND
3	TfOH (0.5)	1.6	CH_3CN	80	ND
4	TfOH (0.5)	1.6	THF	60	ND
5	TfOH (0.5)	1.6	CH_2Cl_2	rt	ND
6	TfOH (0.5)	1.6	DCE	80	ND
7	TfOH (0.5)	1.6	1,4-Dioxane	100	ND
8	TfOH (0.5)	1.6	EtOH	80	ND

4. Substrate scope of aliphatic ketones

We have uesd some aliphatic ketones to react with anthranils under the optimized reaction conditions. However, the aliphatic ketones were not compatible with this transformation. The obstacle to this conversion is that aliphatic ketones might not undergo Kornblum oxidation to obtain corresponding ketoaldehydes intermediates.



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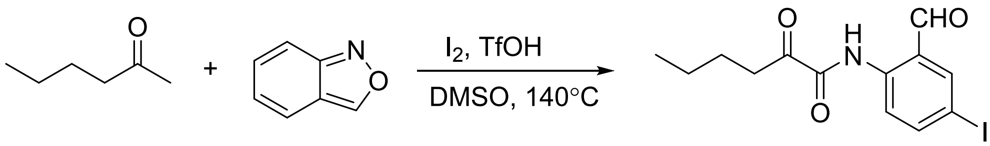

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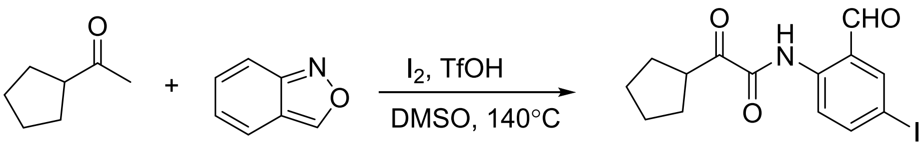

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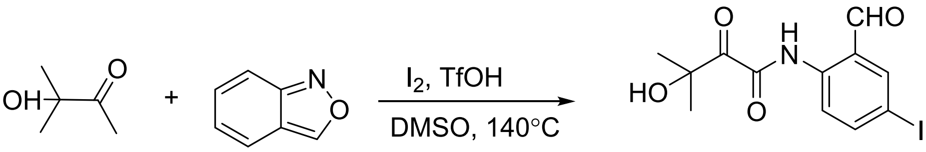

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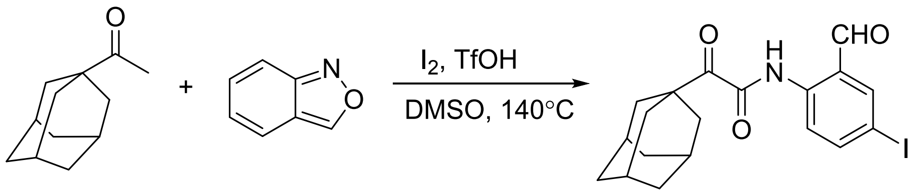

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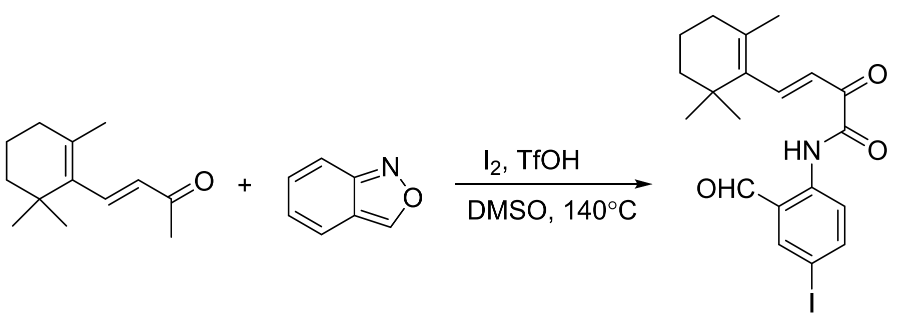

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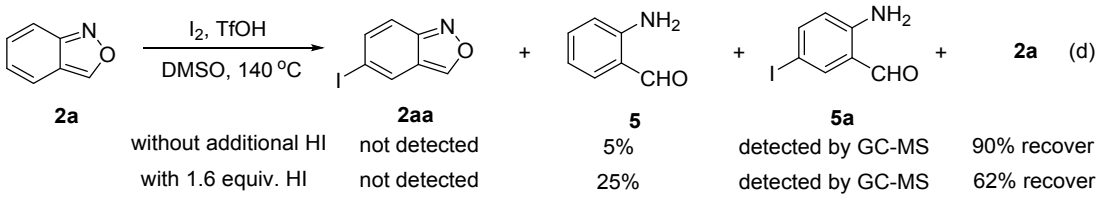
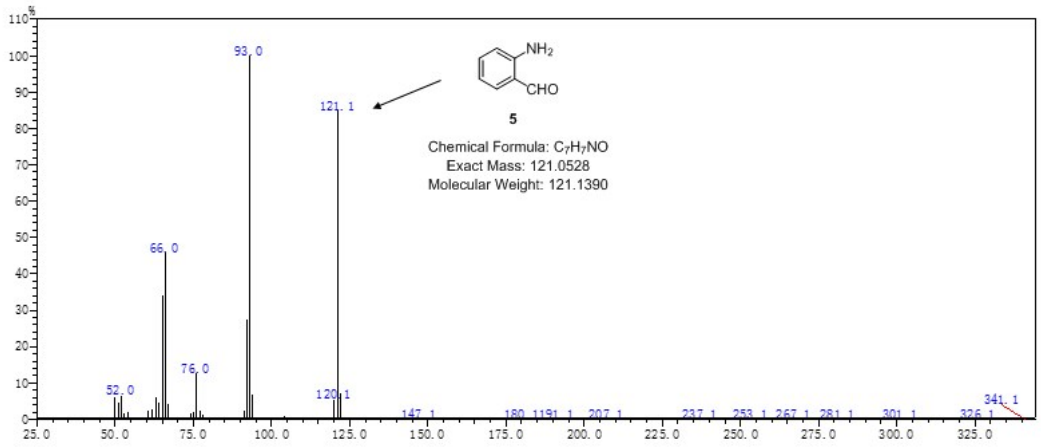
5. GC-MS of intermediates

5.1 GS-MS of the intermediate 5 and 5a





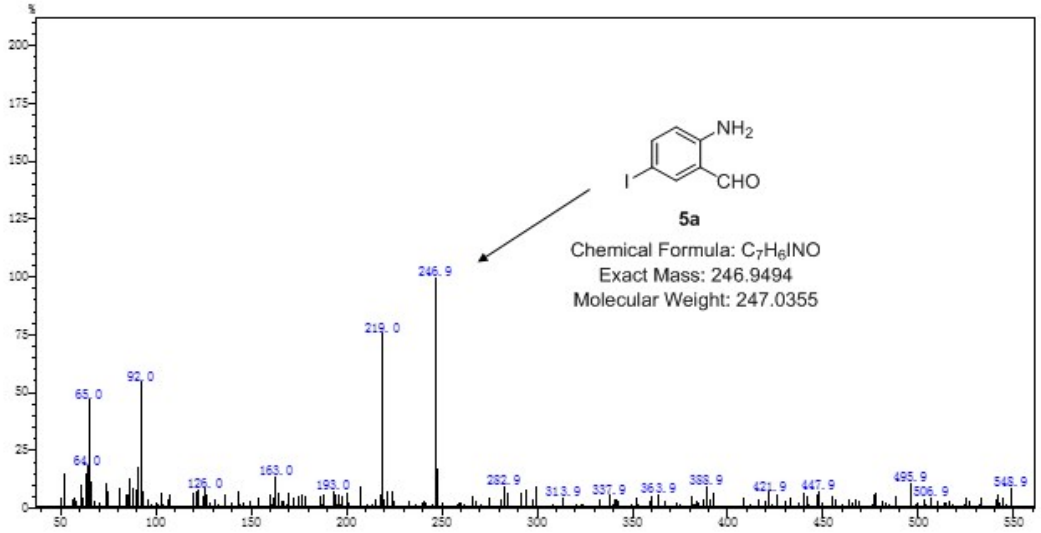
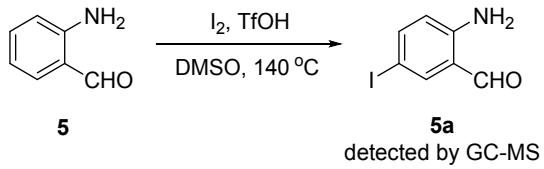


Figure S1. GS-MS of the intermediate **5** and **5a**

5.2 GS-MS of the intermediate 5a



5 **5a**
detected by GC-MS

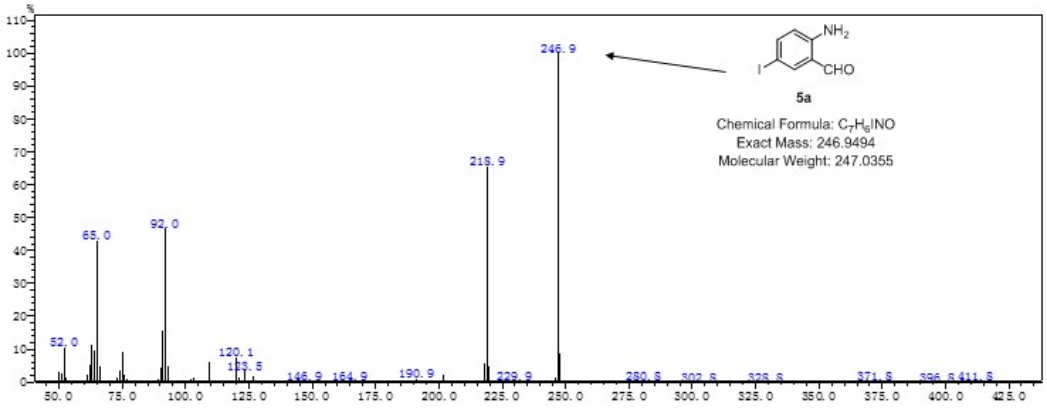
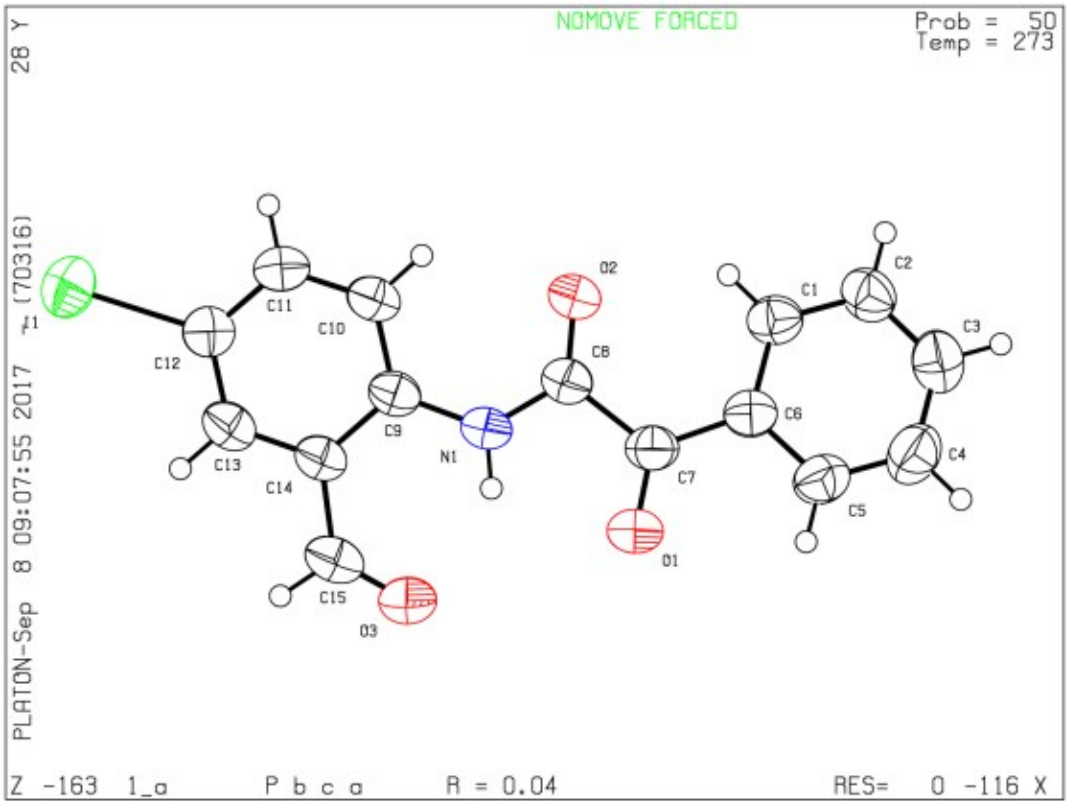
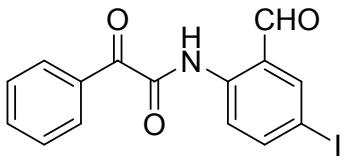


Figure S2**.** GS-MS of the intermediate **5a**

6. The crystallographic data





3a

Figure S2**.** X-ray crystal structure of **3a**

Crystal Data for Compound **3a**: CCDC 2026166 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic.

Bond precision: C-C = 0.0053 A Wavelength=0.71073

Cell: a=7.7449(12) b=16.862(3) c=21.490(3)
alpha=90 beta=90 gamma=90
Temperature: 273 K

	Calculated	Reported
Volume	2806.5(8)	2806.3(7)
Space group	P b c a	P b c a
Hall group	-P 2ac 2ab	-P 2ac 2ab
Moiety formula	C15 H10 I N O3	?
Sum formula	C15 H10 I N O3	C15 H10 I N O3
Mr	379.14	379.14
Dx,g cm-3	1.795	1.795
Z	8	8
Mu (mm-1)	2.288	2.288
F000	1472.0	1472.0
F000'	1468.83	
h,k,lmax	11,24,30	11,24,30
Nref	4335	4317
Tmin,Tmax	0.611,0.662	0.864,0.864
Tmin'	0.599	

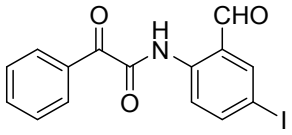
Correction method= # Reported T Limits: Tmin=0.864 Tmax=0.864
AbsCorr = MULTI-SCAN

Data completeness= 0.996 Theta(max)= 30.659

R(reflections)= 0.0398(2430) wR2(reflections)= 0.1349(4317)

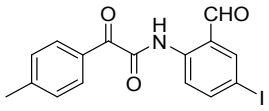
S = 0.992 Npar= 181

7. Spectroscopic data



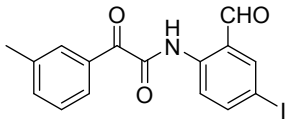
3a

N-(2-formyl-4-iodophenyl)-2-oxo-2-phenylacetamide (**3a**): Yellow solid; 147.8 mg (yield 78%); mp 139-141 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.08 (s, 1H), 9.97 (d, J = 7.2 Hz, 1H), 8.30 (d, J = 2.4 Hz, 2H), 8.20 (d, J = 7.8 Hz, 2H), 8.06 (d, J = 8.4 Hz, 1H), 7.78–7.70 (m, 1H), 7.64–7.52 (m, 2H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.6, 186.7, 160.7, 143.7, 143.2, 137.8, 134.6, 132.8, 130.9, 128.6, 125.5, 122.2, 88.3; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_9INO_3^-$: 377.9633, found: 377.9635.



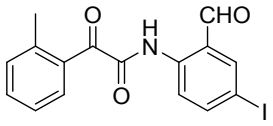
3b

N-(2-formyl-4-iodophenyl)-2-oxo-2-(p-tolyl)acetamide (**3b**): Yellow solid; 147.4 mg (yield 75%); mp 137-139 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.35 (s, 1H), 9.89 (s, 1H), 8.59 (d, J = 9.0 Hz, 1H), 8.28 (d, J = 7.2 Hz, 2H), 8.00 (s, 1H), 7.89 (d, J = 8.4 Hz, 1H), 7.28 (d, J = 7.8 Hz, 2H), 2.43 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 194.0, 193.5, 185.4, 160.5, 145.8, 144.2, 138.6, 131.4, 129.2, 124.3, 121.8, 121.7, 86.4, 21.9; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{11}INO_3^-$: 391.9789, found: 391.9792.



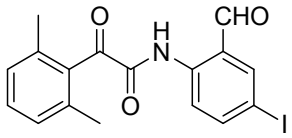
3c

N-(2-formyl-4-iodophenyl)-2-oxo-2-(m-tolyl)acetamide (**3c**) : Yellow solid; 137.6 mg (yield 70%); mp 88-89 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.05 (s, 1H), 9.93 (s, 1H), 8.33-8.20 (m, 2H), 8.07–7.92 (m, 3H), 7.51 (d, J = 7.8 Hz, 1H), 7.43 (t, J = 7.8 Hz, 1H), 2.37 (s, 3H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.6, 186.4, 160.5, 143.6, 143.3, 137.9, 137.7, 135.2, 132.6, 131.0, 128.4, 128.1, 125.2, 121.9, 88.1, 20.9; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{11}INO_3^-$: 391.9789, found: 391.9788.



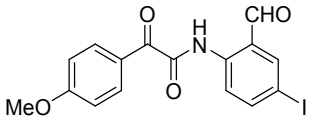
3d

N-(2-formyl-4-iodophenyl)-2-oxo-2-(o-tolyl)acetamide (**3d**): Yellow solid; 143.4 mg (yield 73%); mp 133-135 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.39 (s, 1H), 9.91 (s, 1H), 8.61 (d, J = 8.4 Hz, 1H), 8.02 (s, 1H), 7.98-7.84 (m, 2H), 7.47 (t, J = 7.2 Hz, 1H), 7.35-7.19 (m, 2H), 2.54 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.6, 189.5, 160.6, 144.3, 144.2, 140.5, 138.6, 132.9, 132.0, 131.9, 131.8, 125.2, 124.3, 121.7, 86.5, 21.0; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{11}INO_3^-$: 391.9789, found: 391.9792.



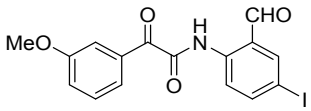
3e

2-(2,6-dimethylphenyl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3e**): Yellow solid; 132.3 mg (yield 65%); mp 184-186 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.05 (s, 1H), 9.97 (d, J = 9.2 Hz, 1H), 8.40-8.21 (m, 2H), 8.06 (d, J = 8.8 Hz, 1H), 7.82 (d, J = 7.6 Hz, 1H), 7.28–7.08 (m, 2H), 2.44 (s, 3H), 2.34 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.5, 189.5, 161.2, 143.7, 143.6, 143.1, 139.9, 137.9, 132.6, 132.3, 129.3, 126.0, 125.6, 122.2, 88.3, 21.2, 20.5; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{17}H_{13}INO_3^-$: 405.9946, found: 405.9937.



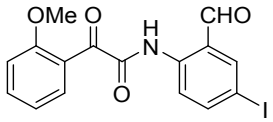
3f

N-(2-formyl-4-iodophenyl)-2-(4-methoxyphenyl)-2-oxoacetamide (**3f**): Yellow solid; 143.2 mg (yield 70%); mp 184-186 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.40 (s, 1H), 9.93 (s, 1H), 8.64 (d, J = 8.4 Hz, 1H), 8.45 (d, J = 8.4 Hz, 2H), 8.04 (s, 1H), 7.94 (d, J = 9.0 Hz, 1H), 6.98 (d, J = 9.6 Hz, 2H), 3.91 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.5, 184.7, 164.4, 161.2, 143.7, 143.2, 137.8, 133.5, 125.5, 125.4, 122.2, 114.1, 88.2, 55.8; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{11}INO_4^-$: 407.9738, found: 407.9741.



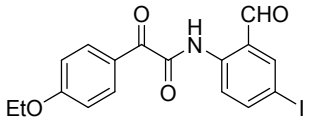
3g

N-(2-formyl-4-iodophenyl)-2-(3-methoxyphenyl)-2-oxoacetamide (**3g**): Yellow solid; 141.1 mg (yield 69%); mp 113-115 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.36 (s, 1H), 9.91 (s, 1H), 8.61 (d, J = 8.4 Hz, 1H), 8.03 (s, 2H), 7.93 (d, J = 8.4 Hz, 1H), 7.85 (s, 1H), 7.41 (t, J = 7.8 Hz, 1H), 7.20 (d, J = 6.0 Hz, 1H), 3.87 (s 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.6, 185.9, 160.4, 159.5, 144.3, 144.2, 138.6, 133.9, 129.6, 124.4, 124.2, 121.8, 121.6, 114.7, 86.5, 55.4.; HRMS (ESI): m/z $[M-H]^-$ calcd for $C_{16}H_{11}INO_4^-$: 407.9738, found: 407.9741.



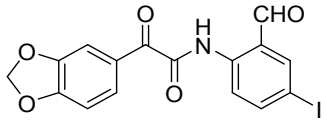
3h

N-(2-formyl-4-iodophenyl)-2-(2-methoxyphenyl)-2-oxoacetamide (**3h**): Yellow solid; 132.9 mg (yield 65%); mp 184-186 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.39 (s, 1H), 9.92 (s, 1H), 8.64 (d, J = 8.4 Hz, 1H), 8.45 (d, J = 8.4 Hz, 2H), 8.03 (s, 1H), 7.94 (d, J = 8.4 Hz, 1H), 6.98 (d, J = 8.4 Hz, 2H), 3.91 (s, 3H).; ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.5, 184.2, 164.8, 161.1, 144.3, 138.7, 134.1, 134.0, 125.8, 124.5, 122.0, 121.9, 121.8, 113.9, 86.3, 55.6; HRMS (ESI): m/z $[M-H]^-$ calcd for $C_{16}H_{11}INO_4^-$: 407.9738, found: 407.9741.



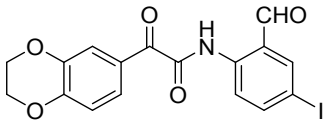
3i

2-(4-ethoxyphenyl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3i**): Yellow solid; 137.5 mg (yield 65%); mp 165-167 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.39 (s, 1H), 9.92 (s, 1H), 8.63 (d, J = 8.4 Hz, 1H), 8.43 (d, J = 7.8 Hz, 2H), 8.03 (s, 1H), 7.93 (d, J = 8.4 Hz, 1H), 6.95 (d, J = 7.8 Hz, 2H), 4.14 (d, J = 6.6 Hz, 2H), 1.46 (t, J = 6.6 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.5, 184.1, 164.3, 161.1, 144.3, 138.8, 134.0, 125.6, 124.5, 121.9, 114.3, 103.8, 86.3, 63.9, 14.6; HRMS (ESI): m/z $[M-H]^-$ calcd for $C_{17}H_{13}INO_4^-$: 421.9895, found: 421.9897.



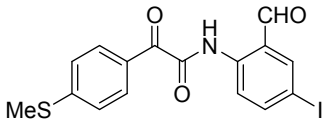
3j

2-(benzo[d][1,3]dioxol-5-yl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3j**): Yellow solid; 129.0 mg (yield 61%); mp 202-204 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.05 (s, 1H), 9.95 (s, 1H), 8.40–8.23 (m, 2H), 8.12-7.94 (m, 2H), 7.66 (s, 1H), 7.11 (d, J = 8.4 Hz, 1H), 6.19 (s, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.5, 184.4, 161.1, 153.0, 147.8, 143.7, 143.1, 137.8, 128.7, 127.0, 125.6, 122.4, 109.4, 108.3, 102.5, 88.3; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_9INO_5^-$: 421.9531, found: 421.9533.



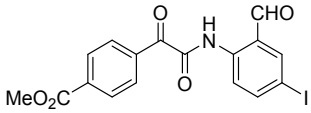
3k

2-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3k**): Yellow solid; 128.9 mg (yield 59%); mp 188-190 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.05 (s, 1H), 9.93 (s, 1H), 8.27 (d, J = 5.6 Hz, 2H), 8.03 (d, J = 8.8 Hz, 1H), 7.86–7.69 (m, 2H), 7.00 (d, J = 8.4 Hz, 1H), 4.33 (d, J = 24.4 Hz, 4H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.6, 184.3, 160.9, 149.5, 143.7, 143.3, 143.0, 137.8, 125.9, 125.4, 122.1, 119.9, 117.3, 88.2, 64.8, 63.9; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{17}H_{11}INO_5^-$: 435.9687, found: 435.9687.



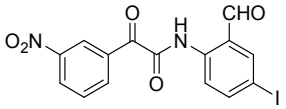
3l

N-(2-formyl-4-iodophenyl)-2-(4-(methylthio)phenyl)-2-oxoacetamide (**3l**): Yellow solid; 131.8 mg (yield 62%); mp 181-183 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.08 (s, 1H), 9.96 (s, 1H), 8.31 (d, J = 11.4 Hz, 2H), 8.17 (d, J = 7.8 Hz, 2H), 8.08 (d, J = 8.4 Hz, 1H), 7.41 (d, J = 7.8 Hz, 2H), 2.56 (s, 3H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.6, 185.3, 161.0, 148.0, 143.7, 143.2, 137.8, 131.3, 128.7, 125.5, 124.6, 122.3, 88.3, 13.8; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{11}INO_3S^-$: 423.9510, found: 423.9506.



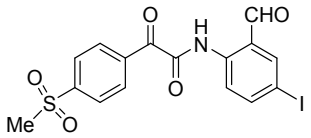
3m

methyl 4-(2-((2-formyl-4-iodophenyl)amino)-2-oxoacetyl)benzoate (**3m**): Yellow solid; 142.0 mg (yield 65%); mp 207-209 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.15 (s, 1H), 9.99 (s, 1H), 8.37-8.27 (m, 4H), 8.14-8.07 (m, 3H), 3.91 (s, 3H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.8, 186.2, 165.5, 160.2, 143.8, 143.4, 137.8, 136.6, 133.9, 131.2, 129.1, 125.5, 122.2, 88.3, 52.6; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{17}H_{11}INO_5^-$: 435.9687, found: 435.9690.



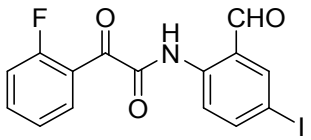
3n

N-(2-formyl-4-iodophenyl)-2-(3-nitrophenyl)-2-oxoacetamide (**4n**): Yellow solid; 127.2 mg (yield 60%); mp 205-207 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.22 (s, 1H), 10.00 (s, 1H), 9.04 (s, 1H), 8.55 (t, J = 8.4 Hz, 2H), 8.37 (d, J = 13.2 Hz, 2H), 8.10 (d, J = 8.4 Hz, 1H), 7.87 (t, J = 7.8 Hz, 1H).; ^{13}C NMR (100 MHz, DMSO-d_6) δ 195.0, 184.3, 159.6, 147.3, 143.8, 143.6, 137.8, 136.8, 134.3, 130.2, 128.2, 125.7, 125.3, 122.0, 88.2; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8IN_2O_5^-$: 422.9483, found: 422.9486.



3o

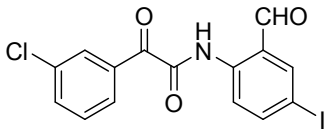
N-(2-formyl-4-iodophenyl)-2-(4-(methylsulfonyl)phenyl)-2-oxoacetamide (**3o**): Yellow solid; 144.0 mg (yield 63%); mp 226-228 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.39 (s, 1H), 9.94 (s, 1H), 8.65 (d, J = 9.0 Hz, 1H), 8.46 (d, J = 8.4 Hz, 2H), 8.04 (s, 1H), 7.95 (d, J = 7.8 Hz, 1H), 6.99 (d, J = 8.4 Hz, 2H), 3.92 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ194.9, 185.8, 159.8, 144.8, 143.8, 143.5, 137.8, 137.0, 131.7, 126.9, 125.4, 122.1, 88.3, 43.1; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{11}INO_5S^-$: 455.9408, found: 455.9411.



3p

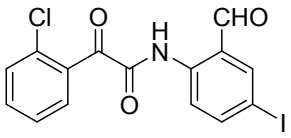
2-(2-fluorophenyl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3p**): Yellow solid; 139.0 mg

(yield 70%); mp 98-100 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.26 (s, 1H), 9.94 (s, 1H), 8.61 (d, J = 9.0 Hz, 1H), 8.06 (d, J = 1.8 Hz, 1H), 7.96 (d, J = 9.0 Hz, 1H), 7.90 (t, J = 6.6 Hz, 1H), 7.65-7.59 (m, 1H), 7.30 (t, J = 7.2 Hz, 1H), 7.20 (t, J = 9.6 Hz, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.7, 186.9, 160.0, 144.5, 144.3, 138.6, 135.7, 131.9, 124.3, 122.4, 122.1, 116.7, 116.5, 108.6, 86.8; ^{19}F NMR (376 MHz, $CDCl_3$) δ -109.45; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8FINO_3^-$: 395.9538, found: 395.9541.



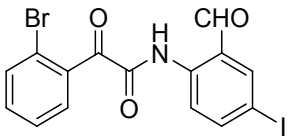
3q

2-(3-chlorophenyl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3q**): Yellow solid; 144.9 mg (yield 70%); mp 165-167 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.12 (s, 1H), 9.97 (s, 1H), 8.32 (d, J = 8.4 Hz, 2H), 8.22 (s, 1H), 8.13 (d, J = 7.6 Hz, 1H), 8.07 (d, J = 8.4 Hz, 1H), 7.79 (d, J = 7.6 Hz, 1H), 7.62 (t, J = 8.0 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 195.3, 185.6, 160.4, 144.2, 143.9, 138.2, 135.2, 134.3, 133.6, 131.0, 130.9, 129.9, 125.8, 122.6, 88.7; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8ClINO_3^-$:411.9243, found: 411.9237.



3r

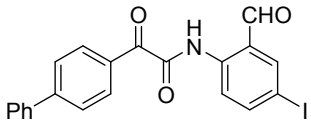
2-(2-chlorophenyl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3r**): Yellow solid; 157.3 mg (yield 76%); mp 155-157 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.34 (s, 1H), 9.94 (s, 1H), 8.59 (d, J = 9.0 Hz, 1H), 8.06 (s, 1H), 7.94 (d, J = 9.0 Hz, 1H), 7.69 (d, J = 7.8 Hz, 1H), 7.54–7.44 (m, 2H), 7.41 (t, J = 7.2 Hz, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.7, 189.1, 159.5, 144.4, 144.3, 138.5, 133.3, 133.1, 131.1, 130.3, 126.7, 124.4, 122.0, 121.9, 86.8; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8ClINO_3^-$: 411.9243, found: 411.9245.



3s

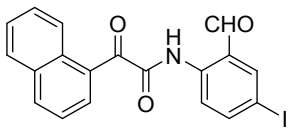
2-(2-bromophenyl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3s**): Yellow solid; 164.9 mg (yield 72%); mp 155-157 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.35 (s, 1H), 9.92 (s, 1H), 8.56 (d, J

= 9.0 Hz, 1H), 8.04 (s, 1H), 7.91 (d, *J* = 7.2 Hz, 1H), 7.64 (t, *J* = 6.6, 2H), 7.48-7.35 (m, 2H).; ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.7, 189.5, 159.0, 144.3, 144.1, 138.4, 135.5, 133.3, 133.1, 131.0, 127.2, 124.3, 121.8, 120.8, 86.8; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8BrINO_3^-$: 455.8738, found: 455.8741.



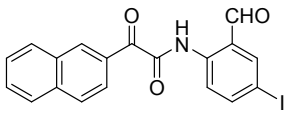
3t

2-([1,1'-biphenyl]-4-yl)-N-(2-formyl-4-iodophenyl)-2-oxoacetamide (**3t**): Yellow solid; 125.1 mg (yield 55%); mp 124-126 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.13 (s, 1H), 9.95 (s, 1H), 8.41–8.21 (m, 4H), 8.03 (d, *J* = 8.4 Hz, 1H), 7.84 (d, *J* = 7.8 Hz, 2H), 7.74 (d, *J* = 7.2 Hz, 2H), 7.49 (t, *J* = 7.2 Hz, 2H), 7.43 (t, *J* = 7.2 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.7, 185.9, 160.7, 145.7, 143.8, 143.4, 138.6, 137.8, 131.7, 131.6, 129.2, 128.8, 127.1, 126.7, 125.4, 122.2, 88.3; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{21}H_{13}INO_3^-$: 453.9946, found: 453.9944.



3u

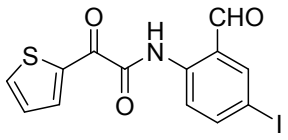
N-(2-formyl-4-iodophenyl)-2-(naphthalen-1-yl)-2-oxoacetamide (**3u**): Yellow solid; 139.4 mg (yield 65%); mp 148-150 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.55 (s, 1H), 9.93 (s, 1H), 8.65 (t, *J* = 6.6 Hz, 2H), 8.32 (d, *J* = 7.2 Hz, 1H), 8.10 (d, *J* = 7.8 Hz, 1H), 8.03 (s, 1H), 7.92 (t, *J* = 9.6 Hz, 2H), 7.64 (t, *J* = 7.2 Hz, 1H), 7.60–7.52 (m, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.7, 188.7, 160.8, 144.3, 138.7, 134.9, 133.8, 133.2, 131.2, 129.0, 128.7, 128.6, 126.7, 125.4, 125.3, 124.4, 124.1, 121.9, 86.6; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{19}H_{11}INO_3^-$: 427.9789, found: 427.9792.



3v

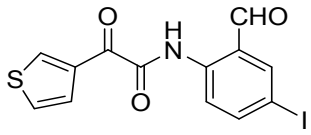
N-(2-formyl-4-iodophenyl)-2-(naphthalen-2-yl)-2-oxoacetamide (**3v**): Yellow solid; 141.6 mg (yield 66%); mp 148-150 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.40 (s, 1H), 9.85 (s, 1H), 9.14 (s, 1H), 8.60 (d, *J* = 9.0 Hz, 1H), 8.20 (d, *J* = 7.8 Hz, 1H), 8.00-7.92 (m, 2H), 7.90–7.80 (m, 3H), 7.63–7.61 (t, *J* = 7.8 Hz, 1H), 7.53 (t, *J* = 7.2 Hz, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.6, 185.6, 160.5,

144.2, 138.5, 136.0, 134.9, 134.8, 132.1, 130.3, 130.0, 129.4, 128.4, 127.7, 126.8, 125.3, 124.3, 121.8, 86.5; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{19}H_{11}INO_3^-$: 427.9789, found: 427.9792.



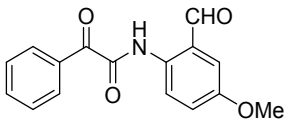
3w

N-(2-formyl-4-iodophenyl)-2-oxo-2-(thiophen-2-yl)acetamide (**3w**): Yellow solid; 115.5 mg (yield 60%); mp 149-151 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.53 (s, 1H), 9.92 (s, 1H), 8.60 (d, J = 9.0 Hz, 1H), 8.43 (d, J = 3.0 Hz, 1H), 8.03 (s, 1H), 7.92 (d, J = 9.0 Hz, 1H), 7.88 (d, J = 4.2 Hz, 1H), 7.22 (t, J = 4.8 Hz, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.6, 193.3, 177.1, 159.7, 144.2, 139.0, 138.3, 138.2, 136.0, 128.3, 124.5, 121.9, 86.8. HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{13}H_7INO_3S^-$: 383.9197, found: 383.9199.



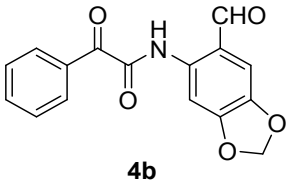
3x

N-(2-formyl-4-iodophenyl)-2-oxo-2-(thiophen-3-yl)acetamide (**3x**): Yellow solid; 121.3 mg (yield 63%); mp 139-141 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.49 (s, 1H), 9.93 (s, 1H), 9.11 (s, 1H), 8.61 (d, J = 9.0 Hz, 1H), 8.03 (s, 1H), 7.93 (d, J = 8.4 Hz, 1H), 7.85 (d, J = 4.8 Hz, 1H), 7.38–7.32 (m, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.5, 178.8, 160.1, 144.3, 139.4, 138.5, 136.5, 128.9, 125.9, 124.5, 121.8, 86.6; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{13}H_7INO_3S^-$: 383.9197, found: 383.9199.



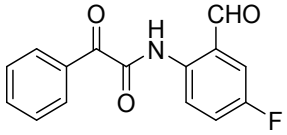
4a

N-(2-formyl-4-methoxyphenyl)-2-oxo-2-phenylacetamide (**4a**): Yellow solid; 82.1 mg (yield 58%); mp 110-112 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.16 (s, 1H), 9.91 (s, 1H), 8.73 (d, J = 9.6 Hz, 1H), 8.37 (d, J = 7.8 Hz, 2H), 7.62 (t, J = 7.2 Hz, 1H), 7.48 (t, J = 7.8 Hz, 2H), 7.20 (d, J = 3.0 Hz, 1H), 7.18-7.14 (m, 1H), 3.83 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 194.3, 186.7, 159.9, 155.8, 134.2, 133.0, 132.3, 131.1, 128.3, 123.6, 121.5, 121.2, 120.0, 55.5. HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{12}NO_4^-$: 282.0772, found: 282.0773.



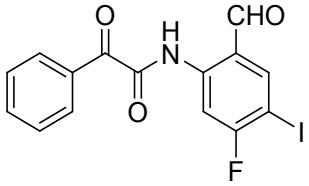
4b

N-(6-formylbenzo[d][1,3]dioxol-5-yl)-2-oxo-2-phenylacetamide (**4b**): Yellow solid; 81.7 mg (yield 55%); mp 163-165 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.31 (s, 1H), 9.82 (s, 1H), 8.22 (d, J = 7.8 Hz, 2H), 8.05 (s, 1H), 7.74 (t, J = 7.2 Hz, 1H), 7.59 (t, J = 7.2 Hz, 2H), 7.45 (s, 1H), 6.20 (s, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 193.0, 186.9, 160.7, 152.9, 144.1, 135.9, 134.5, 132.8, 130.8, 128.6, 118.0, 112.5, 102.9, 101.0; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_{10}NO_5^-$: 296.0564, found: 296.0566.



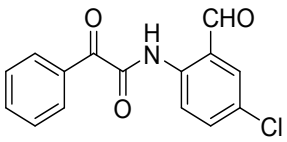
4c

N-(4-fluoro-2-formylphenyl)-2-oxo-2-phenylacetamide (**4c**): Yellow solid; 88.1 mg (yield 65%); mp 140-142 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 11.89 (s, 1H), 10.02 (s, 1H), 8.41-8.34 (m, 1H), 8.20 (d, J = 7.2 Hz, 2H), 7.82 (d, J = 7.2 Hz, 1H), 7.75 (t, J = 7.8 Hz, 1H), 7.65 (t, J = 7.2 Hz, 1H), 7.59 (t, J = 7.8 Hz, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.6, 186.5, 160.3, 157.7, 135.4, 134.6, 132.9, 131.2, 128.5, 123.9, 122.8, 122.2, 121.4; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_9FNO_3^-$: 270.0572, found: 270.0573.



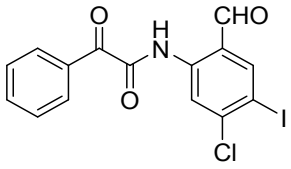
4d

N-(5-fluoro-2-formylphenyl)-2-oxo-2-phenylacetamide (**4d**): Yellow solid; 111.2 mg (yield 56%); mp 124-126 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.28 (s, 1H), 9.91 (s, 1H), 8.44 (d, J = 5.4 Hz, 1H), 8.32 (d, J = 10.2 Hz, 1H), 8.20 (d, J = 7.2 Hz, 2H), 7.72 (t, J = 7.2 Hz, 1H), 7.56 (t, J = 7.2 Hz, 2H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.1, 185.7, 165.6, 163.9, 160.3, 146.7, 140.2, 134.5, 132.6, 130.9, 128.5, 121.8, 106.7, 106.5, 76.0, 75.8; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8FINO_3^-$: 395.9538, found: 395.9530.



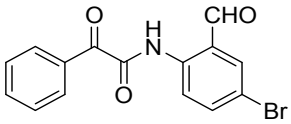
4e

N-(4-chloro-2-formylphenyl)-2-oxo-2-phenylacetamide (**4e**): Yellow solid; 97.9 mg (yield 68%); mp 138-140 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.06 (s, 1H), 9.99 (s, 1H), 8.47 (d, J = 8.4 Hz, 1H), 8.20 (d, J = 7.8 Hz, 2H), 8.03 (s, 1H), 7.79 (d, J = 9.0 Hz, 1H), 7.73 (t, J = 7.2 Hz, 1H), 7.58 (t, J = 7.2 Hz, 2H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.3, 186.7, 160.8, 137.0, 135.1, 134.6, 134.1, 132.8, 130.8, 128.6, 128.5, 125.3, 122.3; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_9ClNO_3^-$: 286.0276, found: 286.0278.



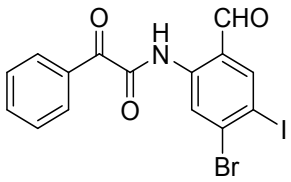
4f

N-(5-chloro-2-formylphenyl)-2-oxo-2-phenylacetamide (**4f**): Yellow solid; 132.5 mg (yield 64%); mp 148-150 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.14 (s, 1H), 9.92 (s, 1H), 8.65 (s, 1H), 8.46 (s, 1H), 8.20 (d, J = 7.8 Hz, 2H), 7.73 (t, J = 7.2 Hz, 1H), 7.56 (t, J = 7.2 Hz, 2H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.2, 185.7, 160.2, 146.3, 144.3, 138.5, 134.5, 132.5, 130.9, 128.4, 123.1, 119.7, 92.3; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8ClINO_3^-$: 411.9243, found: 411.9231.



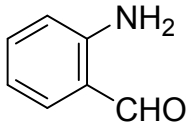
4g

N-(4-bromo-2-formylphenyl)-2-oxo-2-phenylacetamide (**4g**): Yellow solid; 106.2 mg (yield 64%); mp 120-122 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.38 (s, 1H), 9.94 (s, 1H), 8.78 (d, J = 9.0 Hz, 1H), 8.38 (d, J = 6.6 Hz, 2H), 7.87 (s, 1H), 7.77 (d, J = 7.2 Hz, 1H), 7.66 (t, J = 6.6 Hz, 1H), 7.52 (t, J = 7.2 Hz, 2H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 193.7, 186.3, 160.5, 138.6, 138.3, 138.1, 134.6, 132.9, 131.3, 128.6, 124.2, 121.8, 116.6; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_9BrNO_3^-$: 329.9771, found: 329.9773.



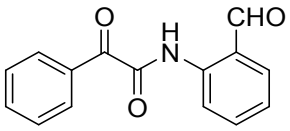
4h

N-(5-bromo-2-formylphenyl)-2-oxo-2-phenylacetamide (**4h**): Yellow solid; 135.1 mg (yield 59%); mp 142-144 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.10 (s, 1H), 9.92 (s, 1H), 8.83 (s, 1H), 8.44 (s, 1H), 8.21 (d, J = 7.8 Hz, 2H), 7.73 (t, J = 7.2 Hz, 1H), 7.57 (t, J = 7.8 Hz, 2H); ^{13}C NMR (150 MHz, DMSO-d_6) δ 194.3, 185.8, 160.2, 145.9, 138.2, 136.8, 134.5, 132.5, 130.9, 128.5, 123.5, 123.2, 95.6; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{15}H_8BrINO_3^-$: 455.8738, found: 455.8721.



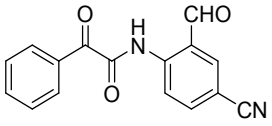
5

2-aminobenzaldehyde (**5**): Yellow solid; 30.3 mg (yield 25%); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.81 (s, 1H), 7.51 (d, J = 7.6 Hz, 1H), 7.29 (t, J = 7.6 Hz, 1H), 7.16 (s, 2H), 6.77 (d, J = 8.4 Hz, 1H), 6.62 (t, J = 7.6 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.1, 150.8, 135.7, 135.1, 117.8, 115.9, 115.0; The ^{1}H NMR and ^{13}C NMR spectra data are consistent with the reported literature.



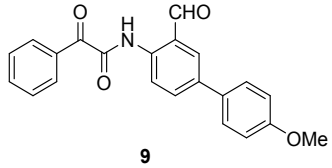
6

N-(2-formylphenyl)-2-oxo-2-phenylacetamide (**6**): Yellow solid; 121.4 mg (yield 80%); mp 110-112 °C; ^{1}H NMR (600 MHz, $CDCl_3$) δ 12.45 (s, 1H), 9.98 (s, 1H), 8.82 (d, J = 8.4 Hz, 1H), 8.37 (d, J = 7.8 Hz, 2H), 7.74 (d, J = 7.2 Hz, 1H), 7.71-7.60 (m, 2H), 7.50 (t, J = 7.8 Hz, 2H), 7.40-7.27 (m, 1H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 194.9, 186.5, 160.4, 138.9, 136.1, 135.8, 134.4, 132.9, 131.1, 128.4, 124.1, 122.7, 119.9; The ^{1}H NMR and ^{13}C NMR spectra data are consistent with the reported literature.



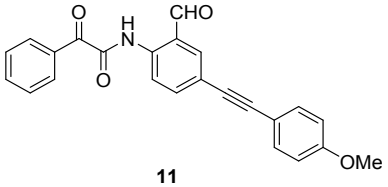
7

N-(4-cyano-2-formylphenyl)-2-oxo-2-phenylacetamide (**7**): Purple solid; 33.4 mg (yield 60%); mp 110-112 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.38 (s, 1H), 10.04 (s, 1H), 8.68 (d, J = 8.4 Hz, 1H), 8.53 (s, 1H), 8.30-8.14 (m, 3H), 7.75 (t, J = 7.2 Hz, 1H), 7.59 (t, J = 7.2 Hz, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 193.4, 185.1, 159.8, 140.7, 138.7, 137.7, 133.6, 131.7, 129.9, 127.6, 122.6, 119.5, 116.8, 105.6; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{16}H_9N_2O_3^-$: 277.0619, found: 277.0609.



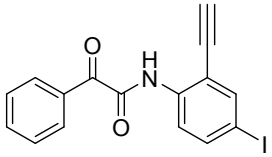
9

N-(3-formyl-4'-methoxy-[1,1'-biphenyl]-4-yl)-2-oxo-2-phenylacetamide (**9**): Yellow solid; 66.1 mg (yield 92%); mp 110-112 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.17 (s, 1H), 10.11 (s, 1H), 8.59 (d, J = 8.8 Hz, 1H), 8.29–8.20 (m, 3H), 8.03 (d, J = 8.4 Hz, 1H), 7.77–7.67 (m, 3H), 7.59 (t, J = 7.6 Hz, 2H), 7.05 (d, J = 8.4 Hz, 2H), 3.80 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 196.0, 187.0, 160.6, 159.3, 136.7, 135.9, 134.5, 133.0, 132.9, 132.8, 130.9, 130.3, 128.6, 127.6, 124.1, 120.6, 114.5, 55.2; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{22}H_{16}NO_4^-$: 358.1085, found: 358.1095.



11

N-(2-formyl-4-((4-methoxyphenyl)ethynyl)phenyl)-2-oxo-2-phenylacetamide (**11**): Yellow solid; 64.3 mg (yield 84%); mp 110-112 °C; ^{1}H NMR (600 MHz, DMSO-d_6) δ 12.23 (s, 1H), 10.03 (s, 1H), 8.58 (d, J = 8.4 Hz, 1H), 8.22 (d, J = 7.2 Hz, 2H), 8.15 (s, 1H), 7.87 (d, J = 7.8 Hz, 1H), 7.74 (t, J = 7.2 Hz, 1H), 7.58 (t, J = 7.2 Hz, 2H), 7.50 (d, J = 8.4 Hz, 2H), 6.98 (d, J = 7.8 Hz, 2H), 3.79 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 194.4, 185.6, 159.6, 158.7, 137.3, 136.79, 136.75, 133.5, 132.0, 131.8, 129.9, 127.6, 122.7, 119.3, 117.7, 113.5, 112.8, 89.5, 85.5, 54.3; HRMS (ESI): m/z [M-H]$^-$ calcd for $C_{24}H_{16}NO_4^-$: 382.1085, found: 382.1090.

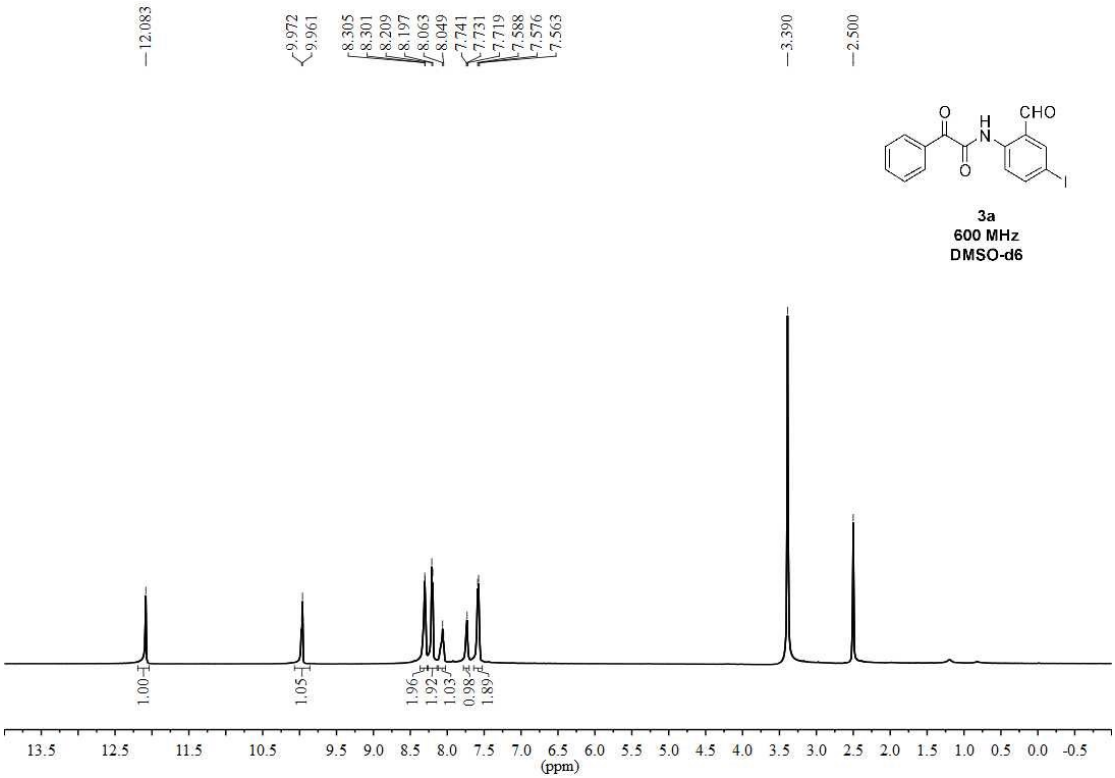


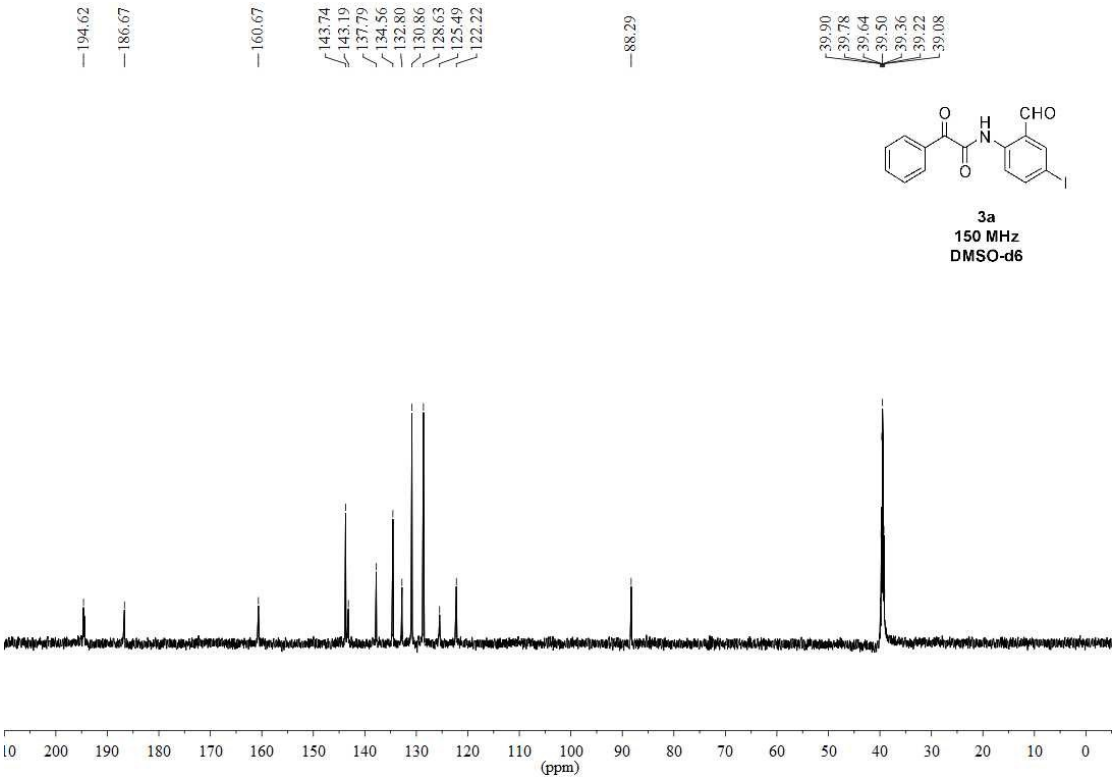
13

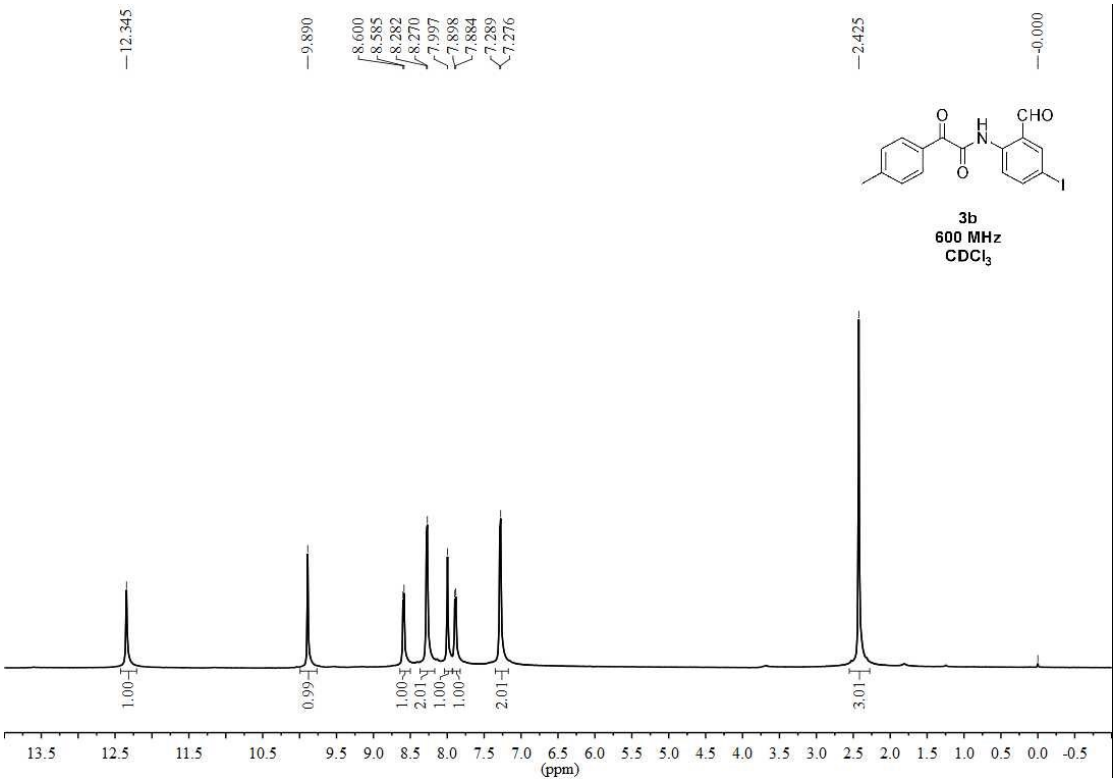
N-(2-ethynyl-4-iodophenyl)-2-oxo-2-phenylacetamide (**13**): Yellow solid; 108.7 mg (yield 58%); mp 200-202 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 11.31 (s, 1H), 9.93 (s, 1H), 8.18 (s, 1H), 8.01 (d,

J = 7.6 Hz, 1H), 7.87 (d, *J* = 6.8 Hz, 1H), 7.65 (s, 2H), 7.55 (d, *J* = 6.0 Hz, 1H), 7.50 (d, *J* = 6.4 Hz, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 192.7, 150.9, 143.4, 140.8, 138.0, 132.5, 130.9, 129.1, 126.5, 124.0, 118.9, 88.9, 85.9, 83.4; HRMS (ESI): m/z $[M+H]^+$ calcd for $C_{16}H_{11}INO_2^+$ 375.9829, found 375.9825.

8. Copies of ^{1}H NMR and ^{13}C NMR spectra



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8.270
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7.898
7.884
7.289
7.276
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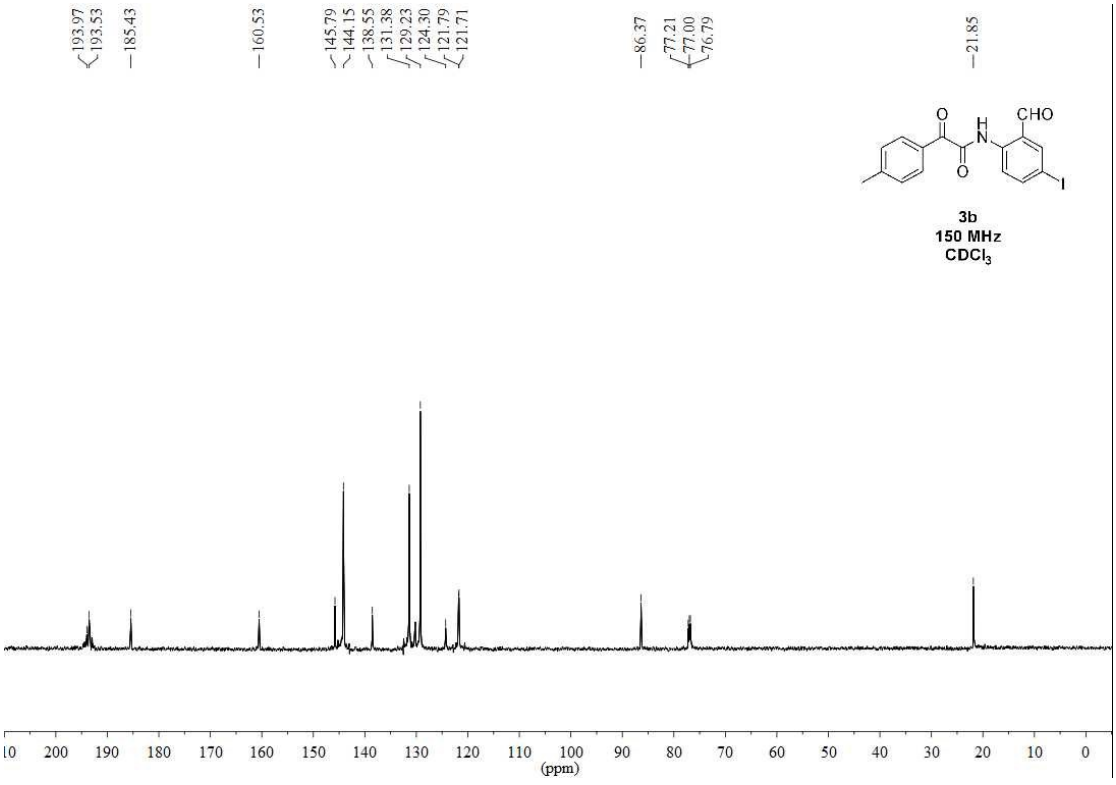
0.000
CHO
3b
600 MHz
CDCl3
1.00
0.99
1.00
2.01
1.00
1.00
2.01
3.01
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)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121.79
121.71
86.37
77.21
77.00
76.79
21.85
CHO
3b
150 MHz
CDCl3
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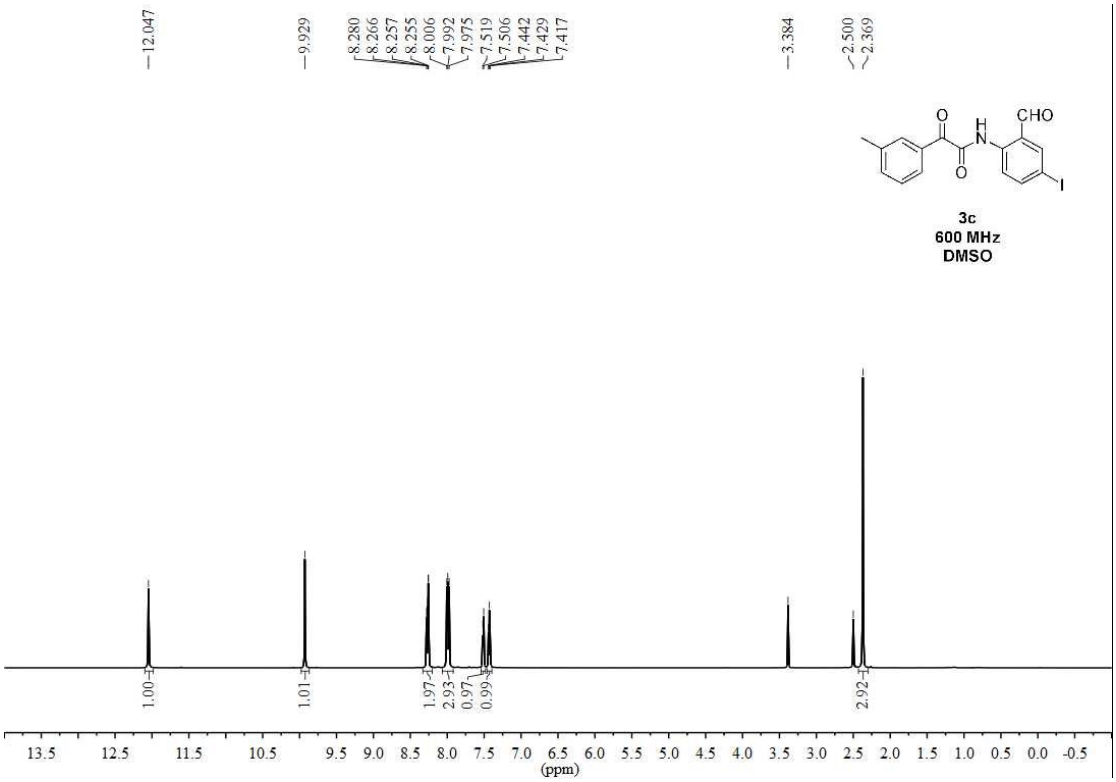
(ppm)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7.519
7.506
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7.429
7.417
3.384
2.500
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DMSO
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2.93
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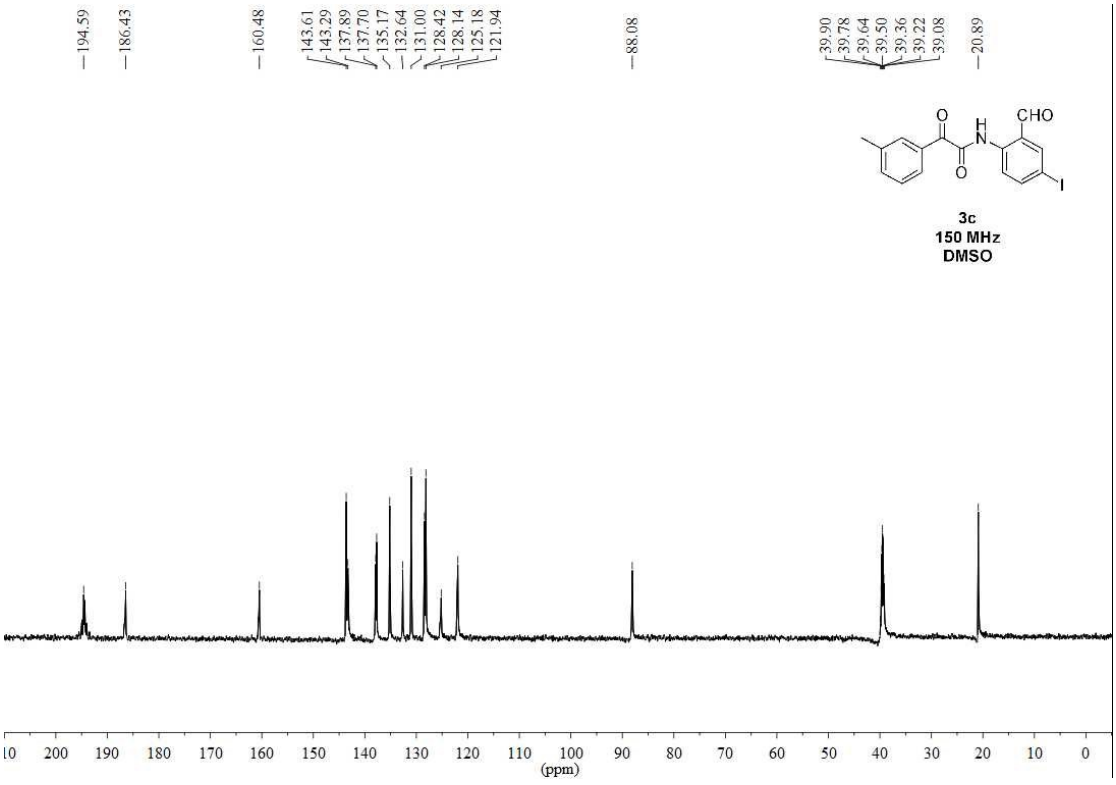
0.99
2.92
(ppm)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132.64
131.00
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128.14
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121.94
88.08
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39.64
39.50
39.36
39.22
39.08
20.89
CHO
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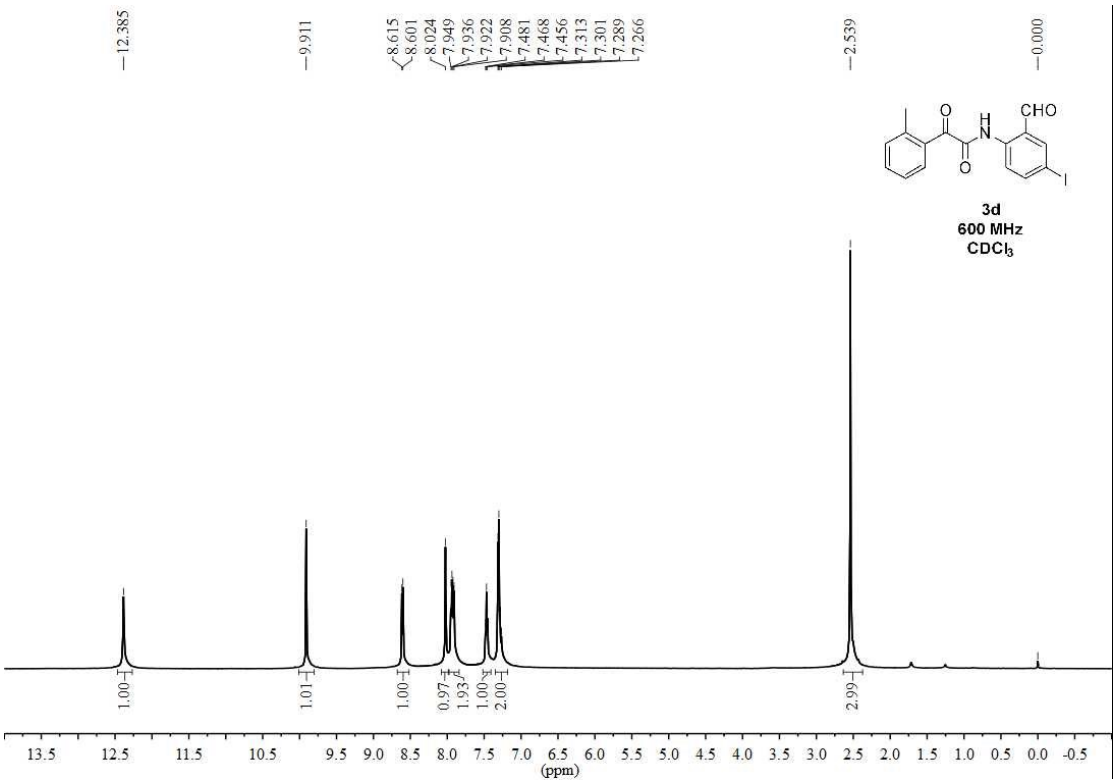
150 MHz
DMSO
(ppm)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7.301
7.289
7.266
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1.93
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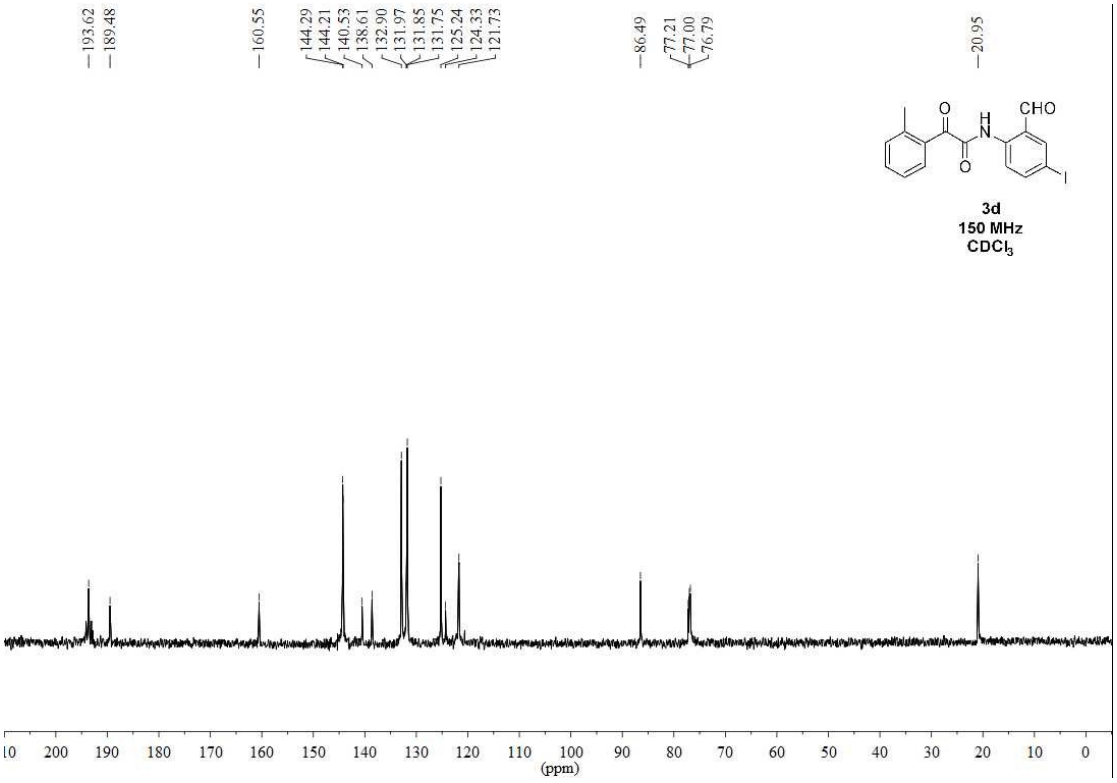
2.00
2.99
(ppm)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131.75
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76.79
20.95
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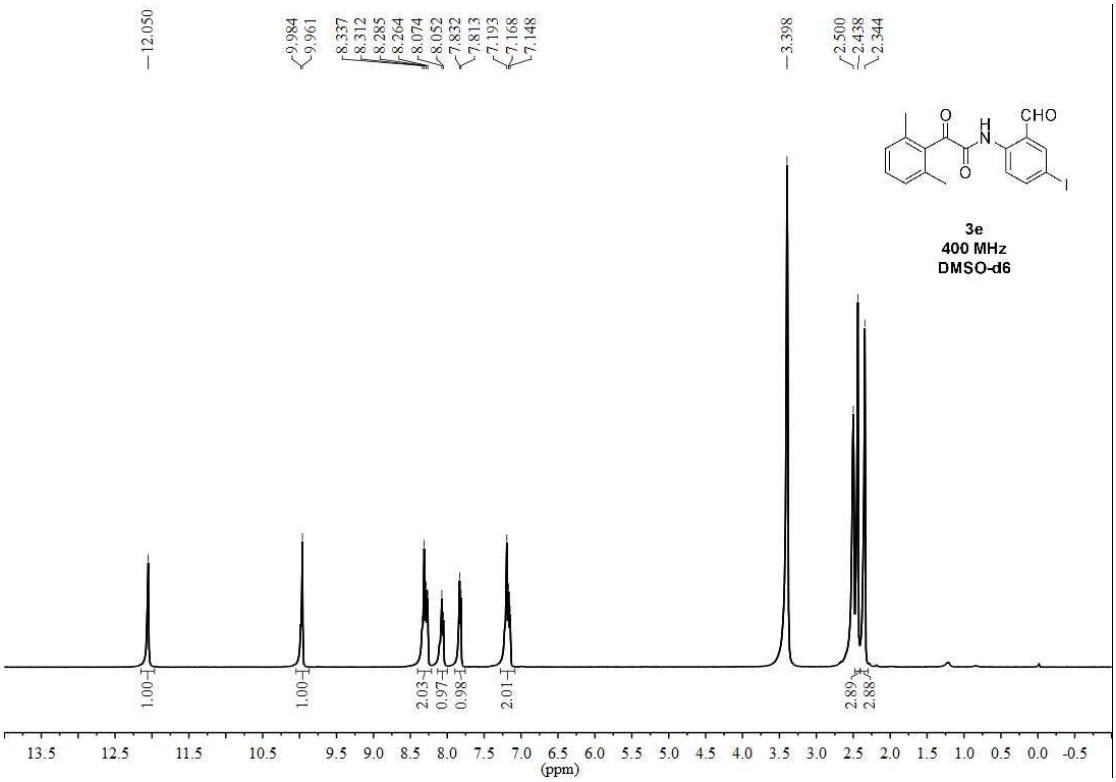
3d
150 MHz
CDCl3
(ppm)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3.398
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2.438
2.344
CHO
3e
400 MHz
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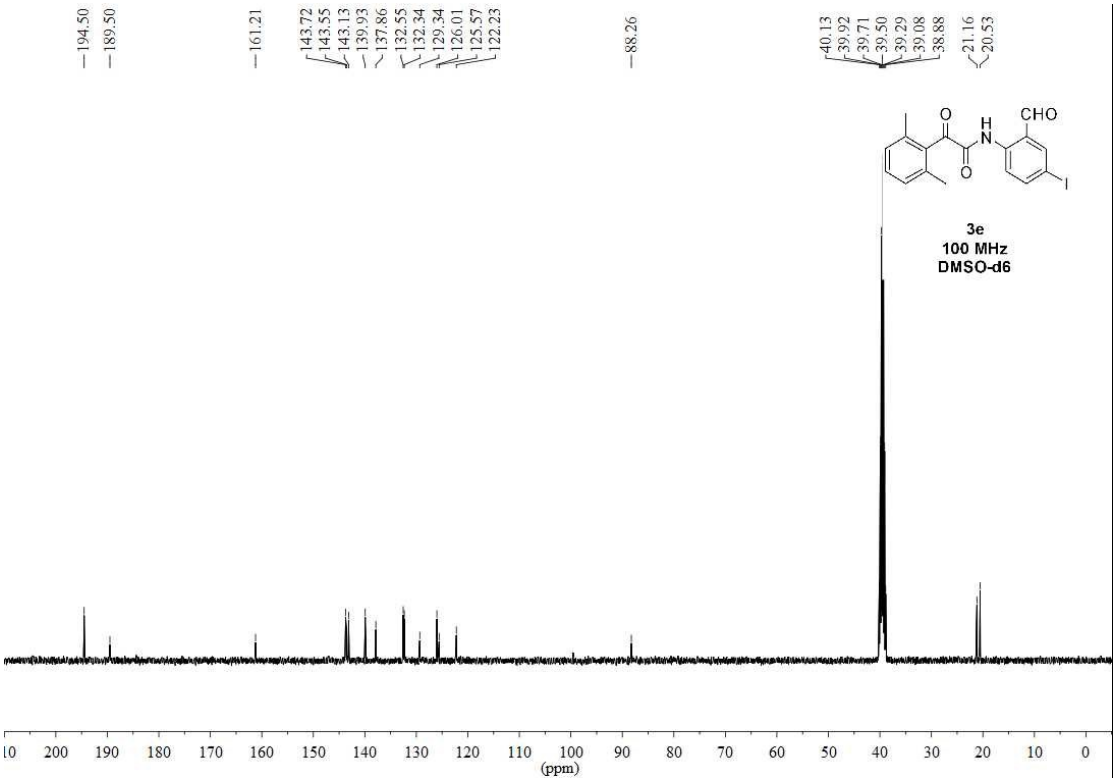
0.98
2.01
2.89
2.88
(ppm)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143.55
143.13
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132.34
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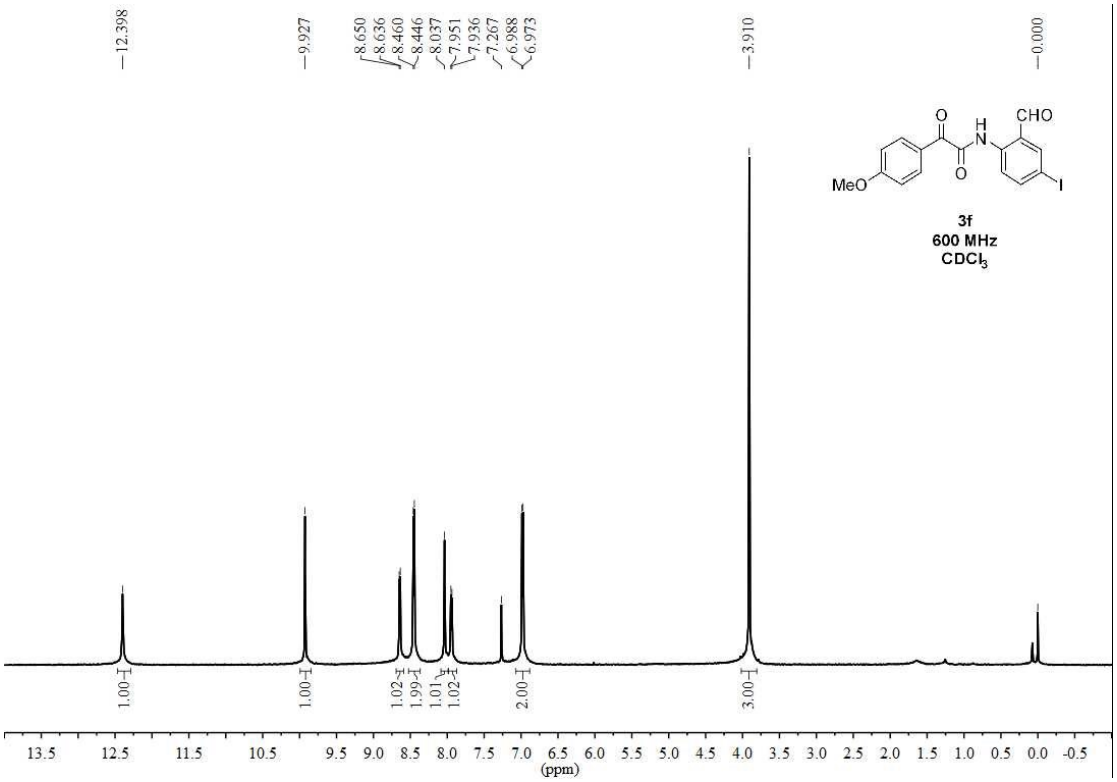
122.23
88.26
40.13
39.92
39.71
39.50
39.29
39.08
38.88
21.16
20.53
CHO
3e
100 MHz
DMSO-d6
(ppm)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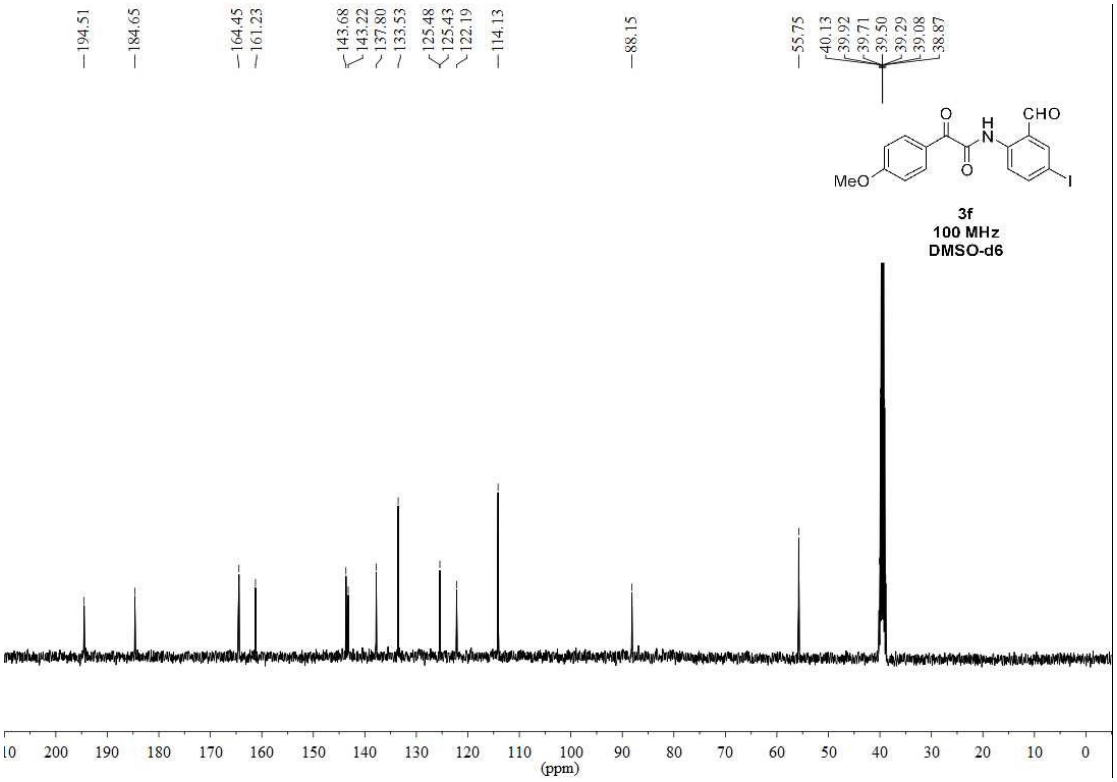
7.267
6.988
6.973
3.910
0.000
1.00
1.00
1.02
1.99
1.01
1.02
2.00
3.00
(ppm)
3f
600 MHz
CDCl3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125.43
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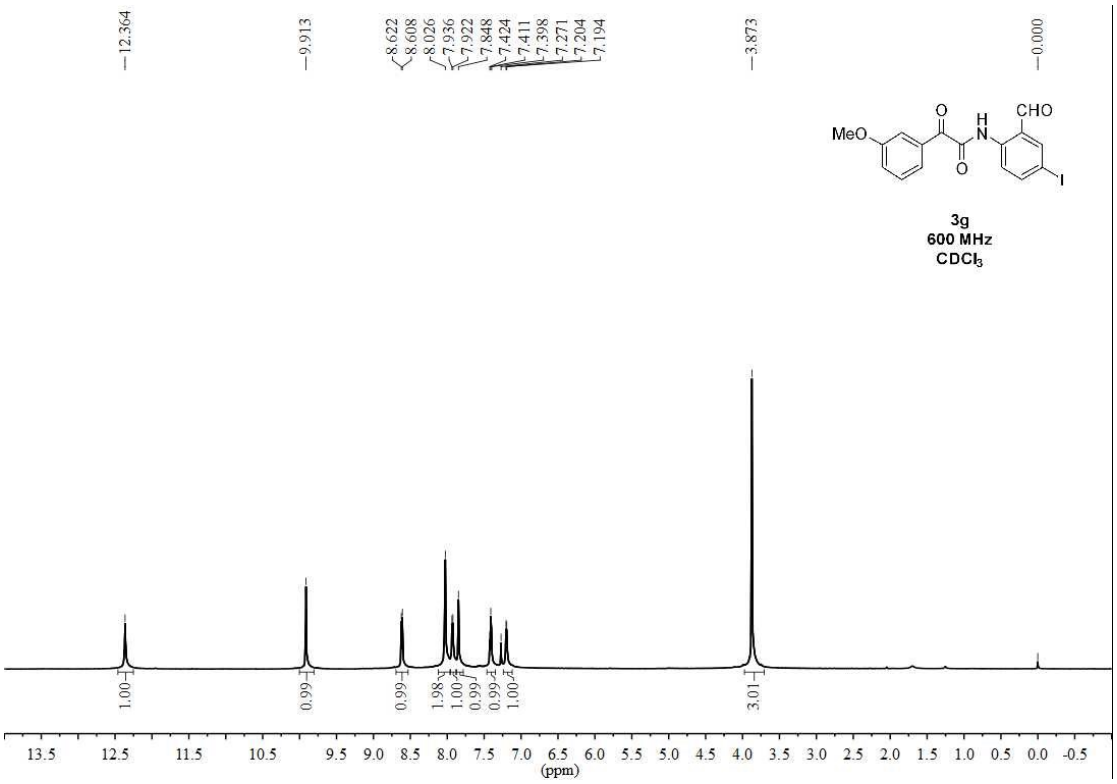
39.71
39.50
39.29
39.08
38.87
(ppm)
3f
100 MHz
DMSO-d6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7.204
7.194
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MeO
CHO
3g
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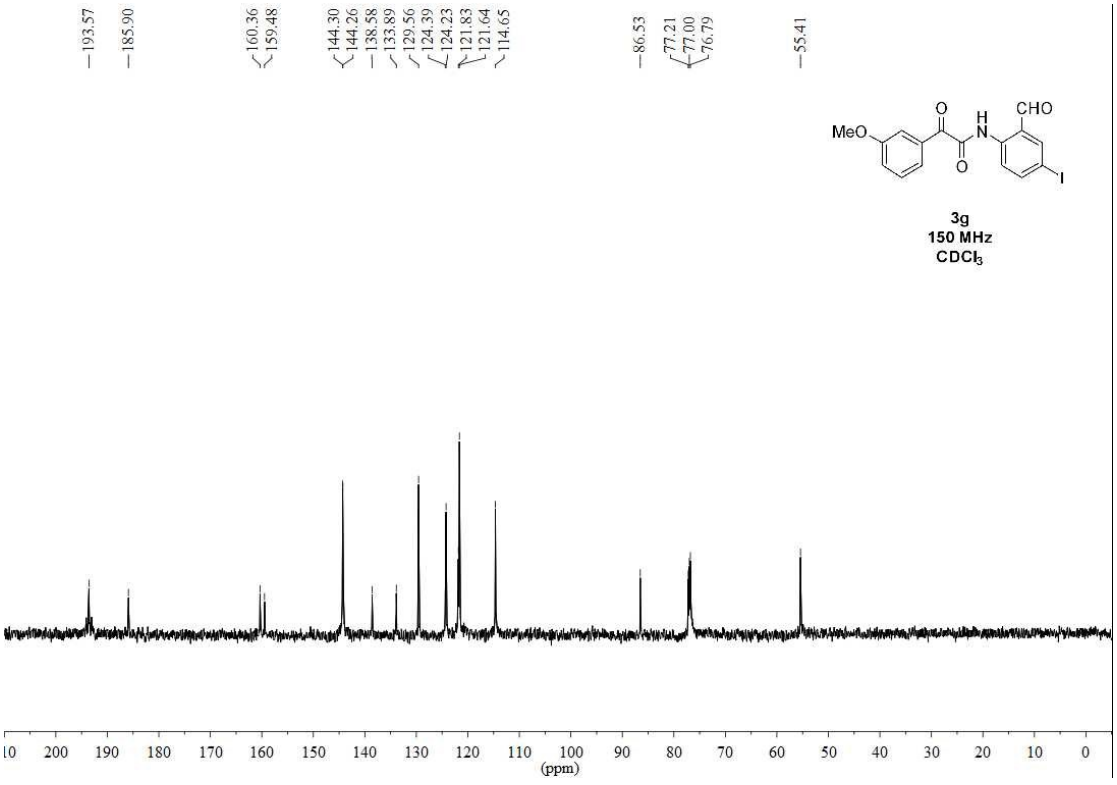
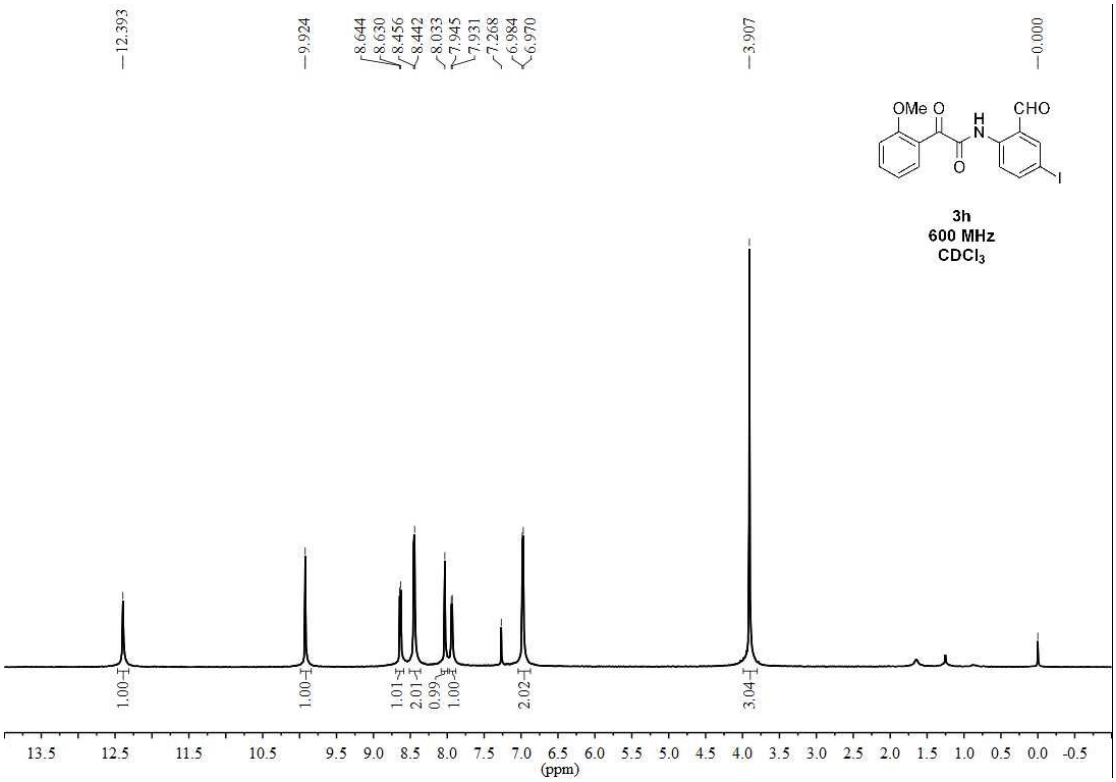
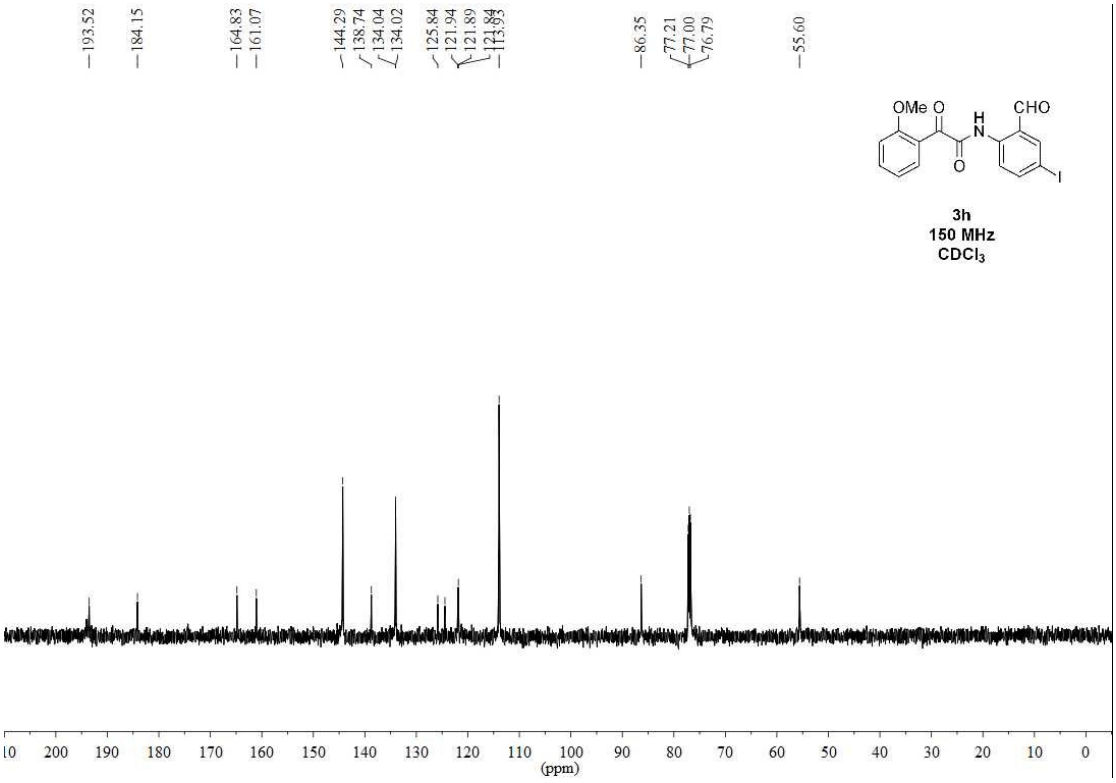
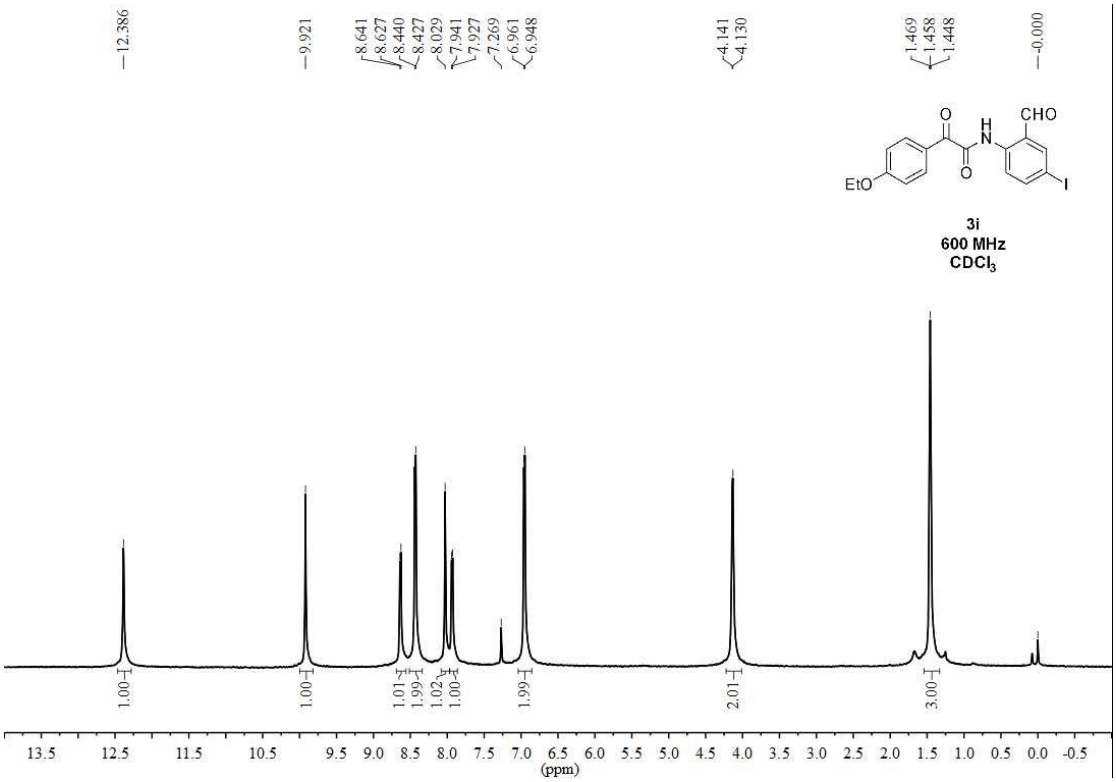
CDCl3
1.00
0.99
0.99
1.98
1.00
0.99
0.99
1.00
3.01
(ppm)


193.57
185.90
160.36
159.48
144.30
144.26
138.58
133.89
129.56
124.39
124.23
121.83
121.64
114.65
86.53
77.21
77.00
76.79
55.41
MeO
CHO
3g
150 MHz
CDCl3
(ppm)


12.393
9.924
8.644
8.630
8.456
8.442
8.033
7.945
7.931
7.268
6.984
6.970
3.907
0.000
OMe O
CHO
H
N
O
I
3h
600 MHz
CDCl3
1.00
1.00
1.01
2.01
0.99
1.00
2.02
3.04
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)


193.52
184.15
164.83
161.07
144.29
138.74
134.04
134.02
125.84
121.94
121.89
121.84
113.93
86.35
77.21
77.00
76.79
55.60
OMe O
CHO
H
N
O
I
3h
150 MHz
CDCl3
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)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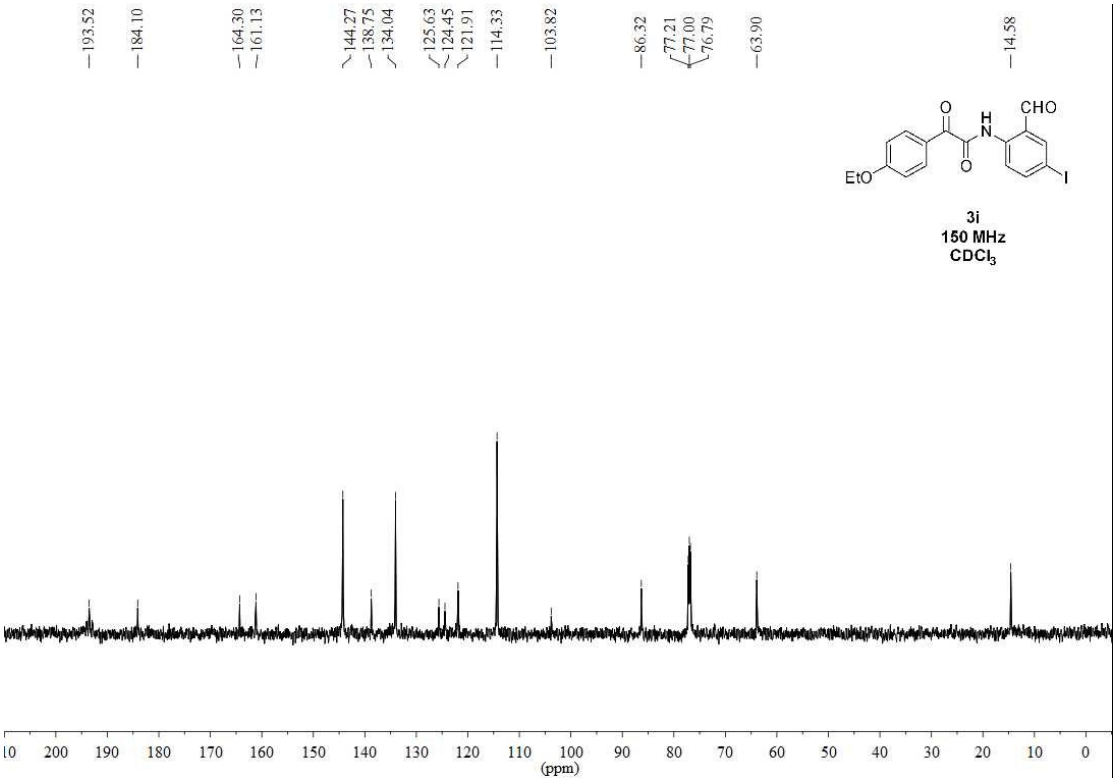
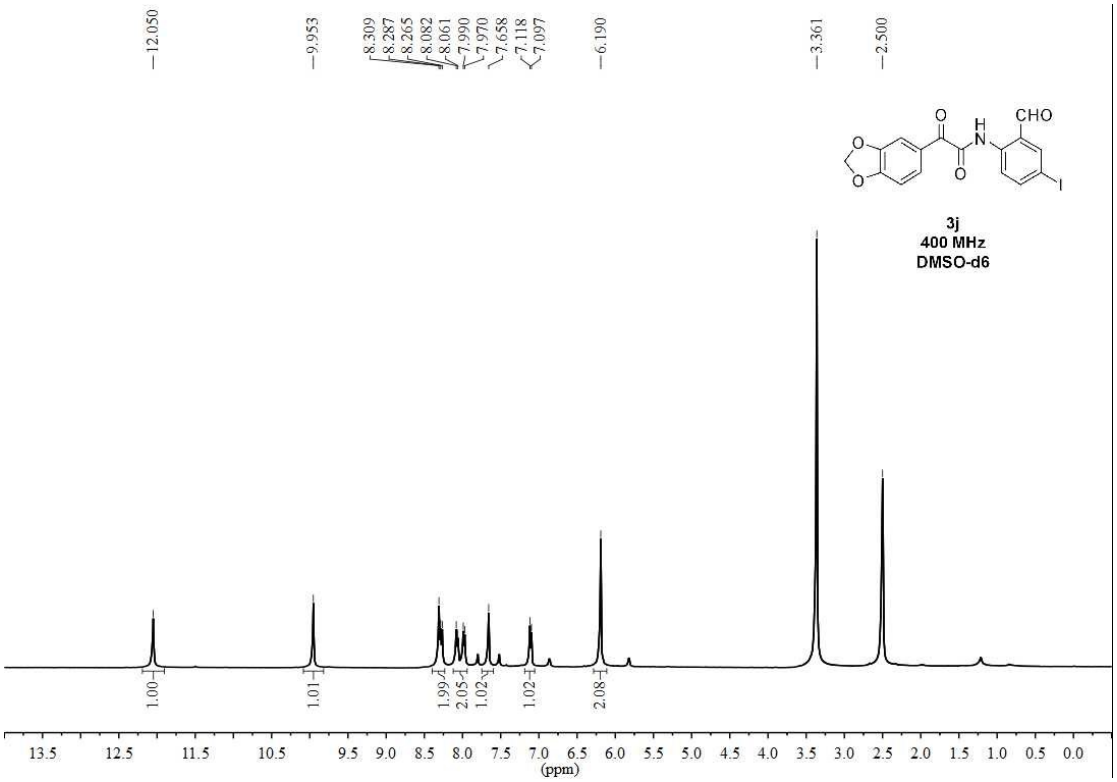
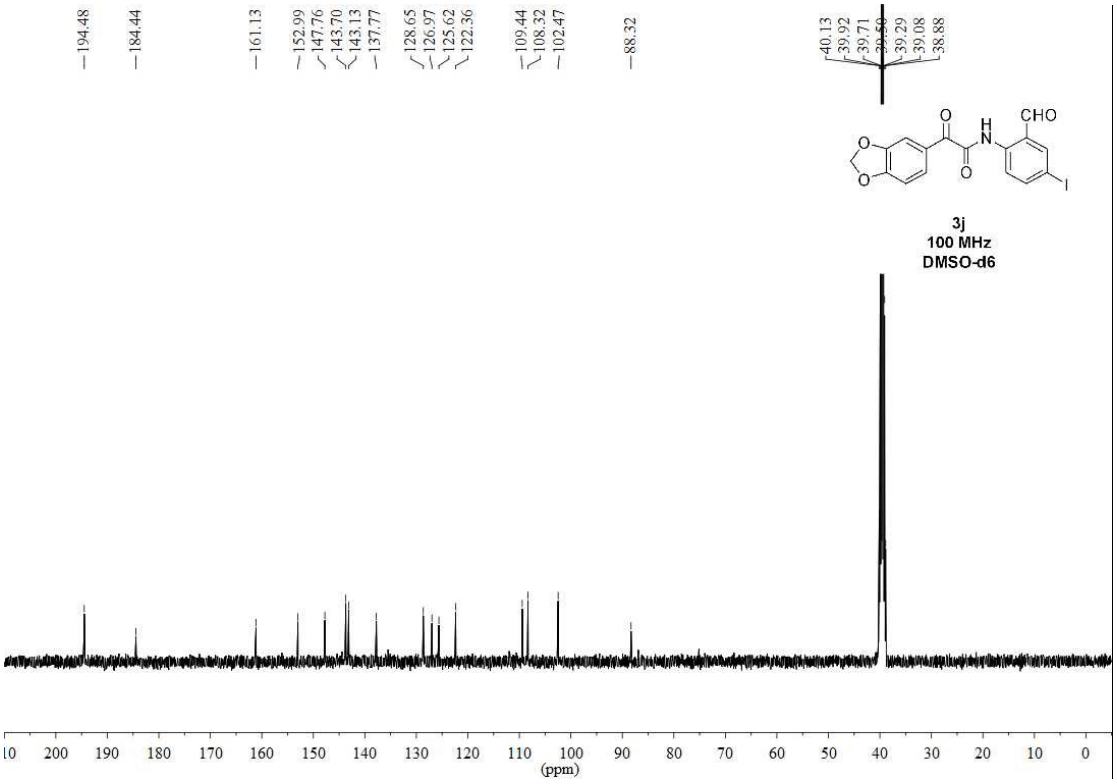
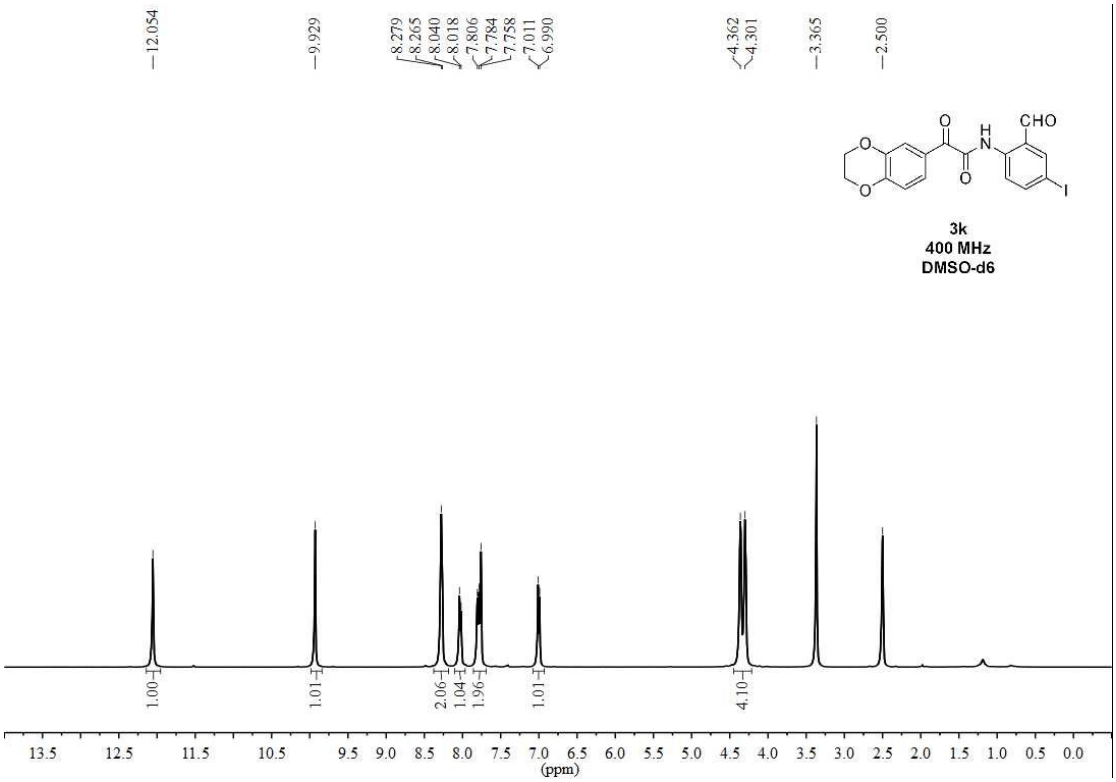
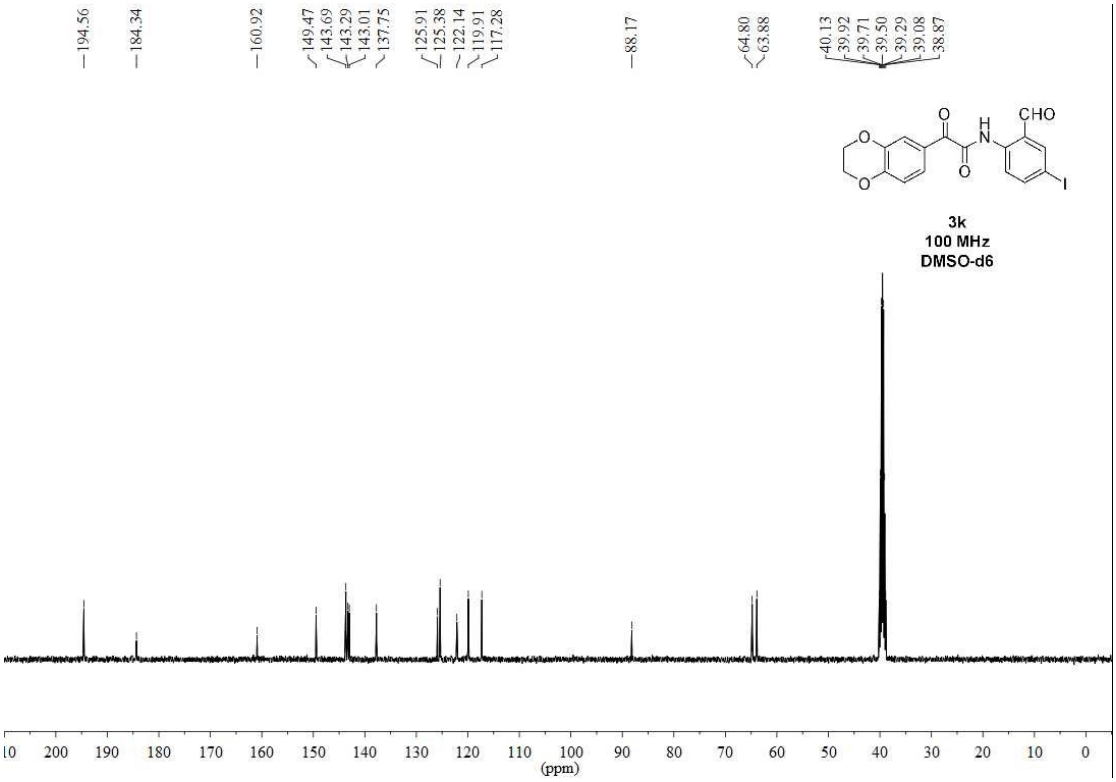
9.921
8.641
8.627
8.440
8.427
8.029
7.941
7.927
7.269
6.961
6.948
4.141
4.130
1.469
1.458
1.448
0.000
CHO
O
N
H
O
EtO
I
3i
600 MHz
CDCl3
1.00
1.00
1.01
1.99
1.02
1.00
1.99
2.01
3.00
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)

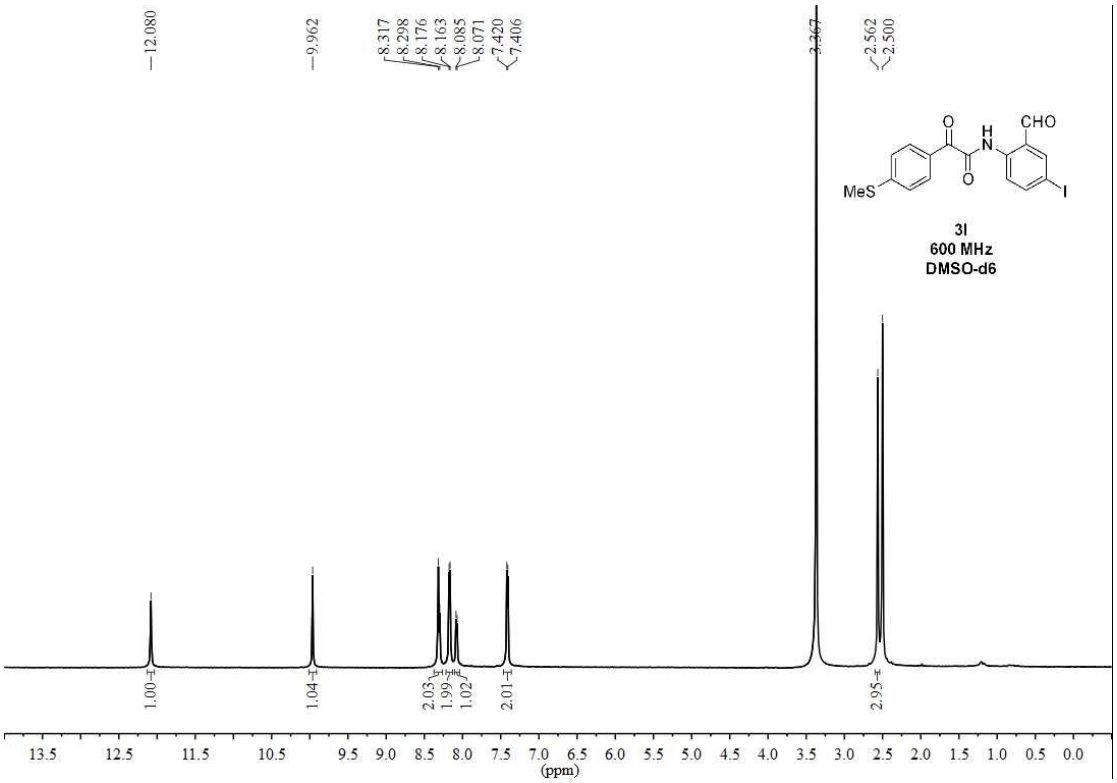

193.52
184.10
164.30
161.13
144.27
138.75
134.04
125.63
124.45
121.91
114.33
103.82
86.32
77.21
77.00
76.79
63.90
14.58
CHO
O
N
H
O
EtO
I
3i
150 MHz
CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)

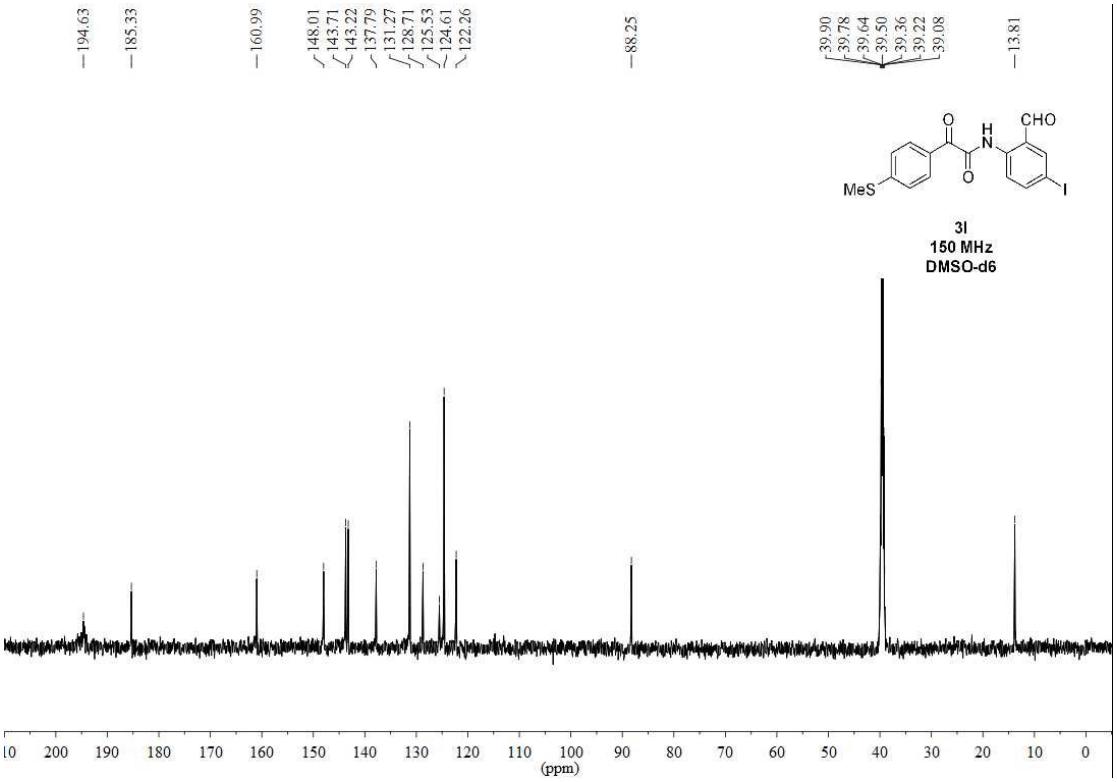

12.050
9.953
8.309
8.287
8.265
8.082
8.061
7.990
7.970
7.658
7.118
7.097
6.190
3.361
2.500
CHO
3j
400 MHz
DMSO-d6
1.00
1.01
1.99
2.05
1.02
1.02
2.08
(ppm)

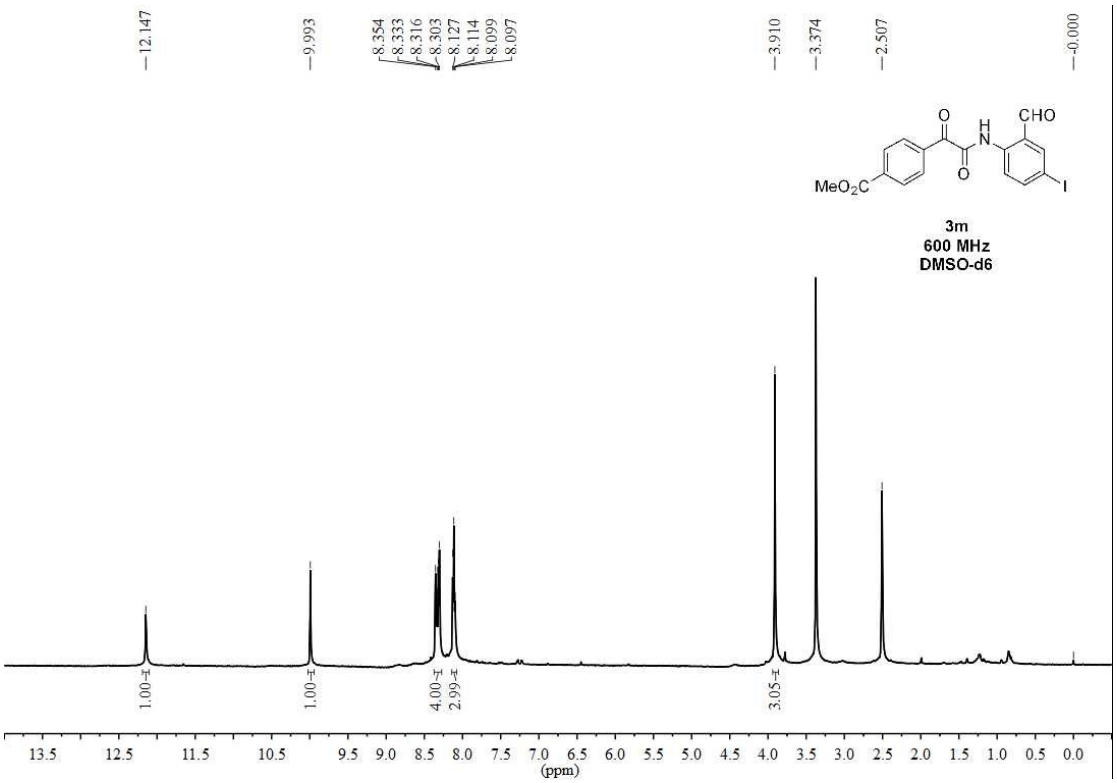

194.48
184.44
161.13
152.99
147.76
143.70
143.13
137.77
128.65
126.97
125.62
122.36
109.44
108.32
102.47
88.32
40.13
39.92
39.71
39.50
39.29
39.08
38.88
CHO
3j
100 MHz
DMSO-d6
(ppm)

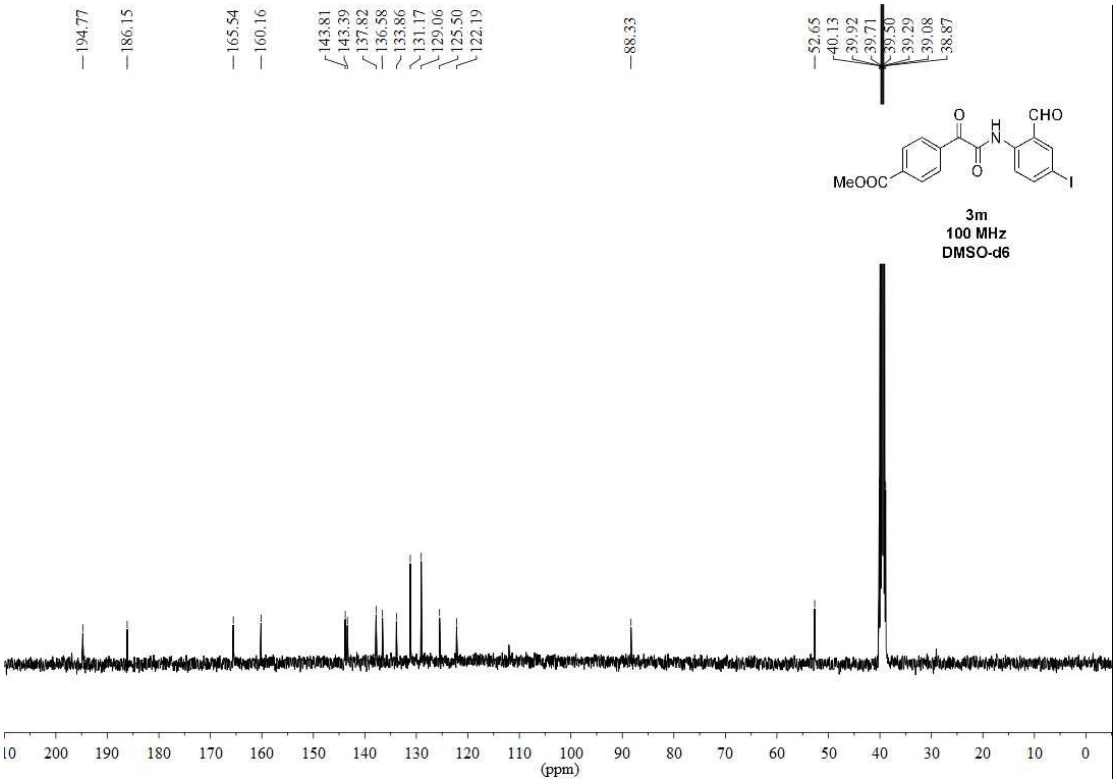

12.054
9.929
8.279
8.265
8.040
8.018
7.806
7.784
7.758
7.011
6.990
4.362
4.301
3.365
2.500
CHO
3k
400 MHz
DMSO-d6
1.00
1.01
2.06
1.04
1.96
1.01
4.10
(ppm)

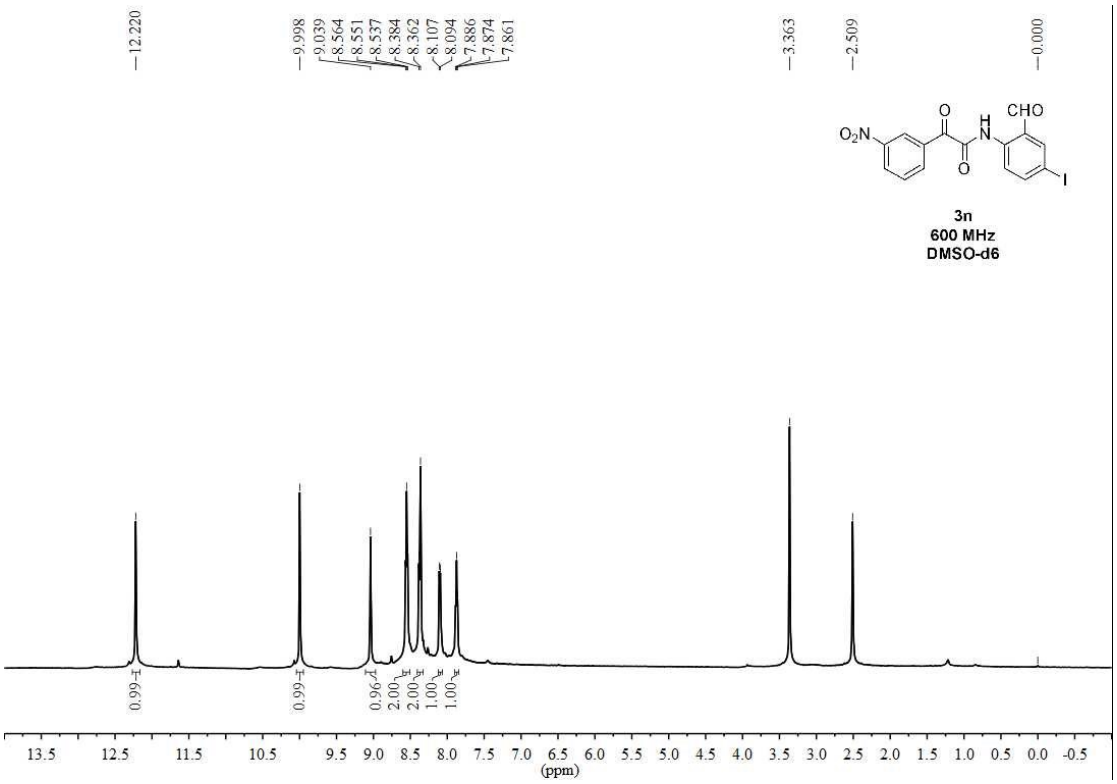

194.56
184.34
160.92
149.47
143.69
143.29
143.01
137.75
125.91
125.38
122.14
119.91
117.28
88.17
64.80
63.88
40.13
39.92
39.71
39.50
39.29
39.08
38.87
CHO
3k
100 MHz
DMSO-d6
(ppm)

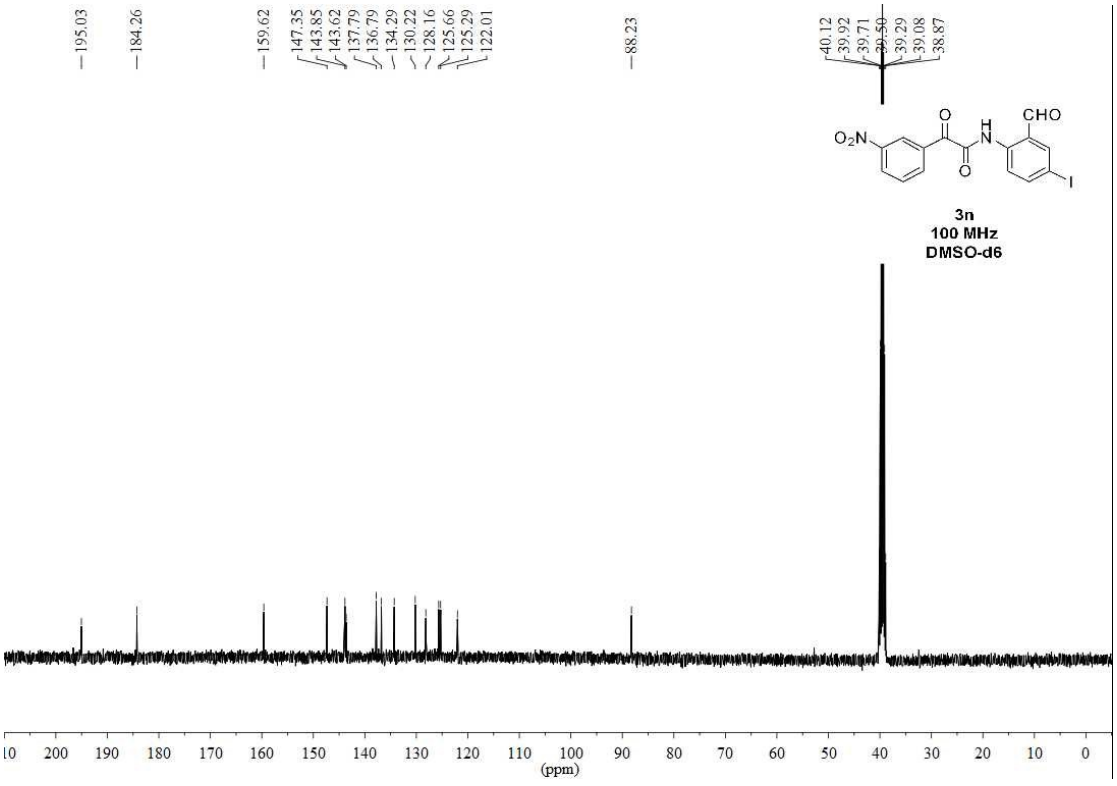

12.080
9.962
8.317
8.298
8.176
8.163
8.085
8.071
7.420
7.406
3.367
2.562
2.500
MeS
CHO
3l
600 MHz
DMSO-d6
1.00
1.04
2.03
1.99
1.02
2.01
2.95
(ppm)

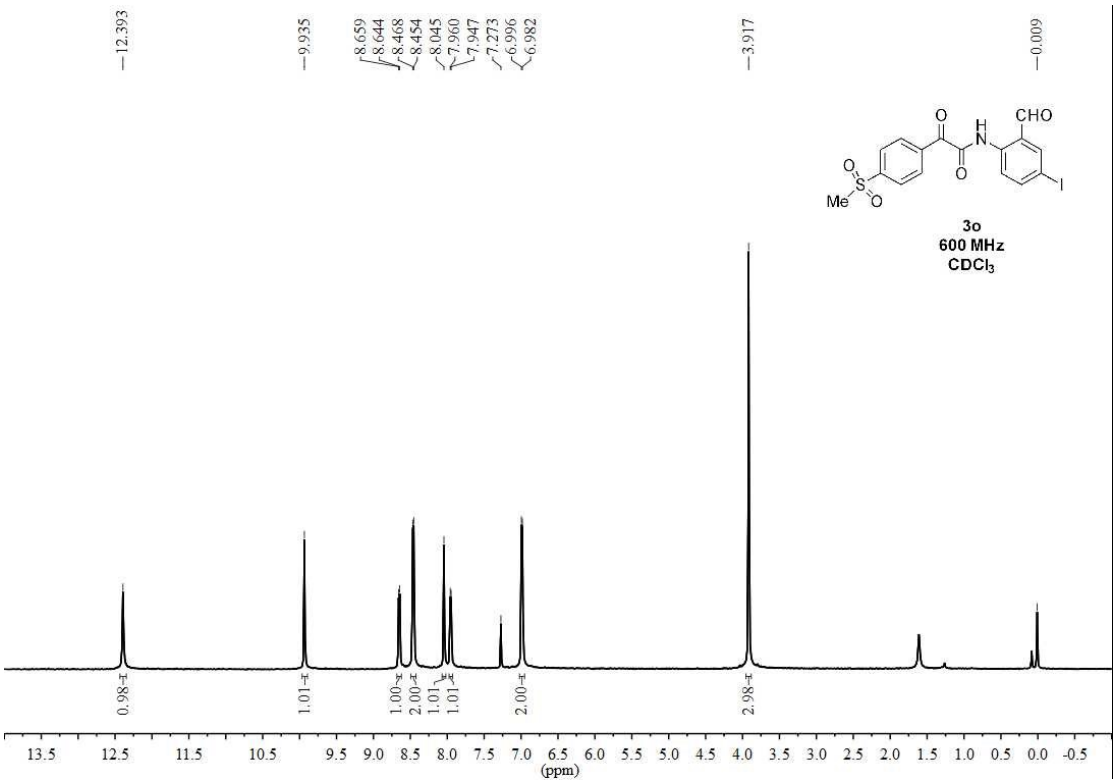

194.63
185.33
160.99
148.01
143.71
143.22
137.79
131.27
128.71
125.53
124.61
122.26
88.25
39.90
39.78
39.64
39.50
39.36
39.22
39.08
13.81
MeS
CHO
3l
150 MHz
DMSO-d6
(ppm)

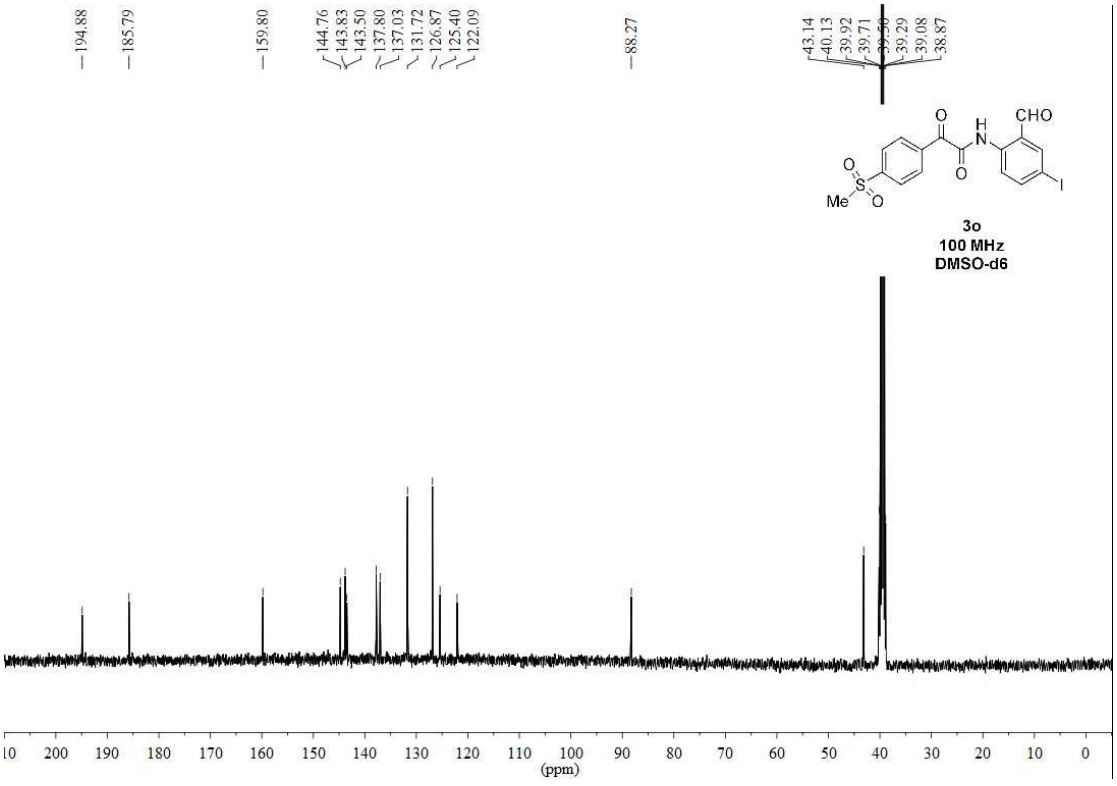

12.147
9.993
8.354
8.333
8.316
8.303
8.127
8.114
8.099
8.097
3.910
3.374
2.507
0.000
MeO2C
CHO
3m
600 MHz
DMSO-d6
1.00
1.00
4.00
2.99
3.05
(ppm)

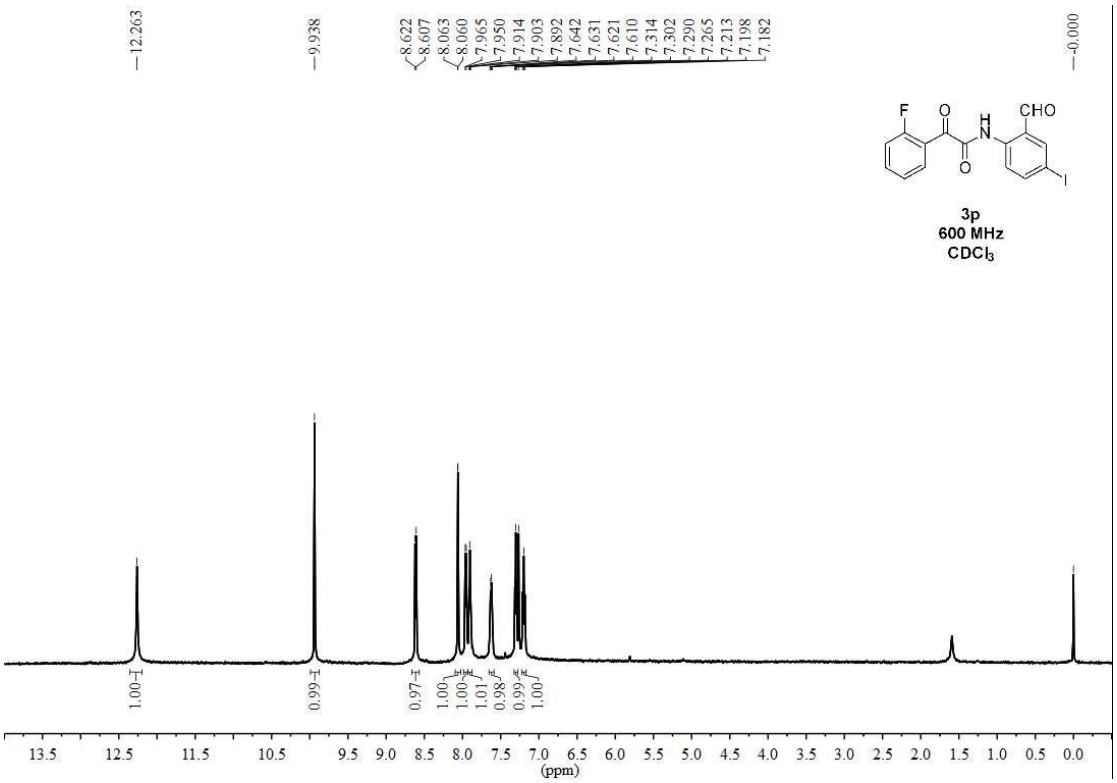

194.77
186.15
165.54
160.16
143.81
143.39
137.82
136.58
133.86
131.17
129.06
125.50
122.19
88.33
52.65
40.13
39.92
39.71
39.50
39.29
39.08
38.87
MeOOC
CHO
3m
100 MHz
DMSO-d6
(ppm)

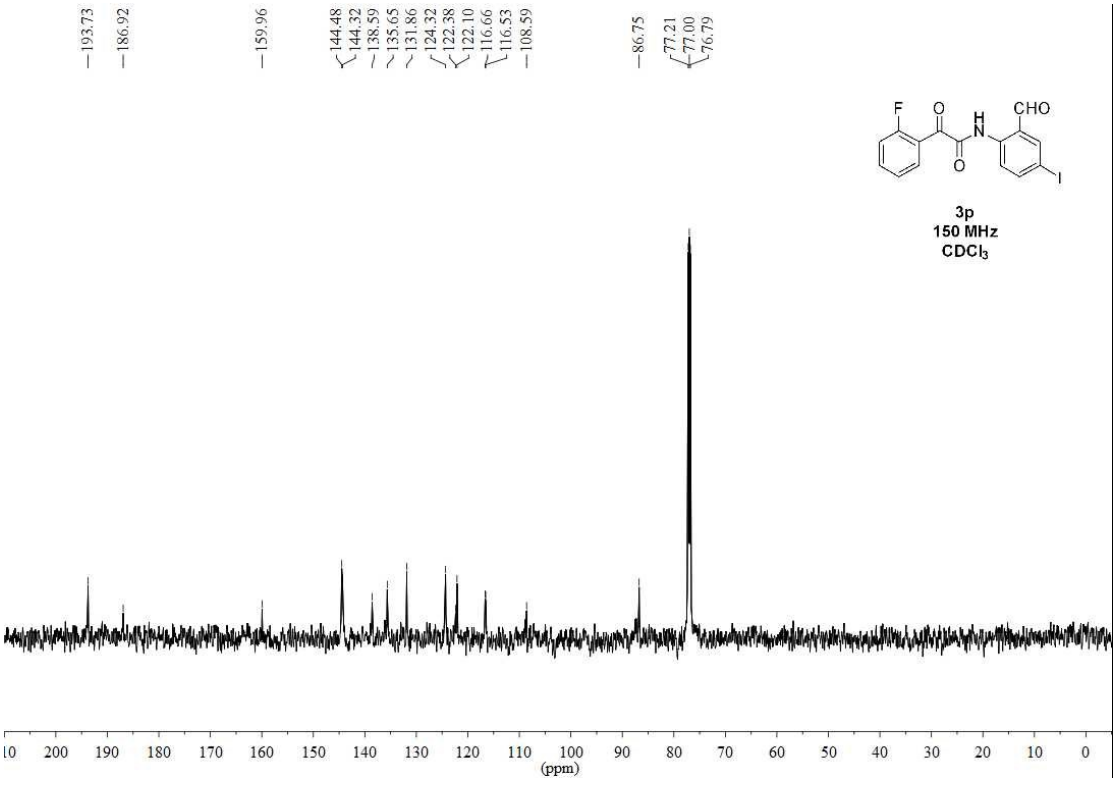

12.220
9.998
9.039
8.564
8.551
8.537
8.384
8.362
8.107
8.094
7.886
7.874
7.861
3.363
2.509
0.000
O2N
CHO
3n
600 MHz
DMSO-d6
0.99
0.99
0.96
2.00
2.00
1.00
1.00
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)

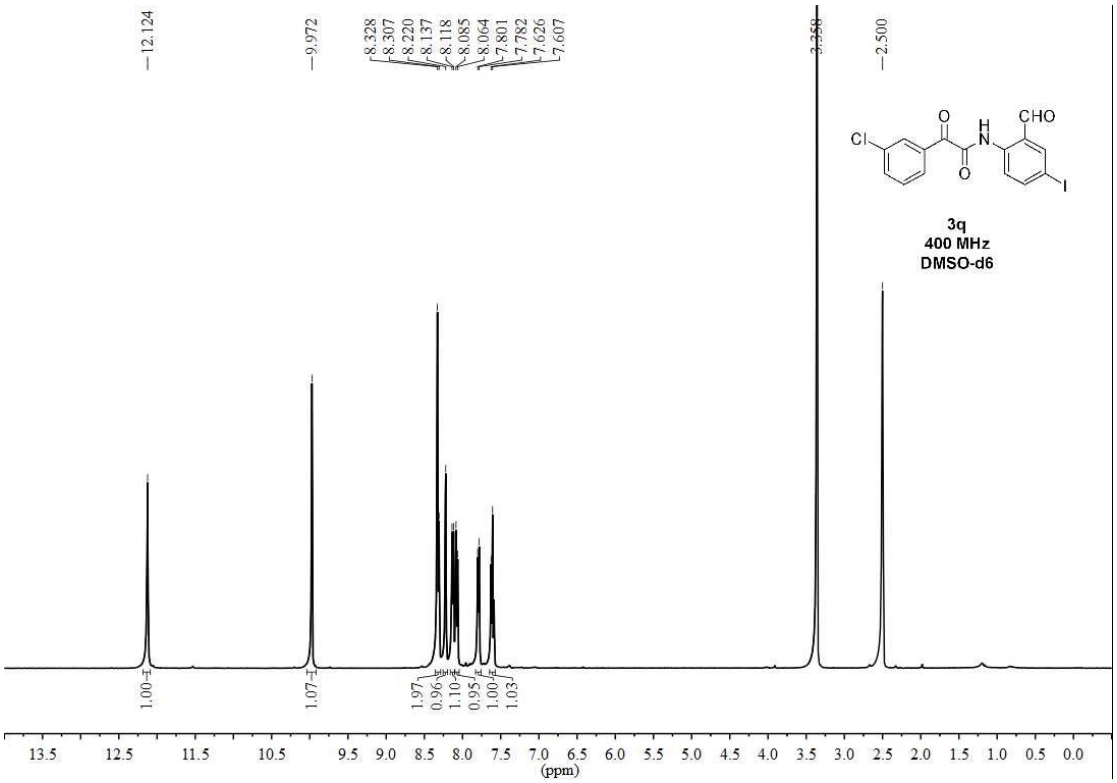

195.03
184.26
159.62
147.35
143.85
143.62
137.79
136.79
134.29
130.22
128.16
125.66
125.29
122.01
88.23
40.12
39.92
39.71
39.50
39.29
39.08
38.87
O2N
CHO
3n
100 MHz
DMSO-d6
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)

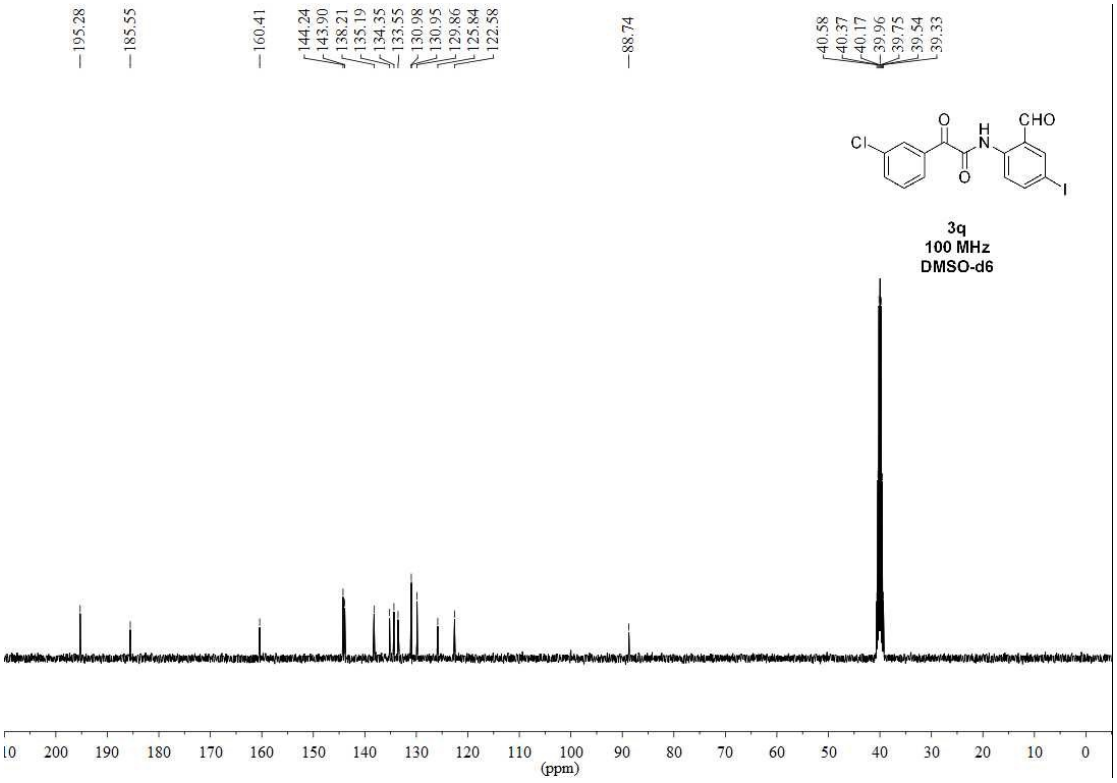

12.393
9.935
8.659
8.644
8.468
8.454
8.045
7.960
7.947
7.273
6.996
6.982
3.917
0.009
CHO
H
N
O
S
Me
I
3o
600 MHz
CDCl3
0.98
1.01
1.00
2.00
1.01
1.01
2.00
2.98
(ppm)

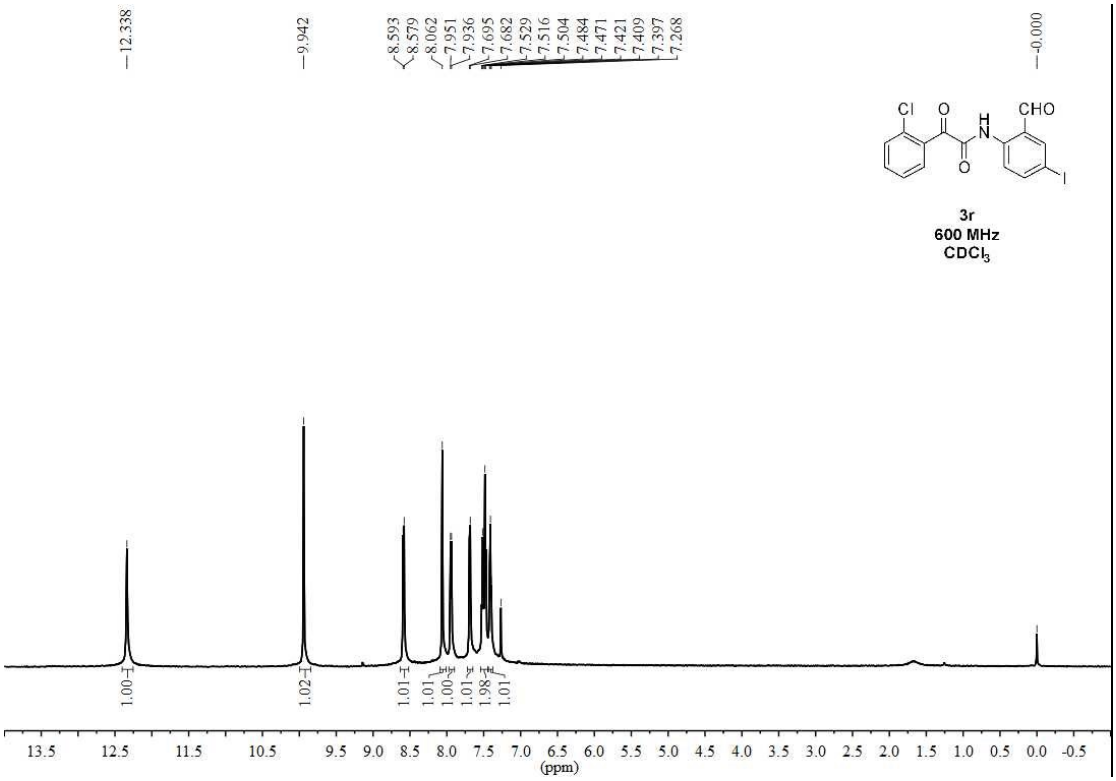

194.88
185.79
159.80
144.76
143.83
143.50
137.80
137.03
131.72
126.87
125.40
122.09
88.27
43.14
40.13
39.92
39.71
39.50
39.29
39.08
38.87
CHO
H
N
O
S
Me
I
3o
100 MHz
DMSO-d6
(ppm)

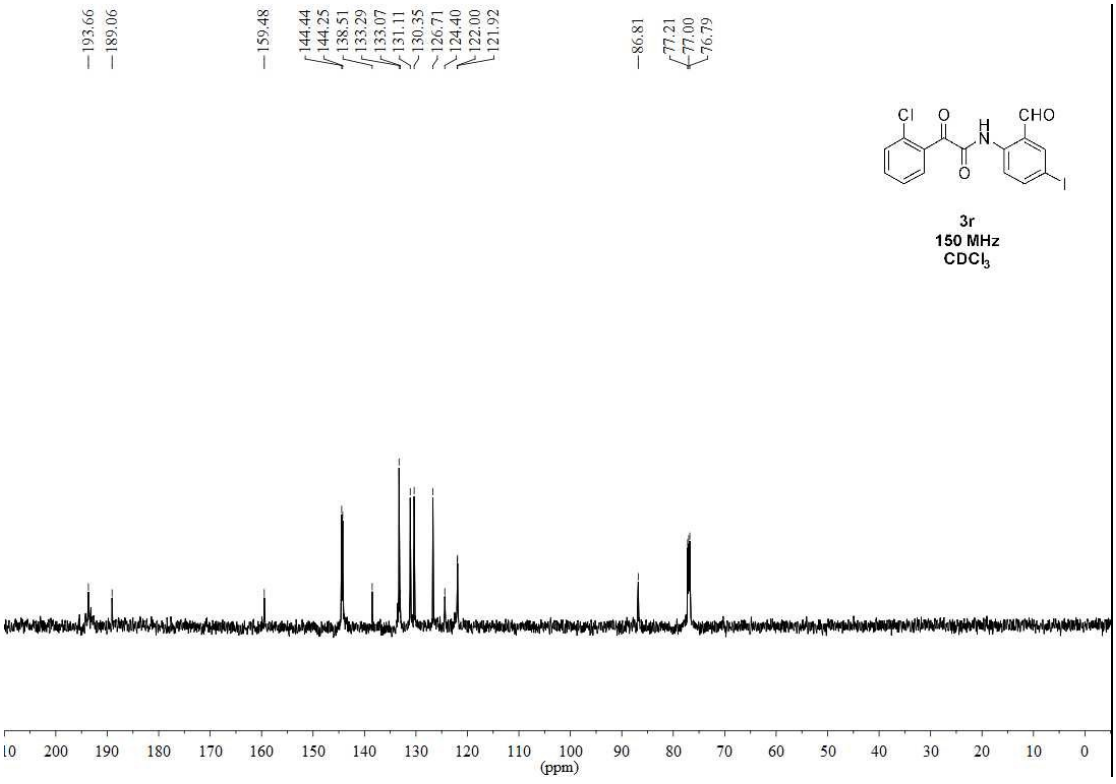

12.263
9.938
8.622
8.607
8.063
8.060
7.965
7.950
7.914
7.903
7.892
7.642
7.631
7.621
7.610
7.314
7.302
7.290
7.265
7.213
7.198
7.182
0.000
F
O
H
N
CHO
O
I
3p
600 MHz
CDCl3
1.00
0.99
0.97
1.00
1.00
1.01
0.98
0.99
1.00
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
(ppm)

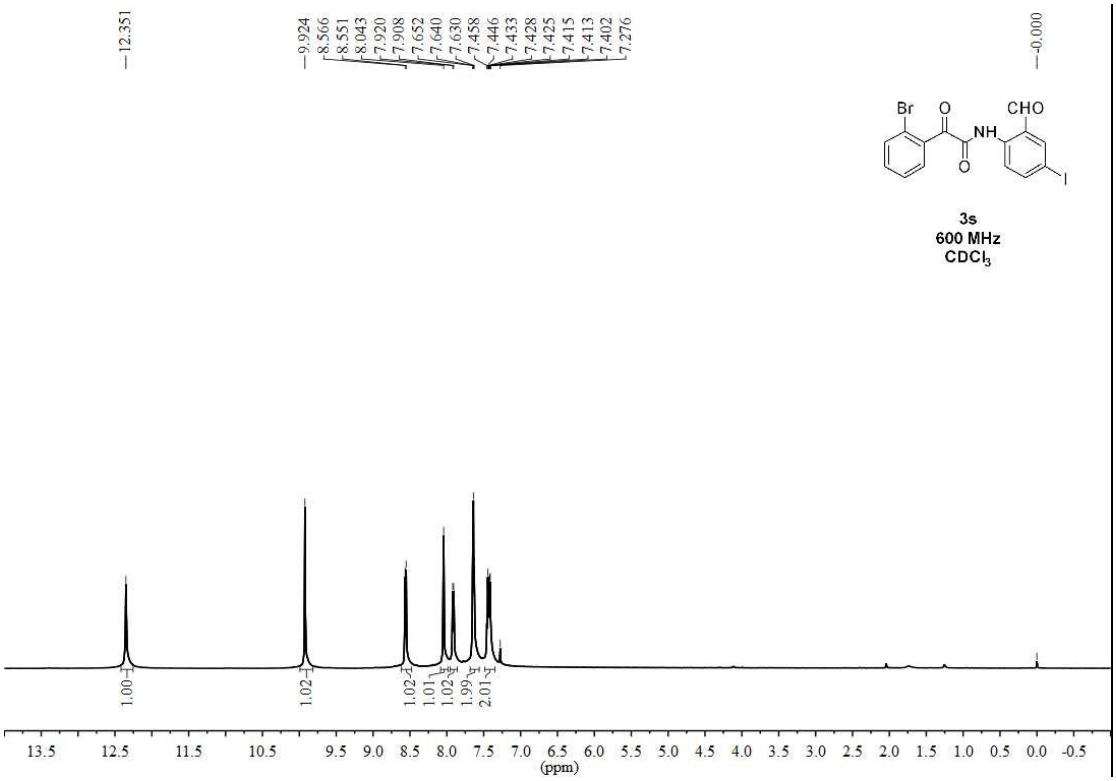

193.73
186.92
159.96
144.48
144.32
138.59
135.65
131.86
124.32
122.38
122.10
116.66
116.53
108.59
86.75
77.21
77.00
76.79
F
O
H
N
CHO
O
I
3p
150 MHz
CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)


12.124
9.972
8.328
8.307
8.220
8.137
8.118
8.085
8.064
7.801
7.782
7.626
7.607
3.358
2.500
1.00
1.07
1.97
0.96
1.10
0.95
1.00
1.03
(ppm)
3q
400 MHz
DMSO-d6


195.28
185.55
160.41
144.24
143.90
138.21
135.19
134.35
133.55
130.98
130.95
129.86
125.84
122.58
88.74
40.58
40.37
40.17
39.96
39.75
39.54
39.33
(ppm)
3q
100 MHz
DMSO-d6


12.338
9.942
8.593
8.579
8.062
7.951
7.936
7.695
7.682
7.529
7.516
7.504
7.484
7.471
7.421
7.409
7.397
7.268
0.000
Cl
O
N
H
O
CHO
I
3r
600 MHz
CDCl3
1.00
1.02
1.01
1.01
1.00
1.01
1.98
1.01
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)


193.66
189.06
159.48
144.44
144.25
138.51
133.29
133.07
131.11
130.35
126.71
124.40
122.00
121.92
86.81
77.21
77.00
76.79
Cl
O
N
H
O
CHO
I
3r
150 MHz
CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)


12.351
9.924
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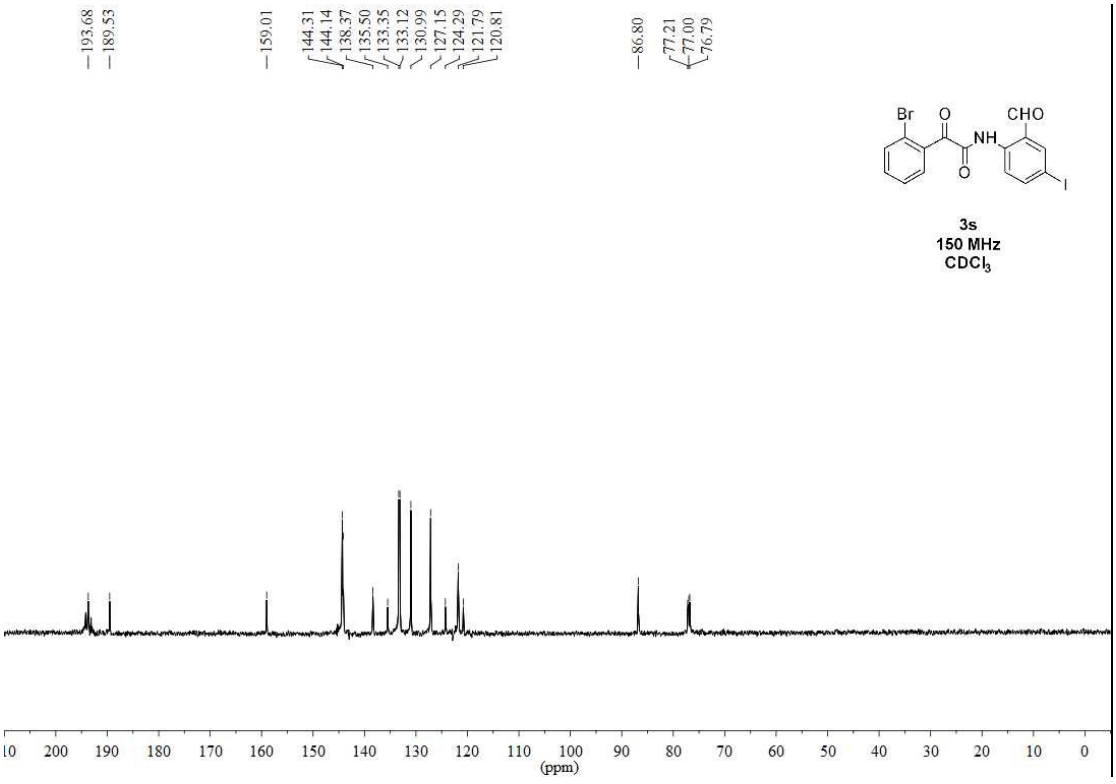
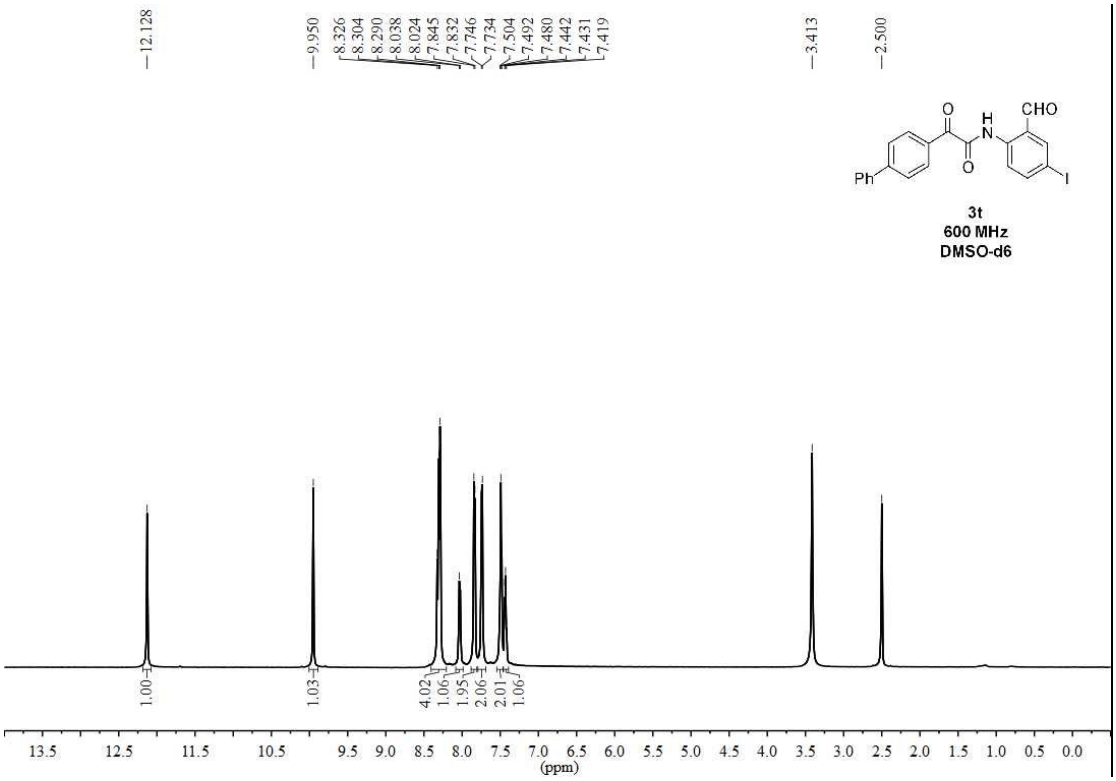
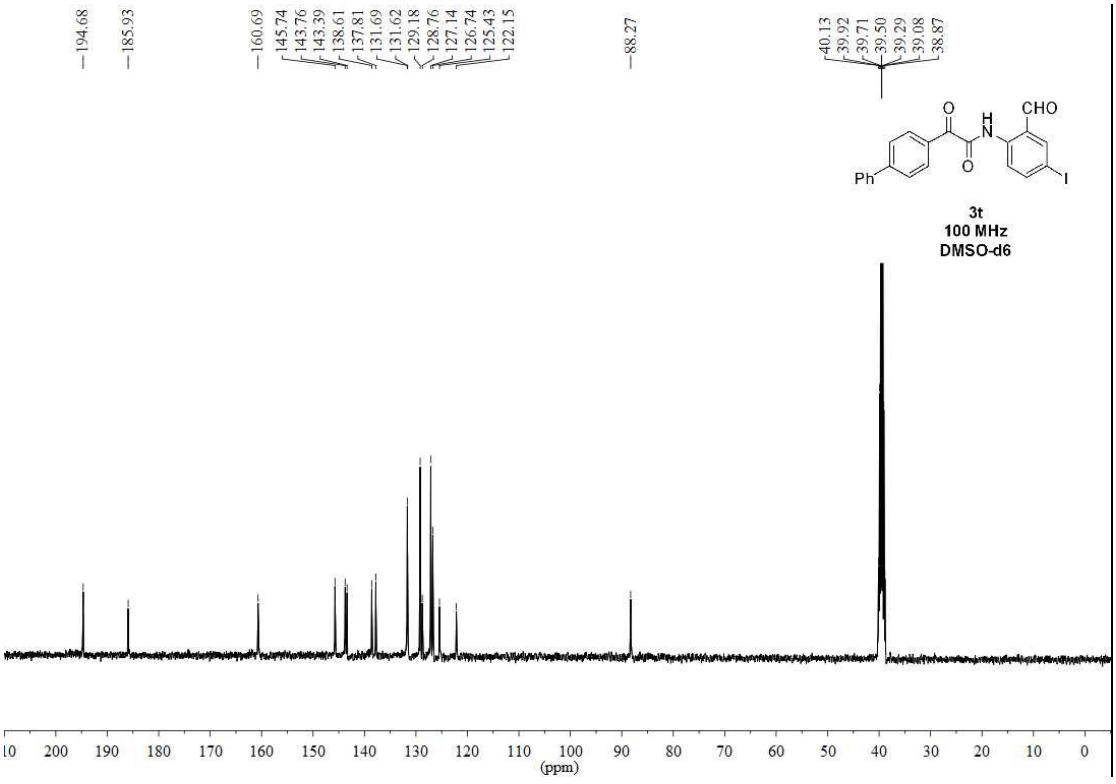
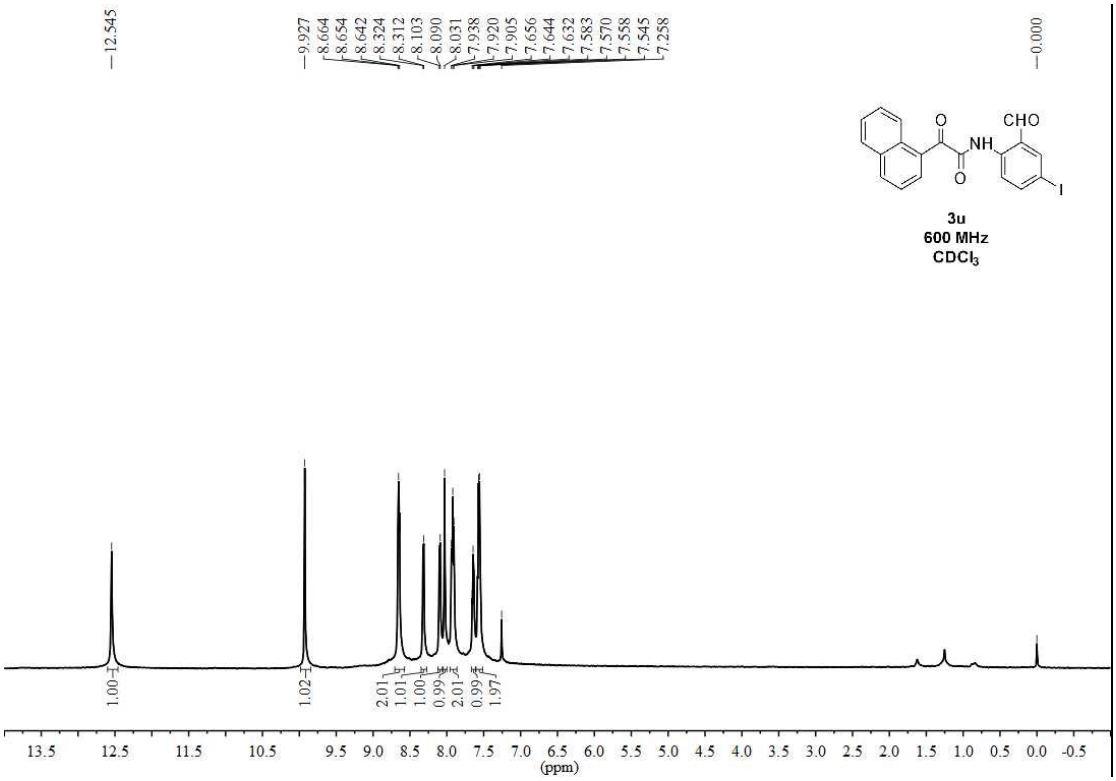
8.551
8.043
7.920
7.908
7.652
7.640
7.630
7.458
7.446
7.433
7.428
7.425
7.415
7.413
7.402
7.276
0.000
Br
O
NH
CHO
O
I
3s
600 MHz
CDCl3
1.00
1.02
1.02
1.01
1.02
1.99
2.01
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)


193.68
189.53
159.01
144.31
144.14
138.37
135.50
133.35
133.12
130.99
127.15
124.29
121.79
120.81
86.80
77.21
77.00
76.79
Br
O
NH
CHO
O
I
3s
150 MHz
CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)


12.128
9.950
8.326
8.304
8.290
8.038
8.024
7.845
7.832
7.746
7.734
7.504
7.492
7.480
7.442
7.431
7.419
3.413
2.500
O
H
N
CHO
O
Ph
I
3t
600 MHz
DMSO-d6
1.00
1.03
4.02
1.06
1.95
2.06
2.01
1.06
13.5 12.5 11.5 10.5 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
(ppm)


194.68
185.93
160.69
145.74
143.76
143.39
138.61
137.81
131.69
131.62
129.18
128.76
127.14
126.74
125.43
122.15
88.27
40.13
39.92
39.71
39.50
39.29
39.08
38.87
O
H
N
CHO
O
Ph
I
3t
100 MHz
DMSO-d6
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)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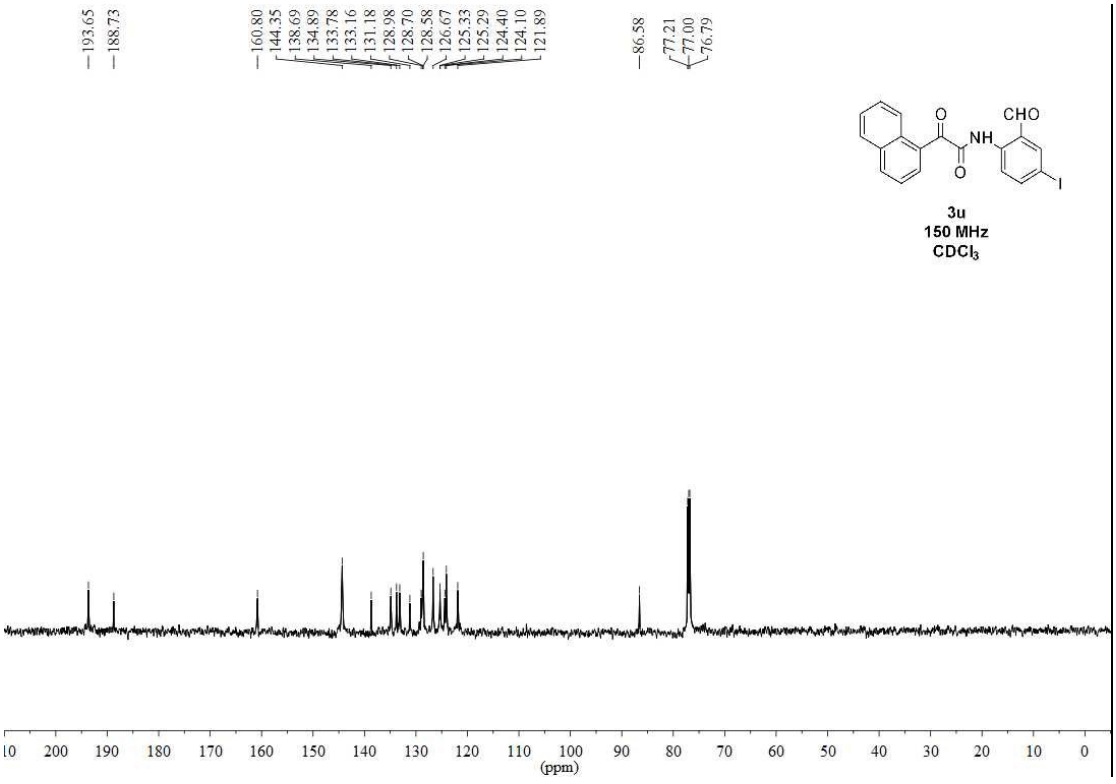
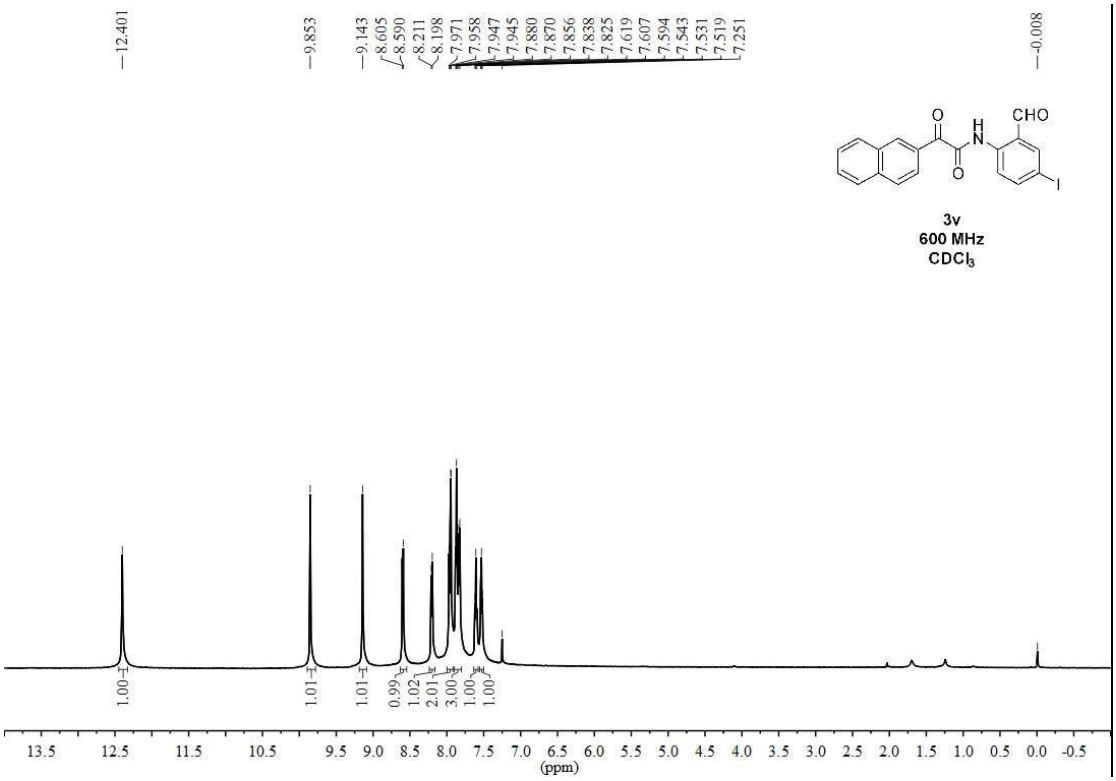
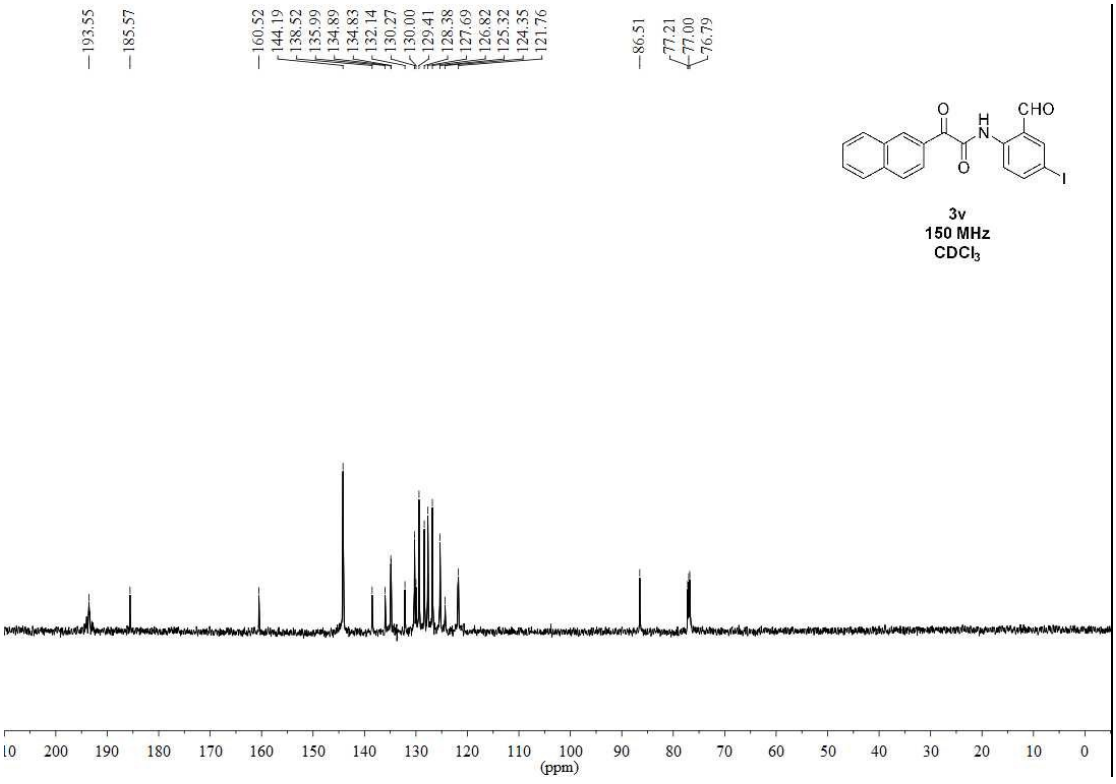
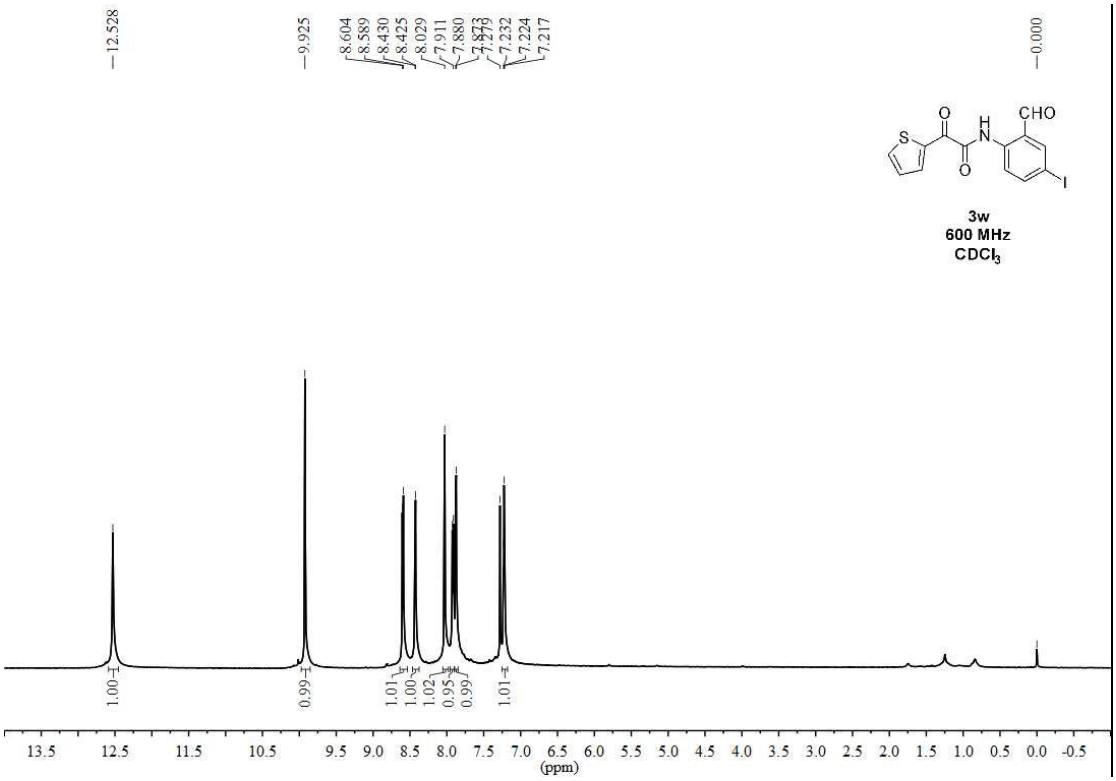
9.927
8.664
8.654
8.642
8.324
8.312
8.103
8.090
8.031
7.938
7.920
7.905
7.656
7.644
7.632
7.583
7.570
7.558
7.545
7.258
0.000
CHO
NH
O
O
I
3u
600 MHz
CDCl3
1.00
1.02
2.01
1.01
1.00
0.99
2.01
0.99
1.97
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)


193.65
188.73
160.80
144.35
138.69
134.89
133.78
133.16
131.18
128.98
128.70
128.58
126.67
125.33
125.29
124.40
124.10
121.89
86.58
77.21
77.00
76.79
CHO
NH
O
O
I
3u
150 MHz
CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)


12.401
9.853
9.143
8.605
8.590
8.211
8.198
7.971
7.958
7.947
7.945
7.880
7.870
7.856
7.838
7.825
7.619
7.607
7.594
7.543
7.531
7.519
7.251
0.008
CHO
3v
600 MHz
CDCl3
1.00
1.01
1.01
0.99
1.02
2.01
3.00
1.00
1.00
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)


193.55
185.57
160.52
144.19
138.52
135.99
134.89
134.83
132.14
130.27
130.00
129.41
128.38
127.69
126.82
125.32
124.35
121.76
86.51
77.21
77.00
76.79
CHO
3v
150 MHz
CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)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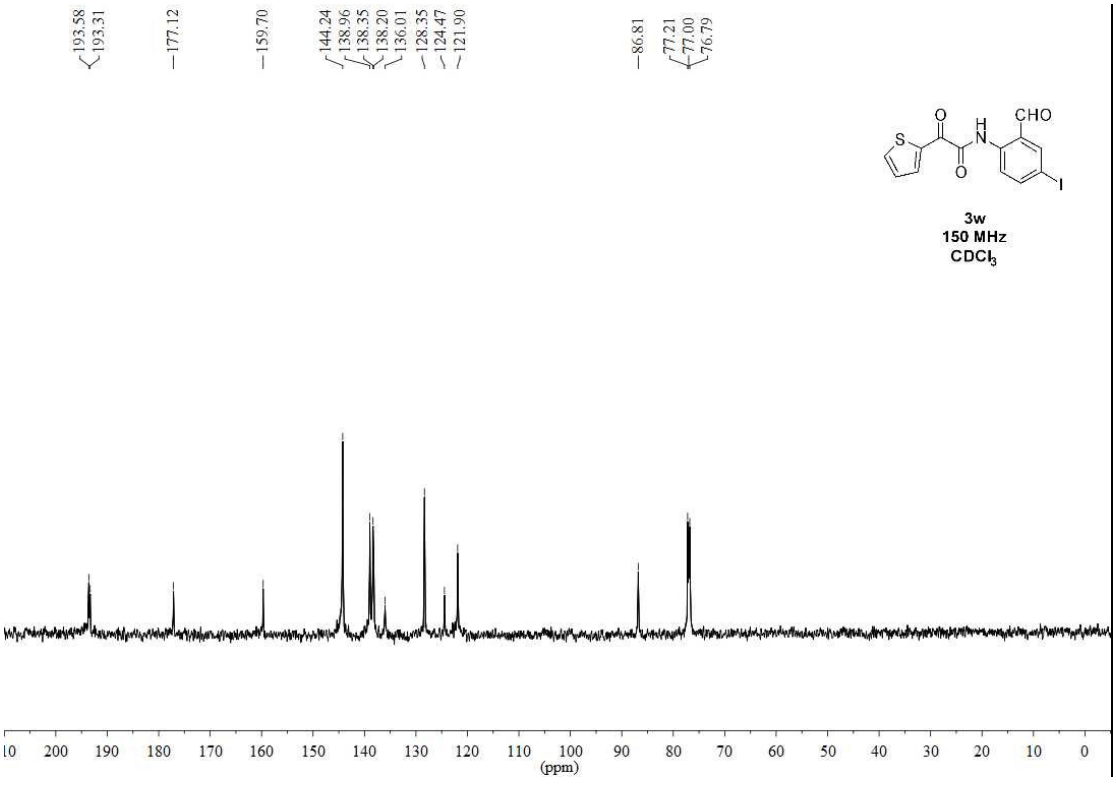
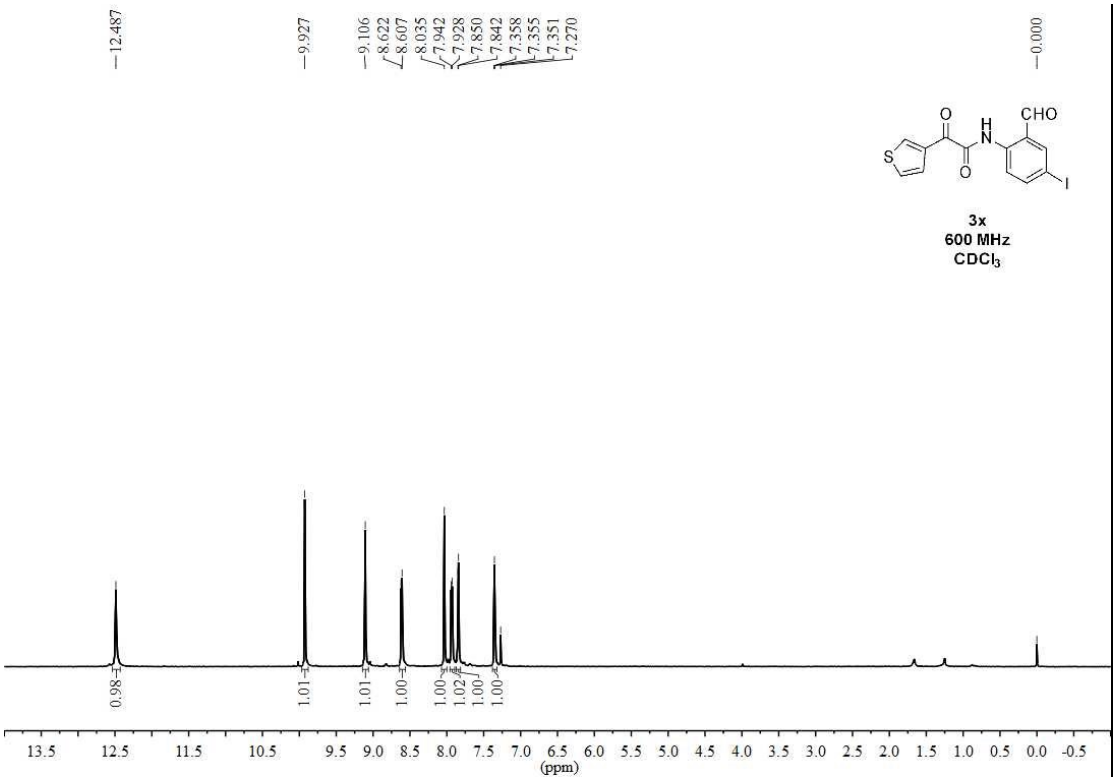
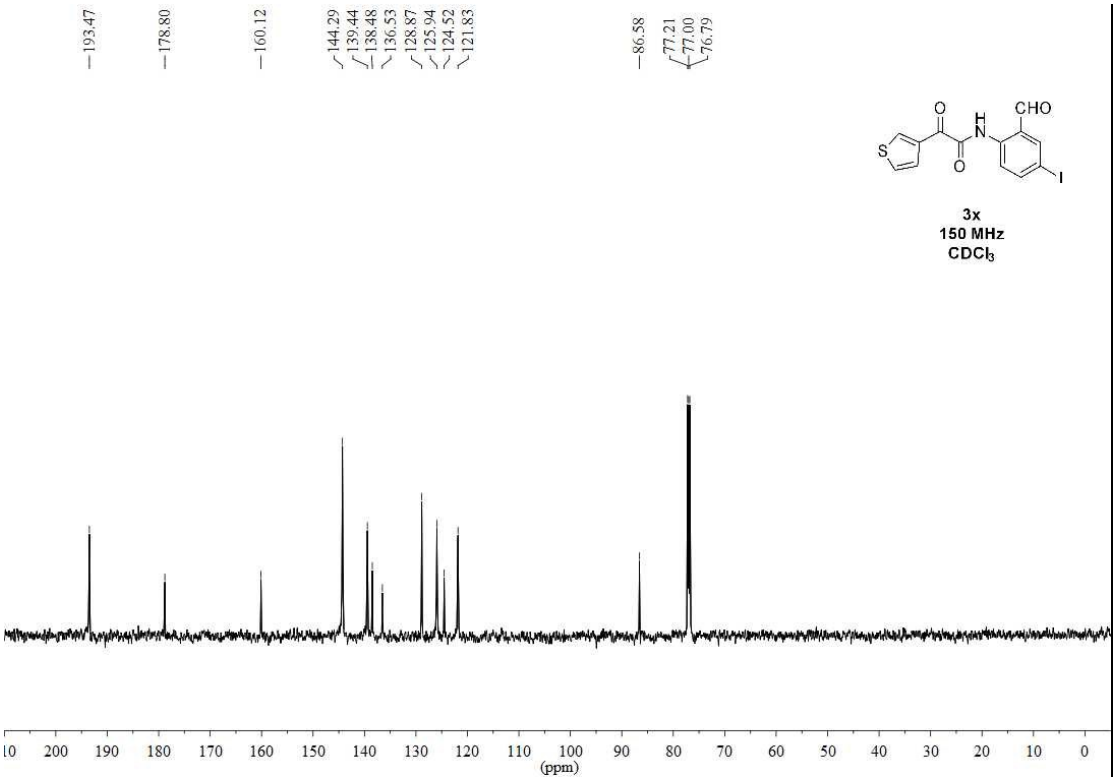
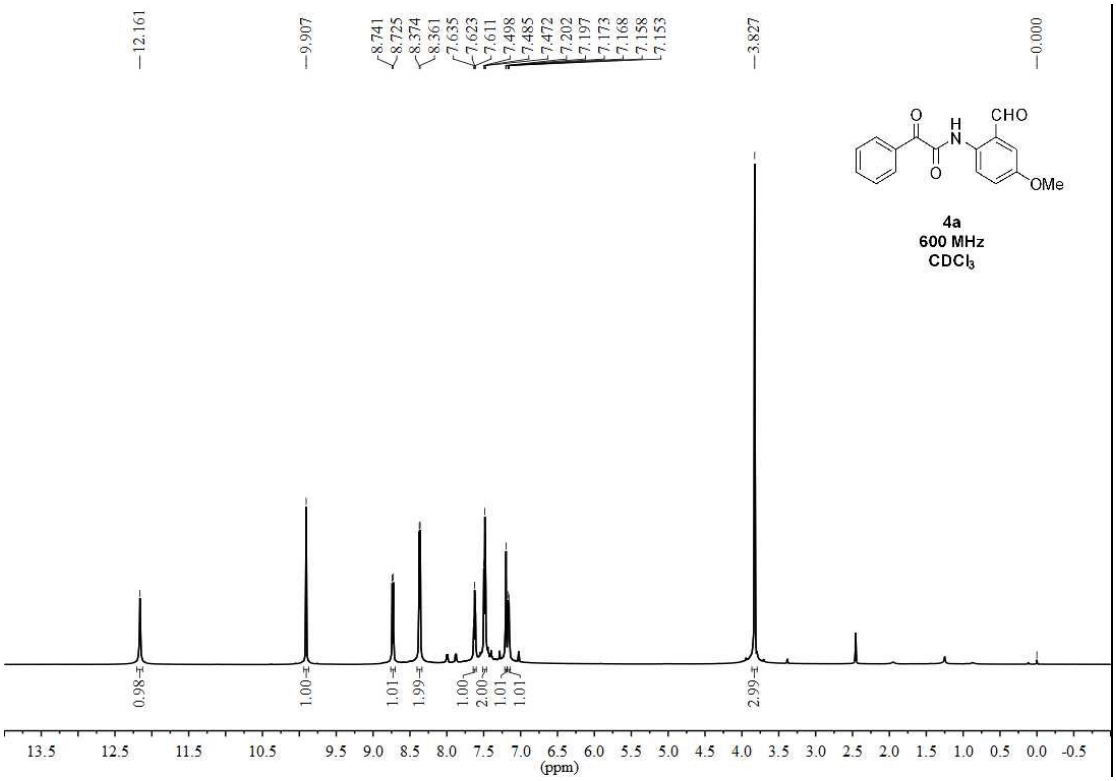
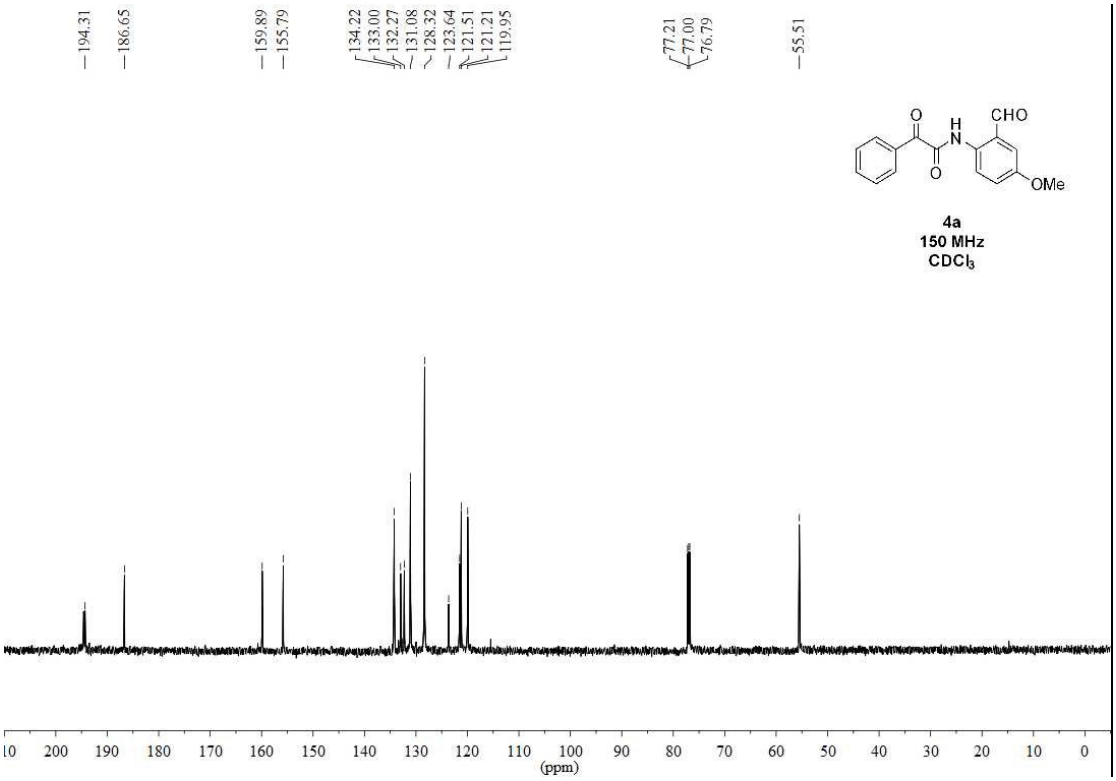
9.925
8.604
8.589
8.430
8.425
8.029
7.911
7.880
7.873
7.232
7.224
7.217
0.000
CHO
3w
600 MHz
CDCl3
1.00
0.99
1.01
1.00
1.02
0.95
0.99
1.01
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)

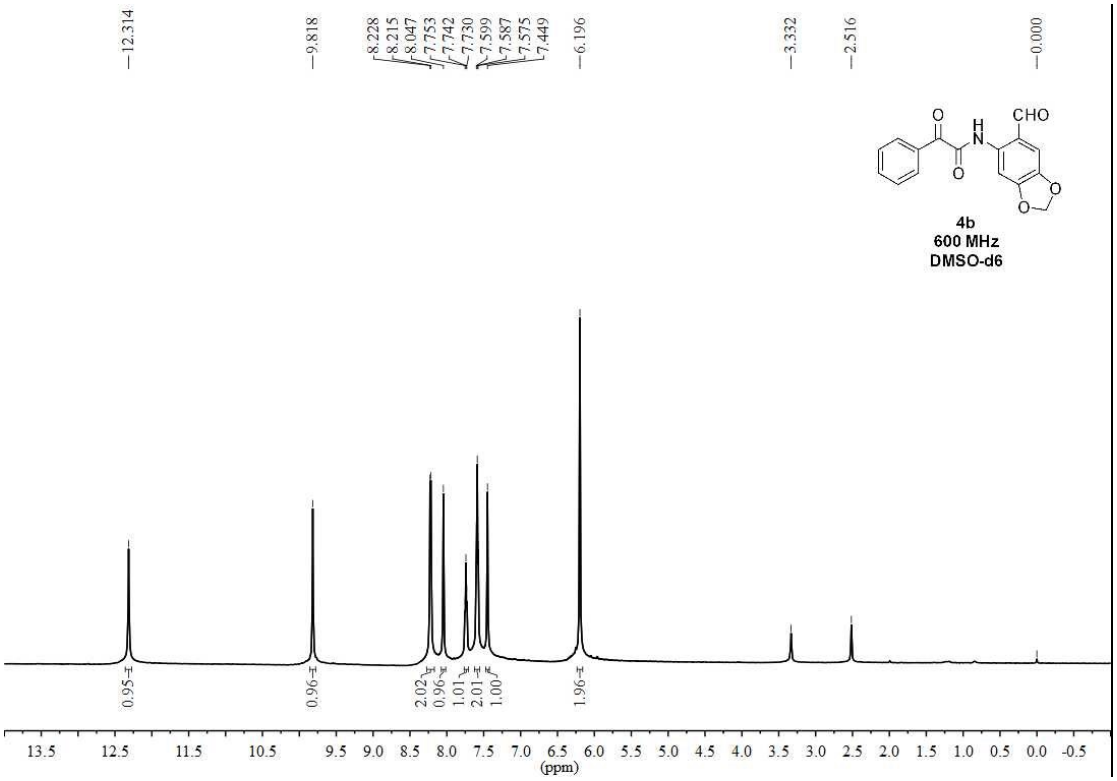

193.58
193.31
177.12
159.70
144.24
138.96
138.35
138.20
136.01
128.35
124.47
121.90
86.81
77.21
77.00
76.79
CHO
3w
150 MHz
CDCl3
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)

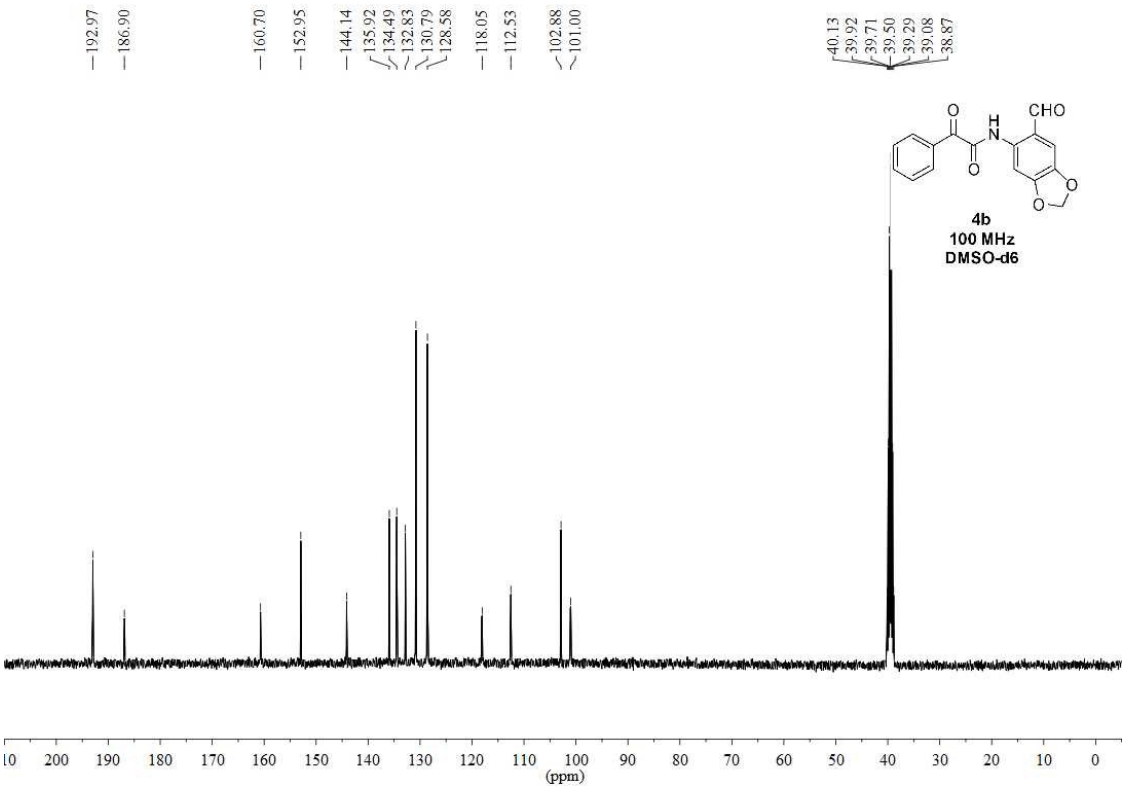

12.487
9.927
9.106
8.622
8.607
8.035
7.942
7.928
7.850
7.842
7.358
7.355
7.351
7.270
0.000
CHO
3x
600 MHz
CDCl3
0.98
1.01
1.01
1.00
1.00
1.02
1.00
1.00
(ppm)

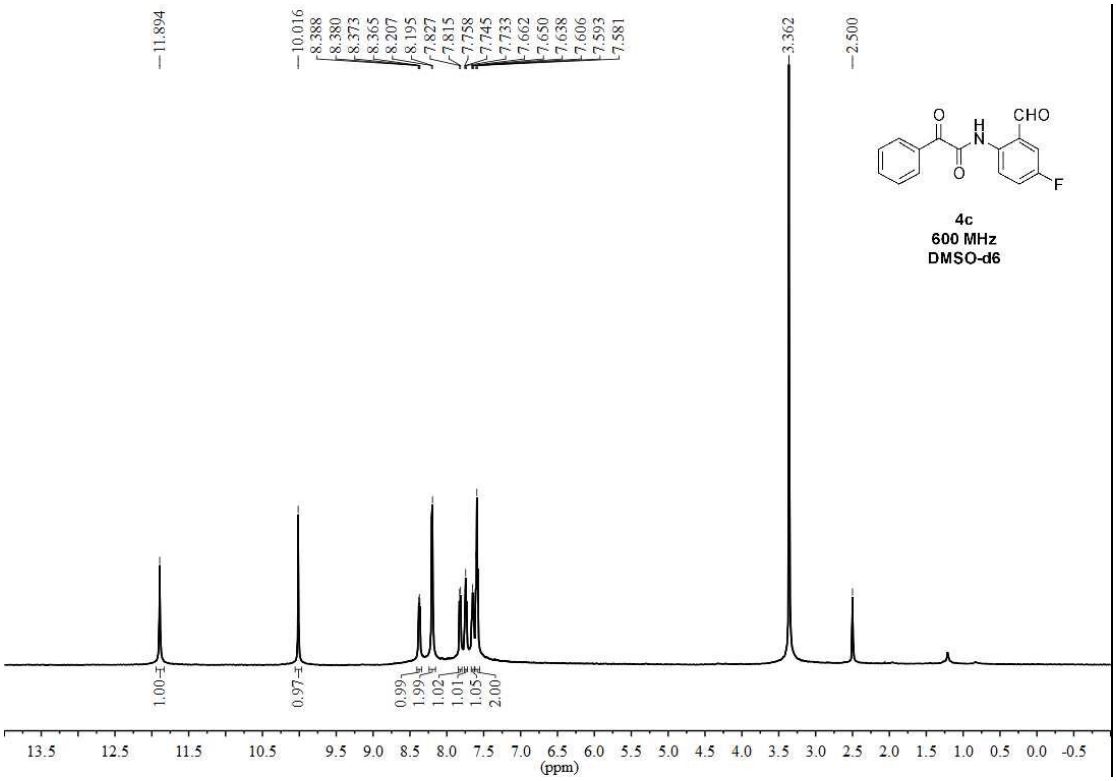

193.47
178.80
160.12
144.29
139.44
138.48
136.53
128.87
125.94
124.52
121.83
86.58
77.21
77.00
76.79
CHO
3x
150 MHz
CDCl3
(ppm)

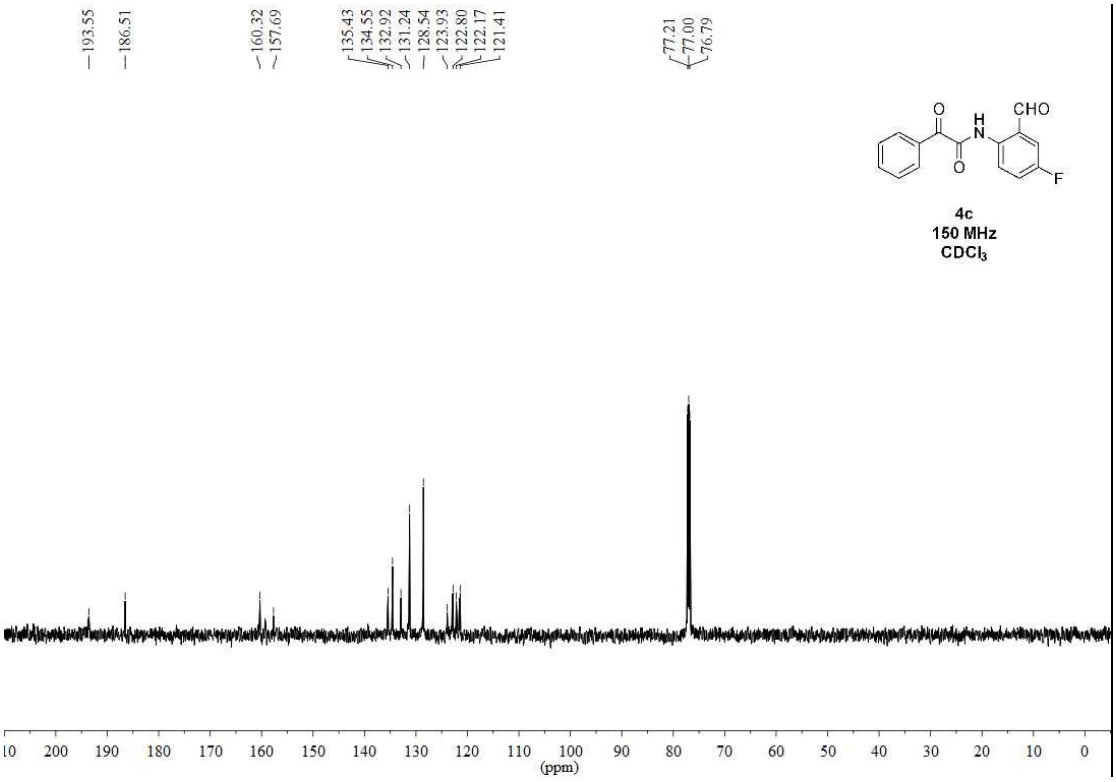

12.161
9.907
8.741
8.725
8.374
8.361
7.635
7.623
7.611
7.498
7.485
7.472
7.202
7.197
7.173
7.168
7.158
7.153
3.827
0.000
CHO
OMe
4a
600 MHz
CDCl3
0.98
1.00
1.01
1.99
1.00
2.00
1.01
1.01
2.99
(ppm)

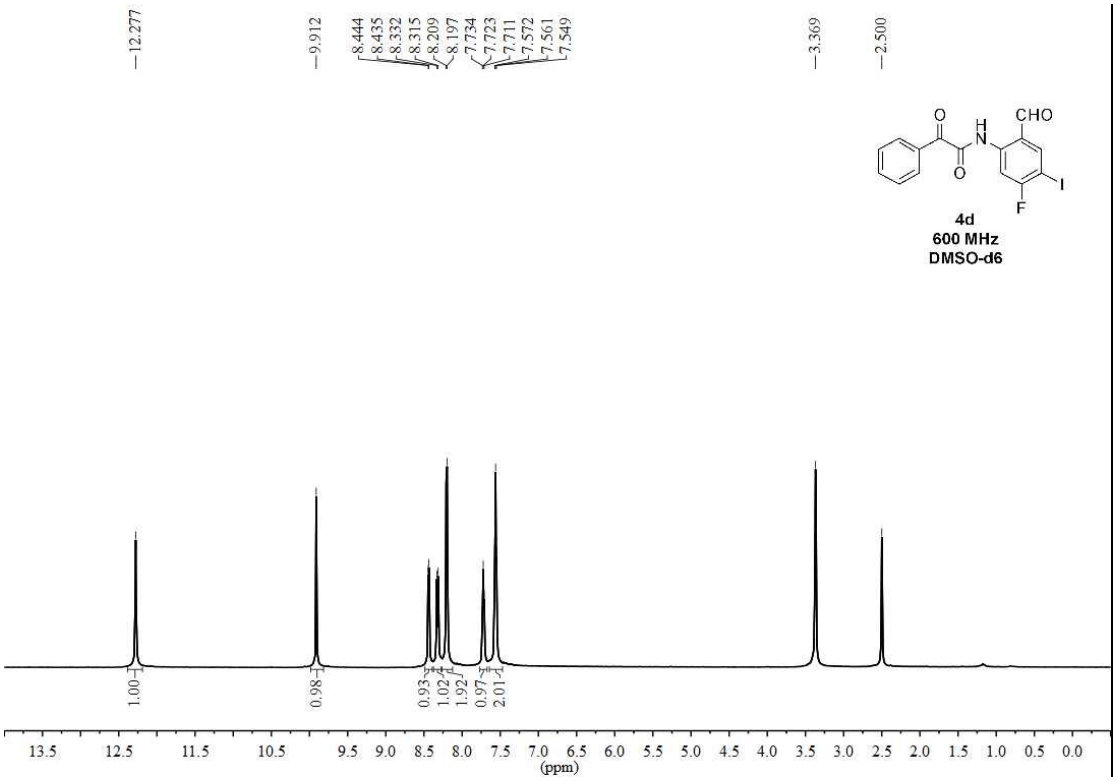

194.31
186.65
159.89
155.79
134.22
133.00
132.27
131.08
128.32
123.64
121.51
121.21
119.95
77.21
77.00
76.79
55.51
CHO
OMe
4a
150 MHz
CDCl3
(ppm)

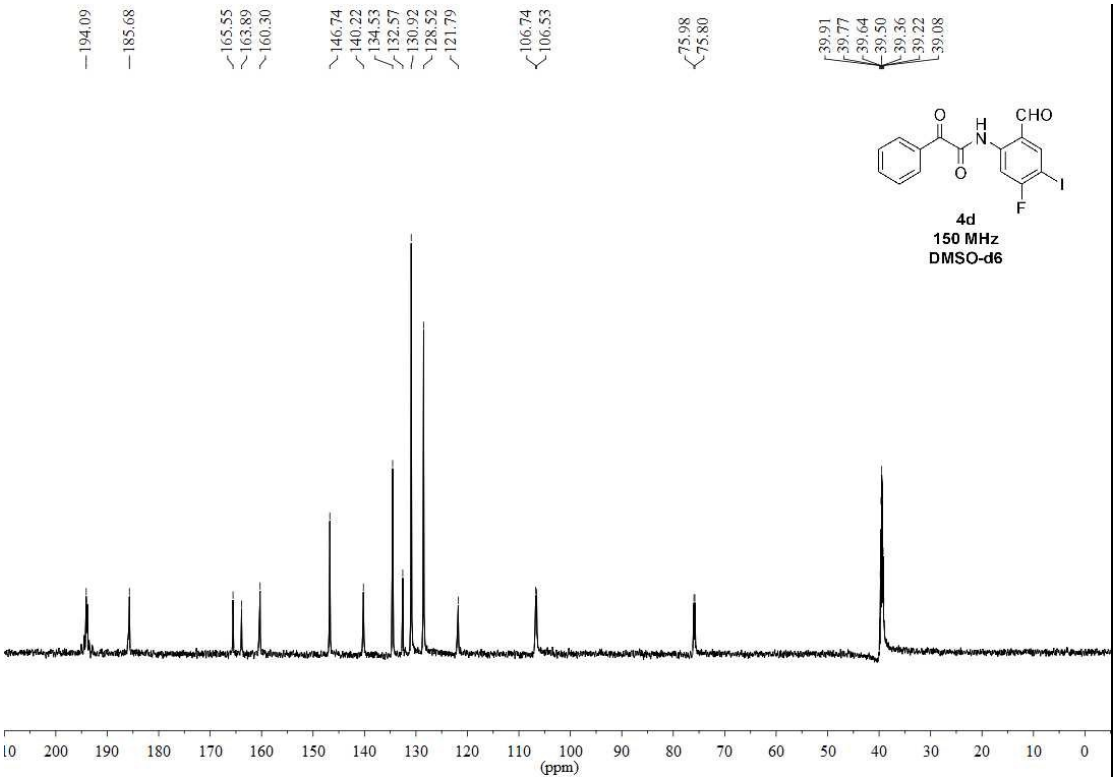

12.314
9.818
8.228
8.215
8.047
7.753
7.742
7.730
7.599
7.587
7.575
7.449
6.196
3.332
2.516
0.000
CHO
4b
600 MHz
DMSO-d6
0.95
0.96
2.02
0.96
1.01
2.01
1.00
1.96
(ppm)

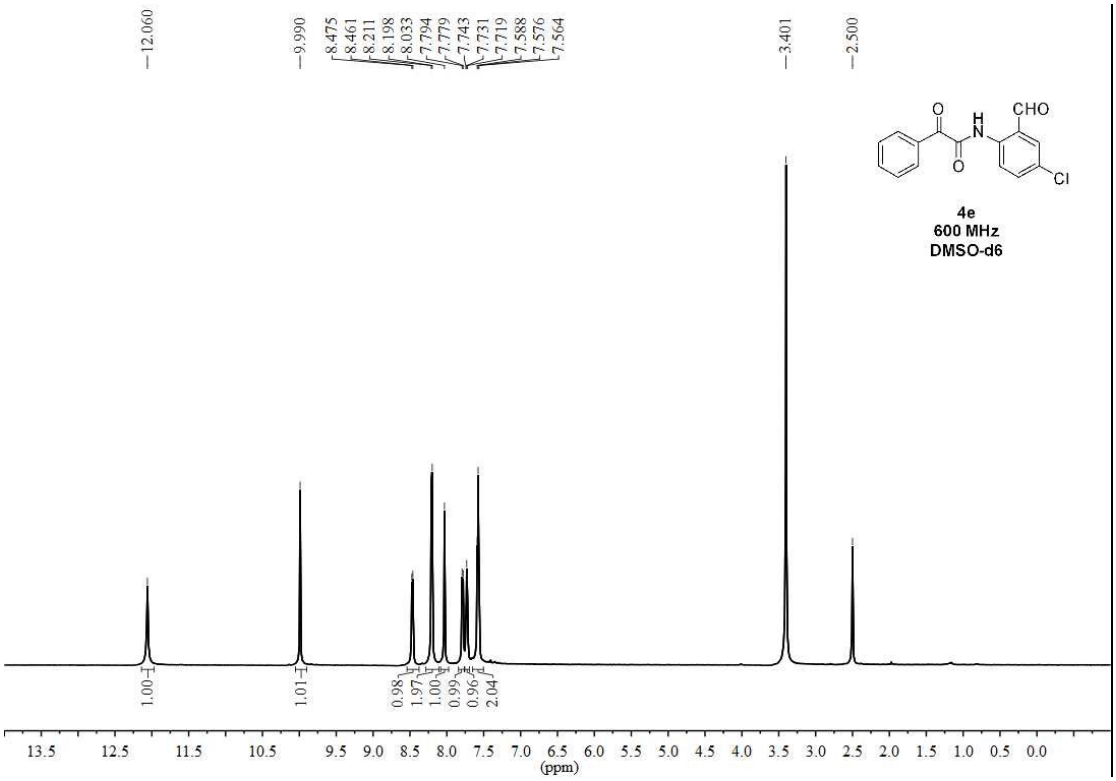

192.97
186.90
160.70
152.95
144.14
135.92
134.49
132.83
130.79
128.58
118.05
112.53
102.88
101.00
40.13
39.92
39.71
39.50
39.29
39.08
38.87
CHO
4b
100 MHz
DMSO-d6
(ppm)

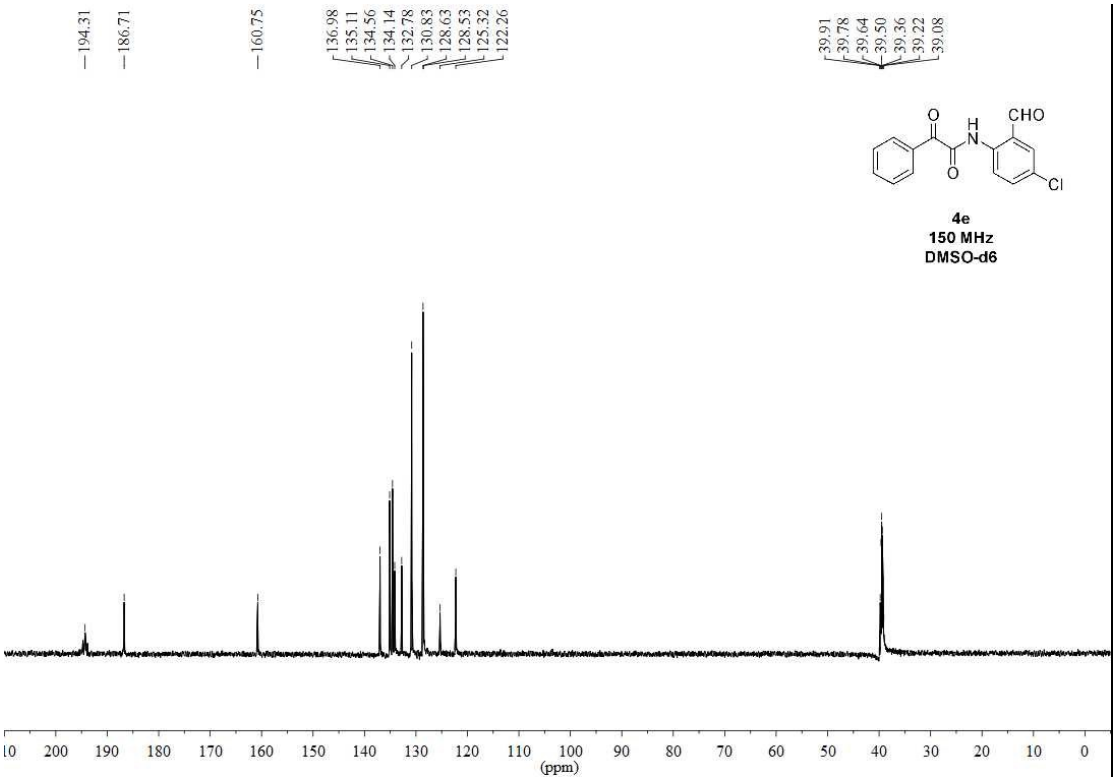

11.894
10.016
8.388
8.380
8.373
8.365
8.207
8.195
7.827
7.815
7.758
7.745
7.733
7.662
7.650
7.638
7.606
7.593
7.581
3.362
2.500
1.00
0.97
0.99
1.99
1.02
1.01
1.05
2.00
(ppm)
CHO
F
4c
600 MHz
DMSO-d6

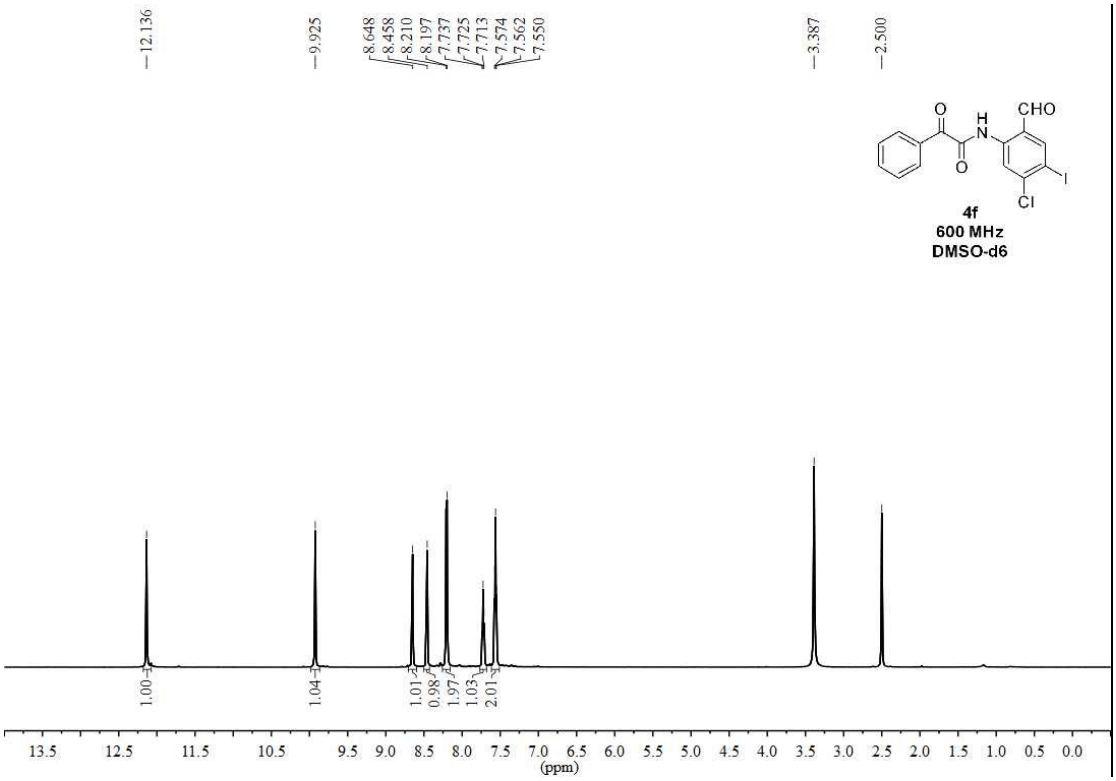

193.55
186.51
160.32
157.69
135.43
134.55
132.92
131.24
128.54
123.93
122.80
122.17
121.41
77.21
77.00
76.79
(ppm)
CHO
F
4c
150 MHz
CDCl3

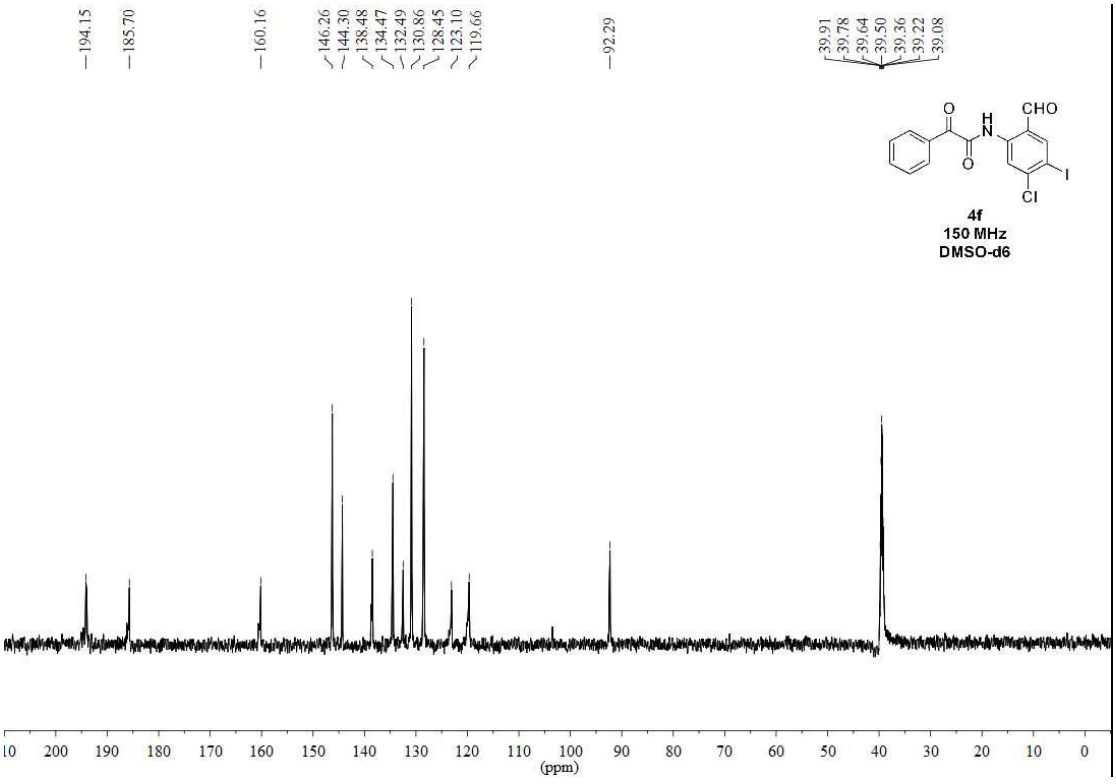

12.277
9.912
8.444
8.435
8.332
8.315
8.209
8.197
7.734
7.723
7.711
7.572
7.561
7.549
3.369
2.500
CHO
O
H
N
O
I
F
4d
600 MHz
DMSO-d6
1.00
0.98
0.93
1.02
1.92
0.97
2.01
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
(ppm)

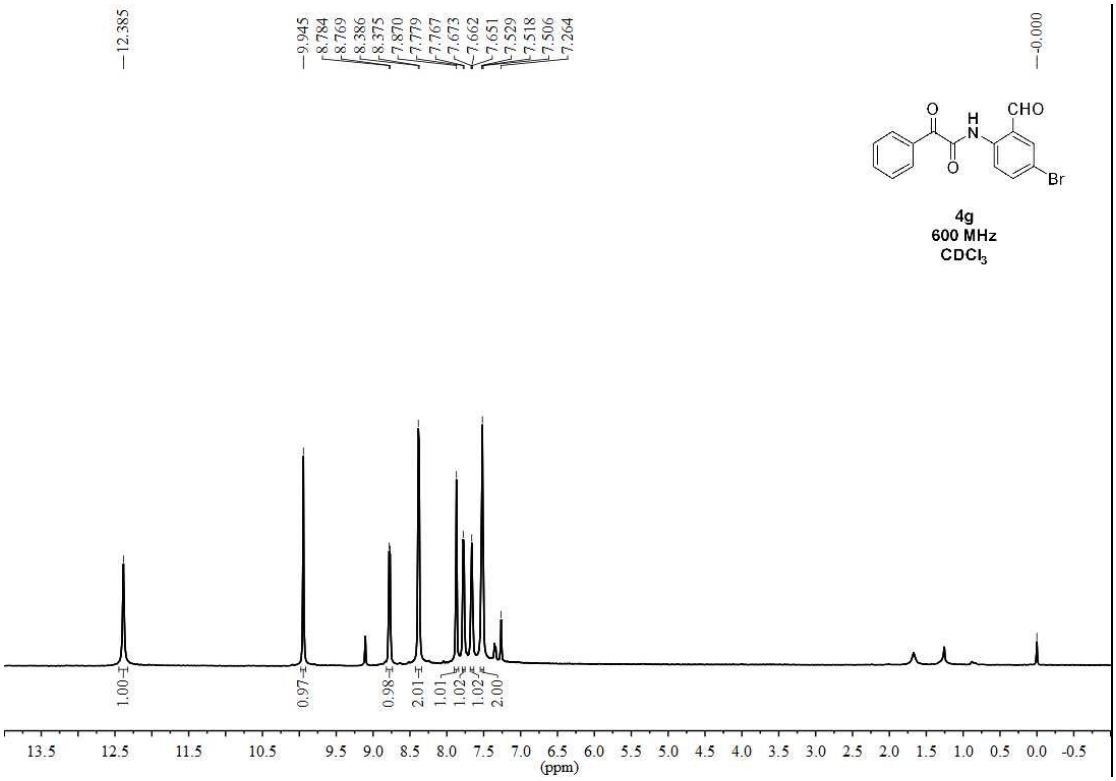

194.09
185.68
165.55
163.89
160.30
146.74
140.22
134.53
132.57
130.92
128.52
121.79
106.74
106.53
75.98
75.80
39.91
39.77
39.64
39.50
39.36
39.22
39.08
CHO
O
H
N
O
I
F
4d
150 MHz
DMSO-d6
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)

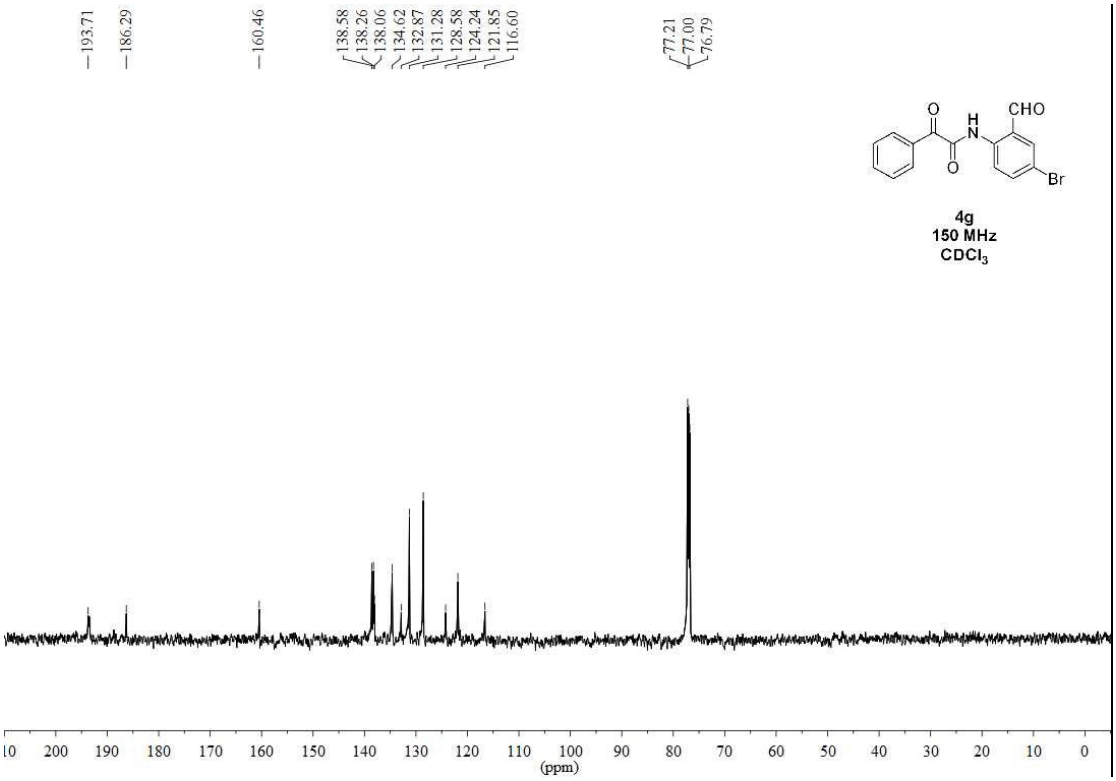

12.060
9.990
8.475
8.461
8.211
8.198
8.033
7.794
7.779
7.743
7.731
7.719
7.588
7.576
7.564
3.401
2.500
CHO
Cl
4e
600 MHz
DMSO-d6
1.00
1.01
0.98
1.97
1.00
0.99
0.96
2.04
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
(ppm)

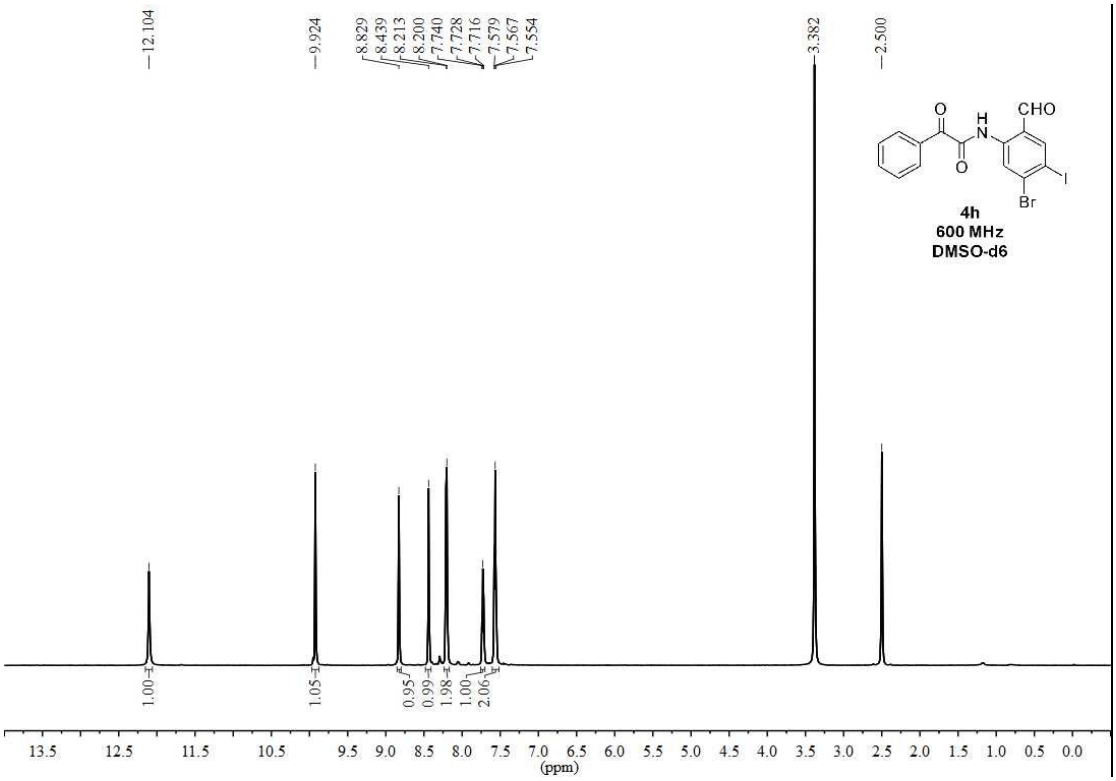

194.31
186.71
160.75
136.98
135.11
134.56
134.14
132.78
130.83
128.63
128.53
125.32
122.26
39.91
39.78
39.64
39.50
39.36
39.22
39.08
CHO
Cl
4e
150 MHz
DMSO-d6
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)

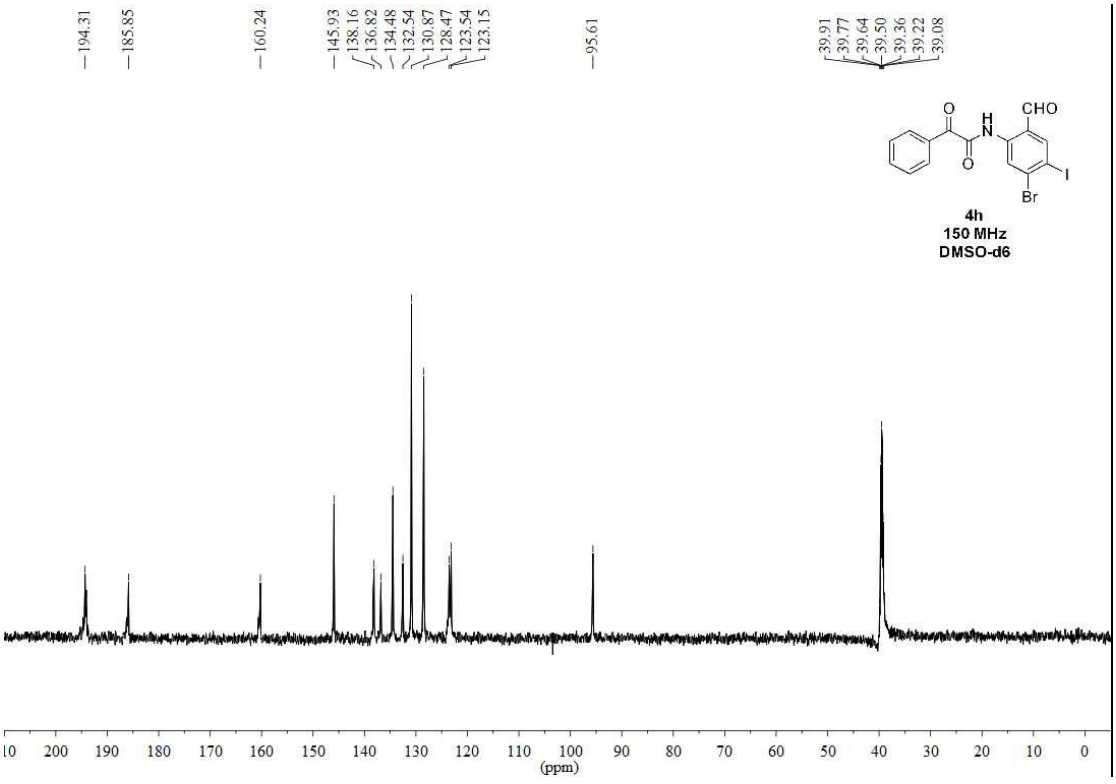

12.136
9.925
8.648
8.458
8.210
8.197
7.737
7.725
7.713
7.574
7.562
7.550
3.387
2.500
4f
600 MHz
DMSO-d6
1.00
1.04
1.01
0.98
1.97
1.03
2.01
(ppm)

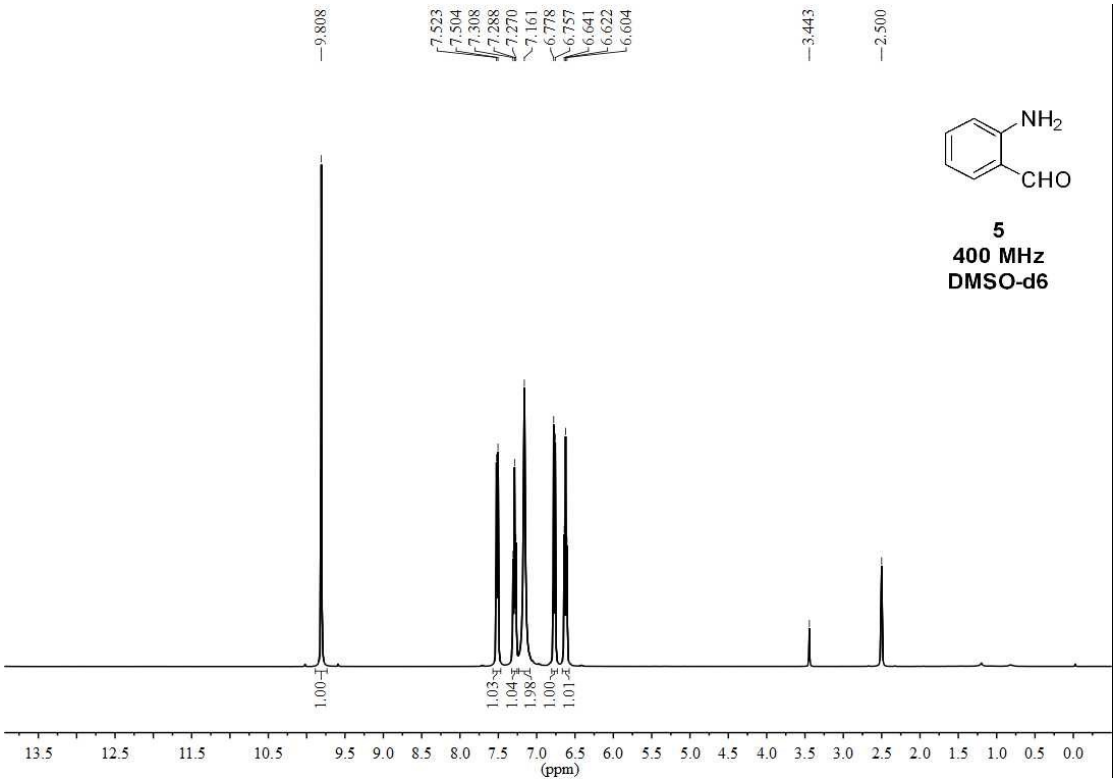

194.15
185.70
160.16
146.26
144.30
138.48
134.47
132.49
130.86
128.45
123.10
119.66
92.29
39.91
39.78
39.64
39.50
39.36
39.22
39.08
4f
150 MHz
DMSO-d6
(ppm)

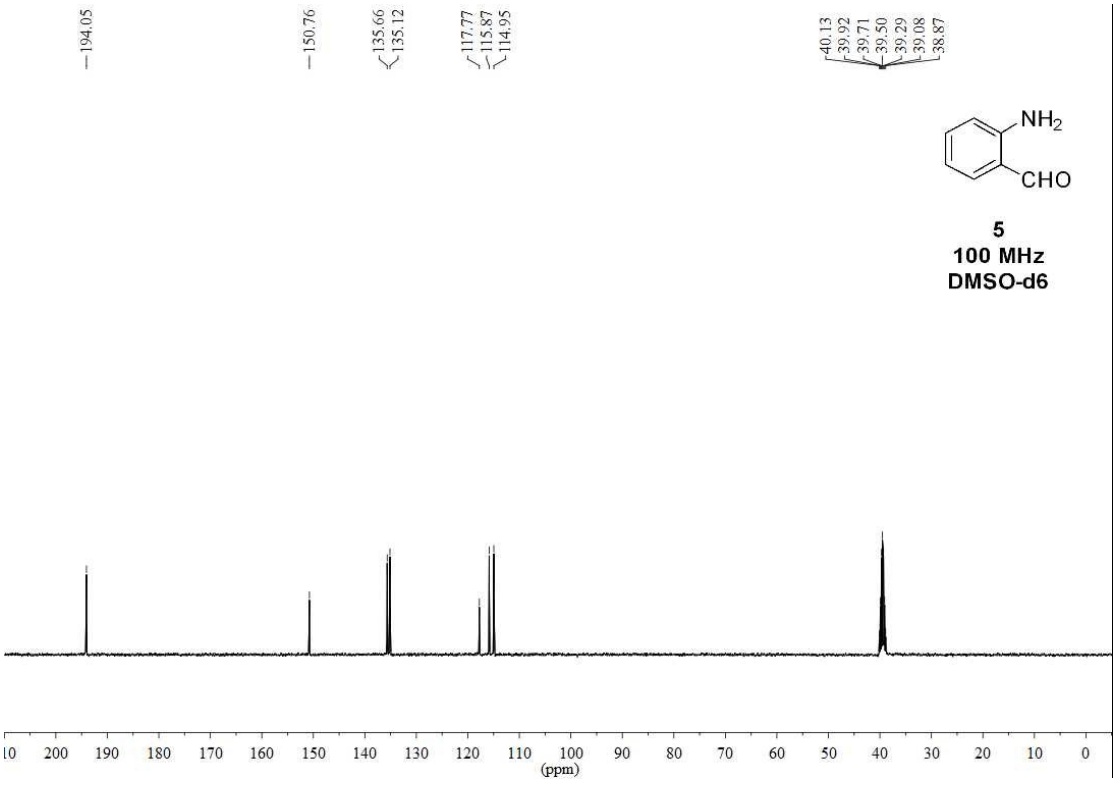

12.385
9.945
8.784
8.769
8.386
8.375
7.870
7.779
7.767
7.673
7.662
7.651
7.529
7.518
7.506
7.264
0.000
CHO
Br
4g
600 MHz
CDCl3
1.00
0.97
0.98
2.01
1.01
1.02
1.02
2.00
(ppm)

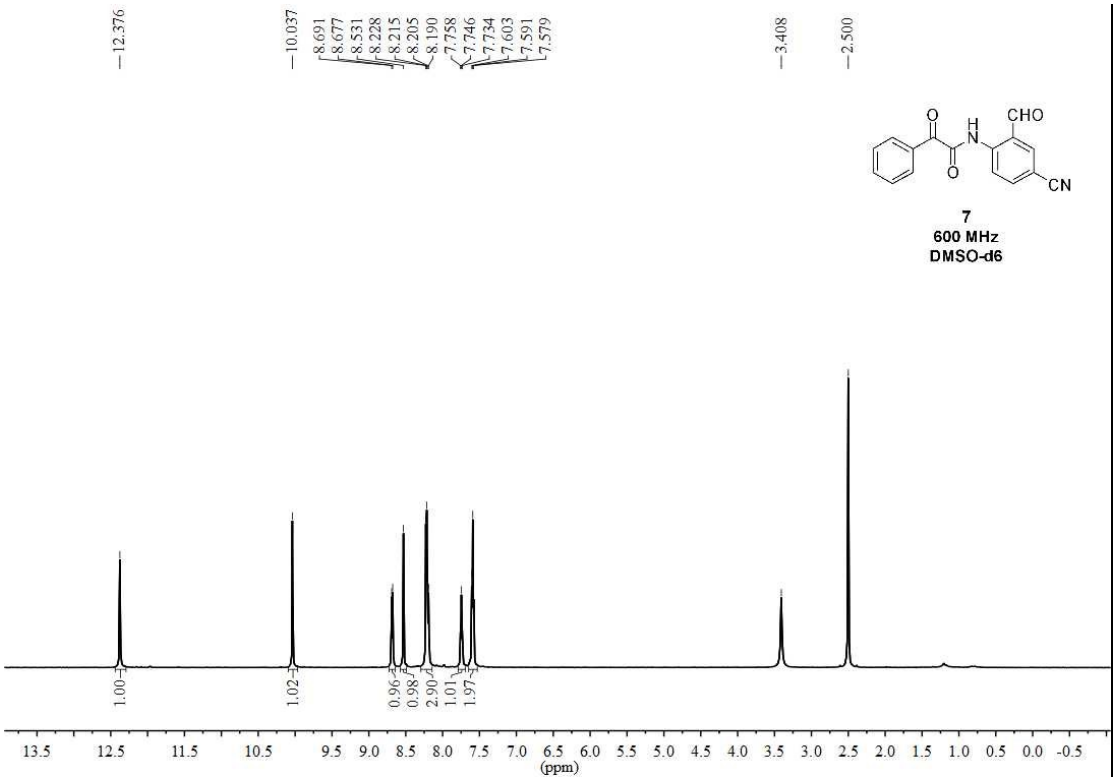

193.71
186.29
160.46
138.58
138.26
138.06
134.62
132.87
131.28
128.58
124.24
121.85
116.60
77.21
77.00
76.79
CHO
Br
4g
150 MHz
CDCl3
(ppm)

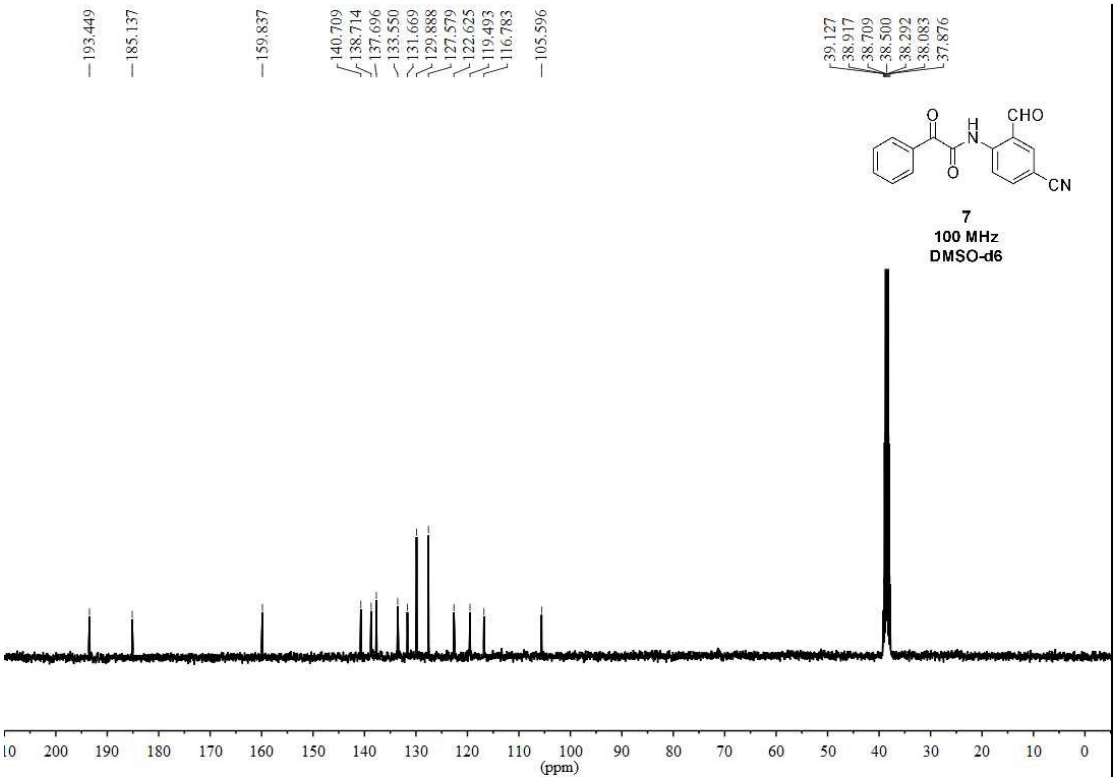

12.104
9.924
8.829
8.439
8.213
8.200
7.740
7.728
7.716
7.579
7.567
7.554
3.382
2.500
1.00
1.05
0.95
0.99
1.98
1.00
2.06
(ppm)
4h
600 MHz
DMSO-d6

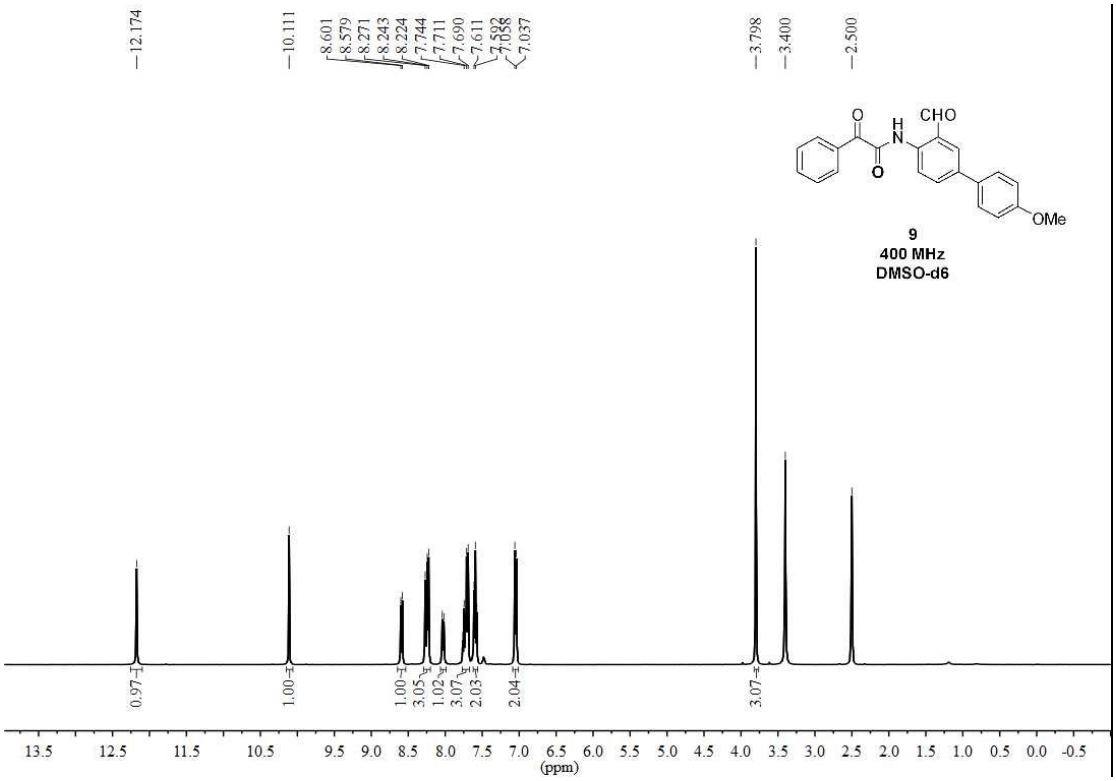

194.31
185.85
160.24
145.93
138.16
136.82
134.48
132.54
130.87
128.47
123.54
123.15
95.61
39.91
39.77
39.64
39.50
39.36
39.22
39.08
(ppm)
4h
150 MHz
DMSO-d6

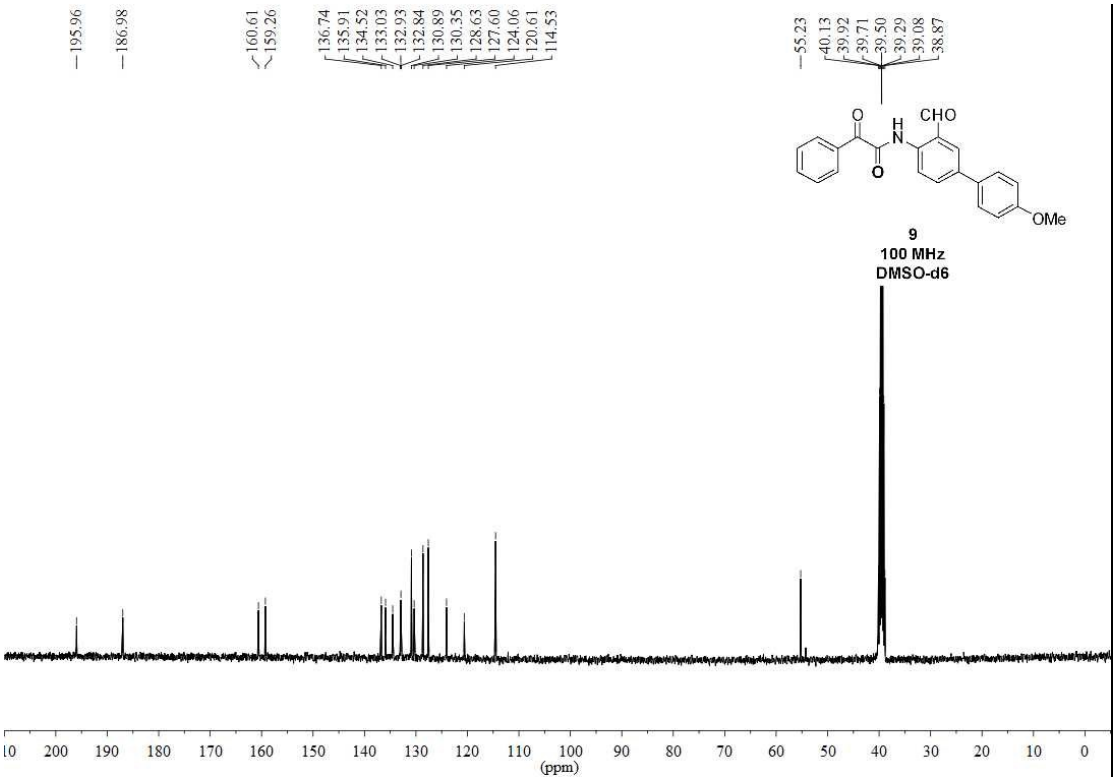

9.808
7.523
7.504
7.308
7.288
7.270
7.161
6.778
6.757
6.641
6.622
6.604
3.443
2.500
NH2
CHO
5
400 MHz
DMSO-d6
1.00
1.03
1.04
1.98
1.00
1.01
(ppm)

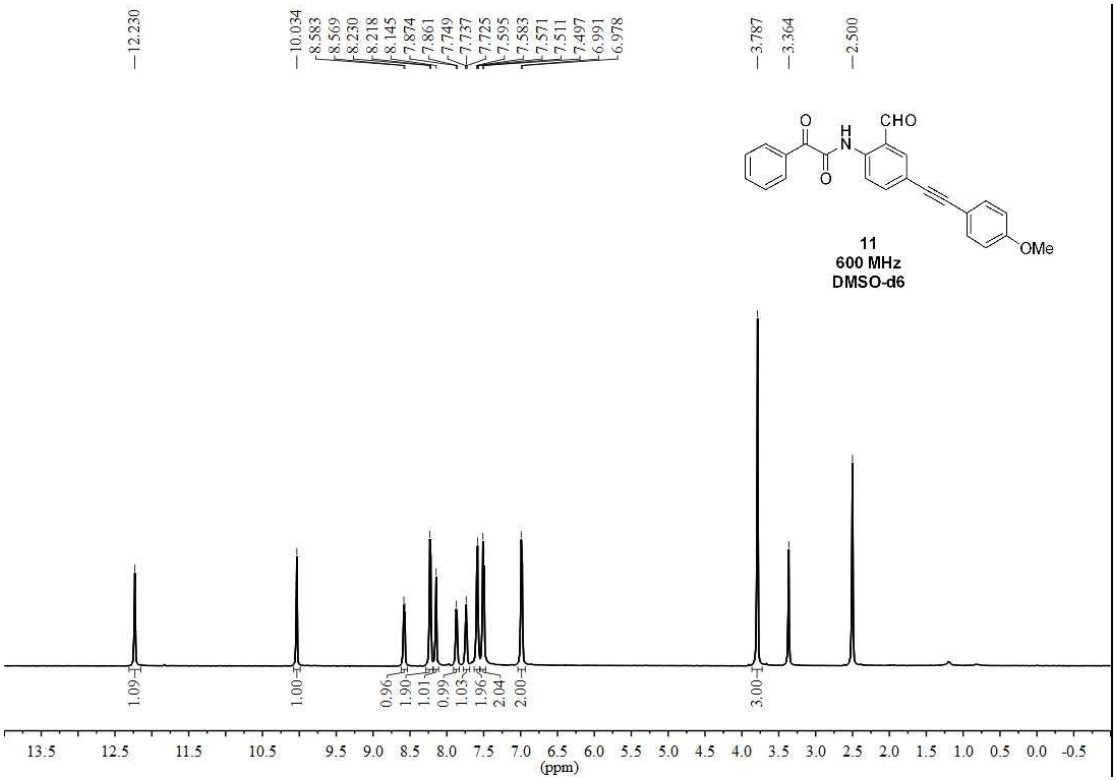

194.05
150.76
135.66
135.12
117.77
115.87
114.95
40.13
39.92
39.71
39.50
39.29
39.08
38.87
NH2
CHO
5
100 MHz
DMSO-d6
(ppm)

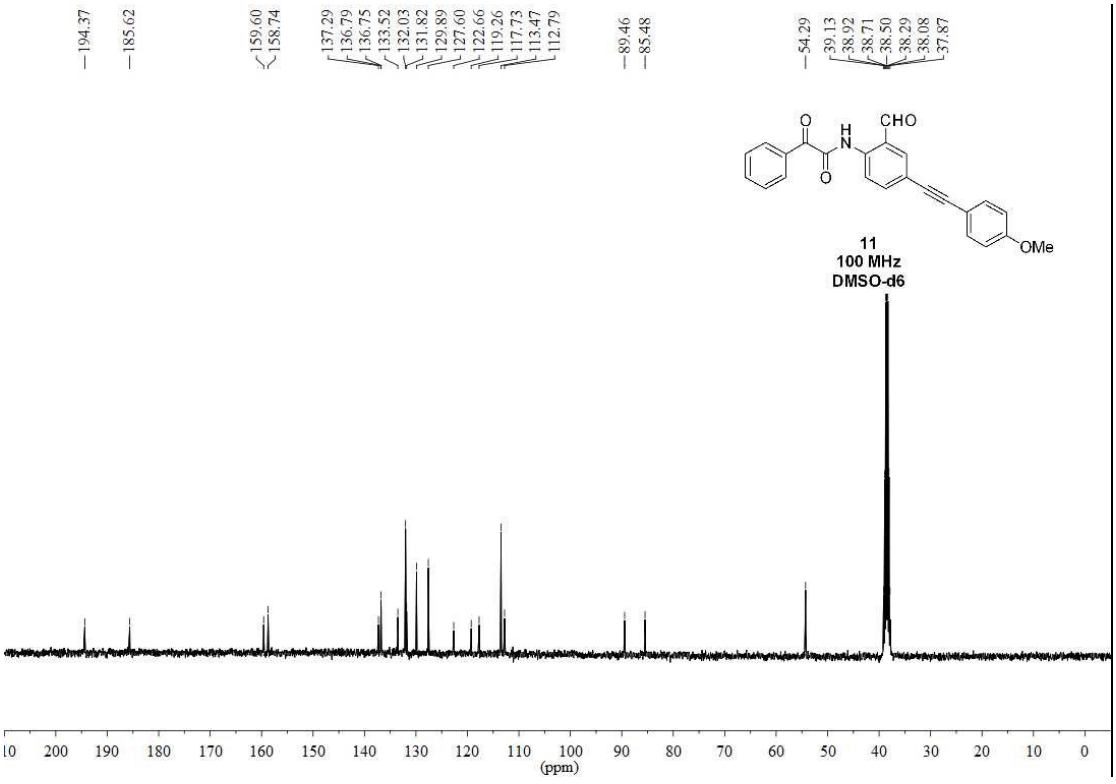

12.376
10.037
8.691
8.677
8.531
8.228
8.215
8.205
8.190
7.758
7.746
7.734
7.603
7.591
7.579
3.408
2.500
CHO
CN
7
600 MHz
DMSO-d6
1.00
1.02
0.96
0.98
2.90
1.01
1.97
(ppm)

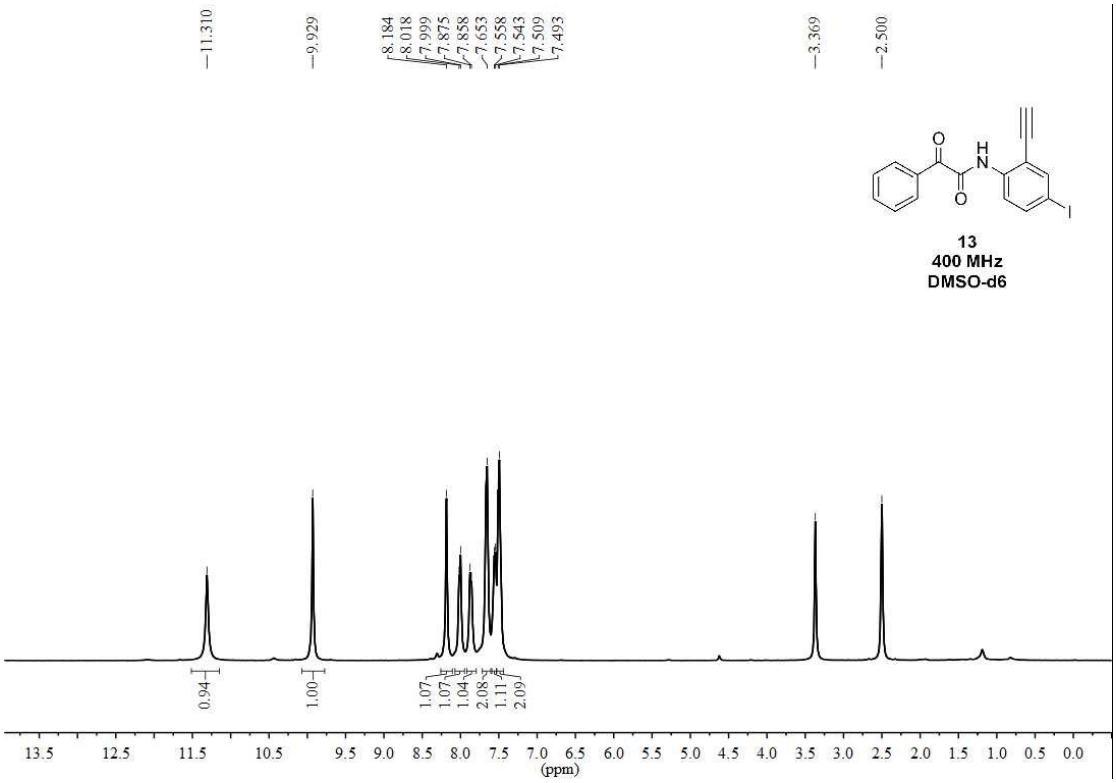

193.449
185.137
159.837
140.709
138.714
137.696
133.550
131.669
129.888
127.579
122.625
119.493
116.783
105.596
39.127
38.917
38.709
38.500
38.292
38.083
37.876
CHO
CN
7
100 MHz
DMSO-d6
(ppm)


12.174
10.111
8.601
8.579
8.271
8.243
8.224
7.744
7.711
7.690
7.611
7.588
7.058
7.037
3.798
3.400
2.500
CHO
O
H
N
O
OMe
9
400 MHz
DMSO-d6
0.97
1.00
1.00
3.05
1.02
3.07
2.03
2.04
3.07
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)

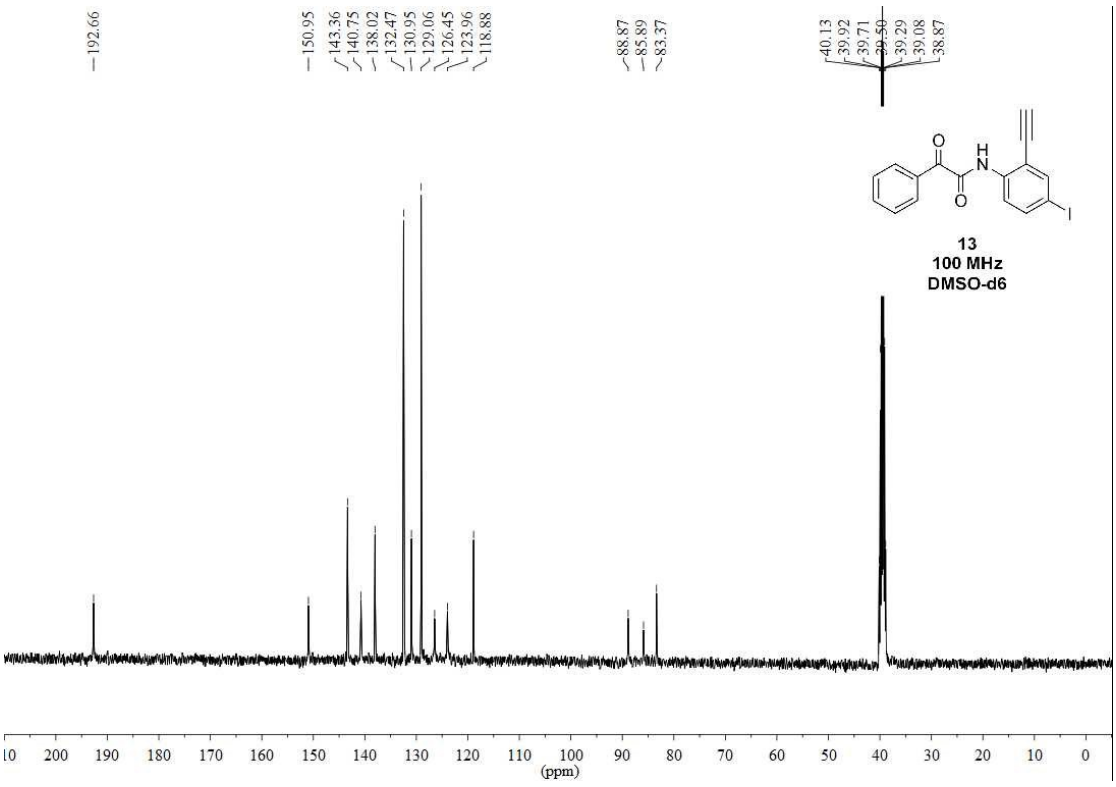

195.96
186.98
160.61
159.26
136.74
135.91
134.52
133.03
132.93
132.84
130.89
130.35
128.63
127.60
124.06
120.61
114.53
55.23
40.13
39.92
39.71
39.50
39.29
39.08
38.87
CHO
O
H
N
O
OMe
9
100 MHz
DMSO-d6
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)


12.230
10.034
8.583
8.569
8.230
8.218
8.145
7.874
7.861
7.749
7.737
7.725
7.595
7.583
7.571
7.511
7.497
6.991
6.978
3.787
3.364
2.500
CHO
O
H
N
O
OMe
11
600 MHz
DMSO-d6
1.09
1.00
0.96
1.90
1.01
0.99
1.03
1.96
2.04
2.00
3.00
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
(ppm)


194.37
185.62
159.60
158.74
137.29
136.79
136.75
133.52
132.03
131.82
129.89
127.60
122.66
119.26
117.73
113.47
112.79
89.46
85.48
54.29
39.13
38.92
38.71
38.50
38.29
38.08
37.87
CHO
O
H
N
O
OMe
11
100 MHz
DMSO-d6
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
(ppm)



13
400 MHz
DMSO-d6



13
100 MHz
DMSO-d6