Supporting Information

Facile synthesis of 1,4-diketones via three-component reactions of α-ketoaldehyde, 1,3-dicarbonyl compound, and a nucleophile in water

Jian Yang,[a] Fuming Mei,[a] Shitao Fu[a*] and Yanlong Gu[a,b*]

[a]: Key laboratory of Material Chemistry for Energy Conversion and Storage, Ministry of Education, School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology (HUST), 1037 Luoyu road, Hongshan District, Wuhan 430074, China. Fax: (0)86-(0)27-87 54 45 32, E-mail: klgyl@hust.edu.cn

[b]: State Key Laboratory for Oxo Synthesis and Selective Oxidation, Lanzhou Institute of Chemical Physics, Lanzhou, 730000 (P.R. China).

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1. General remarks

Unless otherwise noted, all reagents were purchased from commercial suppliers and used without purification. Indole, 2-methylindole, 5-bromoindole, methyl 3-oxovalerate, *N*,*N*-dimethylaniline, and benzoylformic acid were purchased from Energy Chemical Company. 2-Methoxyethyl acetoacetate, ethyl 4-chloroacetoacetate, 1,2,3,4-tetrahydroquinoline, 1-methylpyrrole, benzyl mercaptan, and glyoxal dimethyl acetal were purchased from Alfa Aesar Chemical Company. 6-Methylindole, 5-methoxyindole, 4-nitroindole, and ethyl-3-(2-furyl)-3-oxoprpanote were purchased from Accela ChemBio Co., Ltd. 2-Methylfuran was purchased from Aladdin Industrial Corporation. Methyl acetoacetate, ethyl acetoacetate, and 2,4-pentanedione were purchased from Sinopharm Chemical Reagent Co., Ltd. Pyruvic aldehyde, 5-methoxy-7-methylindole, 5-fluoro-2-methylindole, 7-ethyl-1*H*-indole, 4-chloroindole, and 6-bromoindole were purchased from Adamas Reagent Co., Ltd. 6-Nitroindole, 5-methylindole, 7-azaindole, 5-methyl-1*H*-pyrrolo[2,3-*b*]pyridine, 3,4-(methylenedioxy) phenylglyoxal hydrate, 5-bromo-2-thiopheneglyaxal hydrate, and 4-bromophenylglyoxal hydrate were purchased from BePharm Co., Ltd. ^{1}H and ^{13}C NMR spectra were recorded on a Bruker AV-400. Chemical shifts are expressed in ppm relative to Me_4Si in $CDCl_3$ or DMSO-d_6. IR spectra were recorded on a FT-IR Bruker (EQUINOX 55). Unless otherwise noted, all reactions were conducted in a 10 mL of V-type flask equipped with triangle magnetic stirring.

2. Synthesis of 1,4-diketones (4a–4ag, 4ah, 5a–5k)

In a typical reaction, an aqueous solution of pyruvic aldehyde **1a** (90.0 mg, 0.5 mmol, 40 wt%) was mixed with 2,4-pentanedione **2a** (50.0 mg, 0.5 mmol) and indole **3a** (58.5 mg, 0.5 mmol) in water (1.0 mL) under air. The mixture was then stirred at 80 °C for 5 h. After reaction completion, the mixture was cooled to room temperature and then extracted with ethyl acetate (1.5 ml × 3). The organic phases were combined, and subjected to isolation with preparative TLC [eluting solution: petroleum ether/ethyl acetate = 3/1 (v/v)]. Tests for substrate scope were all performed with an analogous procedure. Large scale synthesis of **4a** was performed also in the similar procedure. The product **4a** was isolated by silica column chromatography.

3. Synthesis of 6a, 6b and 6c

In a 10 mL of V-type flask equipped with triangle magnetic stirring, **1c** (53.5 mg, 0.5 mmol), **2a** (50.0 mg, 0.5 mmol) and **3b** (80.5 mg, 0.5 mmol) was mixed in EtOH (1.0 mL, 50 wt%), The mixture was then stirred 4 hours under 80 °C. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3 / 1 (v/v)). The desired product **6a** was obtained in 67 % yield, 105.6 mg.

In a 10 mL of V-type flask equipped with triangle magnetic stirring, **1d** (53.5 mg, 0.5 mmol), **2a** (50.0 mg, 0.5 mmol) and **3b** (80.5 mg, 0.5 mmol) was mixed in EtOH (1.0 mL, 50 wt%), The mixture was then stirred 4 hours under 80 °C. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3 / 1 (v/v)). The desired product **6b** was obtained below 5 % yield.

In a 10 mL of V-type flask equipped with triangle magnetic stirring, **1e** (87.0 mg, 0.5 mmol, 60 wt%), **2a** (50.0 mg, 0.5 mmol) and **3a** (58.5 mg, 0.5 mmol) was mixed in EtOH (1.0 mL, 50 wt%), The mixture was then stirred 4 hours under 80 ^{o}C. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3/1 (v/v)). The desired product **6c** was obtained in 86 % yield, 130.6 mg.

4. Synthesis of 7a

Compound **4a** (135.5 mg, 0.5 mmol) mixed with EtOH (1.0 mL) and PTSA (17.2 mg, 20 mol %) in a 10 mL of V-type flask equipped with triangle magnetic stirring. The mixture was then stirred at 60 ^{o}C for 3 hours. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 5/1 (v/v)). The desired product **7a** was obtained in 89 % yield, 112.6 mg.

5. Synthesis of 7b

Compound **4a** (135.5 mg, 0.5 mmol) mixed with EtOH (1.0 mL) and Sc(OTf) (12.2 mg, 5 mol %) in a 10 mL of V-type flask equipped with triangle magnetic stirring. The mixture was then stirred at 80 ^{o}C for 5 hours. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 5/1 (v/v)). The desired product **7b** was obtained in 55 % yield, 58.0 mg.

6. Synthesis of 8a

In a 10 mL of V-type flask equipped with triangle magnetic stirring, **4a** (135.5 mg, 0.5 mmol) and **12a** (80.3 mg, 0.75 mmol) was mixed in water (1.0 mL), The mixture was then stirred 6 hours under 100 ^{o}C. After reaction, the mixture was cooled to room temperature and then extracted with ethyl acetate (1.5 ml × 3). The organic phase was combined together, and then subjected to isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3/1 (v/v)). The desired product **8a** was obtained in 74 % yield, 126.5 mg.

7. Synthesis of 9a

Compound **4a** (135.5 mg, 0.5 mmol) mixed with EtOH (1.0 mL) and K_2CO_3 (69.0 mg, 0.5 mmol) in a 10 mL of V-type flask equipped with triangle magnetic stirring. The mixture was then stirred at 80 ^{o}C for 1h. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3/1 (v/v)). The desired product **9a** was obtained in 62 % yield, 71.0 mg.

8. Synthesis of 10a

Compound **4a** (135.5 mg, 0.5 mmol) mixed with EtOH (1.0 mL) and K_2CO_3 (138.0 mg, 1.0 mmol) in a 10 mL of V-type flask equipped with triangle magnetic stirring. The mixture was then stirred at 80 ^{o}C for 10 h. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3/1 (v/v)). The desired product **10a** was obtained in 40 % yield, 44.2 mg.

9. Synthesis of 11a and 11b

Compound **4a** (135.5 mg, 0.5 mmol) mixed with CH_3CN (1.0 mL) and K_2CO_3 (69.0 mg, 0.5 mmol) in a 10 mL of V-type flask equipped with triangle magnetic stirring. The mixture was then stirred at 80 °C for 10 hours. After reaction, the mixture was cooled to room temperature, and the product was obtained by isolation with preparative TLC (eluting solution: petroleum ether / ethyl acetate = 3/1 (v/v)). The desired product **11a** was obtained in 48 % yield, 60.7 mg and product **11b** was obtained in 42 % yield, 53.2 mg.

10. Spectroscopic data of products

3-Acetyl-4-(1*H*-indol-3-yl)hexane-2,5-dione (4a): Brown solid, mp: 100 – 102 °C. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.80 (s, 1H), 7.62 (d, *J* = 7.6 Hz, 1H), 7.37 (d, *J* = 8.0 Hz, 1H), 7.22 (t, *J* = 7.2 Hz, 1H), 7.16 (t, *J* = 7.2 Hz, 1H), 7.03 (d, *J* = 2.4 Hz, 1H), 4.84 (s, 2H), 2.33 (s, 3H), 2.07 (s, 3H), 1.85 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.5, 203.5, 202.5, 136.5, 126.0, 124.2, 122.8, 120.5, 118.6, 111.8, 108.5, 69.4, 50.4, 30.4, 30.3, 28.3 ppm. IR (film): 3399, 2926, 1701, 1422, 1356, 1250, 746, 426 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{17}NNaO_3$, $[M + Na]^+$ 294.1106, found 294.1102.

3-Acetyl-4-(4-hydroxy-1*H*-indol-3-yl)hexane-2,5-dione (4b): Brown viscous liquid. ^{1}H NMR (400 MHz, DMSO-d_6, 25 °C) δ = 10.99 (s, 1H), 9.69 (s, 1H), 7.07 (s, 1H), 6.87 (t, *J* = 8.0 Hz, 1H), 6.81 (d, *J* = 8.0 Hz, 1H), 6.40 (d, *J* = 7.6 Hz, 1H), 5.23 (s, 1H), 4.68 (d, *J* = 11.6 Hz, 1H), 2.23 (s, 3H), 1.98 (s, 3H), 1.90 ppm (s, 3H). ^{13}C NMR (100 MHz, DMSO-d_6, 25 °C) δ = 206.6, 203.4, 202.9, 151.6, 138.8, 123.6, 122.9, 116.2, 108.5, 104.0, 103.8, 70.6, 30.6, 29.6, 28.2 ppm. IR (film): 3391, 2924, 1696, 1457, 1355, 1271, 1041, 740, 567 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{17}NNaO_4$, $[M + Na]^+$ 310.1055, found 310.1047.

3-Acetyl-4-(4-chloro-1*H*-indol-3-yl)hexane-2,5-dione (4c): Yellow viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 9.10 (s, 1H), 7.34 – 7.30 (m, 1H), 7.18 – 7.15 (m, 2H), 7.03 (d, *J* = 2.4 Hz, 1H), 5.89 (d, *J* = 11.2 Hz, 1H), 4.57 (d, *J* = 11.6 Hz, 1H), 2.34 (s, 3H), 2.18 (s, 3H), 2.00 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.6, 203.6, 203.1, 137.6, 125.4, 125.2, 123.3, 122.7, 121.9, 110.8, 109.2, 72.4, 48.0, 30.2, 28.7, 28.0 ppm. IR (film): 3371, 2924, 1699, 1422, 1357, 1192, 937, 738, 568, 502 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{16}ClNNaO_3$, $[M + Na]^+$ 328.0716, found 328.0715.

3-Acetyl-4-(5-bromo-1*H*-indol-3-yl)hexane-2,5-dione (4d): Yellow viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.59 (s, 1H), 7.76 (s, 1H), 7.31 (d, *J* = 8.8 Hz, 1H), 7.26 (d, *J* = 8.8 Hz, 1H), 7.07 (d, *J* = 1.6 Hz, 1H), 4.78 (s, 2H), 2.33 (s, 3H), 2.09 (s, 3H), 1.87 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.0, 203.0, 202.1, 135.0, 127.7, 125.9, 125.3, 121.2, 113.9, 113.2, 108.4, 69.3, 50.1, 30.4, 30.3, 28.4 ppm. IR (film): 3413, 2937, 1701, 1456, 1356, 1194, 802, 607, 423 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{16}BrNNaO_3$, $[M + Na]^+$ 372.0211, found 372.0209.

3-Acetyl-4-(5-methyl-1*H*-indol-3-yl)hexane-2,5-dione (4e): Brownish solid, mp: 148–150 °C. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.56 (s, 1H), 7.38 (s, 1H), 7.25 (d, *J* = 8.4 Hz, 1H), 7.04 (d, *J* = 8.4 Hz, 1H), 6.98 (d, *J* = 2.4 Hz, 1H), 4.81 (s, 2H), 2.46 (s, 3H), 2.33 (s, 3H), 2.07 (s, 3H), 1.85 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.6, 203.4, 202.5, 134.8, 129.8, 126.3, 124.4, 124.2, 118.1, 111.4, 108.0, 69.4, 50.4, 30.4, 30.2, 28.2, 21.6 ppm. IR (film): 3384, 2918, 1724, 1697, 1355, 1263, 1157, 1100, 790, 618, 559 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_3$, $[M + Na]^+$ 308.1263, found 308.1262.

3-Acetyl-4-(5-methoxy-1*H*-indol-3-yl)hexane-2,5-dione (4f): Brownish viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.68 (s, 1H), 7.26 (d, *J* = 8.8 Hz, 1H), 7.05 (s, 1H), 7.00 (s, 1H),

6.88 (d, *J* = 8.4 Hz, 1H), 4.80 (s, 2H), 3.87 (s, 3H), 2.32 (s, 3H), 2.09 (s, 3H), 1.86 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.4, 203.5, 202.5, 154.7, 131.6, 126.6, 124.7, 112.9, 112.5, 108.1, 100.4, 69.2, 55.9, 50.3, 30.4, 30.3, 28.3 ppm. IR (film): 3397, 2941, 1701, 1582, 1486, 1356, 1254, 1216, 1030, 801, 637, 562 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_4$, $[M + Na]^+$ 324.1212, found 324.1208.

3-(4-Acetyl-2,5-dioxohexan-3-yl)-1*H*-indole-5-carboxylic acid (4g): Brown solid, mp: 225–227 °C. ^{1}H NMR (400 MHz, DMSO-d_6, 25 °C) δ = 12.49 (s, 1H), 11.53 (s, 1H), 8.23 (s, 1H), 7.74 (dd, *J* = 8.4, 1.2 Hz, 1H), 7.48 (d, *J* = 2.4 Hz, 1H), 7.44 (d, *J* = 8.8 Hz, 1H), 4.85 (d, *J* = 11.2 Hz, 1H), 4.80 (d, *J* = 11.6 Hz, 1H), 2.25 (s, 3H), 2.00 (s, 3H), 1.86 ppm (s, 3H). ^{13}C NMR (100 MHz, DMSO-d_6, 25 °C) δ = 206.2, 203.5, 202.6, 168.7, 139.4, 127.6, 125.9, 123.2, 122.4, 121.7, 112.2, 109.2, 68.8, 50.0, 30.9, 30.5, 28.3 ppm. IR (film): 3317, 3005, 1703, 1358, 1243, 998, 757, 428 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{17}NNaO_5$, $[M + Na]^+$ 338.1004, found 338.1001.

3-Acetyl-4-(6-fluoro-1*H*-indol-3-yl)hexane-2,5-dione (4h): Yellow viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.86 (s, 1H), 7.54 – 7.51 (m, 1H), 7.08 – 7.05 (m, 2H), 6.92 (t, *J* = 9.2 Hz, 1H), 4.81 (s, 2H), 2.33 (s, 3H), 2.09 (s, 3H), 1.87 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.4, 203.3, 202.4, 160.1.(*J* = 237.7 Hz), 136.5.(*J* = 12.5 Hz), 124.5, 122.6, 119.5.(*J* = 10.1 Hz), 109.4.(*J* = 20.6 Hz), 108.6.(*J* = 2.3 Hz), 98.1.(*J* = 25.9 Hz), 69.26, 50.35, 30.43, 30.36, 28.24 ppm. ^{19}F NMR (377 MHz, $CDCl_3$, 25 °C) δ = –119.93, –119.94, –119.95, –119.97 ppm. IR (film): 3375, 2936, 1700, 1627, 1354, 1255, 1093, 949, 804, 567, 431 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{16}FNNaO_3$, $[M + Na]^+$ 312.1012, found 312.1010.

Methyl 3-(4-acetyl-2,5-dioxohexan-3-yl)-1*H*-indole-6-carboxylate (4i): Yellow viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 9.48 (s, 1H), 8.18 (s, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.66 (d, *J* = 8.4 Hz, 1H), 7.28 (d, *J* = 2.0 Hz, 1H), 4.88 (d, *J* = 11.2 Hz, 1H), 4.83 (d, *J* = 11.2 Hz, 1H), 3.95 (s, 3H), 2.35 (s, 3H), 2.10 (s, 3H), 1.87 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.2, 203.2, 202.2, 168.0, 135.9, 129.5, 127.6, 124.4, 121.4, 118.3, 114.3, 108.9, 69.4, 52.1, 50.2, 30.4, 30.3, 28.3 ppm. IR (film): 3367, 2951, 1707, 1435, 1357, 1285, 1220, 983, 775, 567 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{19}NNaO_5$, $[M + Na]^+$ 352.1161, found 352.1157.

3-Acetyl-4-(6-methyl-1*H*-indol-3-yl)hexane-2,5-dione (4j): Brown viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.51 (s, 1H), 7.50 (d, *J* = 8.4 Hz, 1H), 7.17 (s, 1H), 7.00 (d, *J* = 8.0 Hz, 1H), 6.96 (s, 1H), 4.81 (s, 2H), 2.45 (s, 3H), 2.32 (s, 3H), 2.07 (s, 3H), 1.84 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.5, 203.4, 202.5, 136.9, 132.7, 123.9, 123.5, 122.3, 118.3, 111.6, 108.4, 69.5, 50.4, 30.3, 30.2, 28.2, 21.6 ppm. IR (film): 3397, 2923, 1703, 1356, 1252, 1155, 803, 266, 429 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_3$, $[M + Na]^+$ 308.1263, 308.1269.

3-Acetyl-4-(6-nitro-1*H*-indol-3-yl)hexane-2,5-dione (4k): Yellow viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 11.43 (s, 1H), 8.39 (d, *J* = 2.0 Hz, 1H), 8.00 (dd, *J* = 8.8, 2.0 Hz, 1H), 7.67 (d, *J* = 8.8 Hz, 1H), 7.43 (d, *J* = 2.4 Hz, 1H), 4.83 (q, *J* = 11.6 Hz, 2H), 2.33 (s, 3H), 2.09 (s, 3H), 1.87 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 205.7, 202.4, 201.7, 143.1, 135.3, 130.5, 118.4, 115.1, 109.1, 108.7, 69.2, 49.8, 30.4, 30.2, 28.2 ppm. IR (film): 3380, 2924, 1704, 1511, 1340, 1063, 736, 567, 425 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{16}N_2NaO_5$, $[M + Na]^+$ 339.0957, found 339.0950.

3-Acetyl-4-(7-bromo-1*H*-indol-3-yl)hexane-2,5-dione (4l): Brown viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.80 (s, 1H), 7.54 (d, *J* = 1.2 Hz, 1H), 7.48 (d, *J* = 8.8 Hz, 1H), 7.28 – 7.25 (m, 1H), 7.04 (d, *J* = 2.4 Hz, 1H), 4.80 (s, 2H), 2.33 (s, 3H), 2.08 (s, 3H), 1.86 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.2, 203.2, 202.2, 137.3, 124.9, 124.8, 124.7, 123.9, 123.8, 120.0, 116.4, 114.8, 114.7, 108.8, 69.3, 50.2, 30.5, 30.4, 28.3 ppm. IR (film): 3382, 2923, 1702,

1418, 1357, 1252, 1155, 895, 805, 732, 568, 425 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{16}BrNNaO_3$, $[M + Na]^+$ 372.0211, found 372.0214.

3-Acetyl-4-(7-ethyl-1*H*-indol-3-yl)hexane-2,5-dione (4m): Brown solid, mp: 129 – 131 °C. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.58 (s, 1H), 7.49 (d, *J* = 8.0 Hz, 1H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.07 (d, *J* = 7.2 Hz, 1H), 7.03 (d, *J* = 2.0 Hz, 1H), 4.85 (d, *J* = 11.2 Hz, 1H), 4.80 (d, *J* = 11.2 Hz, 1H), 2.84 (q, *J* = 7.6 Hz, 2H), 2.33 (s, 3H), 2.09 (s, 3H), 1.86 (s, 3H), 1.34 ppm (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.5, 203.4, 202.5, 135.3, 127.1, 125.9, 123.7, 121.2, 120.8, 116.3, 109.1, 69.6, 50.4, 30.3, 30.0, 28.3, 23.8, 13.7 ppm. IR (film): 3380, 2963, 1726, 1697, 1432, 1357, 1263, 1151, 796, 752, 628, 562, 463 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{21}NNaO_3$, $[M + Na]^+$ 322.1419, found 322.1411.

3-Acetyl-4-(5-methoxy-7-methyl-1H-indol-3-yl)hexane-2,5-dione (4n): Brown solid, mp: 167 – 169 °C. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.52 (s, 1H), 7.00 (d, J = 2.4 Hz, 1H), 6.89 (d, J = 1.2 Hz, 1H), 6.71 (s, 1H), 4.81 – 4.75 (m, 2H), 3.86 (s, 3H), 2.43 (s, 3H), 2.32 (s, 3H), 2.10 (s, 3H), 1.87 (s, 3H). 13C NMR (100 MHz, CDCl3, 25 °C) δ = 206.4, 203.4, 202.6, 154.8, 131.3, 126.1, 124.2, 122.1, 113.6, 108.7, 97.8, 69.4, 55.9, 50.3, 30.3, 30.2, 28.3, 16.6 ppm. IR (film): 3386, 2941, 1723, 1699, 1488, 1357, 1261, 1208, 1051, 828, 572 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{21}NNaO_4$, $[M + Na]^+$ 338.1368, found 338.1363.

3-Acetyl-4-(2-methyl-1*H*-indol-3-yl)hexane-2,5-dione (4o): Yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.35 (s, 1H), 7.47 (s, 1H), 7.27 (d, *J* = 7.6 Hz, 1H), 7.15 – 7.09 (m, 2H), 5.00 (s, 1H), 4.76 (s, 1H), 2.40 (s, 3H), 2.34 (s, 3H), 2.00 (s, 3H), 1.79 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.70, 203.2, 202.1, 135.5, 134.0, 126.9, 121.7, 120.2, 118.1, 110.9, 103.8, 66.6, 50.8, 31.6, 30.5, 27.9, 11.6 ppm. IR (film): 3391, 2926, 1703, 1460, 1427, 1356, 1252, 746, 435 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_3$, $[M + Na]^+$ 308.1263, found 308.1267.

3-Acetyl-4-(5-fluoro-2-methyl-1*H*-indol-3-yl)hexane-2,5-dione (4p): White solid, mp: 167 – 169 °C . ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.50 (s, 1H), 7.21 – 7.15 (m, 2H), 6.89 – 6.85 (m, 1H), 4.96 (s, 1H), 4.73 (s, 1H), 2.40 (s, 3H), 2.34 (s, 3H), 2.02 (s, 3H), 1.83 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.4, 203.0, 202.0, 159.2, 156.9, 136.0, 131.9, 111.5 (*J* =9.7 Hz), 109.8 (*J* =26.0 Hz), 104.0, 103.2, 66.4, 50.5, 31.7, 30.5, 28.0, 11.7 ppm. ^{19}F NMR (377 MHz, $CDCl_3$) δ = –123.21, –123.21, –123.23, –123.24 ppm. IR (film): 3373, 2924, 1703, 1584, 1484, 1453, 1357, 1253, 1186, 966, 732, 608 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{18}FNNaO_3$, $[M + Na]^+$ 326.1168, found 326.1163.

3-Acetyl-4-(1-ethyl-2-methyl-1*H*-indol-3-yl)hexane-2,5-dione (4q): Brownish solid, mp: 116 – 118 °C. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 7.45 (s, 1H), 7.28 (d, *J* = 8.4 Hz, 1H), 7.17 (t, *J* = 6.8 Hz, 1H), 7.09 (s, 1H), 5.00 (s, 1H), 4.75 (s, 1H), 4.13 (dd, *J* = 10.6 Hz, 6.4 Hz, 2H), 2.44 (s, 3H), 2.33 (s, 3H), 2.00 (s, 3H), 1.74 (s, 3H), 1.30 ppm (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.7, 203.1, 201.7, 135.9, 134.7, 126.1, 121.2, 119.7, 118.5, 109.1, 103.5, 66.5, 51.2, 38.0, 31.6, 30.5, 27.9, 15.2, 9.9 ppm. IR (film): 3401, 2974, 1693, 1468, 1419, 1348, 1192, 745, 484 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{19}H_{23}NNaO_3$, $[M + Na]^+$ 336.1576, found 336.1578.

3-Acetyl-4-(1-methyl-1*H*-indol-3-yl)hexane-2,5-dione (4r): Yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 7.62 (d, *J* = 8.0 Hz, 1H), 7.31 (d, *J* = 8.0 Hz, 1H), 7.27 – 7.25 (m, 1H), 7.16 (t, *J* = 7.6 Hz, 1H), 6.93 (s, 1H), 4.80 (q, *J* = 11.6 Hz, 2H), 3.75 (s, 3H), 2.32 (s, 3H), 2.09 (s, 3H), 1.85 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.2, 203.0, 202.4, 137.2, 128.4, 126.7, 122.3, 120.1, 118.8, 109.7, 107.1, 69.7, 50.1, 32.9, 30.3, 29.9, 28.3 ppm. IR (film): 3402, 2936, 1704, 1473, 1424, 1356, 1259, 1155, 745, 429 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_3$, [M +

Na]$^+$ 308.1263, found 308.1262.

Ethyl 3-acetyl-2-(1H-indol-3-yl)-4-oxopentanoate (4s): Brown viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.34 (s, 1H), 7.77 (d, *J* = 7.6 Hz, 1H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.27 – 7.16 (m, 2H), 7.04 (d, *J* = 2.4 Hz, 1H), 4.82 (d, *J* = 11.6 Hz, 1H), 4.74 (d, *J* = 12.0 Hz, 1H), 4.17 – 4.09 (m, 1H), 4.03 – 3.95 (m, 1H), 2.33 (s, 3H), 1.87 (s, 3H), 1.13 ppm (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 202.6, 202.3, 172.5, 136.2, 126.1, 123.3, 122.6, 120.2, 119.3, 111.5, 109.6, 70.4, 61.5, 42.5, 30.0, 29.4, 14.0 ppm. IR (film): 3403, 2983, 1725, 1423, 1358, 1253, 1189, 1160, 1099, 1019, 746, 505 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_4$, [M + Na]$^+$ 324.1212, found 324.1216.

3-Acetyl-1-cyclopropyl-2-(5-methoxy-1*H*-indol-3-yl)pentane-1,4-dione (4t): Yellow solid, mp: 162 – 164 °C. ^{1}H NMR (400 MHz, DMSO-d_6, 25 °C) δ = 11.01 (s, 1H), 7.28 – 7.24 (m, 2H), 7.01 (d, *J* = 2.0 Hz, 1H), 6.75 (dd, *J* = 8.8, 2.4 Hz, 1H), 4.90 (d, *J* = 11.2 Hz, 1H), 4.79 (d, *J* = 11.2 Hz, 1H), 3.75 (s, 3H), 2.22 (s, 3H), 2.00 – 1.96 (m, 1H), 1.85 (s, 3H), 0.86 – 0.79 (m, 1H), 0.74 – 0.54 ppm (m, 3H). ^{13}C NMR (100 MHz, DMSO-d_6, 25 °C) δ = 208.0, 203.6, 202.6, 154.0, 132.0, 127.1, 126.3, 112.9, 111.8, 107.5, 100.9, 68.7, 55.9, 50.3, 30.7, 30.7, 19.6, 11.4, 10.8 ppm. IR (film): 3377, 2939, 1727, 1694, 1485, 1357, 1218, 1063, 1026, 804, 629, 560 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{19}H_{21}NNaO_4$, [M + Na]$^+$ 350.1368, found 350.1361.

3-Acetyl-1-(benzofuran-2-yl)-2-(1*H*-indol-3-yl)pentane-1,4-dione (4u): Brown viscous liquid; ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.59 (s, 1H), 7.86 (d, *J* = 7.2 Hz, 1H), 7.52 (d, *J* = 8.0 Hz, 1H), 7.47 (s, 1H), 7.43 (d, *J* = 8.4 Hz, 1H), 7.35 (t, *J* = 8.0 Hz, 1H), 7.30 – 7.27 (m, 1H), 7.19 – 7.14 (m, 4H), 5.63 (d, *J* = 11.4 Hz, 1H), 5.09 (d, *J* = 11.4 Hz, 1H), 2.32 (s, 3H), 1.92 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 203.3, 202.1, 188.2, 155.5, 151.3, 136.4, 128.3, 127.0, 125.9, 124.3, 123.8, 123.3, 122.67, 120.5, 119.1, 114.2, 112.3, 111.7, 108.7, 69.7, 45.5, 31.1, 30.3.

IR (film): 3400, 3060, 1726, 1699, 1553, 1356, 1244, 1139, 910, 746, 612, 428 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{23}H_{19}NNaO_4$, [M + Na]$^+$ 396.1212, found 396.1211.

3-Acetyl-1-(benzo[*d*][1,3]dioxol-5-yl)-2-(1*H*-indol-3-yl)pentane-1,4-dione (4v): Yellow viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.43 (s, 1H), 7.72 – 7.69 (m, 1H), 7.61 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.40 (d, *J* = 1.6 Hz, 1H), 7.29 – 7.26 (m, 1H), 7.16 – 7.13 (m, 2H), 7.03 (d, *J* = 2.0 Hz, 1H), 6.66 (d, *J* = 8.4 Hz, 1H), 5.90 (s, 2H), 5.58 (d, *J* = 10.8 Hz, 1H), 5.03 (d, *J* = 10.8 Hz, 1H), 2.29 (s, 3H), 1.87 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 203.9, 202.2, 195.9, 151.7, 147.9, 136.4, 130.4, 125.7, 125.2, 123.9, 122.6, 120.5, 119.0, 111.6, 109.8, 108.6, 107.9, 101.7, 70.3, 45.3, 31.5, 30.3.ppm. IR (film): 3401, 2908, 1726, 1689, 1669, 1606, 1501, 1441, 1357, 1258, 1038, 744, 501, 430 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{22}H_{19}NNaO_5$, [M + Na]$^+$ 400.1161, found 400.1164.

3-Acetyl-2-(1*H*-indol-3-yl)-1-phenylpentane-1,4-dione (4w): Brown viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.55 (s, 1H), 7.93 (d, *J* = 7.4 Hz, 2H), 7.72 – 7.70 (m, 1H), 7.35 (t, *J* = 7.6 Hz, 1H), 7.26 – 7.22 (m, 3H), 7.15 – 7.12 (m, 2H), 6.98 (d, *J* = 2.4 Hz, 1H), 5.67 (d, *J* = 11.2 Hz, 1H), 5.05 (d, *J* = 11.2 Hz, 1H), 2.27 (s, 3H), 1.85 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 204.1, 202.4, 197.9, 136.4, 135.8, 133.1, 128.7, 128.5, 125.7, 124.2, 122.6, 120.4, 118.9, 111.7, 109.0, 70.2, 45.5, 31.6, 30.3. IR (film): 3398, 2934, 1725, 2696, 1597, 1355, 1264, 744, 691, 560, 504, 427 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{21}H_{19}NNaO_3$, [M + Na]$^+$ 356.1263, found 356.1266.

3-Acetyl-1-(4-bromophenyl)-2-(1*H*-indol-3-yl)pentane-1,4-dione (4x): Brown viscous liquid. ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.51 (s, 1H), 7.78 (d, *J* = 8.4 Hz, 2H), 7.69 – 7.67 (m, 1H), 7.39 (d, *J* = 8.4 Hz, 2H), 7.29 – 7.27 (m, 1H), 7.16 – 7.14 (m, 2H), 7.00 (d, *J* = 2.0 Hz, 1H), 5.59 (d, *J* = 11.2 Hz, 1H), 5.03 (d, *J* = 11.2 Hz, 1H), 2.29 (s, 3H), 1.87 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$,

25 °C) δ = 203.7, 202.1, 196.8, 136.4, 134.6, 131.7, 130.2, 128.1, 125.6, 124.1, 122.8, 120.6, 118.8, 111.7, 108.8, 70.1, 45.4, 31.6, 30.3 ppm. IR (film): 3398, 3059, 1725, 1677, 1584, 1421, 1355, 1262, 1173, 1071, 909, 789, 742, 509, 426 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{21}H_{18}BrNNaO_3$, $[M + Na]^+$ 434.0368, found 434.0362.

Methyl 2-acetyl-3-(1*H*-indol-3-yl)-4-oxopentanoate (4y): A mixture of diastereomers, yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.75 (s, 0.5H), 8.68 (s, 0.5H), 7.61 (t, *J* = 6.8 Hz, 1H), 7.35 (d, *J* = 8.0 Hz, 1H), 7.21 – 7.18 (m, 1H), 7.15 – 7.11 (m, 1H) 7.05 (dd, *J* = 6.4, 2.4 Hz, 1H), 4.86 (d, *J* = 11.6 Hz, 0.5H), 4.76 (d, *J* = 11.6 Hz, 0.5H), 4.65 (d, *J* = 11.6 Hz, 0.5H), 4.55 (d, *J* = 11.2 Hz, 0.5H), 3.74 (s, 1.4H), 3.39 (s, 1.6H), 2.37 (s, 1.6H), 2.11 (s, 1.3H), 2.09 (s, 1.5H), 1.85 ppm (s, 1.4H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.7, 206.5, 203.3, 202.0, 169.2, 168.2, 136.5, 136.4, 126.3, 126.0, 124.5, 124.0, 122.7, 122.5, 120.4, 120.1, 118.9, 118.8, 111.7, 111.6, 108.7, 108.1, 62.0, 60.0, 52.7, 52.5, 49.7, 49.6, 31.4, 29.9, 28.5, 28.4 ppm. IR (film): 3402, 2953, 1743, 1710, 1429, 2355, 1266, 1159, 747, 427 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{17}NNaO_4$, $[M + Na]^+$ 310.1055, found 310.1051.

Ethyl 2-acetyl-3-(1*H*-indol-3-yl)-4-oxopentanoate (4z): A mixture of diastereomers, yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.77 – 8.72 (m, 1H), 7.64 – 7.61, 1H), 7.35 (d, *J* = 8.0 Hz, 1H), 7.19 (t, *J* = 6.8, 1H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.06 – 7.04 (m, 1H), 4.85 (d, *J* = 11.2 Hz, 0.6H), 4.77 (d, *J* = 11.6 Hz, 0.4H), 4.65 (d, *J* = 11.6 Hz, 0.4H), 4.56 (d, *J* = 11.2 Hz, 0.6H), 4.20 (q, *J* = 7.2 Hz, 0.8H), 3.83 (q, *J* = 7.2 Hz, 1.1H), 2.37 (s, 1.7H), 2.12 (s, 1.2H), 2.10 (s, 1.5H), 1.87 (s, 1.2H), 1.27 (t, *J* = 7.2 Hz, 1.5H), 0.84 ppm (t, *J* = 7.2 Hz, 1.7H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.7, 206.4, 203.3, 202.1, 168.7, 167.9, 136.5, 136.4, 126.4, 126.0, 124.4, 124.0, 122.6, 122.5, 120.4, 120.1, 118.9, 118.9, 111.70, 111.5, 108.8, 108.2, 62.1, 61.8, 61.4, 60.2, 49.6, 49.4, 31.4, 29.7, 28.5, 28.4, 14.0, 13.6 ppm. IR (film): 3401, 2983, 1739, 1710, 1357, 1266, 1159, 746, 426 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_4$, $[M + Na]^+$ 324.1212, found 324.1209.

Ethyl 2-benzoyl-3-(1*H*-indol-3-yl)-4-oxopentanoate (4aa): A mixture of diastereomers, yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.73 (d, *J* = 11.2 Hz, 0.6H), 8.45 (d, *J* = 10.8 Hz, 0.4H), 8.12 (d, *J* = 7.6 Hz, 1H), 7.70 – 7.64 (m, 2H), 7.57 (t, *J* = 7.2 Hz, 0.6H), 7.46 (t, *J* = 7.6 Hz, 1H), 7.37 – 7.31 (m, 1H), 7.22 – 7.08 (m, 4H), 6.94 (d, *J* = 2.0 Hz, 0.4H), 5.49 (d, *J* = 11.2 Hz, 0.4H), 5.30 (d, *J* = 11.2 Hz, 0.6H), 5.13 (d, *J* = 11.2 Hz, 0.6H), 5.03 (d, *J* = 11.2 Hz, 0.4H), 4.16 (q, *J* = 3.6 Hz, 0.7H), 3.72 (q, *J* = 7.2 Hz, 1H), 2.15 (s, 3H), 1.18 (t, *J* = 7.2 Hz, 1.3H), 0.70 ppm (t, *J* = 7.2 Hz, 1.7H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 207.1, 206.4, 195.5, 193.9, 168.9, 168.4, 136.6, 136.5, 136.3, 136.0, 133.7, 133.2, 128.9, 128.7, 128.6, 128.2, 126.6, 126.1, 124.4, 124.2, 122.5, 122.3, 120.2, 120.1, 119.0, 118.9, 111.6, 111.4, 108.7, 108.3, 61.8, 61.4, 57.4, 54.9, 50.4, 50.0, 28.6, 28.6, 14.0, 13.4 ppm. IR (film): 3398, 2936, 1735, 1711, 1453, 1349, 1278, 1160, 745, 690, 427 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{22}H_{21}NNaO_4$, $[M + Na]^+$ 386.1368, found 386.1364.

2-Methoxyethyl 2-acetyl-3-(1*H*-indol-3-yl)-4-oxopentanoate (4ab): A mixture of diastereomers, brown viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.74 – 8.65 (m, 1H), 7.61 (d, *J* = 7.6 Hz, 1H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.19 (t, *J* = 7.2 Hz, 1H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.05 (dd, *J* = 12.4, 2.4 Hz, 1H), 4.86 (d, *J* = 11.2 Hz, 0.6H), 4.77 (d, *J* = 11.2 Hz, 0.4H), 4.66 (d, *J* = 11.6 Hz, 0.6H), 4.60 (d, *J* = 11.2 Hz, 0.4H), 4.33 – 4.28 (m, 0.7H), 4.00 – 3.88 (m, 1.3H), 3.62 – 3.58 (m, 0.8H), 3.37 (s, 1.1H), 3.25 – 3.20 (m, 0.7H), 3.163 – 3.08 (m, 2.5H), 2.38 (s, 1.9H), 2.11 (s, 1.2H), 2.10 (s, 1.7H), 1.86 ppm (s, 1.1H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.6, 206.3, 203.0, 201.8, 168.6, 167.8, 136.5, 136.4, 126.4, 126.0, 124.5, 124.2, 122.6, 122.5, 120.4, 120.1, 118.9, 118.9, 111.7, 111.5, 108.7, 108.2, 70.2, 69.8, 64.5, 64.1, 61.9, 60.2, 58.9, 58.6, 49.7, 49.5, 31.2, 29.7, 28.5, 28.3 ppm.

IR (film): 3401, 2930, 1742, 1711, 1457, 1424, 1356, 1267, 1030, 746, 554, 427 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{21}NNaO_5$, $[M + Na]^+$ 354.1317, found 354.1321.

Methyl 2-(cyclopropanecarbonyl)-3-(1*H*-indol-3-yl)-4-oxopentanoate (4ac): A mixture of diastereomers, yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.56 (s, 1H), 7.63 (t, *J* = 8.0 Hz, 1H), 7.35 (dd, *J* = 8.0, 2.0 Hz, 1H), 7.19 (t, *J* = 7.2 Hz, 1H), 7.13 (dd, *J* = 15.6, 7.6 Hz, 1H), 7.06 (dd, *J* = 12.4, 2.4 Hz, 1H), 4.86 (d, *J* = 11.6 Hz, 0.5H), 4.80 (d, *J* = 11.6 Hz, 0.5H), 4.74 (d, *J* = 4.4 Hz, 0.6H), 4.71 (d, *J* = 4.0 Hz, 0.4H), 3.75 (s, 1.6H), 3.40 (s, 1.5H), 2.21 – 2.17 (m, 0.6H), 2.13 (d, *J* = 4.4 Hz, 3H), 1.71 – 1.65 (m, 0.5H), 1.19 – 1.08 (m, 1H), 1.06 – 0.92 (m, 1H), 0.79 – 0.73 (m, 0.6H), 0.68 – 0.61 (m, 0.6H), 0.50 – 0.44 (m, 0.6H), 0.36 – 0.29 ppm (m, 0.5H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.5, 206.3, 205.2, 204.1, 169.5, 168.5, 136.4, 136.4, 126.4, 126.3, 124.4, 123.9, 122.5, 122.4, 120.3, 120.1, 119.0, 118.9, 111.5, 108.8, 108.5, 62.4, 60.2, 52.7, 52.4, 49.9, 48.7, 28.7, 28.4, 21.9, 20.6, 12.0, 11.8, 11.6, 11.5 ppm. IR (film): 3394, 2953, 1740, 1706, 1432, 1384, 1245, 1158, 1066, 746, 594, 427 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{19}NNaO_4$, $[M + Na]^+$ 336.1212, found 336.1218.

Methyl 3-(1*H*-indol-3-yl)-4-oxo-2-propionylpentanoate (4ad): A mixture of diastereomers, yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.53 (d, *J* = 12.4 Hz, 1H), 7.60 (dd, *J* = 7.6, 4.8 Hz, 1H), 7.36 (d, *J* = 8.0 Hz, 1H), 7.21 (t, *J* = 7.2 Hz, 1H), 7.16 – 7.11 (m, 1H), 7.08 (d, *J* = 2.4 Hz, 0.5H), 7.05 (d, *J* = 2.4 Hz, 0.5H), 4.91 (d, *J* = 11.2 Hz, 0.5H), 4.77 (d, *J* = 11.6 Hz, 0.5H), 4.63 (d, *J* = 11.6 Hz, 0.5H), 4.53 (d, *J* = 11.2 Hz, 0.5H), 3.73 (s, 1.6H), 3.38 (s, 1.5H), 2.82 – 2.65 (m, 1H), 2.44- 1.34 (m, 0.6H), 2.12 (d, *J* = 10.8 Hz, 3H), 1.83 – 1.79 (m, 0.6H), 1.11 (t, *J* = 7.2 Hz, 1.5H), 0.65 (t, *J* = 7.2 Hz, 1.6H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.7, 206.6, 205.9, 204.8, 169.2, 168.4, 136.4, 136.4, 126.3, 125.9, 124.3, 124.0, 122.7, 122.5, 120.4, 120.2, 119.1, 118.9, 111.6, 111.52, 109.0, 108.3, 61.1, 59.1, 52.7, 52.4, 49.9, 49.7, 38.0, 36.0, 28.5, 28.4, 7.6, 7.0. IR (film): 3401, 2951, 1743, 1710, 1353, 1268, 1160, 746, 597, 426 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{19}NNaO_4$, $[M + Na]^+$ 324.1212, found 324.1210.

3-Benzoyl-4-(1*H*-indol-3-yl)hexane-2,5-dione (4ae): A mixture of diastereomers, brown viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.70 (s, 0.5H), 8.32 (s, 0.5H), 8.09 (d, *J* = 7.2 Hz, 1H), 7.01 – 7.64 (m, 1.6H), 7.62 – 7.57 (m, 1H), 7.48 (t, *J* = 7.6 Hz, 1H), 7.37 (dd, *J* = 16.0, 8.0 Hz, 1H), 7.23 – 7.16 (m, 2.5H), 7.13 (d, *J* = 2.4, 0.6H), 7.11 – 7.07 (m, 1H), 6.94 (d, *J* = 2.4 Hz, 0.5H), 5.73 (d, *J* = 10.8 Hz, 0.5H), 5.59 (d, *J* = 11.2 Hz, 0.5H), 5.14 (d, *J* = 11.2 Hz, 0.5H), 5.04 (d, *J* = 11.2 Hz, 0.5H), 2.22 (s, 1.5H), 2.14 (s, 1.6H), 2.11 (s, 1.5H), 1.83 ppm (s, 1.6H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 207.3, 206.1, 203.3, 201.8, 195.8, 194.9, 136.8, 136.5, 136.3, 133.7, 133.4, 128.9, 128.4, 126.2, 126.1, 124.4, 124.3, 122.8, 122.4, 120.5, 120.2, 119.0, 118.7, 111.8, 111.4, 108.5, 108.5, 64.7, 63.1, 51.1, 50.8, 30.3, 29.4, 28.5, 28.4 ppm. IR (film): 3395, 3060, 1709, 1673, 1354, 1272, 1181, 977, 743, 694, 488 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{21}H_{19}NNaO_3$, $[M + Na]^+$ 356.1263, found 356.1258.

Allyl 2-acetyl-3-(1*H*-indol-3-yl)-4-oxopentanoate (4af): A mixture of diastereomers, yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.68 (s, 0.4H), 8.60 (s, 0.6H), 7.61 (t, *J* = 7.6 Hz, 1H), 7.35 (dd, *J* = 8.4, 2.4 Hz, 1H), 7.22 – 7.17 (m, 1H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.05 (t, *J* = 2.8 Hz, 1H), 5.93 – 5.86 (m, 0.4H), 5.50 – 5.42 (m, 0.6H), 5.35 – 5.31 (m, 0.4H), 5.27 – 5.24 (m, 0.4H), 5.01 – 4.92 (m, 1.2H), 4.86 (d, *J* = 11.6 Hz, 0.6H), 4.77 (d, *J* = 11.6 Hz, 0.4H), 4.68 (d, *J* = 11.6 Hz, 0.5H), 4.64 (d, *J* = 6.0 Hz, 1H), 4.58 (d, *J* = 11.2 Hz, 0.6H), 4.27 – 4.25 (m, 1.2H), 2.37 (s, 1.8H), 2.11 (s, 1.2H), 2.10 (s, 1.8H), 1.86 ppm (s, 1.2H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.6, 206.4, 203.2, 201.9, 168.3, 167.5, 136.5, 136.4, 131.46, 131.0, 126.4, 126.0, 124.4, 124.1, 122.7, 122.5,

120.4, 120.1, 118.9, 118.8, 118.7, 111.7, 111.5, 108.8, 108.1, 66.3, 66.0, 62.0, 60.1, 49.7, 49.5, 31.5, 29.8, 28.5, 28.4 ppm. IR (film): 3404, 2948, 1741, 1710, 1357, 1270, 1158, 936, 746, 426 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{19}NNaO_4$, $[M + Na]^+$ 336.1212, found 336.1207.

Ethyl 2-(furan-2-carbonyl)-3-(1*H*-indol-3-yl)-4-oxopentanoate (4ag): A mixture of diastereomers, brownish viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.47 (s, 0.6H), 8.31 (s, 0.5H), 7.68 – 7.62 (m, 1.6H), 7.41 – 7.37 (m, 1.6H), 7.24 – 7.09 (m, 3H), 7.03 (d, *J* = 2.0 Hz, 0.4H), 7.00 (d, *J* = 3.6 Hz, 0.4H), 6.57 – 6.56 (m, 0.6H), 6.29 – 6.28 (m, 0.4H), 5.19 (d, *J* = 11.6 Hz, 0.5H), 5.09 – 5.03 (m, 1H), 4.99 (d, *J* = 11.2 Hz, 0.5H), 4.20 – 4.16 (m, 1H), 3.77 (q, *J* = 7.2 Hz, 1H), 2.17 (d, *J* = 6.4 Hz, 3H), 1.22 (t, *J* = 7.2 Hz, 1.4H), 0.76 (t, *J* = 7.2 Hz, 1.7H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.6, 206.1, 182.8, 182.0, 168.6, 168.1, 151.8, 151.6, 147.3, 136.3, 136.3, 126.6, 126.1, 124.5, 124.1, 122.5, 122.4, 120.2, 119.5, 119.3, 119.1, 119.0, 112.6, 112.4, 111.4, 111.3, 108.7, 108.2, 61.8, 61.4, 57.3, 55.5, 49.9, 49.1, 28.6, 14.0, 13.5. IR (film): 3398, 2982, 1734, 1711, 1672, 1463, 1354, 1300, 1159, 1098, 1019, 744, 593, 427 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{20}H_{19}NNaO_5$, $[M + Na]^+$ 376.1161, found 376.1155.

Diethyl 2-(1-(1*H*-indol-3-yl)-2-oxopropyl)malonate (4ah): Brown viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.67 (s, 1H), 7.62 (d, *J* = 8.0 Hz, 1H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.19 (t, *J* = 7.6 Hz, 1H), 7.12 (t, *J* = 7.2 Hz, 1H), 7.04 (d, *J* = 2.4 Hz, 1H), 4.79 (d, *J* = 11.6 Hz, 1H), 4.37 (d, *J* = 11.6 Hz, 1H), 4.23 (q, *J* = 7.2 Hz, 2H), 3.81 – 3.78 (m, 2H), 2.16 (s, 3H), 1.28 (t, *J* = 7.2 Hz, 3H), 0.78 ppm (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.1, 168.7, 168.3, 136.3, 126.4, 124.1, 122.5, 120.1, 118.9, 111.5, 108.2, 61.9, 61.3, 54.4, 49.2, 28.6, 14.0, 13.5. IR (film): 3397, 2982, 1742, 1714, 1459, 1275, 1158, 1099, 1032, 746 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{18}H_{21}NNaO_5$, $[M + Na]^+$ 354.1317, found 354.1321.

3-Acetyl-4-(1-methyl-1*H*-pyrrol-2-yl)hexane-2,5-dione (5a): Brown viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 6.57 (s, 1H), 6.06 (t, *J* = 3.2 Hz, 1H), 5.95 – 5.94 (m, 1H), 4.61 (dd, *J* = 16.8, *J* = 11.2 Hz, 2H), 3.62 (s, 3H), 2.29 (s, 3H), 2.04 (s, 3H), 1.96 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 203.8, 202.9, 201.2, 125.1, 123.6, 108.7, 108.0, 68.8, 49.9, 31.5, 30.9, 30.3, 28.1 ppm. IR (film): 3404, 2949, 1707, 1357, 1256, 1154, 720, 565, 489 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{13}H_{17}NNaO_3$, $[M + Na]^+$ 258.1106, found 258.1102.

3-Acetyl-4-(1,2,5-trimethyl-1*H*-pyrrol-3-yl)hexane-2,5-dione (5b): Brown viscous liquid. ^1H NMR (400 MHz, CDCl3, TMS, 25 °C) δ = 5.55 (s, 1H), 4.52 (d, J = 11.2 Hz, 1H), 4.37 (d, J = 11.6 Hz, 1H), 3.34 (s, 3H), 2.25 (s, 3H), 2.16 (s, 3H), 2.12 (s, 3H), 2.04 (s, 3H), 1.94 (s, 3H).

13C NMR (100 MHz, CDCl3, 25 °C) δ = 206.8, 203.4, 202.7, 128.3, 125.4, 110.6, 104.4, 69.5, 50.7, 30.3, 30.3, 30.2, 28.0, 12.3, 10.0. IR (film): 3406, 2930, 1702, 1613, 1514, 1356, 1152, 820, 453 cm–1. HRMS-ESI (m/z) calcd for C15H21NNaO3, $[M + Na]^+$ 286.1419, found 286.1414.

3-Acetyl-4-(5-methylfuran-2-yl)hexane-2,5-dione (5c): Yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 6.11 (d, *J* = 2.8 Hz, 1H), 5.92 – 5.91 (m, 1H), 4.61 (s, 2H), 2.28 (s, 3H), 2.25 (s, 3H), 2.14 (s, 3H), 2.02 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 203.3, 202.3, 201.4, 153.1, 146.0, 110.42, 107.0, 67.9, 52.3, 30.1, 29.6, 28.2, 13.5 ppm. IR (film): 3389, 2925, 1717, 1358, 1191, 1023, 956, 792, 490 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{13}H_{16}NaO_4$, $[M + Na]^+$ 259.0946, found 259.0944.

3-Acetyl-4-(1*H*-pyrrolo[2,3-*b*]pyridin-3-yl)hexane-2,5-dione (5d): Brown solid, mp: 165–167 °C . ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 11.21 (m, 1H), 8.35 (d, *J* = 4.8 Hz, 1H), 8.00 (dd, *J* = 7.6, 0.8 Hz, 1H), 7.29 (s, 1H), 7.16 (dd, *J* = 8.0, 4.8 Hz, 1H), 4.81 (dd, *J* = 14.0, 11.6 Hz, 2H), 2.32 (s, 3H), 2.12 (s, 3H), 1.89 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.0, 202.7, 201.9, 148.7, 143.2,

128.0, 125.0, 118.9, 116.5, 107.2, 69.4, 50.4, 30.5, 30.3, 28.4. IR (film): 3400, 3140, 3038, 2894, 1704, 1420, 1357, 1270, 1156, 775, 639, 563, 457 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{15}H_{16}N_2NaO_3$, $[M + Na]^+$ 295.1059, found 295.1060.

3-Acetyl-4-(5-methyl-1*H*-pyrrolo[2,3-*b*]pyridin-3-yl)hexane-2,5-dione (5e): Yellow solid, mp: 171 – 173 °C. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 12.02 (s, 1H), 8.21 (s, 1H), 7.79 (s, 1H), 7.30 (s, 1H), 4.82 (s, 2H), 2.48 (s, 3H), 2.33 (s, 3H), 2.12 (s, 3H), 1.90 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.2, 202.9, 202.0, 147.6, 144.0, 127.7, 125.5, 125.3, 118.8, 106.2, 69.3, 50.6, 30.5, 30.3, 28.3, 18.6 ppm. IR (film): 3134, 3009, 2874, 1704, 1408, 1357, 1261, 1194, 1155, 913, 801, 733, 645 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{18}N_2NaO_3$, $[M + Na]^+$ 309.1215, found 309.1213.

3-Acetyl-4-(5-methoxy-1*H*-pyrrolo[3,2-*b*]pyridin-3-yl)hexane-2,5-dione (5f): Brown viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.98 (s, 1H), 7.55 (d, *J* = 8.8 Hz, 1H), 7.09 (d, *J* = 2.8 Hz, 1H), 6.62 (d, *J* = 8.8 Hz, 1H), 5.10 (d, *J* = 11.2 Hz, 1H), 4.81 (d, *J* = 11.4 Hz, 1H), 4.00 (s, 3H), 2.35 (s, 3H), 2.12 (s, 3H), 2.00 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.7, 203.9, 203.3, 160.2, 140.5, 125.5, 124.6, 122.3, 108.9, 106.4, 70.3, 53.3, 48.8, 30.4, 28.8, 28.2. IR (film): 3377, 2945, 1701, 1578, 1491, 1409, 1357, 1257, 1026, 810, 565 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{18}N_2NaO_4$, $[M + Na]^+$ 325.1164, found 325.1162.

3-Acetyl-4-(4-(dimethylamino)phenyl)hexane-2,5-dione (5g): Yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 7.03 (d, *J* = 8.4 Hz, 2H), 6.65 (d, *J* = 8.8 Hz, 2H), 4.58 (d, *J* = 11.6 Hz, 1H), 4.40 (d, *J* = 11.6 Hz, 1H), 2.94 (s, 6H), 2.27 (s, 3H), 2.07 (s, 3H), 1.90 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.4, 203.1, 202.2, 150.2, 129.5, 121.1, 112.9, 70.5, 57.9, 40.3, 30.6, 30.2, 28.4 ppm. IR (film): 3392, 2924, 1695, 1606, 1523, 1357, 1185, 813, 533, 460. cm^{-1}. HRMS-ESI (m/z) calcd for $C_{16}H_{21}NNaO_3$, $[M + Na]^+$ 298.1419, found 297.1418.

3-Acetyl-4-(4-(methylamino)phenyl)hexane-2,5-dione (5h): Yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 6.98 (d, *J* = 8.4 Hz, 2H), 6.55 (d, *J* = 8.4 Hz, 2H), 4.57 (d, *J* = 11.6 Hz, 1H), 4.38 (d, *J* = 11.6 Hz, 1H), 3.85 (br, 1H), 2.81 (s, 3H), 2.26 (s, 3H), 2.07 (s, 3H), 1.90 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.4, 203.1, 202.2, 149.2, 129.6, 122.0, 113.0, 70.4, 58.0, 30.6, 30.5, 30.2, 28.4 ppm. IR (film): 3412, 2925, 1703, 1613, 1524, 1357, 1259, 1187, 1154, 828, 542, 495 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{15}H_{19}NNaO_3$, $[M + Na]^+$ 284.1263, found 284.1259.

3-Acetyl-4-(1,2,3,4-tetrahydroquinolin-6-yl)hexane-2,5-dione (5i): Brown viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 6.75 – 6.72 (m, 2H), 6.39 (d, *J* = 8.0 Hz, 1H), 4.55 (d, *J* = 11.6 Hz, 1H), 4.32 (d, *J* = 11.2 Hz, 1H), 3.90 (s, 1H), 3.28 (t, *J* = 5.2 Hz, 2H), 2.70 (t, *J* = 6.4 Hz, 2H), 2.26 (s, 3H), 2.07 (s, 3H), 1.92 – 1.89 (m, 5H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 206.6, 203.2, 202.4, 144.7, 129.7, 127.2, 122.1, 121.7, 114.6, 70.5, 58.1, 41.8, 30.6, 30.2, 28.5, 26.9, 21.8. IR (film): 3402, 2919, 1704, 1418, 1354, 1152, 965, 774, 489 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{17}H_{21}NNaO_3$, $[M + Na]^+$ 310.1419, found 31.1421.

3-Acetyl-4-(phenylthio)hexane-2,5-dione (5j): Yellow viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 7.40 – 7.37 (m, 5H), 4.35 (d, *J* = 11.6 Hz, 1H), 4.23 (d, *J* = 11.6 Hz, 1H), 2.35 (s, 6H), 2.19 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 202.0, 201.5, 200.9, 134.5, 130.0, 129.4, 129.4, 68.6, 55.1, 30.2, 29.7, 28.2 ppm. IR (film): 3402, 2924, 1704, 1357, 1254, 1150, 748, 465 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{14}H_{16}NaO_3S$, $[M + Na]^+$ 287.0718, found 287.0716

3-Acetyl-4-(benzylthio)hexane-2,5-dione (5k): Yellowish viscous liquid. ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 7.32 – 7.26 (m, 5H), 4.42 (d, *J* = 11.2 Hz, 1H), 4.07 (d, *J* = 11.2 Hz, 1H), 3.65 (d, *J* = 12.8 Hz, 1H), 3.55 (d, *J* = 12.4 Hz, 1H), 2.19 (d, *J* = 2.8 Hz, 9H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 202.2, 201.3, 200.9, 136.8, 129.3, 128.7, 127.6, 68.1, 50.9, 34.7, 30.1, 27.4 ppm. IR (film): 3402,

2925, 1729, 1703, 1596, 1357, 1258, 1193, 1153, 957, 704, 567, 471 cm^{-1}. HRMS-ESI (m/z) calcd for $C_{15}H_{18}NaO_3S$, $[M + Na]^+$ 301.1874, found 301.1877.

3-((5-Methoxy-2-methyl-1H-indol-3-yl)(pyridin-2-yl)methyl)pentane-2,4-dione (6a): Brown viscous liquid, ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.43 (dd, *J* = 5.6, 1.6 Hz, 1H), 8.00 (d, *J* = 5.2 Hz, 1H), 7.41 (td, *J* = 7.6, 1.6 Hz, 1H), 7.07 (d, *J* = 8.6 Hz, 1H), 7.02-7.00 (m, 2H), 6.89 (s, 1H), 6.69 (dd, *J* = 8.8, 2.4 Hz, 1H), 5.38 (d, *J* = 11.6 Hz, 1H), 5.26 (d, *J* = 11.6 Hz, 1H), 3.75 (s, 3H), 2.39 (s, 3H), 2.36 (s, 3H), 1.86 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 204.4, 202.8, 161.1, 153.8, 147.5, 136.3, 133.4, 130.5, 127.9, 123.7, 121.3, 111.4, 110.4, 109.9, 101.4, 69.2, 55.9, 43.9, 30.6, 12.1 ppm. IR (cm^{-1}): 3388, 2937, 1727, 1695, 1588, 1483, 1431, 1355, 1251, 1216, 1033, 910, 731, 625. HRMS-ESI (m/z) calcd for $C_{21}H_{23}N_2O_3$, $[M+H]^+$ 351.1709, found 351.1707.

3-((5-Methoxy-2-methyl-1H-indol-3-yl)(pyridin-4-yl)methyl)pentane-2,4-dione (6b): Brown viscous liquid, ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.88 (s, 1H), 8.45 (d, *J* = 5.6 Hz, 2H), 7.23 (d, *J* = 6.0 Hz, 2H), 7.09 (d, *J* = 8.8 Hz, 1H), 6.99 (d, *J* = 2.0 Hz, 1H), 6.74 – 6.72 (m, 1H), 5.07 (dd, *J* = 15.2 Hz, *J* = 11.6 Hz, 2H), 3.82 (s, 3H), 2.42 (s, 3H), 2.19 (s, 3H), 1.87 ppm (s, 3H). ^{113}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 202.6, 202.3, 153.9, 150.5, 149.8, 133.5, 130.7, 127.2, 123.1, 122.8, 111.4, 110.0, 101.5, 70.6, 56.0, 41.3, 29.6, 12.3 ppm. IR (cm^{-1}): 3392, 2938,1728, 1699, 1595, 1484, 1357, 1250, 1216, 732. HRMS-ESI (m/z) calcd for $C_{21}H_{23}N_2O_3$, $[M+H]^+$ 351.1709, found 351.1704.

3-(1-(1H-indol-3-yl)-2,2-dimethoxyethyl)pentane-2,4-dione (6c): Brown viscous liquid, ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.52 (s, 1H), 7.71 (d, *J* = 7.6 Hz, 1H), 7.30 (d, *J* = 8.0 Hz, 1H), 7.17-7.13 (m, 2H), 6.97 (s, 1H), 4.51 (d, *J* = 11.2 Hz, 1H), 4.40 (d, *J* = 4.8 Hz, 1H), 4.28-4.24 (m, 1H), 3.31 (s, 3H), 3.26 (s, 3H), 2.30 (s, 3H), 1.83 ppm (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 204.2, 203.4, 135.9, 126.9, 123.9, 122.1, 119.7, 118.8, 111.4, 107.5, 69.7, 56.5, 54.6, 40.8, 30.8, 28.5 ppm. IR (cm^{-1}): 3389, 2935, 1727, 1694, 1457, 1355, 1122, 1074, 978, 744, 426. HRMS-ESI (m/z) calcd for $C_{17}H_{21}NNaO_4$, $[M + Na]^+$ 326.1318, found 326.1315.

1-(4-(1H-indol-3-yl)-2,5-dimethylfuran-3-yl)ethanone (7a): Brown viscous liquid; ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.47 (s, 1H), 7.43 – 7.38 (m, 2H), 7.25 – 7.21 (m, 1H), 7.14 – 7.10 (m, 2H), 2.59 (s, 3H), 2.15 (s, 3H), 1.91 (s, 3H).. 13C NMR (100 MHz, CDCl3, 25 oC) δ = 197.0, 156.6, 148.2, 136.0, 128.0, 123.5, 122.4, 120.2, 119.6, 112.6, 111.3, 108.6, 29.9, 14.5, 11.8 ppm. IR (cm^{-1}): 3406, 3355, 2922, 1662, 1563, 1421, 1184, 1097, 1014, 944, 744, 427. HRMS-ESI (m/z) calcd for $C_{16}H_{15}NNaO_2$, $[M + Na]^+$ 276.1000, found 276.1001.

3-(2,5-Dimethylfuran-3-yl)-1H-indole (7b): Brown viscous liquid, ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.14 (s, 1H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.39 (d, *J* = 8.4 Hz, 1H), 7.24 – 7.21 (m, 1H), 7.19 – 7.12 (m, 2H), 6.21 (s, 1H), 2.36 (s, 3H), 2.33 (s, 3H). 13C NMR (100 MHz, CDCl3, 25 °C) δ = 149.7, 145.6, 136.1, 126.9, 122.2, 121.6, 120.0, 119.8, 114.3, 111.2, 110.3, 108.0, 13.6, 12.7 ppm. IR (cm^{-1}):3411, 2921, 1697, 1548, 1423, 1094, 743. HRMS-ESI (m/z) calcd for $C_{14}H_{13}NNaO$, $[M + Na]^+$ 234.0895, found 234.0899.

1-(4-(1H-indol-3-yl)-2,5-dimethyl-1-(p-tolyl)-1H-pyrrol-3-yl)ethanone (8a): Brown viscous liquid; ^1H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.39 (s, 1H), 7.49 (d, J = 7.6 Hz, 1H), 7.42 (d, J = 8.0 Hz, 1H), 7.31 (d, J = 8.0 Hz, 2H), 7.22 (t, J = 7.6 Hz, 1H), 7.17 – 7.10 (m, 4H), 2.44 (s, 3H), 2.35 (s, 3H), 1.94 (s, 3H), 1.84 ppm (s, 3H). 13C NMR (100 MHz, CDCl3, 25 °C) δ = 197.8, 138.5, 136.1, 135.4, 135.2, 130.0, 128.6, 128.2, 127.9, 123.4, 122.3, 122.1, 120.1, 119.9, 113.2, 112.0, 111.1, 30.0, 21.2, 13.3, 11.4. ppm. IR (cm-1): 3331, 2924, 1706, 1634, 1511, 1408, 1192, 818, 741, 513. HRMS-ESI (m/z) calcd for $C_{23}H_{22}N_2NaO$, $[M + Na]^+$ 365.1630, found 365.1633.

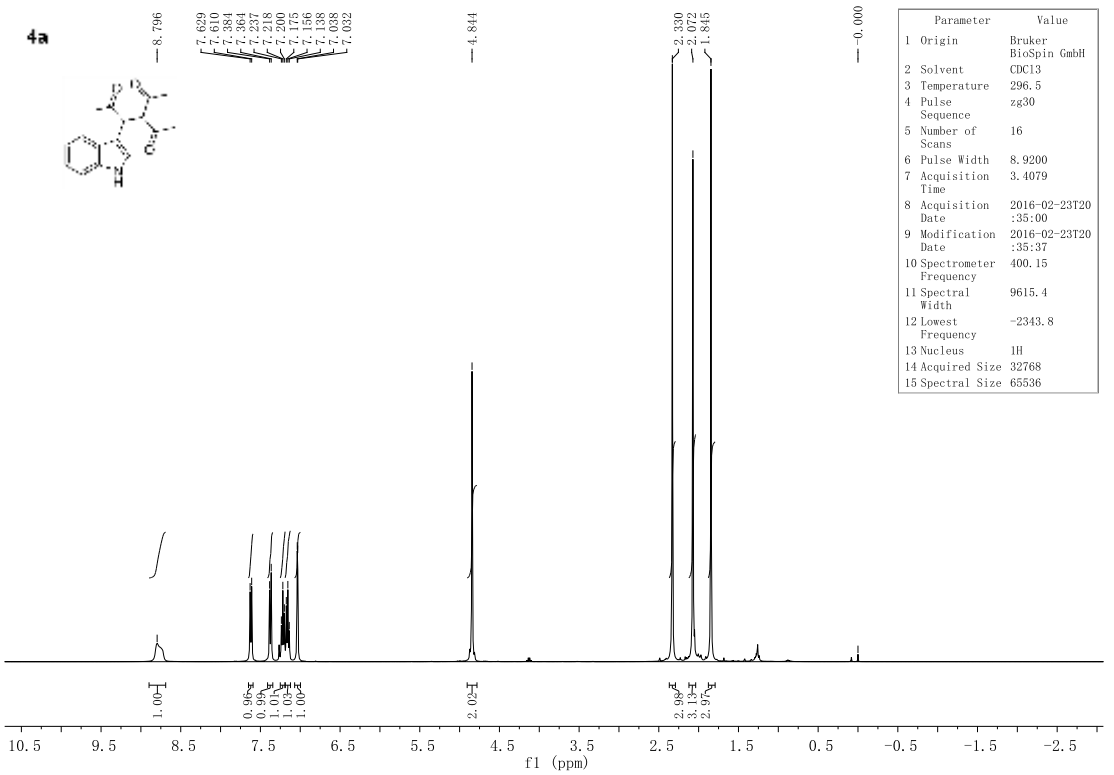
3-(1H-indol-3-yl)hexane-2,5-dione (9a): Brown viscous liquid, ^1H NMR (400 MHz, $CDCl_3$, TMS, 25

°C) δ = 8.28 (s, 1H), 7.59 (d, *J* = 8.0 Hz, 1H), 7.39 (d, *J* = 8. Hz, 1H), 7.23 (t, *J* = 6.0 Hz, 1H), 7.15 (t, *J* = 7.6 Hz, 1H), 7.05 (d, *J* = 2.0 Hz, 1H), 4.52 (dd, *J* = 10.0, 4.0 Hz, 1H), 3.55 (dd, *J* = 18.0, 10.0 Hz, 1H), 2.67 (dd, *J* = 18.0, 4.0 Hz, 1H), 2.17 (d, *J* = 6.4 Hz, 6H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 208.0, 207.7, 136.4, 126.2, 122.8, 122.5, 120.0, 118.8, 112.3, 112.3, 111.5, 45.6, 45.1, 30.1, 28.7. IR (cm-1): 3404, 2919, 1708, 1423, 1356, 1248, 1161, 746. HRMS-ESI (m/z) calcd for $C_{14}H_{15}NNaO_2$, $[M + Na]^+$ 252.1000, found 252.1001.

4-hydroxy-3-(1H-indol-3-yl)-4-methylcyclopent-2-enone (10a): Brown viscous liquid, ^{1}H NMR (400 MHz, DMSO-*d*$_6$, 25 °C) δ = 9.17 (s, 1H), 8.10 (d, *J* = 2.8 Hz, 1H), 7.73 (d, *J* = 7.6 Hz, 1H), 7.43 (d, *J* = 8.0 Hz, 1H), 7.30 – 7.21 (m, 3H), 6.45 (s, 1H), 2.65 (dd, *J* =26.0, 18.0 Hz, 2H), 1.66 (s, 3H). ^{13}C NMR (100 MHz, DMSO-*d*$_6$, 25 °C) δ = 204.7, 136.5, 130.3, 126.0, 123.4, 123.2, 122.1, 120.7, 112.0, 109.3, 79.1, 53.0, 28.9. IR (cm-1): 3288, 2926, 1667, 1566, 1427, 1230, 1130, 740. HRMS-ESI (m/z) calcd for $C_{14}H_{13}NNaO_2$, $[M + Na]^+$ 250.0844, found 250.0842.

5-Acetyl-4-(1H-indol-3-yl)-3-methylcyclopent-2-enone (11a): Brown viscous liquid, ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.86 (s, 1H), 7.60 (d, *J* = 2.4 Hz, 1H), 7.42 (d, *J* = 8.0 Hz, 1H), 7.35 (d, *J* = 8.0 Hz, 1H), 7.23 (d, *J* = 7.2 Hz, 1H), 7.19 – 7.15 (m, , 1H), 3.71 (s, 1H), 2.93 (d, *J* = 18.8 Hz, 1H), 2.76 (d, *J* = 18.4 Hz, 1H), 2.14 (s, 3H), 1.71 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 205.5, 205.4, 159.7, 137.2, 136.0, 127.2, 126.3, 123.1, 121.3, 119.4, 111.8, 105.0, 77.4, 77.0, 76.7, 76.1, 51.1, 30.7, 27.9 ppm. IR (cm-1): 3404, 2920, 1708, 1356, 1247, 1161, 1099, 746. HRMS-ESI (m/z) calcd for $C_{16}H_{15}NNaO_2$, $[M + Na]^+$ 276.1000, found 276.1002.

1-(2-Hydroxy-5-(1H-indol-3-yl)-4-methylcyclopenta-1,4-dien-1-yl)ethanone (11b): Brown viscous liquid, ^{1}H NMR (400 MHz, $CDCl_3$, TMS, 25 °C) δ = 8.94 (s, 1H), 7.55 (d, *J* = 2.8 Hz, 1H), 7.40 (d, *J* = 8.4 Hz, 1H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.23 (t, *J* = 7.2 Hz, 1H), 7.16 (t, *J* = 7.6 Hz, 1H), 3.74 (s, 1H), 2.93 (d, *J* = 18.4 Hz, 1H), 2.76 (d, *J* = 18.8 Hz, 1H), 2.14 (s, 3H), 1.71 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$, 25 °C) δ = 205.6(*J* = 26.9 Hz), 159.8, 137.238, 136.018, 127.3, 126.258, 123.1, 121.2, 119.4, 111.9, 104.9, 76.1, 51.1, 30.7, 27.9. IR (cm-1): 3391, 1713, 1427, 1355, 1238, 1201, 1128, 748. HRMS-ESI (m/z) calcd for $C_{16}H_{15}NNaO_2$, $[M + Na]^+$ 276.1000, found 276.1005.



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2	Solvent	CDCl3
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4	Pulse Sequence	zg30
5	Number of Scans	16
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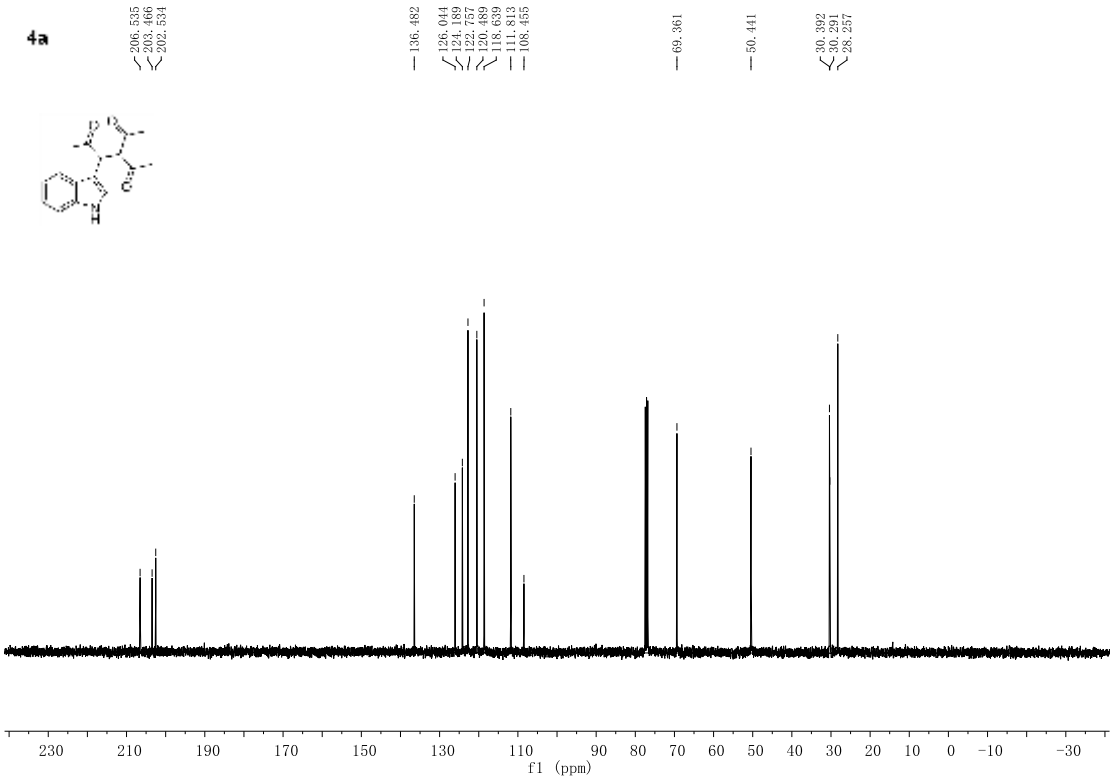

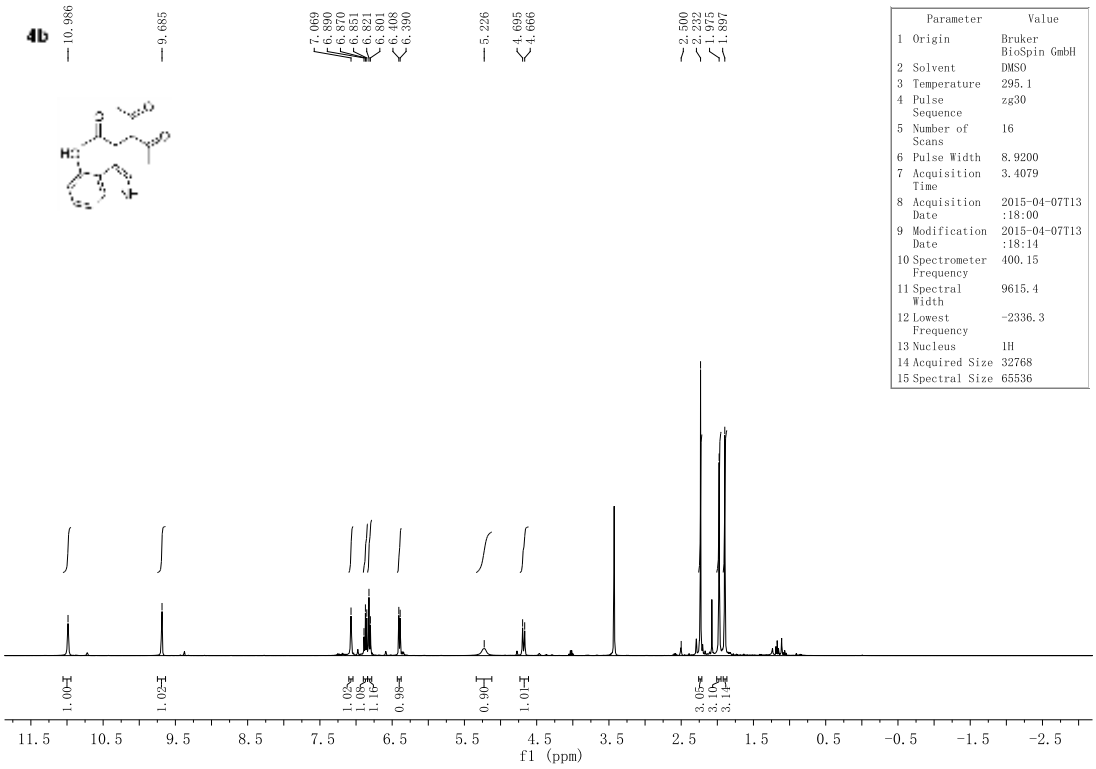

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4	Pulse Sequence	zg30
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14	Acquired Size	32768
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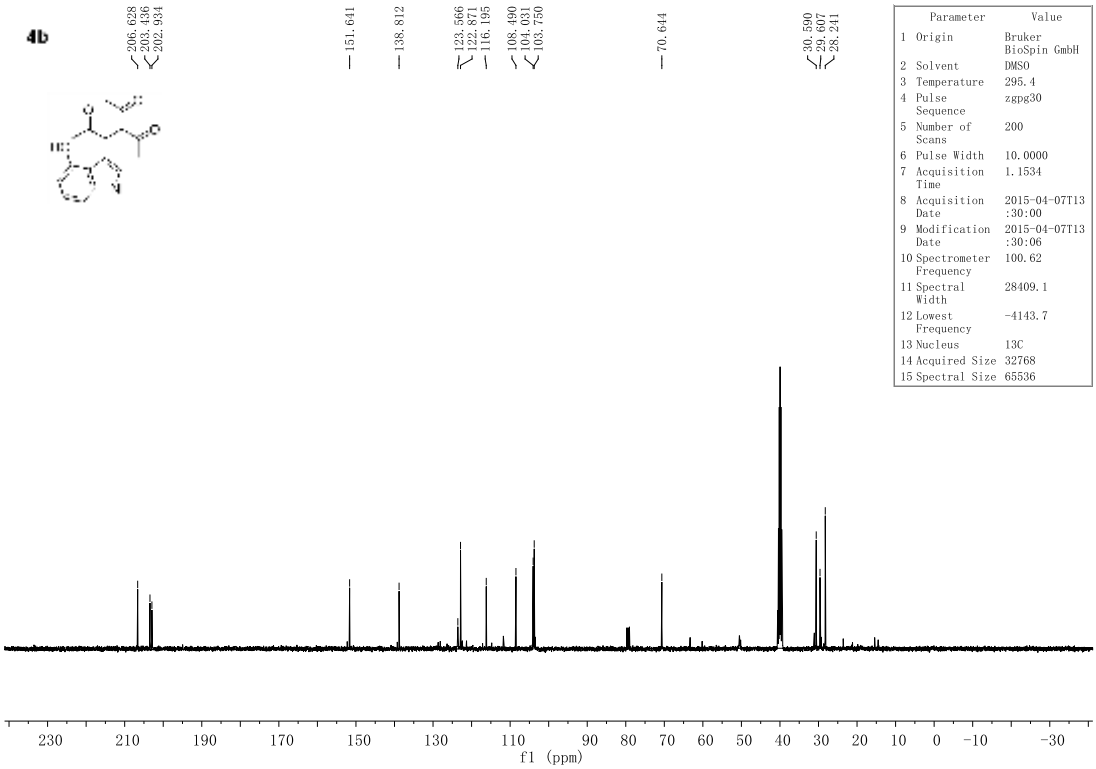

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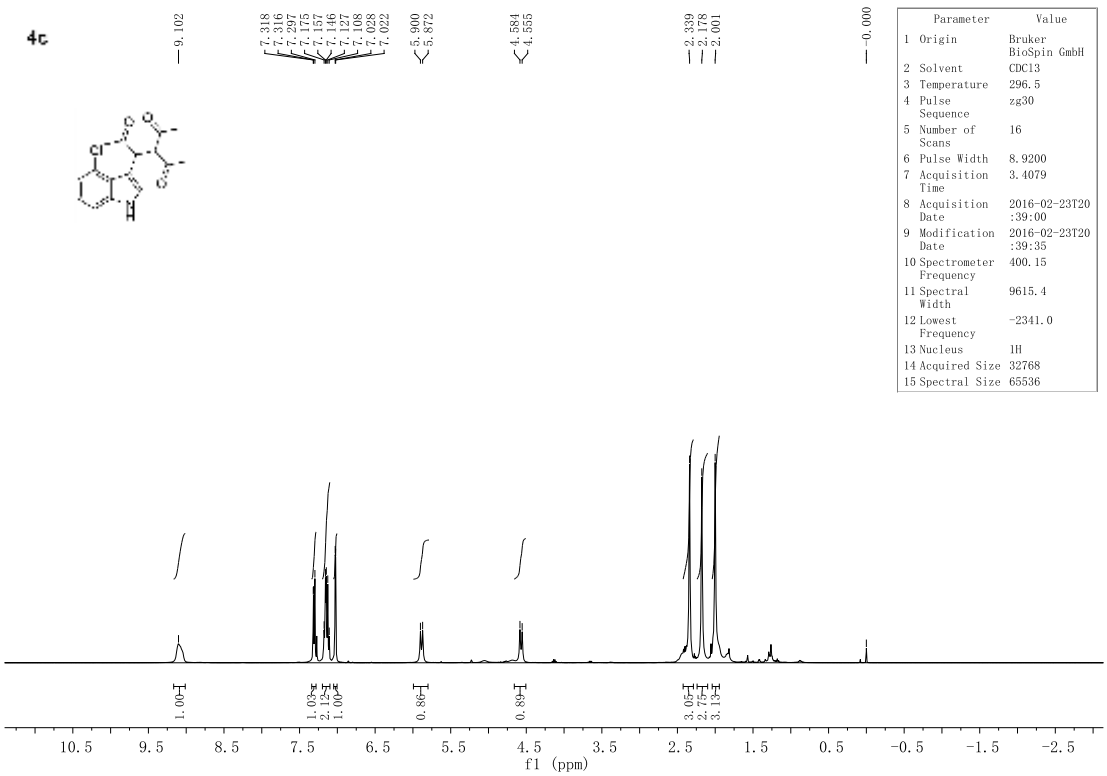
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536



	Parameter	Value
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2	Solvent	CDCl3
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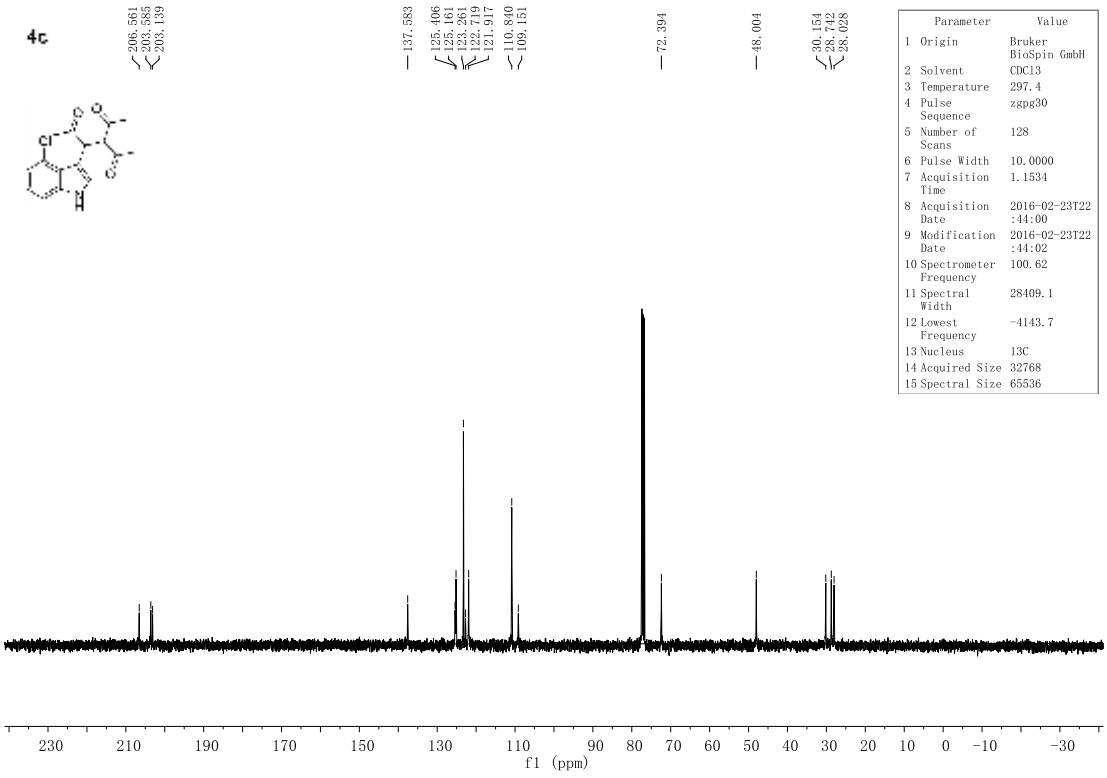
14	Acquired Size	32768
15	Spectral Size	65536



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9	Modification Date	2016-02-23T22:44:02
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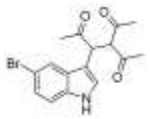
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

4d



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	Parameter	Value
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2	Solvent	CDCl3
3	Temperature	297.1
4	Pulse Sequence	zg30
5	Number of Scans	16
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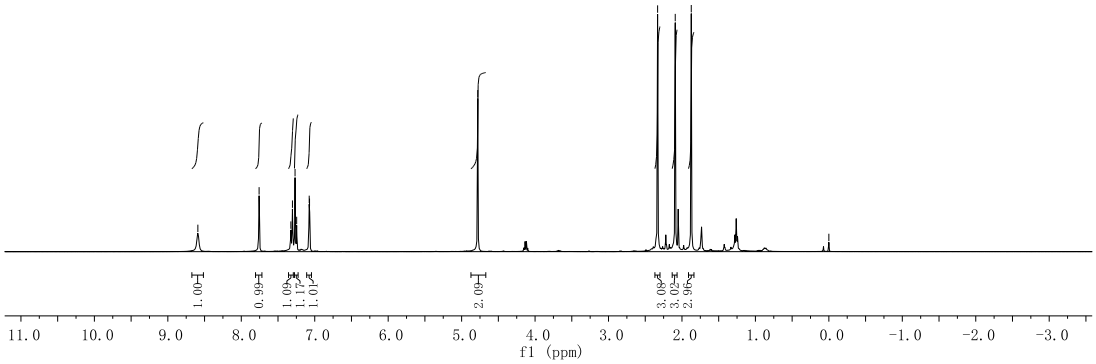
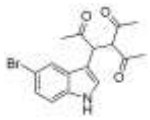
14	Acquired Size	32768
15	Spectral Size	65536



4d



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	Parameter	Value
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7	Acquisition Time	1.1534
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9	Modification Date	2016-02-22T22:21:41
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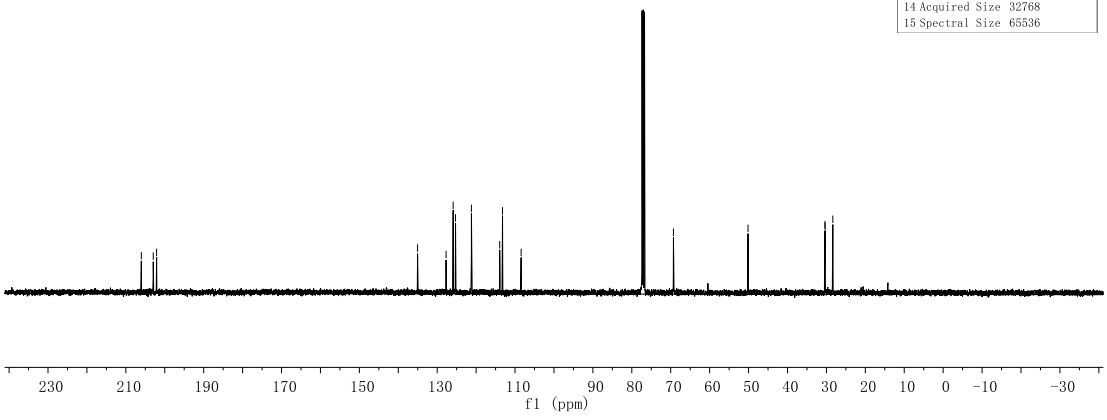
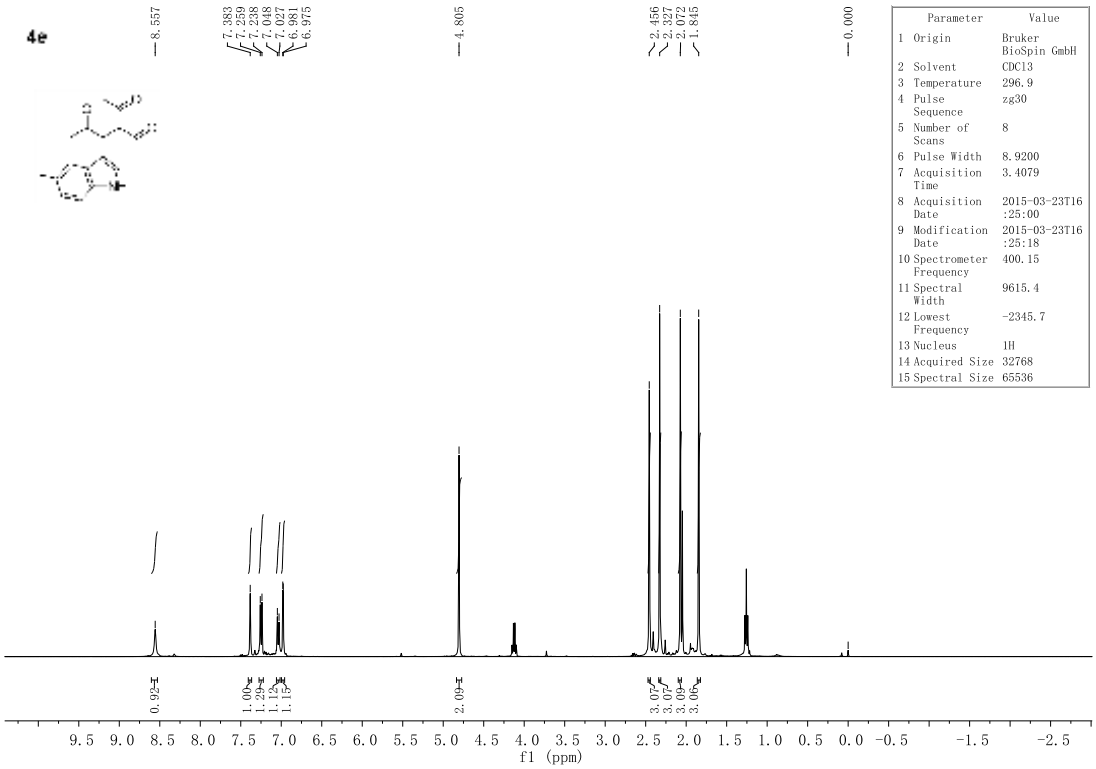
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536





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9	Modification Date	2015-03-23T16:25:18
10	Spectrometer Frequency	400.15
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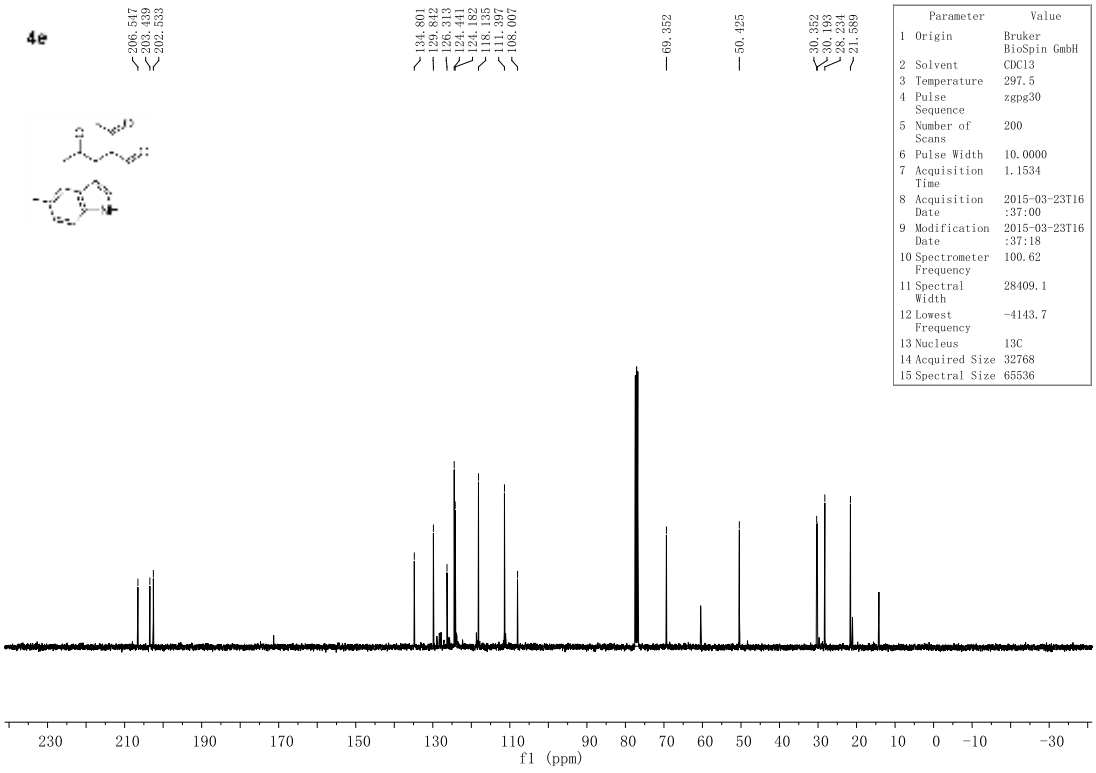
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.5
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
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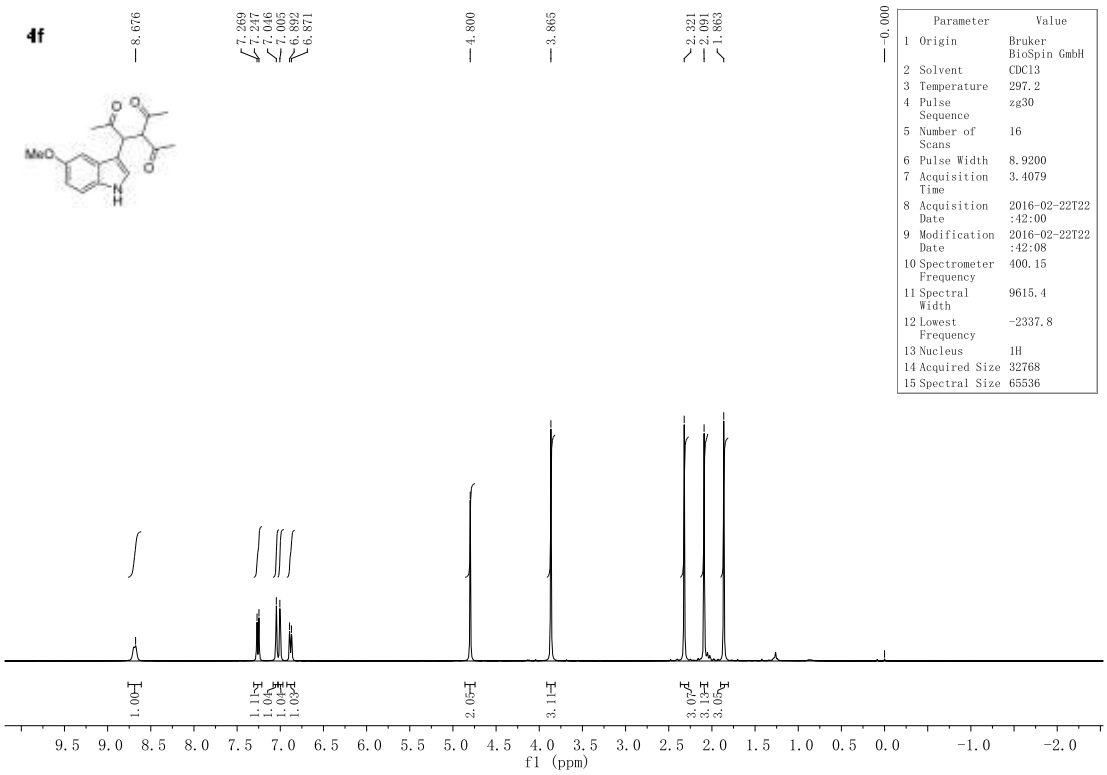
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

4f



	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.2
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
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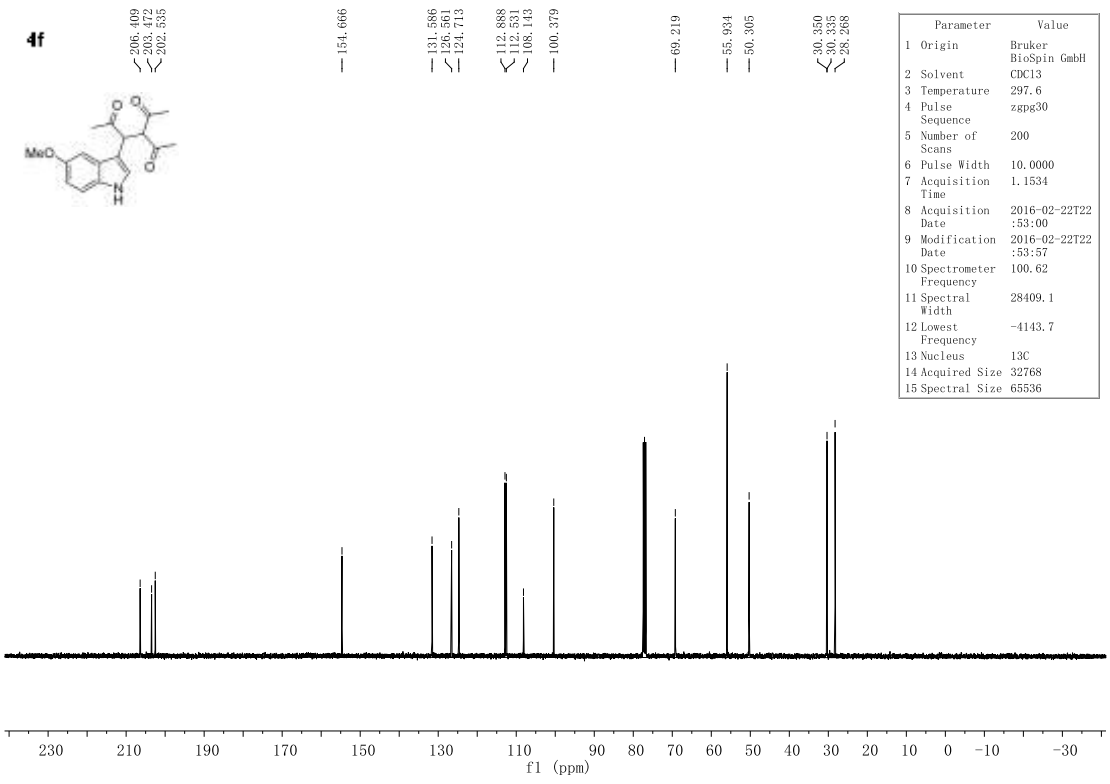
14	Acquired Size	32768
15	Spectral Size	65536

4f



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3	Temperature	297.6
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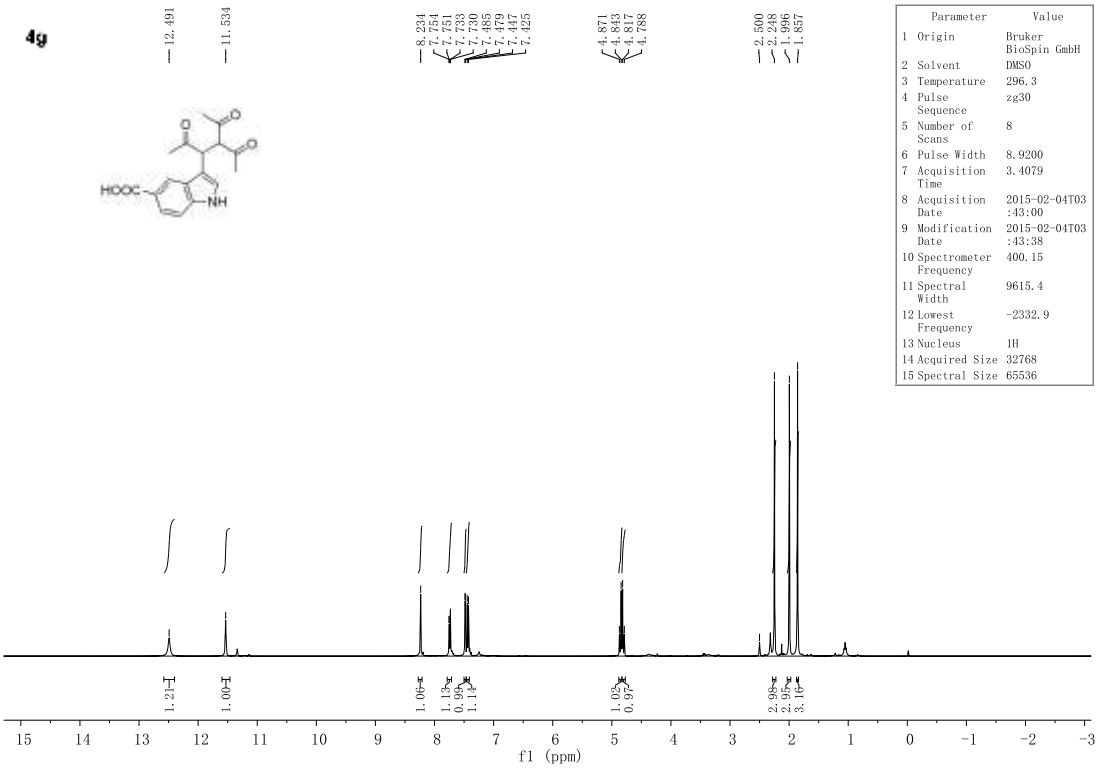
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

4g



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4	Pulse Sequence	zg30
5	Number of Scans	8
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12	Lowest Frequency	-2332.9
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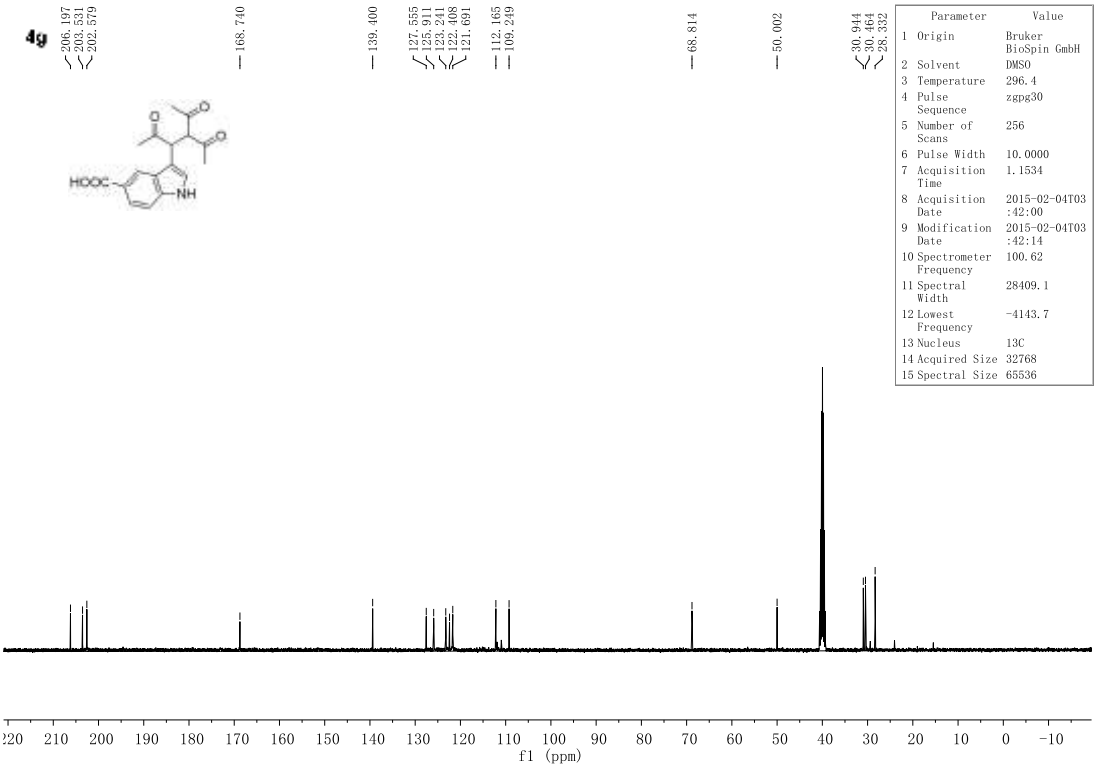
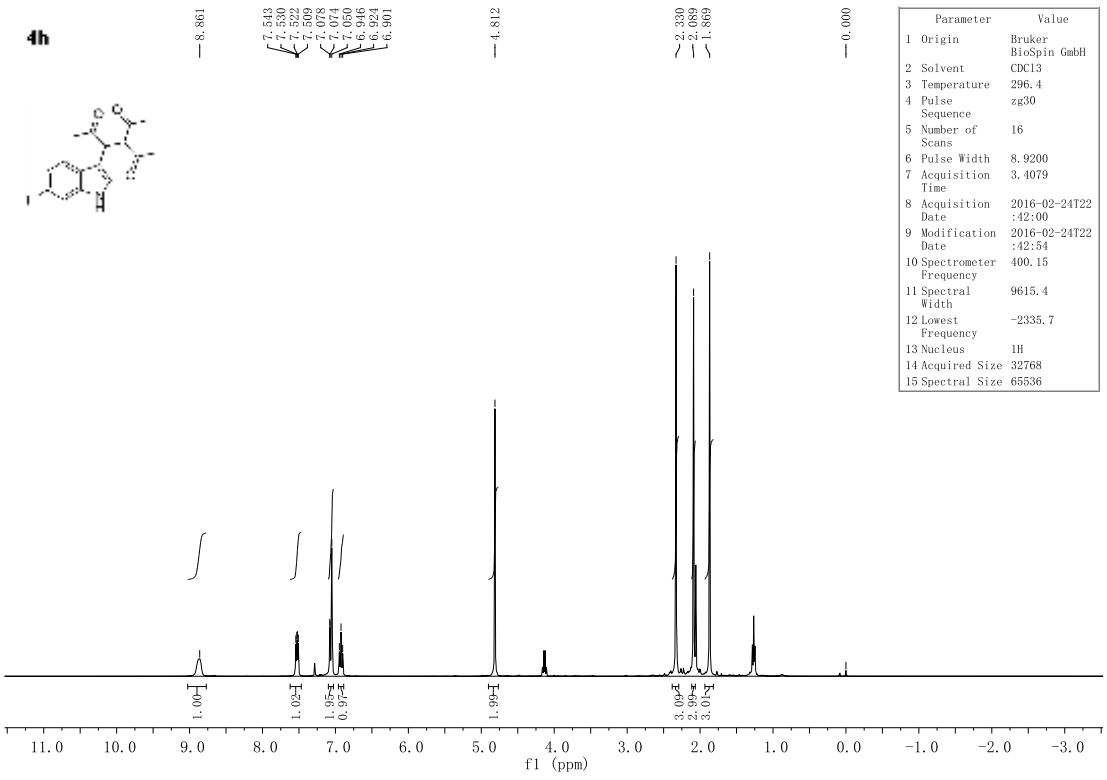
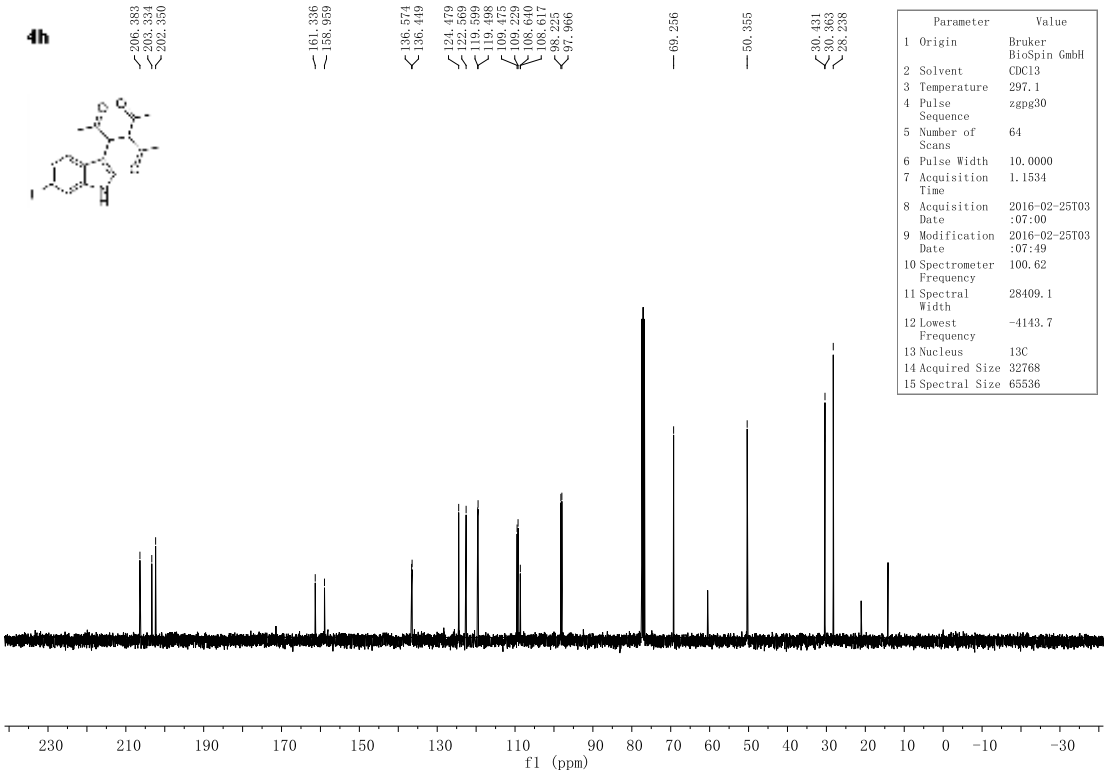
15	Spectral Size	65536

4g

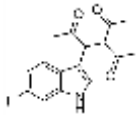


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	DMSO
3	Temperature	296.4
4	Pulse Sequence	zgpg30
5	Number of Scans	256
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-02-04T03 :42:00
9	Modification Date	2015-02-04T03 :42:14
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

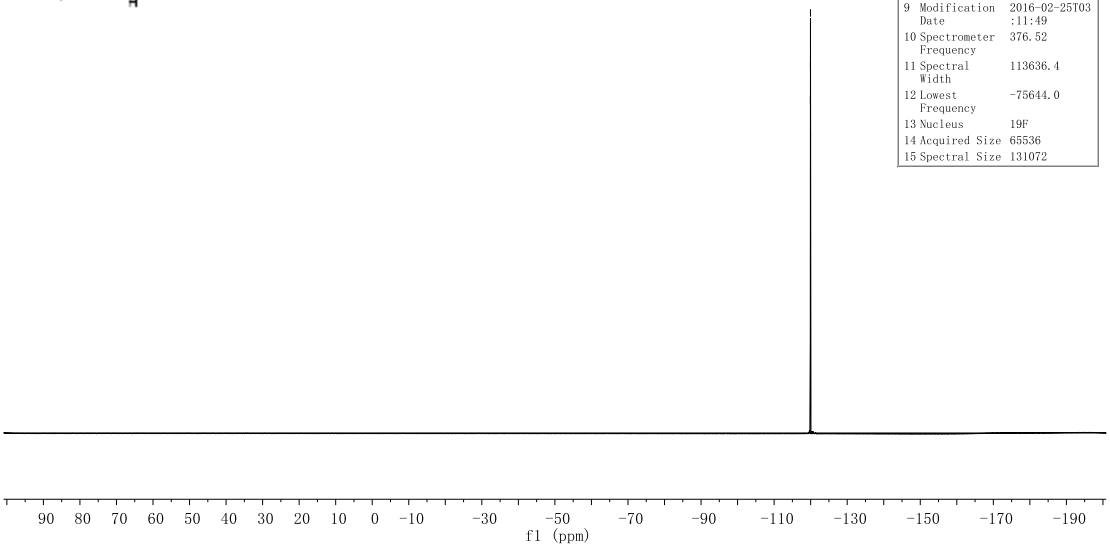

4h
8.861
7.543
7.530
7.522
7.509
7.078
7.074
7.050
6.946
6.924
6.901
4.812
2.330
2.089
1.869
0.000
1.00
1.02
1.95
0.97
1.99
3.09
2.99
3.01
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 296.4
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2016-02-24T22:42:00
9 Modification Date 2016-02-24T22:42:54
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2335.7
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536


4h
206.383
203.334
202.350
161.336
158.959
136.574
136.449
124.479
122.569
119.599
119.498
109.475
109.229
108.640
108.617
98.225
97.966
69.256
50.355
30.431
30.363
28.238
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.1
4 Pulse Sequence zgpg30
5 Number of Scans 64
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-02-25T03:07:00
9 Modification Date 2016-02-25T03:07:49
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536

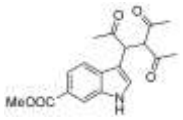
4h



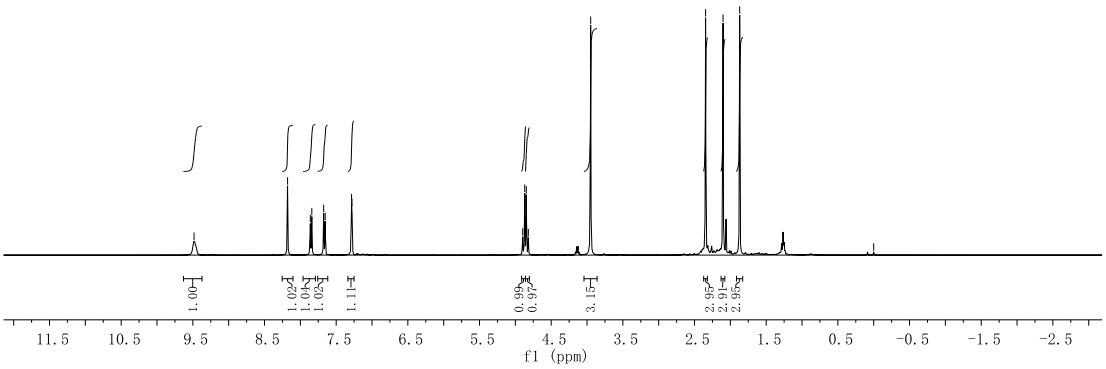
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.0
4	Pulse Sequence	zgflqn
5	Number of Scans	64
6	Pulse Width	14.0000
7	Acquisition Time	0.5767
8	Acquisition Date	2016-02-25T03:11:00
9	Modification Date	2016-02-25T03:11:49
10	Spectrometer Frequency	376.52
11	Spectral Width	113636.4
12	Lowest Frequency	-75644.0
13	Nucleus	19F
14	Acquired Size	65536
15	Spectral Size	131072



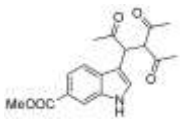
4i



	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.2
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-02-25T21:50:00
9	Modification Date	2016-02-25T21:50:24
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2333.6
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

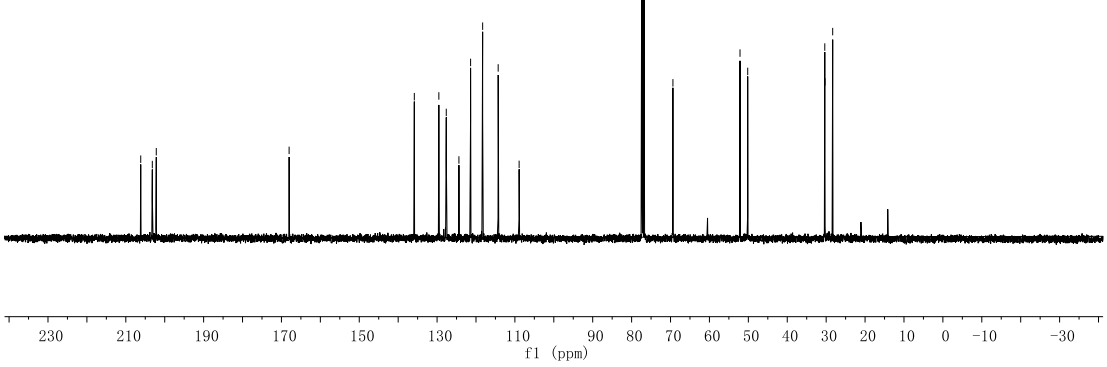


4i

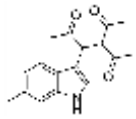


206.162
203.187
202.171
168.029
135.853
129.544
127.637
124.386
121.385
118.289
114.296
108.913
69.384
52.140
50.162
30.352
30.299
28.320

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.9
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-02-26T02:25:00
9	Modification Date	2016-02-26T02:25:24
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

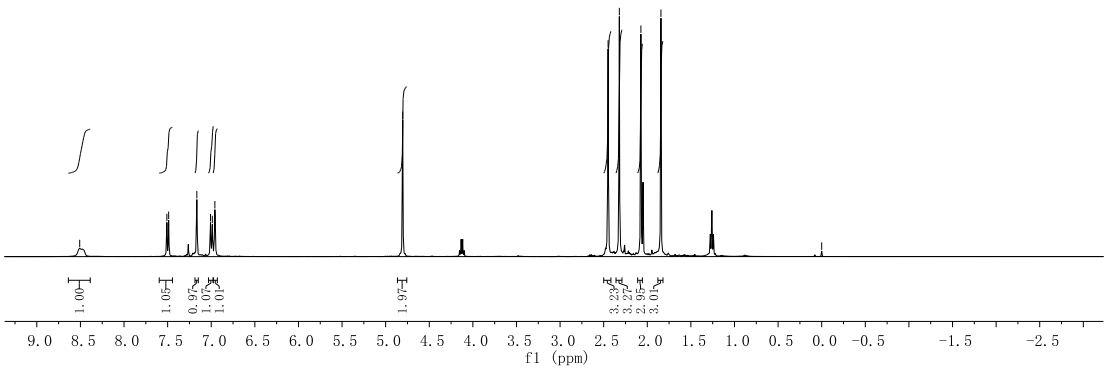


4j

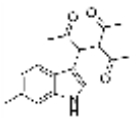


8.508
7.509
7.488
7.165
7.008
6.988
6.958
4.805
2.449
2.320
2.073
1.843
0.000

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.5
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-02-24T22:30:00
9	Modification Date	2016-02-24T22:30:01
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2344.5
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

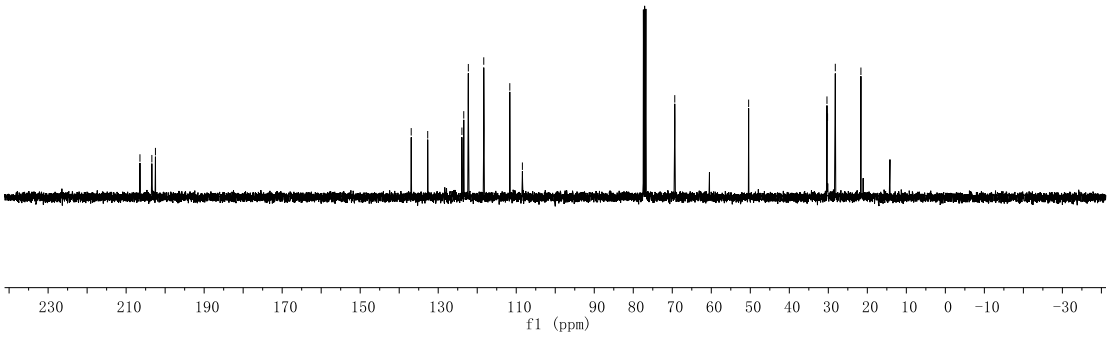


4j

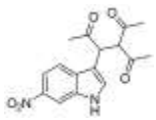


206.455
203.406
202.486
136.923
132.690
123.930
123.451
122.280
118.324
111.648
108.419
69.362
50.425
30.349
30.191
28.209
21.645

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.0
4	Pulse Sequence	zgpg30
5	Number of Scans	64
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-02-25T03:01:00
9	Modification Date	2016-02-25T03:01:14
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

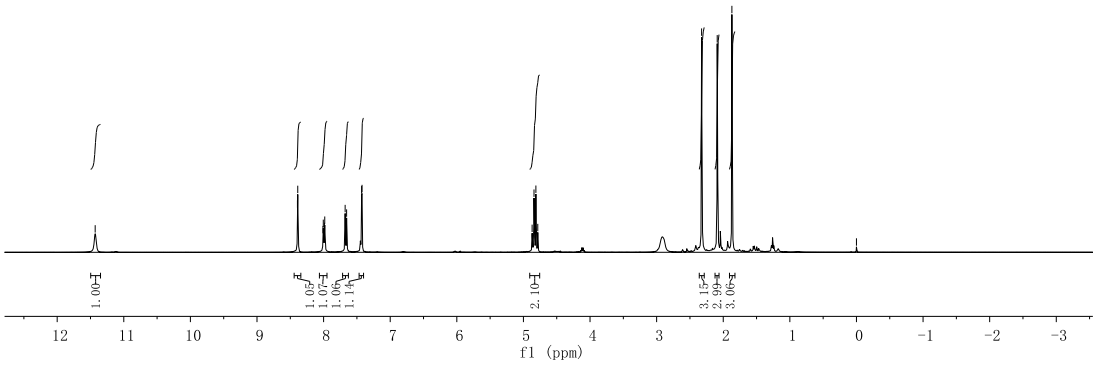


4k



11.429
8.393
8.388
8.010
8.005
7.988
7.983
7.677
7.655
7.429
7.423
4.870
4.841
4.813
4.784
2.325
2.090
1.870
0.000

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.4
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-03-19T18:14:00
9	Modification Date	2016-03-19T18:15:00
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2271.7
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



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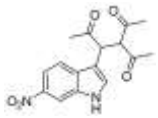
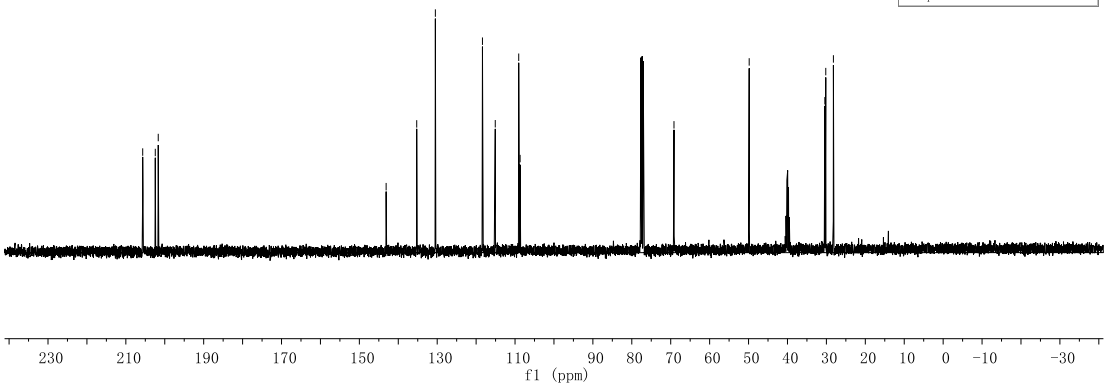


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	299.5
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-03-19T23:21:00
9	Modification Date	2016-03-19T23:21:22
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536



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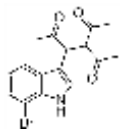
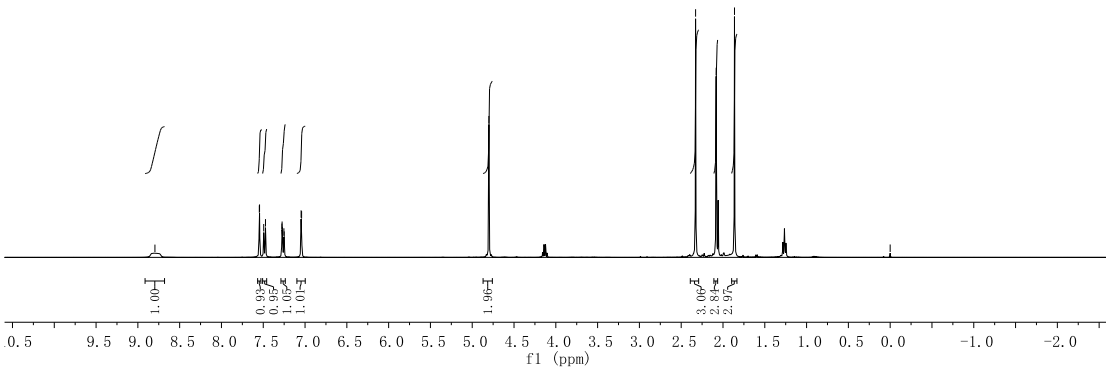
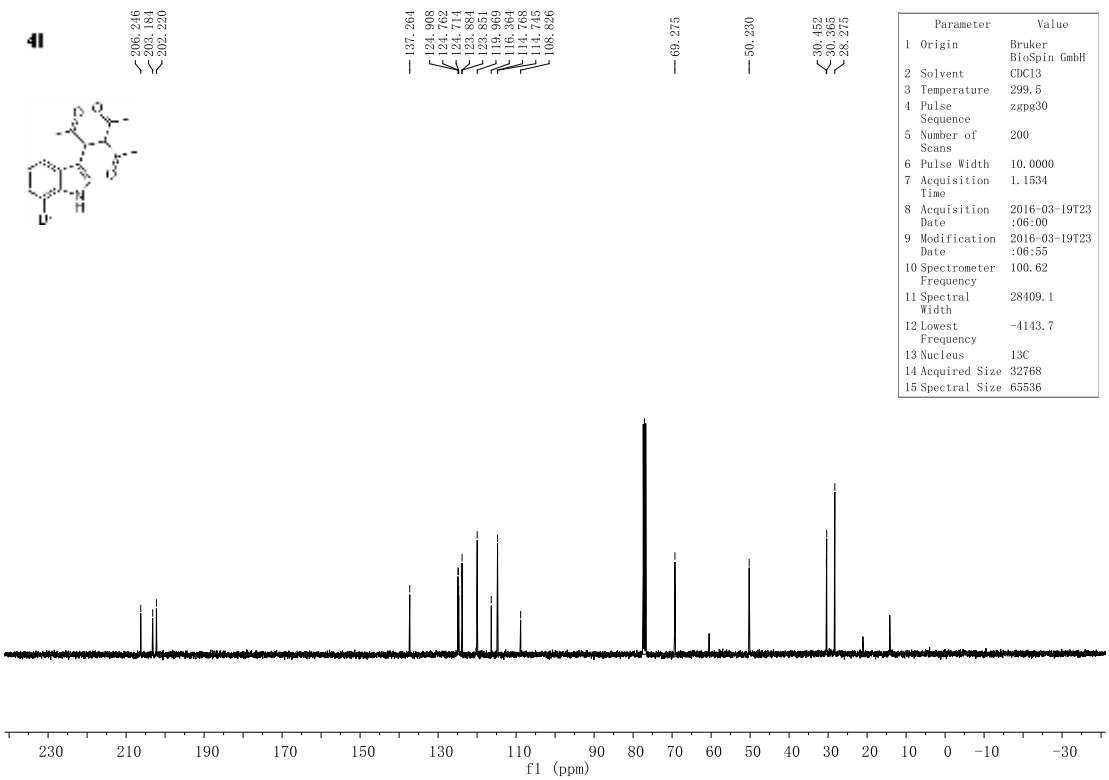
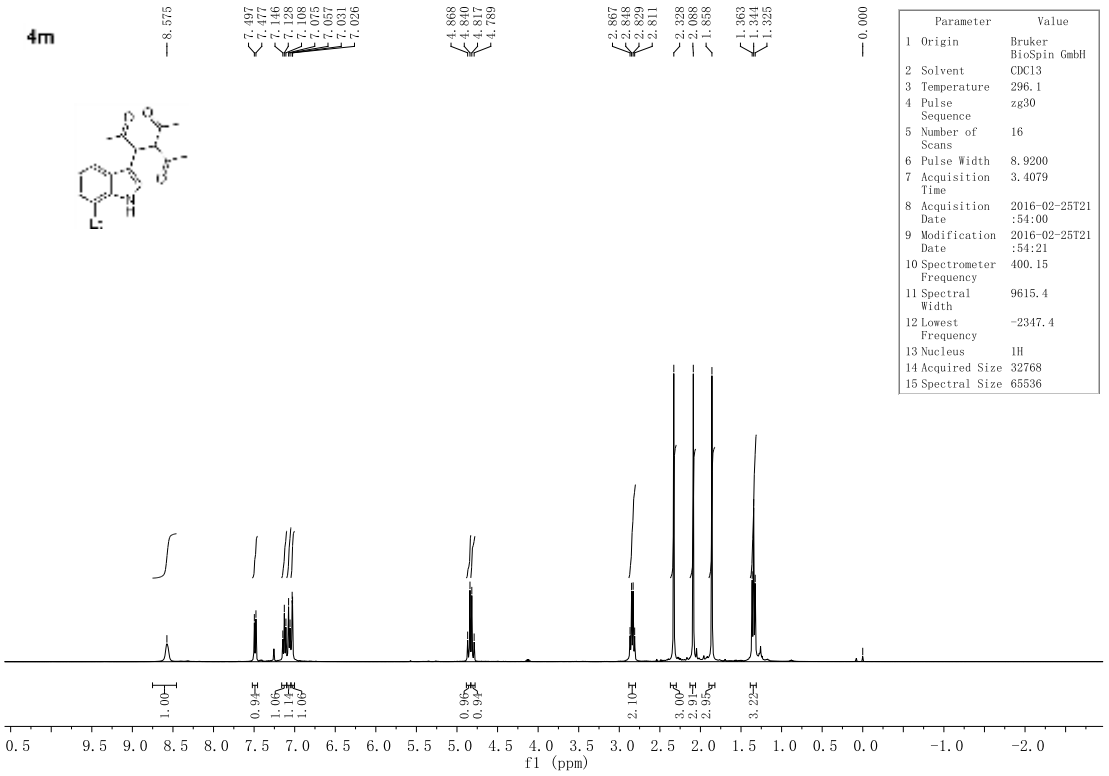


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.4
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-03-19T18:10:00
9	Modification Date	2016-03-19T18:10:47
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2339.5
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



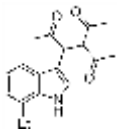


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	299.5
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-03-19T23:06:00
9	Modification Date	2016-03-19T23:06:55
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

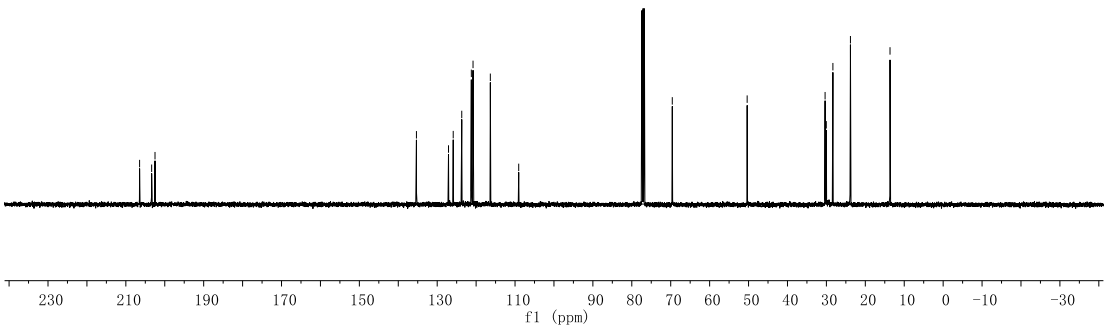


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.1
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-02-25T21:54:00
9	Modification Date	2016-02-25T21:54:21
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2347.4
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

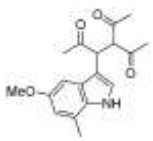
4m



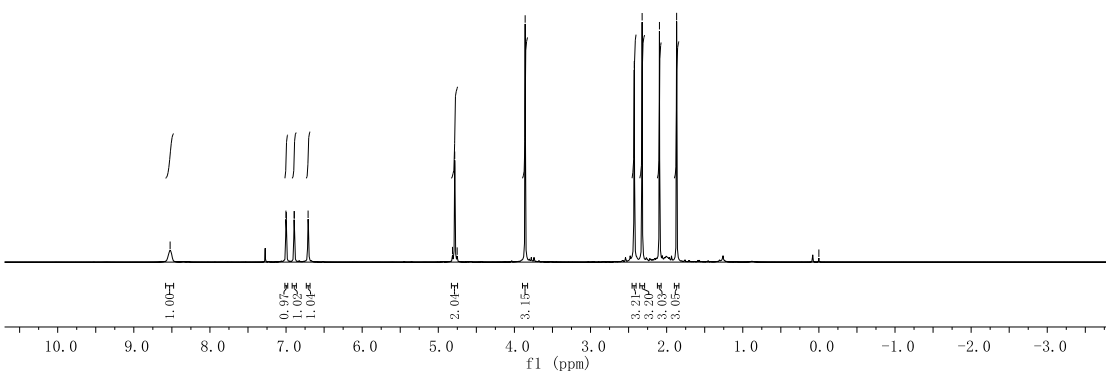
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.1
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-02-26T02:39:00
9	Modification Date	2016-02-26T02:39:08
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536



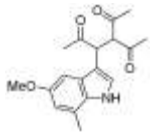
4n



	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.7
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-04-19T22:31:00
9	Modification Date	2016-04-19T22:31:20
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2373.0
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

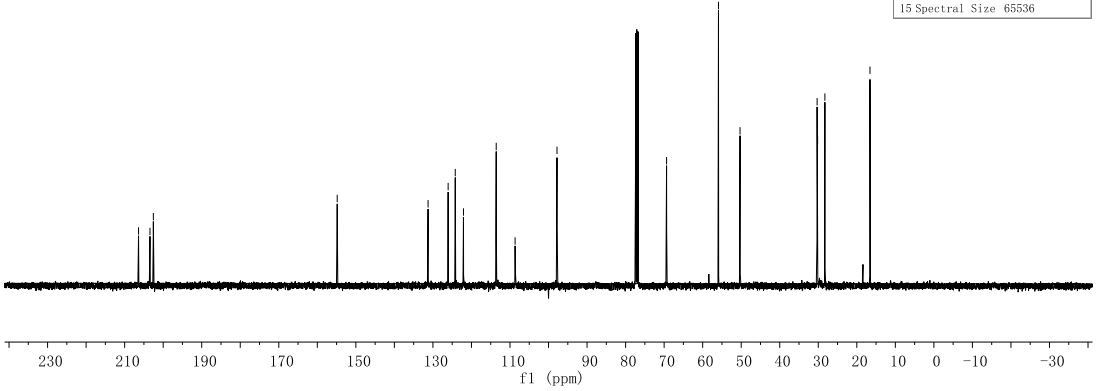


4n

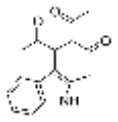


206.392
203.428
202.550
154.838
131.258
126.050
124.204
122.072
113.575
108.678
97.800
69.367
55.895
50.299
30.304
30.172
28.283
16.584

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.9
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-04-20T23:27:00
9	Modification Date	2016-04-20T23:27:14
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

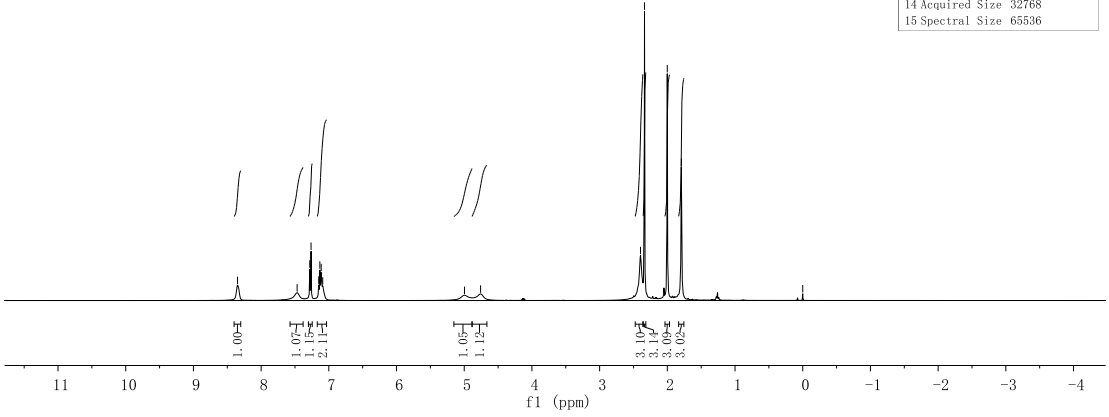


4o

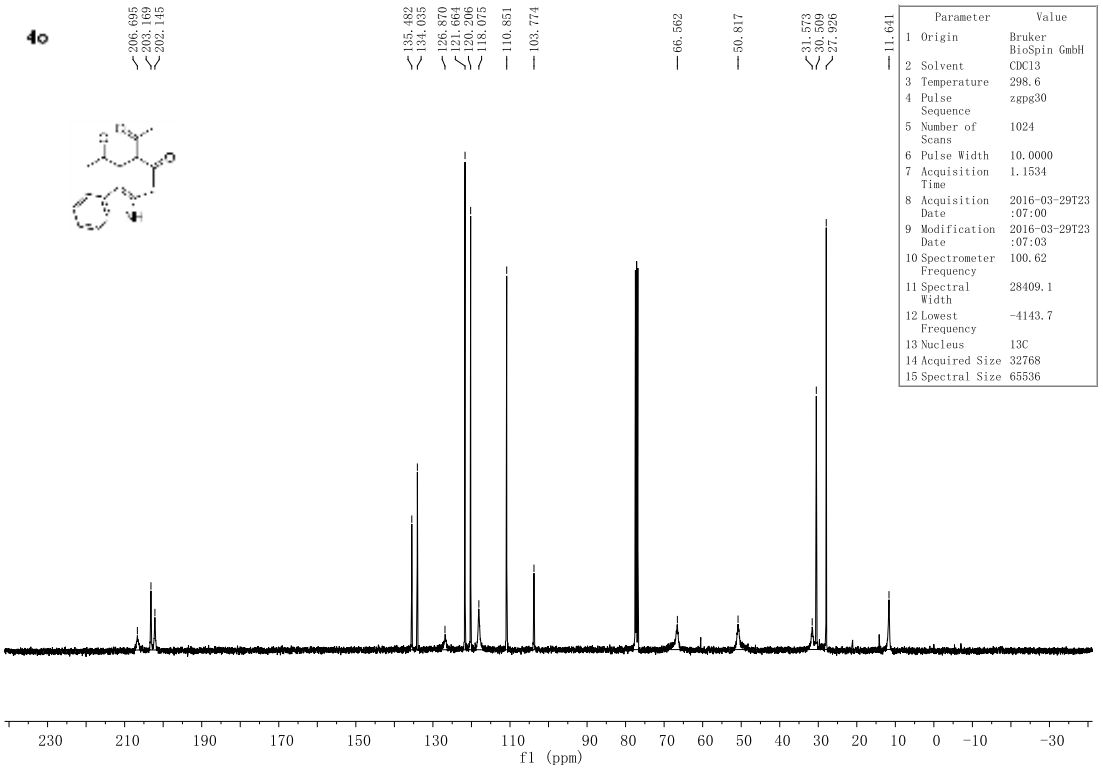


8.348
7.468
7.282
7.263
7.150
7.133
7.113
7.090
4.996
4.758
2.396
2.337
2.001
1.793
0.000

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.0
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-02-29T22:09:00
9	Modification Date	2016-02-29T22:09:15
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2344.8
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

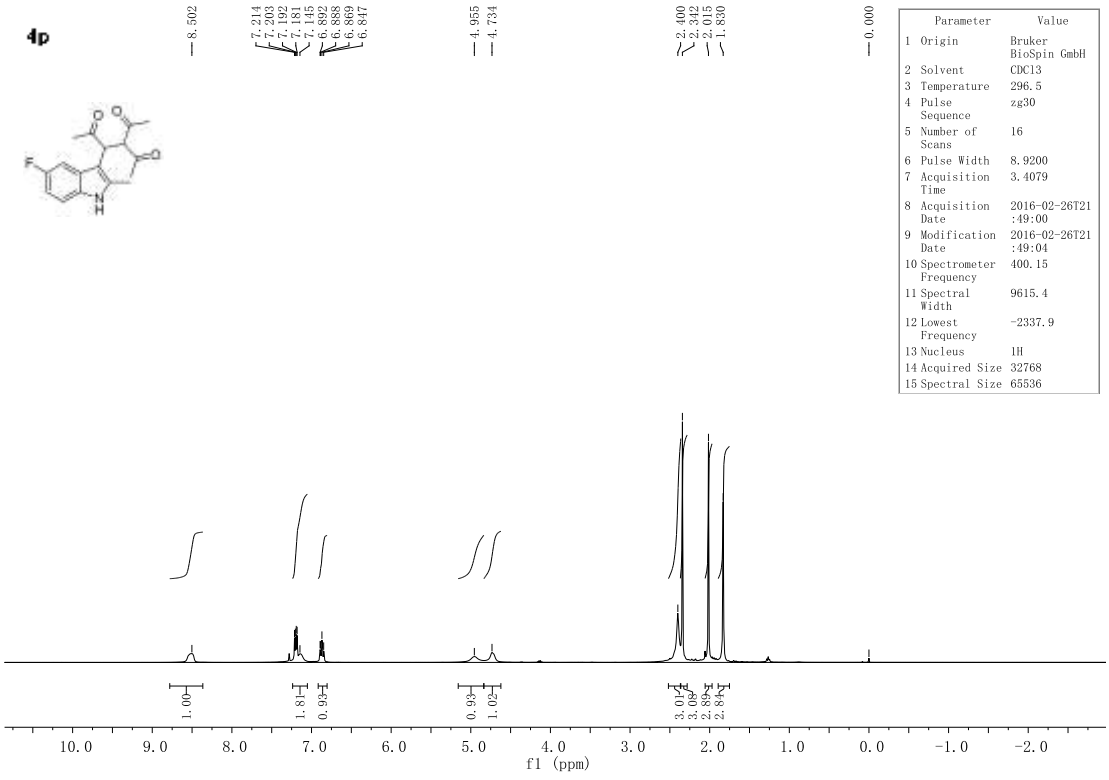


4o

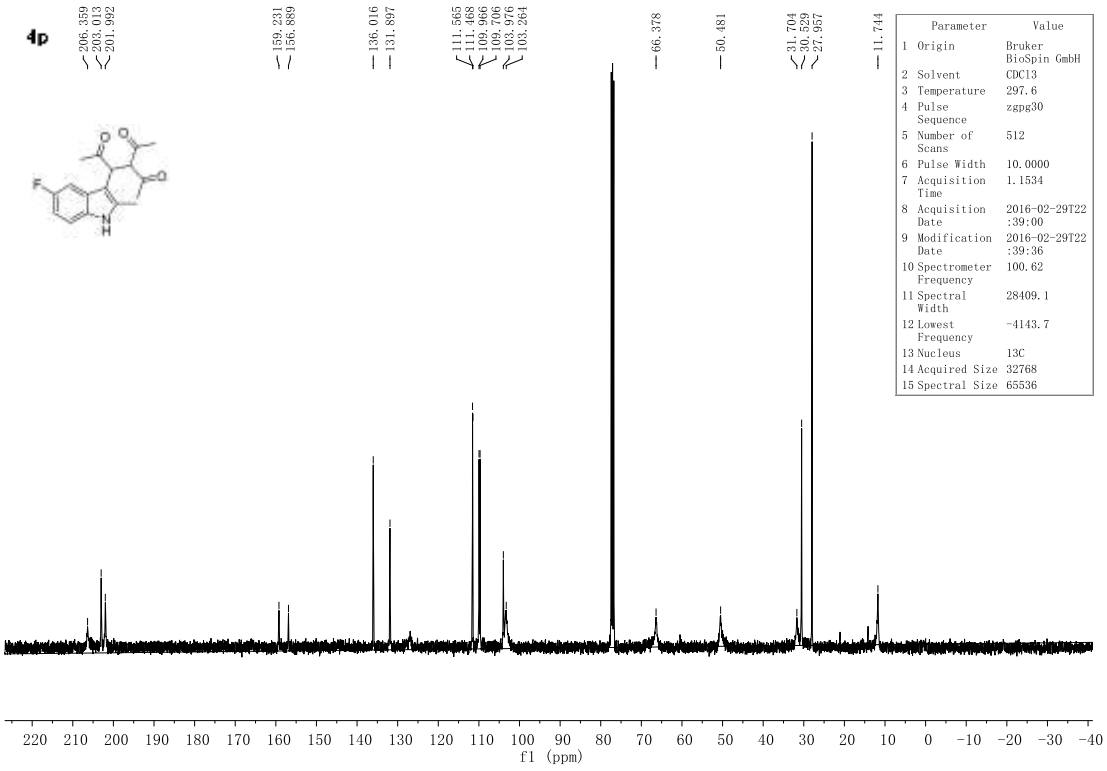


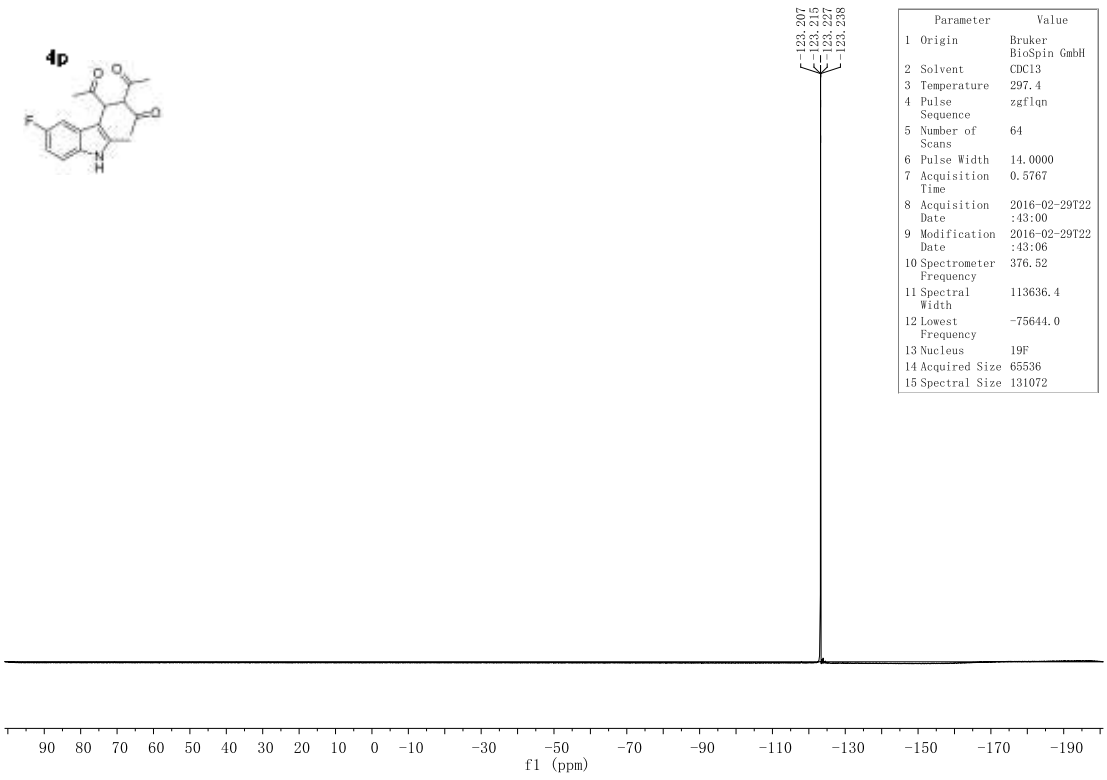
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.6
4	Pulse Sequence	zgpg30
5	Number of Scans	1024
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-03-29T23:07:00
9	Modification Date	2016-03-29T23:07:03
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

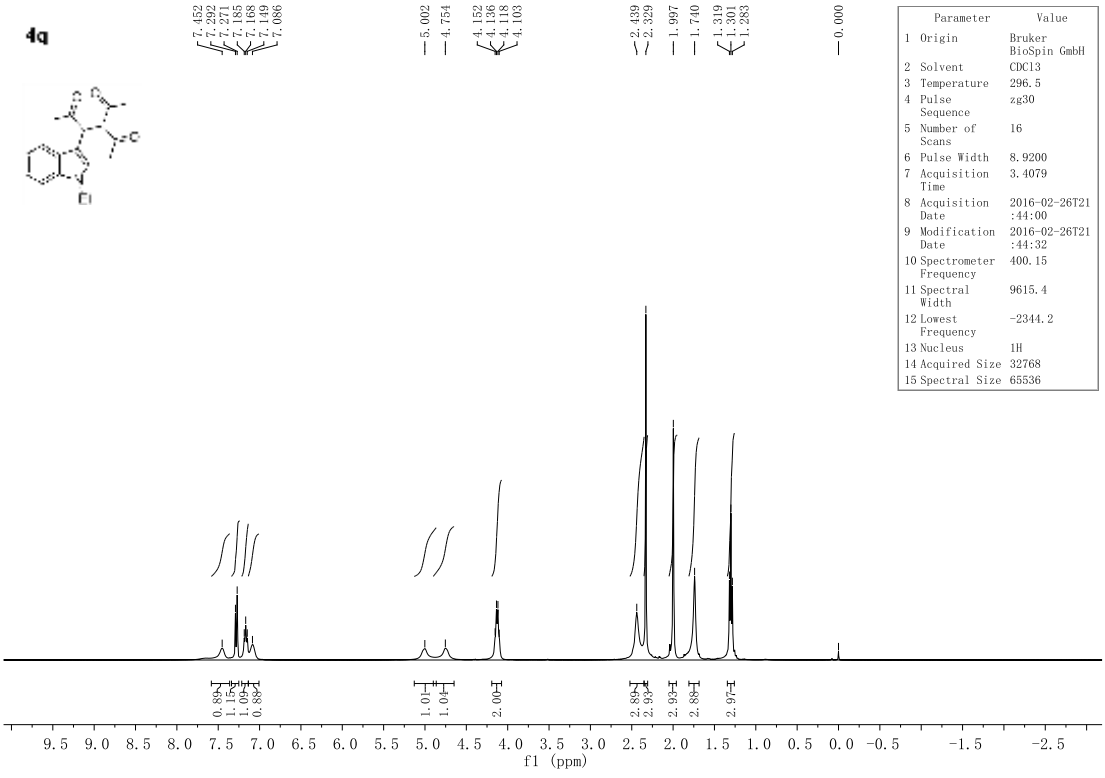
4p



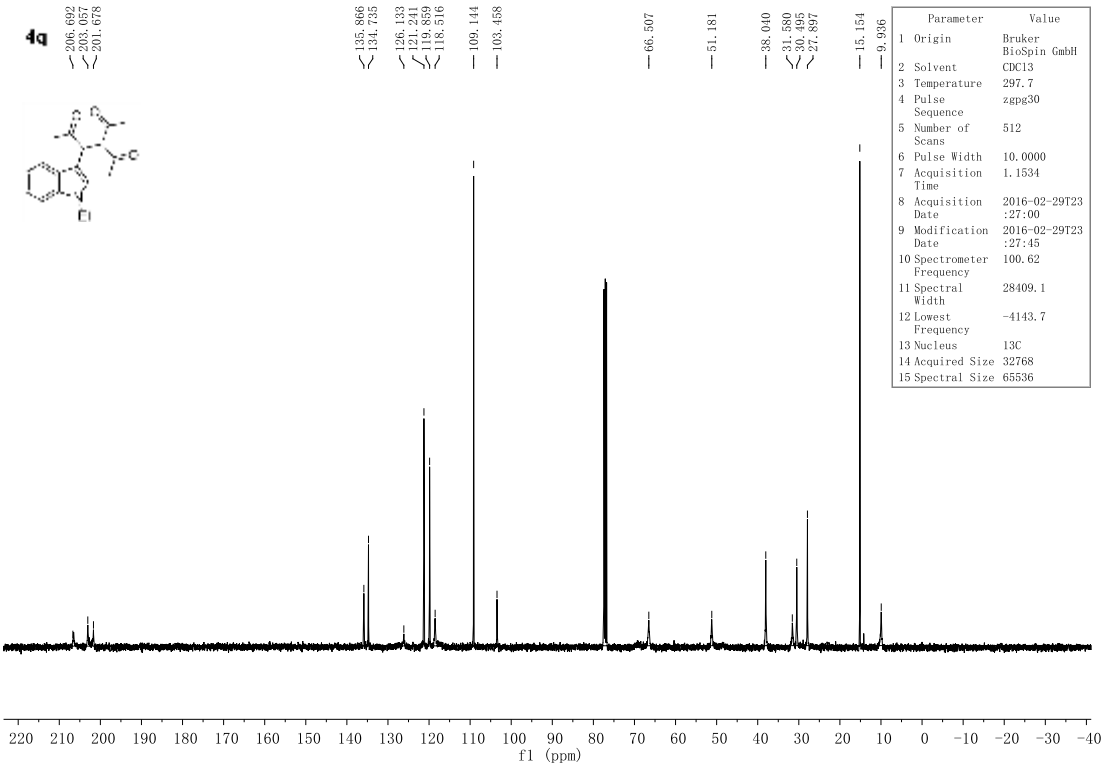
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.5
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-02-26T21:49:00
9	Modification Date	2016-02-26T21:49:04
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2337.9
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536


4p
206.359
203.013
201.992
159.231
156.889
136.016
131.897
111.565
111.468
109.966
109.706
103.976
103.264
66.378
50.481
31.704
30.529
27.957
11.744
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.6
4 Pulse Sequence zgpg30
5 Number of Scans 512
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-02-29T22:39:00
9 Modification Date 2016-02-29T22:39:36
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

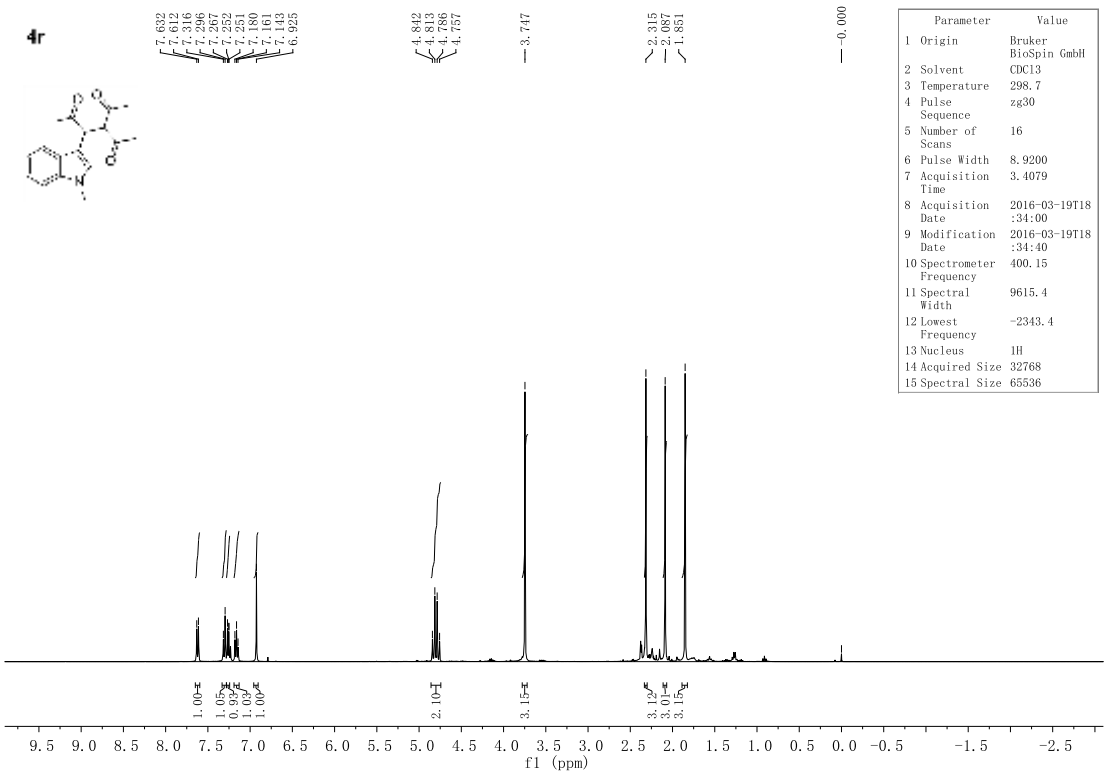

4p
123.207
123.215
123.227
123.238
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.4
4 Pulse Sequence zgflqn
5 Number of Scans 64
6 Pulse Width 14.0000
7 Acquisition Time 0.5767
8 Acquisition Date 2016-02-29T22:43:00
9 Modification Date 2016-02-29T22:43:06
10 Spectrometer Frequency 376.52
11 Spectral Width 113636.4
12 Lowest Frequency -75644.0
13 Nucleus 19F
14 Acquired Size 65536
15 Spectral Size 131072
f1 (ppm)



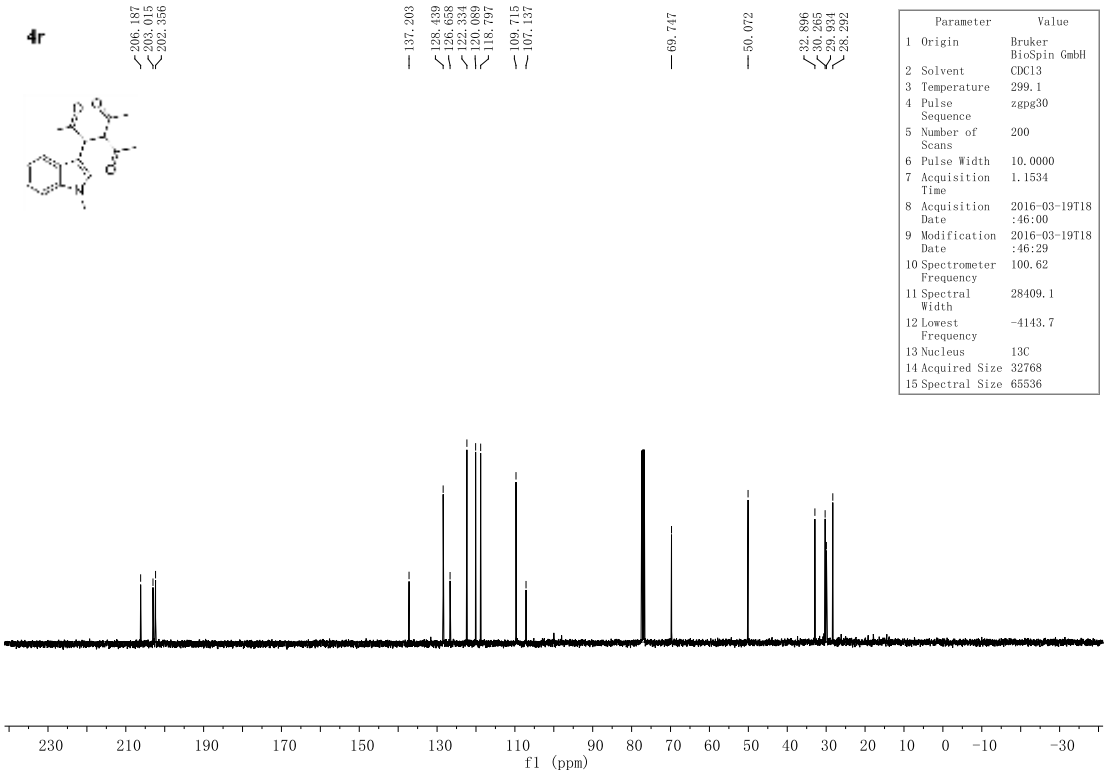
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.5
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-02-26T21:44:00
9	Modification Date	2016-02-26T21:44:32
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2344.2
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



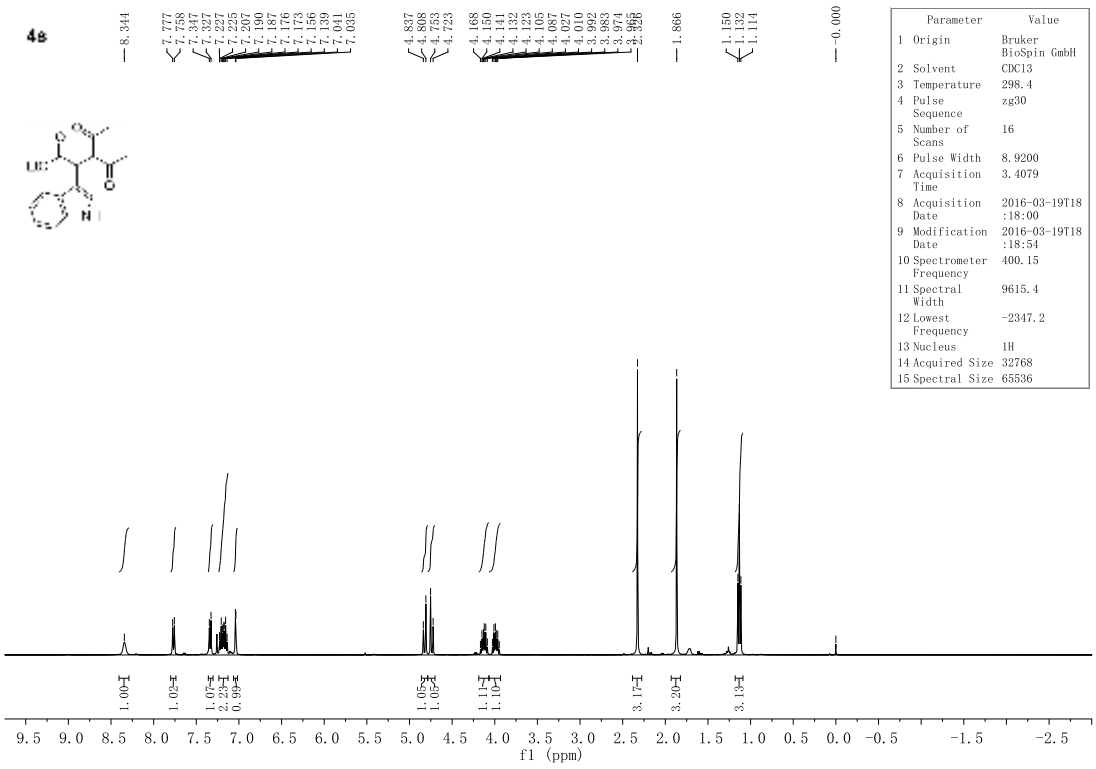
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.7
4	Pulse Sequence	zgpg30
5	Number of Scans	512
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-02-29T23:27:00
9	Modification Date	2016-02-29T23:27:45
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

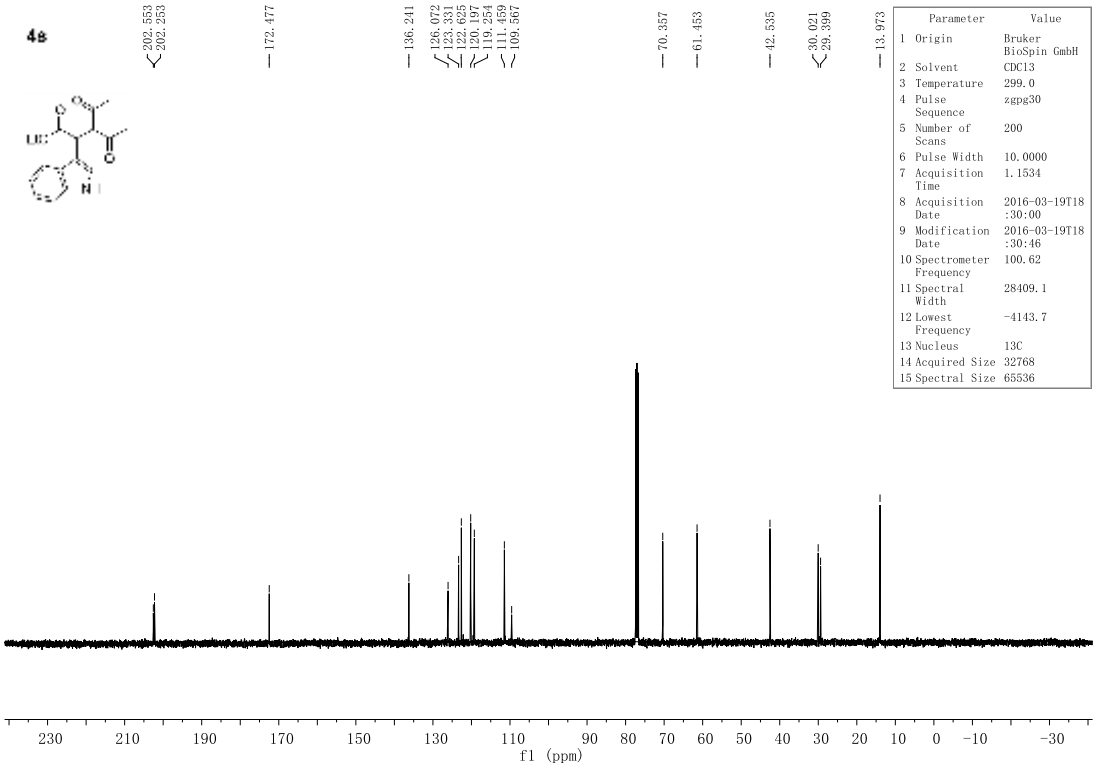


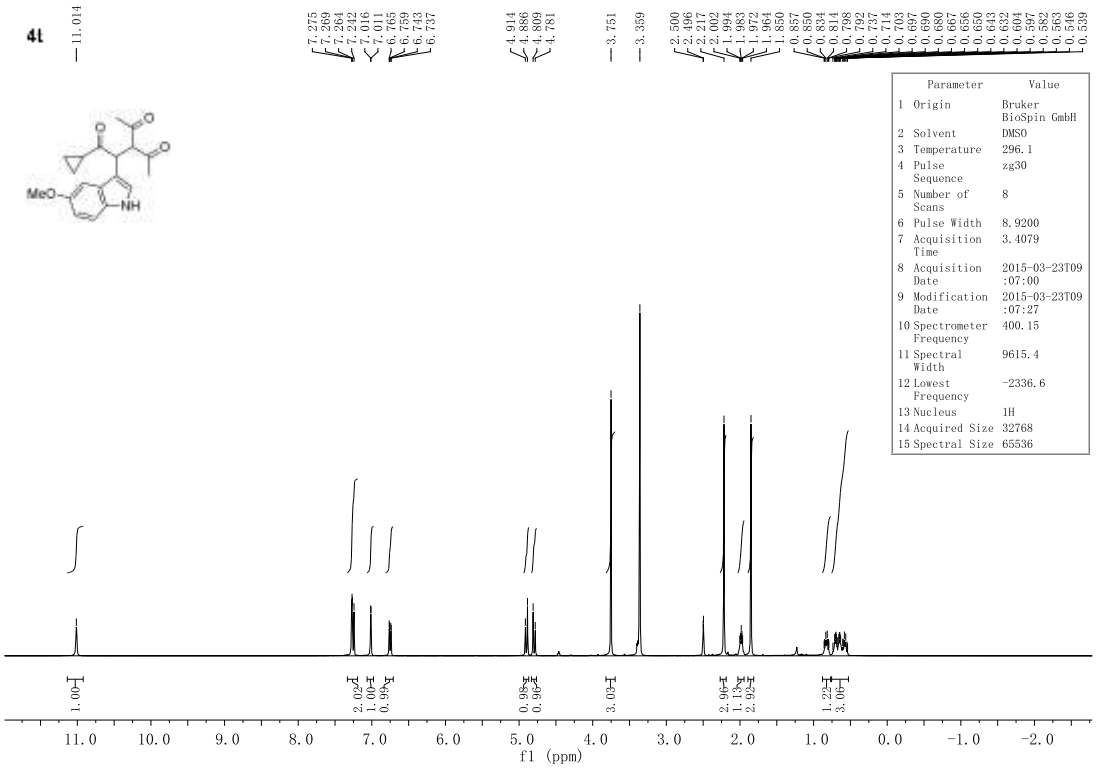
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.7
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-03-19T18:34:00
9	Modification Date	2016-03-19T18:34:40
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2343.4
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

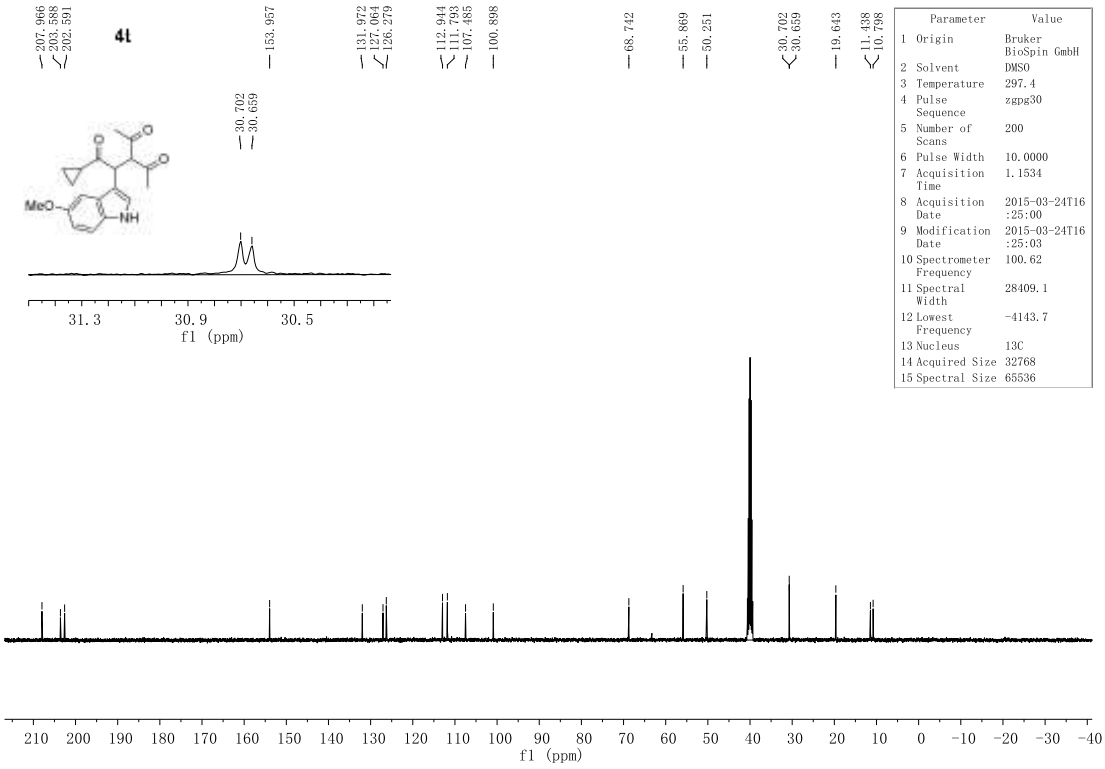


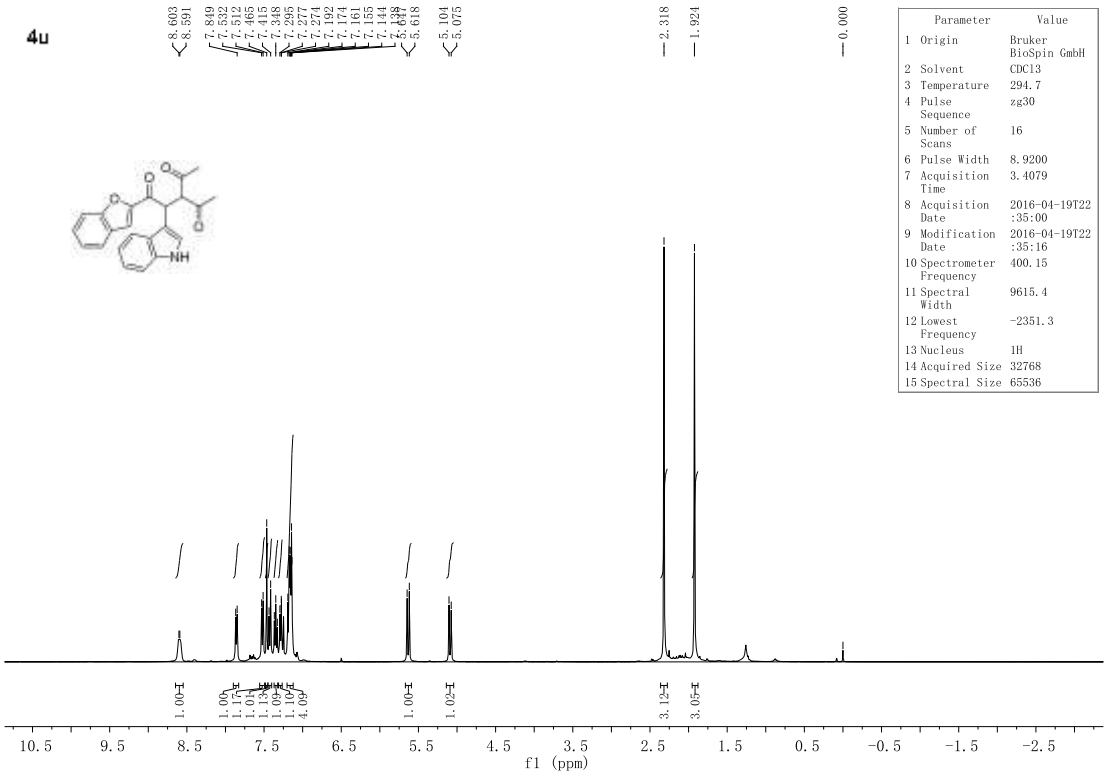
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	299.1
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-03-19T18:46:00
9	Modification Date	2016-03-19T18:46:29
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536


4s
8.344
7.777
7.758
7.347
7.327
7.227
7.225
7.207
7.190
7.187
7.176
7.173
7.156
7.139
7.041
7.035
4.837
4.698
4.753
4.723
4.168
4.150
4.141
4.132
4.123
4.105
4.087
4.027
4.010
3.992
3.983
3.974
3.966
1.866
1.150
1.132
1.114
-0.000
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 298.4
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2016-03-19T18:18:00
9 Modification Date 2016-03-19T18:18:54
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2347.2
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
1.00
1.02
1.07
2.23
0.99
1.05
1.05
1.11
1.10
3.17
3.20
3.13
f1 (ppm)

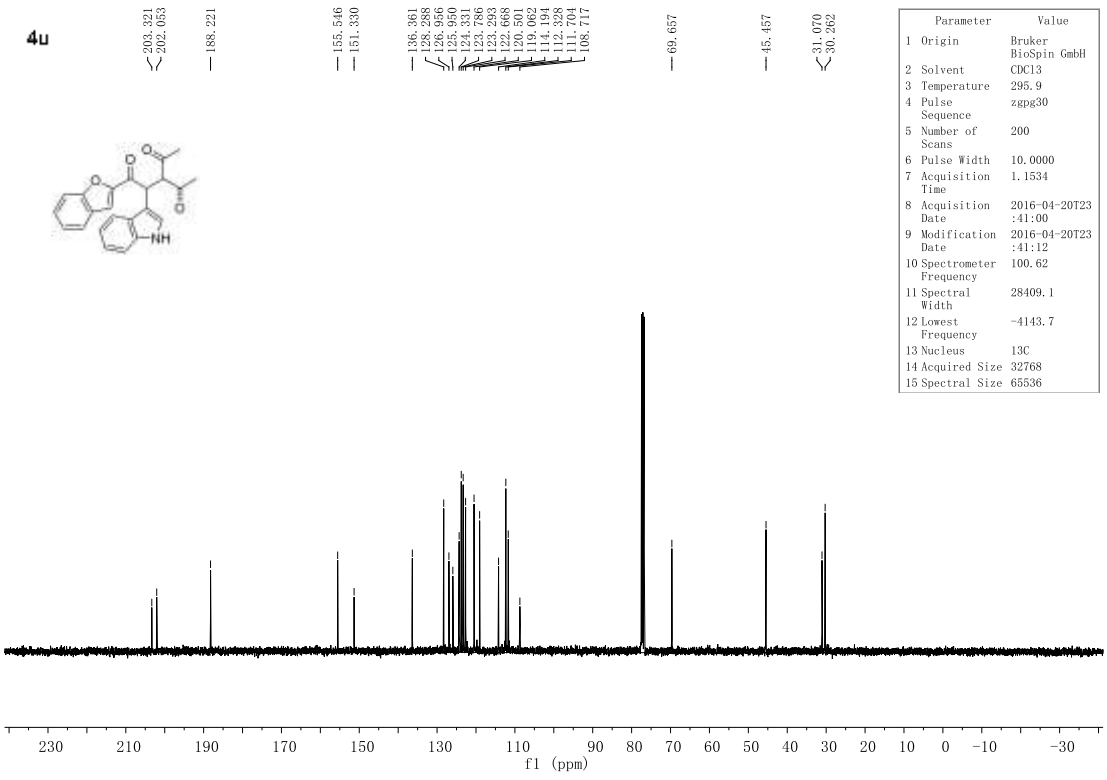

4s
202.553
202.253
172.477
136.241
126.072
123.331
122.625
120.197
119.254
111.459
109.567
70.357
61.453
42.535
30.021
29.399
13.973
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 299.0
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-03-19T18:30:00
9 Modification Date 2016-03-19T18:30:46
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)


4t
11.014
7.275
7.269
7.264
7.242
7.016
7.011
6.765
6.759
6.743
6.737
4.914
4.886
4.809
4.781
3.751
3.359
2.500
2.496
2.217
2.002
1.994
1.983
1.972
1.964
1.850
0.857
0.850
0.834
0.814
0.798
0.792
0.737
0.714
0.703
0.697
0.680
0.667
0.656
0.650
0.643
0.632
0.604
0.597
0.582
0.563
0.546
0.539
MeO
NH
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent DMSO
3 Temperature 296.1
4 Pulse Sequence zg30
5 Number of Scans 8
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2015-03-23T09:07:00
9 Modification Date 2015-03-23T09:07:27
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2336.6
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
1.00
2.02
1.00
0.99
0.98
0.96
3.04
2.96
1.13
2.92
1.22
3.06
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
f1 (ppm)

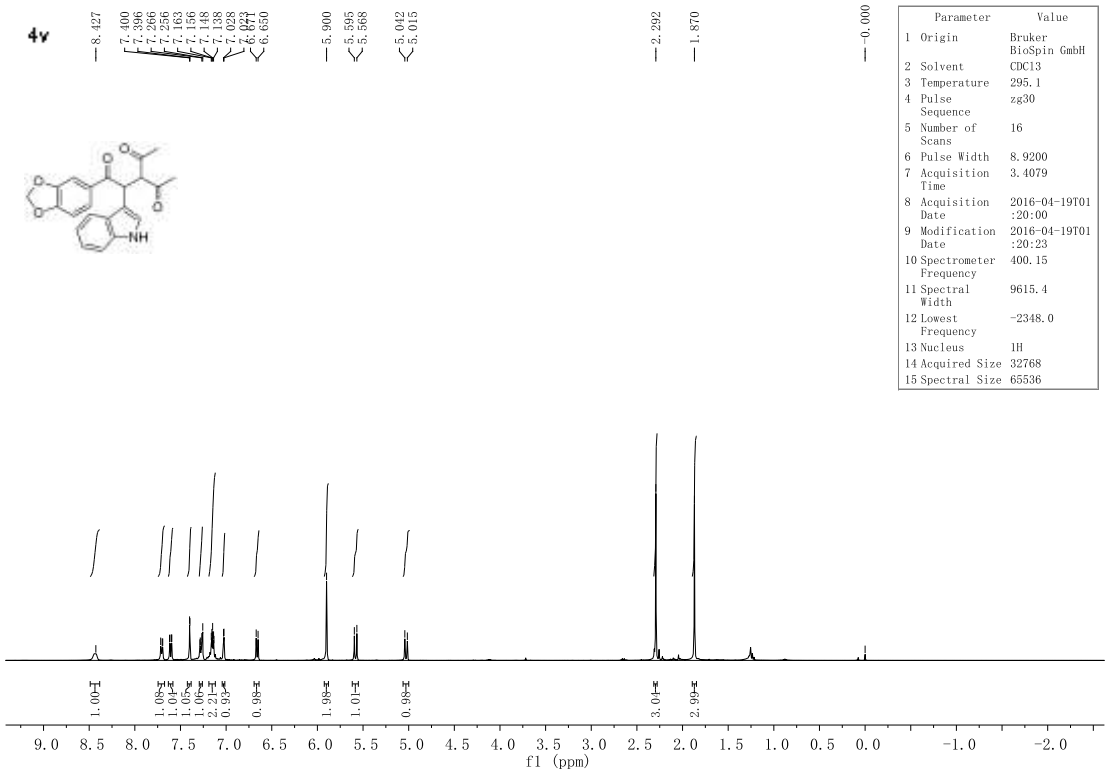

207.966
203.588
202.591
4t
153.957
131.972
127.064
126.279
112.944
111.793
107.485
100.898
68.742
55.869
50.251
30.702
30.659
19.643
11.438
10.798
MeO
NH
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent DMSO
3 Temperature 297.4
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2015-03-24T16:25:00
9 Modification Date 2015-03-24T16:25:03
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
31.3
30.9
30.5
f1 (ppm)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
f1 (ppm)



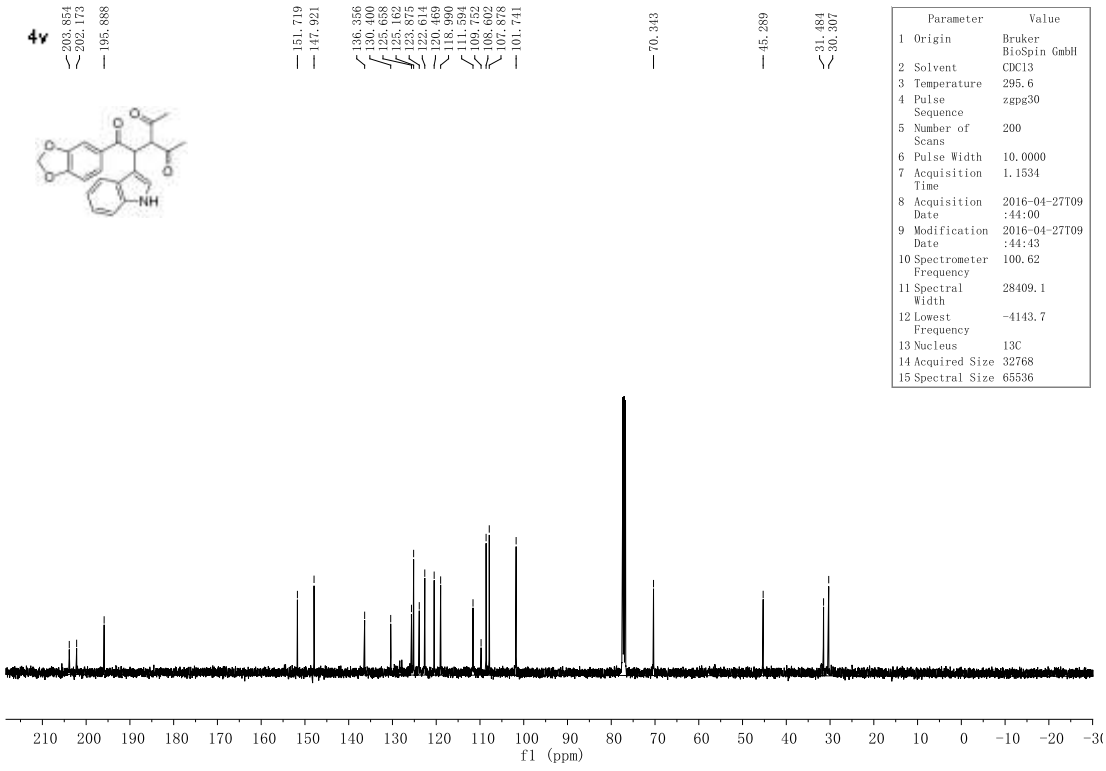
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.7
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-04-19T22:35:00
9	Modification Date	2016-04-19T22:35:16
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2351.3
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



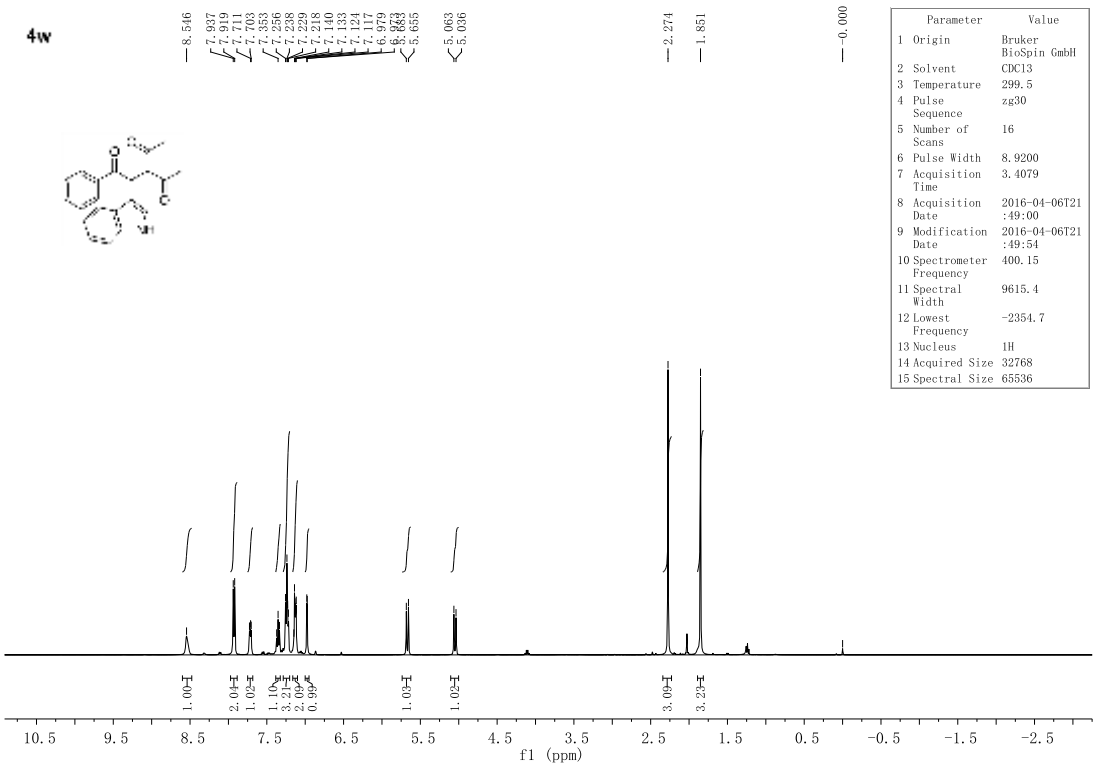
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.9
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-04-20T23:41:00
9	Modification Date	2016-04-20T23:41:12
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

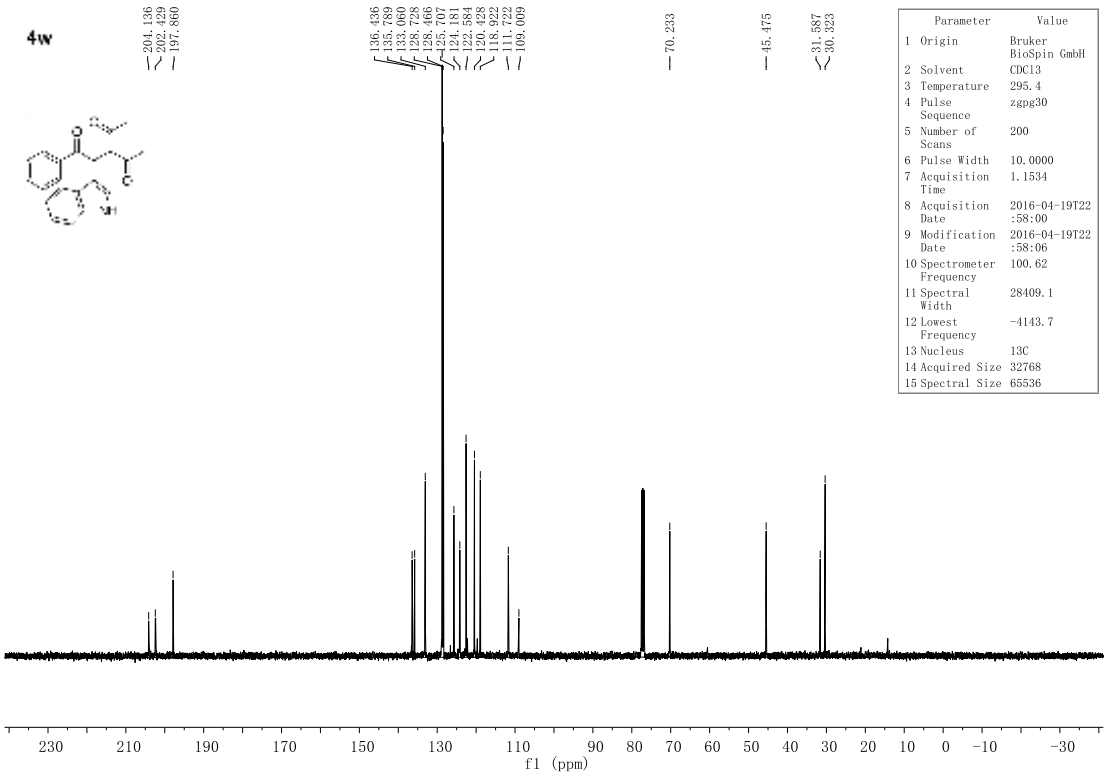


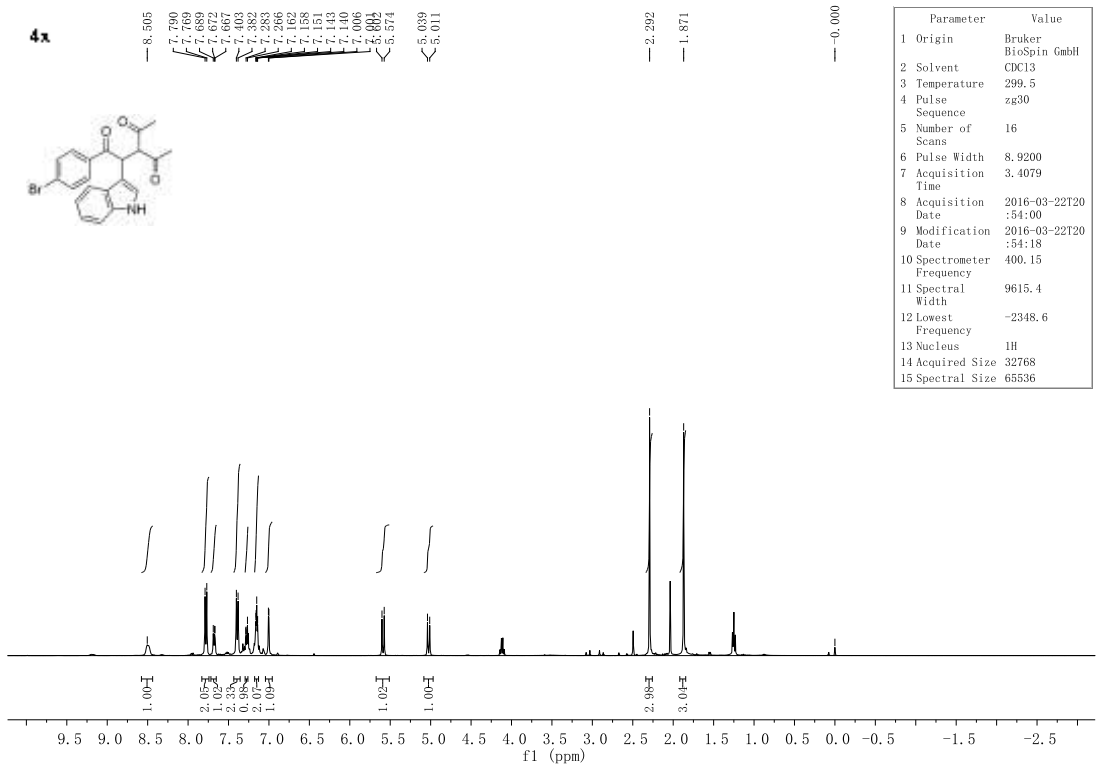
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.1
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-04-19T01:20:00
9	Modification Date	2016-04-19T01:20:23
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2348.0
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



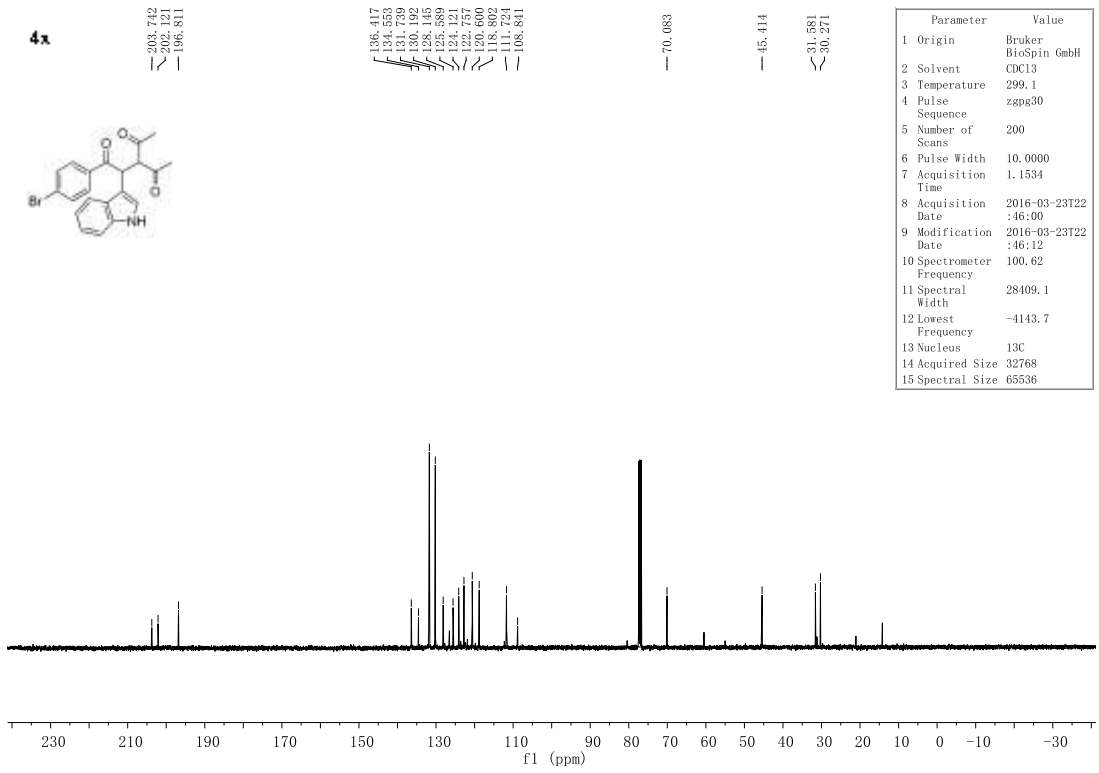
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.6
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-04-27T09:44:00
9	Modification Date	2016-04-27T09:44:43
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536


4w
8.546
7.937
7.919
7.711
7.703
7.353
7.256
7.238
7.229
7.218
7.140
7.133
7.124
7.117
6.979
6.883
6.873
5.655
5.063
5.036
2.274
1.851
-0.000
1.00
2.04
1.02
1.10
3.21
2.09
0.99
1.03
1.02
3.09
3.23
10.5 9.5 8.5 7.5 6.5 5.5 4.5 3.5 2.5 1.5 0.5 -0.5 -1.5 -2.5
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 299.5
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2016-04-06T21:49:00
9 Modification Date 2016-04-06T21:49:54
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2354.7
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536

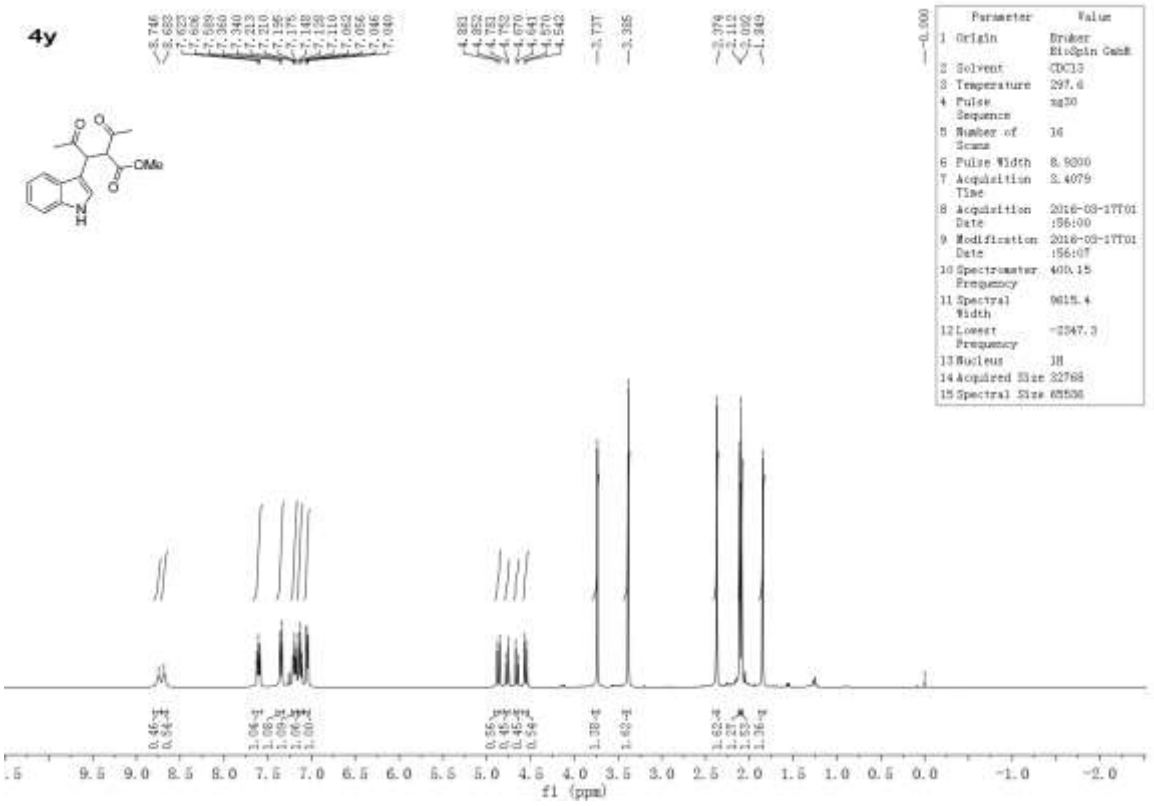

4w
204.136
202.429
197.860
136.436
135.789
133.060
128.728
128.466
125.707
124.181
122.584
120.428
118.922
111.722
109.009
70.233
45.475
31.587
30.323
230 210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10 -30
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.4
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-04-19T22:58:00
9 Modification Date 2016-04-19T22:58:06
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536



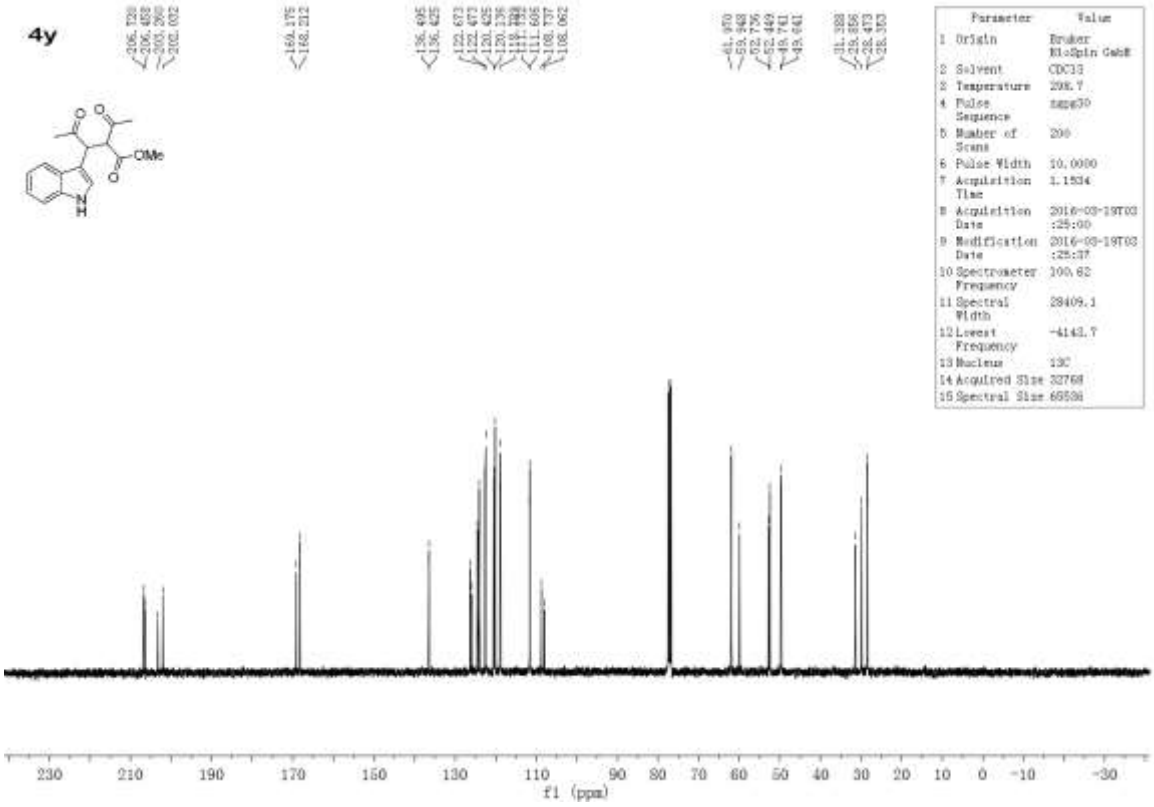
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	299.5
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-03-22T20:54:00
9	Modification Date	2016-03-22T20:54:18
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2348.6
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



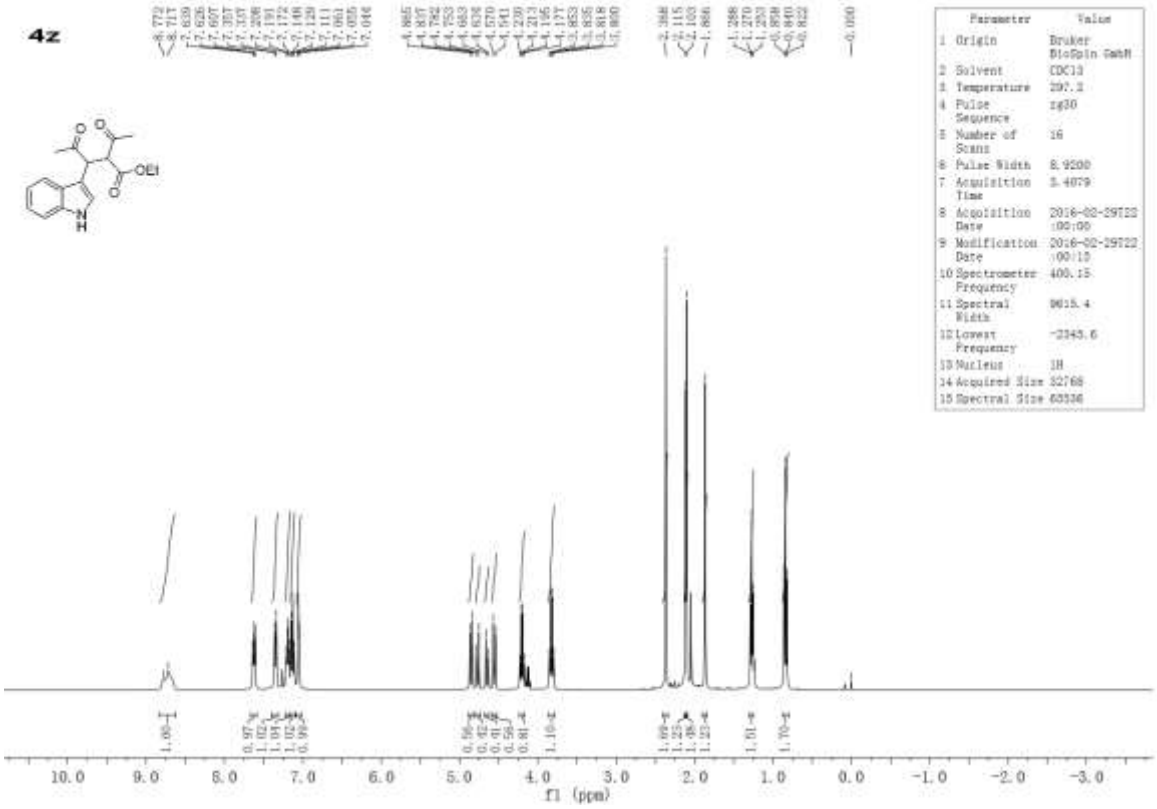
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	299.1
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-03-23T22:46:00
9	Modification Date	2016-03-23T22:46:12
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

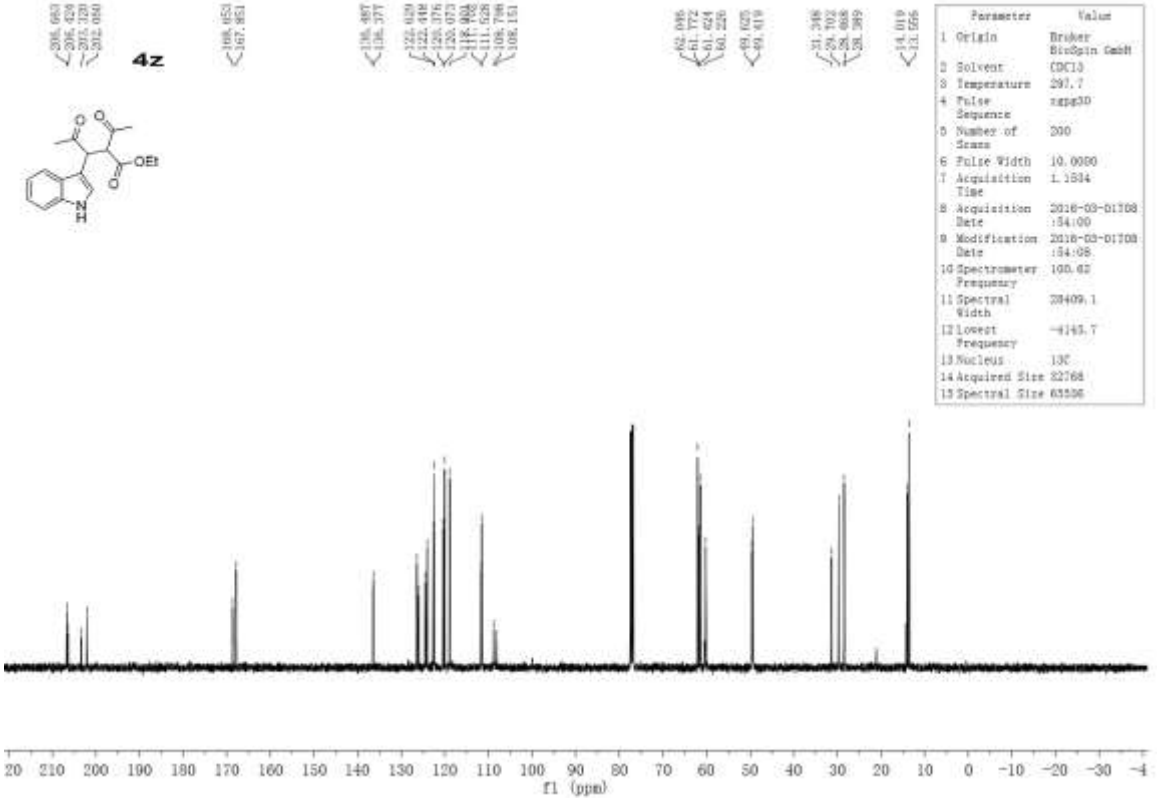


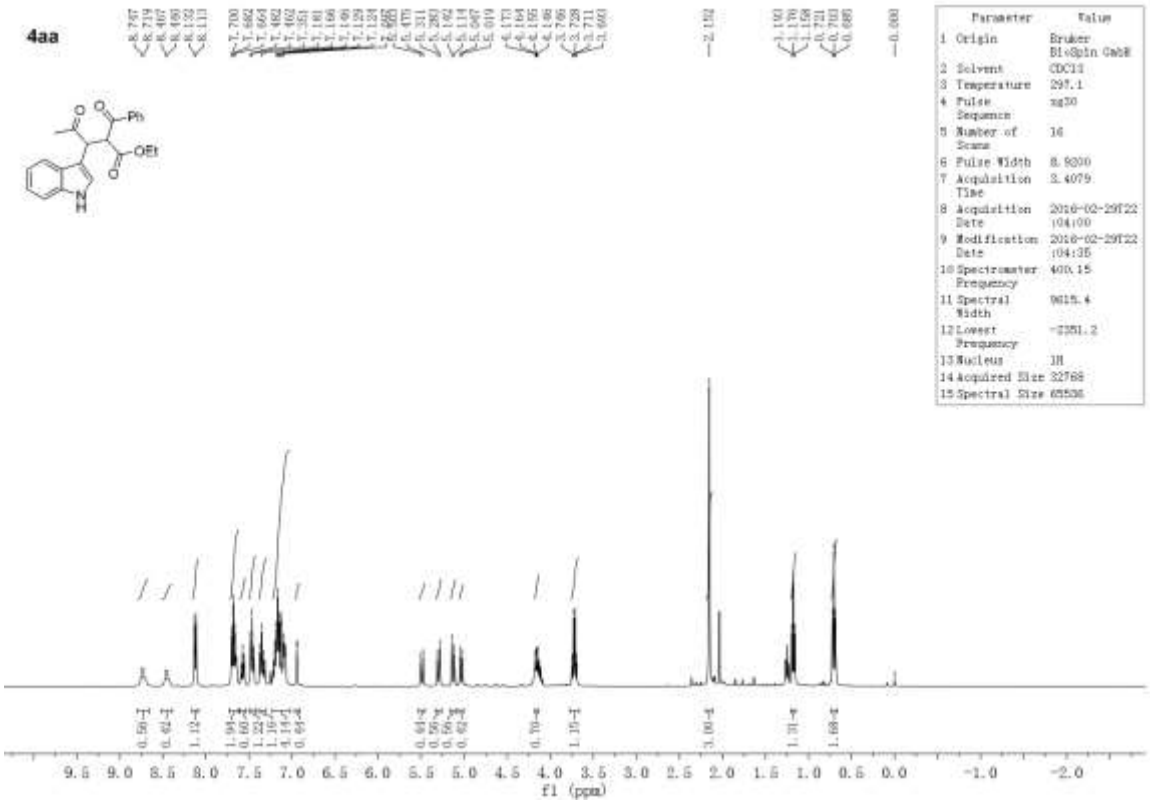
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	297.6
4 Pulse Sequence	zg30
5 Number of Scans	16
6 Pulse Width	8.9200
7 Acquisition Time	3.4079
8 Acquisition Date	2016-09-17T01:56:00
9 Modification Date	2016-09-17T01:56:07
10 Spectrometer Frequency	400.15
11 Spectral Width	9615.4
12 Lowest Frequency	-2347.3
13 Nucleus	1H
14 Acquired Size	32768
15 Spectral Size	65536



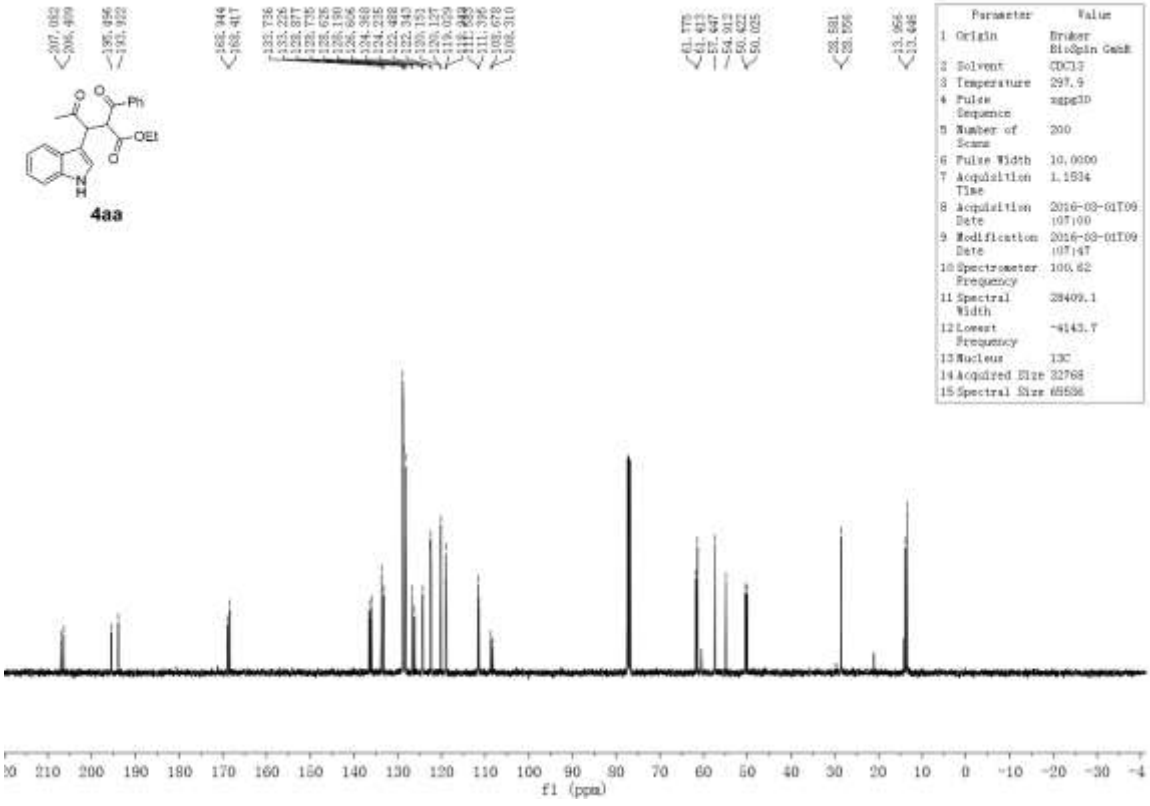
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	298.7
4 Pulse Sequence	zgpg30
5 Number of Scans	290
6 Pulse Width	10.0000
7 Acquisition Time	1.1534
8 Acquisition Date	2016-09-19T03:25:00
9 Modification Date	2016-09-19T03:25:37
10 Spectrometer Frequency	100.62
11 Spectral Width	28409.1
12 Lowest Frequency	-4143.7
13 Nucleus	13C
14 Acquired Size	32768
15 Spectral Size	65536


4z
OEt
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.2
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 5.4079
8 Acquisition Date 2016-02-29T22 :00:00
9 Modification Date 2016-02-29T22 :00:13
10 Spectrometer Frequency 400.15
11 Spectral Width 6615.4
12 Lowest Frequency -2345.6
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

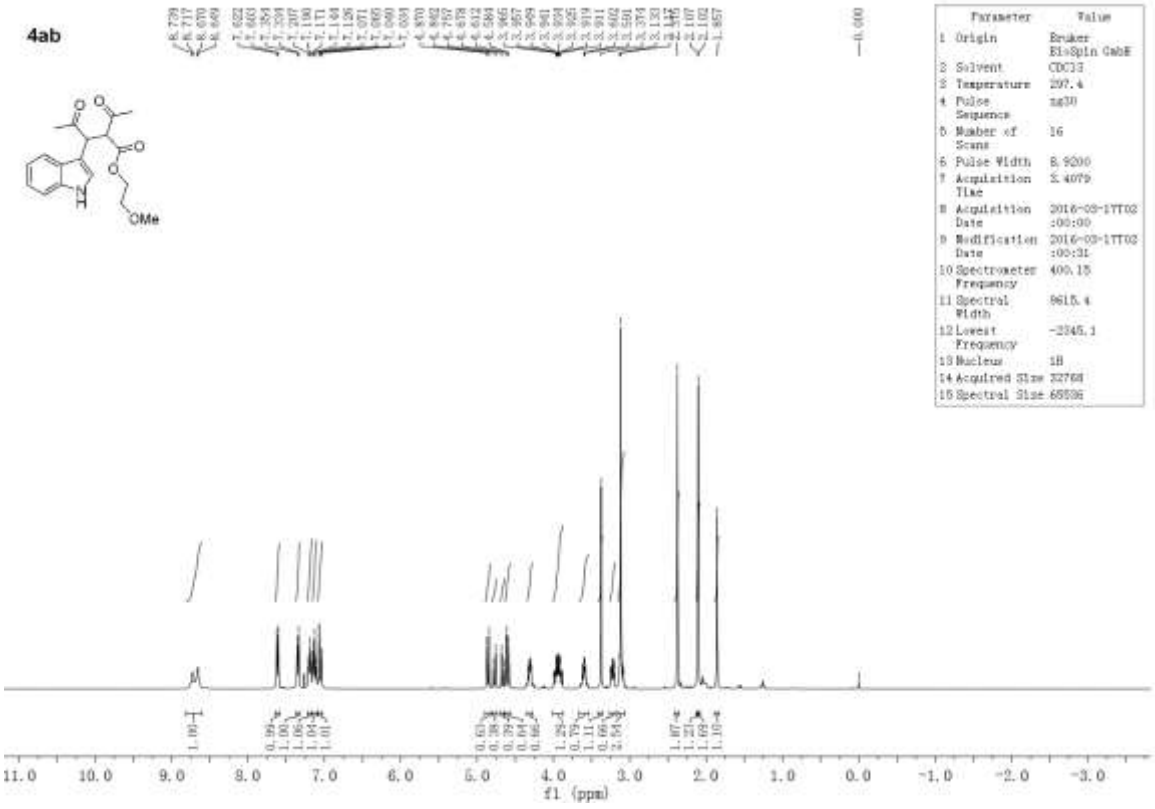

4z
OEt
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.7
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-03-01T08 :54:00
9 Modification Date 2016-03-01T08 :54:08
10 Spectrometer Frequency 100.62
11 Spectral Width 23409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

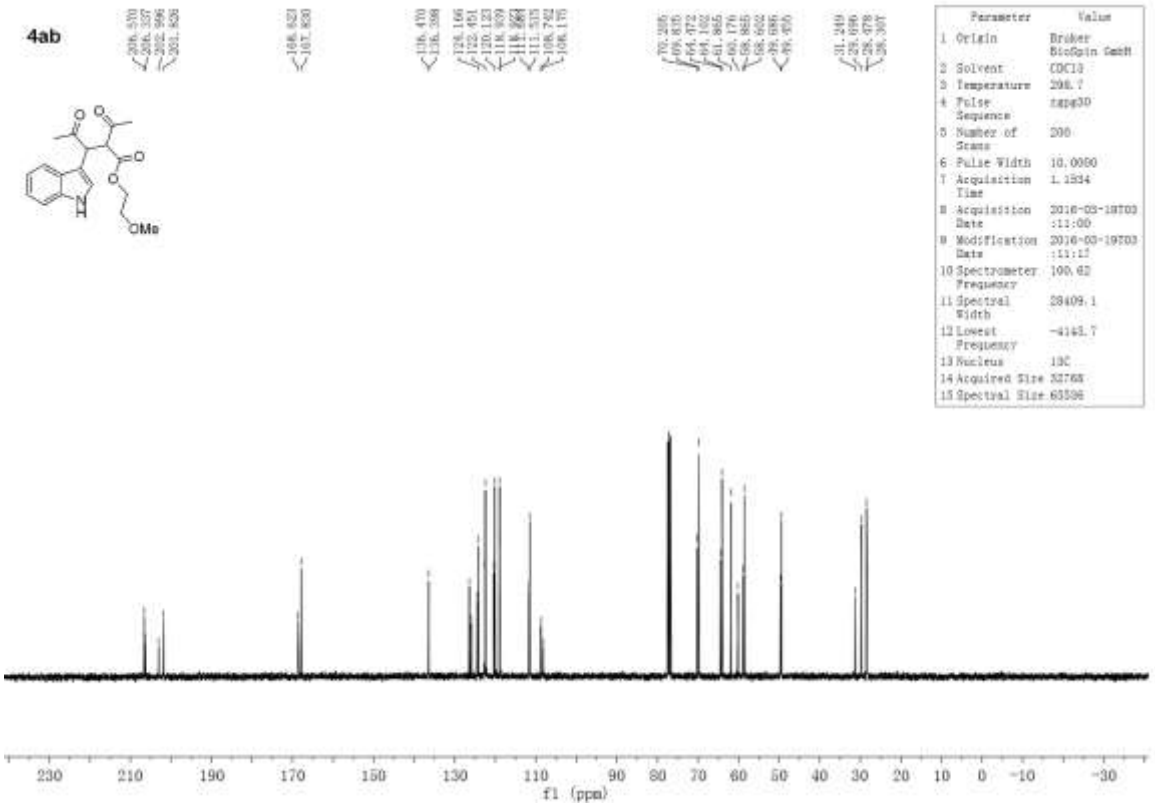


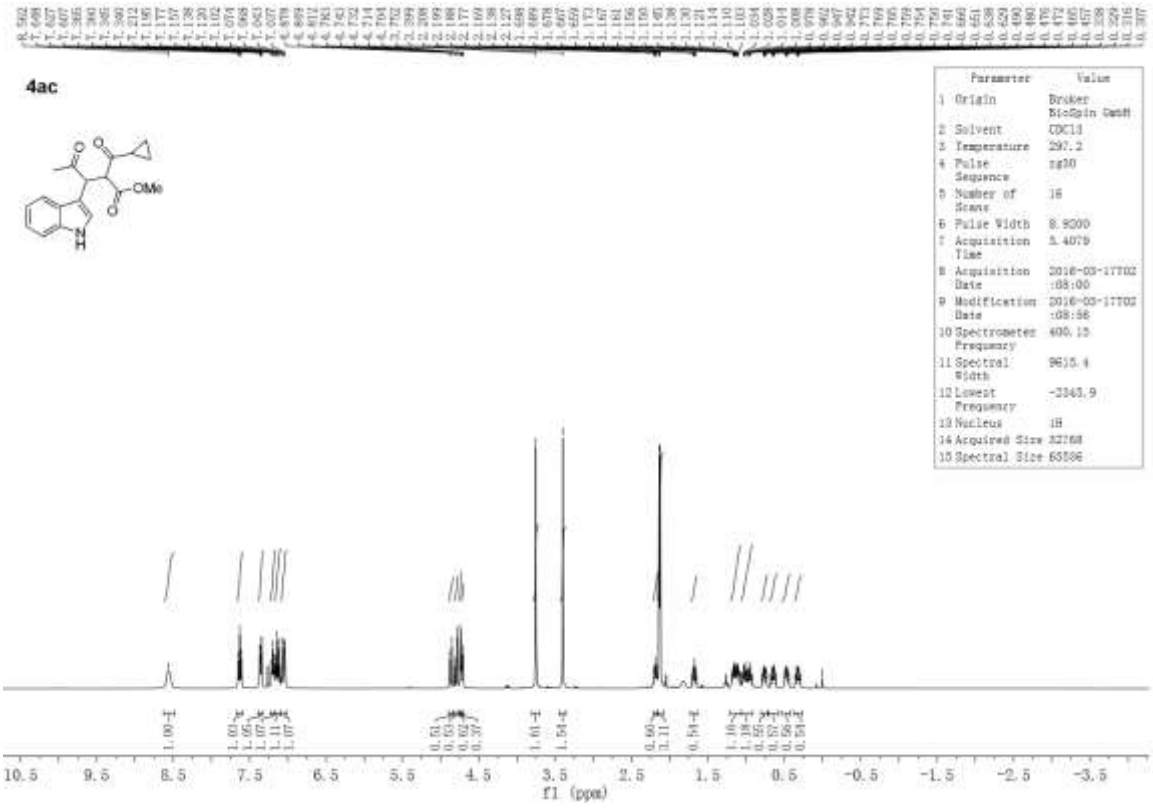
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	297.1
4 Pulse Sequence	zg30
5 Number of Scans	16
6 Pulse Width	8.9200
7 Acquisition Time	3.4079
8 Acquisition Date	2016-02-29T22:04:00
9 Modification Date	2016-02-29T22:04:35
10 Spectrometer Frequency	400.15
11 Spectral Width	9615.4
12 Lowest Frequency	-2351.2
13 Nucleus	1H
14 Acquired Size	32768
15 Spectral Size	65536

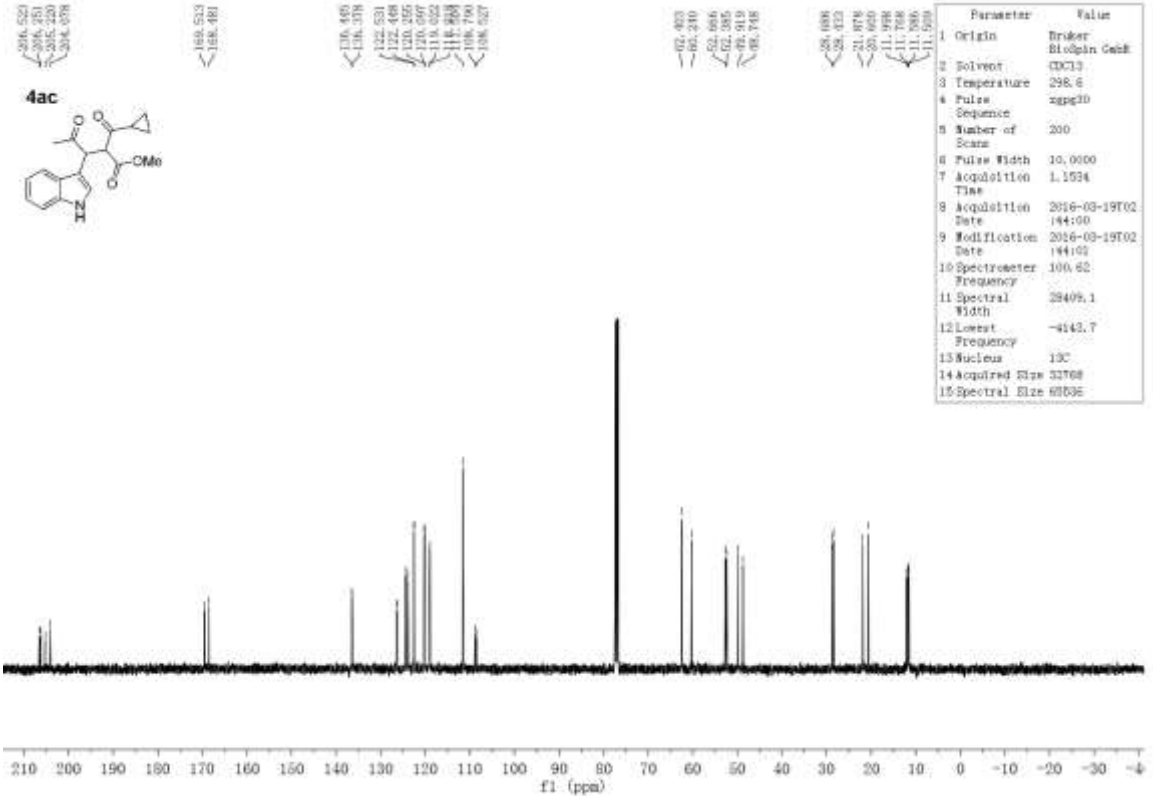


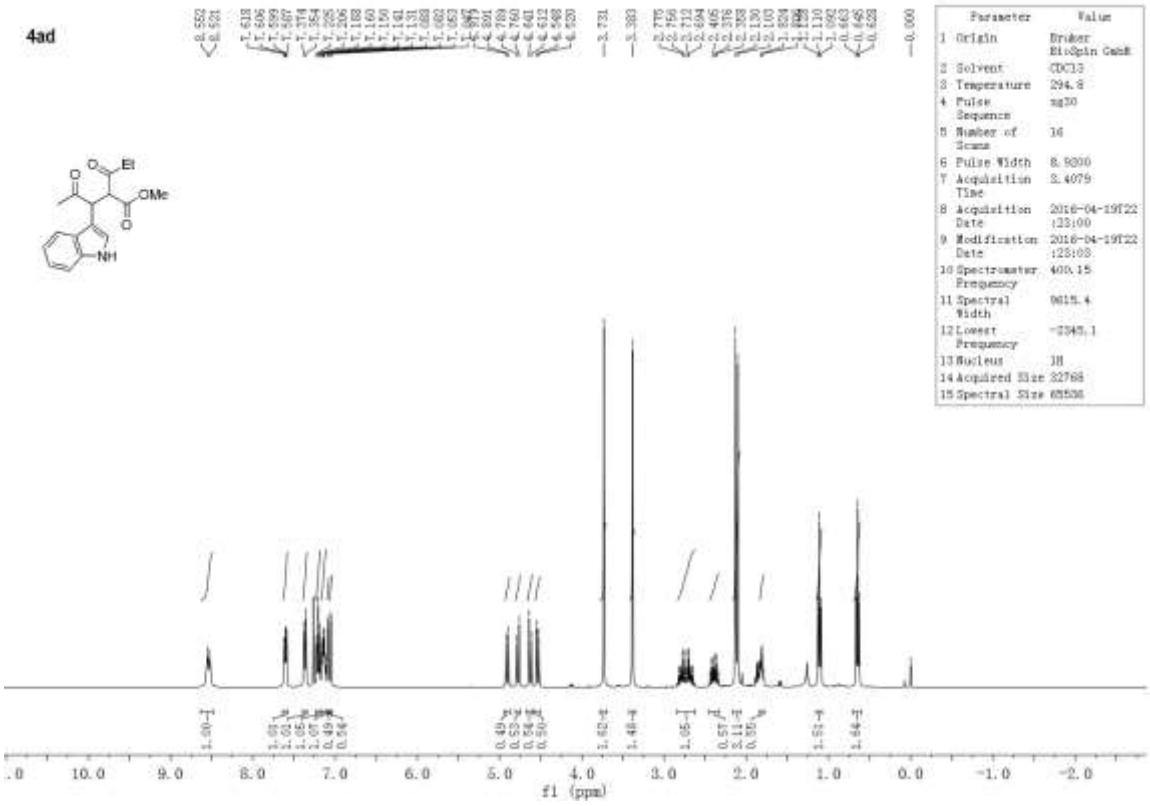
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	297.9
4 Pulse Sequence	zgpg30
5 Number of Scans	200
6 Pulse Width	10.0000
7 Acquisition Time	1.1534
8 Acquisition Date	2016-03-01T09:07:00
9 Modification Date	2016-03-01T09:07:47
10 Spectrometer Frequency	100.62
11 Spectral Width	28409.1
12 Lowest Frequency	-4143.7
13 Nucleus	13C
14 Acquired Size	32768
15 Spectral Size	65536


4ab
OMe
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.4
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 5.4079
8 Acquisition Date 2016-03-17T02:00:00
9 Modification Date 2016-03-17T02:00:31
10 Spectrometer Frequency 400.15
11 Spectral Width 8615.4
12 Lowest Frequency -2345.1
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

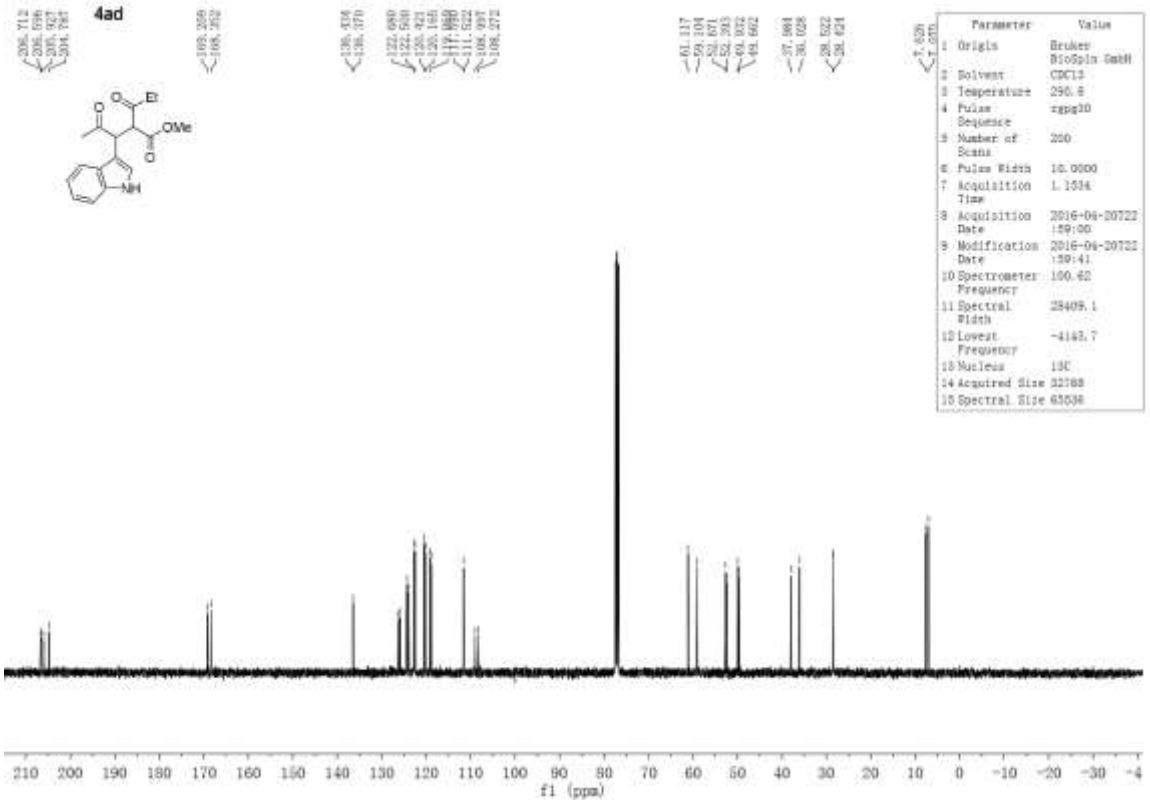

4ab
OMe
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 298.7
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-03-19T03:11:00
9 Modification Date 2016-03-19T03:11:17
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4141.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)


4ac
OMe
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.2
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 5.4079
8 Acquisition Date 2016-03-17T02:08:00
9 Modification Date 2016-03-17T02:08:56
10 Spectrometer Frequency 400.13
11 Spectral Width 9615.4
12 Lowest Frequency -2343.9
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

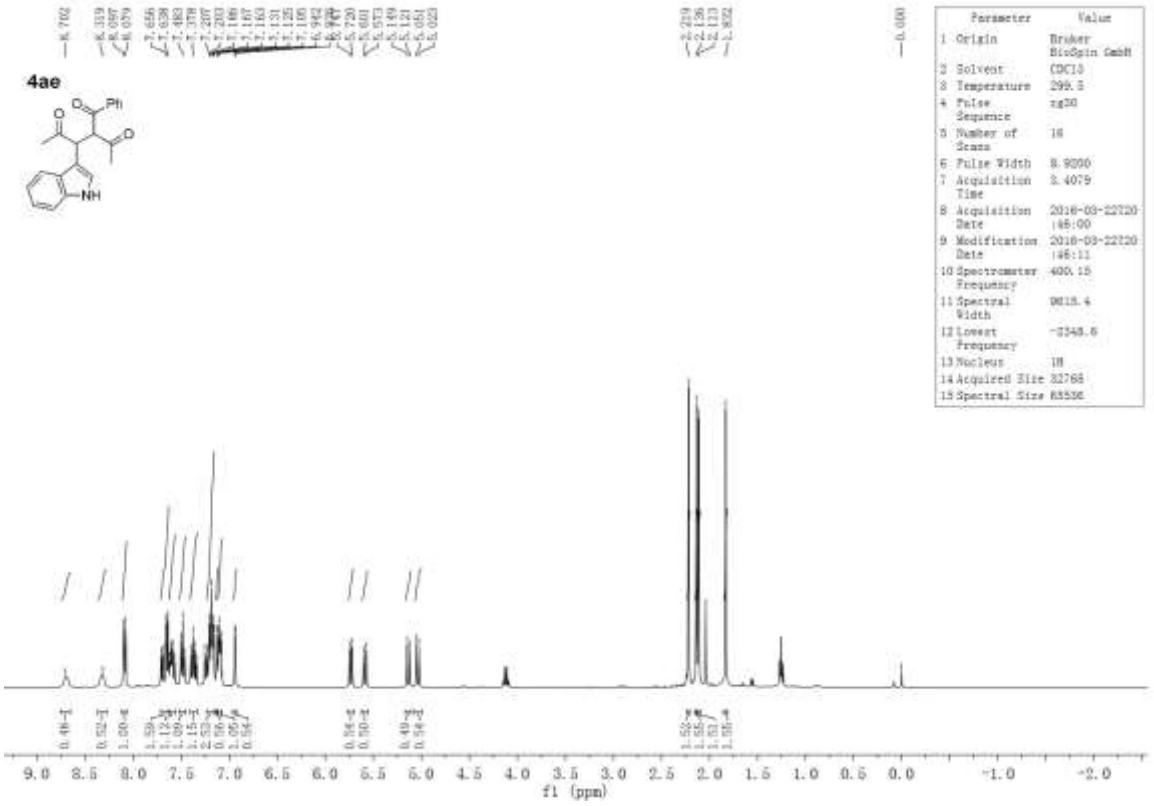

4ac
OMe
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 298.6
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-03-19T02:44:00
9 Modification Date 2016-03-19T02:44:01
10 Spectrometer Frequency 100.62
11 Spectral Width 29409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)



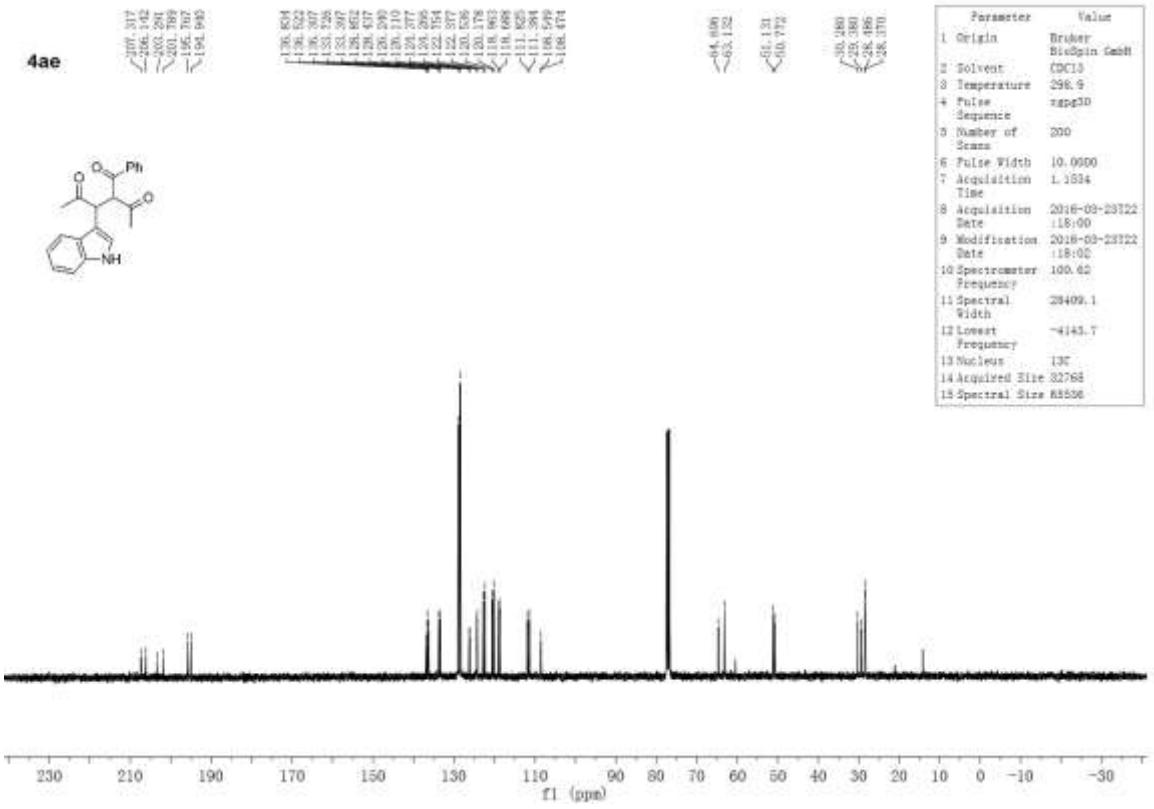
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	294.8
4 Pulse Sequence	zg30
5 Number of Scans	16
6 Pulse Width	8.9200
7 Acquisition Time	3.4079
8 Acquisition Date	2016-04-19T22 :23:00
9 Modification Date	2016-04-19T22 :23:03
10 Spectrometer Frequency	400.15
11 Spectral Width	9615.4
12 Lowest Frequency	-2345.1
13 Nucleus	1H
14 Acquired Size	32768
15 Spectral Size	65536



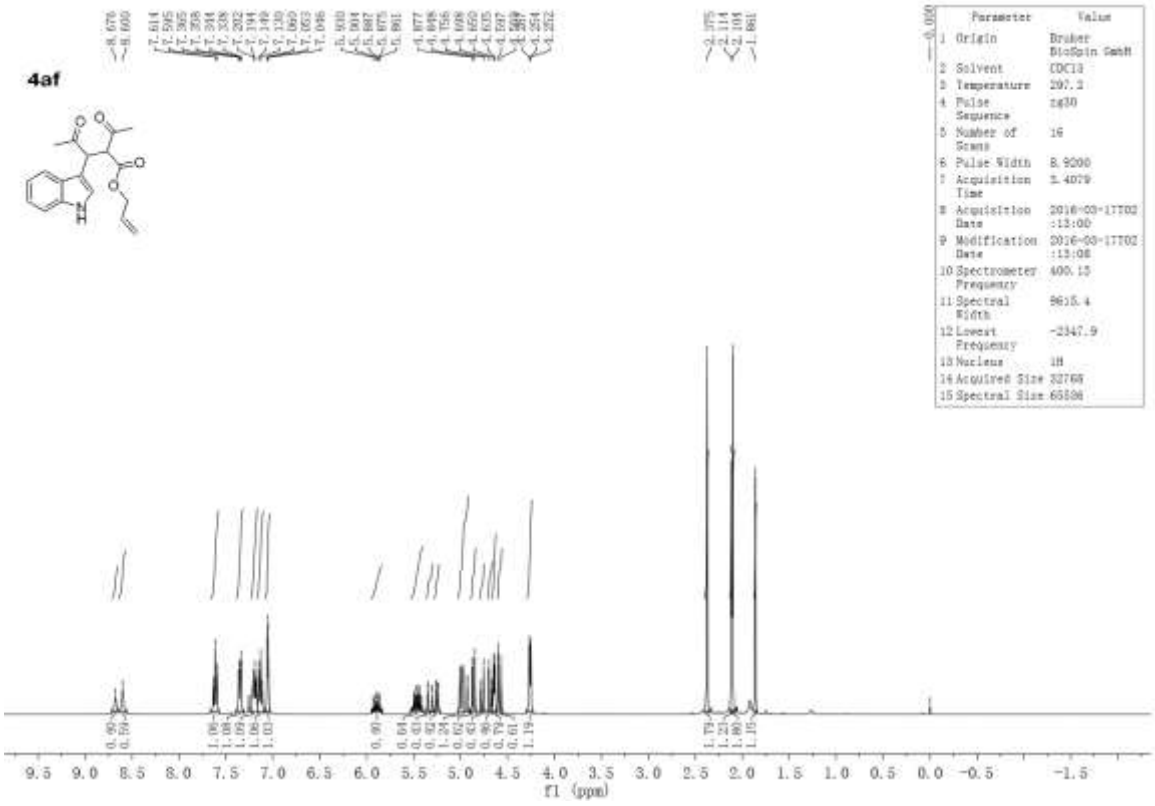
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	298.8
4 Pulse Sequence	zgpg30
5 Number of Scans	200
6 Pulse Width	10.0000
7 Acquisition Time	1.1534
8 Acquisition Date	2016-04-20T22 :59:00
9 Modification Date	2016-04-20T22 :59:41
10 Spectrometer Frequency	100.62
11 Spectral Width	25409.1
12 Lowest Frequency	-4143.7
13 Nucleus	13C
14 Acquired Size	32768
15 Spectral Size	65536

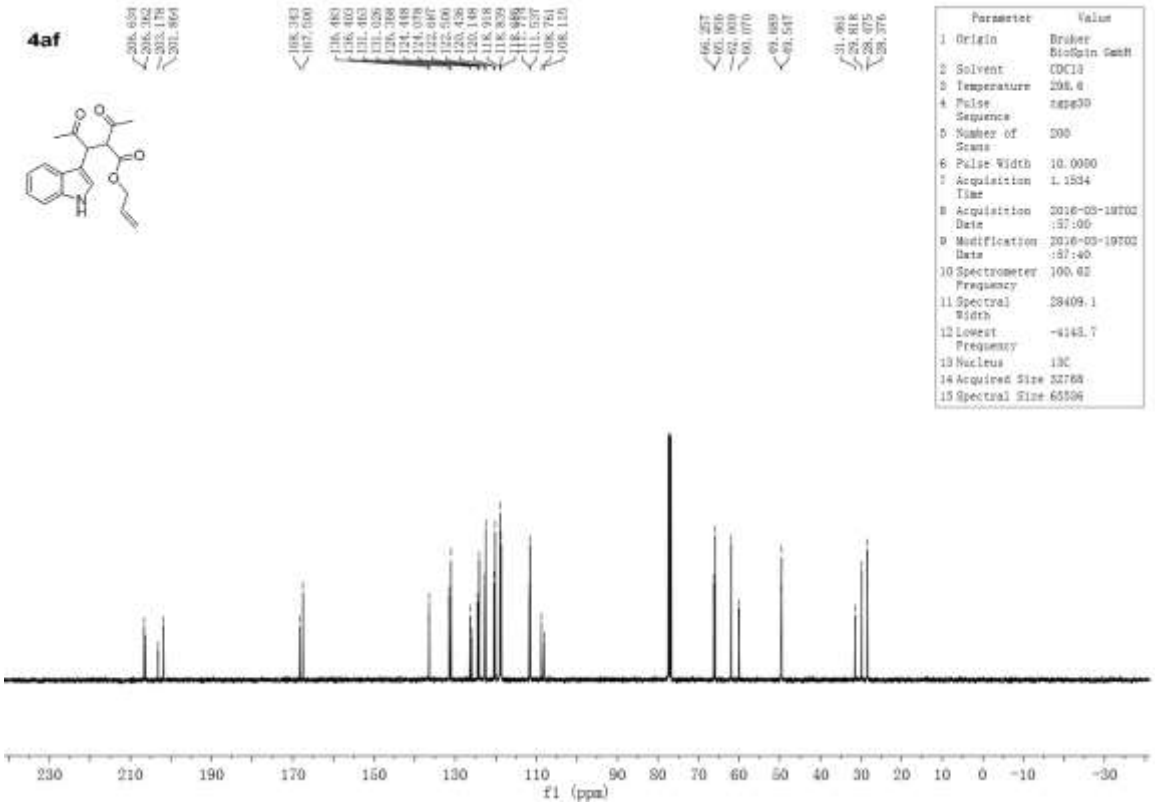


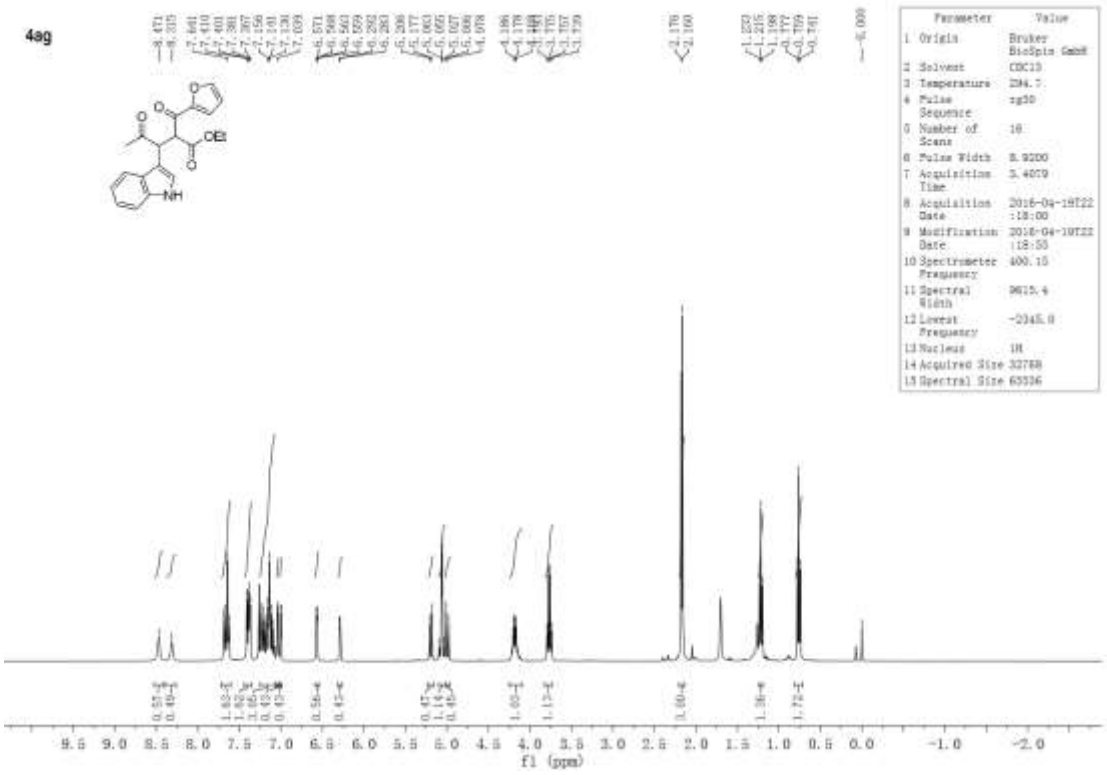
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	298.5
4 Pulse Sequence	zg30
5 Number of Scans	16
6 Pulse Width	8.9200
7 Acquisition Time	3.4079
8 Acquisition Date	2018-09-22T20:46:00
9 Modification Date	2018-09-22T20:46:11
10 Spectrometer Frequency	400.15
11 Spectral Width	8818.4
12 Lowest Frequency	-2348.6
13 Nucleus	1H
14 Acquired Size	32768
15 Spectral Size	65536



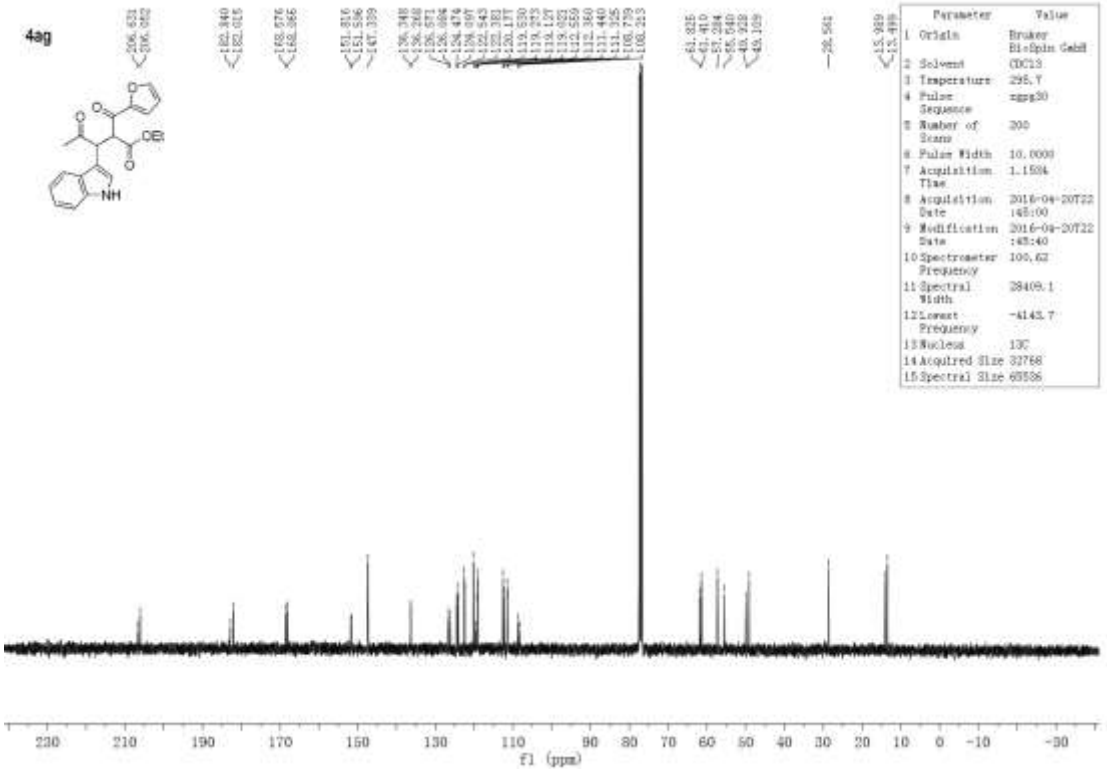
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	298.9
4 Pulse Sequence	zgpg30
5 Number of Scans	200
6 Pulse Width	10.0000
7 Acquisition Time	1.1534
8 Acquisition Date	2018-09-23T22:18:00
9 Modification Date	2018-09-23T22:18:02
10 Spectrometer Frequency	100.62
11 Spectral Width	28409.1
12 Lowest Frequency	-4143.7
13 Nucleus	13C
14 Acquired Size	32768
15 Spectral Size	65536


4af
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 297.2
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 5.4079
8 Acquisition Date 2016-03-17T02:13:00
9 Modification Date 2016-03-17T02:13:08
10 Spectrometer Frequency 400.13
11 Spectral Width 9615.4
12 Lowest Frequency -2347.9
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

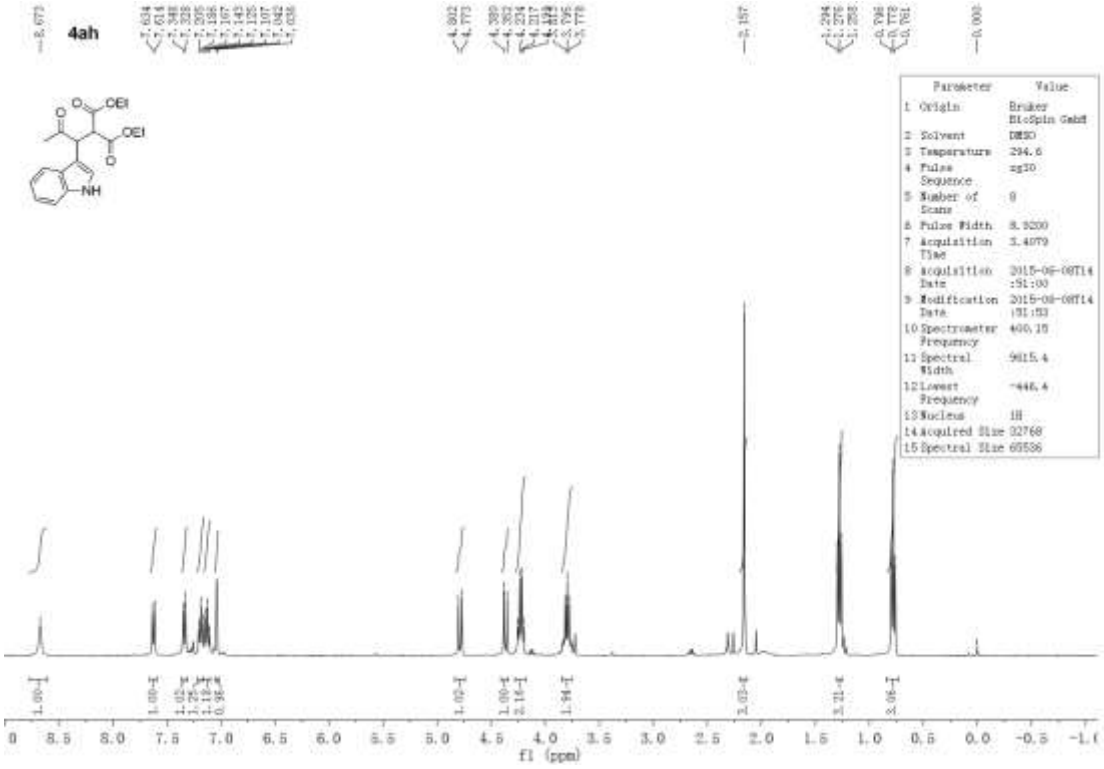

4af
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 298.6
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-03-19T02:57:00
9 Modification Date 2016-03-19T02:57:40
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4148.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

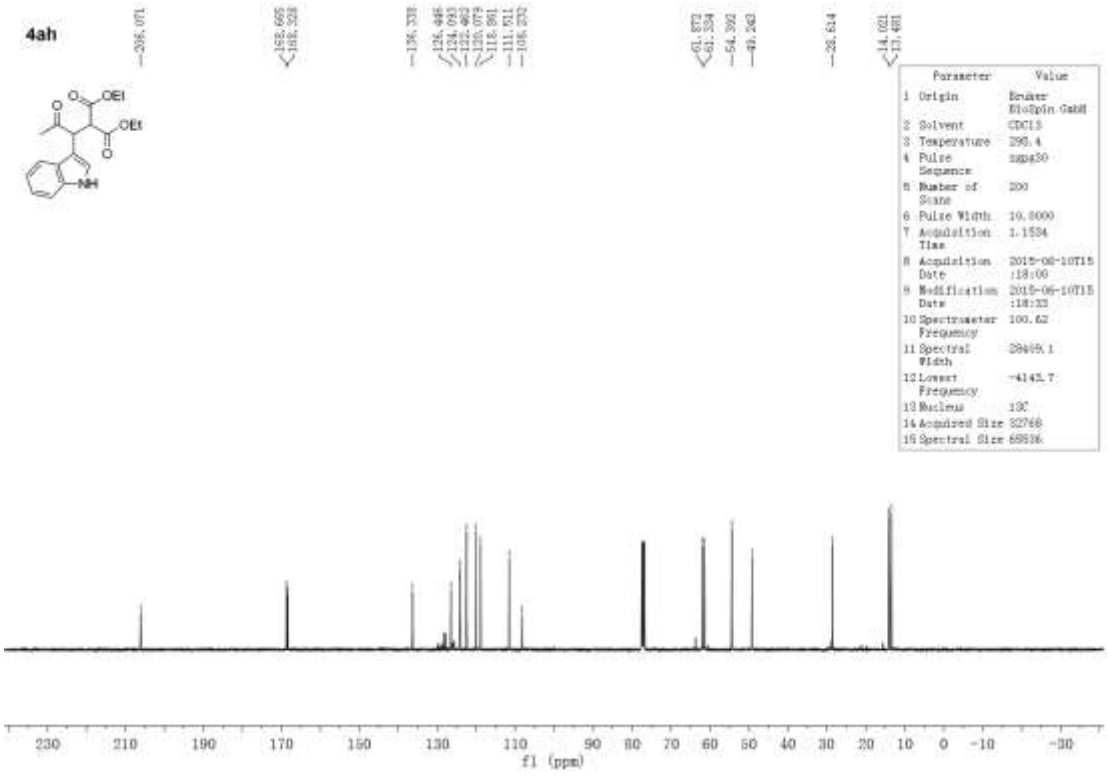


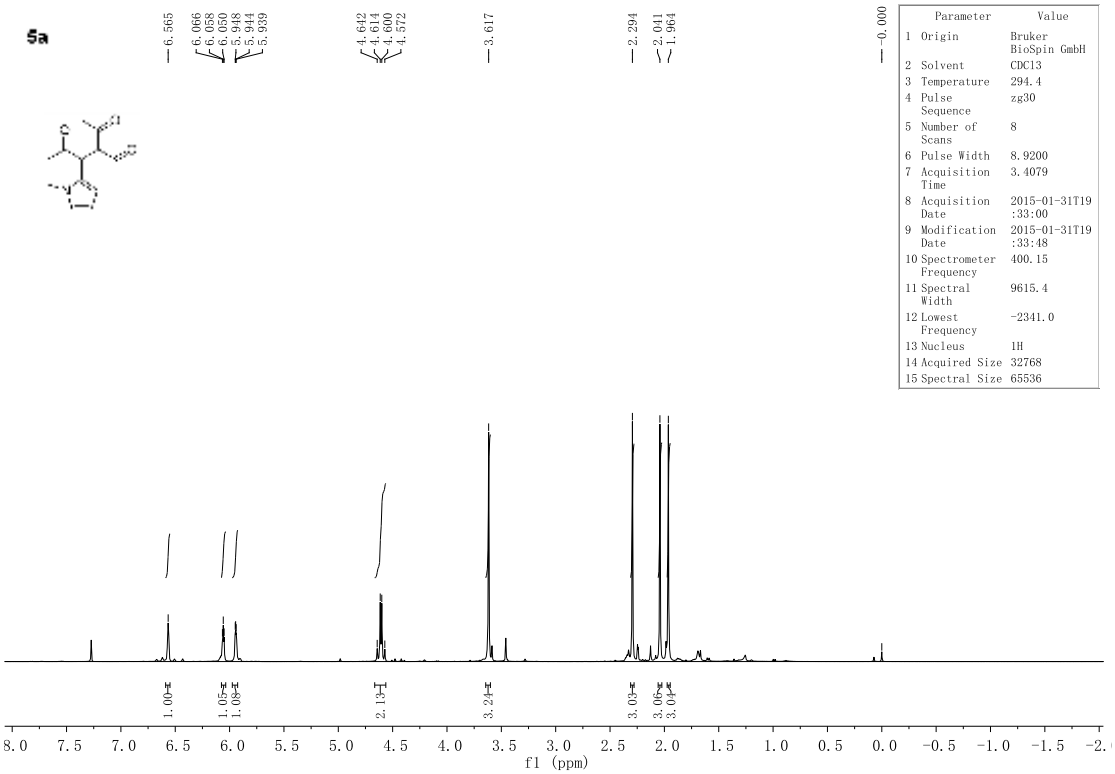
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	294.7
4 Pulse Sequence	zg30
5 Number of Scans	16
6 Pulse Width	8.9200
7 Acquisition Time	3.4079
8 Acquisition Date	2016-04-19T22 :18:00
9 Modification Date	2016-04-19T22 :18:55
10 Spectrometer Frequency	400.15
11 Spectral Width	9615.4
12 Lowest Frequency	-2345.0
13 Nucleus	1H
14 Acquired Size	32768
15 Spectral Size	65536



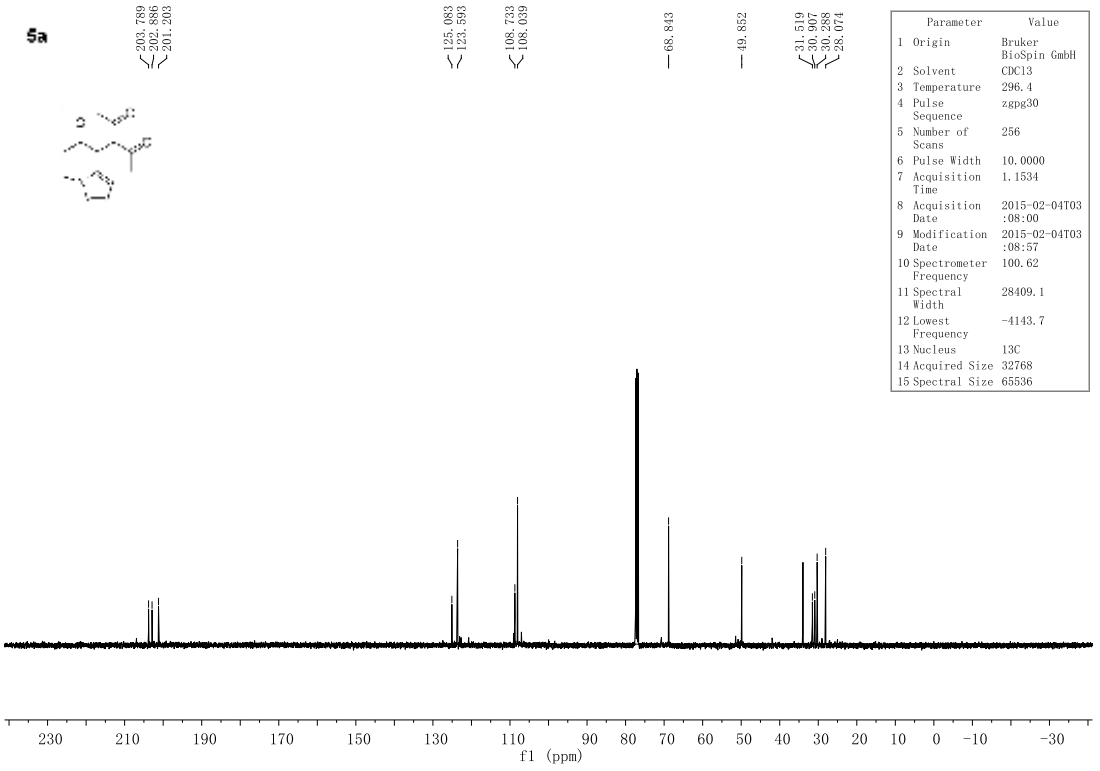
Parameter	Value
1 Origin	Bruker BioSpin GmbH
2 Solvent	CDCl3
3 Temperature	295.7
4 Pulse Sequence	zgpg30
5 Number of Scans	200
6 Pulse Width	10.0000
7 Acquisition Time	1.1534
8 Acquisition Date	2016-04-20T22 :45:00
9 Modification Date	2016-04-20T22 :45:40
10 Spectrometer Frequency	100.62
11 Spectral Width	28409.1
12 Lowest Frequency	-4143.7
13 Nucleus	13C
14 Acquired Size	32768
15 Spectral Size	65536


4ah
OEt
OEt
O
O
NH
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent DMSO
3 Temperature 294.6
4 Pulse Sequence zg30
5 Number of Scans 8
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2015-06-08T14:51:00
9 Modification Date 2015-06-08T14:51:53
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -446.4
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

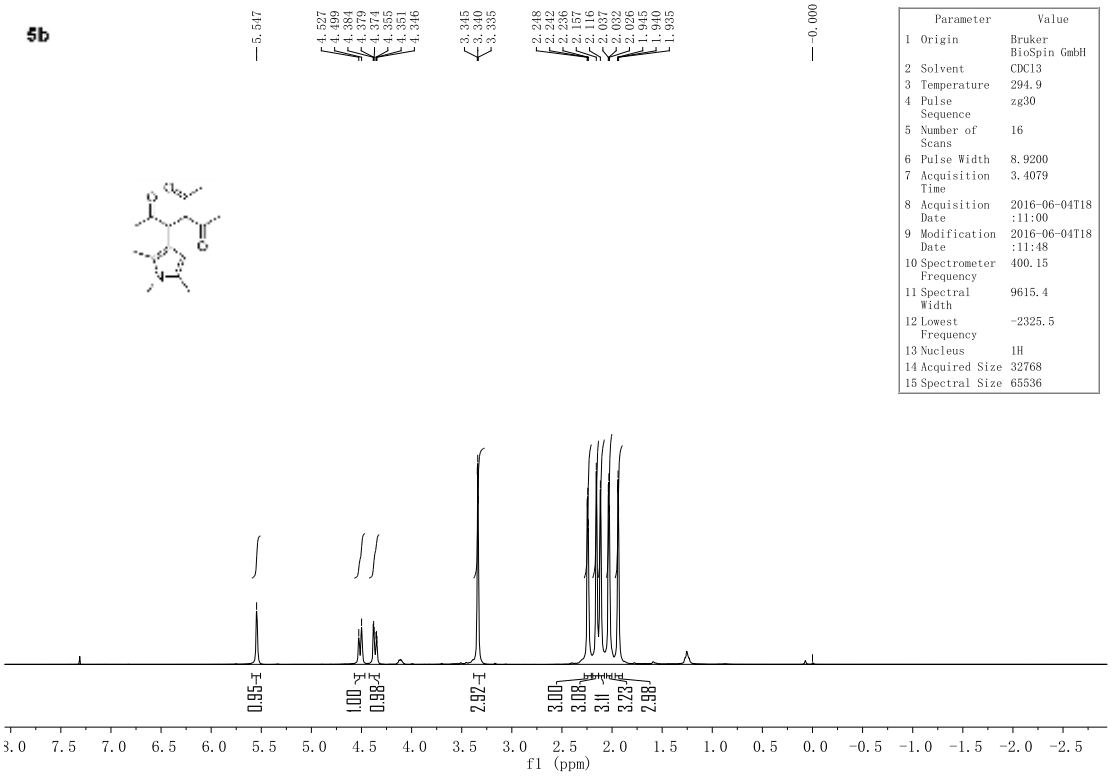

4ah
OEt
OEt
O
O
NH
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 298.4
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2015-06-10T15:18:00
9 Modification Date 2015-06-10T15:18:33
10 Spectrometer Frequency 100.62
11 Spectral Width 29409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)



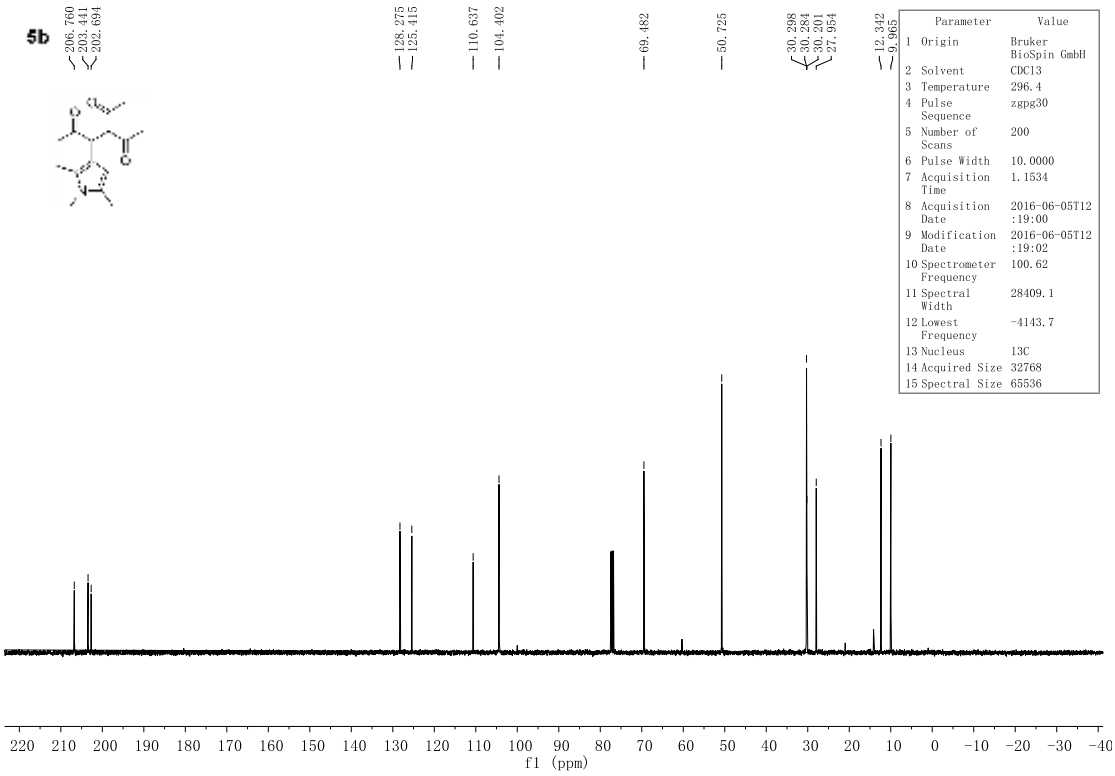
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.4
4	Pulse Sequence	zg30
5	Number of Scans	8
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-01-31T19:33:00
9	Modification Date	2015-01-31T19:33:48
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2341.0
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.4
4	Pulse Sequence	zgpg30
5	Number of Scans	256
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-02-04T03:08:00
9	Modification Date	2015-02-04T03:08:57
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

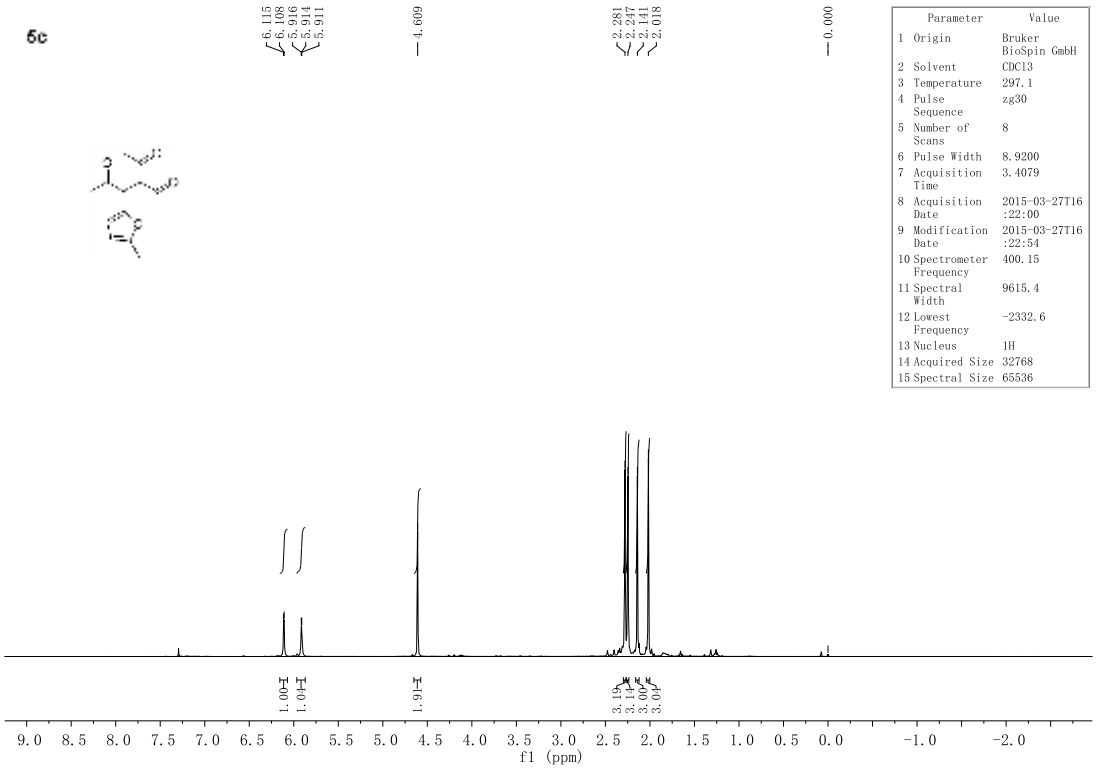


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.9
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-06-04T18:11:00
9	Modification Date	2016-06-04T18:11:48
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2325.5
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



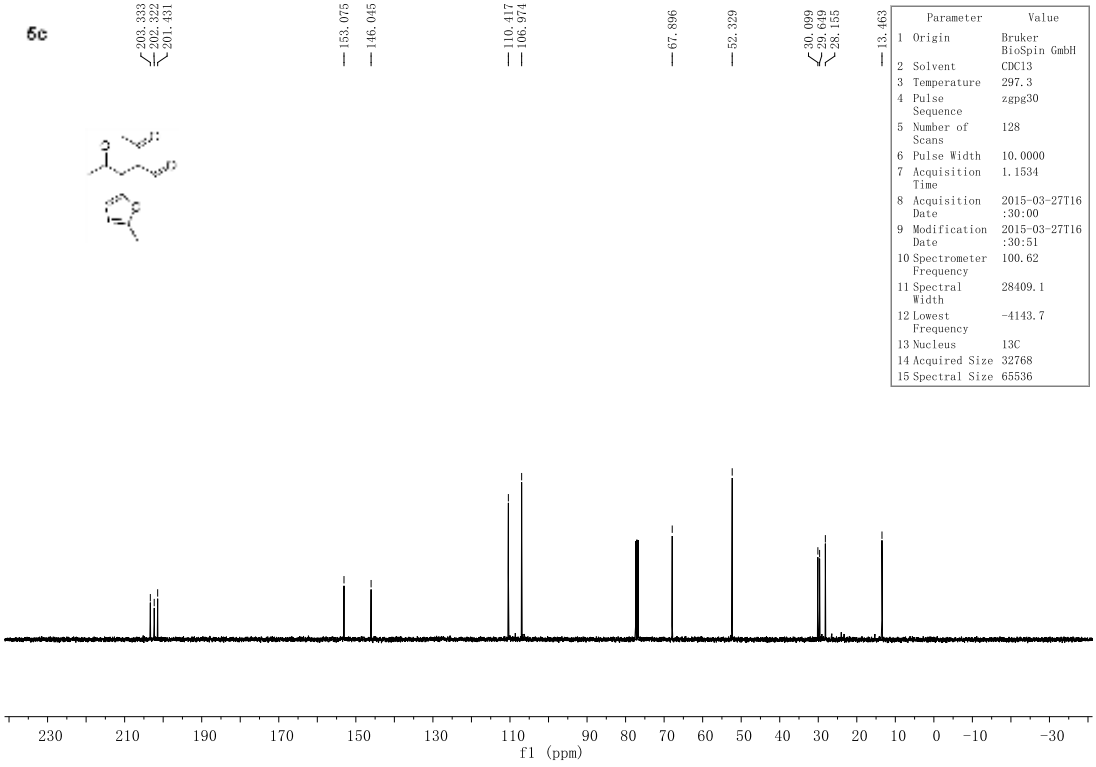
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.4
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-06-05T12:19:00
9	Modification Date	2016-06-05T12:19:02
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

6c

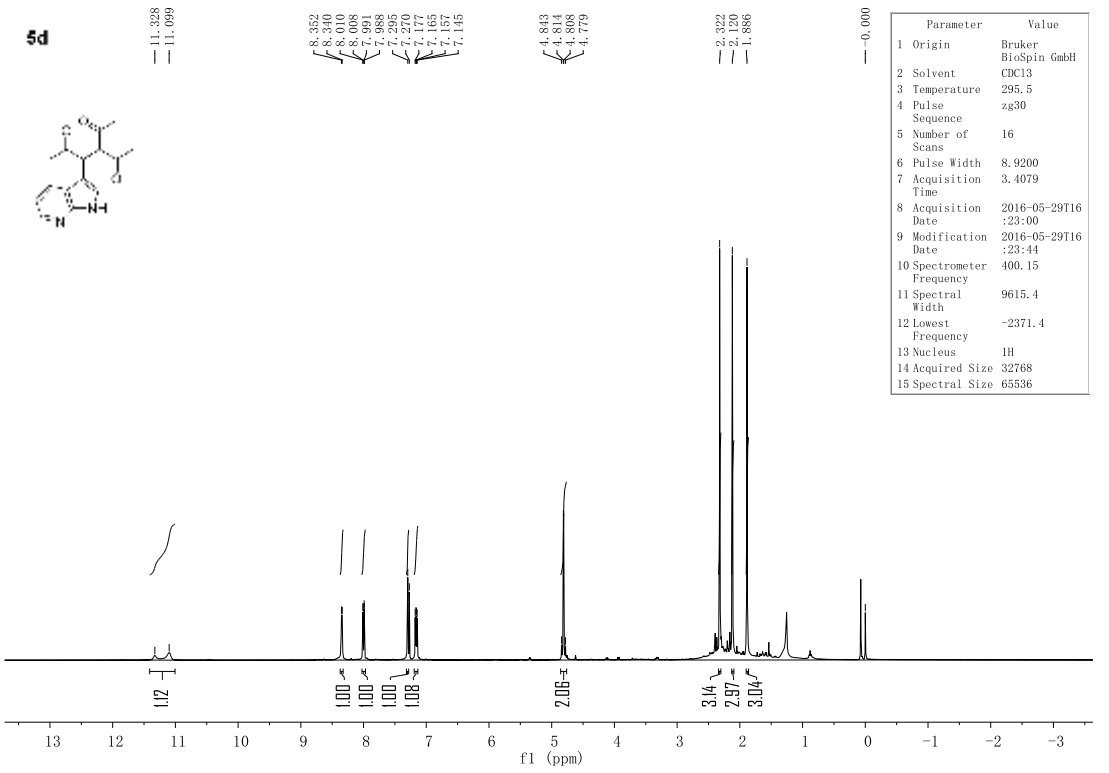


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.1
4	Pulse Sequence	zg30
5	Number of Scans	8
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-03-27T16:22:00
9	Modification Date	2015-03-27T16:22:54
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2332.6
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

6c



	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.3
4	Pulse Sequence	zgpg30
5	Number of Scans	128
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-03-27T16:30:00
9	Modification Date	2015-03-27T16:30:51
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536


5d
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8.352
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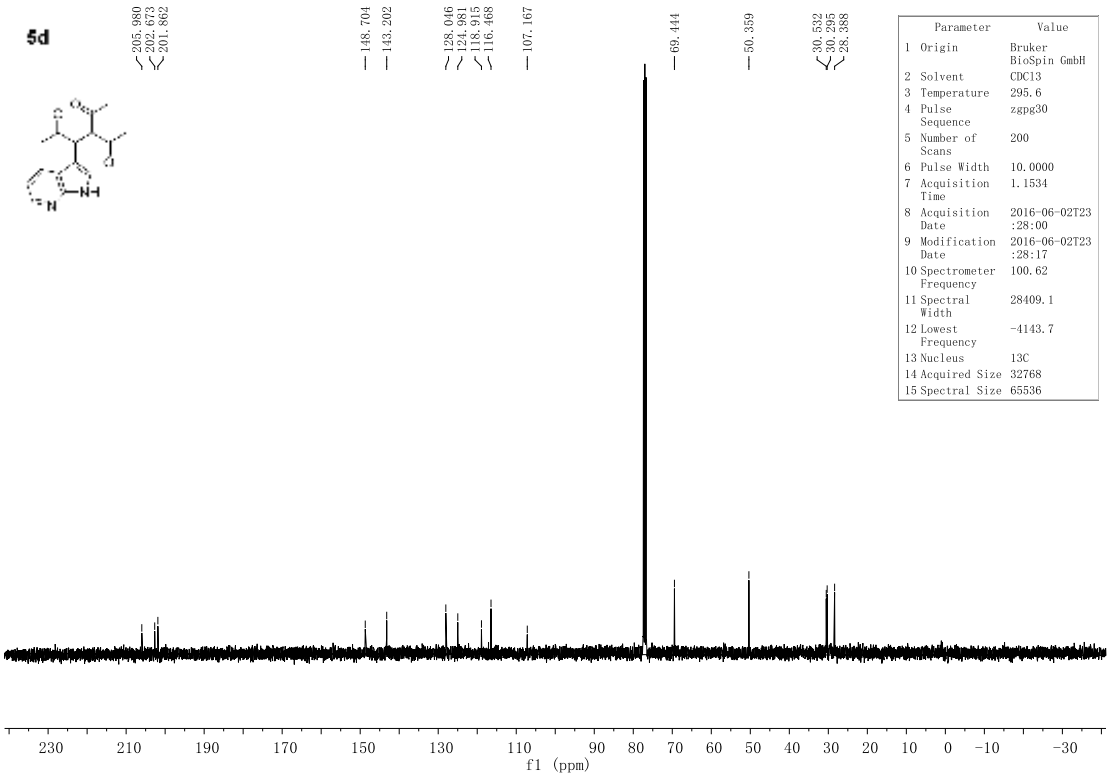
8.010
8.008
7.991
7.988
7.295
7.270
7.177
7.165
7.157
7.145
4.843
4.814
4.808
4.779
2.322
2.120
1.886
-0.000
1.12
1.00
1.00
1.00
1.08
2.06
3.14
2.97
3.04
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.5
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2016-05-29T16:23:00
9 Modification Date 2016-05-29T16:23:44
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2371.4
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536


5d
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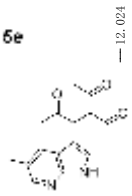
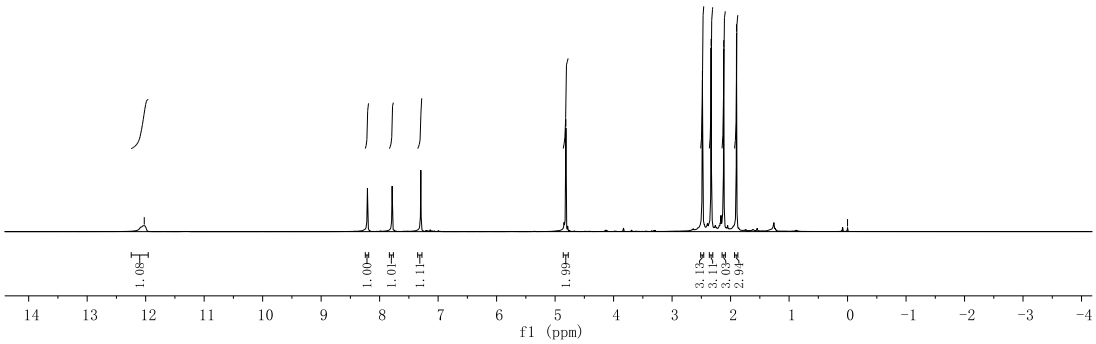
201.862
148.704
143.202
128.046
124.981
118.915
116.468
107.167
69.444
50.359
30.532
30.295
28.388
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.6
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2016-06-02T23:28:00
9 Modification Date 2016-06-02T23:28:17
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536

6e



12.024 4.816 2.481 2.333 2.117 1.899 0.000

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.5
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-04-22T22:09:00
9	Modification Date	2015-04-22T22:09:17
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2332.9
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



6e

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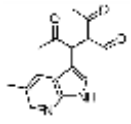
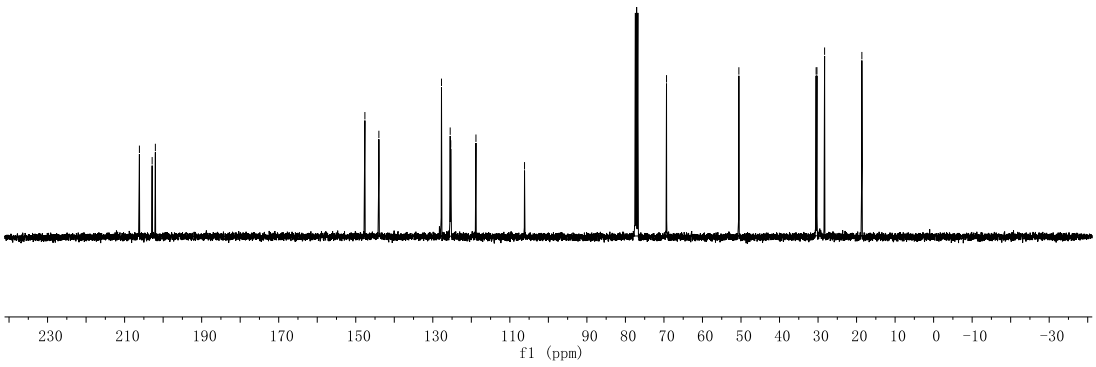
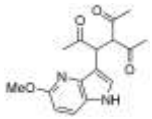


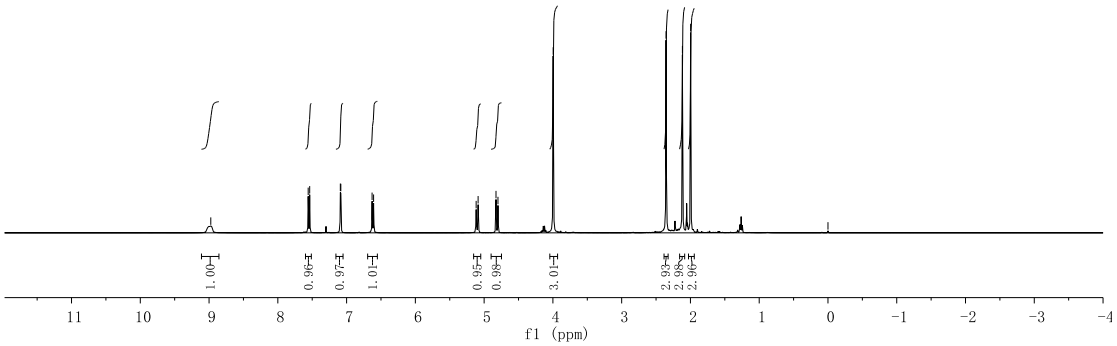
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.0
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-04-22T22:21:00
9	Modification Date	2015-04-22T22:21:05
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536



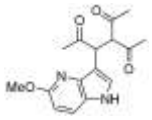
5f



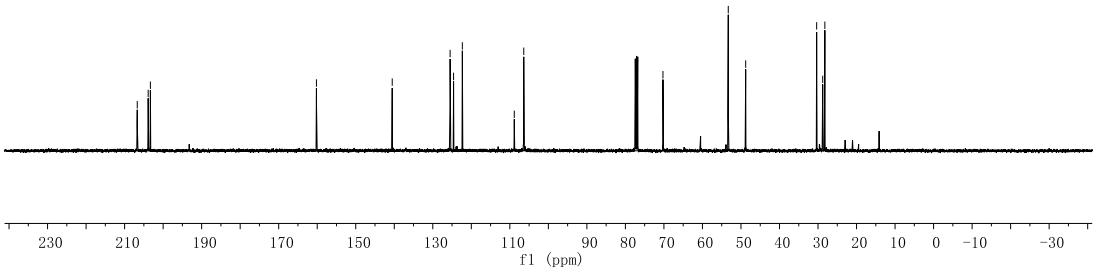
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.7
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-03-23T22:50:00
9	Modification Date	2016-03-23T22:50:25
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2330.5
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

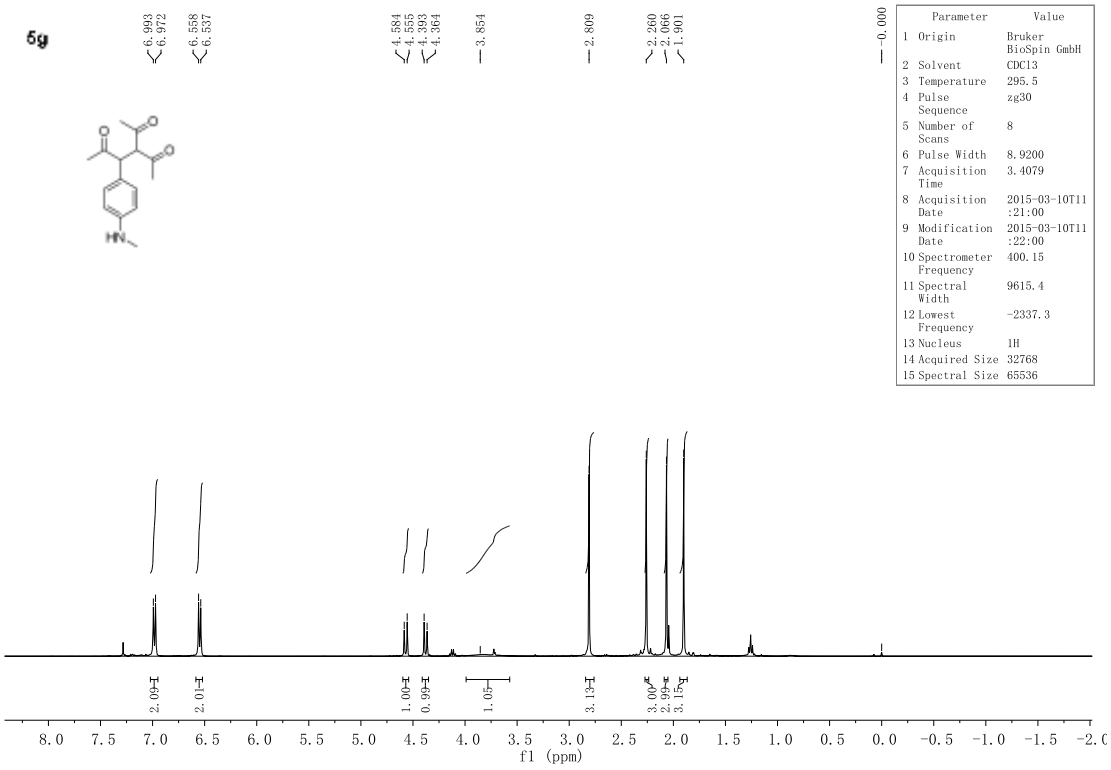


5f

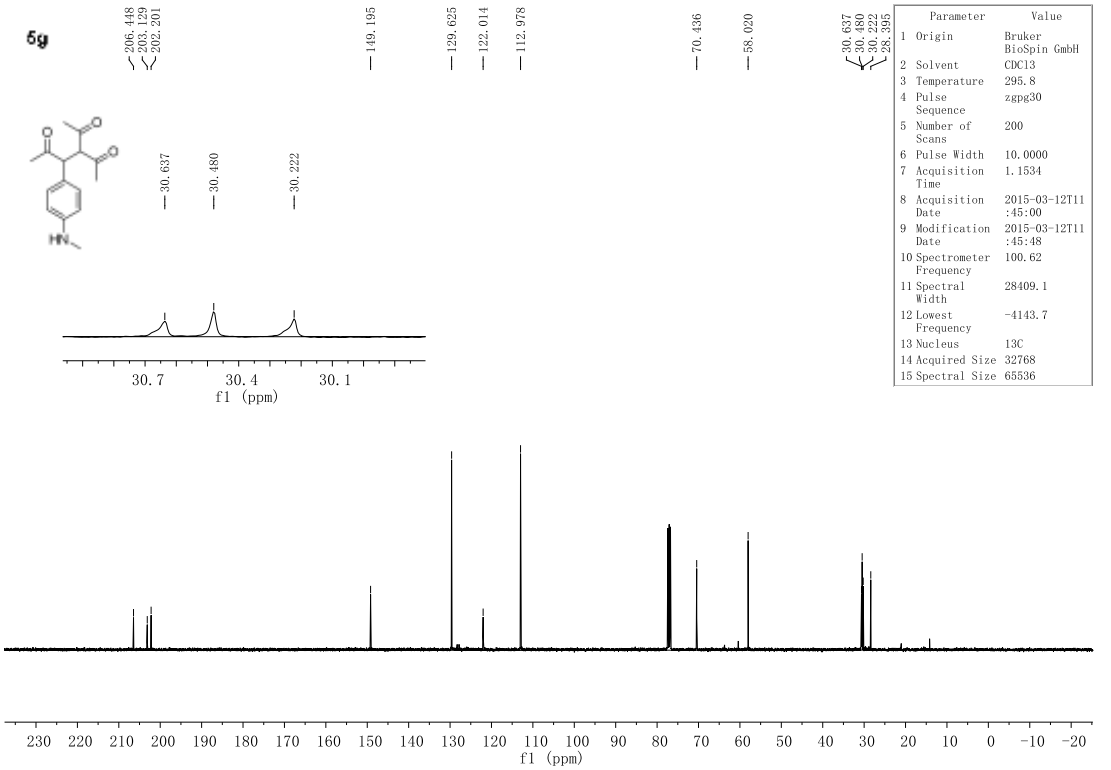


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.2
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-03-29T22:08:00
9	Modification Date	2016-03-29T22:08:53
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

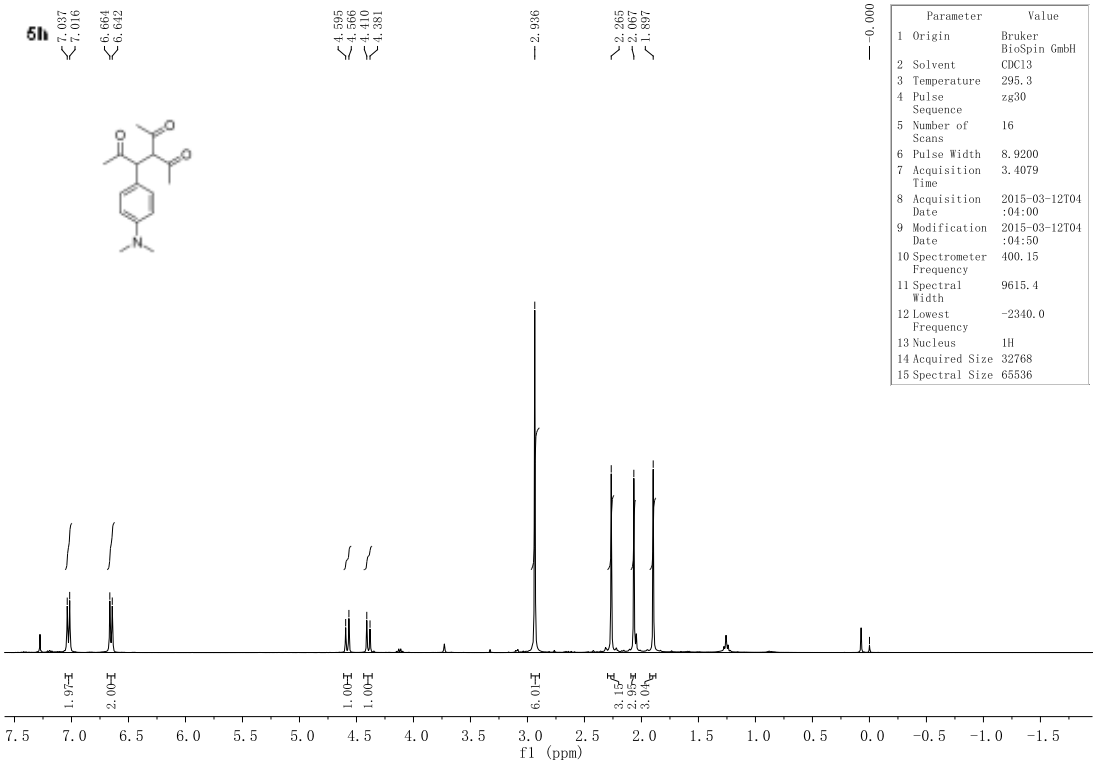


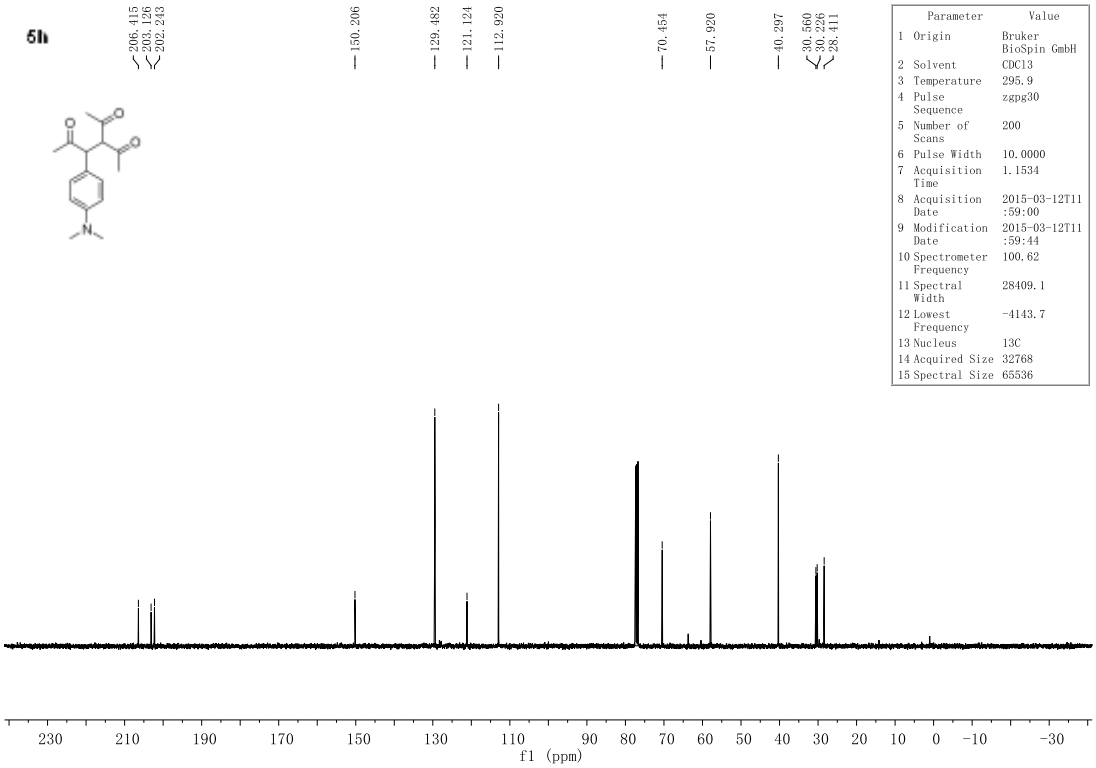


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.5
4	Pulse Sequence	zg30
5	Number of Scans	8
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-03-10T11:21:00
9	Modification Date	2015-03-10T11:22:00
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2337.3
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

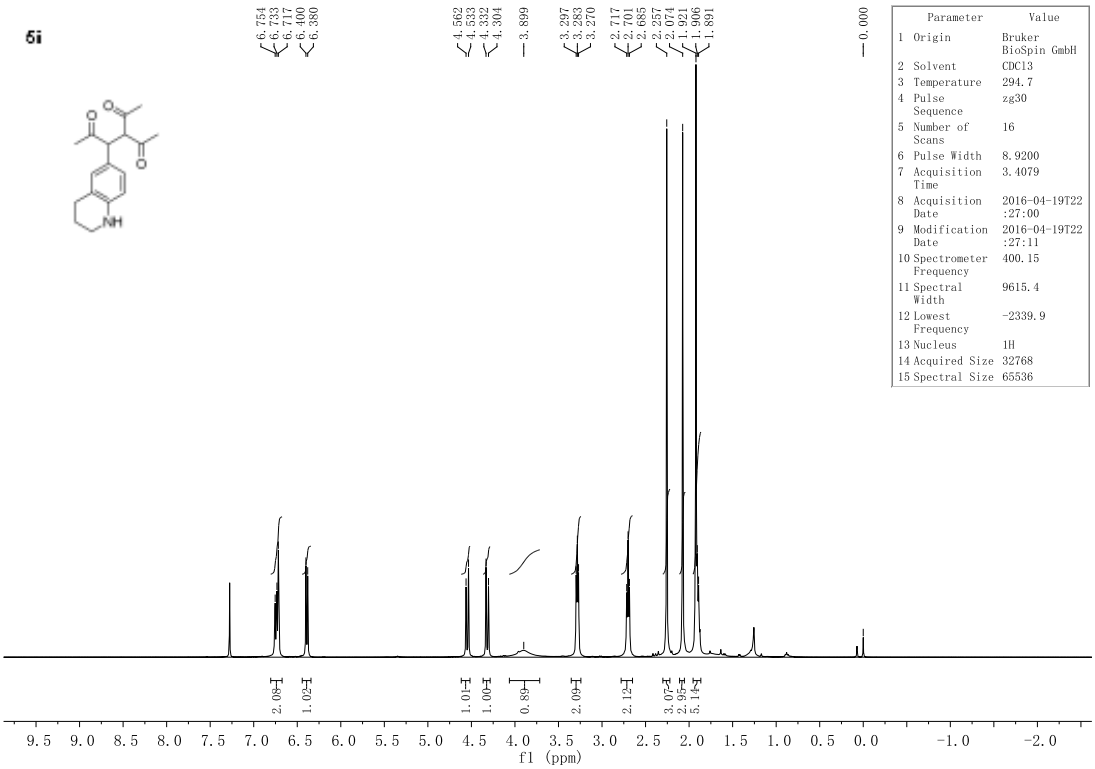


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.8
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-03-12T11:45:00
9	Modification Date	2015-03-12T11:45:48
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536


5h
7.037
7.016
6.664
6.642
4.595
4.566
4.410
4.381
2.936
2.265
2.067
1.697
-0.000
1.97
2.00
1.00
1.00
6.01
3.15
2.89
3.04
7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0 -1.5
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.3
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2015-03-12T04:04:00
9 Modification Date 2015-03-12T04:04:50
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2340.0
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536

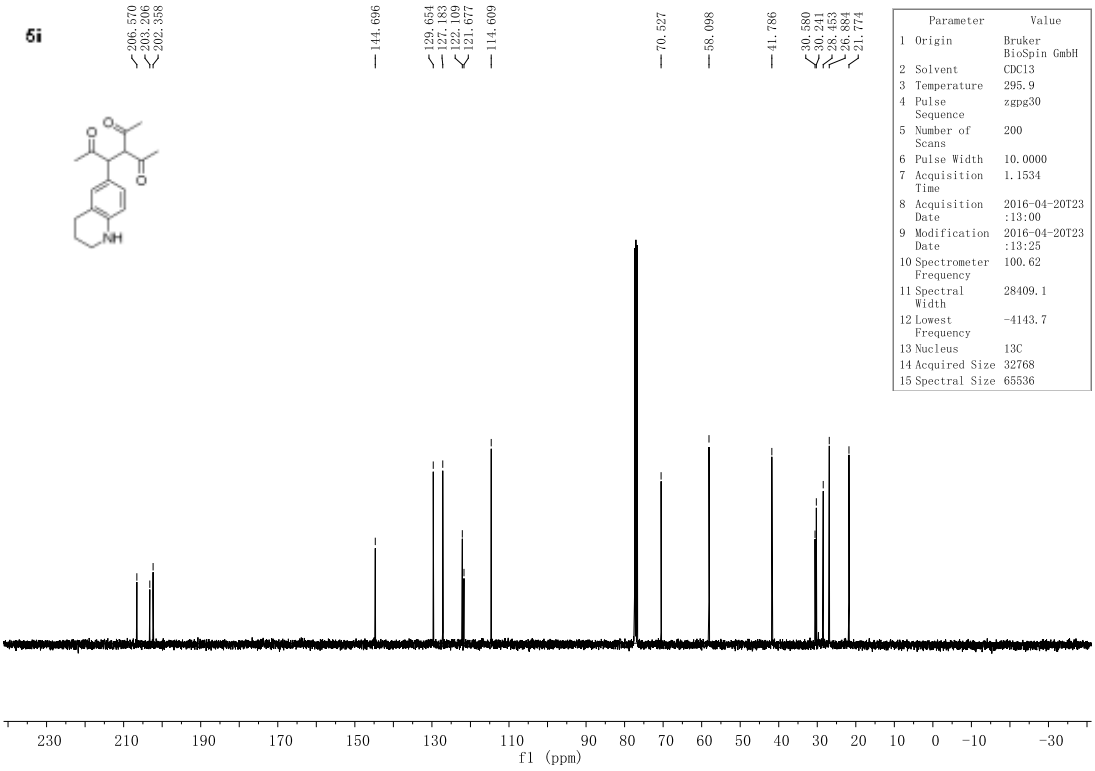

5h
206.415
203.126
202.243
150.206
129.482
121.124
112.920
70.454
57.920
40.297
30.560
30.226
28.411
230 210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10 -30
f1 (ppm)
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.9
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2015-03-12T11:59:00
9 Modification Date 2015-03-12T11:59:44
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536

6i

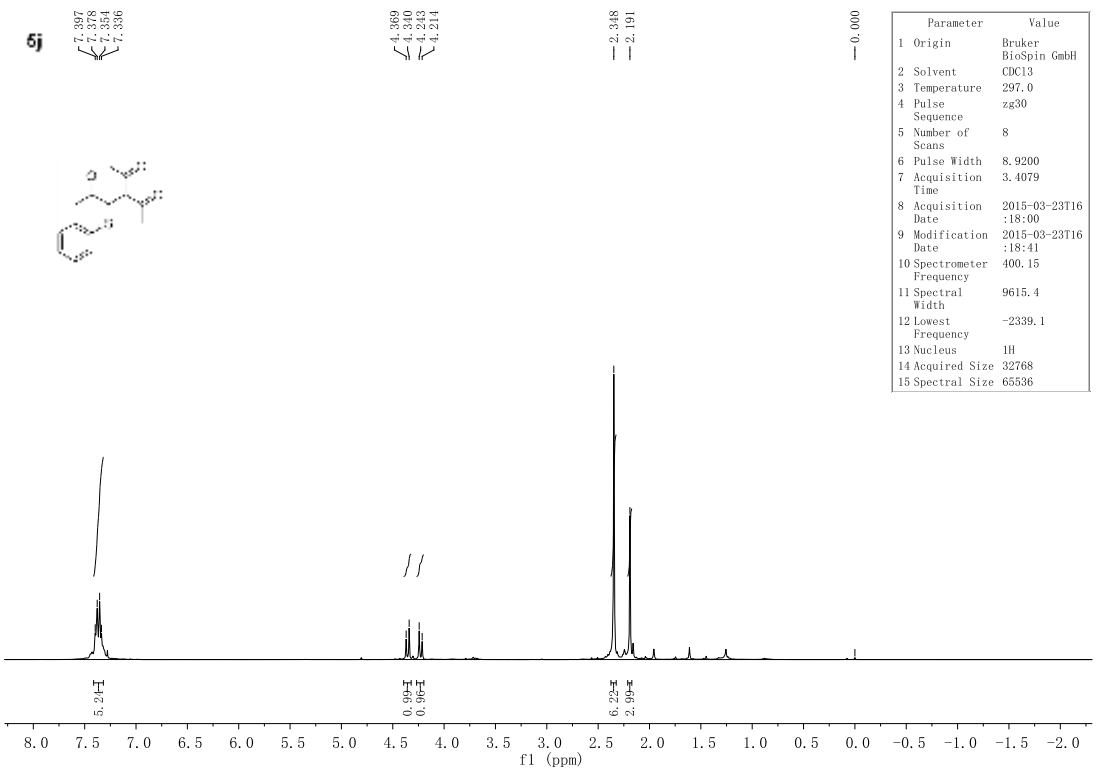


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.7
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2016-04-19T22:27:00
9	Modification Date	2016-04-19T22:27:11
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2339.9
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

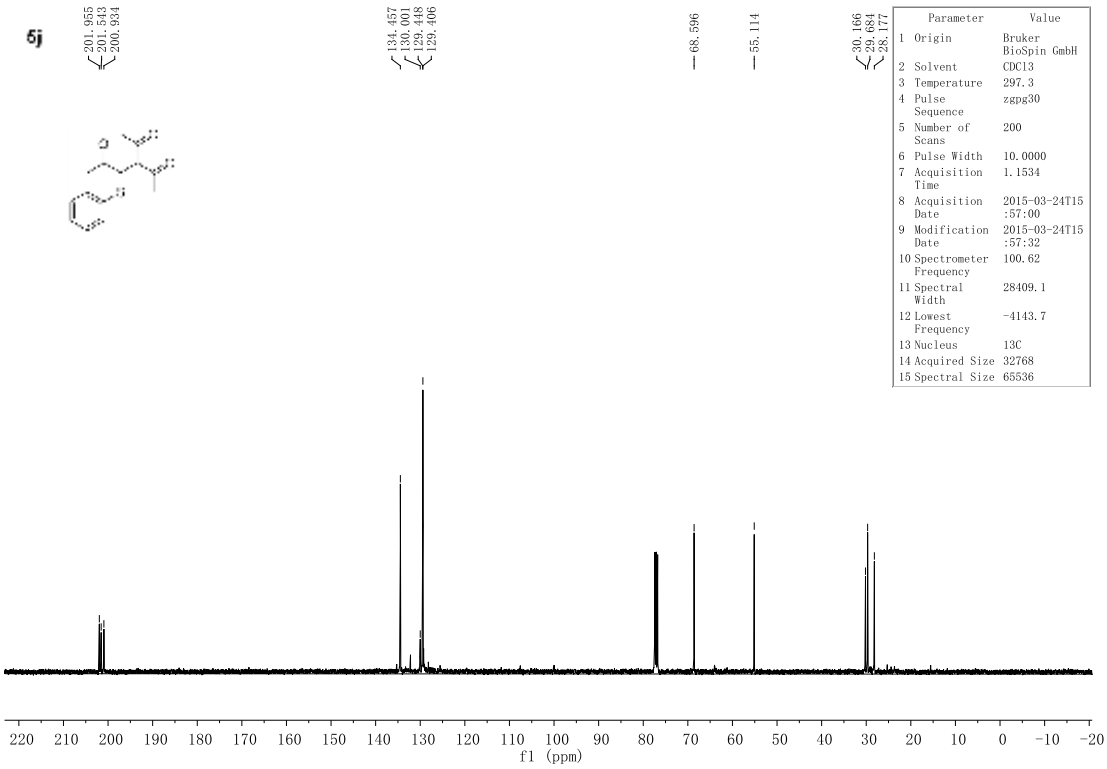
6i



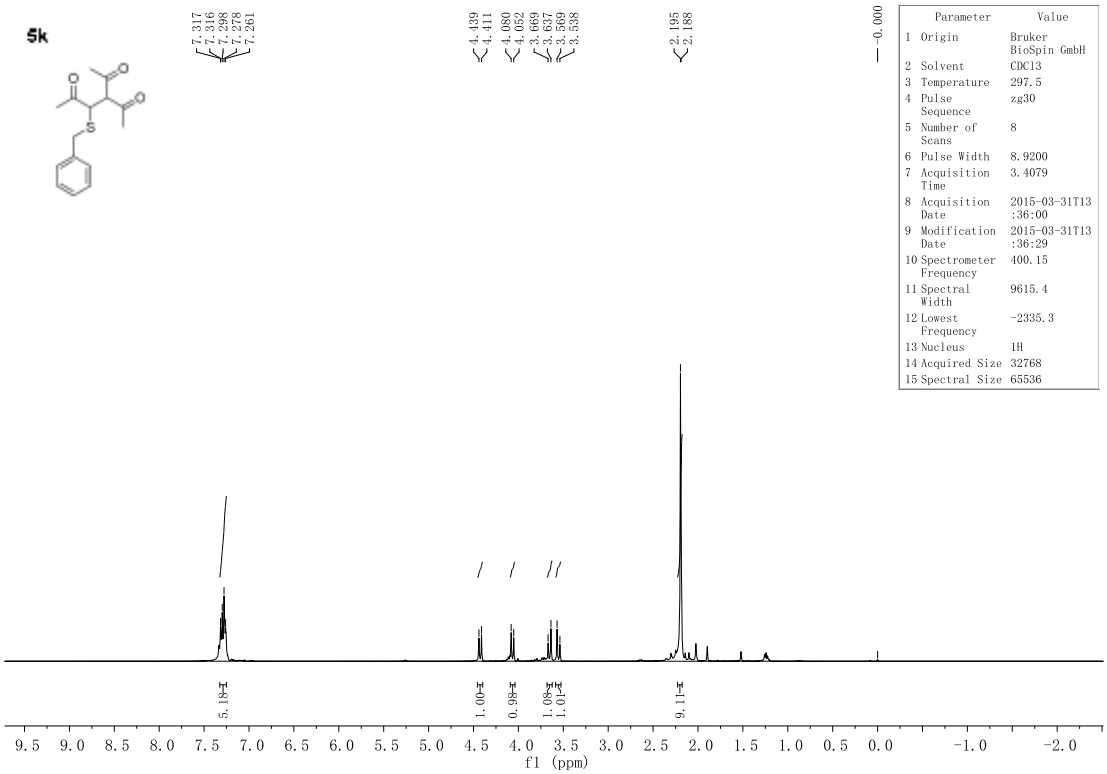
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.9
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2016-04-20T23:13:00
9	Modification Date	2016-04-20T23:13:25
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536



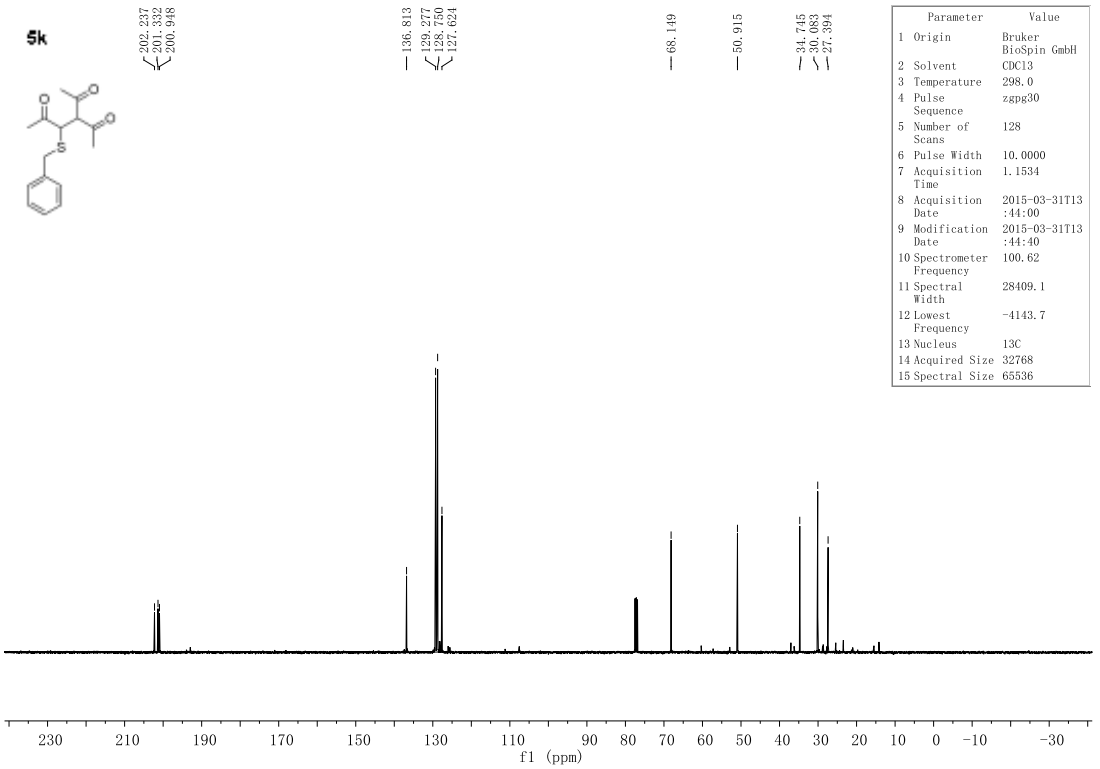
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.0
4	Pulse Sequence	zg30
5	Number of Scans	8
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-03-23T16:18:00
9	Modification Date	2015-03-23T16:18:41
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2339.1
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



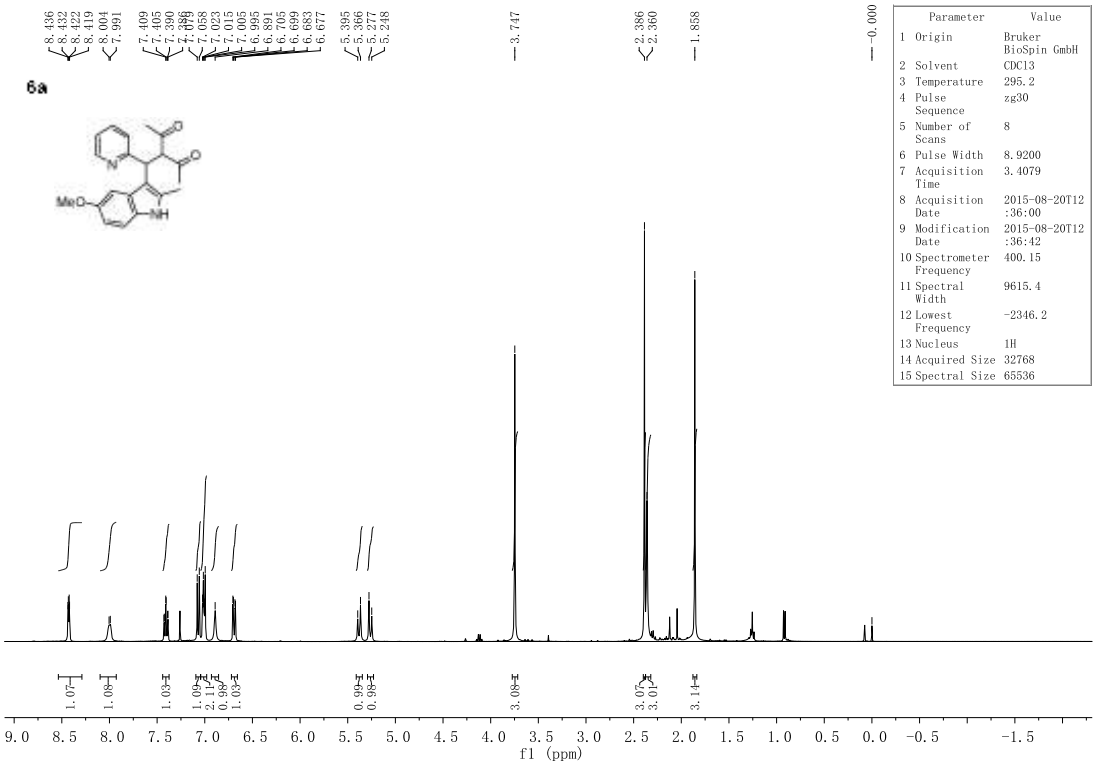
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.3
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-03-24T15:57:00
9	Modification Date	2015-03-24T15:57:32
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536



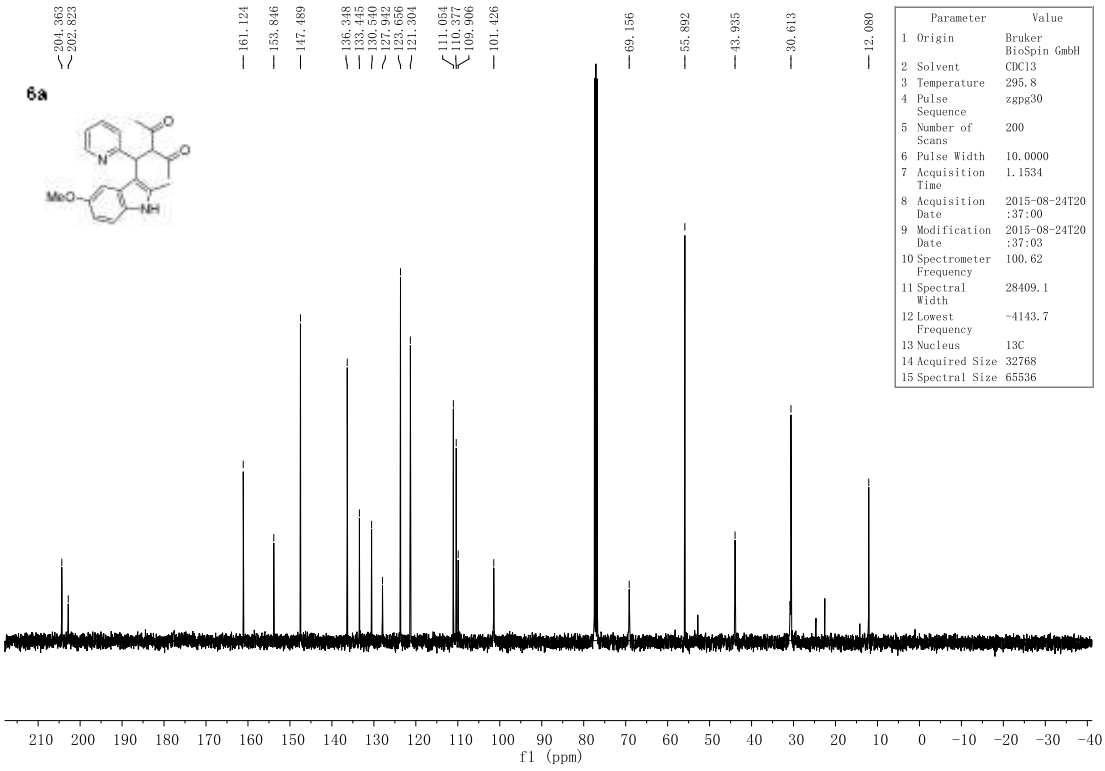
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	297.5
4	Pulse Sequence	zg30
5	Number of Scans	8
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-03-31T13:36:00
9	Modification Date	2015-03-31T13:36:29
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2335.3
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



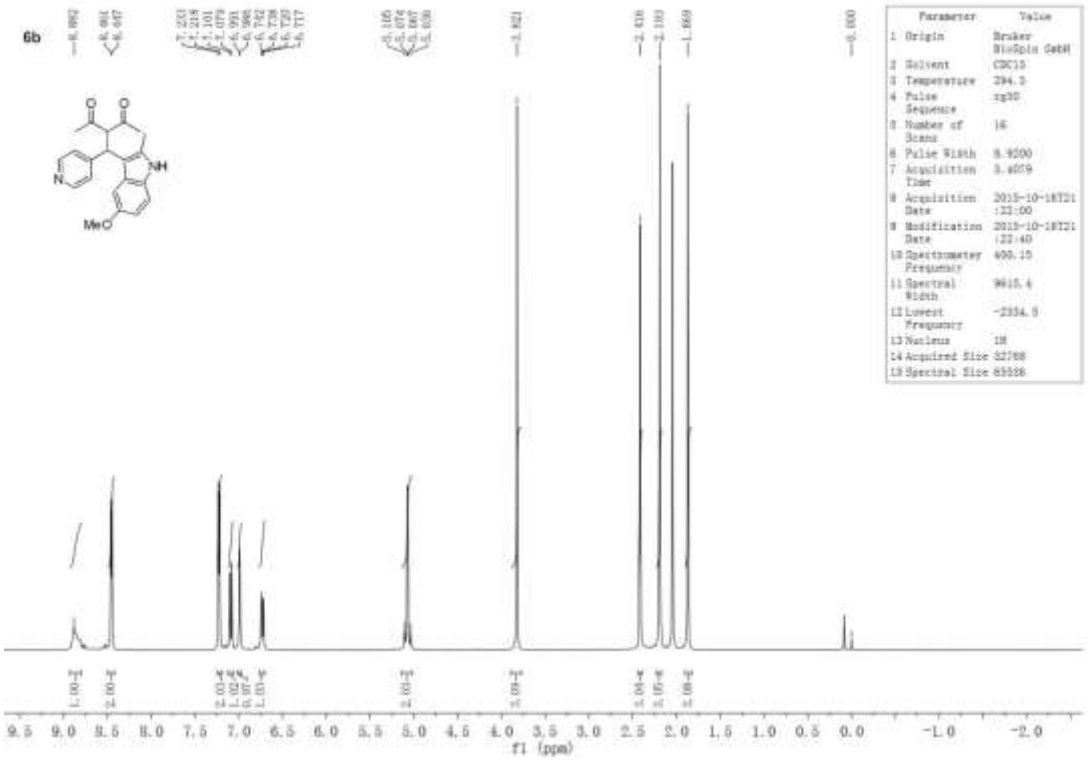
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	298.0
4	Pulse Sequence	zgpg30
5	Number of Scans	128
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-03-31T13:44:00
9	Modification Date	2015-03-31T13:44:40
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

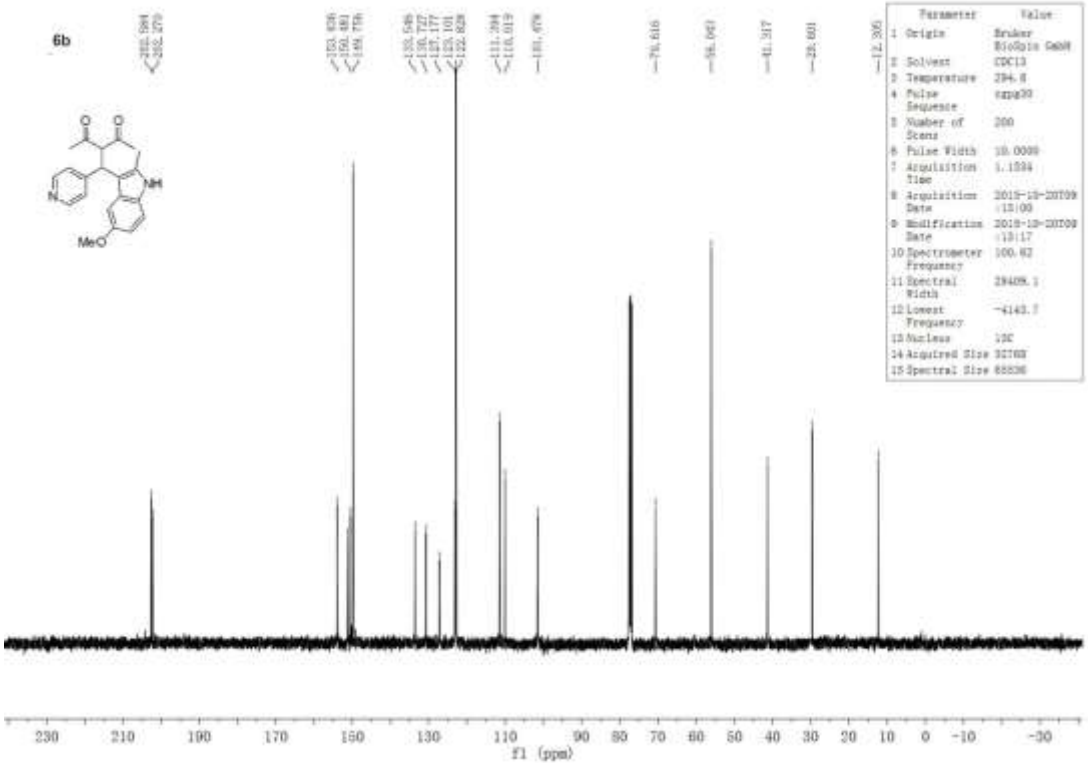


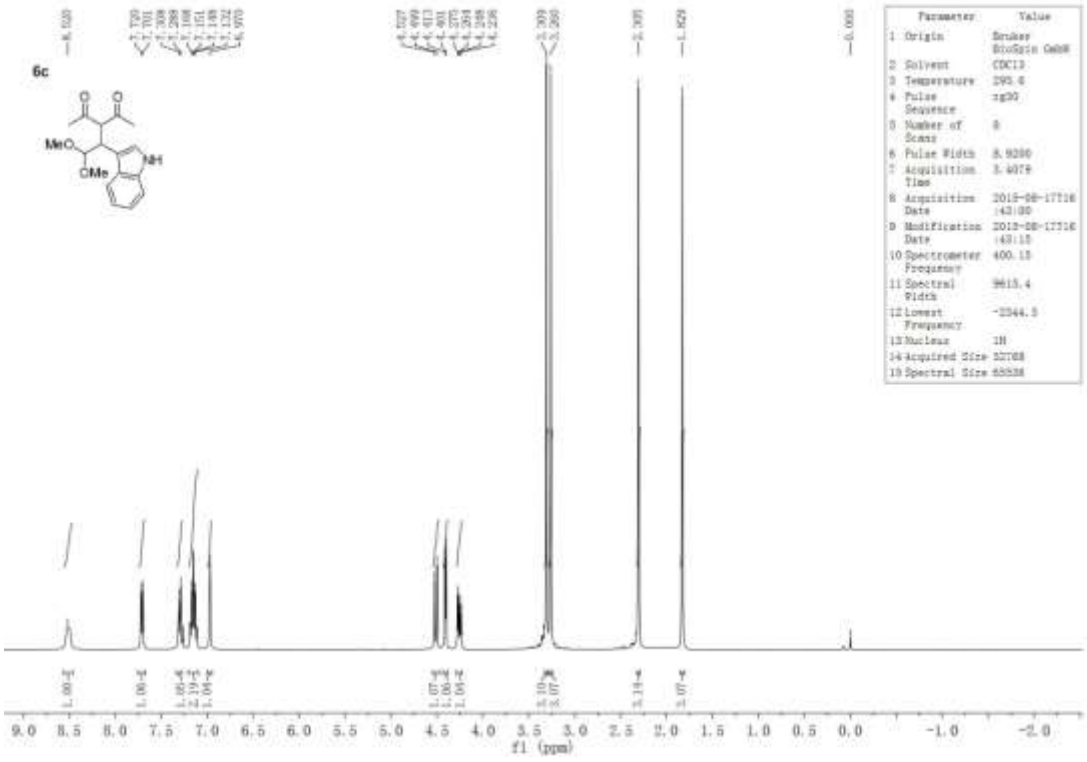
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.2
4	Pulse Sequence	zg30
5	Number of Scans	8
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2015-08-20T12:36:00
9	Modification Date	2015-08-20T12:36:42
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2346.2
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

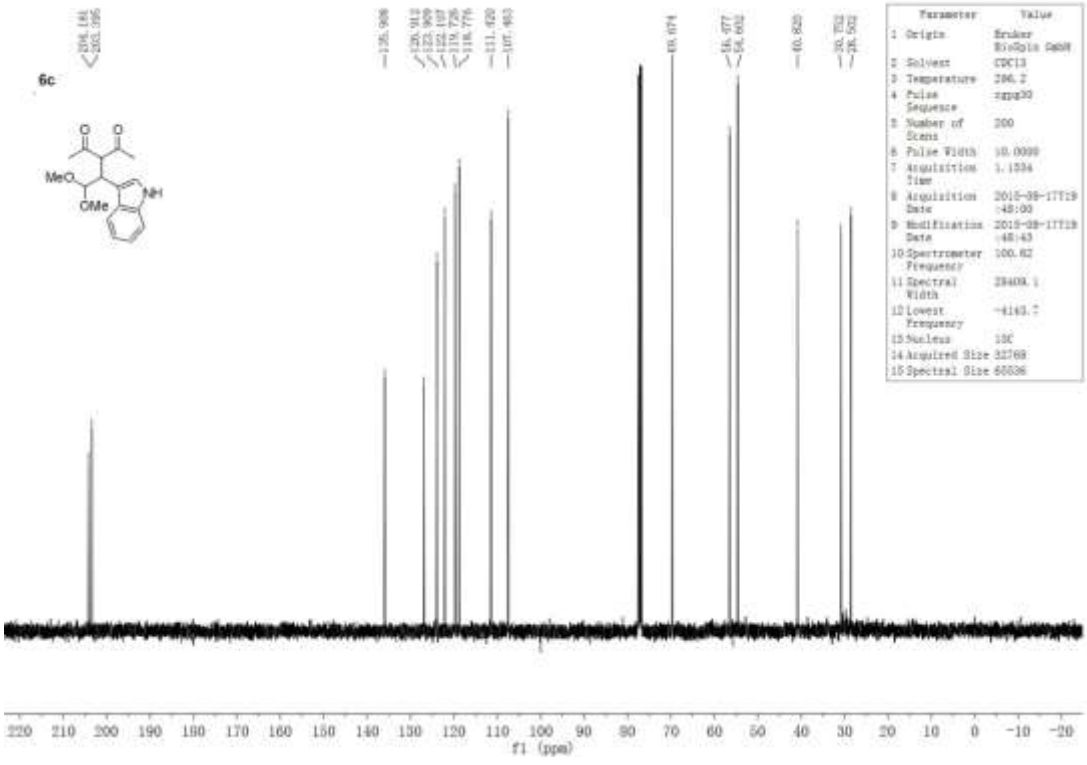


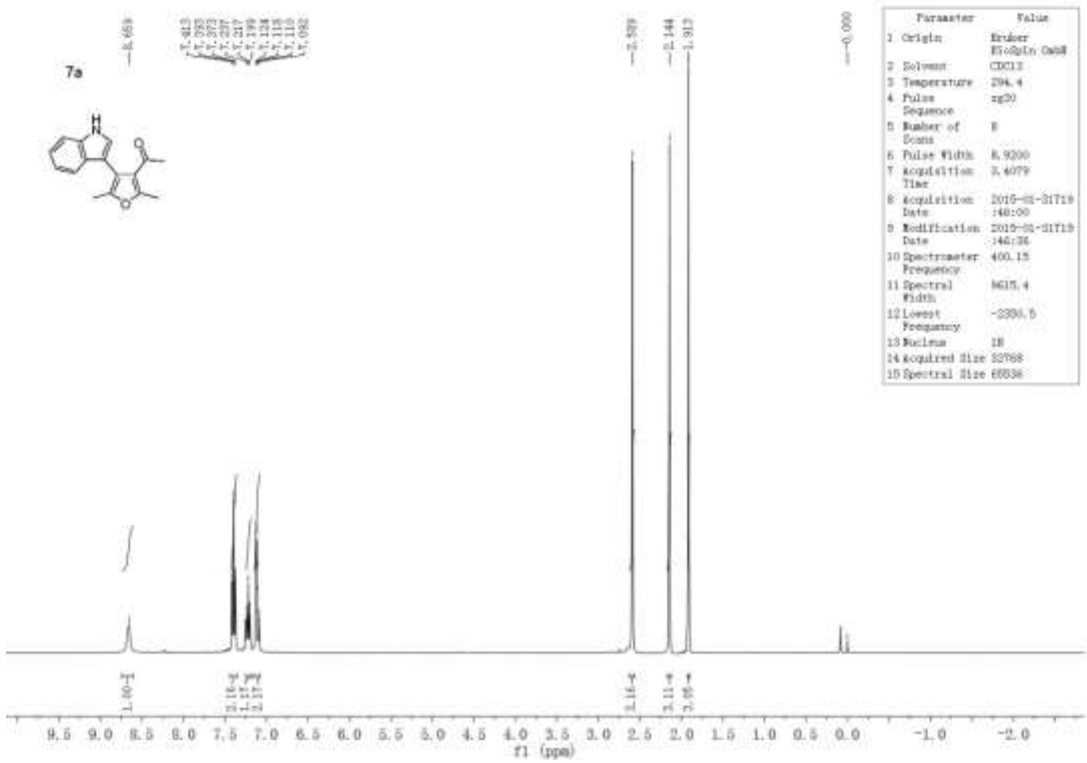
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.8
4	Pulse Sequence	zgpg30
5	Number of Scans	200
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2015-08-24T20:37:00
9	Modification Date	2015-08-24T20:37:03
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

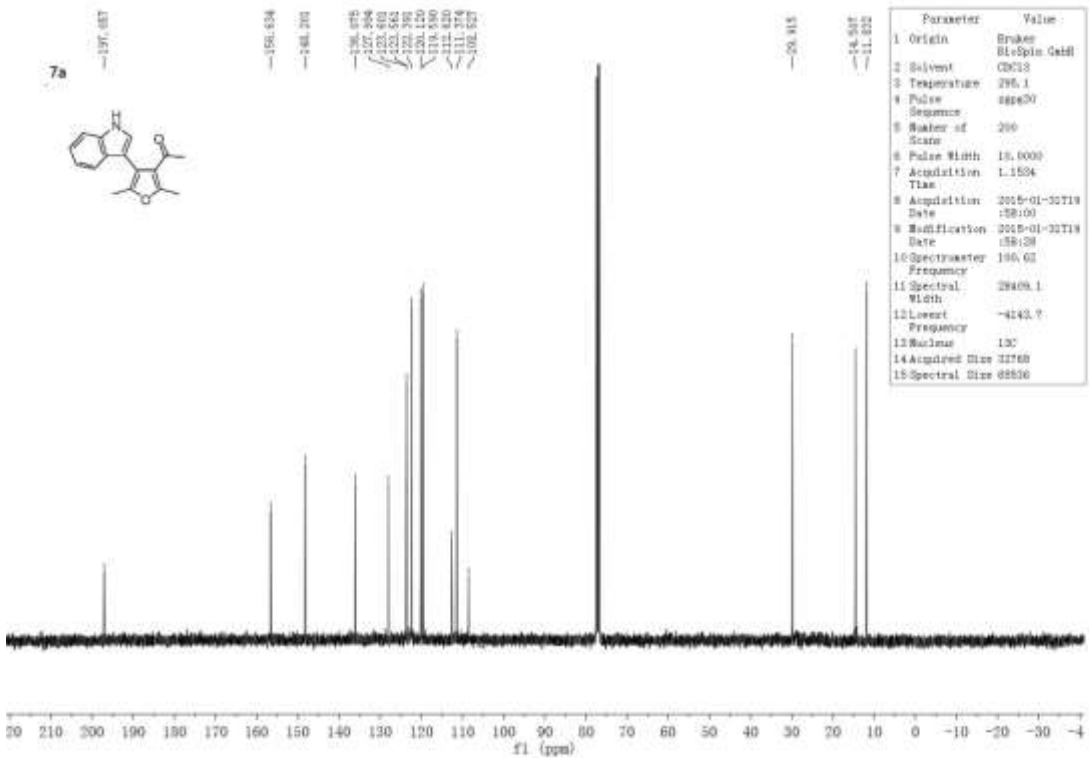

6b
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 294.3
4 Pulse Sequence zg30
5 Number of Scans 16
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2015-10-16T21:22:00
9 Modification Date 2015-10-16T21:22:40
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2334.5
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)


6b
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 294.6
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2015-10-20T09:15:00
9 Modification Date 2015-10-20T09:15:17
10 Spectrometer Frequency 100.62
11 Spectral Width 29409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

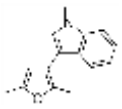

6c
MeO
OMe
NH
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.6
4 Pulse Sequence zg30
5 Number of Scans 8
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2019-08-17T16:42:00
9 Modification Date 2019-08-17T16:43:15
10 Spectrometer Frequency 400.13
11 Spectral Width 9615.4
12 Lowest Frequency -2344.5
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)


6c
MeO
OMe
NH
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 296.2
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2019-08-17T19:48:00
9 Modification Date 2019-08-17T19:48:43
10 Spectrometer Frequency 100.62
11 Spectral Width 29409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)


7a
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 294.4
4 Pulse Sequence zg30
5 Number of Scans 8
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
10 Spectrometer Frequency 400.15
11 Spectral Width 9615.4
12 Lowest Frequency -2330.5
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

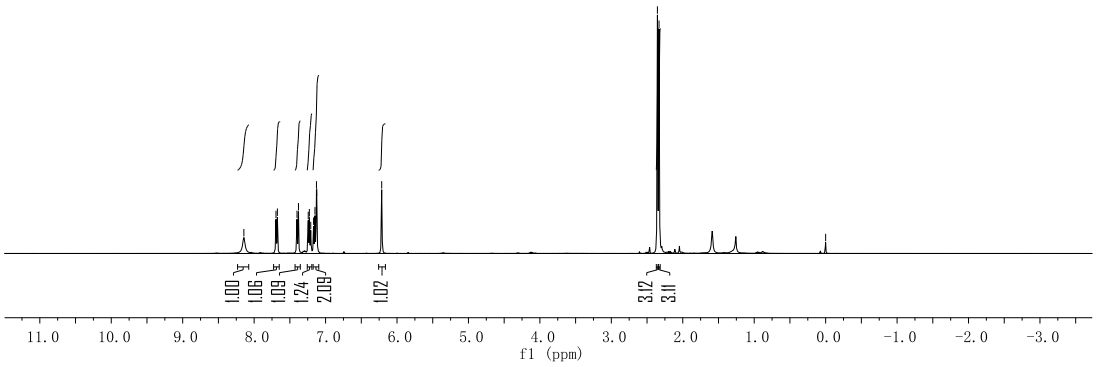

7a
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.1
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

7b

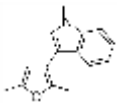


8.144
7.694
7.674
7.400
7.379
7.243
7.227
7.149
7.128
6.423
6.244
2.355
2.332
0.000

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.3
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2017-10-19T20:33:00
9	Modification Date	2017-10-19T20:33:22
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2353.0
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

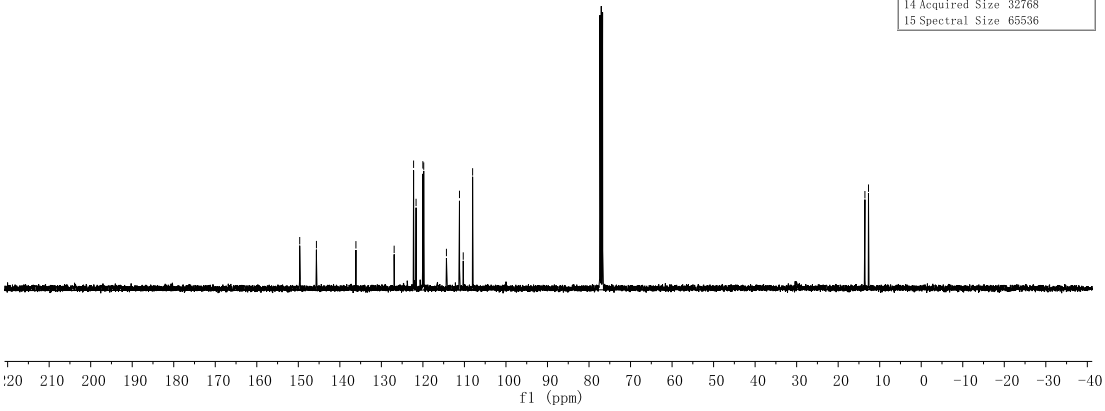


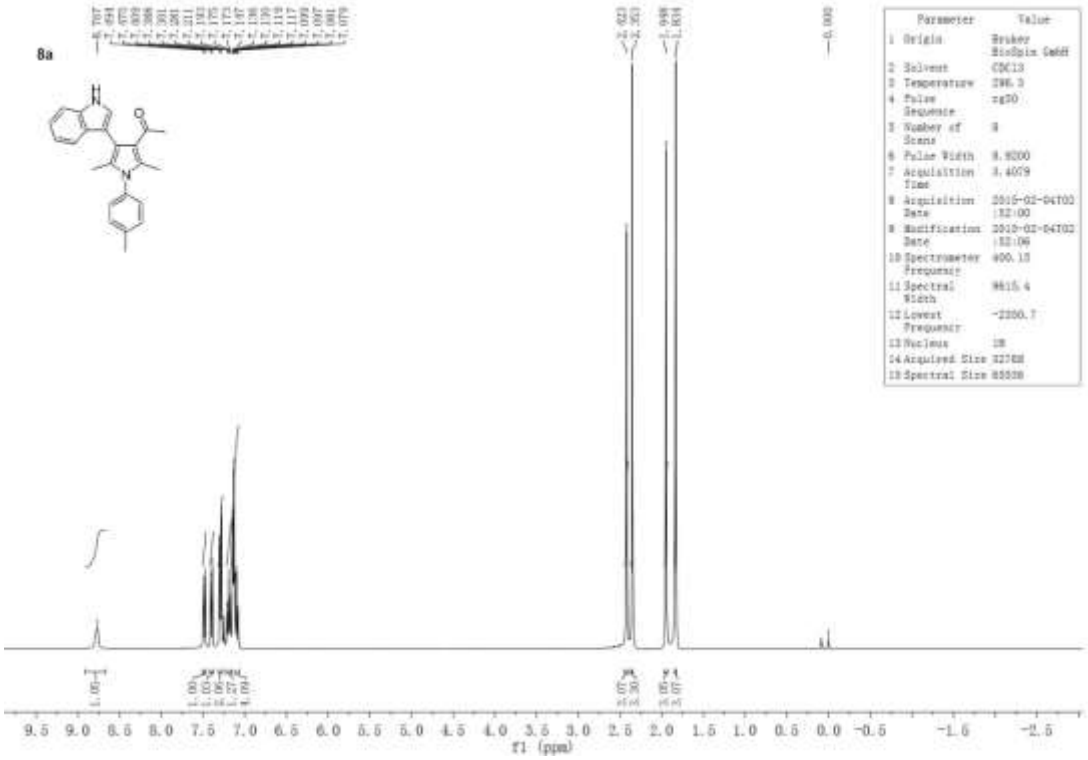
7b

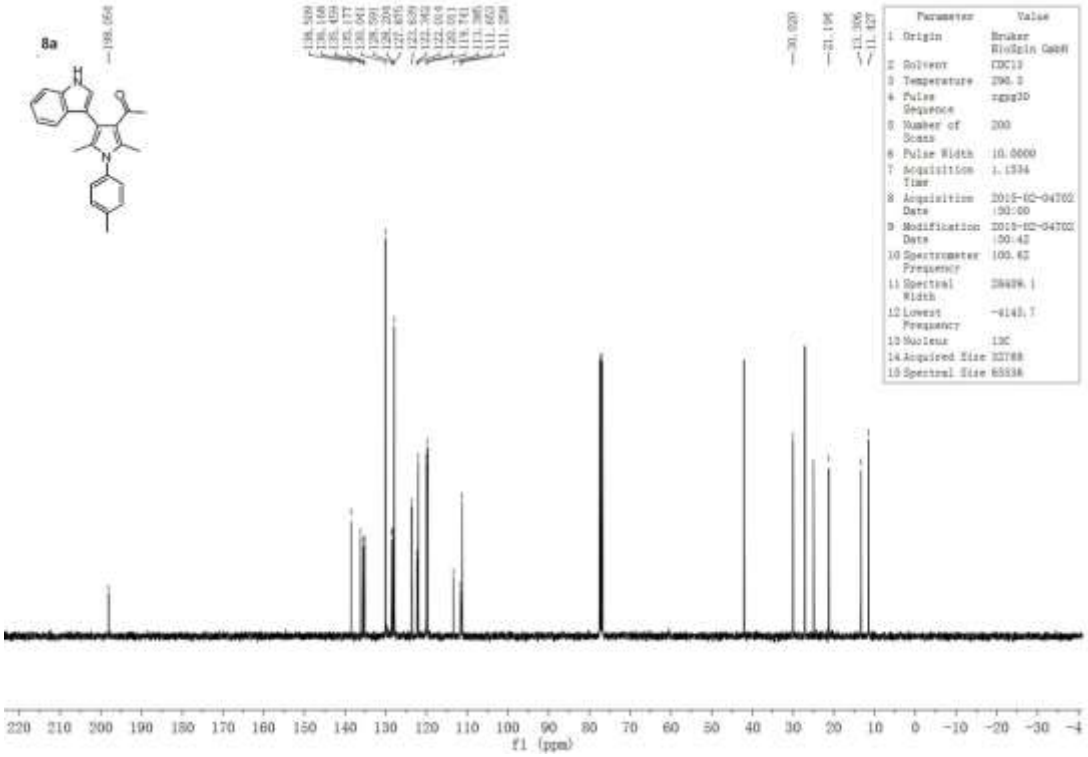


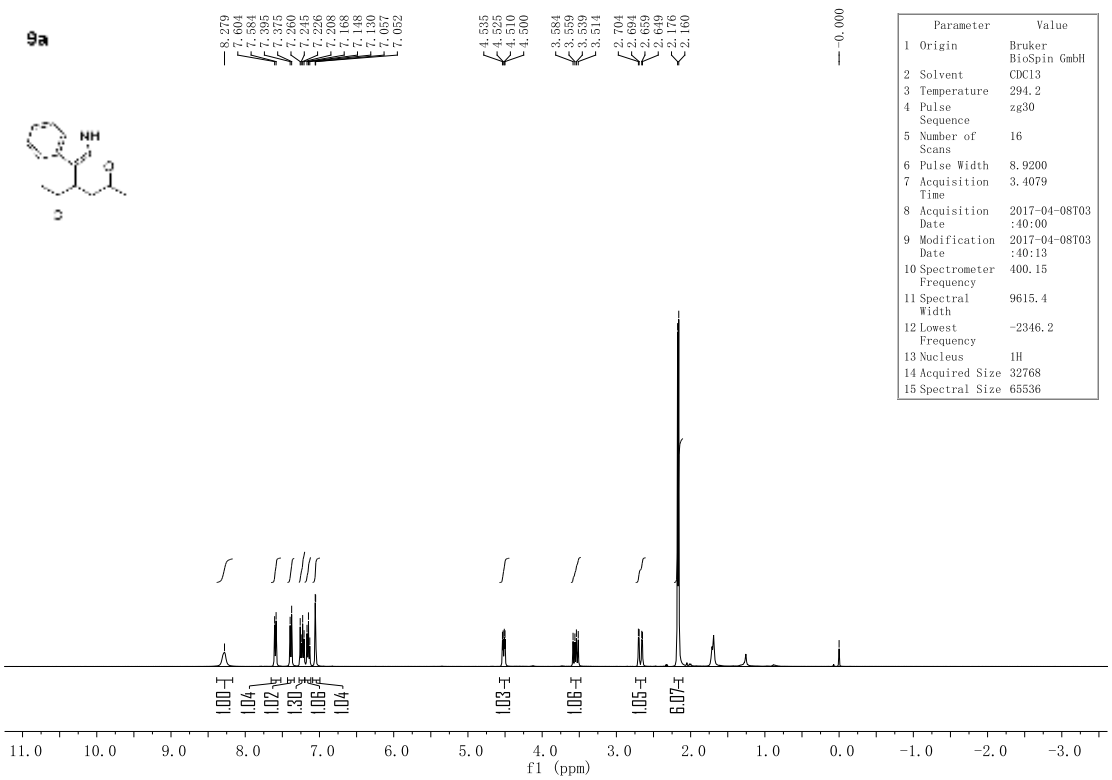
149.665
145.640
136.127
126.922
122.242
121.645
121.013
119.800
114.335
111.190
110.287
108.025
13.558
12.700

	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.7
4	Pulse Sequence	zgpg30
5	Number of Scans	300
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2017-10-24T01:23:00
9	Modification Date	2017-10-24T01:23:20
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

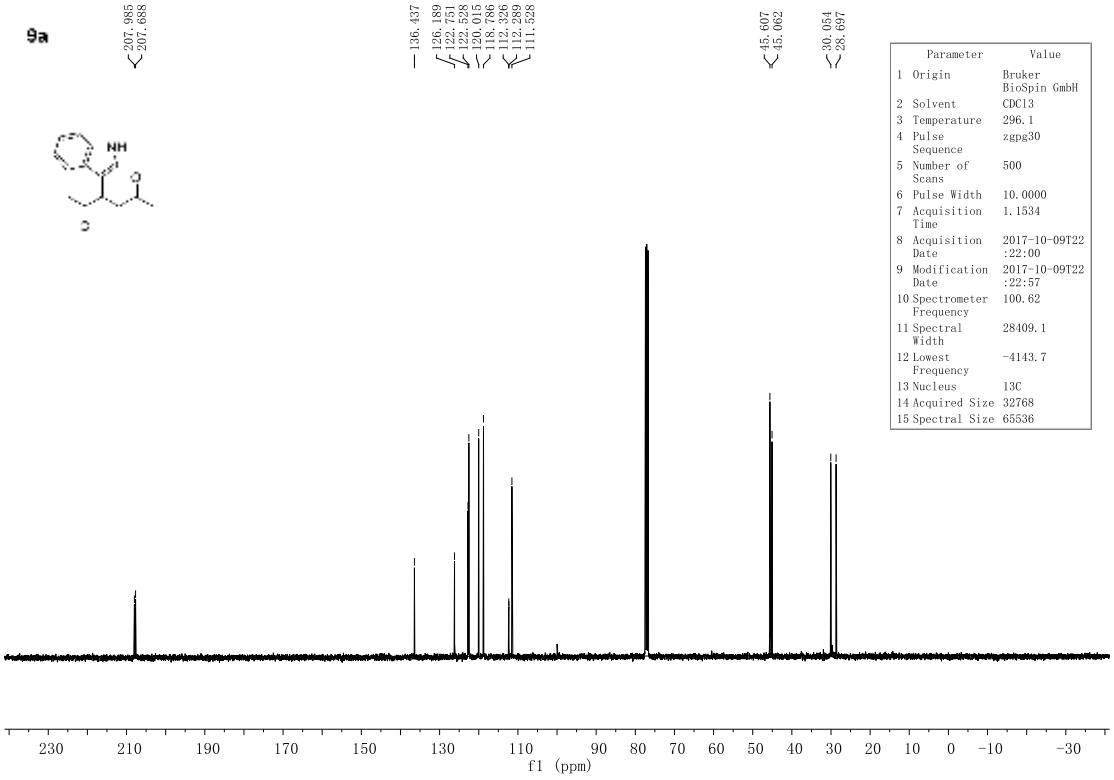



8a
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 296.3
4 Pulse Sequence zg30
5 Number of Scans 8
6 Pulse Width 8.9200
7 Acquisition Time 3.4079
8 Acquisition Date 2015-02-04T02:32:00
9 Modification Date 2015-02-04T02:32:06
10 Spectrometer Frequency 400.13
11 Spectral Width 9615.4
12 Lowest Frequency -2200.7
13 Nucleus 1H
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)


8a
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 296.3
4 Pulse Sequence zgpg30
5 Number of Scans 200
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2015-02-04T02:00:00
9 Modification Date 2015-02-04T02:00:42
10 Spectrometer Frequency 100.62
11 Spectral Width 29409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
f1 (ppm)

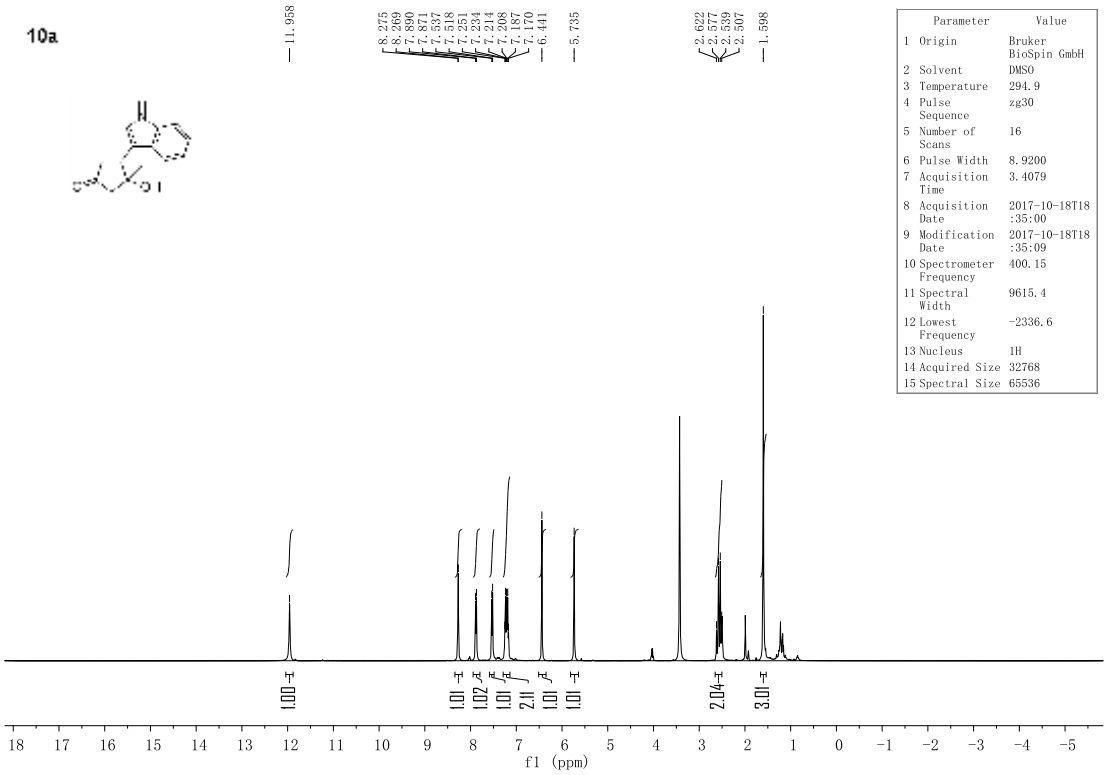


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.2
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2017-04-08T03:40:00
9	Modification Date	2017-04-08T03:40:13
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2346.2
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536



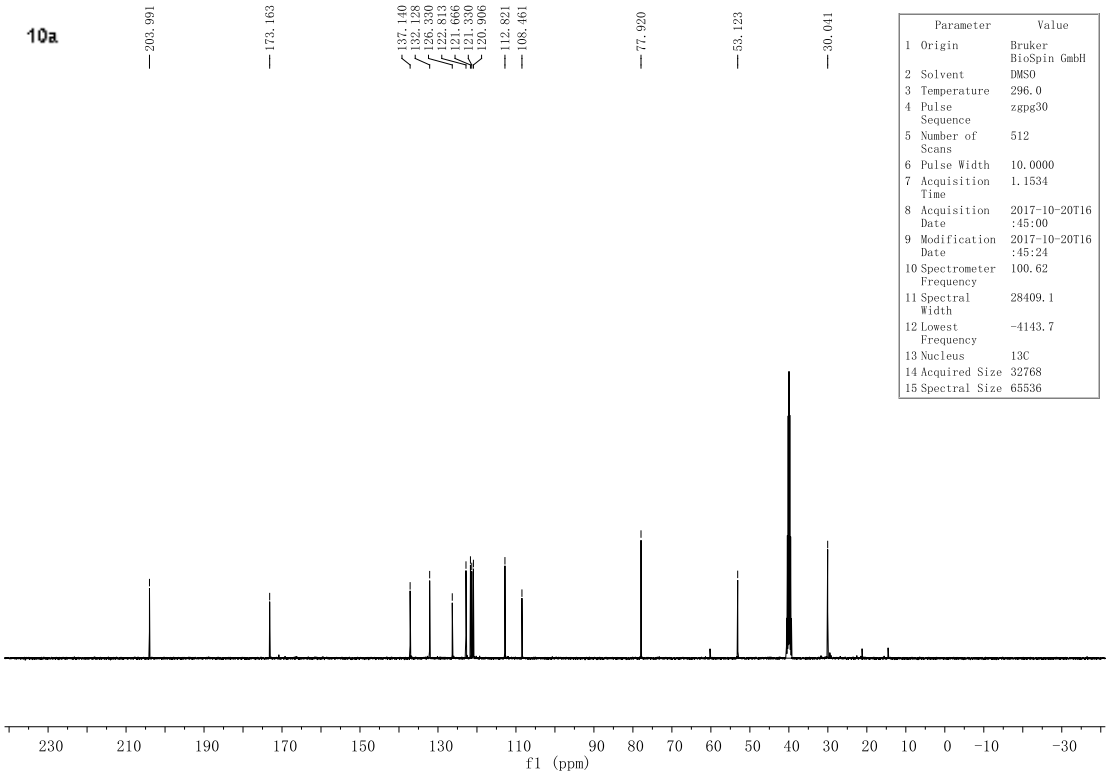
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	296.1
4	Pulse Sequence	zgpg30
5	Number of Scans	500
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2017-10-09T22:22:00
9	Modification Date	2017-10-09T22:22:57
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

10a



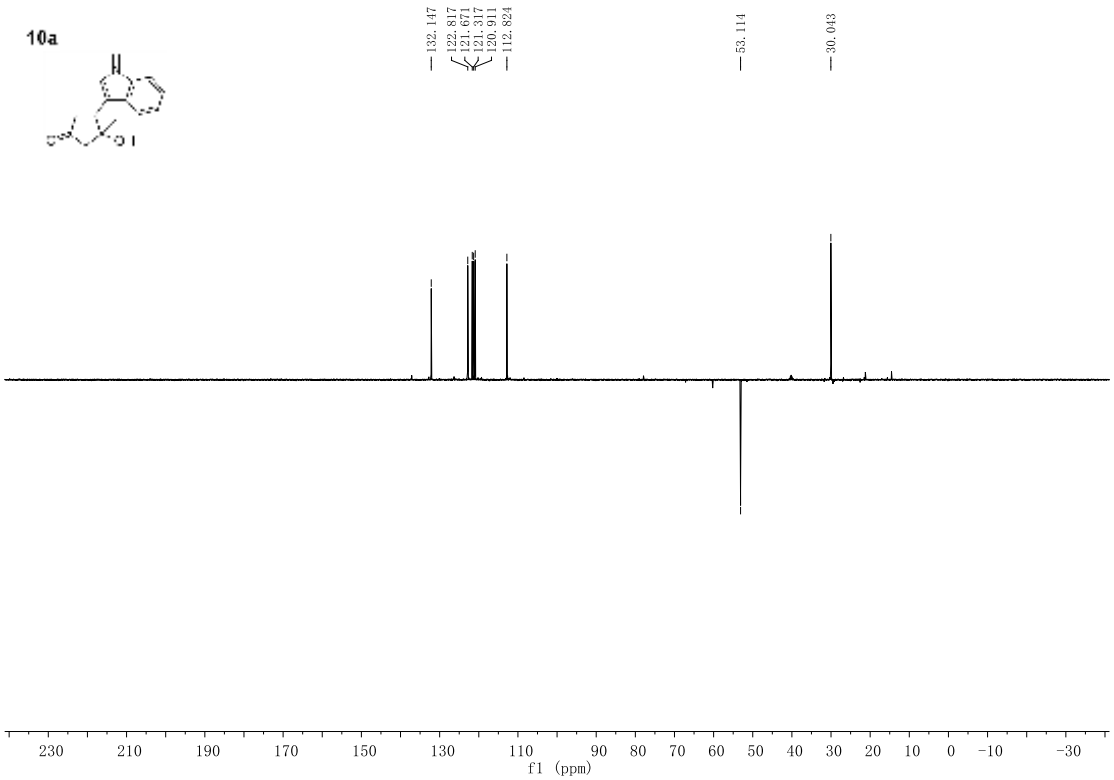
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	DMSO
3	Temperature	294.9
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2017-10-18T18:35:00
9	Modification Date	2017-10-18T18:35:09
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2336.6
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

10a

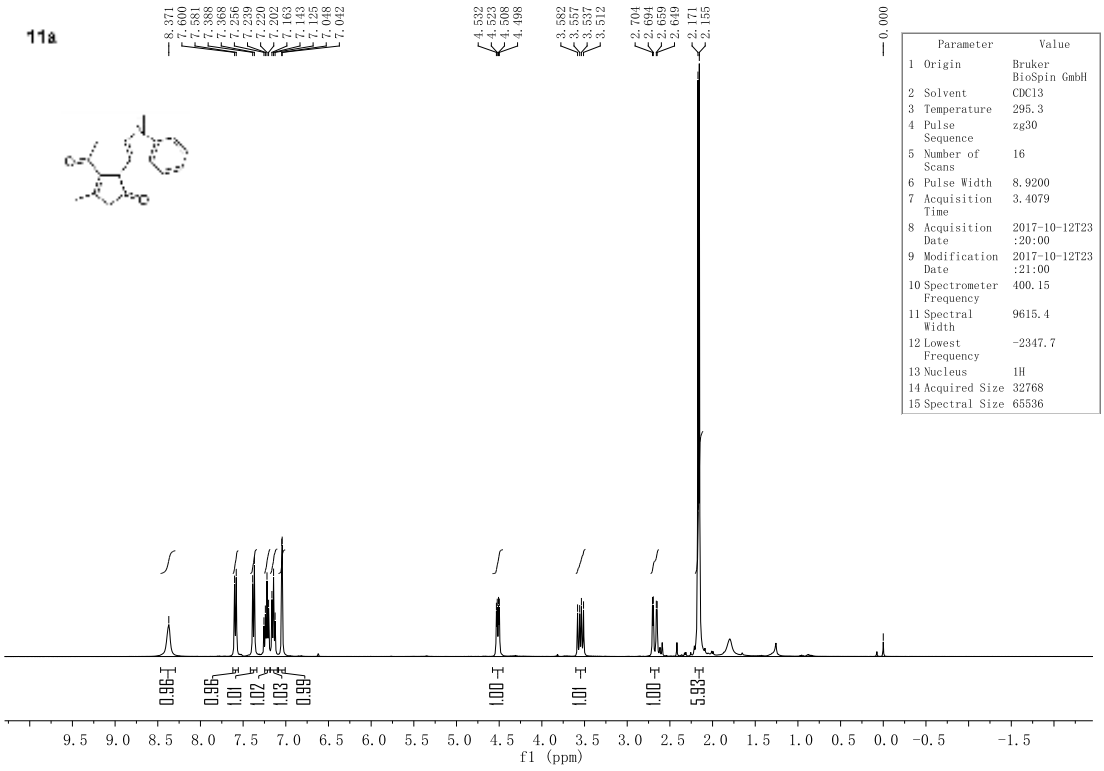


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	DMSO
3	Temperature	296.0
4	Pulse Sequence	zgpg30
5	Number of Scans	512
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2017-10-20T16:45:00
9	Modification Date	2017-10-20T16:45:24
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536

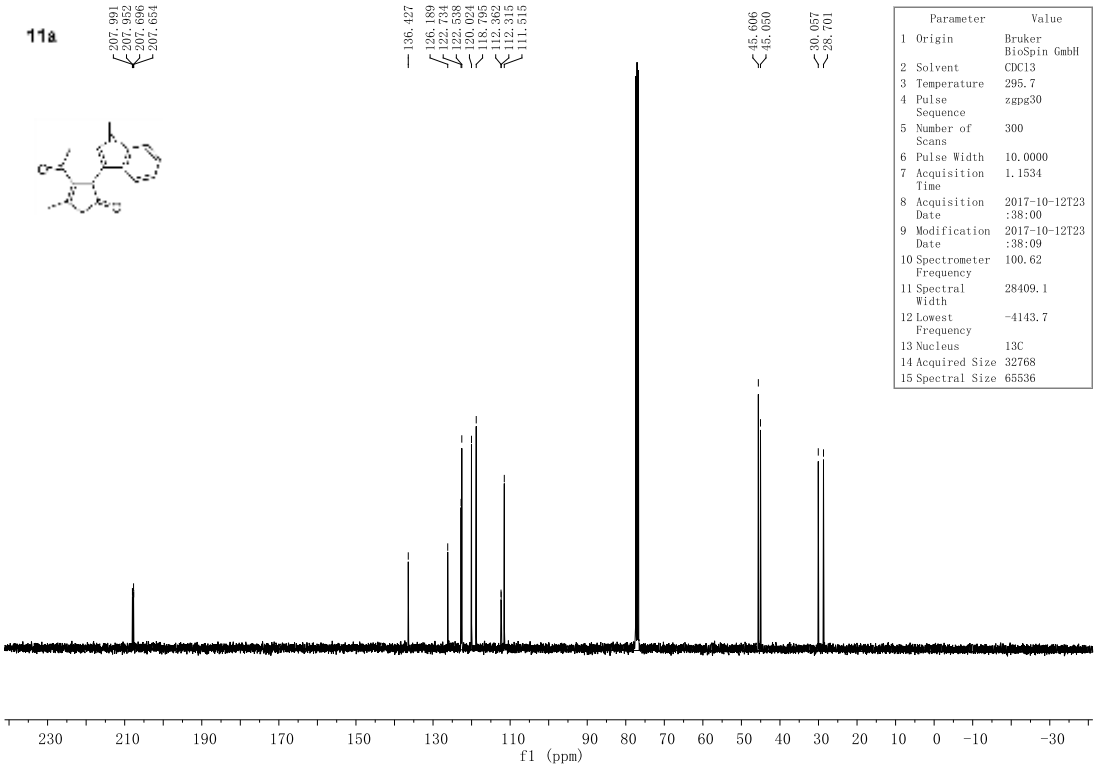
10a

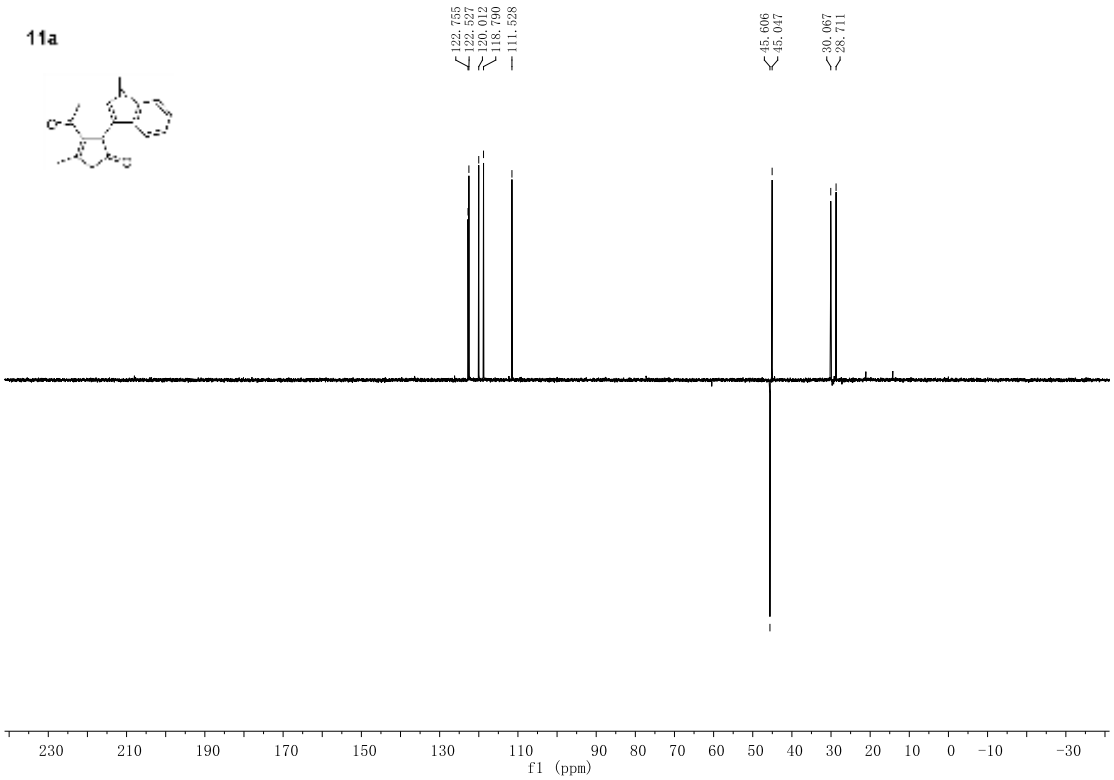


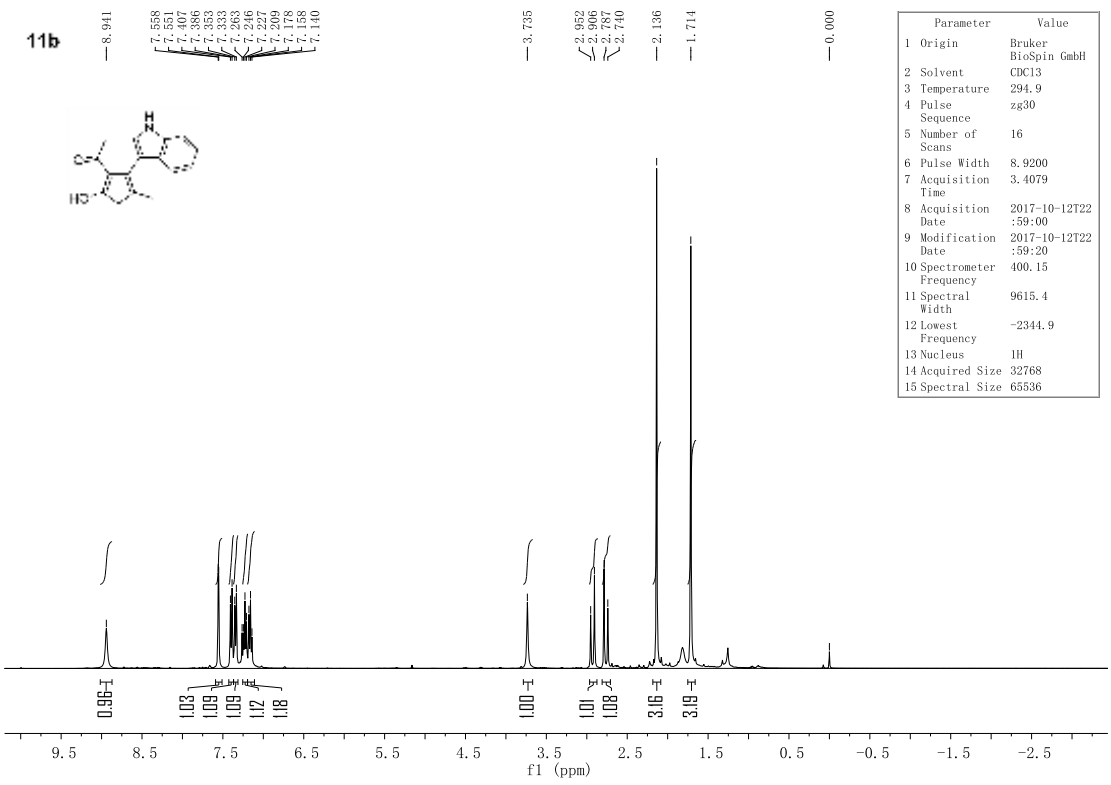
11a



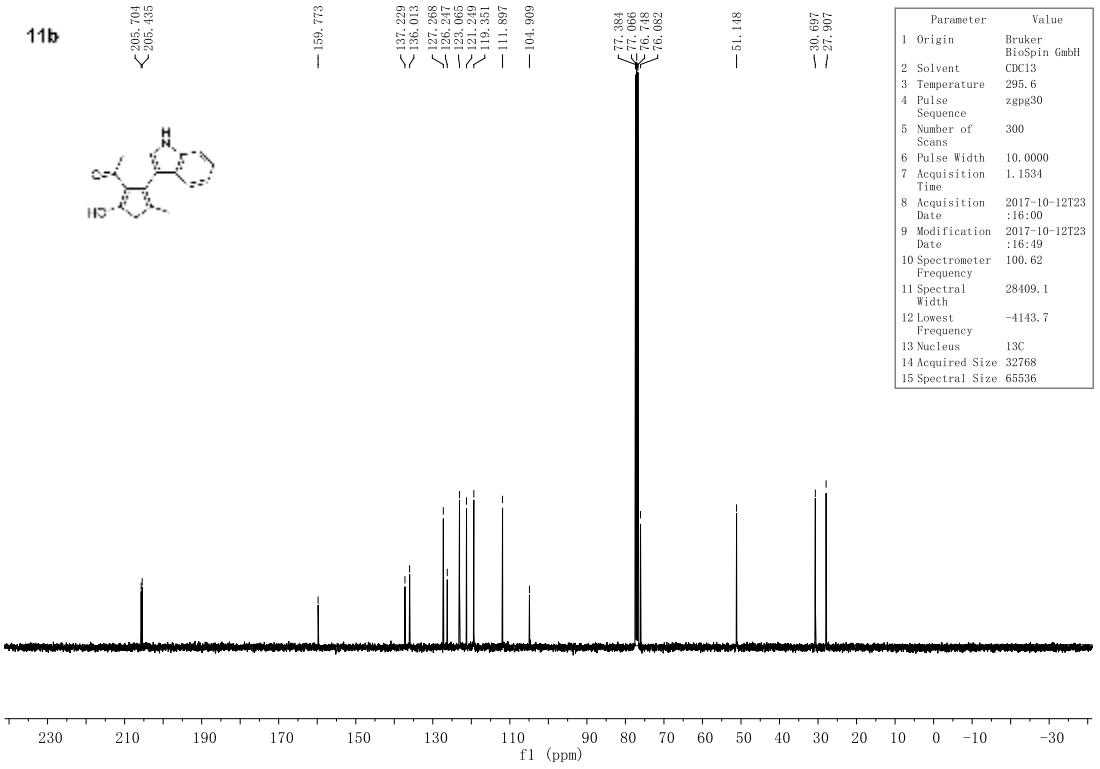
	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.3
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2017-10-12T23:20:00
9	Modification Date	2017-10-12T23:21:00
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2347.7
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536


11a
207.991
207.952
207.696
207.654
136.427
126.189
122.734
122.538
120.024
118.795
112.362
112.315
111.515
45.606
45.050
30.057
28.701
Parameter Value
1 Origin Bruker BioSpin GmbH
2 Solvent CDCl3
3 Temperature 295.7
4 Pulse Sequence zgpg30
5 Number of Scans 300
6 Pulse Width 10.0000
7 Acquisition Time 1.1534
8 Acquisition Date 2017-10-12T23:38:00
9 Modification Date 2017-10-12T23:38:09
10 Spectrometer Frequency 100.62
11 Spectral Width 28409.1
12 Lowest Frequency -4143.7
13 Nucleus 13C
14 Acquired Size 32768
15 Spectral Size 65536
230 210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10 -30
f1 (ppm)

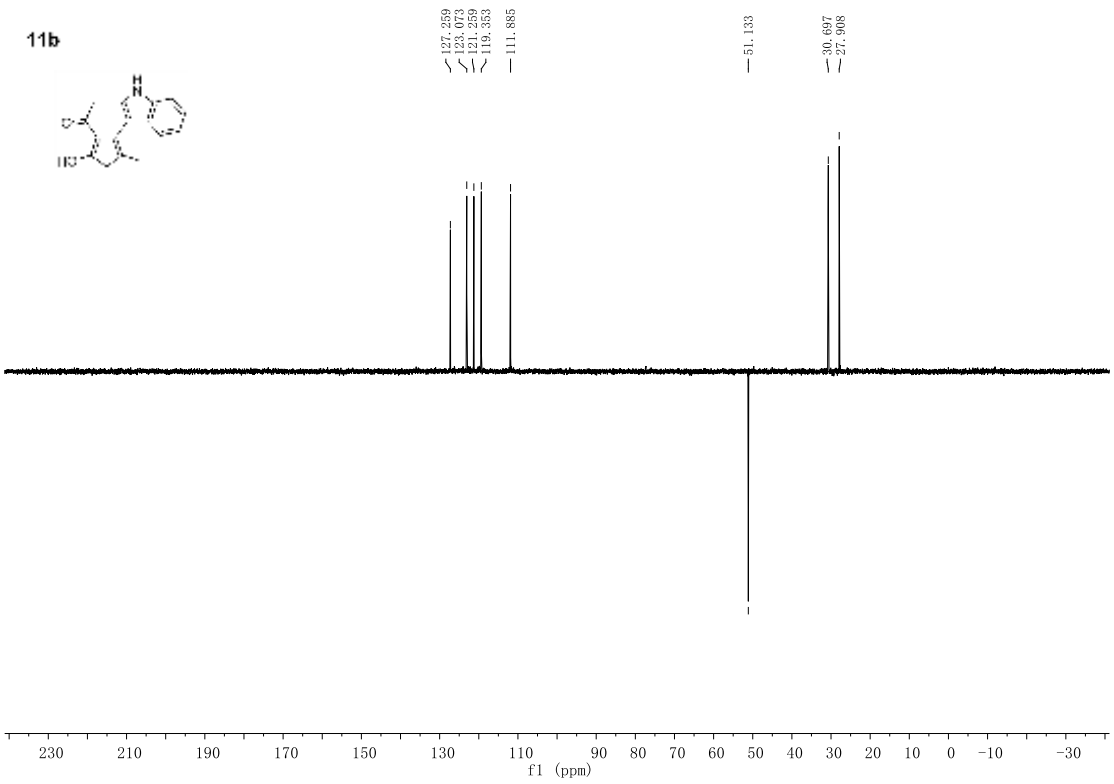

11a
122.755
122.527
120.012
118.790
111.528
45.606
45.047
30.067
28.711
230 210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -10 -30
f1 (ppm)

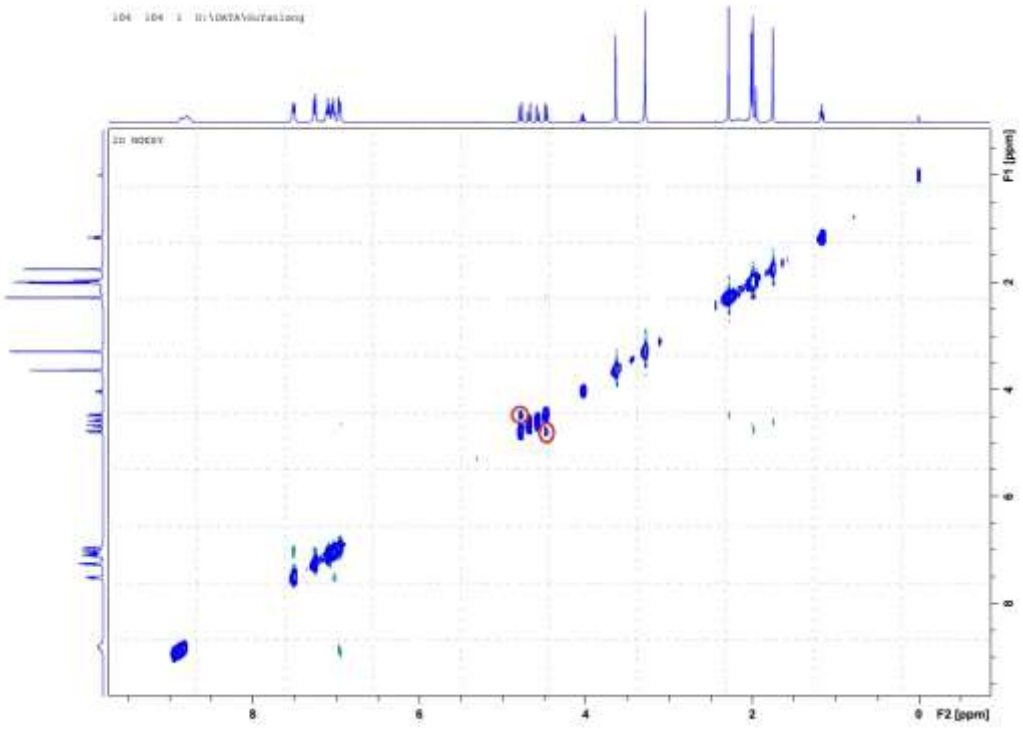


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	294.9
4	Pulse Sequence	zg30
5	Number of Scans	16
6	Pulse Width	8.9200
7	Acquisition Time	3.4079
8	Acquisition Date	2017-10-12T22:59:00
9	Modification Date	2017-10-12T22:59:20
10	Spectrometer Frequency	400.15
11	Spectral Width	9615.4
12	Lowest Frequency	-2344.9
13	Nucleus	1H
14	Acquired Size	32768
15	Spectral Size	65536

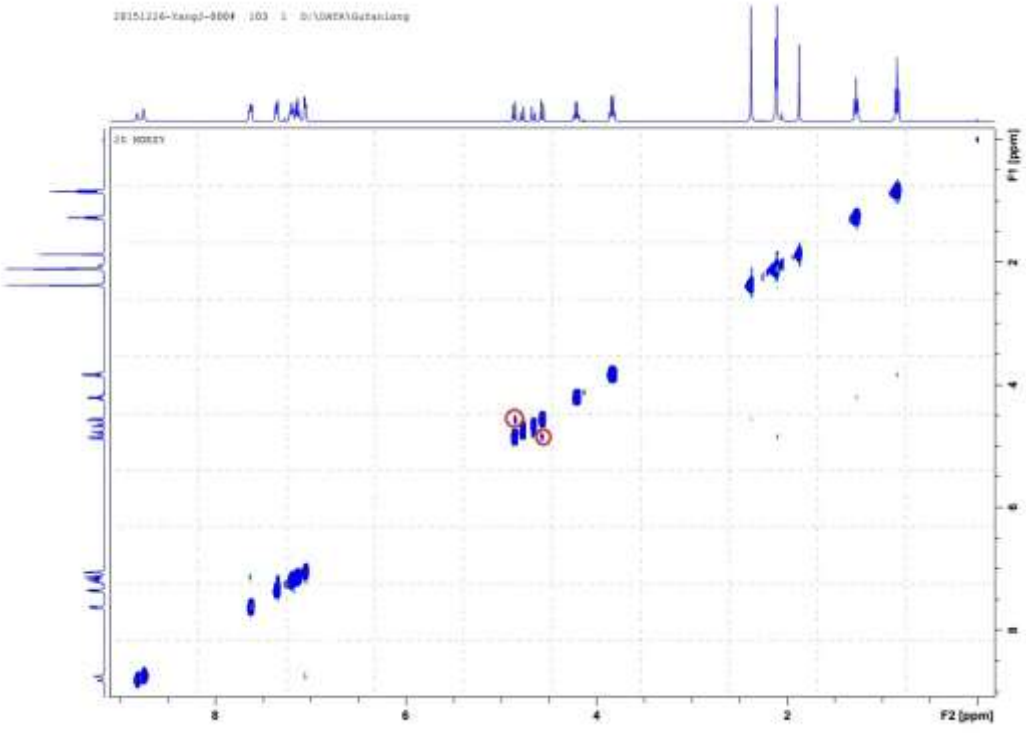


	Parameter	Value
1	Origin	Bruker BioSpin GmbH
2	Solvent	CDCl3
3	Temperature	295.6
4	Pulse Sequence	zgpg30
5	Number of Scans	300
6	Pulse Width	10.0000
7	Acquisition Time	1.1534
8	Acquisition Date	2017-10-12T23:16:00
9	Modification Date	2017-10-12T23:16:49
10	Spectrometer Frequency	100.62
11	Spectral Width	28409.1
12	Lowest Frequency	-4143.7
13	Nucleus	13C
14	Acquired Size	32768
15	Spectral Size	65536





^{1}H-^{1}H NOESY of **4y**



^{1}H-^{1}H NOESY of **4z**