Supporting information

All solvents and reagents were obtained from commercial suppliers. Reagents were used without purification, and solvents were dried through the general protocol reported by Williams and Lawton [1]. ^{1}H (400 MHz) NMR spectra were recorded on a Bruker AVⅢ 400 MHz spectrometer. Chemical shifts are reported in ppm using the 7.26 signal of $CDCl_3$ (^{1}H-NMR) or the 2.51 signal of DMSO-d_6 (^{1}H-NMR) as references and the 77.0 signal of $CDCl_3$ (^{13}C-NMR) and the 40.0 signal of DMSO-d_6 (^{13}C-NMR) as references. ESI Mass spectra (MS) were obtained on a Agilent 6110 Mass Spectrometer (for **3a** – **3o**, **4b - 4e** and **4g** – **4h**) and Waters MALDI SYNAPT Q-TOF Mass Spectrometer (for **4f**). As for GC-MS analysis of **3a** from batch or flow, reaction samples were diluted with 1 ml ethyl acetate and analyzed using a GC-TOFMS apparatus (LECO, MI, USA) equipped with a HV-5 column (Agilent, Santa Clara, CA, USA), and the column temperatures were programmed from 60 to 250 °C at a rate of 20 °C/min and maintained at 250 °C for 10 mins.

Flow experiments were performed on a self-assembled continuous flow set-up (Figures S1and S2). Two HPLC pumps (Sanotac AP0010 and AP0012) were used to deliver the reactants continuously into the flow reactor. A T-shaped mixer (Peek 1/32″ inner diameter) was used to mix two separate feed streams and the mixture was channeled into the flow reactor. The coil reactor was made of PTFE tubing (Poly tetrafluoroethylene, 1/16″ inner diameter) with an internal volume of 120.0 mL.

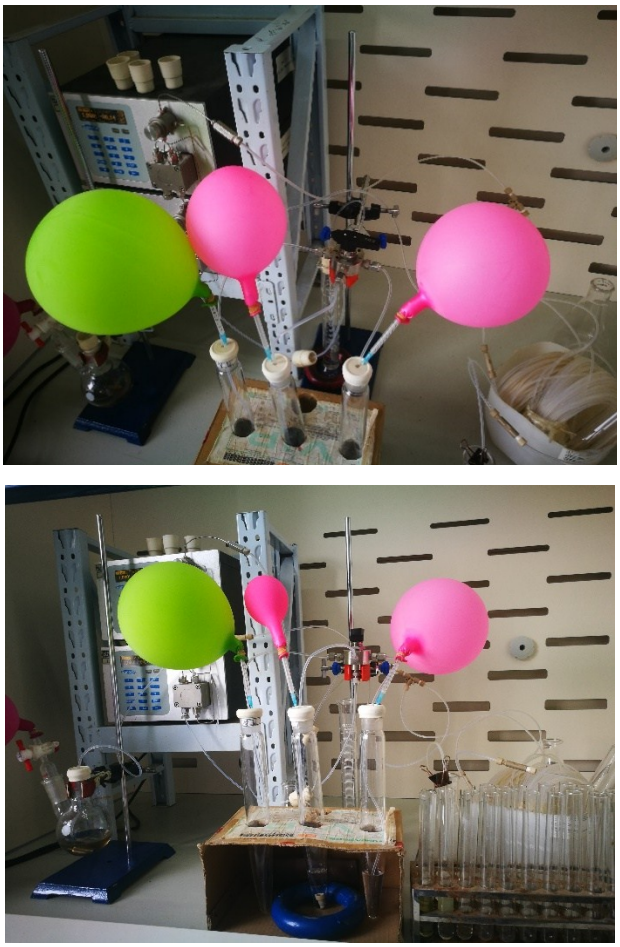


Figure S1 Continuous flow reaction system used in this study.

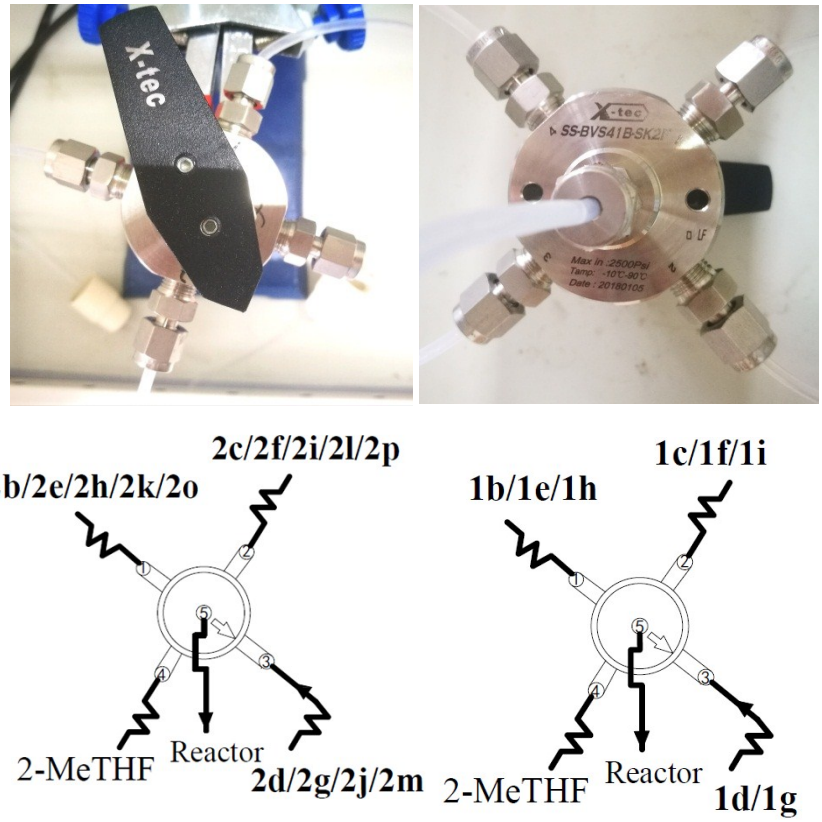
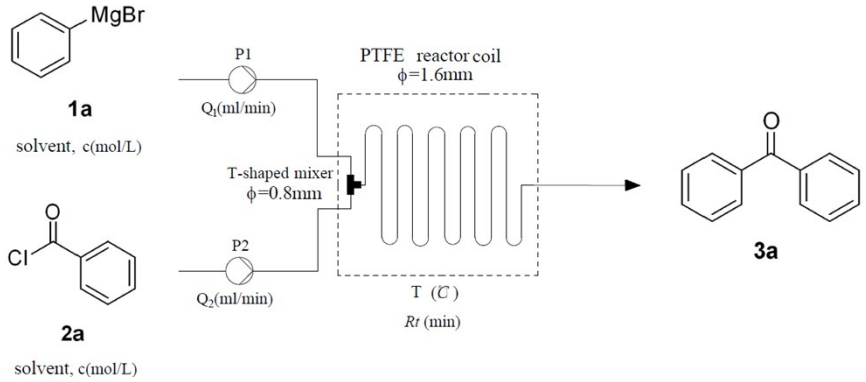


Figure S2 Five-way valve

Procedure for the coupling between phenylmagnesium bromide and benzoyl chloride in batch

To a stirred solution of phenylmagnesium bromide **1a** (0.6 M in 2-MeTHF, 10 mL, 6 mmol) at ambient temperature was added dropwise a solution of benzoyl chloride **2b** (465 μL, 4 mmol) in dry 2-MeTHF (10 mL) for 3 minutes with the stirring rate of 1300 r/min (85-1 Magnetic stirrer, Shanghai Sile Instrument Co., Ltd. ShangHai, China). The internal temperature of the reaction increased from 25 °C to 40 °C indicated by a thermometer. The reaction mixture was stirred for 60 mins at ambient temperature and quenched with 1N HCl (6 mL) solution, the organic layer was separated and concentrated in vacuo to afford the crude product. The residual aqueous layer was extracted with ethyl acetate (3 × 15 mL), the crude product was dissolved in the combined ethyl acetate phase and then dried (MgSO4), filtered, the ethyl acetate was evaporated in vacuo and chromatographed on silica gel (200-300 mesh, LiangChen GuiYuan Inc. Huoshan, China) with 2% of EtOAc in Hexanes as eluent to yield benzophenone (248 mg, 34%) as solid.

Optimal procedure for the coupling between phenylmagnesium bromide and benzoyl chloride in continuous flow

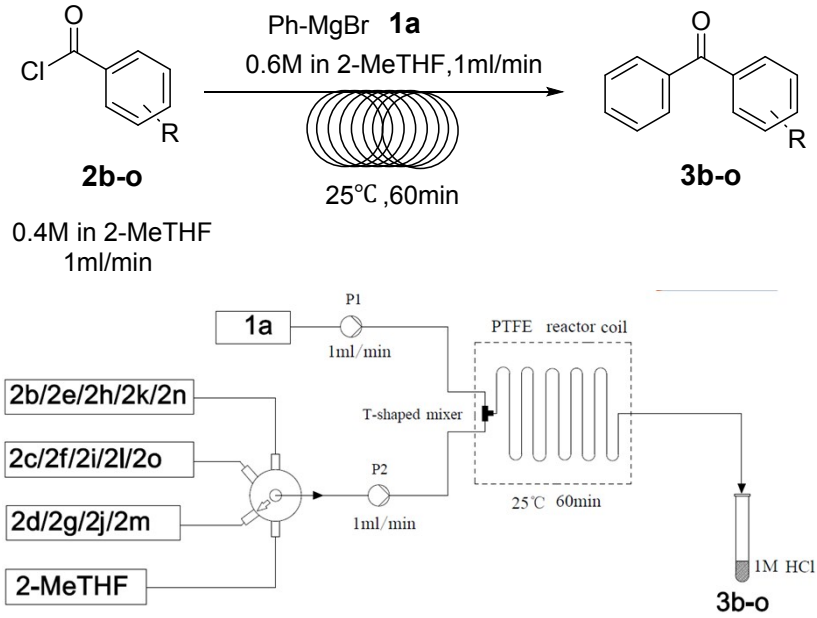


Pilot optimization studies were performed using phenylmagnesium bromide and benzoyl chloride using a simple continuous flow system. The temperature, solvent, reactant equivalents, and residence times were methodically varied and each reaction was monitored using TLC analysis. The final conditions were selected based on the best percent conversion of benzoyl chloride to benzophenone and were used for the other substrates.

A solution of phenylmagnesium bromide **1a** (1 mL/min, 0.6 M, 2-MeTHF, 10 mL) and a solution of benzoyl chloride **2a** (1 mL/min, 0.4 M, 2-MeTHF, 10 mL) were combined in the T-shaped mixer and reacted in the coil reactor for 60 min at room temperature. The reaction stream (20 mL) was collected at a steady state in a flask with 1N HCl (6 mL) after 1/6 of the reactor volume had eluted. The organic layer was separated and concentrated *in vacuo* to afford the crude product, with recycling of 2-MeTHF. The residual aqueous layer was extracted with ethyl acetate (3×15 mL), the crude product was dissolved in the combined ethyl acetate phase and then dried ($MgSO_4$), filtered, the ethyl acetate was evaporated *in vacuo* and chromatographed on silica gel (200-300 mesh, LiangChen GuiYuan Inc. Huoshan, China) with 2% of EtOAc in Hexanes as eluent to yield benzophenone (619 mg, 85%) as solid. ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.75 - 7.73 (m, 4H), 7.71 - 7.67 (m, 2H), 7.59 - 7.55 (m, 4H); MS (ESI): *m/z* calcd. for $C_{13}H_{11}O$ $[M+H]^+$ 183.1, found 183.1.

General procedure for synthesis of 3b–o through the reaction of phenylmagnesium bromide 1a with acyl chloride 2b–o under continuous flow

parallel system (exemplified by 3b-3d)



A solution of phenylmagnesium bromide **1a** (1 mL/min, 0.6 M, 2-MeTHF, 10 mL) and a solution of 2-methylbenzoyl chloride **2b** (1 mL/min, 0.4 M, 2-MeTHF, 10 mL) were pumped into the reactor by P1 (Sanotac AP0010) and P2 (Sanotac AP0012) respectively. After 10 min, P1 and P2 were stopped, the valve was transferred from **2b** to 2-MeTHF, and 2-MeTHF was delivered at the rate of 2 mL/min for 5 min by P2. After P2 was stopped, the valve was transferred from 2-MeTHF to **2c**, and P1 and P2 worked at the rate of 1 mL/min for 10 min, and then stopped. After the valve was transferred from **2c** to 2-MeTHF, P2 worked at the rate of 2 mL/min for 5 min, then stopped. Then the valve was transferred from 2-MeTHF to **2d**, and P1 and P2 pumped **1a** and **2d** at the rate of 1 mL/min for 10 min. The reaction stream (20 mL) for **3b**, **3c** and **3d** were collected separately at steady states in a flask with 1N HCl (6 mL) after 1/6 of the reactor volume had eluted. The organic layer was separated and concentrated *in vacuo* to afford the crude product, with recycling of 2-MeTHF. The residual aqueous layer was extracted with ethyl acetate (3 × 15 mL), the crude product was dissolved in the combined ethyl acetate phase and then dried ($MgSO_4$), filtered, the ethyl acetate was evaporated *in vacuo* and chromatographed on silica gel (200-300 mesh, LiangChen GuiYuan Inc. Huoshan, China) with 2% of EtOAc in Hexanes as eluent to yield **3b** (620mg, 79%), **3c** (447mg, 57%) and **3d** (502 mg, 64%) respectively.

*phenyl(o-tolyl)methanone (**3b**)*: Yield 79%, pale yellow oil; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.72 - 7.66 (m, 3H), 7.57 - 7.54 (m, 2H), 7.49 - 7.45 (m, 1H), 7.39 - 7.29 (m, 3H), 2.24 (s, 3H); ^{13}C NMR (100MHz, DMSO-d_6) δ: 198.2, 138.8, 137.5, 136.2, 134.0, 131.4, 130.8, 130.1, 129.3, 128.5, 125.9, 19.9; MS (ESI): *m/z* calcd. for $C_{14}H_{13}O$ $[M+H]^+$ 197.1, found 197.1.

*phenyl(m-tolyl)methanone (**3c**)*: Yield 57%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.81 - 7.79 (m, 2H), 7.63 - 7.62(m, 1H), 7.59 - 7.57 (m, 2H), 7.50 - 7.46 (m, 2H), 7.41 - 7.34 (m, 2H), 2.42 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ:196.9 , 138.2, 137.8, 137.7, 133.2, 132.3, 130.4, 130.0, 128.2, 128.1 , 127.3, 21.4; MS (ESI): *m/z* calcd. for $C_{14}H_{13}O$ $[M+H]^+$ 197.1, found 197.0.

*phenyl(p-tolyl)methanone (**3d**)*: Yield 64%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.80 -7.77 (m, 2H), 7.72 (d, J = 8.4 Hz, 2H), 7.60 - 7.55 (m, 1H), 7.50 - 7.45 (m, 2H), 7.28 (d, J = 7.6 Hz, 2H), 2.44 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.5, 143.2, 138.0, 134.9, 132.1, 130.3, 129.9, 129.0, 128.2, 21.7; MS (ESI): *m/z* calcd. for $C_{14}H_{13}O$ $[M+H]^+$ 197.1, found197.1.

*(2-fluorophenyl)(phenyl)methanone (**3e**)*: Yield 85%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.79 - 7.65 (m, 4H), 7.61 - 7.55 (m, 3H), 7.42 - 7.37 (m, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 193.2, 159.7 (d, $J_{C,F}$ = 248.0 Hz), 137.2, 134.4, 134.1 (d, $J_{C,F}$ = 8.0 Hz), 130.9 (d, $J_{C,F}$ = 2.8 Hz), 129.9, 129.4, 126.9 (d, $J_{C,F}$ = 15.0 Hz), 125.3 (d, $J_{C,F}$ = 3.0 Hz), 116.7 (d, $J_{C,F}$ = 21.2 Hz); MS (ESI): *m/z* calcd. for $C_{13}H_9FNaO$ $[M+Na]^+$ 223.1, found 223.1.

*(3-fluorophenyl)(phenyl)methanone (**3f**)*: Yield 65%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.81 - 7.79 (m, 2H), 7.63 - 7.56 (m, 2H), 7.52 - 7.44 (m, 4H), 7.31 - 7.27 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 195.3 (d, $J_{C,F}$ = 2.0 Hz), 162.5 (d, $J_{C,F}$ = 246.7 Hz), 139.7 (d, $J_{C,F}$ = 6.1 Hz), 137.1, 132.8, 130.0, 129.9, 128.4, 125.8 (d, $J_{C,F}$ = 3.0Hz), 119.4 (d, $J_{C,F}$ = 21.2 Hz), 116.8 (d, $J_{C,F}$ = 22.3 Hz); MS (ESI): *m/z* calcd. for $C_{13}H_{10}FO$ $[M+H]^+$ 201.1, found 201.1.

*(4-fluorophenyl)(phenyl)methanone (**3g**)*: Yield 55%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.85 - 7.81 (m, 2H), 7.74 - 7.67 (m, 3H), 7.60 - 7.55 (m, 2H), 7.42 - 7.38(m, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 194. 9, 165.2 (d, $J_{C,F}$ = 249.7 Hz), 137.4, 134.0 (d,

$J_{C,F}$ = 2.9 Hz), 133.1 (d, $J_{C,F}$ = 7.9 Hz), 133.0, 130.0, 129.1, 116.1 (d, $J_{C,F}$ = 21.8 Hz); MS (ESI): *m/z* calcd. for $C_{13}H_{10}FO$ $[M+H]^+$ 201.1, found 201.1.

*(3-chlorophenyl)(phenyl)methanone (**3h**)*: Yield 82%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.78 - 7.67 (m, 6H), 7.63 - 7.58 (m, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ:194.9, 139.5, 136.8, 133.9, 133.6, 132.8, 131.0, 130.2, 129.4, 129.2, 128.7; MS (ESI): *m/z* calcd. for $C_{13}H_{10}ClO$ $[M+H]^+$ 217.0, found 217.0.

*phenyl(3-(trifluoromethyl)phenyl)methanone (**3i**)*: Yield 77%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 8.08 - 8.02 (m, 3H), 7.85 - 7.71 (m, 4H), 7.62 - 7.59 (m, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 195.0, 138.4, 136.7, 134.0, 133.7, 130.4, 130.3, 129.8 (q, $J_{C,F}$ = 32.0 Hz), 129.4 (q, $J_{C,F}$ = 3.6 Hz), 129.2, 126.1 (q, $J_{C,F}$ = 3.8 Hz), 124.2 (q, $J_{C,F}$ = 270.8 Hz); MS (ESI): *m/z* calcd. for $C_{14}H_{10}F_3O$ $[M+H]^+$ 251.1, found 251.1.

*phenyl(4-(trifluoromethyl)phenyl)methanone (**3j**)*: Yield 83%; ^{1}H NMR (400 MHz, $CDCl_3$) δ:7.90 (d, J =7.6Hz, 2H), 7.82 - 7.80 (m, 2H), 7.76 (d, J =7.6Hz, 2H), 7.65 - 7.61 (m, 1H), 7.54 - 7.50 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ:195.5, 140.8, 136.8, 133.9, 133.6, 133.0, 130.1(d, $J_{C,F}$ = 3.0 Hz), 128.5, 125.3(q, $J_{C,F}$ = 3.8 Hz), 122.3; MS (ESI): *m/z* calcd. for $C_{14}H_{10}F_3O$ $[M+H]^+$ 251.1, found 251.0.

*(3-methoxyphenyl)(phenyl)methanone (**3k**)*: Yield 60%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.76 - 7.74 (m, 2H), 7.70 - 7.67 (m, 1H), 7.59 - 7.55 (m, 2H), 7.50 - 7.46 (m, 1H), 7.28 - 7.25 (m, 3H), 3.82 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 196.0, 159.7, 138.9, 137.5, 133.2, 130.2, 130.1, 129.0, 122.6, 119.1, 114.6, 55.8; MS (ESI): *m/z* calcd. for $C_{14}H_{13}O_2$ $[M+H]^+$ 213.1, found 213.0.

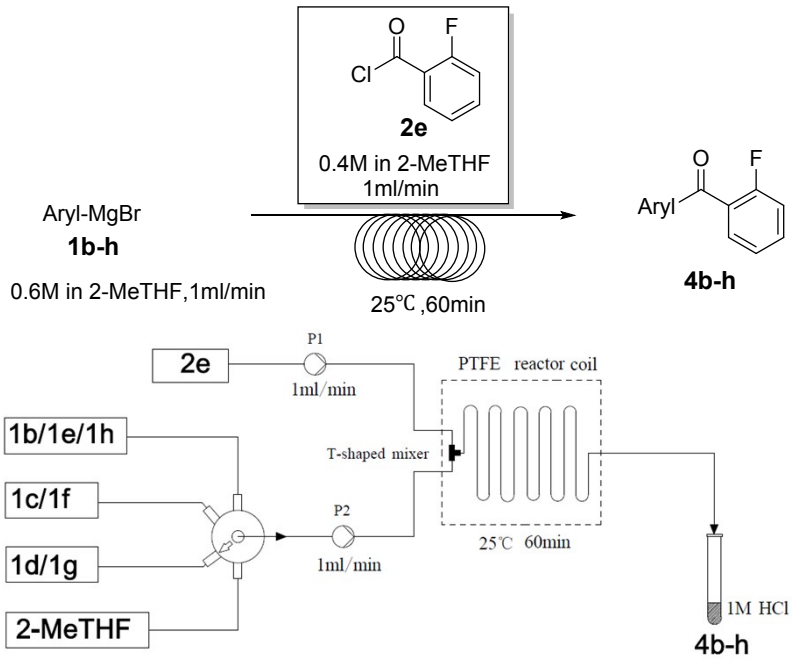
*(4-methoxyphenyl)(phenyl)methanone (**3l**)*: Yield 61%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.78 -7.74 (m, 2H), 7.70 - 7.64 (m, 3H), 7.58 - 7.53 (m, 2H), 7.12 - 7.10 (m, 2H), 3.87 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 194.9, 163.4, 138.2, 132.7, 132.6, 129.8, 129.7, 128.9, 114.4, 56.0; MS (ESI): *m/z* calcd. for $C_{14}H_{13}O_2$ $[M+H]^+$ 213.1, found 213.1.

*4-benzoylbenzonitrile (**3m**)*: Yield 43%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.89 - 7.87 (m, 2H), 7.81 - 7.78 (m, 4H), 7.67 - 7.62 (m, 1H), 7.54 - 7.50 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 195.0, 141.3, 136.4, 133.3, 132.2, 130.2, 130.1, 128.6, 118.0, 115.7; MS (ESI): *m/z* calcd. for $C_{14}H_{10}NO$ $[M+H]^+$ 208.1, found 208.1.

*naphthalen-2-yl(phenyl)methanone (**3n**)*: Yield 42%; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.27 (s, 1H), 7.95 - 7.90 (m, 4H), 7.88 - 7.85(m, 2H), 7.65 - 7.60 (m, 2H), 7.58 - 7.49 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.7, 137.9, 135.3, 134.8, 132.4, 132.3, 131.9, 130.1, 129.4, 128.34, 128.32, 128.29, 127.8, 126.8, 125.8; MS (ESI): *m/z* calcd. for $C_{17}H_{13}O$ $[M+H]^+$ 233.1, found 233.0.

*2-(3-benzoylphenyl)propanenitrile (**3o**)*: Yield 56%; ^{1}HNMR (400MHz, DMSO-d_6) δ: 7.80 - 7.70 (m, 6H), 7.65 - 7.58 (m, 3H), 4.48 (q, J = 7.2Hz, 1H), 1.59 (d, J = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 195.8, 138.7, 138.1, 137.2, 133.4, 131.5, 130.2, 129.9, 129.7, 129.1, 128.3, 122.5, 30.2, 21.1; MS (ESI): *m/z* calcd. for $C_{16}H_{14}NO$ $[M+H]^+$ 236.1, found 236.1.

General procedure for synthesis of 4b-h through the reaction of aryl Grignard reagents 1b-h with 2-fluorobenzoyl chloride 2e under continuous flow parallel system (exemplified by 4b-4d)



A solution of (4-methoxyphenyl)magnesium bromide **1b** (1 mL/min, 0.6 M, 2-MeTHF, 10 mL) and a solution of 2-fluorobenzoyl chloride **2e** (1 mL/min, 0.4 M, 2-

MeTHF, 10 mL) were pumped into the reactor by P1 (Sanotac AP0010) and P2 (Sanotac AP0012) respectively. After 10 min, P1 and P2 were stopped, the valve was transferred from **1b** to 2-MeTHF, and 2-MeTHF was delivered at the rate of 2 mL/min for 5 min by P2. After P2 was stopped, the valve was transferred from 2-MeTHF to **1c**, and P1 and P2 worked at the rate of 1 mL/min for 10 min, and then stopped. After the valve was transferred from **1c** to 2-MeTHF, P2 worked at the rate of 2 mL/min for 5 min, then stopped. Then the valve was transferred from 2-MeTHF to **1d**, and P1 and P2 pumped **2e** and **1d** at the rate of 1 mL/min for 10 min. The reaction stream (20 mL) for **4b**, **4c** and **4d** were collected separately at steady states in a flask with 1N HCl (6 mL) after 1/6 of the reactor volume had eluted. The organic layer was separated and concentrated *in vacuo* to afford the crude product, with recycling of 2-MeTHF. The residual aqueous layer was extracted with ethyl acetate (3 × 15 mL), the crude product was dissolved in the combined ethyl acetate phase and then dried ($MgSO_4$), filtered, the ethyl acetate were evaporated *in vacuo* and chromatographed on silica gel (200-300 mesh, LiangChen GuiYuan Inc. Huoshan, China) with 2% of EtOAc in Hexanes as eluent to yield **4b** (396 mg, 43%), **4c** (814 mg, 95%) and **4d** (694 mg, 81%) respectively.

*(2-fluorophenyl)(4-methoxyphenyl)methanone (**4b**)*: Yield 43%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.76 (d, J = 8.8 Hz, 2H), 7.69 - 7.64 (m, 1H), 7.56 - 7.53 (m, 1H), 7.41 - 7.37 (m, 2H), 7.11 (d, J = 8.8 Hz, 2H), 3.87 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 191.5, 164.3, 159.4 (d, $J_{C,F}$ = 246.5 Hz), 133.5 (d, $J_{C,F}$ = 8.3 Hz), 132.4, 130.5(d, $J_{C,F}$ = 3.1 Hz), 129.9, 127.5 (d, $J_{C,F}$ = 15.7 Hz), 125.2 (d, $J_{C,F}$ = 3.2 Hz), 116.6 (d, $J_{C,F}$ = 21.3 Hz), 114.7, 56.2; MS (ESI): *m/z* calcd. for $C_{14}H_{12}FO_2$ $[M+H]^+$ 231.1, found 231.1.

*(2-fluorophenyl)(o-tolyl)methanone (**4c**)*: Yield 95%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.72 - 7.67 (m, 1H), 7.61 - 7.57 (m, 1H), 7.52 - 7.48 (m, 1H), 7.40 - 7.29 (m, 5H), 2.39 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 195.1, 160.5 (d, $J_{C,F}$ = 251.0 Hz), 138.5, 137.5, 135.0 (d, $J_{C,F}$ = 8.7 Hz), 132.1, 131.9, 131.4 (d, $J_{C,F}$ = 1.8 Hz), 130.1, 127.6 (d, $J_{C,F}$ = 12.4 Hz), 126.3, 125.3 (d, $J_{C,F}$ = 3.6 Hz), 117.0 (d, $J_{C,F}$ = 21.4 Hz), 20.54; MS (ESI): *m/z* calcd. for $C_{14}H_{12}FO$ $[M+H]^+$ 215.1, found 215.1.

*(2-fluorophenyl)(p-tolyl)methanone (**4d**)*: Yield 81%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.68 - 7.64 (m, 3H), 7.57 - 7.54 (m, 1H), 7.41 - 7.36 (m, 4H), 2.41 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 192.7, 159.6 (d, $J_{C,F}$ = 247.1 Hz), 145.0, 134.7, 133.8 (d, $J_{C,F}$ = 8.3 Hz), 130.7 (d, $J_{C,F}$ = 3.0 Hz), 130.1, 129.9, 127.2 (d, $J_{C,F}$ = 15.4 Hz), 125.3 (d, $J_{C,F}$ = 3.3 Hz), 116.7 (d, $J_{C,F}$ = 21.4 Hz), 21.7; MS (ESI): *m/z* calcd. for $C_{14}H_{12}FO$ $[M+H]^+$ 215.1, found 215.1.

*(2-fluorophenyl)(3-fluorophenyl)methanone (**4e**)*: Yield 74%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.74 - 7.69 (m, 1H), 7.66 - 7.54 (m, 5H), 7.43 - 7.39 (m, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 192.0, 162.6 (d, J = 244.4 Hz), 159.9 (d, $J_{C,F}$ = 248.4 Hz), 139.5 (d, $J_{C,F}$ = 6.4 Hz), 134.6 (d, $J_{C,F}$ = 8.5 Hz), 131.6 (d, $J_{C,F}$ = 7.8 Hz), 131.1 (d, $J_{C,F}$ = 2.5 Hz), 126.4 (d, $J_{C,F}$ = 2.0 Hz), 126.3 (d, $J_{C,F}$ = 10.6Hz), 125.4 (d, $J_{C,F}$ = 3.4 Hz), 121.2 (d, $J_{C,F}$ = 21.2 Hz), 116.9 (d, $J_{C,F}$ = 21.2 Hz), 115.8 (d, $J_{C,F}$ = 22.3 Hz); MS (ESI): *m/z* calcd. for $C_{13}H_9F_2O$ $[M+H]^+$ 219.1, found 219.1.

*(2-fluorophenyl)(thiophen-2-yl)methanone (**4f**)*: Yield 73%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 8.18 (d, J = 4.8 Hz, 1H), 7.70 -7.63 (m, 2H), 7.60 -7.59 (m, 1H), 7.45 - 7.37 (m, 2H), 7.28 (t, J = 4.4 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 184.9, 159.3 (d, $J_{C,F}$ = 247.8 Hz), 143.6, 137.4, 136.8, 133.9 (d, $J_{C,F}$ = 8.3 Hz), 130.4 (d, $J_{C,F}$ = 2.7 Hz), 129.6, 127.0 (d, $J_{C,F}$ = 15.2 Hz), 125.2 (d, $J_{C,F}$ = 3.3 Hz), 116.9 (d, $J_{C,F}$ = 21.2 Hz); MS (ESI): *m/z* calcd. for $C_{11}H_8FOS$ $[M+H]^+$ 207.0, found 207.0.

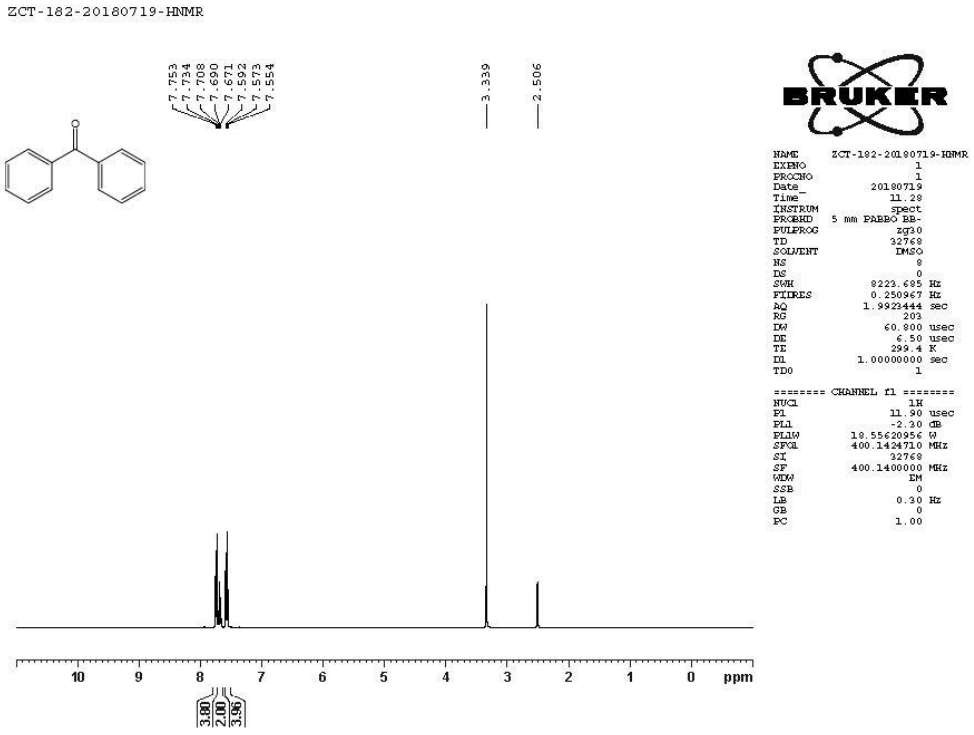
*(2,4-dimethoxyphenyl)(2-fluorophenyl)methanone (**4g**)*: Yield 35%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.61 - 7.48 (m, 3H), 7.31 - 7.23 (m, 2H), 6.67 - 6.64 (m, 2H), 3.86 (s, 3H), 3.60 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 190.5, 164.9, 161.1, 160.1 (d, $J_{C,F}$ = 248.6 Hz), 133.6 (d, $J_{C,F}$ = 8.5 Hz), 132.8, 130.4 (d, $J_{C,F}$ = 2.8 Hz), 129.6 (d, $J_{C,F}$ = 13.6 Hz), 124.8 (d, $J_{C,F}$ = 3.4 Hz), 121.5, 116.1 (d, $J_{C,F}$ = 21.9 Hz), 106.5, 99.1, 56.2, 56.1; MS (ESI): *m/z* calcd. for $C_{15}H_{14}FO_3$ $[M+H]^+$ 261.1, found 261.1.

*(4-chlorophenyl)(2-fluorophenyl)methanone (**4h**)*: Yield 81%; ^{1}H NMR (400 MHz, DMSO-d_6) δ: 7.79 (d, J = 8.4 Hz, 2H), 7.73 - 7.68 (m, 1H), 7.66 (d, J = 8.4 Hz, 2H), 7.64 - 7.55 (m, 1H), 7.48 - 7.37 (m, 2H); ^{13}C NMR (100 MHz, DMSO-d_6) δ: 192.1, 159.7(d, $J_{C,F}$ = 248.2 Hz), 139.3, 135.9, 134.4(d, $J_{C,F}$ = 8.4 Hz), 131.7, 131.0(d, $J_{C,F}$ =

2.7 Hz), 129.5, 126.5(d, $J_{C,F}$ = 14.6 Hz), 125.4(d, $J_{C,F}$ = 3.5Hz), 116.8(d, $J_{C,F}$ = 21.3Hz); MS (ESI): *m/z* calcd. for $C_{13}H_9ClFO$ $[M+H]^+$ 235.0, found 235.1.

Reference

1. D. B. G. Williams., and M. Lawton., *J. Org. Chem*., **2010**, *75 (24)*, 8351–8354.



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Sample Name : ZCT-182-20180713

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Injection Date : 13-Jul-18, 11:03:02
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\PURGE.M
Last changed : 7/10/2018 1:23:46 PM
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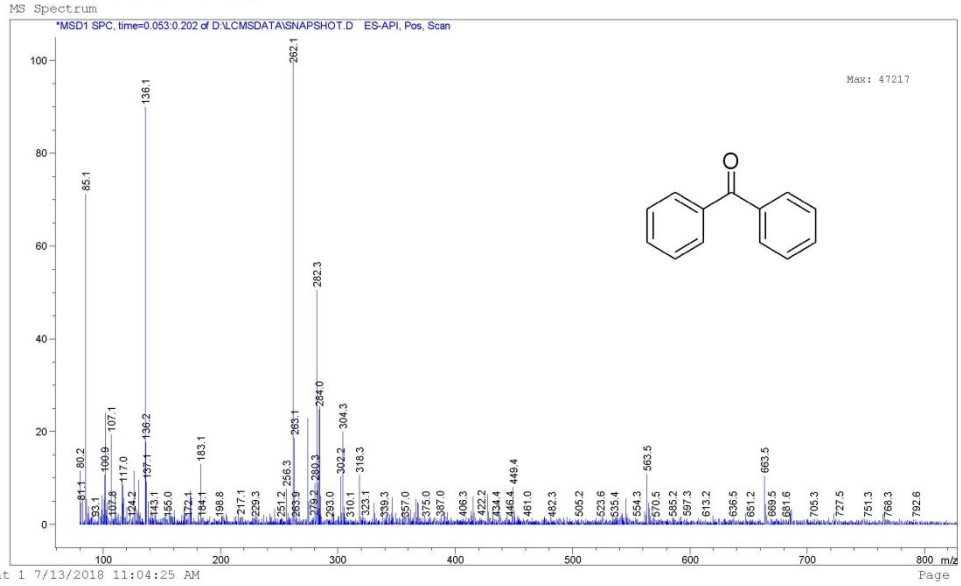
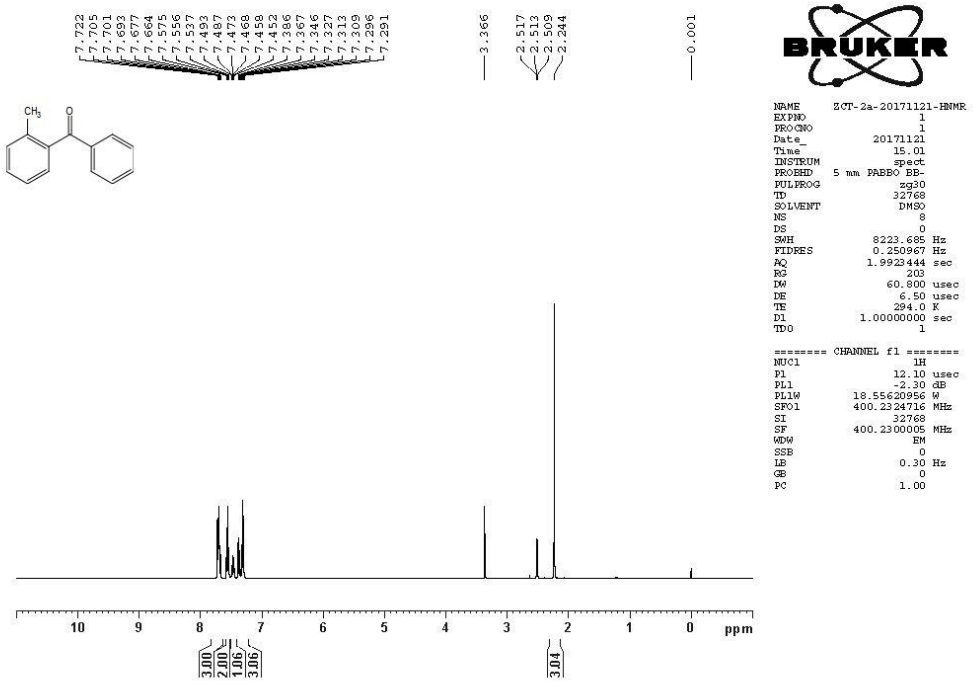
MS Spectrum



ZCT-2a-20171121-HNMR



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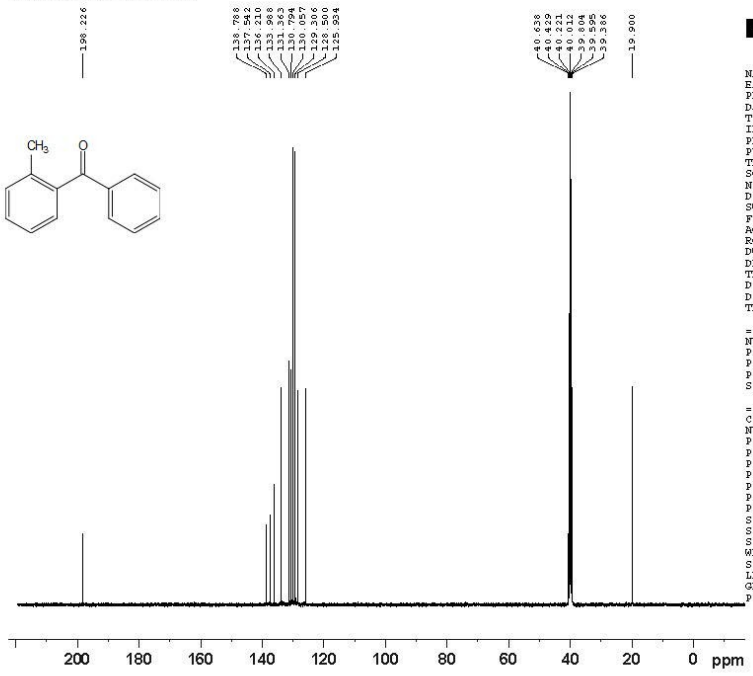
EXPNO	1
PROCNO	1
Date_	20171121
Time	15.01
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	294.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	12.10 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.2334716 MHz
SI	32768
SF	400.2300005 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-2a-20180119-CNMR



BRUKER

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EXPNO	1
PROCNO	1
Date_	20180120
Time	3.43
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.1 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.00 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6479773 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.11 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.42412052 W
PL13W	0.42412052 W
SFO2	400.2316009 MHz
SI	32768
SF	100.6379136 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2a

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:06:54
Acq. Method : GENERAL.M
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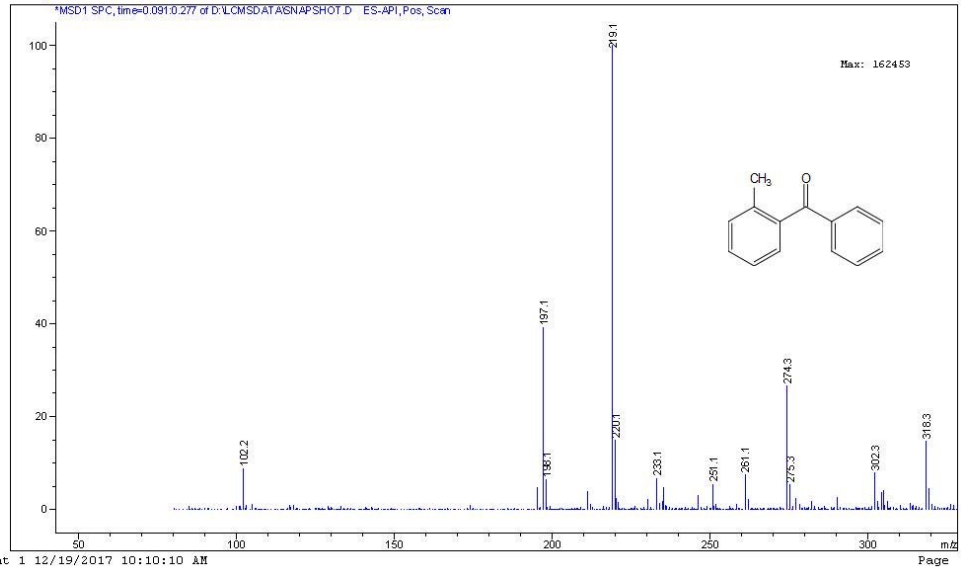
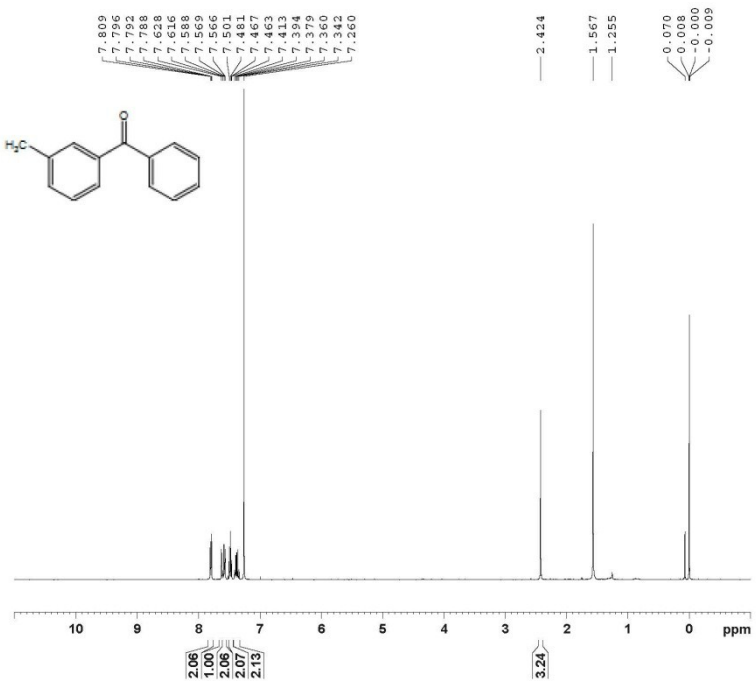
MS Spectrum



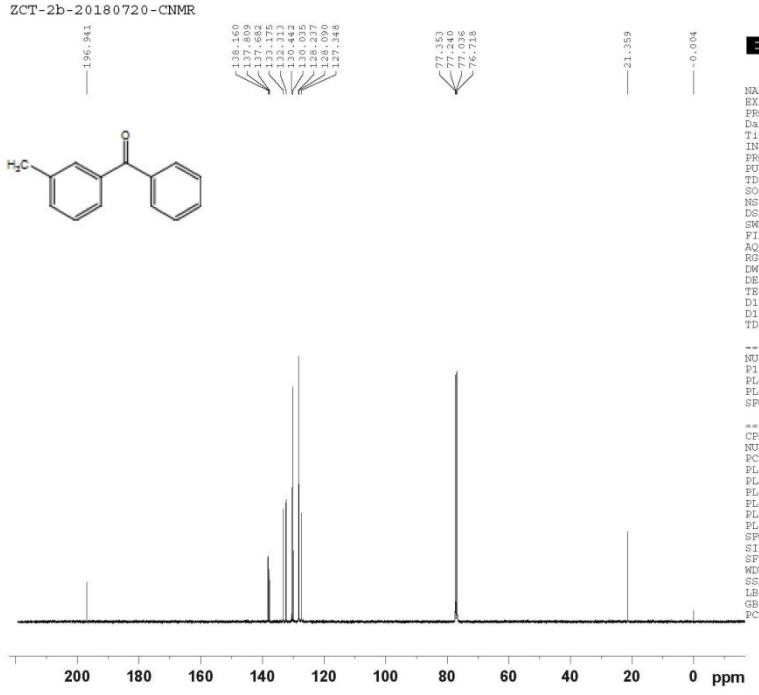
ZCT-2b-20171122-HNMR



BRUKER

NAME	ZCT-2b-20171122-HNMR
EXPNO	1
PROCNO	1
Date_	20171122
Time	11.54
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.6 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1400091 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-2b-20180720-CNMR



BRUKER

NAME	ZCT-2b-20180720-CNMR
EXPNO	1
PROCNO	1
Date_	20180721
Time	1.59
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	301.3 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	11.20 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6253446 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.25 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.41066650 W
PL13W	0.42412052 W
SFO2	400.1416006 MHz
SI	32768
SF	100.6152829 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2b

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:11:34
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
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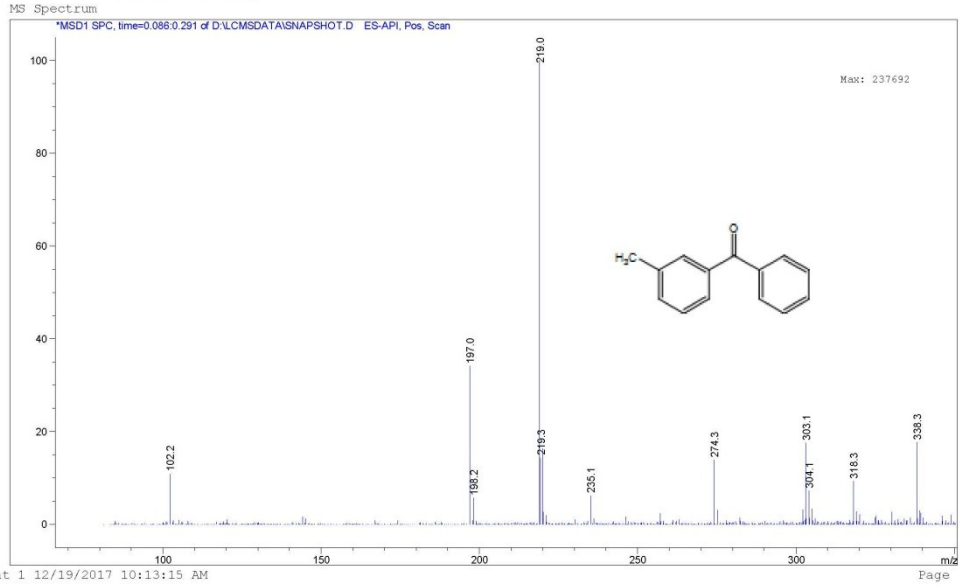
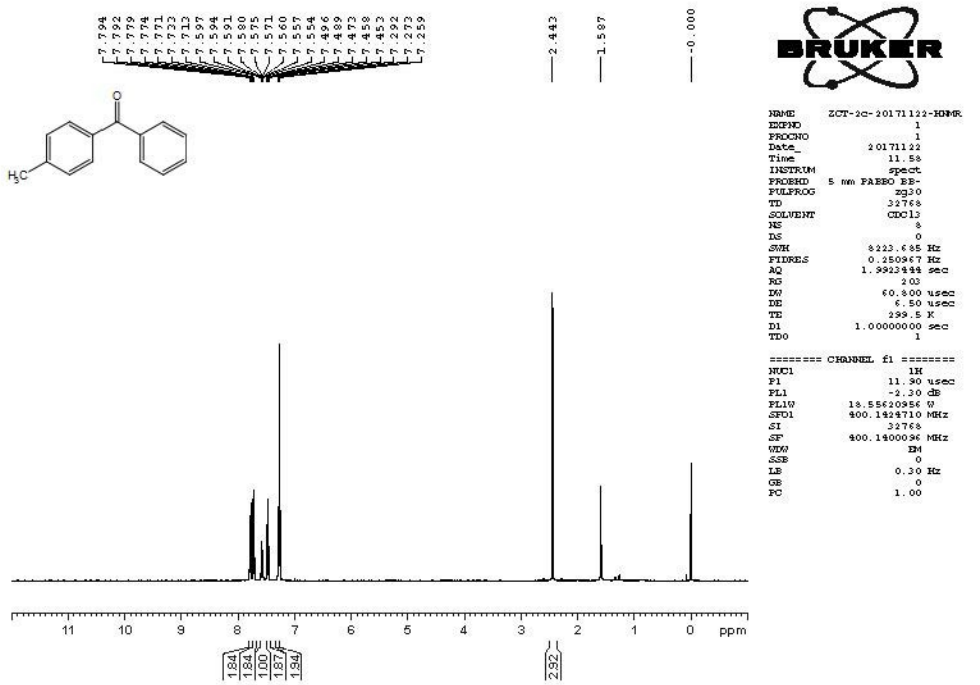
MS Spectrum



ZCT-2c-20171122-HNMR



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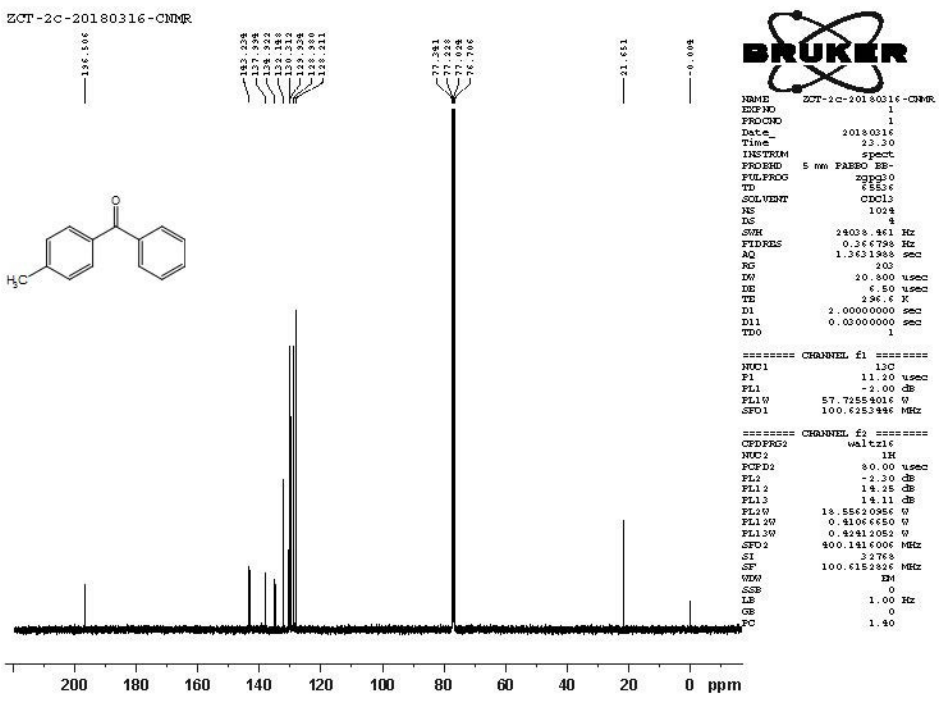
NAME	ZCT-2c-20171122-HNMR
EXPNO	1
PROCNO	1
Date_	20171122
Time	11.58
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923494 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.5 K
D1	1.00000000 sec
TD0	1

======== CHANNEL f1 ========

NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1400096 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00



Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2c

Acq. Operator :
Location : P1-F-01

Injection Date : 19-Dec-17, 10:14:40
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
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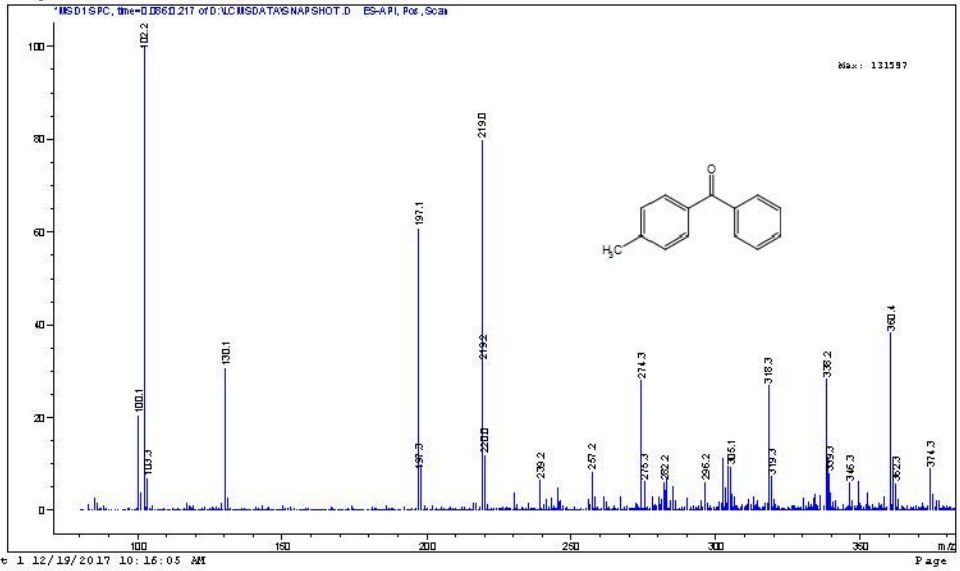
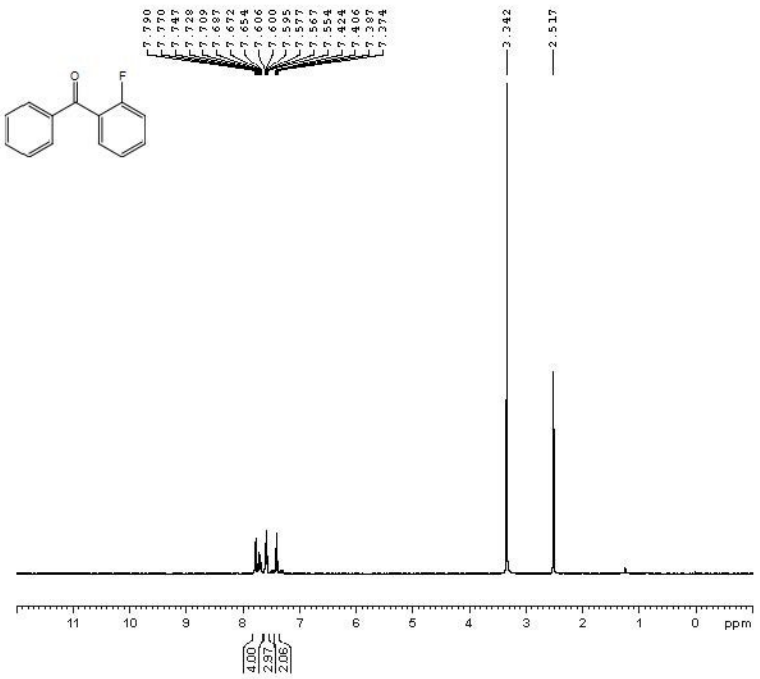
MS Spectrum



ZCT-2d-20171124-HNMR



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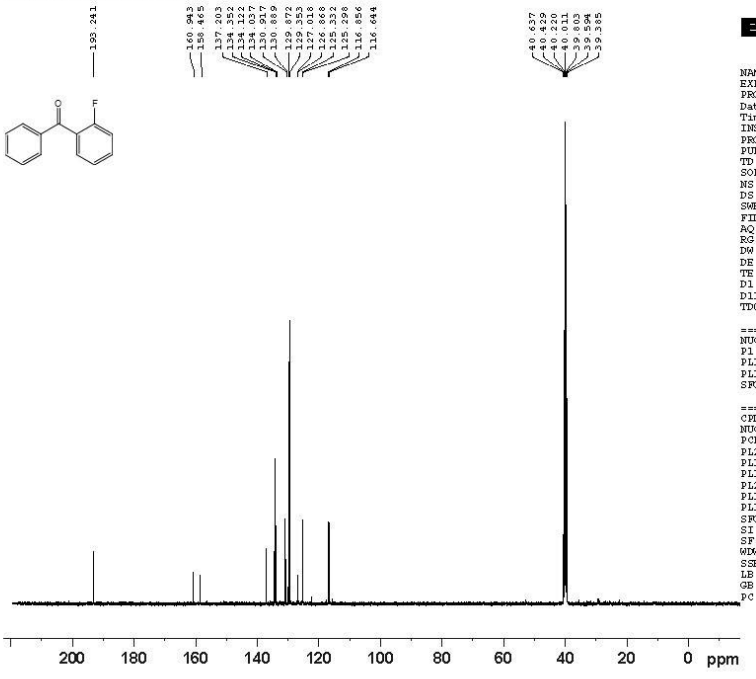
NAME            ZCT-2d-20171124-HNMR
EXPNO                              1
PROCNO                             1
Date_                       20171124
Time                           11.35
INSTRUM                        spect
PROBHD    5 mm PABBO BB-
PULPROG                        zg30
TD                            32768
SOLVENT                        DMSO
NS                                 8
DS                                 0
SWH                     8223.685 Hz
FIDRES                     0.250967 Hz
AQ                      1.9923444 sec
RG                               203
DW                          60.800 usec
DE                           6.50 usec
TE                          299.5 K
D1                      1.00000000 sec
TD0                                1

======== CHANNEL f1 ========
NUC1                           1H
P1                          11.90 usec
PL1                         -2.30 dB
PL1W                   18.55620956 W
SFO1                  400.1424710 MHz
SI                            32768
SF                    400.1399956 MHz
WDW                            EM
SSB                             0
LB                           0.30 Hz
GB                              0
PC                           1.00
```

ZCT-2d-20180119-CNMR



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NAME            ZCT-2d-20180119-CNMR
EXPNO                              1
PROCNO                             1
Date_                       20180120
Time                           5.48
INSTRUM                        spect
PROBHD    5 mm PABBO BB-
PULPROG                      zgpg30
TD                            65536
SOLVENT                        DMSO
NS                             1024
DS                                4
SWH                    24038.461 Hz
FIDRES                     0.366798 Hz
AQ                      1.3631988 sec
RG                               203
DW                          20.800 usec
DE                           6.50 usec
TE                          295.3 K
D1                      2.00000000 sec
D11                     0.03000000 sec
TD0                                1

======== CHANNEL f1 ========
NUC1                           13C
P1                          12.00 usec
PL1                         -2.00 dB
PL1W                   57.72554016 W
SFO1                  100.6479773 MHz

======== CHANNEL f2 ========
CPDPRG2                    waltz16
NUC2                           1H
PCPD2                       80.00 usec
PL2                         -2.30 dB
PL12                        14.11 dB
PL13                        14.11 dB
PL2W                   18.55620956 W
PL12W                   0.42412052 W
PL13W                   0.42412052 W
SFO2                  400.2316009 MHz
SI                            32768
SF                    100.6379129 MHz
WDW                            EM
SSB                             0
LB                           1.00 Hz
GB                              0
PC                           1.40
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Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2d

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:17:30
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
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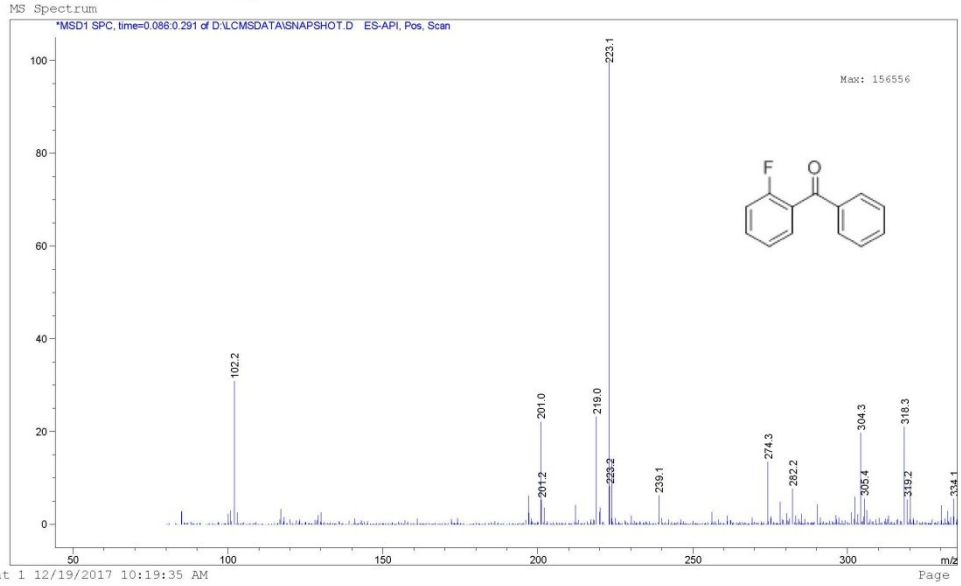
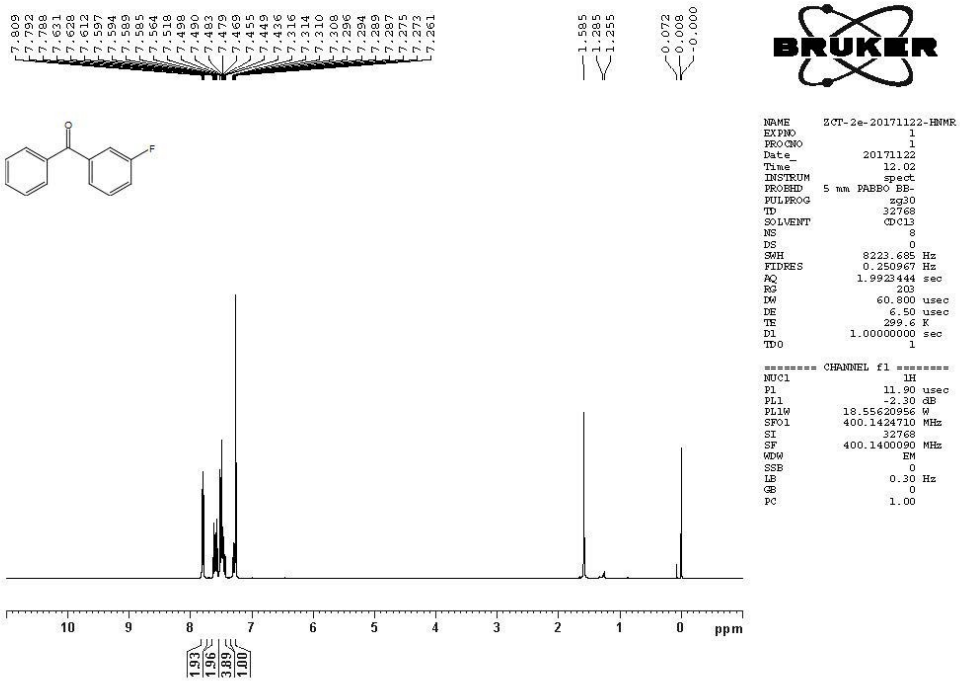
MS Spectrum



ZCT-2e-20171122-HNMR



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EXPNO	1
PROCNO	1
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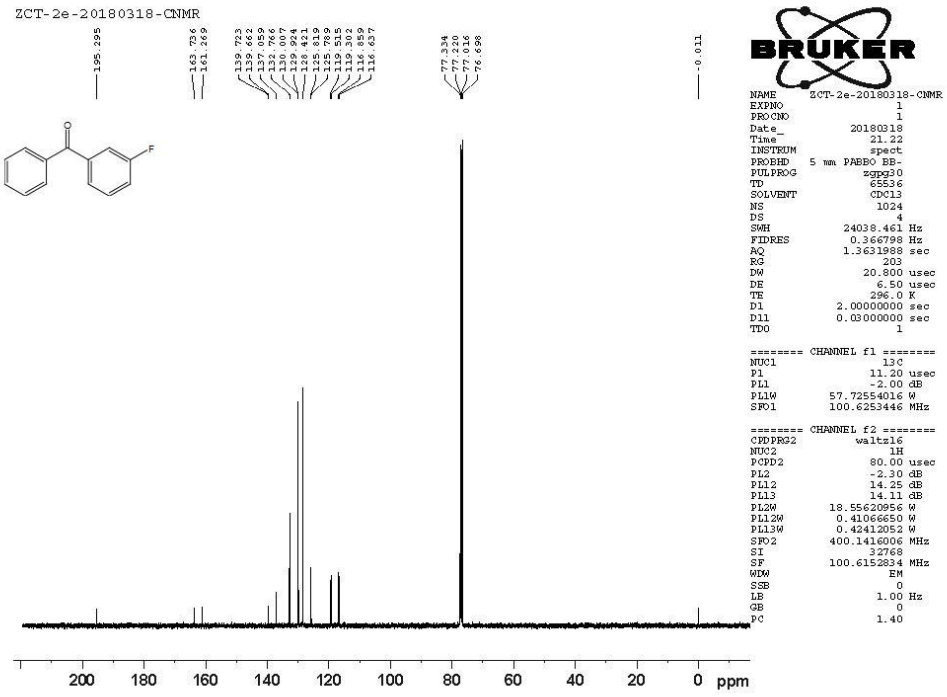
Time	12.02
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.6 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1400090 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00



BRUKER

NAME	ZCT-2e-20180318-CNMR
EXPNO	1
PROCNO	1
Date_	20180318
Time	21.22
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	296.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	11.20 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6253446 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.25 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.41066650 W
PL13W	0.42412052 W
SFO2	400.1416006 MHz
SI	32768
SF	100.6152834 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2e

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:20:57
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
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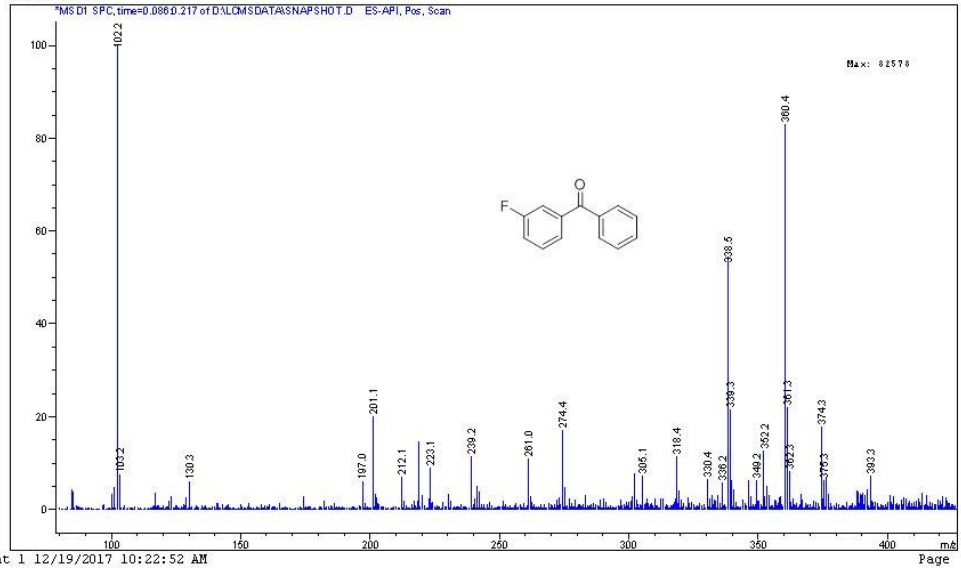
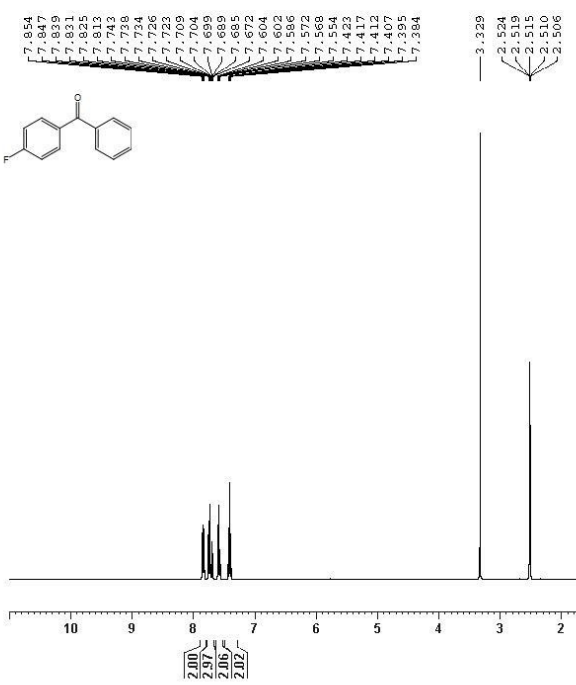
MS Spectrum

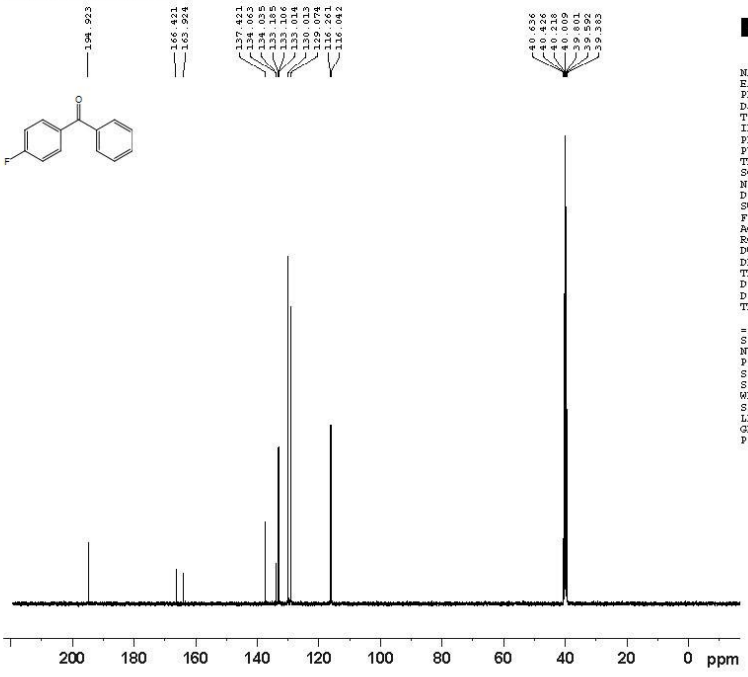


ZCT-2f-20180306-HNMR



NAME	ZCT-2f-20180306-HNMR
EXPNO	1
PROCNO	1
Date_	20180306
Time	13.53
INSTRUM	spect
PROBHD	5 mm PABBO BB/
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8012.820 Hz
FIDRES	0.244532 Hz
AQ	2.0447731 sec
RG	203
DW	62.400 usec
DE	6.50 usec
TE	298.1 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	400.1424710 MHz
NUC1	1H
P1	13.35 usec
SI	65536
SF	400.1399968 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-2f-20180308-CNMR



NAME	ZCT-2f-20180308-CNMR
EXPNO	1
PROCNO	1
Date_	20180308
Time	16.09
INSTRUM	spect
PROBHD	5 mm PABBO BB/
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	446
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.1 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6253441 MHz
NUC1	13C
P1	11.00 usec
SI	32768
SF	100.6152813 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2f

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:24:15
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
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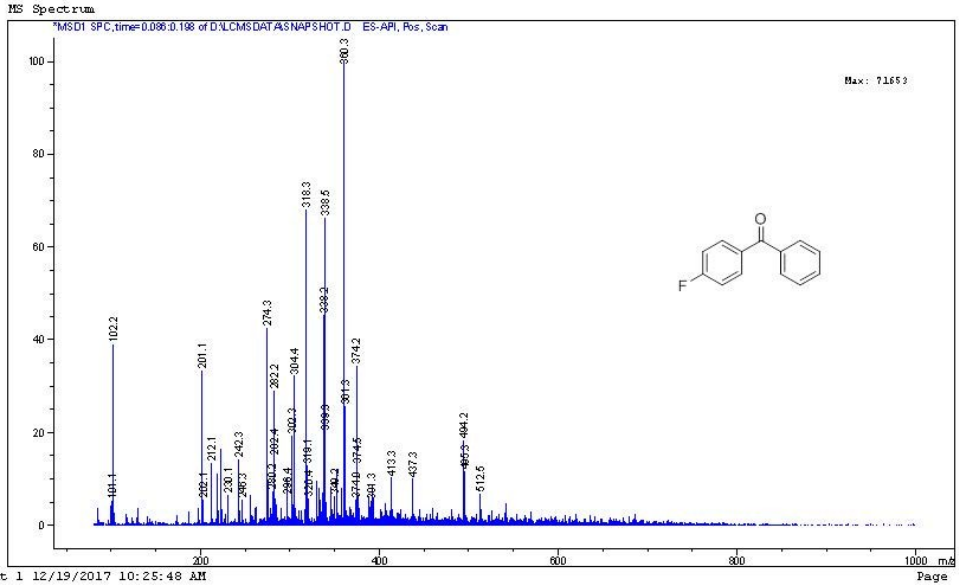
MS Spectrum



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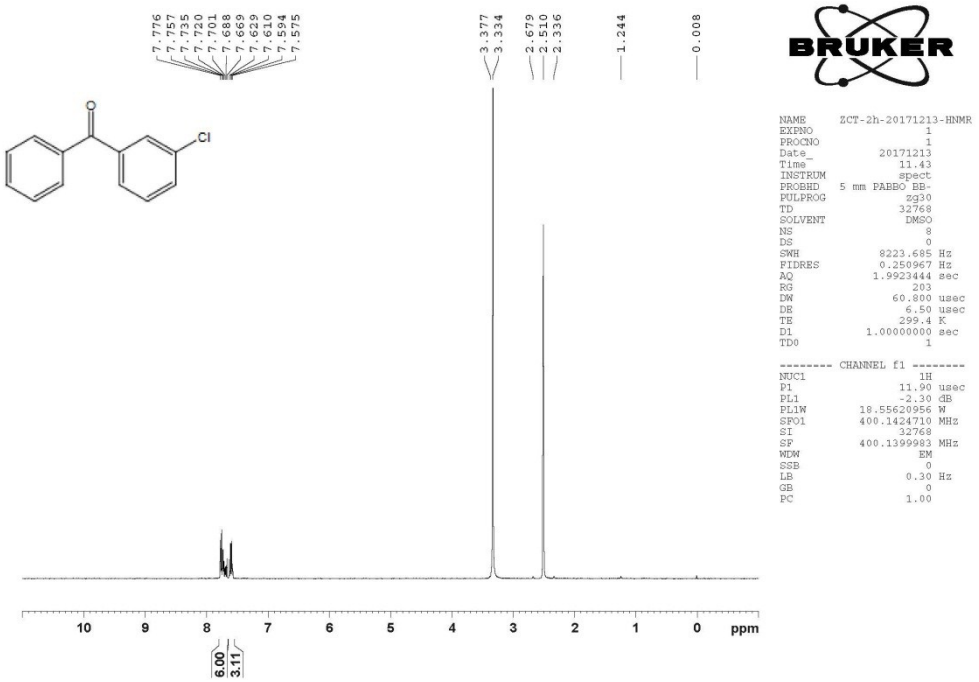
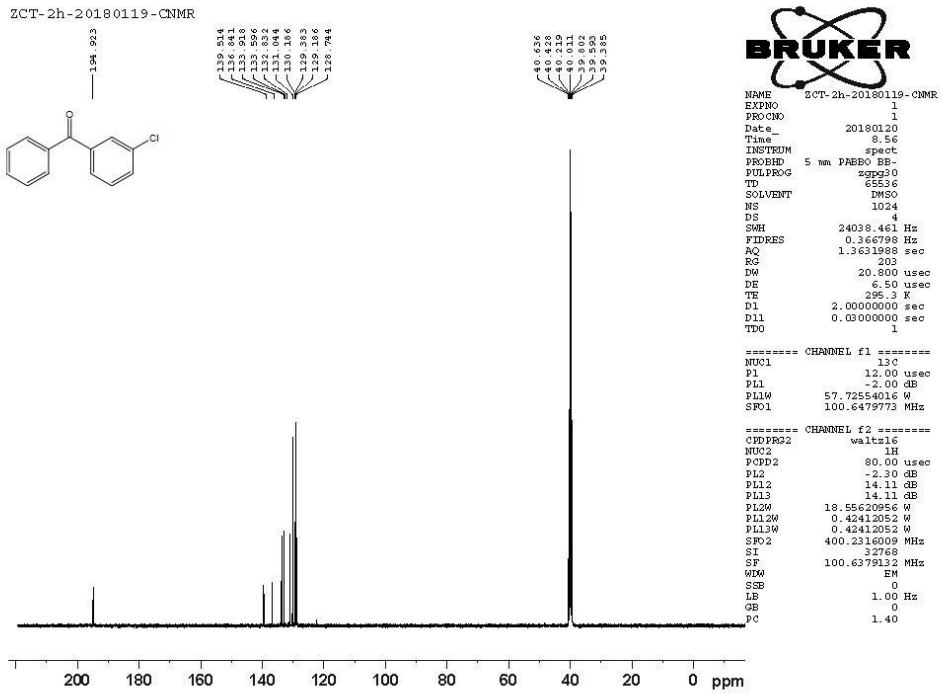
Page 1 of 1

ZCT-2h-20171213-HNMR



BRUKER

NAME	ZCT-2h-20171213-HNMR
EXPNO	1
PROCNO	1
Date_	20171213
Time	11.43
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.4 K
D1	1.00000000 sec
TD0	1
-------- CHANNEL f1 --------	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1399983 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00



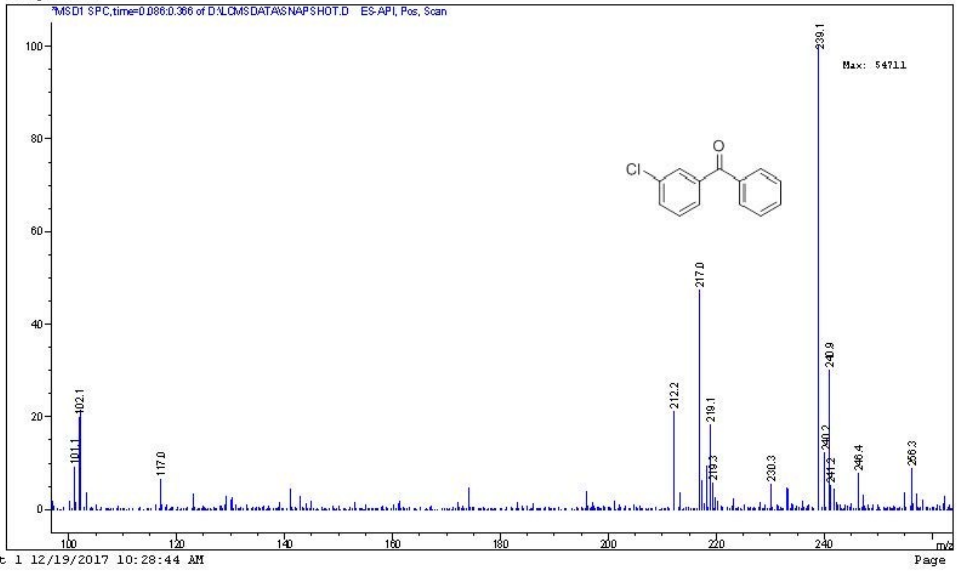
BRUKER

NAME	ZCT-2h-20180119-CNMR
EXPNO	1
PROCNO	1
Date_	20180120
Time	8.56
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.3 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.00 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6479773 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.11 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.42412052 W
PL13W	0.42412052 W
SFO2	400.2316009 MHz
SI	32768
SF	100.6379132 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

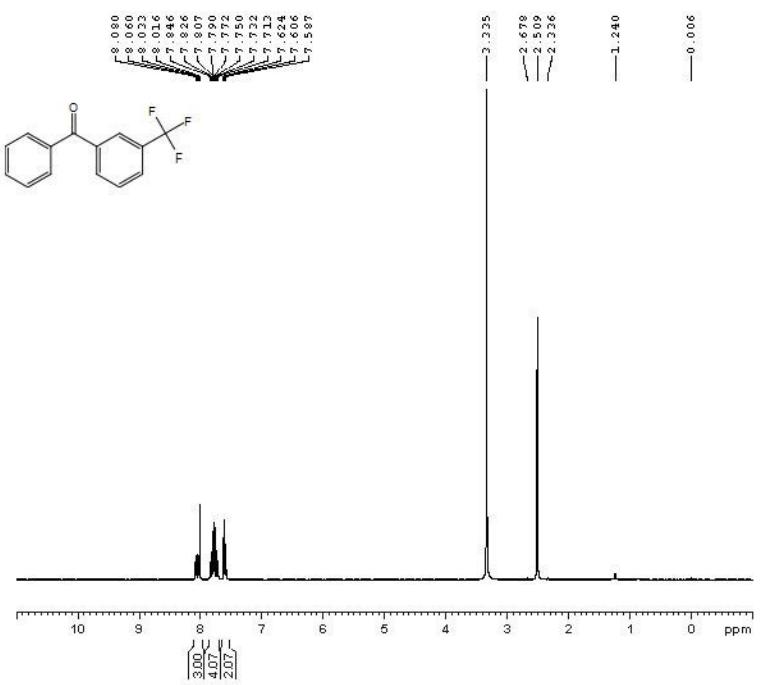
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2h

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:27:15
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\Z22.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum



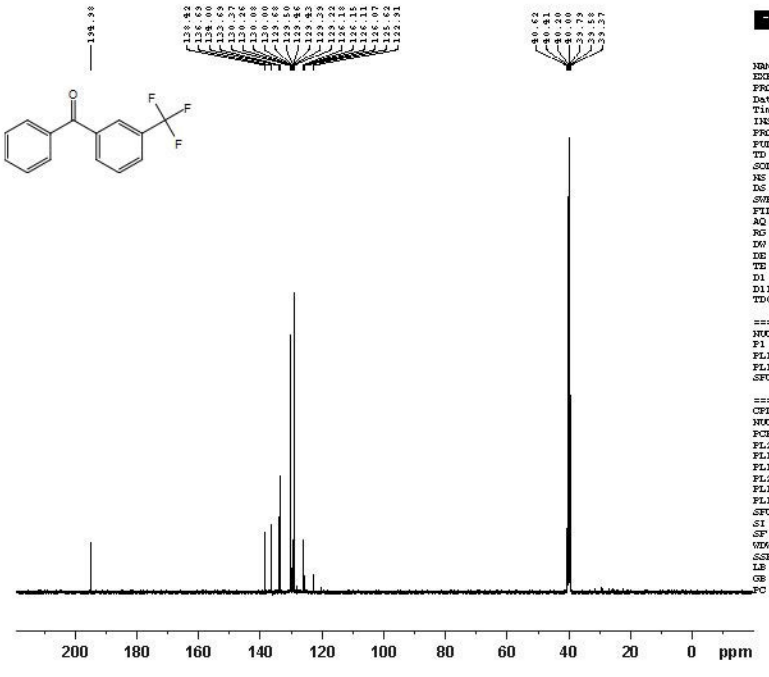
ZCT-2j-20171119-HNMR




```
NAME          ZCT-2j-20171119-HNMR
EXPNO                            1
PROCNO                           1
Date_                     20171119
Time                         11.46
INSTRUM                      spect
PROBHD     5 mm PABBO BB-
PULPROG                       zg30
TD                           32768
SOLVENT                       DMSO
NS                               8
DS                               0
SWH                       8223.685 Hz
FIDRES                    0.250967 Hz
AQ                        1.9923488 sec
RG                             203
DW                          60.800 usec
DE                           6.50 usec
TE                          299.4 K
D1                        1.00000000 sec
TD0                              1

======== CHANNEL f1 ========
NUC1                            1H
P1                           11.90 usec
PL1                          -2.30 dB
PL1W                    18.55620956 W
SFO1                    400.1424710 MHz
SI                           32768
SF                      400.1300000 MHz
WDW                             EM
SSB                              0
LB                           0.30 Hz
GB                               0
PC                            1.00
```

ZCT-2j-20180119-CNMR




```
NAME          ZCT-2j-20180119-CNMR
EXPNO                            1
PROCNO                           1
Date_                     20180120
Time                         9.58
INSTRUM                      spect
PROBHD     5 mm PABBO BB-
PULPROG                   zgpg30
TD                           65536
SOLVENT                       DMSO
NS                            1024
DS                               4
SWH                      24038.461 Hz
FIDRES                    0.366798 Hz
AQ                        1.3631988 sec
RG                             203
DW                          20.800 usec
DE                           6.50 usec
TE                          295.2 K
D1                        2.00000000 sec
D11                       0.03000000 sec
TD0                              1

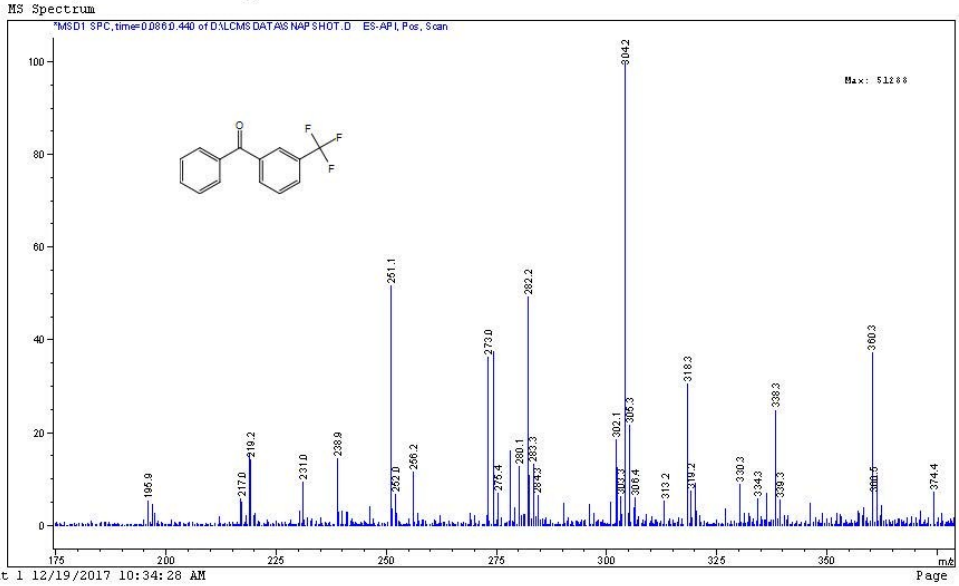
======== CHANNEL f1 ========
NUC1                           13C
P1                           12.00 usec
PL1                          -2.00 dB
PL1W                    57.72554016 W
SFO1                    100.6479773 MHz

======== CHANNEL f2 ========
CPDPRG2                    waltz16
NUC2                            1H
PCPD2                        80.00 usec
PL2                          -2.20 dB
PL12                         14.11 dB
PL13                         14.11 dB
PL2W                    18.55620956 W
PL12W                    0.42412052 W
PL13W                    0.42412052 W
SFO2                    400.2316009 MHz
SI                           32768
SF                      100.6279140 MHz
WDW                             EM
SSB                              0
LB                           1.00 Hz
GB                               0
PC                            1.40
```

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2j

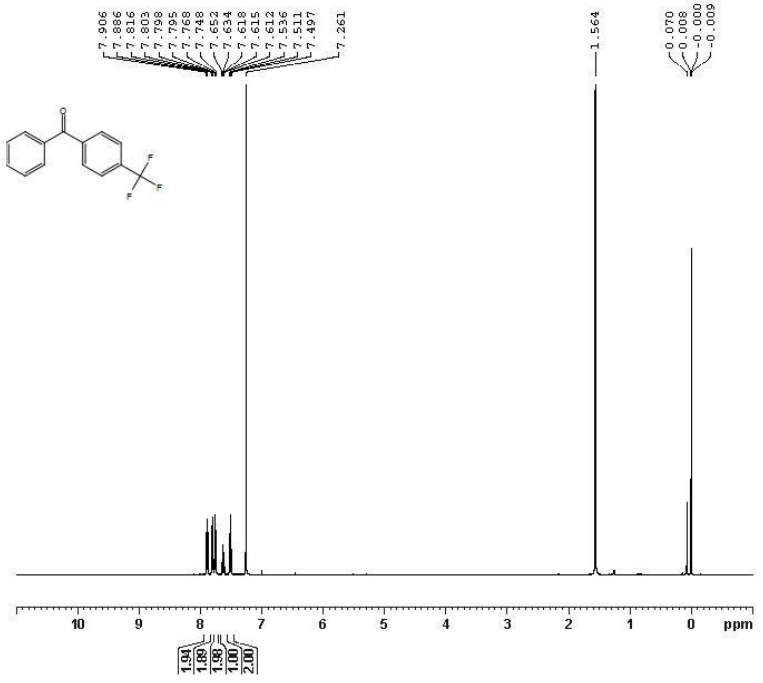
Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:30:15
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum

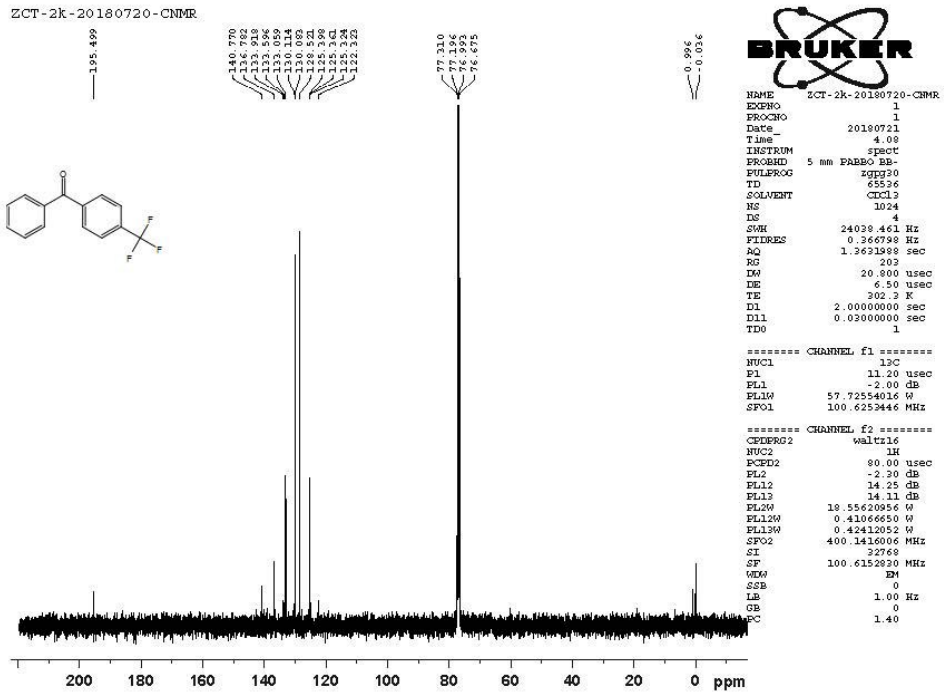


Instrument 1 12/19/2017 10:34:28 AM
Page 1 of 1

ZCT-2k-20171122-HNMR



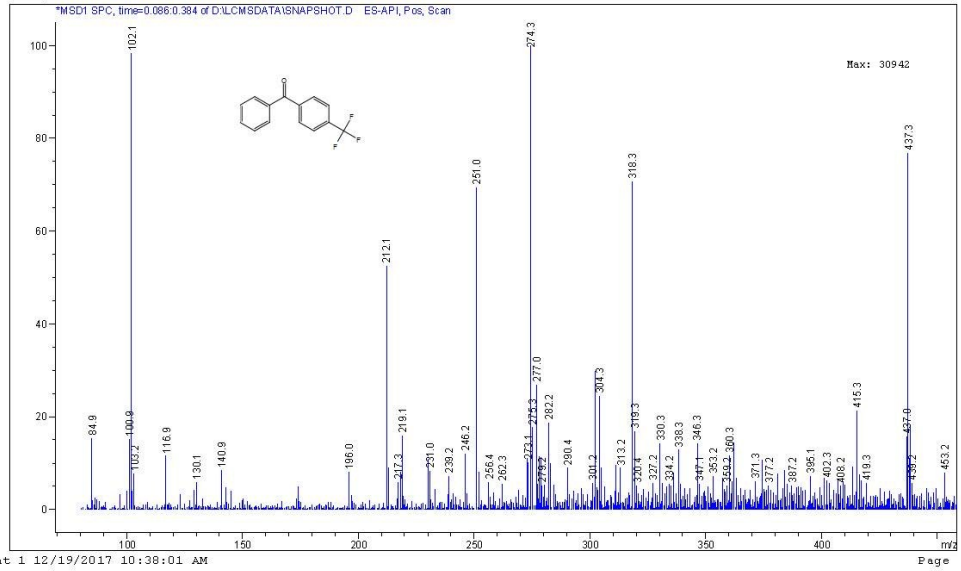
NAME	ZCT-2k-20171122-HNMR
EXPNO	1
PROCNO	1
Date_	20171122
Time	12.10
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	202
DW	60.800 usec
DE	6.50 usec
TE	299.5 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	19.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1400089 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00



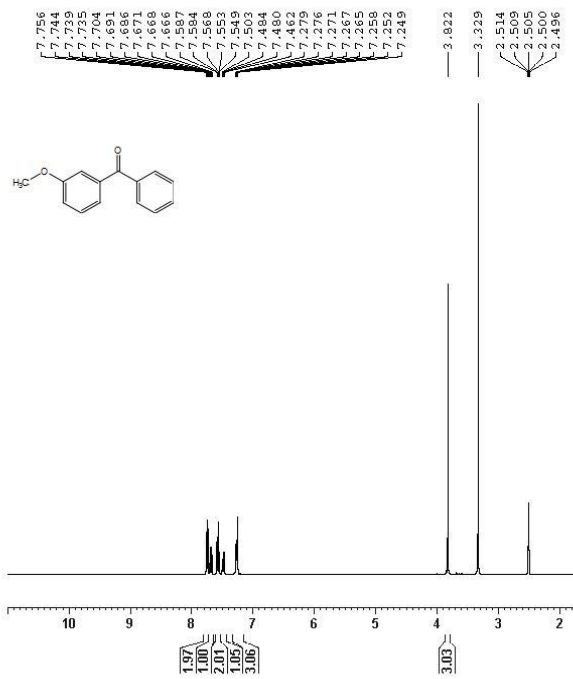
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2k

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:35:50
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum



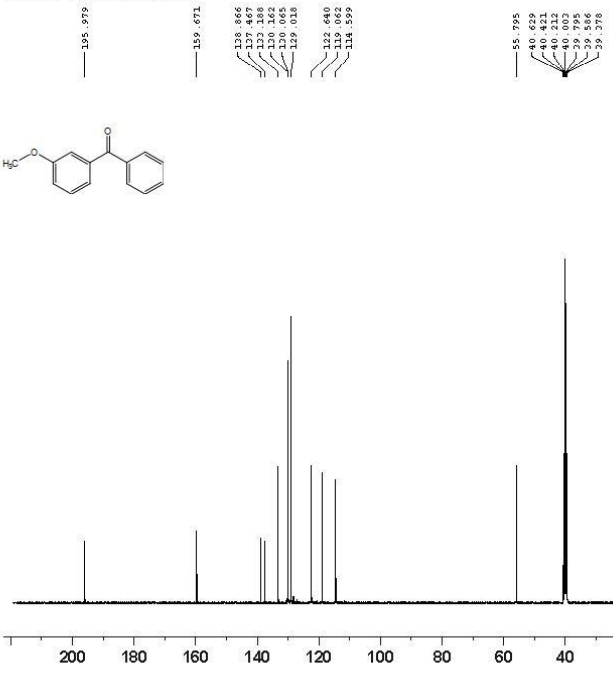
ZCT-2m-20171122-HNMR



```
NAME          ZCT-2m-20171122-HNMR
EXPNO                            1
PROCNO                           1
Date_                     20171122
Time                         12.22
INSTRUM                      spect
PROBHD    5 mm PABBO BB-
PULPROG                      zg30
TD                          32768
SOLVENT                      DMSO
NS                               8
DS                               0
SWH                       8223.685 Hz
FIDRES                    0.250967 Hz
AQ                        1.9923444 sec
RG                             203
DW                          60.800 usec
DE                           6.50 usec
TE                          299.6 K
D1                        1.00000000 sec
TD0                              1

======== CHANNEL f1 ========
NUC1                            1H
P1                           11.90 usec
PL1                          -2.30 dB
PL1W                    18.55620956 W
SFO1                   400.1424710 MHz
SI                          32768
SF                     400.1400007 MHz
WDW                            EM
SSB                             0
LB                           0.30 Hz
GB                              0
PC                           1.00
```

ZCT-2m-20180119-CNMR



```
NAME          ZCT-2m-20180119-CNMR
EXPNO                            1
PROCNO                           1
Date_                     20180120
Time                         13.12
INSTRUM                      spect
PROBHD    5 mm PABBO BB-
PULPROG                    zgpg30
TD                          65536
SOLVENT                      DMSO
NS                           1024
DS                              4
SWH                      24038.461 Hz
FIDRES                    0.366798 Hz
AQ                        1.3631988 sec
RG                             203
DW                          20.800 usec
DE                           6.50 usec
TE                          295.2 K
D1                        2.00000000 sec
D11                       0.03000000 sec
TD0                              1

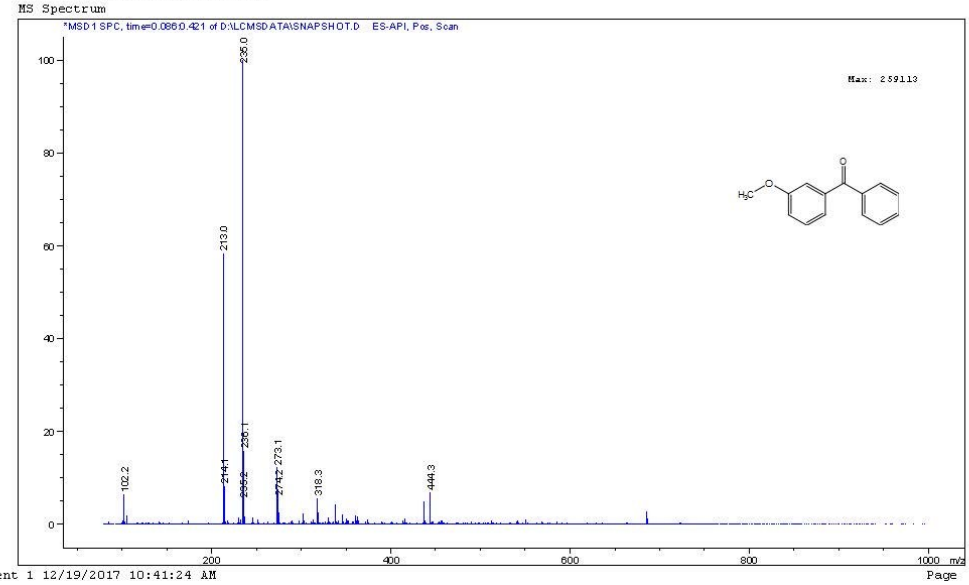
======== CHANNEL f1 ========
NUC1                           13C
P1                           12.00 usec
PL1                          -2.00 dB
PL1W                    57.72554016 W
SFO1                   100.6479773 MHz

======== CHANNEL f2 ========
CPDPRG2                    waltz16
NUC2                            1H
PCPD2                        80.00 usec
PL2                          -2.30 dB
PL12                         14.11 dB
PL13                         14.11 dB
PL2W                    18.55620956 W
PL12W                    0.42412052 W
PL13W                    0.42412052 W
SFO2                   400.2316009 MHz
SI                          32768
SF                     100.6379140 MHz
WDW                            EM
SSB                             0
LB                           1.00 Hz
GB                              0
PC                           1.40
```

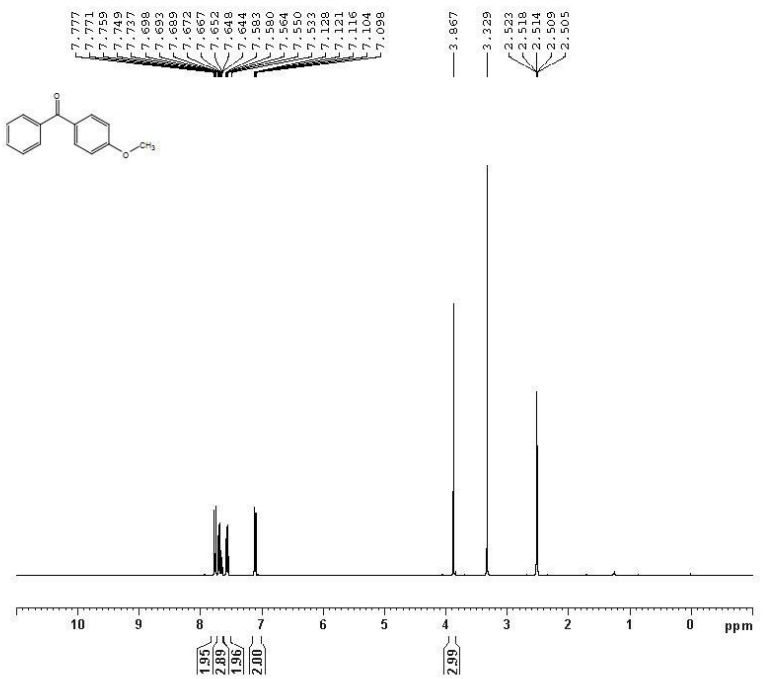
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2m

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:39:22
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum

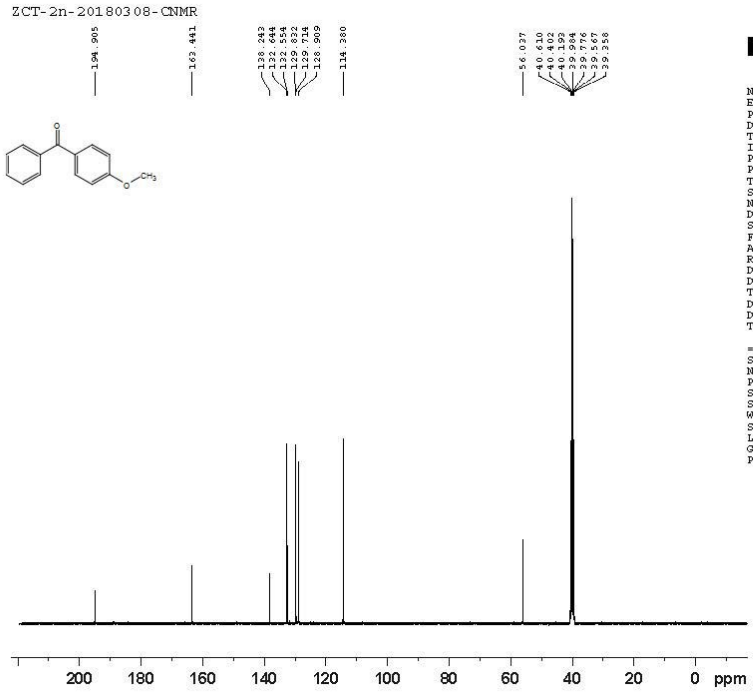


ZCT-2n-20180306-HNMR



BRUKER

NAME	ZCT-2n-20180306-HNMR
EXPNO	1
PROCNO	1
Date_	20180306
Time	13.56
INSTRUM	spect
PROBHD	5 mm PABBO BB/
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8012.820 Hz
FIDRES	0.244532 Hz
AQ	2.0447731 sec
RG	203
DW	62.400 usec
DE	6.50 usec
TE	298.1 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	400.1424710 MHz
NUC1	1H
P1	13.35 usec
SI	65536
SF	400.1399971 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00



BRUKER

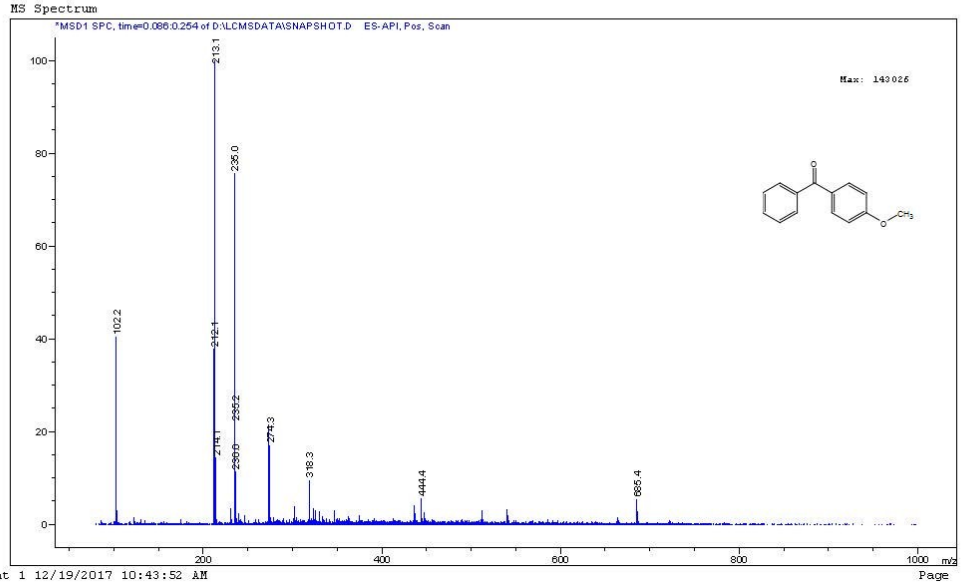
NAME	ZCT-2n-20180308-CNMR
EXPNO	1
PROCNO	1
Date_	20180309
Time	5.15
INSTRUM	spect
PROBHD	5 mm PABBO BB/
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6253441 MHz
NUC1	13C
P1	11.00 usec
SI	32768
SF	100.6152835 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2n

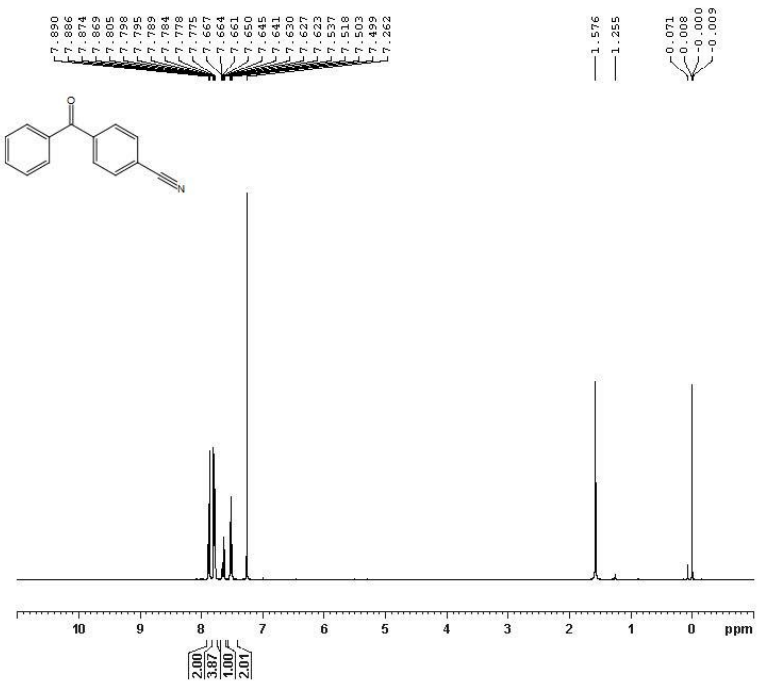
Acq. Operator :
Location : P1-F-01

Injection Date : 19-Dec-17, 10:42:45
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum



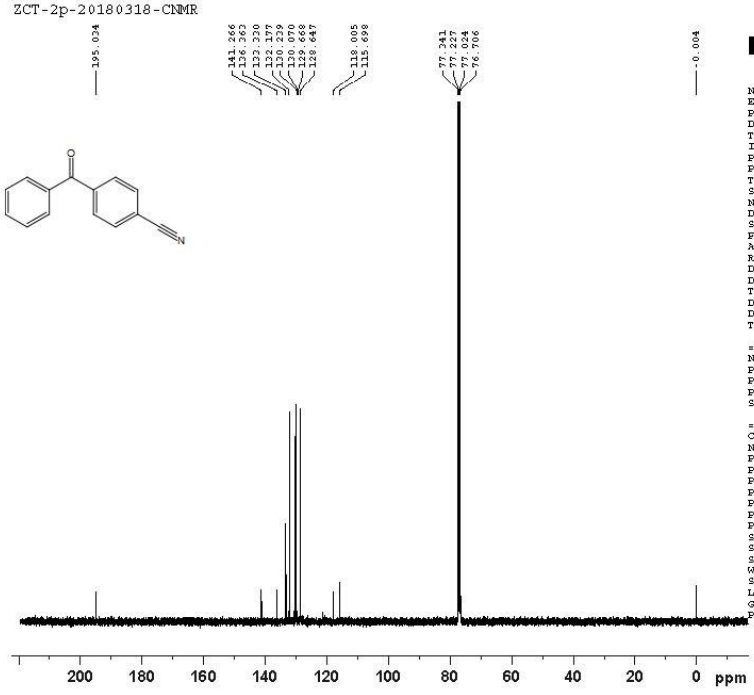
ZCT-2p-20171122-HNMR



BRUKER

NAME	ZCT-2p-20171122-HNMR
EXPNO	1
PROCNO	1
Date_	20171122
Time	12.14
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.6 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1400085 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-2p-20180318-CNMR



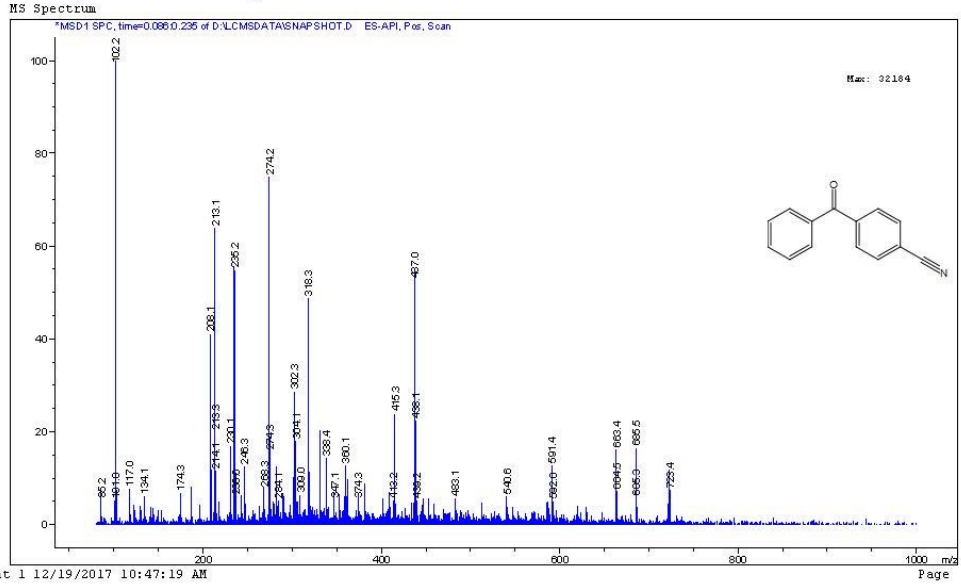
BRUKER

NAME	ZCT-2p-20180318-CNMR
EXPNO	1
PROCNO	1
Date_	20180318
Time	22.25
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.9 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	11.20 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6253446 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.20 dB
PL12	14.25 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.41066650 W
PL13W	0.42412052 W
SFO2	400.1416006 MHz
SI	32768
SF	100.6152826 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

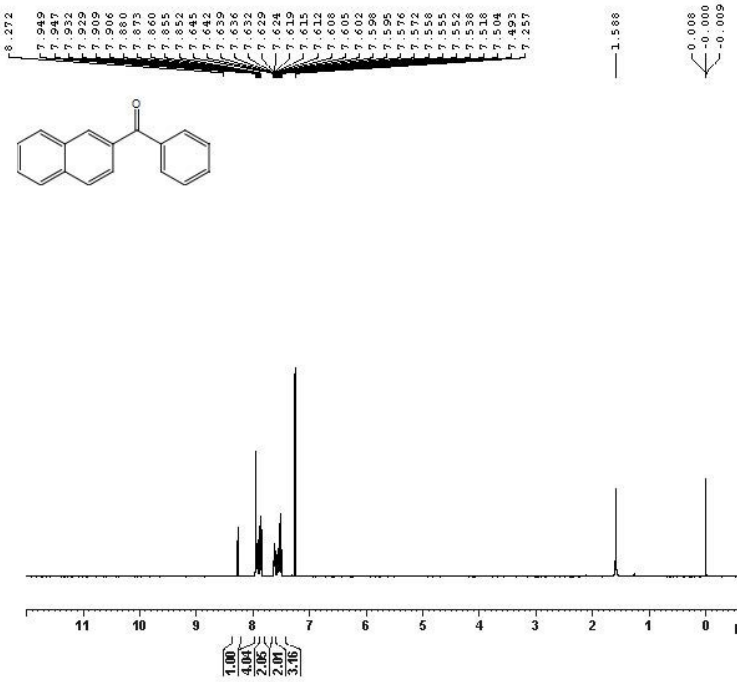
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2p

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:45:14
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum



ZCT-2t-20171122-HNMR

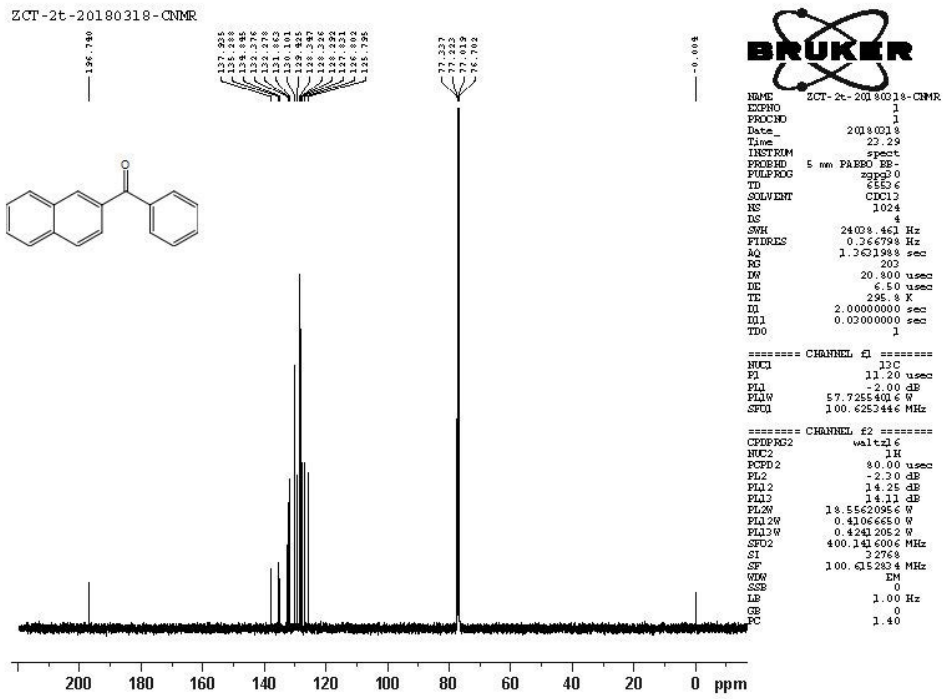


BRUKER

NAME	ZCT-2t-20171122-HNMR
EXPNO	1
PROCNO	1
Date_	20171122
Time	12.18
INSTRUM	spect
PROBHD	5 mm PABBO BB- zg30
PULPROG	32768
TD	CDCl3
SOLVENT	8
NS	0
DS	
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.5 K
D1	1.00000000 sec
TD0	1

======== CHANNEL f1 ========

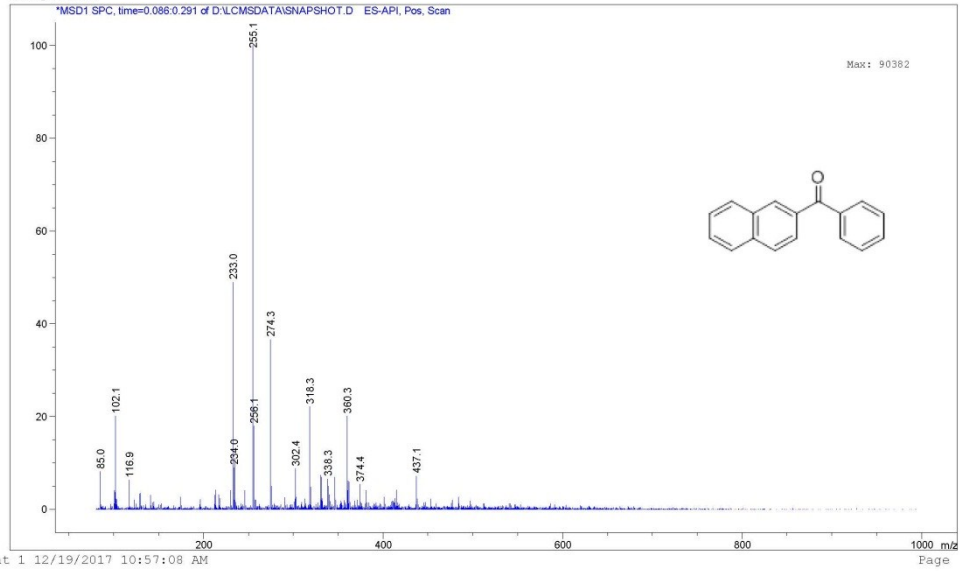
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1400103 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00



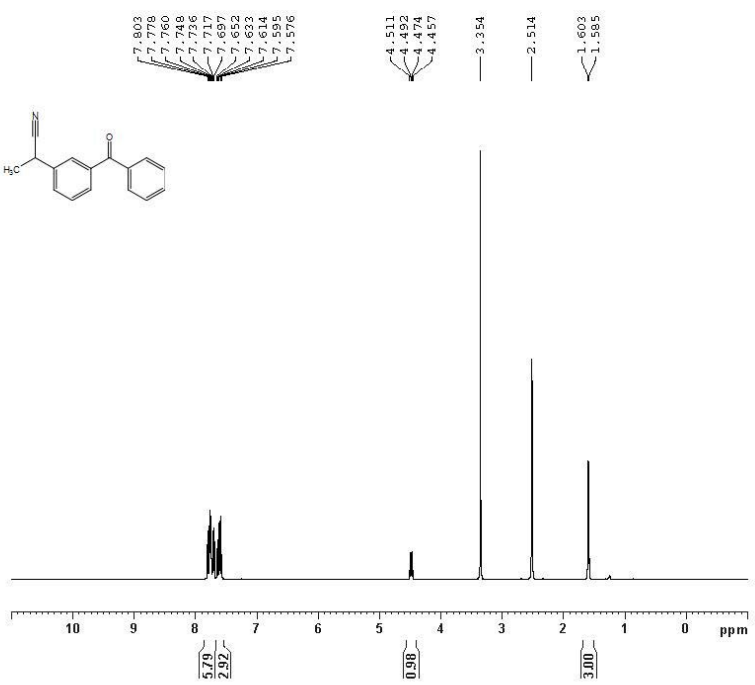
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2t

Acq. Operator :
Location : P1-F-01
Injection Date : 19-Dec-17, 10:55:09
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\222.M
Last changed : 12/15/2017 11:15:14 AM
(modified after loading)

MS Spectrum



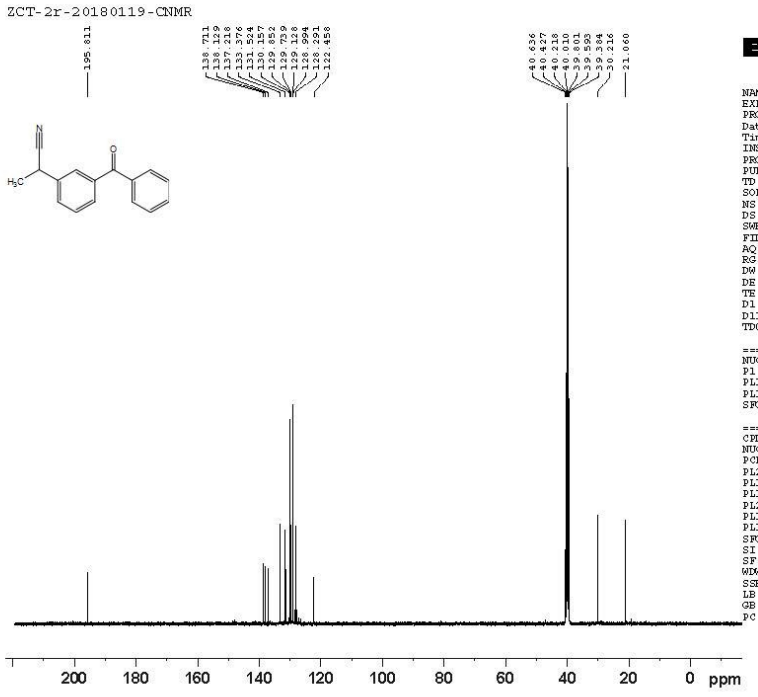
ZCT-2Y-20171228-HNMR




```
NAME          ZCT-2Y-20171228-HNMR
EXPNO                            1
PROCNO                           1
Date_                     20171228
Time                         17.03
INSTRUM                      spect
PROBHD    5 mm PABBO BB-
PULPROG                       zg30
TD                           32768
SOLVENT                       DMSO
NS                               8
DS                               0
SWH                       8223.685 Hz
FIDRES                    0.250967 Hz
AQ                        1.9923444 sec
RG                             203
DW                          60.800 usec
DE                           6.50 usec
TE                          294.1 K
D1                    1.00000000 sec
TD0                              1

======== CHANNEL f1 ========
NUC1                            1H
P1                          12.10 usec
PL1                          -2.30 dB
PL1W                 18.55620956 W
SFO1                400.2324716 MHz
SI                           32768
SF                  400.2300000 MHz
WDW                             EM
SSB                              0
LB                           0.30 Hz
GB                               0
PC                            1.00
```

ZCT-2r-20180119-CNMR




```
NAME          ZCT-2y-20180119-CNMR
EXPNO                            1
PROCNO                           1
Date_                     20180120
Time                          6.50
INSTRUM                      spect
PROBHD    5 mm PABBO BB-
PULPROG                    zgpg30
TD                           65536
SOLVENT                       DMSO
NS                            1024
DS                               4
SWH                      24038.461 Hz
FIDRES                    0.366798 Hz
AQ                        1.3631988 sec
RG                             203
DW                          20.800 usec
DE                           6.50 usec
TE                          295.2 K
D1                    2.00000000 sec
D11                   0.03000000 sec
TD0                              1

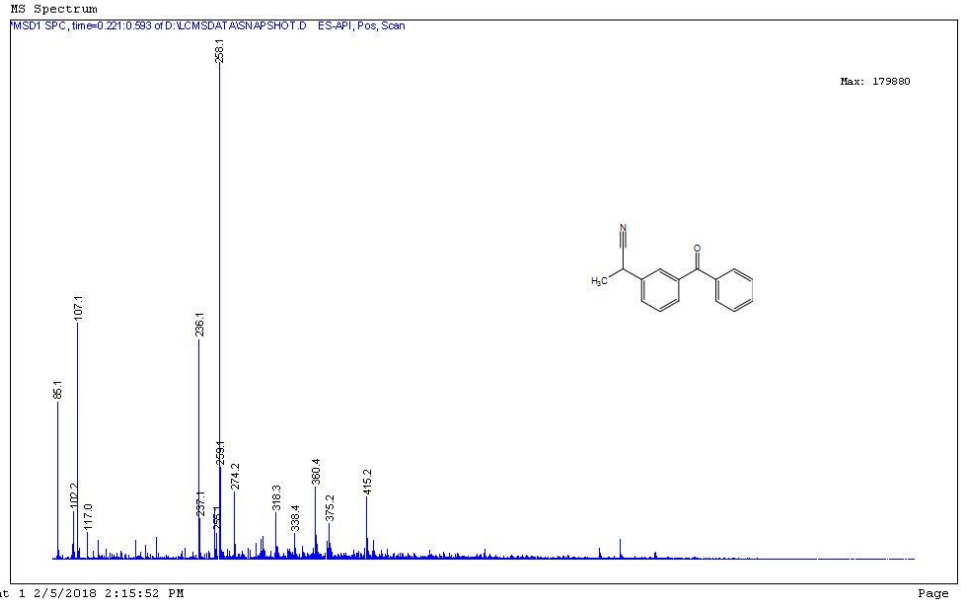
======== CHANNEL f1 ========
NUC1                           13C
P1                          12.00 usec
PL1                          -2.00 dB
PL1W                57.72554016 W
SFO1               100.6479773 MHz

======== CHANNEL f2 ========
CPDPRG2                   waltz16
NUC2                            1H
PCPD2                       80.00 usec
PL2                          -2.30 dB
PL12                         14.11 dB
PL13                         14.11 dB
PL2W                18.55620956 W
PL12W                0.42412052 W
PL13W                0.42412052 W
SFO2               400.2316009 MHz
SI                           32768
SF                 100.6379133 MHz
WDW                             EM
SSB                              0
LB                           1.00 Hz
GB                               0
PC                            1.40
```

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-2y

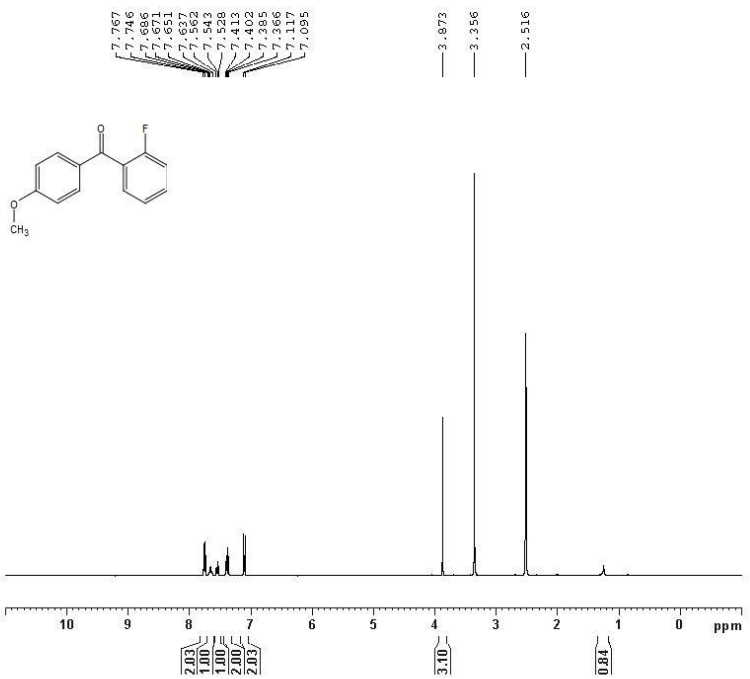
Acq. Operator :
Location : P1-F-01
Injection Date : 05-Feb-18, 14:12:11
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

MS Spectrum



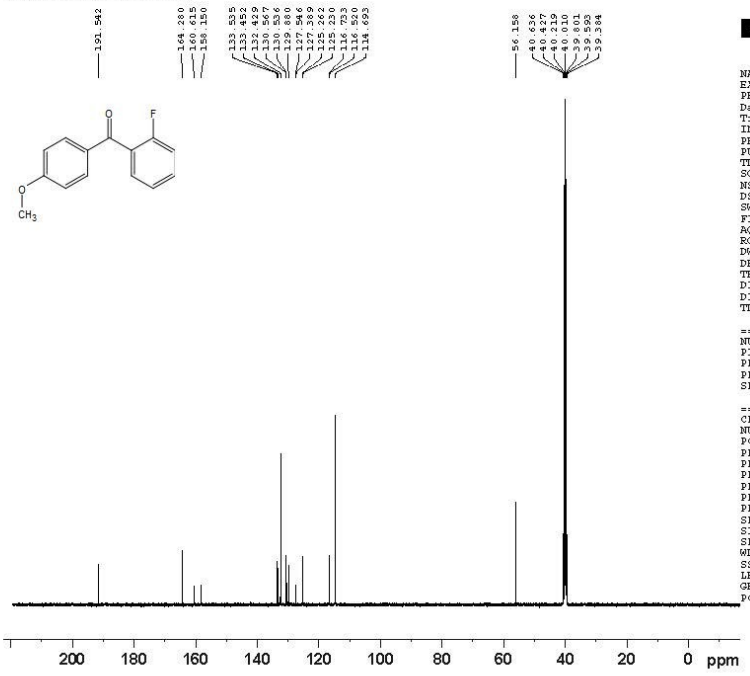
Instrument 1 2/5/2018 2:15:52 PM Page 1 of 1

ZCT-3C-20171220-HNMR



NAME	ZCT-3C-20171220-HNMR
EXPNO	1
PROCNO	1
Date_	20171220
Time	16.10
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	300.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	12.10 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.2334716 MHz
SI	32768
SF	400.2300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-3c-20180119-CNMR



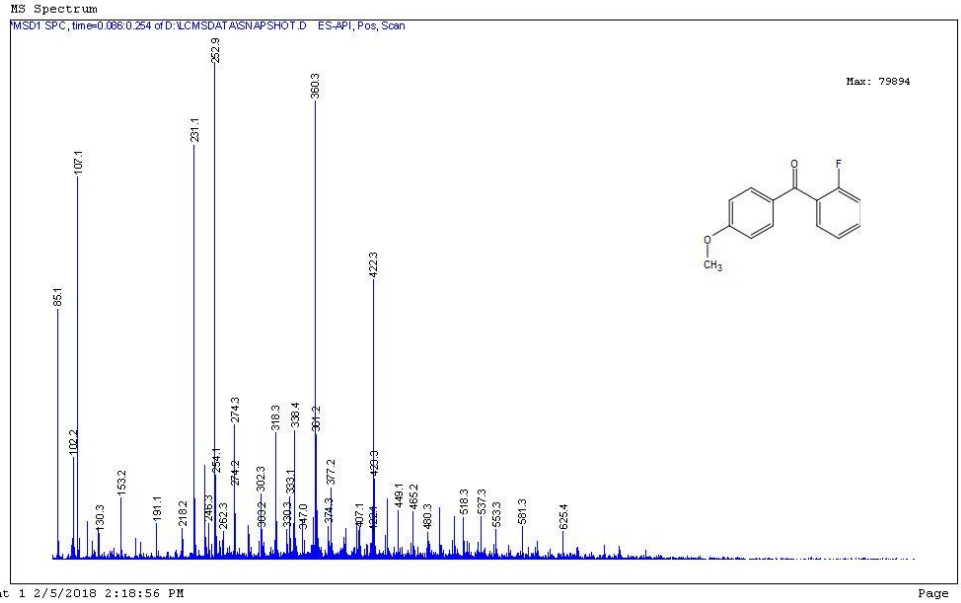
BRUKER

NAME	ZCT-3c-20180119-CNMR
EXPNO	1
PROCNO	1
Date_	20180120
Time	14.15
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.2 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.00 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6479773 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.11 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.42412052 W
PL13W	0.42412052 W
SFO2	400.2316009 MHz
SI	32768
SF	100.6379128 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

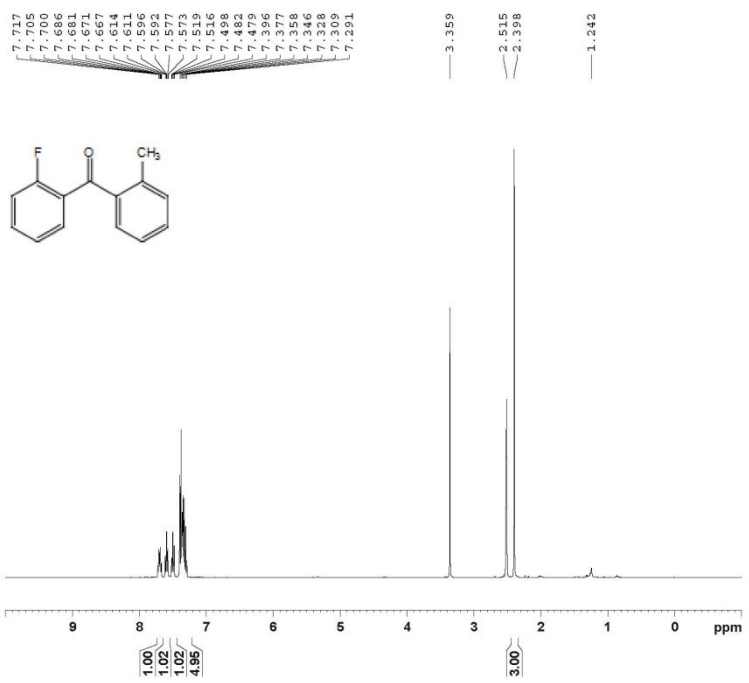
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-3c

Acq. Operator :
Location : P1-F-02
Injection Date : 05-Feb-18, 14:17:28
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

MS Spectrum



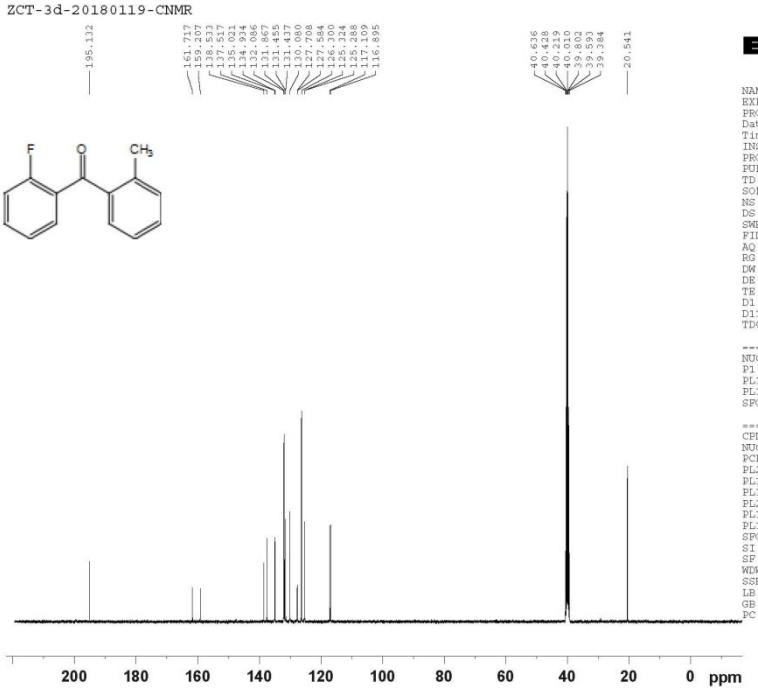
ZCT-3d-20171222-HNMR




```
NAME          ZCT-3d-20171222-HNMR
EXPNO                            1
PROCNO                           1
Date_                     20171222
Time                         19.23
INSTRUM                      spect
PROBHD       5 mm PABBO BB-
PULPROG                       zg30
TD                           32768
SOLVENT                       DMSO
NS                               8
DS                               0
SWH                       8223.685 Hz
FIDRES                    0.250967 Hz
AQ                        1.9923444 sec
RG                             203
DW                           60.800 usec
DE                            6.50 usec
TE                           300.0 K
D1                        1.00000000 sec
TD0                              1

======== CHANNEL f1 ========
NUC1                            1H
P1                           12.10 usec
PL1                          -2.30 dB
PL1W                  18.55620956 W
SFO1                  400.2324716 MHz
SI                           32768
SF                    400.2299987 MHz
WDW                             EM
SSB                              0
LB                            0.30 Hz
GB                               0
PC                            1.00
```

ZCT-3d-20180119-CNMR




```
NAME          ZCT-3d-20180119-CNMR
EXPNO                            1
PROCNO                           1
Date_                     20180120
Time                         15.17
INSTRUM                      spect
PROBHD       5 mm PABBO BB-
PULPROG                    zgpg30
TD                           65536
SOLVENT                       DMSO
NS                            1024
DS                               4
SWH                       24038.461 Hz
FIDRES                    0.366798 Hz
AQ                        1.3631988 sec
RG                             203
DW                           20.800 usec
DE                            6.50 usec
TE                           295.2 K
D1                        2.00000000 sec
D11                       0.03000000 sec
TD0                              1

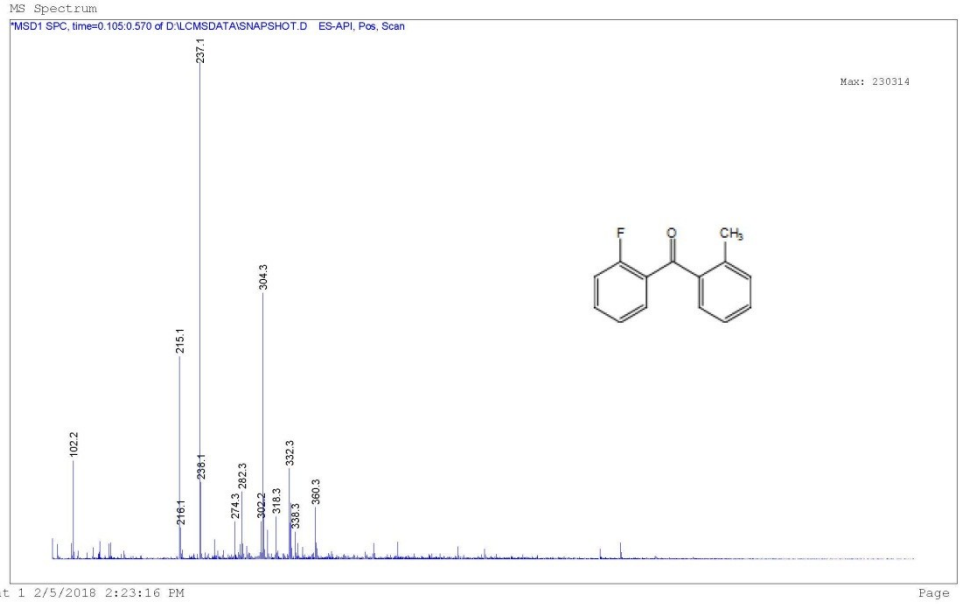
======== CHANNEL f1 ========
NUC1                            13C
P1                           12.00 usec
PL1                          -2.00 dB
PL1W                  57.72554016 W
SFO1                  100.6479773 MHz

======== CHANNEL f2 ========
CPDPRG2                     waltz16
NUC2                            1H
PCPD2                        80.00 usec
PL2                          -2.30 dB
PL12                         14.11 dB
PL13                         14.11 dB
PL2W                  18.55620956 W
PL12W                 0.42412052 W
PL13W                 0.42412052 W
SFO2                  400.2316009 MHz
SI                           32768
SF                    100.6379133 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40
```

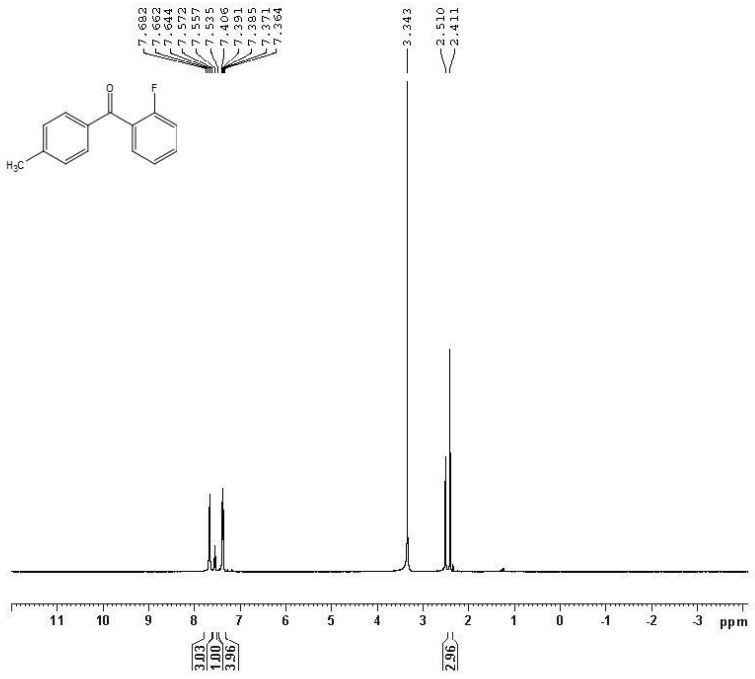
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-3d

Acq. Operator :
Location : P1-F-03
Injection Date : 05-Feb-18, 14:20:18
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

MS Spectrum

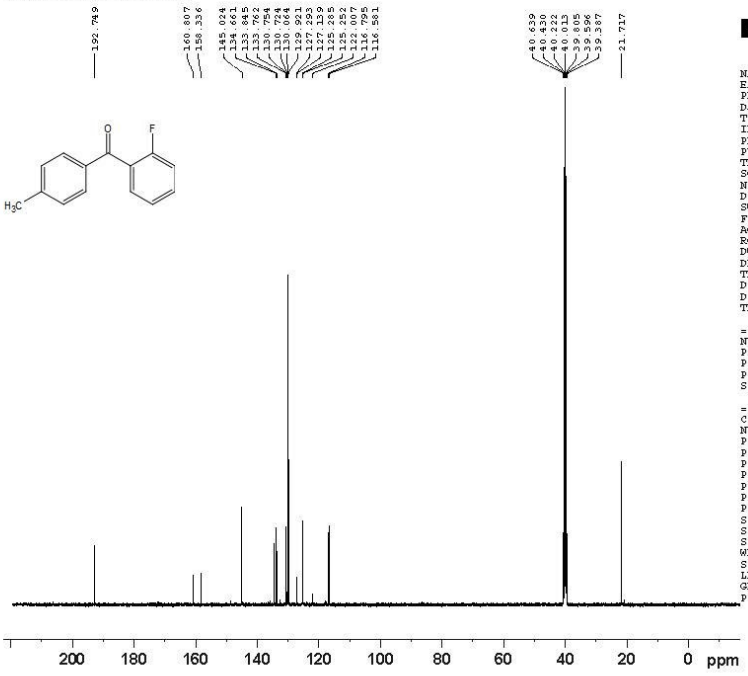


ZCT-3e-20171213-HNMR



NAME	ZCT-3e-20171213-HNMR
EXPNO	1
PROCNO	1
Date_	20171213
Time	11.57
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.4 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1399982 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-3e-20180119-CNMR



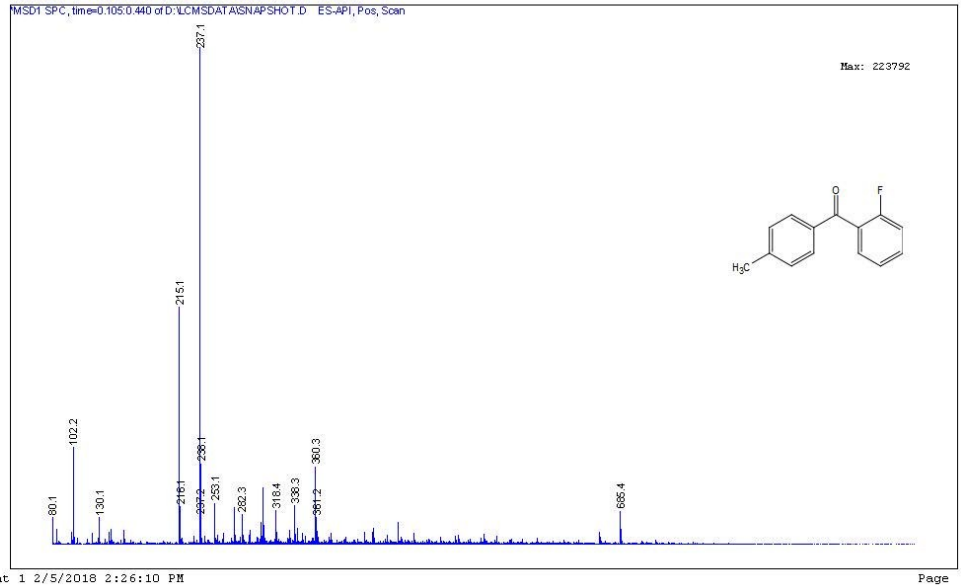
BRUKER

NAME	ZCT-3e-20180119-CNMR
EXPNO	1
PROCNO	1
Date_	20180120
Time	16.20
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.1 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.00 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6479773 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.11 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.42412052 W
PL13W	0.42412052 W
SFO2	400.2316009 MHz
SI	32768
SF	100.6379128 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

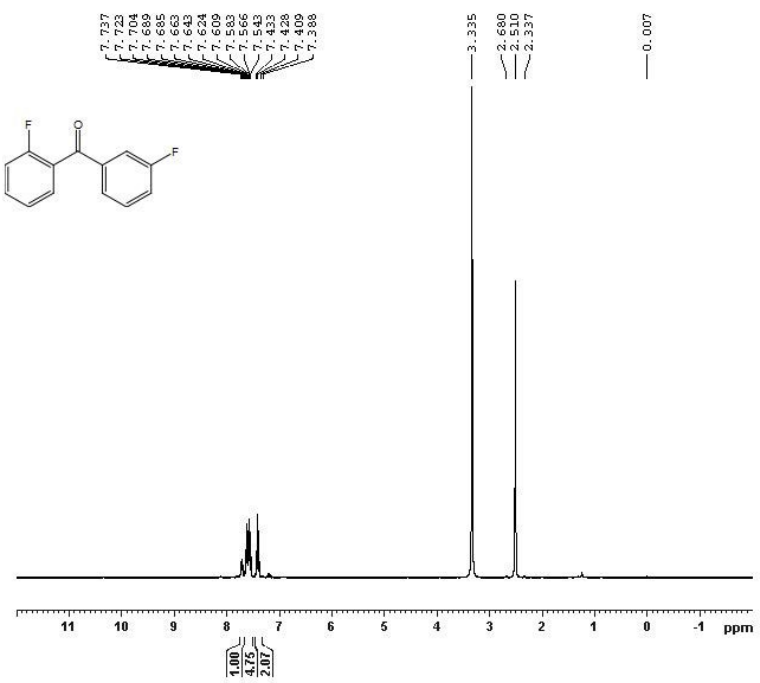
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-3e

Acq. Operator :
Location : P1-F-04
Injection Date : 05-Feb-18, 14:24:40
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

MS Spectrum



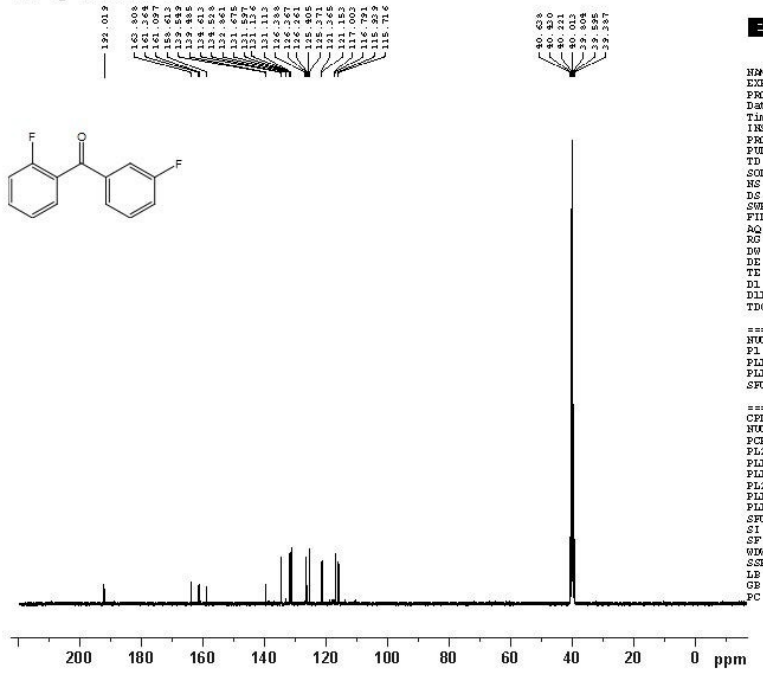
ZCT-3g-20171213-HNMR




```
NAME          ZCT-3g-20171213-HNMR
EXPNO                            1
PROCNO                           1
Date_                     20171213
Time_                        12.01
INSTRUM                      spect
PROBHD       5 mm PABBO BB-
PULPROG                      zg30
TD                          32768
SOLVENT                      DMSO
NS                               8
DS                               0
SWH                       8223.685 Hz
FIDRES                    0.250967 Hz
AQ                        1.9923444 sec
RG                             203
DW                          60.800 usec
DE                           6.50 usec
TE                          299.5 K
D1                        1.00000000 sec
TD0                              1

======== CHANNEL f1 ========
NUC1                            1H
P1                          11.90 usec
PL1                          -2.30 dB
PL1W                    18.55620956 W
SFO1                    400.1424710 MHz
SI                          32768
SF                      400.1299982 MHz
WDW                             EM
SSB                              0
LB                            0.30 Hz
GB                               0
PC                            1.00
```

ZCT-3g-20180119-CNMR




```
NAME          ZCT-3g-20180119-CNMR
EXPNO                            1
PROCNO                           1
Date_                     20180120
Time_                        17.23
INSTRUM                      spect
PROBHD       5 mm PABBO BB-
PULPROG                    zgpg30
TD                          65536
SOLVENT                      DMSO
NS                           1024
DS                              4
SWH                       24038.461 Hz
FIDRES                    0.366798 Hz
AQ                        1.3631988 sec
RG                             203
DW                          20.800 usec
DE                           6.50 usec
TE                          295.1 K
D1                        2.00000000 sec
D11                       0.03000000 sec
TD0                              1

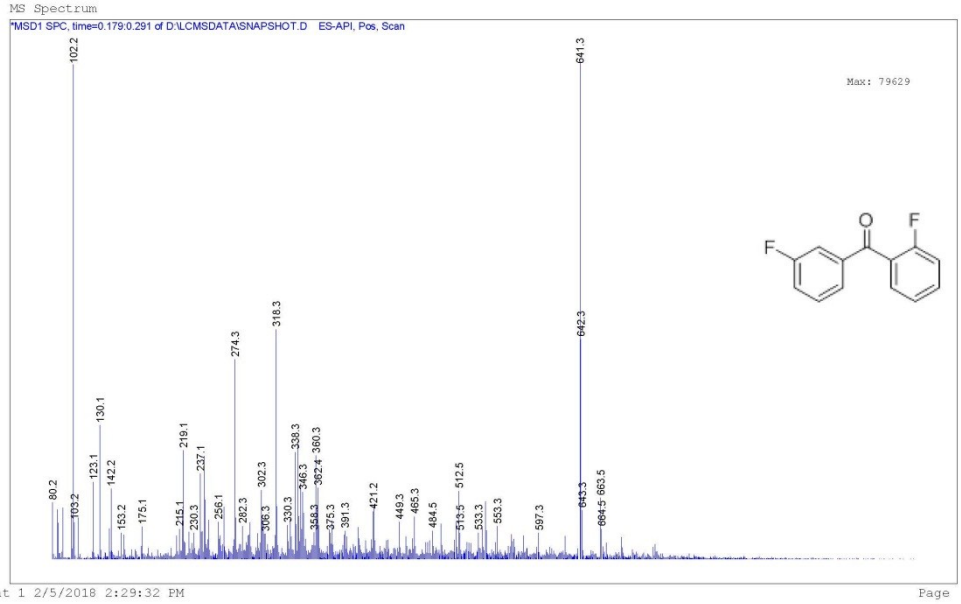
======== CHANNEL f1 ========
NUC1                           13C
P1                          12.00 usec
PL1                          -2.00 dB
PL1W                    57.72554016 W
SFO1                    100.6479773 MHz

======== CHANNEL f2 ========
CPDPRG2                    waltz16
NUC2                            1H
PCPD2                       80.00 usec
PL2                          -2.20 dB
PL12                         14.11 dB
PL13                         14.11 dB
PL2W                    18.55620956 W
PL12W                    0.42412052 W
PL13W                    0.42412052 W
SFO2                    400.2316009 MHz
SI                          32768
SF                      100.6379122 MHz
WDW                             EM
SSB                              0
LB                            1.00 Hz
GB                               0
PC                            1.40
```

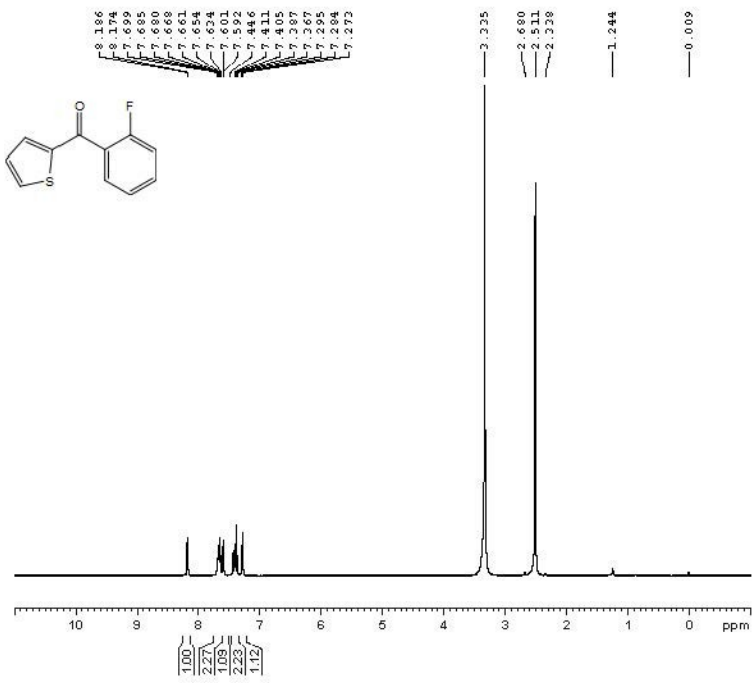
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-3g

Acq. Operator :
Location : P1-F-05
Injection Date : 05-Feb-18, 14:27:32
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

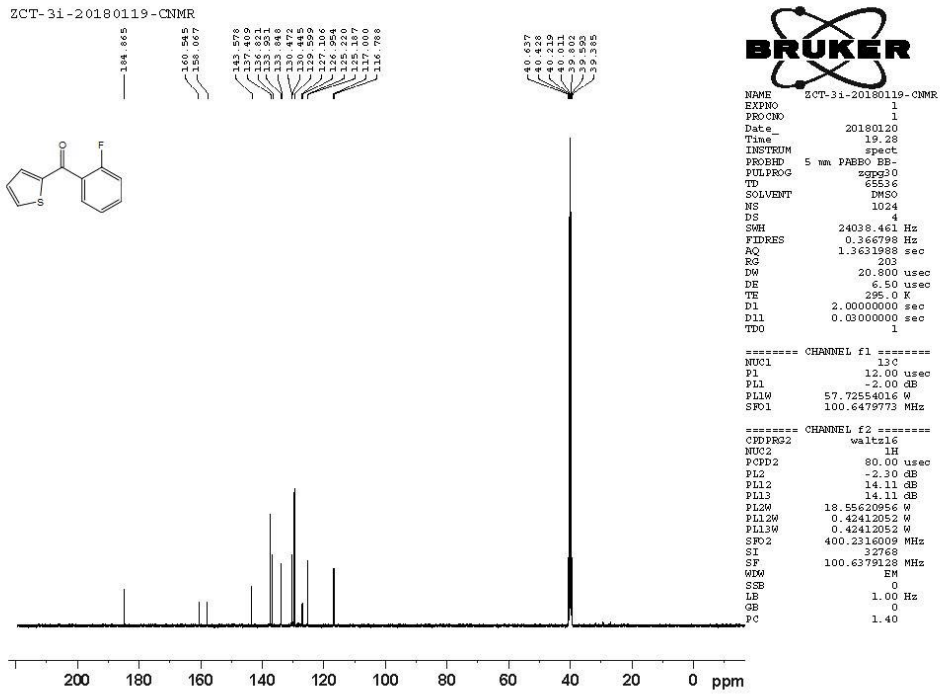
MS Spectrum

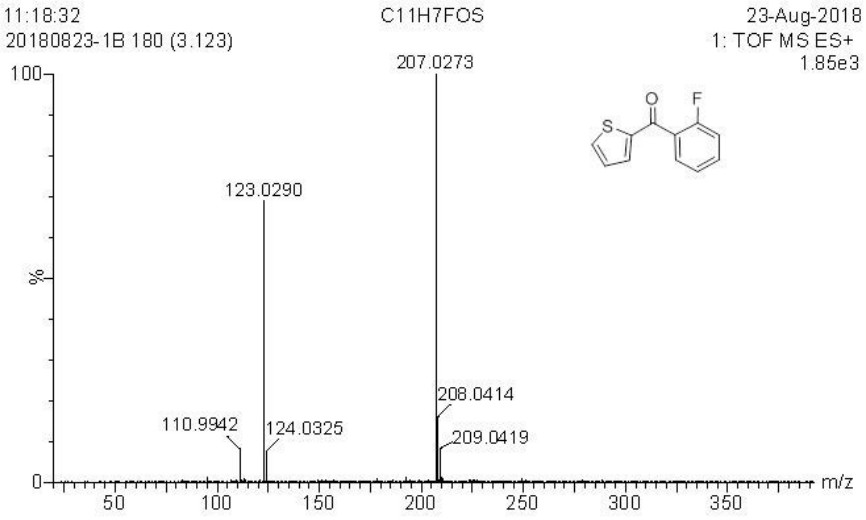


ZCT-3i-20171213-HNMR

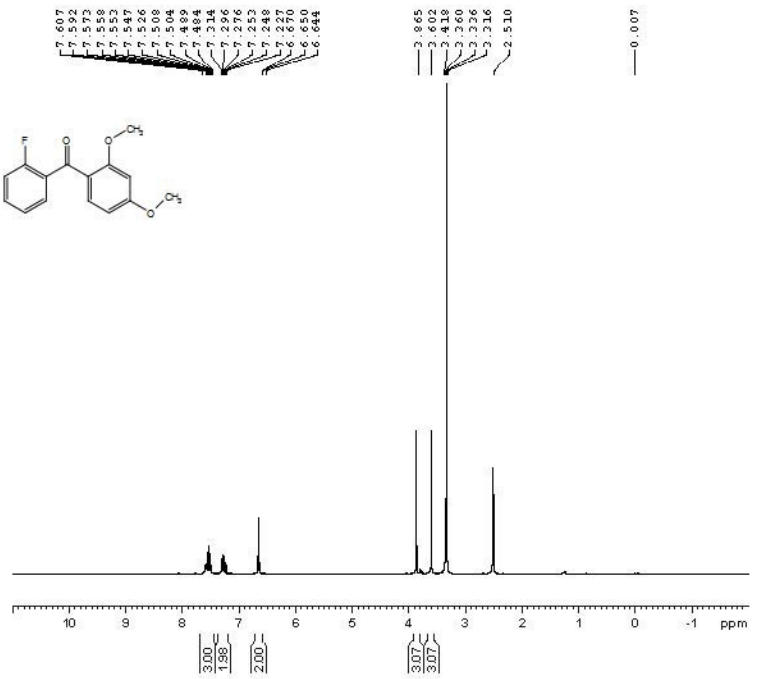


NAME	ZCT-3i-20171213-HNMR
EXPNO	1
PROCNO	1
Date_	20171213
Time	12.04
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.4 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1399982 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00


ZCT-3i-20180119-CNMR
184.865
160.545
158.067
143.578
137.409
136.031
133.931
133.846
130.472
130.445
129.599
127.106
126.954
125.120
125.107
117.000
116.788
40.437
40.228
40.219
40.011
39.802
39.593
39.385
BRUKER
NAME ZCT-3i-20180119-CNMR
EXPNO 1
PROCNO 1
Date_ 20180120
Time 19.28
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 1024
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 203
DW 20.800 usec
DE 6.50 usec
TE 295.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 12.00 usec
PL1 -2.00 dB
PL1W 57.72554016 W
SFO1 100.6479773 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 -2.30 dB
PL12 14.11 dB
PL13 14.11 dB
PL2W 18.55620956 W
PL12W 0.42412052 W
PL13W 0.42412052 W
SFO2 400.2316009 MHz
SI 32768
SF 100.6379128 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
200
180
160
140
120
100
80
60
40
20
0
ppm


11:18:32
20180823-1B 180 (3.123)
C11H7FOS
23-Aug-2018
1: TOF MS ES+
1.85e3
207.0273
123.0290
208.0414
110.9942
124.0325
209.0419
100
%
0
50
100
150
200
250
300
350
m/z

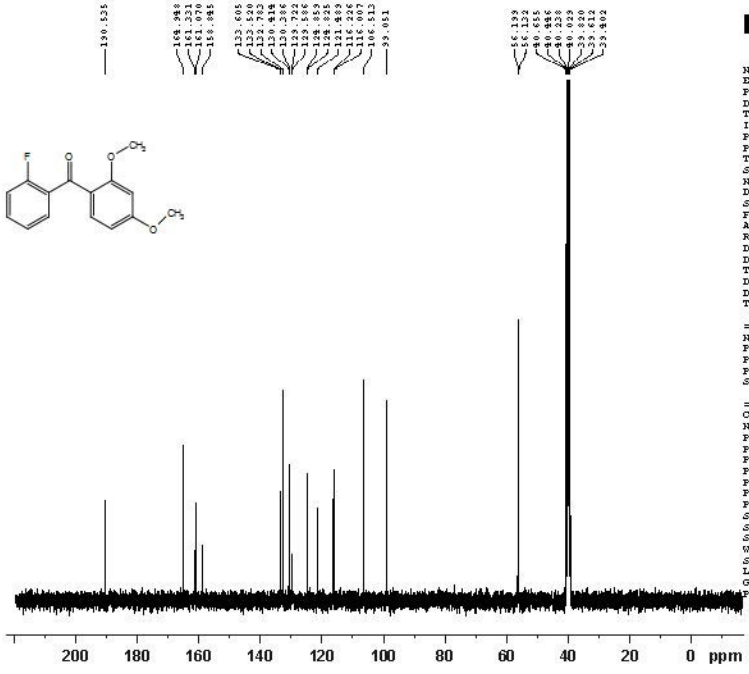
ZCT-3j-20171213-HNMR



BRUKER

NAME	ZCT-3j-20171213-HNMR
EXPNO	1
PROCNO	1
Date_	20171213
Time	12.08
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250867 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	299.4 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	11.90 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.1424710 MHz
SI	32768
SF	400.1399983 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-3j-20180313-CNMR



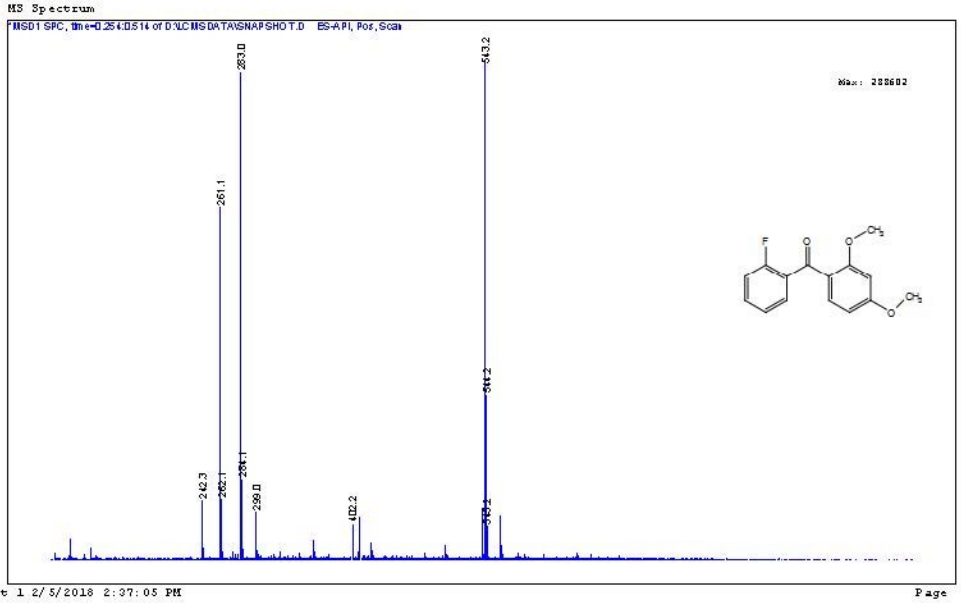
BRUKER

NAME	ZCT-3j-20180313-CNMR
EXPNO	1
PROCNO	1
Date_	20180313
Time	21.02
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	297.7 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	11.20 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6253446 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.20 dB
PL12	14.25 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.41066550 W
PL13W	0.42412052 W
SFO2	400.1416006 MHz
SI	32768
SF	100.6152830 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-3j

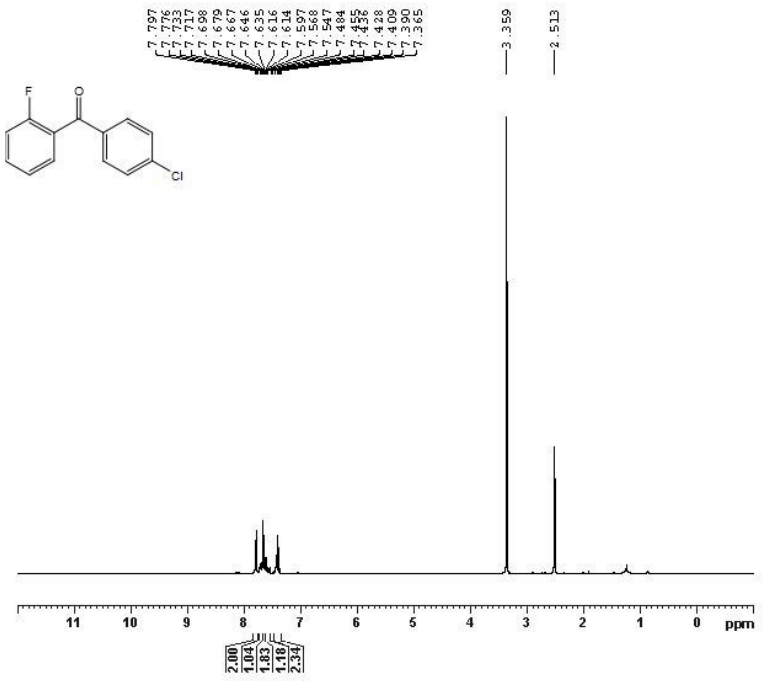
Acq. Operator :
Location : P1-F-07
Injection Date : 05-Feb-18, 14:34:42
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

MS Spectrum



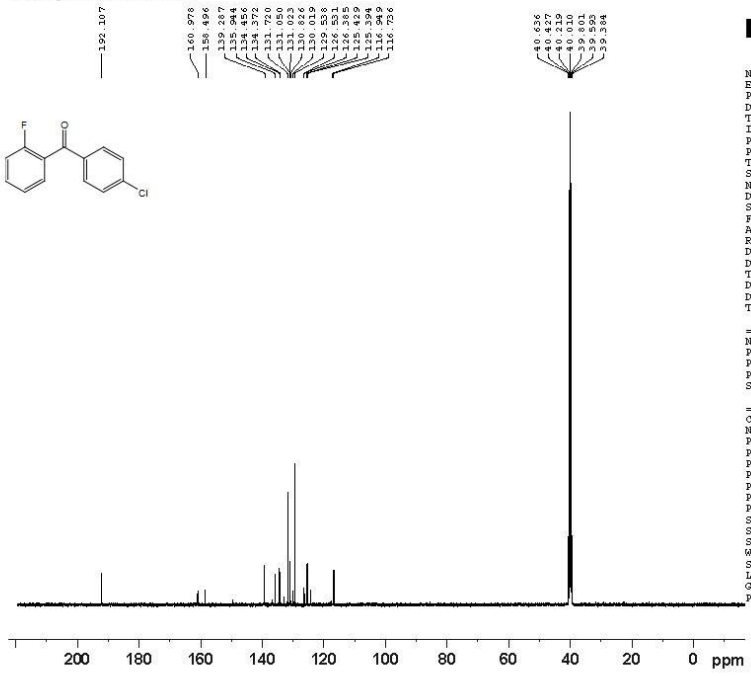
Instrument 1 2/5/2018 2:37:05 PM
Page 1 of 1

ZCT-3P-20180117-HNMR



NAME	ZCT-3P-20180117-HNMR
EXPNO	1
PROCNO	1
Date_	20180117
Time	11.34
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	0
SWH	8223.685 Hz
FIDRES	0.250967 Hz
AQ	1.9923444 sec
RG	203
DW	60.800 usec
DE	6.50 usec
TE	300.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	12.10 usec
PL1	-2.30 dB
PL1W	18.55620956 W
SFO1	400.2324716 MHz
SI	32768
SF	400.2300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

ZCT-3p-20180119-CNMR



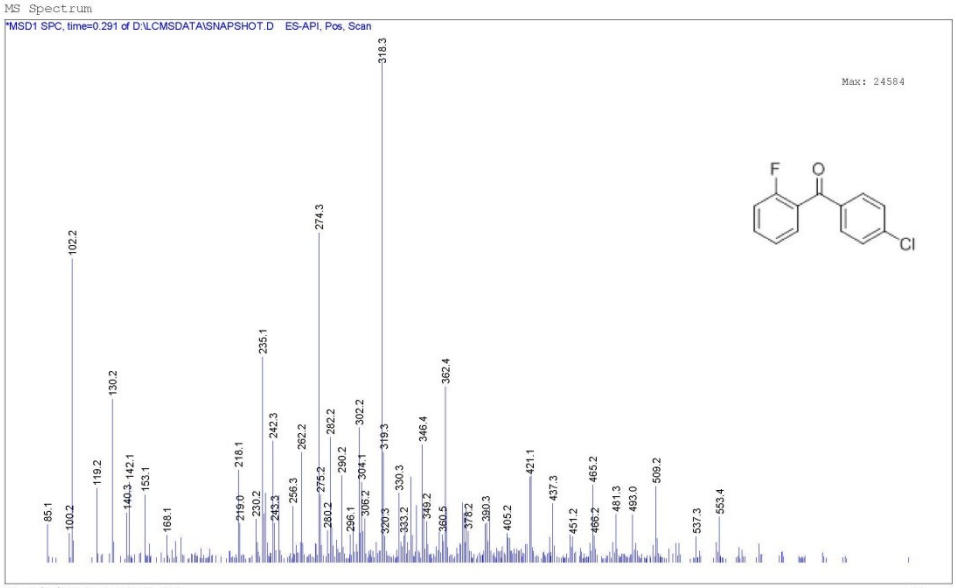
BRUKER

NAME	ZCT-3p-20180119-CNMR
EXPNO	1
PROCNO	1
Date_	20180120
Time	20.31
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1024
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	295.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.00 usec
PL1	-2.00 dB
PL1W	57.72554016 W
SFO1	100.6479773 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	-2.30 dB
PL12	14.11 dB
PL13	14.11 dB
PL2W	18.55620956 W
PL12W	0.42412052 W
PL13W	0.42412052 W
SFO2	400.2316009 MHz
SI	32768
SF	100.6379128 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

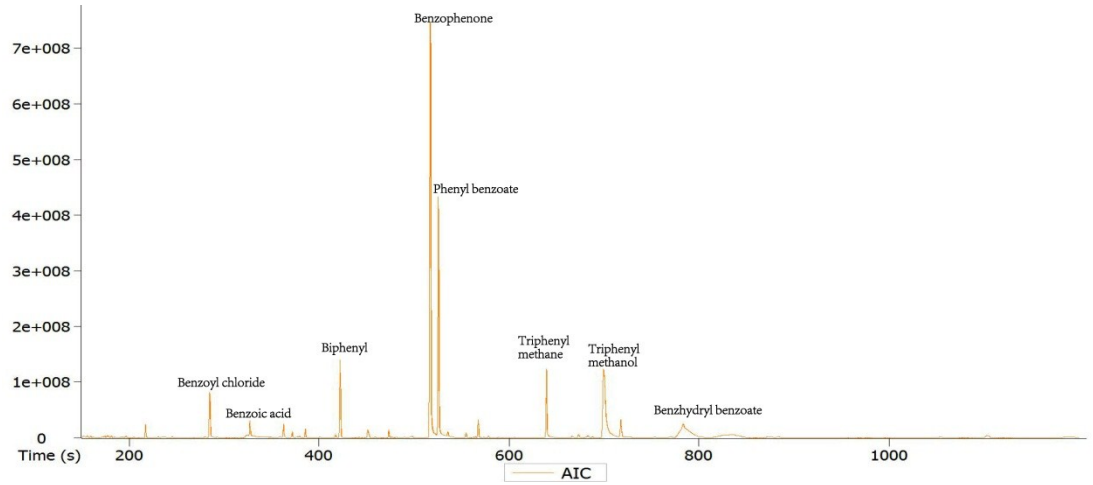
Print of window 80: MS Spectrum
Data File : D:\LCMSDATA\SNAPSHOT.D
Sample Name : ZCT-3p

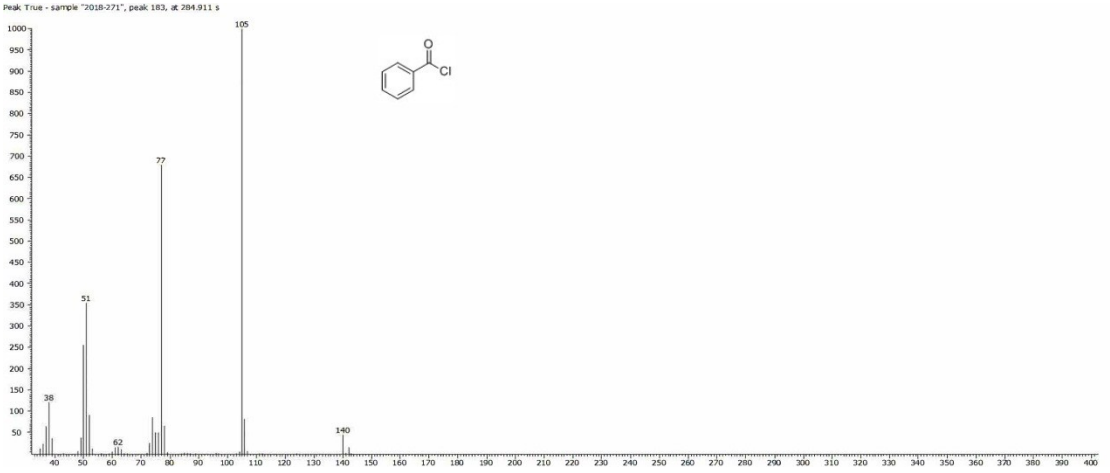
Acq. Operator :
Location : P1-F-08
Injection Date : 05-Feb-18, 14:38:36
Acq. Method : GENERAL.M
Analysis Method : C:\CHEM32\1\METHODS\GENERAL.M
Last changed : 1/31/2018 8:52:45 AM

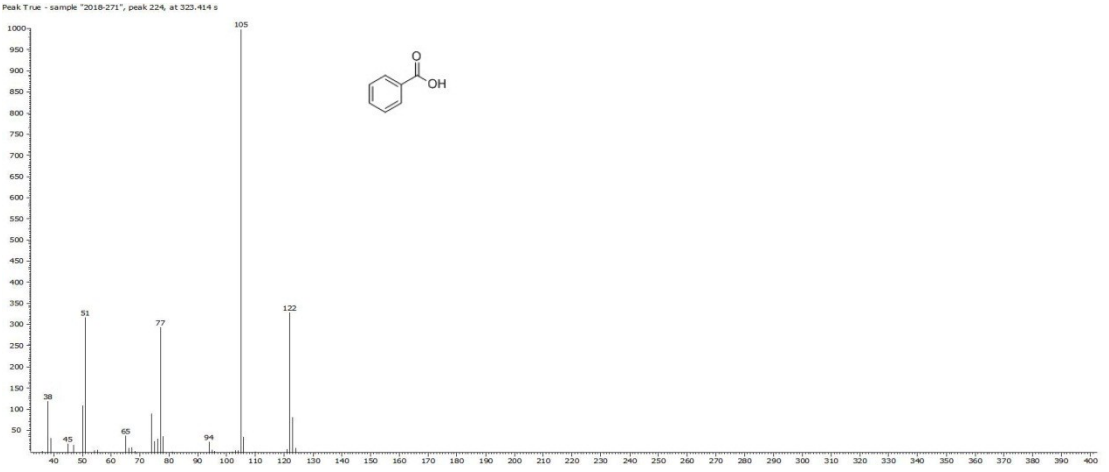
MS Spectrum



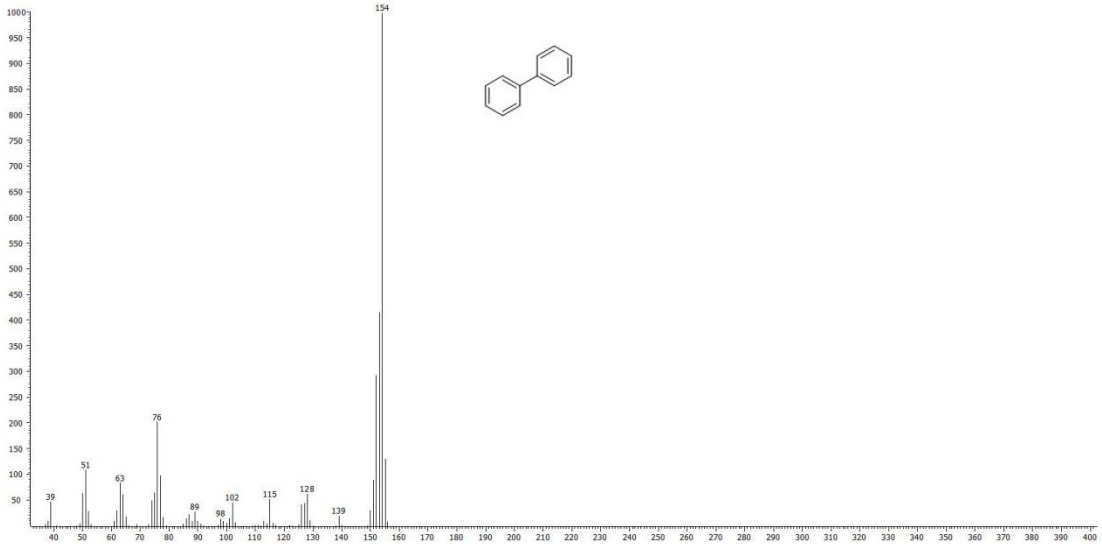
GC-MS data of 3a from batch chemistry



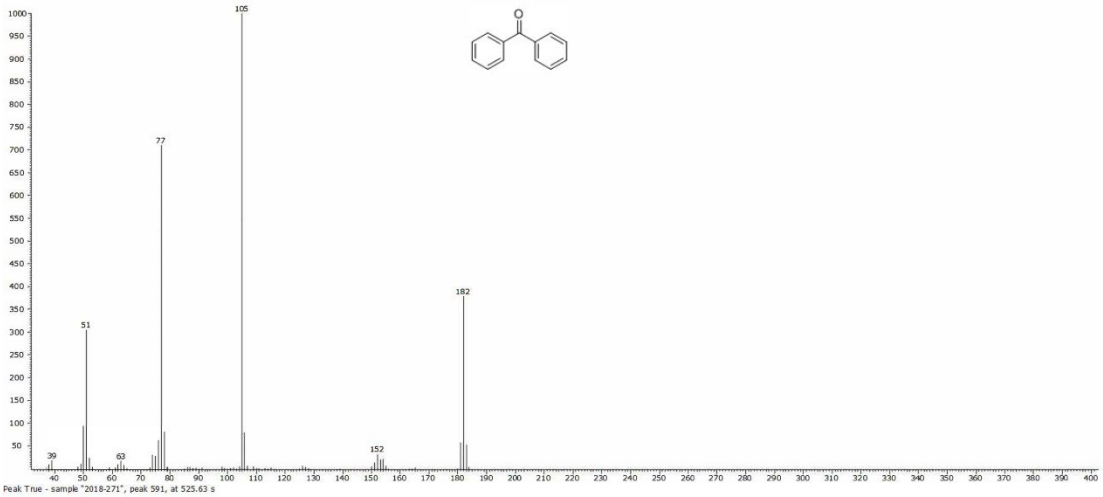




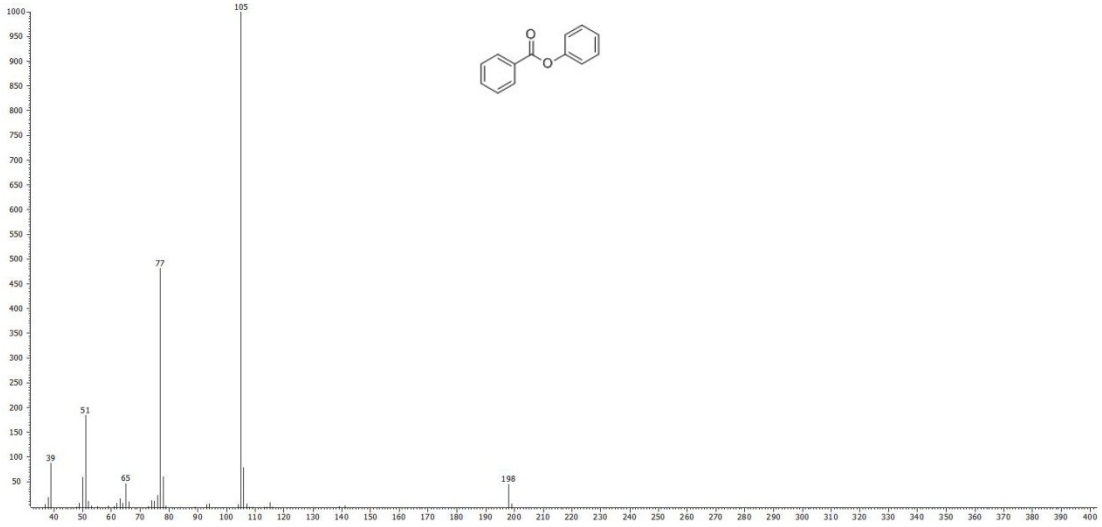
Peak True - sample "2018-271", peak 383, at 422.122 s



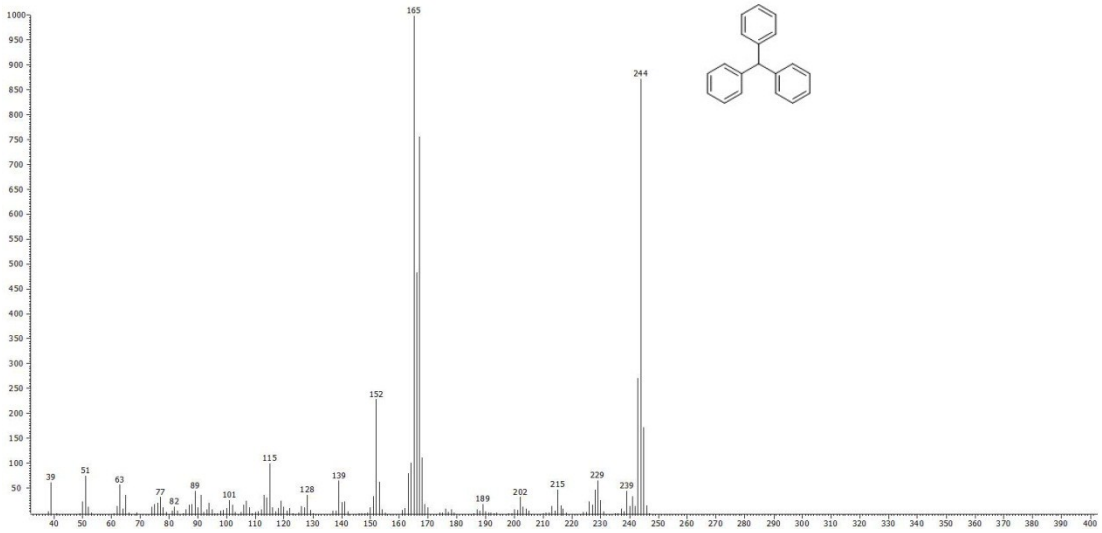
Peak True - sample "2018-271", peak 562, at 517.029 s



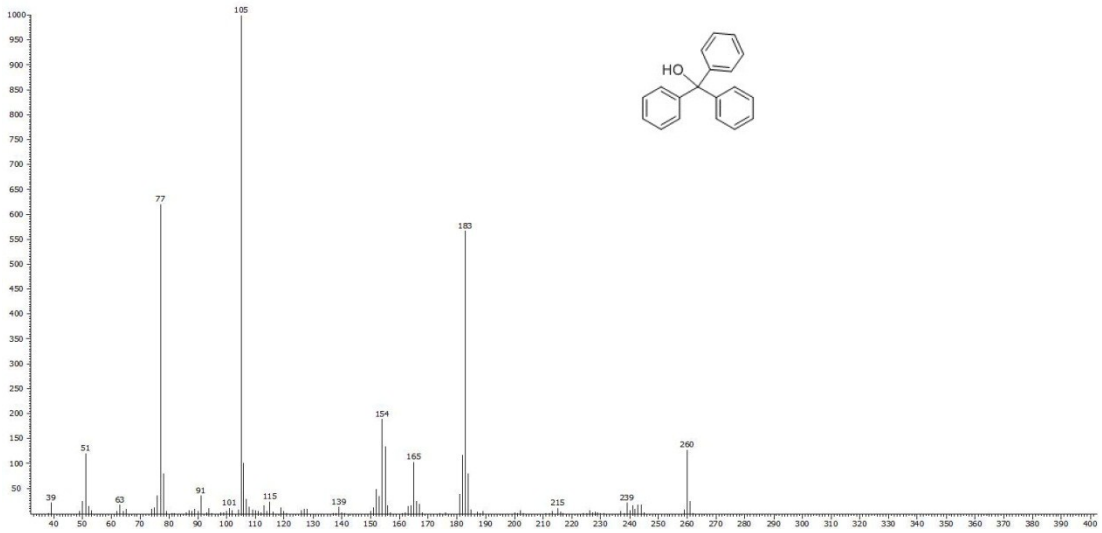
Peak True - sample "2018-271", peak 591, at 525.63 s



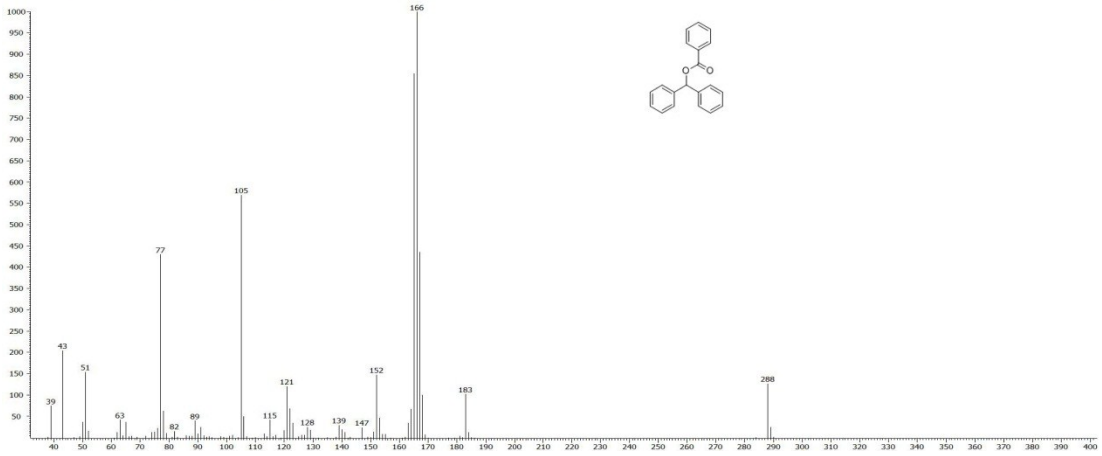
Peak True - sample "2018-271", peak 889, at 639.139 s



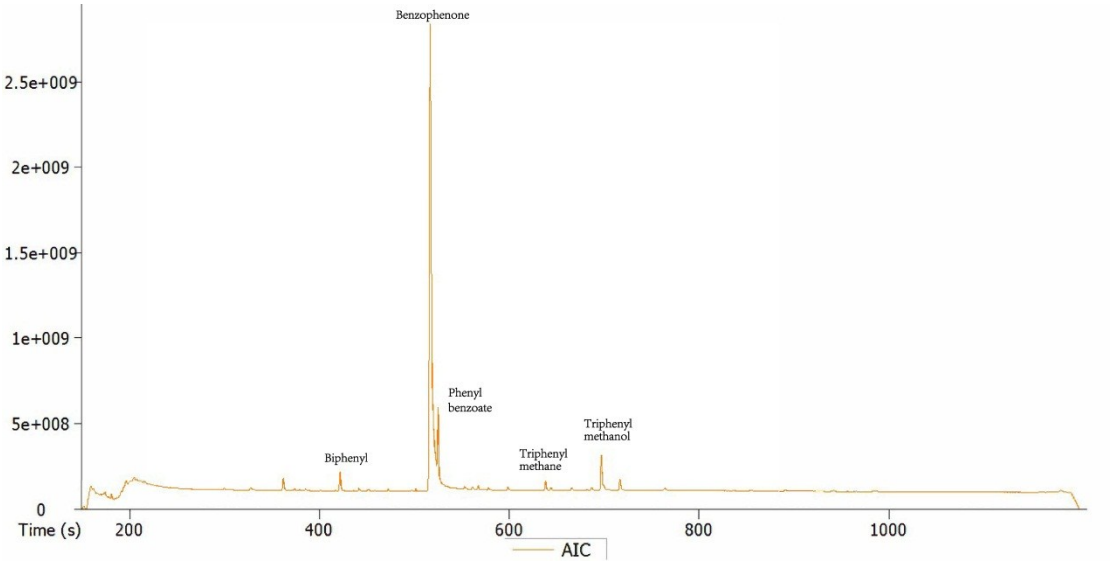
Peak True - sample "2018-271", peak 1067, at 699.444 s

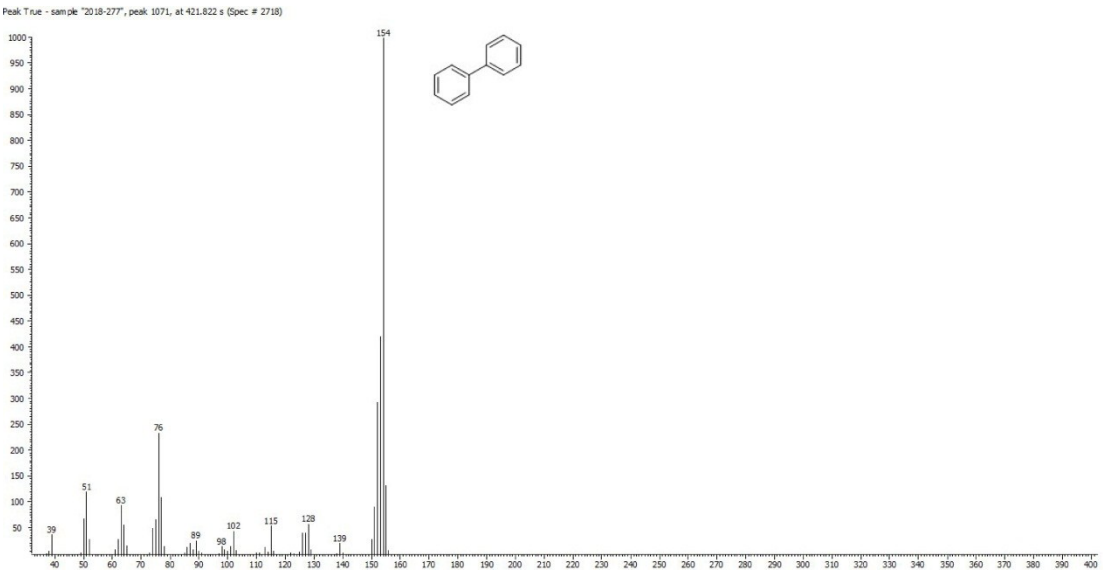


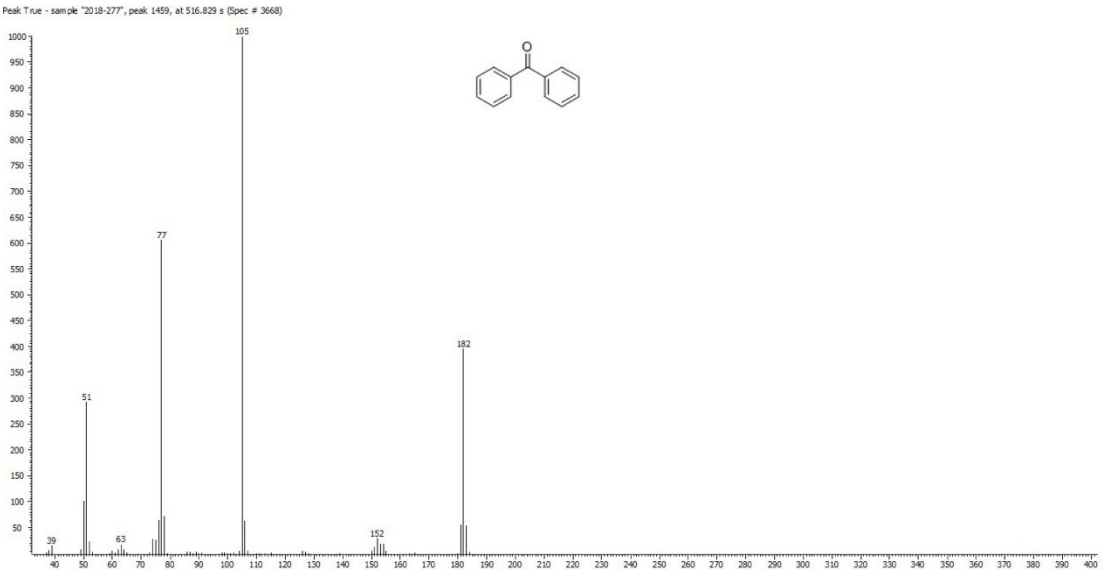
Peak True - sample "2018-271", peak 1279, at 783.251 s (Spec # 6332)



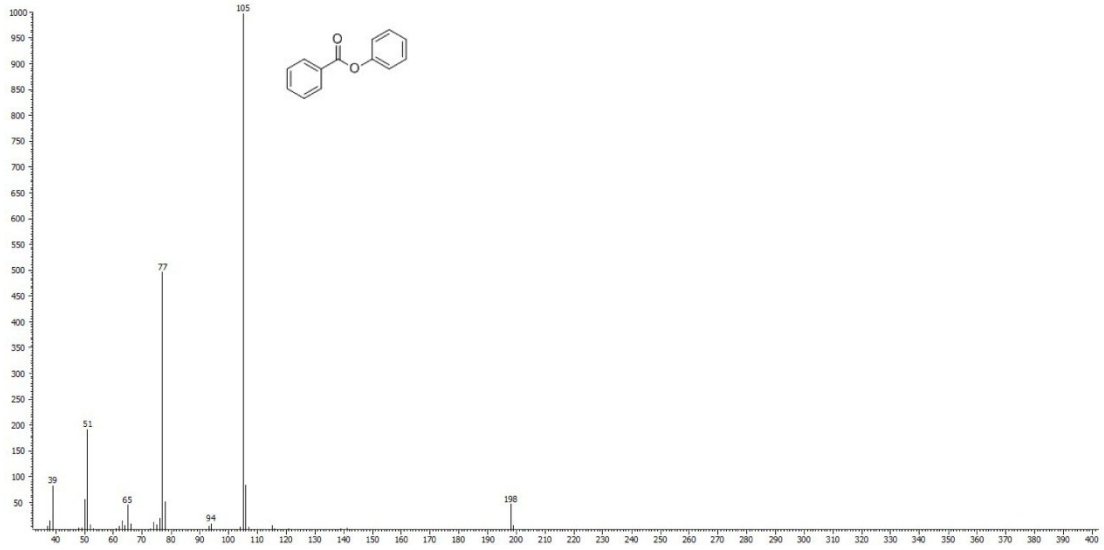
GC-MS data of 3a from flow chemistry



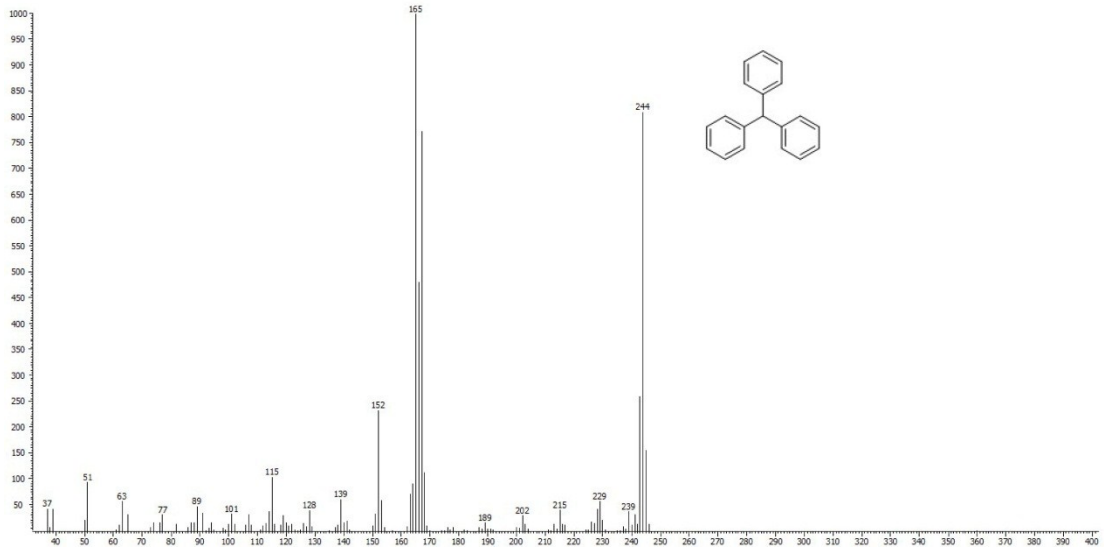




Peak True - sample "2018-277", peak 1480, at 525.03 s (Spec # 3750)



Peak True - sample "2018-277", peak 1811, at 637.539 s (Spec # 4875)



Peak True - sample "2018-277", peak 1979, at 697.144 s (Spec # 5471)