Supplementary Information for

Pd catalyzed cross coupling reactions of less activated alkenyl electrophiles (for tosylates and mesylates) with tosylhydrazones: synthesis of various 1,3-dienes

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1. Reagents

All reactions were carried out under a nitrogen atmosphere. 1,4-Dioxane and toluene were dried over Na with benzophenone-ketyl intermediate as indicator. Air- and moisture-sensitive solvents and solutions were transferred via syringe or stainless-steel cannula. All other chemicals were used as received from the appropriate suppliers. Solvents used were of analytical grade. All reactions were routinely checked by TLC. TLC was performed on aluminium-backed silica gel plates (silica gel 60 F254 grade, Merck DC) with spots visualized by UV light. Column chromatography was performed on silica gel LC 60A (70-200 micron).

Instrumental

All compounds were characterized by ^{1}H NMR, ^{13}C NMR as well as elemental analysis. Melting points were determined in open capillaries on a Veego electronic apparatus VMP-D (Veego Instrument Corporation, Mumbai, India) and are uncorrected. ^{1}HNMR and ^{13}C NMR spectra were recorded on a Bruker400 MHz model spectrometer using DMSO-d_6 as a solvent and TMS as internal standard with 1H resonant frequency of 400 MHz and ^{13}C resonant frequency of 100 MHz. The ^{1}H NMR, ^{13}C NMR chemical shifts were reported as parts per million (ppm) downfield from TMS (Me_4Si). The splitting patterns are designated as follows; s, singlet; d, doublet; t, triplet; m, multiplet. Elemental analyses (C, H, N) were performed using a Heraeus CarloErba 1180 CHN analyzer (Hanau, Germany).

2. Preparation of alkenyl tosylates and mesylates substrates

Pyronyl tosylates and mesylates were prepared from their corresponding precursors with TsCl or MsCl in the presence of triethylamine in CH_2Cl_2 according to the literature method without modifications.[1] Other alkeny tosylates and mesylates were prepared from their corresponding species according to the literature method without modifications.[2]

3. General Procedure for Preparation of Hydrazones.[3]

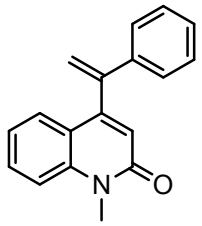
To an oven dried flat-bottomed flask previously equipped with a magnetic stir bar, was charged with p-toluenesulphonohydrazide (5 mmol) in dry methanol (10 mL) at 60 °C, the ketone (5 mmol) was added drop wise. After the completion of reaction the product was began to precipitate. The crude product was filtered, washed with petroleum ether: ethyl acetate (10:1) and dried to afford the corresponding pure N-tosylhydrazones. The reaction provides the *N*-tosylhydrazone derivatives in about 85−98% yields.

4. Typical procedure for Pd-catalyzed N-tosylhydrazones coupling with heteroaryl pseudohalides

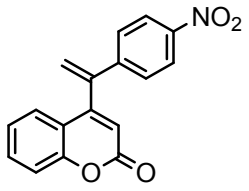
To an oven dried flat-bottomed flask which was equipped with a condenser under nitrogen atmosphere was charged with *N*-tosylhydrazone **1** (1.0 mmol), base (3 mmol), ligand (3 mol %), Pd (1.5 mol %), stir it for two minutes thereafter alkeny tosylate **2** (1.0 mmol) was added in the above reaction mixture (5.0 mL). The reaction was stirred and heated to 90 °C for 1-2 hours. After compilation of reaction, the crude reaction mixture was cooled to room temperature and filtered

through a pad of Celite eluting with ethyl acetate. The filtrate was concentrated and purify by column chromatography on silica gel.

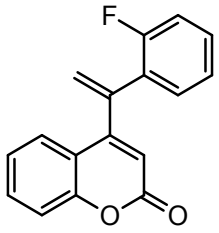
5. Charecterization of coupling yield



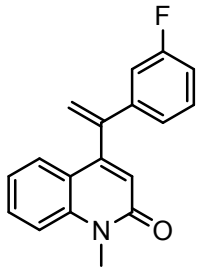
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.82 (dd, J = 7.4, 2.5 Hz, 1H), 7.44-7.30 (m, 5H), 7.17 (dd, J = 7.5, 2.0 Hz, 2H), 7.07 (dd, J = 7.1, 1.5 Hz, 1H), 6.20 (s, 1H), 5.52 (s, 1H), 5.21 (s, 1H), 3.49 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm : 165.52, 144.30, 142.82, 139.03, 129.45, 128.75, 128.37, 128.05, 126.85, 124.75, 124.58, 121.75, 120.18, 117.70, 115.11, 29.56. **Anal. Calcd.** For $C_{18}H_{15}NO$: C: 82.77; H: 5.79; N: 5.36. **Found:** C: 82.68; H: 5.57; N: 5.38. **mp** 202-204 °C.



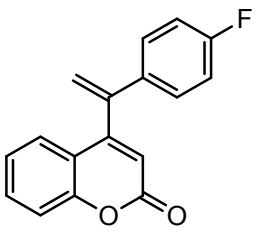
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.94 (d, J = 7.4 Hz, 2H), 7.64-7.42 (m, 4H), 7.24 (d, J = 8.1 Hz, 2H), 6.64 (s, 1H), 5.71 (s, 1H), 5.28 (s, 1H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm : 161.37, 153.81, 151.78, 147.43, 146.12, 141.82, 131.87, 128.93, 126.55, 125.48, 123.27, 120.60, 119.42, 118.29, 109.17. **Anal. Calcd.** For $C_{17}H_{11}NO_4$: C: 69.62; H: 3.78; N: 4.78. **Found:** C: 69.68; H: 3.55; N: 4.79. **mp** 159-162 °C.



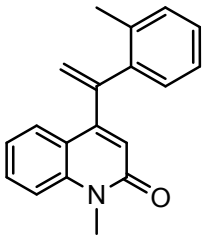
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.82 (dd, *J* = 7.4, 1.5 Hz, 1H), 7.59 (t, *J* = 7.1 Hz, 1H), 7.36-7.17 (m, 6H), 6.26 (s, 1H), 5.52 (s, 1H), 5.38 (s, 1H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm : 165.26, 158.25 (d, *J* = 240.2 Hz), 152.76, 151.24, 140.35, 132.48, 131.19 (d, *J* = 7.1 Hz), 128.93, 128.81 (d, *J* = 15.2 Hz), 126.57 (d, *J* = 7.6 Hz), 125.48, 124.54 (d, *J* = 3.3 Hz), 120.69, 118.54, 117.24, 115.72 (d, *J* = 13.4 Hz), 105.32. **Anal. Calcd.** For $C_{17}H_{11}FO_2$: C, 76.68; H, 4.16. **Found:** C, 76.79; H, 4.16. **mp** 219-221°C.



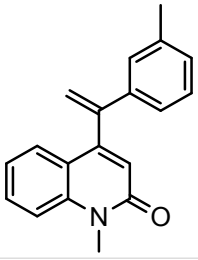
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.48-7.44 (m, 2H), 7.32 (dd, *J* = 7.8, 2.1 Hz, 1H), 7.28 – 7.12 (m, 3H), 7.03 (d, *J* = 7.8 Hz, 2H), 6.89 (s, 1H), 5.52 (s, 1H), 5.14 (s, 1H), 3.39 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 164.8, 159.81(d, *J* = 241.6 Hz), 146.32, 142.41 (d, *J* = 7.9 Hz), 140.86, 138.54, 130.03, 129.39 (d, *J* = 7.5 Hz), 124.67 (d, J = 16.4 Hz), 121.86, 121.64 (d, *J* = 3.2 Hz), 120.36, 115.69 (d, *J* = 13.2 Hz), 115.31 (d, *J* = 12.7 Hz), 114.66, 113.57, 113.01, 31.24. **Anal. Calcd.** For $C_{18}H_{14}FNO$: C, 77.44; H, 5.05; N, 5.01. **Found:** C, 77.40; H, 5.05; N, 5.13. **mp** 231-233 °C.



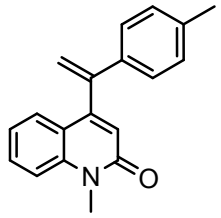
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.74 (dd, *J* = 7.9, 2.1 Hz, 1H), 7.61 (dd, *J* = 7.5, 2.0 Hz, 1H), 7.44 – 7.25 (m, 5H), 6.43 (s, 1H), 5.64 (s, 1H), 5.29 (s, 1H).**^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 164.54, 162.23 (d, *J* = 236.7 Hz), 153.45, 152.67, 143.89, 139.37(d, *J* = 3.1 Hz), 131.71, 129.19 (d, *J* = 8.4 Hz), 125.71, 123.19, 120.73, 117.18, 116.30, 115.27(d, *J* = 23.6 Hz), 110.78. **Anal. Calcd.** For $C_{17}H_{11}FO_2$: C, 76.68; H, 4.16. **Found:** C, 76.71; H, 4.14. **mp** 219-221°C.



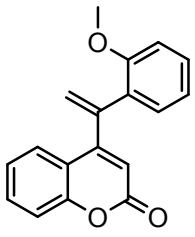
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 8.19 (dd, J = 7.7, 2.1 Hz, 1H), 7.76 (dd, *J* = 7.4, 2.0 Hz, 1H), 7.62 (dd, *J* = 7.8, 2.6 Hz, 1H), 7.37-7.23 (m, 3H), 6.98 (dd, *J* = 7.7, 2.0 Hz, 2H), 6.28 (s, 1H), 5.62 (s, 1H), 5.34 (s, 1H), 3.68 (s, 3H), 2.28 (s, 3H).**^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 162.28, 144.58, 142.41, 140.11, 139.23, 137.37, 130.48, 130.79, 129.98, 129.15, 125.35, 124.39, 123.17, 121.49, 119.13, 115.68, 113.58, 29.78, 19.84. **Anal. Calcd.** For $C_{19}H_{17}NO$: C, 82.88; H, 6.22; N, 5.09. **Found**: C, 82.79; H, 6.25; N, 5.19. **mp** 183-185°C.



^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 8.05 (dd, *J* = 7.4, 2.1 Hz, 1H), 7.41-7.29 (m, 2H), 7.28 (t, *J* = 7.5 Hz, 1H), 7.16 – 7.01 (m, 4H), 6.27 (s, 1H), 5.71 (s, 1H), 5.24 (s, 1H), 3.61 (s, 3H), 2.31 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 163.38, 146.67, 143.72, 139.11, 138.58, 137.81, 131.19, 129.24, 128.88, 128.45, 127.73, 124.49, 123.71, 121.39 117.58, 115.77, 113.87, 29.67, 21.87. **Anal. Calcd.** For $C_{19}H_{17}NO$: C, 82.88; H, 6.22; N, 5.09. **Found**: C, 82.81; H, 6.27; N, 5.11. **mp** 212-215°C.

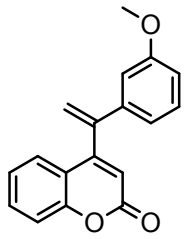


^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.84 (dd, *J* = 7.4, 1.9 Hz, 1H), 7.43-7.32 (m, 3H), 7.19-6.98 (m, 4H), 6.19 (s, 1H), 5.67 (s, 1H), 5.21 (s, 1H), 3.64 (s, 3H), 2.32 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 164.51, 144.84, 143.69, 140.58, 139.93, 137.51, 131.29, 129.47, 127.78, 124.13, 123.25, 121.81, 117.45, 115.71, 113.86, 28.96, 21.42. **Anal. Calcd.** For $C_{19}H_{17}NO$: C, 82.88; H, 6.22; N, 5.09. **Found**: C, 82.76; H, 6.20; N, 5.09. **mp** 198-200°C.

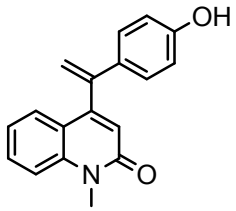


^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.78-7.69 (m, 2H), 7.40-7.31 (m, 2H), 7.28 – 7.18 (m, 2H), 7.04-6.98 (m, 2H), 6.57 (s, 1H), 5.54 (s, 1H), 5.29 (s, 1H), 3.67 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 162.85, 157.71, 153.19, 151.32, 141.59, 132.05, 131.43, 130.89, 128.51,

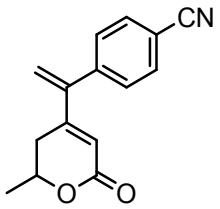
125.74, 124.09, 123.37, 121.47, 120.53, 116.48, 111.96, 109.44, 56.27. **Anal. Calcd.** For $C_{18}H_{14}O_3$: C, 77.68; H, 5.07. **Found:** C, 77.64; H, 5.07. **mp** 225-228°C.



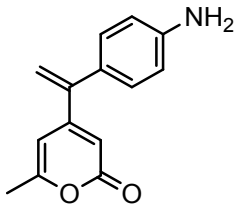
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.83 (dd, J = 7.3, 2.0 Hz, 1H), 7.66 (dd, J = 7.7, 4.7 Hz, 1H), 7.41-7.25 (m, 3H), 7.01–6.85 (m, 3H), 6.36 (s, 1H), 5.69 (s, 1H), 5.45 (s, 1H), 3.73 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 164.85, 158.97, 153.52, 152.42, 143.71, 139.27, 131.33, 129.38, 125.74, 123.82, 123.27, 120.45, 117.63, 117.54, 117.38, 113.04, 110.59, 55.79. **Anal. Calcd.** For $C_{18}H_{14}O_3$: C, 77.68; H, 5.07. **Found:** C, 77.86; H, 5.12. **mp** 205-208°C.



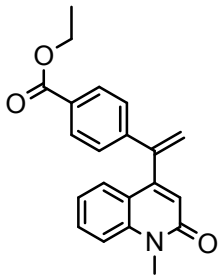
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 9.50 (s, 1H), 8.08 (dd, J = 7.4, 2.1 Hz, 1H), 7.41-7.32 (m, 3H), 7.08-6.98 (m, 2H), 6.82 (d, J = 7.2 Hz, 2H), 6.21 (s, 1H), 5.71 (s, 1H), 5.25 (s, 1H), 3.68 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 164.12, 160.26, 145.70, 143.69, 139.43, 135.68, 129.21, 128.72, 124.47, 123.61, 121.87, 116.68, 115.51, 113.86, 29.88. **Anal. Calcd.** For $C_{18}H_{15}NO_2$: C, 77.96; H, 5.45; N, 5.05. **Found:** C, 77.91; H, 5.47; N, 5.05 **mp** 247-248°C.



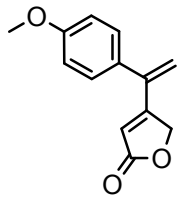
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.74 (d, J = 8.1 Hz, 2H), 7.40 (d, J = 7.4 Hz, 2H), 5.85 (s, 1H), 5.73 (s, 1H), 5.40 (s, 1H), 4.62 (m, 1H), 2.68 (dd, J = 16.3, 7.0 Hz, 1H), 2.29 (d, J = 7.0 Hz, 1H), 1.30 (d, J = 6.8 Hz, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm : 163.76, 156.73, 144.12, 141.47, 133.29, 128.90, 118.58, 115.45, 112.82, 110.37, 72.87, 31.07, 21.07. **Anal. Calcd.** For $C_{15}H_{13}NO_2$: C, 75.30; H, 5.48; N, 5.85. **Found:** C, 75.33; H, 5.54; N, 5.81. **mp** 238-240°C.



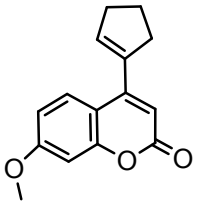
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.31 (d, J = 7.3 Hz, 2H), 6.47 (d, J = 7.3 Hz, 2H), 6.20-6.16 (m, 2H), 5.81 (s, 1H), 5.57 (s, 1H), 5.21 (s, 2H), 2.23 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 166.28, 162.82, 151.27, 147.45, 144.19, 134.55, 128.20, 114.61, 113.30, 109.90, 104.14, 21.87. **Anal. Calcd.** For $C_{14}H_{13}NO_2$: C, 74.00; H, 5.77; N, 6.16. **Found:** C, 74.09; H, 5.72; N, 6.11. **mp** 220-222°C



^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 8.18 (dd, J = 8.1, 2.7 Hz, 1H), 7.71 (d, J = 7.3 Hz, 2H), 7.52-7.44 (m, 3H), 7.08-7.02 (m, 2H), 6.41 (s, 1H), 5.69 (s, 1H), 5.24 (s, 1H), 4.08 (q, J = 8.1 Hz, 2H), 3.68 (s, 3H), 1.34 (t, J = 7.7 Hz, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 162.47, 159.81, 145.66, 143.96, 142.53, 139.61, 131.72, 129.37, 128.78, 125.74, 124.47, 123.19, 122.36, 117.31, 115.67, 113.87, 61.27, 29.72, 14.36. **Anal. Calcd.** For $C_{21}H_{19}NO_3$: C, 75.66; H, 5.74; N, 4.20. **Found:** C, 75.60; H, 5.79; N, 4.29. **mp** 215-217°C.

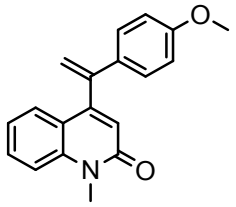


^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.37 (d, J = 7.8 Hz, 2H), 6.93 (d, J = 7.6 Hz, 2H), 6.07 (s, 1H), 5.71 (s, 1H), 5.40 (s, 1H), 4.87 (s, 2H), 3.74 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 176.72, 157.18, 149.89, 136.27, 135.74, 128.24, 119.05, 113.92, 110.54, 72.37, 55.61. **Anal. Calcd.** For $C_{13}H_{12}O_3$: C, 72.21; H, 5.59. **Found:** C, 72.19; H, 5.60. **mp** 212-214°C.

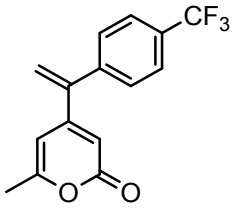


^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.71 (d, J = 7.6 Hz, 1H), 7.09 (d, J = 7.7 Hz, 1H), 6.94 (s, 1H), 6.48 (s, 1H), 6.07 (t, J = 6.3 Hz, 1H), 3.82 (s, 3H), 2.30-2.26 (m, 4H), 1.90-1.83 (m, 2H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 163.87, 159.56, 154.23, 137.51, 136.27, 129.71, 126.86,

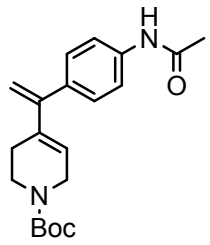
116.41, 110.33, 108.53, 105.81, 54.22, 34.67, 32.63, 22.83. **Anal. Calcd.** For $C_{15}H_{14}O_3$: C, 74.36; H, 5.82. **Found:** C, 74.19; H, 5.97. **mp** 158-160 °C.



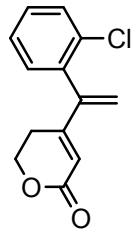
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.79 (dd, *J* = 7.6, 2.1 Hz, 1H), 7.48 – 7.36 (m, 3H), 7.06-6.93 (m, 4H), 6.18 (s, 1H), 5.68 (s, 1H), 5.16 (s, 1H), 3.79 (s, 3H), 3.57 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 163.37, 161.65, 144.60, 143.69, 138.62, 136.08, 129.29, 128.53, 124.65, 123.53, 122.72, 117.38, 115.68, 113.95, 111.86, 58.35, 30.59.**Anal. Calcd.** For $C_{19}H_{17}NO_2$: C, 78.33; H, 5.05; N, 5.45. **Found:** C, 78.58; H, 5.09; N, 5.52. **mp** 252-254 °C.



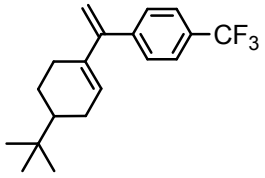
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.49 (d, *J* = 8.1 Hz, 2H), 7.30 (d, *J* = 7.9 Hz, 2H), 6.31 (s, 1H), 6.19 (s, 1H), 5.59 (s, 1H), 5.45 (s, 1H), 2.31 (s, 3H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 164.70, 161.78, 161.63, 144.17, 141.24, 131.91 (q, *J* = 30.7 Hz), 131.73, 126.90 (q, *J* = 3.9 Hz), 125.16 (d, *J* = 271.14 Hz), 114.46, 109.92, 104.45, 20.19. **Anal. Calcd.** For $C_{15}H_{11}F_3O_2$: C, 64.29; H, 3.96. **Found:** C, 64.37; H, 3.87. **mp** 198-200 °C.



^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 9.24 (s, 1H), 7.75 (d, *J* = 7.9 Hz, 2H), 7.64 (d, *J* = 7.6 Hz, 2H), 5.79 (t, *J* = 6.2 Hz, 1H), 5.42 (s, 1H), 5.04 (s, 1H), 3.95 (t, *J* = 5.8 Hz, 2H), 3.45 (d, *J* = 6.2 Hz, 2H), 2.65 (t, *J* = 6.0 Hz, 2H), 2.07 (s, 3H), 1.42 (s, 9H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm : 167.19, 158.79, 144.97, 141.53, 138.13, 136.54, 127.68, 124.52, 118.66, 118.19, 79.30, 49.28, 45.63, 31.27, 27.51, 24.05. **Anal. Calcd.** For $C_{20}H_{26}N_2O_3$: C, 70.15; H, 7.65; N, 8.18. **Found:** C, 70.24; H, 7.71; N, 8.12. **mp** 237-239 °C.



^{1}H NMR (400 MHz, DMSO-d_6) δ ppm: 7.51 (dd, *J* = 7.7, 2.4 Hz, 1H), 7.17-7.07 (m, 3H), 5.97 (s, 1H), 5.59 (s, 1H), 5.38 (s, 1H), 4.27 (t, *J* = 5.1 Hz, 2H), 2.24 (t, *J* = 5.3 Hz, 2H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm : 165.67, 154.72, 144.67, 138.91, 133.67, 130.27, 129.52, 129.37, 125.49, 116.32, 112.32, 64.81, 29.37. **Anal. Calcd.** For $C_{13}H_{11}ClO_2$: C, 66.53; H, 4.72. **Found:** C, 66.57; H, 4.69. **mp** 208-211 °C.



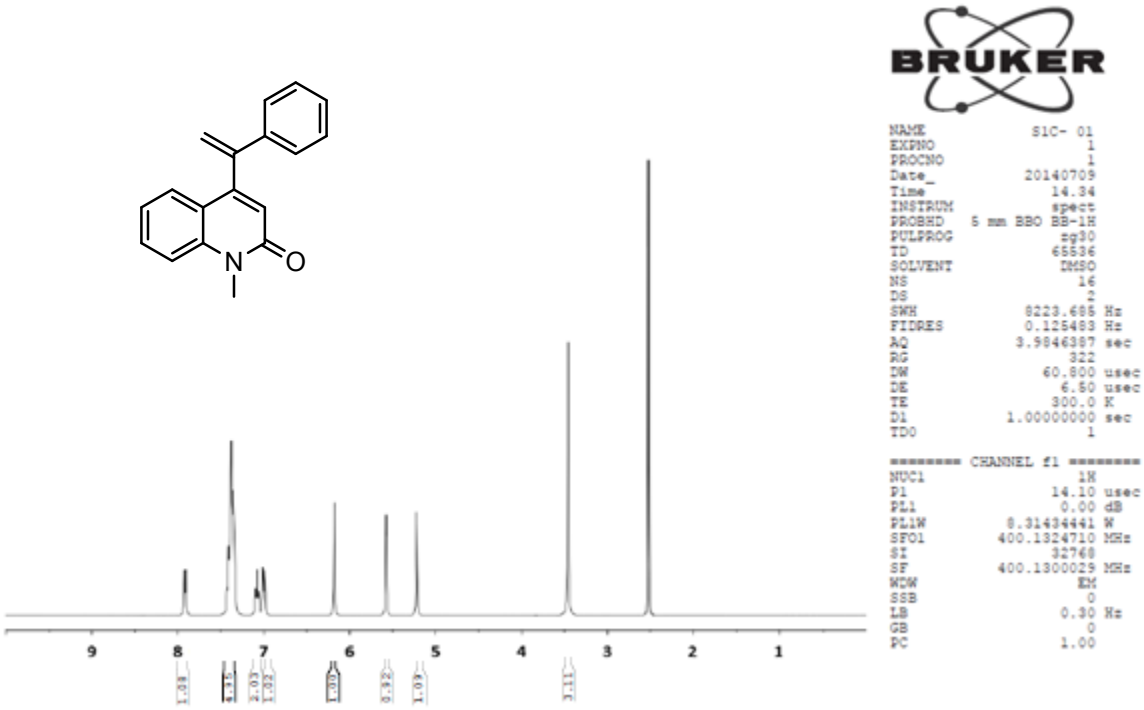
^{1}H NMR (400 MHz, DMSO-d_6) δ ppm : 7.48 (d, J = 8.2 Hz, 2H), 7.31 (d, J = 8.0 Hz, 2H), 5.63 (t, J = 6.2 Hz, 1H), 5.43 (s, 1H), 5.11 (s, 1H), 2.31-2.23 (m, 1H), 2.20–2.02 (m, 2H), 1.81–1.66 (m, 2H), 1.39-1.35 (m, 2H), 0.84 (s, 9H). **^{13}C NMR** (100 MHZ, DMSO-d_6) δ ppm: 145.07, 141.18, 139.17, 134.21, 131.39 (q, J = 32.2 Hz), 128.31 (d, J = 3.4 Hz), 123.17 (d, J = 269.7 Hz), 119.90, 118.19, 44.27, 32.36, 28.89, 27.10, 25.13, 24.95. **Anal. Calcd.** For $C_{19}H_{23}F_3$: C, 74.01; H, 7.52. **Found:** C, 74.07; H, 7.58. **mp** 217-220 °C.

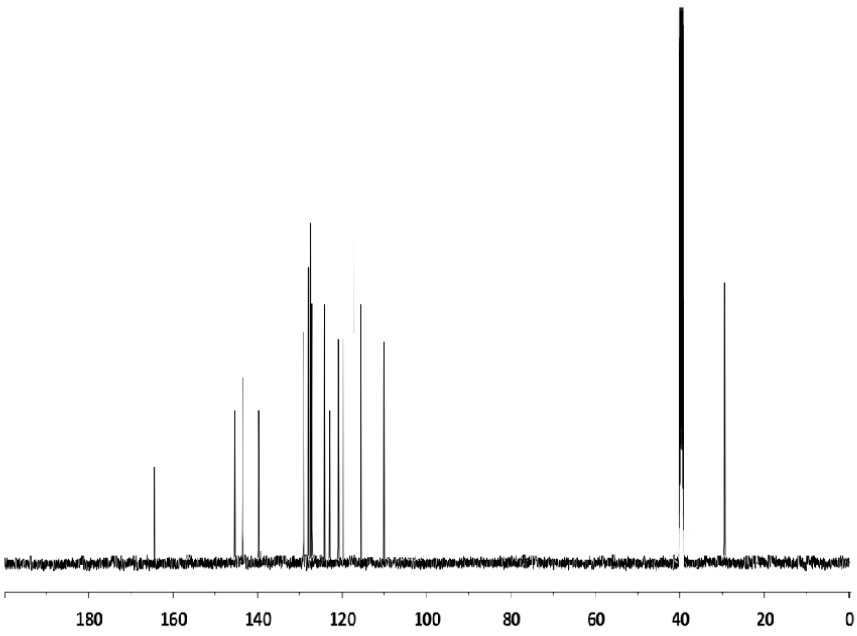
References

1. J. Kuroda, K. Inamoto, K. Hiroya, T. Doi, *Eur. J. Org. Chem.* 2009, 2251-2261.
2. A. Klapars, K. R. Campos, C. Y. Chen, R. P. Volante. *Org. Lett*. 2005, **7**, 1185-1188.
3. Creary, X.; Tam, W. W.; Albizati, K. F.; Stevens, R. V. Org. Synth. 1986, 64, 207.s

7. ^{1}H and ^{13}C NMR Spectra

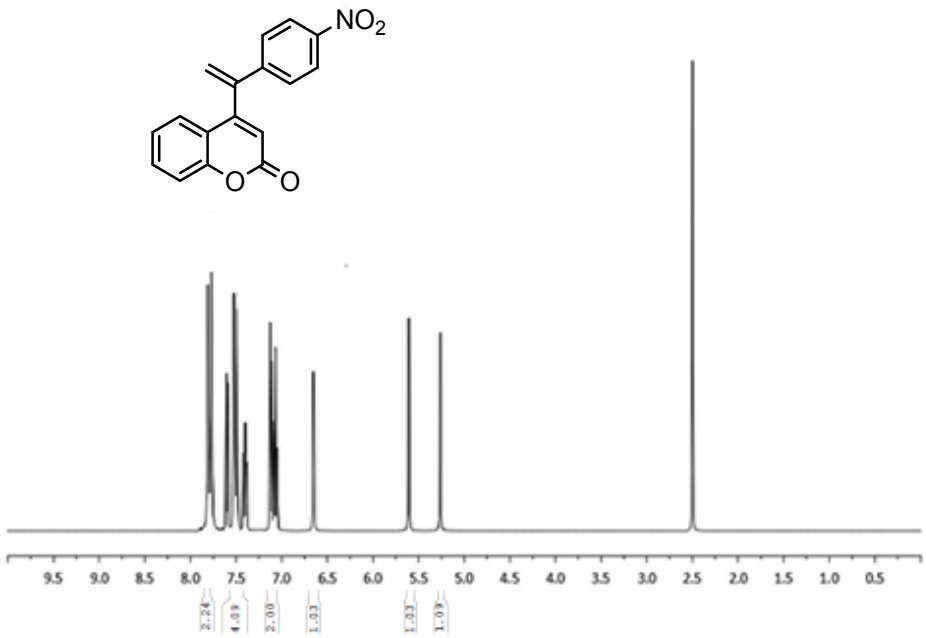
Compound **3a**





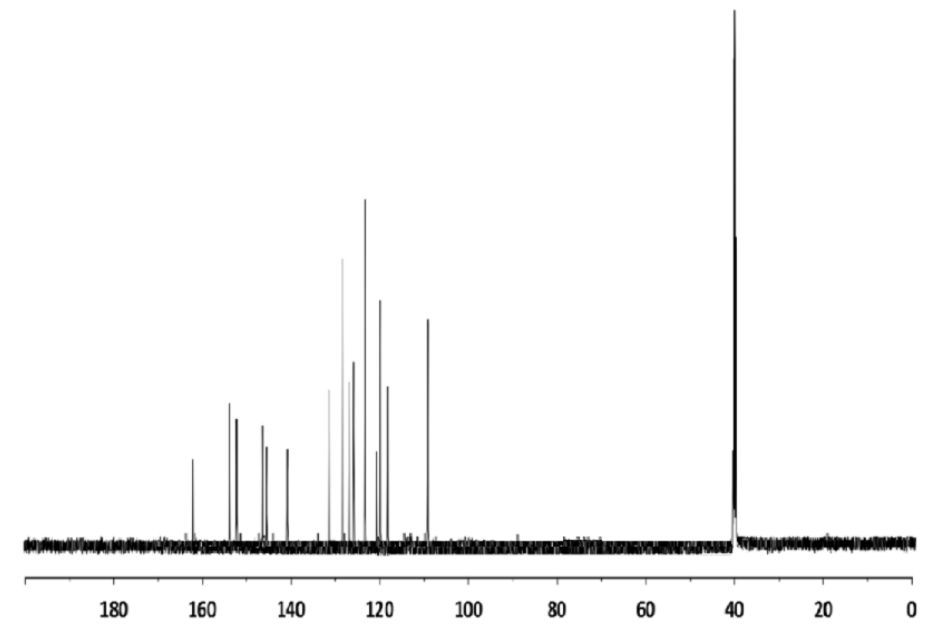
NAME	S1C-01
EXPNO	2
PROCNO	1
Date_	20140701
Time	11.41
INSTRUM	spect
PROBHD	5 mm BBO BB-1H
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	249
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	2050
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	10.00 usec
PL1	0.00 dB
PL1W	35.41759872 W
SFO1	100.6228298 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	0.00 dB
PL12	15.08 dB
PL13	18.08 dB
PL2W	8.31434441 W
PL12W	0.25812379 W
PL13W	0.12936834 W
SFO2	400.1316005 MHz
SI	32768
SF	100.6128193 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

Compound **3b**



BRUKER

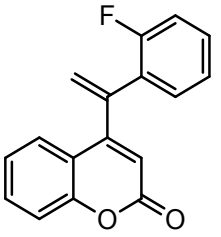
```
NAME                 S1C-02
EXPNO                     1
PROCNO                    1
Date_              20140709
Time                  10.29
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH               8223.685 Hz
FIDRES               0.125483 Hz
AQ                3.9846387 sec
RG                      322
DW                   60.800 usec
DE                    6.50 usec
TE                   300.0 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                      1H
P1                    14.10 usec
PL1                    0.00 dB
PL1W            8.31434441 W
SFO1          400.1324710 MHz
SI                    32768
SF            400.1300029 MHz
WDW                      EM
SSB                       0
LB                    0.30 Hz
GB                        0
PC                    1.00
```

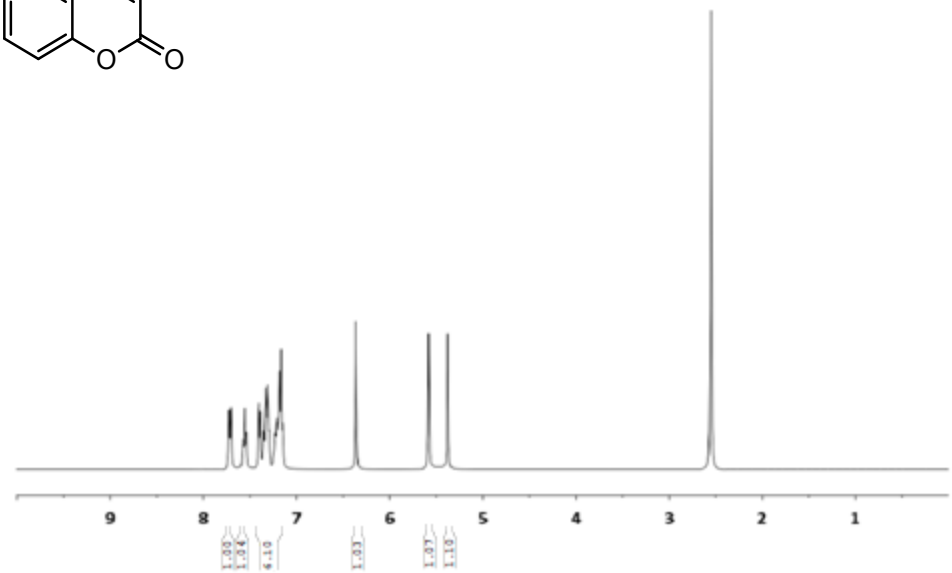


BRUKER

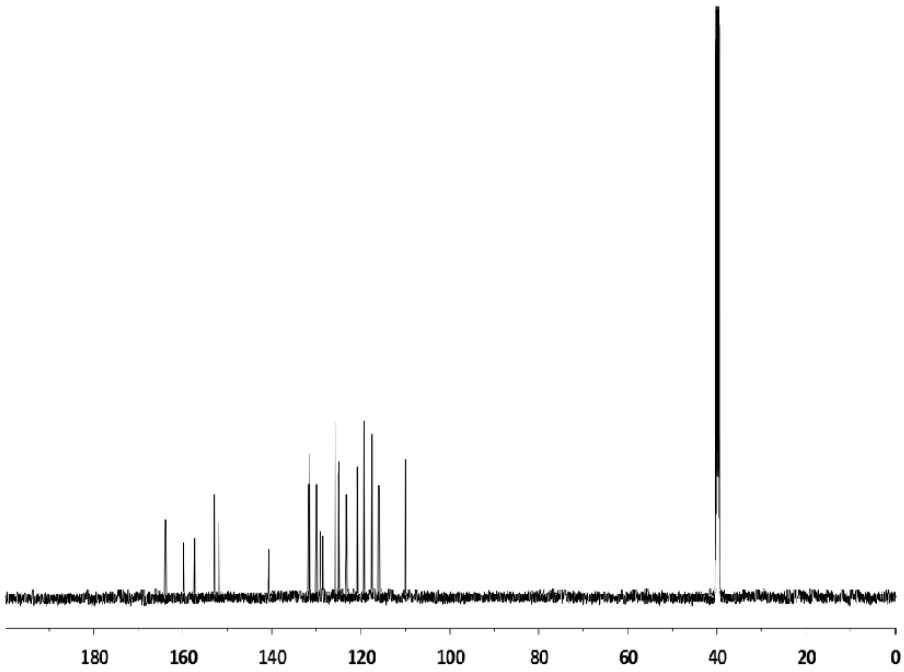
```
NAME                 S1C-02
EXPNO                     3
PROCNO                    1
Date_              20140702
Time                  13.29
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH              24038.461 Hz
FIDRES               0.366798 Hz
AQ                1.3631988 sec
RG                     2050
DW                   20.800 usec
DE                    6.50 usec
TE                   300.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                    10.00 usec
PL1                    0.00 dB
PL1W           35.41759872 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.08 dB
PL13                  18.08 dB
PL2W            8.31434441 W
PL12W           0.25812379 W
PL13W           0.12936834 W
SFO2          400.1316005 MHz
SI                    32768
SF            100.6128193 MHz
WDW                      EM
SSB                       0
LB                    1.00 Hz
GB                        0
PC                    1.40
```

Compound **3c**



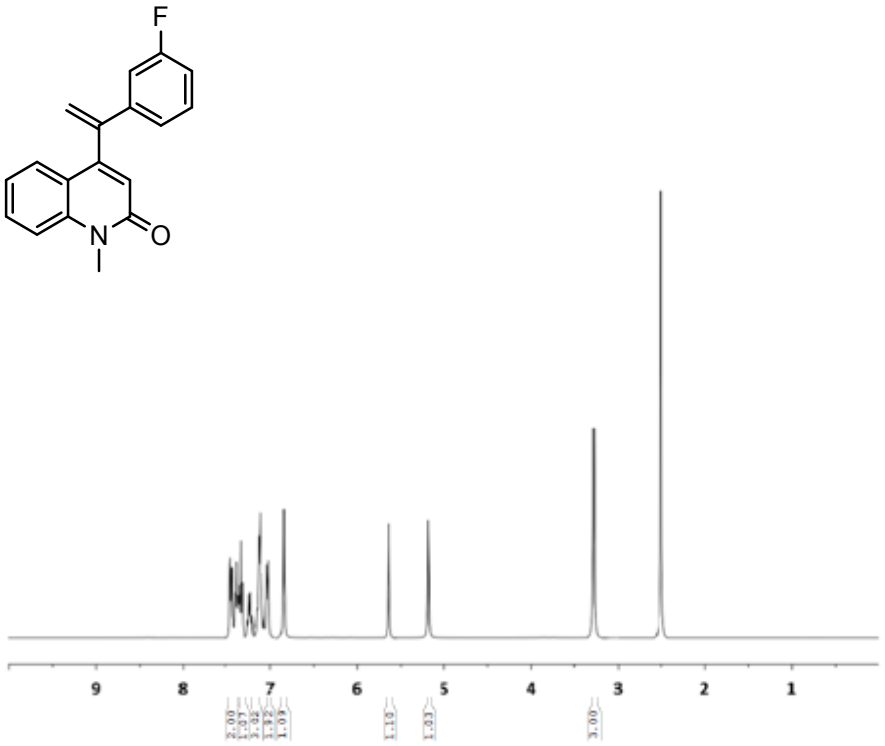



```
NAME                S1C- 03
EXPNO                     1
PROCNO                    1
Date_              20140708
Time                  09.15
INSTRUM                spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                8223.685 Hz
FIDRES             0.125483 Hz
AQ                 3.9846387 sec
RG                      322
DW                  60.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                      1H
P1                   14.10 usec
PL1                   0.00 dB
PL1W           8.31434441 W
SFO1         400.1324710 MHz
SI                    32768
SF           400.1300029 MHz
WDW                      EM
SSB                       0
LB                   0.30 Hz
GB                        0
PC                    1.00
```

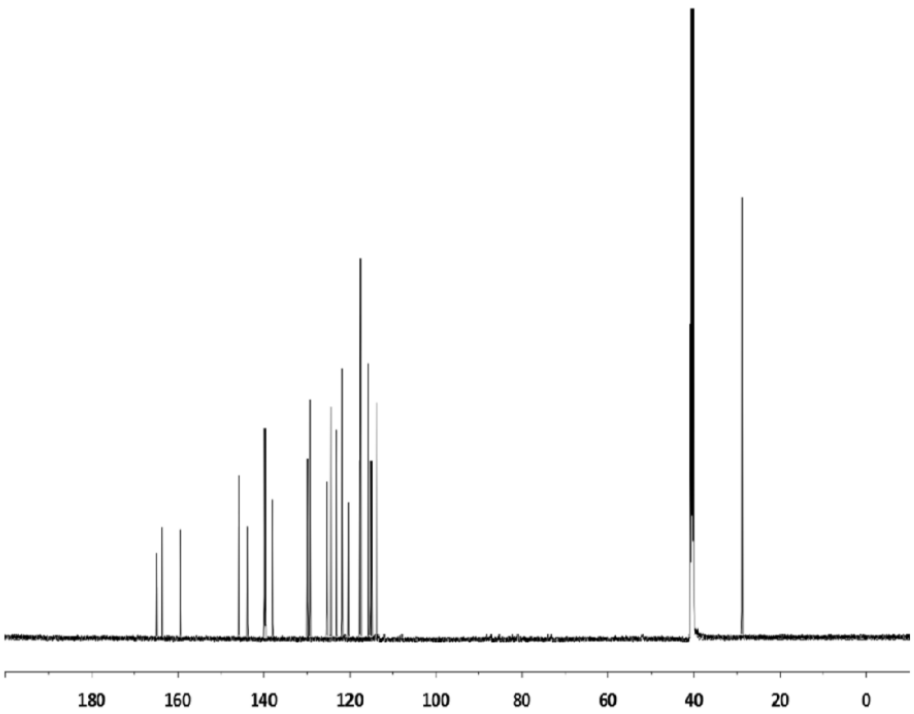



```
NAME                S1C-03
EXPNO                    2
PROCNO                   1
Date_             20140702
Time                 08.58
INSTRUM              spect
PROBHD    5 mm BBO BB-1H
PULPROG            zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631988 sec
RG                     2050
DW                  20.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                   10.00 usec
PL1                   0.00 dB
PL1W          35.41759872 W
SFO1         100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                      1H
PCPD2                80.00 usec
PL2                   0.00 dB
PL12                 15.08 dB
PL13                 18.08 dB
PL2W           8.31434441 W
PL12W          0.25812379 W
PL13W          0.12936834 W
SFO2         400.1316005 MHz
SI                    32768
SF           100.6128193 MHz
WDW                      EM
SSB                       0
LB                   1.00 Hz
GB                        0
PC                    1.40
```

Compound **3d**

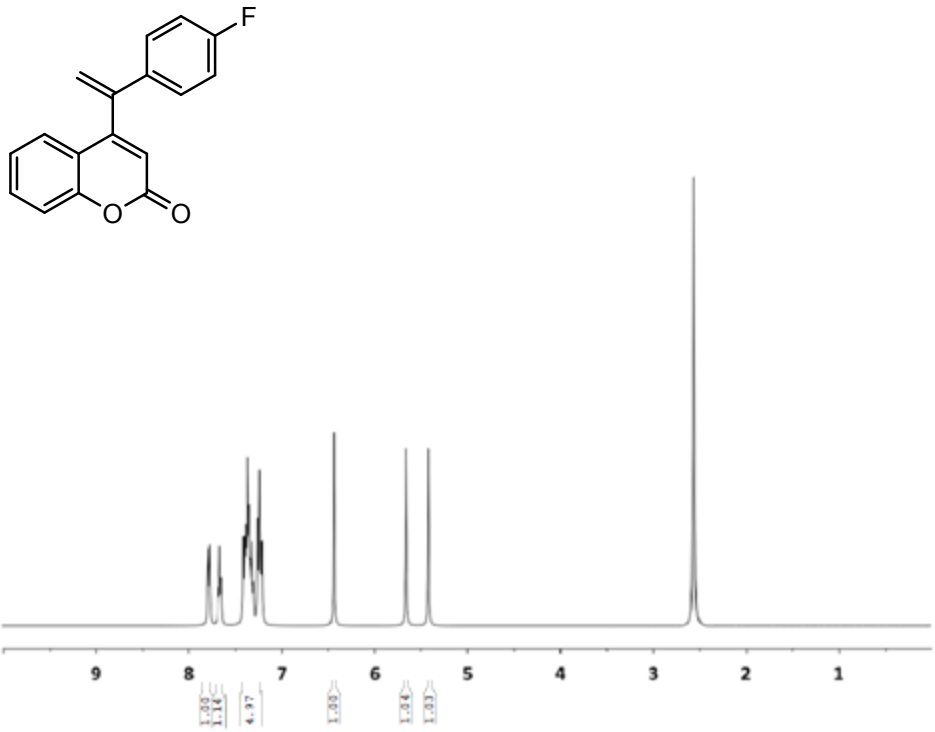



```
NAME                S1C- 04
EXPNO                     1
PROCNO                    1
Date_              20140708
Time                 19.21
INSTRUM              spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH               8223.685 Hz
FIDRES            0.125483 Hz
AQ                3.9846387 sec
RG                      322
DW                 60.800 usec
DE                  6.50 usec
TE                 300.0 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                    1H
P1                  14.10 usec
PL1                  0.00 dB
PL1W          8.31434441 W
SFO1         400.1324710 MHz
SI                    32768
SF           400.1300029 MHz
WDW                     EM
SSB                      0
LB                  0.30 Hz
GB                       0
PC                   1.00
```

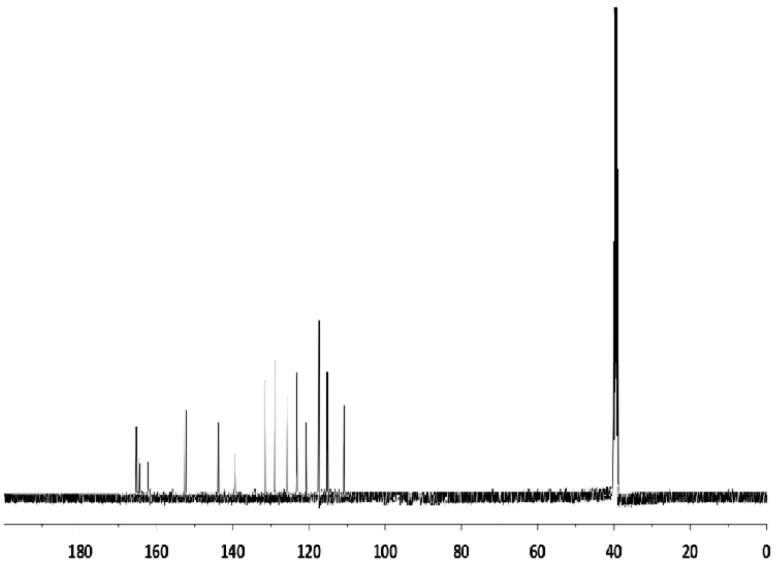



```
NAME                S1C-04
EXPNO                    2
PROCNO                   1
Date_              20140702
Time                 13.31
INSTRUM              spect
PROBHD    5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH              24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631988 sec
RG                     2050
DW                 20.800 usec
DE                  6.50 usec
TE                 300.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                   13C
P1                  10.00 usec
PL1                  0.00 dB
PL1W         35.41759872 W
SFO1        100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.08 dB
PL13                18.08 dB
PL2W          8.31434441 W
PL12W         0.25812379 W
PL13W         0.12936834 W
SFO2         400.1316005 MHz
SI                    32768
SF           100.6128193 MHz
WDW                     EM
SSB                      0
LB                  1.00 Hz
GB                       0
PC                   1.40
```

Compound **3e**

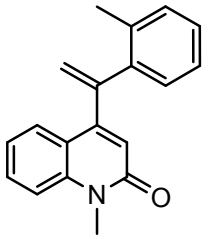


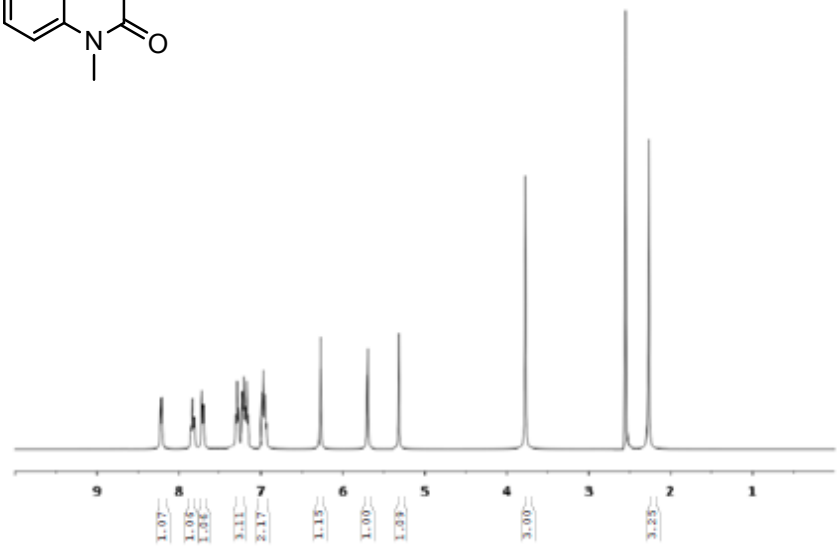

```
NAME                 S1C- 05
EXPNO                      1
PROCNO                     1
Date_               20140708
Time                   11.12
INSTRUM                spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9846387 sec
RG                       322
DW                    60.800 usec
DE                     6.50 usec
TE                     300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W              8.31434441 W
SFO1            400.1324710 MHz
SI                     32768
SF              400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```




```
NAME                 S1C-05
EXPNO                     2
PROCNO                    1
Date_              20140701
Time                  12.36
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                      2050
DW                   20.800 usec
DE                    6.50 usec
TE                    300.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                     13C
P1                    10.00 usec
PL1                    0.00 dB
PL1W           35.41759872 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.08 dB
PL13                  18.08 dB
PL2W            8.31434441 W
PL12W           0.25812379 W
PL13W           0.12936834 W
SFO2           400.1316005 MHz
SI                     32768
SF             100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

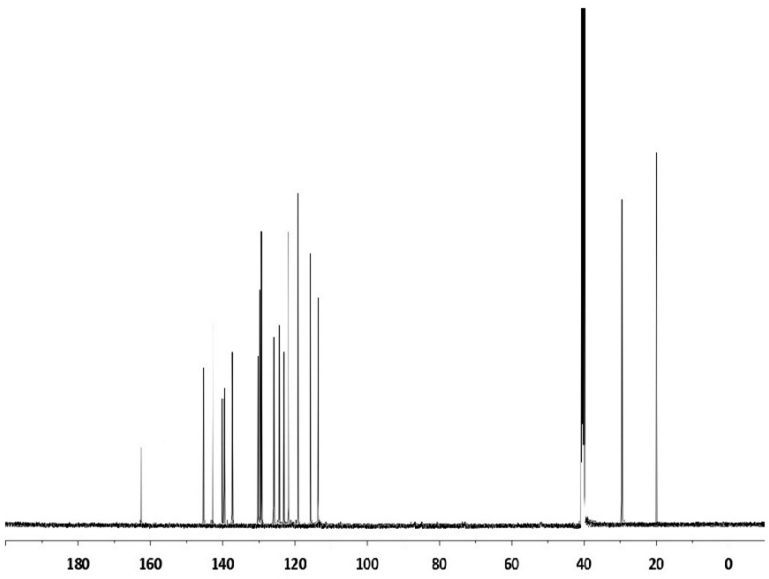
Compound **3f**





BRUKER

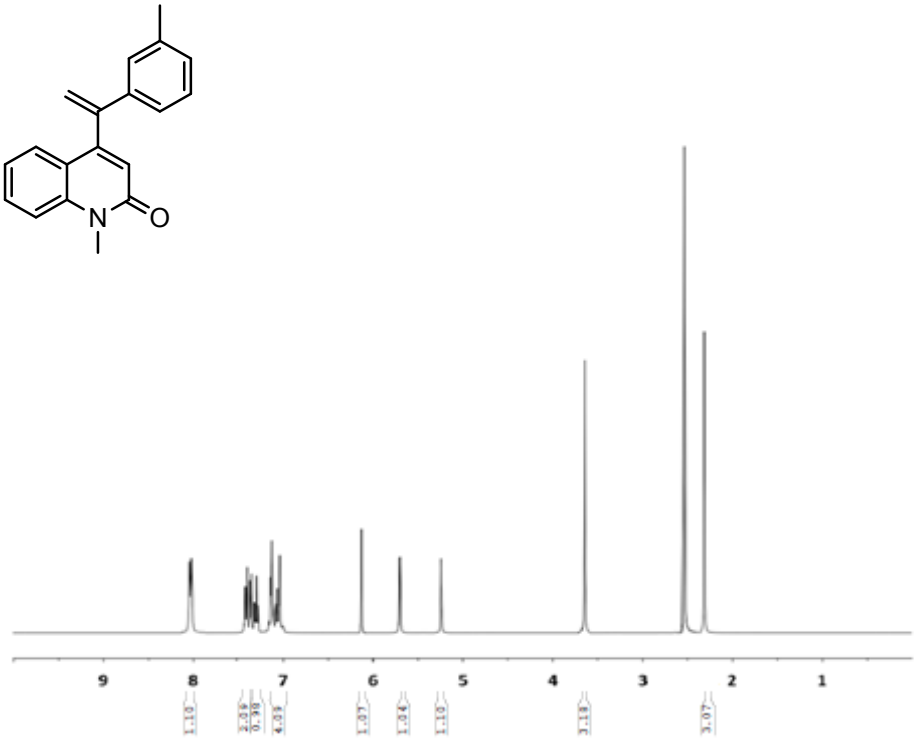
```
NAME                 S1C- 06
EXPNO                      1
PROCNO                     1
Date_               20140708
Time                   11.07
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                8223.685 Hz
FIDRES             0.125483 Hz
AQ                 3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W               8.31434441 W
SFO1             400.1324710 MHz
SI                       32768
SF               400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```



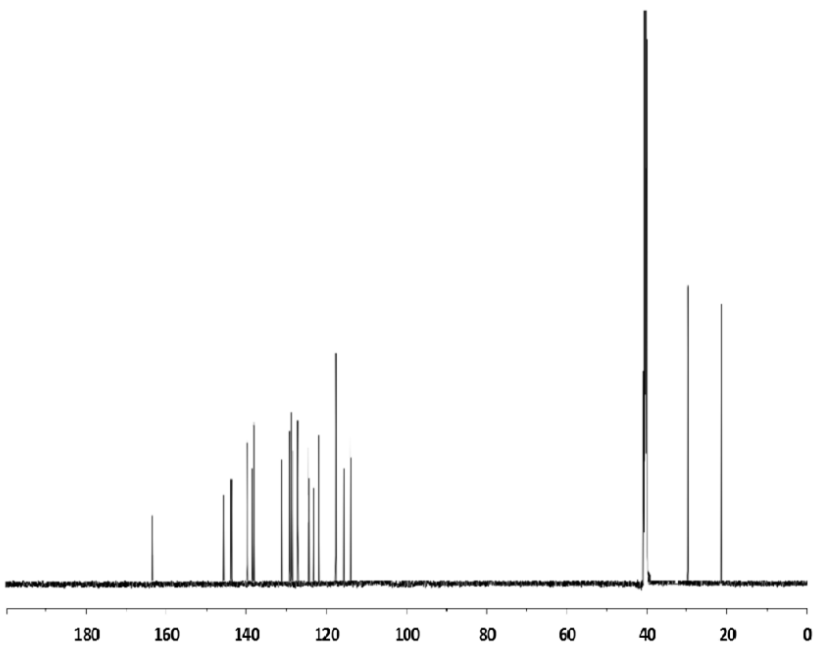
BRUKER

```
NAME                 S1C-06
EXPNO                      2
PROCNO                     1
Date_               20140701
Time                   07.14
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631988 sec
RG                      2050
DW                  20.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W              35.41759872 W
SFO1             100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W               8.31434441 W
PL12W              0.25812379 W
PL13W              0.12936834 W
SFO2             400.1316005 MHz
SI                       32768
SF               100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

Compound **3g**

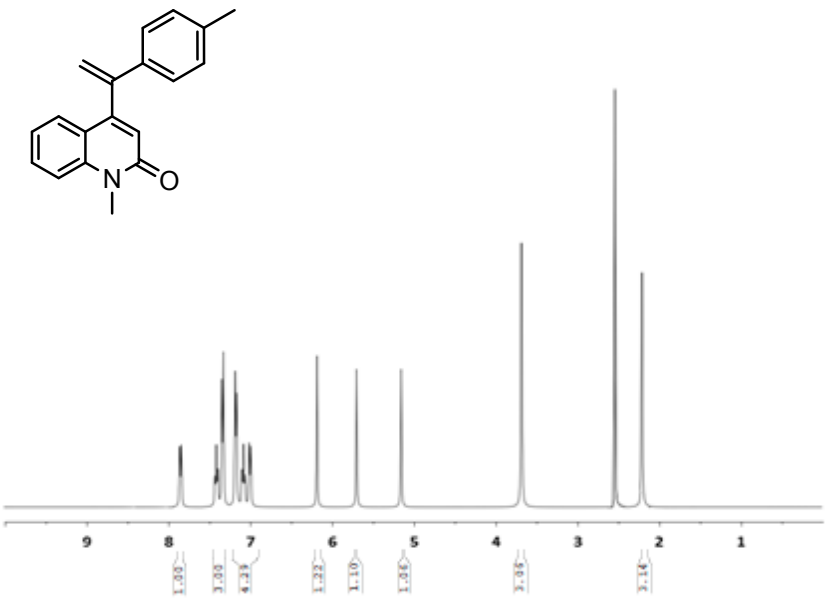


```
NAME                 S1C- 07
EXPNO                      1
PROCNO                     1
Date_               20140708
Time                   14.19
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                   14.10 usec
PL1                   0.00 dB
PL1W           8.31434441 W
SFO1          400.1324710 MHz
SI                     32768
SF            400.1300029 MHz
WDW                       EM
SSB                        0
LB                    0.30 Hz
GB                         0
PC                    1.00
```

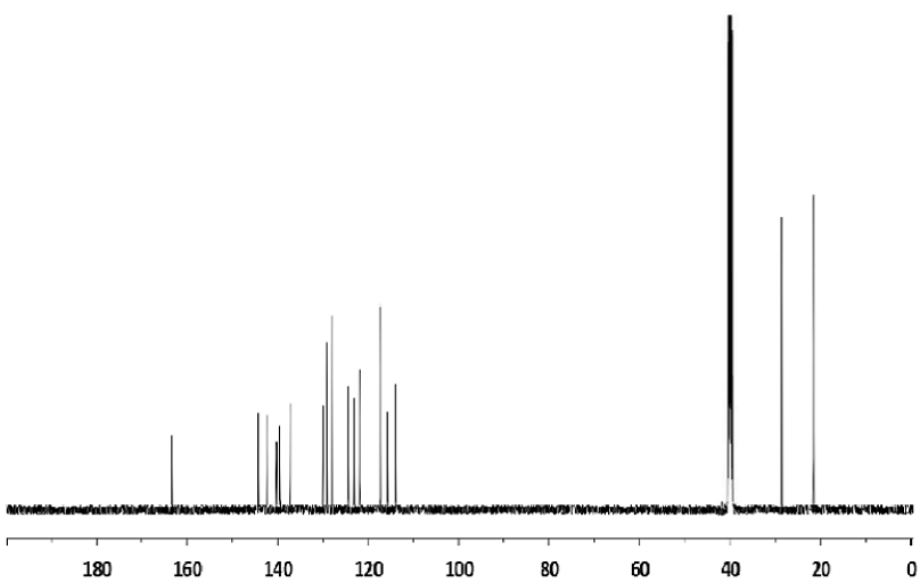


```
NAME                 S1C-07
EXPNO                      2
PROCNO                     1
Date_               20140702
Time                   12.31
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                1.3631988 sec
RG                      2050
DW                  20.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                   10.00 usec
PL1                   0.00 dB
PL1W          35.41759872 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                80.00 usec
PL2                   0.00 dB
PL12                 15.08 dB
PL13                 18.08 dB
PL2W           8.31434441 W
PL12W          0.25812379 W
PL13W          0.12936834 W
SFO2          400.1316005 MHz
SI                     32768
SF            100.6128193 MHz
WDW                       EM
SSB                        0
LB                    1.00 Hz
GB                         0
PC                    1.40
```

Compound **3h**

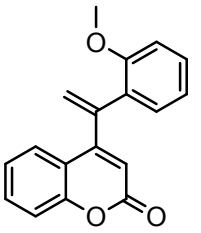


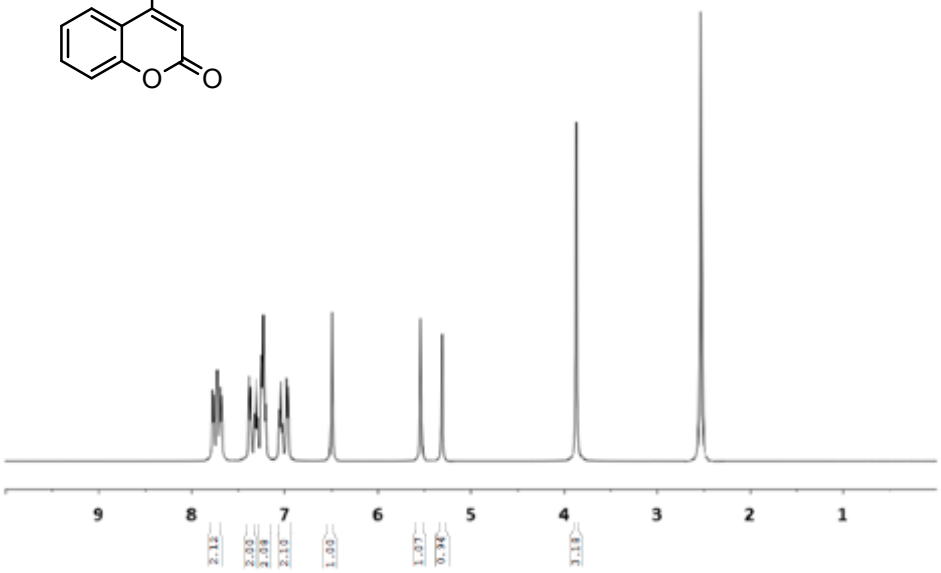
```
NAME                  S1C- 08
EXPNO                       1
PROCNO                      1
Date_              20140709
Time                   14.27
INSTRUM                spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH               8223.685 Hz
FIDRES            0.125483 Hz
AQ                3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                  300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W              8.31434441 W
SFO1            400.1324710 MHz
SI                     32768
SF              400.1300029 MHz
WDW                       EM
SSB                        0
LB                    0.30 Hz
GB                         0
PC                      1.00
```



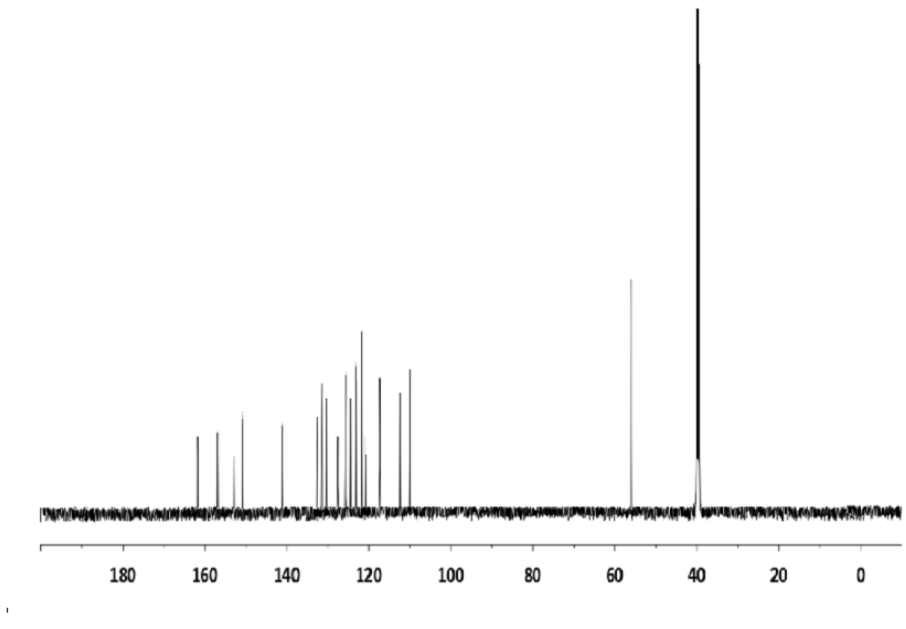
```
NAME                  S1C-08
EXPNO                      2
PROCNO                     1
Date_              20140702
Time                   13.27
INSTRUM                spect
PROBHD    5 mm BBO BB-1H
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH              24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631988 sec
RG                      2050
DW                  20.800 usec
DE                   6.50 usec
TE                  300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W             35.41759872 W
SFO1            100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W              8.31434441 W
PL12W             0.25812379 W
PL13W             0.12936834 W
SFO2            400.1316005 MHz
SI                     32768
SF              100.6128193 MHz
WDW                       EM
SSB                        0
LB                    1.00 Hz
GB                         0
PC                      1.40
```

Compound **3i**



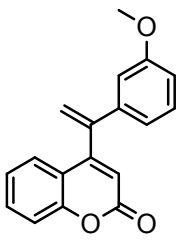


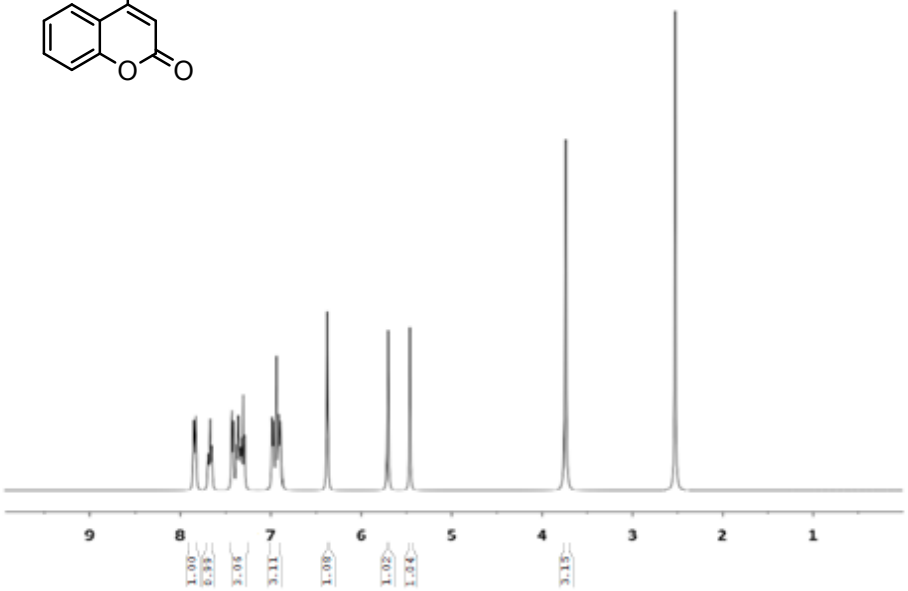

```
NAME                 S1C- 09
EXPNO                      1
PROCNO                     1
Date_               20140708
Time                   15.41
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9846387 sec
RG                       322
DW                    60.800 usec
DE                     6.50 usec
TE                    300.0 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W                8.31434441 W
SFO1               400.1324710 MHz
SI                       32768
SF                 400.1300029 MHz
WDW                        EM
SSB                         0
LB                      0.30 Hz
GB                          0
PC                      1.00
```



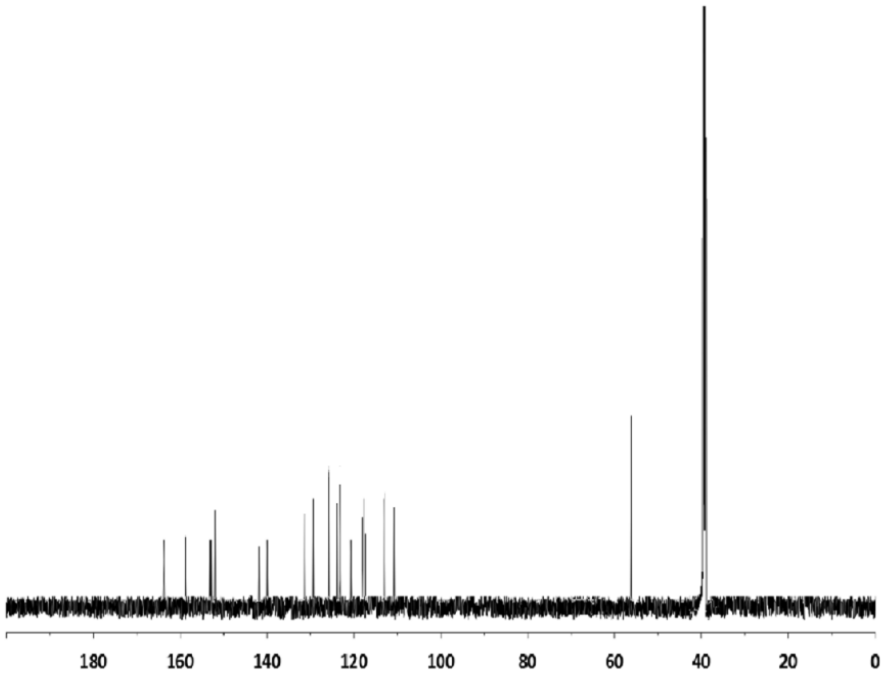

```
NAME                 S1C-09
EXPNO                     2
PROCNO                    1
Date_              20140702
Time                  09.37
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631988 sec
RG                       2050
DW                    20.800 usec
DE                     6.50 usec
TE                    300.0 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                     13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W               35.41759872 W
SFO1               100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W                8.31434441 W
PL12W               0.25812379 W
PL13W               0.12936834 W
SFO2               400.1316005 MHz
SI                       32768
SF                 100.6128193 MHz
WDW                        EM
SSB                         0
LB                      1.00 Hz
GB                          0
PC                      1.40
```

Compound **3j**



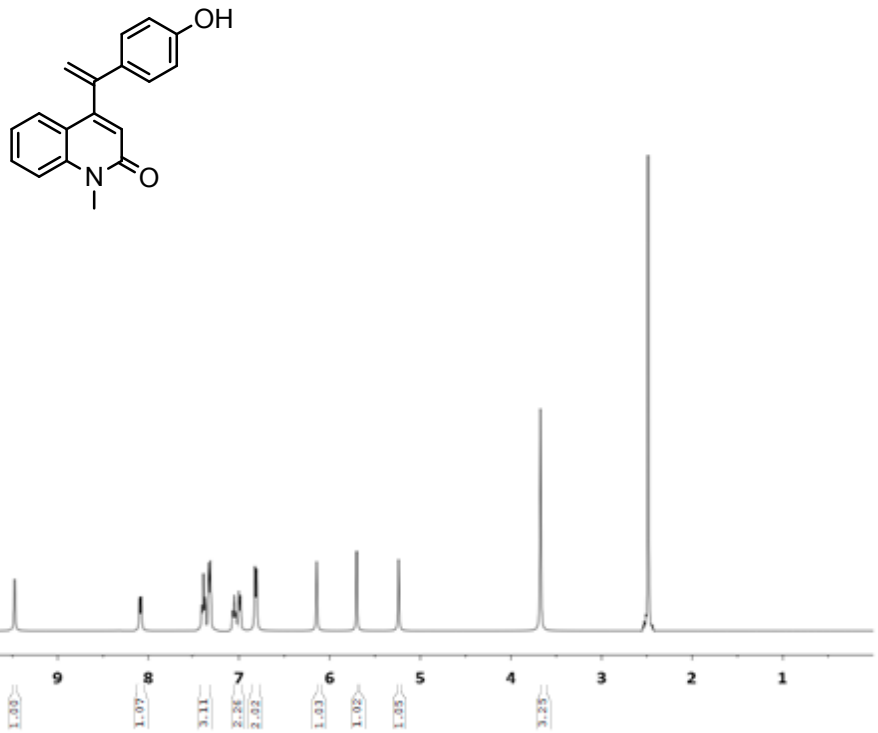



```
NAME                S1C- 10
EXPNO                     1
PROCNO                    1
Date_              20140708
Time                  19.49
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH                8223.685 Hz
FIDRES             0.125483 Hz
AQ                 3.9846387 sec
RG                      322
DW                   60.800 usec
DE                    6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                      1H
P1                    14.10 usec
PL1                    0.00 dB
PL1W              8.31434441 W
SFO1            400.1324710 MHz
SI                      32768
SF              400.1300029 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```



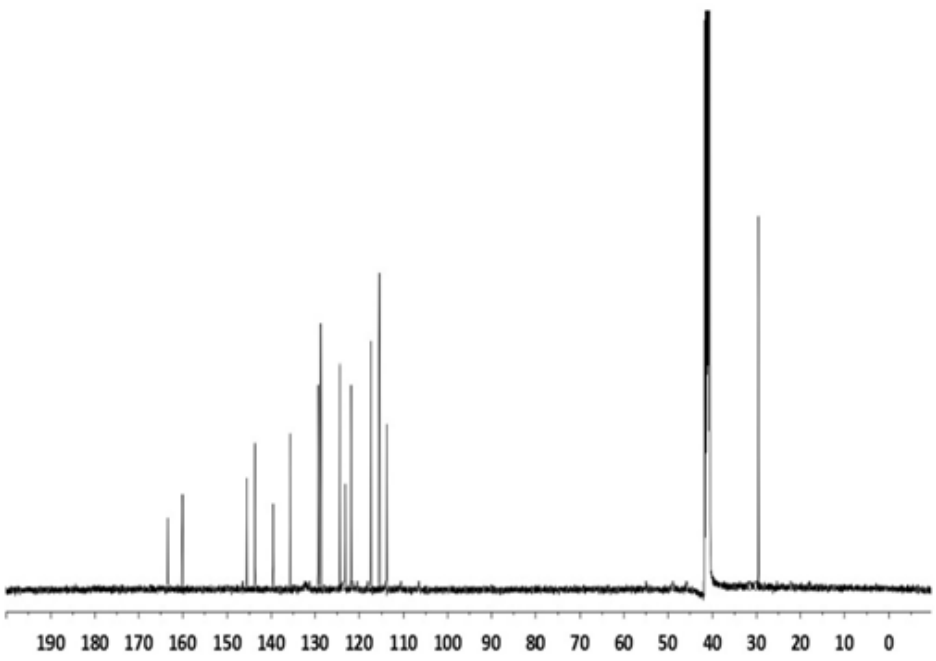

```
NAME                S1C-10
EXPNO                    2
PROCNO                   1
Date_             20140702
Time                 20.38
INSTRUM              spect
PROBHD   5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631988 sec
RG                     2050
DW                   20.800 usec
DE                    6.50 usec
TE                   300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                    10.00 usec
PL1                    0.00 dB
PL1W             35.41759872 W
SFO1            100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.08 dB
PL13                  18.08 dB
PL2W              8.31434441 W
PL12W             0.25812379 W
PL13W             0.12936834 W
SFO2            400.1316005 MHz
SI                      32768
SF              100.6128193 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40
```

Compound **3k**



BRUKER

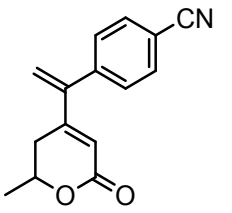
NAME	S1C- 12
EXPNO	1
PROCNO	1
Date_	20140708
Time	15.09
INSTRUM	spect
PROBHD	5 mm BBO BB-1H
PULPROG	zg30
TD	65536
SOLVENT	DMSO
NS	16
DS	2
SWH	8223.685 Hz
FIDRES	0.125483 Hz
AQ	3.9846387 sec
RG	322
DW	60.800 usec
DE	6.50 usec
TE	300.0 K
D1	1.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	14.10 usec
PL1	0.00 dB
PL1W	8.31434441 W
SFO1	400.1324710 MHz
SI	32768
SF	400.1300029 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

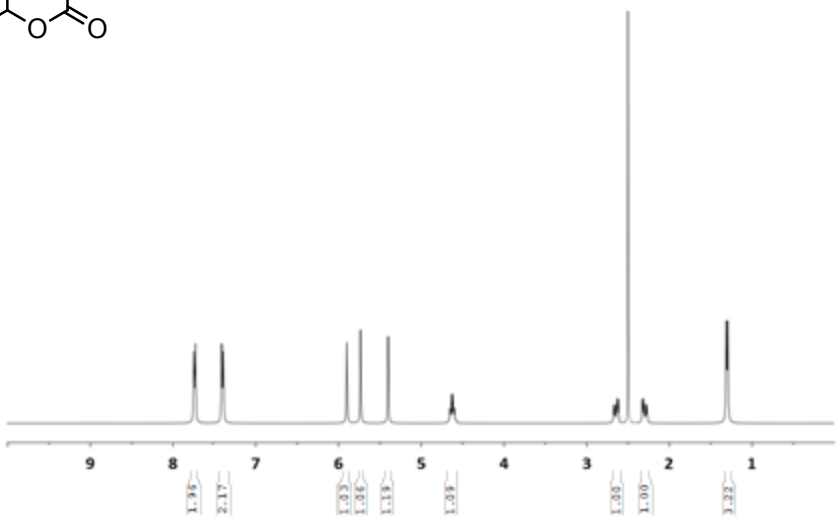


BRUKER

NAME	S1C-12
EXPNO	2
PROCNO	1
Date	20140701
Time	15.27
INSTRUM	spect
PROBHD	5 mm BBO BB-1H
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	249
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	2050
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
-------- CHANNEL f1 --------	
NUC1	13C
P1	10.00 usec
PL1	0.00 dB
PL1W	35.41759872 W
SFO1	100.6228298 MHz
-------- CHANNEL f2 --------	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	0.00 dB
PL12	15.08 dB
PL13	18.08 dB
PL2W	8.31434441 W
PL12W	0.25812379 W
PL13W	0.12936834 W
SFO2	400.1316005 MHz
SI	32768
SF	100.6128193 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

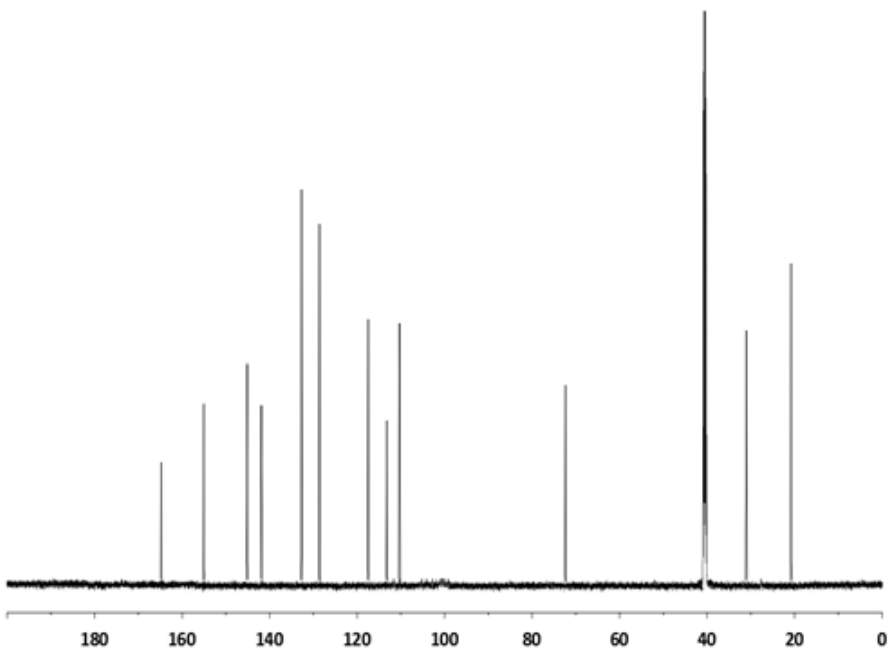
Compound **3l**





BRUKER

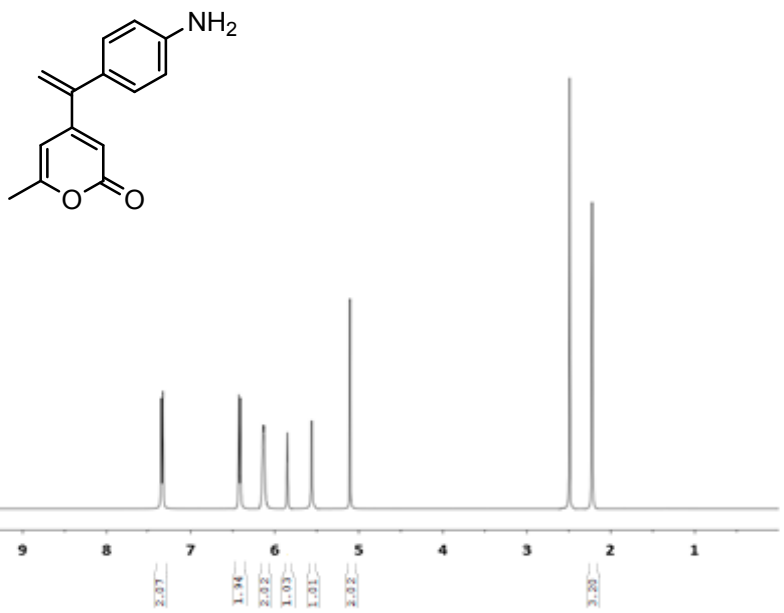
```
NAME                  SIC- 13
EXPNO                       1
PROCNO                      1
Date_              20140708
Time                    08.23
INSTRUM                 spect
PROBHD    5 mm BBO BB-1H
PULPROG                 zg30
TD                     65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                8223.685 Hz
FIDRES             0.125483 Hz
AQ                 3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                  300.0 K
D1                1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      14.10 usec
PL1                      0.00 dB
PL1W               0.31434641 W
SFO1             400.1324710 MHz
SI                       32768
SF               400.1300029 MHz
WDW                         EM
SSB                          0
LB                        0.30 Hz
GB                           0
PC                        1.00
```



BRUKER

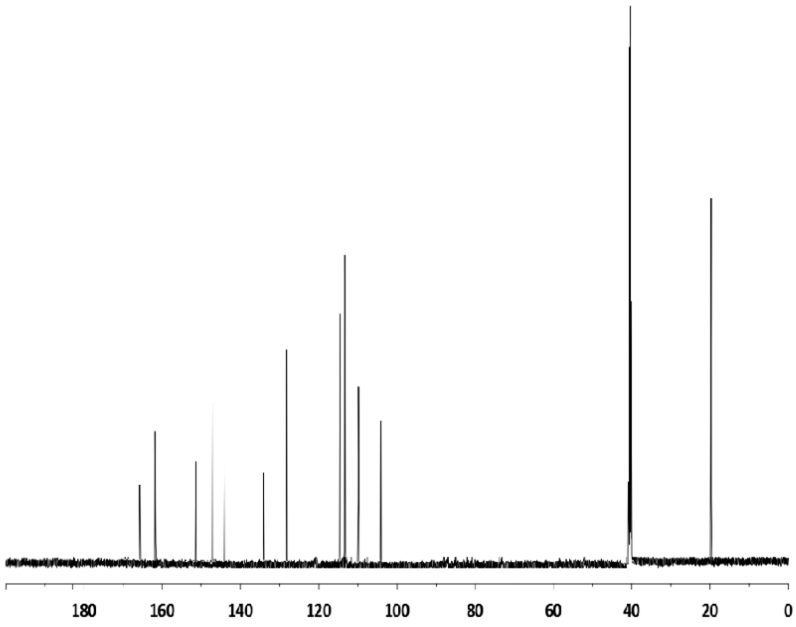
```
NAME                    SIC-13
EXPNO                        2
PROCNO                       1
Date               20140701
Time                    12.08
INSTRUM                 spect
PROBHD    5 mm BBO BB-1H
PULPROG                 zgpg30
TD                     65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631988 sec
RG                      2050
DW                  20.800 usec
DE                   6.50 usec
TE                  300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                         1

--------- CHANNEL f1 ---------
NUC1                       13C
P1                      10.00 usec
PL1                      0.00 dB
PL1W              35.41759872 W
SFO1             100.6228298 MHz

--------- CHANNEL f2 ---------
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    15.08 dB
PL13                    18.08 dB
PL2W              8.31434441 W
PL12W             0.25812379 W
PL13W             0.12936834 W
SFO2             400.1316005 MHz
SI                       32768
SF               100.6128193 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```

Compound **3m**



BRUKER

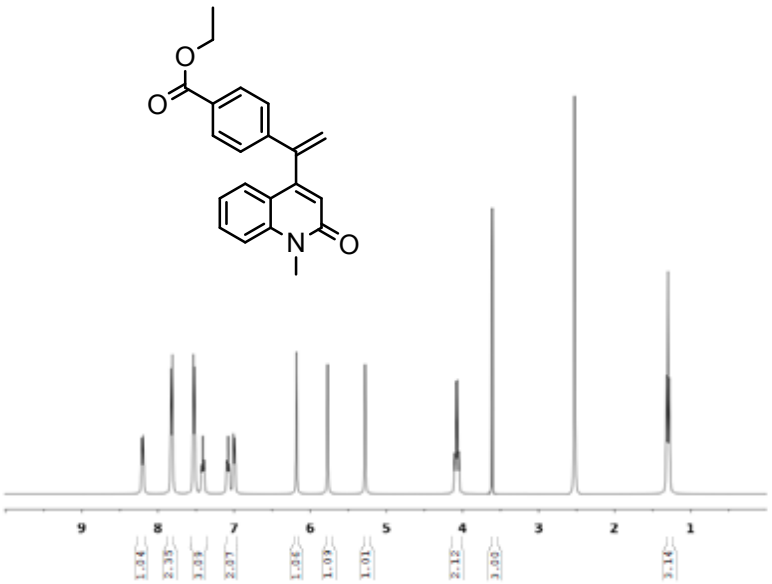
```
NAME                 S1C- 14
EXPNO                      1
PROCNO                     1
Date_               20140708
Time                   15.39
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9846387 sec
RG                       322
DW                    60.800 usec
DE                     6.50 usec
TE                    300.0 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W               8.31434441 W
SFO1             400.1324710 MHz
SI                     32768
SF               400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```



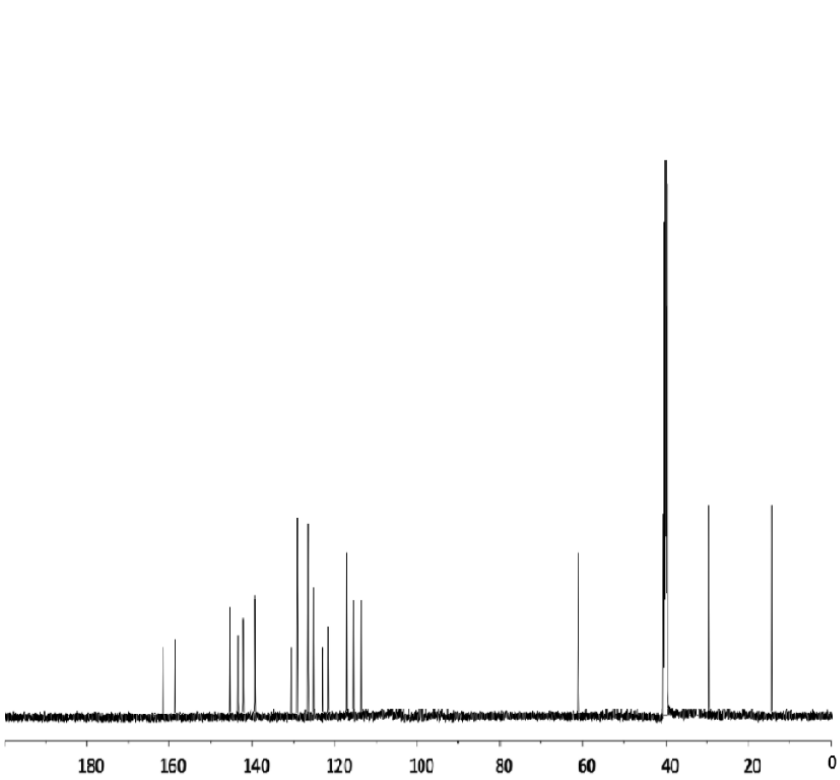
BRUKER

```
NAME                 S1C-14
EXPNO                     3
PROCNO                    1
Date_              20140702
Time                  13.10
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG               zgpg30
TD                    65536
SOLVENT                DMSO
NS                      959
DS                        4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631988 sec
RG                      2050
DW                    20.800 usec
DE                     6.50 usec
TE                    300.0 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                    10.00 usec
PL1                    0.00 dB
PL1W              35.41759872 W
SFO1              100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.08 dB
PL13                  18.08 dB
PL2W               8.31434441 W
PL12W              0.25812379 W
PL13W              0.12936834 W
SFO2              400.1316005 MHz
SI                     32768
SF                100.6128193 MHz
WDW                       EM
SSB                        0
LB                     1.00 Hz
GB                         0
PC                      1.40
```

Compound **3n**

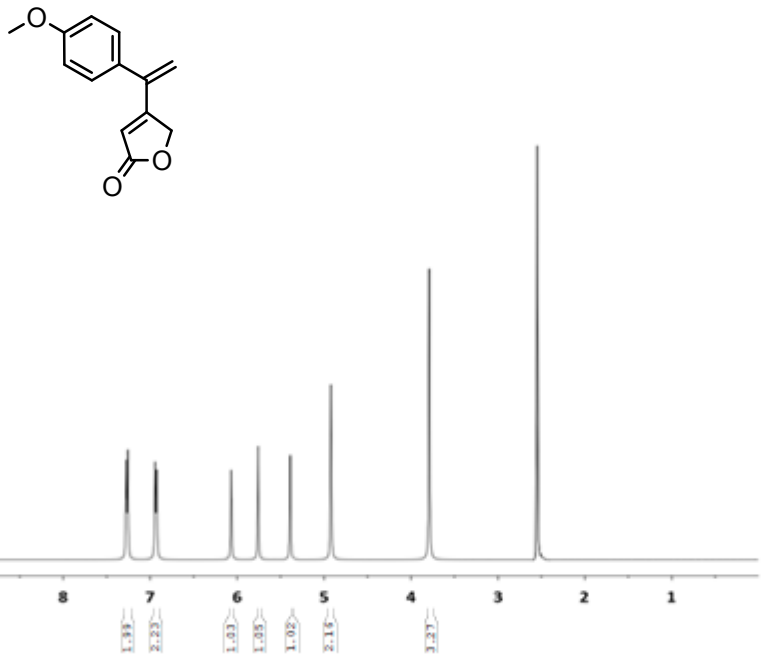


```
NAME                  S1C- 15
EXPNO                       1
PROCNO                      1
Date_              20140709
Time_                 11.19
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH               8223.685 Hz
FIDRES               0.125483 Hz
AQ                3.9846387 sec
RG                       322
DW                    60.800 usec
DE                     6.50 usec
TE                    300.0 K
D1              1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W              8.31434441 W
SFO1            400.1324710 MHz
SI                     32768
SF              400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

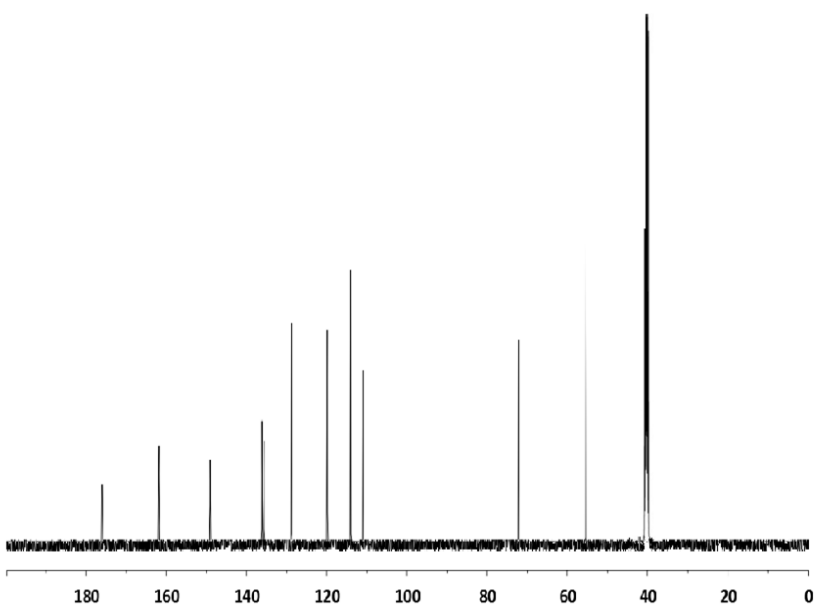


```
NAME                  S1C-15
EXPNO                      3
PROCNO                     1
Date_              20140702
Time                  14.12
INSTRUM              spe1ct
PROBHD    5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       959
DS                         4
SWH              24038.461 Hz
FIDRES               0.366798 Hz
AQ                1.3631988 sec
RG                      2050
DW                    20.800 usec
DE                     6.50 usec
TE                    300.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W           35.41759872 W
SFO1            100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W            8.31434441 W
PL12W           0.25812379 W
PL13W           0.12936834 W
SFO2            400.1316005 MHz
SI                     32768
SF              100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

Compound **3o**

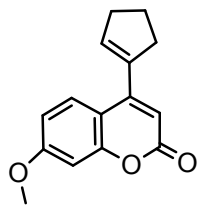


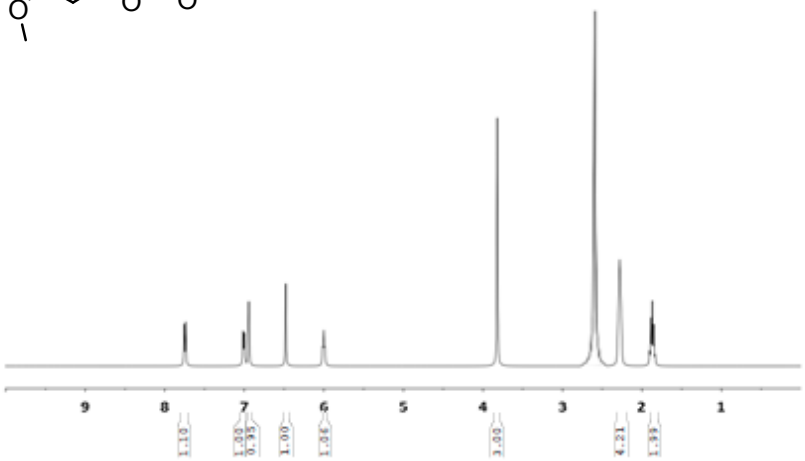
```
NAME                 S1C- 16
EXPNO                      1
PROCNO                     1
Date               20140709
Time                  10.47
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH              8223.685 Hz
FIDRES           0.125483 Hz
AQ               3.9846387 sec
RG                      322
DW                 60.800 usec
DE                  6.50 usec
TE                 300.0 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                      1H
P1                 14.10 usec
PL1                 0.00 dB
PL1W          8.31434441 W
SFO1        400.1324710 MHz
SI                    32768
SF          400.1300029 MHz
WDW                      EM
SSB                       0
LB                 0.30 Hz
GB                        0
PC                     1.00
```



```
NAME                 S1C-16
EXPNO                     2
PROCNO                    1
Date_              20140702
Time                 14.02
INSTRUM              spect
PROBHD   5 mm BBO BB-1H
PULPROG            zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                     2050
DW                 20.800 usec
DE                  6.50 usec
TE                 300.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                 10.00 usec
PL1                 0.00 dB
PL1W         35.41759872 W
SFO1        100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                      1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               15.08 dB
PL13               18.08 dB
PL2W          8.31434441 W
PL12W         0.25812379 W
PL13W         0.12936834 W
SFO2        400.1316005 MHz
SI                    32768
SF          100.6128193 MHz
WDW                      EM
SSB                       0
LB                 1.00 Hz
GB                        0
PC                     1.40
```

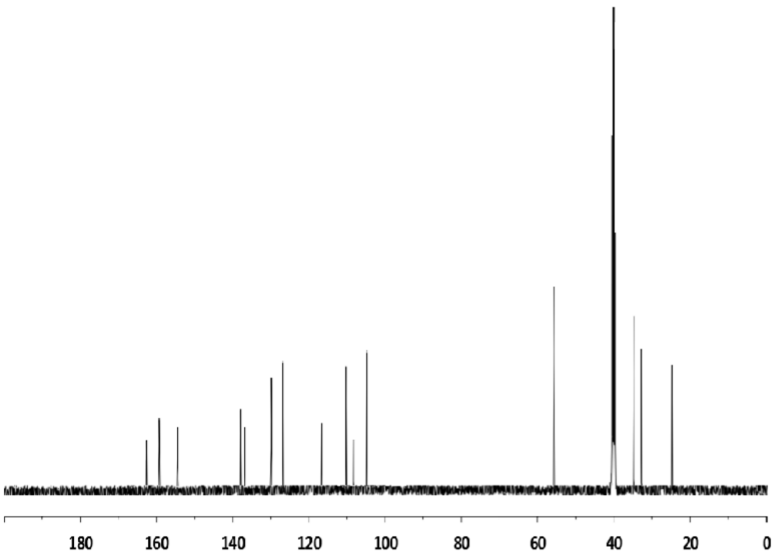
Compound **3p**





BRUKER

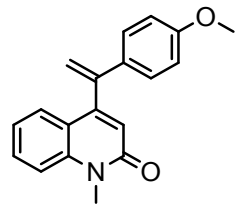
```
NAME                 S1C- 17
EXPNO                      1
PROCNO                     1
Date_               20140709
Time_                 10.07
INSTRUM                spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                8223.685 Hz
FIDRES             0.125483 Hz
AQ                 3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W             8.31434441 W
SFO1           400.1324710 MHz
SI                     32768
SF               400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

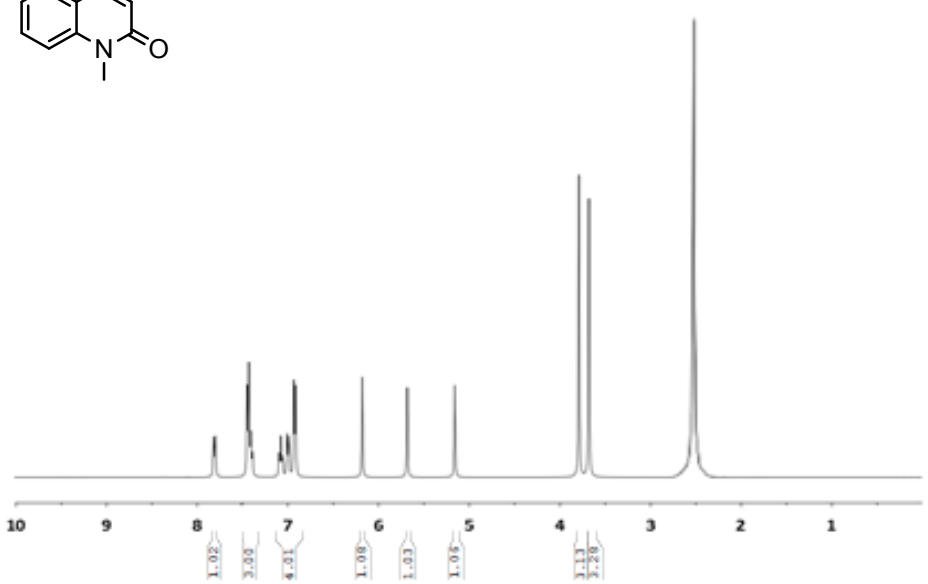


BRUKER

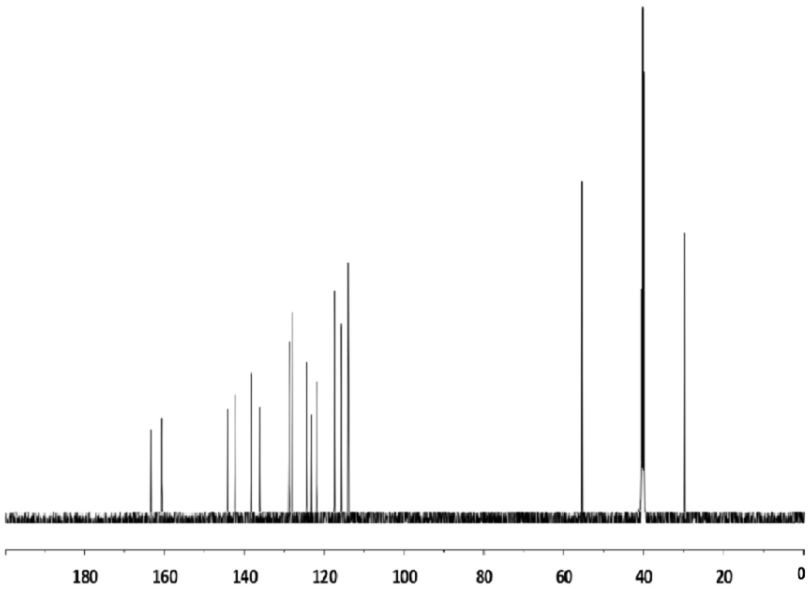
```
NAME                 S1C-17
EXPNO                     2
PROCNO                    1
Date_              20140702
Time_                17.09
INSTRUM              spect
PROBHD    5 mm BBO BB-1H
PULPROG            zgpg30
TD                   65536
SOLVENT               DMSO
NS                     249
DS                       4
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    2050
DW                  20.800 usec
DE                   6.50 usec
TE                   300.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W            35.41759872 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                     1H
PCPD2                80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W             8.31434441 W
PL12W            0.25812379 W
PL13W            0.12936834 W
SFO2           400.1316005 MHz
SI                     32768
SF             100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

Compound **3q**



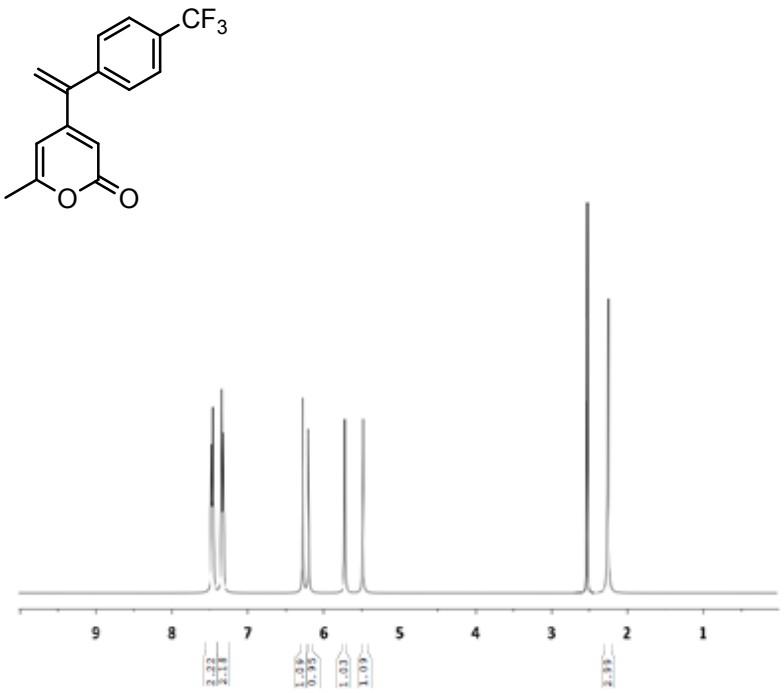



```
NAME                 S1C- 18
EXPNO                      1
PROCNO                     1
Date_               20140708
Time                   17.53
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9846387 sec
RG                       322
DW                    60.800 usec
DE                     6.50 usec
TE                    300.0 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W               0.31434441 W
SFO1             400.1324710 MHz
SI                       32768
SF               400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```



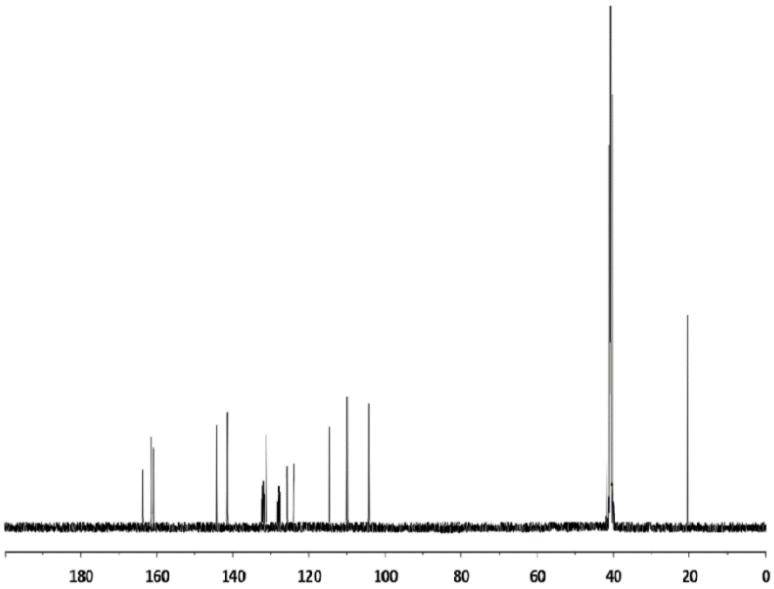

```
NAME                 S1C-18
EXPNO                     2
PROCNO                    1
Date_              20140702
Time                  09.50
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                 1.3631988 sec
RG                      2050
DW                    20.800 usec
DE                     6.50 usec
TE                    300.0 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W              35.41759872 W
SFO1             100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W               8.31434441 W
PL12W              0.25812379 W
PL13W              0.12936834 W
SFO2             400.1316005 MHz
SI                       32768
SF               100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

Compound **3r**



BRUKER

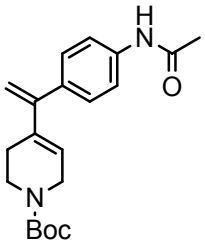
```
NAME                 S1C-19
EXPNO                     1
PROCNO                    1
Date_              20140709
Time_                 10.29
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG               zg30
TD                   65536
SOLVENT               DMSO
NS                       16
DS                        2
SWH               8223.685 Hz
FIDRES            0.125483 Hz
AQ                3.9846387 sec
RG                      322
DW                 60.800 usec
DE                  6.50 usec
TE                   300.0 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     1H
P1                   14.10 usec
PL1                   0.00 dB
PL1W           8.31434441 W
SFO1         400.1324710 MHz
SI                    32768
SF           400.1300029 MHz
WDW                      EM
SSB                       0
LB                   0.30 Hz
GB                        0
PC                     1.00
```

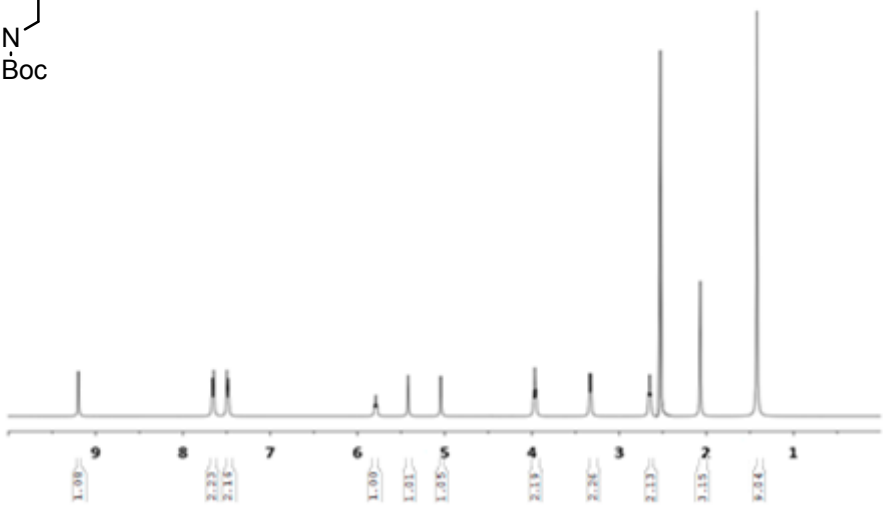


BRUKER

```
NAME                 S1C-19
EXPNO                     2
PROCNO                    1
Date_              20140702
Time_                 12.36
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG             zgpg30
TD                   65536
SOLVENT               DMSO
NS                      249
DS                        4
SWH              24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631988 sec
RG                     2050
DW                 20.800 usec
DE                  6.50 usec
TE                   300.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                    13C
P1                   10.00 usec
PL1                   0.00 dB
PL1W          35.41759872 W
SFO1         100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                     1H
PCPD2                80.00 usec
PL2                   0.00 dB
PL12                 15.08 dB
PL13                 18.08 dB
PL2W           8.31434441 W
PL12W          0.25812379 W
PL13W          0.12936834 W
SFO2         400.1316005 MHz
SI                    32768
SF           100.6128193 MHz
WDW                      EM
SSB                       0
LB                   1.00 Hz
GB                        0
PC                     1.40
```

Compound **3s**

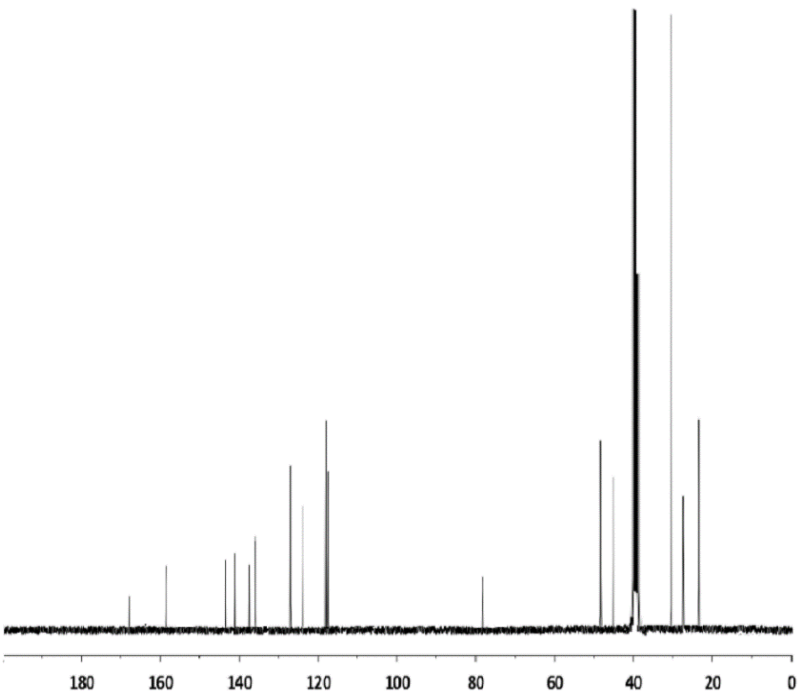




BRUKER

```
NAME                 S1C- 20
EXPNO                      1
PROCNO                     1
Date              20140709
Time                  12.51
INSTRUM               spect
PROBHD    5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH               8223.685 Hz
FIDRES            0.125483 Hz
AQ                3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                  300.0 K
D1                1.00000000 sec
TD0                        1

            CHANNEL f1
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W              8.31434441 W
SFO1            400.1324710 MHz
SI                      32768
SF                400.1300029 MHz
WDW                        EM
SSB                         0
LB                      0.30 Hz
GB                          0
PC                      1.00
```

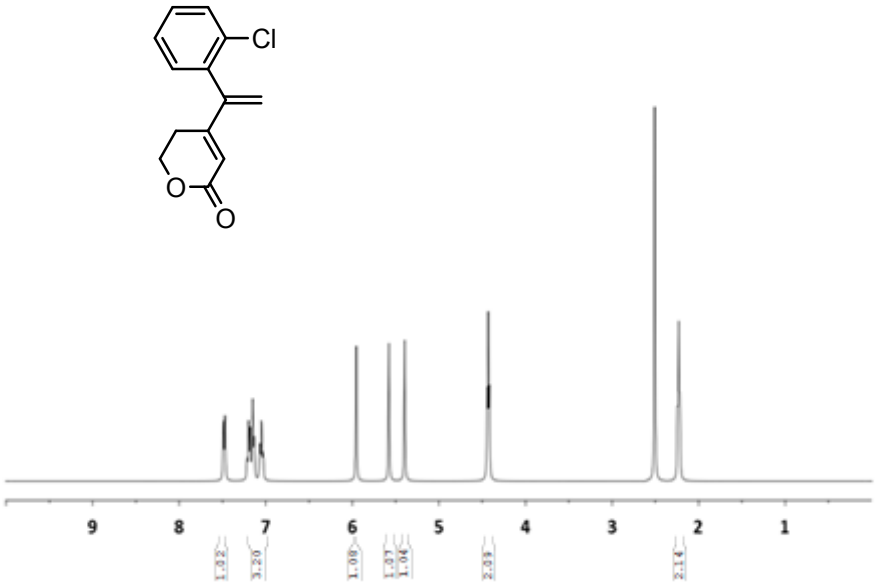
V



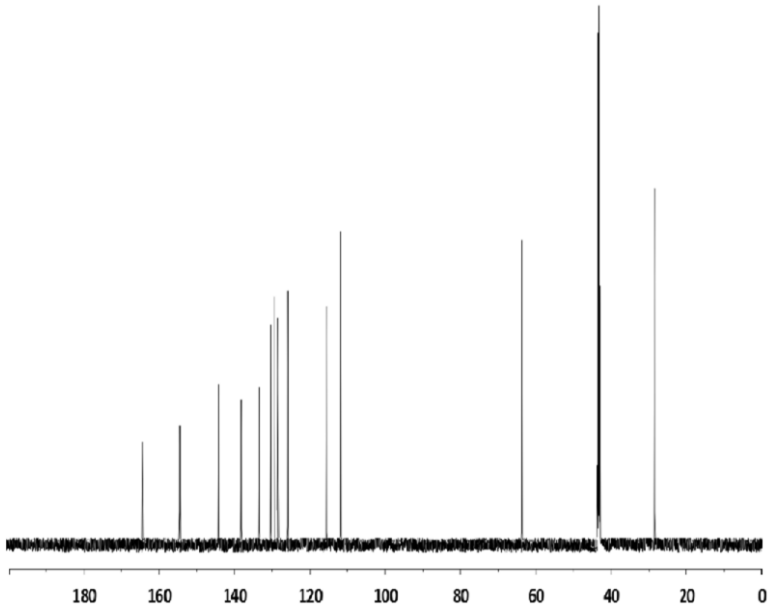
BRUKER

```
NAME                 S1C-20
EXPNO                     2
PROCNO                    1
Date_             20140702
Time                 13.51
INSTRUM              spect
PROBHD   5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                      249
DS                        4
SWH              24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631988 sec
RG                     2050
DW                   20.800 usec
DE                    6.50 usec
TE                   300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                    13C
P1                    10.00 usec
PL1                    0.00 dB
PL1W             35.41759872 W
SFO1            100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                    1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.08 dB
PL13                  18.08 dB
PL2W              8.31434441 W
PL12W             0.25812379 W
PL13W             0.12936834 W
SFO2            400.1316005 MHz
SI                     32768
SF              100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

Compound **3t**

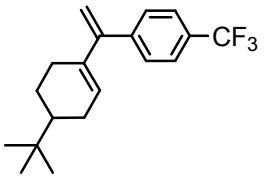



```
NAME                 S1C- 21
EXPNO                      1
PROCNO                     1
Date               20140709
Time                  13.41
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH               8223.685 Hz
FIDRES               0.125483 Hz
AQ                3.9846287 sec
RG                      322
DW                   60.800 usec
DE                    6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.10 usec
PL1                     0.00 dB
PL1W              8.31434441 W
SFO1            400.1324710 MHz
SI                     32768
SF              400.1300029 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```



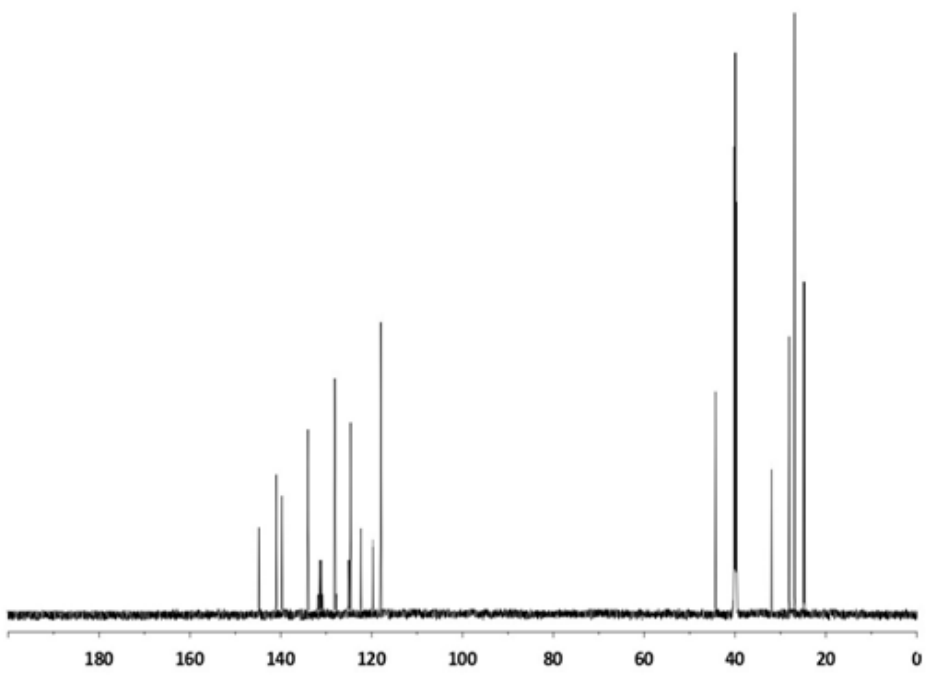

```
NAME                 S1C-21
EXPNO                     2
PROCNO                    1
Date_              20140701
Time                 21.47
INSTRUM              spect
PROBHD   5 mm BBO BB-1H
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       249
DS                         4
SWH              24038.461 Hz
FIDRES               0.366798 Hz
AQ                1.3631988 sec
RG                      2050
DW                   20.800 usec
DE                    6.50 usec
TE                   300.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                     10.00 usec
PL1                     0.00 dB
PL1W             35.41759872 W
SFO1            100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                      1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.08 dB
PL13                   18.08 dB
PL2W              8.31434441 W
PL12W             0.25812379 W
PL13W             0.12936834 W
SFO2            400.1316005 MHz
SI                     32768
SF              100.6128193 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

Compound **3u**



BRUKER

```
NAME                 S1C-  22
EXPNO                      1
PROCNO                     1
Date_               20140709
Time                   10.35
INSTRUM                spect
PROBHD   5 mm BBO BB-1H
PULPROG                zg30
TD                     65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9846387 sec
RG                       322
DW                  60.800 usec
DE                   6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                  14.10 usec
PL1                  0.00 dB
PL1W             8.31434441 W
SFO1           400.1324710 MHz
SI                     32768
SF             400.1300029 MHz
WDW                       EM
SSB                        0
LB                   0.30 Hz
GB                         0
PC                    1.00
```



BRUKER

```
NAME                 S1C-22
EXPNO                     3
PROCNO                    1
Date_              20140702
Time                  10.53
INSTRUM               spect
PROBHD   5 mm BBO BB-1H
PULPROG            zgpg30
TD                    65536
SOLVENT                DMSO
NS                      959
DS                        4
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                     2050
DW                  20.800 usec
DE                   6.50 usec
TE                   300.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                  10.00 usec
PL1                  0.00 dB
PL1W            35.41759872 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                      1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.08 dB
PL13                18.08 dB
PL2W             8.31434441 W
PL12W            0.25812379 W
PL13W            0.12936834 W
SFO2           400.1316005 MHz
SI                     32768
SF             100.6128193 MHz
WDW                       EM
SSB                        0
LB                   1.00 Hz
GB                         0
PC                    1.40
```