

Sequential Cu-Catalyzed Amidation-Base-mediated Camps Cyclization:

A Two-step Synthesis of 2-Aryl-4-quinolones from *ortho*-Halophenones

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Supporting Information

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Experimental Section for Compounds 1-37

General Considerations. All reactions were carried out in oven-dried resealable test tubes or Schlenk tubes under an atmosphere of argon. Potassium carbonate (Mallinckrodt or Aldrich), potassium phosphate (Riedel-de-Haën), and cesium carbonate (Chemetall) bases were stored in bulk in a glove box. Quantities of approximately 5 grams were removed from the glove box and stored in a bench-top desiccator. Sodium hydroxide pellets were crushed using a mortar and pestle and stored in the bench-top desiccator. CuI was obtained from Strem Chemicals (99.9% purity). TiCl₃ (99.999% purity) and Zn nanosize activated powder were both purchased from Aldrich and stored and weighed in the glove box. All three diamine ligands (**L1**, **L2**, **L3**) were obtained from Aldrich and stored in a bench-top desiccator. Amides and aryl halides were obtained from commercial sources and used without further purification, except for 2-bromo-5-methoxypropiophenone, which was synthesized from commercially available starting materials as described in the Supporting Information. Toluene was obtained from J. T. Baker in CYCLE-TAINER kegs which were purged with argon for two hours and subsequently passed through two columns of neutral alumina and copper(II) oxide under a pressure of argon for further purification. Anhydrous 1,4-dioxane and DME were purchased from Aldrich in SureSeal[®] bottles. Molecular sieves (5Å) were obtained as a powder from Acros and were activated in bulk *via* flame-drying under vacuum. Silica column chromatography was performed using a Biotage SP4 Flash Purification System on KP-Sil silica cartridges.

Compounds were characterized using ¹H-NMR, ¹³C-NMR, melting point, IR (KBr plate) and, in certain cases, elemental analysis. (Copies of ¹H-NMR and ¹³C-NMR spectra are provided in the Supporting Information for all new compounds and any compounds that did not have adequate elemental analysis results.) Data of known compounds were compared with existing literature characterization data and the references are given. All isolated and GC yields reported in the Results and Discussion are the average of two or more experiments. Elemental Analyses were conducted by Atlantic Microlabs, Inc., Norcross, GA. NMR spectra were obtained using Varian 500 MHz, Bruker

Advance 400 MHz, or Varian 300 MHz instruments. The chemical shifts are reported in parts per million (ppm) based on the reference of the deuterated solvent. Melting points (uncorrected) were measured using a Mel-Temp II capillary apparatus. GC analysis was performed on an Agilent 6890 instrument with an FID detector and an Agilent 10m x 0.1mm DB-1 capillary column. GC yields and conversions were reported as referenced to dodecane as an internal standard. GC-MS analyses were performed on an Agilent 6850 instrument with an Agilent 5975 inert Mass Selective Detector. IR spectra were measured using a Perkin-Elmer System 2000 FT-IR. Compounds were applied in a thin film on a KBr pellet.

General Procedure A: Amidation of *o*-halophenones. An oven-dried resealable test tube with a Teflon stir bar was charged with amide (1.2 equiv, 0.60 mmol), CuI (10 mol%, 0.05 mmol), base (2 equiv, 1 mmol), and approximately 200 mg activated 5 Å molecular sieves. The test tube was sealed with a rubber septum and evacuated and refilled with Argon through a syringe needle (this sequence was performed three times). Under argon, *o*-halophenone (1.0 equiv, 0.50 mmol), *N,N'*-dimethylethylenediamine (**L1**) (20 mol%, 0.1 mmol), and toluene (1 mL) were each added *via* syringe. The rubber septum was then removed and quickly replaced with a Teflon screw-cap. The test tube was then placed in a preheated oil bath at 110 °C. The reaction was heated with stirring for 24 h and then cooled to room temperature. The reaction mixture was partitioned between EtOAc and water and the organic layer separated. The aqueous layer was extracted with EtOAc and the organic layer combined, dried over magnesium sulfate, filtered, and concentrated *in vacuo* to remove solvent. The product was purified by column chromatography on silica gel with EtOAc and hexane.

***N*-(2-Acetyl-phenyl)-benzamide (1).**ⁱ Following General Procedure A, benzamide (76 mg, 0.63 mmol) was coupled with 2-bromoacetophenone (67 µL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 µL, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). The reaction was heated to 90 °C for 24 h. **1** was purified by column chromatography using a hexane-EtOAc 98:2 to 90:10 gradient. 106 mg (88% yield) of a cream-colored

solid were obtained. Mp: 99-100 °C (lit mp: 100 °C (ether)).ⁱⁱ ¹H-NMR (400 MHz, CDCl₃): δ 12.73 (s, 1H), 9.00 (dd, *J* = 8.5, 1.1 Hz, 1H), 8.08 (m, 2H), 7.98 (dd, *J* = 8.0, 1.5 Hz, 1H), 7.64 (m, 1H), 7.55 (m, 3H), 7.18 (ddd, *J* = 8.5, 7.3, 1.2 Hz, 1H), 2.75 (s, 3H). ¹³C-NMR (400 MHz, CDCl₃): 203.3, 166.1, 141.4, 135.4, 134.8, 132.1, 131.9, 128.9, 127.5, 122.5, 121.9, 120.7, 28.6. IR (neat, cm⁻¹): 3222, 3064, 1679, 1650, 1607, 1585, 1450, 1359, 1313, 1247, 1166, 1099, 1073, 1028, 960, 896, 799, 756, 701, 609. Anal. calcd. for C₁₅H₁₃NO₂: C, 75.30; H, 5.48. Found: C, 75.10; H, 5.50.

***N*-(2-Acetyl-phenyl)-3-chlorobenzamide (2).** Following General Procedure A, 3-chlorobenzamide (93 mg, 0.60 mmol) was coupled with 2-bromoacetophenone (67 μL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **2** was purified by column chromatography using a hexane-EtOAc 98:2 to 90:10 gradient. 112 mg (82% yield) of a white solid were obtained. Mp: 137-139 °C. ¹H-NMR (400 MHz, CDCl₃): δ 12.75 (s, 1H), 8.95 (d, *J* = 8.5 Hz, 1H), 8.07 (s, 1H), 7.98 (dd, *J* = 8.0, 1.4 Hz, 1H), 7.94 (ddd, *J* = 7.7, 1.7, 1.1 Hz, 1H), 7.65 (m, 1H), 7.55 (ddd, *J* = 8.0, 2.0, 1.1 Hz, 1H), 7.48 (t, *J* = 7.8 Hz, 1H), 7.20 (m, 1H), 2.74 (s, 3H). ¹³C-NMR (400 MHz, CDCl₃): 203.5, 164.7, 141.2, 136.7, 135.5, 135.1, 132.1, 132.0, 130.2, 128.2, 125.3, 122.9, 122.0, 120.8, 28.7. IR (neat, cm⁻¹): 3185, 3068, 2920, 1684, 1644, 1608, 1584, 1523, 1452, 1359, 1315, 1258, 1170, 1076, 965, 904, 851, 798, 755, 739, 721, 611. Anal. calcd. for C₁₅H₁₂ClNO₂: C, 65.82; H, 4.42. Found: C, 65.69; H, 4.22.

***N*-(2-Acetyl-phenyl)-isonicotinamide (3).**ⁱⁱⁱ Following General Procedure A, isonicotinamide (73 mg, 0.60 mmol) was coupled with 2-bromoacetophenone (67 μL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), and K₂CO₃ (140 mg, 1.0 mmol), in anhydrous toluene (1 mL). No molecular sieves were added for the synthesis of the title compound. **3** was purified by column chromatography using a hexane-EtOAc 95:5 to 50:50 gradient. 94 mg (78% yield) of a cream-colored solid were obtained. Mp: 119-120 °C (lit mp: 116-117 °C).^{iv} ¹H-NMR (400 MHz, CDCl₃): δ 12.91 (s, 1H), 8.96 (dd, *J* = 8.5, 0.9 Hz, 1H), 8.85 (d, *J* = 5.3 Hz, 2H), 8.01 (dd, *J* = 8.0, 1.5 Hz, 1H), 7.91 (dd, *J* = 4.6, 1.6 Hz, 2H), 7.67 (m, 1H), 7.24 (ddd, *J* = 8.5, 7.3, 1.2 Hz, 1H), 2.75 (s, 3H). ¹³C-NMR (300 MHz,

CDCl₃): 203.6, 163.9, 150.9, 141.8, 140.7, 135.6, 132.0, 123.3, 122.0, 121.1, 120.8, 28.7. IR (neat, cm⁻¹): 3205, 3120, 3029, 1678, 1645, 1611, 1586, 1535, 1449, 1410, 1362, 1317, 1251, 1161, 1062, 963, 836, 756, 692, 677. Anal. calcd. for C₁₄H₁₂N₂O₂: C, 69.99; H, 5.03. Found: C, 69.96; H, 5.09.

***N*-(2-Acetyl-phenyl)-nicotinamide (4).** Following General Procedure A, nicotinamide (73 mg, 0.60 mmol) was coupled with 2-bromoacetophenone (67 μL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **4** was purified by column chromatography using a hexane-EtOAc 90:10 to 50:50 gradient. 100 mg (83% yield) of a cream-colored solid were obtained. Mp: 114-116 °C. ¹H-NMR (400 MHz, CDCl₃): δ 12.85 (s, 1H), 9.32 (d, *J* = 2.0 Hz, 1H), 8.96 (dd, *J* = 8.5, 1.1 Hz, 1H), 8.81 (dd, *J* = 4.8, 1.5 Hz, 1H), 8.35 (ddd, *J* = 8.0, 2.3, 1.7 Hz, 1H), 8.00 (dd, *J* = 8.0, 1.6 Hz, 1H), 7.65 (m, 1H), 7.48 (ddd, *J* = 8.0, 4.8, 0.8 Hz, 1H), 7.22 (ddd, *J* = 8.5, 7.4, 1.2 Hz, 1H), 2.75 (s, 3H). ¹³C-NMR (300 MHz, CDCl₃): 203.5, 164.2, 152.6, 149.2, 140.9, 135.5, 134.9, 132.0, 130.3, 123.5, 123.0, 121.9, 120.7, 28.6. IR (neat, cm⁻¹): 3153, 2919, 1678, 1649, 1610, 1588, 1527, 1454, 1420, 1361, 1316, 1252, 1172, 1112, 1022, 963, 896, 827, 758, 717. Anal. calcd. for C₁₄H₁₂N₂O₂: C, 69.99; H, 5.03. Found: C, 69.69; H, 5.04.

***N*-(2-Acetyl-phenyl)-picolinamide (5).**^v Following General Procedure A, picolinamide (73 mg, 0.60 mmol) was coupled with 2-iodoacetophenone (71 μL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), K₃PO₄ (210 mg, 0.99 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). The reaction was heated for 42 h. **5** was purified by column chromatography using a hexane-EtOAc 95:5 to 70:30 gradient. 85 mg (71% yield) of a pale pink solid were obtained. Mp: 109-112 °C (lit mp: 112-112.5 °C). ¹H-NMR (400 MHz, CDCl₃): δ 13.53 (s, 1H), 8.99 (d, *J* = 8.4 Hz, 1H), 8.76 (d, *J* = 4.3 Hz, 1H), 8.25 (d, *J* = 7.8 Hz, 1H), 7.92 (d, *J* = 7.8 Hz, 1H), 7.86 (td, *J* = 7.7, 1.3 Hz, 1H), 7.58 (t, *J* = 7.4 Hz, 1H), 7.45 (m, 1H), 7.13 (t, *J* = 7.4 Hz, 1H), 2.68 (s, 3H). ¹³C-NMR (300 MHz, CDCl₃): 202.3, 164.0, 150.5, 148.8, 140.3, 137.5, 134.9, 131.8, 126.5, 123.2, 122.8, 122.8, 121.1, 28.7. IR (neat, cm⁻¹): 3207, 1684, 1656, 1576, 1517, 1451, 1430, 1363, 1312, 1251, 1169, 1111,

1042 997, 961, 900, 818, 757, 693, 610. Anal. calcd. for $C_{14}H_{12}N_2O_2$: C, 69.99; H, 5.03. Found: C, 69.85; H, 5.18.

***N*-(2-Acetyl-phenyl)-2-thiophenecarboxamide (6).**^{vi} Following General Procedure A, 2-thiophenecarboxamide (76 mg, 0.60 mmol,) was coupled with 2-bromoacetophenone (67 μ L, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μ L, 0.985 mmol), and K_2CO_3 (140 mg, 1.0 mmol) in anhydrous toluene (1 mL). No molecular sieves were utilized in the synthesis of the title compound. **6** was purified by column chromatography using a hexane-EtOAc 98:2 to 90:10 gradient. 100 mg (82% yield) of a cream-colored solid were obtained. Mp: 131-134 °C (lit mp: 129 °C). 1H -NMR (400 MHz, $CDCl_3$): δ 12.74 (s, 1H), 8.90 (dd, J = 8.5, 1.0 Hz, 1H), 7.97 (dd, J = 8.0, 1.4 Hz, 1H), 7.85 (dd, J = 3.8, 1.1 Hz, 1H), 7.62 (m, 1H), 7.58 (dd, J = 5.0, 1.1 Hz, 1H), 7.17 (m, 2H), 2.74 (s, 3H). ^{13}C -NMR (300 MHz, $CDCl_3$): 203.4, 160.7, 141.3, 140.4, 135.4, 132.0, 131.4, 128.8, 128.1, 122.5, 121.5, 120.5, 28.6. IR (neat, cm^{-1}): 3208, 3094, 2919, 1661, 1641, 1608, 1587, 1541, 1450, 1354, 1315, 1247, 1166, 1094, 1029, 960, 863, 811, 754, 731, 610. Anal. calcd. for $C_{13}H_{11}NO_2S$: C, 63.65; H, 4.52. Found: C, 63.39; H, 4.40.

***N*-(2-Acetyl-phenyl)-3-thiophenecarboxamide (7).** Following General Procedure A, 3-thiophenecarboxamide (76 mg, 0.60 mmol) was coupled with 2-bromoacetophenone (67 μ L, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μ L, 0.985 mmol), K_2CO_3 (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **7** was purified by column chromatography using a hexane-EtOAc 98:2 to 90:10 gradient. 97 mg (79% yield) of a white solid were obtained. Mp: 90-93 °C. 1H -NMR (400 MHz, $CDCl_3$): δ 12.63 (s, 1H), 8.93 (dd, J = 8.5, 1.1 Hz, 1H), 8.16 (dd, J = 3.0, 1.4 Hz, 1H), 7.97 (dd, J = 8.0, 1.5 Hz, 1H), 7.69 (dd, J = 5.1, 1.3 Hz, 1H), 7.62 (m, 1H), 7.41 (dd, J = 5.1, 3.0 Hz, 1H), 7.16 (ddd, J = 8.5, 7.3, 1.2 Hz, 1H), 2.73 (s, 3H). ^{13}C -NMR (300 MHz, $CDCl_3$): 203.4, 161.6, 141.5, 138.4, 135.5, 132.0, 129.6, 126.8, 126.5, 122.4, 121.6, 120.6, 28.7. IR (neat, cm^{-1}): 3218, 3110, 2924, 1677, 1650, 1607, 1585, 1531, 1451, 1358, 1314, 1254, 1207, 1166,

1102, 1072, 1021, 961, 865, 838, 818, 757, 741, 610. Anal. calcd. for C₁₃H₁₁NO₂S: C, 63.65; H, 4.52. Found: C, 63.58; H, 4.41.

***N*-(6-Acetyl-3-fluoro-phenyl)-benzamide (8).** Following General Procedure A, benzamide (76 mg, 0.63 mmol) was coupled with 2-bromo-4-fluoroacetophenone (109 mg, 0.502 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μ L, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **8** was purified by column chromatography using a hexane-EtOAc 95:5 to 90:10 gradient. 101 mg (79% yield) of a white solid were obtained. Mp: 123-126 °C. ¹H-NMR (400 MHz, CDCl₃): δ 12.91 (s, 1H), 8.78 (dd, *J* = 12.1, 2.6 Hz, 1H), 8.05 (m, 2H), 7.94 (dd, *J* = 8.9, 6.3 Hz, 1H), 7.55 (m, 3H), 6.81 (m, 1H), 2.67 (s, 3H). ¹³C-NMR (300 MHz, CDCl₃): 202.0, 166.5 (d, *J*_{CF} = 255 Hz), 166.2, 144.0 (d, *J*_{CF} = 13 Hz), 134.4 (d, *J*_{CF} = 11 Hz), 132.4, 130.2, 129.0, 127.6, 118.5 (d, *J*_{CF} = 3 Hz), 109.8 (d, *J*_{CF} = 23 Hz), 107.8 (d, *J*_{CF} = 28 Hz), 28.6. IR (neat, cm⁻¹): 3175, 1678, 1644, 1602, 1536, 1495, 1361, 1318, 1264, 1250, 1134, 992, 873, 806, 763, 706. Anal. calcd. for C₁₅H₁₂FNO₂: C, 70.03; H, 4.70. Found: C, 69.86; H, 4.49.

***N*-(6-Acetyl-3-fluoro-phenyl)-2-chlorobenzamide (9).** An oven-dried resealable test tube with a Teflon stir bar was charged with CuI (9.5 mg, 0.050 mmol) and NaI (150 mg, 1.0 mmol). The test tube was covered with a rubber septum and evacuated and refilled with argon three times through a syringe needle. Under argon, 2-bromo-4-fluoroacetophenone (109 mg, 0.502 mmol), *N,N'*-dimethylethylenediamine (**L1**) (10.5 μ L, 0.985 mmol), and toluene (1 mL) were each added *via* syringe. The rubber septum was then removed and quickly replaced with a Teflon screw-cap. The test tube was then placed in a preheated oil bath, at 110 °C. The reaction was heated with stirring for 24 h at which point it was cooled to room temperature. Next, 2-chlorobenzamide (93 mg, 0.60 mmol) and K₃PO₄ (210 mg, 0.99 mmol) were added quickly to the reaction mixture. The test tube was re-capped and the reaction was heated with stirring in the oil bath at 110 °C. After 24 h, the reaction was cooled to room temperature. The reaction mixture was partitioned between ethyl acetate and water and the organic layer was extracted. A second portion of ethyl acetate was used to wash the water layer and was extracted and combined with the first layer. The organic layers were dried over magnesium sulfate, filtered, and

concentrated *in vacuo* to remove solvent. **9** was purified by column chromatography with a hexane-EtOAc 95:5 to 90:10 gradient. 97 mg (66% yield) of a beige solid were obtained. Mp: 105-108 °C. ¹H-NMR (400 MHz, CDCl₃): δ 12.42 (s, 1H), 8.74 (dd, *J* = 11.9, 2.6 Hz, 1H), 7.95 (dd, *J* = 8.9, 6.3 Hz, 1H), 7.62 (dd, *J* = 7.5, 1.8 Hz, 1H), 7.41 (m, 3H), 6.85 (dd, *J* = 10.0, 7.4, 2.6 Hz, 1H), 2.63 (s, 3H). ¹³C-NMR (300 MHz, CDCl₃): 201.6, 166.4 (d, *J*_{CF} = 255 Hz), 166.2, 143.2 (d, *J*_{CF} = 13 Hz), 135.8, 134.3 (d, *J*_{CF} = 11 Hz), 131.8, 131.4, 130.8, 129.4, 127.3, 118.8 (d, *J*_{CF} = 3 Hz), 110.3 (d, *J*_{CF} = 22 Hz), 108.1 (d, *J*_{CF} = 28 Hz), 28.7. IR (neat, cm⁻¹): 3113, 1691, 1655, 1592, 1524, 1449, 1359, 1317, 1291, 1248, 1171, 1129, 1104, 1047, 993, 956, 871, 805, 784, 744, 715. Anal. calcd. for C₁₅H₁₁ClFNO₂: C, 61.76; H, 3.80. Found: C, 61.55; H, 3.77.

N-(6-Acetyl-3-fluoro-phenyl)-nicotinamide (10). Following General Procedure A, nicotinamide (73 mg, 0.60 mmol) was coupled with 2-bromo-4-fluoroacetophenone (109 mg, 0.502 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **10** was purified by column chromatography using a hexane-EtOAc 95:5 to 50:50 gradient. 97 mg (75% yield) of a white solid were obtained. Mp: 165-167 °C. ¹H-NMR (400 MHz, CDCl₃): δ 13.04 (s, 1H), 9.30 (s, br, 1H), 8.81 (s, br, 1H), 8.74 (dd, *J* = 11.9, 2.7 Hz, 1H), 8.32 (d, *J* = 8.0 Hz, 1H), 7.99 (dd, *J* = 8.9, 6.2 Hz, 1H), 7.47 (dd, *J* = 7.7, 4.7 Hz, 1H), 6.87 (ddd, *J* = 10.0, 7.4, 2.6 Hz, 1H), 2.70 (s, 3H). ¹³C-NMR (300 MHz, CDCl₃): 203.2, 166.5 (d, *J*_{CF} = 256 Hz), 164.5, 153.0, 149.2, 143.6 (d, *J*_{CF} = 13 Hz), 135.0, 134.5 (d, *J*_{CF} = 11 Hz), 130.0, 123.7, 118.6 (d, *J*_{CF} = 3 Hz), 110.3 (d, *J*_{CF} = 23 Hz), 108.0 (d, *J*_{CF} = 28 Hz), 28.7. IR (neat, cm⁻¹): 3116, 2921, 1687, 1651, 1606, 1589, 1532, 1460, 1419, 1368, 1320, 1299, 1278, 1261, 1251, 1169, 1143, 1110, 1025, 994, 960, 882, 863, 824, 811, 779, 765, 718. Anal. calcd. for C₁₄H₁₁FN₂O₂: C, 65.11; H, 4.29. Found: C, 65.01; H, 4.10.

N-(4-Methoxy-6-propioyl-phenyl)-3-chlorobenzamide (11). Following General Procedure A, 3-chlorobenzamide (93 mg, 0.60 mmol) was coupled with 2-bromo-5-methoxypropiofenone (122 mg, 0.502 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol),

and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **11** was purified by column chromatography using a hexane-EtOAc 95:5 to 90:10 gradient. 107 mg (68% yield) of a pale yellow solid were obtained. Mp: 112-114 °C. ¹H-NMR (400 MHz, CDCl₃): δ 12.43 (s, 1H), 8.85 (d, *J* = 9.2 Hz, 1H), 8.04 (s, 1H), 7.91 (d, *J* = 7.6 Hz, 1H), 7.49 (m, 3H), 7.18 (dd, *J* = 9.2, 3.0 Hz, 1H), 3.86 (s, 3H), 3.08 (q, *J* = 7.2 Hz, 2H), 1.25 (t, *J* = 7.2 Hz, 3H). ¹³C-NMR (300 MHz, CDCl₃): 205.5, 164.2, 154.6, 136.8, 135.1, 134.4, 131.8, 130.1, 128.1, 125.1, 122.9, 122.4, 119.9, 116.1, 55.7, 33.3, 8.6. IR (neat, cm⁻¹): 3221, 3087, 2986, 2968, 2947, 2915, 2838, 1668, 1651, 1642, 1615, 1572, 1531, 1454, 1423, 1383, 1320, 1291, 1265, 1252, 1195, 1176, 1050, 973, 836, 817, 730. Anal. calcd. for C₁₇H₁₆ClNO₃: C, 64.26; H, 5.08. Found: C, 64.07; H, 5.02.

***N*-(4-Methoxy-6-propioyl-phenyl)-2-thiophenecarboxamide (12)**. Following General Procedure A, 2-thiophenecarboxamide (76 mg, 0.60 mmol) was coupled with 2-bromo-5-methoxypropiophenone (122 mg, 0.502 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 µL, 0.985 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). **12** was purified by column chromatography using a hexane-EtOAc 95:5 to 90:10 gradient. 107 mg (74% yield) of a yellow solid were obtained. Mp: 153-155 °C. ¹H-NMR (400 MHz, CDCl₃): δ 12.45 (s, 1H), 8.81 (d, *J* = 9.2 Hz, 1H), 7.82 (dd, *J* = 3.8, 1.1 Hz, 1H), 7.56 (d, *J* = 5.0, 1.1 Hz, 1H), 7.46 (d, *J* = 2.9 Hz, 1H), 7.17 (m, 2H), 3.86 (s, 3H), 3.10 (q, *J* = 7.2 Hz, 2H), 1.26 (t, *J* = 7.2 Hz, 3H). ¹³C-NMR (300 MHz, CDCl₃): 205.5, 160.4, 154.4, 140.7, 134.6, 131.0, 128.4, 128.0, 122.5, 122.2, 120.1, 116.0, 55.7, 33.3, 8.5. IR (neat, cm⁻¹): 3216, 2983, 2911, 2830, 1643, 1616, 1595, 1521, 1420, 1352, 1314, 1287, 1261, 1192, 1175, 1056, 1044, 971, 826, 729. Anal. calcd. for C₁₅H₁₅NO₃S: C, 62.26; H, 5.23. Found: C, 62.06; H, 5.20.

***N*-(2-Acetyl-phenyl)-cinnamamide (13)**.^{vii} Following General Procedure A, cinnamamide (88 mg, 0.60 mmol) was coupled with 2-bromoacetophenone (67 µL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), *rac* trans-1,2-dimethyl-diamino-cyclohexane (**L2**) (15.8 µL, 0.100 mmol), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). The reaction was

heated for 25 h. **13** was purified by column chromatography using a hexane-EtOAc 98:2 to 90:10 gradient. 106 mg (80% yield) of a cream-colored solid were obtained. Mp: 90-93 °C (lit mp: 89.5-90.5 °C). ¹H-NMR (400 MHz, CDCl₃): δ 12.06 (s, 1H), 8.92 (d, *J* = 8.5 Hz, 1H), 7.94 (dd, *J* = 8.0, 1.1 Hz, 1H), 7.76 (d, *J* = 15.6 Hz, 1H), 7.61 (m, 3H), 7.41 (m, 3H), 7.16 (t, *J* = 7.2 Hz, 1H), 6.64 (d, *J* = 15.6 Hz, 1H), 2.71 (s, 3H). ¹³C-NMR (300 MHz, CDCl₃): 203.2, 165.1, 142.4, 141.5, 135.5, 134.8, 132.0, 130.2, 129.1, 128.3, 122.6, 122.3, 121.9, 121.1, 28.9. IR (neat, cm⁻¹): 3224, 3109, 3061, 3027, 1685, 1652, 1629, 1606, 1585, 1524, 1358, 1332, 1295, 1248, 1162, 975, 855, 757, 679, 614. Anal. calcd. for C₁₇H₁₅NO₂: C, 76.96; H, 5.70. Found: C, 76.89; H, 5.65.

N-(2-Acetyl-phenyl)-crotonamide (14). Following General Procedure A, crotonamide (51 mg, 0.60 mmol) was coupled with 2-iodoacetophenone (71 μL, 0.50 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.985 mmol), K₃PO₄ (210 mg, 0.99 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). The reaction was heated at 110 °C for 24 h. **14** was purified by column chromatography using a hexane-EtOAc 98:2 to 90:10 gradient. 73 mg (71% yield) of a beige solid were obtained. Mp: 80-83 °C. ¹H-NMR (400 MHz, CDCl₃): δ 11.84 (s, 1H), 8.85 (dd, *J* = 8.5, 1.1 Hz, 1H), 7.92 (dd, *J* = 8.0, 1.6 Hz, 1H), 7.57 (m, 1H), 7.12 (ddd, *J* = 8.5, 7.4, 1.2 Hz, 1H), 6.99 (dq, *J* = 15.3, 6.9 Hz, 1H), 6.04 (dq, *J* = 15.3, 1.7 Hz, 1H), 2.69 (s, 3H), 1.94 (dd, *J* = 6.9, 1.7 Hz, 3H). ¹³C-NMR (300 MHz, CDCl₃): 203.0, 165.0, 141.4, 141.3, 135.2, 131.8, 126.9, 122.3, 121.7, 120.8, 28.7, 18.0. IR (neat, cm⁻¹): 3208, 2915, 1686, 1643, 1607, 1585, 1523, 1453, 1358, 1331, 1298, 1286, 1250, 1188, 1166, 960, 928, 825, 757, 675. Anal. calcd. for C₁₂H₁₃NO₂: C, 70.92; H, 6.45. Found: C, 71.03; H, 6.45.

1-(2-Acetyl-phenyl)-pyrrolidin-2-one (15).^{viii} Following General Procedure A, 2-pyrrolidinone (46 μL, 0.61 mmol) was coupled with 2-bromoacetophenone (67 μL, 0.50 mmol) using CuI (4.8 mg, 0.025 mmol, 5 mol%), **L1** (5.3 μL, 0.050 mmol, 10 mol%), K₂CO₃ (140 mg, 1.0 mmol), and 200 mg activated 5 Å molecular sieves in anhydrous toluene (1 mL). The reaction was heated at 90 °C for 25 h. **15** was purified by column chromatography using a hexane-EtOAc 50:50 to 0:100 gradient. 87 mg (86% yield) of a white solid were obtained. Mp: 89-91 °C (lit mp: 88-89 °C). ¹H-NMR (300 MHz, CDCl₃): δ 7.57

(dd, $J = 7.7, 1.6$ Hz, 1H), 7.43 (m, 1H), 7.29 (m, 1H), 7.17 (d, $J = 7.9$ Hz, 1H), 3.82 (t, $J = 7$ Hz, 2H), 2.52 (s, 3H), 2.44 (t, $J = 8$ Hz, 2H), 2.15 (m, 2H). ^{13}C -NMR (300 MHz, CDCl_3): 200.6, 175.0, 136.8, 135.9, 131.9, 128.2, 126.8, 125.9, 50.9, 31.8, 28.6, 18.8. IR (neat, cm^{-1}): 3361, 2999, 2958, 2902, 1693, 1598, 1575, 1488, 1453, 1402, 1358, 1324, 1257, 1238, 1167, 1146, 1101, 1020, 968, 776, 656. Anal. calcd. for $\text{C}_{12}\text{H}_{13}\text{NO}_2$: C, 70.92; H, 6.45. Found: C, 70.86; H, 6.52.

General Procedure B: Base-promoted Cyclization to 2-Aryl-4-Quinolones. A resealable oven-dried test tube with Teflon stir bar was charged with *N*-(keto-aryl)amide (1 equiv) obtained in step one and crushed NaOH (3-3.5 equiv). Anhydrous 1,4-dioxane was added *via* syringe such that the reaction mixture was 0.1M in concentration. The test tube was then sealed with a Teflon screw-cap and the reaction was placed in a preheated oil bath at 110 °C. The reaction mixture was stirred for 1-2 h and then removed from the oil bath and allowed to cool to room temperature. The reaction mixture was then dissolved in ethanol and transferred to a round bottom flask in which it was concentrated *in vacuo* to remove solvent. Next, a small amount of water and a large amount of hexane were added to the flask and the flask was sonicated for approximately two minutes. The biphasic mixture was neutralized to pH ~7 with 1M HCl and saturated NaHCO_3 solutions. Solid precipitated out of the water layer and the heterogeneous mixture was filtered through a Buchner funnel. The solid powder was rinsed with copious amounts of hexane and minimal water. The solid was collected and transferred to a vial with ethanol and concentrated *in vacuo* to remove residual solvent. In some cases, the hexane rinses during filtration did not completely wash away the alkyl residue and the ^1H -NMR showed contamination. Further purification involved a more extensive hexane wash in which hexane was added to the vial containing the compound and the mixture was sonicated. The solid was allowed to settle, and then the hexane was carefully removed *via* pipette. Hexane was added and removed twice more before the product was dried *in vacuo*.

2-Phenyl-4-quinolone (16).^{ix} Following General Procedure B, **1** (98 mg, 0.41 mmol) was cyclized using NaOH (49 mg, 1.2 mmol) in 1,4-dioxane (4.1 mL). The reaction was heated for 1 h at 110 °C. After work-up and filtration, 87 mg (96% yield) of a beige solid were obtained. Mp: 247-250 °C

(ethanol) (lit mp: 254 °C).^x ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.26 (d, *J* = 8.1 Hz, 1H), 7.69 (m, 4H), 7.52 (m, 3H), 7.38 (m, 1H), 6.56 (s, 1H). ¹³C-NMR (400 MHz, CD₃OD/CDCl₃): 180.3, 153.0, 141.5, 135.0, 133.3, 131.6, 129.9, 128.2, 125.7, 125.4, 125.1, 119.4, 108.4. IR (neat, cm⁻¹): 3067, 2962, 1635, 1594, 1581, 1546, 1502, 1472, 1450, 1431, 1355, 1320, 1255, 1139, 839, 798, 771, 753, 689, 670.

2-(3'-Chlorophenyl)-4-quinolone (17). Following General Procedure B, **2** (107 mg, 0.39 mmol) was cyclized using NaOH (47 mg, 1.2 mmol) in 1,4-dioxane (3.9 mL). The reaction was heated for 1 h at 110 °C. After work-up and filtration, 96 mg (96% yield) of a cream-colored solid were obtained. Mp: >260 °C. ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.26 (m, 1H), 7.76 (m, 1H), 7.67 (m, 3H), 7.50 (m, 2H), 7.40 (m, 1H), 6.55 (s, 1H). ¹³C-NMR (500 MHz, CD₃OD/CDCl₃): 180.4, 151.4, 141.6, 137.0, 135.9, 133.5, 131.5, 131.4, 128.3, 126.7, 125.8, 125.6, 125.3, 119.5, 108.7. IR (neat, cm⁻¹): 2193, 1604, 1572, 1558, 1503, 1445, 1350, 841, 769, 757, 705.

2-(4'-Pyridyl)-4-quinolone (18).³ Following General Procedure B, **3** (63 mg, 0.26 mmol) was cyclized using NaOH (31 mg, 0.78 mmol) in 1,4-dioxane (2.6 mL). The reaction was heated for 2 h at 110 °C. After work-up and filtration, 52 mg (90% yield) of a beige solid were obtained. Mp: >260 °C. ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.71 (d, *J* = 5.0 Hz, 2H), 8.27 (dt, *J* = 8.2, 1.1 Hz, 1H), 7.70 (m, 4H), 7.39 (m, 1H), 6.60 (s, 1H). ¹³C-NMR (500 MHz, CD₃OD/CDCl₃): 180.1, 150.6, 149.2, 143.2, 141.5, 133.5, 125.7, 125.6, 125.3, 122.8, 119.4, 109.0. IR (neat, cm⁻¹): 3066, 2968, 1635, 1591, 1567, 1536, 1506, 1444, 1358, 1259, 1143, 821, 796, 769, 675.

2-(3'-Pyridyl)-4-quinolone (19). Following General Procedure B, **4** (81 mg, 0.34 mmol) was cyclized using NaOH (41 mg, 1.0 mmol) in 1,4-dioxane (3.4 mL). The reaction was heated for 1 h at 110 °C. After work-up and filtration, 66 mg (88% yield) of a beige solid were obtained. Mp: >260 °C. ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.90 (dd, *J* = 2.4, 0.8 Hz, 1H), 8.68 (dd, *J* = 4.9, 1.6 Hz, 1H), 8.28 (m, 1H), 8.13 (ddd, *J* = 8.0, 2.4, 1.6 Hz, 1H), 7.66 (m, 2H), 7.55 (ddd, *J* = 8.0, 4.9, 0.8 Hz, 1H), 7.40 (m, 1H), 6.54 (s, 1H). ¹³C-NMR (500 MHz, CD₃OD/CDCl₃): 180.1, 151.5, 149.2, 148.3, 141.4,

136.6, 133.4, 131.5, 125.8, 125.5, 125.2, 125.0, 119.2, 109.0. IR (neat, cm^{-1}): 3090, 2966, 1637, 1602, 1578, 1548, 1509, 1442, 1384, 1356, 1024, 801, 749, 704.

2-(2'-Pyridyl)-4-quinolone (20).^{xi} Following General Procedure B, **5** (89 mg, 0.37 mmol) was cyclized using NaOH (44 mg, 1.1 mmol) in 1,4-dioxane (3.7 mL). The reaction was heated for 1 h at 110 °C. After work-up and filtration, 71 mg (86% yield) of a beige solid were obtained. Decomposition: 232-234 °C (ethanol). ¹H-NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 8.77 (ddd, $J = 4.8, 1.7, 1.0$ Hz, 1H), 8.27 (ddd, $J = 8.3, 1.5, 0.6$ Hz, 1H), 8.09 (d, $J = 8.1$ Hz, 1H), 7.97 (td, $J = 7.6, 1.8$ Hz, 1H), 7.78 (ddd, $J = 8.5, 1.1, 0.6$ Hz, 1H), 7.71 (m, 1H), 7.50 (ddd, $J = 7.6, 6.9, 1.2$ Hz, 1H), 7.41 (ddd, $J = 8.2, 6.9, 1.2$ Hz, 1H), 6.98 (s, 1H). ¹³C-NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 181.0, 150.2, 149.8, 147.7, 140.7, 138.7, 133.6, 126.4, 125.9, 125.8, 125.2, 122.3, 119.7, 106.6. IR (neat, cm^{-1}): 3063, 1627, 1603, 1573, 1516, 1477, 1384, 1355, 1321, 1254, 1138, 1022, 995, 781, 760, 692. Anal. calcd. for $\text{C}_{14}\text{H}_{10}\text{N}_2\text{O}$: C, 75.66; H, 4.54. Found: C, 75.45; H, 4.53.

2-(2'-Thiophenyl)-4-quinolone (21).^{xii} Following General Procedure B, **6** (97 mg, 0.40 mmol) was cyclized using NaOH (48 mg, 1.2 mmol) in 1,4-dioxane (4.0 mL). The reaction was heated for 1 h at 110 °C. After work-up, filtration, and a hexane wash, 88 mg (97% yield) of a beige solid were obtained. Mp: >260 °C (lit mp: >300 °C).^{xiii} ¹H-NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 8.22 (ddd, $J = 8.2, 1.4, 0.6$ Hz, 1H), 7.76 (dd, $J = 3.8, 1.1$ Hz, 1H), 7.66 (m, 2H), 7.57 (dd, $J = 5.1, 1.1$ Hz, 1H), 7.36 (ddd, $J = 8.1, 6.7, 1.4$ Hz, 1H), 7.19 (dd, $J = 5.1, 3.8$ Hz, 1H), 6.60 (s, 1H). ¹³C-NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 179.9, 146.0, 141.1, 136.8, 133.2, 130.0, 129.1, 128.5, 125.6, 125.3, 124.8, 118.9, 107.3. IR (neat, cm^{-1}): 3058, 2184, 1598, 1557, 1503, 1443, 1347, 1256, 1136, 857, 824, 768, 756, 697.

2-(3'-Thiophenyl)-4-quinolone (22). Following General Procedure B, **7** (67 mg, 0.27 mmol) was cyclized using NaOH (33 mg, 0.83 mmol) in 1,4-dioxane (2.7 mL). The reaction was heated for 2 h at 110 °C. After work-up and filtration, 57 mg (92% yield) of a beige solid were obtained. Mp: >260 °C ($\text{CDCl}_3/\text{CD}_3\text{OD}$). ¹H-NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 8.23 (d, $J = 8.0$ Hz, 1H), 8.01 (s, 1H), 7.63 (m, 2H), 7.55-7.33 (m, 3H), 6.61 (s, 1H). ¹³C-NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 180.7, 147.8, 141.6,

136.2, 133.5, 128.6, 127.2, 126.9, 125.9, 125.7, 125.2, 119.4, 107.6. IR (neat, cm^{-1}): 3069, 2926, 1633, 1593, 1552, 1508, 1470, 1440, 1428, 1369, 1350, 1313, 1142, 1022, 830, 757, 694.

7-Fluoro-2-phenyl-4-quinolone (23).^{xiv} Following General Procedure B, **8** (76 mg, 0.29 mmol) was cyclized using NaOH (35 mg, 0.88 mmol) in 1,4-dioxane (2.9 mL). The reaction was heated for 2 h at 110 °C. After work-up and filtration, 63 mg (89% yield) of a cream-colored solid were obtained. Mp: >260 °C. ^1H -NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 8.27 (dd, $J = 9.1, 6.1$ Hz, 1H), 7.72 (m, 2H), 7.52 (m, 3H), 7.36 (dd, $J = 9.8, 2.4$ Hz, 1H), 7.10 (ddd, $J = 10.7, 8.3, 2.4$ Hz, 1H), 6.53 (s, 1H). ^{13}C -NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3/\text{CD}_2\text{Cl}_2$): 179.8, 166.1 (d, $J_{\text{CF}} = 252$ Hz), 153.6, 143.1 (d, $J_{\text{CF}} = 13$ Hz), 134.9, 131.7, 130.0, 129.0 (d, $J_{\text{CF}} = 10$ Hz), 128.2, 122.4 (d, $J_{\text{CF}} = 1.7$ Hz), 114.1 (d, $J_{\text{CF}} = 24$ Hz), 108.6, 104.6 (d, $J_{\text{CF}} = 25$ Hz). IR (neat, cm^{-1}): 3255, 3159, 3117, 3082, 3005, 1641, 1602, 1583, 1542, 1509, 1469, 1425, 1367, 1295, 1253, 1162, 1132, 1092, 869, 840, 816, 771, 744, 696.

2-(2'-Chlorophenyl)-7-fluoro-4-quinolone (24). Following General Procedure B, **9** (73 mg, 0.25 mmol) was cyclized using NaOH (30 mg, 0.75 mmol) in 1,4-dioxane (2.5 mL). The reaction was heated for 2 h at 110 °C. After work-up and filtration, 50 mg (73% yield) of a beige solid were obtained. Decomposition: 252-256 °C (ethanol). ^1H -NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 8.30 (dd, $J = 9.0, 6.0$ Hz, 1H), 7.53 (m, 1H), 7.44 (m, 3H), 7.22 (dd, $J = 9.6, 2.4$ Hz, 1H), 7.11 (ddd, $J = 10.8, 8.2, 2.1$ Hz, 1H), 6.31 (s, 1H). ^{13}C -NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 179.4, 165.8 (d, $J_{\text{CF}} = 252$ Hz), 150.9, 142.4 (d, $J_{\text{CF}} = 13$ Hz), 134.2, 133.2, 132.1, 131.3, 130.8, 128.9 (d, $J_{\text{CF}} = 11$ Hz), 127.8, 122.2, 114.1 (d, $J_{\text{CF}} = 24$ Hz), 111.1, 104.2 (d, $J_{\text{CF}} = 25$ Hz). IR (neat, cm^{-1}): 3070, 1642, 1606, 1589, 1551, 1513, 1462, 1259, 1162, 1129, 966, 873, 822, 753, 732.

7-Fluoro-2-(3'-pyridyl)-4-quinolone (25). Following General Procedure B, **10** (85 mg, 0.33 mmol) was cyclized using NaOH (40 mg, 1.0 mmol) in 1,4-dioxane (3.3 mL). The reaction was heated for 1 h at 110 °C. After work-up and filtration, further purification was needed so a hexane wash was performed. Upon drying, 87 mg (96% yield) of a beige solid were obtained. Mp: >260 °C ($\text{CDCl}_3/\text{CD}_3\text{OD}$). ^1H -NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 8.93 (s, br, 1H), 8.72 (s, br, 1H), 8.29 (dd, J

= 9.0, 6.0 Hz, 1H), 8.14 (d, J = 8.1 Hz, 1H), 7.58 (s, br, 1H), 7.34 (dd, J = 9.6, 2.4 Hz, 1H), 7.13 (ddd, J = 10.7, 8.3, 2.4 Hz, 1H), 6.52 (s, 1H). ^{13}C -NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 179.4, 166.1 (d, J_{CF} = 252 Hz), 151.7, 150.2, 148.4, 143.5, 136.7, 131.8, 129.0 (d, J_{CF} = 10 Hz), 125.2, 122.5 (d, J_{CF} = 1.2 Hz), 114.4 (d, J_{CF} = 24 Hz), 109.2, 104.8 (d, J_{CF} = 25 Hz). IR (neat, cm^{-1}): 3079, 2921, 2306, 2266, 1636, 1605, 1579, 1568, 1543, 1515, 1467, 1427, 1259, 1213, 1090, 852, 805, 703.

2-(3'-Chlorophenyl)-6-methoxy-3-methyl-4-quinolone (26). Following General Procedure B, **11** (66 mg, 0.21 mmol) was cyclized using NaOH (29 mg, 0.73 mmol) in 1,4-dioxane (2.1 mL). The reaction was heated for 2 h at 110 °C. After work-up and filtration, 57 mg (91% yield) of a beige crystalline solid were obtained. Mp: >260 °C. ^1H -NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 7.67 (d, J = 2.9 Hz, 1H), 7.46 (m, 4H), 7.37 (m, 1H), 7.24 (dd, J = 9.1, 2.9 Hz, 1H), 3.90 (s, 3H), 2.03 (s, 3H). ^{13}C -NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 178.9, 157.5, 148.1, 137.8, 135.4, 135.4, 131.0, 130.5, 129.7, 128.2, 125.3, 124.4, 120.6, 115.9, 104.3, 56.1, 12.8. IR (neat, cm^{-1}): 3078, 2957, 1582, 1544, 1501, 1380, 1294, 1229, 1190, 1158, 1097, 1032, 848, 812, 768, 736, 714. Anal. calcd. for $\text{C}_{17}\text{H}_{14}\text{ClNO}_2$: C, 68.12; H, 4.71. Found: C, 68.08; H, 4.73.

6-Methoxy-3-methyl-2-(2'-thiophenyl)-4-quinolone (27). Following General Procedure B, **12** (84 mg, 0.29 mmol) was cyclized using NaOH (41 mg, 1.0 mmol) in 1,4-dioxane (2.9 mL). The reaction was heated for 1 h at 110 °C. After work-up and filtration, 73 mg (92% yield) of a pale yellow solid were obtained. Mp: >260 °C ($\text{CDCl}_3/\text{CD}_3\text{OD}$). ^1H -NMR (400 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): δ 7.65 (d, J = 2.9 Hz, 1H), 7.58 (dd, J = 5.1, 1.2 Hz, 1H), 7.49 (d, J = 9.1 Hz, 1H), 7.33 (dd, J = 3.6, 1.2 Hz, 1H), 7.23 (dd, J = 9.1, 2.9 Hz, 1H), 7.18 (dd, J = 5.1, 3.6 Hz, 1H), 3.90 (s, 3H), 2.18 (s, 3H). ^{13}C -NMR (500 MHz, $\text{CD}_3\text{OD}/\text{CDCl}_3$): 178.9, 157.8, 143.2, 136.1, 135.7, 130.7, 129.4, 128.4, 125.5, 124.6, 120.8, 117.2, 104.4, 56.1, 13.1. IR (neat, cm^{-1}): 2951, 1589, 1541, 1488, 1439, 1375, 1256, 1228, 1161, 1026, 850, 822.7, 768, 708, 692. Anal. calcd. for $\text{C}_{15}\text{H}_{13}\text{NO}_2\text{S}$: C, 66.40; H, 4.83. Found (Recrystallized from $\text{CDCl}_3/\text{CD}_3\text{OD}$): C, 66.18; H, 4.74.

2-Styryl-4-quinolone (28).^{xv} Following General Procedure B, **13** (101 mg, 0.38 mmol) was cyclized using NaOH (46 mg, 1.2 mmol) in 1,4-dioxane, (3.8 mL). The reaction was heated for 3 h at 90 °C. After work-up and filtration, 77 mg (82% yield) of an orange-yellow solid were obtained. Mp: >260 °C (lit mp: 279 °C). ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.22 (ddd, *J* = 8.2, 1.4, 0.6 Hz, 1H), 7.58 (m, 5H), 7.38 (m, 4H), 6.96 (d, *J* = 16.5 Hz, 1H), 6.55 (s, 1H). ¹³C-NMR (400 MHz, CD₃OD/CDCl₃): 180.0, 149.5, 141.0 137.5, 136.0, 133.1, 130.3, 129.6, 128.1, 125.6, 125.6, 124.8, 121.5, 118.8, 107.0. IR (neat, cm⁻¹): 3059, 2040, 1621, 1590, 1547, 1494, 1436, 1246, 1138, 959, 752, 686.

2,3-Dihydro-pyrrolo[1,2-a]quinolin-5(1H)-one (29).⁸ Following General Procedure B, **15** (71 mg, 0.35 mmol) was cyclized using NaOH (49 mg, 1.2 mmol) in 1,4-dioxane (3.5 mL). The reaction was heated for 1 h at 110 °C. After the reaction was cooled to room temperature, it was transferred into a round bottom flask with ethanol. The solvent was removed *in vacuo* and water was added. The solution was neutralized to pH ~7 with 1M HCl and saturated NaHCO₃ solutions and then the water was removed *in vacuo*. The title compound was purified by silica column chromatography using a EtOAc-MeOH 100:0 to 95:5 gradient. After the product was collected and concentrated, a hexane wash was performed. 60 mg (93% yield) of a beige solid were obtained. Mp: 167-173 °C (lit mp: 173-174°C). ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.24 (d, *J* = 8.5, 1.5 Hz, 1H), 7.64 (ddd, *J* = 8.5, 7.1, 1.5 Hz, 1H), 7.36 (m, 2H), 6.19 (s, 1H), 4.26 (t, *J* = 7.3 Hz, 2H), 3.15 (t, *J* = 7.6 Hz, 2H), 2.10 (m, 2H). ¹³C-NMR (400 MHz, CD₃OD/CDCl₃): 179.3, 157.8, 139.1, 133.0, 126.5, 125.8, 124.6, 116.7, 105.0, 51.3, 32.4, 21.4. IR (neat, cm⁻¹): 3480 (br), 3388 (br), 2964, 2895, 1625, 1599, 1558, 1503, 1473, 1430, 1310, 1267, 1167, 1151, 1073, 1030, 962, 840, 787, 759, 671, 621.

2-(1'-Propenyl)-4-quinolone (30).^{xvi} Following General Procedure B, **14** (84 mg, 0.41 mmol) was cyclized using NaOH (25 mg, 0.63 mmol, 1.5 equiv) in 1,4-dioxane (4.1 mL). The reaction was heated for 1 h at 110 °C. After the reaction was cooled to room temperature, it was transferred into a round bottom flask with ethanol. The solvent was removed *in vacuo* and water was added. The solution was neutralized to pH ~7 with 1M HCl and saturated NaHCO₃ solutions and then the water was removed *in*

vacuo. The title compound was purified by silica column chromatography using a hexane-EtOAc 50:50 to 0:100 gradient. After the product was collected and concentrated, a hexane wash was performed. 42 mg (54% yield) of a pale yellow solid were obtained. Decomposition: 240-244 °C (lit decomposition: 210 °C). ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 8.17 (d, *J* = 7.9 Hz, 1H), 7.54 (m, 2H), 7.28 (m, 1H), 6.68 (m, 1H), 6.32 (s, 1H), 6.24 (dd, *J* = 15.9, 1.5 Hz, 1H), 1.91 (dd, *J* = 6.7, 1.4 Hz, 3H). ¹³C-NMR (500 MHz, CD₃OD/CDCl₃): 180.0, 149.6, 140.7, 136.4, 132.8, 125.5, 125.4, 125.2, 124.6, 118.7, 106.1, 19.2. IR (neat, cm⁻¹): 3061, 2916, 2773, 2189, 2115, 1596, 1549, 1499, 1442, 1354, 1326, 1249, 1138, 961, 835, 756.

4-Methyl-3-vinyl-2-quinolone (31).^{xvii} Following a slight modification of General Procedure B, **14** (94 mg, 0.46 mmol) was cyclized using Cs₂CO₃ (450 mg, 1.4 mmol) in 1,4-dioxane (4.6 mL). The reaction was heated for 24 h at 110 °C. After the reaction was cooled to room temperature, it was transferred into a round bottom flask with ethanol. The solvent was removed *in vacuo* and water was added. The solution was neutralized to pH ~ 7 with 1M HCl and saturated NaHCO₃ solutions and then the water was removed *in vacuo*. The title compound was purified by silica column chromatography using a hexane-EtOAc 75:25 to 100:0 gradient. After the product was collected and concentrated, a hexane wash was performed. 65 mg (76% yield) of a pale yellow solid were obtained. Decomposition: >150 °C (lit mp: 203-205°C). ¹H-NMR (400 MHz, CD₃OD/CDCl₃): δ 7.73 (dd, *J* = 8.2, 0.9 Hz, 1H), 7.44 (m, 1H), 7.28 (dd, *J* = 8.2, 0.7 Hz, 1H), 7.21 (m, 1H), 6.76 (dd, *J* = 17.8, 11.7 Hz, 1H), 5.77 (dd, *J* = 17.8, 2.1 Hz, 1H), 5.64 (dd, *J* = 11.7, 2.1 Hz, 1H), 2.55 (s, 3H). ¹³C-NMR (400 MHz, CD₃OD/CDCl₃): 163.3, 145.3, 137.4, 131.2, 130.7, 128.3, 125.7, 123.3, 122.5, 121.7, 116.3, 16.3. IR (neat, cm⁻¹): 2944, 2845, 1648, 1603, 1551, 1503, 1431, 1380, 1270, 919, 747, 664. Anal. calcd. for C₁₂H₁₁NO: C, 77.81; H, 5.99. Found: C: 77.70, H: 5.96.

N-(2-Acetyl-phenyl)-n-hexanamide (32). Following General Procedure A, hexanamide (138 mg, 1.20 mmol) was coupled with 2-iodoacetophenone (141 mg, 1.00 mmol) using CuI (9.5 mg, 0.050 mmol), **L1** (10.5 μL, 0.100 mmol), K₃PO₄ (425 mg, 2.0 mmol), and 400 mg activated 5 Å molecular

sieves in anhydrous toluene (2 mL). The title compound was purified by column chromatography using a 5-10% ethyl acetate/hexane gradient. 187 mg (80% yield) of a clear, yellow oil were obtained. ¹H-NMR (400 MHz, CDCl₃): δ 11.68 (s, 1H), 8.73 (dd, *J* = 8.5, 1.1 Hz, 1H), 7.82 (dd, *J* = 8.0, 1.5 Hz, 1H), 7.47 (m, 1H), 7.03 (m, 1H), 2.60 (s, 3H), 2.37 (t, *J* = 7.4 Hz, 2H), 1.70 (m, 2H), 1.32 (m, 4H), 0.86 (m, 3H). ¹³C-NMR (300 MHz, CDCl₃): 202.8, 172.7, 141.2, 135.1, 131.7, 122.1, 121.6, 120.6, 38.7, 31.4, 31.4, 28.6, 25.2, 22.4, 22.4, 14.0. IR (neat, cm⁻¹): 3253, 2957, 2931, 2861, 1699, 1653, 1607, 1585, 1521, 1451, 1360, 1311, 1298, 1248, 1163, 1092, 1022, 962, 756, 606. Anal. calcd. for C₁₄H₁₉NO₂: C, 72.07; H, 8.21. Found: C, 72.23; H, 8.26.

3-*n*-Butyl-4-methyl-2-quinolone (33)^{xviii} and **2-*n*-Pentyl-4-quinolone (34)**^{xix} Following General Procedure B, **32** (82 mg, 0.35 mmol) was cyclized using NaOH (42 mg, 3 equiv.) in 1,4-dioxane (3.5 mL). The reaction was heated for 1 h at 110 °C. After the reaction was cooled to room temperature, ethanol was added to dissolve all solid and the reaction mixture was loaded directly onto a Biotage samplet. The samplet was dried with gentle heating. The title compounds were purified by silica column chromatography using a hexane-EtOAc 75:25 to 0:100 gradient followed by a EtOAc-MeOH 100:0 to 95:5 gradient. **33** eluted faster than **34** under these conditions. After the products were collected and concentrated, hexane washes were performed on both compounds. 17 mg (23% yield) of **33** were obtained as a white solid. Mp: 171-173 °C (lit mp: 170-171 °C). ¹H-NMR (400 MHz, CDCl₃): δ 11.99 (s, br, 1H), 7.70 (dd, *J* = 8.2, 0.9 Hz, 1H), 7.46 (m, 1H), 7.38 (m, 1H), 7.21 (m, 1H), 2.83 (t, *J* = 7.3 Hz, 2H), 2.51 (s, 3H), 1.52 (m, 4H), 0.99 (t, *J* = 7.2 Hz, 3H). ¹³C-NMR (400 MHz, CDCl₃): 164.1, 143.2, 137.0, 131.9, 129.3, 124.4, 122.3, 121.3, 116.2, 31.5, 26.9, 23.2, 15.3, 14.3. IR (neat, cm⁻¹): 2946, 2860, 1654, 1611, 1562, 1503, 1428, 1394, 1274, 1182, 1158, 1097, 1032, 905, 747, 706, 667, 613. 37 mg (49% yield) of **34** were obtained as a white solid. Mp: 142-145 °C (lit mp: 141-142 °C). ¹H-NMR (400 MHz, CDCl₃): δ 13.02 (s, 1H), 8.38 (d, *J* = 8.0 Hz, 1H), 7.88 (d, *J* = 8.4 Hz, 1H), 7.60 (t, *J* = 7.1 Hz, 1H), 7.35 (t, *J* = 7.5 Hz, 1H), 6.28 (s, 1H), 2.72 (t, *J* = 7.5 Hz, 2H), 1.71 (m, 2H), 1.22 (m, 4H), 0.78 (t, *J* = 6.8 Hz, 3H). ¹³C-NMR (400 MHz, CDCl₃): 179.0, 156.0, 141.0, 131.9, 125.2, 123.8, 119.0, 108.2,

34.5, 31.5, 29.1, 22.5, 14.0. IR (neat, cm^{-1}): 3250, 3065, 2956, 2930, 2871, 1639, 1595, 1552, 1505, 1472, 1444, 1355, 1322, 1249, 1176, 1138, 1111, 844, 761, 675.

General Procedure C: McMurry-Type Coupling to Form Indoles.^{xx} In a glove box, TiCl_3 (1.8 mmol, 3.6 equiv.) and Zn powder (3.6 mmol, 7.2 equiv.) were weighed into an oven-dried Schlenk tube with a Teflon-coated stir bar. The Schlenk tube was capped with a rubber septum and removed from the glove box. Outside of the glove box, the Schlenk tube was evacuated and refilled with Argon twice. While still under a stream of Argon, the rubber septum was removed and the *N*-(keto-aryl)amide (0.5 mmol, 1 equiv.) was added quickly to the Schlenk tube. The Schlenk tube was recapped with the septum and evacuated and refilled with Argon three more times. Anhydrous DME was added *via* syringe and the rubber septum was replaced with a Teflon Schlenk cap. The reaction was placed in a preheated oil bath at 90 °C, and the reaction was heated with stirring for 4-28 h, monitored by TLC. The reaction mixture was allowed to cool to room temperature and filtered through a pad of silica gel with copious amounts of EtOAc. The filtrate was concentrated *in vacuo*, and the crude material was purified *via* silica gel column chromatography using a hexane-EtOAc 100:0 to 92:8 gradient.

3-Methyl-2-phenylindole (35).^{1c} Following General Procedure C, **1** (119.6 mg, 0.50 mmol) underwent an intramolecular coupling using TiCl_3 (280 mg, 1.8 mmol) and Zn powder (235 mg, 3.6 mmol) in DME (6.0 mL). The reaction was heated for 28 h at 90 °C. After filtration and column chromatography, 71 mg (69% yield) of a pale yellow solid were obtained. Mp: 88-92 °C (lit mp. 90-92 °C). ^1H -NMR (400 MHz, CDCl_3): δ 8.03 (s, br, 1H), 7.61 (m, 3H), 7.50 (m, 2H), 7.38 (m, 2H), 7.23 (m, 1H), 7.17 (m, 1H), 2.49 (s, 3H). ^{13}C -NMR (400 MHz, CDCl_3): 136.1, 134.3, 133.6, 130.3, 129.1, 128.0, 127.6, 122.6, 119.8, 119.3, 111.0, 108.9, 9.9. IR (neat, cm^{-1}): 3448, 3421, 3056, 2914, 2862, 1603, 1458, 1445, 1332, 1306, 1235, 1074, 918, 770, 739, 700.

3-Methyl-2-(3'-thiophenyl)-indole (36). Following General Procedure C, **7** (122.7 mg, 0.50 mmol) underwent an intramolecular coupling using TiCl_3 (280 mg, 1.8 mmol) and Zn powder (235 mg, 3.6 mmol) in DME (6.0 mL). The reaction was heated for 16 h at 90 °C. After filtration and column chromatography, 75 mg (70% yield) of a beige solid were obtained. Mp: 92-95 °C. ^1H -NMR (400 MHz,

CDCl₃): δ 7.77 (s, br, 1H), 7.55 (d, J = 7.7 Hz, 1H), 7.34 (dd, J = 4.6, 3.4 Hz, 1H), 7.24 (m, 3H), 7.13 (m, 3H), 2.39 (s, 3H). ¹³C-NMR (400 MHz, CDCl₃): 135.7, 134.2, 130.0, 130.0, 126.7, 126.3, 122.4, 121.3, 119.7, 119.0, 110.8, 108.6, 9.87. IR (neat, cm⁻¹): 3417, 3100, 3056, 2916, 2862, 1461, 1350, 1332, 1291, 1240, 1206, 1153, 1118, 1090, 1025, 1007, 865, 781, 741, 683, 619. Anal. calcd. for C₁₃H₁₁NS: C, 73.20; H, 5.20. Found: C, 73.33; H, 5.30.

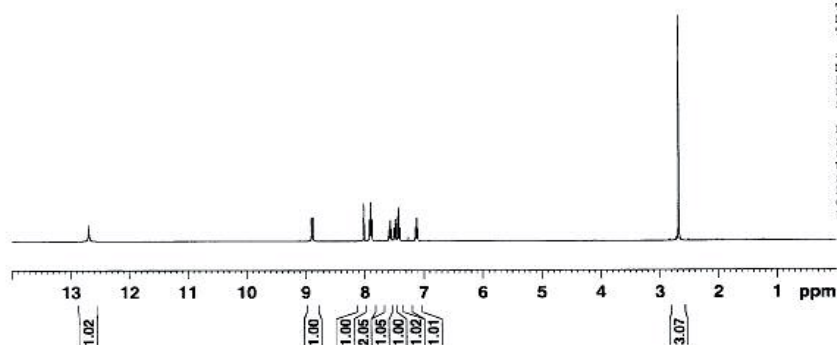
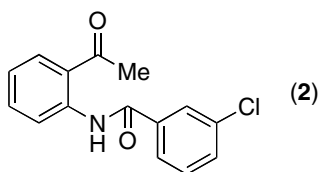
2,3-Dihydro-9-methyl-1H-pyrrolo[1,2-a]indole (37).^{xxi} Following General Procedure C, **15** (101.6 mg, 0.50 mmol) underwent an intramolecular coupling using TiCl₃ (280 mg, 1.8 mmol) and Zn powder (235 mg, 3.6 mmol) in DME (6.0 mL). The reaction was heated for 4.5 h at 90 °C. After filtration and column chromatography, 29 mg (34% yield) of a colorless oil were obtained. Note: Title compound readily decomposes even at low temperature. ¹H-NMR (400 MHz, CDCl₃): δ 7.54 (d, J = 7.4 Hz, 1H), 7.25 (m, 1H), 7.14 (m, 2H), 4.06 (t, J = 6.9 Hz, 2H), 2.98 (t, J = 7.5 Hz, 2H), 2.63 (m, 2H), 2.32 (s, 3H). ¹³C-NMR (400 MHz, CDCl₃): 141.5, 133.3, 132.7, 120.1, 118.5, 118.5, 109.3, 100.8, 43.7, 28.0, 23.1, 9.2.

Experimental Section for Starting Materials

2-Bromo-5-methoxypropiophenone.^{xxii,xxiii} 2-Bromo-5-methoxybenzoyl chloride (1.91 g, 7.67 mmol) was added to a flame-dried round bottom flask. The flask was covered with a rubber septum and then evacuated and refilled with Argon three times. Anhydrous THF (20 mL) was added *via* syringe and the reaction mixture was cooled to -78 °C. Ethyl magnesium bromide (3M in ether) was added dropwise over approximately 30 minutes. Then the reaction mixture was allowed to warm to room temperature and was stirred for 20 h at which point saturated ammonium chloride was added. The organic layer was extracted and concentrated. Then it was partitioned between ether and water. The ether layer was extracted and then washed once more with water. The organic layer was dried over MgSO₄, filtered, and concentrated to dry. The title compound was purified by silica column chromatography using a hexane-EtOAc 100:0 to 90:10 gradient. 1.37 g (74% yield) of a clear, yellow oil were obtained. ¹H-NMR (300 MHz, CDCl₃): δ 7.47 (dd, J = 8.6, 0.5 Hz, 1H), 6.85 (m, 2H), 3.81 (s,

3H), 2.93 (q, $J = 7.2$ Hz, 2H), 1.21 (t, $J = 7.2$ Hz, 3H). ^{13}C -NMR (400 MHz, CDCl_3): 204.7, 158.8, 142.6, 134.2, 117.1, 113.6, 108.5, 55.5, 35.9, 8.0. IR (neat, cm^{-1}): 3073, 2977, 2939, 2905, 2840, 1705, 1592, 1569, 1467, 1405, 1345, 1290, 1241, 1198, 1175, 1090, 1051, 1027, 967, 874, 846, 816.

NMR Data

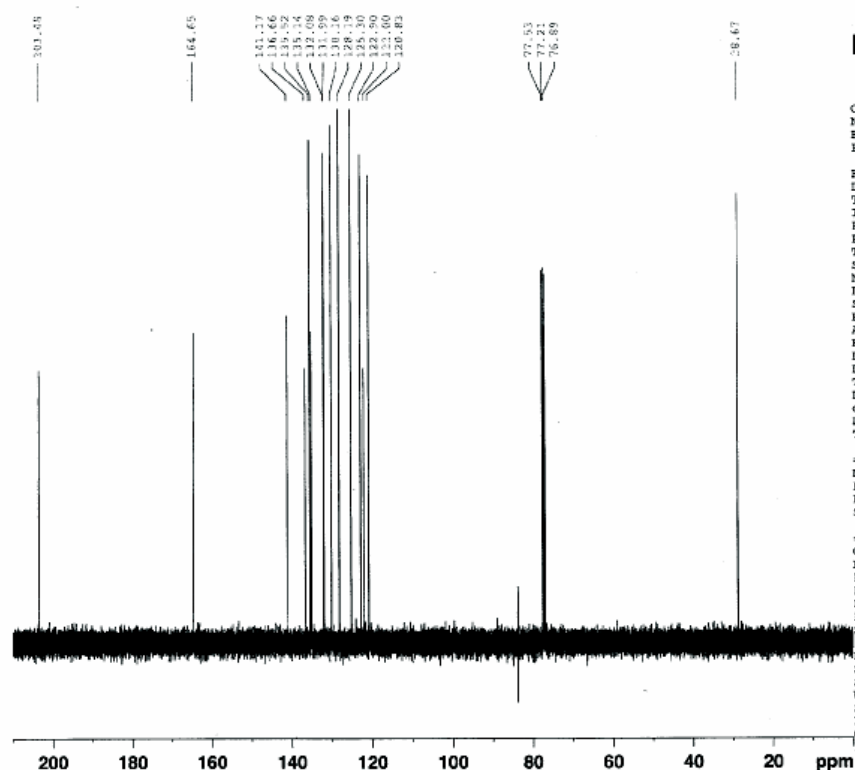


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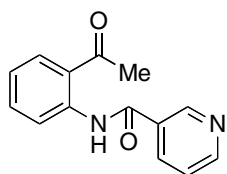


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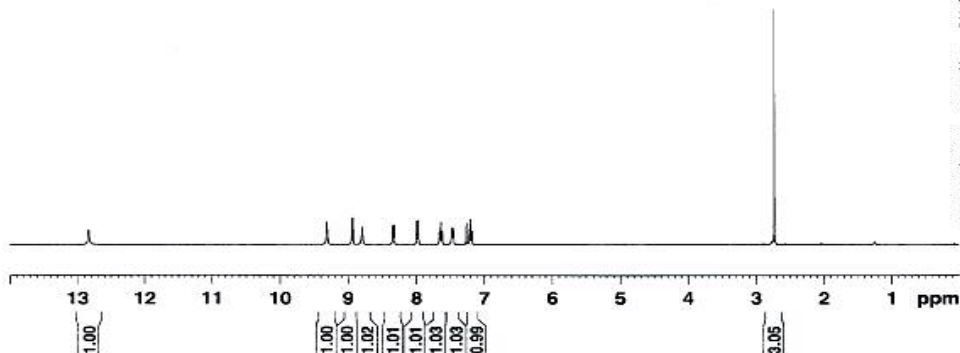
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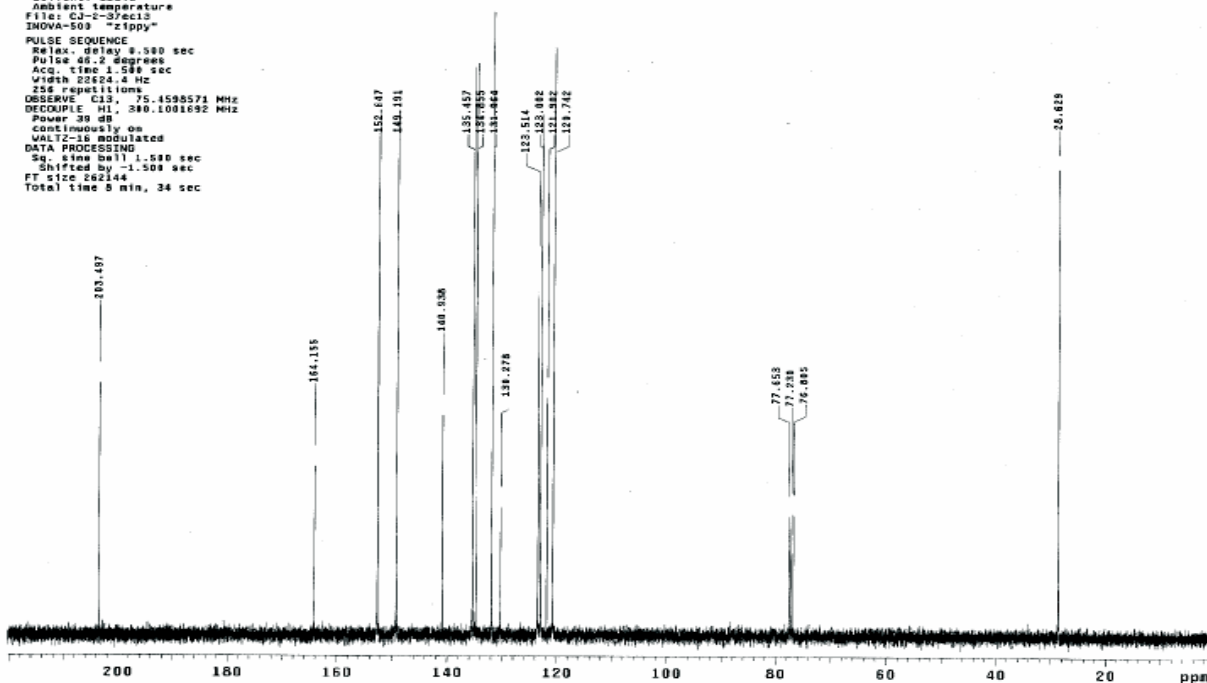
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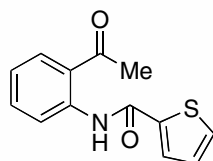


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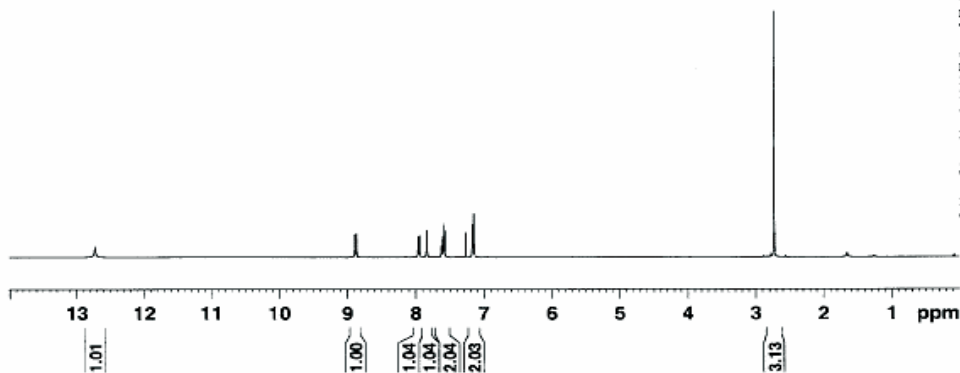
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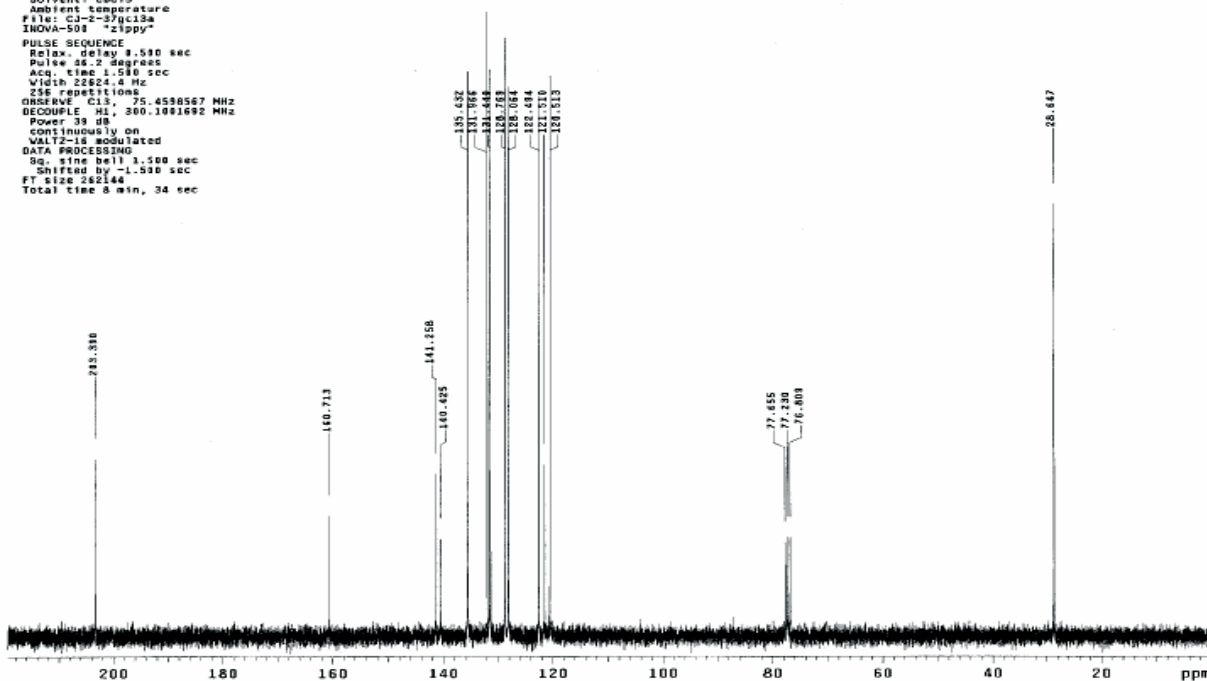
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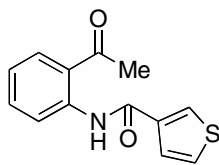
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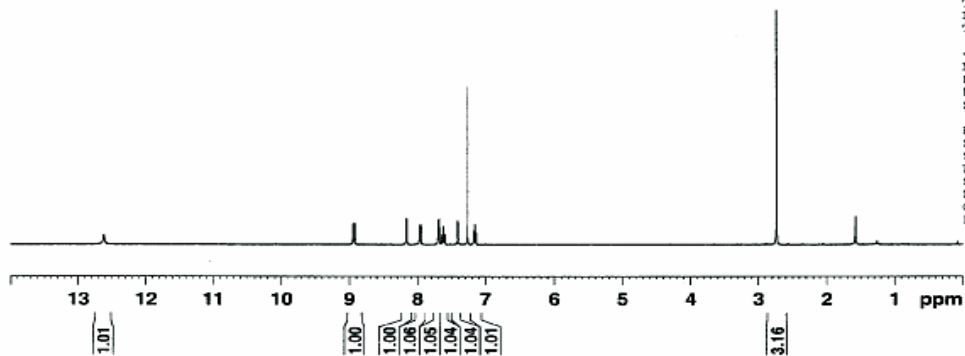


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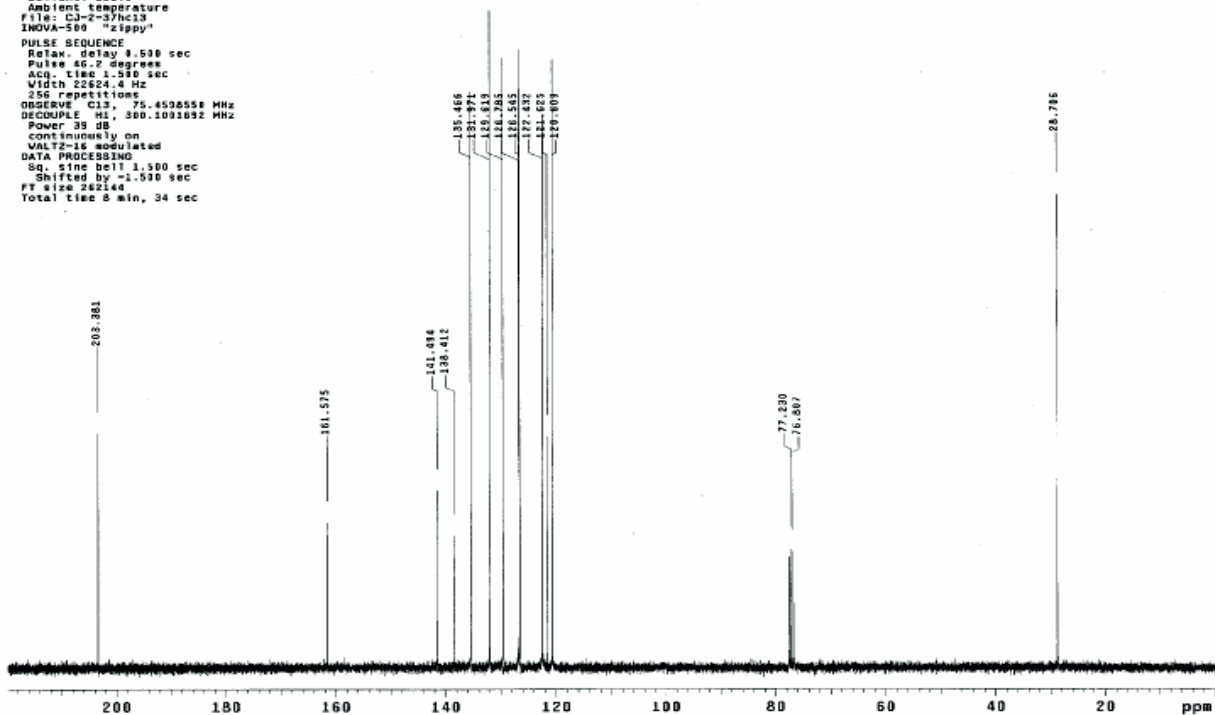
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DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

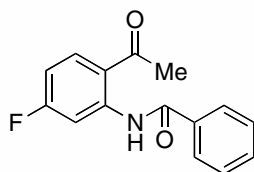
----- CHANNEL f1 -----
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300074 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

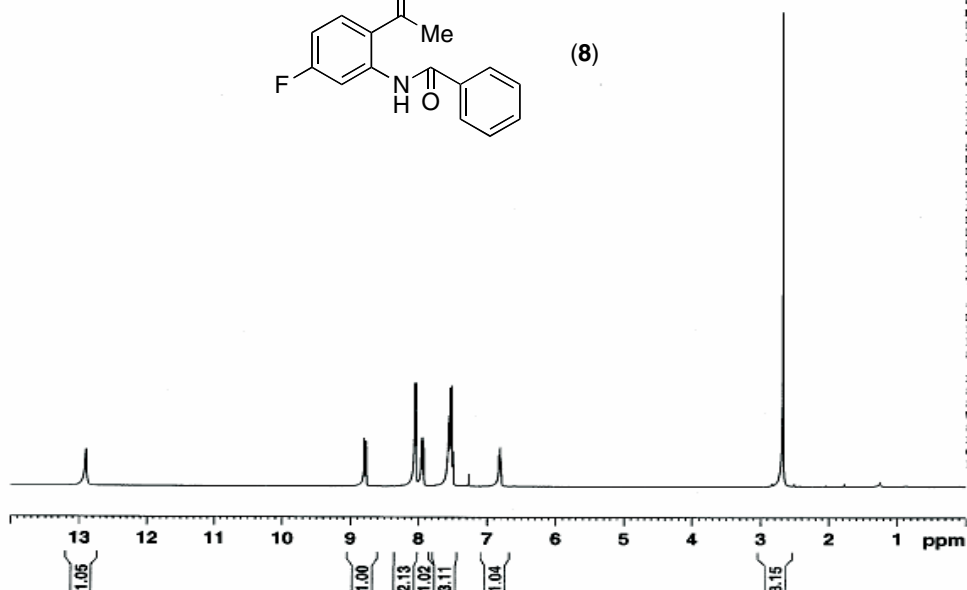


CJ-2-37h
Pulse Sequence: s2pul
Solvent: CDCl3
Ambient temperature
File: CJ-2-37hcl3
INNOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 3.500 sec
Pulse 46.2 degrees
Acq. time 1.500 sec
Width 22624.4 Hz
256 repetitions
OBSERVE C13, 75.4526558 MHz
DECOUPLE H1, 300.1001892 MHz
Power 35 dB
continuously on
VOLTAGE-16 modulated
DATA PROCESSING
Sg. sine bell 1.500 sec
Shifted by -1.500 sec
FT size 262144
Total time 8 min, 34 sec





(8)



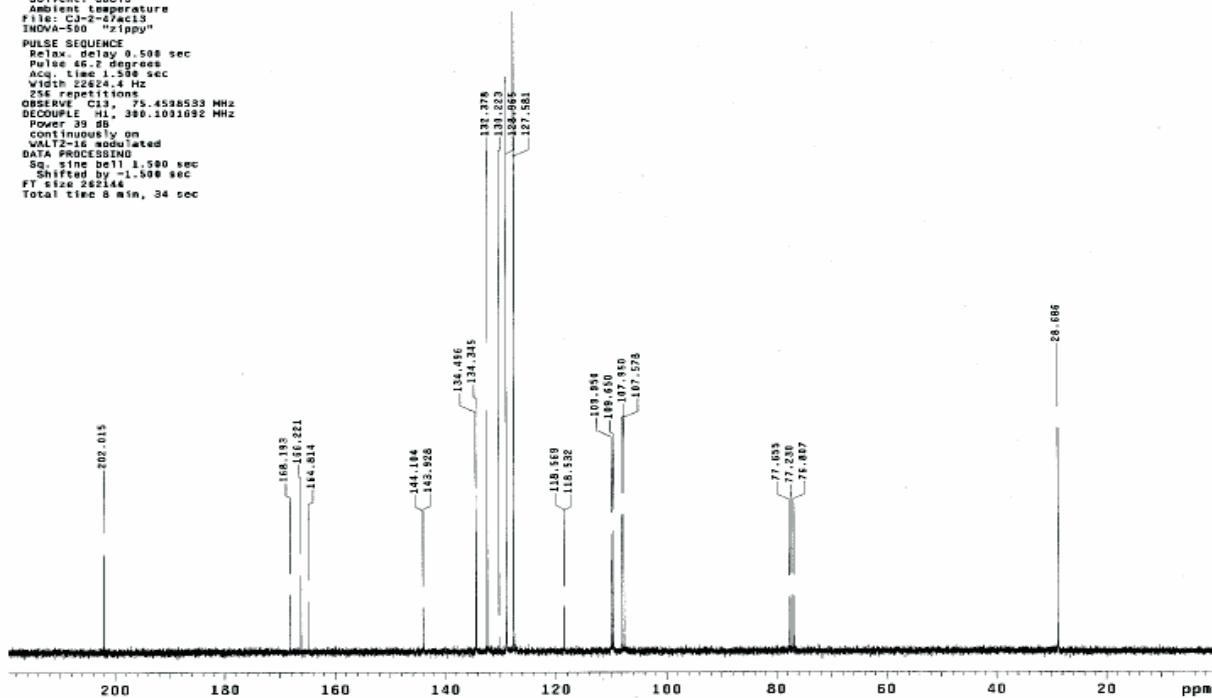
Current Data Parameters
NAME CJ-2-47a
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070122
Time 16.08
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 114
DN 60.400 usec
DE 8.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300060 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

CJ-2-47a
Pulse Sequence: s2pu1
Solvent: CDCl3
Ambient temperature
file: CJ-2-47a.c13
INOVA-500 75.19999
PULSE SEQUENCE
Relax. delay 0.500 sec
Pulse 45.2 degrees
Acq. time 1.500 sec
Width 22824.4 Hz
256 repetitions
OBSERVE C13, 75.4538533 MHz
DECOUPLE H1, 399.1031092 MHz
Power 39 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Sg, sine bell 1.500 sec
Shifted by -1.500 sec
FT size 262144
Total time 8 min, 34 sec



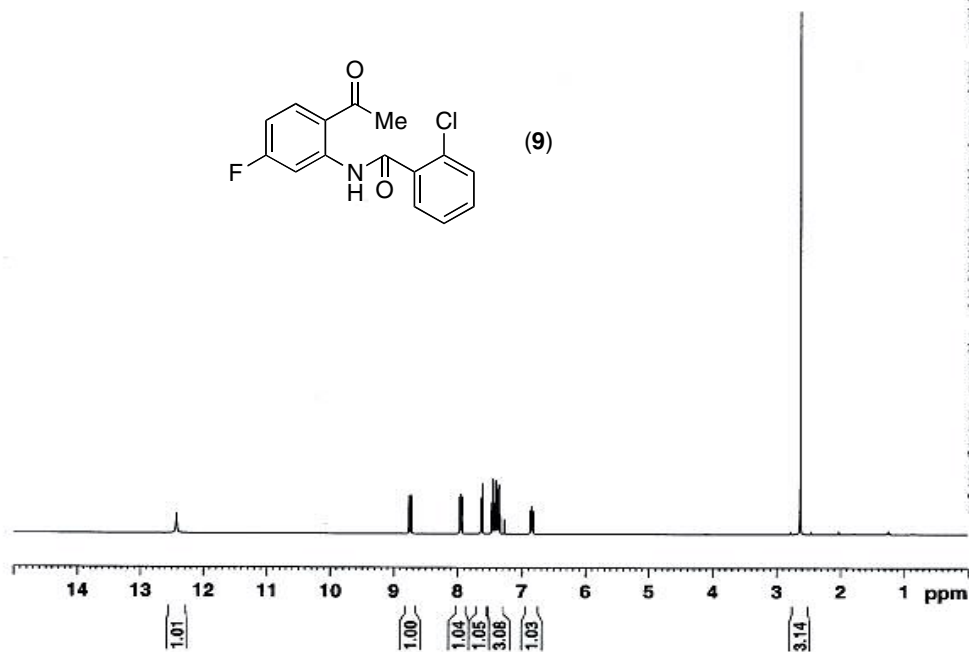
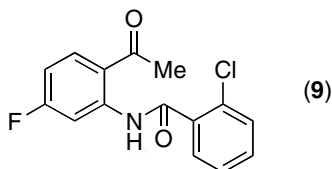


Current Data Parameters
 NAME CJ-2-55
 EXPNO 1
 PROCNO 1

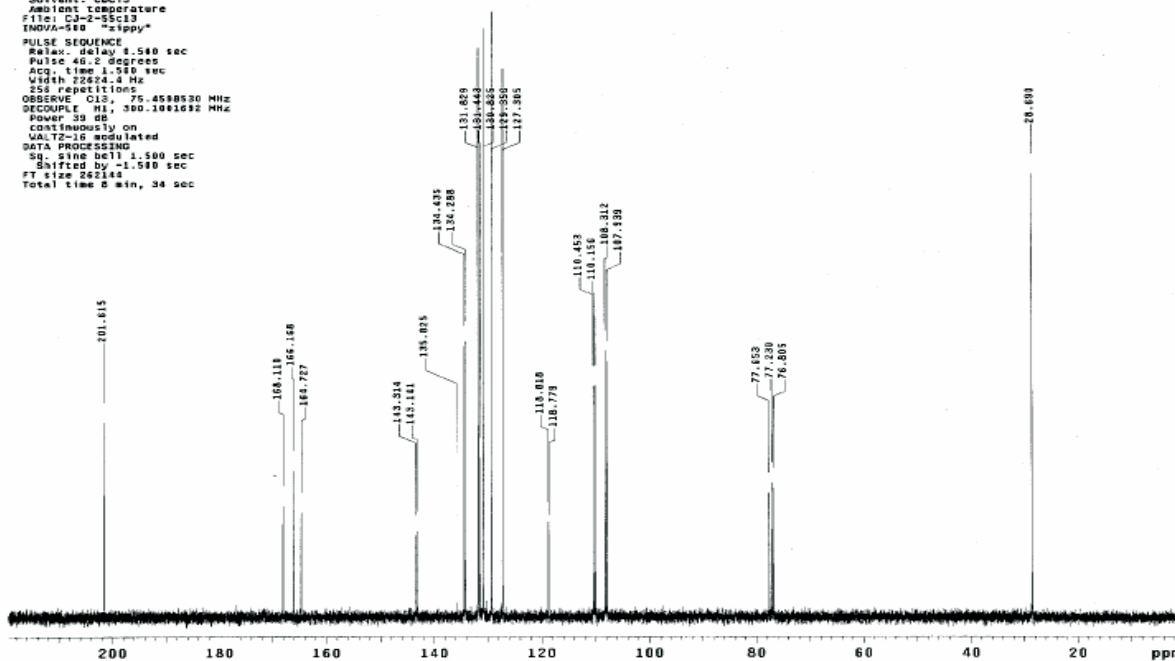
F2 - Acquisition Parameters
 Date_ 20070122
 Time 16.25
 INSTRUM spect
 PROBED 5 mm QNP 1H/13
 PULPROG zg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 8278.146 Hz
 FIDRES 0.126314 Hz
 AQ 3.9584243 sec
 RG 80.6
 DW 60.400 usec
 DE 6.00 usec
 TE 293.2 K
 D1 1.00000000 sec
 TD0 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 14.00 usec
 PL1 0.00 dB
 SFO1 400.1324710 MHz

F2 - Processing parameters
 SI 65536
 SF 400.1300555 MHz
 WDW no
 SSB 0
 LB 0.00 Hz
 GB 0
 PC 1.00



CJ-2-55
 Pulse Sequence: szpul
 Solvent: CDCl3
 Ambient Temperature
 File: CJ-2-55c13
 INDV=sta "stppy"
 PULSE SEQUENCE
 Relax. delay 1.500 sec
 Pulse 40.2 degrees
 Acq. time 1.500 sec
 Width 22824.4 Hz
 255 repetitions
 OBSERVE C13, 75.4580530 MHz
 DECOUPLE H1, 500.1361632 MHz
 Power 39 dB
 CONTINUOUSLY ON
 WALTZ-16 modulated
 DATA PROCESSING
 Sg. sine bell 1.500 sec
 Shifted by -1.500 sec
 FT time 26.1142
 Total time 8 min, 34 sec



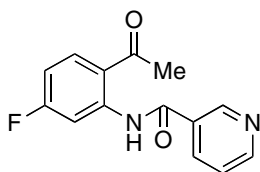


Current Data Parameters
NAME CJ-2-47c
EXPNO 1
PROCNO 1

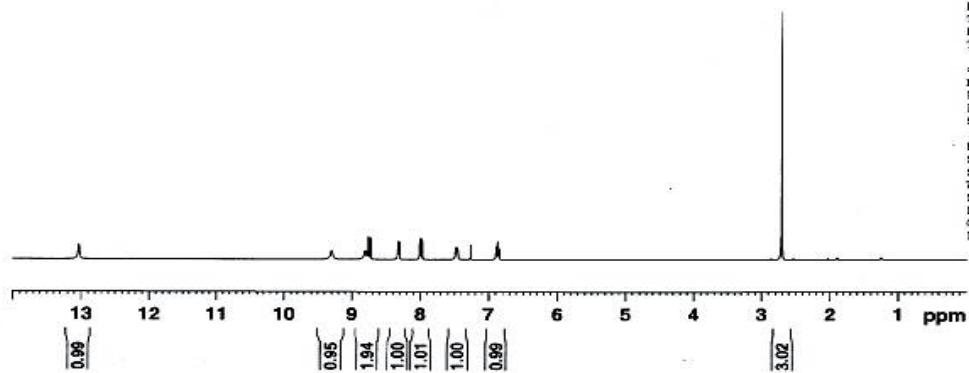
F2 - Acquisition Parameters
Date_ 20070115
Time 20.32
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 456.1
DW 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

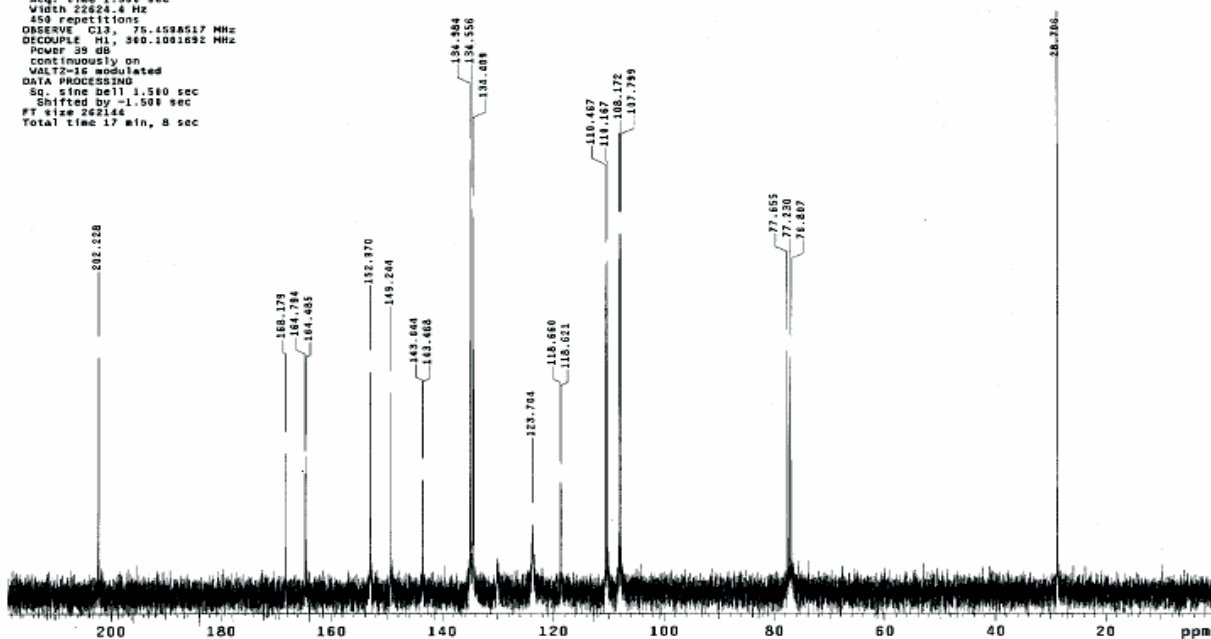
F2 - Processing parameters
SI 65536
SF 400.1300067 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

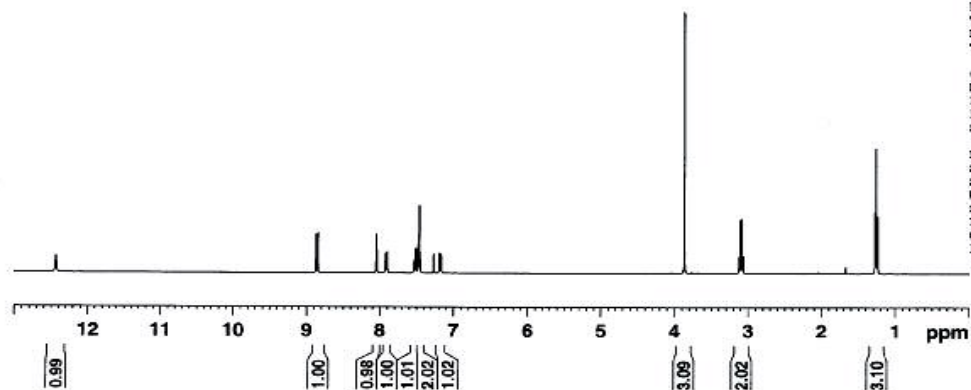
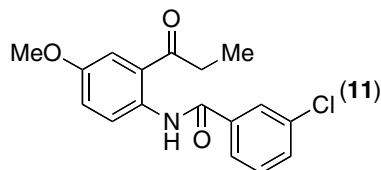


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CJ-2-47c
Pulse Sequence: s2pul
Solvent: CDCl3
Ambient temperature
File: CJ-2-47cc13a
EMVA-500 "sippy"
PULSE SEQUENCE
Relax. delay 0.500 sec
Pulse 46.2 degrees
Acq. time 1.500 sec
Width 22624.6 Hz
450 repetitions
OBSERVE C13, 75.459A517 MHz
DECOUPLE H1, 360.1001692 MHz
Power 39 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Sg. sine bell 1.560 sec
Shifted by -1.500 sec
FT size 262144
Total time 17 min, 8 sec





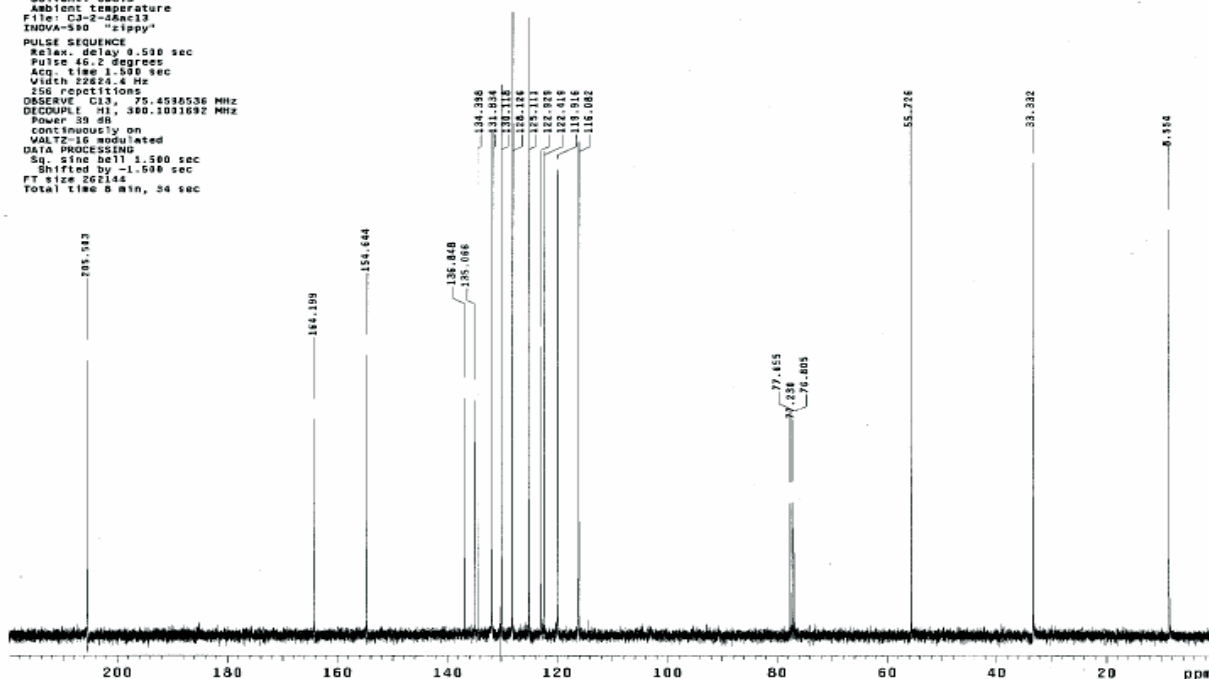
Current Data Parameters
NAME CJ-2-48a
EXPNO 1
PROCNO 1

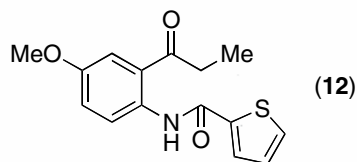
F2 - Acquisition Parameters
Date_ 20070115
Time 20.42
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 362
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.0000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.130053 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

CJ-2-48a
Pulse Sequence: zgpg30
Solvent: CDCl3
Ambient temperature
File: CJ-2-48a13
INNOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 0.500 sec
Pulse 45.2 degrees
Acq. time 1.500 sec
VidHz 22825.4 Hz
256 repetitions
OBSERVE C13, 75.4536536 MHz
DECOUPLE H1, 300.1081692 MHz
Power 39 dB
CONTINUOUSLY ON
VOLTAGE 16 modulated
DATA PROCESSING
Sg. sine bell 1.500 sec
Shifted by -1.500 sec
FT size 262144
Total time 9 min, 34 sec



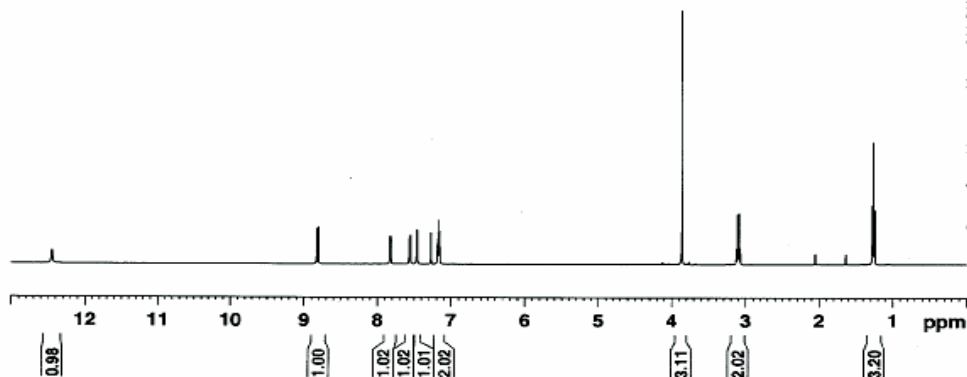


Current Data Parameters
NAME CJ-2-48b
EXPNO 1
PROCNO 1

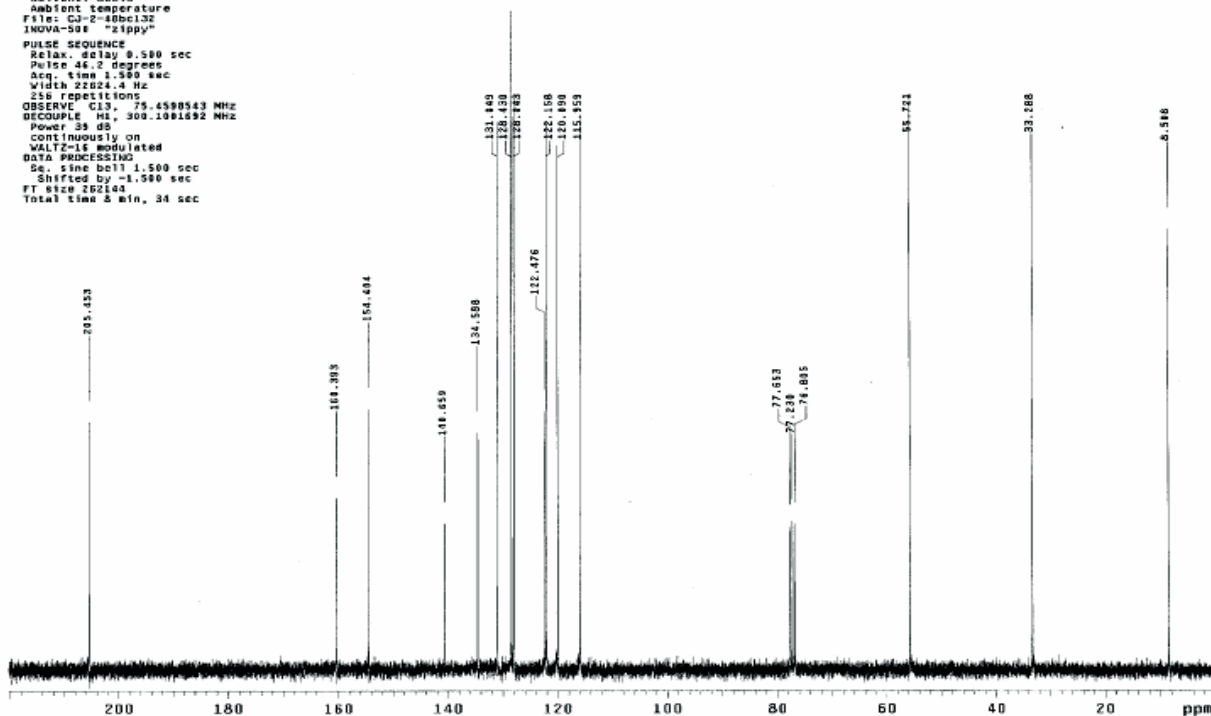
F2 - Acquisition Parameters
Date_ 20070115
Time 20.22
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 456.1
DN 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

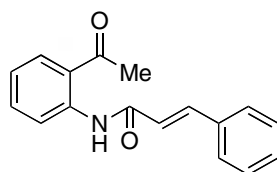
===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.130055 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

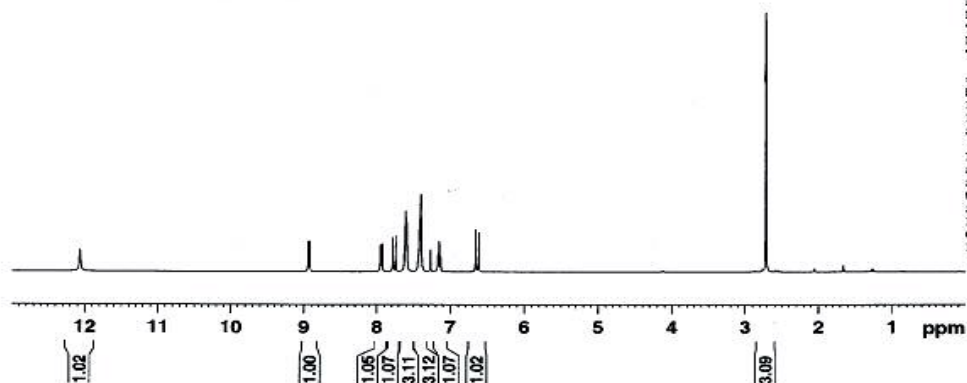


CJ-2-48b
Pulse Sequence: s2pul
Solvent: CDCl3
Ambient temperature
File: CJ-2-48bcl32
INOVA-Sat "slippy"
PULSE SEQUENCE
Relax. delay 0.500 sec
Pulse 46.2 degrees
Acq. time 1.500 sec
Width 22024.4 Hz
256 repetitions
OBSERVE C13, 75.4590543 MHz
DECOUPLE H1, 300.1081692 MHz
Power 38 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Se. time bet 1.500 sec
Shifted by -1.500 sec
FT size 1024
Total time & min, 34 sec





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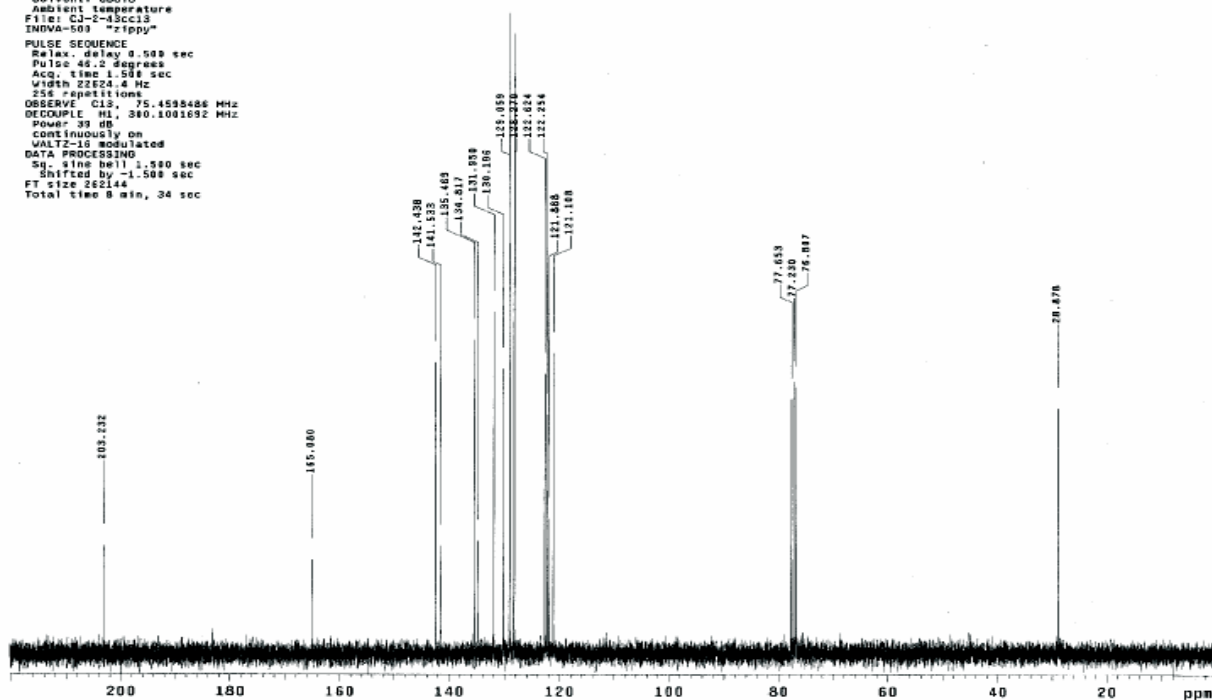
Current Data Parameters
NAME CJ-2-43c
EXPNO 1
PROCNO 1

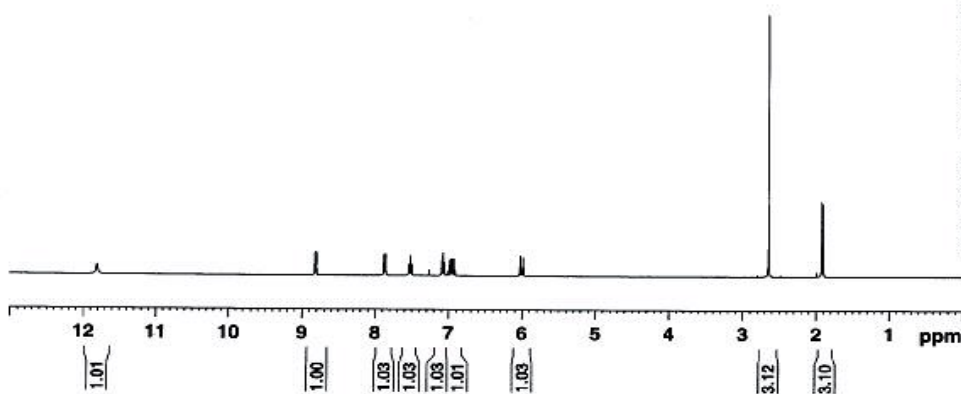
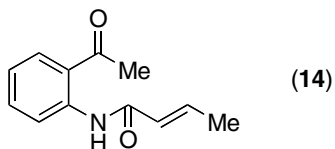
F2 - Acquisition Parameters
Date_ 20070115
Time 20.37
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 406.4
RW 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300061 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

CJ-2-13c
Pulse Sequence: s2pu1
Solvent: CDCl3
Ambient temperature
File: CJ-2-13c13
INDVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 9.500 sec
Pulse 46.2 degrees
Acq. time 1.500 sec
Width 22824.4 Hz
256 repetitions
OBSERVE C13, 75.4533406 MHz
DECOUPLE H1, 390.1001692 MHz
Power 39 dB
Continuously on
WALTZ-16 modulated
DATA PROCESSING
Sg. sine bell 1.500 sec
Shifted by -1.500 sec
FT size 262144
Total time 8 min, 34 sec





Current Data Parameters
NAME CJ-2-148c
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070529
Time 16.33
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 80.6
RW 60.400 usec
DE 6.00 usec
TE 294.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300069 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

13C OBSERVE

Pulse Sequence: szpul

Solvent: CDCl3

Ambient temperature

File: CJ-2-148c13

INDVA-500 "zippy"

PULSE SEQUENCE

Relax. delay 8.500 sec

Pulse 40.5 degrees

Acq. time 1.500 sec

Width 22821.8 Hz

157 repetitions

OBSERVE C13, 75.4638538 MHz

DECOUPLE H1, 300.1081692 MHz

Power 35 dB

continuously on

VALTZ-16 modulated

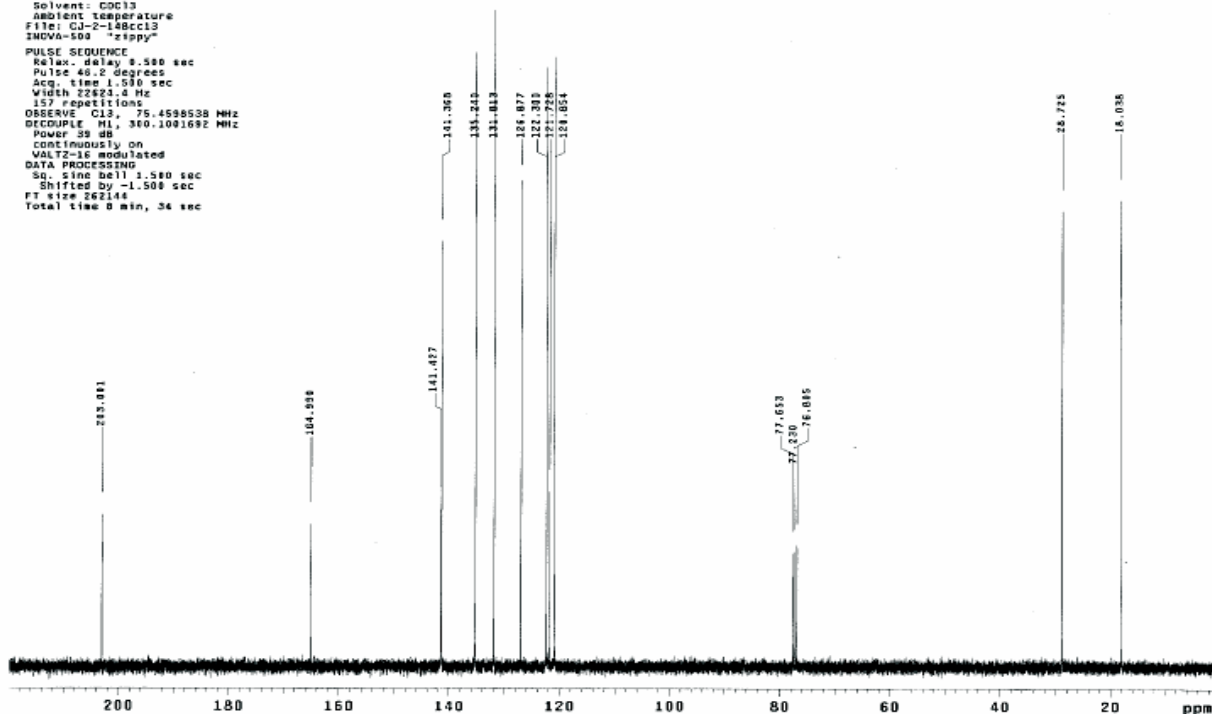
DATA PROCESSING

Sq. sine bell 1.500 sec

Shifted by -1.508 sec

FT size 262144

Total time 8 min, 36 sec



CJ-2-59

Pulse Sequence: szpul

Solvent: CDCl₃

Ambient temperature

File: CJ-2-59

INNOVA-500 "zippy"

PULSE SEQUENCE

Relax. delay 9.050 sec

Pulse 30.0 degrees

Acq. time 4.003 sec

Width 6082.4 Hz

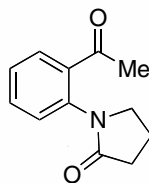
16 repetitions

OBSERVE H1, 300.1065361 MHz

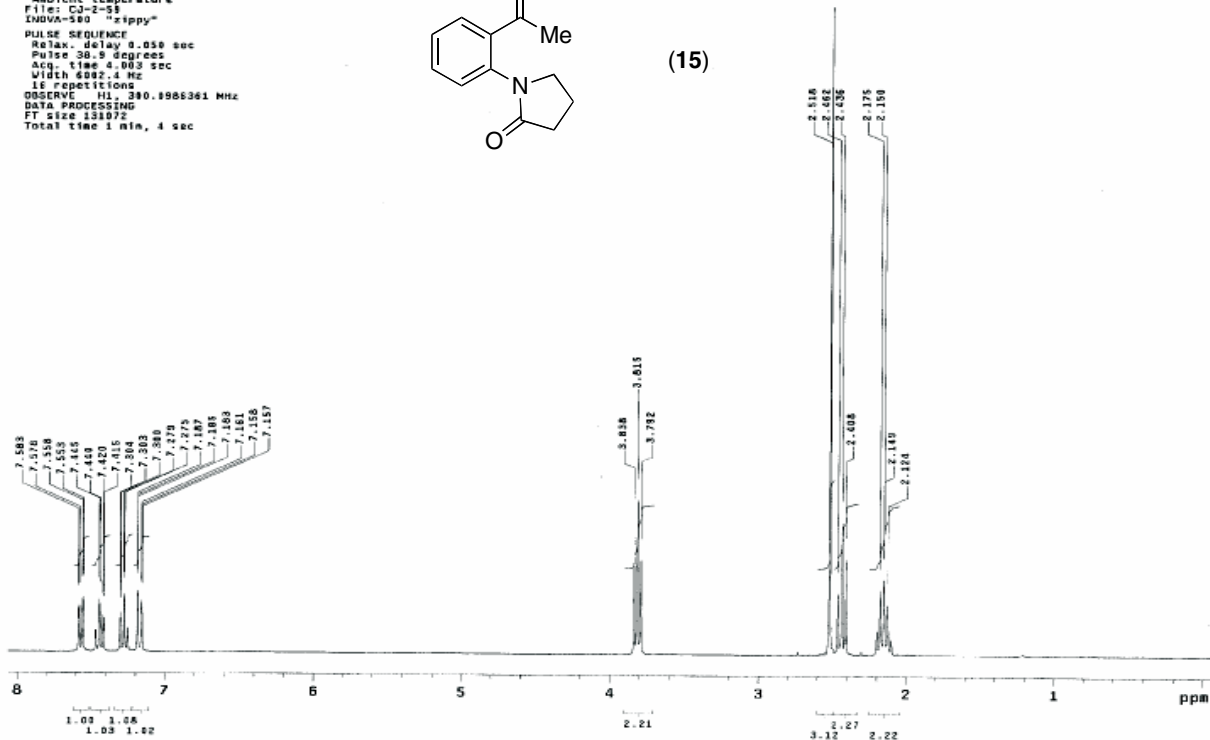
DATA PROCESSING

FT size 131072

Total time 1 min, 4 sec



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CJ-2-59

Pulse Sequence: szpul

Solvent: CDCl₃

Ambient temperature

File: CJ-2-59c13

INNOVA-500 "zippy"

PULSE SEQUENCE

Relax. delay 3.500 sec

Pulse 40.2 degrees

Acq. time 1.536 sec

Width 22624.4 Hz

358 repetitions

OBSERVE C13, 75.4598500 MHz

DECOUPLE H1, 300.1061692 MHz

Power 39 dB

continuously on

WALTZ-16 modulated

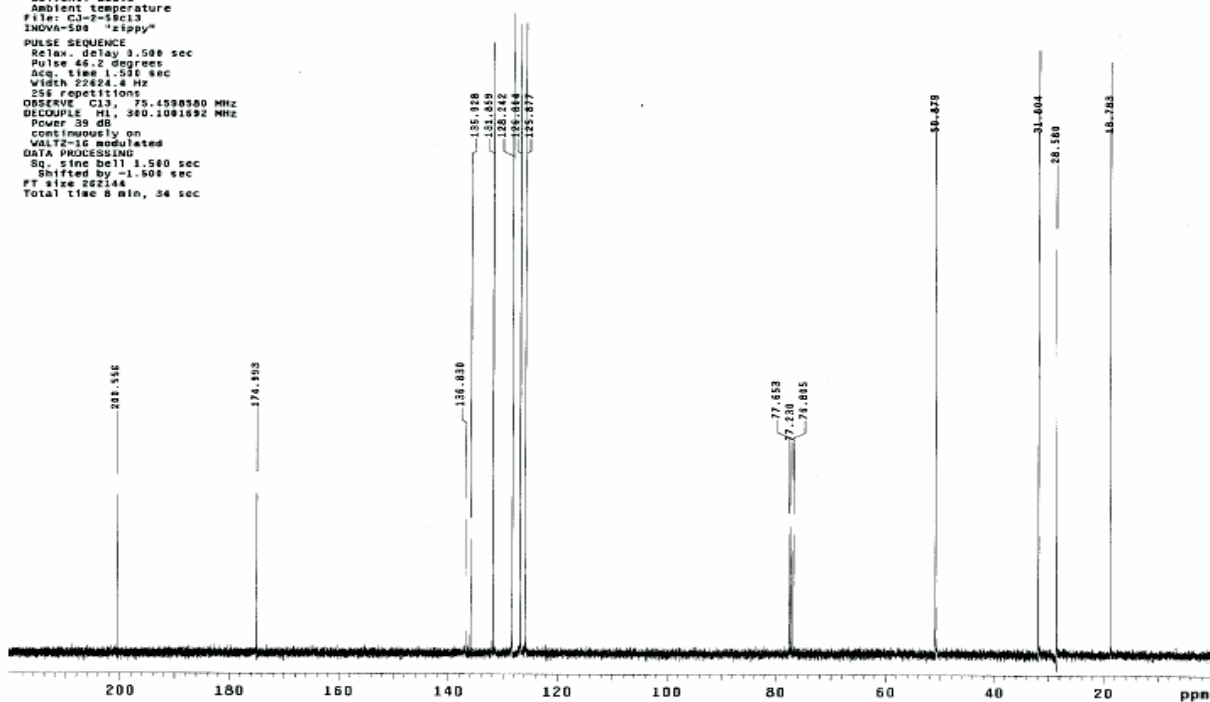
DATA PROCESSING

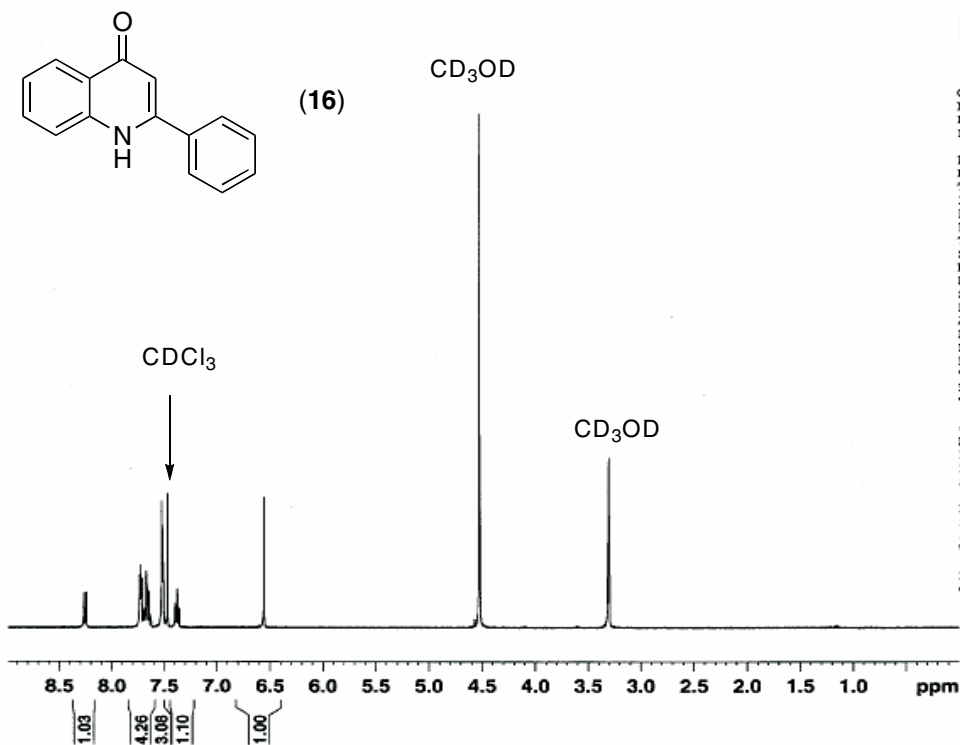
Sq. sine bell 1.500 sec

Shifted by -1.500 sec

FT size 522144

Total time 8 min, 34 sec

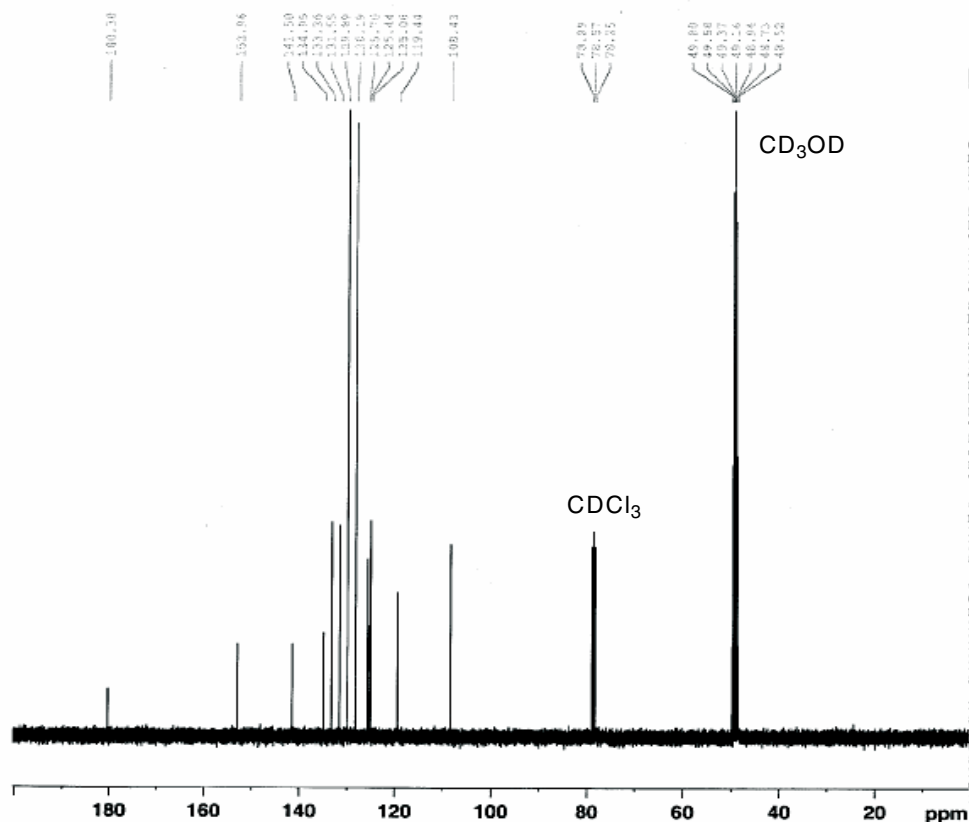




Current Data Parameters
NAME CJ-2-20
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20061201
Time 11.05
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT CDCl₃
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 228.1
DW 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz
F2 - Processing parameters
SI 65536
SF 400.1311021 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



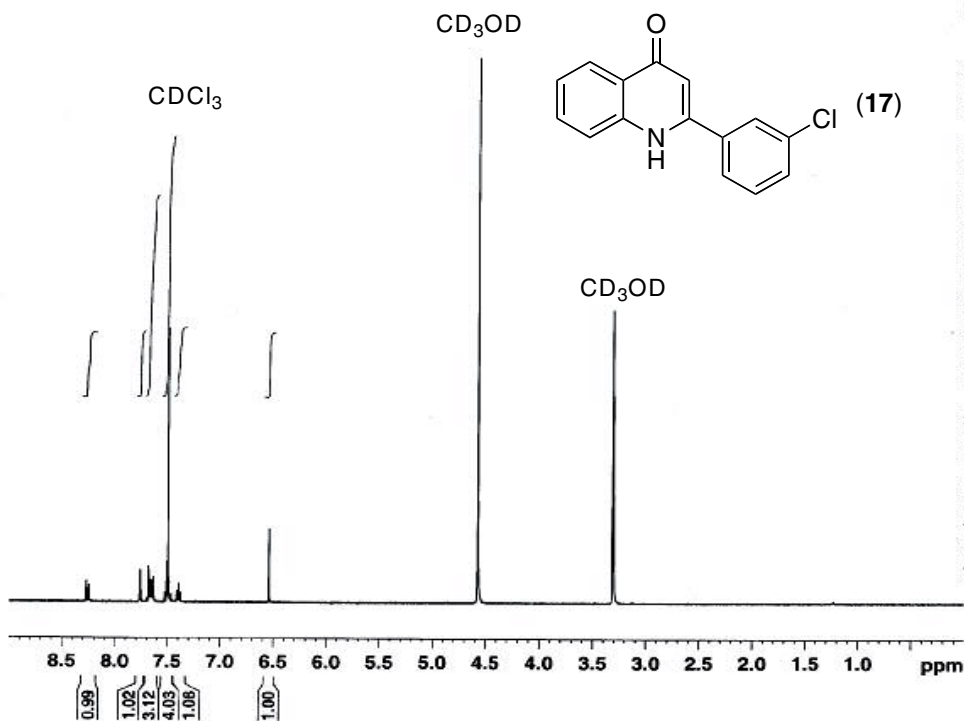
Current Data Parameters
NAME CJ-2-20cd3meod
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070316
Time 12.28
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT MeOD
NS 1597
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3684756 sec
RG 8152
DW 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6126744 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40



Current Data Parameters
NAME CJ-2-19
EXPNO 1
PROCNO 1

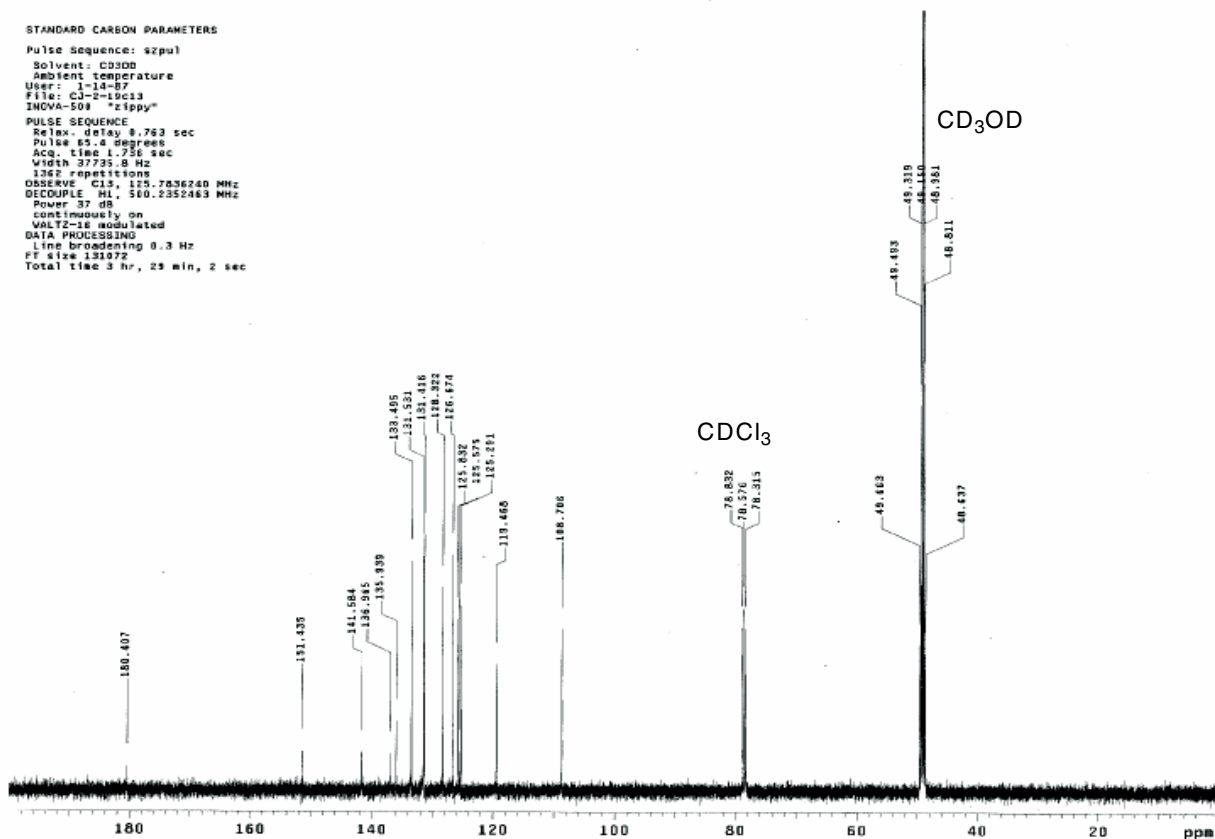
F2 - Acquisition Parameters
Date_ 20061130
Time 10.30
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 645.1
DW 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

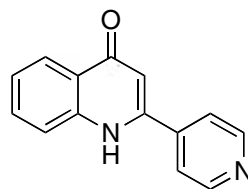
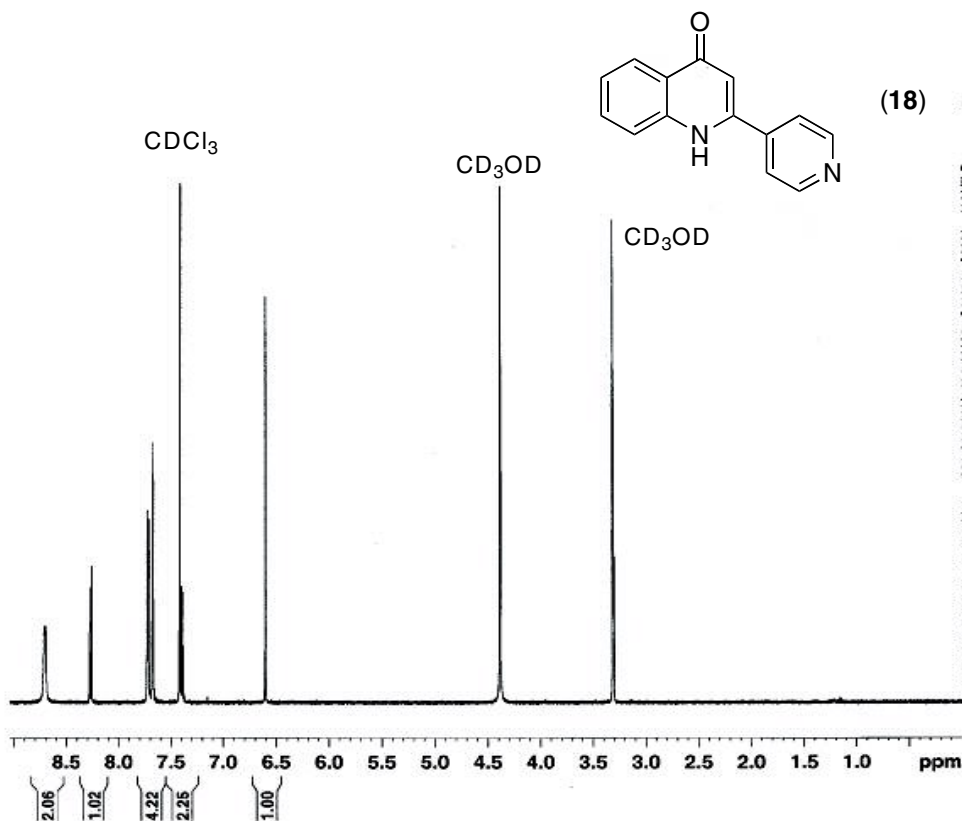
===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300083 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

STANDARD CARBON PARAMETERS

Pulse Sequence: szpul
Solvent: CD3OD
Ambient temperature
User: 1-10-87
File: CJ-2-19c13
INNOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 8.763 sec
Pulse 65.0 degree
Acq. time 1.756 sec
Width 37735.8 Hz
1362 repetitions
OBSERVE C13, 125.7836240 MHz
DECOUPLE H1, 500.2352463 MHz
Power 37 dB
continuously on
VOLTAGE-16 modulated
DATA PROCESSING
Line broadening 0.3 Hz
FT size 131072
Total time 3 hr, 23 min, 2 sec





Current Data Parameters
NAME CJ-1-297
EXPNO 1
PROCNO 1

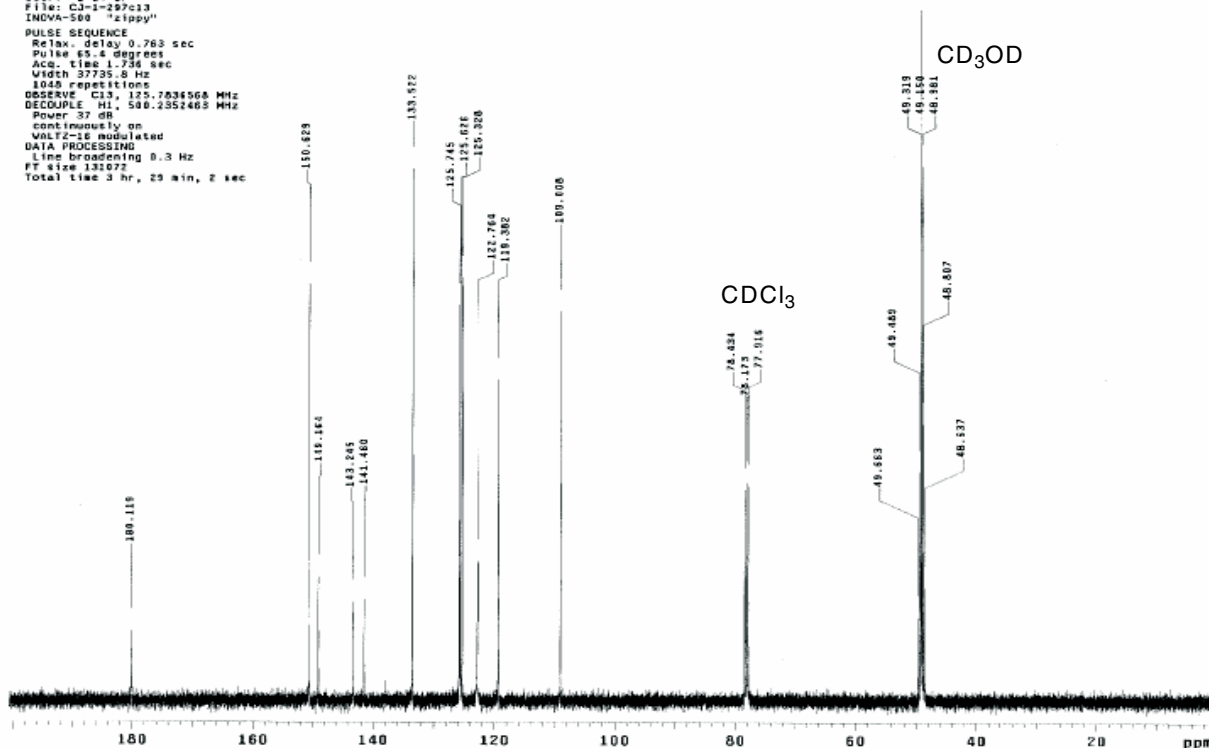
F2 - Acquisition Parameters
Date_ 20061115
Time 11.17
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 362
LW 60.400 usec
DE 6.00 usec
TE 292.2 K
D1 1.0000000 sec
TDO 1

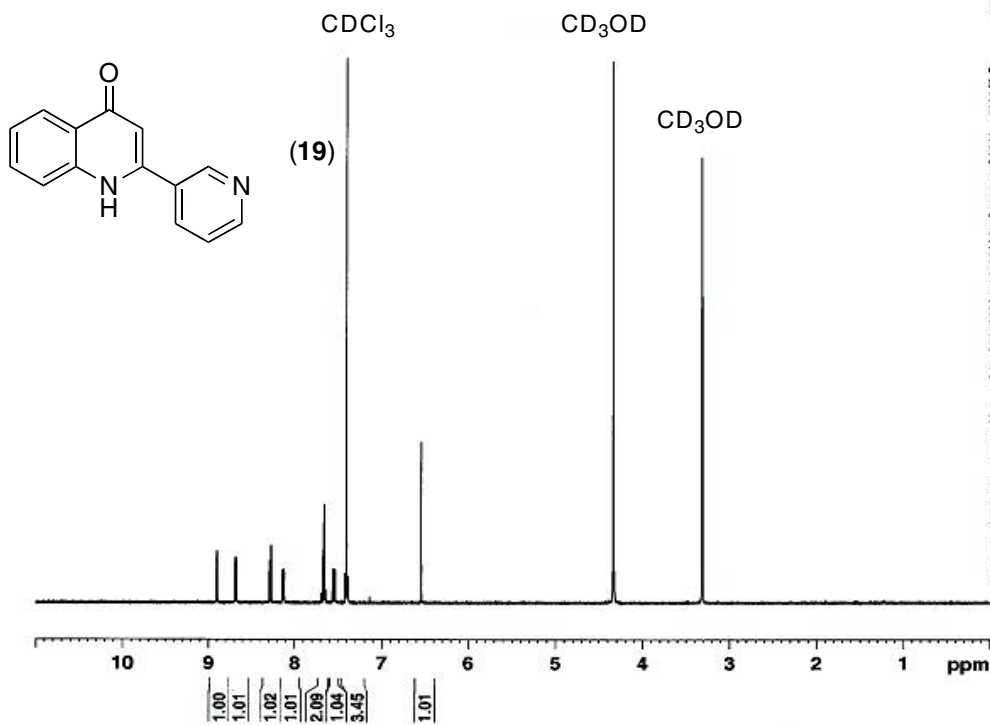
===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300068 MHz
WDW NO
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

STANDARD CARBON PARAMETERS

Pulse Sequence: szpul
Solvent: CD3OD
Acoustic temperature
User: 1-12-87
File: CJ-1-297c13
INOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 0.763 sec
Pulse 65.4 degrees
Acq. time 1.736 sec
Width 37735.8 Hz
1024 repetitions
OBSERVE C13, 125.7635568 MHz
DECOUPLE H1, 500.2352463 MHz
Power 37 dB
continuously on
VOLTAGE-16 modulated
DATA PROCESSING
Line broadening 0.3 Hz
FT size 131072
Total time 3 hr, 29 min, 2 sec





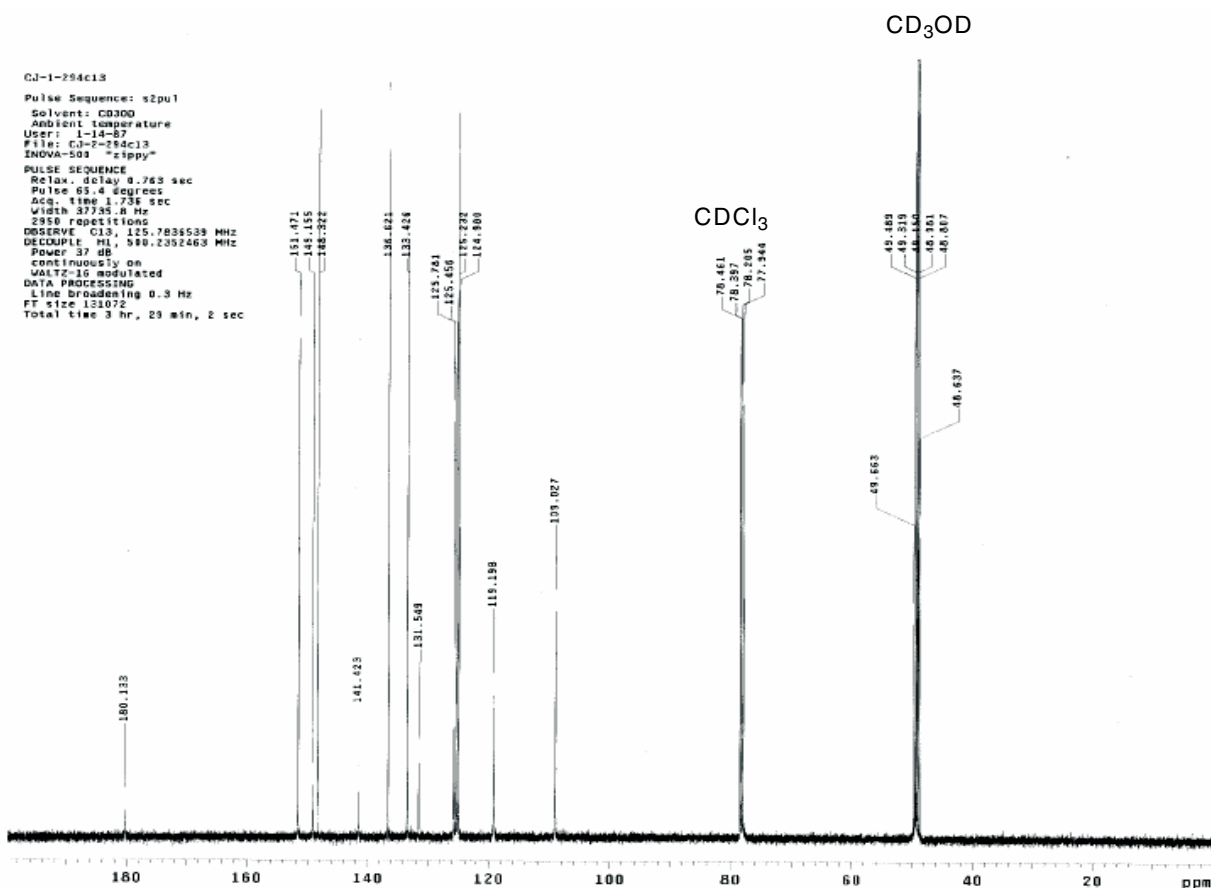
Current Data Parameters
NAME CJ-1-294
EXPNO 1
PROCNO 1

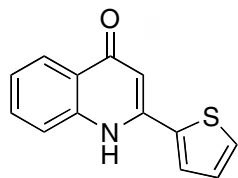
F2 - Acquisition Parameters
Date_ 20061110
Time 12.13
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 322.5
DW 60.400 usec
DE 6.00 usec
TE 292.2 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300087 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

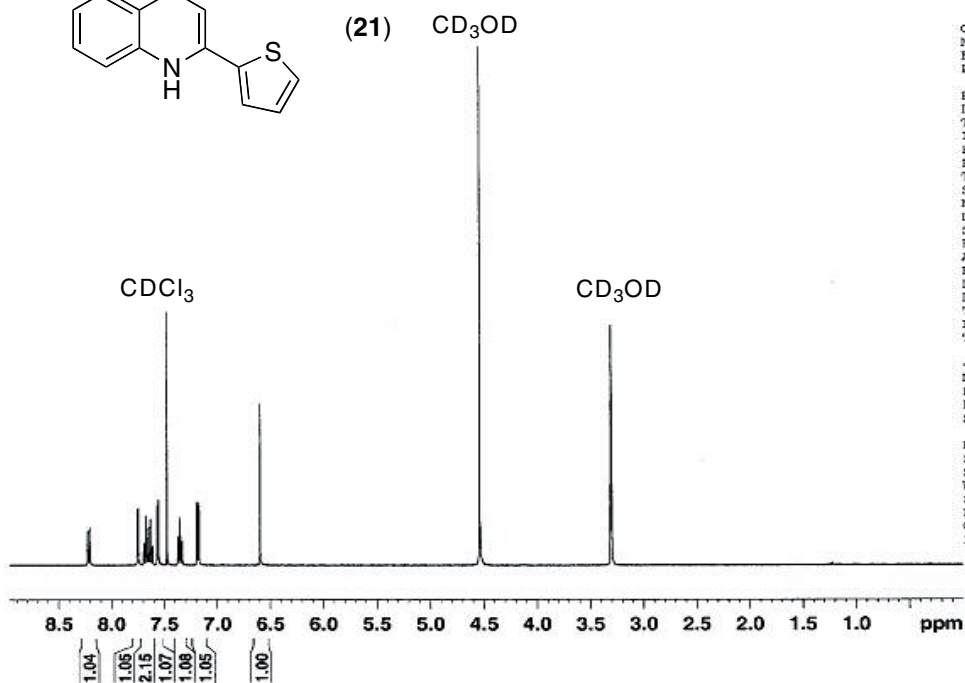
CJ-1-294C13
Pulse Sequence: s2pul
Solvent: CD3OD
Ambient temperature
User: 1-14-87
File: CJ-1-294C13
INNOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 0.763 sec
Pulse 65.4 degrees
Acq. time 1.735 sec
Width 3735.8 Hz
3850 repetitions
OBSERVE C13, 125.7835539 MHz
DECOUPLE H1, 500.2352463 MHz
Power 37 dB
continuously on
VOLTZ-10 modulated
DATA PROCESSING
Line broadening 0.3 Hz
FT size 131072
Total time 3 hr, 29 min, 2 sec





(21)

CD₃OD



Current Data Parameters
NAME CJ-2-13-2
EXPNO 1
PROCNO 1

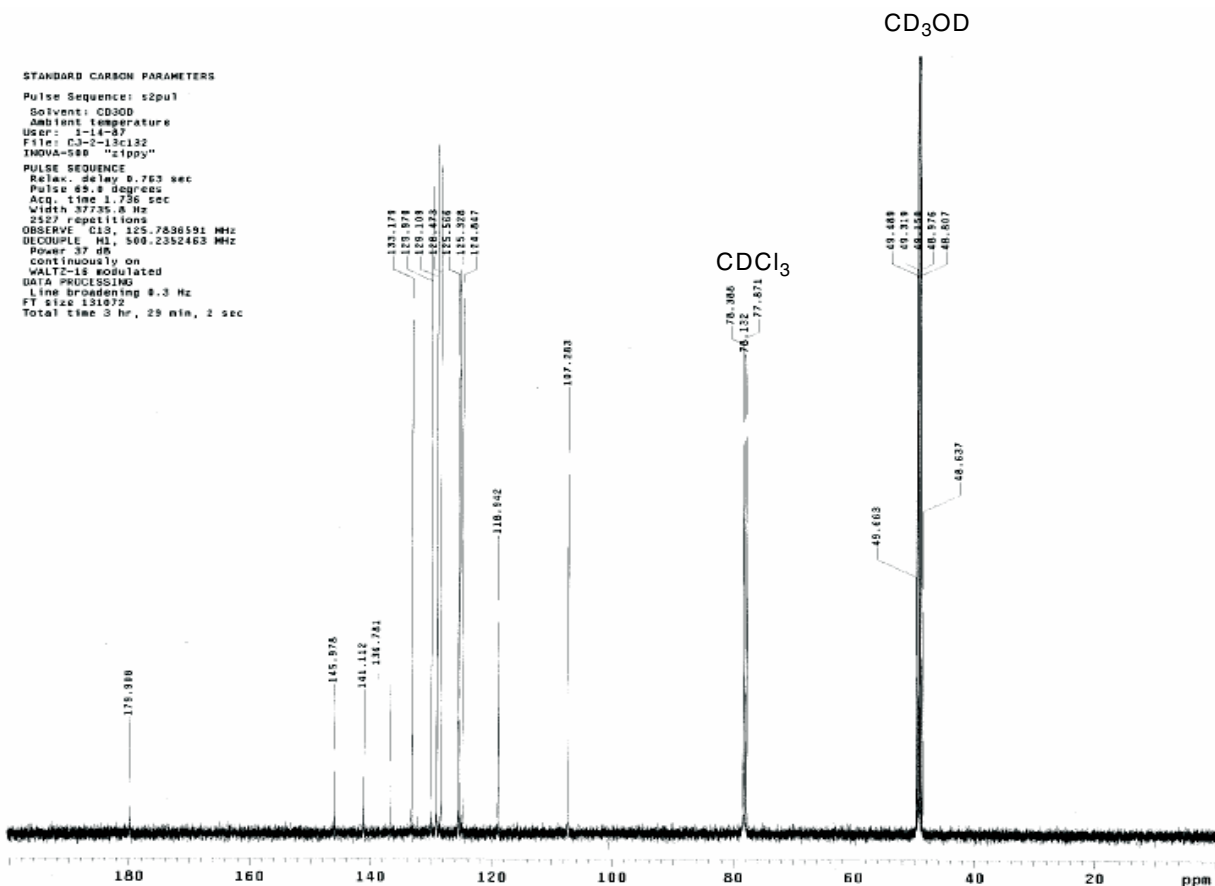
F2 - Acquisition Parameters
Date_ 20061202
Time 14.31
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 6278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 456.1
DW 60.400 usec
DE 6.00 usec
TE 293.2 K
DL 1.00000000 sec
TDO 1

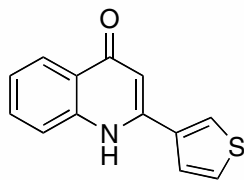
----- CHANNEL f1 -----
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300093 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

STANDARD CARBON PARAMETERS

Pulse Sequence: s2pu1
Solvent: CD3OD
Ambient temperature
User: 1-14-97
File: CJ-2-13c132
INNOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 8.763 sec
Pulse 69.8 degrees
Acq. time 1.736 sec
Width 37735.8 Hz
2527 repetitions
OBSERVE C13, 125.7636591 MHz
DECOUPLE H1, 500.2352463 MHz
Power 37 dB
continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 8.3 Hz
FT size 131072
Total time 3 hr, 29 min, 2 sec





(22)

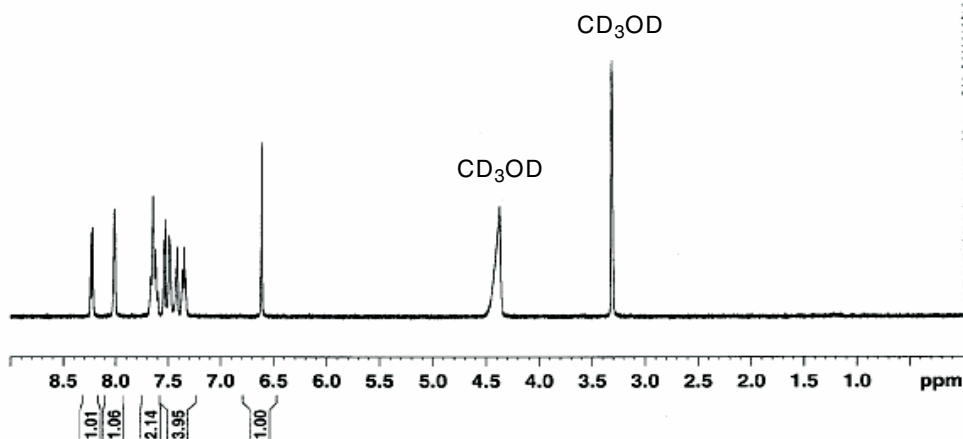


Current Data Parameters
NAME CJ-1-293
EXPNO 1
PROCNO 1

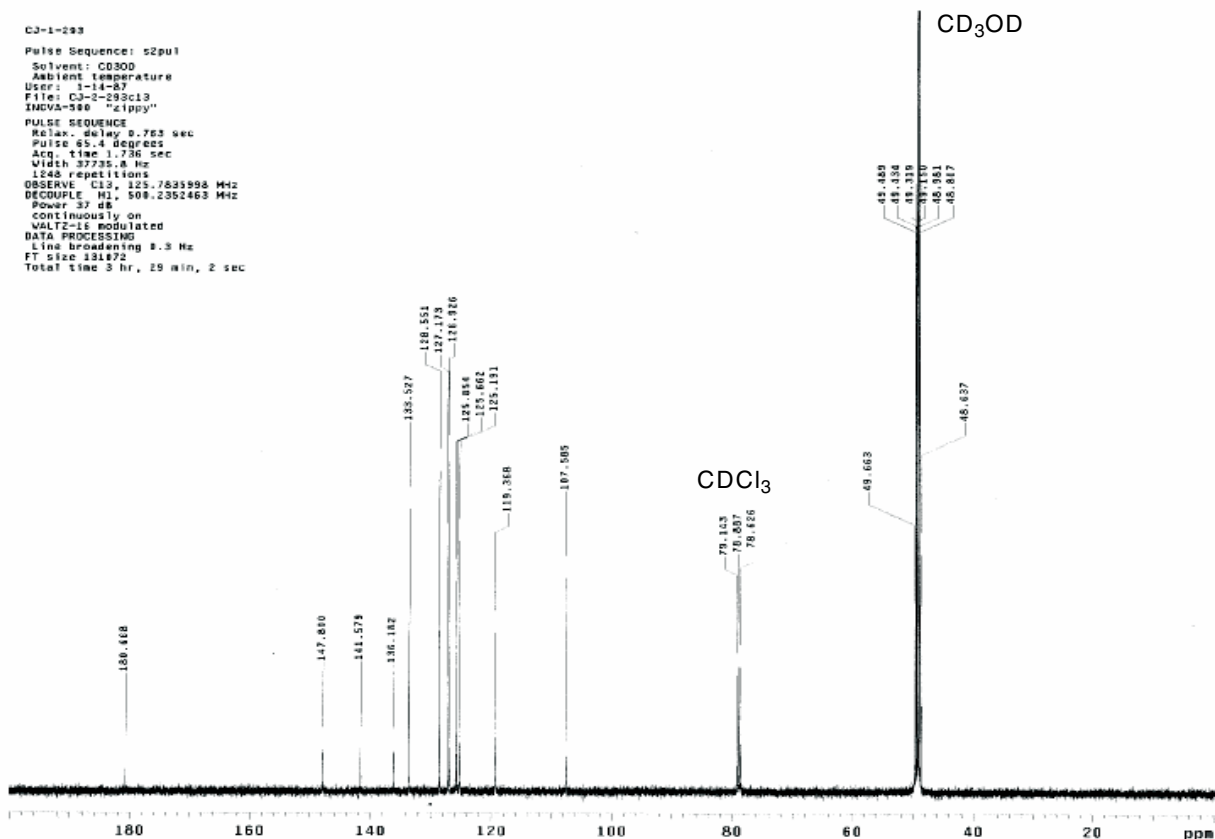
F2 - Acquisition Parameters
Date_ 20061115
Time 11.04
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 1.9594243 sec
RG 57
DM 60.400 usec
DE 6.00 usec
TE 292.2 K
D1 1.0000000 sec
TD0 1

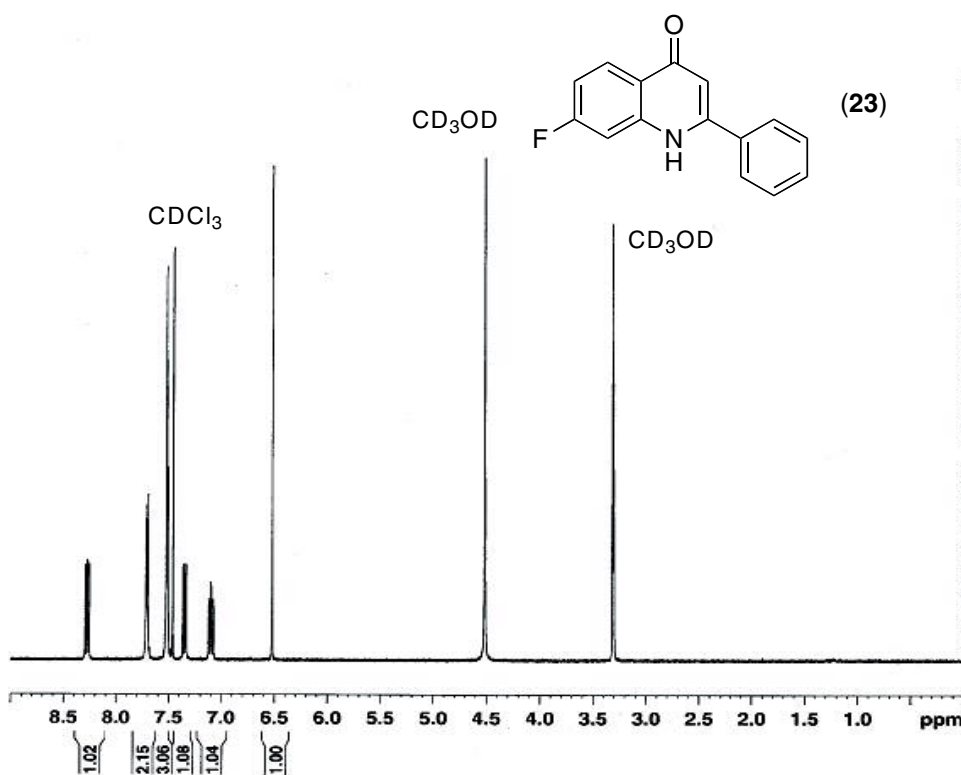
===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300093 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



CJ-1-293
Pulse Sequence: s2pul
Solvent: CD3OD
Ambient temperature
User: 1-14-87
File: CJ-2-293c13
INVOA-S98 "zippy"
PULSE SEQUENCE
Relax. delay 0.763 sec
Pulse 65.4 degrees
Acq. time 1.736 sec
Width 37735.8 Hz
1248 repetitions
OBSERVE C13, 125.7635998 MHz
DECOUPLE H1, 500.2352463 MHz
Power 37 dB
continuously on
VOLTZ-18 modulated
DATA PROCESSING
Line broadening 0.3 Hz
FT size 131872
Total time 3 hr, 29 min, 2 sec





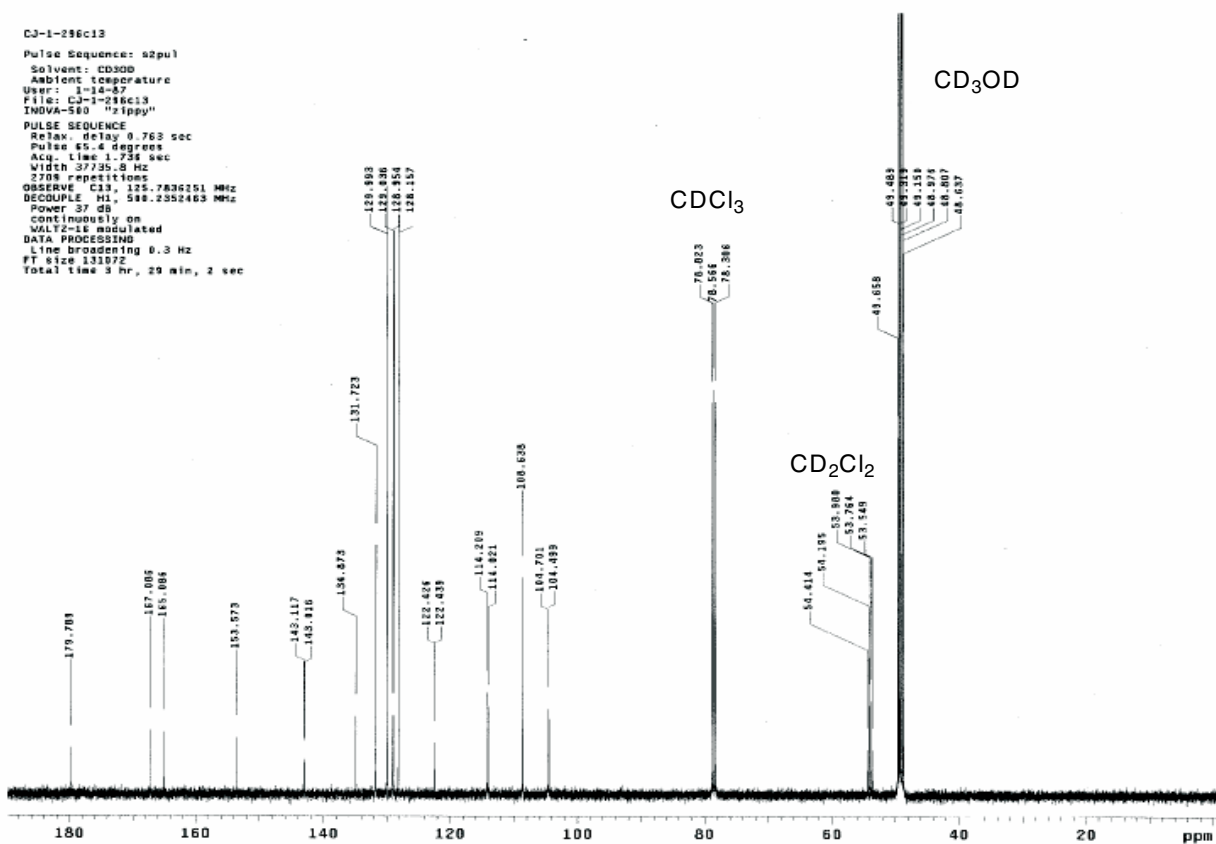
Current Data Parameters
 NAME CJ-1-296
 EXPNO 1
 PROCNO 1

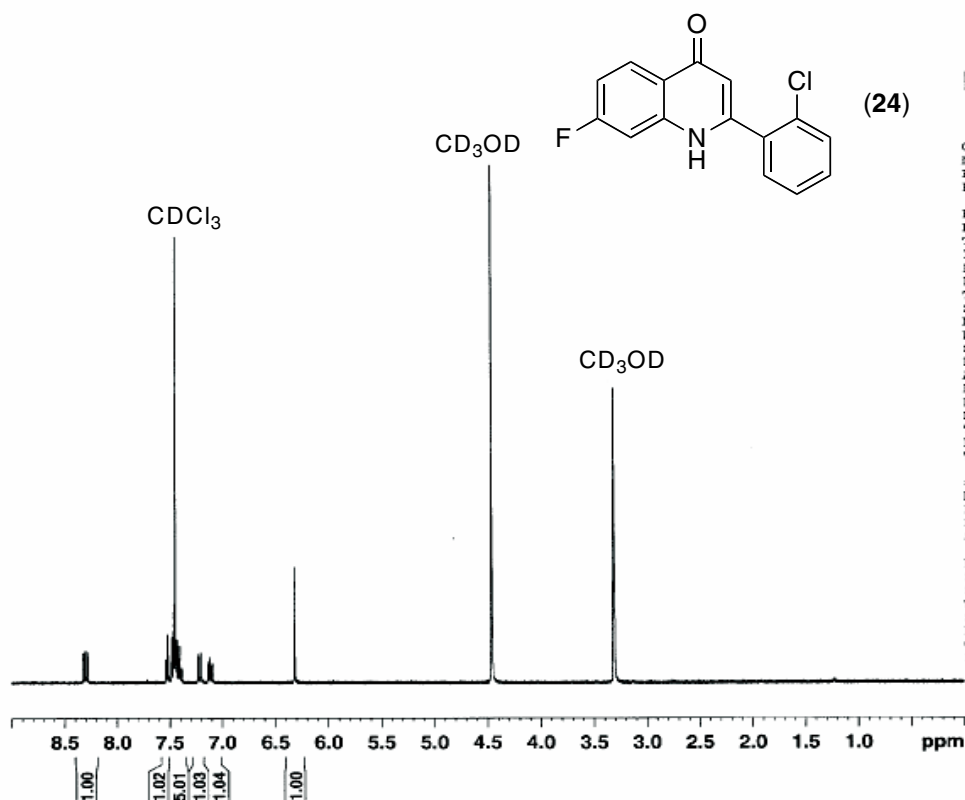
F2 - Acquisition Parameters
 Date_ 20061115
 Time 11.11
 INSTRUM spect
 PROBHD 5 mm QNP 1H/13
 PULPROG zg30
 TD 65536
 SOLVENT MeOD
 NS 16
 DS 2
 SWH 8276.146 Hz
 FIDRES 0.126314 Hz
 AQ 3.9584243 sec
 RG 322.5
 DW 60.400 usec
 DE 6.00 usec
 TE 292.2 K
 D1 1.00000000 sec
 TDD 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 0.00 dB
 SFO1 400.1324710 MHz

F2 - Processing parameters
 SI 65536
 SF 400.1300088 MHz
 WLW no
 SCB 0
 LB 0.00 Hz
 GB 0
 PC 1.00

CJ-1-296c13
 Pulse Sequence: zgpg30
 Solvent: CD3OD
 Ambient temperature
 User: 1-16-07
 File: CJ-1-296c13
 INOVA-500 "1hpy"
 PULSE SEQUENCE
 Relax delay 0.763 sec
 Pulse 15.4 degrees
 Acq. time 1.754 sec
 Width 37735.8 Hz
 2700 repetitions
 OBSERVE C13, 125.7636251 MHz
 DECOUPLE H1, 500.2352463 MHz
 Power 37 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.3 Hz
 FT size 131072
 Total time 3 hr, 29 min, 2 sec





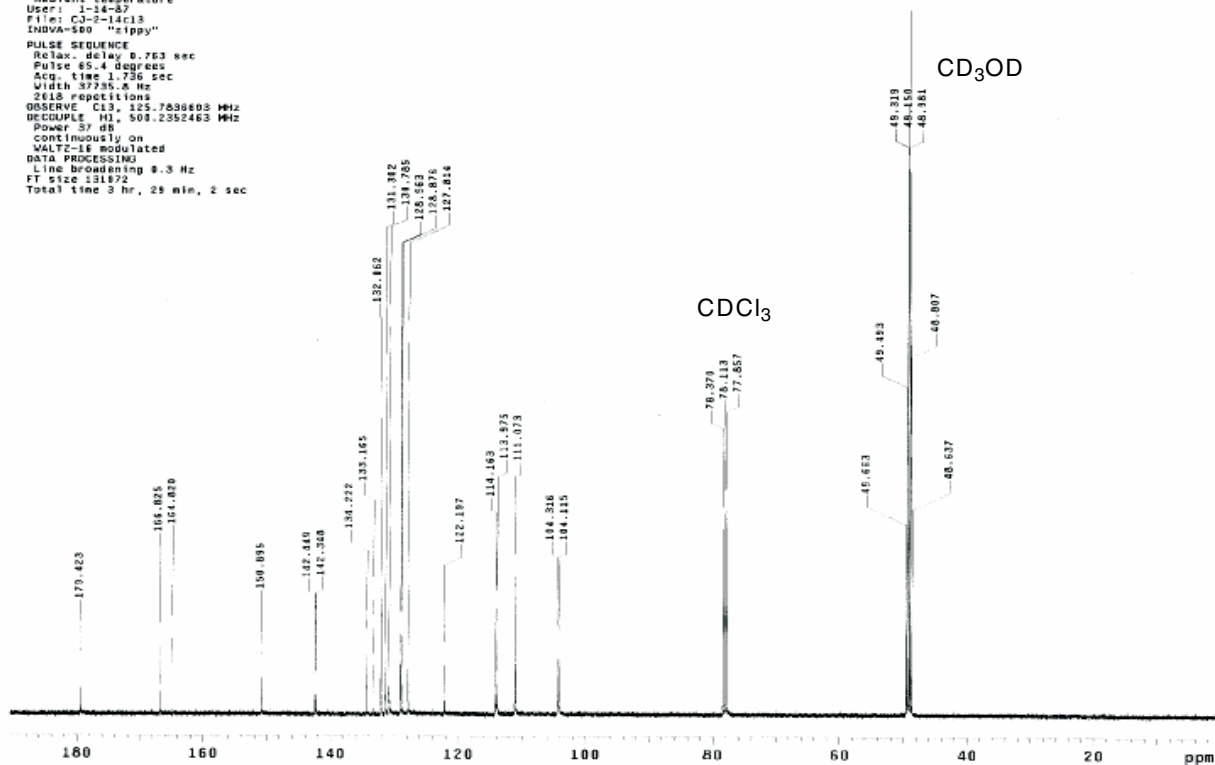
Current Data Parameters
 NAME CJ-2-14
 EXPNO 1
 PROCNO 1

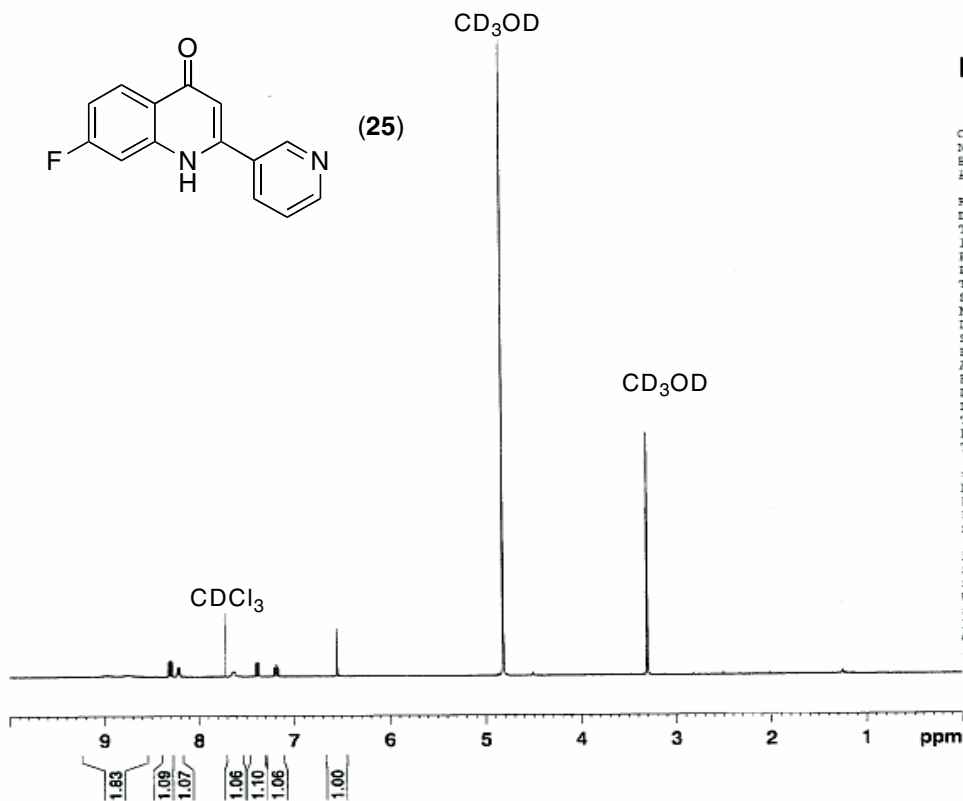
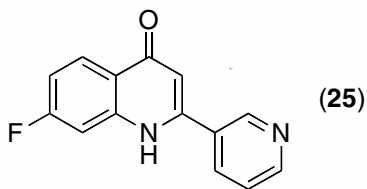
F2 - Acquisition Parameters
 Date_ 20061122
 Time 15.10
 INSTRUM spect
 PROBHD 5 mm QNP 1H/13
 PULPROG zg30
 TD 65536
 SOLVENT CDCl₃
 NS 16
 DS 2
 SWH 8278.146 Hz
 FIDRES 0.126314 Hz
 AQ 3.9584243 sec
 RG 574.7
 DW 60.400 usec
 DE 6.00 usec
 TE 293.2 K
 D1 1.00000000 sec
 TDO 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 0.00 dB
 SFO1 400.1324710 MHz

F2 - Processing parameters
 SI 65536
 SF 400.1315833 MHz
 WDW no
 SSB 0
 LB 0.00 Hz
 GB 0
 PC 1.00

CJ-2-14c13
 Pulse Sequence: s2pul
 Solvents: CD3OD
 Ambient temperature
 User: 1-14-07
 File: CJ-2-14c13
 INOVA-500 "sippy"
 PULSE SEQUENCE
 Relax. delay 6.763 sec
 Pulse 85.4 degrees
 Acq. time 1.736 sec
 Width 37395.8 Hz
 SLS repetitions
 OBSERVE C13, 125.7638693 MHz
 DECOUPLE H1, 500.2352463 MHz
 Power 37 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.3 Hz
 FT size 131872
 Total time 3 hr, 28 min, 2 sec





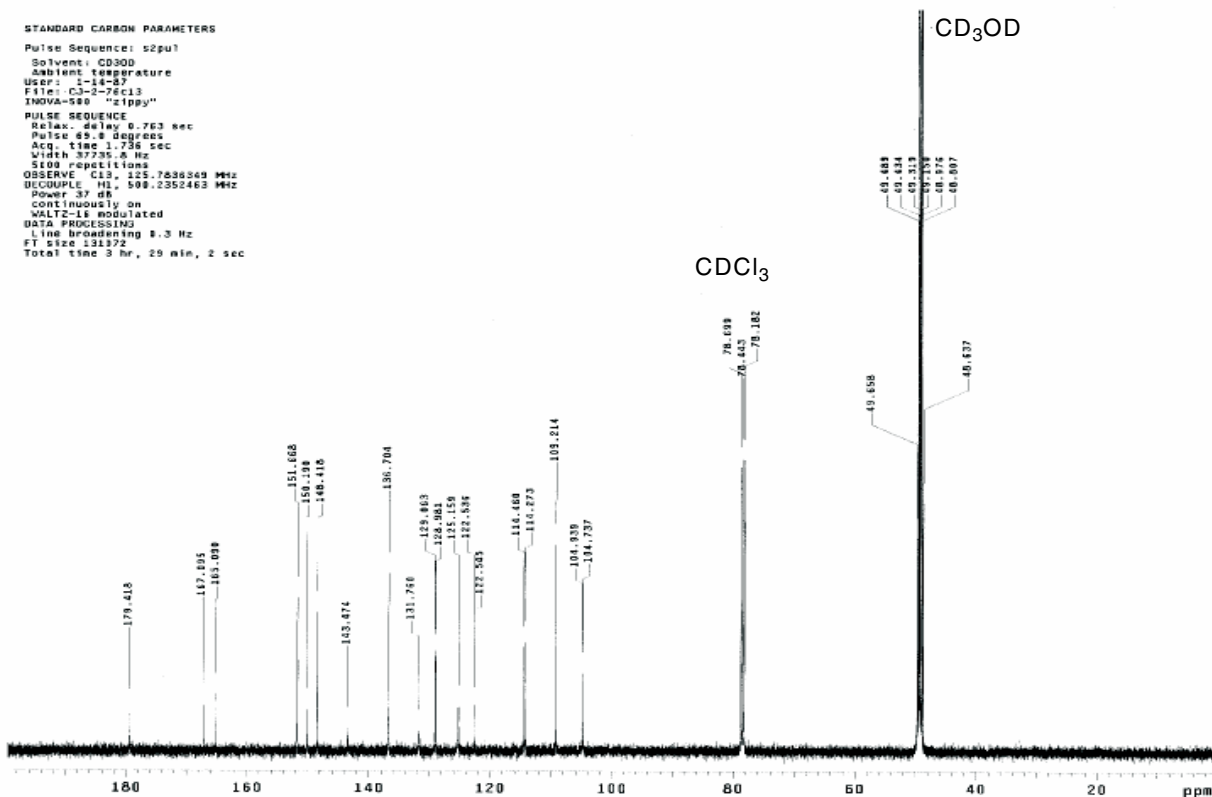
Current Data Parameters
 NAME CU-1-295-3
 EXPNO 1
 PROCNO 1

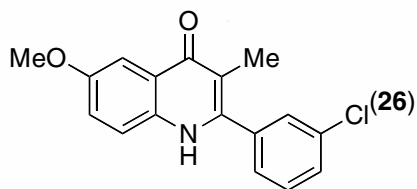
F2 - Acquisition Parameters
 Date_ 20070321
 Time 13.58
 INSTRUM spect
 PROBHD 5 mm QNP 1H/13
 PULPROG zg30
 TD 65536
 SOLVENT MeOD
 NS 16
 DS 2
 SWH 8278.146 Hz
 FIDRES 0.126314 Hz
 AQ 3.9584243 sec
 RG 362
 DW 60.400 usec
 DE 6.00 usec
 TE 293.2 K
 D1 1.00000000 sec
 TDC 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 14.00 usec
 PL1 0.00 dB
 SFO1 400.1324710 MHz

F2 - Processing parameters
 SI 65536
 SF 400.1300099 MHz
 WDW no
 SSB 0
 LB 0.00 Hz
 GB 0
 PC 1.00

STANDARD CARBON PARAMETERS
 Pulse Sequence: s2pu1
 Solvent: CD3OD
 Ambient temperature
 User: 1-14-97
 File: C3-2-76c13
 INOVA-500 "z1ppy"
 PULSE SEQUENCE
 Relax. delay 0.763 sec
 Pulse 65.8 degrees
 Acq. time 1.736 sec
 Width 37735.6 Hz
 5000 repetitions
 OBSERVE C13, 125.7636369 MHz
 DECOUPLE H1, 500.2352463 MHz
 Power 37 dB
 Continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.3 Hz
 FT size 131072
 Total time 3 hr, 29 min, 2 sec



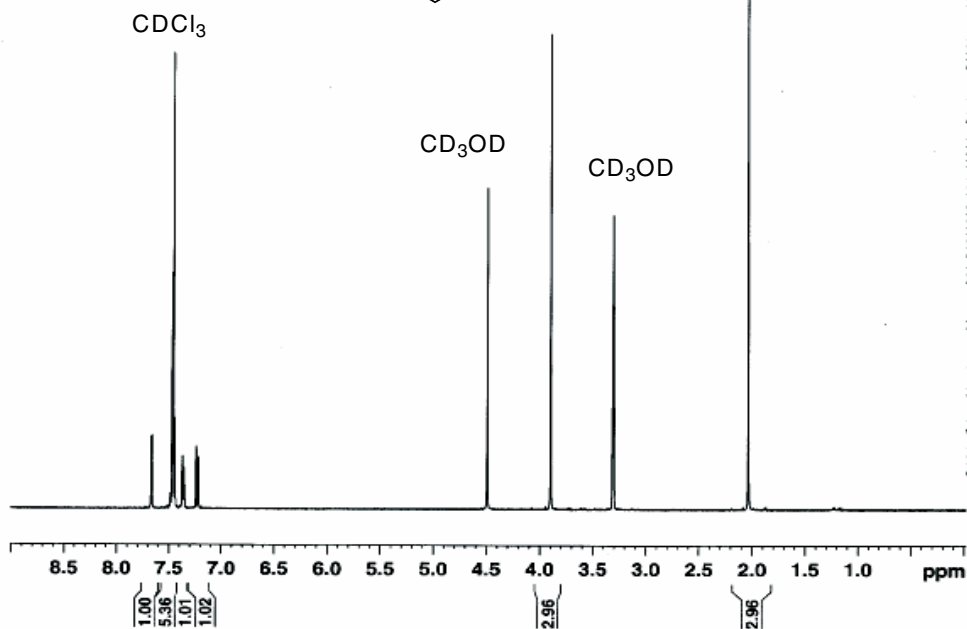


Current Data Parameters
NAME CJ-2-70
EXPNO 1
PROCNO 1

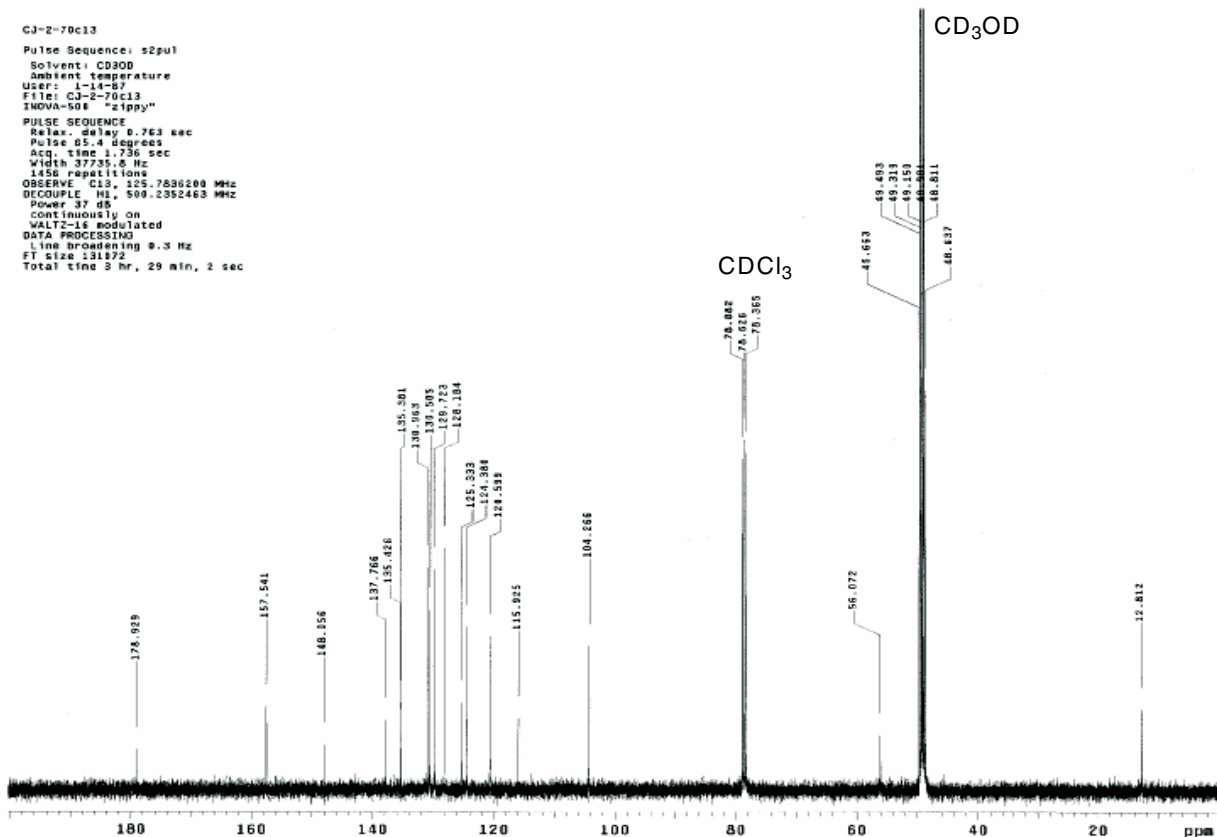
F2 - Acquisition Parameters
Date_ 20070210
Time 15.23
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 322.5
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.0000000 sec
TD0 1

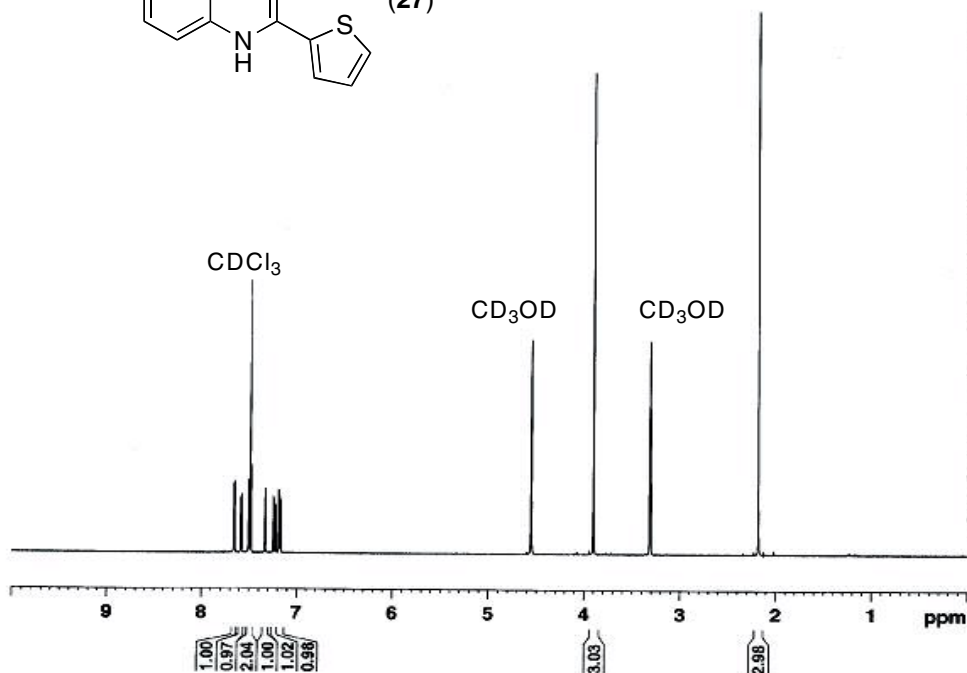
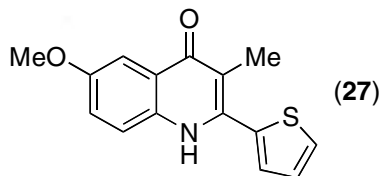
===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300086 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



CJ-2-70c13
Pulse Sequence: s2pul
Solvent: CD3OD
Ambient temperature
User: 1-14-07
File: CJ-2-70c13
INNOVA-500 "zippy"
PULSE SEQUENCE
Relax. delay 0.763 sec
Pulse 65.4 degrees
Acq. time 1.736 sec
Width 37735.8 Hz
1156 repetitions
OBSERVE C13, 125.763200 MHz
DECOUPLE H1, 500.2352463 MHz
Power 37 dB
Continuously on
WALTZ-16 modulated
DATA PROCESSING
Line broadening 0.3 Hz
FT size 531872
Total time 3 hr, 29 min, 2 sec





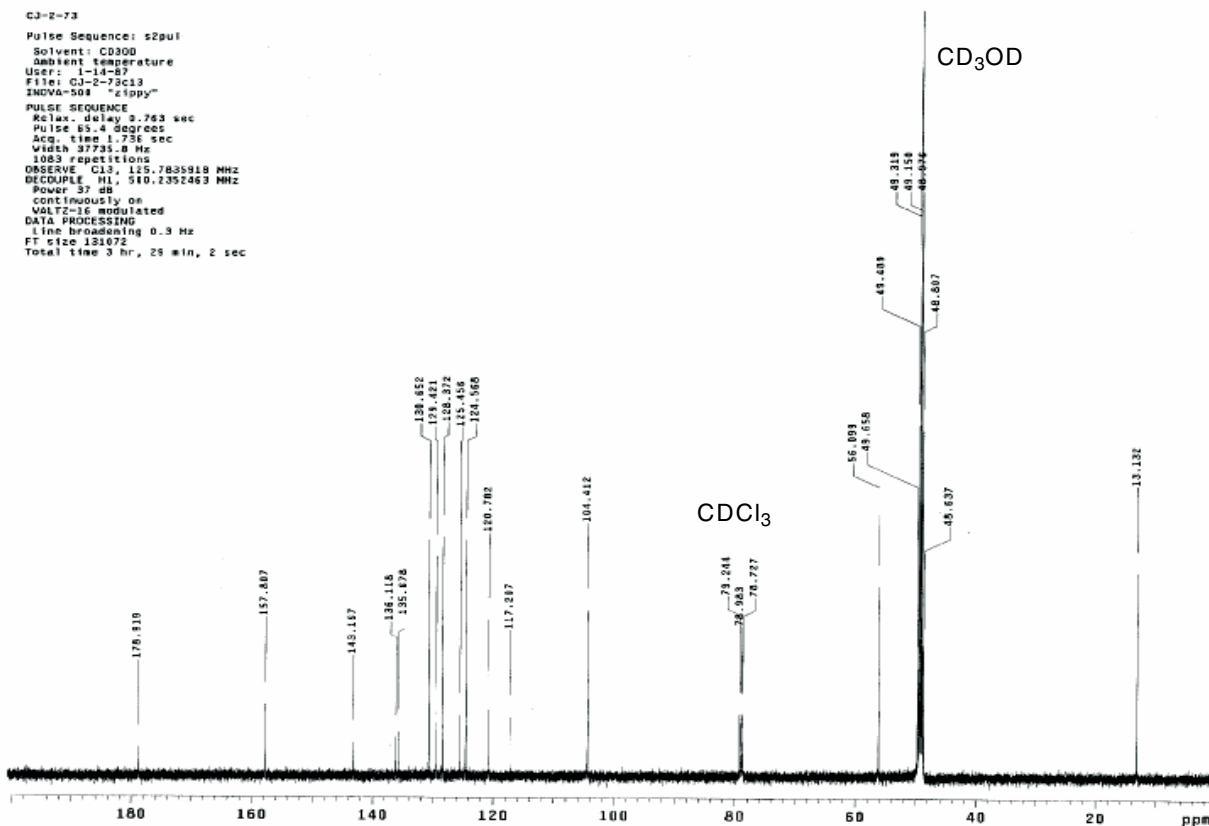
Current Data Parameters
NAME CJ-2-73
EXPNO 1
PROCNO 1

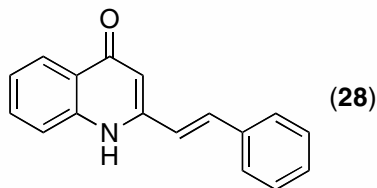
F2 - Acquisition Parameters
Date_ 20070210
Time 15.13
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWE 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 322.5
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300080 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00

CJ-2-73
Pulse Sequence: s2pul
Solvent: CD3OD
Ambient temperature
User: 1-14-87
File: CJ-2-73c13
INDVA-508 "zippy"
PULSE SEQUENCE
Relax. delay 3.763 sec
Pulse 65.4 degrees
Acq. time 1.736 sec
Width 37735.8 Hz
1083 repetitions
OBSERVE C13, 125.7835918 MHz
DECOUPLE H1, 510.2352463 MHz
Power 37 dB
continuously on
VOLTAGE-16 modulated
DATA PROCESSING
Line broadening 0.3 Hz
FT size 131072
Total time 3 hr, 28 min, 2 sec



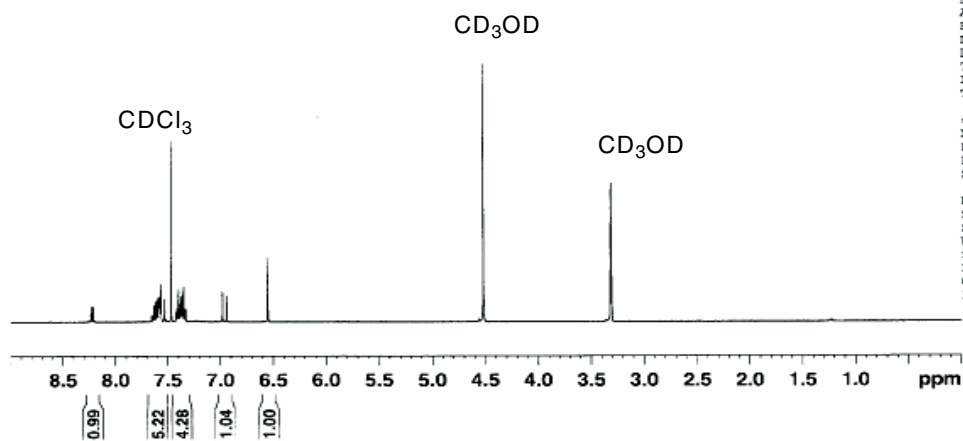


Current Data Parameters
NAME CJ-2-133
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070417
Time 10.34
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 228.1
DW 60.400 usec
DE 6.00 usec
TE 693.2 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300075 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



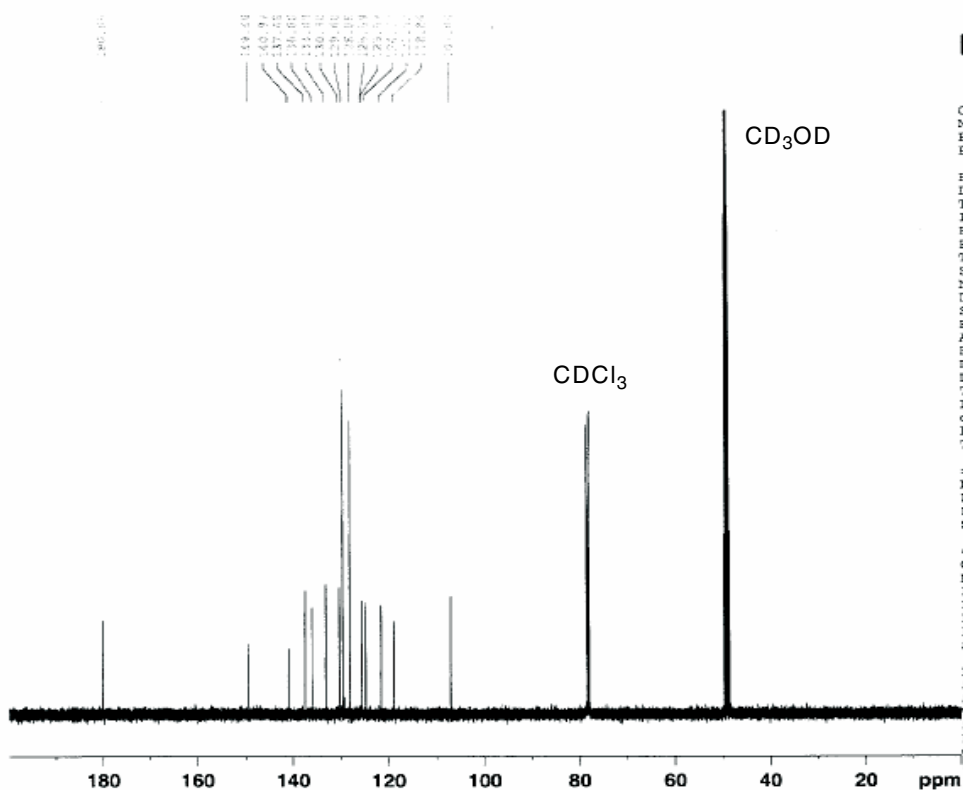
Current Data Parameters
NAME CJ-2-133c13
EXPNO 1
PROCNO 1

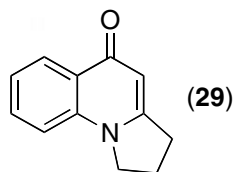
F2 - Acquisition Parameters
Date_ 20070420
Time 16.56
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT MeOD
NS 946
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 8192
DW 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.8999999 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

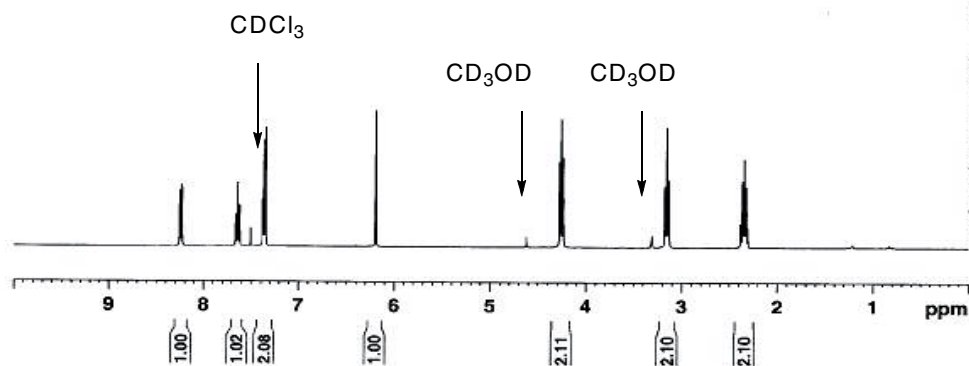
===== CHANNEL f2 =====
CFDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 -8.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6126918 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40

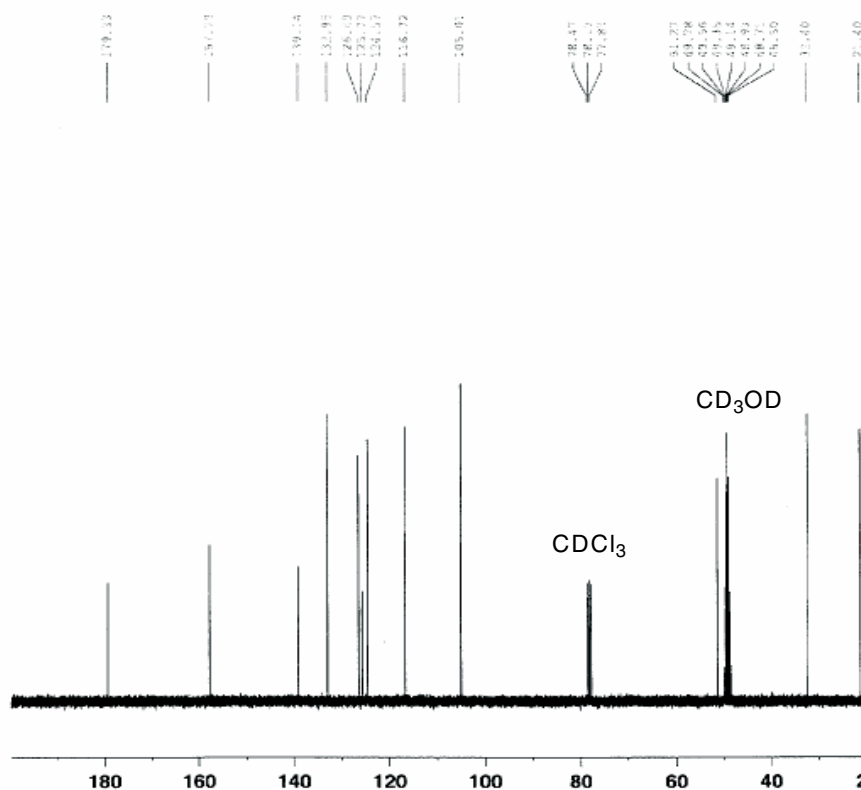




Current Data Parameters
NAME CJ-2-104-2
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
Date_ 20070307
Time 9.33
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 128
DW 60.400 usec
DE 6.00 usec
TE 294.2 K
D1 1.00000000 sec
TDO 1

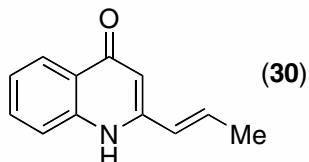


===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz
F2 - Processing parameters
SI 65536
SF 400.1300083 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



Current Data Parameters
NAME CJ-2-104c13-2
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
Date_ 20070309
Time 15.22
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT MeOD
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 18390.4
DW 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz
F2 - Processing parameters
SI 65536
SF 100.6127048 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40

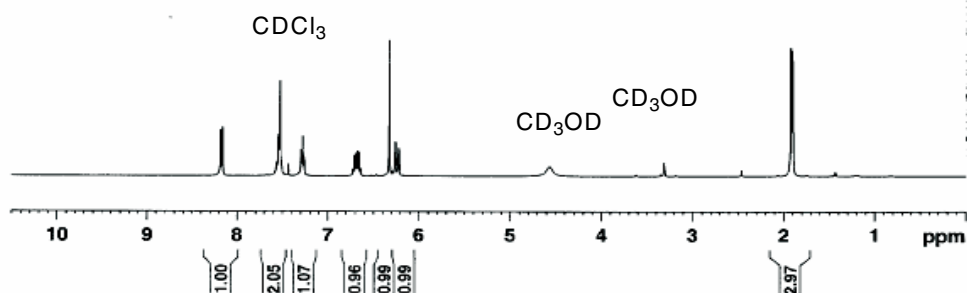


Current Data Parameters
 NAME CJ-2-114-2
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070329
 Time 13.43
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 65536
 SOLVENT MeOD
 NS 16
 DS 2
 SWH 8278.146 Hz
 FIDRES 0.126314 Hz
 AQ 3.9584243 sec
 RG 128
 DW 60.400 usec
 DE 6.00 usec
 TE 293.2 K
 D1 1.0000000 sec
 TDO 1

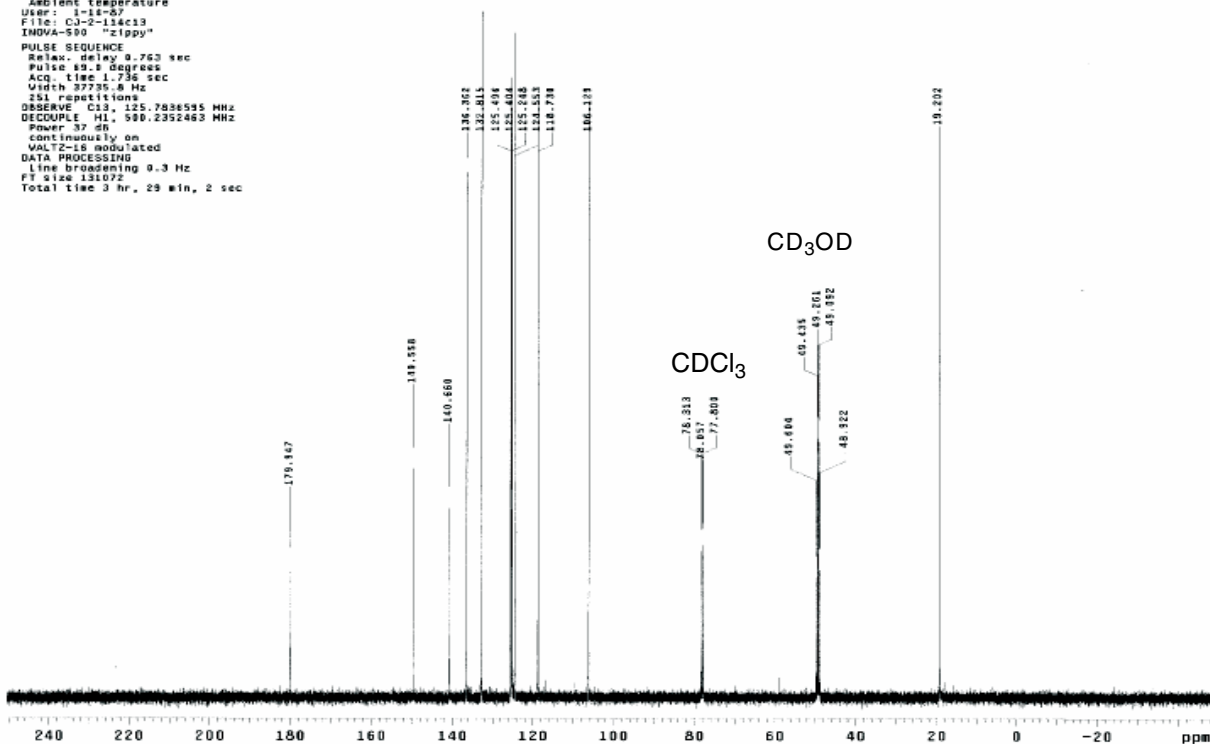
***** CHANNEL f1 *****
 NUC1 1H
 P1 15.07 usec
 PL1 0.00 dB
 SF01 400.1324710 MHz

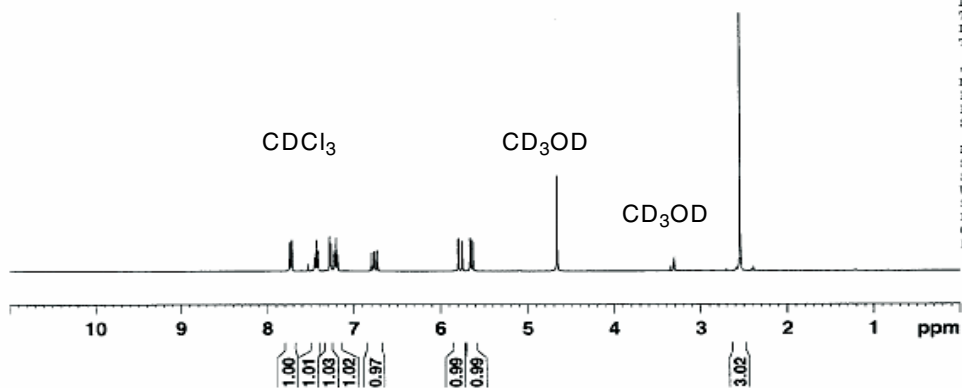
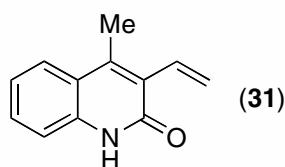
F2 - Processing parameters
 SI 65536
 SF 400.1300082 MHz
 WDW no
 SSB 0
 LB 0.00 Hz
 GB 0
 PC 1.00



STANDARD CARBON PARAMETERS

Pulse Sequence: s2pul
 Solvent: CD3OD
 Ambient temperature
 User: 1-18-87
 File: CJ-2-114-2
 INOVA-500 "zippy"
 PULSE SEQUENCE
 Relax. delay 9.763 sec
 Pulse 19.2 degrees
 Acq. time 1.736 sec
 Width 37735.8 Hz
 251 repetitions
 OBSERVE C13, 125.7826595 MHz
 DECOUPLE H1, 500.2352463 MHz
 Power 37 dB
 Continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.3 Hz
 FT size 131072
 Total time 3 hr, 29 min, 2 sec



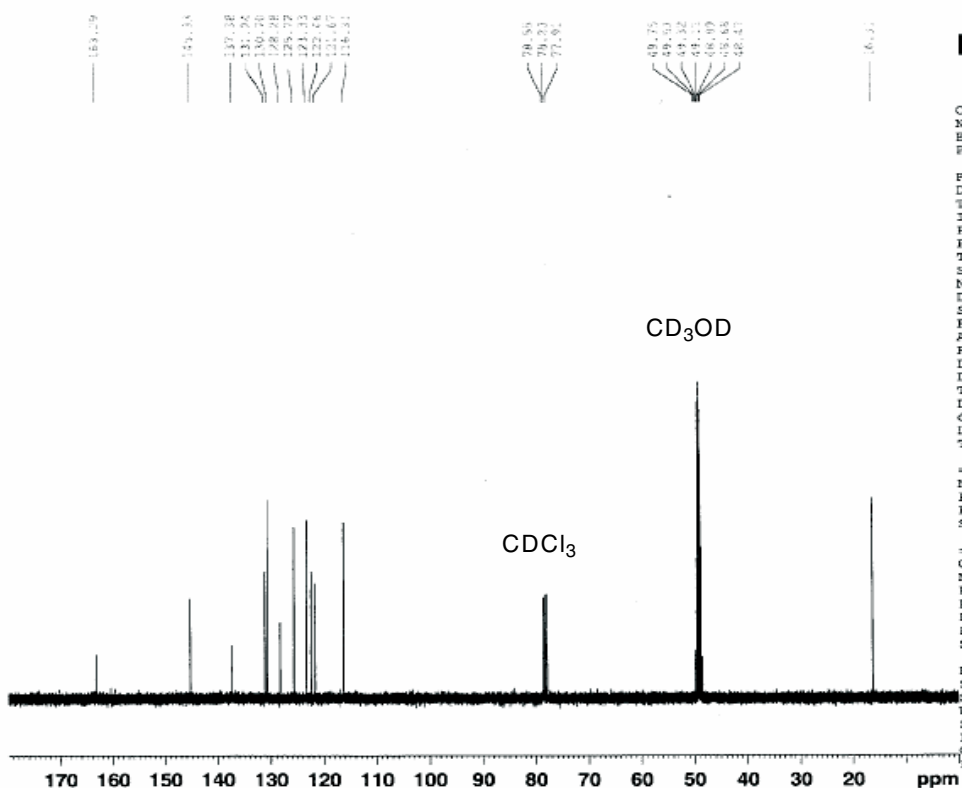


Current Data Parameters
NAME CJ-2-113-2
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070323
Time 10.40
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT MeOD
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 128
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300079 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



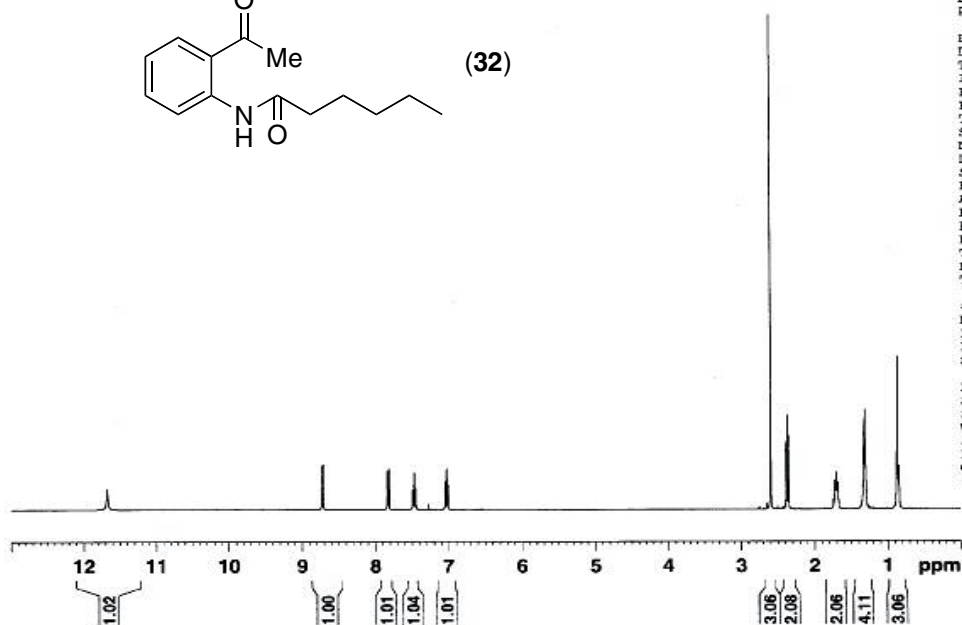
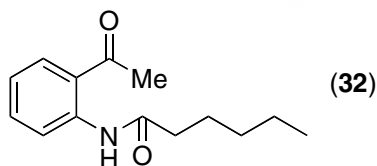
Current Data Parameters
NAME CJ-2-113-2c13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070323
Time 10.52
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 16384
DM 20.850 usec
DE 6.00 usec
TE 293.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6126954 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40

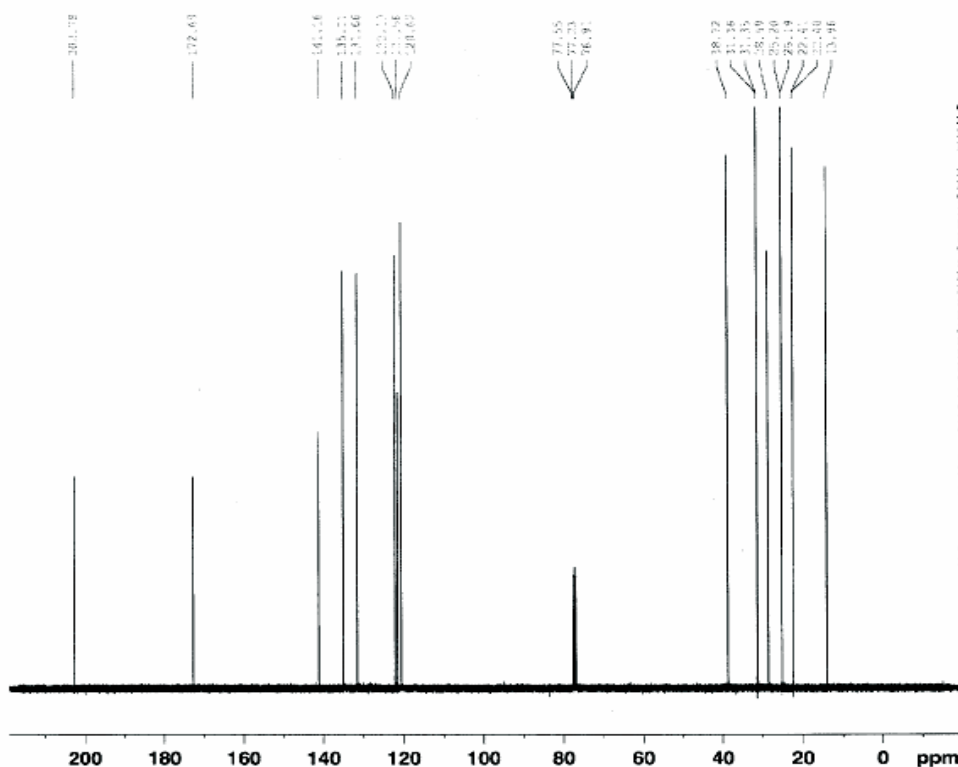


Current Data Parameters
NAME CJ-2-140
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070510
Time 10.03
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 28.5
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300054 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



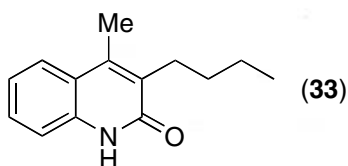
Current Data Parameters
NAME CJ-2-140c13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070510
Time 10.18
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 14596.5
DM 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -1.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CFDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

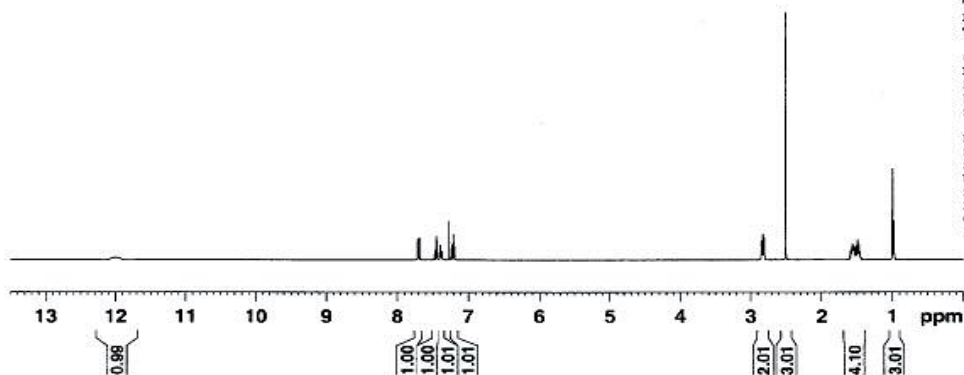
F2 - Processing parameters
SI 65536
SF 100.6127655 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40



Current Data Parameters
NAME CJ-2-23fhex
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070511
Time 10.53
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 256
DW 60.400 usec
DE 5.00 usec
TE 293.2 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 14.00 usec
PL1 0.00 dB
SFO1 400.1324710 MHz
F2 - Processing parameters
SI 65536
SF 400.1300068 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



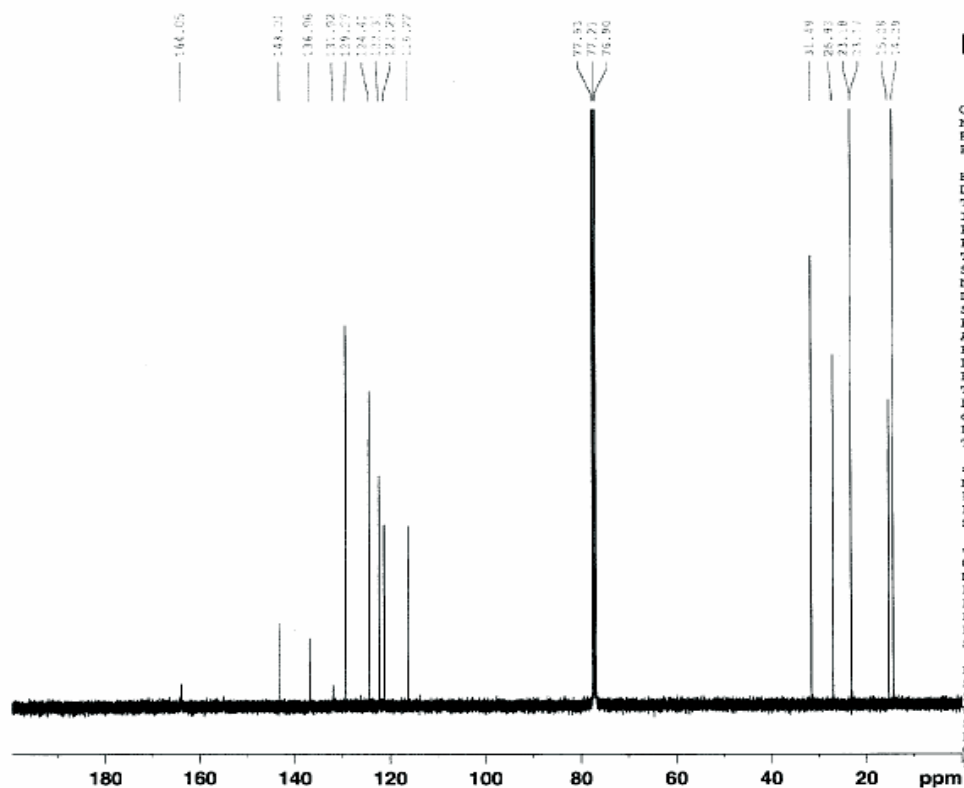
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NAME CJ-2-23fhexcl3
EXPNO 1
PROCNO 1

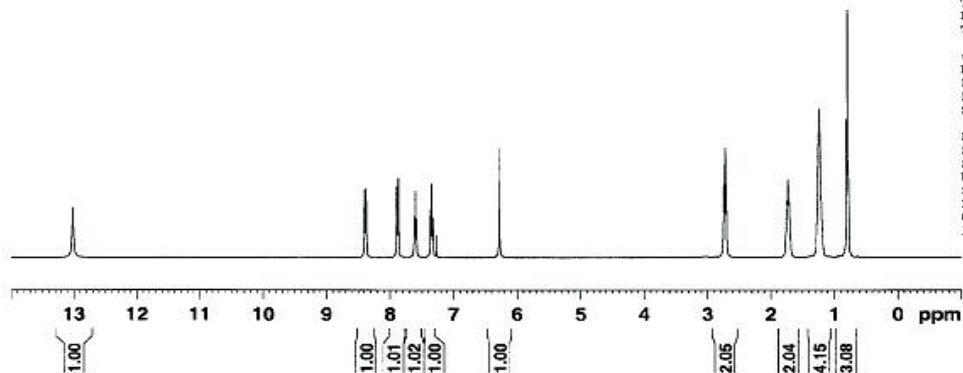
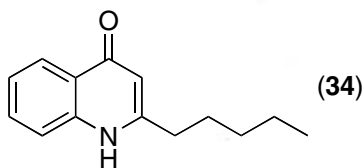
F2 - Acquisition Parameters
Date_ 20070512
Time 12.15
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 3108
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 8192
DW 20.850 usec
DE 6.00 usec
TE 293.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127521 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40



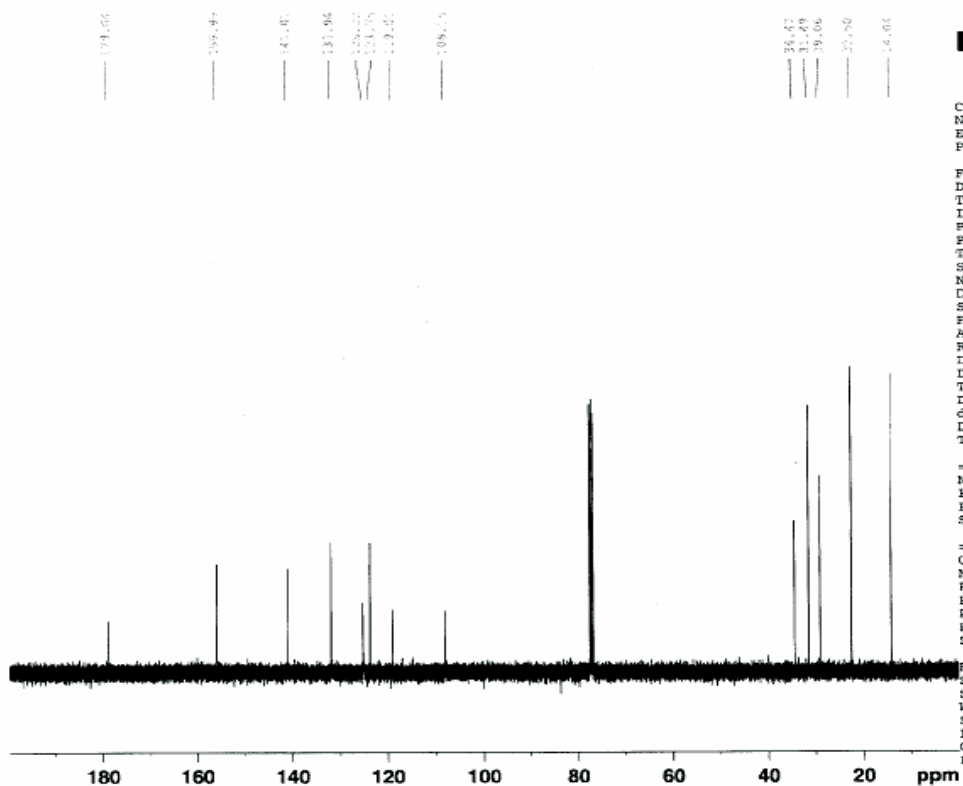


Current Data Parameters
NAME CJ-2-23shex
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070511
Time 8.54
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 71.8
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300059 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



Current Data Parameters
NAME CJ-2-23shexcl3
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070511
Time 9.06
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 14596.5
DM 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999999 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127545 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40

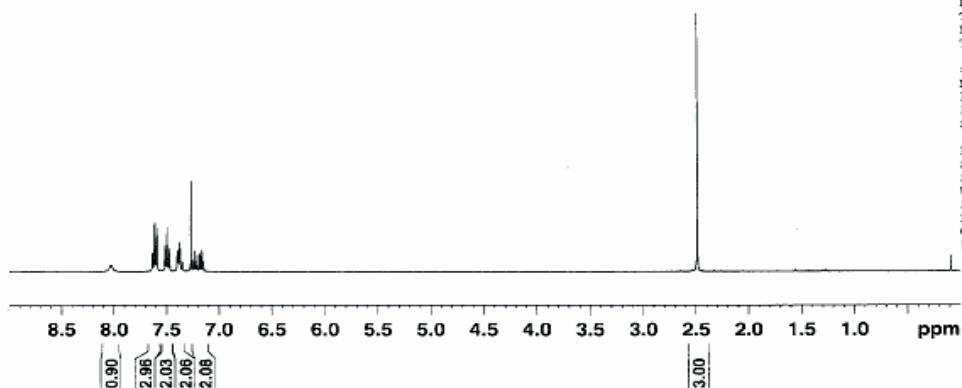
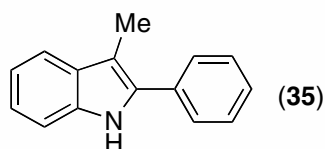


Current Data Parameters
NAME CJ-1-289-2
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070406
Time 9.55
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 1.9584243 sec
RG 256
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.0000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.130064 MHz
WDW nc
SSB c
LB 0.00 Hz
GB 0
PC 1.00



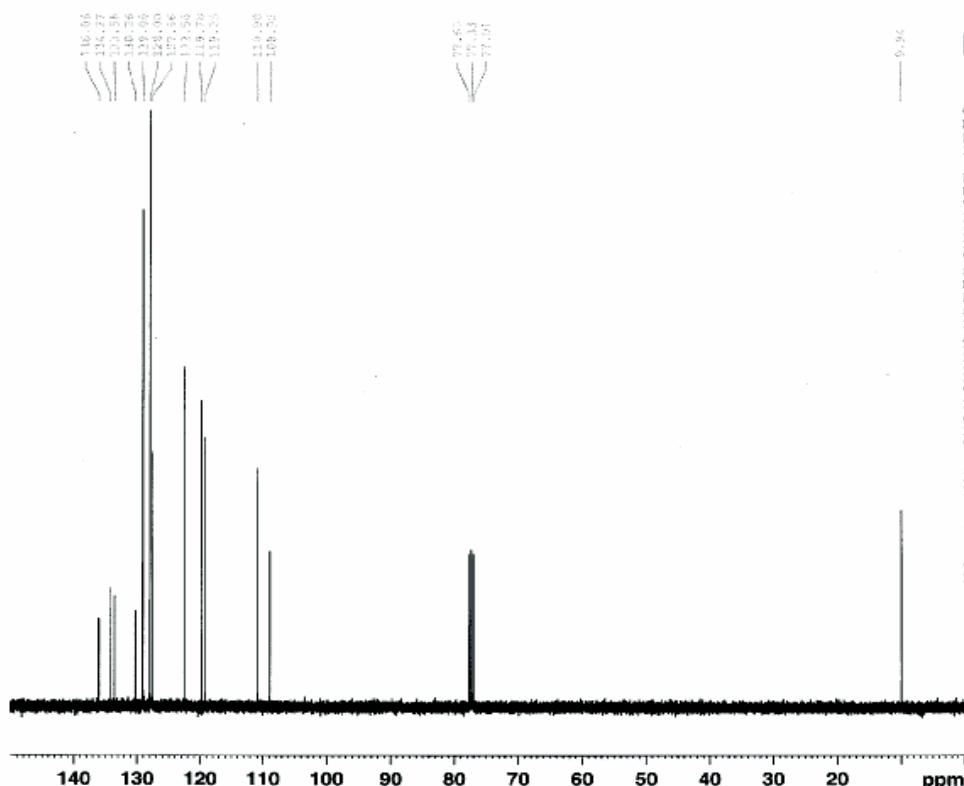
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NAME CJ-1-289-2c132
EXPNO 1
PROCNO 1

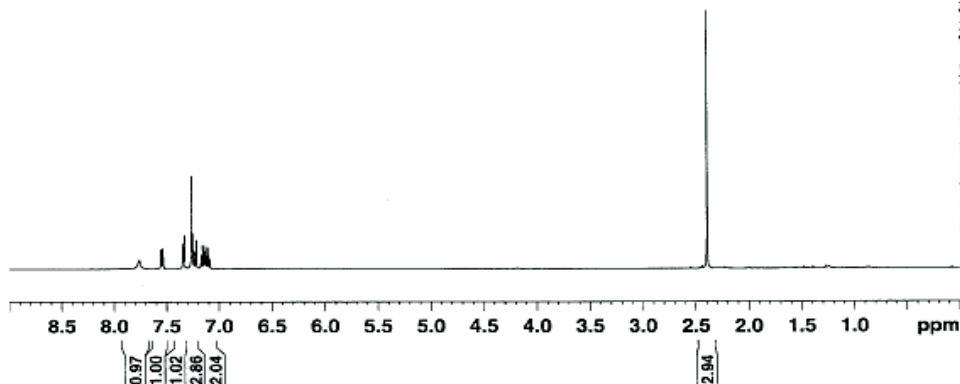
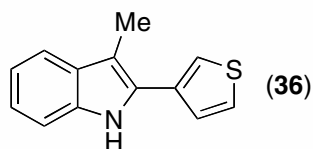
F2 - Acquisition Parameters
Date_ 20070406
Time 10.36
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 4096
DM 20.850 usec
DE 6.00 usec
TE 293.2 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.8999999 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.38 usec
PL1 0.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CFDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 0.00 dB
PL12 16.10 dB
PL13 19.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127528 MHz
WDW nc
SSB 0
LB 0.00 Hz
GB 0
PC 1.40



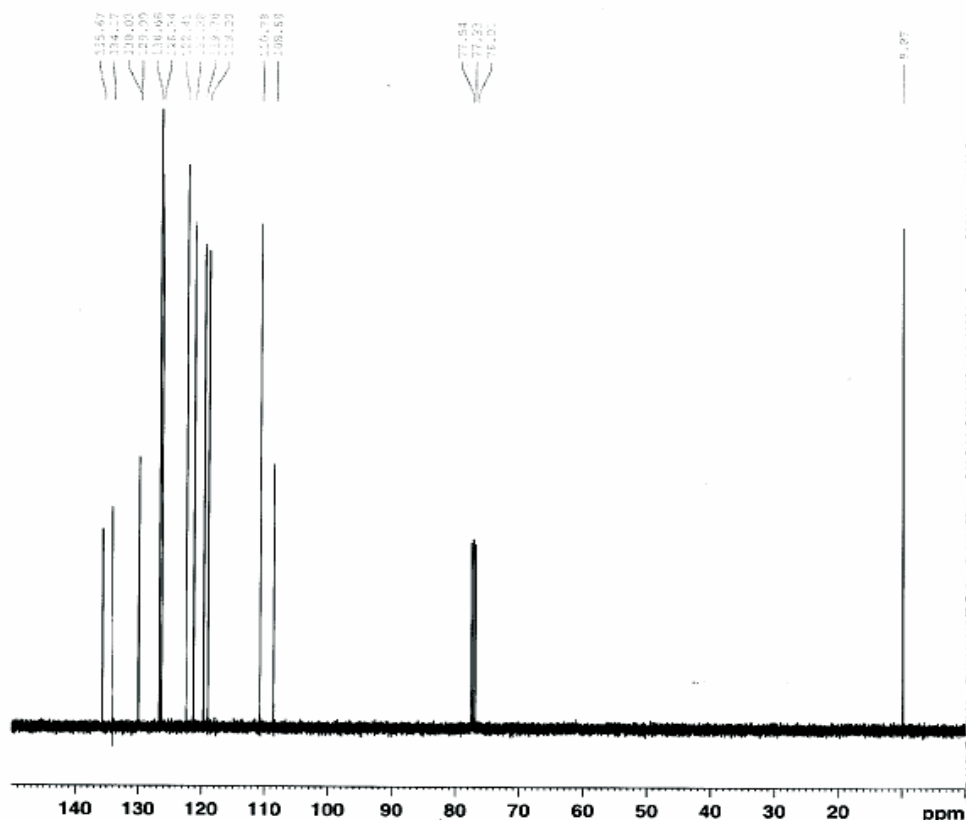


Current Data Parameters
NAME CJ-2-116
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070322
Time 12.02
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 57
DM 60.400 usec
DE 8.00 usec
TE 293.2 K
D1 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.67 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300626 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



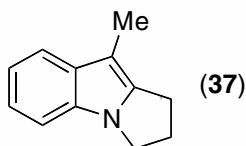
Current Data Parameters
NAME CJ-2-116c13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070322
Time 12.16
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 8192
DM 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.89999998 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127667 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40

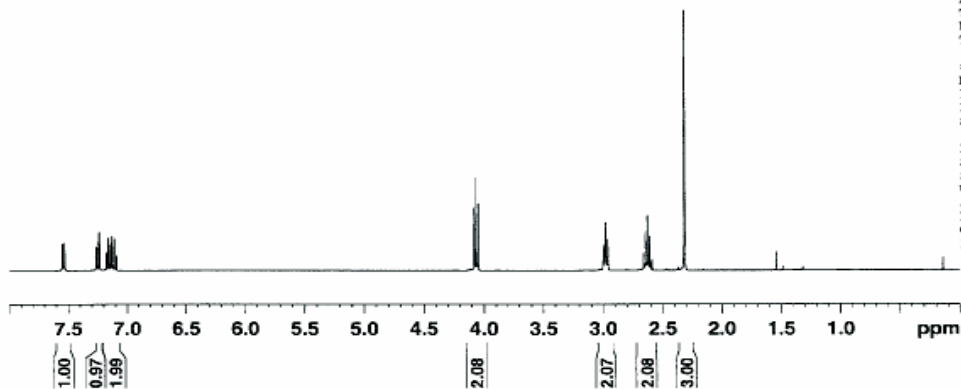


Current Data Parameters
 NAME CJ-2-119
 EXPNO 1
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20070322
 Time 12.22
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 16
 DS 2
 SWH 8278.146 Hz
 FIDRES 0.126314 Hz
 AQ 1.9584243 sec
 RG 128
 DW 60.400 usec
 DE 5.00 usec
 TE 293.2 K
 D1 1.0000000 sec
 TDO 1

===== CHANNEL f1 =====
 NUC1 1H
 P1 15.07 usec
 PL1 0.00 dB
 SFO1 400.1324710 MHz

F2 - Processing parameters
 SI 65536
 SF 400.1300062 MHz
 WDW no
 SSB 0
 LB 0.00 Hz
 GB 0
 PC 1.00



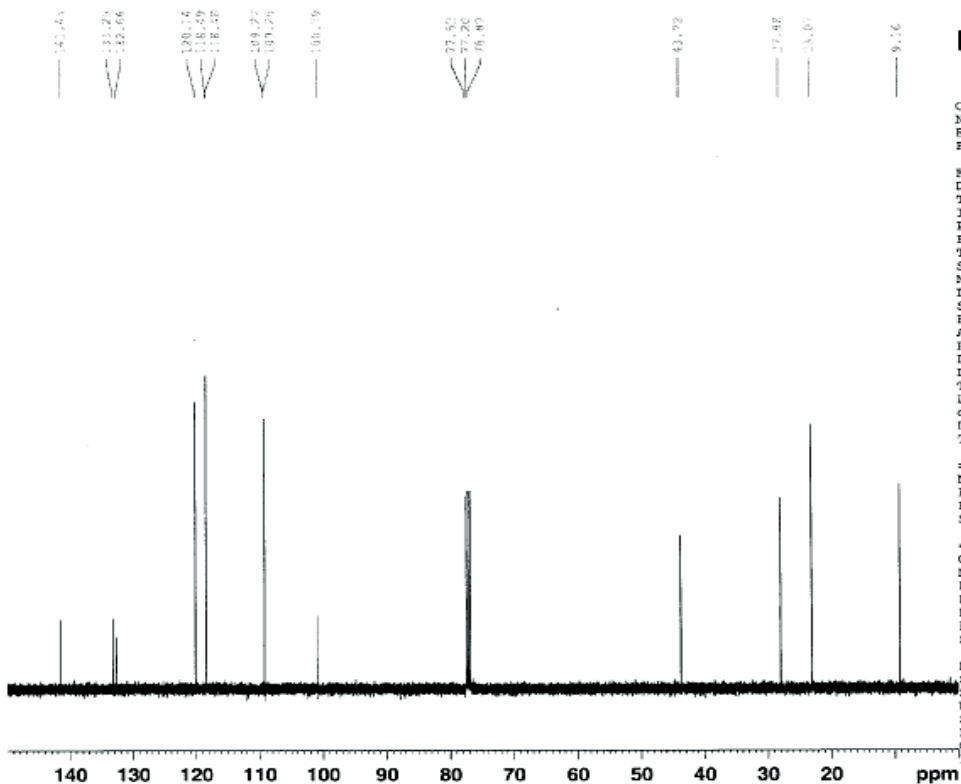
Current Data Parameters
 NAME CJ-2-119c13
 EXPNO 1
 PROCNO 1

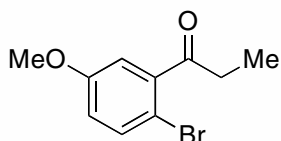
F2 - Acquisition Parameters
 Date_ 20070322
 Time 12.34
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT CDCl3
 NS 128
 DS 2
 SWH 23980.814 Hz
 FIDRES 0.364918 Hz
 AQ 1.3664756 sec
 RG 18390.4
 DW 20.850 usec
 DE 6.00 usec
 TE 293.2 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 DELTA 1.8999999 sec
 TDO 1

===== CHANNEL f1 =====
 NUC1 13C
 P1 8.75 usec
 PL1 -3.00 dB
 SFO1 100.6228298 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 90.00 usec
 PL2 -1.00 dB
 PL12 14.52 dB
 PL13 18.00 dB
 SFO2 400.1316005 MHz

F2 - Processing parameters
 SI 65536
 SF 100.6127587 MHz
 WDW no
 SSB 0
 LB 0.00 Hz
 GB 0
 PC 1.40



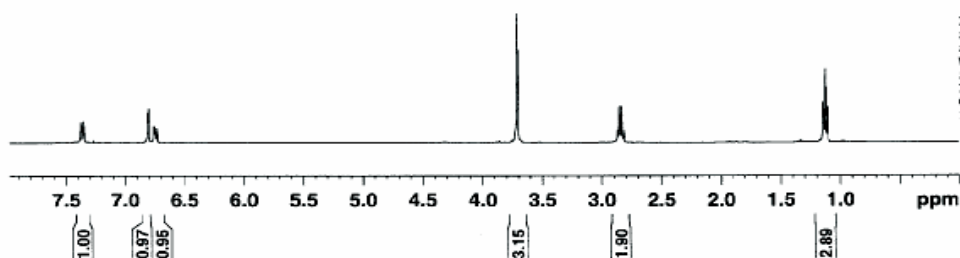


Current Data Parameters
NAME CJ-2-39-2
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070511
Time 9.13
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8278.146 Hz
FIDRES 0.126314 Hz
AQ 3.9584243 sec
RG 28.5
DM 60.400 usec
DE 6.00 usec
TE 293.2 K
D1 1.00000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 15.07 usec
PL1 0.00 dB
SFO1 400.1324710 MHz

F2 - Processing parameters
SI 65536
SF 400.1300056 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.00



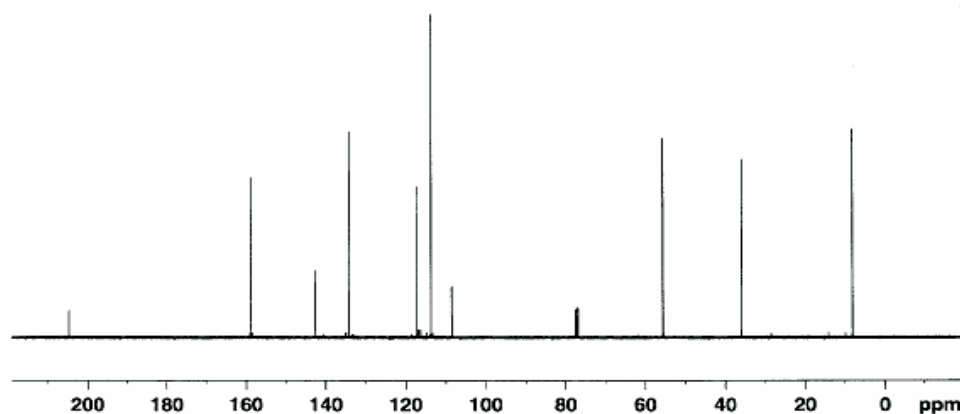
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NAME CJ-2-39c13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20070511
Time 9.25
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 128
DS 2
SWH 23980.814 Hz
FIDRES 0.365918 Hz
AQ 1.3664756 sec
RG 13.004
DM 20.850 usec
DE 6.00 usec
TE 294.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 8.75 usec
PL1 -3.00 dB
SFO1 100.6228298 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PL2 -1.00 dB
PL12 14.52 dB
PL13 18.00 dB
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 65536
SF 100.6127718 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 1.40



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