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SUPPORTING INFORMATION

Title: TBD-Catalyzed Direct 5- and 6-*enolexo* Aldolization of Ketoaldehydes
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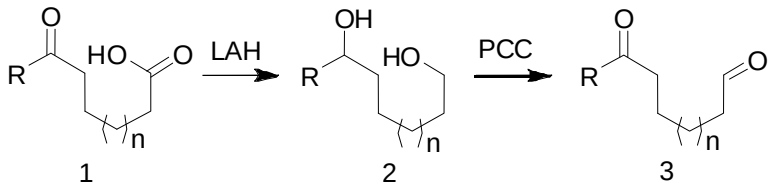
Ref. No.: O200800539

I. General information

All reactions were performed under an Argon atmosphere. The following solvents were distilled from the indicated drying agents: CH_2Cl_2 (CaH_2), THF (Na), CH_3CN (CaH_2), or dried over 4 Å molecular sieves. All commercially available reagents were used without further purification. Analytical thin-layer chromatography (TLC) was performed on glass-backed silica gel plates. Visualization of the developed chromatogram was performed using UV absorbance and a vanillin solution. Flash column chromatography was performed with silica gel (40-63 μm) according to a standard technique. Nuclear magnetic resonance spectra (^1H and ^{13}C) were recorded on a 200 or 300 MHz spectrometer equipped with a BBI or a DUAL probe. Chemical shifts for ^1H and ^{13}C spectra are recorded in parts per million using the residual chloroform as internal standard (^1H, δ = 7.26 ppm; ^{13}C, δ = 77.16 ppm). Multiplicities are indicated by s (singlet), bs (broad singlet), d (doublet), t (triplet), q (quadruplet), qt (quintuplet) and m (multiplet). Coupling constants, *J*, are reported in Hertz. Infrared spectra were recorded on a FT-IR spectrometer equipped with KRS-5 (ThI/ThBr) lenses and are reported in reciprocal centimetres (cm^{-1}). Melting points were uncorrected.

II. A representative procedure for the synthesis of ketoaldehydes substrates 3



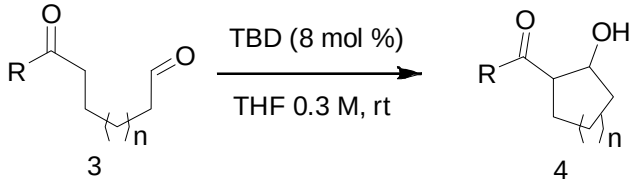
1 2 3

To a suspension of lithium aluminium hydride (3.7 equiv) in anhydrous THF, was added dropwise *via* an addition funnel a solution of the oxocarboxylic acid **1** in THF. The reaction was stirred for 1h at room temperature then cooled to 0°C. The excess hydride was cautiously quenched by the sequential addition of water and 15% of sodium hydroxide. The resulting white suspension was warmed to room temperature and stirred for 30 min. Filtration through Celite afforded filtrate, which was dried over magnesium sulfate. Filtration, followed by

concentration *in vacuo*, provided the crude that was purified by flash chromatography to give the diol **2** as oil or a solid.

To a solution of **2** in anhydrous CH_2Cl_2 was added PCC (3 equiv) at room temperature. The mixture was stirred for 4h then the medium was concentrated and the crude directly purified by silica gel chromatography to give the ketolaldehyde substrates **3**. These ketoaldehydes must be used directly for the intramolecular aldol reactions because they are unstable and undergo oxidation rapidly to give the oxocarboxylic acid derivatives. Due to oxidation problems, the melting points of the solid ketoaldehydes were not measured.

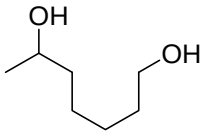
A representative procedure for the TBD-catalyzed intramolecular aldolization.



To a solution of ketoaldehyde **3** in anhydrous THF (0.3 M) was added 8 mol % of TBD at room temperature. The reaction mixture was stirred for 30 min and then quenched with saturated ammonium chloride solution. The organic layer was separated. The aqueous layer was extracted 3 times with diethyl ether. The organic layers were dried over magnesium sulfate, filtered, concentrated *in vacuo* to afford a crude that was purified by flash chromatography to give the desired aldol products **4** as a mixture of two diastereoisomers.

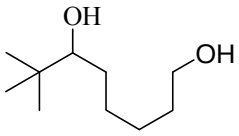
The relative stereochemistry of the diastereoisomers was assigned by analogy to our results and to reported data.[1]

Characterization data



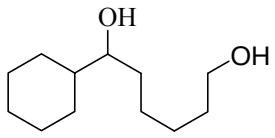
Heptane-1,6-diol (2a)

81% as colorless oil after purification by flash chromatography (EtOAc/cyclohexane 80/20); ^{1}H NMR (300 MHz, $CDCl_3$) δ 3.65 (m, 3H), 3.46 (t, *J* = 6.4 Hz, 2H), 1.48-1.4 (m, 2H), 1.38-1.19 (m, 6H), 1.05 (d, *J* = 6.3 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 67.5, 62.0, 39.0, 32.4, 25.7, 25.4, 23.2; IR (neat): 3356, 2929, 2858, 1463, 1376, 1135, 1057, 1018, 947 cm^{-1}; exact mass calculated for $C_7H_{16}Li_1O_2$ ($M+Li^+$) : 139.1305 ; found 139.1302.



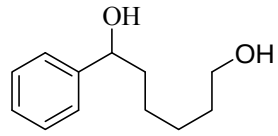
7,7-Dimethyl-octane-1,6-diol (2b)

97% as colorless oil after purification by flash chromatography (EtOAc/cyclohexane 70/30); ^{1}H NMR (200 MHz, $CDCl_3$) δ 3.65 (t, *J* = 6.4, 2H), 3.19 (dd, *J* = 10 Hz, *J* = 1.6 Hz, 1H), 1.62-1.20 (m, 8H), 1.41 (s, 2H), 0.88 (s, 9H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 79.8, 62.5, 35.0, 32.7, 31.4, 26.8, 25.8, 25.8; IR (neat): 3369, 2944, 2867, 1648, 1478, 1465, 1393, 1364, 1071, 1053, 1004, 652 cm^{-1}; exact mass calculated for $C_{10}H_{22}Li_1O_2$ ($M+Li^+$) : 181.1775 ; found 181.1773.



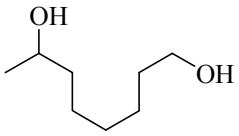
1-Cyclohexyl-hexane-1,6-diol (2c)

99% as colorless oil after purification by flash chromatography (EtOAc/cyclohexane 80/20); ^{1}H NMR (300 MHz, $CDCl_3$) δ 3.65 (t, *J* = 6 Hz, 2H), 3.38-3.33 (m, 1H), 1.18-1.01 (m, 19H), 1.40 (bs, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 76.0, 62.5, 43.7, 34.0, 32.6, 29.3, 27.9, 26.6, 26.4, 26.3, 25.8, 25.7; IR (neat): 3368, 2928, 2853, 1651, 1450, 1055, 683 cm^{-1}; exact mass calculated for $C_{12}H_{24}Li_1O_2$ ($M+Li^+$) : 207.1931 ; found 207.1928.



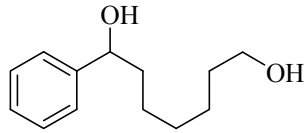
1-Phenyl-hexane-1,6-diol (2d)

94% as white solid after purification by flash chromatography (EtOAc/cyclohexane 50/50); ^{1}H NMR (200 MHz, $CDCl_3$) δ 7.36-7.26 (m, 5H), 4.68 (dd, *J* = 7.2 Hz, *J* = 5.8 Hz, 1H), 3.62 (t, *J* = 6.4 Hz, 2H), 1.77-1.18 (m, 10H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.0, 128.4, 127.4, 125.9, 74.3, 62.5, 39.0, 32.5, 25.6, 25.56; IR (neat): 3339, 2935, 2860, 1651, 1493, 1453, 1055, 1015, 762, 701 cm^{-1}; mp : 54-57 °C; exact mass calculated for $C_{12}H_{18}Li_1O_2$ ($M+Li^+$) : 201.1462 ; found 201.1460.



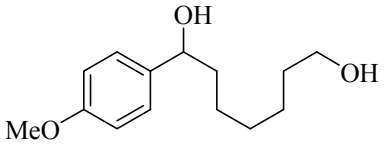
Octane-1,7-diol (2e)

91% as colorless oil after flash chromatography (EtOAc/cyclohexane 80:20) ; ^{1}H NMR (200 MHz, $CDCl_3$) δ 3.87-3.72 (m, 1H), 3.64 (t, *J* = 6.6 Hz, 2H), 1.60-1.53 (m, 2H), 1.45-1.33 (m, 10H), 1.18 (d, *J* = 6 Hz, 3H) ; ^{13}C NMR (75 MHz, $CDCl_3$) δ 67.5, 62.0, 38.9, 32.4, 29.3, 25.6, 23.1; IR (neat): 3339, 2931, 2858, 1460, 1374, 1132, 1058 cm^{-1}; exact mass calculated for $C_8H_{18}Li_1O_2$ ($M+Li^+$) : 153.1462 ; found 153.1459.



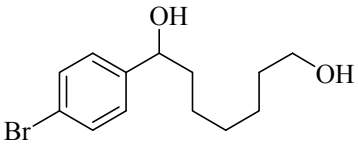
1-Phenyl-heptane-1,7-diol (2f)

96% as white solid after purification by flash chromatography (EtOAc/cyclohexane 50:50); ^{1}H NMR (200 MHz, $CDCl_3$) δ 7.36-7.26 (m, 5H), 4.67 (dd, *J* = 7 Hz, *J* = 5.8 Hz, 1H), 3.62 (t, *J* = 6.4 Hz, 2H), 1.85-1.31 (m, 12H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.0, 128.4, 127.5, 126.0, 74.6, 62.8, 39.0, 32.6, 29.3, 25.8, 25.7; IR (neat): 3351, 2933, 2858, 1493, 1454, 1056, 763, 701 cm^{-1}; mp : 40-43 °C; exact mass calculated for $C_{13}H_{20}Li_1O_2$ ($M+Li^+$) : 215.1618 ; found 215.1619.



1-(4-Methoxy-phenyl)-heptane-1,7-diol (2g)

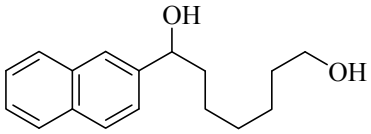
73% as white solid after purification by flash chromatography (EtOAc 100%); ^{1}H NMR (200 MHz, $CDCl_3$) δ 7.30-7.21 (m, 3H), 6.91-6.86 (m, 2H), 4.63 (t, *J* = 6.4 Hz, 1H), 3.82 (s, 3H), 3.63 (t, *J* = 6.4 Hz, 2H), 1.90-1.20 (m, 12H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 159.0, 137.2, 127.2, 113.9, 74.3, 63.0, 55.4, 39.0, 32.7, 29.4, 25.9, 25.7; IR (neat): 3391, 2934, 2851, 1651, 1611, 1513, 1247, 833 cm^{-1}; mp : 80-81 °C; exact mass calculated for $C_{14}H_{22}Li_1O_3$ ($M+Li^+$) : 245.1724 ; found 245.1718.



1-(4-Bromo-phenyl)-heptane-1,7-diol (2h)

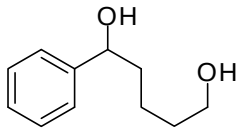
83% as white solid after purification by flash chromatography (EtOAc/cyclohexane 70:30); ^{1}H NMR (200 MHz, $CDCl_3$) δ 7.53-7.23 (m, 4H), 4.67 (t, *J* = 6.4 Hz, 1H), 3.66 (t, *J* = 6.4 Hz, 2H), 1.90-1.30 (m, 12H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.0, 131.5, 127.7, 121.2, 73.9,

62.9, 39.1, 32.6, 29.3, 25.8, 25.7; IR (neat): 3359, 2933, 2857, 1486, 1070, 1010, 826, 701 cm^{-1}; mp : 53.5-56 °C; exact mass calculated for $C_{13}H_{19}Br_1Li_1O_2$ ($M+Li^+$) : 293.0723 ; found 293.0718.



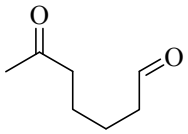
1-Naphthalen-2-yl-heptane-1,7-diol (2i)

75% as white solid after purification by flash chromatography (EtOAc/cyclohexane 70:30); ^1H NMR (200 MHz, $CDCl_3$) δ 7.85-7.78 (m, 4H), 7.50-7.45 (m, 3H), 4.84 (t, *J* = 6.6 Hz, 1H), 3.61 (t, *J* = 6.6 Hz, 2H), 1.57-1.35 (m, 12H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 142.3, 133.4, 133.1, 128.4, 128.0, 127.8, 126.2, 125.9, 124.7, 124.2, 74.8, 63.0, 39.0, 32.7, 29.4, 25.9, 25.7; IR (neat): 3390, 2934, 1644, 820, 749 cm^{-1}; mp : 87-88 °C; exact mass calculated for $C_{17}H_{22}Li_1O_2$ ($M+Li^+$) : 265.1775 ; found 265.1765.



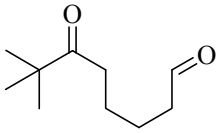
1-Phenyl-pentane-1,5-diol (2k)

96% as white solid after purification by flash chromatography (EtOAc/cyclohexane 90/10); ^1H NMR (200 MHz, $CDCl_3$) δ 7.35-7.26 (m, 5H), 4.68 (dd, *J* = 7.6 Hz, *J* = 5.6 Hz, 1H), 3.63 (t, *J* = 6.4 Hz, 2H), 1.93-1.32 (m, 6H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.0, 128.4, 127.4, 125.9, 74.3, 62.3, 38.7, 32.3, 22.0; IR (neat): 3351, 2939, 2864, 1455, 1070, 1056, 1029, 701 cm^{-1}; mp : 52-54 °C ; exact mass calculated for $C_{11}H_{16}Li_1O_2$ ($M+Li^+$) : 187.1305 ; found 187.1299.



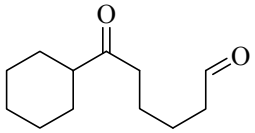
6-Oxo-heptanal (3a)

65% as colorless oil after purification by flash chromatography (EtOAc/cyclohexane 50:50); ^{1}H NMR (200 MHz, $CDCl_3$) δ 9.77 (s, 1H), 2.48-2.44 (m, 4H), 2.14 (s, 3H), 1.64-1.57 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 208.5, 202.3, 43.7, 43.3, 30.0, 23.1, 21.5; IR (neat): 2941, 2868, 2727, 1717, 1412, 1365, 1174, 1162, 735 cm^{-1}; exact mass calculated for $C_7H_{12}Li_1O_2$ ($M+Li^+$) : 135.0992 ; found 135.0992.



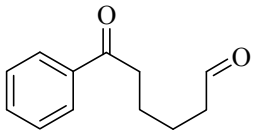
7,7-Dimethyl-6-oxo-octanal (3b)

82% as yellow pale oil after purification by flash chromatography (cyclohexane/EtOAc 80:20); ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.68 (t, *J* = 1.5 Hz, 1H), 2.46-2.35 (m, 4H), 1.51 (m, 4H), 0.88 (s, 9H) ; ^{13}C NMR (75 MHz, $CDCl_3$) δ 215.3, 202.3, 44.0, 43.8, 36.0, 26.4, 23.3, 21.6; IR (neat): 2967, 2871, 2825, 1725, 1705, 1479, 1366, 1169, 1060, 736 cm^{-1}; exact mass calculated for $C_{10}H_{18}Li_1O_2$ ($M+Li^+$) : 177.1462 ; found 177.1454.



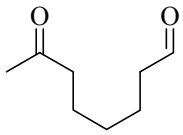
6-Cyclohexyl-6-oxo-hexanal (3c)

84% as yellow pale oil after purification by flash chromatography (cyclohexane/EtOAc 80:20); ^{1}H NMR (200 MHz, $CDCl_3$) δ 9.73 (t, *J* = 1.5 Hz, 1H), 2.21-2.12 (m, 4H), 2.10-1.96 (m, 1H), 1.56-1.43 (m, 4H), 1.34-1.24 (m, 4H), 1.12-0.89 (m, 6H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 213.7, 202.4, 50.9, 43.8, 40.2, 28.6, 25.9, 25.7, 23.1, 21.7; IR (neat): 2931, 2855, 2720, 1724, 1707, 1450, 1410, 1375, 1145 cm^{-1}; exact mass calculated for $C_{12}H_{20}Li_1O_2$ ($M+Li^+$) : 203.1618 ; found 203.1614.



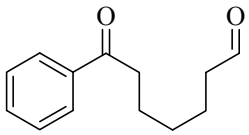
6-Oxo-6-phenyl-hexanal (3d)

74% as white solid after purification by flash chromatography (cyclohexane/EtOAc 80:20); ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.79 (t, *J* = 1.5 Hz, 1H), 7.96-7.93 (m, 2H), 7.59-7.53 (m, 1H), 7.49-7.43 (m, 2H), 3.01 (t, *J* = 6.9 Hz, 2H), 2.51 (td, *J* = 7.2 Hz, *J* = 1.5 Hz, 2H), 1.79-1.70 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.3, 199.7, 136.9, 133.1, 128.6, 128.0, 43.8, 38.2, 23.6, 21.7; IR (neat): 2945, 2934, 2868, 1713, 1678, 1459, 1449, 1405, 733, 692 cm^{-1}; exact mass calculated for $C_{12}H_{14}Li_1O_2$ ($M+Li^+$) : 197.1149 ; found 197.1152.



7-Oxo-octanal (3e)

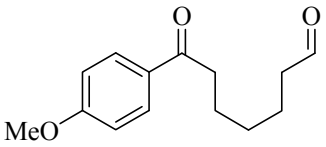
68% as colorless oil after purification by flash chromatography (cyclohexane/EtOAc 50:50); ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.76 (t, *J* = 1.5 Hz, 1H), 2.43 (t, *J* = 7.5 Hz, 4H) 2.13 (s, 3H), 1.68-1.54 (m, 4H), 1.37-1.29 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 208.6, 202.3, 43.4, 43.1, 29.7, 28.4, 23.2, 21.6; IR (neat): 2938, 2863, 2725, 1716, 1460, 1411, 1361, 1163 cm^{-1}; exact mass calculated for $C_8H_{14}Li_1O_2$ ($M+Li^+$) : 149.1149 ; found 149.1145.



7-Oxo-7-phenyl-heptanal (3f)

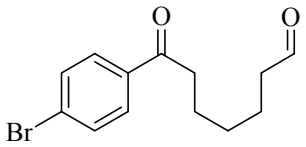
73% as white solid after purification by flash chromatography (cyclohexane/EtOAc 50:50); ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.78 (t, *J* = 1.5 Hz, 1H), 7.95 (d, *J* = 7.2 Hz, 2H), 7.59-7.43 (m, 3H), 2.98 (t, *J* = 7.2 Hz, 2H), 2.46 (td, *J* = 7.2 Hz, *J* = 1.5 Hz, 2H), 1.82-1.65 (m, 4H), 1.48-1.40 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.5, 200.1, 137.0, 133.0, 128.6, 128.0, 43.7,

38.2, 28.8, 23.9, 21.9; IR (neat): 2938, 2863, 2724, 1723, 1686, 1597, 1580, 1449, 1218, 755, 692 cm^{-1}; exact mass calculated for $C_{13}H_{16}Li_1O_2$ ($M+Li^+$) : 211.1305; found 211.1309.



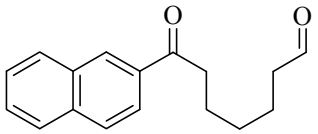
7-(4-Methoxy-phenyl)-7-oxo-heptanal (3g)

83% as white solid after purification by flash chromatography (EtOAc/cyclohexane 60:40); ^1H NMR (300 MHz, $CDCl_3$) δ 9.76 (t, *J* = 1.5 Hz, 1H), 7.92 (d, *J* = 8.7 Hz, 2H), 6.92 (d, *J* = 8.7 Hz, 2H), 3.86 (s, 3H), 2.92 (t, *J* = 7.2 Hz, 2H), 2.45 (td, *J* = 7.2 Hz, *J* = 1.5 Hz, 2H), 1.79-1.62 (m, 4H), 1.46-1.38 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.7, 198.8, 163.5, 130.4, 130.1, 113.8, 55.6, 43.8, 38.0, 28.9, 24.2, 22.0; IR (neat): 2937, 2851, 2722, 1721, 1676, 1601, 1575, 1510, 1259, 1172, 1029, 837 cm^{-1}; exact mass calculated for $C_{14}H_{18}Li_1O_3$ ($M+Li^+$) : 241.1411 ; found 241.1400.



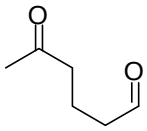
7-(4-Bromo-phenyl)-7-oxo-heptanal (3h)

85% as white solid after purification by flash chromatography (EtOAc/cyclohexane 60:40); ^1H NMR (200 MHz, $CDCl_3$) δ 9.81 (t, *J* = 1.5 Hz, 1H), 8.01-7.82 (m, 2H), 7.66-7.45 (m, 2H), 3.00 (t, *J* = 7.4 Hz, 2H), 2.5 (td, *J* = 7 Hz, *J* = 1.5 Hz, 2H), 1.89-1.65 (m, 4H), 1.54-1.40 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.6, 199.1, 132.0, 129.6, 128.7, 128.1, 43.8, 38.3, 28.8, 23.9, 21.9; IR (neat): 2940, 2862, 2717, 1722, 1685, 1584, 1397, 1215, 1008, 692 cm^{-1}; exact mass calculated for $C_{13}H_{15}Br_1Li_1O2$ ($M+Li^+$) : 289.0410 ; found 289.0403.



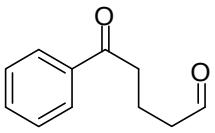
7-Naphthalen-2-yl-7-oxo-heptanal (3i)

87% as white solid after purification by flash chromatography (cyclohexane/EtOAc 80/20); ^{1}H NMR (200 MHz, $CDCl_3$) δ 9.76 (t, *J* = 1.5 Hz, 1H), 8.45 (s, 1H), 8.04-7.84 (m, 4H), 7.63-7.49 (m, 2H), 3.09 (t, *J* = 7.2 Hz, 2H), 2.46 (td, *J* = 7.2 Hz, *J* = 1.5 Hz, 2H), 1.88-1.62 (m, 4H), 1.52-1.36 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.7, 200.1, 135.6, 134.3, 132.6, 129.7, 129.6, 128.5, 127.8, 126.8, 123.9, 43.8, 38.3, 28.9, 24.1, 22.0; IR (neat): 3061, 2938, 2863, 1719, 1682, 1461, 1410, 816 cm^{-1}; exact mass calculated for $C_{17}H_{18}Li_1O_2$ ($M+Li^+$) : 261.1462 ; found 261.1458.



5-Oxo-hexanal (3j)

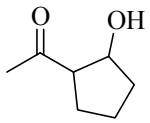
Synthesized according to literature[2]: colorless oil after purification by flash chromatography (cyclohexane/EtOAc 70/30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.76 (t, *J* = 1.5 Hz, 1H), 2.52-2.45 (m, 4H), 2.13 (bs, 3H), 1.89 (qt, *J* = 7.2 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 207.7, 201.7, 42.6, 41.9, 29.6, 15.7.



5-Oxo-5-phenyl-pentanal (3k)

51% as yellow pale oil after purification by flash chromatography (cyclohexane/EtOAc 50/50) ; ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.79 (t, *J* = 1.5 Hz, 1H), 7.94 (m, 2H), 7.58-7.42 (m, 3H), 3.03 (t, *J* = 7.2 Hz, 2H), 2.58 (td, *J* = 7.2 Hz, *J* = 1.5 Hz, 2H), 2.06 (qt, *J* = 7.2 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 181.0, 178.8, 126.8, 123.8, 120.0, 119.5, 48.9, 44.1, 26.8; IR

(neat): 2942, 2896, 2823, 2726, 1722, 1685, 1598, 1580, 1449, 1372, 1230, 748, 692 cm^{-1} ; exact mass calculated for $C_{11}H_{12}Li_1O_2$ ($M+Li^+$) : 183.0992 ; found 183.0984.

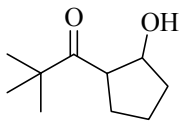


1-(2-Hydroxy-cyclopentyl)-ethanone (4a)

The product was partly lost in the aqueous phase thus no work up was used and the reaction medium was directly poured on the column for purification.

Ratio of diasteroisomers (anti/syn): 69/31

93% as colorless oil after purification by flash chromatography (cyclohexane/EtOAc 80:20); Syn diastereoisomer: Rf = 0.42 (cyclohexane/EtOAc 60:40); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.48 (q, *J* = 3.6 Hz, 1H), 2.77 (td, *J* = 9.06 Hz, *J* = 4.38 Hz, 1H), 2.21 (s, 3H), 2.02-1.89 (m, 3H), 1.79-1.64 (m, 3H) ; ^{13}C NMR (75 MHz, $CDCl_3$) δ 212.2, 74.0, 57.2, 34.5, 30.5, 25.8, 22.2; IR (neat): 3448, 2962, 2877, 1706, 1364, 1184, 595 cm^{-1}; Anti diastereoisomer: Rf = 0.36 (cyclohexane/EtOAc 60:40); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.36 (q, *J* = 6.24 Hz, 1H), 2.78 (td, *J* = 8.43 Hz, *J* = 6.24 Hz, 1H), 2.20 (s, 3H), 2.05-1.57 (m, 6H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 210.9, 75.1, 60.5, 34.7, 29.6, 27.0, 22.3; IR (neat): 3402, 2963, 2876, 1698, 1365, 1184, 665 cm^{-1}; exact mass calculated for $C_7H_{12}O_2$ (M^+) : 128.08373 ; found 128.0832.

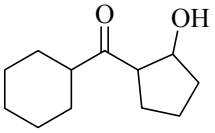


1-(2-Hydroxy-cyclopentyl)-2,2-dimethyl-propan-1-one (4b)

Ratio of diasteroisomers (anti/syn): 23/77

60% as colorless oil after purification by flash chromatography (cyclohexane/EtOAc 80:20); Syn diastereoisomer: Rf = 0.51 (cyclohexane/EtOAc 70:30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.21 (s, 1H), 3.72 (s, 1H), 3.07 (td, *J* = 9.3 Hz, *J* = 4.1 Hz, 1H), 1.90-1.50 (m, 6H), 1.08 (s, 9H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 221.5, 75.4, 49.1, 44.9, 35.3, 29.2, 25.7, 22.3; IR (neat):

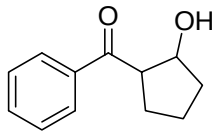
3464, 2969, 2873, 1699, 1680, 1478, 1396, 1366, 1085 cm^{-1}; Anti diastereoisomer: Rf = 0.36 (cyclohexane/EtOAc 70:30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.36 (q, *J* = 6 Hz, 1H), 3.20 (td, *J* = 8.7 Hz, *J* = 5.7 Hz, 1H), 2.01-1.93 (m, 2H), 1.78-1.70 (m, 3H), 1.65-1.49 (m, 2H), 1.14 (s, 9H) ; ^{13}C NMR (75 MHz, $CDCl_3$) δ 218.9, 77.6, 54.3, 44.5, 35.3, 30.5, 26.0, 23.2; IR (neat): 3455, 2957, 2871, 1731, 1449, 1365, 1287, 1261, 1169, 1140, 1059, 1015 cm^{-1}; exact mass calculated for $C_{10}H_{16}O$ ($M-H_2O^+$) : 152.12012 ; found 152.1208.



Cyclohexyl-(2-hydroxy-cyclopentyl)-methanone (4c)

Ratio of diasteroisomers (anti/syn): 77/23

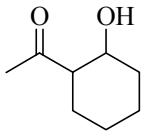
59% as colorless oil after purification by flash chromatography (cyclohexane/EtOAc 80:20); Syn diastereoisomer: Rf = 0.51 (cyclohexane/EtOAc 70:30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.40 (m, 1H), 3.48 (s, 1H), 2.89 (td, *J* = 9.3 Hz, *J* = 3.9 Hz, 1H), 2.48-2.39 (m, 1H), 2.00-1.10 (m, 17H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 218.7, 74.6, 53.9, 51.3, 34.7, 28.6, 28.1, 26.9, 25.9, 25.8, 25.6, 22.3; IR (neat): 3482, 2932, 2855, 1705, 1450 cm^{-1}; Anti diastereoisomer: Rf = 0.4 (cyclohexane/EtOAc 70:30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.31 (q, *J* = 6 Hz, 1H), 2.92 (td, *J* = 8.4 Hz, *J* = 5.4 Hz, 1H), 2.49-2.39 (m, 2H), 2.03-1.51 (m, 10H), 1.38-1.09 (m, 6H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 216.3, 75.6, 58.0, 50.6, 34.8, 28.5, 28.3, 27.8, 25.9, 25.7, 25.7, 22.6; IR (neat): 3423, 2930, 2855, 1701, 1449, 1375, 1347, 1004 cm^{-1}; exact mass calculated for $C_{12}H_{18}O$ ($M-H_2O^+$) : 178.13577 ; found 178.1362.



(2-Hydroxy-cyclopentyl)-phenyl-methanone (4d)

Ratio of diasteroisomers (anti/syn): 83/17

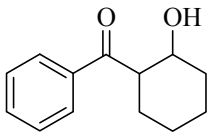
90% as colorless oil after purification by flash chromatography (cyclohexane/EtOAc 80:20); Syn diastereoisomer: Rf = 0.51 (cyclohexane/EtOAc 60:40); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.95 (m, 2H), 7.61-7.45 (m, 3H), 4.59 (m, 1H), 3.83 (s, 1H), 3.58 (td, *J* = 9.3 Hz, *J* = 3.9 Hz, 1H), 2.13-1.75 (m, 6H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 204.5, 137.2, 133.6, 128.9, 128.5, 75.1, 51.1, 34.8, 28.2, 22.5; IR (neat): 3443, 2962, 1681, 1597, 1580, 1448, 1261, 1223, 1096, 1024, 798, 693 cm^{-1}; Anti diastereoisomer: Rf = 0.42 (cyclohexane/EtOAc 60:40); ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.01 (m, 2H), 7.59-7.44 (m, 3H), 4.60 (q, *J* = 5.4 Hz, 1H), 3.66 (m, 1H), 2.21-1.68 (m, 7H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.2, 136.7, 133.1, 128.6, 75.8, 55.3, 35.0, 28.9, 23.0; IR (neat): 3409, 2960, 1676, 1448, 1219, 1004, 701 cm-1; exact mass calculated for $C_{12}H_{12}O$ ($M\text{-}H_2O^+$) : 172.08882 ; found 172.0881.



1-(2-Hydroxy-cyclohexyl)-ethanone (4e)

Ratio of diasteroisomers (anti/syn): 83/17

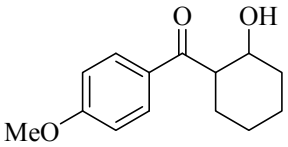
33% as colourless oil for both diastereoisomers after purification by flash chromatography (cyclohexane/EtOAc 60:40); Syn diastereoisomer: ^{1}H NMR (300 MHz, $CDCl_3$) δ 3.73 (m, 1H), 2.71 (bs, 1H), 2.31 (m, 1H), 2.15 (s, 3H), 1.93 (m, 2H), 1.72 (m, 2H), 1.21 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 213.0, 70.8, 58.9, 33.8, 29.2, 28.0, 25.4, 24.5; IR (neat): 3422, 2934, 2859, 1702, 1450, 1424, 1356, 1172, 1066, 962, 609 cm^{-1}; Anti diastereoisomer: ^{1}H NMR (300 MHz, $CDCl_3$) δ 3.76 (td, *J* = 9.6 Hz, *J* = 4.5 Hz, 1H), 2.53 (bs, 1H), 2.33 (m, 1H), 2.16 (s, 3H), 1.96 (m, 2H), 1.73 (m, 2H), 1.25 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 212.9, 70.8, 59.0, 33.8, 29.2, 28.0, 25.4, 24.5; IR (neat): 3415, 2934, 2859, 1702, 1450, 1424, 1357, 1172, 1066, 609 cm^{-1}; exact mass calculated for $C_8H_{14}O_2$ (M^+) : 142.09938 ; found 142.1001.



(2-Hydroxy-cyclohexyl)-phenyl-methanone (4f)

Ratio of diasteroisomers (anti/syn): 83/17

91% as white solid after purification by flash chromatography (cyclohexane/EtOAc 80:20); During purification the syn isomer (Rf = 0.6 (cyclohexane/EtOAc 60:40)) epimerized to the anti one. Isolated diastereoisomer (Anti): Rf = 0.53 (cyclohexane/EtOAc 60:40); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.96 (m, 2H), 7.59-7.43 (m, 3H), 4.08 (m, 1H), 3.26 (m, 1H), 2.40 (bs, 1H), 2.12-1.96 (m, 2H), 1.86-1.74 (m, 2H), 1.51-1.27 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 203.8, 136.7, 133.1, 128.6, 128.5, 70.8, 53.8, 33.7, 29.7, 25.5, 24.6; IR (neat): 3436, 2934, 2858, 1676, 1597, 1580, 1448, 1211, 1063, 942, 701 cm^{-1}; mp : 75-77 °C; exact mass calculated for $C_{13}H_{16}O_2$ (M^+) : 204.11503 ; found 204.1158.

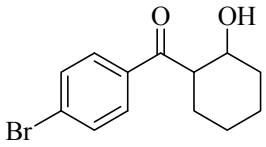


(2-Hydroxy-cyclohexyl)-(4-methoxy-phenyl)-methanone (4g)

Ratio of diasteroisomers (anti/syn): 55/45

85% as white solid after purification by flash chromatography (cyclohexane/EtOAc 50:50); Syn diastereoisomer: Rf = 0.59 (cyclohexane/EtOAc 40:60); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.94-7.90 (m, 2H), 6.96-6.93 (m, 2H), 4.26 (m, 1H), 3.88 (s, 3H), 3.32-3.29 (m, 1H), 1.99-1.66 (m, 5H), 1.57-1.40 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 204.6, 163.9, 130.8, 128.6, 113.9, 66.5, 55.5, 47.6, 32.0, 25.7, 24.9, 19.6; IR (neat): 3483, 2935, 2859, 1655, 1600, 1510, 1420, 1253, 1171, 978, 847 cm^{-1}; mp : 74.5-77 °C; Anti diastereoisomer: Rf = 0.46 (cyclohexane/EtOAc 40:60); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.96 (m, 2H), 6.94 (m, 2H), 4.07 (m, 1H), 3.87 (s, 3H), 3.22 (m, 1H), 2.34 (bs, 1H), 2.07-1.96 (m, 2H), 1.86-1.74 (m, 2H), 1.45-1.20 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.2, 163.6, 130.8, 129.6, 113.8, 70.8, 55.5, 53.5, 33.7, 29.9, 25.5, 24.7; IR (neat): 3449, 2935, 2858, 1667, 1601, 1510, 1421, 1253,

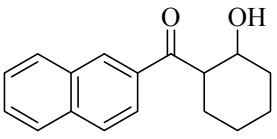
1172, 942, 838 cm^{-1}; mp : 100-102 °C; exact mass calculated for $C_{14}H_{18}O_3$ (M^+) : 234.12559 ; found 234.1263.



(4-Bromo-phenyl)-(2-hydroxy-cyclohexyl)-methanone (4h)

Ratio of diasteroisomers (anti/syn): 83/17

66% as colorless oil of the first diastereoisomer and white solid of the second one, after purification by flash chromatography (cyclohexane/EtOAc 90:10); Syn diastereoisomer coelutes with an unidentified minor compound : Rf = 0.54 (cyclohexane/EtOAc 70:30); ^1H NMR (300 MHz, $CDCl_3$) δ 7.80-7.77 (m, 2H), 7.64-7.60 (m, 2H), 4.27 (bs, 1H), 3.77 (bs, 1H), 3.29 (m, 1H), 2.04-1.4 (m, 8H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 205.2, 132.5, 130.3, 129.1, 128.8, 66.8, 48.6, 32.3, 25.9, 25.0, 20.0; IR (neat): 3495, 2934, 2860, 1682, 1667, 1585, 1566, 1447, 1397, 1251, 1211, 1176, 1071, 1010, 978, 848, 704, 517 cm^{-1}; Anti diastereoisomer : Rf = 0.43 (cyclohexane/EtOAc 70:30); ^1H NMR (300 MHz, $CDCl_3$) δ 7.83-7.79 (m, 2H), 7.61-7.57 (m, 2H), 4.08-4.00 (m, 1H), 3.24-3.16 (m, 1H), 2.35 (bs, 1H), 2.10-1.74 (m, 4H), 1.44-1.27 (m, 4H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 202.8, 135.4, 132.0, 130.0, 128.4, 70.9, 53.8, 33.8, 29.6, 25.5, 24.6; IR (neat): 3423, 2934, 2858, 1675, 1585, 1397, 1070, 941 cm^{-1}; mp : 106-107.5 °C; exact mass calculated for $C_{13}H_{15}Br_1O_2$ (M^+) : 282.02554 ; found 282.0257.

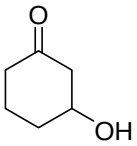


(2-Hydroxy-cyclohexyl)-naphthalen-2-yl-methanone (4i)

Ratio of diasteroisomers (anti/syn): 77/23

87% as colorless oil of the first diastereoisomer and white solid of the second one, after purification by flash chromatography (cyclohexane/EtOAc 80:20); Syn diastereoisomer

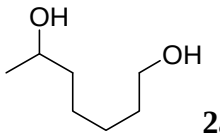
coelutes with an unidentified minor compound : Rf = 0.58 (cyclohexane/EtOAc 70:30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.44 (s, 1H), 8.00-7.85 (m, 4H), 7.59 (m, 2H), 4.34 (bs, 1H), 4.05 (bs, 1H), 3.53 (m, 1H), 2.05-1.43 (m, 8H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 206.1, 135.9, 133.2, 132.6, 130.3, 129.8, 128.8, 128.3, 127.9, 127.0, 124.1, 66.6, 48.3, 32.1, 25.8, 25.0, 19.8; IR (neat): 3498, 2934, 2859, 1677, 1626, 1467, 1446, 1259, 1174, 1127, 981, 776, 476 cm^{-1}; Anti diastereoisomer : Rf = 0.39 (cyclohexane/EtOAc 70:30); ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.47 (s, 1H), 8.00 (dd, *J* = 8.7 Hz, *J* = 1.8 Hz, 1H), 7.94 (d, *J* = 7.8 Hz, 1H), 7.84 (m, 2H), 7.55 (m, 2H), 4.12 (td, *J* = 9.9 Hz, *J* = 3.9 Hz, 1H), 3.44 (m, 1H), 2.69 (bs, 1H), 2.06 (m, 2H), 1.81 (m, 2H), 1.56-1.26 (m, 4H) ; ^{13}C NMR (75 MHz, $CDCl_3$) δ 203.8, 135.6, 134.0, 132.6, 130.2, 129.7, 128.5, 127.8, 126.8, 124.2, 70.9, 53.9, 33.8, 29.9, 25.6, 24.7; IR (neat): 3443, 2934, 2858, 1672, 1627, 1467, 1450, 1182, 1126, 1064, 934, 755, 476 cm^{-1}; m.p.: 100-102 °C; exact mass calculated for $C_{17}H_{18}O_2$ (M^+) : 254.13068 ; found 254.1310.



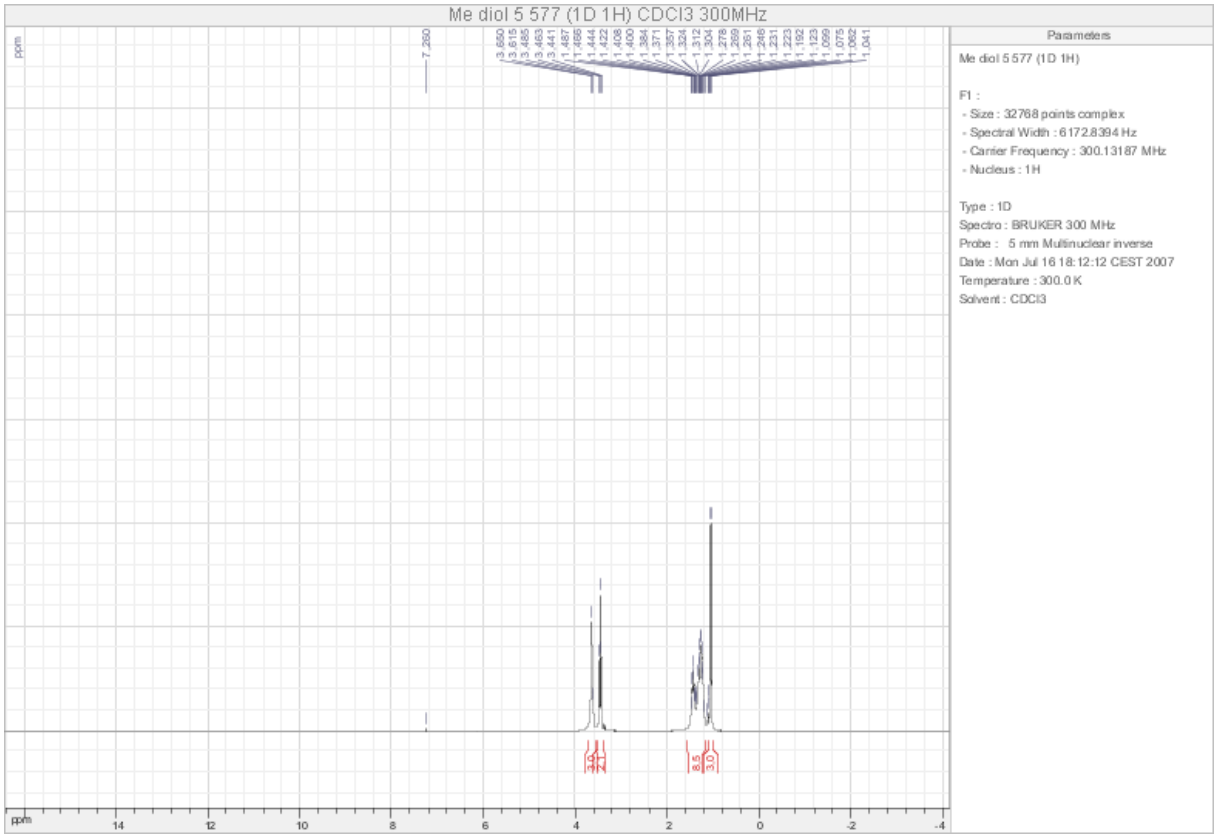
3-Hydroxy-cyclohexanone (4j)

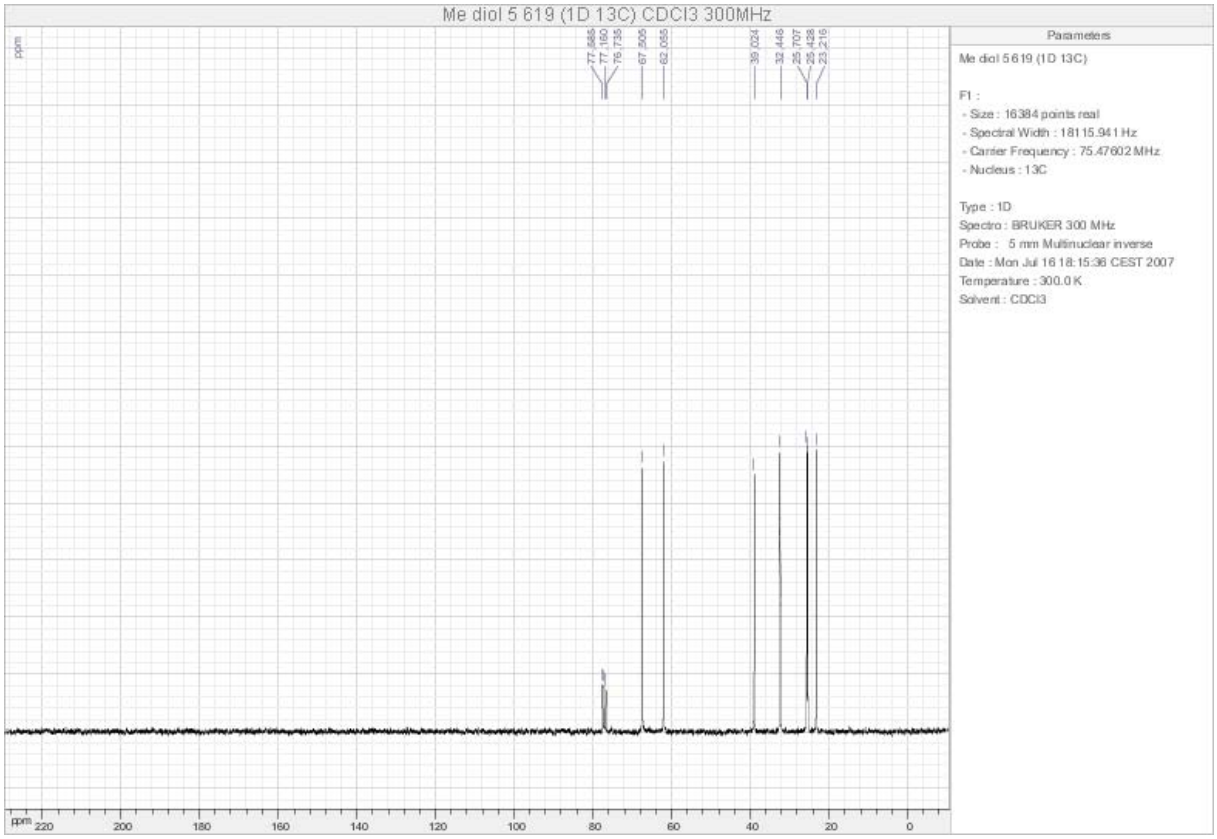
82% as colorless oil after purification by flash chromatography (cyclohexane/EtOAc 50/50); Rf = 0.26 (cyclohexane/EtOAc 30:70); ^{1}H NMR (300 MHz, $CDCl_3$) δ 4.14-4.07 (m, 1H), 3.34 (bs, 1H), 2.56 (dd, *J* = 14.1 Hz, *J* = 4.2 Hz, 1H), 2.33 (dd, *J* = 13.8 Hz, *J* = 7.4 Hz, 1H), 2.23 (t, *J* = 6.6 Hz, 2H), 2.06-1.88 (m, 2H), 1.77-1.57 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 210.9, 69.5, 50.3, 40.9, 32.6, 20.6; IR (neat): 3407, 2949, 2885, 1704, 1452, 1423, 1363, 1347, 1315, 1269, 1224, 1105, 1094, 1064, 965, 531 cm^{-1}; exact mass calculated for $C_6H_{10}O_2$ (M^+) : 114.06808 ; found 114.0688.

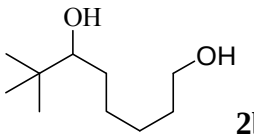
IV. NMR spectras



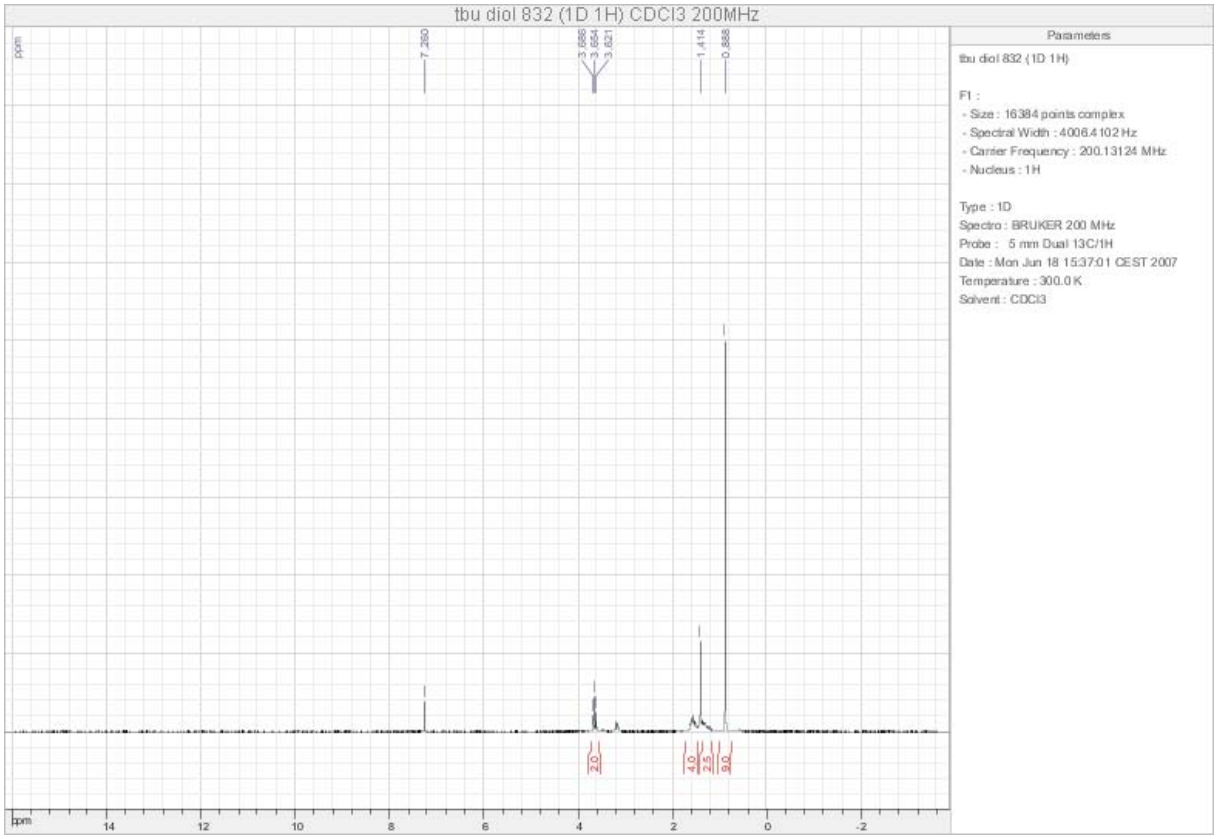
2a

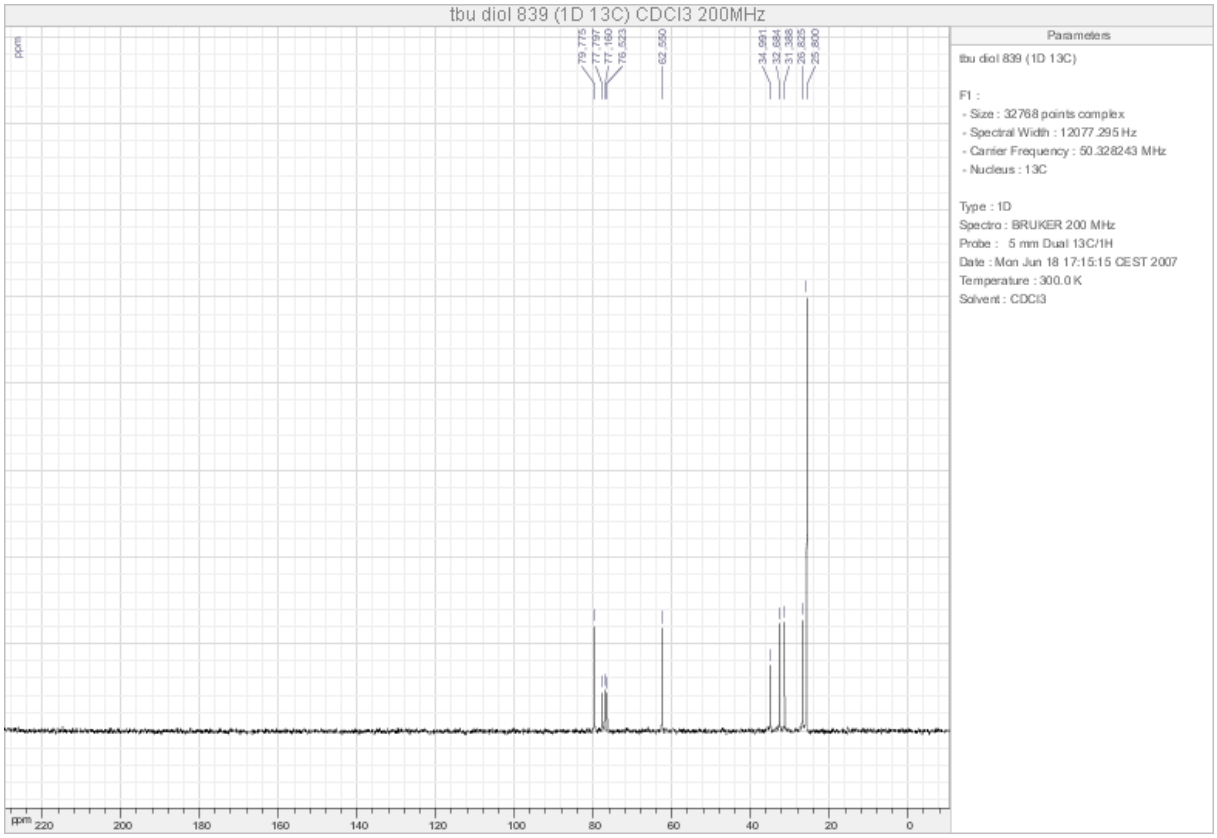


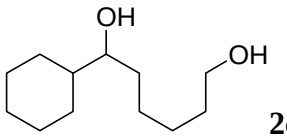



OH
OH

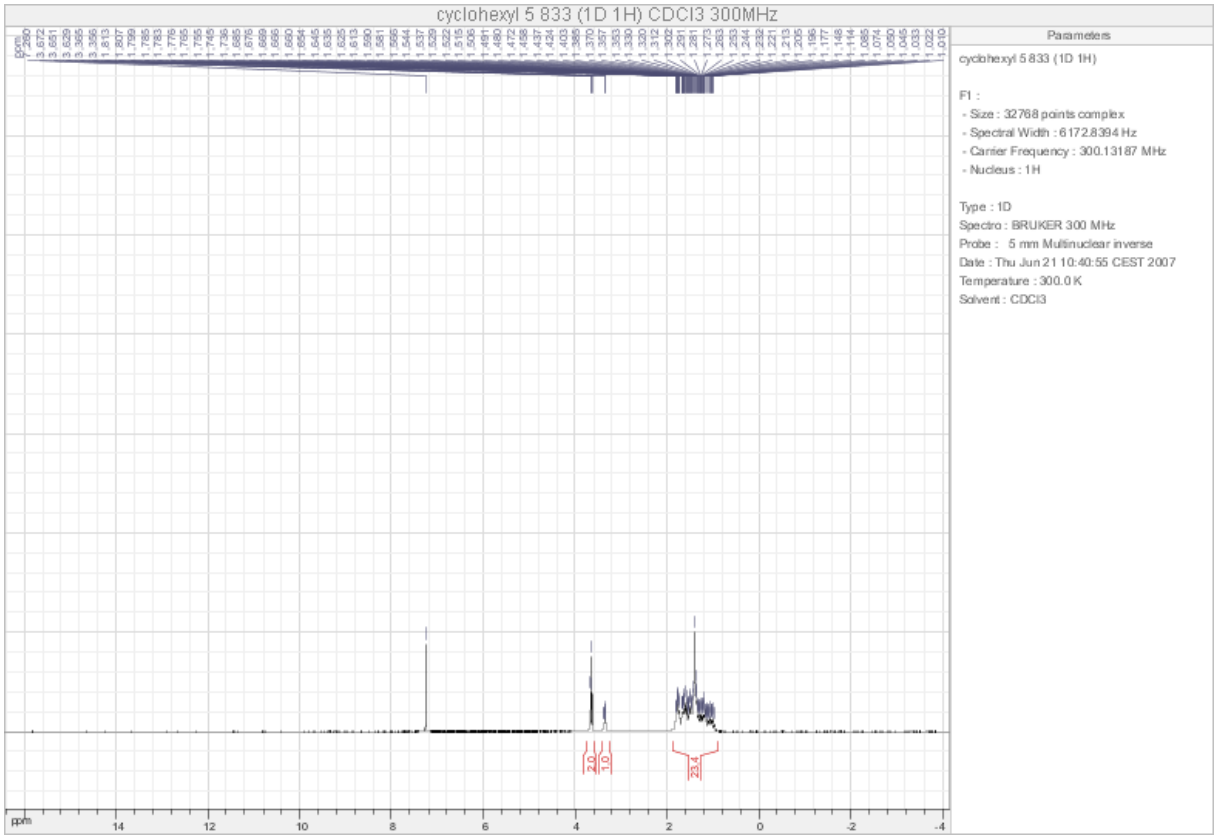
2b

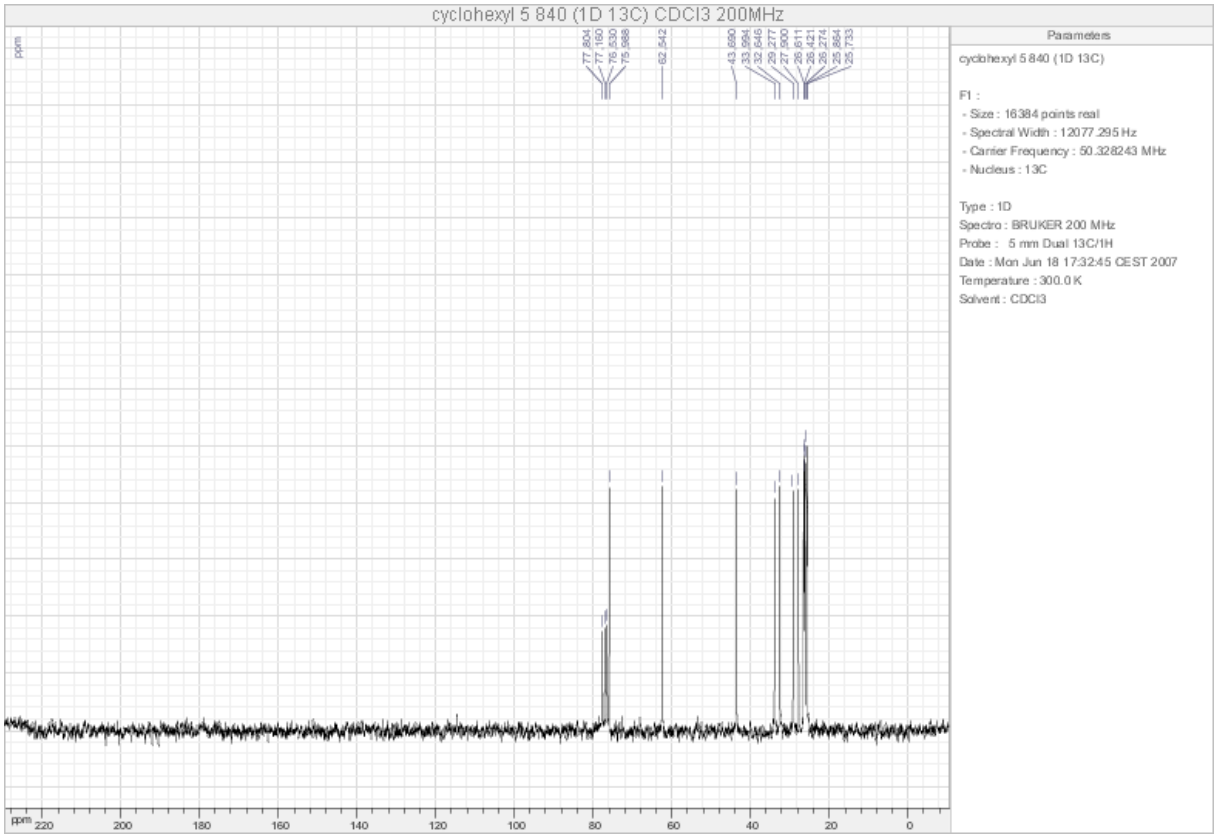

tbu diol 832 (1D 1H) CDCl3 200MHz
Parameters
tbu diol 832 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 15:37:01 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

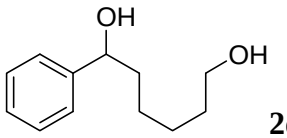

tbu diol 839 (1D 13C) CDCl3 200MHz
Parameters
tbu diol 839 (1D 13C)
F1 :
- Size : 32768 points complex
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 17:15:15 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH

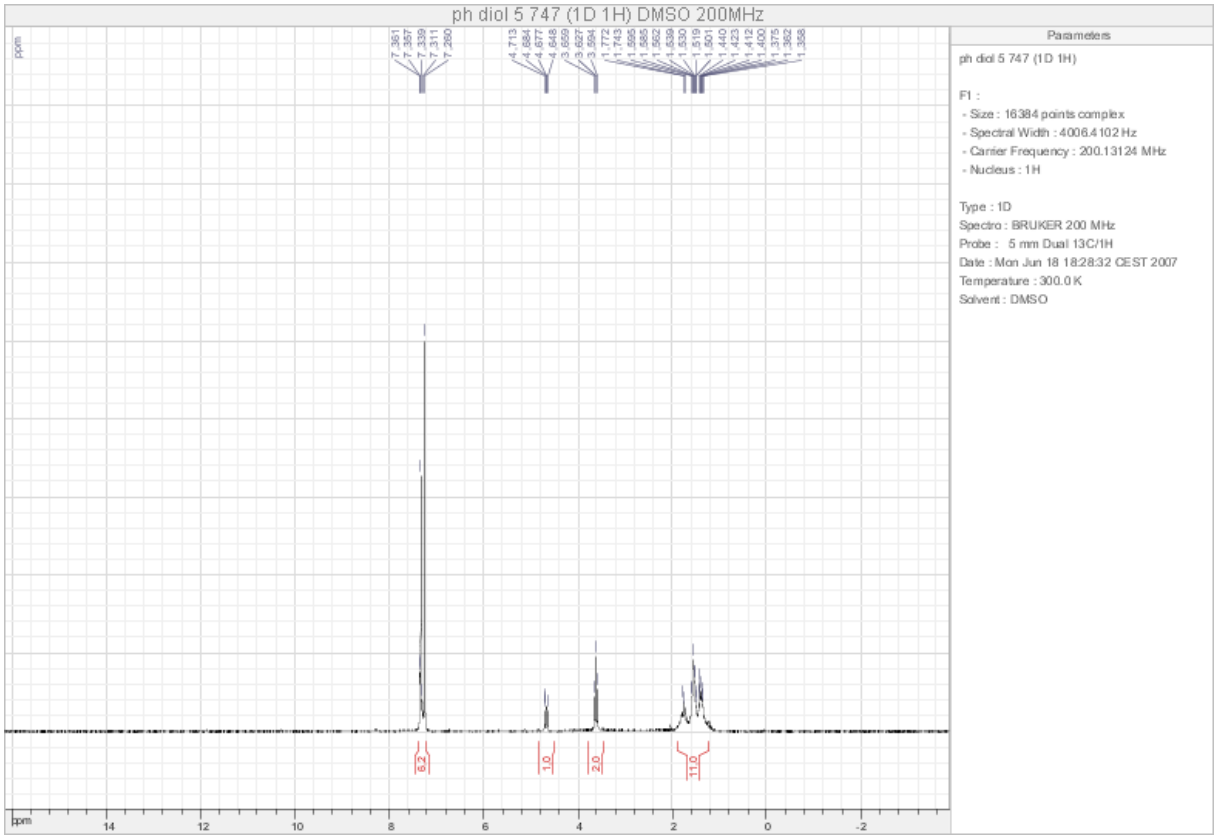
2c

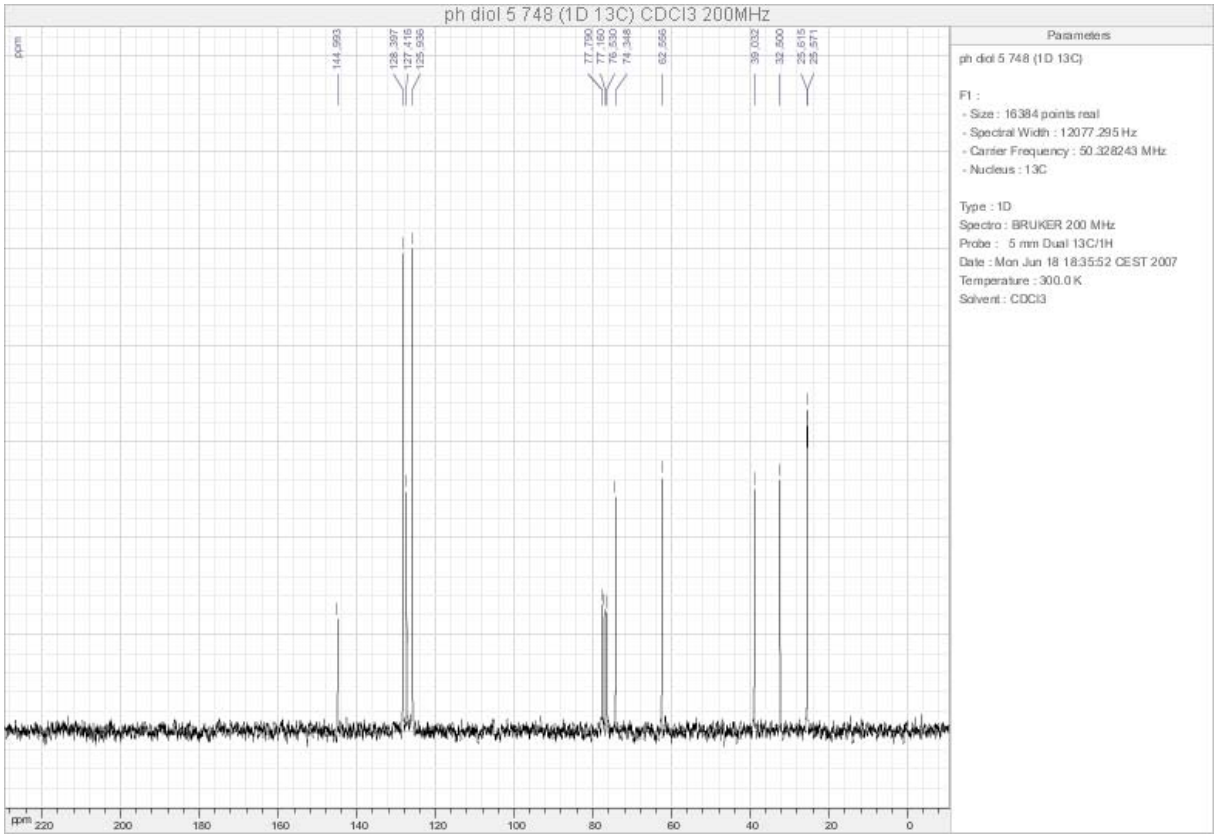

cyclohexyl 5 833 (1D 1H) CDCl3 300MHz
Parameters
cyclohexyl 5 833 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Jun 21 10:40:55 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

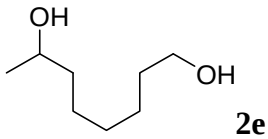

cyclohexyl 5 840 (1D 13C) CDCl3 200MHz
Parameters
cyclohexyl 5 840 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 17:32:45 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH

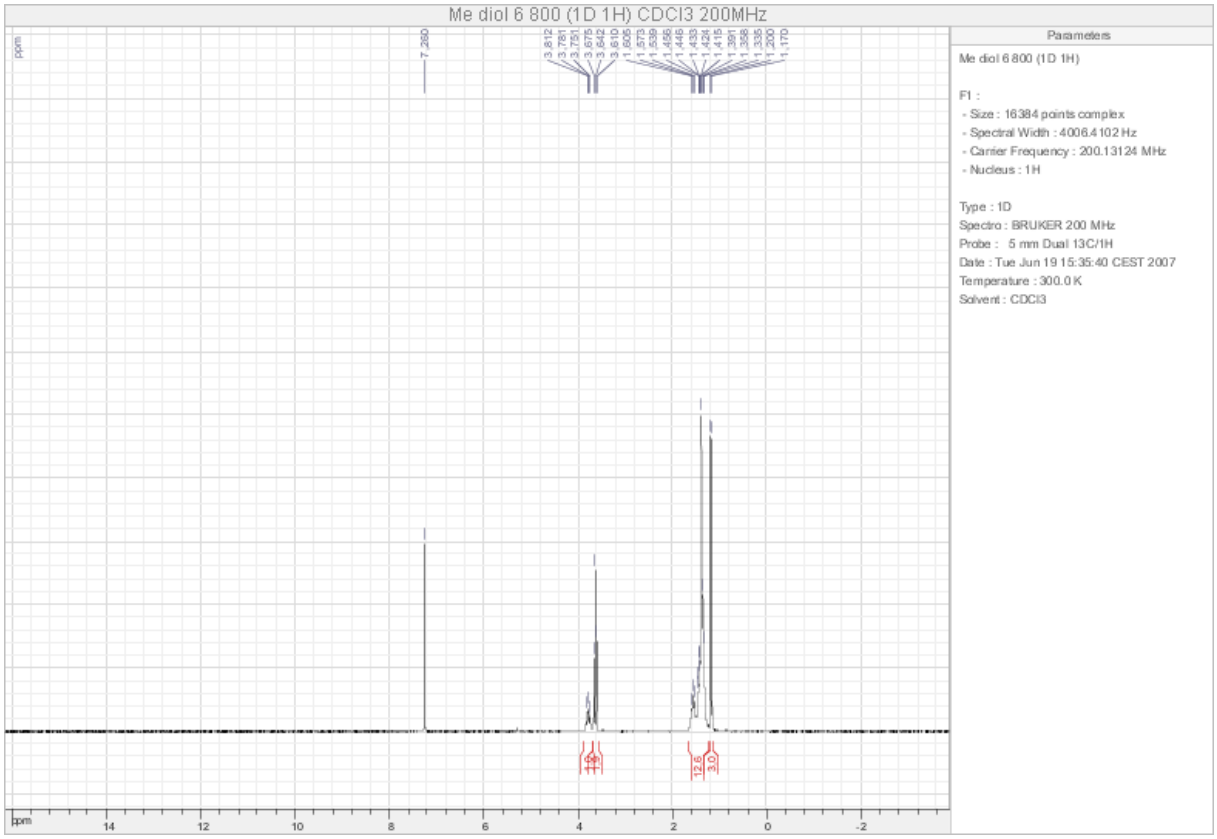
2d

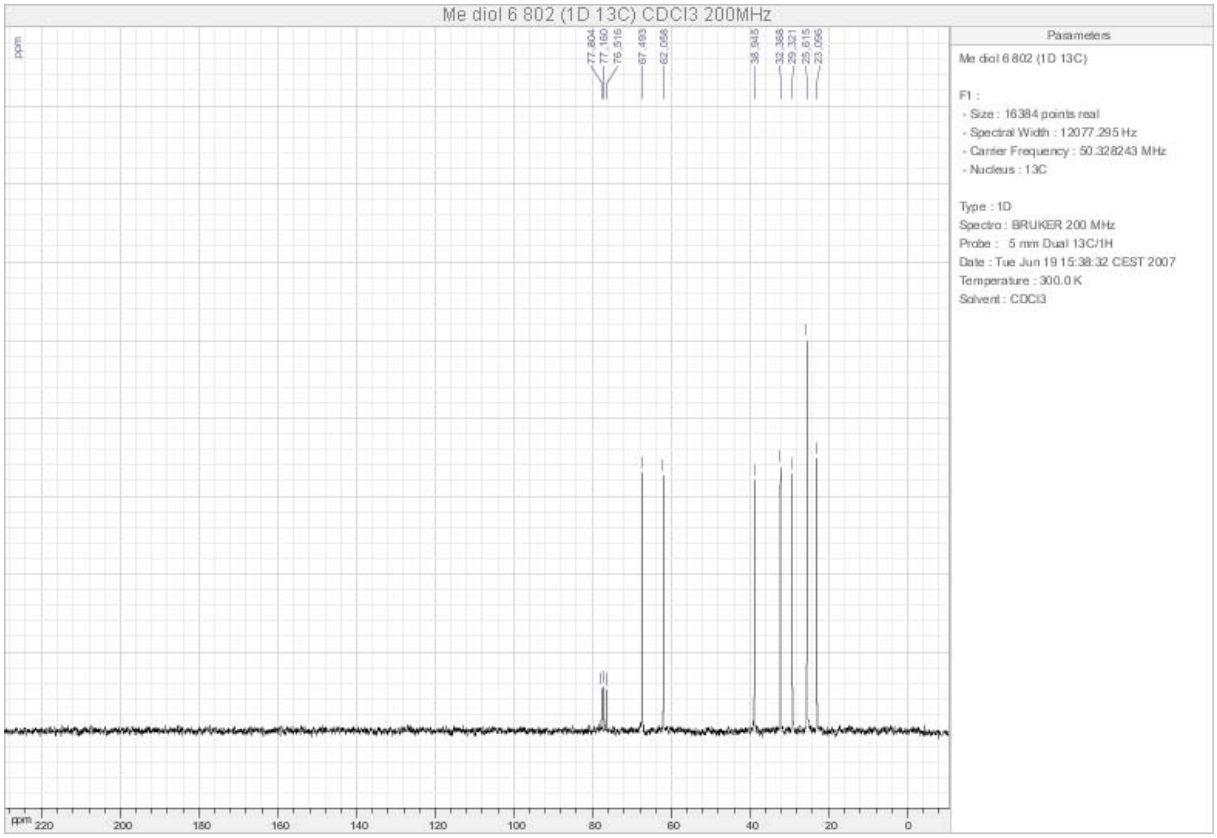

ph diol 5 747 (1D 1H) DMSO 200MHz
Parameters
ph diol 5 747 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 18:28:32 CEST 2007
Temperature : 300.0 K
Solvent : DMSO

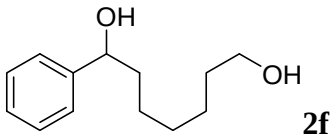

ph diol 5 748 (1D 13C) CDCl3 200MHz
Parameters
ph diol 5 748 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 18:35:52 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH

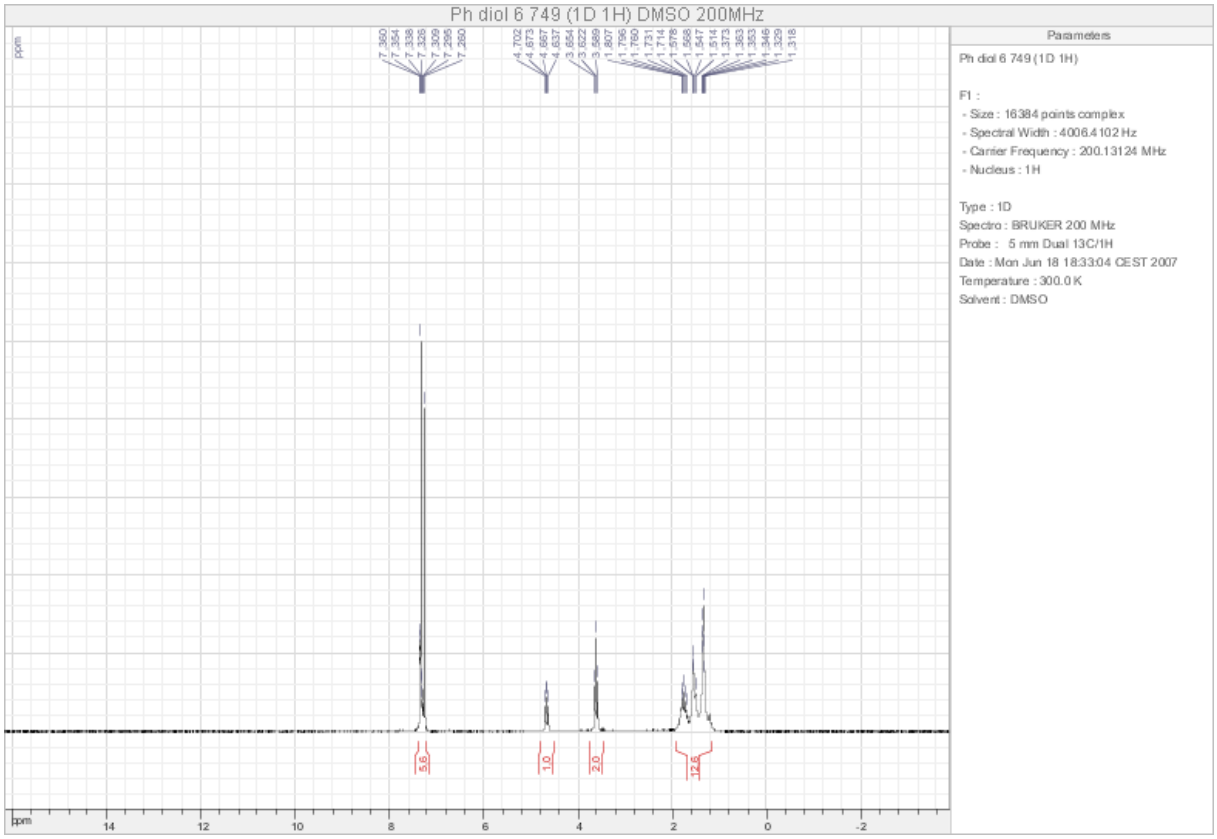
2e

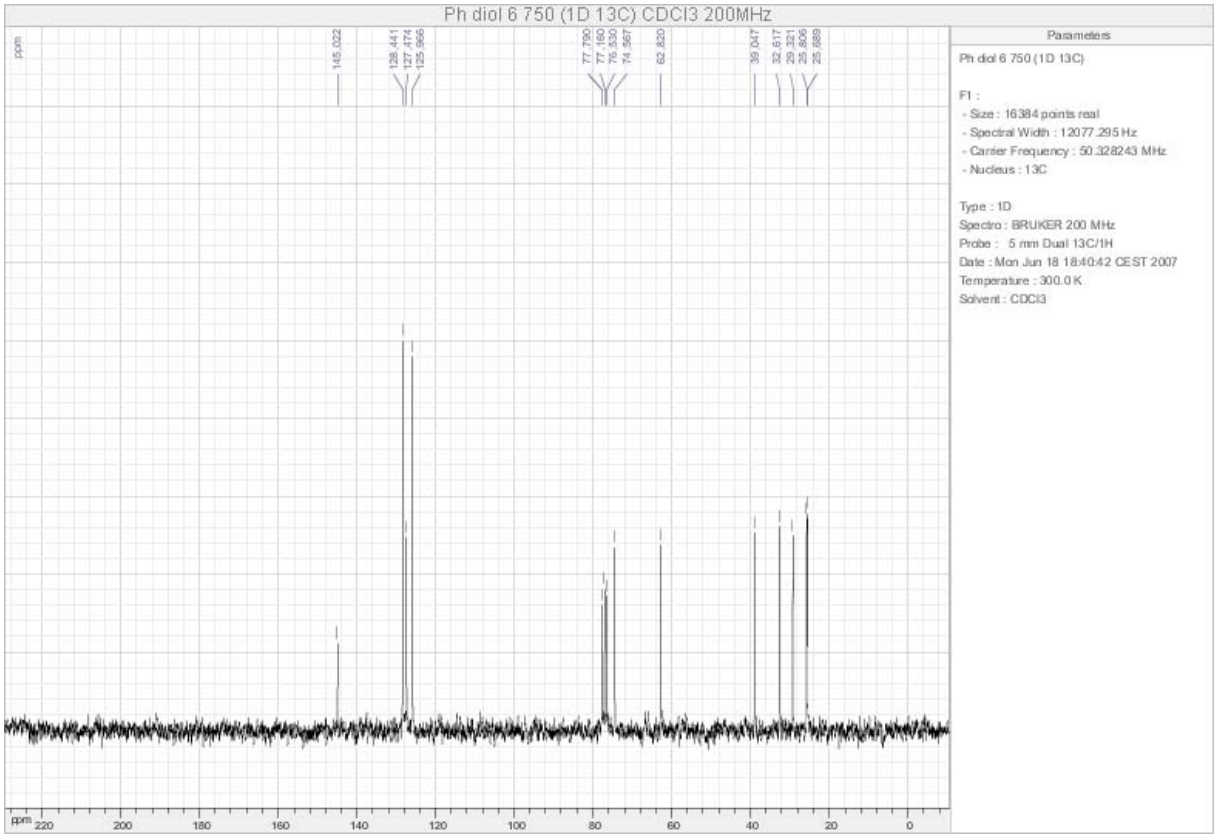

Me diol 6 800 (1D 1H) CDCl3 200MHz
Parameters
Me diol 6 800 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 19 15:35:40 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

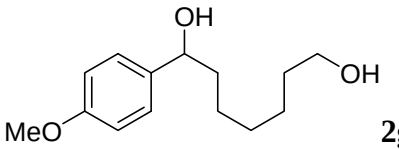

Me diol 6 802 (1D 13C) CDCl3 200MHz
Parameters
Me diol 6 802 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 19 15:38:32 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH

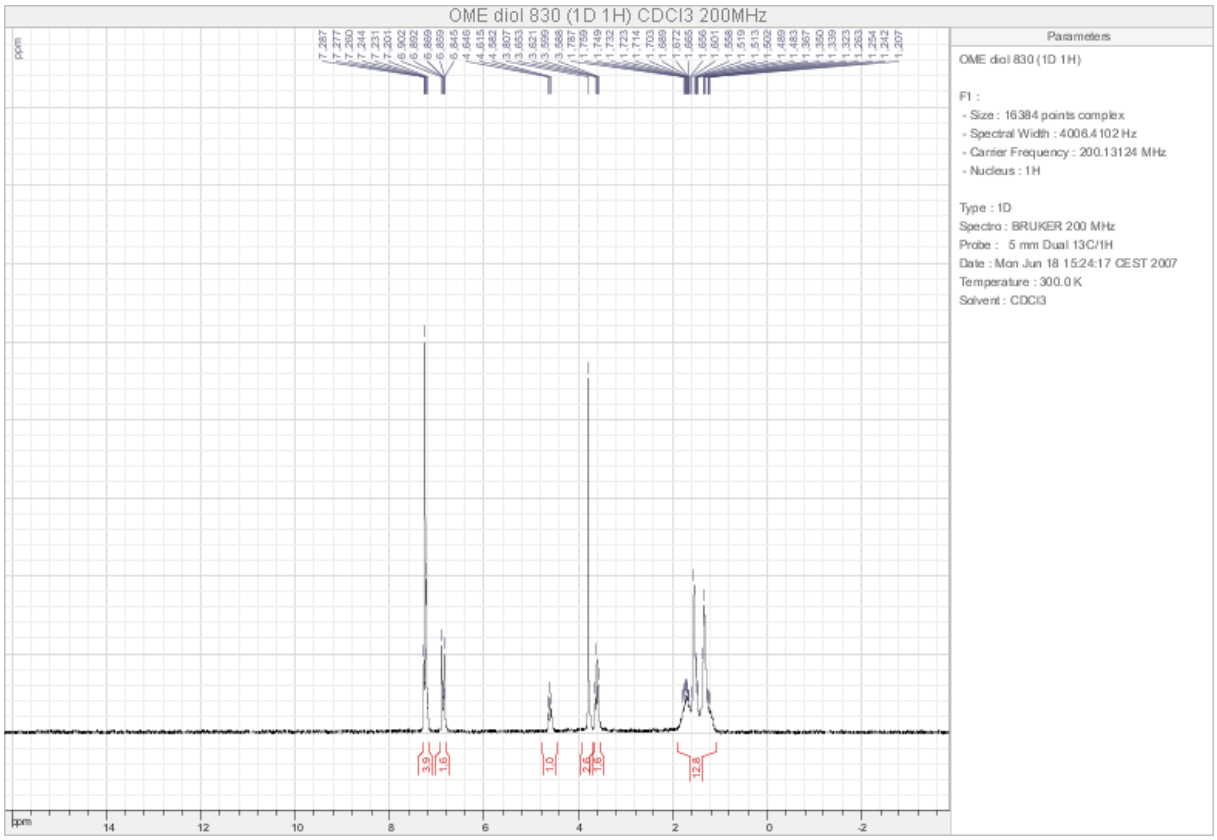
2f

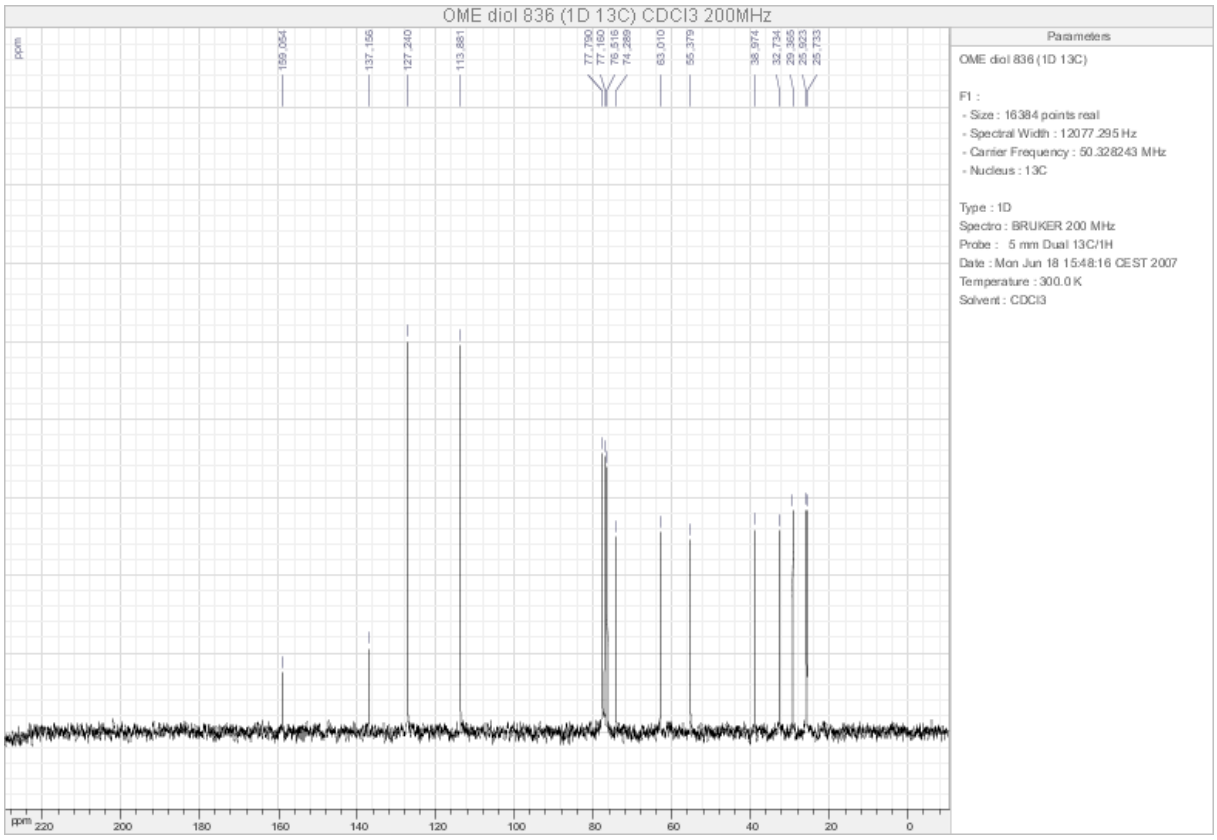

Ph diol 6 749 (1D 1H) DMSO 200MHz
Parameters
Ph diol 6 749 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 18:33:04 CEST 2007
Temperature : 300.0 K
Solvent : DMSO
ppm
5.6
1.0
2.0
12.6

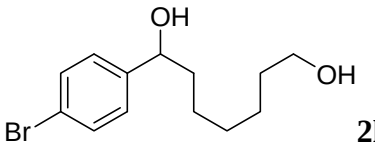

Ph diol 6 750 (1D 13C) CDCl3 200MHz
Parameters
Ph diol 6 750 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 18:40:42 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm


OH
OH
MeO

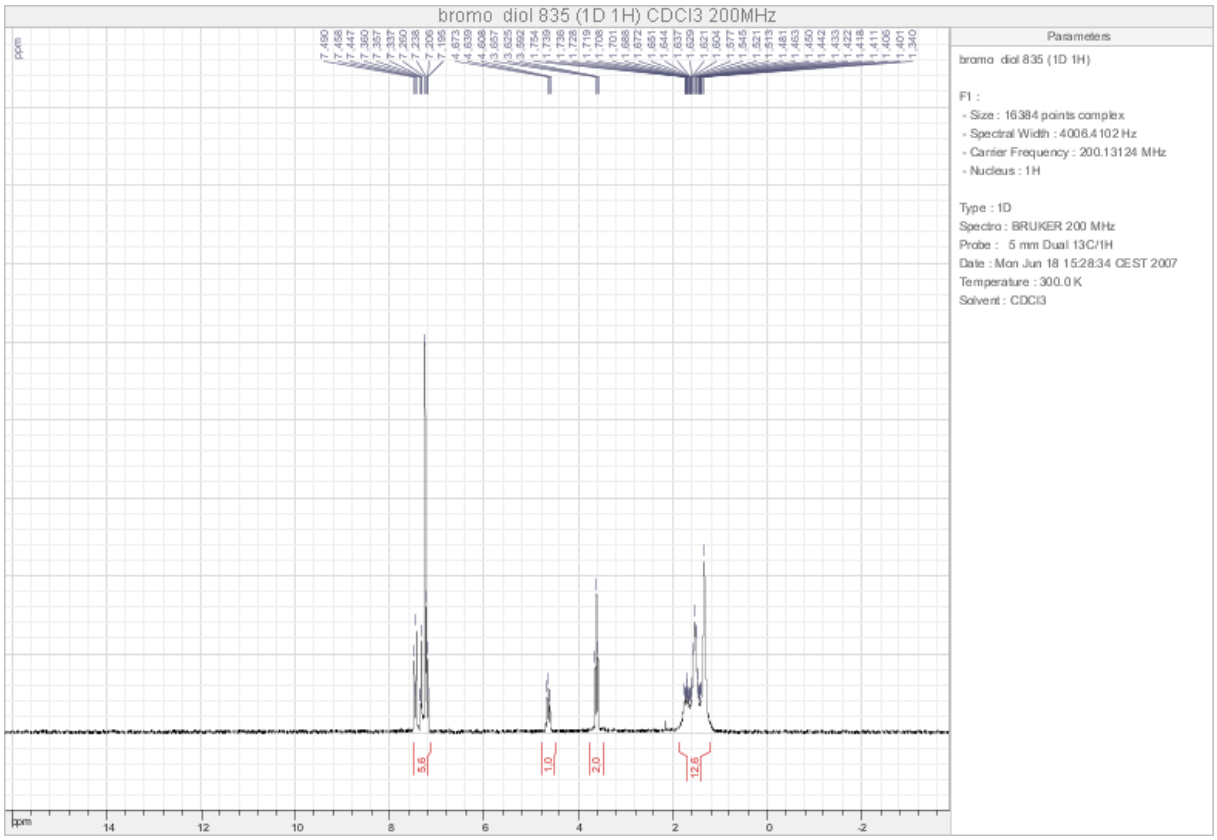
2g

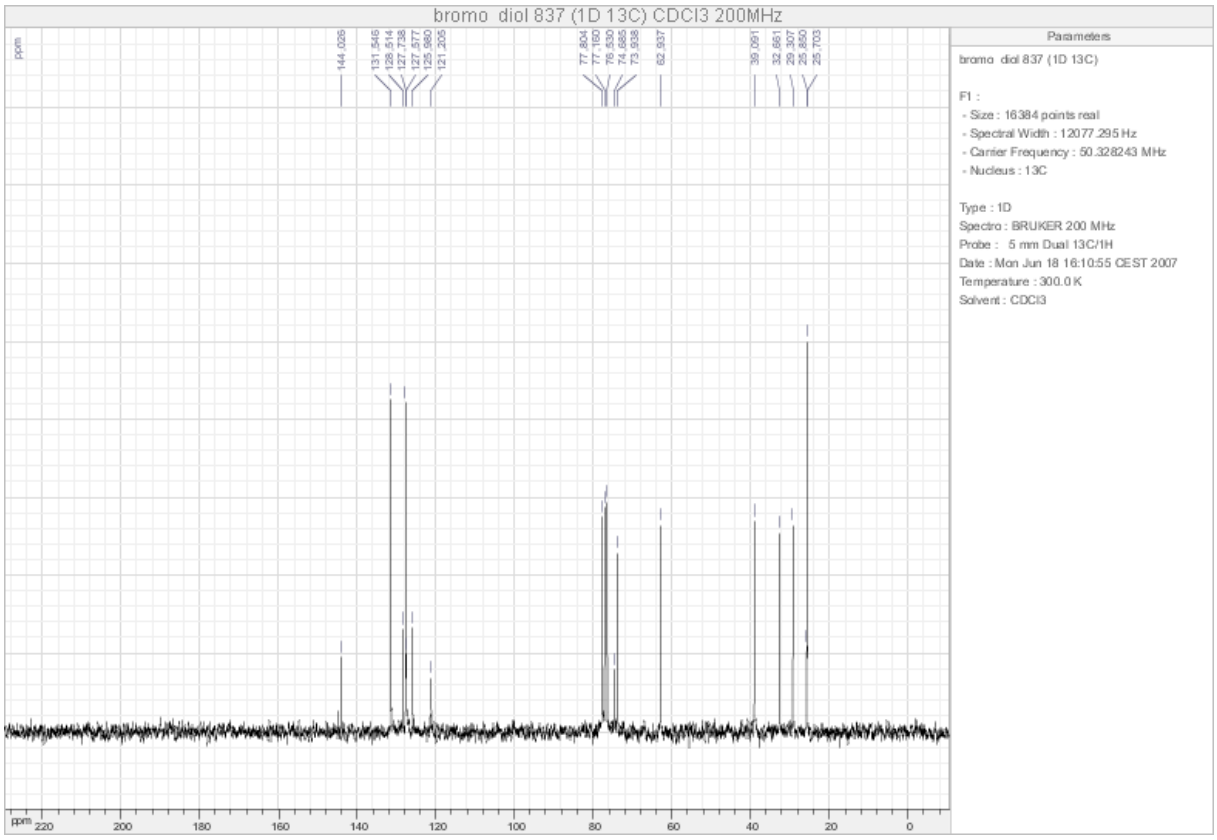

OME diol 830 (1D 1H) CDCl3 200MHz
Parameters
OME diol 830 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 15:24:17 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

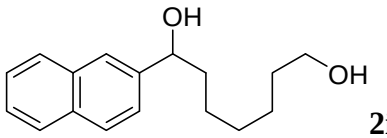

OME diol 836 (1D 13C) CDCl3 200MHz
Parameters
OME diol 836 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 15:48:16 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH
Br

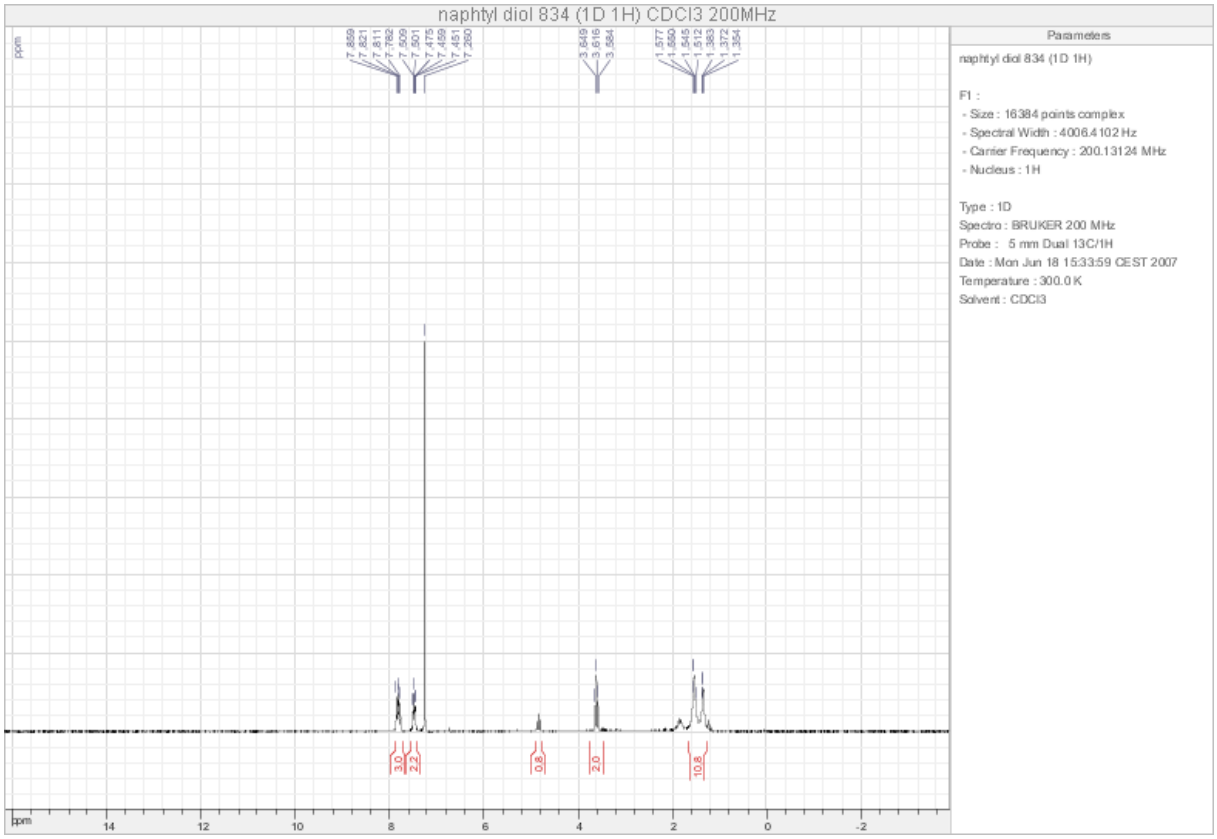
2h

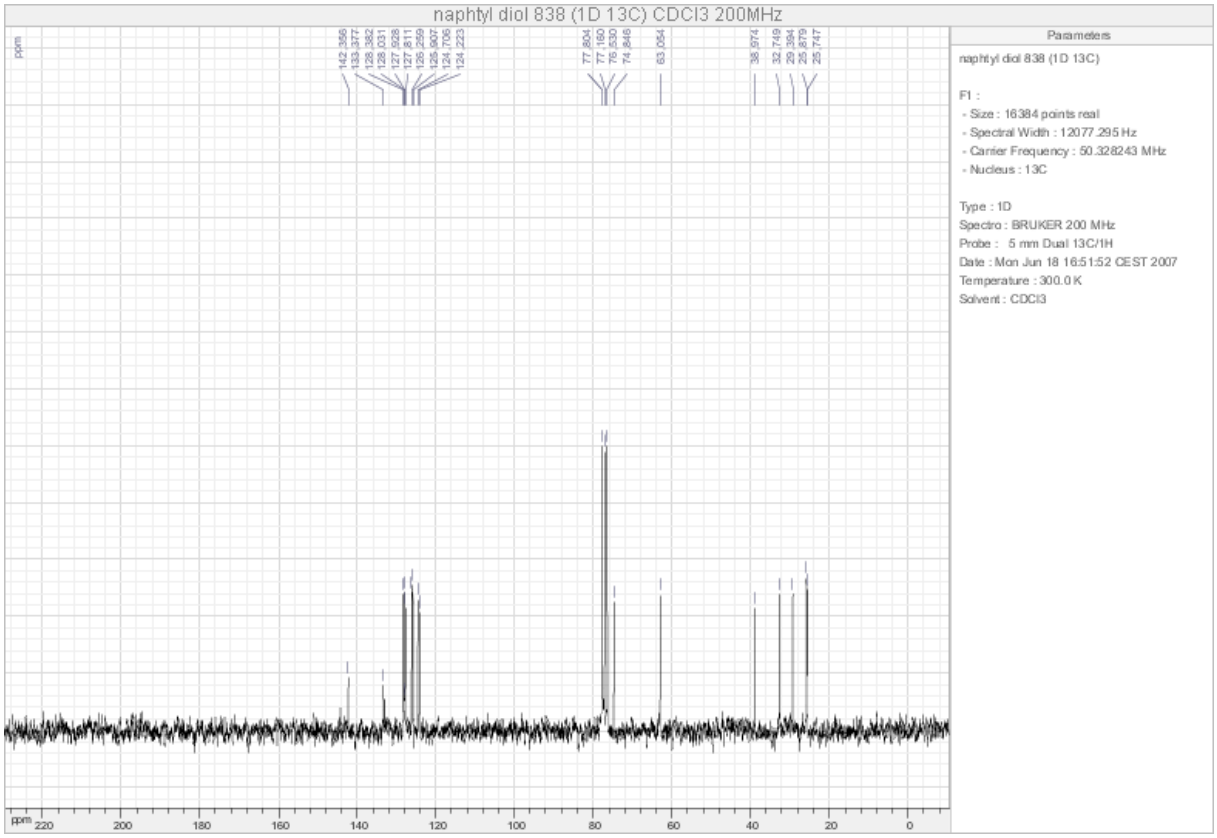

bromo diol 835 (1D 1H) CDCl3 200MHz
Parameters
bromo diol 835 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 15:28:34 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

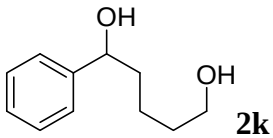

bromo diol 837 (1D 13C) CDCl3 200MHz
Parameters
bromo diol 837 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 16:10:55 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH

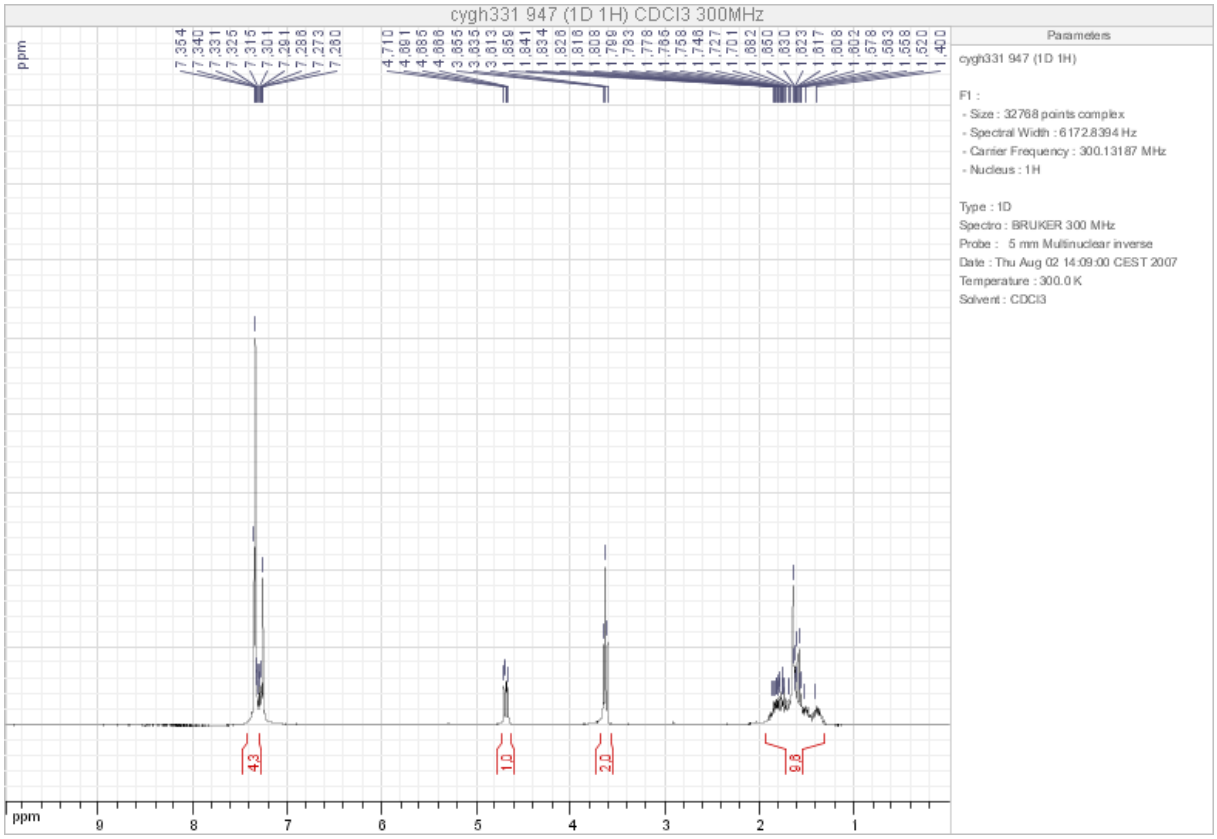
2i

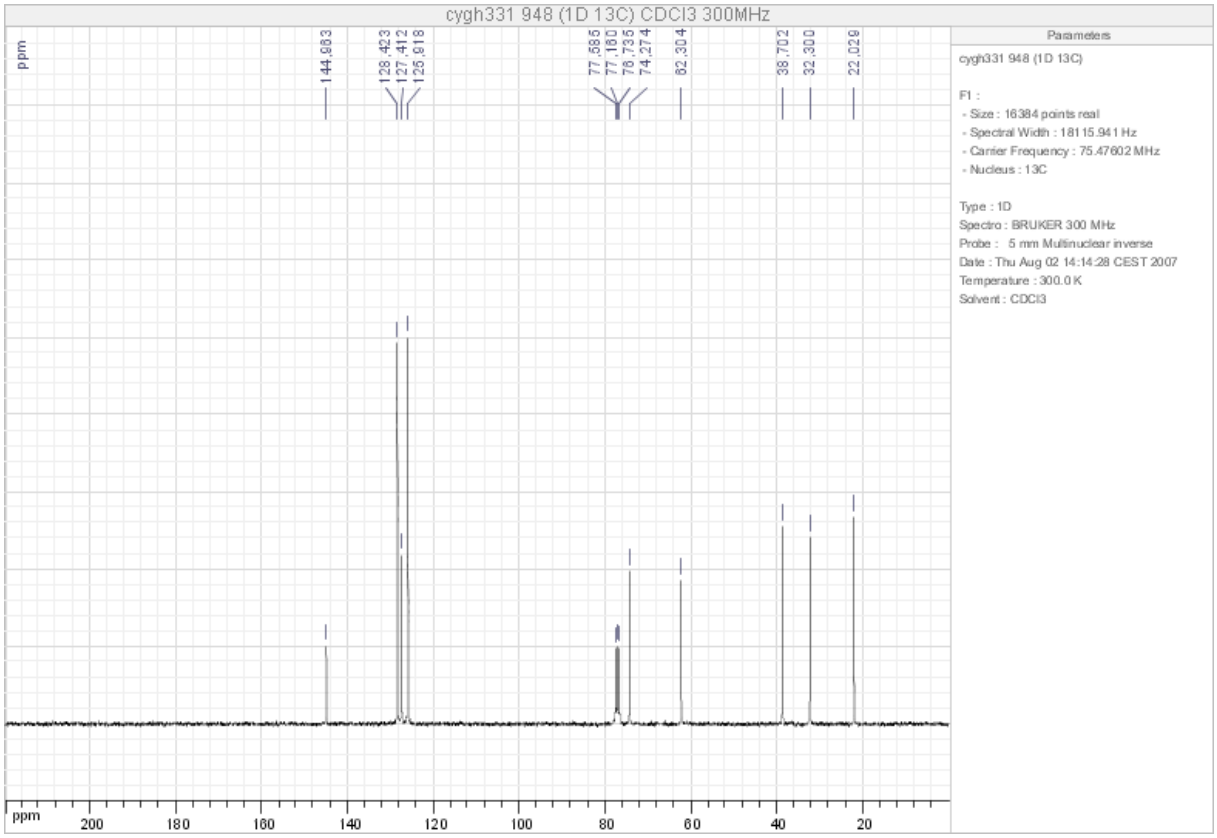

naphtyl diol 834 (1D 1H) CDCl3 200MHz
Parameters
naphtyl diol 834 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 15:33:59 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

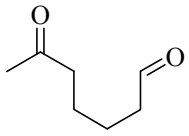

naphtyl diol 838 (1D 13C) CDCl3 200MHz
Parameters
naphtyl diol 838 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 16:51:52 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


OH
OH

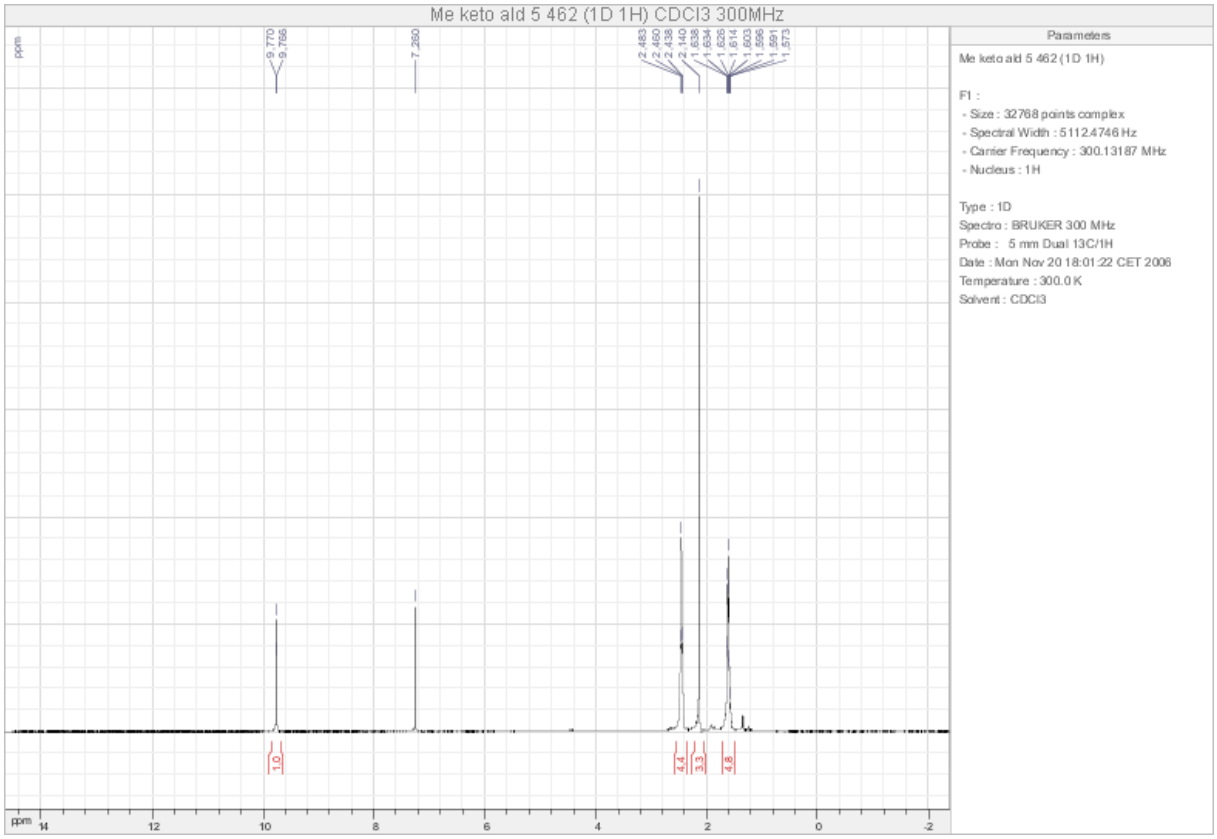
2k

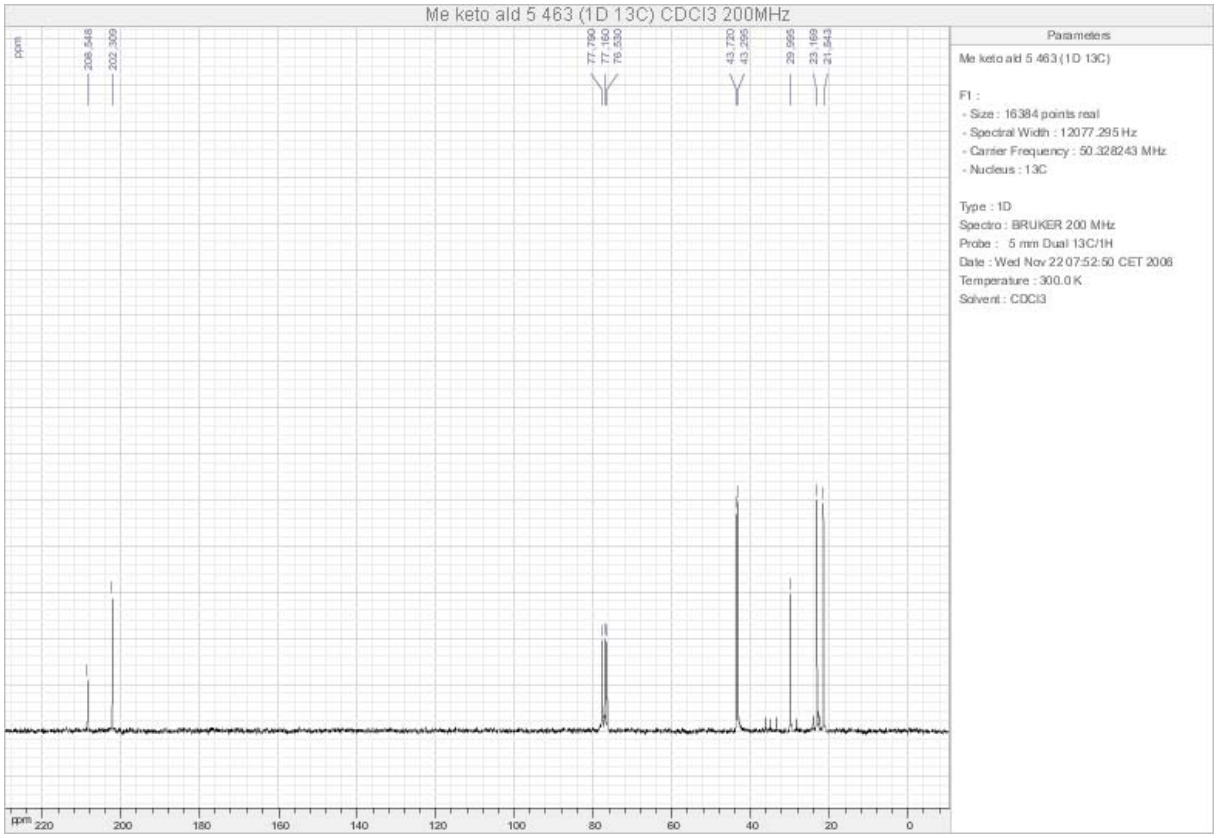

cygh331 947 (1D 1H) CDCl3 300MHz
Parameters
cygh331 947 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Aug 02 14:09:00 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
4.3
1.0
2.0
9.8

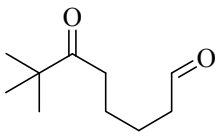

cygh331 948 (1D 13C) CDCl3 300MHz
Parameters
cygh331 948 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Aug 02 14:14:28 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
144.683
128.423
127.412
125.818
77.585
77.160
76.735
74.274
62.304
38.702
32.300
22.029



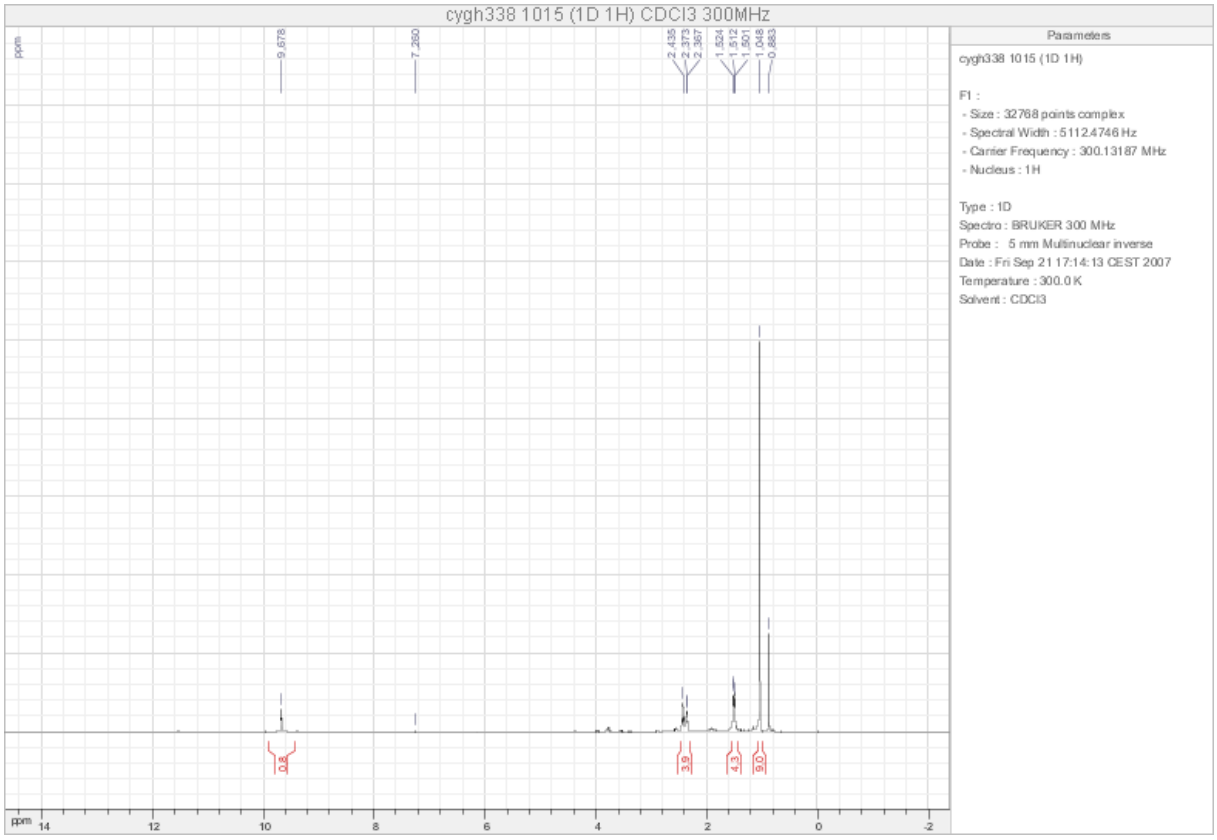
3a

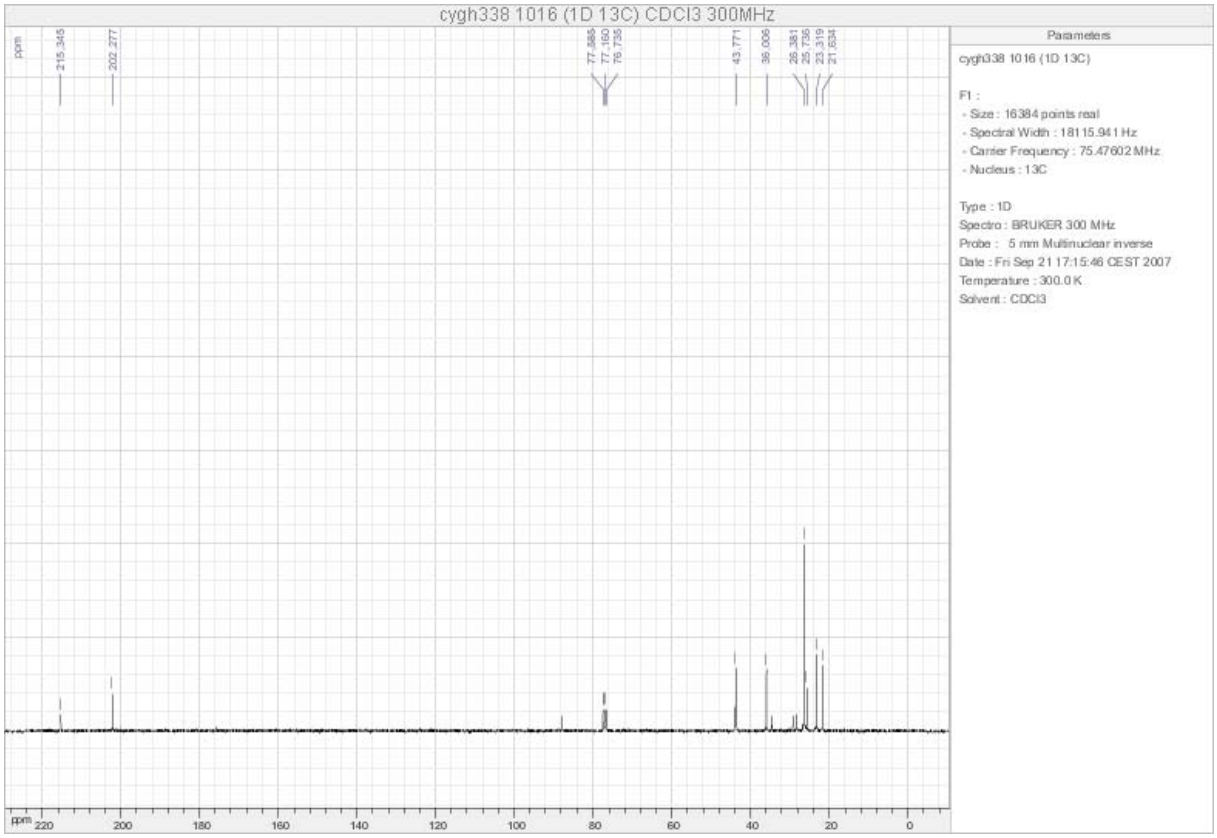

Me keto ald 5 462 (1D 1H) CDCl3 300MHz
Parameters
Me keto ald 5 462 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Nov 20 18:01:22 CET 2006
Temperature : 300.0 K
Solvent : CDCl3

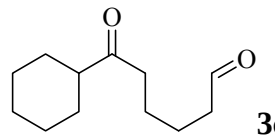

Me keto ald 5 463 (1D 13C) CDCl3 200MHz
Parameters
Me keto ald 5 463 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Nov 22 07:52:50 CET 2006
Temperature : 300.0 K
Solvent : CDCl3



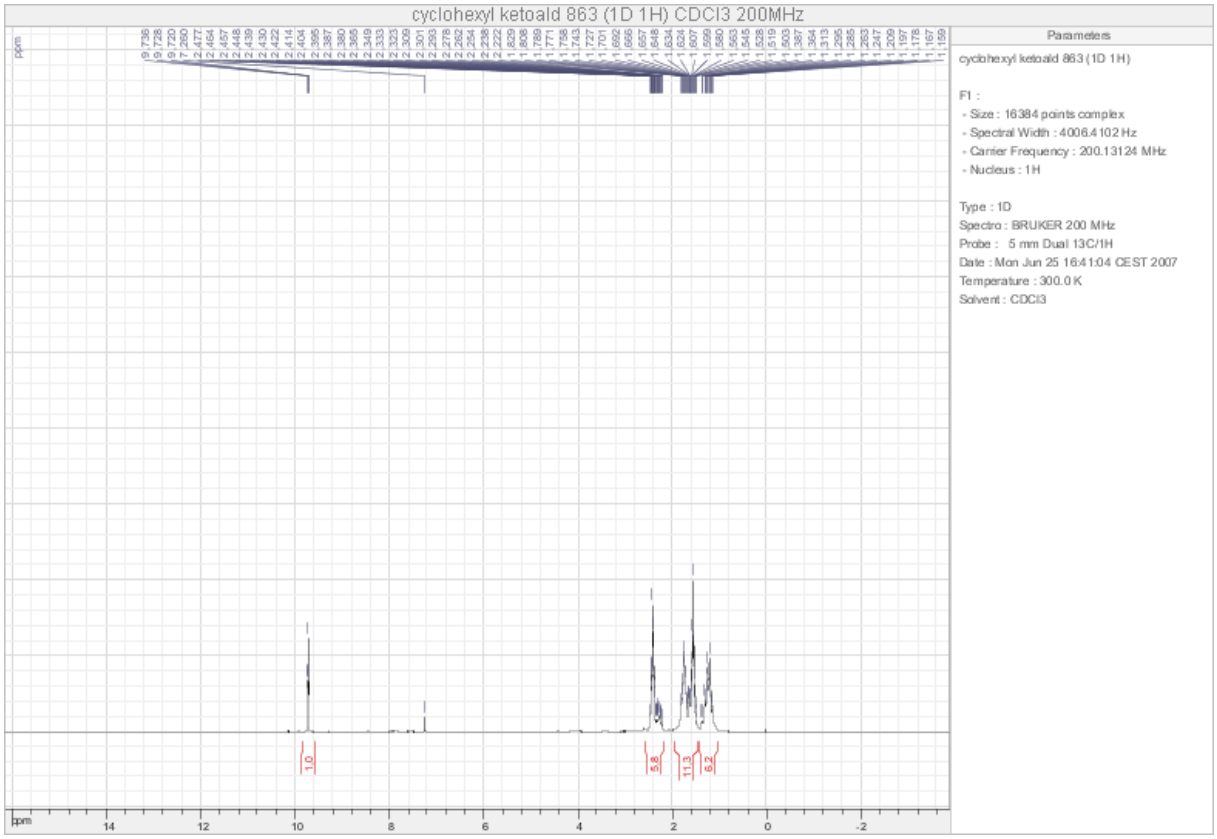
3b

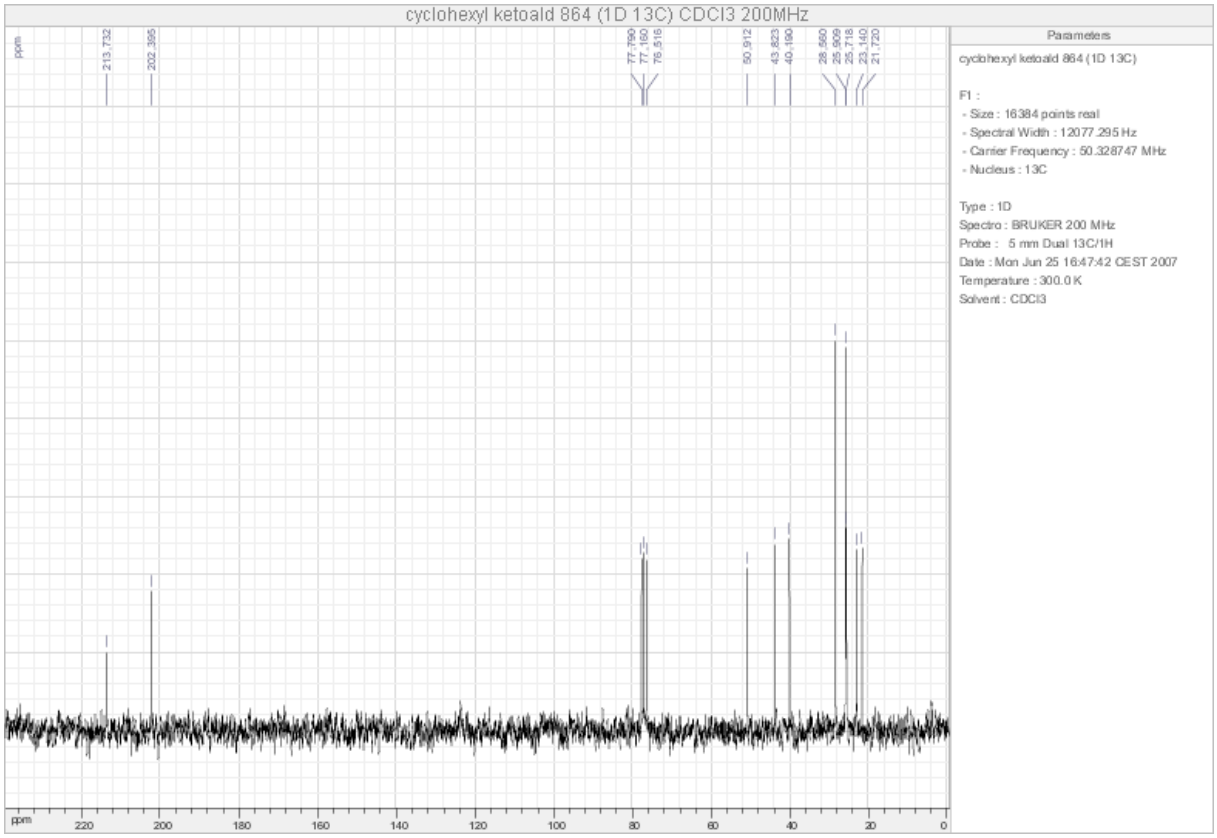

cygh338 1015 (1D 1H) CDCl3 300MHz
Parameters
cygh338 1015 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Fri Sep 21 17:14:13 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

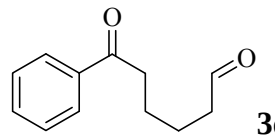

cygh338 1016 (1D 13C) CDCl3 300MHz
Parameters
cygh338 1016 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Fri Sep 21 17:15:46 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3



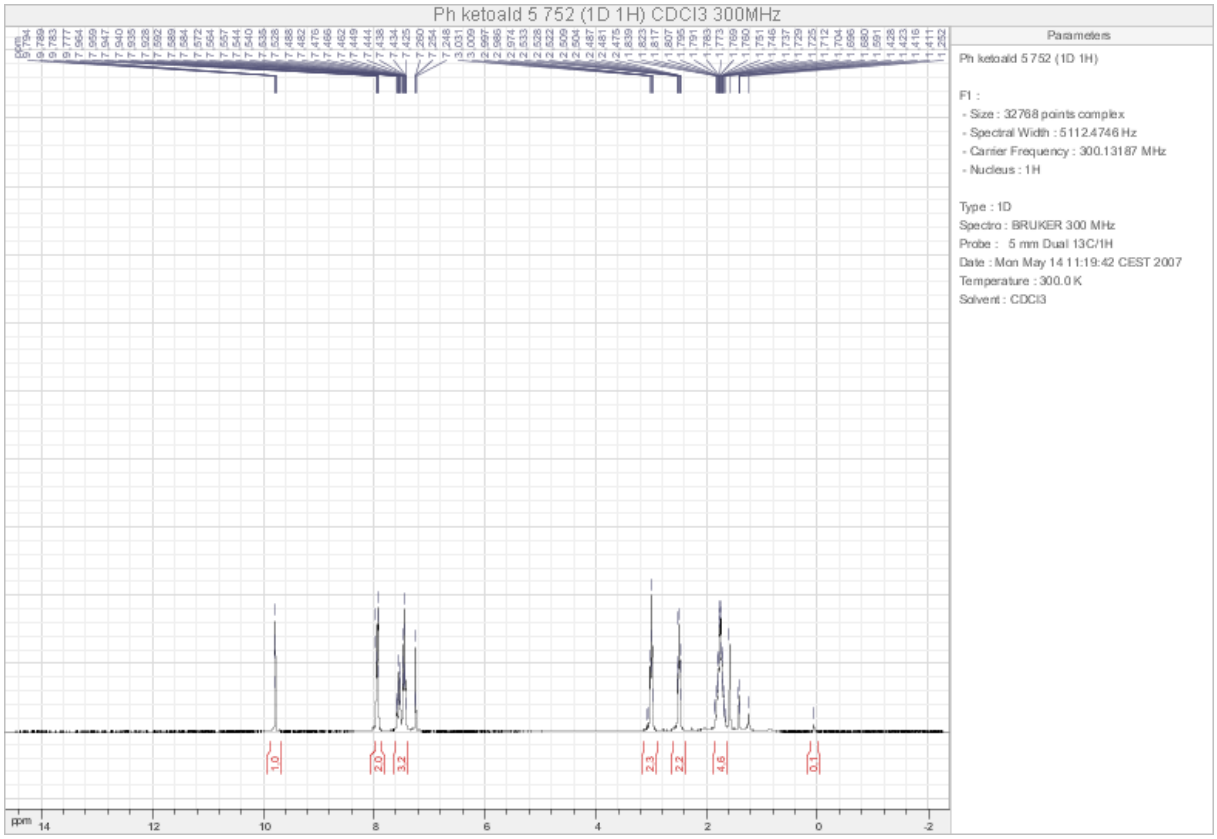
3c

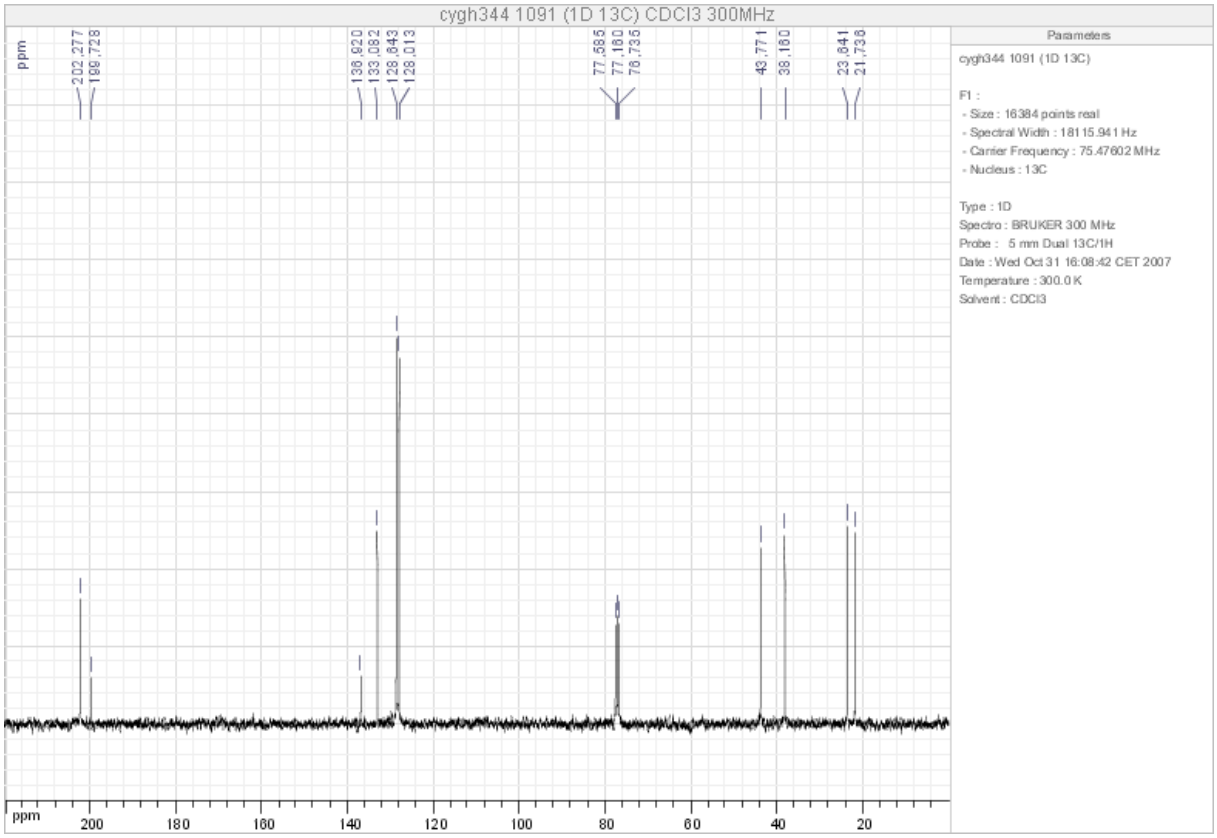

cyclohexyl ketoald 863 (1D 1H) CDCl3 200MHz
Parameters
cyclohexyl ketoald 863 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 25 16:41:04 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
1.0
5.8
11.3
6.2

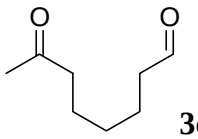

cyclohexyl ketoald 864 (1D 13C) CDCl3 200MHz
Parameters
cyclohexyl ketoald 864 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328747 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 25 16:47:42 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
213.732
202.395
77.790
77.160
76.516
50.912
43.823
40.190
28.560
25.999
25.718
23.140
21.720



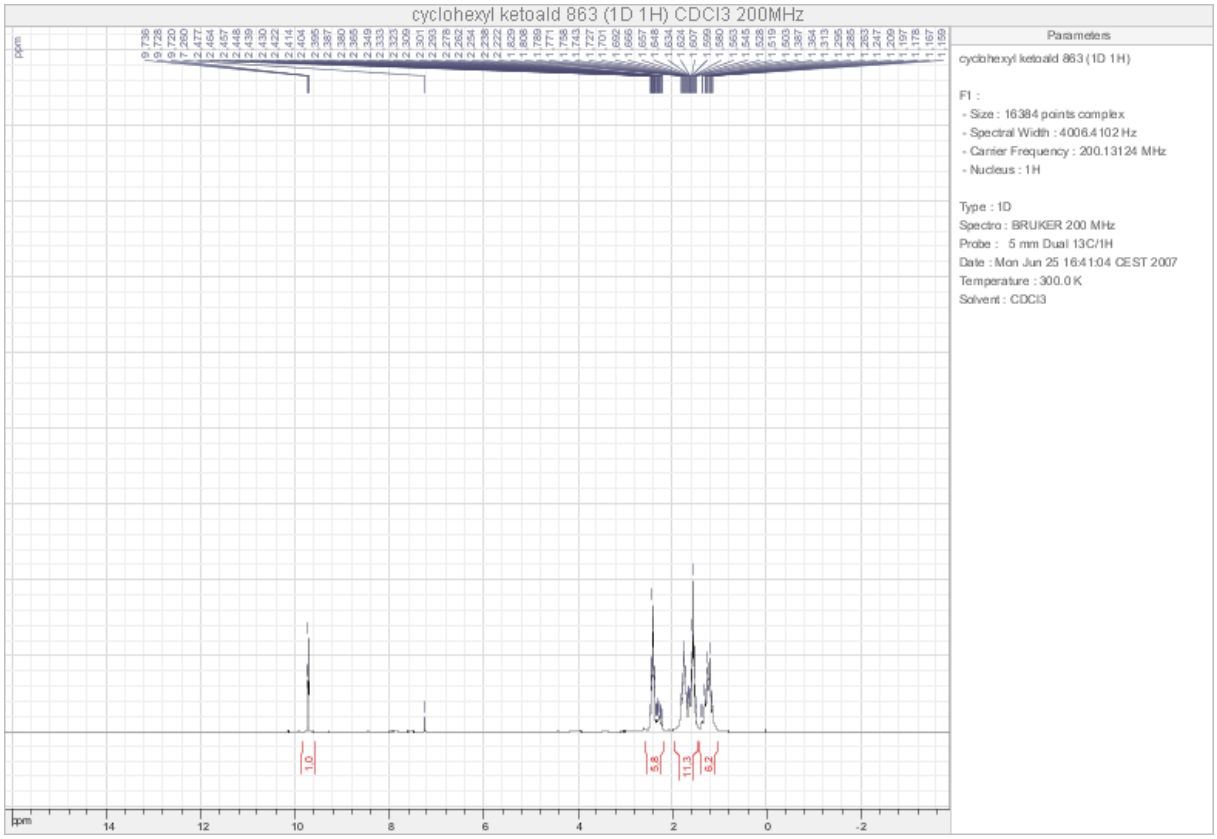
3d

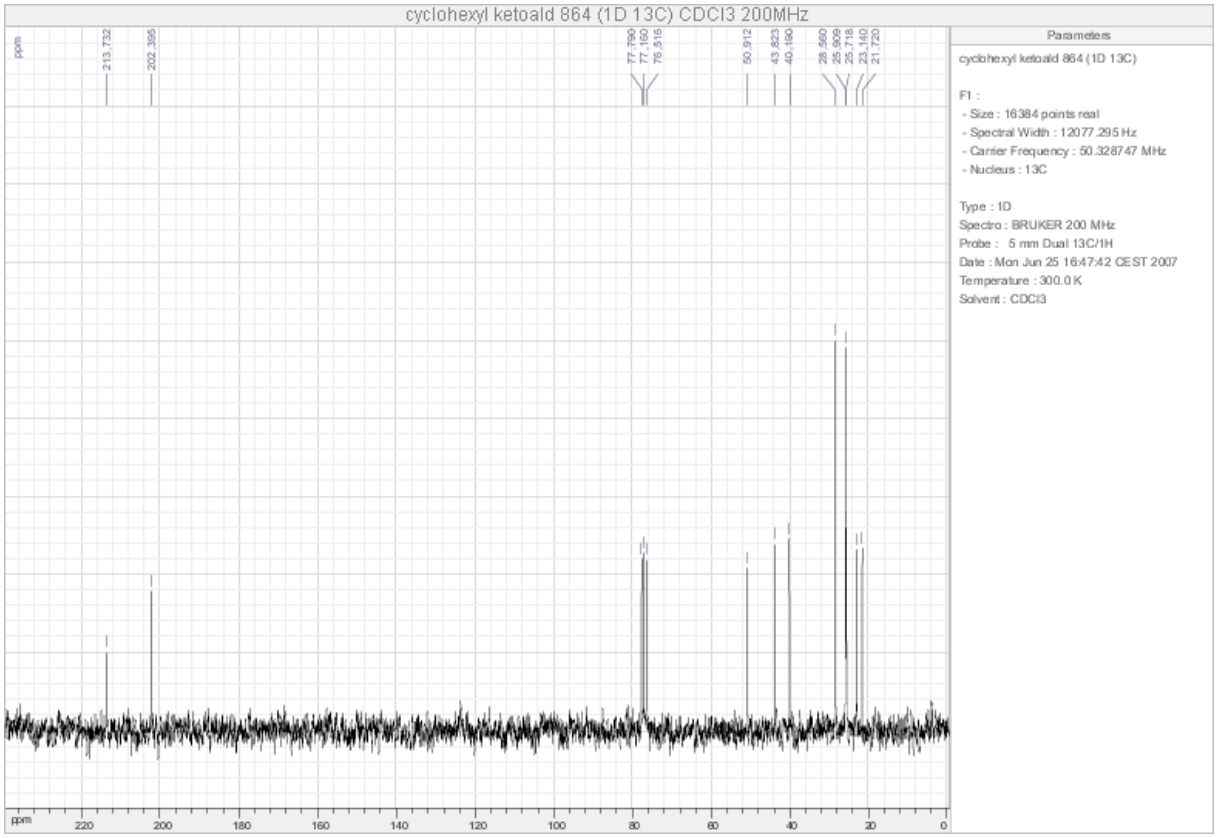

Ph ketoald 5 752 (1D 1H) CDCl3 300MHz
Parameters
Ph ketoald 5 752 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon May 14 11:19:42 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
14
12
10
8
6
4
2
0
-2
1.0
2.0
3.2
2.3
2.2
4.6
0.1

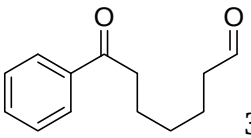

cygh344 1091 (1D 13C) CDCl3 300MHz
Parameters
cygh344 1091 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Oct 31 16:08:42 CET 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
202.277
199.728
136.620
133.082
128.843
128.013
77.585
77.160
76.735
43.771
38.160
23.841
21.738
200
180
160
140
120
100
80
60
40
20



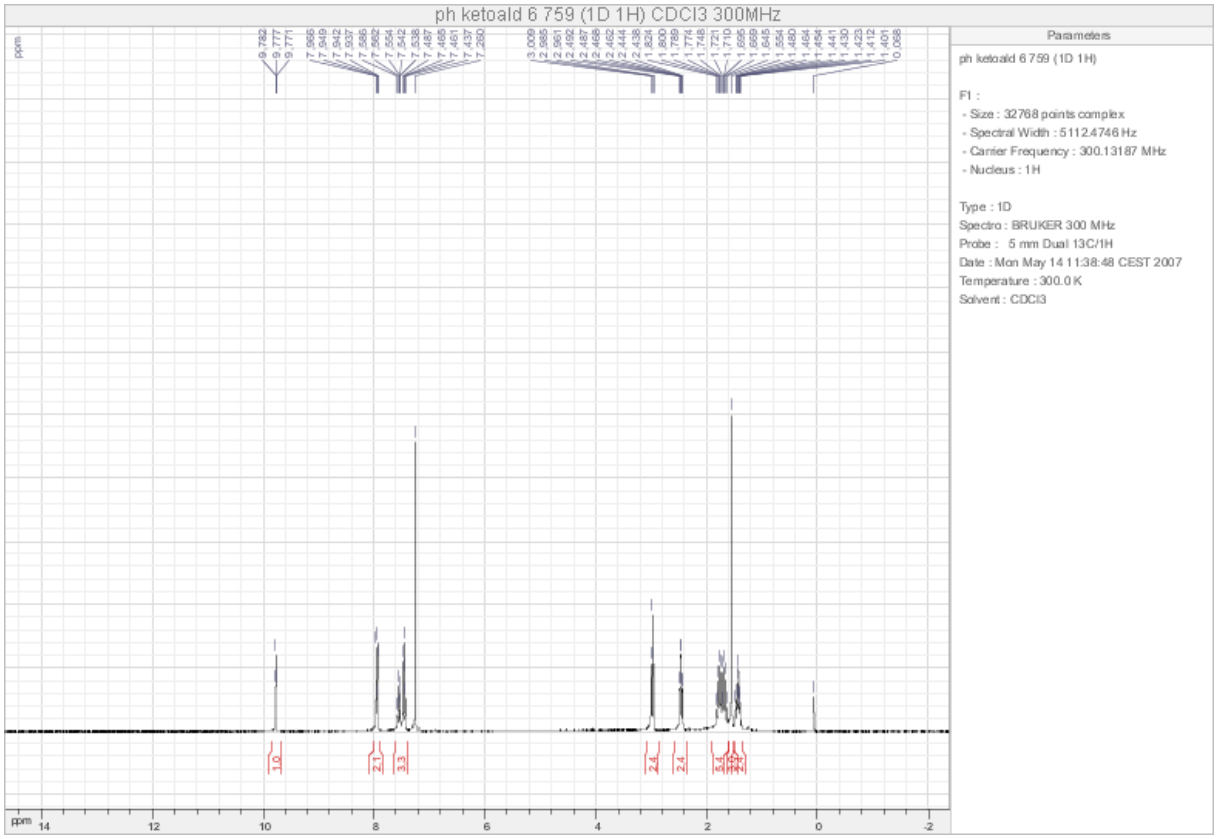
3e

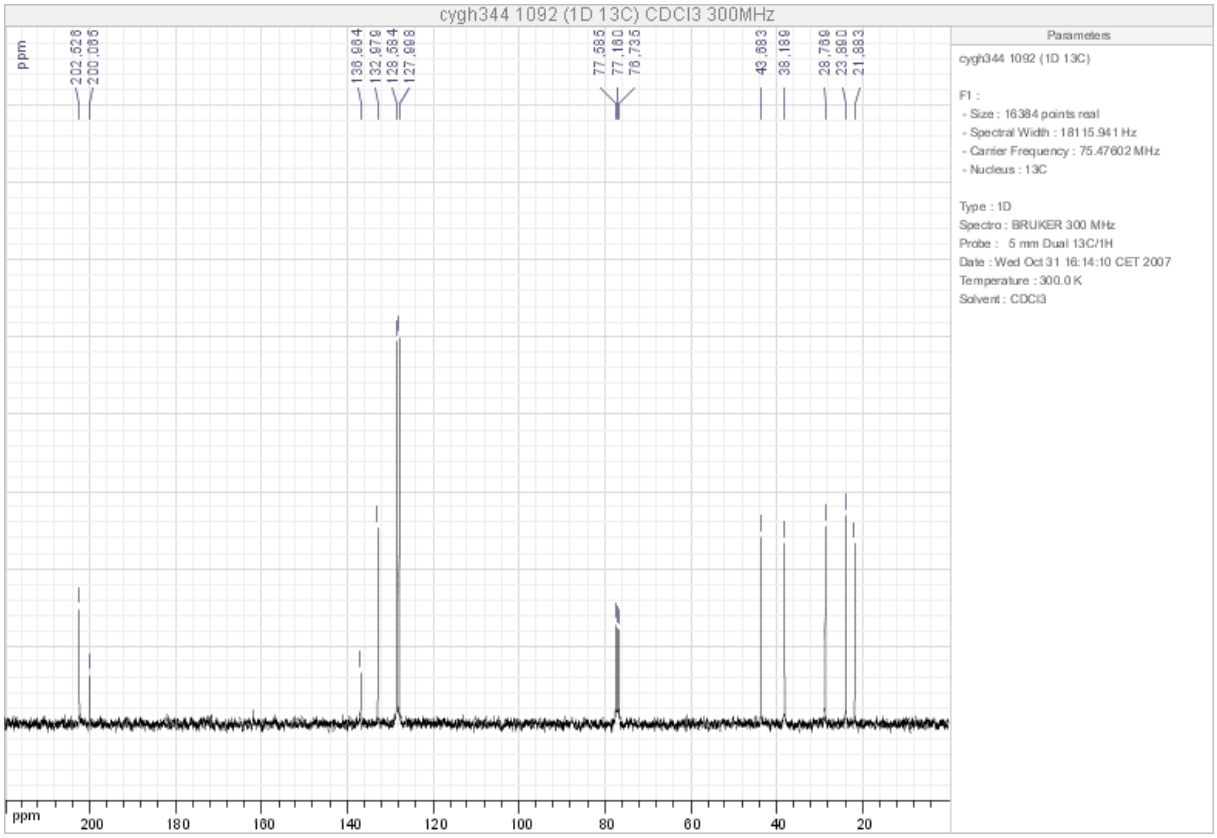

cyclohexyl ketoald 863 (1D 1H) CDCl3 200MHz
Parameters
cyclohexyl ketoald 863 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 25 16:41:04 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

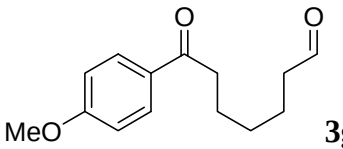

cyclohexyl ketoald 864 (1D 13C) CDCl3 200MHz
Parameters
cyclohexyl ketoald 864 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328747 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 25 16:47:42 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3



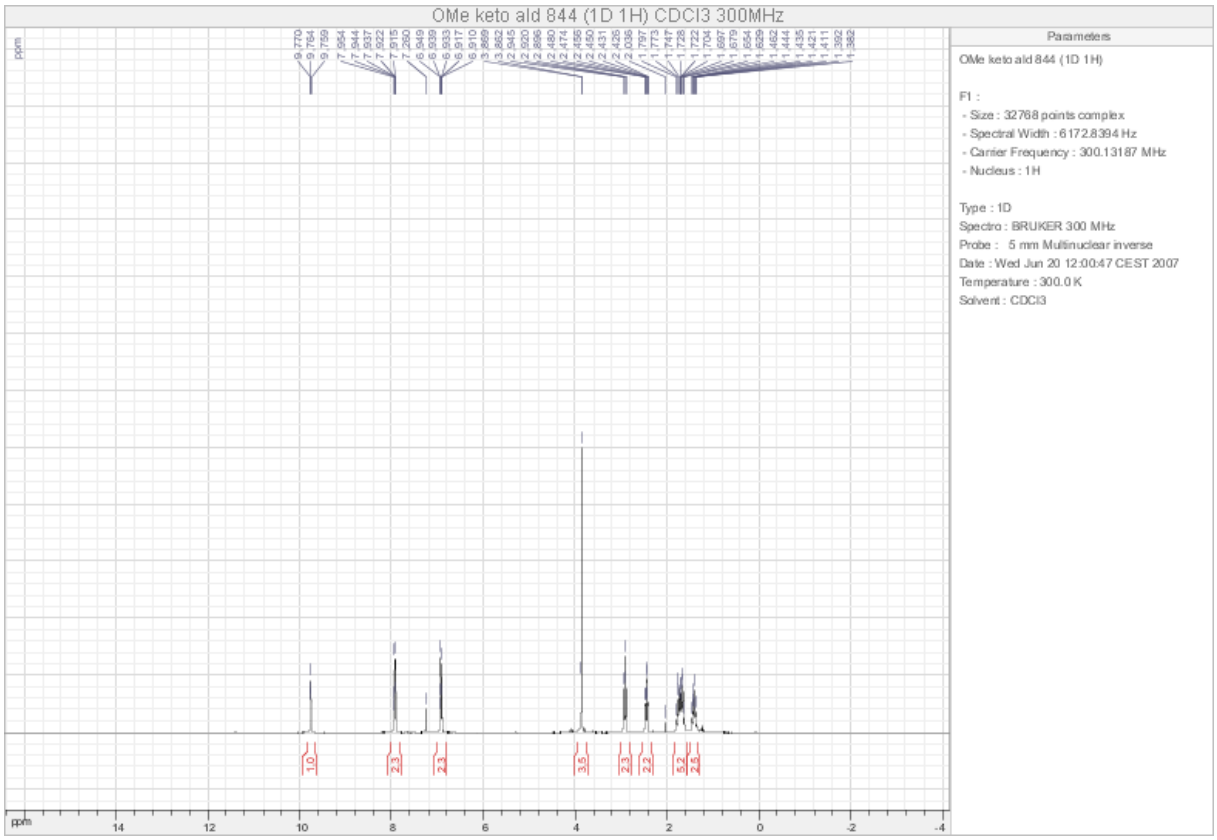
3f

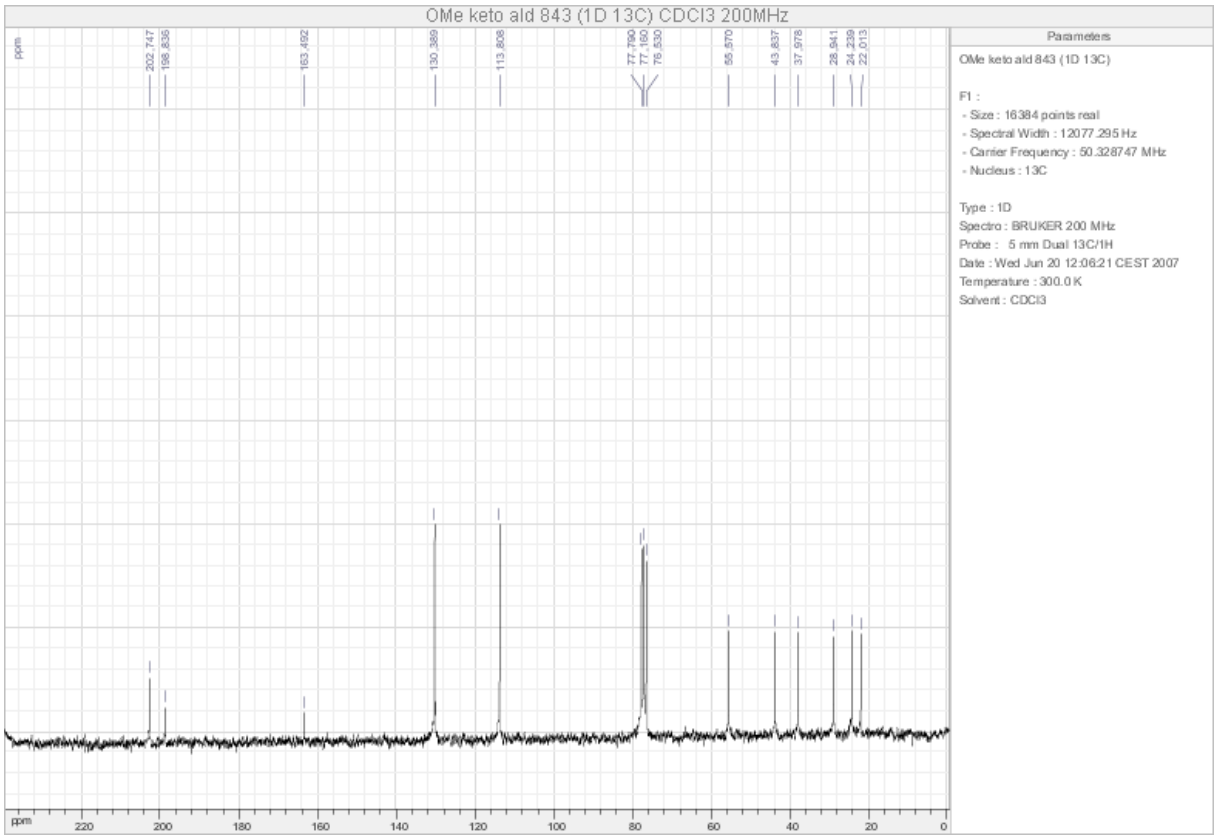

ph ketoald 6 759 (1D 1H) CDCl3 300MHz
Parameters
ph ketoald 6 759 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon May 14 11:38:48 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

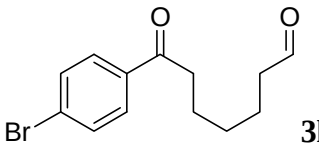

cygh344 1092 (1D 13C) CDCl3 300MHz
Parameters
cygh344 1092 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Oct 31 16:14:10 CET 2007
Temperature : 300.0 K
Solvent : CDCl3


O
O
MeO

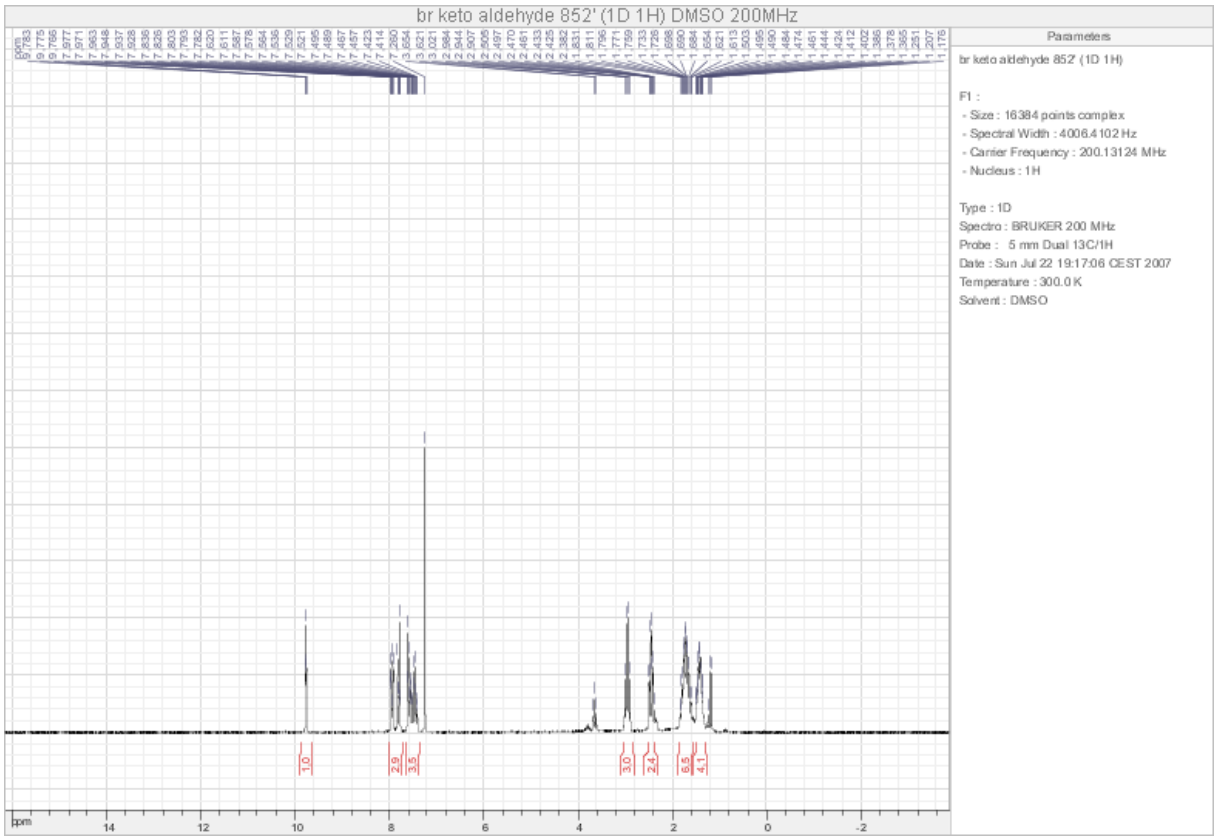
3g

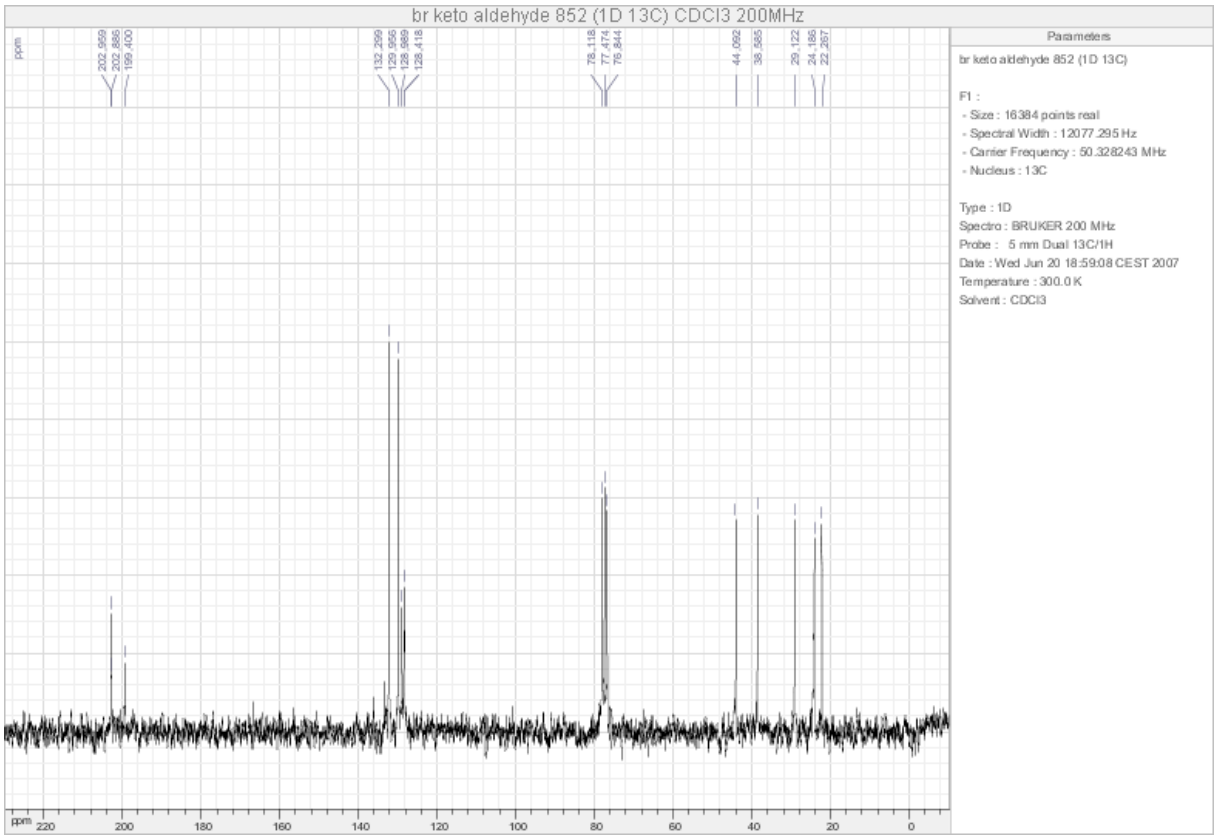

OMe keto ald 844 (1D 1H) CDCl3 300MHz
Parameters
OMe keto ald 844 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Wed Jun 20 12:00:47 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

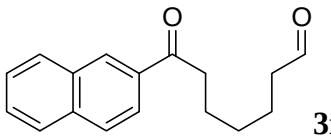

OMe keto ald 843 (1D 13C) CDCl3 200MHz
Parameters
OMe keto ald 843 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328747 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 20 12:06:21 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
O
Br

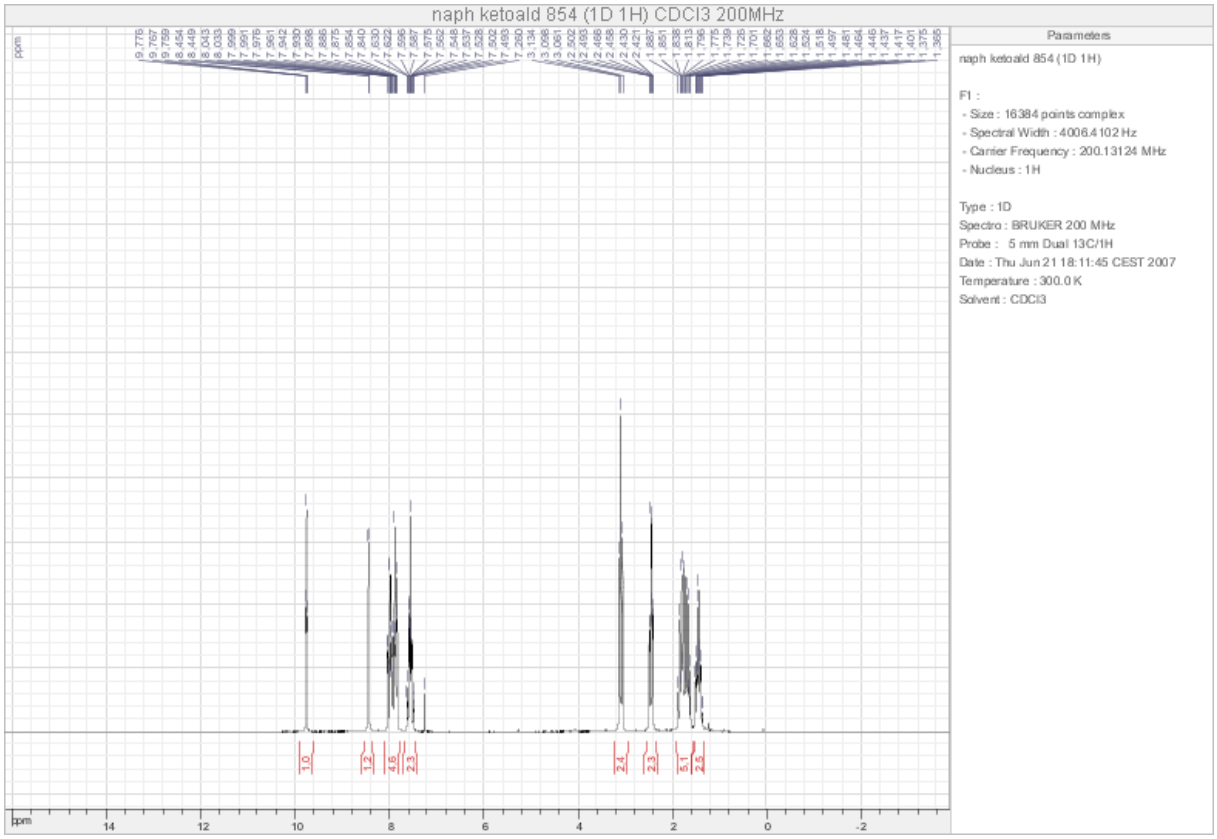
3h

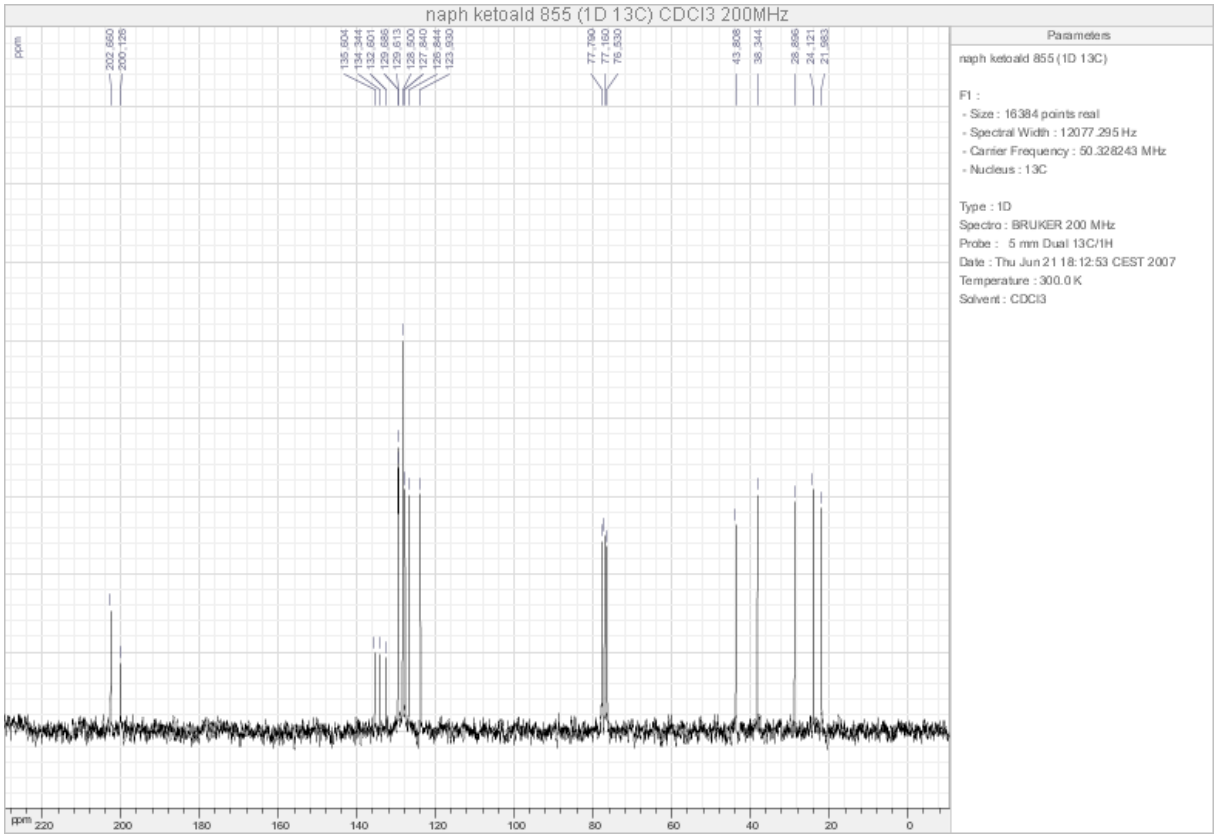

br keto aldehyde 852' (1D 1H) DMSO 200MHz
Parameters
br keto aldehyde 852' (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Sun Jul 22 19:17:06 CEST 2007
Temperature : 300.0 K
Solvent : DMSO

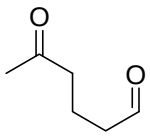

br keto aldehyde 852 (1D 13C) CDCl3 200MHz
Parameters
br keto aldehyde 852 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 20 18:59:08 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3



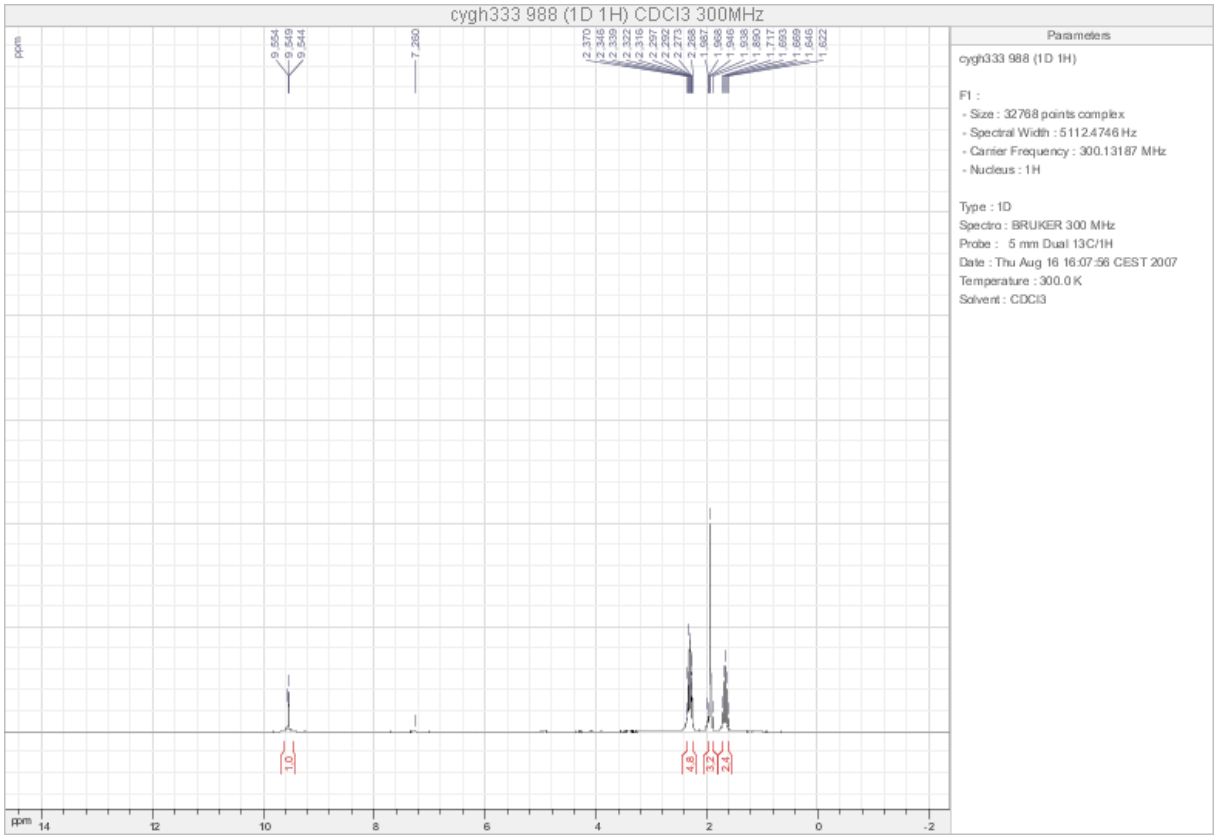
3i

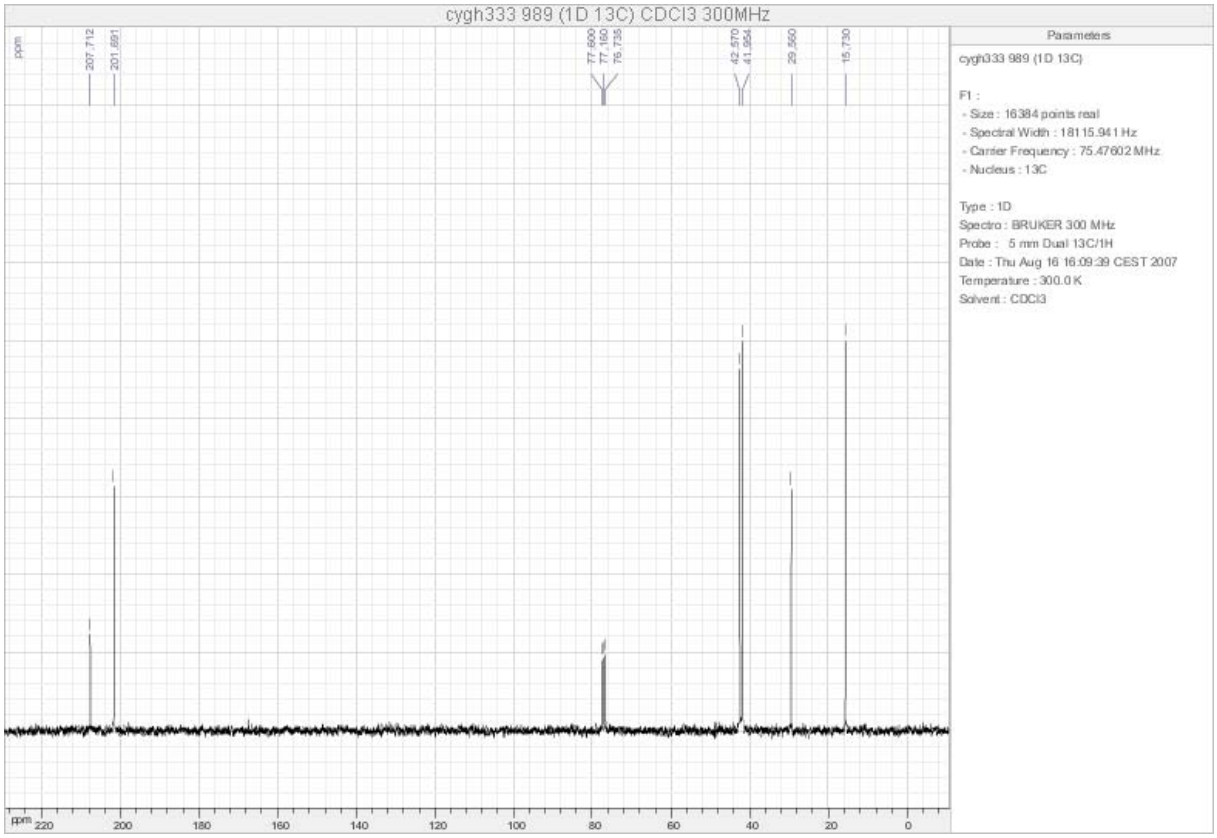

naph ketoald 854 (1D 1H) CDCl3 200MHz
Parameters
naph ketoald 854 (1D 1H)
F1 :
- Size : 16384 points complex
- Spectral Width : 4006.4102 Hz
- Carrier Frequency : 200.13124 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Thu Jun 21 18:11:45 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

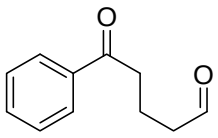

naph ketoald 855 (1D 13C) CDCl3 200MHz
Parameters
naph ketoald 855 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Thu Jun 21 18:12:53 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3



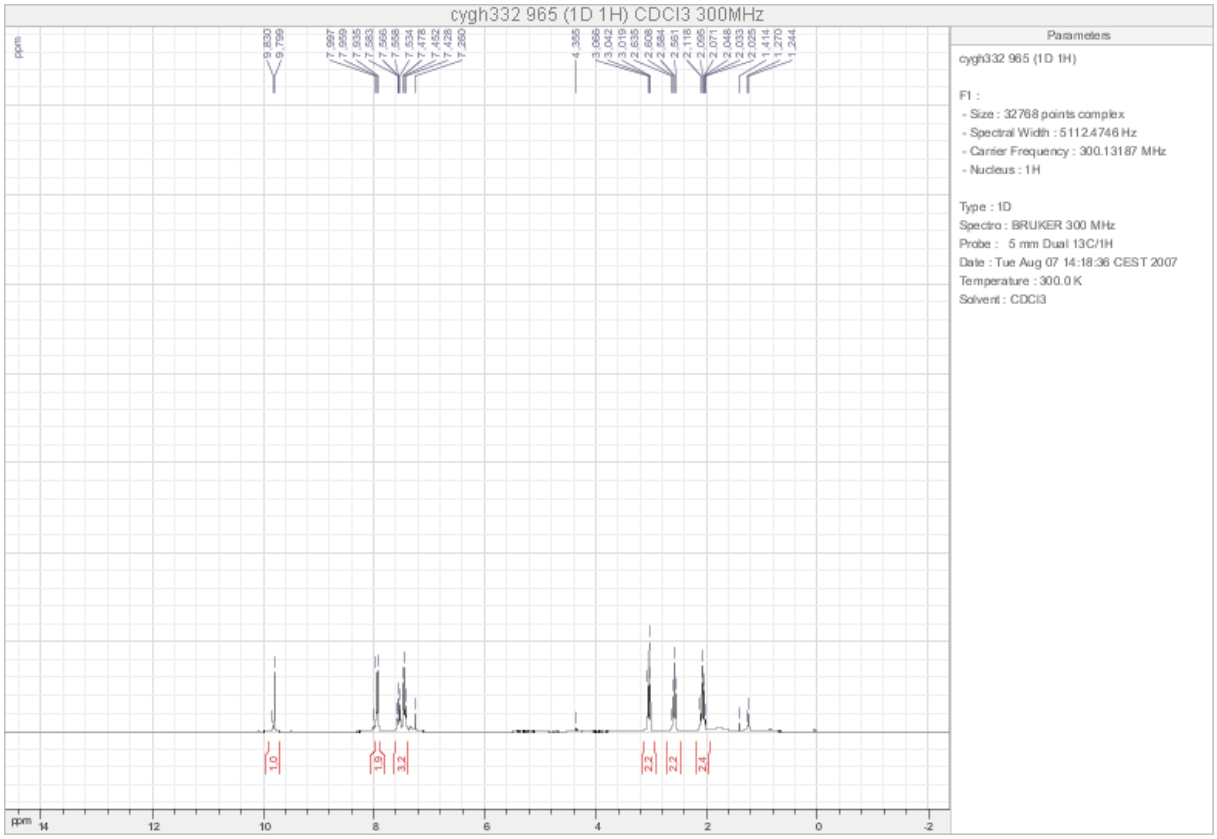
3j

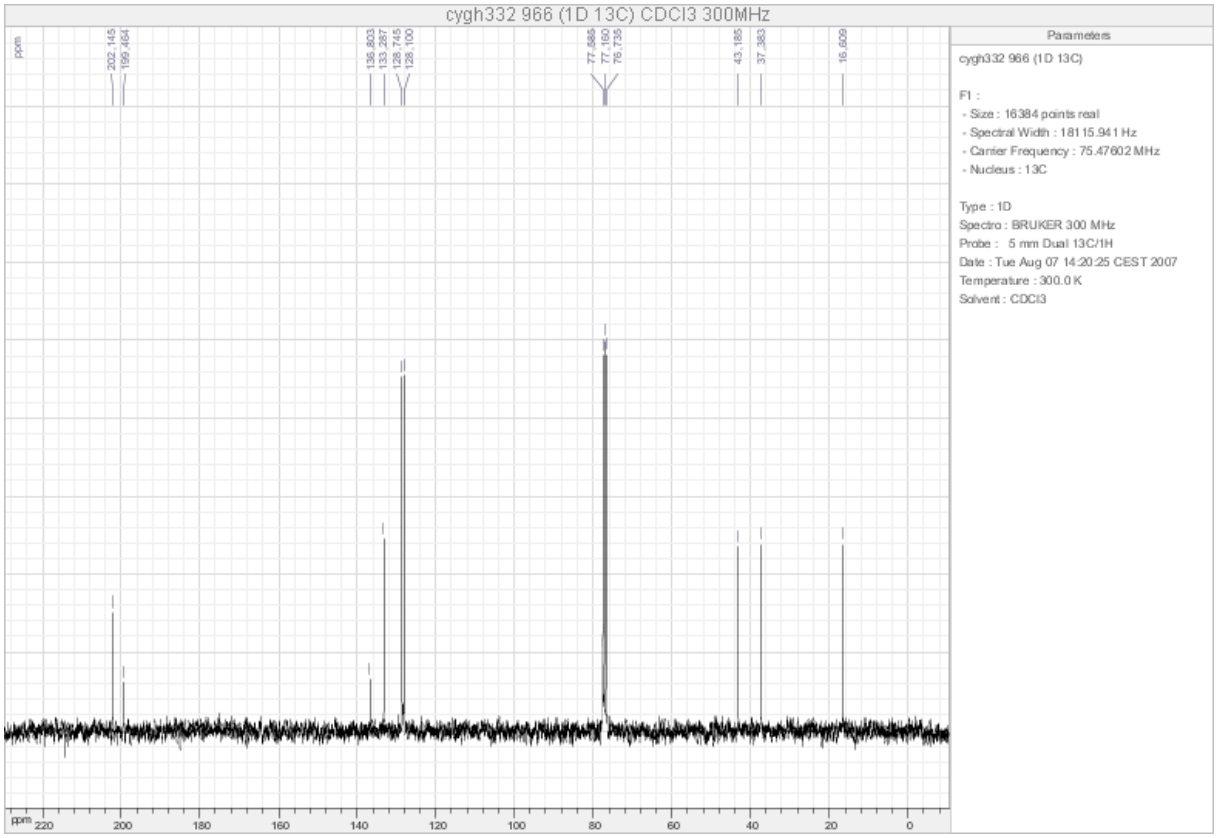

cygh333 988 (1D 1H) CDCl3 300MHz
Parameters
cygh333 988 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Thu Aug 16 16:07:56 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

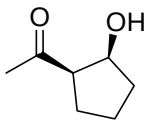

cygh333 989 (1D 13C) CDCl3 300MHz
Parameters
cygh333 989 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Thu Aug 16 16:09:39 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3



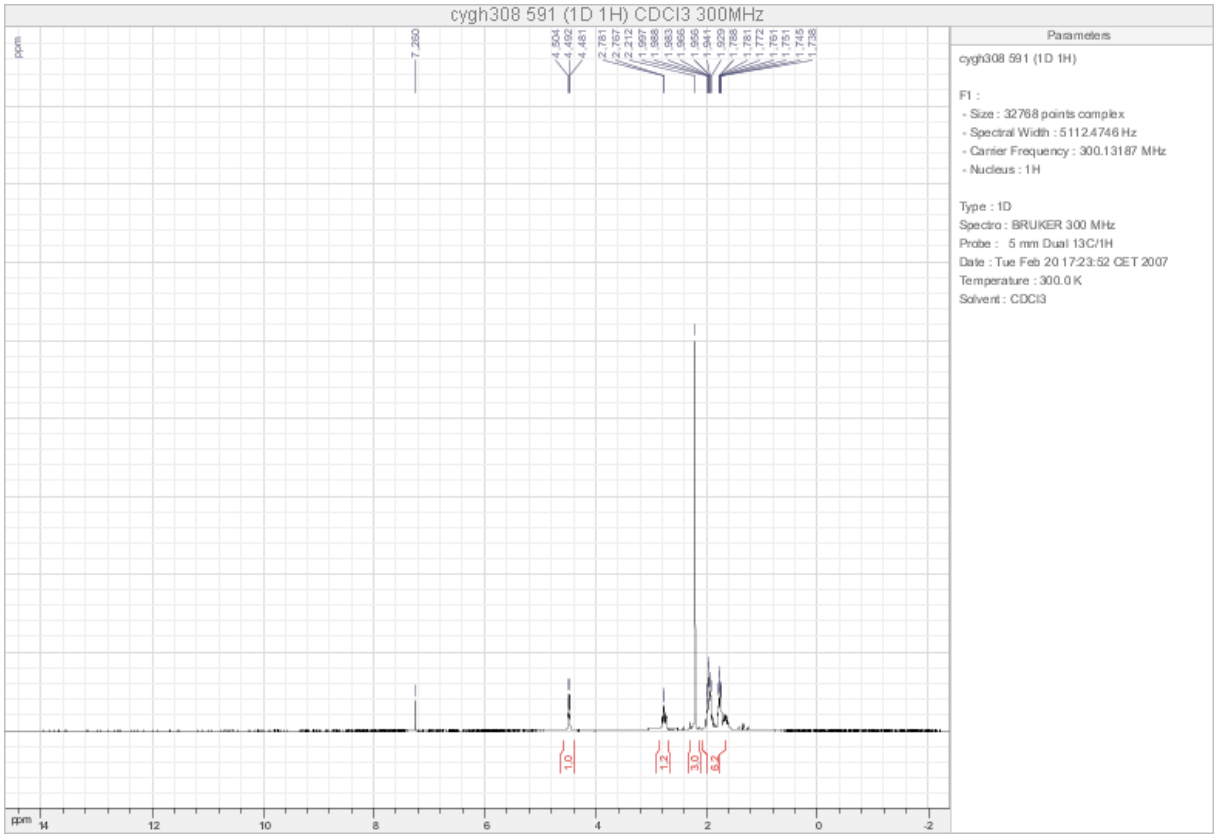
3k

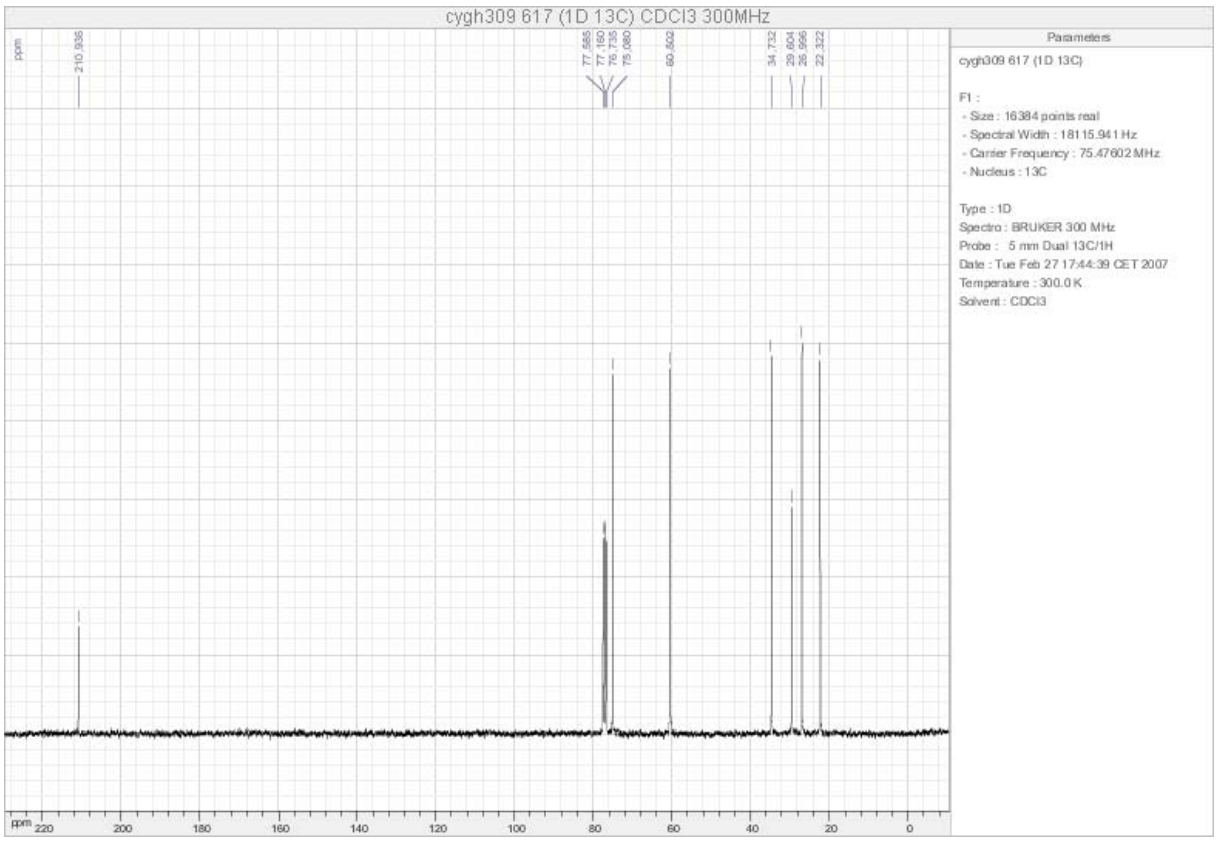

cygh332 965 (1D 1H) CDCl3 300MHz
Parameters
cygh332 965 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Aug 07 14:18:36 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

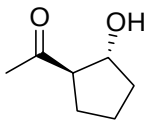

cygh332 966 (1D 13C) CDCl3 300MHz
Parameters
cygh332 966 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Aug 07 14:20:25 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

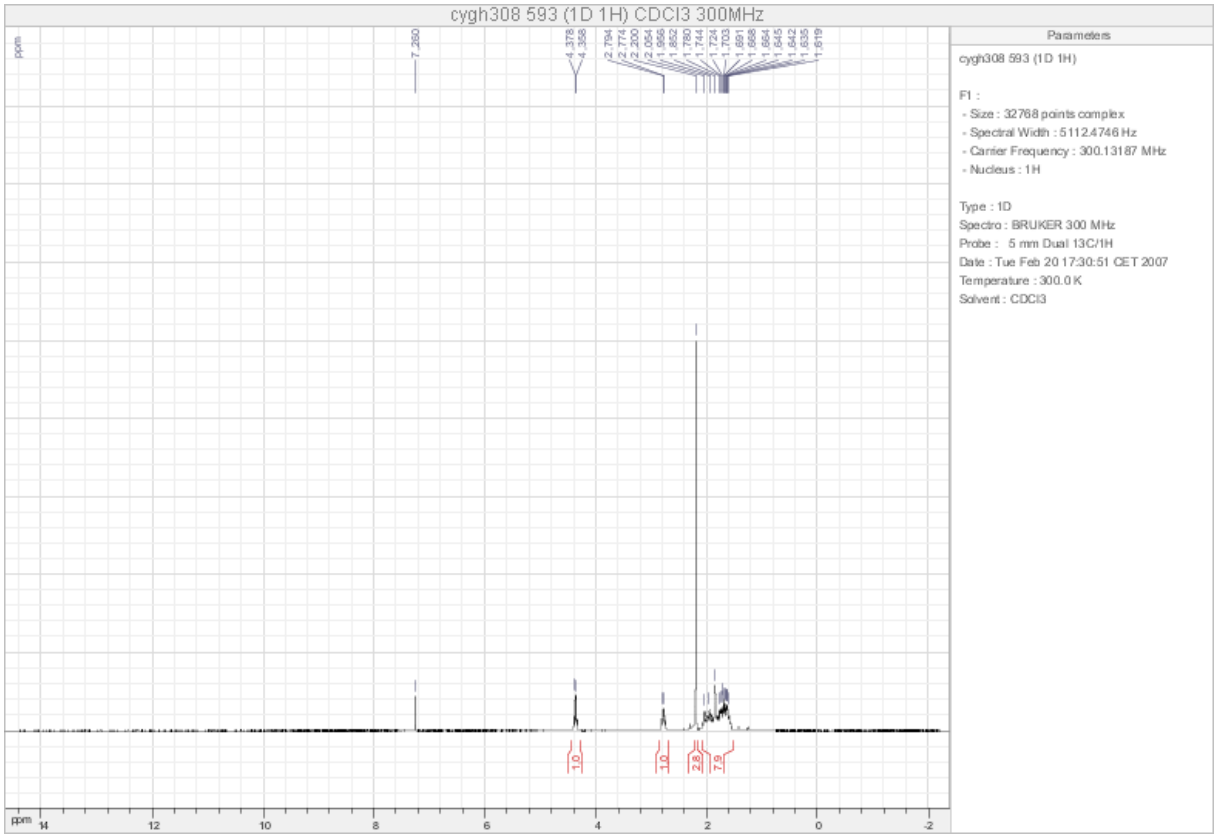
4a

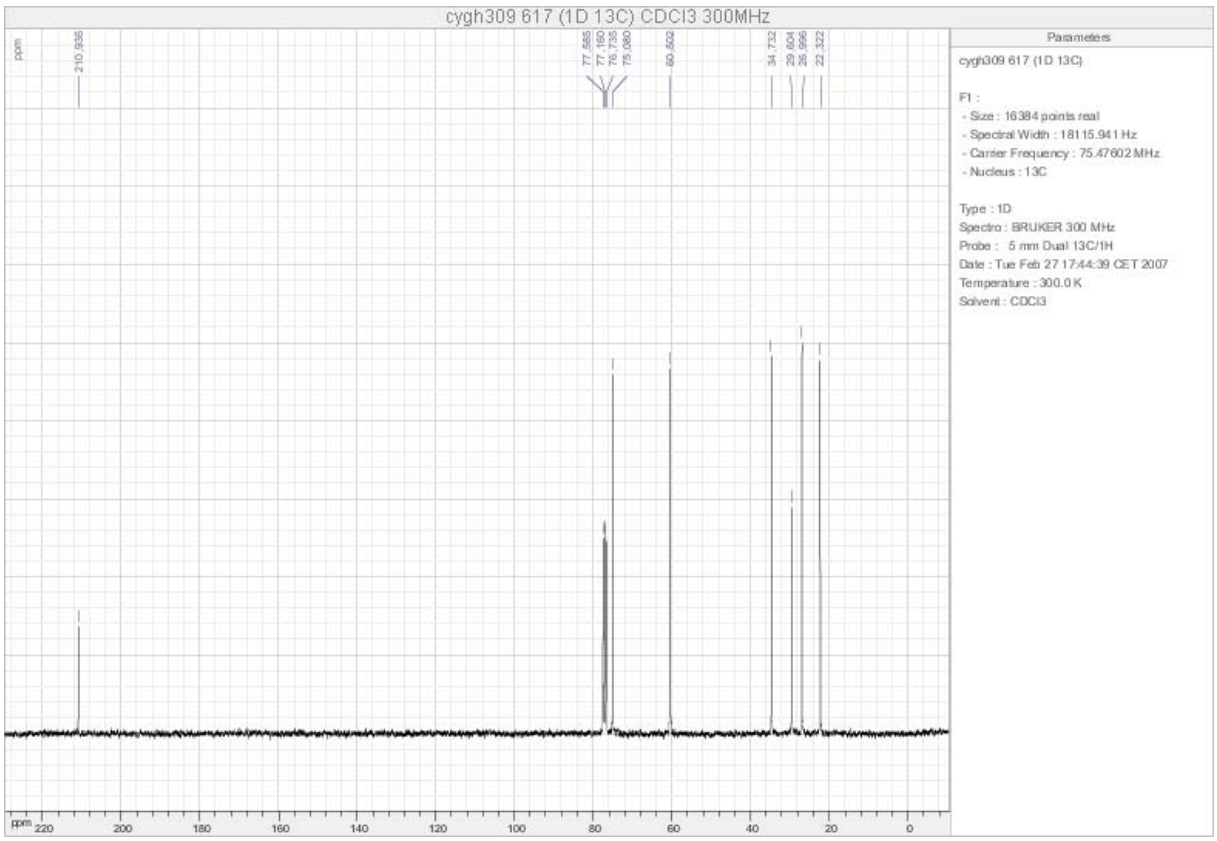

cygh308 591 (1D 1H) CDCl3 300MHz
Parameters
cygh308 591 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Feb 20 17:23:52 CET 2007
Temperature : 300.0 K
Solvent : CDCl3

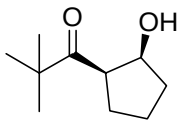

cygh309 617 (1D 13C) CDCl3 300MHz
Parameters
cygh309 617 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Feb 27 17:44:39 CET 2007
Temperature : 300.0 K
Solvent : CDCl3



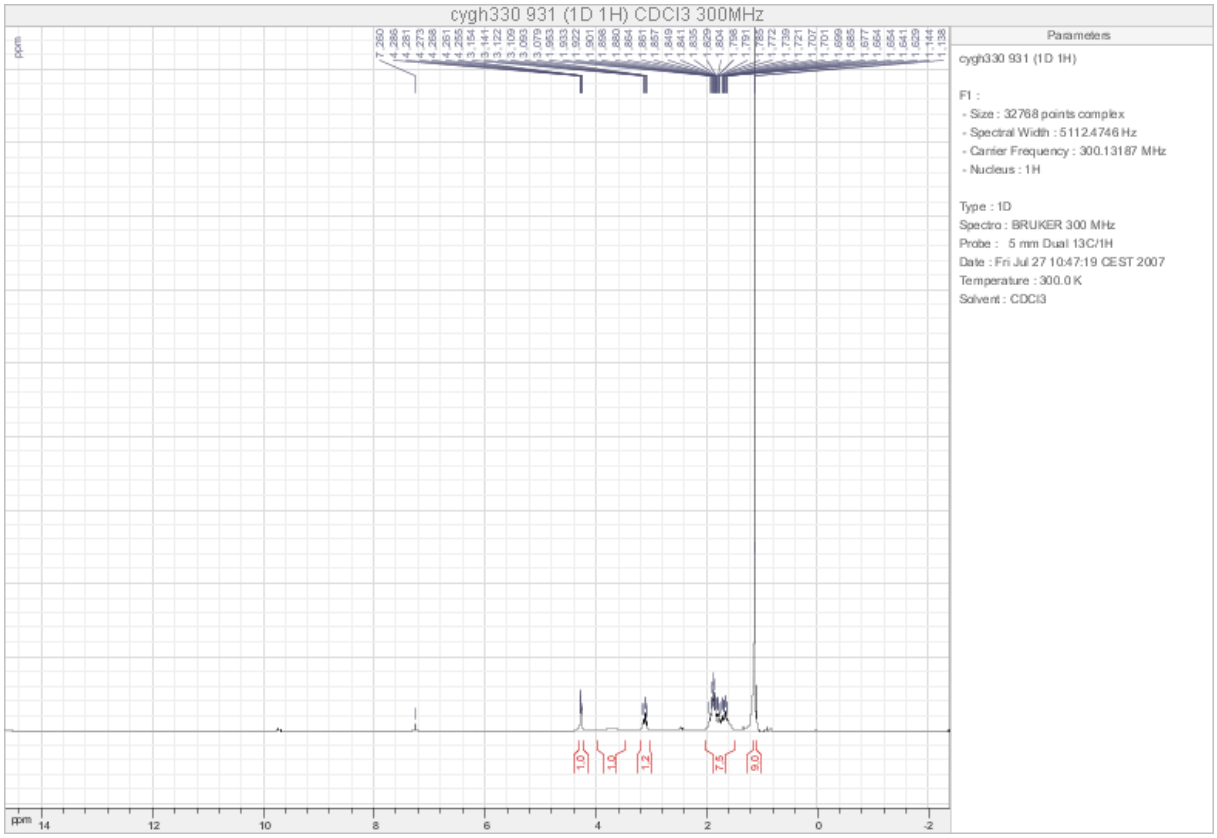
4a

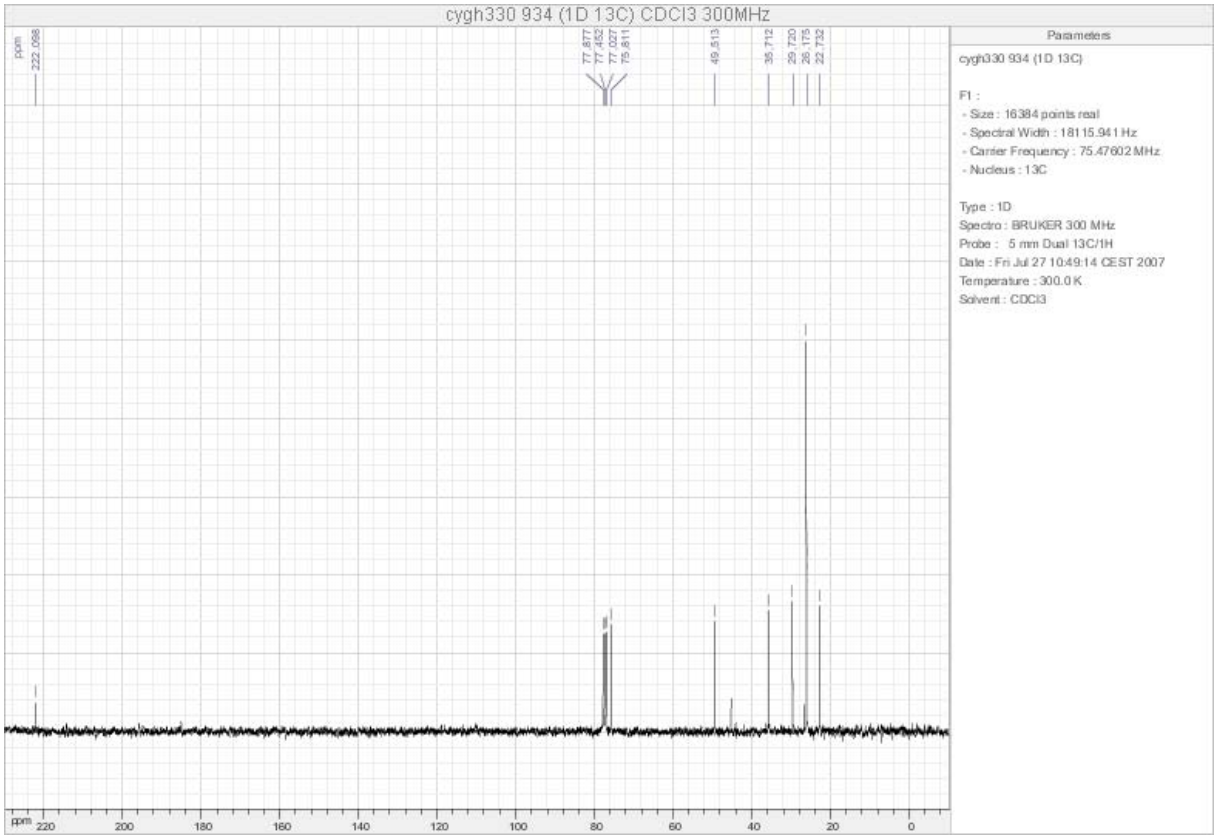

cygh308 593 (1D 1H) CDCl3 300MHz
Parameters
cygh308 593 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Feb 20 17:30:51 CET 2007
Temperature : 300.0 K
Solvent : CDCl3

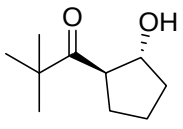

cygh309 617 (1D 13C) CDCl3 300MHz
Parameters
cygh309 617 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Feb 27 17:44:39 CET 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

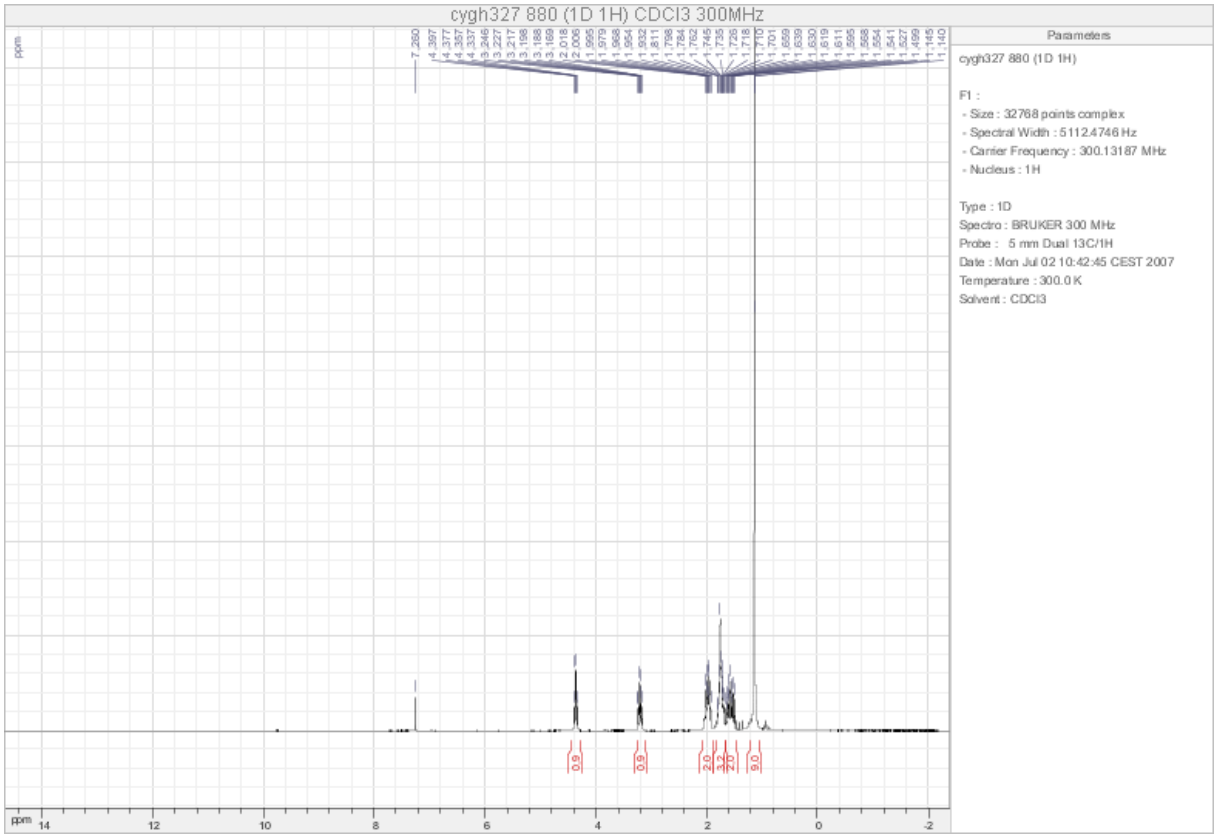
4b

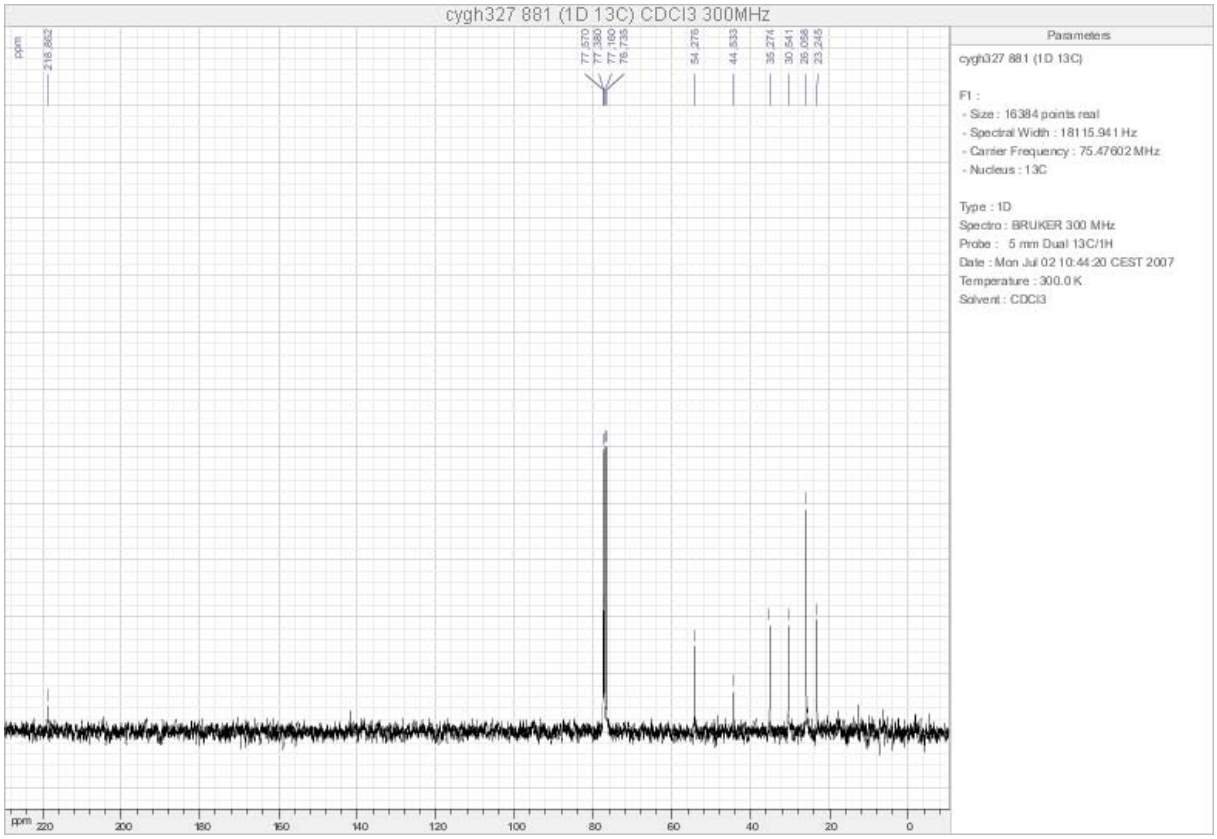

cygh330 931 (1D 1H) CDCl3 300MHz
Parameters
cygh330 931 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Fri Jul 27 10:47:19 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

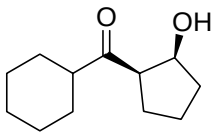

cygh330 934 (1D 13C) CDCl3 300MHz
Parameters
cygh330 934 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Fri Jul 27 10:49:14 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

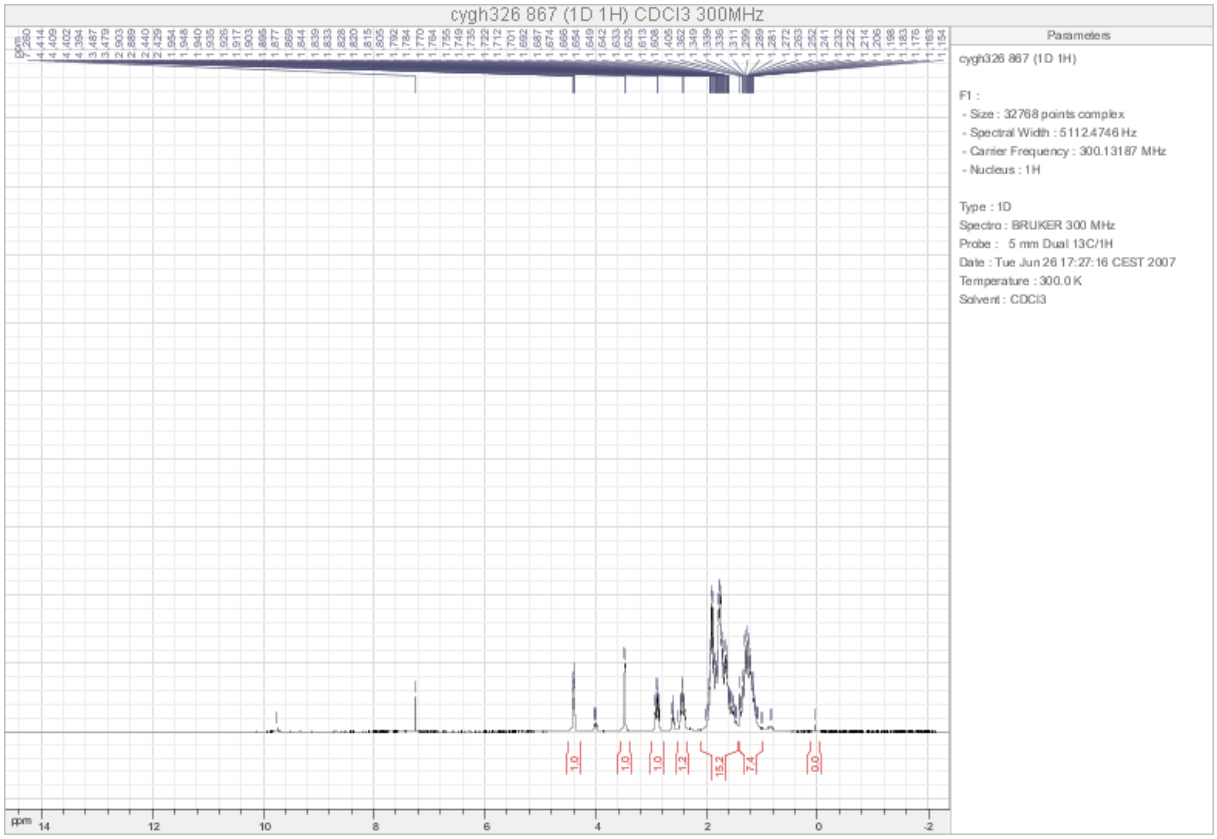
4b

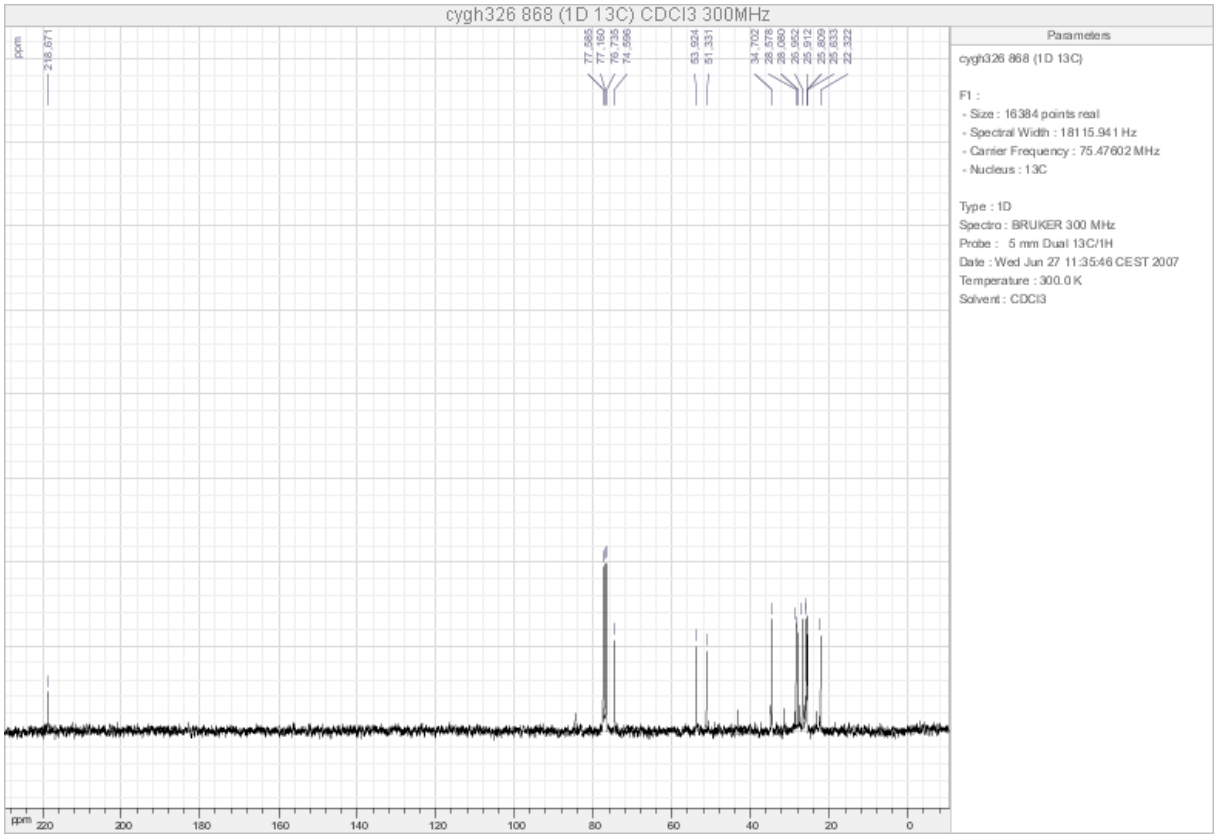

cygh327 880 (1D 1H) CDCl3 300MHz
Parameters
cygh327 880 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jul 02 10:42:45 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

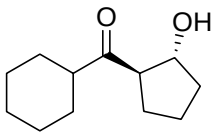

cygh327 881 (1D 13C) CDCl3 300MHz
Parameters
cygh327 881 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jul 02 10:44:20 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

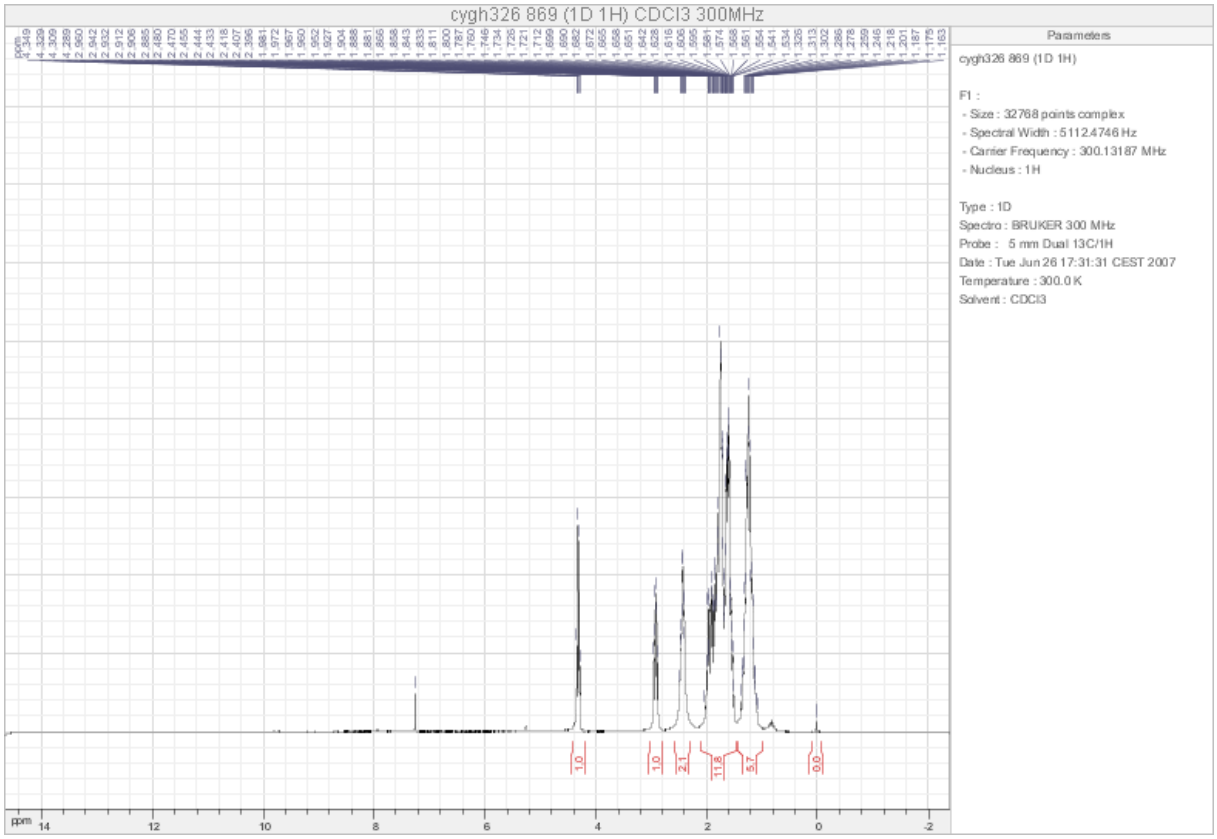
4c

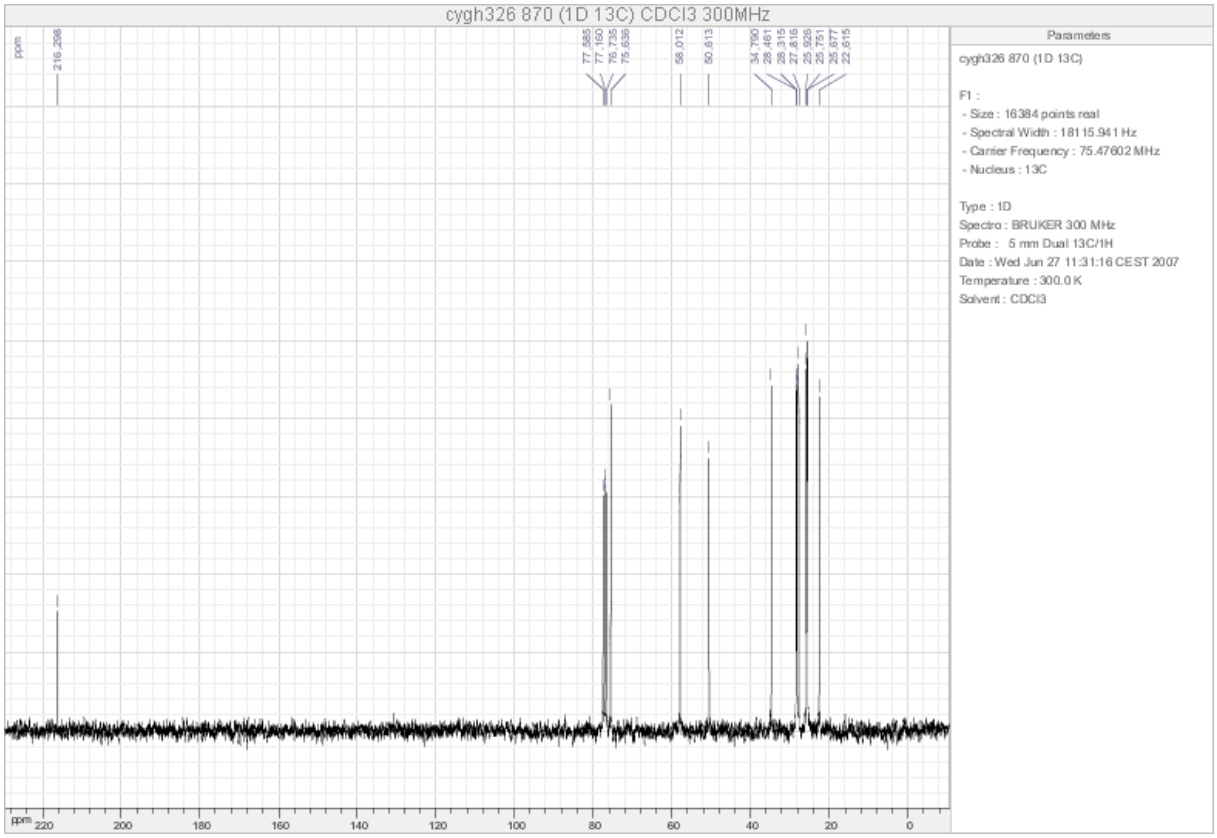

cygh326 867 (1D 1H) CDCl3 300MHz
Parameters
cygh326 867 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 26 17:27:16 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
14
12
10
8
6
4
2
0
-2

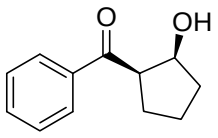

cygh326 868 (1D 13C) CDCl3 300MHz
Parameters
cygh326 868 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 27 11:35:46 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
220
200
180
160
140
120
100
80
60
40
20
0


O
OH

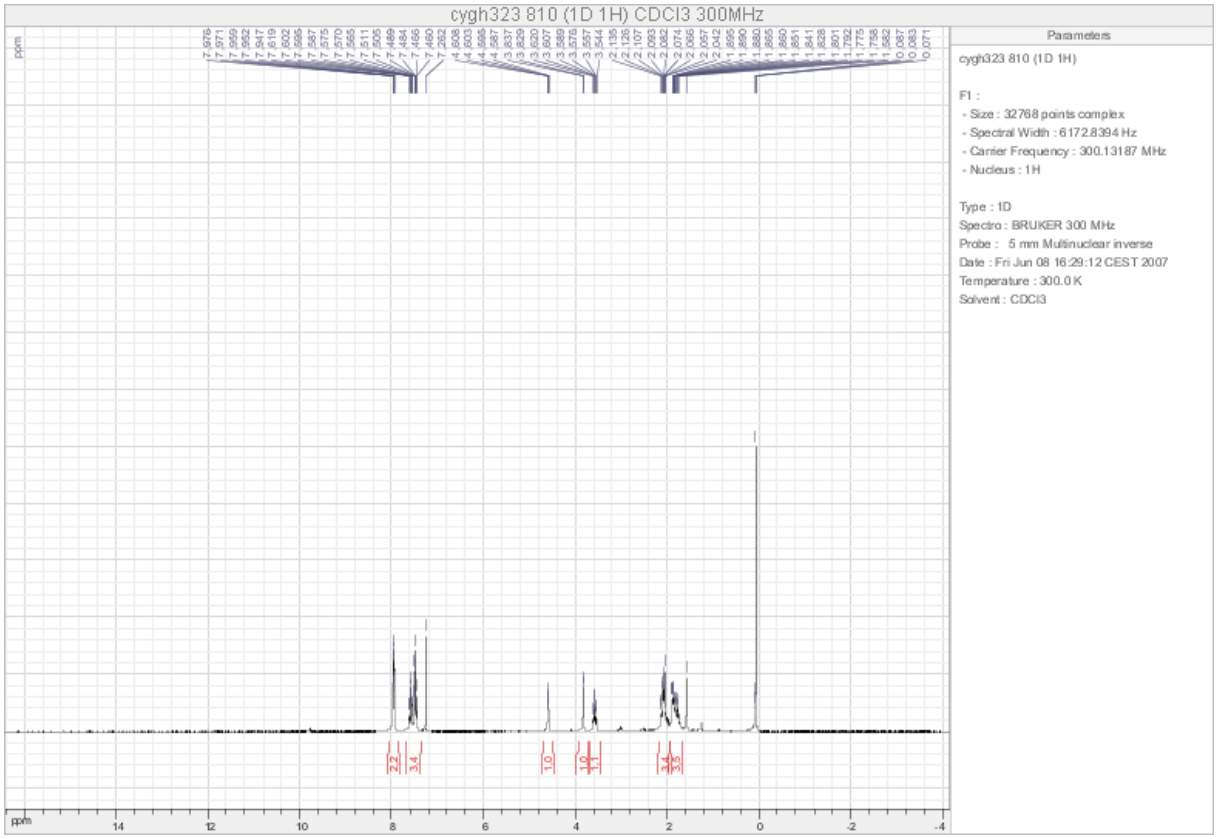
4c

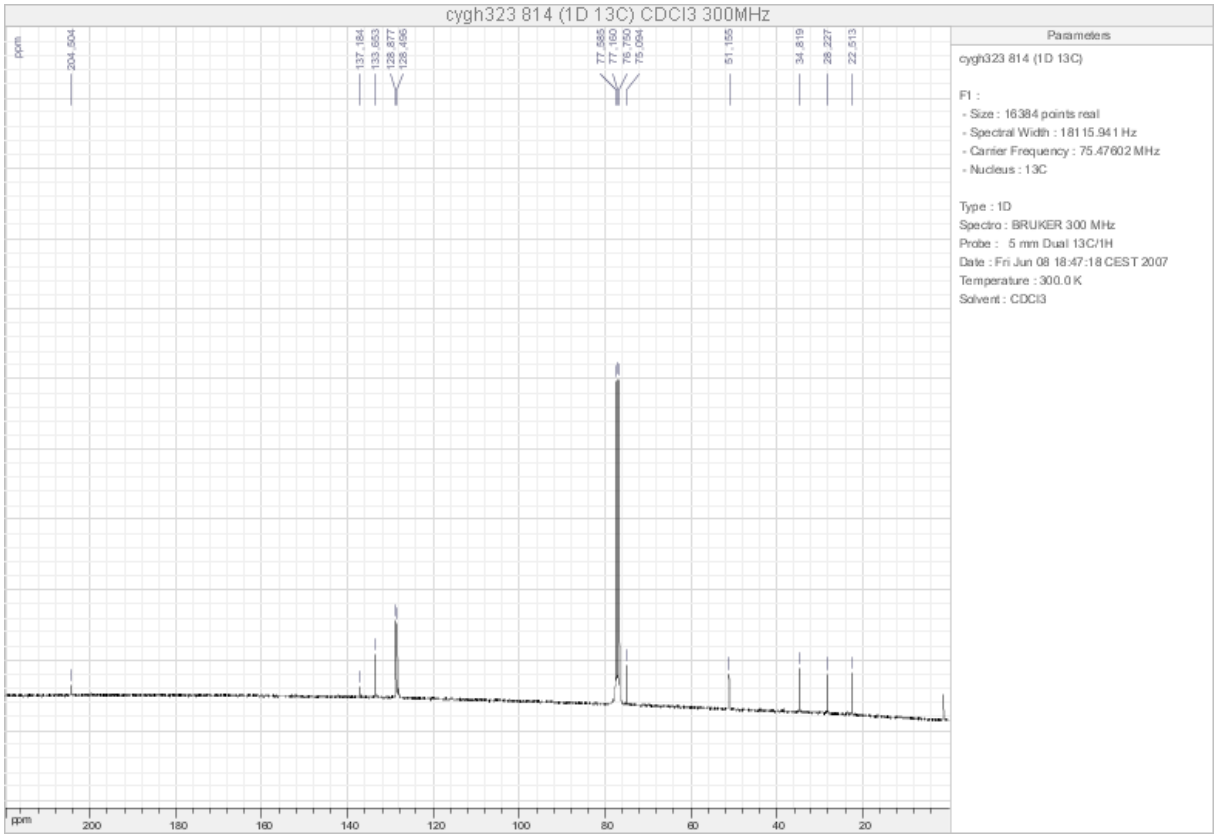

cygh326 869 (1D 1H) CDCl3 300MHz
Parameters
cygh326 869 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 26 17:31:31 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
14
12
10
8
6
4
2
0
-2

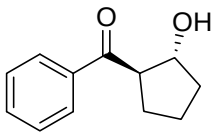

cygh326 870 (1D 13C) CDCl3 300MHz
Parameters
cygh326 870 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 27 11:31:16 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
ppm
220
200
180
160
140
120
100
80
60
40
20
0


O
OH

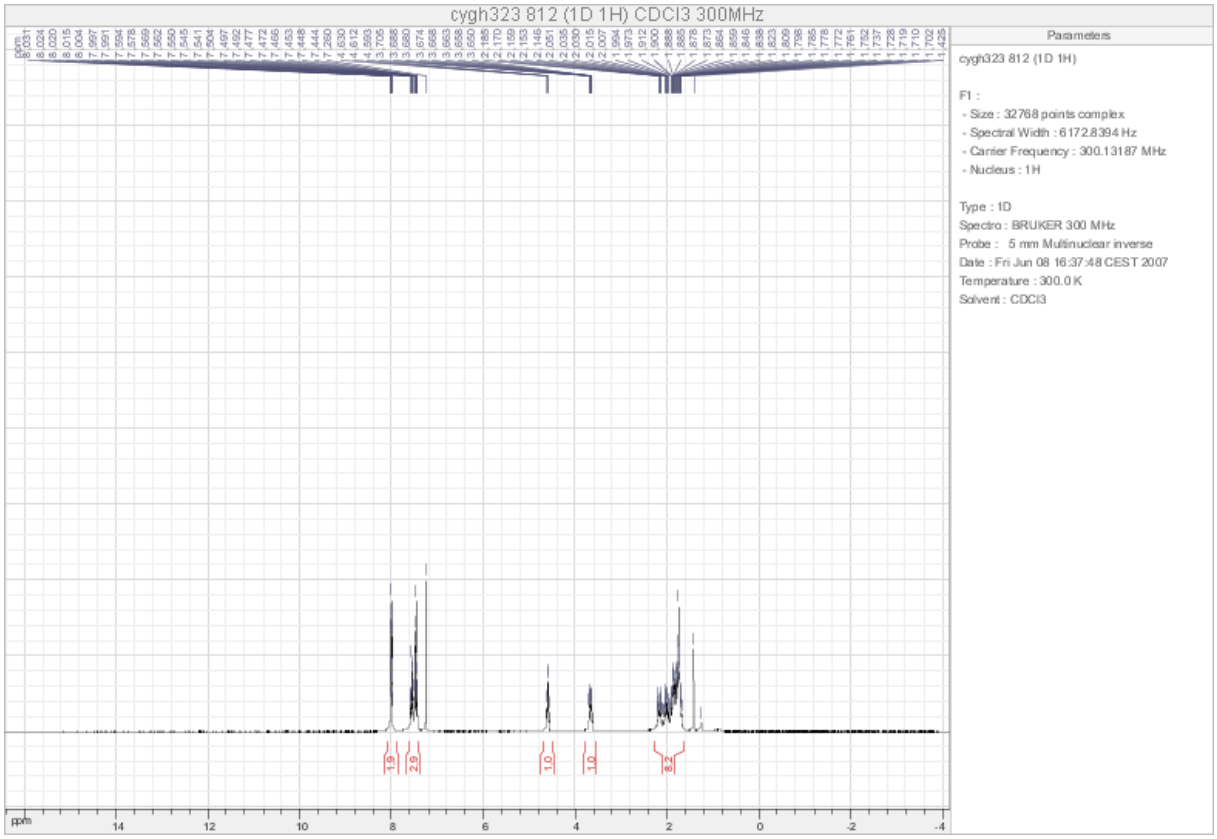
4d

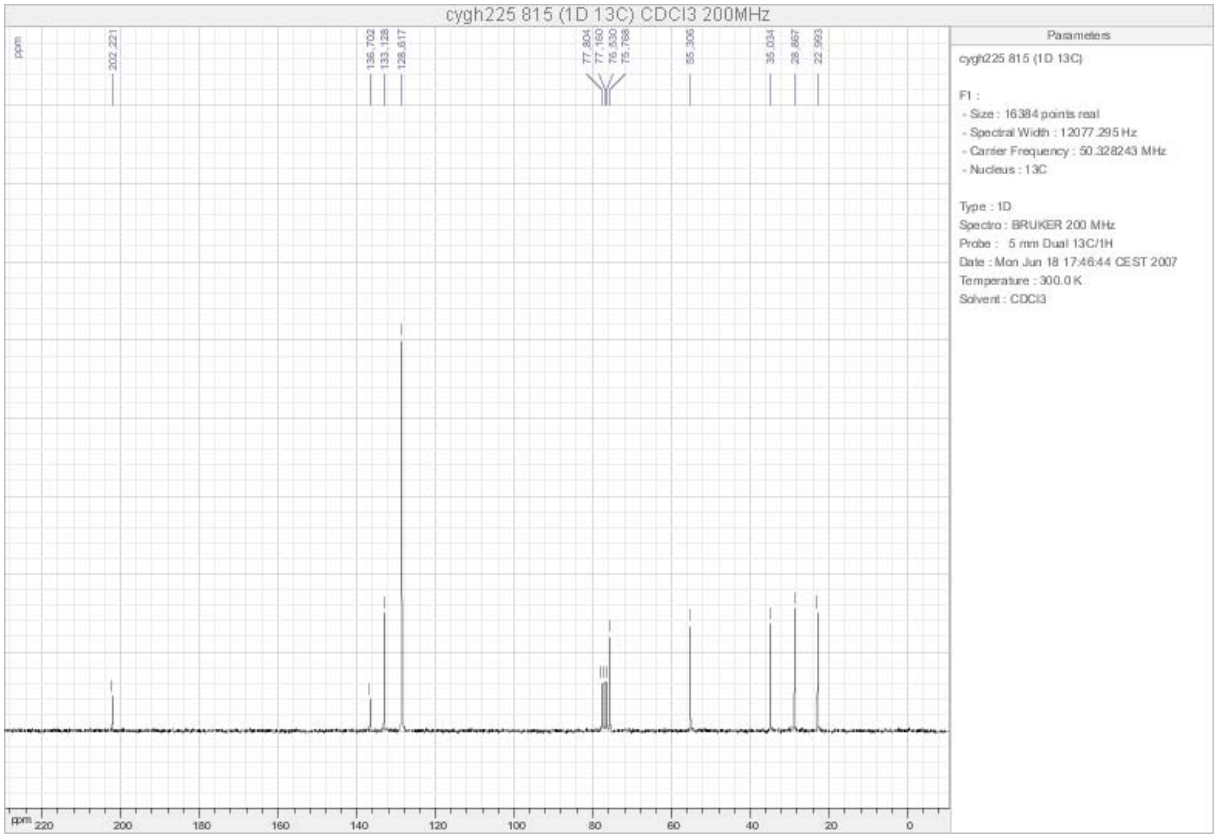

cygh323 810 (1D 1H) CDCl3 300MHz
Parameters
cygh323 810 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Fri Jun 08 16:29:12 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

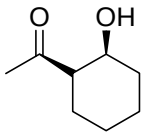

cygh323 814 (1D 13C) CDCl3 300MHz
Parameters
cygh323 814 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Fri Jun 08 18:47:18 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

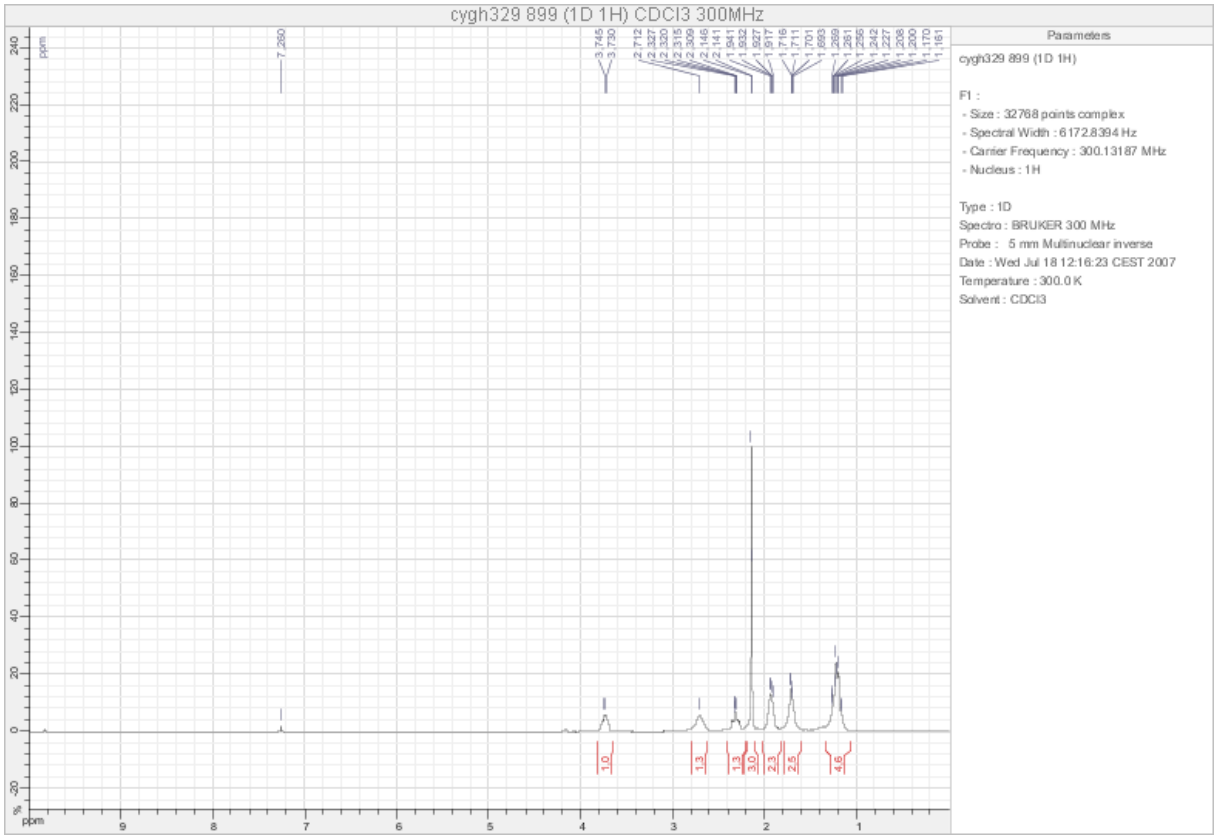
4d

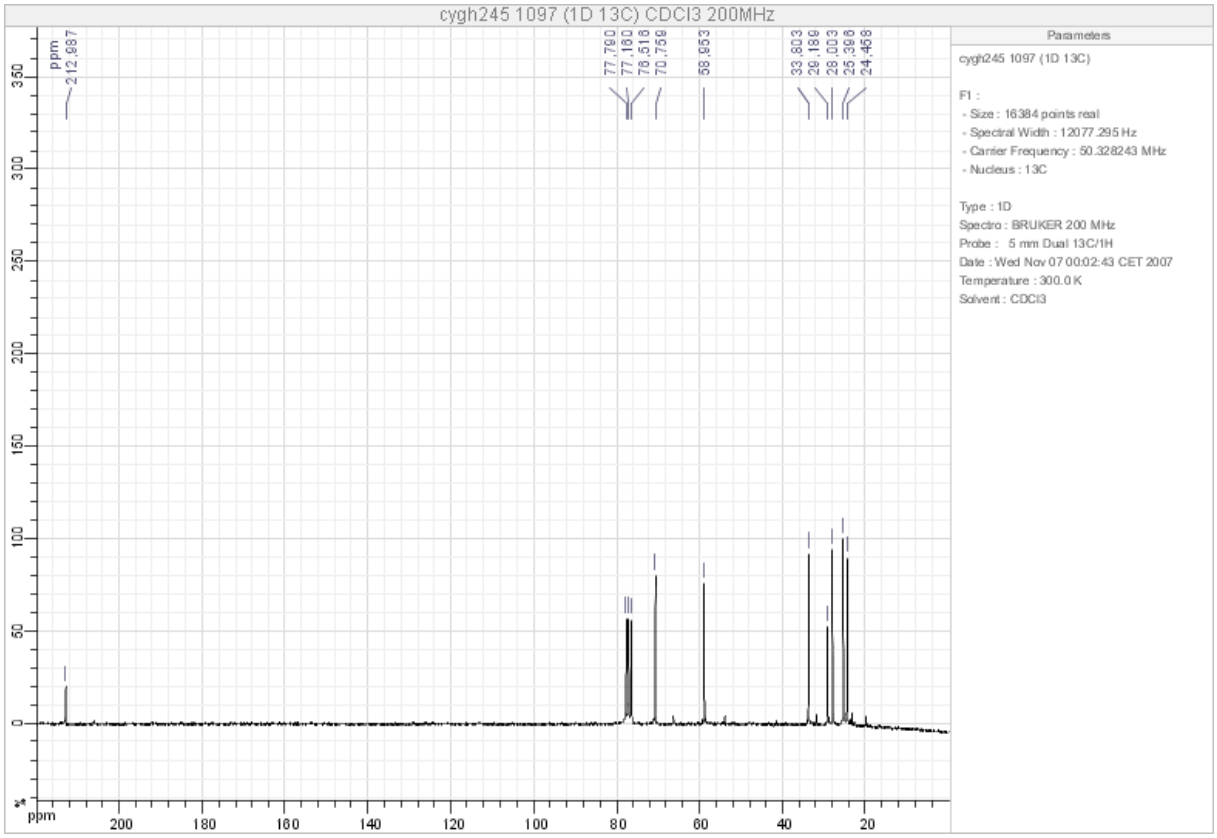

cygh323 812 (1D 1H) CDCl3 300MHz
Parameters
cygh323 812 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Fri Jun 08 16:37:48 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
1.9
2.9
1.0
1.0
3.2
ppm
14
12
10
8
6
4
2
0
-2
-4

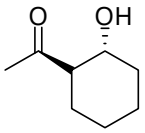

cygh225 815 (1D 13C) CDCl3 200MHz
Parameters
cygh225 815 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 18 17:46:44 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3
202.221
136.702
133.128
128.617
77.804
77.160
76.530
75.768
55.306
35.034
28.867
22.993
ppm
220
200
180
160
140
120
100
80
60
40
20
0



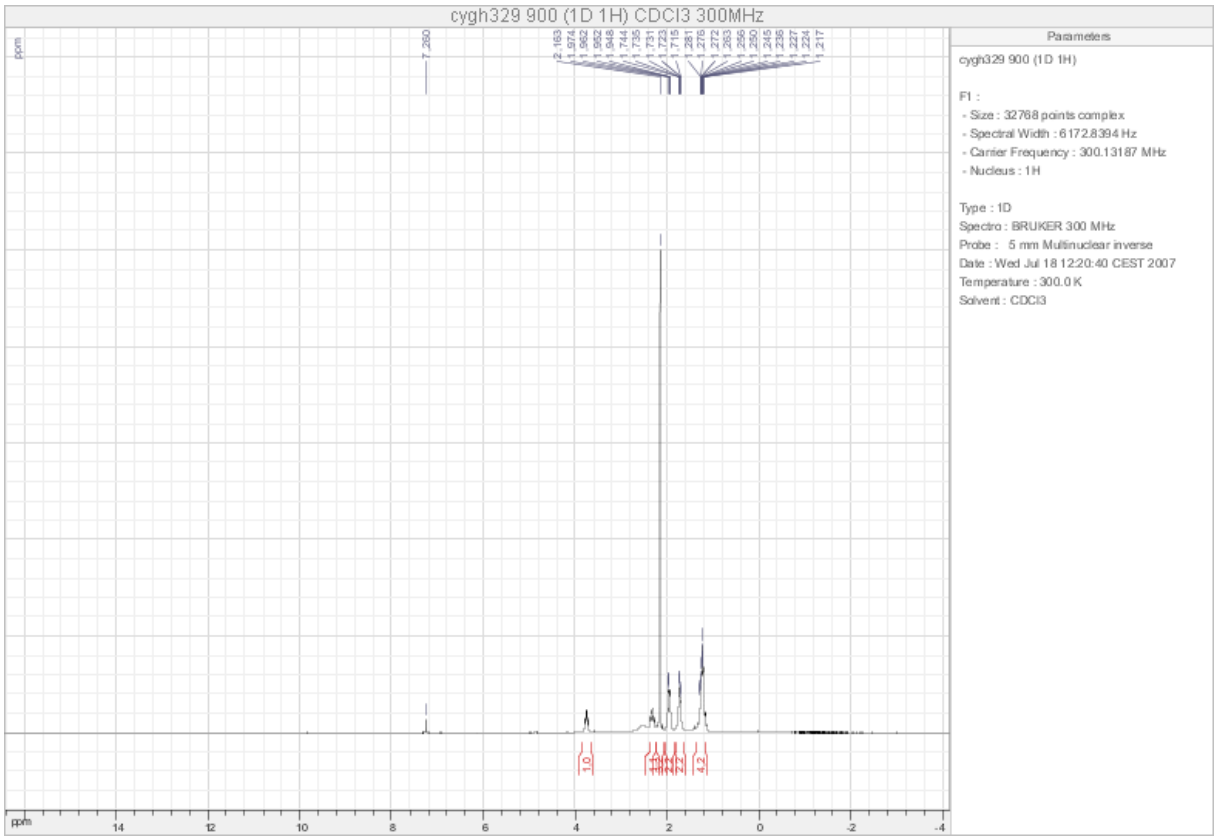
4e

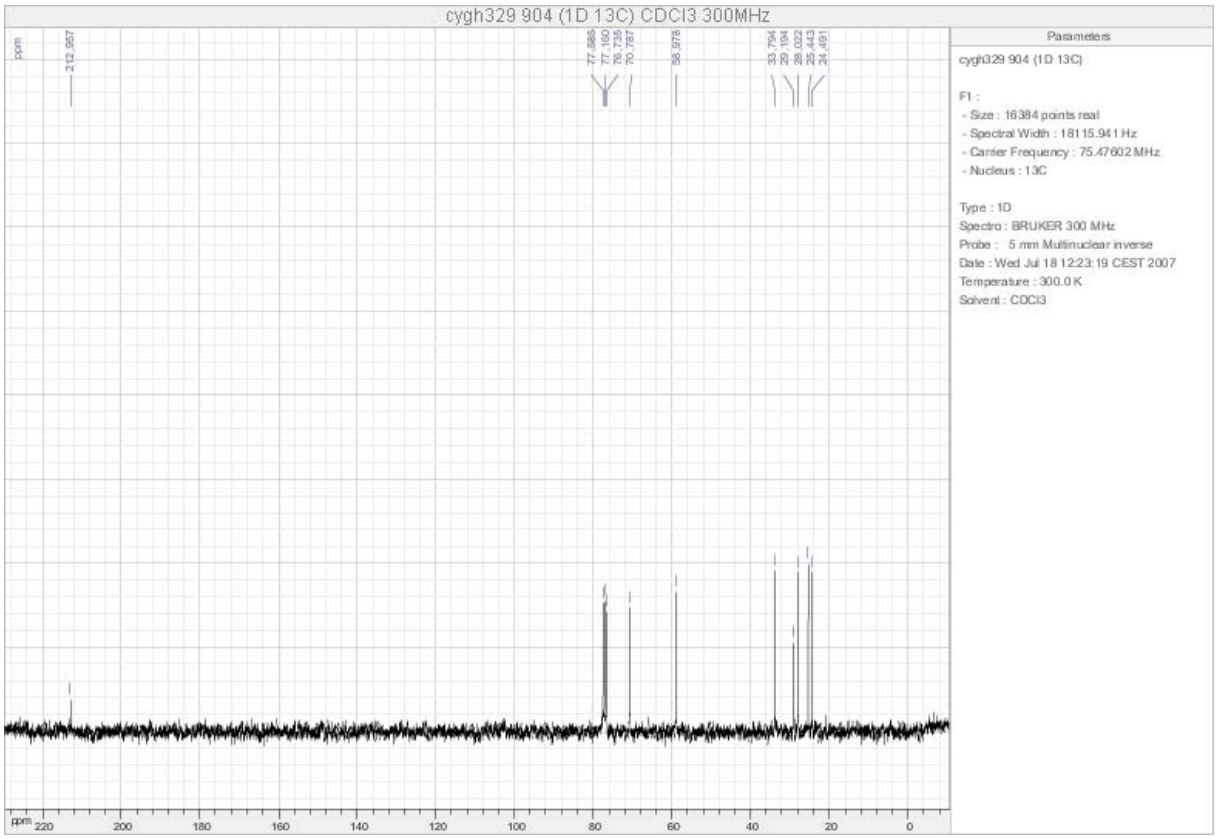

cygh329 899 (1D 1H) CDCl3 300MHz
Parameters
cygh329 899 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Wed Jul 18 12:16:23 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

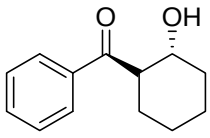

cygh245 1097 (1D 13C) CDCl3 200MHz
Parameters
cygh245 1097 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Nov 07 00:02:43 CET 2007
Temperature : 300.0 K
Solvent : CDCl3



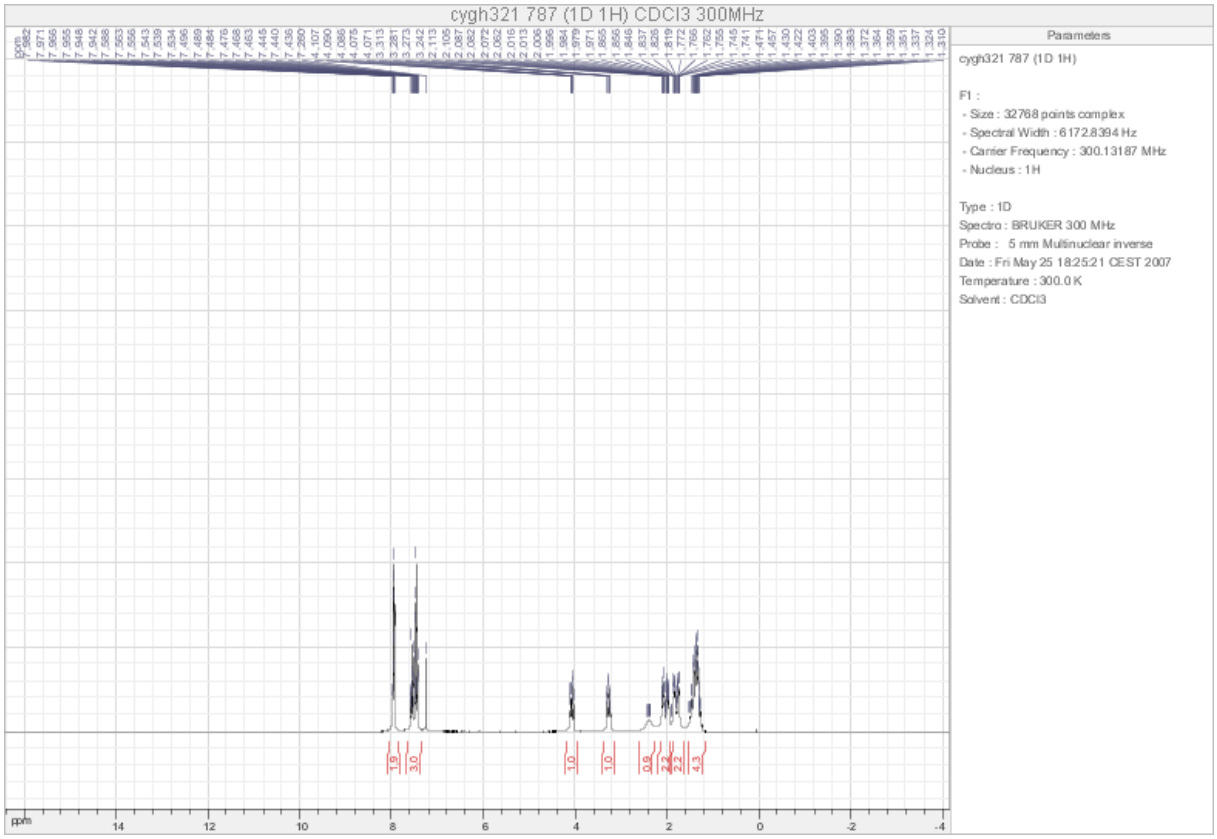
4e

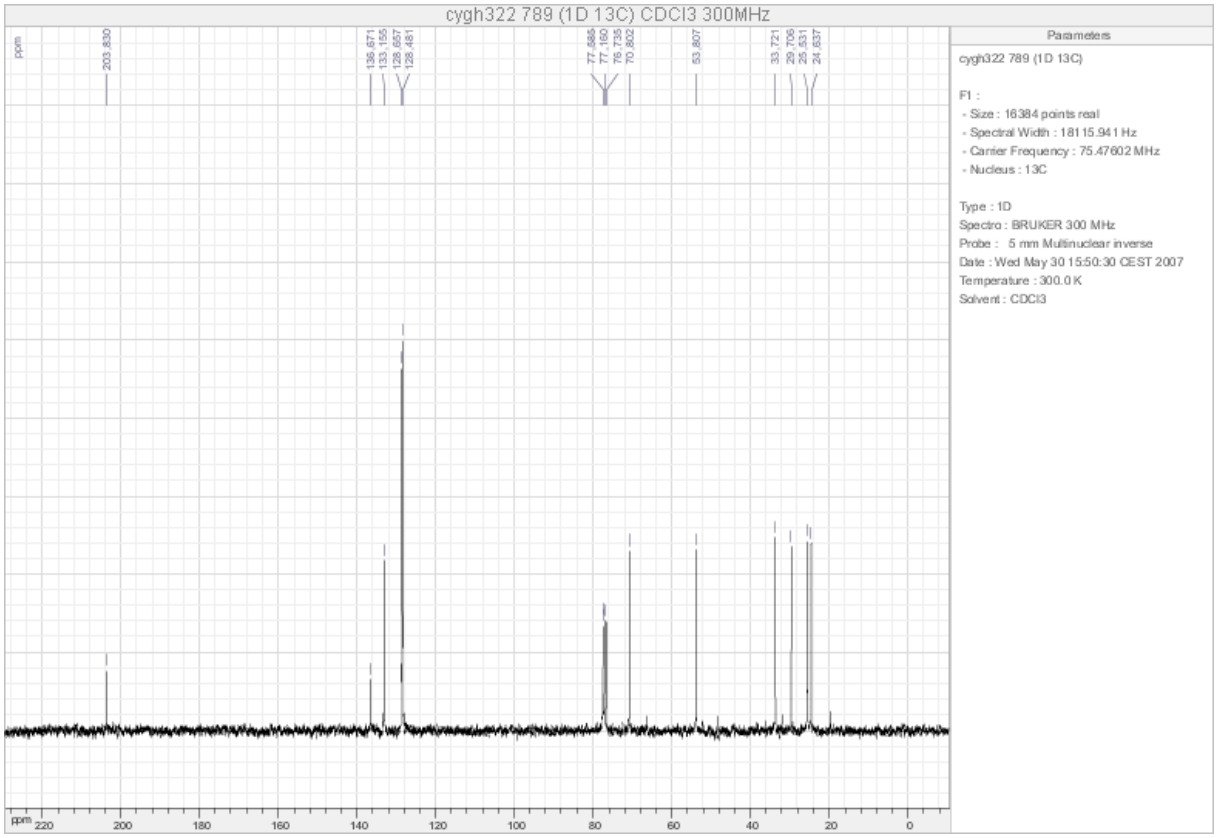

cygh329 900 (1D 1H) CDCl3 300MHz
Parameters
cygh329 900 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Wed Jul 18 12:20:40 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

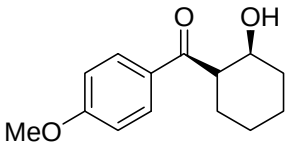

cygh329 904 (1D 13C) CDCl3 300MHz
Parameters
cygh329 904 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Wed Jul 18 12:23:19 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

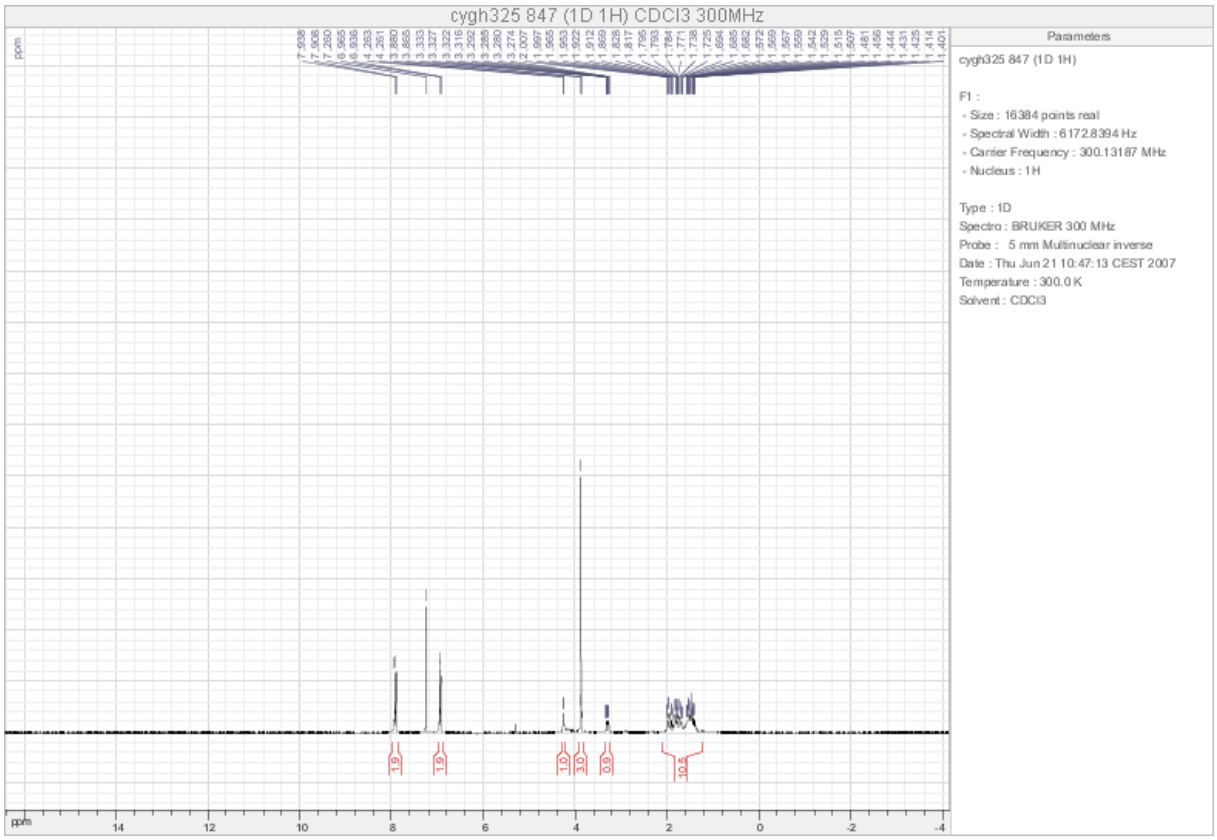
4f

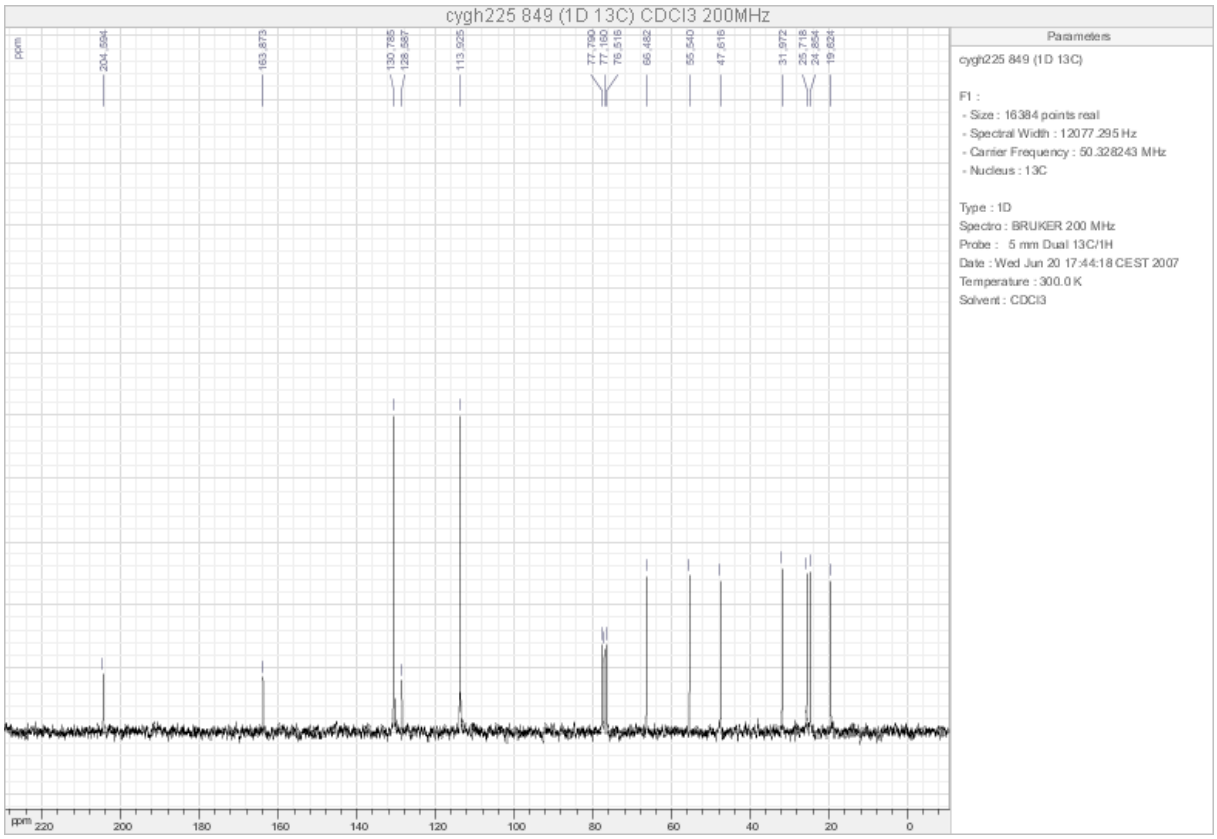

cygh321 787 (1D 1H) CDCl3 300MHz
Parameters
cygh321 787 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Fri May 25 18:25:21 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

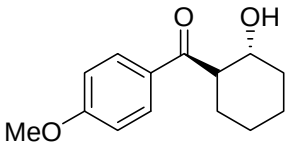

cygh322 789 (1D 13C) CDCl3 300MHz
Parameters
cygh322 789 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Wed May 30 15:50:30 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH
MeO

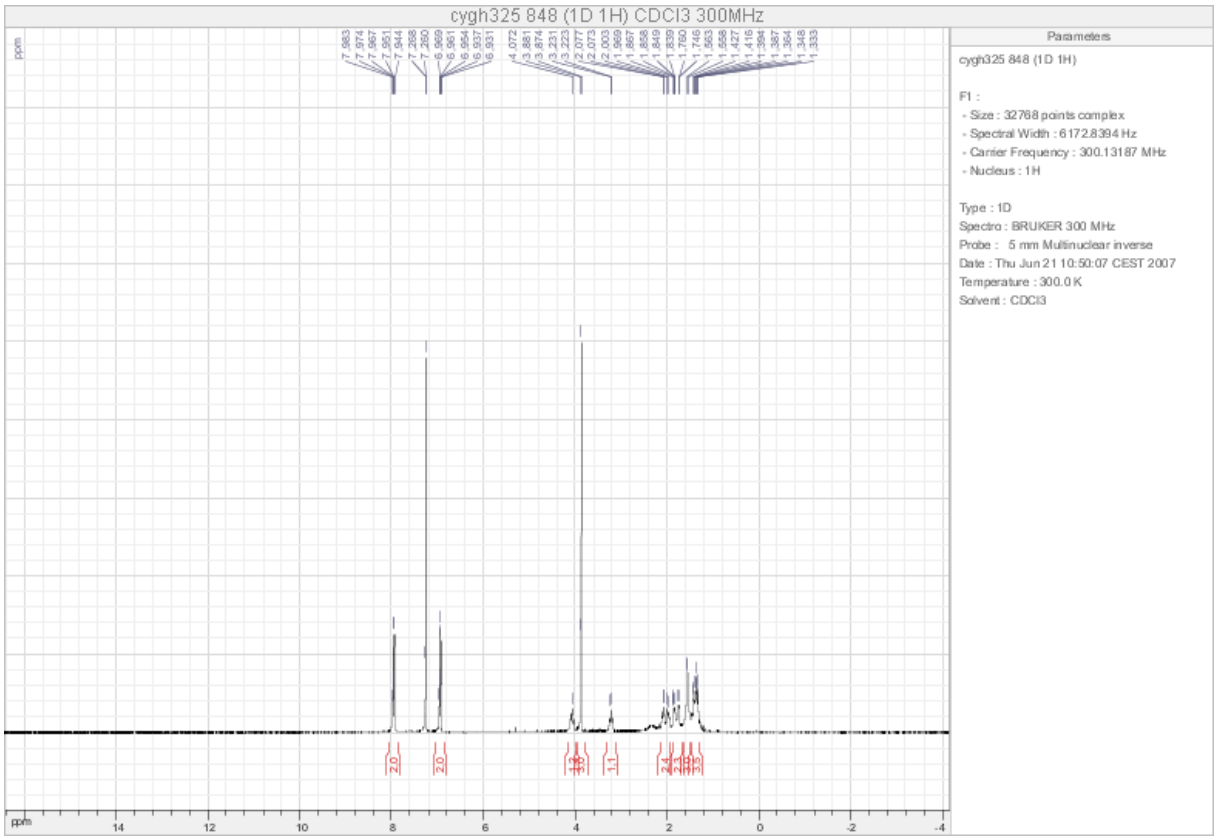
4g

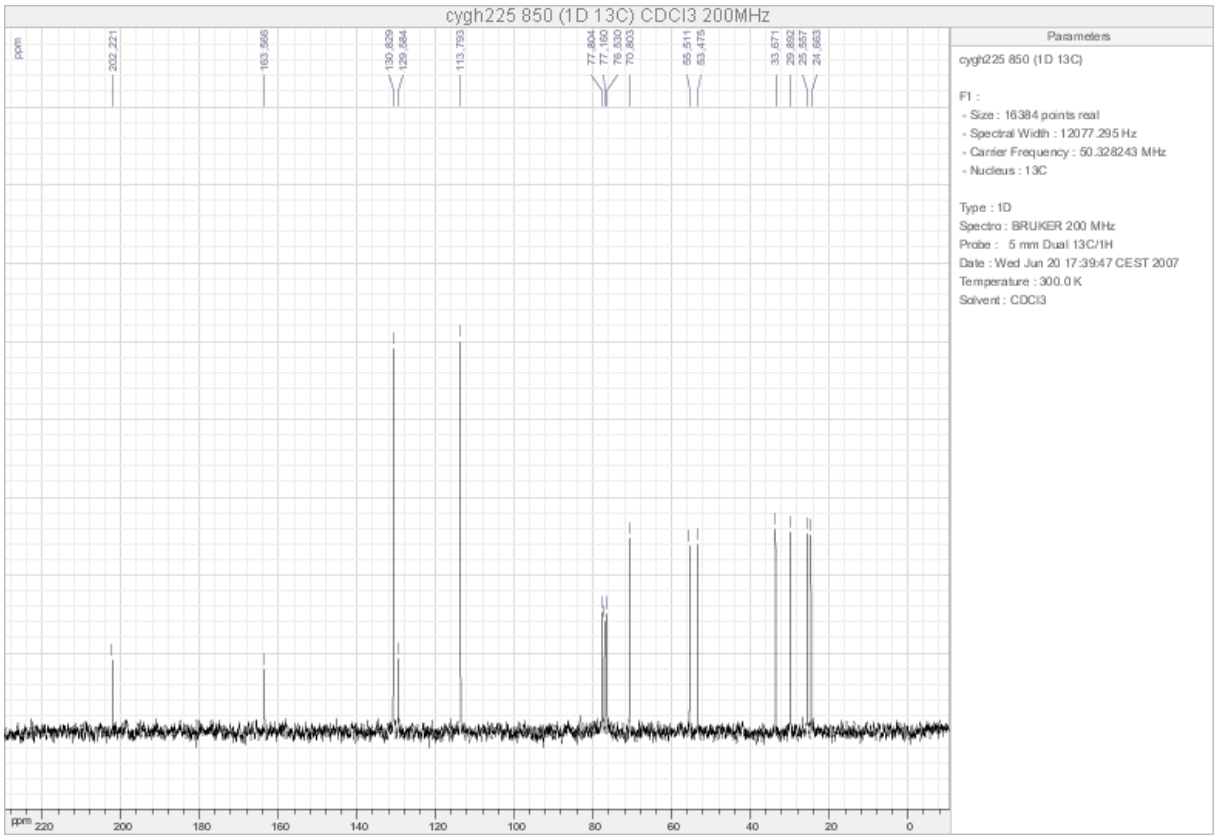

cygh325 847 (1D 1H) CDCl3 300MHz
Parameters
cygh325 847 (1D 1H)
F1 :
- Size : 16384 points real
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Jun 21 10:47:13 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

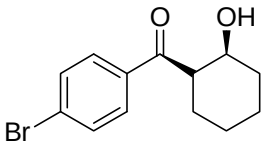

cygh225 849 (1D 13C) CDCl3 200MHz
Parameters
cygh225 849 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 20 17:44:18 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH
MeO

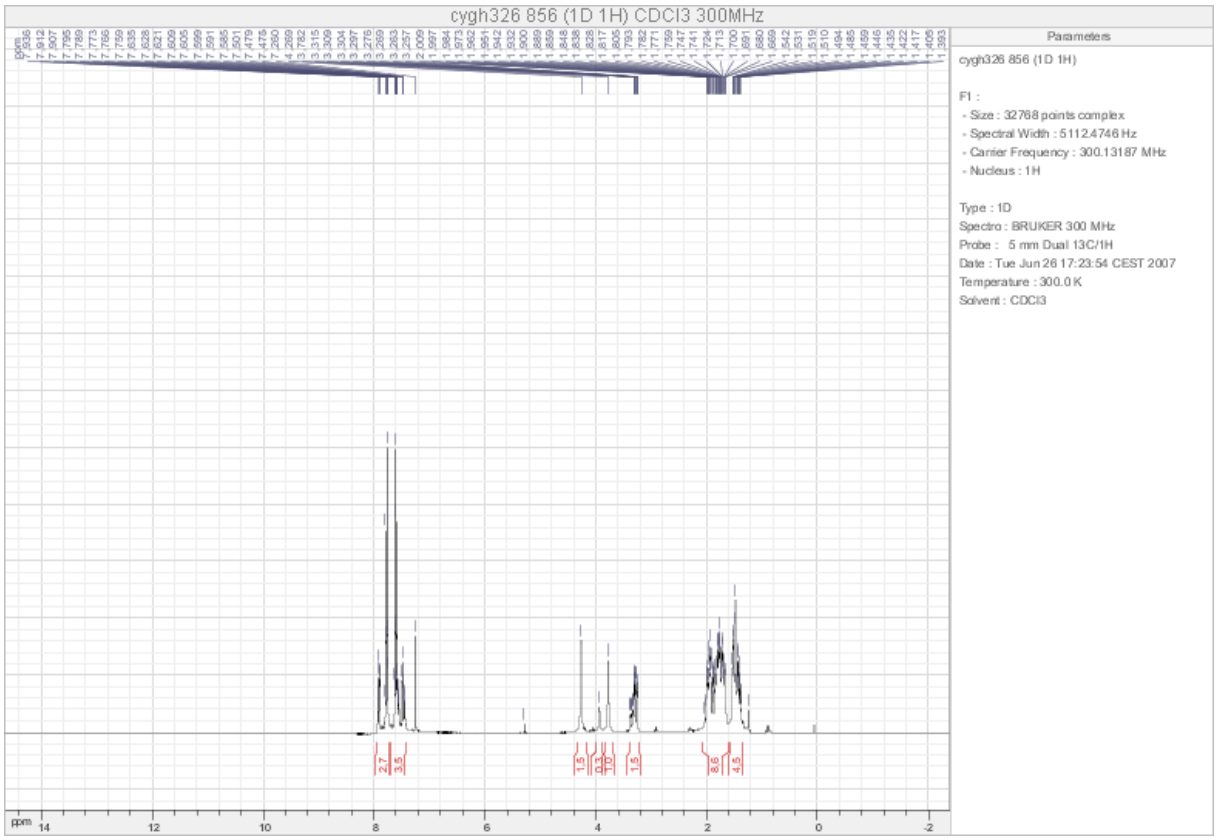
4g

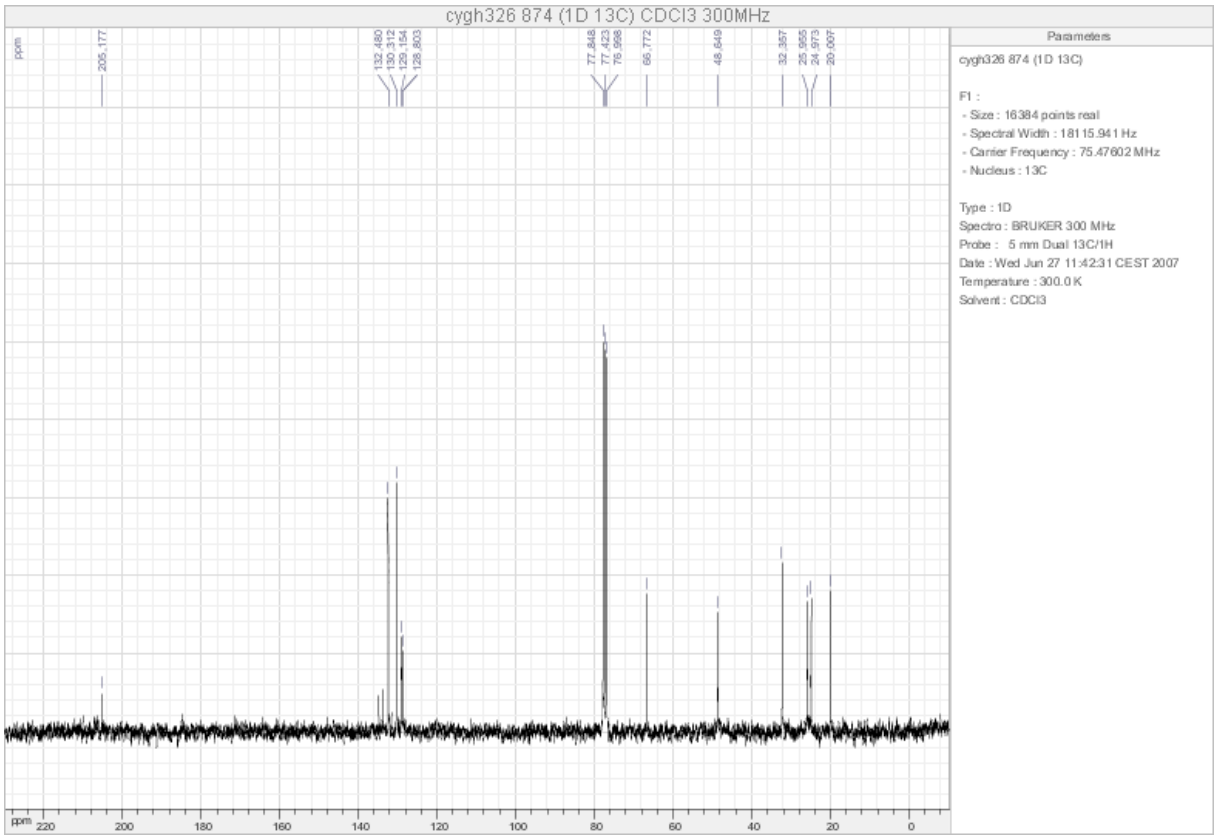

cygh325 848 (1D 1H) CDCl3 300MHz
Parameters
cygh325 848 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Jun 21 10:50:07 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

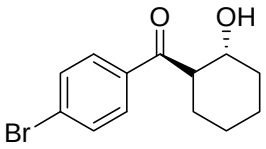

cygh225 850 (1D 13C) CDCl3 200MHz
Parameters
cygh225 850 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 12077.295 Hz
- Carrier Frequency : 50.328243 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 200 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 20 17:39:47 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH
Br

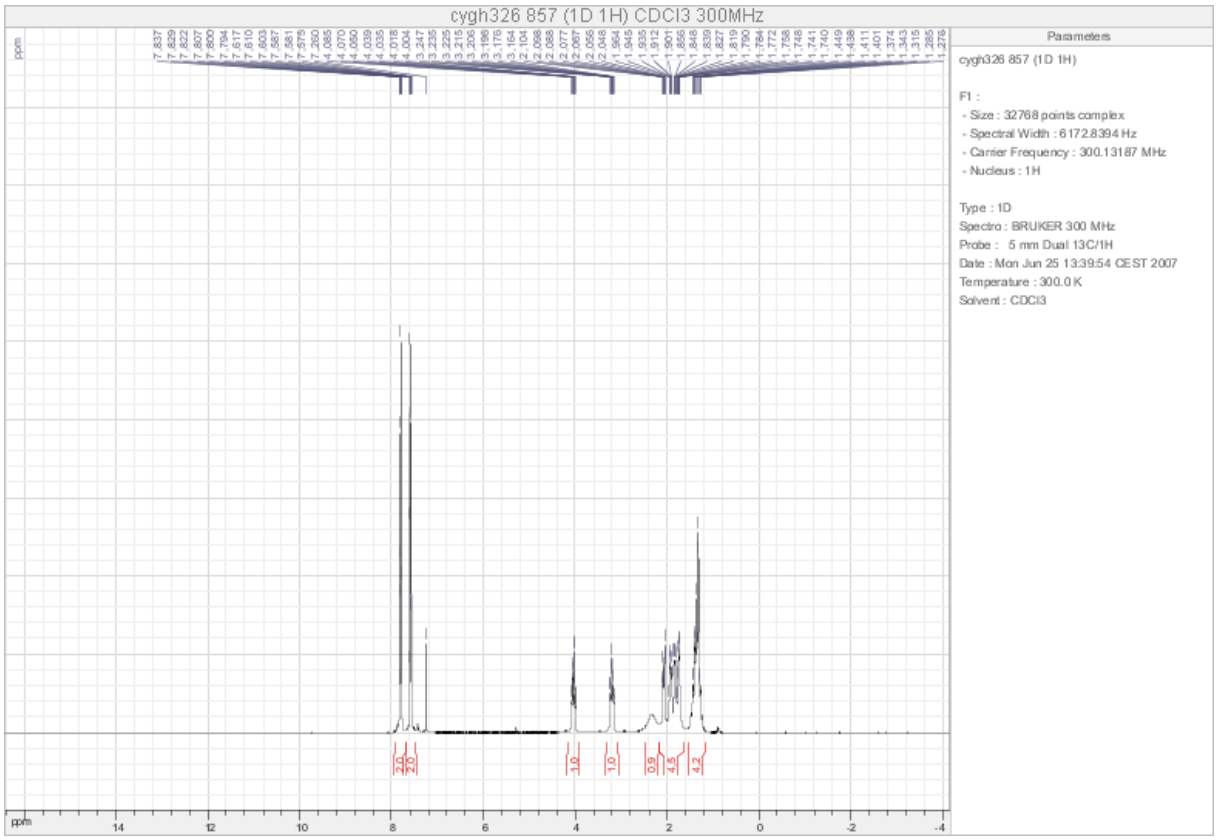
4h

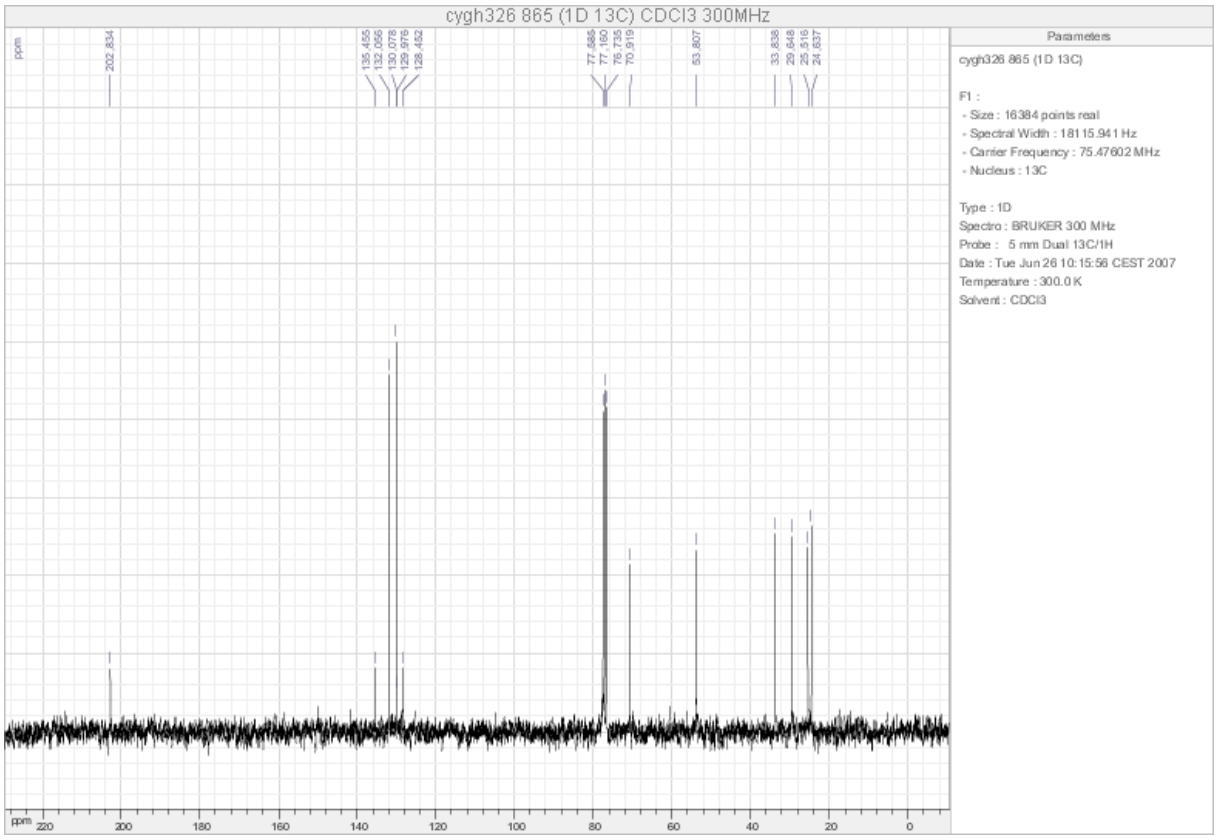

cygh326 856 (1D 1H) CDCl3 300MHz
Parameters
cygh326 856 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 26 17:23:54 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

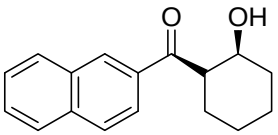

cygh326 874 (1D 13C) CDCl3 300MHz
Parameters
cygh326 874 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Wed Jun 27 11:42:31 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH
Br

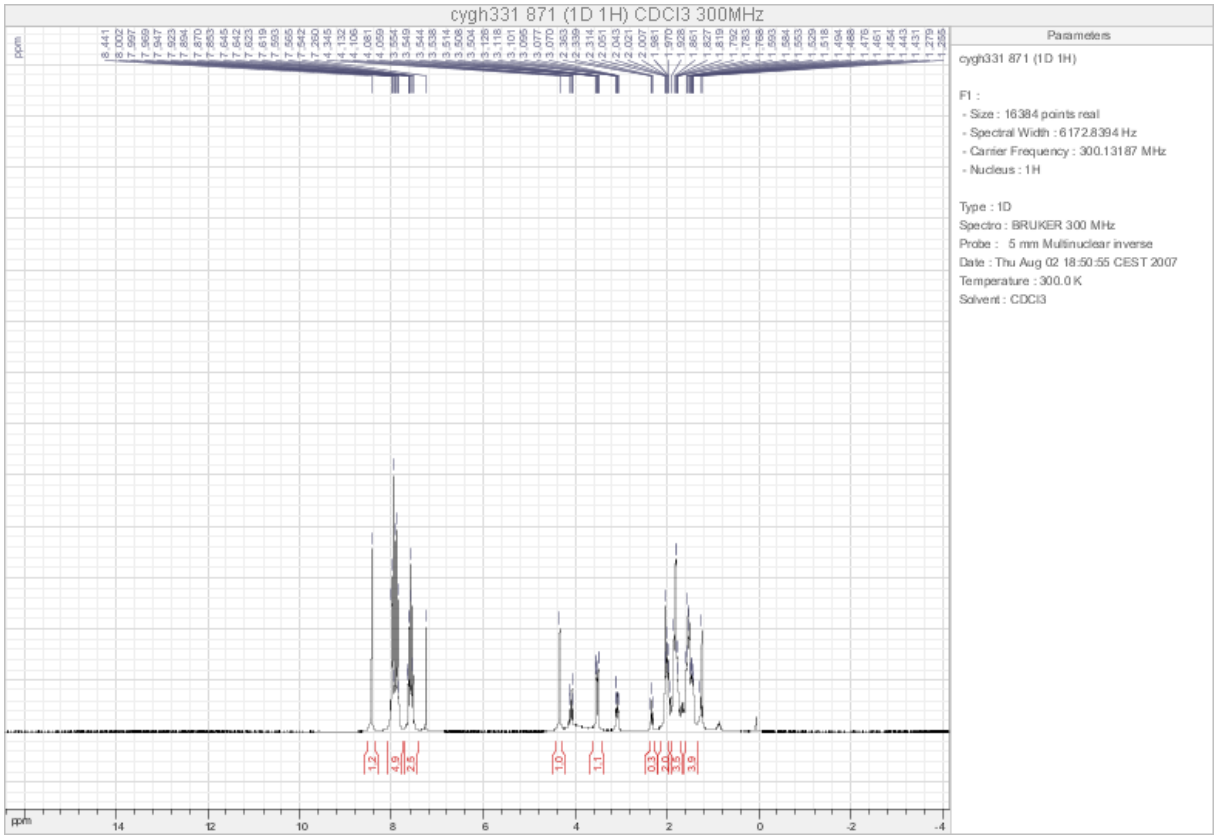
4h

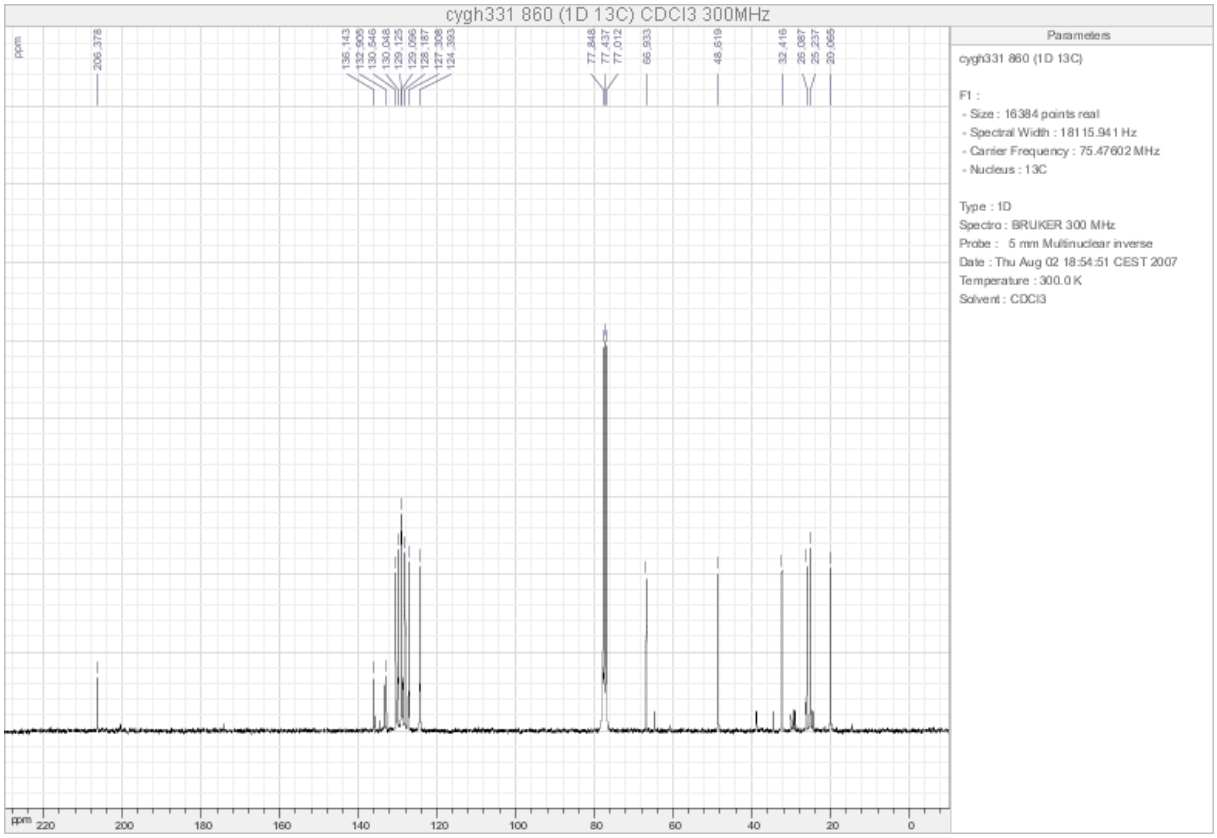

cygh326 857 (1D 1H) CDCl3 300MHz
Parameters
cygh326 857 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Mon Jun 25 13:39:54 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

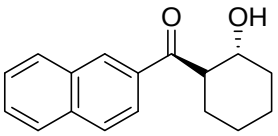

cygh326 865 (1D 13C) CDCl3 300MHz
Parameters
cygh326 865 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 26 10:15:56 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

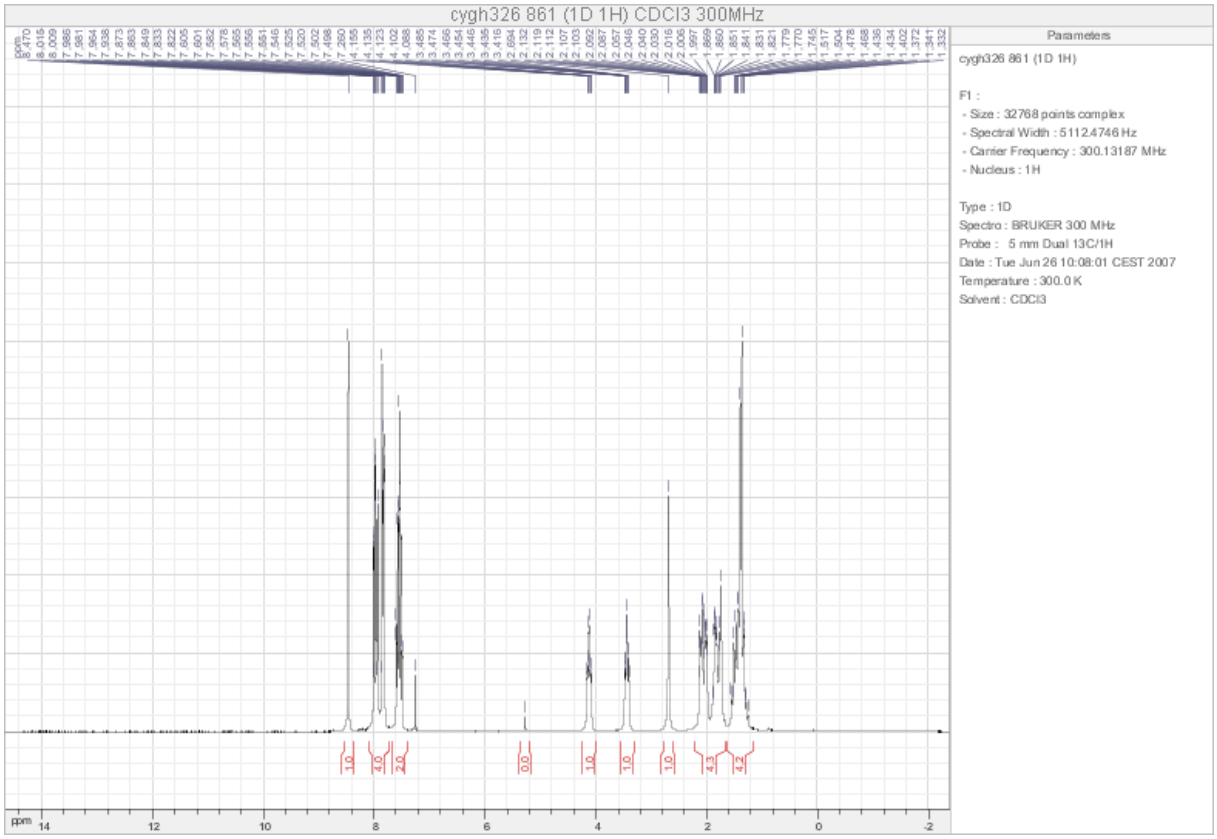
4i

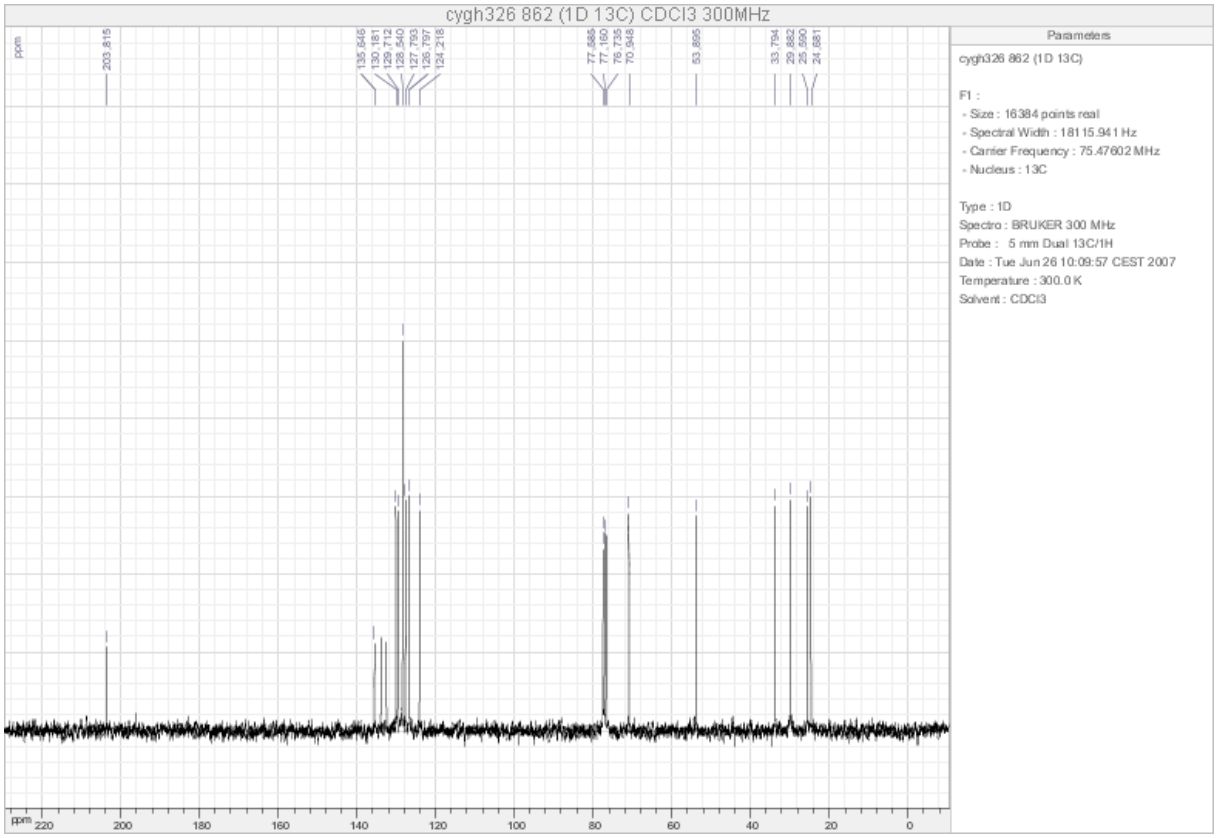

cygh331 871 (1D 1H) CDCl3 300MHz
Parameters
cygh331 871 (1D 1H)
F1 :
- Size : 16384 points real
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Aug 02 18:50:55 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

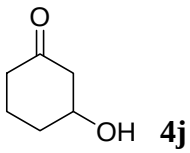

cygh331 860 (1D 13C) CDCl3 300MHz
Parameters
cygh331 860 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Thu Aug 02 18:54:51 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


O
OH

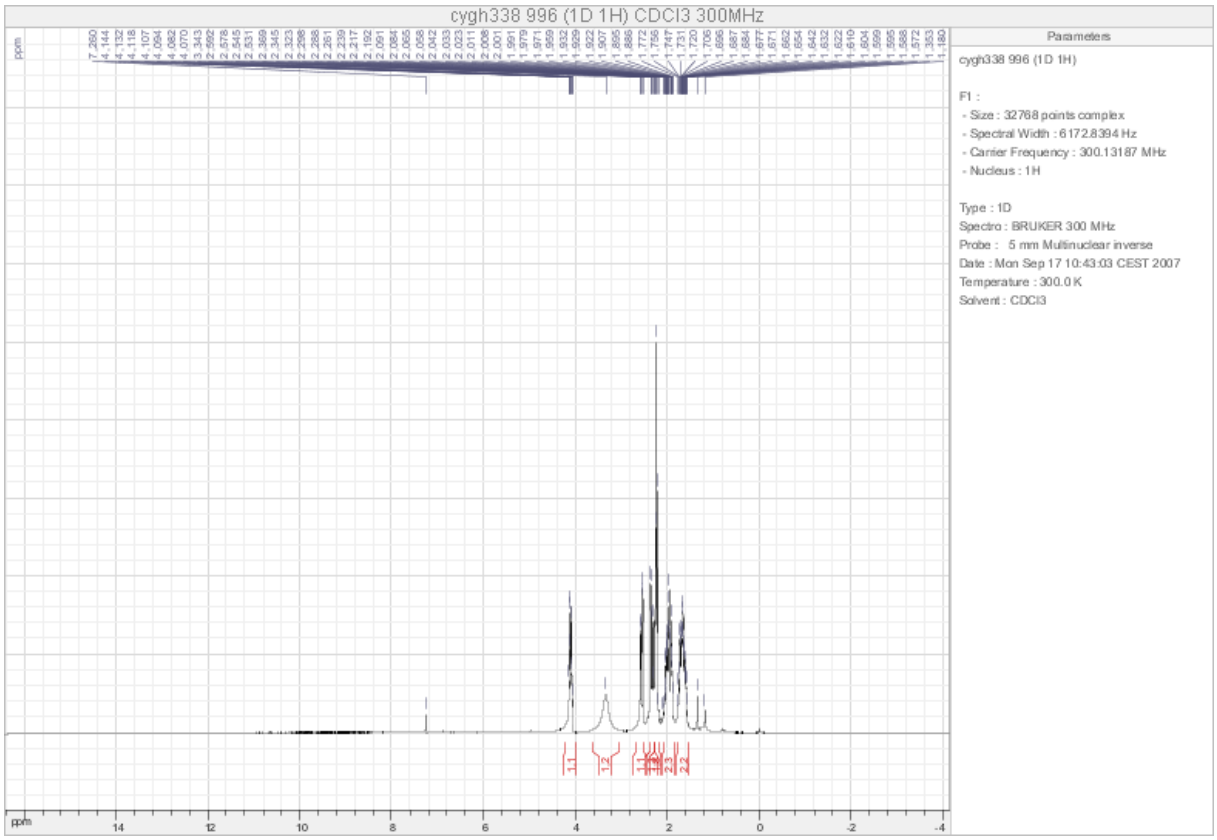
4i

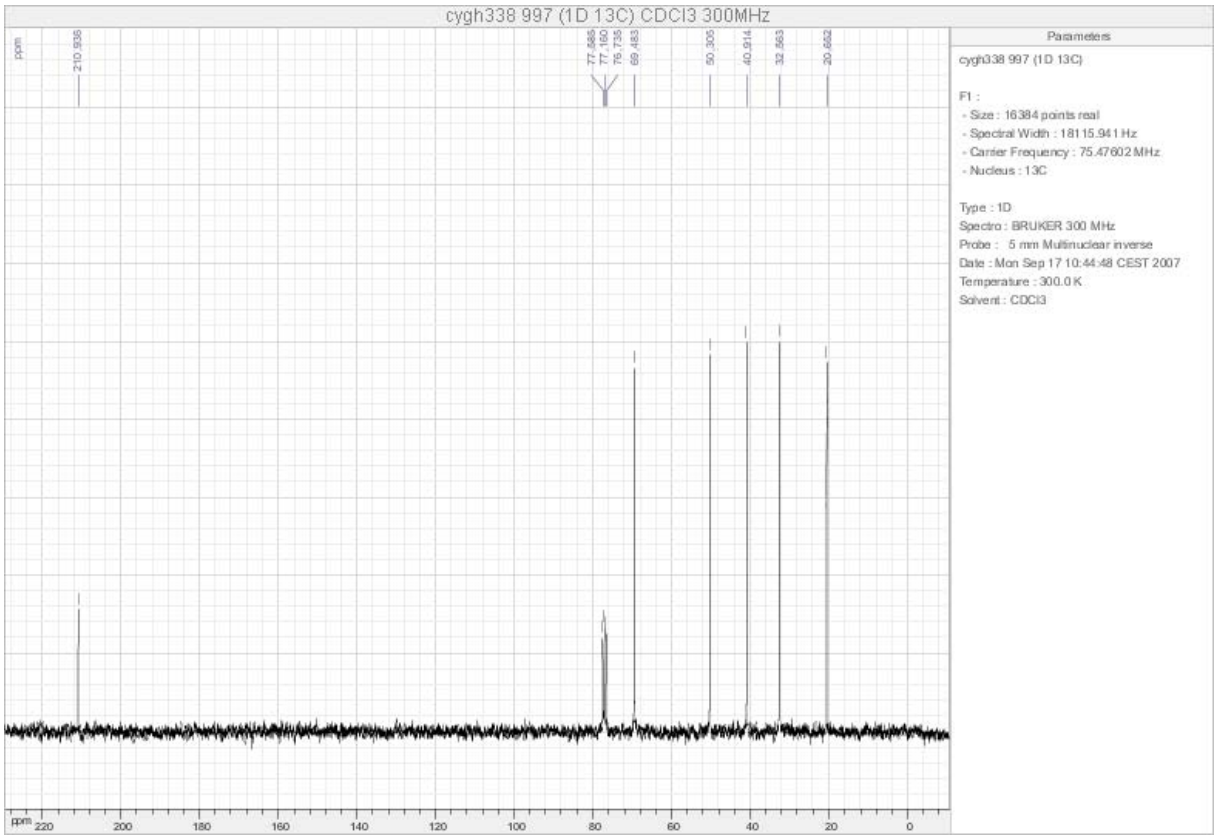

cygh326 861 (1D 1H) CDCl3 300MHz
Parameters
cygh326 861 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 5112.4746 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 26 10:08:01 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


cygh326 862 (1D 13C) CDCl3 300MHz
Parameters
cygh326 862 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Dual 13C/1H
Date : Tue Jun 26 10:09:57 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3



4j


cygh338 996 (1D 1H) CDCl3 300MHz
Parameters
cygh338 996 (1D 1H)
F1 :
- Size : 32768 points complex
- Spectral Width : 6172.8394 Hz
- Carrier Frequency : 300.13187 MHz
- Nucleus : 1H
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Mon Sep 17 10:43:03 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3


cygh338 997 (1D 13C) CDCl3 300MHz
Parameters
cygh338 997 (1D 13C)
F1 :
- Size : 16384 points real
- Spectral Width : 18115.941 Hz
- Carrier Frequency : 75.47602 MHz
- Nucleus : 13C
Type : 1D
Spectro : BRUKER 300 MHz
Probe : 5 mm Multinuclear inverse
Date : Mon Sep 17 10:44:48 CEST 2007
Temperature : 300.0 K
Solvent : CDCl3

V. References

[1] (a) H.-Y. Jang, R.R. Huddleston, M.J. Krische, *J. Am. Chem. Soc.* **2002**, *51*, 15156-15157; (b) D.P. Curran, *J. Am. Chem. Soc.* **1983**, *105*, 5826-5833; (c) D.P. Curran, S.A. Scanga, C.J. Fenk, *J. Org. Chem.* **1984**, *49*, 3474-3478.

[2] B. Hong, F.-L. Chen, S.-H. Chen, J.-H. Liao, G.-H. Lee, *Org. Lett.* **2005**, *4*, 557-560.