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Diastereoselective Addition of Anisoles to *N-tert*-Butanesulfinylimines via Four-Membered Lithiumcycles.

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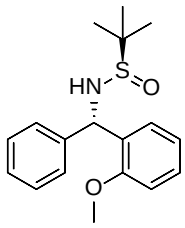
General Information.

All the reactions were performed under nitrogen gas in glasswares that was flame-dried and equipped with a magnetic stirring bar. Thin-layer chromatography (TLC) was performed using silica gel 60 F254 pre-coated plates (0.25 mm). All the reactions monitored by the TLC analysis (single spot/ two solvent systems) using a UV lamp or PMA for detection purposes. Flash chromatography was performed using silica gel (40 µm particle size). ^{1}H and ^{13}C NMR spectra were recorded on a FT-NMR spectrometer at 400 and 100 MHz, respectively. Low-resolution mass spectroscopy (LRMS) was carried out in electro spray mode. The diastereoselectivity was determined by ^{1}H NMR analysis of the crude product. The “>95:5” dr denotes that signal for only one diastereomer were observed. Mass spectra (HRMS) were obtained using an electrospray ionization (ESI-TOF) mass spectrometer. The aldehydes and *N-tert*-Butanesulfamide were purchased from Aldrich. All solvents were purchased from Aldrich and used without further purification. Unless indicated

otherwise, the reaction temperatures refer to external reaction temperatures. All the Ellman's Imines (3**a-k**) were synthezied using known procedures.

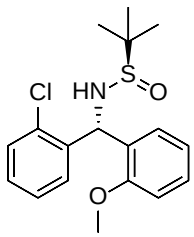
General procedure (GP1):

In a three neck flask under nitrogen was taken Anisole (5.0 mmol) in THF (2.5 mL) and it was cooled to 0 ^{o}C. Then to it *n*- Butyllithium (1.6 M in cyclohexane, 3.0 mmol) was added dropwise via syringe. The resulting solution was stirred for 2 h at same temperature. After that the solution was cooled to -78 ^{o}C and *N-tert*-butanesulfinyl aldimine (R_S) **3** (1.0 mmol in 0.5 mL of THF) was added dropwise via syringe over the period of 30 min. The reaction mixture was stirred for 2 h at -78 ^{o}C and then reaction mixture was quenched with water (5 mL). It was allowed to come to room temperature over the period of 30 min. The reaction mixture was extracted with Ethyl acetate (3 x 5 mL). The combined Organic layer was evaporated in vacuo to give crude product. The crude product were purified by column chromatography (silica gel Ethyl acetate/Hexanes) affords the pure Compound **7** (**a-l)** and Compound **8** (**a-k)**.



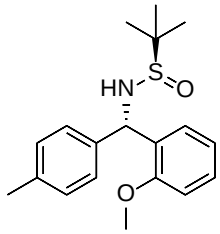
(*R*)-N-((*S*)-(2-methoxyphenyl)(phenyl)methyl)-2-methylpropane-2-sulfinamide (7a):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3a** (200 mg, 0.96 mmol) with Anisole (4.8 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.9 mmol) afforded amine **7a** as white solid (273 mg, 90%). $[\alpha]^{20}_{D}$ = -52.4 (c. 0.25 in EtOH), [lit. data $[\alpha]^{20}_{D}$ = -51.9 (c. 2.2 in EtOH)]. IR: 3224, 2962, 1598, 1490, 1462, 1242, 945, 759. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (d, *J* = 6.8 Hz, 1H), 7.35-7.26 (m, 4H), 7.24-7.19 (m, 2H), 6.99-6.94 (m, 2H), 5.85 (brs, 2H), 3.76 (s, 3H), 1.13 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 156.9, 142.4, 129.8, 128.5, 128.5, 128.1, 128.0, 127.4, 127.4, 120.4, 110.8, 56.5, 55.9, 55.4, 22.6. HRMS (ESI) Calcd for $C_{18}H_{24}NO_2S$ [M+H]: 318.1528, Found 318.1538.



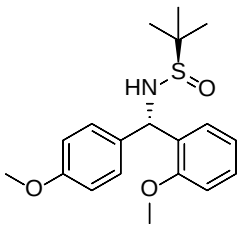
(*R*)-N-((*R*)-(2-chlorophenyl)(2-methoxyphenyl)methyl)-2-methylpropane-2-sulfinamide (7b):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3b** (200 mg, 0.82 mmol) with Anisole (4.10 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.46 mmol) afforded amine **7b** as white solid (262 mg, 91%). mp = 80-82 ^{o}C, $[\alpha]^{20}_{D}$ = -27.9 (c. 0.25 in $CHCl_3$). IR: 3201, 2956, 1598, 1465, 1244, 1056, 756. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55-7.50 (m, 1H), 7.41-7.20 (m, 5H), 7.00-6.88 (m, 2H), 6.37 (d, *J* = 5.2 Hz, 1H), 3.94-3.89 (m, 1H), 3.83 (s, 3H), 1.27 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 157.1, 139.4, 133.4, 129.8, 129.3, 128.9, 128.8, 128.6, 126.7, 120.3, 110.8, 56.2, 55.4, 54.6, 22.6. HRMS (EI) Calcd for $C_{18}H_{23}ClNO_2S$ [M+H]: 352.1138, Found 352.1142.



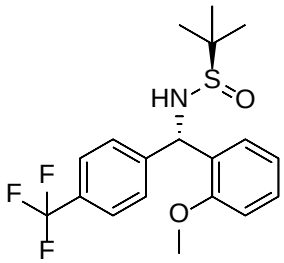
(*R*)-N-((*S*)-(2-methoxyphenyl)(p-tolyl)methyl)-2-methylpropane-2-sulfinamide (7c):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3c** (200 mg, 0.89 mmol) with Anisole (4.50 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.7 mmol) afforded amine **7c** as white solid (264 mg, 90%). mp =71-73 ^{o}C, $[\alpha]^{20}_{D}$ = -73.3 (c. 0.25 in $CHCl_3$). IR: 3317, 2964, 1915, 1595, 1489, 1242, 1062, 756. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52-7.47 (m, 1H), 7.33-7.27 (m, 3H), 7.16-7.10 (m, 2H), 7.04-6.96 (m, 1H), 6.92-6.86 (m, 1H), 6.04 (s, 1H), 3.82-3.80 (m, 1H), 3.81 (s, 3H), 2.34 (s, 3H), 1.28 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 156.9, 139.5, 137.2, 130.0, 129.2, 128.4, 128.1, 127.4, 120.4, 110.8, 56.2, 55.9, 55.5, 22.7, 21.1. HRMS (ESI) Calcd for $C_{19}H_{26}NO_2S$ [M+H]: 332.1684, Found 332.1692.



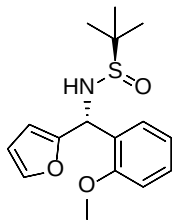
(*R*)-N-((*S*)-(2-methoxyphenyl)(4-methoxyphenyl)methyl)-2-methylpropane-2-sulfinamide (7d):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3d** (200 mg, 0.84 mmol) with Anisole (4.2 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.5 mmol) afforded amine **7d** as white solid (249 mg, 89%). $[\alpha]^{20}_D$ = -53.5 (c. 0.25 in $CHCl_3$). IR: 3600, 3163, 3001, 2943, 2293, 2252, 1512, 1444, 1375, 1246, 1037, 918. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.53-7.49 (m, 1H), 7.39-7.24 (m, 3H), 7.05-6.99 (m, 1H), 6.93-6.82 (m, 3H), 6.02 (d, *J*= 3.6 Hz, 1H), 3.87-3.80 (m, 1H), 3.80 (s, 6H), 1.28 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 158.8, 156.9, 134.6, 130.0, 128.7, 128.4, 128.0, 120.4, 113.8, 110.8, 55.9, 55.8, 55.4, 55.2, 22.7. HRMS (ESI) Calcd for $C_{19}H_{26}NO_3S$ [M+H]: 348.1633, Found 348.1630.



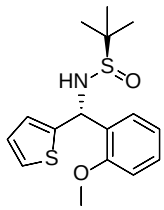
(R)-N-((S)-(2-methoxyphenyl)(4-(trifluoromethyl)phenyl)methyl)-2-methylpropane-2-sulfinamide (7e):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3e** (200 mg, 0.72 mmol) with Anisole (3.6 mmol) and *n*- Butyllithium (1.6 M in cyclohexane, 2.1 mmol) afforded amine **7e** as white solid (255 mg, 92%). $[\alpha]^{20}_D$ = -107.9 (c. 0.25 in $CHCl_3$). mp = 77-79 ^{o}C, IR: 3309,3012, 2843, 1598, 1469, 1417, 1328, 1244, 1168, 1112, 1064, 900, 756. ^{1}H NMR (400 MHz, $CHCl_3$) δ 7.61-7.51 (m, 4H), 7.47-7.41 (m, 1H), 7.32-7.28 (m, 1H), 7.03-6.99 (m, 1H), 6.91 (d, *J* = 8.4 Hz, 1H), 6.04 (d, *J* = 4.8 Hz, 1H), 3.97 (d, *J* = 4.8 Hz, 1H), 3.80 (s, 3H), 1.28 (s, 9H). ^{13}C NMR (100 MHz, CHCl3) δ ppm 156.7, 146.4, 129.6, 129.3, 129.1, 129.0, 128.1, 127.7, 125.4, 122.7, 120.6, 111.0, 57.1, 56.1, 55.4, 22.6. LRMS (EI) Calcd for $C_{19}H_{23}F_3NO_2S$ [M+1]: 386.1397, Found 386.1401.



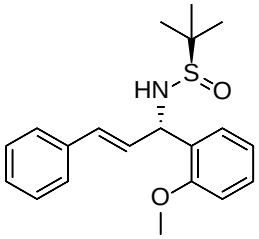
(*R*)-N-((*R*)-furan-2-yl(2-methoxyphenyl)methyl)-2-methylpropane-2-sulfinamide (7f):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3f** (200 mg, 1.0 mmol) with Anisole (5.0 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 3.0 mmol) afforded amine **7f** as colourless oil (270 mg, 90%). $[\alpha]^{20}_D$ = -81.13 (c. 0.25 in CHCl3). IR: 3620, 3163, 3001, 2943, 2293, 2252, 1490, 1375, 1039, 759. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42-7.39 (m, 2H), 7.35-7.27 (m, 2H), 7.03-6.96 (m, 1H), 6.96-6.90 (m, 1H), 6.43 (s, 1H), 5.91 (d, *J* = 5.6 Hz, 1H), 3.89-3.83 (m, 1H), 3.84 (s, 3H), 1.25 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 156.7, 143.2, 140.3, 129.6, 128.7, 128.0, 127.7, 120.5, 110.8, 110.0, 55.9, 55.4, 50.4, 22.6. HRMS (ESI) Calcd for $C_{16}H_{22}NO_3S$ [M+H]: 308.1320, Found 308.1324.



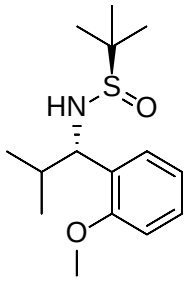
(*R*)-N-((*R*)-(2-methoxyphenyl)(thiophen-2-yl)methyl)-2-methylpropane-2-sulfinamide (7g):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3g** (200 mg, 0.92 mmol) with anisole (4.6 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.28 mmol) afforded amine **7g** as white solid (277 mg, 92%). mp=98-100 ^{o}C, $[\alpha]^{20}_D$ = -59.2 (c. 0.25 in $CHCl_3$). IR: 3199, 2958, 1598, 1490, 1462, 1244, 1045, 759, 704. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52-7.46 (m, 1H), 7.36-7.29 (m, 1H), 7.23-7.20 (m, 1H), 7.10-7.05 (m, 1H), 7.03-6.97 (m, 1H), 6.96-6.90 (m, 2H), 6.28 (d, *J* = 4.4 Hz, 1H), 4.05 (d, *J* = 3.6 Hz, 1H), 3.85 (s, 3H), 1.27 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 156.8, 146.7, 129.7, 129.0, 128.1, 126.7, 125.5, 125.0, 120.6, 111.0, 56.0, 55.5, 52.9, 22.6. HRMS (ESI) Calcd for $C_{16}H_{22}NO_2S_2$ [M+H]: 324.1092, Found 324.1096.



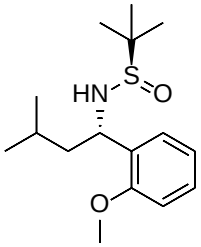
(*R*)-N-((*S,E*)-1-(2-methoxyphenyl)-3-phenylallyl)-2-methylpropane-2-sulfinamide (7h):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3h** (200 mg, 0.85 mmol) with Anisole (4.25mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.55 mmol) afforded amine **7h** as colourless oil (217 mg, 82%). $[\alpha]^{20}_D$ = -67.6 (c. 0.25 in $CHCl_3$). IR: 3640, 3163, 3001, 2943, 2291, 2252, 1490, 1375, 1246, 1039, 918, 493. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43-7.36 (m, 3H), 7.35-7.20 (m, 4H), 7.05-6.91 (m, 2H), 6.63-6.44 (m, 2H), 5.54-5.47(m, 1H), 3.92-3.87 (m, 1H), 3.89 (s, 3H), 1.25 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 157.0, 136.6, 131.3, 130.4, 129.1, 128.8, 128.5, 128.3, 127.7, 126.6, 120.7, 111.0, 56.9, 55.9, 55.5, 22.6. HRMS (ESI) Calcd for $C_{20}H_{26}NO_2S$ [M+H]: 344.1684, Found 318.1688.



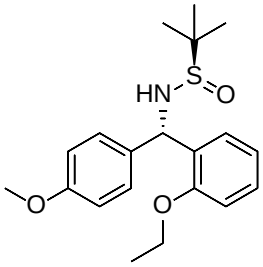
(*R*)-N-((*S*)-1-(2-methoxyphenyl)-2-methylpropyl)-2-methylpropane-2-sulfinamide (7i):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3i** (200 mg, 1.1 mmol) with Anisole (5.5 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 3.3 mmol) afforded amine **7i** as colourless oil (284 mg, 88%). $[\alpha]^{20}_D$ = -78.5 (c. 0.25 in $CHCl_3$). IR: 3600, 3163, 2964, 2293, 2252, 1600, 1508, 1490, 1375, 1242, 1120, 918, 759.^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29-7.18 (m, 2H), 6.99-6.88 (m, 2H), 4.52-4.48 (m, 1H), 3.86 (s, 3H), 3.88-3.80 (m, 1H), 2.13-2.07 (m, 1H), 1.17 (s, 9H), 1.05 (d, *J*=6.4 Hz, 3H), 0.87 (d, *J*=6.8 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 157.1, 129.8, 128.8, 128.3, 128.0, 120.2, 110.6, 55.5, 55.3, 33.7, 22.4, 19.6, 19.1. HRMS (ESI) Calcd for $C_{15}H_{26}NO_2S$ [M+H]: 284.1684, Found 284.1694.



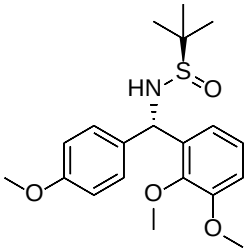
(*R*)-N-((*S*)-1-(2-methoxyphenyl)-3-methylbutyl)-2-methylpropane-2-sulfinamide (7j):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3j** (200 mg, 1.05 mmol) with Anisole (5.3 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 3.2 mmol) afforded amine **7j** as colourless oil (246 mg, 84%). $[\alpha]^{20}_{D}$ = -60.0 (c. 0.25 in $CHCl_3$). IR: 3630, 2940, 2291, 2252, 1490, 1375, 1242, 1049918, 759. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30-7.22 (m, 2H), 6.99-6.88 (m, 2H), 4.85-4.80 (m, 1H), 3.85 (s, 3H), 3.72-3.67 (m, 1H), 1.84-1.50 (m, 2H), 1.18 (s, 9H), 1.07-0.97 (m, 7H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 152.3, 126.1, 123.4, 123.1, 115.8, 106.0, 50.8, 50.6, 48.7, 41.9, 20.3, 17.8. HRMS (ESI) Calcd for $C_{16}H_{28}NO_2S$ [M+H]: 298.1841, Found 298.1845.



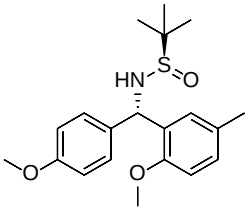
(*R*)-N-((*S*)-(2-ethoxyphenyl)(4-methoxyphenyl)methyl)-2-methylpropane-2-sulfinamide (7k):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3d** (200 mg, 0.84 mmol) with Ethoxy benzene **5b** (4.2 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.5 mmol) afforded amine **7k** as colourless oil (242 mg, 80%). $[\alpha]^{20}_{D}$ = -65.6 (c. 0.25 in $CHCl_3$). IR: 3608, 2962, 2252, 1610, 1512, 1452, 1375, 1246, 1041, 758. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 7.2 Hz, 1H), 7.37-7.28 (m, 2H), 7.28-7.21 (m, 1H), 7.03-6.96 (m, 1H), 6.89-6.82 (m, 3H), 6.00 (s, 1H), 4.00 (q, *J* = 6.8 Hz, 2H), 3.86-3.79 (m, 1H), 3.80 (s, 3H), 1.37 (t, *J* = 6.8 Hz, 3H), 1.28 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 158.7, 156.2, 134.8, 130.2, 129.4, 128.7, 128.3, 127.7, 120.2, 113.5, 111.6, 63.6, 56.3, 55.8, 55.2, 22.7, 14.8. HRMS (ESI) Calcd for $C_{20}H_{28}NO_3S$ [M+H]: 362.1790, Fund 362.1792.



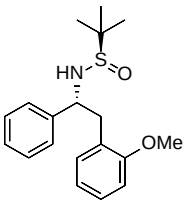
(*R*)-N-((*S*)-(2,3-dimethoxyphenyl)(4-methoxyphenyl)methyl)-2-methylpropane-2-sulfinamide (7l):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3d** (200 mg, 0.84 mmol) with 1,2-dimethoxy benzene **5c** (4.2 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.5 mmol) afforded amine **7l** as colourless oil (236 mg, 75%). $[\alpha]^{20}_D$ = -111.5 (c. 0.25 in $CHCl_3$). IR: 3600, 3200, 2962, 2293, 2252, 1610, 1512, 1375, 1037, 794. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39-7.33 (m, 2H), 7.13-7.08 (m, 2H), 6.87-6.83 (m, 3H), 6.01 (d, *J* = 3.6 Hz, 1H), 3.88-3.84 (m ,1H), 3.88 (s, 3H), 3.80 (s, 3H), 3.70 (s, 3H), 1.27 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 158.8, 152.8, 146.7, 135.8, 134.9, 128.4, 123.9, 119.8, 113.9, 111.3, 60.6, 56.2, 55.8, 55.6, 55.2, 22.6. HRMS (ESI) Calcd for $C_{20}H_{28}NO_4S$ [M+H]: 378.1739, Found 378.1729.



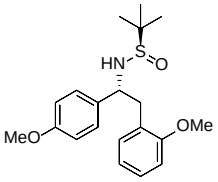
(*R*)-N-((*S*)-(2-methoxy-5-methylphenyl)(4-methoxyphenyl)methyl)-2-methylpropane-2-sulfinamide (7m):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3d** (200 mg, 0.84 mmol) with 4-Methyl anisole **5d** (4.2 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.5 mmol) afforded amine **7m** as colourless oil (271 mg, 90%). $[\alpha]^{20}_D$ = -46.2 (c. 0.25 in $CHCl_3$). IR: 3734, 3311, 2954, 2833, 1600, 1500, 1246, 1033, 833, 746. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36-7.25 (m, 3H), 7.09-7.04 (m, 1H), 6.91-6.83 (m, 2H), 6.81-6.75 (m, 1H), 5.96 (d, *J*= 4.0 Hz, 1H), 3.83-3.80 (m, 1H), 3.80 (s, 3H), 3.77 (s, 3H), 2.33 (s, 3H), 1.27 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 158.8, 154.9, 134.8, 129.9, 129.6, 129.3, 128.8, 128.8, 128.7, 113.8, 110.9, 56.4, 56.0, 55.7, 55.3, 22.8, 20.8.HRMS (ESI) Calcd for $C_{20}H_{28}NO_3S$ [M+H]: 362.1790, Found 362.1784.



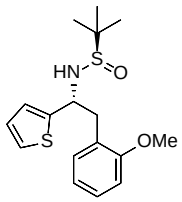
(*R*)-N-((*R*)-2-(2-methoxyphenyl)-1-phenylethyl)-2-methylpropane-2-sulfinamide (8a):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3a** (200 mg, 0.96 mmol) with o-Methyl anisole (4.8 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.9 mmol) afforded amine **8a** as colourless oil (259 mg, 86%). $[\alpha]^{20}_D$ = -38.7 (c. 0.25 in $CHCl_3$). IR: 3614,3163, 2943, 2252, 1510, 1442, 1375, 1176, 1037, 918, 750. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45-7.28 (m, 4H), 7.25-7.20 (m, 2H), 7.06-6.98 (m, 1H), 6.88-6.81 (m, 2H), 4.71-4.63 (m, 1H), 3.83 (s, 3H), 3.82-3.80 (m, 1H), 3.33-3.26 (m, 1H), 3.05-2.98 (m, 1H), 1.11 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 157.5, 142.8, 131.3, 128.4, 127.8, 127.5, 127.1, 126.3, 120.3, 110.2, 60.0, 55.9, 55.3, 38.7, 22.3. HRMS (ESI) Calcd for $C_{19}H_{26}NO_2S$ [M+H]: 332.1684, Found 332.1694.



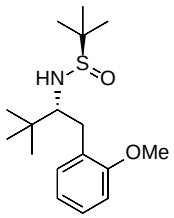
(*R*)-N-((*R*)-2-(2-methoxyphenyl)-1-(4-methoxyphenyl)ethyl)-2-methylpropane-2-sulfinamide (8d):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3d** (200 mg, 0.84 mmol) with *o*-Methyl anisole (2.5 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 4.2 mmol) afforded amine **8d** as colourless oil (272 mg, 90%). $[\alpha]^{20}_D$ = -51.0 (c. 0.25 in $CHCl_3$). IR: 3205, 2956, 2835, 1585, 1514, 1246, 1074, 823, 754. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30-7.27 (m, 2H), 7.25-7.19 (m, 1H), 7.01-6.97 (m, 1H), 6.88-6.82 (m, 4H), 4.65-4.60 (m, 1H), 3.84 (s, 3H), 3.82 (s, 3H), 3.71 (d, *J* = 4.4 Hz, 1H), 3.31-3.26 (m, 1H), 3.01-2.96 (m, 1H), 1.11 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 158.9, 157.5, 134.8, 131.3, 128.2, 127.8, 126.4, 120.3, 113.7, 110.1, 59.4, 55.8, 55.3, 55.2, 38.5, 22.4. HRMS (ESI) Calcd for $C_{20}H_{28}NO_3S$ [M+H]: 362.1790, Found 362.1794.



(*R*)-N-((R)-2-(2-methoxyphenyl)-1-(thiophen-2-yl)ethyl)-2-methylpropane-2-sulfinamide (8f):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3f** (200 mg, 0.93 mmol) with o-Methyl anisole (4.7 mmol) and *n*-Butyllithium (1.6 M in cyclohexane, 2.8 mmol) afforded amine **8f** as colourless oil (276 mg, 88 %). $[\alpha]^{20}_D$ = -28.0 (c. 0.25 in $CHCl_3$). IR: 3199, 3007, 2837, 1600, 1496, 1438, 1246, 925, 756, 694. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27–7.21 (m, 2H), 7.08–7.03 (m, 2H), 6.97-6.95 (m, 1H), 6.89-6.85 (m, 2H), 5.03-4.94 (m, 1H), 3.86 (s, 3H), 3.71 (d, *J* = 5.2 Hz, 1H), 3.39-3.30 (m, 1H), 3.19-3.12 (m, 1H), 1.11 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 157.6, 146.6, 131.5, 128.0, 126.7, 126.0, 125.3, 124.6, 120.3, 110.2, 56.0, 55.7, 55.3, 39.5, 22.4. LRMS (ESI) Calcd for $C_{17}H_{24}NO_2S_2$ [M+H]: 338.1248, Found 338.1244.

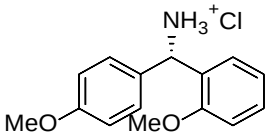


(*R*)-N-((*R*)-1-(2-methoxyphenyl)-3,3-dimethylbutan-2-yl)-2-methylpropane-2-sulfinamide (8k):

Following the general procedure (GP1), the reaction of *N-tert*-butanesulfinyl aldimine (R_S) **3k** (200 mg, 1.0 mmol) with o-Methyl anisole (5.0 mmol) and *n*- Butyllithium (1.6 M in cyclohexane, 3.0 mmol) afforded amine **8k** as colourless oil (293 mg, 90 %). $[\alpha]^{20}_D$ = -82.8 (c. 0.25 in $CHCl_3$). IR: 3415, 3163, 2953, 2835, 1658, 1600, 1494, 1367, 1242, 1116, 1014, 925, 752. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24–7.16 (m, 1H), 7.15–7.09 (m, 1H), 6.92-6.81 (m, 2H), 3.85 (s, 3H), 3.44-3.35 (m, 1H), 3.30-3.24 (m, 1H), 3.04-2.96 (m, 1H), 2.65-2.54 (m, 1H), 1.12 (s, 9H), 0.88 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ ppm 157.7, 131.5, 128.2, 127.5, 120.3, 110.2, 66.0, 56.0, 55.2, 35.3, 32.7, 27.0, 22.2. HRMS (ESI) Calcd for $C_{17}H_{30}NO_2S$ [M+H]: 312.1997, Found 312.54.

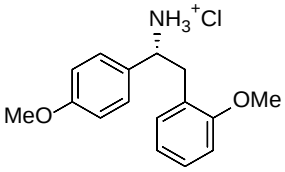
General procedure (GP2):

In a flask under nitrogen was taken sulfinamides (1.0 mmol) in 1,4-Dioxane (1 mL) and to it was added HCl (4.0 *M* solultion in 1,4-Dioxane, 10.0 mmol) at room temperature. It was stirred for 2 h at same temperature and then reaction mixture was concentrated under vacuo.



(*S*)-(2-methoxyphenyl)(4-methoxyphenyl)methanamine hydrochloride(9d):

Following the general procedure (GP2), the reaction of α-(diarylmethyl) alkyl amines **7d** (100 mg, 0.28 mmol) with HCl in dioxane (4.0 M in dioxane, 2.8 mmol, 0.7 mL) afforded amine **9d** as white solid (79 mg, 97%). $[\alpha]^{20}_{D}$ = 8.4 (c. 1.0 in Methanol). ^{1}H NMR (400 MHz, DMSO*d*-6) δ 8.91 (bs, 3H), 7.57-7.53 (m, 1H), 7.41-7.34 (m, 3H), 7.11-7.01 (m, 2H), 6.99-6.93 (m, 2H), 5.68-5.63 (m, 1H), 3.80 (s, 3H), 3.75 (s, 3H). ^{13}C NMR (100 MHz, DMSO*d*-6) δ ppm 159.5, 156.3, 130.1, 129.9, 129.4, 127.8, 126.5, 121.0, 114.3, 111.9, 56.1, 55.6, 52.0, HRMS (ESI) Calcd for $C_{15}H_{18}NO_2$ [M+H]: 244.1338 , Found 244.1328.



(*R*)-2-(2-methoxyphenyl)-1-(4-methoxyphenyl)ethan-1-amine hydrochloride (10d):

Following the general procedure (GP2), the reaction of α-(diarylmethyl) alkyl amines **8d** (100 mg, 0.27 mmol) with HCl in dioxane (4.0 M in dioxane, 2.7 mmol, 0.7 mL) afforded amine **10d** as white solid (78 mg, 96%). $[\alpha]^{20}_{D}$ = -86.0 (c. 1.0 in Methanol). ^{1}H NMR (400 MHz, DMSO*d*-6) δ 8.41 (bs, 3H), 7.34-7.29 (m, 2H), 7.21-7.13 (m, 1H), 6.96-6.87 (m, 4H), 6.80-6.72 (m, 1H), 4.47-4.42 (m, 1H), 3.77 (s, 3H), 3.73 (s, 3H), 3.30-3.22 (m, 1H), 3.13-3.03 (m, 1H). ^{13}C NMR (100 MHz, DMSO*d*-6) δ ppm 159.6, 157.6, 131.2, 129.7, 129.4, 128.6, 124.5, 120.5, 114.1, 111.2, 55.80, 55.5, 54.1, 35.5. HRMS (ESI) Calcd for $C_{16}H_{20}NO_2$ [M+H]: 258.1494, Found 258.1498.

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1H NMR of 7a
AAA_PROTON DMSO {D:\2018\01 JAN 18} O2B 23

NMR-02

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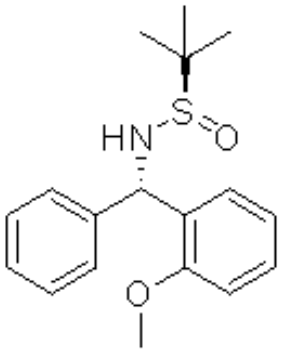

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PROCNO 1

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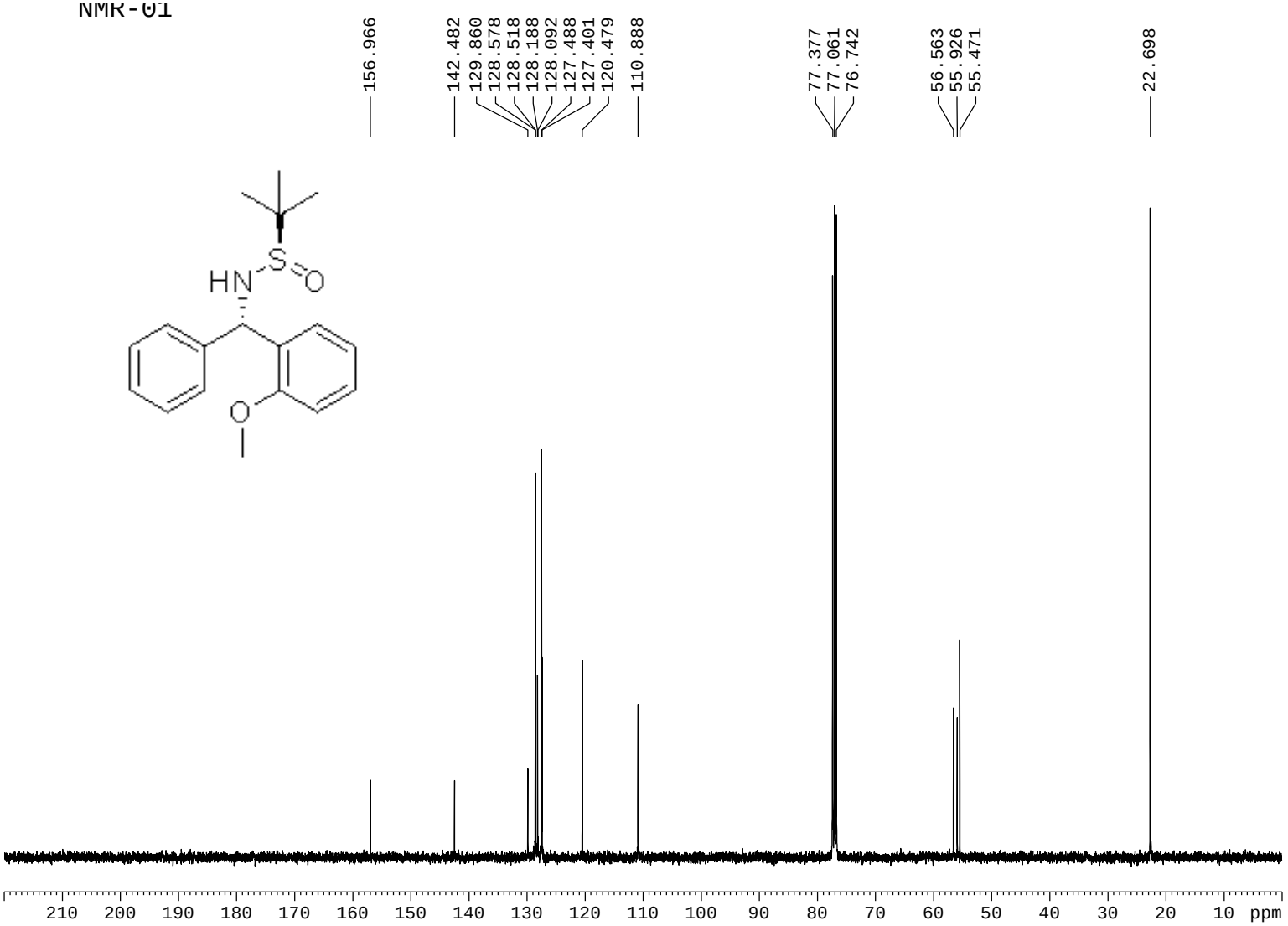
13C NMR of 7a
C13CPD CDCl3 {E:\2018\03 MAR 18} O2B
1

NMR-01



BRUKER

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TE                294.1 K
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F2 - Processing parameters
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SF           100.6127690 MHz
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SSB      0
LB                1.00 Hz
GB       0
PC                1.40
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1H NMR of 7b
AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 23

NMR-02

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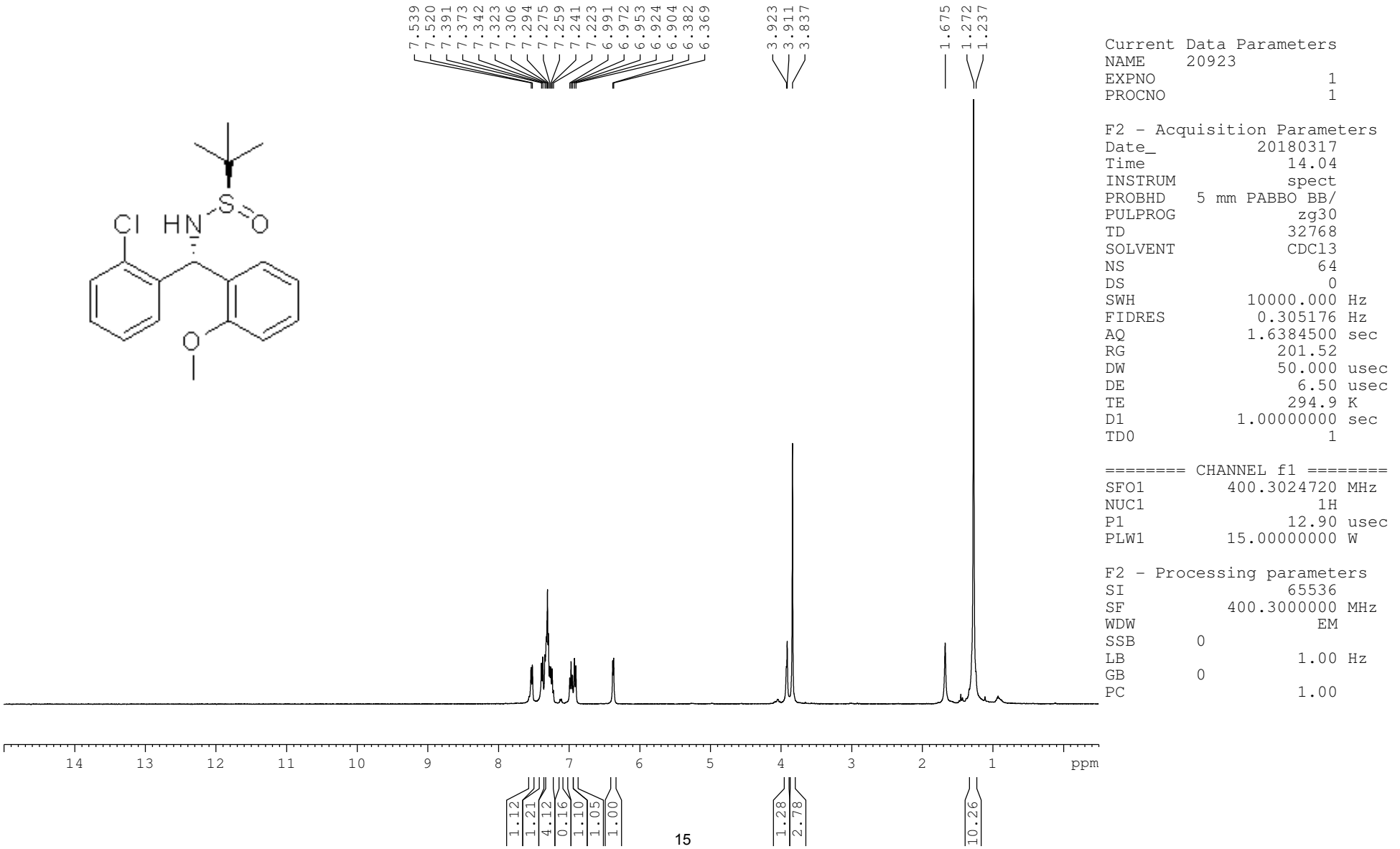


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F2 - Processing parameters
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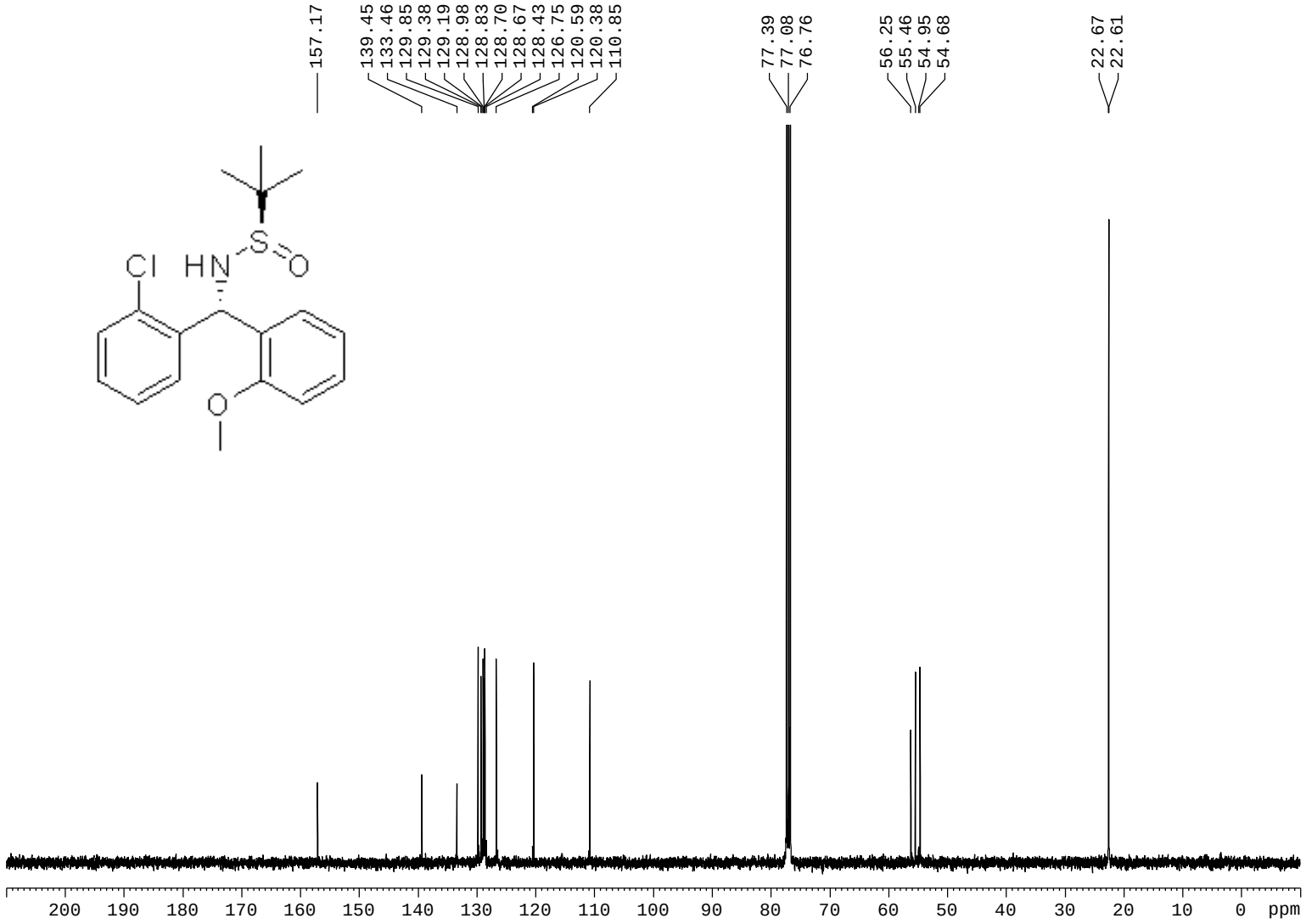
13C NMR of 7b

C13CPD CDCl3 {D:\2018\03 MAR 18} O2B 44

NMR-02

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PROCNO                1

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SSB      0
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GB       0
PC                1.40
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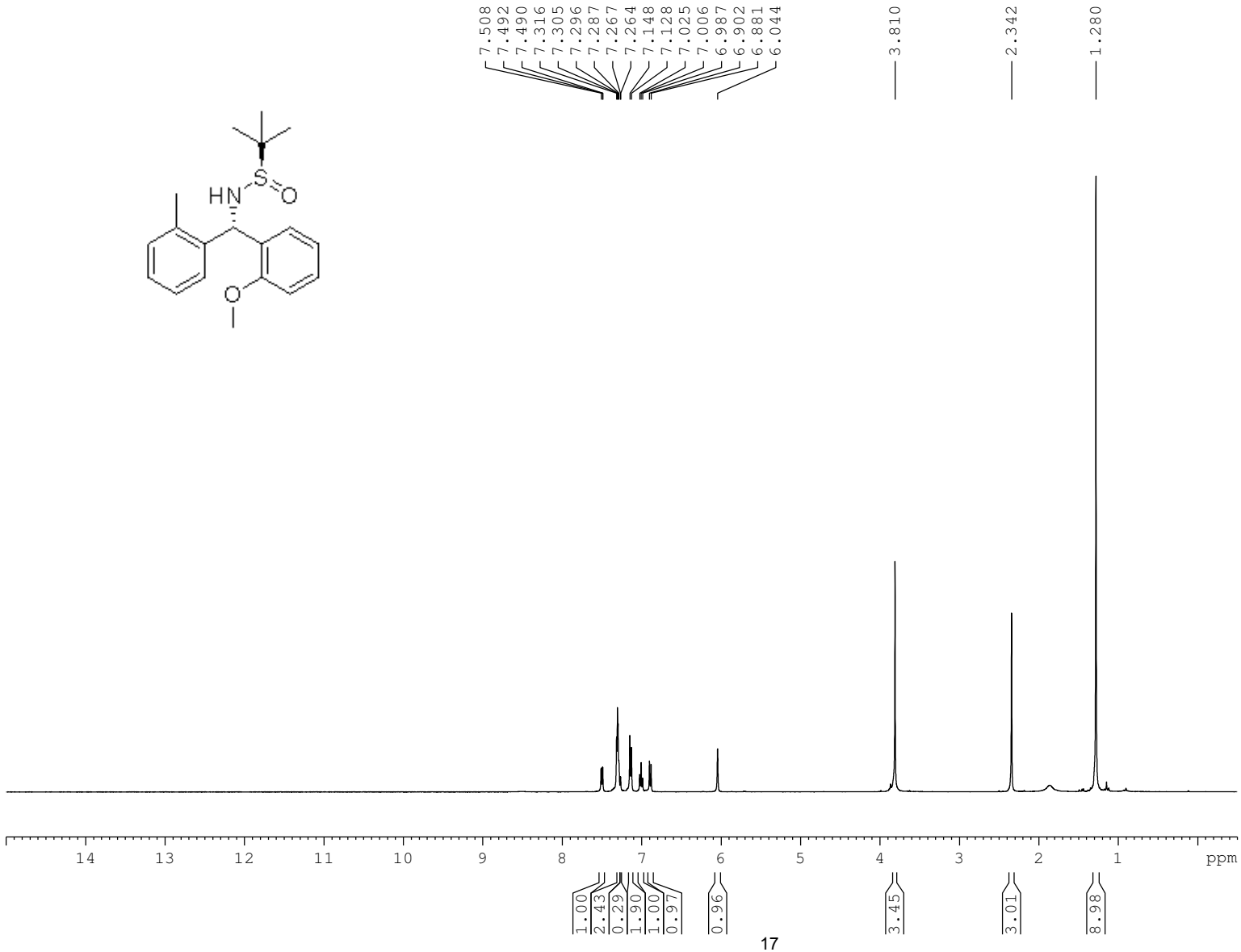
1H NMR of 7c

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 22

NMR-02

BRUKER

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TD                 32768
SOLVENT            CDCl3
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TE                294.9 K
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TD0                    1

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PLW1         15.00000000 W

F2 - Processing parameters
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WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
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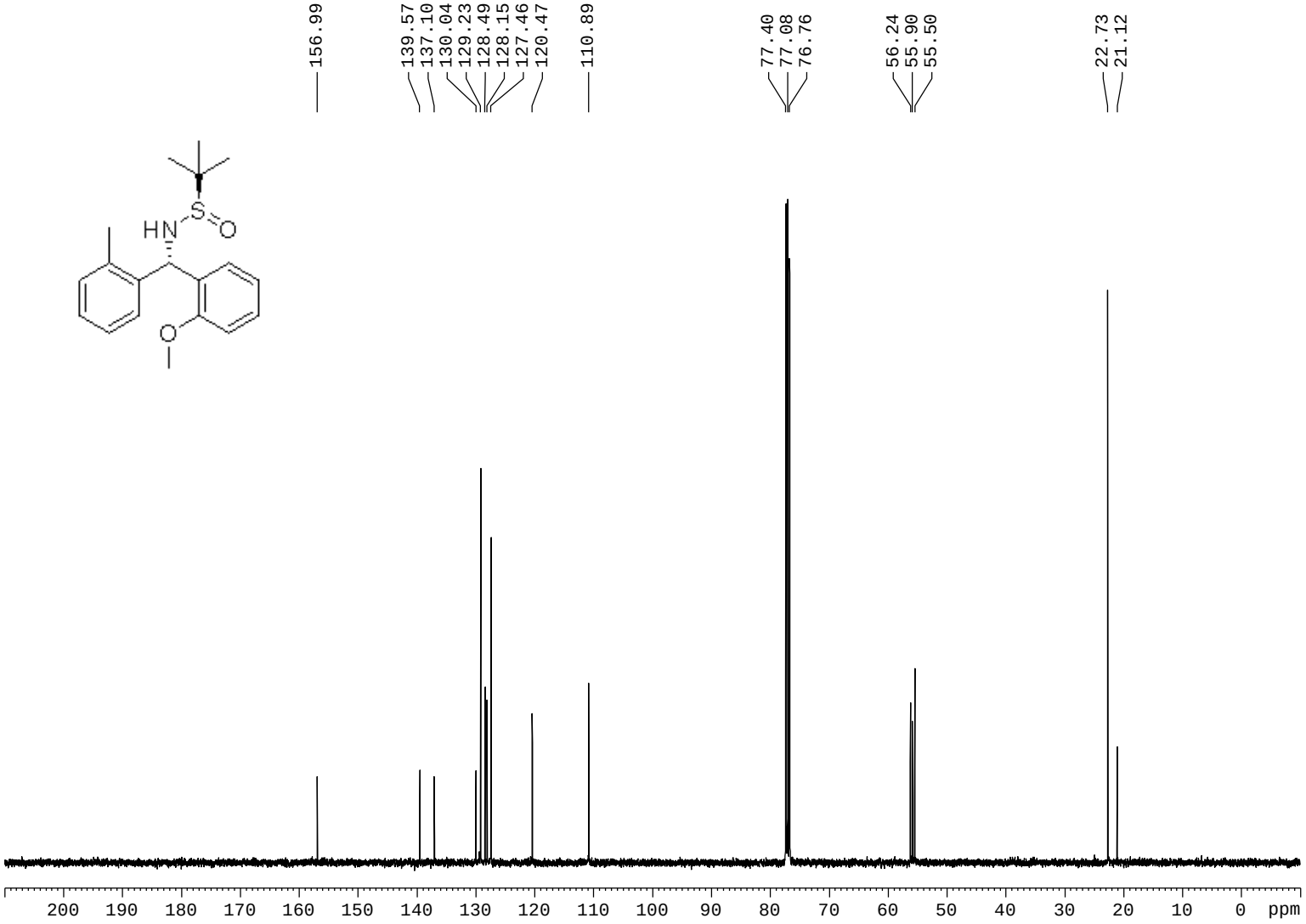
13C NMR of 7c

C13CPD CDCl3 {D:\2018\03 MAR 18} O2B 8

NMR-02

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PROCNO               1

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RG               201.52
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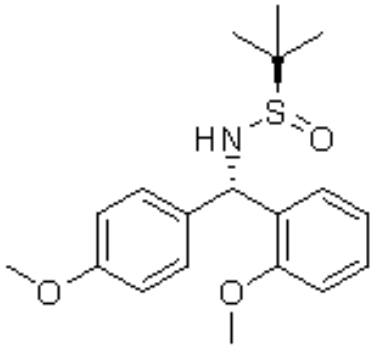
1H NMR of 7d

AAA_PROTON CDCl3 {D:\2018\04 APR 18} O2B 30

NMR-02

BRUKER



Current Data Parameters

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PROCNO	1

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

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PLW1	15.00000000 W

F2 - Processing parameters

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SF	400.3000000 MHz
WDW	EM
SSB	0
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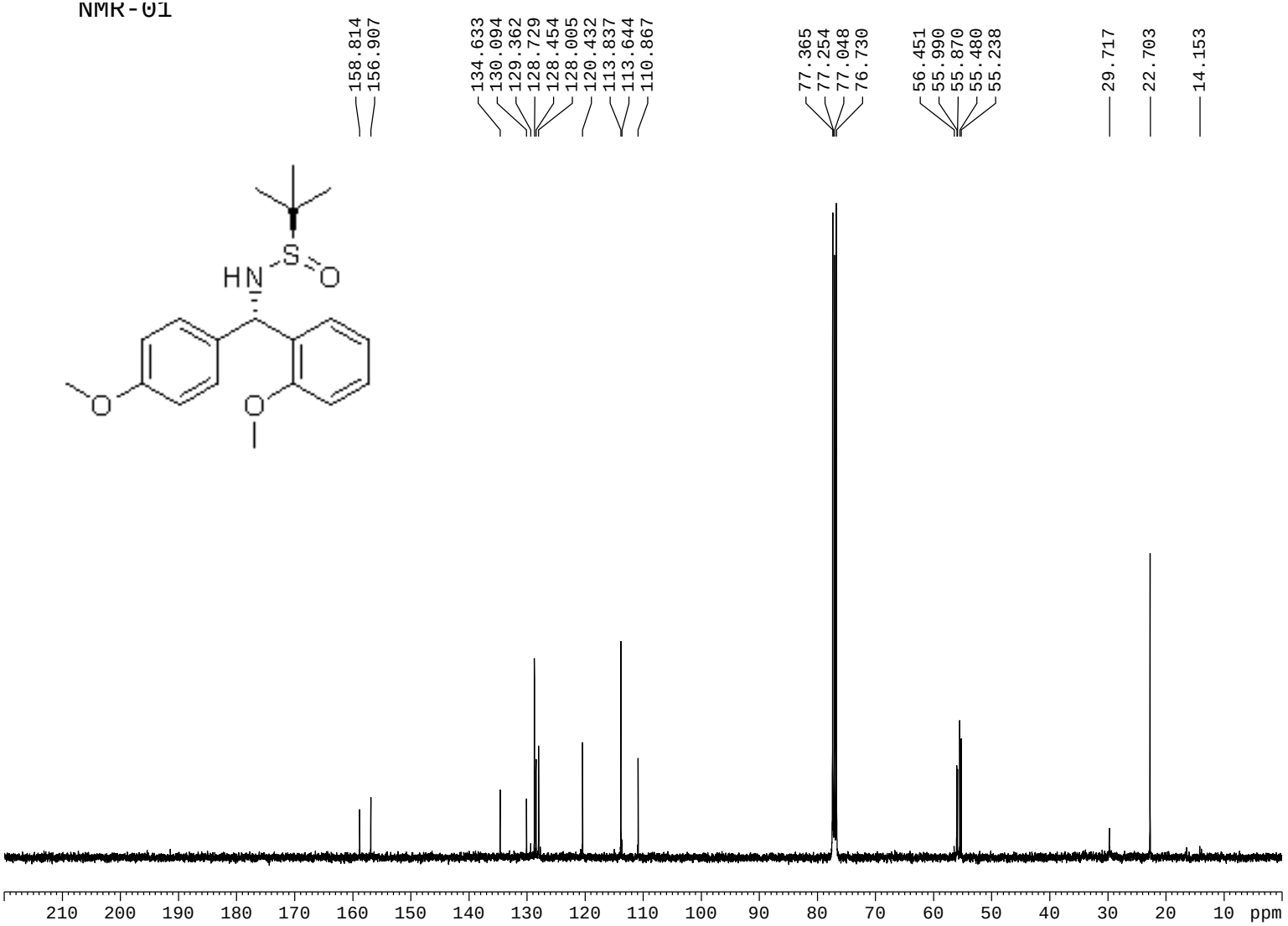
13C NMR of 7d

C13CPD CDCl3 {E:\2018\03 MAR 18} O2B
2

NMR-01

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FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
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DE                6.50 usec
TE                295.3 K
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NUC1               13C
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PLW1        54.00000000 W

======== CHANNEL f2 ========
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NUC2               1H
CPDPRG[2        waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
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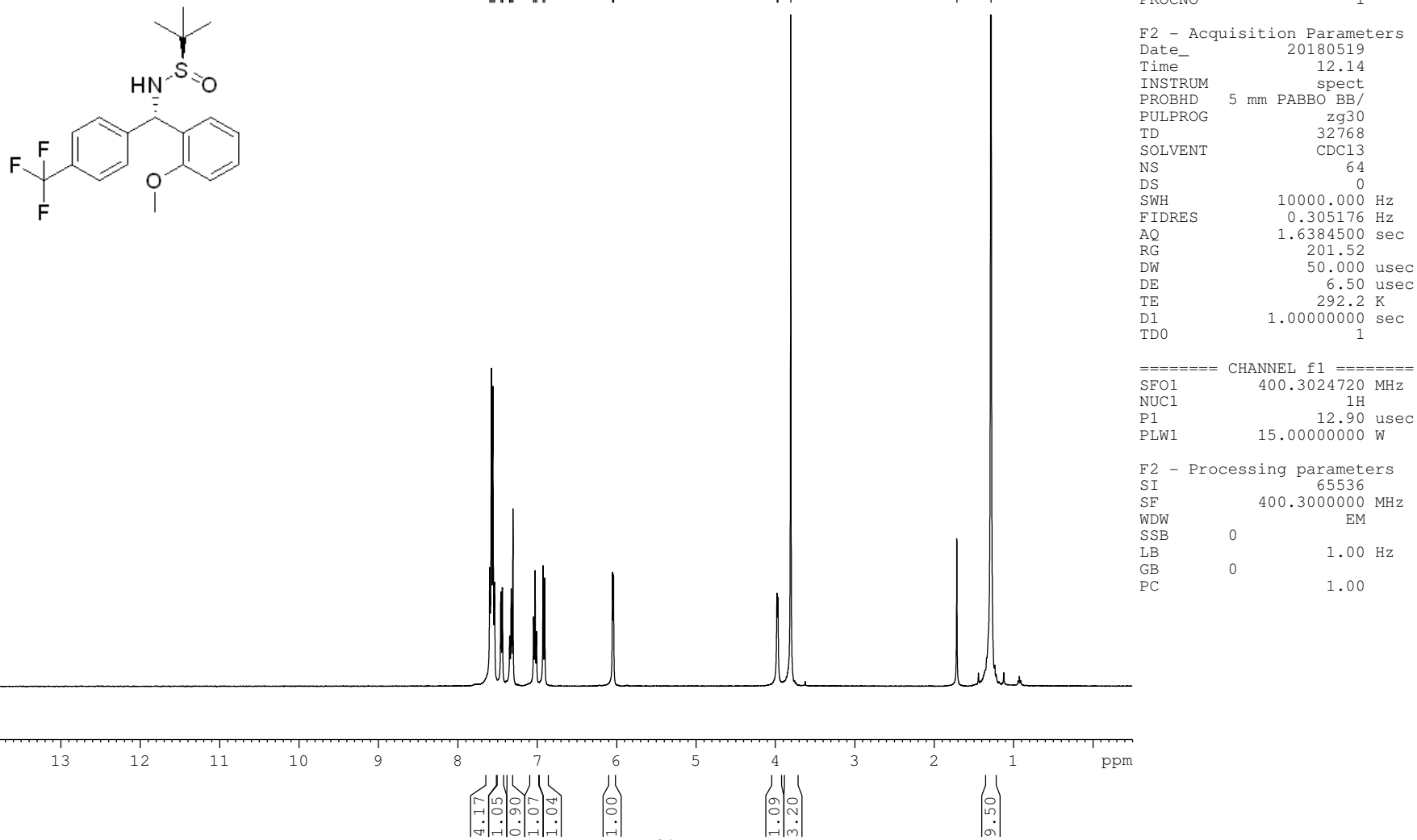
1H NMR of 7e

AAA_PROTON CDCl3 {D:\2018\05 MAY 18} O2B 38

NMR-02

BRUKER




```
Current Data Parameters
NAME      40138
EXPNO         1
PROCNO        1

F2 - Acquisition Parameters
Date_      20180519
Time          12.14
INSTRUM       spect
PROBHD   5 mm PABBO BB/
PULPROG       zg30
TD           32768
SOLVENT      CDCl3
NS              64
DS               0
SWH      10000.000 Hz
FIDRES       0.305176 Hz
AQ         1.6384500 sec
RG             201.52
DW            50.000 usec
DE             6.50 usec
TE            292.2 K
D1       1.00000000 sec
TD0              1

======== CHANNEL f1 ========
SFO1    400.3024720 MHz
NUC1           1H
P1           12.90 usec
PLW1    15.00000000 W

F2 - Processing parameters
SI            65536
SF      400.3000000 MHz
WDW             EM
SSB      0
LB            1.00 Hz
GB       0
PC            1.00
```

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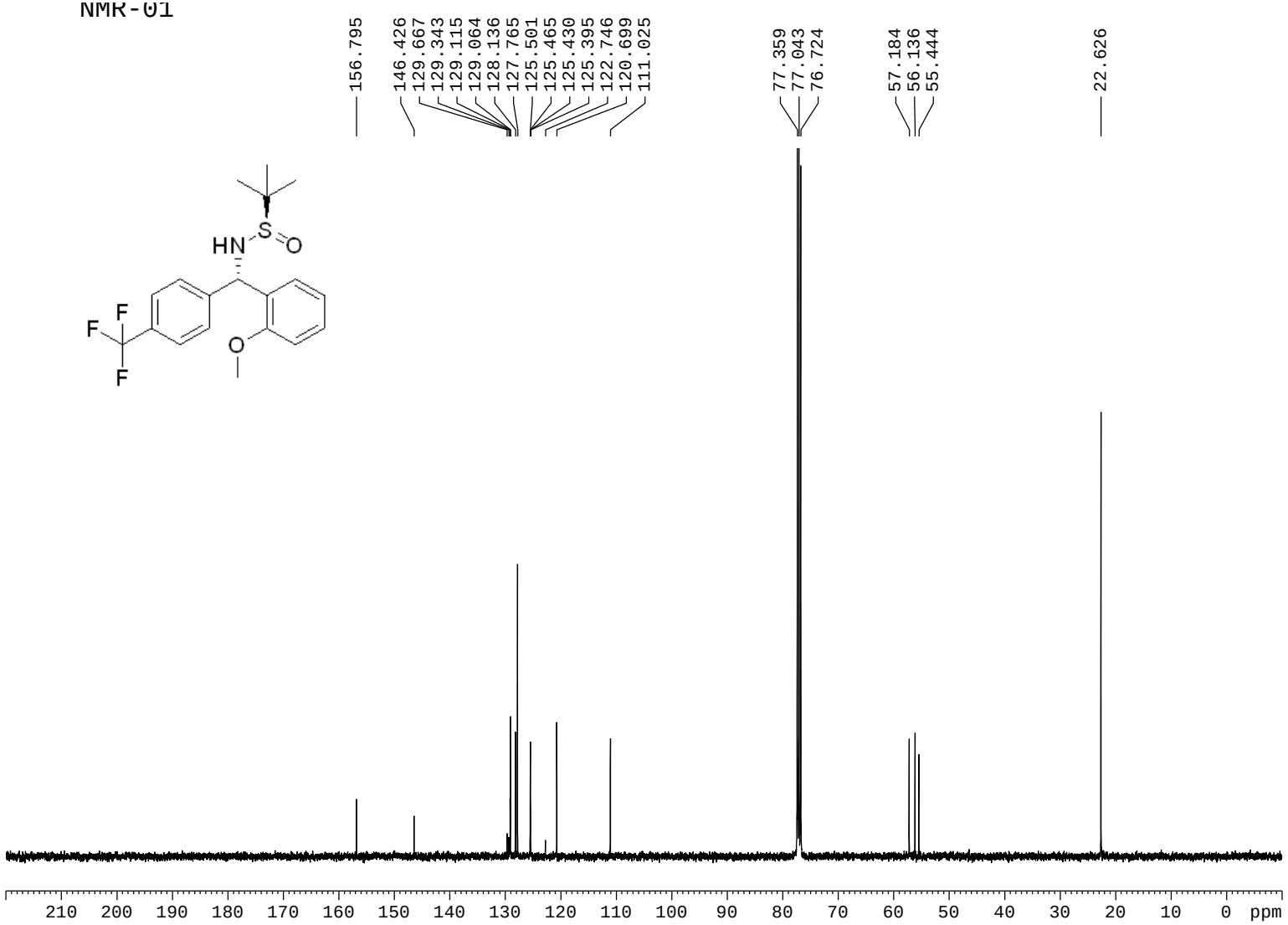
NMR-01

13C NMR of 7e
C13CPD CDCl3 {E:\2018\05 MAY 18} O2B
2



BRUKER

```
Current Data Parameters
NAME     40138
EXPNO                2
PROCNO               1

F2 - Acquisition Parameters
Date_          20180519
Time              16.08
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 1400
DS                    4
SWH           39682.539 Hz
FIDRES         0.605507 Hz
AQ            0.8257536 sec
RG               193.66
DW               12.600 usec
DE                6.50 usec
TE                293.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1               13C
P1                8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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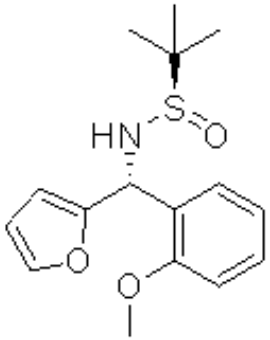
1H NMR of 7f

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 41

NMR-02

BRUKER

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Current Data Parameters
NAME     21441
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180319
Time               21.04
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                293.9 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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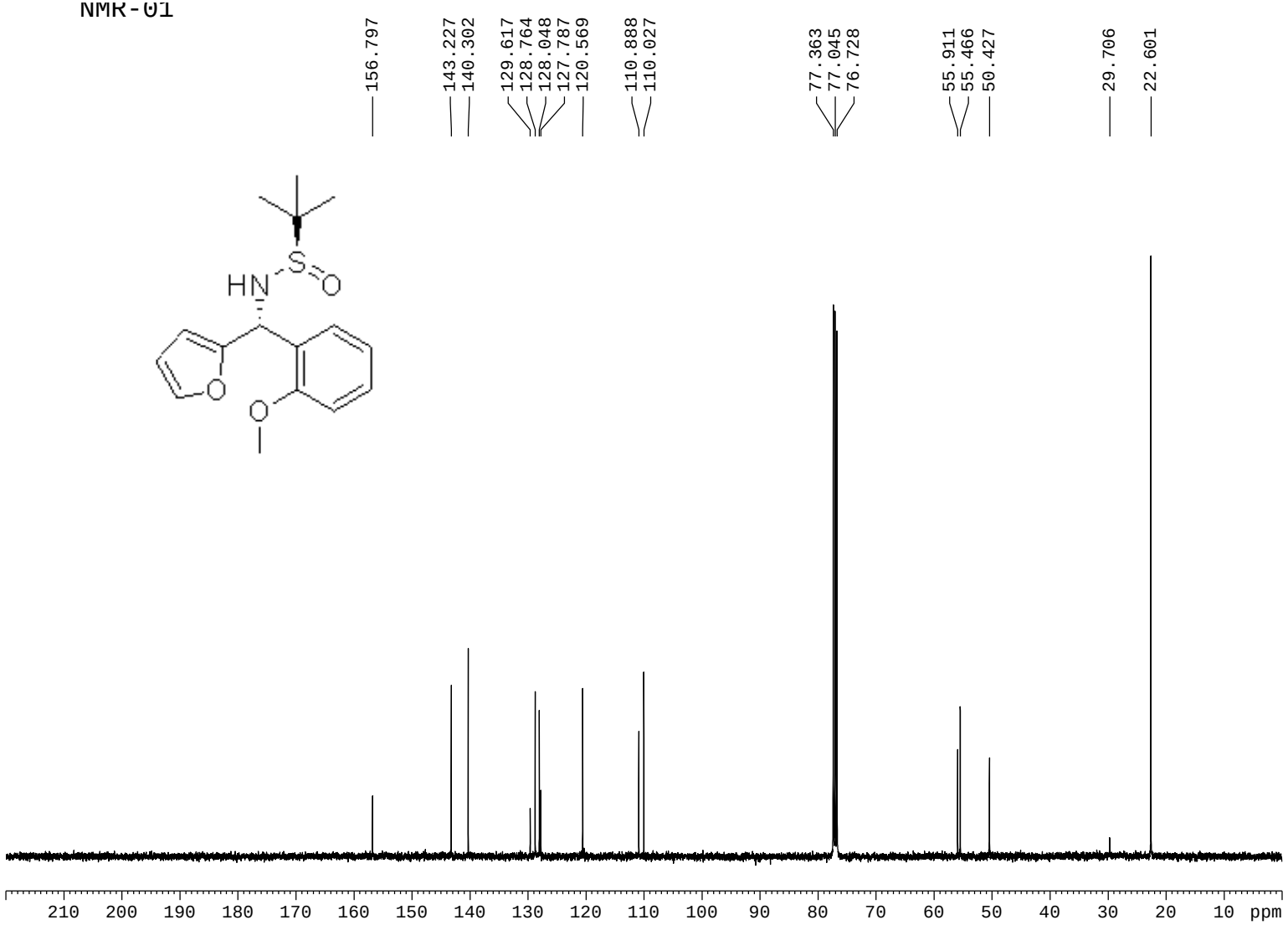
NMR-01

13C NMR of 7f
C13CPD CDCl3 {E:\2018\03 MAR 18} O2B
1



BRUKER

```
Current Data Parameters
NAME     22716
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180323
Time               9.12
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 2000
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
DW               15.600 usec
DE                6.50 usec
TE                295.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1               13C
P1                8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

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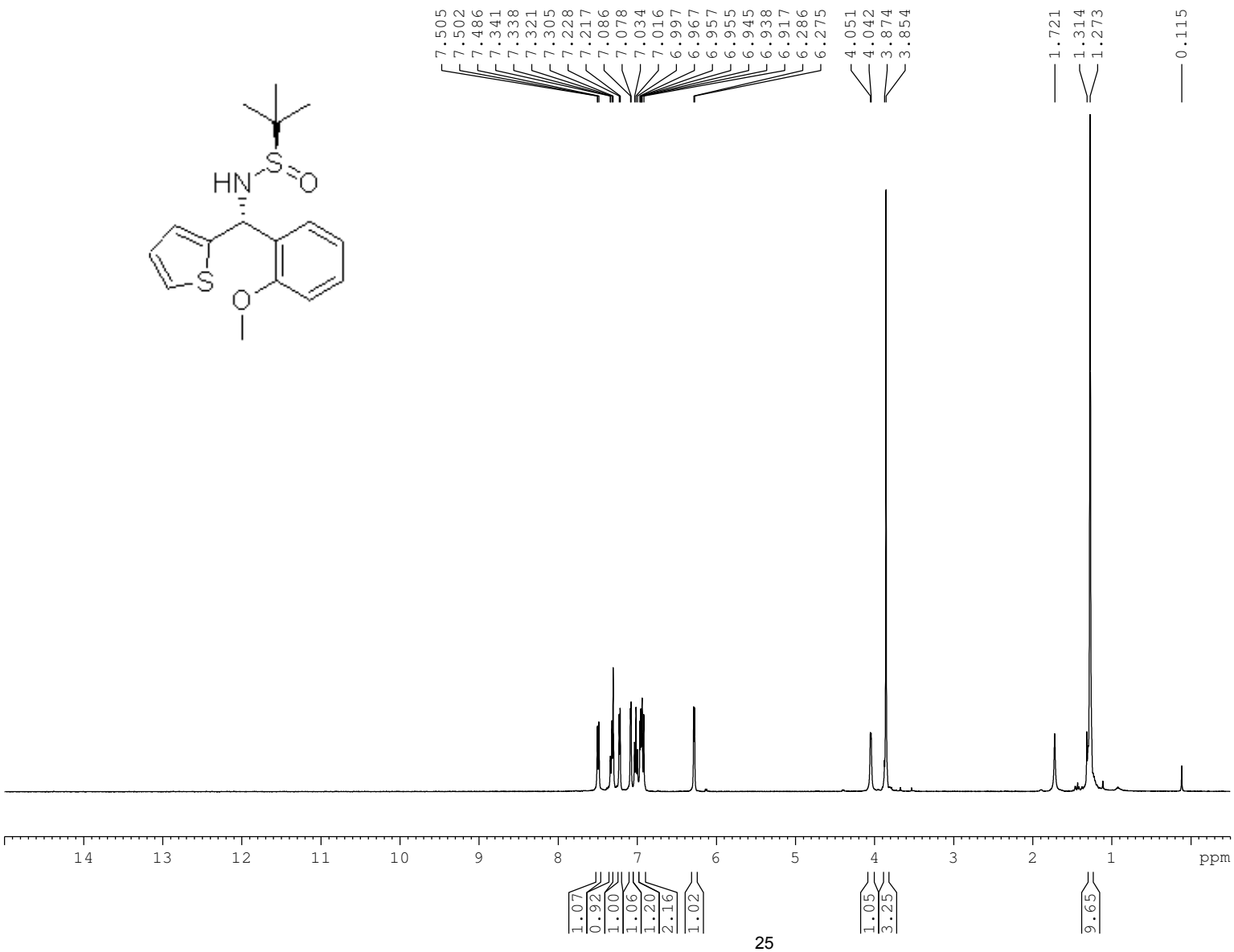
1H NMR of 7g

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 21

NMR-02

BRUKER




```
Current Data Parameters
NAME     20921
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180317
Time               13.55
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                294.9 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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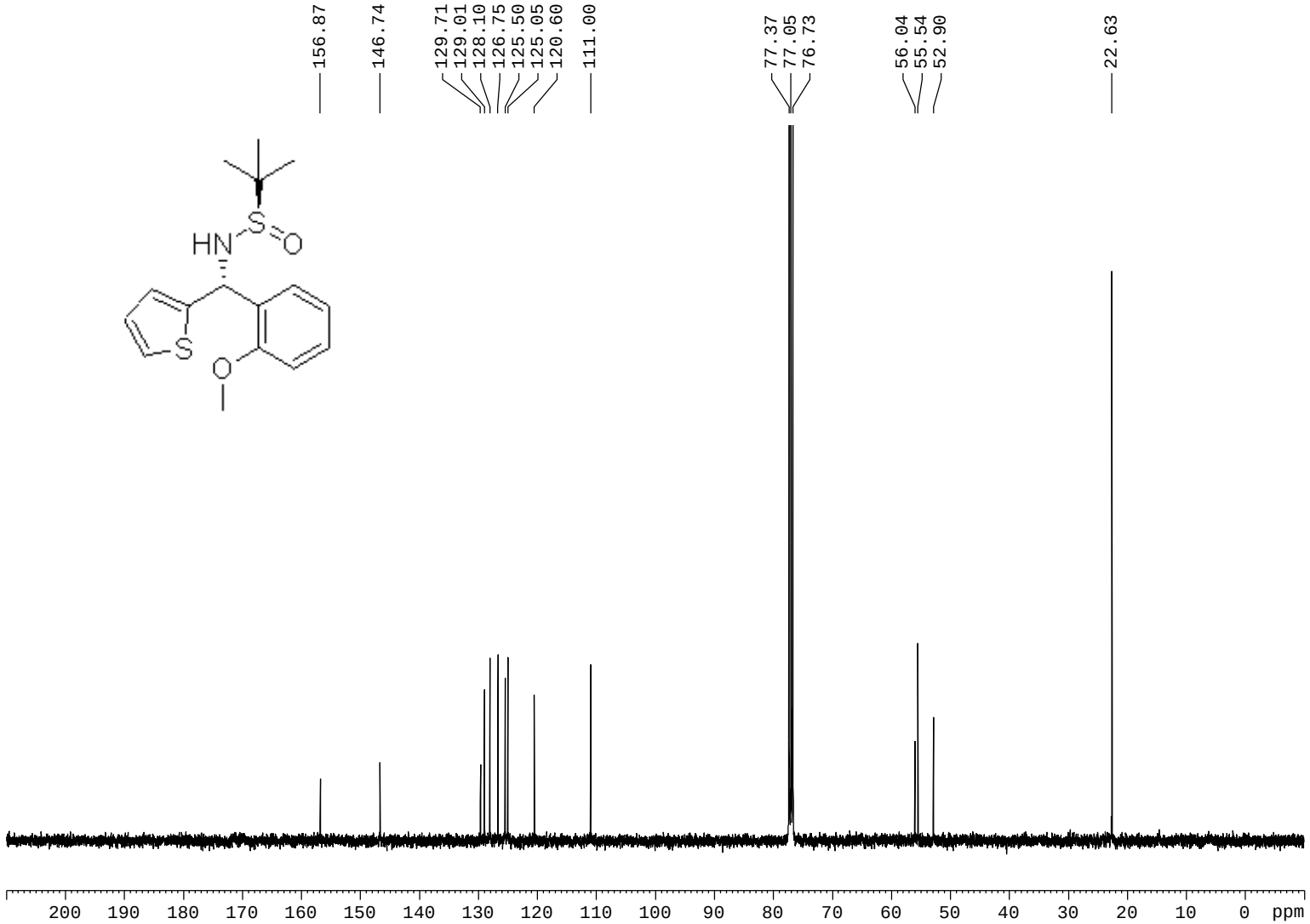
13C NMR of 7g
C13CPD CDCl3 {E:\2018\03 MAR 18} O2B 1

NMR-02




```
Current Data Parameters
NAME    21962
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_           20180320
Time              21.04
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 1200
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
DW               15.600 usec
DE                6.50 usec
TE                294.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1                13C
P1                 8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                  EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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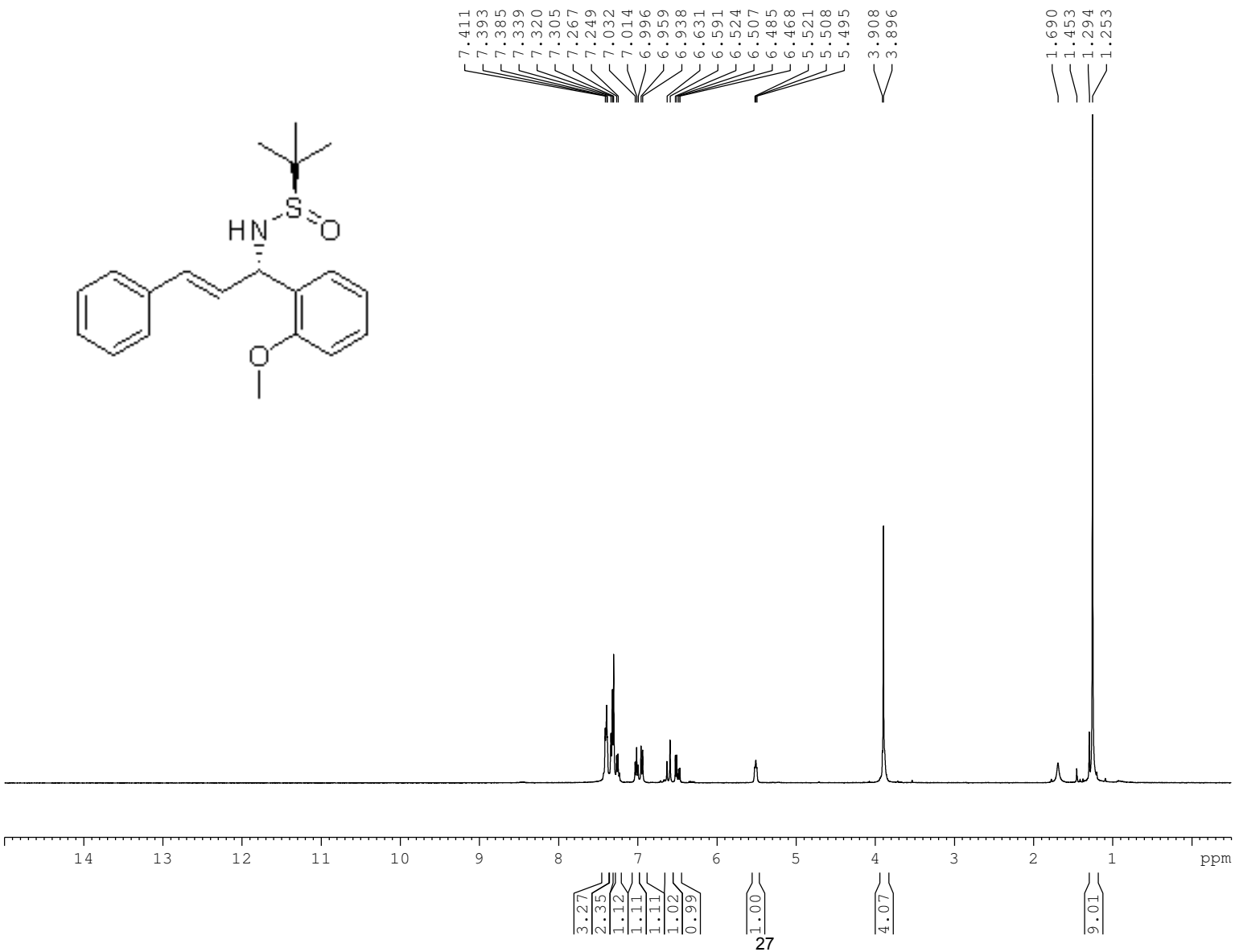
N1H NMR of 7h

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 23

NMR-02

BRUKER




```
Current Data Parameters
NAME     22123
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180321
Time               15.57
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                292.9 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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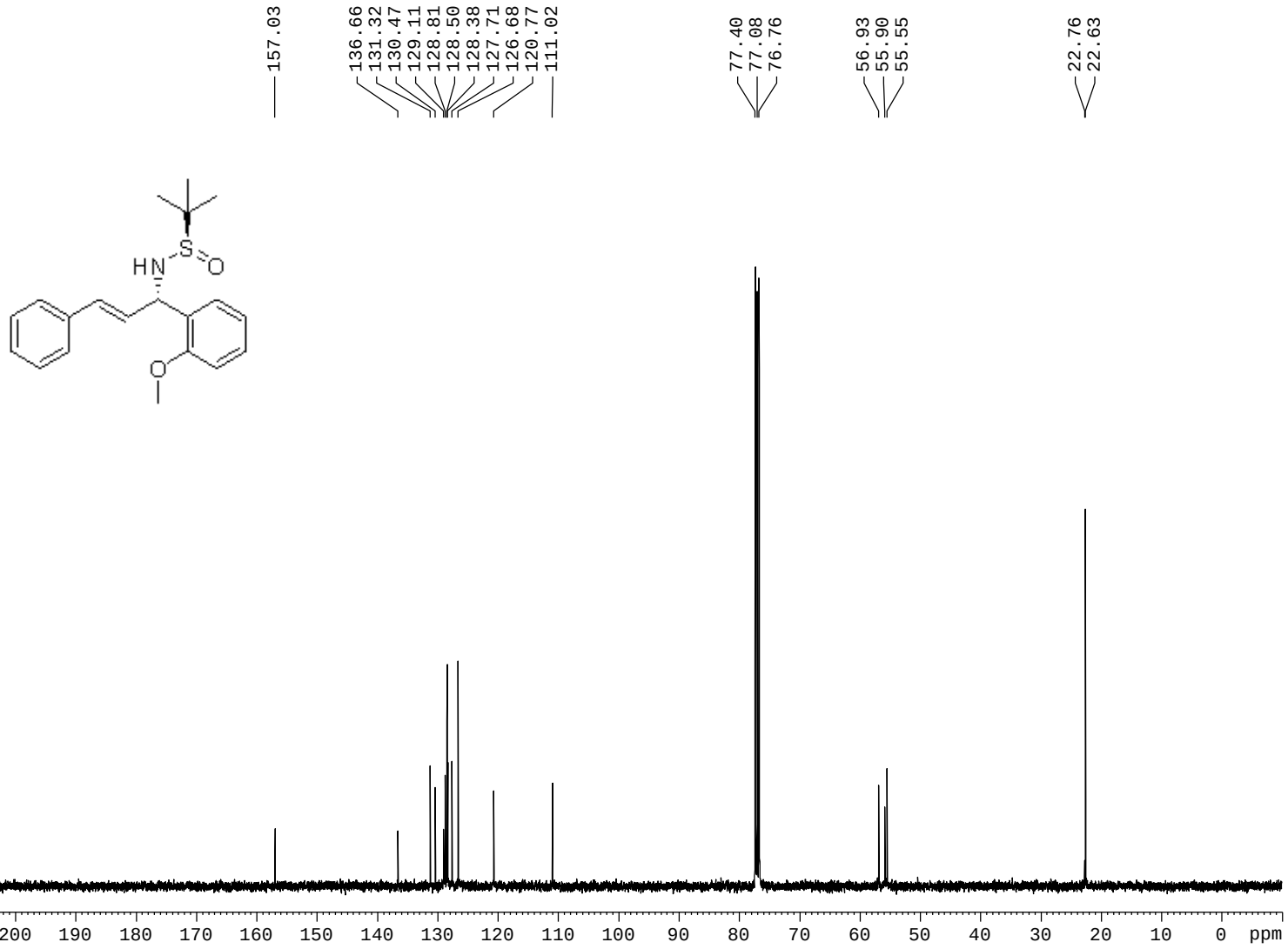
13C NMR of 7h

C13CPD CDCl3 {D:\2018\03 MAR 18} O2B 13

NMR-02




```
Current Data Parameters
NAME    22713
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_           20180322
Time               22.25
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG           zgpg30
TD                 65536
SOLVENT            CDCl3
NS                  1400
DS                     0
SWH            32051.281 Hz
FIDRES          0.489064 Hz
AQ             1.0223616 sec
RG                201.52
DW                15.600 usec
DE                 6.50 usec
TE                293.8 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         100.6655801 MHz
NUC1                13C
P1                 9.00 usec
PLW1         58.00000000 W

======== CHANNEL f2 ========
SFO2         400.3016012 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         15.00000000 W
PLW12         0.30816999 W
PLW13         0.24962001 W

F2 - Processing parameters
SI                 32768
SF           100.6555151 MHz
WDW                   EM
SSB      0
LB                 1.00 Hz
GB       0
PC                 1.40
```

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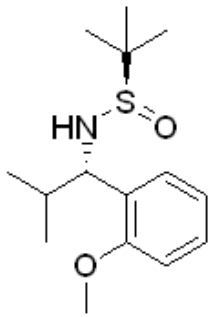
1H NMR of 7i

AAA_PROTON CDCl3 {D:\2018\04 APR 18} O2B 17

NMR-02

BRUKER




```
Current Data Parameters
NAME     29117
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_         20180413
Time             11.07
INSTRUM          spect
PROBHD   5 mm PABBO BB/
PULPROG           zg30
TD               32768
SOLVENT          CDCl3
NS                  64
DS                   0
SWH          10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6384500 sec
RG               201.52
DW               50.000 usec
DE                6.50 usec
TE               292.2 K
D1          1.00000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        400.3024720 MHz
NUC1                1H
P1                12.90 usec
PLW1        15.00000000 W

F2 - Processing parameters
SI                65536
SF          400.3000000 MHz
WDW                 EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.00
```

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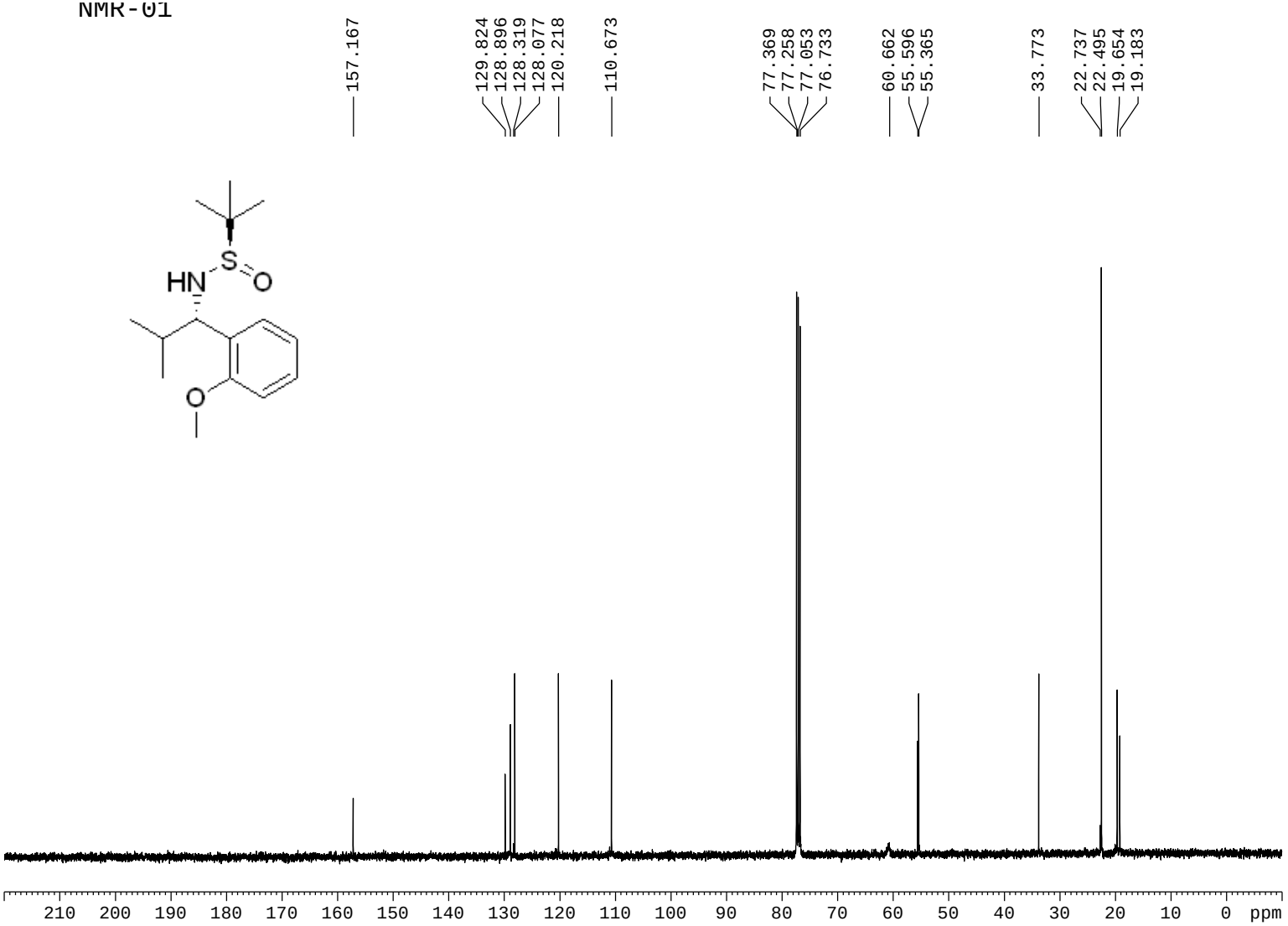
NMR-01

13C NMR of 7i
C13CPD CDCl3 {E:\2018\04 APR 18} 02B
2




```
Current Data Parameters
NAME     29411
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180416
Time              13.50
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 1400
DS                    4
SWH           39682.539 Hz
FIDRES         0.605507 Hz
AQ            0.8257536 sec
RG               193.66
DW               12.600 usec
DE                6.50 usec
TE                293.8 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1                13C
P1                 8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

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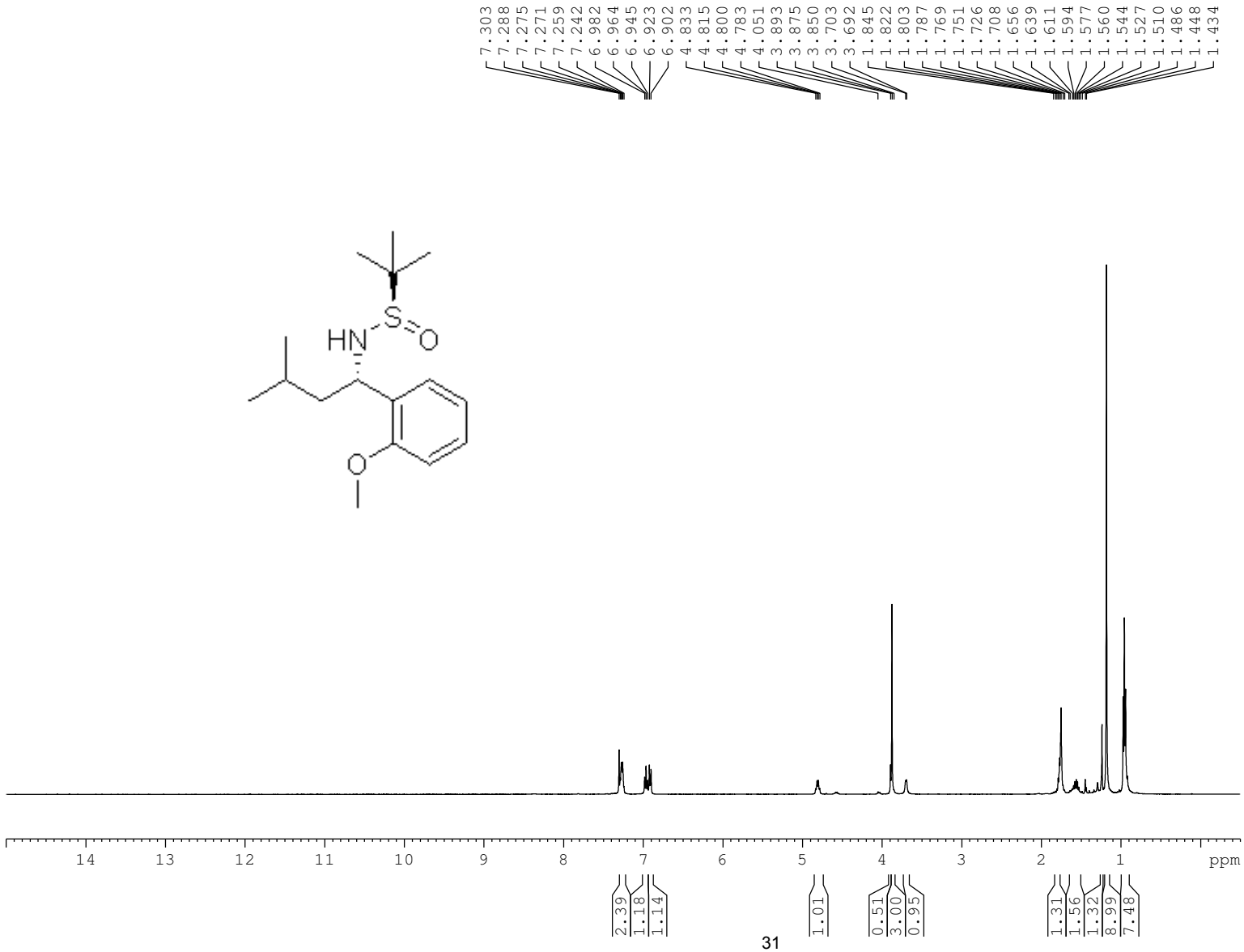
1H NMR of 7j

AAA_PROTON CDCl3 {D:\2018\02 FEB 18} O2B 30

NMR-02




```
Current Data Parameters
NAME     9630
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20180206
Time               15.55
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                292.4 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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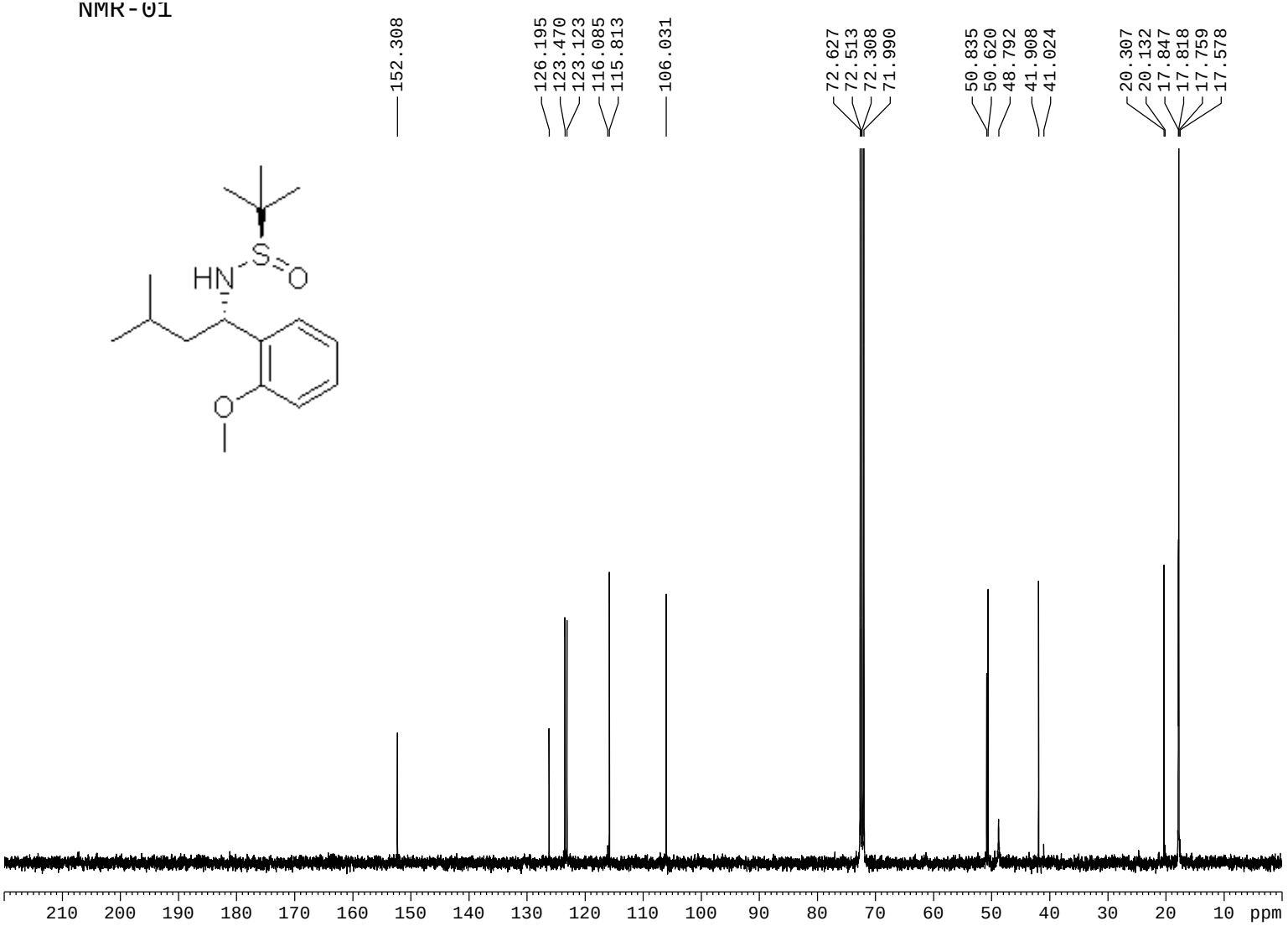
NMR-01

13C NMR of 7j
C13CPD CDCl3 {E:\2018\03 MAR 18} 02B
1



BRUKER

```
Current Data Parameters
NAME     22870
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180323
Time              13.03
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT            DMSO
NS                 2000
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
DW               15.600 usec
DE                6.50 usec
TE                293.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1                13C
P1                 8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

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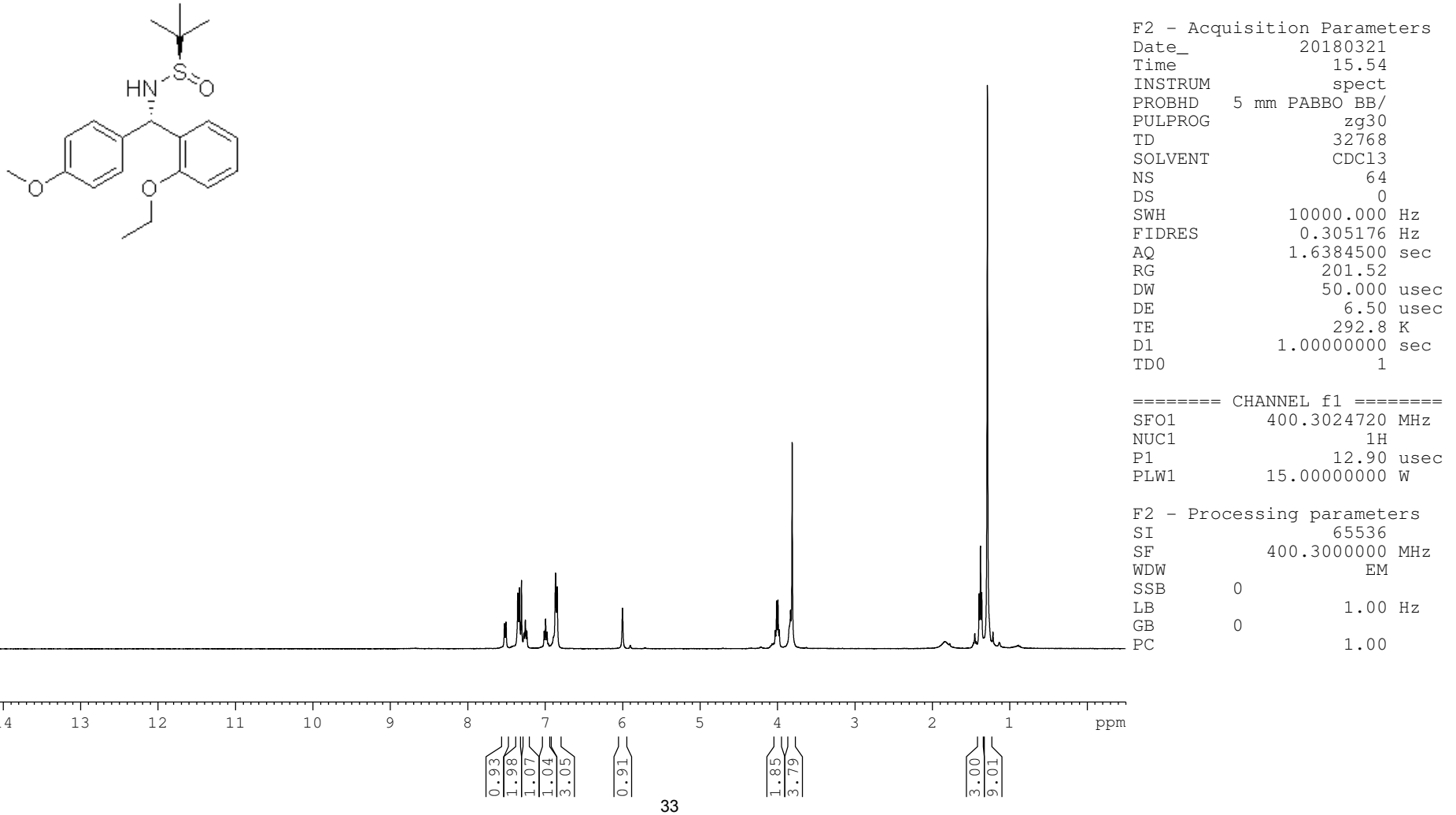
1H NMR of 7k

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 22

NMR-02

BRUKER




```
Current Data Parameters
NAME     22122
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180321
Time               15.54
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                292.8 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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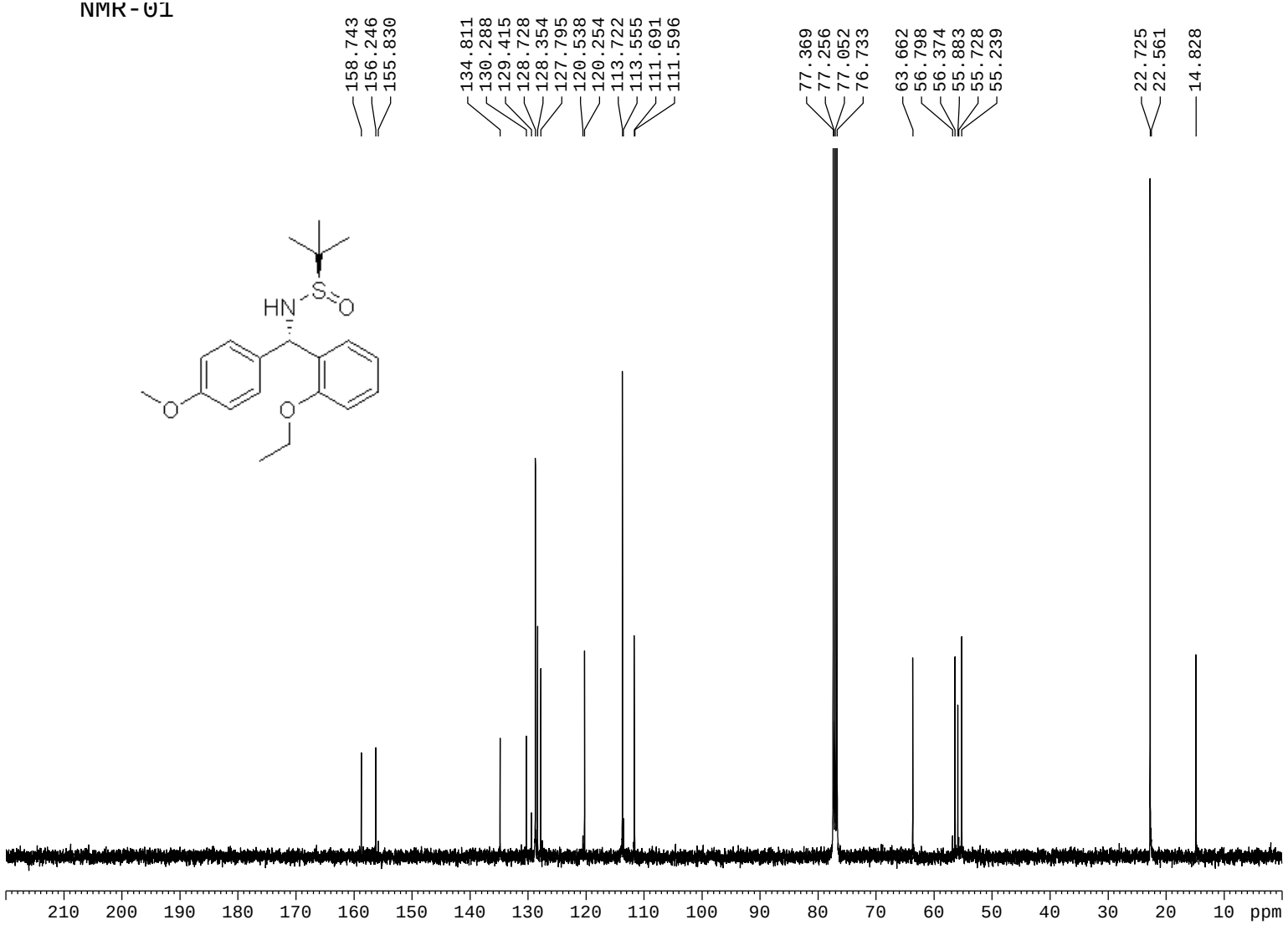
NMR-01

13C NMR of 7k
C13CPD CDCl3 {E:\2018\03 MAR 18} O2B
1



BRUKER

```
Current Data Parameters
NAME     22876
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180323
Time               13.48
INSTRUM            spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 2000
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
DW               15.600 usec
DE                6.50 usec
TE                293.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1               13C
P1                8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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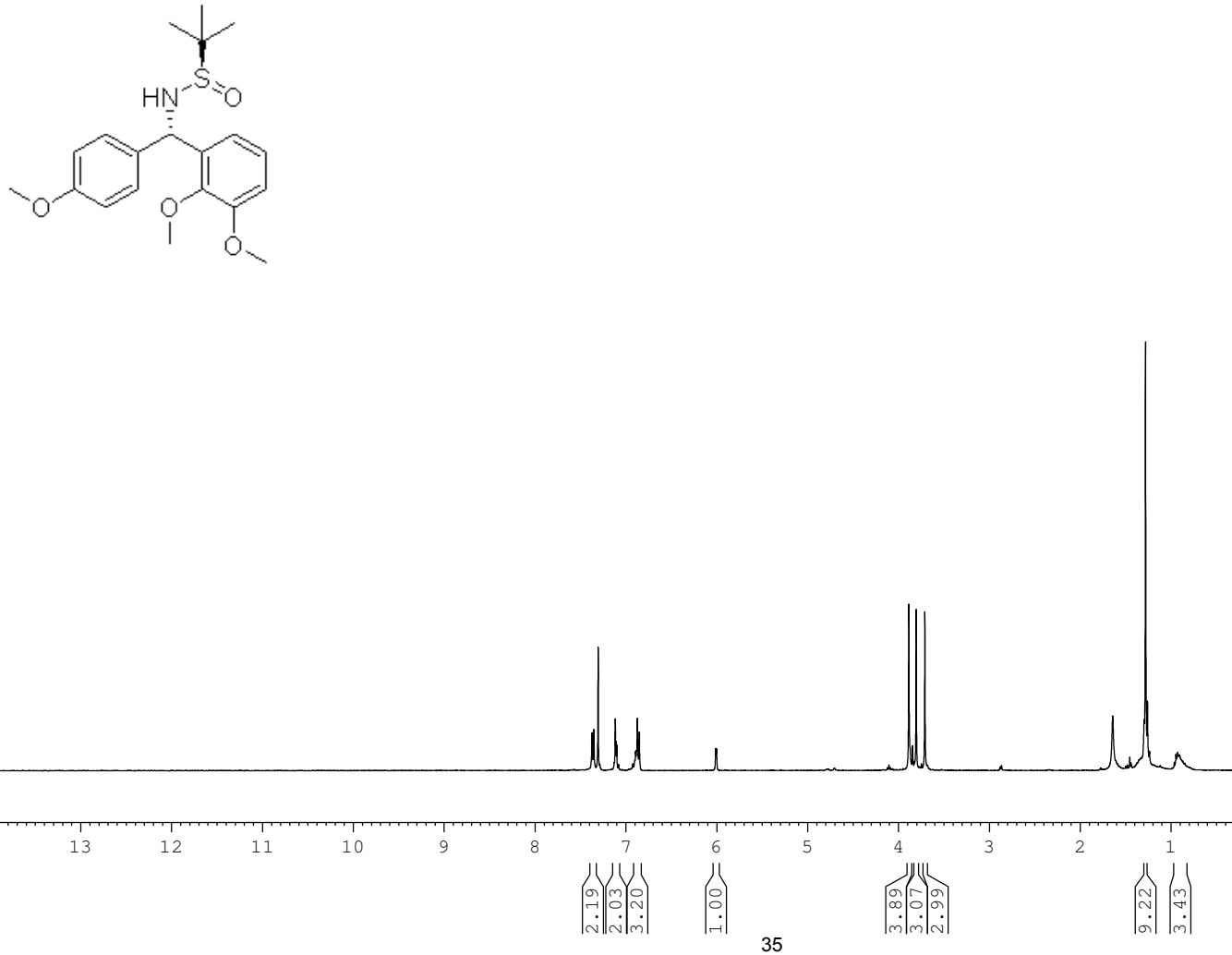
1H NMR of 7l

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 40

NMR-02




```
Current Data Parameters
NAME     21440
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180319
Time               21.01
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                293.9 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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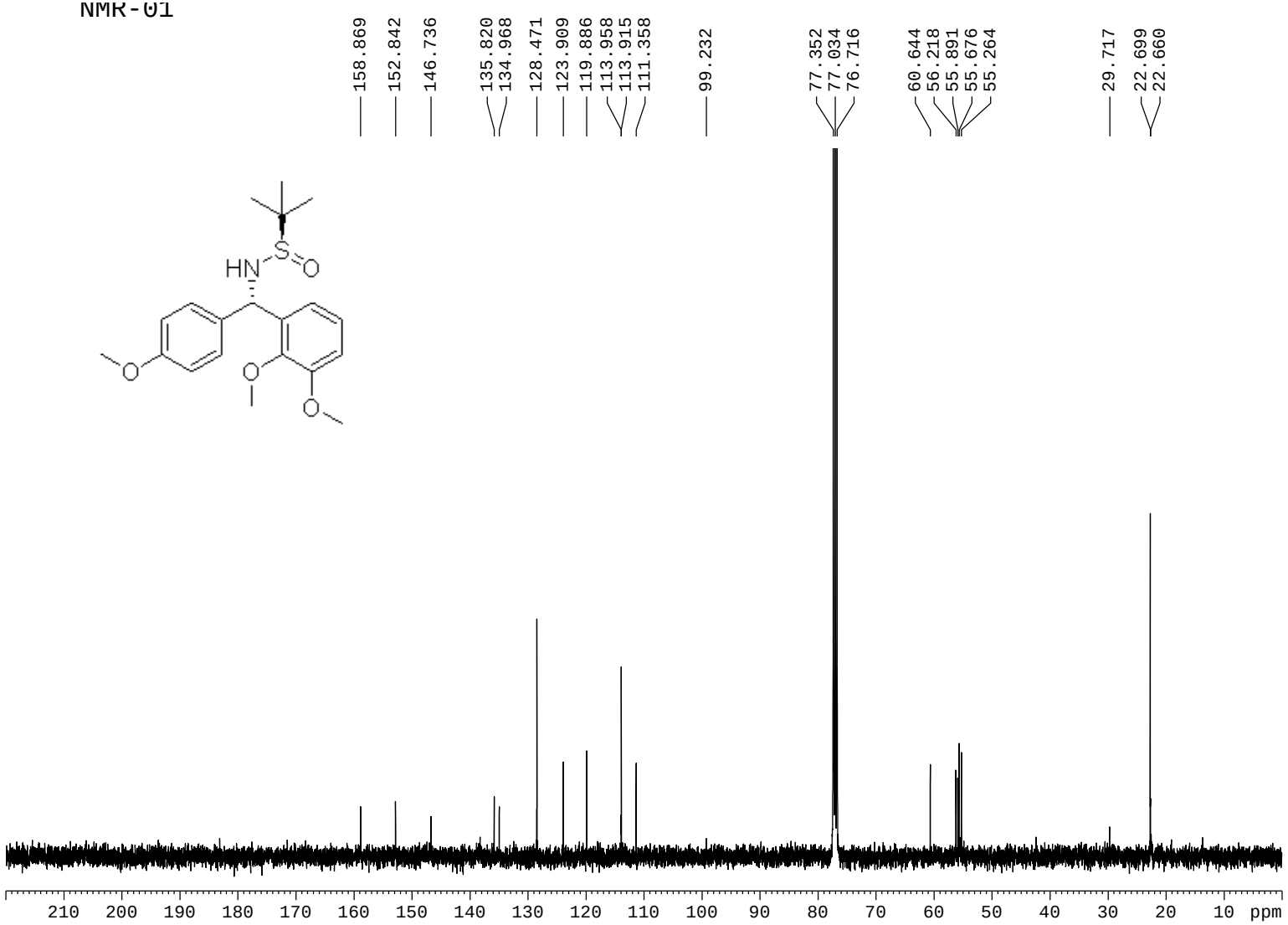
13C NMR of 7l

C13CPD CDCl3 {E:\2018\03 MAR 18} O2B
1

NMR-01



BRUKER

```
Current Data Parameters
NAME     22997
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180323
Time              19.06
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 3000
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
DW               15.600 usec
DE                6.50 usec
TE                293.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1                13C
P1                 8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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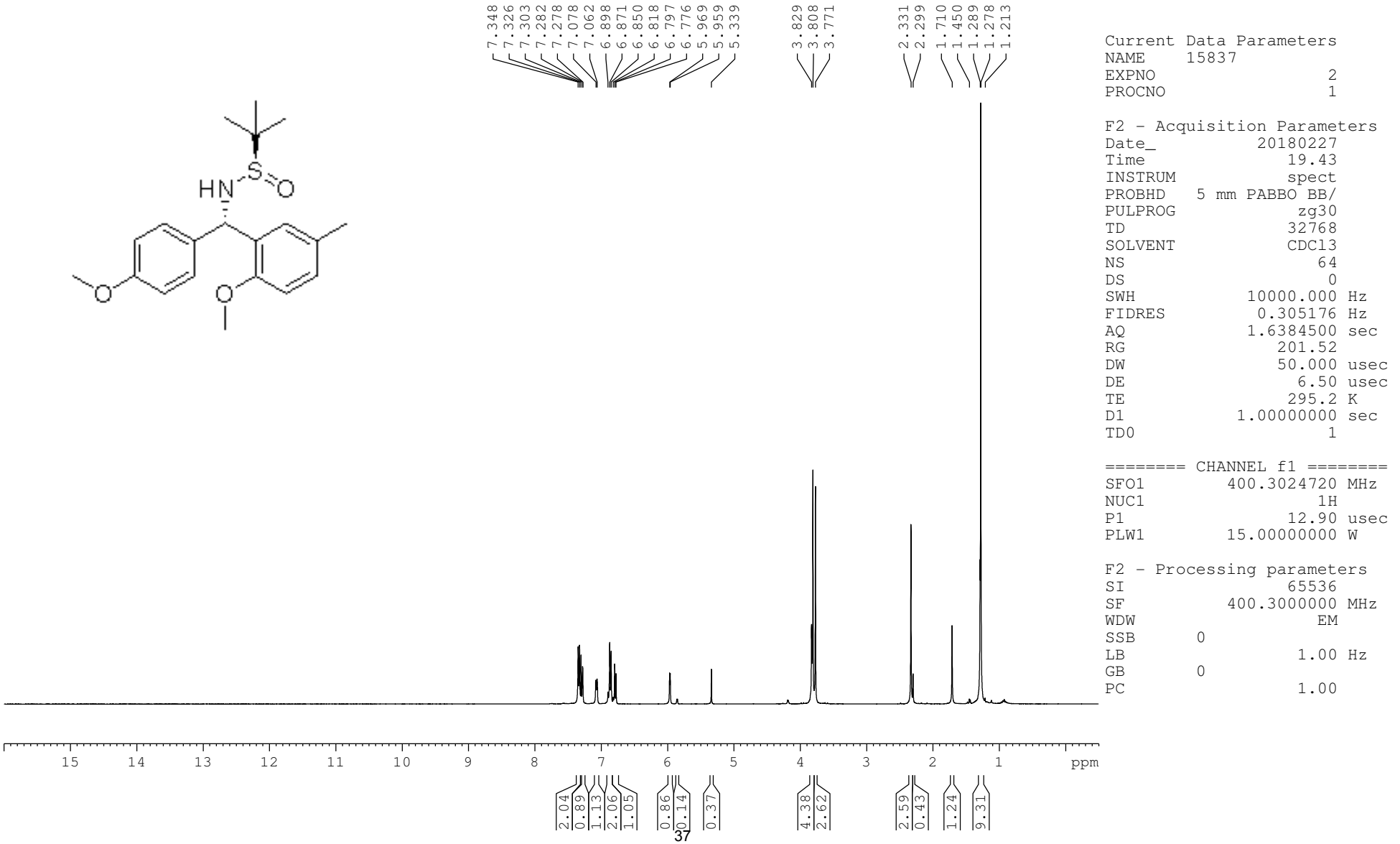
1H NMR of 7m

AAA_PROTON CDCl3 {D:\2018\02 EB 18} O2B 37

NMR-02




```
Current Data Parameters
NAME     15837
EXPNO                2
PROCNO               1

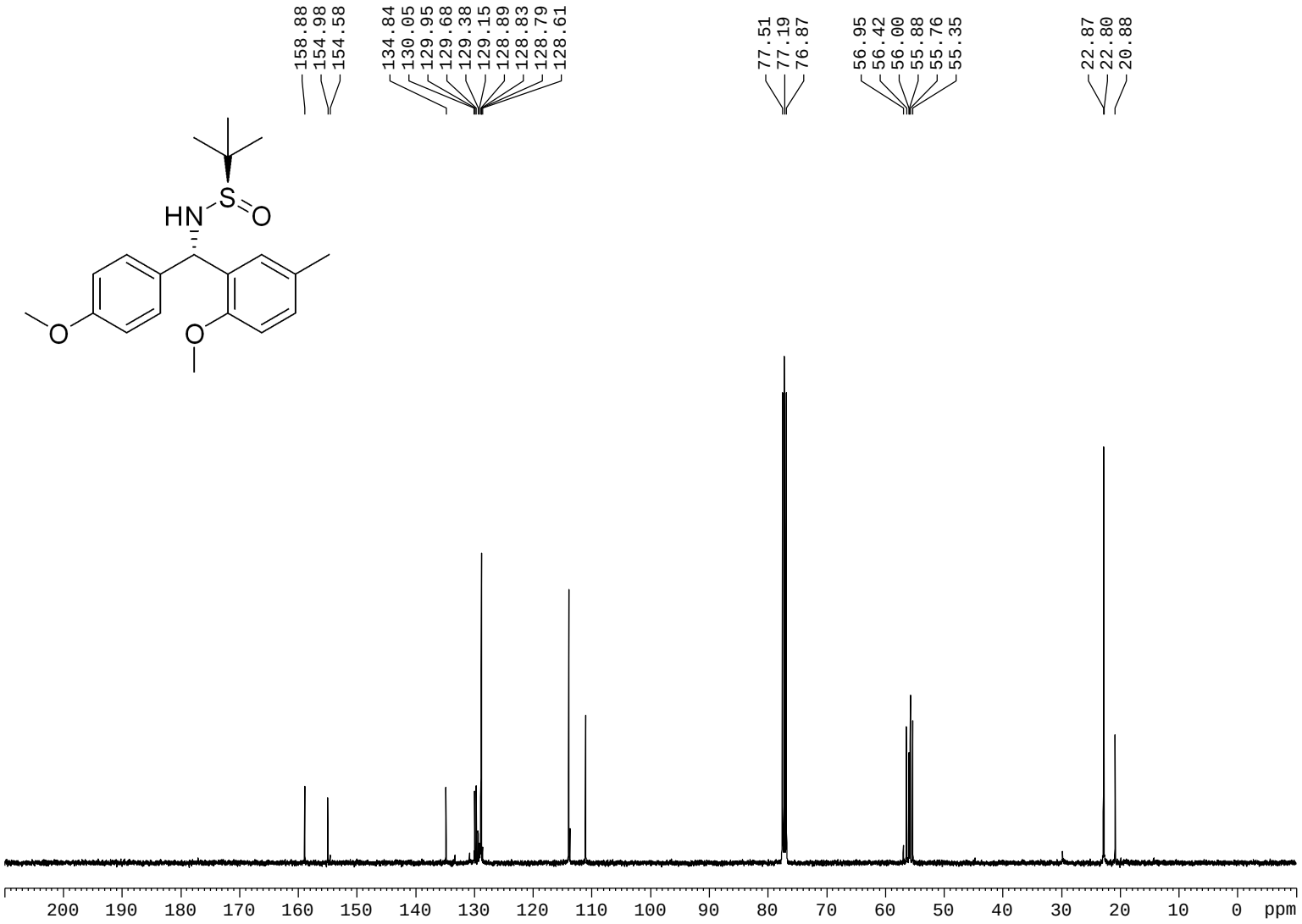
F2 - Acquisition Parameters
Date_         20180227
Time             19.43
INSTRUM          spect
PROBHD   5 mm PABBO BB/
PULPROG           zg30
TD               32768
SOLVENT          CDCl3
NS                  64
DS                   0
SWH          10000.000 Hz
FIDRES        0.305176 Hz
AQ            1.6384500 sec
RG               201.52
DW               50.000 usec
DE                6.50 usec
TE               295.2 K
D1          1.00000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        400.3024720 MHz
NUC1                1H
P1                12.90 usec
PLW1        15.00000000 W

F2 - Processing parameters
SI                65536
SF          400.3000000 MHz
WDW                 EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.00
```

13C NMR of 7m
C13CPD CDCl3 {E:\2018\04 APR 18} O2B 2

NMR-02




```
Current Data Parameters
NAME    36661
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180508
Time              13.35
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT             DMSO
NS                 2500
DS                    0
SWH           39682.539 Hz
FIDRES         0.605507 Hz
AQ            0.8257536 sec
RG               193.66
DW               12.600 usec
DE                 6.50 usec
TE                294.1 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1               13C
P1                8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6122794 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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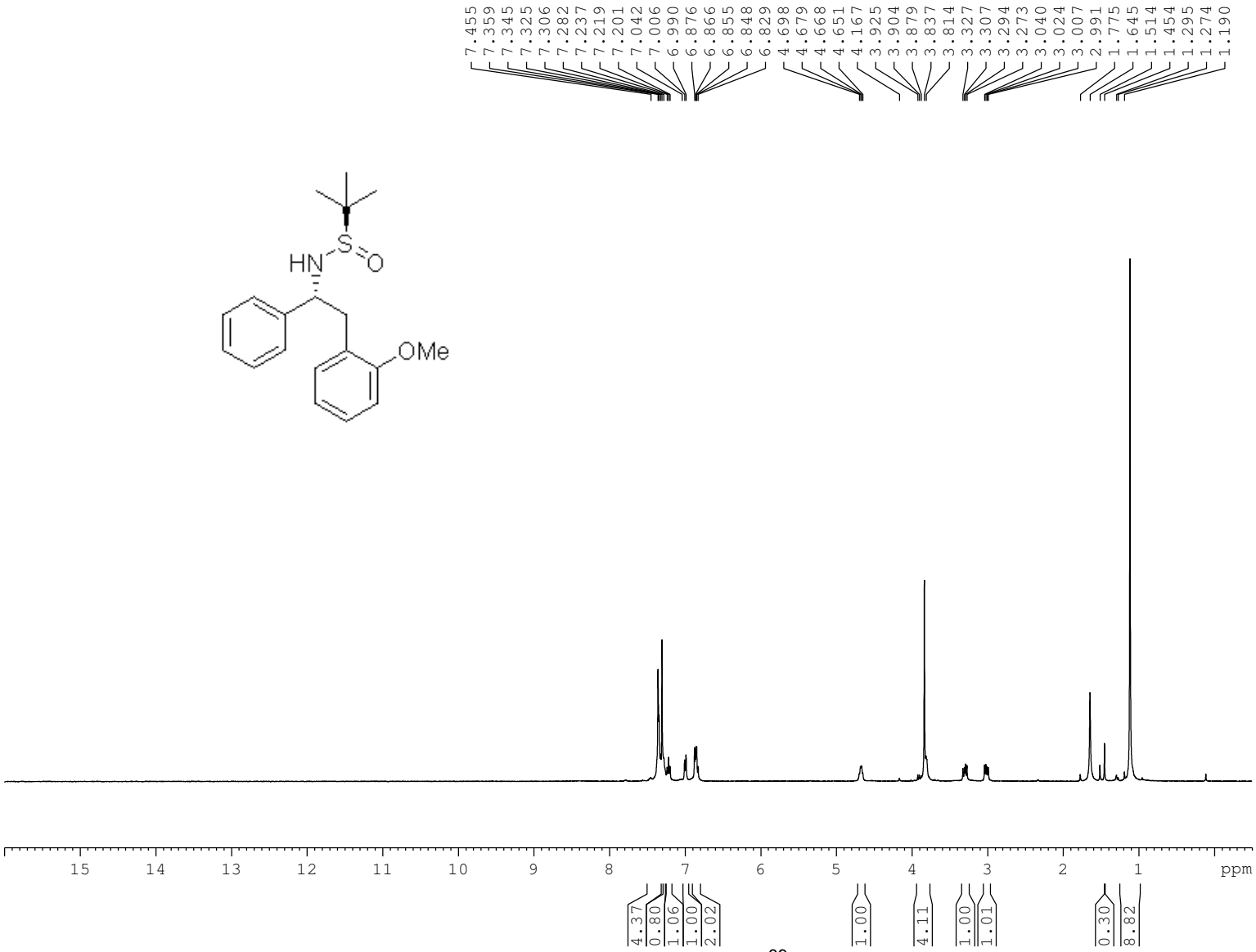
1H NMR of 8a

AAA_PROTON CDCl3 {D:\2018\04 APR 18} O2B 52

NMR-02

BRUKER



Current Data Parameters
NAME 29852
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20180417
Time 12.46
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 64
DS 0
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6384500 sec
RG 201.52
DW 50.000 usec
DE 6.50 usec
TE 293.5 K
D1 1.00000000 sec
TD0 1

======== CHANNEL f1 ========
SFO1 400.3024720 MHz
NUC1 1H
P1 12.90 usec
PLW1 15.00000000 W

F2 - Processing parameters
SI 65536
SF 400.3000000 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.00

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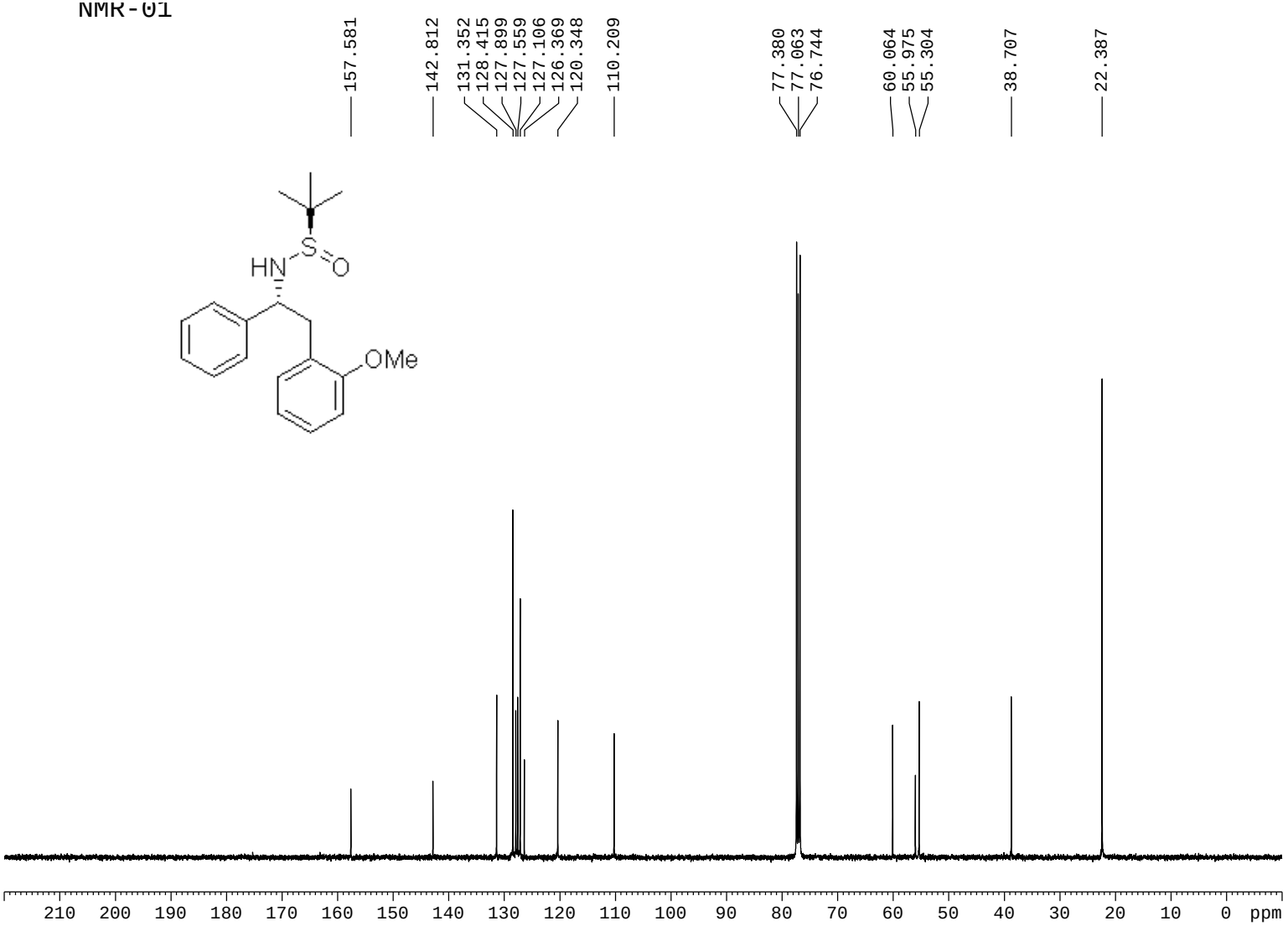
13C NMR of 8a
C13CPD CDCl3 {E:\2018\04 APR 18} O2B
1

NMR-01



BRUKER

```
Current Data Parameters
NAME     29865
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180417
Time              13.08
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 2500
DS                    0
SWH           39682.539 Hz
FIDRES         0.605507 Hz
AQ            0.8257536 sec
RG               193.66
DW               12.600 usec
DE                6.50 usec
TE                294.8 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1                13C
P1                 8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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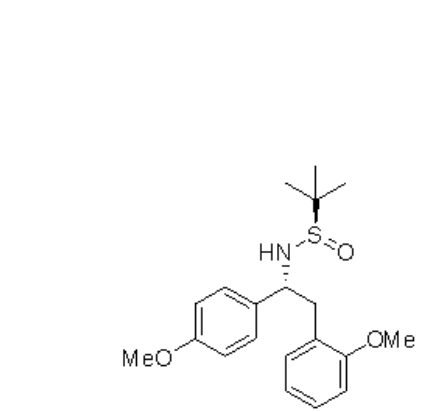
1H NMR of 8d

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 29

NMR-02

BRUKER



Current Data Parameters

NAME	20929
EXPNO	1
PROCNO	1

F2 - Acquisition Parameters

Date_	20180317
Time	14.21
INSTRUM	spect
PROBHD	5 mm PABBO BB/
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	64
DS	0
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6384500 sec
RG	201.52
DW	50.000 usec
DE	6.50 usec
TE	294.9 K
D1	1.00000000 sec
TD0	1

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

SFO1	400.3024720 MHz
NUC1	1H
P1	12.90 usec
PLW1	15.00000000 W

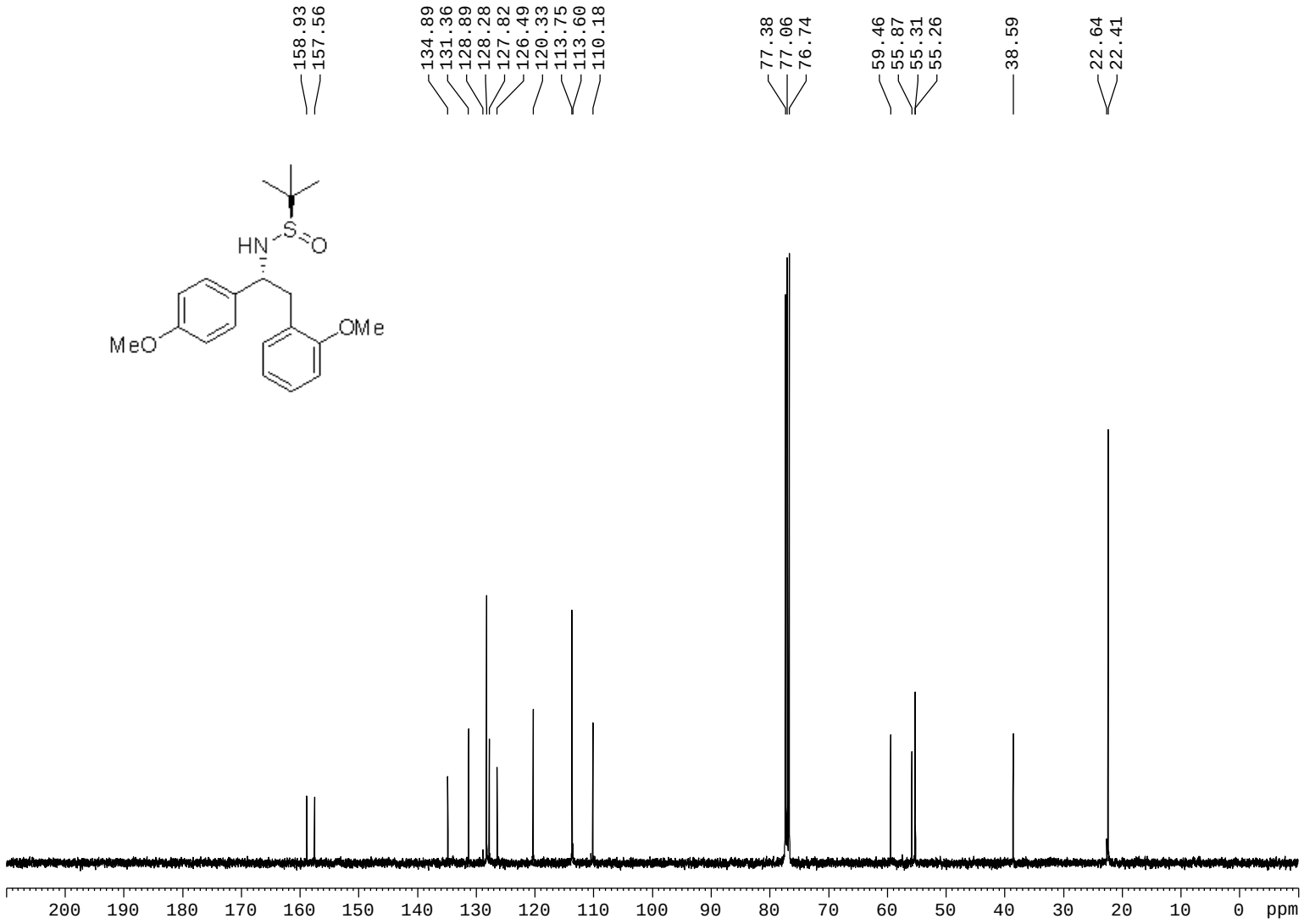
F2 - Processing parameters

SI	65536
SF	400.3000000 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.00

13C NMR of 8d

C13CPD CDCl3 {E:\2018\03 MAR 18} O2B 1

NMR-02




```
Current Data Parameters
NAME    21461
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_           20180319
Time              21.22
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 1200
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               193.66
DW               15.600 usec
DE                6.50 usec
TE                294.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1                13C
P1                 8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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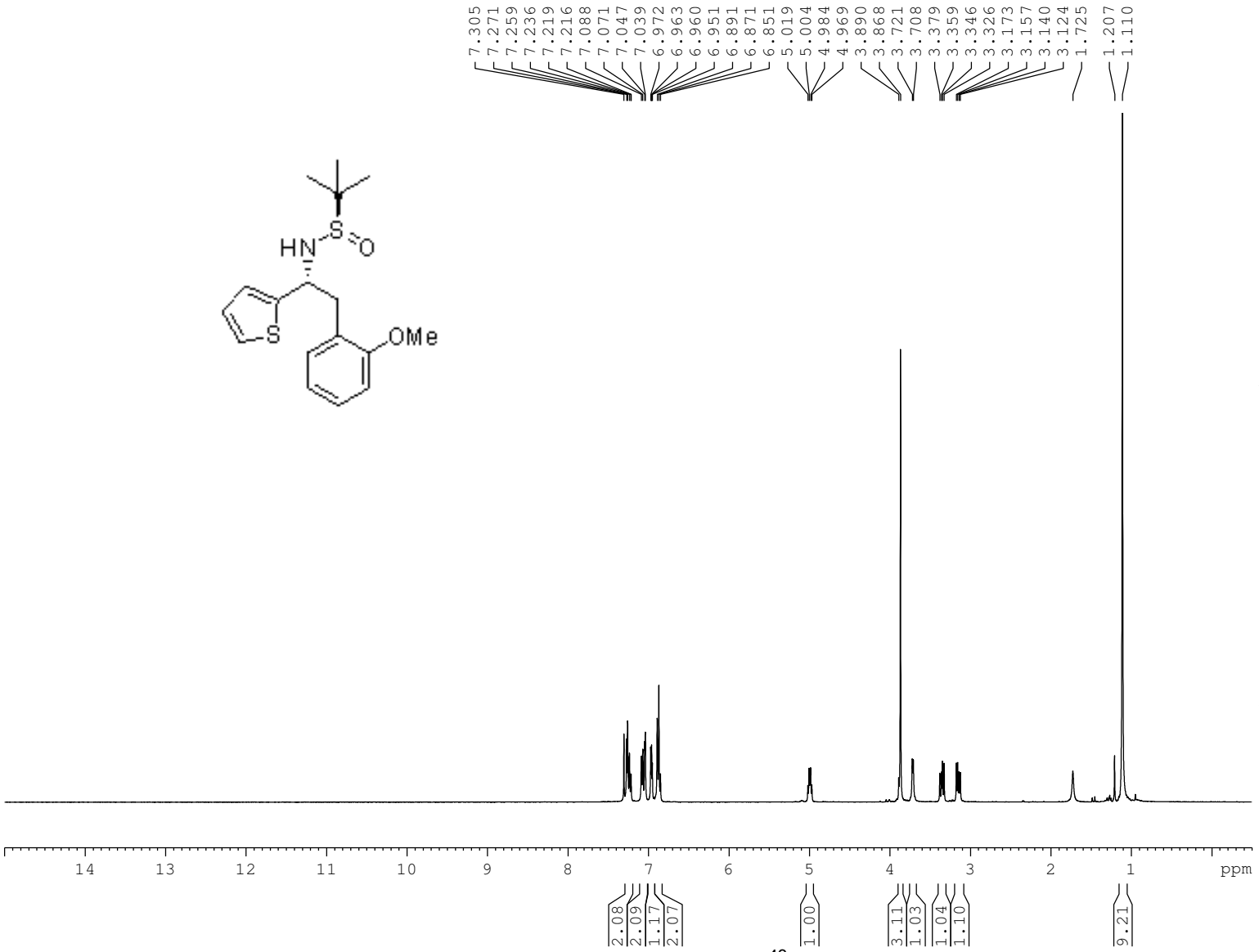
1H NMR of 8f

AAA_PROTON CDCl3 {D:\2018\03 MAR 18} O2B 28

NMR-02

BRUKER




```
Current Data Parameters
NAME     20928
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180317
Time               14.17
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                294.9 K
D1            1.00000000 sec
TD0                    1

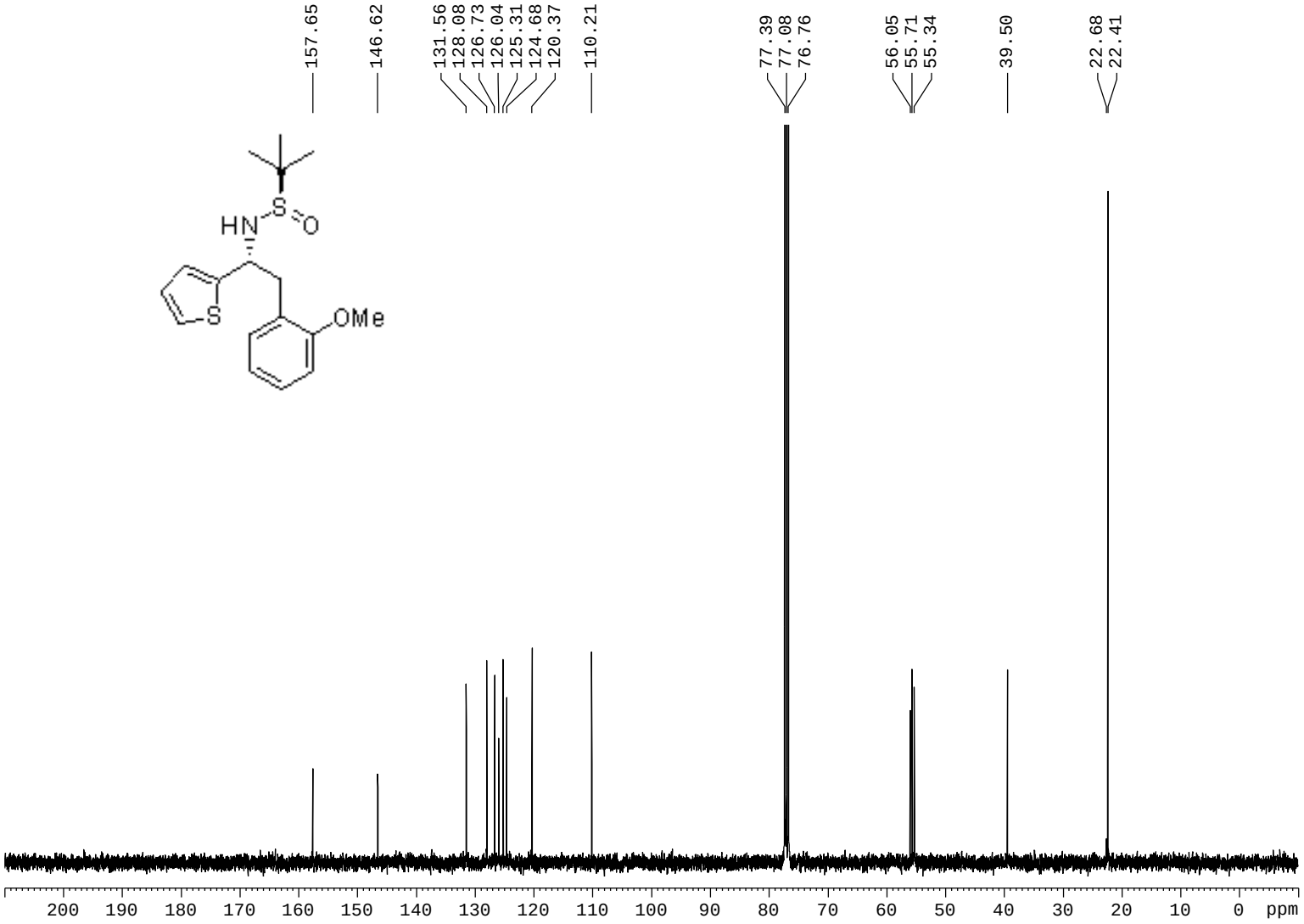
======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

13C NMR of 8f

C13CPD CDCl3 {D:\2018\03 MAR 18} O2B 48

NMR-02




```
Current Data Parameters
NAME    21448
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_           20180319
Time              21.51
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 1200
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               201.52
DW               15.600 usec
DE                6.50 usec
TE                294.9 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6655801 MHz
NUC1                13C
P1                 9.00 usec
PLW1        58.00000000 W

======== CHANNEL f2 ========
SFO2        400.3016012 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        15.00000000 W
PLW12        0.30816999 W
PLW13        0.24962001 W

F2 - Processing parameters
SI                32768
SF           100.6555151 MHz
WDW                  EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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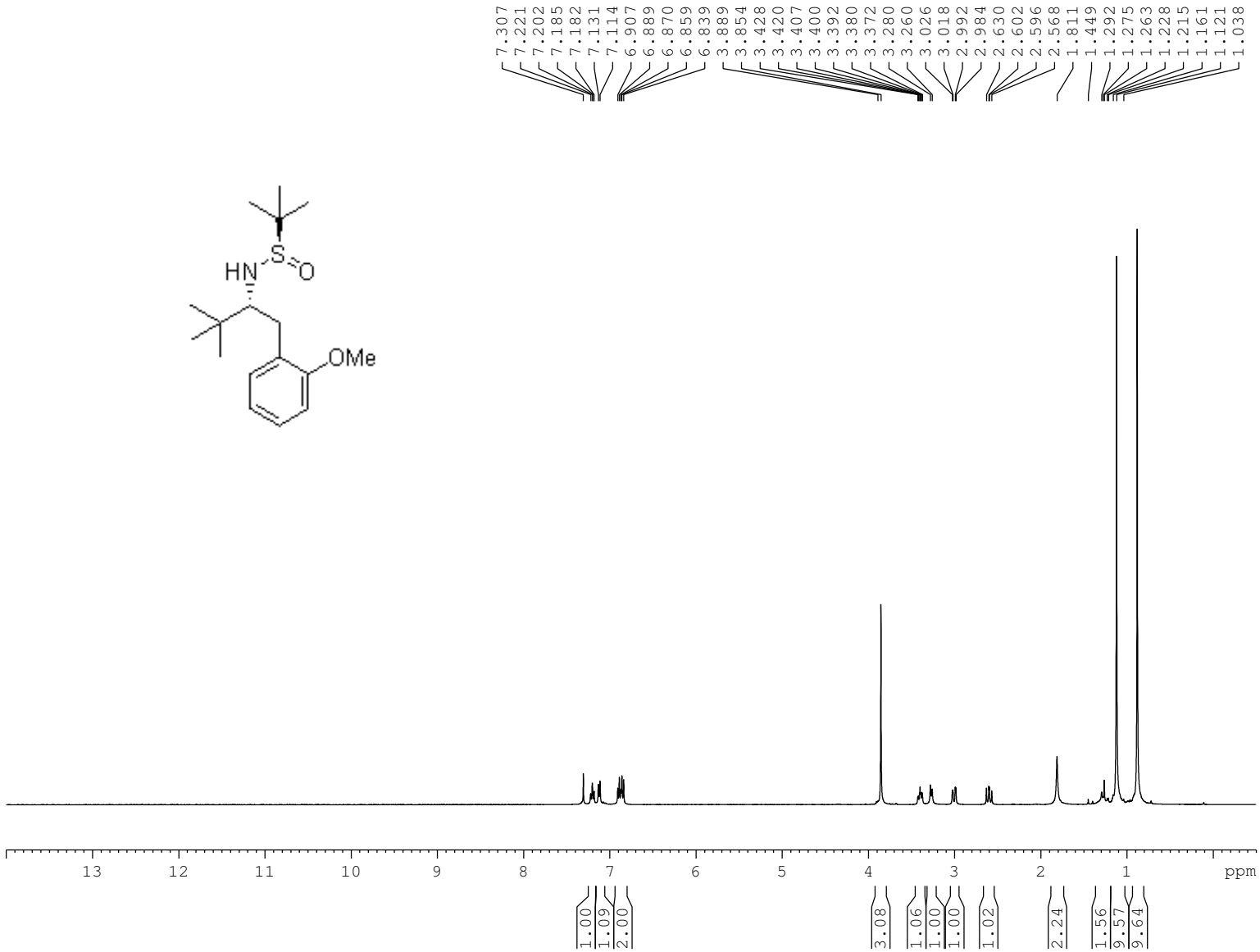
1H NMR of 8k

AAA_PROTON CDCl3 {D:\2018\04 APR 18} O2B 45

NMR-02

BRUKER




```
Current Data Parameters
NAME     27545
EXPNO                1
PROCNO               1

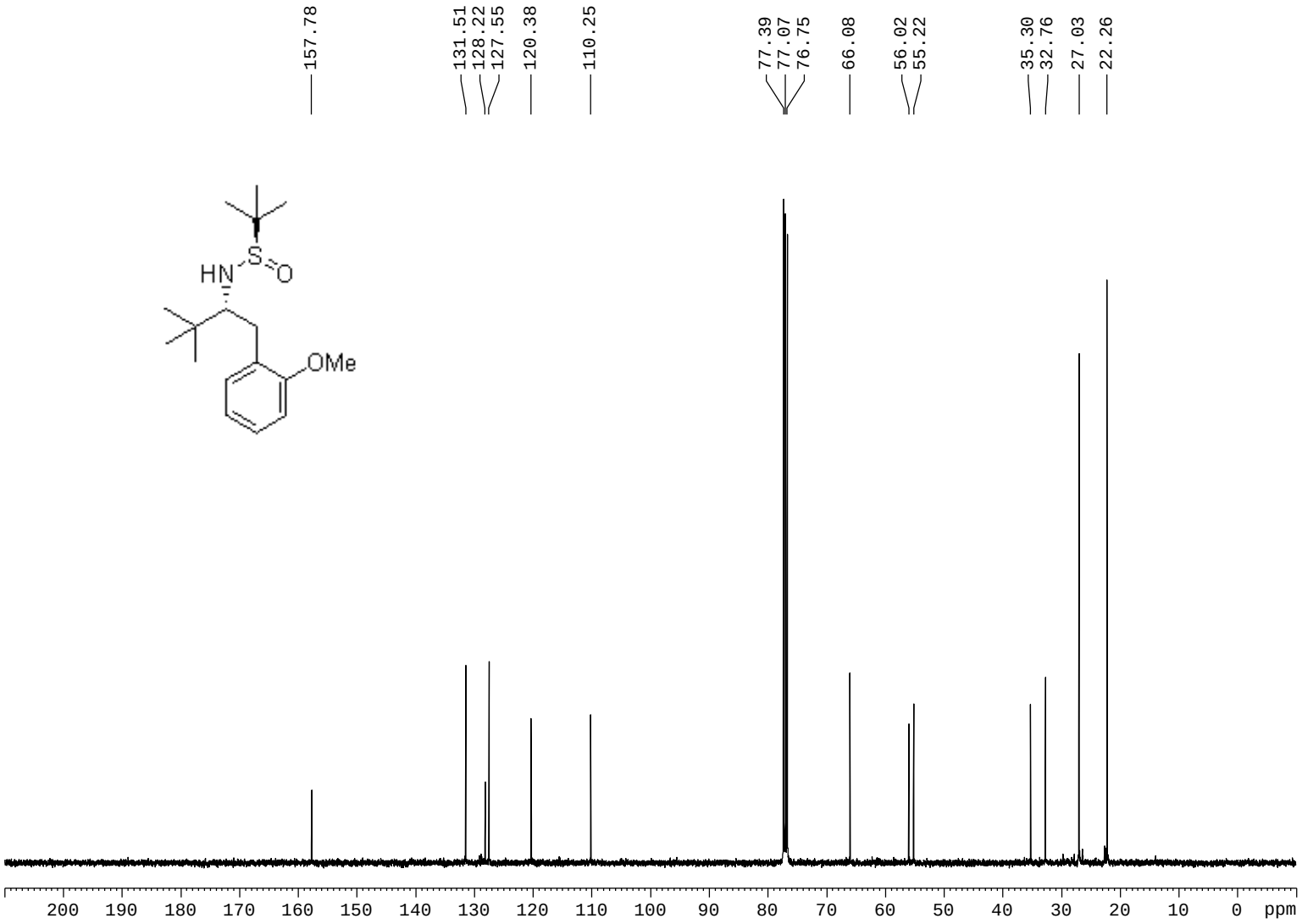
F2 - Acquisition Parameters
Date_           20180409
Time               10.22
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                134.98
DW                50.000 usec
DE                 6.50 usec
TE                290.9 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                1H
P1                12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                  EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

13C NMR of 8k
C13CPD CDCl3 {D:\2018\04 APR 18} O2B 52

NMR-02




```
Current Data Parameters
NAME    27781
EXPNO                 1
PROCNO                1

F2 - Acquisition Parameters
Date_          20180410
Time               7.14
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 2500
DS                    0
SWH           32051.281 Hz
FIDRES         0.489064 Hz
AQ            1.0223616 sec
RG               201.52
DW               15.600 usec
DE                6.50 usec
TE                295.4 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1        100.6655801 MHz
NUC1                13C
P1                 9.00 usec
PLW1        58.00000000 W

======== CHANNEL f2 ========
SFO2        400.3016012 MHz
NUC2                1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        15.00000000 W
PLW12        0.30816999 W
PLW13        0.24962001 W

F2 - Processing parameters
SI                32768
SF           100.6555151 MHz
WDW                  EM
SSB      0
LB                 1.00 Hz
GB       0
PC                 1.40
```

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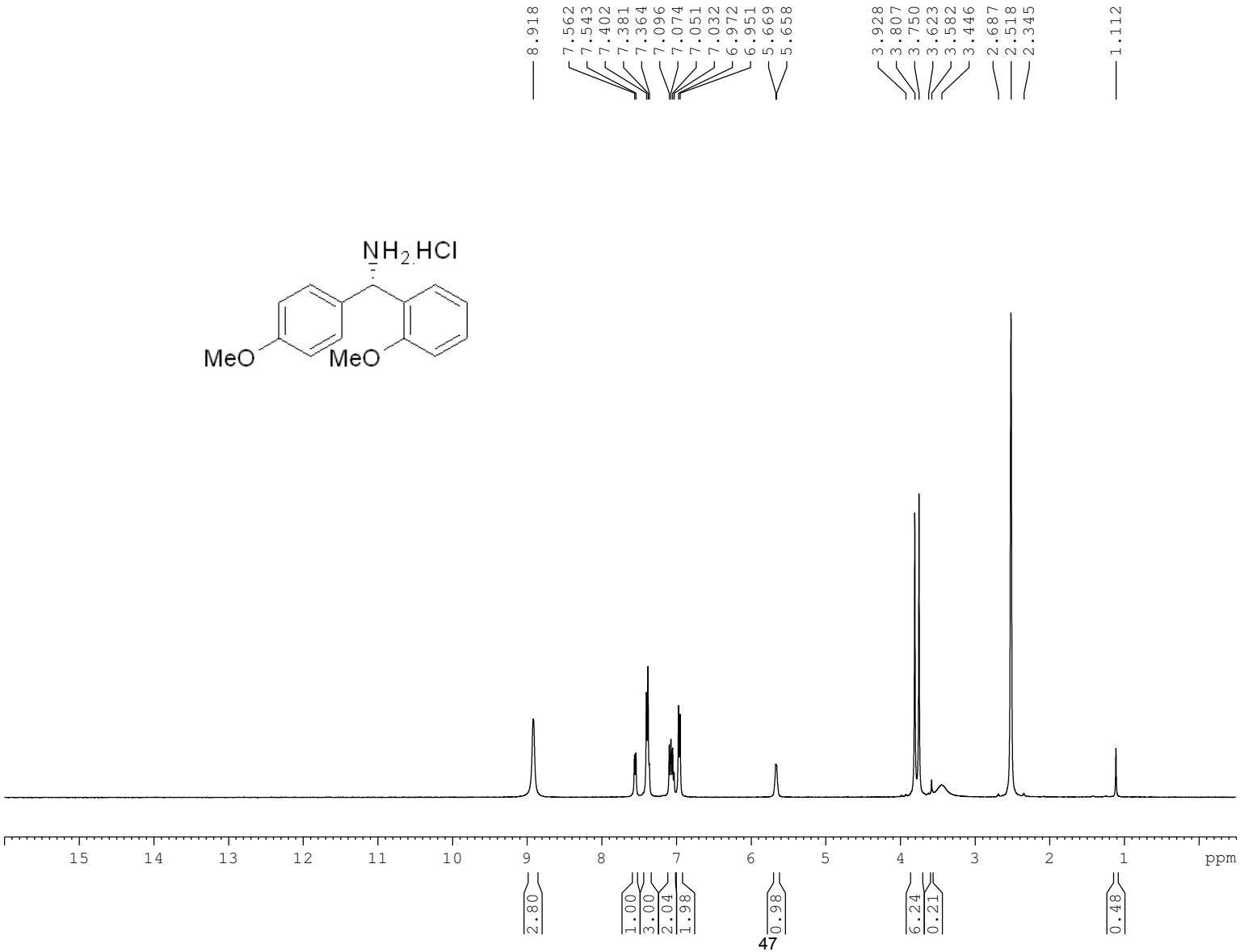
1H NMR of 9d

AAA_PROTON DMSO {D:\2018\04 APR 18} O2B 37

NMR-02




```
Current Data Parameters
NAME     26137
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180404
Time               11.45
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT             DMSO
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                 50.000 usec
DE                  6.50 usec
TE                 290.9 K
D1            1.00000000 sec
TD0                    1

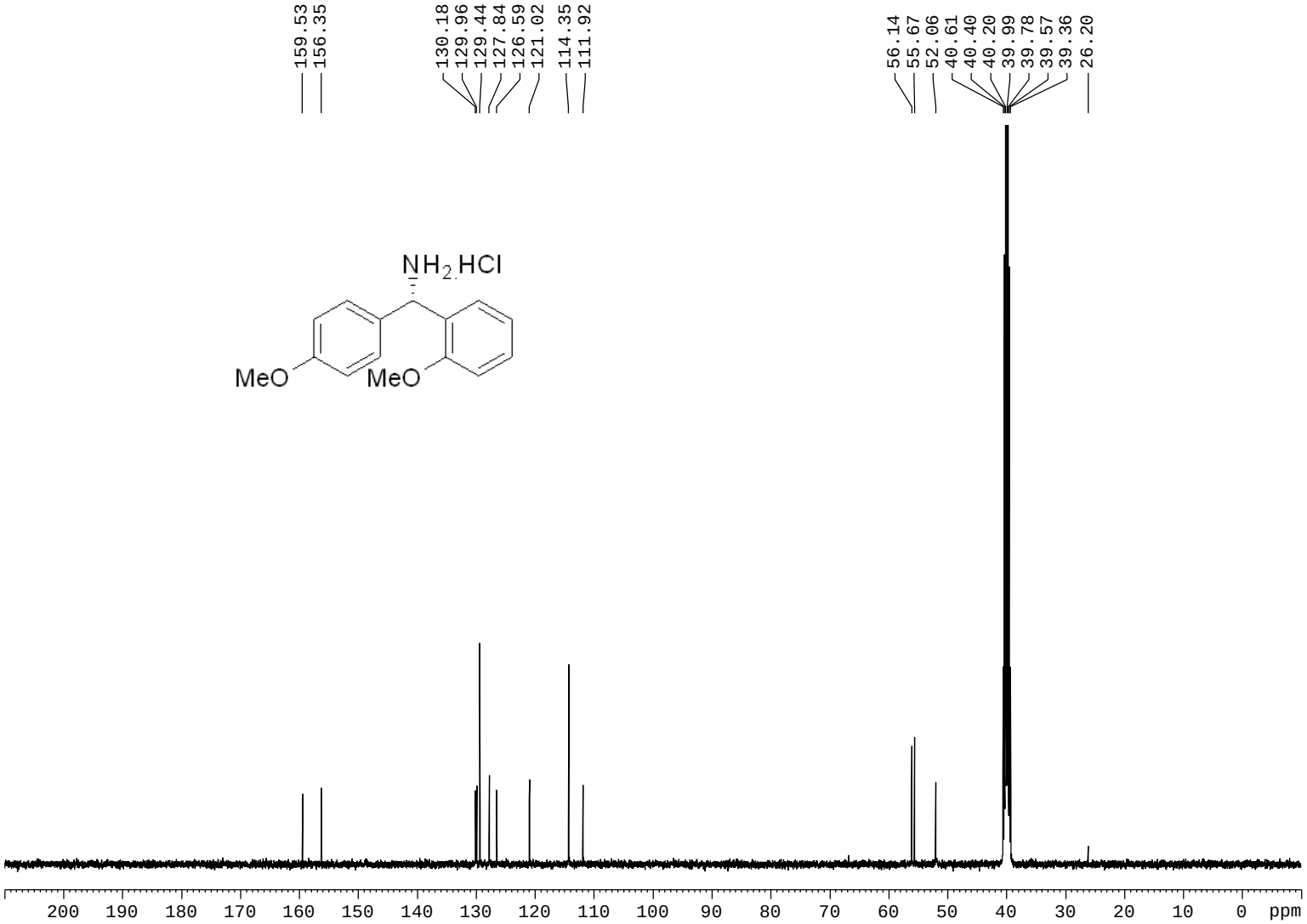
======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

13C NMR of 9d

C13CPD DMSO {D:\2018\04 APR 18} O2B 31

NMR-02




```
Current Data Parameters
NAME    26383
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_          20180404
Time             21.39
INSTRUM          spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD               65536
SOLVENT            DMSO
NS                 1400
DS                    0
SWH          32051.281 Hz
FIDRES        0.489064 Hz
AQ           1.0223616 sec
RG              201.52
DW              15.600 usec
DE                6.50 usec
TE               294.6 K
D1          2.00000000 sec
D11         0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6655801 MHz
NUC1               13C
P1                9.00 usec
PLW1        58.00000000 W

======== CHANNEL f2 ========
SFO2        400.3016012 MHz
NUC2               1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        15.00000000 W
PLW12        0.30816999 W
PLW13        0.24962001 W

F2 - Processing parameters
SI                32768
SF           100.6555151 MHz
WDW                EM
SSB      0
LB                1.00 Hz
GB       0
PC                1.40
```

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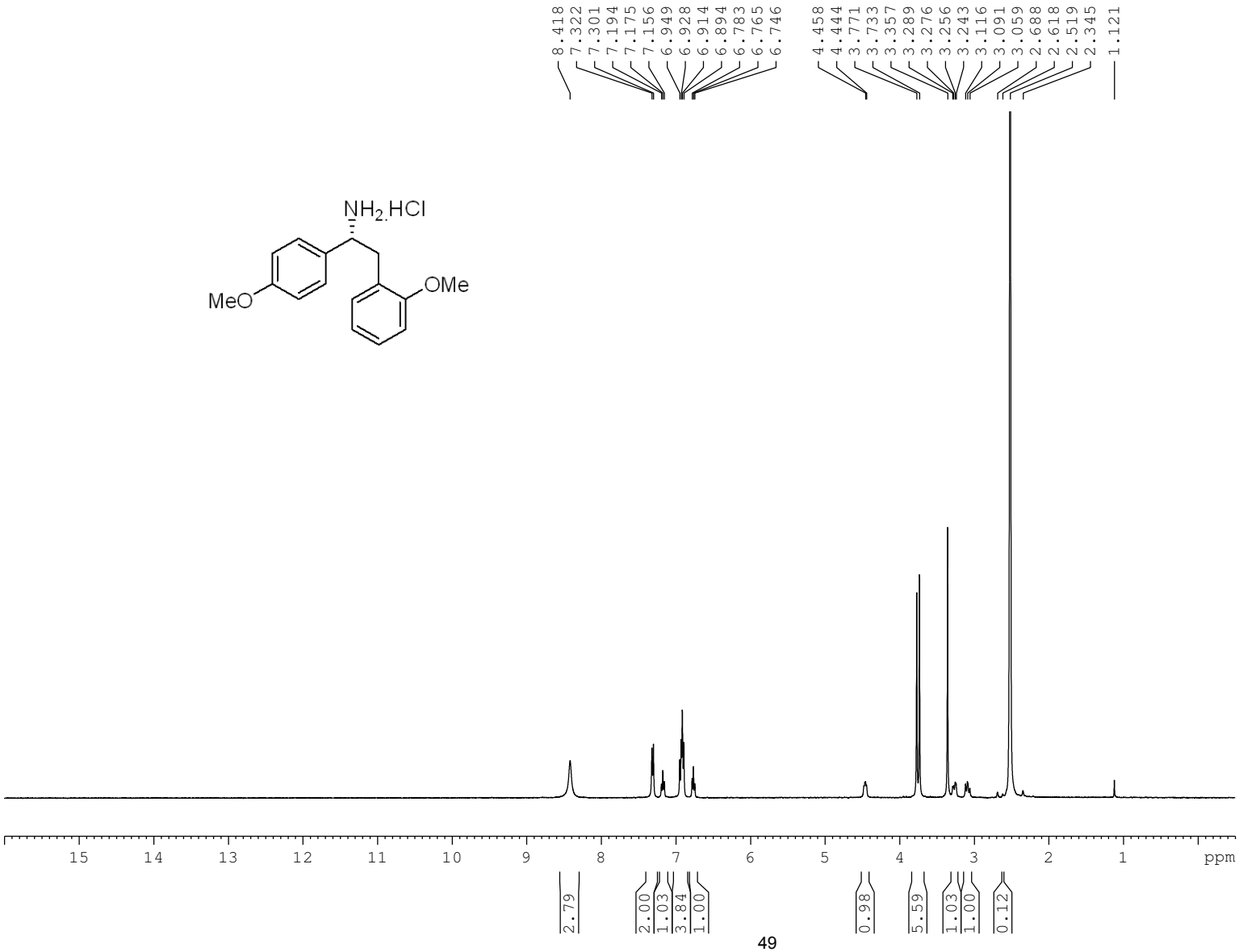
1H NMR of 10d

AAA_PROTON DMSO {D:\2018\04 APR 18} O2B 60

NMR-02

BRUKER




```
Current Data Parameters
NAME     25860
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_           20180403
Time               14.59
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 32768
SOLVENT             DMSO
NS                    64
DS                     0
SWH            10000.000 Hz
FIDRES          0.305176 Hz
AQ             1.6384500 sec
RG                201.52
DW                50.000 usec
DE                 6.50 usec
TE                293.8 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         400.3024720 MHz
NUC1                   1H
P1                 12.90 usec
PLW1         15.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.3000000 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.00
```

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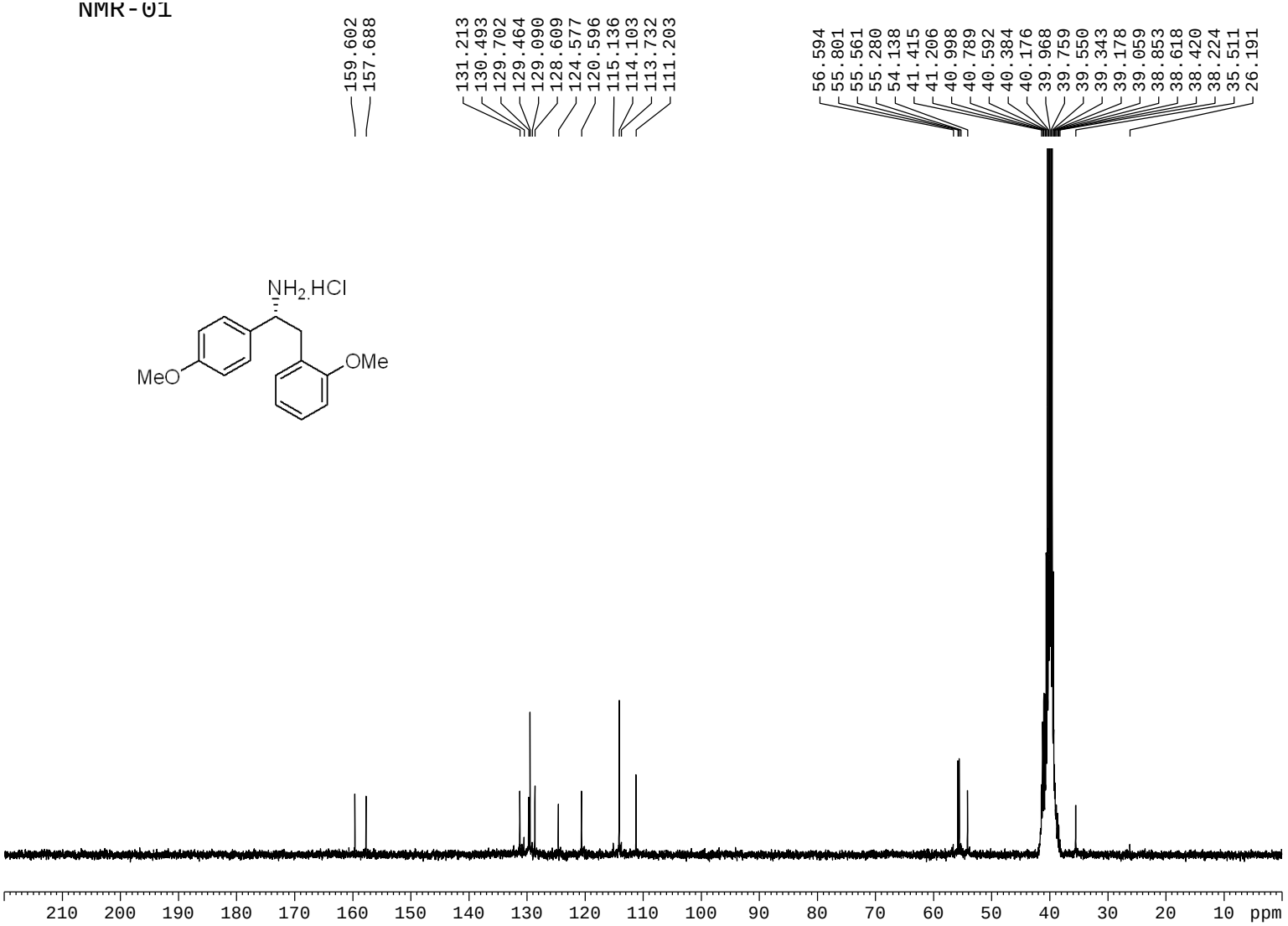
NMR-01

13C NMR of 10d

C13CPD DMSO {E:\2018\03 MAR 18} O2B 2




```
Current Data Parameters
NAME     25977
EXPNO                2
PROCNO               1

F2 - Acquisition Parameters
Date_          20180403
Time              21.15
INSTRUM           spect
PROBHD   5 mm BBO BB/19
PULPROG          zgpg30
TD                65536
SOLVENT             DMSO
NS                 1400
DS                    0
SWH           39682.539 Hz
FIDRES         0.605507 Hz
AQ            0.8257536 sec
RG               193.66
DW               12.600 usec
DE                6.50 usec
TE                295.8 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1        100.6228293 MHz
NUC1               13C
P1                8.70 usec
PLW1        54.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2               1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        10.50000000 W
PLW12        0.26323000 W
PLW13        0.21322000 W

F2 - Processing parameters
SI                32768
SF           100.6127690 MHz
WDW                EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```