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Supporting Information

A General Palladium-Catalyzed Hiyama Cross-Coupling Reaction of Aryl and Heteroaryl Chlorides

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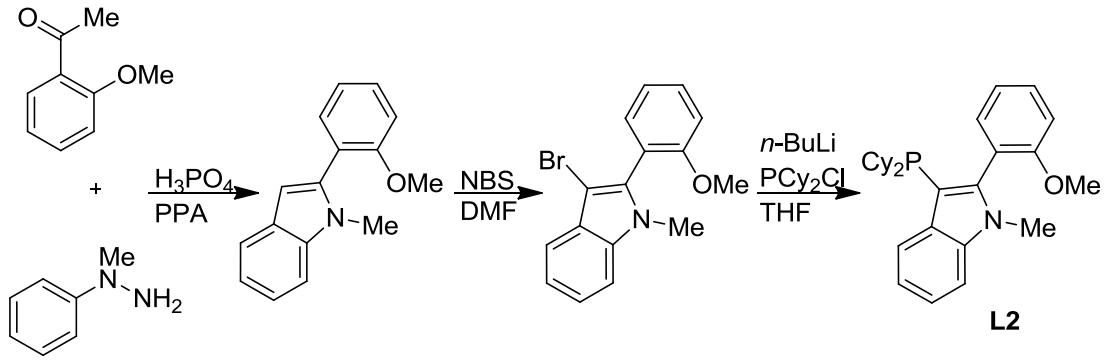
1. General considerations

Unless otherwise noted, all reagents were purchased from commercial suppliers and used without purification. All Hiyama cross-coupling reactions were performed in resealable screw cap Schlenk tube (approx. 15 mL volume) in the presence of Teflon-coated magnetic stirrer bar (4 mm × 10 mm). A blast shield was applied to all close-capped reactions. Toluene and tetrahydrofuran (THF) were distillated from sodium and sodium benzophenone ketyl under nitrogen, respectively.[1] Indolylphosphine ligand **L1**, **L3** and **L4** were prepared according to the reported procedures.[2] Ligands **L5** – **L10** were purchased from commercial suppliers. Tetrabutylammonium fluoride trihydrate (TBAF•$3H_2O$) was purchased from Aldrich, Acros and Fluka. The tetrabutylammonium fluoride trihydrate (TBAF•$3H_2O$) may be subjected to further purification depending on the receiving quality. KF and CsF were purchased from Aldrich. Aryl silanes except for trimethoxy(*o*-tolyl)silane, triethoxy(4-fluorophenyl)silane, (4-(*tert*-butyl)phenyl)triethoxysilane, 1-methyl-5-(triethoxysilyl)-1*H*-indole and tri(methoxy-d_3)phenylsilane were purchased from commercial suppliers and used directly. Trimethoxy(*o*-tolyl)silane, triethoxy(4-fluorophenyl)silane, (4-(*tert*-butyl)phenyl)triethoxysilane, 1-methyl-5-(triethoxysilyl)-1*H*-indole and tri(methoxy-d_3)phenylsilane were synthesized according to the reported procedures.[3] New bottle of *n*-butyllithium was used (*Note*: since the concentration of *n*-BuLi may vary, we recommend performing a titration prior to use). Thin layer chromatography was performed on pre-coated silica gel 60 F_{254} plates. Silica gel (Merck, 70-230 and 230-400 mesh) was used for column chromatography. Melting points were recorded on an uncorrected Büchi Melting Point B-545 instrument. NMR spectra were recorded on a Brüker spectrometer (400 MHz for ^{1}H, 100 MHz for ^{13}C, 376 MHz for ^{19}F and 162 MHz for ^{31}P). Spectra were referenced internally to the residual proton resonance in $CDCl_3$ (δ 7.26 ppm) as the internal standard. Chemical shifts (δ) were reported as part per million (ppm) in δ scale downfield from TMS. ^{13}C NMR spectra were referenced to $CDCl_3$ (δ 77.0 ppm, the middle peak). ^{19}F NMR chemical shifts were determined relative to $CFCl_3$ as the external standard and low field is positive. ^{31}P NMR spectra were referenced to 85% H_3PO_4 externally. Coupling constants (*J*) were reported in Hertz (Hz). Mass spectra (EI-MS and ES-MS) were recorded on a HP 5989B Mass Spectrometer. High-resolution mass spectra (HRMS) were obtained on a Brüker APEX 47e FTICR mass spectrometer (ESI-MS). GC-MS analysis was conducted on a HP 5973 GCD system using a HP5MS column (30 m × 0.25 mm). The products described in GC yield were accorded to the authentic

samples/dodecane calibration standard from HP 6890 GC-FID system. All yields reported refer to isolated yield of compounds estimated to be greater than 95% purity as determined by capillary gas chromatography (GC) or ^{1}H NMR. Compounds described in the literature were characterized by comparison of their ^{1}H, ^{13}C and/or ^{19}F NMR spectra to the previously reported data. The procedures in this section are representative, and thus the yields may differ from those reported in tables.

2. Preparation of indolylphosphine ligand L2



Indolylphosphine ligand L2 was prepared according to the reported procedures without modification.[2]

3-(Dicyclohexylphosphino)-2-(2-methoxyphenyl)-1-methyl-1-*H*-indole (L2)

3-Bromo-2-(2-methoxyphenyl)-1-methyl-1*H*-indole (10 mmol), *n*-BuLi (11 mmol) and chlorodicyclohexylphosphine (12 mmol) in THF (25 ml) were given white solid product (3.1 g, 71%). ^{1}H NMR (400 MHz, C_6D_6) δ 1.02-1.39 (m, 10H), 1.50-2.01 (m, 10H), 2.31-2.37 (m, 1H), 2.47-2.54 (m, 1H), 3.09 (s, 3H), 3.23 (s, 3H), 7.09-7.13 (m, 1H), 7.14-7.16 (m, 1H), 7.22-7.26 (m, 2H), 7.44 (d, *J*= 7.4 Hz, 1H), 8.07 (d, *J*= 8.0 Hz, 1H); ^{13}C NMR (100 MHz, C_6D_6) δ 27.2, 27.3, 29.9, 30.2, 30.3, 30.8, 30.9, 31.8, 32.0, 32.2, 32.4, 33.9, 34.0, 34.5, 34.7, 54.5, 104.5, 104.7, 109.7, 110.4, 119.7, 119.9, 121.3, 121.5, 122.1, 129.8, 130.9, 131.0, 134.01, 134.04, 138.3, 146.5, 146.9, 158.2; ^{31}P NMR (162 MHz, C_6D_6) δ -17.87; MS (EI): *m/z* (relative intensity) 433.3 (M^+, 5), 402.3 (100), 320 (10), 268.1 (30).

3. General procedure for initial ligand and reaction conditions screening

An array of stock solutions of Pd metal sources (0.010 mmol) with ligand (Pd:L =1:4) in freshly distilled THF (4.0 mL) were initially prepared with continuously stirring at room temperature for 1 min. An array of Schlenk tubes were charged with magnetic stirrer bar (4

mm x 10 mm) and were evacuated and backfilled with nitrogen (3 cycles). The stock solutions (0.40 mL, 0.20 mol% Pd) were added by syringe to the array of Schlenk tubes respectively. The solvent in Schlenk tubes were removed under reduced pressure. The Schlenk tubes were charged with bases and were again evacuated and backfilled with nitrogen (3 cycles). The Schlenk tubes were then added with trimethoxyphenylsilane (0.19 mL, 1.0 mmol) via autopipette. The reaction mixtures were allowed stir for 1 min and 2-chlorotoluene (59 μL, 0.50 mmol) was added to each Schlenk tubes via autopipette. This batch of Schlenk tube was resealed and magnetically stirred in a preheated 110 ^{o}C oil bath for 3 h. The reactions were allowed to reach room temperature. Ethyl acetate (~8 mL), dodecane (113 μL, internal standard) and water (~2 mL) were added. The organic layer was subjected to GC analysis. The GC yield was previously calibrated by authentic sample/dodecane calibration curve.

4. General procedure for palladium-catalyzed Hiyama coupling of aryl chlorides

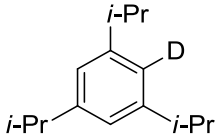
$Pd(OAc)_2$ (2.3 mg, 0.010 mmol) with ligand **L2** (17.3 mg, 0.040 mmol) in freshly distilled 10 mL THF (0.2 mol% Pd per 1 mL stock solution) were initially prepared with continuously stirring at room temperature for 1 min. Schlenk tube was charged with magnetic stirrer bar (4 mm x 10 mm) and was evacuated and backfilled with nitrogen (3 cycles). The corresponding volume of stock solution was added by syringe to the tube. The solvent was removed under reduced pressure. TBAF•$3H_2O$ (0.32 g, 1.0 mmol) and solid aryl chlorides (0.50 mmol) was added to the tube which was again evacuated and backfilled with nitrogen (3 cycles). Trimethoxyphenylsilane (0.19 mL, 1.0 mmol) was then added to the tube via autopipette and the reaction mixture was allowed stir for 1 min. Liquid aryl chlorides (0.50 mmol) was added to the tube via autopipette. Acetic acid or water and/or toluene (0.50-1.0 mL) were then added via autopipette and syringe respectively (if needed, as indicated in Table 2 and 4). The tube was resealed and magnetically stirred in a preheated 110 ^{o}C oil bath for 3 h. The reaction was allowed to reach room temperature. Ethyl acetate (~8 mL), water (~2 mL) were added. The organic layers were combined and concentrated. The crude products were purified by column chromatography on silica gel (230-400 mesh).

5. General procedure for large-scale Hiyama coupling of aryl chlorides

$Pd(OAc)_2$ (23 mg, 0.10 mmol) and ligand **L1** (0.173 g, 0.40 mmol) were loaded to a 250 mL Schlenk flask (with a glass stopcock and 24/29 joint with hooks) which equipped with a magnetic stirrer bar (30 mm x 6 mm) and fitted with septum. The flask was carefully evacuated and backfilled with nitrogen for three cycles. Precomplexation was accomplished by adding 10 mL freshly distilled THF in to the flask and the solution was allowed to stir at room temperature for 1 min. The solvent was removed under reduced pressure. TBAF•$3H_2O$ (63 g, 0.20 mol) was quickly charged to the flask which was evacuated and backfilled with nitrogen for other three cycles. Trimethoxyphenylsilane (38 mL, 0.20 mol) was then added to the tube by syringe and the reaction mixture was allowed to stir for 10 min. 3-chlorotoluene (11.8 mL, 0.10 mol) was added to the flask by syringe and allowed to stir for another 5 min. The septum was replaced with a 24/29 stopper with hooks which was then fixed with wire to the flask. The stopcock was closed and the flask was placed in a preheated 110 ^oC oil bath for 3 h (CAUTION! A BLAST SHIELD HAS TO BE APPLIED!). The reaction was allowed to reach room temperature. Ethyl acetate and water were added to the flask and the mixture was transferred to separating funnel and subjected to extraction. The organic layers were combined and concentrated. The crude product was filtered through a pad of silica gel (10 cm x 20 cm, 230-400 mesh) and eluted with hexane to yield the pure 3-methylbiphenyl (16.6 g, 99%).

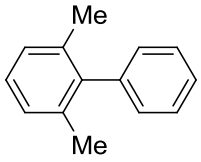
6. Characterization data for coupling products

Benzene-*d*, 2,4,6-tris(1-methylethyl)- (Scheme 1)



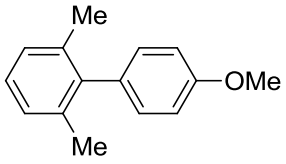
Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^1H NMR (400 MHz, $CDCl_3$) δ 1.36 (d, *J*= 6.8 Hz, 18H), 2.93-3.03 (m, 3H), 7.02 (s, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 24.1, 34.2, 34.3, 122.1, 148.6, 148.7; MS (EI): *m/z* (relative intensity) 205.2 (M^+, 27), 190.1 (100), 162.1 (51), 106.0 (20), 92.0 (11); HRMS: calcd. for $C_{15}H_{24}D^+$: 206.2019, found 206.2016.

2,6-Dimethyl-1,1'-biphenyl (Table 3, entry 1-2)[2a]



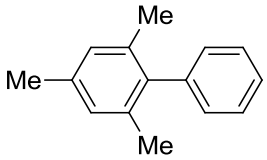
Eluents (Hexane, R_f= 0.55) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.11 (s, 6H), 7.17-7.26 (m, 5H), 7.40 (t, *J*= 7.4 Hz, 1H), 7.49 (t, *J*= 7.4 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 20.8, 126.6, 127.0, 127.2, 128.4, 129.0, 136.0, 141.0, 141.8; MS (EI): *m/z* (relative intensity) 182.0 (M^+, 72), 167.0 (100), 152.0 (30), 115.0 (21), 77.0 (15).

4'-Methoxy-2,6-dimethyl-1,1'-biphenyl (Table 3, entry 3)[4]



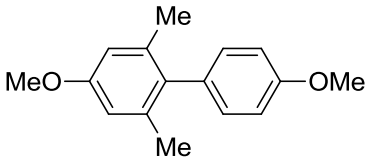
Eluents (DCM: Hexane= 1: 10, R_f= 0.30) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.11 (s, 3H), 3.91 (s, 3H), 7.01-7.05 (m, 2H), 7.11-7.23 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 20.8, 55., 113.7, 126.8, 127.2, 130.0, 1333.3, 136.4, 141.5, 158.2; MS (EI): *m/z* (relative intensity) 212.2 (M^+, 100), 197.1 (34), 181.1 (26), 165.1 (28), 153.1 (22).

2,4,6-Trimethyl-1,1'-biphenyl (Table 3, entry 4-5)[5]



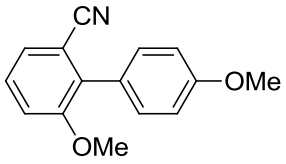
Eluents (Hexane, R_f= 0.55) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.07 (s, 6H), 2.40 (s, 3H), 7.01 (s, 2H), 7.20 (d, *J*= 7.8 Hz, 2H), 7.38 (t, *J*= 7.4 Hz, 1H), 7.47 (t, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 20.7, 21.0, 126.5, 128.0, 128.3, 129.3, 135.9, 136.5, 139.0, 141.1; MS (EI): *m/z* (relative intensity) 196.1 (M^+, 100), 165.0 (66), 141.0 (7), 115.0 (15), 89.0 (13).

4,4'-Dimethoxy-2,6-dimethyl-1,1'-biphenyl (Table 3, entry 6)



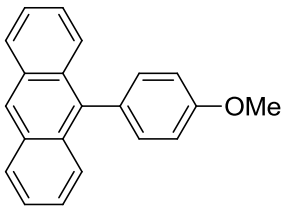
Eluents (DCM: Hexane= 1: 10, R_f= 0.20) was used for flash column chromatography. White solid; m.p.=114.7-117.2 ; ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.07 (s, 3H), 3.85 (s, 3H), 3.88 (s, 3H), 6.71 (s, 2H), 6.99 (d, *J*= 8.4 Hz, 2H), 7.09 (d, *J*= 8.8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.1, 55.0, 55.1, 112.5, 113.7, 127.7, 130.6, 133.0, 134.1, 137.8, 158.1; MS (EI): *m/z* (relative intensity) 242.2 (M^+, 100), 227.1 (22), 199.1 (7), 184.1 (4), 152.1 (4); HRMS: calcd. for $C_{16}H_{18}O_2^+$: 242.1301, found 242.1301.

4',6-Dimethoxy-[1,1'-biphenyl]-2-carbonitrile (Table 3, entry 7)



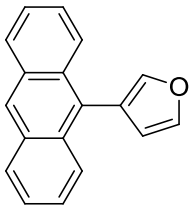
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.20) was used for flash column chromatography. White solid; m.p.= 89.1-92.1; ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.79 (s, 3H), 3.86 (s, 3H), 7.00 (d, *J*= 8.8 Hz, 2H), 7.17 (d, *J*= 8.0 Hz, 1H), 7.32-7.40 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 55.1. 55.9. 113.6. 113.7. 115.2. 118.4. 125.0. 126.2. 128.7. 131.2. 134.3. 156.9. 159.6; MS (EI): *m/z* (relative intensity) 239.1 (M^+, 100), 224.1 (29), 209.1 (19), 193.1 (12), 153.1 (12); HRMS: calcd. for $C_{15}H_{14}NO_2^+$: 240.1019, found 240.1020.

9-(4-Methoxyphenyl)anthracene (Table 3, entry 8)[6]



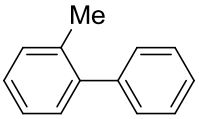
Eluents (Hexane, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.98 (s, 3H), 7.17 (d, *J*= 8.6 Hz, 2H), 7.39-7.43 (m, 4H), 7.51 (t, *J*= 8.4 Hz, 2H), 7.80 (d, *J*= 8.8 Hz, 2H), 8.08 (d, *J*= 8.8 Hz, 2H), 8.52 (s, 1H);' ^{13}C NMR (100 MHz, $CDCl_3$) δ 55.3, 113.8, 125.0, 125.2, 126.3, 126.9, 128.3, 130.5, 130.8, 131.4, 132.3, 136.8, 159.0; MS (EI): *m/z* (relative intensity) 284.1 (M^+, 100), 269.1 (16), 239.1 (36), 119.6 (12).

3-(Anthracen-9-yl)furan (Table 3, entry 9)



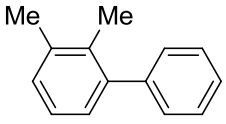
Eluents (Hexane, R_f= 0.40) was used for flash column chromatography. Yellow gel; ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.71 (s, 1H), 7.46-7.55 (m, 4H), 7.705-7.709 (m, 1H), 7.796-8.804 (m, 1H), 8.06-8.09 (m, 4H), 8.51 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 114.1, 121.4, 125.1, 125.5, 126.5, 126.9, 127.5, 128.4, 130.9, 131.3, 141.9, 143.0; MS (EI): *m/z* (relative intensity) 244.1 (M^+, 100), 215.1 (75), 189.1 (7), 106.7 (7); HRMS: calcd. for $C_{18}H_{12}O^+$: 244.0883, found 244.0883.

2-Methyl-1,1'-biphenyl (Table 4, entry 1)[2a]



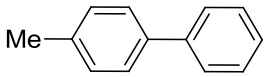
Eluents (Hexane, R_f= 0.55) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.36 (s, 3H), 7.32–7.36 (m, 4H), 7.40–7.43 (m, 3H), 7.47–7.51 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 20.4, 125.7, 126.7, 127.2, 128.0, 129.2, 129.8, 130.3, 135.3, 141.9, 142.0; MS (EI): *m/z* (relative intensity) 168.1 (M^+, 100), 153.0 (40), 139.0 (8), 115.0 (14), 77.0 (4).

2,3-Dimethyl-1,1'-biphenyl (Table 4, entry 2)[7]



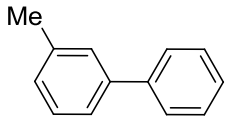
Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.55 (s, 3H), 2.44 (s, 3H), 7.18-7.27 (m, 3H), 7.39–7.44 (m, 3H), 7.49 (t, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 16.9, 20.7, 125.2, 126.6, 127.6, 128.8, 129.4, 134.0, 137.1, 142.2, 142.6; MS (EI): *m/z* (relative intensity) 182.1 (M^+, 95), 167.1 (100), 152.0 (26), 128.0 (8), 76.0 (8).

4-Methyl-1,1'-biphenyl (Table 4, entry 3)[2a]**Error! Bookmark not defined.**



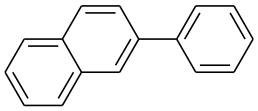
Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.48 (s, 3H), 7.33 (d, *J*= 7.6 Hz, 2H), 7.40 (t, *J*= 7.6 Hz, 1H), 7.50 (t, *J*= 7.6 Hz, 2H), 7.58 (d, *J*= 8.0 Hz, 2H), 7.66 (d, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.1, 126.9, 127.0, 128.7, 129.4, 137.0, 138.3, 141.1; MS (EI): *m/z* (relative intensity) 168.0 (M^+, 100),139.0 (8), 115.0 (15), 91.0 (6), 62.9 (9).

3-Methyl-1,1'-biphenyl (Table 4, entry 4)[8]



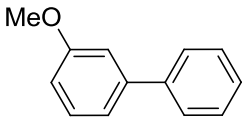
Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400MHz, $CDCl_3$) δ 2.48 (s, 3H), 7.29 (d, *J*= 7.6 Hz, 1H), 7.46 (t, *J*= 7.6 Hz, 2H), 7.52–7.57 (m, 4H), 7.72 (d, *J*= 7.8 Hz, 2H); ^{13}C NMR (100MHz, $CDCl_3$) δ 21.5, 124.2, 127.1, 127.2, 127..9, 128.0, 128.6, 128.7, 138.3, 141.2, 141.3; MS (EI): *m/z* (relative intensity) 168.1 (M^+, 100), 152.0 (23), 139.0 (5), 115.0 (8), 89.0 (4).

2-Phenylnaphthalene (Table 4, entry 5)[9]



Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.48 (s, 3H), 7.47–7.51 (m, 1H), 7.57–7.63 (m, 4H), 7.82–7.87 (m, 3H), 7.96–8.02 (m, 3H), 8.16 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 125.5, 125.7, 125.9, 126.2, 127.3, 127.4, 127.6, 128.2, 128.4, 128.8, 132.6, 133.6, 138.5, 141.1; MS (EI): *m/z* (relative intensity) 204.1 (M^+, 100), 176.0 (3), 152.1 (3), 126.0 (3), 101.0 (7).

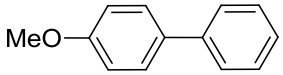
3-Methoxy-1,1'-biphenyl (Table 4, entry 6)[10]



Eluents (Ethyl acetate: Hexane= 1: 50, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.96 (s, 3H), 7.03 (d, *J*= 8.2 Hz, 1H), 7.29 (s, 1H), 7.33 (d, *J*=

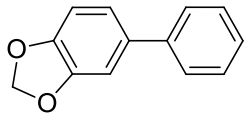
8.0 Hz, 1H), 7.46–7.50 (m, 2H), 7.56 (t, *J*= 7.6 Hz, 2H), 7.73. (d, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 55.1, 112.6, 112.8, 119.6, 127.1, 127.3, 128.7, 129.7, 141.0, 142.7, 159.9; MS (EI): *m/z* (relative intensity) 184.0 (M^+, 100), 154.1 (28), 141.0 (51), 115.0 (92), 76.1 (17).

4-Methoxy-1,1'-biphenyl (Table 4, entry 7)[2a]



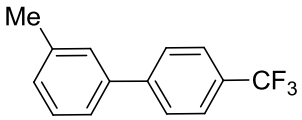
Eluents (Ethyl acetate: Hexane= 1: 20, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.90 (s, 3H), 7.05 (d, *J*= 8.8 Hz, 2H), 7.38 (t, *J*= 7.6 Hz, 1H), 7.49 (t, *J*= 7.6 Hz, 1H), 7.59–7.65 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 55.2, 114.2, 126.6, 126.7, 128.1, 128.7, 133.7, 140.8, 159.1; MS (EI): *m/z* (relative intensity) 184.0 (M^+, 100), 169.0 (47), 141.0 (57), 115.0 (52), 89.1 (7).

5-Phenylbenzo[d][1,3]dioxole (Table 4, entry 8)[9]



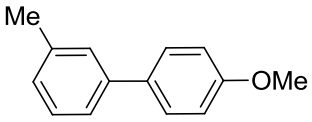
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.03 (s. 3H), 6.94 (d, *J*= 8.0 Hz, 1H), 7.11-7.15 (m, 2H), 7.37 (t, *J*= 7.4 Hz, 1H), 7.47 (t, *J*= 7.6 Hz, 2H), 7.58 (d, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 101.0, 107.6, 108.5, 120.5, 126.8, 126.9, 128.7, 135.5, 140.8, 147.0, 148.0; MS (EI): *m/z* (relative intensity) 198.0 (M^+, 100), 139.0 (44), 115.0 (4), 98.8 (4), 77.0 (2).

3-Methyl-4'-(trifluoromethyl)-1,1'-biphenyl (Table 4, entry 9-10)[11]



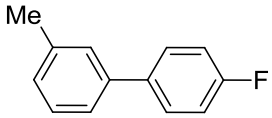
Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.48 (s, 3H), 7.26 (d, *J*= 7.4 Hz, 1H), 7.38-7.45 (m, 3H), 7.72 (s, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.5, 124.36 (q, *J*= 270 Hz), 124.37, 125.6 (q, *J*= 4.0 Hz), 127.4, 128.0, 128.88, 128.92, 129.2 (q, *J*= 32 Hz), 138.6, 139.8, 144.9; ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.3; MS (EI): *m/z* (relative intensity) 236.0 (M^+, 100), 217.1 (13), 165.0 (45), 152.0 (16), 91.1 (6).

4'-Methoxy-3-methyl-1,1'-biphenyl (Table 4, entry 11-12)[12]



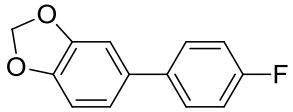
Eluents (Ethyl acetate: Hexane= 1: 50, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.47 (s, 3H), 3.89 (s, 3H), 7.03 (d, *J*= 8.8 Hz, 2H), 7.19 (d, *J*= 7.6 Hz, 1H), 7.37 (t, *J*= 7.4 Hz, 1H), 7.41–7.44 (m, 2H), 7.59 (d, *J*= 8.8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.5, 55.2, 114.1, 123.8, 127.4, 127.5, 128.1, 128.6, 133.8, 138.2, 140.8, 159.0; MS (EI): *m/z* (relative intensity) 198.1 (M^+, 100), 183.0 (51), 155.0 (40), 128.0 (16), 89.0 (4).

4'-Fluoro-3-methyl-1,1'-biphenyl (Table 4, entry 13)[13]



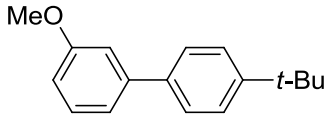
Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.48 (s, 3H), 7.14-7.24 (m, 3H), 7.36-7.42 (m, 3H), 7.56-7.61 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.5, 115.5 (d, *J*= 21.0 Hz), 124.1, 127.8, 128.0, 128.6 (d, *J*= 8.0 Hz), 128.7, 137.4 (d, *J*= 3.0 Hz), 138.4, 140.2, 162.4 (d, *J*= 245.0 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -115.9; MS (EI): *m/z* (relative intensity) 186.1 (M^+, 100), 165.1 (26), 133.1 (5), 91.2 (4).

5-(4-Fluorophenyl)benzo[d][1,3]dioxole (Table 4, entry 14)[14]



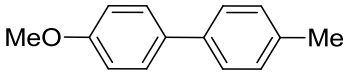
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.00 (s, 2H), 6.88 (d, *J*= 7.92 Hz, 1H), 7.01 (d, *J*= 8.08 Hz, 1H), 7.03 (s, 1H), 7.08-7.13 (m, 2H), 7.45-7.48 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 101.1, 107.4, 108.4, 115.5 (d, *J*= 21.0 Hz), 120.3, 128.3 (d, *J*= 8.0 Hz), 134.5, 137.0 (d, *J*= 3.0 Hz), 146.9, 148.0, 162.1 (d, *J*= 244.0 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -116.1; MS (EI): *m/z* (relative intensity) 216.1 (M^+, 100), 157.1 (47), 138.1 (3), 107.8 (4).

4'-(*tert*-Butyl)-3-methoxy-1,1'-biphenyl (Table 4, entry 15)[15]



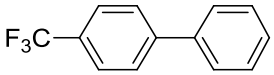
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.45 (s, 9H), 3.92 (s, 3H), 6.96 (d, *J*= 8.2 Hz, 1H), 7.23 (s, 1H), 7.27 (d, *J*= 7.68 Hz, 1H), 7.42 (t, *J*= 7.88 Hz, 1H), 7.55 (d, *J*= 8.44 Hz, 2H), 7.63 (d, *J*= 8.44 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 31.3, 34.5, 55.2, 112.3, 112.7, 119.5, 125.6, 126.8, 129.6, 138.1, 142.6, 150.4, 159.9; MS (EI): *m/z* (relative intensity) 240.2 (M^+, 42), 225.2 (100), 197.1 (13), 165.1 (8).

4-Methoxy-4'-methyl-1,1'-biphenyl (Table 4, entry 16)[10]



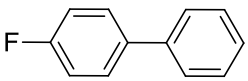
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.46 (s, 3H), 3.90 (s, 3H), 7.04 (d, *J*= 8.4 Hz, 2H), 7.30 (d, *J*= 7.6 Hz, 2H), 7.53 (d, *J*= 6.4 Hz, 2H), 7.59 (d, *J*= 7.8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.0, 55.3, 114.2, 126.6, 127.9, 129.4, 133.7, 136.3, 138.0, 158.9; MS (EI): *m/z* (relative intensity) 198.1 (M^+, 100), 183.1 (61), 155.0 (45), 128.0 (19), 77.1 (6).

4-(Trifluoromethyl)-1,1'-biphenyl (Table 4, entry 17)[16]



Eluents (Hexane, R_f= 0.60) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 (d, *J*= 7.2 Hz. 1H), 7.52 (t, *J*= 7.6 Hz, 2H), 7.64 (d, *J*= 7.6 Hz, 2H), 7.71-7.75 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 124.3 (q, *J*= 270.0 Hz), 125.7 (q, *J*= 4.0 Hz), 127.3, 127.4, 128.1, 129.0, 129.3 (q, *J*= 33.0 Hz), 139.7, 144.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.3; MS (EI): *m/z* (relative intensity) 222.1 (M^+, 100), 201.0 (12), 172.0 (4), 152.0 (24), 75.0 (3).

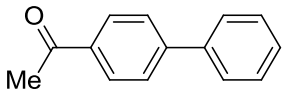
4-Fluoro-1,1'-biphenyl (Table 4, entry 18)[16]



Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.14 (t, *J*= 8.6 Hz, 2H), 7.36 (t, *J*= 7.4 Hz, 1H), 7.45 (t, *J*= 7.4 Hz, 2H), 7.55-7.57 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 115.6 (d, *J*= 22.0 Hz), 126.9, 127.2, 128.6 (d, *J*= 8.0

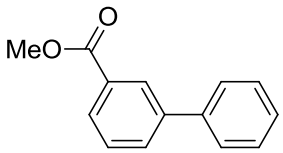
Hz), 128.8, 137.3 (d, *J*= 3.0 Hz), 140.2, 162.4 (d, *J*= 244.0 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -115.7; MS (EI): *m/z* (relative intensity) 172.0 (M^+, 100), 146.0 (6), 120.0 (3), 74.0 (4), 51.0 (3).

1-([1,1'-Biphenyl]-4-yl)ethanone (Table 4, entry 19-20)[17]



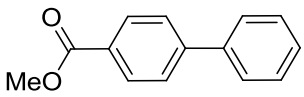
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.63 (s, 3H), 7.41 (t, *J*= 7.4 Hz, 1H), 7.47 (t, *J*= 7.4 Hz, 2H), 7.63 (d, *J*= 7.2 Hz, 2H), 7.68 (d, *J*= 8.4 Hz, 2H), 8.03 (d, *J*= 8.4 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 26.5, 127.0, 127.1, 128.1, 128.8, 128.9, 135.7, 139.7, 145.6, 197.6; MS (EI): *m/z* (relative intensity) 196.0 (M^+, 43), 181.0 (100), 152.0 (65), 126.9 (6), 76.0 (10).

Methyl [1,1'-biphenyl]-3-carboxylate (Table 4, entry 21-25)[18]



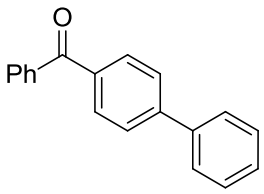
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.50) was used for flash column chromatography.; ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.96 (s, 3H), 7.39 (t, *J*= 7.2 Hz, 1H), 7.46-7.54 (m, 3H), 7.64 (d, *J*= 7.2 Hz, 2H), 7.80 (d, *J*= 7.6 Hz, 1H), 8.04 (d, *J*= 7.6 Hz, 1H), 8.31 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 52.1, 127.1, 127.7, 128.2, 128.3, 128.8, 128.9, 130.6, 131.5, 140.0, 141.4, 167.0 ; MS (EI): *m/z* (relative intensity) 212.0 (M^+, 87), 196.0 (8), 181.0 (100), 152.0 (92), 76.0 (19).

Methyl [1,1'-biphenyl]-4-carboxylate (Table 4, entry 26-29)[10]



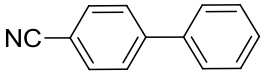
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.95 (s, 3H), 7.40 (t, *J*= 7.2 Hz, 1H), 7.47 (t, *J*= 7.4 Hz, 2H), 7.62-7.67 (m, 4H), 8.13 (d, *J*= 8.4 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 51.9, 126.9, 127.1, 128.0, 128.7, 128.8, 130.0, 139.8, 145.4, 166.8; MS (EI): *m/z* (relative intensity) 212.1 (M^+, 72), 181.0 (100), 152.0 (56), 126.0 (5), 76.0 (9).

[1,1'-Biphenyl]-4-yl(phenyl)methanone (Table 4, entry 30)[10]



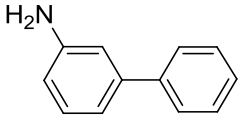
Eluents (Ethyl acetate: Hexane= 1: 4, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 (d, *J*= 7.2 Hz, 1H), 7.47-7.53 (m, 4H), 7.58-7.63 (m, 1H), 7.67 (d, *J*= 8.0 Hz, 2H), 7.72 (d, *J*= 8.4 Hz, 2H), 7.82-7.86 (m, 2H), 7.92 (d, *J*= 8.4 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 126.8, 127.1, 128.1, 128.2, 128.8, 129.9, 130.6, 132.2, 136.1, 137.6, 139.8, 145.0, 196.2; MS (EI): *m/z* (relative intensity) 258.1 (M^+, 75), 181.0 (100), 152.0 (64), 105.0 (24), 77.0 (40).

[1,1'-Biphenyl]-4-carbonitrile (Table 4, entry 31)[19]



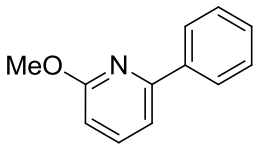
Eluents (Ethyl acetate: Hexane= 1: 4, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41-7.45 (m, 1H), 7.49 (t, *J*= 7.4 Hz, 2H), 7.59-7.61 (m, 2H), 7.67-7.73 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 110.8, 118.8, 127.1, 127.6, 128.6, 129.0, 132.5, 139.0, 145.5; MS (EI): *m/z* (relative intensity) 179.1 (M^+, 100), 151.0 (14), 126.0 (3), 100.0 (2), 76.0 (6).

[1,1'-Biphenyl]-3-amine (Table 4, entry 32)[20]



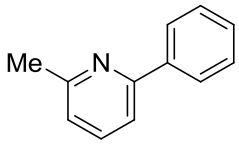
Eluents (Ethyl acetate: Hexane= 1: 2, R_f= 0.60) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.62 (s, 2H), 6.71 (d, *J*= 7.2 Hz,1H), 6.94 (s, 1H), 7.04 (d, *J*= 7.6 Hz, 1H), 7.27 (t, *J*= 7.6 Hz, 2H), 7.37 (t, *J*= 7.2 Hz, 1H), 7.46 (t, *J*= 7.6 Hz, 2H), 7.61 (d, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 113.8, 114.0, 117.6, 127.0, 127.1, 128.6, 129.6, 141.3, 142.4, 146.6 ; MS (EI): *m/z* (relative intensity) 169.0 (M^+, 100), 141.0 (11), 115.0 (11), 89.0 (4), 71.6 (3).

2-Methoxy-6-phenylpyridine (Table 5, entry 1)[21]



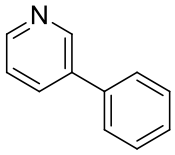
Eluents (Ethyl acetate: Hexane= 3: 7, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.09 (s, 3H), 6.74 (d, *J*= 8.0 Hz, 1H), 7.37 (d, *J*= 7.6 Hz, 1H), 7.44 (t, *J*= 7.2 Hz, 1H), 7.51 (t, *J*= 7.4 Hz, 2H), 7.64 (t, *J*= 7.8 Hz, 1H), 8.11 (d, *J*= 7.2 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 53.1, 109.2, 112.7, 126.6, 128.5, 128.8, 139.0, 139.1, 154.6, 163.7 ; MS (EI): *m/z* (relative intensity) 184.0 (M^+, 100), 154.0 (60), 127.0 (10), 102.0 (6), 77.0 (8).

2-Methyl-6-phenylpyridine (Table 5, entry 2)[10]



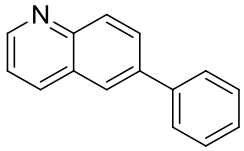
Eluents (Ethyl acetate: Hexane= 1: 4, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.65 (s, 3H), 7.08 (d, *J*= 7.6 Hz, 1H), 7.42 (t, *J*= 7.2 Hz, 1H), 7.47-7.52 (m, 3H), 7.61 (t, *J*= 7.6 Hz, 1H), 8.02 (d, *J*= 7.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 24.6, 117.5, 121.4, 126.9, 128.5, 128.6, 136.7, 139.6, 156.8, 158.2; MS (EI): *m/z* (relative intensity) 169.1 (M^+, 100), 154.0 (8), 127.0 (6), 115.0 (5), 77.0 (6).

3-Phenylpyridine (Table 5, entry 3)[10]



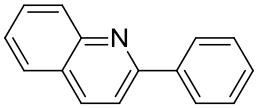
Eluents (Ethyl acetate: Hexane= 1: 2, R_f= 0.40) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32-7.35 (m, 1H), 7.37-7.41 (m, 1H), 7.46 (t, *J*= 7.4 Hz, 2H), 7.56 (d, *J*= 7.2 Hz, 2H), 7.85 (d, *J*= 7.6 Hz, 1H), 8.58 (d, *J*= 3.6 Hz, 1H), 8.85 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 123.4, 127.0, 128.0, 129.0, 134.2, 136.5, 137.7, 148.2, 148.3; MS (EI): *m/z* (relative intensity) 155.1 (M^+, 100), 127.0 (16), 102.0 (14), 76.0 (7), 51.0 (9).

6-Phenylquinoline (Table 5, entry 4)[22]



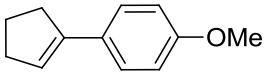
Eluents (Ethyl acetate: Hexane= 1: 4, R_f= 0.25) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35-7.41 (m, 2H), 7.48 (t, *J*= 7.6 Hz, 2H), 7.69 (d, *J*= 7.6 Hz, 2H), 7.95-7.97 (m, 2H), 8.13-8.19 (m, 2H), 8.89-8.91 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 121.3, 125.3, 127.3, 127.6, 128.3, 128.8, 129.0, 129.7, 136.1, 139.1, 140.1, 147.5, 150.2; MS (EI): *m/z* (relative intensity) 205.1 (M^+, 100), 176.0 (12), 151.0 (6), 102.1 (8), 76.0 (5).

2-Phenylquinoline (Table 5, entry 5)[23]



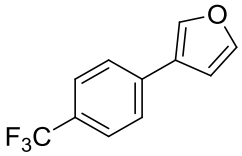
Eluents (Ethyl acetate: Hexane= 1: 2, R_f= 0.30) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47-7.57 (m, 4H), 7.75 (t, *J*= 7.8 Hz, 1H), 7.81 (d, *J*= 8.0 Hz, 1H), 7.85 (d, *J*= 8.8 Hz, 1H), 7.17-8.24 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 118.9, 126.2, 127.1, 127.4, 127.5, 128.7, 129.2, 129.5, 129.6, 136.7, 139.5, 148.2, 157.2; MS (EI): *m/z* (relative intensity) 205.1 (M^+, 100), 176.0 (6), 151.0 (3), 102.1 (6), 75.0 (4).

1-Cyclopentenyl-4-methoxybenzene (Table 5, entry 6)[2b]



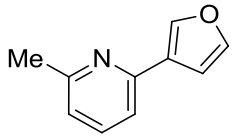
Eluents (Hexane, R_f= 0.30) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 1.99-2.07 (m, 2H), 2.51-2.56 (m, 2H), 2.67-2.72 (m, 2H), 3.82 (s, 3H), 6.06-6.08 (m, 1H), 6.87 (d, *J*= 8.8 Hz, 2H), 7.40 (d, *J*= 8.8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 23.4, 33.2, 33.3, 55.2, 113.6, 123.9, 126.7, 129.7, 141.8, 158.6 ; MS (EI): *m/z* (relative intensity) 174.1 (M^+, 100), 159.0 (37), 143.1 (54), 128.0 (35), 91.0 (20).

3-(4-(Trifluoromethyl)phenyl)furan (Table 6, entry 1)[24]



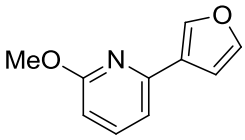
Eluents (Ethyl acetate: Hexane= 1: 20, R_f= 0.80) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.73 (d, *J*= 0.8 Hz, 1H), 7.52 (dd, *J*=1.6 Hz, 1.6 Hz, 1H), 7.58 (d, *J*= 8.0 Hz, 2H), 7.63 (d, *J*= 8.4 Hz, 2H), 7.80 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ ; ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.5; MS (EI): *m/z* (relative intensity) 212.0 (M^+, 100), 183.0 (40), 164.0 (15), 133.0 (29), 115.0 (76).

2-(Furan-3-yl)-6-methylpyridine (Table 6, entry 2)



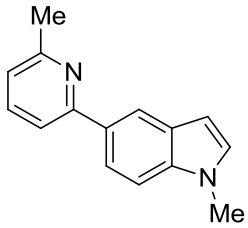
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.35) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.56 (s, 3H), 6.88 (d, *J*= 1.2 Hz, 1H), 6.99 (d, *J*= 7.6 Hz, 1H), 7.24 (d, *J*= 7.6 Hz, 1H), 7.47 (dd, *J*= 1.8 Hz, 1.6 Hz, 1H), 7.54 (t, *J*= 7.6 Hz, 1H), 8.02 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 24.5, 108.7, 117.1, 121.2, 127.2, 136.7, 141.1, 143.6, 151.1, 158.4 ; MS (EI): *m/z* (relative intensity) 159.0 (M^+, 100), 130.0 (100), 118.0 (4), 103.0 (13), 77.0 (17); HRMS: calcd. for $C_{10}H_{10}NO^+$: 160.0757, found 160.0757.

2-(Furan-3-yl)-6-methoxypyridine (Table 6, entry 3)[25]



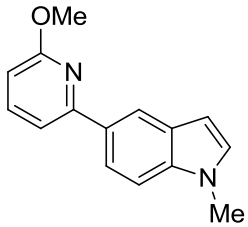
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.98 (s, 3H), 6.61 (d, *J*= 8.4 Hz, 1H), 6.87 (d, *J*= 0.8 Hz, 1H), 7.03 (d, *J*= 7.2 Hz, 1H), 7.48 (dd, *J*= 1.6 Hz, 1.6 Hz, 1H), 7.54 (t, *J*= 8.0 Hz, 1H), 8.03 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 53.1. 108.5, 108.6, 112.4, 127.0, 138.9, 141.2, 143.6, 149.2, 163.7; MS (EI): *m/z* (relative intensity) 175.0 (M^+, 100), 146.0 (32), 117.0 (49), 90.0 (26), 77.0 (10).

1-Methyl-5-(6-methylpyridin-2-yl)-1*H*-indole (Table 6, entry 4)



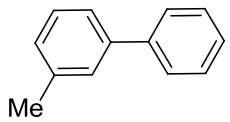
Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.45) was used for flash column chromatography. Yellow solid; m.p.= 129.9-132.2; ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.65 (s, 3H), 3.82 (s, 3H), 6.57 (d, *J*= 2.8 Hz, 1H), 7.03-7.08 (m, 2H), 7.39 (d, *J*= 8.8 Hz, 1H), 7.56-7.63 (m, 2H), 7.91 (d, *J*= 8.8 Hz, 1H), 8.27 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 24.8, 32.9, 101.8, 109.3, 117.4, 119.7, 120.5, 121.0, 128.8, 129.4, 131.4, 136.7, 137.2, 158.0, 158.3; MS (EI): *m/z* (relative intensity) 222.1 (M^+, 100), 206.1 (6), 180.1 (5), 155.0 (5), 111.0 (3); HRMS: calcd. for $C_{15}H_{15}N_2^+$: 223.1230, found 223.1231.

5-(6-Methoxypyridin-2-yl)-1-methyl-1*H*-indole (Table 6, entry 5)



Eluents (Ethyl acetate: Hexane= 1: 9, R_f= 0.30) was used for flash column chromatography. Yellow solid; m.p.= 117.3-120.8; ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.83 (s, 3H), 4.09 (s, 3H), 6.58 (d, *J*= 2.8 Hz, 1H), 6.64 (d, *J*= 8.0 Hz, 1H), 7.08 (d, *J*= 2.8 Hz, 1H), 7.37-7.41 (m, 2H), 7.62 (t, *J*= 8.0 Hz, 1H), 7.98 (d, *J*= 8.8 Hz, 1H); 8.35 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 32.9, 53.2, 101.8, 107.7, 109.2, 112.4, 119.5, 120.8, 128.8, 129.5, 130.7, 139.0, 163.6; MS (EI): *m/z* (relative intensity) 238.1 (M^+, 100), 207.1 (31), 192.0 (11), 155.0 (8), 103.1 (6); HRMS: calcd. for $C_{15}H_{15}N_2O^+$: 239.1179, found 239.1181.

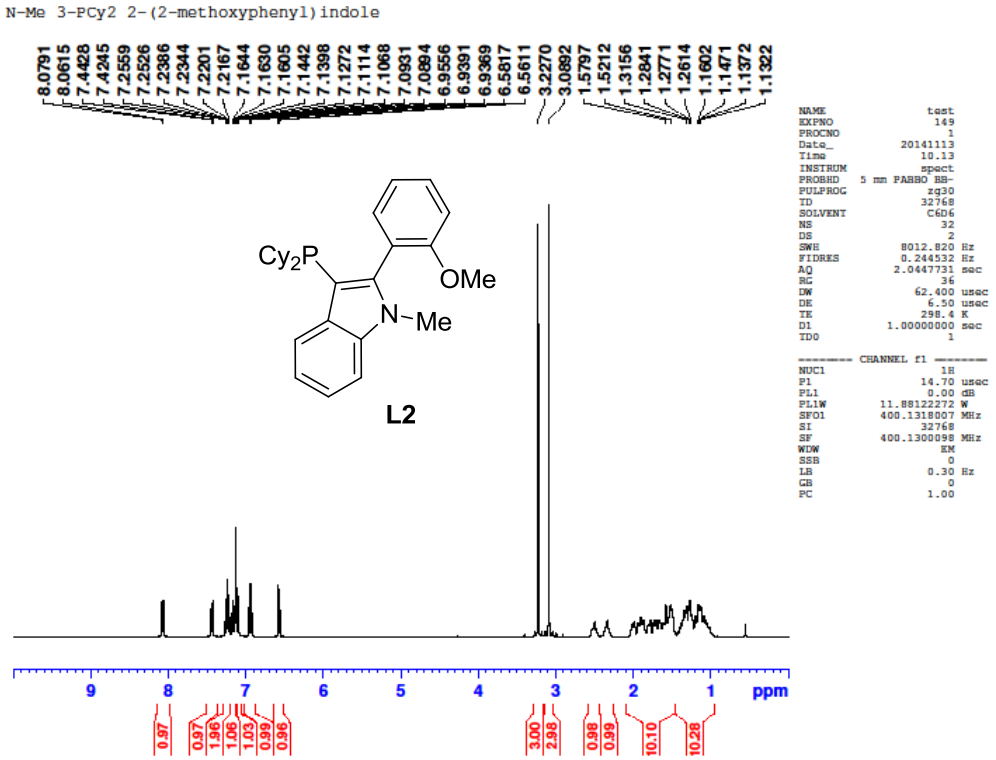
3-Methyl-1,1'-biphenyl (Scheme 3)[8]

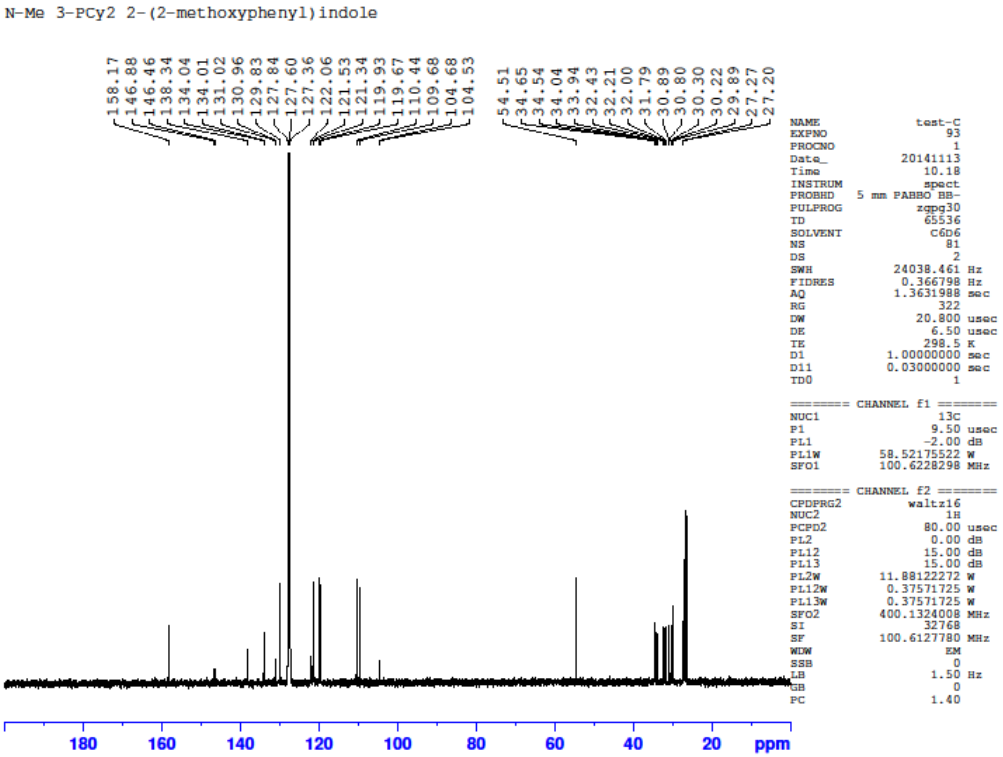


Eluents (Hexane, R_f= 0.50) was used for flash column chromatography. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.68 (s, 3H), 7.43 (d, *J*= 7.6 Hz, 1H), 7.59 (t, *J*= 7.6 Hz, 2H), 7.67–7.70 (m, 4H), 7.87 (d, *J*= 7.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 21.4, 124.2, 127.1, 127.8, 127.9,

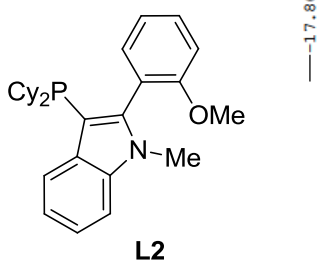
128.4, 128.60, 128.62, 138.2, 141.2, 141.3; MS (EI): *m/z* (relative intensity) 168.1 (M^+, 100), 152.0 (26), 115.0 (10), 82.8 (5), 63.0 (5).

7. ^{1}H, ^{13}C, ^{19}F, ^{31}P NMR, MS and HRMS spectra





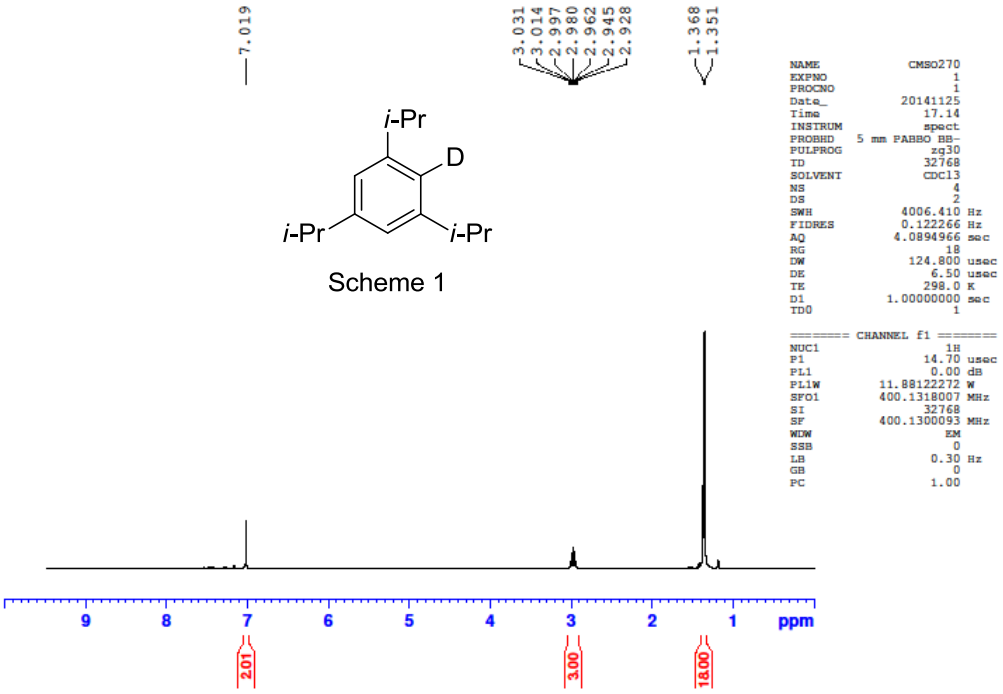
N-Me 3-PCy2 2-(2-methoxyphenyl)indole



L2

NAME	Standard 31P
EXPNO	195
PROCNO	1
Date_	20141113
Time	10.10
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zqpg30
TD	65536
SOLVENT	C6D6
NS	128
DS	4
SWH	64102.563 Hz
FIDRES	0.978127 Hz
AQ	0.5112308 sec
RG	2050
DW	7.800 use
DE	6.50 use
TE	297.5 K
D1	0.50000000 sec
D11	0.03000000 sec
TD0	1
========	CHANNEL f1 =======
NUC1	31P
P1	14.70 use
PL1	3.00 dB
PL1W	12.96693134 W
SFO1	161.9755930 MHz
========	CHANNEL f2 =======
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 use
PL2	0.00 dB
PL12	15.00 dB
PL13	15.00 dB
PL2W	11.88122272 W
PL12W	0.37571725 W
PL13W	0.37571725 W
SFO2	400.1316005 MHz
SI	32768
SF	161.9755930 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

CMSO270H



Scheme 1

```
NAME            CMSO270
EXPNO                 1
PROCNO                1
Date_          20141125
Time              17.14
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    4
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                   18
DW              124.800 usec
DE                6.50 usec
TE               298.0 K
D1            1.00000000 sec
TD0                   1

======== CHANNEL f1 =======
NUC1                 1H
P1                14.70 usec
PL1                0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI                32768
SF         400.1300093 MHz
WDW                  EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
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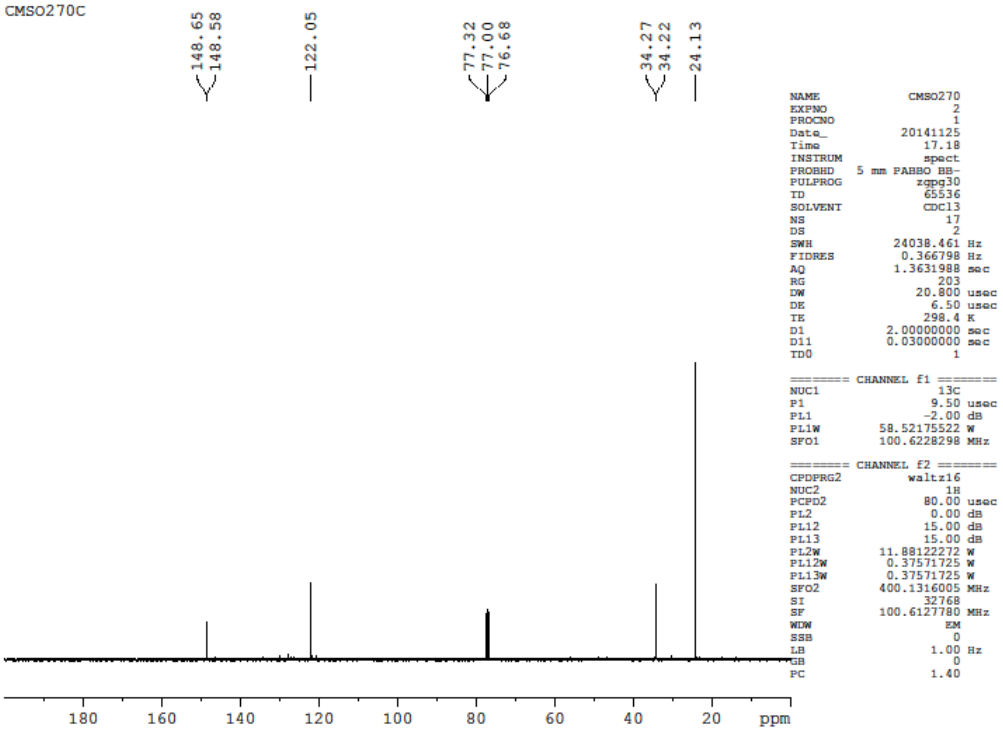
CMSO270C




```
NAME            CMSO270
EXPNO                 2
PROCNO                1
Date_          20141125
Time              17.18
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   17
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW              20.800 usec
DE                6.50 usec
TE               298.4 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 =======
NUC1                13C
P1                 9.50 usec
PL1               -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 =======
CPDPRG2         waltz16
NUC2                 1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI                32768
SF         100.6127780 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
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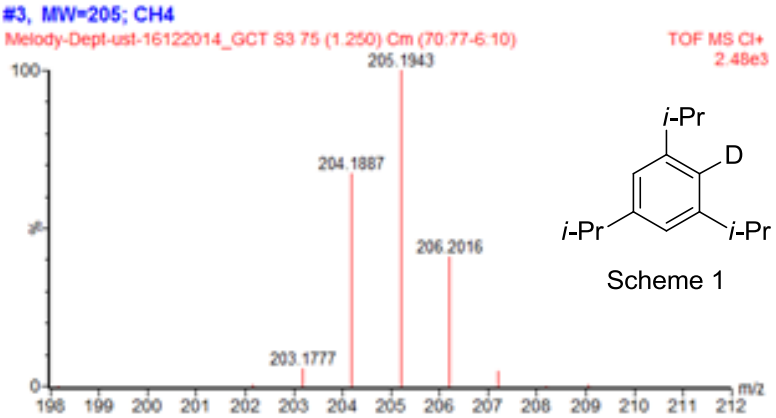
HS



Scheme 1

Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
206.2016	206.2019	-0.3	-1.5	3.5	5.9	C15 H24 D

CMSO177H

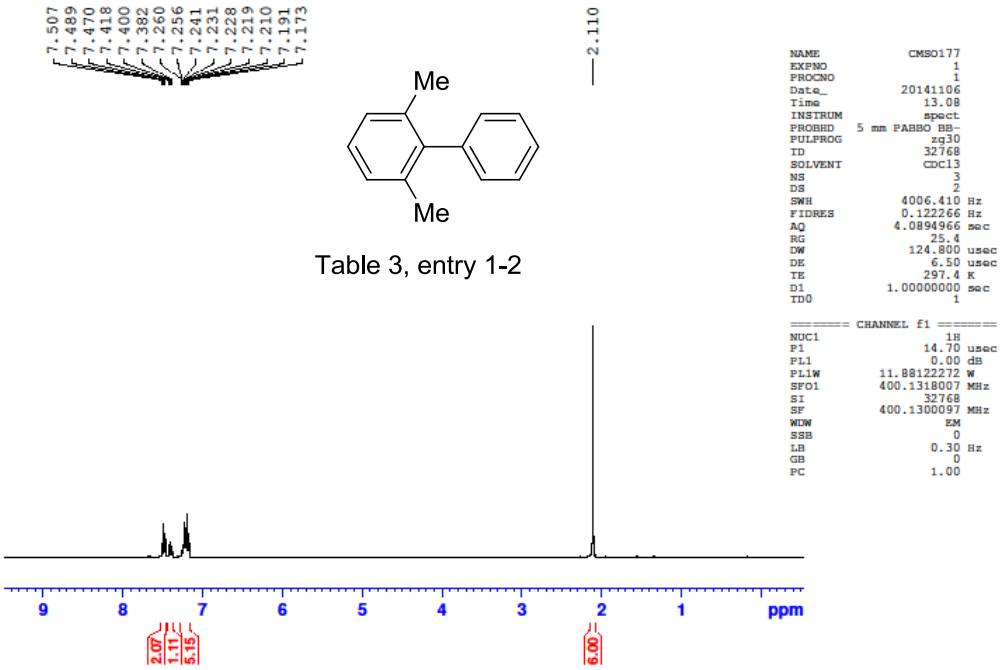
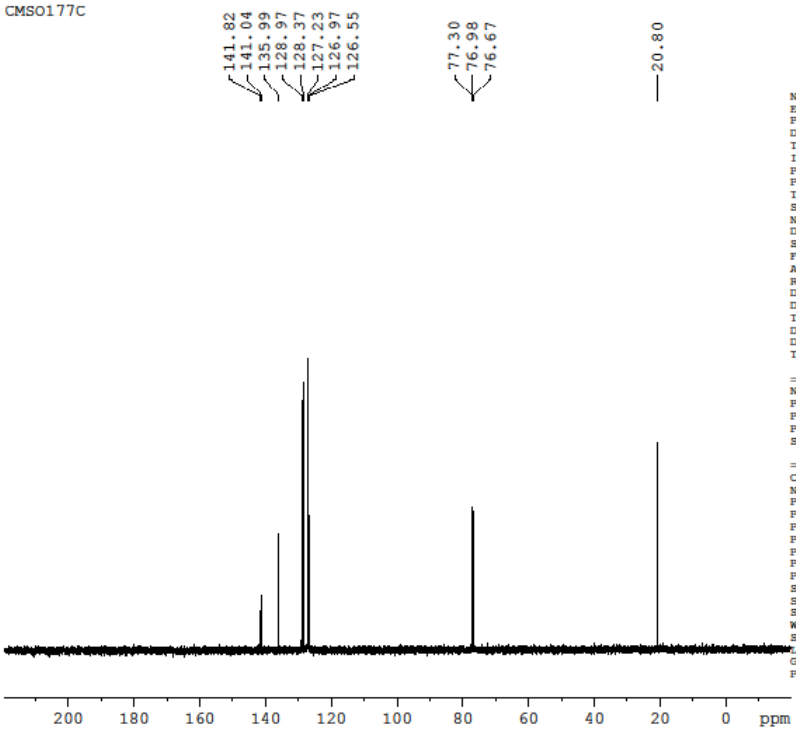


Table 3, entry 1-2

```
NAME            CMSO177
EXPNO                 1
PROCNO                1
Date_          20141106
Time              13.08
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    3
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE                297.4 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                1H
P1               14.70 usec
PL1               0.00 dB
PL1W       11.88122272 W
SFO1      400.1318007 MHz
SI                32768
SF        400.1300097 MHz
WDW                EM
SSB                 0
LB              0.30 Hz
GB                  0
PC               1.00
```

CMSO177C




```
NAME            CMSO177
EXPNO                 2
PROCNO                1
Date_          20141106
Time              13.09
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   13
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                297.7 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1               13C
P1                9.50 usec
PL1              -2.00 dB
PL1W       58.52175522 W
SFO1      100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             15.00 dB
PL13             15.00 dB
PL2W       11.88122272 W
PL12W       0.37571725 W
PL13W       0.37571725 W
SFO2      400.1316005 MHz
SI                32768
SF        100.6127817 MHz
WDW                EM
SSB                 0
LB              1.00 Hz
GB                  0
PC               1.40
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cmso330

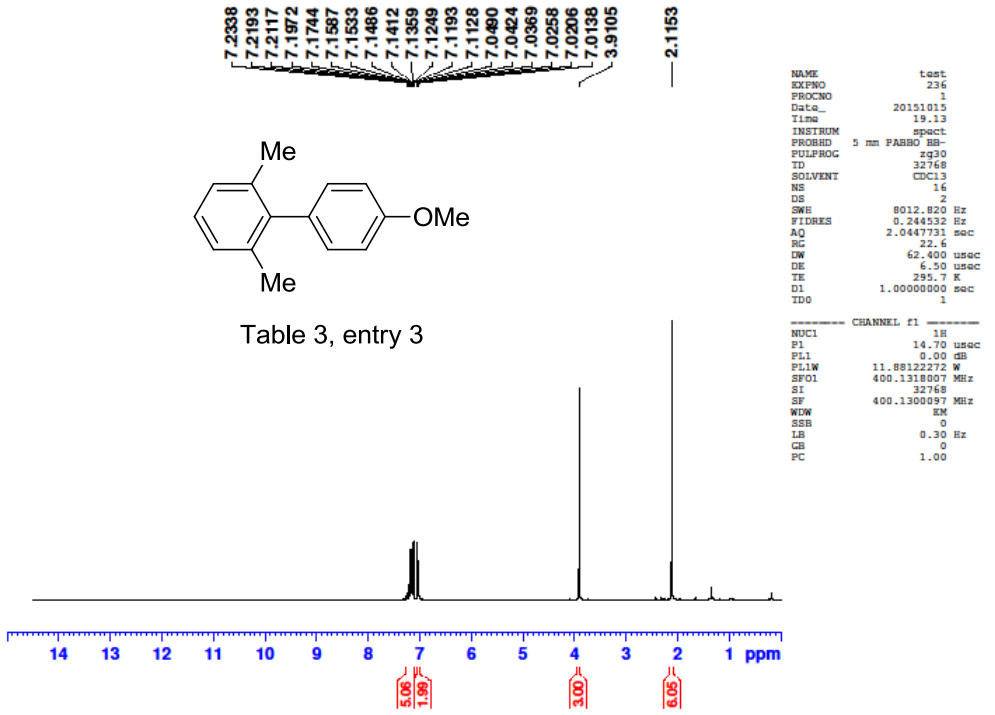
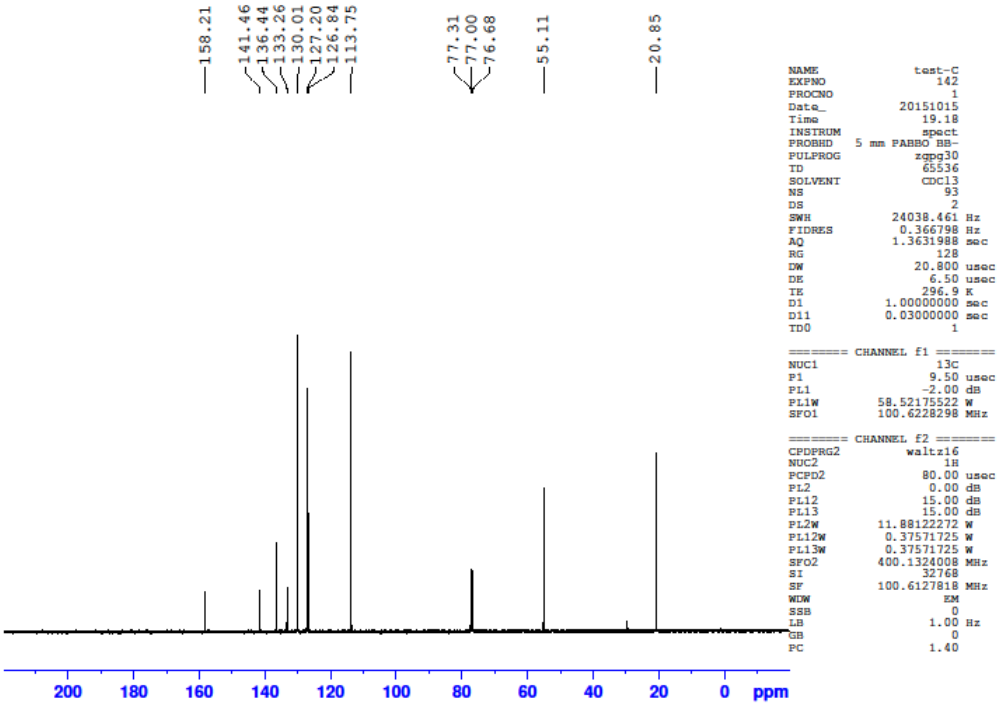


Table 3, entry 3

cmso330



CMSO175H

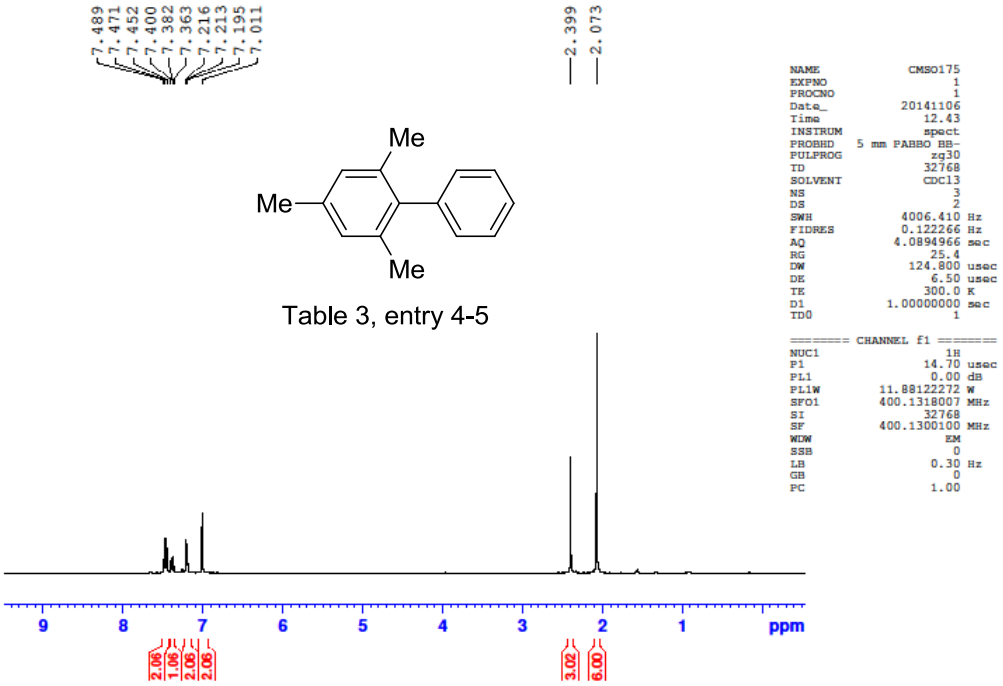
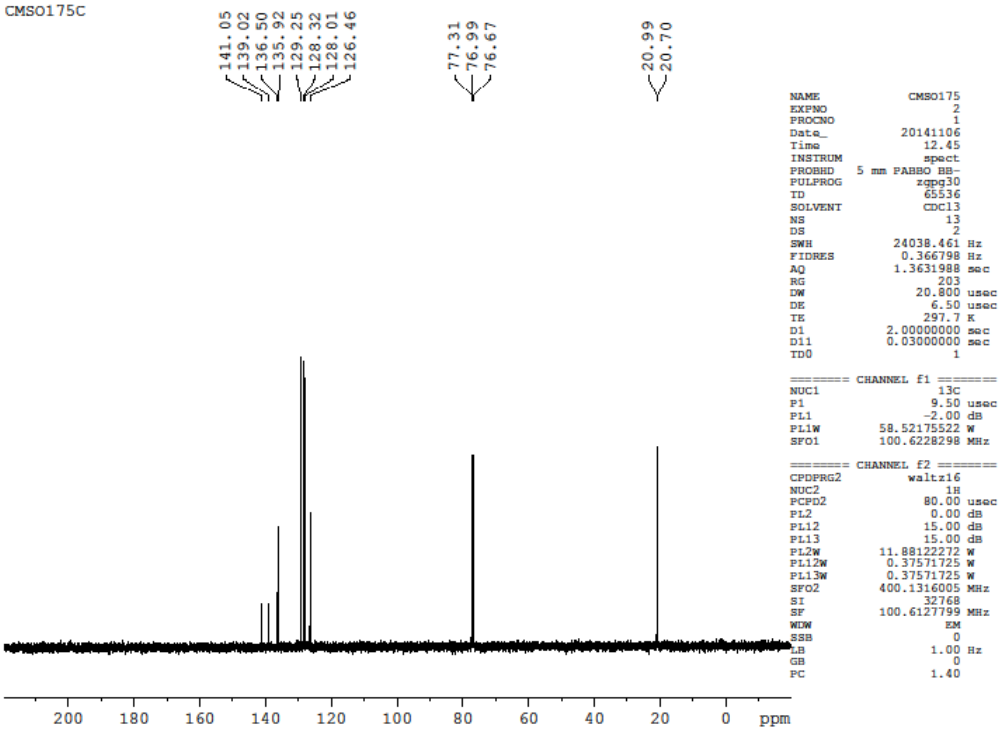
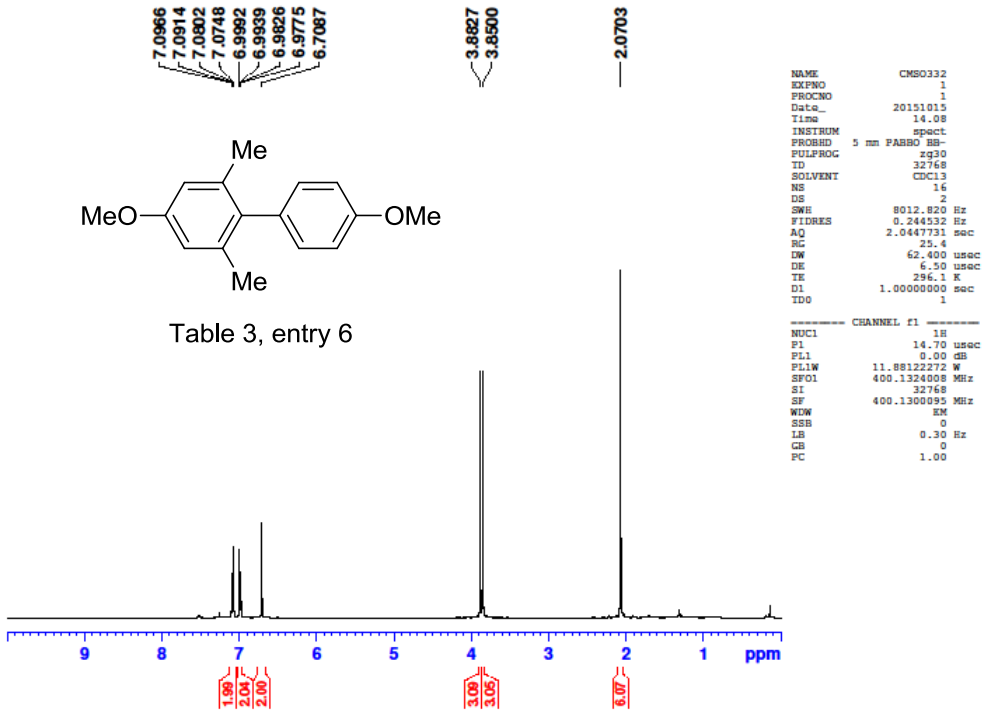


Table 3, entry 4-5

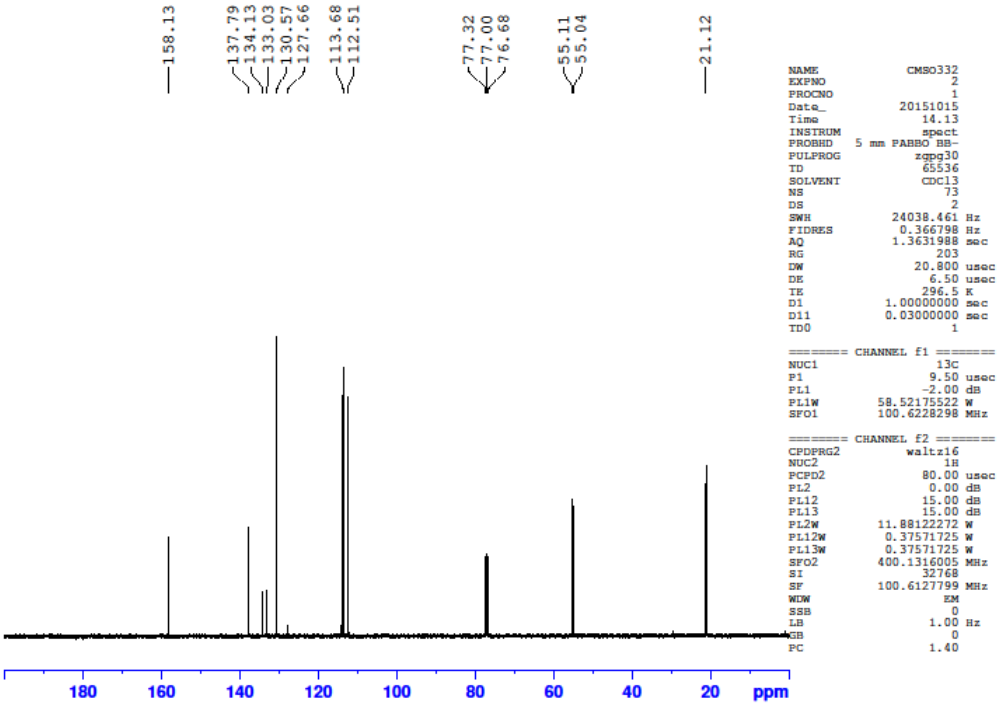
CMSO175C



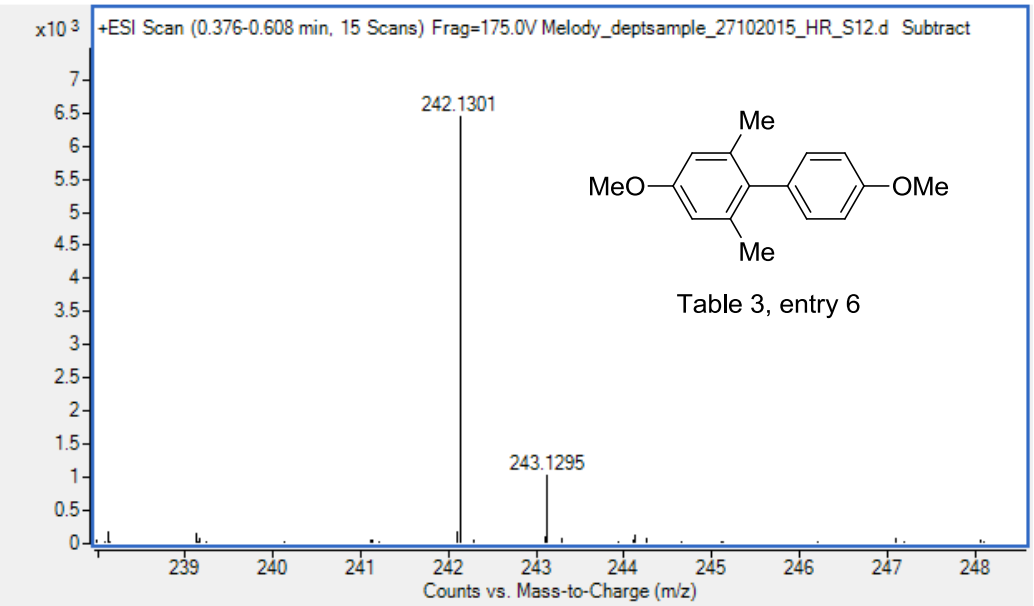
CMSO332H



CMSO332C



HS


x10 3
+ESI Scan (0.376-0.608 min, 15 Scans) Frag=175.0V Melody_deptsample_27102015_HR_S12.d Subtract
242.1301
243.1295
Me
MeO
OMe
Me
Table 3, entry 6
Counts vs. Mass-to-Charge (m/z)

CMSO335H

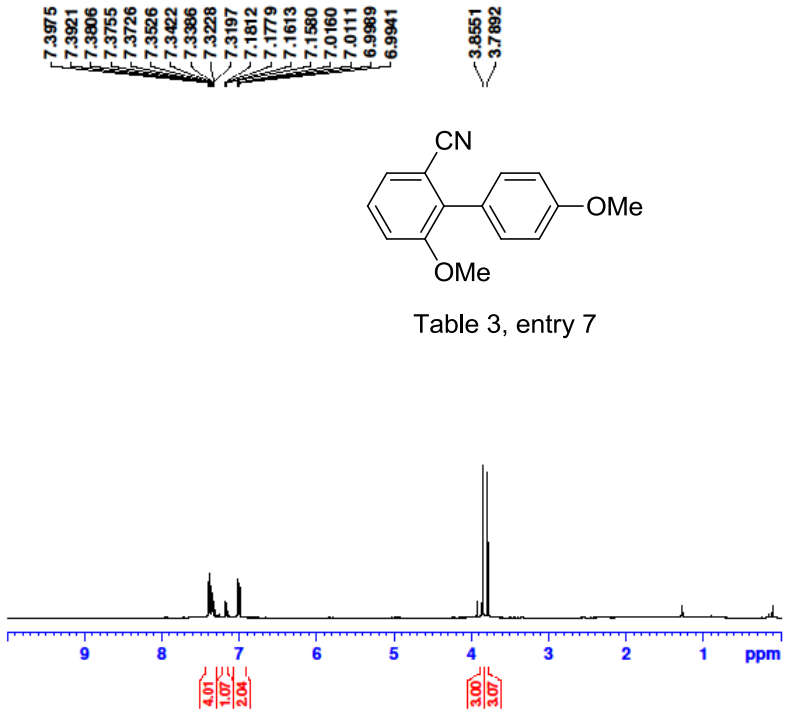


Table 3, entry 7

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EXPNO                   1
PROCNO                  1
Date_            20151020
Time                14.11
INSTRUM             spect
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PULPROG             zg30
TD                 32768
SOLVENT             CDCl3
NS                     16
DS                      2
SWH             8012.820 Hz
FIDRES          0.244532 Hz
AQ              2.0447731 sec
RG                   25.4
DW                62.400 usec
DE                 6.50 usec
TE                295.5 K
D1             1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1           400.1324008 MHz
SI                   32768
SF             400.1300097 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```
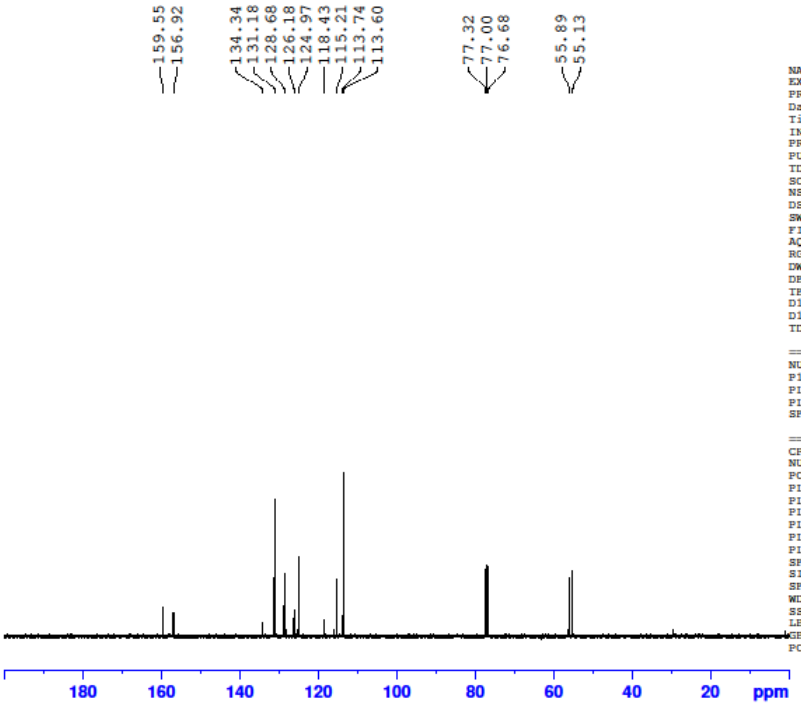
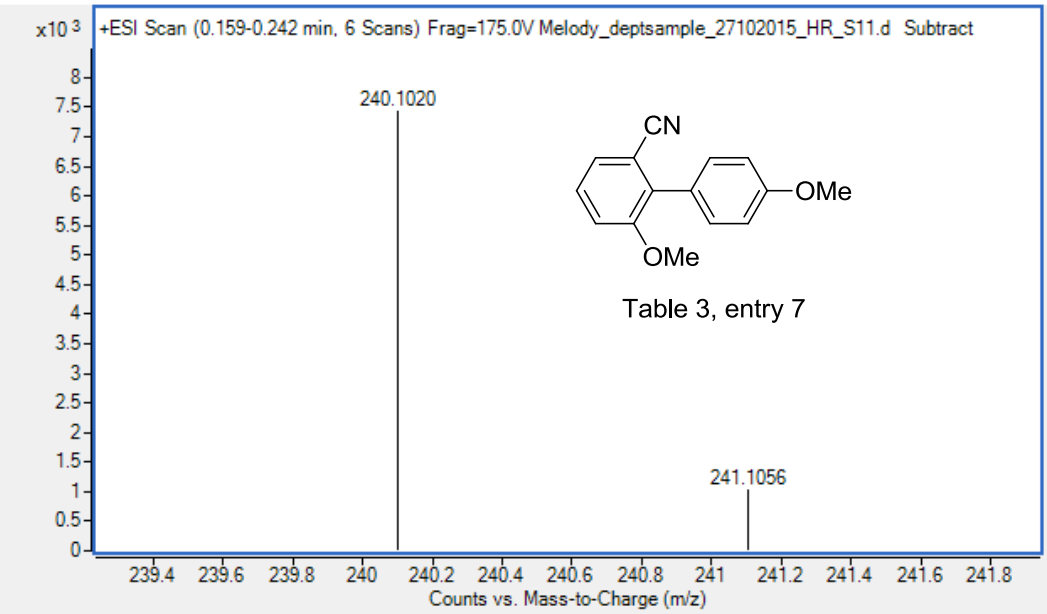

CMSO335C




```
NAME              CMSO335
EXPNO                   2
PROCNO                  1
Date_            20151020
Time                14.14
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 65536
SOLVENT             CDCl3
NS                     61
DS                      2
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ              1.3631988 sec
RG                    203
DW                20.800 usec
DE                 6.50 usec
TE                296.4 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                  9.50 usec
PL1                -2.00 dB
PL1W           58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               15.00 dB
PL13               15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2           400.1316005 MHz
SI                   32768
SF             100.6127813 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

HS


x10 3
+ESI Scan (0.159-0.242 min, 6 Scans) Frag=175.0V Melody_deptsample_27102015_HR_S11.d Subtract
240.1020
241.1056
CN
OMe
OMe
Table 3, entry 7
Counts vs. Mass-to-Charge (m/z)

CMSO314H

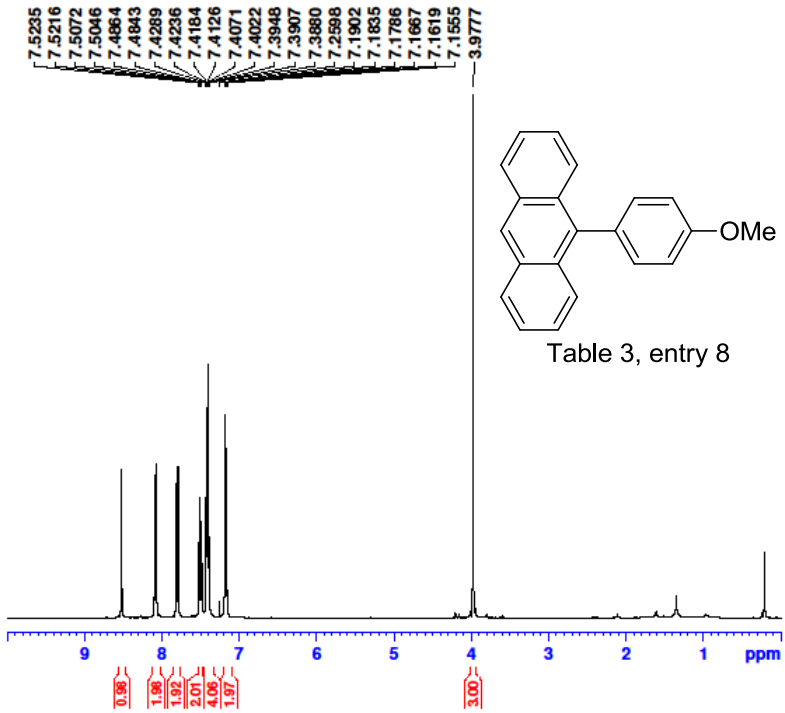
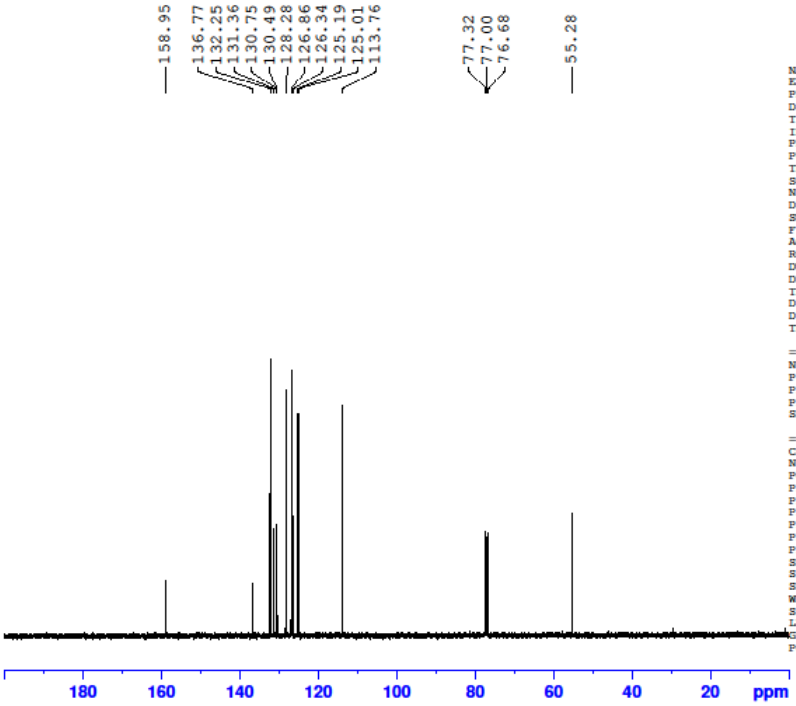


Table 3, entry 8

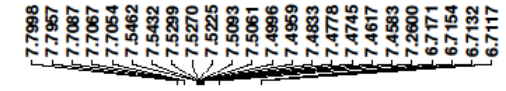
```
NAME            CMSO314
EXPNO                 1
PROCNO                1
Date_          20151020
Time              14.06
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                   16
DS                    2
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG                 25.4
DW                62.400 usec
DE                 6.50 usec
TE                295.5 K
D1            1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                 14.70 usec
PL1                0.00 dB
PL1W          11.88122272 W
SFO1          400.1324008 MHz
SI                 32768
SF            400.1300095 MHz
WDW                   EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
```

CMSO314C




```
NAME            CMSO314
EXPNO                 2
PROCNO                1
Date_          20151020
Time              14.07
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG         zgpg30
TD                65536
SOLVENT           CDCl3
NS                   40
DS                    2
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG                  203
DW                20.800 usec
DE                 6.50 usec
TE                295.9 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.50 usec
PL1               -2.00 dB
PL1W          58.52175522 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W          11.88122272 W
PL12W          0.37571725 W
PL13W          0.37571725 W
SFO2          400.1316005 MHz
SI                 32768
SF            100.6127835 MHz
WDW                   EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
```

CMSO325H



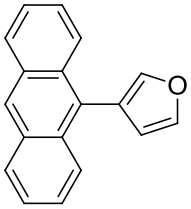
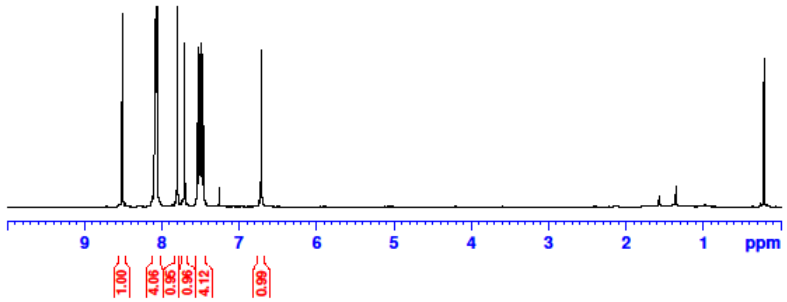


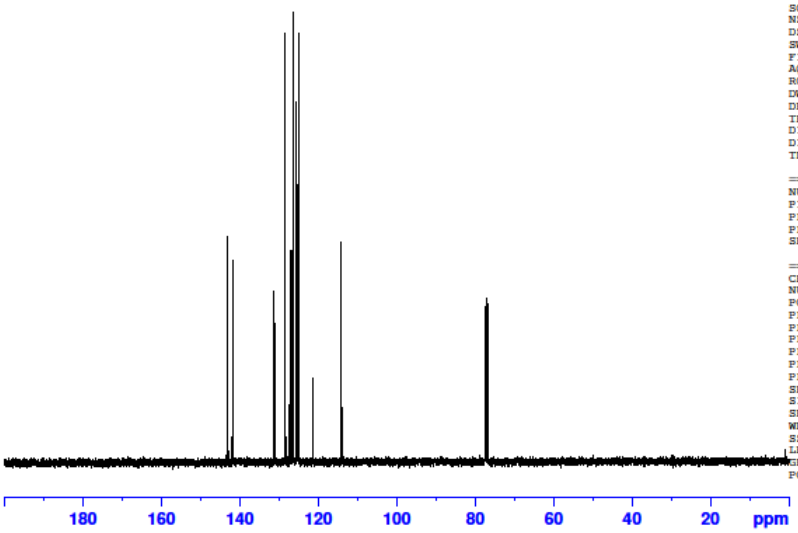
Table 3, entry 9

```
NAME              CMSO325
EXPNO                   1
PROCNO                  1
Date_            20151020
Time                13.59
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                     16
DS                      2
SWH              8012.820 Hz
FIDRES           0.244532 Hz
AQ               2.0447731 sec
RG                   25.4
DW                62.400 usec
DE                 6.50 usec
TE                295.4 K
D1               1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W            11.88122272 W
SFO1           400.1324008 MHz
SI                  32768
SF             400.1300091 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

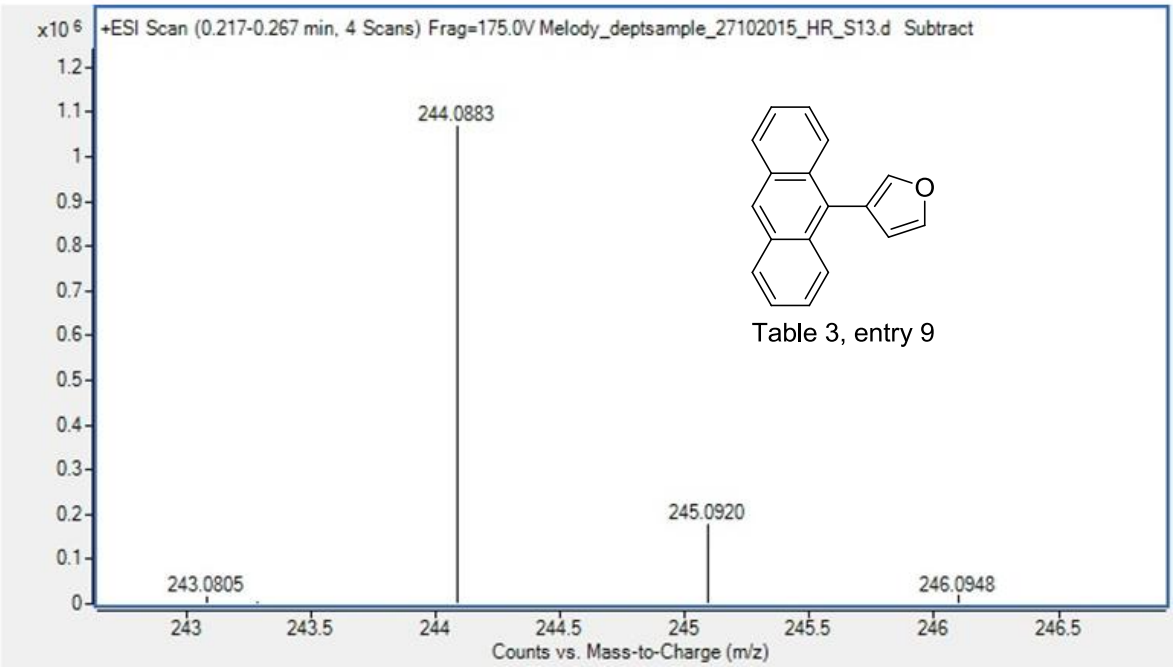


CMSO325C


```
NAME              CMSO325
EXPNO                   2
PROCNO                  1
Date_            20151020
Time                14.02
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     26
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                20.800 usec
DE                 6.50 usec
TE                295.7 K
D1               1.00000000 sec
D11              0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W            58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W            11.88122272 W
PL12W            0.37571725 W
PL13W            0.37571725 W
SFO2           400.1316005 MHz
SI                  32768
SF             100.6127844 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```



HS


x10 6
+ESI Scan (0.217-0.267 min, 4 Scans) Frag=175.0V Melody_deptsample_27102015_HR_S13.d Subtract
244.0883
245.0920
243.0805
246.0948
O
Table 3, entry 9
Counts vs. Mass-to-Charge (m/z)

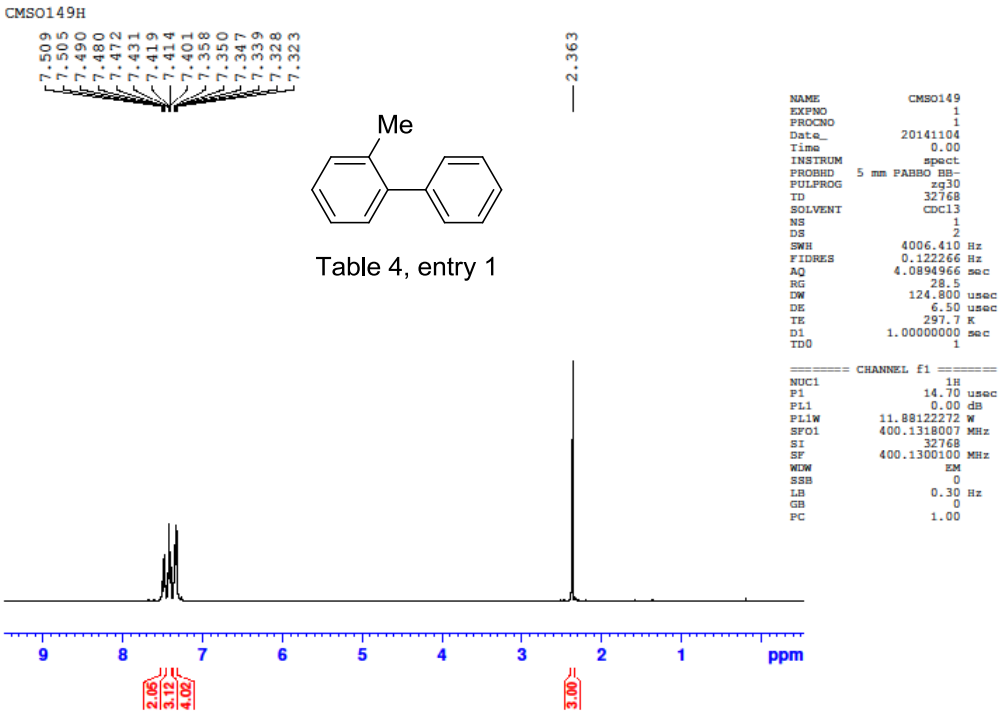
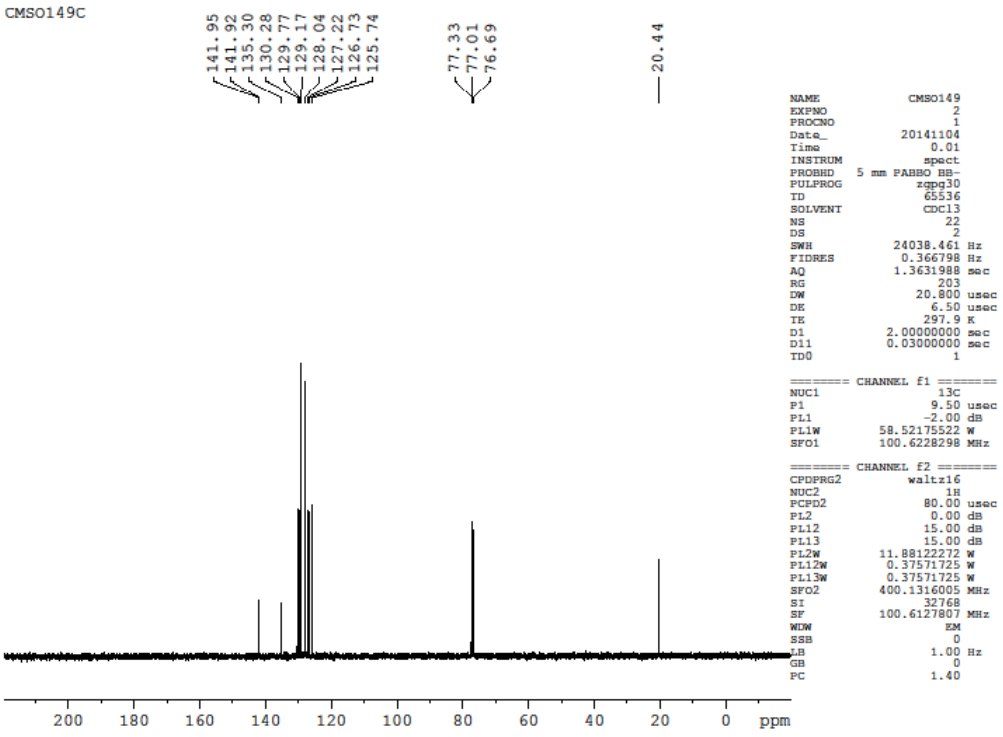


Table 4, entry 1



CMSO163H

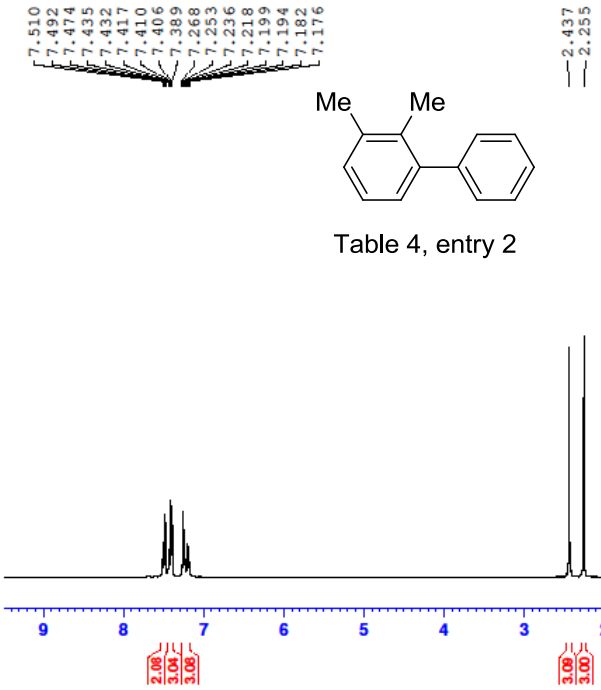
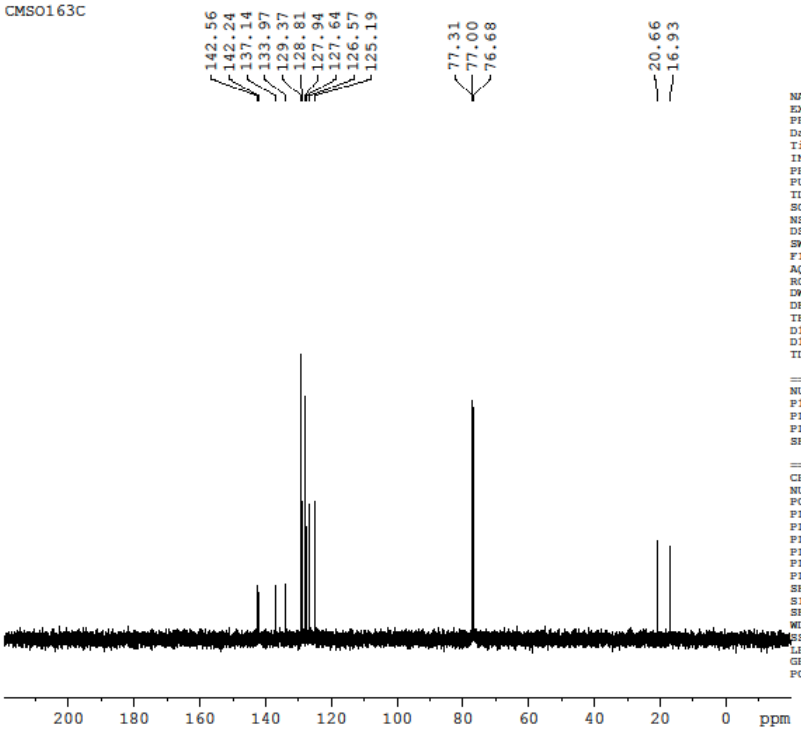


Table 4, entry 2

```
NAME              CMSO163
EXPNO                   1
PROCNO                  1
Date_            20141106
Time                12.58
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                      3
DS                      2
SWH              4006.410 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                   25.4
DW                124.800 usec
DE                  6.50 usec
TE                 300.0 K
D1               1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1          400.1318007 MHz
SI                  32768
SF            400.1300097 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO163C




```
NAME              CMSO163
EXPNO                   3
PROCNO                  1
Date_            20141110
Time                19.01
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                      8
DS                      2
SWH              24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                   90.5
DW                20.800 usec
DE                  6.50 usec
TE                 298.1 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W           58.52175522 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2          400.1316005 MHz
SI                  32768
SF            100.6127760 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

CMSO128H

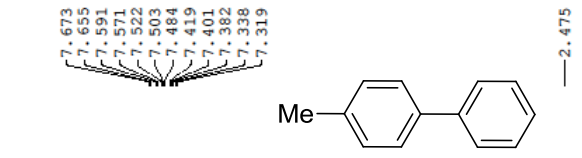
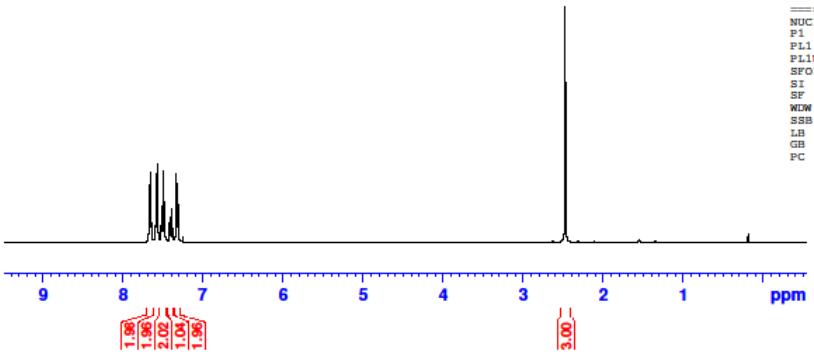
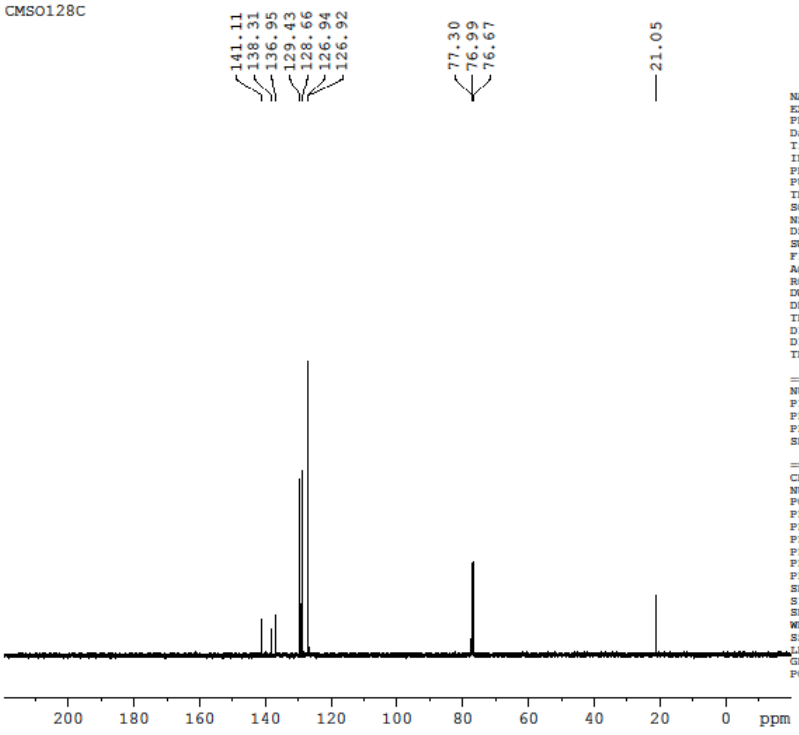


Table 4, entry 3

```
NAME              CMSO128
EXPNO                   1
PROCNO                  1
Date_            20141101
Time                2.29
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                     12
DS                      2
SWH              4006.410 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                   25.4
DW                124.800 usec
DE                  6.50 usec
TE                 297.4 K
D1               1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W            11.88122272 W
SFO1           400.1318007 MHz
SI                  32768
SF             400.1300100 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```



CMSO128C




```
NAME              CMSO128
EXPNO                   2
PROCNO                  1
Date_            20141101
Time                2.32
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     16
DS                      2
SWH              24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                20.800 usec
DE                  6.50 usec
TE                 298.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W            58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W            11.88122272 W
PL12W            0.37571725 W
PL13W            0.37571725 W
SFO2           400.1316005 MHz
SI                  32768
SF             100.6127835 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

CMSO138H

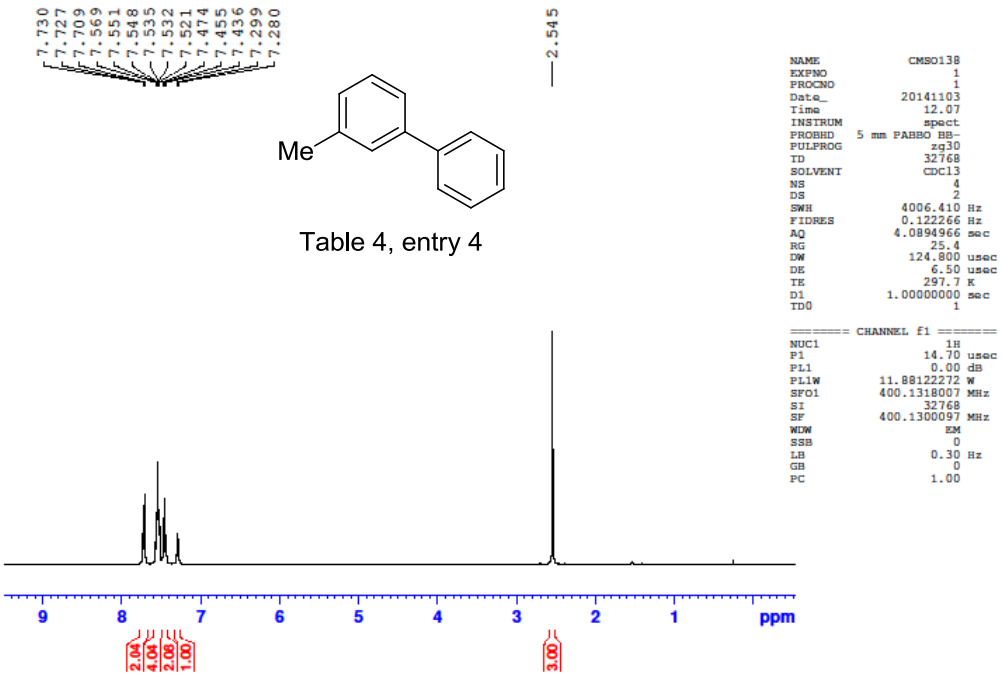
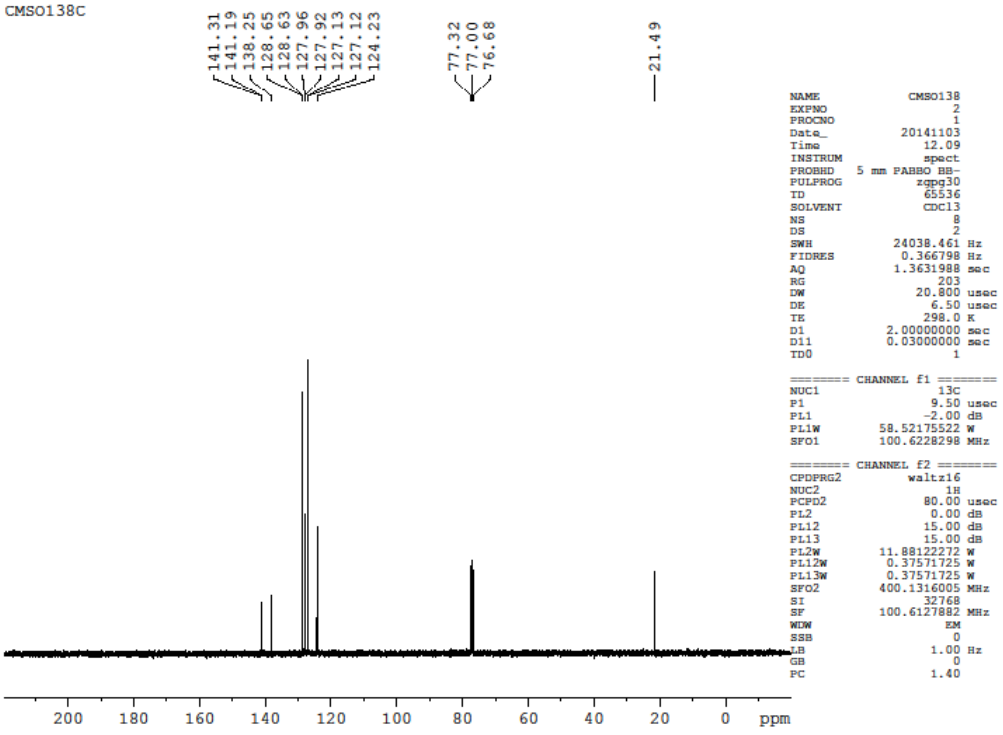


Table 4, entry 4

```
NAME              CMSO138
EXPNO                   1
PROCNO                  1
Date_            20141103
Time                12.07
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                      4
DS                      2
SWH              4006.410 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                   25.4
DW                124.800 usec
DE                  6.50 usec
TE                 297.7 K
D1               1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1           400.1318007 MHz
SI                  32768
SF             400.1300097 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO138C




```
NAME              CMSO138
EXPNO                   2
PROCNO                  1
Date_            20141103
Time                12.09
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                      8
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                20.800 usec
DE                  6.50 usec
TE                 298.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W           58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2           400.1316005 MHz
SI                  32768
SF             100.6127882 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

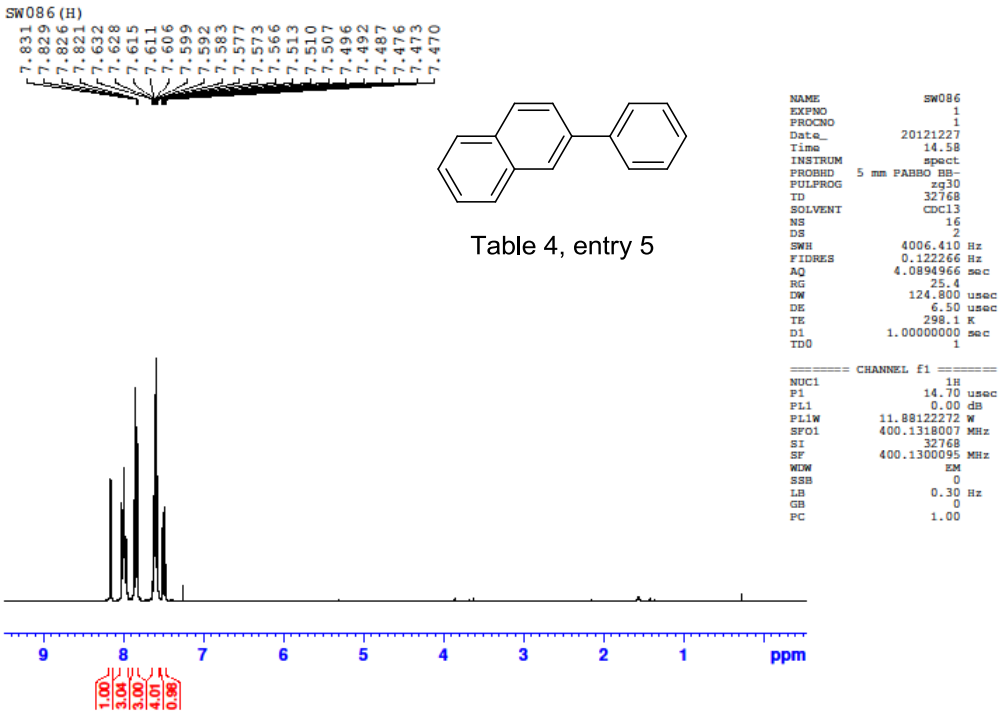
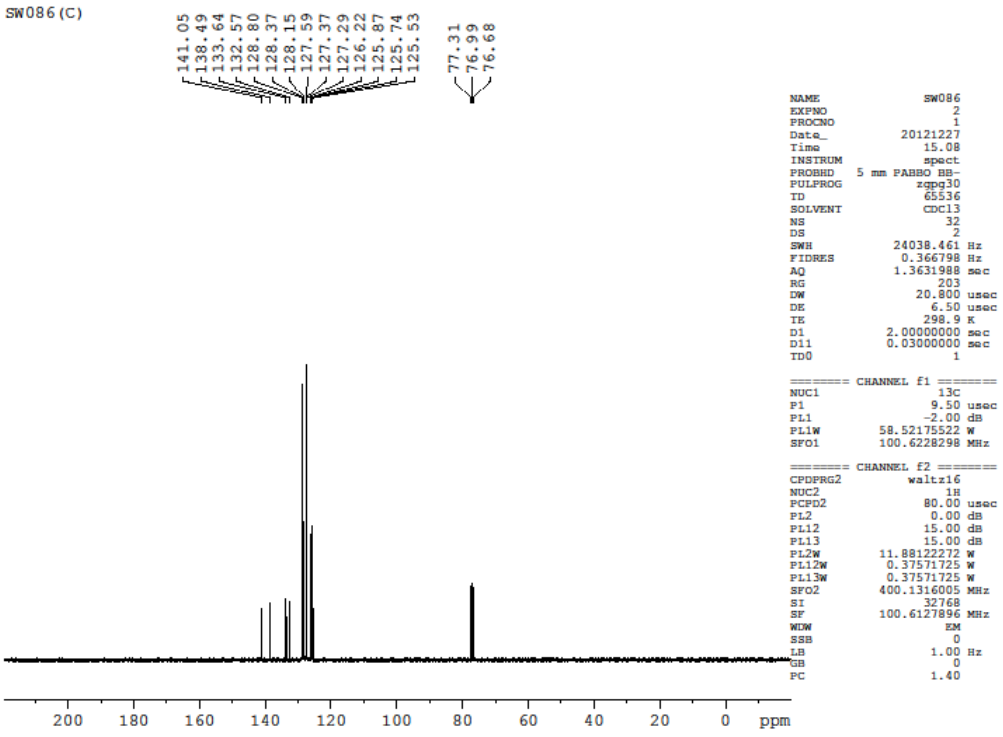


Table 4, entry 5



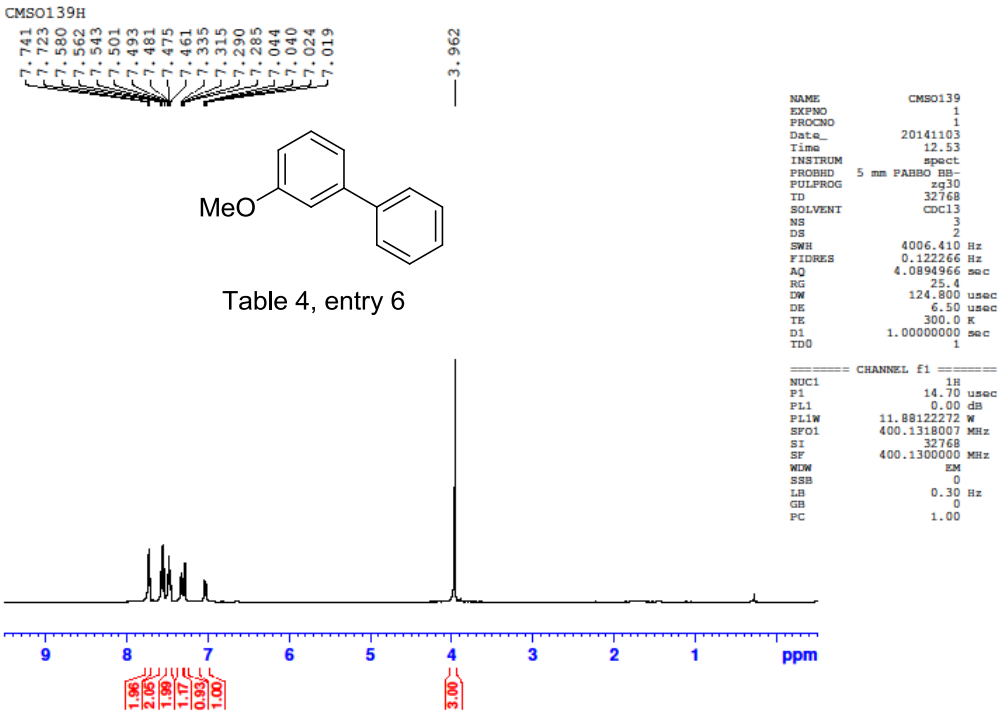
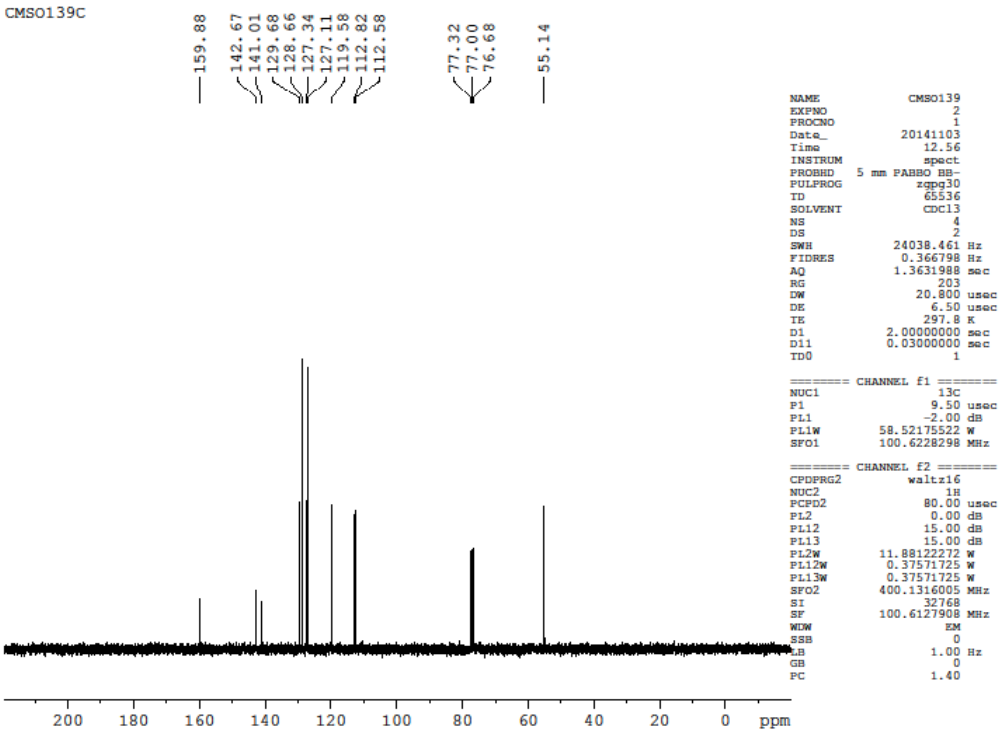


Table 4, entry 6



CMSO127H

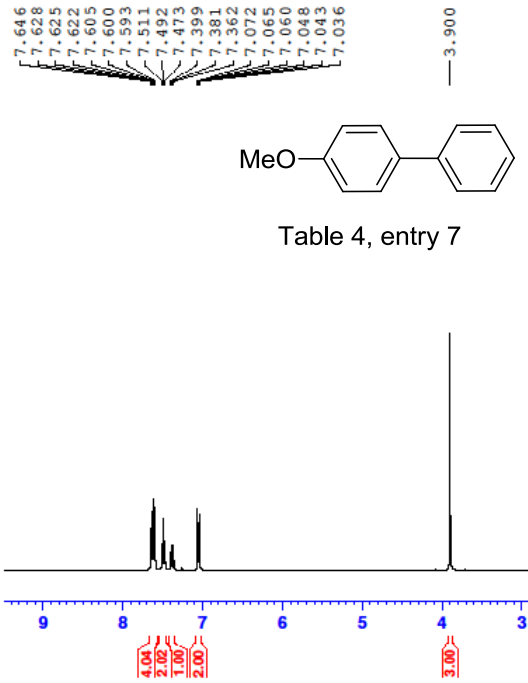
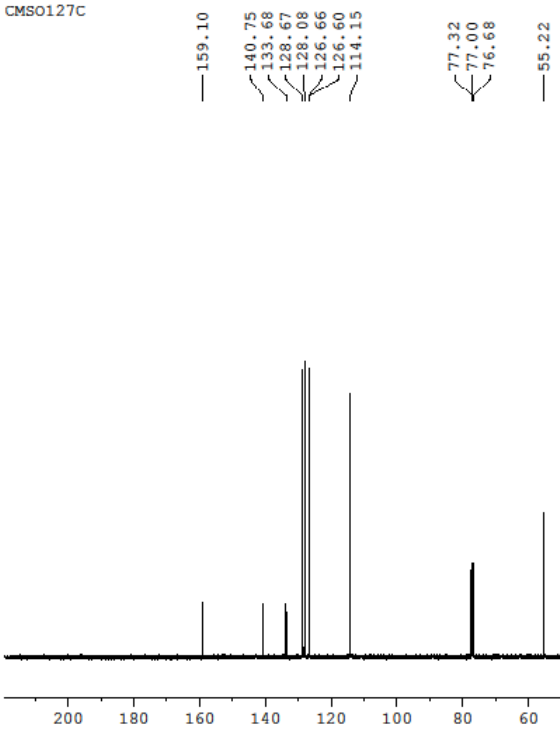


Table 4, entry 7

```
NAME            CMSO127
EXPNO                 1
PROCNO                1
Date_          20141101
Time               2.37
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                   16
DS                    2
SWH            4006.410 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE                297.5 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                14.70 usec
PL1                0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI                32768
SF         400.1300098 MHz
WDW                  EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
```

CMSO127C




```
NAME            CMSO127
EXPNO                 2
PROCNO                1
Date_          20141101
Time               2.39
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   32
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                298.5 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.50 usec
PL1               -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                  1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI                32768
SF         100.6127849 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
```

CMSO141H

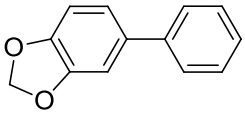
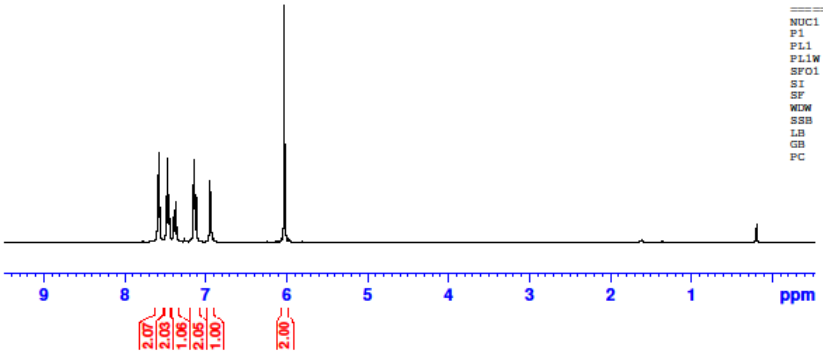
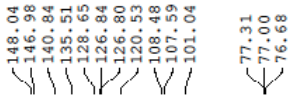


Table 4, entry 8

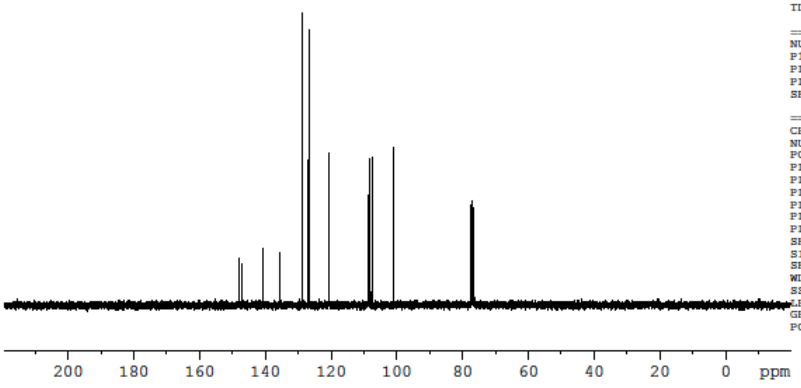
```
NAME                CMSO141
EXPNO                     1
PROCNO                    1
Date_              20141103
Time                  12.59
INSTRUM               spect
PROBHD   5 mm PABBO BB-
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                        2
DS                        2
SWH                4006.410 Hz
FIDRES            0.122266 Hz
AQ                4.0894966 sec
RG                     25.4
DW                 124.800 usec
DE                    6.50 usec
TE                   297.8 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                      1H
P1                    14.70 usec
PL1                    0.00 dB
PL1W           11.88122272 W
SFO1           400.1318007 MHz
SI                    32768
SF             400.1300095 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```



CMSO141C




```
NAME                CMSO141
EXPNO                     2
PROCNO                    1
Date_              20141103
Time                  13.00
INSTRUM               spect
PROBHD   5 mm PABBO BB-
PULPROG             zgpg30
TD                    65536
SOLVENT               CDCl3
NS                        6
DS                        2
SWH               24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631988 sec
RG                      203
DW                 20.800 usec
DE                    6.50 usec
TE                   298.1 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                     9.50 usec
PL1                   -2.00 dB
PL1W           58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.00 dB
PL13                  15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2           400.1316005 MHz
SI                    32768
SF             100.6127859 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40
```



CMSO157H

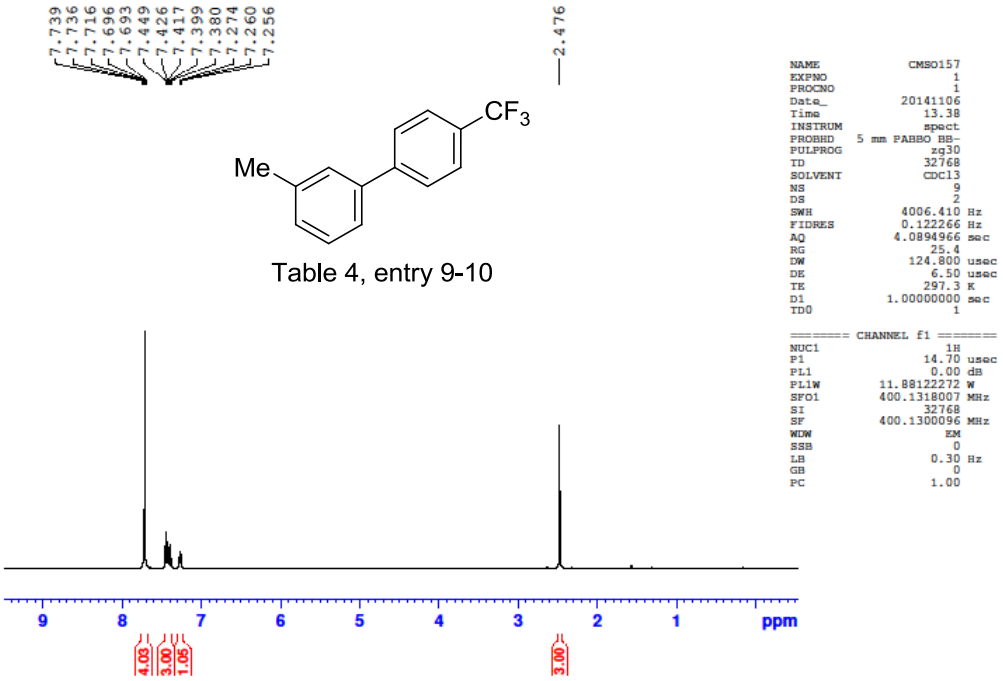
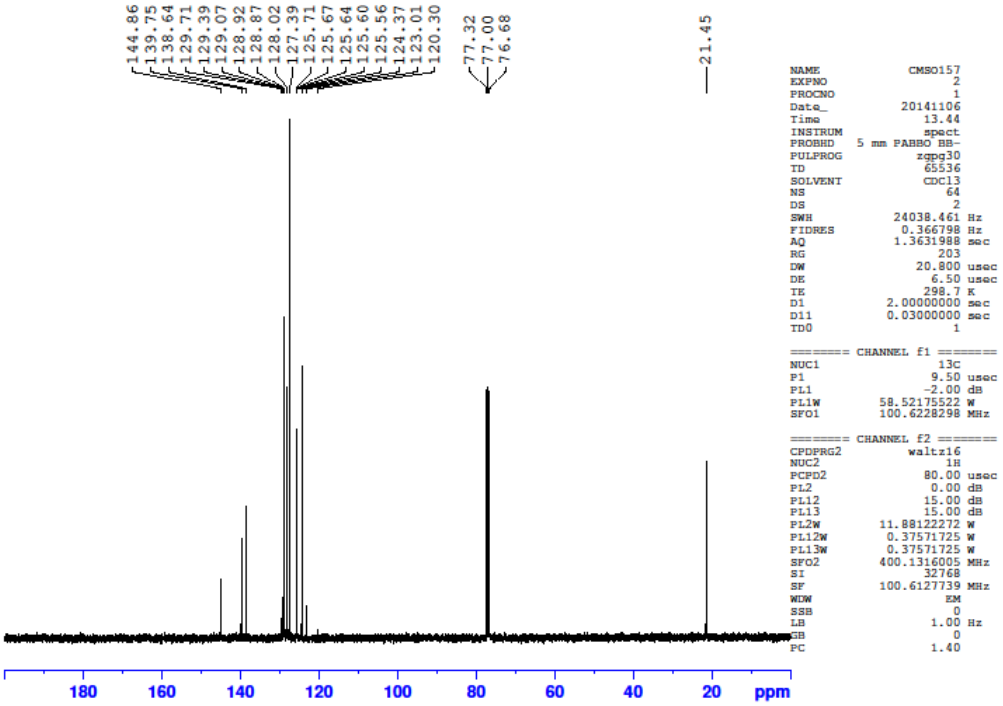


Table 4, entry 9-10

```
NAME            CMSO157
EXPNO                 1
PROCNO                1
Date_          20141106
Time              13.38
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    9
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE                297.3 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 =======
NUC1                1H
P1               14.70 usec
PL1               0.00 dB
PL1W       11.88122272 W
SFO1      400.1318007 MHz
SI                32768
SF        400.1300096 MHz
WDW                EM
SSB                 0
LB               0.30 Hz
GB                  0
PC               1.00
```

CMSO157C




```
NAME            CMSO157
EXPNO                 2
PROCNO                1
Date_          20141106
Time              13.44
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   64
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                298.7 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 =======
NUC1                13C
P1                9.50 usec
PL1              -2.00 dB
PL1W       58.52175522 W
SFO1      100.6228298 MHz

======== CHANNEL f2 =======
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             15.00 dB
PL13             15.00 dB
PL2W       11.88122272 W
PL12W       0.37571725 W
PL13W       0.37571725 W
SFO2      400.1316005 MHz
SI                32768
SF        100.6127739 MHz
WDW                EM
SSB                 0
LB               1.00 Hz
GB                  0
PC               1.40
```

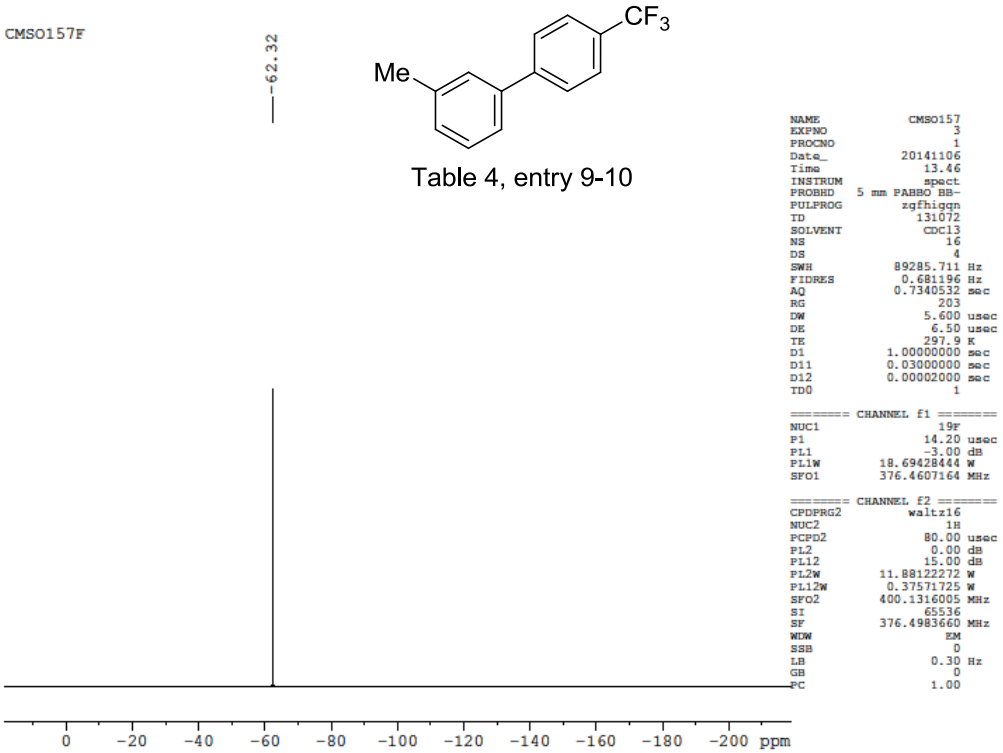


Table 4, entry 9-10

```
NAME              CMSO157
EXPNO                   3
PROCNO                  1
Date_            20141106
Time                13.46
INSTRUM              spect
PROBHD   5 mm PABBO BB-
PULPROG          zgfhigqn
TD                 131072
SOLVENT              CDCl3
NS                      16
DS                       4
SWH              89285.711 Hz
FIDRES           0.681196 Hz
AQ               0.7340532 sec
RG                     203
DW                 5.600 usec
DE                 6.50 usec
TE                 297.9 K
D1            1.00000000 sec
D11           0.03000000 sec
D12           0.00002000 sec
TD0                     1

======= CHANNEL f1 =======
NUC1                   19F
P1                  14.20 usec
PL1                 -3.00 dB
PL1W          18.69428444 W
SFO1         376.4607164 MHz

======= CHANNEL f2 =======
CPDPRG2            waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL2W          11.88122272 W
PL12W          0.37571725 W
SFO2         400.1316005 MHz
SI                  65536
SF           376.4983660 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO156H

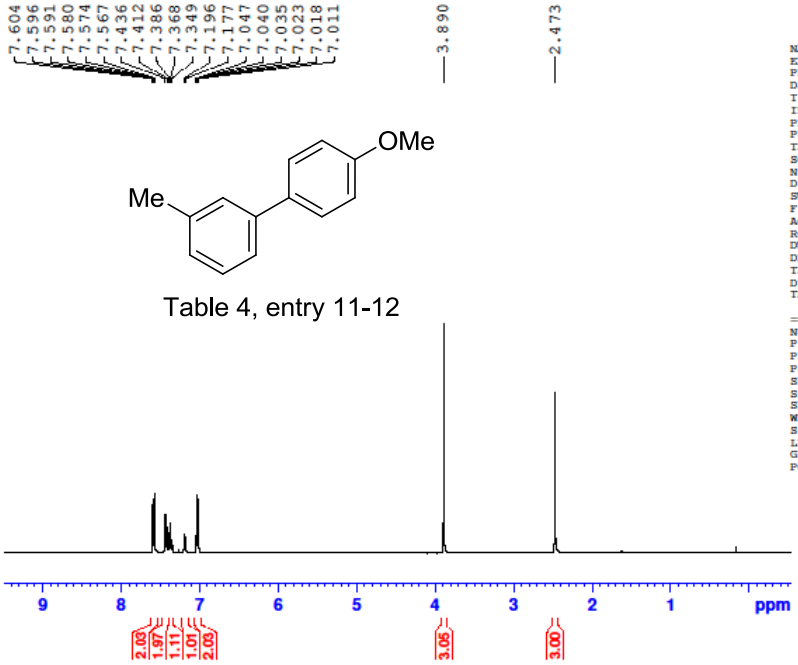
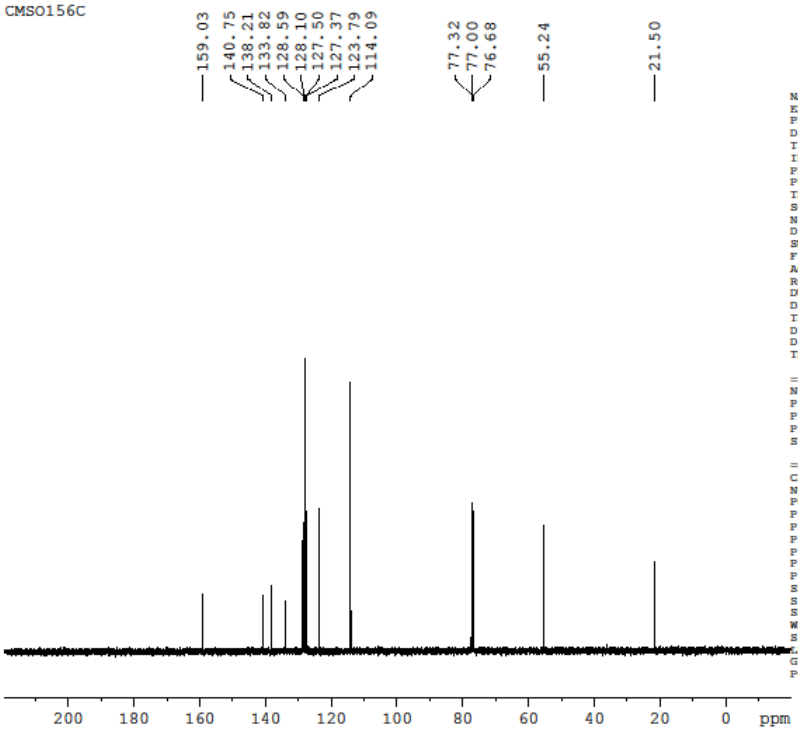


Table 4, entry 11-12

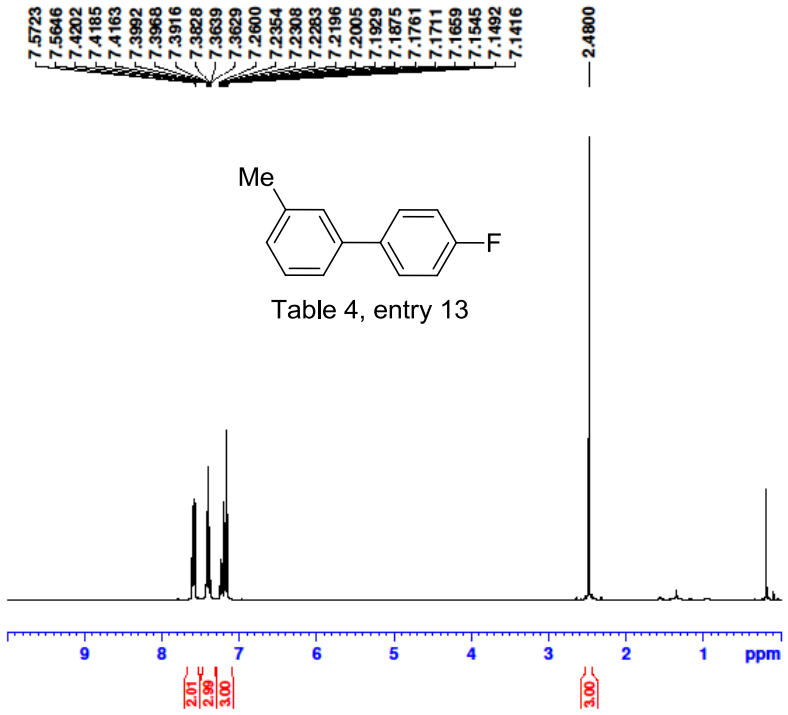
```
NAME            CMSO156
EXPNO                 1
PROCNO                1
Date_          20141106
Time              13.32
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                   10
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE               297.3 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                14.70 usec
PL1                0.00 dB
PL1W         11.88122272 W
SFO1        400.1318007 MHz
SI                32768
SF          400.1300096 MHz
WDW                  EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
```

CMSO156C



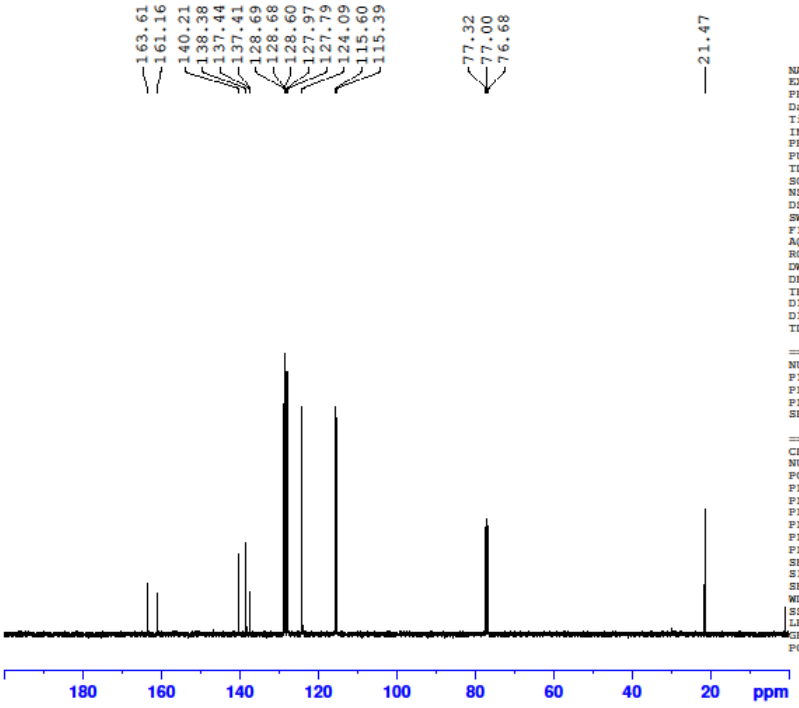

```
NAME            CMSO156
EXPNO                 2
PROCNO                1
Date_          20141106
Time              13.34
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   17
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE               298.0 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.50 usec
PL1               -2.00 dB
PL1W         58.52175522 W
SFO1        100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                  1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W         11.88122272 W
PL12W         0.37571725 W
PL13W         0.37571725 W
SFO2        400.1316005 MHz
SI                32768
SF          100.6127819 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
```

CMSO352H




```
NAME            CMSO352
EXPNO                 1
PROCNO                1
Date_          20160217
Time              19.14
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG           zg30
TD               32768
SOLVENT          CDCl3
NS                   16
DS                    2
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG                 25.4
DW               62.400 usec
DE                6.50 usec
TE               296.3 K
D1            1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                14.70 usec
PL1                0.00 dB
PL1W        11.88122272 W
SFO1        400.1324008 MHz
SI                 32768
SF          400.1300095 MHz
WDW                   EM
SSB                    0
LB                0.30 Hz
GB                     0
PC                  1.00
```

CMSO352C




```
NAME            CMSO352
EXPNO                 3
PROCNO                1
Date_          20160217
Time              19.23
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                   74
DS                    2
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG                  144
DW               20.800 usec
DE                6.50 usec
TE               297.1 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.50 usec
PL1               -2.00 dB
PL1W        58.52175522 W
SFO1        100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                  1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2        400.1316005 MHz
SI                 32768
SF          100.6127795 MHz
WDW                   EM
SSB                    0
LB                1.00 Hz
GB                     0
PC                  1.40
```

CMSO352F

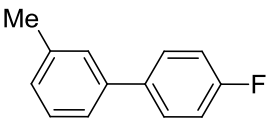


Table 4, entry 13


```
NAME              CMSO352
EXPNO                   2
PROCNO                  1
Date_            20160217
Time                19.19
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG          zgfhigqn
TD                 131072
SOLVENT               CDCl3
NS                       16
DS                        4
SWH              89285.711 Hz
FIDRES               0.681196 Hz
AQ                   0.7340532 sec
RG                         456
DW                       5.600 usec
DE                       6.50 usec
TE                      296.4 K
D1               1.00000000 sec
D11              0.03000000 sec
D12              0.00002000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                      19F
P1                      14.20 usec
PL1                     -3.00 dB
PL1W             18.69428444 W
SFO1            376.4607164 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      0.00 dB
PL12                    15.00 dB
PL2W             11.88122272 W
PL12W             0.37571725 W
SFO2            400.1316005 MHz
SI                       65536
SF              376.4983660 MHz
WDW                        EM
SSB                         0
LB                       0.30 Hz
GB                          0
PC                       1.00
```

CMSO354H

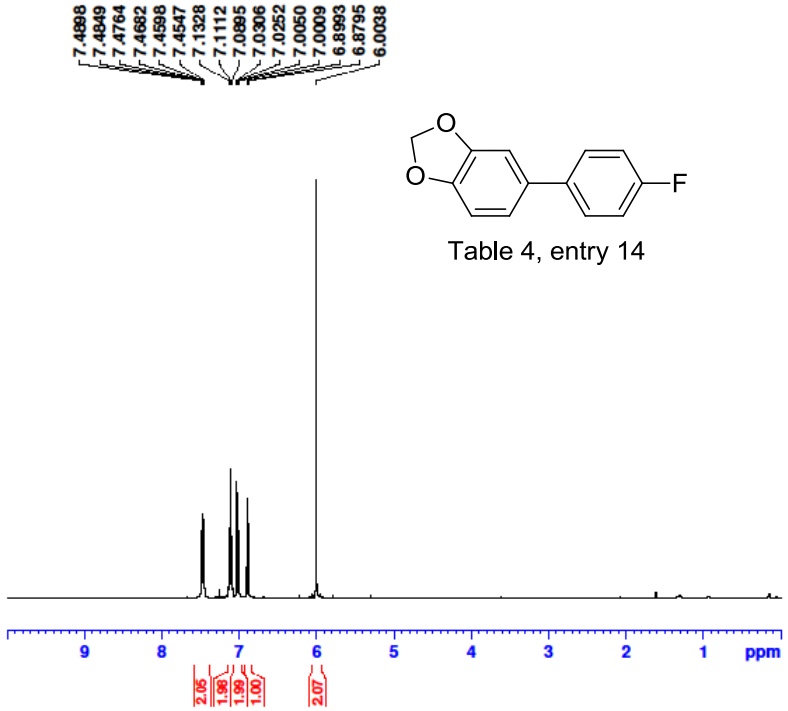
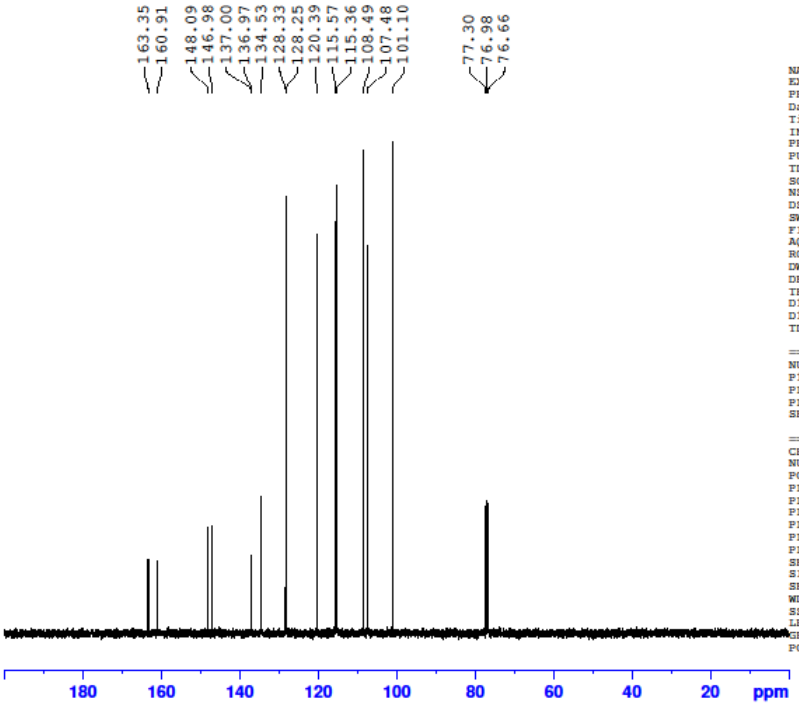


Table 4, entry 14

```
NAME              CMSO354
EXPNO                   1
PROCNO                  1
Date_            20160217
Time                18.52
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                     16
DS                      2
SWH              8012.820 Hz
FIDRES           0.244532 Hz
AQ               2.0447731 sec
RG                   25.4
DW                62.400 usec
DE                 6.50 usec
TE                296.4 K
D1               1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W         11.88122272 W
SFO1         400.1324008 MHz
SI                  32768
SF           400.1300088 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO354C




```
NAME              CMSO354
EXPNO                   2
PROCNO                  1
Date_            20160217
Time                18.57
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     67
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    128
DW                20.800 usec
DE                 6.50 usec
TE                297.4 K
D1               1.00000000 sec
D11              0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W         58.52175522 W
SFO1         100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W         11.88122272 W
PL12W         0.37571725 W
PL13W         0.37571725 W
SFO2         400.1316005 MHz
SI                  32768
SF           100.6127808 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

CMSO354F

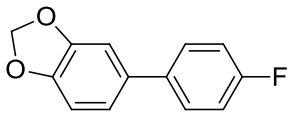


Table 4, entry 14


```
NAME                CMSO354
EXPNO                     3
PROCNO                    1
Date_              20160217
Time                  18.53
INSTRUM                spect
PROBHD     5 mm PABBO BB-
PULPROG             zgfhigqn
TD                    131072
SOLVENT                CDCl3
NS                        16
DS                         4
SWH               89285.711 Hz
FIDRES                0.681196 Hz
AQ                    0.7340532 sec
RG                         1030
DW                        5.600 usec
DE                        6.50 usec
TE                       296.5 K
D1                1.00000000 sec
D11               0.03000000 sec
D12               0.00002000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      19F
P1                      14.20 usec
PL1                      -3.00 dB
PL1W             18.69428444 W
SFO1            376.4607164 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                       0.00 dB
PL12                     15.00 dB
PL2W             11.88122272 W
PL12W             0.37571725 W
SFO2            400.1316005 MHz
SI                        65536
SF              376.4983660 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

CMSO353H

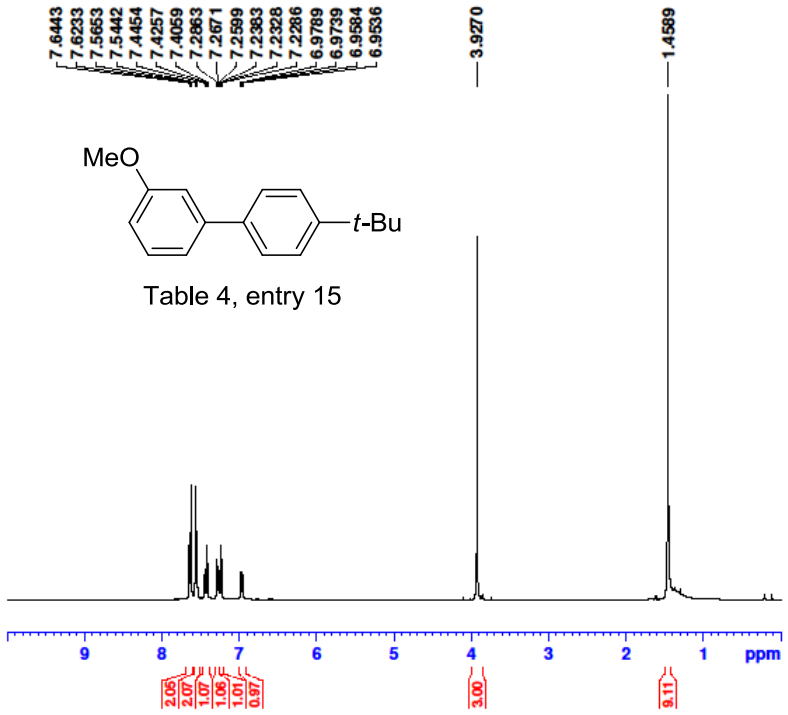
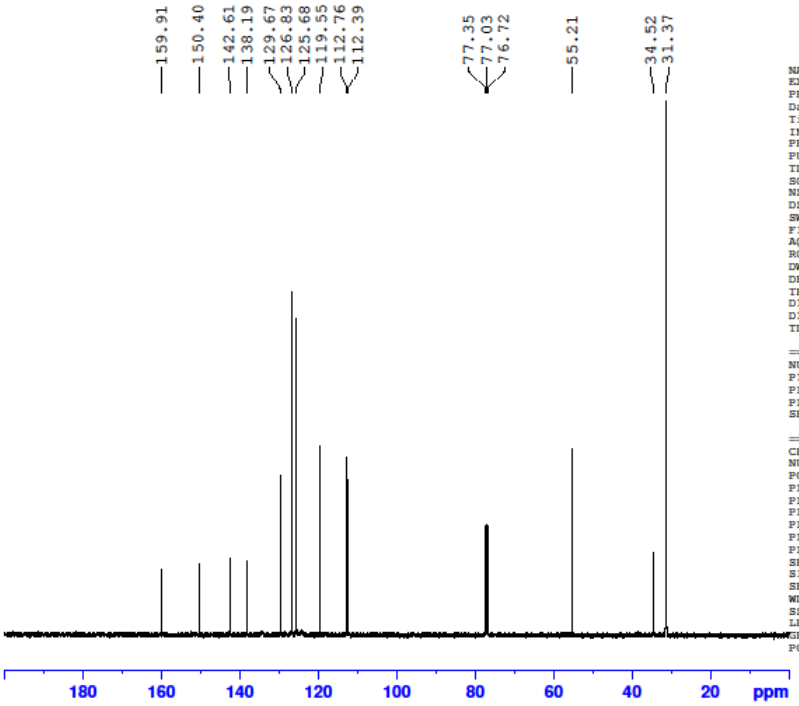


Table 4, entry 15

```
NAME              CMSO353
EXPNO                   1
PROCNO                  1
Date_            20160217
Time                19.28
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                     15
DS                      2
SWH           8012.820 Hz
FIDRES        0.244532 Hz
AQ            2.0447731 sec
RG                   25.4
DW              62.400 usec
DE               6.50 usec
TE               296.5 K
D1            1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                 14.70 usec
PL1                 0.00 dB
PL1W        11.88122272 W
SFO1        400.1324008 MHz
SI                  32768
SF          400.1300095 MHz
WDW                    EM
SSB                     0
LB                 0.30 Hz
GB                      0
PC                   1.00
```

CMSO353C




```
NAME              CMSO353
EXPNO                   2
PROCNO                  1
Date_            20160217
Time                19.31
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     64
DS                      2
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG                   144
DW              20.800 usec
DE               6.50 usec
TE               297.3 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                  9.50 usec
PL1                -2.00 dB
PL1W        58.52175522 W
SFO1        100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                   1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               15.00 dB
PL13               15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2        400.1316005 MHz
SI                  32768
SF          100.6127795 MHz
WDW                    EM
SSB                     0
LB                 1.00 Hz
GB                      0
PC                   1.40
```

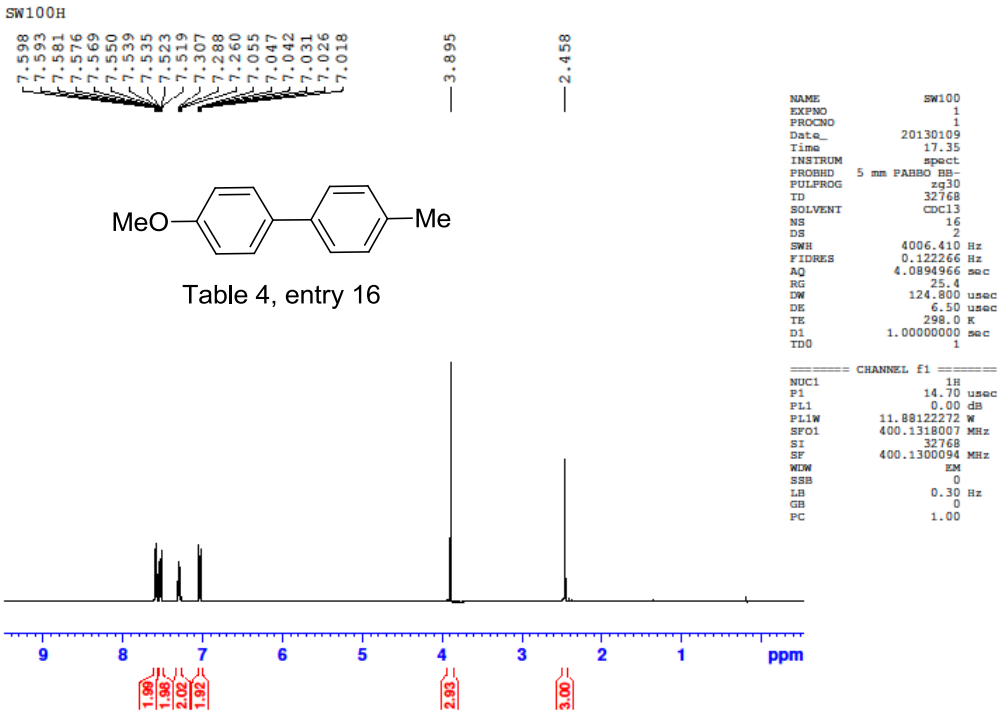
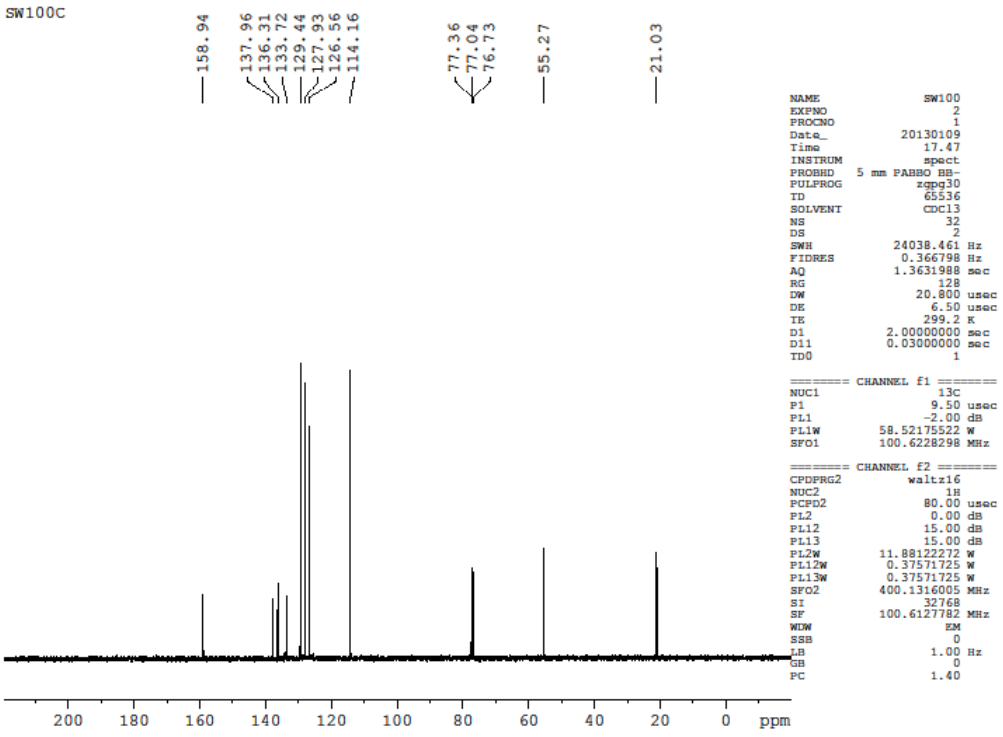
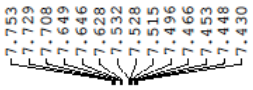


Table 4, entry 16



CMSO123H



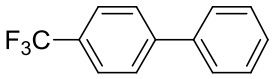
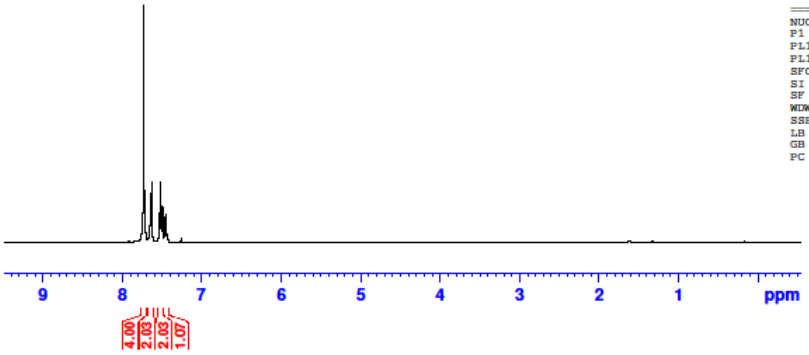
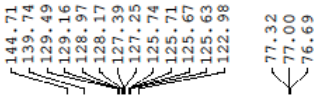


Table 4, entry 17

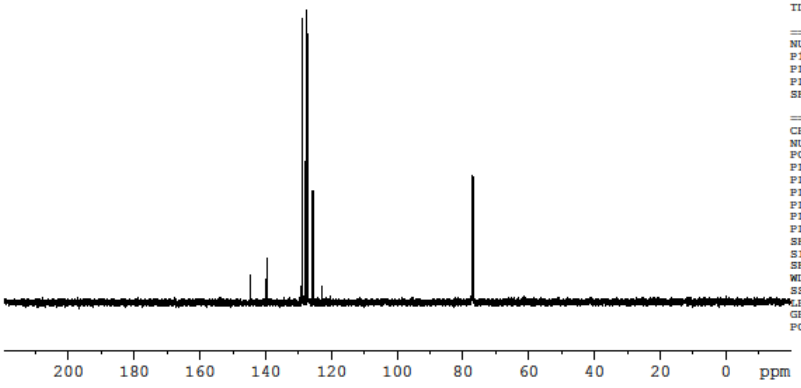
```
NAME            CMSO123
EXPNO                 1
PROCNO                1
Date_          20141103
Time              12.21
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    3
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                 45.2
DW               124.800 usec
DE                6.50 usec
TE                297.8 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                1H
P1               14.70 usec
PL1               0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI                32768
SF         400.1300097 MHz
WDW                EM
SSB                 0
LB               0.30 Hz
GB                  0
PC               1.00
```



CMSO123C




```
NAME            CMSO123
EXPNO                 2
PROCNO                1
Date_          20141103
Time              12.22
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   17
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                298.4 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1               13C
P1                9.50 usec
PL1              -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             15.00 dB
PL13             15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI                32768
SF         100.6127751 MHz
WDW                EM
SSB                 0
LB               1.00 Hz
GB                  0
PC               1.40
```



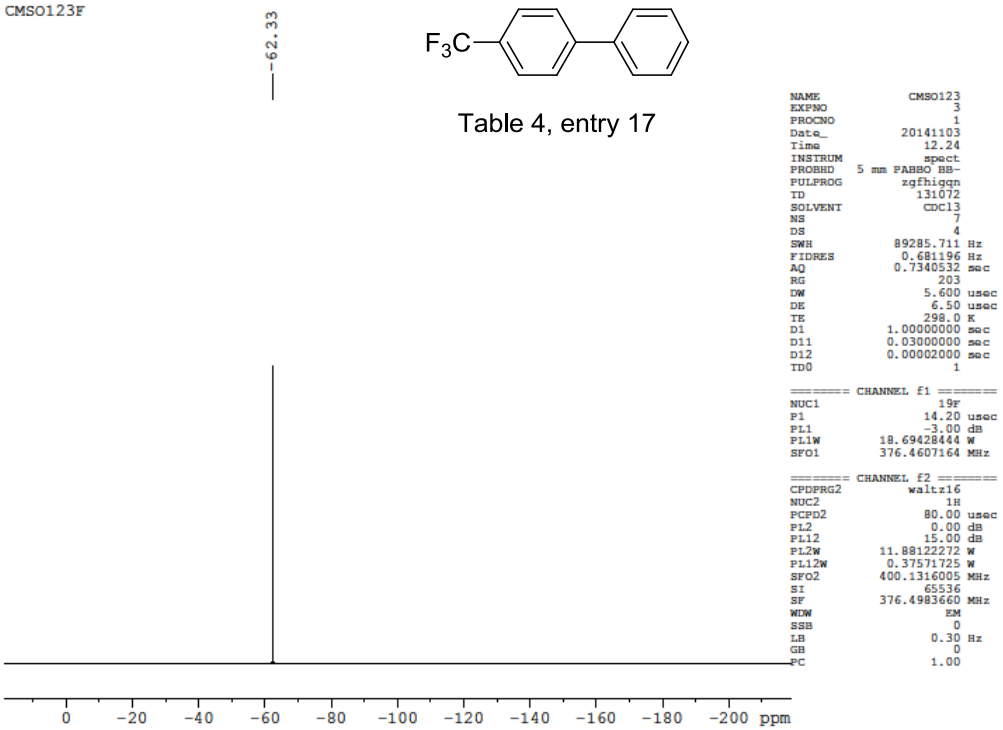


Table 4, entry 17

```
NAME              CMSO123
EXPNO                   3
PROCNO                  1
Date_            20141103
Time                12.24
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG          zgfhigqn
TD                 131072
SOLVENT              CDCl3
NS                      7
DS                      4
SWH              89285.711 Hz
FIDRES           0.681196 Hz
AQ               0.7340532 sec
RG                    203
DW                 5.600 usec
DE                 6.50 usec
TE                 298.0 K
D1            1.00000000 sec
D11           0.03000000 sec
D12           0.00002000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  19F
P1                 14.20 usec
PL1                -3.00 dB
PL1W         18.69428444 W
SFO1         376.4607164 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                  1H
PCPD2              80.00 usec
PL2                 0.00 dB
PL12               15.00 dB
PL2W         11.88122272 W
PL12W         0.37571725 W
SFO2         400.1316005 MHz
SI                  65536
SF           376.4983660 MHz
WDW                   EM
SSB                    0
LB                  0.30 Hz
GB                     0
PC                  1.00
```

CMSO140H

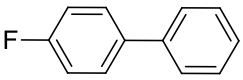
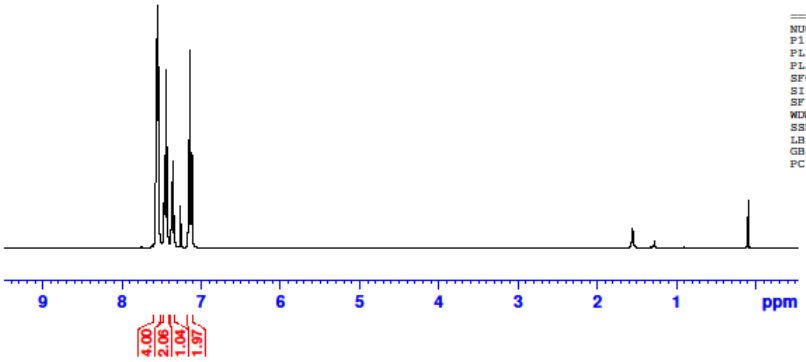
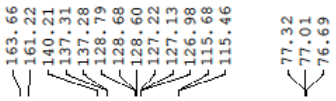


Table 4, entry 18

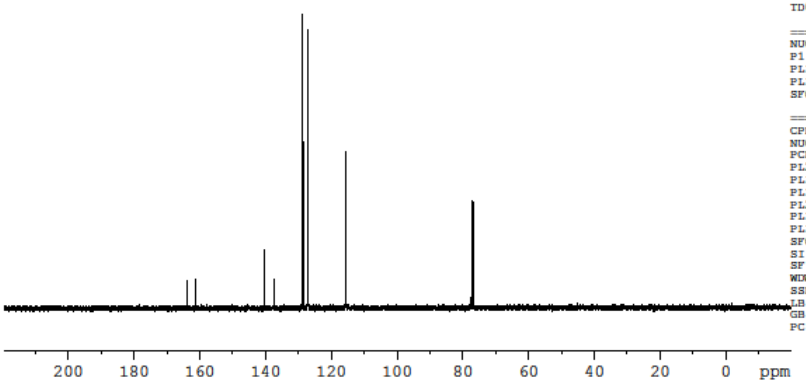
```
NAME            CMSO140
EXPNO                 4
PROCNO                1
Date_          20141107
Time               0.25
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    5
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE                300.0 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                1H
P1               14.70 usec
PL1               0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI                32768
SF         400.1300101 MHz
WDW                EM
SSB                 0
LB               0.30 Hz
GB                  0
PC               1.00
```



CMSO140C




```
NAME            CMSO140
EXPNO                 3
PROCNO                1
Date_          20141103
Time              23.38
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   23
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                297.8 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1               13C
P1                9.50 usec
PL1              -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             15.00 dB
PL13             15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI                32768
SF         100.6127802 MHz
WDW                EM
SSB                 0
LB               1.00 Hz
GB                  0
PC               1.40
```



CMSO140F

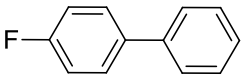


Table 4, entry 18


```
NAME                CMSO140
EXPNO                     2
PROCNO                    1
Date_              20141103
Time                  23.36
INSTRUM                spect
PROBHD   5 mm PABBO BB-
PULPROG             zgfhigqn
TD                    131072
SOLVENT                CDCl3
NS                        16
DS                         4
SWH                89285.711 Hz
FIDRES             0.681196 Hz
AQ                 0.7340532 sec
RG                      203
DW                    5.600 usec
DE                     6.50 usec
TE                   297.6 K
D1                 1.00000000 sec
D11                0.03000000 sec
D12                0.00002000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     19F
P1                     14.20 usec
PL1                    -3.00 dB
PL1W              18.69428444 W
SFO1              376.4607164 MHz

======== CHANNEL f2 ========
CPDPRG2               waltz16
NUC2                      1H
PCPD2                  80.00 usec
PL2                     0.00 dB
PL12                   15.00 dB
PL2W              11.88122272 W
PL12W              0.37571725 W
SFO2              400.1316005 MHz
SI                      65536
SF                376.4983660 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

CMSO134H

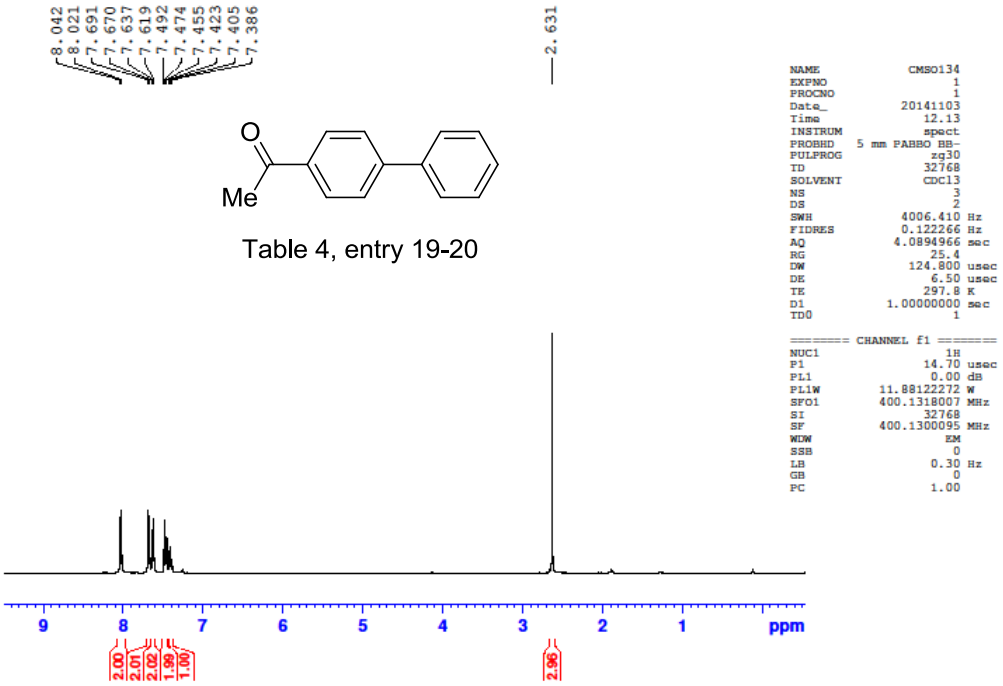
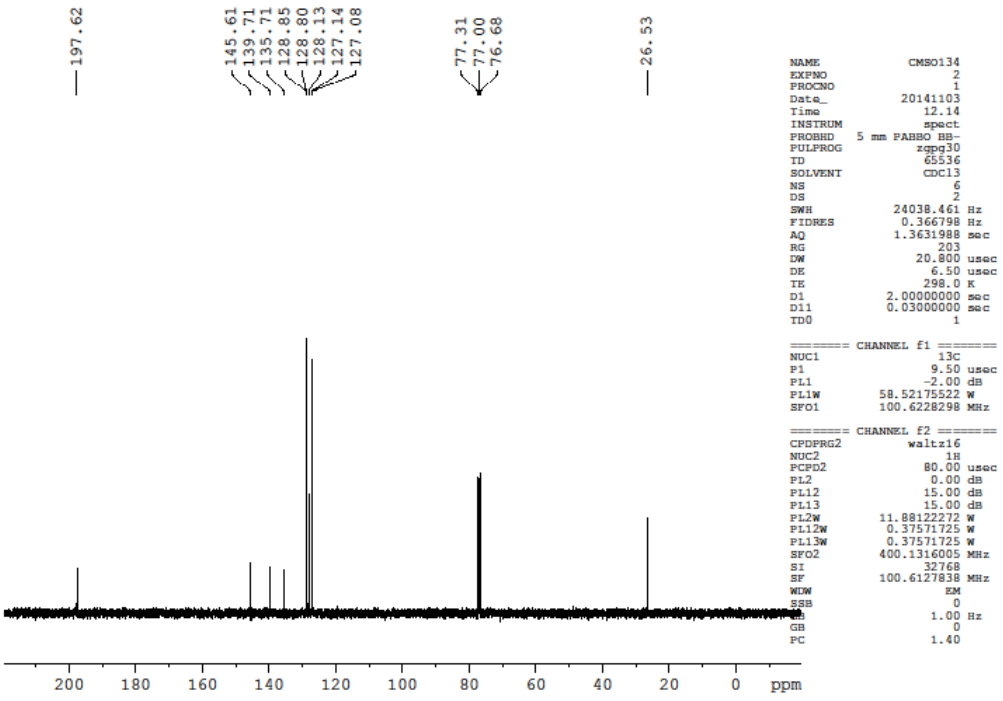


Table 4, entry 19-20

```
NAME              CMSO134
EXPNO                   1
PROCNO                  1
Date_            20141103
Time                12.13
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                      3
DS                      2
SWH              4006.410 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                   25.4
DW                124.800 usec
DE                  6.50 usec
TE                 297.8 K
D1               1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1           400.1318007 MHz
SI                  32768
SF             400.1300095 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO134C




```
NAME              CMSO134
EXPNO                   2
PROCNO                  1
Date_            20141103
Time                12.14
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                      6
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                20.800 usec
DE                  6.50 usec
TE                 298.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W           58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2           400.1316005 MHz
SI                  32768
SF             100.6127838 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

CMSO135H

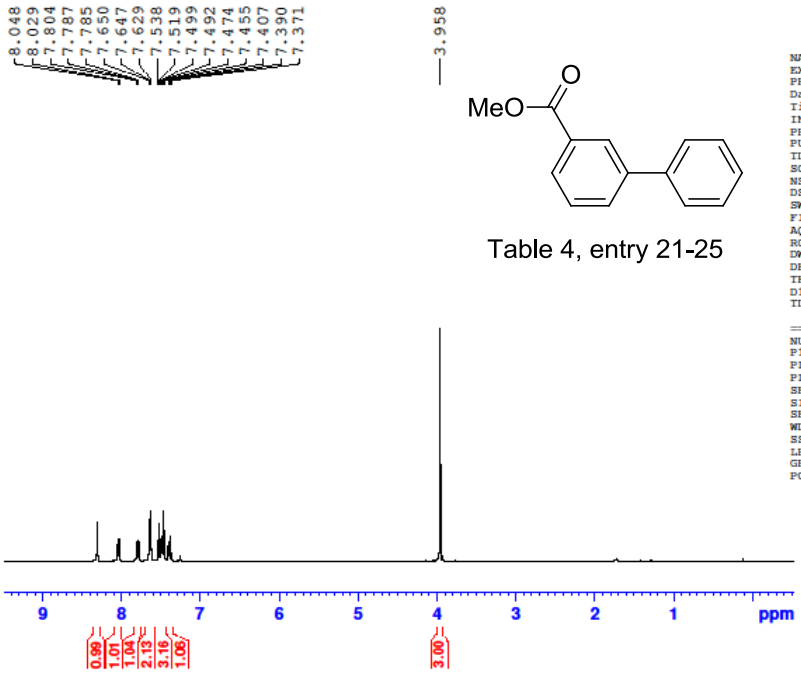
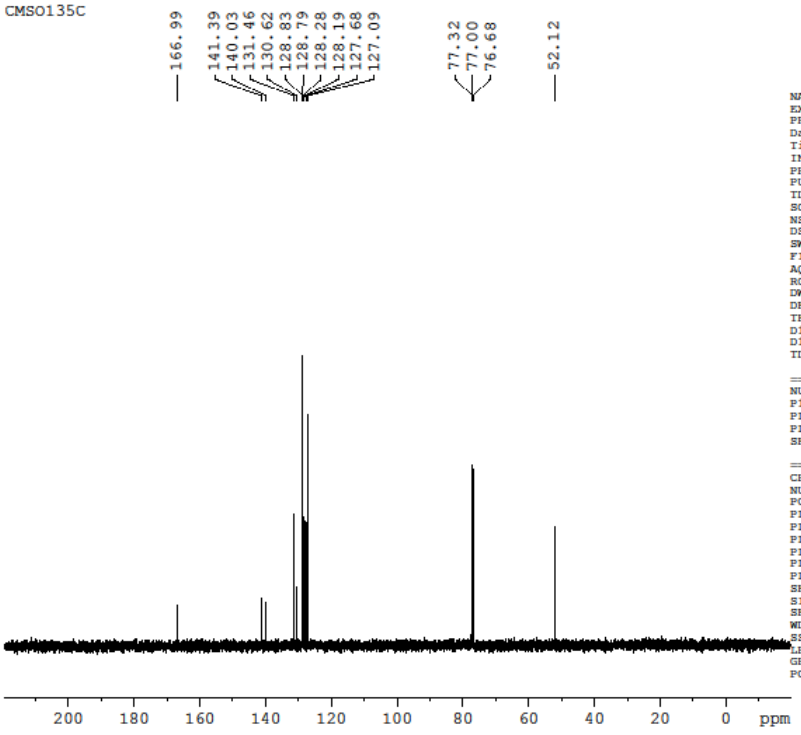


Table 4, entry 21-25

```
NAME                CMSO135
EXPNO                     1
PROCNO                    1
Date_              20141103
Time                  12.17
INSTRUM               spect
PROBHD   5 mm PABBO BB-
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                        3
DS                        2
SWH                4006.410 Hz
FIDRES                0.122266 Hz
AQ                 4.0894966 sec
RG                      45.2
DW                   124.800 usec
DE                     6.50 usec
TE                    297.7 K
D1                 1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.70 usec
PL1                     0.00 dB
PL1W               11.88122272 W
SFO1              400.1318007 MHz
SI                        32768
SF                400.1300096 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

CMSO135C




```
NAME                CMSO135
EXPNO                     2
PROCNO                    1
Date_              20141103
Time                  12.18
INSTRUM               spect
PROBHD   5 mm PABBO BB-
PULPROG             zgpg30
TD                    65536
SOLVENT               CDCl3
NS                        8
DS                        2
SWH               24038.461 Hz
FIDRES                0.366798 Hz
AQ                 1.3631988 sec
RG                      203
DW                   20.800 usec
DE                     6.50 usec
TE                    298.1 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     13C
P1                     9.50 usec
PL1                   -2.00 dB
PL1W               58.52175522 W
SFO1              100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 80.00 usec
PL2                     0.00 dB
PL12                   15.00 dB
PL13                   15.00 dB
PL2W               11.88122272 W
PL12W               0.37571725 W
PL13W               0.37571725 W
SFO2              400.1316005 MHz
SI                        32768
SF                100.6127786 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

CMSO136H

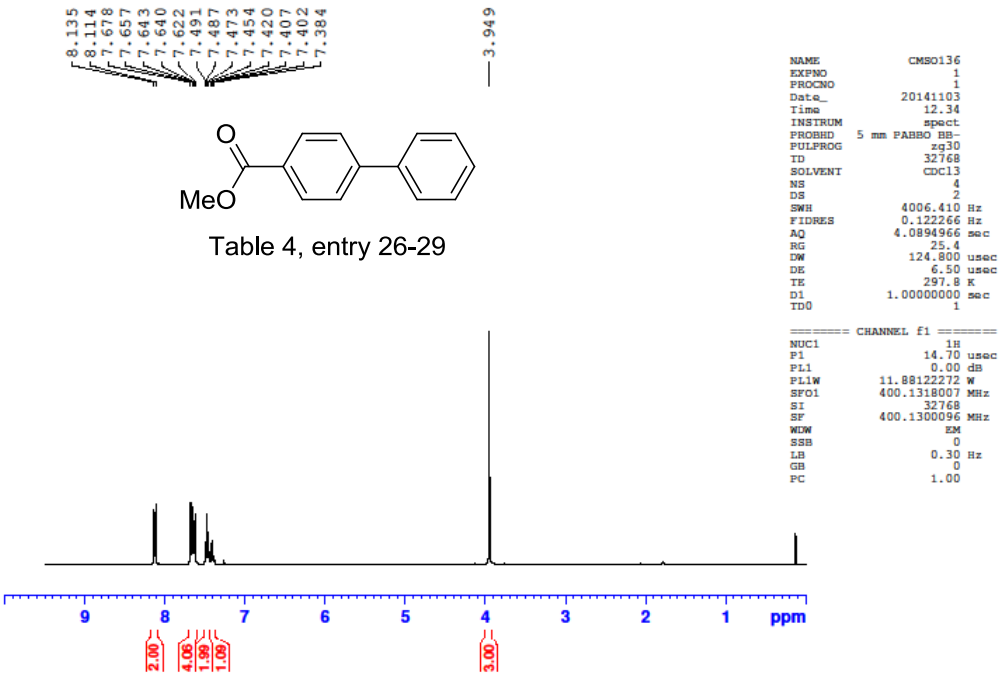
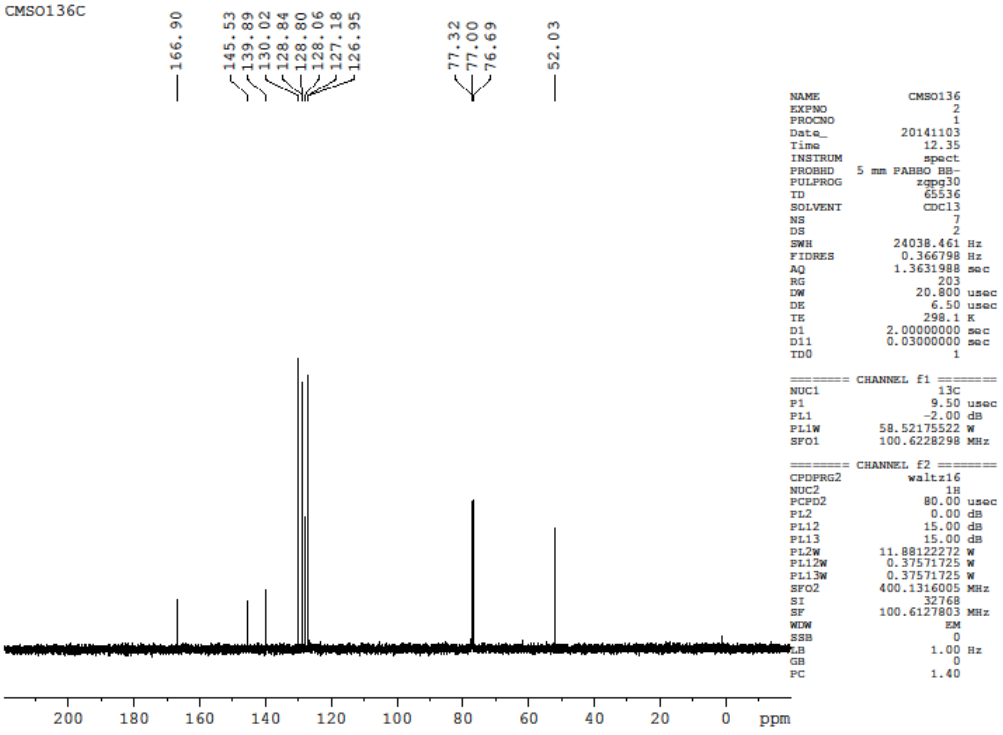


Table 4, entry 26-29

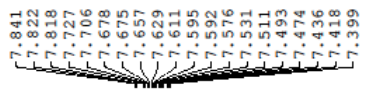
```
NAME            CMSO136
EXPNO                 1
PROCNO                1
Date_          20141103
Time              12.34
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    4
DS                    2
SWH            4006.410 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE                297.8 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                1H
P1               14.70 usec
PL1               0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI                32768
SF         400.1300096 MHz
WDW                EM
SSB                 0
LB              0.30 Hz
GB                  0
PC               1.00
```

CMSO136C




```
NAME            CMSO136
EXPNO                 2
PROCNO                1
Date_          20141103
Time              12.35
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                    7
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                298.1 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1               13C
P1                9.50 usec
PL1              -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             15.00 dB
PL13             15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI                32768
SF         100.6127803 MHz
WDW                EM
SSB                 0
LB              1.00 Hz
GB                  0
PC               1.40
```

CMSO169H



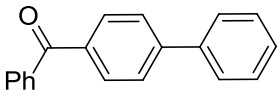
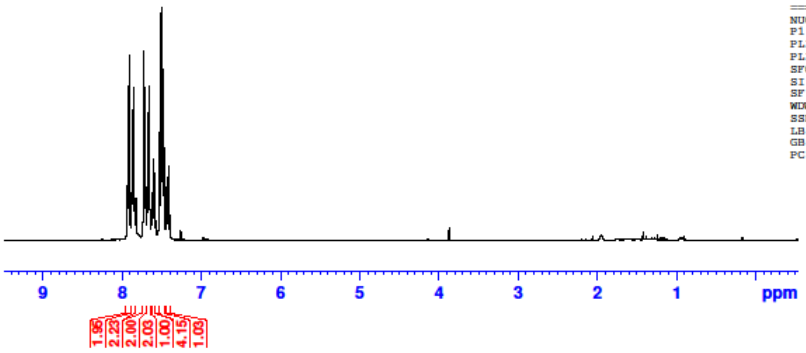


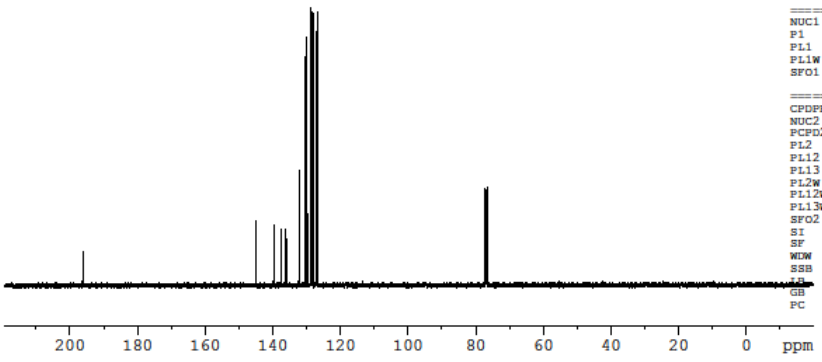
Table 4, entry 30

```
NAME              CMSO169
EXPNO                   1
PROCNO                  1
Date_            20141106
Time                14.06
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                      9
DS                      2
SWH              4006.410 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                   25.4
DW                124.800 usec
DE                  6.50 usec
TE                 300.0 K
D1             1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1          400.1318007 MHz
SI                  32768
SF            400.1300093 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```



CMSO169C


```
NAME              CMSO169
EXPNO                   2
PROCNO                  1
Date_            20141106
Time                14.09
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     24
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                20.800 usec
DE                  6.50 usec
TE                 298.2 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W           58.52175522 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2            waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2          400.1316005 MHz
SI                  32768
SF            100.6127895 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```



CMSO168H

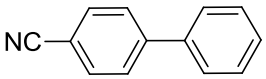
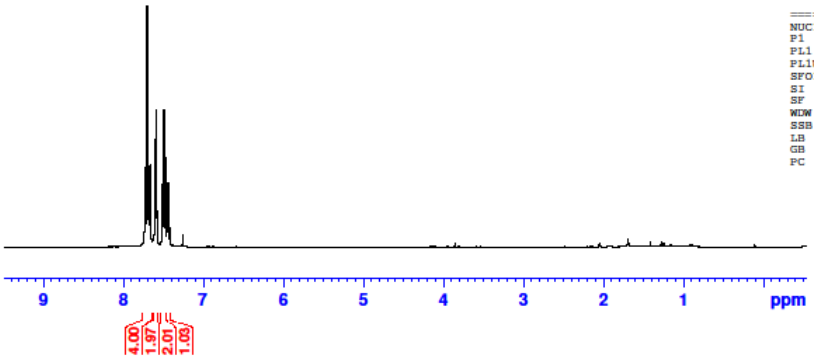
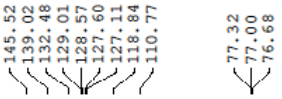


Table 4, entry 31

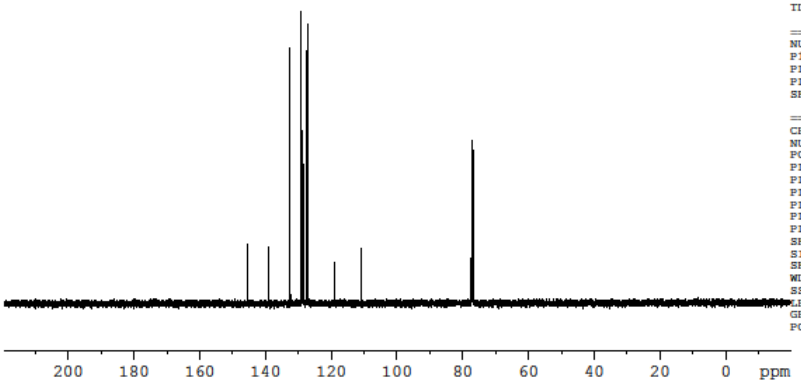
```
NAME                CMSO168
EXPNO                     1
PROCNO                    1
Date_              20141106
Time                 14.02
INSTRUM              spect
PROBHD     5 mm PABBO BB-
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                        9
DS                        2
SWH                4006.410 Hz
FIDRES                0.122266 Hz
AQ                 4.0894966 sec
RG                     25.4
DW                   124.800 usec
DE                     6.50 usec
TE                    297.4 K
D1                 1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     1H
P1                    14.70 usec
PL1                    0.00 dB
PL1W              11.88122272 W
SFO1              400.1318007 MHz
SI                    32768
SF                400.1300098 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```



CMSO168C




```
NAME                CMSO168
EXPNO                     2
PROCNO                    1
Date_              20141106
Time                 14.04
INSTRUM              spect
PROBHD     5 mm PABBO BB-
PULPROG             zgpg30
TD                    65536
SOLVENT               CDCl3
NS                       19
DS                        2
SWH               24038.461 Hz
FIDRES                0.366798 Hz
AQ                 1.3631988 sec
RG                      203
DW                   20.800 usec
DE                     6.50 usec
TE                    298.1 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                    13C
P1                     9.50 usec
PL1                   -2.00 dB
PL1W              58.52175522 W
SFO1              100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                     1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.00 dB
PL13                  15.00 dB
PL2W              11.88122272 W
PL12W              0.37571725 W
PL13W              0.37571725 W
SFO2              400.1316005 MHz
SI                    32768
SF                100.6127832 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40
```



CMSO145H

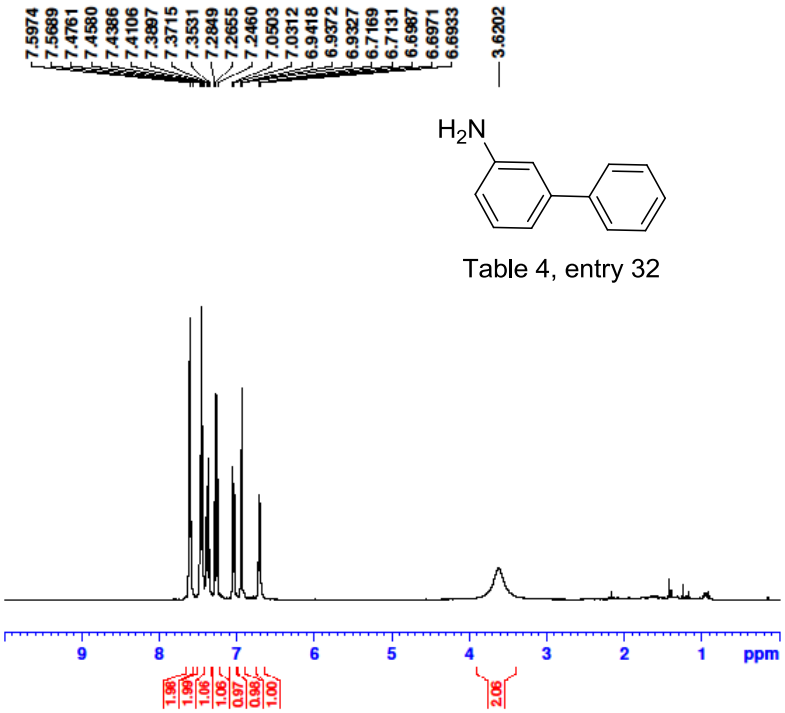
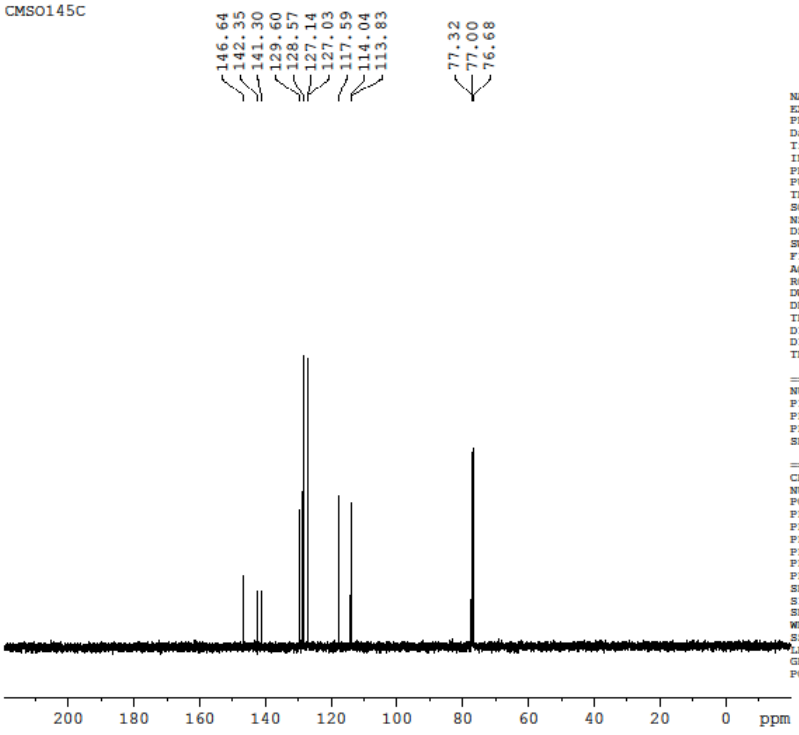


Table 4, entry 32

```
NAME              CMSO145
EXPNO                   1
PROCNO                  1
Date_            20141106
Time                13.15
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                      4
DS                      2
SWH              6393.862 Hz
FIDRES           0.195125 Hz
AQ               2.5625076 sec
RG                   40.3
DW                 78.200 usec
DE                  6.50 usec
TE                 297.4 K
D1              1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W            11.88122272 W
SFO1            400.1318007 MHz
SI                    32768
SF              400.1300098 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO145C




```
NAME              CMSO145
EXPNO                   2
PROCNO                  1
Date_            20141106
Time                13.16
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                     18
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                 20.800 usec
DE                  6.50 usec
TE                 298.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W            58.52175522 W
SFO1            100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W            11.88122272 W
PL12W            0.37571725 W
PL13W            0.37571725 W
SFO2            400.1316005 MHz
SI                    32768
SF              100.6127831 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

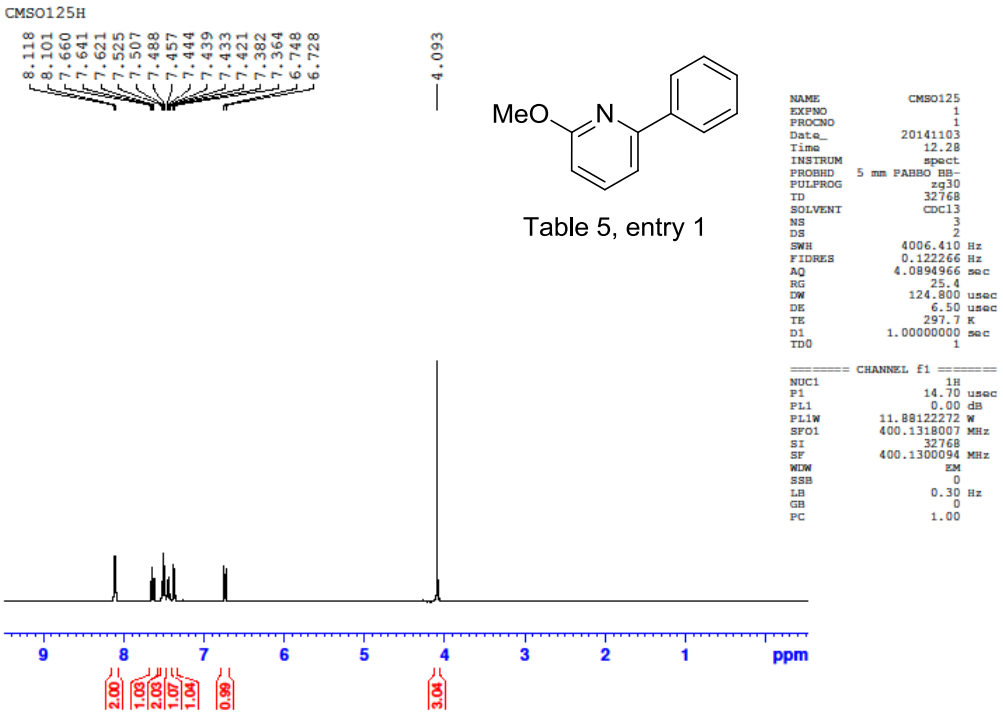
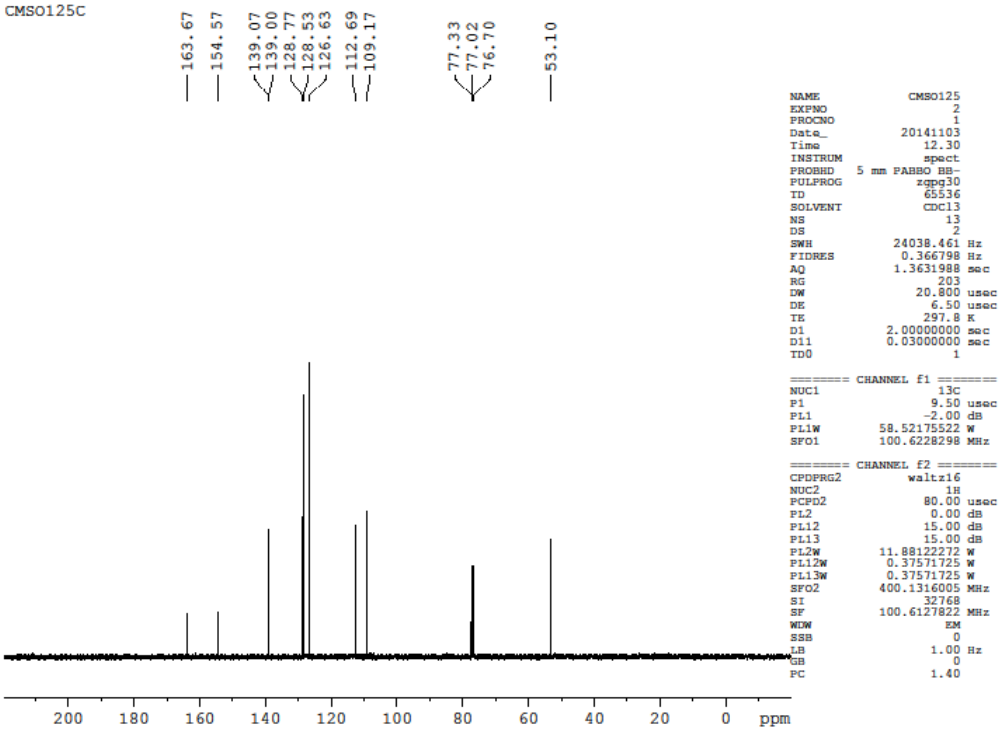


Table 5, entry 1



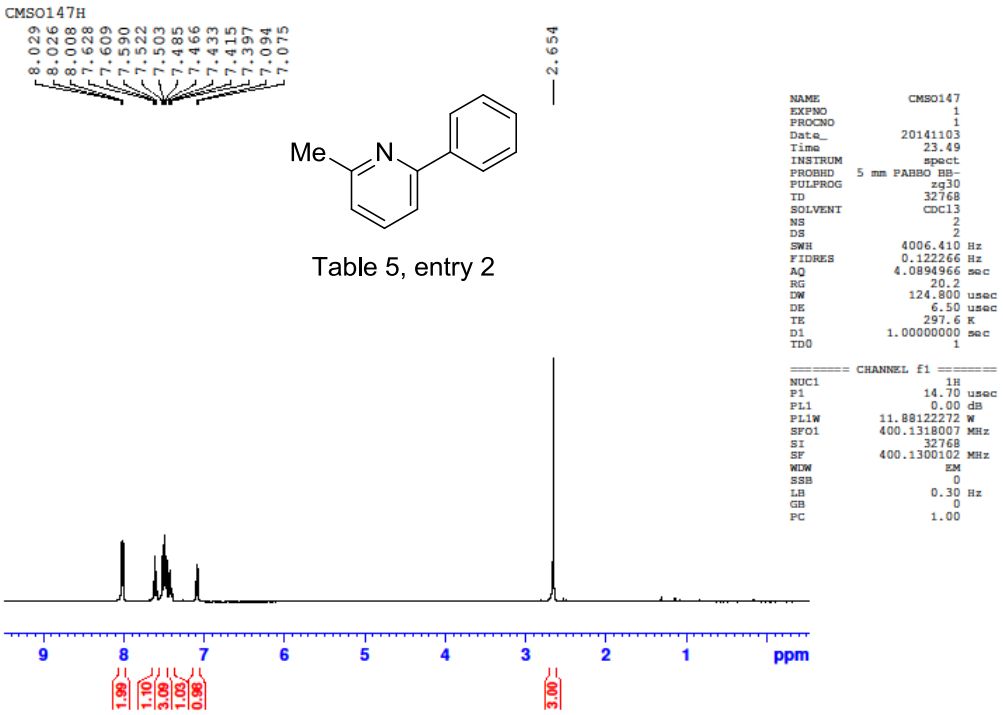
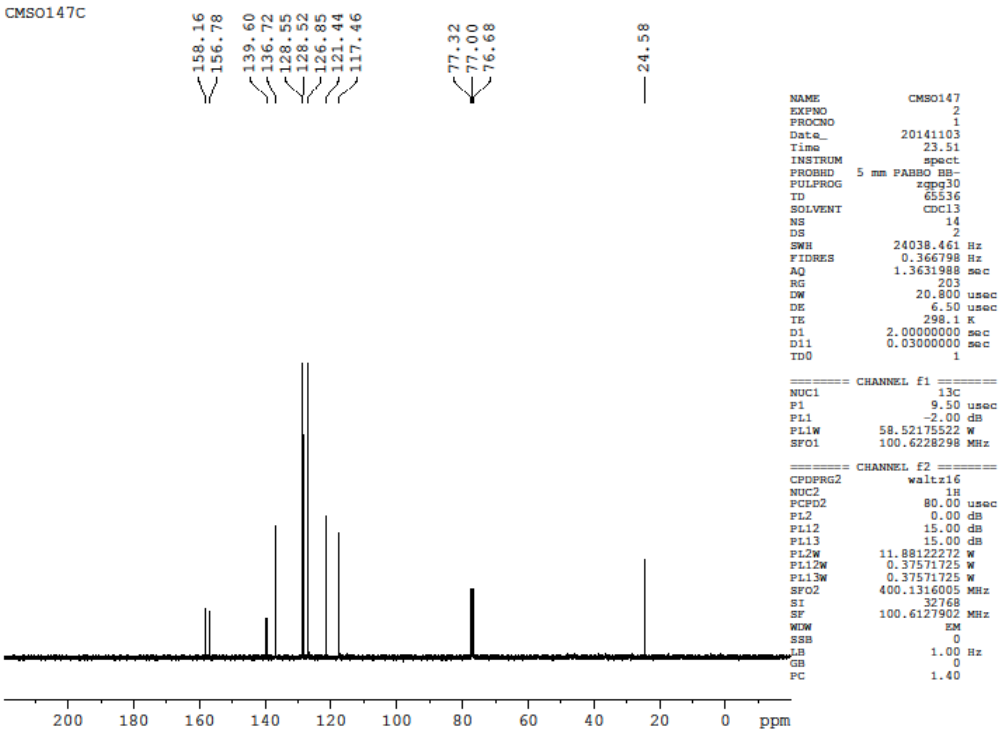
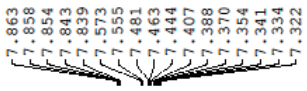


Table 5, entry 2



CMSO148H



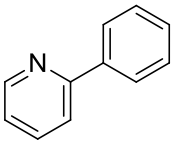
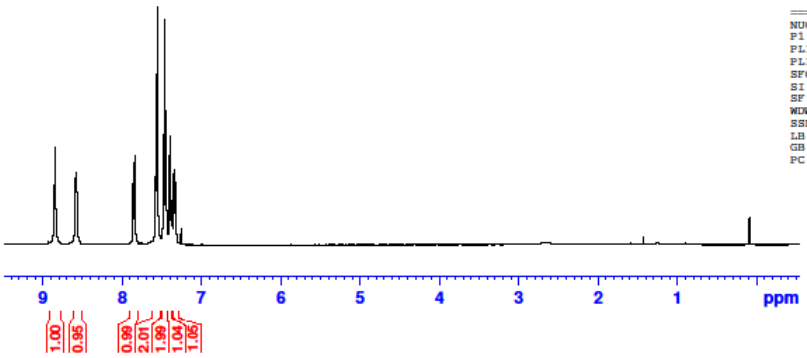
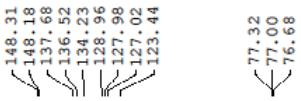


Table 5, entry 3

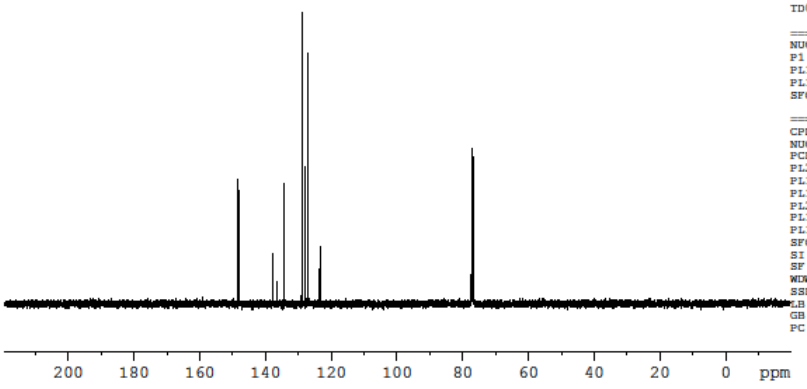
```
NAME                CMSO148
EXPNO                     1
PROCNO                    1
Date_              20141103
Time                 23.56
INSTRUM              spect
PROBHD     5 mm PABBO BB-
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                        2
DS                        2
SWH                4006.410 Hz
FIDRES                0.122266 Hz
AQ                 4.0894966 sec
RG                     45.2
DW                   124.800 usec
DE                     6.50 usec
TE                   297.7 K
D1                 1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                     1H
P1                    14.70 usec
PL1                    0.00 dB
PL1W              11.88122272 W
SFO1              400.1318007 MHz
SI                    32768
SF                400.1300102 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```



CMSO148C




```
NAME                CMSO148
EXPNO                     2
PROCNO                    1
Date_              20141103
Time                 23.57
INSTRUM              spect
PROBHD     5 mm PABBO BB-
PULPROG              zgpg30
TD                    65536
SOLVENT               CDCl3
NS                       14
DS                        2
SWH               24038.461 Hz
FIDRES                0.366798 Hz
AQ                 1.3631988 sec
RG                      203
DW                   20.800 usec
DE                     6.50 usec
TE                   298.2 K
D1                 2.00000000 sec
D11                0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                    13C
P1                     9.50 usec
PL1                   -2.00 dB
PL1W              58.52175522 W
SFO1              100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                     1H
PCPD2                 80.00 usec
PL2                    0.00 dB
PL12                  15.00 dB
PL13                  15.00 dB
PL2W              11.88122272 W
PL12W              0.37571725 W
PL13W              0.37571725 W
SFO2              400.1316005 MHz
SI                    32768
SF                100.6127826 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40
```



CMSO155H

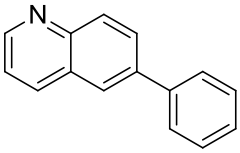
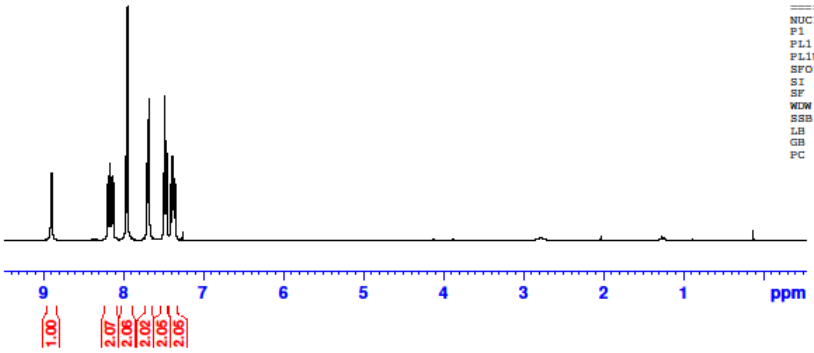
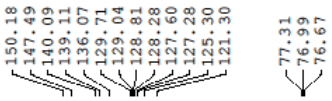


Table 5, entry 4

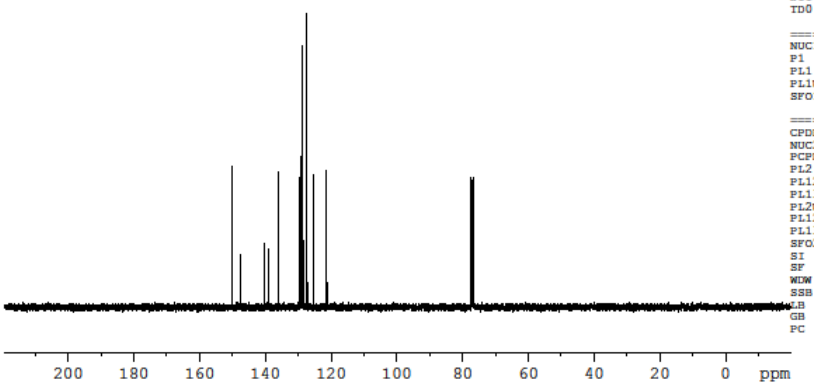
```
NAME              CMSO155
EXPNO                   1
PROCNO                  1
Date_            20141106
Time                12.48
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                      3
DS                      2
SWH              4006.410 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                   25.4
DW                124.800 usec
DE                  6.50 usec
TE                 300.0 K
D1             1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1          400.1318007 MHz
SI                  32768
SF            400.1300098 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```



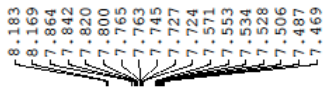
CMSO155C




```
NAME              CMSO155
EXPNO                   2
PROCNO                  1
Date_            20141106
Time                12.49
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 65536
SOLVENT            CDCl3
NS                     15
DS                      2
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631988 sec
RG                    203
DW                20.800 usec
DE                  6.50 usec
TE                 297.8 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W           58.52175522 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2          400.1316005 MHz
SI                  32768
SF            100.6127873 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```



CMSO162H



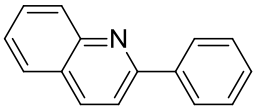
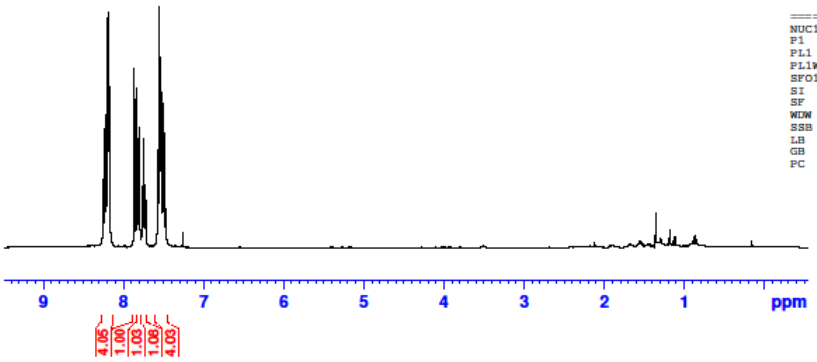
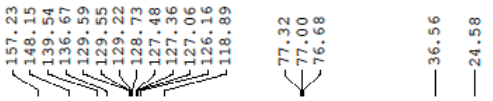


Table 5, entry 5

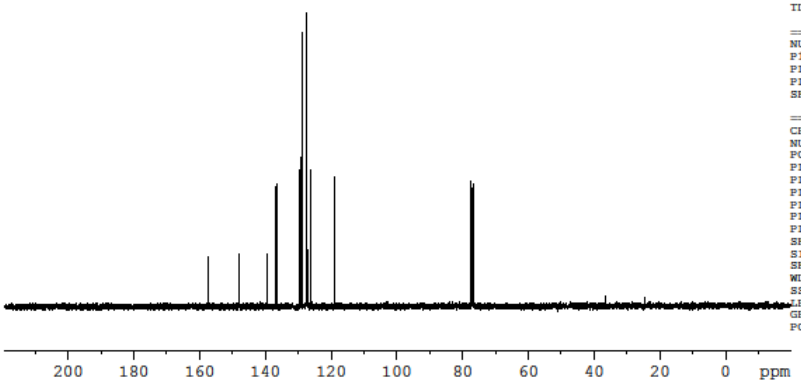
```
NAME                CMSO162
EXPNO                     2
PROCNO                    1
Date_              20141107
Time                  0.28
INSTRUM               spect
PROBHD   5 mm PABBO BB-
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                        4
DS                        2
SWH                4006.410 Hz
FIDRES            0.122266 Hz
AQ                4.0894966 sec
RG                     25.4
DW                 124.800 usec
DE                    6.50 usec
TE                   300.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                    1H
P1                   14.70 usec
PL1                   0.00 dB
PL1W           11.88122272 W
SFO1           400.1318007 MHz
SI                    32768
SF             400.1300099 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```



CMSO162C




```
NAME                CMSO162
EXPNO                     3
PROCNO                    1
Date_              20141107
Time                  0.32
INSTRUM               spect
PROBHD   5 mm PABBO BB-
PULPROG             zgpg30
TD                    65536
SOLVENT               CDCl3
NS                       19
DS                        2
SWH               24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631988 sec
RG                      203
DW                 20.800 usec
DE                    6.50 usec
TE                   298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
NUC1                   13C
P1                    9.50 usec
PL1                  -2.00 dB
PL1W           58.52175522 W
SFO1           100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                    1H
PCPD2                80.00 usec
PL2                   0.00 dB
PL12                 15.00 dB
PL13                 15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2           400.1316005 MHz
SI                    32768
SF             100.6127859 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```



CMSO170H

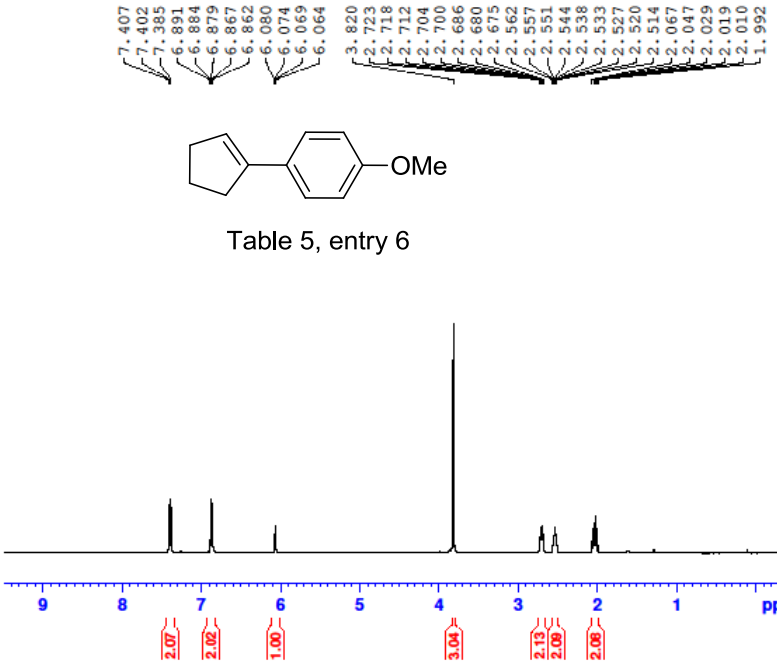
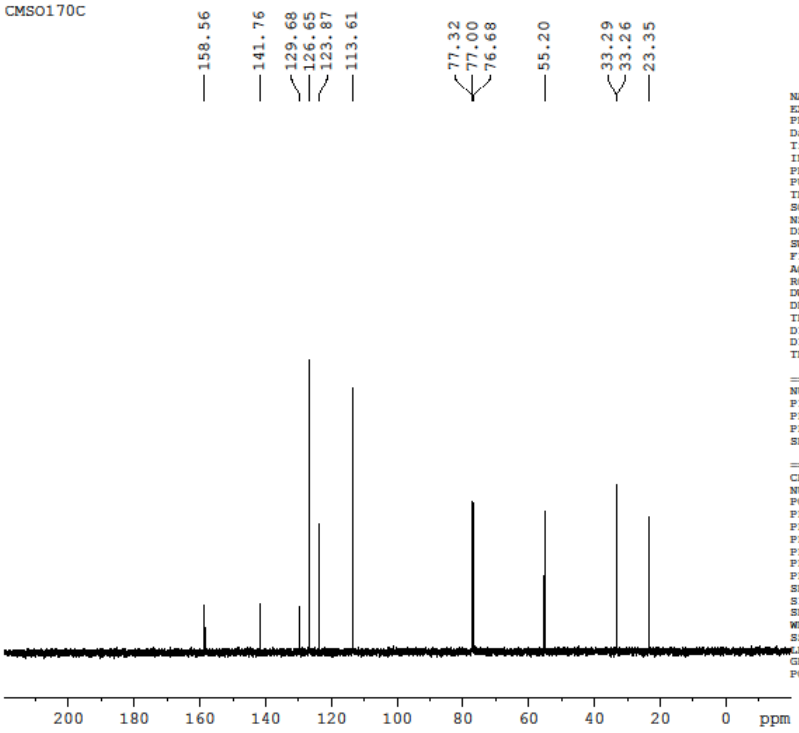


Table 5, entry 6

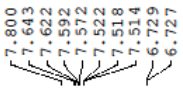
```
NAME            CMSO170
EXPNO                 1
PROCNO                1
Date_          20141106
Time              13.55
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG           zg30
TD               32768
SOLVENT          CDCl3
NS                   13
DS                    2
SWH           4006.410 Hz
FIDRES        0.122266 Hz
AQ            4.0894966 sec
RG                 25.4
DW              124.800 usec
DE                6.50 usec
TE               297.4 K
D1            1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                1H
P1               14.70 usec
PL1               0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI               32768
SF         400.1300093 MHz
WDW                 EM
SSB                  0
LB                0.30 Hz
GB                   0
PC                1.00
```

CMSO170C




```
NAME            CMSO170
EXPNO                 2
PROCNO                1
Date_          20141106
Time              13.58
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG         zgpg30
TD               65536
SOLVENT          CDCl3
NS                   25
DS                    2
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG                  203
DW              20.800 usec
DE                6.50 usec
TE               298.1 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                13C
P1                9.50 usec
PL1              -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                1H
PCPD2            80.00 usec
PL2               0.00 dB
PL12             15.00 dB
PL13             15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI               32768
SF         100.6127752 MHz
WDW                 EM
SSB                  0
LB                1.00 Hz
GB                   0
PC                1.40
```

CMSO206H



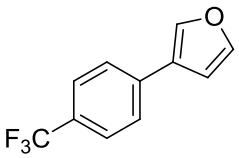
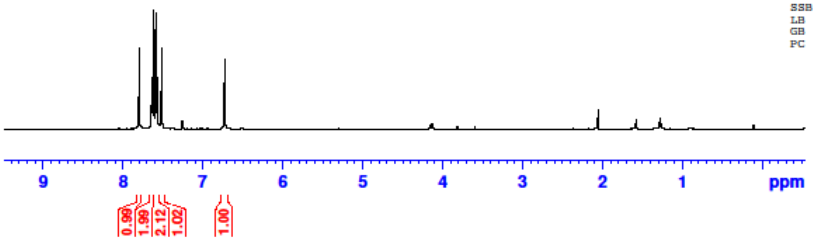


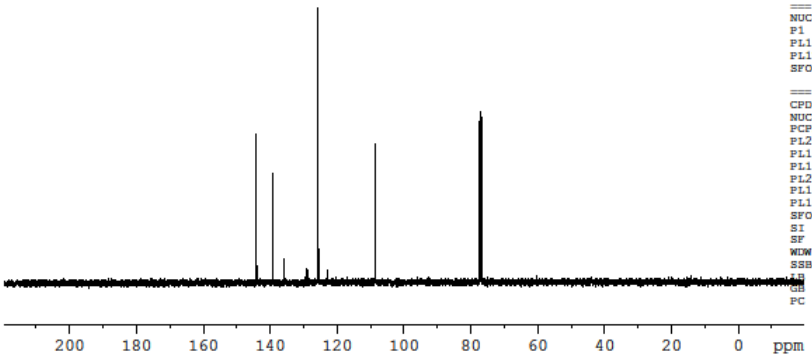
Table 6, entry 1

```
NAME            CMSO206
EXPNO                 1
PROCNO                1
Date_          20141111
Time              19.52
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    8
DS                    2
SWH            4006.410 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                   64
DW              124.800 usec
DE                6.50 usec
TE               297.4 K
D1            1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 1H
P1                14.70 usec
PL1                0.00 dB
PL1W        11.88122272 W
SFO1       400.1318007 MHz
SI                32768
SF         400.1300098 MHz
WDW                  EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
```



CMSO206C


```
NAME            CMSO206
EXPNO                 2
PROCNO                1
Date_          20141111
Time              19.56
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   22
DS                    2
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW              20.800 usec
DE                6.50 usec
TE               298.1 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                13C
P1                9.50 usec
PL1               -2.00 dB
PL1W        58.52175522 W
SFO1       100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                 1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W        11.88122272 W
PL12W        0.37571725 W
PL13W        0.37571725 W
SFO2       400.1316005 MHz
SI                32768
SF         100.6127722 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
```



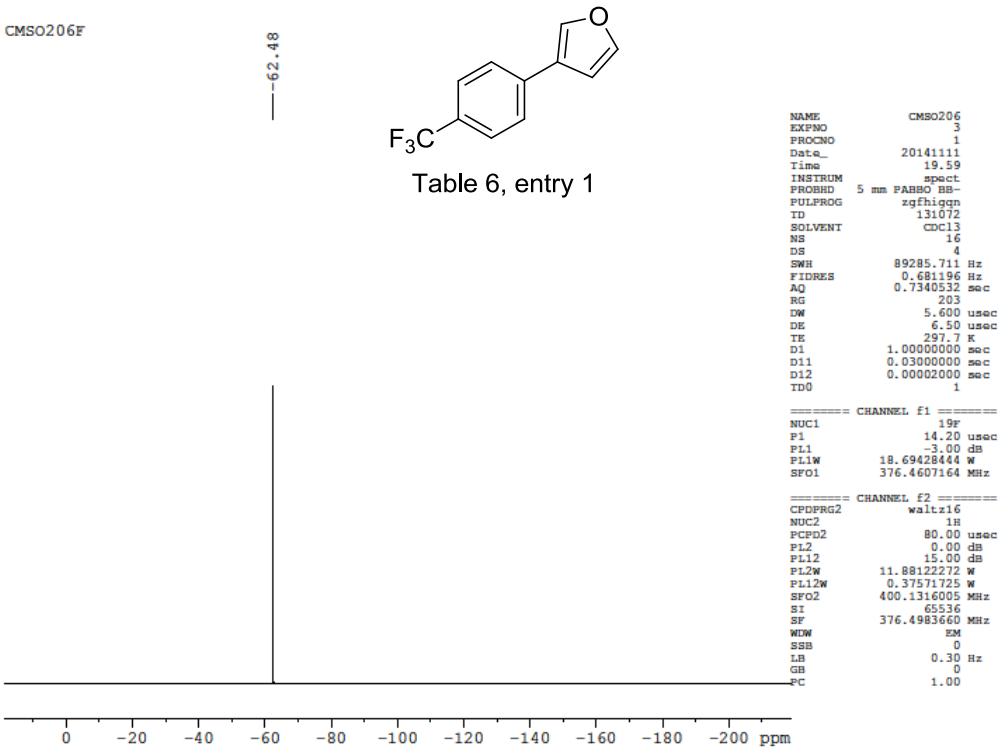


Table 6, entry 1

NAME	CMSO206
EXPNO	3
PROCNO	1
Date_	20141111
Time	19.59
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgfhigqn
TD	131072
SOLVENT	CDCl3
NS	16
DS	4
SWH	89285.711 Hz
FIDRES	0.681196 Hz
AQ	0.7340532 sec
RG	203
DW	5.600 usec
DE	6.50 usec
TE	297.7 K
D1	1.00000000 sec
D11	0.03000000 sec
D12	0.00002000 sec
TD0	1
======= CHANNEL f1 =======	
NUC1	19F
P1	14.20 usec
PL1	-3.00 dB
PL1W	18.69428444 W
SFO1	376.4607164 MHz
======= CHANNEL f2 =======	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	0.00 dB
PL12	15.00 dB
PL2W	11.88122272 W
PL12W	0.37571725 W
SFO2	400.1316005 MHz
SI	65536
SF	376.4983660 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

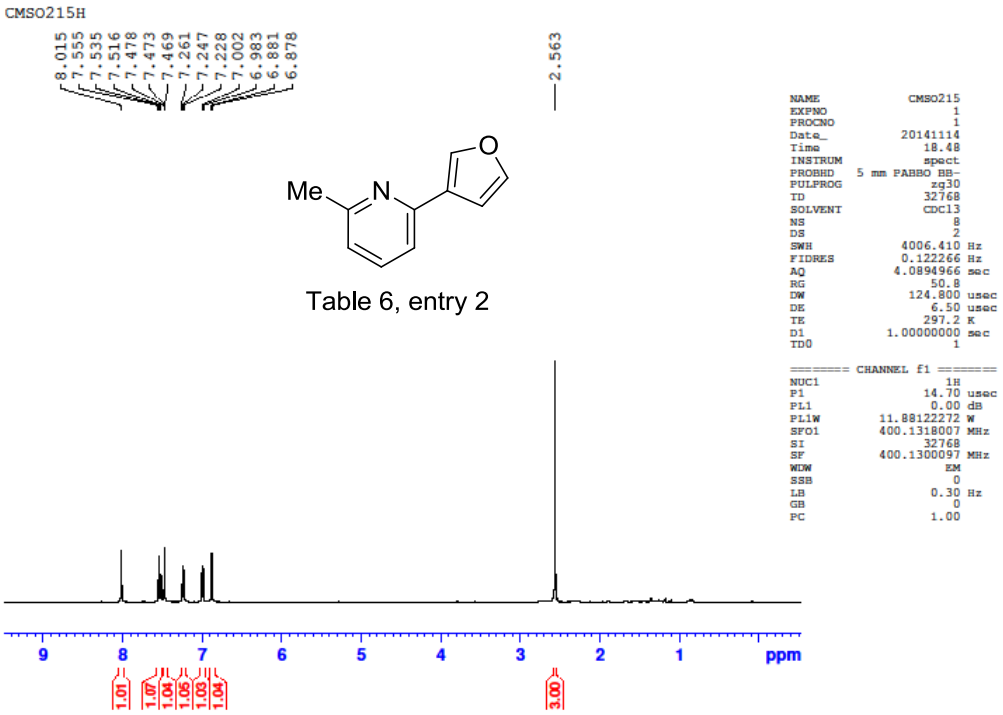
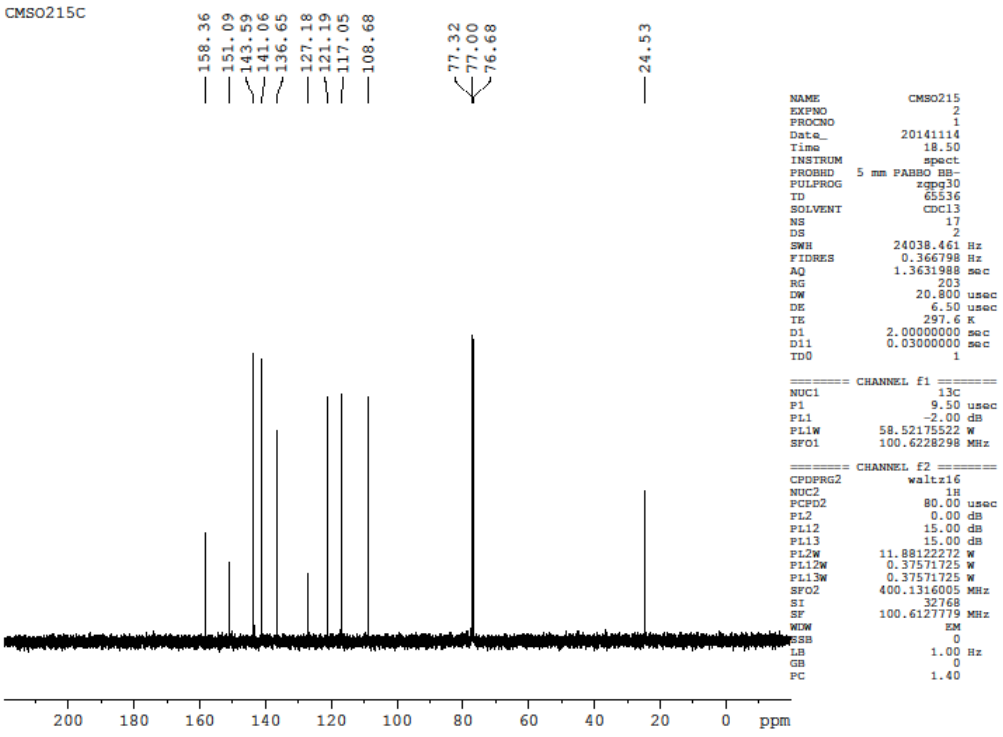


Table 6, entry 2



HS

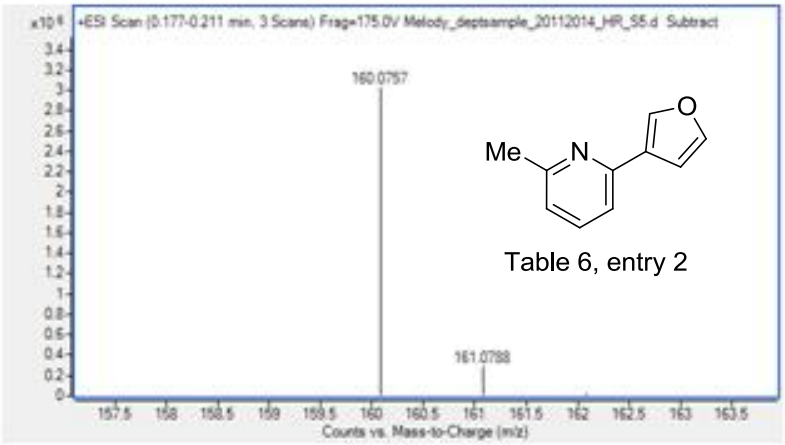


Table 6, entry 2

Mass	Calc. Mass	mDa	PPM	Formula
160.0757	160.0757	0	0	C10 H10 N O

CMSO210H

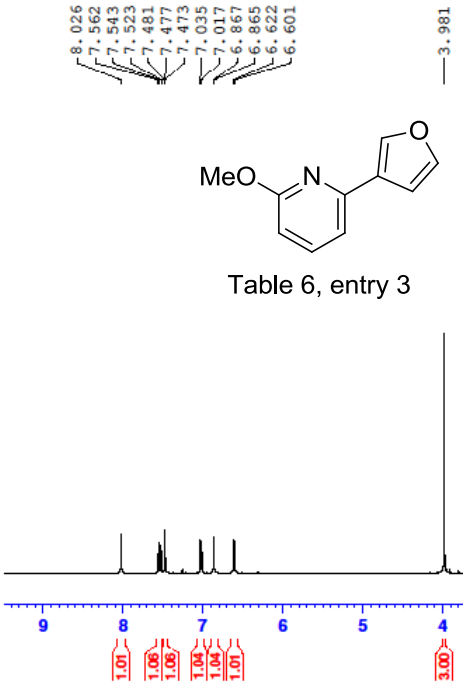
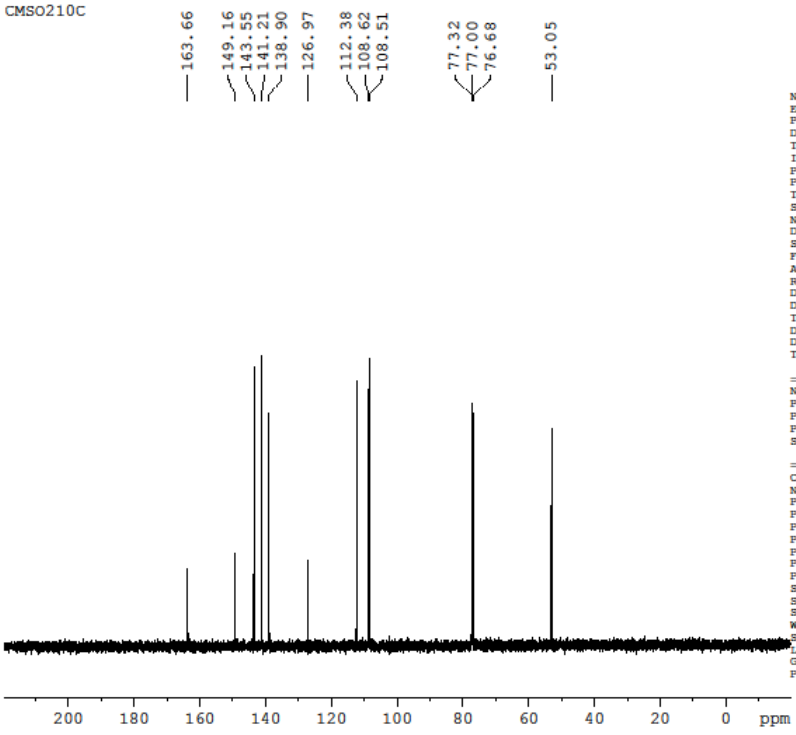


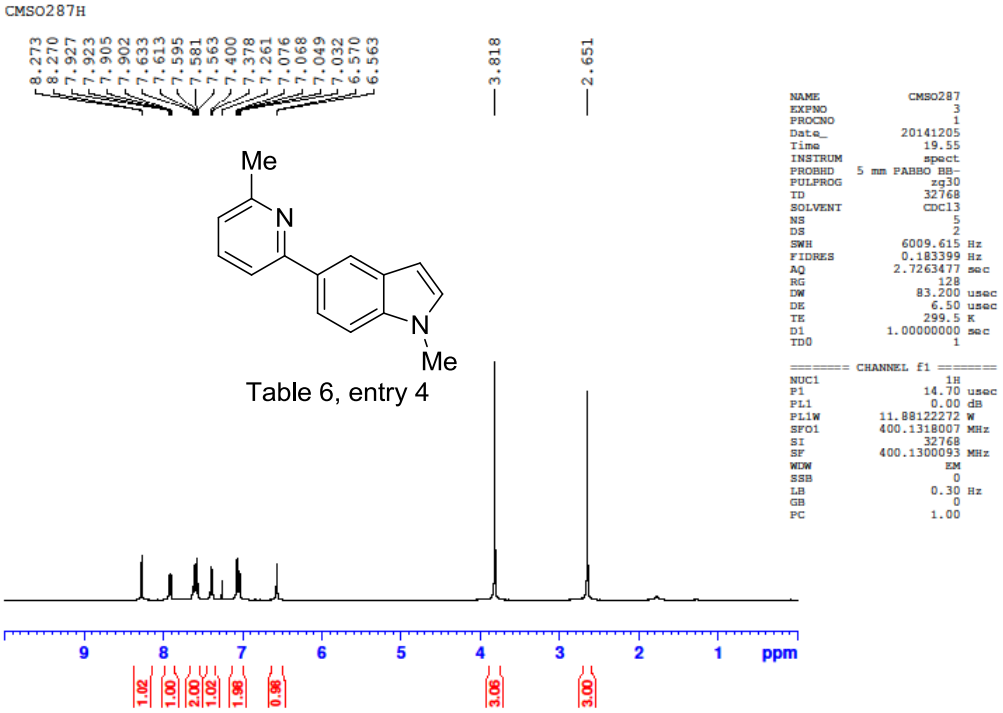
Table 6, entry 3

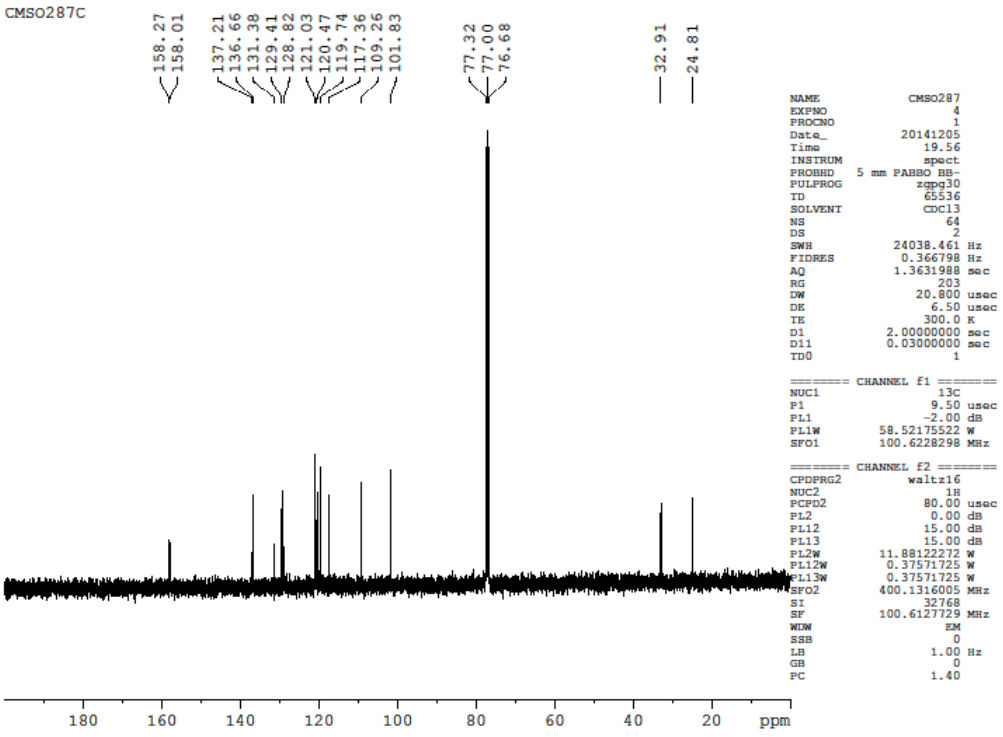
```
NAME            CMSO210
EXPNO                 1
PROCNO                1
Date_          20141114
Time              18.41
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                32768
SOLVENT           CDCl3
NS                    5
DS                    2
SWH            4006.410 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                 25.4
DW               124.800 usec
DE                6.50 usec
TE                297.1 K
D1             1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                  1H
P1                14.70 usec
PL1                0.00 dB
PL1W          11.88122272 W
SFO1         400.1318007 MHz
SI                32768
SF           400.1300097 MHz
WDW                  EM
SSB                   0
LB                 0.30 Hz
GB                    0
PC                 1.00
```

CMSO210C




```
NAME            CMSO210
EXPNO                 2
PROCNO                1
Date_          20141114
Time              18.44
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                   14
DS                    2
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631988 sec
RG                  203
DW               20.800 usec
DE                6.50 usec
TE                297.6 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.50 usec
PL1               -2.00 dB
PL1W          58.52175522 W
SFO1         100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                  1H
PCPD2             80.00 usec
PL2                0.00 dB
PL12              15.00 dB
PL13              15.00 dB
PL2W          11.88122272 W
PL12W          0.37571725 W
PL13W          0.37571725 W
SFO2         400.1316005 MHz
SI                32768
SF           100.6127781 MHz
WDW                  EM
SSB                   0
LB                 1.00 Hz
GB                    0
PC                 1.40
```


CMSO287H
8.273
8.270
7.927
7.923
7.905
7.902
7.633
7.613
7.595
7.581
7.563
7.400
7.378
7.261
7.076
7.068
7.049
7.032
6.570
6.563
3.818
2.651
Me
N
N
Me
Table 6, entry 4
NAME CMSO287
EXPNO 3
PROCNO 1
Date_ 20141205
Time 19.55
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 5
DS 2
SWH 6009.615 Hz
FIDRES 0.183399 Hz
AQ 2.7263477 sec
RG 128
DW 83.200 usec
DE 6.50 usec
TE 299.5 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 14.70 usec
PL1 0.00 dB
PL1W 11.88122272 W
SFO1 400.1318007 MHz
SI 32768
SF 400.1300093 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
9 8 7 6 5 4 3 2 1 ppm
1.02 1.00 2.00 1.02 1.96 0.98 3.06 3.00


CMSO287C
158.27
158.01
137.21
136.66
131.38
129.41
128.82
121.03
120.47
119.74
117.36
109.26
101.83
77.32
77.00
76.68
32.91
24.81
NAME CMSO287
EXPNO 4
PROCNO 1
Date_ 20141205
Time 19.56
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 64
DS 2
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631988 sec
RG 203
DW 20.800 usec
DE 6.50 usec
TE 300.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 9.50 usec
PL1 -2.00 dB
PL1W 58.52175522 W
SFO1 100.6228298 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 0.00 dB
PL12 15.00 dB
PL13 15.00 dB
PL2W 11.88122272 W
PL12W 0.37571725 W
PL13W 0.37571725 W
SFO2 400.1316005 MHz
SI 32768
SF 100.6127729 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
180 160 140 120 100 80 60 40 20 ppm

HS

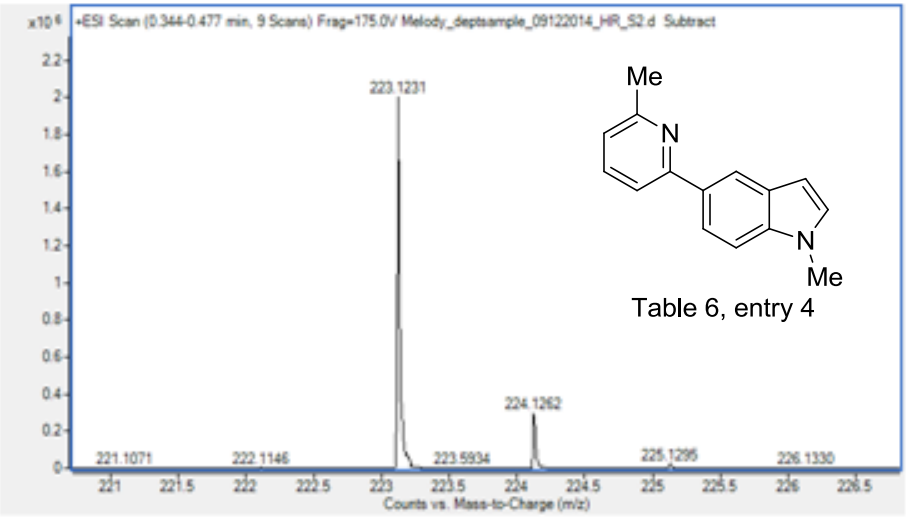
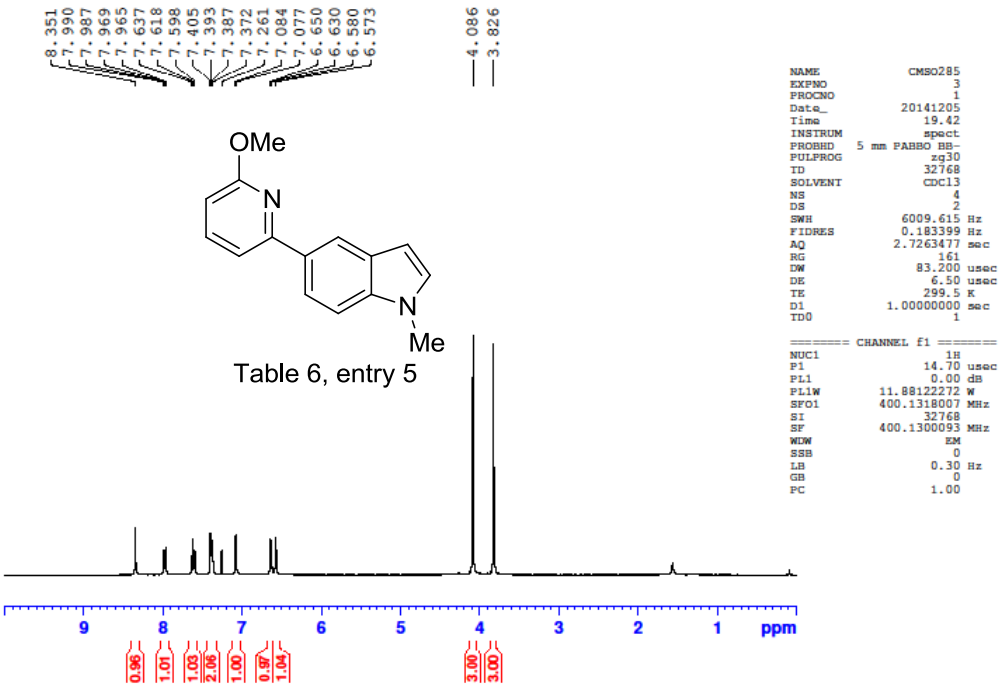


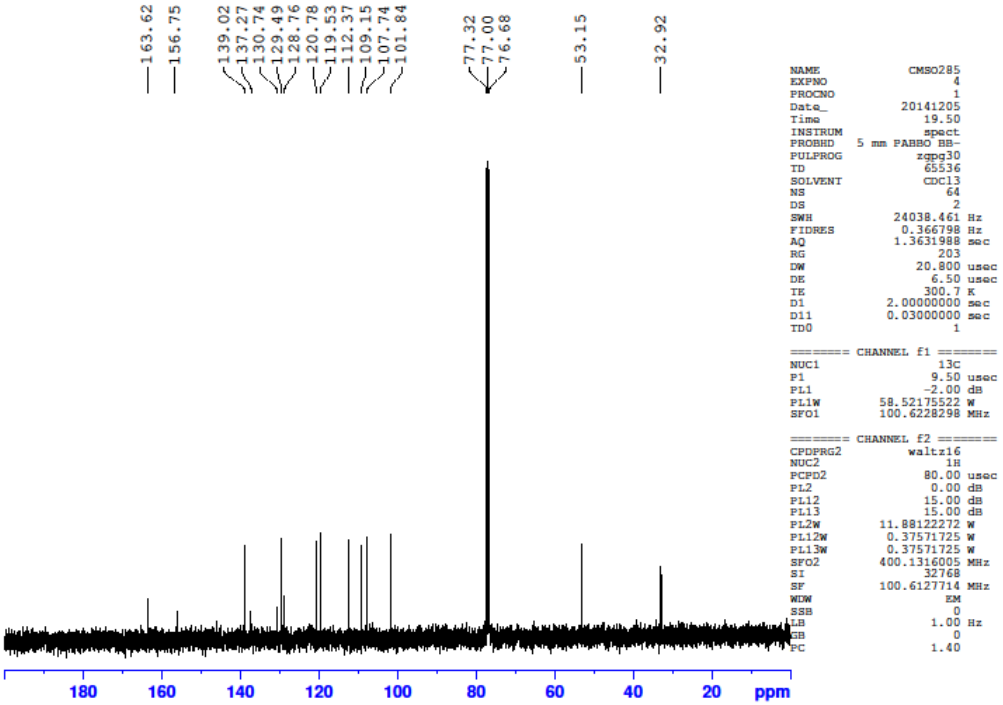
Table 6, entry 4

Mass	Calc. Mass	mDa	PPM	Formula
223.1231	223.1230	0.1	0.4	C15 H15 N2

CMSO285H



CMSO285C



HS

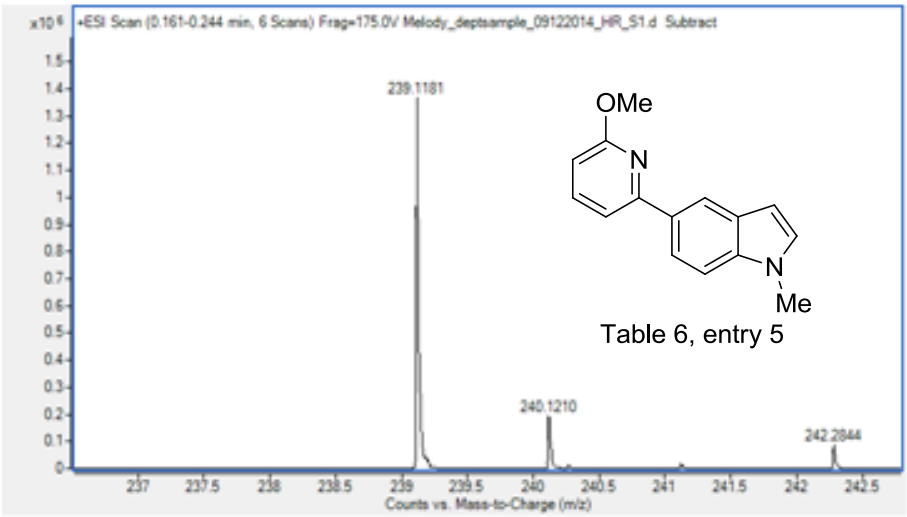
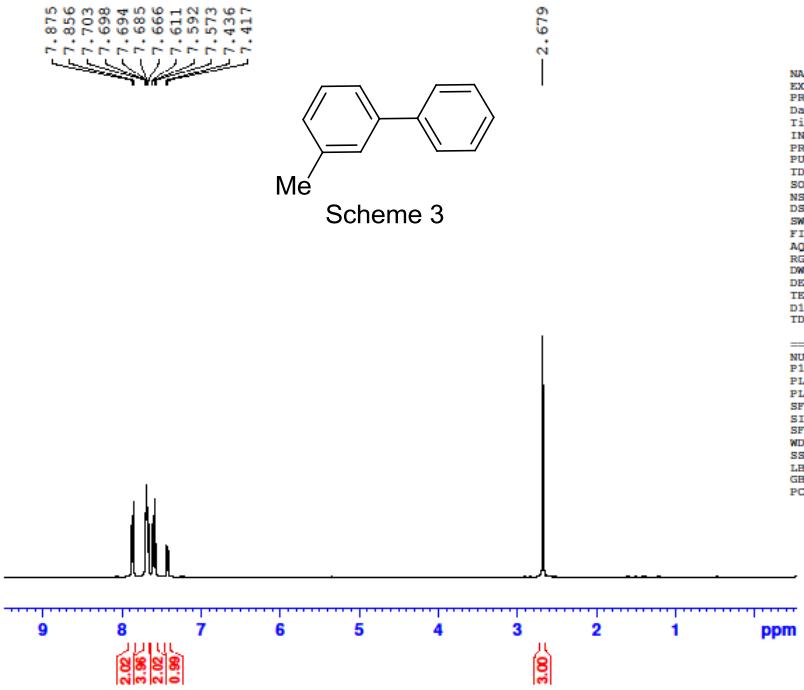


Table 6, entry 5

Mass	Calc. Mass	mDa	PPM	Formula
239.1181	239.1179	0.2	0.8	C15 H15 N2 O

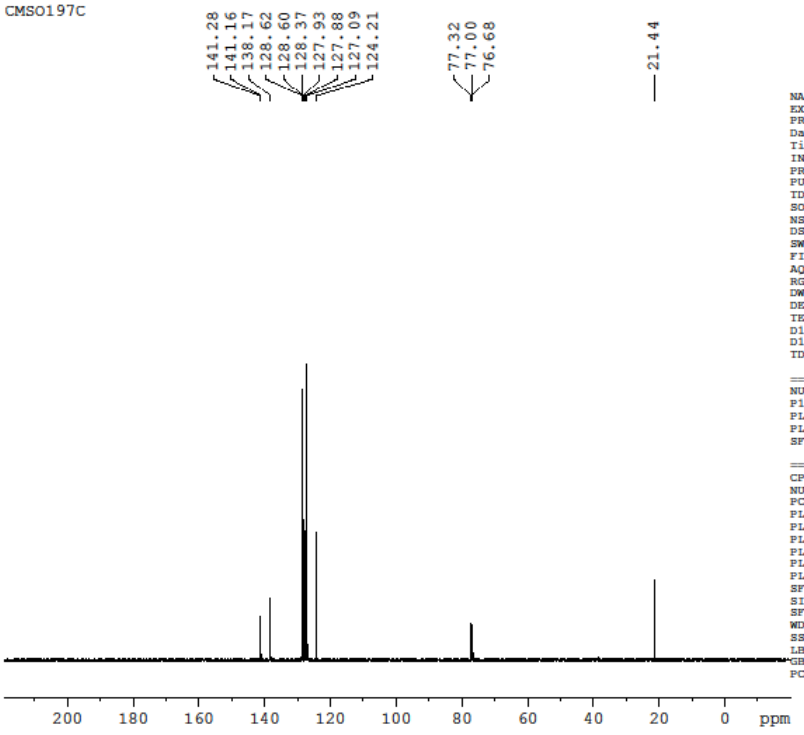
CMSO197H



Scheme 3

```
NAME              CMSO197
EXPNO                   1
PROCNO                  1
Date_            20141107
Time                 0.19
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG              zg30
TD                  32768
SOLVENT             CDCl3
NS                     10
DS                      2
SWH             4006.410 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                   12.7
DW                124.800 usec
DE                  6.50 usec
TE                 297.2 K
D1              1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                   1H
P1                  14.70 usec
PL1                  0.00 dB
PL1W           11.88122272 W
SFO1          400.1318007 MHz
SI                  32768
SF            400.1300095 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

CMSO197C




```
NAME              CMSO197
EXPNO                   2
PROCNO                  1
Date_            20141107
Time                 0.21
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                  65536
SOLVENT             CDCl3
NS                      9
DS                      2
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ              1.3631988 sec
RG                    203
DW                20.800 usec
DE                  6.50 usec
TE                 297.5 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
NUC1                  13C
P1                   9.50 usec
PL1                 -2.00 dB
PL1W           58.52175522 W
SFO1          100.6228298 MHz

======== CHANNEL f2 ========
CPDPRG2           waltz16
NUC2                   1H
PCPD2               80.00 usec
PL2                  0.00 dB
PL12                15.00 dB
PL13                15.00 dB
PL2W           11.88122272 W
PL12W           0.37571725 W
PL13W           0.37571725 W
SFO2          400.1316005 MHz
SI                  32768
SF            100.6128085 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```

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