

Supporting information for:

Novel method of aromatic coupling between N-aryl methanesulfonamide and thiophene derivatives.

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SUPPORTING INFORMATION

A. Experimental protocols. Unless otherwise indicated, proton and ^{13}C NMR spectra were recorded at 300 and 75 MHz, respectively, in CDCl_3 solutions. Chemical shifts are reported in ppm on the δ scale. Multiplicities are described as s (singlet), d (doublet), st (sextuplet), dd, ddd, etc. (doublet of doublets, doublet of doublets of doublets, etc.), t (triplet), q (quartet) m (multiplet), and further qualified as br (broad). Coupling constants, J, are reported in Hz. Low- and high-resolution mass spectra (m/e) were measured in the EI mode.

1: Procedure for reaction with thiophene in TFE, compounds a-e, 5, 11, 13, 20, 21, 23:

A solution of PhI(OAc)_2 ("DIB", 56 mg, 0.17 mmol, 1.1 equiv.) in $\text{CF}_3\text{CH}_2\text{OH}$ ("TFE", 0.3 mL) was added to a vigorously stirred solution of sulphonamide (0.15 mmol, 1 equiv.) in thiophene (152 mg, 1.8 mmol, 12 equiv.) and TFE (0.50 mL).

NB: For compounds (**5, 13, 20, 21, 23**) one drop of TFA (CF_3COOH) was added to the mixture to drop pH and to complete the reaction just after addition of DIB. The mixture was then stirred for 10 min, concentrated under vacuum, diluted with CHCl_3 (4 mL) and camphor sulphonic acid was added (~4 mg, 0.015 mmol, 10%). The reaction was then stirred for 2 hours, concentrated and compounds were purified by silica gel chromatography of the residue, with 1:4 AcOEt / hexane, (except for compound **d** with 3:2 AcOEt / hexane).

2: Procedure for reaction with thiophene in HFIP, compounds a-e, 5, 11, 13, 20, 21, 23:

A solution of PhI(OAc)_2 ("DIB", 56 mg, 0.17 mmol, 1.1 equiv.) in $(\text{CF}_3)_2\text{CHOH}$ ("HFIP", 0.3 mL) was added to a vigorously stirred solution of sulphonamide (0.15 mmol, 1 equiv.) in thiophene (126 mg, 1.5 mmol, 10 equiv.) and HFIP (0.5 mL). The mixture was then stirred for 10 min and concentrated under vacuum, diluted with CHCl_3 (4 mL) and camphor sulphonic acid was added (~4 mg, 0.015 mmol, 10%). The reaction was then stirred for 2 hours, concentrated and compounds were purified by silica gel chromatography of the residue, with 1:4 AcOEt / hexane, (except for compound **d** with 3:2 AcOEt / hexane).

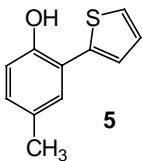
3: Procedure for reaction with 3-bromo-thiophene in HFIP, compounds f-j:

A solution of PhI(OAc)_2 ("DIB", 56 mg, 0.17 mmol, 1.1 equiv.) in $(\text{CF}_3)_2\text{CHOH}$ ("HFIP", 0.3 mL) was added to a vigorously stirred solution of sulphonamide (0.15 mmol, 1 equiv.) in 3-bromo-thiophene (245 mg, 1.5 mmol, 10 equiv.), HFIP (0.5 mL) and to MeCN (~0.05 mL) to homogenize layers. The mixture was then stirred for 10 min and concentrated under vacuum. Compounds were purified by silica gel chromatography of the residue, with 1:4 AcOEt / hexane, (except for compound **d** with 1:1 AcOEt / hexane).

4: Procedure for reaction with methylthiophene, compounds k-m, 15/16.

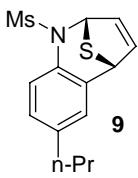
Same procedure as **1** or **2**: compounds were purified by silica gel chromatography of the residue, with 1:4 AcOEt / hexane.

B: Descriptions:

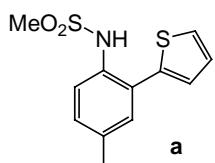


RMN ¹H (300 MHz, CDCl₃) δ = 7.39 (dd, 1H, J = 5.3, 1.2 Hz), 7.29 (dd, 1H, J = 3.5, 1.2 Hz), 7.22 (d, 1H, J = 1.2 Hz), 7.14 (dd, 1H, J = 5.3, 3.5 Hz), 7.04 (dd, 1H, J = 8.2, 2.3 Hz), 6.86 (d, 1H, J = 8.2 Hz), 5.33 (br, 1H), 2.31 (s, 3H).

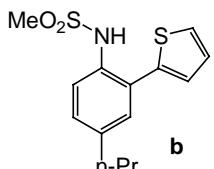
IR: 3502; 2924; 1495; 1216 (cm⁻¹). **HRMS:** calc. for C₁₁H₁₀OS₁ (M⁺): 190.0452; found: 190.0455.



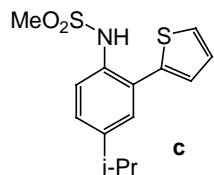
RMN ¹H (300 MHz, CDCl₃) δ = 7.32 (d, 1H, J = 8.8 Hz), 7.08 (d, 1H, J = 8.8 Hz), 7.07 (s, 1H), 6.41 (dd, 1H, J = 5.9, 1.2 Hz), 5.79 (dd, 1H, J = 5.9, 1.2 Hz), 5.74 (dm, 1H, J = 10 Hz), 5.45 (d, 1H, J = 10 Hz), 2.89 (s, 3H), 2.55 (t, 2H, J = 7.6 Hz), 1.60 (m, 2H), 0.94 (t, 3H, J = 7.3 Hz). **IR:** 2924; 1484; 1350; 1150 (cm⁻¹). **HRMS:** calc. for C₁₄H₂₀N₁₇O₂S₂ (M⁺): 295.0701; found: 295.0705.



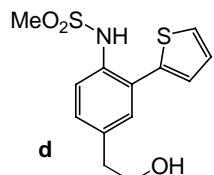
RMN ¹H (300 MHz, CDCl₃) δ = 7.56 (d, 1H, J = 8.2 Hz), 7.43 (dd, 1H, J = 5.3, 1.2 Hz), 7.22 (s, 1H), 7.20 (d, 1H, J = 8.2 Hz), 7.14 (dd, 1H, J = 5.3, 3.5 Hz), 7.09 (dd, 1H, J = 3.5, 1.2 Hz), 6.69 (br, 1H), 2.89 (s, 3H), 2.36 (s, 3H). **RMN ¹³C** (75 MHz, CDCl₃) δ = 138.2, 135.0, 132.0, 131.8, 130.2, 128.0, 127.2, 126.9, 125.9, 121.1, 39.4, 20.6. **IR:** 3287; 2922; 1325; 1157 (cm⁻¹). **HRMS:** calc. for C₁₂H₁₃N₁O₂S₂ (M⁺): 267.0388; found: 267.0387.



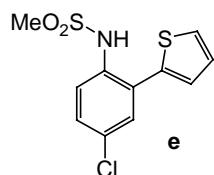
Mp: 61°C. **RMN ¹H** (300 MHz, CDCl₃) δ = 7.56 (d, 1H, J = 8.2 Hz), 7.43 (dd, 1H, J = 5.3, 1.2 Hz), 7.22-7.10 (m, 4H), 6.74 (br, 1H), 2.90 (s, 3H), 2.59 (t, 2H, J = 7.3 Hz), 1.65 (st, 2H, J = 7.3 Hz), 0.96 (t, 3H, J = 7.3 Hz). **RMN ¹³C** (75 MHz, CDCl₃) δ = 139.7, 138.3, 131.8, 131.3, 129.5, 127.9, 127.1, 126.8, 125.9, 121.1, 39.4, 37.1, 24.3, 13.7. **IR:** 3284; 2923; 1327; 1156 (cm⁻¹). **HRMS:** calc. for C₁₄H₁₇N₁O₂S₂ (M⁺): 295.0701; found: 295.0704.



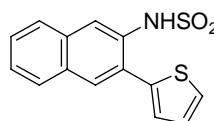
Mp: 84°C. **RMN** ¹H (300 MHz, CDCl₃) δ = 7.58 (d, 1H, J = 9.3 Hz), 7.44 (d, 1H, J = 5.3 Hz), 7.25 (m, 2H), 7.15 (dd, 1H, J = 5.3, 3.5 Hz), 7.10 (d, 1H, J = 2.3 Hz), 6.71 (br, 1H), 2.91 (s, 3H), 2.91 (m, 1H), 1.26 (d, 6H, 7.0 Hz). **RMN** ¹³C (75 MHz, CDCl₃) δ = 145.8, 138.5, 132.0, 129.5, 128.0, 127.6, 127.2, 126.9, 125.8, 121.0, 39.5, 33.4, 23.8. **IR:** 3282; 2921; 1325; 1154 (cm⁻¹). **HRMS:** calc. for C₁₄H₁₇N₁O₂S₂ (M⁺): 295.0701; found: 295.0697.



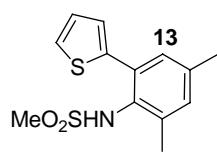
RMN ¹H (300 MHz, CDCl₃) δ = 7.60 (d, 1H, J = 8.2 Hz), 7.44 (d, 1H, J = 4.7 Hz), 7.26 (m, 2H), 7.15 (dd, 1H, J = 5.3, 3.5 Hz), 7.10 (d, 1H, J = 3.5 Hz), 6.75 (br, 1H), 3.88 (t, 2H, J = 6.4 Hz), 2.93 (s, 3H), 2.86 (t, 2H, J = 6.4 Hz). **RMN** ¹³C (75 MHz, CDCl₃) δ = 138.0, 135.5, 132.8, 132.0, 130.1, 128.0, 127.3, 127.1, 127.1, 126.0, 120.9, 63.3, 39.7, 38.2. **IR:** 3506; 3288; 2928; 1495; 1327; 1152 (cm⁻¹). **HRMS:** calc. for C₁₃H₁₅N₁O₃S₂ (M⁺): 297.0493; found: 297.0496.



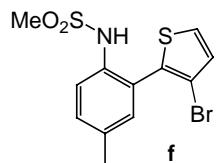
Mp: 92°C. **RMN** ¹H (300 MHz, CDCl₃) δ = 7.62 (d, 1H, 8.2 Hz), 7.48 (dd, 1H, J = 4.7, 1.2 Hz), 7.40 (d, 1H, J = 2.3 Hz), 7.36 (dd, 1H, J = 8.8, 2.3 Hz), 7.17 (dd, 1H, J = 5.3, 3.5 Hz), 7.12 (dd, 1H, J = 3.5, 1.2 Hz), 6.75 (br, 1H), 2.94 (s, 3H). **RMN** ¹³C (75 MHz, CDCl₃) δ = 136.4, 133.1, 131.1, 130.3, 129.5, 128.2, 127.7, 127.8, 127.2, 121.7, 39.7. **IR:** 3277; 1483; 1329; 1158 (cm⁻¹). **HRMS:** calc. for C₁₁H₁₀Cl₁N₁O₂S₁ (M⁺): 286.9842; found: 286.9841.



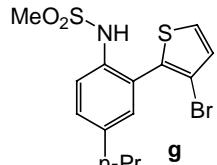
Mp: 141°C. **RMN** ¹H (300 MHz, CDCl₃) δ = 7.95 (s, 2H), 7.89 (dd, 1H, J = 8.2, 2.3 Hz), 7.62 (s, 1H, J = 5.3, 1.2 Hz), 7.54-7.40 (m, 3H), 7.29 (dd, 1H, J = 4.7, 2.9 Hz), 7.11 (dd, 1H, J = 3.7, 1.2 Hz), 6.63 (br, 1H), 2.96 (s, 3H). **RMN** ¹³C (75 MHz, CDCl₃) δ = 140.7, 139.5, 138.3, 133.3, 132.0, 129.6, 128.8, 127.4, 127.2, 126.3, 40.6, 20.9, 19.6. **IR:** 3318; 1595; 1400; 1313; 1160; 982 (cm⁻¹). **HRMS:** calc. for C₁₅H₁₃N₁O₂S₂ (M⁺): 303.0388; found: 303.0386.



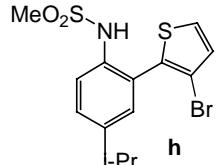
RMN ^1H (300 MHz, CDCl_3) δ = 7.39 (dd, 1H, J = 5.3, 1.2 Hz), 7.16 (dd, 1H, J = 3.5, 1.2 Hz), 7.14 (s, 1H), 7.12 (s, 1H), 7.10 (dd, 1H, J = 5.3, 3.5 Hz), 6.20 (br, 1H), 2.48 (s, 3H), 2.44 (s, 3H), 2.34 (s, 3H). **RMN ^{13}C** (75 MHz, CDCl_3) δ = 134.4, 134.0, 133.9, 130.5, 129.8, 128.3 $^{*}2$, 127.8, 127.2, 125.6, 125.4, 120.1, 119.2, 118.7, 39.7. **IR:** 3269; 2924; 2054; 1472; 1386; 1316; 1146; 975 (cm^{-1}). **HRMS:** calc. for $\text{C}_{13}\text{H}_{15}\text{N}_1\text{O}_2\text{S}_2$ (M^+): 281.0544; found: 281.0547.



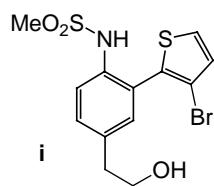
Mp: 72°C. **RMN ^1H** (300 MHz, CDCl_3) δ = 7.60 (d, 1H, J = 8.2 Hz), 7.44 (d, 1H, J = 5.9 Hz), 7.27 (dd, 1H, J = 8.8, 1.7 Hz), 7.14 (s, 1H), 7.11 (d, 1H, J = 5.3 Hz), 6.37 (br, 1H), 2.88 (s, 3H), 2.37 (s, 3H). **RMN ^{13}C** (75 MHz, CDCl_3) δ = 135.0, 133.4, 132.7, 131.4, 130.9, 127.5, 123.8, 121.3, 111.3, 39.6, 20.6. **IR:** 3276; 2924; 1495; 1385; 1332; 1159 (cm^{-1}). **HRMS:** calc. for $\text{C}_{12}\text{H}_{12}\text{Br}_1\text{N}_1\text{O}_2\text{S}_2$ (M^+): 344.9493; found: 344.9494.



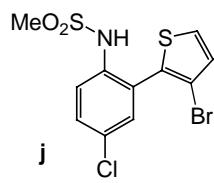
Mp: 89°C. **RMN ^1H** (300 MHz, CDCl_3) δ = 7.61 (d, H, J = 8.2 Hz), 7.43 (d, H, J = 5.3 Hz), 7.27 (dd, 1H, J = 8.2, 1.8 Hz), 7.14 (m, 2H), 7.11 (d, 1H, J = 5.3 Hz), 6.39 (br, 1H), 2.89 (s, 3H), 2.60 (t, 2H, J = 7.3 Hz), 1.65 (st, 2H, J = 7.3 Hz), 0.96 (t, 3H, J = 7.3 Hz). **RMN ^{13}C** (75 MHz, CDCl_3) δ = 139.7, 133.4, 132.7, 132.1, 130.9, 130.7, 127.5, 123.7, 121.2, 111.3, 39.6, 37.0, 24.2, 13.7. **IR:** 3278; 2924; 1494; 1385; 1331; 1157(cm^{-1}). **HRMS:** calc. for $\text{C}_{14}\text{H}_{16}\text{Br}_1\text{N}_1\text{O}_2\text{S}_2$ (M^+): 372.9806; found: 372.9805.



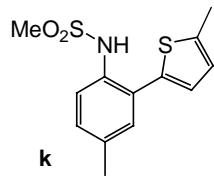
RMN ^1H (300 MHz, CDCl_3) δ = 7.62 (d, 1H, J = 8.2 Hz), 7.44 (d, 1H, J = 5.3 Hz), 7.32 (dd, 1H, J = 8.2, 2.3 Hz), 7.17 (s, 1H), 7.11 (d, 1H, J = 5.3 Hz), 6.40 (br, 1H), 2.89 (s, 3H), 2.89 (m, 1H), 1.26 (d, 2H, J = 6.4 Hz). **RMN ^{13}C** (75 MHz, CDCl_3) δ = 145.8, 133.6, 132.7, 130.9, 130.2, 128.7, 127.4, 123.8, 121.3, 111.2, 39.6, 33.3, 23.8. **IR:** 3281; 2921; 1498; 1385; 1330; 1159 (cm^{-1}). **HRMS:** calc. for $\text{C}_{14}\text{H}_{16}\text{Br}_1\text{N}_1\text{O}_2\text{S}_2$ (M^+): 372.9806; found: 372.9807.



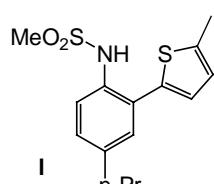
RMN ^1H (300 MHz, CDCl_3) δ = 7.64 (d, 1H, J = 8.2 Hz), 7.44 (d, 1H, J = 5.9 Hz), 7.33 (d, 1H, J = 8.2 Hz), 7.20 (s, 1H), 7.11 (d, 1H, J = 5.3 Hz), 6.42 (br, 1H), 3.88 (t, 2H, J = 6.4 Hz), 2.91 (s, 3H), 2.87 (t, 2H, J = 6.4 Hz). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 135.6, 133.6, 133.0, 132.8, 131.3, 131.0, 127.7, 123.8, 121.1, 111.4, 63.2, 39.8, 38.2. **IR:** 3510; 3288; 2921; 1491; 1329; 1152 (cm^{-1}). **HRMS:** calc. for $\text{C}_{13}\text{H}_{14}\text{Br}_1\text{N}_1\text{O}_3\text{S}_2$ ($\text{M}^+ \ddagger$): 374.9599; found: 374.9600.



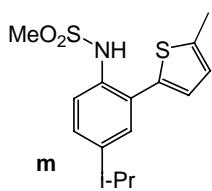
Mp: 105°C. **RMN** ^1H (300 MHz, CDCl_3) δ = 7.68 (d, 1H, J = 8.8 Hz), 7.48 (d, 1H, J = 5.3 Hz), 7.44 (dd, 1H, J = 8.8, 2.3 Hz), 7.32 (d, 1H, 2.3 Hz), 7.13 (d, 1H, J = 5.3 Hz), 6.40 (br, 1H), 2.94 (s, 3H). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 134.1, 132.0, 131.5, 131.1, 130.7, 130.1, 128.2, 124.9, 121.6, 112.0, 39.8. **IR:** 3275; 1482; 1329; 1155 (cm^{-1}). **HRMS:** calc. for $\text{C}_{11}\text{H}_{10}\text{Br}_1\text{Cl}_1\text{N}_1\text{O}_2\text{S}_2$ ($\text{M}^+ \ddagger$): 364.8947; found: 364.8947.



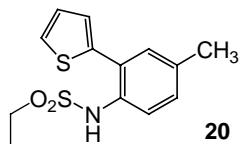
RMN ^1H (300 MHz, CDCl_3) δ = 7.54 (d, 1H, J = 8.2 Hz), 7.18 (s, 1H), 7.16 (dd, 1H, J = 8.2, 1.2 Hz), 6.86 (d, 1H, J = 2.9 Hz), 6.78 (d, 1H, J = 2.9 Hz), 6.77 (br, 1H), 2.90 (s, 3H), 2.53 (s, 3H), 2.34 (s, 3H). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 141.6, 135.7, 134.8, 131.8, 129.9, 127.2, 126.2, 126.1, 120.9, 131.7, 39.3, 20.6, 15.2. **IR:** 3280; 2920; 1327 (cm^{-1}). **HRMS:** calc. for $\text{C}_{13}\text{H}_{15}\text{N}_1\text{O}_2\text{S}_2$ ($\text{M}^+ \ddagger$): 281.0544; found: 281.0543.



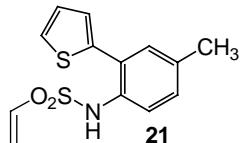
RMN ^1H (300 MHz, CDCl_3) δ = 7.55 (d, 1H, J = 8.2 Hz), 7.19 (s, 1H), 7.16 (d, 1H, J = 8.2 Hz), 6.87 (d, 1H, J = 2.9 Hz), 6.79 (br, 2H), 2.91 (s, 3H), 2.57 (t, 3H, J = 7.6 Hz), 2.53 (d, 3H, J = 1.2 Hz), 1.64 (st, 2H, J = 7.6 Hz), 0.96 (t, 3H, J = 7.6 Hz). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 141.6, 139.6, 135.8, 131.9, 131.2, 129.3, 127.2, 126.1, 123.7, 120.8, 39.3, 37.1, 24.3, 15.2, 13.7. **IR:** 3281; 2920; 1329; 1153(cm^{-1}). **HRMS:** calc. for $\text{C}_{15}\text{H}_{19}\text{N}_1\text{O}_2\text{S}_2$ ($\text{M}^+ \ddagger$): 309.0857; found: 309.0853.



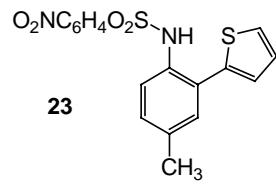
RMN ^1H (300 MHz, CDCl_3) δ = 7.53 (d, 1H, J = 8.2 Hz), 7.19 (d, 1H, J = 8.2 Hz), 7.17 (s, 1H), 6.83 (d, 1H, J = 2.9 Hz), 6.74 (br, 2H), 2.88 (s, 3H), 2.57 (t, 3H, J = 7.6 Hz), 2.53 (d, 3H, J = 1.2 Hz), 1.64 (st, 2H, J = 7.6 Hz), 0.96 (t, 3H, J = 7.6 Hz). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 145.7, 141.6, 132.0, 129.3, 128.9, 128.4, 127.4, 127.2, 126.1, 120.8, 39.4, 33.4, 23.8, 15.2. **IR:** 3280; 2924; 1325; 1152 (cm^{-1}). **HRMS:** calc. for $\text{C}_{15}\text{H}_{19}\text{N}_1\text{O}_2\text{S}_2$ (M^+): 309.0857; found: 309.0851.



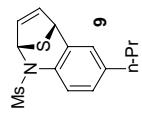
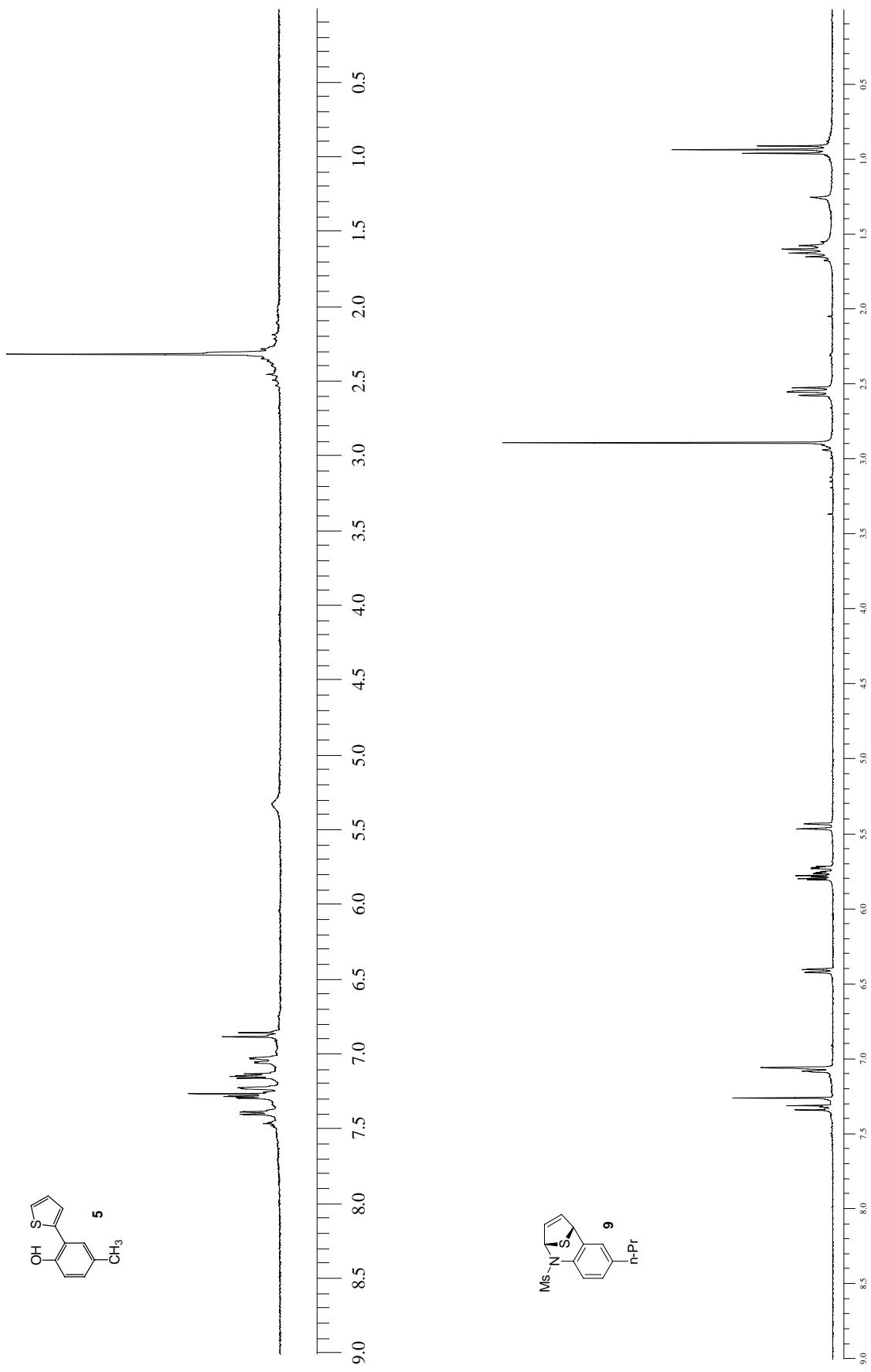
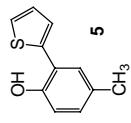
RMN ^1H (300 MHz, CDCl_3) δ = 7.56 (d, 1H, J = 8.2 Hz), 7.43 (dd, 1H, J = 5.3, 1.2 Hz), 7.19 (s, 1H), 7.17 (d, 1H, J = 8.2 Hz), 7.14 (dd, 1H, J = 5.3; 3.5 Hz), 7.10 (dd, 1H, J = 3.5, 1.2 Hz), 6.71 (br, 1H), 3.03 (q, 2H, J = 7.3 Hz), 2.34 (s, 3H), 1.20 (t, 3H, J = 7.3 Hz). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 138.3, 134.4, 132.0, 130.1, 128.0, 127.1, 126.9, 125.3, 123.6, 120.3, 46.1, 20.6, 7.9. **IR:** 3287; 2928; 1383; 1332; 1154 (cm^{-1}). **HRMS:** calc. for $\text{C}_{13}\text{H}_{15}\text{N}_1\text{O}_2\text{S}_2$ (M^+): 281.0544; found: 281.0546.



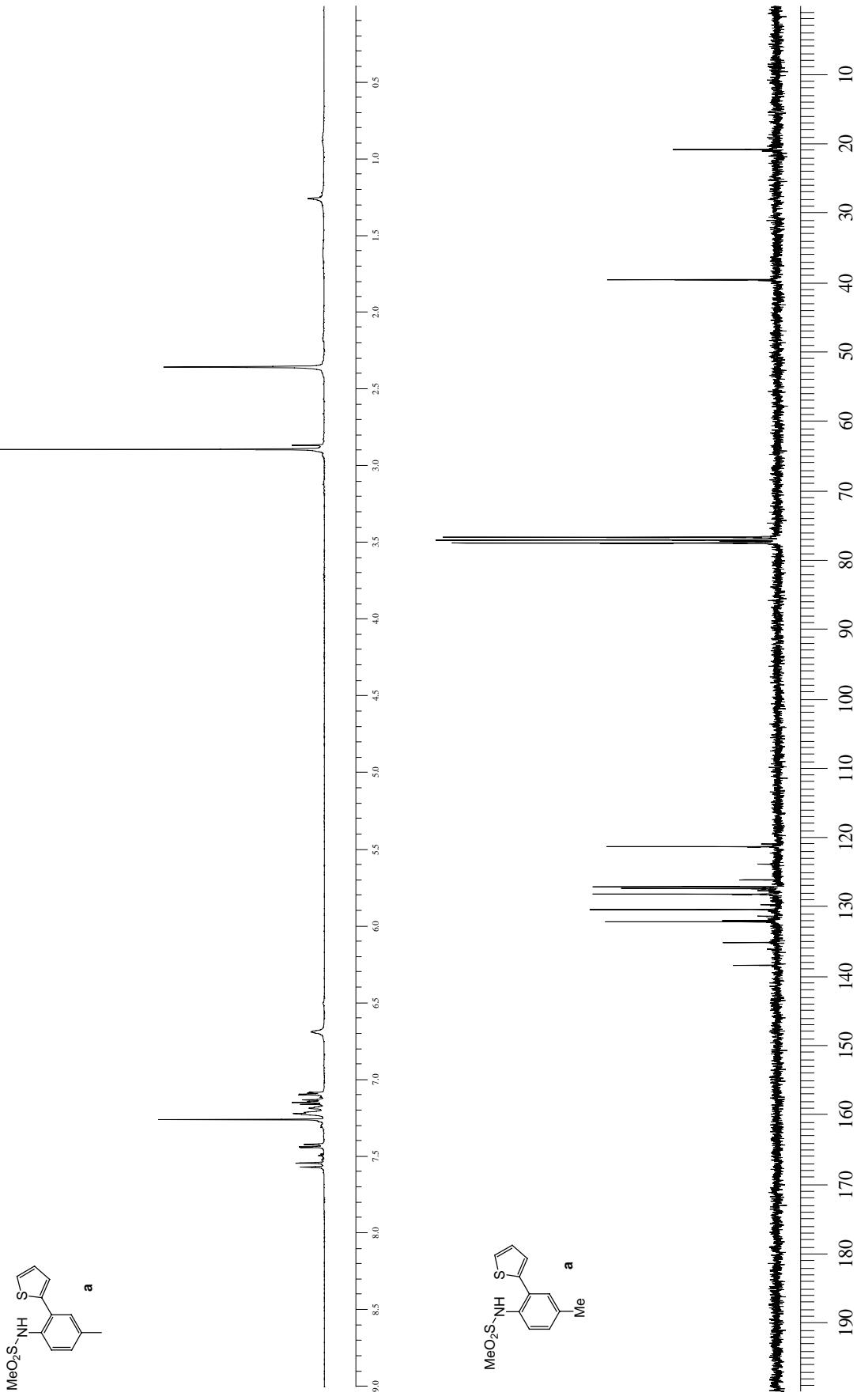
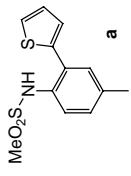
RMN ^1H (300 MHz, CDCl_3) δ = 7.49 (d, 1H, J = 7.6 Hz), 7.42 (d, 1H, J = 5.3 Hz), 7.21-7.10 (m, 3H), 7.07 (dd, 1H, J = 3.5, 1.2 Hz), 6.69 (br, 1H), 6.44 (dd, 1H, J = 16.4, 9.4 Hz), 6.23 (d, 1H, J = 16.4 Hz), 5.92 (d, 1H, J = 10.0 Hz), 2.34 (s, 3H). **RMN** ^{13}C (75 MHz, CDCl_3) δ = 138.3, 135.0, 134.7, 131.8, 131.3, 129.9, 128.2, 127.9, 127.1, 126.9, 125.9, 121.0, 20.6. **IR:** 3283; 2924; 1494; 1386; 1335; 1154 (cm^{-1}). **HRMS:** calc. for $\text{C}_{13}\text{H}_{13}\text{N}_1\text{O}_2\text{S}_2$ (M^+): 279.0388; found: 279.0388.

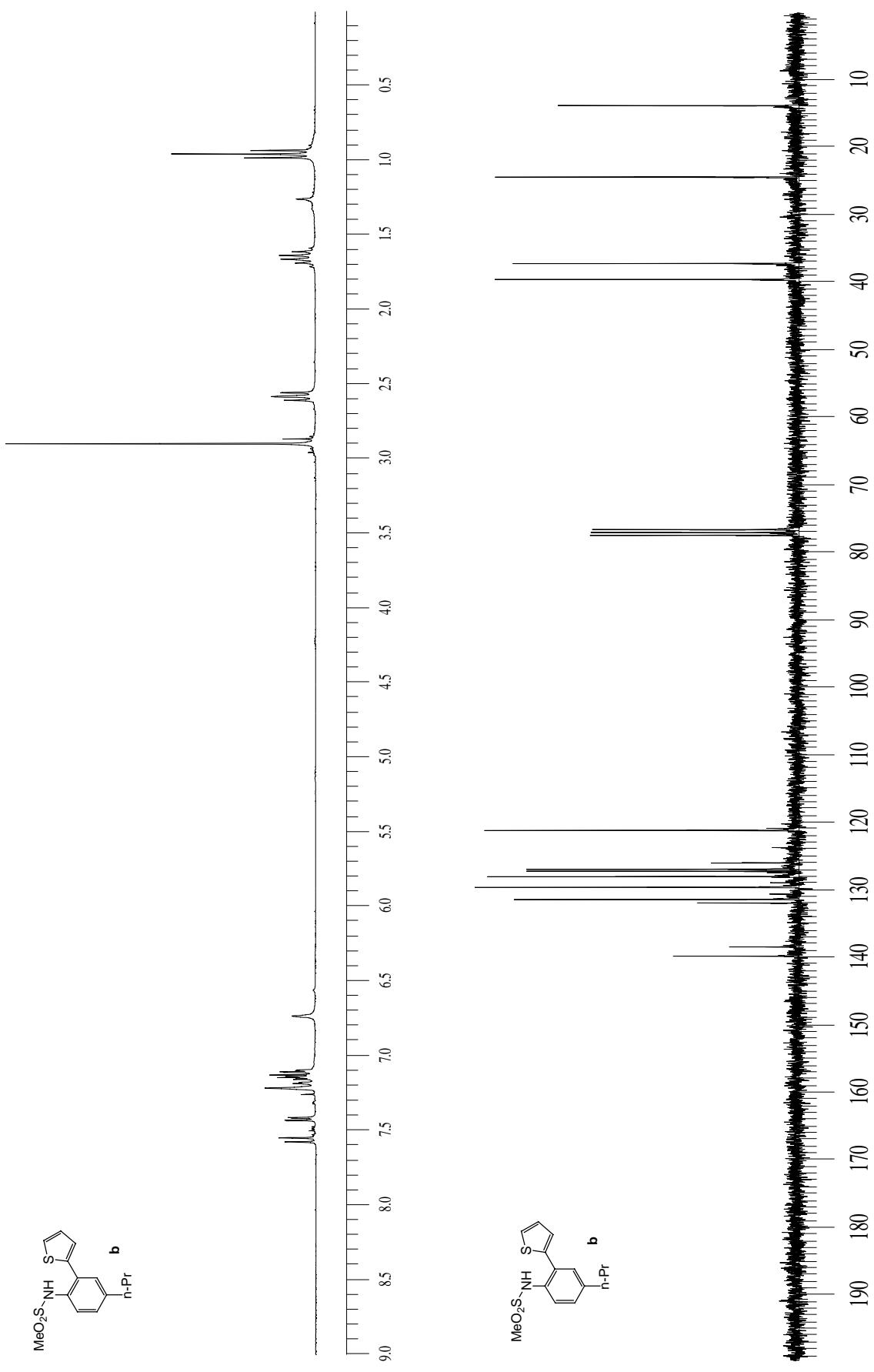
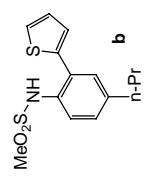


RMN ^1H (300 MHz, CDCl_3) δ = 8.18 (d, 2H, J = 8.8 Hz), 7.70 (d, 2H, J = 8.8 Hz), 7.59 (d, 1H, J = 8.8 Hz), 7.32 (dd, 1H, J = 5.3, 1.2 Hz), 7.19 (dd, 1H, J = 8.2, 1.8 Hz), 7.06 (s, 1H), 7.01 (dd, 1H, J = 5.3, 3.5 Hz), 6.98 (br, 1H), 6.66 (dd, 1H, J = 3.5, 1.2 Hz), 2.32 (s, 3H). **IR:** 3320; 2925; 1529; 1348; 1167.9 (cm^{-1}). **HRMS:** calc. for $\text{C}_{17}\text{H}_{14}\text{N}_2\text{O}_4\text{S}_2$ (M^+): 374.0395; found: 374.0394.

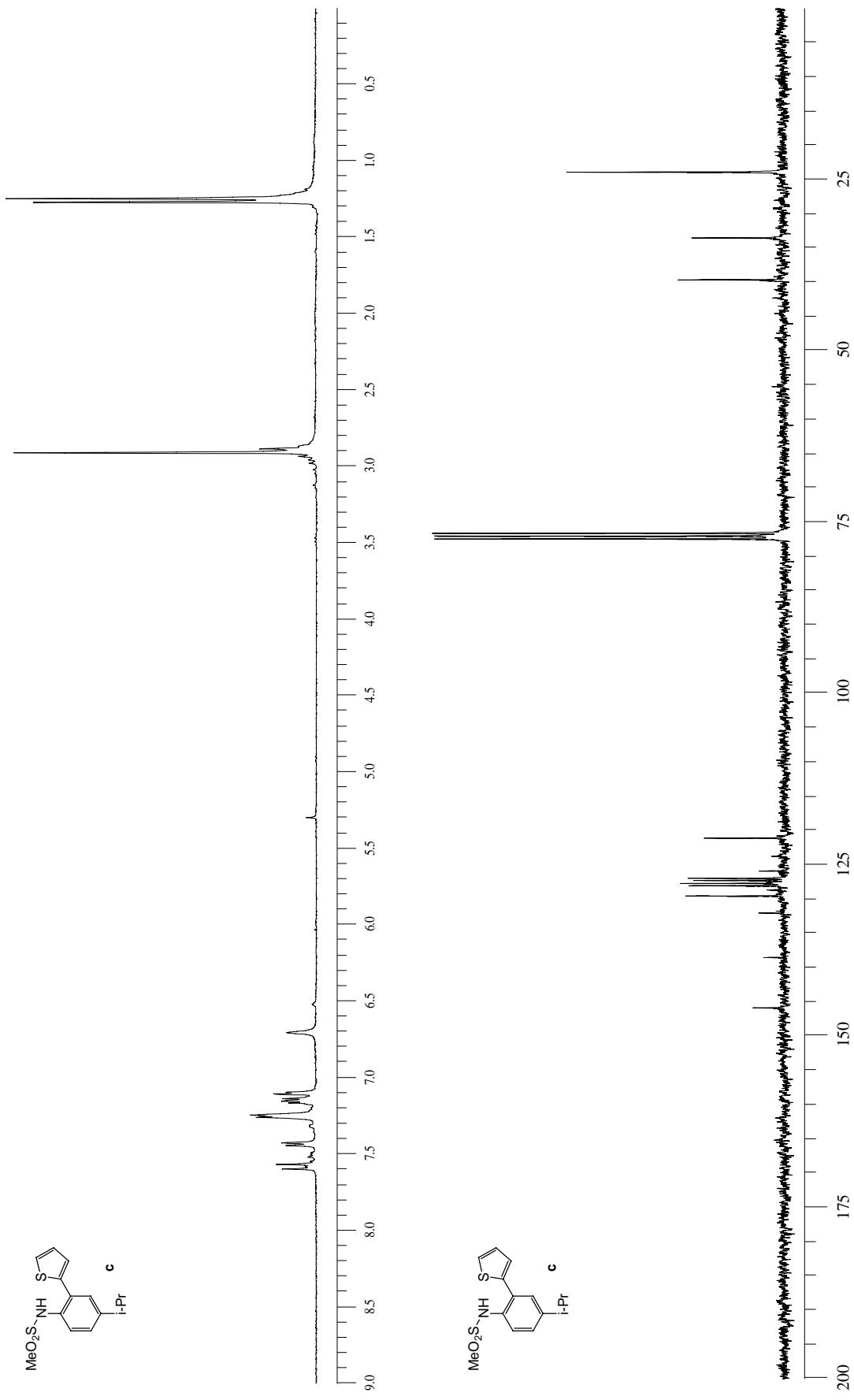
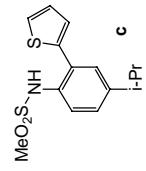


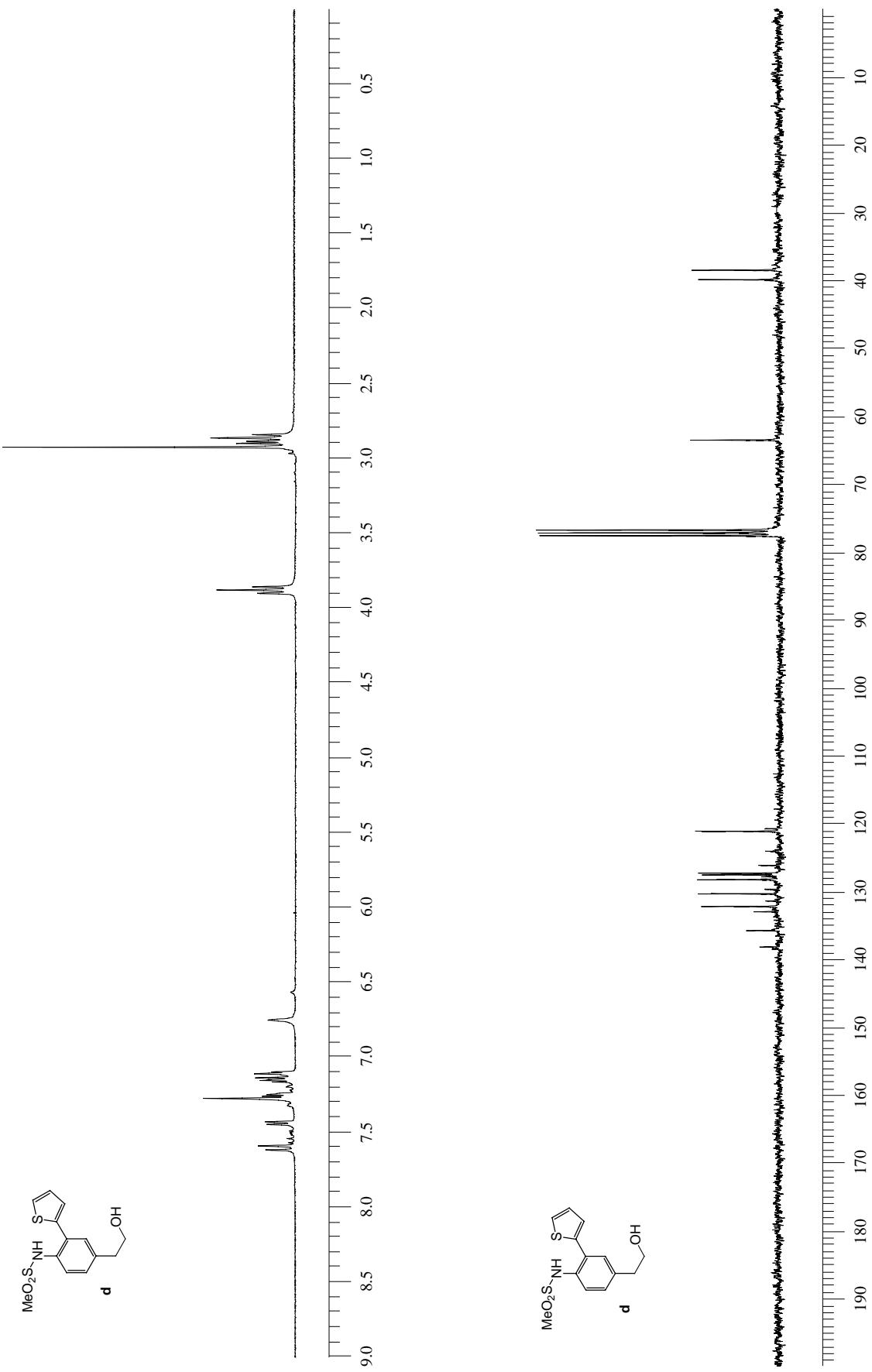
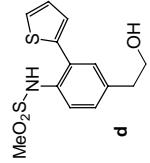
S8



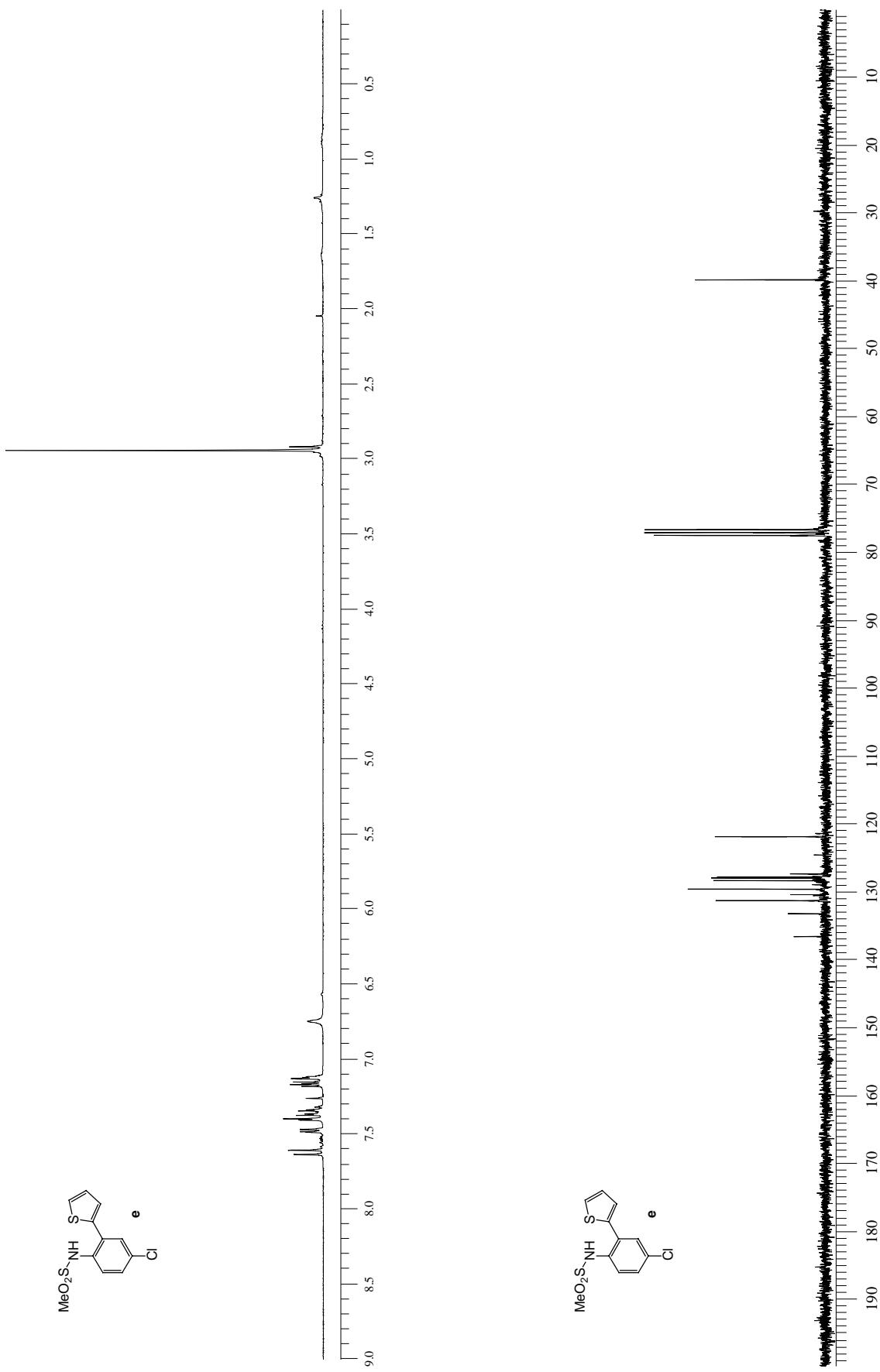
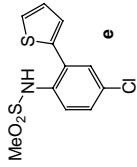


S10

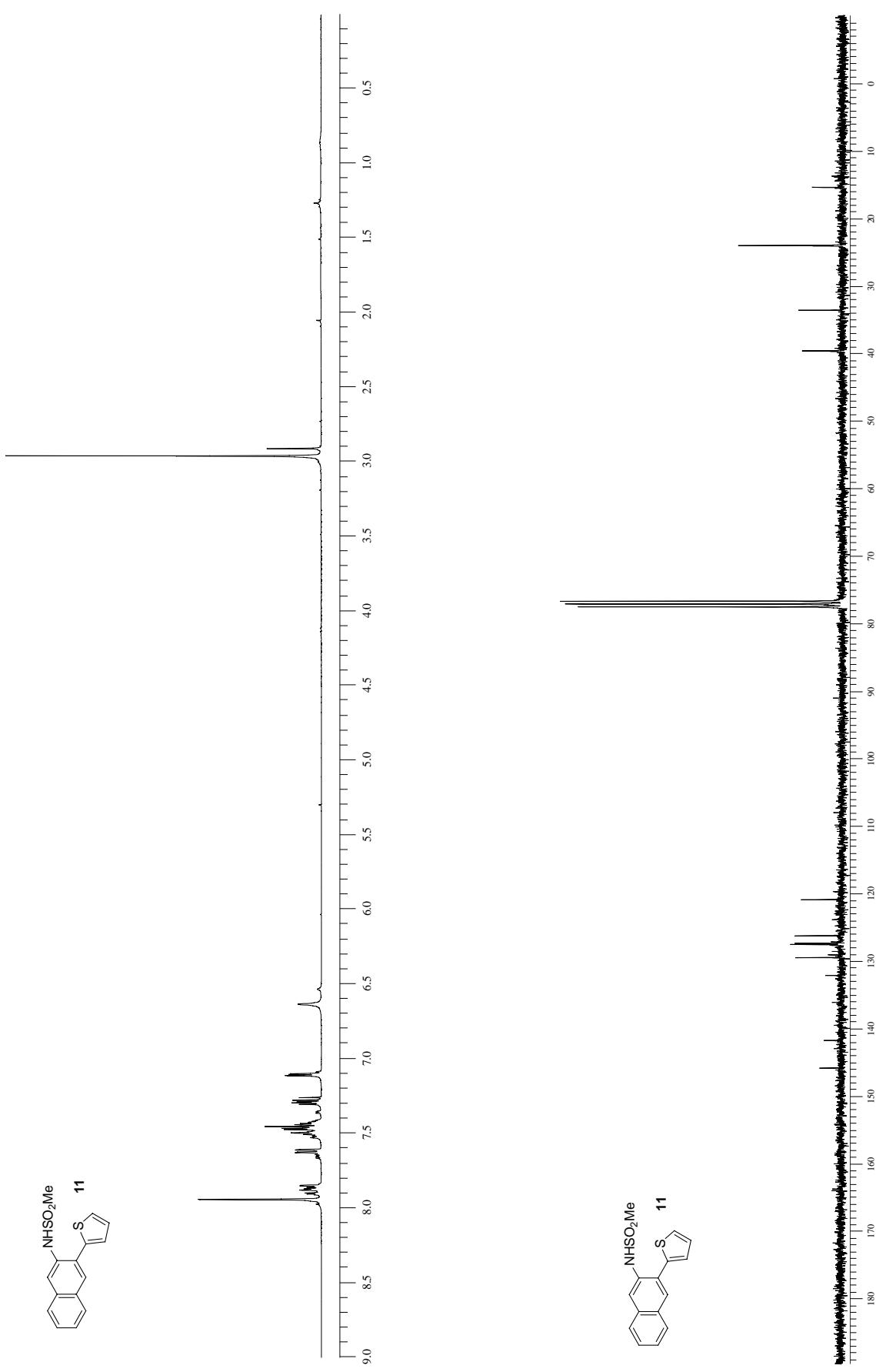
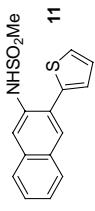




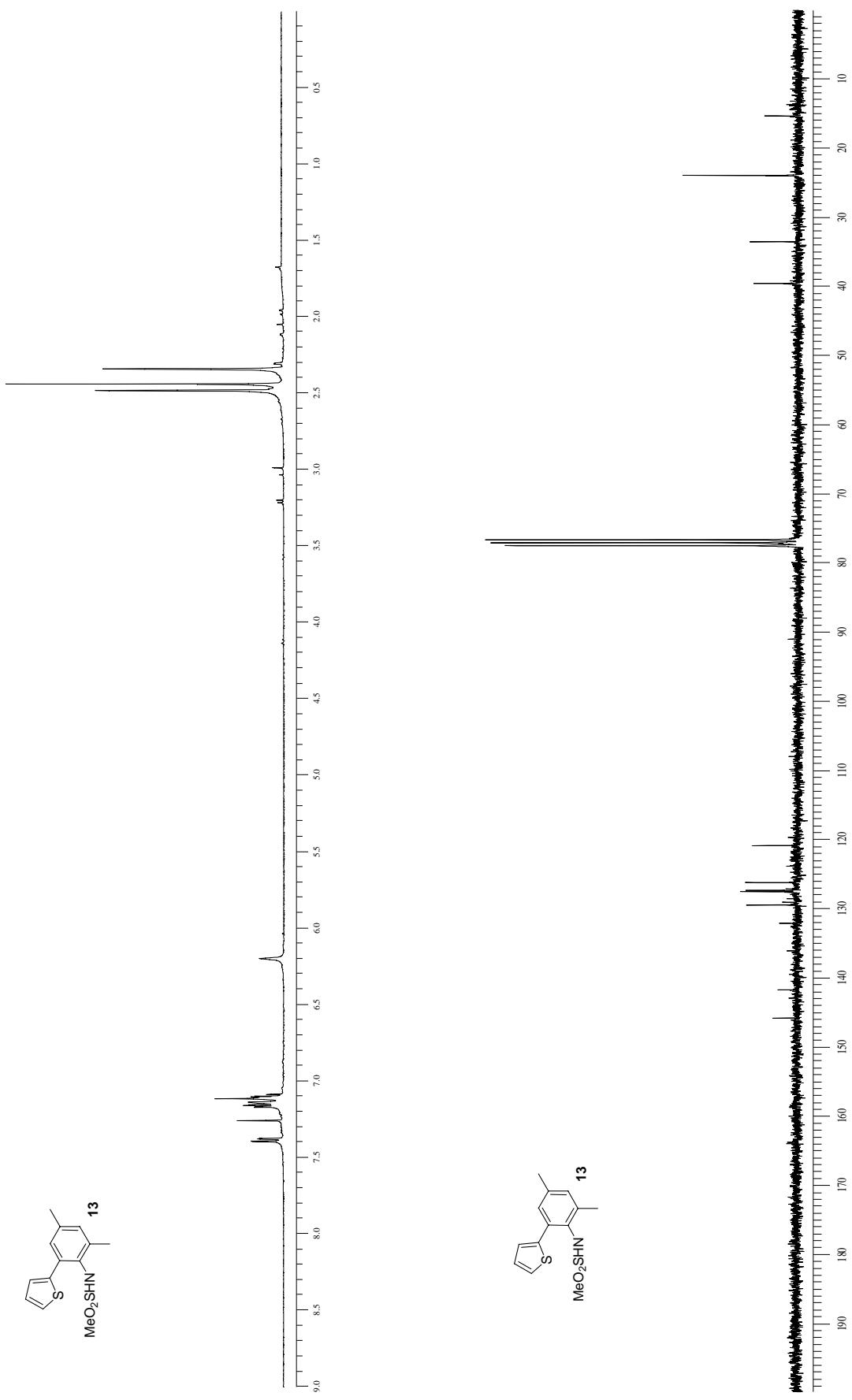
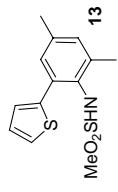
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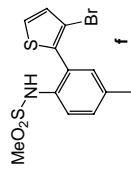
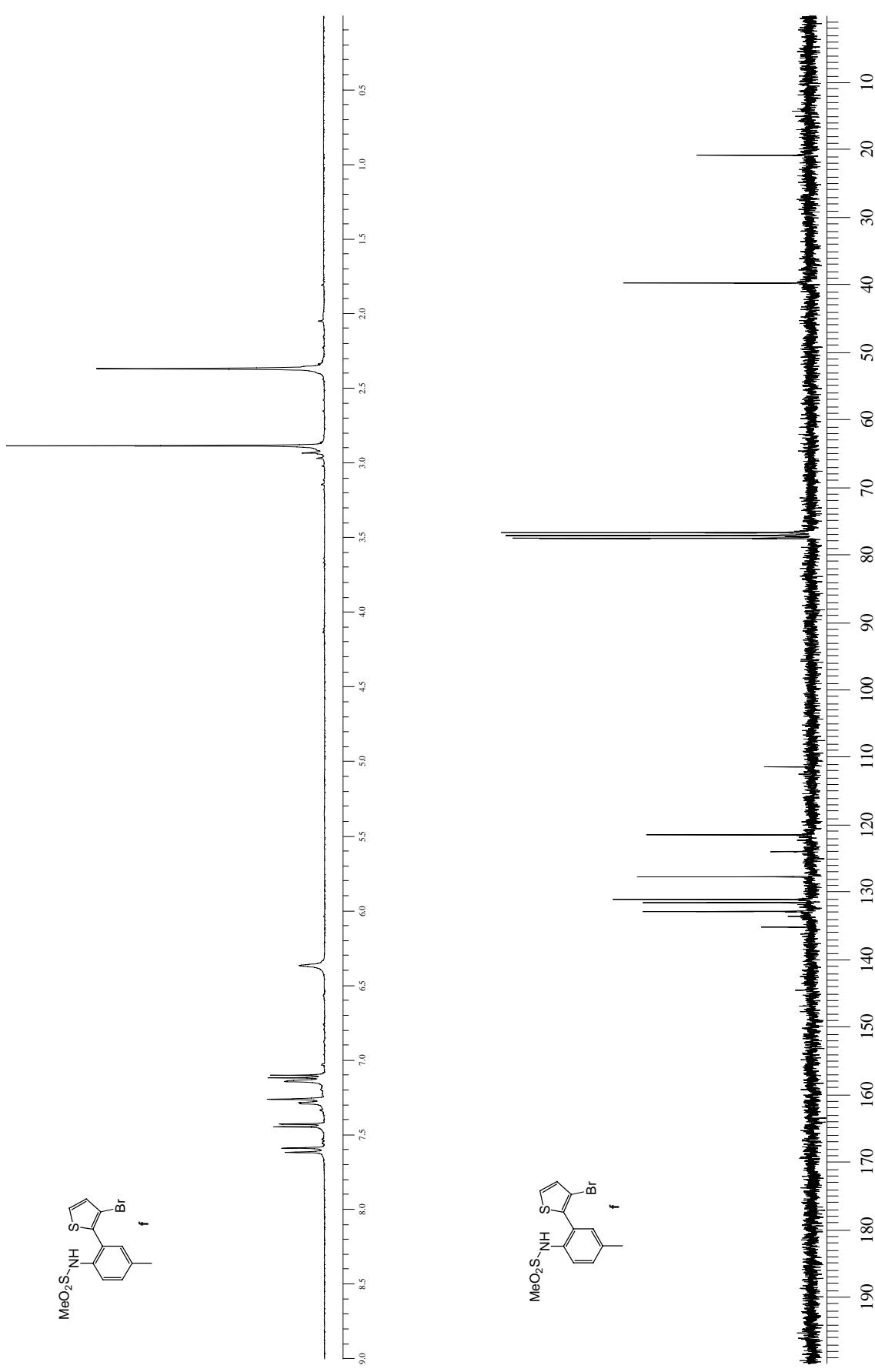
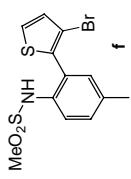


S13

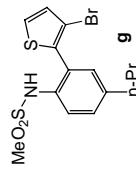
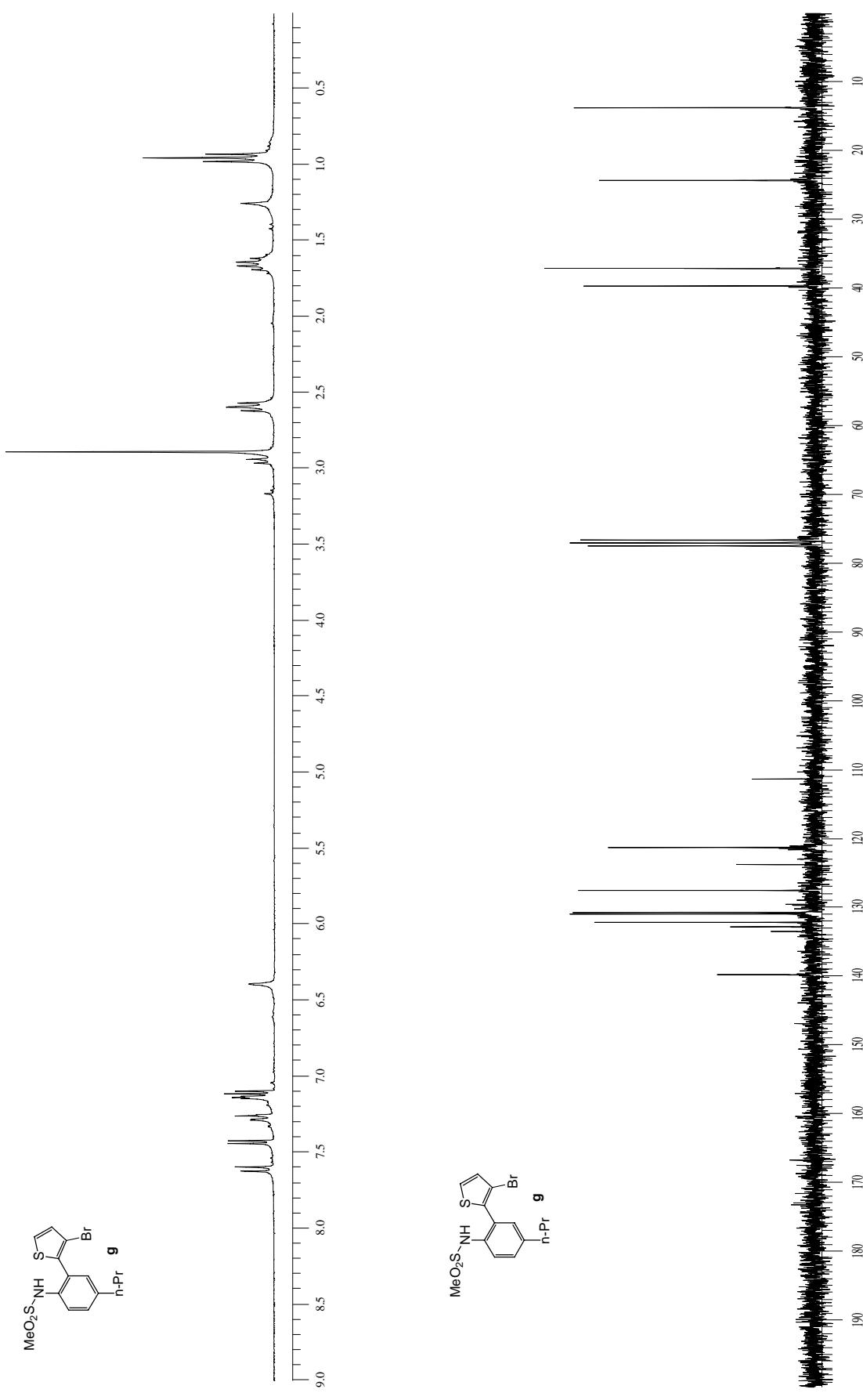
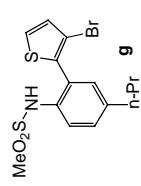


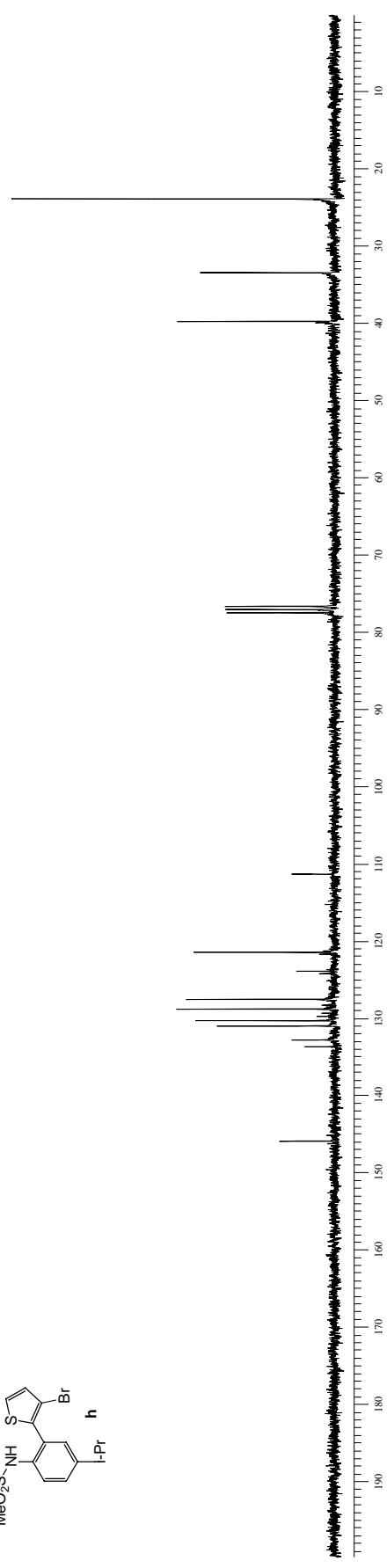
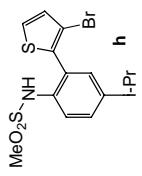
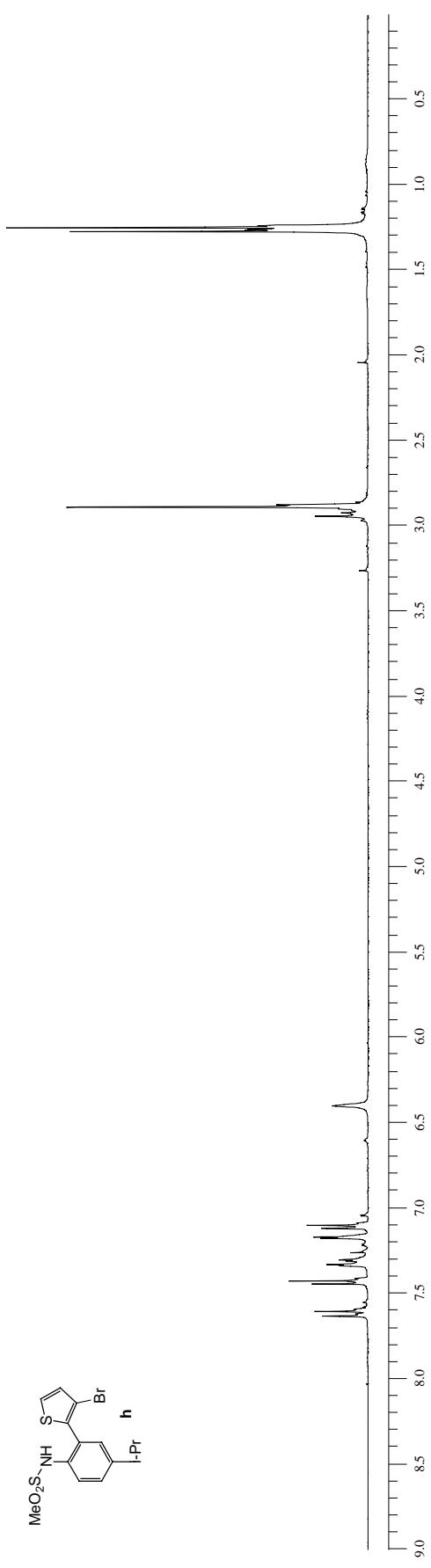
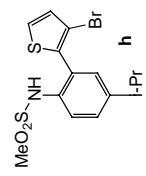
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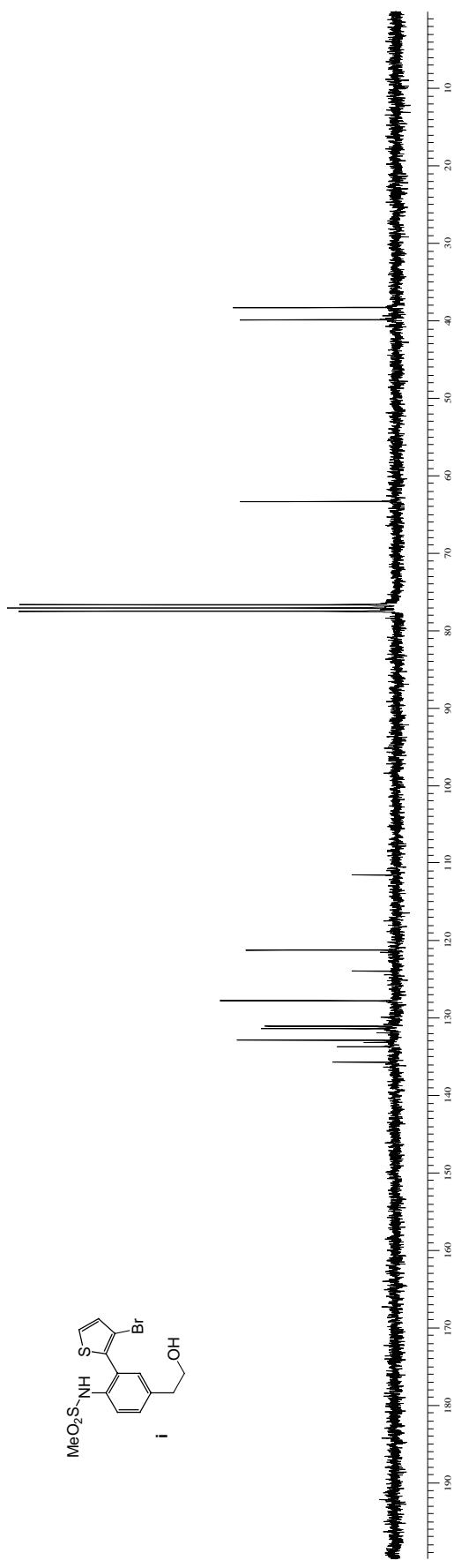
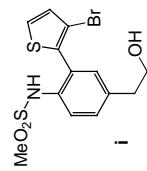
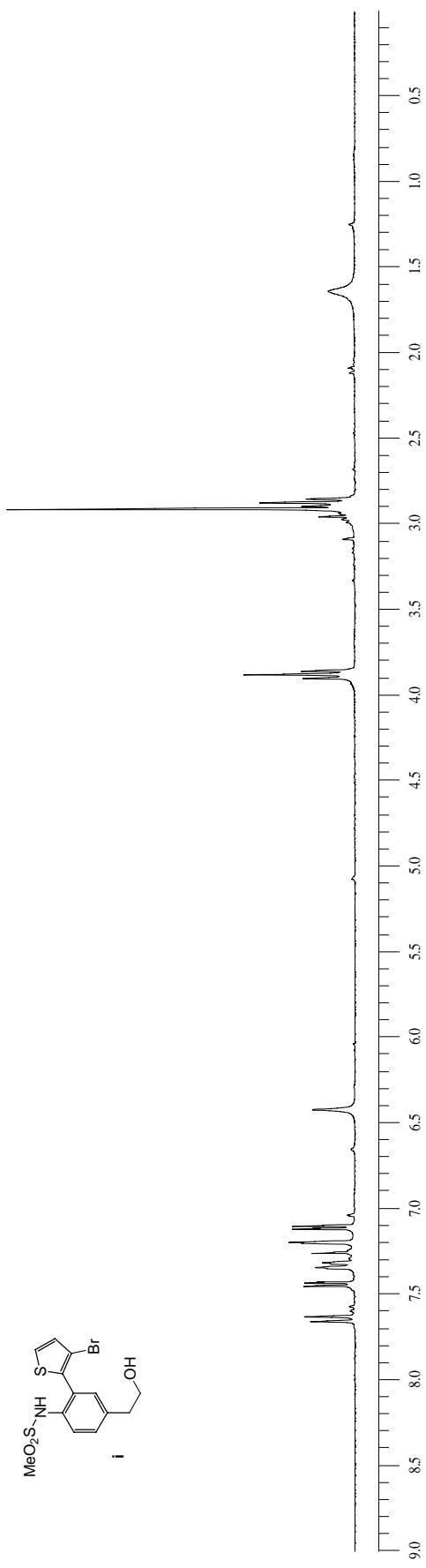
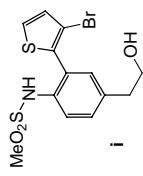


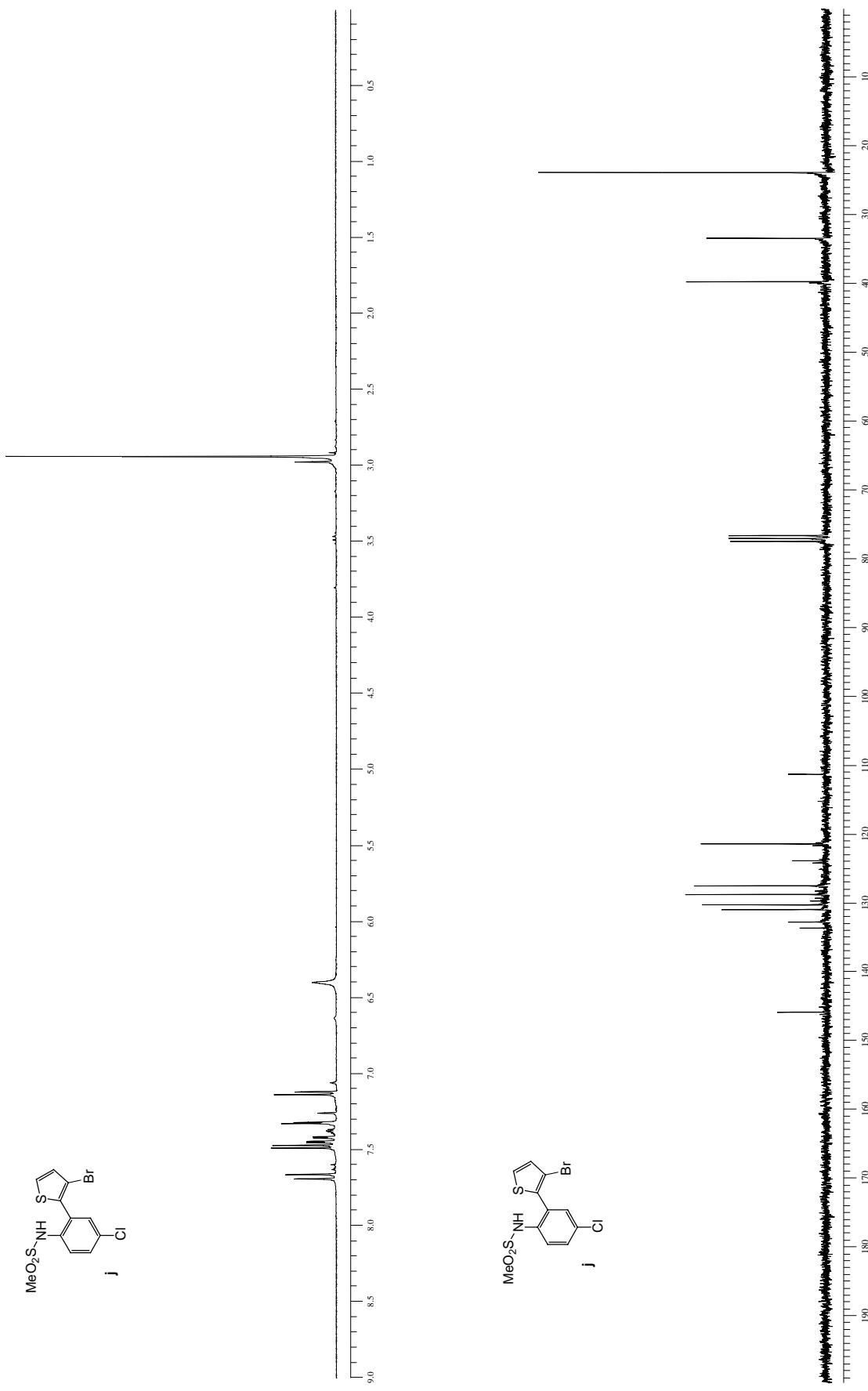
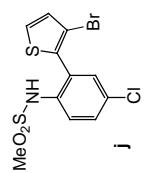
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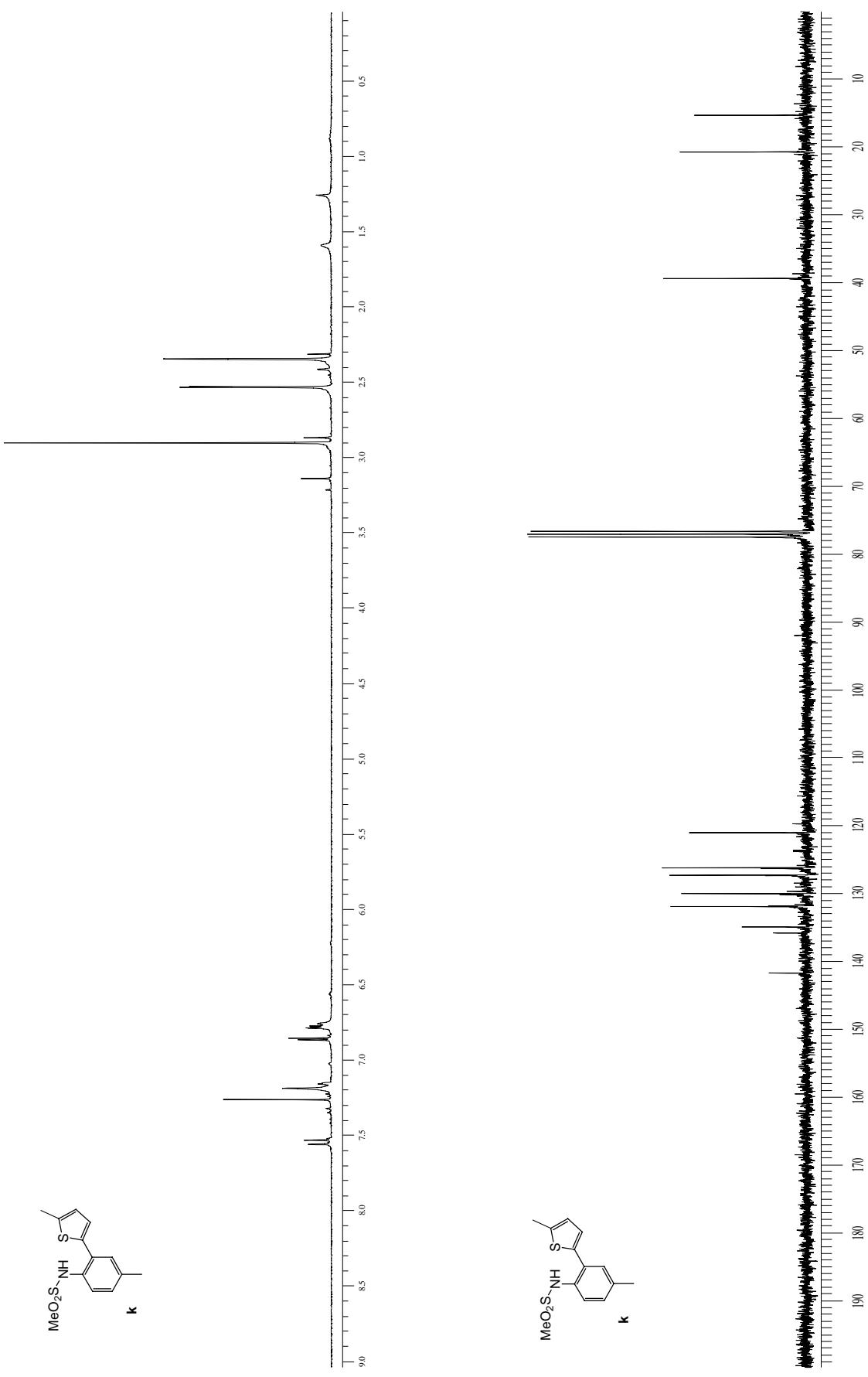
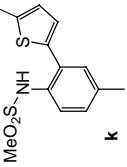




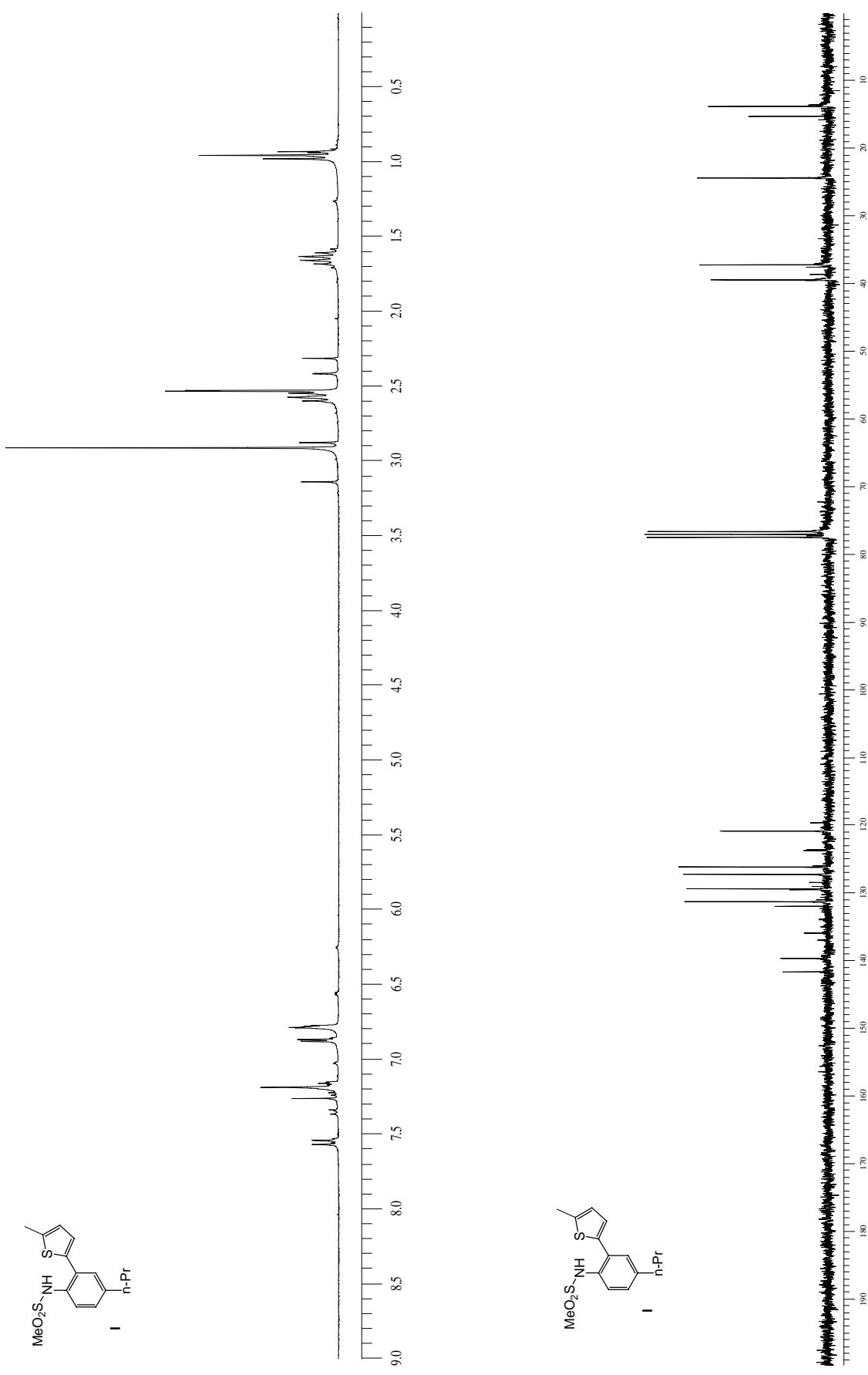
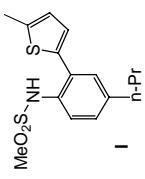
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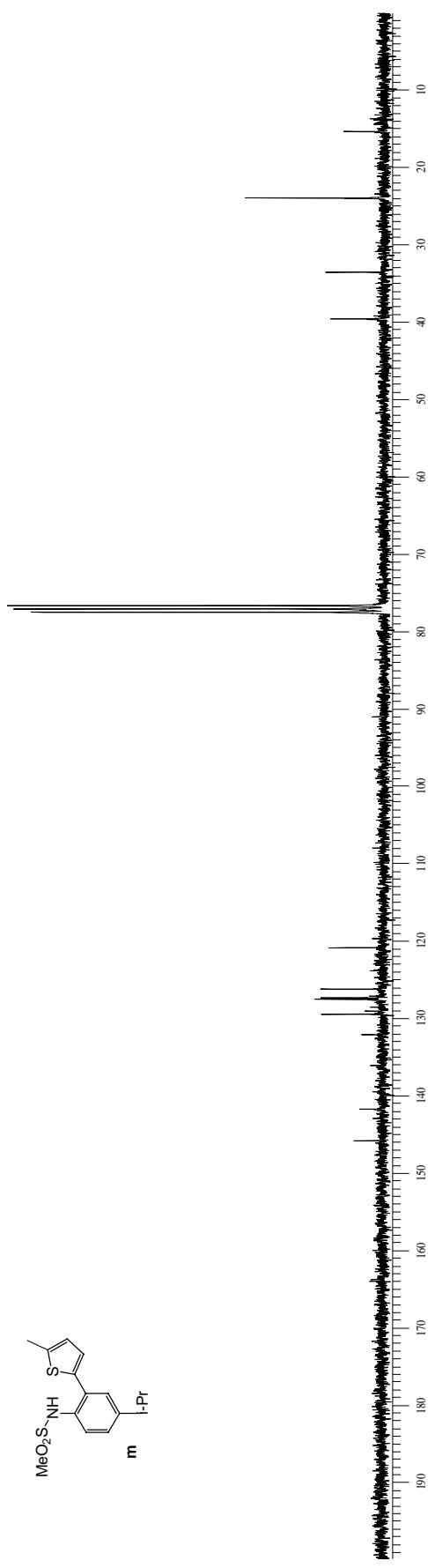
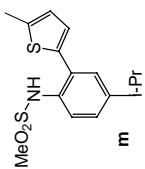
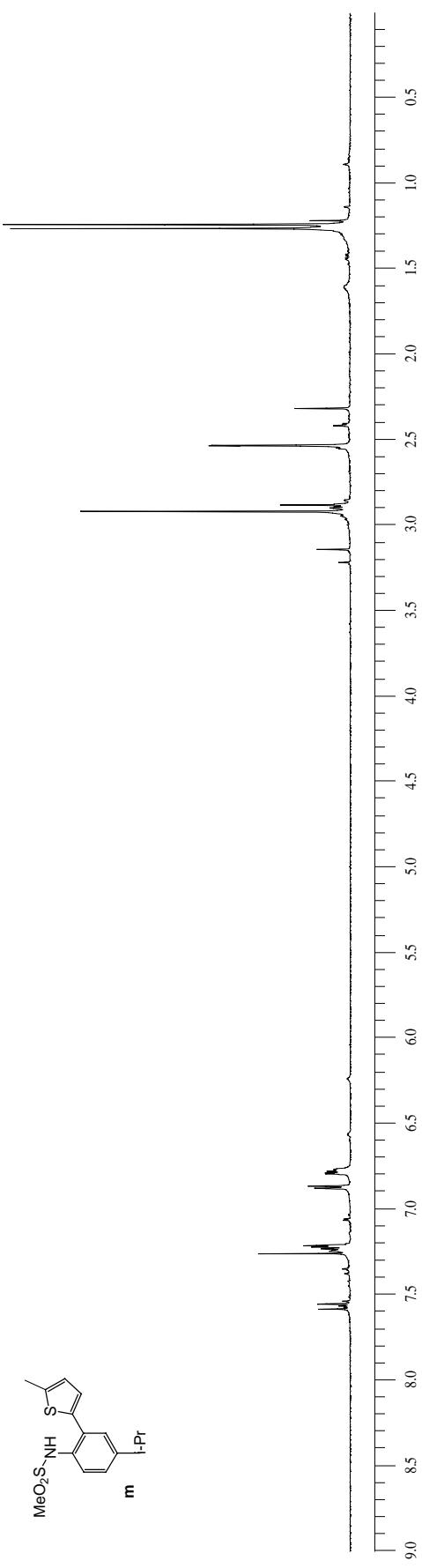
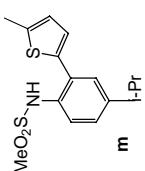




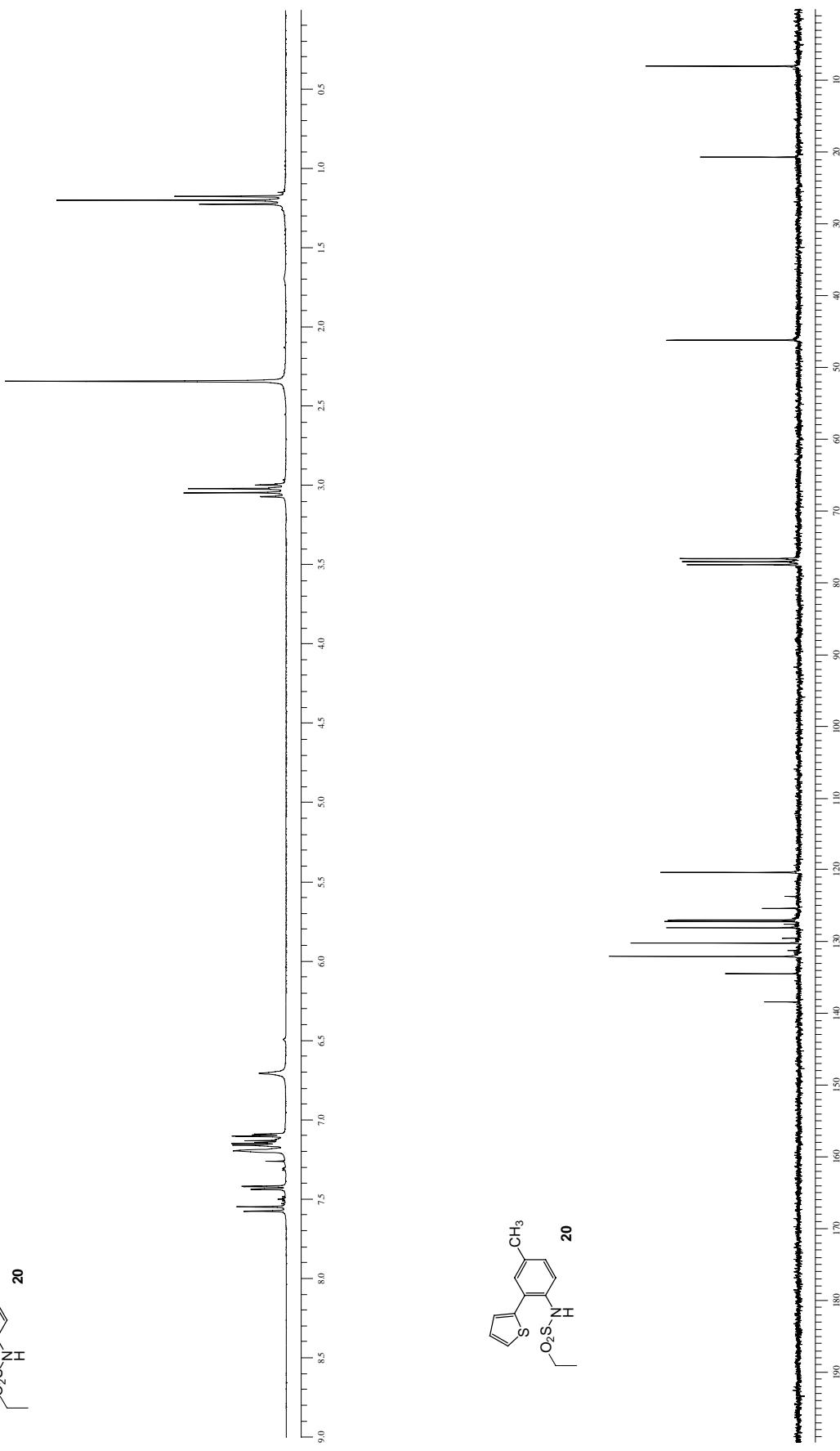
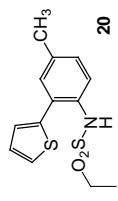


S21

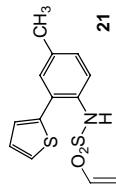




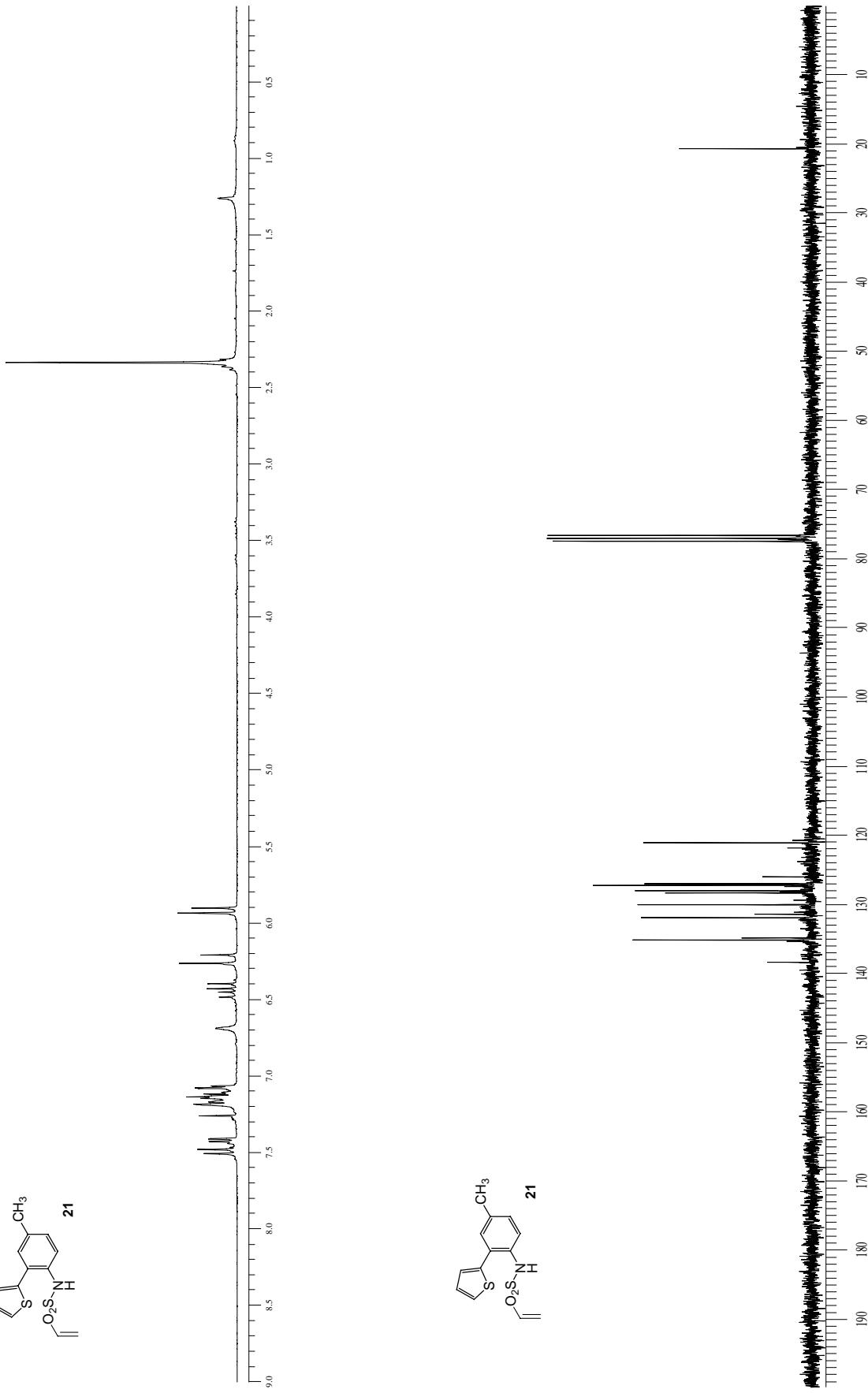
S23

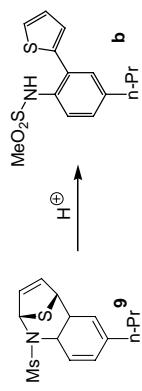
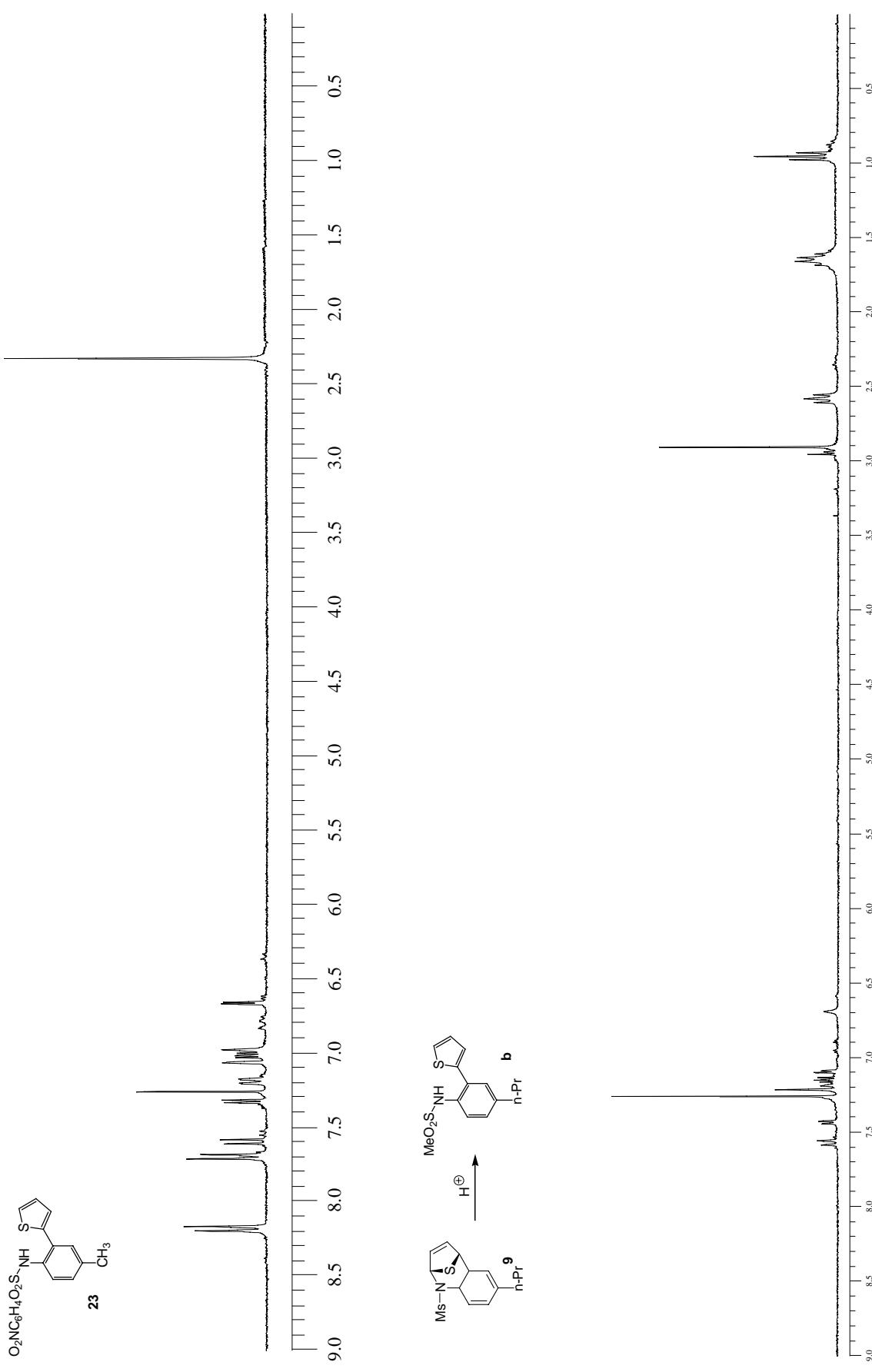
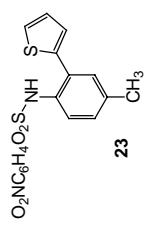


S24



21





S26