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Supporting Information

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Iron-Catalyzed *N*-Arylation of Nitrogen Nucleophiles**

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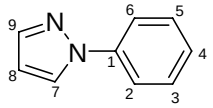
General information: All reagents were purchased from commercial suppliers and used without further purification. All experiments were carried out under argon. Flash chromatography was carried out with Merck silica gel 60 (63-200 mesh). Analytical TLC was performed with Merck silica gel 60 F_{254} plates, and the products were visualized by UV detection. ^{1}H NMR and ^{13}C NMR (300 or 400 MHz and 75 or 100 MHz, respectively) spectra were recorded in $CDCl_3$. Chemical shifts (δ) are reported in ppm using TMS as internal standard, and spin-spin coupling constants (J) are given in Hz.

General procedure for *N*-arylation of nitrogen nucleophiles: An oven-dried tube was charged with the *N*-nucleophile (1.0 equiv), $FeCl_3$ (0.10 equiv) and K_3PO_4 (2.0 equiv). Under an argon atmosphere the aryl halide (1.5 equiv) and DMEDA (0.20 equiv) was added followed by dry toluene (1 mL/mmol of nucleophile). The tube was sealed under argon and the mixture was heated to 135 ºC. After stirring at 135 ºC for 24 h, the heterogeneous mixture was cooled to room temperature and diluted with dichloromethane. The resulting solution was directly filtered through a pad of silica gel

and concentrated to yield the product, which was purified by silica gel chromatography to yield the *N*-arylated product. The identity and purity of the products was confirmed by ^{1}H and ^{13}C NMR spectroscopic analysis.

1-Phenyl-1*H*-pyrazole[1] (3a). Following the general procedure using 1*H*-pyrazole (300 mg, 4.32 mmol) and iodobenzene (0.73 mL, 6.48 mmol) provided 500 mg (80% yield) of the coupling product as a yellowish oil after purification by flash chromatography (1:1 pentane/ethyl acetate) of the crude brown oil.

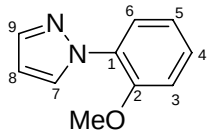


^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.91 (dd, J^3 = 2.5 Hz, J^4 = 0.5 Hz, 1H, H-7), 7.68-7.72 (m, 3H, H-2,6,9), 7.41-7.46 (m, 2H, H-3,5), 7.25-7.29 (m, 1H, H-4), 6.45 (dd, J^3 = 2.5 Hz, J^3 = 1.8 Hz, 1H, H-8).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 141.0 (C-9), 140.1 (C-1), 129.4 (C-3,5), 126.7 (C-7), 126.4 (C-4), 119.2 (C-2,6), 107.6 (C-8).

All spectral data correspond to those given in the literature.[1]

1-(2-Methoxyphenyl)-1*H*-pyrazole[2] (3b). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 2-iodoanisole (0.14 mL, 1.08 mmol) provided 52 mg (41% yield) of the coupling product as a colorless oil after purification by flash chromatography (1:1 pentane/ethyl acetate) of the crude oil.



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[1] H.-J. Cristau, P. P. Cellier, J.-F. Spindler, M. Taillefer, *Org. Lett.* **2004**, *6*, 695.

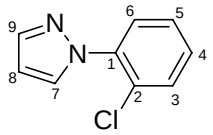
[2] T. Asaumi, N. Chatani, T. Matsuo, F. Kakiuchi, S. Murai, *J. Org. Chem.* **2003**, *68*, 7538.

^{1}H-NMR (400 MHz, $CDCl_3$) δ 8.01 (d, J = 2.2 Hz, 1H), 7.68-7.72 (m, 2H), 7.23-7.28 (m, 1H), 6.99-7.05 (m, 2H), 6.39-6.40 (m, 1H), 3.81 (s, 3H).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 151.2 (C), 139.9 (CH), 131.5 (CH), 129.7 (C), 127.9 (CH), 125.2 (CH), 121.1 (CH), 112.3 (CH), 106.2 (CH), 55.9 (CH_3).

All spectral data correspond to those given in the literature.[2]

1-(2-Chlorophenyl)-1*H*-pyrazole[3] (3c). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 1-chloro-2-iodobenzene (0.13 mL, 1.08 mmol) provided 23 mg (18% yield) of the coupling product as a yellowish oil after purification by flash chromatography (1:1 pentane/ethyl acetate) of the crude oil.



^{1}H-NMR (300 MHz, $CDCl_3$) δ 7.88 (dd, J^3 = 2.2 Hz, J^4 = 0.5 Hz, 1H, H-7), 7.75 (d, J = 1.5 Hz, 1H, H-9), 7.57-7.71 (m, 1H), 7.50-7.53 (m, 1H), 7.30-7.45 (m, 2H), 6.47-6.48 (m, 1H, H-8).

^{13}C-NMR (300 MHz, $CDCl_3$) δ 140.9 (C-9), 138.2 (C), 131.3 (CH), 130.6 (CH), 129.0 (CH), 128.4 (C), 127.8 (CH), 127.7 (CH), 106.6 (C-8).

All spectral data correspond to those given in the literature.[3]

1-(3-Methylphenyl)-1*H*-pyrazole[4] (3d). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 3-iodotoluene (0.14 mL, 1.08 mmol) provided 93 mg (82% yield) of the coupling product as a yellowish oil after purification by flash chromatography (dichloromethane) of the crude oil.

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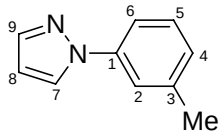
[3] D. Kalyani, A. R. Dick, W. Q. Anani, M. S. Sanford, *Tetrahedron* **2006**, *62*, 11483.

[4] T.-H. Kwon, H. S. Cho, M. K. Kim, J.-W. Kim, J.-J. Kim, K. H. Lee, S. J. Park, I.-S. Shin, H. Kim, D. M. Shin, Y. K. Chung, J.-I. Hong, *Organometallics* **2005**, *24*, 1578.

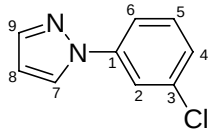


^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.87 (d, J^3 = 2.5 Hz, 1H, H-7), 7.70 (d, J^3 = 1.4 Hz, 1H), 7.53 (s, 1H), 7.42-7.45 (m, 1H), 7.29 (t, J = 7.8 Hz, 1H), 7.06 (d, J = 7.4 Hz, 1H), 6.42 (t, J = 2.2 Hz, 1H, H-9), 2.54 (s, 3H).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 140.9 (CH), 140.1 (C), 139.4 (C), 129.2 (CH), 127.2 (CH), 126. 8 (CH), 119.9 (CH), 116.2 (CH), 107.5 (CH), 21.6 (CH_3).

All spectral data correspond to those given in the literature.[4]

1-(3-Chlorophenyl)-1*H*-pyrazole[5] (3e). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 1-chloro-3-iodobenzene (0.16 mL, 1.08 mmol) provided 111 mg (87% yield) of the coupling product as a yellowish oil after purification by flash chromatography (dichloromethane) of the crude oil.



^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.89 (dd, J^3 = 2.48 Hz, J^4 = 0.5 Hz, 1H, H-7), 7.74 (d, J = 1.9 Hz, 1H), 7.71 (d, J = 1.6 Hz, 1H), 7.55-7.58 (m, 1H), 7.35 (t, J^2 = 8.1 Hz, 1H), 7.22-7.25 (m, 1H), 6.45-6.46 (m, 1H, H-9).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 141.5 (C-9), 141.0 (C), 135.2 (C), 130.4 (CH), 126.7 (CH), 126. 3 (CH), 119.4 (CH), 116.9 (CH), 108.1 (C-8).

All spectral data correspond to those given in the literature.[5]

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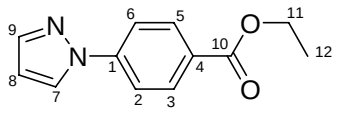
[5] U. Maeder, A. von Zelewsky, H. Stoeckli-Evans, *Helv. Chim. Acta* **1992**, *75*, 1320.

4-Pyrazol-1-yl-benzoic acid ethylester[6] (3f). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 4-iodobenzoic acid ethylester (0.18 mL, 1.08 mmol) provided 114 mg (74% yield) of the coupling product as a white solid after purification by flash chromatography (dichloromethane) of the crude oil.



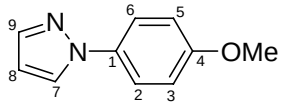
Mp: 63-64 ºC (Lit.[6] mp 66 ºC).

^{1}H-NMR (400 MHz, $CDCl_3$) δ 8.14 (d, J = 8.8 Hz, 2H, H-3,5), 8.11 (d, J = 2.2 Hz, 1H, H-7), 7.75-7.78 (m, 3H, H-2,6,9), 6.47-6.48 (m, 1H, H-3), 4.38 (q, J = 7.2 Hz, 2H, H-11), 1.40 (t, J = 7.2, 3H, H-12).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 165.7 (C-10), 143.1 (C-1), 141.8 (C-9), 131.0 (C-3,5), 128.0 (C-4), 126.8 (C-7), 118.2 (C-5,6), 108.4 (C-8), 61.1 (C-11), 14.5 (C-12).

All spectral data correspond to those given in the literature. [6]

1-(4-Methoxyphenyl)-1*H*-pyrazole[7] (3g). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and either 4-iodoanisole (258 mg, 1.08 mmol) or 4-bromoanisole (0.13 mL, 1.08 mmol) provided 109 mg (87% yield) and 80 mg (64% yield), respectively, of the coupling product as a yellowish oil after purification by flash chromatography (pentane) of the crude oil.



^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.80 (dd, J^3 = 2.2 Hz, J^4 = 0.5 Hz, 1H, H-7), 7.68-7.69 (m, 1H, H-9), 7.55-7.59 (m, 2H, H-2,6), 6.92-6.97 (m, 2H, H-3,5), 6.41-6.42 (m, 1H, H-8), 381 (s, 3H, CH_3).

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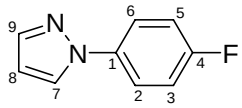
[6] M. Taillefer, N. Xia, A. Ouani, *Angew. Chem.* **2007**, *119*, 952; *Angew. Chem., Int. Ed.* **2007**, *46*, 934.

[7] H.-J. Cristau, P. P. Cellier, J.-F. Spindler, M. Taillefer, *Eur. J. Org. Chem.* **2004**, 695.

^{13}C-NMR (400 MHz, $CDCl_3$) δ 158.1 (C-4), 140.5 (C-9), 134.0 (C-1), 126.7 (C-7), 120.8 (C-2,6), 114.5 (C-3,5), 107.1 (C-8), 55.6 (CH_3).

All spectral data correspond to those given in the literature.[7]

1-(4-Fluorophenyl)-1*H*-pyrazole[8] (3h). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 1-fluoro-4-iodobenzene (0.12 mL, 1.08 mmol) provided 57 mg (46% yield) of the coupling product as a yellowish oil after purification by flash chromatography (pentane) of the crude oil.

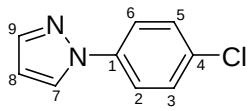


^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.84-7.85 (m, 1H, H-7), 7.70 (d, J = 1.1 Hz, 1H), 7.62-7.67 (m, 2H), 7.11-7.16 (m, 2H), 6.46 (dd, J = 2.5 Hz, J = 1.9 Hz, 1H).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 160.5 (d, J^2 = 245.7 Hz, C-4), 141.0 (C-9), 136.5 (C-1), 126.8 (C-7), 120.9 (d, J^4 = 8.4 Hz, C-2,6), 116.2 (d, J^3 = 22.9 Hz, C-3,5), 107.7 (C-8).

All spectral data correspond to those given in the literature.[8]

1-(4-Chlorophenyl)-1*H*-pyrazole[7] (3i). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 1-chloro-4-iodobenzene (257 mg, 1.08 mmol) provided 72 mg (56% yield) of the coupling product as a white solid after purification by flash chromatography (pentane) of the crude oil.



Mp: 53-54 ºC (Lit.[7] mp 52 ºC).

^{1}H-NMR (300 MHz, $CDCl_3$) δ 7.87-7.89 (m, 1H, H-7), 7.72 (d, J^3 = 1.7 Hz, 1H, H-9), 7.61-7.66 (m, 2H, H-3,5), 7.38-7.43 (m, 2H, H-2,6), 6.46-6.48 (m, 1H, H-8).

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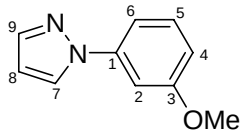
[8] A. de la Hoz, M. C. Pardo, *Magnetic Resonance in Chemistry*, **1989**, *27*, 603.

^{13}C-NMR (300 MHz, $CDCl_3$) δ 141.4 (C-9), 138.7 (C-1), 131.9 (C-4), 129.5 (C-3,5), 126.7 (C-7), 120.3 (C-2,6), 107.9 (C-8).

All spectral data correspond to those given in the literature.[7]

1-(3-Methoxyphenyl)-1*H*-pyrazole[6] (3j). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 3-bromoanisole (0.14 mL, 1.08 mmol) provided 49 mg (39% yield) of the coupling product as a yellow oil after purification by flash chromatography (dichloromethane) of the crude oil.

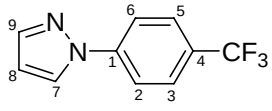


^{1}H-NMR (300 MHz, $CDCl_3$) δ 7.90-7.91 (m, 1H, H-7), 7.32 (d, J = 1.2 Hz, 1H, H-9), 7.30-7.36 (m, 2H, H-4,6), 7.20-7.25 (m, 1H, H-3), 6.80-6.84 (m, 1H, H-2), 6.45 (dd, J = 2.5 Hz, J = 1.7 Hz, 1H, H-8), 3.86 (s, 3H, CH_3).

^{13}C-NMR (300 MHz, $CDCl_3$) δ 160.5 (C-3), 141.3 (C-1), 141.0 (C-9), 130.2 (C-5), 126.9 (C-7), 112.4 (C-4), 111.2 (C-6), 107.6 (C-8), 105.1 (C-2), 55.5 (CH_3).

All spectral data correspond to those given in the literature. [6]

1-(4-Trifluoromethylphenyl)-1*H*-pyrazole[6] (3k). Following the general procedure using 1*H*-pyrazole (50 mg, 0.72 mmol) and 4-bromobenzotrifluoride (0.15 mL, 1.08 mmol) provided 57 mg (37% yield) of the coupling product as a white solid after purification by flash chromatography (pentane) of the crude oil.



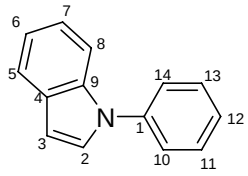
Mp: 93-94 ºC (Lit.[6] mp 93 ºC).

^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.97 (dd, J^3 = 2.5 Hz, J^4 = 0.5 Hz, 1H, H-7), 7.82 (d, J^2 = 8.5 Hz, 2H, H-3,5), 7.76 (d, J^3 = 1.4 Hz, 1H, H-9), 7.69 (d, J^2 = 8.5 Hz, 2H, H-2,6), 6.50-6.51 (m, 1H, H-8).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 142.5 (C-1), 141.9 (C-9), 126.8 (C-7), 126.7 (m, C-3,5), 125.2 (C-4), 122.5 (C-10), 118.8 (C-2,6), 108.5 (C-8).

All spectral data correspond to those given in the literature.[6]

1-Phenyl-1*H*-indole[9] (4). Following the general procedure using 1*H*-indole (100 mg, 0.85 mmol) and iodobenzene (0.14 mL, 1.28 mmol) provided 99 mg (60% yield) of the coupling product as a yellow oil after purification by flash chromatography (pentane) of the crude oil.



^{1}H-NMR (300 MHz, $CDCl_3$) δ 7.65-7.69 (m, 1H), 7.52-7.56 (m, 1H), 7.40-7.46 (m, 4H), 7.27-7.31 (m, 1H), 7.10-7.25 (m, 2H), 6.65 (dd, J^3 = 3.3 Hz, J^5 = 0.7 Hz, 1H).

^{13}C-NMR (300 MHz, $CDCl_3$) δ 139.9 (C-1), 135.9 (C-7), 129.7 (C-2,6), 129.5 (C-12), 128.1 (C-14), 126.5 (C-4), 124.5 (C-3,5), 122.5 (C-9), 121.3 (C-11), 120.5 (C-10), 110.7 (C-8), 103.7 (C-13).

All spectral data correspond to those given in the literature. [9]

1-Phenyl-7-aza-1*H*-indole[10] (5a). Following the general procedure using 7-aza-1*H*-indole (100 mg, 0.83 mmol) and iodobenzene (0.14 mL, 1.28 mmol) provided 135 mg (84% yield) of the coupling product as a yellow oil after purification by flash chromatography (pentane) of the crude oil.

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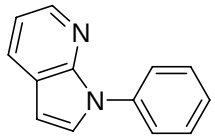
[9] H.-J. Cristau, P. P. Cellier, J.-F. Spindler, M. Taillefer, *Chem. Eur. J.* **2004**, *10*, 5607.

[10] C. S. Hong, J. Y. Seo, E. K. Yum, *Tetrahedron Lett.* **2007**, *48*, 4831.

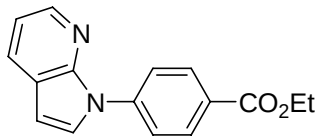


^{1}H-NMR (300 MHz, $CDCl_3$) δ 8.36 (dd, J = 3.8 Hz, J = 1.7 Hz, 1H), 7.93 (dd, J = 7.9 Hz, J = 1.7 Hz, 1H), 7.71-7.76 (m, 2H), 7.46-7.52 (m, 3H), 7.27-7.30 (m, 1H), 7.10 (dd, J = 7.9 Hz, J = 4.7 Hz, 1H), 6.58 (d, J = 3.5 Hz, 1H).

^{13}C-NMR (300 MHz, $CDCl_3$) δ 147.5 (C), 143.6 (CH), 138.5 (C), 129.4 (CH), 129.1 (CH), 127.9 (CH), 126.3 (CH), 124.0 (CH), 121.6 (C), 116.7 (CH), 101.7 (CH).

All spectral data correspond to those given in the literature.[10]

4-(7-Aza-1*H*-indol-1-yl)-benzoic acid ethylester[11] (5b). Following the general procedure using 7-aza-1*H*-indole (100 mg, 0.83 mmol) and 4-iodobenzoic acid ethylester (0.21 mL, 1.08 mmol) provided 155 mg (74% yield) of the coupling product as a colorless oil after purification by flash chromatography (dichloromethane) of the crude oil.

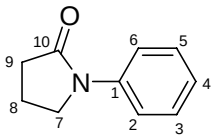


^{1}H-NMR (300 MHz, $CDCl_3$) δ 8.38 (dd, J = 4.7 Hz, J = 1.5 Hz, 1H), 8.17-8.22 (m, 2H), 7.92-7.98 (m, 3H), 7.55 (d, J = 3.9 Hz, 1H), 7.15 (dd, J = 7.7 Hz, J = 4.7 Hz, 1H), 6.65 (d, J = 3.7 Hz, 1H), 4.40 (q, J = 7.2 Hz, 2H), 1.41 (t, J = 7.2 Hz, 3H).

^{13}C-NMR (300 MHz, $CDCl_3$) δ 166.1 (C), 147.5 (C), 143.7 (CH), 142.3 (C), 130.9 (CH), 129.3 (CH), 127.6 (C), 127.1 (CH), 122.6 (CH), 122.0 (C), 117.2 (CH), 102.9 (CH), 61.0 (CH_2), 14.4 (CH_3).

[11] T. Takahiro, S. Toshinobu, H, Chikara, T. Masakazu, WO 043401, **2007**.

1-Phenyl-pyrrolidin-2-one[9] (6a). Following the general procedure using pyrrolidin-2-one (100 mg, 1.17 mmol) and iodobenzene (0.19 mL, 1.75 mmol) provided 101 mg (53% yield) of the coupling product as a yellowish solid after purification by flash chromatography (1:1 n-pentane/ethyl acetate) of the crude oil.



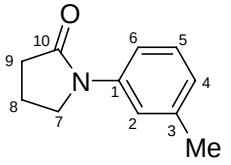
Mp: 66-67 ºC (Lit.[9] mp 68 ºC).

^{1}H-NMR (300 MHz, $CDCl_3$) δ 7.58-7.62 (m, 2H, H-3,5), 7.32-7.39 (m, 2H, H-2,6), 7.10-7.16 (m, 1H, H-4), 3.85 (t, J = 7.0 Hz, 2H, H-7), 2.60 (t, J = 8.0 Hz, 2H, H-9), 2.09-2.19 (m, 2H, H-8).

^{13}C-NMR (300 MHz, $CDCl_3$) δ 174.2 (C-10), 139.4 (C-1), 128.8 (C-3,5), 124.5 (C-4), 119.9 (C-2,6), 48.8 (C-7), 32.8 (C-8), 18.0 (C-9).

All spectral data correspond to those given in the literature.[9]

1-(3-Methylphenyl)-pyrrolidin-2-one[12] (6b). Following the general procedure using pyrrolidin-2-one (100 mg, 1.17 mmol) and 3-iodotoluene (0.22 mL, 1.75 mmol) provided 101 mg (53% yield) of the coupling product as a white solid after purification by flash chromatography (1:1 n-pentane/ethyl acetate) of the crude oil.



Mp: 57-58 ºC (Lit.[12] mp 57 ºC).

^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.43 (s, 1H), 7.37-7.38 (m, 1H), 7.23 (t, J = 7.7 Hz, 1H), 6.95 (d, J = 7.4 Hz, 1H), 3.82 (t, J = 7.1 Hz, 2H, H-7), 2.57 (t, J = 8.1 Hz, 2H, H-9), 2.35 (s, 3H), 2.03-2.15 (m, 2H, H-8).

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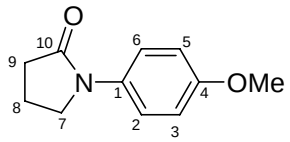
[12] D. G. Billing, J. C. A. Boeyens, L. Denner, K. E. du Plooy, G. C. Long, J. P. Michael, *Acta Crystallogr., Sect. B* **1991**, *47*, 284.

^{13}C-NMR (400 MHz, $CDCl_3$) δ 174.1 (C-10), 139.3 (C), 138.6 (C), 128.6 (CH), 125.3 (CH), 120.8 (CH), 118.1 (CH), 49.0 (C-7), 32.9 (C-8), 21.7 (CH_3), 18.2 (C-9).

All spectral data correspond to those given in the literature.[12]

1-(4-Methoxyphenyl)-pyrrolidin-2-one[13] (6b). Following the general procedure using pyrrolidin-2-one (100 mg, 1.17 mmol) and 4-iodoanisole (418 mg, 1.75 mmol) provided 115 mg (51% yield) of the coupling product as a white solid after purification by flash chromatography (1:1 n-pentane/ethyl acetate) of the crude oil.



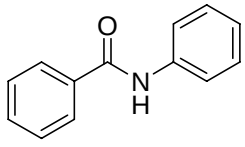
Mp: 112-114 ºC (Lit.[13] mp 108 ºC).

^{1}H-NMR (400 MHz, $CDCl_3$) δ 7.48 (d, J = 9.3 Hz, 2H), 6.88 (d, J = 9.3 Hz, 2H), 3.78-3.80 (m, 2H, H-7), 3.79 (s, 3H), 2.54-2.58 (m, 2H, H-9), 2.10-2.16 (m, 2H, H-8).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 173.8 (C-10), 156.4 (C), 132.6 (C), 121.7 (CH), 113.9 (CH), 55.5 (CH_3), 49.2 (C-7), 32.6 (C-8), 18.1 (C-9).

All spectral data correspond to those given in the literature.[13]

***N*-phenylbenzamide[9] (7a).** Following the general procedure using benzamide (100 mg, 0.83 mmol) and iodoabenzene (0.14 mL, 1.24 mmol) provided 128 mg (78% yield) of the coupling product as a white solid after purification by flash chromatography (dichloromethane) of the crude oil.



Mp: 162-163 ºC (Lit.[9] mp 164 ºC).

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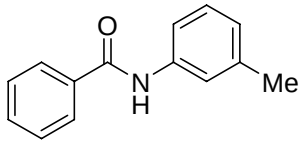
[13] C. J. Easton, M. J. Pitt, C. M. Ward, *Tetrahedron* **1995**, *51*, 12781.

^{1}H-NMR (400 MHz, CD_3OD) δ 7.87-7.93 (m, 2H), 7.67-7.70 (m, 2H), 7.45-7.57 (m, 3H), 7.33-7.36 (m, 2H), 7.12-7.16 (m, 1H).

^{13}C-NMR (400 MHz, CD_3OD) δ 167.5 (C), 138.2 (C), 134.8 (C), 131.5 (CH), 128.5 (CH), 128.2 (CH), 127.3 (CH), 124.3 (CH), 121.0 (CH).

All spectral data correspond to those given in the literature.[9]

***N*-(3-Methylphenyl)benzamide[14] (7b).** Following the general procedure using benzamide (100 mg, 0.83 mmol) and 1-chloro-3-iodobenzene (0.15 mL, 1.24 mmol) provided 138 mg (79% yield) of the coupling product as a white solid after purification by flash chromatography (dichloromethane) of the crude oil.



Mp: 117-119 ºC (Lit.[14] mp 120-123 ºC).

^{1}H-NMR (400 MHz, $CDCl_3$) δ 8.27 (br s, 1H, NH), 7.79-7.83 (m, 2H), 7.32-7.47 (m, 5H), 7.16 (t, J = 7.9 Hz, 1H), 6.92 (d, J = 7.7 Hz, 1H).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 166.1 (C), 138.9 (C), 138.0 (C), 135.0 (C), 131.7 (CH), 128.8 (CH), 128.6 (CH), 127.2 (CH), 125.4 (CH), 121.2 (CH), 117.7 (CH), 21.5 (CH_3).

All spectral data correspond to those given in the literature.[14]

***N*-(3-Chlorophenyl)benzamide[14] (7c).** Following the general procedure using benzamide (100 mg, 0.83 mmol) and 1-chloro-3-iodobenzene (0.18 mL, 1.24 mmol) provided 186 mg (97% yield) of the coupling product as a white solid after purification by flash chromatography (dichloromethane) of the crude oil.

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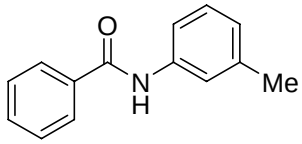
[14] A. M. C. H. van den Nieuwendijk, D. Pietra, L. Heitman, A. Göblyös, A. P. Ijzerman, *J. Med. Chem.* **2004**, *47*, 663.



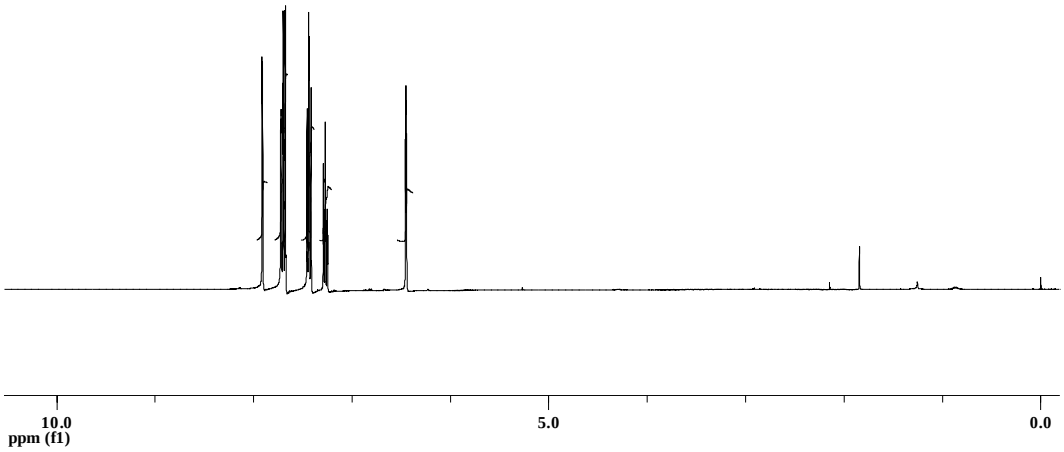
Mp: 125-126 ºC (Lit.[14] mp 123-124 ºC).

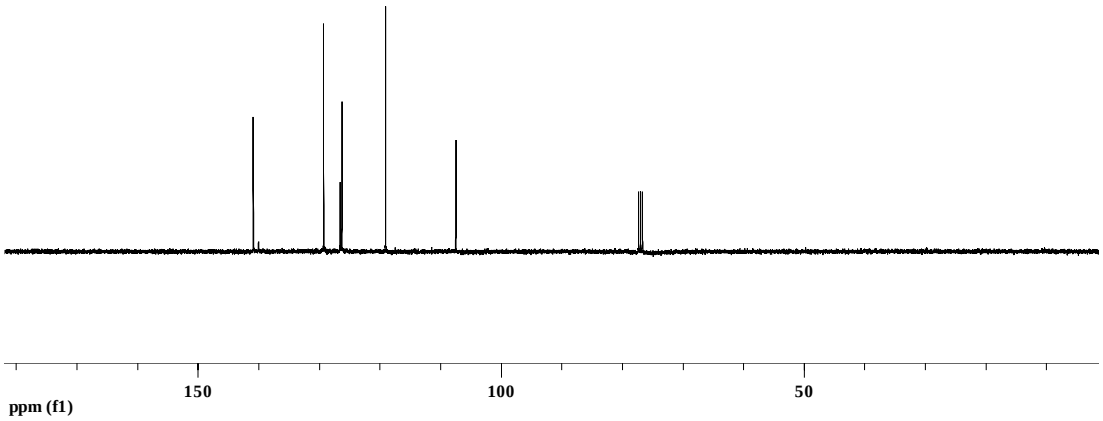
^{1}H-NMR (400 MHz, $CDCl_3$) δ 8.51 (br s, 1H, NH), 7.75-7.81 (m, 2H), 7.72 (t, J = 1.9 Hz, 1H), 7.44-7.47 (m, 2H), 7.33 (t, J = 7.7 Hz, 2H), 7.14-7.19 (m, 2H).

^{13}C-NMR (400 MHz, $CDCl_3$) δ 166.5 (C), 139.1 (C), 134.5 (C), 134.4 (C), 131.9 (CH), 129.9 (CH), 128.6 (CH), 127.1 (CH), 124.5 (CH), 120.7 (CH), 118.6 (CH).

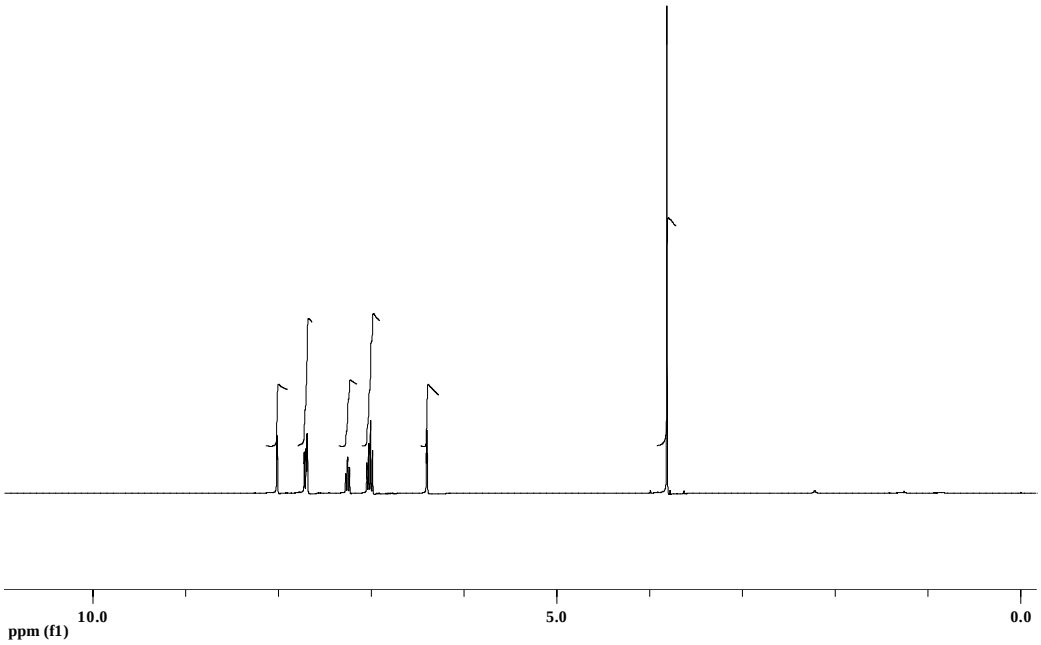
All spectral data correspond to those given in the literature.[14]

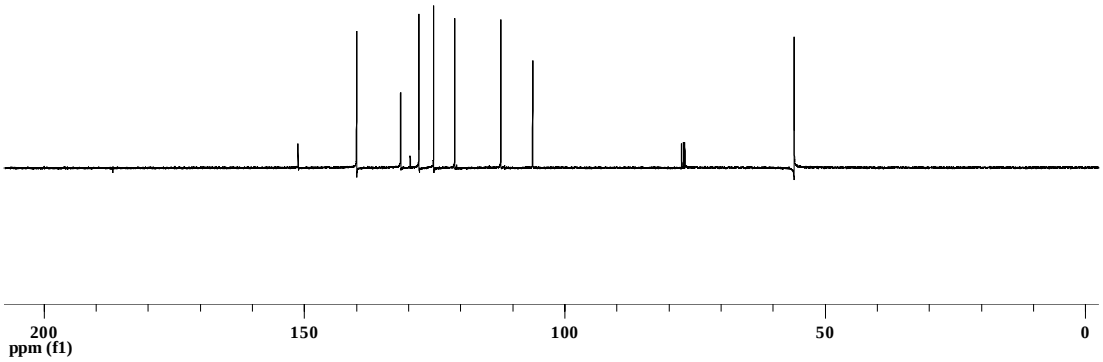
1-Phenyl-1*H*-pyrazole (3a)



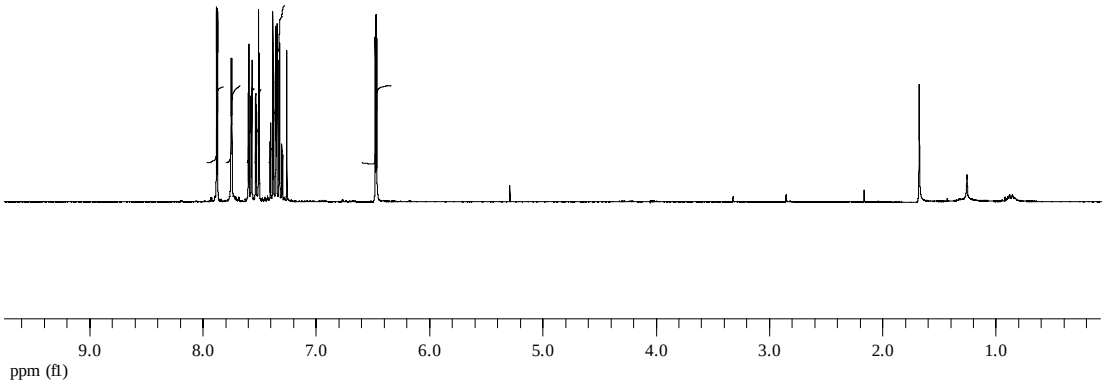


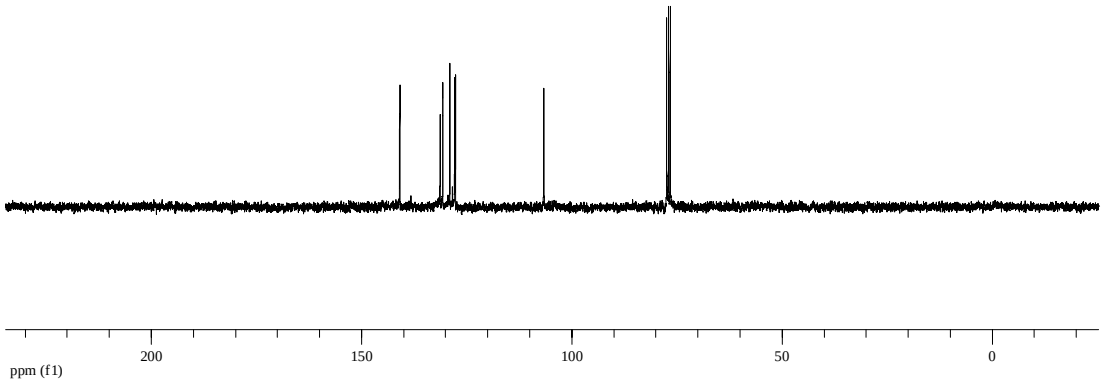
1-(2-Methoxyphenyl)-1*H*-pyrazole (3b)



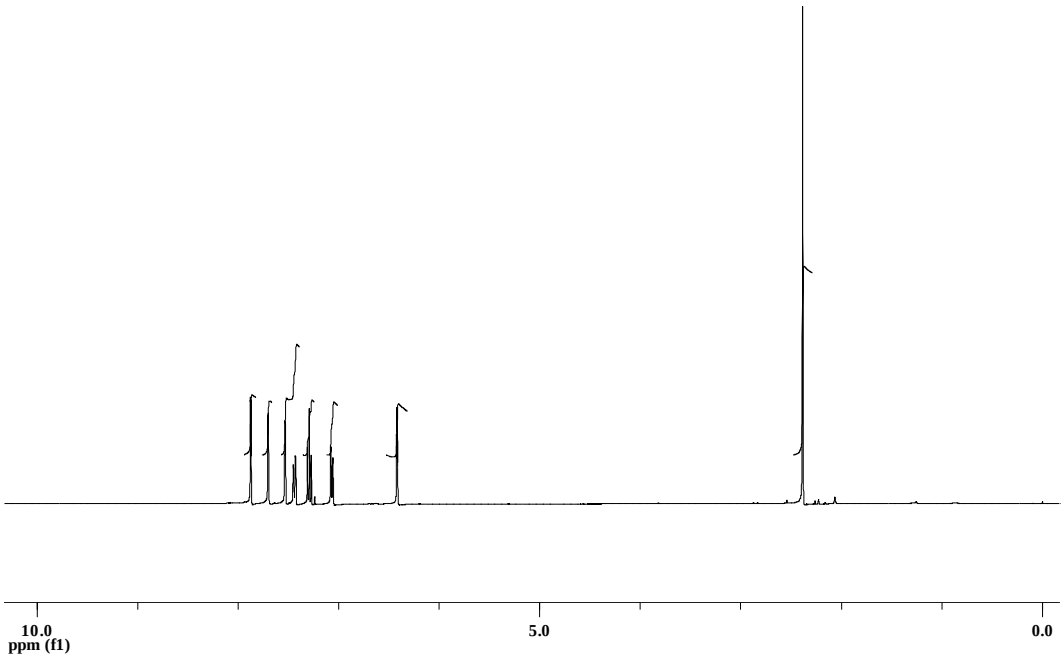


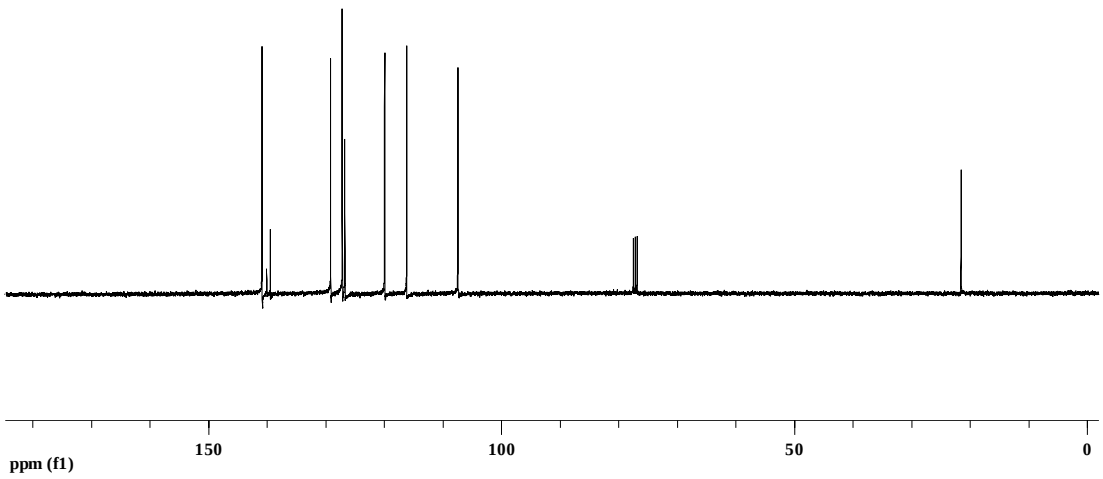
1-(2-Chlorophenyl)-1*H*-pyrazole (3c)



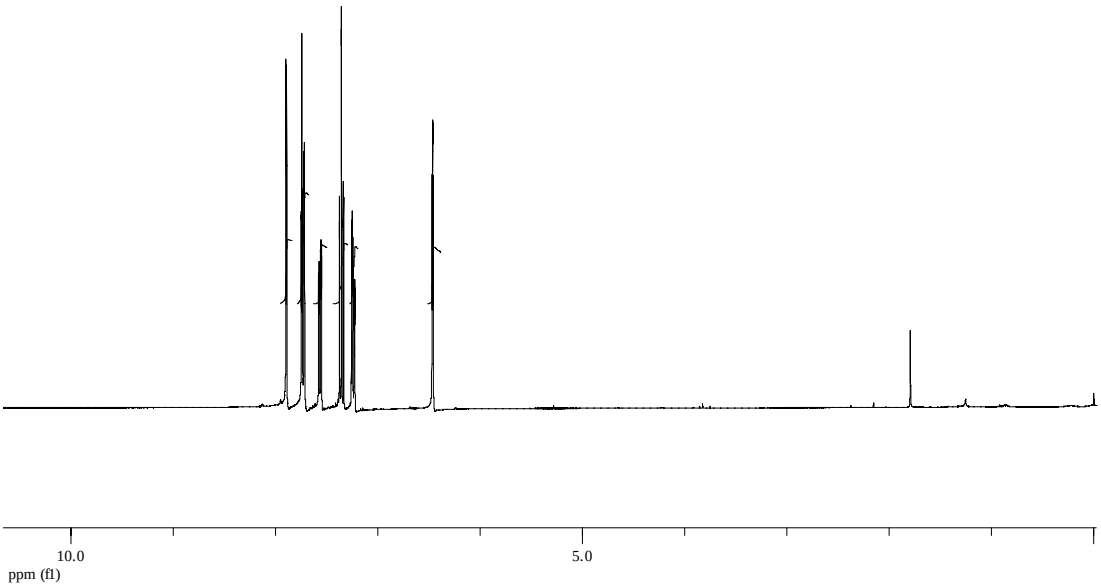


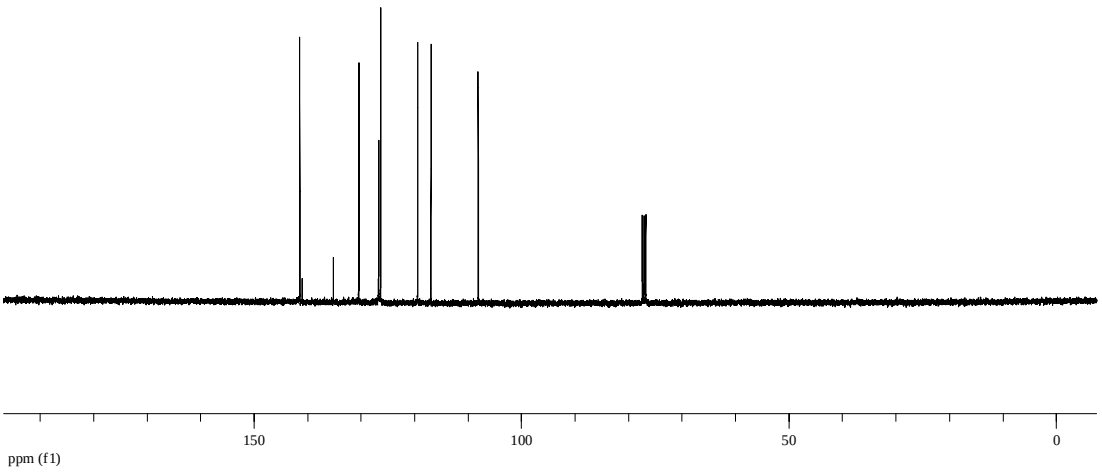
1-(3-Tolyl)-1*H*-pyrazole (3d)



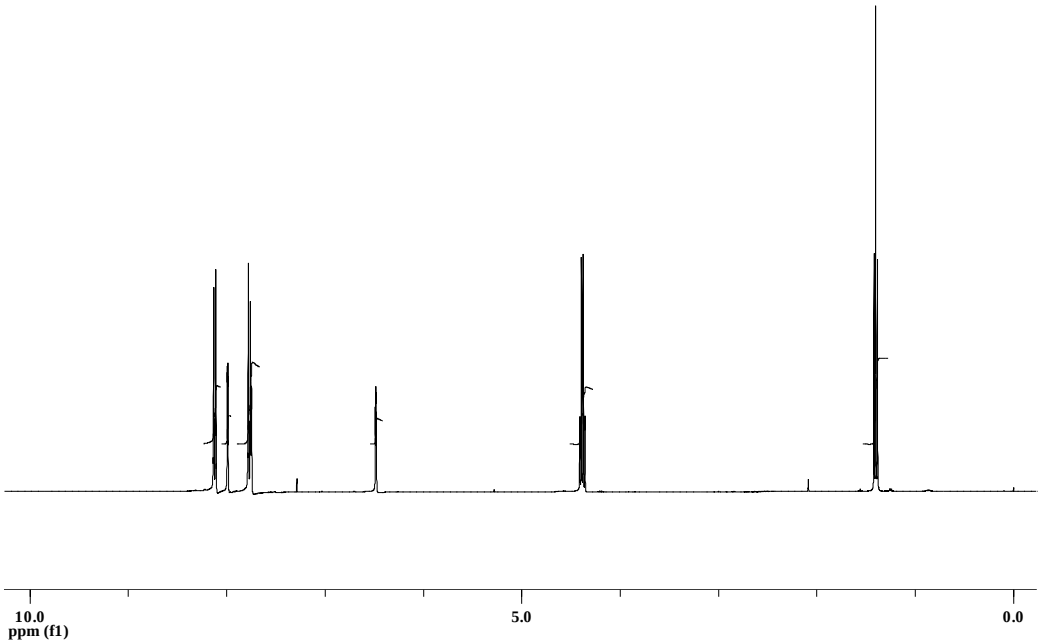


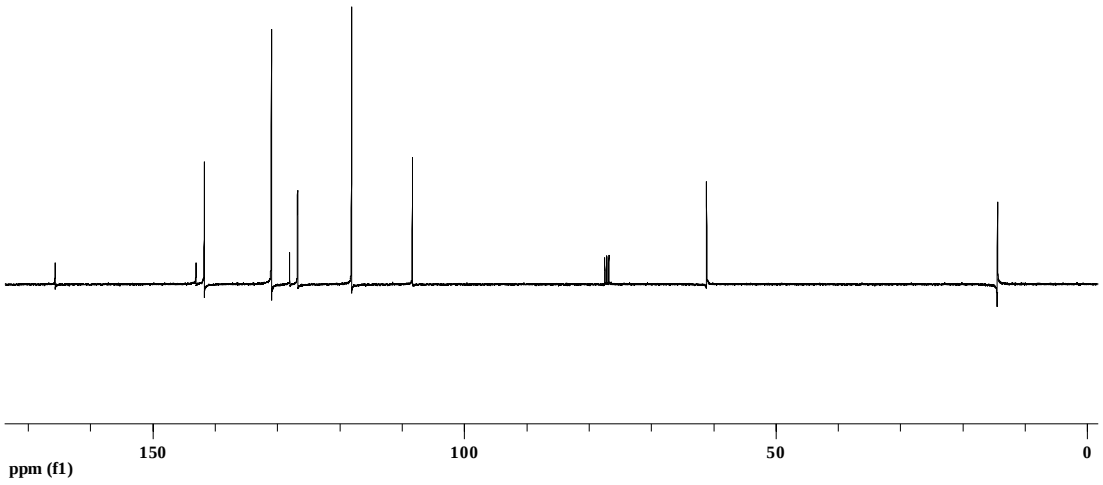
1-(3-Chlorophenyl)-1*H*-pyrazole (3e)



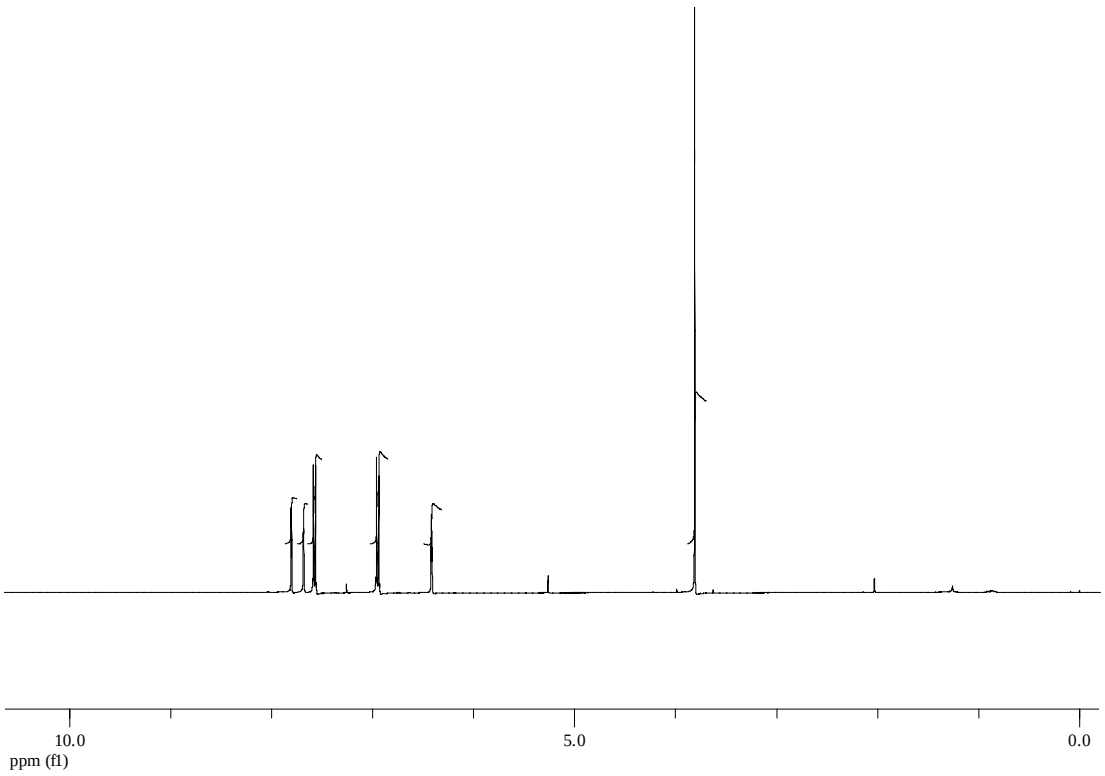


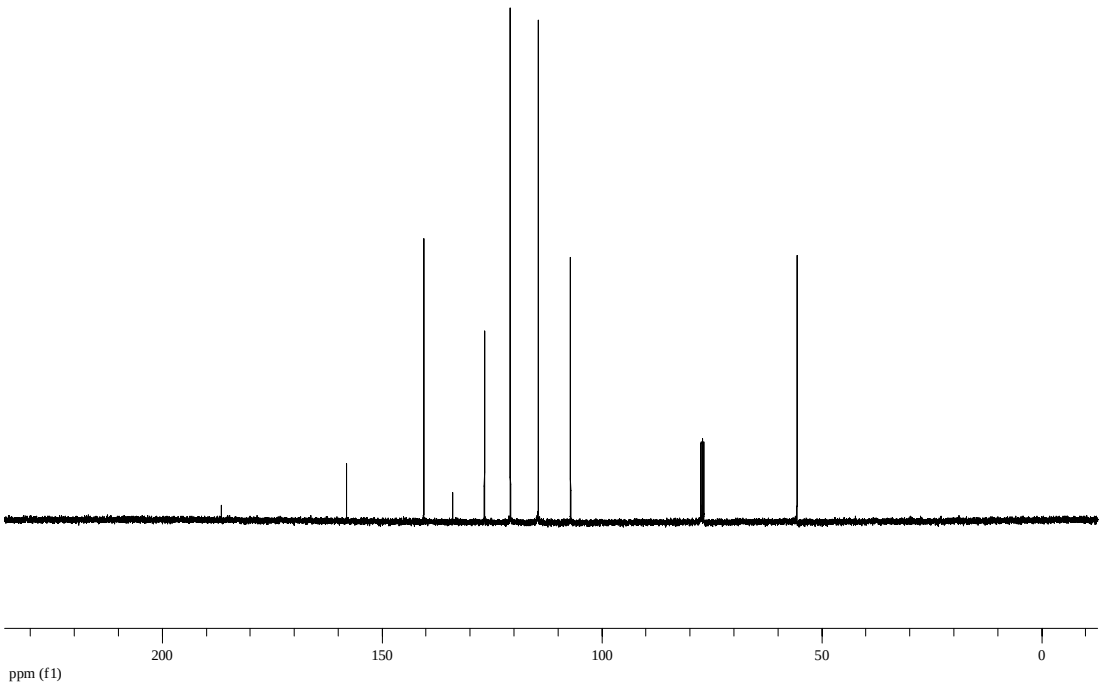
4-Pyrazol-1-yl-benzoic acid ethylester (3f)



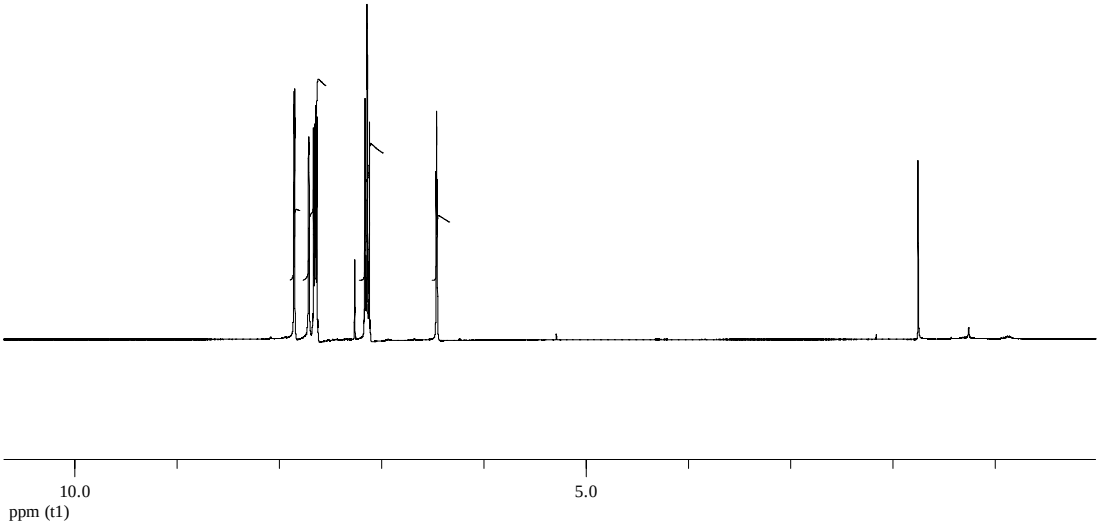


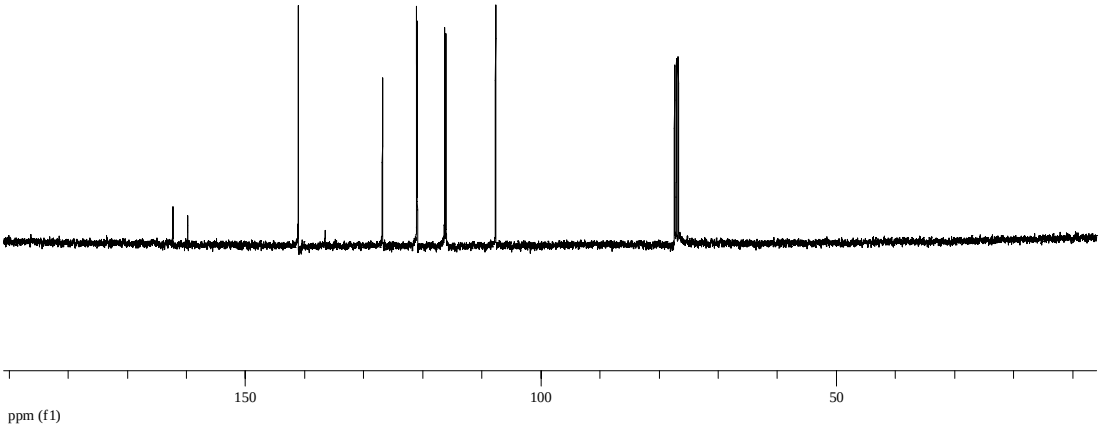
1-(4-Methoxyphenyl)-1*H*-pyrazole (3g)



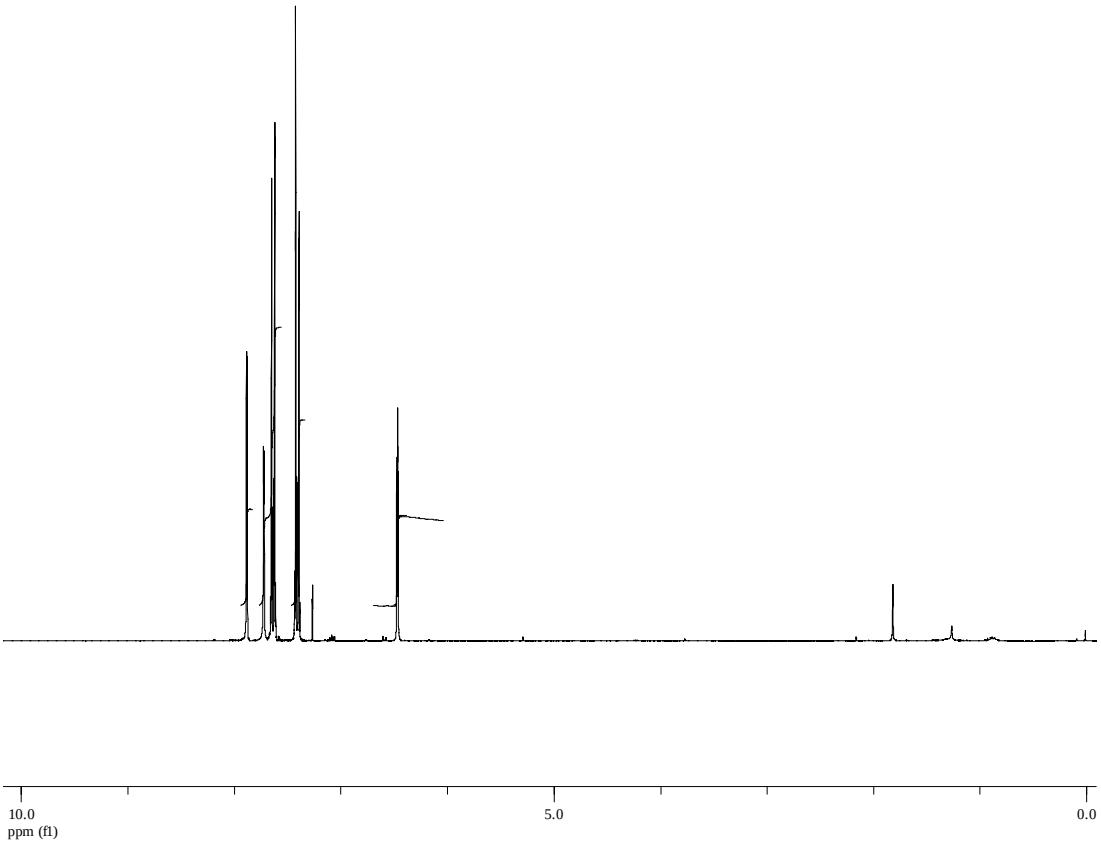


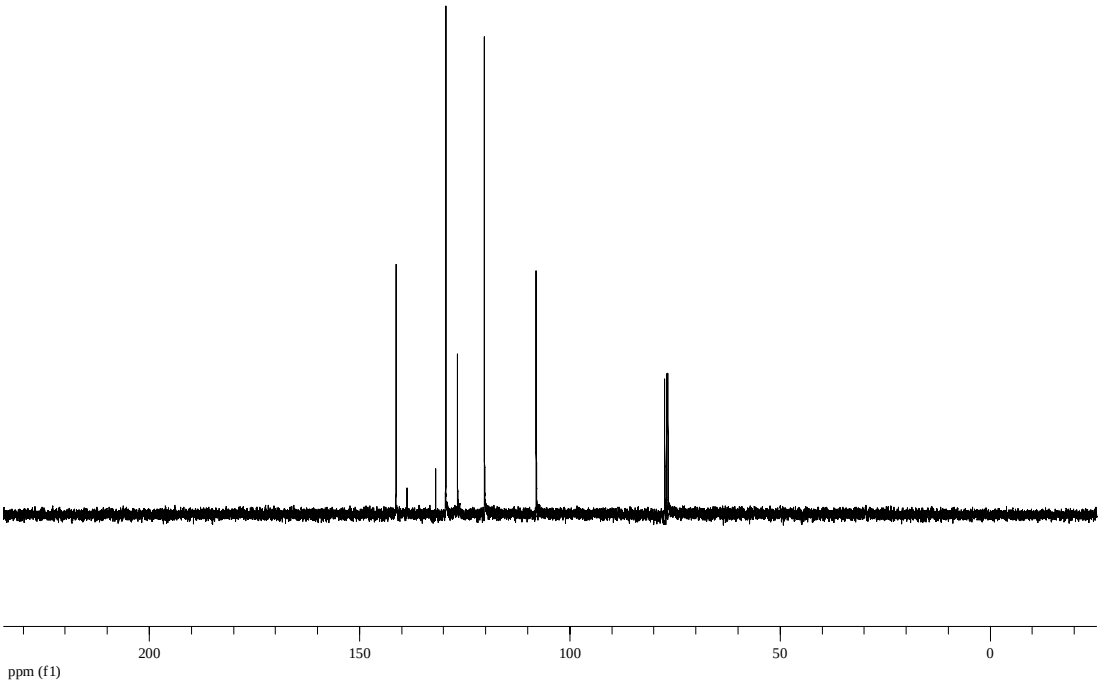
1-(4-Fluorophenyl)-1*H*-pyrazole (3h)



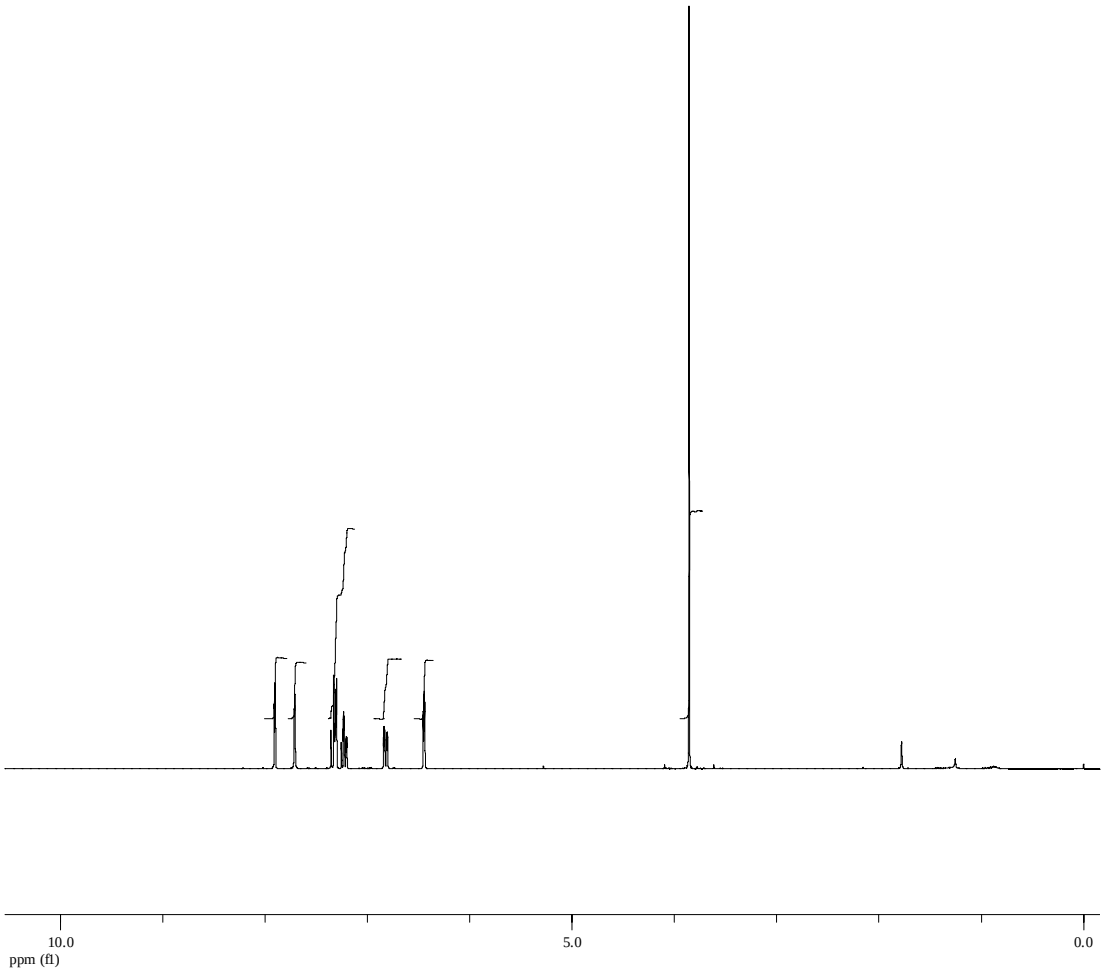


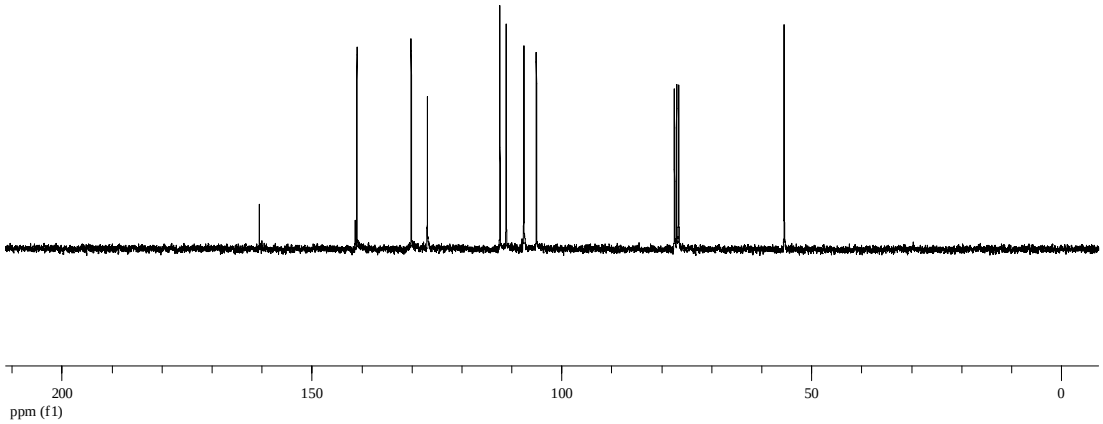
1-(4-Chlorophenyl)-1*H*-pyrazole (3i)



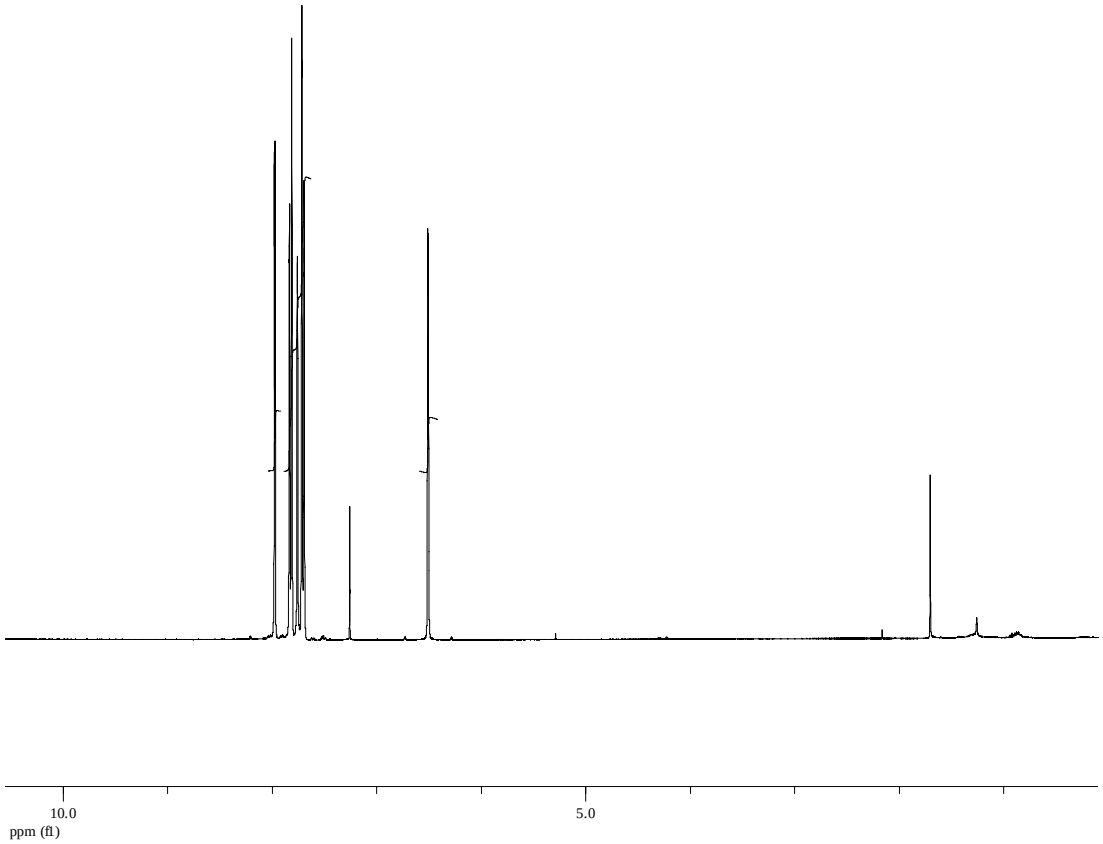


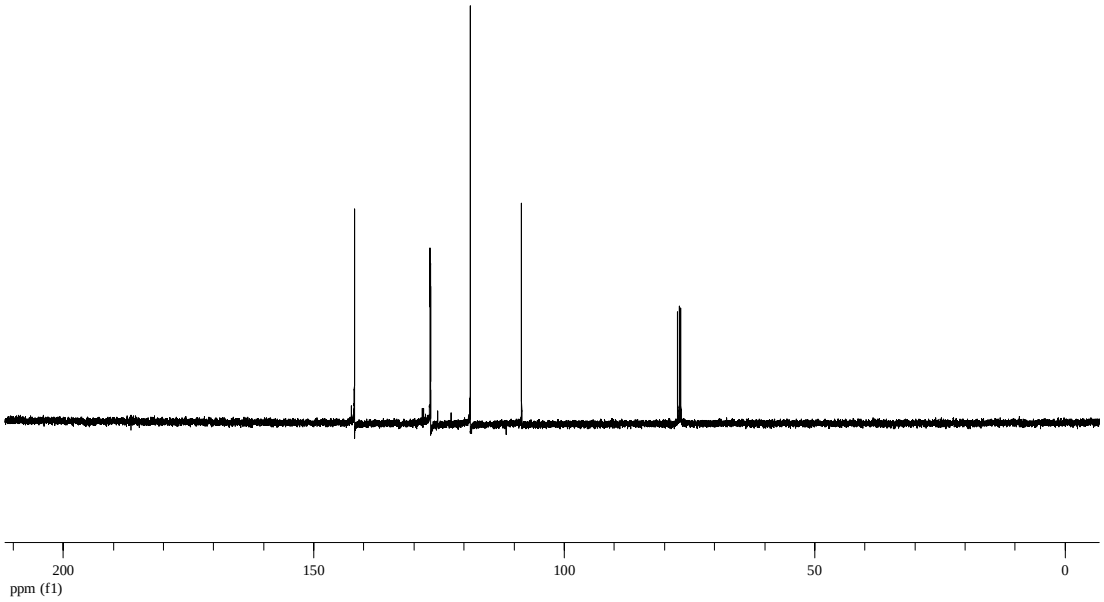
1-(3-Methoxyphenyl)-1*H*-pyrazole (3j)



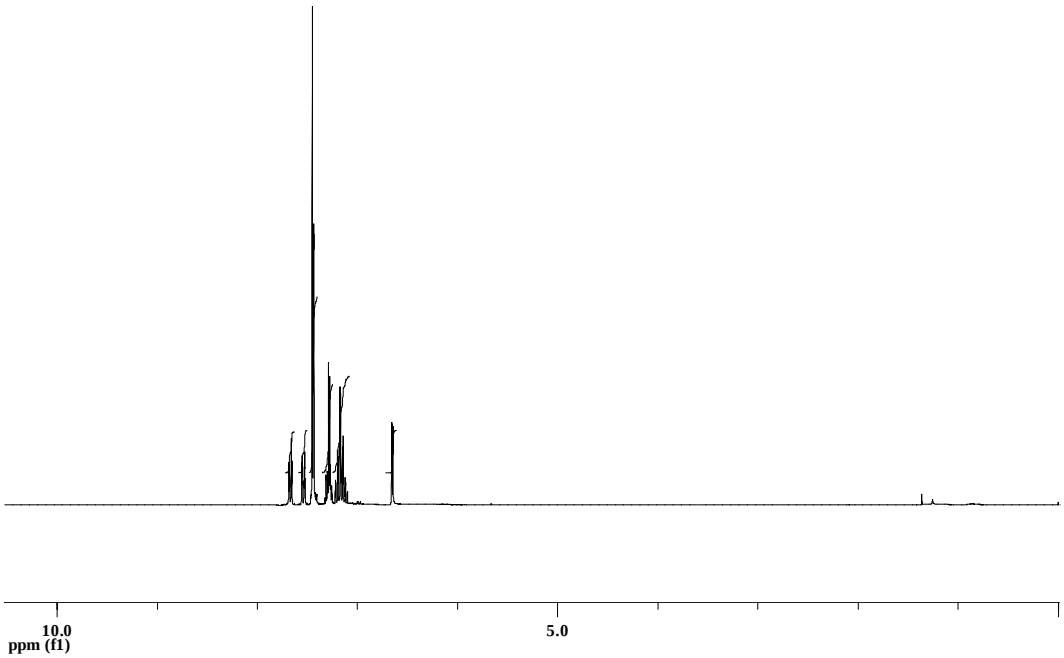


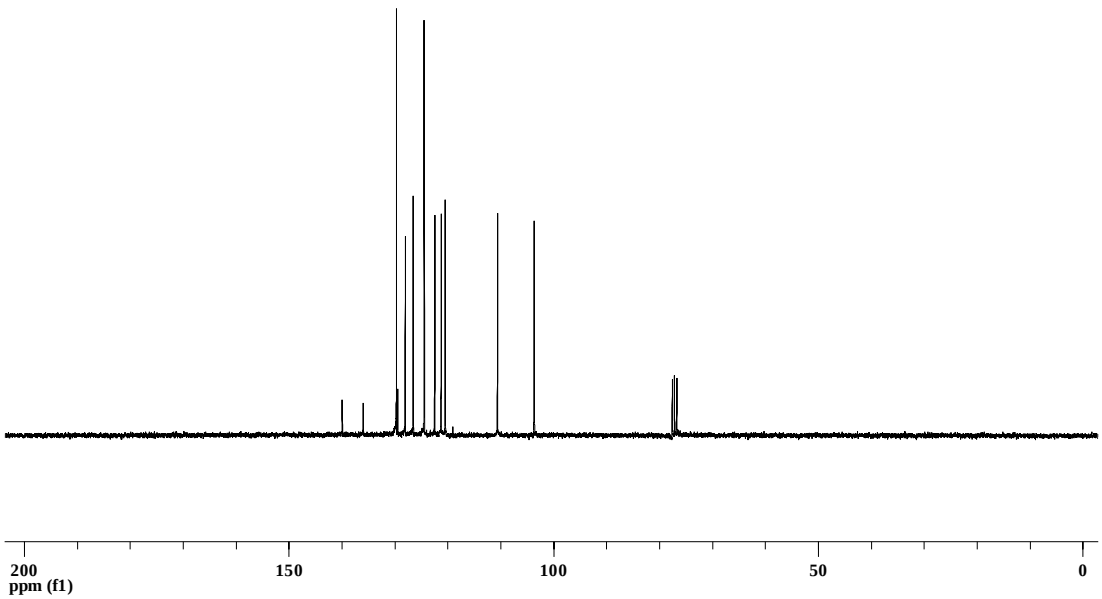
1-(4-Trifluoromethylphenyl)-1*H*-pyrazole (3k)



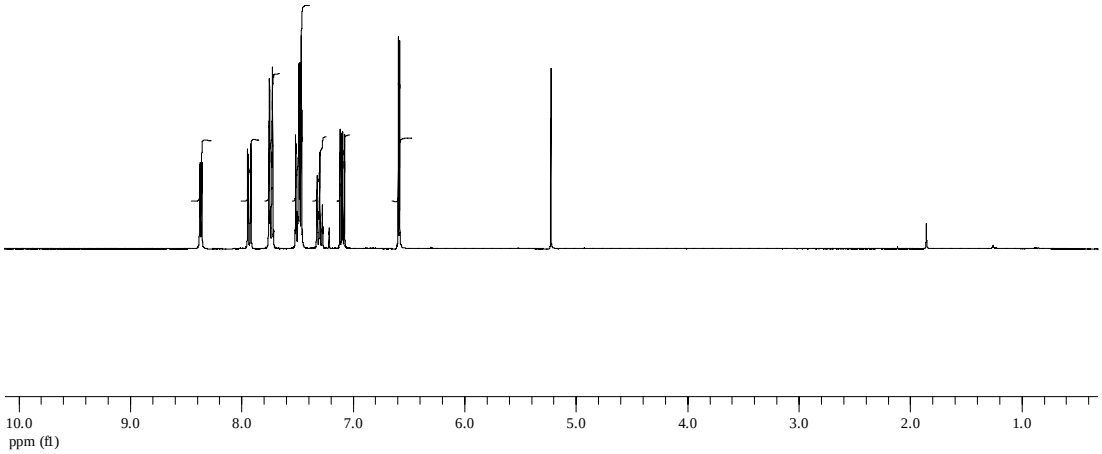


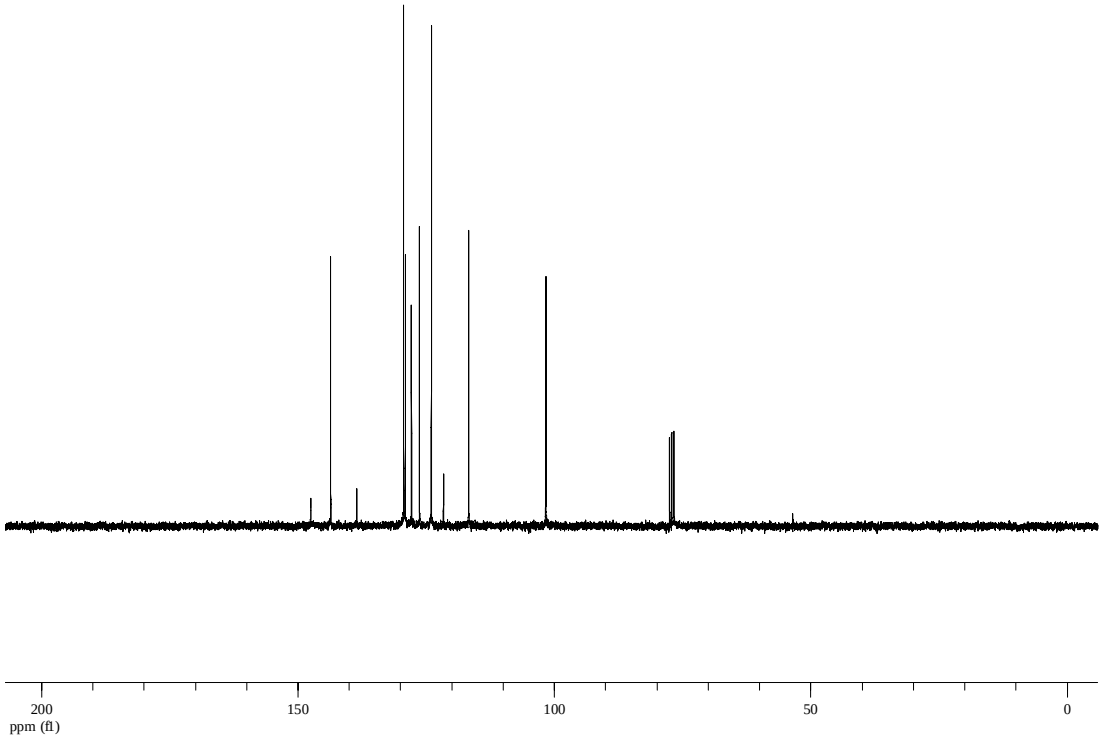
1-Phenyl-1*H*-indole (4)



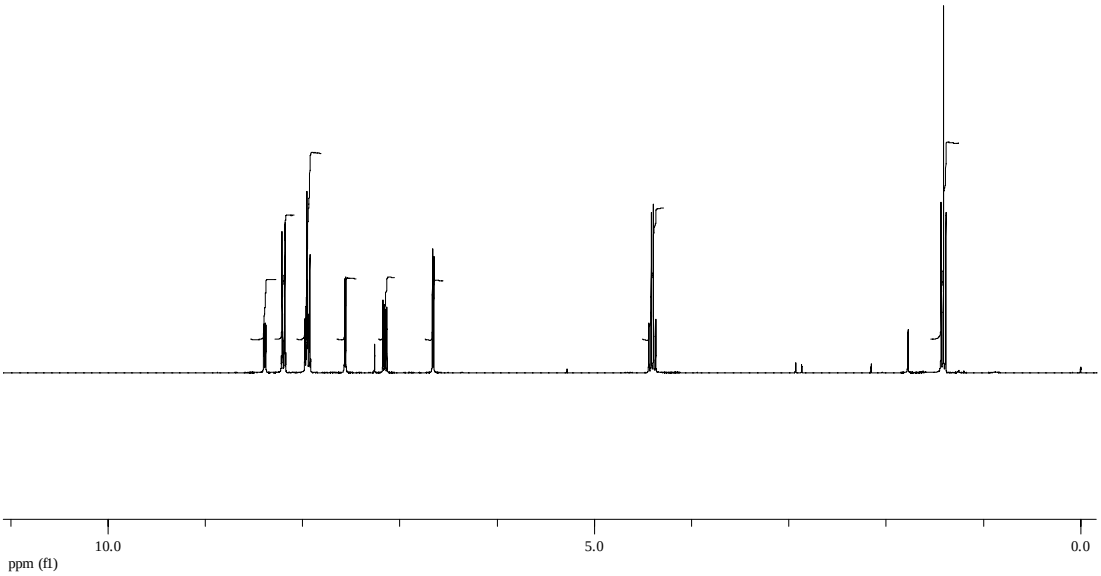


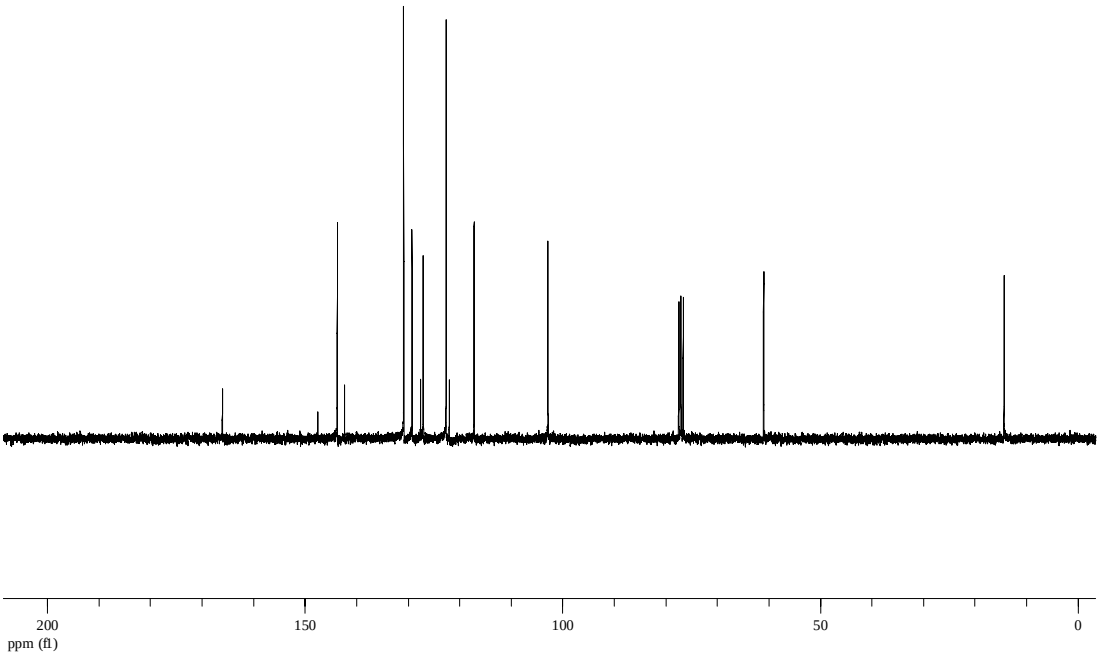
1-Phenyl-7-aza-1*H*-indole (5a)



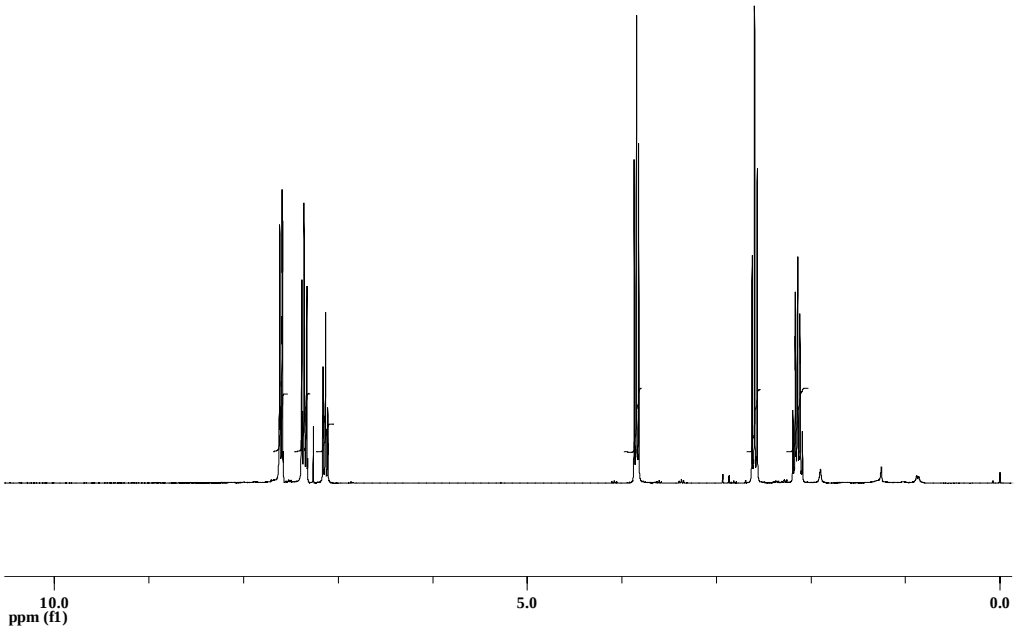


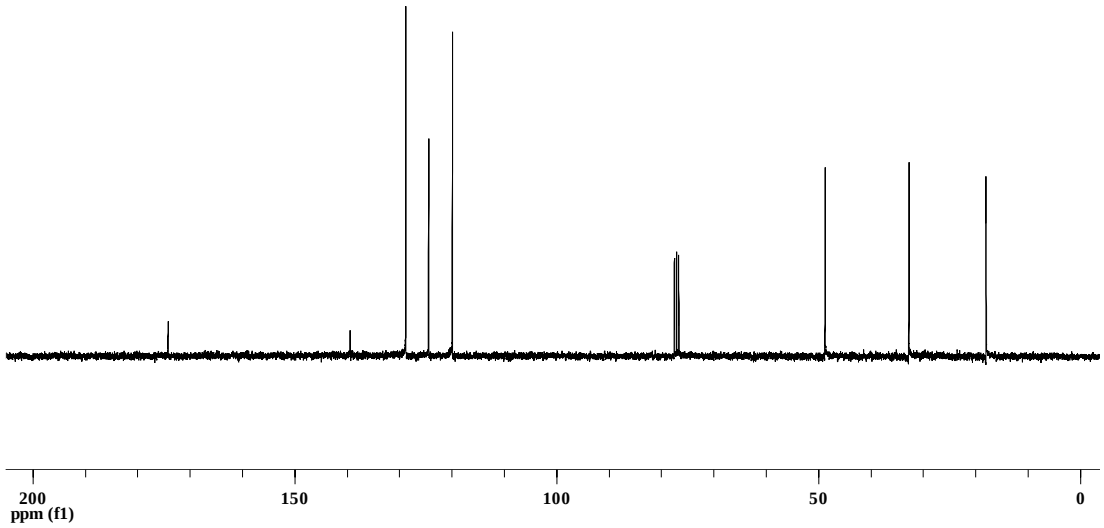
4-(7-Aza-1*H*-indol-1-yl)-benzoic acid ethylester (5b)



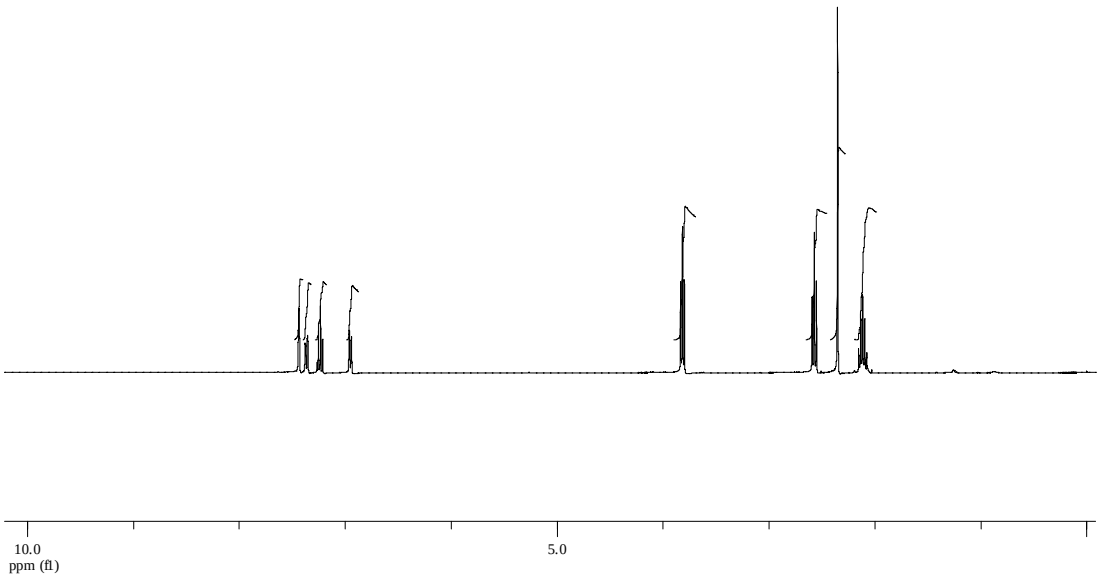


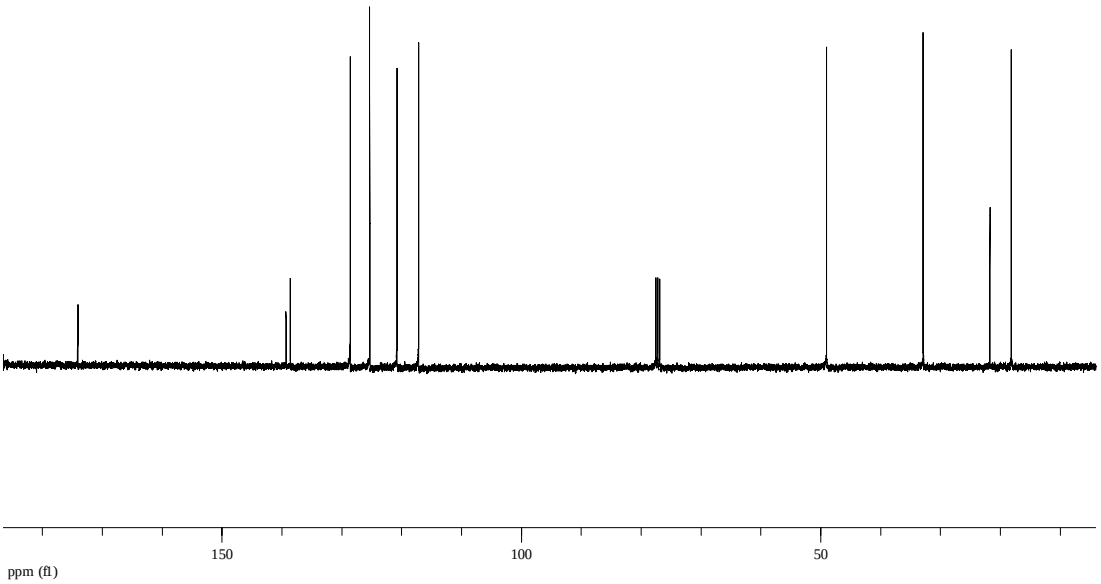
1-Phenyl-pyrrolidin-2-one (6a)



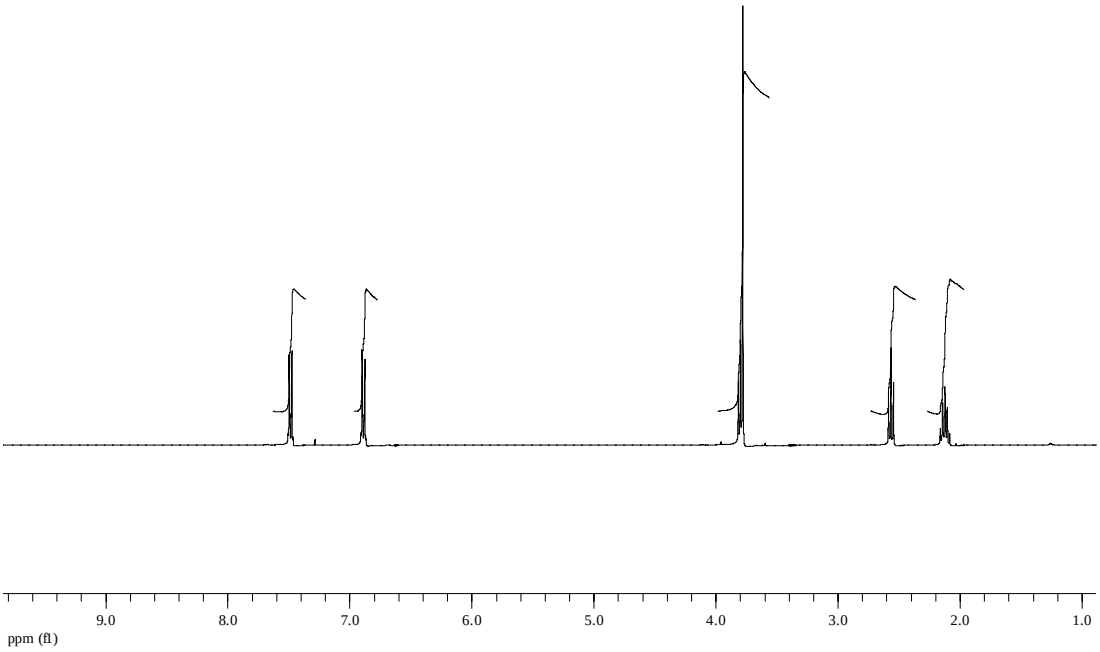


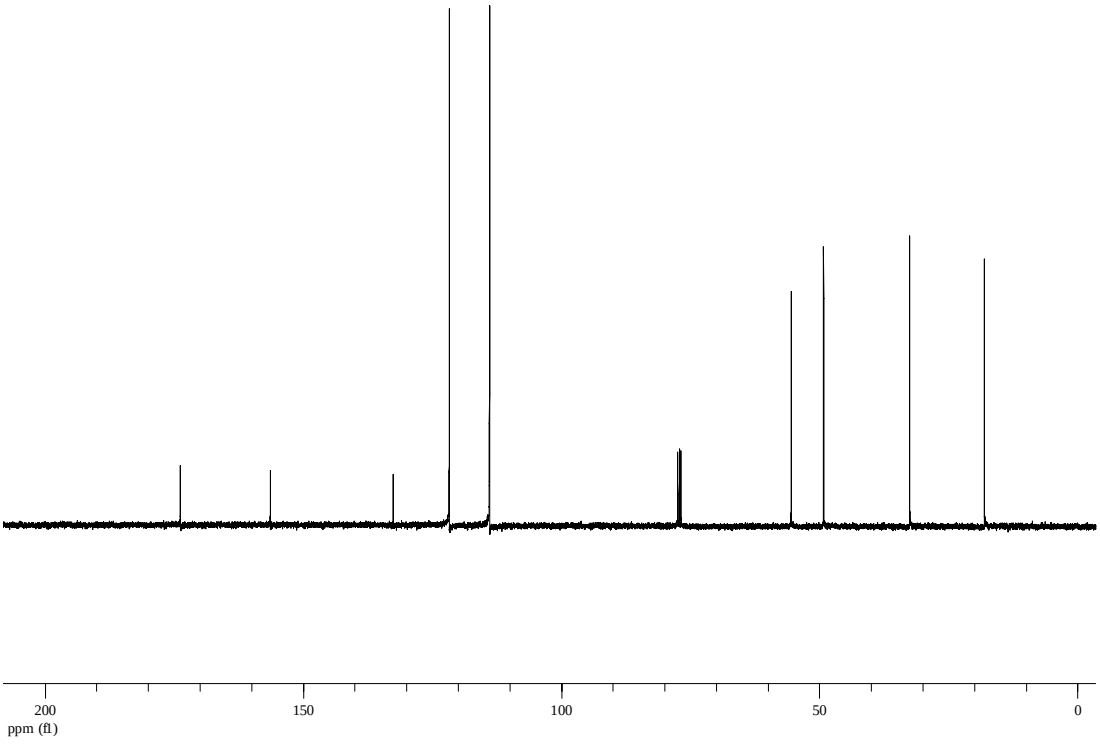
1-(3-Methylphenyl)-pyrrolidin-2-one (6b)



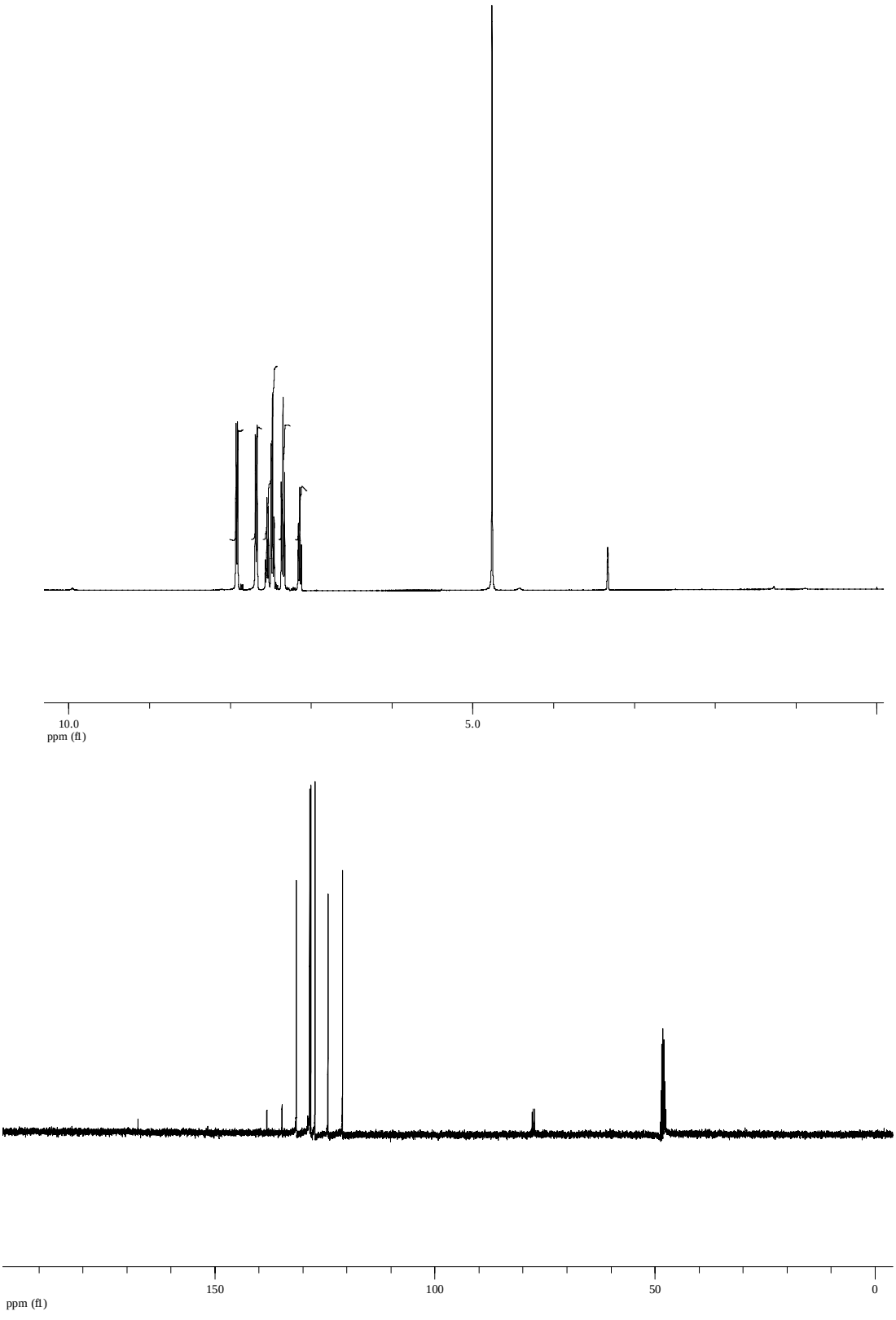


1-(4-Methoxyphenyl)-pyrrolidin-2-one (6c)

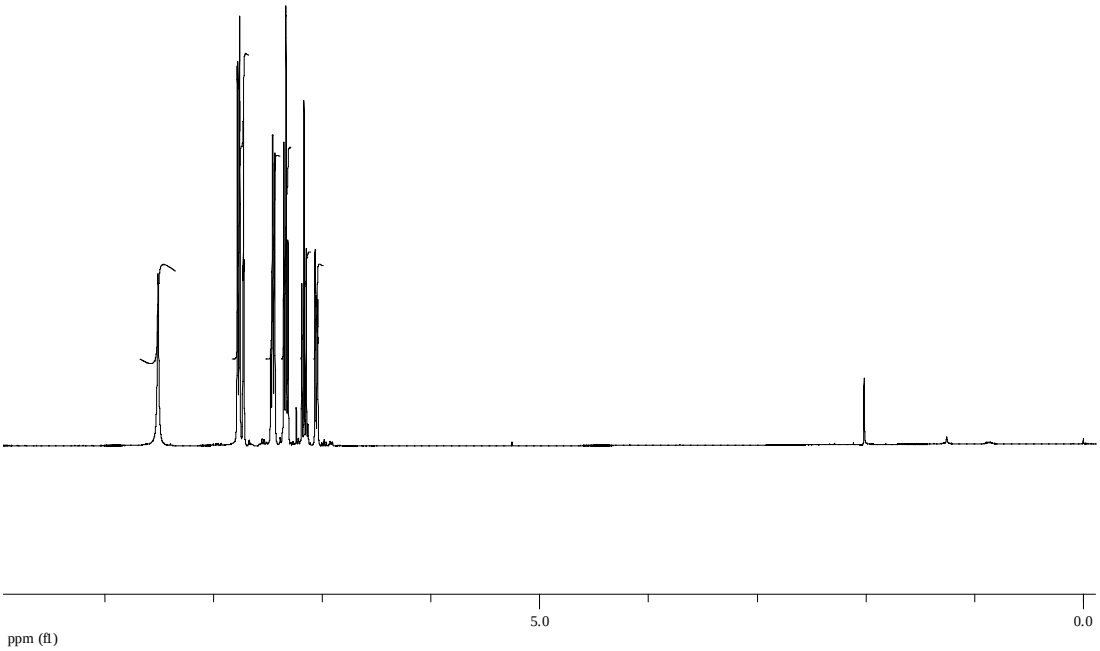


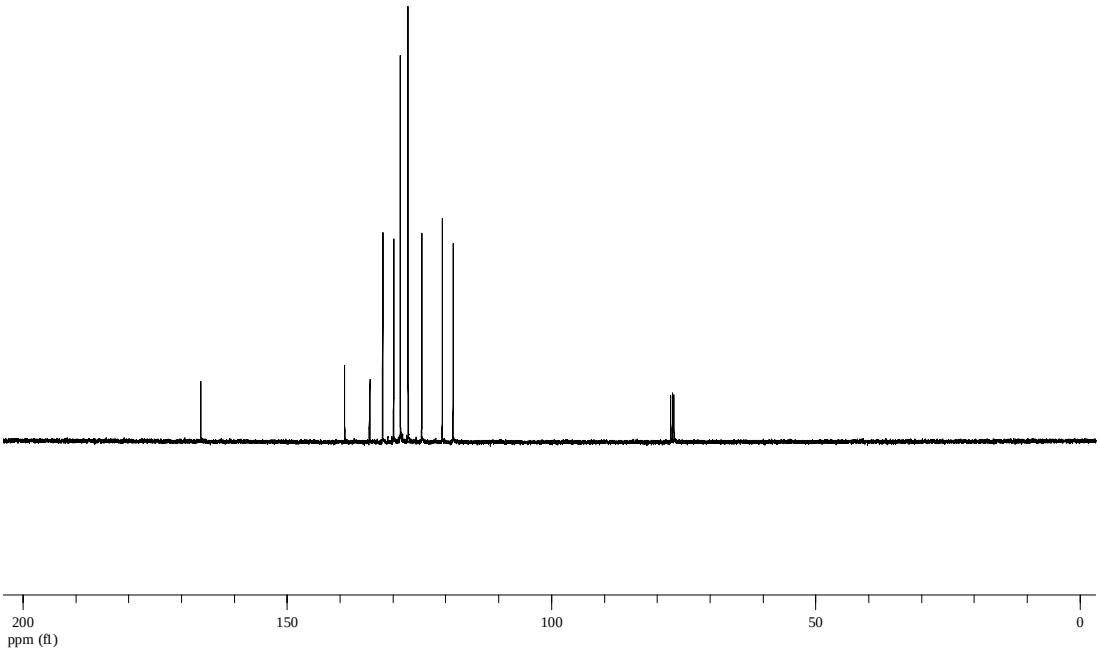


_N_-phenylbenzamide (7a)



_N_-(3-Chlorophenyl)benzamide (7b)





_N_-(3-Methylphenyl)benzamide (7c)