Supporting Information

CuI-NP catalyzed N-Arylation of amines using Vit-E analoues as Amphiphile in water :Application in the synthesis of pharmaceutical entities

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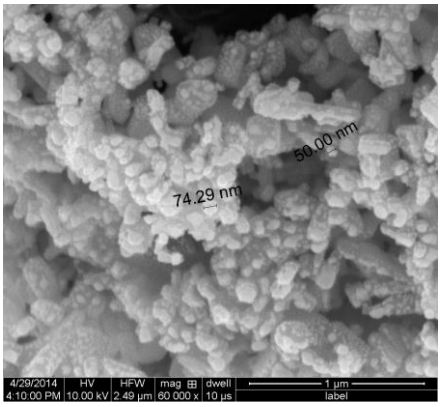
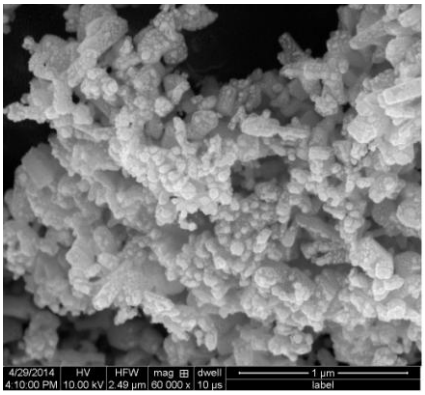
General: All the reagents and solvents were purchased from Sigma-Aldrich or Merck chemical Co. Column chromatography was performed using Spectrochem siliga gel (100-200). Organic solvents were concentrated under reduced pressure on Ika rotary evaporator. The progress of reaction was checked by thin-layer chromatography. The plates were visualized first with UV illumination followed by iodine. ^{1}H and ^{13}C NMR spectra were obtained using either a Bruker DRX-200 or AV-300 spectrometer. Chemical shifts are reported in ppm from tetramethylsilane with the solvent resonance as the internal standard and ^{1}H NMR Spectra are reported in the order: multiplicity, coupling constant (J value) in hertz (Hz) and no of protons; signals were characterized as s (singlet), d (doublet), t (triplet), m (multiplet). ^{13}C NMR spectra were recorded at 50 or 75 MHz. Mass spectra were obtained using JEOL SX-102 (ESI) instrument. The surface property and the composition of the CuI nanoparticles was determined using Scanning electron microscope (SEM-EDX) –FEI, Netherland, Quanta™ 450 FEG and Transmission electron microscopy (TEM) – FEI, netherland, Tecnai™ G2 Spirit.

General procedure for preparation of CuI nanoparticles

0.464 g (4 mmol) of dimethylglyoxime (dmgH) and 0.400 g (2 mmol) of $Cu(OAc)_2.H_2O$ were added into 50 ml of absolute ethanol in sequence, which was stirred at 0 °C for 30 min to get brown precipitates Cu(dmg) 2 . Then the collected precipitates dispersed in 50 ml of absolute ethanol again, 0.664 g (4 mmol) KI was added and stirred vigorously for 2 h. After that, the mixture was transferred into 60 mL Teflon-lined stainless steel autoclave. The autoclave was sealed and heated at 180 °C for 6 h, and then the reactor bomb is allowed to cool to room temperature. Black precipitates were obtained, then centrifugalized and washed

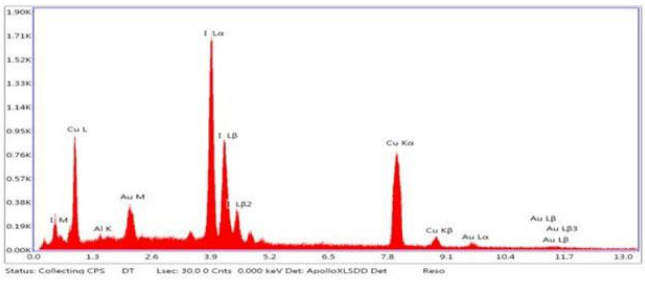
with ethanol and deionized water for three times to ensure the removal of the impurities. The final product was then dried in a vacuum oven at room temperature for 12 h.

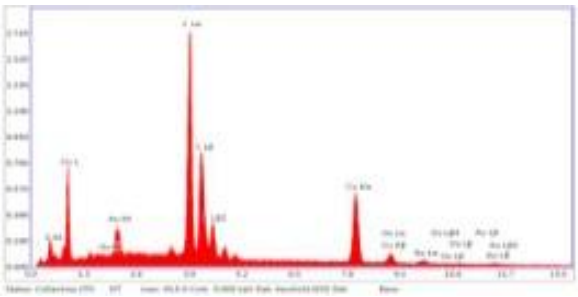




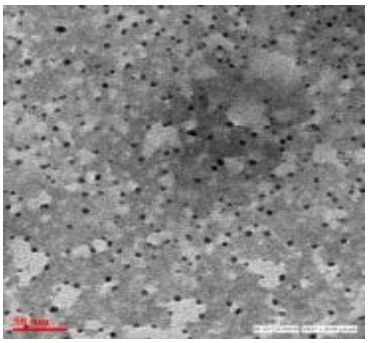
SEM images of catalyst before the reaction (b) After the 5th run

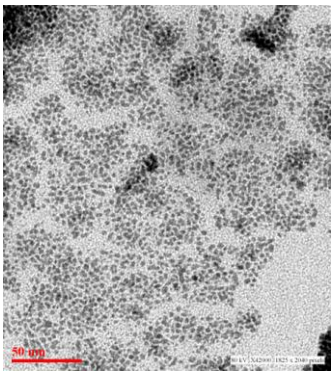
TEM images before the reaction (d) After the 5th run





EDX image of fresh catalyst, and (f) EDX image of catalyst after 5th run.





TEM images before the reaction (d) After the 5th run

General procedure for the N-Arylation of amine / azoles:

The N-arylation of amines was carried out in a round bottomed flask. In a typical experiment, a mixture of chlorobenzene (1 mmol), morpholine (1.5 mmol), CuI NPs (3.5 mol%) and NaOH (3 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (5 ml) as solvent and stirred for the 4.5 hours at room temperature. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by column chromatography using EtOAc / hexane solvent system.

General procedure for the Intermediate of Imitinib.

In a typical experiment, a mixture of 4-(pyridin-3-yl)pyrimidin-2-amine (1.0 mmol), 2-bromo-1-methyl-4-nitrobenzene (1.0 mmol), CuI NPs (3.5 mol%) and NaOH (3 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (3 ml) as solvent and stirred for the 9 hours at 60 ^{0}C. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by column chromatography using EtOAc / hexane solvent system.

General procedure for the N^1-Selective Intermediate of Nilotinib:

In a typical experiment, a mixture of 4-methyl-1H-imidazole (1.0 mmol), 3-bromo-5-(trifluoromethyl)aniline (1.0 mmol), CuI NPs (3.5 mol%) and NaOH (3 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (3 ml) as solvent and stirred for the 6 hours at room temperature. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous

sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by column chromatography using EtOAc / hexane solvent system.

General procedure for the 1-phenylpiperazine.

In a typical experiment, a mixture of piperazine (0.5 mmol), bromobenzene (0.5 mmol), CuI NPs (3.5 mol%) and NaOH (3 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (3 ml) as solvent and stirred for the 1.5 hours at room temperature. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by column chromatography using EtOAc / hexane solvent system.

General procedure for the Tryptanthrin:

In a typical experiment, a mixture of 2-aminobenzamide (1.0 mmol), 2-chloro-3H-indol-3-one (1.0 mmol), CuI NPs (3.5 mol%) and NaOH (3 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (3 ml) as solvent and stirred for the 1.0 hours at room temperature. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by column chromatography using EtOAc / hexane solvent system.

General procedure for the 2-bromoIndole derivatives in one-pot.

The intramolecular amination reaction was carried out in a round bottomed flask. In a typical experiment, a mixture of 2-(2,2-dibromovinyl)aniline (1 mmol), CuI NPs (3.5 mol%) and NaOH (3.0 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (5 ml) as solvent and stirred for the 15 hours at 90 ^{0}C temperature. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by silica column chromatography using EtOAc / hexane solvent system.

General procedure for the Intermediate of Oxacarbazepine:

In a typical experiment, a mixture of 1-(2-aminophenyl)-2-(2-bromophenyl)ethanone (1 mmol), CuI NPs (3.5 mol%) and NaOH (3.0 equ.) were dissolved in aqueous TPGS (2 wt %) amphiphile solution (5 ml) as solvent and stirred for the 6 hours at 80 ^{0}C temperature. The reaction was monitored to completion using TLC. At the end of reaction, the mixture was then cooled to room temperature and poured into distilled water. The products were extracted using EtOAc and the organic layer was dried over anhydrous sodium sulphate (Na_2SO_4). The solvent was evaporated in vacuo, the crude products were purified by silica column chromatography using EtOAc / hexane solvent system.

Characterization data for synthesized compounds:

4-phenylmorpholine (1) Solid, Yield 92 %, ESI MS (*m/z*) = 164 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 3.11(t, 4H, *J* = 4.5 Hz) 3.83 (t, 4H, *J* = 4.6 Hz), 6.80-6.91 (m, 3H), 7.22-7.3 (m, 2H). ^{13}C NMR (75 MHz, DMSO-d_6) δ_C : 49.0, 66.7, 115.3, 119.5, 129.0, 151.2. Analysis calculated for : $C_{10}H_{13}NO$, C 73.59, H 8.03, N 8.58 Found : C 73.58, H 8.08, N 8.52.

1-phenylpiperidine (2) Solid, Yield 90 %, ESI MS (*m/z*) = 162 (M+H), ^{1}H NMR (300 MHz: DMSO-d_6) δ_H **:** 1.50-1.62 (m, 2H), 1.65-1.75 (m, 4H), 3.15 (t, 4H, *J* = 5.0 Hz), 6.82 (d, 1H, *J* = 7.8 Hz), 6.95 (d, 2H, *J* = 7.9 Hz), 7.22-7.30 (m, 2H). ^{13}C NMR (75 MHz: DMSO-d_6) δ_C : 24.2, 26.2, 50.5, 116.5, 119.5, 128.9, 152.5. Analysis calculated for : $C_{11}H_{15}NO$, C 81.94, H 9.38, N 8.69, Found : C 81.92, H 9.37, N 8.65.

2-methoxy-N-phenylaniline (3) Solid, Yield 91 %, ESI MS (*m/z*) = 200 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 3.92 (s, 3H), 6.20 (s, 1H), 6.88-6.98 (m, 3H), 6.98 (t, 1H, *J* = 7.3 Hz), 7.18-7.24 (m, 2H), 7.30-7.36 (m, 3H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 55.6, 110.9, 114.8, 118.7, 119.8, 120.9, 121.3, 129.4, 133.1, 142.8, 148.4. Analysis calculated for : $C_{13}H_{13}NO$, C 78.36, H 6.58, N 7.03, Found: C 78.32, H 6.52, N 7.09.

4-(naphthalen-2-yl)morpholine (4) Solid, Yield 90 %, ESI MS (*m/z*) = 214 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 3.25 (t, 4H, *J* = 4.3 Hz), 3.95 (t, 4H, *J* = 4.8 Hz), 7.13 (d, 1H, *J* = 6.3 Hz), 7.20- 7.28 (m, 1H), 7.25- 7.32 (m, 1H), 7.41(d, 1H, *J* = 6.3 Hz), 7.68-7.75

(m, 3H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 49.8, 66.7, 110.1, 118.9, 123.6, 126.5, 126.8, 127.5, 128.7, 128.9, 134.6, 149.0. Analysis calculated for : $C_{14}H_{15}NO$, C 78.84, H 7.09, N 6.57, Found : C 78.88, H 7.07, N 6.53.

4-methyl-N-phenylaniline (5) Solid, Yield 88 %, ESI MS (*m/z*) = 184 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H **:** 2.34 (s, 3H), 5.63 (s, 1H), 6.91 (t, 1H, *J* = 7.3 Hz), 7.00-7.10 (m, 4H), 7.12 (d, 2H, *J* = 8.2 Hz), 7.28 (d, 2H, *J* = 7.4 Hz) ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 20.9, 117.1, 119.1, 120.4, 129.8, 130.0, 131.1, 140.5, 144.1. Analysis calculated for: $C_{13}H_{13}N$, C 85.21, H 7.15, N 7.64, Found : C 85.18, H 7.13, N 7.69.

3-methoxy-N-phenylaniline (6) Solid, Yield 90 %,ESI MS (*m/z*) = 200 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H :3.80 (s, 3H), 5.74 (s, 1H), 6.51 (d, 1H, *J* = 7.2 Hz) 6.65-6.69 (m, 2H), 6.97 (t, 1H, *J* = 7.2 Hz), 7.10-7.15 (m, 2H), 7.19- 7.32 (m, 3H).^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 55.5, 103.6, 106.4, 110.4, 118.6, 121.5, 129.5, 130.3, 143.1, 144.8, 160.9. Analysis calculated for : $C_{13}H_{13}NO$, C 78.36, H 6.58, N 7.03 Found : C 78.33, H 6.57, N 7.06.

4-methyl-4'-chlorophenylamine (**7)** Solid, Yield 85 %,ESI MS (*m/z*) = 218 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H **:** 2.33 (s, 3H), 5.59 (s, 1H), 6.98 (d, 2H, *J* = 8.5 Hz), 6.99 (d, 2H, *J* = 8.2 Hz), 7.11 (d, 2H, *J* = 8.1 Hz), 7.21 (d, 2H, *J* = 8.8 Hz). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 20.9, 118.2, 119.6, 125.0, 129.0, 130.2, 131.8, 140.1, 143.1. Analysis calculated for : $C_{13}H_{12}ClN$, C 71.72, H 5.56, Cl 16.29, N 6.43 Found : C 71.73, H 5.58, Cl 16.2 N 6.46.

4-(4-methoxyphenyl)morpholine (8) Solid, Yield 85 %, ESI MS (*m/z*) = 194 (M+H), ^{1}H NMR (300 MHz: DMSO-d_6) δ_H **:** 3.04 (t, 4H, *J* = 4.8 Hz), 3.77 (s, 3H), 3.86 (t, 4H, *J* = 4.8 Hz), 6.82-6.90 (m, 4H). ^{13}C NMR (75 MHz: DMSO-d_6) δ_C : 50.8, 55.5, 67.0, 114.4, 117.8, 145.6, 153.9. Analysis calculated for : $C_{11}H_{15}NO_2$, C 68.37, H 7.82, N 7.25, Found : C 68.32, H 7.86, N 7.29.

N-phenylimidazole (9) Solid, Yield 90 %, ESI MS (*m/z*) = 145 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 7.14 (s, 1H), 7.37 (t, 1H, *J* = 7.2 Hz), 7.53 (t, 2H, *J* = 7.4 Hz), 7.67-7.78 (m, 3H), 8.3 (s, 1H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 118.5, 121.5, 127.8, 130.1, 130.8, 135.7, 137.7. Analysis calculated for : C_9H_8N, C 74.98, H 5.59, N 19.43, Found: C 74.95, H 5.52, N 19.48.

1-p-Tolyl-1H-imidazole (10) Solid, Yield 88 %, ESI MS (*m/z*) = 159 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H **:** 2.34 (s, 3H), 7.06 (d, 3H, *J* = 7.4 Hz), 7.55 (d, 2H, *J* = 6.9 Hz), 7.70 (s, 1H), 8.20 (s, 1H). ^{13}C NMR (75 MHz: DMSO-d_6) δ_C : 21.1, 118.4, 121.5, 130.2, 131.2, 135.1, 135.7, 137.6 Analysis calculated for : $C_{10}H_{10}N_2$, C 75.92, H 6.37, N 17.71; Found : C 75.97, H 6.36, N 17.66.

1-(4-Imidazol-1-yl-phenyl)-ethanone (11) Solid, Yield 85 %, ESI MS (*m/z*) = 187 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 2.68 (s, 3H), 7.23 (s, 1H), 7.95 (d, 2H, *J* = 8.8 Hz), 7.98 (s, 1H), 8.19 (d, 2H, *J* = 8.7 Hz), 8.48 (s, 1H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 26.7, 117.6, 120.5, 130.5, 131.8, 135.5, 136.1, 141.0, 196.8. Analysis calculated for : $C_{11}H_{10}N_2O$, C 70.95, H 5.41, N 15.04, Found : C 70.90, H 5.35, N 15.3.

4-(1H-imidazol-1-yl)benzonitrile (12) Solid, Yield 86 %, ESI MS (*m/z*) = 170 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 7.16 (s, 1H), 7.86 (d, 3H, *J* = 8.8 Hz), 8.00 (d, 2H, *J* = 8.3 Hz), 8.48 (s, 1H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 110, 118.5, 119.1, 120.8, 131.0, 134.5, 136.5, 140.1 Analysis calculated for : $C_{10}H_7N_3$, C 70.99, H 4.17, N 24.84, Found : C 70.84, H 4.11, N 24.89.

1-(4-isocyanophenyl)-1H-benzo[d]imidazole (13) Solid, Yield 80 %, ESI MS (*m/z*) = 220 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 7.31-7.36 (m, 2H), 7.68-7.79 (m, 2H), 7.90 (d, 2H, *J* = 8.8 Hz), 8.06 (d, 2H, *J* = 8.4 Hz), 8.65 (s, 1H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 110.4, 111.3, 118.6, 120.6, 123.5, 124.3, 124.5, 132.6, 134.7, 140.2, 143.6, 144.4 Analysis calculated for : $C_{14}H_9N_3$, C 76.70, H 4.14, N 19.17, Found : C 76.78, H 4.11, N 19.21.

1-phenyl-1H-benzo[d]imidazol-2-amine (14) Solid, Yield 83 %,ESI MS (*m/z*) = 210 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 5.34 (br, s, 2H), 6.94-7.06 (m, 2H), 7.09-7.19 (m, 1H), 7.42-7.51 (m, 1H), 7.59 (t, 2H, *J* = 7.6 Hz) ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 108.5, 116.4, 120.1, 122.3, 126.8, 128.9, 130.5, 135.6, 142.4, 153.4 Analysis calculated for : $C_{13}H_{11}N_3$, C 74.62, H 5.30, N 20.08, Found : C 74.65, H 5.39, N 20.16.

1-(4-chloro-3-(trifluoromethyl)phenyl)-1H-imidazole (15) Solid, Yield 84 %,ESI MS (*m/z*) = 247 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 7.15 (s, 1H), 7.90 (m, 2H), 8.05 (m, 1H), 8.15 (d, 1H, *J* = 8.3 Hz), 8.42 (s, 1H). ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 113.3, 118.2,

123.9, 129.6, 130.4, 131.2, 131.8, 133.2, 135.5, 136.2 Analysis calculated for : $C_{10}H_6ClF_3N_2$, C 48.70, H 2.45, N 11.36, Found : C 48.65, H 2.41, N 11.40.

N-(2-methyl-5-nitrophenyl)-4-(pyridin-3-yl)pyrimidin-2-amine (16) Solid, Yield 90 %, ESI MS (*m/z*) = 308 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 2.43 (s, 3H), 7.54 (m, 3H), 7.90 (d, 1H, J=8.2 Hz), 8.48 (d, 1H, J=7.8 Hz), 8.63 (d, 1H, J= 5.4 Hz), 8.73 (d, 1H, J=8.5 Hz), 8.82 (d, 1H, J=2.2 Hz), 9.29 (d, 1H, J=1.6 Hz), 9.44 (s, IH); ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 159.4, 158.6, 147.2, 146.8, 144.4, 139.0, 137.7, 134.5, 132.1,131.0,125.6, 118.1, 115.5, 109.2, 29.6, 18.4. Analysis calculated for : $C_{16}H_{13}N_5O_2$, C 62.53, H 4.26, N 22.79, Found : C 62.49, H 4.22, N 22.65.

3-(4-Methyl-1H-imidazol-1-yl)-5-(trifluoromethyl)aniline (17) Solid, Yield 85 %, ESI MS (*m/z*) = 242 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 2.15 (s, 3H), 5.91 (s, 2H), 6.84 (s, 1H), 6.94 (s, 1H), 6.98 (s, 1H), 7.35 (s, 1H), 8.12 (d, *J* = 1.2 Hz, 1H); ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 150.9, 138.5, 134.9, 131.3 (q, *J* = 38 Hz), 124.2 (q, *J* = 272 Hz), 114.2, 107.8, 103.4 (q, *J* = 4 Hz), 13.4. Analysis calculated for : $C_{11}H_{10}F_3N_3$, C 54.77, H 4.18, N 17.42, Found : C 54.69, H 4.22, N 17.35.

1-phenylpiperazine (18) Solid, Yield 82 %, ESI MS (*m/z*) = 163 (M+H), ^{1}H NMR (300 MHz; $CDCl_3$) δ_H : 2.42 - 2.46 (m, 4H), 2.92 - 2.94 (m, 4H), 6.83-6.98 (m, 3H), 7.23-7.38 (m, 2H); ^{13}C NMR (75 MHz; $CDCl_3$) δ_C : 151.7, 128.9, 119.5, 115.8, 50.29, 46.1. Analysis calculated for : $C_{10}H_{14}N_2$, C 74.03, H 8.70, N 17.27, Found : C 74.12, H 8.65, N 17.29.

Indolo[2,1-b]quinazoline-6,12-dione (19) Solid, Yield 85 %, ESI MS (*m/z*) = 249 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 7.41 (d, J= 7.58, 1H), 7.71-7.92 (m, 4H), 8.02 (d, J=8.12, 1H), 8.42 (d, J=7.8, 1H), 8.62 (d, J=8.12, 1H); ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 117.8, 121.9, 123.6, 125.3, 127.1, 127.5, 130.2, 130.5, 135.1, 138.2, 144.2, 146.3, 146.6, 158.0, 182.4. Analysis calculated for : $C_{15}H_8N_2O_2$, C 72.58, H 3.25, N 11.28, Found : C 72.52, H 3.22, N 11.22.

1-(2-Aminophenyl)-2-(2-bromophenyl)ethanone (20) Solid, Yield 75 %, ESI MS (*m/z*) = 291 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 4.46 (2H, s), 6.19 (2H, bs), 6.69-6.78 (2H, m), 7.14-7.34 (4H, m), 7.62 (1H, d, J = 7.53), 7.87 (1H, d, J = 7.92); ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 46.3, 115.9, 117.3, 125.3, 127.5, 128.6, 131.0, 131.7, 132.6, 134.5, 135.4, 150.5, 198.3; Analysis calculated for : $C_{14}H_{12}BrNO$, C 57.95, H 4.17, N 4.83, Found : C 57.92, H 4.12, N 4.81.

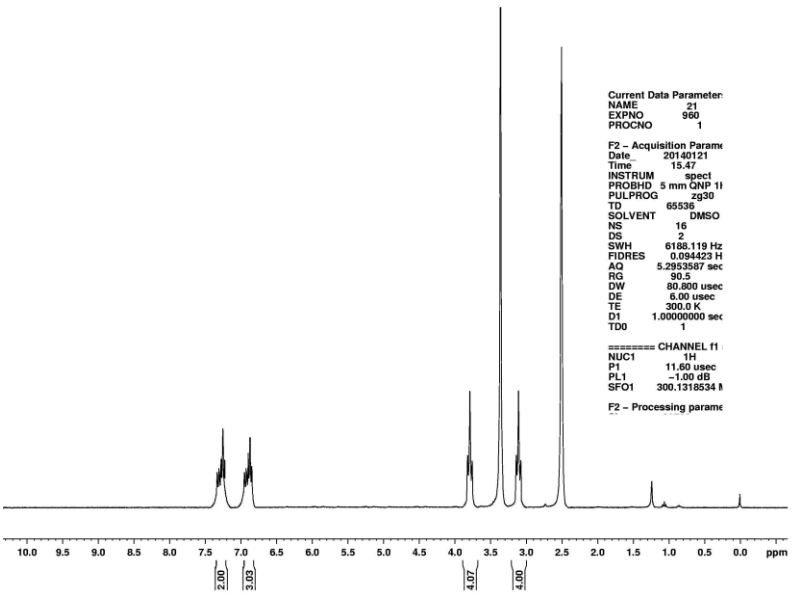
10,11-Dihydro-5H-dibenz[b,f]azepin-10-one (21) Solid, Yield 82 %, ESI MS (*m/z*) = 210 (M+H), ^{1}H NMR (300 MHz; DMSO-d_6) δ_H : 3.83 (2H, s), 6.82 (1H, bs), 6.94 (1H, t, J = 7.53), 7.03-7.31 (5H, m), 7.41 (1H, d, J = 7.53), 8.04 (1H, d, J = 8.33); ^{13}C NMR (75 MHz; DMSO-d_6) δ_C : 49.4, 118.7, 119.2, 119.3, 124.0, 124.3, 124.9, 127.6, 129.9,130.6, 133.4, 141.3, 146.3, 189.8; Analysis calculated for : $C_{14}H_{11}NO$, C 80.36, H 5.30, N 6.69, Found : C 80.29, H 5.29, N 6.62.

2-bromo-1H-indole (22) Solid, Yield 74 %, ESI MS (*m/z*) = 196 (M+H), ^{1}H NMR (300 MHz; $CDCl_3$) δ_H 8.05 (br s, 1H), 7.53 (d, *J* = 7.6 Hz, 1H), 7.23 (d, *J* = 8.0 Hz, 1H), 7.05-7.18 (m, 2H), 6.53 (s, 1H). ^{13}C NMR (75 MHz; $CDCl_3$) δ_C : 136.4, 128.7, 122.4, 120.6, 119.8, 110.3, 108.9, 104.8. Analysis calculated for : C_8H_6BrN, C 49.01, H 3.08, N 7.14, Found : C 49.15, H 3.15, N 7.10.

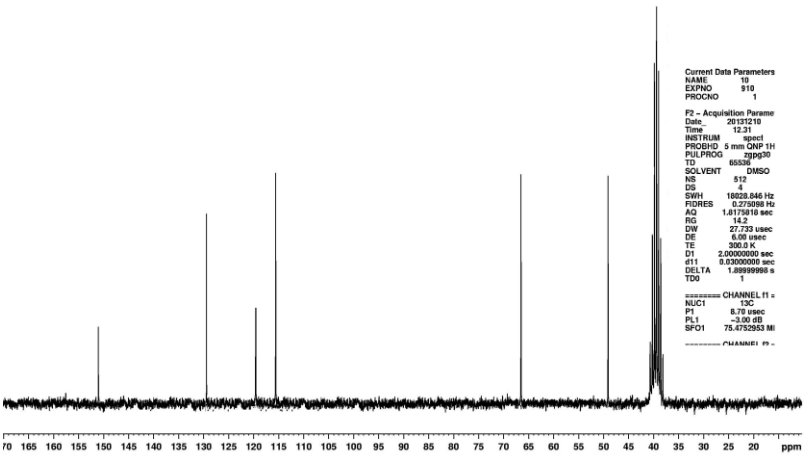
Methyl 2-bromo-1H-indole-6-carboxylate (23) Solid, Yield 72 %,ESI MS (*m/z*) = 254 (M+H), ^{1}H NMR (300 MHz; $CDCl_3$) δ_H 8.46 (br s, 1H), 8.08 (s, 1H), 7.85 (d, 8.4 Hz, 1H), 7.55 (d, *J* = 8.4 Hz, 1H), 6.59 (s, 1H), 3.94 (s, 3H). ^{13}C NMR (75 MHz; $CDCl_3$) δ_C : 167.7, 135.6, 132.7, 124.0, 121.4, 119.2, 112.6, 105.4, 52.2. Analysis calculated for : $C_{10}H_8BrNO_2$, C 47.27, H 3.17, N 5.51, Found : C 47.31, H 3.12, N 5.49.

2,5-dibromo-1H-indole (24) Solid, Yield 70 %, ESI MS (*m/z*) = 274 (M+H), ^{1}H NMR (300 MHz; $CDCl_3$) δ_H = 7.45-7.61 (m, 4H), 7.39 (d, *J* = 6.8 Hz, 2H), 7.13-7.19 (m, 3H), 6.76 (s, 1H). ^{13}C NMR (75 MHz; $CDCl_3$) δ_C : 138.3, 137.4, 129.2, 128.7, 128.5, 128.1, 122.4, 120.8, 119.6, 113.3, 110.5, 105.7. Analysis calculated for : $C_8H_5Br_2N$, C 34.95, H 1.83, N 5.09, Found : C 34.91, H 1.87, N 5.11.

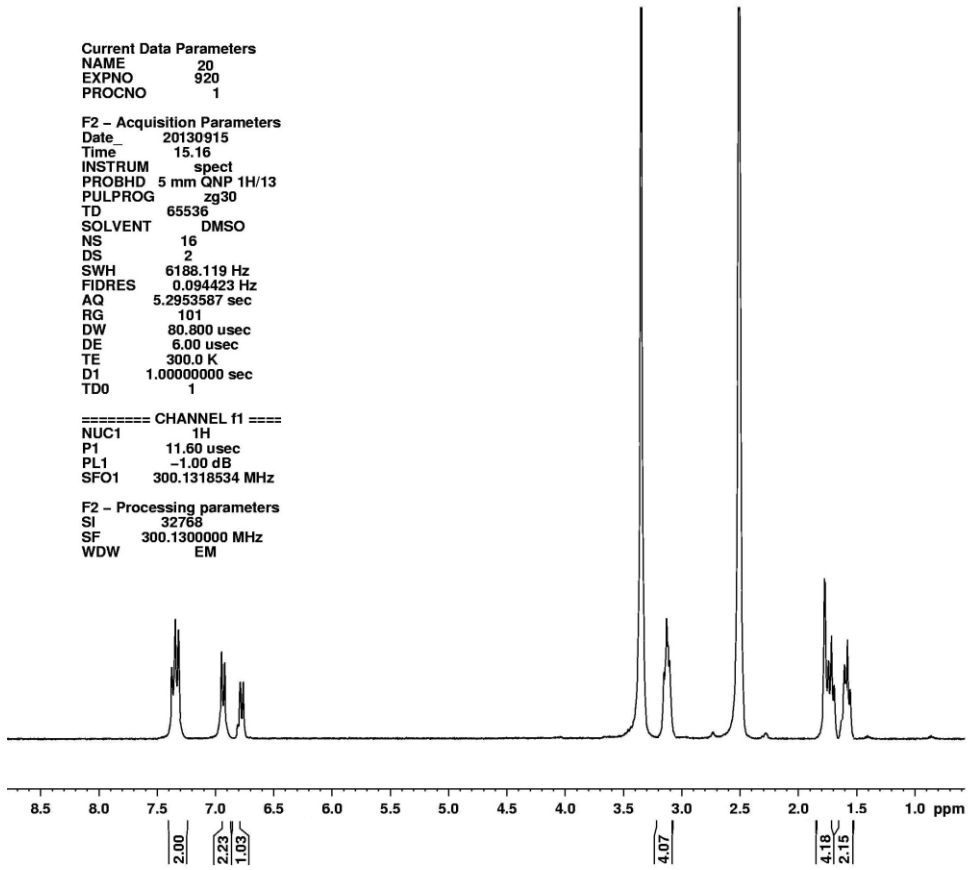
2-bromo-1-phenyl-1H-indole (25) Solid, Yield 70 %,ESI MS (*m/z*) = 272 (M+H), ^{1}H NMR (300 MHz; $CDCl_3$) δ_H = 7.45-7.61 (m, 4H), 7.39 (d, *J* = 6.8 Hz, 2H), 7.13-7.19 (m, 3H), 6.76 (s, 1H). ^{13}C NMR (75 MHz; $CDCl_3$) δ_C : 138.3, 137.4, 129.2, 128.7, 128.5, 128.1, 122.4, 120.8, 119.6, 113.3, 110.5, 105.7. Analysis calculated for : $C_{14}H_{10}BrN$, C 61.79, H 3.70, N 5.15, Found : C 61.72, H 3.63, N 5.21.



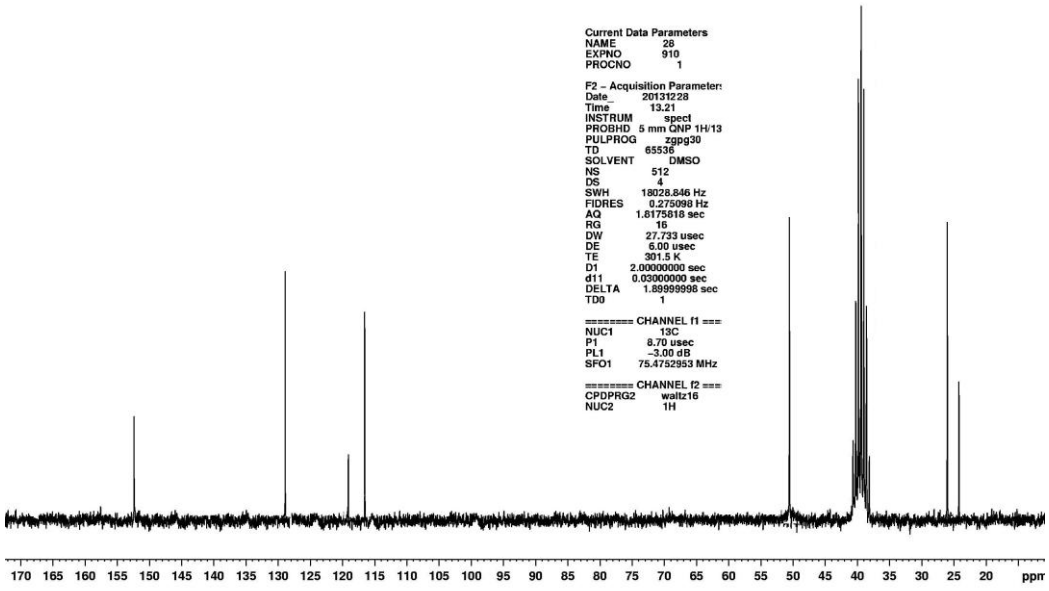
^{1}H NMR spectra of 4-phenylmorpholine (1)



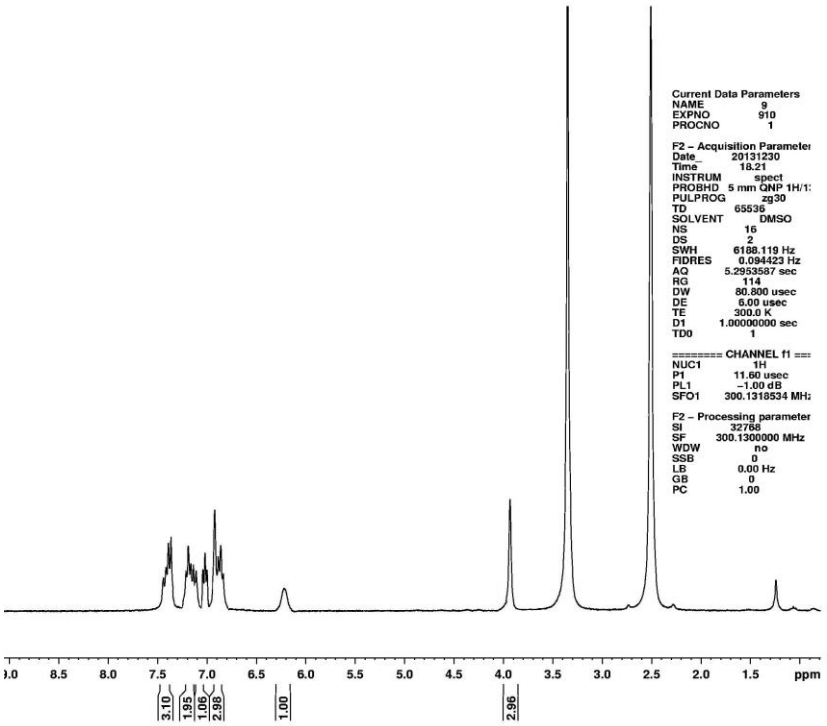
^{13}C NMR spectra of 4-phenylmorpholine (1)



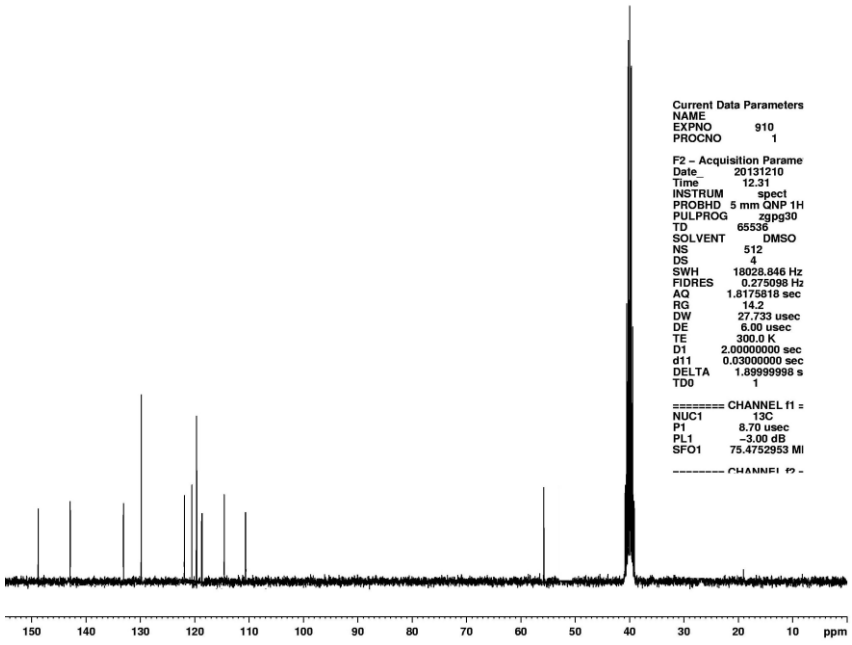
^{1}H NMR spectra of 1-phenylpiperidine (2)



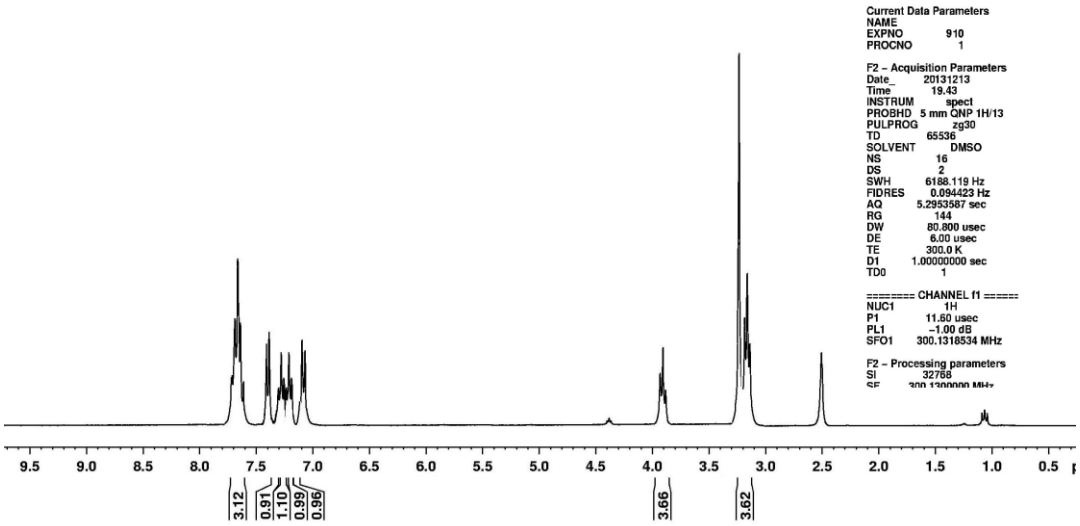
^{13}C NMR spectra of 1-phenylpiperidine (2)



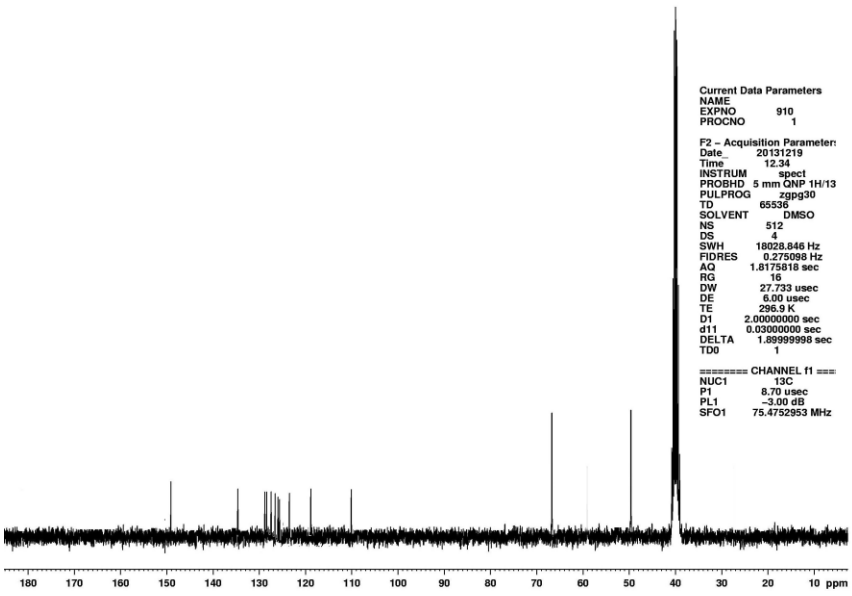
^{1}H NMR spectra of 2-Methoxydiphenylamine (3)



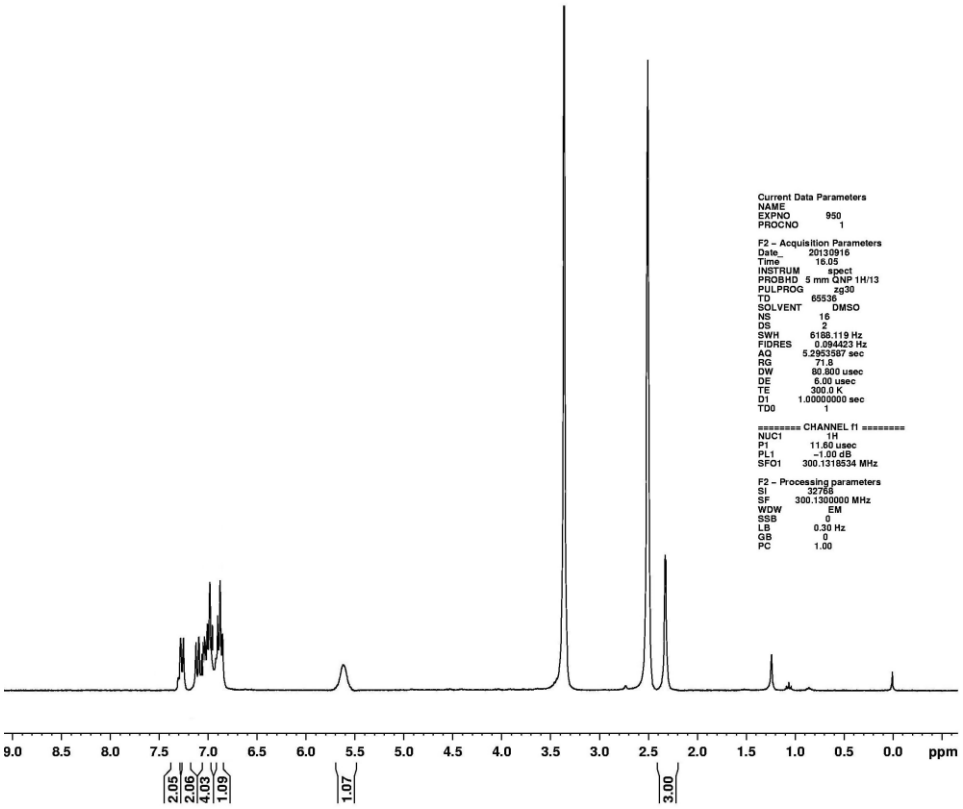
^{13}C NMR spectra of 2-Methoxydiphenylamine (3)



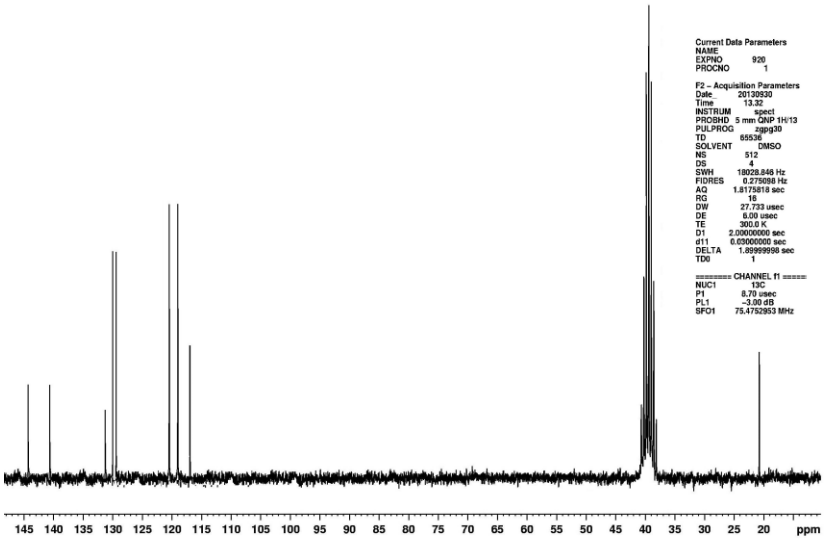
^{1}H NMR spectra of 4-(naphthalene-2-yl)morpholine (4)



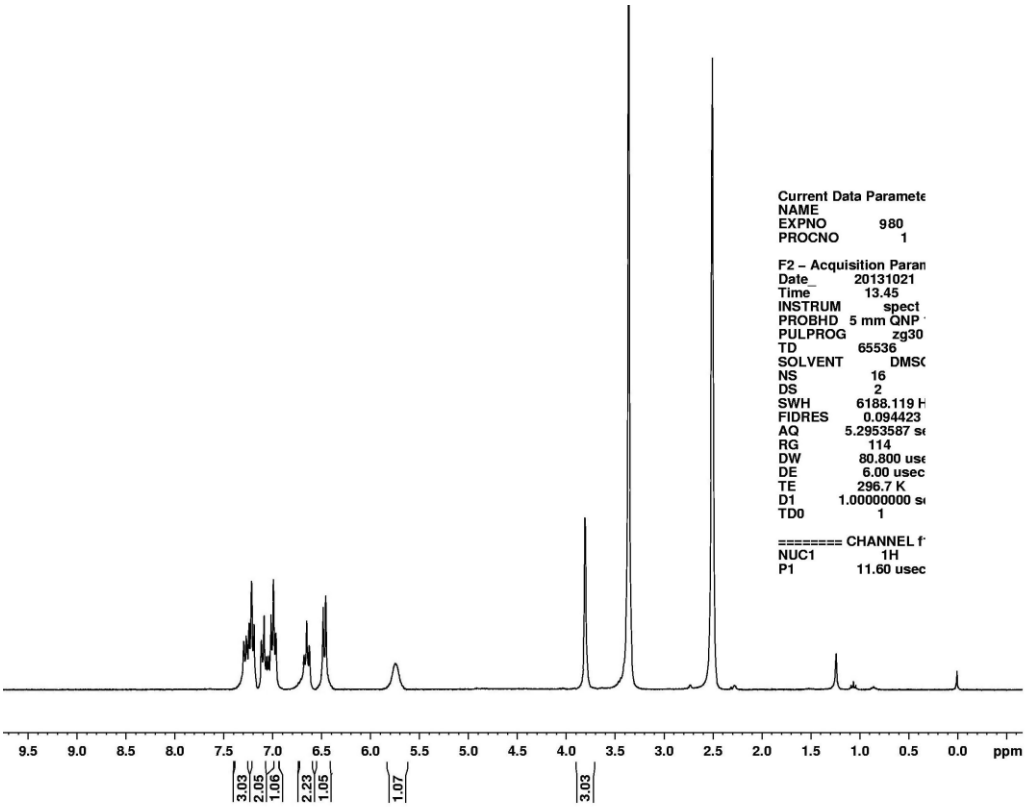
^{13}C NMR spectra of 4-(naphthalene-2-yl)morpholine (4)



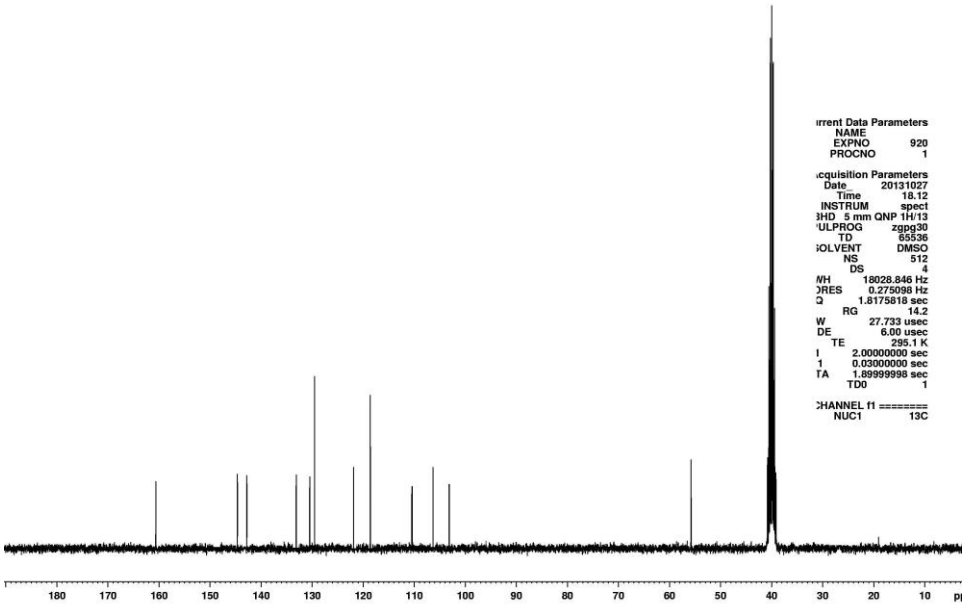
^{1}H NMR spectra of 4-methyldiphenylamine (5)



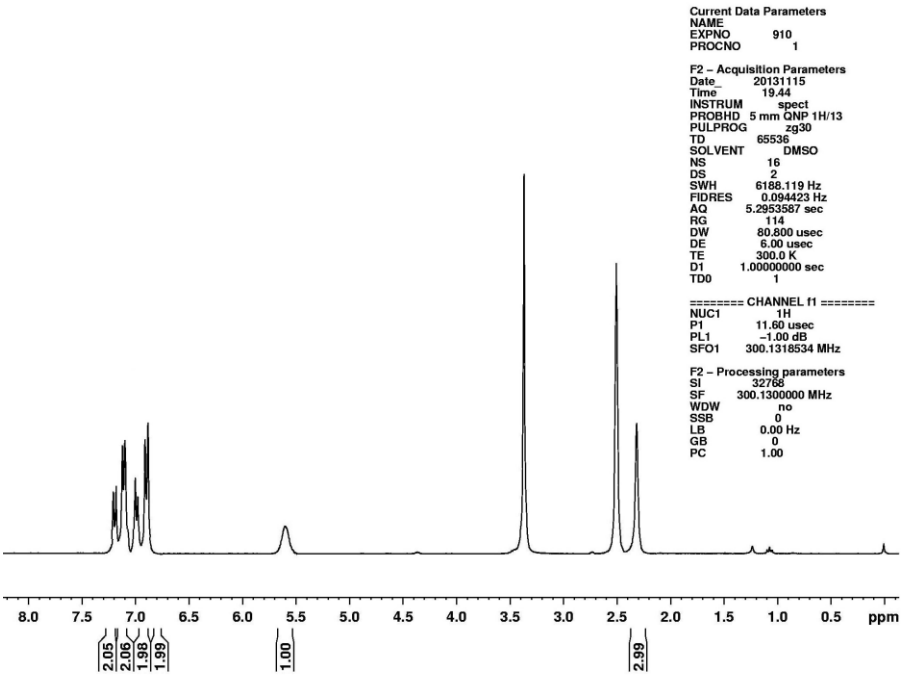
^{13}C NMR spectra of 4-methyldiphenylamine (5)



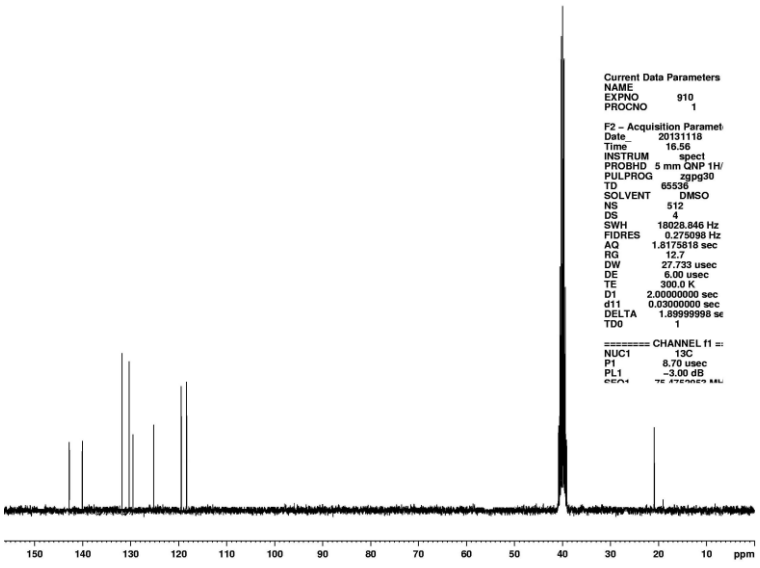
^{1}H NMR spectra of 3-Methoxydiphenylamine (6)



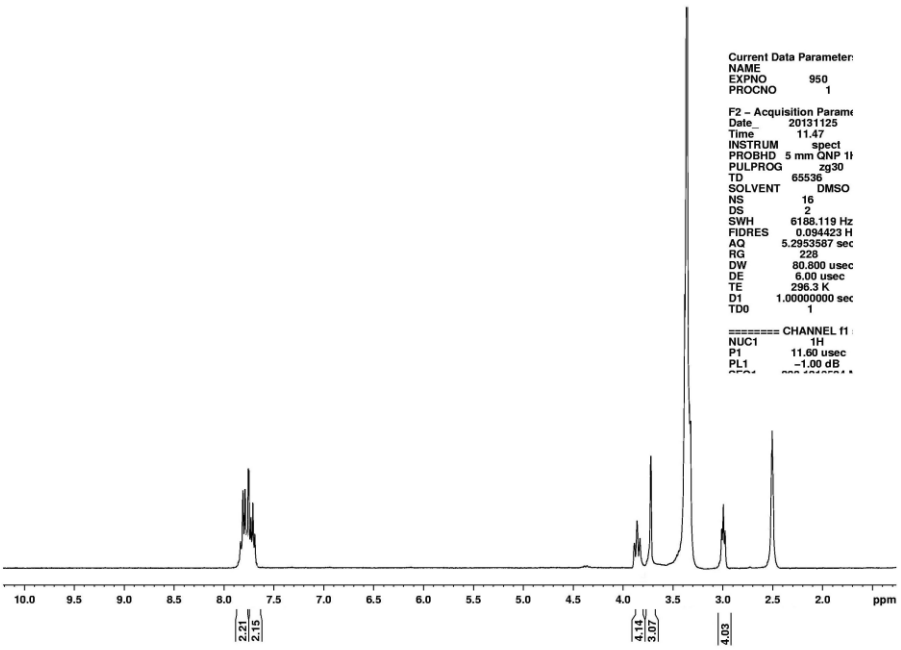
^{13}C NMR spectra of 3-Methoxydiphenylamine (6)



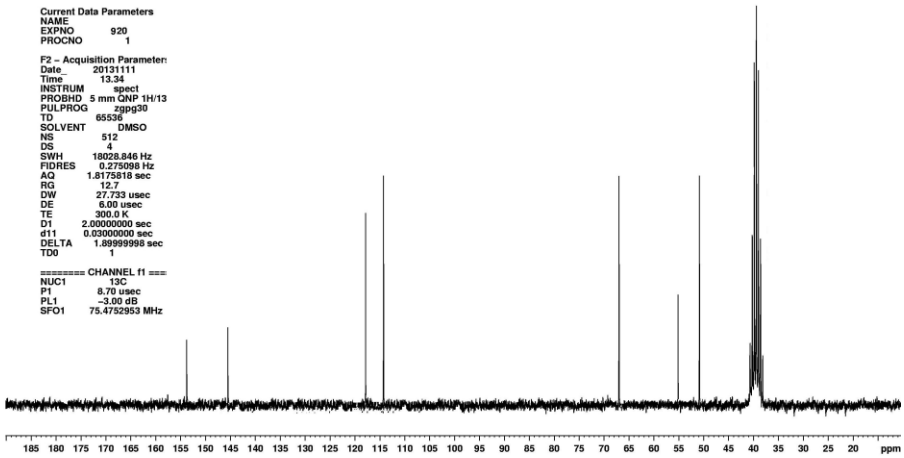
^{1}H NMR spectra of 4-chloro-N-p-tolylaniline (7)



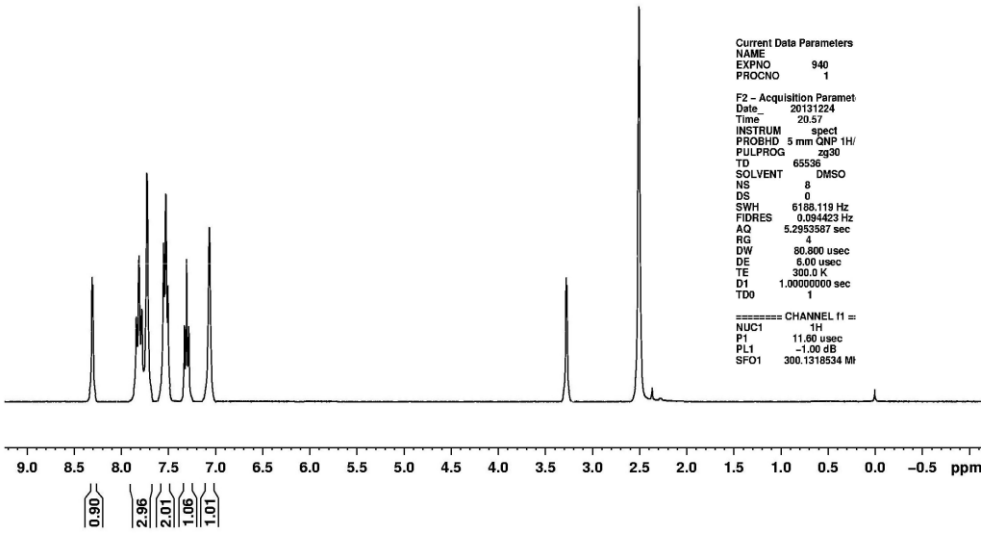
^{13}C NMR spectra of 4-chloro-N-p-tolylaniline (7)



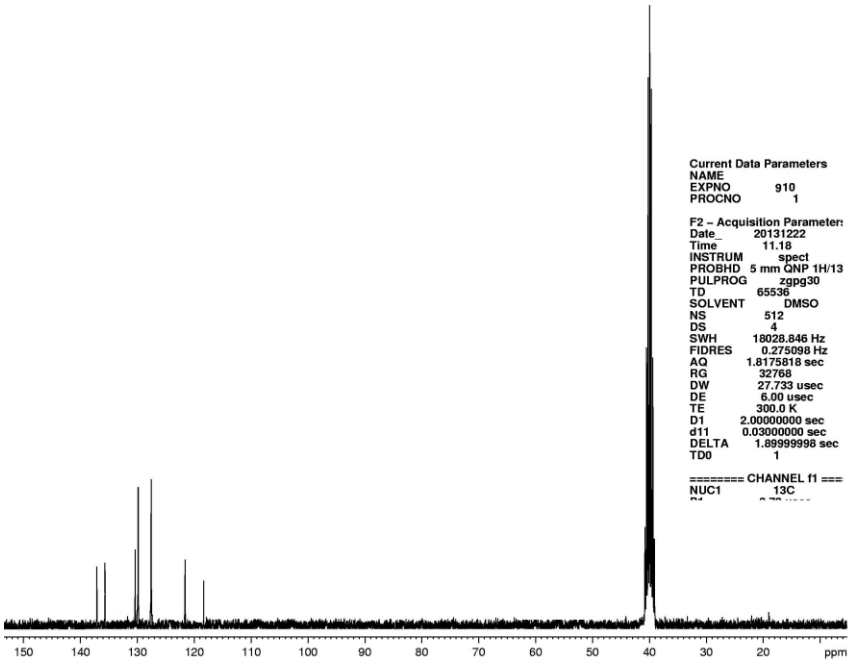
^{1}H NMR spectra of 4-(4-methoxyphenyl)morpholine (8)



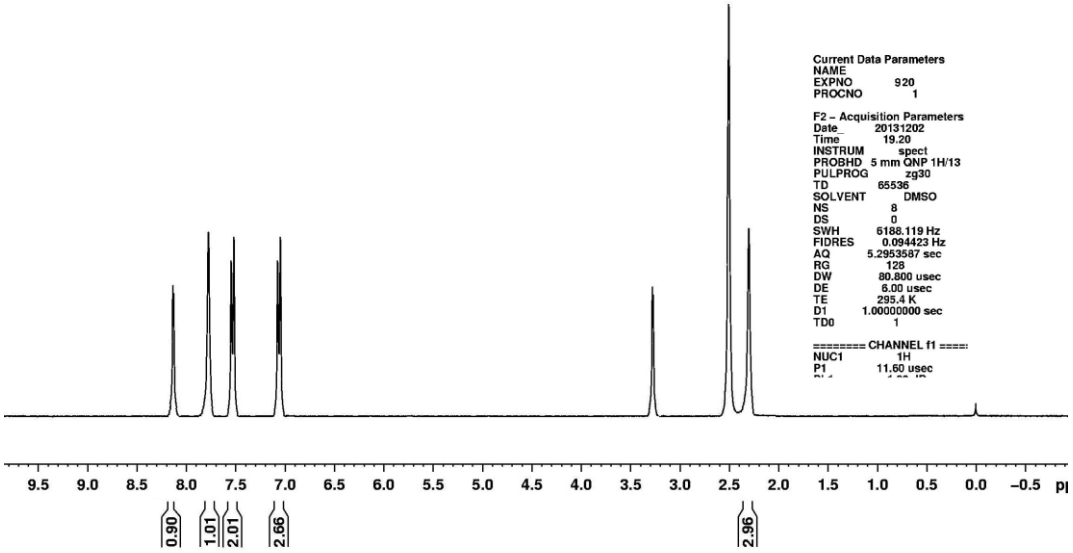
^{13}C NMR spectra of 4-(4-methoxyphenyl)morpholine (8)



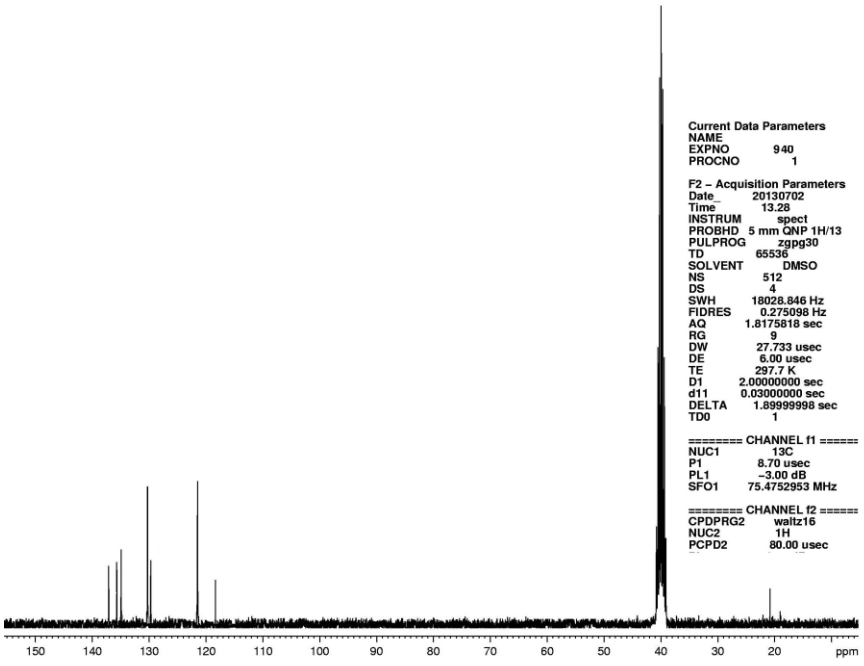
^{1}H NMR spectra of 1-phenyl-1H-imidazole (9)



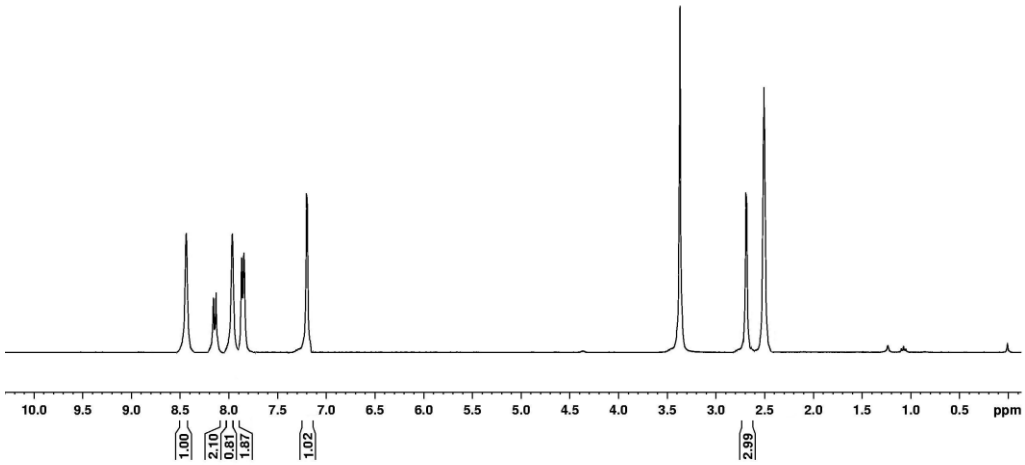
^{13}C NMR spectra of 1-phenyl-1H-imidazole (9)



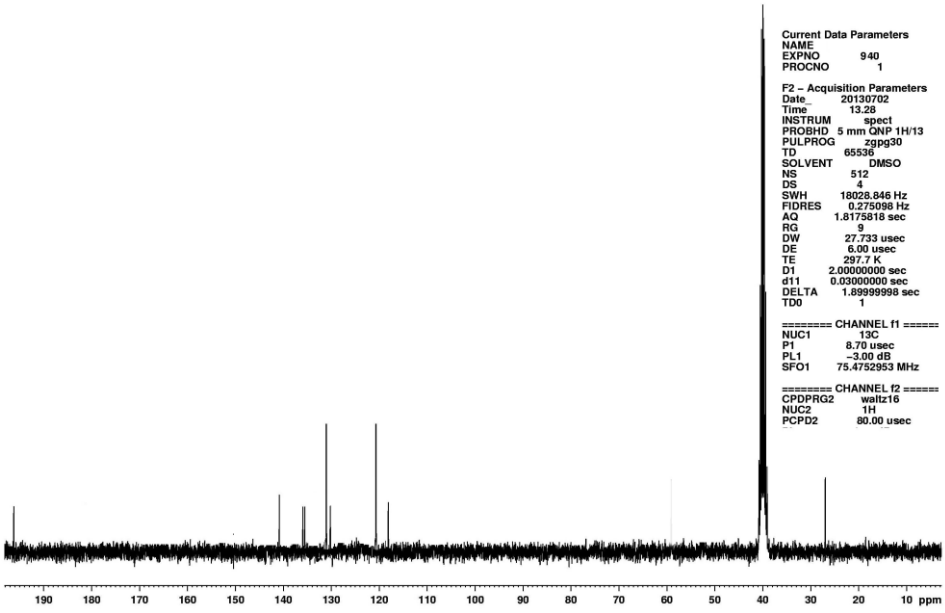
^{1}H NMR spectra of 1-p-tolyl-1H-imidazole (10)



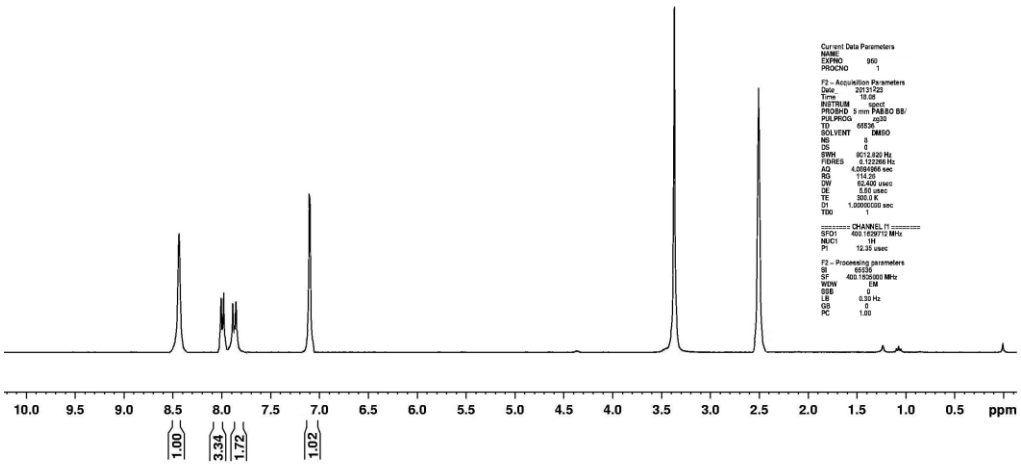
^{13}C NMR spectra of 1-p-tolyl-1H-imidazole (10)



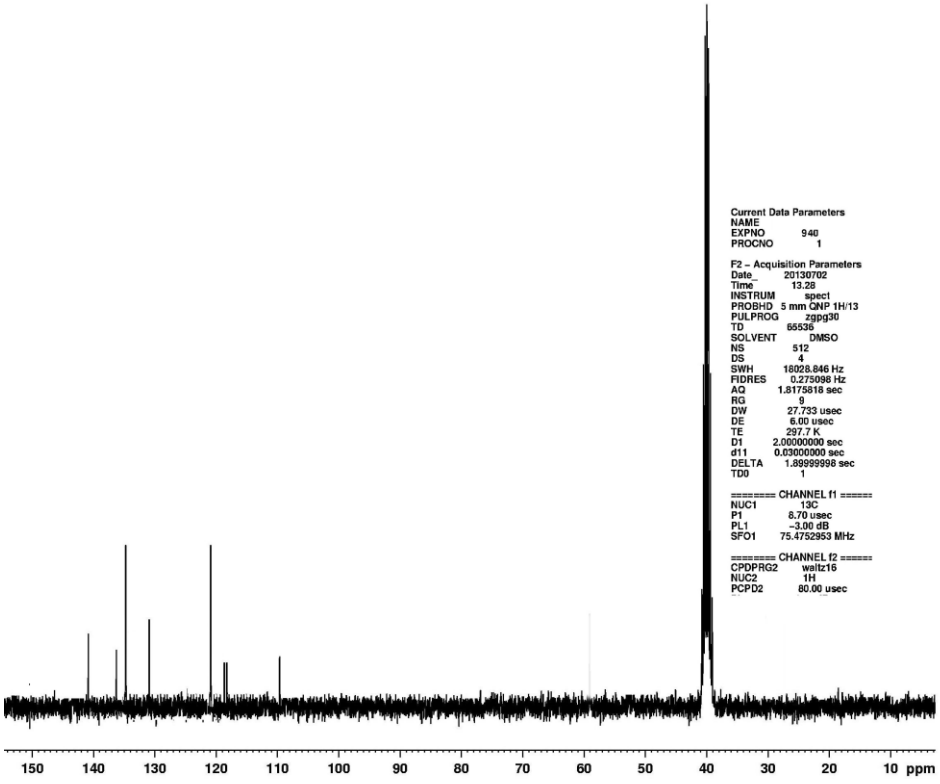
^{1}H NMR spectra of 1-(4-(1H-imidazol-1-yl)phenyl)ethanone (11)



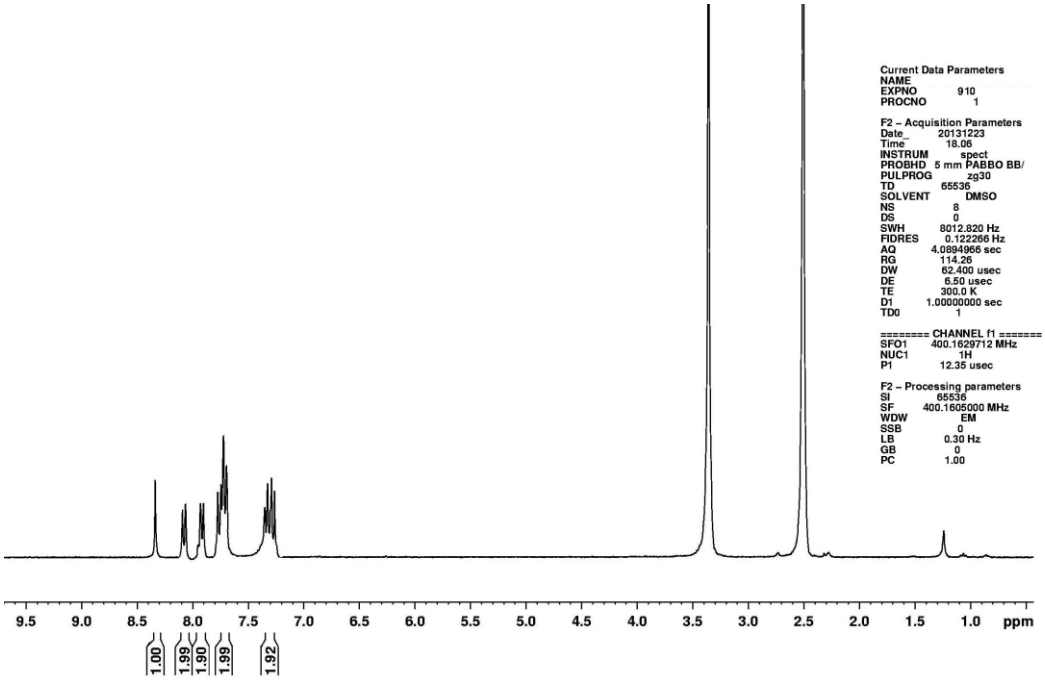
^{13}C NMR spectra of 1-(4-(1H-imidazol-1-yl)phenyl)ethanone (11)



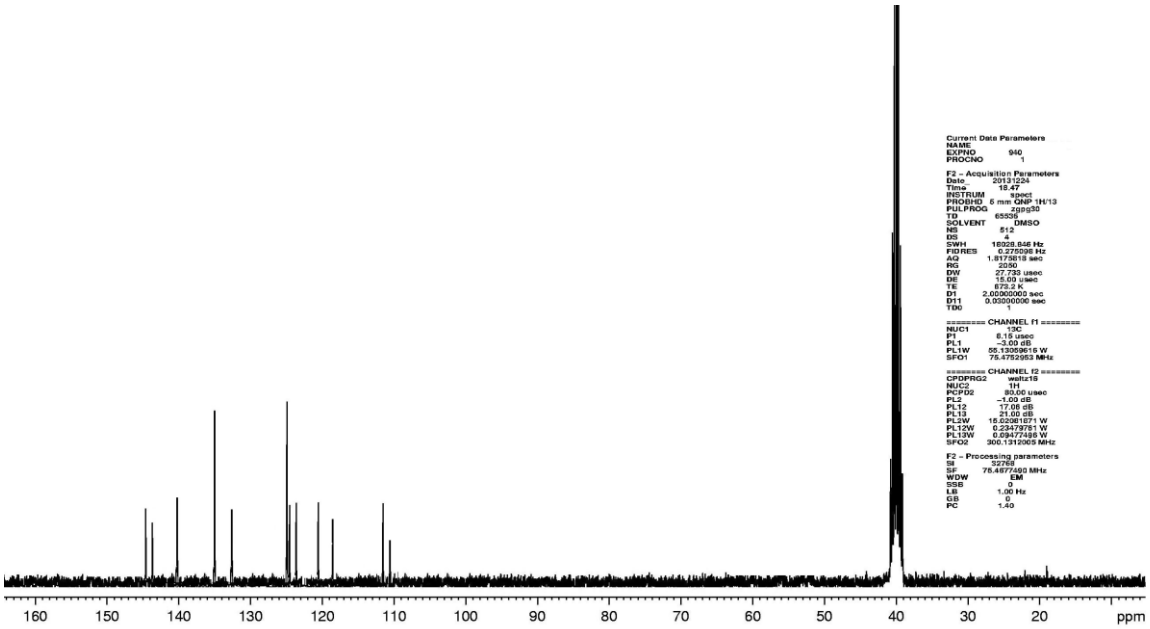
^{1}H NMR spectra of 1-(4-isocyanophenyl)-1H-imidazole (12)



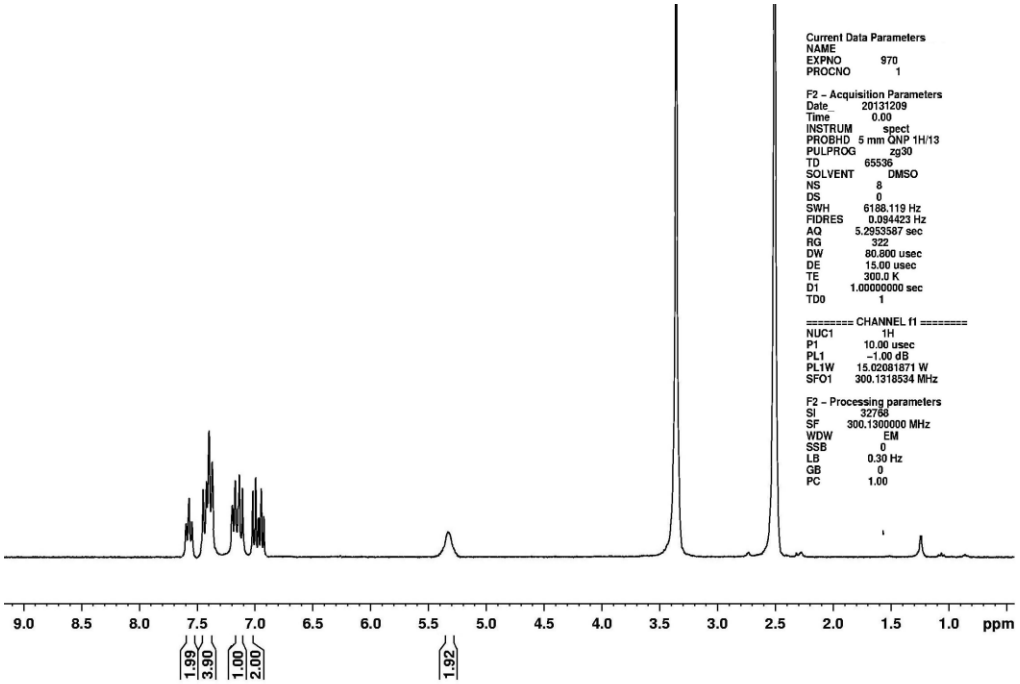
^{13}C NMR spectra of 1-(4-isocyanophenyl)-1H-imidazole (12)



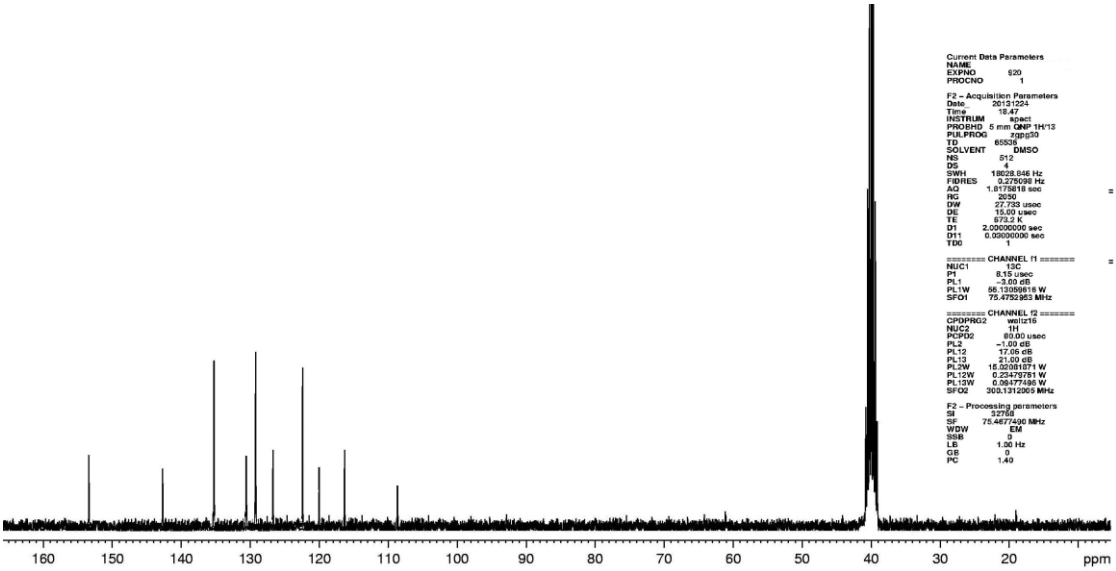
^{1}H NMR spectra of 1-(4-isocyanophenyl)-1H-benzo[d]imidazole (13)



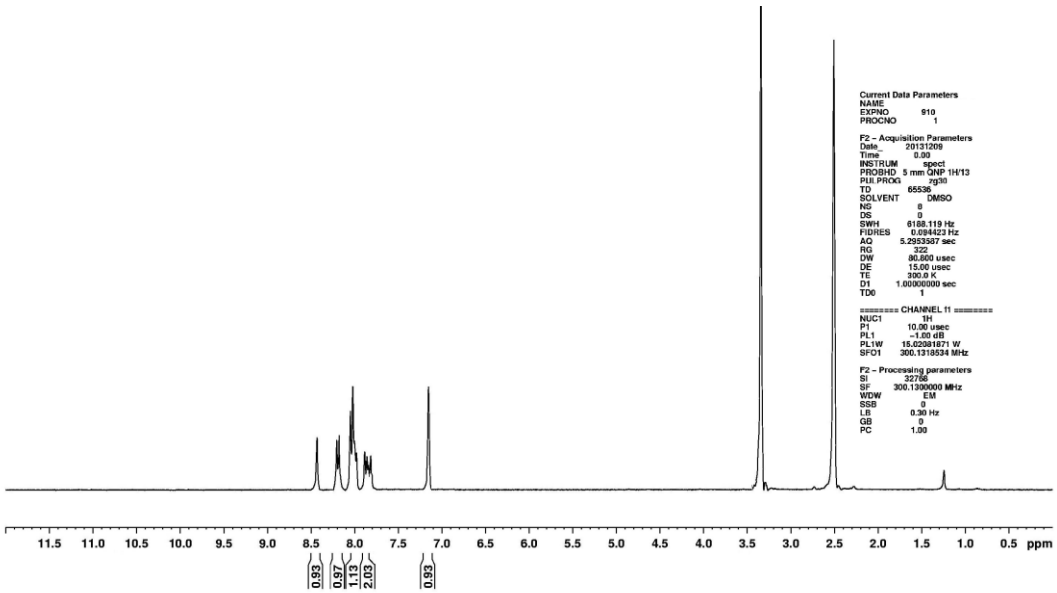
^{13}C NMR spectra of 1-(4-isocyanophenyl)-1H-benzo[d]imidazole (13)



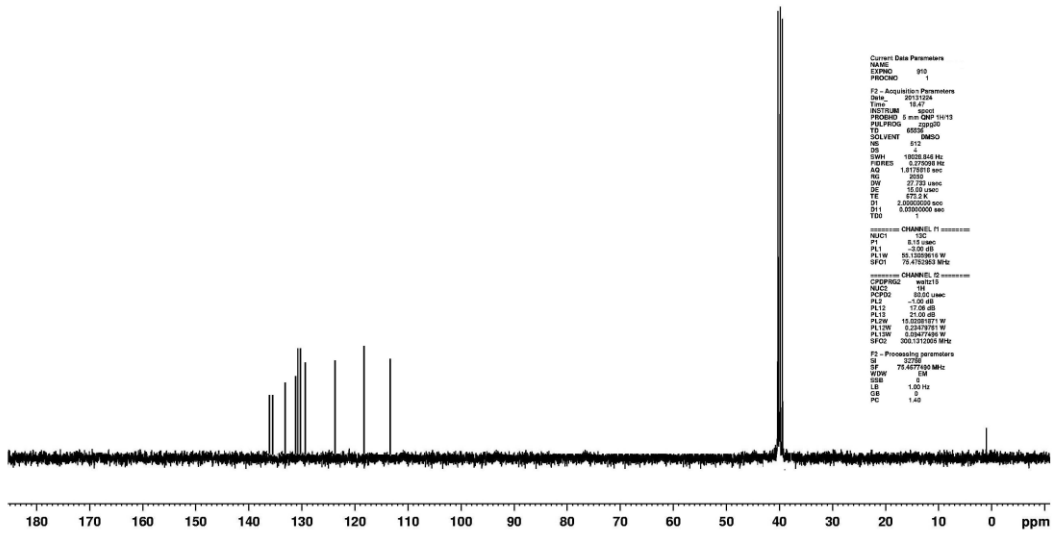
^{1}H NMR spectra of 1-phenyl-1H-benzo[d]imidazol-2-amine (14)



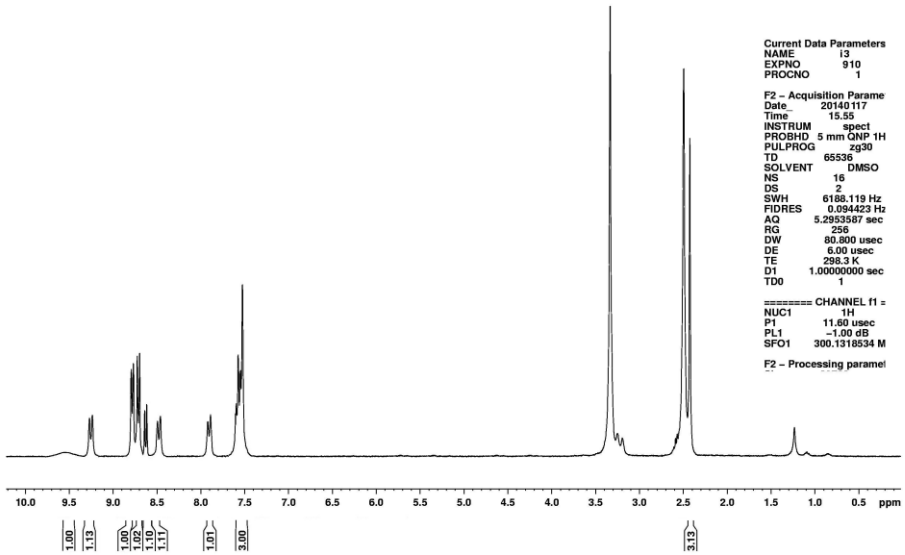
^{13}C NMR spectra of 1-phenyl-1H-benzo[d]imidazol-2-amine (14)



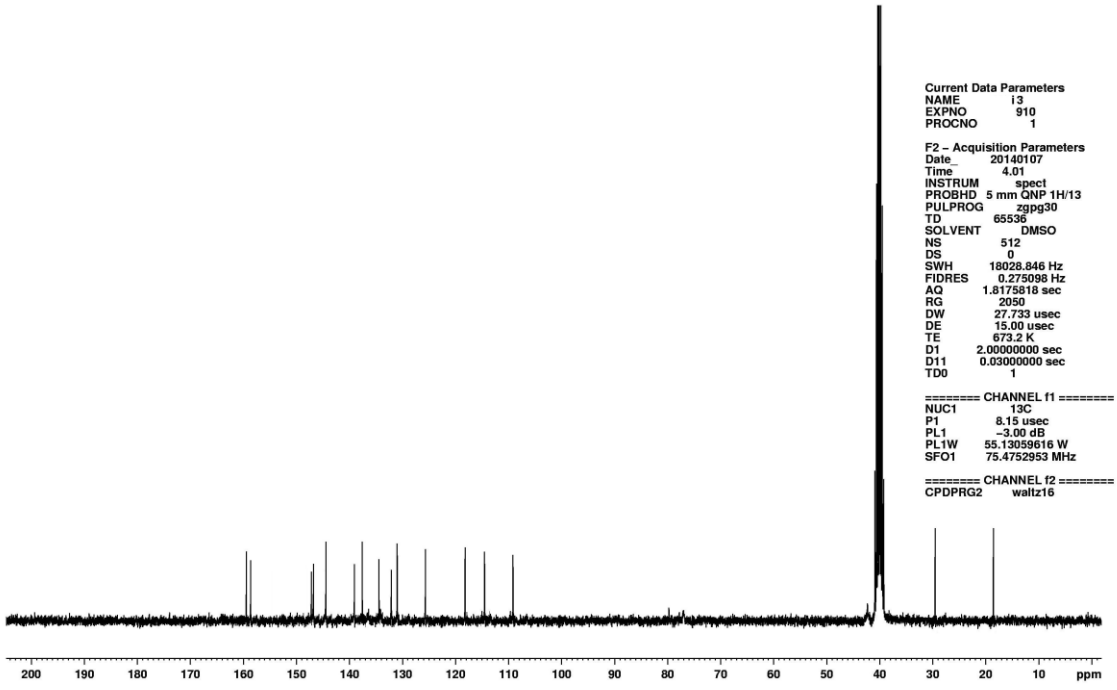
^{1}H NMR spectra of 1-(4-chloro-3-(trifluoromethyl)phenyl)-1H-imidazole (15)



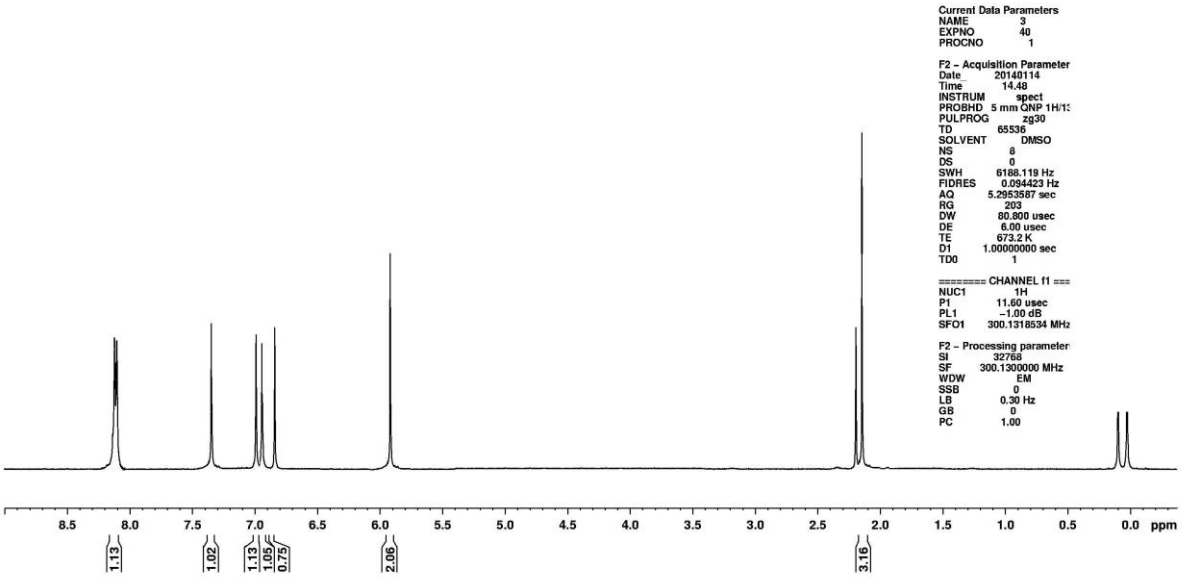
^{13}C NMR spectra of 1-(4-chloro-3-(trifluoromethyl)phenyl)-1H-imidazole (15)



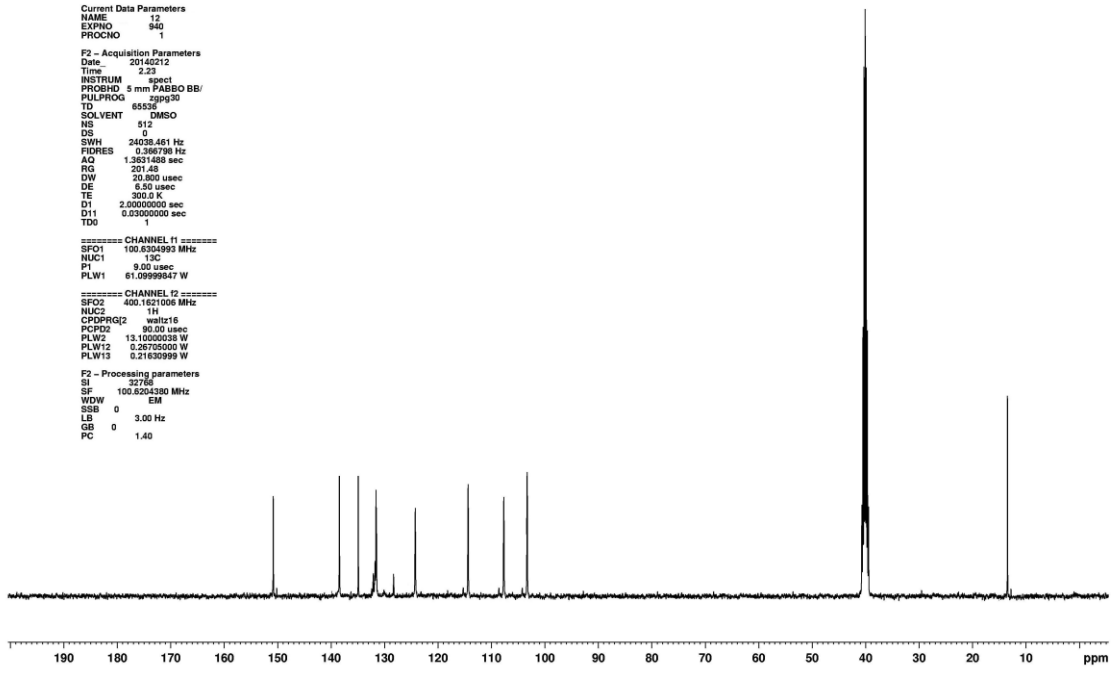
^{1}H NMR spectra of N-(2-methyl-5-nitrophenyl)-4-(pyridin-3-yl)pyrimidin-2-amine (16)



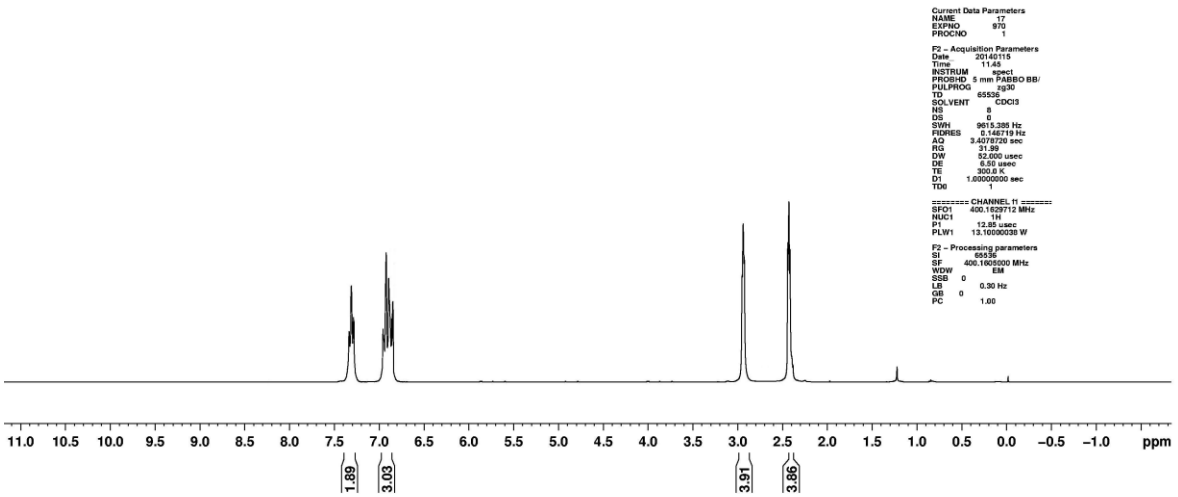
^{13}C NMR spectra of N-(2-methyl-5-nitrophenyl)-4-(pyridin-3-yl)pyrimidin-2-amine (16)



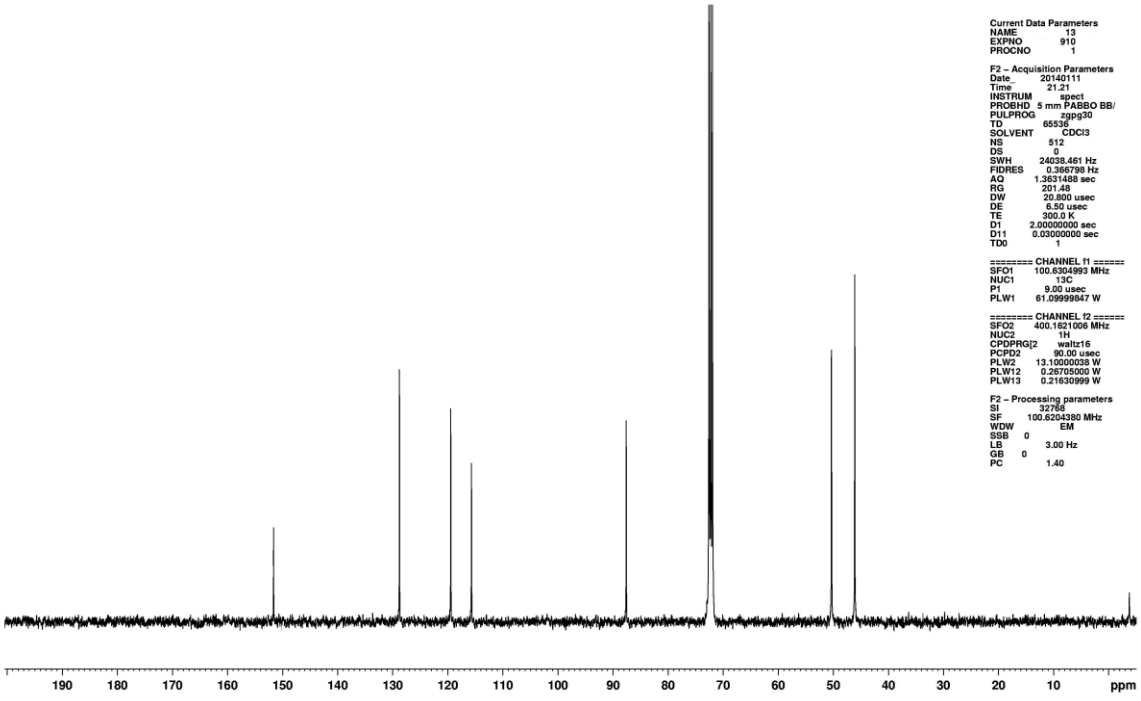
^{1}H NMR spectra of 3-(4-Methyl-1H-imidazol-1-yl)-5-(trifluoromethyl)aniline (17)



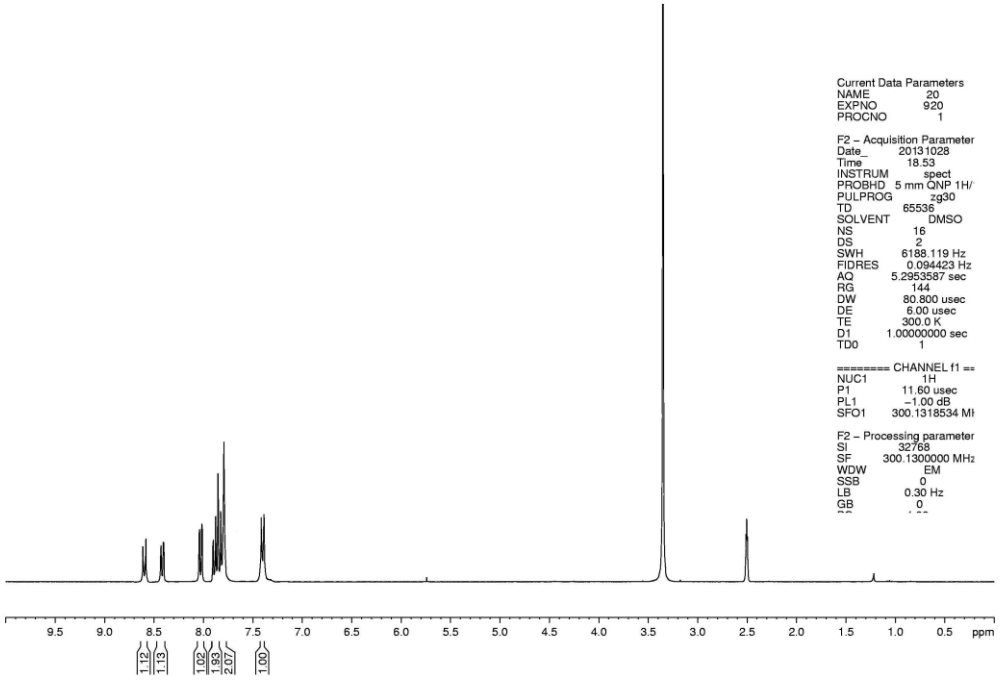
^{13}C NMR spectra of 3-(4-Methyl-1H-imidazol-1-yl)-5-(trifluoromethyl)aniline (17)



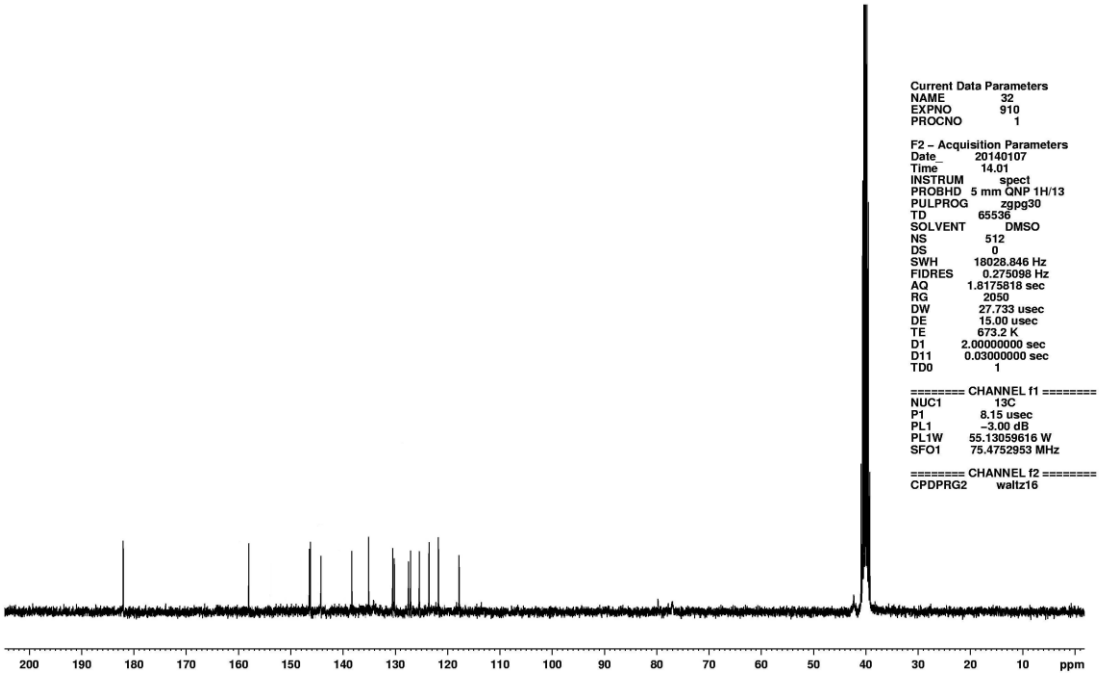
^{1}H NMR spectra of 1-phenylpiperazine (18)



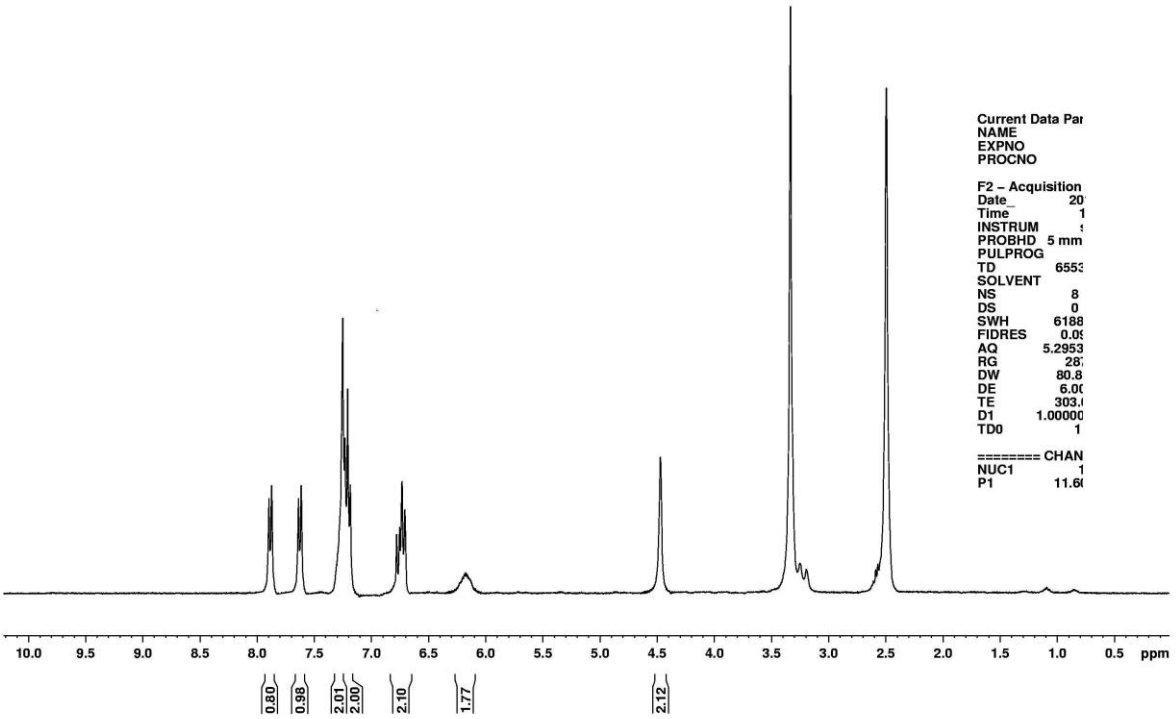
^{13}C NMR spectra of 1-phenylpiperazine (18)



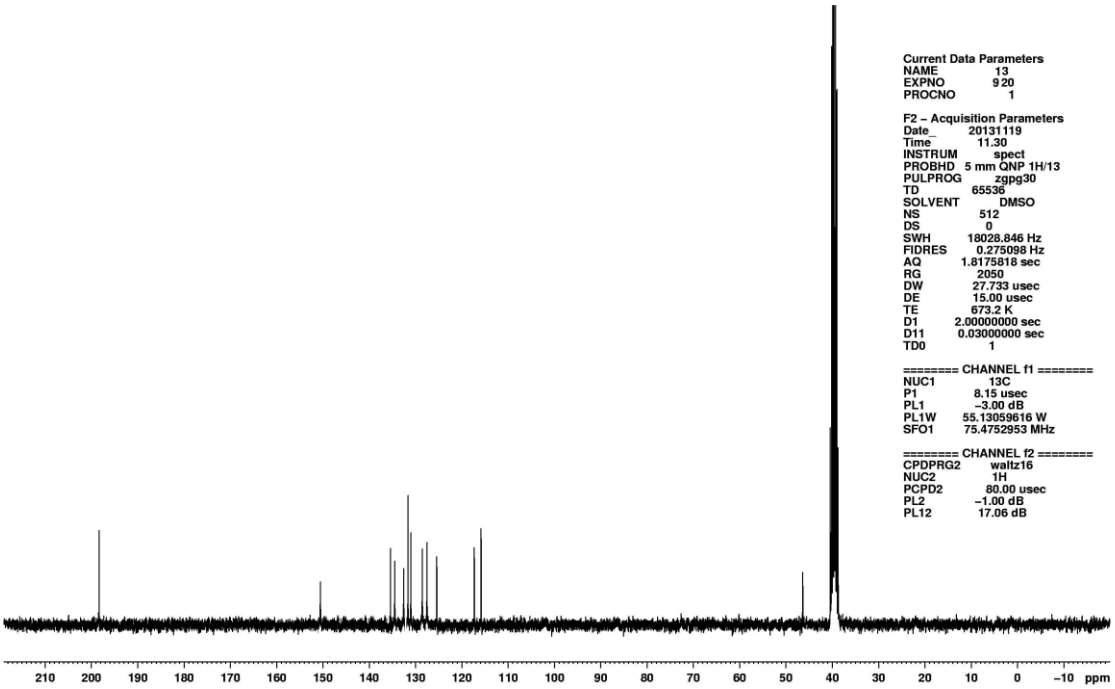
^{1}H NMR spectra of Indolo[2,1-b]quinazoline-6,12-dione (19)



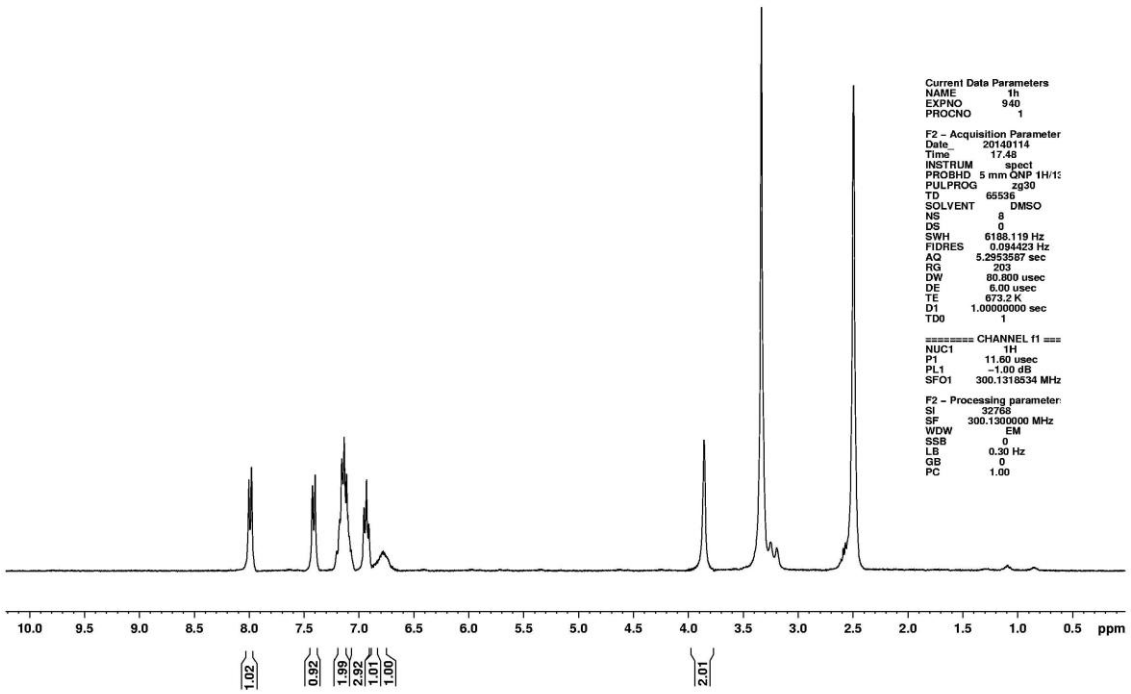
^{13}C NMR spectra of Indolo[2,1-b]quinazoline-6,12-dione (19)



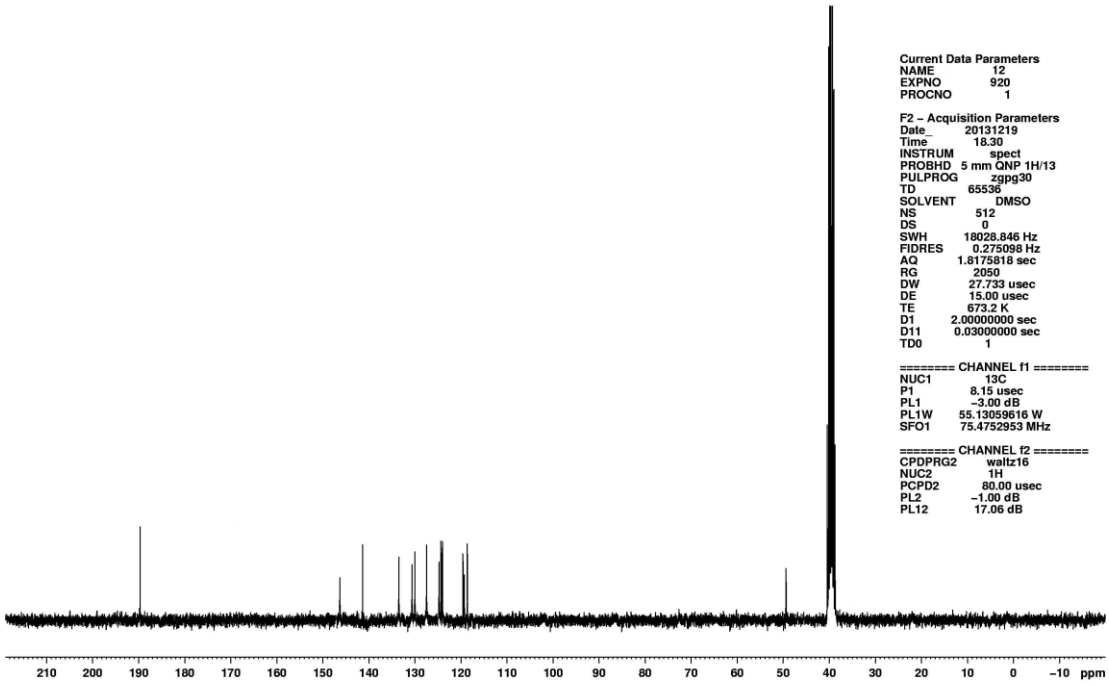
^{1}H NMR spectra of 1-(2-Aminophenyl)-2-(2-bromophenyl)ethanone (20)



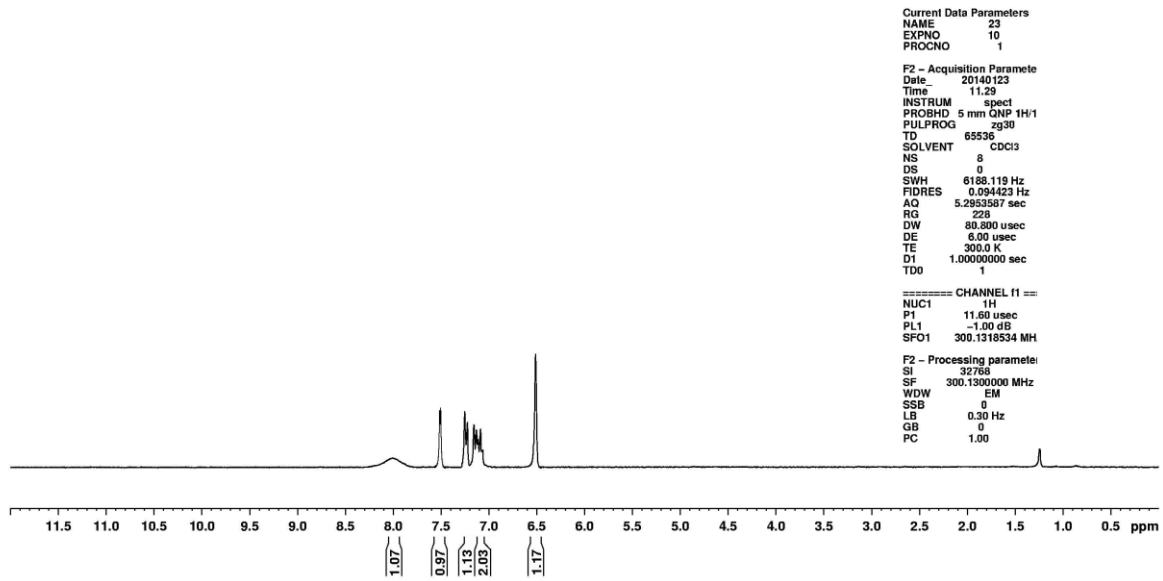
^{13}C NMR spectra of 1-(2-Aminophenyl)-2-(2-bromophenyl)ethanone (20)



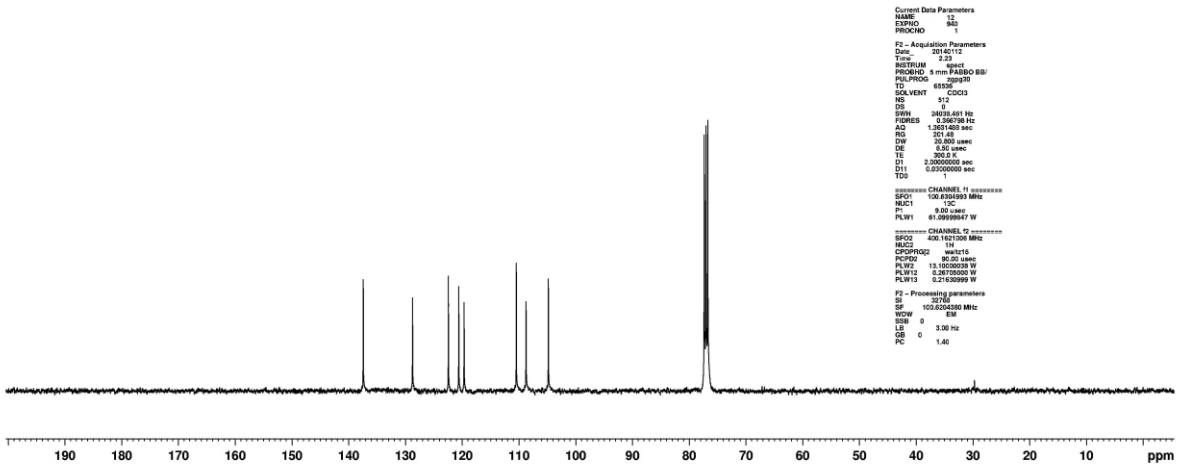
^{1}H NMR spectra of 10,11-Dihydro-5H-dibenz[b,f]azepin-10-one (21)



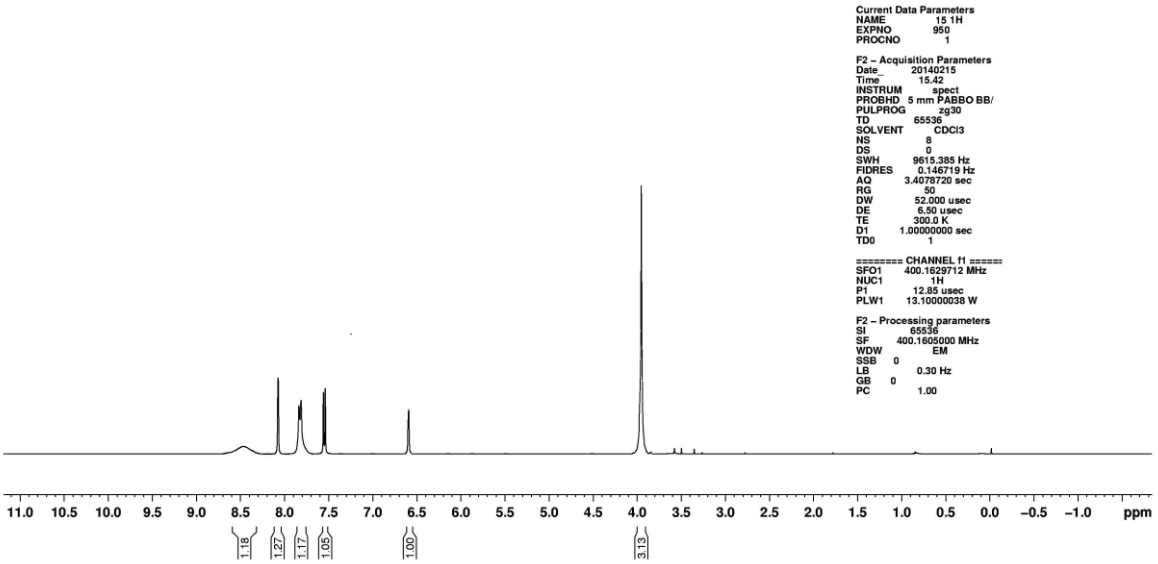
^{13}C NMR spectra of 10,11-Dihydro-5H-dibenz[b,f]azepin-10-one (21)



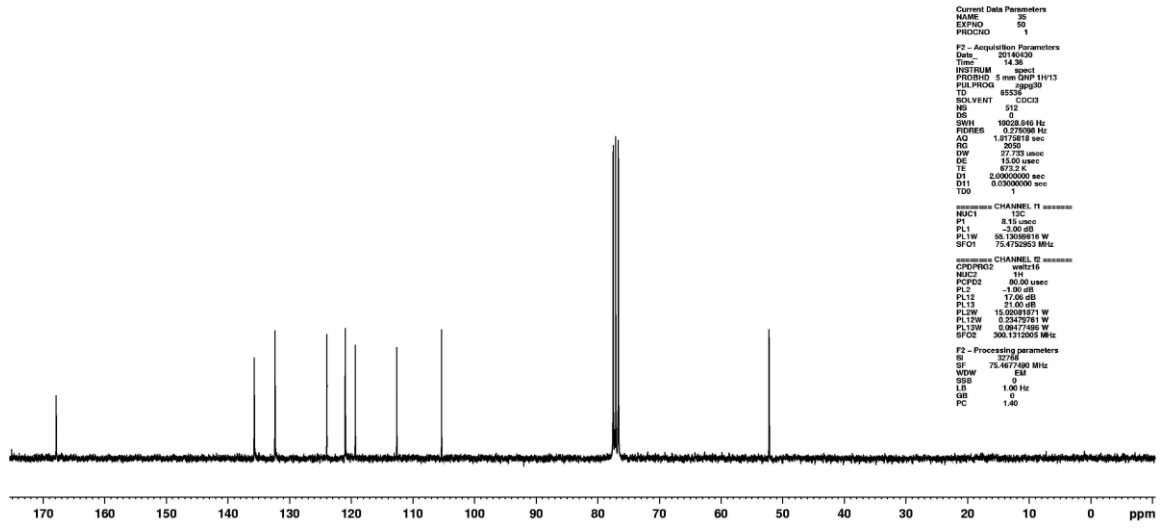
^{1}H NMR spectra of 2-bromo-1H-indole (22)



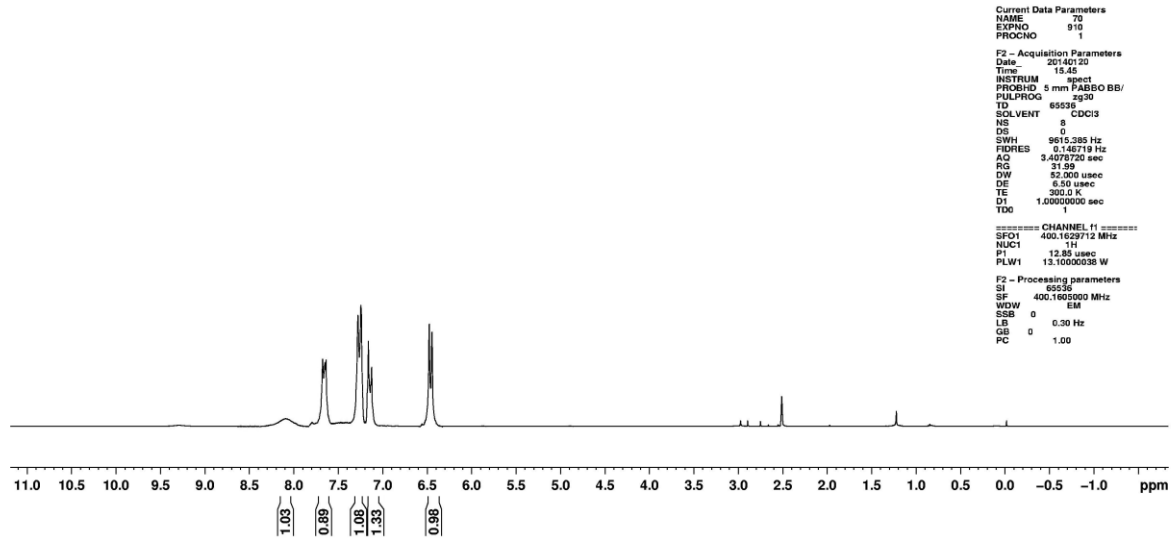
^{13}C NMR spectra of 2-bromo-1H-indole (22)



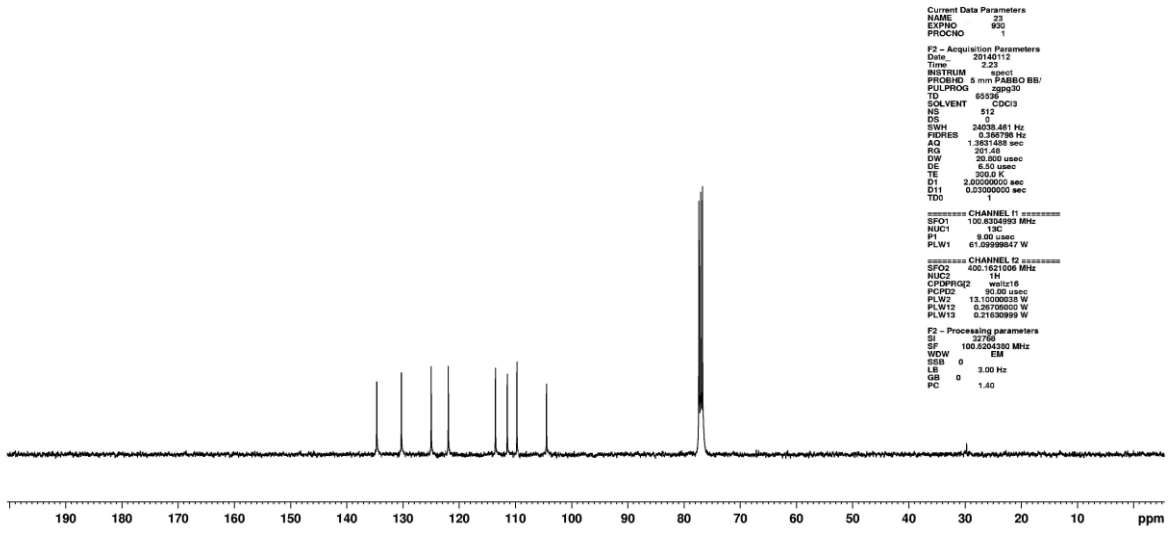
^{1}H NMR spectra of Methyl 2-bromo-1H-indole-6-carboxylate (23)



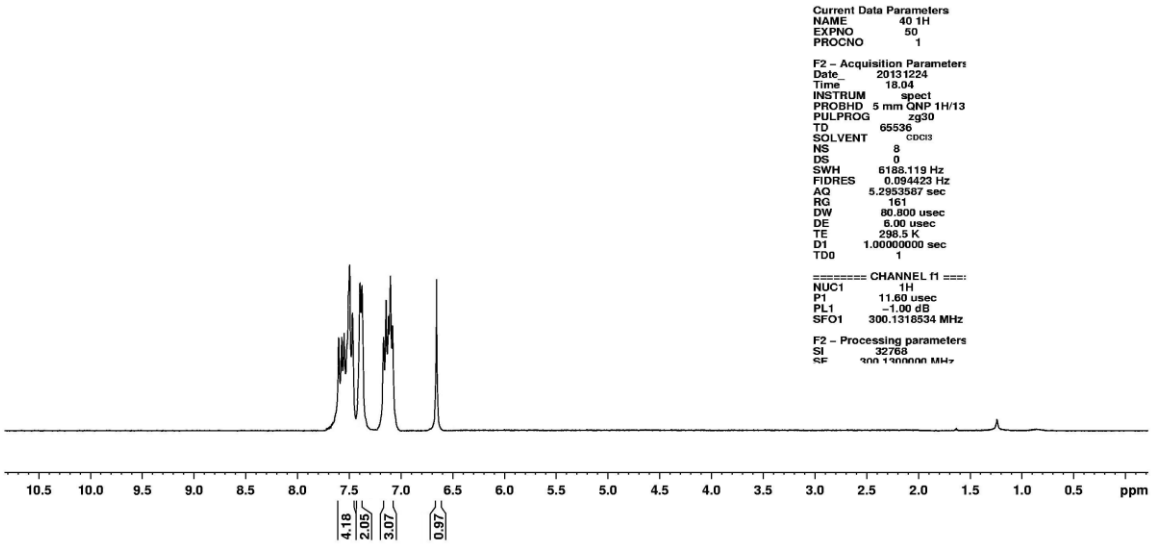
^{13}C NMR spectra of Methyl 2-bromo-1H-indole-6-carboxylate (23)



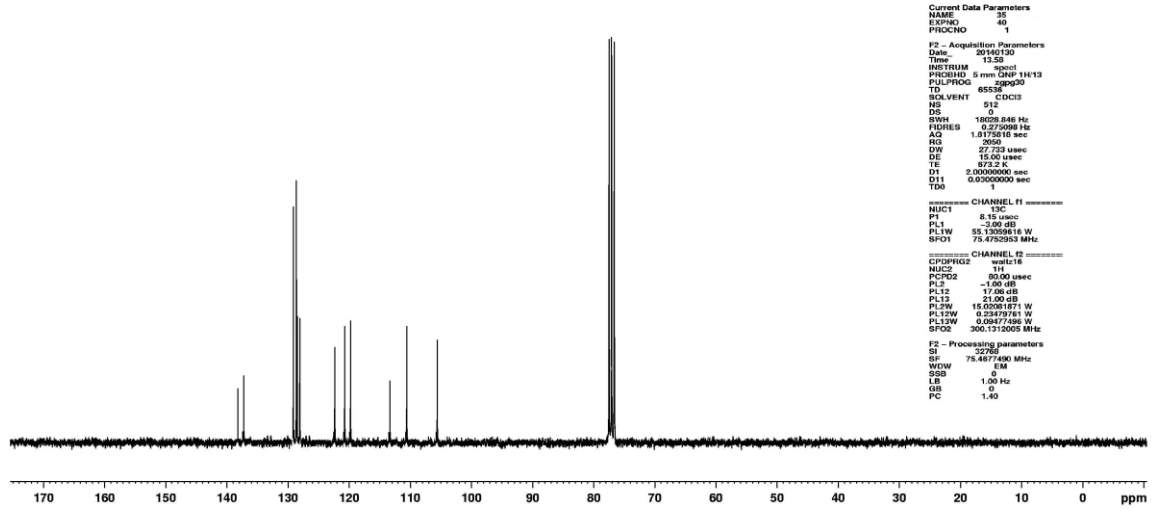
^{1}H NMR spectra of 2,5-dibromo-1H-indole (24)



^{13}C NMR spectra of 2,5-dibromo-1H-indole (24)



^{1}H NMR spectra of 2-bromo-1-phenyl-1H-indole (25)



^{13}C NMR spectra of 2-bromo-1-phenyl-1H-indole (25)