Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information for

Biosynthesis of Poly(ethylene glycol)-supported palladium nanoparticles using *Colocasia esculenta* leaf extract and their catalytic activity for Suzuki-Miyaura cross-coupling reaction

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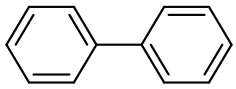
1. General Information

All the reactions were carried out under air. The reactions were monitored by thin-layer-chromatography (TLC) using aluminium precoated TLC plates with silica gel $60F_{254}$ (Merck) and UV light was used to visualize the spots. Purifications of the products were carried out by column chromatography technique using silica gel (60-120 mesh). Phenylboronic acid was purchased from Alfa-Aesar, potassium carbonate from Qualigens, bromobenzene from G.S. Chemical testing labs, Bombay, India and all other chemicals were purchased from Sisco-Research-Laboratories Pvt. Ltd. India. Hexane and Ethyl acetate used for purifications were distilled prior to use. All other chemicals were used without further purification. Melting points were recorded in BUCHI B450 melting point apparatus. UV-visible spectra of the samples were analyzed in Shimadzu (UV-2550) UV-Vis spectrophotometer, FT-IR spectra for the samples were recorded in a Nicolet (Impact 410) FT-IR spectrophotometer with frequencies expressed in wave numbers (cm^{-1}). ^{1}H and ^{13}C NMR spectra were recorded in a 400 MHz NMR spectrophotometer (JEOL, JNM-ECS) using tetramethylsilane (TMS) as the internal standard and the coupling constants are expressed in Hertz. Chemical shifts are expressed in ppm. The XRD pattern was recorded with Rigaku X-ray diffractometer over the range of $2\Theta = 10\text{-}80^{0}$. The surface morphology was studied using JEOL Scanning microscope (model JSM-6390LV SEM).

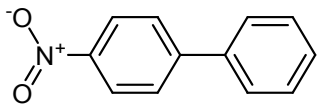
2. Characterization data of the products.

Biphenyl (entry 1, table 3)[23]



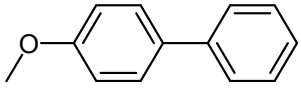
White crystal, m.p. 69.2 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.60 (m, 4H), 7.45 (m, 4H), 7.41 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 141.3, 128.8, 127.3, 127.2.

4-Nitrobiphenyl (entries 2 and 13, table 3)[24]



Colourless crystal, m.p. 113 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 8.30 (m, 2H), 7.75-7.72 (m, 2H), 7.62 (d, *J* = 8 Hz, 2H), 7.60-7.50 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 147.7, 147.1, 138.8, 129.2, 129.0, 127.8, 127.4, 124.1.

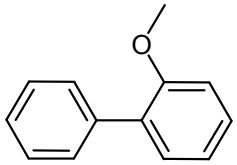
4-Methoxybiphenyl (entry 3, table 3)[24]



White crystal, m.p. 89.1 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.54 (t, *J* = 8 Hz, 4H), 7.43-7.41 (m, 2H), 7.30-7.25 (m, 1H), 6.99-6.96 (m, 2H), 3.83 (s,

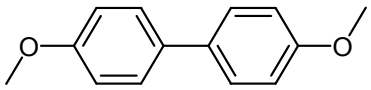
3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 159.2, 140.9, 133.8, 128.8, 128.2, 126.8, 126.7, 114.2, 55.4.

2-Methoxybiphenyl (entry 4, table 3)[25]



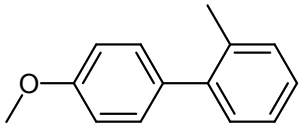
Yellow oily liquid, m.p. 30 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.42 (d, *J* = 8 Hz, 2H), 7.30-7.28 (m, 2H), 7.20-7.19 (m, 3H), 6.90-6.87 (m, 1H), 6.84 (d, *J* = 8 Hz, 1H), 3.6 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 156.6, 138.7, 131.1, 130.9, 129.7, 128.8, 128.2, 126.9, 121.0, 111.4, 55.7.

4,4'-dimethoxybiphenyl (entry 5, table 3)[23]



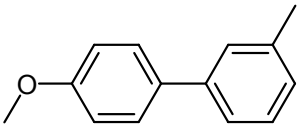
White Crystalline solid, m.p. 175.5 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.47 (d, *J* = 8 Hz, 4H), 6.95 (d, *J* = 8 Hz, 4H), 3.83 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 158.7, 133.5, 127.8, 114.2, 55.4.

2-Methyl-4'-methoxybiphenyl (entry 6, table 3)[26]



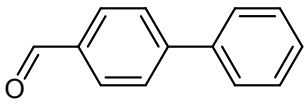
Colourless oil, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.53-7.50 (m, 2H), 7.36-7.25 (m, 3H), 7.15-7.10 (m, 1H), 6.98-6.95 (m, 2H), 3.84 (s, 3H), 2.40 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 159.1, 140.8, 138.3, 133.3, 128.7, 128.2, 127.6, 127.4, 123.9, 114.2, 55.4, 21.6.

3-Methyl,4'-methoxybiphenyl (entry 7, table 3)[27]



White Crystalline solid, m.p. 51 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.52-7.49 (m, 2H), 7.35-7.29 (m, 3H), 7.15-7.10 (m, 1H), 6.97-6.94 (m, 2H), 3.83 (s, 1H), 2.40 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 159.1, 140.9, 138.3, 133.9, 128.7, 128.2, 127.6, 127.5, 123.9, 114.2, 55.4, 21.6.

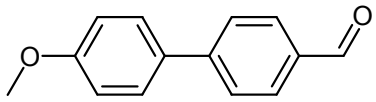
4-Formylbiphenyl (entry 8, table 3)[24]



White crystal, m.p. 58 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 10.06 (s, 1H), 7.95 (d, J = 8 Hz, 2H), 7.71 (d, J = 8 Hz, 3H), 7.56 (d, J = 8 Hz, 2H), 7.45 (d,

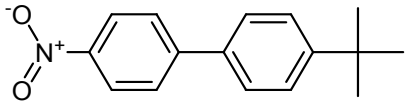
J = 8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 191.4, 145.9, 138.2, 135.4, 134.8, 130.4, 129.3, 128.6, 127.6.

4-Formyl-4'-methoxybiphenyl (entry 9, table 3)



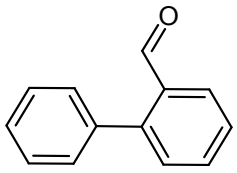
White crystal, m.p. 98 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 10.03 (s, 1H), 7.93 (d, *J* = 8 Hz, 2H), 7.72 (d, *J* = 8 Hz, 2H), 7.61-7.58 (m, 2H), 7.01 (d, *J* = 8 Hz, 2H), 3.87 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 191.9, 159.2, 134.7, 130.4, 128.5, 127.1, 114.5, 55.4.

4-Nitro-4'-*tert*-butylbiphenyl (entry 10, table 3)



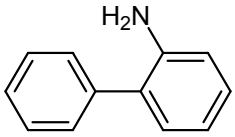
White crystal, m.p. 160 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 8.28 (d, *J* = 8 Hz, 2H), 7.73 (d, *J* = 8 Hz, 2H), 7.59-7.51 (m, 4H), 1.37 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 152.3, 147.5, 146.9, 135.8, 127.6, 127.1, 126.2, 124.1, 34.8, 31.3.

2-Formylbiphenyl (entry 11, table 3)[24]



Brown liquid, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 9.98 (s, 1H), 8.0 (m, 1H), 7.66-7.63 (m, 1H), 7.50-7.44 (m, 5H), 7.40-7.37 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 192.6, 146.0, 137.8, 133.7, 133.6, 130.8, 130.4, 128.5, 128.2, 127.8, 127.6.

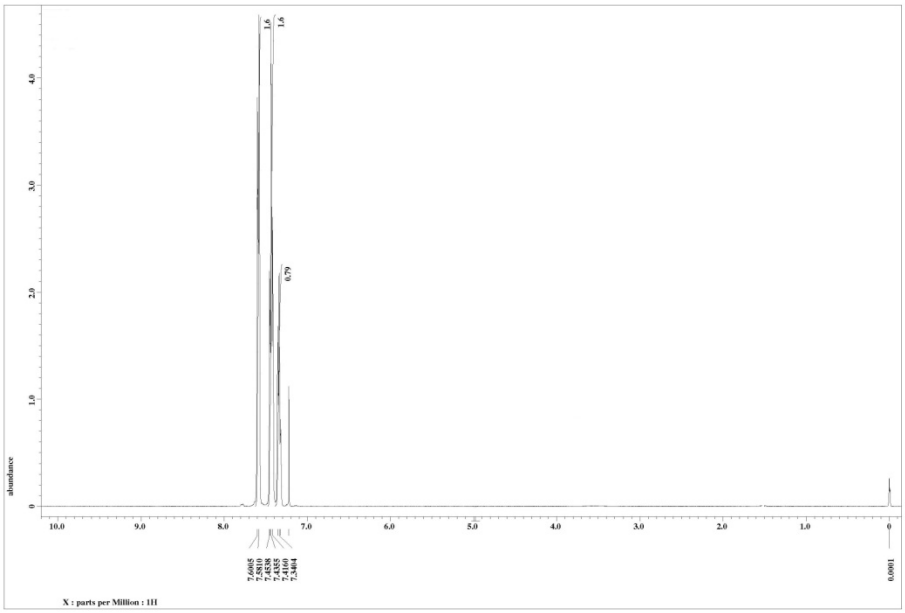
2-Aminobiphenyl (entry 12, table 3)



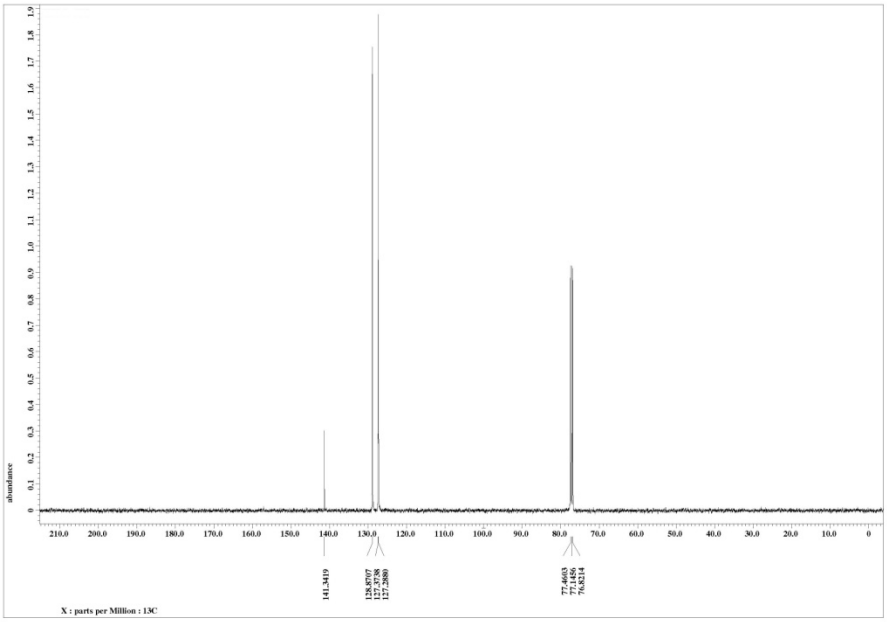
White crystal, m.p. 51.6 ^{0}C, ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm): 7.57-7.55 (m, 2H), 7.43-7.39 (m, 2H), 7.38-7.25 (m, 1H), 7.24-7.22 (m, 1H), 7.21-6.95 (m, 1H), 6.91-6.90 (m, 1H), 6.73-6.71 (m, 1H), 3.73 (s, br, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ (ppm): 146.7, 142.5, 141.4, 129.7, 128.7, 127.3, 127.2, 117.7, 114.1, 113.9.

3. ^{1}H and ^{13}C NMR spectra of the products

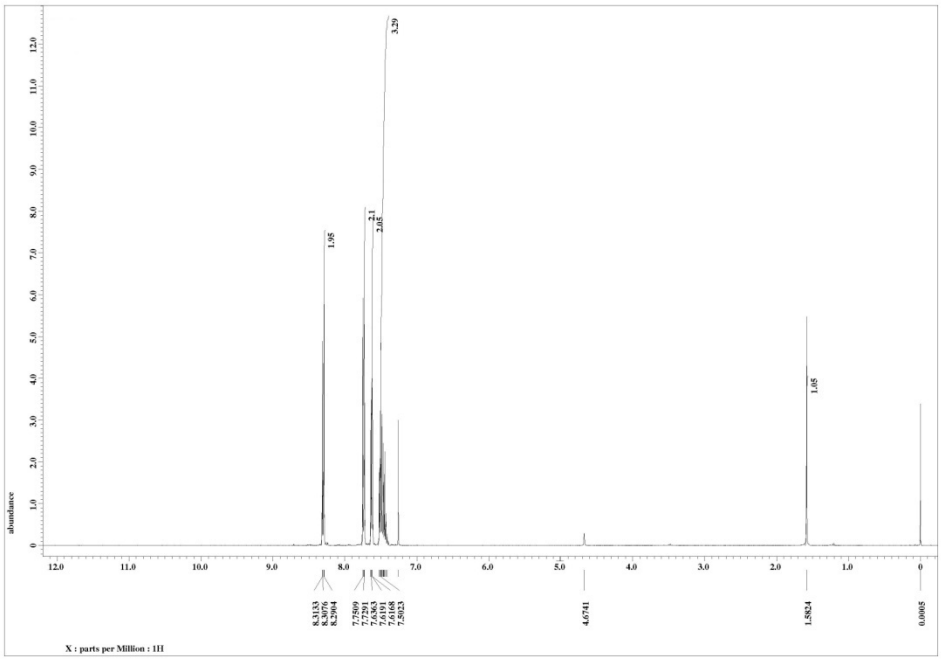
3.1 ^{1}H NMR spectrum of Biphenyl (entry 1, table 3)



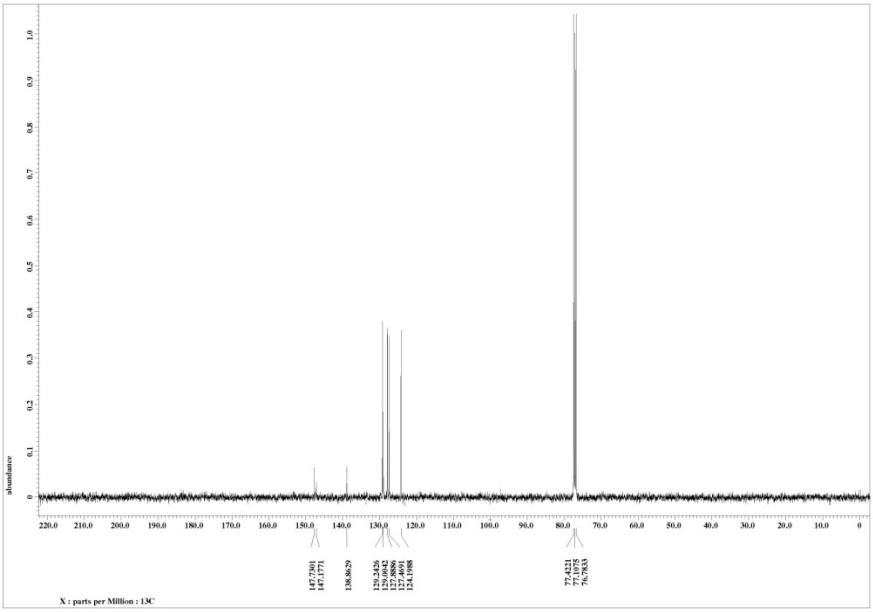
3.2 ^{13}C NMR spectrum of Biphenyl (entry 1, Table 3)



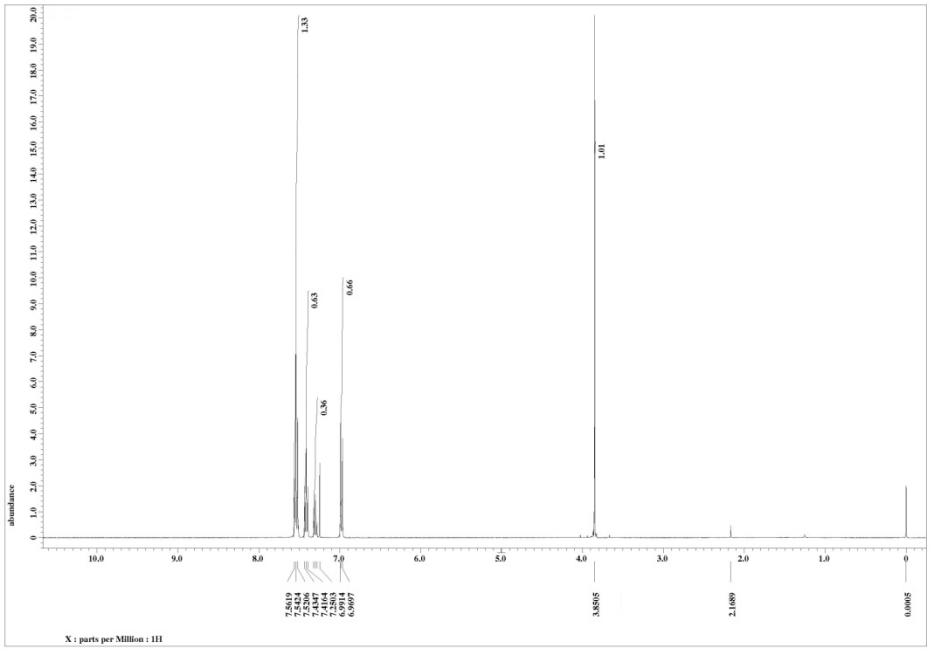
3.3 ^{1}H NMR spectrum of 4-nitrobiphenyl (entries 2 and 13, table 3)



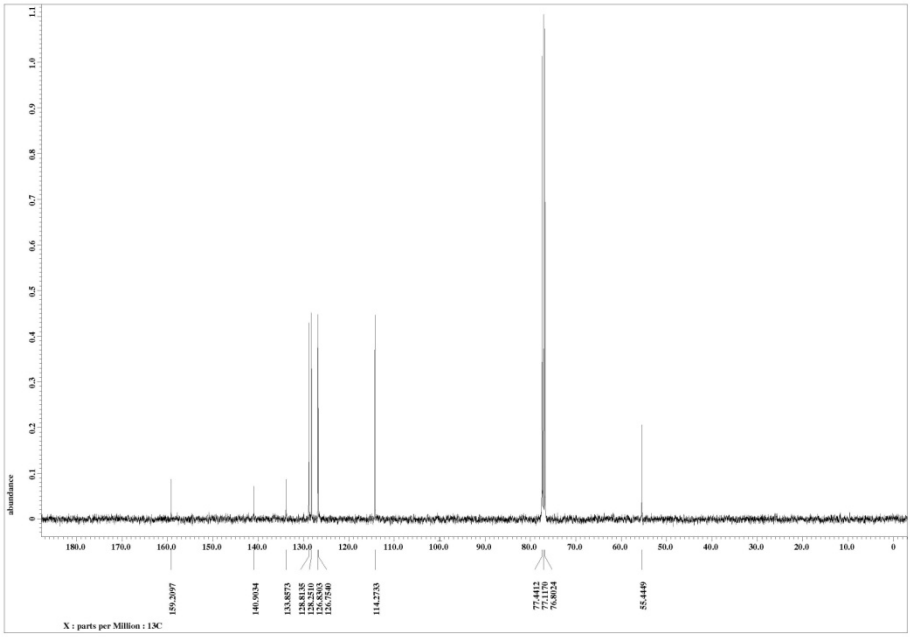
3.4 ^{13}C NMR spectrum of 4-nitrobiphenyl (entries 2 and 13, table 3)



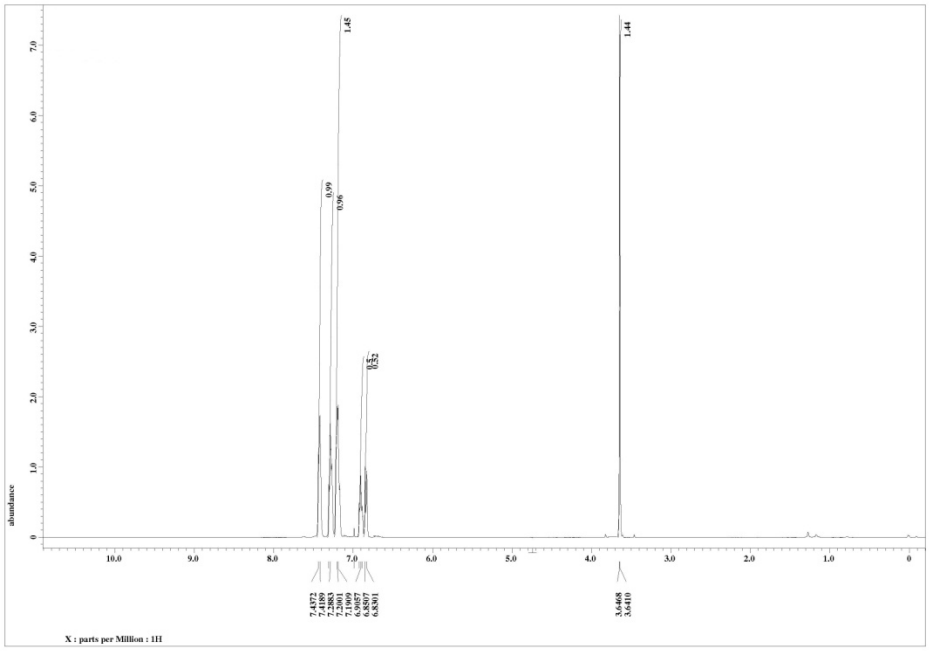
3.5 ^{1}H NMR spectrum of 4-methoxybiphenyl (entry 3, table 3)



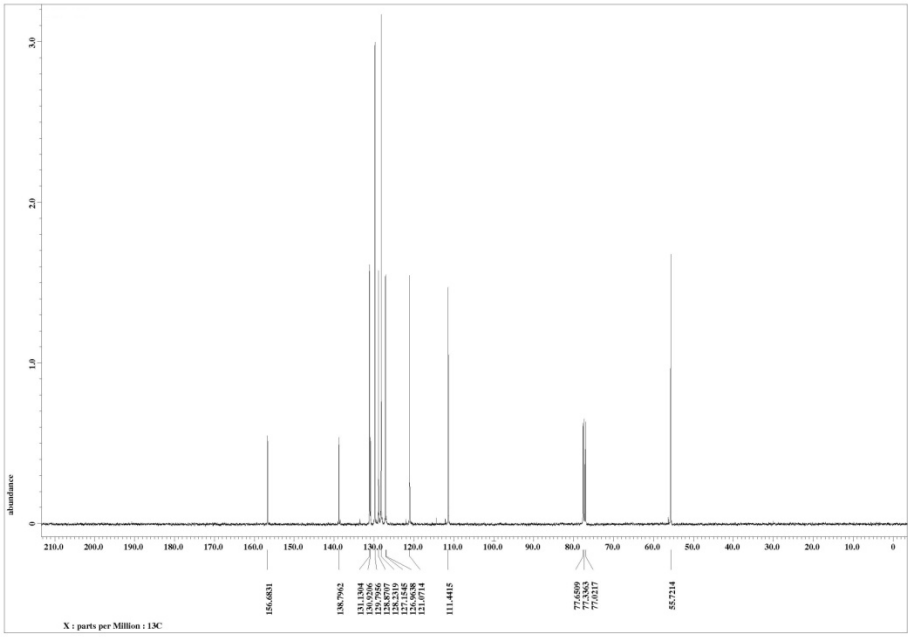
3.6 ^{13}C NMR spectrum of 4-methoxybiphenyl (entry 3, table 3)



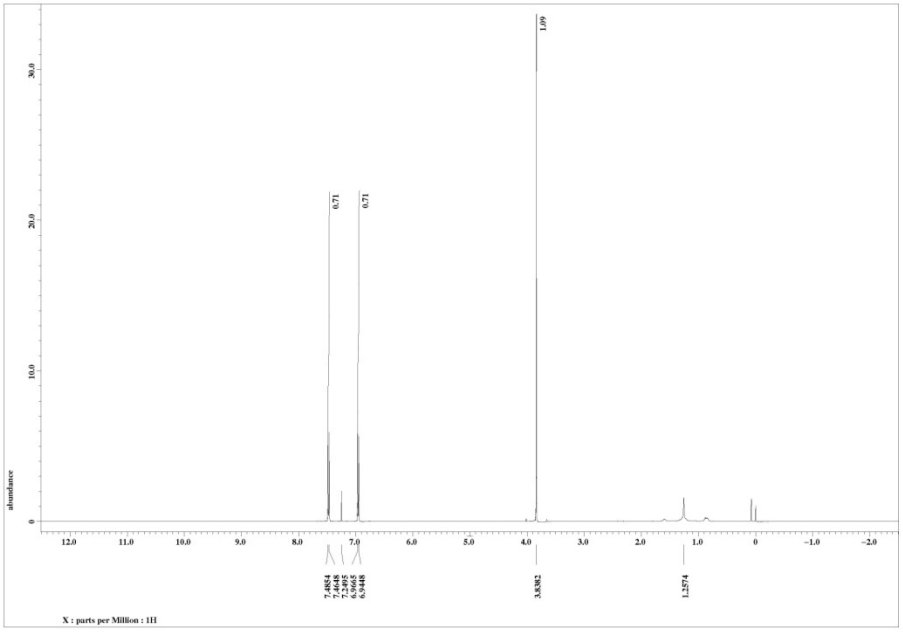
3.7 ^{1}H NMR spectrum of 2-methoxybiphenyl (entry 4, table 3)



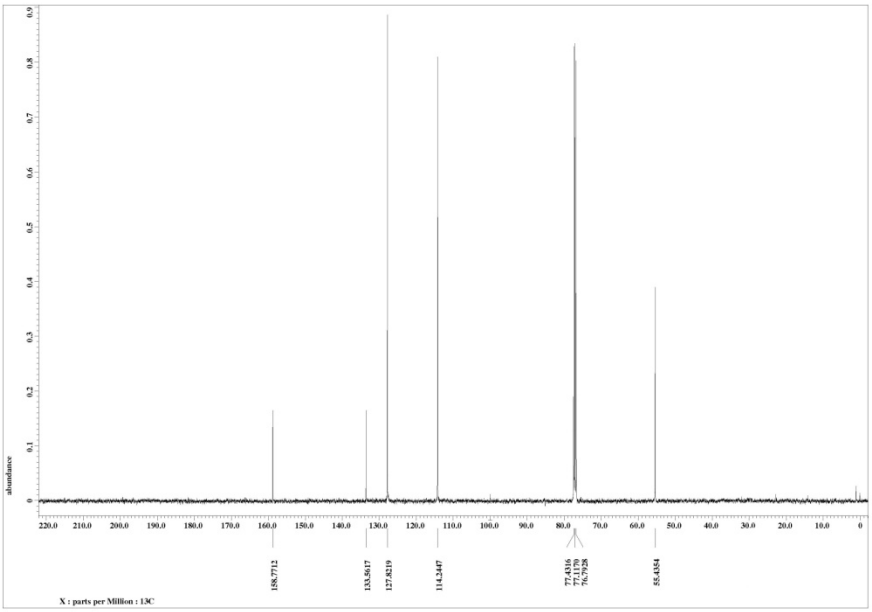
3.8 ^{13}C NMR spectrum of 2-methoxybiphenyl (entry 4, table 3)



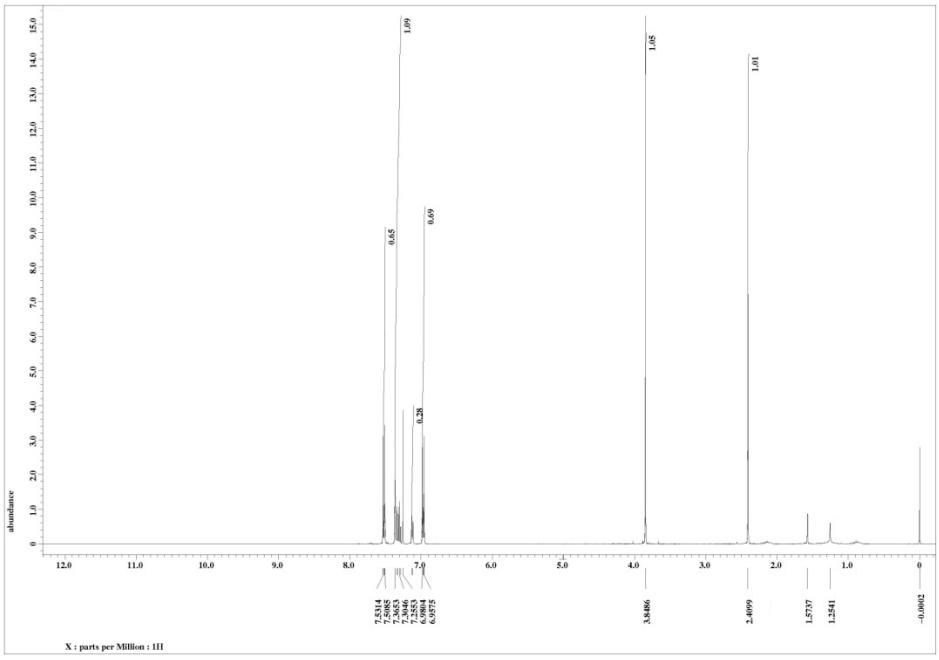
3.9 ^{1}H NMR spectrum of 4,4'-dimethoxybiphenyl (entry 5, table 3)



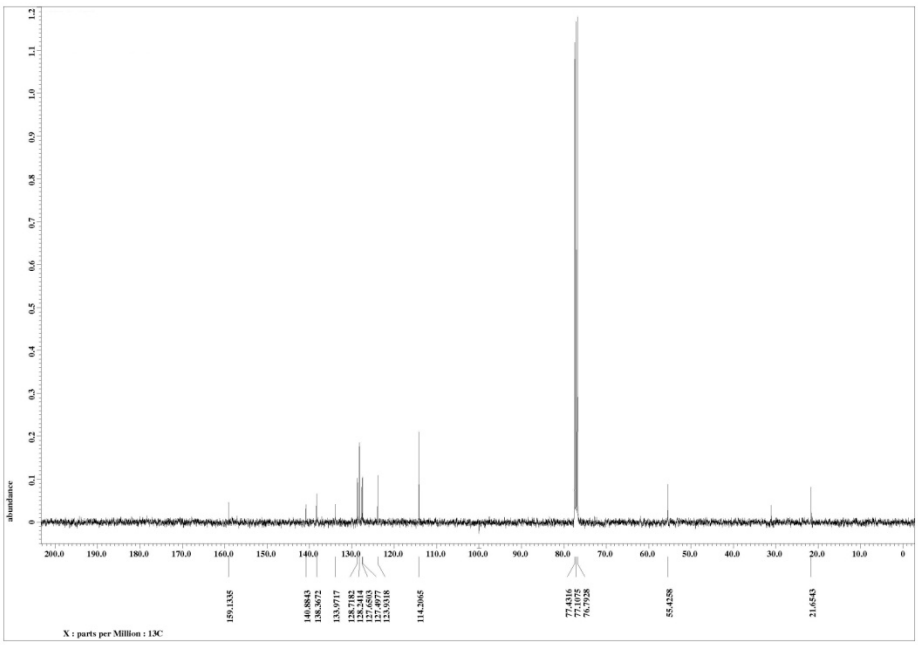
3.10 ^{13}C NMR spectrum of 4,4'-dimethoxybiphenyl (entry 5, table 3)



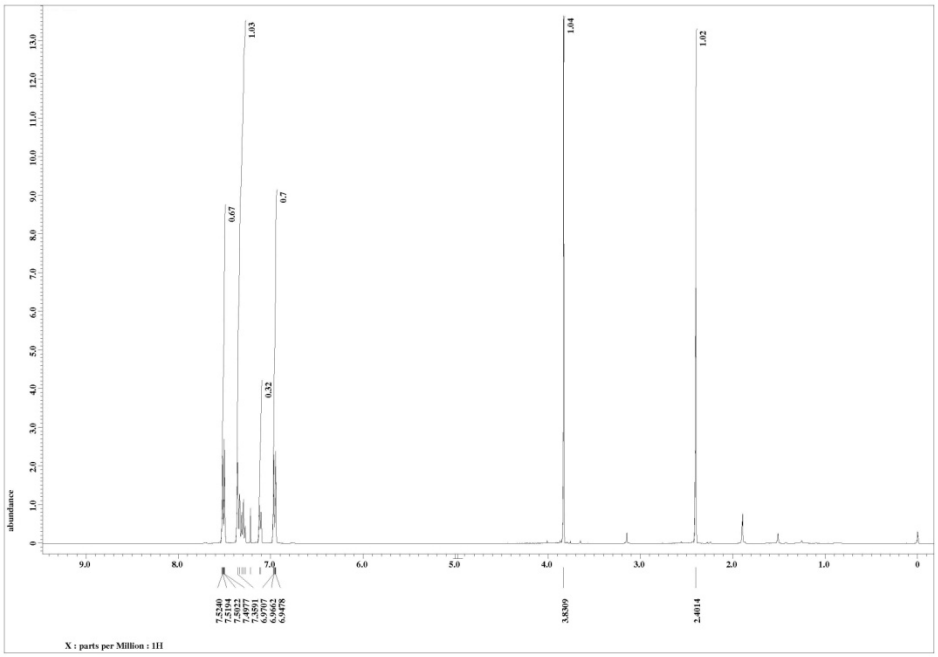
3.11 ^{1}H NMR spectrum of 2-Methyl-4'-methoxybiphenyl (entry 6, table 3)



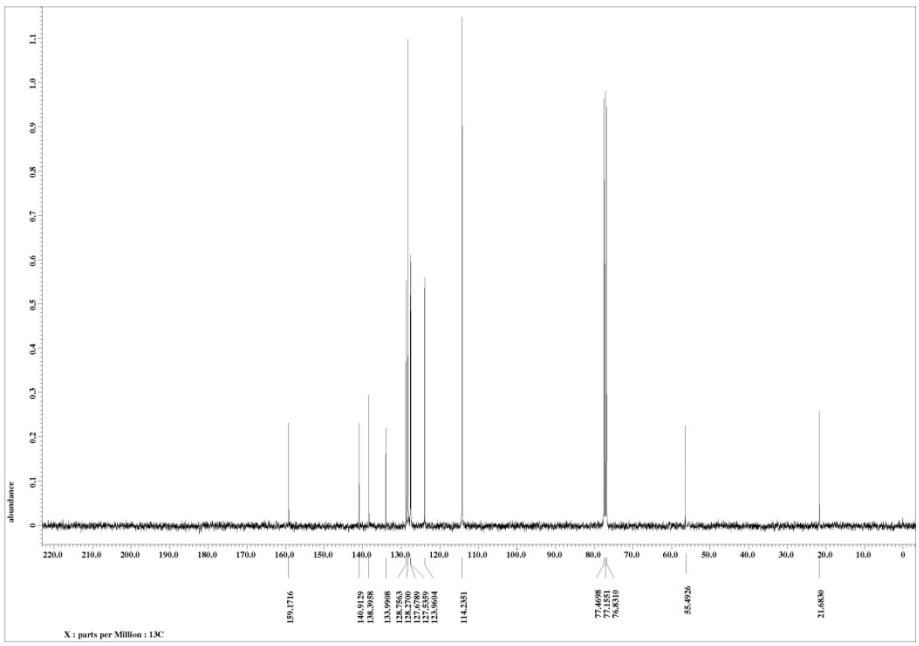
3.12 ^{13}C NMR spectrum of 2-Methyl-4'-methoxybiphenyl (entry 6, table 3)



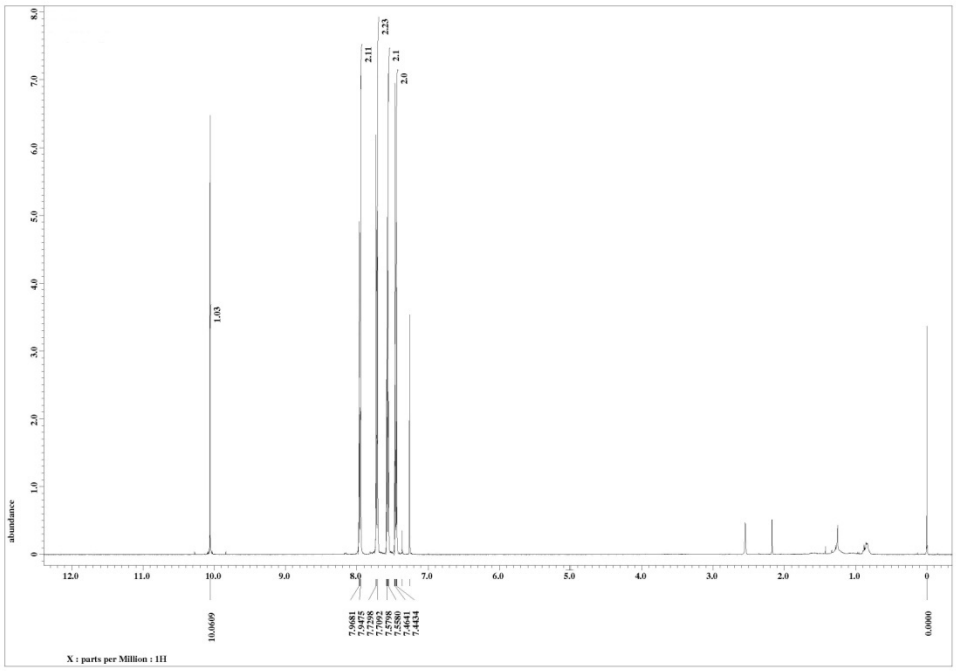
3.13 ^{1}H NMR spectrum of 3-Methyl-4'-methoxybiphenyl (entry 7, table 3)



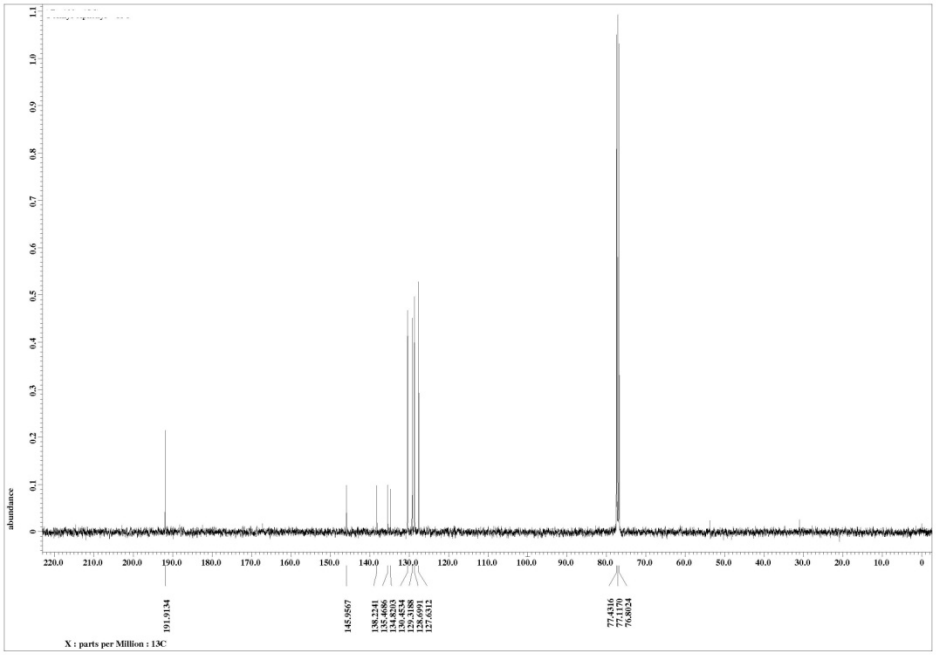
3.14 ^{13}C NMR spectrum of 3-methyl-4'-methoxybiphenyl (entry 7, table 3)



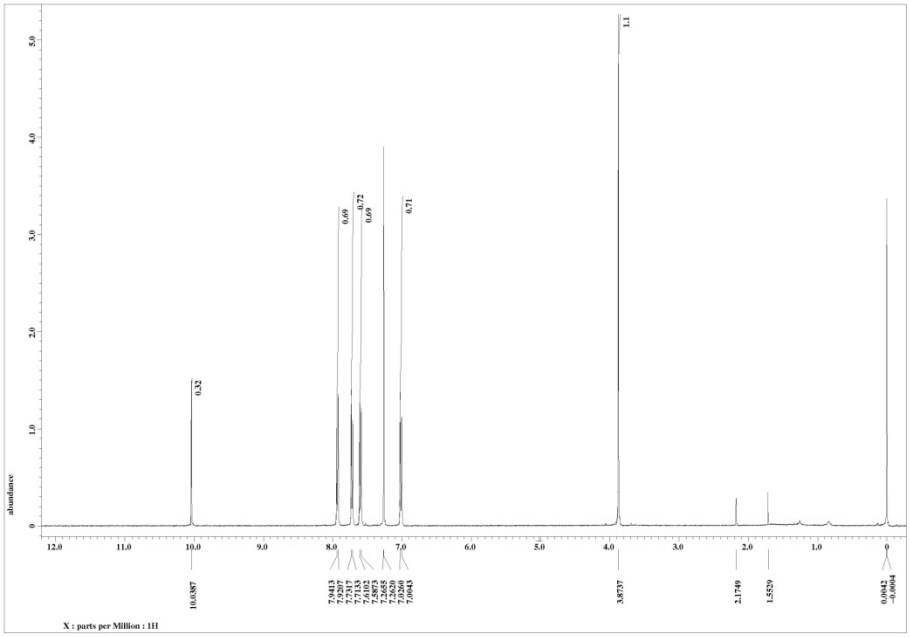
3.15 ^{1}H NMR spectrum of 4-formylbiphenyl (entry 8, table 3)



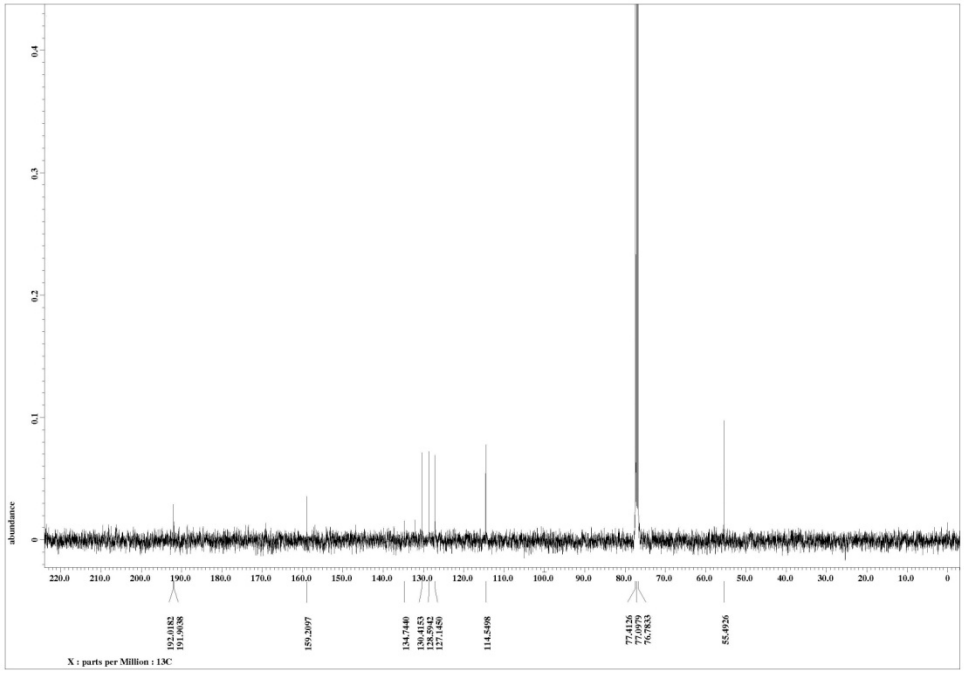
3.16 ^{13}C NMR spectrum of 4-formylbiphenyl (entry 8, table 3)



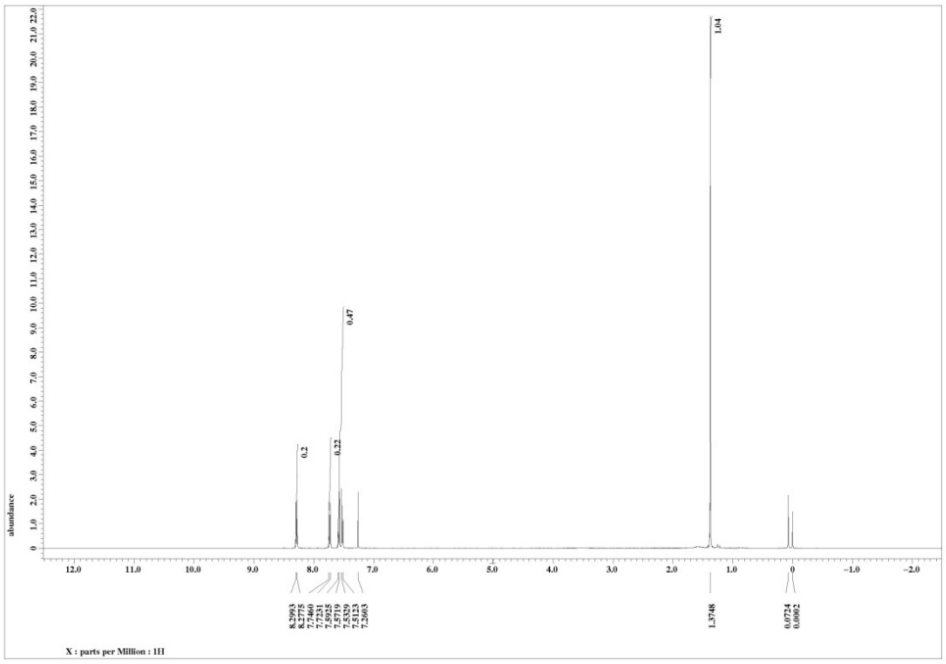
3.17 ^{1}H NMR spectrum of 4-formyl-4'-methoxybiphenyl (entry 9, table 3)



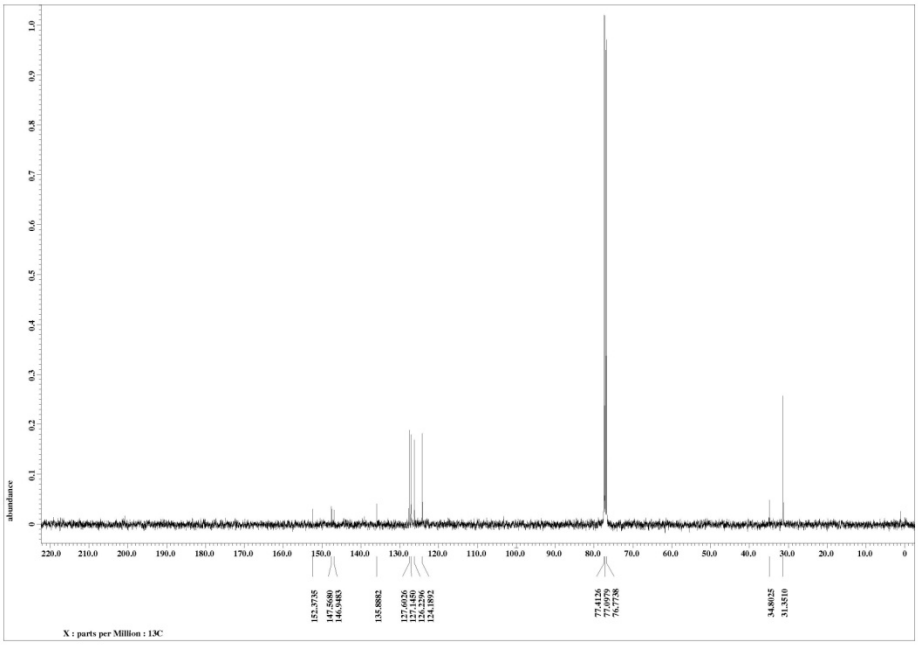
3.18 ^{13}C NMR spectrum of 4-formyl-4-methoxybiphenyl (entry 9, table 3)



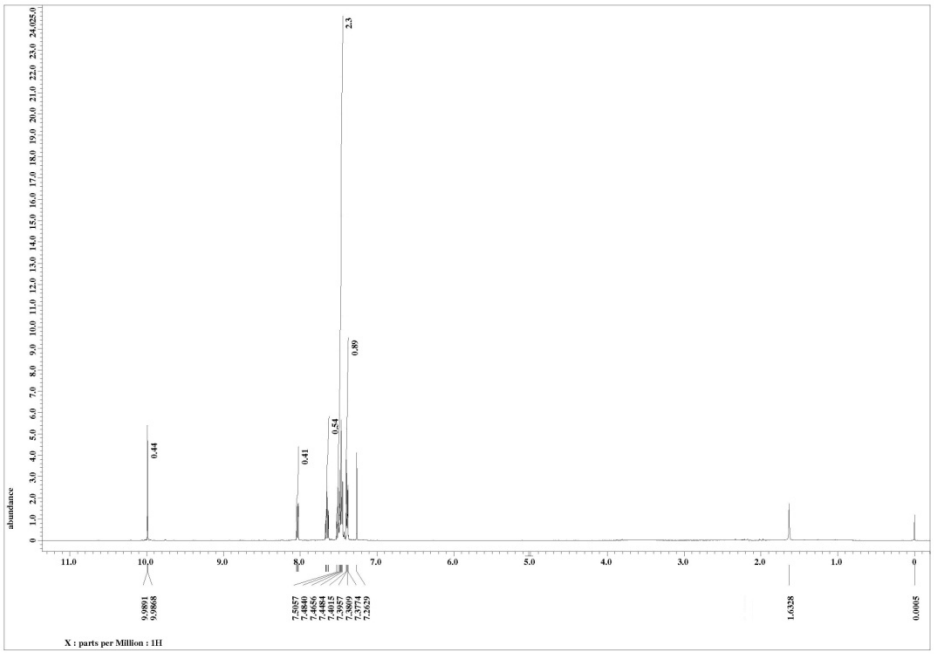
3.19 ^{1}H NMR spectrum of 4-Nitro-4'-*tert*-butylbiphenyl (entry 10, table 3)



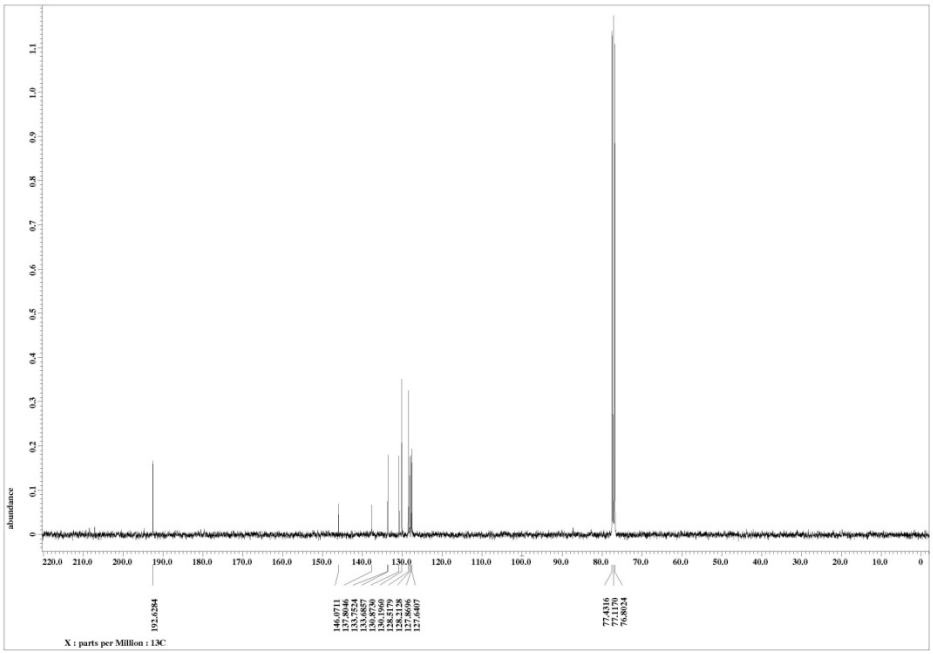
3.20 ^{13}C NMR spectrum of 4-Nitro-4-*tert*-butylbiphenyl (entry 10, table 3)



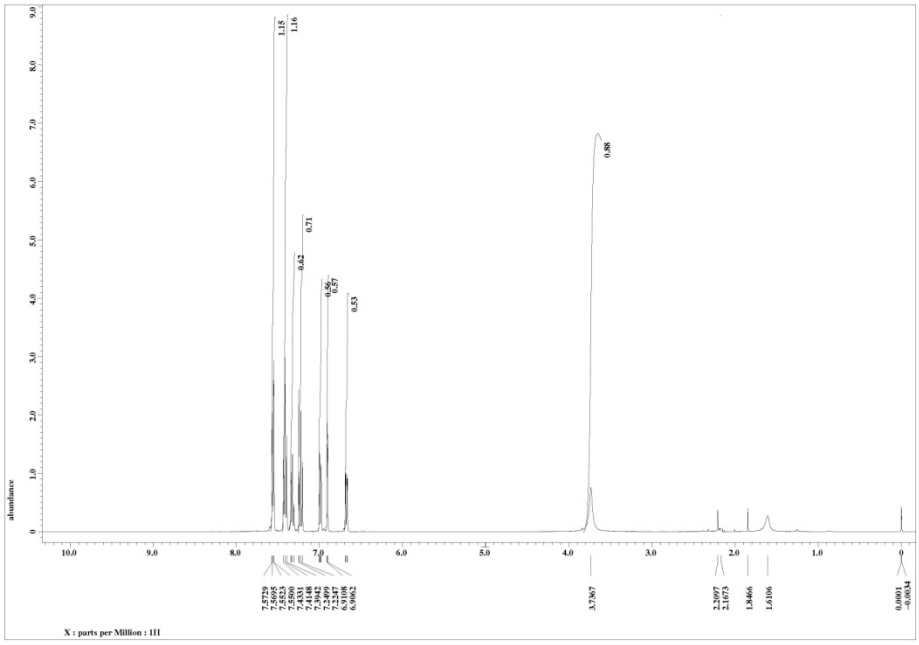
3.21 ^{1}H NMR spectrum of 2-Formylbiphenyl (entry 11, table 3)



3.22 ^{13}C NMR spectrum of 2-formylbiphenyl (entry 11, table 3)



3.23 ^{1}H NMR spectrum of 2-Aminobiphenyl (entry 12, table 3)



3.24 ^{13}C NMR spectrum of 2-Aminobiphenyl (entry 12, table 3)