Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

"*Quick* and *Click*" Assembly of Functionalised Indole Rings *via* Metal-Promoted Cyclative Tandem Reactions

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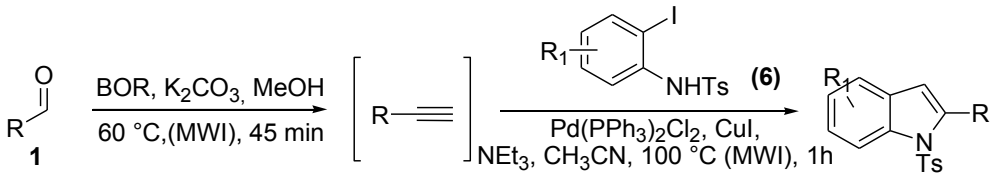
1. General Experimental Method

Commercially available reagents were purchased from Acros, Aldrich, Strem Chemicals, Alfa-Aesar, TCI Europe and used as received. The solvents were purchased from Aldrich or Fluka in sure/sealed^{TM} bottles over molecular sieves. Flash column chromatography was performed with Merck silica gel 60, particle size 0.040–0.063 mm (230–400 mesh). All reactions were monitored by thin-layer chromatography (TLC) performed on glass-backed silica gel 60 F_{254}, 0.2 mm plates (Merck), and compounds were visualized under UV light (254 nm) or using *p*-anisaldehyde (otherwise $KMnO_4$) solution with subsequent heating. The eluents were technical grade and distilled prior to use. ^{1}H NMR spectra were recorded at 25 °C. ^{1}H and ^{13}C liquid NMR spectra were recorded on a Bruker Avance III (400 MHz) NMR spectrometer at 25 °C. Proton chemical shifts are expressed in parts per million (ppm, δ scale) and are referred to the residual hydrogen in the solvent ($CHCl_3$, 7.27 ppm). Data are represented as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, pent = pentuplet, sex = sextuplet, sept = septuplet, m = multiplet and/or multiple resonances, br s = broad singlet; br t= broad triplet), coupling constant (*J*) in Hertz and integration. Carbon chemical shifts are expressed in parts per million (ppm, δ scale) and are referenced to the carbon resonances of the NMR solvent ($CDCl_3$, δ 77.0 ppm). Deuterated NMR solvents were obtained from Aldrich. Melting points were determined in a Büchi 504 apparatus. IR spectra were recorded in a Nicolet (Impact 410) FT-IR spectrophotometer using neat samples. High resolution mass spectra (HRMS) were obtained with a JEOL JMS-700 spectrometer using electrospray (ESI).

2. Microwave Irradiation Experiments

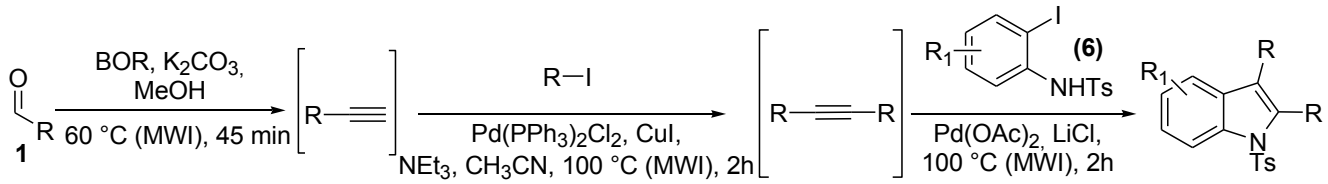
All the reactions involving microwave dielectric heating were performed with a microwave oven (Discover from CEM) under mono-mode irradiation in a 10-mL glass tube sealed with a CEM 's proprietary "snap-on" cap. The microwave heating was carried out at 100 °C using "dynamic power" mode with maximum power of 250 W for 1 hr and operating at a frequency of 2.45GHz.The reaction mixtures were stirred with a magnetic stir bar during the irradiation. During the course of reactions, the internal temperature was monitored through an IR sensor (standard infrared temperature sensor). The maximal internal pressure was monitored and maintained under the value of 300 psi using the provided software. At the end of the reaction, the tube was cooled to room temperature with air-compressed jet cooling.

3. General procedure for the preparation of 2-substituted indoles:



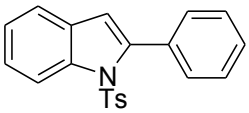
A 10-mL microwave reaction vessel equipped with a magnetic stir bar was charged with aldehyde **1** (0.5 mmol), K_2CO_3 (1 mmol), dimethyl-1-diazo-2-oxopropylphosphonate (BOR) (0.6 mmol) and CH_3OH (0.4 mL), the resulting mixture was irradiated at 60 °C for 45 min. in a microwave oven. Then *N*-tosyl-2-iodoaniline **6** (0.33 mmol), NEt_3 (0.5 mmol), $Pd(PPh_3)_2Cl_2$ (3 mol%), CuI (5 mol%) and CH_3CN (2.8 mL) were subsequently added, the mixture was irradiated at 100 °C for 1h in the microwave oven. The crude reaction mixture was directly loaded on silica gel column without aqueous work-up and pure 2-substituted indole was obtained by flash column chromatography (silica gel, mixture of hexane/ethyl acetate).

4. General procedure for the preparation of 2,3-substituted indoles:

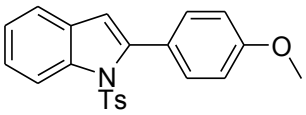


A 10-mL microwave reaction vessel equipped with a magnetic stir bar was charged with aldehyde **1** (0.5 mmol), K_2CO_3 (1 mmol), dimethyl-1-diazo-2-oxopropylphosphonate (BOR) (0.6 mmol) and CH_3OH (0.4 mL) and irradiated at 60 °C for 45 min. in a microwave oven. Then iodoarene (0.33 mmol), NEt_3(0.5 mmol), $Pd(PPh_3)_2Cl_2$ (3 mol%), CuI (5 mol%) and CH_3CN (2.8 mL) were subsequently added, the resulting mixture was irradiated at 100 °C for 2h in the microwave oven. Next, *N*-tosyl-2-iodoaniline **6** (0.33 mmol), $Pd(OAc)_2$ (5 mol%), LiCl (0.33 mmol) were added and irradiated at 100 °C for 2h in the microwave oven. The crude reaction mixture was directly loaded on silica gel column without aqueous work-up and pure 2,3-substituted indole was obtained by flash column chromatography (silica gel, mixture of hexane/ethyl acetate).

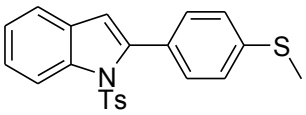
5. Characterization data for compounds 9, 12-35, 52-55:



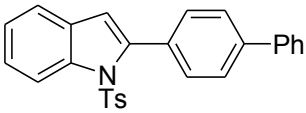
2-Phenyl-1-(toluene-4-sulfonyl)-1H-indole, (9). A yellow solid (292 mg, 84 %), m.p. 144-146 °C (lit.,[1] m.p. 144–145 °C); R_f = 0.44 (hexane/AcOEt: 8/1); IR (film) cm^{-1}: 3063, 2955, 2923, 2854, 1596, 1450, 1373, 1177. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.31 (d, *J* = 8.4 Hz, 1H), 7.50-7.41 (m, 6H), 7.35 (t, *J* = 7.8 Hz, 1H), 7.28-7.24 (m, 3H), 7.03 (d, *J* = 8.0 Hz, 2H), 6.54 (s, 1H), 2.27 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.4, 142.1, 138.2, 134.6, 132.4, 130.5, 130.3, 129.1, 128.6, 127.4, 126.7, 124.7, 124.2, 120.6, 116.6, 113.5, 21.5. These assignment matched with those previously published.[1]



2-(4-Methoxy-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (12). A white solid (98 mg, 79 %), m.p. 125-126 °C (lit.,[2] m.p. 124–125 °C); R_f = 0.32 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3056, 2837, 2358, 1612, 1540, 1505, 1449, 1372. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.30 (d, *J* = 8.3 Hz, 1H), 7.41 (d, *J* = 8.5 Hz, 3H), 7.33 (t, *J* = 7.8 Hz, 1H), 7.27-7.25 (m, 3H), 6.99 (dd, *J* = 33.2, 8.2 Hz, 4H), 6.48 (s, 1H), 3.88 (s, 3H), 2.28 (s, 3H). ^{13}C-NMR (100 MHz, $CDCl_3$): δ 160.0, 144.4, 142.0, 138.1, 134.7, 131.6, 130.6, 129.1, 126.7, 124.7, 124.5, 124.2, 120.4, 116.6, 112.9, 112.8, 55.3, 21.5. These assignment matched with those previously published.[2]

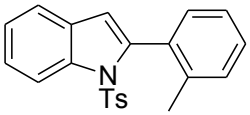


2-(4-Methylsulfanyl-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (13). A white solid (117 mg, 90 %), m.p. 147-148 °C; R_f = 0.21 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2921, 2853, 1596, 1488, 1448, 1372, 1187, 1176. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.30 (d, *J* = 8.4 Hz, 1H), 7.42 (d, *J* = 8.1 Hz, 3H), 7.34 (t, *J* = 7.8 Hz, 1H), 7.29-7.25 (m, 5H), 7.03 (d, *J* = 8.0 Hz, 2H), 6.51 (s, 1H), 2.55 (s, 3H), 2.28 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.5, 141.7, 139.5, 138.2, 134.5, 130.6, 130.5, 129.1, 128.8, 126.7, 125.0, 124.7, 124.3, 120.6, 116.7, 113.5, 21.5, 15.4. HRMS: *m/z* calcd for $C_{22}H_{20}NO_2S_2$: 394.0935 $[M+H]^+$. Found: 394.0937.

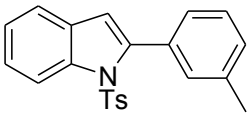


2-Biphenyl-4-yl-1-(toluene-4-sulfonyl)-1H-indole, (14). A yellow solid (128 mg, 92%), m.p. 180-181 °C; R_f = 0.38 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3062, 3030, 2359, 1597, 1486, 1448, 1372, 1176. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.32 (d, *J* = 8.4 Hz, 1H), 7.70-7.65 (m, 4H), 7.58 (d, *J* = 8.0 Hz, 2H), 7.47 (q, *J* = 7.9 Hz, 3H), 7.37 (q, *J* = 7.7 Hz, 2H), 7.31-7.25 (m, 3H), 7.04 (d, *J* = 8.0 Hz, 2H), 6.59 (s, 1H), 2.28 (s, 3H). ^{13}C-NMR (100

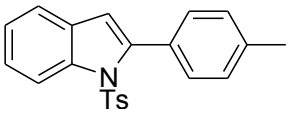
MHz; $CDCl_3$): δ = 144.5, 141.9, 141.3, 140.5, 138.3, 134.5, 131.3, 130.7, 130.6, 129.1, 128.8, 127.5, 127.1, 126.8, 126.2, 126.1, 124.9, 124.8, 124.3, 120.6, 116.7, 113.7, 21.5. HRMS: *m/z* calcd for $C_{27}H_{22}NO_2S$: 424.1371 $[M+H]^+$. Found: 424.1367.



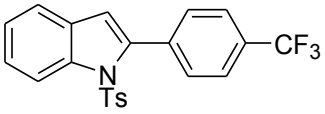
1-(Toluene-4-sulfonyl)-2-o-tolyl-1H-indole, (**15**). A white solid (93 mg, 78%), m.p. 96-97 °C; R_f = 0.43 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3065, 2955, 2924, 1597, 1491, 1449, 1372, 1306, 1248, 1177. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.33 (d, *J* = 8.4 Hz, 1H), 7.48 (d, *J* = 7.7 Hz, 1H), 7.36-7.34 (m, 4H), 7.26 (t, *J* = 7.4 Hz, 2H), 7.21-7.17 (m, 1H), 7.10-7.06 (m, 3H), 6.45 (s, 1H), 2.29 (s, 3H), 2.21 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.6, 140.2, 139.3, 137.2, 135.5, 132.0, 130.8, 130.0, 129.5, 129.3, 129.0, 126.8, 124.6, 124.5, 123.7, 120.6, 115.6, 112.2, 21.5, 20.4. HRMS: *m/z* calcd for $C_{22}H_{20}NO_2S$: 362.1215 $[M+H]^+$. Found: 362.1218.



1-(Toluene-4-sulfonyl)-2-m-tolyl-1H-indole, (16). A yellow solid (98 mg, 82%), m.p. 104-105 °C (lit.,[2a,3] m.p. 104–105 °C); R_f = 0.36 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3051, 2921, 1596, 1449, 1372, 1186, 1175, 1090. ^{1}H-NMR (400 MH; $CDCl_3$): δ = 8.30 (d, *J* = 8.3 Hz, 1H), 7.43 (d, *J* = 7.7 Hz, 1H), 7.36-7.23 (m, 8H), 7.04 (d, *J* = 8.0 Hz, 2H), 6.52 (s, 1H), 2.41 (s, 3H), 2.28 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.4, 142.2, 138.2, 136.9, 134.7, 132.2, 131.0, 130.5, 129.3, 129.1, 127.4, 127.3, 126.8, 124.6, 124.2, 120.6, 116.5, 113.3, 21.4, 21.3. These assignment matched with those previously published.[2a,3]

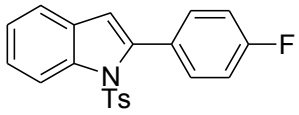


1-(Toluene-4-sulfonyl)-2-p-tolyl-1H-indole, (17). A yellow solid (104 mg, 87%), m.p. 108-109 °C (lit.,[2a,4] m.p. 108–110 °C); R_f = 0.32 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2921, 2859, 1646, 1597, 1505, 1449, 1373, 1187. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.29 (d, *J* = 8.3 Hz, 1H), 7.42-7.22 (m, 9H), 7.02 (d, *J* = 8.0 Hz, 2H), 6.50 (s, 1H), 2.43 (s, 3H), 2.27 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.4, 142.2, 138.5, 138.1, 134.6, 130.6, 130.1, 129.5, 129.1, 128.2, 126.7, 124.5, 124.2, 120.5, 116.6, 113.2, 21.48, 21.41. These assignment matched with those previously published.[2a,4]

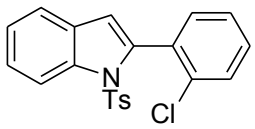


1-(Toluene-4-sulfonyl)-2-(4-trifluoromethyl-phenyl)-1H-indole, (18). A white solid (115 mg, 84%), m.p. 163-165 °C; R_f 0.30 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2925, 2860, 1617, 1598, 1450, 1375, 1323, 1173. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.31 (d, *J* = 8.4 Hz, 1H), 7.66 (dd, *J* = 19.8, 8.2 Hz, 4H), 7.46 (d, *J* = 7.7 Hz, 1H),

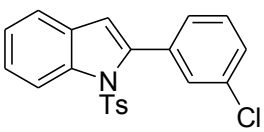
7.39 (t, *J* = 7.8 Hz, 1H), 7.30 -7.25 (m, 3H), 7.05 (d, *J* = 8.0 Hz, 2H), 6.61 (s, 1H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.8, 140.5, 138.5, 136.0, 134.3, 130.6, 130.4 (q, $J_{C\text{-}F}$ = 32.1 Hz, 1C), 130.3, 129.3, 126.7, 125.3 (q, $J_{C\text{-}F}$ = 270.3 Hz, 1C), 124.6, 124.5 (q, $J_{C\text{-}F}$ = 5 Hz, 1C), 122.7, 120.9, 116.7, 114.9, 21.5. ^{19}F-NMR (376.5 MHz, $CDCl_3$, decoupled) δ = -61.31 (s, 3F). These assignment matched with those previously published.[5]



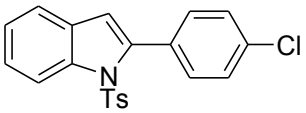
2-(4-Fluoro-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (19). A white solid (110 mg, 92%), m.p. 113-115 °C (lit.,[3] m.p. 112–115 °C); R_f = 0.5 (hexane/AcOEt: 5/1). IR (film) cm^{-1}: 3068, 2922, 1595, 1501, 1449, 1373, 1226, 1187. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.31 (d, *J* = 8.4 Hz, 1H), 7.45 (t, *J* = 7.2 Hz, 3H), 7.36 (t, *J* = 7.8 Hz, 1H), 7.26-7.24 (m, 3H), 7.11 (t, *J* = 8.6 Hz, 2H), 7.05 (d, *J* = 8.1 Hz, 2H), 6.52 (s, 1H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 163.3 (d, $J_{C\text{-}F}$ = 247.5 Hz, 1C), 144.6, 140.8, 138.2, 134.6, 132.3 (d, $J_{C\text{-}F}$ = 8.3 Hz, 1C), 130.3, 129.2, 128.4, 128.3, 126.7, 124.8, 120.6, 116.6, 114.8 (d, $J_{C\text{-}F}$ = 21.6 Hz, 1C), 113.5, 21.5. ^{19}F-NMR (376.5 MHz, $CDCl_3$, decoupled) δ = -112.58 (s, 1F). These assignment matched with those previously published.[3]



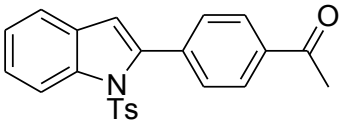
2-(2-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (20). A white solid (100 mg, 80%), m.p. 50-52 °C (lit.,[3] m.p. 48-52 °C); R_f = 0.37 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3064, 2922, 1596, 1446, 1373, 1187, 1176, 1088. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.27 (d, *J* = 8.3 Hz, 1H), 7.50-7.24 (m, 9H), 7.09 (d, *J* = 7.9 Hz, 2H), 6.62 (s, 1H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.6, 137.3, 137.1, 135.2, 135.0, 132.9, 131.5, 130.0, 129.7, 129.4, 129.3, 126.9, 125.7, 124.9, 123.9, 120.9, 115.6, 113.7, 21.5. These assignment matched with those previously published.[3]



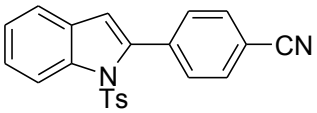
2-(3-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (21). A yellow solid (103 mg, 82%), m.p. 51-52 °C (lit.,[3] m.p. 47-50 °C); R_f = 0.28 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3065, 2922, 1597, 1448, 1373, 1187, 1176, 1090. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.30 (d, *J* = 8.4 Hz, 1H), 7.45-7.32 (m, 6H), 7.28-7.24 (m, 3H), 7.05 (d, *J* = 7.9 Hz, 2H), 6.55 (s, 1H), 2.28 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.7, 140.3, 138.3, 134.4, 134.0, 133.3, 130.2, 129.8, 129.2, 129.3, 128.7, 128.6, 126.7, 125.1, 124.4, 120.8, 116.5, 114.1, 21.4. These assignment matched with those previously published.[3]



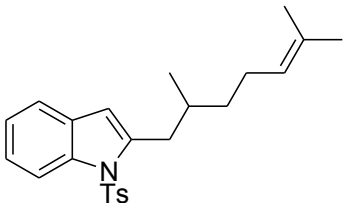
2-(4-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (22). A Yellow solid (105 mg, 83%), m.p. 127-128 °C; R_f = 0.47 (hexane/AcOEt: 5/1). IR (film) cm^{-1}: 2924, 1646, 1636, 1597, 1487, 1448, 1373, 1187. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.30 (d, *J* = 8.4 Hz, 1H), 7.44 -7.34 (m, 6H), 7.28-7.25 (m, 3H), 7.04 (d, *J* = 8.0 Hz, 2H), 6.53 (s, 1H), 2.28 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.6, 140.8, 138.3, 134.7, 134.4, 131.4, 130.8, 130.4, 129.2, 127.8, 126.7, 125.0, 124.4, 120.7, 116.6, 113.9, 21.5. HRMS: *m/z* calcd for $C_{21}H_{17}ClNO_2S$: 382.0669 $[M+H]^+$. Found: 382.0665.



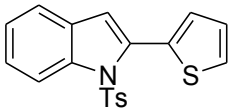
1-{4-[1-(Toluene-4-sulfonyl)-1H-indol-2-yl]-phenyl}-ethanone, (23). A white solid (45 mg, 35%), m.p. 192-193 °C; R_f = 0.1 (hexane/AcOEt: 1/1). IR (film) cm^{-1}: 3066, 1682, 1606, 1448, 1403, 1372, 1266, 1187. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.30 (d, *J* = 8.4 Hz, 1H), 8.02 (d, *J* = 8.1 Hz, 2H), 7.63 (d, *J* = 8.1 Hz, 2H), 7.45 (d, *J* = 7.7 Hz, 1H), 7.38 (t, *J* = 7.8 Hz, 1H), 7.26 (d, *J* = 8.4 Hz, 3H), 7.03 (d, *J* = 8.2 Hz, 2H), 6.62 (s, 1H), 2.66 (s, 3H), 2.27 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 197.6, 144.7, 140.9, 138.5, 137.0, 136.6, 134.0, 130.4, 130.2, 129.2, 127.5, 126.6, 125.3, 124.5, 120.9, 116.7, 115.0, 26.6, 21.4. HRMS: *m/z* calcd for $C_{23}H_{20}NO_3S$: 390.1164 $[M+H]^+$. Found: 390.1160



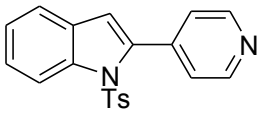
4-[1-(Toluene-4-sulfonyl)-1H-indol-2-yl]-benzonitrile, (24). A white solid (100 mg, 81%), m.p. 126-127 °C; R_f = 0.28 (hexane/AcOEt: 5/1). IR (film) cm^{-1}: 2955, 2923, 2853, 2227, 1607, 1448, 1373, 1175. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.29 (d, *J* = 8.4 Hz, 1H), 7.68 (dd, *J* = 29.8, 8.1 Hz, 4H), 7.46 (d, *J* = 7.9 Hz, 1H), 7.40 (t, *J* = 7.3 Hz, 1H), 7.31-7.23 (m, 3H), 7.05 (d, *J* = 8.1 Hz, 2H), 6.64 (s, 1H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.9, 140.0, 138.6, 137.0, 134.0, 131.3, 130.5, 130.3, 129.3, 126.6, 125.7, 124.7, 121.1, 118.7, 116.8, 115.6, 112.0, 21.5. HRMS: *m/z* calcd for $C_{22}H_{17}N_2O_2S$: 373.1011 $[M+H]^+$. Found: 373.1012.



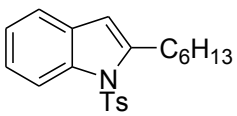
2-(2,6-Dimethyl-hept-5-enyl)-1-(toluene-4-sulfonyl)-1H-indole, (26). A yellow oil (111 mg, 85 %); R_f = 0.38 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3050, 2962, 2924, 2853, 1596, 1566, 1493, 1452, 1371. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.16 (d, *J* = 8.1 Hz, 1H), 7.58 (d, *J* = 8.1 Hz, 2H), 7.40 (d, *J* = 7.5 Hz, 1H), 7.24-7.15 (m, 4H), 6.36 (s, 1H), 5.10 (br t, 1H), 2.98 (dd, *J* = 15.2, 6.0 Hz, 1H), 2.76 (dd, *J* = 15.3, 7.8 Hz, 1H), 2.32 (s, 3H), 2.08-1.95 (m, 3H), 1.68 (s, 3H), 1.59 (s, 3H), 1.51-1.44 (m, 1H), 1.25-1.16 (m, 1H), 0.93 (d, *J* = 6.6 Hz, 3H). ^{13}C-NMR (100 MHz; CDCl3): *δ* = 144.5, 141.3, 137.3, 136.1, 131.2, 129.8, 129.6, 126.2, 124.6, 123.7, 123.4, 119.9, 115.0, 110.2, 36.9, 36.7, 32.6, 25.7, 25.5, 21.5, 19.5, 17.6. HRMS: *m/z* calcd for $C_{24}H_{30}NO_2S$: 396.1997 $[M+H]^+$. Found: 396.1991.



2-Thiophen-2-yl-1-(toluene-4-sulfonyl)-1H-indole, (27). A yellow oil (91 mg, 78%); R_f = 0.4 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3109, 3068, 2922, 2854, 1595, 1449, 1420, 1374, 1187, 1175. ^{1}H-NMR (400 MHz; $CDCl_3$): *δ* = 8.32 (d, *J* = 8.4 Hz, 1H), 7.45-7.24 (m, 7H), 7.11 (t, *J* = 4.3 Hz, 1H), 7.05 (d, *J* = 8.0 Hz, 2H), 6.63 (s, 1H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): *δ* = 144.6, 138.2, 134.8, 133.9, 132.3, 130.5, 129.8, 129.3, 127.0, 126.9, 126.7, 125.1, 124.2, 120.6, 116.4, 114.4, 21.5. HRMS: *m/z* calcd for $C_{19}H_{16}NO_2S_2$: 354.0622 $[M+H]^+$. Found: 354.0625.

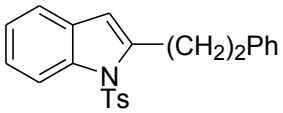


2-Pyridin-4-yl-1-(toluene-4-sulfonyl)-1H-indole, (28). A yellow solid (50 mg, 44%), m.p. 124-125 °C; R_f = 0.20 (hexane/AcOEt: 1/1). IR (film) cm^{-1}: 3054, 2925, 2853, 1637, 1604, 1375, 1265, 1187. ^{1}H-NMR (400 MHz; $CDCl_3$): *δ* = 8.68 (d, *J* = 3.5 Hz, 2H), 8.30 (d, *J* = 8.4 Hz, 1H), 7.48-7.39 (m, 4H), 7.30 – 7.26 (m, 3H), 7.05 (d, *J* = 8.0 Hz, 2H), 6.68 (s, 1H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): *δ* = 149.1, 144.9, 140.2, 139.2, 138.7, 134.0, 130.2, 129.3, 126.6, 125.7, 124.7, 124.3, 121.2, 116.7, 115.8, 21.5. HRMS: *m/z* calcd for $C_{20}H_{17}N_2O_2S$: 349.1011 $[M+H]^+$. Found: 349.1016

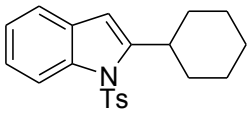


2-Hexyl-1-(toluene-4-sulfonyl)-1H-indole, (29). A white solid (97 mg, 83 %), m.p. 90-91 °C (lit.,[6] m.p. 89-90 °C); R_f = 0.53 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2954, 2928, 2857, 1596, 1453, 1369, 1174, 1145. ^{1}H-

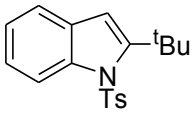
NMR (400 MHz; $CDCl_3$): δ = 8.16 (d, *J* = 8.2 Hz, 1H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.39 (d, *J* = 7.5 Hz, 1H), 7.25-7.16 (m, 2H), 7.14 (d, *J* = 8.0 Hz, 2H), 6.36 (s, 1H), 2.97 (t, *J* = 7.6 Hz, 2H), 2.29 (s, 3H), 1.73 (pent, *J* = 7.7 Hz, 2H), 1.42-1.31 (m, 6H), 0.89 (br t, *J* = 6.3 Hz, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.5, 142.5, 137.1, 136.2, 129.8, 129.6, 126.1, 123.6, 123.3, 119.9, 114.7, 108.5, 31.5, 29.0, 28.9, 28.7, 22.5, 21.4, 14.0. These assignment matched with those previously published.[6]



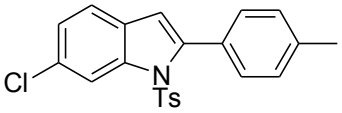
2-Phenethyl-1-(toluene-4-sulfonyl)-1H-indole, (30). A white solid (103 mg, 83 %), m.p. 120-122 °C; R_f = 0.38 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3066, 2955, 2923, 2853, 1607, 1448, 1373, 1175. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.18 (d, *J* = 8.3 Hz, 1H), 7.60 (d, *J* = 8.2 Hz, 2H), 7.39 (d, *J* = 7.6 Hz, 1H), 7.31-7.17 (m, 7H), 7.14 (d, *J* = 8.1 Hz, 2H), 6.38 (s, 1H), 3.30 (t, *J* = 8.0 Hz, 2H), 3.07 (t, *J* = 8.0 Hz, 2H), 2.30 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.6, 141.3, 141.1, 137.2, 136.0, 129.8, 129.7, 128.5, 128.4, 126.2, 126.1, 123.9, 123.5, 120.1, 114.8, 109.3, 35.5, 31.0, 21.4. HRMS: *m/z* calcd for $C_{23}H_{22}NO_2S$: 376.1371 $[M+H]^+$. Found 376.1369.



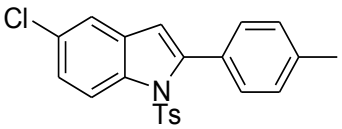
2-Cyclohexyl-1-(toluene-4-sulfonyl)-1H-indole, (31). A yellow solid (93 mg, 80 %), m.p. 158-160 °C; R_f = 0.43 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2928, 2853, 1637, 1598, 1451, 1366, 1174, 1090. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.16 (d, *J* = 8.2 Hz, 1H), 7.54 (d, *J* = 8.0 Hz, 2H), 7.38 (d, *J* = 7.5 Hz, 1H), 7.24-7.17 (m, 2H), 7.13 (d, *J* = 8.0 Hz, 2H), 6.39 (s, 1H), 3.31 (t, *J* = 11.3 Hz, 1H), 2.29 (s, 3H), 2.09 (d, *J* = 12.1 Hz, 2H), 1.84-1.75 (m, 3H), 1.51-1.22 (m, 5H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 148.5, 144.4, 137.2, 136.1, 130.1, 129.6, 126.0, 123.7, 123.4, 120.1, 115.2, 107.2, 37.3, 34.4, 26.6, 26.2, 21.4. HRMS: *m/z* calcd for $C_{21}H_{24}NO_2S$: 354.1528 $[M+H]^+$. Found: 354.1532.



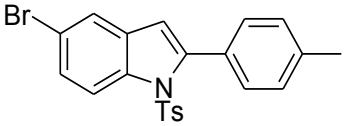
2-tert-Butyl-1-(toluene-4-sulfonyl)-1H-indole, (32). A yellow oil (77 mg, 71 %). R_f = 0.5 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2965, 2920, 2870, 1597, 1452, 1370, 1357, 1189. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.02 (d, *J* = 8.4 Hz, 1H), 7.43-7.37 (m, 3H), 7.17-7.15 (m, 2H), 7.09 (d, *J* = 8.0 Hz, 2H), 6.60 (s, 1H), 2.27 (s, 3H), 1.58 (s, 9H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 152.7, 143.9, 138.9, 136.8, 129.4, 129.2, 125.9, 124.1, 123.5, 120.2, 116.0, 110.7, 34.9, 31.3, 21.4. These assignment matched with those previously published.[7]



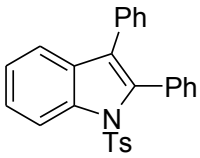
6-Chloro-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole,(33). A white solid (101 mg, 77 %), m.p. 171-173 °C; R_f = 0.53 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2922, 2854, 1637, 1597, 1503, 1455, 1375, 1177. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.33 (s, 1H), 7.28 (m, 8H), 7.06 (d, *J* = 8.0 Hz, 2H), 6.45 (s, 1H), 2.43 (s, 3H), 2.30 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.7, 142.8, 138.8, 138.5, 134.5, 130.4, 130.2, 129.3 (2C), 128.9, 128.2, 126.8, 124.8, 121.2, 116.6, 112.5, 21.5, 21.4. HRMS: *m/z* calcd for $C_{22}H_{19}ClNO_2S$: 396.0825 $[M+H]^+$. Found: 396.0820.



5-Chloro-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole, (34). A white solid (103 mg, 79 %), m.p. 148-150 °C; R_f = 0.39 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2922, 2855, 1597, 1506, 1444, 1375, 1188, 1176. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.22 (d, *J* = 8.9 Hz, 1H), 7.38 (d, *J* = 8.8 Hz, 3H), 7.30-7.23 (m, 5H), 7.05 (d, *J* = 8.0 Hz, 2H), 6.44 (s, 1H), 2.44 (s, 3H), 2.30 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.7, 143.7, 139.0, 136.5, 134.4, 131.8, 130.2, 129.9, 129.2, 128.9, 128.3, 126.7, 124.6, 120.1, 117.6, 112.2, 21.5, 21.4. HRMS: *m/z* calcd for $C_{22}H_{19}ClNO_2S$: 396.0825 $[M+H]^+$. Found: 396.0822

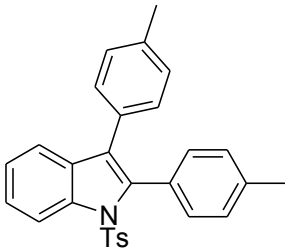


5-Bromo-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole, (35). A white solid (121 mg, 83%), m.p. 61-63 °C, R_f = 0.56 (hexane/AcOEt: 5/1). IR (film) cm^{-1}: 2920, 1646, 1636, 1595, 1443, 1188, 1176, 1090. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.16 (d, *J* = 8.9 Hz, 1H), 7.55 (s, 1H), 7.42 (d, *J* = 8.9 Hz, 1H), 7.37 (d, *J* = 7.7 Hz, 2H), 7.24 (t, *J* = 6.6 Hz, 4H), 7.05 (d, *J* = 8.0 Hz, 2H), 6.43 (s, 1H), 2.44 (s, 3H), 2.30 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.7, 143.6, 139.0, 136.8, 134.4, 132.3, 130.2, 129.2, 128.9, 128.3, 127.3, 126.7, 123.2, 118.0, 117.7, 112.1, 21.5, 21.4. HRMS: *m/z* calcd for $C_{22}H_{19}BrNO_2S$: 440.0320 $[M+H]^+$. Found: 440.0324

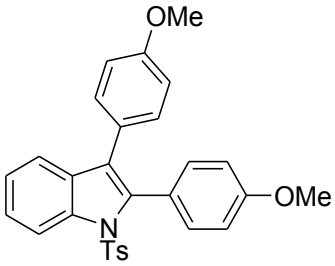


2,3-Diphenyl-1-(toluene-4-sulfonyl)-1H-indole, (52). A white solid (108 mg, 77 %), m.p. 172-174 °C (lit.,[2b,8] m.p. 173-174 °C); R_f = 0.38 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3063, 3030, 1596, 1493, 1448, 1380, 1187, 1176. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.41 (d, *J* = 8.4 Hz, 1H), 7.48 (d, *J* = 7.8 Hz, 1H), 7.41 (t, *J* = 7.8 Hz, 1H), 7.33 (d, *J* = 8.1 Hz, 3H), 7.30-7.18 (m, 8H), 7.07 (t, *J* = 7.7 Hz, 4H), 2.30 (s, 3H). ^{13}C-NMR (100 MHz, $CDCl_3$): δ

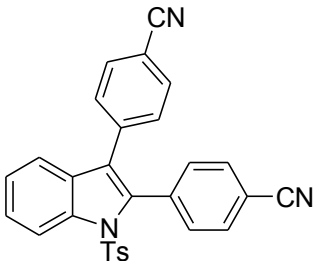
= 144.5, 137.2, 136.8, 135.3, 132.6, 132.0, 130.8, 130.4, 129.8, 129.2, 128.4, 128.1, 127.2, 126.9, 126.8, 125.1, 124.7, 124.1, 119.9, 116.2, 21.5. These assignment matched with those previously published.[2b,8]



1-(Toluene-4-sulfonyl)-2,3-di-p-tolyl-1H-indole, (53). A yellow solid (107 mg, 72 %), m.p. 160-164 °C; R_f = 0.48 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 3026, 2921, 2854, 1518, 1506, 1448, 1378, 1176. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.38 (d, *J* = 8.4 Hz, 1H), 7.46 (d, *J* = 7.8 Hz, 1H), 7.40-7.33 (m, 3H), 7.28-7.24 (m, 1H), 7.15-6.97 (m, 10H), 2.38 (s, 3H), 2.31 (s, 3H), 2.29 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 144.4, 138.2, 137.2, 136.8, 136.4, 135.3, 131.8, 130.7, 129.7 (2C), 129.6, 129.2, 128.9, 128.0, 126.9, 124.9, 124.5, 124.0, 119.9, 116.2, 21.5, 21.4, 21.1. HRMS: *m/z* calcd for $C_{29}H_{26}NO_2S$: 452.1684 $[M+H]^+$. Found: 452.1682.



2,3-Bis-(4-methoxy-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (54). A yellow solid (70 mg, 44 %), m.p. 184-186 °C; R_f = 0.14 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2924, 2837, 1612, 1597, 1517, 1502, 1449, 1377. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.39 (d, *J* = 8.4 Hz, 1H), 7.46 (d, *J* = 7.8 Hz, 1H), 7.39 (t, *J* = 7.8 Hz, 1H), 7.33-7.27 (m, 3H), 7.15 (d, *J* = 8.4 Hz, 2H), 7.04 (dd, *J* = 20.2, 8.2 Hz, 4H), 6.79 (dd, *J* = 14.9, 8.4 Hz, 4H), 3.84 (s, 3H), 3.76 (s, 3H), 2.31 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$) δ = 159.6, 158.3, 144.4, 137.1, 136.4, 135.4, 133.3, 130.9 (2C), 130.7, 129.2, 126.9, 125.0, 124.8, 124.0, 123.1, 119.8, 116.2, 113.6, 112.7, 55.16, 55.13, 21.5. HRMS: *m/z* calcd for $C_{29}H_{26}NO_4S$: 484.1583 $[M+H]^+$. Found: 484.1585.



2,3-Bis-(4-cyano-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (55). A white solid (91 mg, 58 %), m.p. 269-271 °C; R_f = 0.16 (hexane/AcOEt: 8/1). IR (film) cm^{-1}: 2923, 2854, 2228, 1636, 1610, 1380, 1188, 1176. ^{1}H-NMR (400 MHz; $CDCl_3$): δ = 8.41 (d, *J* = 8.4 Hz, 1H), 7.58 (dd, *J* = 23.1, 8.0 Hz, 4H), 7.49 (t, *J* = 7.8 Hz, 1H), 7.43 (d, *J* = 7.8 Hz, 1H), 7.34 (dd, *J* = 18.1, 8.0 Hz, 5H), 7.14 (dd, *J* = 14.3, 8.1 Hz, 4H), 2.34 (s, 3H). ^{13}C-NMR (100 MHz; $CDCl_3$): δ = 145.3, 137.3, 137.0, 135.3, 135.1, 134.7, 132.4, 132.3, 131.2, 130.3, 129.6, 129.2, 126.7, 126.3, 124.9, 124.2, 119.7, 118.39, 118.32, 116.3, 112.7, 111.2, 21.6. HRMS: *m/z* calcd for $C_{29}H_{20}N_3O_2S$: 474.1276 $[M+H]^+$. Found: 474.1281.

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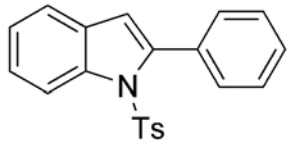
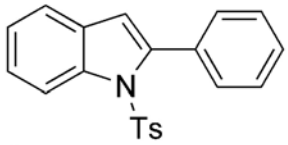


2-Phenyl-1-(toluene-4-sulfonyl)-1*H*-indole (9)

144.49
142.12
138.26
134.66
132.41
130.53
130.32
129.18
128.63
127.48
126.78
124.76
124.28
120.66
116.65
113.59
77.32
77.00
76.68
21.50



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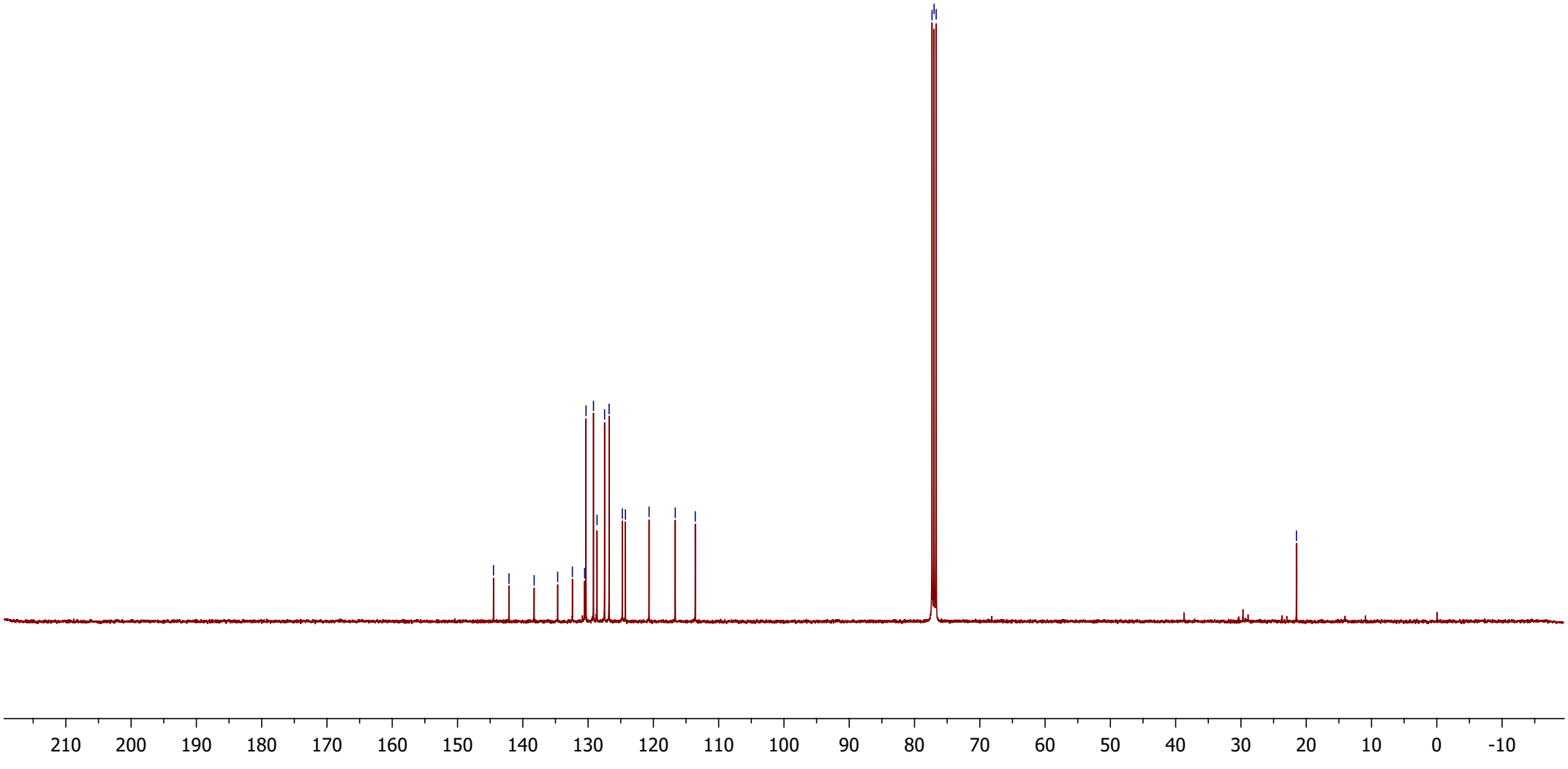
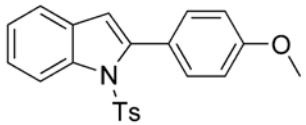
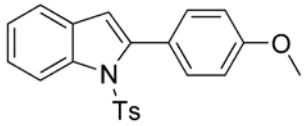
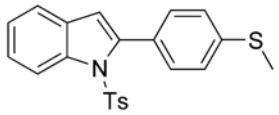




2-(4-Methoxy-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (12)



2-(4-Methoxy-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (12)



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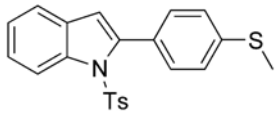

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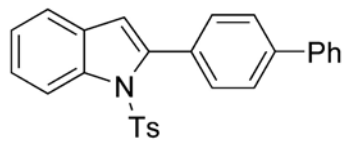
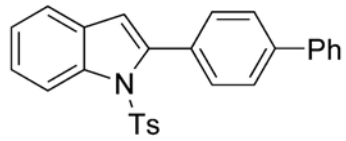
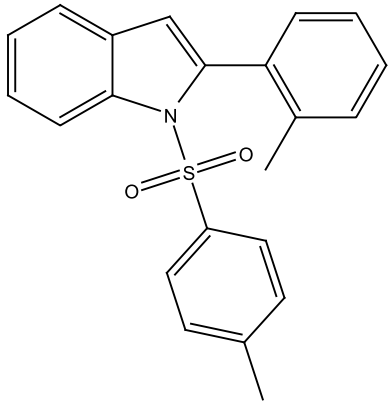


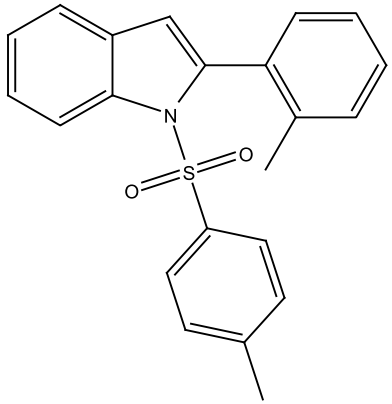
2-Biphenyl-4-yl-1-(toluene-4-sulfonyl)-1*H*-indole (14)



2-Biphenyl-4-yl-1-(toluene-4-sulfonyl)-1*H*-indole (14)



1-(Toluene-4-sulfonyl)-2-o-tolyl-1H-indole, (15)



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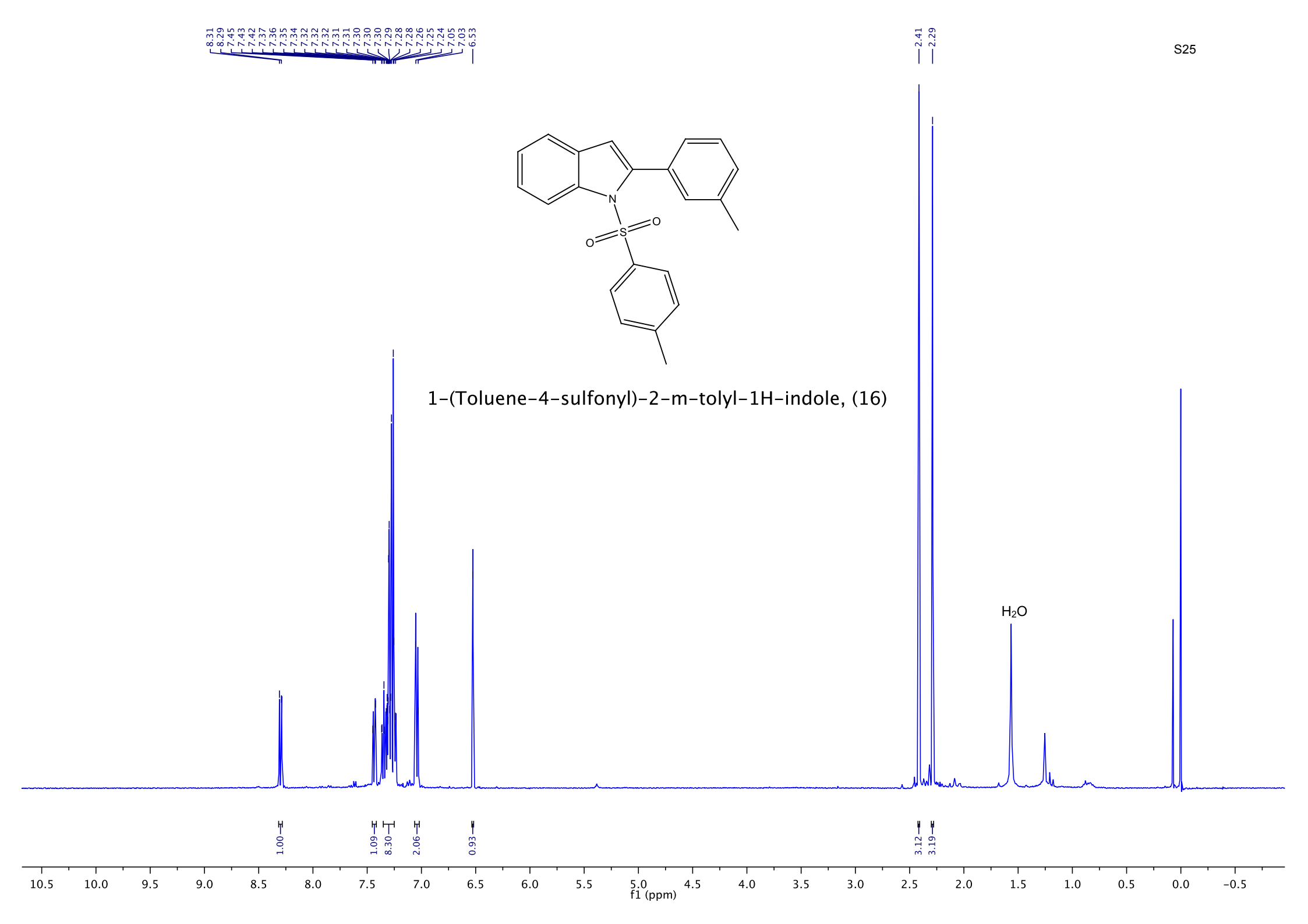
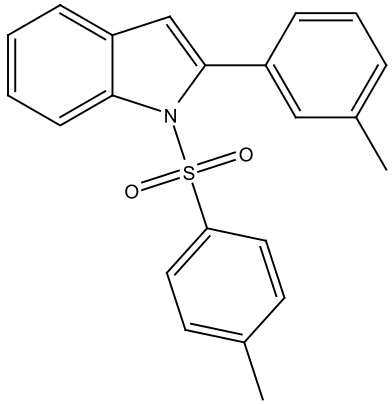
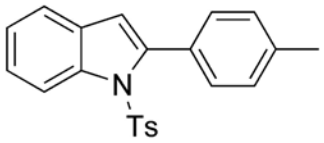
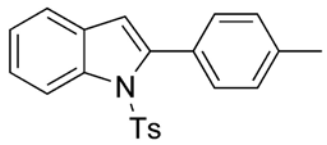

8.31
8.29
7.45
7.43
7.42
7.37
7.36
7.35
7.34
7.32
7.32
7.32
7.31
7.31
7.30
7.30
7.30
7.29
7.28
7.28
7.26
7.25
7.24
7.05
7.03
6.53
2.41
2.29
N
S
O
O
1-(Toluene-4-sulfonyl)-2-m-tolyl-1H-indole, (16)
H2O
1.00
1.09
8.30
2.06
0.93
3.12
3.19
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)



1-(Toluene-4-sulfonyl)-2-m-tolyl-1H-indole, (16)



1-(Toluene-4-sulfonyl)-2-*p*-tolyl-1*H*-indole (17)



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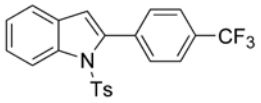
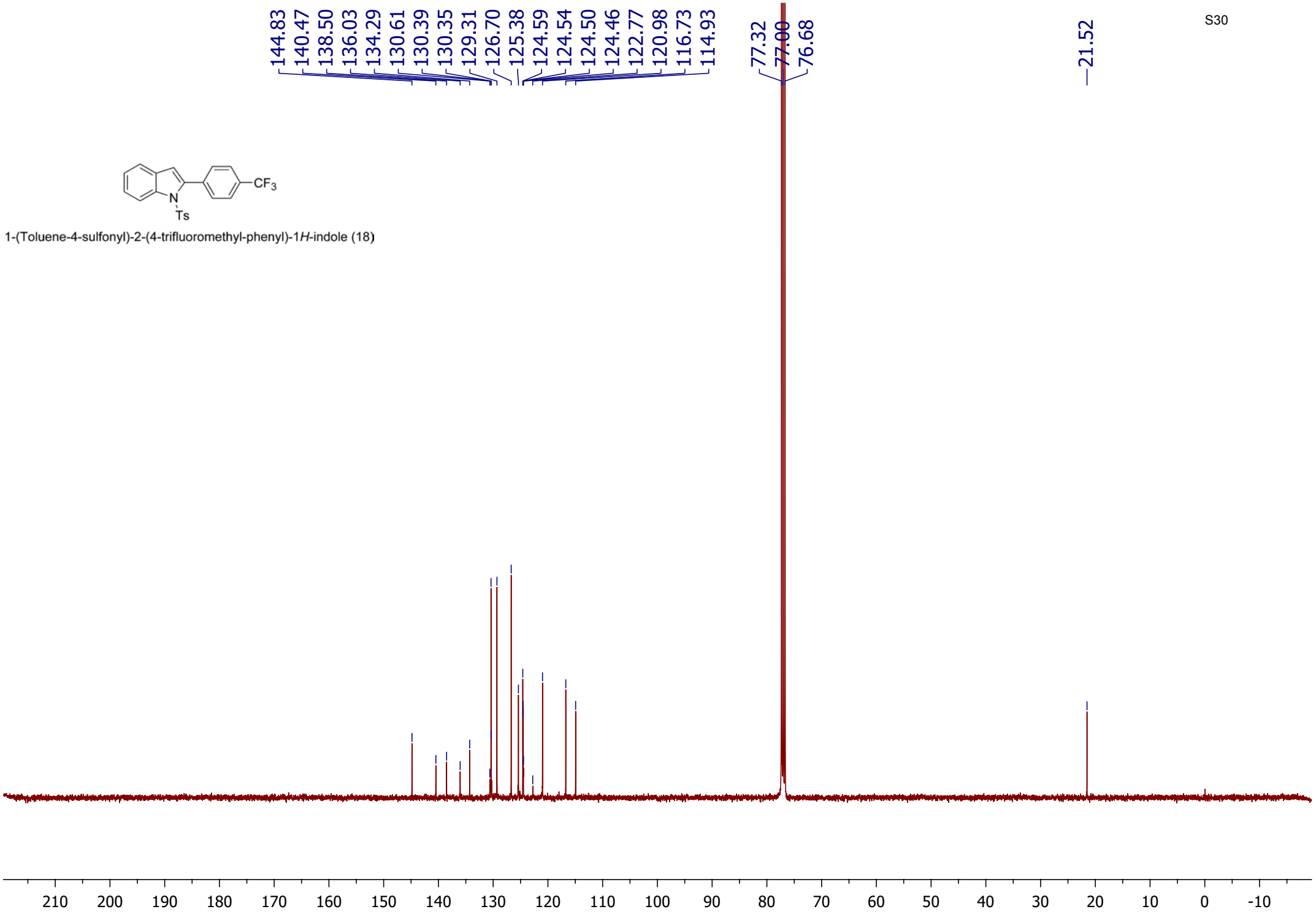
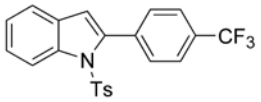


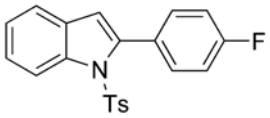
1-(Toluene-4-sulfonyl)-2-(4-trifluoromethyl-phenyl)-1*H*-indole (18)



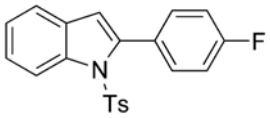
1-(Toluene-4-sulfonyl)-2-(4-trifluoromethyl-phenyl)-1*H*-indole (18)



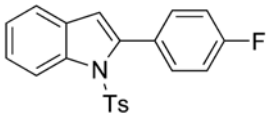
1-(Toluene-4-sulfonyl)-2-(4-trifluoromethyl-phenyl)-1*H*-indole (18)



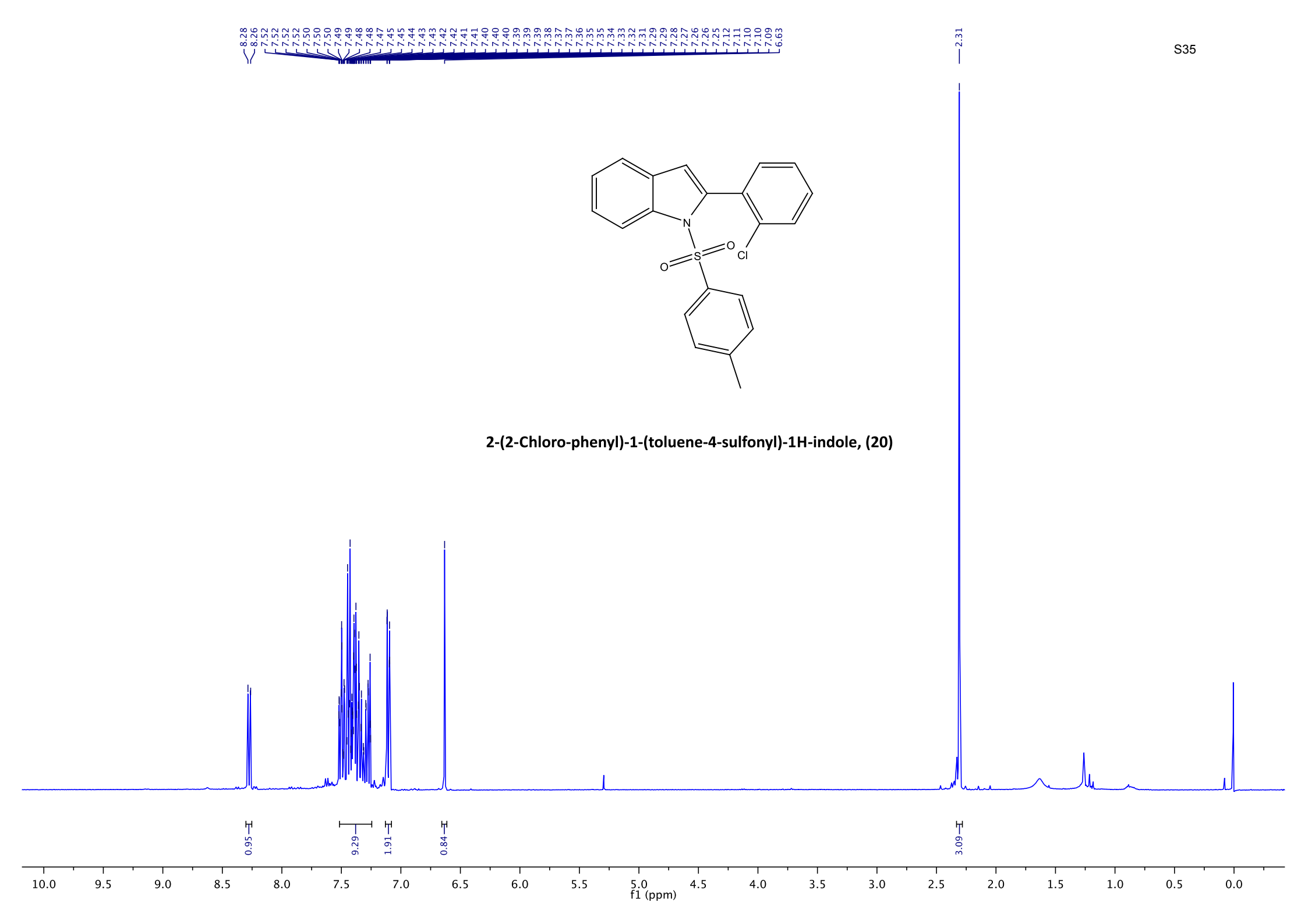
2-(4-Fluoro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (19)



2-(4-Fluoro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (19)

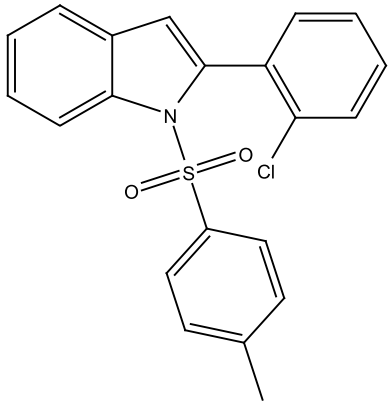


2-(4-Fluoro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (19)

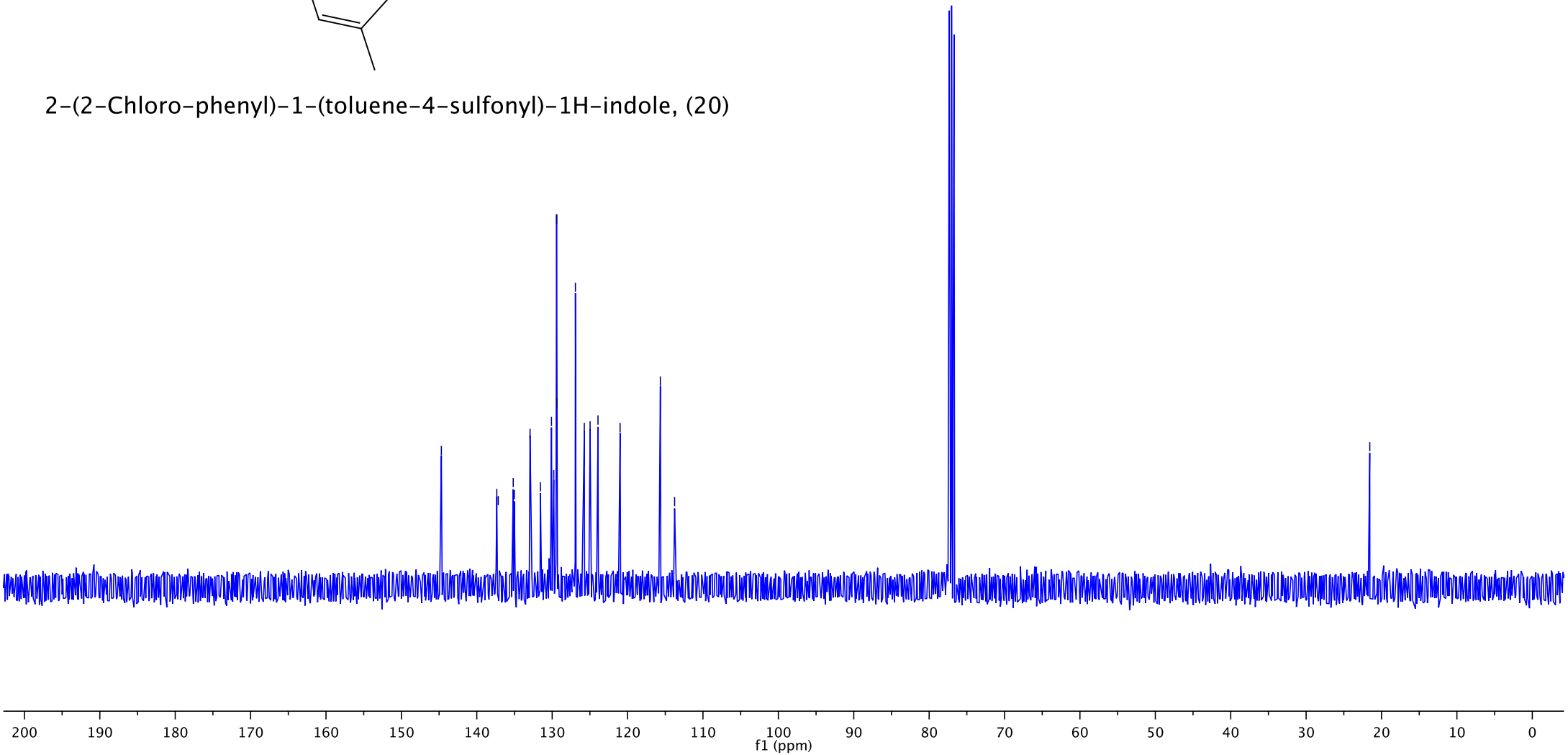


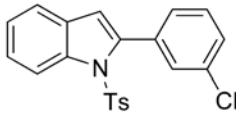
2-(2-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (20)

144.70
137.35
137.15
135.17
135.03
132.94
131.56
130.09
129.79
129.42
129.38
126.92
125.74
124.97
123.92
120.99
115.65
113.76
21.56

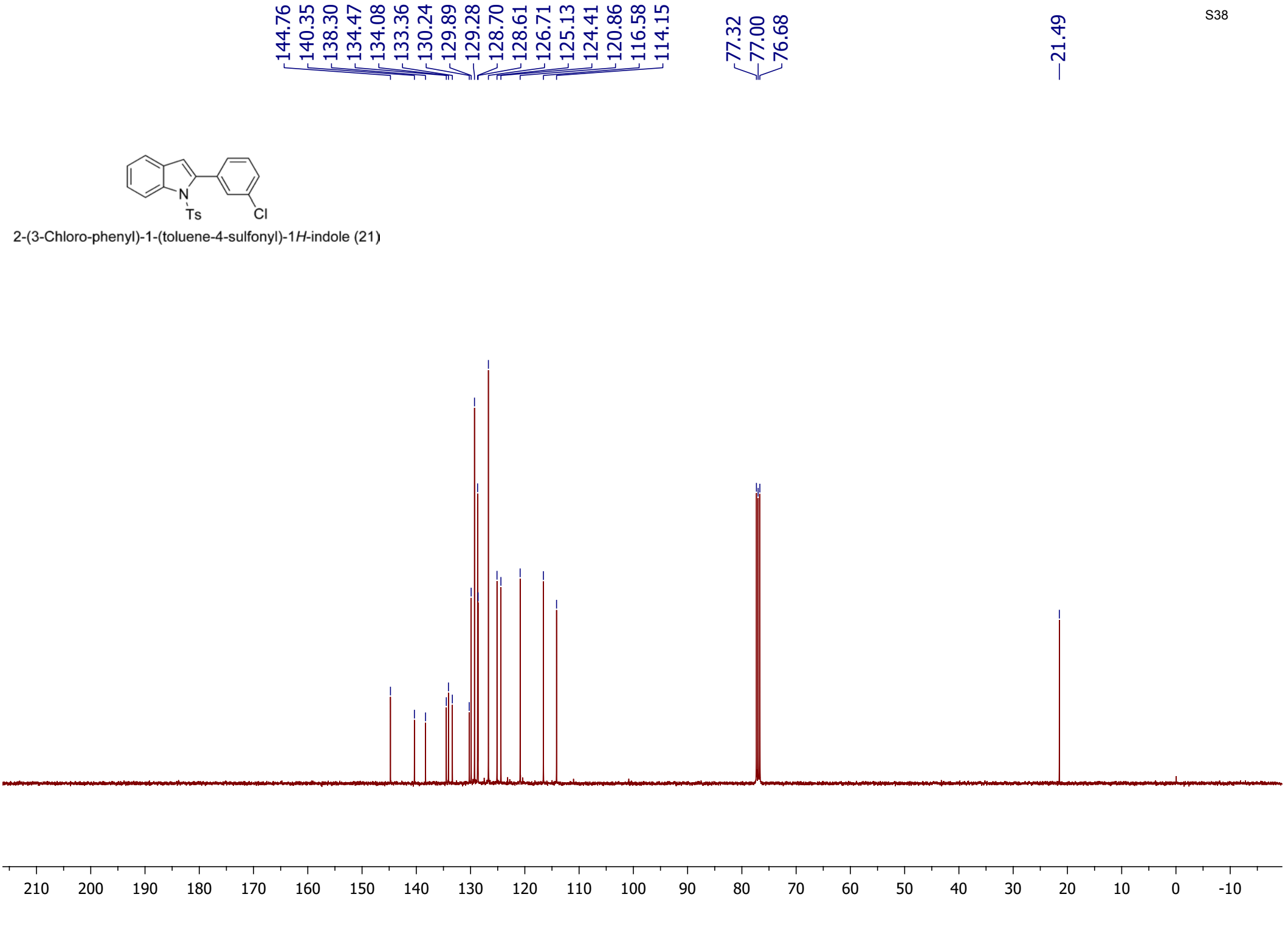


2-(2-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1H-indole, (20)

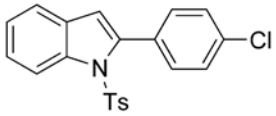




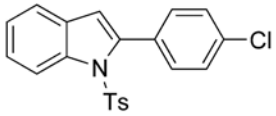
2-(3-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (21)



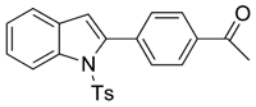
2-(3-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (21)



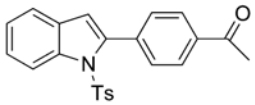
2-(4-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (22)



2-(4-Chloro-phenyl)-1-(toluene-4-sulfonyl)-1*H*-indole (22)



1-{4-[1-(Toluene-4-sulfonyl)-1*H*-indol-2-yl]-phenyl}-ethanone (23)



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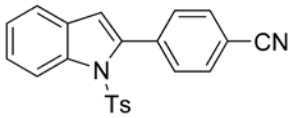
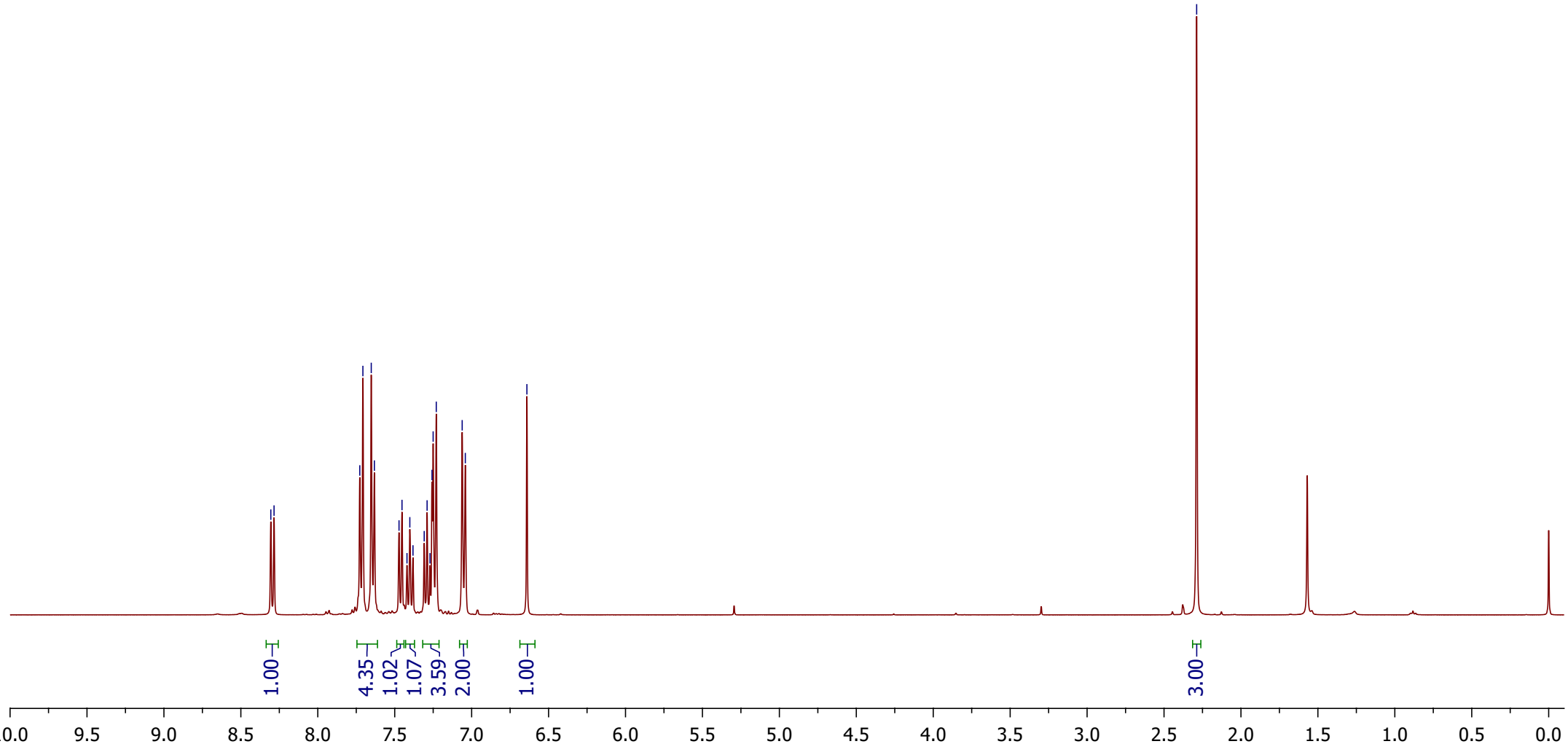
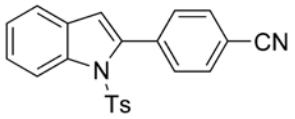
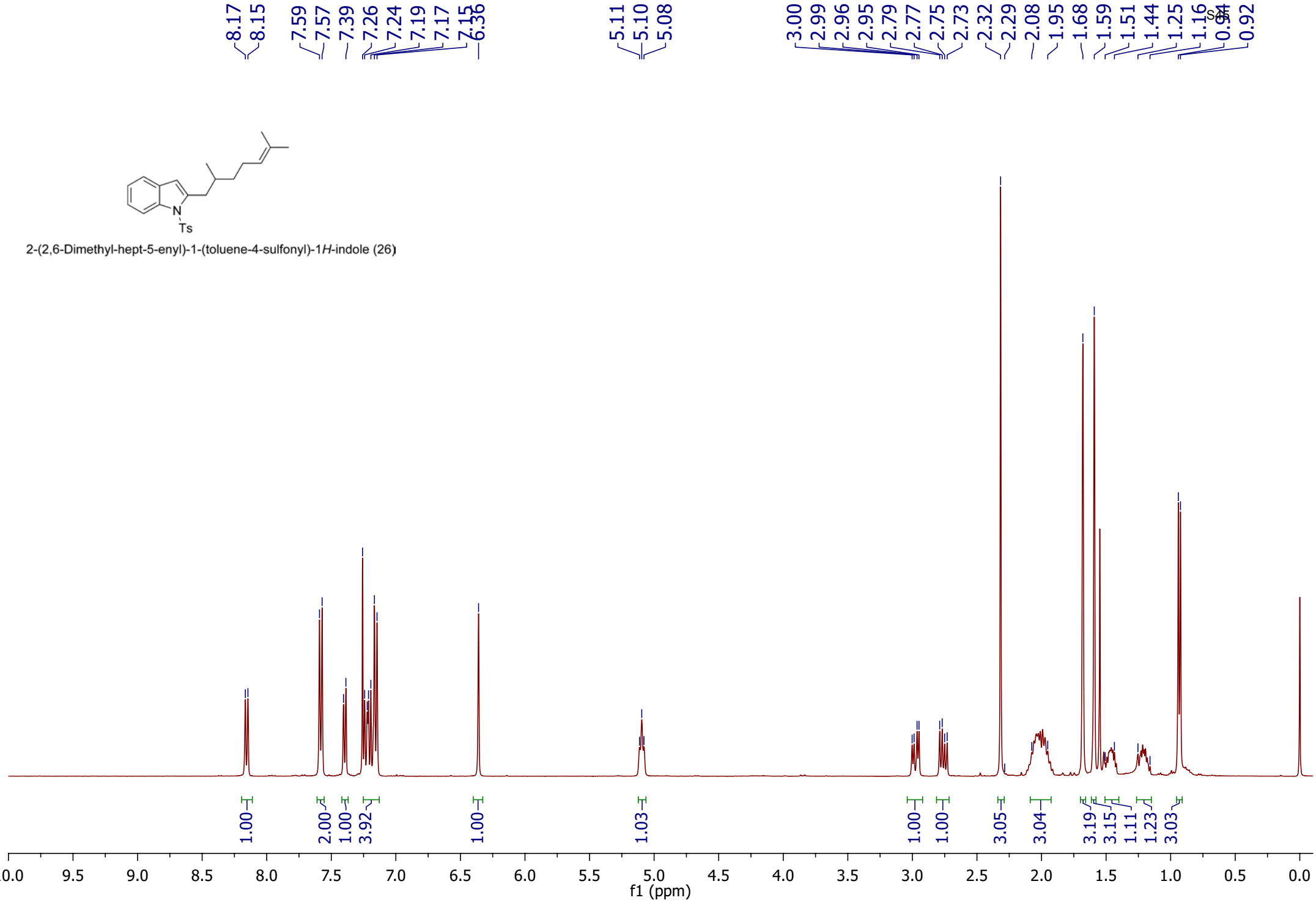


4-[1-(Toluene-4-sulfonyl)-1*H*-indol-2-yl]-benzonitrile (24)

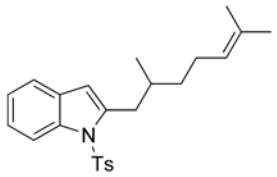




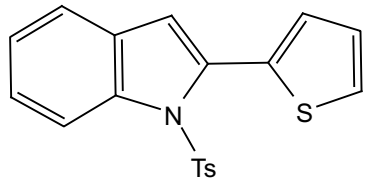
4-[1-(Toluene-4-sulfonyl)-1*H*-indol-2-yl]-benzonitrile (24)



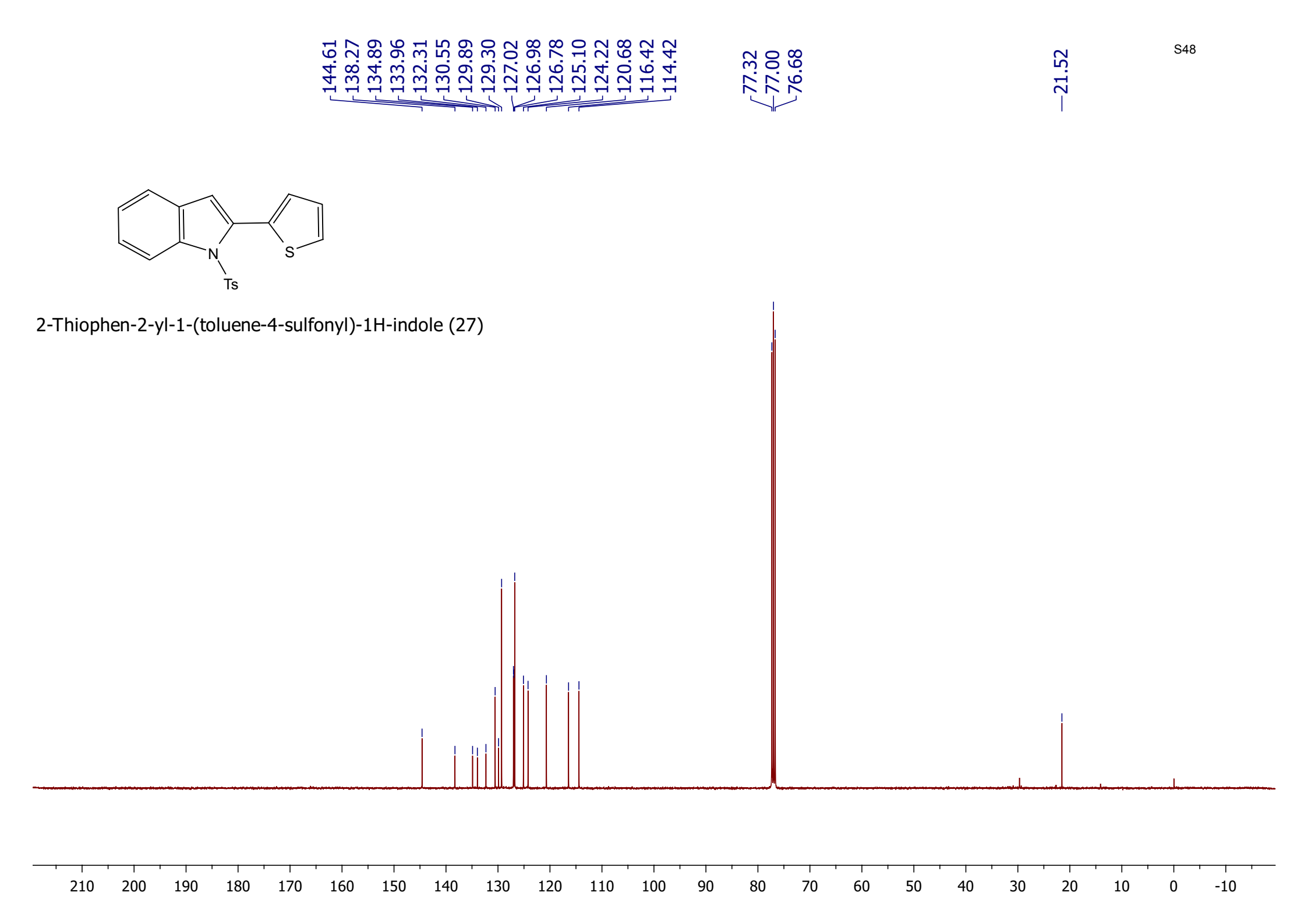
2-(2,6-Dimethyl-hept-5-enyl)-1-(toluene-4-sulfonyl)-1*H*-indole (26)

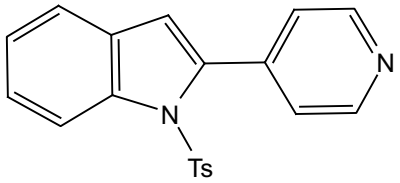


2-(2,6-Dimethyl-hept-5-enyl)-1-(toluene-4-sulfonyl)-1*H*-indole (26)

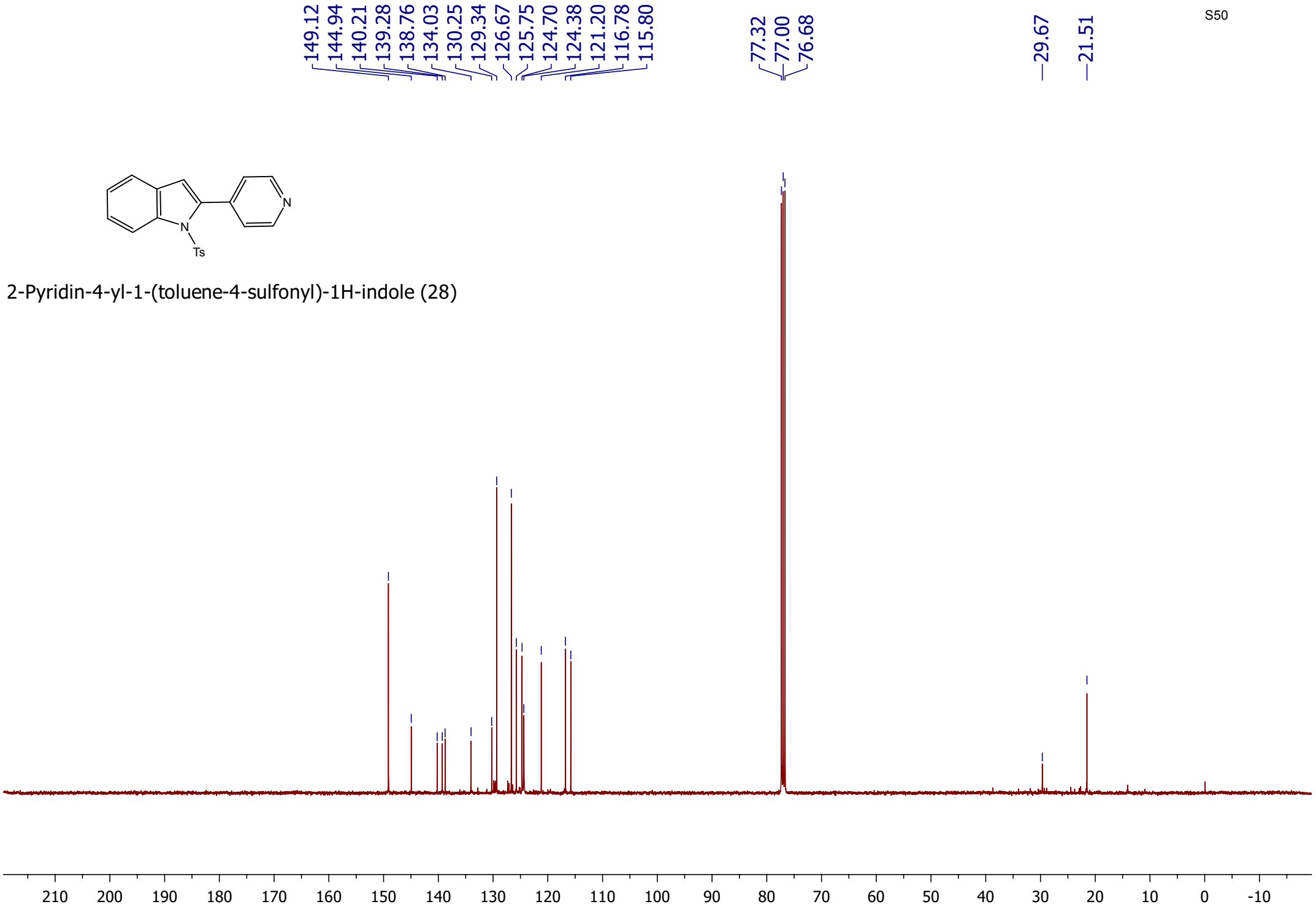


2-Thiophen-2-yl-1-(toluene-4-sulfonyl)-1H-indole (27)

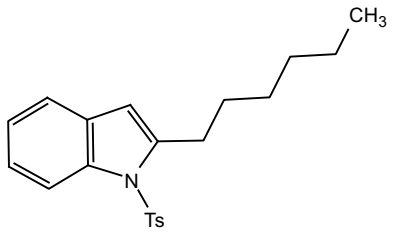

144.61
138.27
134.89
133.96
132.31
130.55
129.89
129.30
127.02
126.98
126.78
125.10
124.22
120.68
116.42
114.42
77.32
77.00
76.68
21.52
N
S
Ts
2-Thiophen-2-yl-1-(toluene-4-sulfonyl)-1H-indole (27)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10



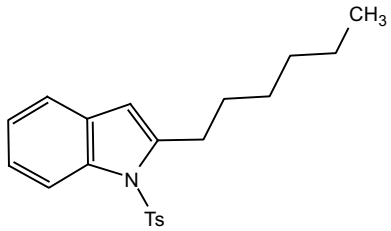
2-Pyridin-4-yl-1-(toluene-4-sulfonyl)-1H-indole (28)



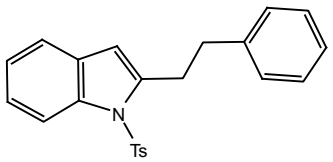
2-Pyridin-4-yl-1-(toluene-4-sulfonyl)-1H-indole (28)



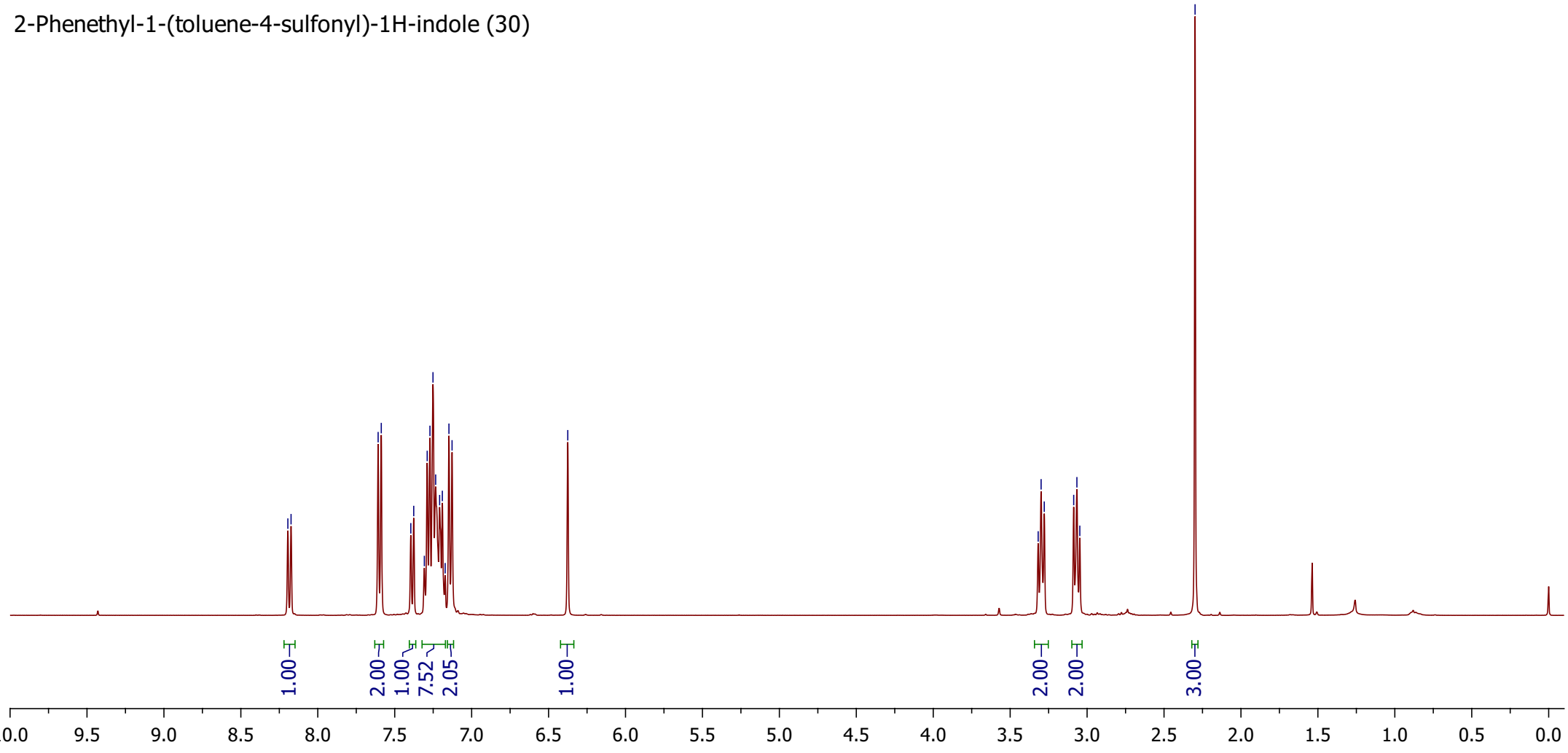
2-Hexyl-1-(toluene-4-sulfonyl)-1H-indole (29)

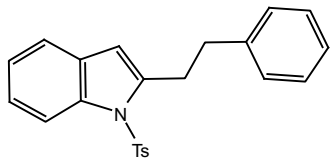


2-Hexyl-1-(toluene-4-sulfonyl)-1H-indole (29)

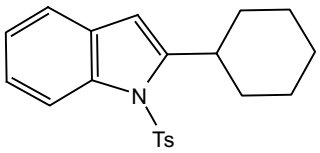


2-Phenethyl-1-(toluene-4-sulfonyl)-1H-indole (30)



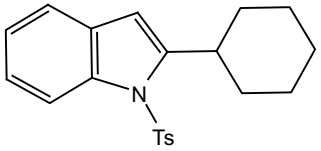


2-Phenethyl-1-(toluene-4-sulfonyl)-1H-indole (30)

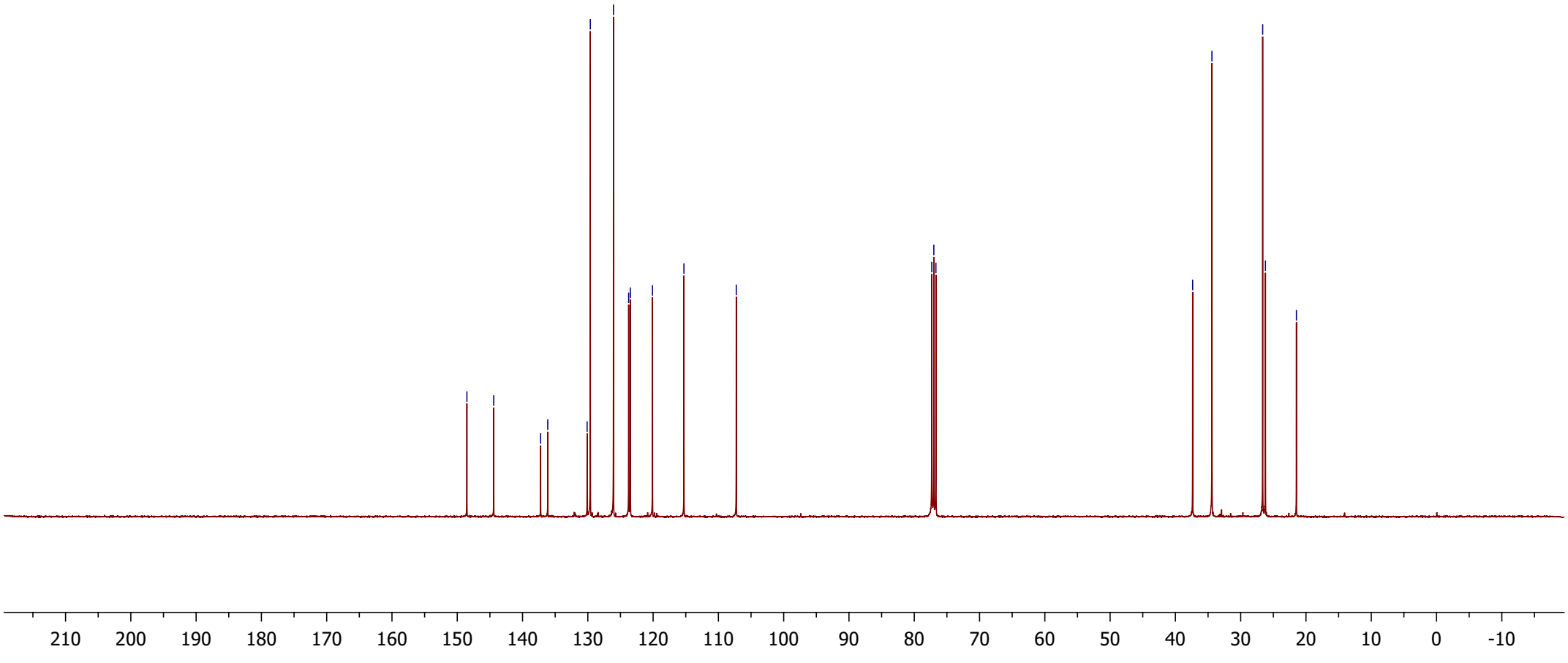


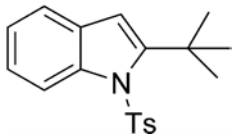
2-Cyclohexyl-1-(toluene-4-sulfonyl)-1H-indole (31)

148.52
144.42
137.23
136.14
130.11
129.62
126.07
123.74
123.49
120.10
115.28
107.26
77.32
77.00
76.68
37.36
34.40
26.63
26.21
21.46



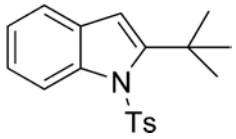
2-Cyclohexyl-1-(toluene-4-sulfonyl)-1H-indole (31)



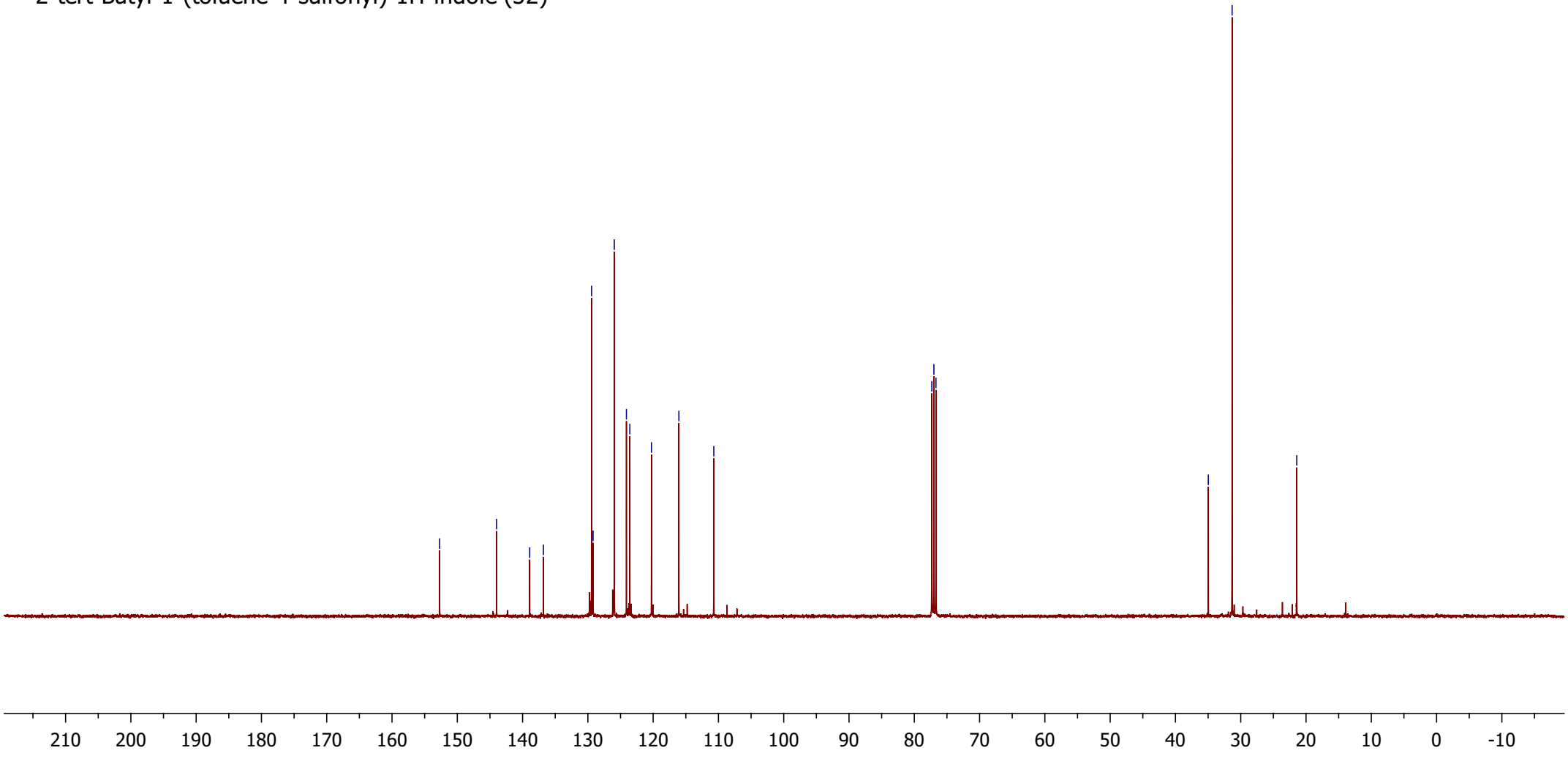


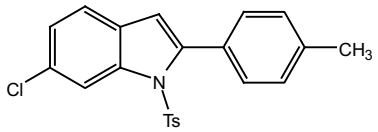
2-tert-Butyl-1-(toluene-4-sulfonyl)-1H-indole (32)

152.71
143.99
138.91
136.81
129.43
129.20
125.95
124.10
123.57
120.26
116.06
110.71
77.32
77.00
76.68
34.96
31.32
21.42

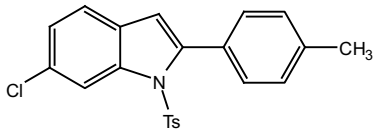


2-tert-Butyl-1-(toluene-4-sulfonyl)-1H-indole (32)

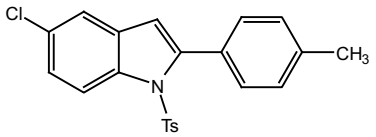




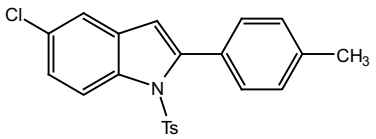
6-Chloro-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole (33)



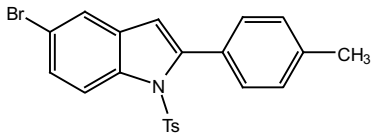
6-Chloro-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole (33)



5-Chloro-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole (34)

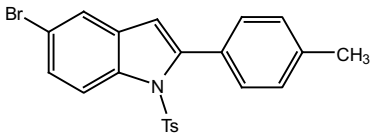


5-Chloro-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole (34)

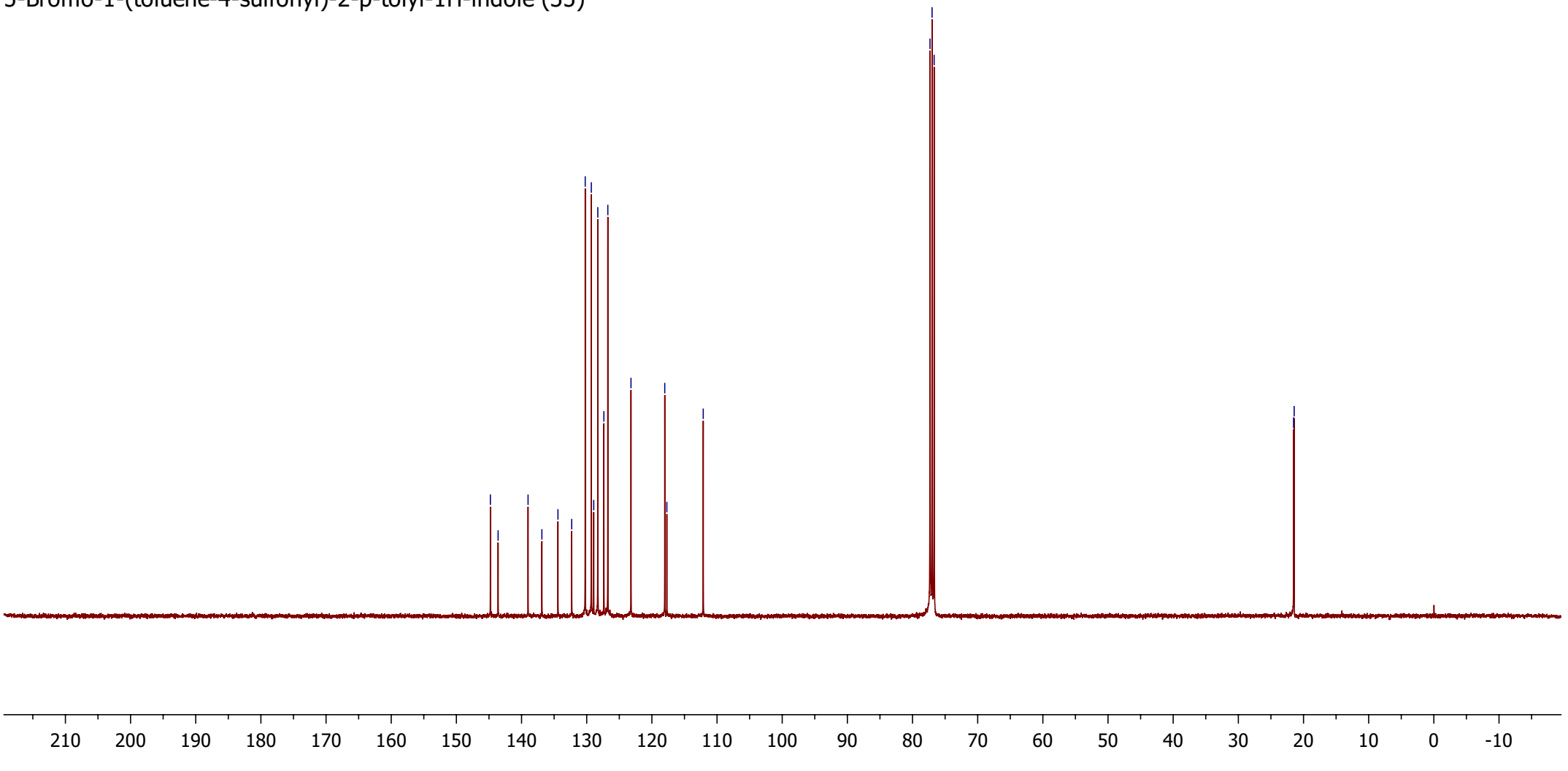


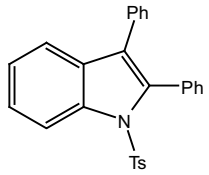
5-Bromo-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole (35)

144.78
143.60
139.00
136.88
134.41
132.30
130.23
129.29
128.92
128.30
127.37
126.76
123.21
118.02
117.70
112.12
77.32
77.00
76.68
21.53
21.43



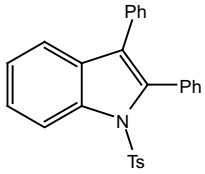
5-Bromo-1-(toluene-4-sulfonyl)-2-p-tolyl-1H-indole (35)



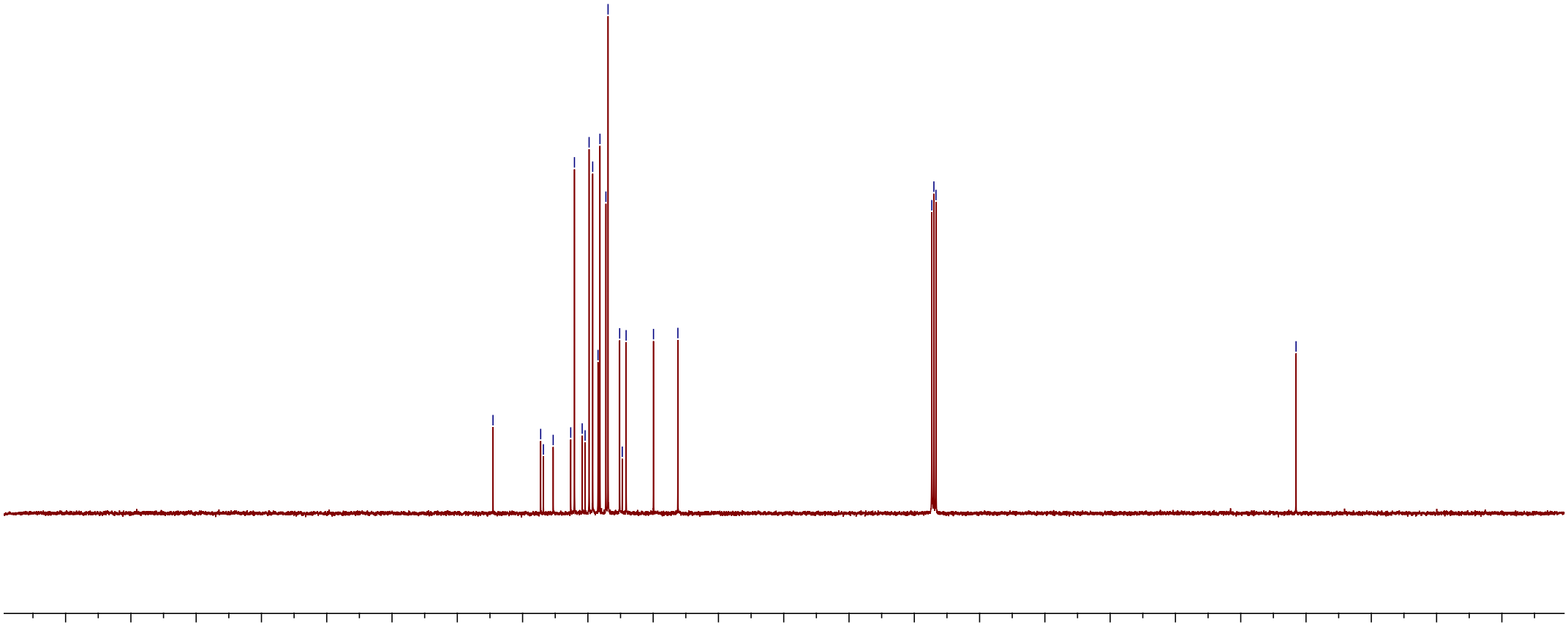


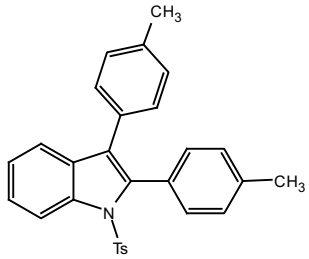
2,3-Diphenyl-1-(toluene-4-sulfonyl)-1H-indole (52)

144.53
137.23
136.81
135.32
132.63
132.06
130.87
130.42
129.81
129.26
128.45
128.15
127.24
126.91
125.13
124.73
124.14
119.95
116.21
77.32
77.00
76.68
21.53

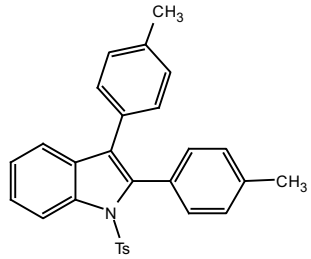


2,3-Diphenyl-1-(toluene-4-sulfonyl)-1H-indole (52)

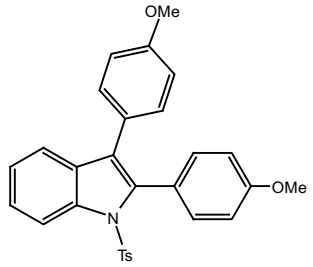




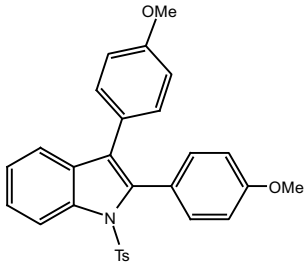
1-(Toluene-4-sulfonyl)-2,3-di-p-tolyl-1H-indole (53)



1-(Toluene-4-sulfonyl)-2,3-di-p-tolyl-1H-indole (53)

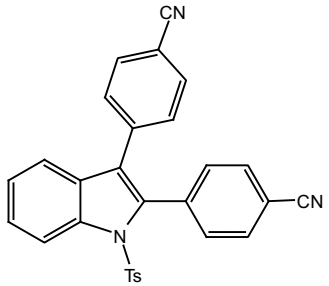


2,3-Bis-(4-methoxy-phenyl)-1-(toluene-4-sulfonyl)-1H-indole (54)

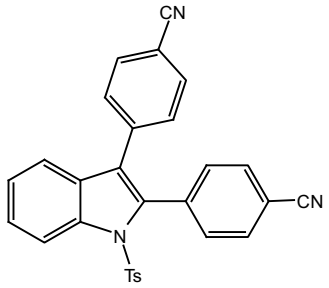


159.61
158.38
144.40
137.19
135.43
133.35
130.90
130.71
129.22
126.91
125.02
124.89
124.04
123.19
119.82
116.27
113.69
112.78
77.32
77.00
76.68
55.16
55.13
21.54

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10



2,3-Bis-(4-cyano-phenyl)-1-(toluene-4-sulfonyl)-1H-indole (55)



2,3-Bis-(4-cyano-phenyl)-1-(toluene-4-sulfonyl)-1H-indole (55)