Supporting information

Tandem 1,2-Sulfur Migration and (Aza)-Diels-Alder Reaction of β-Thio-α-Diazoimines: Rhodium Catalyzed Synthesis of (Fused)-Polyhydropyridines, and Cyclohexenes

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1. General Comments:

All reactions were carried out under an atmosphere of dry nitrogen using reaction tubes. Dry 1,2-DCE was prepared by distilling over CaH_2 and stored over using molecular sieves 4Å under N_2 atmosphere. $[Rh_2(OAc)_4]$, $[Rh_2(Oct)_4]$, $[Rh_2(DOSP)_4]$ and $[Rh_2(TBSP)_4]$ were obtained from Aldrich and they were used as received.

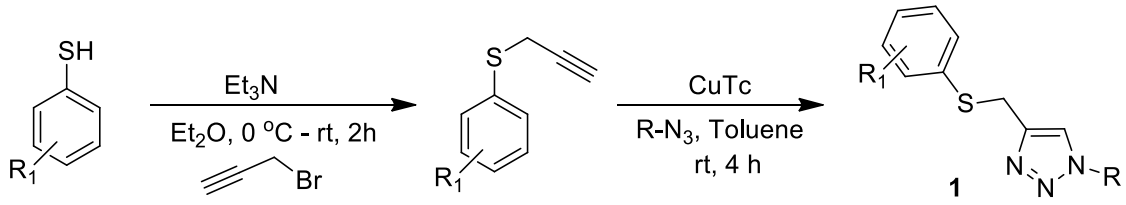
Column chromatography was performed using Rankem Silicagel (100-200 mesh) and the solvent system used unless otherwise specified, was ethyl acetate-hexanes with various percentage of polarity depending on the nature of the substrate.

It is important to note that purity of both triazoles and dienophiles significantly affect the reactions.

2. Analytical Methods:

NMR data were recorded on 400 and 500 MHz spectrometers. ^{13}C and ^{1}H NMR spectra were referenced to signals of deutero solvents and residual protonated solvents, respectively. Infrared spectra were recorded on a Thermo Nicolet iS10 FT spectrometer. HRMS were recorded by electron spry ionization (ESI) method on a Q-TOF Micro with lock spray source. Melting points are corrected. The crystal data were collected and integrated using a Bruker Axs kappa apex2 CCD diffractometer, with graphite monochromated Mo-Kα radiation.

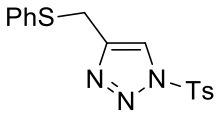
3. General procedure for the synthesis of thio-tethered *N*-sulfonyl-1,2,3-triazoles **1**:[1]



Step-1: To the mixture of propargyl bromide (0.95 mL, 10.74 mmol, 1.1 equiv) and triethylamine (2.71 mL, 19.54 mmol, 2 equiv) in Et_2O (15 mL) at 0 ^oC, aryl thiols (9.77 mmol, 1 equiv) was added dropwise over 5 min. The reaction mixture was stirred at 0 ^oC for 15 minutes then warmed to room temperature and stirred for 2 h. The progress of the reaction was monitored by TLC analysis. After the completion of the reaction, the reaction mixture was quenched with H_2O (10 mL), extracted with diethyl ether (2 x 15 mL) and the organic layer was washed with 10% NaOH (2 x 10 mL). The organic layer was dried over (Na_2SO_4), filtered and the solvent was removed under reduced pressure. The resultant aryl propargyl sulfide was used in the next step without further purification.

Step-2: To a stirred solution of crude aryl propargyl sulfide (1 equiv) and CuTc (0.1 equiv) in toluene (15 mL), sulfonyl azide (1 equiv) was added at room temperature under N_2 atmosphere. The resulting solution was stirred for 4 h and monitored by TLC analysis. After the completion of the reaction, the reaction mixture was quenched with saturated NH_4Cl solution (25 mL), extracted with EtOAc (2 x 25 mL) and dried over (Na_2SO_4). Evaporation of solvent under reduced pressure followed by purification by column chromatography afforded the thio-tethered *N*-sulfonyl-1,2,3-triazoles **1** in good yieldss.

4-((Phenylthio)methyl)-1-tosyl-1,2,3-triazole (1a) :



According to the general procedure the product was isolated in 90% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

[1] J. Raushel, V. V. Fokin, *Org. Lett.* **2010**, *12*, 4952.

mp: 95-97 ºC.

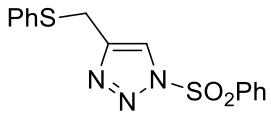
FTIR (KBr): 3128, 3085, 2981, 1641, 1582, 1549, 1479, 1434, 1390, 1368, 1304, 1233, 1191, 1171, 1087, 1008, 968, 807, 743, 670, 577, 537 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.90 (d, 2H, *J* = 8.5 Hz), 7.81 (s, 1H), 7.36 (d, 2H, *J* = 8.1 Hz), 7.28-7.20 (m, 5H), 4.17 (s, 2H), 2.45 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 147.3, 145.1, 134.6, 133.1, 130.5, 130.4, 129.2, 128.7, 127.2, 121.9, 28.9, 21.9.

HRMS: calcd.for $C_{16}H_{15}N_3O_2S_2$+H: 346.0678; found: 346.0679.

1- (Phenylsulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1b) :



According to the general procedure the product was isolated in 83% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 68-70 ºC.

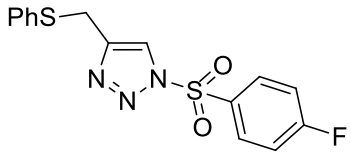
FTIR (KBr): 3152, 3056, 2985, 1583, 1479, 1446, 1396, 1310, 1265, 1195, 1090, 1011, 971, 895, 736, 706, 625, 592, 563 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.04-8.01 (m, 2H), 7.83 (s, 1H), 7.74-7.70 (m, 1H), 7.60-7.56 (m, 2H), 7.28-7.20 (m, 5H), 4.18 (s, 2H),

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 145.2, 136.2, 135.7, 134.5, 130.5, 129.9, 129.2, 128.6, 127.2, 122.0, 28.9.

HRMS: calcd.for $C_{15}H_{13}N_3O_2S_2$+H: 332.0522; found: 332.0527.

1-((4-Fluorophenyl)sulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1c) :



According to the general procedure the product was isolated in 70% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 94-96 ºC.

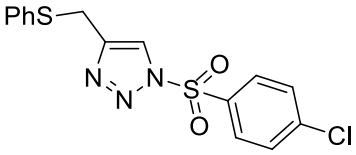
FTIR (KBr): 3153, 3062, 2926, 1588, 1491, 1398, 1264, 1192, 1090, 1011, 970, 837, 750, 679, 582, 539 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.08-8.04 (m, 2H), 7.83 (s, 1H), 7.29-7.20 (m, 7H), 4.18 (s, 2H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 167.0 (d, J = 261.1 Hz), 145.3, 134.5, 132.1, 131.8 (d, J = 10.1 Hz), 130.4, 129.2, 129.2, 127.2, 121.9, 117.5 (d, J = 23.2 Hz), 28.8.

HRMS: calcd.for $C_{15}H_{12}N_3O_2FS_2$+H: 350.0428; found: 350.0430.

1-((4-Chlorophenyl)sulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1d) :



According to the general procedure the product was isolated in 70% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 114-116 ºC.

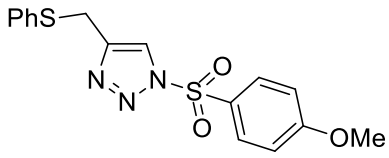
FTIR (KBr): 3131, 3091, 1579, 1476, 1437, 1398, 1369, 1308, 1274, 1262, 1239, 1191, 1090, 1011, 970, 823, 748, 690, 640, 610, 571 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.95 (d, 2H, J = 8.7 Hz), 7.82 (s, 1H), 7.54 (d, 2H, J = 8.7 Hz), 7.28-7.20 (m, 5H), 4.18 (s, 2H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 145.4, 142.9, 134.6, 134.5, 130.4, 130.3, 130.0, 129.2, 127.2, 122.0, 28.9.

HRMS: calcd.for $C_{15}H_{12}ClN_3O_2S_2$+H: 366.0132; found: 366.0138.

1-((4-Methoxyphenyl)sulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1e) :



According to the general procedure the product was isolated in 72% yield using the mixture of ethyl acetate/hexanes (12:88) as an eluent for column chromatography.

mp: 93-95 ºC.

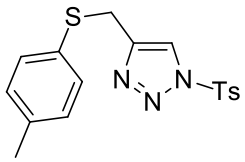
FTIR (KBr): 3148, 3059, 2978, 2942, 2843, 1591, 1497, 1391, 1310, 1269, 1195, 1170, 1092, 1015, 975, 835, 805, 743, 678, 583, 552 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.96 (d, 2H, J = 9.1 Hz), 7.81 (s, 1H), 7.28-7.20 (m, 5H), 7.00 (d, 2H, J = 9.1 Hz), 4.17 (s, 2H), 3.88 (s, 3H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 165.4, 145.0, 134.6, 131.2, 130.3, 129.2, 127.1, 127.0, 121.8, 115.1, 56.0, 28.9.

HRMS: calcd.for $C_{16}H_{15}N_3O_3S_2$+H: 362.0628; found: 362.0633.

4-((*p*-Tolylthio)methyl)-1-tosyl-1,2,3-triazole (1f) :



According to the general procedure the product was isolated in 68% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

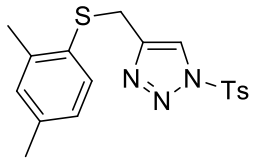
mp: 101-103 ºC.

FTIR (KBr): 3150, 3055, 2983, 2924, 1594, 1493, 1395, 1307, 1264, 1192, 1181, 1091, 1011, 972, 809, 747, 701, 671, 583, 541 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.91 (d, 2H, *J* = 8.4 Hz), 7.78 (s, 1H), 7.36 (d, 2H, *J* = 7.9 Hz), 7.16 (d, 2H, *J* = 8.2 Hz), 7.04 (d, 2H, *J* = 7.9 Hz), 4.11 (s, 2H), 2.45 (s, 3H), 2.31 (s, 3H).

^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C): δ 147.3, 145.3, 137.5, 133.2, 131.3, 130.8, 130.5, 130.0, 128.7, 121.9, 29.6, 21.9, 21.1.

4-(((2,4-Dimethylphenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1g) :



According to the general procedure the product was isolated in 72% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

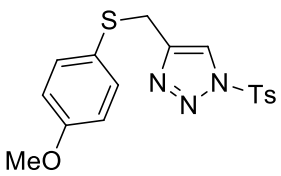
mp: 63-65 ºC.

FTIR (KBr): 3128, 2981, 2921, 1592, 1548, 1479, 1392, 1306, 1236, 1190, 1124, 1088, 1011, 964, 876, 747, 671, 539 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.92 (d, 2H, *J* = 8.2 Hz), 7.71 (s, 1H), 7.37 (d, 2H, *J* = 8.2 Hz), 7.10 (d, 1H, *J* = 7.7 Hz), 6.97 (s, 1H), 6.87 (d, 2H, *J* = 8.0 Hz), 4.07 (s, 2H), 2.45 (s, 3H), 2.28 (s, 3H), 2.23 (s, 3H).

^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C): δ 147.3, 145.3, 139.4, 137.5, 133.2, 131.6, 131.4, 130.4, 129.9, 128.7, 127.4, 121.8, 28.8, 21.9, 21.0, 20.3.

4-(((4-Methoxyphenyl)thio)methyl)-1-tosyl-1H-1,2,3-triazole (1h) :



According to the general procedure the product was isolated in 70% yield using the mixture of ethyl acetate/hexanes (12:88) as an eluent for column chromatography.

mp: 92-94 ºC.

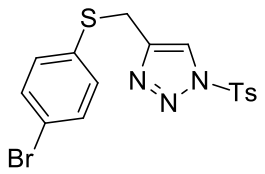
FTIR (KBr): 3141, 2962, 2896, 1592, 1494, 1388, 1309, 1287, 1252, 1194, 1175, 1088, 1011, 973, 818, 677, 580, 537 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.90 (d, 2H, *J* = 8.4 Hz), 7.72 (s, 1H), 7.36 (d, 2H, *J* = 8.1 Hz), 7.20 (d, 2H, *J* = 8.8 Hz), 6.75 (d, 2H, *J* = 8.8 Hz), 4.04 (s, 2H), 3.78 (s, 3H), 2.44 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 159.7, 147.3, 145.2, 134.4, 133.2, 130.5, 128.6, 124.5, 121.8, 114.8, 55.4, 30.8, 21.9.

HRMS: calcd.for $C_{17}H_{17}N_3O_3S_2$+H: 376.0784; found: 376.0789.

4-(((4-Bromophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1i) :



According to the general procedure the product was isolated in 63% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

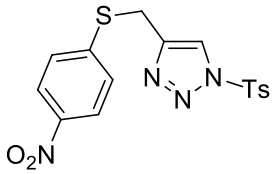
mp: 101-103 ºC.

FTIR (KBr): 3129, 3059, 2962, 2923, 1591, 1540, 1469, 1440, 1388, 1301, 1236, 1196, 1174, 1091, 1036, 1003, 969, 894, 804, 719, 667, 624, 579, 540, 510 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.90 (d, 2H, *J* = 8.2 Hz), 7.85 (s, 1H), 7.38 (d, 2H, *J* = 8.2 Hz), 7.32 (d, 2H, *J* = 8.5 Hz), 7.11 (d, 2H, *J* = 8.4 Hz), 4.15 (s, 2H), 2.46 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 24 °C): δ 147.5, 144.7, 133.7, 133.0, 132.2, 131.9, 130.5, 128.7, 122.0, 121.2, 28.8, 22.0.

4-(((4-Nitrophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1j) :



According to the general procedure the product was isolated in 32% yield using the mixture of ethyl acetate/hexanes (13:87) as an eluent for column chromatography.

mp: 148-150 ºC.

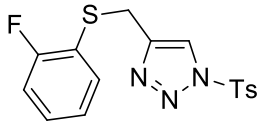
FTIR (KBr): 3156, 2925, 2851, 1586, 1512, 1396, 1338, 1264, 1182, 1118, 1090, 1013, 975, 853, 744, 668, 579, 543 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 8.06 (d, 2H, J = 9.0 Hz), 8.01 (s, 1H), 7.92 (d, 2H, J = 8.5 Hz), 7.36-7.33 (m, 4H), 4.31 (s, 2H), 2.44 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 147.8, 145.0, 143.9, 132.8, 130.6, 128.8(4), 128.8(0), 127.2, 124.1, 122.1, 26.9, 21.9.

HRMS: calcd.for $C_{16}H_{14}N_4O_4S_2$+Na: 413.0349; found: 413.0354.

4-(((2-Fluorophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1k) :



According to the general procedure the product was isolated in 90% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 83-85 ºC.

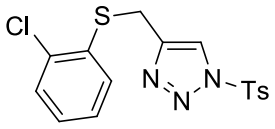
FTIR (KBr): 3142, 3083, 2925, 1592, 1471, 1394, 1259, 1188, 1013, 971, 814, 754, 670, 583, 540 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.90 (d, 2H, J = 8.3 Hz), 7.84 (s, 1H), 7.36 (d, 2H, J = 8.1 Hz), 7.25-7.21 (m, 2H), 7.05-6.97 (m, 2H), 4.16 (s, 2H), 2.44 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 161.9 (d, J = 246.1 Hz), 147.4, 144.7, 133.7, 133.1, 130.5, 129.8 (d, J = 8.0 Hz), 128.7, 124.7 (d, J = 3.7 Hz), 121.9, 121.1 (d, J = 18.5 Hz), 116.0 (d, J = 22.7 Hz), 28.3, 21.9.

HRMS: calcd.for $C_{16}H_{14}N_3O_2FS_2$+H: 364.0584; found: 364.0584.

4-(((2-Chlorophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1l) :



According to the general procedure the product was isolated in 82% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 112-114 ºC.

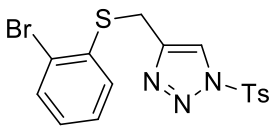
FTIR (KBr): 3150, 3055, 2986, 2926, 1594, 1452, 1395, 1308, 1265, 1193, 1118, 1091, 1012, 973, 811, 750, 670, 583, 542 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.92 (d, 2H, J = 8.4 Hz), 7.90 (s, 1H), 7.37-7.35 (m, 3H), 7.25-7.22 (m, 1H), 7.14-7.12 (m, 2H), 4.22 (s, 2H), 2.45 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 147.5, 144.5, 134.7, 133.0, 130.6, 130.5, 130.4, 130.0, 128.8, 127.9, 127.4, 122.1, 27.5, 21.9.

HRMS: calcd.for $C_{16}H_{14}N_3O_2S_2Cl$+H: 380.0289; found: 380.0309.

4-(((2-Bromophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1m) :



According to the general procedure the product was isolated in 70% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 113-115 ºC.

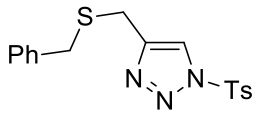
FTIR (KBr): 3147, 3026, 2925, 1593, 1449, 1394, 1261, 1191, 1090, 1013, 972, 812, 749, 669, 582, 539 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.95-7.90 (m, 3H), 7.54-7.52 (m, 1H), 7.36 (d, 2H, *J* = 8.1 Hz), 7.23-7.15 (m, 2H), 7.07-7.03 (m, 1H), 4.22 (s, 2H), 2.45 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 147.5, 144.4, 135.9, 133.2, 133.0, 130.5, 129.9, 128.8, 128.0, 127.9, 124.6, 122.1, 27.9, 21.9.

HRMS: calcd.for $C_{16}H_{15}N_3O_2S_2Br$+H: 423.9784; found: 423.9774.

4-((Benzylthio)methyl)-1-tosyl-1,2,3-triazole (1n) :



According to the general procedure the product was isolated in 70% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

mp: 93-95 ºC.

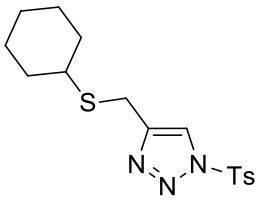
FTIR (KBr): 3130, 3022, 2990, 1593, 1546, 1492, 1451, 1384, 1299, 1233, 1180, 1014, 975, 816, 738, 681, 574, 537 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.98 (d, 2H, *J* = 8.5 Hz), 7.88 (s, 1H), 7.38 (d, 2H, *J* = 8.0 Hz), 7.29-7.23 (m, 5H), 3.71 (s, 2H), 3.65 (s, 2H), 2.45 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 147.4, 145.9, 137.6, 133.1, 130.5, 129.1, 128.8, 128.7, 127.4, 121.6, 36.3, 25.1, 21.9.

HRMS: calcd.for $C_{17}H_{17}N_3O_2S_2$+H: 360.0835; found: 360.0839.

4- ((Cyclohexylthio)methyl)-1-tosyl-1,2,3-triazole (1o) :



According to the general procedure the product was isolated in 60% yield using the mixture of ethyl acetate/hexanes (6:94) as an eluent for column chromatography.

mp: 86-88 ºC.

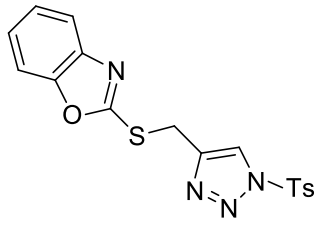
FTIR (KBr): 3135, 3053, 2925, 2849, 1592, 1549, 1446, 1387, 1304, 1242, 1191, 1180, 1091, 1011, 964, 814, 744, 676, 584, 540 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.02 (s, 1H), 7.97 (d, 2H, J = 8.3 Hz), 7.37 (d, 2H, J = 8.0 Hz), 3.79 (s, 2H), 2.66-2.44 (m, 1H), 2.44 (s, 3H), 1.92-1.90 (m, 2H), 1.74-1.71 (m, 2H), 1.31-1.21 (m, 6H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 147.2, 146.5, 133.0, 130.3, 128.6, 121.5, 43.5, 33.2, 25.8, 25.6, 24.1, 21.7.

HRMS: calcd.for $C_{16}H_{21}N_3O_2S_2$+H: 352.1148; found: 352.1142.

2-(((1-Tosyl-1,2,3-triazol-4-yl)methyl)thio)benzo[d]oxazole (1p) :



According to the general procedure the product was isolated in 64% yield using the mixture of ethyl acetate/hexanes (12:88) as an eluent for column chromatography.

mp: 155-157 ºC.

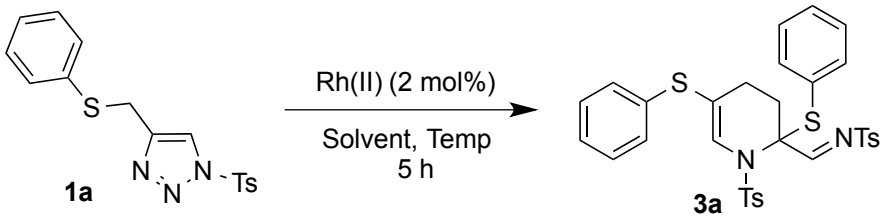
FTIR (KBr): 3113, 3071, 2993, 2923, 1594, 1555, 1500, 1447, 1388, 1310, 1239, 1127, 1091, 1019, 927, 807, 744, 671, 539 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.26 (s, 1H), 7.92 (d, 2H, J = 8.5 Hz), 7.64-7.62 (m, 1H), 7.44-7.42 (m, 1H), 7.33-7.24 (m, 4H), 4.58 (s, 2H), 2.40 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 163.7, 152.2, 147.5, 143.6, 141.7, 132.9, 130.5, 128.8, 124.6, 124.3, 122.9, 118.6, 110.1, 26.3, 21.9.

HRMS: calcd.for $C_{17}H_{14}N_4O_3S_2$+H: 387.0580; found: 387.0570.

4. Rhodium catalyzed tandem 1,2-sulfur migration and aza-Diels-Alder reaction of 1a: Optimization.

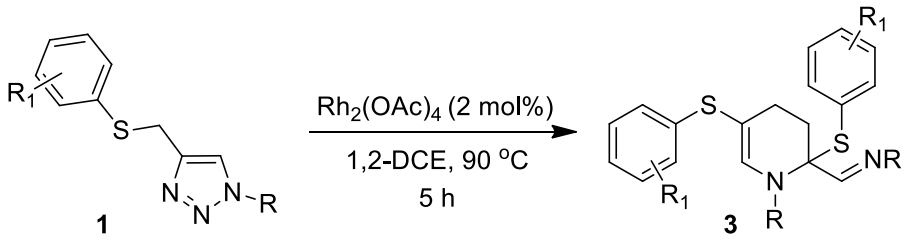


4-((Phenylthio)methyl)-1-tosyl-1,2,3-triazole **1a** (50 mg, 0.144 mmol) and Rh(II)-catalyst (0.0028 mmol, 2 mol%) were added under nitrogen atmosphere to an oven dried 10 mL reaction tube equipped with stir bar. Solvent (1 mL, as mentioned in the table) was introduced through syringe, subsequently; the reaction tube was sealed and kept at temperature mentioned in the table for 5 h. After the TLC analysis, it was cooled to room temperature and purified by column chromatography using hexane/ethyl acetate mixture as eluent to afford tetrahydropyridine **3a**.

Entry	Rh(II) (2 mol%)	Solvent	Temp (^{o}C)	Yield of 3a (%)[a]
1	$Rh_2(OAc)_4$	$CHCl_3$	75	43
2	$Rh_2(OAc)_4$	$CHCl_3$	90	55
3	$Rh_2(OAc)_4$	Toluene	90	80
4	$Rh_2(OAc)_4$	1,2-DCE	90	94
5	$Rh_2(Oct)_4$	1,2-DCE	90	85
6	$Rh_2(DOSP)_4$	1,2-DCE	90	93
7	$Rh_2(TBSP)_4$	1,2-DCE	90	94
8	$Rh_2(OAc)_4$	1,2-DCE	90	83[b]

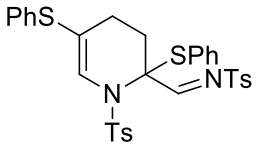
[a] Isolated yields. [b] 3 h.

5. General procedure for the synthesis of tetrahydropyridines 3:



N-Sulfony-1,2,3-triazole **1** (0.144 mmol) and $Rh_2(OAc)_4$ (1.28 mg, 0.0028 mmol, 2 mol%) were added under nitrogen atmosphere to an oven dried 10 mL reaction tube equipped with stir bar. 1,2-DCE (1 mL) was introduced through syringe and the reaction tube was sealed and stirred at 90 °C for 5 h. After the TLC analysis, it was cooled to room temperature and purified by column chromatography using hexane/ethyl acetate mixture as eluent to afford tetrahydropyridines **3** in high yield and purity.

_N_-((2,5-Bis(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3a) :



According to the general procedure the product was isolated in 94% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 131-133 ºC.

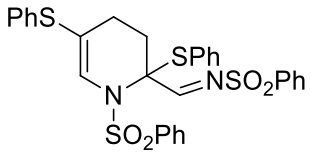
FTIR (KBr): 3101, 2956, 1620, 1595, 1472, 1439, 1331, 1163, 1088, 1040, 960, 835, 812, 787, 743, 691, 664, 566, 538, 502 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.71 (s, 1H), 7.87 (d, 2H, J = 8.2 Hz), 7.44-7.34 (m, 7H), 7.32-7.25 (m, 6H), 7.22-7.20 (m, 3H), 7.13 (s, 1H), 2.49 (s, 3H), 2.44 (s, 1H), 2.41 (s, 3H), 2.05 (dd, 1H, J = 6.1, 18.1 Hz), 1.92 (dd, 1H, J = 6.9, 14.6 Hz), 1.66-1.61 (m, 1H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.7, 145.2, 144.9, 137.5, 135.3, 134.8, 133.1, 130.6, 130.0, 129.4, 129.3, 129.2, 129.1, 128.6, 127.7, 127.0, 126.7, 119.0, 71.8, 28.0, 25.3, 21.8, 21.7.

HRMS: calcd. for $C_{32}H_{30}N_2O_4S_4$+H: 635.1161; found: 635.1152.

***N*-((1-(Phenylsulfonyl)-2,5-bis(phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3b) :**



According to the general procedure the product was isolated in 80% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

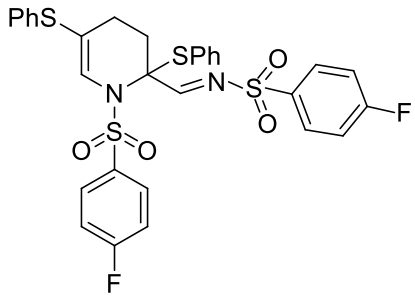
FTIR ($CHCl_3$): 3065, 2924, 1619, 1444, 1338, 1167, 1085, 838, 797, 743, 691, 586 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.77 (s, 1H), 8.01-7.99 (m, 2H), 7.72-7.68 (m, 1H), 7.61-7.54 (m, 3H), 7.47-7.39 (m, 4H), 7.37-7.24 (m, 9H), 7.22-7.20 (m, 1H), 7.12 (t, 1H, J = 1.5 Hz), 2.48-2.38 (m, 1H), 2.04 (dd, 1H, J = 6.1, 18.3 Hz), 1.92 (dd, 1H, J = 6.1, 14.8 Hz), 1.63-1.56 (m, 1H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 169.1, 138.2, 137.5, 136.3, 134.6, 134.1, 133.8, 130.8, 129.5, 129.4, 129.3, 129.2, 129.1, 128.2, 127.6, 126.9, 126.8, 119.6, 71.8, 28.0, 25.3.

HRMS: calcd. for $C_{30}H_{26}N_2O_4S_4$+Na: 629.0668; found: 629.0660.

4-Fluoro-*N*-((1-((4-fluorophenyl)sulfonyl)-2,5-bis(phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3c) :



According to the general procedure the product was isolated in 75% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

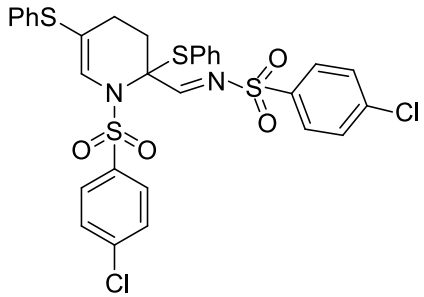
FTIR ($CHCl_3$): 3057, 2983, 2929, 1621, 1585, 1476, 1348, 1265, 1169, 1089, 1017, 894, 740, 621, 564, 483 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.70 (s, 1H), 8.00-7.97 (m, 2H), 7.57-7.54 (m, 2H), 7.45-7.41 (m, 1H), 7.36-7.22 (m, 11H), 7.12-7.08 (m, 3H), 2.45 (dddd, 1H, *J* = 1.2, 7.1, 12.1, 18.3 Hz), 2.08 (dd, 1H, *J* = 6.4, 18.3 Hz), 1.92 (dd, 1H, *J* = 6.5, 14.3 Hz), 1.65 (ddd, 1H, *J* = 6.4, 12.3, 18.8 Hz).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 169.1, 166.2 (d, *J* = 257.1 Hz), 165.7 (d, *J* = 257.5 Hz), 137.4, 134.3, 134.3, 132.1, 132.0 (d, *J* = 9.5 Hz), 130.8, 130.6 (d, *J* = 9.5 Hz), 129.5, 129.5, 129.2, 128.3, 127.6, 127.0, 126.7, 125.4, 120.1, 116.9, 116.6, 71.7, 28.2, 25.2.

HRMS: calcd.for $C_{30}H_{24}N_2O_4F_2S_4$+Na: 665.0479; found: 665.0468.

4-Chloro-*N*-((1-((4-chlorophenyl)sulfonyl)-2,5-bis(phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3d) :



According to the general procedure the product was isolated in 76% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

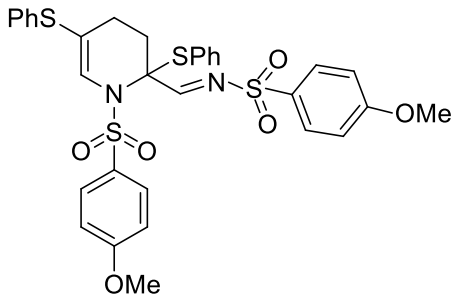
FTIR ($CHCl_3$): 3060, 2927, 2856, 1626, 1580, 1474, 1345, 1265, 1165, 1088, 1015, 909, 829, 740, 619, 558, 481 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.65 (s, 1H), 7.89 (d, 2H, *J* = 8.7 Hz), 7.54 (d, 2H, *J* = 8.7 Hz), 7.47-7.38 (m, 5H), 7.33-7.28 (m, 7H), 7.24-7.22 (m, 2H), 7.06 (s, 1H), 2.44 (dddd, 1H, *J* = 1.4, 7.1, 12.2, 18.3 Hz), 2.09 (dd, 1H, *J* = 6.3, 18.3 Hz), 1.92 (dd, 1H, *J* = 6.4, 14.7 Hz), 1.66 (ddd, 1H, *J* = 6.5, 12.4, 18.8 Hz).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 169.1, 141.1, 140.6, 137.4, 136.7, 134.5, 134.3, 130.9, 130.5, 129.8, 129.6, 129.5, 129.3, 129.1, 128.3, 127.5, 127.1, 126.6, 120.3, 71.7, 28.3, 25.3.

HRMS: calcd.for $C_{30}H_{24}N_2O_4Cl_2S_4$+H: 675.0069; found: 675.0082.

4-Methoxy-*N*-((1-((4-methoxyphenyl)sulfonyl)-2,5-bis(phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3e) :



According to the general procedure the product was isolated in 85% yield using the mixture of ethyl acetate/hexanes (11:89) as an eluent for column chromatography.

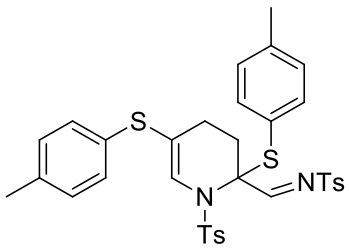
FTIR ($CHCl_3$): 3058, 2970, 2928, 2255, 1593, 1494, 1343, 1264, 1163, 1092, 1028, 908, 736, 568 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.54 (s, 1H), 7.83 (d, 2H, *J* = 8.9 Hz), 7.37 (d, 2H, *J* = 9.0 Hz), 7.32-7.30 (m, 1H), 7.26-7.17 (m, 8H), 7.13-7.12 (m, 1H), 7.04 (t, 1H, *J* = 1.3 Hz), 6.96 (d, 2H, *J* = 9.0 Hz), 6.78 (d, 2H, *J* = 8.9 Hz), 3.81 (s, 3H), 3.77 (s, 3H), 2.35 (dddd, 1H, *J* = 1.4, 7.1, 12.2, 18.1 Hz), 1.98 (dd, 1H, *J* = 6.2, 18.1 Hz), 1.83 (dd, 1H, *J* = 6.3, 14.8 Hz), 1.58-1.50 (m, 1H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.1, 164.2, 163.7, 137.4, 134.8, 131.4, 130.5, 129.9, 129.6, 129.3, 129.2, 129.1, 128.7, 127.0, 126.9, 126.7, 119.0, 114.6, 114.5, 71.6, 55.8, 55.7, 28.0, 25.3.

HRMS: calcd.for $C_{32}H_{30}N_2O_6S_4$+H: 667.1059; found: 667.1083.

***N*-((2,5-Bis(*p*-tolylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3f) :**



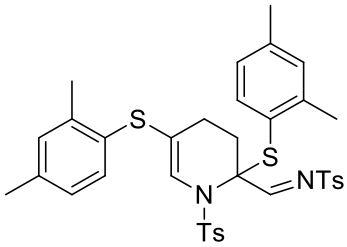
According to the general procedure the product was isolated in 87% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

FTIR ($CHCl_3$): 3056, 2975, 2933, 1614, 1439, 1344, 1264, 1168, 1087, 1047, 907, 813, 733, 567 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.67 (s, 1H), 7.94-7.81 (m, 2H), 7.39-7.34 (m, 4H), 7.22 (d, 4H, *J* = 8.1 Hz), 7.18-7.15 (m, 2H), 7.09 (d, 4H, *J* = 8.0 Hz), 7.06-7.02 (m, 1H), 2.48 (s, 3H), 2.45-2.34 (m, 1H), 2.41 (s, 3H), 2.35 (s, 3H), 2.32 (s, 3H), 2.00 (dd, 1H, *J* = 6.2, 17.8 Hz), 1.87 (dd, 1H, *J* = 6.3, 14.7 Hz), 1.52 (ddd, 1H, *J* = 6.4, 12.1, 18.5 Hz).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.7, 145.1, 144.7, 141.0, 137.3, 137.0, 135.2, 133.2, 130.6, 130.1, 130.0, 129.9(7), 129.9(4), 129.8, 129.1, 127.7, 127.4, 123.3, 120.5, 71.6, 27.5, 25.2, 21.8, 21.7, 21.5, 21.4.

_N_-((2,5-Bis((2,4-dimethylphenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3g) :



According to the general procedure the product was isolated in 89% yield using the mixture of ethyl acetate/hexanes (10:90) as an eluent for column chromatography.

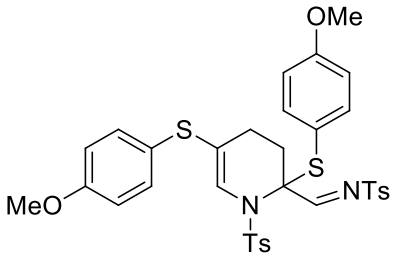
FTIR ($CHCl_3$): 3056, 2982, 2927, 1612, 1439, 1340, 1260, 1166, 1089, 1046, 817, 737, 669, 569 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.53 (s, 1H), 7.84 (d, 2H, *J* = 8.1 Hz), 7.32 (d, 2H, *J* = 8.1 Hz), 7.22-7.22 (m, 2H), 7.16-7.08 (m, 5H), 7.0 (s, 1H), 6.97-6.87 (m, 3H), 2.43 (s, 3H), 2.41 (s, 3H), 2.38 (s, 3H), 2.37-2.33 (m, 1H), 2.34 (s, 3H), 2.32 (s, 3H), 2.28 (s, 3H), 2.02-1.91 (m, 2H), 1.55 (ddd, 1H, *J* = 6.5, 12.2, 19.0 Hz).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 169.4, 145.0, 144.5, 144.1, 141.0, 139.0, 138.0, 137.5, 135.3, 133.5, 131.9, 131.5, 131.2, 129.8, 129.1, 129.0, 128.3, 127.6, 127.3, 125.8, 125.3, 122.6, 121.2, 72.5, 28.4, 25.1, 21.7, 21.7, 21.6, 21.4, 21.0, 20.4.

HRMS: calcd.for $C_{36}H_{38}N_2O_4S_4$+Na: 713.1607; found: 713.1612.

***N*-((2,5-bis((4-methoxyphenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3h) :**



According to the general procedure the product was isolated in 96% yield using the mixture of ethyl acetate/hexanes (11:89) as an eluent for column chromatography.

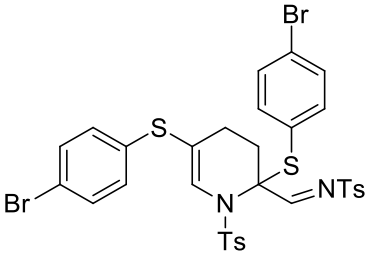
FTIR ($CHCl_3$): 3020, 2964, 2929, 1615, 1592, 1492, 1347, 1290, 1249, 1215, 1164, 1090, 1031, 760, 667, 568, 543, 416 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.67 (s, 1H), 7.87 (d, 2H, *J* = 8.3 Hz), 7.38 (d, 2H, *J* = 8.3 Hz), 7.32-7.28 (m, 4H), 7.23 (d, 2H, *J* = 8.8 Hz), 7.14 (d, 2H, *J* = 8.3 Hz), 6.95 (s, 1H), 6.83 (d, 2H, *J* = 8.8 Hz) 6.79 (d, 2H, *J* = 8.7 Hz), 3.80 (s, 3H), 3.79 (s, 3H), 2.47 (s, 3H), 2.39 (s, 3H), 2.38-2.28 (m, 1H), 1.95 (dd, 1H, *J* = 6.5, 18.2 Hz), 1.83 (dd, 1H, *J* = 6.8, 14.6 Hz), 1.47 (ddd, 1H, *J* = 6.8, 12.3, 19.0 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.8, 161.6, 159.4, 145.1, 144.7, 139.1, 135.2, 132.9, 129.9, 129.8, 129.1, 128.3, 127.7, 125.7, 124.1, 122.2, 117.4, 114.9, 114.8, 71.7, 55.4, 55.4, 27.2, 25.0, 21.8, 21.7.

HRMS: calcd.for $C_{34}H_{34}N_2O_6S_4$+Na: 717.1192; found: 717.1197.

***N*-((2,5-Bis((4-bromophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3i) :**



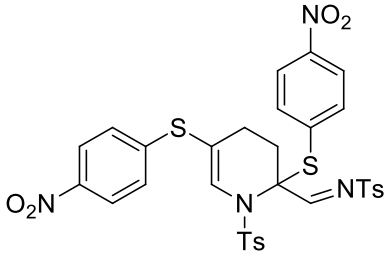
According to the general procedure the product was isolated in 55% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

FTIR ($CHCl_3$): 3063, 2923, 2853, 1638, 1597, 1565, 1470, 1386, 1338, 1161, 1087, 1007, 909, 813, 731, 667, 564, 483 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.64 (s, 1H), 7.84 (d, 2H, *J* = 8.1 Hz), 7.40-7.36 (m, 8H), 7.21-7.12 (m, 7H), 2.49 (s, 3H), 2.42 (s, 3H), 2.40-2.33 (m, 1H), 2.04 (dd, 1H, *J* = 6.4, 18.3 Hz), 1.93 (dd, 1H, *J* = 6.4, 14.7 Hz), 1.64 (ddd, 1H, *J* = 6.4, 12.1, 18.7 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.3, 145.5, 145.2, 138.7, 135.3, 134.1, 132.9, 132.6, 132.3, 130.6, 130.1, 130.1, 129.2, 129.1, 127.6, 126.0, 125.8, 120.7, 117.9, 71.9, 28.3, 25.1, 21.9, 21.8.

_N_-((2,5-Bis((4-nitrophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3j) :



According to the general procedure the product was isolated in 44% yield using the mixture of ethyl acetate/hexanes (11:89) as an eluent for column chromatography.

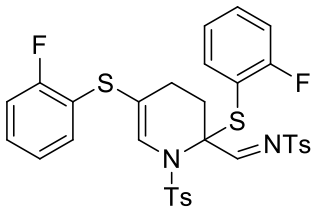
FTIR ($CHCl_3$): 3053, 2986, 1597, 1580, 1522, 1343, 1265, 1167, 1089, 853, 750, 650, 543 cm^{-1}.

^1H NMR (500 MHz, $CDCl_3$, 24 °C): δ 8.63 (s, 1H), 8.06 (d, 2H, *J* = 9.0 Hz), 7.98 (d, 2H, *J* = 8.7 Hz), 7.79 (d, 2H, *J* = 8.3 Hz), 7.48 (d, 2H, *J* = 8.8 Hz), 7.42 (d, 2H, *J* = 8.3 Hz), 7.35 (d, 2H, *J* = 8.0 Hz), 7.30-7.28 (m, 3H), 7.22 (d, 2H, *J* = 8.3 Hz), 2.52-2.43 (m, 1H), 2.47 (s, 3H), 2.40 (s, 3H), 2.15 (dd, 1H, *J* = 6.1, 18.5 Hz), 2.04 (dd, 1H, *J* = 6.2, 14.7 Hz), 1.83 (ddd, 1H, *J* = 6.4, 12.6, 18.9 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.1, 148.9, 145.9, 145.7, 137.9, 135.3(5), 135.3(2), 132.9, 132.2, 130.4, 130.1, 129.1, 128.3, 127.8, 127.5, 126.8, 124.3, 124.0, 113.2, 72.9, 29.7, 25.2, 21.8.

HRMS: calcd.for $C_{32}H_{28}N_4O_8S_4$+Na: 747.0682; found: 747.0688.

***N*-((2,5-Bis((2-fluorophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3k) :**



According to the general procedure the product was isolated in 82% yield using the mixture of ethyl acetate/hexanes (10:90) as an eluent for column chromatography.

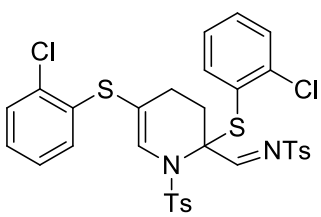
FTIR ($CHCl_3$): 2981, 2933, 1630, 1458, 1375, 1254, 1095, 1046, 909, 735, 652 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.75 (s, 1H), 7.86 (d, 2H, *J* = 8.3 Hz), 7.48-7.31 (m, 7H), 7.25-7.16 (m, 3H), 7.15-7.02 (m, 5H), 2.57-2.44 (m, 1H), 2.47 (s, 3H), 2.40 (s, 3H), 2.05 (dd, 1H, *J* = 6.2, 18.1 Hz), 1.96 (dd, 1H, *J* = 6.4, 14.8 Hz), 1.67 (ddd, 1H, *J* = 6.4, 12.4, 18.8 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.7, 164.1 (d, *J* = 251.2 Hz), 160.9 (d, *J* = 245.9 Hz), 145.2, 144.9, 139.8, 135.2, 133.4 (d, *J* = 8.0 Hz), 132.9, 131.7, 130.0, 129.9, 129.2, 129.1 (d, *J* = 7.9 Hz), 128.9, 128.8, 128.3, 127.6, 125.3, 125.0 (d, *J* = 3.7 Hz), 124.7 (d, *J* = 3.6 Hz), 121.6 (d, *J* = 16.5 Hz), 116.9, 116.5 (d, *J* = 23.6 Hz), 115.9 (d, *J* = 22.0 Hz), 114.3 (d, *J* = 18.3 Hz), 72.5, 28.4, 25.1, 21.8, 21.7.

HRMS: calcd.for $C_{32}H_{28}F_2N_2O_4S_4$+H: 671.0973; found: 671.0984.

***N*-((2,5-Bis((2-chlorophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3l) :**



According to the general procedure the product was isolated in 83% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

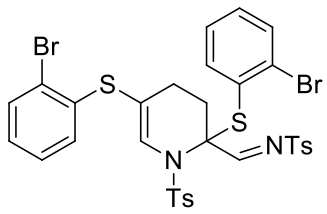
FTIR ($CHCl_3$): 3061, 2923, 2857, 1622, 1596, 1450, 1429, 1368, 1346, 1329, 1164, 1090, 1033, 841, 812, 754, 737, 660, 570, 554, cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.73 (s, 1H), 7.86 (d, 2H, *J* = 8.3 Hz), 7.52-7.43 (m, 4H), 7.40-7.35 (m, 4H), 7.28-7.19 (m, 5H), 7.14-7.12 (m, 2H), 2.56 (dddd, 1H, *J* = 1.7, 6.8, 12.1, 18.0 Hz), 2.46 (s, 3H), 2.42 (s, 3H), 2.16-2.09 (m, 2H), 1.81 (ddd, 1H, *J* = 6.6, 12.6, 18.8 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.9, 145.2, 145.0, 141.2, 139.6, 135.5, 134.8, 133.2, 133.1, 132.1, 130.8, 130.6, 130.1, 130.0, 129.9, 129.1, 128.9, 127.7, 127.6, 127.3, 127.2, 126.5, 115.7, 73.2, 29.4, 25.3, 21.8, 21.7.

HRMS: calcd.for $C_{32}H_{28}N_2O_4Cl_2S_4$+H: 703.0382; found: 703.0391.

_N_-((2,5-Bis((2-bromophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3m) :



According to the general procedure the product was isolated in 77% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

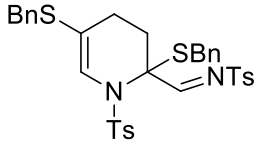
mp: 155-157 ºC.

FTIR (KBr): 3053, 2985, 2924, 2855, 1580, 1460, 1446, 1423, 1375, 1265, 1169, 909, 741, 650, 492, 458, 439 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.72 (s, 1H), 7.86 (d, 2H, *J* = 8.0 Hz), 7.69-7.63 (m, 1H), 7.56-7.49 (m, 2H), 7.46-7.39 (m, 2H), 7.38-7.27 (m, 4H), 7.24-7.14 (m, 5H), 7.07-6.99 (m, 1H), 2.63-2.49 (m, 1H), 2.45 (s, 3H), 2.41 (s, 3H), 2.20-2.08 (m, 2H), 1.88-1.76 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 168.9, 145.2, 145.0, 139.1, 136.9, 135.5, 134.0, 133.3(4), 133.3(0), 132.4, 132.0, 131.1, 130.1, 129.9, 129.1, 128.8, 128.6, 128.2, 127.8, 127.7, 127.4, 122.8, 116.0, 73.3, 29.5, 25.3, 21.8, 21.7.

***N*-((2,5-Bis(benzylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3n) :**



According to the general procedure the product was isolated in 68% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

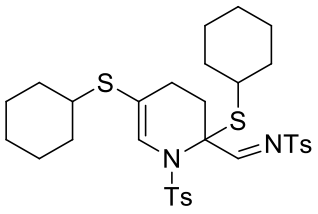
FTIR ($CHCl_3$): 3057, 2932, 2855, 1654, 1439, 1348, 1265, 1169, 1110, 1034, 905, 809, 756, 667, 567 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 8.80 (s, 1H), 7.81 (d, 2H, J = 8.3 Hz), 7.33 (d, 2H, J = 8.0 Hz), 7.30-7.26 (m, 4H), 7.25-7.19 (m, 6H), 7.08 (d, 2H, J = 8.3 Hz), 7.02 (d, 2H, J = 8.1 Hz), 6.48 (t, 1H, J = 1.3 Hz), 3.80 & 3.77 (ABq, 2H, J = 13.8 Hz), 3.73 & 3.68 (ABq, 2H, J = 12.9 Hz), 2.41 (s, 3H), 2.33 (s, 3H), 2.23 (dddd, 1H, J = 1.4, 7.3, 12.1, 17.9 Hz), 1.91 (dd, 1H, J = 6.3, 17.8 Hz), 1.81 (dd, 2H, J = 6.4, 14.8 Hz), 1.32 (ddd, 1H, J = 6.6, 12.1, 18.7 Hz).

$^{13}C\{^{1}H\}$ NMR (125 MHz, $CDCl_3$, 24 °C): δ 167.6, 145.1, 144.7, 137.6, 136.1, 134.9, 133.8, 129.9(9), 129.9(2), 129.3, 128.8(9), 128.8(5), 128.7, 128.7, 127.6(5), 127.6(3), 127.3, 123.5, 121.1, 70.6, 37.1, 34.0, 27.4, 25.5, 21.8, 21.7.

HRMS: calcd.for $C_{34}H_{34}N_2O_4S_4$+H: 663.1474; found: 663.1472.

***N*-((2,5-Bis(cyclohexylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3o) :**



According to the general procedure the product was isolated in 85% yield using the mixture of ethyl acetate/hexanes (6:94) as an eluent for column chromatography.

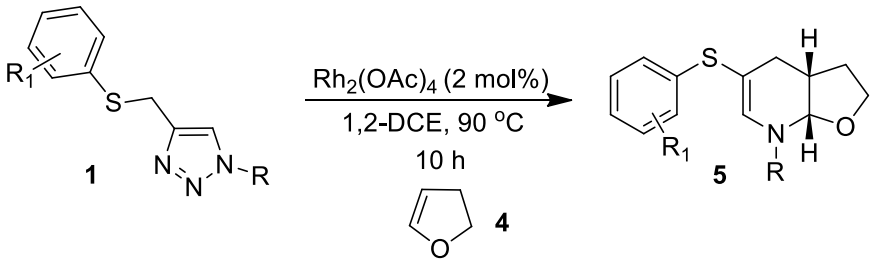
FTIR ($CHCl_3$): 3054, 2986, 2933, 2855, 1598, 1447, 1422, 1347, 1265, 1164, 1091, 1044, 895, 744, 705, 660, 566 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.66 (s, 1H), 7.90 (d, 2H, *J* = 8.3 Hz), 7.39 (d, 2H, *J* = 8.0 Hz), 7.33 (d, 2H, *J* = 8.3 Hz), 7.13 (d, 2H, *J* = 8.1 Hz), 6.80 (s, 1H), 2.91-2.82 (m, 2H), 2.46 (s, 3H), 2.37 (s, 3H), 2.37-2.28 (m, 1H), 2.04-1.90 (m, 2H), 1.86-1.61 (m, 9H), 1.42-1.37 (m, 1H), 1.35-1.23 (m, 11H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 167.0, 145.1, 144.8, 134.9, 133.2, 130.0, 129.9, 129.2, 127.8, 126.6, 121.4, 70.9, 44.5, 42.8, 35.8, 34.6, 33.4, 33.3, 27.5, 27.1, 25.8, 25.4, 21.8, 21.7.

HRMS: calcd.for $C_{32}H_{42}N_2O_4S_4$+Na: 669.1920; found: 669.1921.

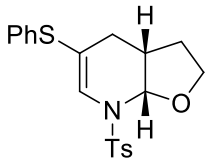
6. General procedure for the synthesis of fused tetrahydropyridines 5:



N-Sulfonyl-1,2,3-triazole **1** (50 mg, 0.144 mmol), $Rh_2(OAc)_4$ (1.28 mg, 0.0028 mmol, 2 mol%) and 1,2-DCE (1 mL) were added under nitrogen atmosphere to an oven dried 10 mL reaction tube equipped with stir bar. Next, 2,3-dihydrofuran **4** (40 mg, 0.576 mmol) was introduced through syringe, the reaction tube was sealed and stirred at 90 °C for 10 h. After the TLC analysis, it was cooled to room

temperature and purified by column chromatography using hexane/ethyl acetate mixture as eluent to afford fused tetrahydropyridines **5** in high yield and purity.

5-(Phenylthio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5a) :



According to the general procedure the product was isolated in 90% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

mp: 121-123 ºC.

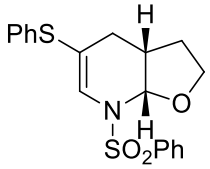
FTIR (KBr): 2941, 2889, 1640, 1598, 1475, 1436, 1404, 1351, 1240, 1106, 1027, 967, 862, 803, 746, 695, 667, 587, 549 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.83 (d, 2H, *J* = 8.2 Hz), 7.33 (d, 2H, *J* = 8.4 Hz), 7.29-7.26 (m, 2H), 7.23-7.17 (m, 3H), 7.15-7.13 (m, 1H), 5.55 (d, 1H, *J* = 4.4 Hz), 3.84 (dt, 1H, *J* = 4.5, 8.9 Hz), 3.78 (q, 1H, *J* = 8.0 Hz), 2.45 (s, 3H), 2.35-2.32 (m, 1H), 2.22 (dd, 1H, *J* = 6.6, 17.1 Hz), 2.13-2.08 (m, 1H), 1.95 (ddd, 1H, *J* = 1.4, 8.4, 17.0 Hz), 1.74-1.70 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.4, 136.8, 135.5, 129.8, 129.1, 128.7, 128.6, 127.6, 126.3, 108.9, 83.9, 64.4, 35.8, 29.9, 28.4, 21.7.

HRMS: calcd.for $C_{20}H_{21}NO_3S_2$+H: 388.1036; found: 388.1056.

7-(Phenylsulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5b) :



According to the general procedure the product was isolated in 97% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

mp: 106-108 ºC.

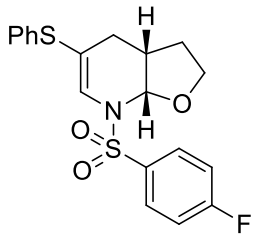
FTIR (KBr): 3055, 2982, 2928, 1638, 1595, 1431, 1369, 1263, 1169, 1043, 908, 735, 653, 415 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.95-7.92 (m, 2H), 7.62-7.58 (m, 1H), 7.55-7.51 (m, 2H), 7.28-7.17 (m, 5H), 7.13-7.13 (m, 1H), 5.55 (d, 1H, *J* = 4.4 Hz), 3.82 (dt, 1H, *J* = 4.7, 8.9, 13.4 Hz), 3.73 (q, 1H, *J* = 7.8 Hz), 2.38-2.30 (m, 1H), 2.22 (dd, 1H, *J* = 6.7, 6.5 Hz), 2.13-2.04 (m, 1H), 1.94 (ddd, 1H, *J* = 1.7, 8.2, 17.0 Hz), 1.74-1.69 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 139.8, 135.4, 133.2, 129.2, 129.1, 128.7, 128.5, 127.6, 126.4, 109.2, 83.9, 64.5, 36.0, 29.9, 28.7.

HRMS: calcd. for $C_{19}H_{19}NO_3S_2$+H: 374.0879; found: 374.0881.

7-((4-Fluorophenyl)sulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5c) :



According to the general procedure the product was isolated in 78% yield using the mixture of ethyl acetate/hexanes (08:92) as an eluent for column chromatography.

mp: 118-120 ºC.

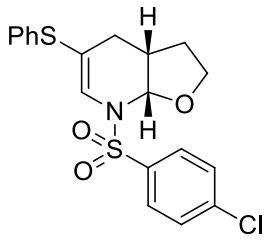
FTIR (KBr): 3061, 2985, 2941, 2907, 1464, 1447, 1374, 1299, 1240, 1098, 1046, 938, 847, 737, 703, 634, 608 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.97-7.94 (m, 2H), 7.28-7.15 (m, 7H), 7.07-7.07 (m, 1H), 5.56 (d, 1H, *J* = 4.4 Hz), 3.81 (dt, 1H, *J* = 4.6, 8.7 Hz), 3.73 (q, 1H, *J* = 8.0 Hz), 2.39-2.33 (m, 1H), 2.22 (dd, 1H, *J* = 6.9, 17.3 Hz), 2.14-2.03 (m, 1H), 1.93 (ddd, 1H, *J* = 1.8, 8.4, 17.1 Hz), 1.73-1.66 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 165.4 (d, *J* = 253.6 Hz), 135.9 (d, *J* = 3.1 Hz), 135.2, 130.5 (d, *J* = 9.7 Hz), 129.1, 128.8, 128.0, 126.5, 116.4 (d, *J* = 22.3 Hz), 109.6, 83.9, 64.4, 36.0, 29.9, 28.3.

HRMS: calcd.for $C_{19}H_{18}FNO_3S_2$+Na: 414.0604; found: 428.0610.

7-((4-Chlorophenyl)sulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5d) :



According to the general procedure the product was isolated in 79% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

mp: 140-142 ºC.

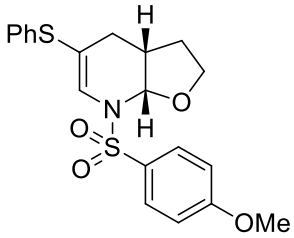
FTIR (KBr): 3086, 2924, 1638, 1580, 1467, 1357, 1169, 1094, 1029, 969, 859, 804, 750, 699, 624, 561 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.87 (d, 2H, *J* = 8.7 Hz), 7.49 (d, 2H, *J* = 8.7 Hz), 7.28-7.16 (m, 5H), 7.06-7.06 (m, 1H), 5.56 (d, 1H, *J* = 4.4 Hz), 3.82 (dt, 1H, *J* = 4.6, 8.8 Hz), 3.73 (q, 1H, *J* = 8.1 Hz), 2.41-2.33 (m, 1H), 2.22 (dd, 1H, *J* = 6.7, 17.1 Hz), 2.14-2.05 (m, 1H), 1.93 (ddd, 1H, *J* = 1.8, 8.4, 17.2 Hz), 1.74-1.66 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 139.8, 138.3, 135.2, 129.4, 129.2, 129.1, 128.8, 127.9, 126.5, 109.9, 84.0, 64.5, 36.0, 29.9, 28.3.

HRMS: calcd.for $C_{19}H_{18}NO_3ClS_2$+H: 408.0489; found: 408.0498.

7-((4-Methoxyphenyl)sulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5e) :



According to the general procedure the product was isolated in 80% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

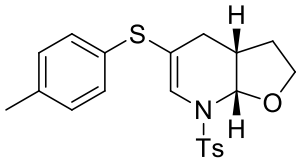
FTIR ($CHCl_3$): 3056, 2982, 2930, 1592, 1494, 1430, 1352, 1265, 1164, 1100, 1033, 896, 737, 568 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.84 (d, 2H, *J* = 8.9 Hz), 7.25-7.12 (m, 5H), 7.07 (t, 1H, *J* = 0.9 Hz), 6.95 (d, 2H, *J* = 8.9 Hz), 5.50 (d, 1H, *J* = 4.2 Hz), 3.84 (s, 3H), 3.80 (dt, 1H, *J* = 4.6, 9.1 Hz), 3.75 (q, 1H, *J* = 8.0 Hz), 2.33-2.26 (s, 1H), 2.17 (dd, 1H, *J* = 6.8, 17.0 Hz), 2.11-2.04 (m, 1H), 1.90 (ddd, 1H, *J* = 1.9, 6.7, 17.2 Hz), 1.71-1.64 (m, 1H).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 163.4, 135.6, 131.4, 129.9, 129.1, 128.8, 128.6, 126.3, 114.3, 108.7, 83.9, 64.4, 55.8, 35.8, 30.9, 28.4.

HRMS: calcd.for $C_{20}H_{21}NO_4S_2$+H: 404.0985; found: 404.0981.

5-(*p*-Tolylthio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5f) :



According to the general procedure the product was isolated in 84% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

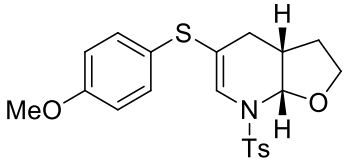
FTIR ($CHCl_3$): 3055, 2977, 1637, 1598, 1436, 1357, 1265, 1169, 1101, 1040, 909, 804, 736, 664 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.80 (d, 2H, *J* = 8.3 Hz), 7.30 (d, 2H, *J* = 8.0 Hz), 7.14-7.06 (m, 5H), 5.51 (d, 1H, *J* = 4.4 Hz), 3.80 (dt, 1H, *J* = 4.8, 8.8 Hz), 3.73 (q, 1H, *J* = 7.9 Hz), 2.42 (s, 3H), 2.31-2.28 (m, 1H), 2.30 (s,3H), 2.17 (dd, 1H, *J* = 6.7, 17.1 Hz), 2.08-2.03 (m, 1H), 1.90 (ddd, 1H, *J* = 1.8, 10.1, 18.7 Hz), 1.71-1.63 (m, 1H).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.0, 136.7, 136.5, 131.4, 129.7, 129.6, 129.3, 127.5, 127.4, 109.9, 83.9, 64.3, 35.8, 29.8, 28.1, 21.6, 21.0.

HRMS: calcd.for $C_{21}H_{23}NO_3S_2$+H: 402.1192; found: 402.1201.

5-((4-Methoxyphenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5h) :



According to the general procedure the product was isolated in 72% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

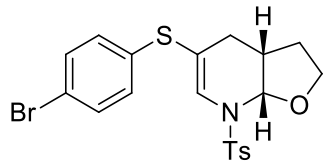
FTIR ($CHCl_3$): 2985, 2941, 2909, 1465, 1448, 1373, 1299, 1240, 1170, 1098, 1045, 937, 918, 847, 735, 634, 608 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.71 (d, 2H, *J* = 8.3 Hz), 7.21 (d, 2H, *J* = 8.2 Hz), 7.14 (d, 2H, *J* = 6.9 Hz), 6.93 (s, 1H), 6.73 (d, 2H, *J* = 8.8 Hz), 5.42 (d, 1H, *J* = 4.5 Hz), 3.69 (s, 3H), 3.74-3.68 (m, 1H), 3.64 (q, 1H, *J* = 7.9 Hz), 2.34 (s, 3H), 2.22-2.16 (m, 1H), 2.06 (dd, 1H, *J* = 6.4, 17.0 Hz), 2.01-1.92 (m, 1H), 1.78 (ddd, 1H, *J* = 1.6, 8.1, 17.0 Hz), 1.59-1.54 (m, 1H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 159.1, 143.9, 136.7, 132.1, 129.6, 127.4, 126.2, 124.9, 114.6, 114.4, 83.9, 64.4, 55.3, 35.9, 29.8, 27.9, 21.6.

HRMS: calcd.for $C_{21}H_{23}NO_4S_2$+H: 418.1141; found: 418.1132.

5-((4-Bromophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5i) :



According to the general procedure the product was isolated in 78% yield using the mixture of ethyl acetate/hexanes (9:91) as an eluent for column chromatography.

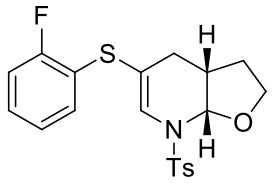
FTIR ($CHCl_3$): 3055, 2980, 1636, 1598, 1467, 1425, 1362, 1264, 1170, 1097, 1043, 898, 737 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.80 (d, 2H, *J* = 8.3 Hz), 7.40-7.34 (m, 2H), 7.33-7.29 (m, 2H), 7.13-7.13 (m, 1H), 7.07-7.05 (m, 2H), 5.53 (d, 1H, *J* = 4.3 Hz), 3.81 (dt, 1H, *J* = 4.6, 8.9 Hz), 3.75 (q, 1H, *J* = 8.0 Hz), 2.43 (s, 3H), 2.35-2.27 (m, 1H), 2.17 (dd, 1H, *J* = 6.7, 17.0 Hz), 2.13-2.05 (m, 1H), 1.90 (ddd, 1H, *J* = 1.9, 10.4, 19.0 Hz), 1.73-1.65 (m, 1H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.2, 137.5, 135.0, 132.1, 130.0, 129.8, 129.3, 127.6, 120.1, 108.0, 83.7, 64.3, 35.7, 29.9, 28.3, 21.7.

HRMS: calcd.for $C_{20}H_{20}NO_3BrS_2$+H: 466.0141; found: 466.0140.

5-((2-Fluorophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5k) :



According to the general procedure the product was isolated in 76% yield using the mixture of ethyl acetate/hexanes (9:91) as an eluent for column chromatography.

mp: 150-152 ºC

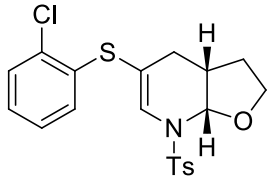
FTIR (KBr): 3057, 2960, 2255, 1639, 1466, 1362, 1258, 1172, 1103, 1043, 910, 744, 663 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.80 (d, 2H, *J* = 8.3 Hz), 7.31 (d, 2H, *J* = 8.1 Hz), 7.20-7.13 (m, 3H), 7.07-7.00 (m, 2H), 5.52 (d, 1H, *J* = 4.4 Hz), 3.82 (dt, 1H, *J* = 4.6, 8.8 Hz), 3.74 (q, 1H, *J* = 8.0 Hz), 2.43 (s, 3H), 2.35-2.29 (m, 1H), 2.20 (dd, 1H, *J* = 6.5, 16.9 Hz), 2.13-2.04 (m, 1H), 1.93 (ddd, 1H, *J* = 1.7, 8.3, 17.0 Hz), 1.73-1.66 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 160.6 (d, *J* = 245.9 Hz), 159.4, 144.1, 136.7, 130.6, 129.8, 129.3, 128.3 (d, *J* = 7.5 Hz), 127.5, 124.6 (d, *J* = 3.6 Hz), 122.8 (d, *J* = 17.3 Hz), 115.8 (d, *J* = 21.7 Hz), 107.1, 83.8, 64.4, 35.8, 29.9, 28.4, 21.7.

HRMS: calcd.for $C_{20}H_{20}FNO_3S_2$+Na: 428.0761; found: 428.0766.

5-((2-Chlorophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5l) :



According to the general procedure the product was isolated in 88% yield using the mixture of ethyl acetate/hexanes (1:9) as an eluent for column chromatography.

mp: 135-137 ºC.

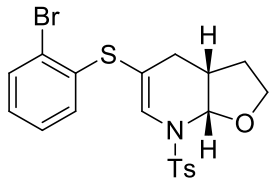
FTIR (KBr): 2924, 2895, 2852, 1636, 1597, 1450, 1431, 1366, 1348, 1247, 1168, 1103, 1032, 968, 752, 664 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.80 (d, 2H, *J* = 8.3 Hz), 7.33-7.30 (m, 3H), 7.17-7.03 (m, 4H), 5.55 (d, 1H, *J* = 4.2 Hz), 3.84 (dt, 1H, *J* = 4.4, 8.7 Hz), 3.78 (q, 1H, *J* = 8.0 Hz), 2.43 (s, 3H), 2.39-2.32 (m, 1H), 2.23 (dd, 1H, *J* = 6.8, 17.2 Hz), 2.17-2.08 (m, 1H), 1.97 (ddd, 1H, *J* = 1.8, 8.7, 17.1 Hz), 1.76-1.69 (m, 1H).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.3, 136.7, 135.6, 132.4, 130.9, 129.9, 129.8, 127.8, 127.6, 127.2, 126.7, 106.4, 83.7, 64.3, 35.6, 30.0, 28.5, 21.7.

HRMS: calcd.for $C_{20}H_{20}NO_3ClS_2$+H: 422.0646; found: 422.0669.

5-((2-Bromophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5m) :



According to the general procedure the product was isolated in 80% yield using the mixture of ethyl acetate/hexanes (9:91) as an eluent for column chromatography.

mp: 125-127 ºC.

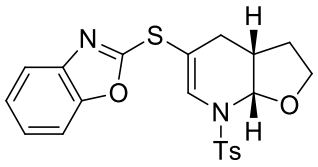
FTIR (KBr): 3054, 2982, 2958, 2930, 1637, 1599, 1446, 1367, 1265, 1217, 1168, 1102, 1044, 909, 740, 664, 650 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.80 (d, 2H, *J* = 8.3 Hz), 7.51-7.48 (m, 1H), 7.31 (d, 2H, *J* = 8.0 Hz), 7.22-7.18 (m, 2H), 7.02-6.98 (m, 2H), 5.55 (d, 1H, *J* = 4.2 Hz), 3.85 (dt, 1H, *J* = 4.4, 8.8 Hz), 3.78 (q, 1H, *J* = 8.2 Hz), 2.43 (s, 3H), 2.37-2.32 (m, 1H), 2.24 (dd, 1H, *J* = 6.8, 17.2 Hz), 2.18-2.09 (m, 1H), 1.98 (ddd, 1H, *J* = 1.9, 8.7, 17.0 Hz), 1.77-1.70 (m, 1H).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.3, 137.7, 136.7, 133.2, 131.0, 129.8(5), 129.8(2), 127.8, 127.6, 126.9, 122.1, 106.8, 83.7, 64.2, 35.6, 30.0, 28.5, 21.7.

HRMS: calcd.for $C_{20}H_{20}NO_3BrS_2$+H: 466.0141; found: 466.0138.

2-((7-Tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridin-5-yl)thio)benzo[d]oxazole (5p) :



According to the general procedure the product was isolated in 91% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

mp: 169-171 ºC.

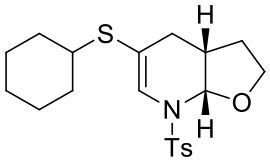
FTIR (KBr): 3057, 2985, 1450, 1375, 1248, 1088, 1049, 932, 848, 737, 613 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.82 (d, 2H, *J* = 8.3 Hz), 7.35-7.33 (m, 3H), 7.28-7.26 (m, 2H), 7.12 (s, 1H), 7.01-6.99 (m, 1H), 5.60 (d, 1H, *J* = 4.3 Hz), 3.87 (dt, 1H, *J* = 5.4, 8.5 Hz), 3.71 (q, 1H, *J* = 8.5 Hz), 2.66-2.62 (m, 2H), 2.45 (s, 3H), 2.41-2.36 (m, 1H), 2.25-2.16 (m, 1H), 2.12-2.04 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 180.2, 147.6, 144.4, 136.6, 133.0, 129.8, 127.5, 126.7, 125.2, 124.6, 112.2, 110.6, 109.8, 84.6, 65.1, 36.1, 29.6, 23.8, 21.7.

HRMS: calcd.for $C_{21}H_{20}N_2O_4S_2$+H: 429.0937; found: 429.0929.

5-(Cyclohexylthio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5o) :



According to the general procedure the product was isolated in 86% yield using the mixture of ethyl acetate/hexanes (6:94) as an eluent for column chromatography.

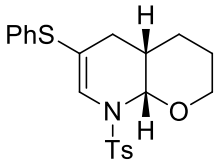
FTIR ($CHCl_3$): 2985, 2938, 1462, 1447, 1374, 1299, 1243, 1168, 1100, 1047, 913, 738, 647 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.77 (d, 2H *J* = 8.3 Hz), 7.28 (d, 2H, *J* = 8.3 Hz), 6.86 (s, 1H), 5.48 (d, 2H, *J* = 4.5 Hz), 3.81 (dt, 1H, *J* = 4.8, 8.6 Hz), 3.76 (q, 1H, *J* = 7.6 Hz), 2.75-2.71 (m, 1H), 2.41 (s, 3H), 2.34-2.23 (m, 2H), 2.13-2.07 (m, 1H), 1.97 (ddd, 1H, *J* = 1.6, 7.7, 16.5 Hz), 1.85-1.83 (m, 2H), 1.77-1.71 (m, 3H), 1.36-1.12 (m, 6H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 143.8, 136.8, 129.6, 127.4, 126.8, 109.8, 84.0, 64.5, 44.3, 36.0, 33.4, 33.2, 29.9, 25.9, 25.8, 21.6.

HRMS: calcd.for $C_{20}H_{28}NO_3S_2$+H: 394.1505; found: 394.1506.

6-(Phenylthio)-8-tosyl-3,4,4a,5,8,8a-hexahydro-2H-pyrano[2,3-b]pyridine (5a') :



According to the general procedure the product was isolated in 30% yield using the mixture of ethyl acetate/hexanes (3:97) as an eluent for column chromatography.

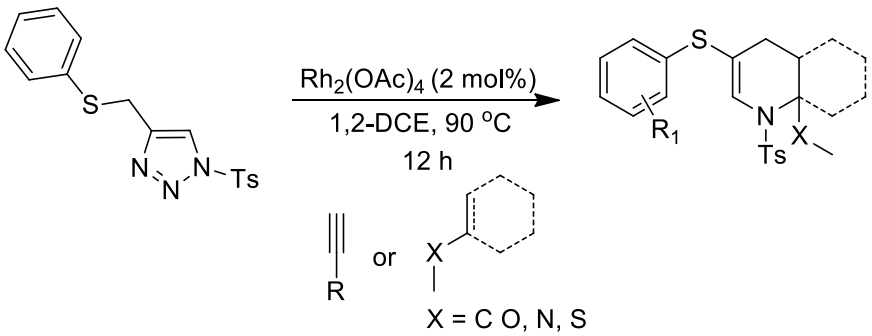
FTIR ($CHCl_3$): 3058, 2925, 2855, 1636, 1596, 1582, 1473, 1443, 1360, 1305, 1267, 1230, 1167, 1071, 1026, 986, 870, 667 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.70 (d, 2H, J = 8.2 Hz), 7.25-7.06 (m, 7H), 6.93 (s, 1H), 5.20 (s, 1H), 3.88-3.84 (m, 1H), 3.57-3.51 (m, 1H), 2.54-2.38 (m, 1H), 2.34 (s, 1H), 1.93-1.47 (m, 8H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.1, 141.7, 137.0, 136.0, 129.7, 129.0, 128.2, 127.6, 126.0, 109.2, 82.0, 68.3, 32.6, 27.2, 26.5, 21.7, 20.2.

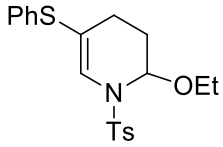
HRMS: calcd.for $C_{21}H_{23}NO_3S_2$+H: 402.1192; found: 402.1188.

7. General procedure for the synthesis of tetrahydropyridines (6-11, 16), dihydropyridine (14 and 15) and cyclohexenes (18):



4-((Phenylthio)methyl)-1-tosyl-1,2,3-triazole (50 mg, 0.144 mmol) and $Rh_2(OAc)_4$ (1.28 mg, 0.0028 mmol, 2 mol%) and 1,2-DCE (1 mL) were added under nitrogen atmosphere to an oven dried 10 mL reaction tube equipped with stir bar. The dienophile (0.576 mmol) was introduced through syringe; next, the reaction tube was sealed and stirred at 90 °C for 12 h. After the TLC analysis, it was cooled to room temperature and purified by column chromatography using hexane/ethyl acetate mixture as eluent to afford products in high yield and purity.

2-Ethoxy-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (6) :



According to the general procedure the product was isolated in 84% yield using the mixture of ethyl acetate/hexanes (8:92) as an eluent for column chromatography.

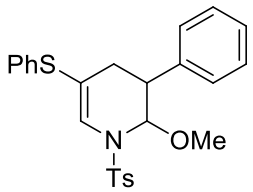
FTIR ($CHCl_3$): 3056, 2981, 2928, 1595, 1427, 1359, 1265, 1169, 1103, 738, 564 cm^{-1}.

^1H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.69 (d, 2H, J = 7.9 Hz), 7.33 (d, 2H, J = 8.2 Hz), 7.23-7.20 (m, 2H), 7.15-7.12 (m, 3H), 7.07 (s, 1H), 5.24 (s, 1H), 3.87-3.80 (m, 1H), 3.66-3.60 (m, 1H), 2.45 (s, 1H), 2.39-2.31 (m, 1H), 1.93-1.83 (m, 2H), 1.20 (t, 3H, J = 7.0 Hz), 1.05-0.98 (m, 1H).

$^{13}C\{^1H\}$ NMR (125 MHz, $CDCl_3$, 24 °C): δ 144.1, 136.4, 136.1, 130.0, 129.0, 128.9, 127.7, 127.0, 125.8, 114.1, 80.7, 63.2, 26.7, 22.6, 21.7, 15.0.

HRMS: calcd.for $C_{20}H_{23}NO_3S_2$+K: 428.0751; found: 428.0760.

2-Methoxy-3-phenyl-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (7) :



According to the general procedure the product was isolated in 60% yield using the mixture of ethyl acetate/hexanes (5:95) as an eluent for column chromatography.

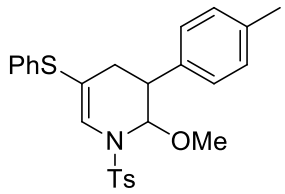
FTIR ($CHCl_3$): 3054, 2985, 2928, 1632, 1597, 1583, 1440, 1423, 1362, 1343, 1265, 1189, 1168, 1103, 1070, 943, 909, 739, 650 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.30-7.23 (m, 4H), 7.20-7.18 (m, 1H), 7.11-7.06 (m, 4H), 6.97-6.93 (m, 4H), 6.89 (d, 1H, *J* = 7.3 Hz), 5.32-5.30 (m, 1H), 3.57 (s, 3H), 3.36 (dd, 1H, *J* = 2.3, 7.1 Hz), 2.82 (ddd, 1H, *J* = 2.1, 7.4, 17.9 Hz), 2.36 (s, 3H), 2.24 (d, 1H, *J* = 17.8 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 143.3, 139.0, 136.4, 135.3, 129.7, 129.4, 129.0, 128.5, 128.1, 127.5, 126.8, 126.6, 111.7, 87.2, 55.9, 41.3, 27.8, 21.6.

HRMS: calcd.for $C_{25}H_{25}NO_3S_2$+Na: 474.1168; found: 474.1174.

2-Methoxy-5-(phenylthio)-3-(p-tolyl)-1-tosyl-1,2,3,4-tetrahydropyridine (8) :



According to the general procedure the product was isolated in 70% yield using the mixture of ethyl acetate/hexanes (5:95) as an eluent for column chromatography.

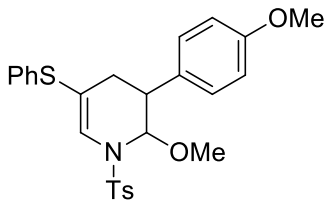
FTIR ($CHCl_3$): 3055, 2983, 2929, 1632, 1595, 1357, 1265, 1169, 1099, 909, 736, 657 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.30-7.22 (m, 4H), 7.19-7.15 (m, 1H), 7.11-7.06 (m, 3H), 6.94 (d, 2H, *J* = 8.0 Hz), 6.75-6.70 (m, 4H), 5.26-5.25 (m, 1H), 3.55 (s, 3H), 3.30 (dd, 1H, *J* = 2.4, 7.2 Hz), 2.79 (ddd, 1H, *J* = 2.1, 7.5, 17.9 Hz), 2.36 (s, 3H), 2.24 (s, 3H), 2.20 (d, 1H, *J* = 17.9 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 143.0, 136.5, 136.4, 136.0, 135.3, 129.5, 129.4, 129.0(3), 129.0(1), 128.0, 127.2, 126.6, 112.0, 87.3, 55.8, 41.0, 27.8, 21.6, 21.1.

HRMS: calcd.for $C_{26}H_{27}NO_3S_2$+Na: 488.1325; found: 488.1330.

2-Methoxy-3-(4-methoxyphenyl)-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (9) :



According to the general procedure the product was isolated in 72% yield using the mixture of ethyl acetate/hexanes (6:94) as an eluent for column chromatography.

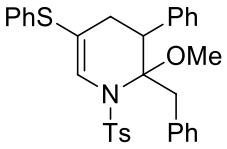
FTIR ($CHCl_3$): 2984, 2924, 1646, 1583, 1450, 1404, 1375, 1095, 1049, 931, 848, 737, 612 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.21-7.13 (m, 4H), 7.09-7.06 (m, 4H), 7.11-7.06 (m, 2H), 6.85 (d, 2H, *J* = 8.0 Hz), 6.66 (d, 2H, *J* = 8.5 Hz), 6.33 (d, 2H, *J* = 8.7 Hz), 5.14-5.13 (m, 1H), 3.62 (s, 3H), 3.46 (s, 3H), 3.18 (dd, 1H, *J* = 2.4, 7.1 Hz), 2.79 (ddd, 1H, *J* = 2.0, 7.4, 17.9 Hz), 2.25 (s, 3H), 2.09 (d, 1H, *J* = 17.9 Hz).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 158.5, 143.2, 136.4, 135.2, 130.9, 129.4, 128.9, 128.2, 127.9, 126.5, 113.6, 111.7, 87.3, 55.7, 55.0, 40.4, 27.8, 21.4.

HRMS: calcd.for $C_{26}H_{27}NO_4S_2$+Na: 504.1274; found: 504.1279.

2-Benzyl-2-methoxy-3-phenyl-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (10) :



According to the general procedure the product was isolated in 36% yield using the mixture of ethyl acetate/hexanes (5:95) as an eluent for column chromatography.

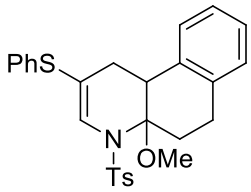
FTIR ($CHCl_3$): 3060, 2923, 2852, 1636, 1593, 1492, 1476, 1454, 1440, 1354, 1265, 1168, 1086, 1067, 1004, 910, 741, 662, 566, 408 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.82 (d, 2H, *J* = 8.3 Hz), 7.39-7.27 (m, 7H), 7.22 (d, 1H, *J* = 2.1 Hz), 7.17-7.09 (m, 8H), 6.98-6.96 (m, 2H), 4.11 (d, 1H, *J* = 14.1 Hz), 3.29 (s, 3H), 3.11-3.04 (m, 2H), 2.57-2.51 (m, 1H), 2.50 (s, 3H), 2.0 (dd, 1H, *J* = 4.6, 16.3 Hz).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 143.6, 139.5, 139.0, 135.9, 135.5, 131.7, 131.0, 129.7, 129.4, 128.9, 128.6, 128.3, 128.1, 127.5, 127.2, 126.7, 126.1, 114.3, 94.6, 53.3, 50.4, 39.8, 33.3, 21.7.

HRMS: calcd.for $C_{32}H_{31}NO_3S_2$+Na: 564.1638; found: 564.1643.

4a-Methoxy-2- (phenylthio)-4-tosyl-1,4,4a,5,6,10b-hexahydrobenzo[f]quinolone (11) :



According to the general procedure the product was isolated in 46% yield using the mixture of ethyl acetate/hexanes (5:95) as an eluent for column chromatography.

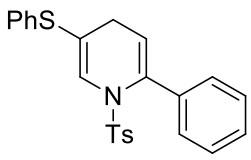
FTIR ($CHCl_3$): 3053, 2972, 1580, 1534, 1436, 1352, 1267, 1177, 1070, 1039, 899, 856, 736 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.78 (d, 2H, J = 8.3 Hz), 7.50 (d, 1H, J = 1.5 Hz), 7.30-7.27 (m, 3H), 7.25-7.22 (m, 2H), 7.19-7.07 (m, 3H), 7.04-7.00 (m, 2H), 6.89 (d, 1H, J = 7.8 Hz), 3.35-3.31 (m, 1H), 3.08-2.98 (m, 1H), 2.80 (s, 3H), 2.58-2.52 (m, 1H), 2.42 (s, 3H), 2.36-2.17 (m, 2H), 2.05 (s, 1H), 2.01 (s, 1H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 143.8, 138.7, 136.2, 135.9, 134.6, 133.1, 129.5, 129.1, 128.8, 128.5, 128.2, 127.7, 126.9, 126.3, 126.0, 106.6, 92.6, 50.5, 41.1, 36.3, 28.7, 26.3, 21.7.

HRMS: calcd.for $C_{27}H_{27}NO_3S_2$+K: 516.1064; found: 516.1078.

2-Phenyl-5-(phenylthio)-1-tosyl-1,4-dihydropyridine (14) :



According to the general procedure the product was isolated in 23% yield using the mixture of ethyl acetate/hexanes (4:96) as an eluent for column chromatography.

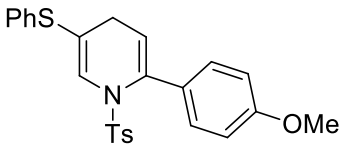
FTIR ($CHCl_3$): 3069, 2965, 2895, 1639, 1584, 1476, 1439, 1357, 1293, 1074, 911, 735, 650 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.62 (d, 2H, J = 8.3 Hz), 7.49-7.47 (m, 2H), 7.37-7.26 (m, 8H), 7.23-7.20 (m, 2H), 5.40 (t, 1H, J = 4.5 Hz), 2.48 (s, 3H), 2.31 (d, 2H, J = 4.4 Hz).

^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C): δ 144.4, 138.9, 137.4, 130.8, 130.0, 129.8, 129.5, 129.3, 129.2, 129.0, 128.4, 128.1, 127.9, 127.4, 127.0, 117.6, 29.1, 21.8.

HRMS: calcd.for $C_{24}H_{21}NO_2S_2$+H: 420.1086; found: 420.1081.

2-(4-Methoxyphenyl)-5-(phenylthio)-1-tosyl-1,4-dihydropyridine (15) :



According to the general procedure the product was isolated in 27% yield using the mixture of ethyl acetate/hexanes (4:96) as an eluent for column chromatography.

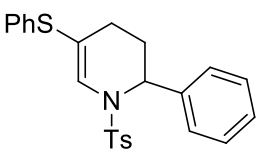
FTIR ($CHCl_3$): 3056, 2967, 2878, 1592, 1484, 1460, 1387, 1265, 1164, 1187, 1053, 876, 765 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.59 (d, 2H, J = 8.3 Hz), 7.39 (d, 2H, J = 8.8 Hz), 7.31-7.20 (m, 7H), 6.92 (s, 1H), 6.88 (d, 2H, J = 8.8 Hz), 5.29 (t, 1H, J = 4.5 Hz), 3.82 (s, 3H), 2.46 (s, 3H), 2.27 (d, 2H, J = 4.4 Hz).

^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C): δ 159.8, 144.3, 138.5, 133.6, 132.7, 130.8, 130.0, 129.8, 129.4, 129.1, 128.2, 128.0, 127.4, 124.7, 116.0, 113.5, 55.3, 29.0, 21.8.

HRMS: calcd.for $C_{25}H_{23}NO_3S_2$+H: 450.1192; found: 450.1186.

2-Phenyl-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (16) :



According to the general procedure the product was isolated in 25% yield using the mixture of ethyl acetate/hexanes (4:96) as an eluent for column chromatography.

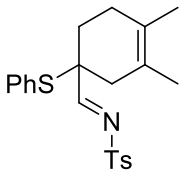
FTIR ($CHCl_3$): 3055, 2960, 2927, 2855, 1623, 1597, 1584, 1363, 1340, 1265, 1169, 1105, 1083, 955, 738, 704, 666 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.65 (d, 2H, *J* = 8.4 Hz), 7.49-7.49 (m, 1H), 7.29-7.09 (m, 12H), 5.24-5.23 (m, 1H), 2.43 (s, 3H), 2.03-1.97 (m, 1H), 1.86-1.73 (m, 2H), 1.57-1.53 (m, 1H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.0, 139.5, 136.2, 136.0, 131.1, 129.8, 128.9, 128.5, 128.0, 127.4, 127.1, 126.0, 125.9, 111.4, 55.4, 27.7, 23.0, 21.7.

HRMS: calcd.for $C_{24}H_{23}NO_2S_2$+H: 422.1243; found: 422.1253.

***N*-((3,4-Dimethyl-1-(phenylthio)cyclohex-3-en-1-yl)methylene)-4-methylbenzenesulfonamide (18a) :**



According to the general procedure (reaction was performed at 120 °C) the product was isolated in 46% yield using the mixture of ethyl acetate/hexanes (3:97) as an eluent for column chromatography.

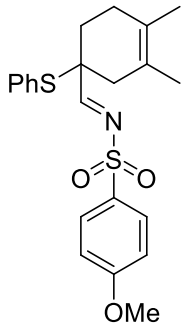
FTIR ($CHCl_3$): 2920, 2861, 1610, 1442, 1324, 1267, 1161, 1091, 909, 804, 734 cm^{-1}.

^1H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.31 (s, 1H), 7.65 (d, 2H, *J* = 8.3 Hz), 7.25 (d, 2H, *J* = 8.1 Hz), 7.22-7.18 (m, 1H), 7.16-7.14 (m, 2H), 2.40 (s, 3H), 2.23-2.08 (m, 3H), 1.87-1.78 (m, 3H), 1.53 (s, 3H), 1.49 (s, 3H).

$^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 174.7, 144.4, 137.5, 135.4, 129.7, 129.6, 128.8, 128.2, 128.0, 125.7, 122.1, 53.8, 38.0, 28.8, 21.7, 19.0, 18.7.

HRMS: calcd.for $C_{22}H_{25}NO_2S_2$+H: 400.1399; found: 400.1398.

***N*-((3,4-dimethyl-1-(phenylthio)cyclohex-3-en-1-yl)methylene)-4-methoxybenzenesulfonamide (18b) :**



According to the general procedure (reaction was performed at 120 ^{o}C) the product was isolated in 35% yield using the mixture of ethyl acetate/hexanes (3:97) as an eluent for column chromatography.

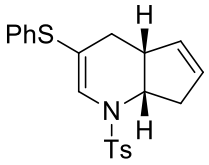
FTIR ($CHCl_3$): 3056, 2983, 2926, 1594, 1495, 1437, 1331, 1264, 1161, 1092, 1031, 908, 737 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.33 (s, 1H), 7.74 (d, 2H, *J* = 9.0 Hz), 7.25-7.23 (m, 1H), 7.21-7.18 (m, 2H), 7.11-7.07 (m, 2H), 6.96 (d, 2H, *J* = 8.9 Hz), 3.86 (s, 3H), 2.27-2.21 (m, 3H), 1.93-1.81 (m, 3H), 1.57 (s, 3H), 1.54 (s, 3H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 174.1, 163.6, 137.4, 130.0, 129.7, 129.5, 128.7, 128.1, 125.6, 122.0, 114.3, 55.7, 53.6, 37.9, 28.8, 28.7, 19.0, 18.6.

HRMS: calcd.for $C_{22}H_{25}NO_3S_2$+H: 417.1349; found: 417.1345.

3-(Phenylthio)-1-tosyl-4,4a,7,7a-tetrahydro-1*H*-cyclopenta[b]pyridine (20a) :



According to the general procedure the product was isolated in 28% yield using the mixture of ethyl acetate/hexanes (3:97) as an eluent for column chromatography.

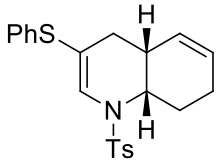
FTIR ($CHCl_3$): 3057, 2932, 2855, 1635, 1437, 1358, 1265, 1169, 1101, 1007, 903, 806, 738, 666 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.73 (d, 2H, *J* = 8.3 Hz), 7.35-7.23 (m, 3H), 7.26-7.22 (m, 2H), 7.16-7.13 (m, 3H), 5.84-5.82 (m, 1H), 5.79-5.74 (m, 1H), 4.63-4.61 (m, 1H), 2.46 (s, 3H), 2.43-2.40 (m, 1H), 2.22-2.15 (m, 1H), 1.97-1.84 (m, 3H).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.2, 136.2, 135.7, 134.0, 131.3, 130.9, 130.0, 129.0, 128.1, 127.2, 126.0, 109.6, 61.1, 38.0, 34.8, 30.3, 21.7.

HRMS: calcd.for $C_{21}H_{21}NO_2S_2$+H: 384.1086; found: 384.1089.

3-(Phenylthio)-1-tosyl-1,4,4a,7,8,8a-hexahydroquinoline (20b) :



According to the general procedure the product was isolated in 26% yield using the mixture of ethyl acetate/hexanes (3:97) as an eluent for column chromatography.

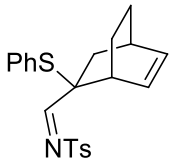
FTIR ($CHCl_3$): 3053, 2984, 2927, 2856, 1631, 1598, 1583, 1476, 1355, 1265, 1169, 1026, 910, 805, 792, 671, 652 cm^{-1}.

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C): δ 7.63 (d, 2H, *J* = 8.3 Hz), 7.24 (d, 2H, *J* = 8.0 Hz), 7.17-7.12 (m, 3H), 7.06-7.03 (m, 3H), 5.59-5.56 (m, 1H), 5.39-5.36 (m, 1H), 4.38 (m, 1H), 2.36 (s, 3H), 2.09 (ddd, 1H, *J* = 2.0, 11.0, 17.3 Hz), 1.89-1.85 (m, 2H), 1.71-1.53 (m, 4H).

^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C): δ 144.2, 136.4, 136.3, 130.1, 130.0, 129.4, 129.0, 128.0, 127.7, 127.1, 125.8, 110.5, 52.7, 29.1, 27.0, 25.2, 21.7, 20.4.

HRMS: calcd.for $C_{22}H_{23}NO_2S_2$+H: 398.1243; found: 398.1239.

4-Methyl-*N*-((2-(phenylthio)bicyclo[2.2.2]oct-5-en-2yl)methylene)benzenesulfonamide (22) :



According to the general procedure the product was isolated in 56% (dr; 1.5:1) yield using the mixture of ethyl acetate/hexanes (4:96) as an eluent for column chromatography.

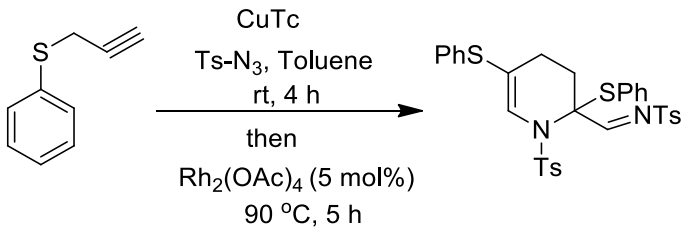
FTIR ($CHCl_3$): 3050, 2928, 2864, 1602, 1473, 1439, 1324, 1306, 1291, 1160, 1090, 1019, 813, 780, 750, 703, 694, 668 cm^{-1}.

^1H NMR (500 MHz, $CDCl_3$, 24 °C): δ 8.37 (s, 0.65H), 8.11 (s, 1H), 7.67 (d, 1.5H, *J* = 8.3 Hz), 7.59 (d, 2H, *J* = 8.2 Hz), 7.24-7.09 (m, 8H), 7.02-6.98 (m, 3.4H), 6.36-6.27 (s, 1.3H), 6.14-6.10 (m, 1H), 6.00-5.97 (m, 1H), 2.64-2.54 (m, 3H), 2.46-2.41 (m, 1H), 2.37 (s, 2H), 2.36 (s, 3H), 2.23 (dd, 1H, *J* = 2.5, 13.9 Hz), 2.04 (td, 1H, *J* = 3.3, 13.6 Hz), 1.68- 1.60 (m, 1H), 1.47 (dd, 1H, *J* = 2.1, 11.6 Hz), 1.38-1.20 (m, 4H).

$^{13}C\{^1H\}$ NMR (125 MHz, $CDCl_3$, 24 °C): δ 176.0, 175.6, 144.5, 144.2, 136.6, 136.5, 135.9, 135.4, 135.3, 134.9, 132.9, 132.8, 131.3, 129.8, 129.6, 129.4, 129.3, 129.2, 128.9, 128.0, 127.9, 127.1, 58.9, 58.5, 36.9, 36.1, 34.7, 33.5, 30.2, 30.0, 25.5, 22.9, 22.8, 21.7, 21.7, 20.0.

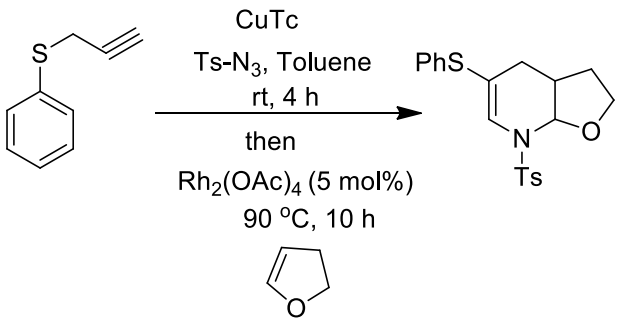
HRMS: calcd.for $C_{22}H_{23}NO_2S_2$+H: 398.1243; found: 398.1265.

8. One-pot synthesis of compound 3a from phenylpropargyl sulfide:



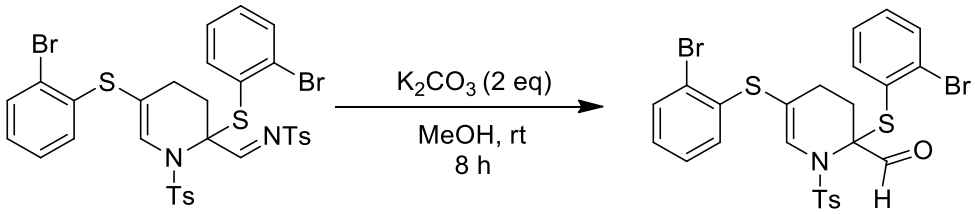
Phenylpropargyl sulfide (96 mg, 0.649 mmol, 1 equiv) and CuTc (12 mg, 0.1 equiv) in toluene (4 mL) was added tosyl azide (128 mg, 0.649 mmol, 1 equiv) at room temperature under N_2 atmosphere. The reaction mixture was stirred at room temperature for 4 h. After the consumption of starting material, $Rh_2(OAc)_4$ (14.34 mg, 0.0324 mmol, 5 mol%) was added to the reaction tube and stirred at 90 °C for 5 h. After the TLC analysis, it was cooled to room temperature and purified by column chromatography using hexane/ethyl acetate mixture as eluent to afford tetrahydropyridine **3a** in 66% yield.

9. One-pot synthesis of compound 5a from phenylpropargyl sulfide:



Phenylpropargyl sulfide (96 mg, 0.649 mmol, 1 equiv) and CuTc (12 mg, 0.1 equiv) in toluene (4 mL) was added tosyl azide (128 mg, 0.649 mmol, 1 equiv) at room temperature under N_2 atmosphere. The reaction mixture was stirred at room temperature for 4 h. After the consumption of starting material, $Rh_2(OAc)_4$ (14.34 mg, 0.0324 mmol, 5 mol%) and 2,3-dihydrofuran (181 mg, 2.596 mmol) were added to the reaction tube and stirred at 90 °C for 10 h. After the TLC analysis, it was cooled to room temperature and purified by column chromatography using hexane/ethyl acetate mixture as eluent to afford fused tetrahydropyridine **5a** in 69% yield.

10. Synthesis of compound 24:



Compound **3m** (50 mg, 0.063 mmol) and K_2CO_3 (0.126 mmol, 2 equiv) were added under nitrogen atmosphere to an oven dried 10 mL reaction tube equipped with stir bar. 4 mL of MeOH was introduced through syringe and the reaction mixture was stirred at room temperature for 8 h. After the TLC analysis, the reaction mixture was dilute with water (10 mL) and extracted with DCM (2 x 5 mL). The combined organic layer was dried over (Na_2SO_4) and filtered. Evaporation of solvent under reduced pressure followed by column chromatography of the crude product afforded the aldehyde **24** in 70% yield.

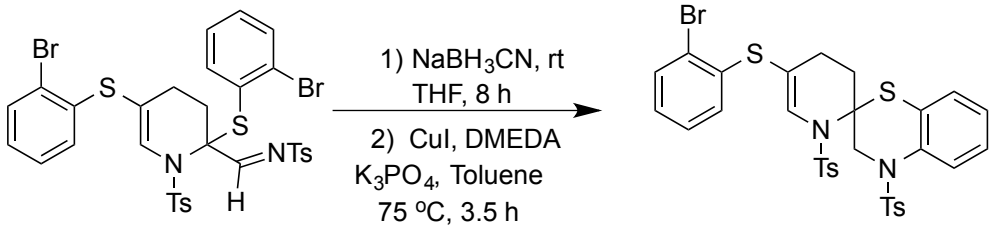
FTIR ($CHCl_3$): 2925, 2855, 1748, 1623, 1596, 1424, 1371, 1264, 1169, 1100, 1020, 910, 744, 653 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 9.90 (s, 1H), 7.72-7.61 (m, 4H), 7.54-7.52 (m, 1H), 7.36-7.28 (m, 4H), 7.22-7.18 (m, 3H), 7.06-6.99 (m, 1H), 2.53-2.46 (m, 1H), 2.44 (s, 3H), 2.13 (dd, 2H, *J* = 5.9, 18.1 Hz), 2.02-1.82 (m, 2H).

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C): δ 189.9, 145.1, 139.4, 137.2, 136.9, 136.0, 133.9, 133.3, 131.7, 131.3, 130.1, 128.4, 128.3, 127.9, 127.7, 127.3, 126.8, 122.7, 113.7, 76.2, 28.6, 24.9, 21.7.

HRMS: calcd.for $C_{25}H_{21}NO_3Br_2S_3$+Na: 659.8943; found: 659.8948.

11. Synthesis of compound 25:



over all yield for two steps 54%

Sodium cyanoborohydride (0.189, 1.5 equiv) was added a solution of compound **3m** (100 mg, 0.126 mmol) in dry THF (5 mL) at room temperature. The reaction mixture was stirred at rt for 8 h. After the TLC analysis, the reaction mixture was quenched with addition of water (10 mL) and extracted with EtOAc (2 x 5 mL). The combined organic layer was dried over (Na_2SO_4) and filtered. Evaporation of solvent resulted in the amide, which was used in the next step without further purification.

The amide obtained above was dissolved in 2 mL of toluene in reaction tube, subsequently, CuI (5 mol%), *N*,*N*'-dimethylethylenediamine (DMEDA) (10 mol%) and K_3PO_4 (2 equiv) were added under nitrogen atmosphere. The reaction tube was sealed and stirred at 75 °C for 1.5 h. After the TLC analysis, the reaction mixture was cooled to room temperature and purified by column chromatography using ethyl acetate hexane/ hexane (1:9) mixture as eluent to afford benzo[b][1,4]thiazine-2,2'-pyridine **25** in overall yield of 54% for two steps.

FTIR ($CHCl_3$): 2955, 2865, 1709, 1575, 1362, 1294, 1175, 1079, 1028, 967, 924, 660, 569, 428 cm^{-1}.

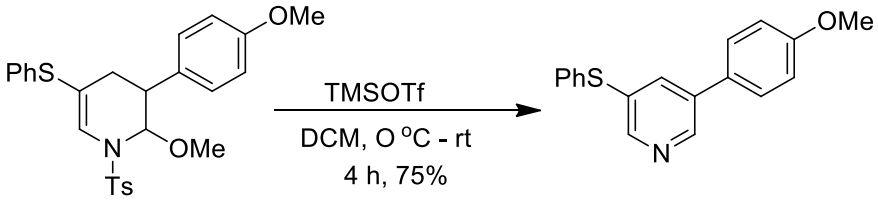
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 7.76 (d, 2H, *J* = 8.3 Hz), 7.68 (d, 2H, *J* = 8.4 Hz), 7.53 (dd, 1H, *J* = 1.1, 7.9 Hz), 7.40 (s, 1H), 7.35 (d, 2H, *J* = 8.1 Hz), 7.30-7.23 (m, 4H), 7.11 (dd, 1H, *J* = 1.5, 7.9

Hz), 7.07-6.95 (m, 4H), 4.70 (d, 1H, *J* = 13.7 Hz), 4.39 (d, 1H, *J* = 13.7 Hz), 2.73 (s, 1H), 2.58-2.47 (s, 2H), 2.45 (s, 6H).

$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 144.7, 144.3, 138.3, 137.6, 137.4, 137.3, 133.4, 133.3, 130.2, 129.8, 128.0, 127.9, 127.7, 127.2, 127.1(8), 127.1(3), 127.0, 126.9, 125.7, 125.3, 121.4, 110.0, 71.6, 55.6, 37.6, 24.3, 21.7, 21.7.

HRMS: calcd.for $C_{32}H_{29}N_2O_4BrS_4$+H: 713.0266; found: 713.0278.

12. Synthesis of 3-(4-methoxyphenyl)-5-(phenylthio)pyridine 26 :



Compound **9** (50 mg, 0.1 mmol, 1 equiv) in dichloromethane (2 mL) at 0 °C was added TMSOTf (0.259 mmol, 2.5 equiv) drop wise over 5 min. The reaction mixture was then slowly allowed to come to room temperature over 4 h and an aqueous solution of saturated bicarbonate (3 mL) was added. The reaction was extracted with DCM (3 x 5 mL) and the combined organic part was dried over Na_2SO_4, filtered and evaporated under reduced pressure. The crude product was purified by column chromatography using hexane/ethyl acetate (9:91) mixture as eluent to afford 3-(4-methoxyphenyl)-5-(phenylthio)pyridine **26** in 75% yield.

FTIR ($CHCl_3$): 3057, 2959, 2924, 2852, 1609, 1578, 1513, 1475, 1462, 1439, 1421, 1322, 1216, 1107, 1083, 1047, 829, 808, 743, 705, 691, 663 cm^{-1}.

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C): δ 8.58 (d, 1H, *J* = 2.1 Hz), 8.39 (d, 1H, *J* = 2.1 Hz), 7.68 (t, 1H, *J* = 2.1 Hz), 7.40-7.33 (m, 4H), 7.29-7.26 (m, 2H), 7.19 (s, 1H), 6.91 (d, 2H, *J* = 8.8 Hz), 3.78 (s, 3H).

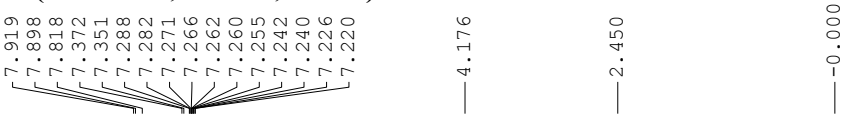
$^{13}C\{^{1}H\}$ NMR (100 MHz, $CDCl_3$, 24 °C): δ 160.1, 149.1, 146.2, 136.8, 135.8, 134.1, 133.5, 131.8, 129.6, 129.5, 128.4, 128.0, 114.7, 55.5.

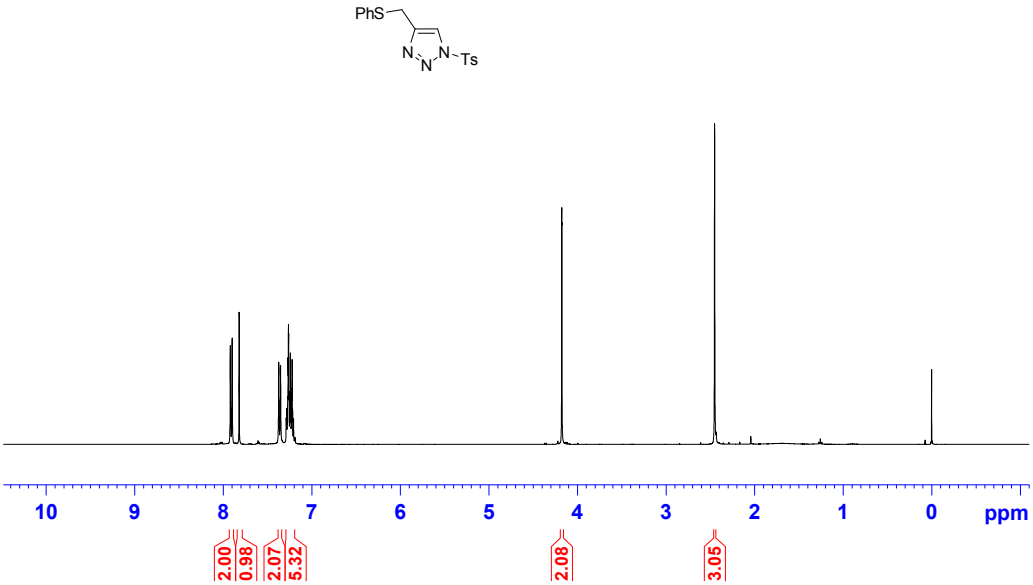
HRMS: calcd.for $C_{18}H_{15}NOS$+H: 294.0947; found: 294.0951.

13. NMR spectra of isolated compounds:

4-((Phenylthio)methyl)-1-tosyl-1,2,3-triazole (1a) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



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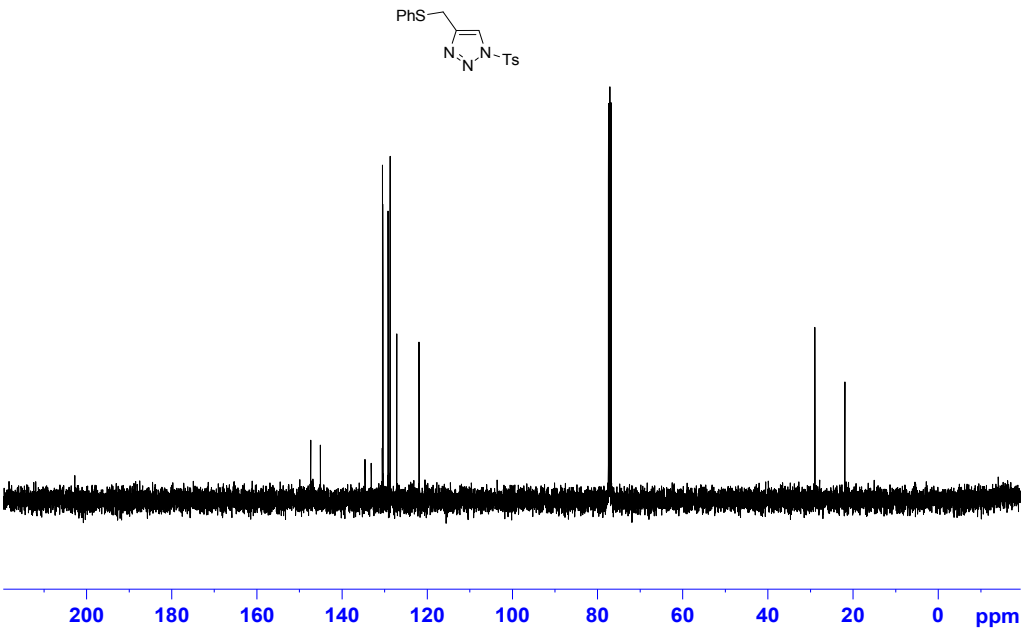
Current Data Parameters
NAME            spa41014
EXPNO               1125
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141031
Time              16.07
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG           zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE                300.3 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300095 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

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Current Data Parameters
NAME            spa41014
EXPNO               1126
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141031
Time              16.14
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG         zgpg30
TD                16540
SOLVENT           CDCl3
NS                  256
DS                    4
SWH           24038.461 Hz
FIDRES         1.453353 Hz
AQ             0.3440820 sec
RG                28.27
DW                20.800 usec
DE                 6.50 usec
TE                301.0 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127578 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```
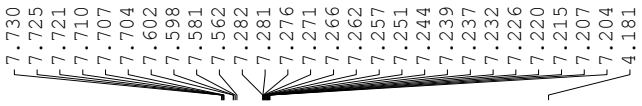
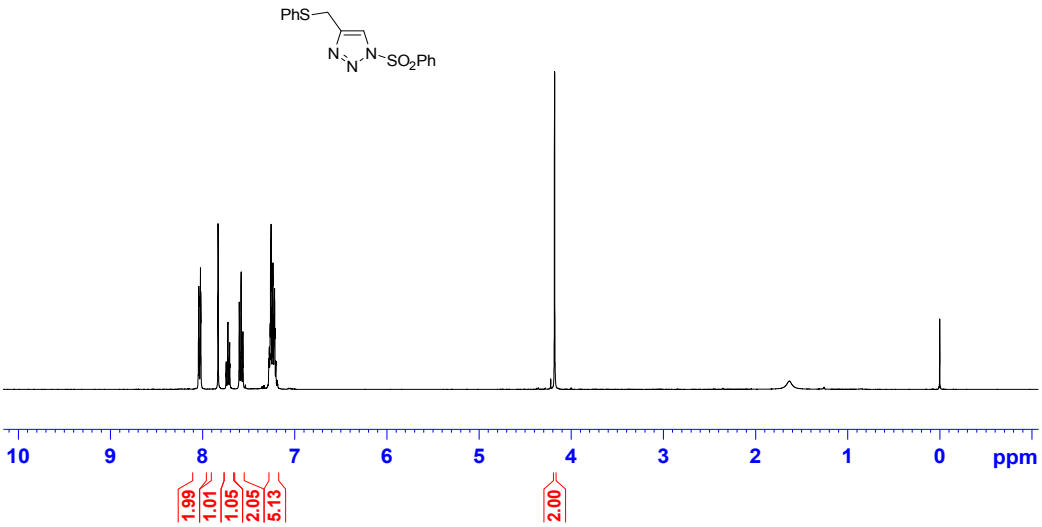

1- (Phenylsulfonyl)-4- ((phenylthio)methyl)-1,2,3-triazole (1b) :

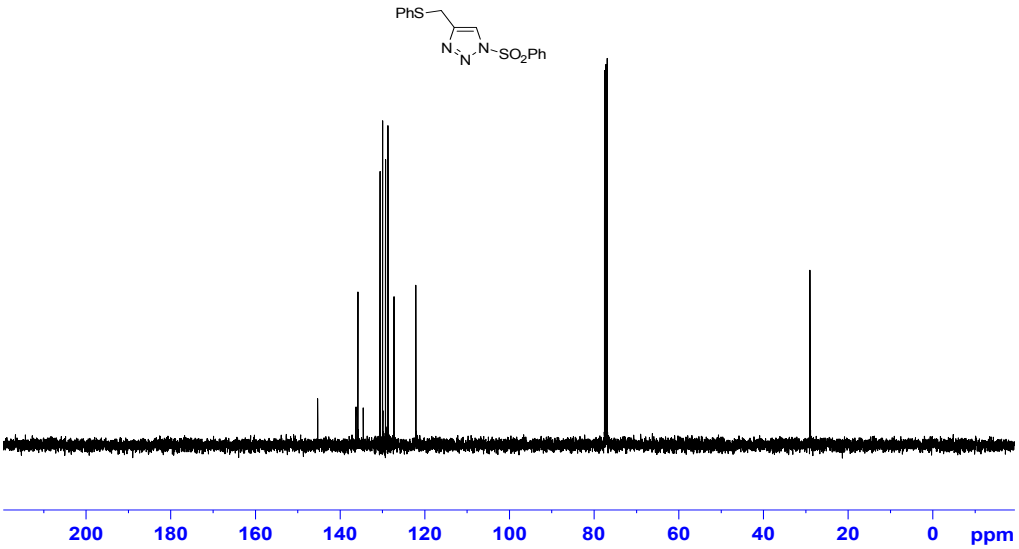
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME                  spa40914
EXPNO                      420
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140920
Time                      8.28
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                       6.50 usec
TE                  0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300087 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

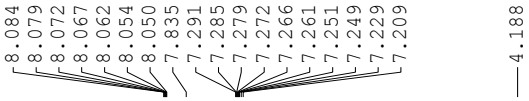
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

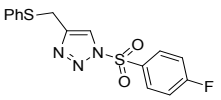


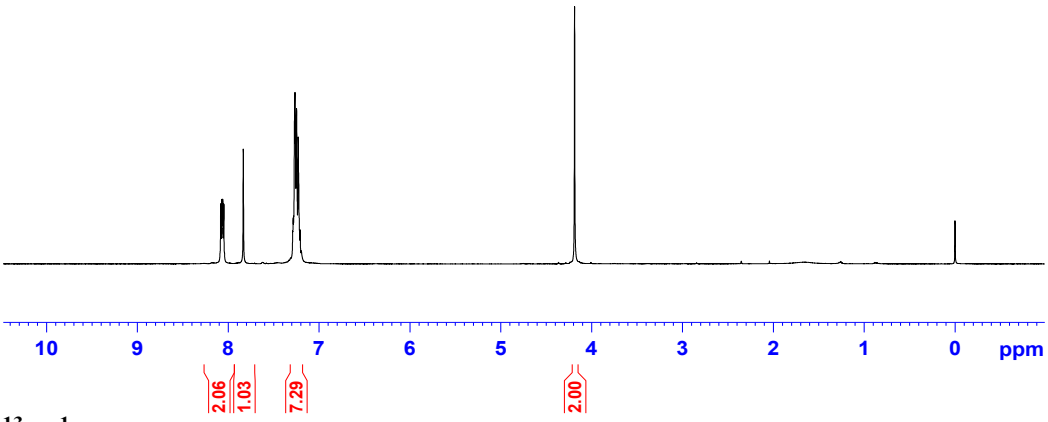

```
Current Data Parameters
NAME                  spa40914
EXPNO                      421
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140920
Time                      8.35
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                  0 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127572 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

1-((4-Fluorophenyl)sulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1c) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)

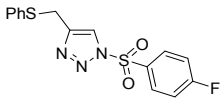


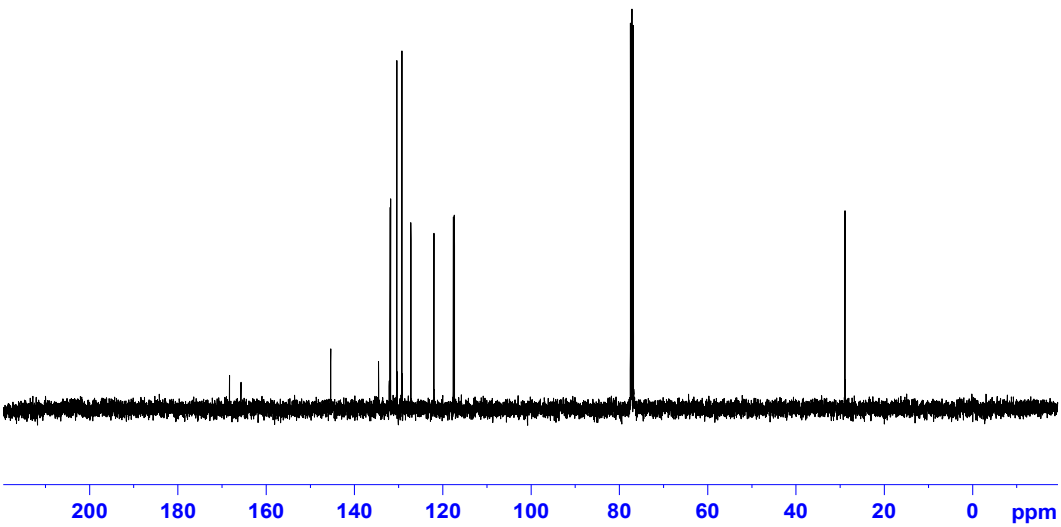





```
Current Data Parameters
NAME            spa41014
EXPNO                184
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141006
Time                20.27
INSTRUM             spect
PROBHD    5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                 200.34
DW                 62.400 usec
DE                   6.50 usec
TE                  299.1 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300090 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

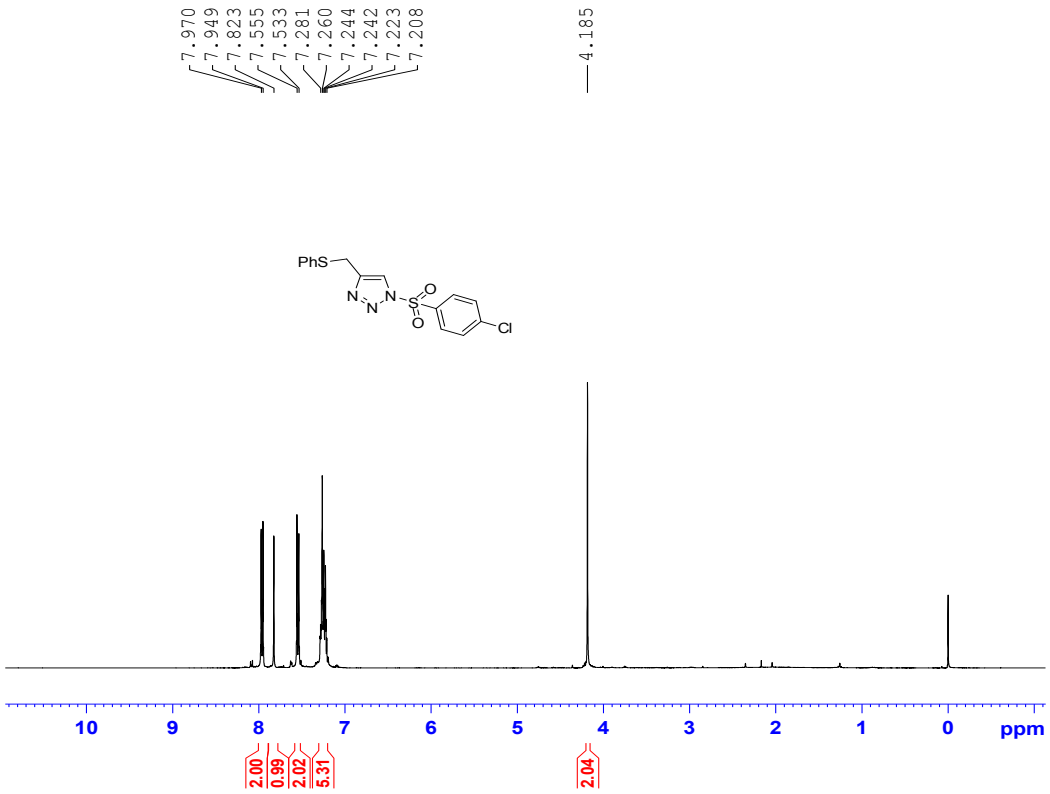





```
Current Data Parameters
NAME            spa41014
EXPNO                185
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141006
Time                20.34
INSTRUM             spect
PROBHD    5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                   6.50 usec
TE                  299.6 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1           47.00000000 W
SFO1          100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2          400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127558 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

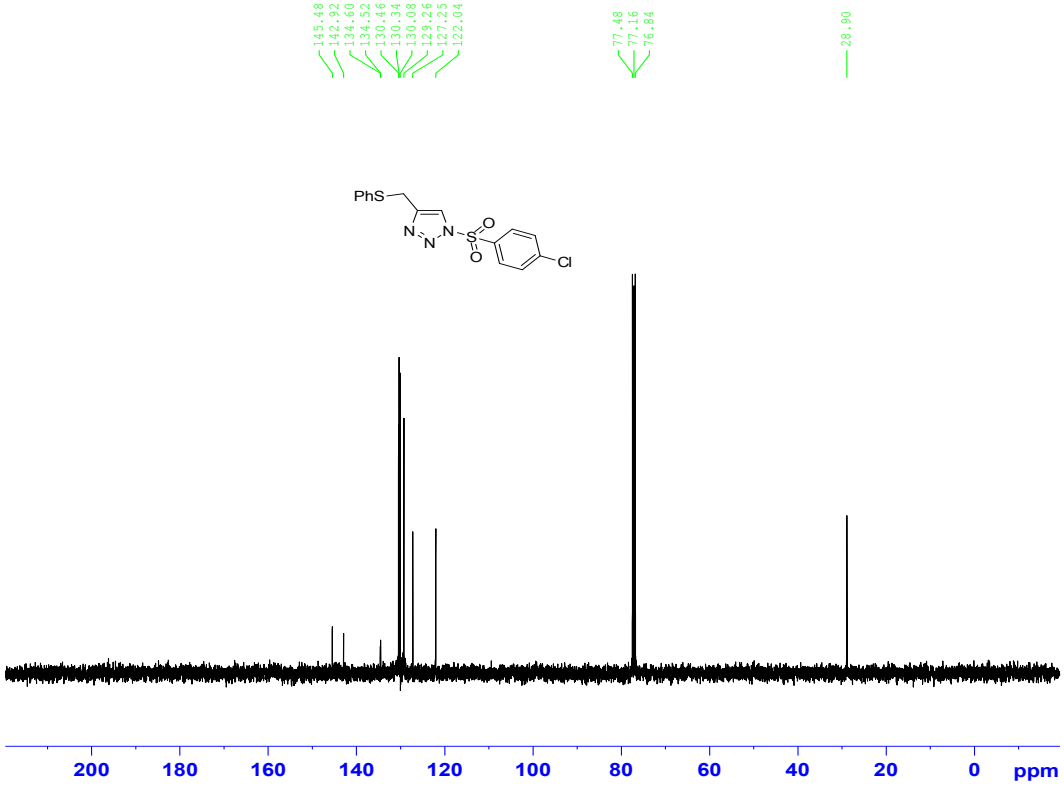
1-((4-Chlorophenyl)sulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1d) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                      621
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141016
Time_                    23.40
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                       6.50 usec
TE                      301.0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300095 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

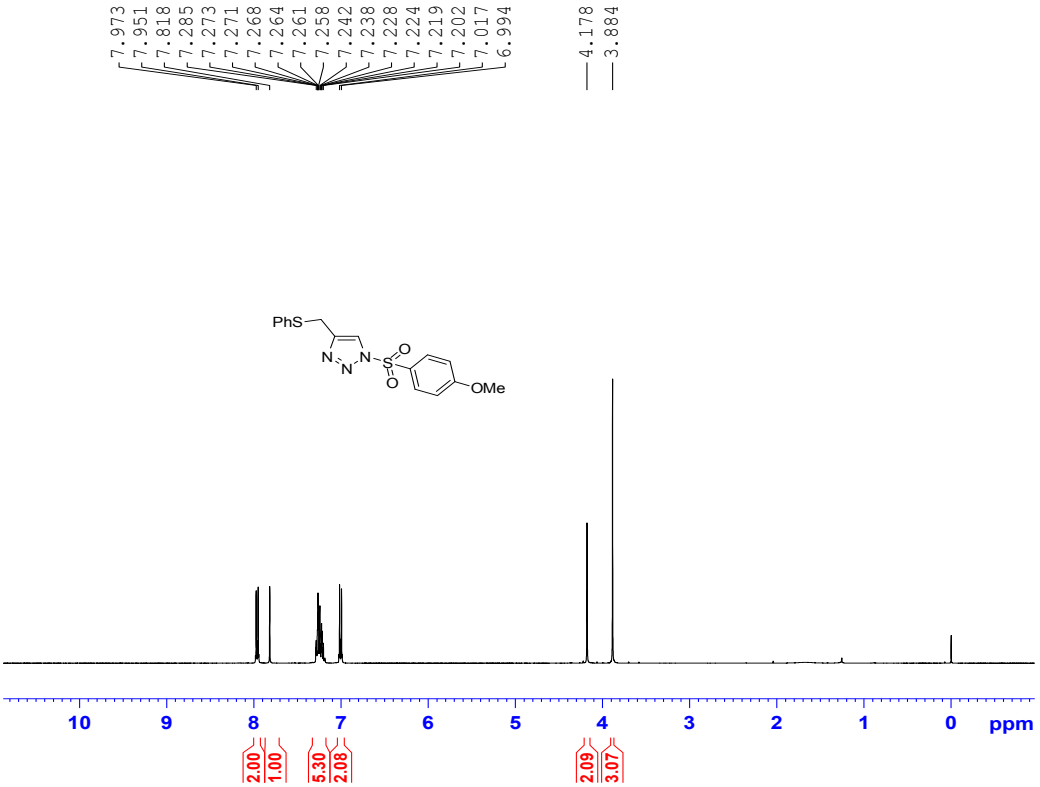
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                      622
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141016
Time_                    23.47
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      301.7 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127546 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

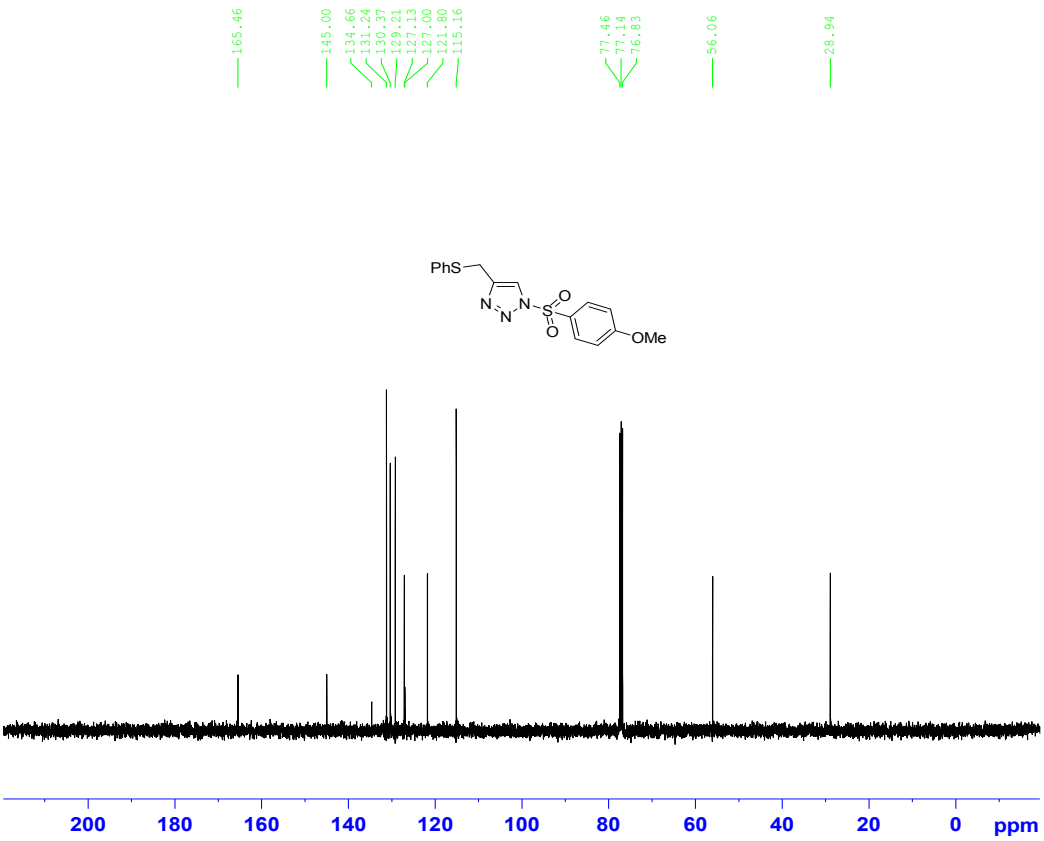
1-((4-Methoxyphenyl)sulfonyl)-4-((phenylthio)methyl)-1,2,3-triazole (1e) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                 57
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140911
Time                0.33
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                 169.77
DW                 62.400 usec
DE                   6.50 usec
TE                  297.8 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1            7.75000000 W
SFO1          400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF            400.1300093 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

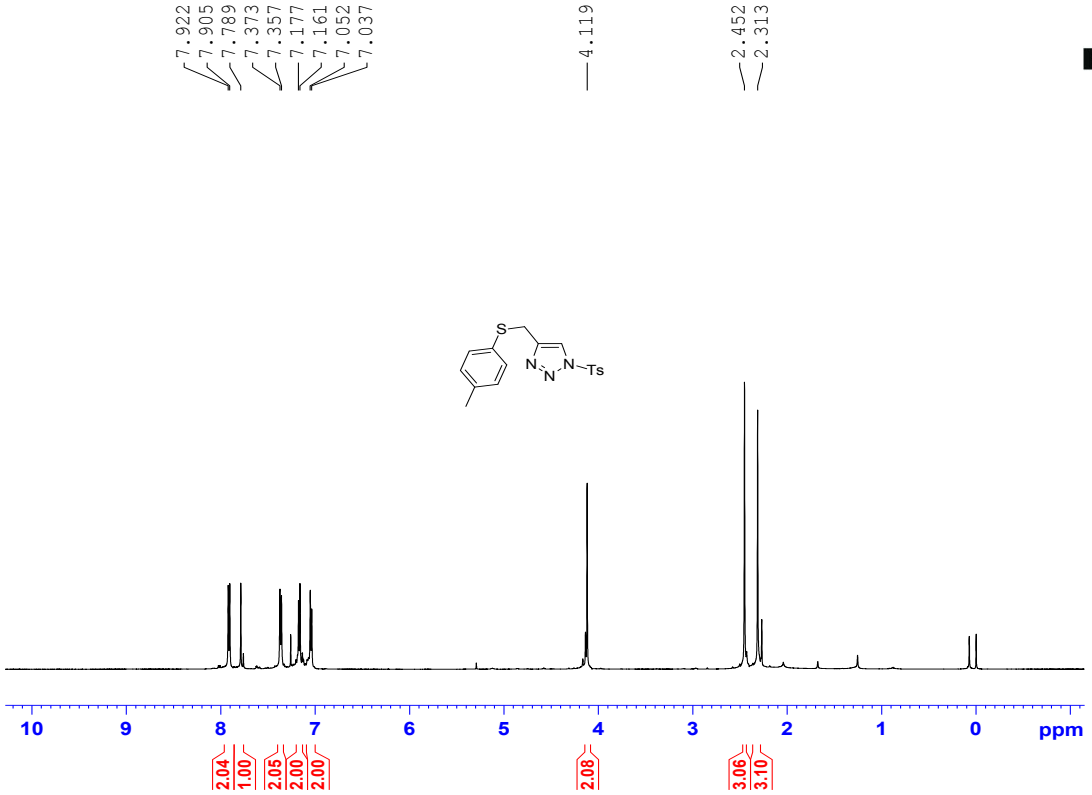
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                 58
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140911
Time                0.41
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                   6.50 usec
TE                  298.3 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1           47.00000000 W
SFO1          100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2            7.75000000 W
PLW12           0.23583999 W
PLW13           0.19103000 W
SFO2          400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF            100.6127592 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

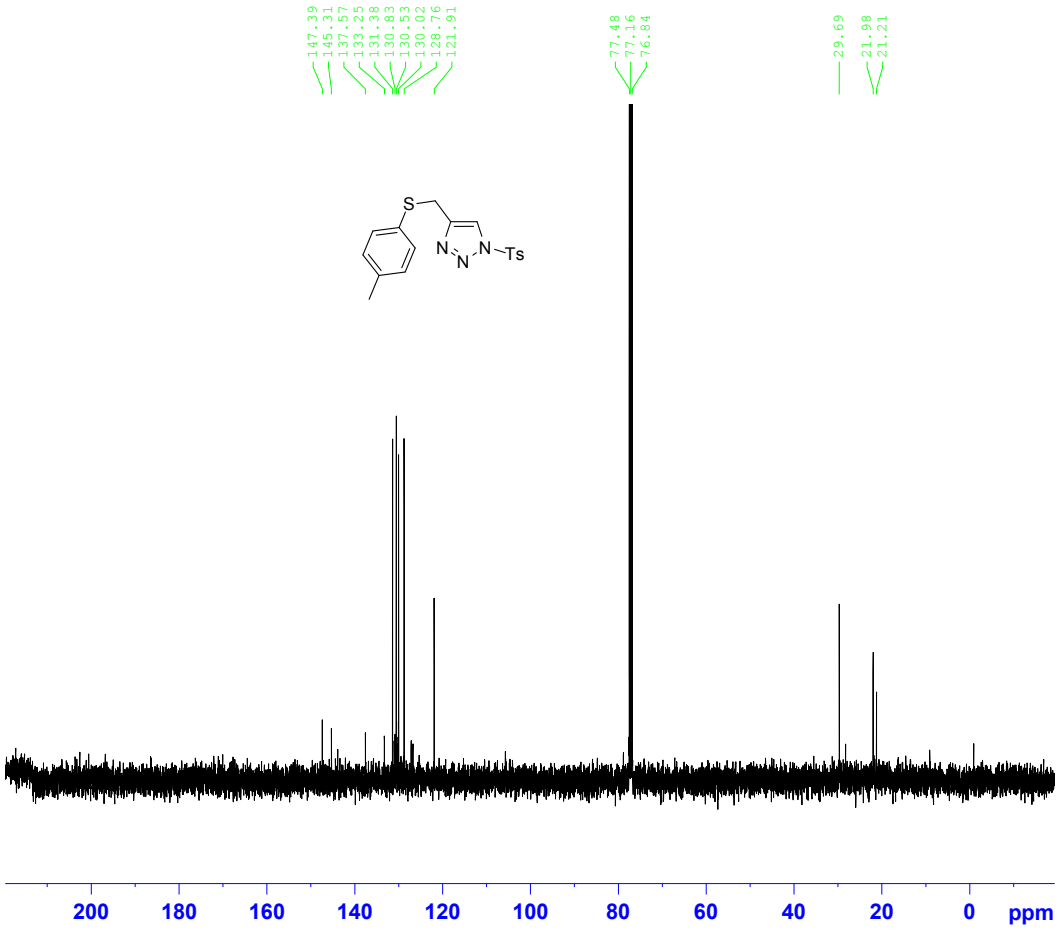
4-((*p*-tolylthio)methyl)-1-tosyl-1,2,3-triazole (1f) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa50914
EXPNO                      252
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140910
Time_                    16.12
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      32768
SOLVENT                  CDCl3
NS                          16
DS                           2
SWH                 10000.000 Hz
FIDRES                0.305176 Hz
AQ                    1.6384500 sec
RG                       114.76
DW                       50.000 usec
DE                         6.50 usec
TE                       299.8 K
D1                    0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                500.1525008 MHz
NUC1                        1H
P1                       11.75 usec
PLW1                15.30000019 W

F2 - Processing parameters
SI                          65536
SF                  500.1500234 MHz
WDW                            EM
SSB                  0
LB                           0.30 Hz
GB                   0
PC                           1.00
```

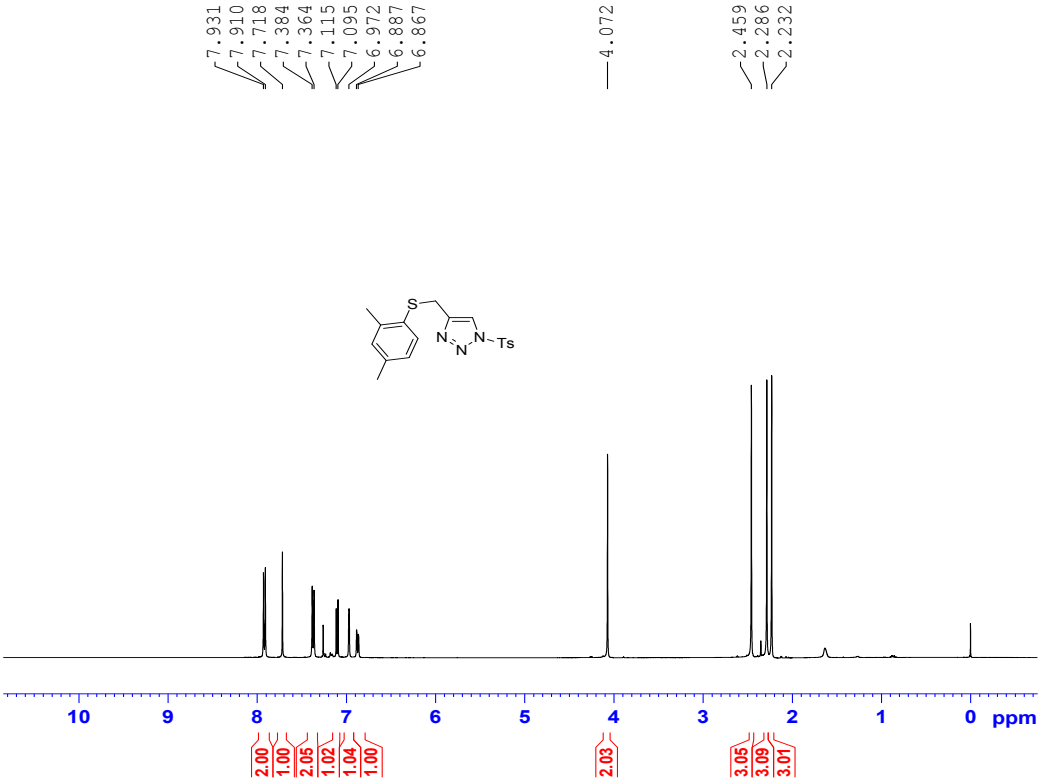
^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      352
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150511
Time_                    1.40
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                  CDC13
NS                         256
DS                           4
SWH                 24038.461 Hz
FIDRES                1.453353 Hz
AQ                    0.3440820 sec
RG                       200.34
DW                       20.800 usec
DE                         6.50 usec
TE                       299.4 K
D1                    1.00000000 sec
D11                   0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1                100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                 waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2                400.1316005 MHz

F2 - Processing parameters
SI                          32768
SF                  100.6127548 MHz
WDW                            EM
SSB                  0
LB                           1.00 Hz
GB                   0
PC                           1.40
```

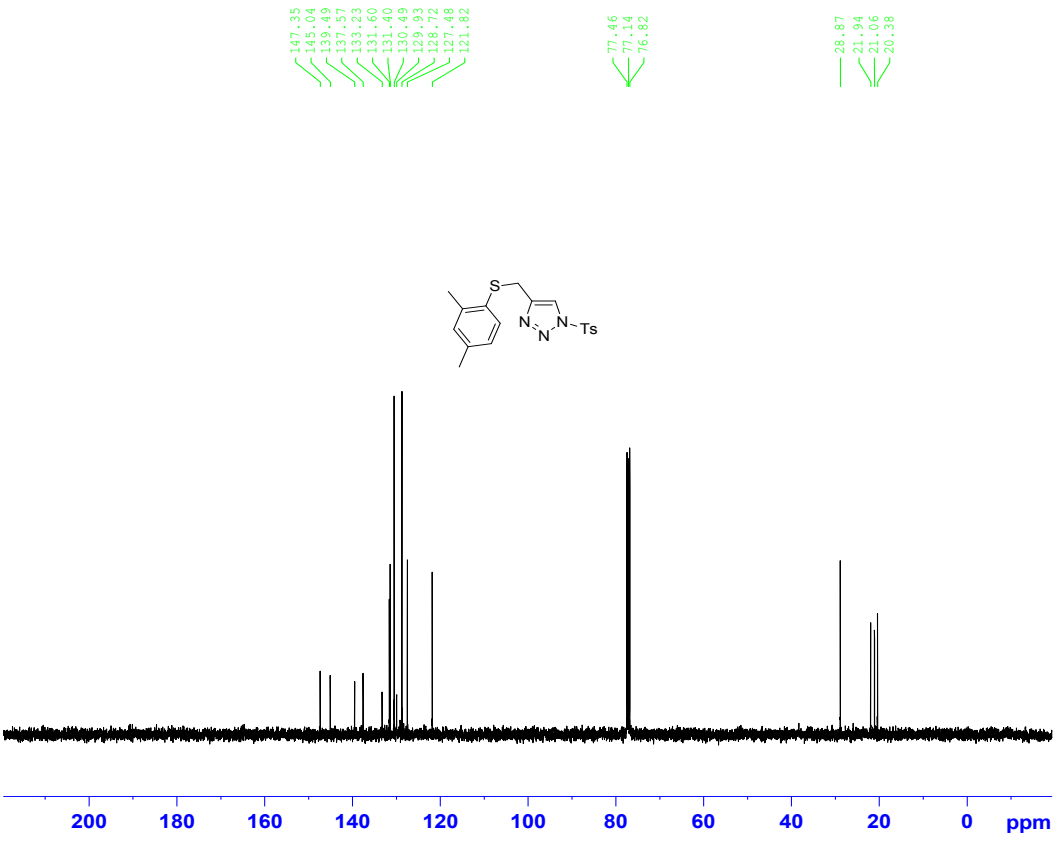
4-(((2,4-dimethylphenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1g) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                 spa40914
EXPNO                     745
PROCNO                      1

F2 - Acquisition Parameters
Date_               20140929
Time                   17.13
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       16
DS                        2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894966 sec
RG                     95.73
DW                    62.400 usec
DE                     6.50 usec
TE                  0 K
D1                  0.50000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                        65536
SF                400.1300093 MHz
WDW                          EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

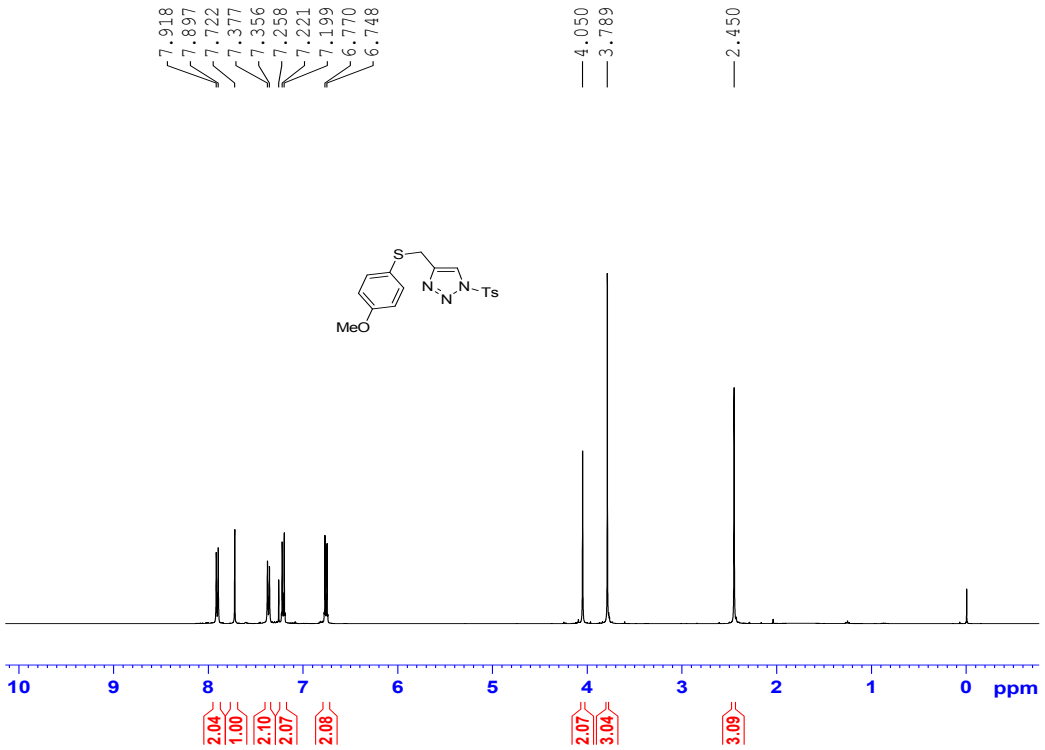
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                 spa40914
EXPNO                     746
PROCNO                      1

F2 - Acquisition Parameters
Date_               20140929
Time                   17.21
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG             zgpg30
TD                    16540
SOLVENT               CDCl3
NS                      256
DS                        4
SWH                24038.461 Hz
FIDRES              1.453353 Hz
AQ                  0.3440820 sec
RG                     200.34
DW                    20.800 usec
DE                     6.50 usec
TE                  0 K
D1                  1.00000000 sec
D11                 0.03000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                      13C
P1                      9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                       1H
PCPD2                  90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                        32768
SF                100.6127589 MHz
WDW                          EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

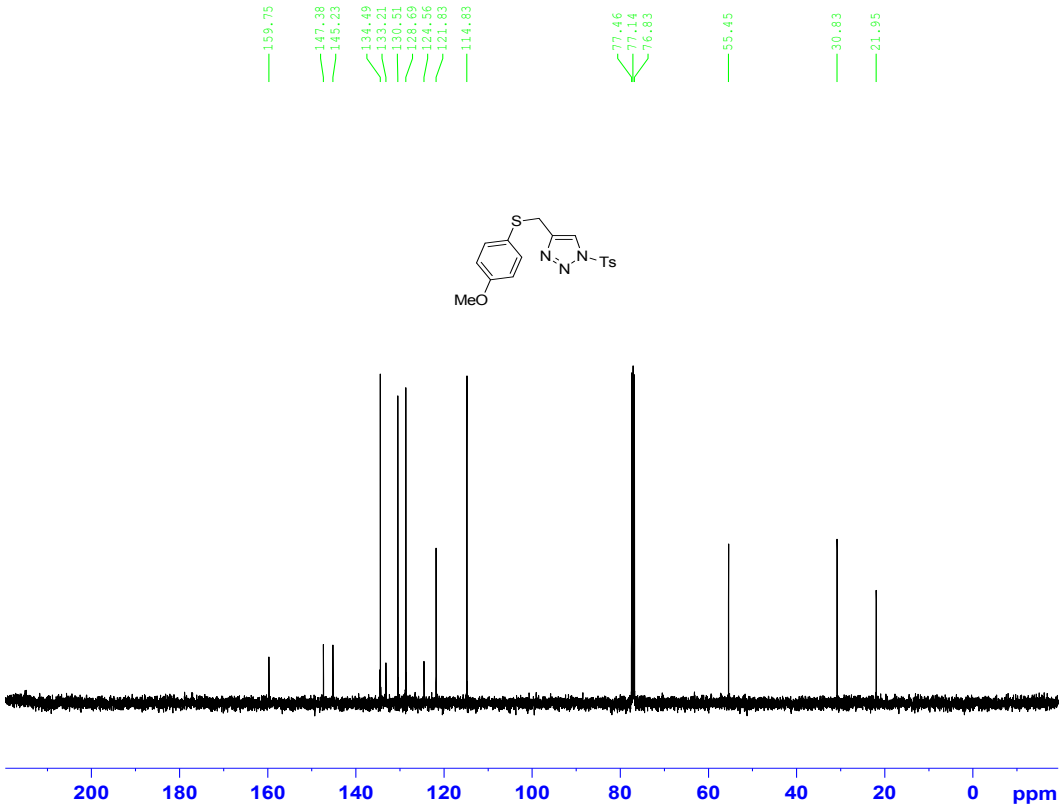
4-(((4-Methoxyphenyl)thio)methyl)-1-tosyl--1,2,3-triazole (1h) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                      138
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141004
Time                     19.53
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      169.77
DW                      62.400 usec
DE                       6.50 usec
TE                      299.0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300101 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

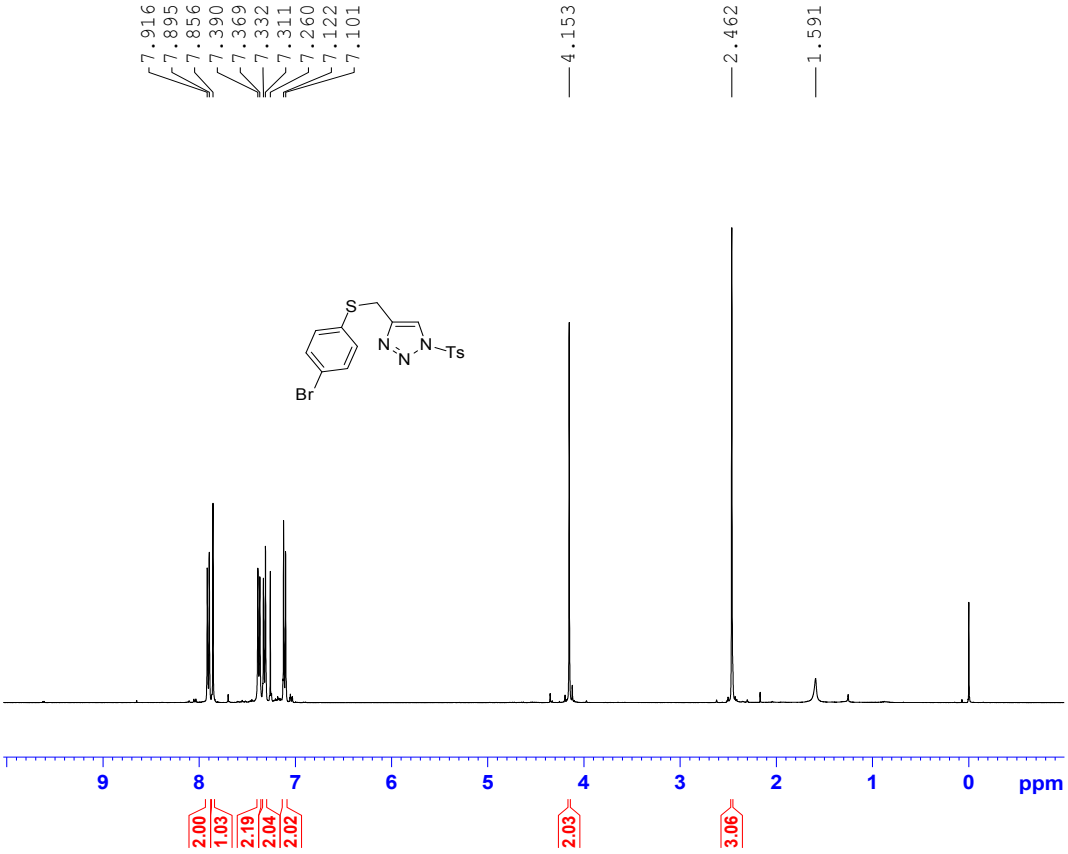
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                      139
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141004
Time                     20.01
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      299.5 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127584 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

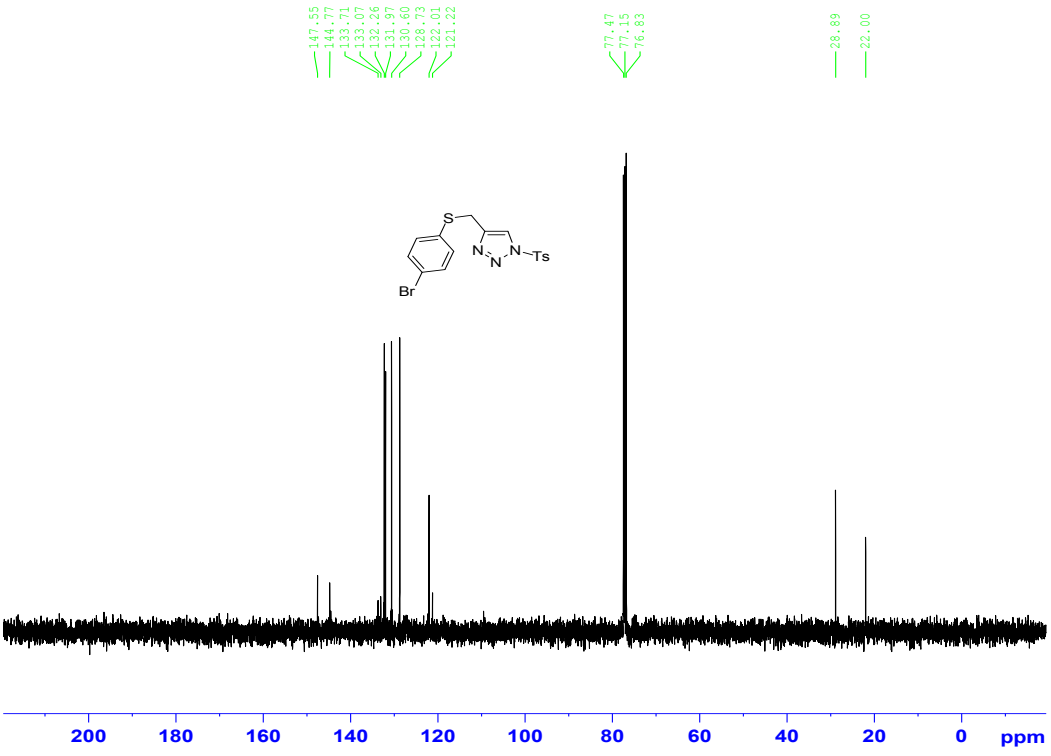
4-(((4-bromophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1i) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      292
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150510
Time                    0.43
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        16
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894966 sec
RG                     200.34
DW                     62.400 usec
DE                      6.50 usec
TE                     298.7 K
D1                  0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                         65536
SF                400.1300094 MHz
WDW                           EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

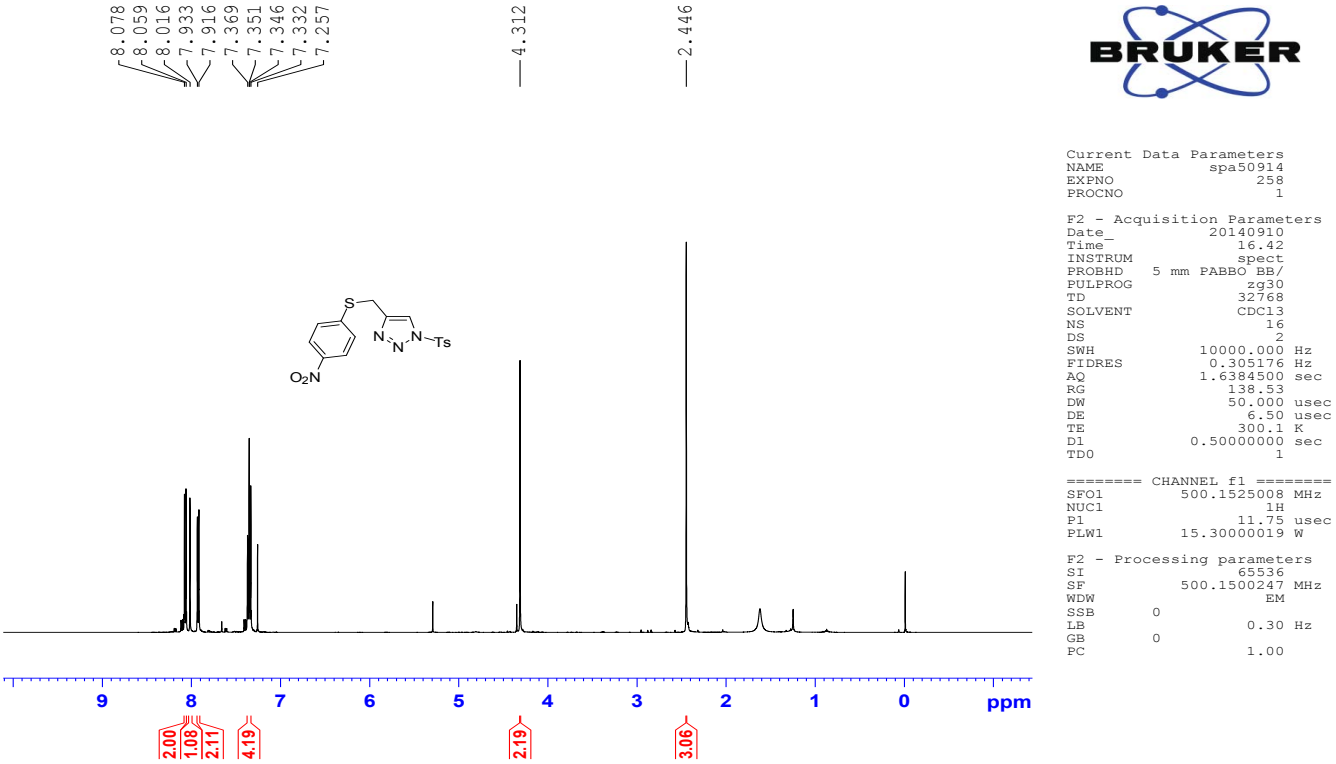
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40914
EXPNO                        84
PROCNO                       1

F2 - Acquisition Parameters
Date_               20140911
Time                   20.42
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG              zgpg30
TD                     16540
SOLVENT                CDCl3
NS                       256
DS                         4
SWH                24038.461 Hz
FIDRES              1.453353 Hz
AQ                  0.3440820 sec
RG                     200.34
DW                     20.800 usec
DE                      6.50 usec
TE           0 K
D1                  1.00000000 sec
D11                 0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                         32768
SF                100.6127559 MHz
WDW                           EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

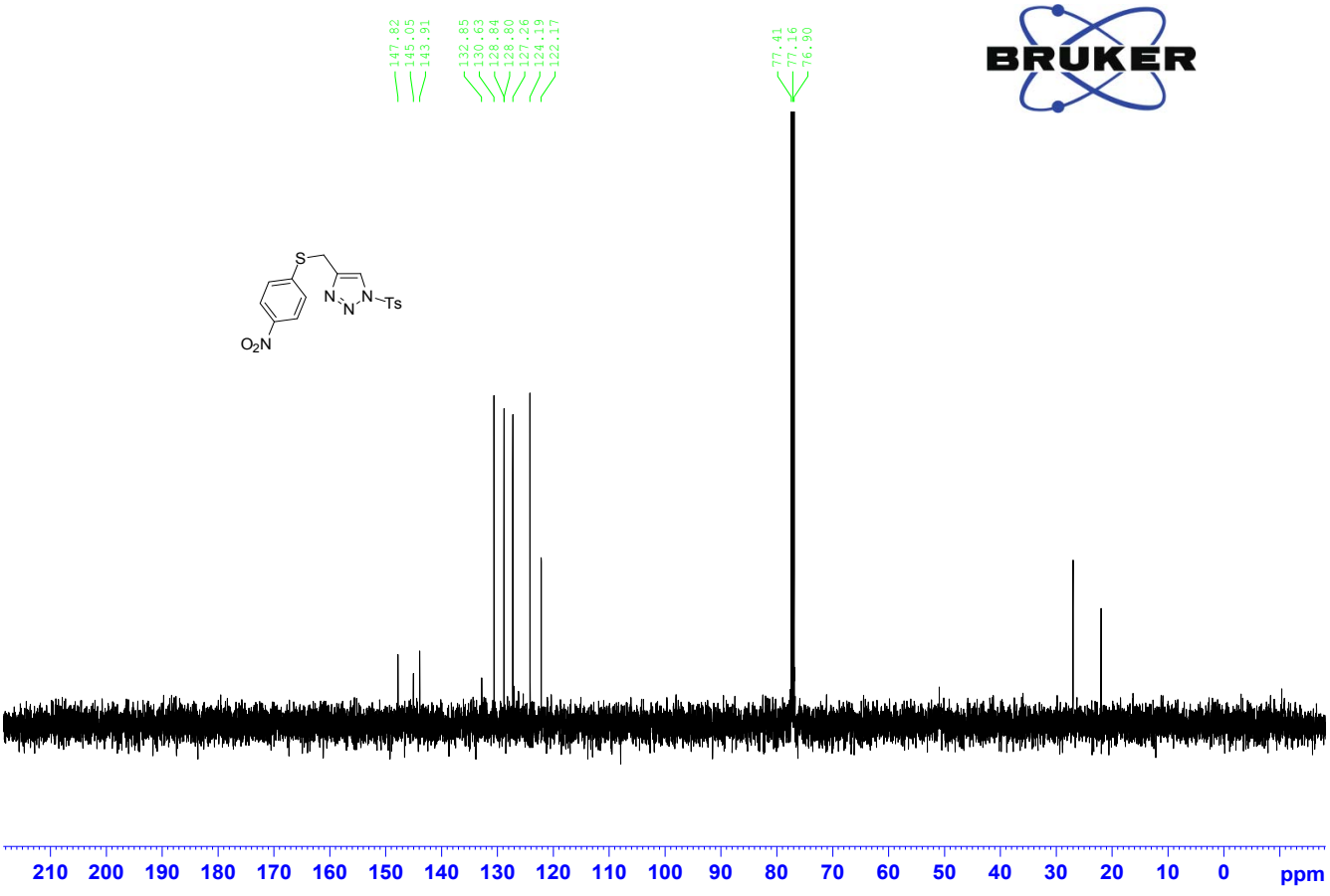
4-(((4-Nitrophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1j) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)



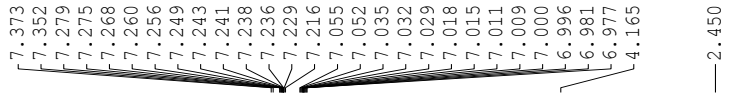

```
Current Data Parameters
NAME                  spa50914
EXPNO                      258
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140910
Time_                    16.42
INSTRUM                  spect
PROBHD     5 mm PABBO BB/
PULPROG                  zg30
TD                      32768
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                 10000.000 Hz
FIDRES                0.305176 Hz
AQ                    1.6384500 sec
RG                       138.53
DW                       50.000 usec
DE                        6.50 usec
TE                       300.1 K
D1                    0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                500.1525008 MHz
NUC1                        1H
P1                       11.75 usec
PLW1                15.30000019 W

F2 - Processing parameters
SI                       65536
SF                  500.1500247 MHz
WDW                         EM
SSB                  0
LB                        0.30 Hz
GB                   0
PC                        1.00
```

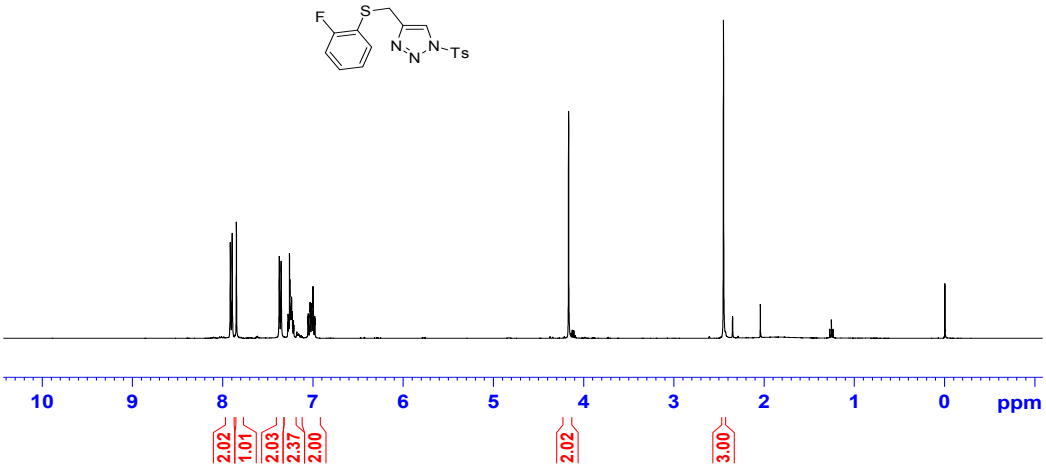
^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C)



4-(((2-Fluorophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1k) :

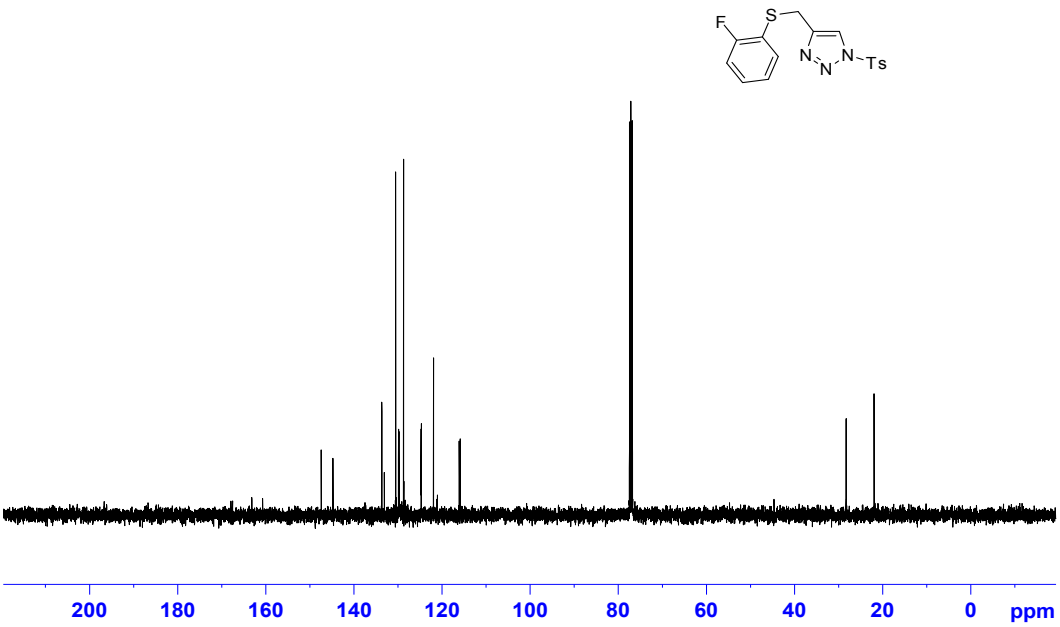
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME                  spa40914
EXPNO                      417
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140920
Time                      8.13
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                        6.50 usec
TE                 0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                        65536
SF                 400.1300098 MHz
WDW                          EM
SSB               0
LB                        0.30 Hz
GB                0
PC                        1.00
```

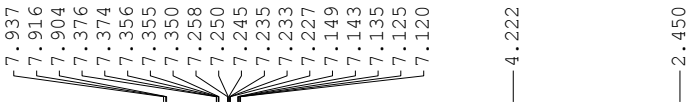
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

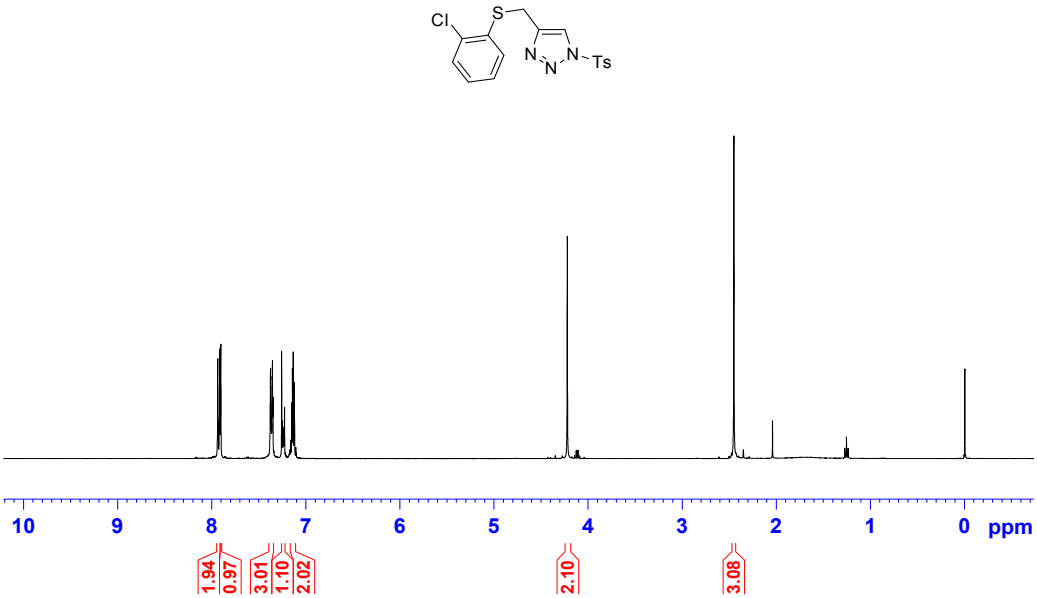



```
Current Data Parameters
NAME                  spa40914
EXPNO                      418
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140920
Time                      8.20
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                           4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                        6.50 usec
TE                 0 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                        32768
SF                 100.6127560 MHz
WDW                          EM
SSB               0
LB                        1.00 Hz
GB                0
PC                        1.40
```

4-(((2-Chlorophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1l) :

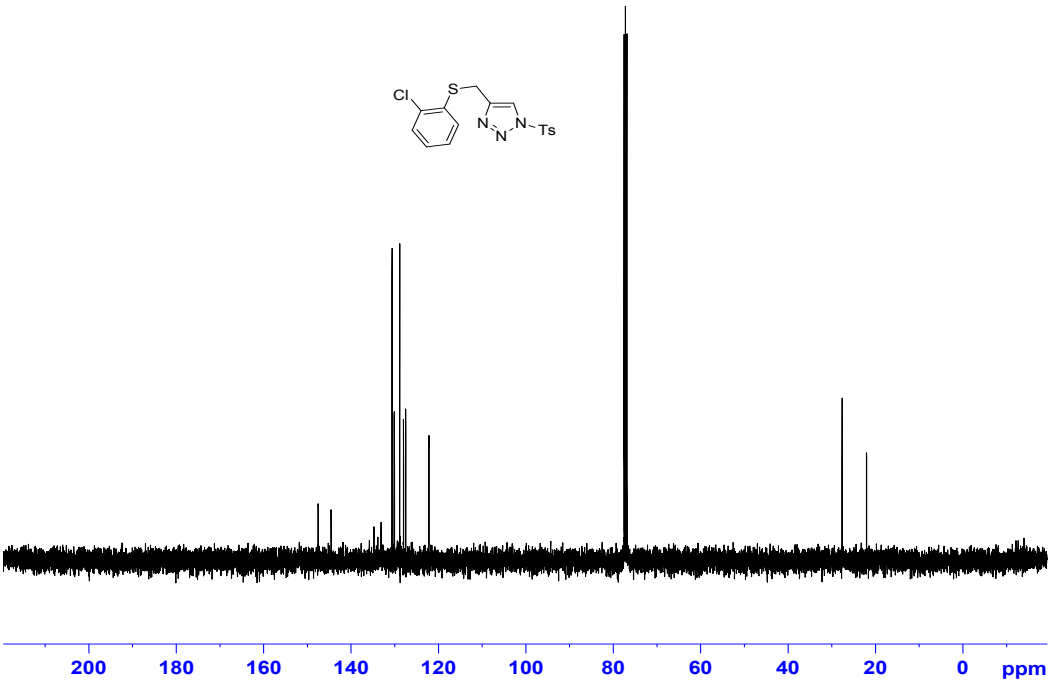
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME            spa41014
EXPNO                187
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141006
Time                20.42
INSTRUM             spect
PROBHD    5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                 200.34
DW                 62.400 usec
DE                   6.50 usec
TE                  299.1 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300104 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

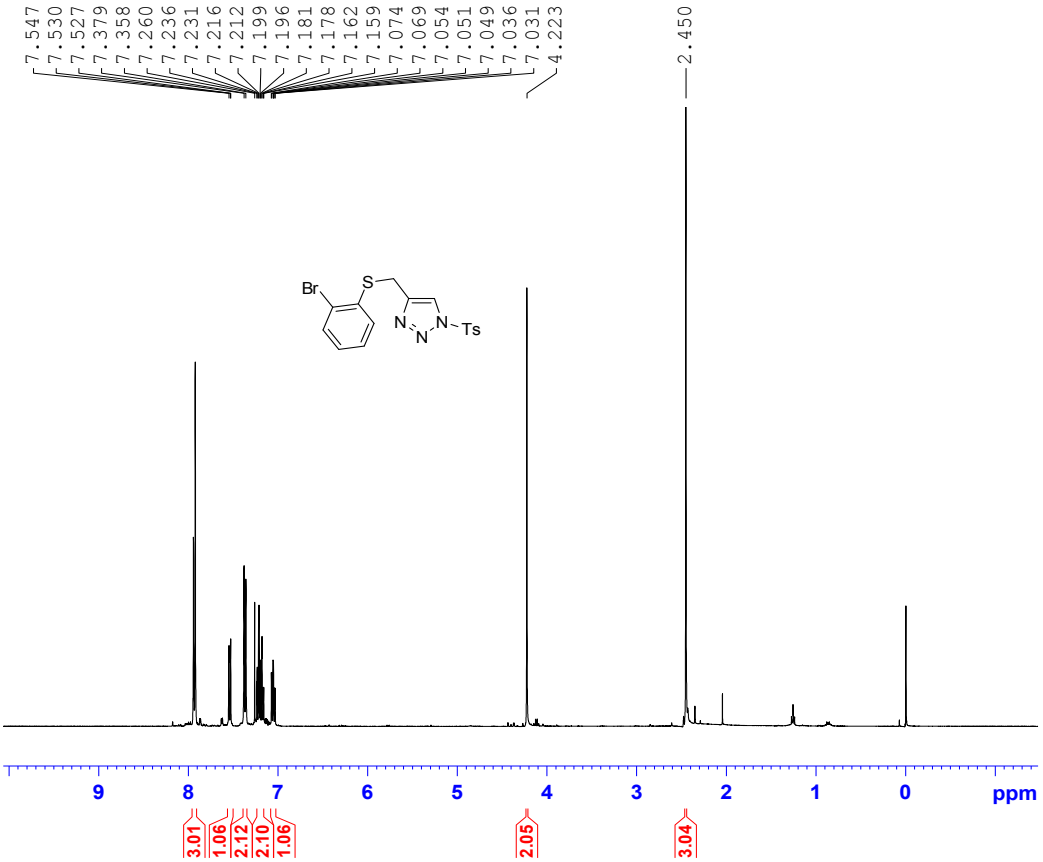
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                193
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141006
Time                21.30
INSTRUM             spect
PROBHD    5 mm PABBO BB-
PULPROG          zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   750
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                   6.50 usec
TE                  299.6 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127552 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

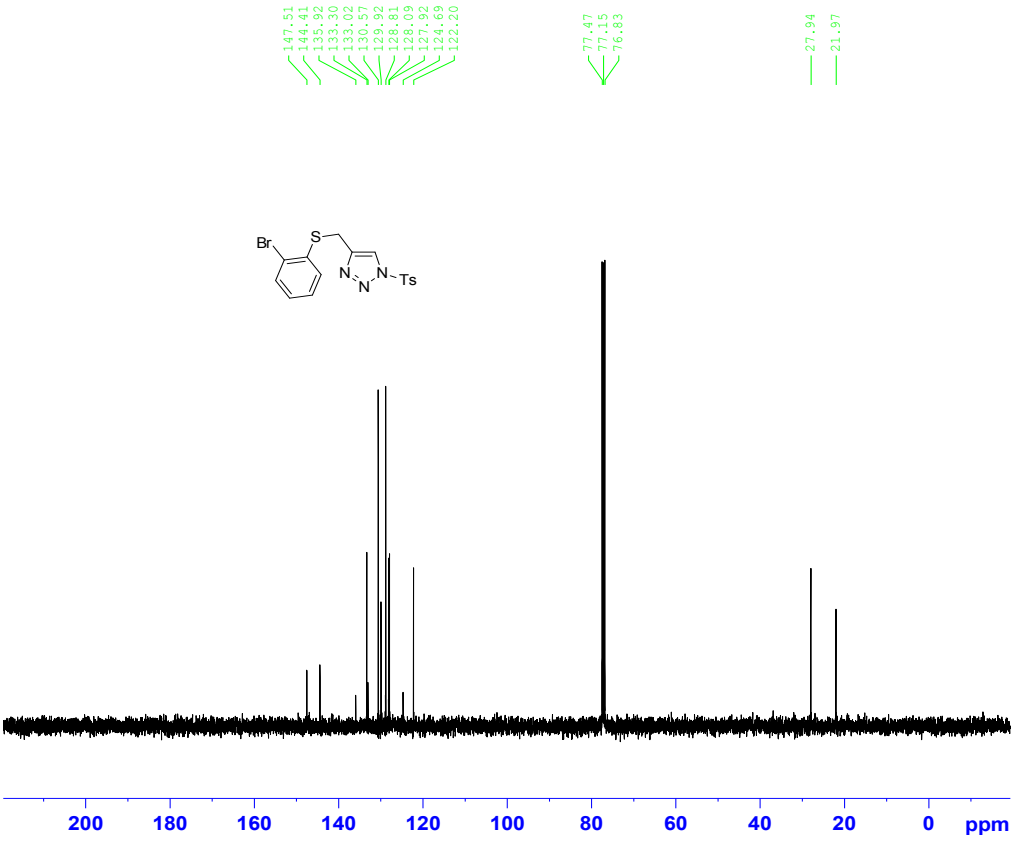
4-(((2-Bromophenyl)thio)methyl)-1-tosyl-1,2,3-triazole (1m) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                414
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140920
Time                7.58
INSTRUM            spect
PROBHD    5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE        0 K
D1           0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF          400.1300098 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

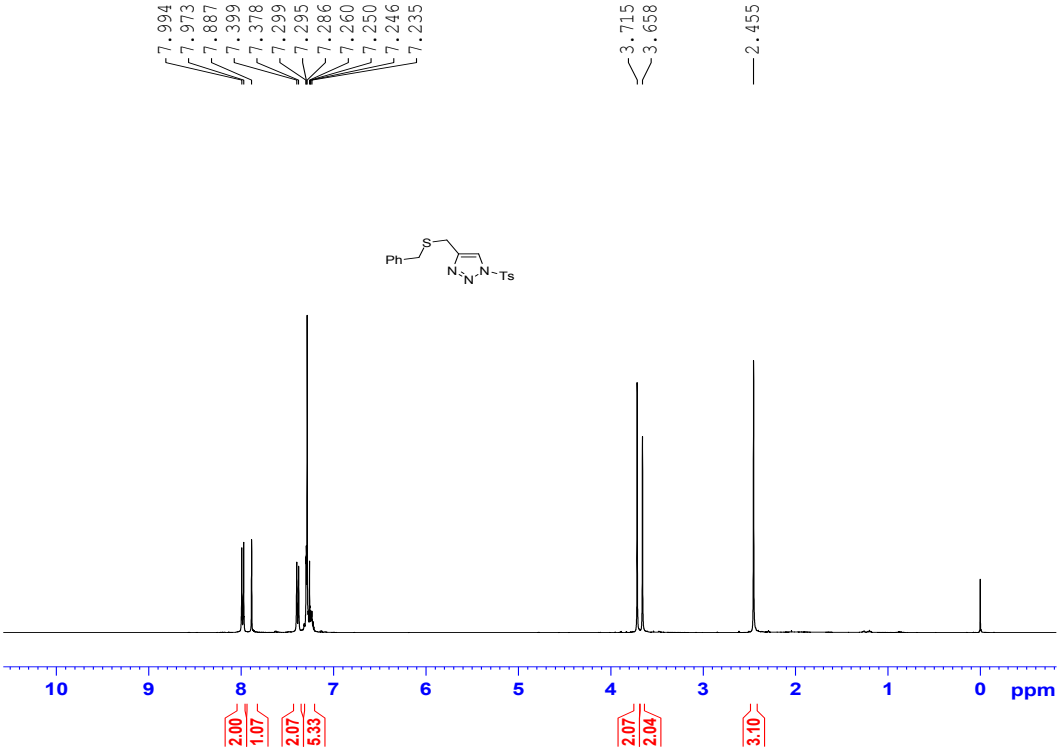
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                415
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140920
Time                8.05
INSTRUM            spect
PROBHD    5 mm PABBO BB-
PULPROG          zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE        0 K
D1           1.00000000 sec
D11          0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127581 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

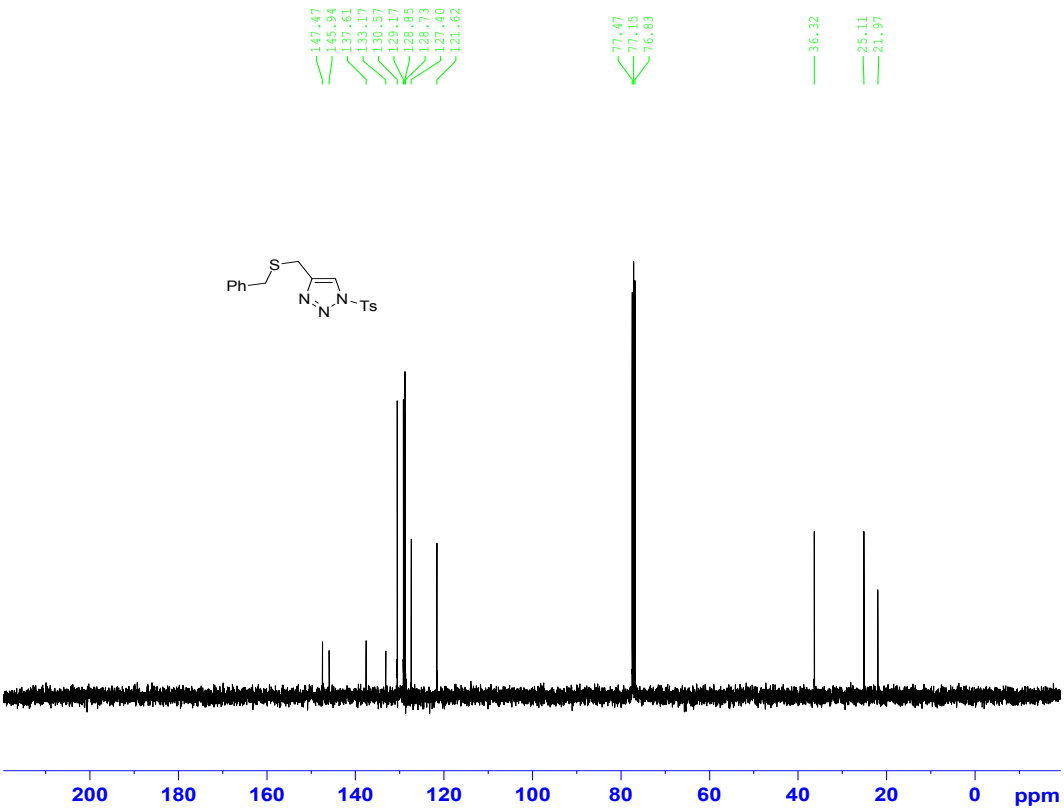
4-((Benzylthio)methyl)-1-tosyl-1,2,3-triazole (1n) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                       56
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141002
Time                     23.22
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                       6.50 usec
TE                      298.8 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300093 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

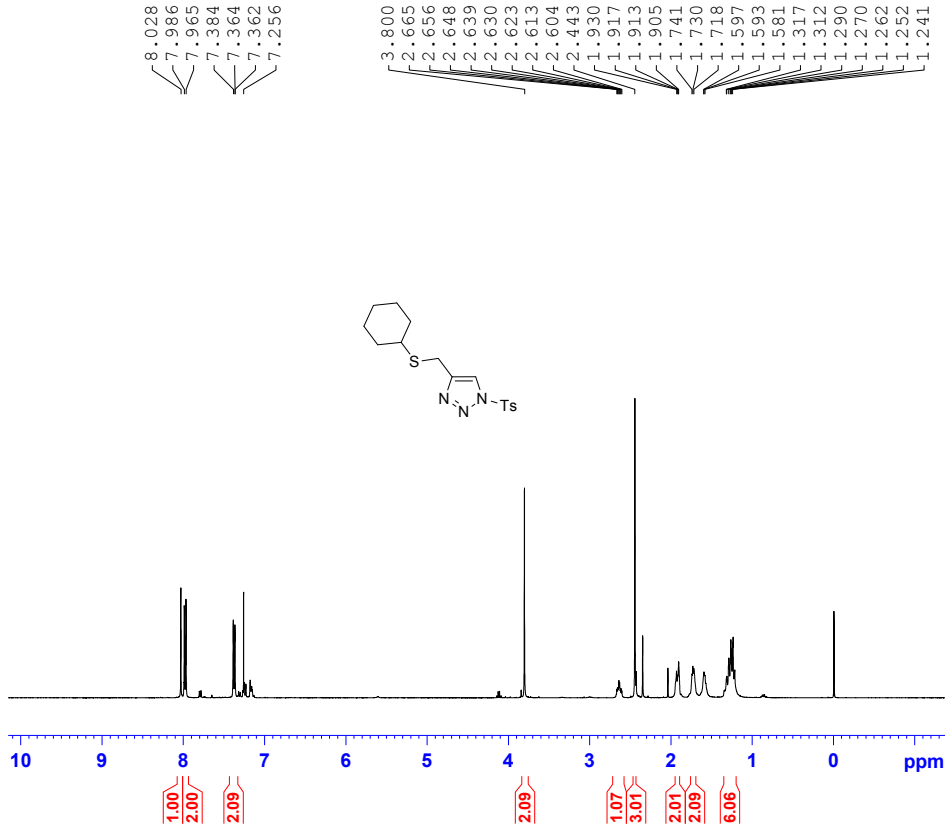
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                       57
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141002
Time                     23.29
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                 zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      299.3 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127567 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

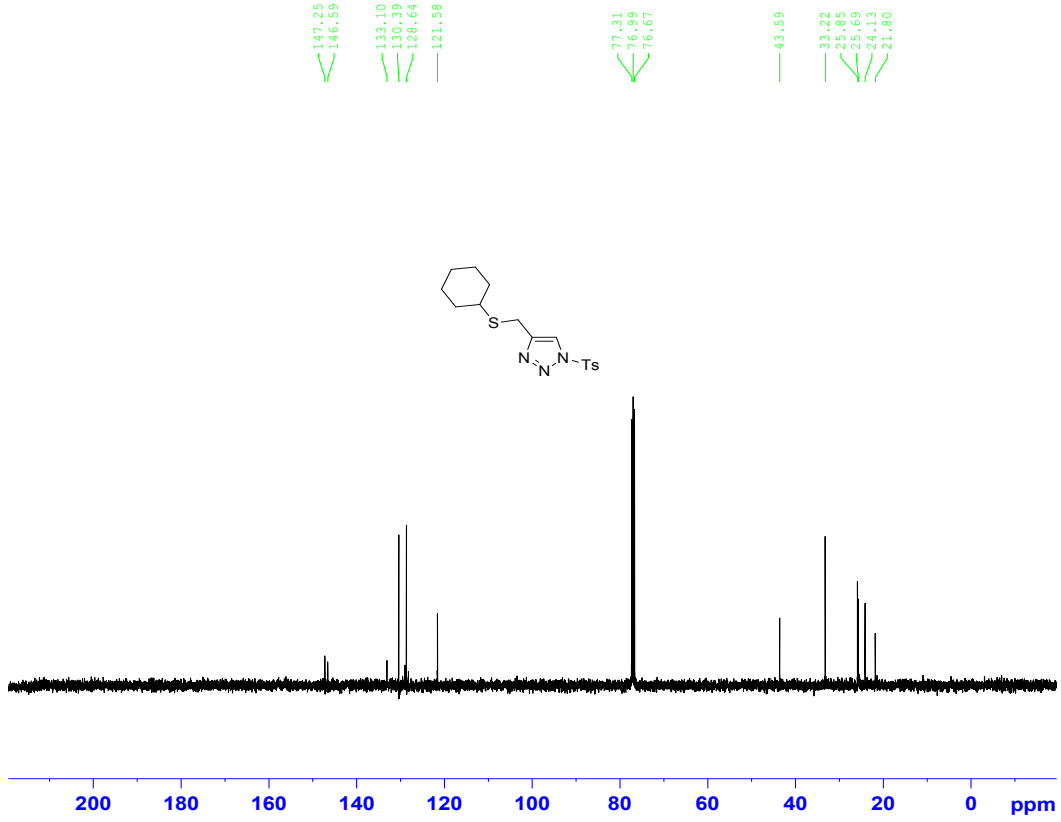
4-((Cyclohexylthio)methyl)-1-tosyl-1,2,3-triazole (1o) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                135
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141004
Time               19.38
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE                299.0 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF            400.1300110 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

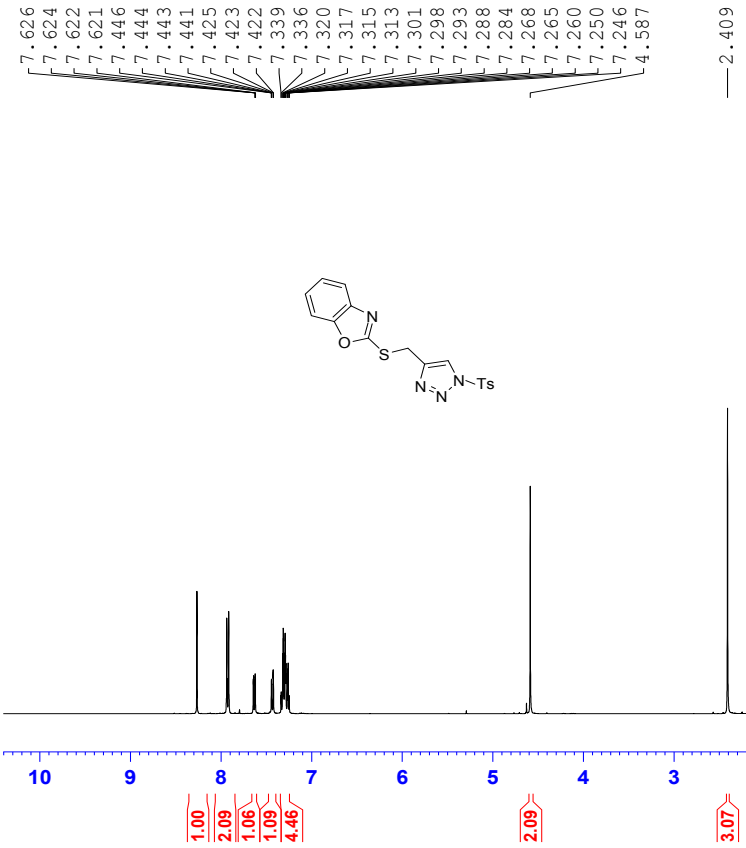
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                136
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141004
Time               19.45
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                299.4 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  13C
P1                 9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127720 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

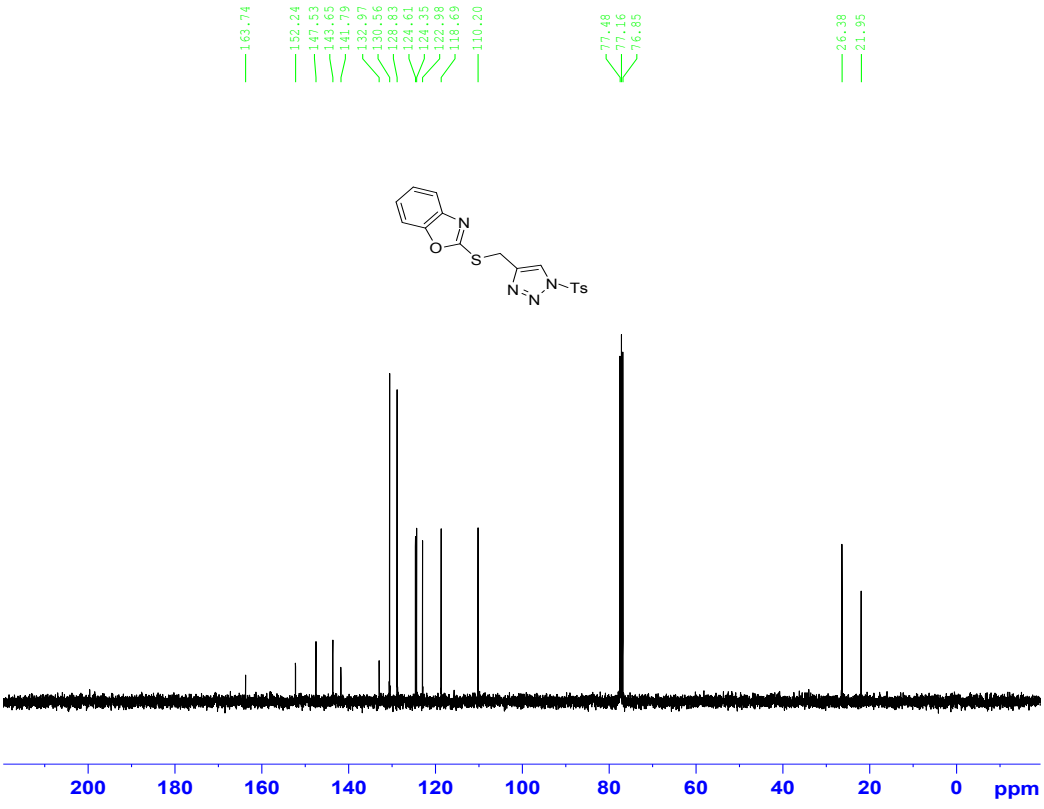
2-(((1-Tosyl-1,2,3-triazol-4-yl)methyl)thio)benzo[d]oxazole (1p) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40914
EXPNO                       86
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140911
Time                     20.49
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                       6.50 usec
TE                  0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300098 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

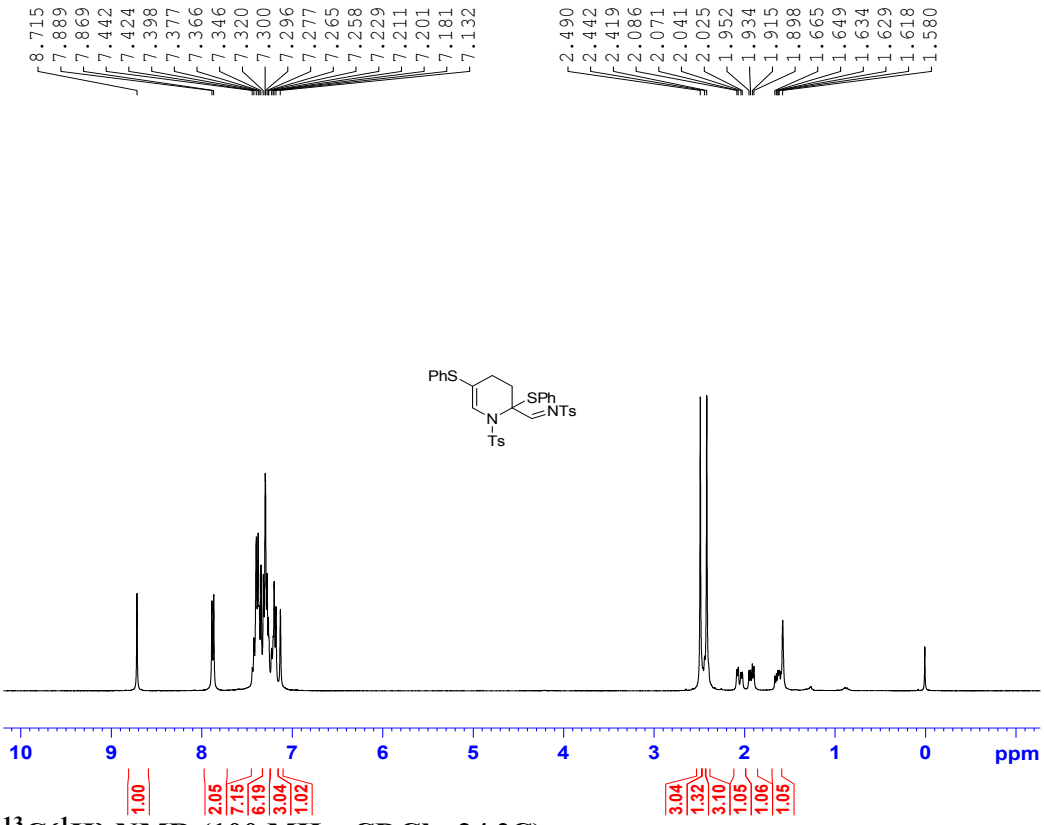
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40914
EXPNO                       87
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140911
Time                     20.57
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                  0 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127561 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

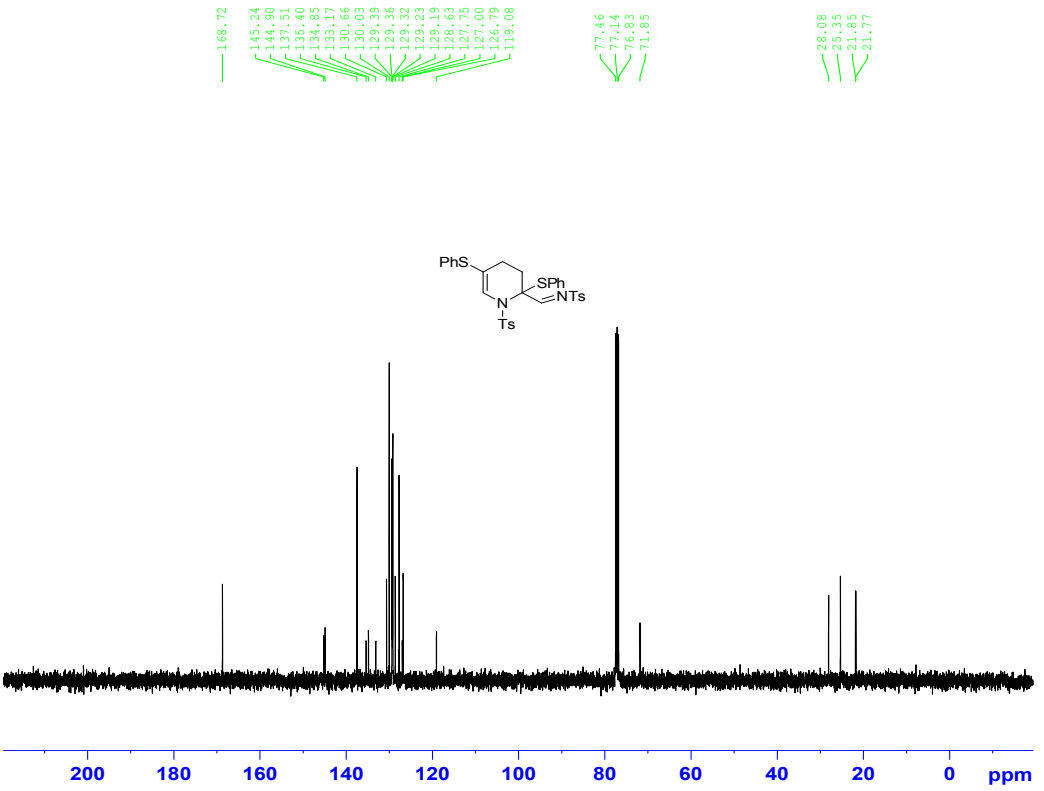
***N*-((2,5-Bis(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3a) :**

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41114
EXPNO                      448
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141115
Time                     13.21
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      169.77
DW                      62.400 usec
DE                       6.50 usec
TE                      300.4 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                          65536
SF                 400.1300075 MHz
WDW                            EM
SSB                 0
LB                           0.30 Hz
GB                  0
PC                           1.00
```

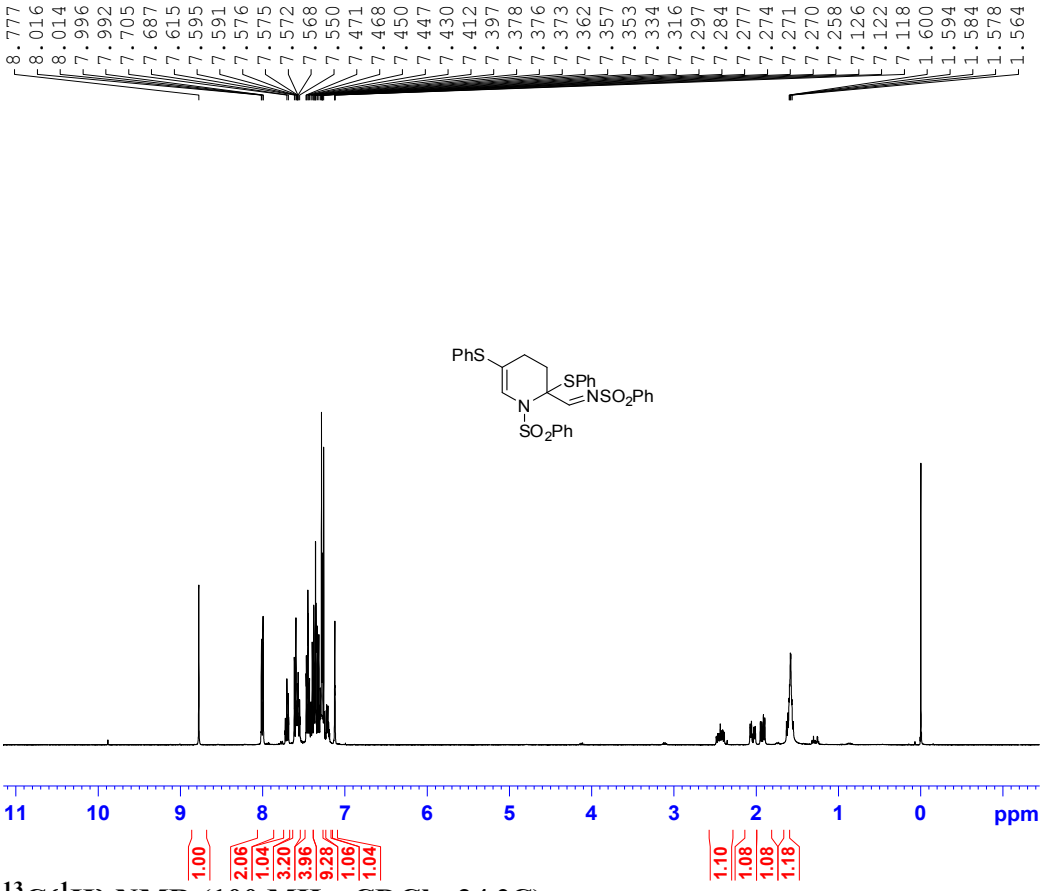
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41114
EXPNO                      449
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141115
Time                     13.28
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      301.2 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                          32768
SF                 100.6127569 MHz
WDW                            EM
SSB                 0
LB                           1.00 Hz
GB                  0
PC                           1.40
```

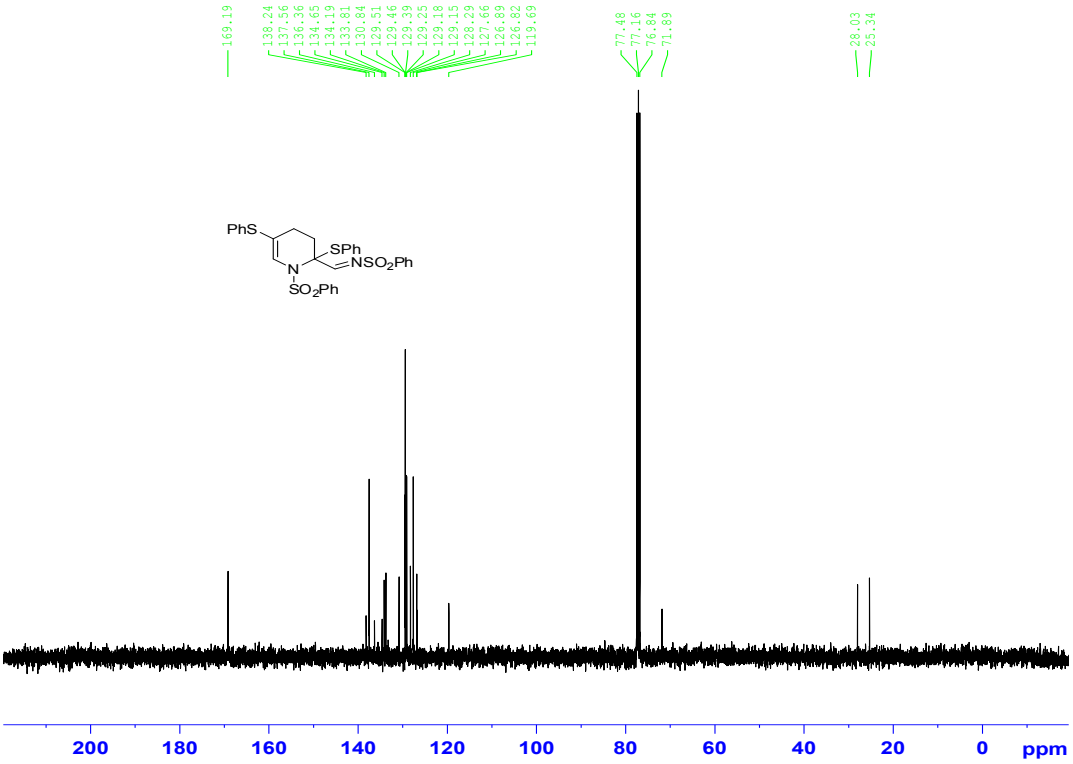
***N*-((1-(Phenylsulfonyl)-2,5-bis(phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3b) :**

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                480
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140921
Time               15.34
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES             0.122266 Hz
AQ              4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE        0 K
D1            0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF            400.1300106 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

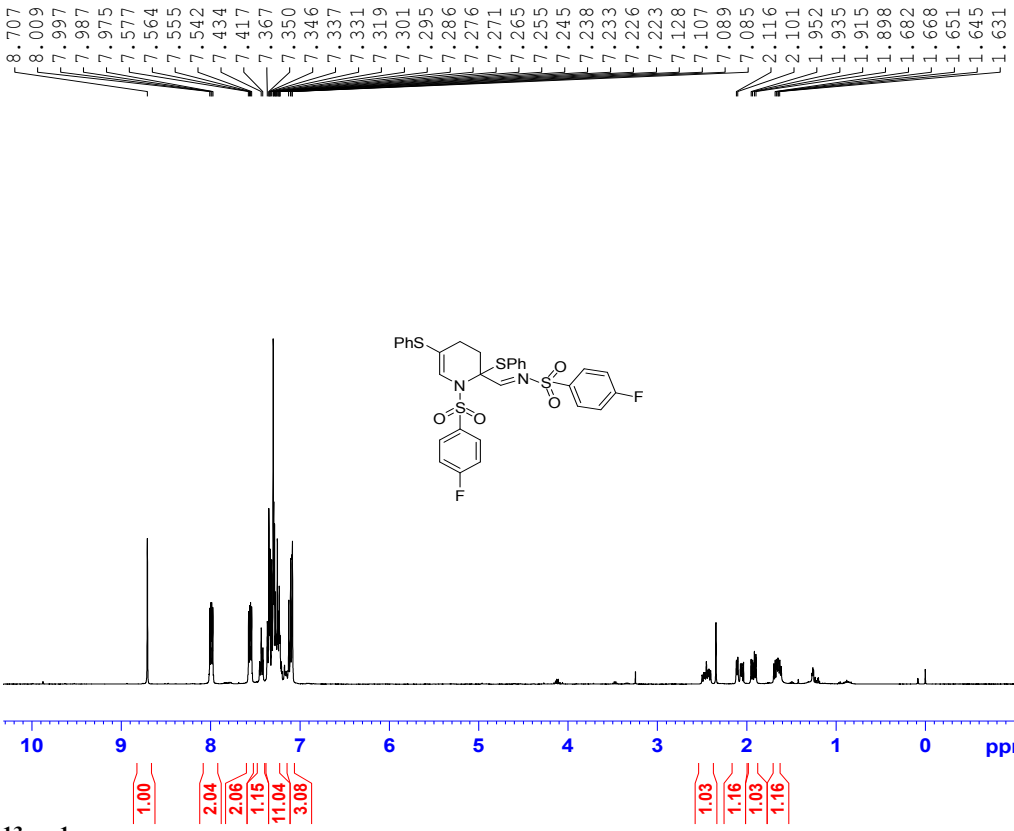
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                469
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140921
Time               14.42
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES             1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE        0 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF            100.6127559 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

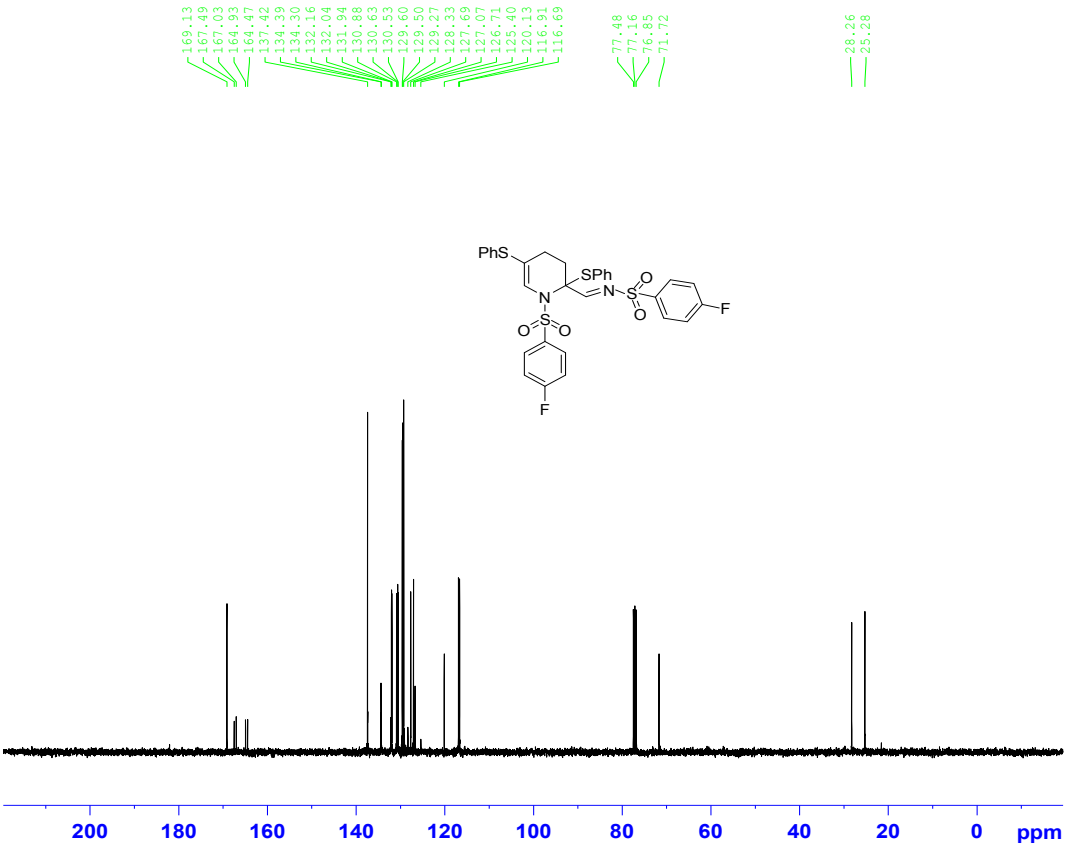
(*E*)-4-Fluoro-*N*- ((1- ((4-fluorophenyl)sulfonyl)-2,5-bis (phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3c) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                615
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141016
Time               22.34
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH           8012.820 Hz
FIDRES        0.122266 Hz
AQ            4.0894966 sec
RG                88.51
DW               62.400 usec
DE                6.50 usec
TE               301.0 K
D1            0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF          400.1300126 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

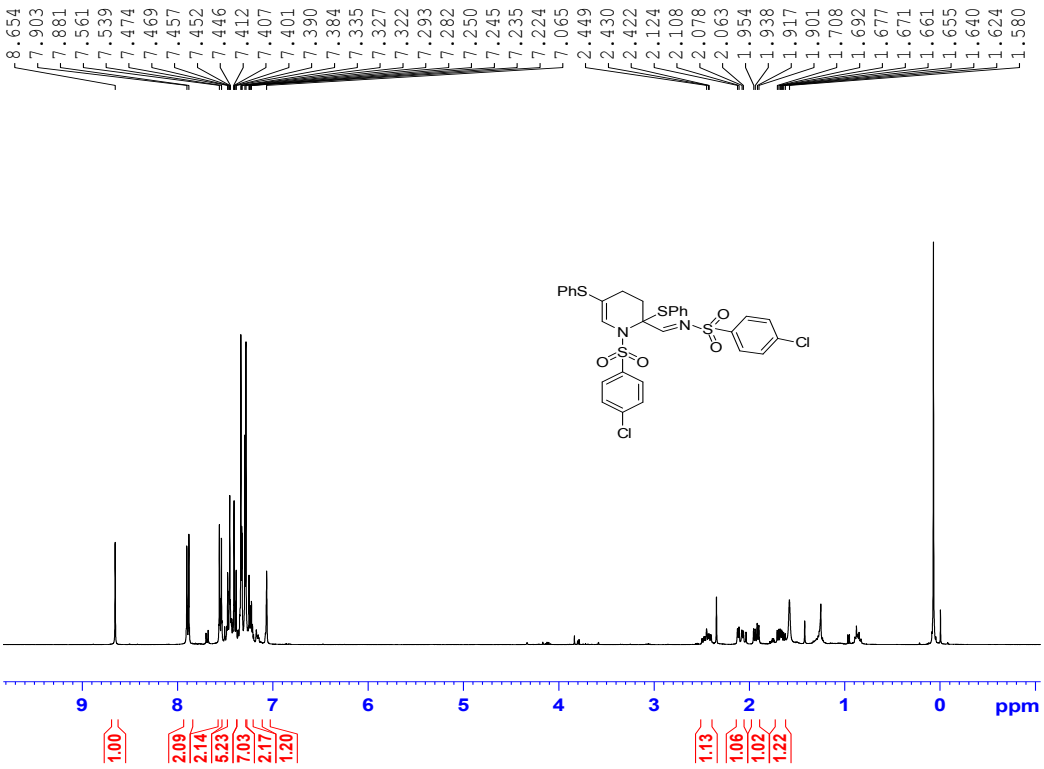
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                616
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141016
Time               22.42
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                16540
SOLVENT           CDCl3
NS                  256
DS                    4
SWH           24038.461 Hz
FIDRES         1.453353 Hz
AQ            0.3440820 sec
RG                200.34
DW               20.800 usec
DE                6.50 usec
TE               301.8 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127600 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

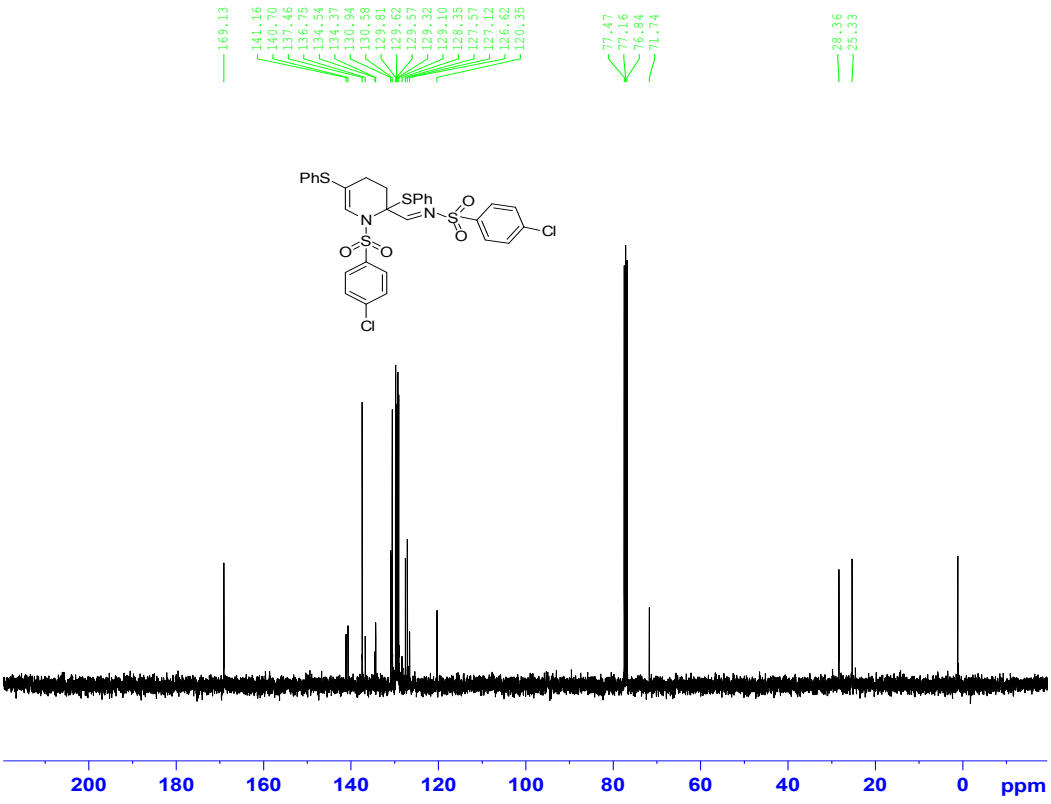
(*E*)-4-Chloro-*N*- ((1- ((4-chlorophenyl)sulfonyl)-2,5-bis (phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3d) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41014
EXPNO                      712
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141018
Time                     20.51
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      138.85
DW                      62.400 usec
DE                       6.50 usec
TE                      300.3 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                          65536
SF                 400.1300136 MHz
WDW                            EM
SSB                 0
LB                           0.30 Hz
GB                  0
PC                           1.00
```

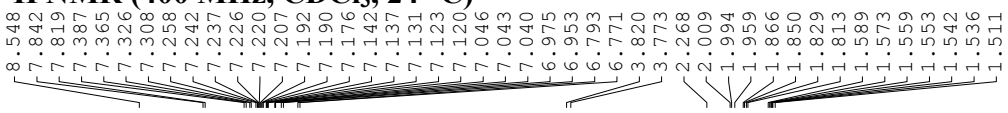
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

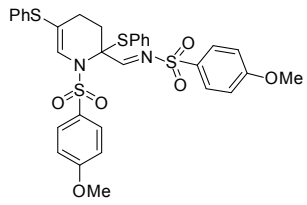



```
Current Data Parameters
NAME                  spa41014
EXPNO                      713
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141018
Time                     20.58
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      301.0 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                          32768
SF                 100.6127562 MHz
WDW                            EM
SSB                 0
LB                           1.00 Hz
GB                  0
PC                           1.40
```

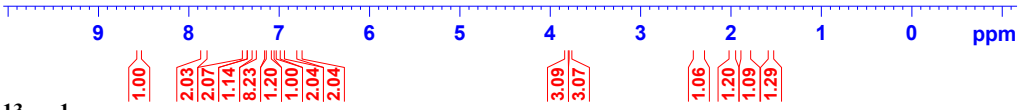
(*E*)-4-Methoxy-*N*- ((1- ((4-methoxyphenyl)sulfonyl)-2,5-bis (phenylthio)-1,2,3,4-tetrahydropyridin-2-yl)methylene)benzenesulfonamide (3e) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)

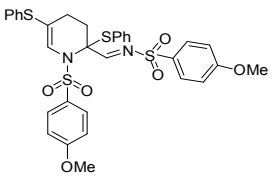




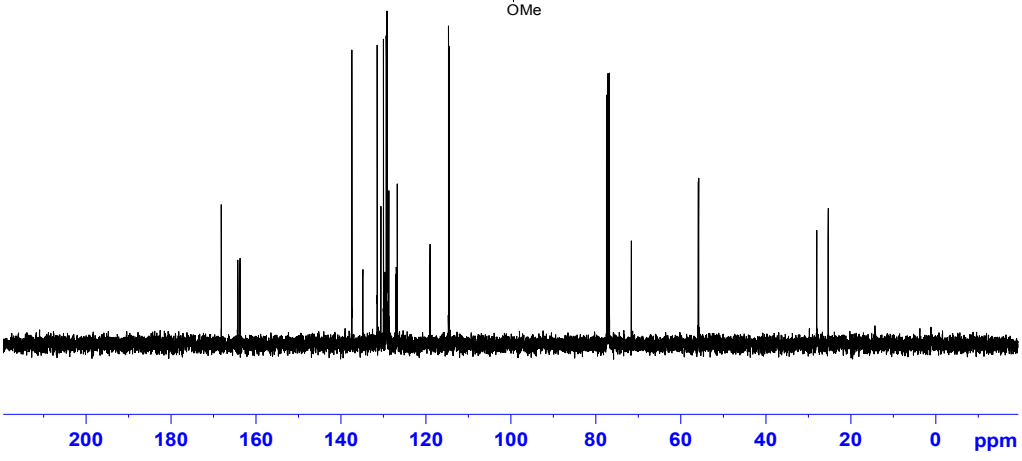

```
Current Data Parameters
NAME            spa40914
EXPNO                214
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140914
Time                15.57
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                  88.51
DW                 62.400 usec
DE                  6.50 usec
TE        0 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300431 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```



^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

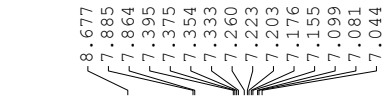


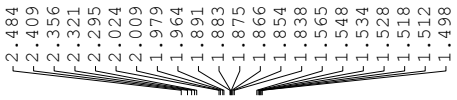

```
Current Data Parameters
NAME            spa40914
EXPNO                215
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140914
Time                16.04
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                  6.50 usec
TE        0 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127621 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

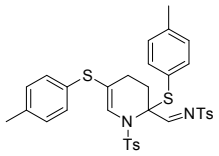


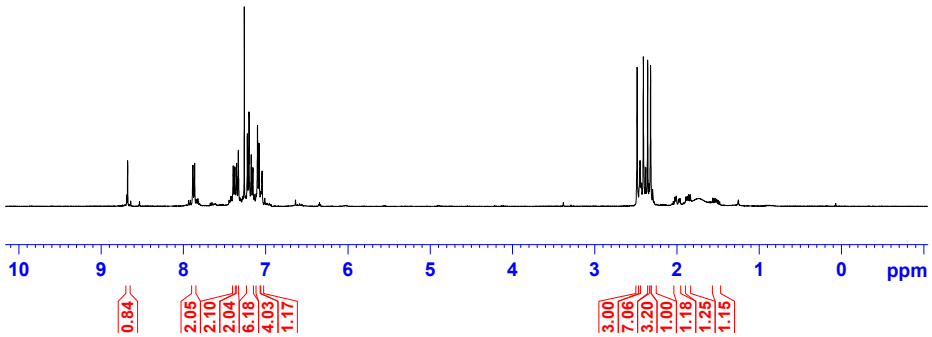
***N*- ((2,5-Bis (p-tolylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3f) :**

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



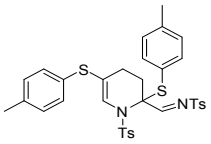


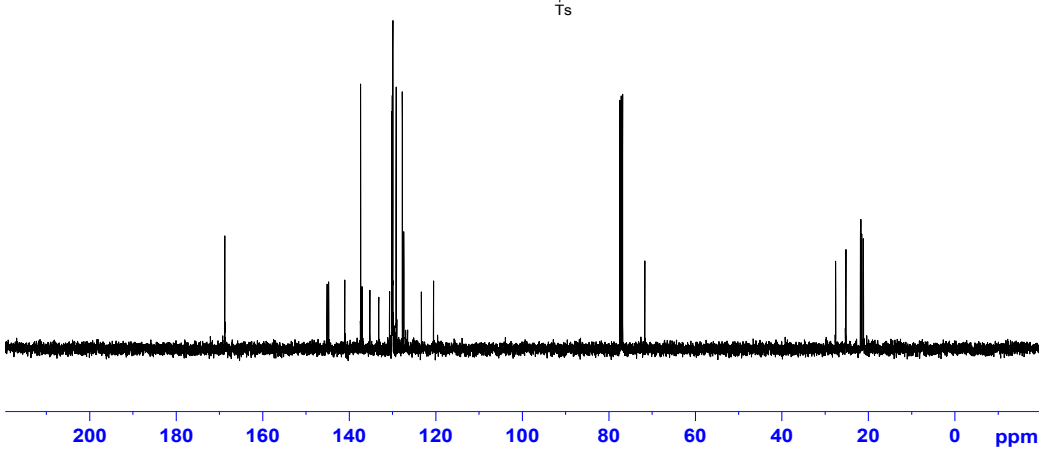





```
Current Data Parameters
NAME            spa40515
EXPNO                504
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150514
Time              21.03
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE                295.7 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300094 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

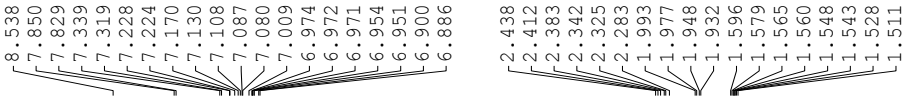


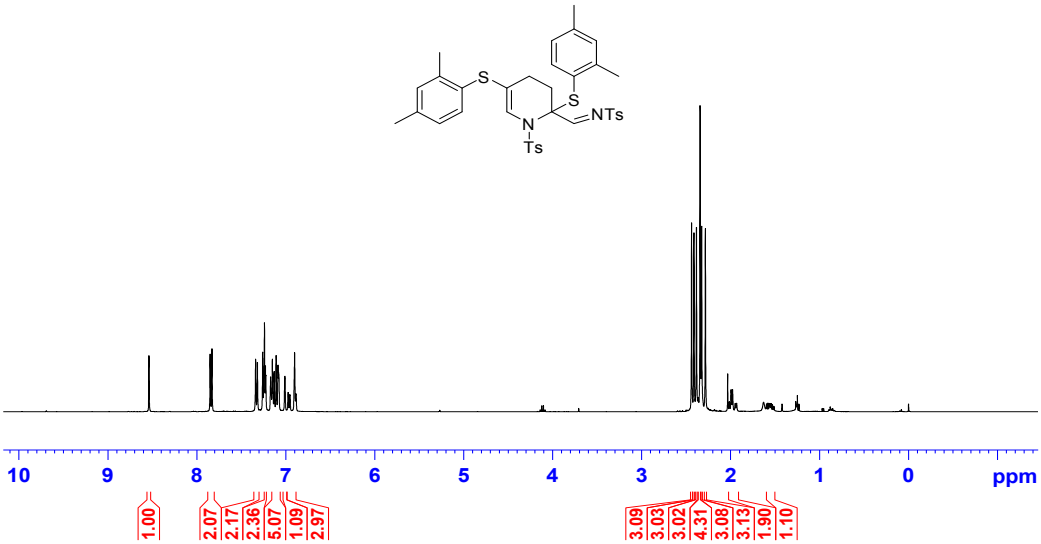



```
Current Data Parameters
NAME            spa40914
EXPNO                212
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140914
Time              15.49
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                16540
SOLVENT           CDCl3
NS                  107
DS                    4
SWH           24038.461 Hz
FIDRES         1.453353 Hz
AQ             0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE            0 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                9.25 usec
PLW1          47.00000000 W
SFO1          100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2          400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127616 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

***N*-((2,5-Bis((2,4-dimethylphenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2yl)methylene)-4-methylbenzenesulfonamide (3g) :**

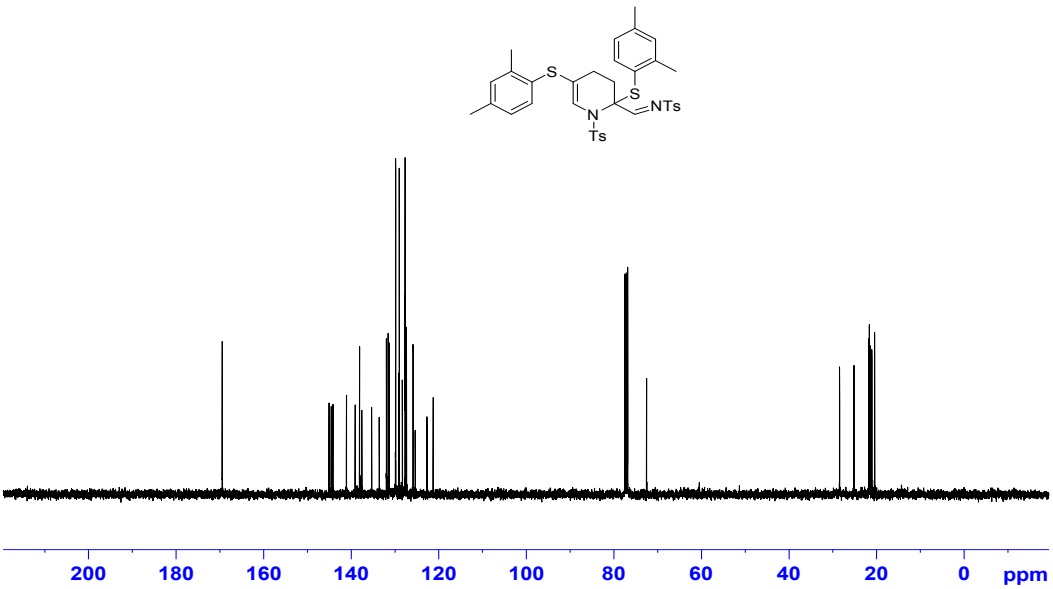
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME                  spa40914
EXPNO                      791
PROCNO                       1

F2 - Acquisition Parameters
Date_               20140930
Time                   18.58
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       16
DS                        2
SWH                8012.820 Hz
FIDRES             0.122266 Hz
AQ                 4.0894966 sec
RG                     67.99
DW                    62.400 usec
DE                     6.50 usec
TE                    298.6 K
D1                 0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       1H
P1                      15.70 usec
PLW1               7.75000000 W
SFO1             400.1320007 MHz

F2 - Processing parameters
SI                    65536
SF               400.1300186 MHz
WDW                       EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

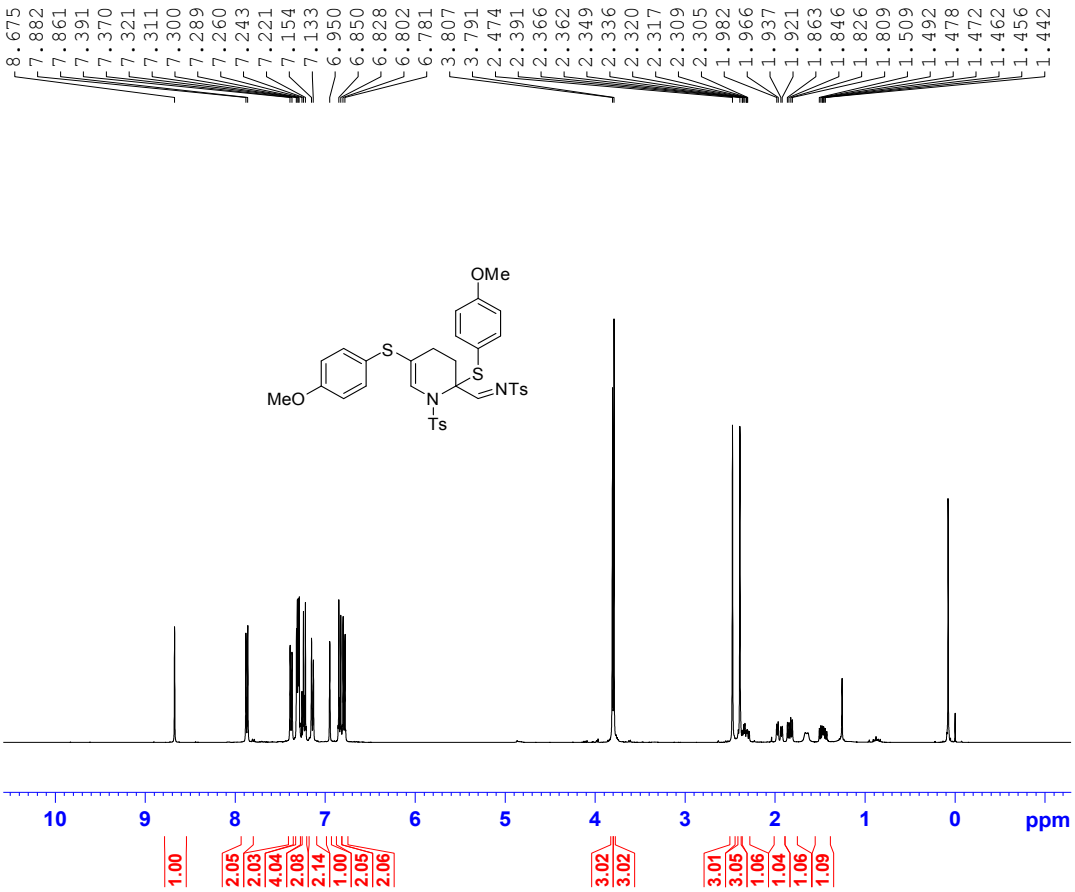
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40914
EXPNO                      792
PROCNO                       1

F2 - Acquisition Parameters
Date_               20140930
Time                   19.05
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG              zgpg30
TD                    16540
SOLVENT               CDCl3
NS                      240
DS                        4
SWH               24038.461 Hz
FIDRES             1.453353 Hz
AQ                 0.3440820 sec
RG                     200.34
DW                    20.800 usec
DE                     6.50 usec
TE                    299.1 K
D1                 1.00000000 sec
D11                0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                      13C
P1                      9.25 usec
PLW1              47.00000000 W
SFO1             100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  90.00 usec
PLW2               7.75000000 W
PLW12              0.23583999 W
PLW13              0.19103000 W
SFO2             400.1316005 MHz

F2 - Processing parameters
SI                    32768
SF               100.6127626 MHz
WDW                       EM
SSB          0
LB                     1.00 Hz
GB           0
PC                     1.40
```

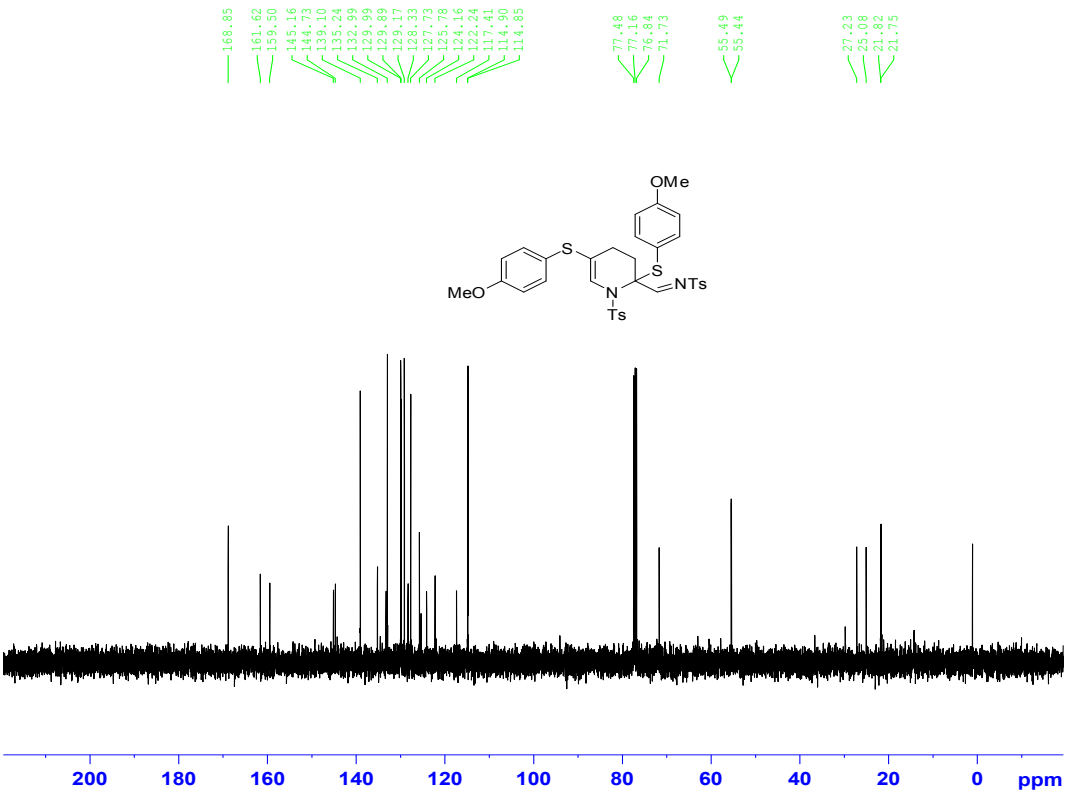
***N*- ((2,5-Bis ((4-methoxyphenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3h)** :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                241
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141007
Time               21.47
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES             0.122266 Hz
AQ              4.0894966 sec
RG                 88.51
DW                 62.400 usec
DE                  6.50 usec
TE                298.1 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300094 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

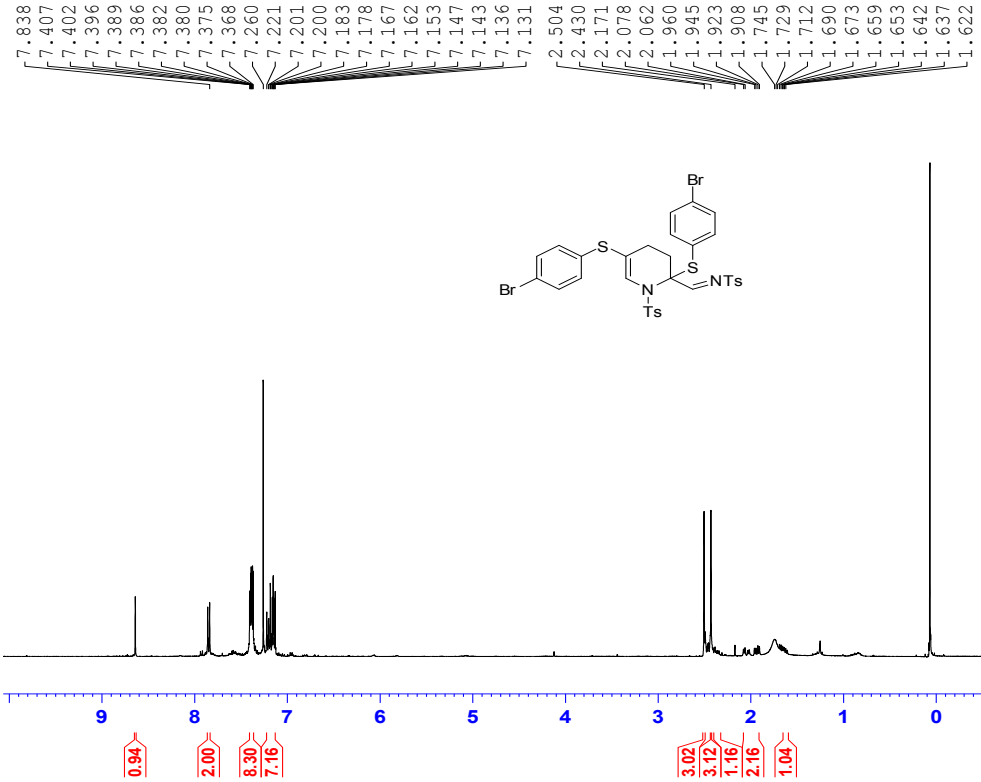
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                227
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141007
Time               19.37
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   222
DS                     4
SWH            24038.461 Hz
FIDRES             1.453353 Hz
AQ              0.3440820 sec
RG                 56.23
DW                 20.800 usec
DE                  6.50 usec
TE                298.1 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1          47.00000000 W
SFO1         100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127597 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

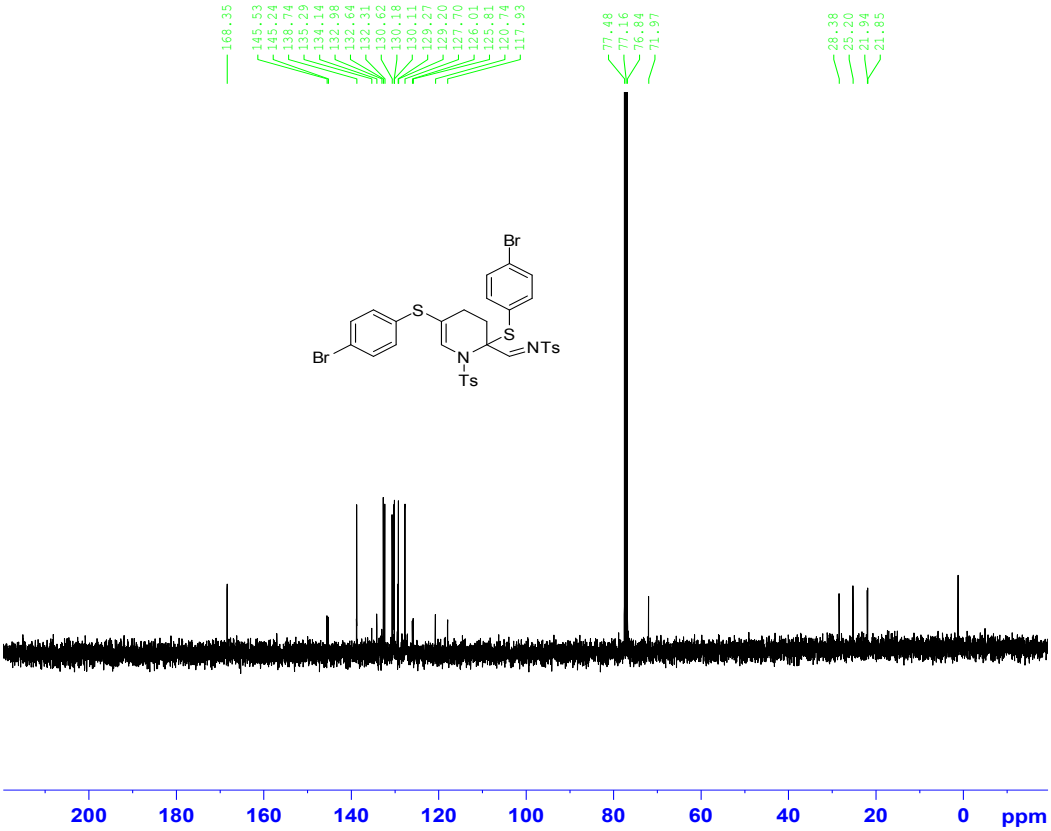
***N*- ((2,5-Bis ((4-bromophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3i)** :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40515
EXPNO                      502
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150514
Time                     20.08
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                        6.50 usec
TE                      296.0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300095 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

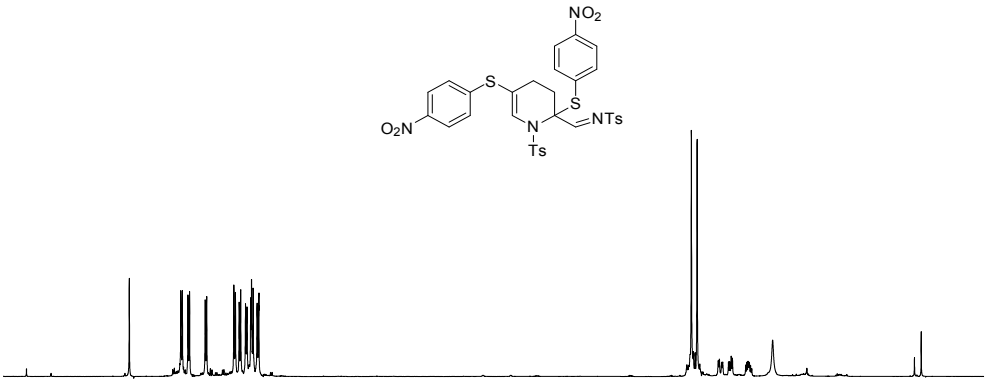
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

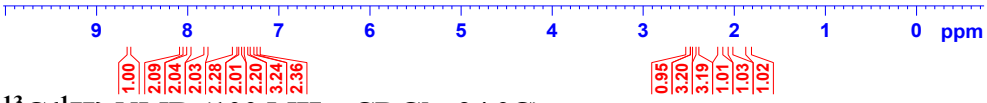


```
Current Data Parameters
NAME                  spa40515
EXPNO                      426
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150513
Time                     12.28
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                          4
SWH                  24038.461 Hz
FIDRES                1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                        6.50 usec
TE                      296.5 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127551 MHz
WDW                        EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

***N*-((2,5-Bis ((4-nitrophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3j)** :

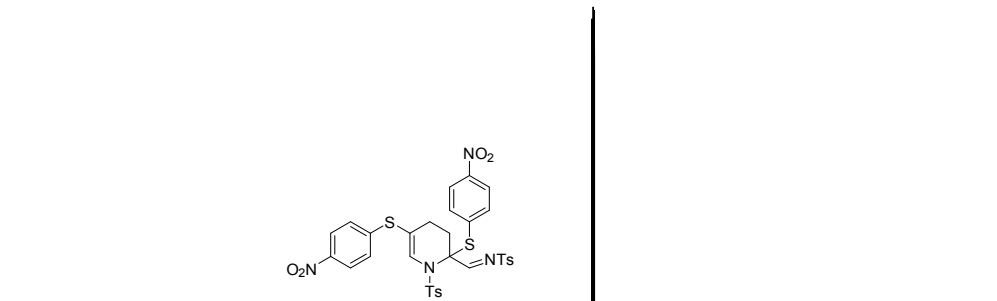
^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)

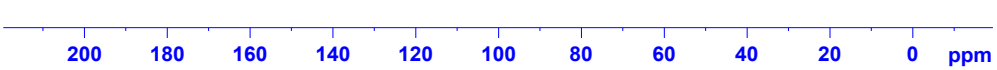





```
Current Data Parameters
NAME                  spa50515
EXPNO                       78
PROCNO                       1

F2 - Acquisition Parameters
Date_                20150518
Time                    15.58
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                      32768
SOLVENT                 CDCl3
NS                         32
DS                          2
SWH                10000.000 Hz
FIDRES              0.305176 Hz
AQ                  1.6384500 sec
RG                     114.76
DW                     50.000 usec
DE                      6.50 usec
TE                     295.4 K
D1                 0.50000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1             500.1525008 MHz
NUC1                       1H
P1                      11.75 usec
PLW1             15.30000019 W

F2 - Processing parameters
SI                      65536
SF               500.1500445 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

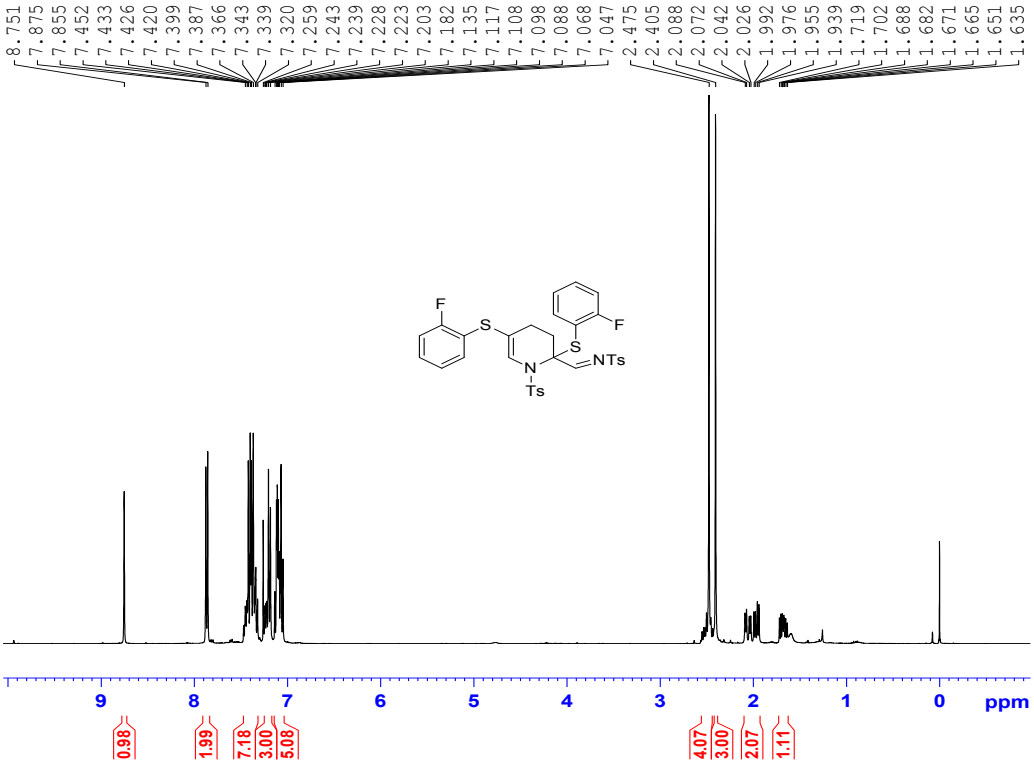





```
Current Data Parameters
NAME                  spa40914
EXPNO                       90
PROCNO                       1

F2 - Acquisition Parameters
Date_                20140911
Time                    22.33
INSTRUM                 spect
PROBHD    5 mm PABBO BB-
PULPROG              zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                24038.461 Hz
FIDRES              1.453353 Hz
AQ                  0.3440820 sec
RG                     200.34
DW                     20.800 usec
DE                      6.50 usec
TE           0 K
D1                 1.00000000 sec
D11                0.03000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       13C
P1                      9.25 usec
PLW1            47.00000000 W
SFO1            100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2             waltz16
NUC2                       1H
PCPD2                90.00 usec
PLW2             7.75000000 W
PLW12            0.23583999 W
PLW13            0.19103000 W
SFO2            400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF               100.6127574 MHz
WDW                        EM
SSB          0
LB                      1.00 Hz
GB           0
PC                      1.40
```

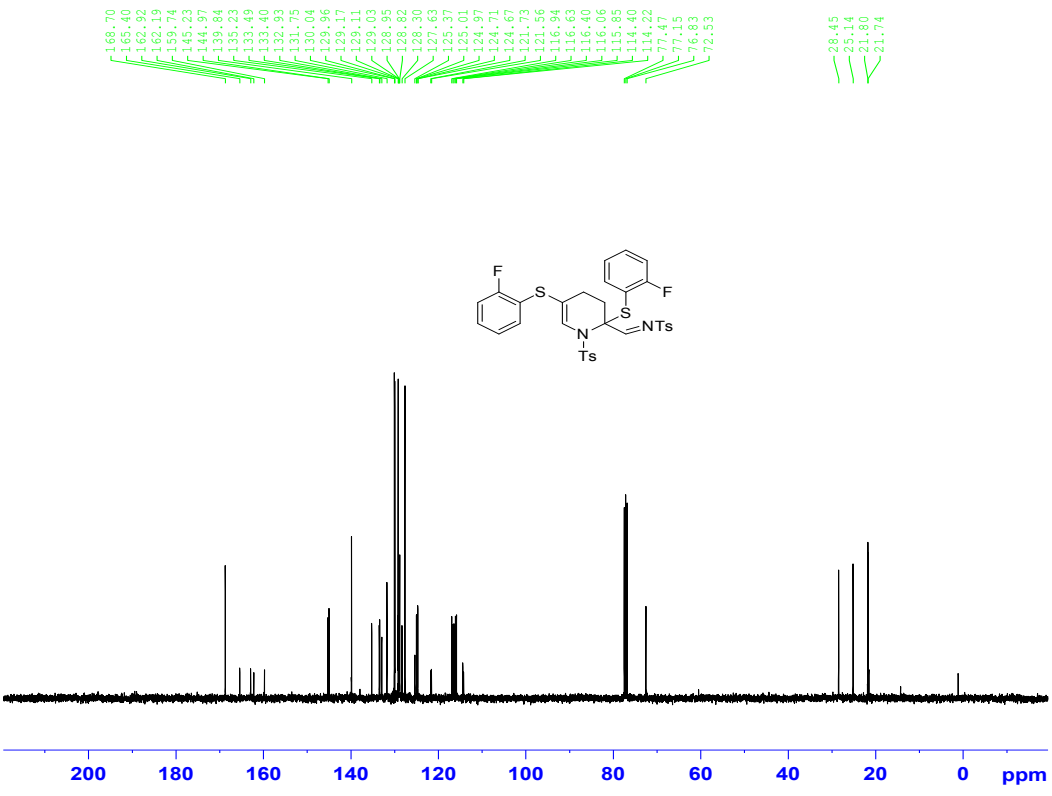
***N*-((2,5-bis ((2-fluorophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3k)** :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40415
EXPNO                      927
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150429
Time                     14.39
INSTRUM                  spect
PROBHD     5 mm PABBI 1H/
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                       88.51
DW                      62.400 usec
DE                       6.50 usec
TE                      298.3 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       9.00 usec
PLW1                 8.50000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                          65536
SF                 400.1300104 MHz
WDW                            EM
SSB                 0
LB                           0.30 Hz
GB                  0
PC                           1.00
```

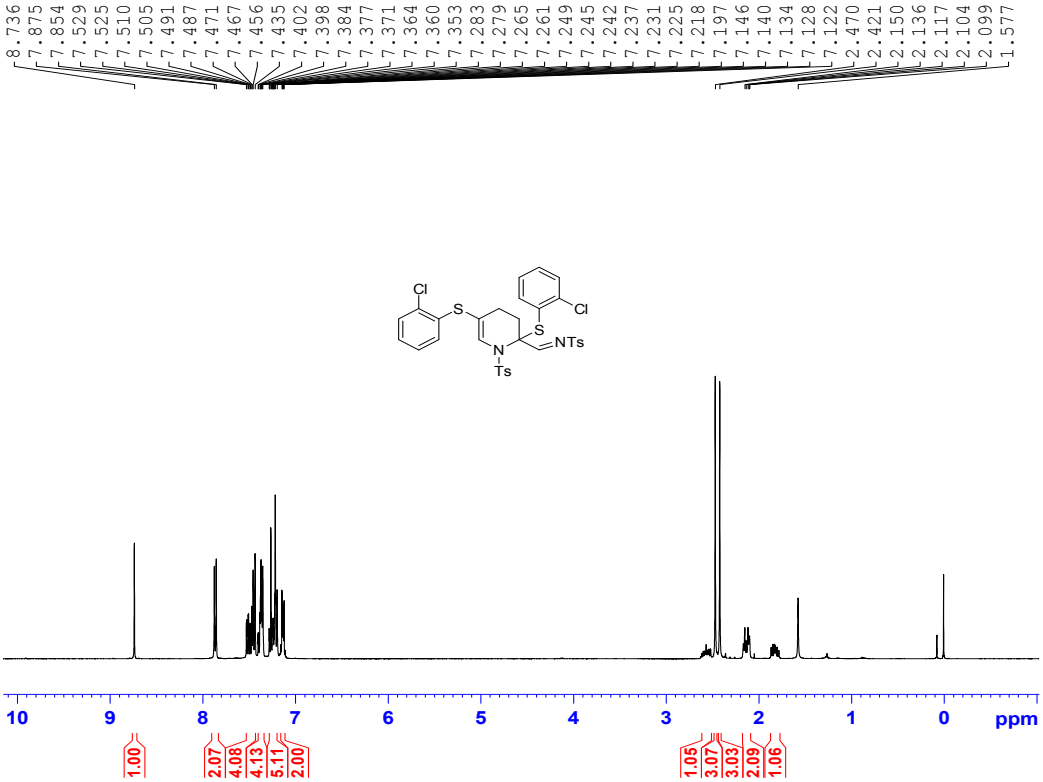
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40914
EXPNO                      496
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140923
Time                      1.43
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                           4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                       200.34
DW                      20.800 usec
DE                       6.50 usec
TE                  0 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                          32768
SF                 100.6127634 MHz
WDW                            EM
SSB                 0
LB                           1.00 Hz
GB                  0
PC                           1.40
```

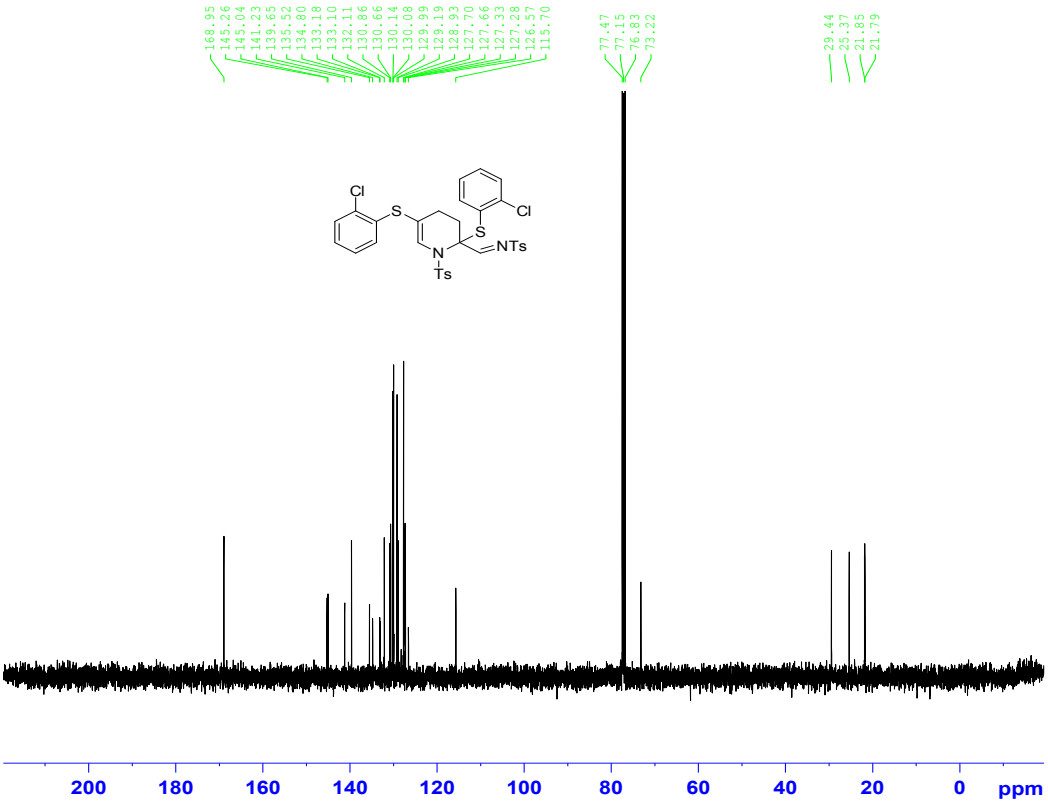
***N*-((2,5-bis ((2-chlorophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3l)**：

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                218
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141007
Time               16.00
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE                299.3 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF          400.1300073 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

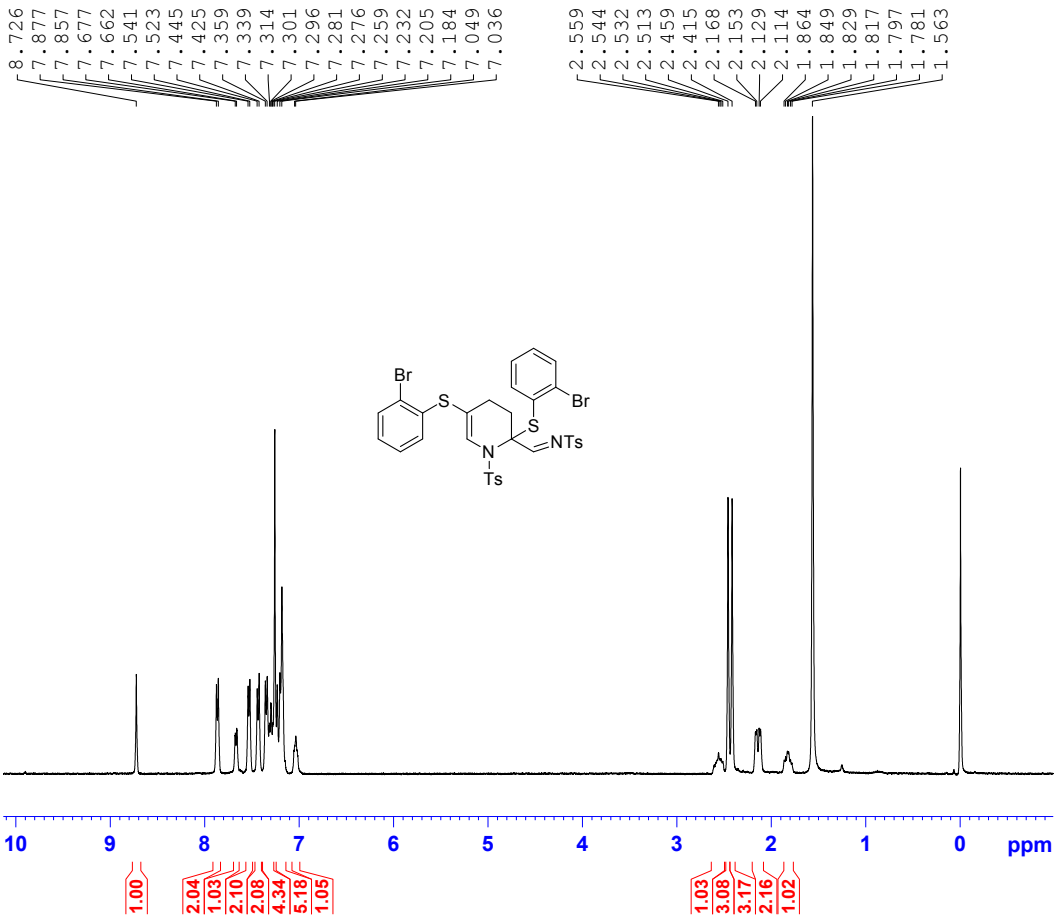
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                219
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141007
Time               16.08
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                299.8 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127563 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

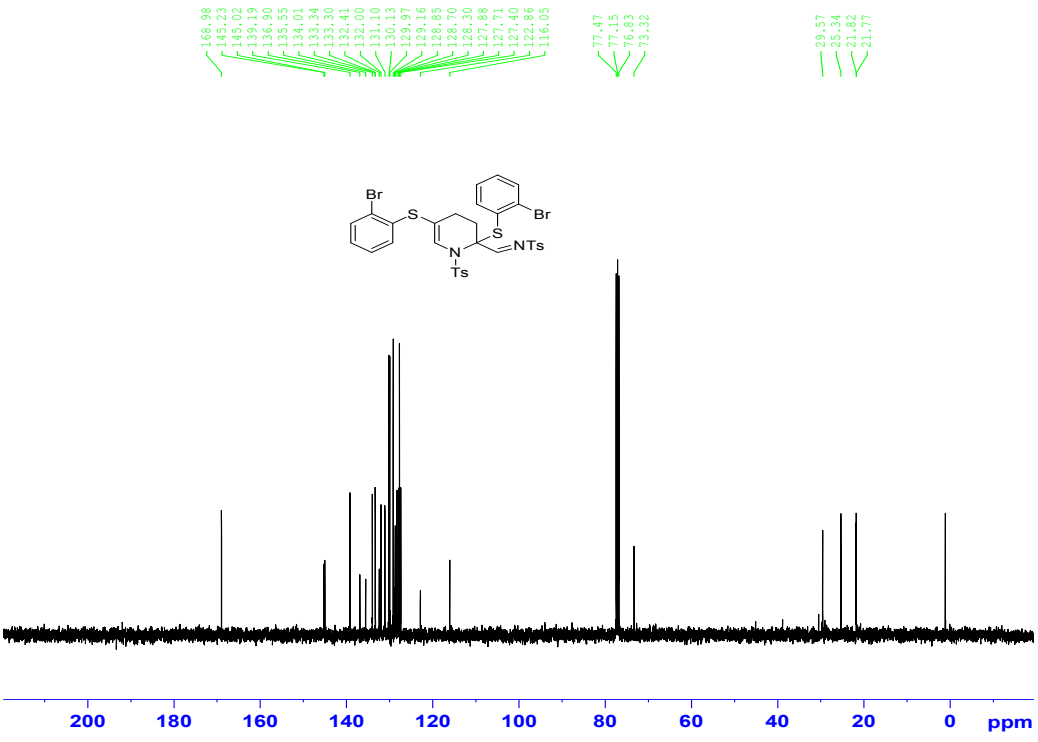
***N*-((2,5-Bis((2-bromophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3m) :**

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40515
EXPNO                472
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150514
Time               10.53
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE                295.6 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF          400.1300097 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

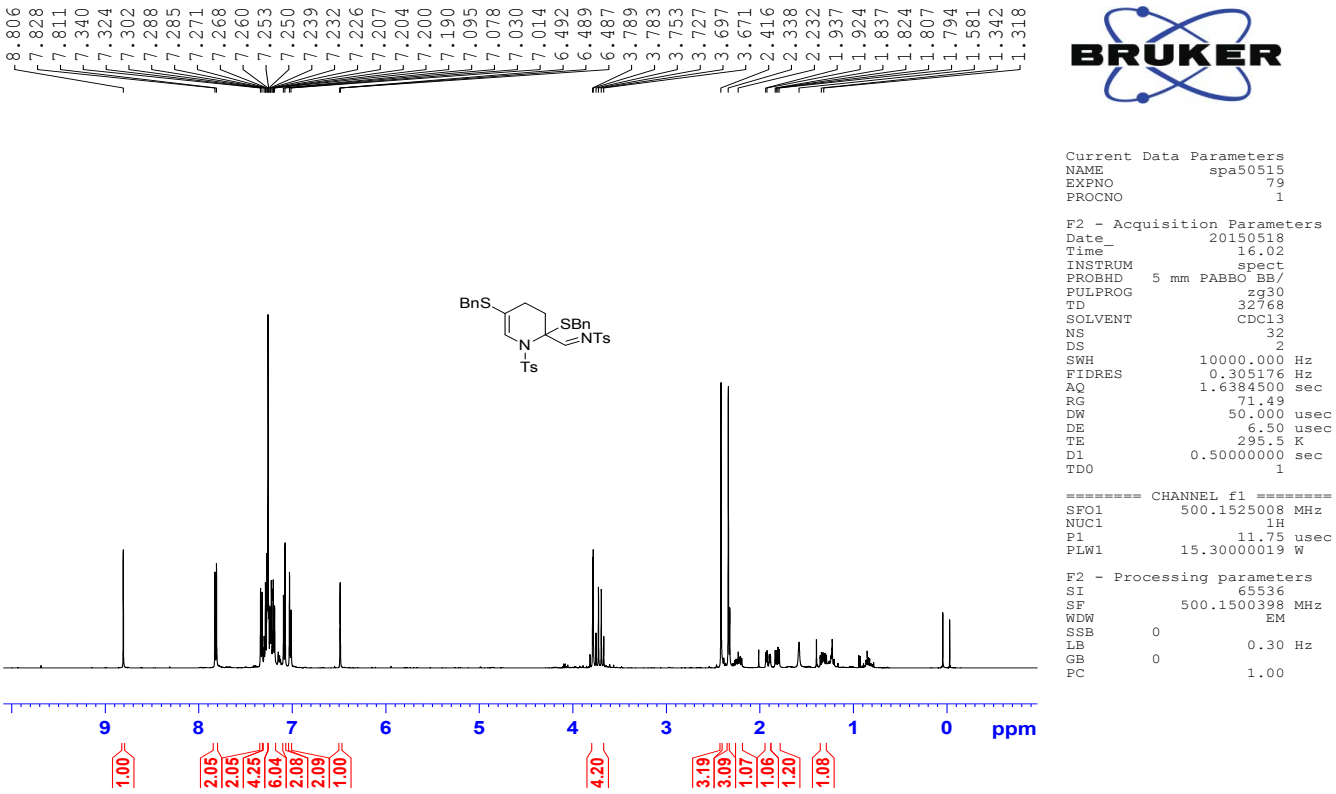
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41114
EXPNO                557
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141119
Time               14.59
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                301.7 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127576 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

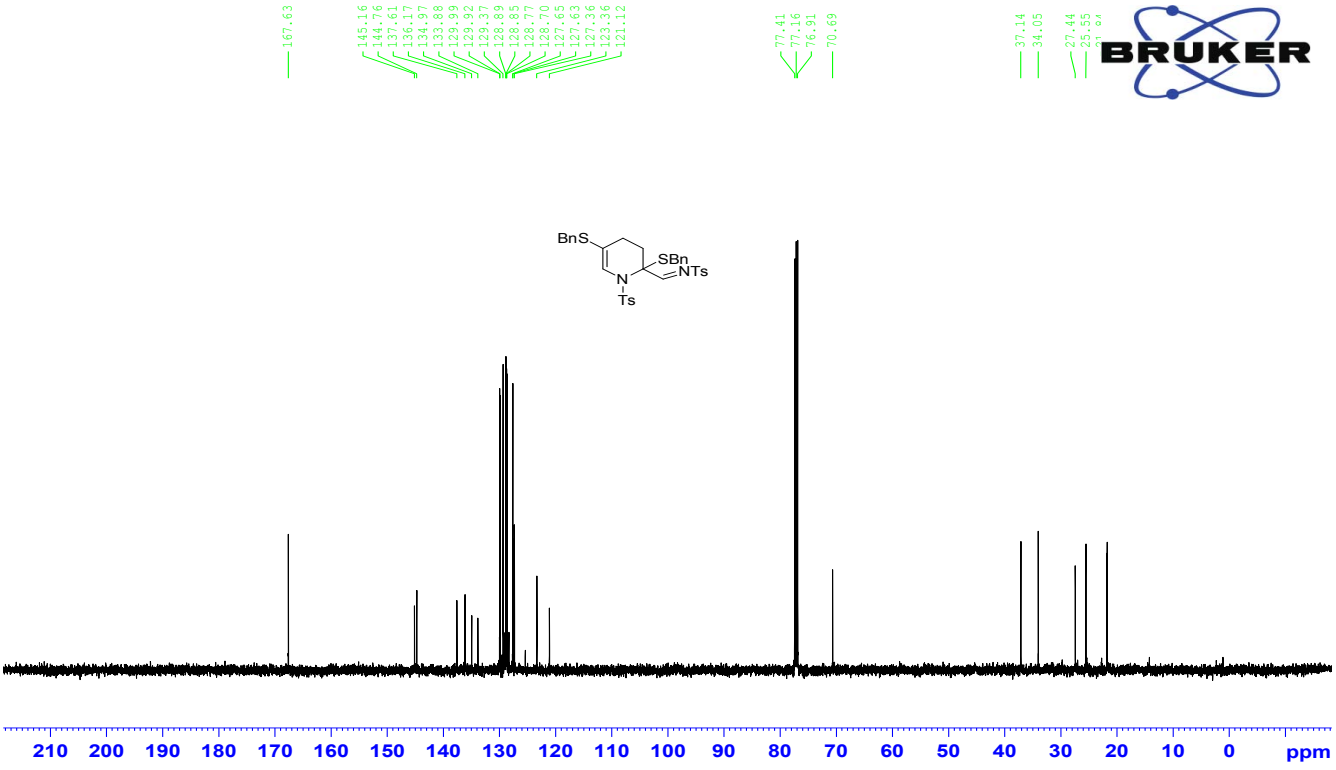
***N*-((2,5-Bis (benzylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3n) :**

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)



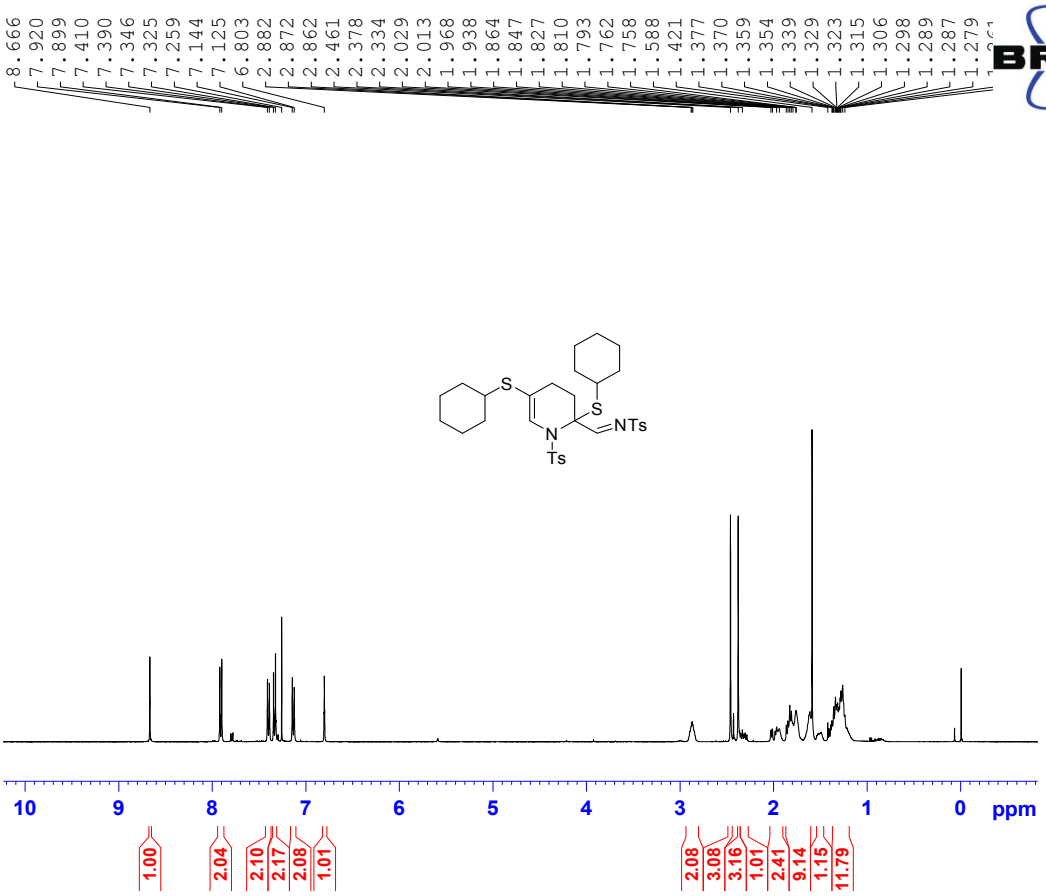

```
Current Data Parameters
NAME                  spa50515
EXPNO                       79
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150518
Time                     16.02
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      32768
SOLVENT                 CDCl3
NS                         32
DS                          2
SWH                 10000.000 Hz
FIDRES                0.305176 Hz
AQ                    1.6384500 sec
RG                       71.49
DW                      50.000 usec
DE                        6.50 usec
TE                       295.5 K
D1                  0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1                500.1525008 MHz
NUC1                        1H
P1                       11.75 usec
PLW1                15.30000019 W

F2 - Processing parameters
SI                          65536
SF                  500.1500398 MHz
WDW                            EM
SSB                 0
LB                           0.30 Hz
GB                  0
PC                           1.00
```

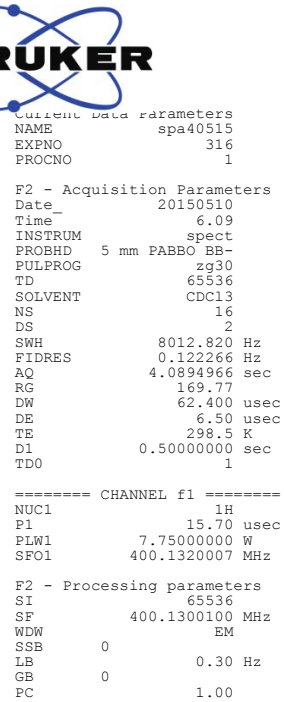
^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C)



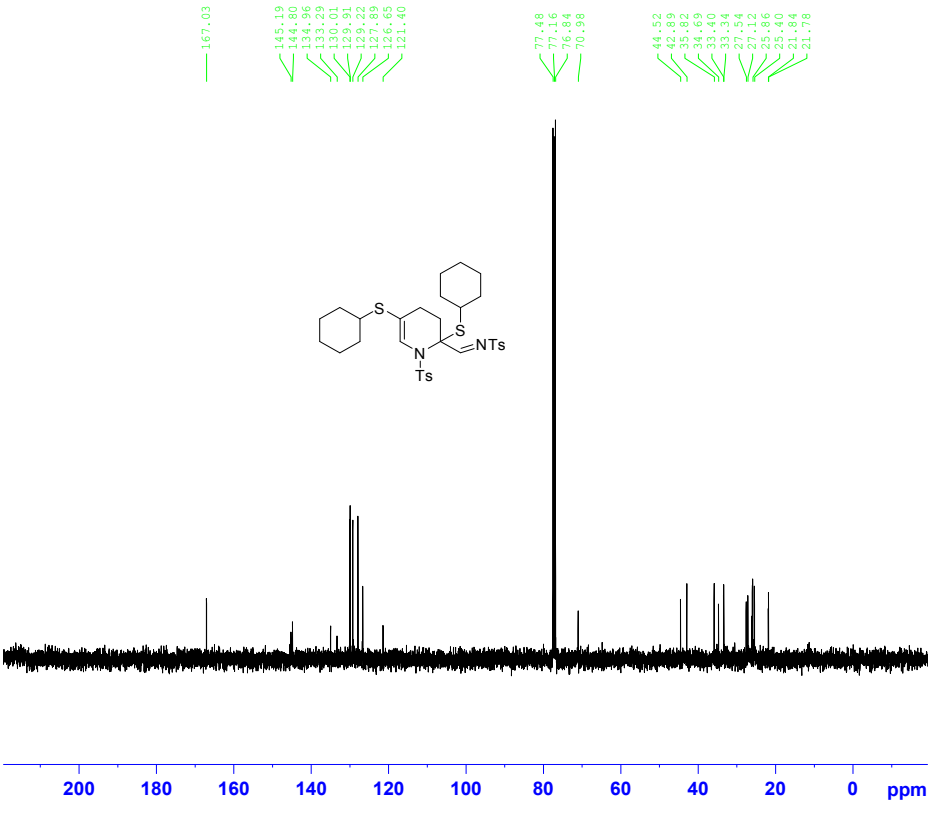
***N*-((2,5-bis(cyclohexylthio)-1-tosyl-1,2,3,4-tetrahydropyridin-2-yl)methylene)-4-methylbenzenesulfonamide (3o) :**

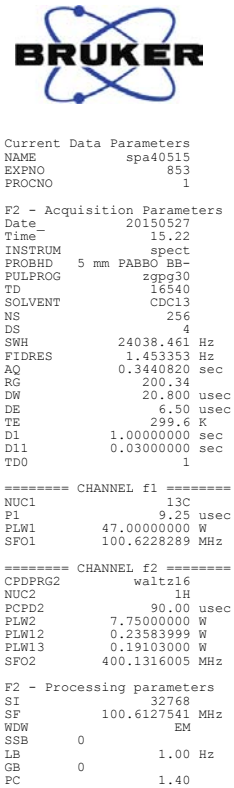
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)





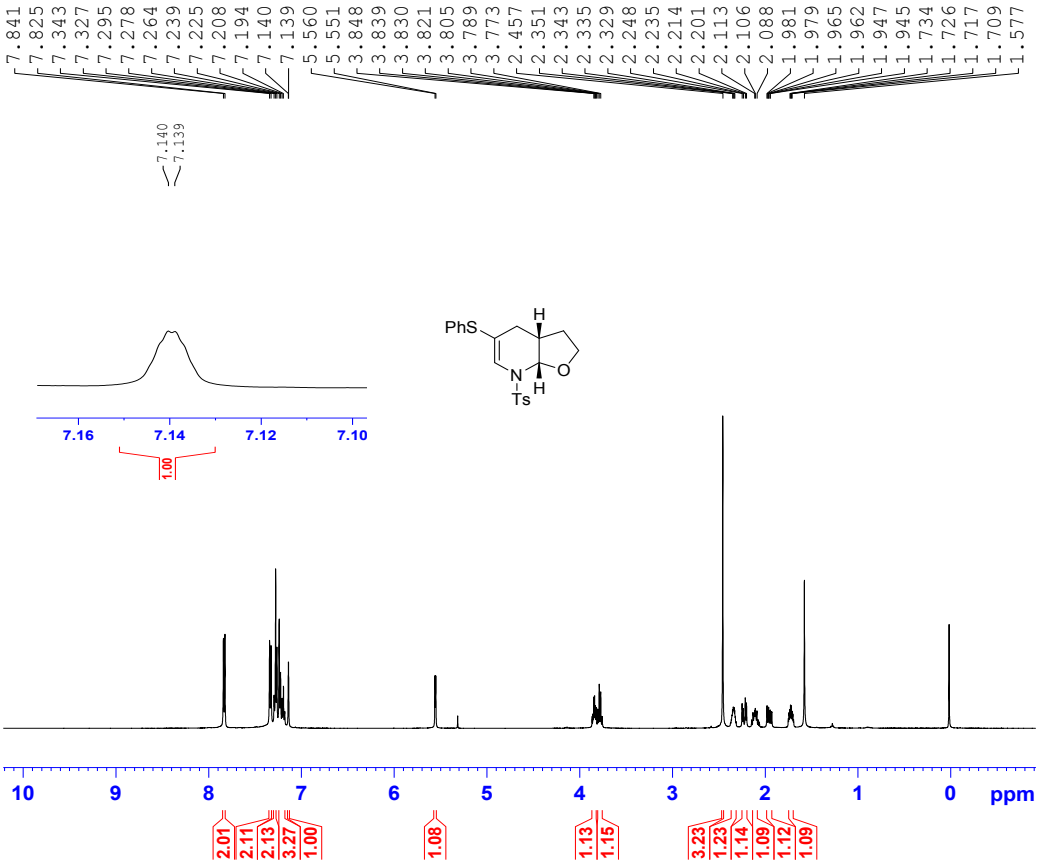
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)





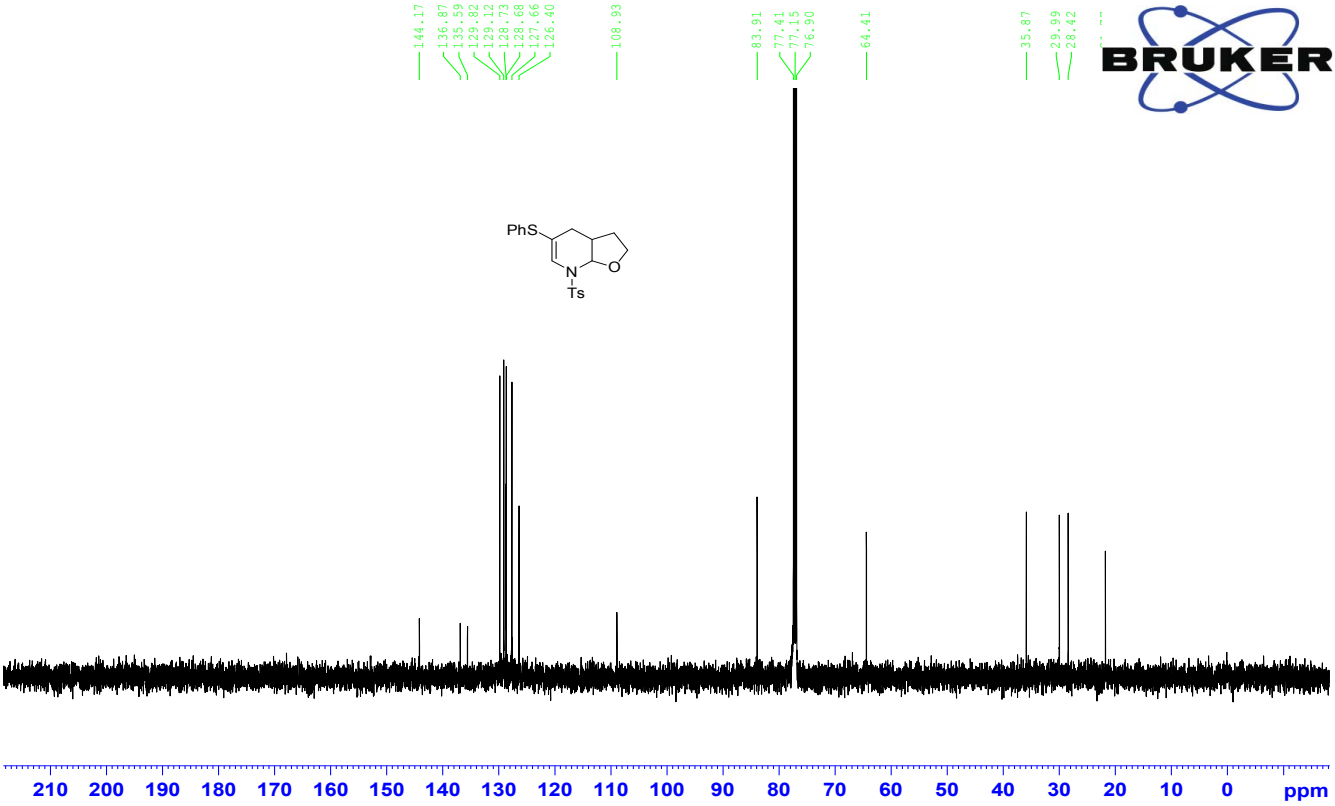
5- (Phenylthio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5a) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)



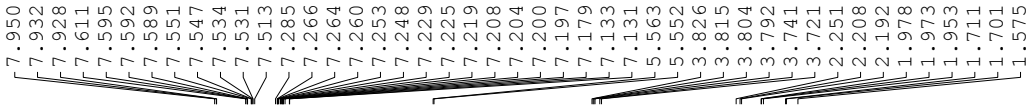

```
Current Data Parameters
NAME                 spa50914
EXPNO                     103
PROCNO                      1

F2 - Acquisition Parameters
Date_               20140905
Time                   21.06
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                       32
DS                        2
SWH                10000.000 Hz
FIDRES             0.305176 Hz
AQ                 1.6384500 sec
RG                    162.95
DW                    50.000 usec
DE                     6.50 usec
TE                    298.2 K
D1                 0.50000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1            500.1525008 MHz
NUC1                      1H
P1                     11.75 usec
PLW1           15.30000019 W

F2 - Processing parameters
SI                        65536
SF              500.1500142 MHz
WDW                       EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

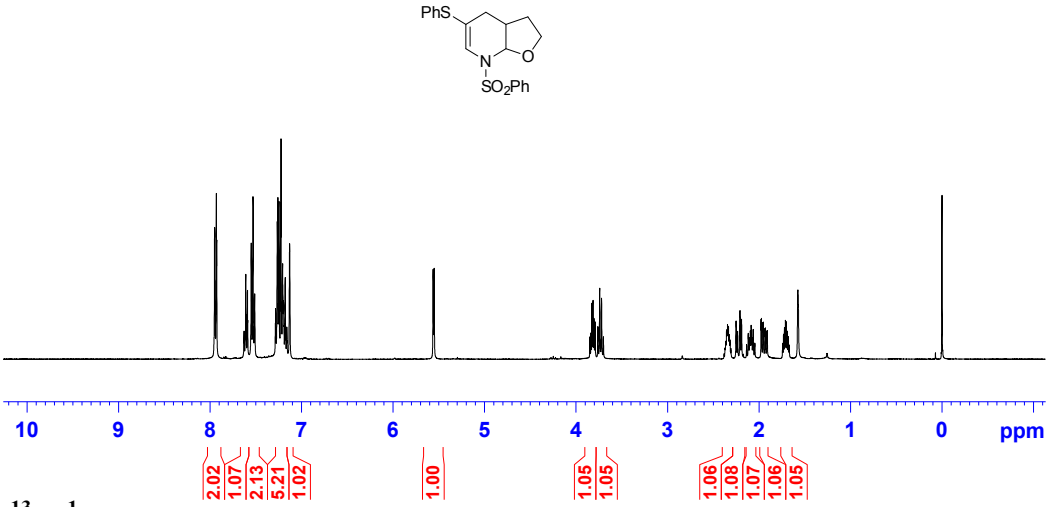
^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C)



7-(Phenylsulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5b) :

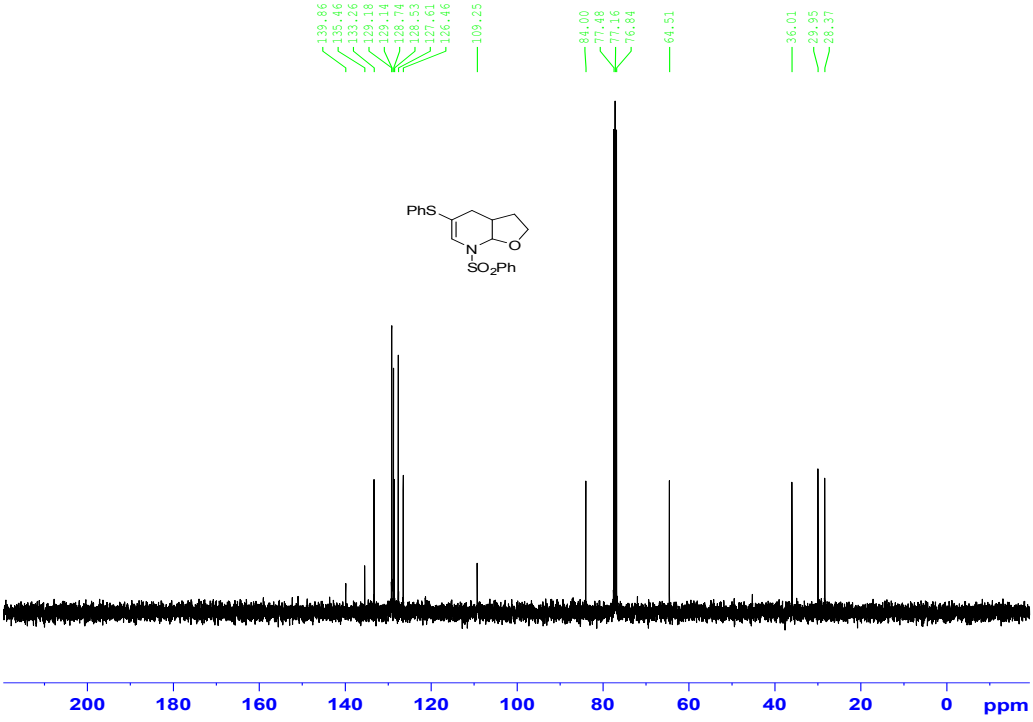
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME            spa40914
EXPNO                544
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140923
Time                21.59
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                 200.34
DW                 62.400 usec
DE                  6.50 usec
TE        0 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300096 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

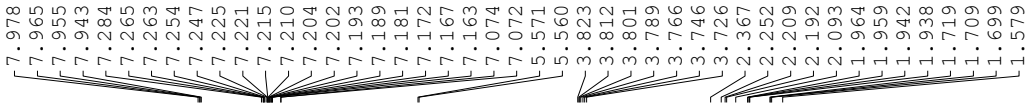
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

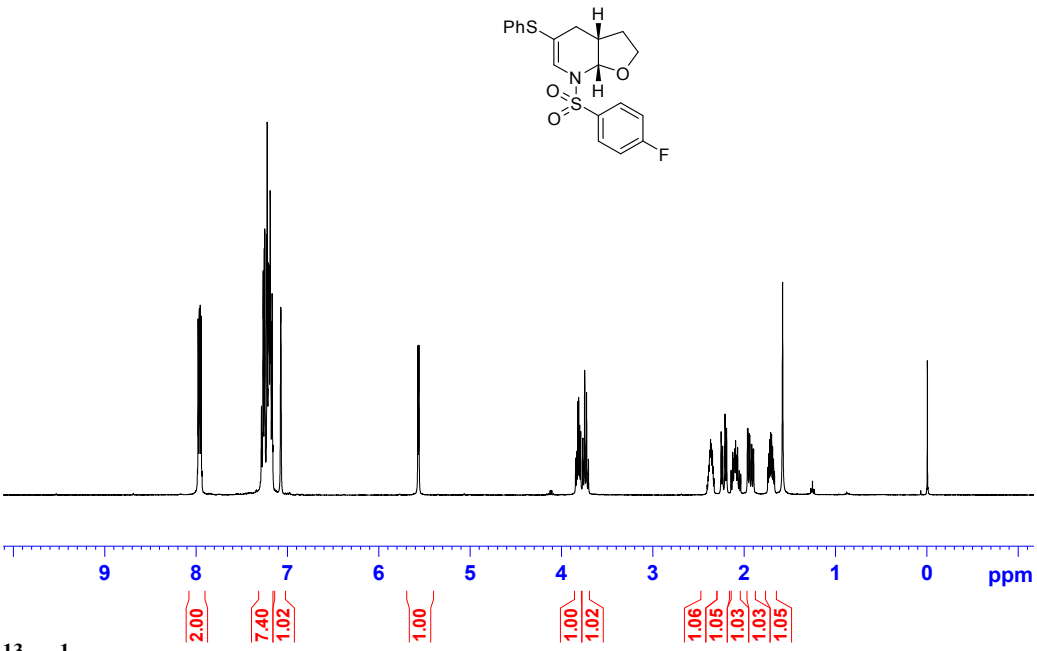



```
Current Data Parameters
NAME            spa40914
EXPNO                549
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140923
Time                22.06
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                  6.50 usec
TE        0 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127559 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

7-((4-Fluorophenyl)sulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5c) :

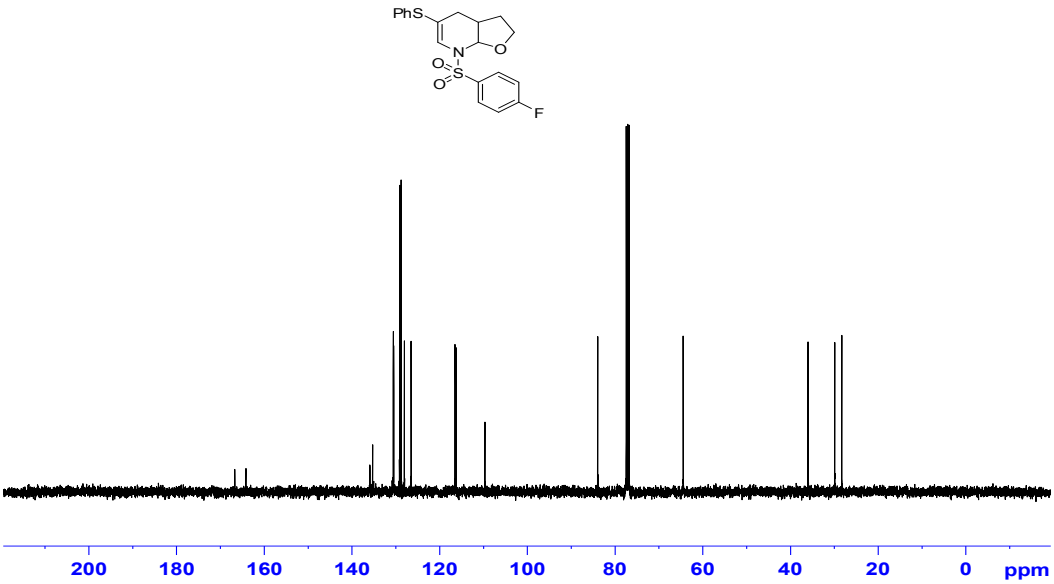
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME            spa41014
EXPNO                376
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141010
Time                19.30
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                 169.77
DW                 62.400 usec
DE                  6.50 usec
TE                 298.1 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300119 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

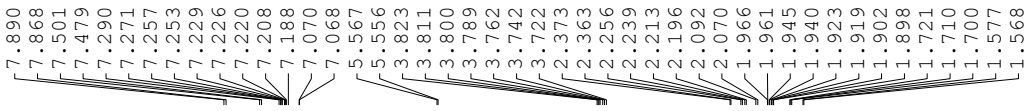
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

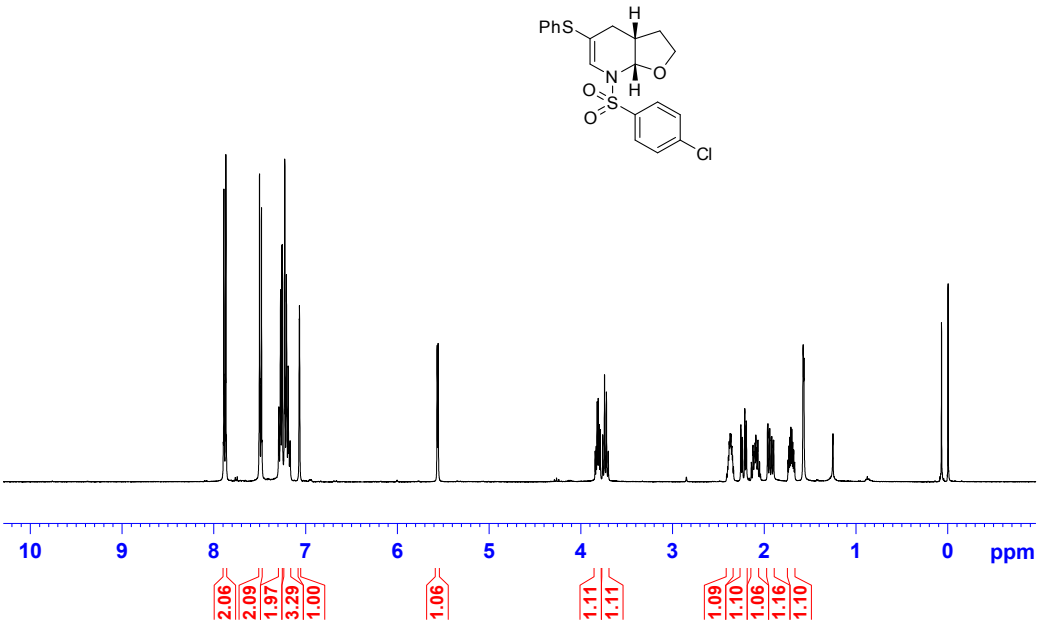



```
Current Data Parameters
NAME            spa41014
EXPNO                377
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141010
Time                19.43
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   512
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                  6.50 usec
TE                 298.1 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127583 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

7-((4-Chlorophenyl)sulfonyl)-5- (phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5d) :

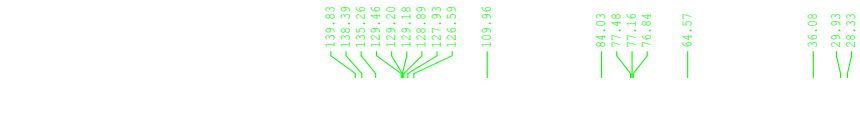
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)

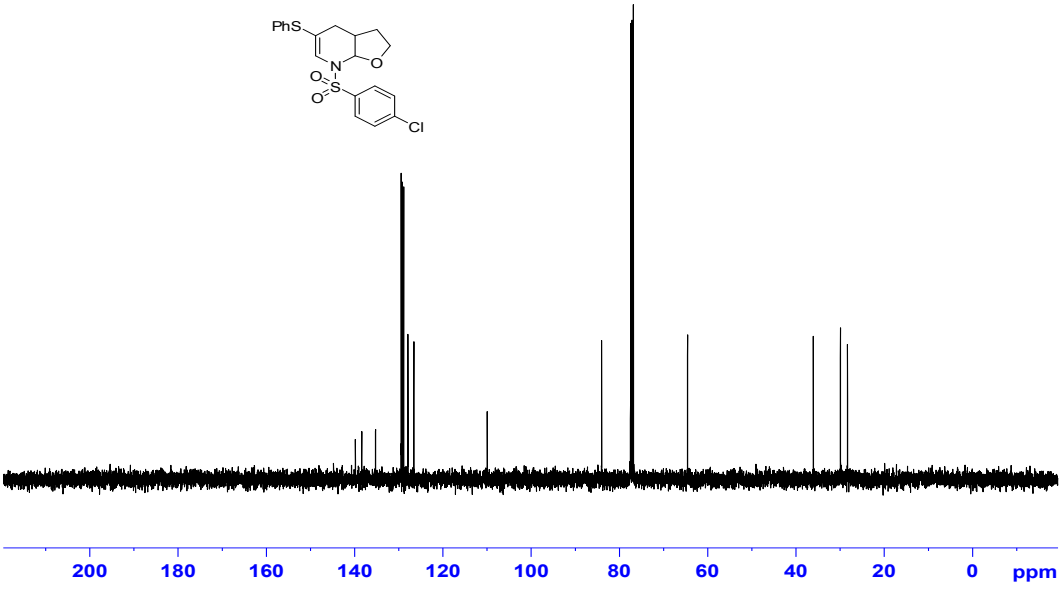





```
Current Data Parameters
NAME            spa40914
EXPNO                717
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140927
Time              21.12
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                200.34
DW                62.400 usec
DE                 6.50 usec
TE                298.1 K
D1             0.50000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                 1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                65536
SF          400.1300107 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

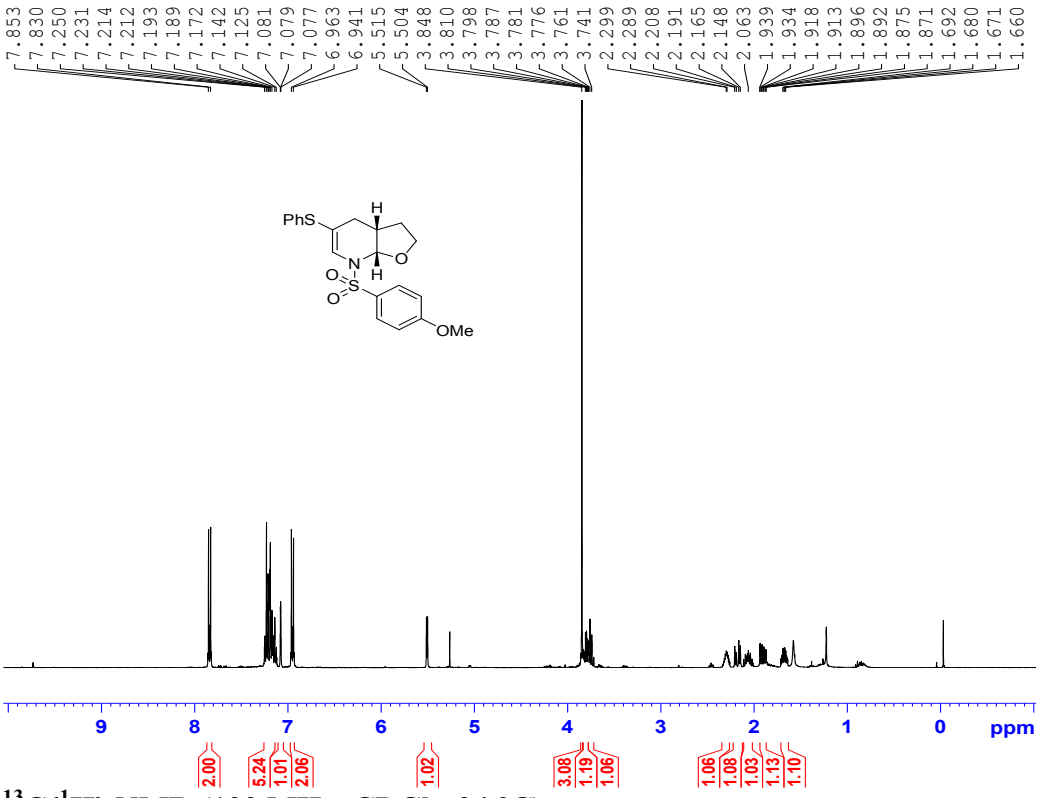





```
Current Data Parameters
NAME            spa40914
EXPNO                718
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140927
Time              21.25
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                16540
SOLVENT           CDCl3
NS                  512
DS                    4
SWH           24038.461 Hz
FIDRES         1.453353 Hz
AQ             0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                298.1 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                   1

======== CHANNEL f1 ========
NUC1                13C
P1                9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2         waltz16
NUC2                 1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                32768
SF          100.6127556 MHz
WDW                  EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

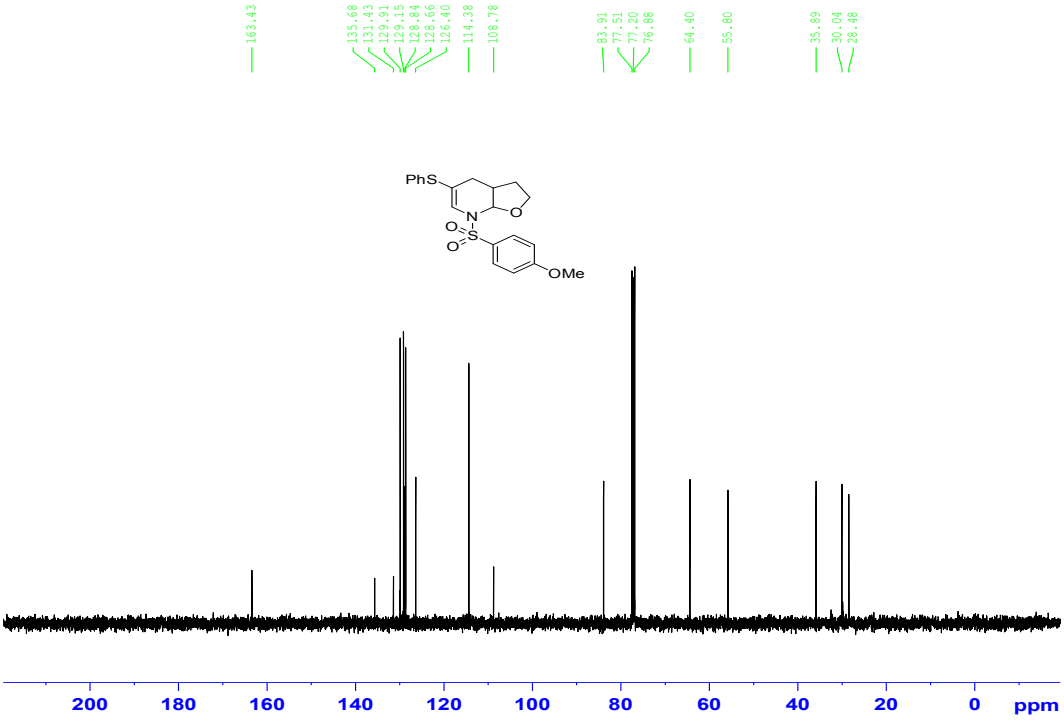
7-((4-Methoxyphenyl)sulfonyl)-5-(phenylthio)-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5e) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40914
EXPNO                      243
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140915
Time                     15.45
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                   8012.820 Hz
FIDRES                0.122266 Hz
AQ                    4.0894966 sec
RG                       153.13
DW                       62.400 usec
DE                        6.50 usec
TE                  0 K
D1                    0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                  7.75000000 W
SFO1                400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300210 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

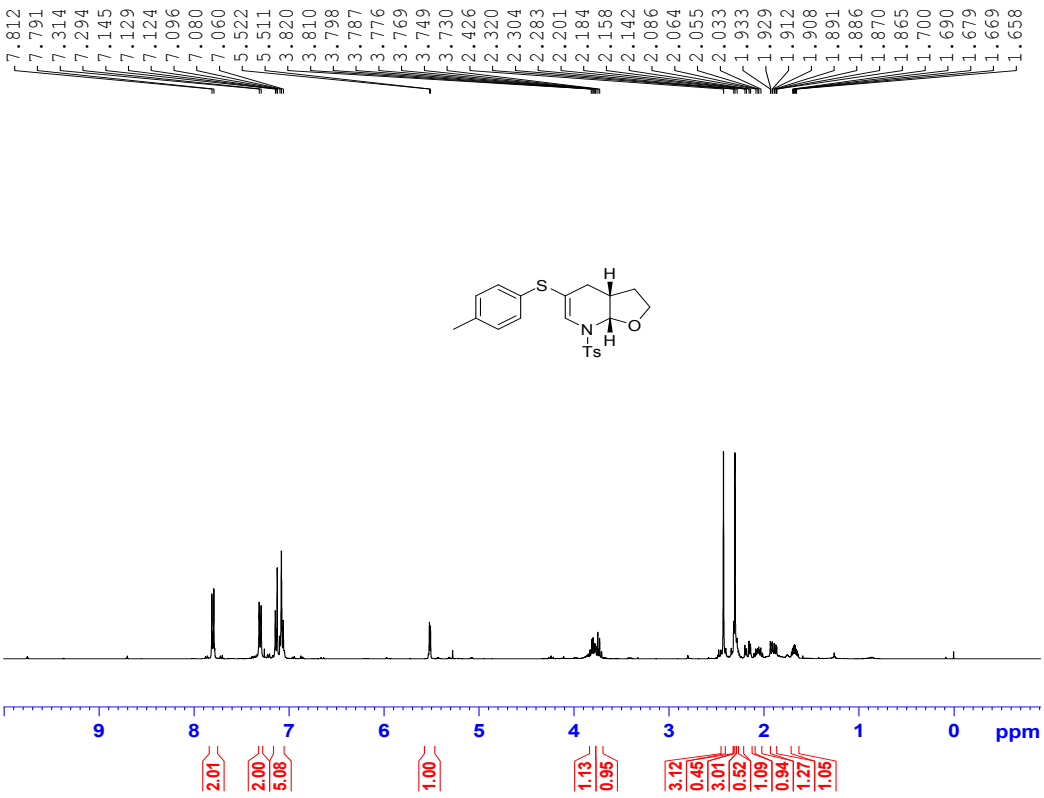
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40914
EXPNO                      244
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140915
Time                     15.53
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                           4
SWH                  24038.461 Hz
FIDRES                1.453353 Hz
AQ                    0.3440820 sec
RG                       200.34
DW                       20.800 usec
DE                        6.50 usec
TE                  0 K
D1                    1.00000000 sec
D11                   0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                 47.00000000 W
SFO1                100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                  7.75000000 W
PLW12                 0.23583999 W
PLW13                 0.19103000 W
SFO2                400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127526 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

5- (*p*-Tolylthio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5f) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



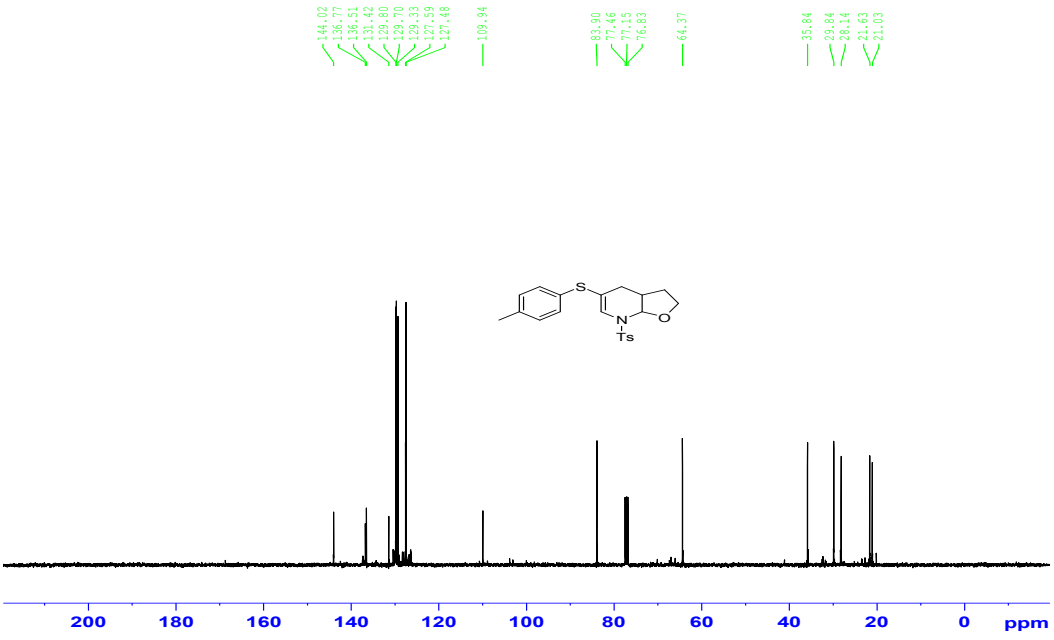
Current Data Parameters
NAME spa40914
EXPNO 237
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140915
Time 15.15
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894966 sec
RG 50.04
DW 62.400 usec
DE 6.50 usec
TE 0 K
D1 0.50000000 sec
TD0 1

======== CHANNEL f1 ========
NUC1 1H
P1 15.70 usec
PLW1 7.75000000 W
SFO1 400.1320007 MHz

F2 - Processing parameters
SI 65536
SF 400.1300096 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)



Current Data Parameters
NAME spa40914
EXPNO 238
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140915
Time 15.23
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 16540
SOLVENT CDCl3
NS 256
DS 4
SWH 24038.461 Hz
FIDRES 1.453353 Hz
AQ 0.3440820 sec
RG 200.34
DW 20.800 usec
DE 6.50 usec
TE 0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1

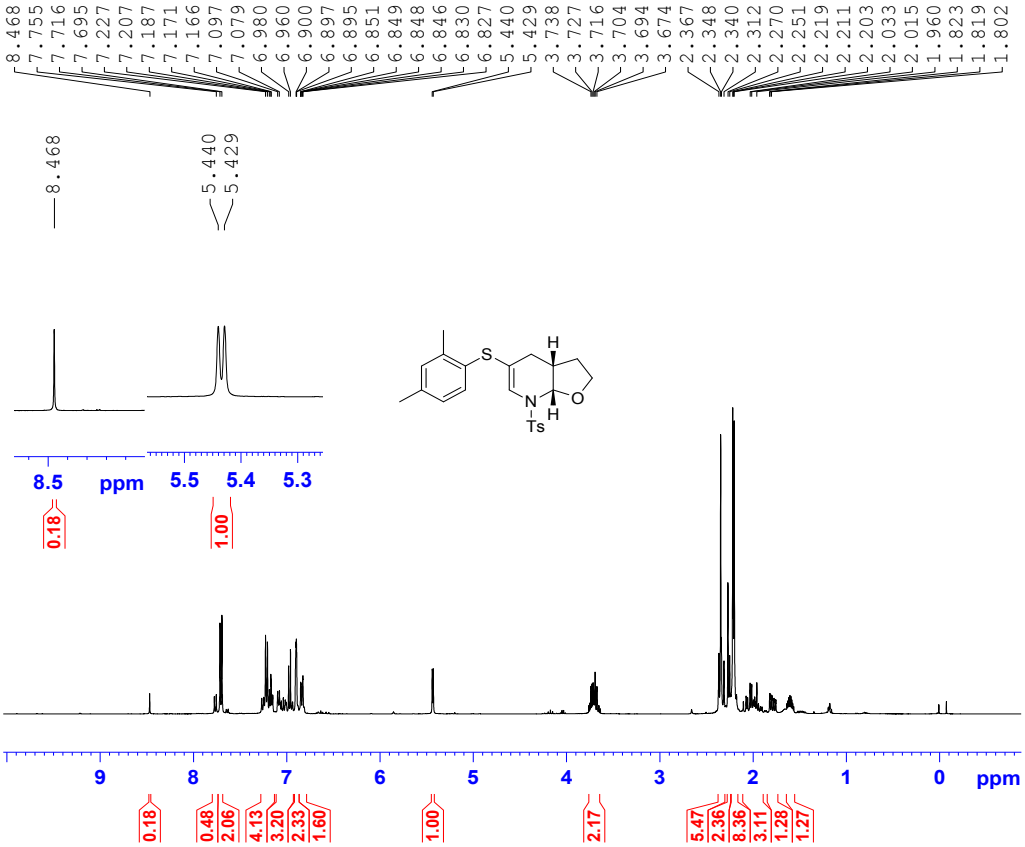
======== CHANNEL f1 ========
NUC1 13C
P1 9.25 usec
PLW1 47.00000000 W
SFO1 100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PLW2 7.75000000 W
PLW12 0.23583999 W
PLW13 0.19103000 W
SFO2 400.1316005 MHz

F2 - Processing parameters
SI 32768
SF 100.6127684 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

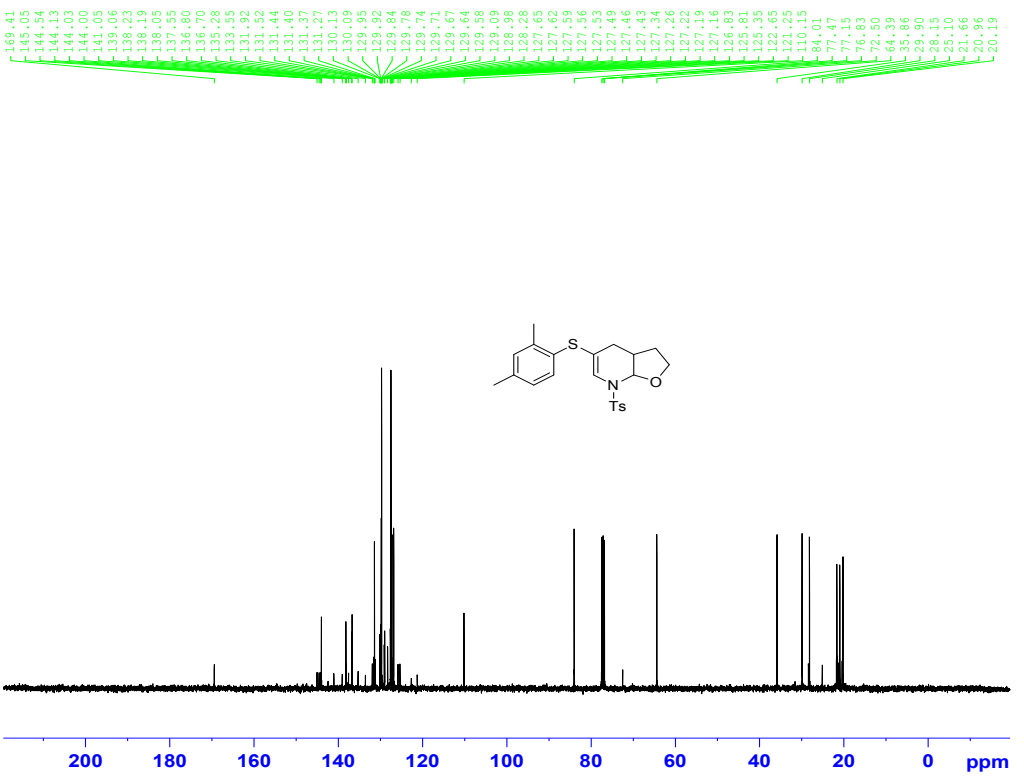
5-((2,4-Dimethylphenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5g) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                794
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140930
Time               19.12
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES             0.122266 Hz
AQ              4.0894966 sec
RG                  60.89
DW                 62.400 usec
DE                  6.50 usec
TE                 298.7 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300449 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

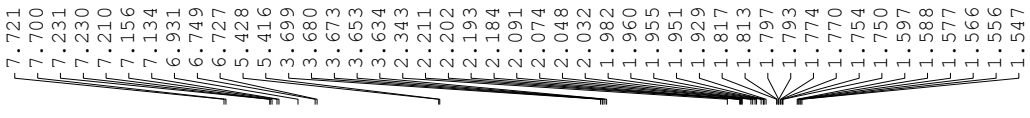
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

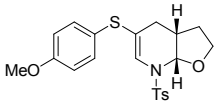


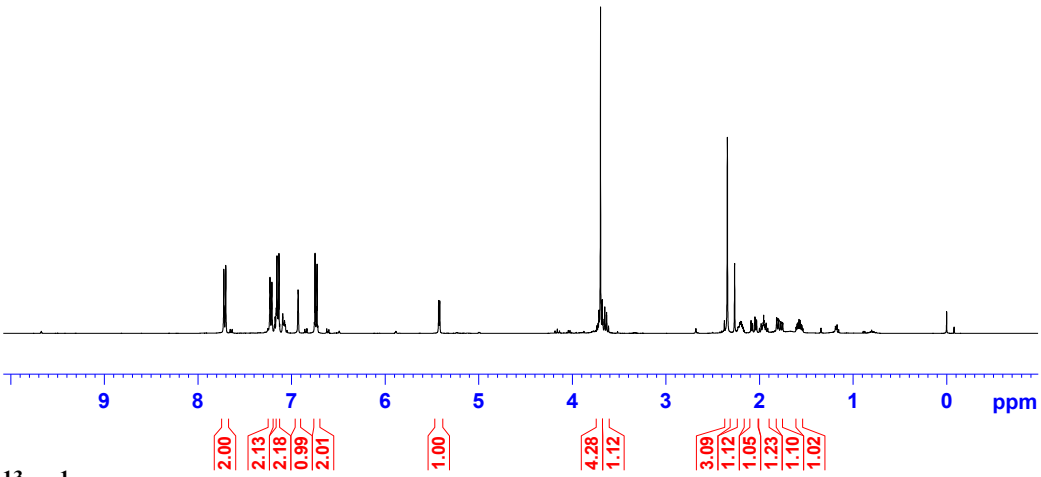

```
Current Data Parameters
NAME            spa40914
EXPNO                795
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140930
Time               19.20
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                 200.34
DW                 20.800 usec
DE                  6.50 usec
TE                 299.1 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  13C
P1                  9.25 usec
PLW1           47.00000000 W
SFO1          100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2          400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127656 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

5-((4-Methoxyphenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5h) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)

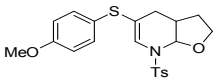


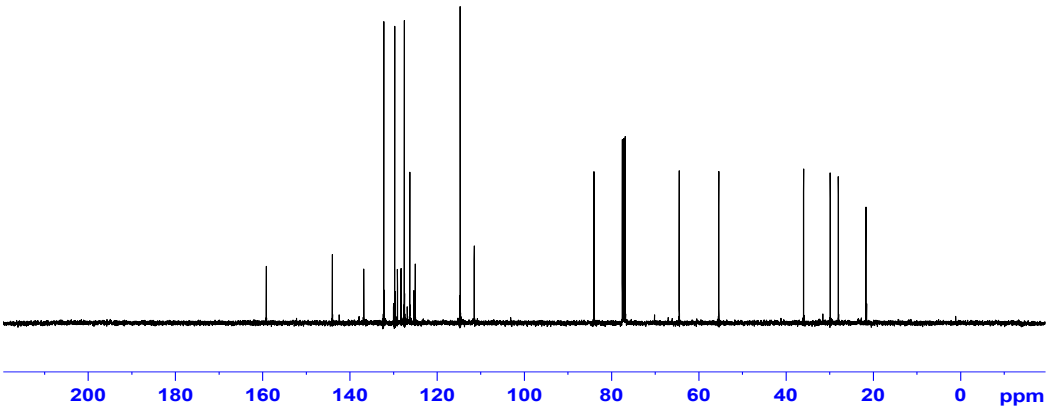





```
Current Data Parameters
NAME                  spa41014
EXPNO                      324
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141009
Time                     19.14
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                       60.89
DW                      62.400 usec
DE                       6.50 usec
TE                      298.2 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300431 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

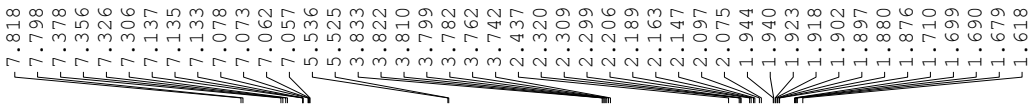


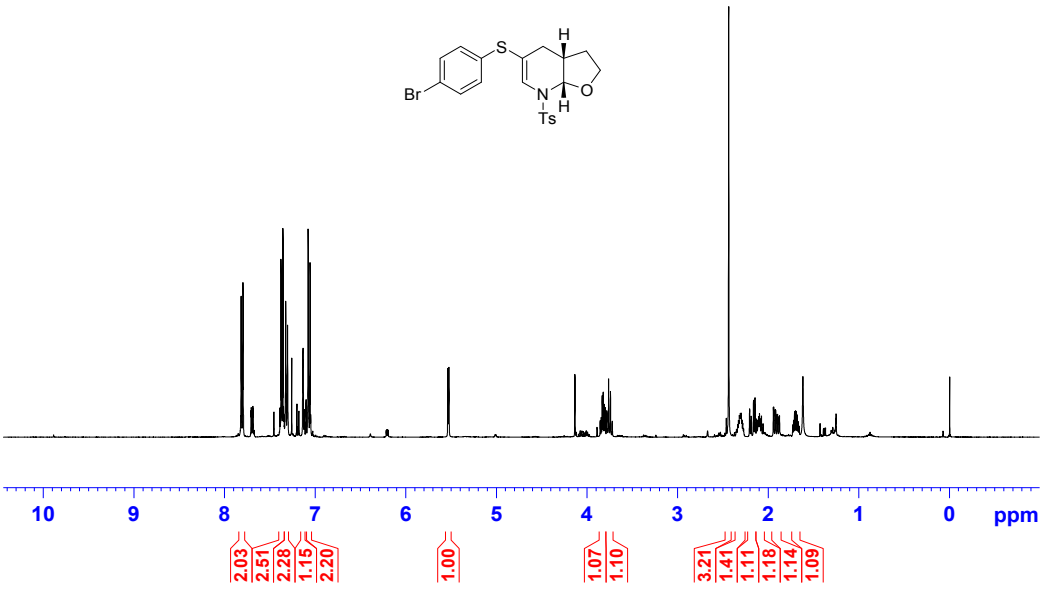



```
Current Data Parameters
NAME                  spa41014
EXPNO                      325
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141009
Time                     19.25
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                       200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      298.2 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127672 MHz
WDW                        EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

5-((4-Bromophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5i) :

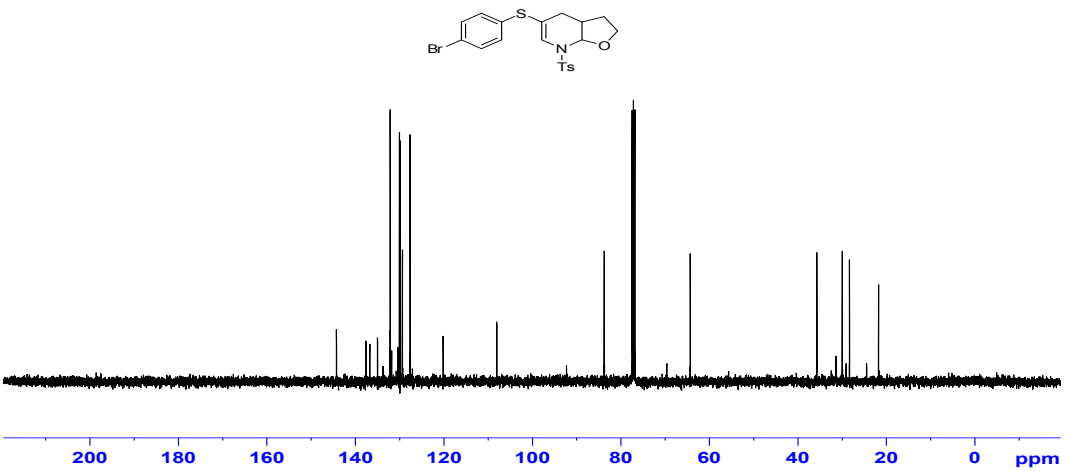
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME            spa40914
EXPNO                334
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140918
Time                1.02
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                138.85
DW                62.400 usec
DE                 6.50 usec
TE              0 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF          400.1300098 MHz
WDW                   EM
SSB             0
LB                 0.30 Hz
GB              0
PC                 1.00
```

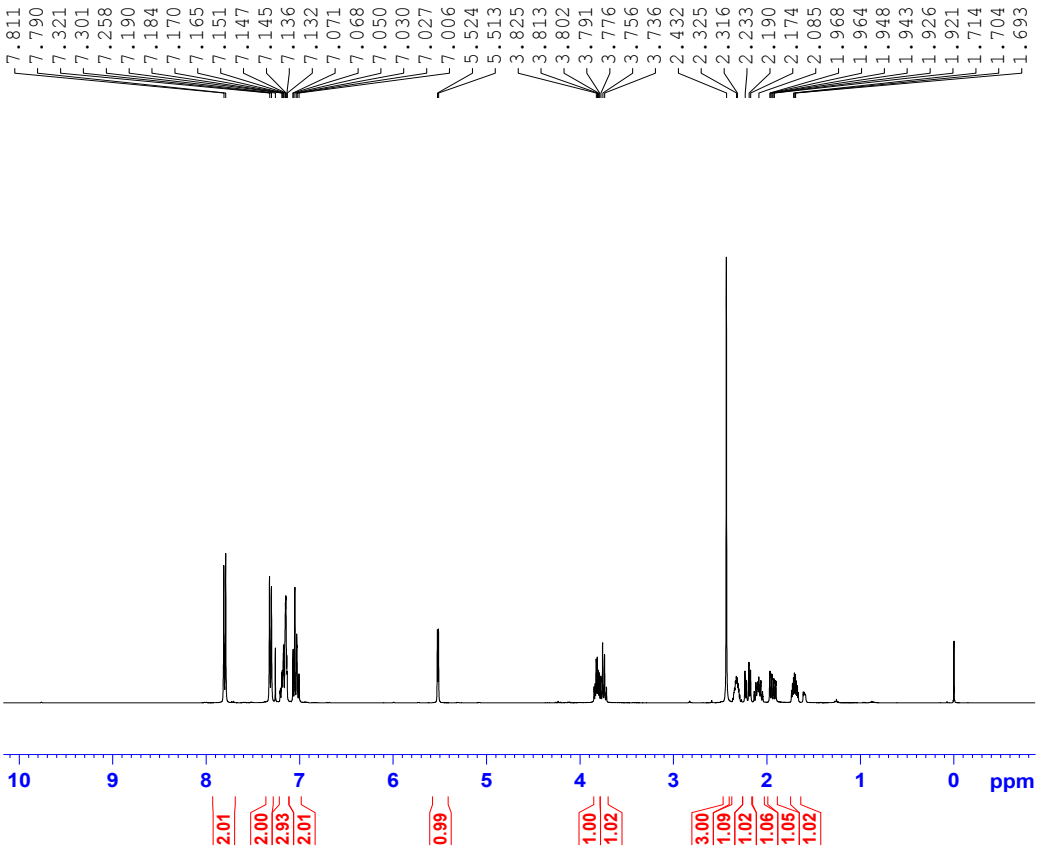
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40914
EXPNO                335
PROCNO                 1

F2 - Acquisition Parameters
Date_           20140918
Time                1.09
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE              0 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  13C
P1                  9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF          100.6127580 MHz
WDW                   EM
SSB             0
LB                 1.00 Hz
GB              0
PC                 1.40
```

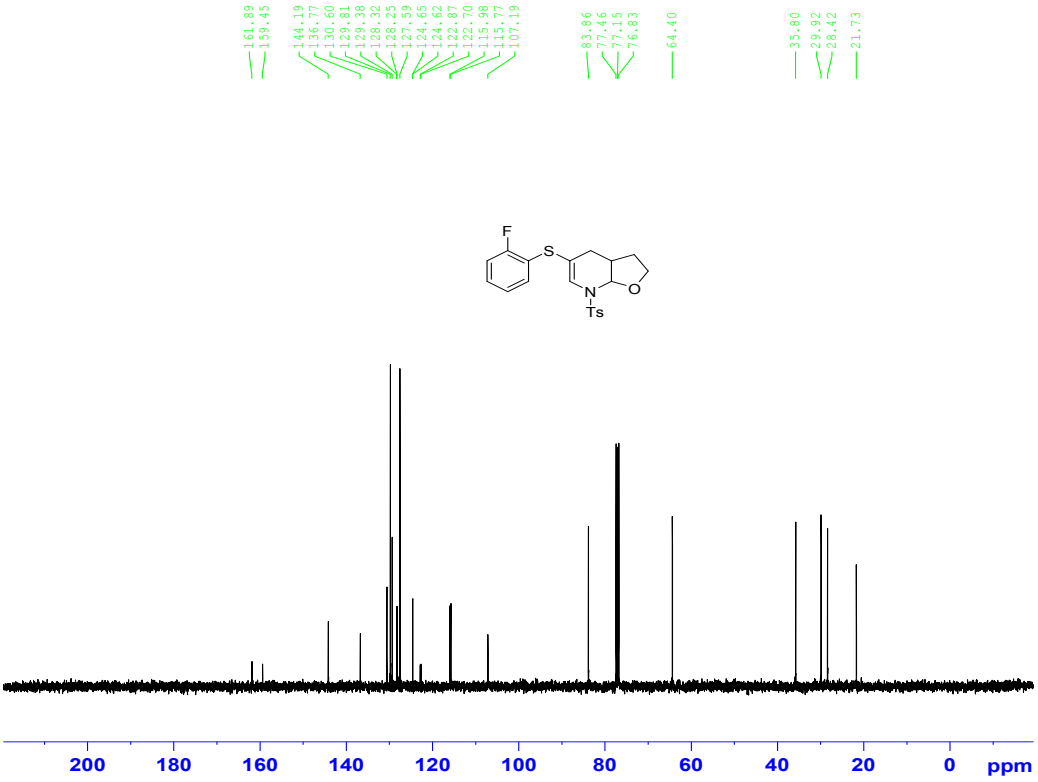
5-((2-Fluorophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5k) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa40914
EXPNO                      533
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140923
Time                     13.24
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      138.85
DW                      62.400 usec
DE                       6.50 usec
TE             0 K
D1                0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                400.1300102 MHz
WDW                        EM
SSB            0
LB                       0.30 Hz
GB             0
PC                       1.00
```

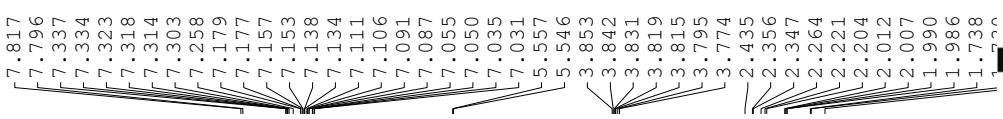
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

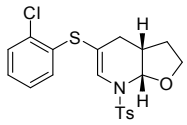


```
Current Data Parameters
NAME                  spa40914
EXPNO                      534
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140923
Time                     13.26
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                           4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE             0 K
D1                1.00000000 sec
D11               0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                100.6127591 MHz
WDW                        EM
SSB            0
LB                       1.00 Hz
GB             0
PC                       1.40
```

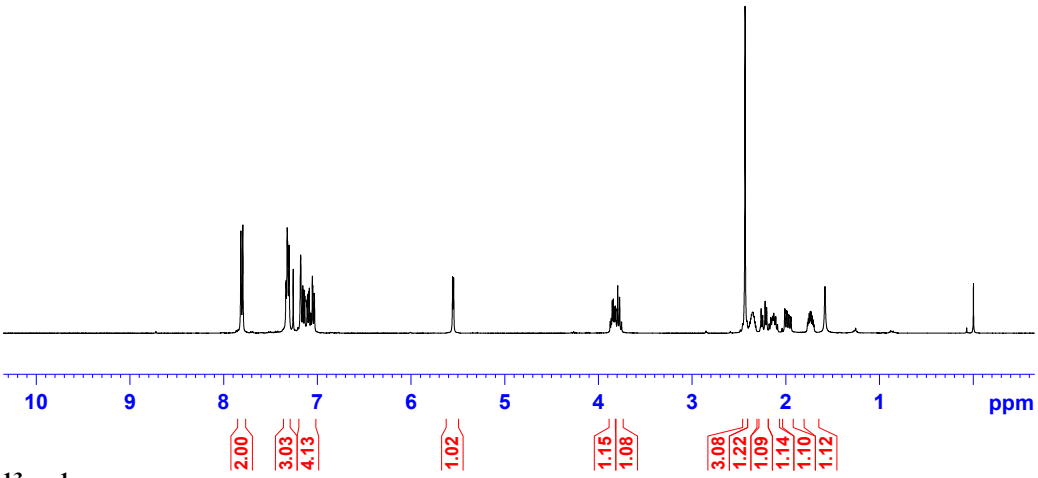
5-((2-Chlorophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5l) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



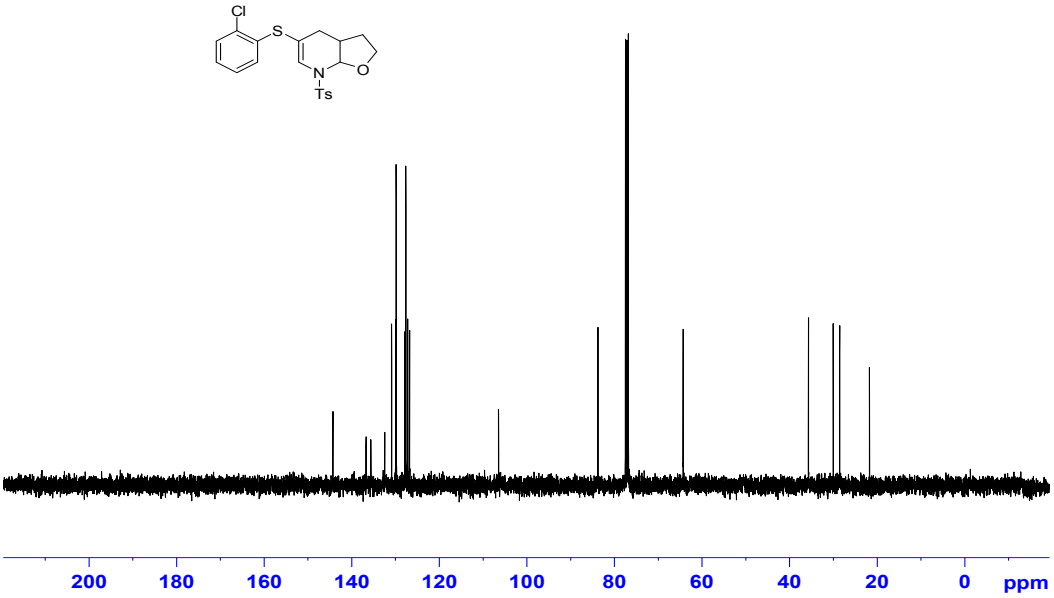



```
Current Data Parameters
NAME            spa41014
EXPNO                312
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141009
Time                14.11
INSTRUM             spect
PROBHD    5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                169.77
DW                62.400 usec
DE                 6.50 usec
TE                298.1 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1          7.75000000 W
SFO1        400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300101 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



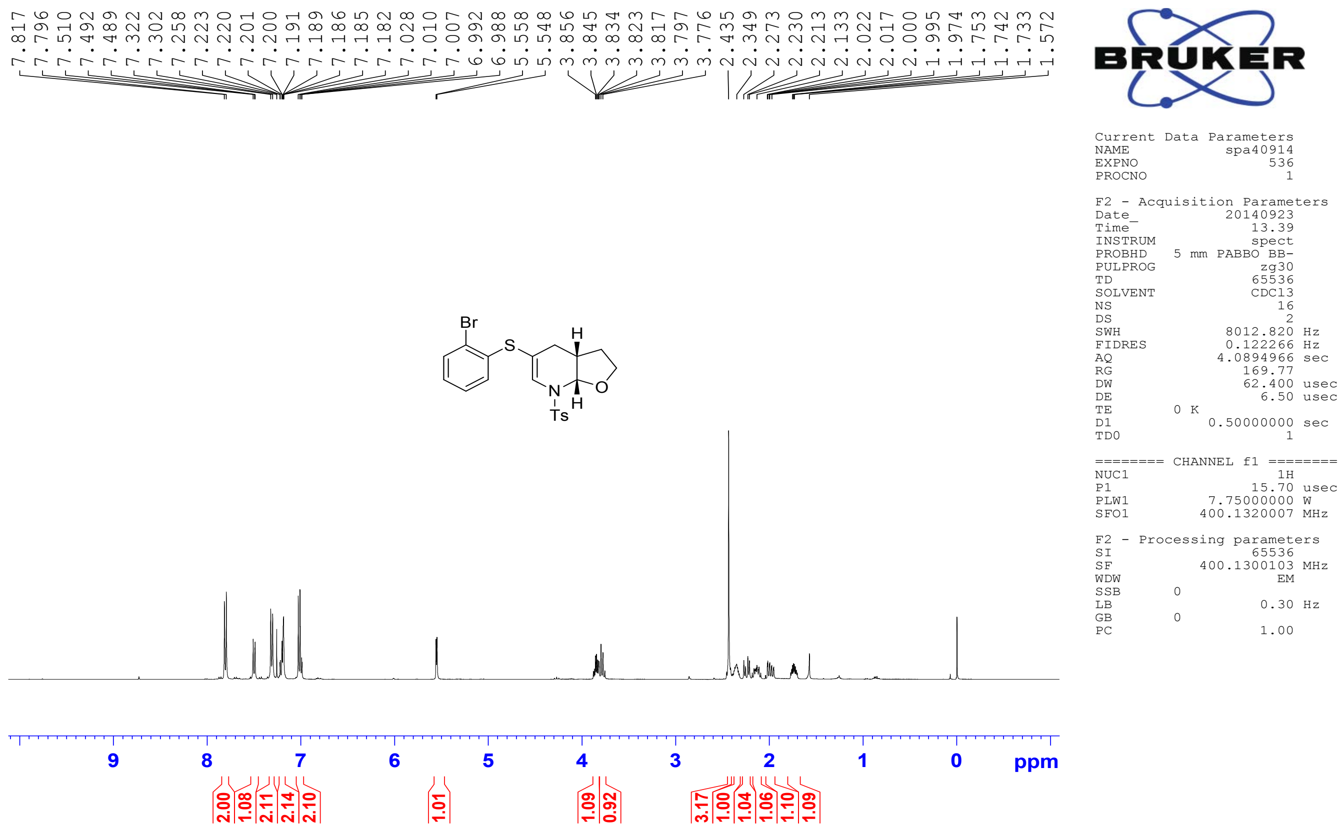
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)


```
Current Data Parameters
NAME            spa41014
EXPNO                313
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141009
Time                14.18
INSTRUM             spect
PROBHD    5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                298.1 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2        400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127561 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```



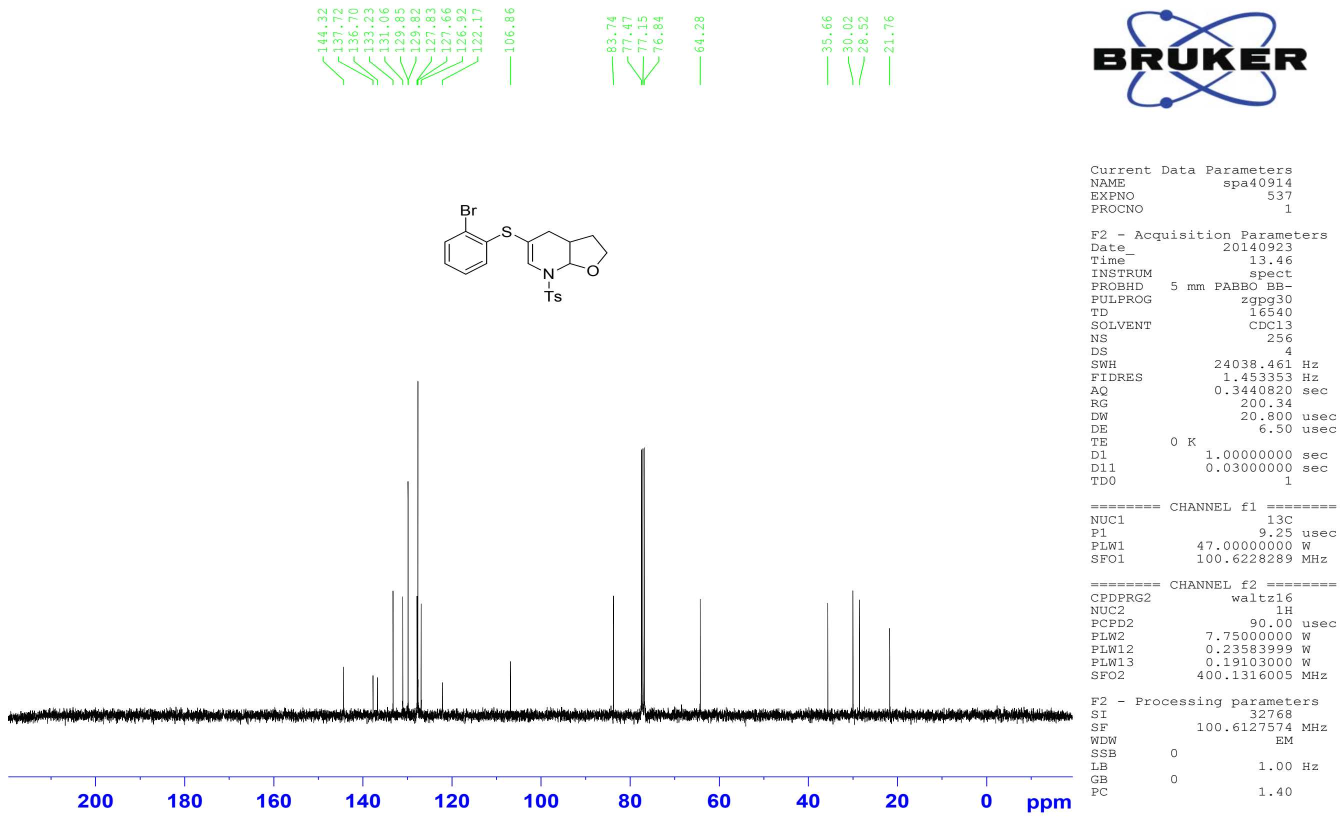
5-((2-Bromophenyl)thio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5m) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



7.817 7.796 7.510 7.492 7.489 7.322 7.302 7.258 7.223 7.220 7.201 7.200 7.191 7.189 7.186 7.185 7.182 7.028 7.010 7.007 6.992 6.988 5.558 5.548 3.856 3.845 3.834 3.823 3.817 3.797 3.776 2.435 2.349 2.273 2.230 2.213 2.133 2.022 2.017 2.000 1.995 1.974 1.753 1.742 1.733 1.572
BRUKER
Current Data Parameters
NAME spa40914
EXPNO 536
PROCNO 1
F2 - Acquisition Parameters
Date_ 20140923
Time 13.39
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0894966 sec
RG 169.77
DW 62.400 usec
DE 6.50 usec
TE 0 K
D1 0.50000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 15.70 usec
PLW1 7.75000000 W
SFO1 400.1320007 MHz
F2 - Processing parameters
SI 65536
SF 400.1300103 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
Br
S
H
N
H
O
Ts
9 8 7 6 5 4 3 2 1 0 ppm
2.00 1.08 2.11 2.14 2.10 1.01 1.09 0.92 3.17 1.00 1.04 1.06 1.10 1.09

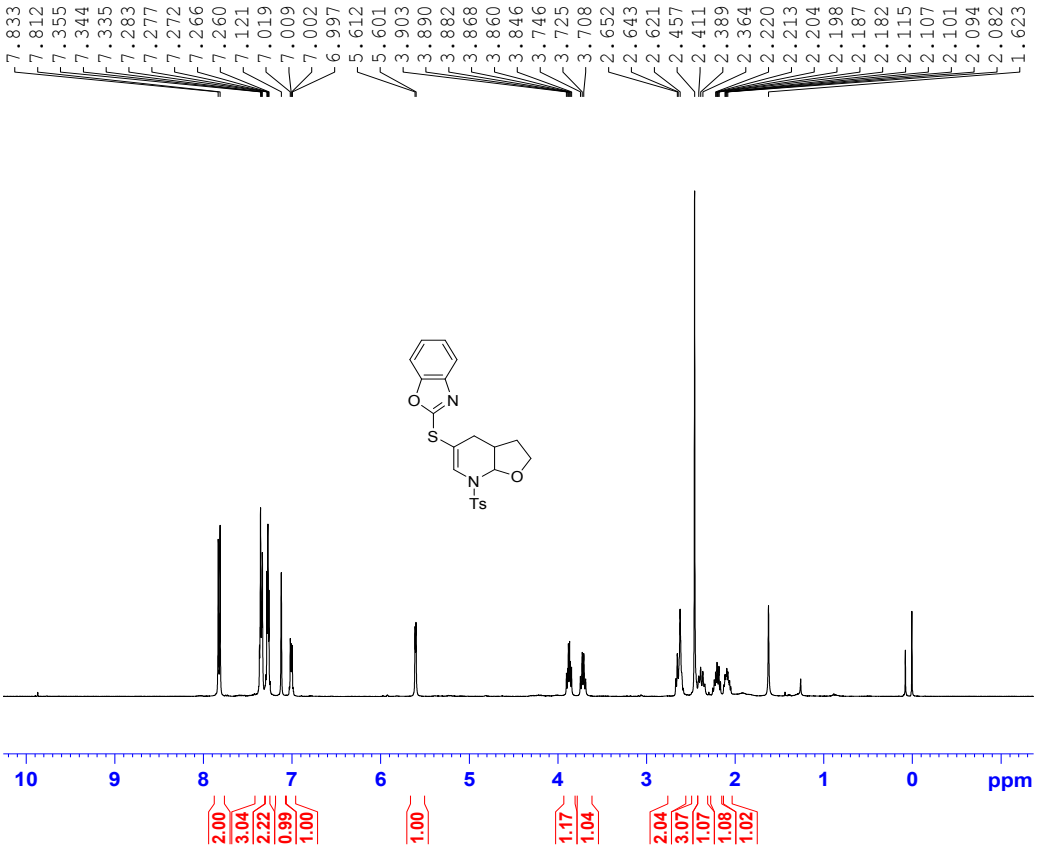
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)



144.32 137.72 136.70 133.23 131.06 129.85 129.82 127.83 127.66 126.92 122.17 106.86 83.74 77.47 77.15 76.84 64.28 35.66 30.02 28.52 21.76
BRUKER
Current Data Parameters
NAME spa40914
EXPNO 537
PROCNO 1
F2 - Acquisition Parameters
Date_ 20140923
Time 13.46
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 16540
SOLVENT CDCl3
NS 256
DS 4
SWH 24038.461 Hz
FIDRES 1.453353 Hz
AQ 0.3440820 sec
RG 200.34
DW 20.800 usec
DE 6.50 usec
TE 0 K
D1 1.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 9.25 usec
PLW1 47.00000000 W
SFO1 100.6228289 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 90.00 usec
PLW2 7.75000000 W
PLW12 0.23583999 W
PLW13 0.19103000 W
SFO2 400.1316005 MHz
F2 - Processing parameters
SI 32768
SF 100.6127574 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
Br
S
N
O
Ts
200 180 160 140 120 100 80 60 40 20 0 ppm

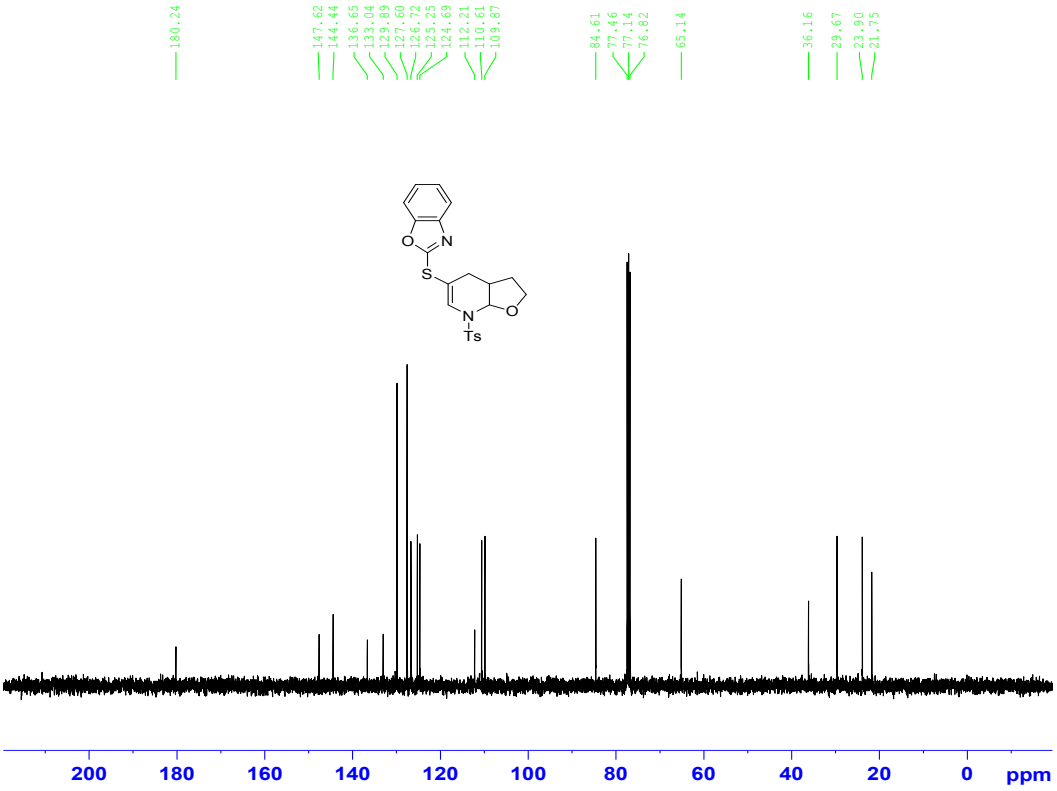
2-((7-Tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridin-5-yl)thio)benzo[d]oxazole (5p) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40914
EXPNO                      379
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140918
Time                     21.58
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      169.77
DW                      62.400 usec
DE                       6.50 usec
TE                  0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300048 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

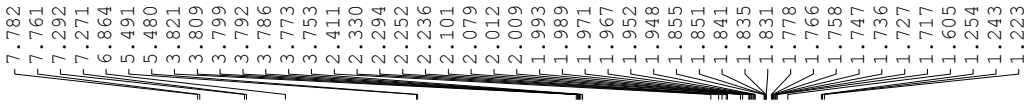
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

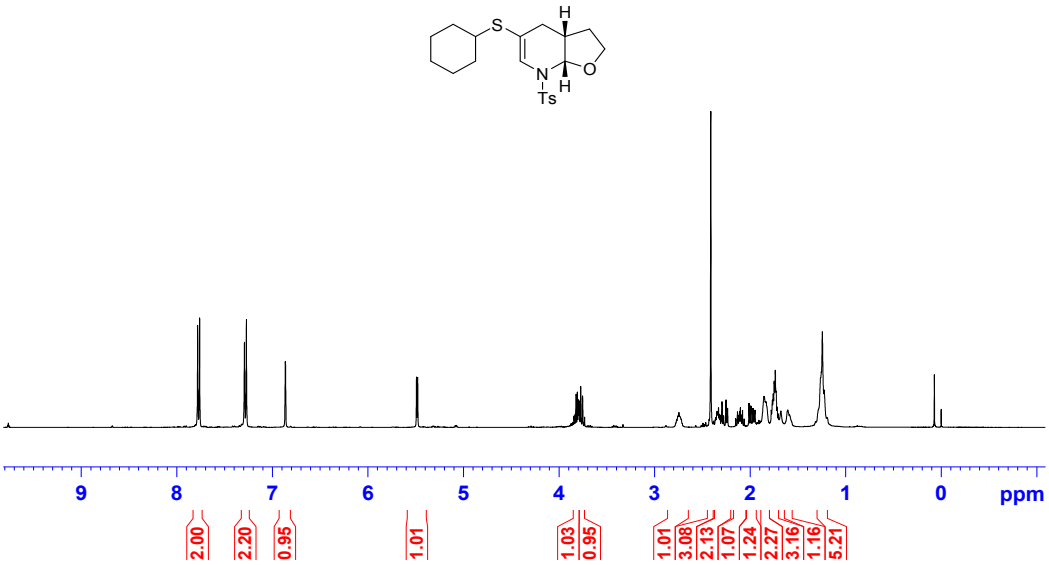



```
Current Data Parameters
NAME                  spa40914
EXPNO                      380
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20140918
Time                     22.06
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                  0 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127593 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

5-(Cyclohexylthio)-7-tosyl-2,3,3a,4,7,7a-hexahydrofuro[2,3-b]pyridine (5o) :

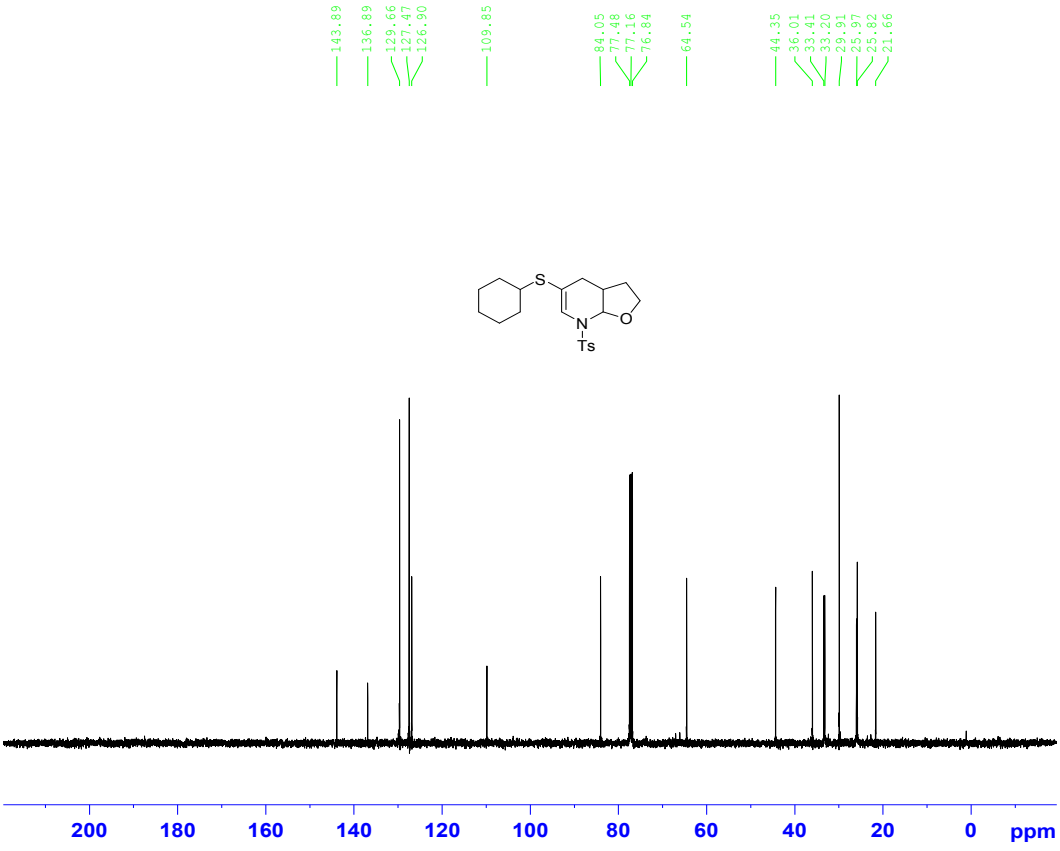
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME            spa41014
EXPNO                346
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141009
Time_              23.54
INSTRUM            spect
PROBHD    5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH             8012.820 Hz
FIDRES             0.122266 Hz
AQ              4.0894966 sec
RG                 88.51
DW                62.400 usec
DE                 6.50 usec
TE                298.1 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                65536
SF           400.1300050 MHz
WDW                  EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

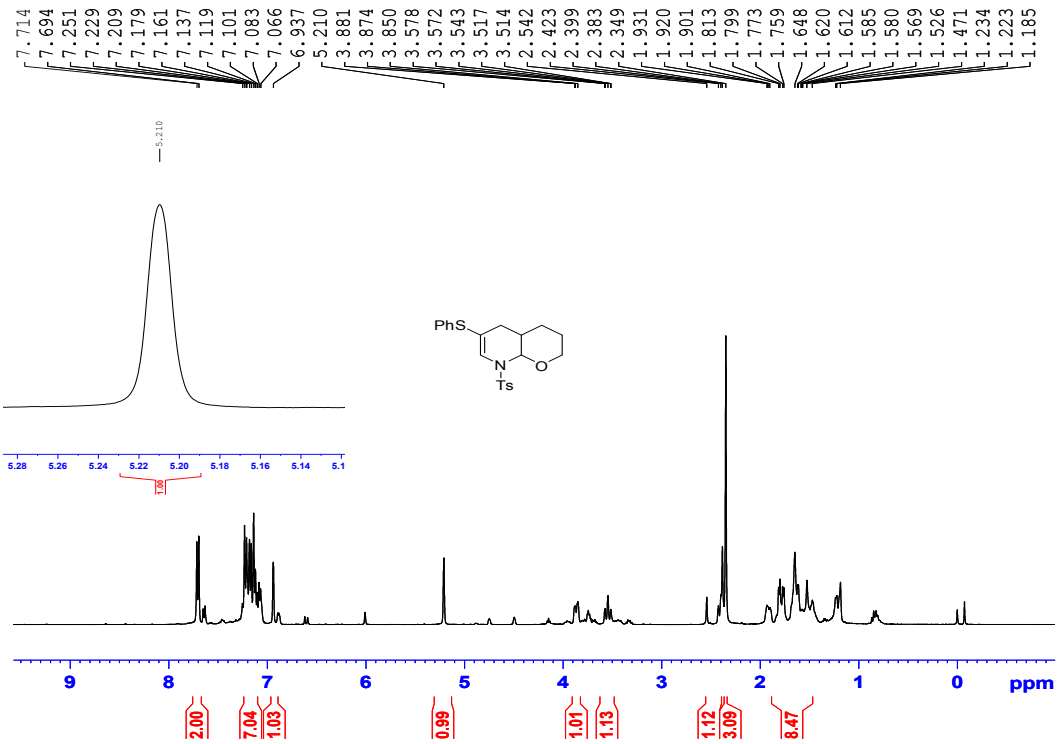
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41014
EXPNO                347
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141010
Time                0.01
INSTRUM            spect
PROBHD    5 mm PABBO BB-
PULPROG          zgpg30
TD                16540
SOLVENT           CDCl3
NS                  256
DS                    4
SWH            24038.461 Hz
FIDRES             1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                298.1 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1          47.00000000 W
SFO1         100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                32768
SF           100.6127614 MHz
WDW                  EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

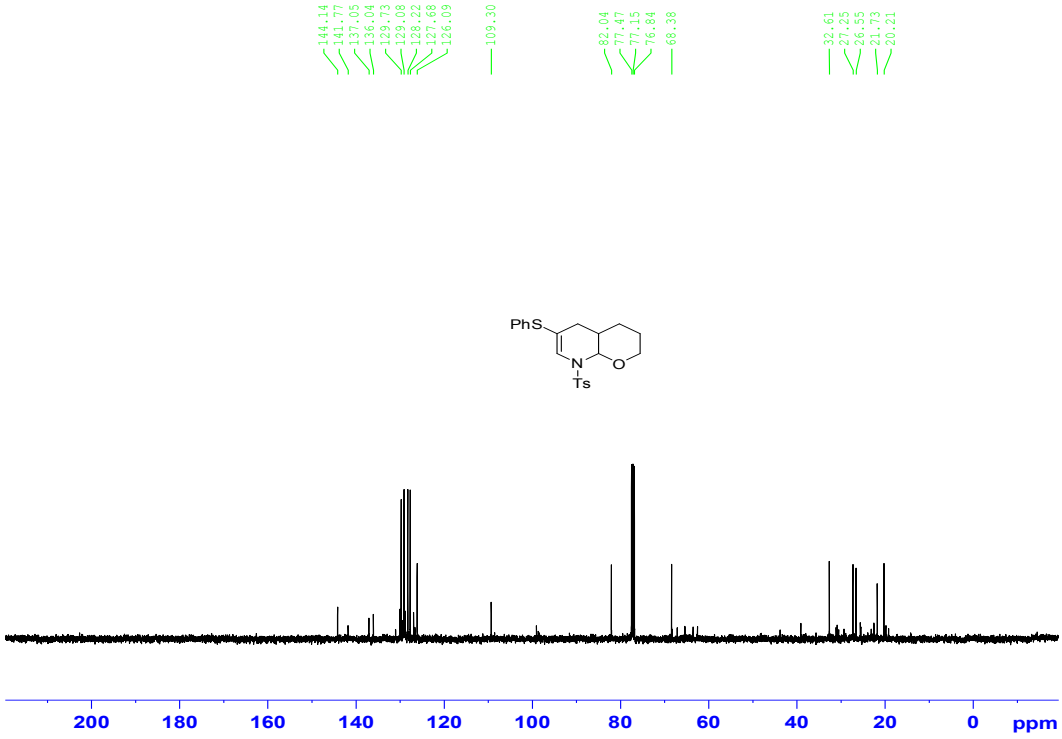
6- (Phenylthio)-8-tosyl-3,4,4a,5,8,8a-hexahydro-2H-pyrano[2,3-b]pyridine (5a') :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41114
EXPNO                      229
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141107
Time                     18.01
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      124.58
DW                      62.400 usec
DE                       6.50 usec
TE                      301.5 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300393 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

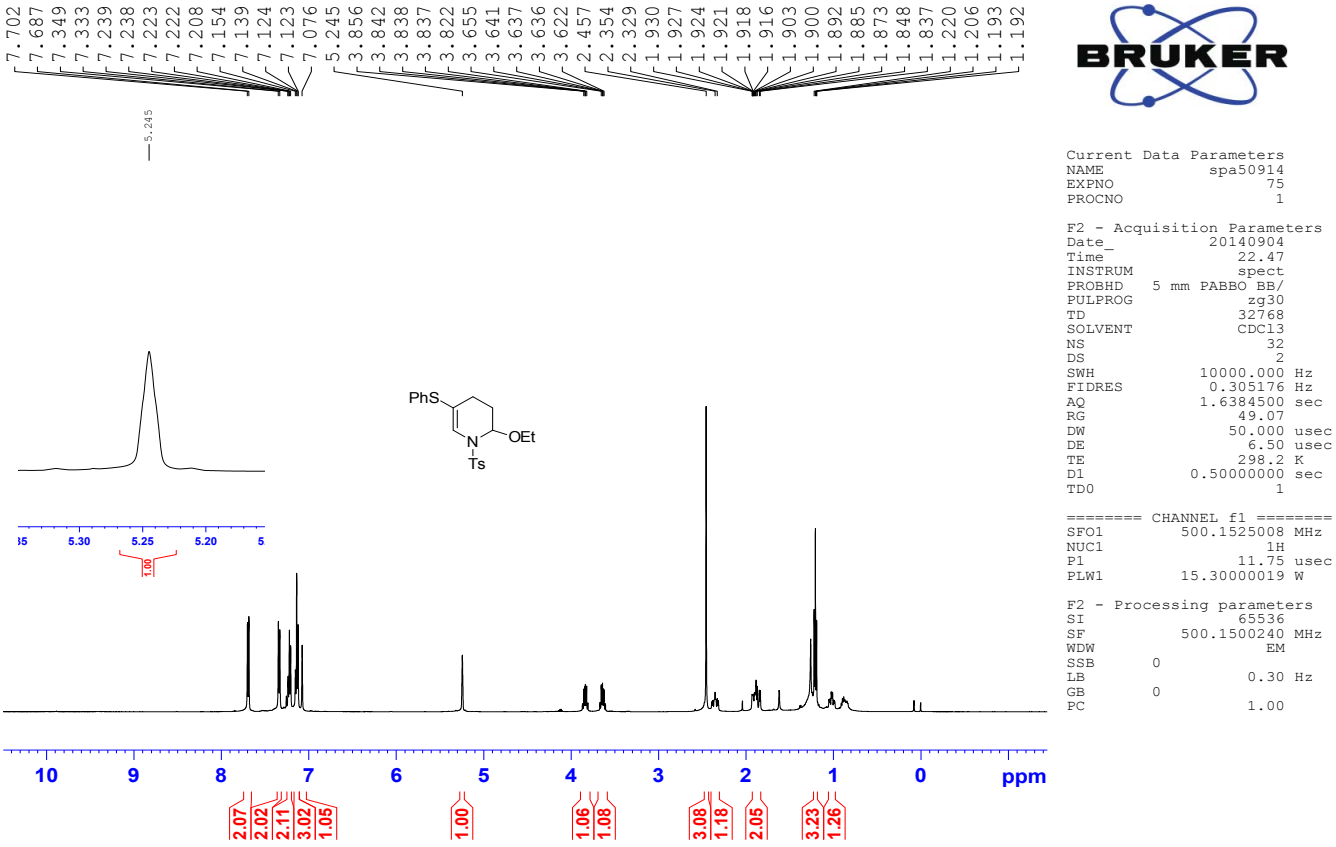
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41114
EXPNO                      259
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141108
Time                     22.49
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                 zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      298.2 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127581 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

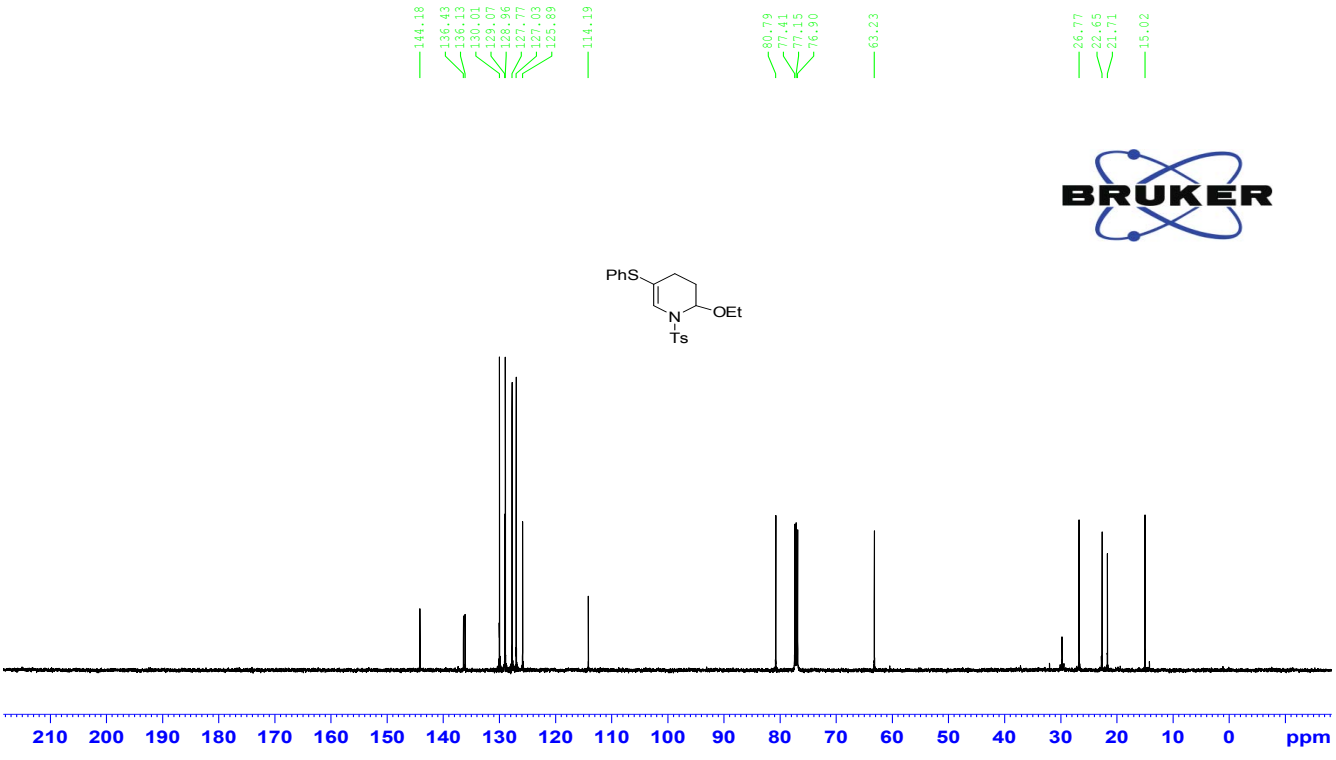
2-Ethoxy-5- (phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (6) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)



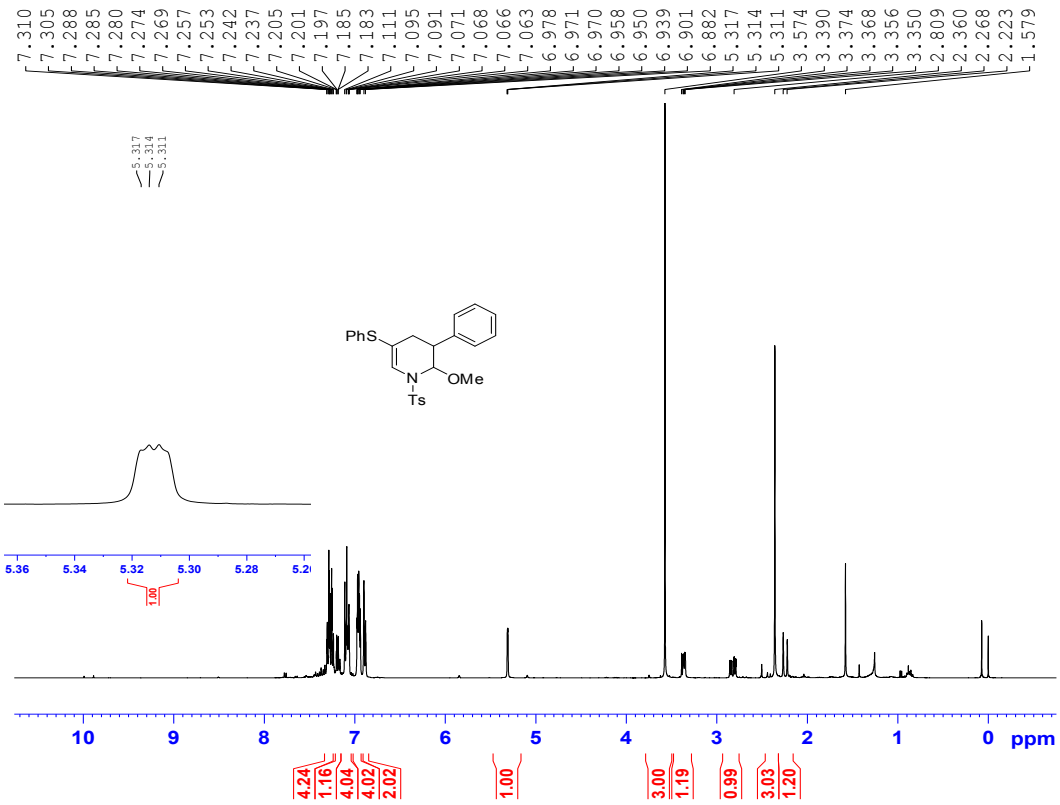

```
Current Data Parameters
NAME                  spa50914
EXPNO                       75
PROCNO                       1

F2 - Acquisition Parameters
Date_               20140904
Time                    22.47
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                        32
DS                         2
SWH                10000.000 Hz
FIDRES             0.305176 Hz
AQ                 1.6384500 sec
RG                     49.07
DW                    50.000 usec
DE                     6.50 usec
TE                    298.2 K
D1                 0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
SFO1              500.1525008 MHz
NUC1                        1H
P1                      11.75 usec
PLW1              15.30000019 W

F2 - Processing parameters
SI                         65536
SF                500.1500240 MHz
WDW                           EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C)



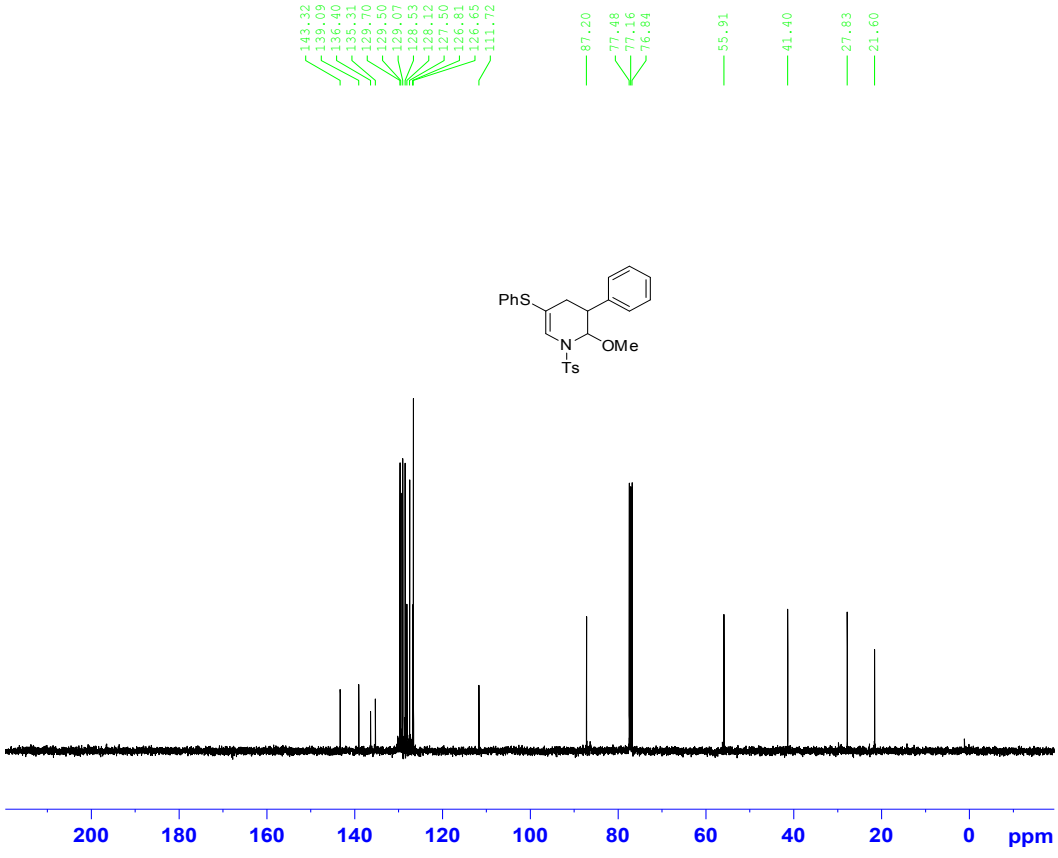
2-Methoxy-3-phenyl-5- (phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (7) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



```
Current Data Parameters
NAME                  spa41114
EXPNO                       27
PROCNO                       1

F2 - Acquisition Parameters
Date_                20141101
Time                    21.06
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      124.58
DW                      62.400 usec
DE                       6.50 usec
TE                      300.1 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                       65536
SF                 400.1300123 MHz
WDW                         EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

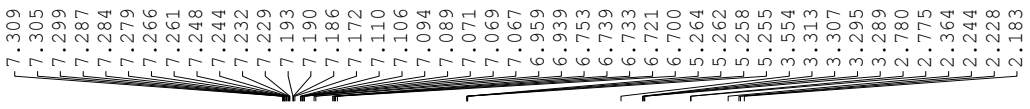
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

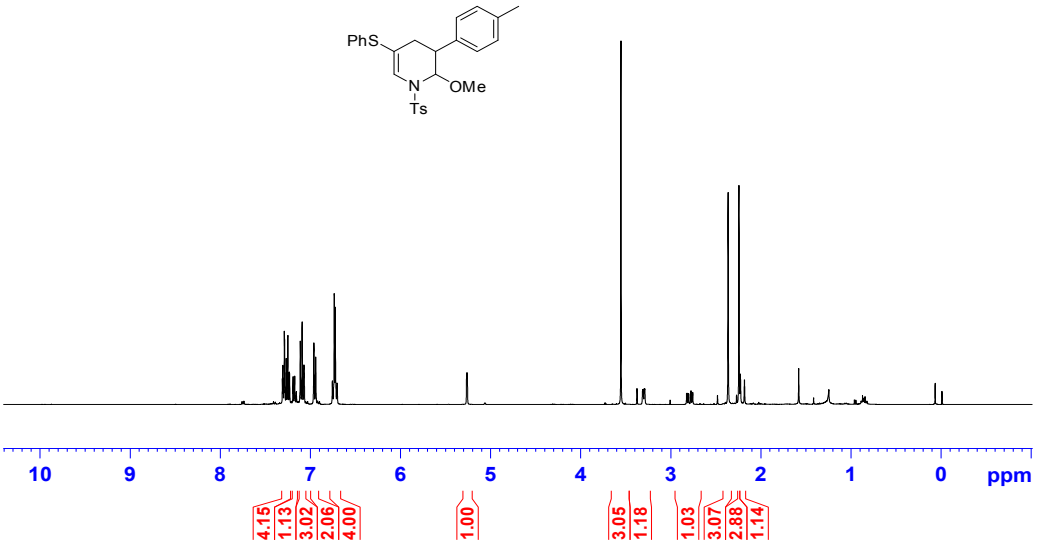


```
Current Data Parameters
NAME                  spa41114
EXPNO                       28
PROCNO                       1

F2 - Acquisition Parameters
Date_                20141101
Time                    21.19
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        512
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      301.1 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                       32768
SF                 100.6127561 MHz
WDW                         EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

2-Methoxy-5- (phenylthio)-3- (p-tolyl)-1-tosyl-1,2,3,4-tetrahydropyridine (8) :

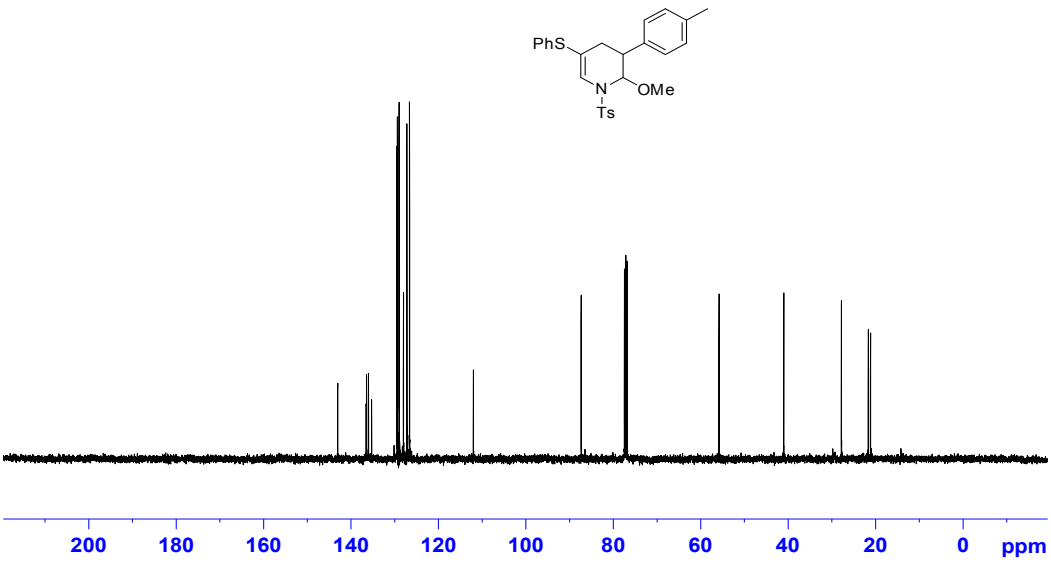
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME            spa41114
EXPNO                  7
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141101
Time              14.48
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG           zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH            8012.820 Hz
FIDRES         0.122266 Hz
AQ             4.0894966 sec
RG                79.8
DW               62.400 usec
DE                6.50 usec
TE               300.4 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300204 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

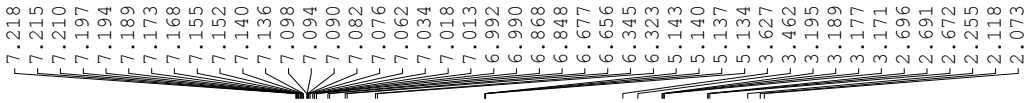
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

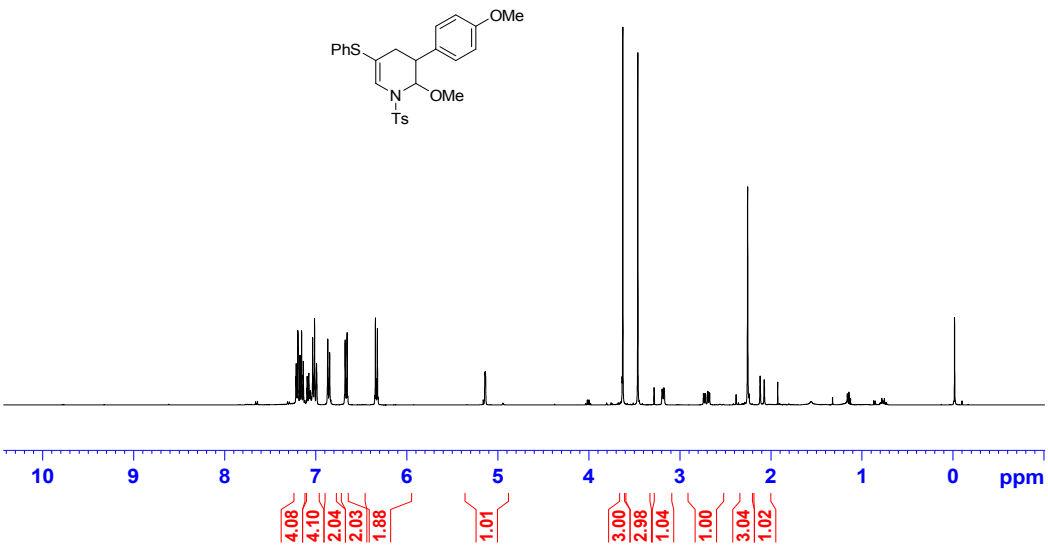



```
Current Data Parameters
NAME            spa41114
EXPNO                  8
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141101
Time              14.55
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG         zgpg30
TD                16540
SOLVENT           CDCl3
NS                  256
DS                    4
SWH           24038.461 Hz
FIDRES         1.453353 Hz
AQ             0.3440820 sec
RG                200.34
DW               20.800 usec
DE                6.50 usec
TE               301.1 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                9.25 usec
PLW1          47.00000000 W
SFO1         100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127596 MHz
WDW                   EM
SSB       0
LB               1.00 Hz
GB        0
PC                1.40
```

2-Methoxy-3-(4-methoxyphenyl)-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (9) :

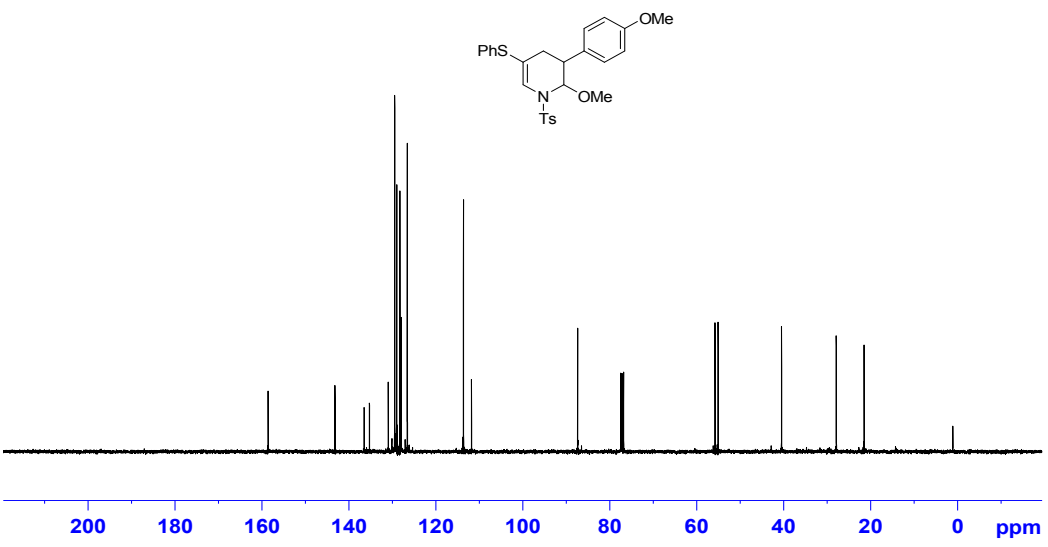
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME                  spa41114
EXPNO                      638
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141121
Time                     18.54
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                       50.04
DW                      62.400 usec
DE                       6.50 usec
TE                      301.5 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300588 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

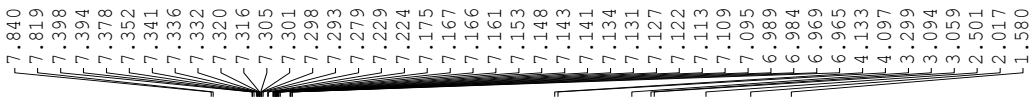
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

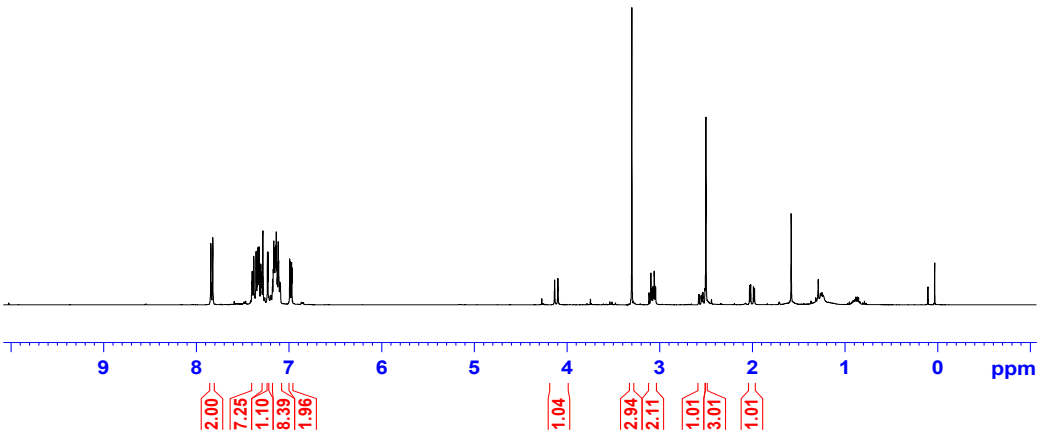



```
Current Data Parameters
NAME                  spa41114
EXPNO                      639
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141121
Time                     19.02
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                 zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      302.2 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127657 MHz
WDW                        EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

2-Benzyl-2-methoxy-3-phenyl-5-(phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (10) :

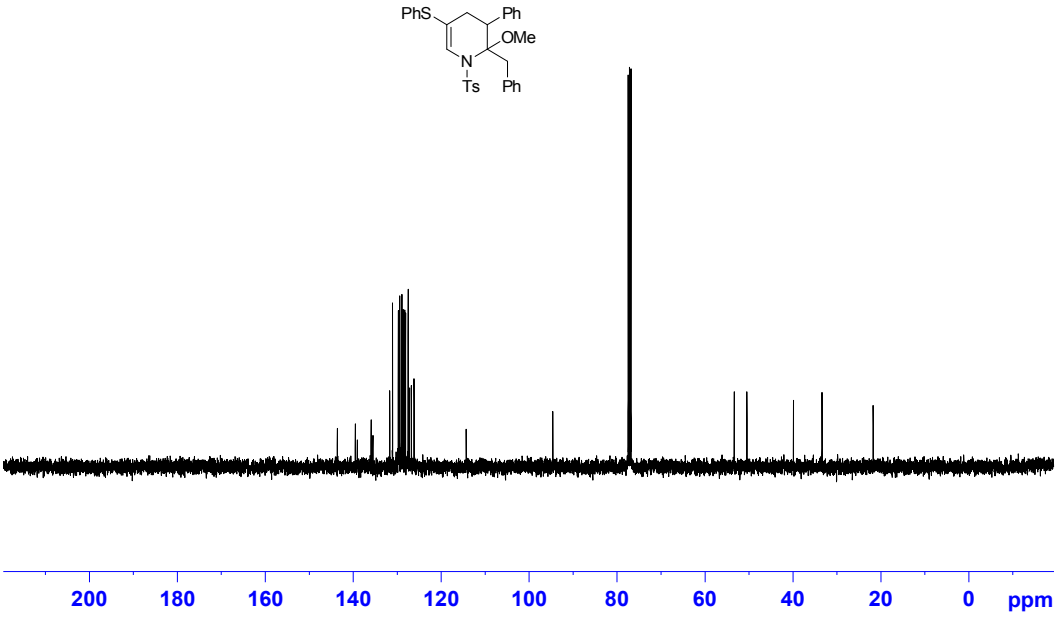
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME                  spa40515
EXPNO                      673
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150521
Time                   15.41
INSTRUM                spect
PROBHD     5 mm PABBO BB-
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       16
DS                        2
SWH                8012.820 Hz
FIDRES            0.122266 Hz
AQ                4.0894966 sec
RG                    138.85
DW                    62.400 usec
DE                     6.50 usec
TE                    301.1 K
D1                0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                      1H
P1                     15.70 usec
PLW1             7.75000000 W
SFO1           400.1320007 MHz

F2 - Processing parameters
SI                        65536
SF             400.1300018 MHz
WDW                          EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

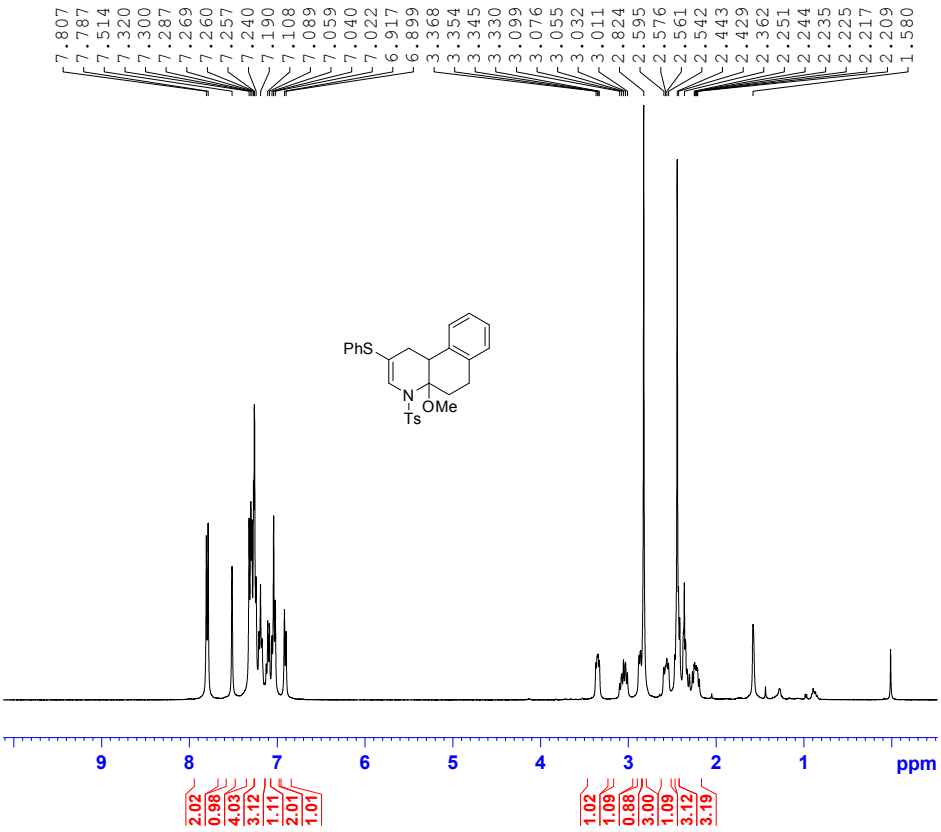
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      851
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150527
Time                   15.09
INSTRUM                spect
PROBHD     5 mm PABBO BB-
PULPROG              zgpg30
TD                    16540
SOLVENT               CDCl3
NS                      256
DS                        4
SWH               24038.461 Hz
FIDRES            1.453353 Hz
AQ                0.3440820 sec
RG                    200.34
DW                    20.800 usec
DE                     6.50 usec
TE                    299.5 K
D1                1.00000000 sec
D11               0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                     13C
P1                     9.25 usec
PLW1            47.00000000 W
SFO1           100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2              waltz16
NUC2                      1H
PCPD2                 90.00 usec
PLW2             7.75000000 W
PLW12            0.23583999 W
PLW13            0.19103000 W
SFO2           400.1316005 MHz

F2 - Processing parameters
SI                        32768
SF             100.6127550 MHz
WDW                          EM
SSB          0
LB                     1.00 Hz
GB           0
PC                     1.40
```

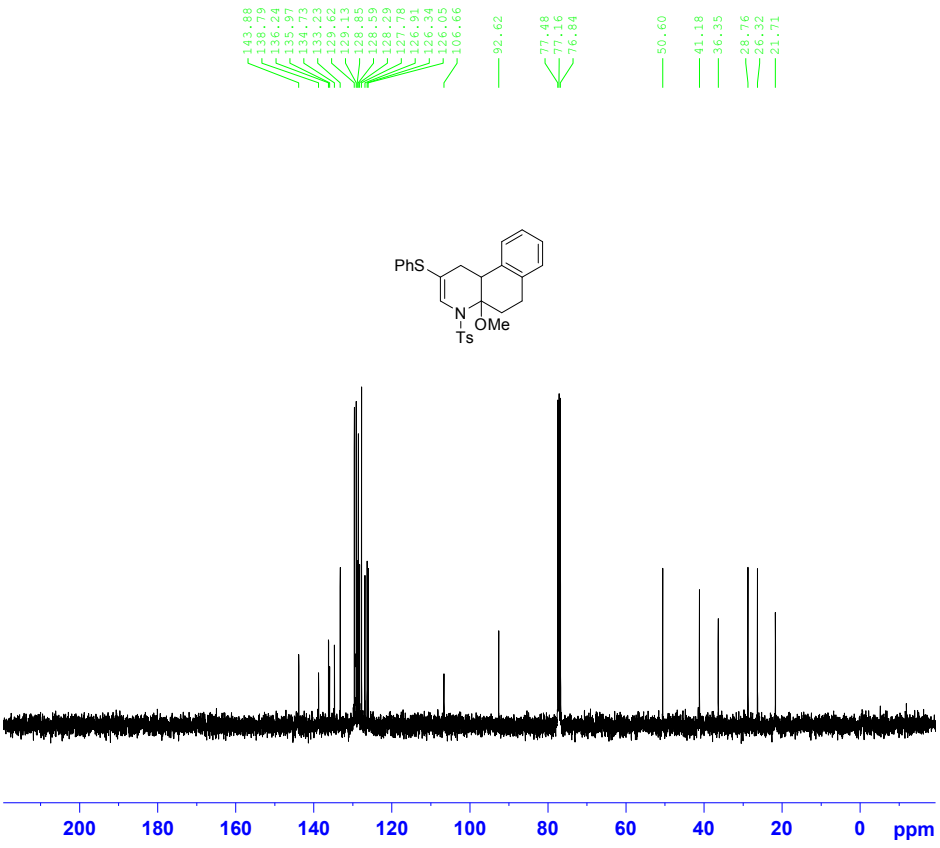
4*a*-Methoxy-2-(phenylthio)-4-tosyl-1,4,4a,5,6,10b-hexahydrobenzo[f]quinolone (11) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40115
EXPNO                 51
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150103
Time              17.53
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   16
DS                    2
SWH            8012.820 Hz
FIDRES        0.122266 Hz
AQ             4.0894966 sec
RG                153.13
DW                62.400 usec
DE                 6.50 usec
TE                301.1 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300088 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

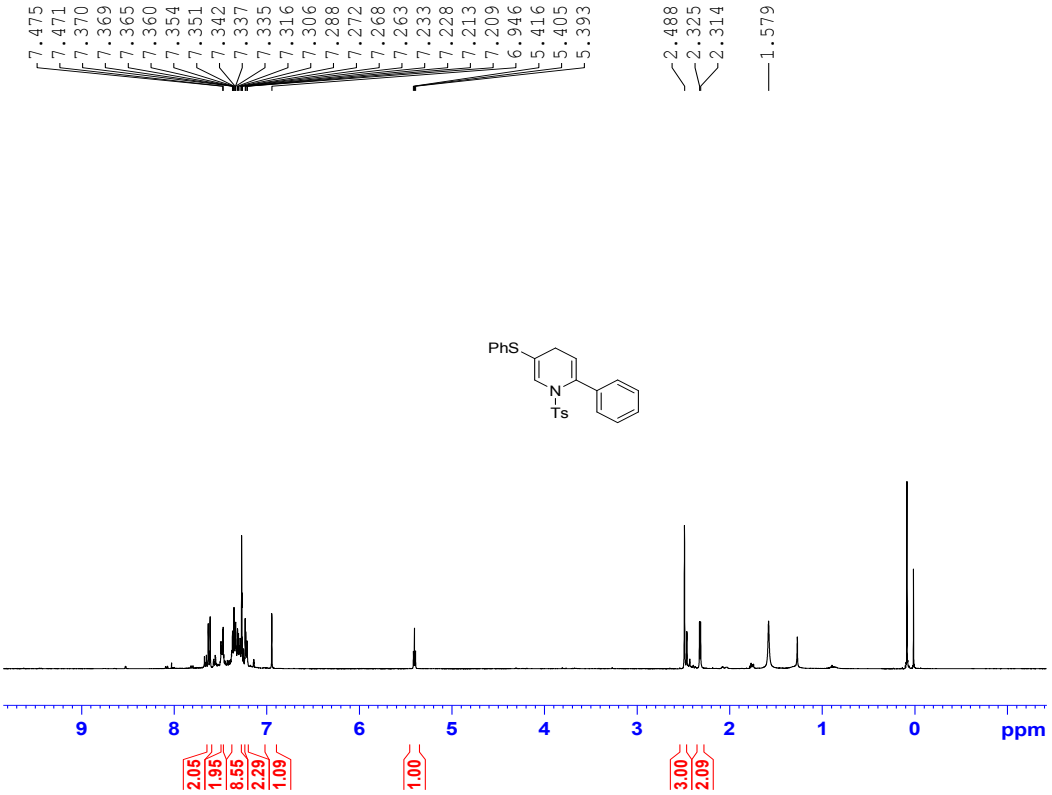
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40115
EXPNO                 52
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150103
Time              18.01
INSTRUM           spect
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                16540
SOLVENT           CDCl3
NS                  281
DS                    4
SWH           24038.461 Hz
FIDRES         1.453353 Hz
AQ             0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                301.9 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1          47.00000000 W
SFO1         100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127558 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

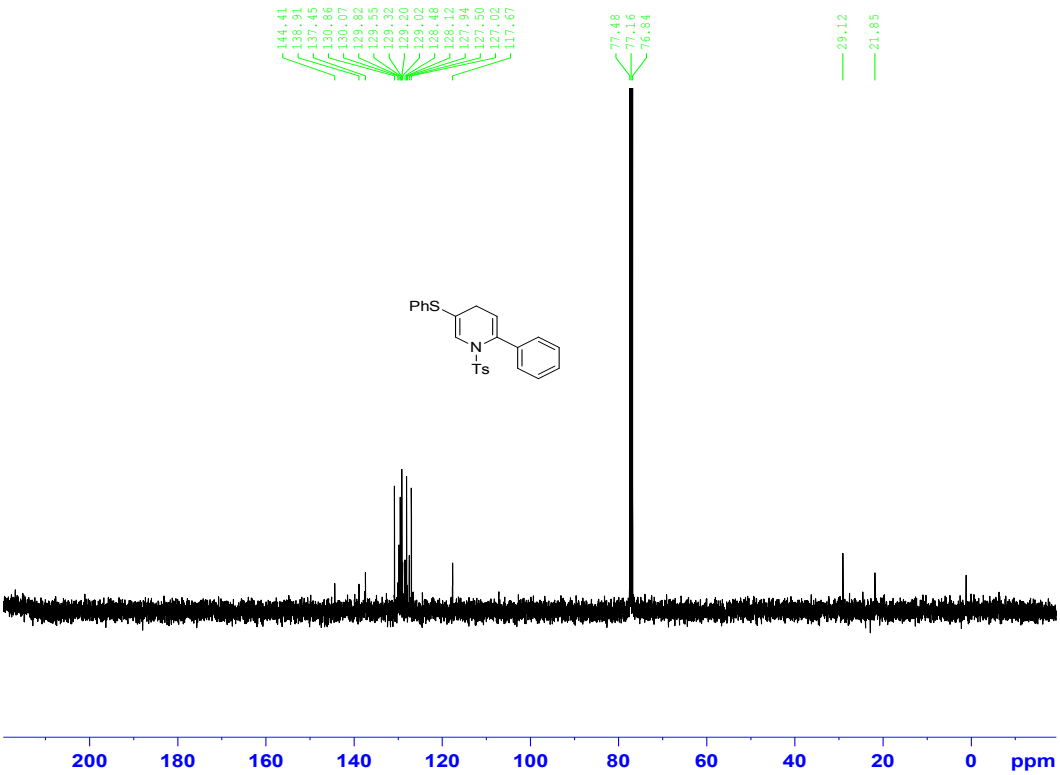
2-Phenyl-5-(phenylthio)-1-tosyl-1,4-dihydropyridine (14) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41114
EXPNO                      835
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141129
Time                     12.37
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                       6.50 usec
TE                      298.5 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                400.1300047 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

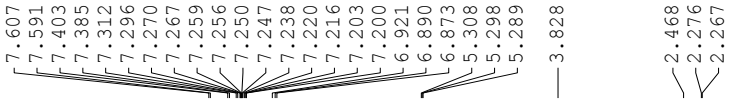
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)



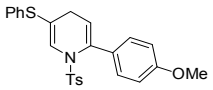

```
Current Data Parameters
NAME                  spa41114
EXPNO                      836
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141129
Time                     12.45
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         256
DS                           4
SWH                  24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      299.3 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                100.6127546 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

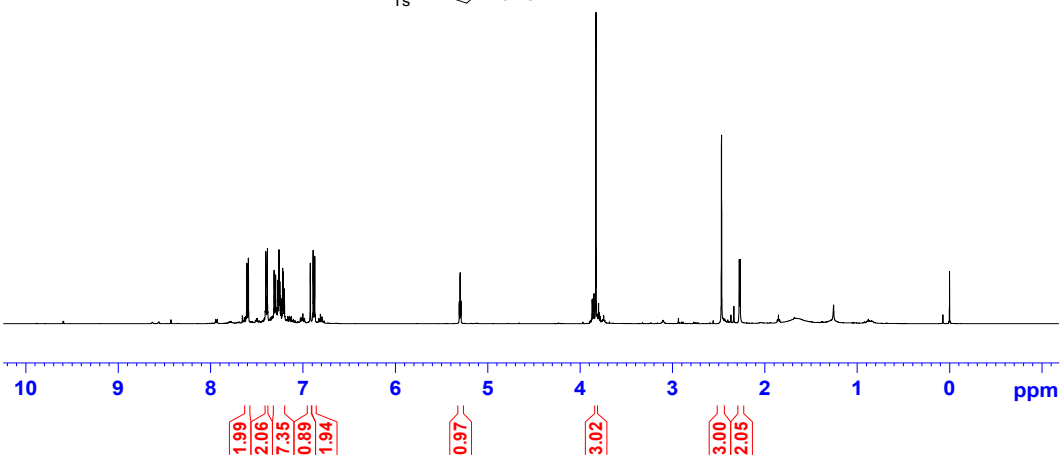
2-(4-Methoxyphenyl)-5-(phenylthio)-1-tosyl-1,4-dihydropyridine (15) :

^{1}H NMR (500 MHz, $CDCl_3$, 24 °C)

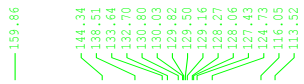


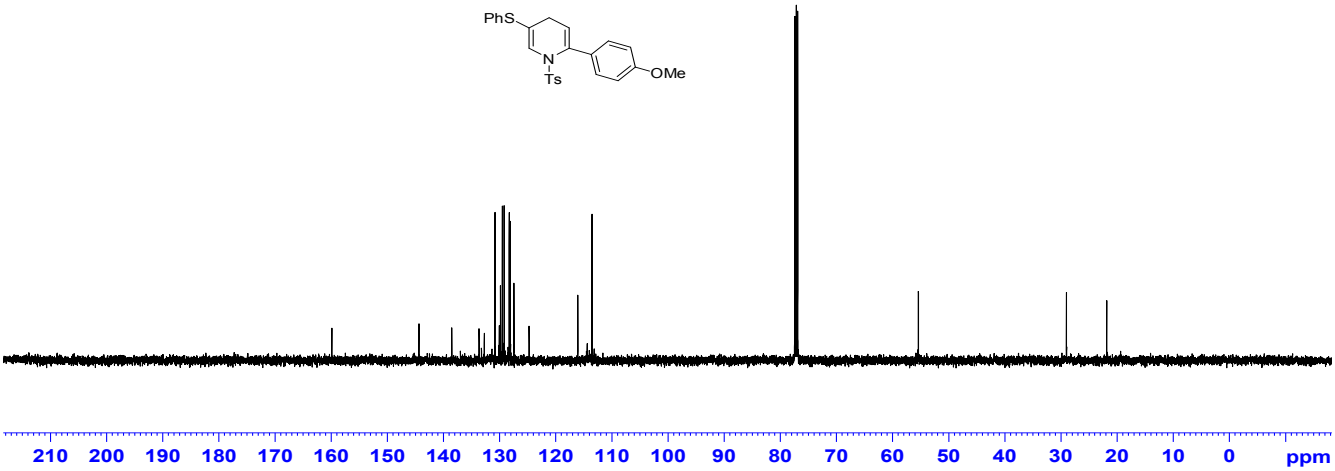
```
Current Data Parameters
NAME                 spa50914
EXPNO                     127
PROCNO                      1

F2 - Acquisition Parameters
Date_               20140905
Time                   23.42
INSTRUM                spect
PROBHD   5 mm PABBO BB/
PULPROG                zg30
TD                    32768
SOLVENT               CDCl3
NS                       32
DS                        2
SWH                10000.000 Hz
FIDRES                0.305176 Hz
AQ                 1.6384500 sec
RG                    124.08
DW                    50.000 usec
DE                     6.50 usec
TE                    298.1 K
D1                 0.50000000 sec
TD0                         1

======== CHANNEL f1 ========
SFO1              500.1525008 MHz
NUC1                      1H
P1                     11.75 usec
PLW1              15.30000019 W

F2 - Processing parameters
SI                        65536
SF                500.1500235 MHz
WDW                        EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```





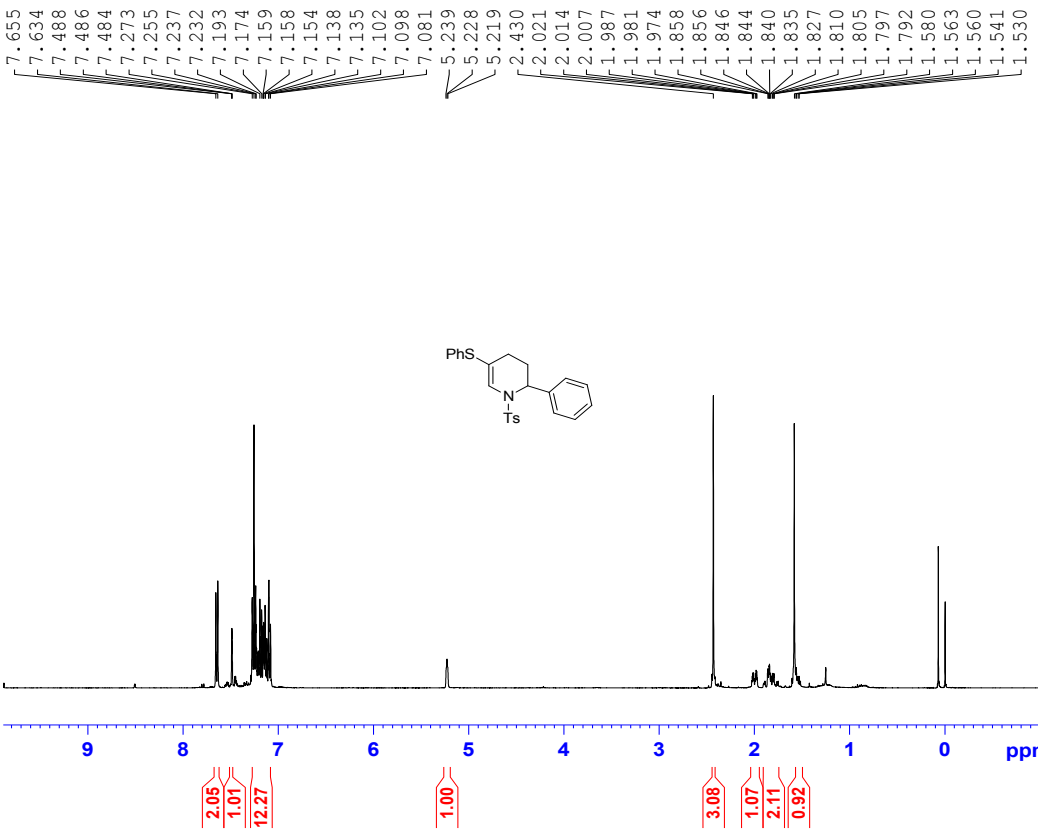
^{13}C{^{1}H} NMR (125 MHz, $CDCl_3$, 24 °C)





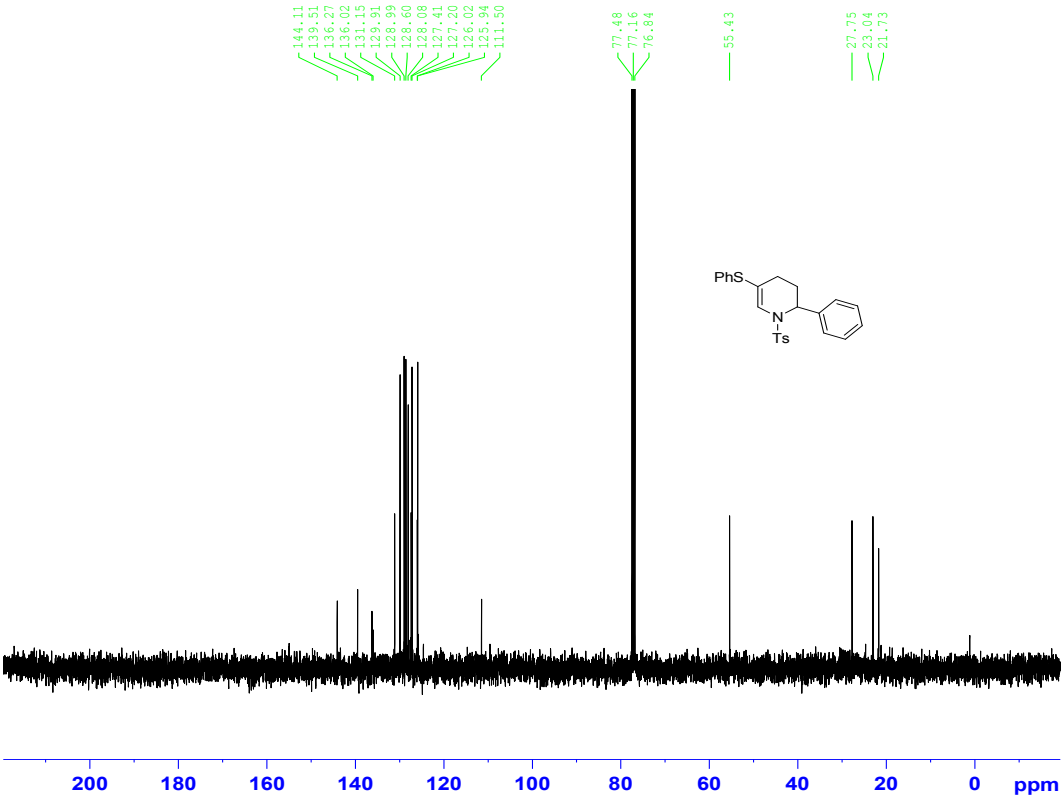
2-Phenyl-5- (phenylthio)-1-tosyl-1,2,3,4-tetrahydropyridine (16) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      445
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150513
Time                     18.02
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                       200.34
DW                       62.400 usec
DE                        6.50 usec
TE                       295.7 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300115 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

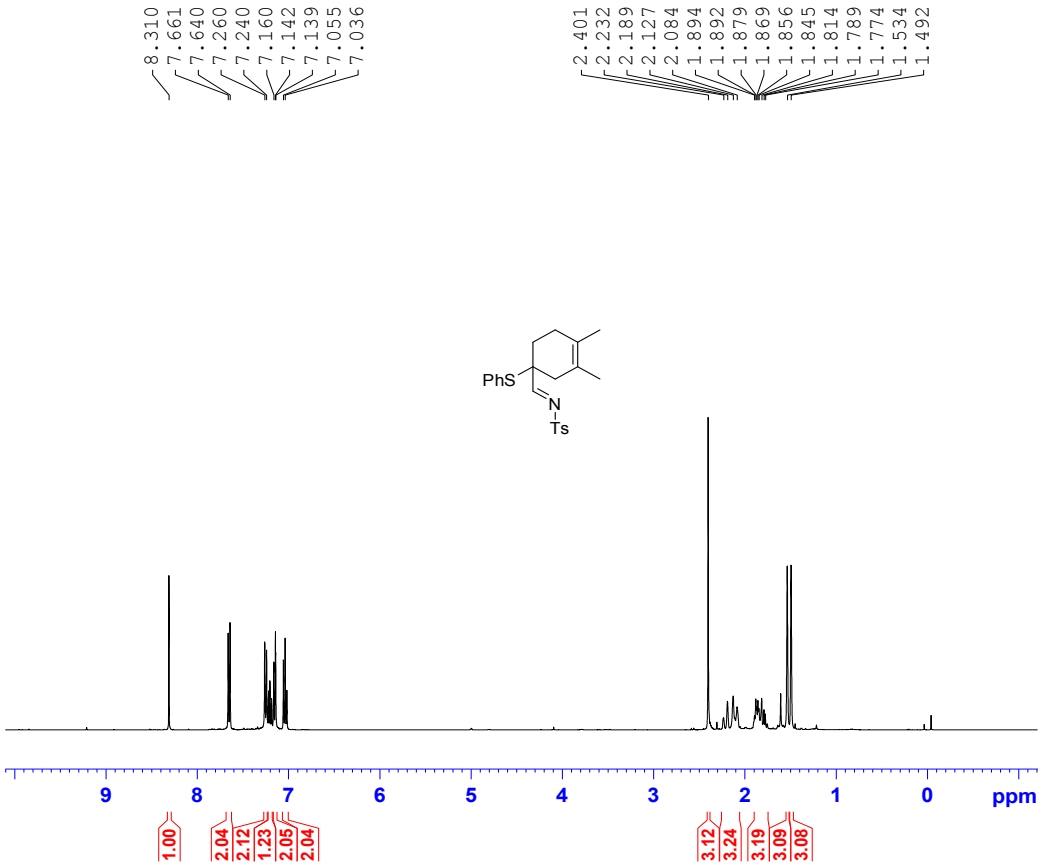
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      446
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150513
Time                     18.10
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                       200.34
DW                       20.800 usec
DE                        6.50 usec
TE                       296.4 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127558 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

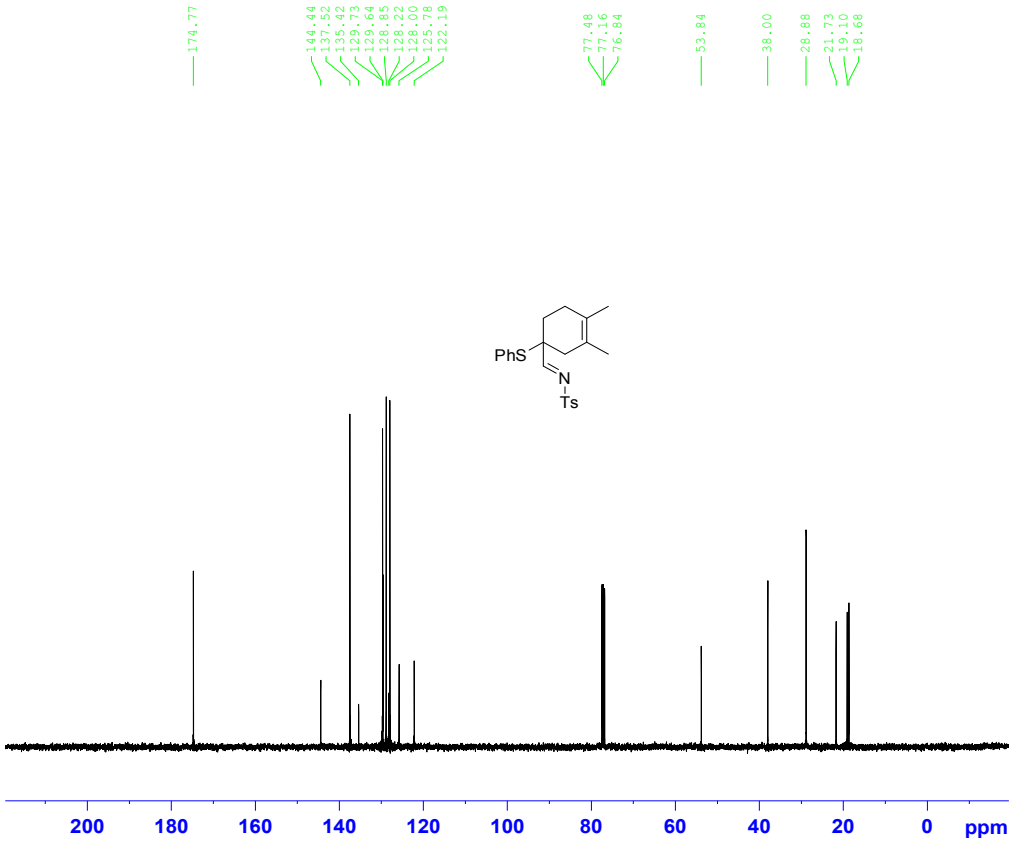
***N*-((3,4-Dimethyl-1-(phenylthio)cyclohex-3-en-1-yl)methylene)-4-methylbenzenesulfonamide (18a) :**

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      319
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150510
Time                    6.42
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        16
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894966 sec
RG                       79.8
DW                     62.400 usec
DE                      6.50 usec
TE                     298.7 K
D1                  0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                         65536
SF                400.1300261 MHz
WDW                           EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

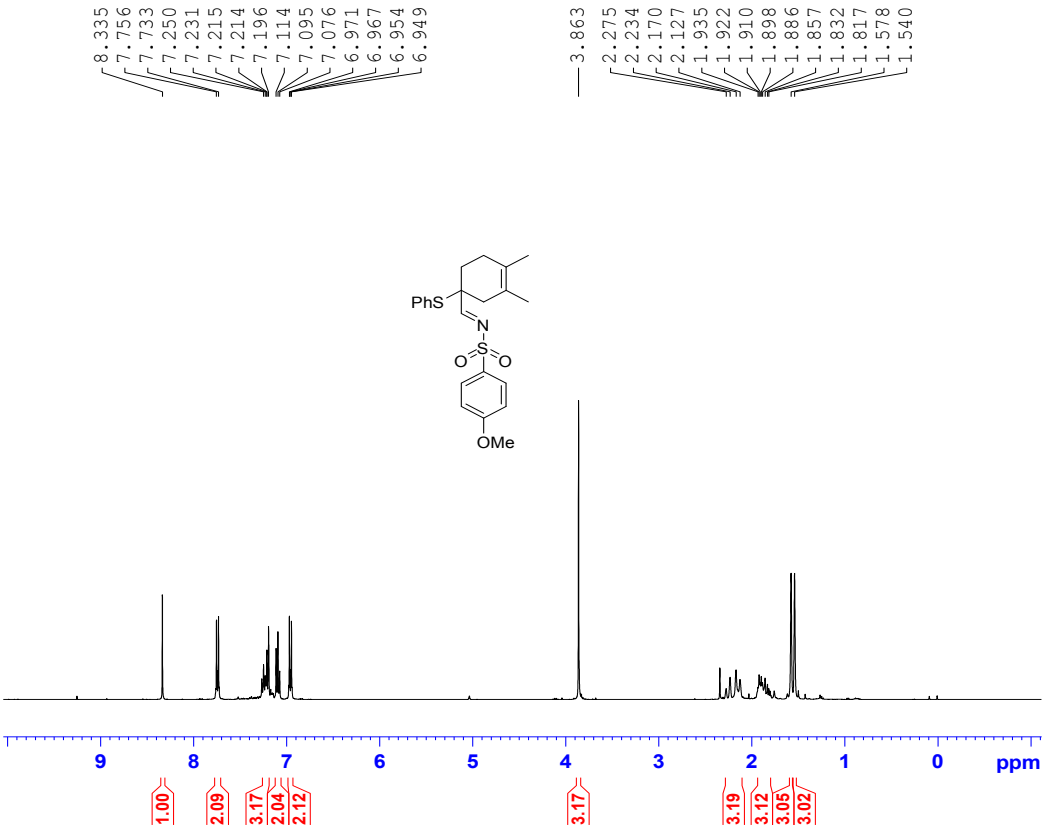
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      320
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150510
Time                    6.49
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                     16540
SOLVENT                CDCl3
NS                       256
DS                         4
SWH                24038.461 Hz
FIDRES              1.453353 Hz
AQ                  0.3440820 sec
RG                     200.34
DW                     20.800 usec
DE                      6.50 usec
TE                     299.4 K
D1                  1.00000000 sec
D11                 0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                         32768
SF                100.6127596 MHz
WDW                           EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

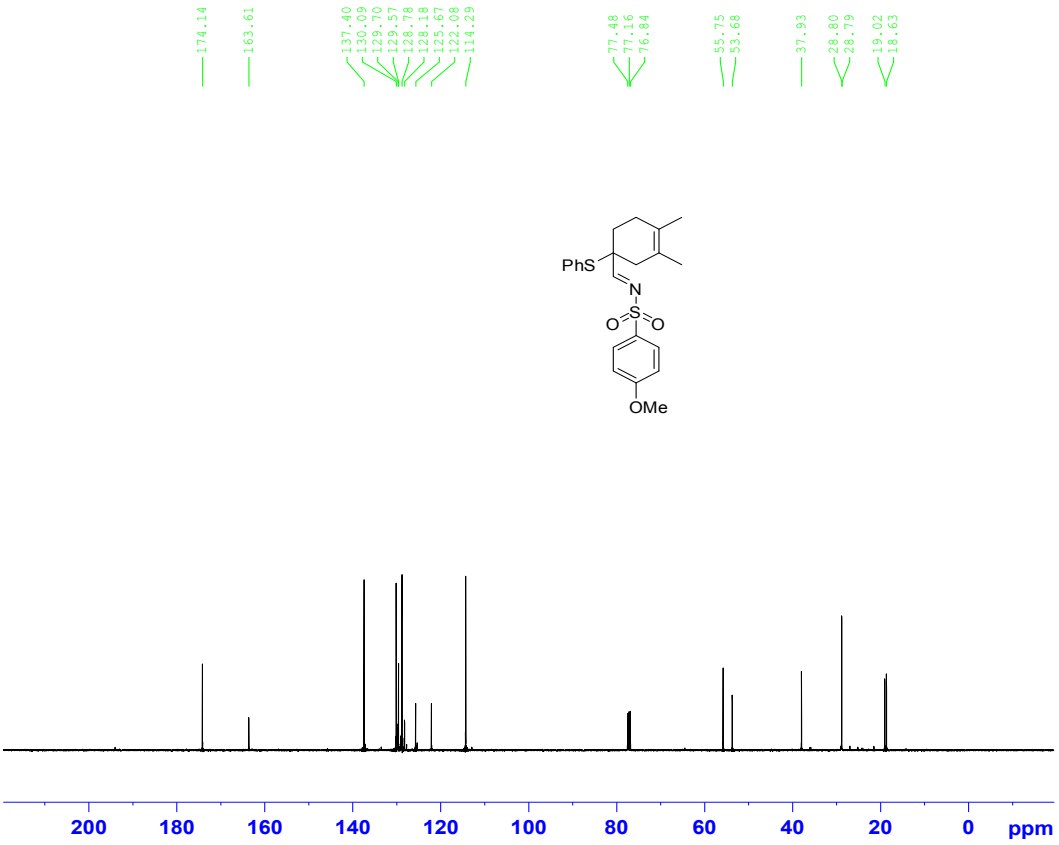
***N*-((3,4-Dimethyl-1- (phenylthio)cyclohex-3-en-1-yl)methylene)-4-methoxybenzenesulfonamide (18b) :**

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      322
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150510
Time                      6.57
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                        31.9
DW                      62.400 usec
DE                       6.50 usec
TE                      298.7 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                          65536
SF                400.1300056 MHz
WDW                            EM
SSB                 0
LB                           0.30 Hz
GB                  0
PC                           1.00
```

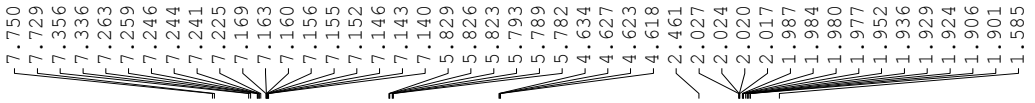
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

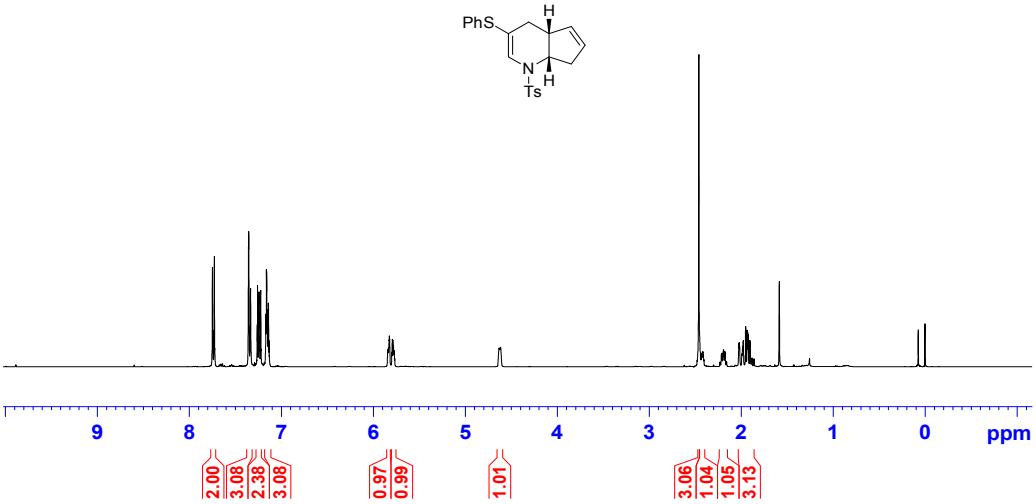



```
Current Data Parameters
NAME                  spa40515
EXPNO                      323
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150510
Time                      7.04
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                        256
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                       200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      299.4 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                        9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                          32768
SF                100.6127688 MHz
WDW                            EM
SSB                 0
LB                           1.00 Hz
GB                  0
PC                           1.40
```

3-(Phenylthio)-1-tosyl-4,4a,7,7a-tetrahydro-*1H*-cyclopenta[b]pyridine (20a) :

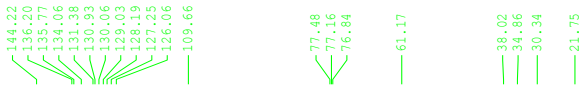
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)

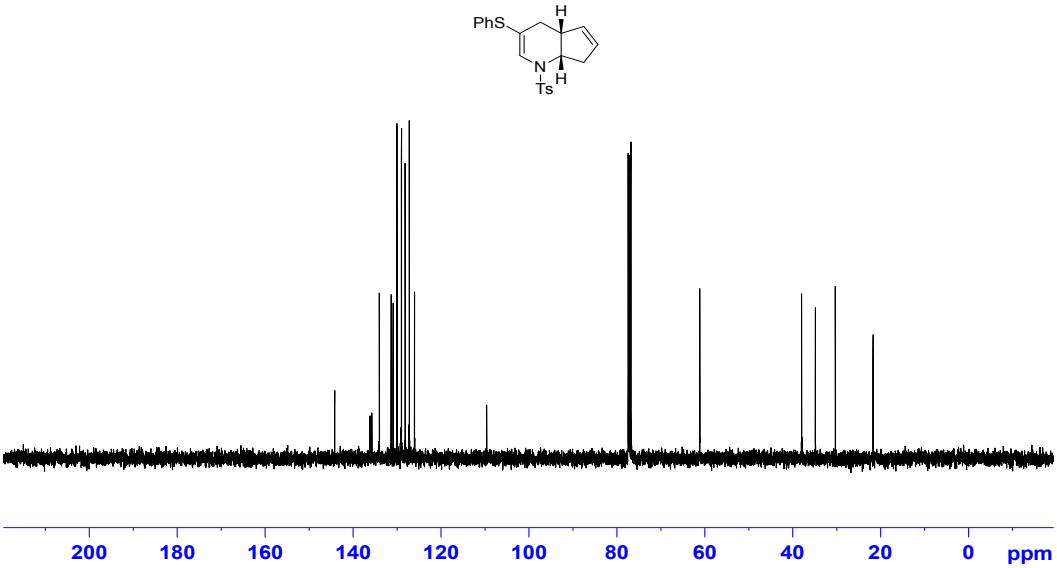





```
Current Data Parameters
NAME                  spa40415
EXPNO                      988
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150430
Time                   23.18
INSTRUM                spect
PROBHD    5 mm PABBI 1H/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        16
DS                         2
SWH                 8012.820 Hz
FIDRES              0.122266 Hz
AQ                  4.0894966 sec
RG                      95.73
DW                     62.400 usec
DE                      6.50 usec
TE                     298.7 K
D1                  0.50000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                       1H
P1                       9.00 usec
PLW1                8.50000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                         65536
SF                400.1300105 MHz
WDW                           EM
SSB          0
LB                        0.30 Hz
GB           0
PC                        1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

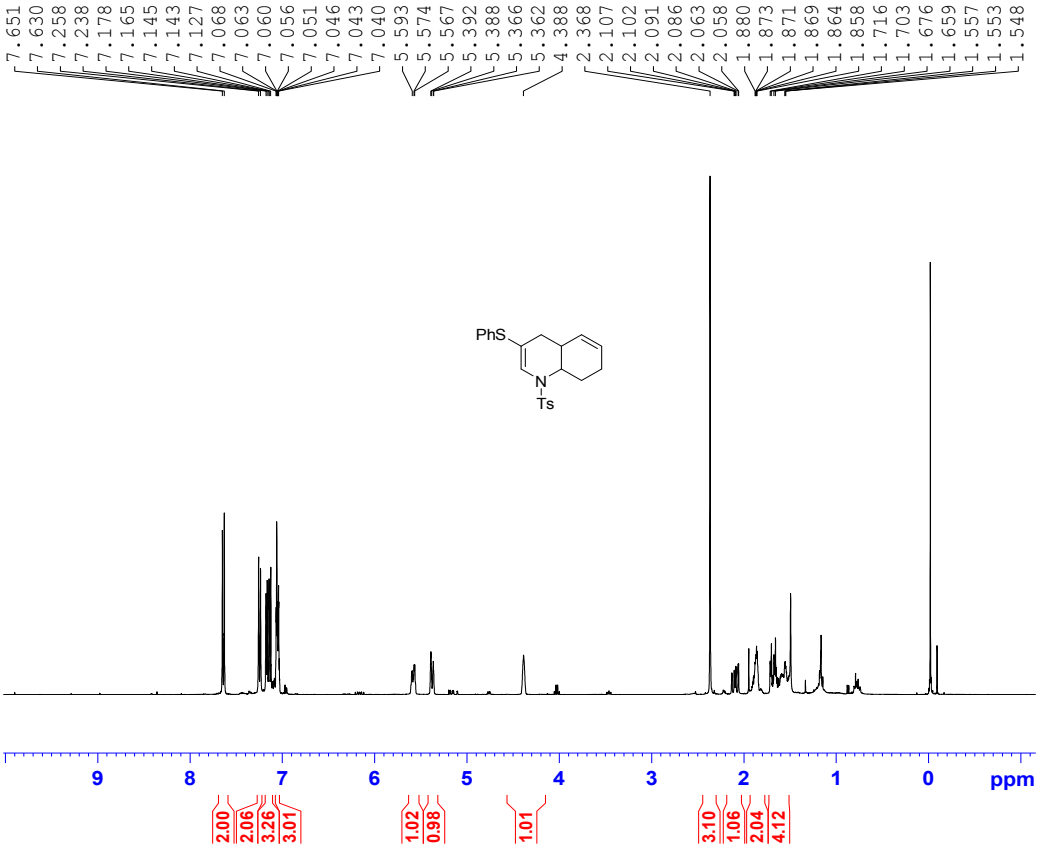





```
Current Data Parameters
NAME                  spa40415
EXPNO                      989
PROCNO                       1

F2 - Acquisition Parameters
Date_               20150430
Time                   23.28
INSTRUM                spect
PROBHD    5 mm PABBI 1H/
PULPROG               zgpg30
TD                     16540
SOLVENT                CDCl3
NS                       412
DS                         4
SWH                24038.461 Hz
FIDRES              1.453353 Hz
AQ                  0.3440820 sec
RG                      200.34
DW                     20.800 usec
DE                      6.50 usec
TE                     299.0 K
D1                  1.00000000 sec
D11                 0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      13C
P1                      15.00 usec
PLW1               76.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   90.00 usec
PLW2                8.50000000 W
PLW12               0.08500000 W
PLW13               0.06885000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                         32768
SF                100.6127563 MHz
WDW                           EM
SSB          0
LB                        1.00 Hz
GB           0
PC                        1.40
```

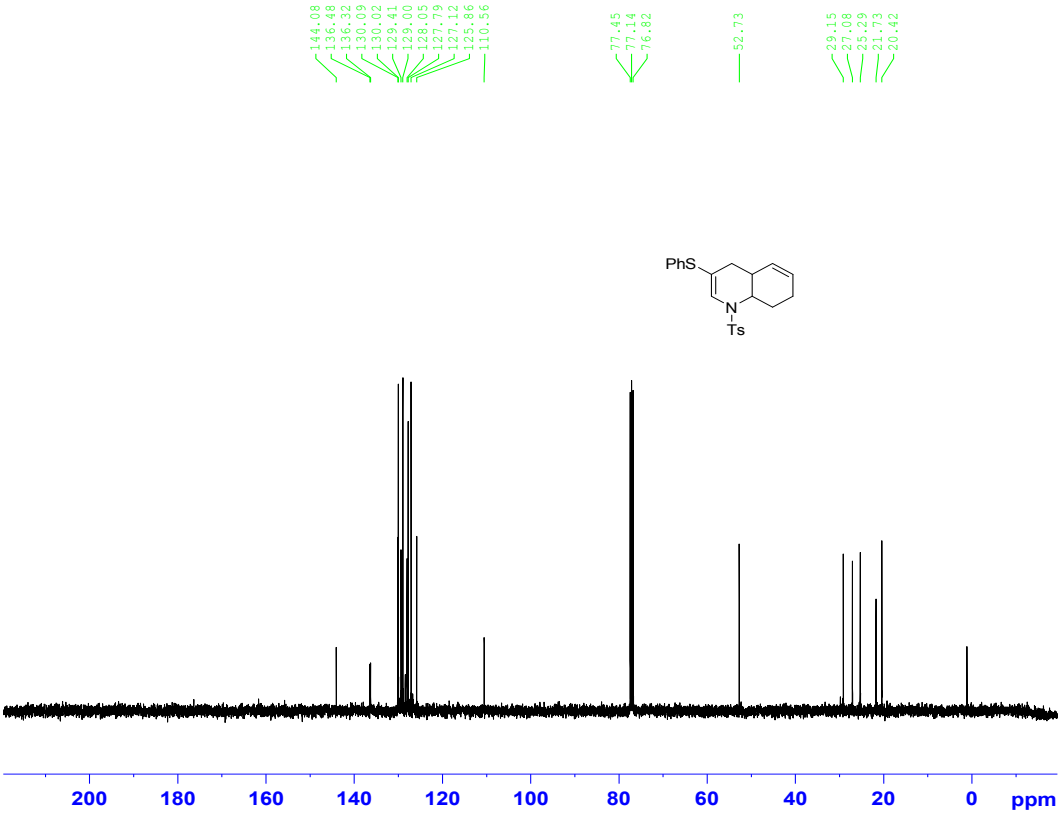
3-(Phenylthio)-1-tosyl-1,4,4*a*,7,8,8*a*-hexahydroquinoline (20b) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41114
EXPNO                 10
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141101
Time               15.36
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH             8012.820 Hz
FIDRES          0.122266 Hz
AQ              4.0894966 sec
RG                124.58
DW                62.400 usec
DE                 6.50 usec
TE                300.3 K
D1             0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1           7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF           400.1300474 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

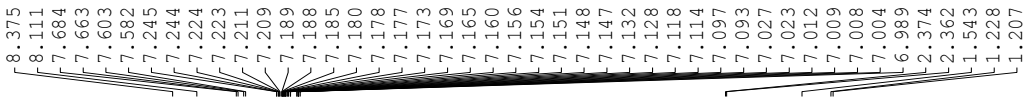
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)

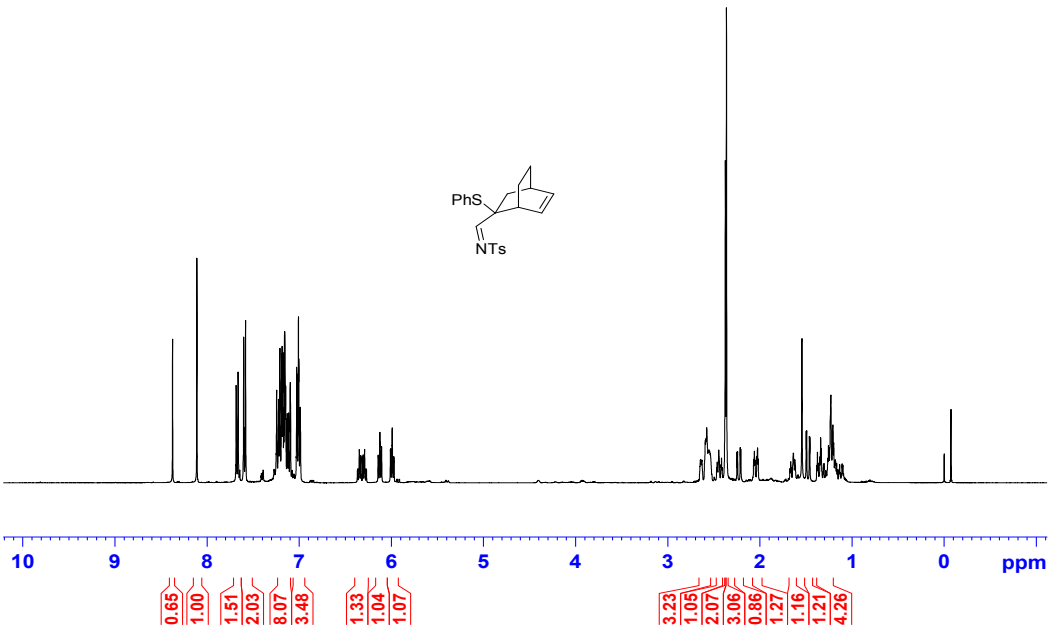



```
Current Data Parameters
NAME            spa41114
EXPNO                 11
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141101
Time               15.44
INSTRUM            spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          1.453353 Hz
AQ              0.3440820 sec
RG                200.34
DW                20.800 usec
DE                 6.50 usec
TE                301.1 K
D1             1.00000000 sec
D11            0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                 9.25 usec
PLW1          47.00000000 W
SFO1         100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2             90.00 usec
PLW2           7.75000000 W
PLW12          0.23583999 W
PLW13          0.19103000 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF           100.6127583 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

4-Methyl-*N*-(((*1R,2S,4R*)-2- (phenylthio)bicyclo[2.2.2]oct-5-en-2-yl)methylene)benzenesulfonamide (22) :

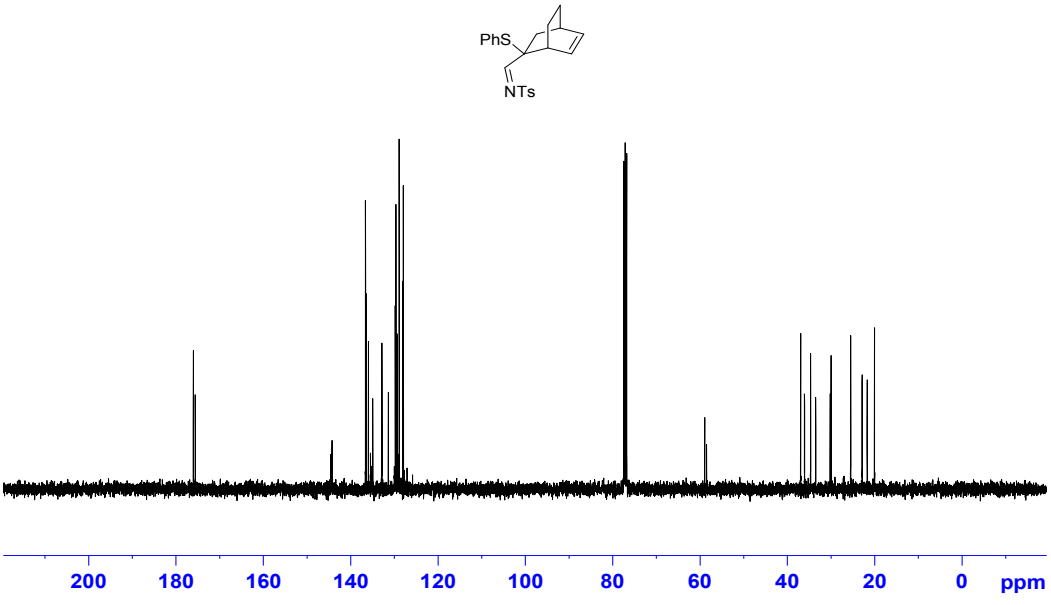
^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)






```
Current Data Parameters
NAME                 spa41114
EXPNO                      13
PROCNO                      1

F2 - Acquisition Parameters
Date_               20141101
Time                   15.52
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       16
DS                        2
SWH                8012.820 Hz
FIDRES                0.122266 Hz
AQ                 4.0894966 sec
RG                    108.26
DW                    62.400 usec
DE                     6.50 usec
TE                    300.3 K
D1                 0.50000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                        65536
SF                400.1300394 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

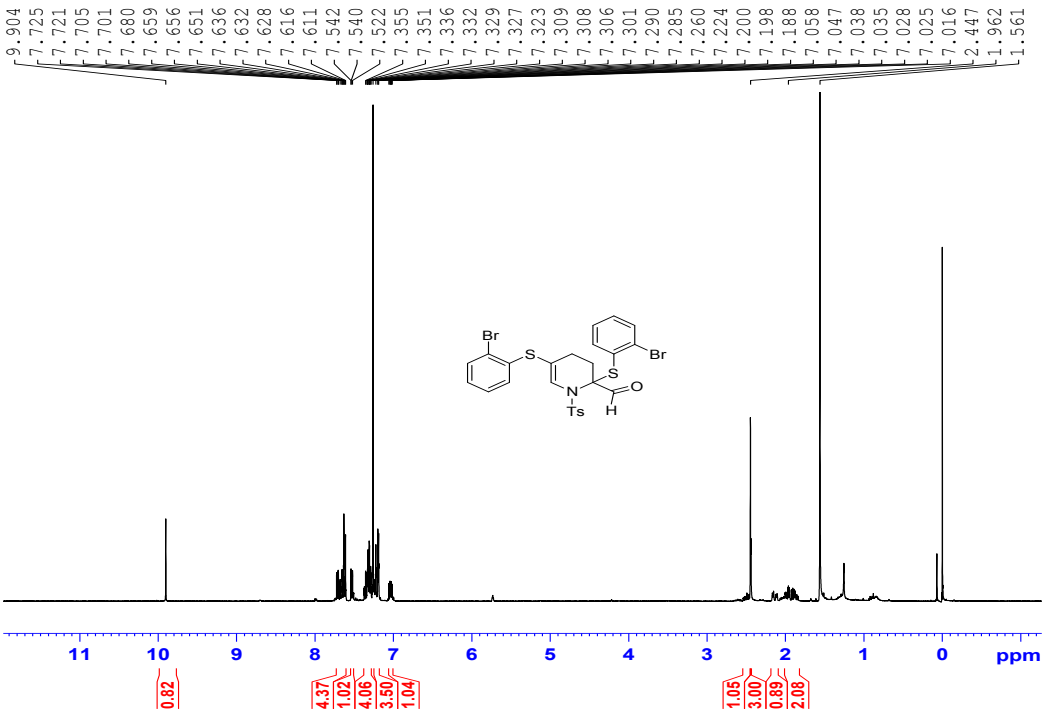
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                 spa41114
EXPNO                      14
PROCNO                      1

F2 - Acquisition Parameters
Date_               20141101
Time                   16.00
INSTRUM                spect
PROBHD    5 mm PABBO BB-
PULPROG              zgpg30
TD                    16540
SOLVENT               CDCl3
NS                      256
DS                        4
SWH               24038.461 Hz
FIDRES                1.453353 Hz
AQ                 0.3440820 sec
RG                    200.34
DW                    20.800 usec
DE                     6.50 usec
TE                    301.0 K
D1                 1.00000000 sec
D11                0.03000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                      13C
P1                      9.25 usec
PLW1               47.00000000 W
SFO1              100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                  90.00 usec
PLW2                7.75000000 W
PLW12               0.23583999 W
PLW13               0.19103000 W
SFO2              400.1316005 MHz

F2 - Processing parameters
SI                        32768
SF                100.6127583 MHz
WDW                        EM
SSB          0
LB                      1.00 Hz
GB           0
PC                      1.40
```

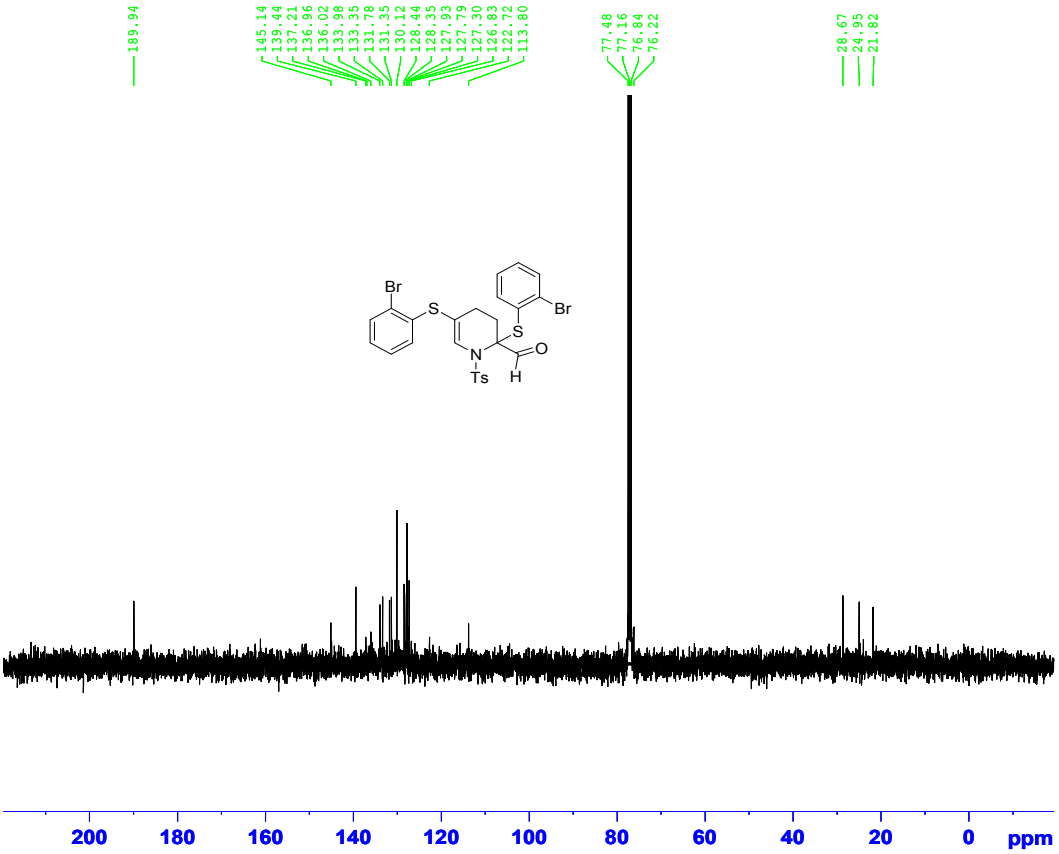
2,5-Bis((2-bromophenyl)thio)-1-tosyl-1,2,3,4-tetrahydropyridine-2-carbaldehyde (24) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40515
EXPNO                      315
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150510
Time_                     6.05
INSTRUM                  spect
PROBHD    5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                        6.50 usec
TE                       298.5 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                7.75000000 W
SFO1              400.1320007 MHz

F2 - Processing parameters
SI                        65536
SF                  400.1300095 MHz
WDW                          EM
SSB                 0
LB                        0.30 Hz
GB                  0
PC                        1.00
```

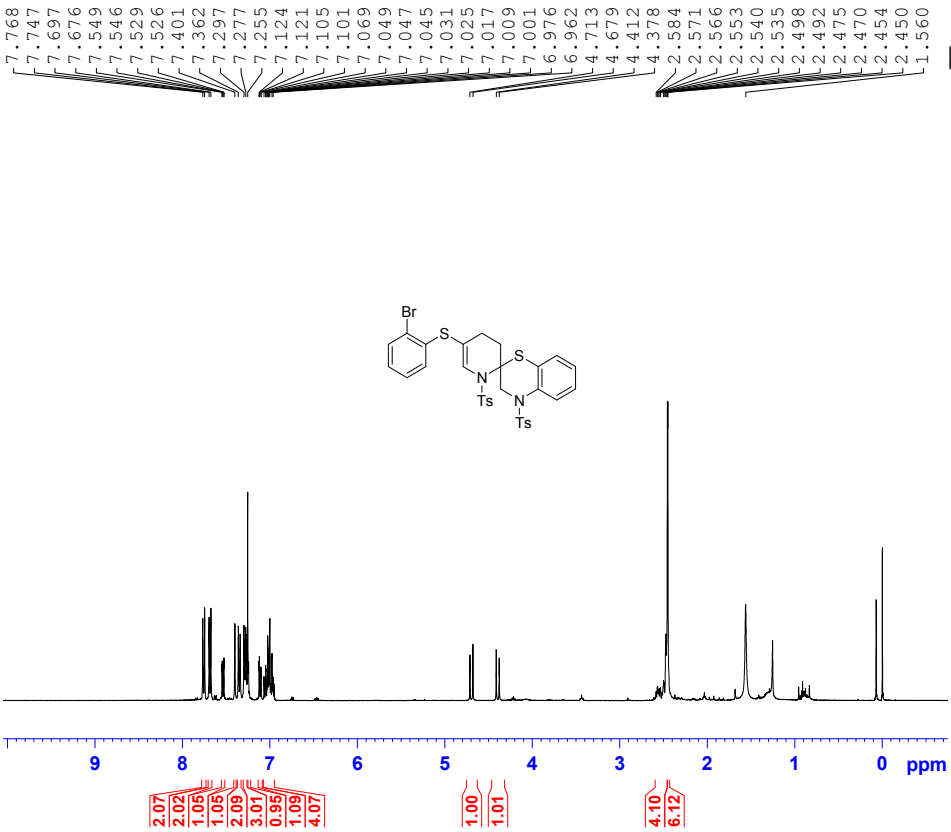
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa40415
EXPNO                      947
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20150430
Time_                     1.18
INSTRUM                  spect
PROBHD    5 mm PABBI 1H/
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         2500
DS                            4
SWH                  24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                        6.50 usec
TE                       298.9 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       15.00 usec
PLW1                76.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                    90.00 usec
PLW2                8.50000000 W
PLW12               0.08500000 W
PLW13               0.06885000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                        32768
SF                 100.6127537 MHz
WDW                          EM
SSB                 0
LB                        1.00 Hz
GB                  0
PC                        1.40
```

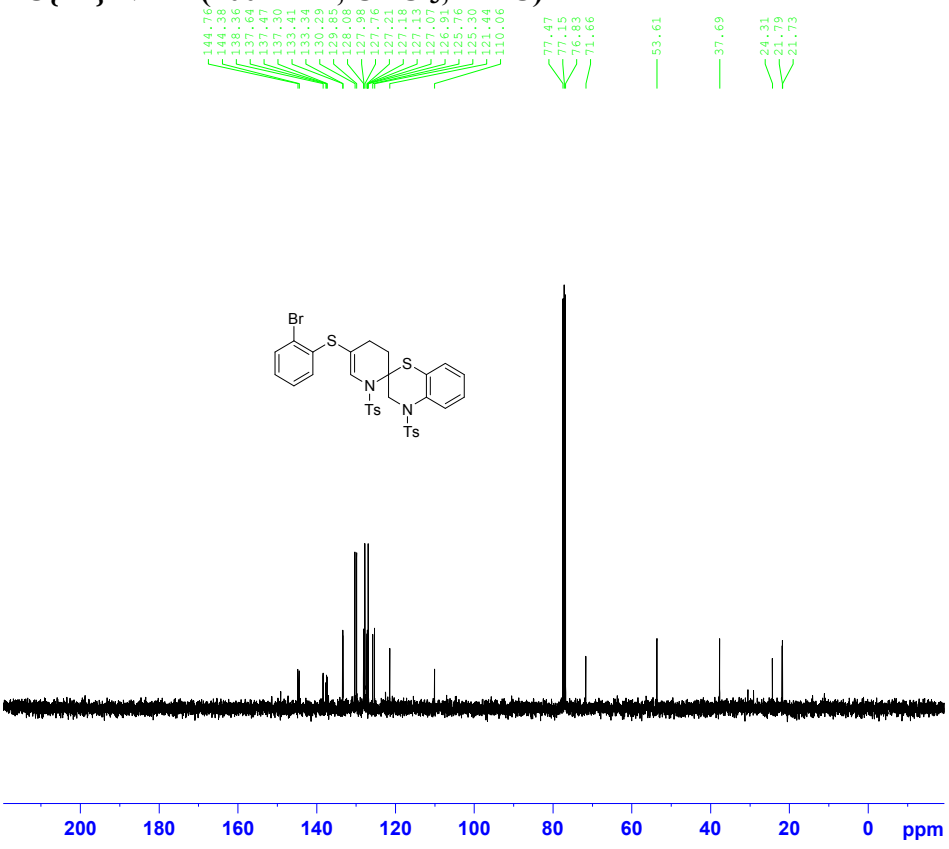
5'-((2-bromophenyl)thio)-1',4-ditosyl-3,3',4,4'-tetrahydro-1'H-spiro[benzo[b][1,4]thiazine-2,2'-pyridine] (25) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa40115
EXPNO                 50
PROCNO                 1

F2 - Acquisition Parameters
Date_           20150103
Time                15.26
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT            CDCl3
NS                    16
DS                     2
SWH              8012.820 Hz
FIDRES           0.122266 Hz
AQ               4.0894966 sec
RG                  200.34
DW                  62.400 usec
DE                   6.50 usec
TE                  300.9 K
D1              0.50000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                 15.70 usec
PLW1          7.75000000 W
SFO1         400.1320007 MHz

F2 - Processing parameters
SI                 65536
SF            400.1300115 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

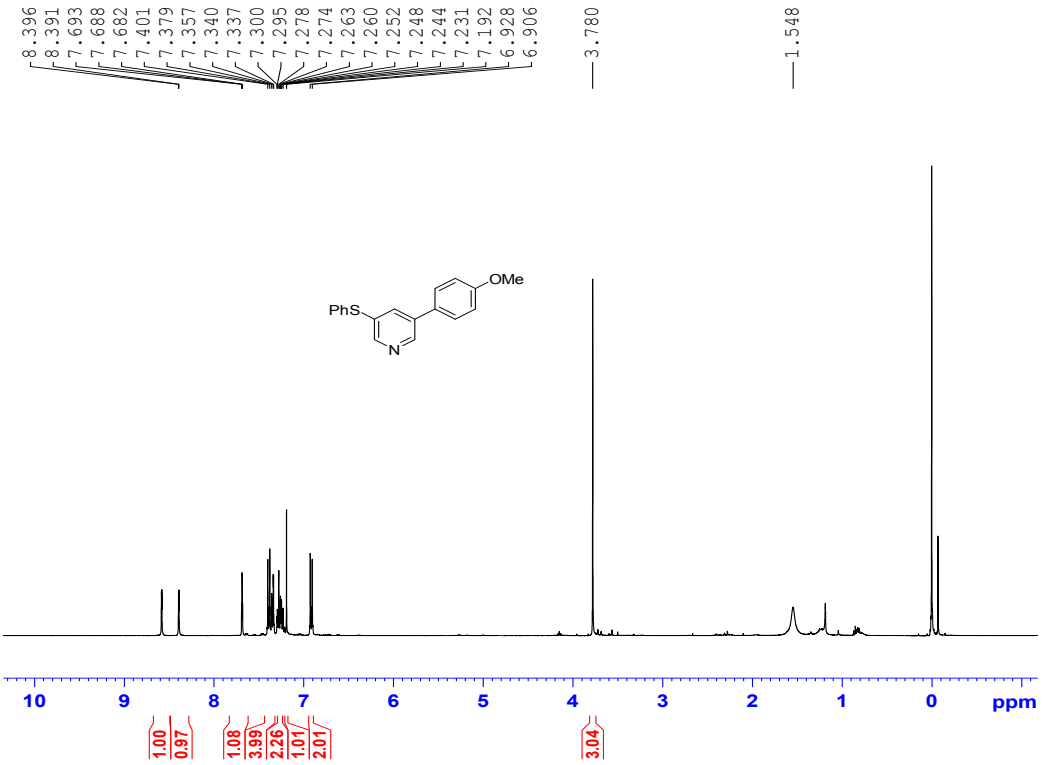
^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME            spa41114
EXPNO                373
PROCNO                 1

F2 - Acquisition Parameters
Date_           20141113
Time                 0.46
INSTRUM             spect
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 16540
SOLVENT            CDCl3
NS                   256
DS                     4
SWH             24038.461 Hz
FIDRES           1.453353 Hz
AQ               0.3440820 sec
RG                  200.34
DW                  20.800 usec
DE                   6.50 usec
TE                  300.8 K
D1              1.00000000 sec
D11             0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                 13C
P1                  9.25 usec
PLW1         47.00000000 W
SFO1        100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                  1H
PCPD2              90.00 usec
PLW2          7.75000000 W
PLW12         0.23583999 W
PLW13         0.19103000 W
SFO2         400.1316005 MHz

F2 - Processing parameters
SI                 32768
SF            100.6127559 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

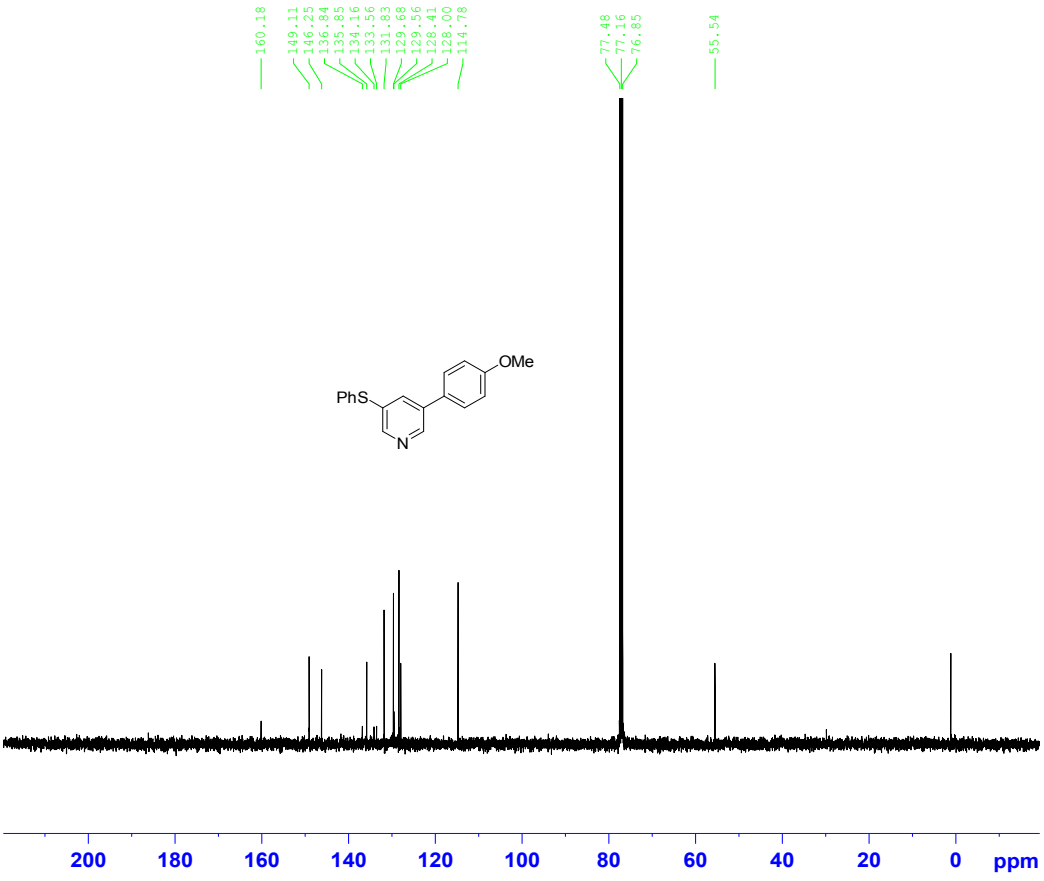
3- (4-Methoxyphenyl)-5- (phenylthio)pyridine (26) :

^{1}H NMR (400 MHz, $CDCl_3$, 24 °C)



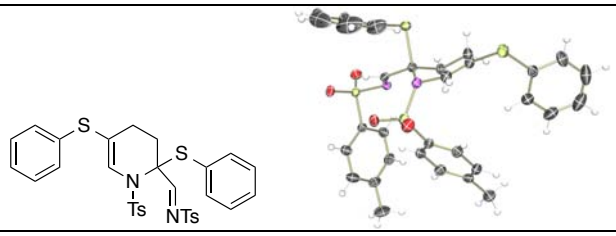

```
Current Data Parameters
NAME                  spa41114
EXPNO                      388
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141113
Time                     15.33
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                  zg30
TD                      65536
SOLVENT                 CDCl3
NS                         16
DS                          2
SWH                  8012.820 Hz
FIDRES               0.122266 Hz
AQ                   4.0894966 sec
RG                      200.34
DW                      62.400 usec
DE                       6.50 usec
TE                      300.0 K
D1                   0.50000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       15.70 usec
PLW1                 7.75000000 W
SFO1               400.1320007 MHz

F2 - Processing parameters
SI                      65536
SF                 400.1300365 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$, 24 °C)




```
Current Data Parameters
NAME                  spa41114
EXPNO                      401
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20141113
Time                     17.25
INSTRUM                  spect
PROBHD     5 mm PABBO BB-
PULPROG                zgpg30
TD                      16540
SOLVENT                 CDCl3
NS                         1500
DS                          4
SWH                 24038.461 Hz
FIDRES               1.453353 Hz
AQ                   0.3440820 sec
RG                      200.34
DW                      20.800 usec
DE                       6.50 usec
TE                      301.1 K
D1                   1.00000000 sec
D11                  0.03000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                       13C
P1                       9.25 usec
PLW1                47.00000000 W
SFO1               100.6228289 MHz

======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                        1H
PCPD2                   90.00 usec
PLW2                 7.75000000 W
PLW12                0.23583999 W
PLW13                0.19103000 W
SFO2               400.1316005 MHz

F2 - Processing parameters
SI                      32768
SF                 100.6127528 MHz
WDW                        EM
SSB                 0
LB                       1.00 Hz
GB                  0
PC                       1.40
```

14. Crystallographic Data and Structure Refinements Summary for Compound 3a.

DATA	3a
Molecular Structure (Ortep Structure)	
CCDC number	1040728
Formula	$C_{32}H_{30}N_2O_4S_4$
Formula weight	634.86
Color	Colorless
Temperature/K	296(2)
Radiation	Mo Kα
Wavelength/Å	0.71073
Crystal system	Triclinic
Space group	$P\,\bar{1}$
a (Å)	11.2966(2)
b (Å)	12.1022(3)
c (Å)	12.7036(3)
α (°)	85.244(1)
β (°)	70.619(1)
γ (°)	77.661(1)
Volume (Å^3)	1600.36(6)
Z	2
Density (g/ml)	1.317
μ (1/mm)	0.335
F (000)	664
θ (min, max)	1.723, 25
No. of unique reflns	5632
No. of parameters	381
R_obs, wR_2_obs	0.035, 0.092
$\Delta\rho_{min}$, $\Delta\rho_{max}$ (eÅ^{-3})	−0.306, 0.282
GooF	1.029