Electronic Supplementary Information

A [4+3] annulation of benzofuran-derived azadienes and α-bromohydroxamates for the synthesis of benzofuran-fused 1,4-diazepinones

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General Methods Solvents were treated prior to use according to the standard methods. Other reagents were used as purchased without further purification. Reaction progress was monitored by thin-layer chromatography (TLC) on silica gel plates. Chromatographic purification was performed on silica gel columns (100-200 mesh size). Melting points were uncorrected. ^{1}H NMR and ^{13}C NMR spectra were recorded at 400 MHz and 100 MHz in $CDCl_3$ with chemical shift (δ) given in ppm relative to TMS as the internal standard. Multiplicities were indicated as followed: s (singlet), d (doublet), t (triplet), m (multiplet), dd (doublet of doublets), and so forth; the coupling constant (*J*) was given in hertz (Hz). High-resolution mass spectra (HRMS) were recorded using electrospray ionization (ESI) and time-of-flight (TOF) mass analysis. Benzofuran-derived azadienes (BDAs) **1**[1-5] and α-bromohydroxamates **2**[6,7] were prepared according to literature procedures.

General Procedure for the Synthesis of Product 3. To a solution of benzofuran-derived azadienes **1** (0.1 mmol) and α-bromohydroxamates **2** (0.12 mmol) in anhydrous MeCN (2 mL) were added Cs_2CO_3 (0.12 mmol). The reaction mixture was stirred at room temperature for 1-3 h. After the completion of the reaction, the solid was filtered and washed with dicholomethane, and the combined filtrate was concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5) to afford product **3**.

4-(Benzyloxy)-5-phenyl-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-on e (**3aa**). White solid (43 mg, 78% yield); mp 113-115 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19-8.16 (m, 1H), 7.73 (d, *J* = 8.0 Hz, 2H), 7.45-7.38 (m, 3H), 7.33-7.21 (m, 10H), 7.13-7.10

(m, 2H), 5.90 (s, 1H), 4.72 (d, *J* = 16.8 Hz, 1H), 4.11 and 4.06 (ABq, *J* = 10.0 Hz, 2H), 3.99 (d, *J* = 16.8 Hz, 1H), 2.26 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 153.0, 144.8, 144.0, 137.5, 134.5, 134.2, 129.7, 129.0, 128.9, 128.8, 128.5, 126.5, 125.7, 124.5, 123.7, 123.2, 121.6, 111.3, 76.9, 63.5, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{31}H_{27}N_2O_5S$ $[M + H]^+$ 539.1641; found 539.1668.

4-(Benzyloxy)-5-(4-fluorophenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ba**). White solid (46 mg, 82% yield); mp 114-116 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17-8.15 (m, 1H), 7.73 (d, *J* = 8.0 Hz, 2H), 7.45-7.37 (m, 3H), 7.34-7.29 (m, 5H), 7.25-7.21 (m, 2H), 7.11-7.08 (m, 2H), 6.94 (t, *J* = 8.8 Hz, 2H), 5.86 (s, 1H), 4.72 (d, *J* = 16.8 Hz, 1H), 4.11 and 4.06 (ABq, *J* = 10.0 Hz, 2H), 3.96 (d, *J* = 16.8 Hz, 1H), 2.27 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 162.7 (*J* = 247.3 Hz), 153.0, 144.9, 143.7, 134.4, 134.2, 133.4 (*J* = 3.4 Hz), 129.8, 128.9, 128.8, 128.6, 128.5, 124.4, 123.8, 123.2, 121.8, 116.0 (*J* = 21.6 Hz), 111.3, 76.9, 62.9, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{31}H_{25}FN_2NaO_5S$ $[M + Na]^+$ 579.1366; found 579.1394.

4-(Benzyloxy)-5-(4-chlorophenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ca**). White solid (45 mg, 78% yield); mp 120-122 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19-8.13 (m, 1H), 7.73 (d, *J* = 8.4 Hz, 2H), 7.46-7.37 (m, 3H), 7.34-7.29 (m, 5H), 7.25-7.21 (m, 4H), 7.05 (d, *J* = 8.4 Hz, 2H), 5.85 (s, 1H), 4.72 (d, *J* = 16.8 Hz, 1H), 4.11 and 4.07 (ABq, *J* = 10.0 Hz, 2H), 3.94 (d, *J* = 16.8 Hz, 1H), 2.28 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.0, 144.9, 136.0, 134.9, 134.4, 134.2, 129.8, 129.2, 128.9, 128.9, 128.8, 128.6, 128.0, 125.9, 124.4, 123.8, 123.2, 121.9, 111.3, 77.0, 63.0, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{31}H_{25}ClN_2NaO_5S$ $[M + Na]^+$ 595.1070; found 595.1049.

4-(Benzyloxy)-5-(p-tolyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3da**). White solid (45 mg, 82% yield); mp 124-126 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18-8.16 (m, 1H), 7.72 (d, *J* = 8.4 Hz, 2H), 7.45-7.37 (m, 3H), 7.32-7.28 (m, 5H), 7.24-7.21 (m, 2H), 7.05 (d, *J* = 8.4 Hz, 2H), 6.99 (t, *J* = 8.4 Hz, 2H), 5.86 (s, 1H), 4.72 (d, *J* = 16.4 Hz, 1H), 4.08 and 4.04 (ABq, *J* = 10.0 Hz, 2H), 4.00 (d, *J* = 16.4 Hz, 1H), 2.27 (s, 3H), 2.26 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 153.0, 144.8, 144.2, 138.8, 134.6, 134.2, 129.7, 129.7, 128.9, 128.8, 128.7, 128.5, 126.4, 125.7, 124.5, 123.6, 123.2, 121.5, 111.3, 76.8, 63.3, 54.9, 21.5, 21.0. HRMS (ESI) m/z calcd for $C_{32}H_{28}N_2NaO_5S$ $[M + Na]^+$ 575.1617; found 575.1638.

4-(Benzyloxy)-5-(4-methoxyphenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ea**). White solid (49 mg, 86% yield); mp 126-128 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18-8.16 (m, 1H), 7.72 (d, *J* = 8.4 Hz, 2H), 7.45-7.37 (m, 3H), 7.34-7.28 (m, 5H), 7.24-7.22 (m, 2H), 7.02 (d, *J* = 8.8 Hz, 2H), 6.76 (d, *J* = 8.8 Hz, 2H), 5.96 (s, 1H), 4.73 (d, *J* = 16.8 Hz, 1H), 4.07 and 4.02 (ABq, *J* = 10.0 Hz, 2H), 4.01 (d, *J* = 16.8 Hz, 1H), 3.73 (s, 3H), 2.26 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 159.8, 153.0, 144.8, 144.3, 134.6, 134.3, 129.7, 129.6, 128.9, 128.8, 128.7, 128.5, 127.9, 125.7, 124.5, 123.6, 123.1, 121.6, 114.3, 111.3, 76.8, 63.1, 55.3, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{32}H_{29}N_2O_6S$ $[M + H]^+$ 569.1746; found 569.1749.

4-(Benzyloxy)-5-(4-(methylthio)phenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3fa**). White solid (48 mg, 82% yield); mp 128-130 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18-8.14 (m, 1H), 7.73 (d, *J* = 8.0 Hz, 2H), 7.45-7.38 (m, 3H), 7.33-7.28 (m, 5H), 7.24-7.21 (m, 2H), 7.11 (d, *J* = 8.4 Hz, 2H), 7.02 (d, *J* = 8.4 Hz, 2H), 5.85 (s, 1H), 4.72 (d, *J* =

16.8 Hz, 1H), 4.09 and 4.05 (ABq, *J* = 10.0 Hz, 2H), 3.98 (d, *J* = 16.4 Hz, 1H), 2.40 (s, 3H), 2.27 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.0, 144.8, 143.9, 139.8, 134.5, 134.3, 134.1, 129.8, 128.9, 128.8, 128.6, 127.0, 126.6, 125.8, 124.5, 123.7, 123.2, 121.7, 111.3, 76.9, 63.2, 55.0, 21.5, 15.4. HRMS (ESI) m/z calcd for $C_{32}H_{28}N_2NaO_5S_2$ $[M + Na]^+$ 607.1337; found 607.1363.

5-([1,1'-Biphenyl]-4-yl)-4-(benzyloxy)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4] diazepin-3-one (**3ga**). White solid (44 mg, 72% yield); mp 124-126 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20-8.17 (m, 1H), 7.75 (d, *J* = 8.4 Hz, 2H), 7.49-7.45 (m, 5H), 7.43-7.38 (m, 4H), 7.35-7.29 (m, 6H), 7.25-7.23 (m, 2H), 7.18 (d, *J* = 8.4 Hz, 2H), 5.94 (s, 1H), 4.75 (d, *J* = 16.8 Hz, 1H), 4.13 and 4.09 (ABq, *J* = 10.0 Hz, 2H), 4.06 (d, *J* = 16.8 Hz, 1H), 2.27 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.0, 144.8, 144.0, 141.8, 140.1, 136.4, 134.5, 134.2, 129.8, 128.9, 128.8, 128.8, 128.6, 127.7, 127.6, 127.0, 127.0, 125.8, 124.5, 123.7, 123.2, 121.7, 111.3, 76.9, 63.3, 55.0, 21.5. HRMS (ESI) m/z calcd for $C_{37}H_{30}N_2NaO_5S$ $[M + Na]^+$ 637.1773; found 637.1790.

4-(Benzyloxy)-5-(3-chlorophenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diaz epin-3-one (**3ha**). White solid (42 mg, 74% yield); mp 121-123 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17-8.15 (m, 1H), 7.75 (d, *J* = 8.4 Hz, 2H), 7.46-7.39 (m, 3H), 7.34-7.27 (m, 6H), 7.22-7.18 (m, 3H), 7.13 (t, *J* = 2.0 Hz, 1H), 6.99 (d, *J* = 7.6 Hz, 1H), 5.82 (s, 1H), 4.71 (d, *J* = 16.8 Hz, 1H), 4.12 and 4.06 (ABq, *J* = 10.0 Hz, 2H), 4.00 (d, *J* = 16.8 Hz, 1H), 2.28 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 153.0, 144.9, 143.2, 139.4, 135.0, 134.3, 134.2, 130.3, 129.8, 129.1, 129.0, 128.9, 128.8, 128.6, 126.9, 125.9, 124.7, 124.3, 123.8, 123.2, 121.9, 111.4, 76.7, 63.1, 55.0, 21.5. HRMS (ESI) m/z calcd for $C_{31}H_{25}ClN_2NaO_5S$ $[M + Na]^+$

595.1070; found 595.1068.

4-(Benzyloxy)-5-(3-methoxyphenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]di azepin-3-one (**3ia**). White solid (43 mg, 76% yield); mp 125-127 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17-8.15 (m, 1H), 7.73 (d, *J* = 8.4 Hz, 2H), 7.45-7.36 (m, 3H), 7.32-7.28 (m, 5H), 7.23-7.21 (m, 2H), 7.17 (t, *J* = 8.0 Hz, 1H), 6.80 (dd, *J* = 8.0, 2.0 Hz, 1H), 6.71 (t, *J* = 2.0 Hz, 1H), 6.66 (d, *J* = 8.0 Hz, 1H), 5.84 (s, 1H), 4.71 (d, *J* = 16.4 Hz, 1H), 4.09 (s, 2H), 4.01 (d, *J* = 16.8 Hz, 1H), 3.69 (s, 3H), 2.27 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 159.9, 153.0, 144.8, 143.9, 139.1, 134.6, 134.2, 130.1, 129.8, 128.9, 128.8, 128.8, 128.5, 125.7, 124.4, 123.7, 123.2, 121.6, 118.5, 113.7, 113.0, 111.3, 76.9, 63.4, 55.2, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{32}H_{29}N_2O_6S$ $[M + H]^+$ 569.1746; found 569.1766.

4-(Benzyloxy)-5-(2-fluorophenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diaz epin-3-one (**3ja**). White solid (43 mg, 78% yield); mp 115-117 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03-8.00 (m, 1H), 7.77 (d, *J* = 8.4 Hz, 2H), 7.38-7.28 (m, 9H), 7.21-7.17 (m, 2H), 7.08-6.98 (m, 3H), 6.13 (s, 1H), 4.88 (d, *J* = 17.6 Hz, 1H), 4.53 (d, *J* = 17.2 Hz, 1H), 4.16 (d, *J* = 9.6 Hz, 1H), 3.95 (d, *J* = 9.6 Hz, 1H), 2.30 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.2, 160.7 (*J* = 247.8 Hz), 153.3, 144.8, 143.9, 134.7, 134.3, 131.0 (*J* = 8.6 Hz), 129.9, 129.4 (*J* = 3.2 Hz), 128.8, 128.7, 128.5, 128.4, 125.8, 124.8, 124.6 (*J* = 3.6 Hz), 123.9 (*J* = 13.1 Hz), 123.7, 122.4, 121.1, 116.4 (*J* = 2.2 Hz), 111.3, 76.1, 59.0, 55.8, 21.5. HRMS (ESI) m/z calcd for $C_{31}H_{25}FN_2NaO_5S$ $[M + Na]^+$ 579.1366; found 579.1395.

4-(Benzyloxy)-5-(2-chlorophenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diaz epin-3-one (**3ka**). White solid (44 mg, 77% yield); mp 122-124 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.98-7.95 (m, 1H), 7.79 (d, *J* = 8.4 Hz, 2H), 7.41 (dd, *J* = 8.0, 1.2 Hz, 1H),

7.37-7.30 (m, 5H), 7.29-7.27 (m, 3H), 7.17-7.10 (m, 3H), 6.95 (dd, *J* = 8.0, 1.6 Hz, 1H), 6.46 (s, 1H), 4.86 (d, *J* = 17.6 Hz, 1H), 4.66 (d, *J* = 17.2 Hz, 1H), 4.25 (d, *J* = 9.2 Hz, 1H), 3.77 (d, *J* = 9.2 Hz, 1H), 2.31 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.3, 153.4, 144.9, 144.6, 134.7, 134.7, 134.6, 134.1, 130.3, 130.2, 130.0, 129.0, 128.8, 128.6, 128.5, 128.4, 127.4, 125.8, 124.9, 123.7, 122.2, 121.0, 111.4, 76.2, 60.9, 56.2, 21.6. HRMS (ESI) m/z calcd for $C_{31}H_{25}ClN_2NaO_5S$ $[M + Na]^+$ 595.1070; found 595.1071.

4-(Benzyloxy)-5-(2-bromophenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3la**). White solid (46 mg, 75% yield); mp 114-116 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97-7.95 (m, 1H), 7.90 (d, *J* = 8.4 Hz, 2H), 7.61-7.59 (m, 1H), 7.36-7.30 (m, 5H), 7.29-7.26 (m, 3H), 7.21-7.15 (m, 2H), 7.13-7.10 (m, 2H), 6.94-6.92 (m, 1H), 6.49 (s, 1H), 4.85 (d, *J* = 15.6 Hz, 1H), 4.68 (d, *J* = 15.2 Hz, 1H), 4.28 (d, *J* = 9.2 Hz, 1H), 3.74 (d, *J* = 9.2 Hz, 1H), 2.31 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.3, 153.5, 144.9, 144.8, 136.3, 134.7, 134.0, 133.6, 130.4, 130.0, 129.0, 128.7, 128.6, 128.5, 128.3, 128.0, 125.8, 125.2, 124.9, 123.7, 122.2, 120.9, 111.4, 76.2, 63.4, 56.3, 21.6. HRMS (ESI) m/z calcd for $C_{31}H_{25}BrN_2NaO_5S$ $[M + Na]^+$ 639.0565; found 639.0593.

4-(Benzyloxy)-5-(o-tolyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ma**). White solid (43 mg, 78% yield); mp 126-128 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01-7.99 (m, 1H), 7.82 (d, *J* = 8.4 Hz, 2H), 7.36-7.31 (m, 4H), 7.29-7.23 (m, 4H), 7.21-7.18 (m, 2H), 7.07-7.00 (m, 3H), 6.76 (d, *J* = 8.0 Hz, 1H), 6.11 (s, 1H), 4.72 and 4.71 (ABq, *J* = 15.6 Hz, 2H), 4.19 (d, *J* = 9.2 Hz, 1H), 3.72 (d, *J* = 9.2 Hz, 1H), 2.38 (s, 3H), 2.30 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.9, 153.3, 145.7, 144.9, 137.6, 135.3, 134.7, 134.2, 131.2, 130.0, 129.1, 128.8, 128.7, 128.6, 128.4, 127.3, 126.3, 125.6, 124.9, 123.6, 122.2, 120.9,

111.3, 76.5, 61.0, 56.0, 21.5, 19.8. HRMS (ESI) m/z calcd for $C_{32}H_{28}N_2NaO_5S$ $[M + Na]^+$ 575.1617; found 575.1631.

4-(Benzyloxy)-5-(naphthalen-1-yl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3na**). White solid (49 mg, 83% yield); mp 115-117 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (d, *J* = 8.4 Hz, 1H), 8.07 (d, *J* = 7.6 Hz, 1H), 7.87-7.82 (m, 4H), 7.49 (t, *J* = 7.2 Hz, 1H), 7.43 (t, *J* = 7.2 Hz, 1H), 7.37-7.28 (m, 5H), 7.24-7.17 (m, 4H), 6.99 (d, *J* = 7.2 Hz, 1H), 6.91 (d, *J* = 7.2 Hz, 2H), 6.66 (s, 1H), 4.78 and 4.69 (ABq, *J* = 17.2 Hz, 2H), 4.21 (d, *J* = 9.6 Hz, 1H), 3.81 (d, *J* = 9.6 Hz, 1H), 2.31 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.6, 153.1, 145.1, 144.9, 134.6, 134.2, 134.1, 131.8, 129.9, 128.9, 128.7, 128.7, 128.6, 128.3, 126.6, 126.1, 125.7, 124.9, 124.8, 123.7, 123.6, 122.4, 121.5, 111.3, 77.0, 76.7, 55.8, 21.6. HRMS (ESI) m/z calcd for $C_{35}H_{28}N_2NaO_5S$ $[M + Na]^+$ 611.1617; found 611.1644.

4-(Benzyloxy)-5-(naphthalen-2-yl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3oa**). White solid (50 mg, 84% yield); mp 114-116 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23-8.19 (m, 1H), 7.78-7.73 (m, 4H), 7.70-7.68 (m, 1H), 7.48-7.40 (m, 6H), 7.36-7.29 (m, 6H), 7.23-7.21 (m, 2H), 6.04 (s, 1H), 4.72 (d, *J* = 16.4 Hz, 1H), 4.15 and 4.08 (ABq, *J* = 10.0 Hz, 1H), 4.06 (d, *J* = 16.4 Hz, 1H), 2.27 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.3, 153.0, 144.8, 144.0, 135.0, 134.5, 134.2, 133.1, 132.9, 129.8, 129.1, 128.9, 128.8, 128.8, 128.6, 128.2, 127.6, 126.8, 126.6, 125.8, 125.7, 124.5, 124.1, 123.7, 123.2, 121.8, 111.4, 77.0, 63.7, 55.0, 21.5. HRMS (ESI) m/z calcd for $C_{35}H_{28}N_2NaO_5S$ $[M + Na]^+$ 611.1617; found 611.1645.

4-(Benzyloxy)-8-methoxy-5-phenyl-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ta**). White solid (42 mg, 73% yield); mp 130-132 ºC. ^{1}H NMR (400 MHz,

$CDCl_3$) δ 8.16-8.12 (m, 1H), 7.72 (d, *J* = 8.4 Hz, 2H), 7.43-7.33 (m, 3H), 7.30-7.26 (m, 5H), 7.23-7.19 (m, 2H), 7.15 (t, *J* = 8.0 Hz, 1H), 6.78 (d, *J* = 8.0 Hz, 1H), 6.70 (s, 1H), 6.64 (d, *J* = 7.6 Hz, 1H), 5.82 (s, 1H), 4.69 (d, *J* = 16.8 Hz, 1H), 4.10 (s, 2H), 4.00 (d, *J* = 16.4 Hz, 1H), 3.67 (s, 3H), 2.25 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 160.0, 153.0, 144.8, 144.0, 139.1, 134.7, 134.3, 130.1, 129.8, 128.9, 128.8, 128.7, 128.5, 125.7, 124.5, 123.6, 123.2, 121.6, 118.6, 113.8, 113.0, 111.3, 76.9, 63.5, 55.2, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{32}H_{29}N_2O_6S$ $[M + H]^+$ 569.1746; found 569.1746.

4-Methoxy-5-phenyl-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ab**). White solid (35 mg, 75% yield); mp 110-112 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17-8.14 (m, 1H), 7.64 (d, *J* = 8.0 Hz, 2H), 7.47-7.33 (m, 4H), 7.30-7.28 (m, 4H), 7.16-7.12 (m, 2H), 5.93 (s, 1H), 4.76 (d, *J* = 16.8 Hz, 1H), 3.99 (d, *J* = 16.8 Hz, 1H), 3.09 (s, 3H), 2.38 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.1, 144.6, 144.0, 137.3, 134.1, 129.7, 129.1, 128.9, 128.6, 126.6, 125.8, 124.5, 123.7, 123.2, 121.6, 111.3, 61.5, 55.0, 21.5. HRMS (ESI) m/z calcd for $C_{25}H_{23}N_2O_5S$ $[M + H]^+$ 463.1328; found 463.1312.

4-Ethoxy-5-phenyl-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ac**). White solid (35 mg, 74% yield); mp 109-111 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18-8.15 (m, 1H), 7.64 (d, *J* = 8.0 Hz, 2H), 7.46-7.44 (m, 1H), 7.42-7.36 (m, 2H), 7.30-7.25 (m, 5H), 7.17-7.12 (m, 2H), 5.92 (s, 1H), 4.72 (d, *J* = 16.4 Hz, 1H), 3.95 (d, *J* = 16.8 Hz, 1H), 3.23-3.11 (m, 2H), 2.39 (s, 3H), 1.03 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 153.0, 144.5, 144.0, 137.6, 134.1, 129.7, 129.1, 129.1, 128.8, 128.7, 126.5, 125.8, 124.5, 123.7, 123.3, 121.7, 111.3, 70.1, 63.5, 54.9, 21.5, 13.8. HRMS (ESI) m/z calcd for $C_{26}H_{24}N_2NaO_5S$ $[M + Na]^+$ 499.1304; found 499.1321.

4-(Allyloxy)-5-phenyl-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3ad**). White solid (38 mg, 77% yield); mp 111-113 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17-8.15 (m, 1H), 7.66 (d, *J* = 8.4 Hz, 2H), 7.46-7.44 (m, 1H), 7.40-7.37 (m, 2H), 7.29-7.26 (m, 5H), 7.17-7.13 (m, 2H), 5.97 (s, 1H), 5.78-5.68 (m, 1H), 5.22-5.19 (m, 2H), 4.71 (d, *J* = 16.4 Hz, 1H), 3.96 (d, *J* = 16.8 Hz, 1H), 3.65 (dd, *J* = 11.2, 6.4 Hz, 1H), 3.54 (dd, *J* = 10.8, 6.0 Hz, 1H), 2.37 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.0, 144.7, 144.0, 137.5, 134.1, 131.6, 129.7, 129.1, 128.9, 128.7, 126.5, 125.8, 124.5, 123.7, 123.2, 121.7, 120.3, 111.3, 75.8, 63.7, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{27}H_{24}N_2NaO_5S$ $[M + Na]^+$ 511.1304; found 511.1293.

4-(Allyloxy)-5-(p-tolyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diazepin-3-one (**3dd**). White solid (31 mg, 61% yield); mp 107-109 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17-8.14 (m, 1H), 7.66 (d, *J* = 8.0 Hz, 2H), 7.45-7.43 (m, 1H), 7.40-7.37 (m, 2H), 7.27 (d, *J* = 8.4 Hz, 2H), 7.08 (d, *J* = 8.0 Hz, 2H), 7.01 (d, *J* = 8.0 Hz, 2H), 5.93 (s, 1H), 5.78-5.68 (m, 1H), 5.20 (d, *J* = 11.6 Hz, 2H), 4.71 (d, *J* = 16.8 Hz, 1H), 3.97 (d, *J* = 16.4 Hz, 1H), 3.64 (dd, *J* = 11.2, 6.4 Hz, 1H), 3.51 (d, *J* = 11.2, 6.4 Hz, 1H), 2.37 (s, 3H), 2.28 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 153.0, 144.7, 144.2, 138.8, 134.5, 134.2, 131.6, 129.7, 128.7, 126.4, 125.7, 124.5, 123.6, 123.2, 121.6, 120.2, 111.3, 75.8, 63.5, 54.9, 21.5, 21.0. HRMS (ESI) m/z calcd for $C_{28}H_{26}N_2NaO_5S$ $[M + Na]^+$ 525.1460; found 525.1444.

4-(Allyloxy)-5-(4-methoxyphenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]diaz epin-3-one (**3ed**). White solid (33 mg, 64% yield); mp 112-114 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16-8.14 (m, 1H), 7.66 (d, *J* = 8.0 Hz, 2H), 7.45-7.36 (m, 3H), 7.27 (d, *J* = 8.8 Hz, 2H), 7.06 (d, *J* = 8.4 Hz, 2H), 6.79 (d, *J* = 8.8 Hz, 2H), 5.91 (s, 1H), 5.78-5.68 (m, 1H), 5.21

(d, *J* = 11.6 Hz, 2H), 4.71 (d, *J* = 16.4 Hz, 1H), 3.97 (d, *J* = 16.4 Hz, 1H), 3.75 (s, 3H), 3.64 (dd, *J* = 11.2, 6.4 Hz, 1H), 3.51 (dd, *J* = 11.2, 6.4 Hz, 1H), 2.37 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 159.8, 153.0, 144.7, 144.3, 134.2, 131.6, 129.7, 129.6, 128.7, 127.9, 125.7, 124.5, 123.7, 123.2, 121.6, 120.2, 114.3, 111.3, 75.8, 63.3, 55.3, 54.9, 21.5. HRMS (ESI) m/z calcd for $C_{28}H_{27}N_2O_6S$ $[M + H]^+$ 519.1590; found 519.1572.

4-(Allyloxy)-5-(4-(methylthio)phenyl)-1-tosyl-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4] diazepin-3-one (**3fd**). White solid (33 mg, 62% yield); mp 113-115 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16-8.14 (m, 1H), 7.67-7.65 (m, 2H), 7.46-7.38 (m, 3H), 7.28 (d, *J* = 8.4 Hz, 2H), 7.14 (d, *J* = 8.4 Hz, 2H), 7.05 (d, *J* = 8.4 Hz, 2H), 5.92 (s, 1H), 5.78-5.68 (m, 1H), 5.24-5.19 (m, 2H), 4.71 (d, *J* = 16.8 Hz, 1H), 3.94 (d, *J* = 16.8 Hz, 1H), 3.65 (dd, *J* = 11.2, 6.4 Hz, 1H), 3.52 (dd, *J* = 11.2, 6.4 Hz, 1H), 2.42 (s, 3H), 2.37 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.0, 144.7, 143.9, 139.8, 134.1, 134.0, 131.5, 129.7, 128.7, 127.0, 126.6, 125.8, 124.5, 123.7, 123.2, 121.7, 120.3, 111.3, 75.8, 63.4, 54.9, 21.5, 15.4. HRMS (ESI) m/z calcd for $C_{28}H_{26}N_2NaO_5S_2$ $[M + Na]^+$ 557.1181; found 557.1166.

4-(Benzyloxy)-5-phenyl-1-(phenylsulfonyl)-1,2,4,5-tetrahydro-3H-benzofuro[3,2-e][1,4]dia zepin-3-one (**3ua**). White solid (42 mg, 81% yield); mp 113-115 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20-8.17 (m, 1H), 7.86 (dd, *J* = 7.2, 1.6 Hz, 2H), 7.59-7.55 (m, 3H), 7.46-7.39 (m, 3H), 7.33-7.29 (m, 3H), 7.28-7.25 (m, 3H), 7.22-7.19 (m, 2H), 7.13-7.10 (m, 2H), 5.88 (s, 1H), 4.74 (d, *J* = 16.4 Hz, 1H), 4.07-4.00 (m, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.4, 153.0, 144.1, 137.5, 137.2, 134.4, 133.6, 129.2, 129.0, 128.8, 128.8, 128.7, 128.5, 126.5, 125.8, 124.3, 123.7, 123.1, 121.5, 111.3, 76.8, 63.5, 55.0. HRMS (ESI) m/z calcd for $C_{30}H_{24}N_2NaO_5S$ $[M + Na]^+$ 547.1304; found 547.1297.

Gram-Scale Synthesis of Compound 3la. To a solution of compound **1l** (1.04 g, 2.3 mmol) and *N*-(benzyloxy)-2-bromoacetamide **2a** (0.67 g, 2.76 mmol) in anhydrous MeCN (5 mL) was added Cs_2CO_3 (0.91 g, 2.8 mmol). The resulting mixture was stirred at room temperature for 1 h. After the completion of the reaction, the solid was filtered and washed with 2-3 mL of dichloromethane (10 mL), and the combined filtrate was concentrated under reduced pressure. The residue was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5) to afford the product **3la** as a white solid (1.08 g, 76% yield).

Synthesis of Compound 4. To a solution of compound **3la** (61.6 mg, 0.1 mmol) in MeCN/H_2O (9:1, 2 mL) was added $Mo(CO)_6$ (60.7 mg, 0.23 mmol). The reaction mixture was stirred and heated to 85 ºC for 3 h under nitrogen (monitored by TLC). After the completion of the reaction, the mixture was filtered through a pad of Celite. The filter cake was washed with 2-3 mL of ethyl acetate (10 mL), and the combined filtrates were evaporated to afford a crude product that was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5) to afford the compound **4** as a white solid (39.3 mg, 77% yield); mp 113-115 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15-8.11 (m, 1H), 7.60 (d, *J* = 8.0 Hz, 3H), 7.41-7.31 (m, 3H), 7.26 (d, *J* = 8.4 Hz, 2H), 7.23-7.15 (m, 2H), 6.49 (dd, *J* = 7.2, 2.0 Hz, 1H), 5.86 (d, *J* = 4.4 Hz, 1H), 5.63 (d, *J* = 3.6 Hz, 1H), 4.57 (d, *J* = 16.8 Hz, 1H), 4.40 (d, *J* = 16.4 Hz, 1H), 2.42 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.5, 153.1, 144.5, 144.3, 137.8, 133.6, 133.0, 130.6, 129.3, 128.6, 128.5, 128.1, 125.8, 125.0, 123.8, 123.8, 123.0, 122.8, 111.3, 56.5, 54.6, 21.7. HRMS (ESI) m/z calcd for $C_{24}H_{18}BrN_2O_4S$ $[M - H]^+$ 509.0171; found 509.0192.

Synthesis of Compound 5. To a solution of compound **4** (51.1 mg, 0.1 mmol) in THF (1 mL) was added K_2CO_3 (16.6 mg, 0.12 mmol,) and MeI (7.5 μL, 0.12 mmol). The resulting

mixture was stirred at room temperature for 6 h (monitored by TLC). After the completion of the reaction, the mixture was quenched with water and extracted with ethyl acetate (3 X 5 mL). The combined organic layers were dried and concentrated under reduced pressure followed by silica gel column chromatography purification (ethyl acetate/petroleum ether = 1:5) to give the compound **5** as a white solid (33.1 mg, 63% yield); mp 106-108 ºC. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.98 (d, *J* = 7.2 Hz, 1H), 7.62 (d, *J* = 8.0 Hz, 1H), 7.59 (d, *J* = 8.0 Hz, 2H), 7.36-7.28 (m, 5H), 7.25-7.16 (m, 2H), 6.91 (d, *J* = 8.0 Hz, 1H), 5.77 (s, 1H), 4.99 (d, *J* = 16.8 Hz, 1H), 4.50 (d, *J* = 17.2 Hz, 1H), 2.45 (s, 3H), 2.28 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.5, 153.3, 145.7, 144.4, 137.1, 133.6, 133.6, 130.4, 129.4, 128.6, 128.1, 128.1, 125.6, 125.0, 124.2, 123.7, 122.1, 121.0, 111.3, 62.2, 58.1, 36.2, 21.6. HRMS (ESI) m/z calcd for $C_{25}H_{21}BrN_2NaO_4S$ $[M + Na]^+$ 547.0303; found 547.0315.

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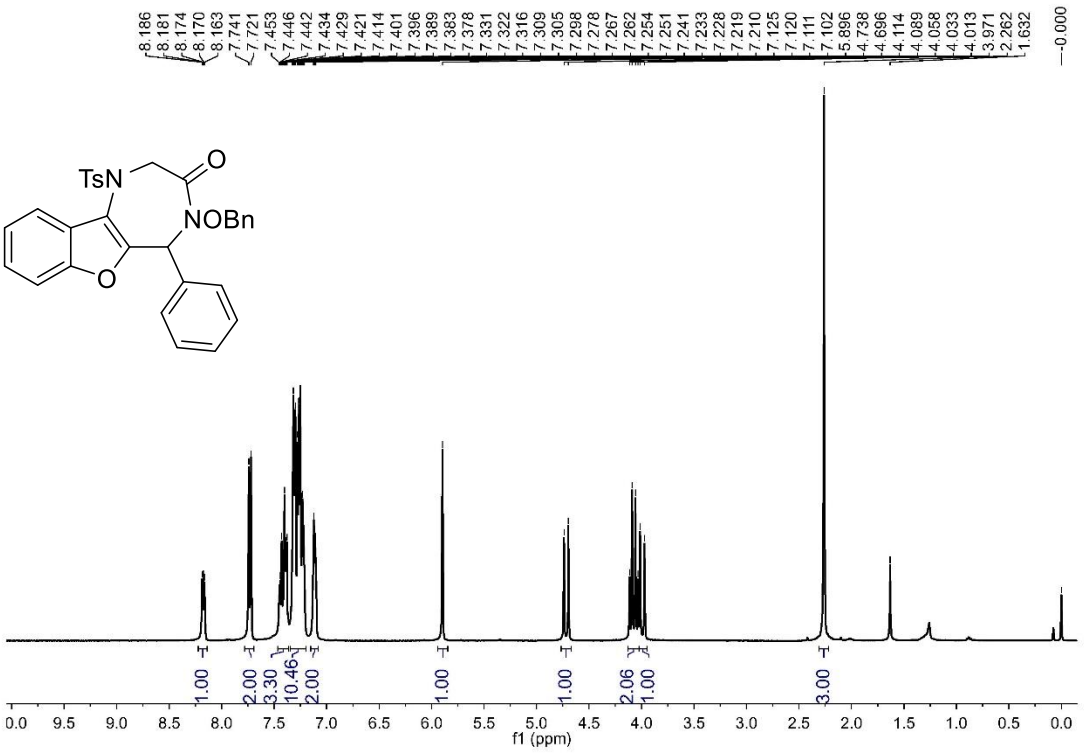
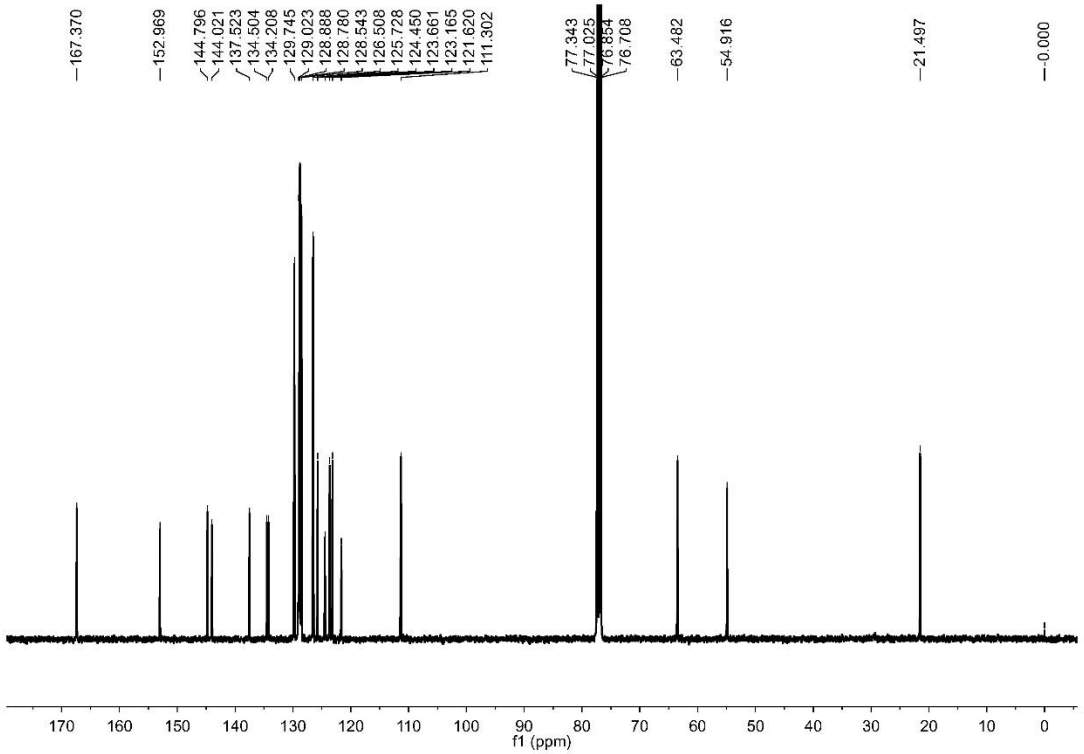
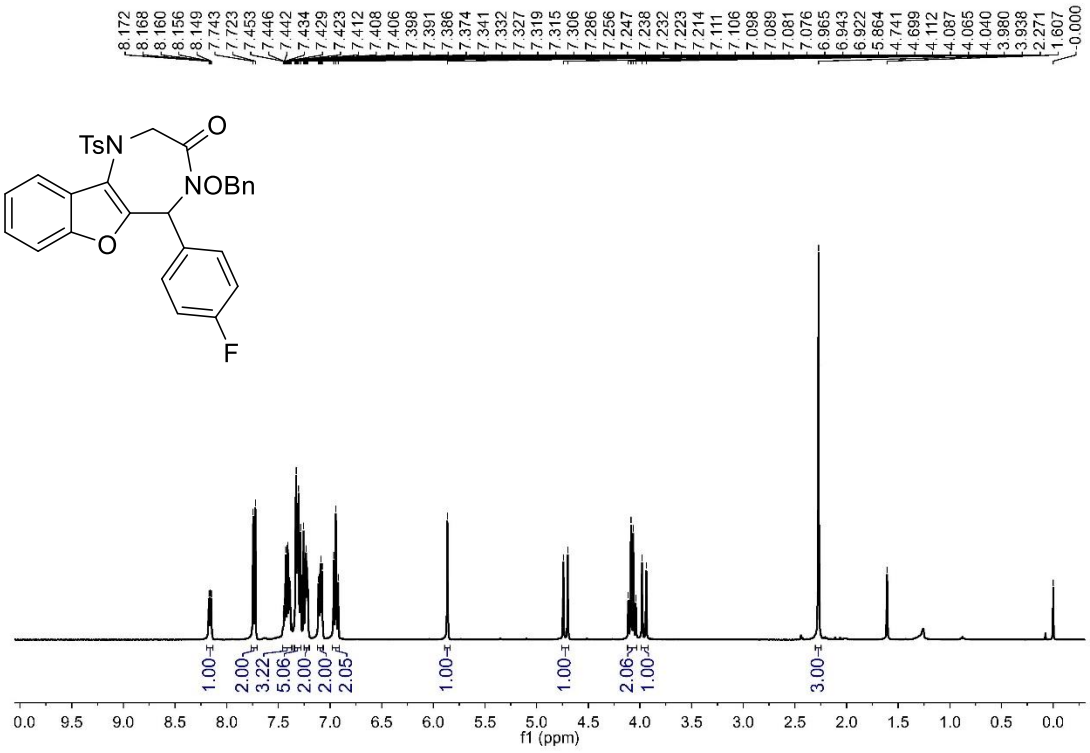


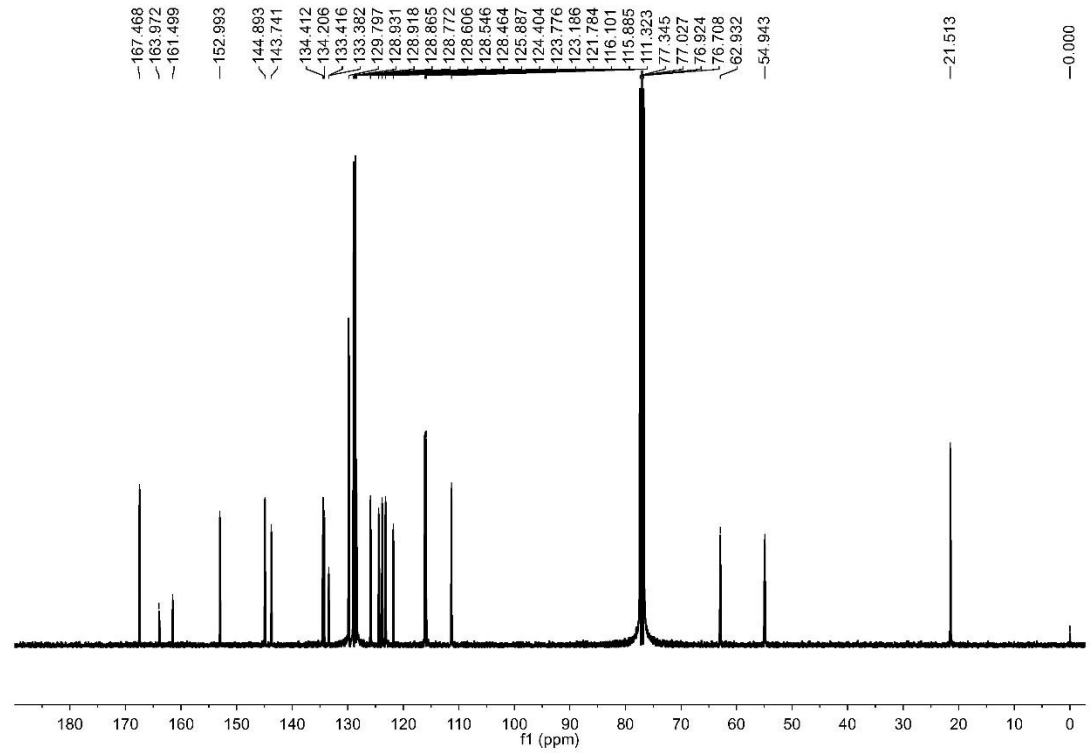
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3aa**



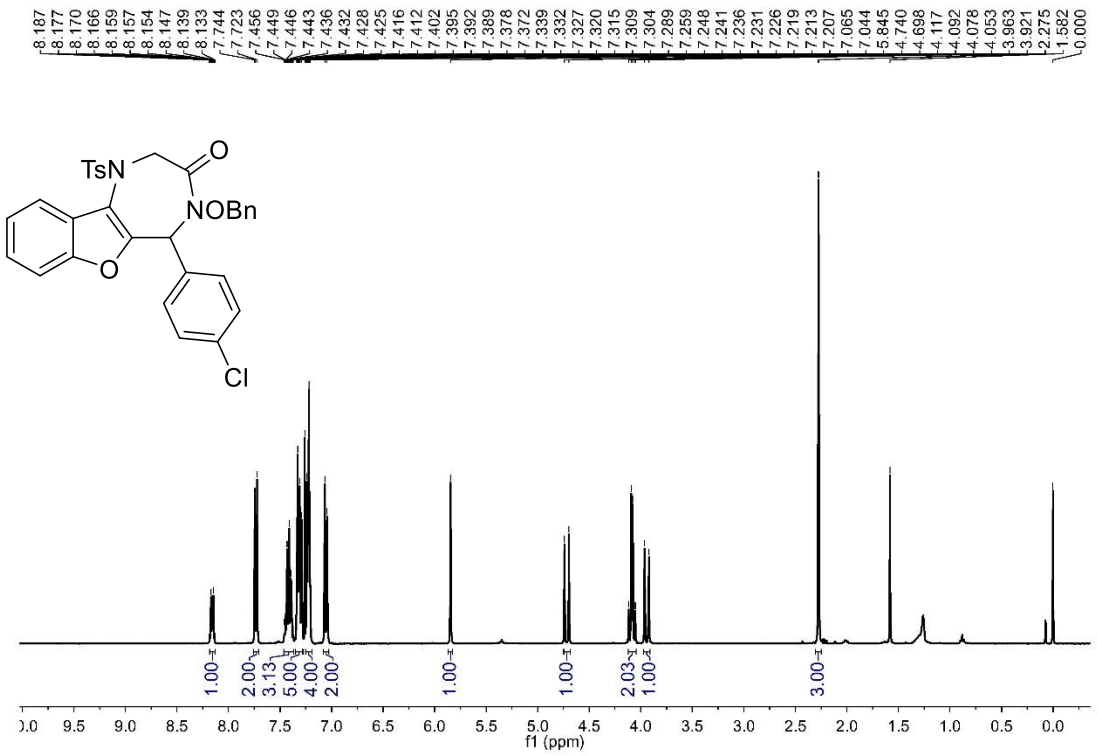
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3aa**



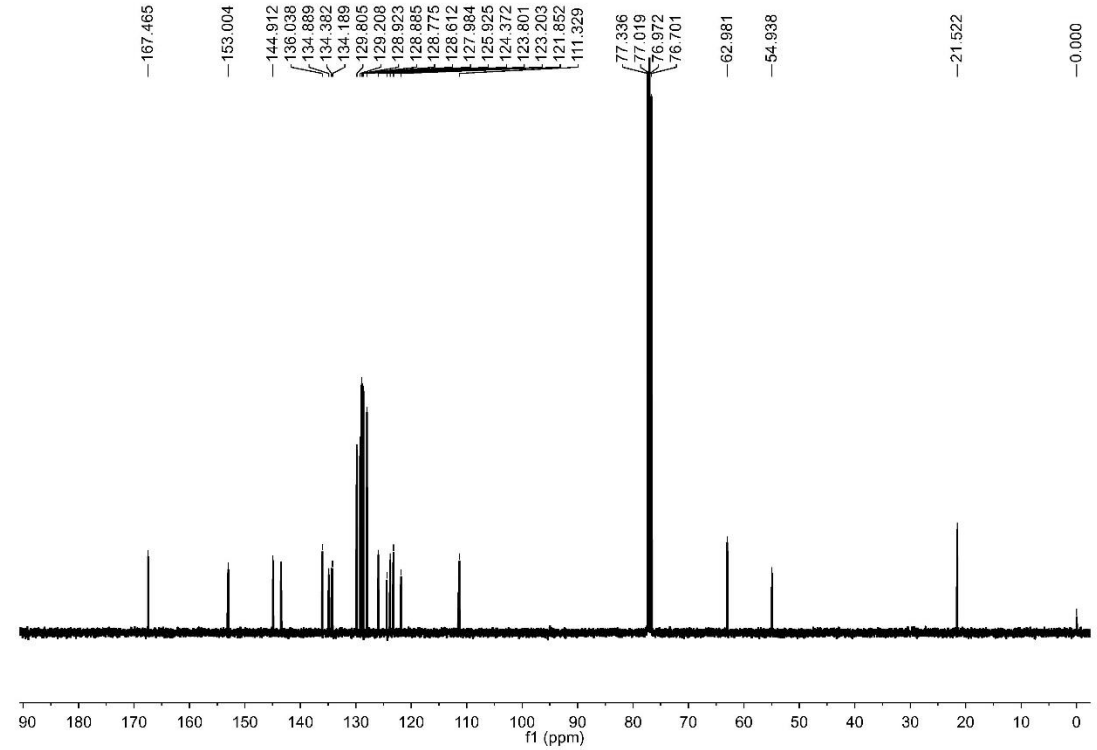
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ba**



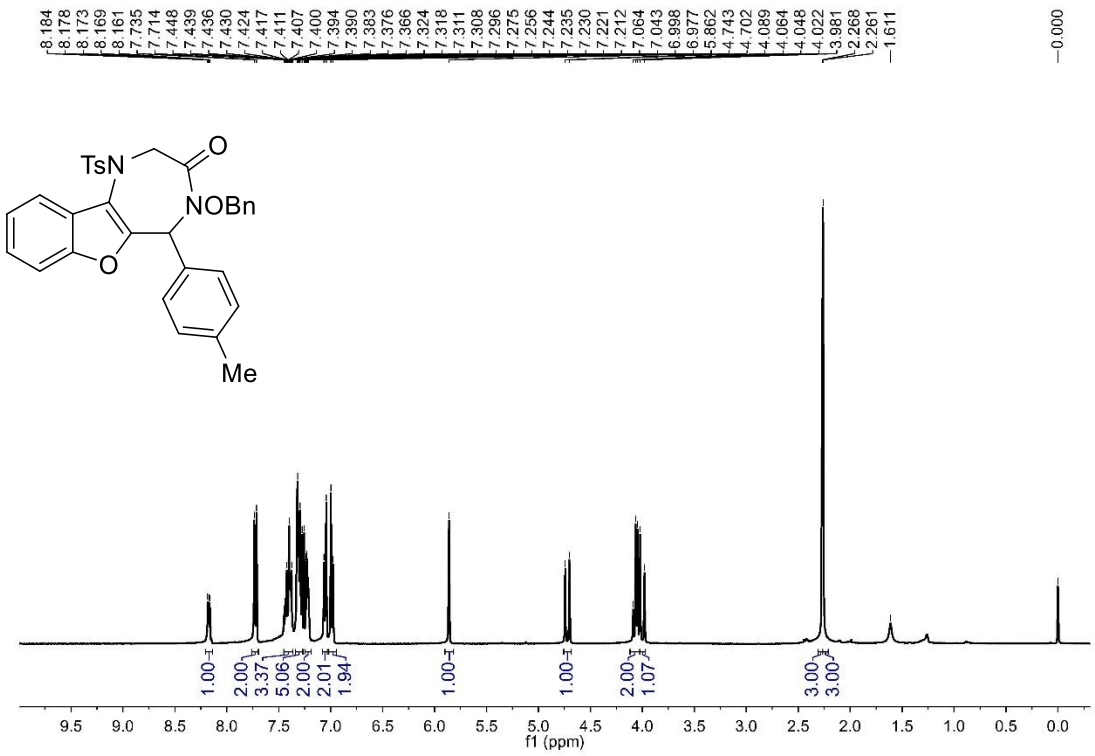
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ba**



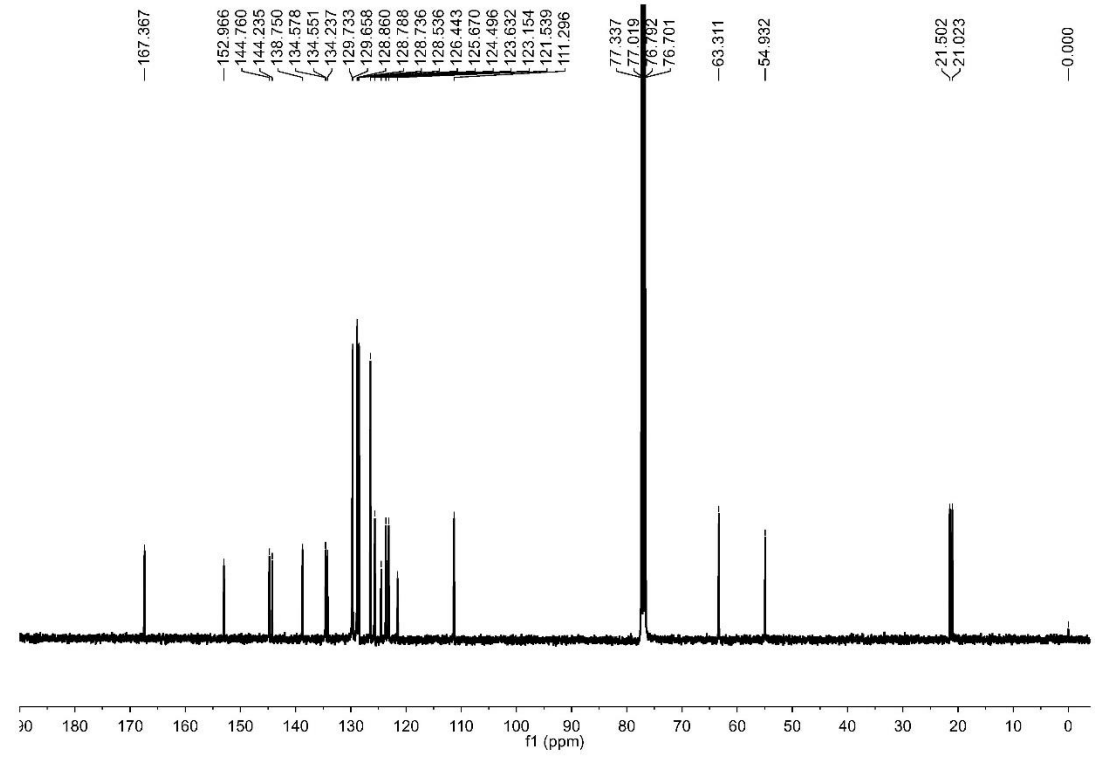
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ca**



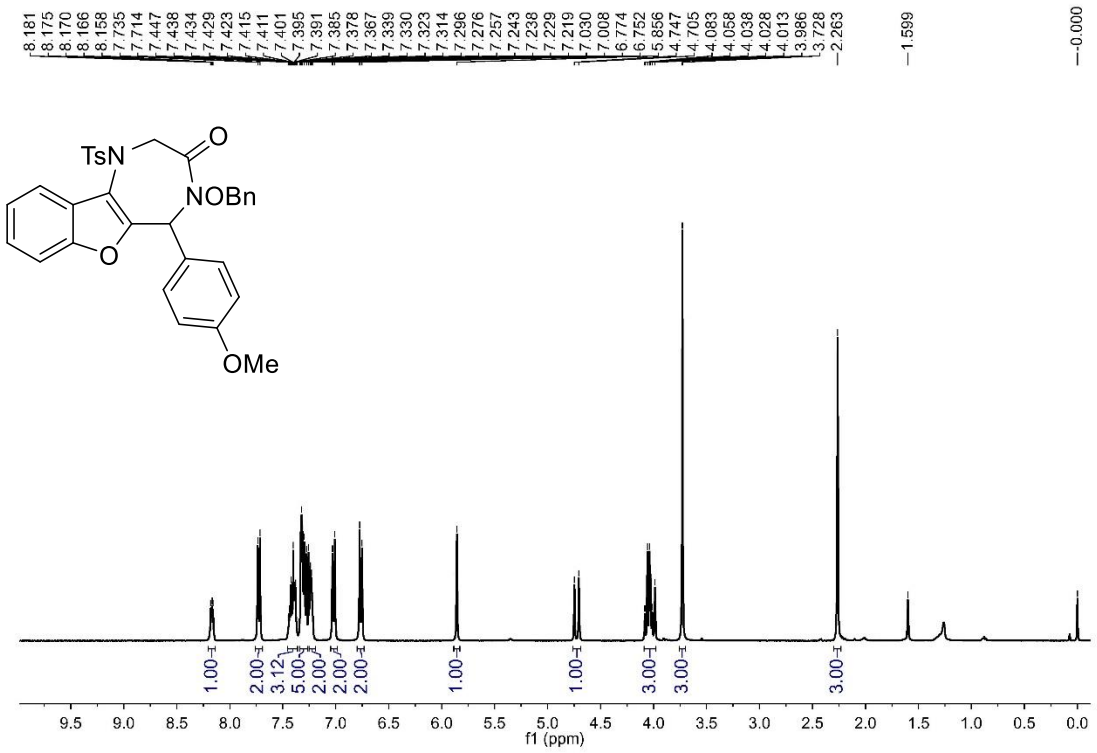
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ca**



^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3da**



^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3da**



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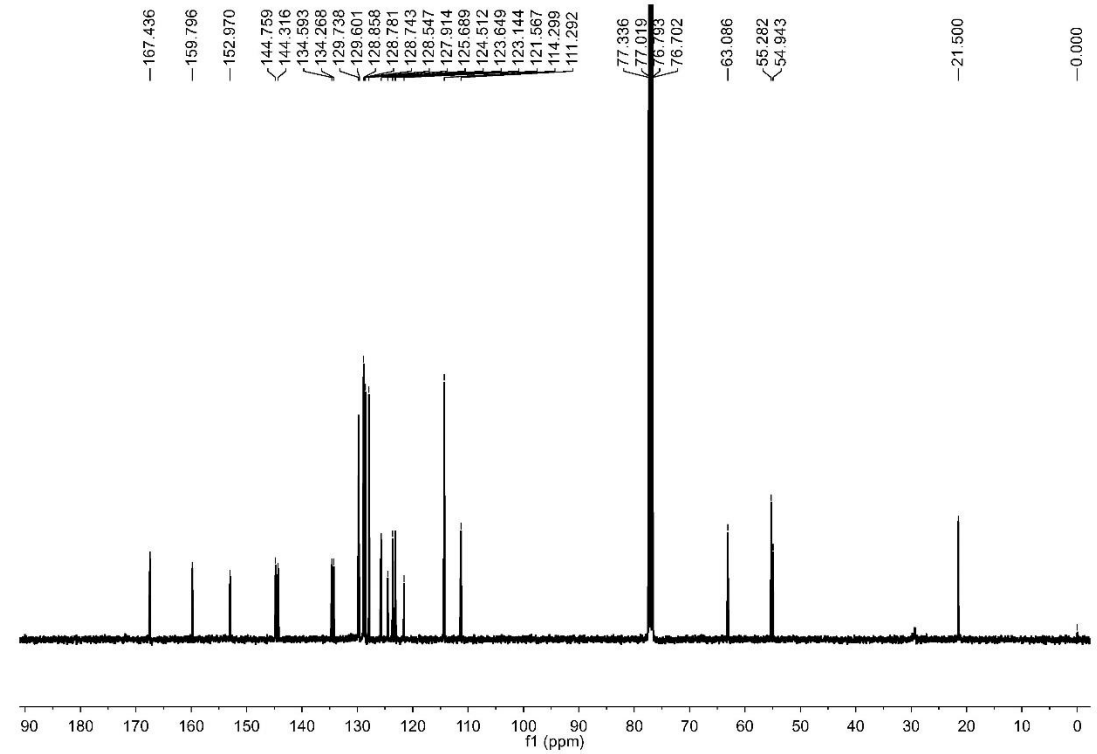
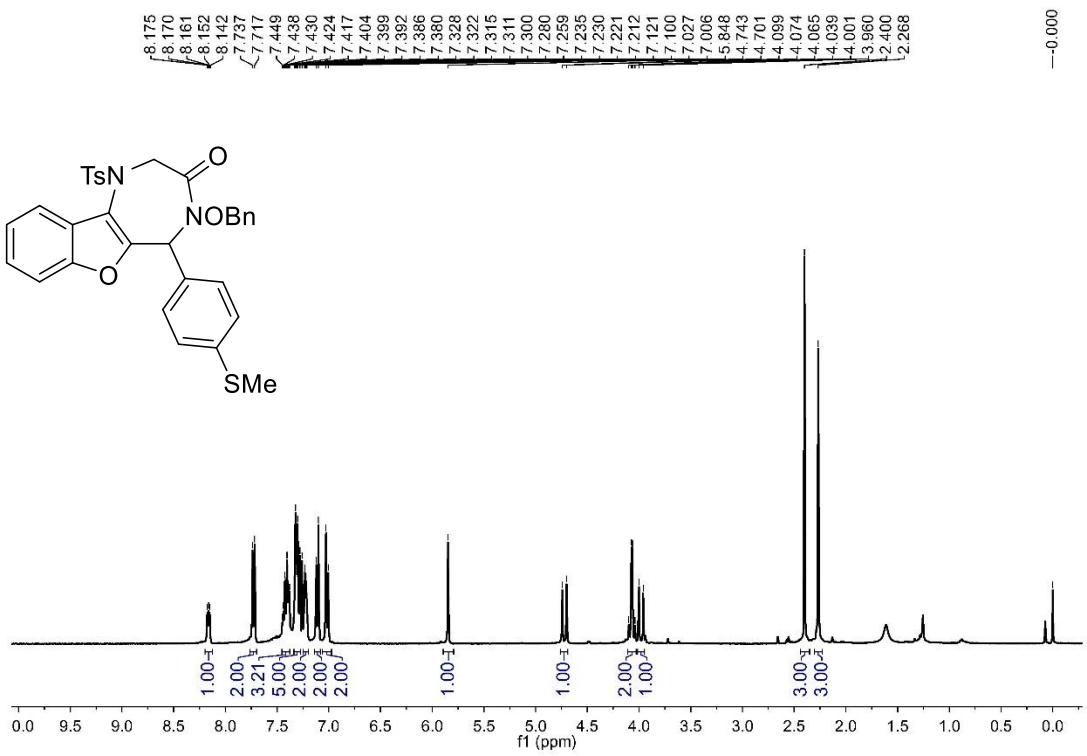
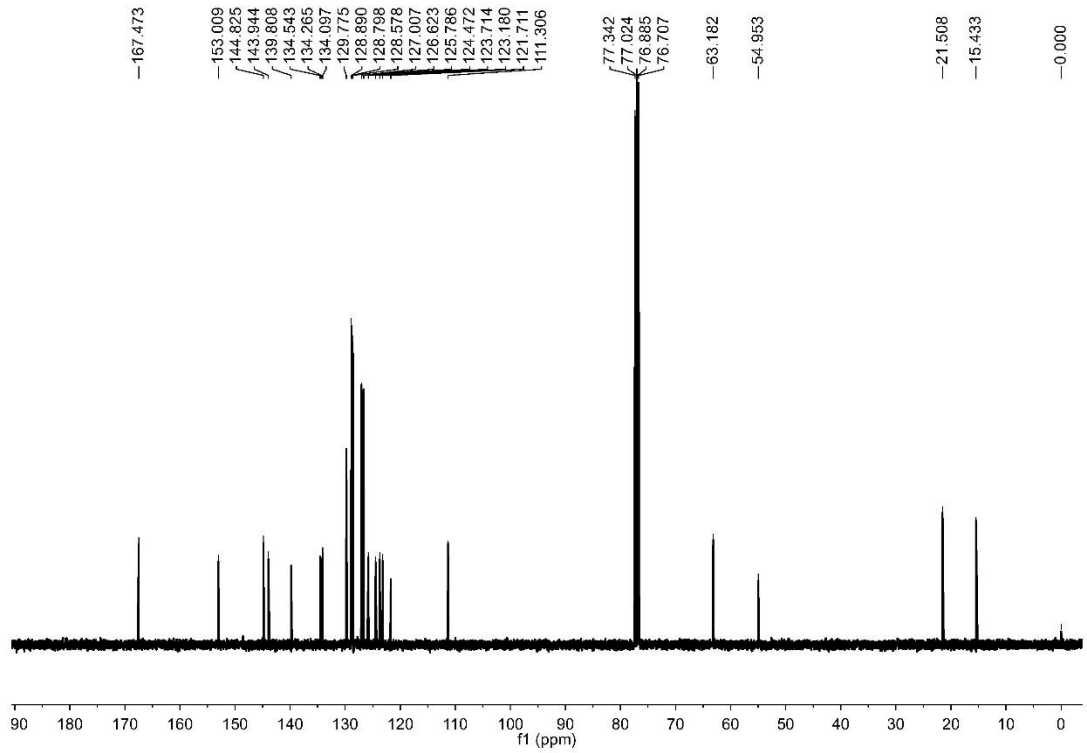


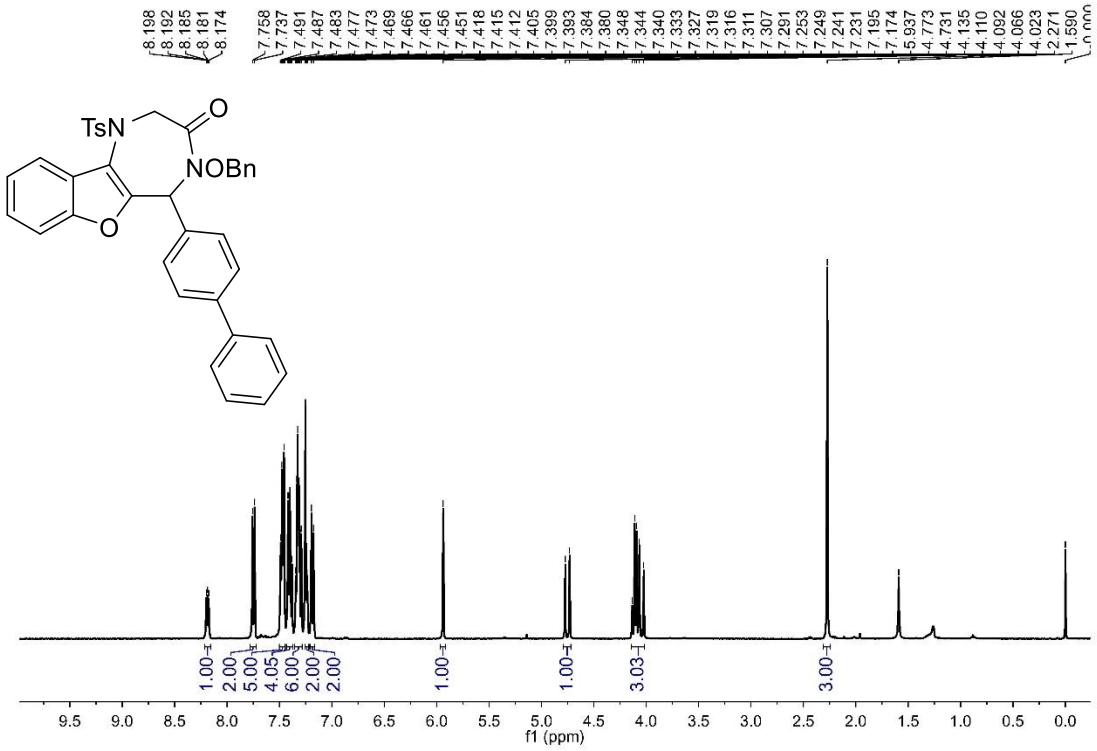
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ea**



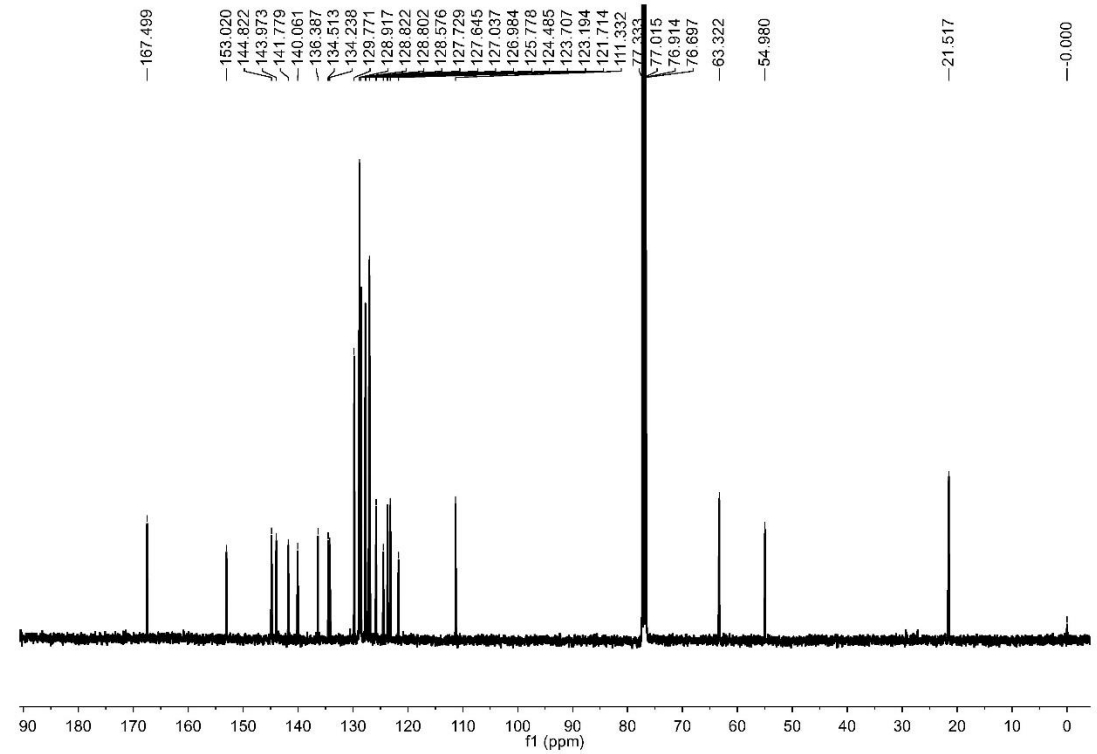
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3fa**



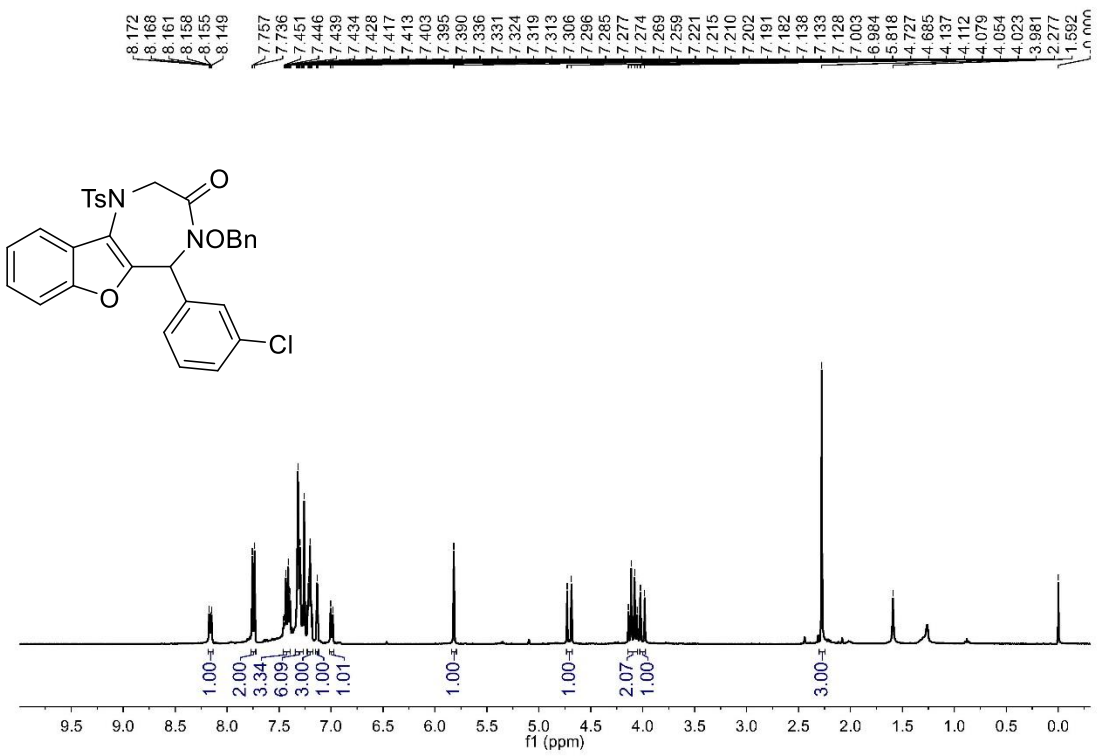
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3fa**



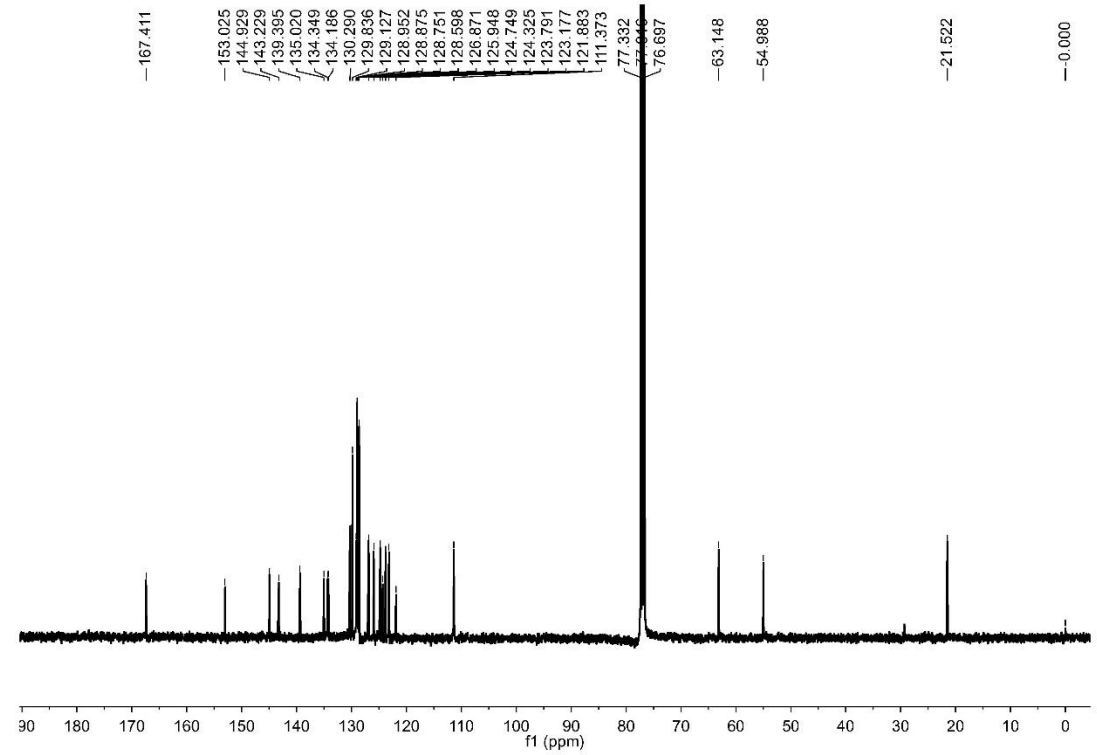
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ga**



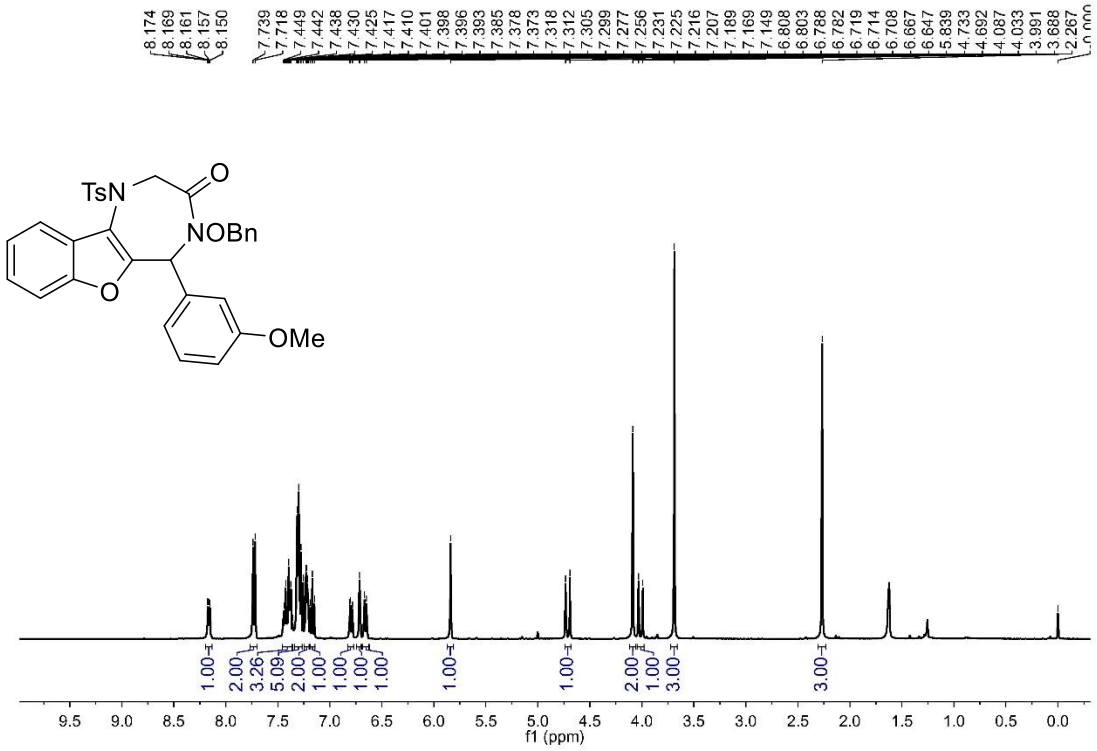
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ga**



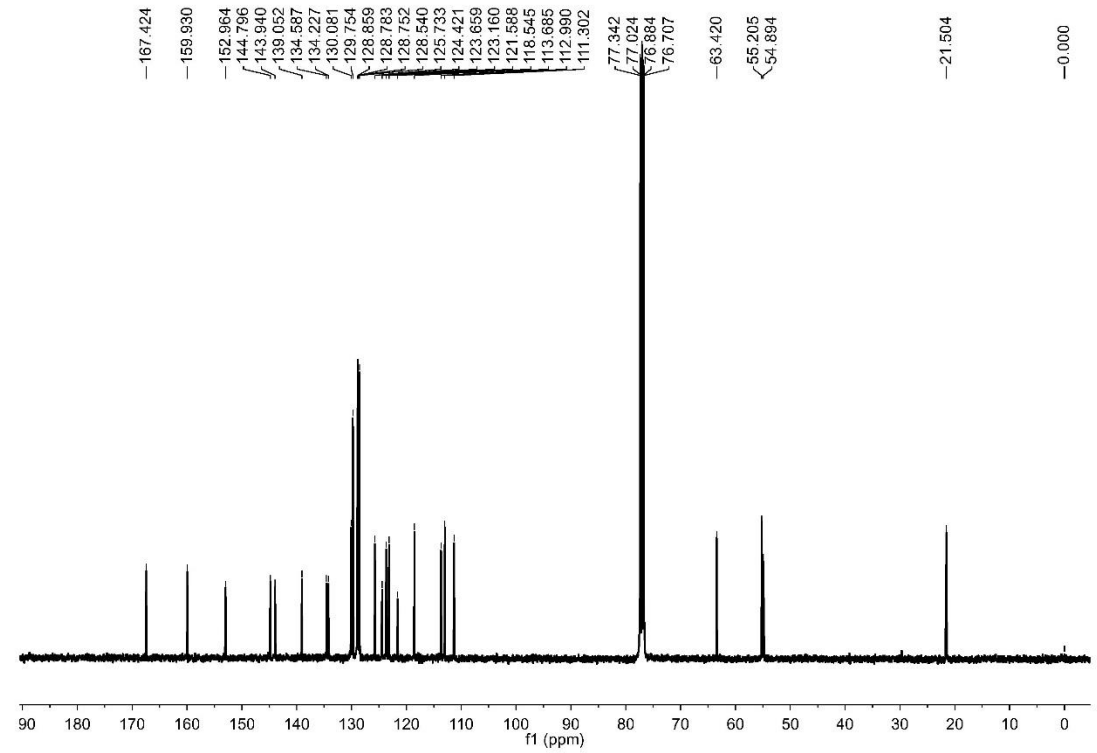
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ha**



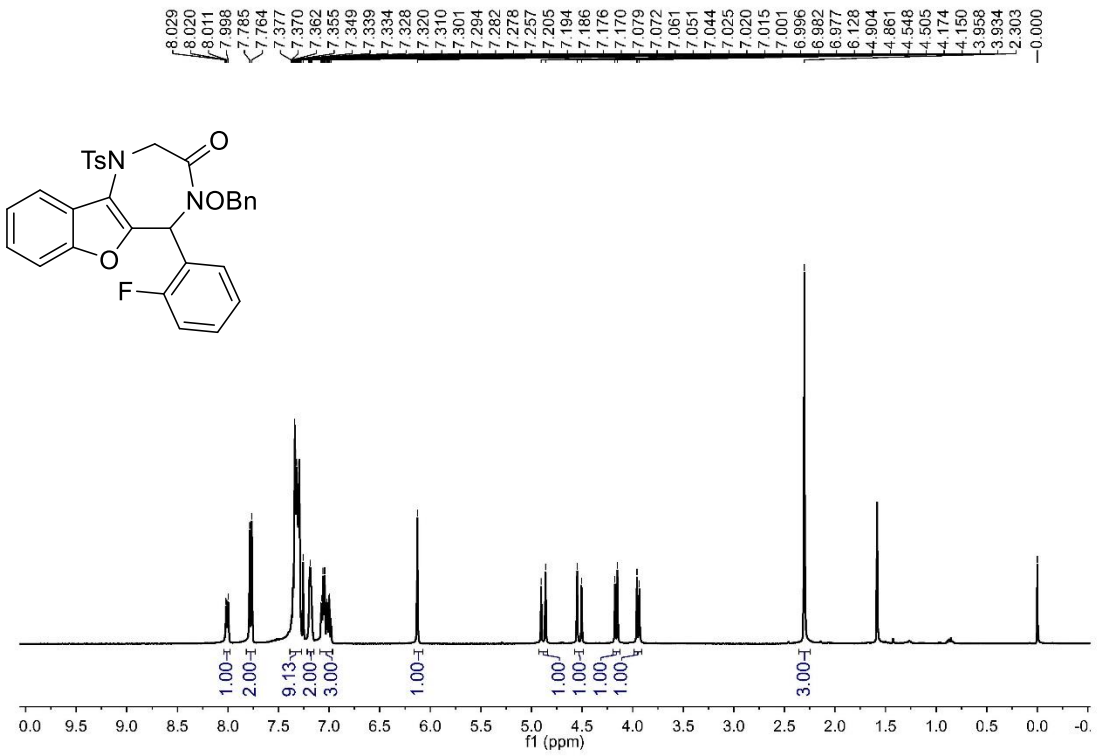
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ha**



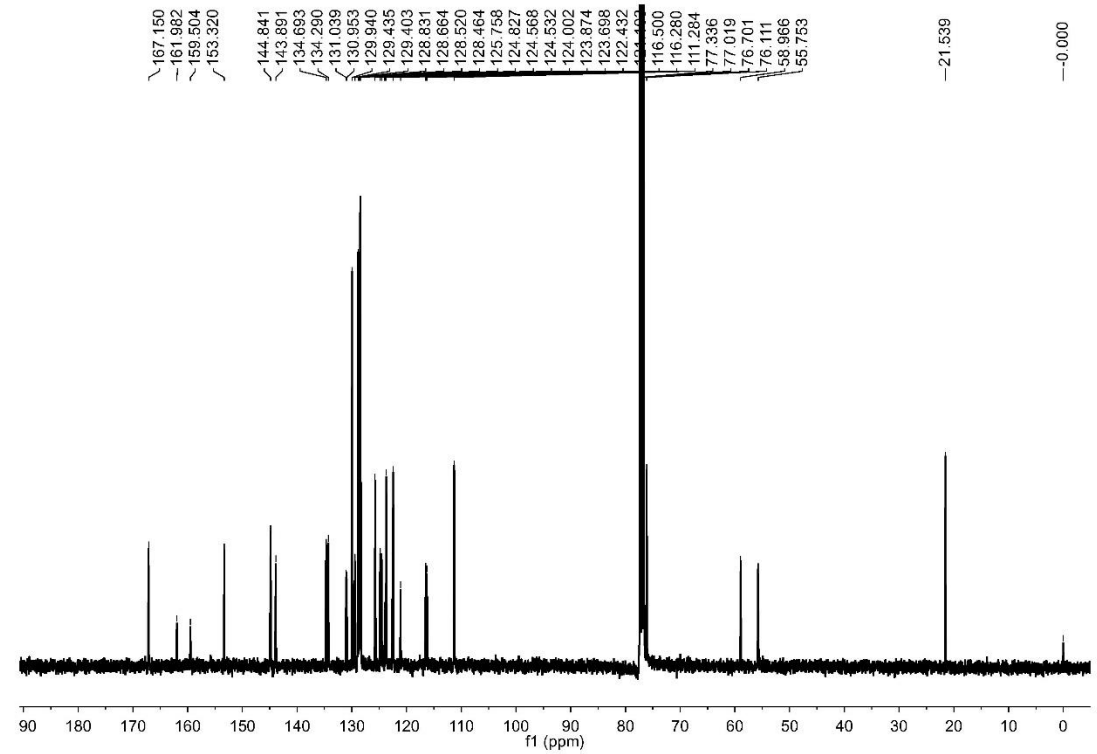
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ia**



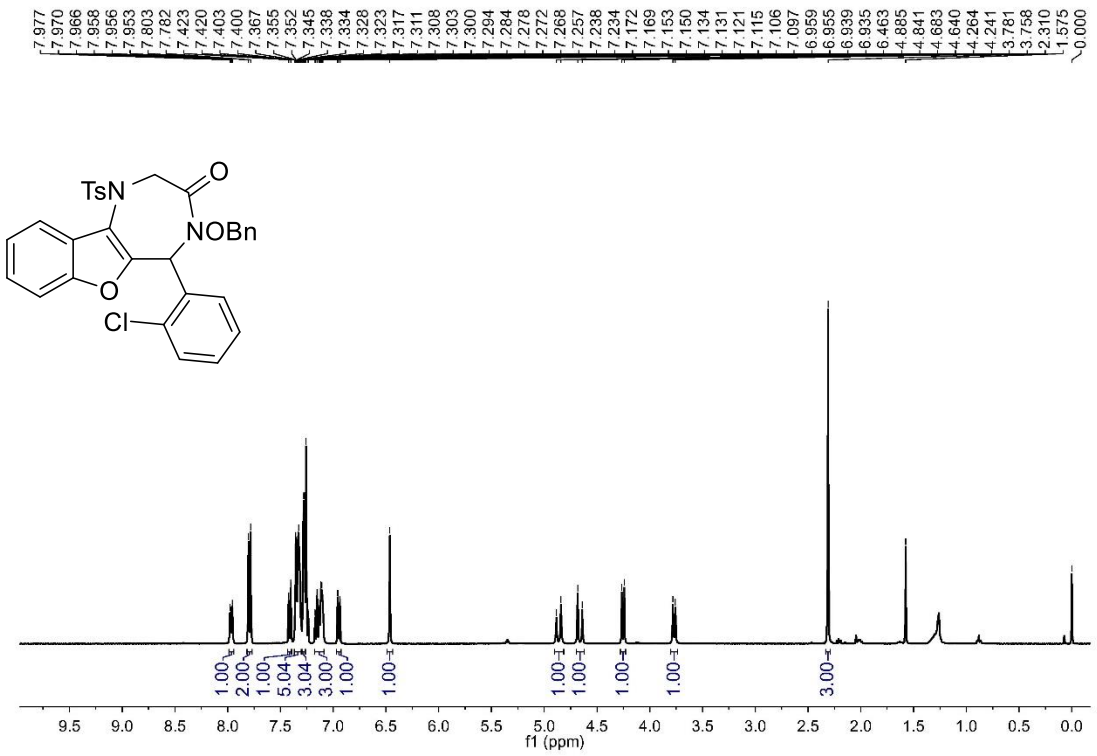
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ia**



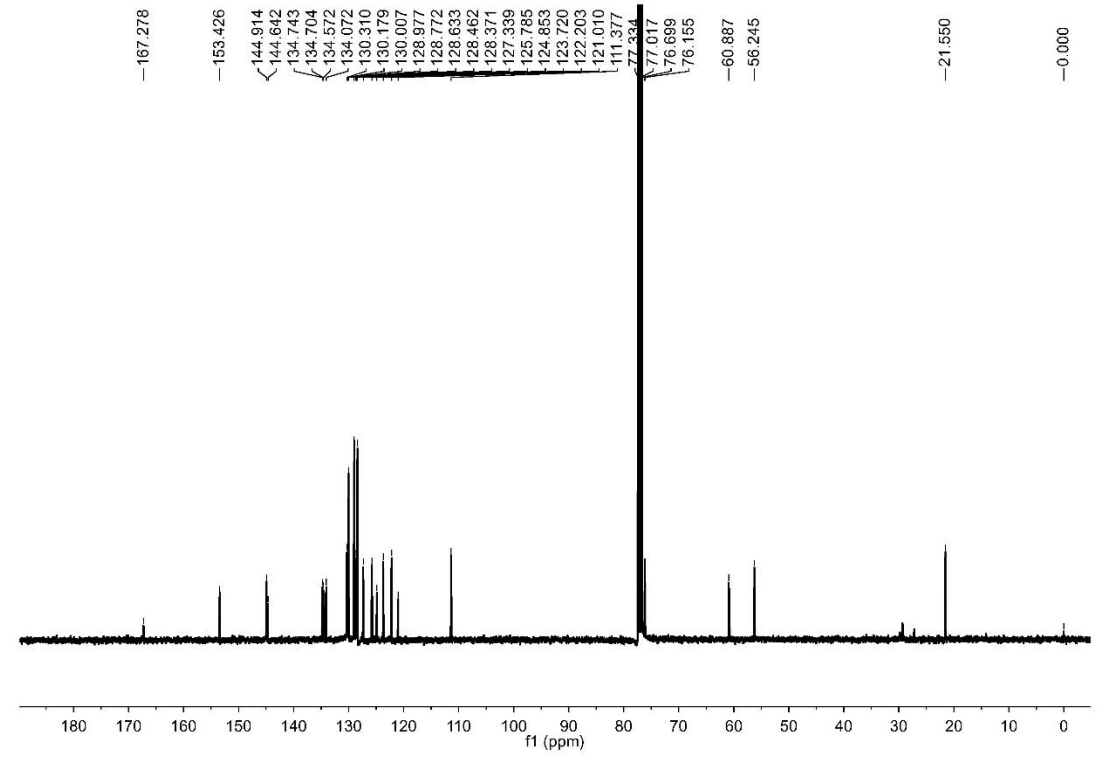
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ja**



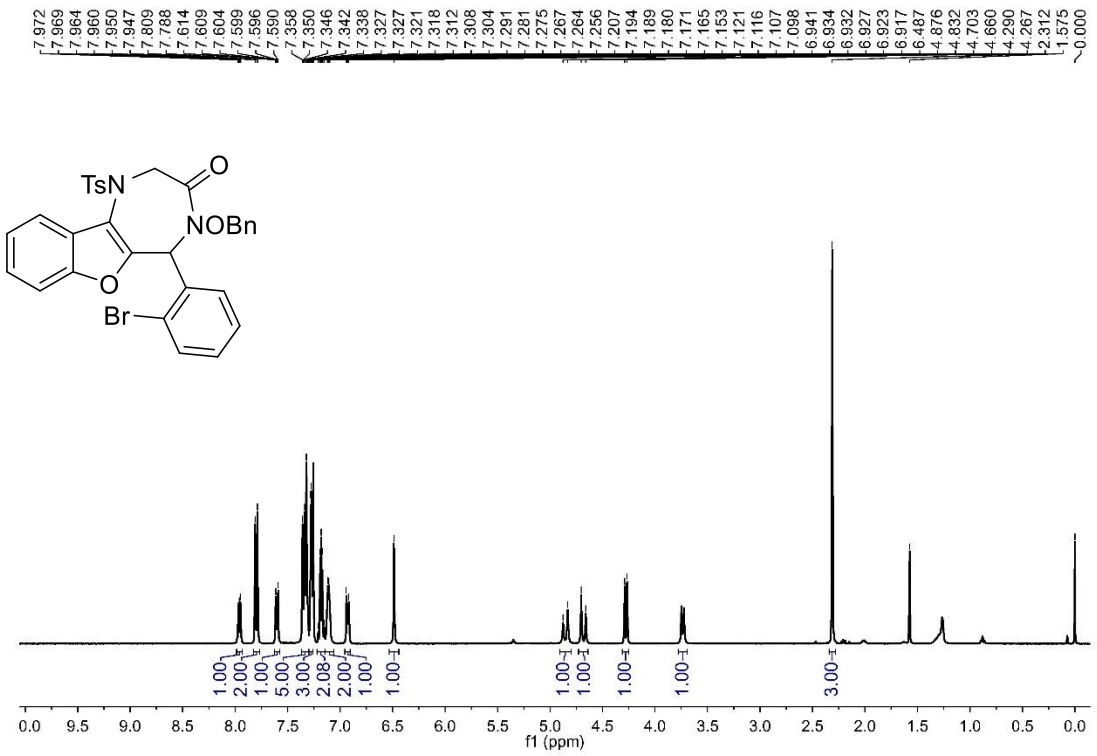
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ja**



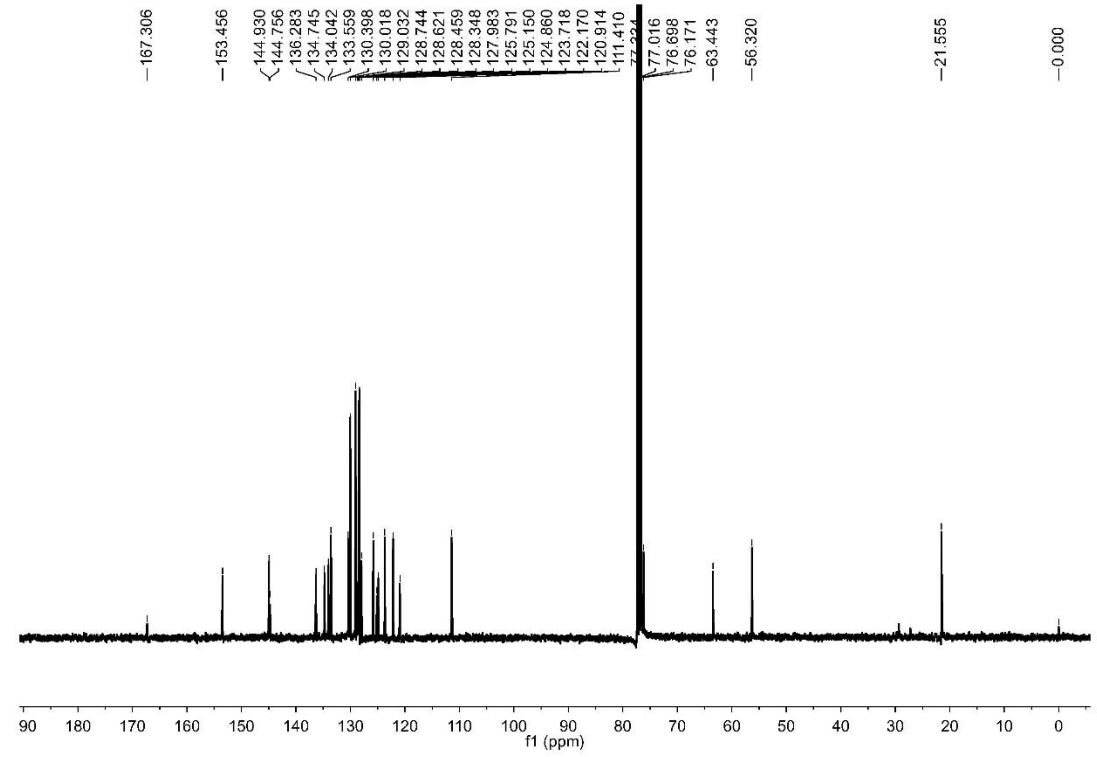
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ka**



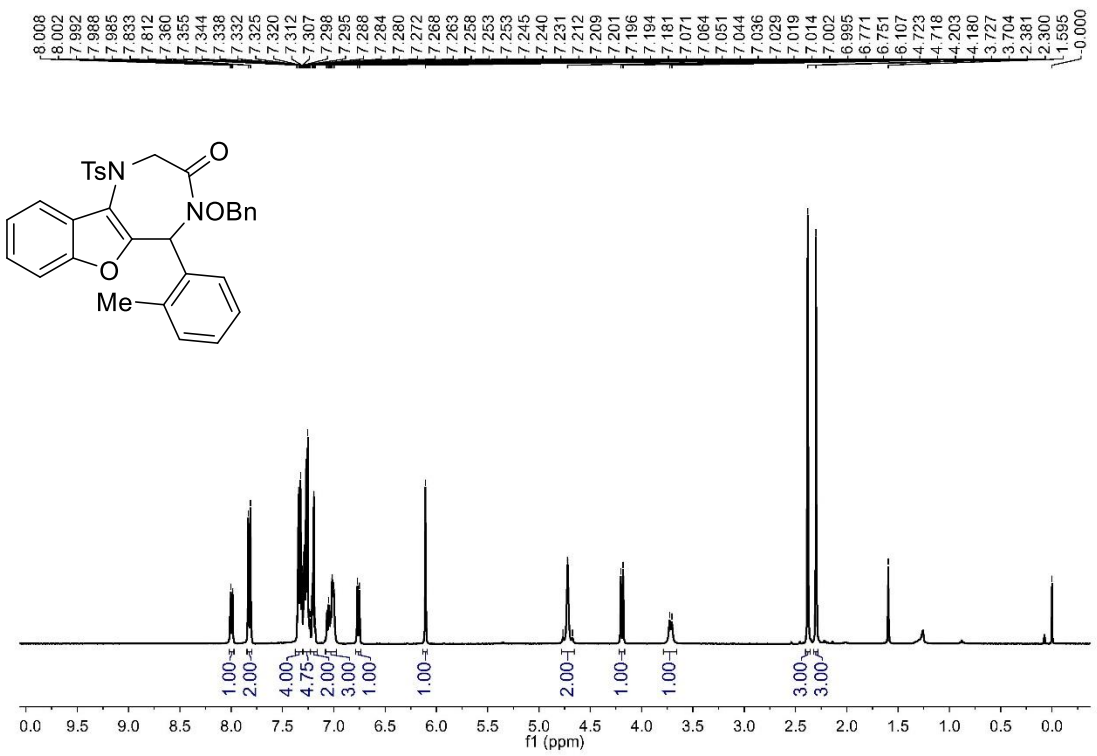
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ka**



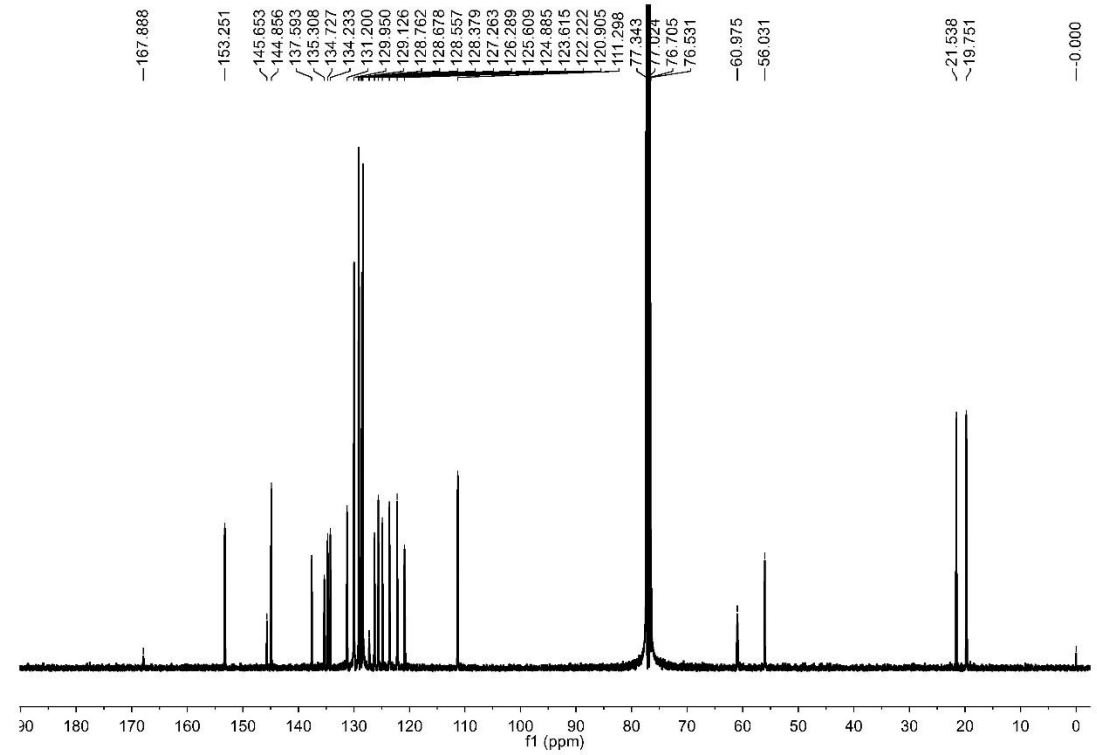
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3la**



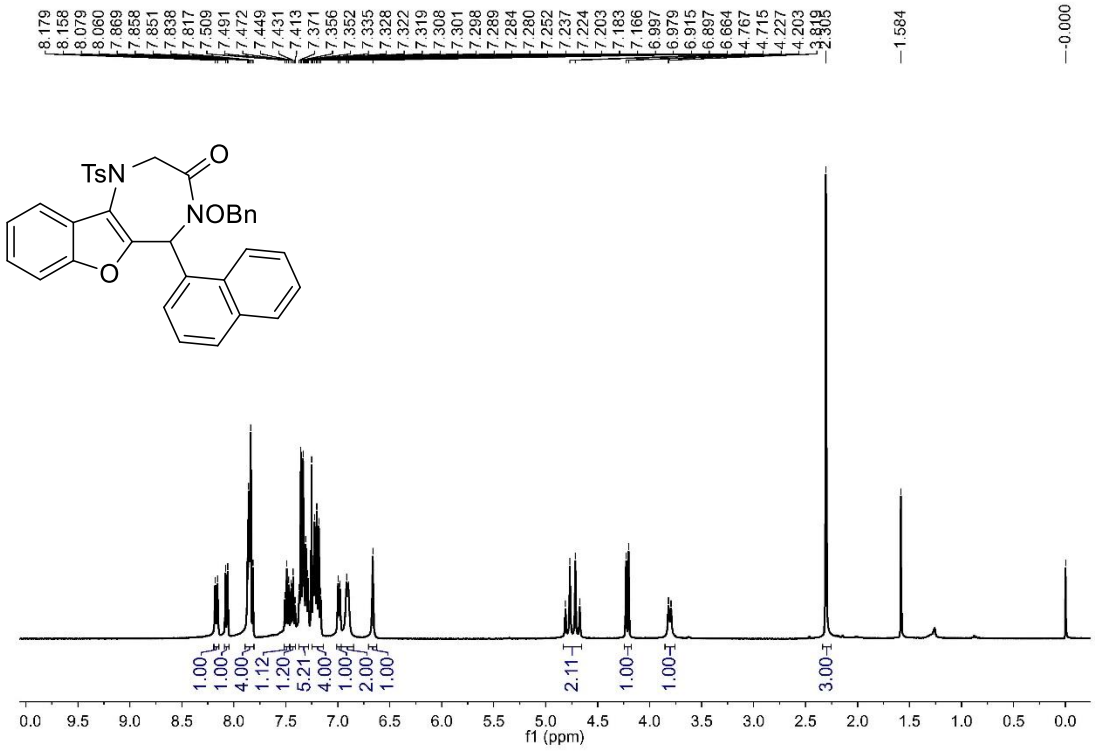
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3la**



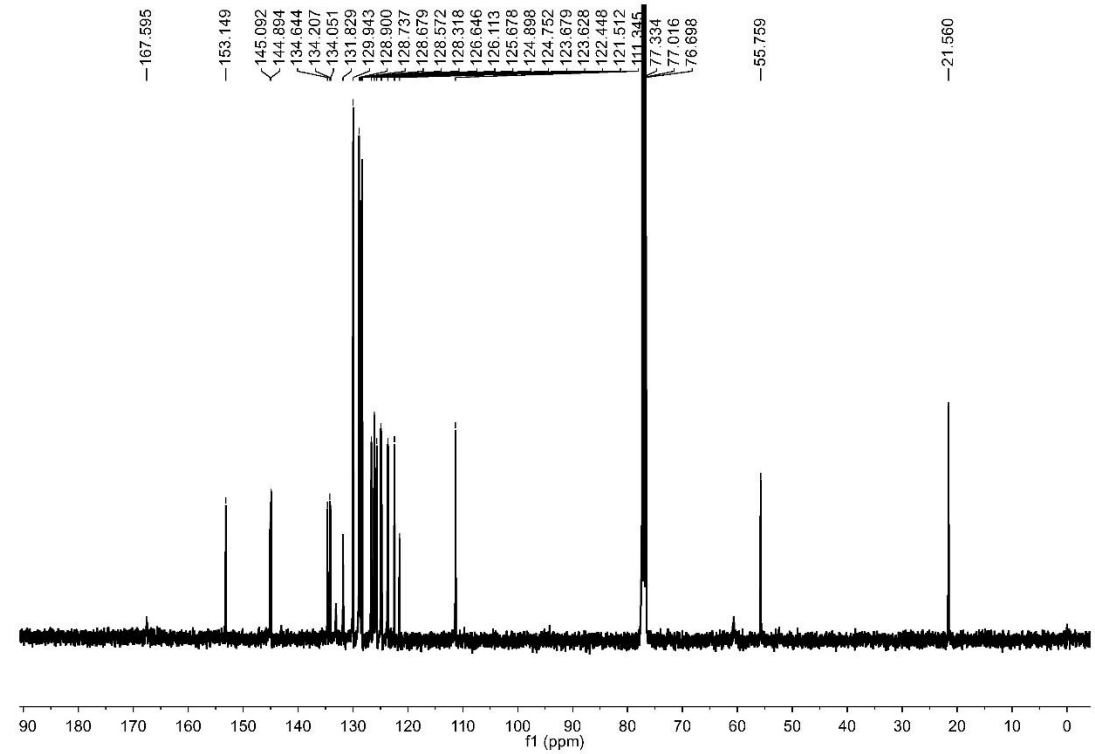
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ma**



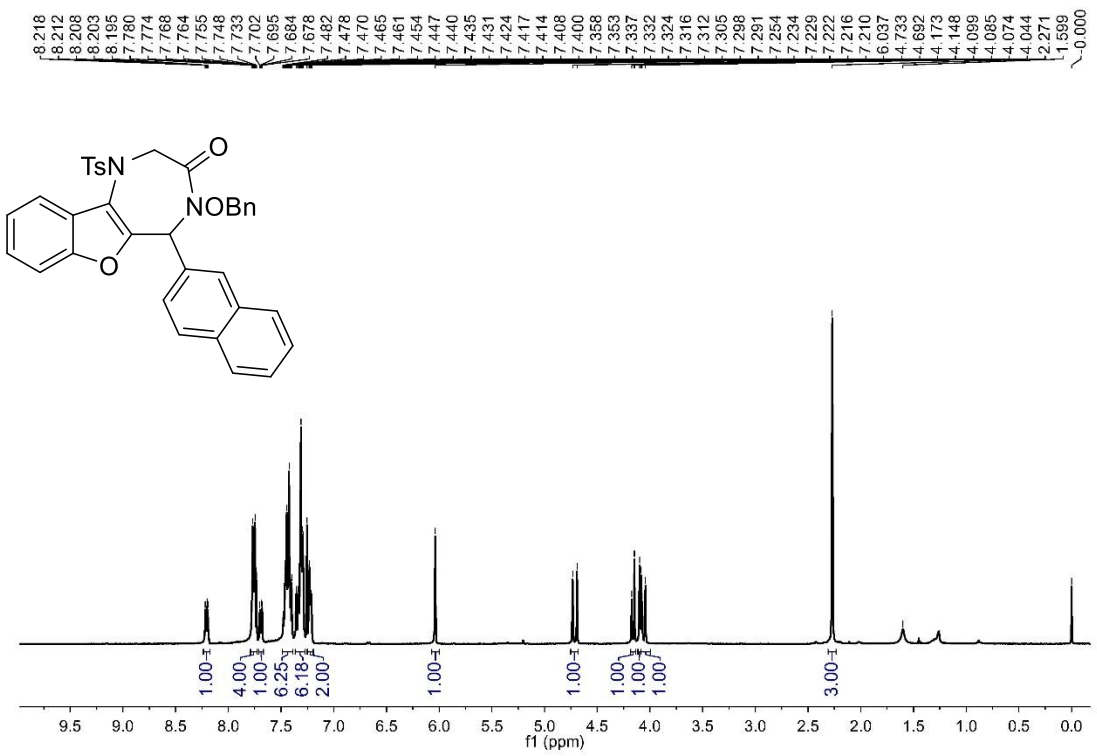
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ma**



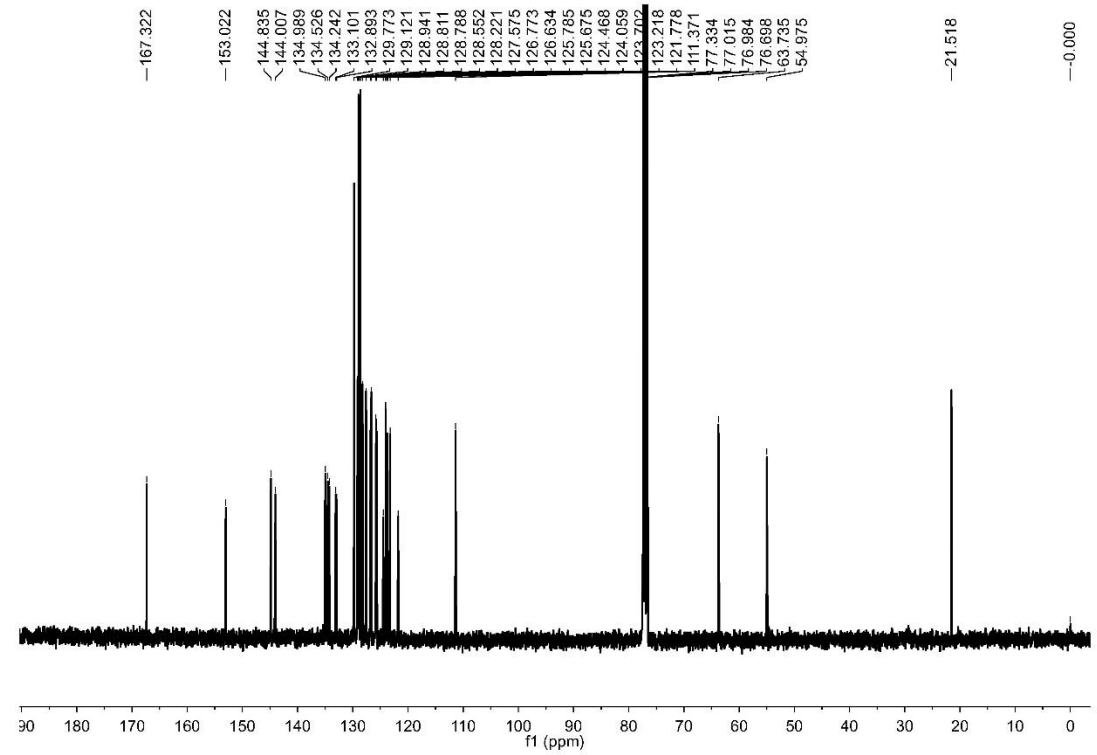
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3na**



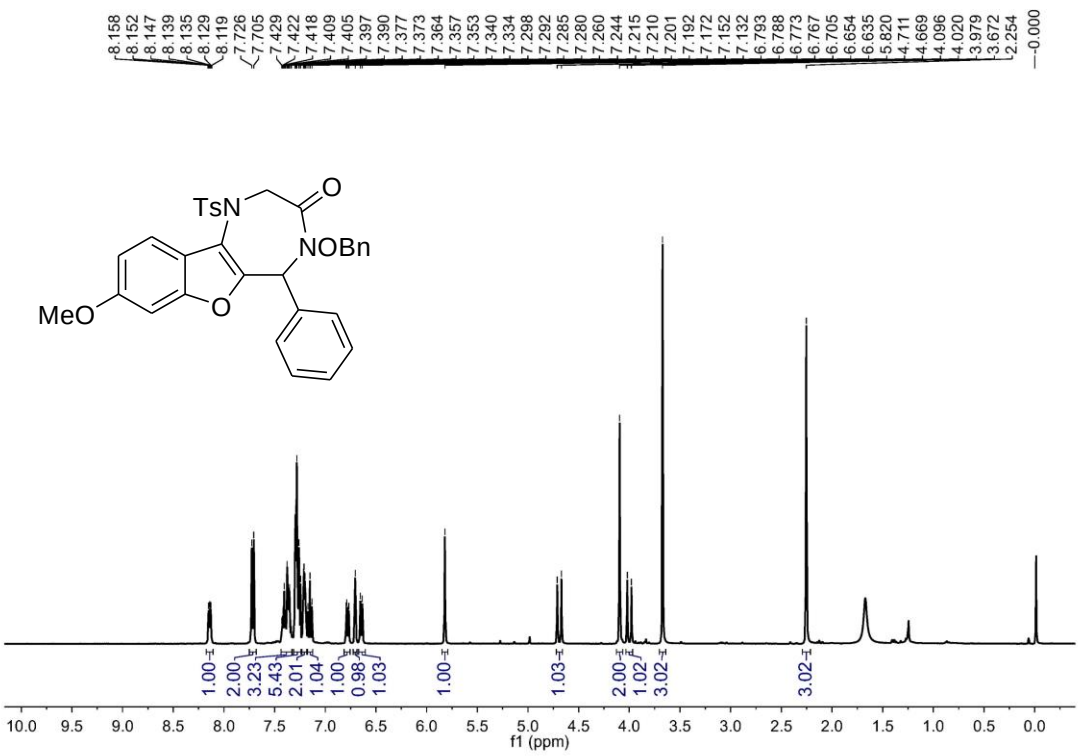
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3na**



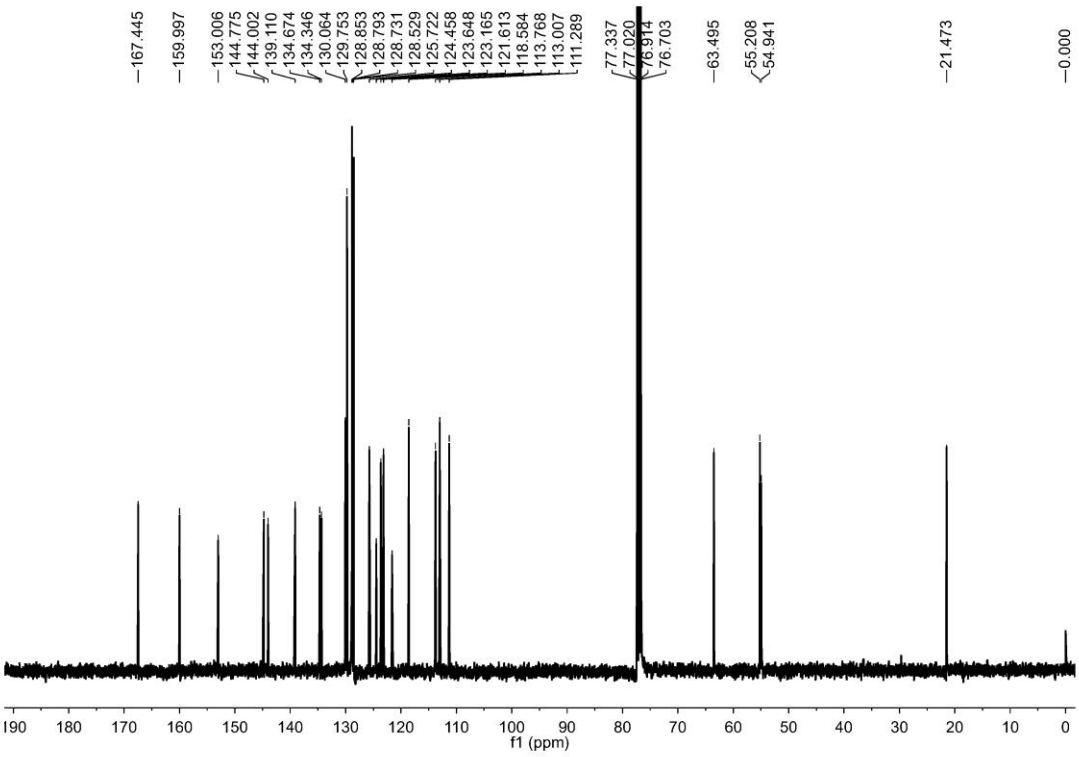
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3oa**



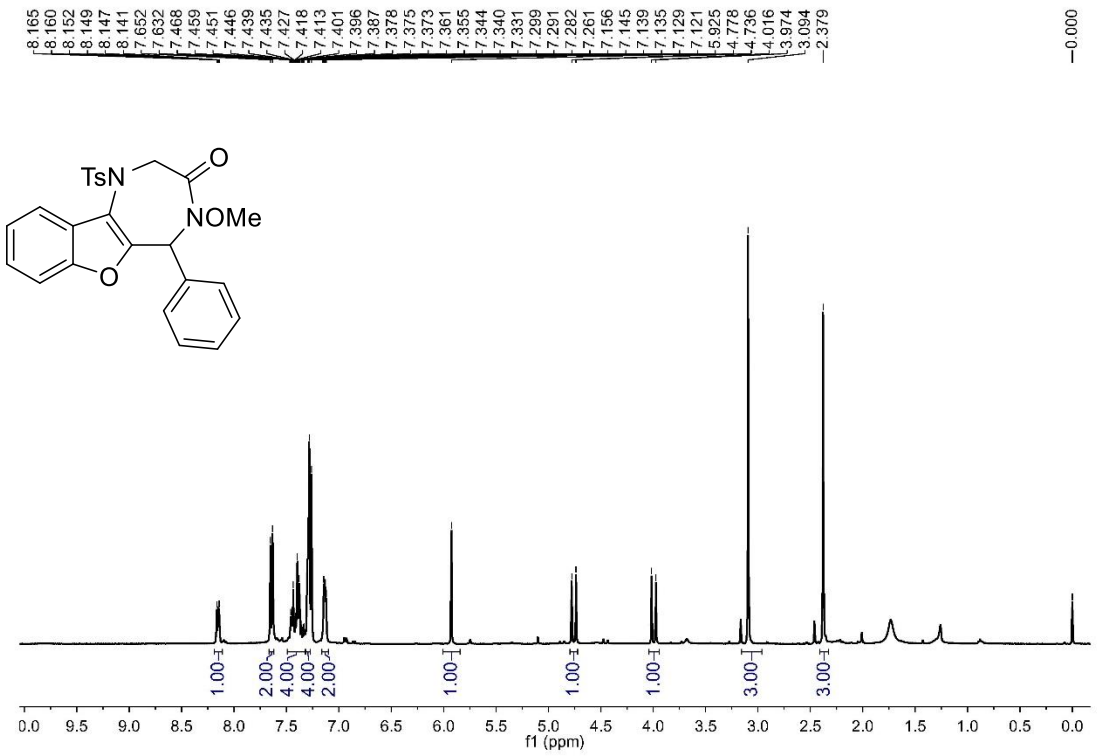
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3oa**



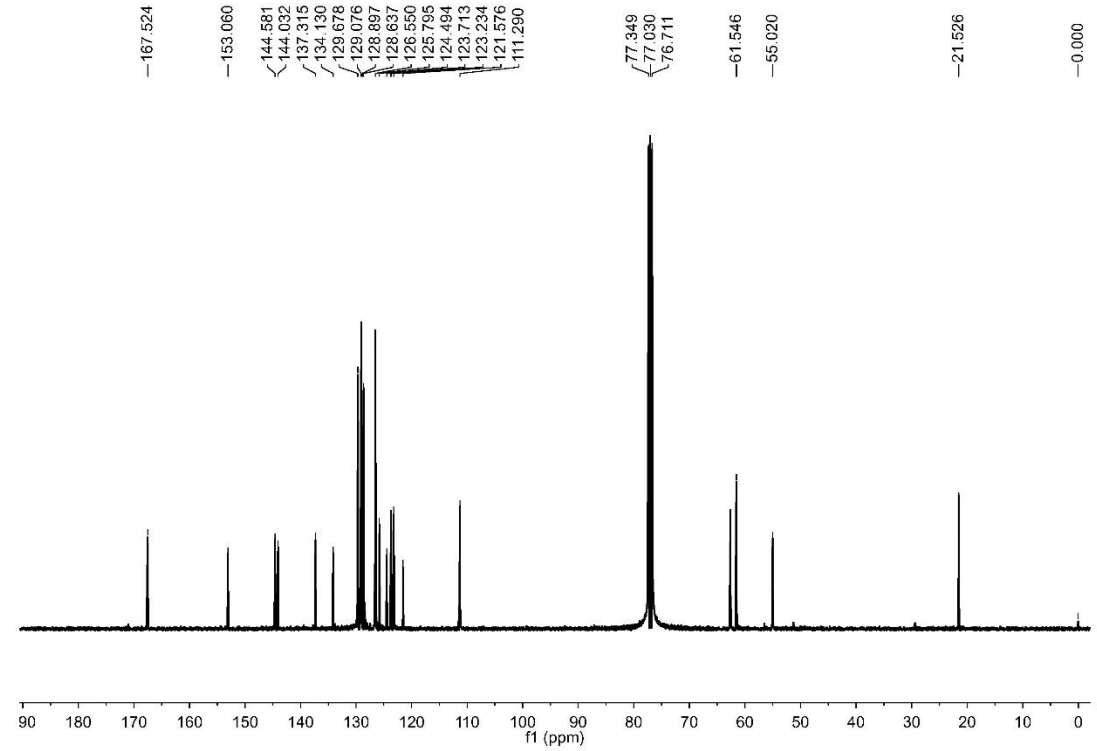
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ta**



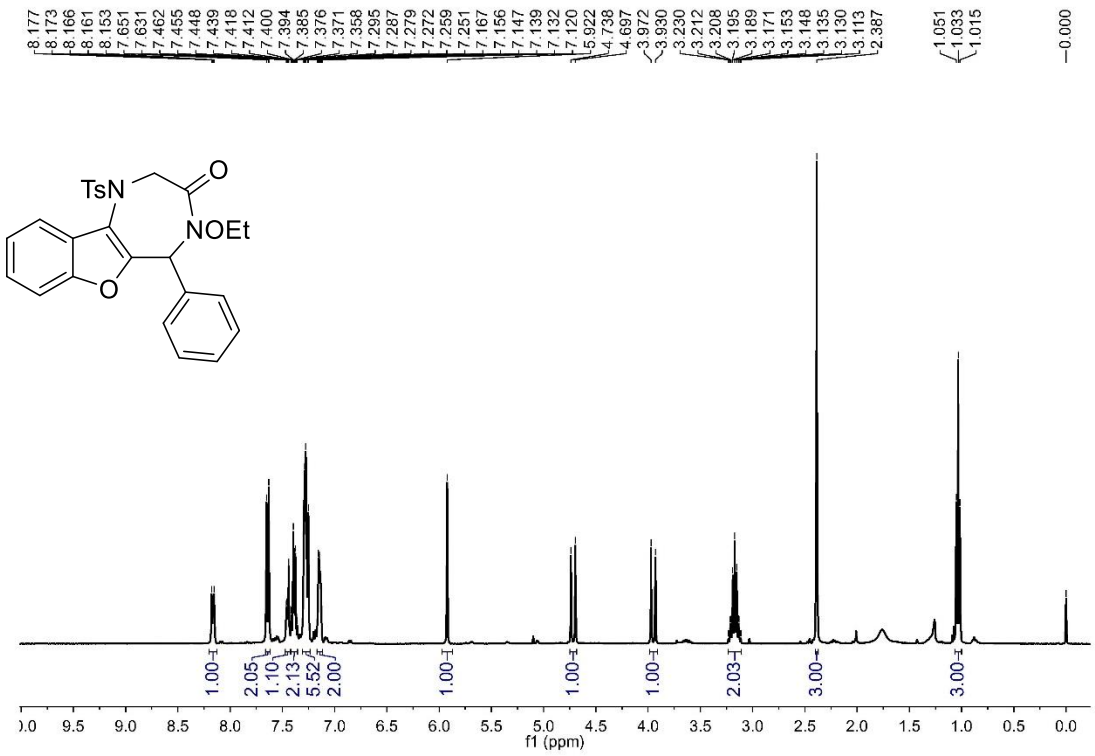
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ta**



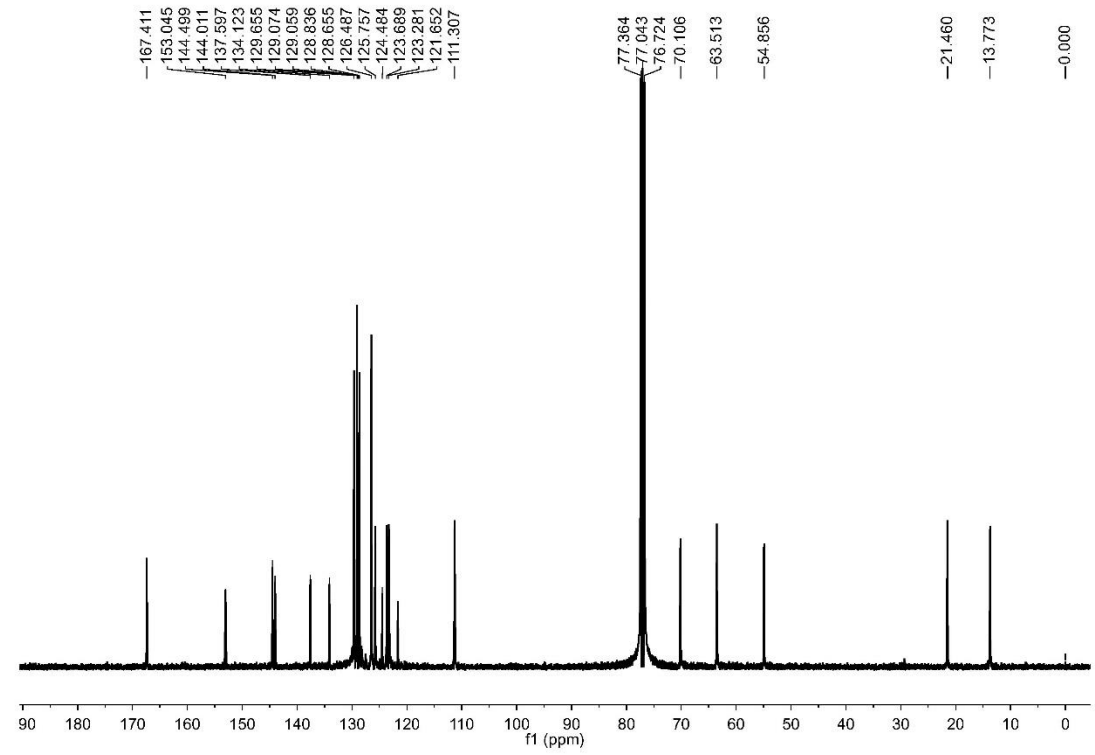
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ab**



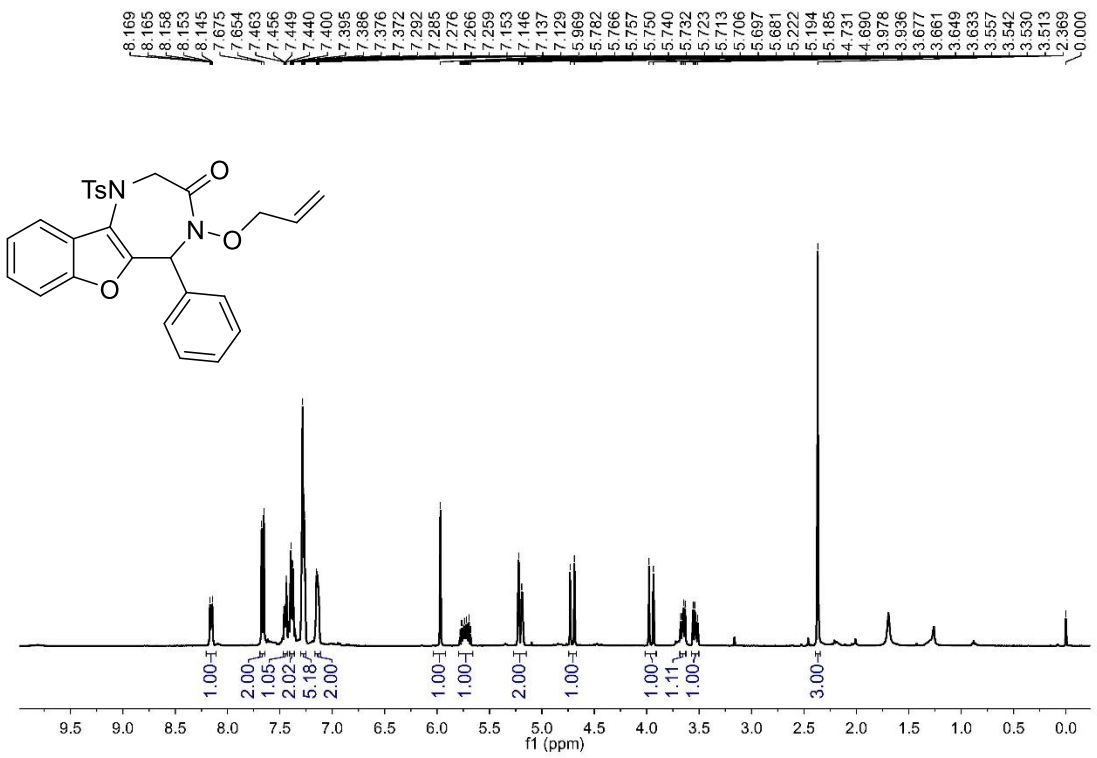
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ab**



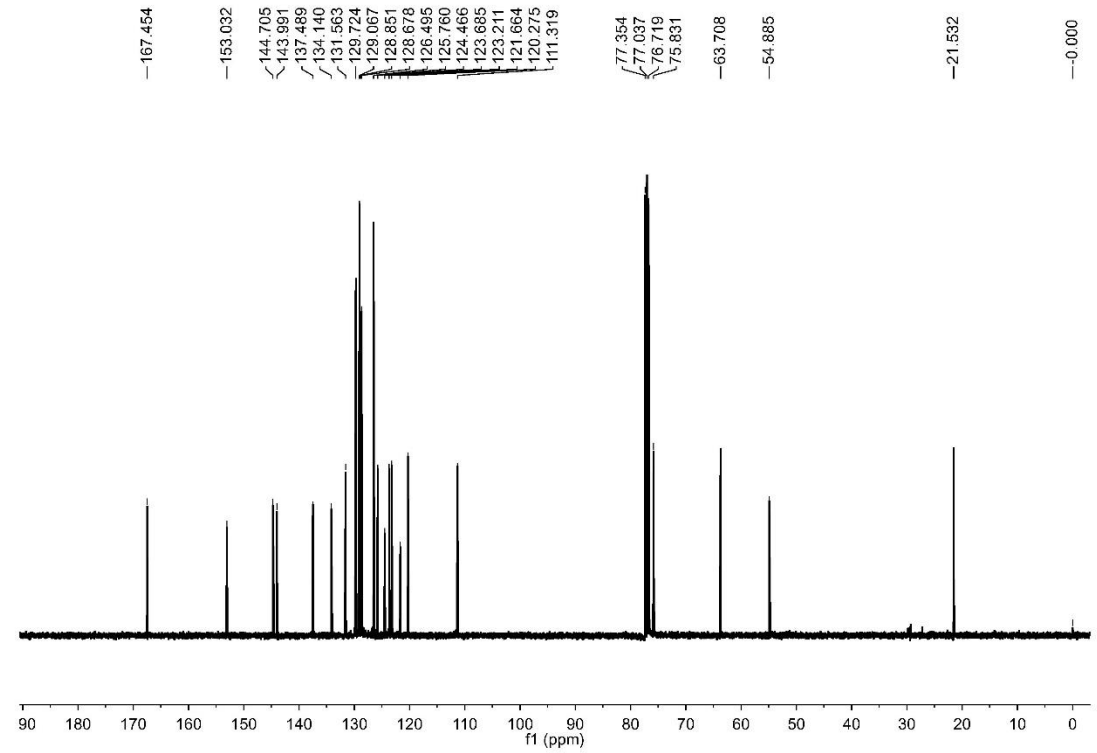
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ac**



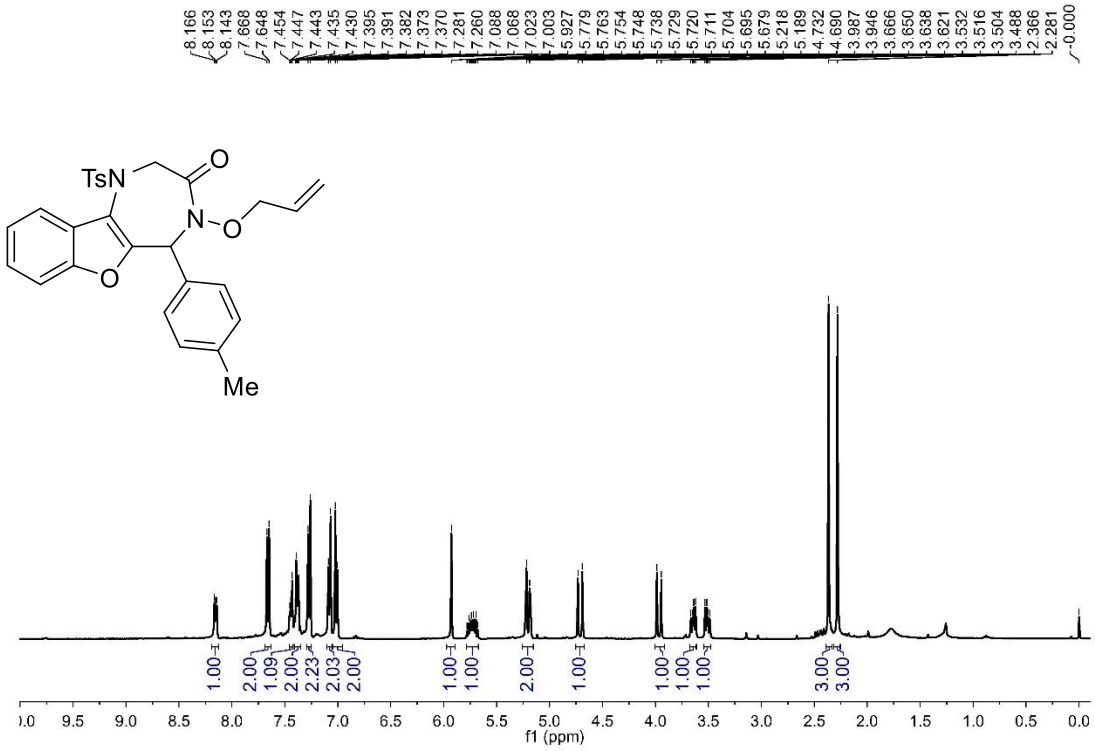
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ac**



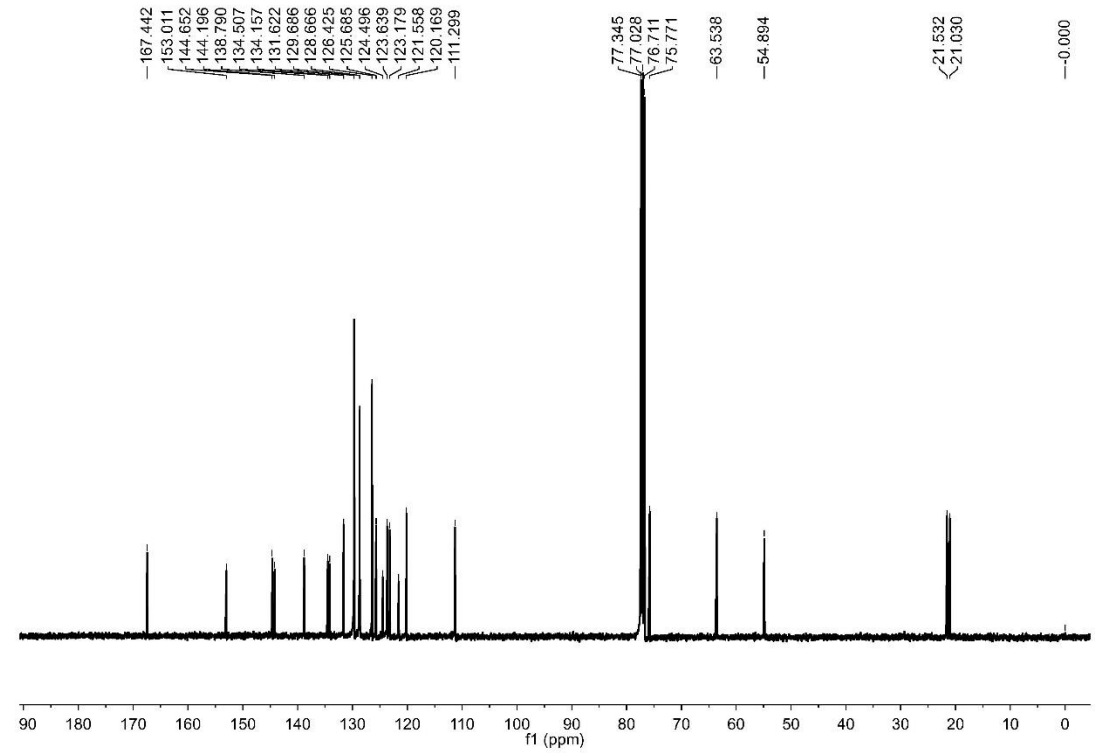
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ad**



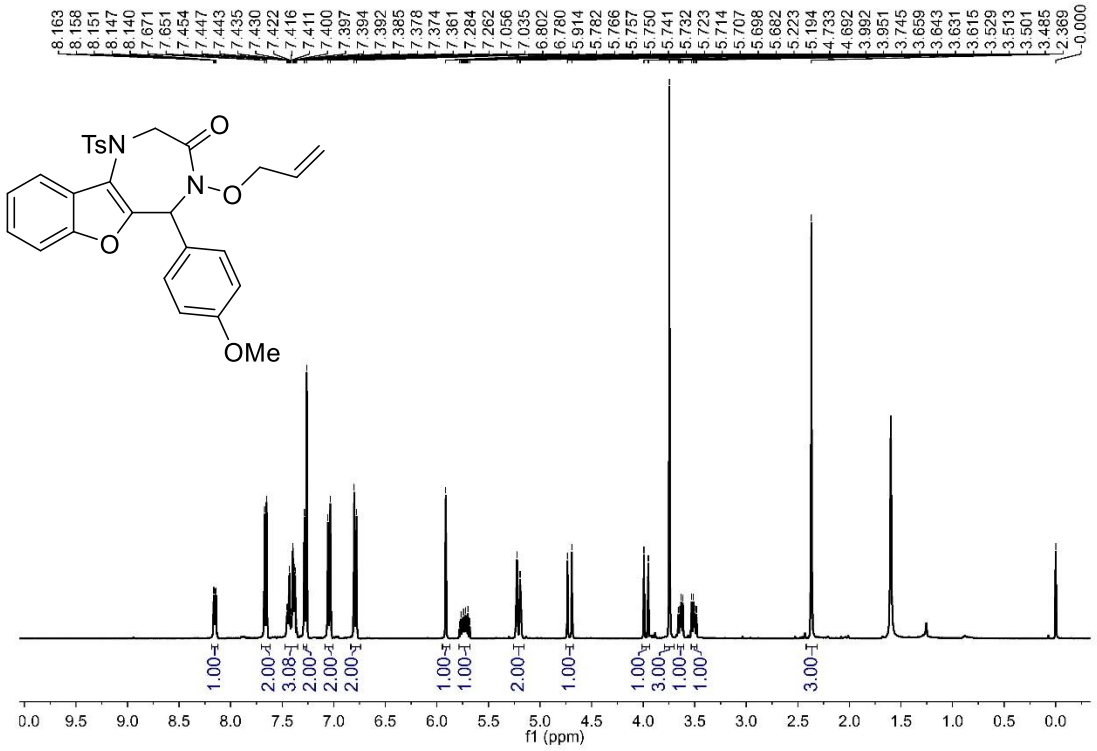
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ad**



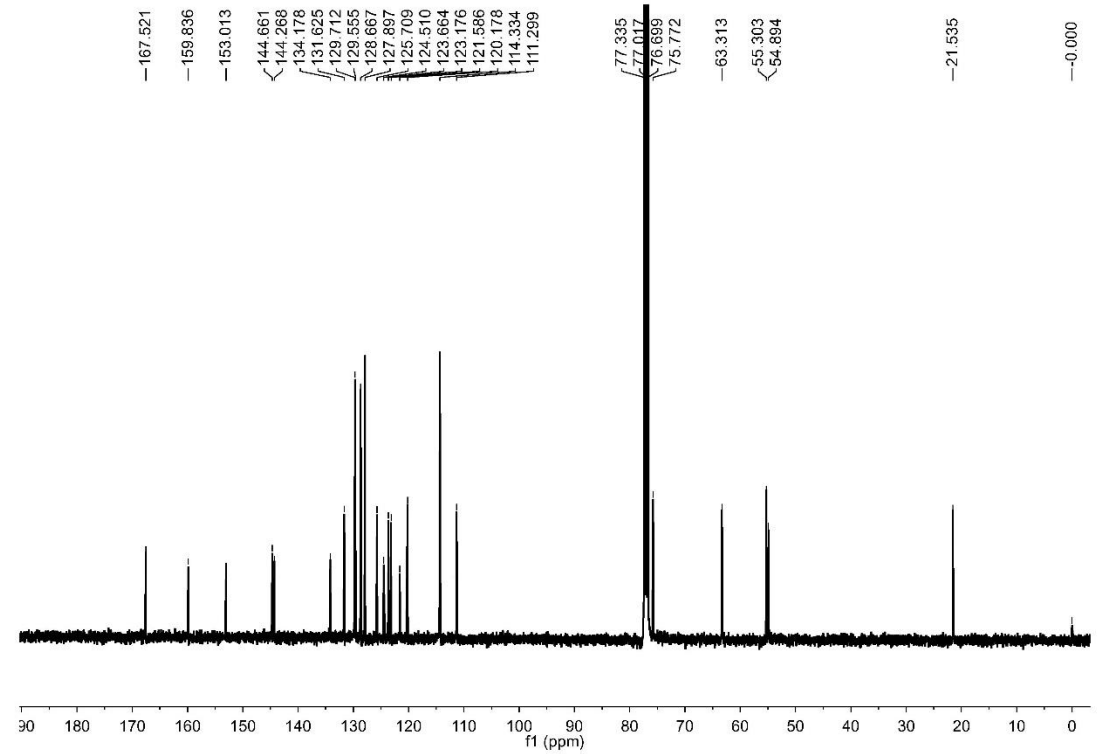
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3dd**



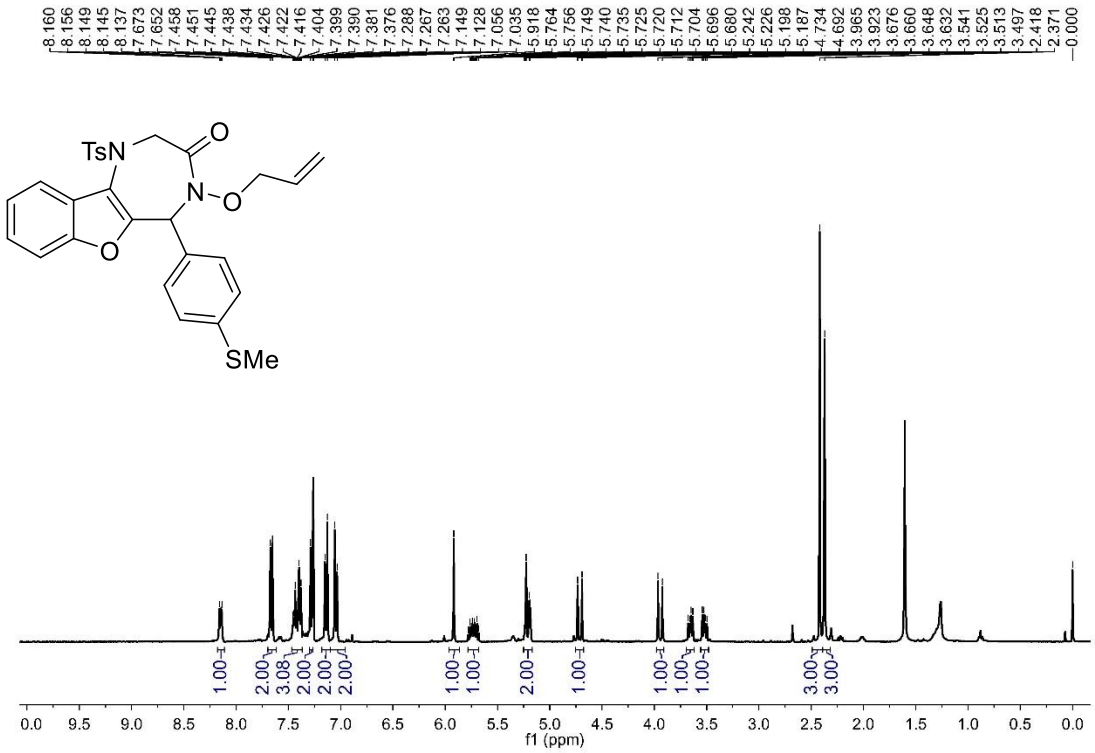
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3dd**



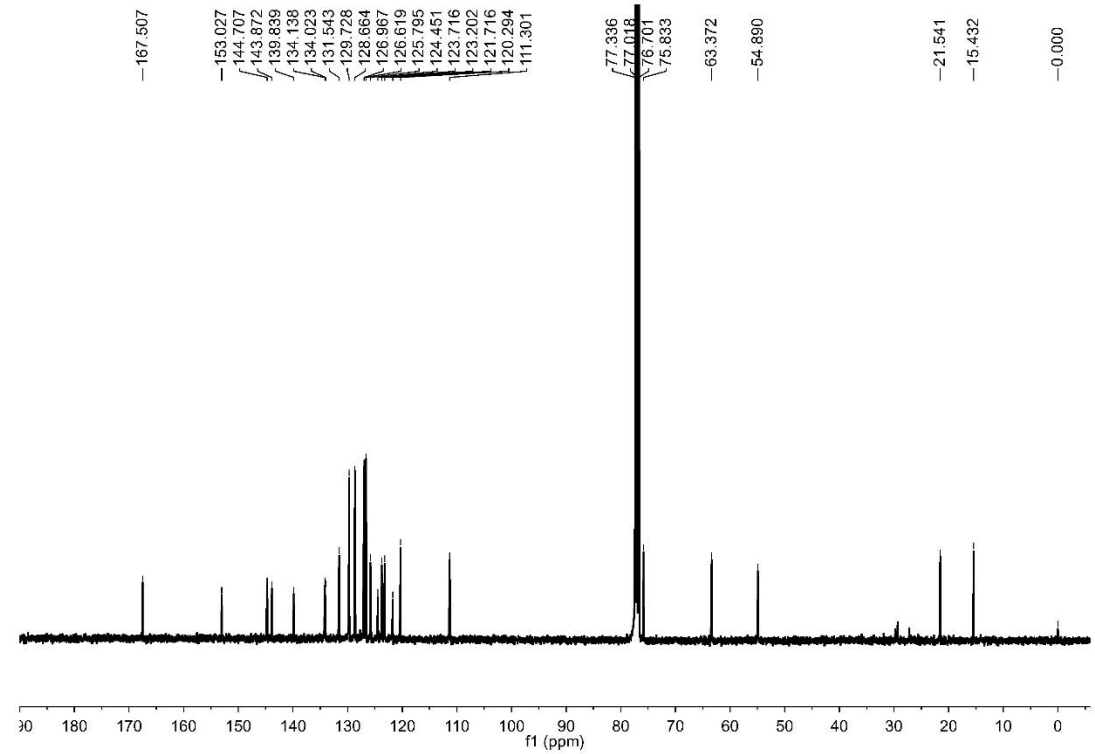
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ed**



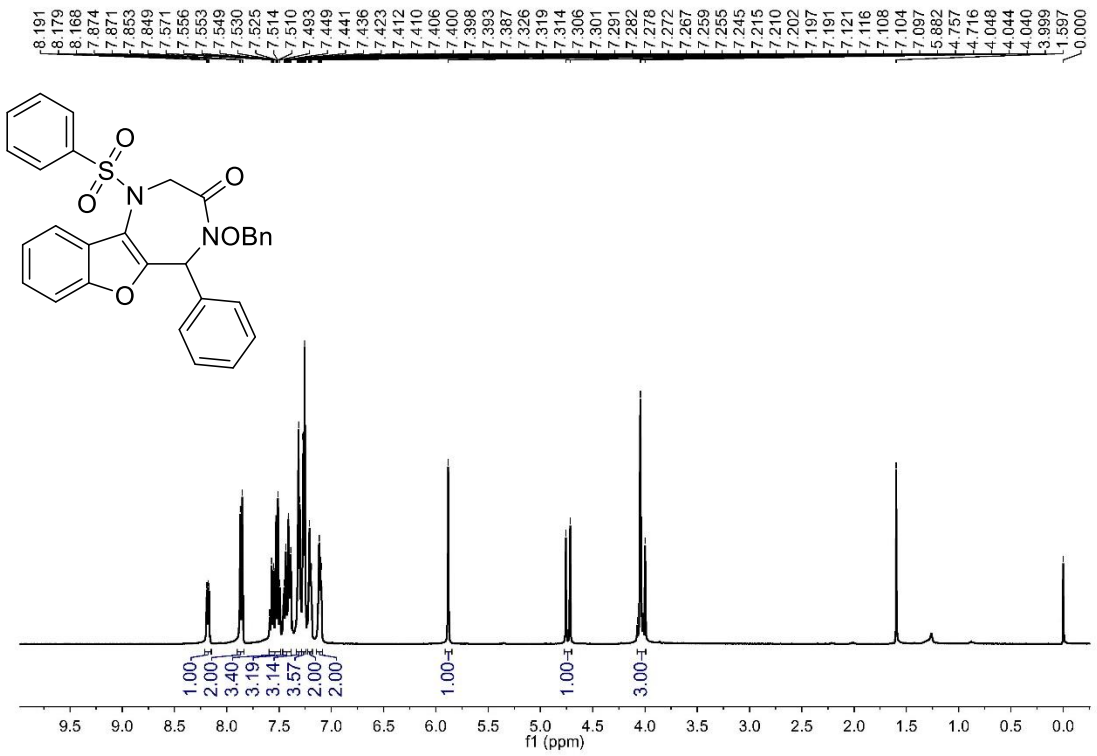
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ed**



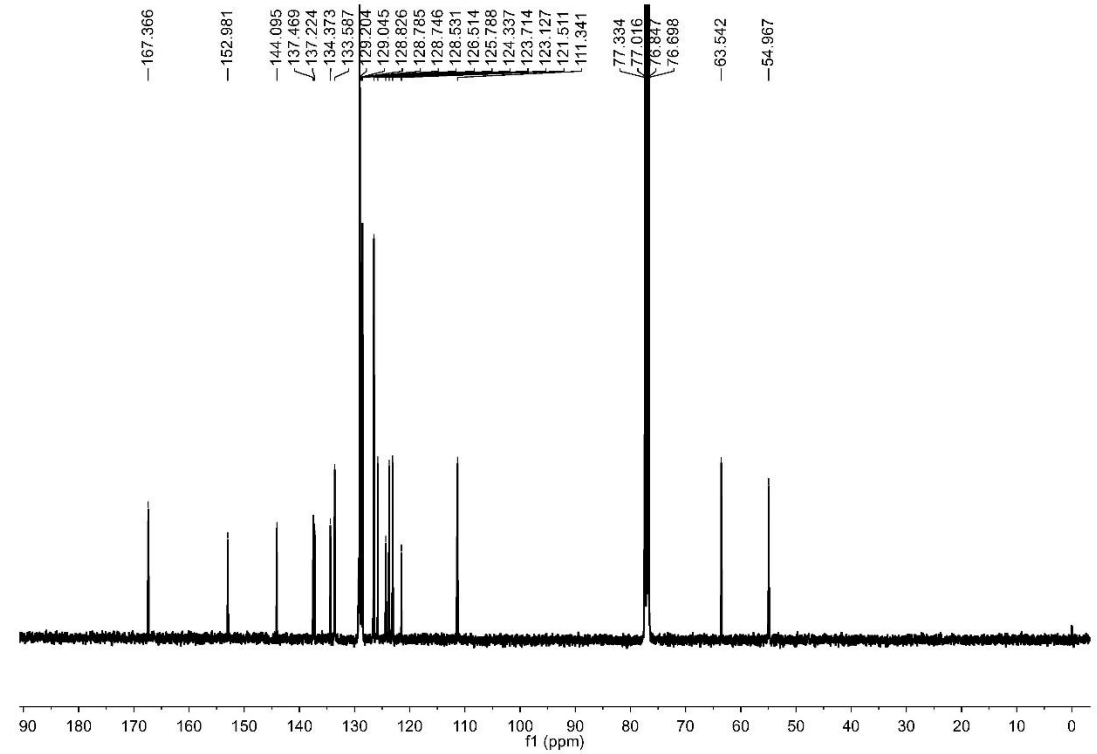
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3fd**



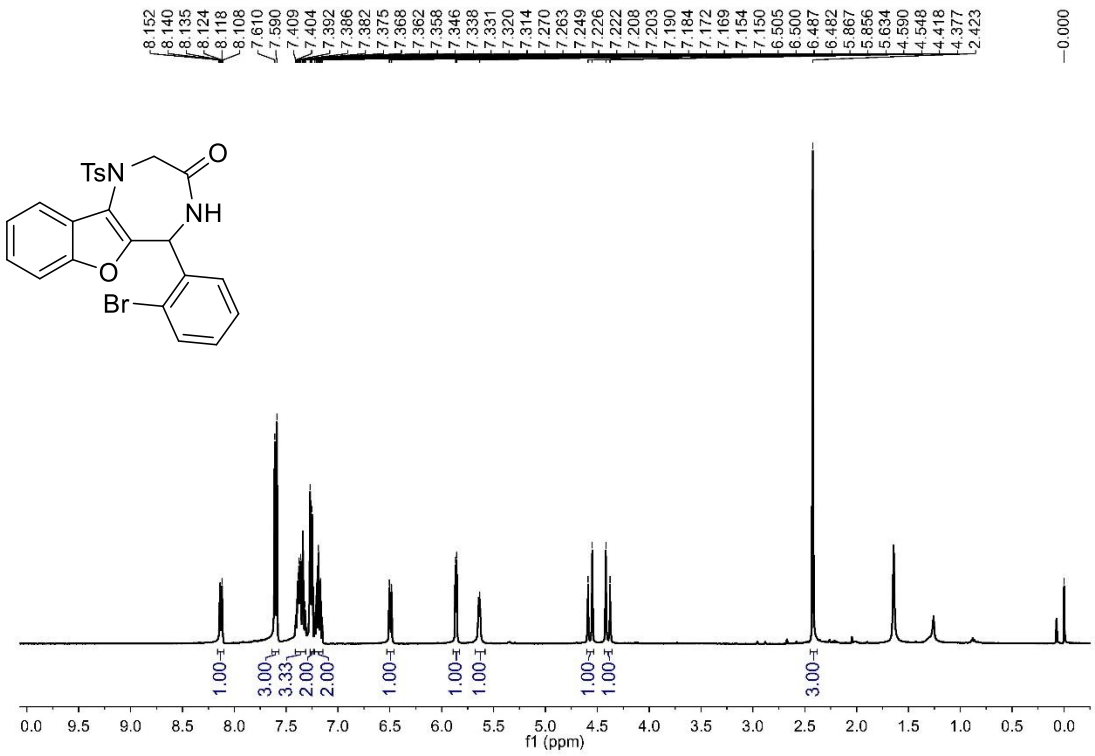
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3fd**



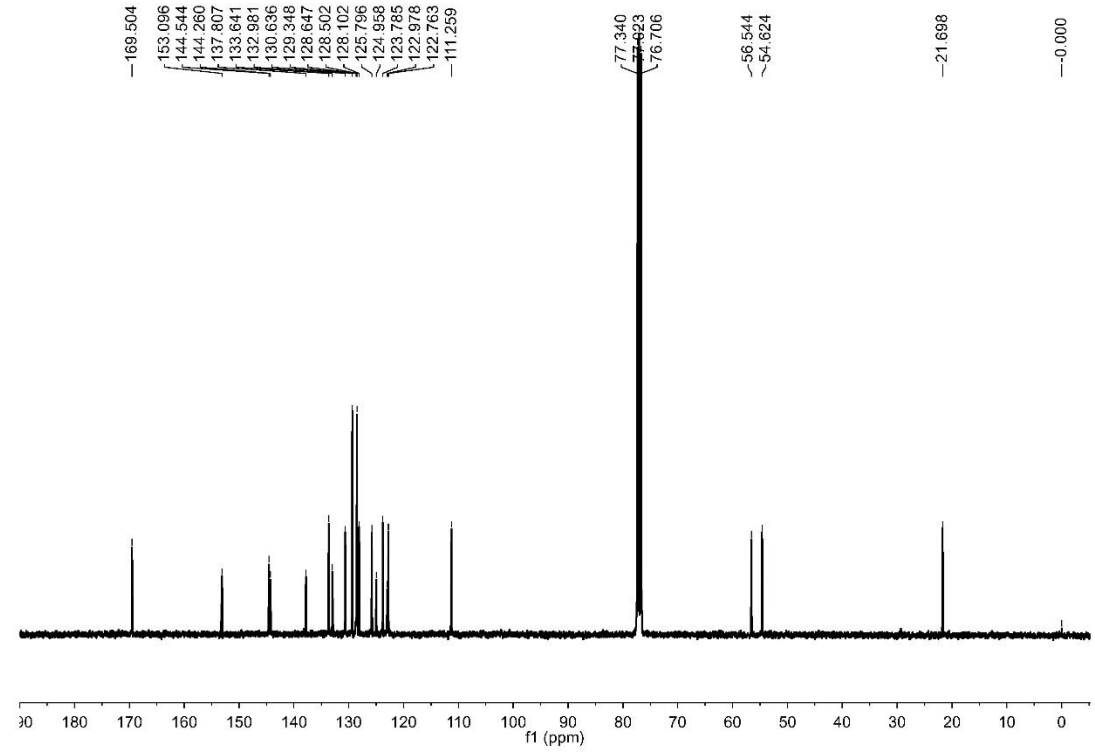
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **3ua**



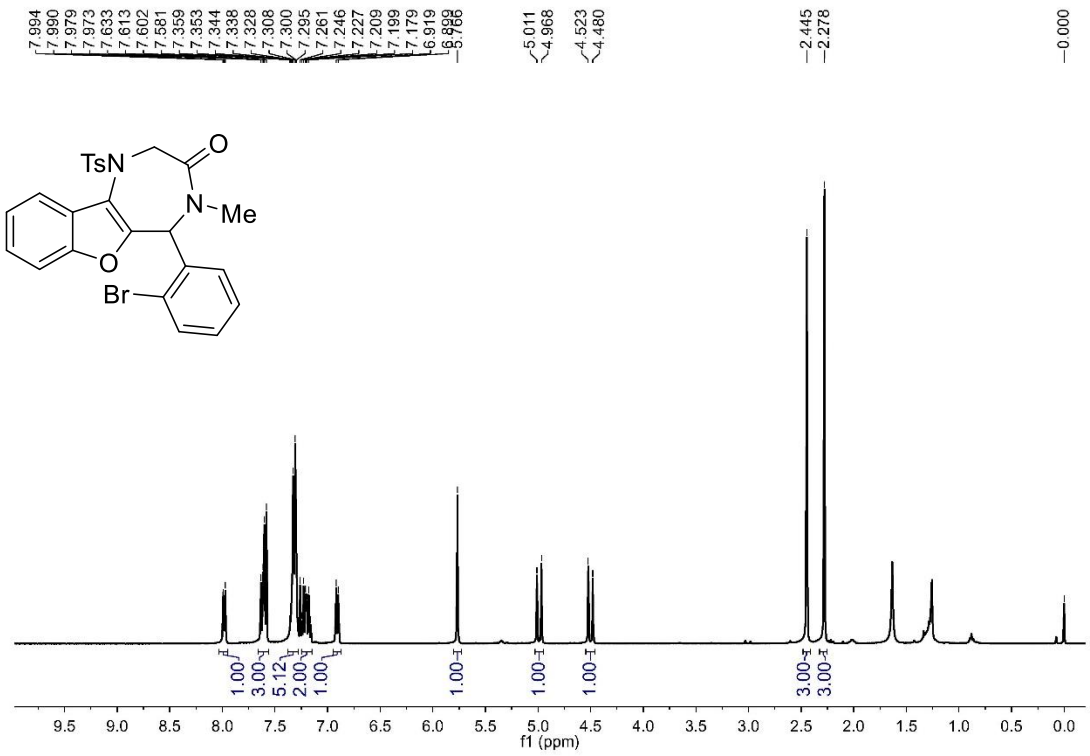
^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **3ua**



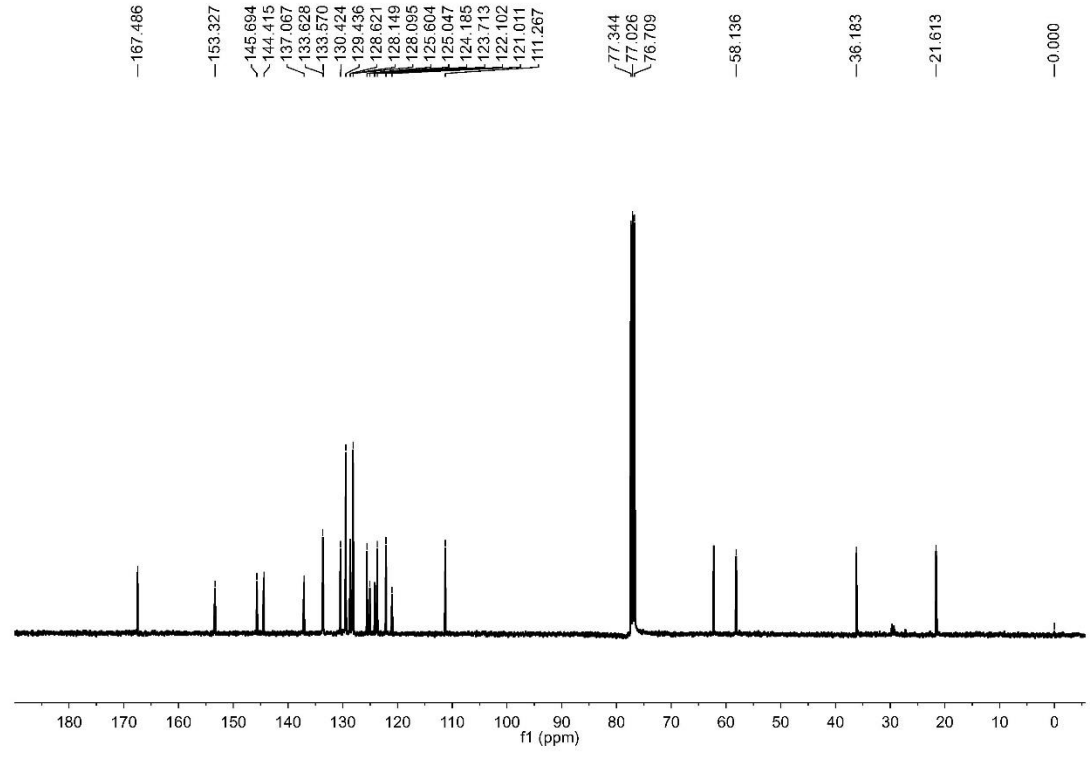
^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **4**



^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **4**



^{1}H NMR Spectrum (400 MHz, $CDCl_3$) of Compound **5**



^{13}C NMR Spectrum (100 MHz, $CDCl_3$) of Compound **5**

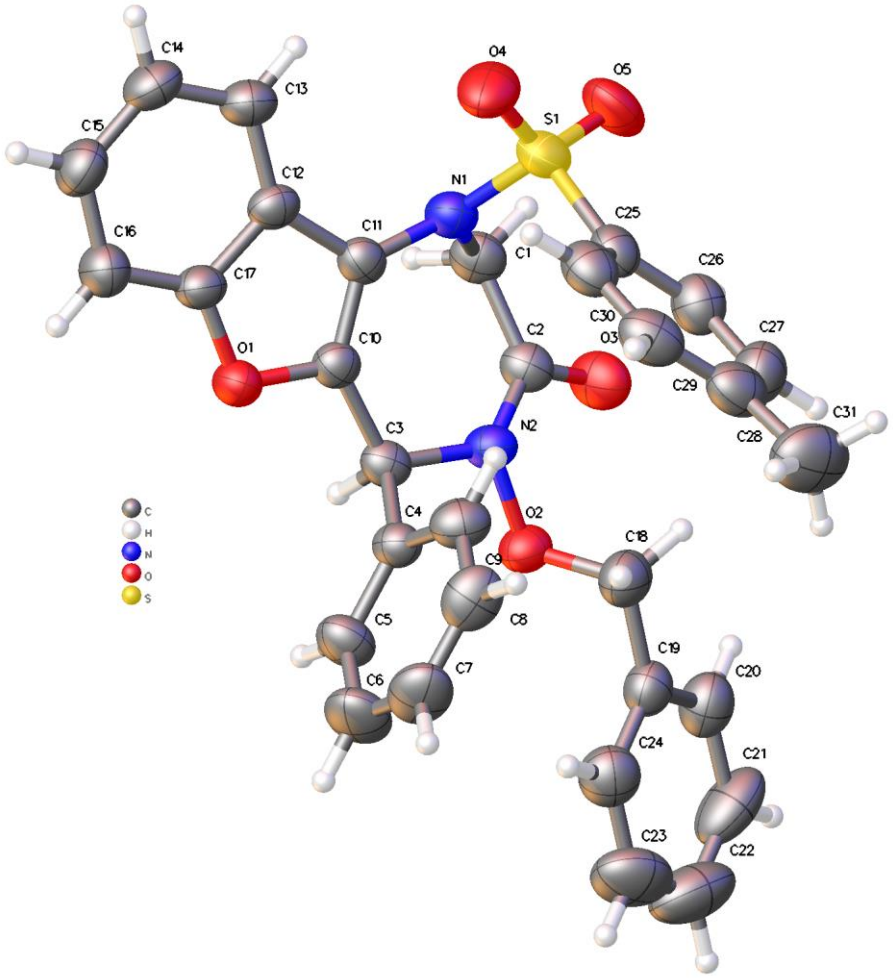


Figure S1. Crystal Structure of **3aa** (50% probability level for the thermal ellipsoids).

Table S1. Crystal Data for Compound **3aa**

Formula	$C_{31}H_{26}N_2O_5S$
Formula weight	538.60
Temperature	293 (2) K
Wavelength	0.71073 Å
Crystal system	triclinic
Space group	P-1
Unit cell dimensions	a = 9.9502 (7) Å, α = 113.915 (6) deg.
	b = 11.9913 (7) Å, β = 96.434 (6) deg.
	c = 14.0968 (10) Å, γ = 93.254 (5) deg.
Volume	1518.19 (19) $Å^3$
Z	2
Density (calculated)	1.178 g / cm^3
Absorption coefficient	0.146 mm^{-1}
F(000)	564.0
Crystal	0.22 x 0.19 x 0.12 mm
Theta range for data collection	5.572 to 48.994 deg
Limiting indices	-11<=h<=10, -13<=k<=13, -16<=l<=14
Reflections collected	10614
Independent reflections	5045 [R(int) = 0.0274, Rsigma = 0.0447]
Data / restraints / parameters	5045 / 0 / 353
Goodness-of-fit on F^2	1.048
Final R indices [$I > 2\sigma(I)$]	R_1 = 0.0677, wR_2 = 0.1935
R indices (all data)	R_1 = 0.0846, wR_2 = 0.2084
Largest diff. peak and hole	0.70 and -0.68 e. $Å^{-3}$