Supporting Information

Base-Catalyzed Diastereoselective Construction of Spiro-epoxyoxindoles by the Darzens Reaction of 3-Chlorooxindoles with Aryl Aldehydes under Solvent-free Grinding

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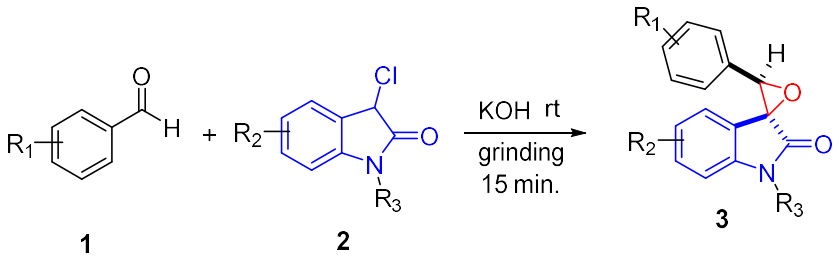
I Experimental Section

1. General methods

The reactions were monitored by thin layer chromatography (TLC) using silica gel GF254. All compounds were fully characterized by spectroscopic data. The NMR spectra were recorded on a Bruker Avance III (^{1}H: 400 MHz, ^{13}C: 100 MHz, ^{19}F NMR: 377 MHz), chemical shifts (δ) are expressed in ppm, and J values are given in Hz. $CDCl_3$ and DMSO-d_6 were used as solvents. High resolution mass spectra (HRMS) were recorded on LCMS-IT-TOF. All chemicals and solvents were used as received without further purification unless otherwise stated. α-Chlorooxindoles **2** was synthesized according to a procedure described in the literature.[1] Column chromatography was performed on silica gel (200–300 mesh).

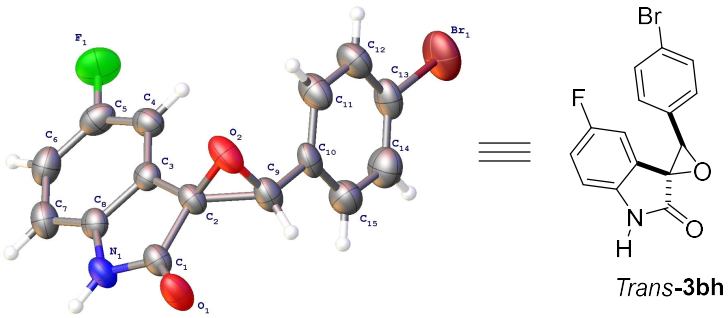
2. General procedure for preparation of Compound 3.



1 2 3

A mixture of aryl aldehydes**1** (0.6 mmol) and α-chlorooxindoles **2** (0.6 mmol) and potassium hydroxide (0.06 mmol) was taken in a mortar and ground continuously for 15 min. The reaction was monitored by TLC until completion. The syrupy reaction mixture formed was diluted with water (3 mL) and extracted with EtOAc (3 × 10 mL). The combined organic layer was washed with water (2 × 5 mL) and dried over anhydrous Na_2SO_4. The solvent was evaporated and the crude product was purified by column chromatography on silica gel (EtOAc/hexanes, 20%) to provide products **3**.

II Crystal data and structure refinement for *trans*-**3bh**

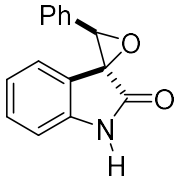


Trans-**3bh**

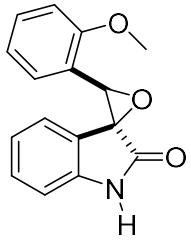
Table 1 Crystal data and structure refinement for 3bh.

Identification code	3bh
Empirical formula	$C_{15}H_9BrFNO_2$
Formula weight	334.146
Temperature/K	293(2)
Crystal system	monoclinic
Space group	$P2_1/c$
a/Å	14.9190(14)
b/Å	6.6980(4)
c/Å	14.7572(15)
α/°	90
β/°	117.141(13)
γ/°	90
Volume/Å^3	1312.3(3)
Z	4
ρ_{calc}g/cm^3	1.691
μ/mm^{-1}	3.144
F(000)	663.6
Crystal size/mm^3	0.13 × 0.12 × 0.11
Radiation	Mo Kα (λ = 0.71073)
2Θ range for data collection/°	6.82 to 52.74
Index ranges	$-18 \le h \le 18$, $-9 \le k \le 8$, $-18 \le l \le 19$
Reflections collected	9011
Independent reflections	2682 [R_{int} = 0.0421, R_{sigma} = 0.0522]
Data/restraints/parameters	2682/0/182
Goodness-of-fit on F^2	1.052
Final R indexes [I>=2σ (I)]	R_1 = 0.0435, wR_2 = 0.0882
Final R indexes [all data]	R_1 = 0.0748, wR_2 = 0.1037
Largest diff. peak/hole / e Å^{-3}	0.83/-0.77

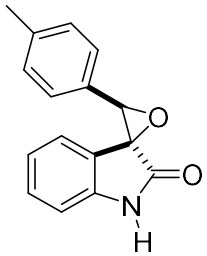
III ^{1}H , ^{19}F and ^{13}C NMR Spectra Data of Compounds 3



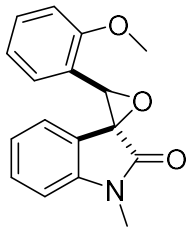
3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3aa): White solid; mp: 162-163 ºC (92% yield, 130.8 mg, 92:8 dr)). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 9.33 (s, 1H), 7.50 – 7.36 (m, 5H), 7.22 (s, 1H), 6.97 (d, *J* = 7.8 Hz, 1H), 6.75 (s, 1H), 6.46 (d, *J* = 7.5 Hz, 1H), 4.83 (s, 1H).**^{13}C NMR** (100 MHz, Chloroform-*d*) δ 174.1, 142.4, 133.0, 130.2, 128.8, 128.5, 126.8, 124.0, 122.6, 121.2, 110.8, 65.2, 61.9. **HRMS (ESI)**: m/z calcd for $C_{15}H_{11}NO_2$ $[M-H]^-$: 236.0717; found: 236.0714.



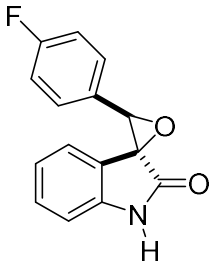
3'-(2-methoxyphenyl)spiro[indoline-3,2'-oxiran]-2-one (3ab): Brown solid; mp: 228-229ºC (82% yield, 131.4 mg, 86:14 dr). The major isomer **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.78 (s, 1H), 7.63 (d, *J* = 7.4 Hz, 1H), 7.37 – 7.32 (m, 1H), 7.19 (td, *J* = 7.7, 1.1 Hz, 1H), 7.09 (d, *J* = 8.1 Hz, 1H), 6.90 (d, *J* = 7.9 Hz, 1H), 6.82 (d, *J* = 7.9 Hz, 1H), 6.72 (t, *J* = 7.3 Hz, 1H), 6.39 (d, *J* = 8.2 Hz, 1H), 4.80 (s, 1H), 3.61 (s, 3H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.8, 158.0, 144.0, 130.7, 130.6, 127.2, 123.1, 121.9, 121.8, 121.5, 120.7, 111.5, 111.1, 62.5, 61.6, 56.0. **HRMS (ESI)**: m/z calcd for $C_{16}H_{13}NO_3[M+H]^+$:268.0969; found: 268.0952. The minor isomer: **^{1}H NMR** (400 MHz, Chloroform-d) δ 8.34 (s, 1H), 7.72 – 7.70 (m, 1H), 7.46–7.38 (m, 1H), 7.31 (s, 1H), 7.25 – 7.23 (m, 1H), 7.06 – 6.96 (m, 2H), 6.88 – 6.84 (m , 1H), 6.82 (d, *J* = 7.9 Hz, 1H), 4.77 (s, 1H), 3.73 (s, 3H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 171.4, 157.7, 143.3, 130.6, 130.4, 129.8, 128.7, 122.8, 122.3, 121.5, 121.0, 120.0, 110.8, 63.5, 61.7, 55.9.



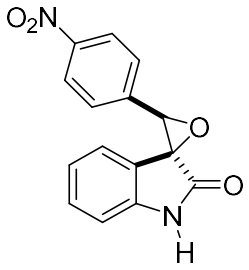
3'-(p-tolyl)spiro[indoline-3,2'-oxiran]-2-one (3ac): Yellow solid; mp: 242-243ºC (85% yield , 128 mg, 100:0 dr)) **^{1}H NMR** (400 MHz, DMSO-d6) δ 10.86 (s, 1H), 7.37 (d, J = 8.0 Hz, 2H), 7.27 – 7.21 (m, 3H), 6.90 (d, J = 7.7 Hz, 1H), 6.72 (td, J = 7.6, 0.9 Hz, 1H), 6.42 (d, J = 7.5 Hz, 1H), 4.65 (s, 1H), 2.32 (s, 3H).**^{13}C NMR** (100 MHz, DMSO-d6) δ 172.2, 143.8, 137.9, 130.3, 130.1, 128.9, 126.6,123.15, 121.5, 120.9, 110.6, 64.4, 61.7, 20.9. **HRMS (ESI)**: m/z calcd for $C_{16}H_{13}NO_2$ $[M+H]^+$: 251.0946; found: 251.0945



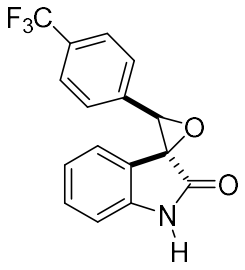
3'-(2-methoxyphenyl)-1-methylspiro[indoline-3,2'-oxiran]-2-one (3ad): Brown solid; mp: 221-222ºC (85% yield, 143.3 mg, 100:0 dr). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.62 (d, *J* = 7.4 Hz, 1H), 7.37 – 7.32 (m, 1H), 7.28 – 7.24 (m, 1H), 7.07 (t, *J* = 7.4 Hz, 1H), 6.84 (dd, *J* = 18.8, 8.1 Hz, 2H), 6.75 (t, *J* = 7.6 Hz, 1H), 6.42 (d, *J* = 7.4 Hz, 1H), 4.82 (s, 1H), 3.61 (s, 3H), 3.31 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 172.0, 157.9, 145.2, 129.9, 127.4, 123.2, 122.3, 122.1, 121.6, 120.2, 110.4, 108.4, 77.2, 62.9, 61.4, 55.3, 26.7. **HRMS (ESI)**: m/z calcd for $C_{17}H_{15}NO_3[M+H]^+$:282.1125; found: 282.1109.



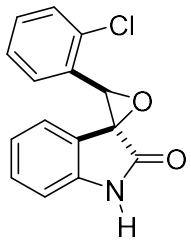
3'-(4-fluorophenyl)spiro[indoline-3,2'-oxiran]-2-one(3ae): Brown solid; mp: 201-202 ºC (89% yields, 136 mg, 95:5 dr).**^{1}H NMR** (400 MHz, Chloroform-*d*) δ 9.02 (s, 1H), 7.38 (dd, *J* = 8.6, 5.3 Hz, 2H), 7.19 – 7.14 (m, 1H), 7.04 (t, *J* = 8.6 Hz, 2H), 6.89 (d, *J* = 7.8 Hz, 1H), 6.70 (t, *J* = 7.6 Hz, 1H), 6.35 (d, *J* = 7.5 Hz, 1H), 4.72 (s, 1H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 174.1, 163.0(d, $J_{F\text{-}C}$ = 246.4 Hz), 142.6, 130.5, 129.0(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.16 Hz), 128.8(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.29 Hz), 124.0, 122.8, 121.1, 115.8(d, $J_{F\text{-}C\text{-}C}$ = 21.76 Hz), 111.1, 64.7, 62.1. **^{19}F NMR** (377 MHz, Chloroform-*d*) δ -112.18. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}FNO_2$ $[M-H]^-$:254.0622; found: 254.0619.



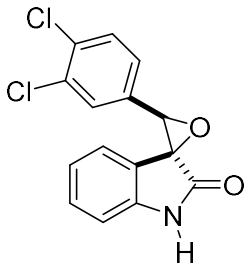
3'-(4-nitrophenyl)spiro[indoline-3,2'-oxiran]-2-one (3af/3af'): Brown solid mp: 216-217 ºC (91% yield, 154 mg, 88:12 dr). The major isomer: **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.87 (s, 1H), 8.21 (d, *J* = 8.8 Hz, 2H), 7.73 (d, *J* = 8.6 Hz, 2H), 7.16 (t, *J* = 7.2 Hz, 1H), 6.83 (d, *J* = 7.7 Hz, 1H), 6.64 (t, *J* = 7.3 Hz, 1H), 6.27 (d, *J* = 7.5 Hz, 1H), 4.78 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.1, 147.9, 144.5, 141.2, 131.1, 128.7, 127.5, 124.0, 123.5, 122.1, 111.3, 64.1, 62.4. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}N_2O_4[M-H]^-$:281.0567; found: 281.0567. The minor isomer: **^{1}H NMR** (400 MHz, DMSO-d_6) δ 9.05 (d, *J* = 8.8 Hz, 1H), 8.02 (d, *J* = 8.8 Hz, 2H), 7.58 (d, *J* = 8.6 Hz, 2H), 7.34 (t, 1H), 6.96(t, 1H), 6.84 (d, *J* = 7.3 Hz, 1H), 5.55 (t, 1H), 4.64 (s, 1H).



3'-(4-(trifluoromethyl)phenyl)spiro[indoline-3,2'-oxiran]-2-one (3ag): Brown solid mp: 192-193ºC (86% yield, 157.4 mg, 93:7dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.85 (s, 1H), 7.73 (d, J = 8.2 Hz, 2H), 7.66 (d, J = 8.2 Hz, 2H), 7.16 (t, J = 7.6 Hz, 1H), 6.84 (d, J = 7.8 Hz, 1H), 6.65 (t, J = 7.6 Hz, 1H), 6.26 (d, J = 7.5 Hz, 1H), 4.73 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d6) δ 172.3, 144.4, 138.4(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 0.99 Hz), 131.0, 129.2(d, $J_{CF3\text{-}C\text{-}C}$ = 31.61 Hz), 128.2, 125.8(d, $J_{CF3\text{-}C\text{-}C\text{-}C}$ = 3.71 Hz), 124.6(d, $J_{3F\text{-}C}$ = 270.6 Hz),123.4, 122.1, 120.8, 111.2, 64.2, 62.2. **^{19}F NMR** (377 MHz, DMSO-d_6) δ -61.00. **HRMS (ESI)**: m/z calcd for $C_{16}H_{10}F_3NO_2$ [M-H]$^-$:304.0590; found: 304.0590.

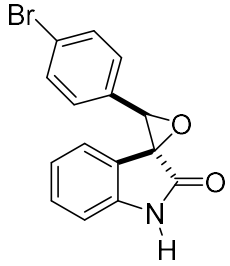


3'-(2-chlorophenyl)spiro[indoline-3,2'-oxiran]-2-one(3ah/3ah'): Yellow solid mp: 215-216 ºC (88% yield, 143.6 mg, 85:15 dr). The major isomer: **^{1}H NMR** (400 MHz, Chloroform-d) δ 9.59 (s, 1H), 7.73 (d, J = 7.2 Hz, 1H), 7.43 (td, J = 7.4, 1.5 Hz, 1H), 7.40 (m, 1H), 7.32 (d, J = 1.3 Hz, 1H), 7.21 (dd, J = 7.7, 1.0 Hz, 1H), 6.94 (d, J = 7.8 Hz, 1H), 6.71 (t, J = 7.5 Hz, 1H), 6.21 (d, J = 7.5 Hz, 1H), 4.83 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.2, 144.1, 132.6, 132.0, 131.1, 131.0, 129.6, 128.7, 127.9, 122.8, 122.1, 120.7, 111.2, 63.4, 61.53. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}ClNO_2$ [M-H]$^-$:270.0327; found: 270.0328. The minor isomer: **^{1}H NMR** (400 MHz, Chloroform-d) δ 9.04 (s, 1H), 7.77 (m, 1H), 7.39 (m, 1H), 7.34 (m, 2H), 7.29 (m, 1H), 7.26 (m, 1H), 7.13 – 7.09 (m, 1H), 6.91 – 6.81 (m, 1H), 4.77 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 170.9, 143.5, 131.9, 131.7, 131.0, 130.2, 129.7, 128.9, 127.1, 123.3, 123.1, 122.5, 110.9, 64.3, 61.7.

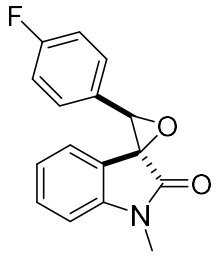


3'-(3,4-dichlorophenyl)spiro[indoline-3,2'-oxiran]-2-one (3ai): Yellow solid mp: 245-246ºC ºC (88% yield, 161.5 mg, 98:2 dr). **^{1}H NMR** (400 MHz, DMSO-d6) δ 10.91 (s, 1H), 7.78 (d, J = 1.8 Hz, 1H), 7.72 (d, J = 8.3 Hz, 1H), 7.53 (dd, J = 8.8, 1.9 Hz, 1H), 7.26 (td, J = 7.7, 1.2 Hz, 1H), 6.92 (d, J = 7.7 Hz, 1H), 6.78 (td, J

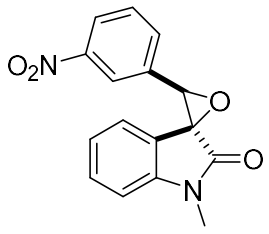
= 7.6, 0.9 Hz, 1H), 6.35 (d, J = 7.5 Hz, 1H), 4.72 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d6) δ 171.7, 144.0, 134.5, 131.3, 131.2, 130.7, 130.6, 129.1, 127.0, 122.9, 121.7, 120.3, 110.8, 63.1, 61.7. **HRMS (ESI)**: m/z calcd for $C_{15}H_9Cl_2NO_2[M+H]^+$: 305.0010; found: 305.0011.



3'-(4-bromophenyl)spiro[indoline-3,2'-oxiran]-2-one(3aj): Brown solid; mp: 177-178ºC (88% yields, 166.8 mg, 98:2 dr). **^{1}H NMR** (400 MHz, DMSO-*d*$_6$) δ 10.82 (s, 1H), 7.56 (d, *J* = 8.4 Hz, 2H), 7.38 (d, *J* = 8.4 Hz, 2H), 7.16 (td, *J* = 7.7, 1.1 Hz, 1H), 6.83 (d, *J* = 7.7 Hz, 1H), 6.70 – 6.65 (m, 1H), 6.30 (d, *J* = 7.5 Hz, 1H), 4.61 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-*d*$_6$) δ 172.4, 144.3, 133.1, 131.8, 130.9, 129.4, 123.5, 122.2, 122.1, 121.0, 111.2, 64.3, 62.1. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}BrNO_2$ [M-H]$^-$: 313.9822; found: 315.9797.

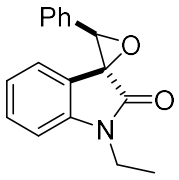


3'-(4-fluorophenyl)-1-methylspiro[indoline-3,2'-oxiran]-2-one(3ak): Brown solid; mp: 210-212ºC (93% yield, 150 mg, 98:2 dr).**^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.34 (dd, *J* = 8.4, 5.4 Hz, 2H), 7.20 (t, *J* = 7.9 Hz, 1H), 7.01 (t, *J* = 8.6 Hz, 2H), 6.79 (d, *J* = 7.8 Hz, 1H), 6.70 (t, *J* = 7.6 Hz, 1H), 6.34 (d, *J* = 7.5 Hz, 1H), 4.69 (s, 1H), 3.20 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 170.5, 161.7(d, $J_{F\text{-}C}$ = 246.16 Hz), 144.2, 129.3, 128.1(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.12 Hz), 127.5(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.28 Hz), 122.5, 121.5, 119.7, 114.6(d, $J_{F\text{-}C\text{-}C}$ = 21.6 Hz), 107.7, 63.4, 60.6, 25.6. **^{19}F NMR** (377 MHz, Chloroform-*d*) δ -112.35. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}FNO_2$ [M+H]$^+$: 270.0925; found: 270.0911.

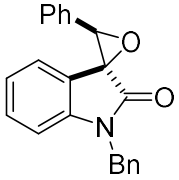


1-methyl-3'-(3-nitrophenyl)spiro[indoline-3,2'-oxiran]-2-one (3al): Brown solid mp: 170-171ºC (90% yield, 159.8 mg, 95:5 dr). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.34 (s, 1H), 8.26 (d, *J* = 8.2 Hz, 1H), 7.83 (d, *J* = 7.7 Hz, 1H), 7.64 (t, *J* = 7.9 Hz, 1H), 7.32 (td, *J* = 7.8, 1.1 Hz, 1H), 6.91 (d, *J* = 7.8 Hz, 1H), 6.81 – 6.76 (m, 1H), 6.38 (d, *J* = 7.5 Hz, 1H), 4.87 (s, 1H), 3.32 (s, 3H). **^{13}C NMR** (101 MHz, Chloroform-*d*) δ 170.9, 148.3, 145.4, 135.6, 132.8, 130.8, 129.8, 123.8, 123.2, 122.7, 121.9, 119.9, 109.1, 63.9, 61.9, 26.8. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}N_2O_4[M+H]^+$:

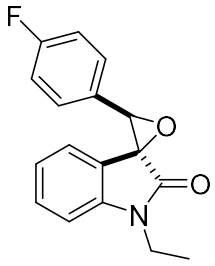
297.0870; found: 297.0853.



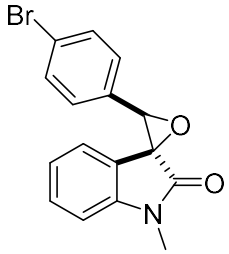
1-ethyl-3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3am): White solid; mp: 156-157 ºC (95% yield, 151 mg, 99:1dr))**^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.43 – 7.27 (m, 5H), 7.24 – 7.15 (m, 1H), 6.82 (d, *J* = 7.9 Hz, 1H), 6.68 (td, *J* = 7.6, 0.8 Hz, 1H), 6.44 – 6.37 (m, 1H), 4.76 (s, 1H), 3.78 (qd, *J* = 7.2, 1.7 Hz, 2H), 1.26 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.3, 144.4, 133.3, 130.1, 128.7, 128.5, 126.8, 123.9, 122.3, 121.2, 108.8, 65.1, 61.6, 35.3, 12.8. **HRMS (ESI)**: m/z calcd for $C_{17}H_{15}NO_2$ $[M+H]^+$: 266.1176; found: 266.1161.



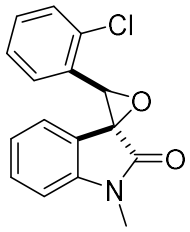
1-benzyl-3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3an): Yellow solid; mp: 140-142 ºC (97% yield, 190.3 mg, 98:2 dr).**^{1}H NMR** (400 MHz, Chloroform-*d*): δ 7.48 – 7.44 (m, 2H), 7.43 – 7.36 (m, 3H), 7.36 – 7.28 (m, 5H), 7.13 (td, *J* = 7.8, 1.2 Hz, 1H), 6.77 – 6.68 (m, 2H), 6.47 (d, *J* = 8.1 Hz, 1H), 4.97 (d, *J* = 5.2 Hz, 2H), 4.90 (s, 1H). **^{13}C NMR** (100 MHz, Chloroform-*d*): δ 171.9, 144.5, 135.4, 133.2, 130.2, 128.9, 128.8, 128.5, 127.9, 127.5, 126.8, 123.8, 122.6, 121.0, 109.8, 65.3, 61.6, 44.4. **HRMS (ESI)**: m/z calcd for $C_{22}H_{17}NO_2$ $[M+H]^+$: 328.1333; found: 328.1329.



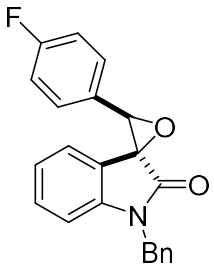
1-ethyl-3'-(4-fluorophenyl)spiro[indoline-3,2'-oxiran]-2-one(3ao): Brown solid; mp: 208-209ºC (84% yield, 142.6 mg, 96:4 dr).**^{1}H NMR** (400 MHz, Chloroform-*d*): δ 7.44 (dd, *J* = 8.5, 5.3 Hz, 2H), 7.30 – 7.25 (m, 1H), 7.10 (t, *J* = 8.7 Hz, 2H), 6.90 (d, *J* = 7.9 Hz, 1H), 6.78 (t, *J* = 7.8 Hz, 1H), 6.44 (d, *J* = 7.0 Hz, 1H), 4.79 (s, 1H), 3.85 (q, *J* = 7.2 Hz, 2H), 1.32 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*): δ 171.1, 162.8(d, $J_{F\text{-}C}$ = 246.13 Hz), 144.4, 130.3, 129.1(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.1 Hz), 128.6(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.27 Hz), 123.8, 122.3, 120.9, 115.6(d, $J_{F\text{-}C\text{-}C}$ = 21.71 Hz) 108.9, 64.5, 61.6, 35.3, 12.7. **^{19}F NMR** (377 MHz, Chloroform-*d*): δ -112.36. **HRMS (ESI)**: m/z calcd for $C_{17}H_{14}FNO_2$ $[M+H]^+$: 284.1082; found: 284.1066.



3'-(4-bromophenyl)-1-methylspiro[indoline-3,2'-oxiran]-2-one (3ap): Brown solid; mp: 179-180ºC (95% yields, 187.5 mg, 83:17 dr). The major isomer: **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.55 (d, *J* = 8.4 Hz, 2H), 7.33 (d, *J* = 8.3 Hz, 2H), 7.31 – 7.26 (m, 1H), 6.88 (d, *J* = 7.8 Hz, 1H), 6.81 (t, *J* = 7.6 Hz, 1H), 6.45 (d, *J* = 7.0 Hz, 1H), 4.75 (s, 1H), 3.30 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.4, 145.3, 132.3, 131.7, 130.4, 128.5, 123.6, 122.8, 122.6, 120.6, 108.8, 64.5, 61.6, 26.7. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}BrNO_2$ $[M-H]^-$: 327.9978; found: 327.9977. The minor isomer: ^{1}H NMR (400 MHz, CDCl3) δ 7.50−7.36 (m, 4H), 7.25-7.23(s,1H), 7.15-7.10 (m, 1H), 6.85 (m, 1H), 5.13(s,1H),4.66 (s, 1H), 3.23 (s, 3H)

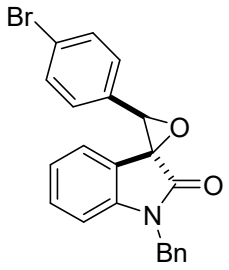


3'-(2-chlorophenyl)-1-methylspiro[indoline-3,2'-oxiran]-2-one (3aq/aq'): Brown solid mp: 218-219ºC (87% yields, 148.7 mg, 89:11 dr). The major isomer: **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.72 (d, *J* = 7.5 Hz, 1H), 7.41 (dd, *J* = 7.4, 1.5 Hz, 1H), 7.33 (dd, *J* = 7.1, 1.6 Hz, 1H), 7.31 (d, *J* = 1.3 Hz, 1H), 7.27 (d, *J* = 7.4 Hz, 1H), 6.88 (d, *J* = 7.8 Hz, 1H), 6.74 (t, *J* = 7.9 Hz, 1H), 6.22 (d, *J* = 8.0 Hz, 1H), 4.82 (s, 1H), 3.31 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.3, 145.3, 133.4, 131.9, 130.3, 130.0, 129.2, 128.3, 126.8, 122.9 122.5, 120.6, 108.7, 63.6, 61.4, 26.8. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}ClNO_2$ $[M+H]^+$:286.0630; found: 286.0614. The minor isomer: **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.79 (d, *J* = 4.0 Hz, 1H), 7.44 (m, 1H), 7.39 – 7.35 (m, 2H), 7.30 – 7.29 (m, 2H), 7.15 – 7.12 (m, 1H), 6.91 (d, *J* = 7.9 Hz, 1H), 4.78 (s, 1H), 3.16 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 169.7, 144.8, 132.5, 130.7, 130.4, 129.7, 129.4, 128.6, 126.2, 123.0 122.8, 121.8, 64.8, 61.5, 29.7, 26.6.

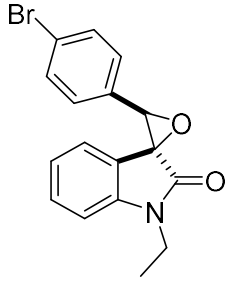


1-benzyl-3'-(4-fluorophenyl)spiro[indoline-3,2'-oxiran]-2-one(3ar): Yellow solid mp: 192-193ºC (88% yields, 182.1 mg, 90:10 dr).**^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.45 (dd, *J* = 8.5, 5.3 Hz, 2H), 7.36 – 7.27 (m, 5H), 7.16 (td, *J* = 7.8, 1.2 Hz, 1H), 7.10 (t, *J* = 8.7 Hz, 2H), 6.79 – 6.72 (m, 2H), 6.43 (d, *J* = 7.5 Hz, 1H), 5.02 – 4.93 (m, 2H), 4.86 (s, 1H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ

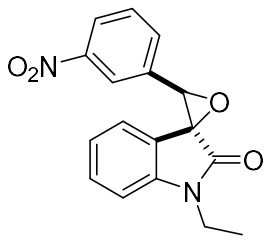
171.7,162.8(d, $J_{F\text{-}C}$ = 246.24 Hz), 144.5, 135.4, 130.3, 129.0 (d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.06 Hz), 128.9, 128.7(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.27 Hz), 127.9, 127.5, 123.7, 122.6, 120.8, 115.7 (d, $J_{F\text{-}C\text{-}C}$ = 21.71 Hz), 109.8, 64.7, 61.6, 44.4. **^{19}F NMR** (377 MHz, Chloroform-*d*) δ -112.15. **HRMS (ESI)**: m/z calcd for $C_{22}H_{16}FNO_2$ $[M+H]^+$: 346.1238; found: 346.1218.



1-benzyl-3'-(4-bromophenyl)spiro[indoline-3,2'-oxiran]-2-one(3as): Brown solid; mp: 193-194ºC (89% yield, 216.3 mg, 89:11dr)). The major isomer: **1H NMR** (400 MHz, Chloroform-d) δ 7.54 (d, J = 8.4 Hz, 2H), 7.36 (s, 1H), 7.34 (d, J = 1.4 Hz, 4H), 7.32 – 7.26 (m, 2H), 7.17 (td, J = 7.8, 1.1 Hz, 1H), 6.81 C 6.74 (m, 2H), 6.45 (d, J = 7.2 Hz, 1H), 5.01 – 4.92 (m, 2H), 4.82 (s, 1H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.6, 144.5, 135.3, 132.3, 131.8, 130.4, 128.9, 128.5, 127.9, 127.5, 123.7, 122.87, 122.7, 120.6, 109.9, 64.7, 61.6, 44.4. **HRMS (ESI)**: m/z calcd for $C_{22}H_{16}BrNO_2$ $[M+H]^+$:406.0438; found: 406.0415. The minor isomer: **^{1}H NMR** (400 MHz, Chloroform-d) δ 7.43(d, j=7.4 Hz, 2H), 7.25 – 7.21(m, 3H), 7.08 (td, J=7.6, 1.0 Hz, 2H), 6.73 (d, J=7.9 Hz, 2H), 5.22(s, 1H), 5.03(s, 2H),4.92 (d, J=3.7 Hz, 3H), 4.65 (d,J=2.8 Hz, 1H)

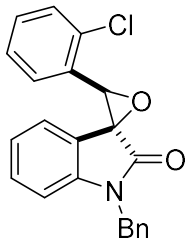


3'-(4-bromophenyl)-1-ethylspiro[indoline-3,2'-oxiran]-2-one (3at): Brown solid; mp: 187-188ºC (85% yield, 174.9 mg, 97:3 dr). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.47 (d, *J* = 8.4 Hz, 2H), 7.24 (dd, *J* = 25.8, 7.5 Hz, 3H), 6.83 (d, *J* = 7.9 Hz, 1H), 6.72 (t, *J* = 7.6 Hz, 1H), 6.38 (d, *J* = 7.5 Hz, 1H), 4.68 (s, 1H), 3.77 (d, *J* = 7.2 Hz, 2H), 1.25 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.2, 144.6, 132.5, 131.8, 130.5, 128.6, 123.9, 122.9, 122.5, 120.89, 109.0, 64.6, 61.7, 35.4, 12.9. **HRMS (ESI)**: m/z calcd for $C_{17}H_{14}BrNO_2$ $[M+H]^+$: 344.0281; found: 344.0264.

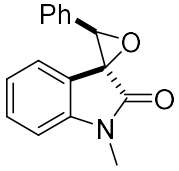


1-ethyl-3'-(3-nitrophenyl)spiro[indoline-3,2'-oxiran]-2-one(3au): Brown solid mp: 205-206ºC (86% yield, 146 mg, 96:4 dr). **^{1}H NMR** (400

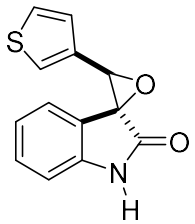
MHz, Chloroform-*d*) δ 8.34 (s, 1H), 8.27 – 8.23 (m, 1H), 7.85 (d, *J* = 7.7 Hz, 1H), 7.65 (t, *J* = 8.0 Hz, 1H), 7.31 (td, *J* = 7.8, 1.1 Hz, 1H), 6.94 (d, *J* = 7.9 Hz, 1H), 6.80 – 6.75 (m, 1H), 6.41 – 6.36 (m, 1H), 4.87 (s, 1H), 3.86 (q, *J* = 7.2 Hz, 2H), 1.34 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 170.5, 148.3, 144.6, 135.6, 132.9, 130.7, 129.8, 123.74, 123.4, 122.5, 121.9, 120.1, 109.2, 63.9 61.8, 35.4, 12.7. **HRMS (ESI)**: m/z calcd for $C_{17}H_{14}N_2O_4$ $[M+H]^+$: 311.1027; found: 311.1019.



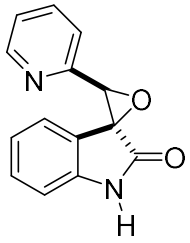
1-benzyl-3'-(2-chlorophenyl)spiro[indoline-3,2'-oxiran]-2-one (3av): Brown solid, mp: 205-206ºC (88% yield, 190 mg, 96:4 dr). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.66 (d, *J* = 7.1 Hz, 1H), 7.34 (td, *J* = 7.4, 1.5 Hz, 1H), 7.29 – 7.24 (m, 3H), 7.23 – 7.17 (m, 4H), 7.06 (td, *J* = 7.8, 1.2 Hz, 1H), 6.65 (d, *J* = 7.9 Hz, 1H), 6.61 (td, *J* = 7.6, 0.7 Hz, 1H), 6.17 – 6.11 (m, 1H), 5.06 (d, *J* = 15.8 Hz, 1H), 4.82 (d, *J* = 15.8 Hz, 1H), 4.80 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 166.7, 139.5, 130.6, 128.6, 127.2, 125.5, 125.3, 124.5, 124.1, 123.6, 123.1, 122.4, 122.1, 118.1, 117.8, 115.8, 105.1, 59.3, 56.7, 39.4. **HRMS (ESI)**: m/z calcd for $C_{22}H_{16}ClNO_2$ $[M+H]^+$:362.0943; found: 362.0944.



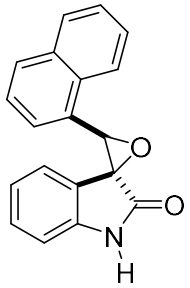
1-methyl-3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3aw): White solid, mp: 158-159 ºC (94%yield, 141.5 mg, 99:1 dr)).**^{1}H NMR** (400 MHz, Chloroform-d) δ 7.30 (dt, J = 22.2, 7.8 Hz, 5H), 7.16 (t, J = 7.8 Hz, 1H), 6.75 (d, J = 7.8 Hz, 1H), 6.65 (t, J = 7.6 Hz, 1H), 6.37 (d, J = 7.5 Hz, 1H), 4.72 (s, 1H), 3.17 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 171.7, 145.3, 133.2, 130.2, 128.7, 128.5, 126.7, 123.7, 122.5, 121.0, 108.6, 65.1, 61.6, 26.7. **HRMS (ESI)**: m/z calcd for $C_{16}H_{13}NO_2$ $[M+H]^+$: 252.1020; found: 252.1007.



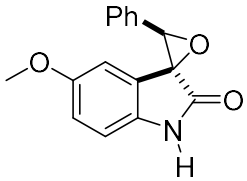
3'-(thiophen-3-yl)spiro[indoline-3,2'-oxiran]-2-one(3ax): White solid, mp: (84% yield, 122.4 mg, 99:1 dr). **^{1}H NMR** (400 MHz, DMSO-d6) δ 10.86 (s, 1H), 7.69 – 7.66 (m, 1H), 7.61 (dd, J = 5.0, 3.0 Hz, 1H), 7.25 (td, J = 7.7, 1.2 Hz, 1H), 7.20 (dd, J = 5.0, 1.2 Hz, 1H), 6.91 (d, J = 7.7 Hz, 1H), 6.77 (td, J = 7.6, 0.9 Hz, 1H), 6.55 – 6.51 (m, 1H), 4.65 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d6) δ 172.2, 143.8, 134.5, 130.3, 127.1, 126.7, 124.1, 123.1, 121.5, 120.9, 110.6, 61.9, 61.5. **HRMS (ESI)**: m/z calcd for $C_{13}H_9NO_2S[M+H]^+$: 243.0354; found: 243.0353.



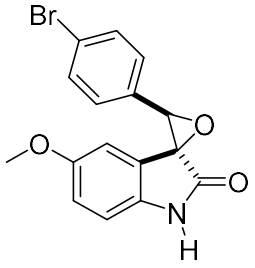
3'-(pyridin-2-yl)spiro[indoline-3,2'-oxiran]-2-one (3ay)： Yellow solid, mp: 225-226 ºC (90% yield, 128.5 mg, 99:1 dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.95 (s, 1H), 8.58 (d, J = 4.4 Hz, 1H), 7.93 (t, J = 7.7 Hz, 1H), 7.68 (d, J = 7.8 Hz, 1H), 7.44 – 7.40 (m, 1H), 7.24 (t, J = 7.6 Hz, 1H), 6.92 (d, J = 7.8 Hz, 1H), 6.74 (t, J = 7.6 Hz, 1H), 6.55 (d, J = 7.5 Hz, 1H), 4.68 (s, 1H). **^{13}C NMR** (100MHz, DMSO-d_6) δ 171.8, 152.7, 149.5, 143.8, 137.0, 130.6, 123.8, 123.3, 121.8, 121.7, 120.4, 110.8, 64.5, 61.4. **HRMS (ESI)**: m/z calcd for $C_{14}H_{10}N_2O_2$ $[M+H]^+$: 238.0742; found: 238.0744**.**



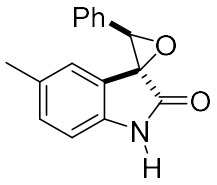
3'-(naphthalen-2-yl)spiro[indoline-3,2'-oxiran]-2-one (3az): Yellow solid, mp: 248-250 ºC (83% yield, 142.9 mg, 99:1 dr); **^{1}H NMR** (400 MHz, DMSO-d6) δ 10.97 (s, 1H), 8.01 – 7.95 (m, 2H), 7.77 (d, J = 7.0 Hz, 1H), 7.68 – 7.63 (m, 2H), 7.49 (pd, J = 6.9, 1.5 Hz, 2H), 7.13 (td, J = 7.7, 1.2 Hz, 1H), 6.88 (d, J = 7.7 Hz, 1H), 6.54 (td, J = 7.6, 0.9 Hz, 1H), 6.10 (s, 1H), 5.16 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d6) δ 172.2, 143.6, 132.8, 130.4, 130.3, 129.3, 128.9, 128.7, 126.9, 126.3, 125.3, 124.2, 122.5, 122.5, 121.5, 120.6, 110.7, 63.7, 61.9. **HRMS (ESI)**: m/z calcd for $C_{19}H_{13}NO_2$ $[M+H]^+$: 287.0946; found: 287.0944.



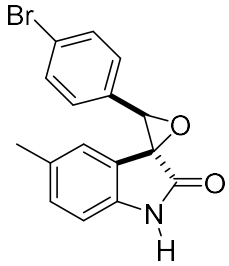
5-methoxy-3'-phenylspiro[indoline-3,2'-oxiran]-2-one(3ba): Brown solid; mp: 192-193ºC (93% yield, 148.9 mg, 91:9 dr)). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.69 (s, 1H), 7.52 – 7.40 (m, 5H), 6.83 – 6.79 (m, 2H), 5.93 (d, J = 2.1 Hz, 1H), 4.72 (s, 1H), 3.43 (s, 3H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.5, 154.7, 137.4, 133.6, 129.1, 128.8, 127.2, 122.4, 115.4, 111.5, 110.5, 64.7, 62.1, 55.6. **HRMS (ESI)**: m/z calcd for $C_{16}H_{13}NO_3$ $[M-H]^-$:266.0822; found: 266.0822.



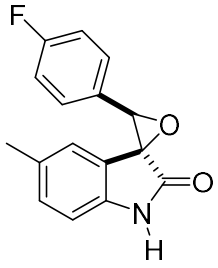
3'-(4-bromophenyl)-5-methoxyspiro[indoline-3,2'-oxiran]-2-one (3bb): Yellow solid; mp: 197-198ºC (92% yield , 190.9 mg, 92:8 dr).**^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.54 (s, 1H), 7.57 (d, *J* = 8.4 Hz, 2H), 7.35 (d, *J* = 8.3 Hz, 2H), 6.84 (d, *J* = 8.5 Hz, 1H), 6.77 (dd, *J* = 8.5, 2.5 Hz, 1H), 6.01 (d, *J* = 2.4 Hz, 1H), 4.75 (s, 1H), 3.53 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 173.4, 155.5, 135.5, 132.1, 131.7, 128.5, 122.9, 122.0, 115.5, 111.3, 110.5, 64.5, 55.5, 29.7. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}BrNO_2$ $[M+H]^+$:346.0074; found: 346.0056.



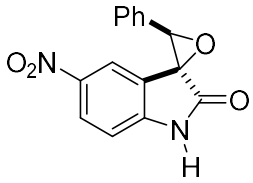
5-methyl-3'-phenylspiro[indoline-3,2'-oxiran]-2-one(3bc): Yellow solid; mp: 170-171 ºC (89% yield, 134.0 mg, 95:5 dr). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.92 (s, 1H), 7.36 (ddd, *J* = 17.4, 12.2, 6.8 Hz, 5H), 6.94 (d, *J* = 7.8 Hz, 1H), 6.76 (d, *J* = 7.9 Hz, 1H), 6.19 (s, 1H), 4.74 (s, 1H), 1.98 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ173.0, 138.9, 132.1, 131.0, 129.5, 127.7, 127.4, 125.8, 123.8, 120.2, 109.4, 64.1, 60.9, 19.9. **HRMS (ESI)**: m/z calcd for $C_{16}H_{13}NO_2$ $[M+H]^+$: 252.1020; found: 252.1007.



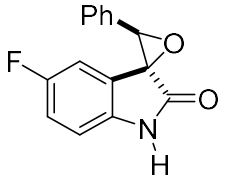
3'-(4-bromophenyl)-5-methylspiro[indoline-3,2'-oxiran]-2-one(3bd): Brown solid; mp: 193-194ºC (86% yield, 170.2 mg, 93:7 dr)). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.96 (s, 1H), 7.56 (d, *J* = 8.4 Hz, 2H), 7.35 (d, *J* = 8.3 Hz, 2H), 7.04 (d, *J* = 8.7 Hz, 1H), 6.84 (d, *J* = 7.9 Hz, 1H), 6.27 (s, 1H), 4.73 (s, 1H), 2.10 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 174.0, 140.1, 132.4, 132.3, 131.8, 130.9, 128.6, 124.7, 122.9, 120.9, 110.8, 64.7, 62.2, 21.2. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}BrNO_2$ $[M+H]^+$: 330.0125; found: 330.3349.



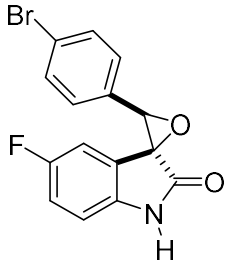
3'-(4-fluorophenyl)-5-methylspiro[indoline-3,2'-oxiran]-2-one(3be): Yellow solid; mp: 178-179ºC (83% yield, 133.9 mg, 90:10 dr). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 9.10 (s, 1H), 7.45 (dd, *J* = 8.6, 5.3 Hz, 2H), 7.13 (t, *J* = 8.6 Hz, 2H), 7.04 (d, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 7.9 Hz, 1H), 6.23 (s, 1H), 4.77 (s, 1H), 2.08 (s, 3H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 174.1, 162.8(d, $J_{F\text{-}C}$ = 246.1 Hz), 140.0, 132.2, 130.7, 128.9(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.12 Hz), 128.7(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.25 Hz), 124.6, 121.0, 115.6(d, $J_{F\text{-}C\text{-}C}$ =21.73 Hz), 110.7, 64.5, 62.1, 21.0. **^{19}F NMR** (377 MHz, Chloroform-*d*) δ -112.29. **HRMS (ESI)**: m/z calcd for $C_{16}H_{12}FNO_2$ $[M+H]^+$:270.0925; found: 270.0911.



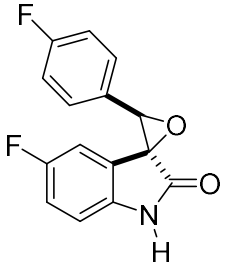
5-nitro-3'-phenylspiro[indoline-3,2'-oxiran]-2-one(3bf): Brown solid; mp: 189-190 ºC (78% yield,131.9 mg, 90:10 dr)). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 11.59 (s, 1H), 8.19 (dd, *J* = 8.6, 2.0 Hz, 1H), 7.60 – 7.43 (m, 5H), 7.10 (d, *J* = 8.5 Hz, 2H), 4.86 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.9, 150.5, 142.1, 133.0, 129.5, 129.0, 127.7, 127.2, 122.5, 118.7, 111.2, 65.3, 61.4.**HRMS (ESI)**: m/z calcd for $C_{15}H_{10}N_2O_4$ $[M-H]^-$:281.0567; found: 281.0566.



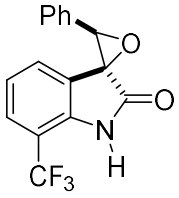
5-fluoro-3'-phenylspiro[indoline-3,2'-oxiran]-2-one(3bg): Brown solid; mp: 198-199 ºC (91% yield, 139.2 mg, 92:8 dr)). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 9.00 (s, 1H), 7.38 (s, 5H), 6.93 – 6.72 (m, 2H), 6.13 (d, *J* = 7.3 Hz, 1H), 4.77 (s, 1H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 174.1, 158.6 (d, $J_{F\text{-}C}$ = 239.8 Hz), 138.2, 132.5, 129.1, 128.7, 126.6, 122.9 (d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.48 Hz), 116.8 (d, $J_{F\text{-}C\text{-}C}$ = 23.71 Hz), 112.0 (d, $J_{F\text{-}C\text{-}C}$ = 25.97 Hz), 111.4 (d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.08Hz), 65.4, 61.9. **^{19}F NMR** (377 MHz, Chloroform-*d*) δ -119.46. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}FNO_2$ $[M+H]^+$: 254.0622; found: 254.0620.



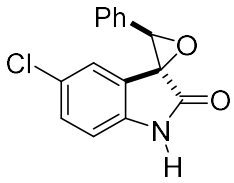
(3S,3'R)-3'-(4-bromophenyl)-5-fluorospiro[indoline-3,2'-oxiran]-2-one (3bh): Brown solid; mp: 185-186°C (80% yields, 159.8 mg, 95:5 dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.93 (s, 1H), 7.65 (d, J = 8.4 Hz, 2H), 7.47 (d, J = 8.4 Hz, 2H), 7.11 (td, J = 9.1, 2.7 Hz, 1H), 6.91 (dd, J = 8.6, 4.4 Hz, 1H), 6.15 (dd, J = 8.4, 2.6 Hz, 1H), 4.72 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 171.9, 157.3 (d, J = 237.4 Hz), 140.1 (d, J = 1.6 Hz), 132.3, 131.5, 129.0, 122.3 (d, J = 8.6 Hz), 122.0, 116.9 (d, J = 23.3 Hz), 111.7 (d, J = 8.0 Hz), 110.6 (d, J = 25.7 Hz), 64.1, 61.7. **^{19}F NMR** (377 MHz, DMSO-d_6) δ -121.21. **HRMS (ESI)**: m/z calcd for $C_{15}H_9FNO_2$ [M-H]$^-$:331.9727; found: 331.9731.



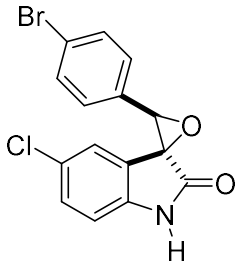
5-fluoro-3'-(4-fluorophenyl)spiro[indoline-3,2'-oxiran]-2-one (3bi): Brown solid; mp: 209-210°C (79% yield, 129.4 mg, 85:15 dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.85 (s, 1H), 7.49 (dd, J = 8.5, 5.5 Hz, 2H), 7.21 (t, J = 8.8 Hz, 2H), 7.02 (td, J = 9.5, 2.7 Hz, 1H), 6.83 (dd, J = 8.6, 4.4 Hz, 1H), 6.03 (dd, J = 8.4, 2.6 Hz, 1H), 4.66 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.4, 162.6(d, $J_{F\text{-}C}$ = 243.58 Hz), 157.6(d, $J_{F\text{-}C}$ =235.72 Hz), 140.5, 129.5, 129.5(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.5 Hz), 122.9(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.77 Hz), 117.3(d, $J_{F\text{-}C\text{-}C}$ = 23.11 Hz), 115.9 (d, $J_{F\text{-}C\text{-}C}$ = 21.65 Hz), 112.0(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 7.99 Hz), 111.0(d, $J_{F\text{-}C\text{-}C}$ = 25.81 Hz), 64.5, 62.1. **^{19}F NMR** (377 MHz, DMSO-d_6) δ -112.64, -121.39. **HRMS (ESI)**: m/z calcd for $C_{15}H_9F_2NO_2$ [M-H]$^-$:272.0528; found: 272.0527.



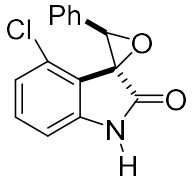
3'-phenyl-7-(trifluoromethyl)spiro[indoline-3,2'-oxiran]-2-one (3bj): Yellow solid; mp: 190-191 °C (93% yield, 170.1 mg, 93:7 dr)). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 11.30 (s, 1H), 7.44 (d, J = 7.1 Hz, 3H), 7.35 (q, J = 9.7, 8.1 Hz, 3H), 6.81 (t, J = 7.7 Hz, 1H), 6.48 (d, J = 7.4 Hz, 1H), 4.72 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 173.1, 141.5 (d, J = 2.1 Hz), 133.1, 129.3, 128.9, 127.3, 127.1, 127.1, 123.8 (d, J = 271.9 Hz), 123.3, 122.0, 112.1 (d, J = 33.0 Hz), 65.5, 60.9. **^{19}F NMR** (377 MHz, DMSO-d_6) δ -60.20. **HRMS (ESI)**: m/z calcd for $C_{16}H_{10}F_3NO_2$ [M-H]$^-$:304.0590; found: 304.0590.



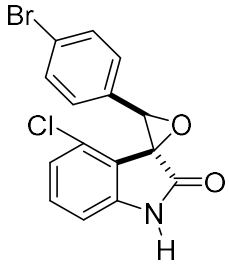
5-chloro-3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3bk): Brown solid; mp: 189-190 ºC (80% yield, 130.0 mg, 93:7dr)).**^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.95 (s, 1H), 7.38 (s, 5H), 7.13 (d, *J* = 6.9 Hz, 1H), 6.81 (d, *J* = 8.2 Hz, 1H), 6.35 (s, 1H), 4.76 (s, 1H). **^{13}C NMR** (100 MHz, Chloroform-*d*) δ 173.7, 140.8, 132.4, 130.2, 129.2, 128.7, 128.0, 126.7, 124.4, 123.0, 111.7, 65.4, 61.7.**HRMS (ESI)**: m/z calcd for $C_{15}H_{10}ClNO_2$ $[M-H]^-$:270.0327; found: 270.0330.



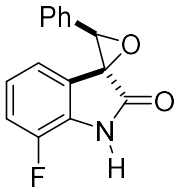
3'-(4-bromophenyl)-5-chlorospiro[indoline-3,2'-oxiran]-2-one (3bl): Brown solid; mp: 193-194ºC (74% yield, 154.9 mg, 88:12 dr).**^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.97 (s, 1H), 7.59 (d, *J* = 8.4 Hz, 2H), 7.40 (d, *J* = 8.3 Hz, 2H), 7.23 (dd, *J* = 8.3, 2.2 Hz, 1H), 6.84 (d, *J* = 8.3 Hz, 1H), 6.22 (d, *J* = 2.1 Hz, 1H), 4.65 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.1, 143.3, 132.7, 131.9, 130.7, 129.5, 125.9, 123.2, 123.2, 122.4, 112.6, 64.6, 61.9. **HRMS (ESI)**: m/z calcd for $C_{15}H_9BrClNO_2$ $[M-H]^-$: 347.9432; found: 347.9438.



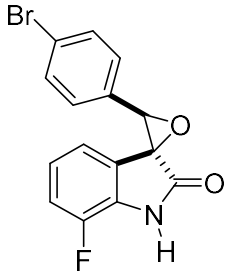
4-chloro-3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3bm): Brown solid; mp: 180-181ºC (76% yield, 123.6 mg, 95:5 dr)). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.79 (s, 1H), 7.53 – 7.45 (m, 2H), 7.28 – 7.23 (m, 4H), 6.96 (d, *J* = 8.2 Hz, 1H), 6.80 (d, *J* = 7.7 Hz, 1H), 5.25 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 170.3, 145.4, 132.2, 132.0, 129.4, 128.8, 128.1, 127.9, 123.4, 119.5, 110.0, 62.7, 62.2. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}ClNO_2$ $[M+H]^+$: 272.0473; found: 272.0465.



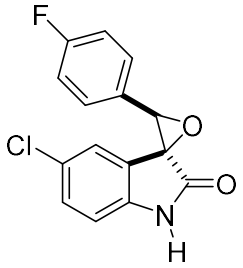
3'-(4-bromophenyl)-4-chlorospiro[indoline-3,2'-oxiran]-2-one (3bn): Brown solid; mp: 184-185ºC (78% yield, 163.3 mg, 85:15 dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.83 (s, 1H), 7.46 (d, J = 2.7 Hz, 4H), 7.26 (t, J = 8.0 Hz, 1H), 6.97 (d, J = 8.2 Hz, 1H), 6.80 (d, J = 7.8 Hz, 1H), 5.25 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 170.5, 145.5, 132.3, 131.6, 130.8, 130.3, 129.5, 123.5, 122.0, 119.3, 110.0, 62.5, 61.6. **HRMS (ESI)**: m/z calcd for $C_{15}H_9BrClNO_2$ $[M-H]^-$:347.9432; found: 349.9407.



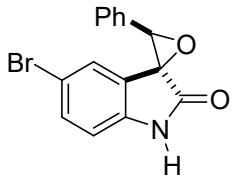
7-fluoro-3'-phenylspiro[indoline-3,2'-oxiran]-2-one (3bo): Brown solid; mp: 185-186ºC (84% yield, 128.5 mg, 90:10 dr)). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 11.35 (s, 1H), 7.41 (d, J = 6.9 Hz, 2H), 7.38 – 7.29 (m, 3H), 7.12 – 7.05 (m, 1H), 6.65 (td, J = 8.0, 4.8 Hz, 1H), 6.11 (d, J = 7.5 Hz, 1H), 4.67 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.4, 147.2 (d, $J_{F\text{-}C}$ = 241.3 Hz), 133.3, 131.3 (d, $J_{F\text{-}C\text{-}C}$ = 13.21 Hz), 129.2, 128.9, 127.2, 124.3 (d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 4.15 Hz), 122.8 (d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 5.87 Hz), 119.6 (d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.25 Hz), 117.9, (d, $J_{F\text{-}C\text{-}C}$ = 16.96 Hz), 65.2, 62.0 (d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 4.48 Hz). **^{19}F NMR** (377 MHz, DMSO-d_6) δ -132.84. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}FNO_2$ $[M+H]^+$: 256.0769; found: 256.0761.



3'-(4-bromophenyl)-7-fluorospiro[indoline-3,2'-oxiran]-2-one (3bp): Yellow solid; mp: 216-127ºC (78% yield, 155.8 mg, 89:11 dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 11.35 (s, 1H), 7.55 (d, J = 8.4 Hz, 2H), 7.39 (d, J = 8.4 Hz, 2H), 7.14 – 7.07 (m, 1H), 6.70 (td, J = 8.0, 4.8 Hz, 1H), 6.12 (d, J = 7.5 Hz, 1H), 4.64 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.2, 147.2 (d, $J_{F\text{-}C}$ = 241.5 Hz), 132.8, 131.8, 131.3 (d, $J_{F\text{-}C\text{-}C}$ = 13.32 Hz), 129.5, 124.1(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 4.16 Hz), 123.0(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 5.91 Hz), 122.4, 119.5(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 3.07 Hz), 118.0(d, $J_{F\text{-}C\text{-}C}$ = 16.9 Hz), 64.7, 62.1(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 4.48 Hz). **^{19}F NMR** (377 MHz, DMSO-d_6) δ -132.74. **HRMS (ESI)**: m/z calcd for $C_{15}H_9BrFNO_2$ $[M-H]^-$: 331.9727; found: 331.9728.

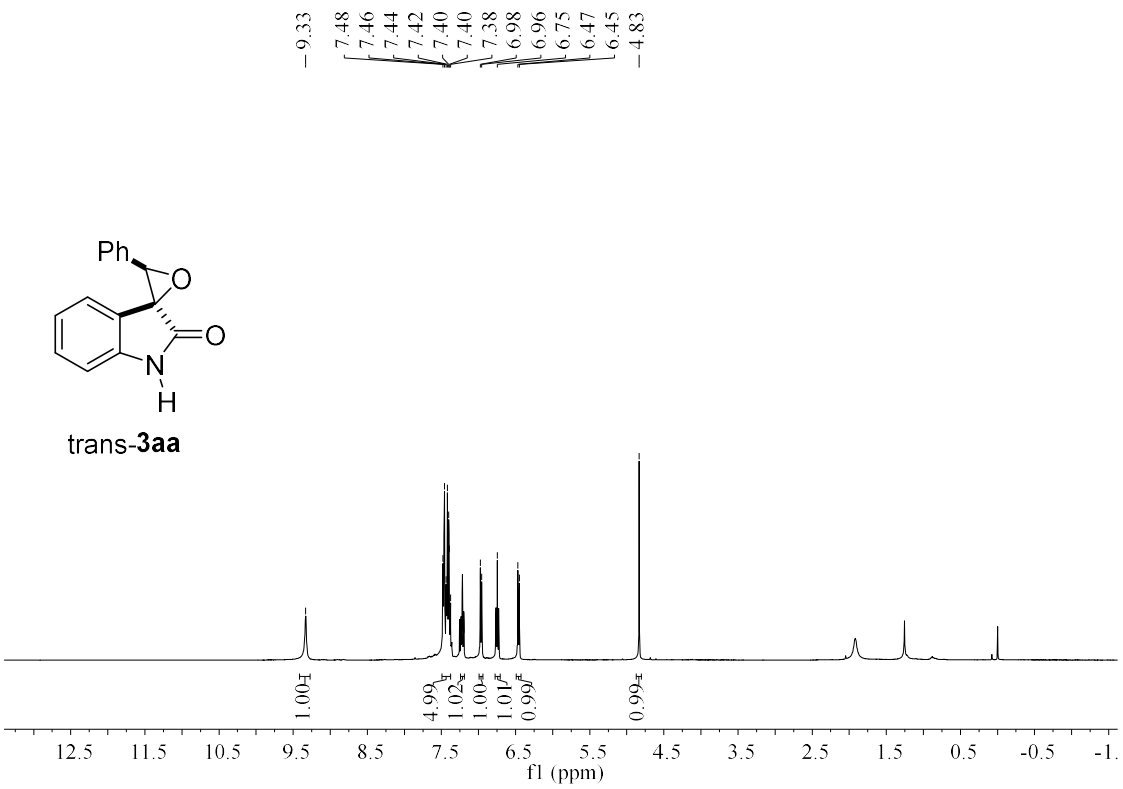


5-chloro-3'-(4-fluorophenyl)spiro[indoline-3,2'-oxiran]-2-one(3bq): Brown solid; mp: 190-191ºC (82% yield, 150.0 mg, 88:12 dr). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 11.10 (s, 1H), 7.63 (dd, J = 8.3, 5.6 Hz, 2H), 7.40 – 7.32 (m, 3H), 6.98 (d, J = 8.3 Hz, 1H), 6.31 (d, J = 1.8 Hz, 1H), 4.80 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.1, 162.6(d, $J_{F\text{-}C}$ = 243.34 Hz), 143.2, 130.6, 130.5 ,129.6 ,129.5(d, $J_{F\text{-}C\text{-}C\text{-}C}$ = 8.56 Hz), 125.8, 123.3(d, $J_{F\text{-}C\text{-}C\text{-}C\text{-}C}$ = 4.42 Hz), 115.9(d, $J_{F\text{-}C\text{-}C}$ = 21.67 Hz), 112.5, 64.5, 61.8. **^{19}F NMR** (377 MHz, DMSO-d_6) δ -112.56. **HRMS (ESI)**: m/z calcd for $C_{15}H_9ClFNO_2$ [M-H]$^-$: 288.0233; found: 288.0232.

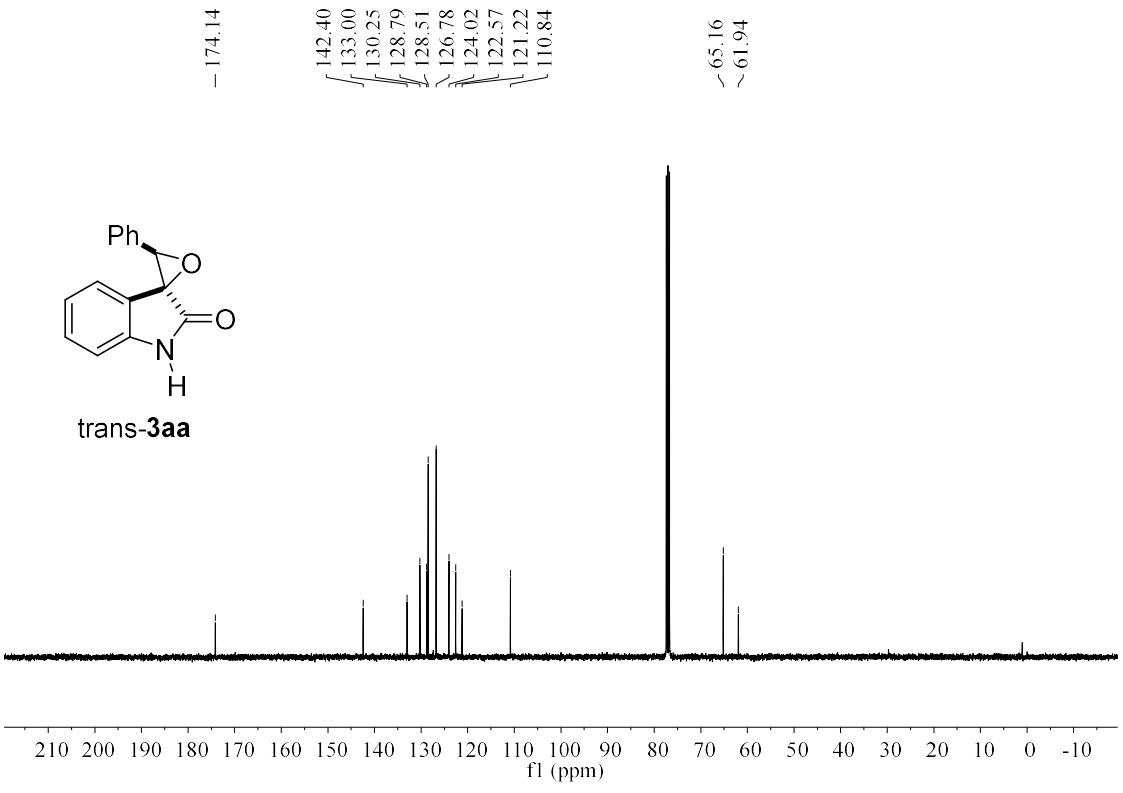


5-bromo-3'-phenylspiro[indoline-3,2'-oxiran]-2-one(3br): Brown solid; mp: 181-182 ºC (85% yield, 160.6 mg, 97:3 dr)). **^{1}H NMR** (400 MHz, DMSO-d_6) δ 10.95 (s, 1H), 7.41 (t, J = 8.4 Hz, 4H), 7.36 – 7.31 (m, 2H), 6.78 (d, J = 8.3 Hz, 1H), 6.30 (d, J = 2.0 Hz, 1H), 4.67 (s, 1H). **^{13}C NMR** (100 MHz, DMSO-d_6) δ 172.1, 143.6, 133.4, 133.3, 129.3, 128.9, 127.2, 126.1, 123.8, 113.4, 113.0, 65.0, 61.7. **HRMS (ESI)**: m/z calcd for $C_{15}H_{10}BrNO_2$ [M-H]$^-$: 313.9822; found:313.9826.

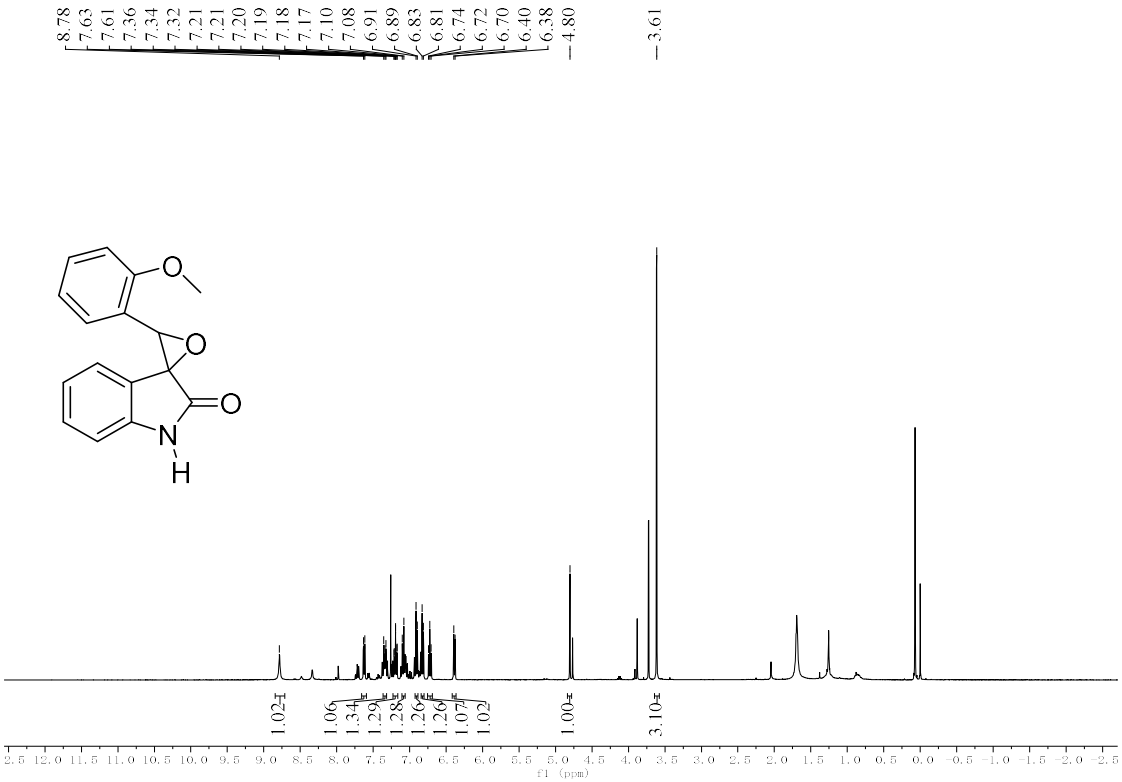
IV Spectroscopic of Compounds **3**



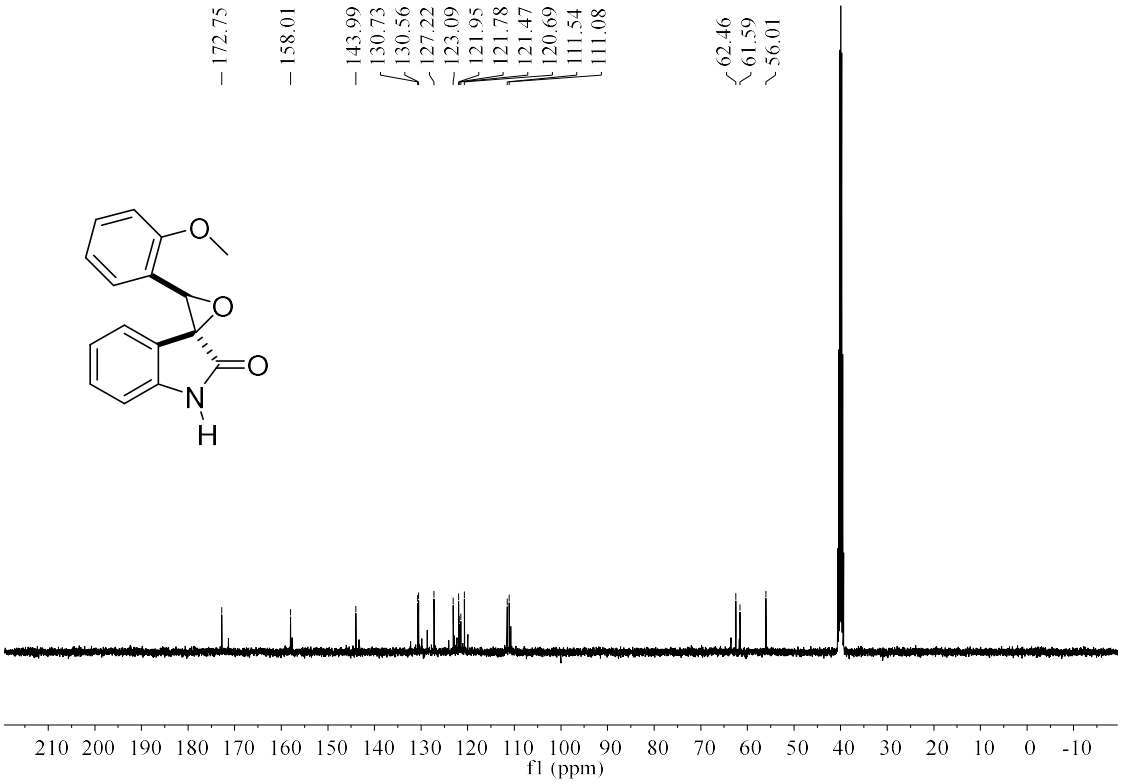
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3aa**



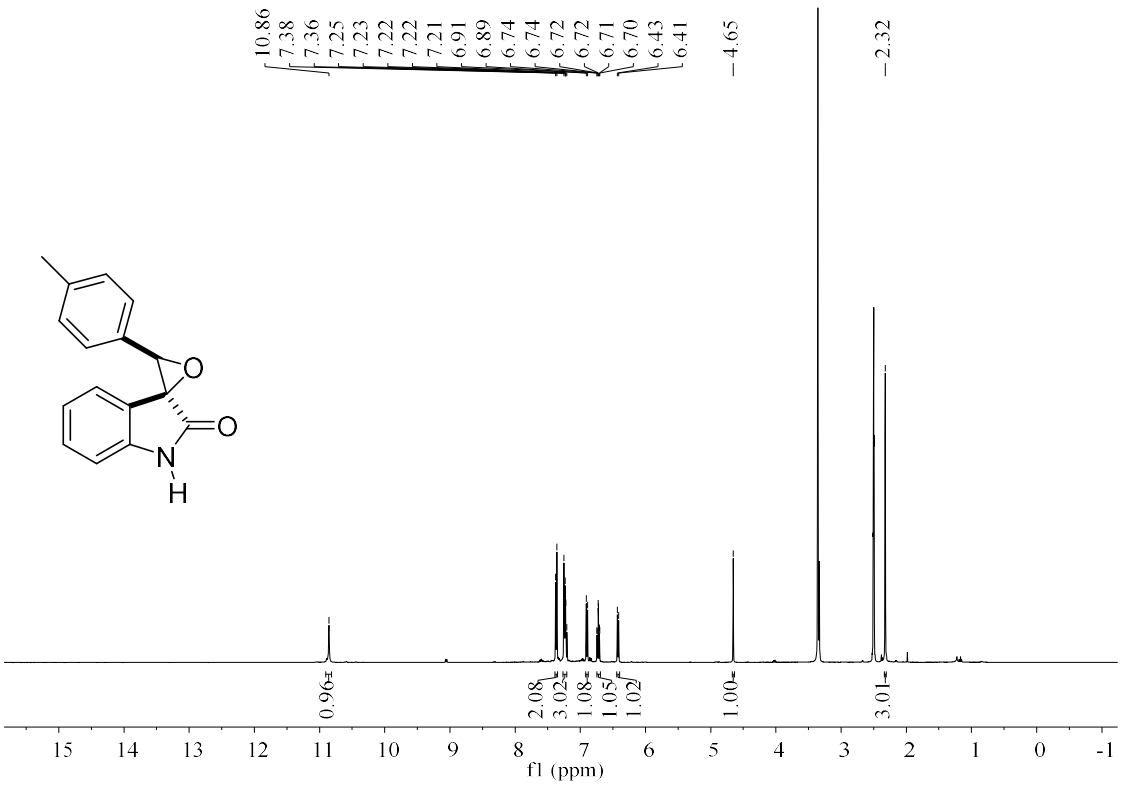
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3aa**



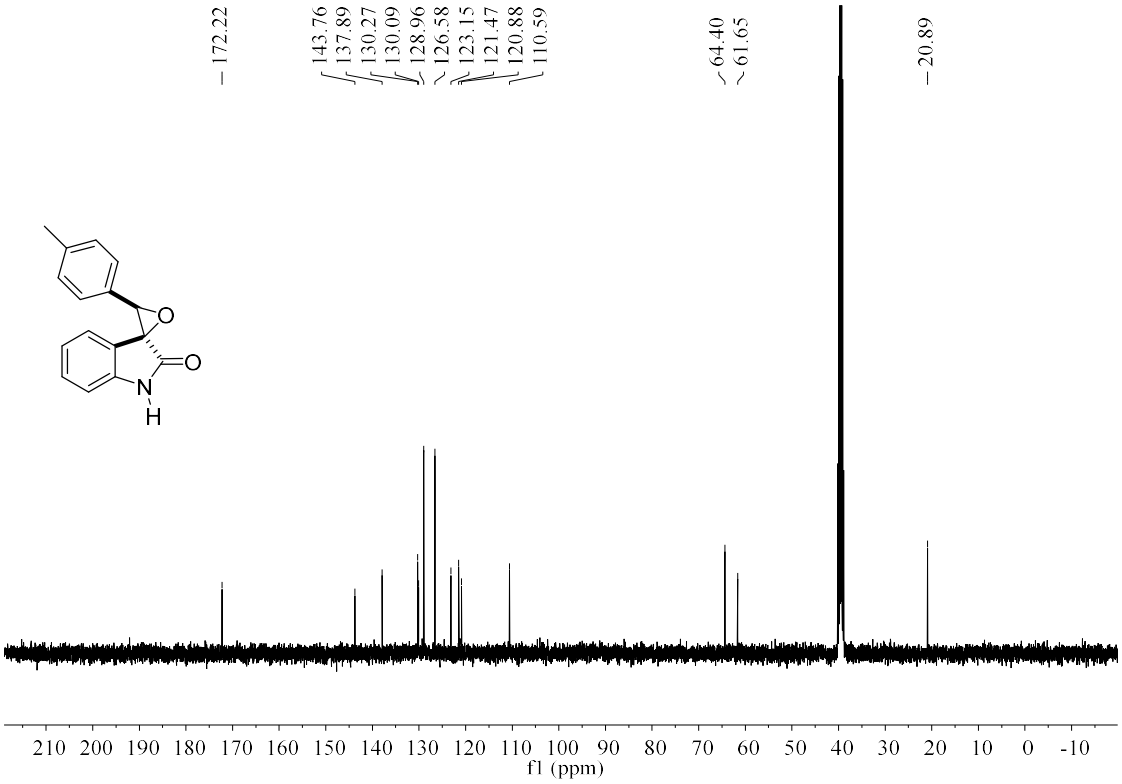
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ab**



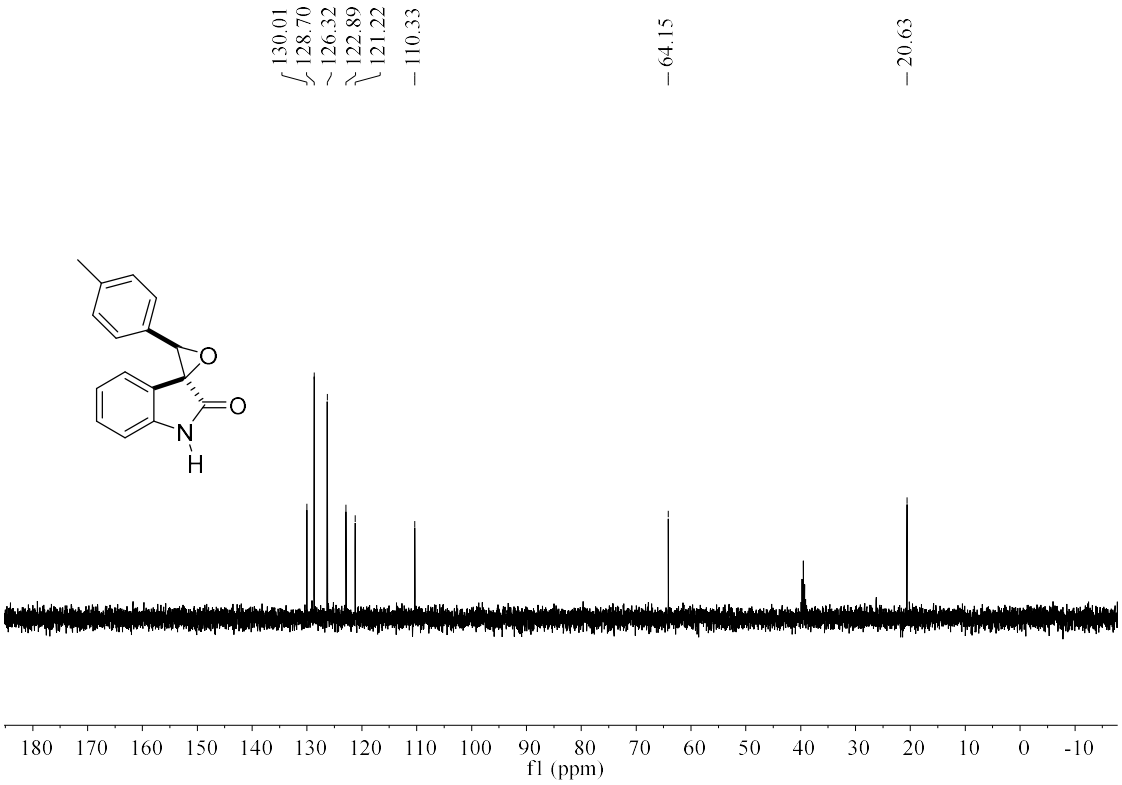
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3ab**



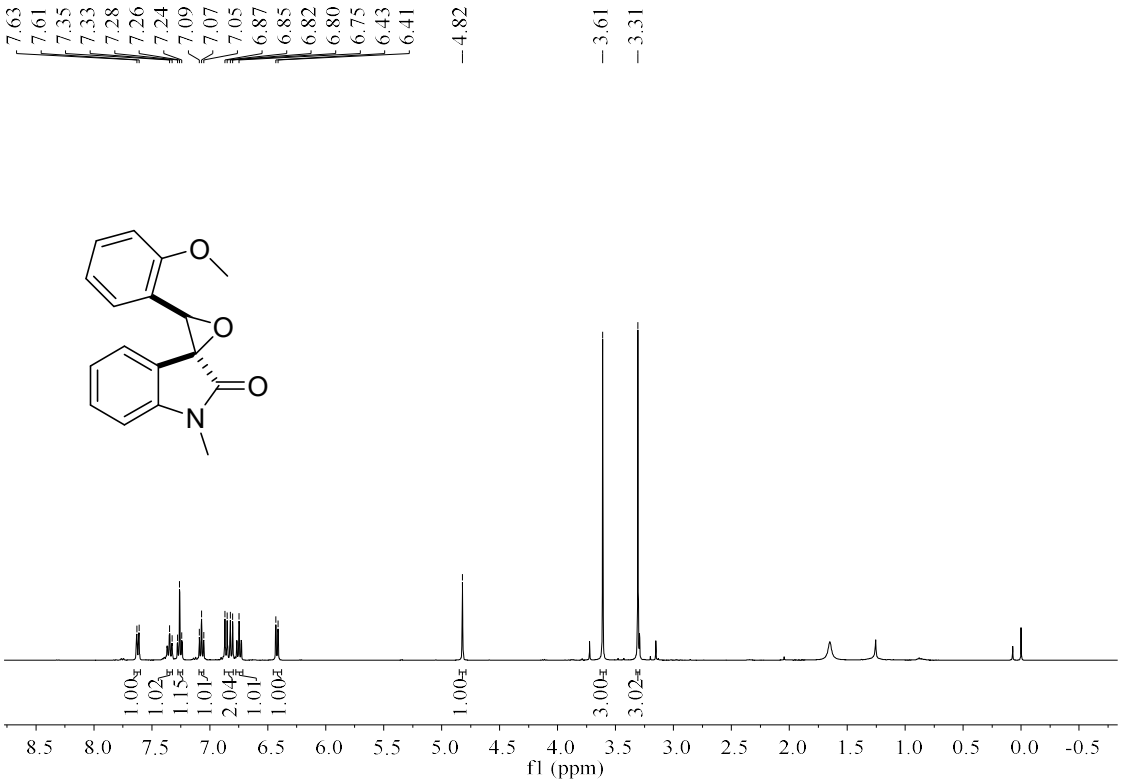
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ac**



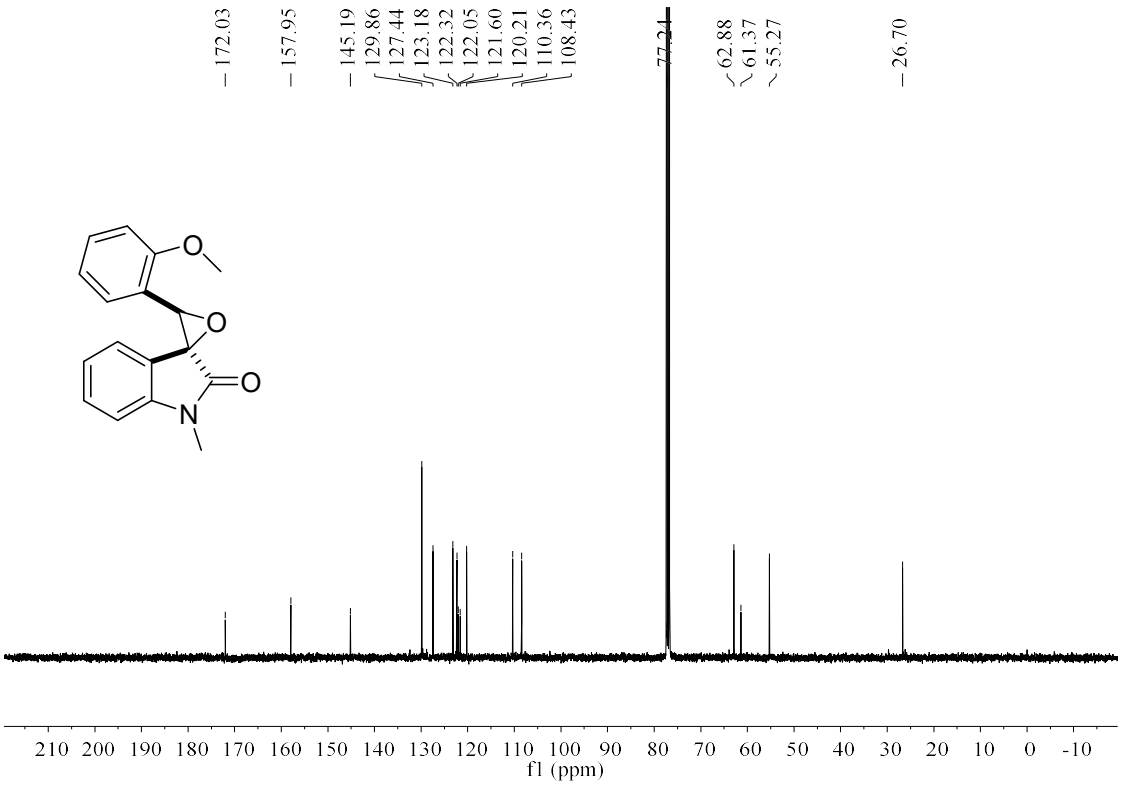
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ac**



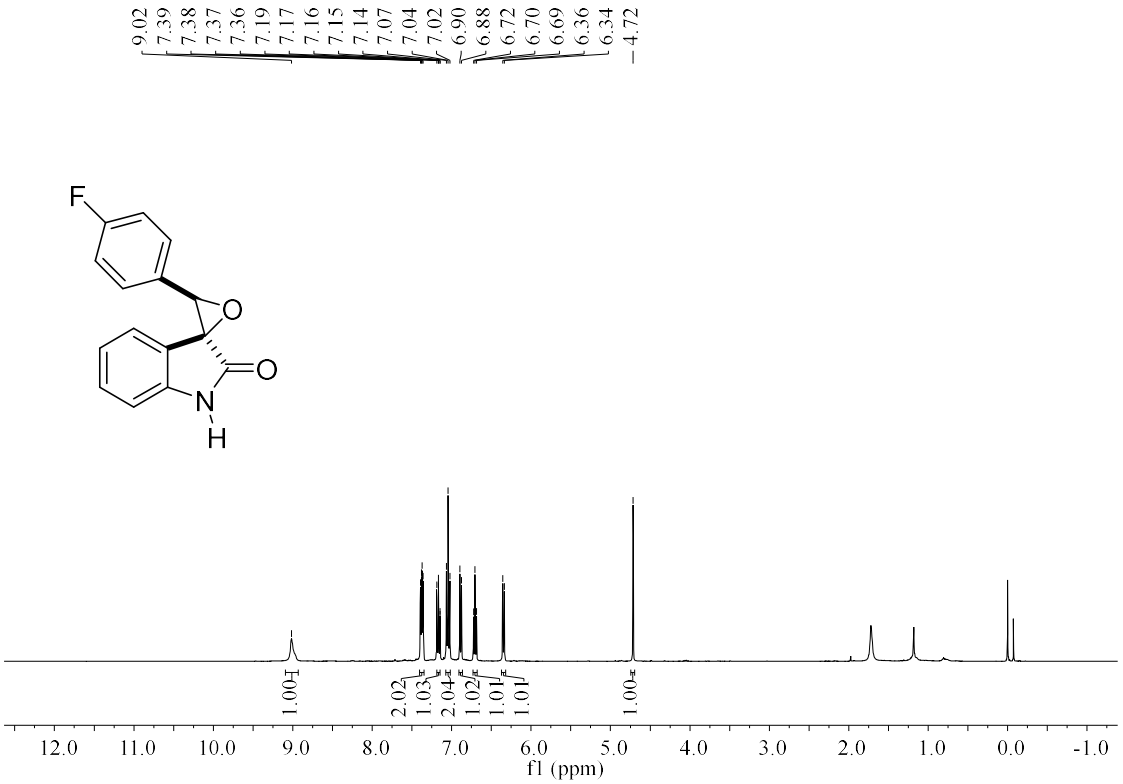
DEPT135° spectrum of 3ac



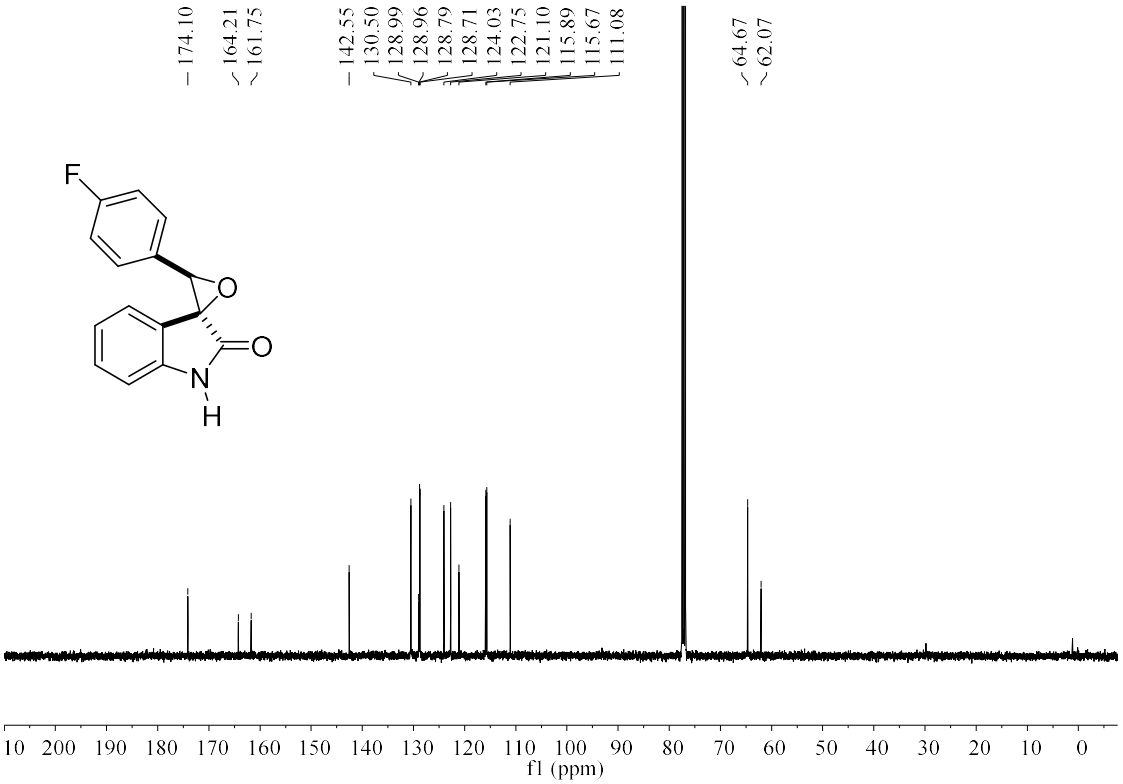
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ad**



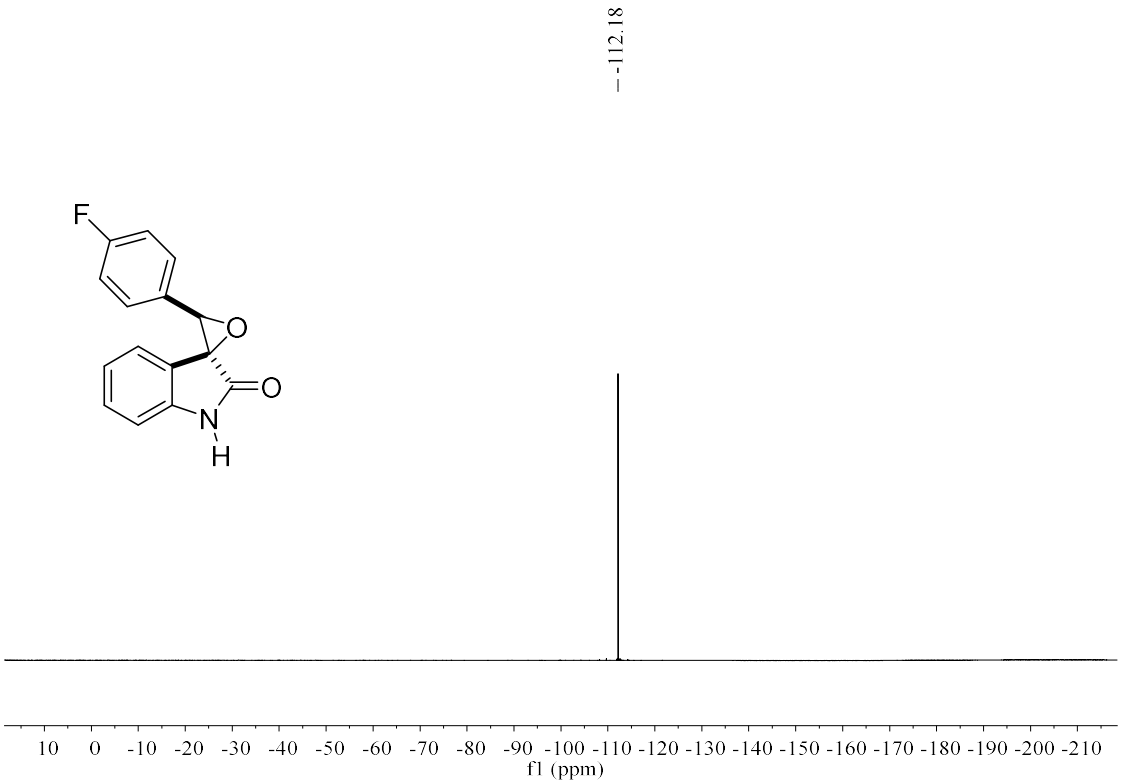
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ad**



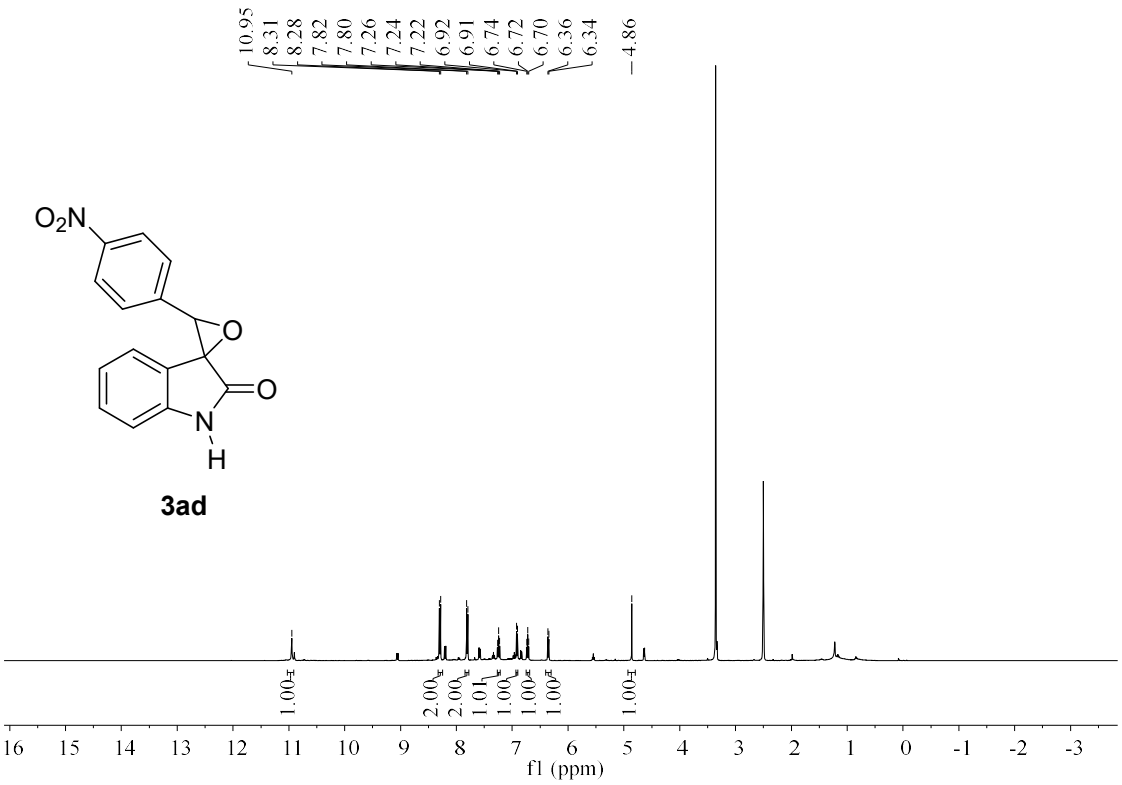
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ae**



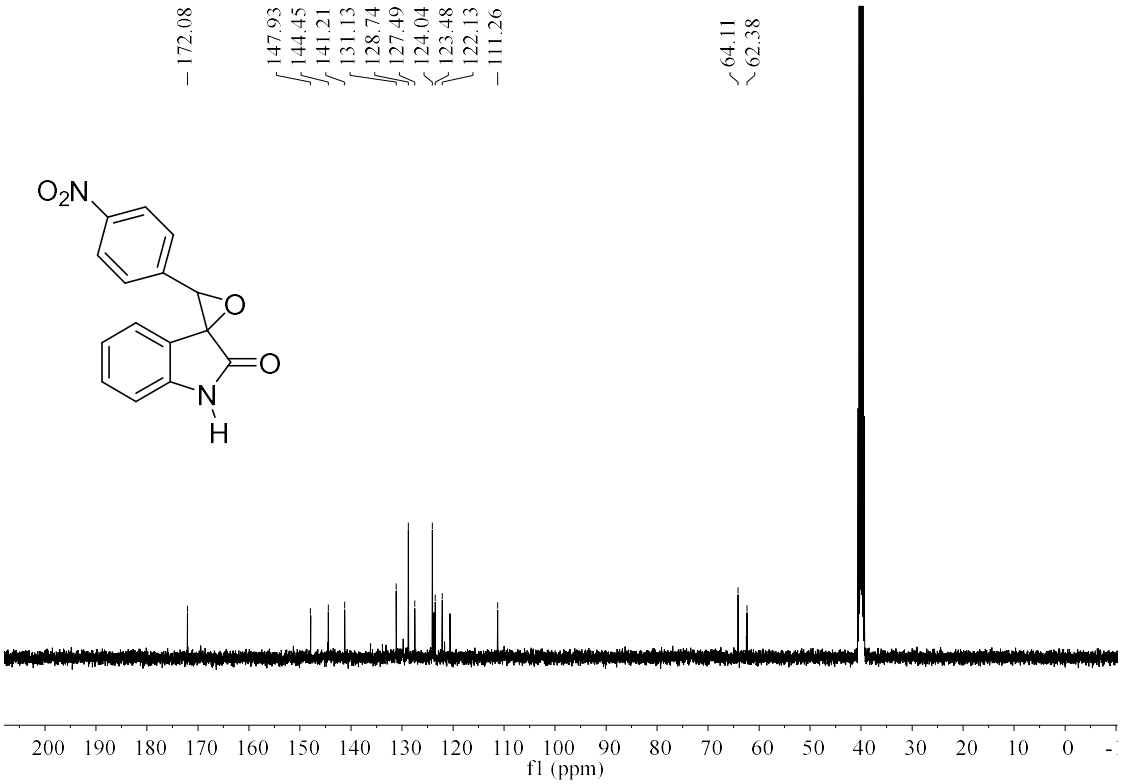
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ae**



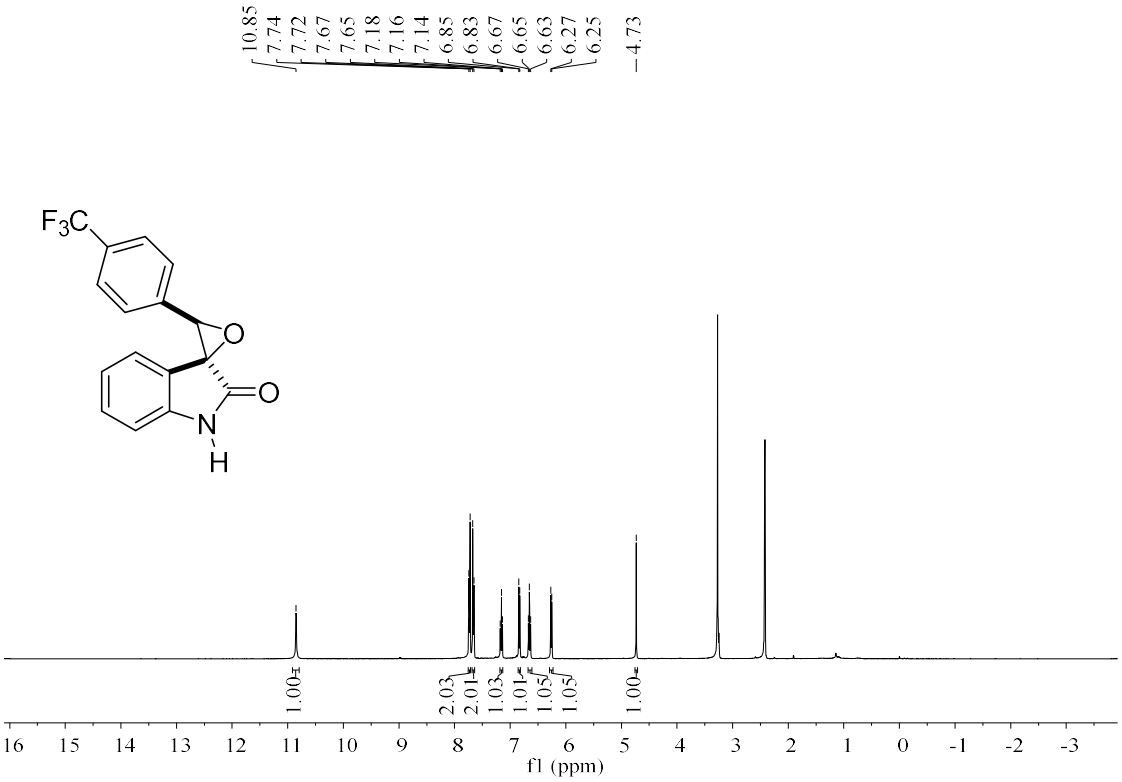
^{19}F NMR spectrum (377 MHz, Chloroform-*d*) of **3ae**



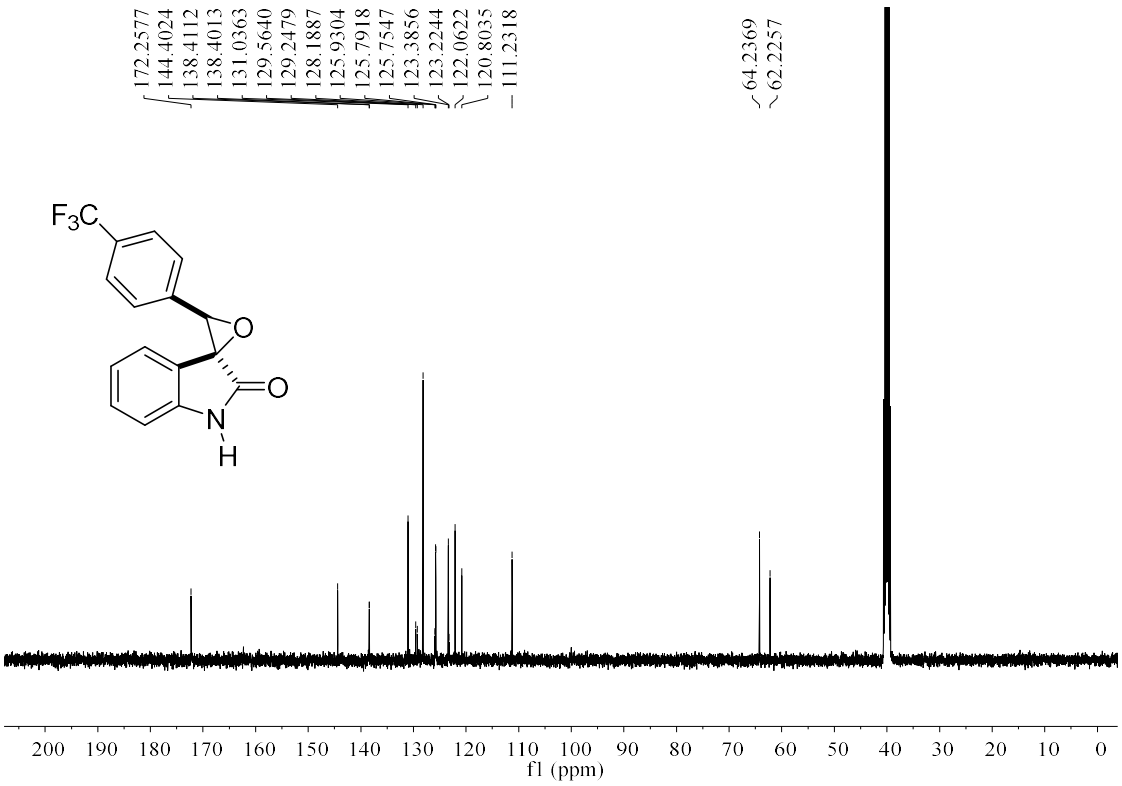
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3af**



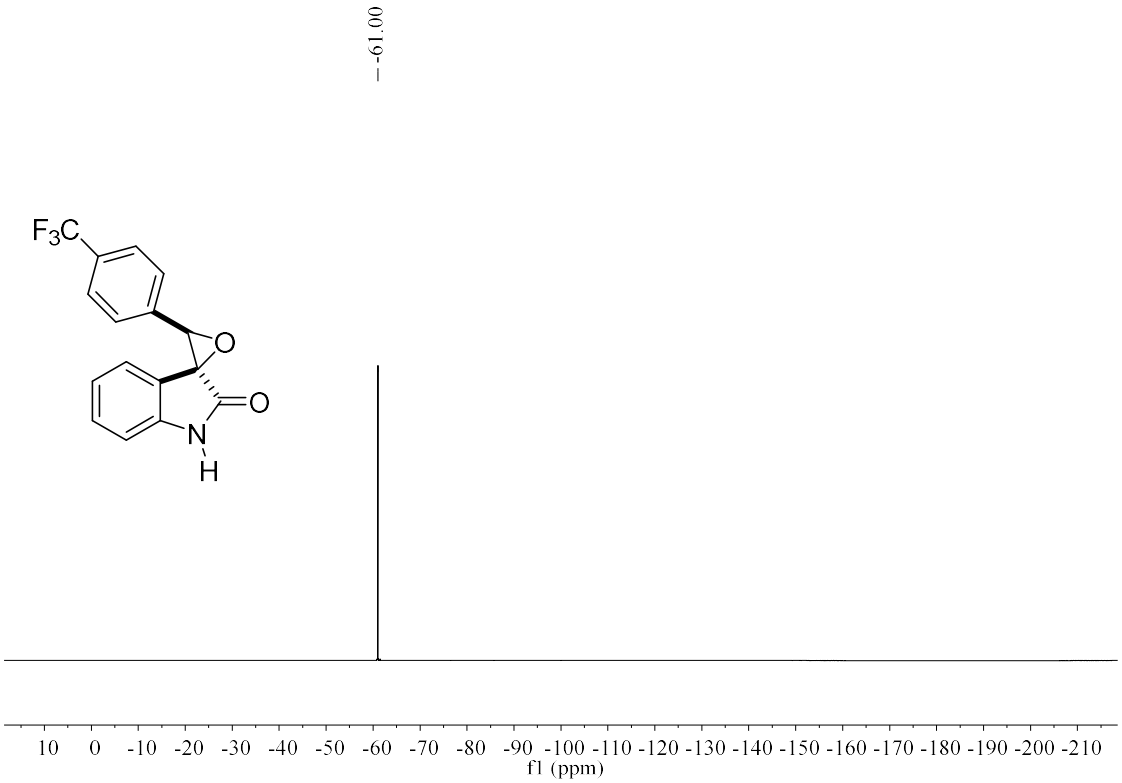
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3af**



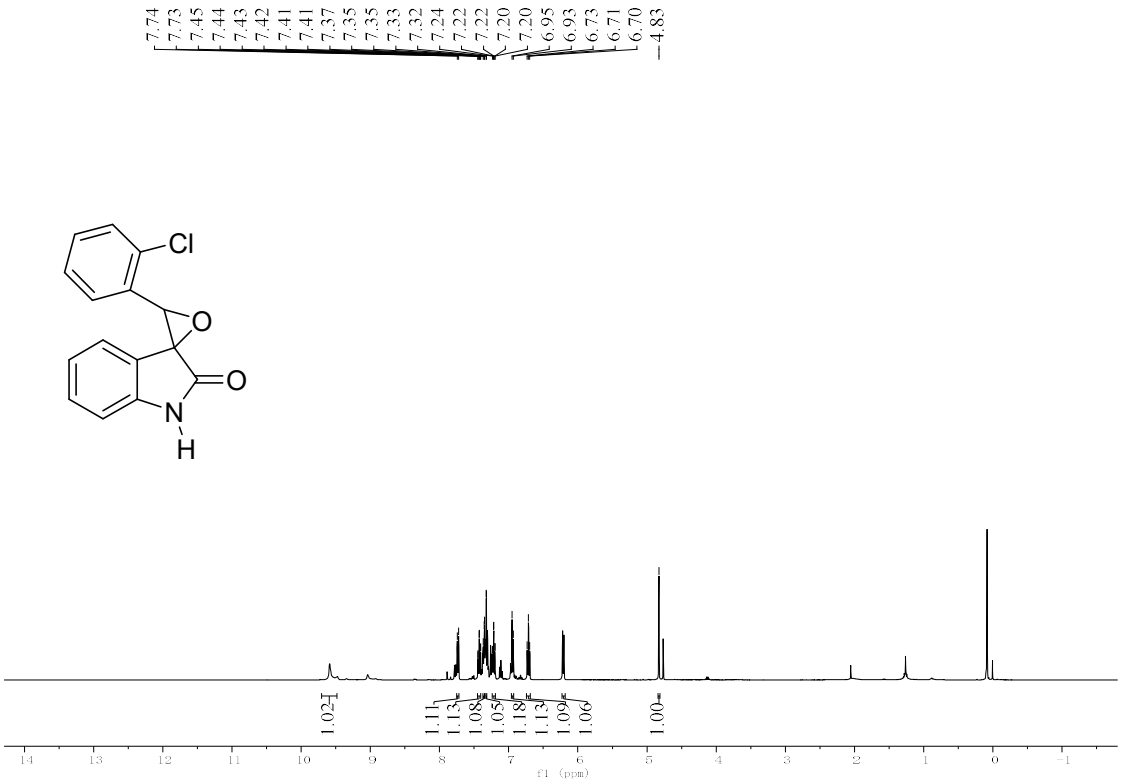
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3ag**



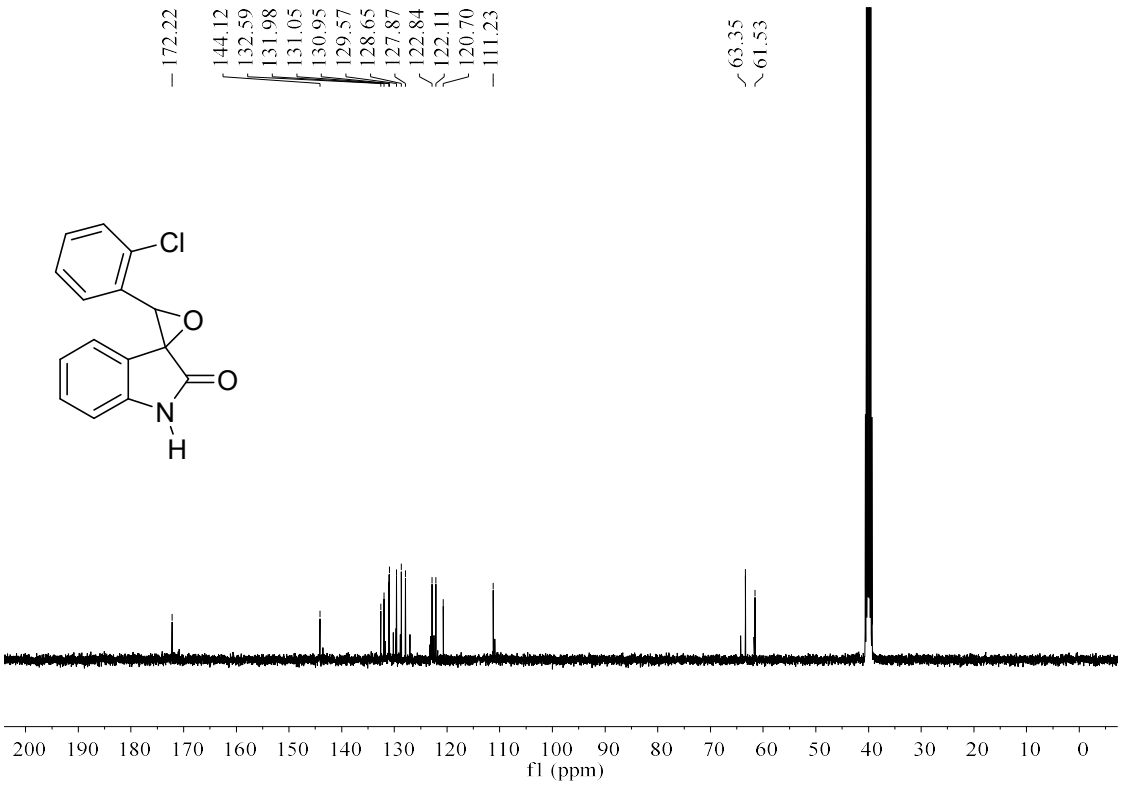
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3ag**



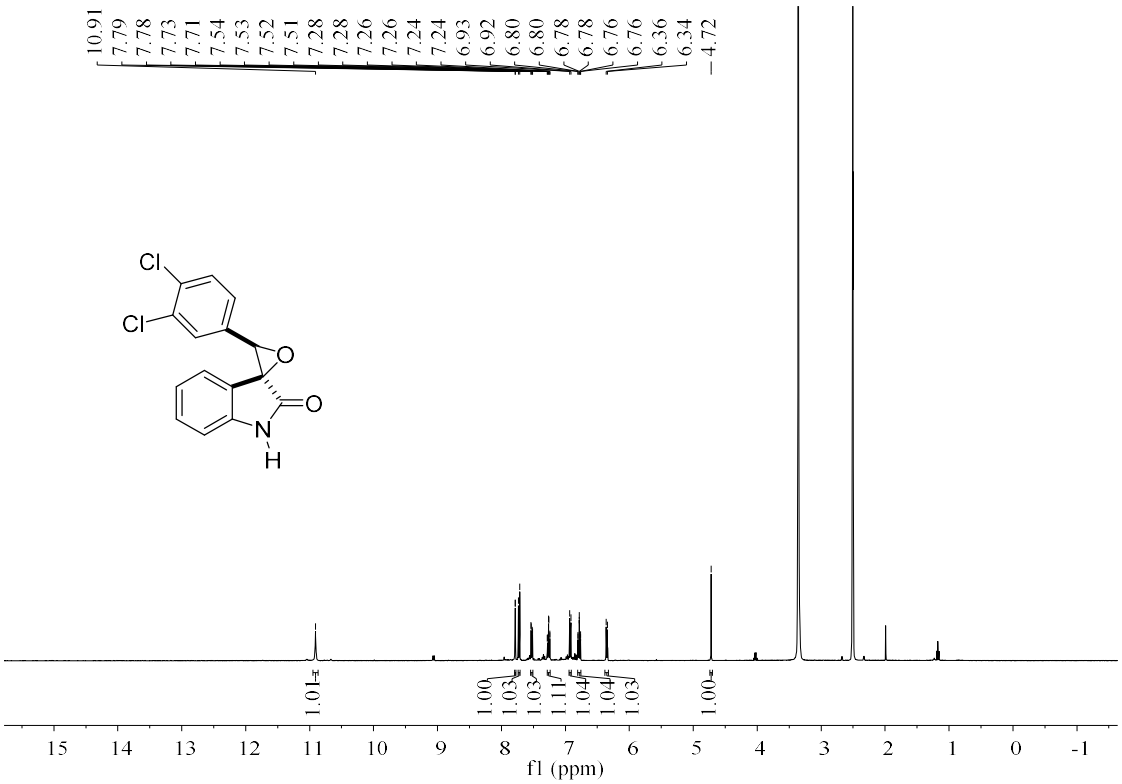
^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3ag**



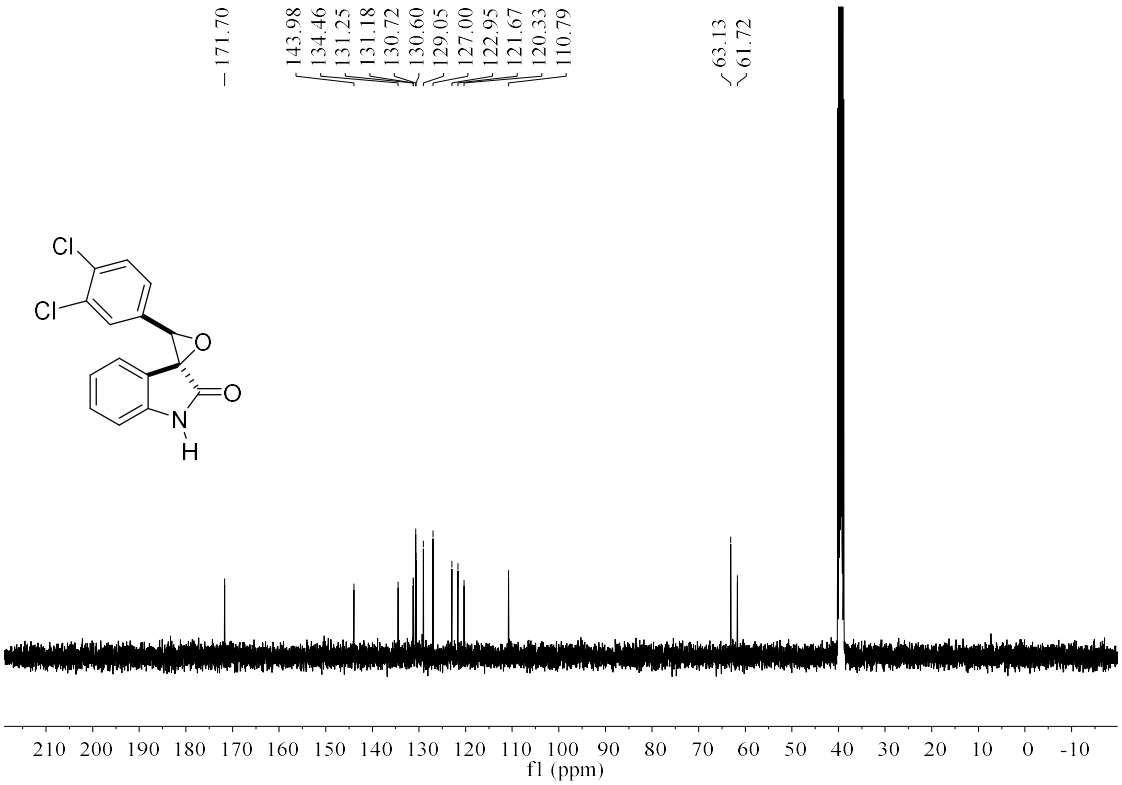
[1]H NMR spectrum (400 MHz, Chloroform-*d*) of **3ah**



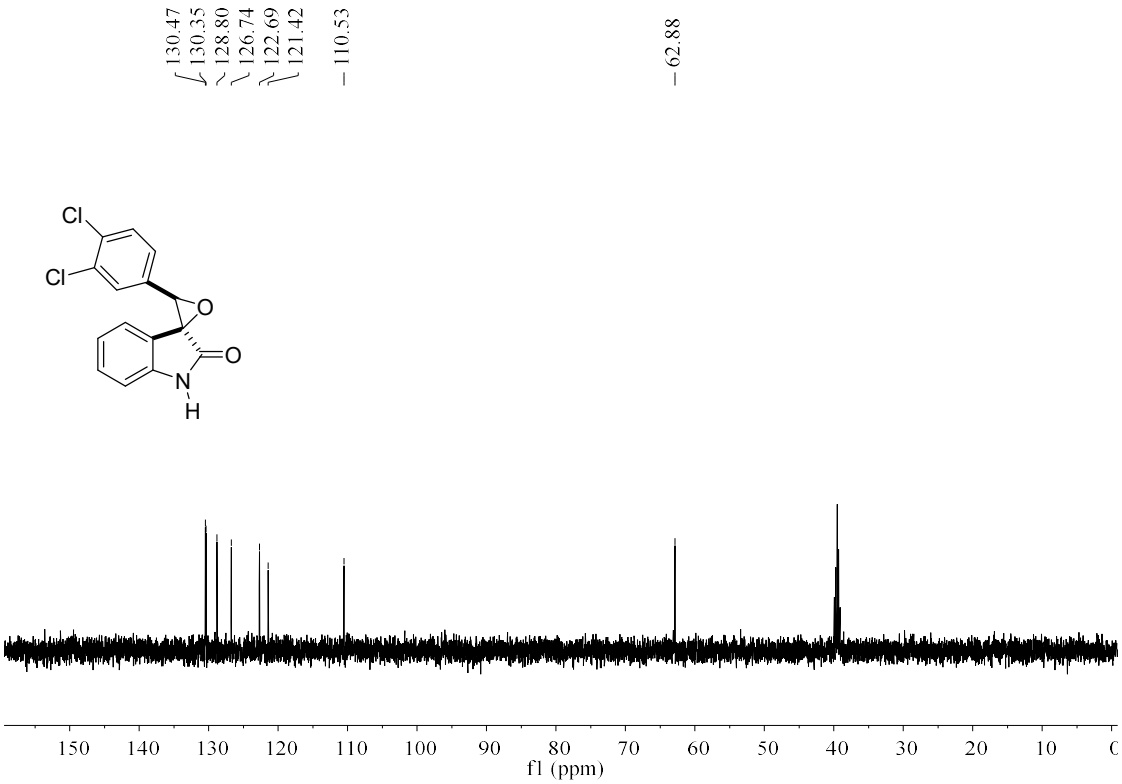
[13]C NMR spectrum (100 MHz, DMSO-d_6) of **3ah**



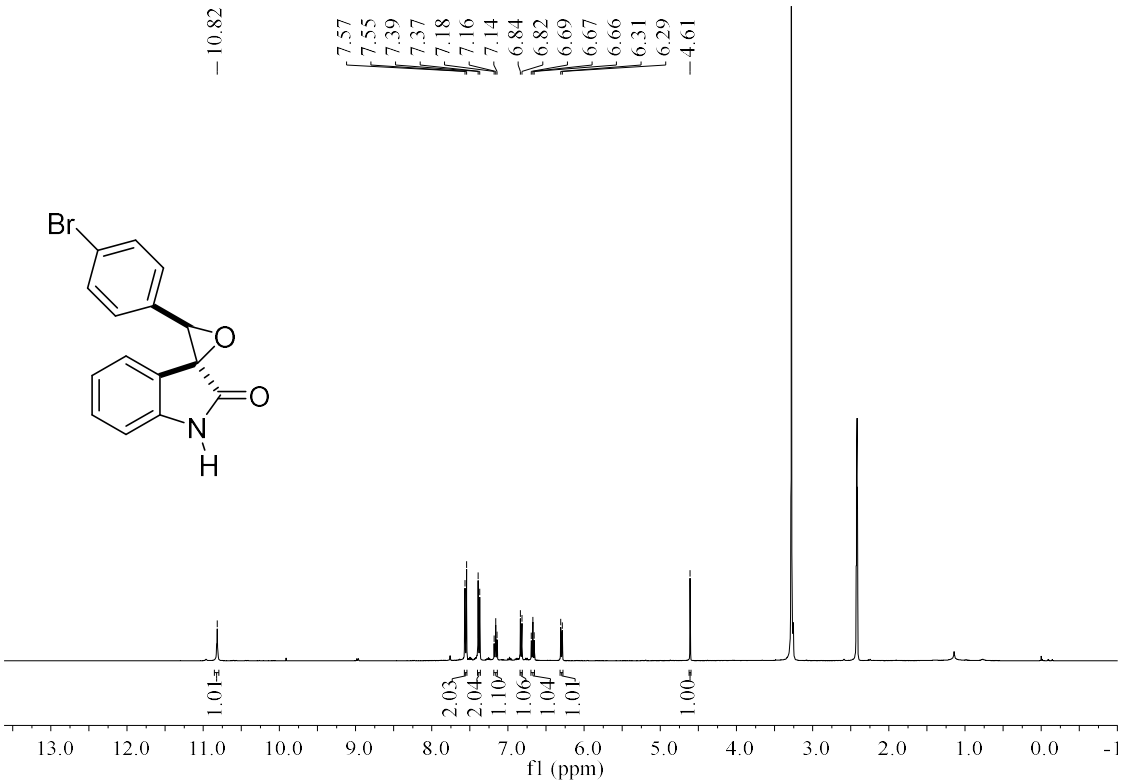
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ai**



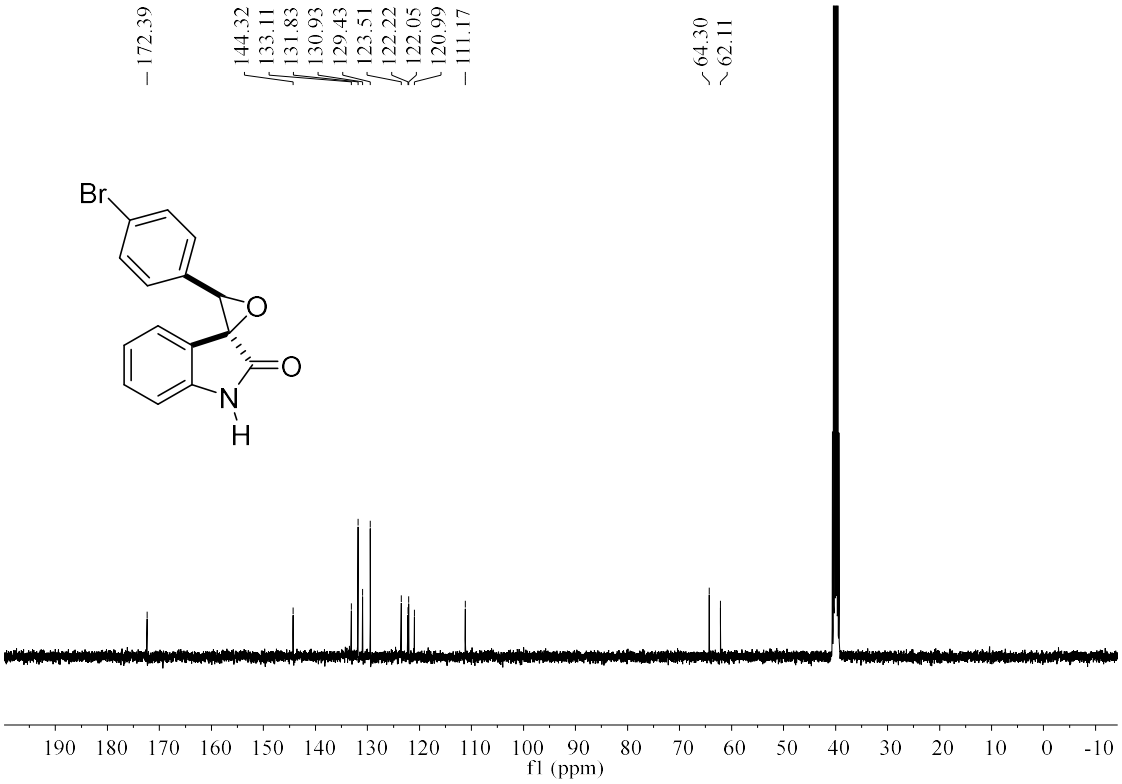
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ai**



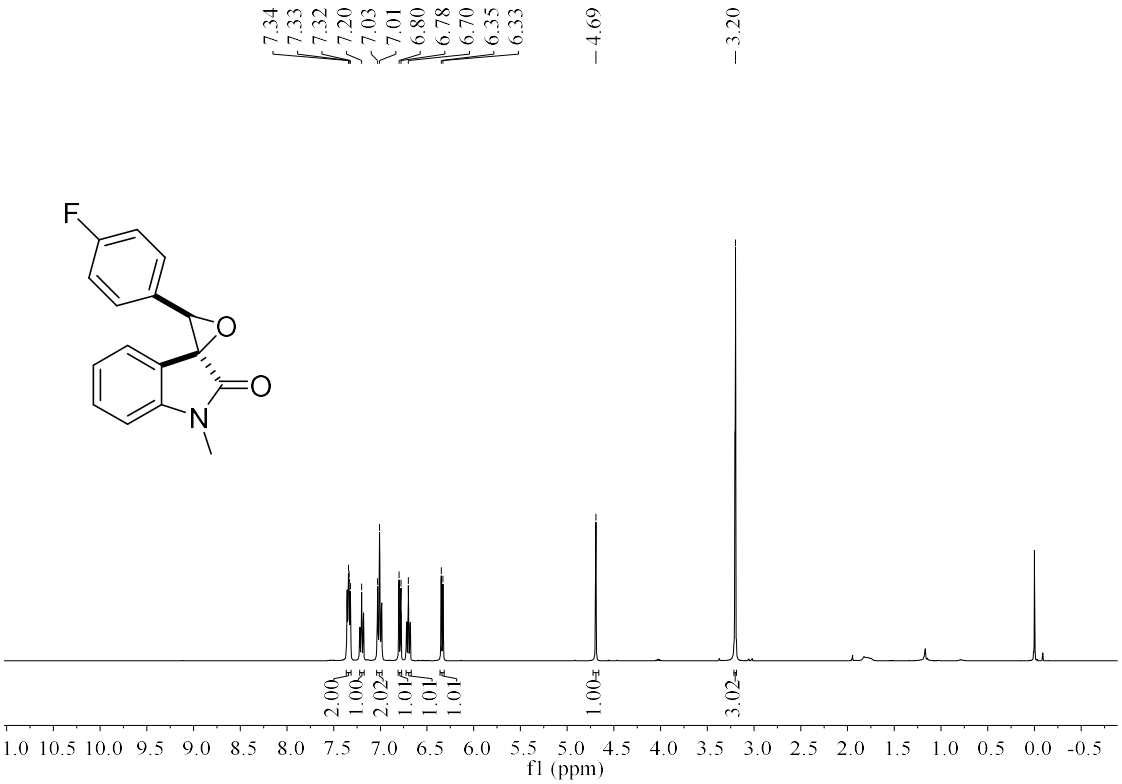
DEPT135° spectrum of **3ai**



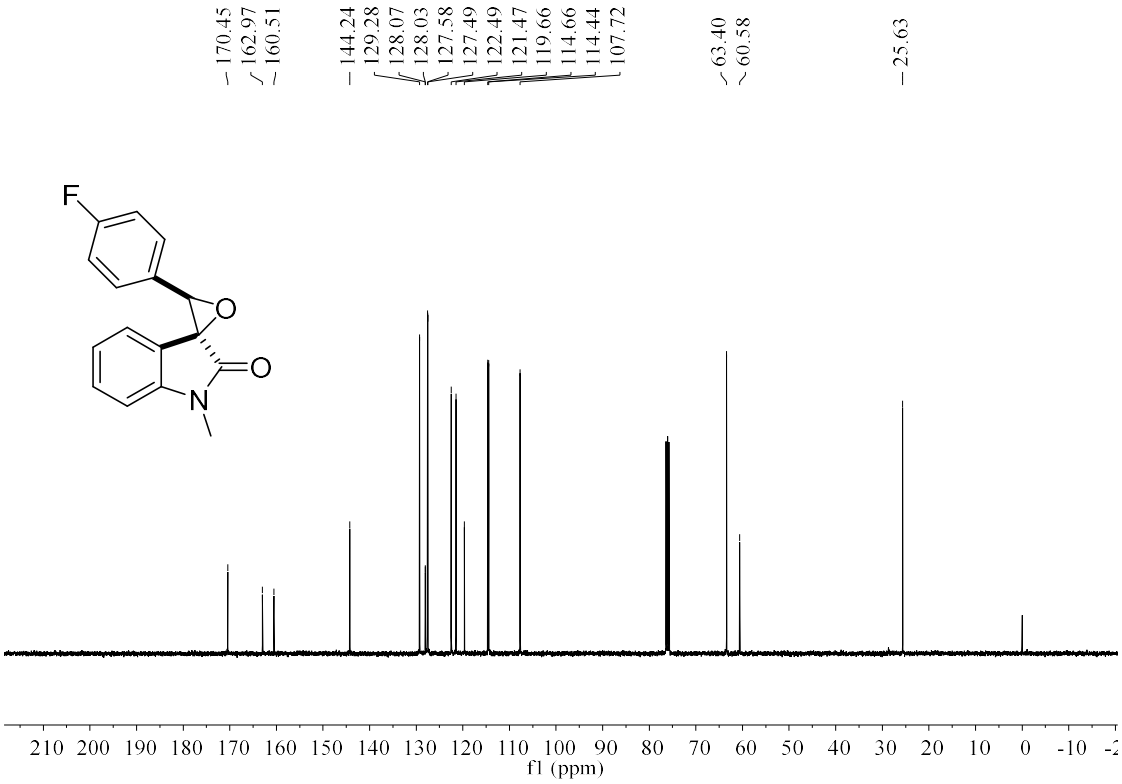
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3aj**



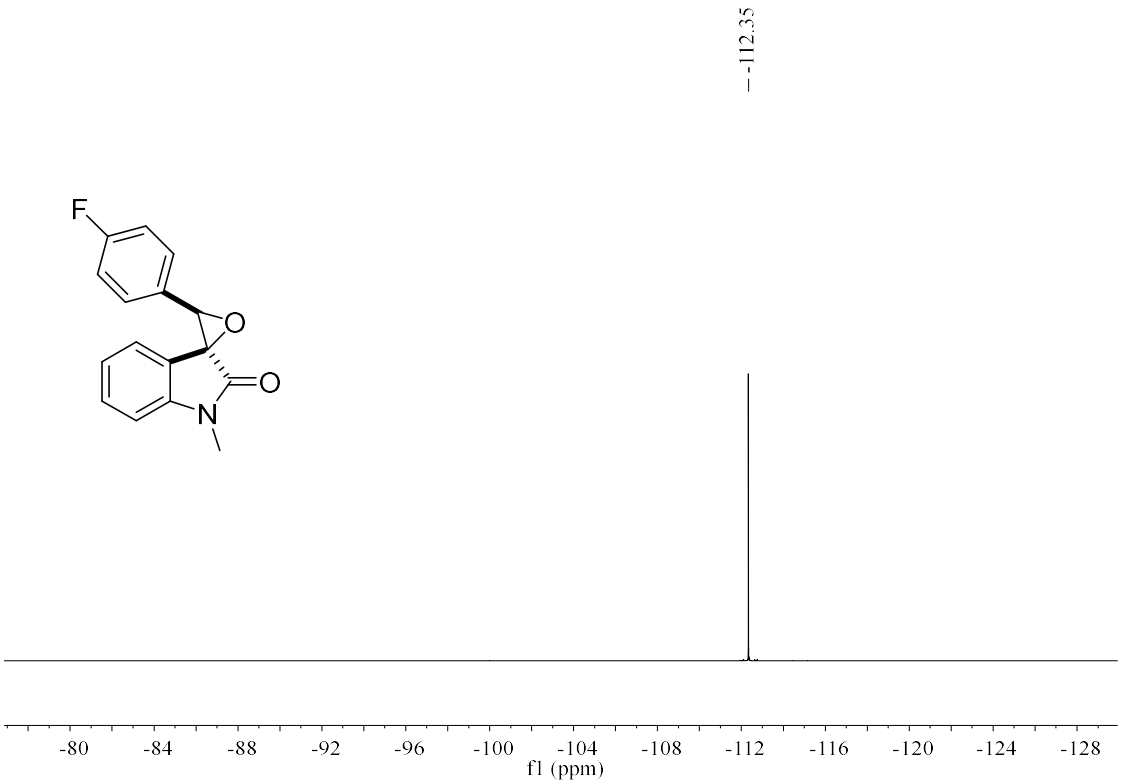
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3aj**



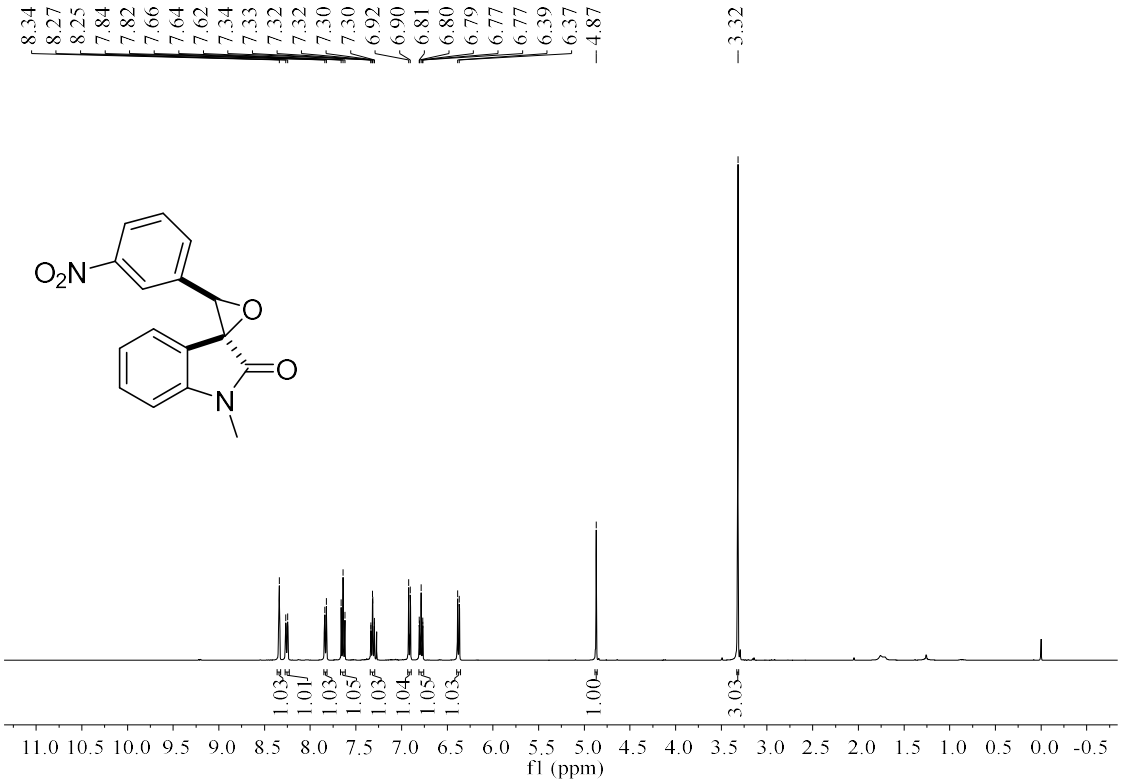
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ak**



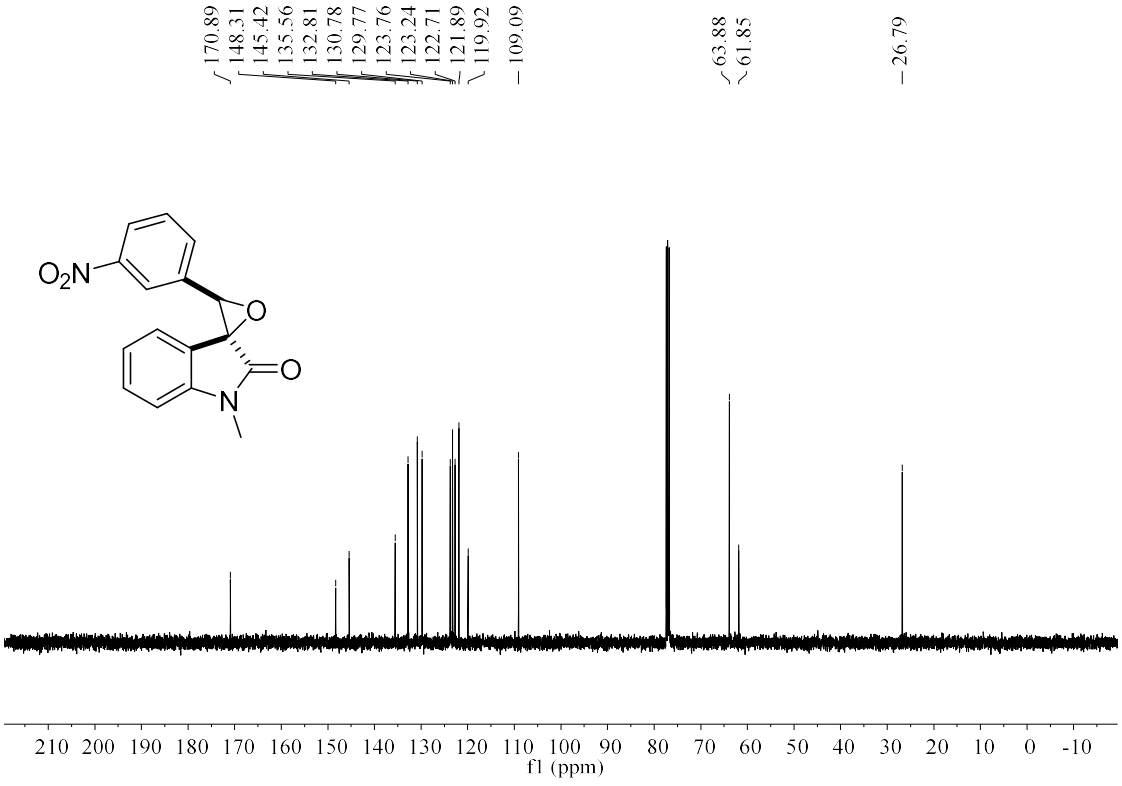
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ak**



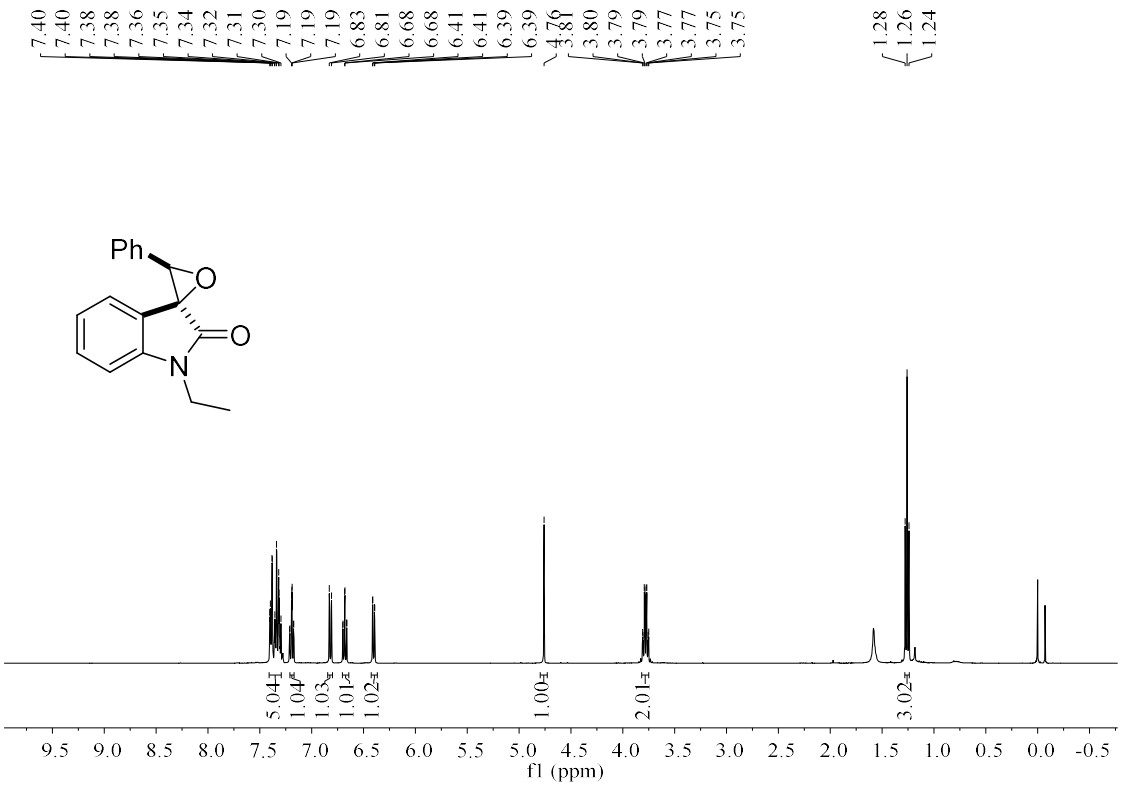
^{19}F NMR spectrum (377 MHz, Chloroform-*d*) of **3ak**



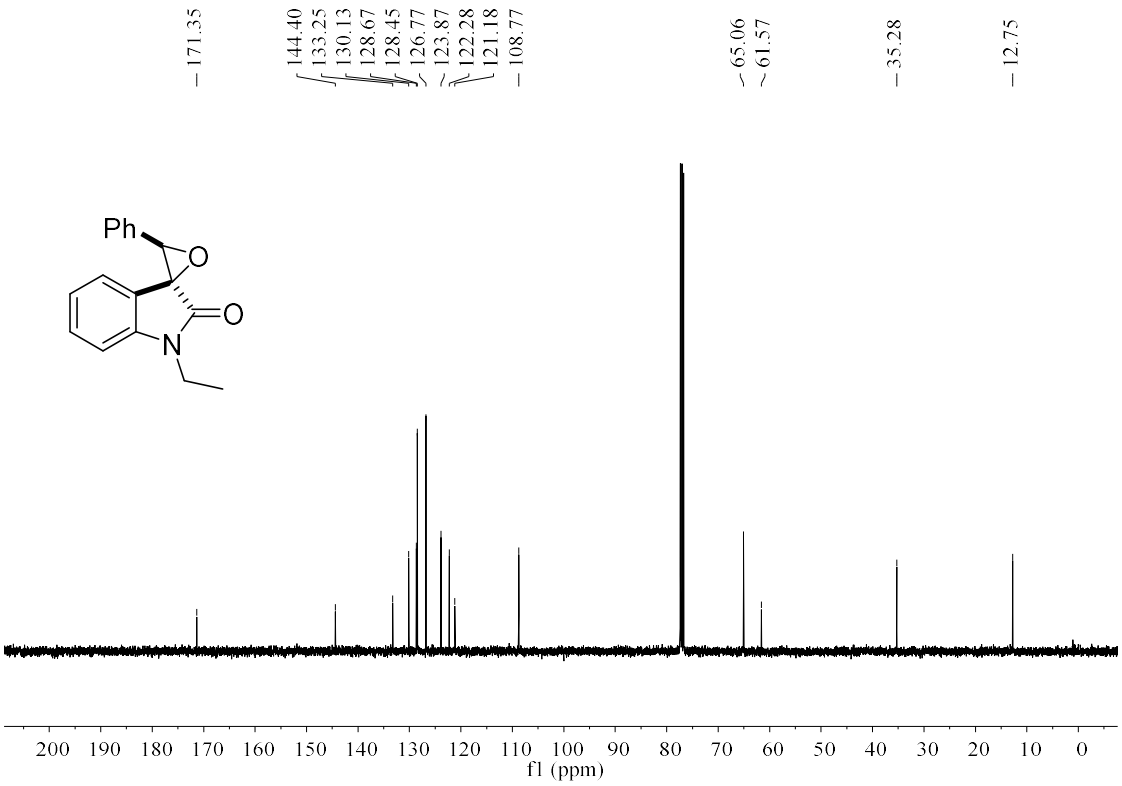
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3al**



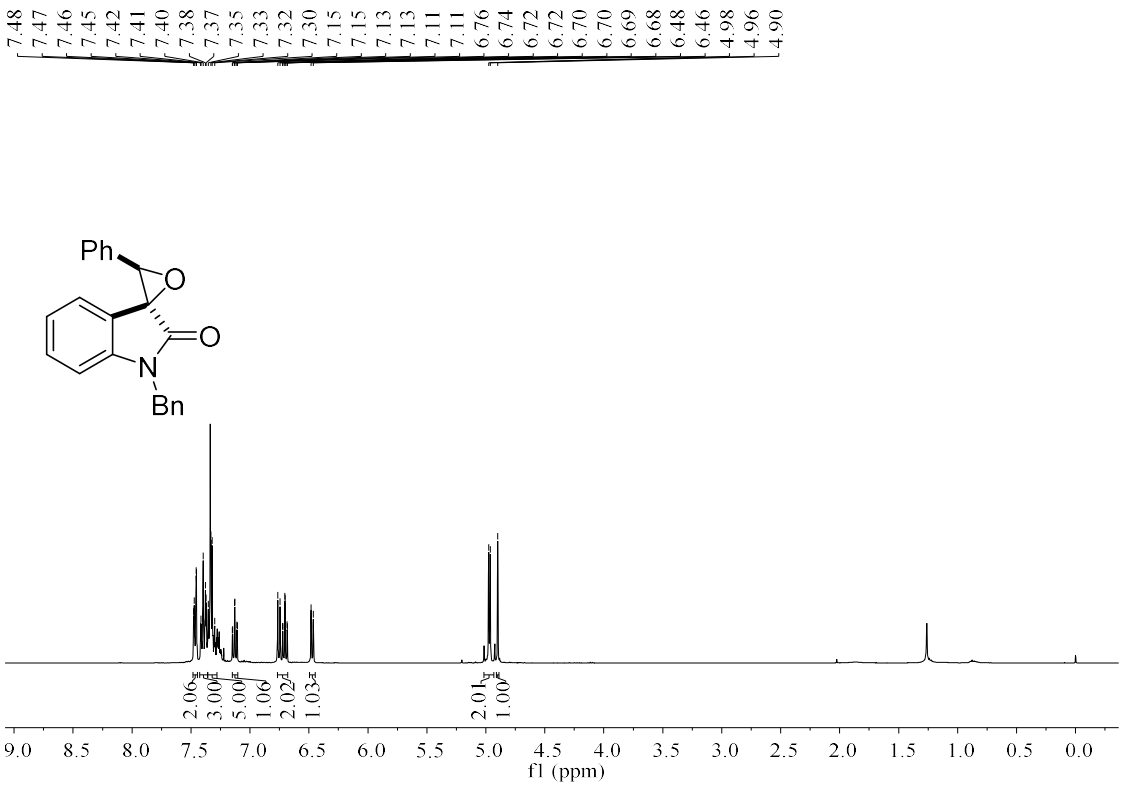
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3al**



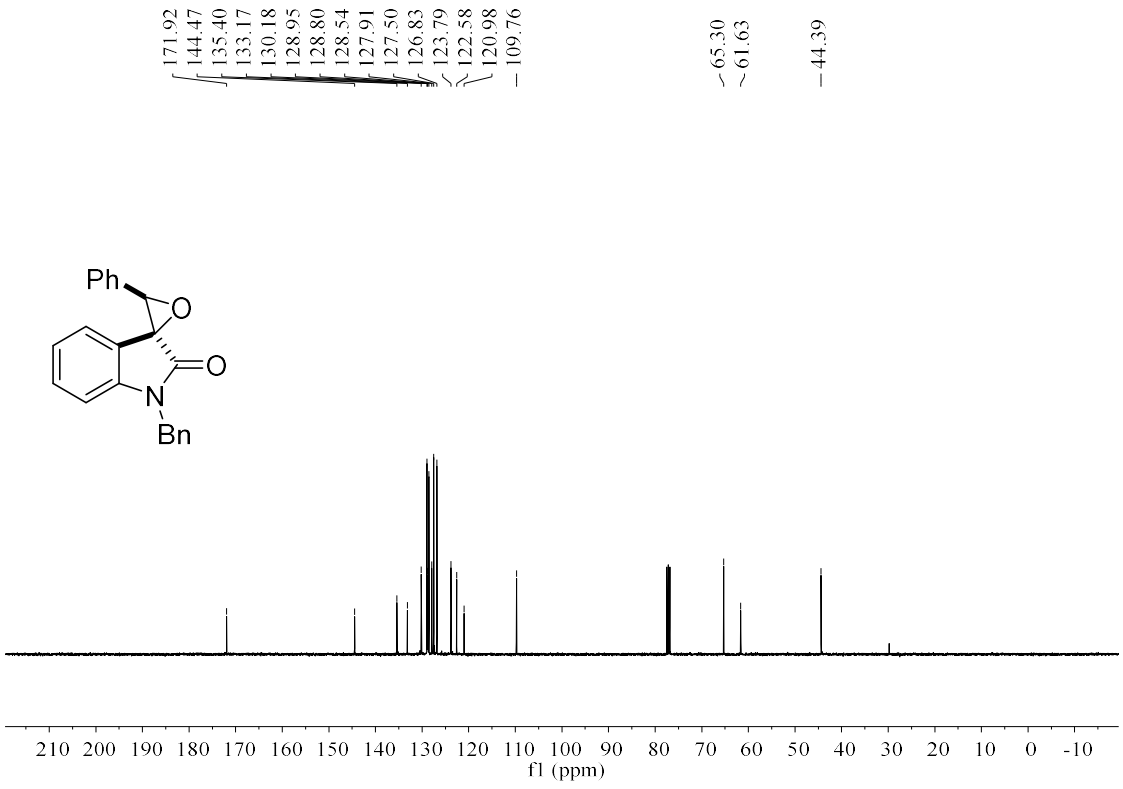
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3am**



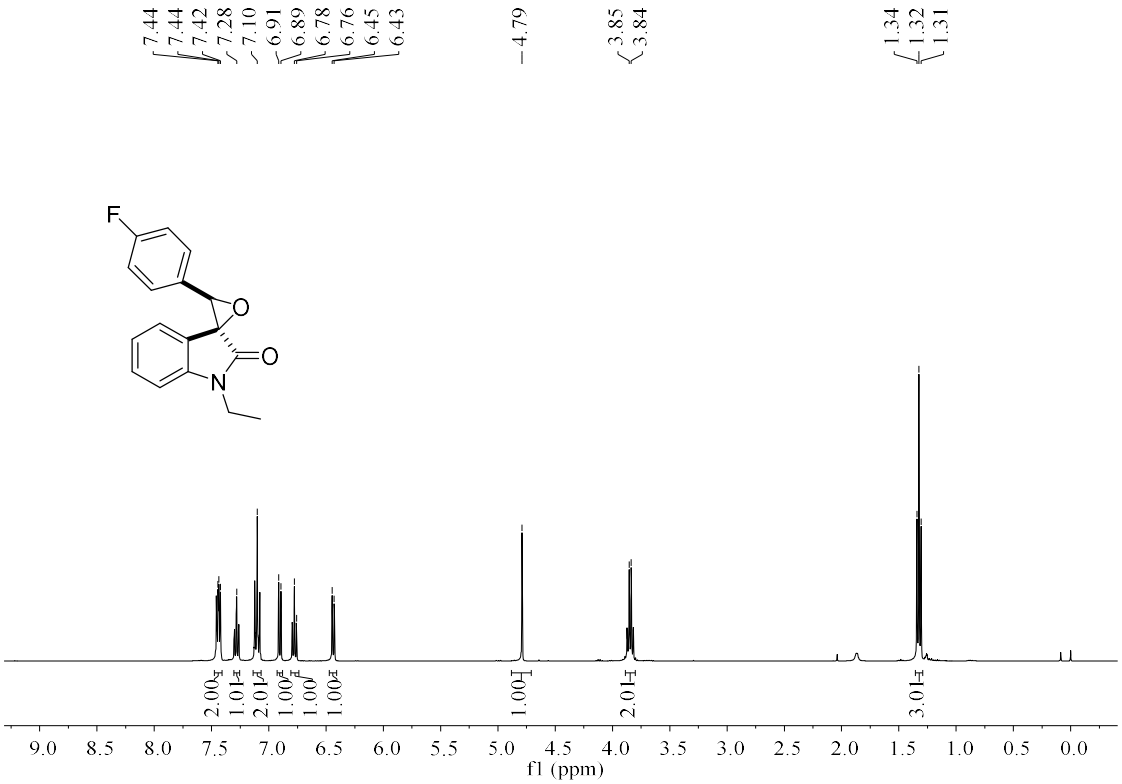
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3am**



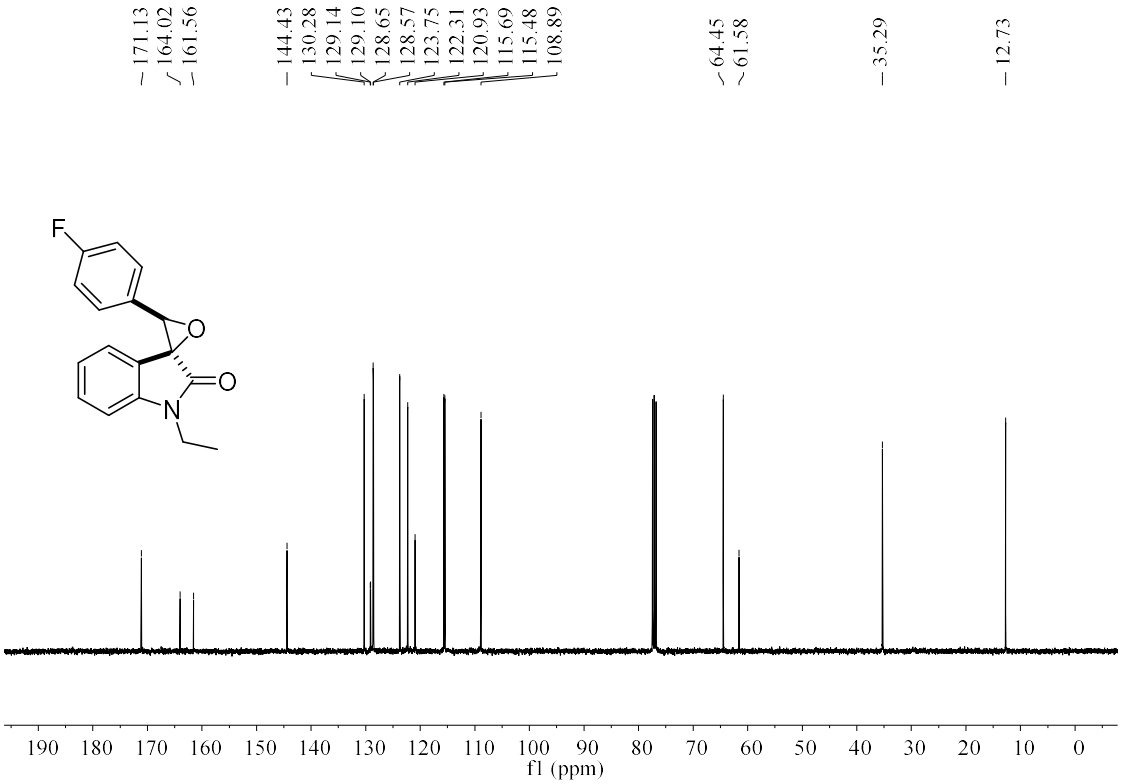
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3an**



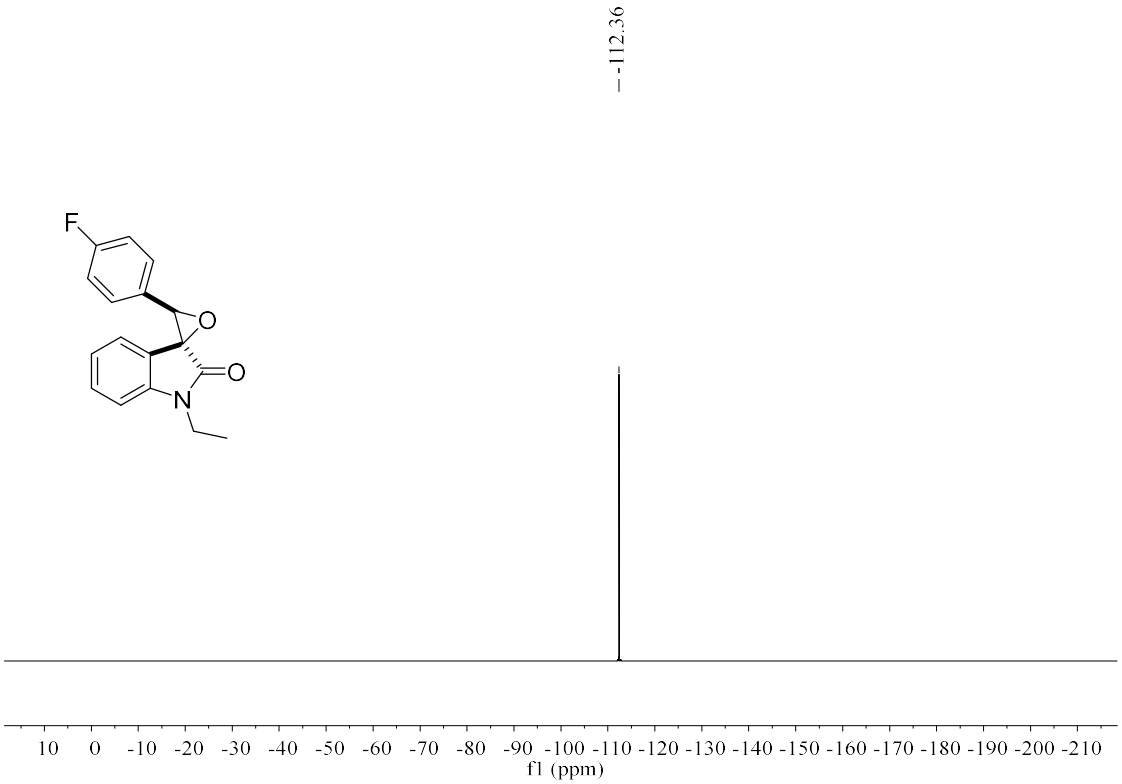
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3an**



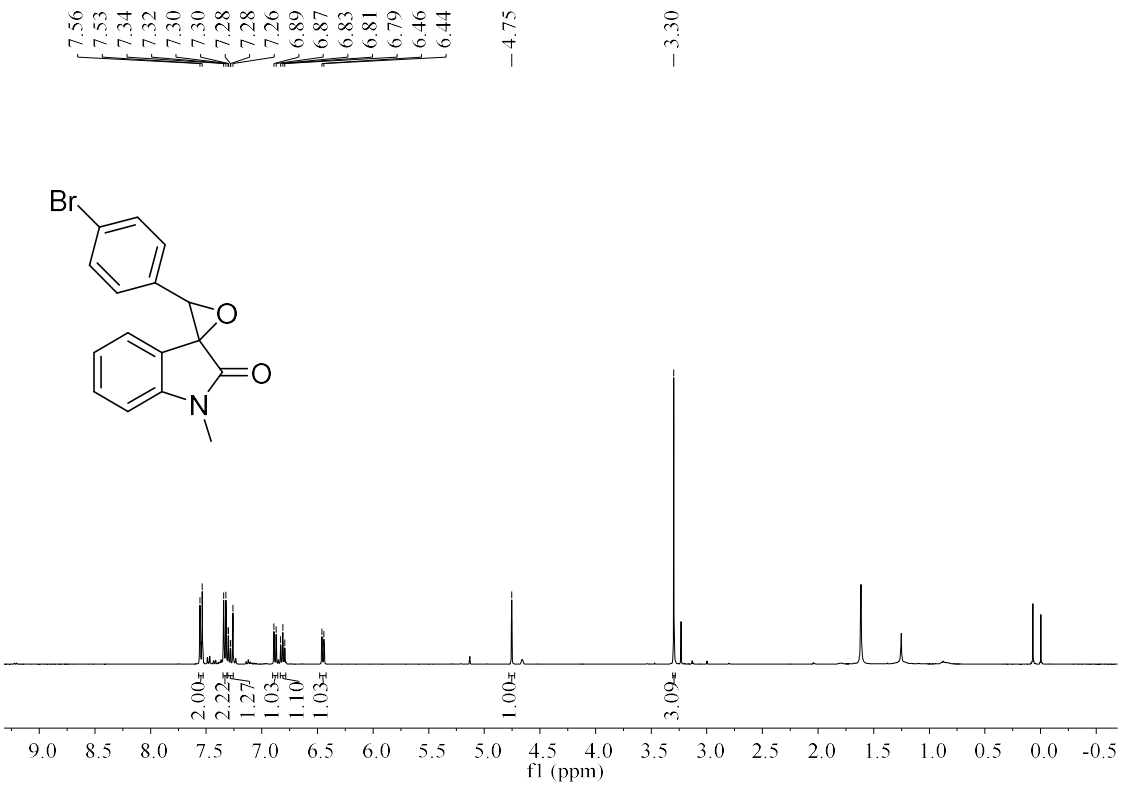
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ao**



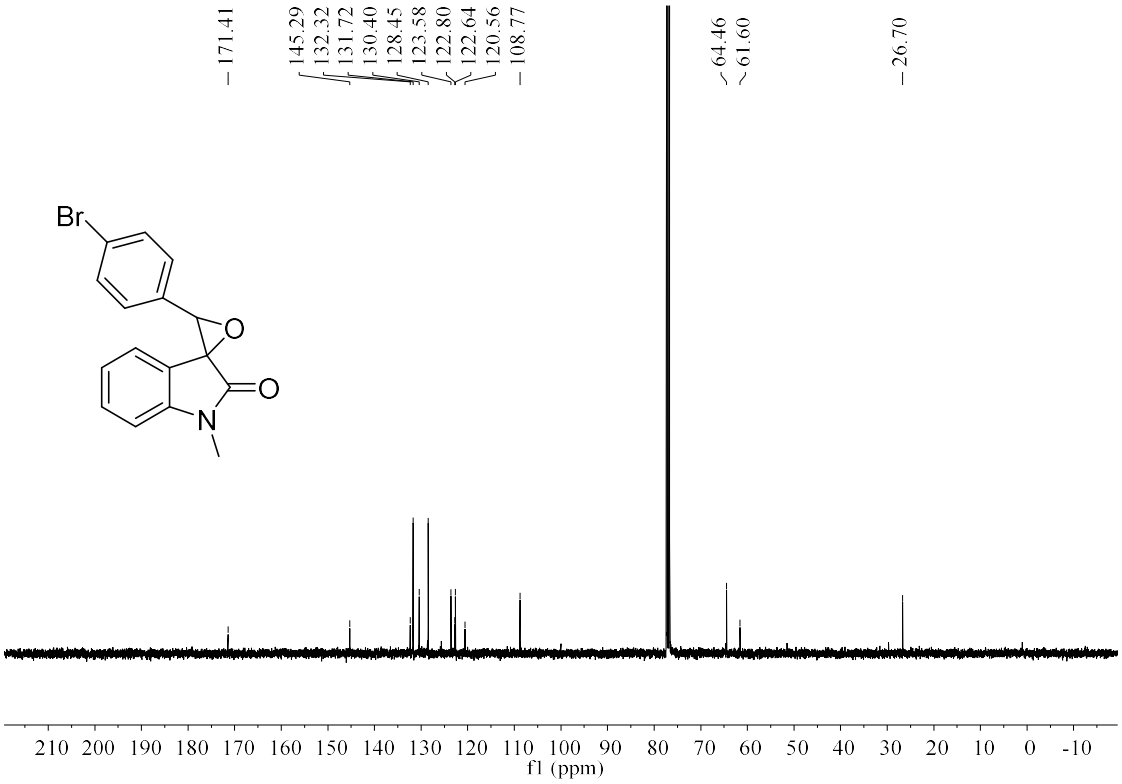
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ao**



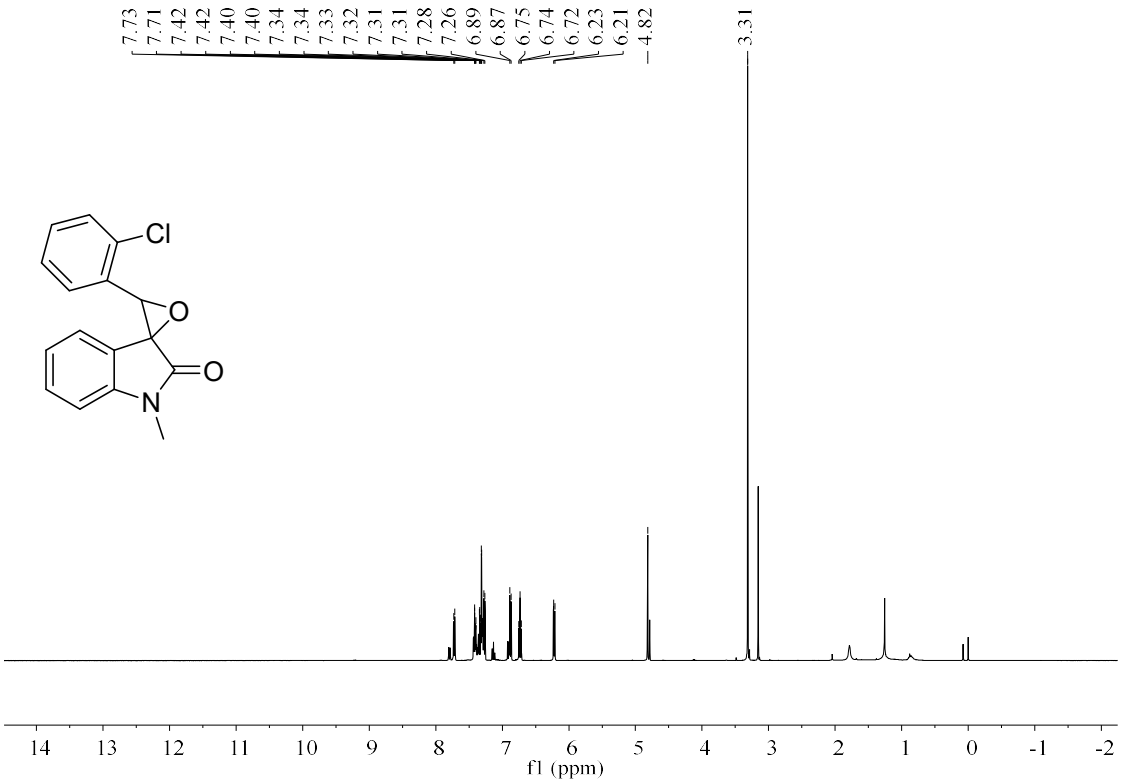
^{19}F NMR spectrum (377 MHz, Chloroform-*d*) of **3ao**



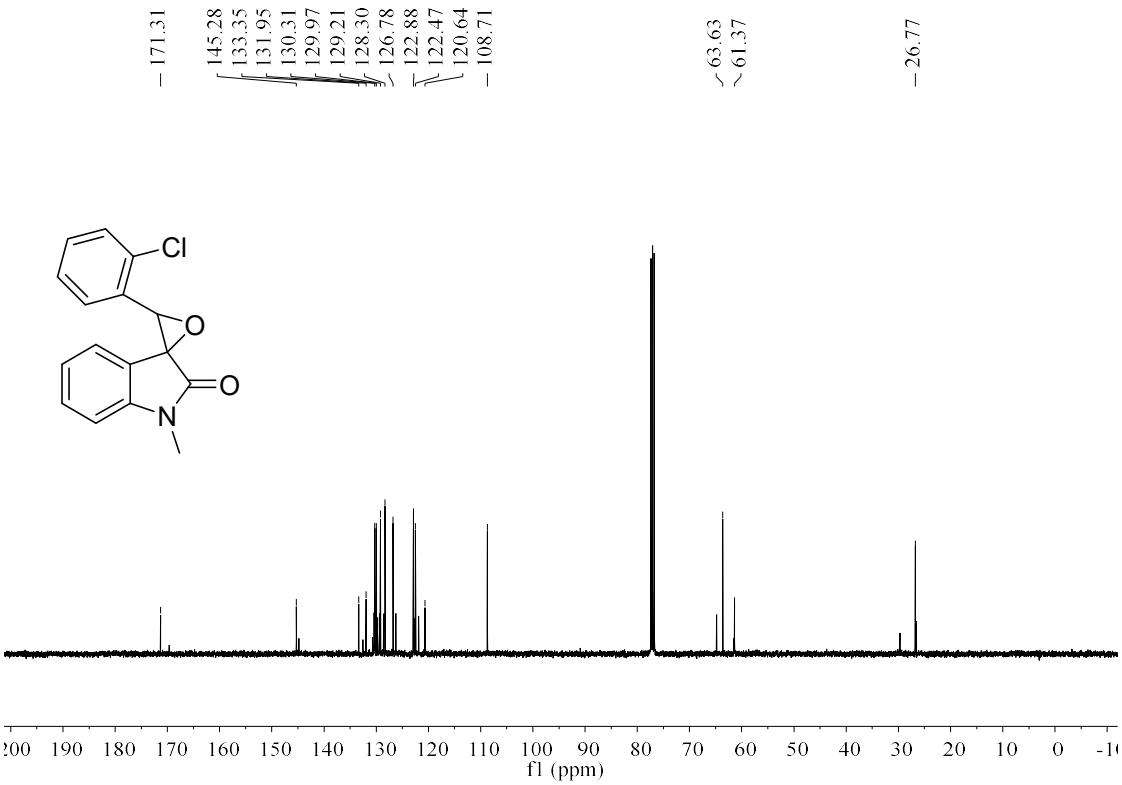
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ap**



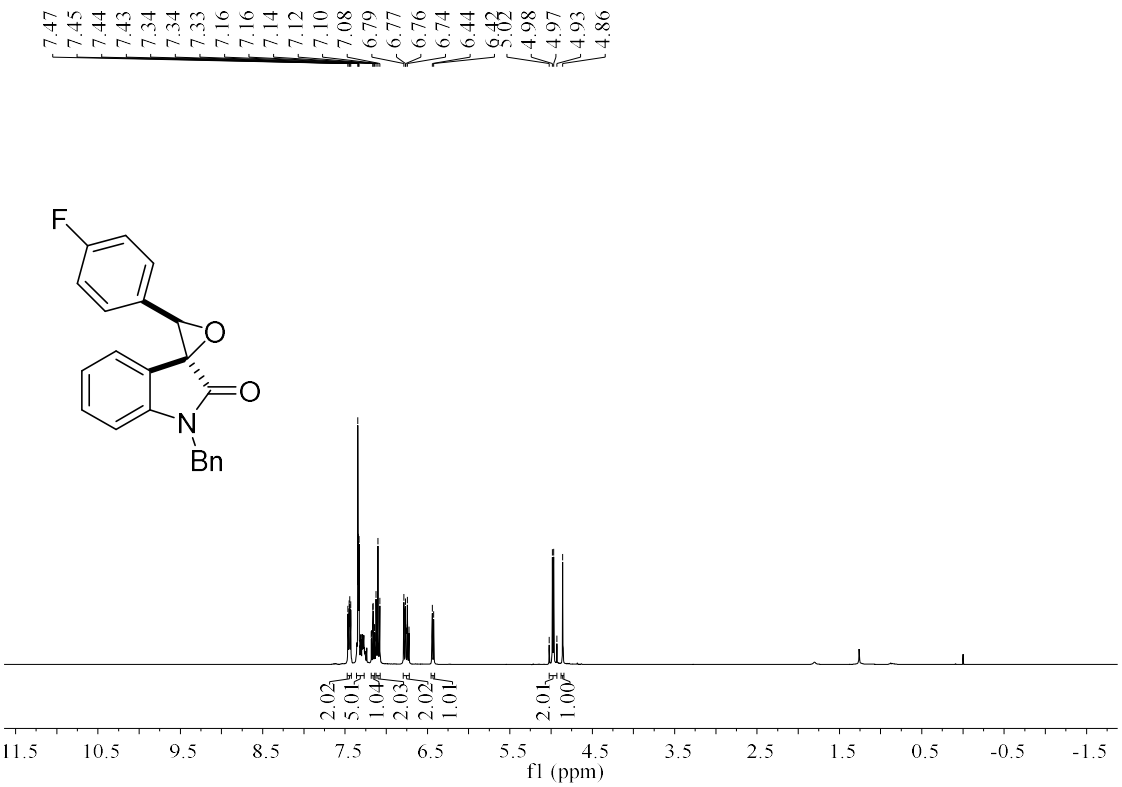
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ap**



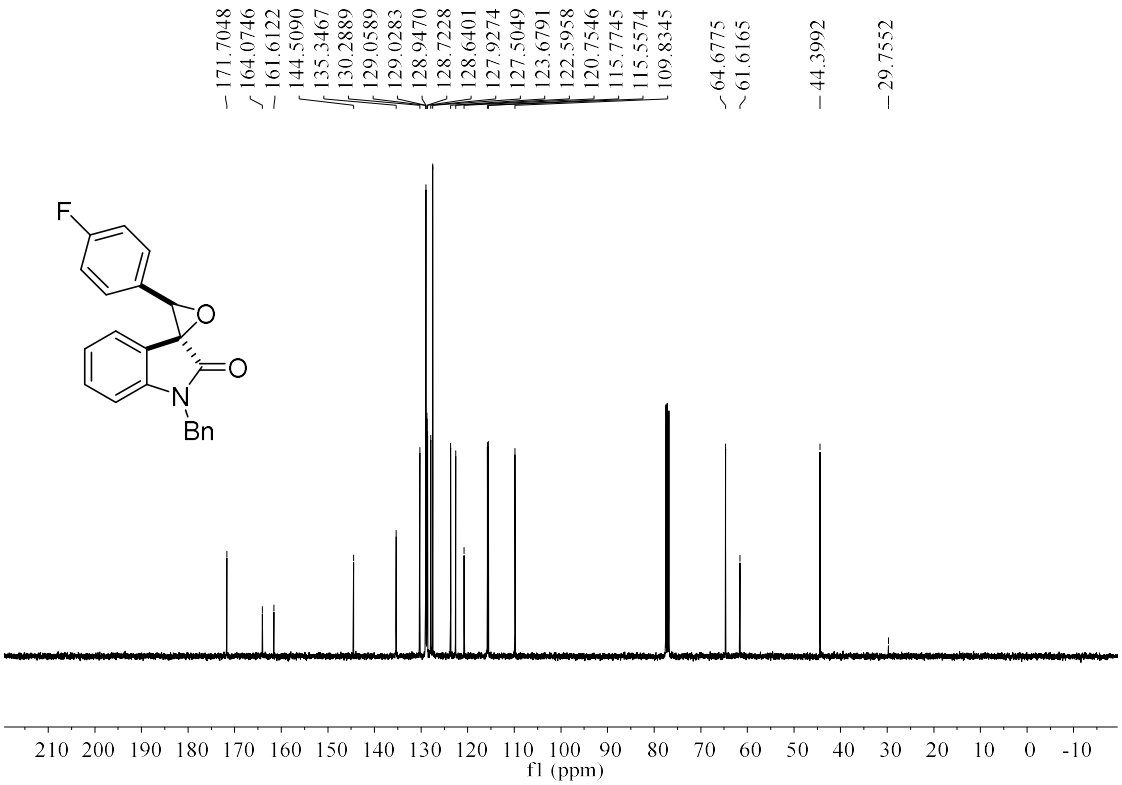
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3aq**



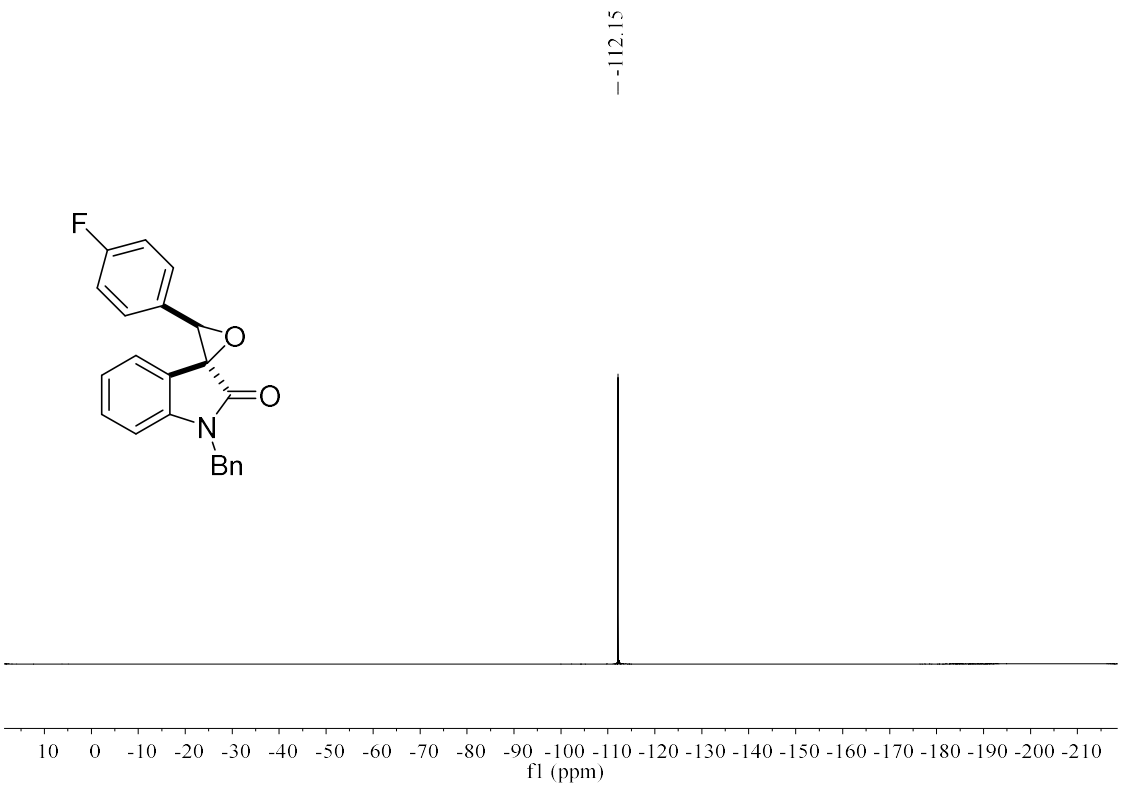
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3aq**



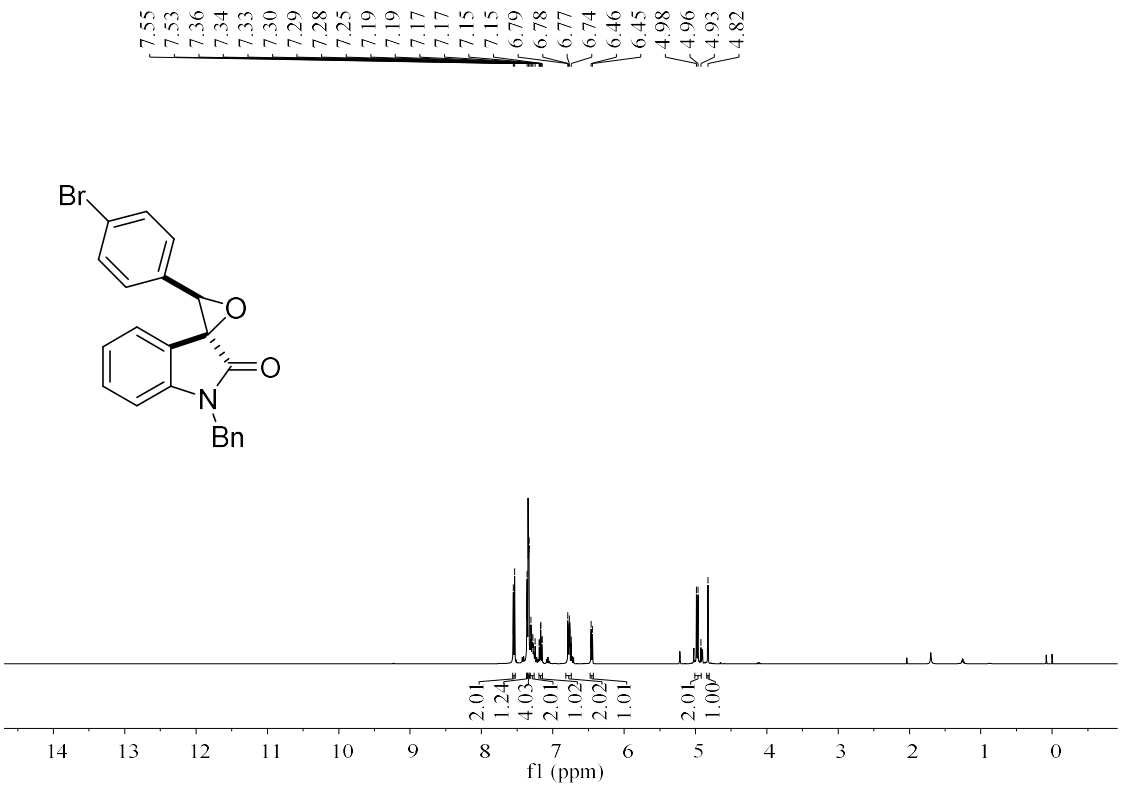
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ar**



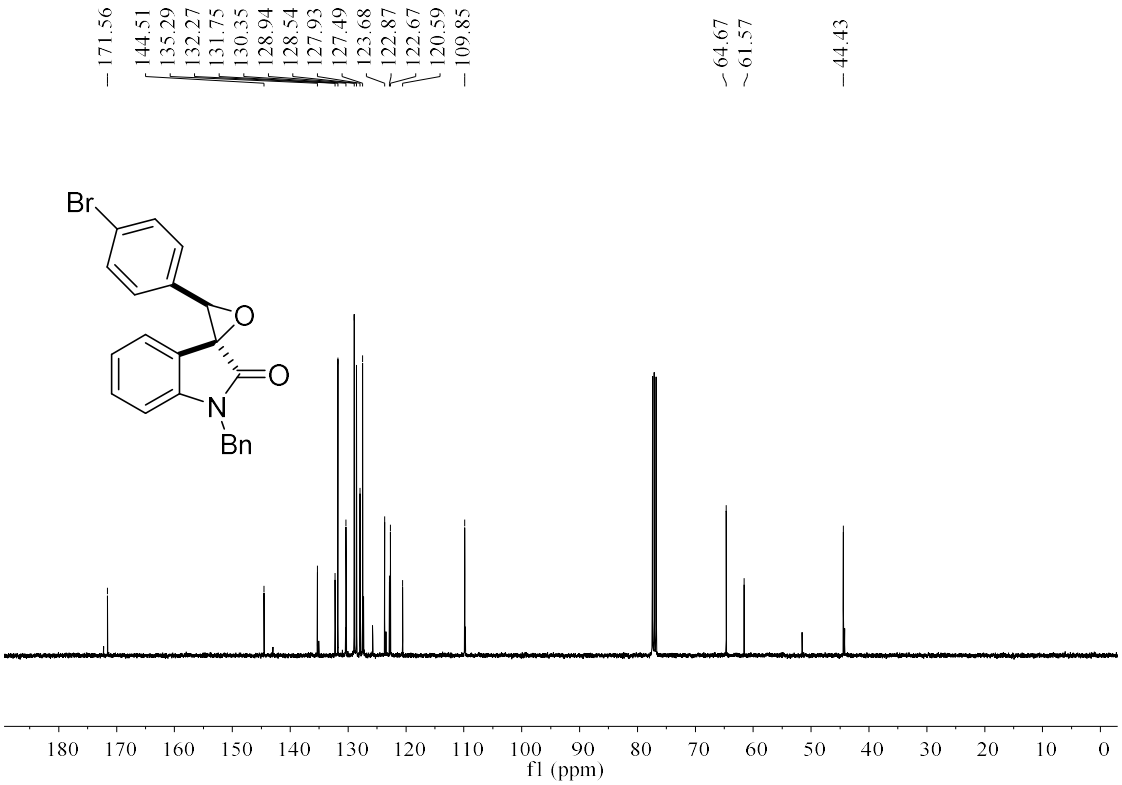
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ar**



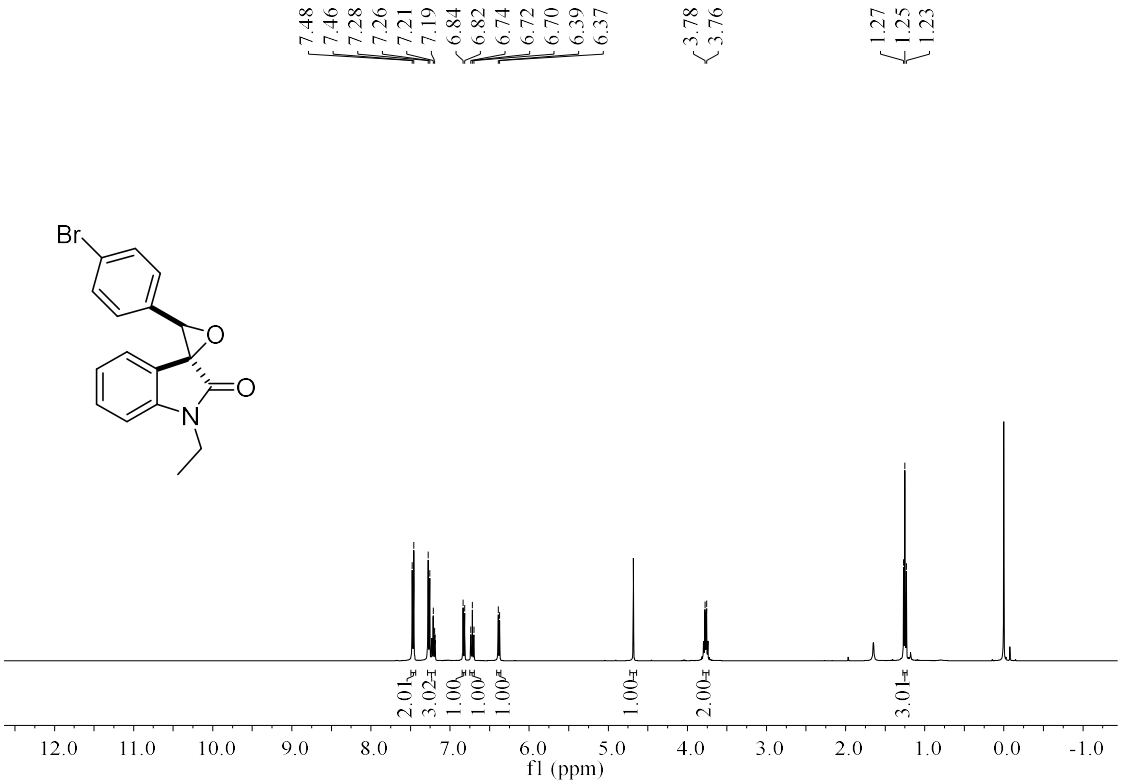
^{19}F NMR spectrum (377 MHz, Chloroform-*d*) of **3ar**



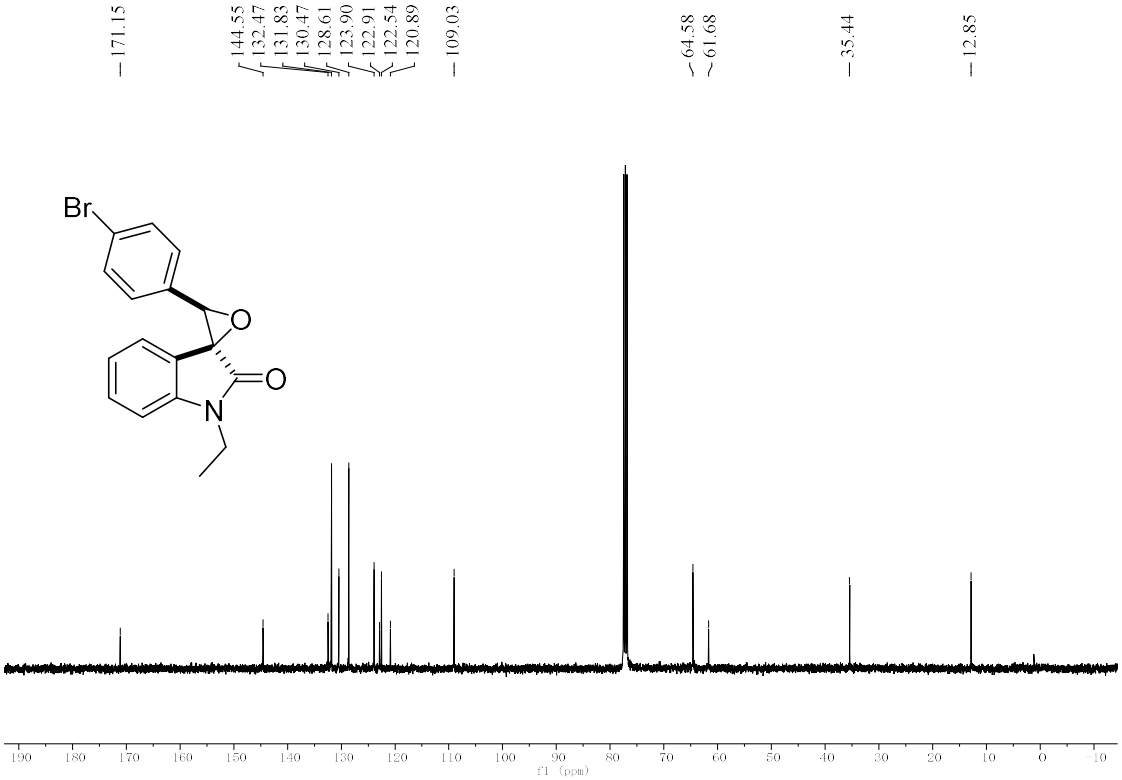
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3as**



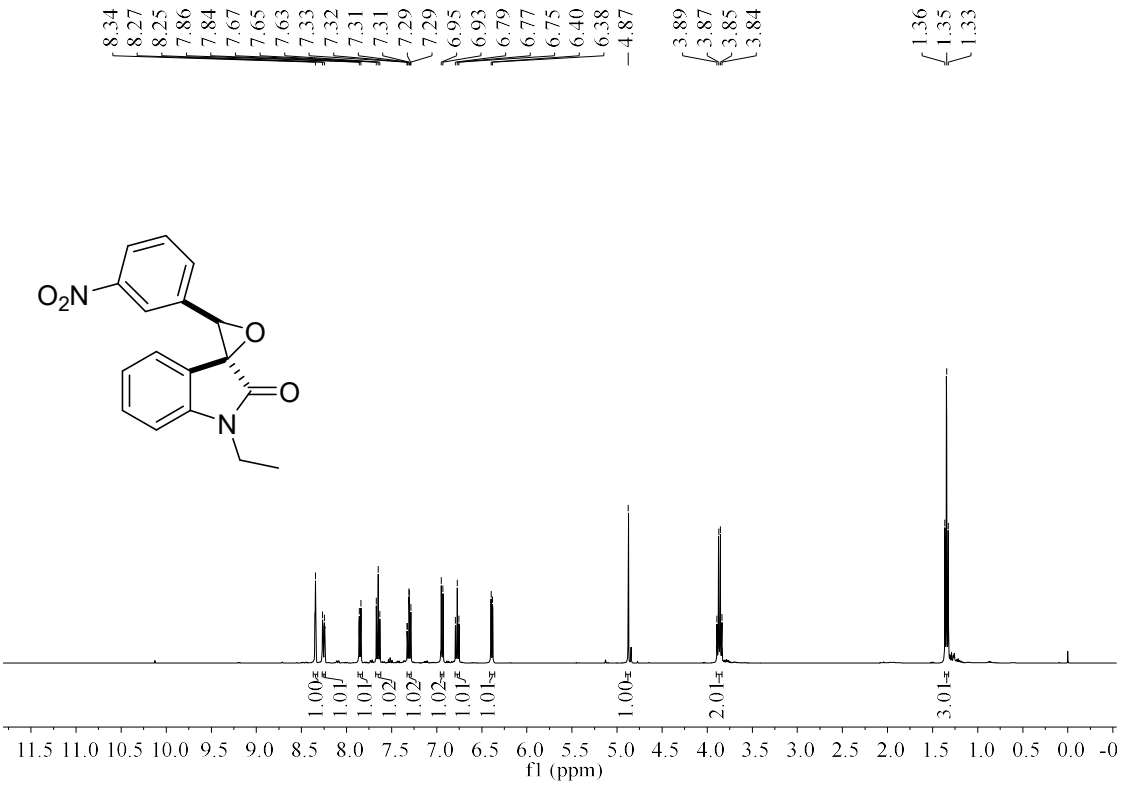
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3as**



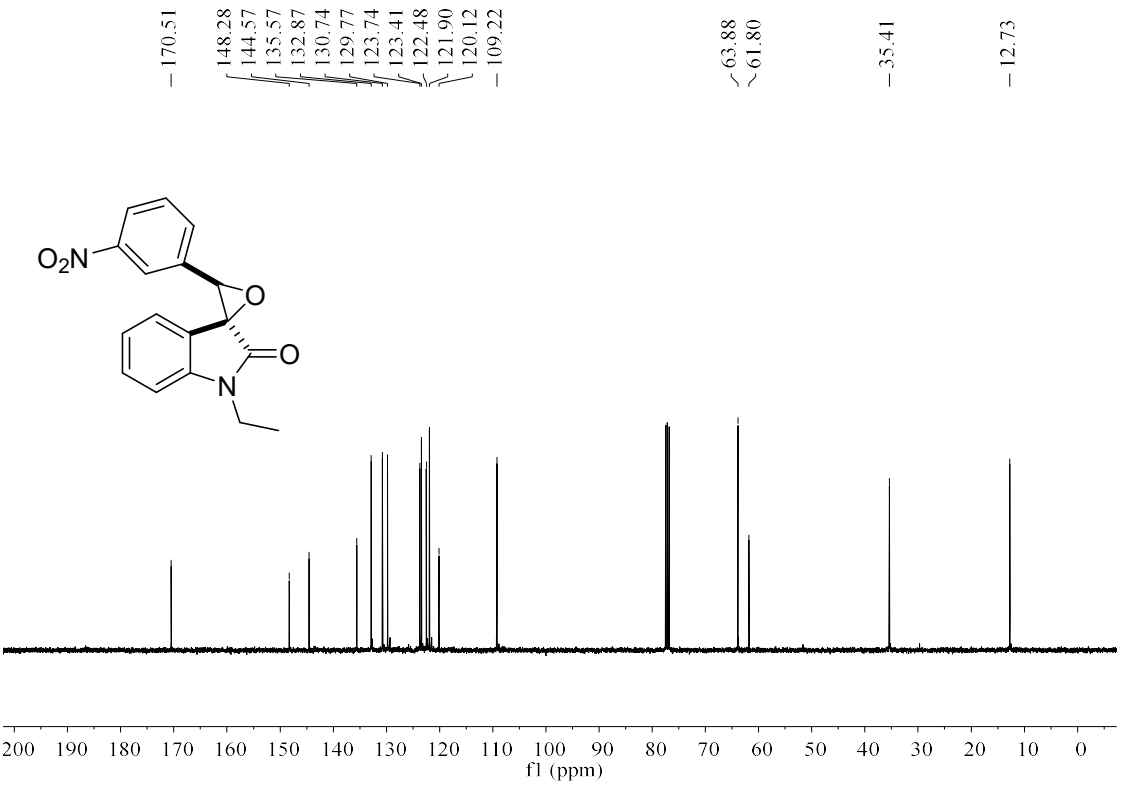
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3at**



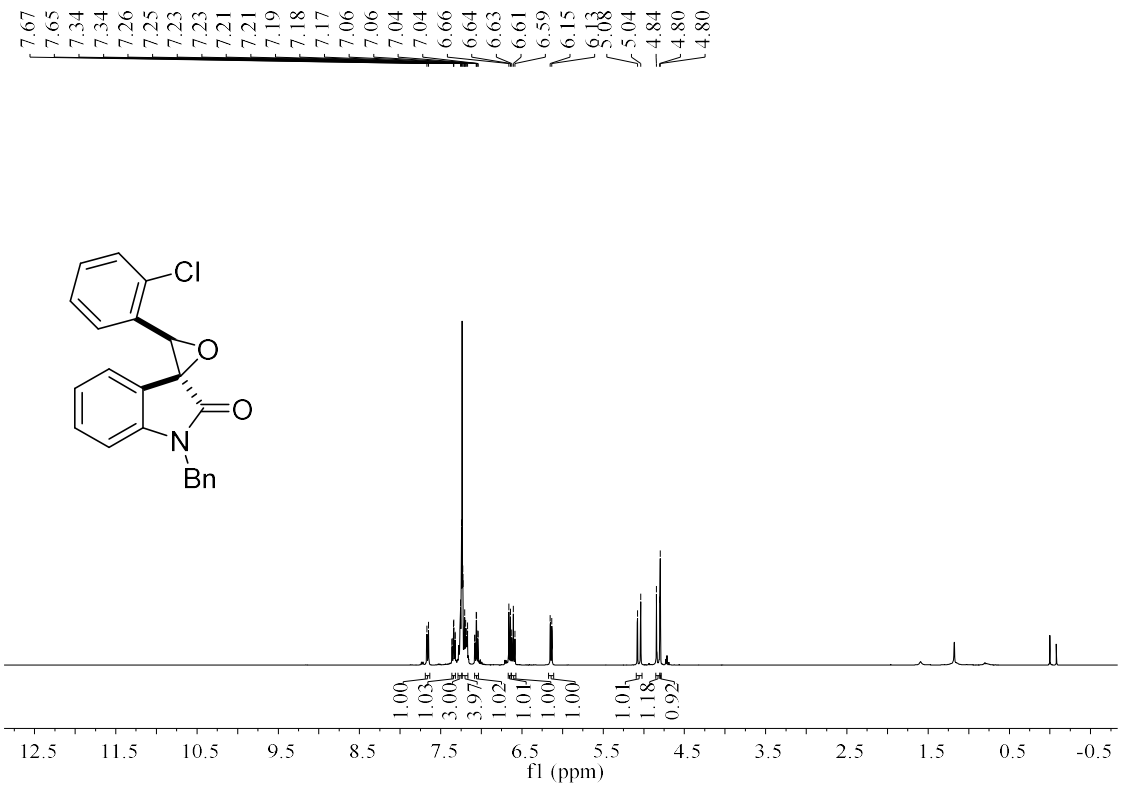
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3at**



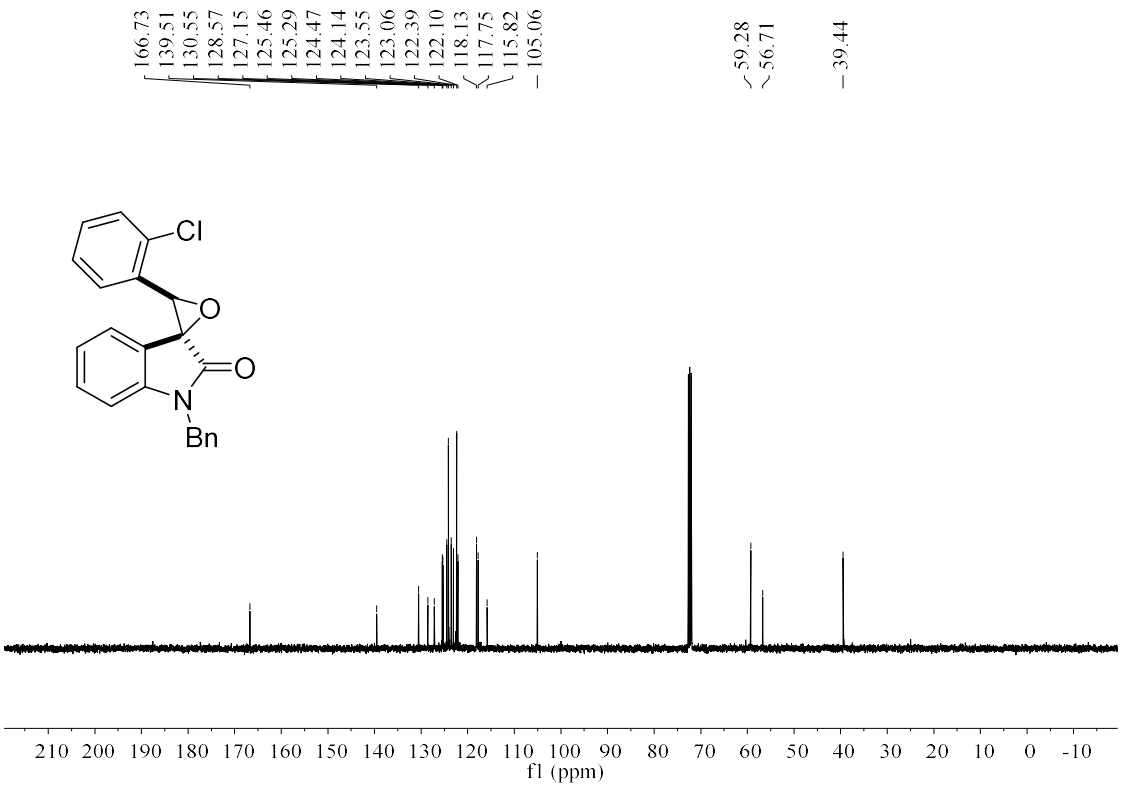
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3au**



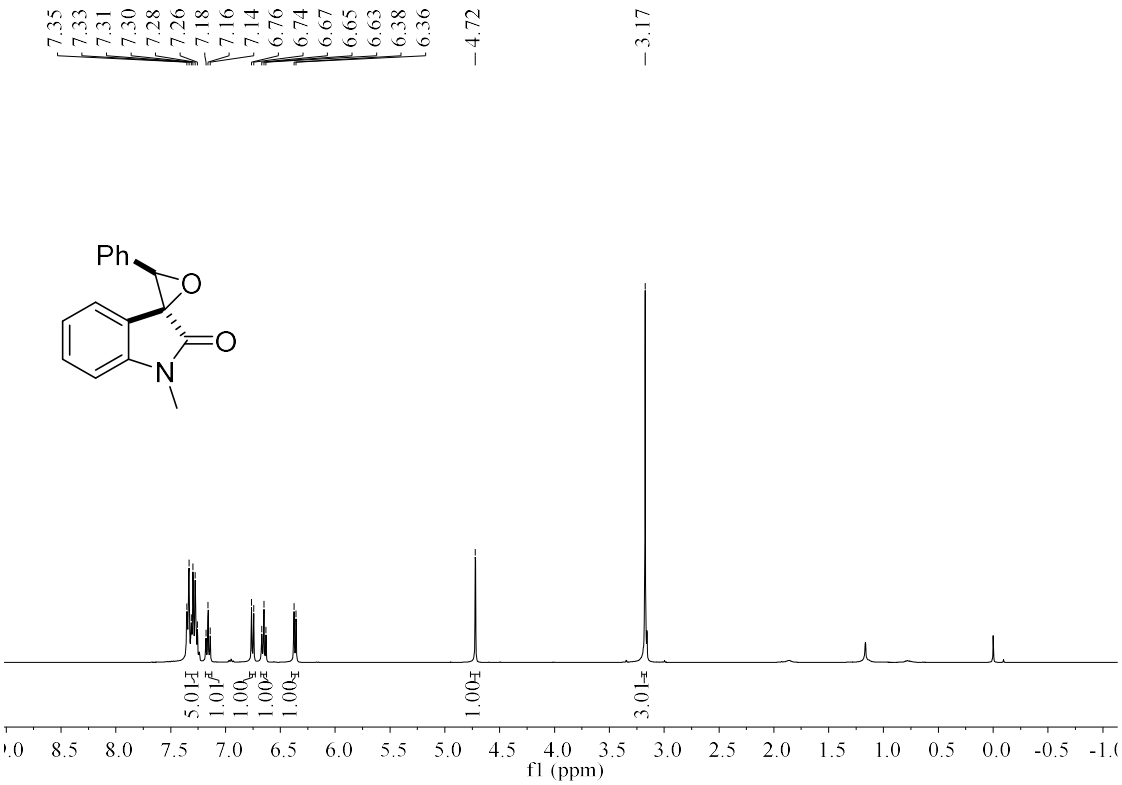
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3au**



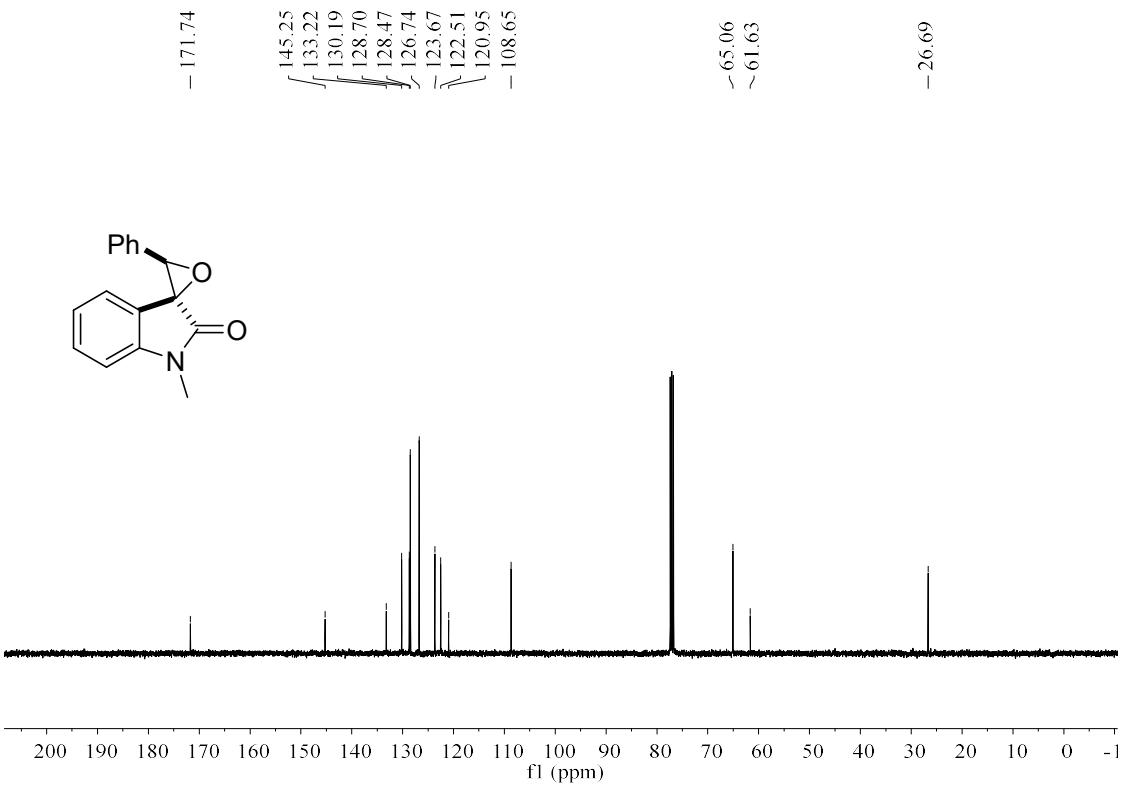
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3av**



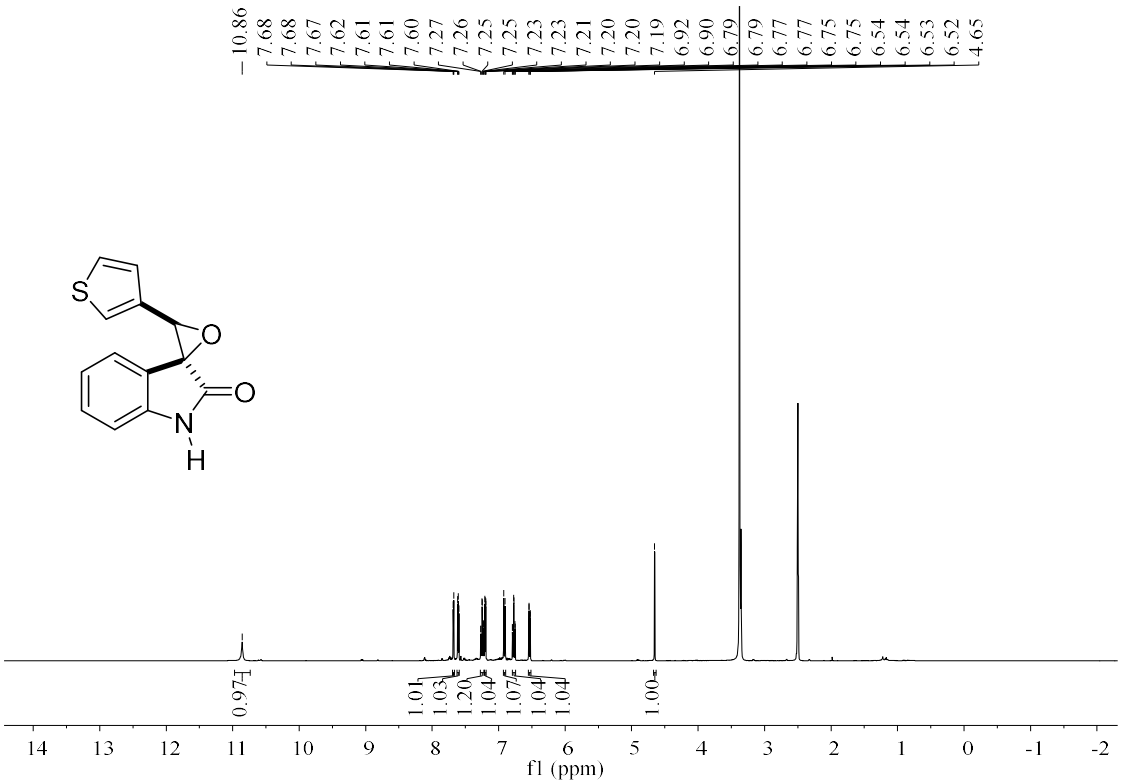
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3av**



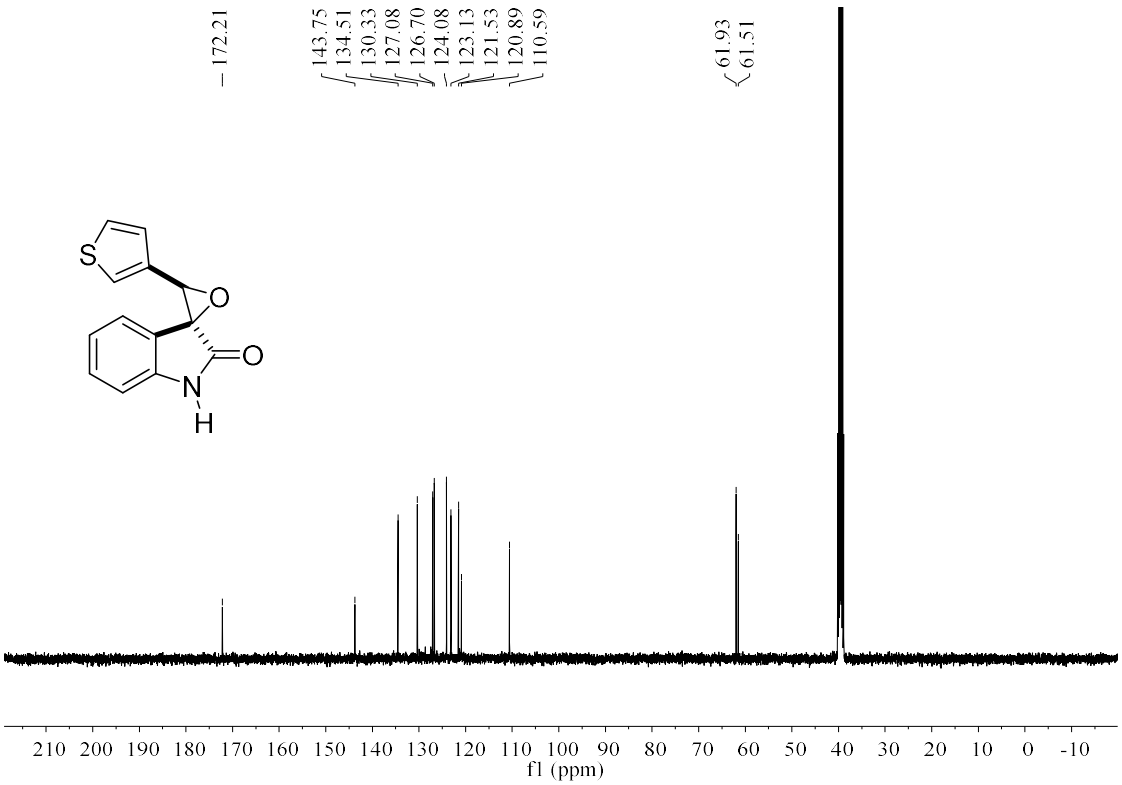
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3aw**



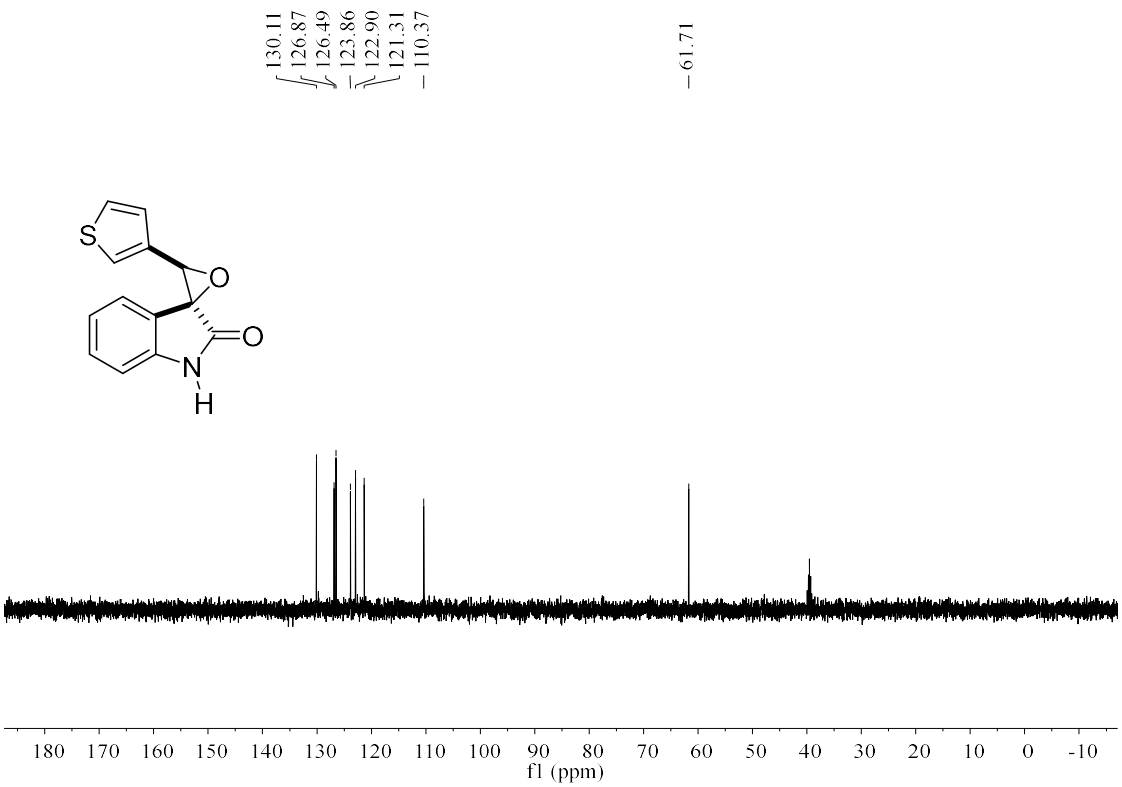
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3aw**



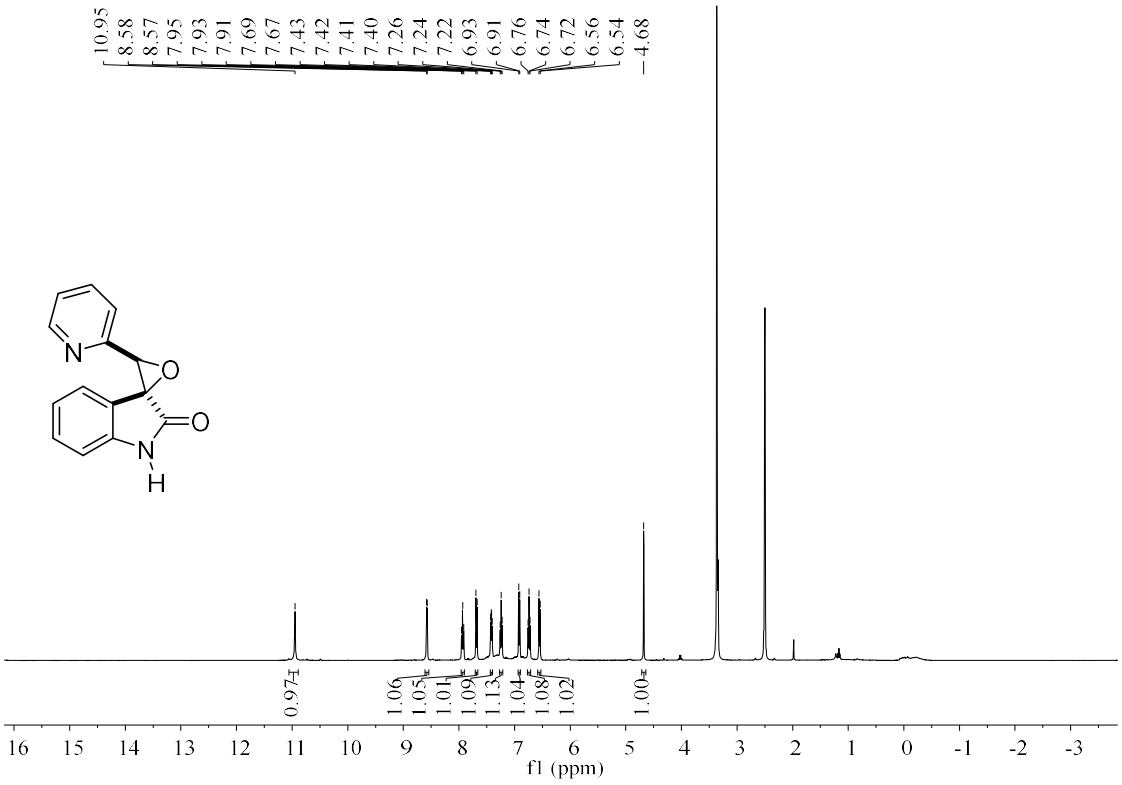
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ax**



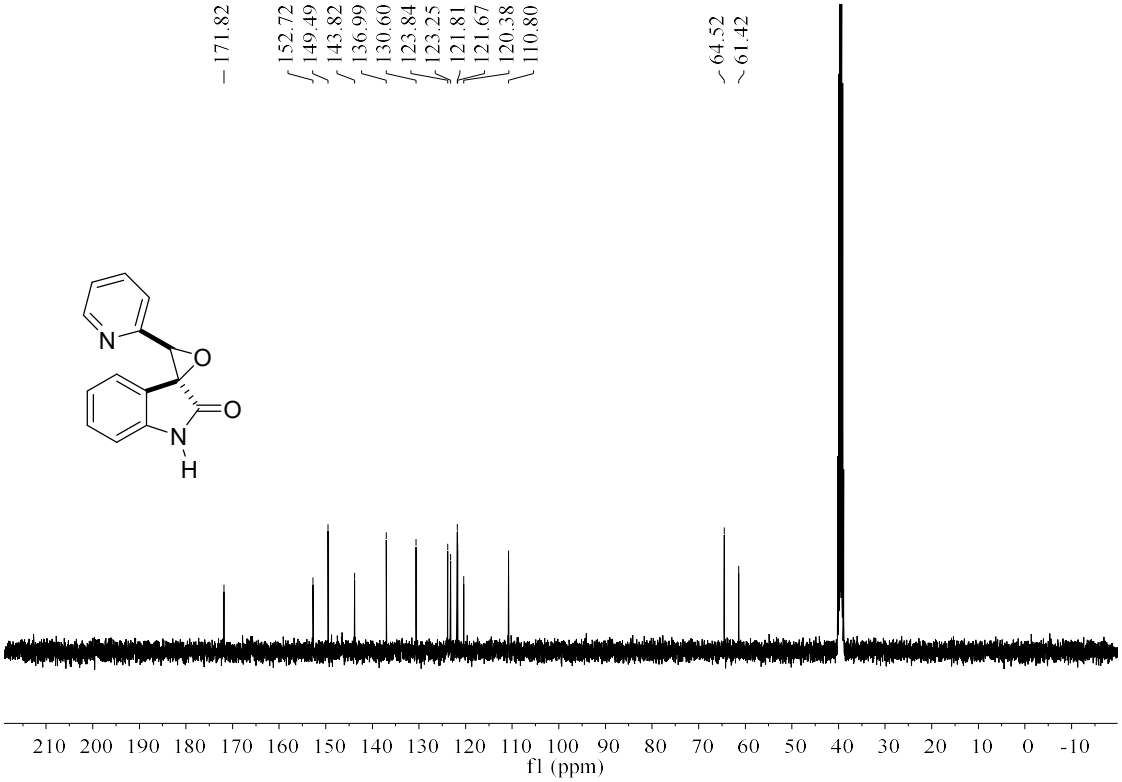
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ax**



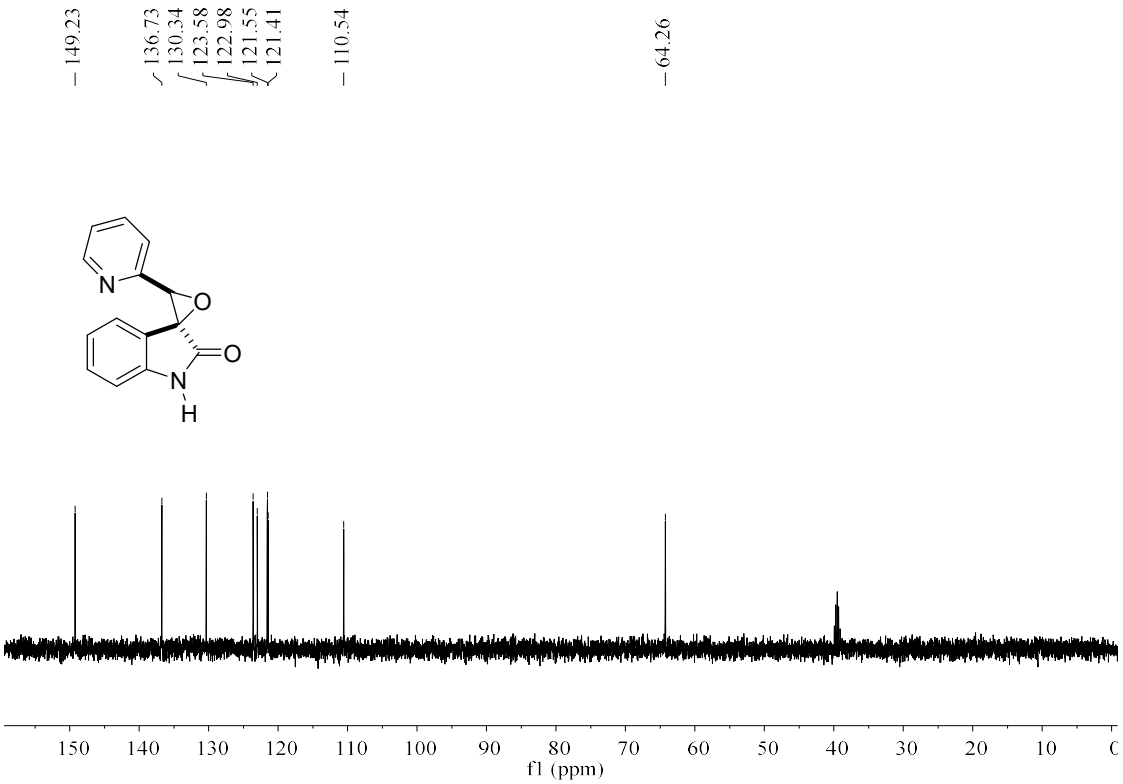
DEPT135° spectrum of **3ax**



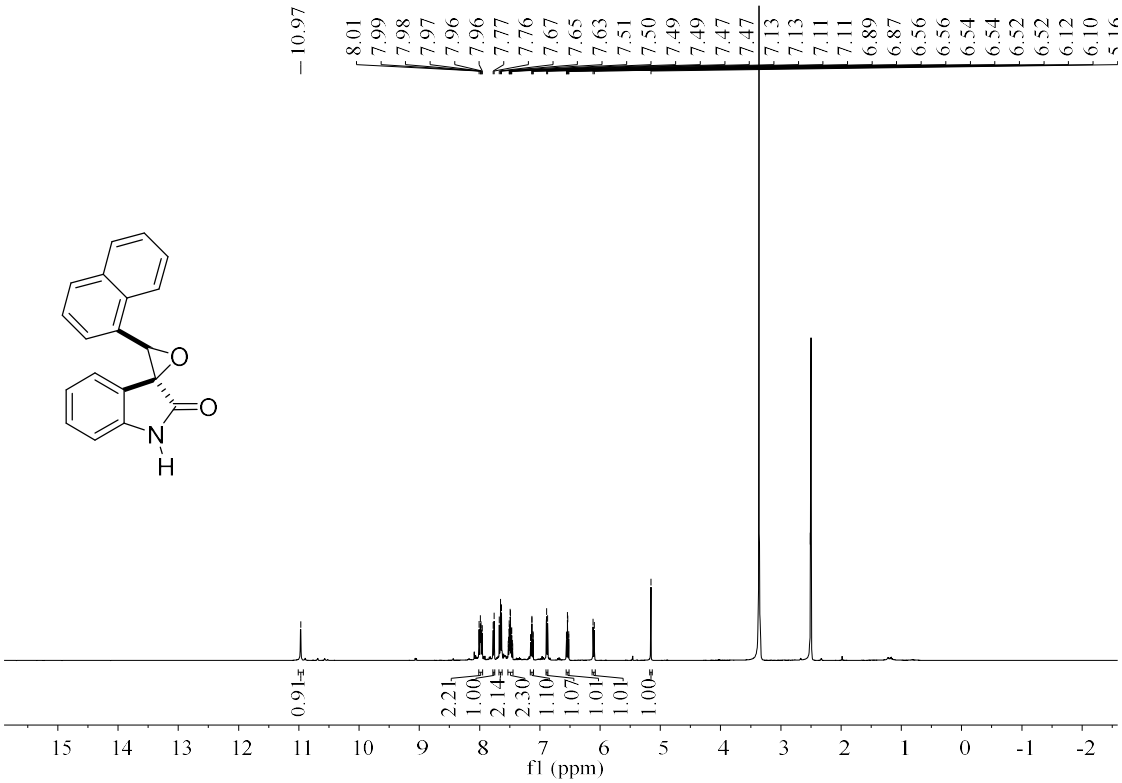
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3ay**



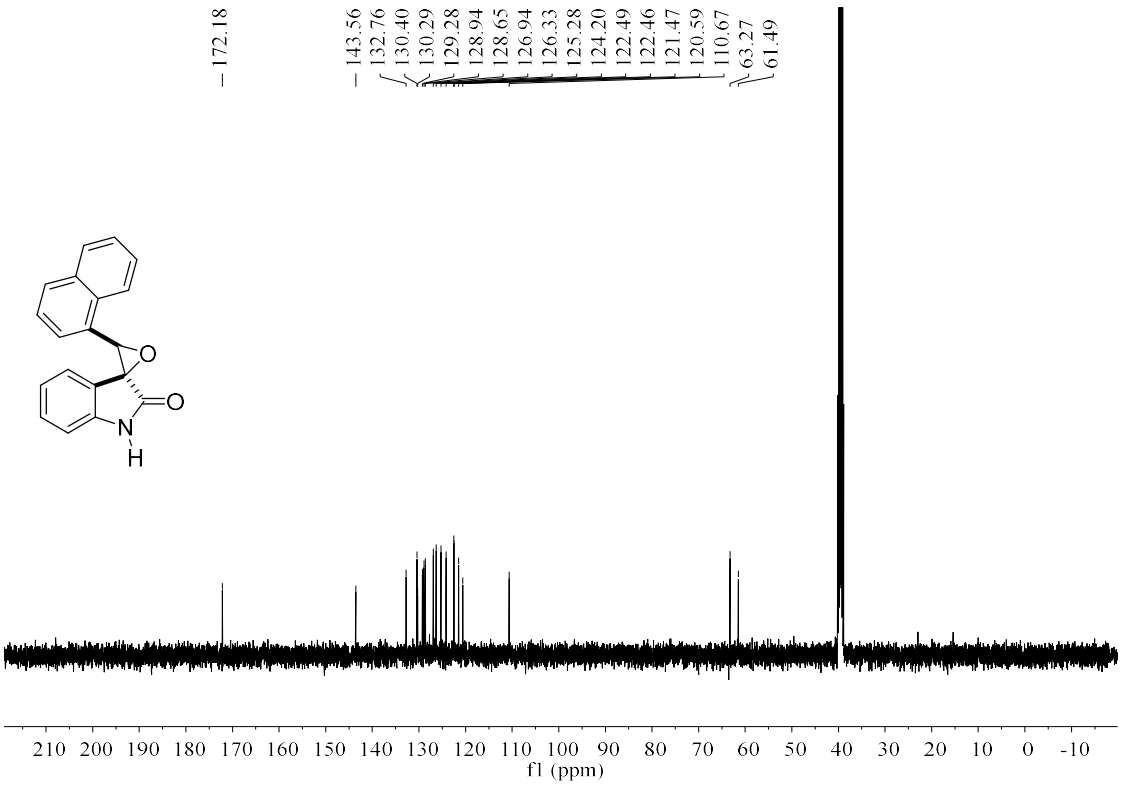
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3ay**



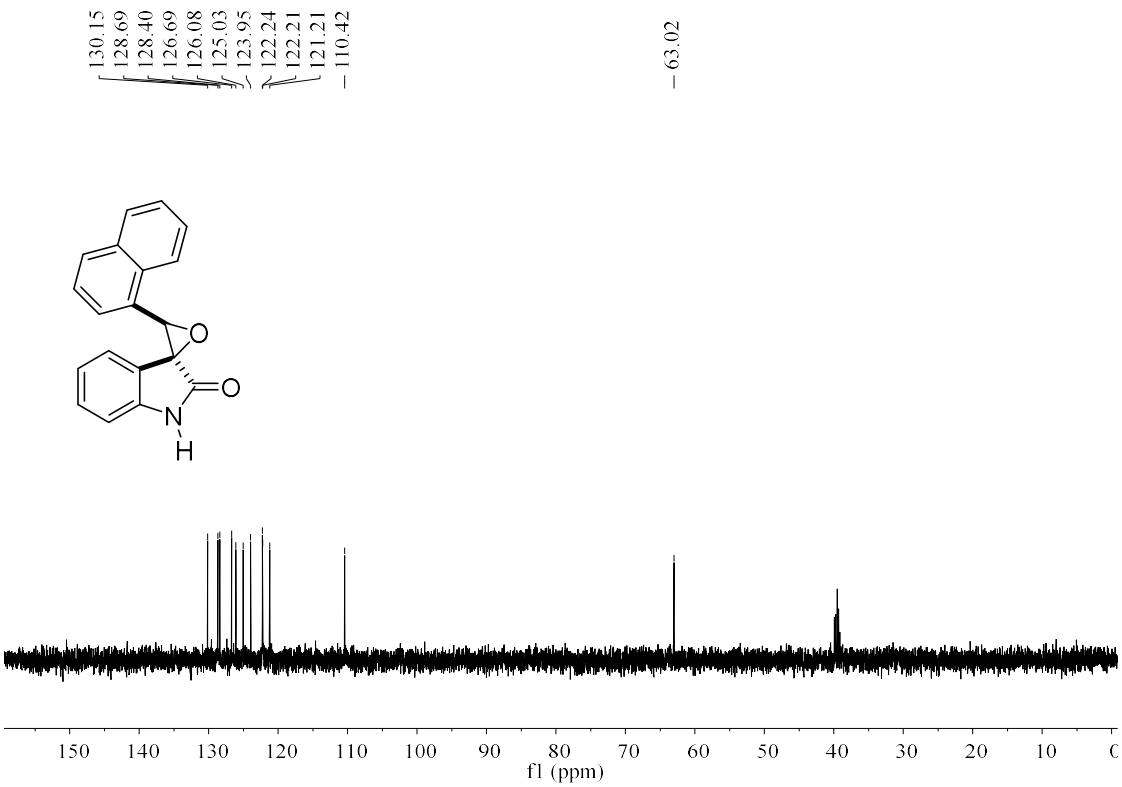
DEPT135° spectrum of **3ay**



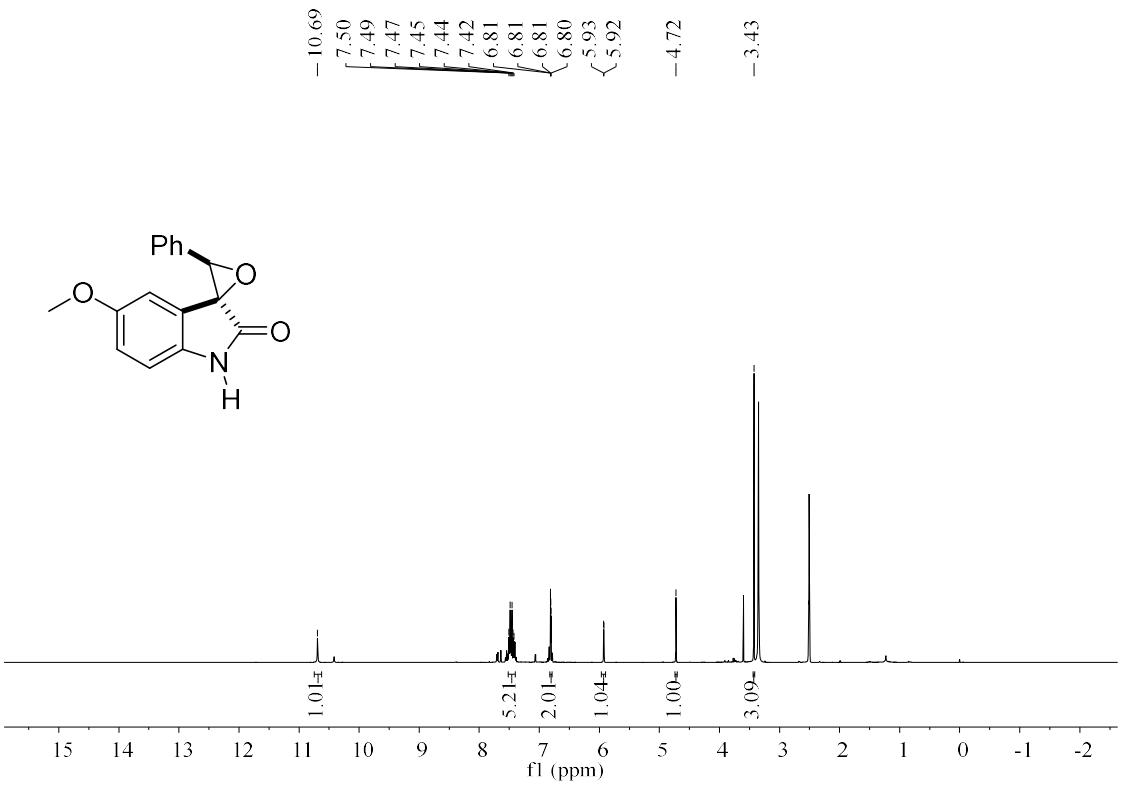
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3az**



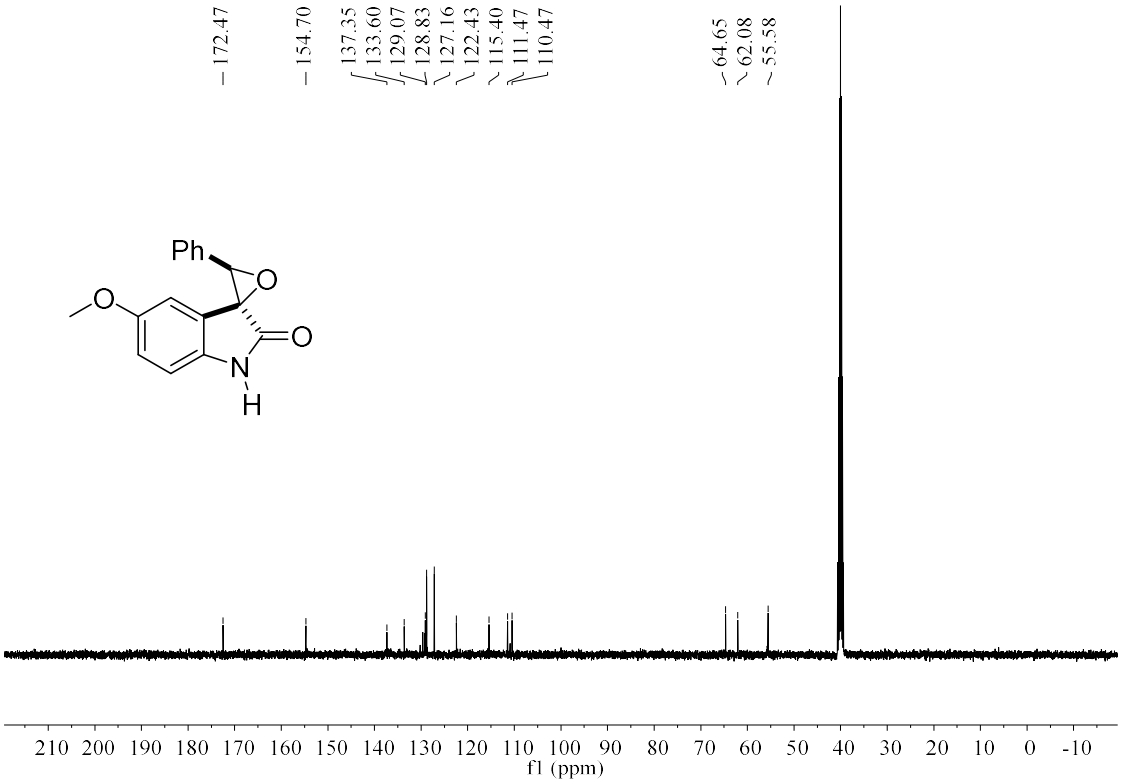
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3az**



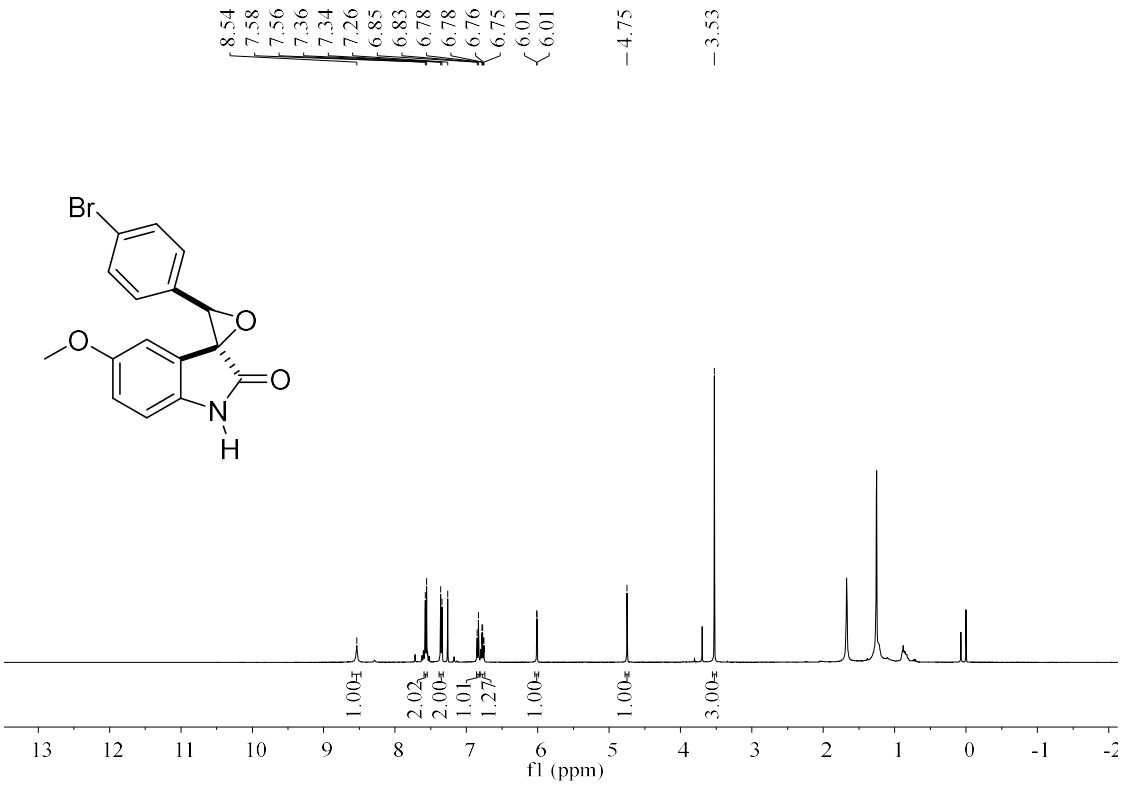
DEPT135° spectrum of **3az**



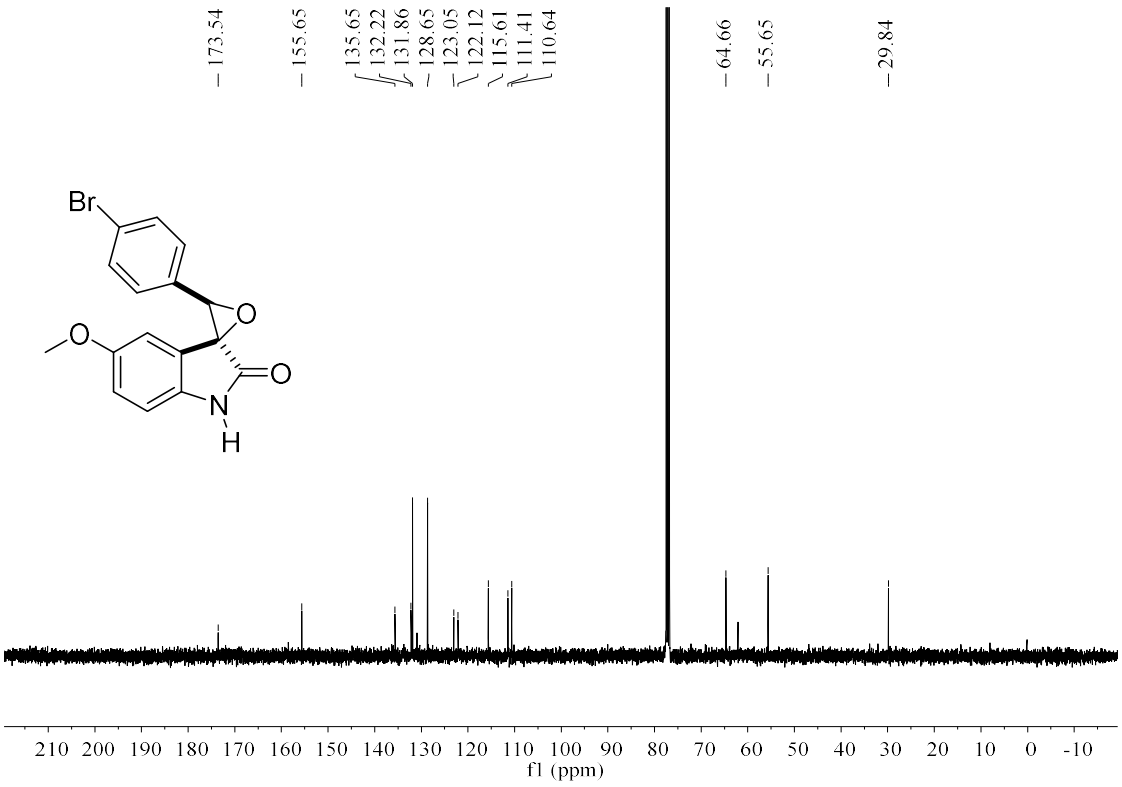
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3ba**



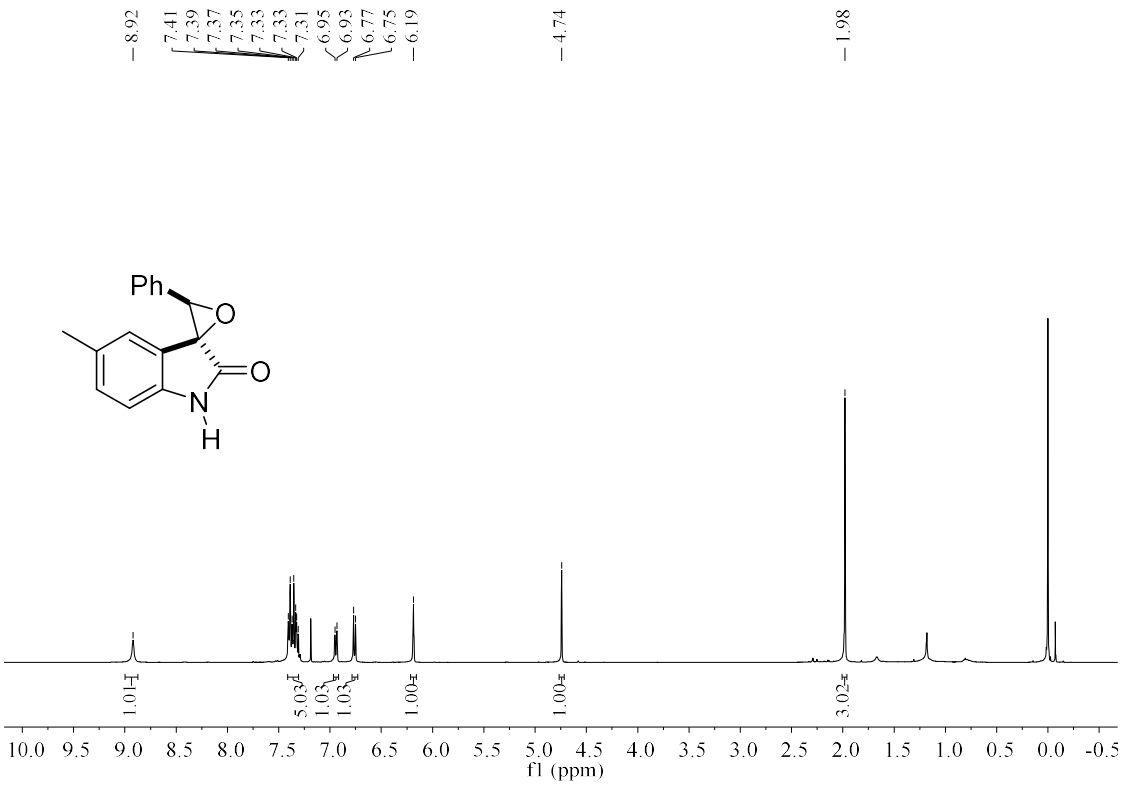
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3ba**



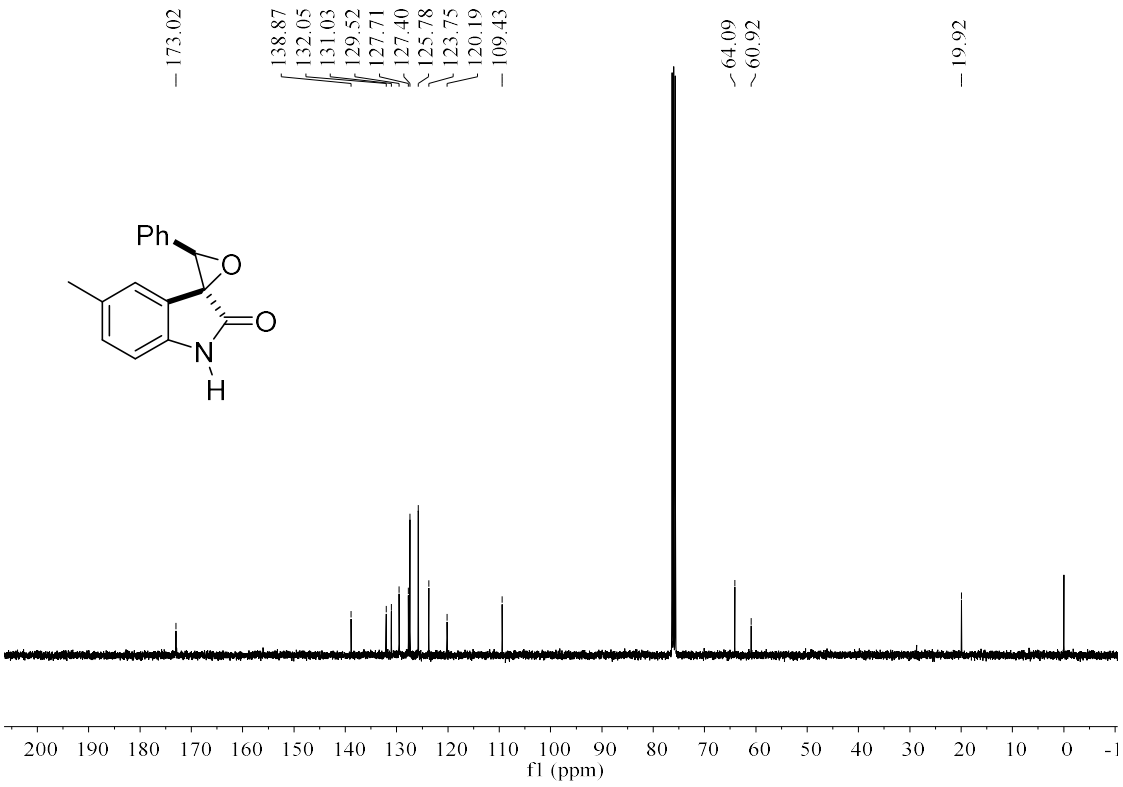
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3bb**



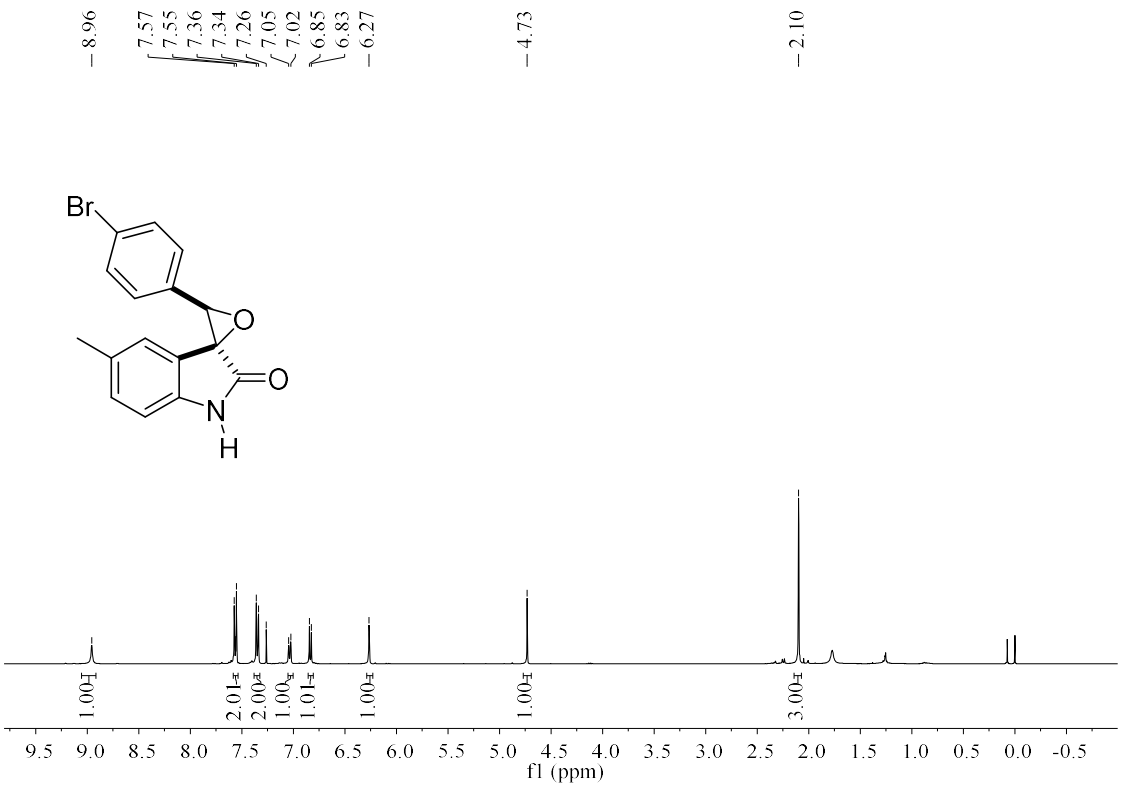
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3bb**



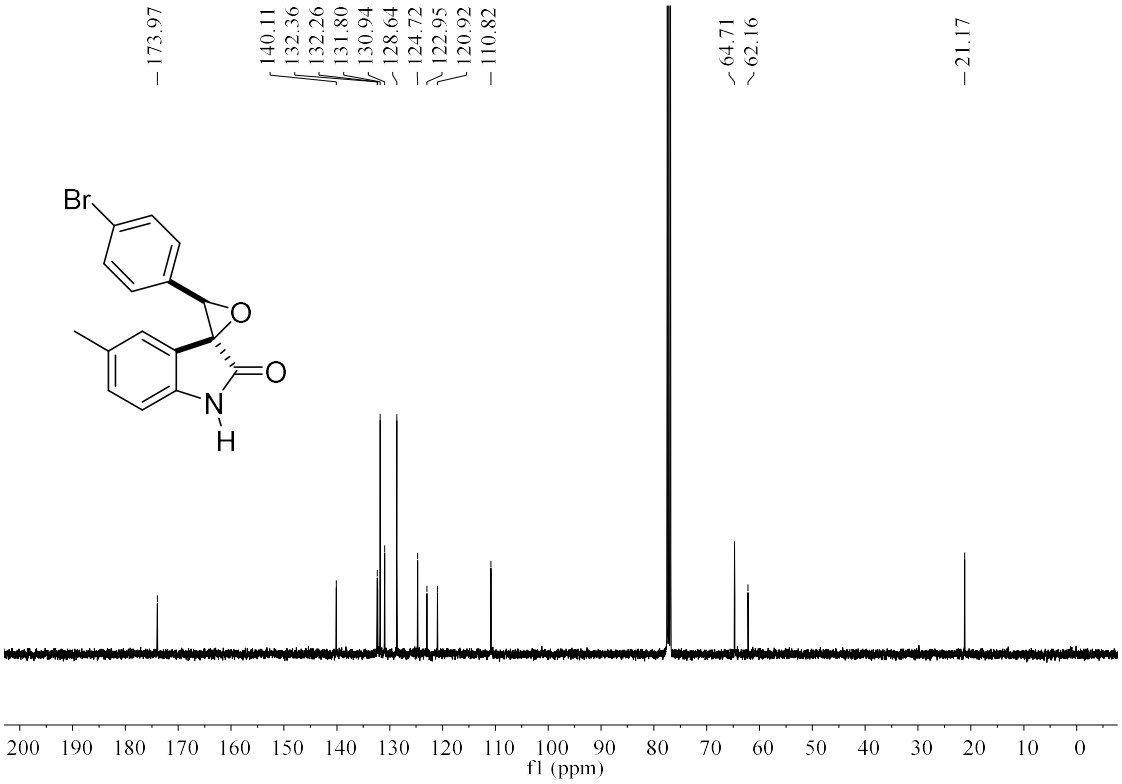
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3bc**



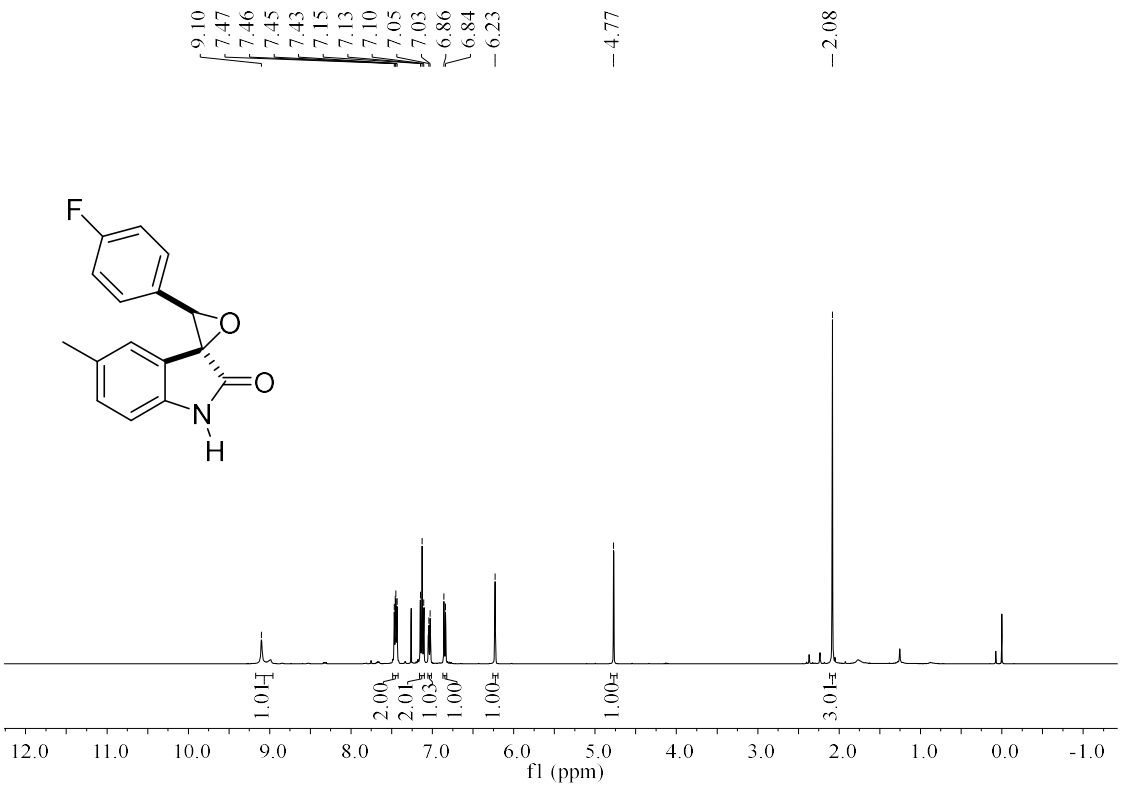
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3bc**



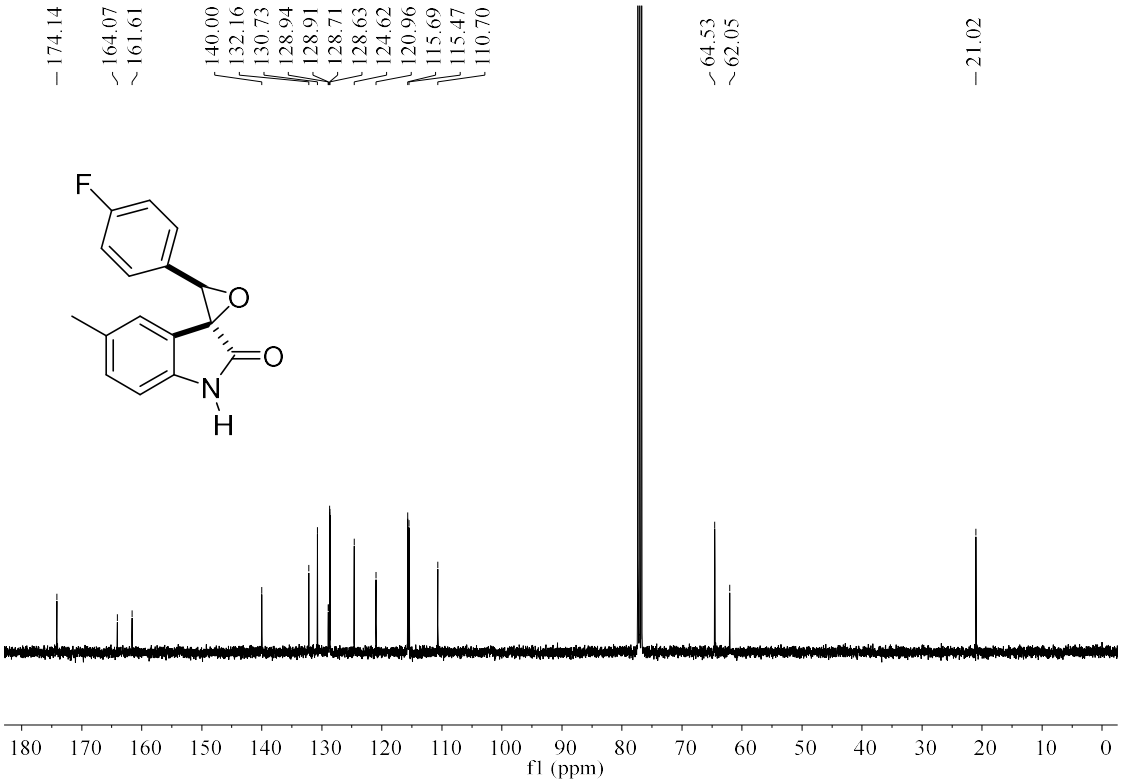
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3bd**



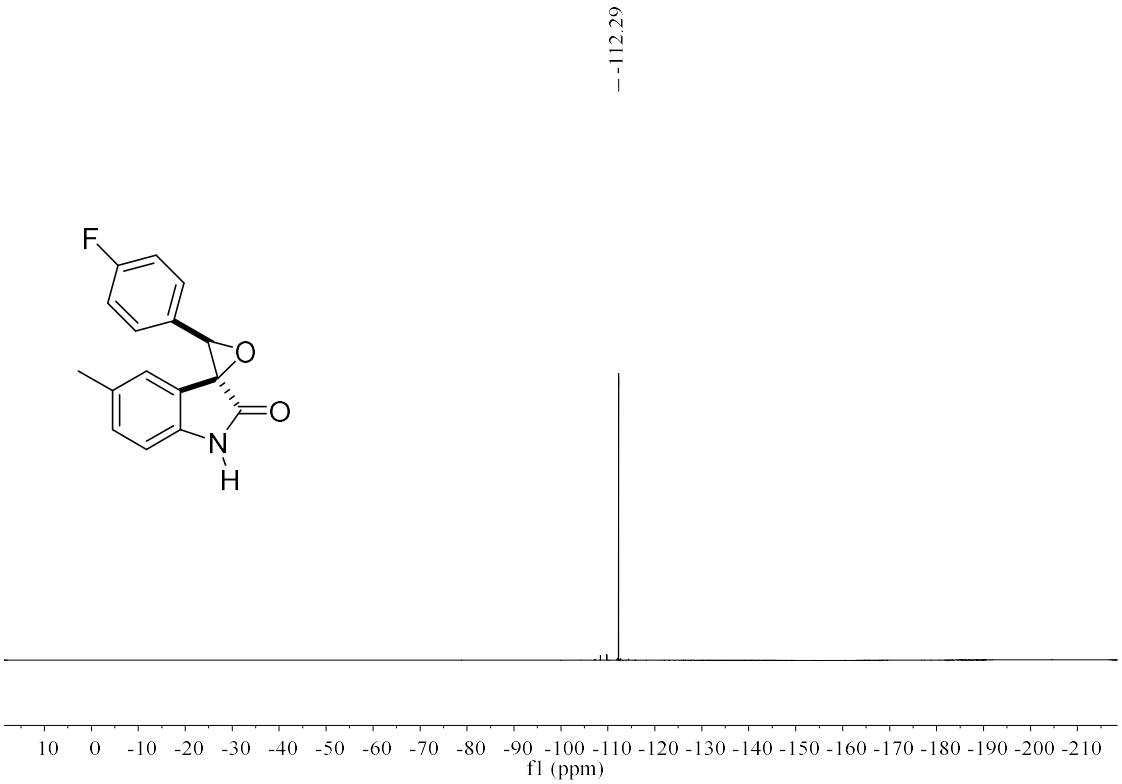
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3bd**



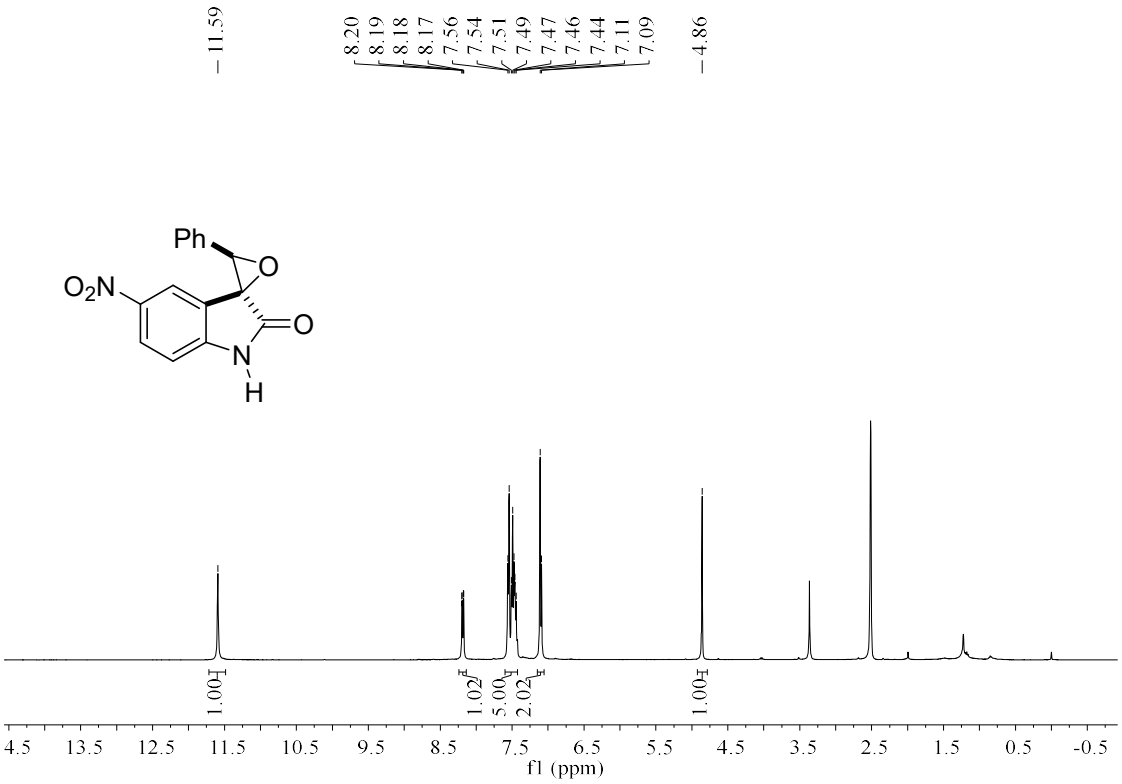
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3be**



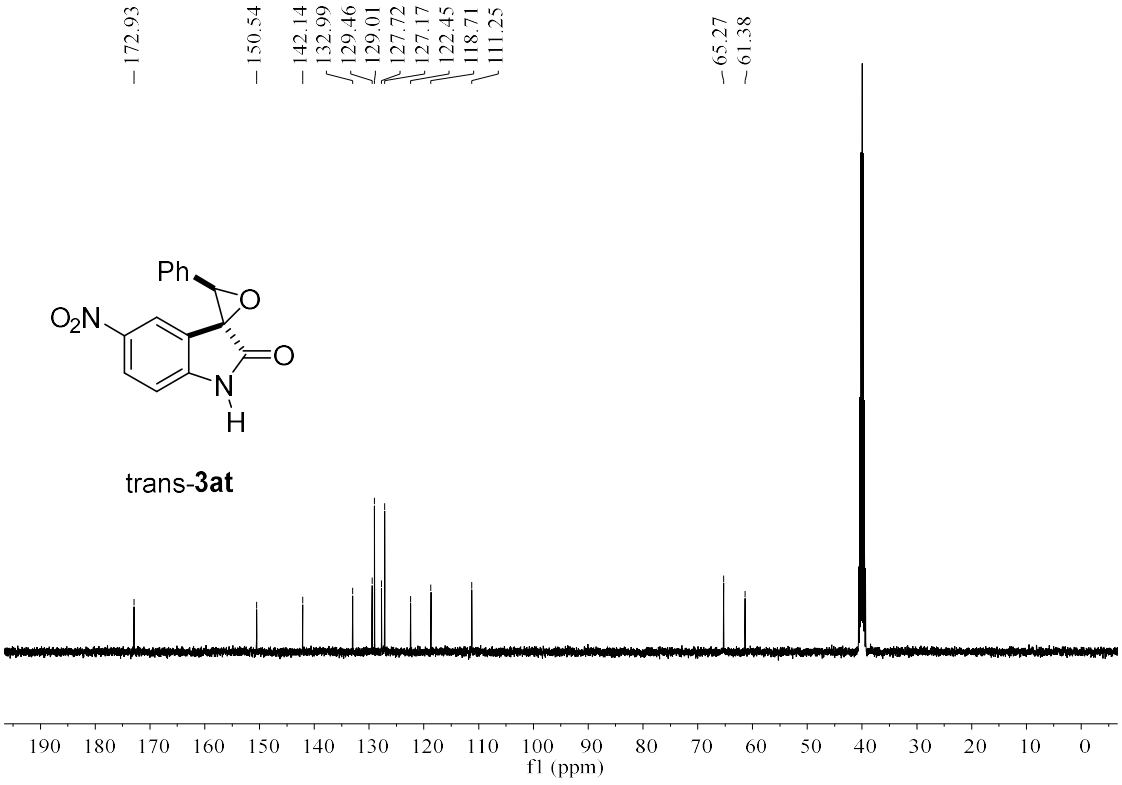
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3be**



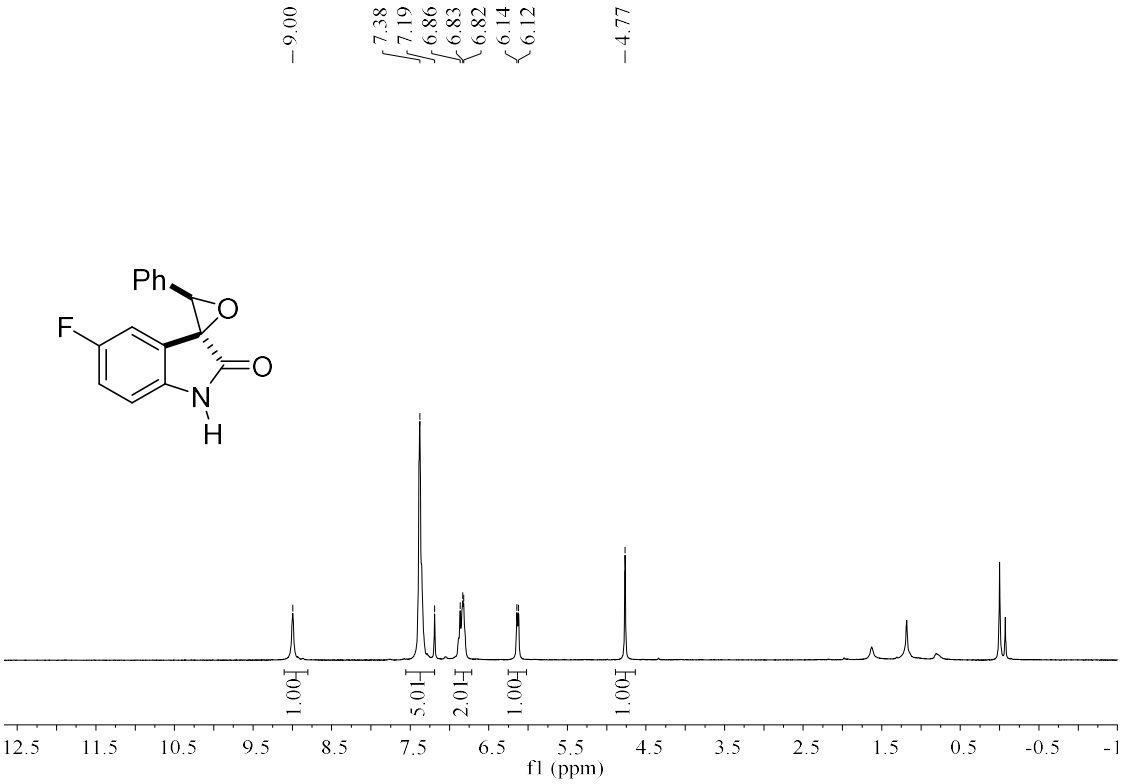
^{19}F NMR spectrum (377 MHz, Chloroform-*d*) of **3be**



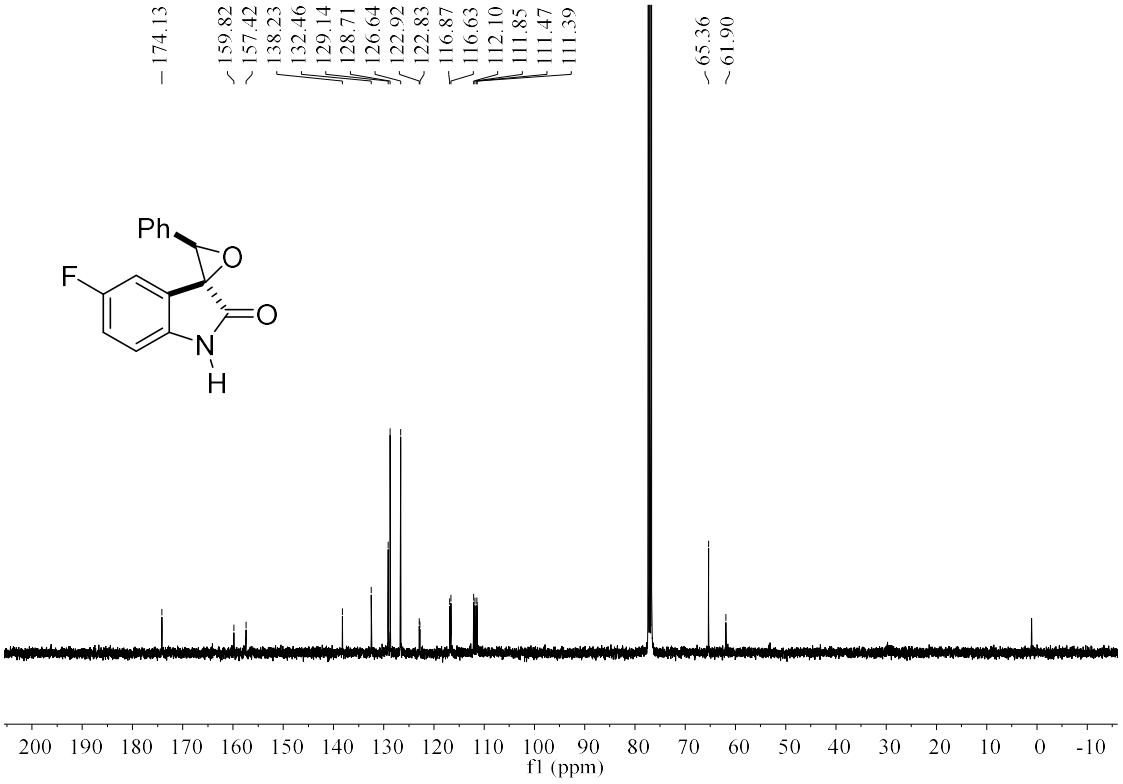
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bf**



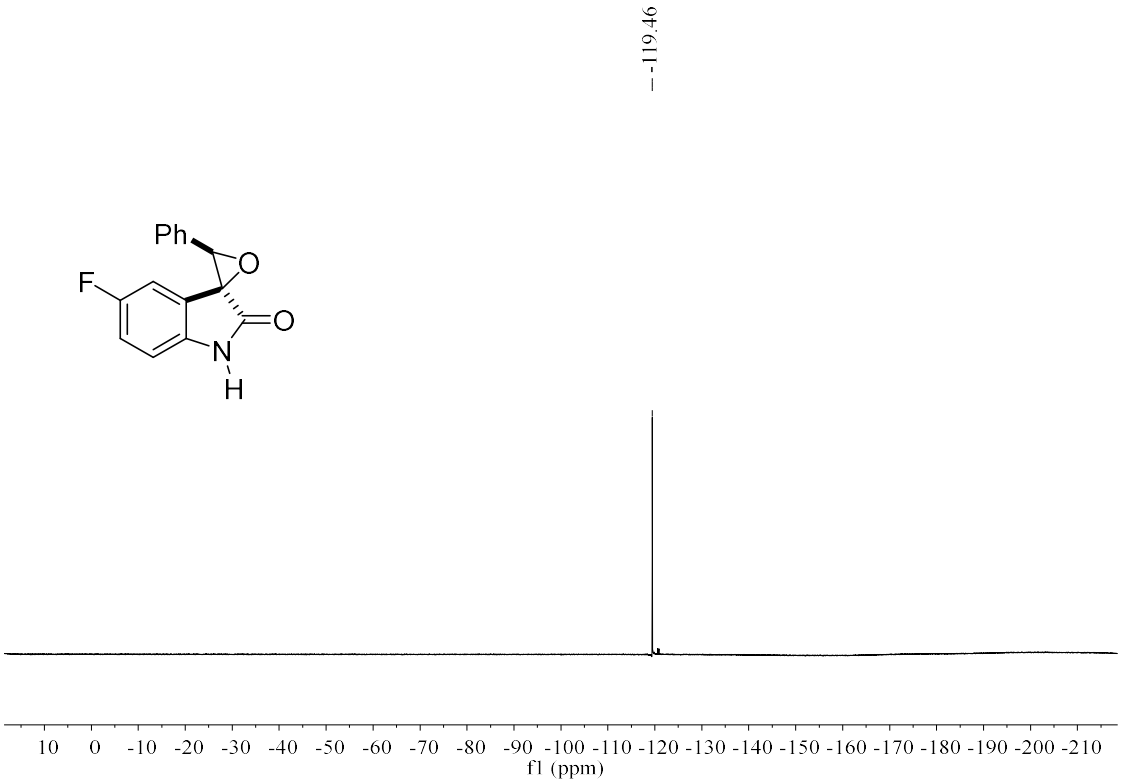
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bf**



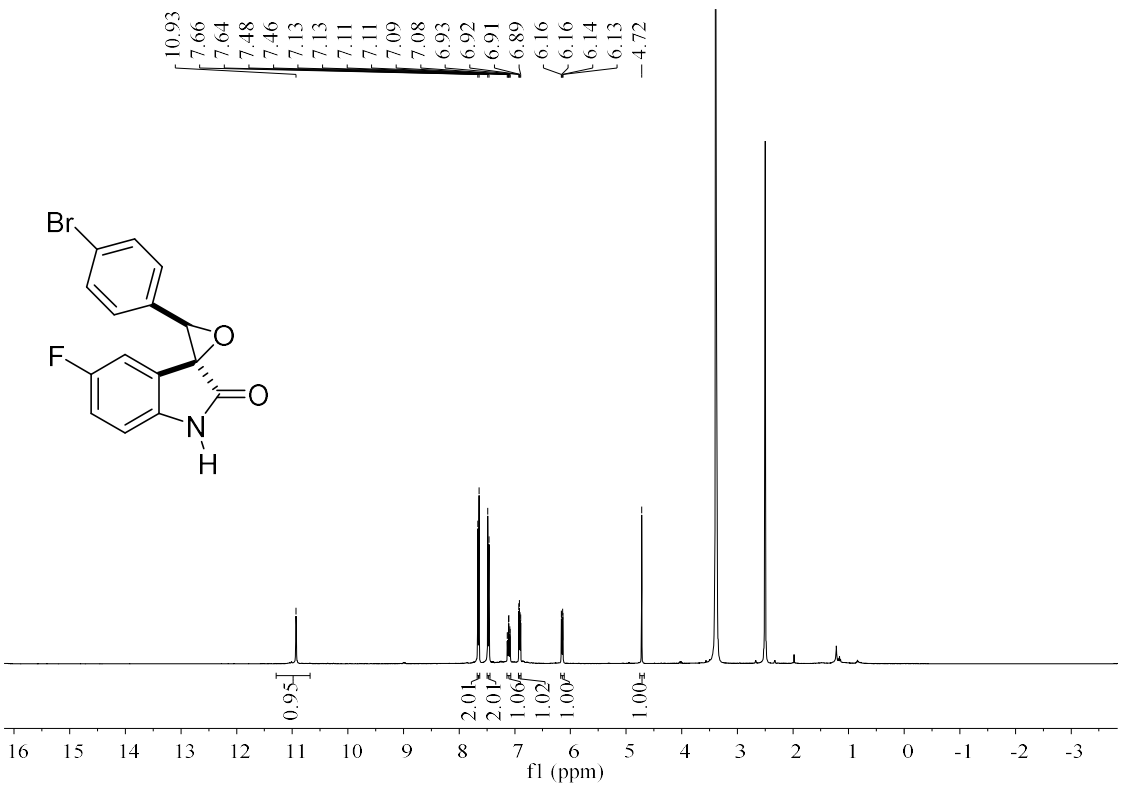
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3bg**



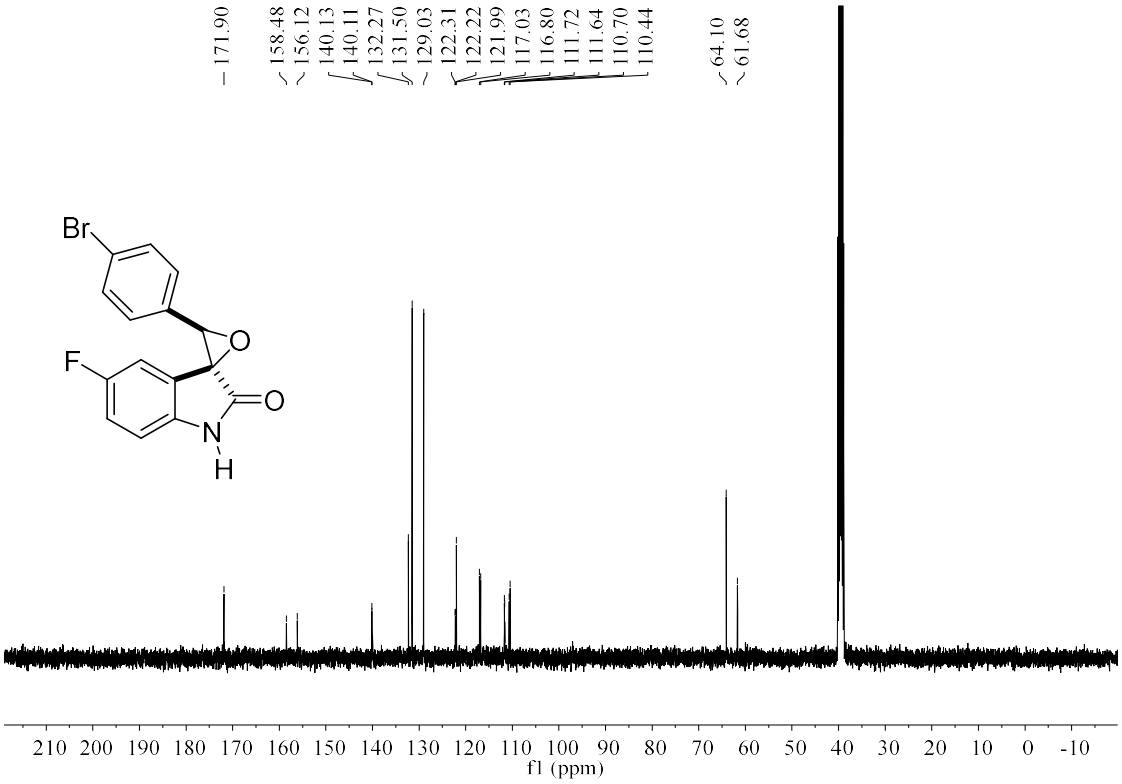
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3bg**



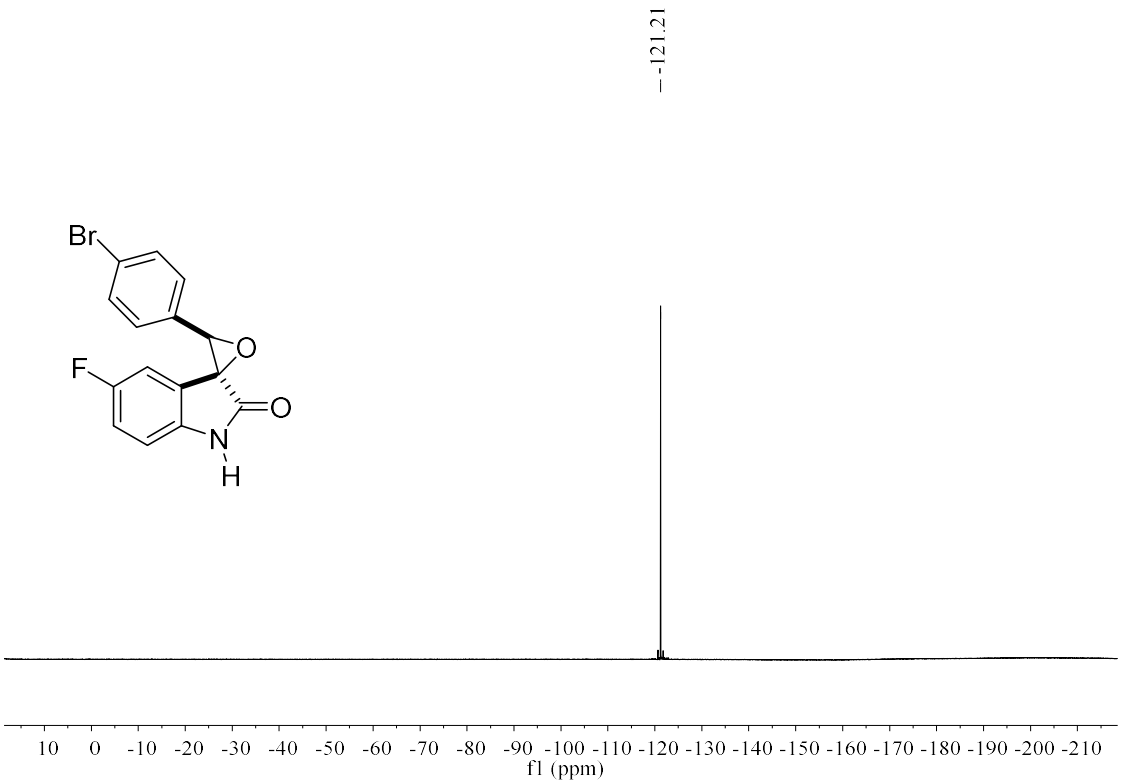
^{19}F NMR spectrum (377 MHz, Chloroform-*d*) of **3bg**



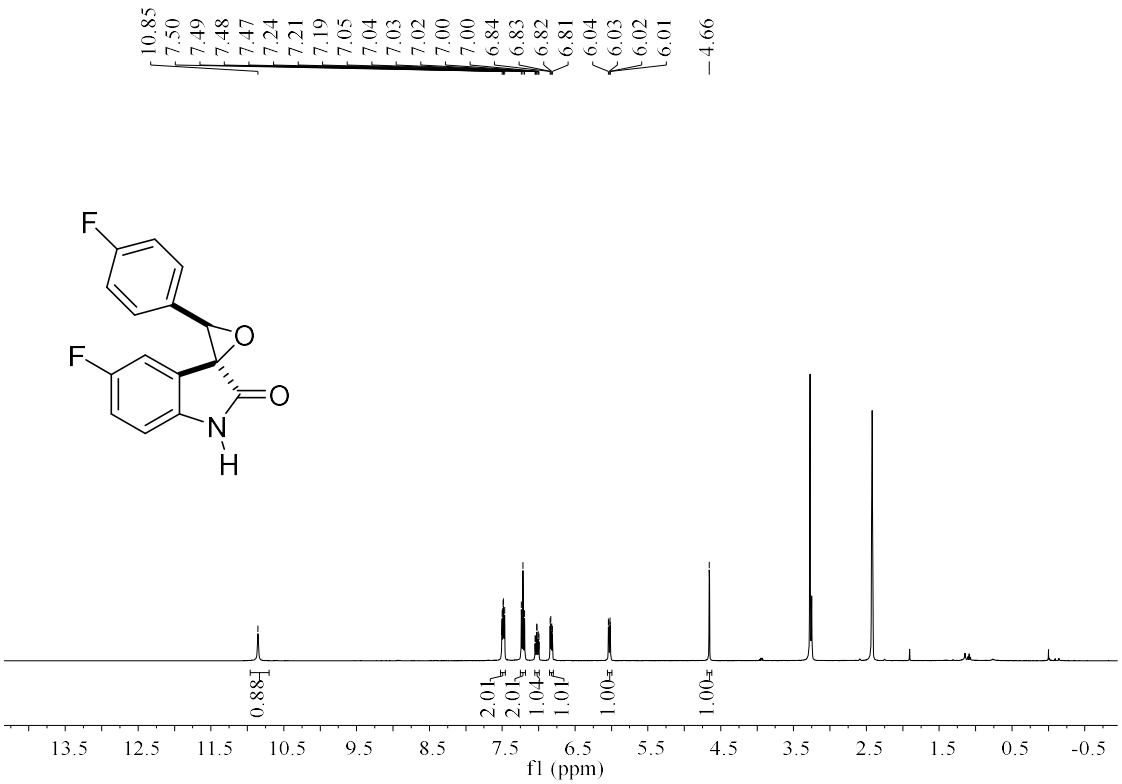
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bh**



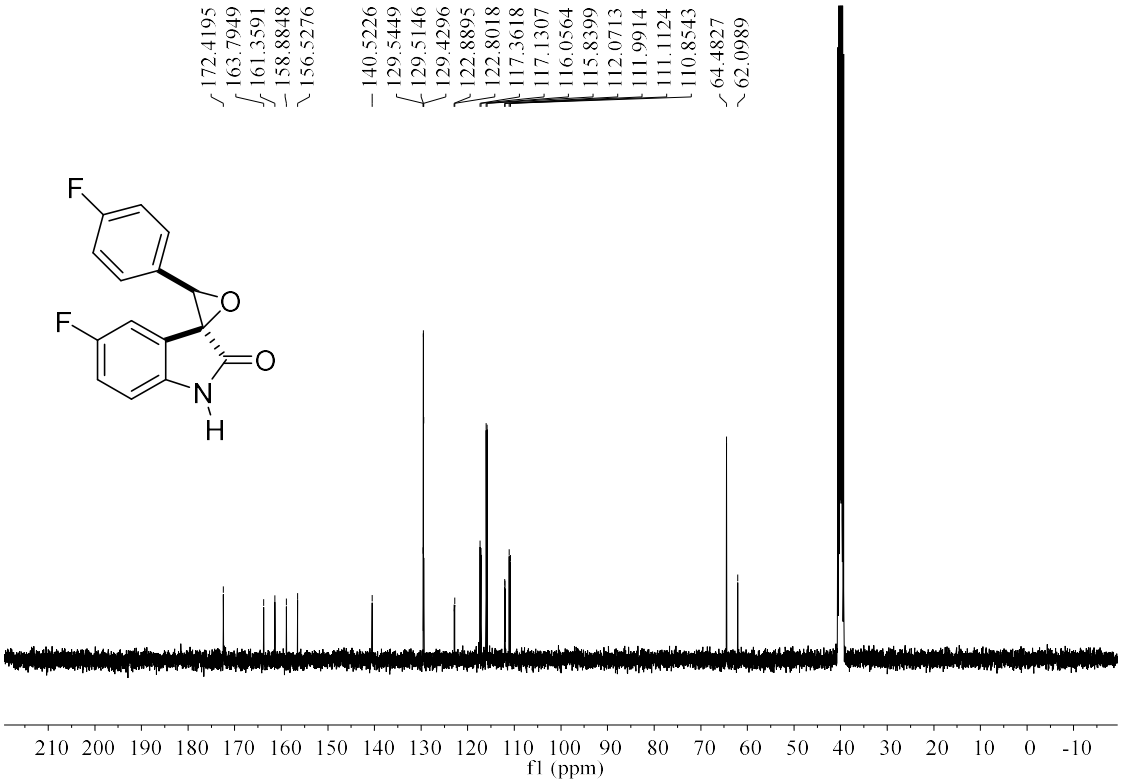
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bh**



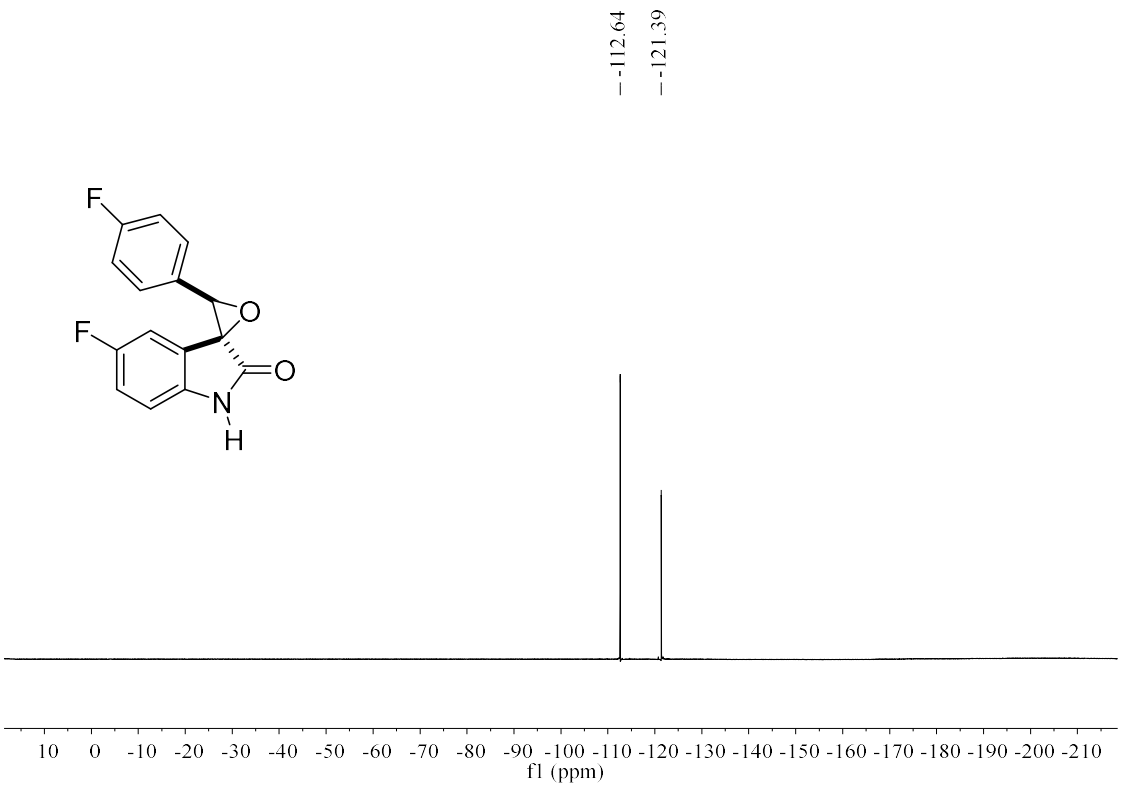
^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3bh**



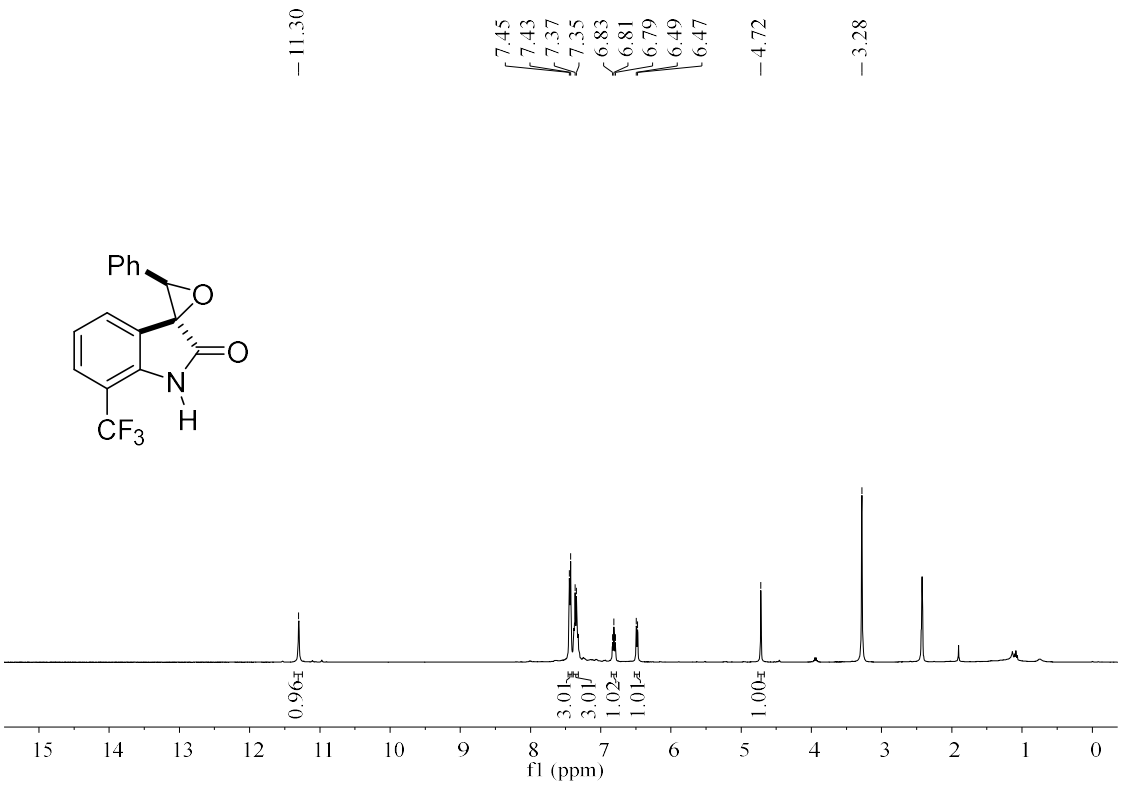
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bi**



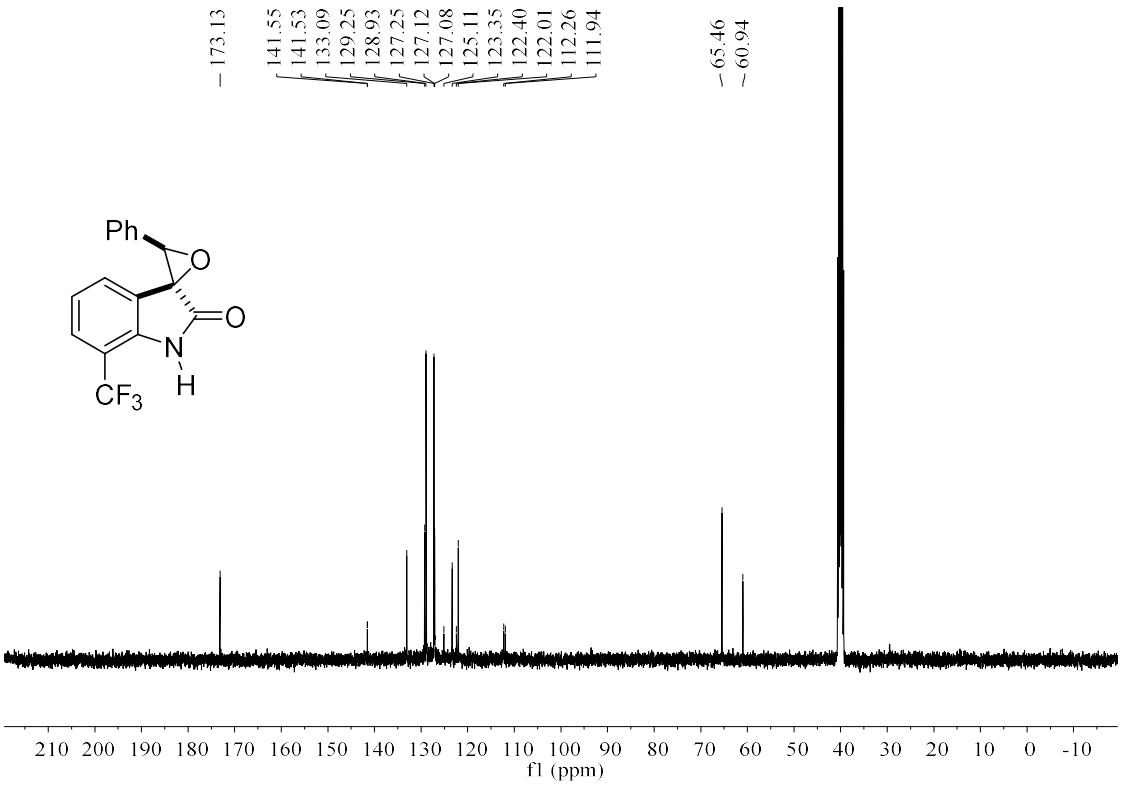
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bi**



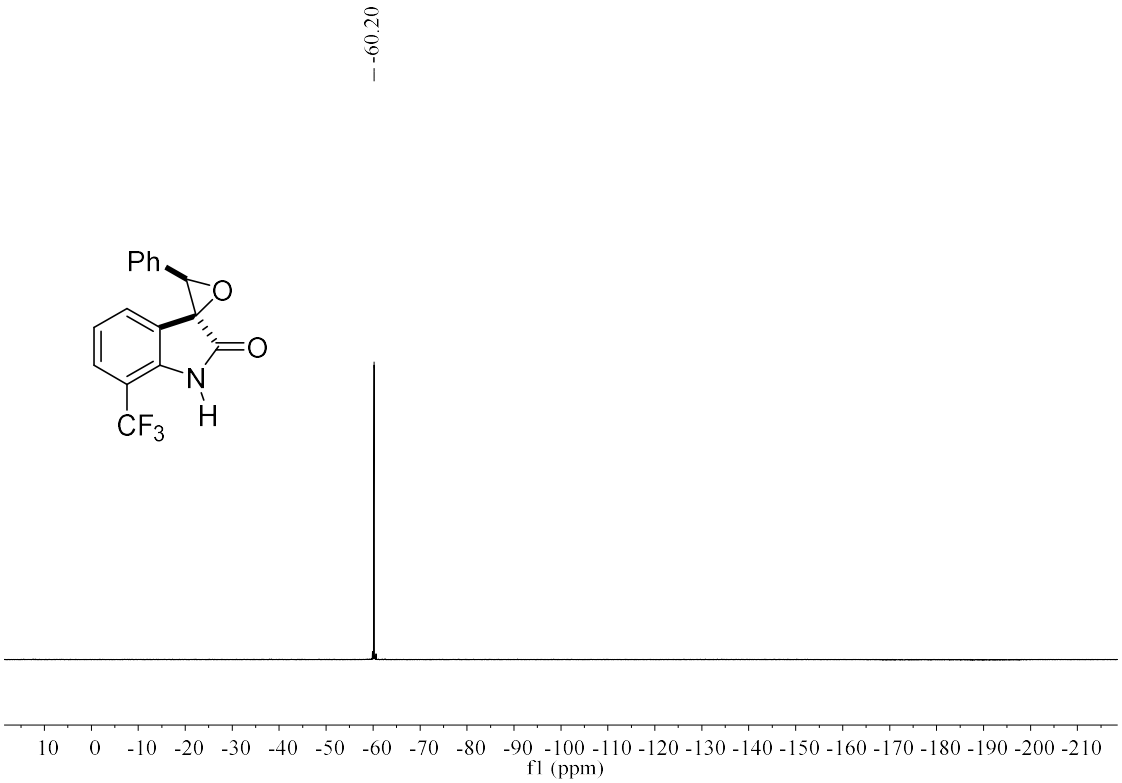
^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3bi**



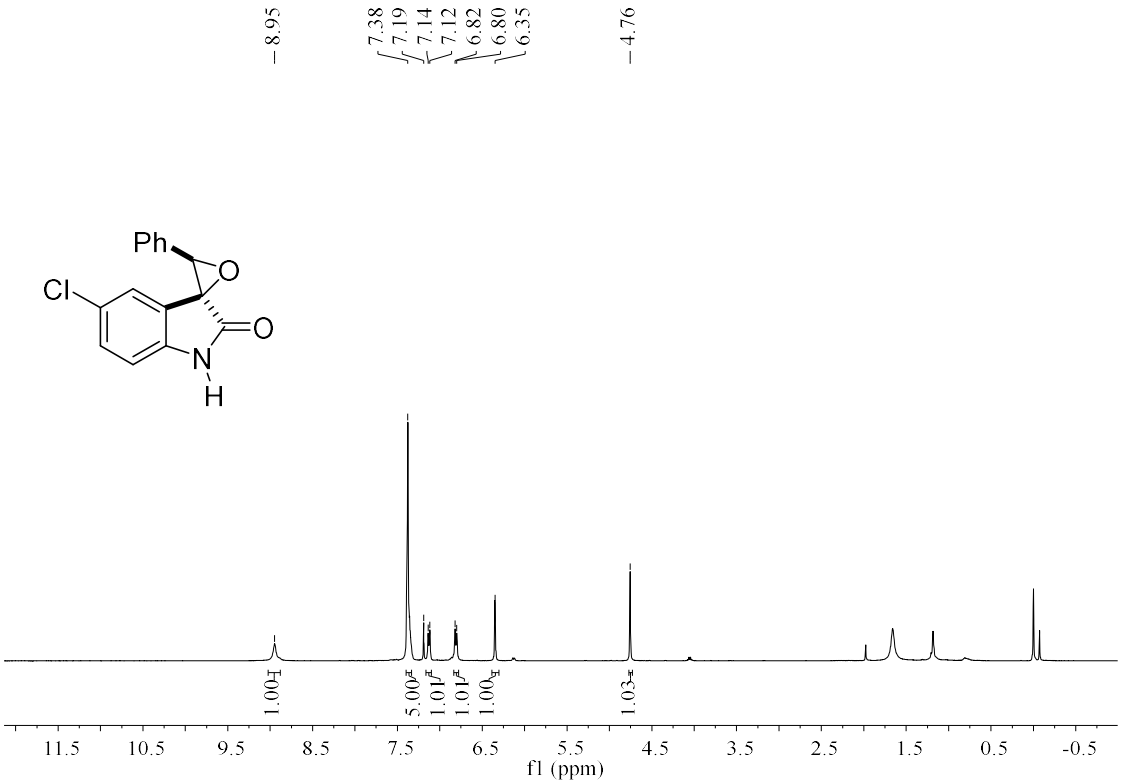
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bj**



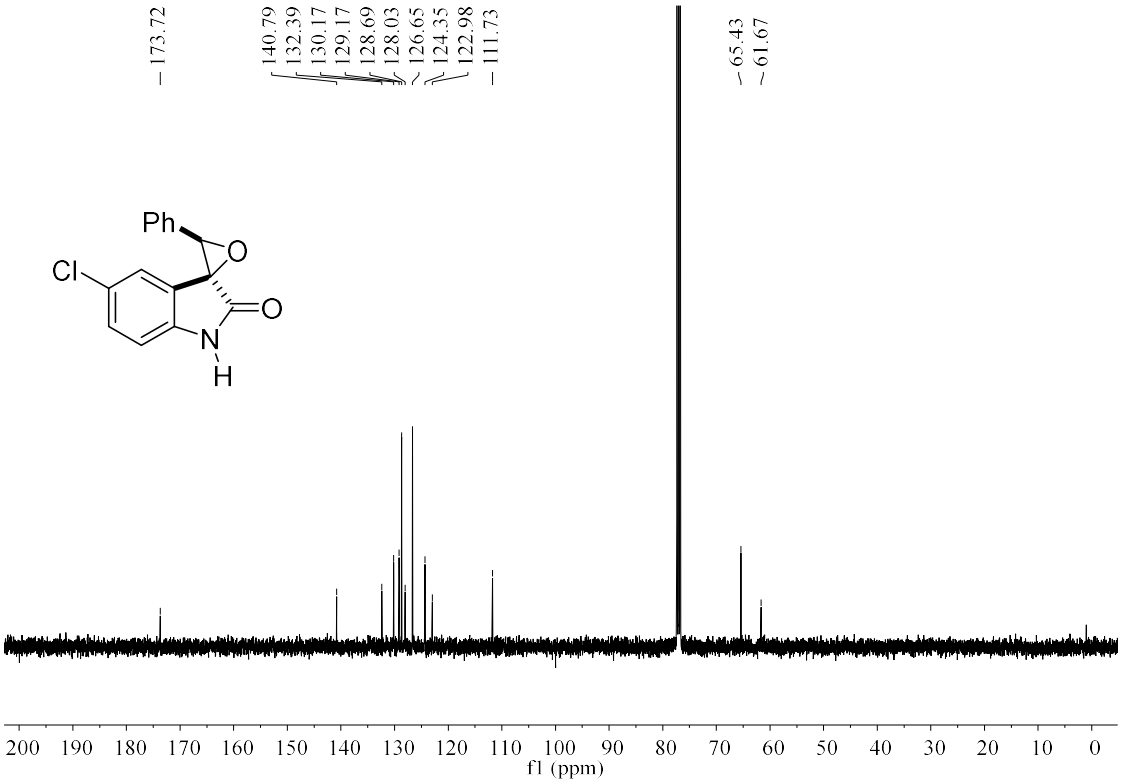
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bj**



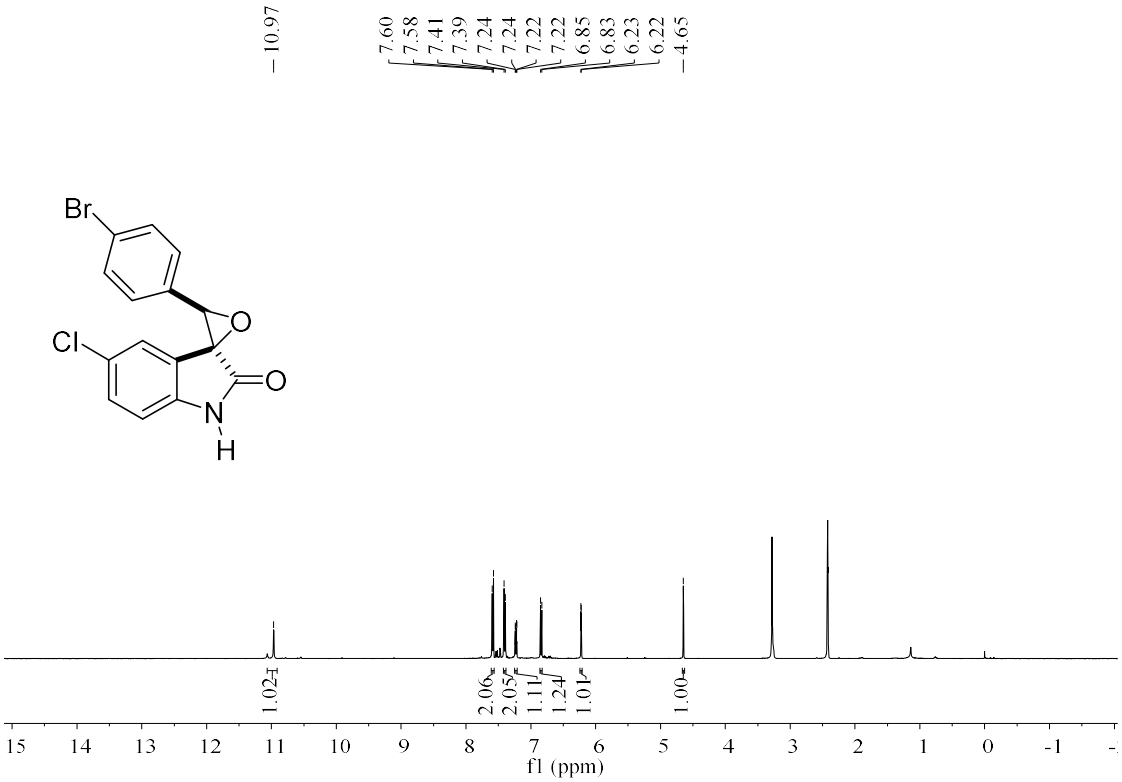
^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3bj**



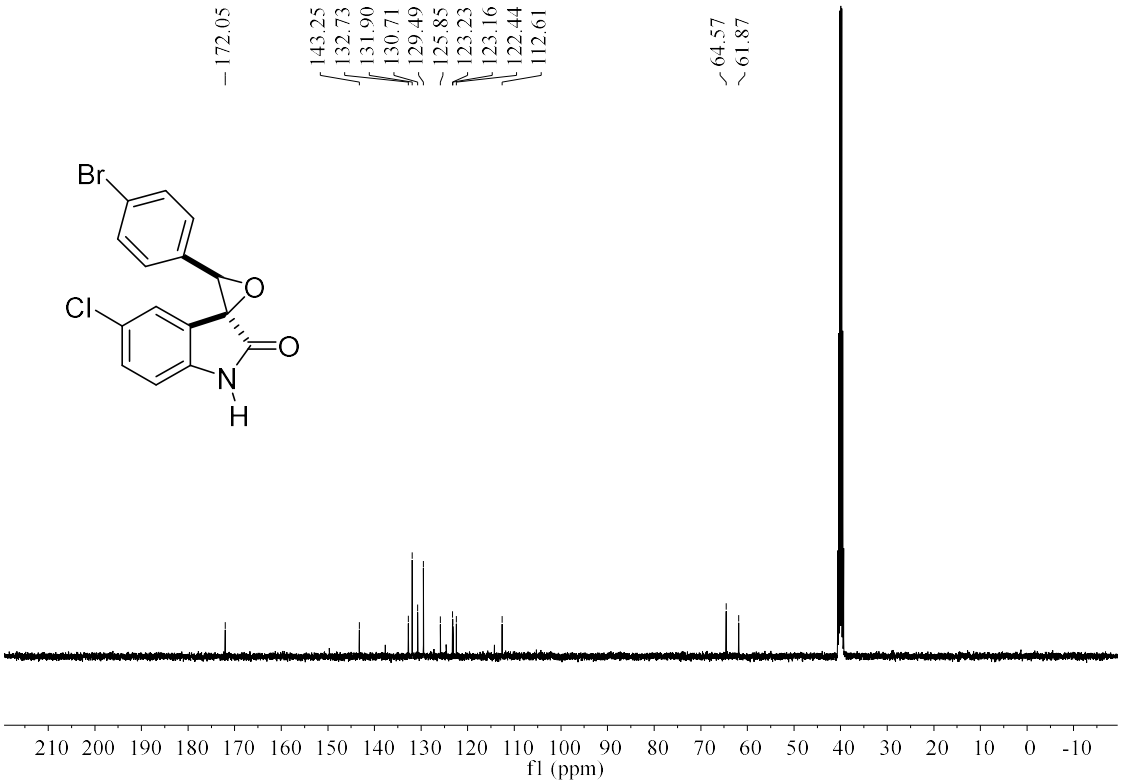
^{1}H NMR spectrum (400 MHz, Chloroform-*d*) of **3bk**



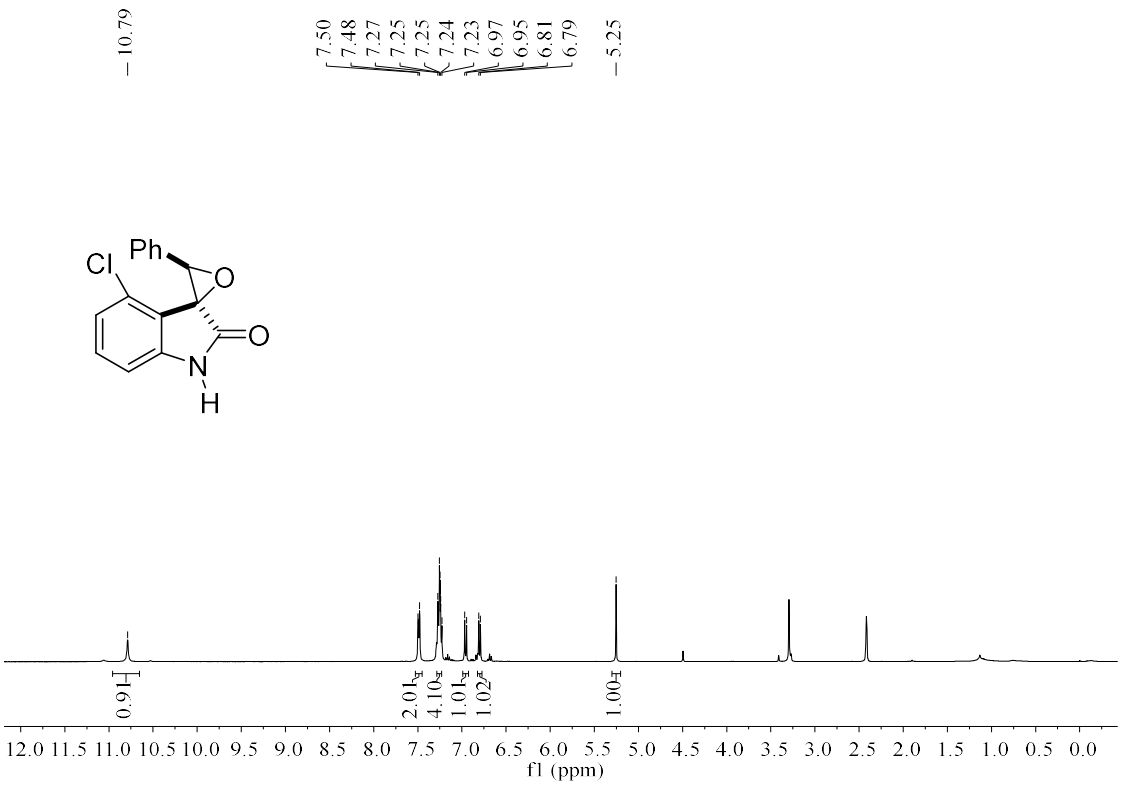
^{13}C NMR spectrum (100 MHz, Chloroform-*d*) of **3bk**



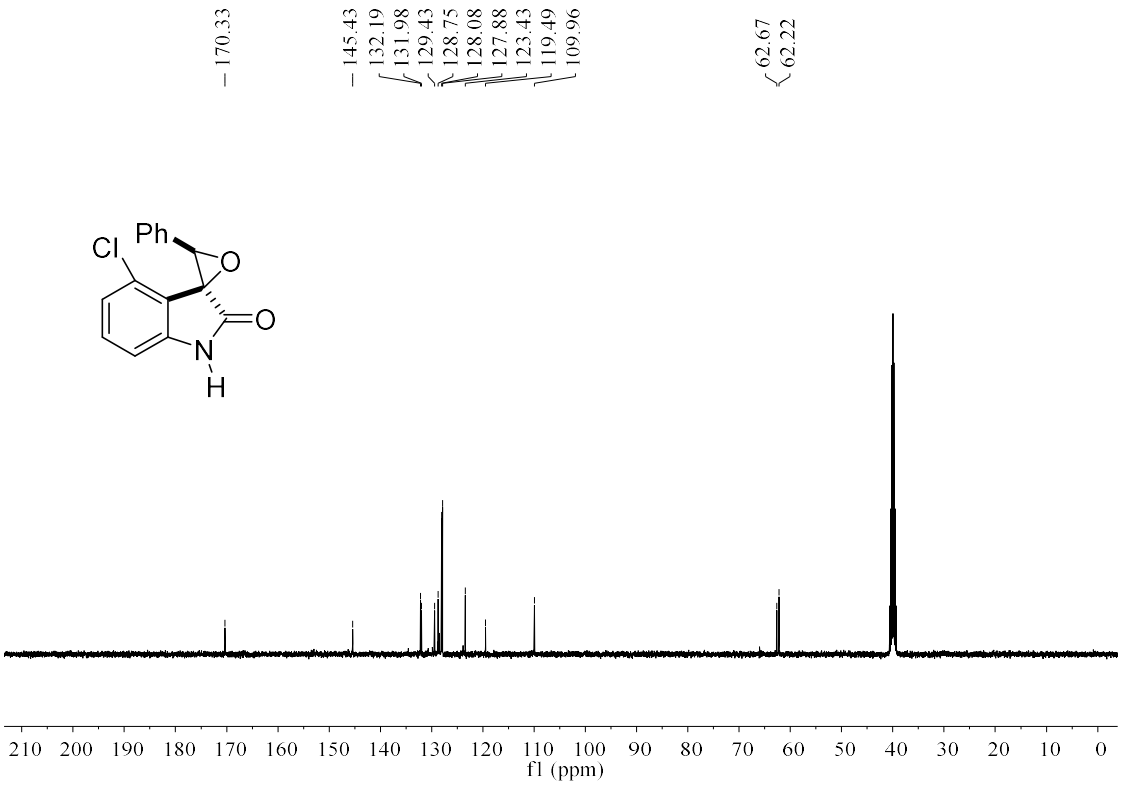
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bl**



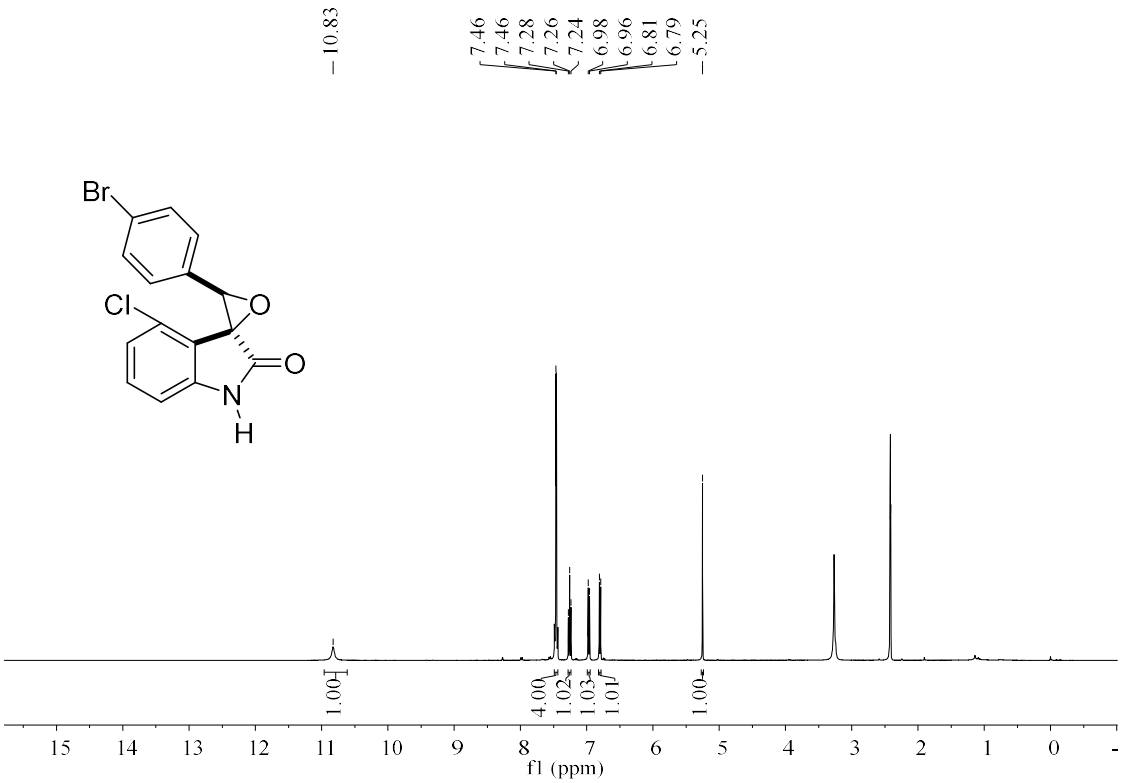
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bl**



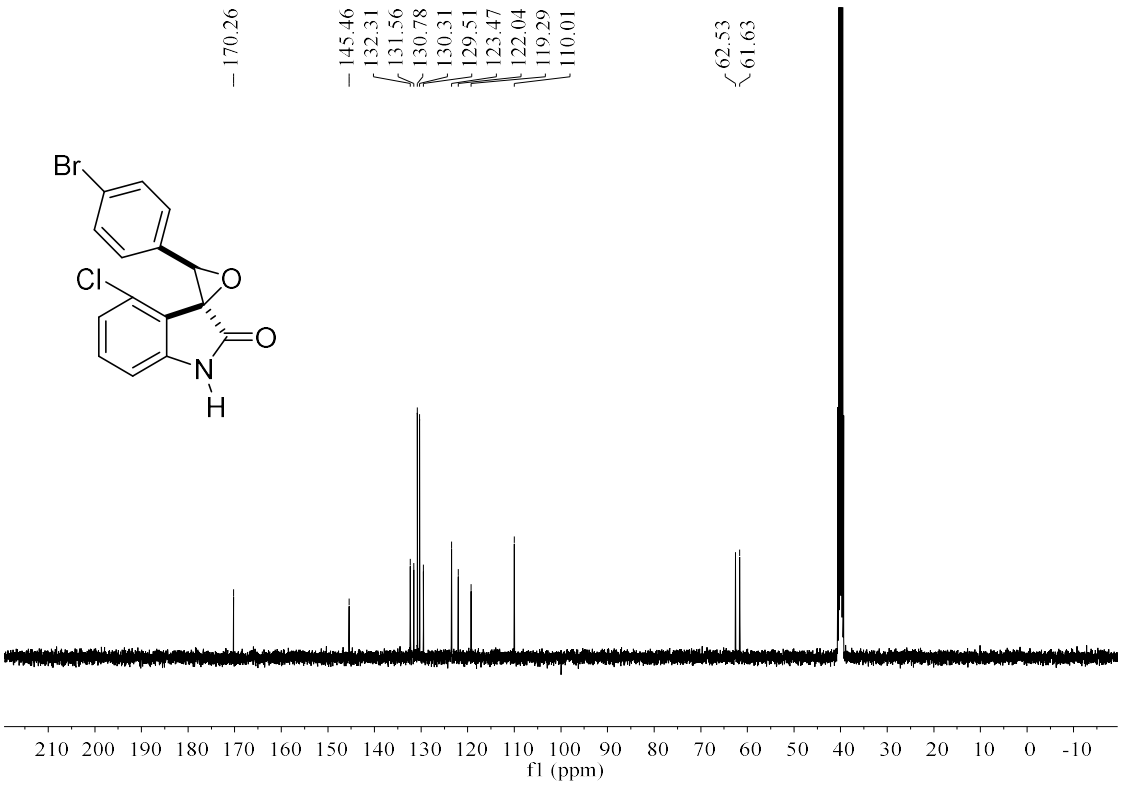
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bm**



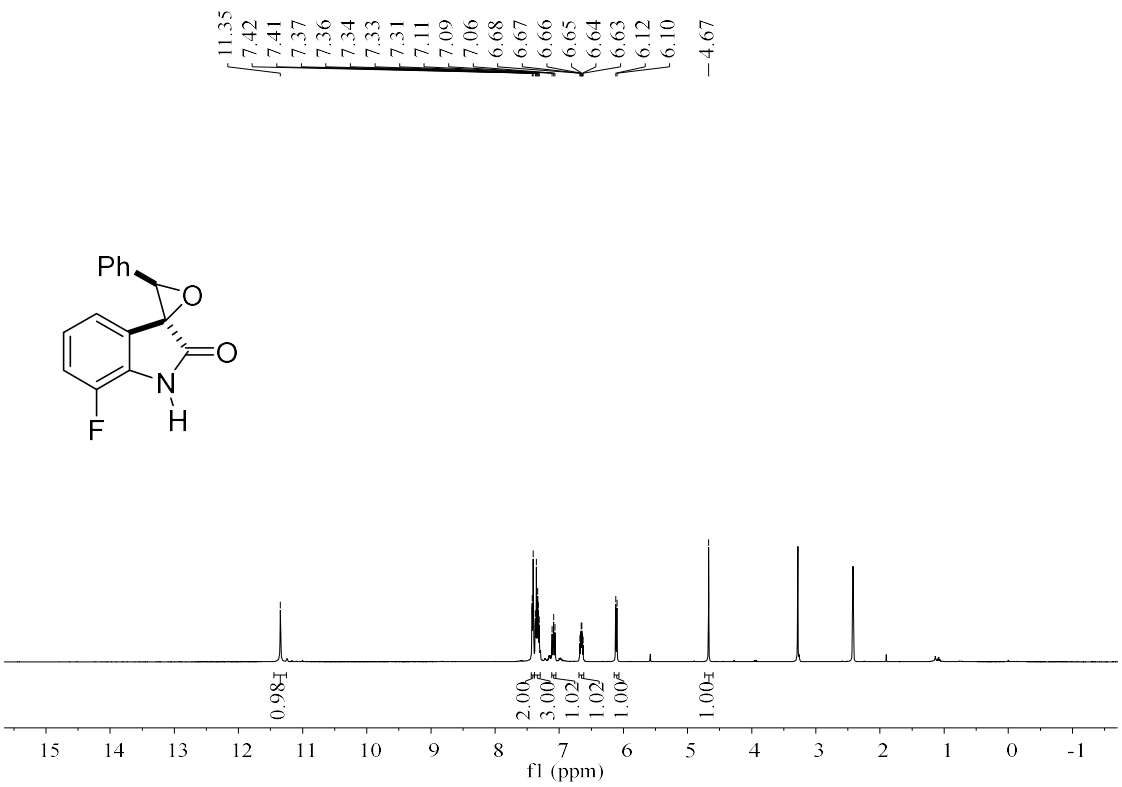
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bm**



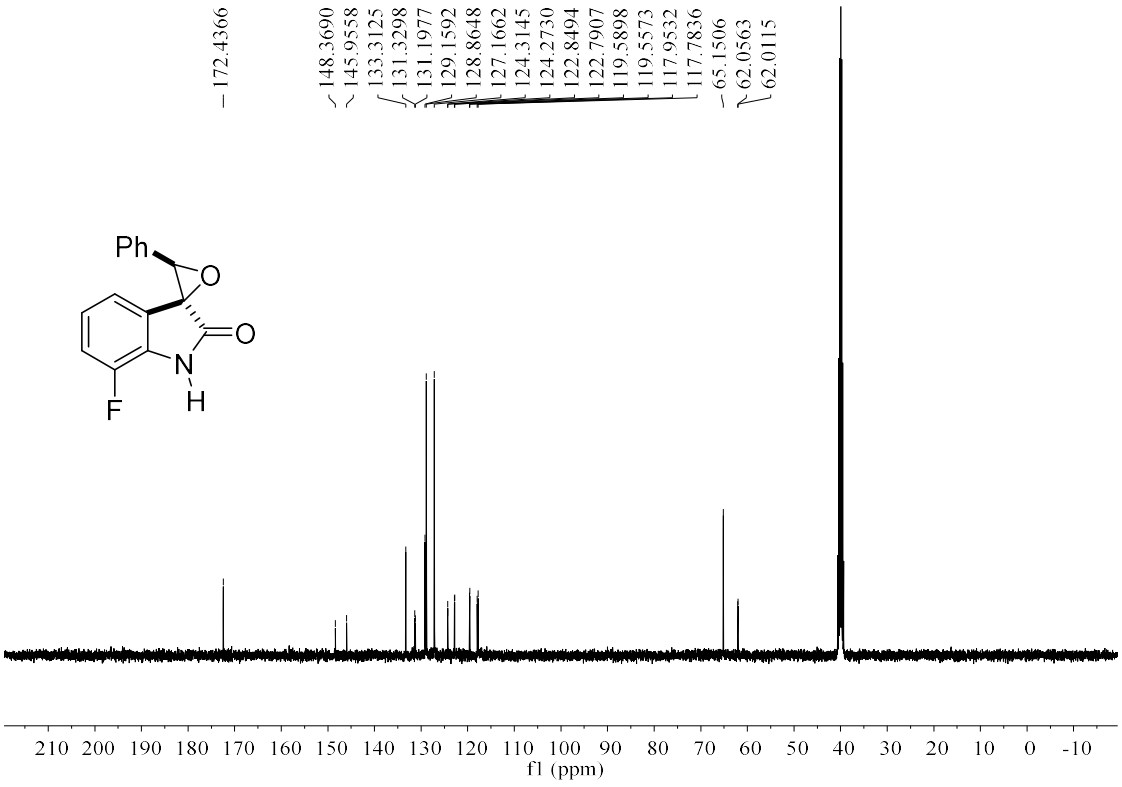
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bn**



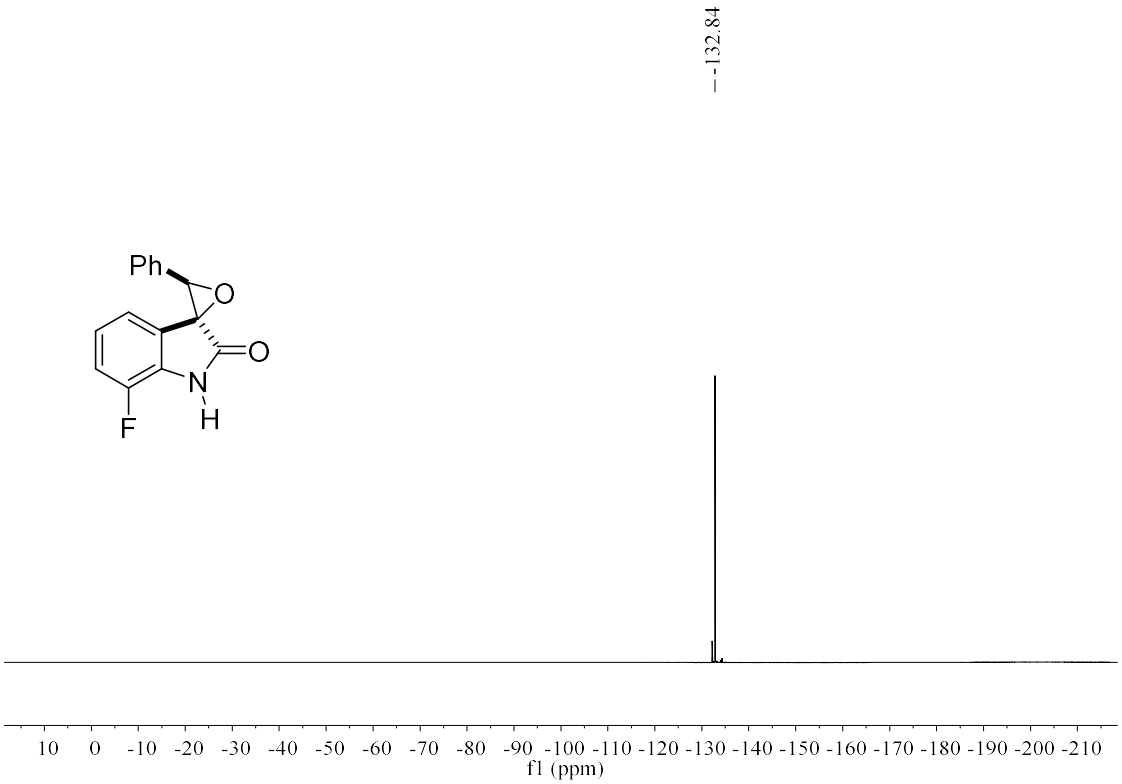
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bn**



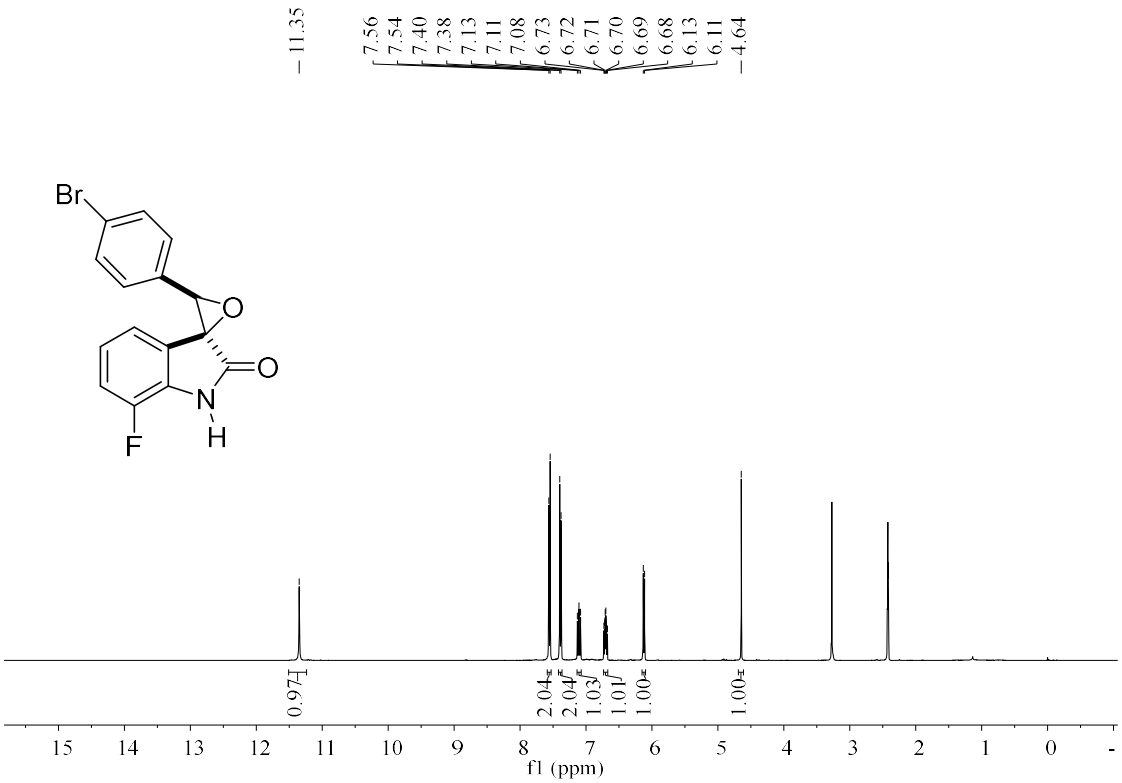
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bo**



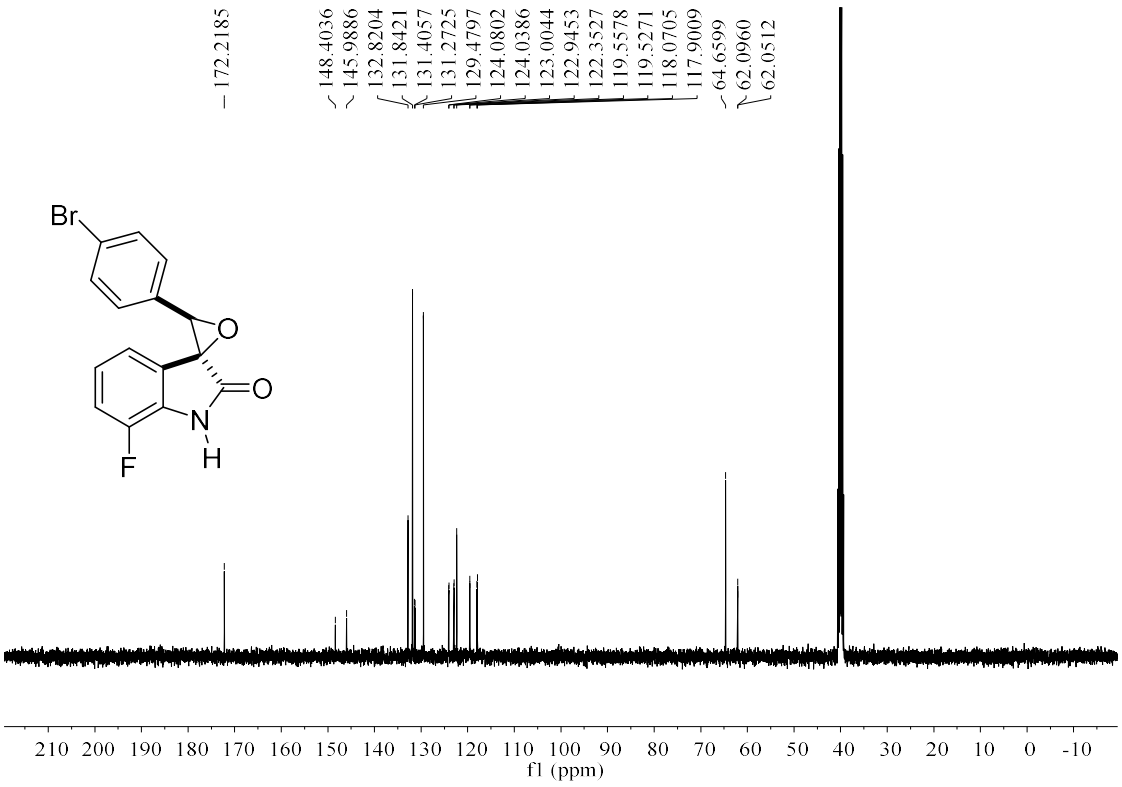
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bo**



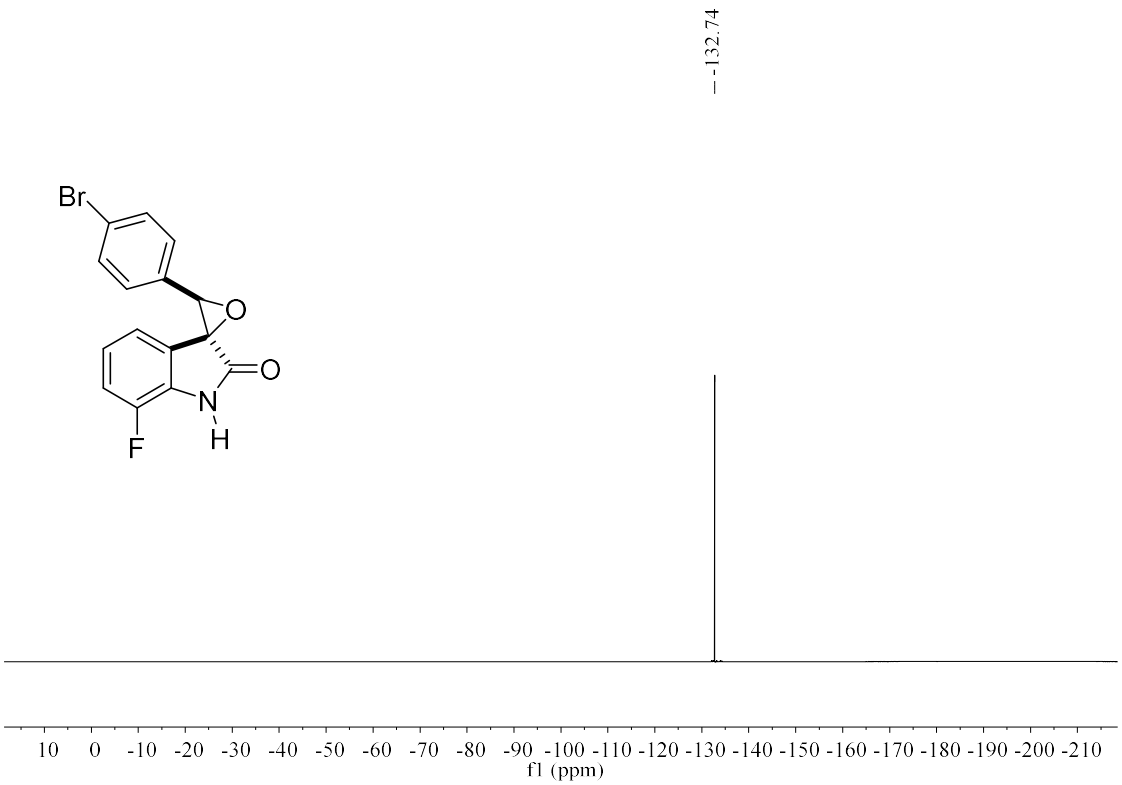
^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3bo**



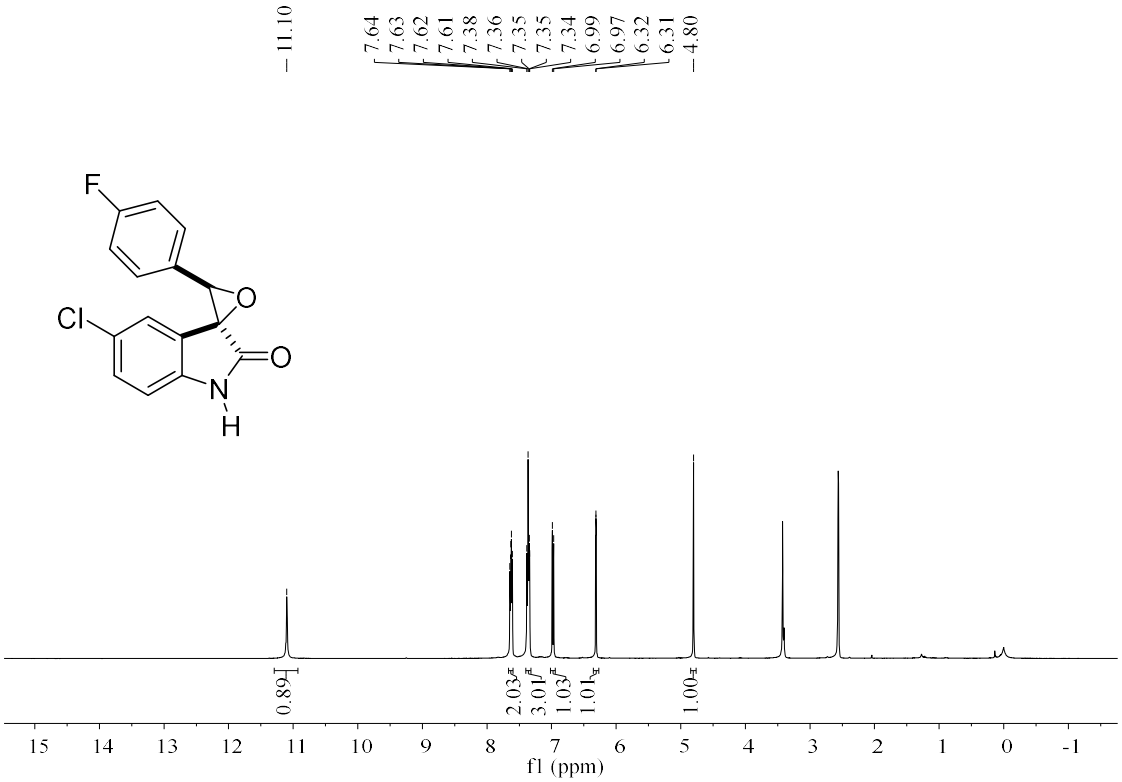
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bp**



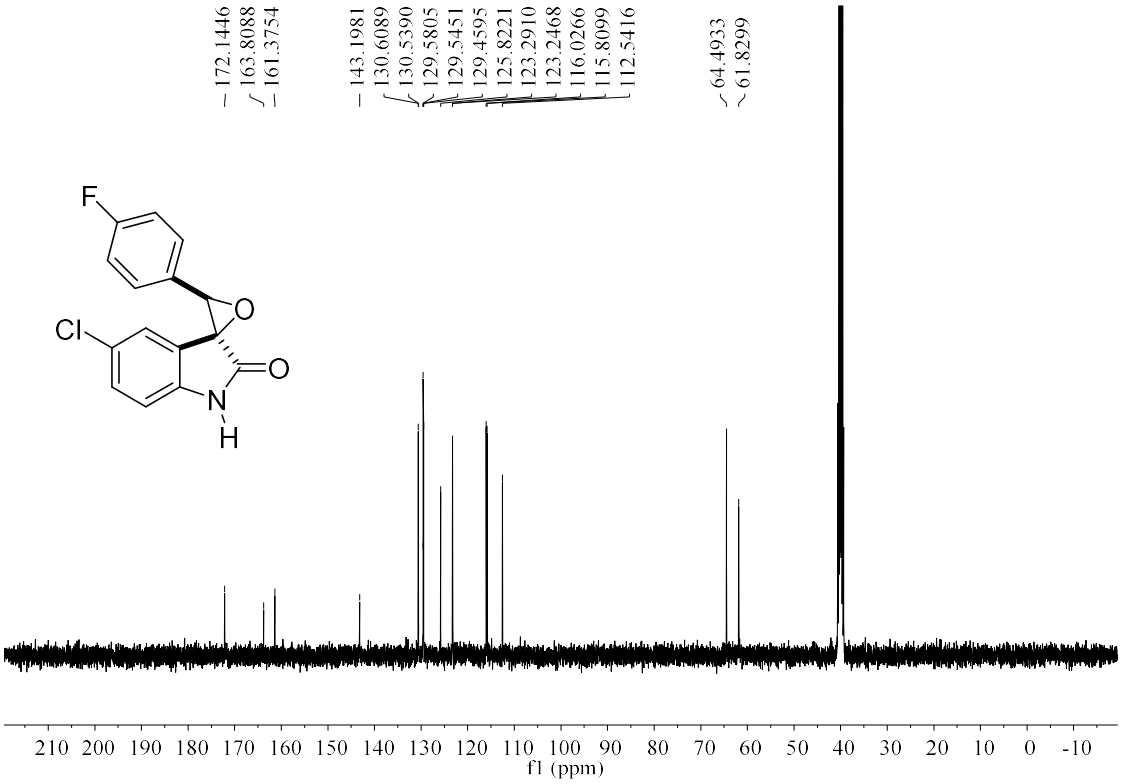
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bp**



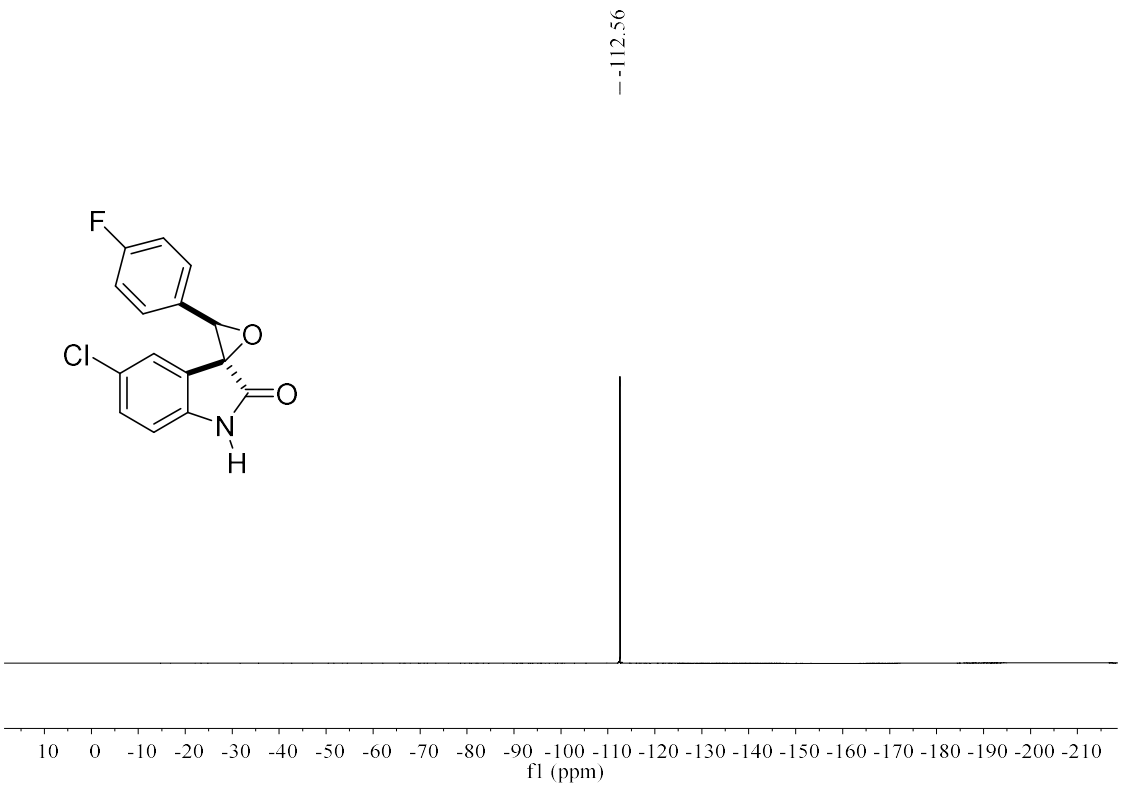
^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3bp**



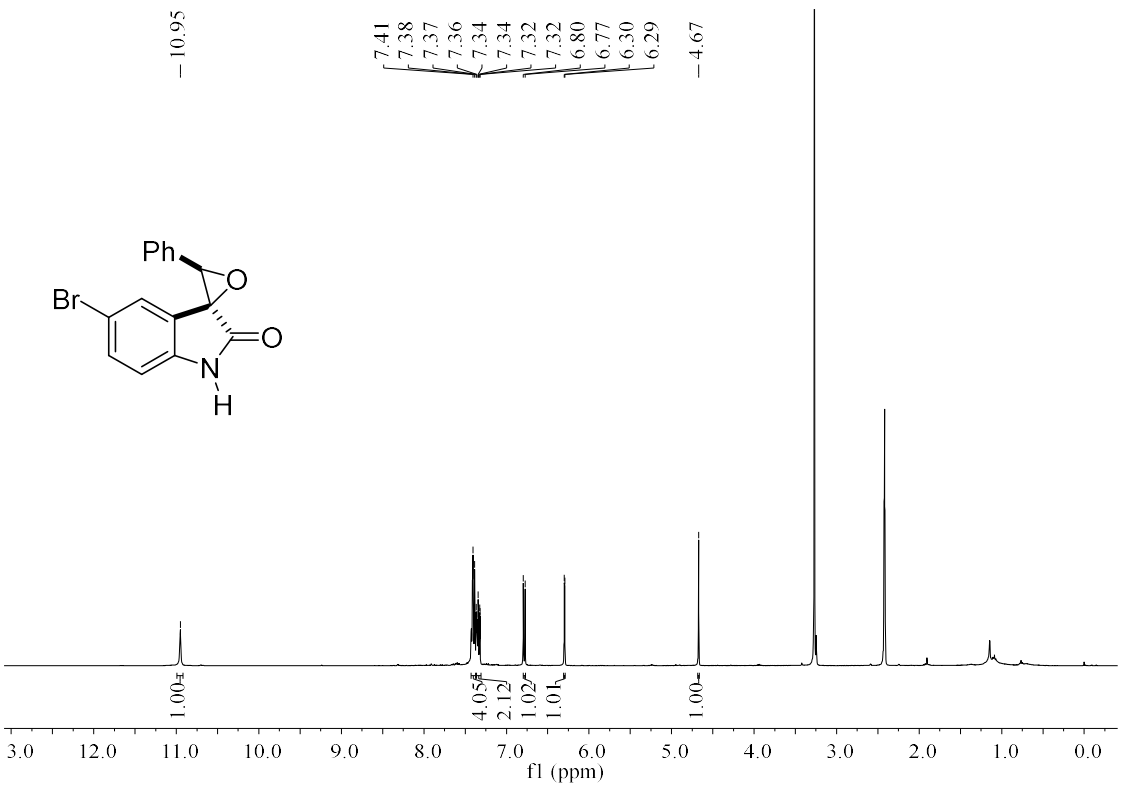
^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3bq**



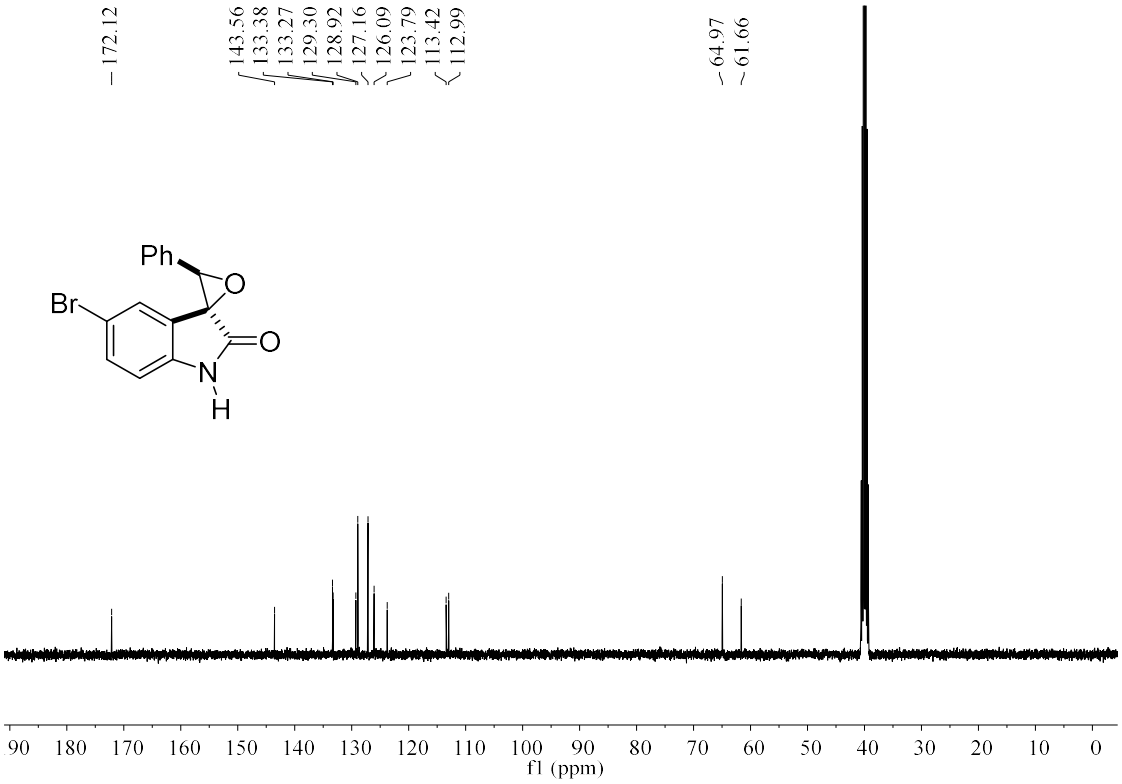
^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3bq**



^{19}F NMR spectrum (377 MHz, DMSO-d_6) of **3bq**



^{1}H NMR spectrum (400 MHz, DMSO-d_6) of **3br**



^{13}C NMR spectrum (100 MHz, DMSO-d_6) of **3br**

References

1 Liu, L.; Li, Y.; Huang, T.; Kong, D.; Wu, M. *Beilstein J. Org. Chem.* **2021**, *17*, 2321-2328.