

Supporting Information

A Two-Step Kinugasa/Conia-Ene-Type Sequential Reaction for Asymmetric Synthesis of 8-Methylene-2,6-diaza-spiro [3.4]octane-1,5-diones

Shanyue Li,^{a,b} Qicai Ma,^a Bohua Wu,^{a,b} Haowen Ma,^b Wei Zhou*^a and Qian Cai*^{a,b}

^a College of Pharmacy, Jinan University, No. 601 Huangpu Avenue West, Guangzhou, 510632, P. R. China.

^b College of Chemistry and Materials Science, Zhejiang Normal University, No. 688 Yingbin Road, Jinhua, Zhejiang Province, 321004, R. R. China.

E-mails: weizhou88@jnu.edu.cn; caiqian@zjnu.edu.cn

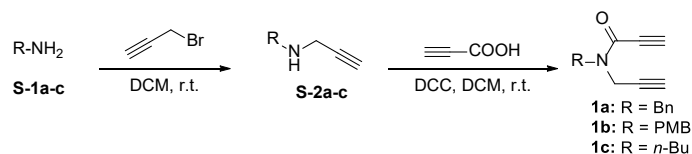
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I. General Remarks

^1H NMR and ^{13}C NMR spectra were recorded on a Bruker AVANCE III HD 400 MHz spectrometer. Chemical shifts (δ) are given in relative to tetramethylsilane (δ 0.00 ppm) in CDCl_3 . Coupling constants, J , were reported in hertz unit (Hz). High resolution mass spectra (HRMS) were obtained on a High Resolution Orbitrap Mass Spectrometer. Chemical names were generated using Cambridge Soft ChemDraw 16.0. Optical rotations were measured on a Jasco, P-2000 Automatic Digital Polarimeter. Enantiomeric ratios were determined by chiral HPLC using a chiralpak AD-H (Amylose tris (3,5-dimethylphenylcarbamate) coated on 5 μm silica-gel), chiralpak AS-H (Amylose tris-[(S)- α -methylbenzylcarbamate] coated on 5 μm silica-gel), chiralpak AS (Amylose tris-[(S)- α -methylbenzylcarbamate] coated on 10 μm silica-gel) with hexane and *i*-PrOH as solvents. Commercially obtained reagents were used without further purification.

II. Synthesis of Substrates



3-Bromoprop-1-yne (2.33 mL, 24.0 mmol, 1.0 equiv) was slowly added to a solution of benzylamine (**S-1a**, 13.15 g, 96.0 mmol, 4 equiv) in dichloromethane (100 mL) at room temperature. The mixture was stirred for 12 h before the reaction was completed. The mixture was filtrated, and the filtrate was evaporated in vacuo. The residue was purified by flash chromatography (ethyl acetate/petroleum ether = 1/10) to afford **S-2a** (2.55g, 61% yield) as a yellow transparent liquid. Next, the mixture of **S-2a** (14.6 mmol, 2.55 g, 1.0 equiv), propiolic acid (16.1 mmol, 1.12 g, 1.1 equiv) and DCC (16.1 mmol, 3.32 g, 1.1 equiv) in DCM (100 mL) were stirred at room temperature for 6 hours. After the reaction was completed, the mixture was filtrated, and solvent was removed in vacuum. The residue was purified by flash chromatography (ethyl acetate/petroleum ether = 1/5) to afford compound **1a** as a yellow transparent liquid (2.1g, 73% yield). ^1H NMR (400 MHz, CDCl_3 , two rotamers) δ 7.28-7.38 (m, 5H), 4.93 & 4.74 (2s, 2H), 4.27 & 4.12 (2d, J = 2.4 Hz, 2H), 3.25 & 3.24 (2s, 1H), 2.37 & 2.27 (2t, J = 2.4Hz, 1H);

^{13}C NMR (100MHz, CDCl_3 , two rotamers) δ 153.1, 153.0, 135.4, 135.2, 129.0, 128.8, 128.6, 128.3, 128.0, 127.9, 80.2, 80.0, 77.4, 75.4, 75.1, 73.6, 72.8, 51.4, 46.6, 37.5, 32.4; HRMS (ESI) calcd. for $\text{C}_{13}\text{H}_{12}\text{NO}^+$ ($\text{M} + \text{H}$) $^+$ 198.0919, found 198.0912.

N-(4-methoxybenzyl)-*N*-(prop-2-yn-1-yl)propiolamide (**1b**)

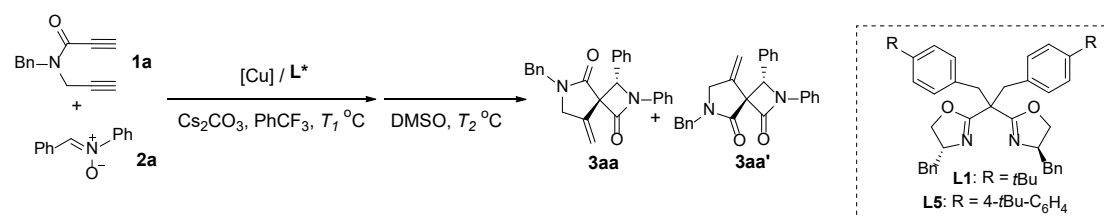
Substrates **1b** was synthesized via similar procedure of **1a**. The product was purified by column chromatography (ethyl acetate/petroleum ether = 1:10). 2.6 g, 78%, yellow transparent liquid. ^1H NMR (400 MHz, CDCl_3 , two rotamers) δ 7.18-7.23 (m, 2H), 6.87 & 6.84 (2d, $J = 8.4$ Hz, 2H), 4.84 & 4.64 (2s, 2H), 4.22 & 4.07 (2d, $J = 2.4$ Hz, 2H), 3.78 & 3.76 (2s, 3H), 3.23 & 3.21 (2s, 1H), 2.34 & 2.24 (2t, $J = 2.4$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3 , two rotamers) δ 159.6, 159.4, 152.9, 152.8, 130.1, 129.3, 127.4, 127.0, 114.3, 114.2, 79.9, 79.9, 77.5, 75.5, 75.2, 73.4, 72.7, 55.3, 55.3, 50.8, 46.0, 37.3, 32.1; HRMS (ESI) calcd. for $\text{C}_{14}\text{H}_{14}\text{NO}_2^+$ ($\text{M} + \text{H}$) $^+$ 228.1025, found 228.1019.

N-butyl-*N*-(prop-2-yn-1-yl)propiolamide (**1c**)

Substrates **1c** was synthesized via similar procedure of **1a**. The product was purified by column chromatography (ethyl acetate/petroleum ether = 1:10). 1.27g, 53%, yellow transparent liquid. ^1H NMR (400 MHz, CDCl_3 , two rotamers) δ 4.37 & 4.22 (2d, $J = 2.4$ Hz, 2H), 3.70 & 3.50 (2t, $J = 7.6$ Hz, 2H), 3.18 & 3.14 (2s, 1H), 2.32 & 2.24 (2t, $J = 2.4$ Hz, 1H), 1.56-1.71 (m, 2H), 1.25-1.39 (m, 2H), 0.91-0.98 (m, 3H); ^{13}C NMR (100 MHz, CDCl_3 , two rotamers) δ 153.1, 152.9, 79.3, 79.1, 77.8, 77.8, 75.5, 75.4, 72.9, 72.3, 48.2, 44.3, 38.6, 33.4, 30.3, 29.0, 20.0, 19.7, 13.8, 13.7; HRMS (ESI) calcd. for $\text{C}_{10}\text{H}_{14}\text{NO}^+$ ($\text{M} + \text{H}$) $^+$ 164.1075, found 164.1070.

III. The Two-Step Sequential Reaction

Supplementary Table 1: Screening of the reaction conditions. ^a



Entry	L*	[Cu]	Cs ₂ CO ₃ (eq.)	T ₁ / T ₂ (°C)	yield (%) ^b	e.r. ^c (3aa)	3aa / 3aa' ^d
1	L1	Cu(CH ₃ CN) ₄ BF ₄	3.0	-10 / 60 °C	41	83:17	4.5:1
2	L1	CuCl	3.0	-10 / 60 °C	43	76:24	5:1
3	L1	CuOTf	3.0	-10 / 60 °C	35	85.5:15.5	6:1
4	L1	Cu(MeCN) ₄ PF ₆	3.0	-10 / 60 °C	49	90.5:9.5	7:1
5	L5	Cu(CH ₃ CN) ₄ PF ₆	3.0	-10 / 60 °C	53	94:6	7:1
6	L5	Cu(CH ₃ CN) ₄ PF ₆	3.0	-20 / 60 °C	35	94:6	7:1
7 ^e	L5	Cu(CH ₃ CN) ₄ PF ₆	3.0	-10 / 60 °C	53	94:6	6:1
8 ^f	L5	Cu(CH ₃ CN) ₄ PF ₆	3.0	-10 / 60 °C	50	87.5:12.5	7:1
9	L5	Cu(CH ₃ CN) ₄ PF ₆	2.5	-10 / 60 °C	46	94:6	7:1
10	L5	Cu(CH ₃ CN) ₄ PF ₆	3.5	-10 / 60 °C	50	94:9	7:1

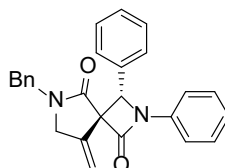
^[a] **1a** (0.2 mmol), **2a** (0.24 mmol), copper catalyst (10 mol%), ligand (12 mol%), Cs₂CO₃ (0.6 mmol), PhCF₃ (2 mL), -10 °C for 6 h, then in DMSO (2 mL), 60 °C for 6 h. ^[b] Isolated yields. ^[c] Determined by HPLC analysis. ^[d] Determined by ¹H NMR analysis of the crude reaction mixture. ^[e] L5 (20 mol%), Cu(MeCN)₄PF₆ (20 mol%). ^[f] L5 (6 mol%), Cu(MeCN)₄PF₆ (5 mol%) .

General procedure:

A mixture of propiolamide **1a** (0.20 mmol, 1.0 equiv.), nitrone **2a** (0.24 mmol, 1.2 equiv.), Cs₂CO₃ (0.6 mmol, 195.2 mg, 3.0 equiv.), Cu(CH₃CN)₄PF₆ (0.02 mmol, 7.5 mg, 10 mol%) with chiral ligand **L5** (0.024 mmol, 18.7 mg, 12 mol%) in 2 mL dry PhCF₃ was stirred at -10 °C for 6 hours under the atmosphere of argon. Then DMSO (2 mL) was added, and the mixture was stirred at 60 °C for another 6 hours. After the reaction was completed (monitored by TLC), H₂O (5.0 mL) and ethyl acetate (5.0 mL) were added into the mixture. The organic phase was separated, and the aqueous phase was extracted with ethyl acetate (5.0 mL × 3). The combined organic phase was washed with H₂O and brine, dried over Na₂SO₄. The solvent was removed under reduced pressure. The residue was purified by flash chromatography (ethyl acetate/petroleum ether = 1/5~1/3) to afford the desired products **3aa**.

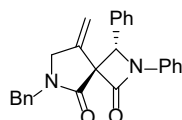
Other products were prepared according to the similar procedures.

(3S,4S)-6-benzyl-8-methylene-2,3-diphenyl-2,6-diazaspiro[3.4]octane-1,5-dione (**3aa**)



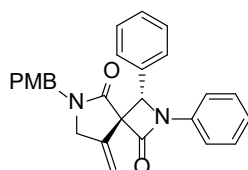
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5), 41.8 mg, 53%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.38-7.41 (m, 7H), 7.31-7.35 (m, 2H), 7.25-7.28 (m, 3H), 7.14 (t, $J = 7.2$ Hz, 1H), 6.86-6.88 (m, 2H), 5.50 (s, 1H), 5.42 (s, 1H), 5.17 (s, 1H), 4.68 (d, $J = 14.4$ Hz, 1H), 3.99 (d, $J = 14.4$ Hz, 1H), 3.92 (d, $J = 14.4$ Hz, 1H), 3.88 (d, $J = 14.4$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.5, 162.4, 138.2, 137.1, 135.5, 132.4, 129.2, 128.9, 128.7, 128.3, 128.0, 127.7, 127.6, 124.5, 117.7, 112.1, 70.2, 69.4, 50.2, 46.5; HRMS (ESI) calcd. for $\text{C}_{26}\text{H}_{22}\text{N}_2\text{O}_2^+$ ($\text{M} + \text{H}$) $^+$ 395.1760, found 395.1758; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 10.5$ min, $\tau_{\text{minor}} = 8.8$ min; $[\alpha]_{\text{D}}^{25} -122.6$ (c 1.0, CHCl_3 , 94:6 er).

(3*S*,4*R*)-6-benzyl-8-methylene-2,3-diphenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3aa')



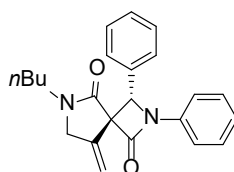
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5). white solid, ^1H NMR (400 MHz, CDCl_3) δ 7.36-7.41 (m, 4H), 7.34 - 7.26 (m, 8H), 7.15 - 7.10 (m, 3H), 5.62 (s, 1H), 4.99 (s, 1H), 4.81 (s, 1H), 4.65 (d, $J = 14.8$ Hz, 1H), 4.55 (d, $J = 14.8$ Hz, 1H), 3.77 (d, $J = 13.6$ Hz, 1H), 3.59 (d, $J = 13.6$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 169.5, 162.1, 137.1, 135.4, 133.5, 133.0, 129.1, 129.0, 128.8, 128.5, 128.2, 128.0, 126.9, 124.5, 117.7, 115.5, 70.1, 64.4, 50.6, 47.0; HRMS (ESI) calcd. for $\text{C}_{26}\text{H}_{22}\text{N}_2\text{O}_2^+$ ($\text{M} + \text{H}$) $^+$ 395.1760, found 395.1758; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 8.5$ min, $\tau_{\text{minor}} = 9.9$ min; $[\alpha]_{\text{D}}^{25} -95.7$ (c 1.0, CHCl_3 , 94:6 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-2,3-diphenyl-2,6 diazaspiro[3.4]octane-1,5-dione (3ba)



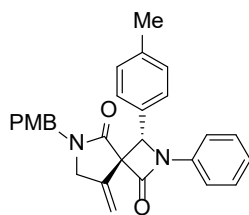
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 41.6 mg, 49%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.31-7.37 (m, 7H), 7.28-7.30 (m, 2H), 7.11 (t, $J = 7.2$ Hz, 1H), 6.76-6.90 (m, 4H), 5.46 (s, 1H), 5.38 (s, 1H), 5.12 (s, 1H), 4.57 (d, $J = 14.6$ Hz, 1H), 3.92 (d, $J = 14.6$ Hz, 1H), 3.85 (s, 2H), 3.79 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.3, 162.4, 159.1, 138.3, 137.1, 132.5, 129.4, 129.1, 128.8, 128.3, 127.6, 127.6, 124.4, 117.7, 114.0, 112.0, 70.2, 69.3, 55.3, 50.0, 45.8; HRMS (ESI) calcd. for $\text{C}_{27}\text{H}_{24}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 425.1865, found 425.1859; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 15.2$ min, $\tau_{\text{minor}} = 10.6$ min; $[\alpha]_{\text{D}}^{25} -135.4$ (c 1.0, CHCl_3 , 95.5, 4.5 er).

(3*S*,4*S*)-6-butyl-8-methylene-2,3-diphenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3ca)



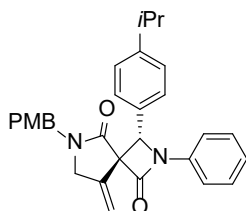
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5). 30.3 mg, 42%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.37 - 7.29 (m, 9H), 7.10 (t, $J = 7.2$ Hz, 1H), 5.48 (s, 1H), 5.44 (s, 1H), 5.12 (s, 1H), 4.06 (d, $J = 14.0$ Hz, 1H), 3.95 (d, $J = 14.0$ Hz, 1H), 3.27-3.34 (m, 1H), 2.93-3.03 (m, 1H), 1.24-1.29 (m, 2H), 1.00-1.06 (m, 2H), 0.77 (t, $J = 7.2$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.2, 162.6, 138.6, 137.1, 132.5, 129.1, 128.7, 128.2, 127.4, 124.4, 117.6, 111.7, 70.2, 69.1, 50.6, 42.1, 28.9, 19.5, 13.6; HRMS (ESI) calcd. for $\text{C}_{23}\text{H}_{25}\text{N}_2\text{O}_2^+$ ($\text{M} + \text{H}$) $^+$ 361.1916, found 361.1911; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 6.7$ min, $\tau_{\text{minor}} = 5.8$ min; $[\alpha]_{\text{D}}^{25} -97.8$ (c 1.0, CHCl_3 , 88:12 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-3-(*p*-tolyl)-2,6diazaspiro[3.4]octane-1,5-dione (3bb)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5). 44.7 mg, 51%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.39 (d, $J = 7.8$ Hz, 2H), 7.28-7.34 (m, 3H), 7.27 (s, 1H), 7.20 (d, $J = 8.0$ Hz, 2H), 7.13 (t, $J = 7.6$ Hz, 1H), 6.76-6.82 (m, 4H), 5.47 (s, 1H), 5.39 (s, 1H), 5.11 (s, 1H), 4.58 (d, $J = 14.6$ Hz, 1H), 3.98 (d, $J = 14.6$ Hz, 1H), 3.88 (d, $J = 14.0$ Hz, 1H), 3.86 (d, $J = 14.0$ Hz, 1H), 3.82 (s, 3H), 2.40 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.4, 162.5, 159.1, 138.6, 138.4, 137.1, 129.4, 129.4, 129.1, 129.0, 127.6, 127.5, 124.4, 117.7, 114.0, 111.8, 70.3, 69.3, 55.3, 50.0, 45.8, 21.4; HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{27}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 439.2022, found 439.2018; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 11.7$ min, $\tau_{\text{minor}} = 8.1$ min; $[\alpha]_{\text{D}}^{25} -160.5$ (c 1.0, CHCl_3 , 93:7 er).

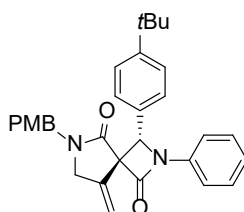
(3S,4S)-3-(4-isopropylphenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bc)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5). 45.7 mg, 49%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.40 (d, $J = 7.8$ Hz, 2H), 7.25-7.36 (m, 6H), 7.13 (t, $J = 7.2$ Hz, 1H), 6.76 (s, 4H), 5.47 (s, 1H), 5.39 (s, 1H), 5.11 (s, 1H), 4.66 (d, $J = 14.6$ Hz, 1H), 3.88 (d, $J = 14.6$ Hz, 1H), 3.85 (s, 1H), 3.81 (s, 3H), 2.98 - 2.93 (m, 1H), 1.30 (dd, $J = 6.4, 2.4$ Hz, 6H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.4, 162.5, 159.1, 149.4, 138.4, 137.1, 129.7, 129.3, 129.1, 127.7, 127.6, 126.4, 124.4, 117.7, 113.9, 111.9, 70.3, 69.6, 55.3, 50.0, 45.8, 33.9, 24.1, 23.8; HRMS (ESI) calcd. for $\text{C}_{30}\text{H}_{31}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 467.2335, found 467.2330; HPLC (AS-H, *n*-hexane/*i*-

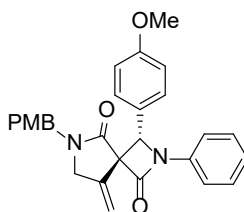
PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 8.8$ min, $\tau_{\text{minor}} = 6.4$ min; $[\alpha]_{\text{D}}^{25} -155.3$ (c 1.0, CHCl₃, 91:9 er).

(3*S*,4*S*)-3-(4-(tert-butyl)phenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bd)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:5). 65.3 mg, 68%, white solid. ¹H NMR (400 MHz, CDCl₃) δ 7.28-7.40 (m, 8H), 7.11 (t, $J = 7.2$ Hz, 1H), 6.71-6.76 (m, 4H), 5.44 (s, 1H), 5.37 (s, 1H), 5.08 (s, 1H), 4.66 (d, $J = 14.4$ Hz, 1H), 3.85 (d, $J = 14.4$ Hz, 1H), 3.82 (s, 2H), 3.78 (s, 3H), 1.34 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ 166.4, 162.6, 159.1, 151.7, 138.4, 137.1, 129.3, 129.3, 129.1, 127.7, 127.4, 125.2, 124.4, 117.7, 113.9, 111.9, 70.3, 69.6, 55.3, 50.0, 45.8, 34.7, 31.4; HRMS (ESI) calcd. for C₃₁H₃₃N₂O₃⁺ (M + H)⁺ 481.2491, found 481.2487; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 8.2$ min, $\tau_{\text{minor}} = 6.0$ min; $[\alpha]_{\text{D}}^{25} -146.2$ (c 1.0, CHCl₃, 94.5:5.5 er).

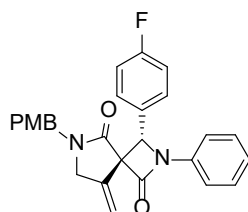
(3*S*,4*S*)-6-(4-methoxybenzyl)-3-(4-methoxyphenyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione(3be)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 48.1 mg, 53%, white solid, ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.37 (m, 6H), 7.10 (t, $J = 7.0$ Hz, 1H), 6.89 (d, $J = 7.2$ Hz, 2H), 6.78 (d, $J = 8.0$ Hz, 2H), 6.74 (d, $J = 8.0$ Hz, 2H) 5.43, (s, 1H), 5.35 (s, 1H), 5.06 (s, 1H), 4.57 (d, $J = 14.6$ Hz, 1H), 3.94

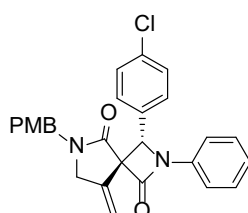
(d, $J = 14.6\text{Hz}$, 1H), 3.83, (s, 2H), 3.82, (s, 3H), 3.78, (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.5, 162.5, 160.0, 159.1, 138.4, 137.1, 129.3, 129.1, 129.0, 127.6, 124.4, 124.2, 117.7, 114.0, 113.7, 111.8, 70.4, 69.3, 55.3, 55.2, 50.0, 45.8; HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{26}\text{N}_2\text{O}_4^+$ ($\text{M} + \text{H}$) $^+$ 455.1971, found 455.1962; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 20.3$ min, $\tau_{\text{minor}} = 11.3$ min; $[\alpha]_{\text{D}}^{25} -132.5$ (c 1.0, CHCl_3 ,. 91.5:8.5 er).

(3*S*,4*S*)-3-(4-fluorophenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bf)



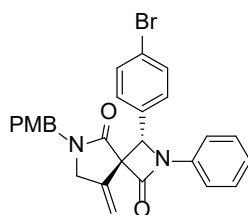
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 54.8 mg, 62%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.30-7.35 (m, 6H), 7.02-7.13 (m, 2H), 6.75-6.82 (m, 4H), 5.46 (s, 1H), 5.39 (s, 1H), 5.09 (s, 1H), 4.56 (d, $J = 14.6$ Hz, 1H), 3.95 (d, $J = 14.6$ Hz, 1H), 3.86 (s, 2H), 3.79 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.3, 163.0 (d, $J = 246.0$ Hz), 162.2, 159.2, 138.0, 136.9, 129.5, 129.4, 129.2, 128.2 (d, $J = 3.0$ Hz), 127.6, 124.6, 117.6, 115.4 (d, $J = 21.6$ Hz), 114.0, 112.1, 70.2, 68.6, 55.3, 50.1, 45.9; HRMS (ESI) calcd. for $\text{C}_{27}\text{H}_{24}\text{FN}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 443.1771, found 443.1767; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 14.9$ min, $\tau_{\text{minor}} = 9.8$ min; $[\alpha]_{\text{D}}^{25} -142.1$ (c 1.0, CHCl_3 , 88:12 er).

(3*S*,4*S*)-3-(4-chlorophenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bg)



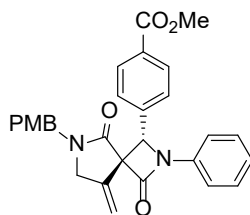
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 48.5 mg, 53%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.24-7.38 (m, 9H), 6.75-6.78 (m, 4H), 5.46 (s, 1H), 5.39 (s, 1H), 5.09 (s, 1H), 4.57 (d, $J = 14.6$, 1H), 3.91 (d, $J = 14.6$ Hz, 1H), 3.84 (s, 2H), 3.79 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.1, 162.3, 159.1, 138.1, 135.5, 132.0, 129.6, 129.4, 129.2, 129.0, 128.4, 127.5, 118.9, 117.6, 114.0, 112.2, 70.5, 69.5, 55.3, 50.0, 45.9; HRMS (ESI) calcd. for $\text{C}_{27}\text{H}_{24}\text{ClN}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 459.1475, found 459.1471; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 13.4$ min, $\tau_{\text{minor}} = 9.3$ min; $[\alpha]_{\text{D}}^{25} -149.3$ (c 1.0, CHCl_3 , 89:11 er).

(3*S*,4*S*)-3-(4-bromophenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bh)



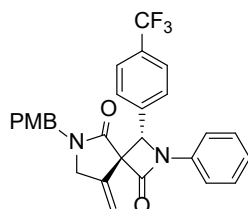
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 48.2 mg, 48%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.48 (d, $J = 8.4$ Hz, 2H), 7.28-7.34 (m, 4H), 7.23 (d, $J = 8.4$ Hz, 2H), 7.13 (t, $J = 6.4$ Hz, 1H), 6.78 (s, 4H), 5.46 (s, 1H), 5.39 (s, 1H), 5.05 (s, 1H), 4.59 (d, $J = 14.6$ Hz, 1H), 3.92 (d, $J = 14.6$ Hz, 1H), 3.86 (s, 2H), 3.81 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.2, 162.1, 159.2, 137.9, 136.8, 131.5, 129.4, 129.3, 129.2, 127.6, 124.7, 124.6, 123.0, 117.6, 114.1, 112.3, 70.2, 68.6, 55.3, 50.1, 45.9; HRMS (ESI) calcd. for $\text{C}_{27}\text{H}_{24}\text{BrN}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 503.0970, found 503.0964; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 14.2$ min, $\tau_{\text{minor}} = 9.9$ min; $[\alpha]_{\text{D}}^{25} -151.4$ (c 1.0, CHCl_3 , 86:14 er).

Methyl-4-((1*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-3,5-dioxo-2-phenyl-2,6-diazaspiro[3.4]octan-1-yl)benzoate (3bi)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:2). 50.1mg, 52%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 8.03 (d, $J = 8.4$ Hz, 2H), 7.41 (d, $J = 8.4$ Hz, 2H), 7.29-7.35 (m, 4H), 7.11-7.15 (m, 1H), 6.75-6.79 (m, 4H), 5.49 (d, $J = 0.8$ Hz, 1H), 5.41 (d, $J = 0.8$ Hz, 1H), 5.15 (s, 1H), 4.54 (d, $J = 14.4$ Hz, 1H), 3.94 (d, $J = 14.4$ Hz, 1H), 3.92 (s, 3H), 3.87 (s, 2H), 3.80 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.7, 166.0, 162.1, 159.2, 137.9, 137.7, 136.8, 130.5, 129.6, 129.4, 129.2, 127.5, 127.4, 124.7, 117.6, 114.1, 112.4, 70.2, 68.4, 55.3, 52.2, 50.0, 45.9; HRMS (ESI) calcd. for $\text{C}_{29}\text{H}_{27}\text{N}_2\text{O}_5^+$ ($\text{M} + \text{H}$) $^+$ 483.1920, found 483.1915; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 21.9$ min, $\tau_{\text{minor}} = 14.0$ min; $[\alpha]_{\text{D}}^{25} -143.1$ (c 1.0, CHCl_3 , 87.5:12.5v).

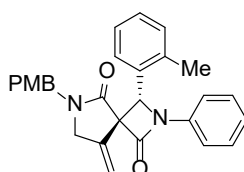
(3S,4S)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-3-(4-(trifluoromethyl)phenyl)-2,6-diazaspiro[3.4]octane-1,5-dione (3bj)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 52.2 mg, 53%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.61 (d, $J = 8.0$ Hz, 2H), 7.47 (d, $J = 8.0$ Hz, 2H), 7.30-7.34 (m, 4H), 7.12-7.16 (m, 1H), 6.73-6.78 (m, 4H), 5.49 (s, 1H), 5.43 (s, 1H), 5.15 (s, 1H), 4.58 (d, $J = 14.6$ Hz, 1H), 3.91 (d, $J = 14.6$ Hz, 1H), 3.89 (s, 2H), 3.78 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.0, 162.1, 159.2, 137.7, 136.7, 136.6, 130.8 (q, $J = 32.2$ Hz), 129.4, 129.3, 128.0, 127.5, 125.3 (q, $J = 4.1$ Hz), 124.8, 117.5, 114.0, 112.6, 70.2, 68.3, 55.2, 50.1, 46.0; HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{24}\text{F}_3\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 493.1739, found 493.1733; HPLC (AS-H, *n*-hexane/*i*-PrOH

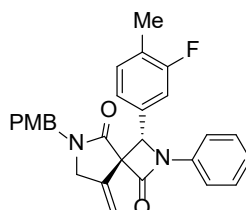
= 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 9.4$ min, $\tau_{\text{minor}} = 6.7$ min; $[\alpha]_{\text{D}}^{25} -124.5$ (c 1.0, CHCl₃, 91.5:8.5 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-3-(*o*-tolyl)-2,6-diazaspiro[3.4]octane-1,5-dione (3bk)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 44.8 mg, 51%, white solid. ¹H NMR (400 MHz, CDCl₃) δ 7.14-7.41 (m, 9H), 6.85 (d, $J = 8.0$ Hz, 2H), 6.79 (d, $J = 8.0$ Hz, 2H), 5.50 (s, 1H), 5.41 (s, 1H), 5.27 (s, 1H), 4.67 (d, $J = 14.4$ Hz, 1H), 3.92 (d, $J = 14.4$ Hz, 1H), 3.87 (d, $J = 13.6$ Hz, 2H), 3.83 (s, 3H), 2.09 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.0, 162.7, 159.2, 138.2, 137.2, 134.6, 130.7, 130.1, 129.5, 129.1, 128.4, 127.7, 125.7, 124.5, 117.7, 114.0, 112.0, 69.1, 66.6, 55.3, 50.0, 45.9, 19.3; HRMS (ESI) calcd. for C₂₈H₂₇N₂O₃⁺ (M + H)⁺ 439.2022, found 439.2012; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 16.9$ min, $\tau_{\text{minor}} = 10.1$ min; $[\alpha]_{\text{D}}^{25} -143.2$ (c 1.0, CHCl₃, 92.5:7.5 er).

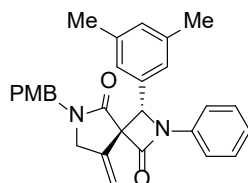
(3*S*,4*S*)-3-(3-fluoro-4-methylphenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bl)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 47.4 mg, 52%, white solid. ¹H NMR (400 MHz, CDCl₃) δ 7.28-7.36 (m, 4H), 7.09-7.19 (m, 3H), 6.98 (t, $J = 8.8$ Hz, 1H), 6.81 (d, $J = 8.4$ Hz, 2H), 6.77 (d, $J = 8.4$ Hz, 2H), 5.44 (s, 1H), 5.37 (s, 1H), 5.04 (s, 1H), 4.59 (d, $J = 14.6$ Hz, 1H), 3.94 (d,

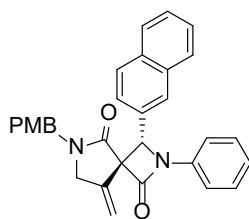
$J = 14.6$ Hz, 1H), 3.86 (s, 2H), 3.79 (s, 3H), 2.26 (s, 3H); ^{13}C NMR (100MHz, CDCl_3) δ 166.3, 162.3, 161.5 (d, $J = 245.0$ Hz), 159.2, 138.3, 137.0, 130.5 (d, $J = 5.4$ Hz), 129.3, 129.1, 127.9, 127.6, 126.8, (d, $J = 8.0$ Hz), 124.8 (d, $J = 18.0$ Hz), 124.5, 117.6, 115.0 (d, $J = 22.0$ Hz), 114.0, 111.9, 70.2, 68.8, 55.3, 50.1, 45.9, 14.7; HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{26}\text{FN}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 457.1927, found 457.1917; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 11.3$ min, $\tau_{\text{minor}} = 7.5$ min; $[\alpha]_{\text{D}}^{25} -132.5$ (c 1.0, CHCl_3 , 90:10 er).

(3*S*,4*S*)-3-(3,5-dimethylphenyl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bm)



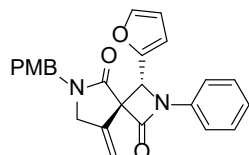
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 48.8 mg, 54%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.39 (d, $J = 4.0$ Hz, 2H), 7.28-7.32 (m, 2H), 7.11 (t, $J = 7.2$ Hz, 1H), 6.96-6.98 (m, 3H), 6.80 (d, $J = 8.0$ Hz, 2H), 6.75 (d, $J = 8.0$ Hz, 2H), 5.43 (s, 1H), 5.36 (s, 1H), 5.05 (s, 1H), 4.63 (d, $J = 14.6$ Hz, 1H), 3.92 (d, $J = 14.6$ Hz, 1H), 3.85 (d, $J = 7.6$ Hz, 2H), 3.79 (s, 3H), 2.31 (s, 6H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.4, 162.6, 159.1, 138.6, 137.8, 137.3, 132.4, 130.5, 129.3, 129.1, 127.7, 125.1, 124.3, 117.7, 114.1, 111.7, 70.2, 69.4, 55.3, 50.1, 45.8, 21.5; HRMS (ESI) calcd. for $\text{C}_{29}\text{H}_{29}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 453.2178, found 453.2171; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 8.8$ min, $\tau_{\text{minor}} = 6.5$ min; $[\alpha]_{\text{D}}^{25} -152.0$ (c 1.0, CHCl_3 , 89:11 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-3-(naphthalen-2-yl)-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bn)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 55.9 mg, 59%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.82-7.88 (m, 4H), 7.51-7.60 (m, 3H), 7.28-7.40 (m, 4H), 7.11 (t, $J = 7.2$ Hz, 1H), 6.53 (d, $J = 8.2$ Hz, 2H), 6.41 (d, $J = 8.2$ Hz, 2H), 5.52 (s, 1H), 5.42 (s, 1H), 5.28 (s, 1H), 4.58 (d, $J = 14.6$ Hz, 1H), 3.90 (d, $J = 14.0$ Hz, 1H), 3.84 (d, $J = 14.0$ Hz, 1H), 3.79 (d, $J = 14.6$ Hz, 1H), 3.69 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.4, 162.4, 159.0, 138.4, 137.2, 133.7, 133.0, 130.5, 129.2, 129.1, 128.2, 128.0, 128.0, 127.5, 126.9, 126.5, 126.3, 125.3, 124.5, 117.6, 113.9, 112.1, 70.6, 69.8, 55.2, 50.2, 45.8; HRMS (ESI) calcd. for $\text{C}_{31}\text{H}_{27}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 475.2022, found 475.2015; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, $I = 254$ nm) $\tau_{\text{major}} = 10.9$ min, $\tau_{\text{minor}} = 14.6$ min; $[\alpha]_{\text{D}}^{25} -152.3$ (c 1.0, CHCl_3 , 91:9 er).

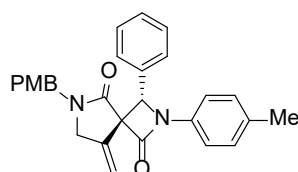
(3R,4S)-3-(furan-2-yl)-6-(4-methoxybenzyl)-8-methylene-2-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bo)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 48.8 mg, 59%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.44 (s, 1H), 7.29-7.38 (m, 4H), 7.13 (t, $J = 7.2$ Hz, 1H), 7.00 (d, $J = 8.4$ Hz, 2H), 6.82 (d, $J = 8.4$ Hz, 2H), 6.42-6.54 (m, 2H), 5.42 (s, 1H), 5.36 (s, 1H), 5.13 (s, 1H), 4.60 (d, $J = 14.6$ Hz, 1H), 4.16 (d, $J = 14.6$ Hz, 1H), 3.90 (d, $J = 14.4$ Hz, 1H), 3.87 (d, $J = 14.4$ Hz, 1H), 3.79 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.1, 161.9, 159.2, 146.6, 142.7, 137.7, 136.6, 129.4, 129.1, 127.6, 124.6, 117.5, 114.1, 112.0, 111.3, 111.0, 69.6, 62.1, 55.3, 49.9, 46.0; HRMS (ESI) calcd. for $\text{C}_{25}\text{H}_{23}\text{N}_2\text{O}_4^+$ ($\text{M} + \text{H}$) $^+$ 415.1658, found 415.1650;

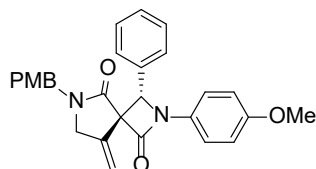
HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 23.6$ min, $\tau_{\text{minor}} = 14.5$ min; $[\alpha]_{\text{D}}^{25} -113.5$ (c 1.0, CHCl₃, 95:5 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2-(*p*-tolyl)-2,6-diazaspiro[3.4]octane-1,5-dione (3bp)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 53.4 mg, 61%, white solid, ¹H NMR (400 MHz, CDCl₃) δ 7.33-7.37 (m, 5H), 7.24 (d, *J* = 8.2 Hz, 2H), 7.09 (d, *J* = 8.2 Hz, 2H), 6.77 (d, *J* = 8.8 Hz, 2H), 6.74 (d, *J* = 8.8 Hz, 2H), 5.44 (s, 1H), 5.36 (s, 1H), 5.08 (s, 1H), 4.56 (d, *J* = 14.6 Hz, 1H), 3.91 (d, *J* = 14.6 Hz, 1H), 3.83 (s, 2H), 3.78 (s, 3H), 2.29 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.4, 162.1, 159.1, 138.3, 134.6, 134.1, 132.6, 129.6, 129.4, 128.8, 128.3, 127.6, 127.6, 117.6, 114.0, 111.9, 70.1, 69.3, 55.3, 50.0, 45.8, 21.0; HRMS (ESI) calcd. for C₂₈H₂₇N₂O₃⁺ (M + H)⁺ 439.2022, found 439.2018; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 16.4$ min, $\tau_{\text{minor}} = 10.3$ min; $[\alpha]_{\text{D}}^{25} -152.0$ (c 1.0, CHCl₃, 95.5:4.5 er).

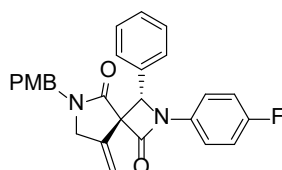
(3*S*,4*S*)-6-(4-methoxybenzyl)-2-(4-methoxyphenyl)-8-methylene-3-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione(3bq)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 42.7 mg, 47%, white solid. ¹H NMR (400 MHz, CDCl₃) δ 7.38-7.40 (m, 5H), 7.33 (d, *J* = 8.4 Hz, 2H), 6.85 (d, *J* = 8.4 Hz, 2H), 6.76-6.81 (m, 4H), 5.48 (s, 1H), 5.40 (s, 1H), 5.10 (s, 1H), 4.59 (d, *J* = 14.8 Hz, 1H), 3.94 (d, *J* = 14.8 Hz, 1H), 3.86 (s, 2H), 3.81 (s, 3H), 3.79 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.4, 161.9, 159.1,

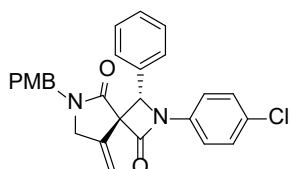
156.4, 138.3, 132.6, 130.6, 129.4, 128.8, 128.3, 127.6, 119.0, 114.4, 114.0, 111.9, 70.2, 69.4, 55.5, 55.3, 50.0, 45.8; HRMS (ESI) calcd. for $C_{28}H_{27}N_2O_4^+$ ($M + H$)⁺455.1971, found 455.1966; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) τ_{major} = 31.1 min, τ_{minor} = 19.0 min; $[\alpha]_D^{25}$ -123.8 (c 1.0, CHCl₃, 91:9 er).

(3*S*,4*S*)-2-(4-fluorophenyl)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3br)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 59.2 mg, 67%, white solid. ¹H NMR (400 MHz, CDCl₃) δ 7.35-7.39 (m, 7H), 6.99-7.02 (m, 2H), 6.73-6.78 (m, 4H), 5.46 (s, 1H), 5.39 (s, 1H), 5.09 (s, 1H), 4.57 (d, J = 14.6 Hz, 1H), 3.92 (d, J = 14.6 Hz, 1H), 3.84 (s, 2H), 3.79 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.2, 162.2, 159.9 (d, J = 242.6 Hz), 159.1, 138.1, 133.3 (d, J = 2.6 Hz), 132.1, 129.4, 129.0, 128.4, 127.6 (d, J = 3.5 Hz), 119.1 (d, J = 7.9 Hz), 116.0 (d, J = 23.0 Hz), 114.0, 112.1, 70.4, 69.5, 55.3, 50.0, 45.9; HRMS (ESI) calcd. for $C_{27}H_{24}FN_2O_3^+$ ($M + H$)⁺ 443.1771, found 443.1767; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) τ_{major} = 17.2 min, τ_{minor} = 11.4 min; $[\alpha]_D^{25}$ -152.2 (c 1.0, CHCl₃, 96:4 er).

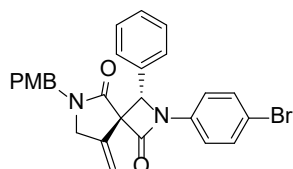
(3*S*,4*S*)-2-(4-chlorophenyl)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bs)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 41.2 mg, 45%, white solid. ¹H NMR (400 MHz, CDCl₃) δ 7.22-7.40 (m, 9H), 6.76 (d, J = 8.8 Hz, 2H), 6.73 (d, J = 8.8 Hz, 2H), 5.46 (s, 1H), 5.39 (s, 1H), 5.09

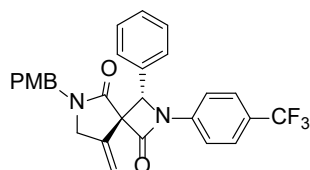
(s, 1H), 4.56 (d, $J = 14.6$ Hz, 1H), 3.91 (d, $J = 14.6$ Hz, 1H), 3.84 (s, 2H), 3.78 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.1, 162.3, 159.1, 138.1, 135.4, 132.0, 129.6, 129.4, 129.2, 129.0, 128.4, 127.5, 127.5, 118.9, 114.0, 112.2, 70.5, 69.5, 55.3, 50.0, 45.9; HRMS (ESI) calcd. for $\text{C}_{27}\text{H}_{24}\text{ClN}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 459.1475, found 459.1468; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 19.1$ min, $\tau_{\text{minor}} = 11.8$ min; $[\alpha]_{\text{D}}^{25} -133.214$ (c 1.0, CHCl_3 , 91:9 er).

(3*S*,4*S*)-2-(4-bromophenyl)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione (3bt)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 46.2 mg, 46%, white solid. ^1H NMR (400 MHz, CDCl_3) δ 7.34-7.43 (m, 7H), 7.27 (d, $J = 8.0$ Hz, 2H), 6.78 (d, $J = 8.8$ Hz, 2H), 6.74 (d, $J = 8.2$ Hz, 2H), 5.48 (s, 1H), 5.41 (s, 1H), 5.11 (s, 1H), 4.59 (d, $J = 14.6$ Hz, 1H), 3.93 (d, $J = 14.6$ Hz, 1H), 3.87 (s, 2H), 3.81 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.1, 162.4, 159.1, 138.1, 136.0, 132.2, 132.0, 129.4, 129.0, 128.4, 127.5, 127.5, 119.2, 117.3, 114.0, 112.2, 70.5, 69.5, 55.3, 50.0, 45.9; HRMS (ESI) calcd. For $\text{C}_{27}\text{H}_{24}\text{BrN}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 503.0970, found 503.0966; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 19.2$ min, $\tau_{\text{minor}} = 12.0$ min; $[\alpha]_{\text{D}}^{25} -114.4$ (c 1.0, CHCl_3 , 94:6 er).

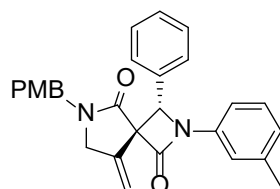
(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2-(4-(trifluoromethyl)phenyl)-2,6-diazaspiro[3.4]octane-1,5-dione (3bu)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 49.2 mg, 50%, white solid, ^1H NMR (400 MHz, CDCl_3) δ 7.36-7.56 (m,

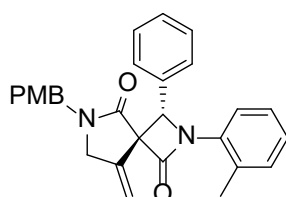
9H), 6.73-6.78 (m, 4H), 5.47 (s, 1H), 5.41 (s, 1H), 5.15 (s, 1H), 4.57 (d, $J = 14.6$ Hz, 1H), 3.92 (d, $J = 14.6$ Hz, 1H), 3.86 (s, 2H), 3.79 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 166.0, 162.8, 159.2, 139.7, 138.0, 131.8, 129.4, 129.1, 128.5, 127.5, 127.4, 126.5 (q, $J = 3.0$ Hz), 125.7, (q, $J = 270.0$ Hz), 117.6, 114.1, 112.3, 70.6, 69.6, 55.3, 50.0, 45.9. HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{24}\text{F}_3\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 493.1739, found 493.1731, HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 12.1$ min, $\tau_{\text{minor}} = 7.8$ min; $[\alpha]_{\text{D}}^{25} -110.4$ (c 1.0, CHCl_3 , 92:8 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2-(*m*-tolyl)-2,6-diazaspiro[3.4]octane-1,5-dione (3bv)



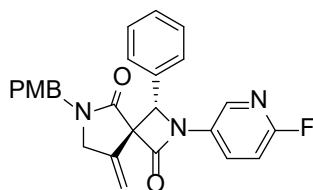
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 43.7 mg, 54%, white solid, ^1H NMR (400 MHz, CDCl_3) δ 7.39 – 7.35 (m, 6H), 7.16 (t, $J = 8.0$ Hz, 1H), 7.02 (d, $J = 8.0$ Hz, 1H), 6.93 (d, $J = 7.6$ Hz, 1H), 6.80 – 6.74 (m, 4H), 5.45 (s, 1H), 5.37 (s, 1H), 5.11 (s, 1H), 4.58 (d, $J = 14.6$ Hz, 1H), 3.92 (d, $J = 14.6$ Hz, 1H), 3.85 (d, $J = 1.5$ Hz, 2H), 3.79 (s, 3H), 2.31 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 166.3, 162.4, 159.1, 139.3, 138.4, 137.0, 132.6, 129.4, 128.9, 128.8, 128.3, 127.6, 127.5, 125.3, 118.5, 114.6, 114.0, 111.9, 70.1, 69.3, 55.3, 50.0, 45.8, 21.5. HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{27}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 439.2016, found 439.2014, HPLC (AS, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 9.7$ min, $\tau_{\text{minor}} = 7.5$ min; $[\alpha]_{\text{D}}^{25} -143.2$ (c 1.0, CHCl_3 , 93.5:6.5 er).

(3*S*,4*S*)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2-(*o*-tolyl)-2,6-diazaspiro[3.4]octane-1,5-dione (3bw)



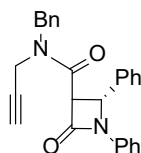
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 20.2 mg, 23%, white solid, ^1H NMR (400 MHz, CDCl_3) δ 7.30-7.28 (m, 6H), 7.20 – 7.18 (m, 1H), 7.15 (q, $J = 4.0$ Hz, 2H), 6.74 (s, 4H), 5.54 (s, 1H), 5.43 (s, 1H), 5.36 (s, 1H), 4.60 (d, $J = 14.6$ Hz, 1H), 3.92 (d, $J = 14.6$ Hz, 1H), 3.85 (s, 2H), 3.78 (s, 3H), 2.60 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 166.8, 162.8, 159.1, 138.1, 134.5, 133.1, 132.8, 131.7, 129.3, 128.6, 128.3, 127.7, 127.6, 126.8, 126.4, 121.8, 114.0, 112.3, 70.3, 69.8, 55.3, 50.0, 45.8, 19.7. HRMS (ESI) calcd. for $\text{C}_{28}\text{H}_{27}\text{N}_2\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 439.2016, found 439.2018, HPLC (AS, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 23.7$ min, $\tau_{\text{minor}} = 8.2$ min; $[\alpha]_{\text{D}}^{25} -145.4$ (c 1.0, CHCl_3 , 90:10 er).

(3*S*,4*S*)-2-(6-fluoropyridin-3-yl)-6-(4-methoxybenzyl)-8-methylene-3-phenyl-2,6-diazaspiro[3.4]octane-1,5-dione(3bx)



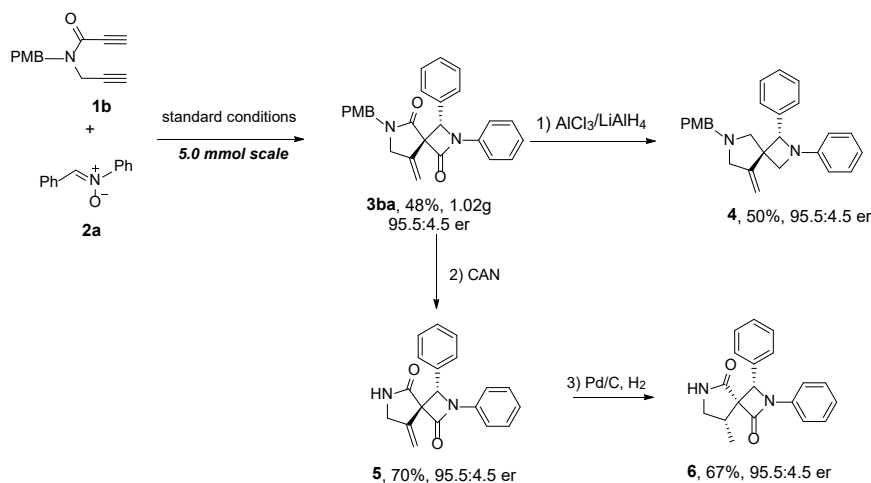
The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:3). 46.1 mg, 52%, white solid, ^1H NMR (400 MHz, CDCl_3) δ 8.09 – 8.05 (m, 2H), 7.42 – 7.39 (m, 5H), 6.96 – 6.93 (m, 1H), 6.76 (s, 4H), 5.50 (s, 1H), 5.44 (s, 1H), 5.15 (s, 1H), 4.59 (d, $J = 14.6$ Hz, 1H), 3.95 (d, $J = 14.6$ Hz, 1H), 3.87 (s, 2H), 3.81 (s, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ 165.9, 162.5, 159.7 (d, $J = 236.0$ Hz), 159.1, 137.8, 135.8, (d, $J = 15.0$ Hz), 131.8 (d, $J = 4.0$ Hz), 131.3, 130.7 (d, $J = 7.0$ Hz), 129.3, 129.3, 128.6, 127.6, 127.4, 114.1, 112.5, 110.0 (d, $J = 39.0$ Hz), 71.2, 69.7, 55.3, 50.0, 45.9. HRMS (ESI) calcd. for $\text{C}_{26}\text{H}_{23}\text{FN}_3\text{O}_3^+$ ($\text{M} + \text{H}$) $^+$ 444.1718, found 444.1708, HPLC (AS, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 16.2$ min, $\tau_{\text{minor}} = 12.3$ min; $[\alpha]_{\text{D}}^{25} -121.6$ (c 1.0, CHCl_3 , 95:5 er).

(4*R*)-*N*-benzyl-2-oxo-1,4-diphenyl-*N*-(prop-2-yn-1-yl)azetidione-3-carboxamide (7)



The product was purified by silica gel column chromatography (ethyl acetate/petroleum ether = 1:10). 44 mg, 55%, white solid. ^1H NMR (400 MHz, CDCl_3 , two rotamers) δ 7.17-7.50 (m, 14H), 7.07-7.12 (m, 1H), 5.84 & 5.79 (2d, $J = 2.4$ Hz, 1H), 5.23 & 5.08 (2d, $J = 14.8$ Hz, 1H), 4.85 & 4.82 (2d, $J = 13.2$ Hz, 1H), 4.14-4.42 (m, 2H), 3.91 & 3.87 (2d, $J = 14.8$ Hz, 1H), 2.20-2.22 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3 , two rotamers) δ 164.9, 164.8, 160.8, 160.4, 137.2, 136.7, 136.7, 136.0, 129.3, 129.3, 129.2, 129.1, 128.9, 128.8, 128.2, 128.0, 127.8, 127.5, 126.4, 126.3, 124.4, 124.4, 117.3, 117.3, 78.2, 77.9, 73.3, 72.4, 63.5, 63.4, 57.6, 57.5, 50.0, 48.7, 36.1, 34.3; HRMS (ESI) calcd. for $\text{C}_{26}\text{H}_{25}\text{N}_2\text{O}_2^+$ ($\text{M} + \text{H}$) $^+$ 395.1081, found 395.1075; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) $\tau_{\text{major}} = 7.8$ min, $\tau_{\text{minor}} = 10.1$ min; $[\alpha]_{\text{D}}^{25} - 76.7$ (c 1.0, CHCl_3 , 94:6 er).

IV. Synthetic Transformations



Gram synthesis of 3ba: A mixture of $\text{Cu}(\text{CH}_3\text{CN})_4\text{PF}_6$ (0.5 mmol, 186.2 mg, 10 mol%) with (4*R*,4'*R*)-L5 (L5, 0.6 mmol, 467.4 mg, 12 mol%) in dry PhCF_3 (10 mL) was stirred at room temperature for 0.5 h under the atmosphere of argon. Then, corresponding propiolamide **1b** (5.0 mmol, 1.14 g, 1.0 equiv.), nitrone **2a** (6.0 mmol, 1.18 g, 1.2 equiv.), Cs_2CO_3 (15.0 mmol, 4.88 g, 3.0 equiv.) and dry PhCF_3 (20 mL) were added to the mixture at -10 °C for 6 hours subsequently, transfer to 60 °C and 30 ml of dry DMSO

was added to continue the reaction for 6 hours. After the reaction was complete (monitored by TLC), the solvent was removed in vacuum. Then H₂O (50.0 mL) and ethyl acetate (50.0 mL) were added into the mixture. The organic phase was separated, and the aqueous phase was extracted with ethyl acetate (50.0 mL × 3). The combined organic phase was washed with H₂O and brine, dried over Na₂SO₄. The solvent was removed under reduced pressure. The residue was purified by flash chromatography (ethyl acetate/petroleum ether = 1:5) to afford the desired products **3ba** in 48% yield (1.02 g) with 95.5:4.5 er.

Synthesis of 4: The mixture of **3ba** (0.1 mmol, 42.4 mg, 1.0 equiv.), LiAlH₄ (0.62 mmol, 6.2 equiv.) and AlCl₃ (0.62 mmol, 6.2 equiv.) in Et₂O (10 mL) were stirred at room temperature for 45 minutes. After the reaction was complete, the reaction was quenched with saturated NaHCO₃ solution and extracted with dichloromethane. The organic phase was dried over Na₂SO₄, concentrated in vacuum and the residue was loaded on silica column (ethyl acetate/petroleum ether = 3:1) to afford compound **4** as a white solid in 50% yield (19.8 mg). ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.37 (m, 5H), 7.17 (t, *J* = 7.6 Hz, 2H), 6.94 (d, *J* = 8.4 Hz, 2H), 6.75-6.80 (m, 3H), 6.49 (d, *J* = 7.8 Hz, 2H), 5.20 (s, 1H), 5.18 (s, 1H), 4.95 (s, 1H), 4.01 (d, *J* = 6.8 Hz, 1H), 3.79 (s, 3H), 3.74 (d, *J* = 6.8 Hz, 1H), 3.49 (d, *J* = 13.0 Hz, 1H), 3.14-3.29 (m, 3H), 2.58 (d, *J* = 9.6 Hz, 1H), 2.42 (d, *J* = 9.6 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 158.5, 151.8, 138.7, 129.3, 128.9, 128.3, 127.5, 126.7, 118.4, 113.6, 112.9, 106.5, 63.3, 61.5, 59.5, 59.3, 55.3, 49.8, 29.7; HRMS (ESI) calcd. for C₂₇H₂₉N₂O⁺ (M + H)⁺ 397.2280, found 397.2275; HPLC (AD-H, n-hexane/*i*-PrOH = 99:1, flow rate = 1.0 mL/min, I = 254 nm) τ_{major} = 6.5 min, τ_{minor} = 9.1 min; [α]_D²⁵ -76.7 (c 1.0, CHCl₃, 95.5:4.5 er).

Synthesis of 5: The mixture of **3ba** (0.1 mmol, 42.4 mg, 1.0 equiv.), Ce(NH₄)₂(NO₃)₆ (0.4 mmol, 219.3 mg, 4.0 equiv.) in MeCN/H₂O (9:1, 10 mL) were stirred at room temperature for 12 hours. After the reaction was complete, the mixture was quenched with H₂O and extracted with DCM, dried over Na₂SO₄. The organic phase was

concentrated in vacuum and the residue was loaded on silica column (ethyl acetate/petroleum ether=3:1) to afford compound **5** as a white solid in 70% yield (21.3mg). ¹H NMR (400 MHz, DMSO-*d*₆) δ 8.09 (s, 1H), 7.37 - 7.28 (m, 9H), 7.13 (d, *J* = 7.2 Hz, 1H), 5.46 (s, 2H), 5.40 (s, 1H), 4.00 - 3.90 (m, 2H). ¹³C NMR (100MHz, DMSO-*d*₆) δ 169.0, 163.2, 141.4, 137.1, 133.4, 129.7, 128.6, 128.3, 128.0, 124.7, 117.9, 112.3, 69.5, 67.8, 45.8. HRMS (ESI) calcd. for C₁₉H₁₇N₂O₂⁺ (M + H)⁺ 305.1290, found 305.1281 HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) τ_{major} = 10.4 min, τ_{minor} = 12.8 min; [α]_D²⁵ 22.6 (c 1.0, CHCl₃, 95.5:4.5 er).

Synthesis of 6: A mixture of **5** (0.1 mmol, 30.4 mg, 1.0 equiv) and Pd/C (0.01mmol, 10.6mg, 10 mol%) in EtOH (10 mL) was stirred at room temperature for 12 h under the atmosphere of hydrogen. After the reaction was complete (monitored by TLC), the mixture was quenched with H₂O and extracted with dichloromethane, dried over Na₂SO₄. The organic phase was concentrated in vacuum and the residue was loaded on silica column (ethyl acetate/petroleum ether = 3:1) to afford compound **6** as a white solid in 96% yield (29.5 mg). ¹H NMR (400 MHz, CDCl₃) δ 7.25-7.34 (m, 9H), 7.08 (t, *J* = 6.8 Hz, 1H), 5.57 (s, 1H), 5.05 (s, 1H), 3.48-3.52 (m, 1H), 3.10-3.13 (m, 1H), 2.98-3.04 (m, 1H), 1.40 (d, *J* = 7.2 Hz, 3H); ¹³C NMR (100MHz, CDCl₃) δ 170.7, 162.5, 137.1, 132.8, 129.1, 128.6, 128.3, 127.3, 124.2, 117.4, 69.6, 64.1, 47.0, 37.4, 15.0; HRMS (ESI) calcd. for C₁₉H₁₉N₂O₂⁺ (M + H)⁺ 307.1447, found 307.1438; HPLC (AS-H, *n*-hexane/*i*-PrOH = 80:20, flow rate = 1.0 mL/min, I = 254 nm) τ_{major} = 11.7min, τ_{minor} = 15.1min; [α]_D²⁵ 38.9 (c 1.0, CHCl₃, 95.5:4.5 er).

V. X-Ray Crystallographic Data of 3aa and 3aa'

X-Ray Crystallographic Analysis of 3aa

A suitable crystal of **3aa** was selected and collected on a SuperNova, Dual, Cu at zero, AtlasS2 diffractometer. The crystal was kept at 292.99(10) K during data collection. Using Olex2^[1], the structure was solved with the SHELXS structure solution

program using Direct Methods and refined with the SHELXL refinement package using Least Squares minimisation.

The chiral **3aa** was completely dissolved in ethyl acetate (0.1 mL), Petroleum ether (0.2 mL) was added slowly to the solution at room temperature. The solvent diffused slowly, and the single crystal was obtained after two days. The structure in **Figure S1** showed the absolute configuration of **3aa** is (3*S*, 4*S*). The CCDC number is 2371699. These details can be obtained free of charge via <https://www.ccdc.com.ac.uk/> from the Cambridge Crystallographic Data Centre.

Figure S1. Thermal Ellipsoid Plot for 3aa (50% probability level)

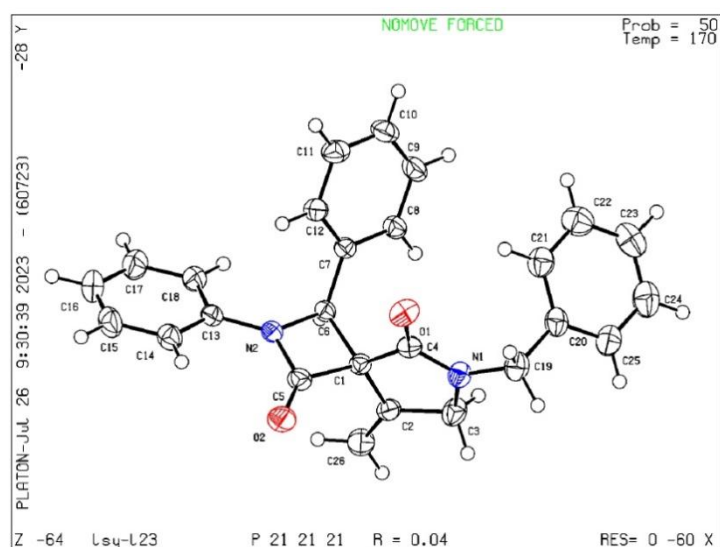


Table 1 Crystal data and structure refinement for LSY-L23.

Identification code	LSY-L23
Empirical formula	C ₂₆ H ₂₂ N ₂ O ₂
Formula weight	394.45
Temperature/K	170.00(10)
Crystal system	orthorhombic
Space group	P2 ₁ 2 ₁ 2 ₁
a/Å	9.99923(13)
b/Å	13.0716(2)
c/Å	16.3120(3)

$\alpha/^\circ$	90
$\beta/^\circ$	90
$\gamma/^\circ$	90
Volume/ \AA^3	2132.07(6)
Z	4
$\rho_{\text{calc}}/\text{cm}^3$	1.229
μ/mm^{-1}	0.620
F(000)	832.0
Crystal size/ mm^3	$0.15 \times 0.13 \times 0.11$
Radiation	Cu K α ($\lambda = 1.54184$)
2θ range for data collection/ $^\circ$	8.668 to 146.87
Index ranges	$-12 \leq h \leq 12, -14 \leq k \leq 15, -19 \leq l \leq 14$
Reflections collected	12913
Independent reflections	4218 [$R_{\text{int}} = 0.0283, R_{\text{sigma}} = 0.0248$]
Data/restraints/parameters	4218/0/279
Goodness-of-fit on F^2	1.061
Final R indexes [$I \geq 2\sigma(I)$]	$R_1 = 0.0358, wR_2 = 0.0896$
Final R indexes [all data]	$R_1 = 0.0373, wR_2 = 0.0913$
Largest diff. peak/hole / $e \text{\AA}^{-3}$	0.28/-0.23
Flack/Hoof parameter	-0.02(10)/0.06(10)

X-Ray Crystallographic Analysis of **3aa'**

A suitable crystal of **3aa'** was selected and collected on a SuperNova, Dual, Cu at zero, AtlasS2 diffractometer. The crystal was kept at 292.99(10) K during data collection. Using Olex2^[1], the structure was solved with the SHELXS structure solution program using Direct Methods and refined with the SHELXL refinement package using Least Squares minimisation.

The chiral **3aa'** was completely dissolved in ethyl acetate (0.1 mL), Petroleum ether (0.2 mL) was added slowly to the solution at room temperature. The solvent diffused slowly, and the single crystal was obtained after two days. The structure in

Figure S2 showed the absolute configuration of **3aa'** is (3*S*,4*R*). The CCDC number is 2371702. These details can be obtained free of charge via <https://www.ccdc.com.ac.uk/> from the Cambridge Crystallographic Data Centre.

Figure S2. Thermal Ellipsoid Plot for 3aa' (50% probability level)

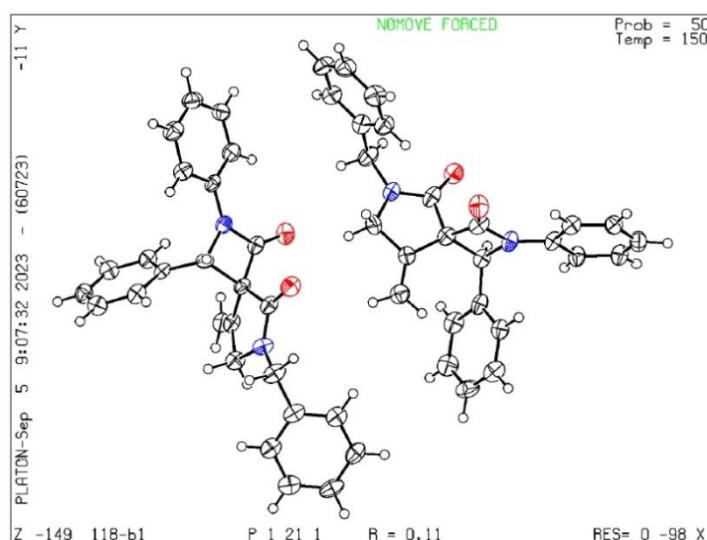
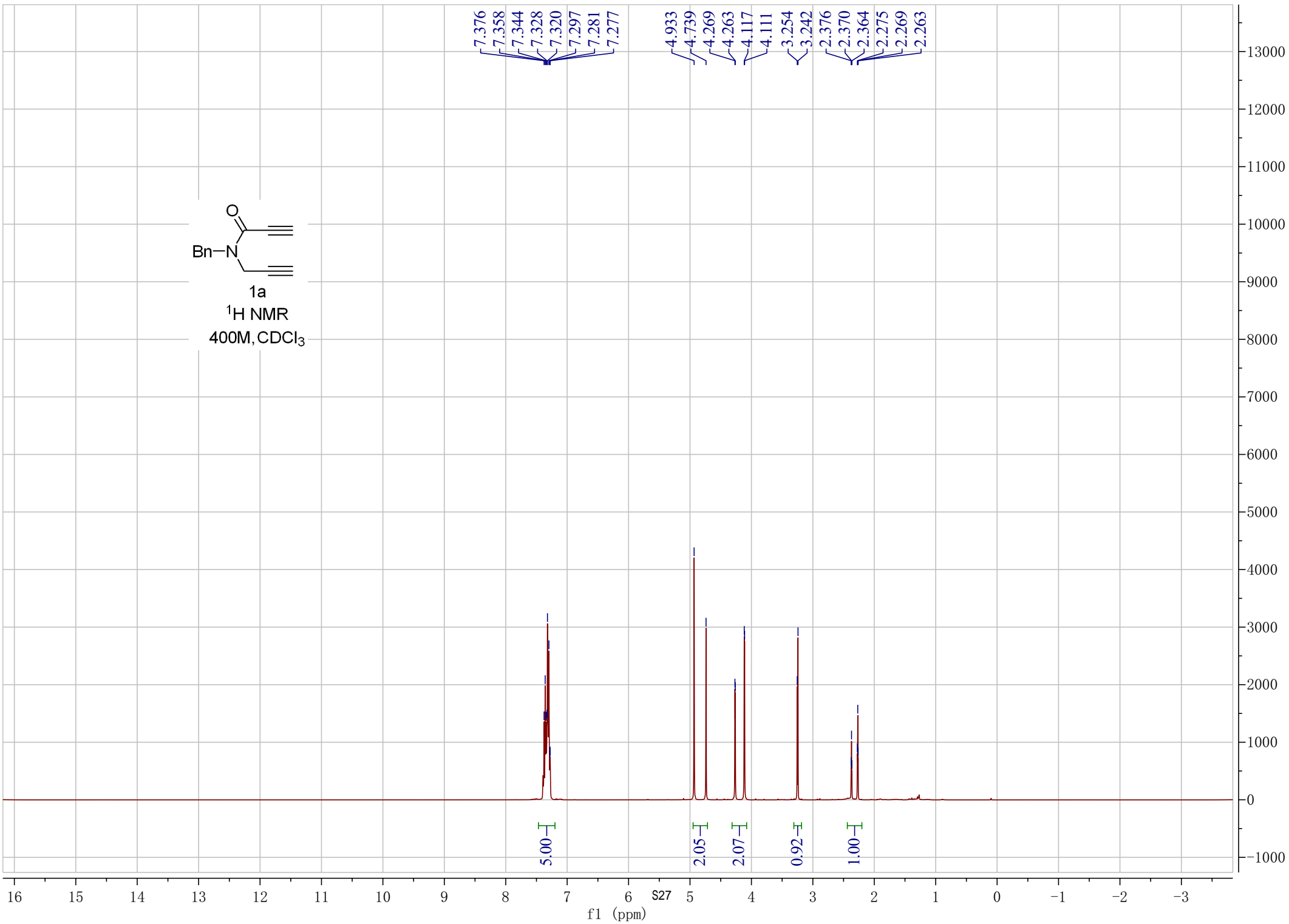
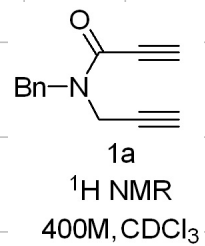


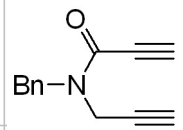
Table 2 Crystal data and structure refinement for 118-b1.

Identification code	118-b1
Empirical formula	C ₂₆ H ₂₂ N ₂ O ₂
Formula weight	394.45
Temperature/K	150.00(10)
Crystal system	monoclinic
Space group	P2 ₁
a/Å	14.3085(14)
b/Å	9.9631(10)
c/Å	14.4518(16)
α/°	90
β/°	93.217(11)
γ/°	90

Volume/Å ³	2057.0(4)
Z	4
ρ _{calc} /cm ³	1.274
μ/mm ⁻¹	0.643
F(000)	832.0
Crystal size/mm ³	0.16 × 0.12 × 0.1
Radiation	Cu Kα (λ = 1.54184)
2θ range for data collection/°	6.126 to 147.96
Index ranges	-16 ≤ h ≤ 17, -12 ≤ k ≤ 11, -17 ≤ l ≤ 17
Reflections collected	17946
Independent reflections	7857 [R _{int} = 0.1250, R _{sigma} = 0.1341]
Data/restraints/parameters	7857/1/541
Goodness-of-fit on F ²	1.030
Final R indexes [I ≥ 2σ (I)]	R ₁ = 0.1063, wR ₂ = 0.2908
Final R indexes [all data]	R ₁ = 0.1420, wR ₂ = 0.3281
Largest diff. peak/hole / e Å ⁻³	0.42/-0.46
Flack parameter	-0.2(8)

VI. NMR and HPLC Spectra





1a

^{13}C NMR
100M, CDCl_3

153.07
153.01

135.41
135.14
128.95
128.82
128.60
128.28
128.00
127.85

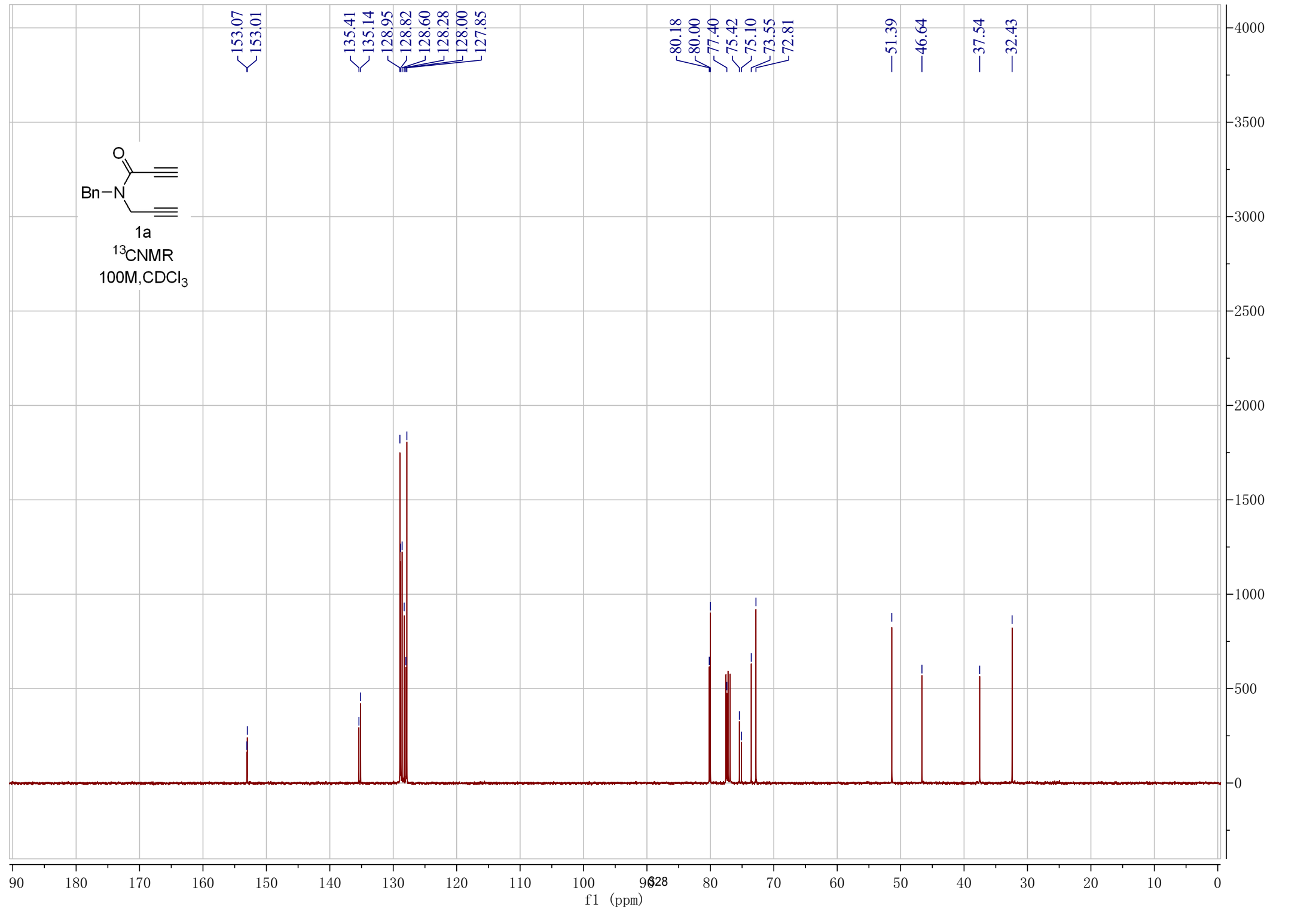
80.18
80.00
77.40
75.42
75.10
73.55
72.81

51.39

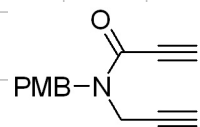
46.64

37.54

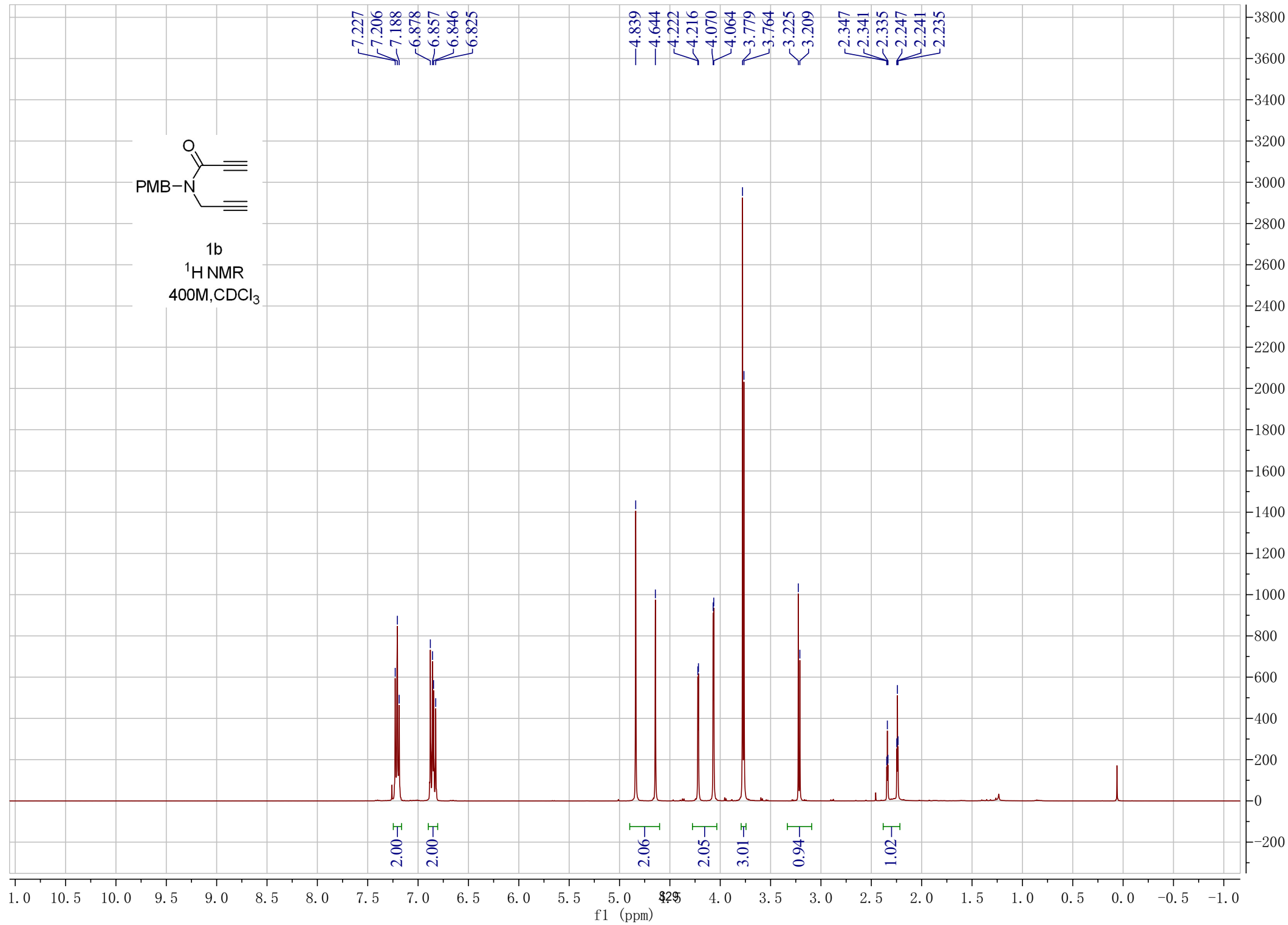
32.43

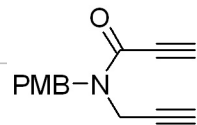


f1 (ppm)

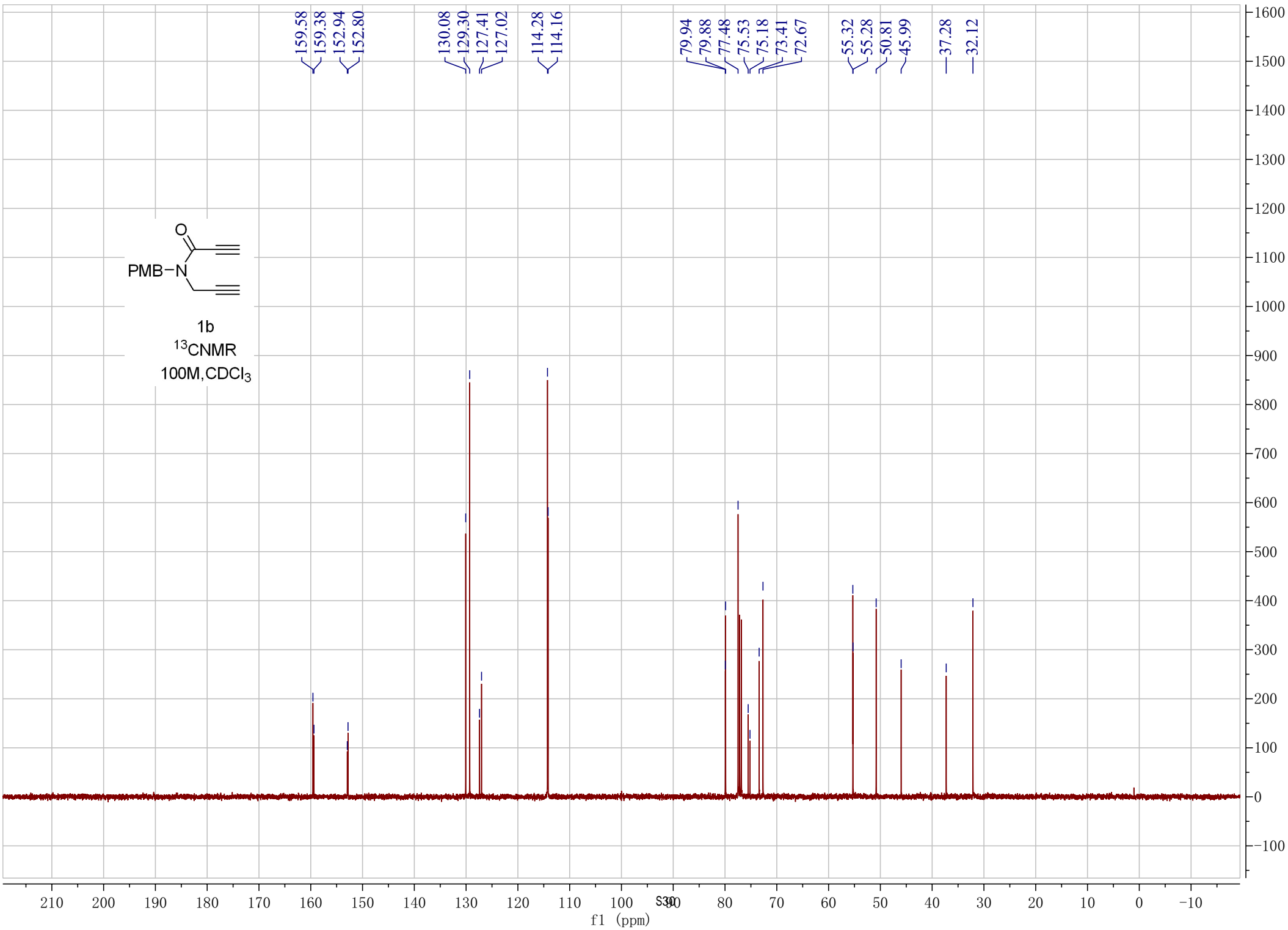


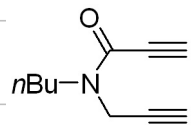
1b
¹H NMR
400M, CDCl₃



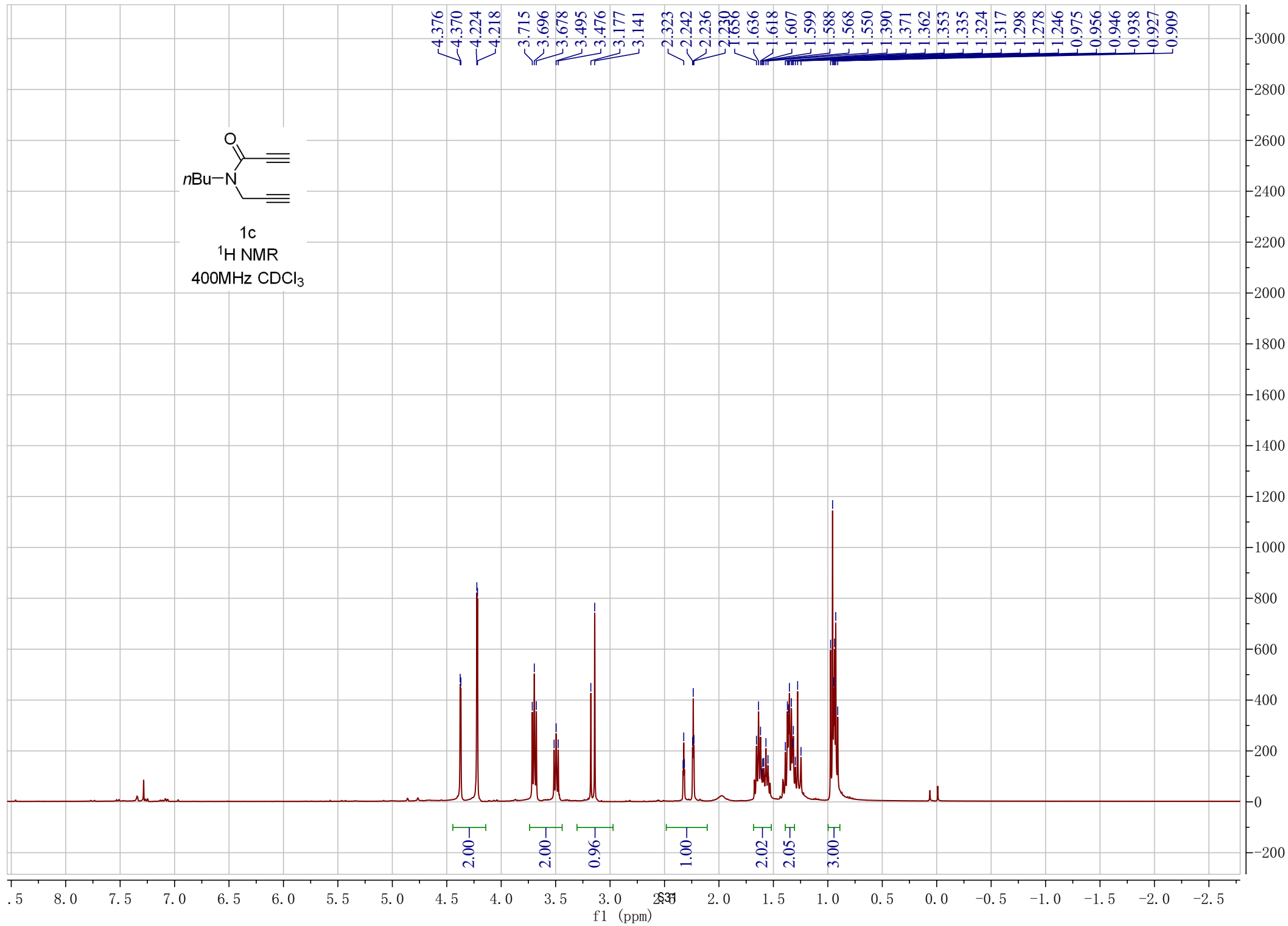


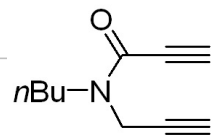
1b
¹³CNMR
100M, CDCl₃



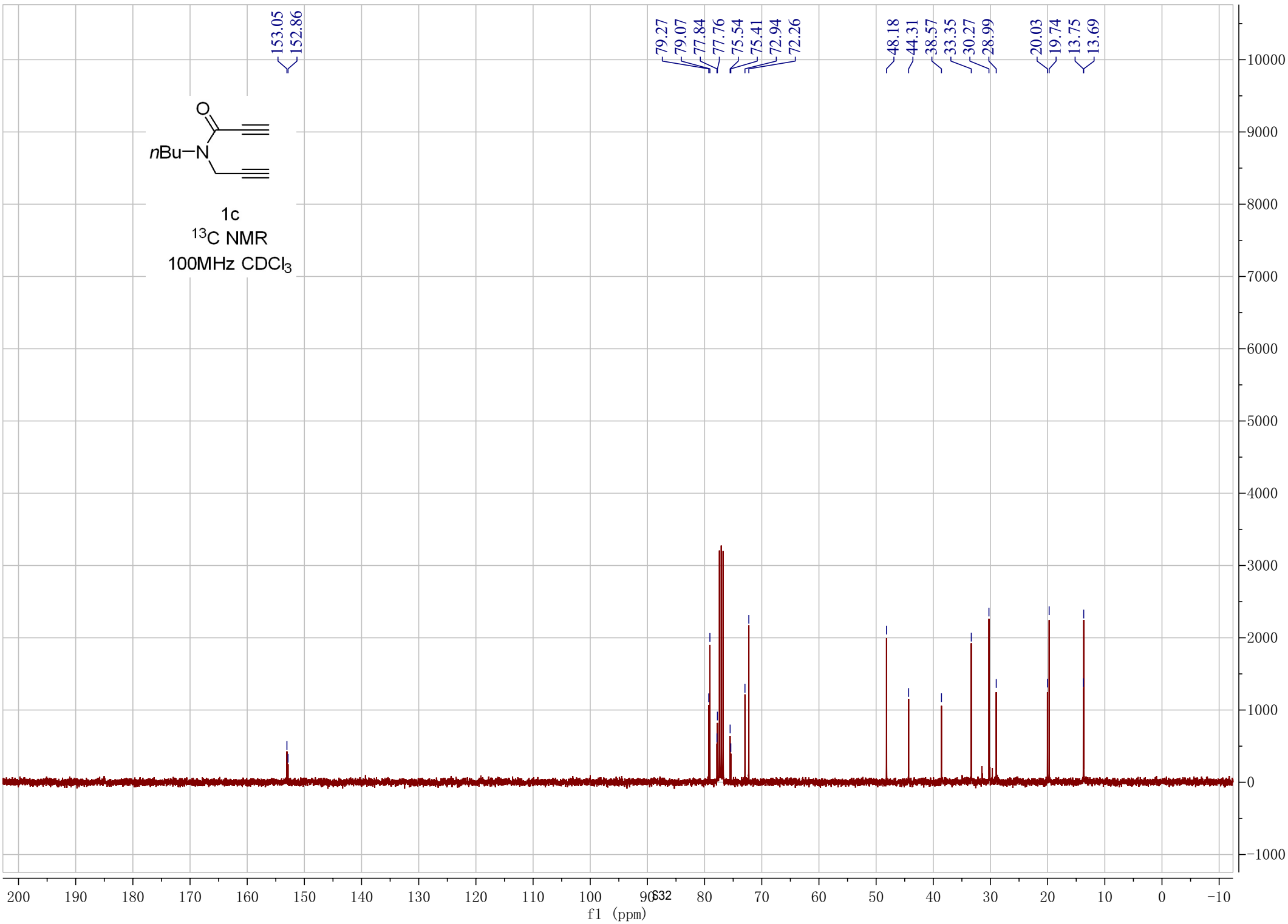


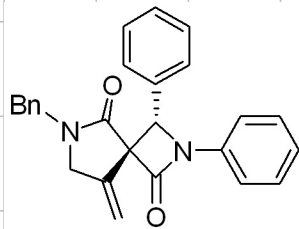
1c
¹H NMR
400MHz CDCl₃





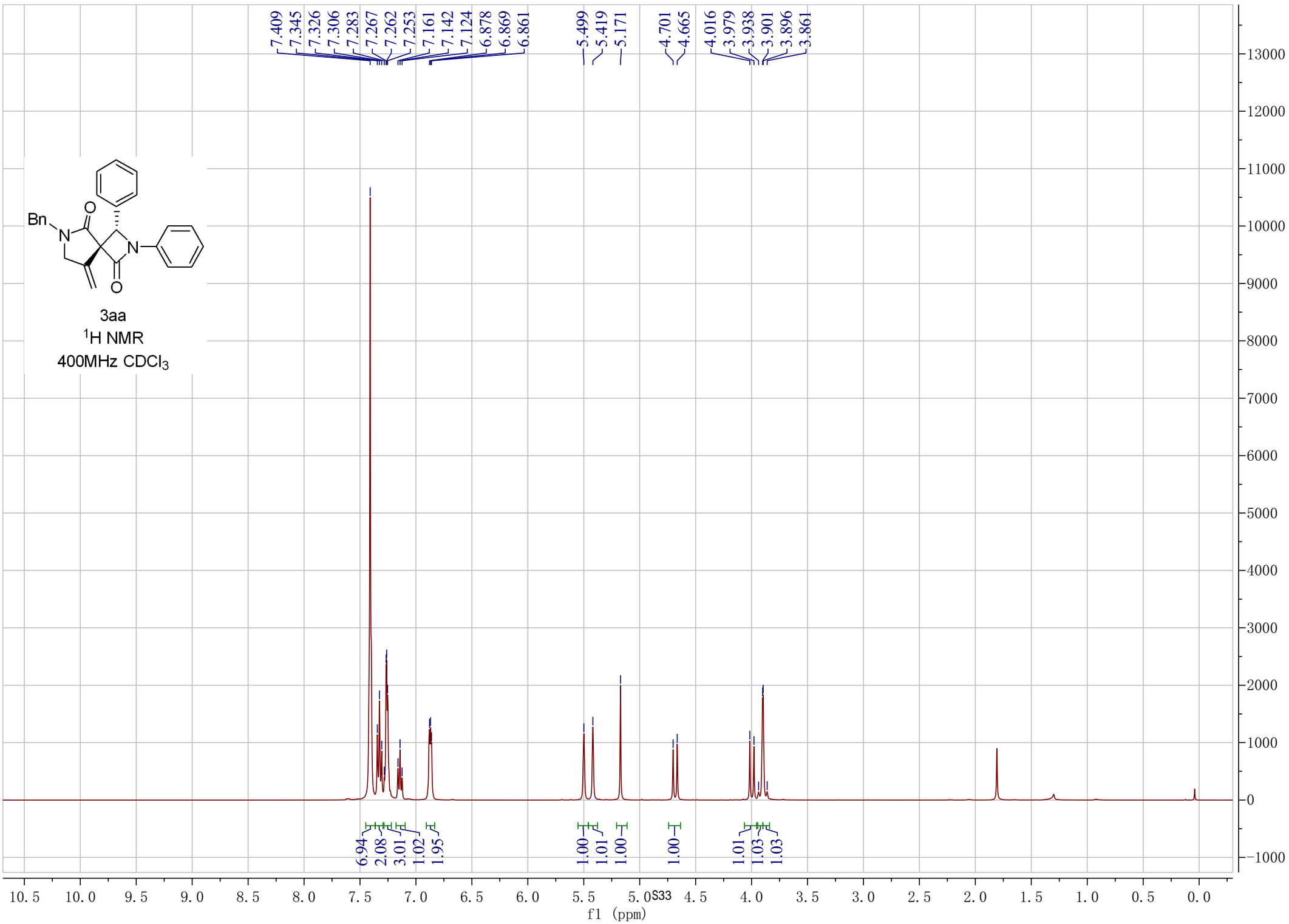
1c
¹³C NMR
100MHz CDCl₃

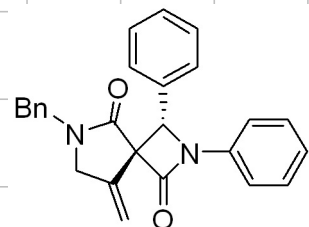




3aa

¹H NMR
400MHz CDCl₃





3aa

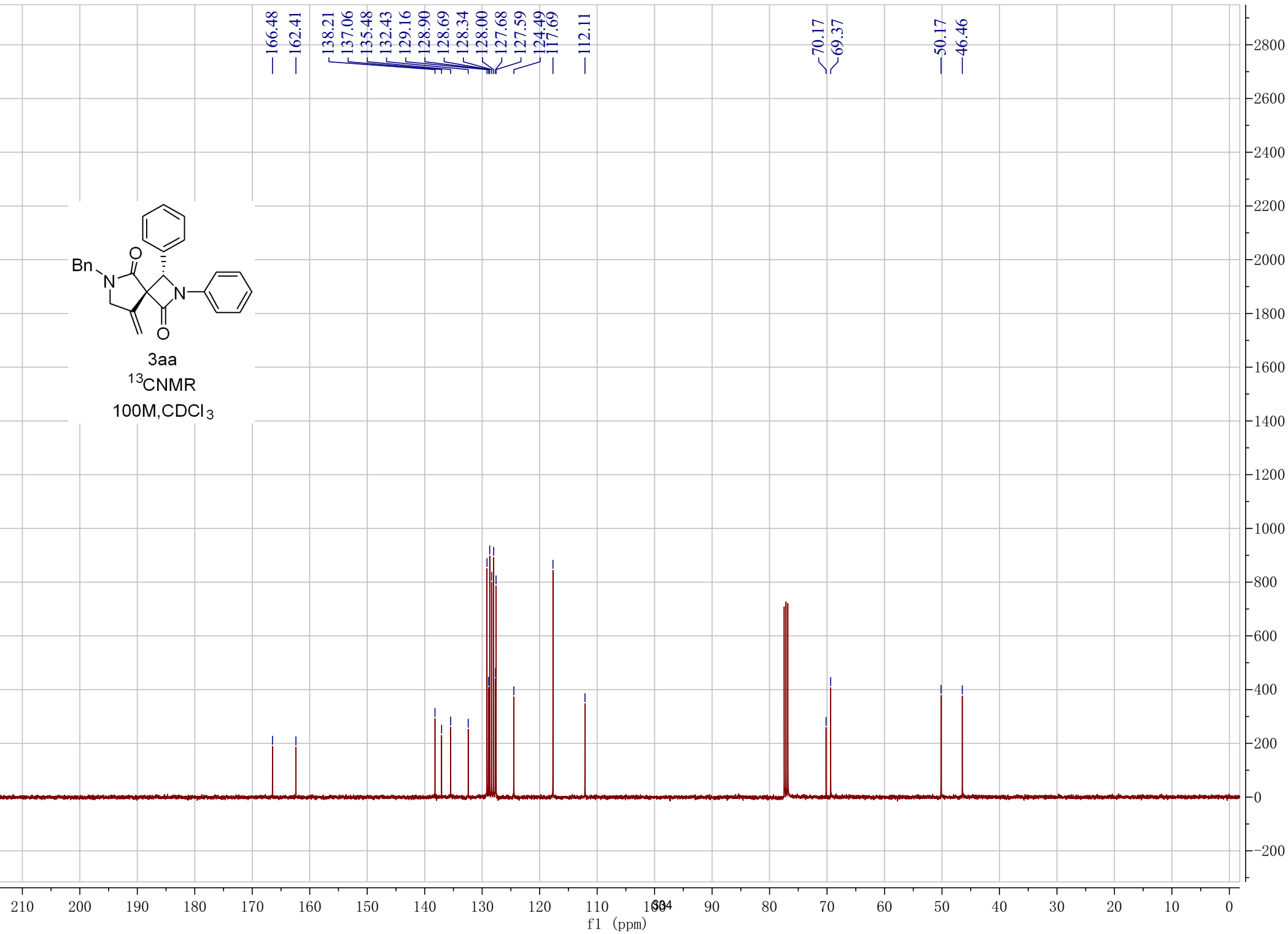
^{13}C NMR

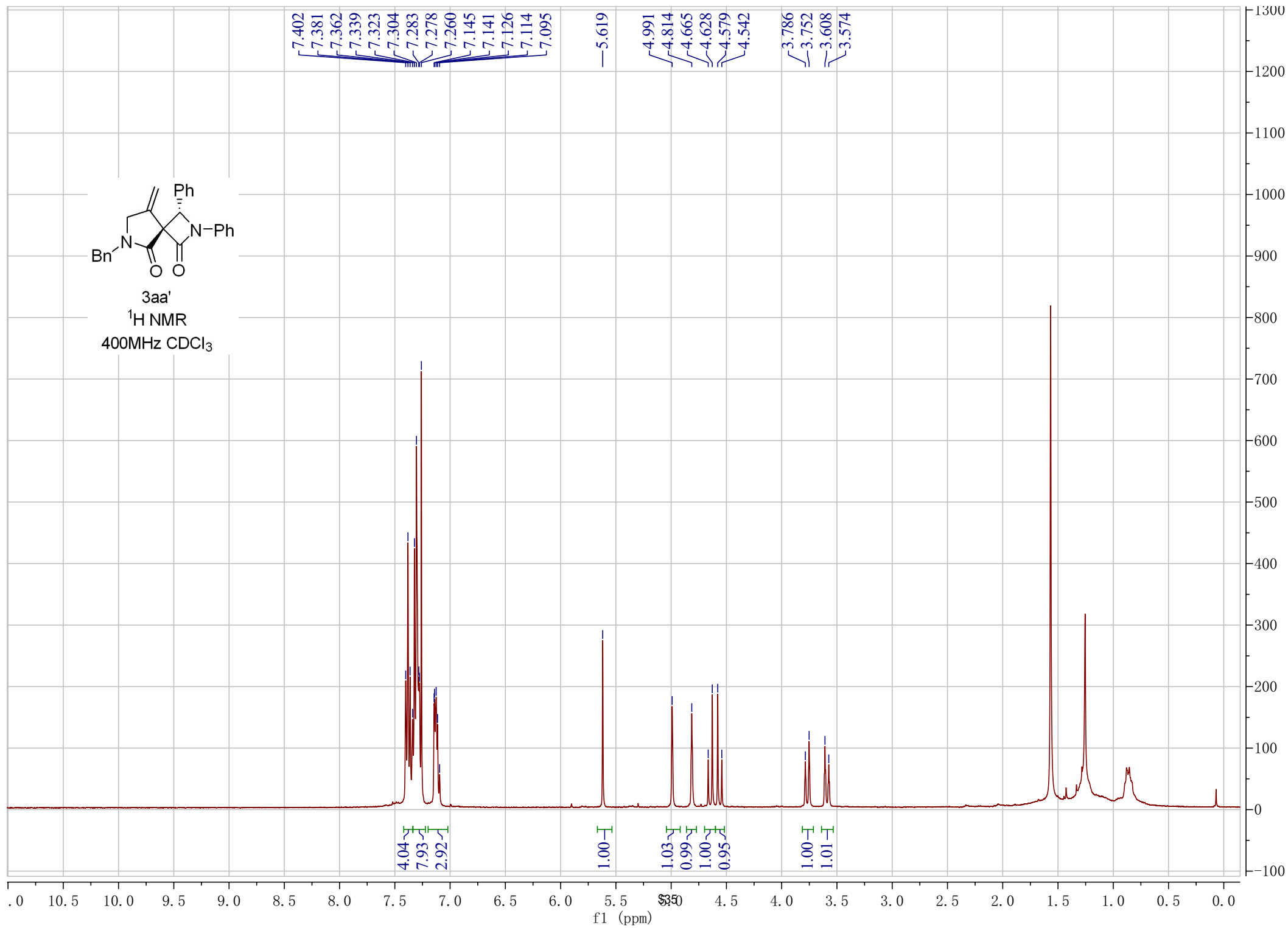
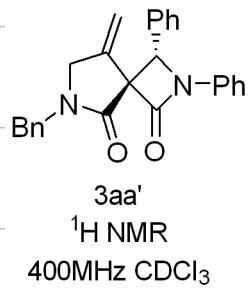
100M, CDCl_3

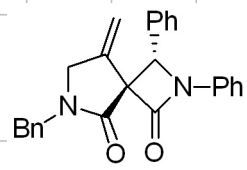
166.48
162.41
138.21
137.06
135.48
132.43
129.16
128.90
128.69
128.34
128.00
127.68
127.59
124.49
117.69
112.11

70.17
69.37

50.17
46.46







3aa'

¹³C NMR

100MHz CDCl₃

169.45

162.12

137.13

135.42

133.54

133.03

129.08

128.95

128.75

128.50

128.20

128.01

126.91

124.46

117.66

115.49

70.13

64.36

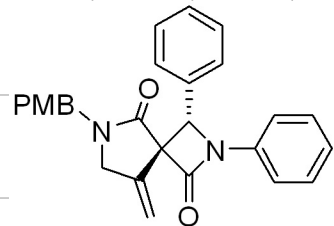
50.59

46.96

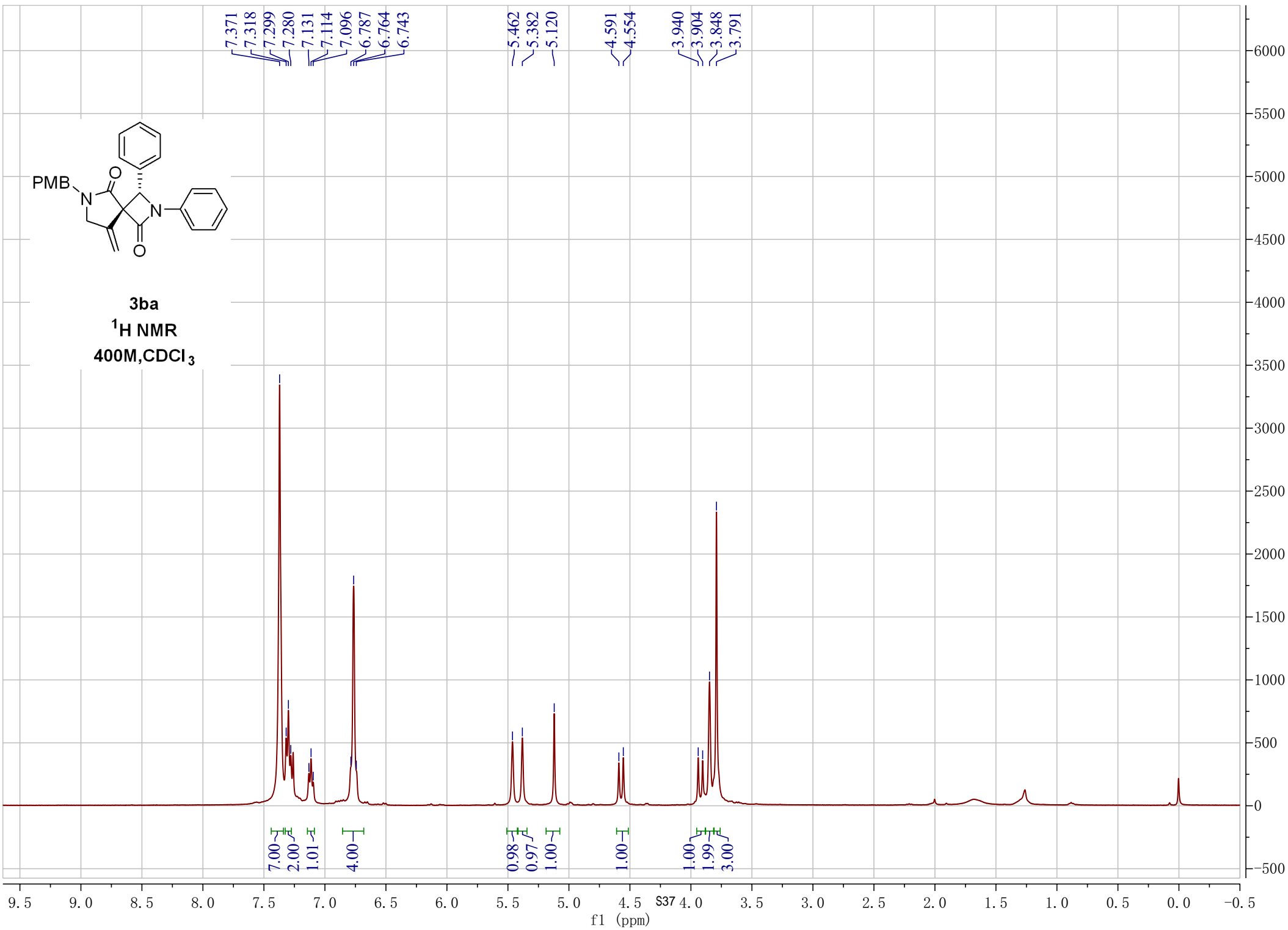
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10

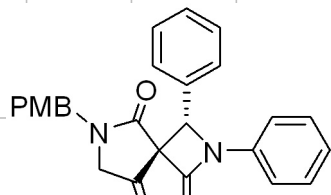
f1 (ppm)

S36

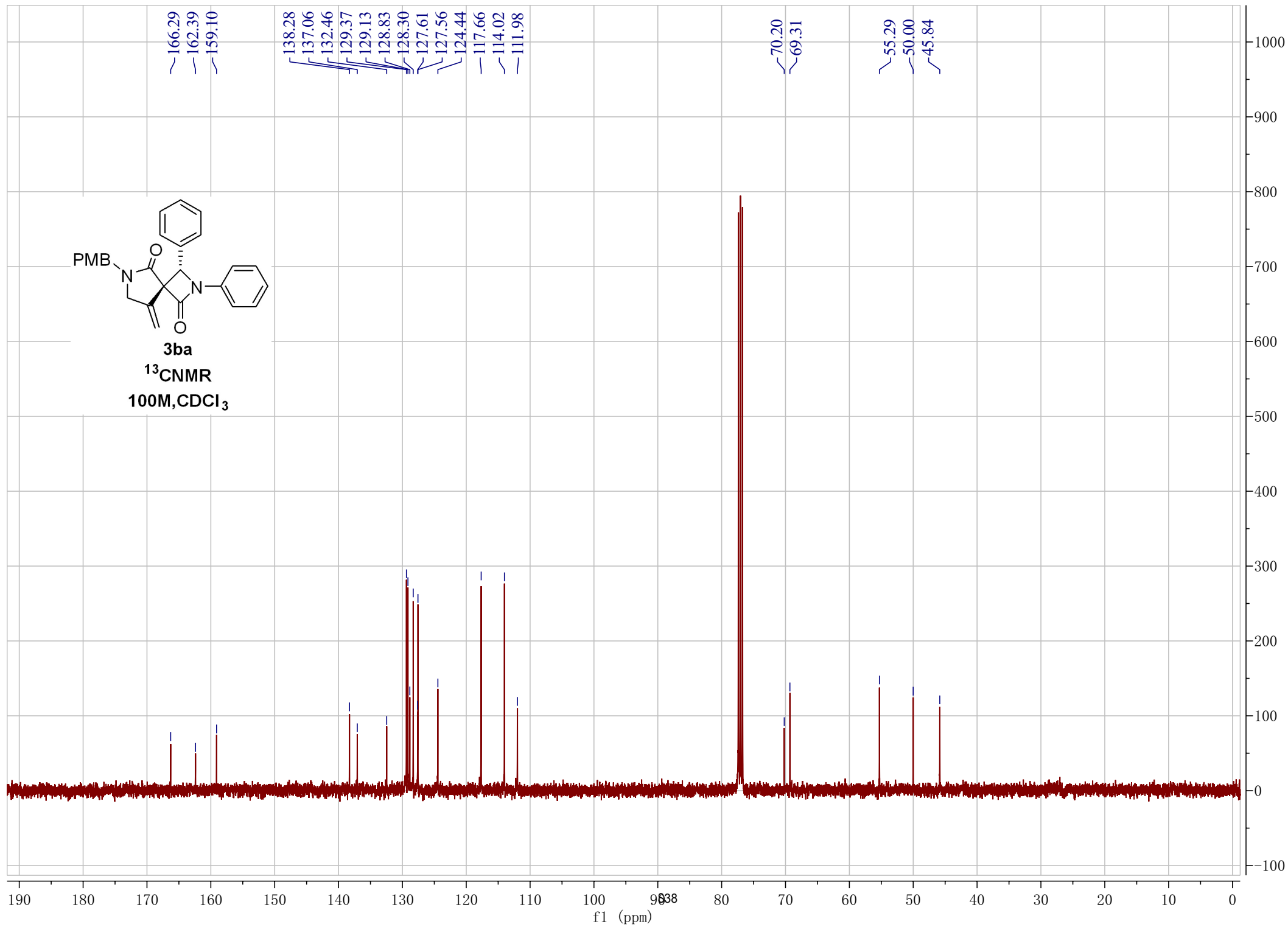


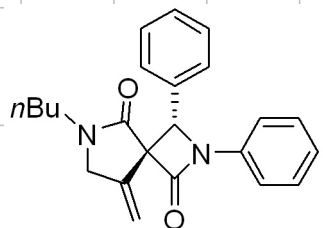
3ba
¹H NMR
400M, CDCl₃





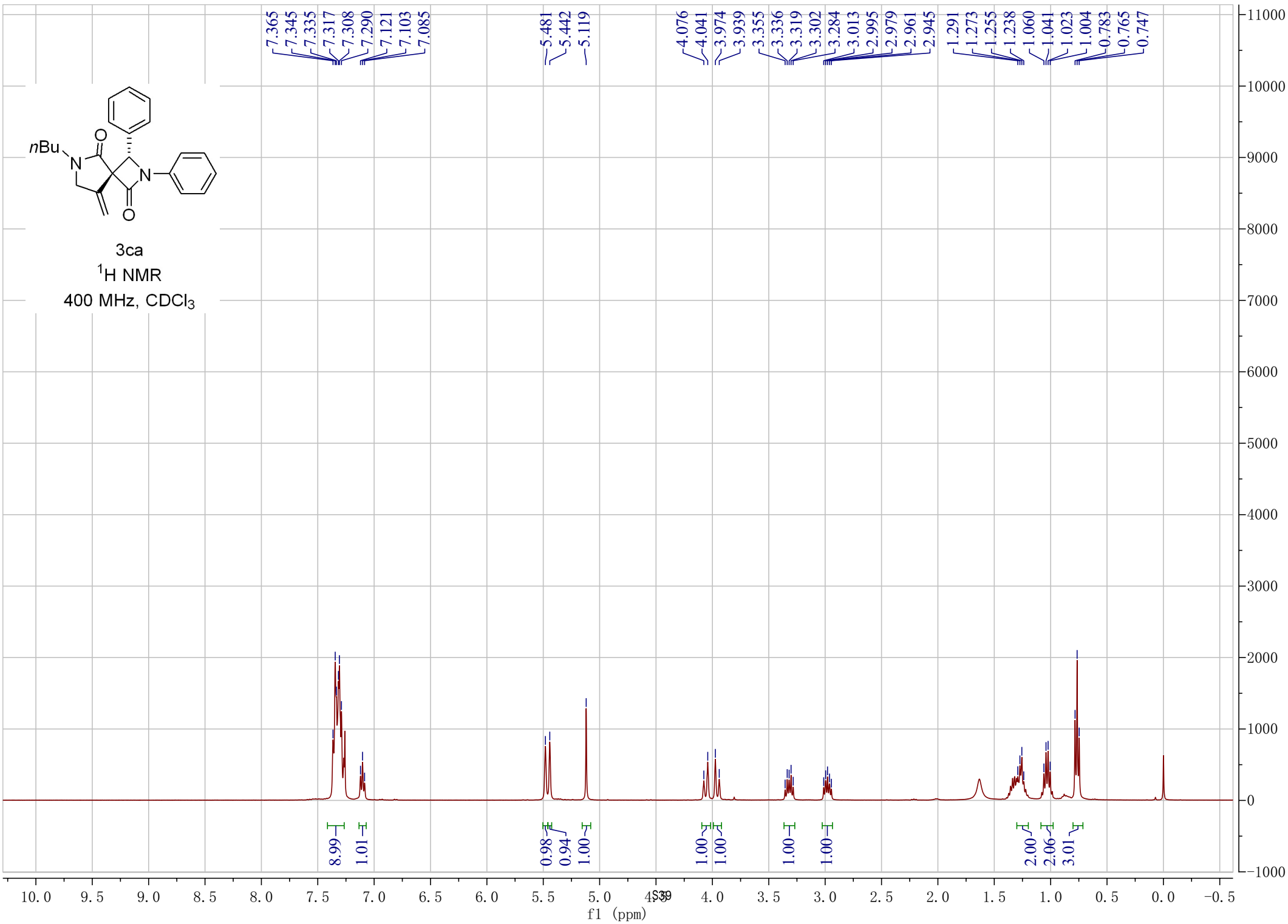
3ba
¹³CNMR
100M, CDCl₃

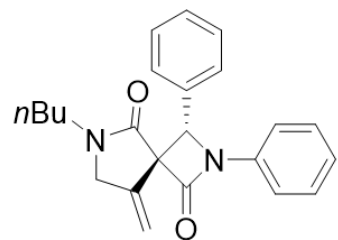




3ca

¹H NMR
400 MHz, CDCl₃

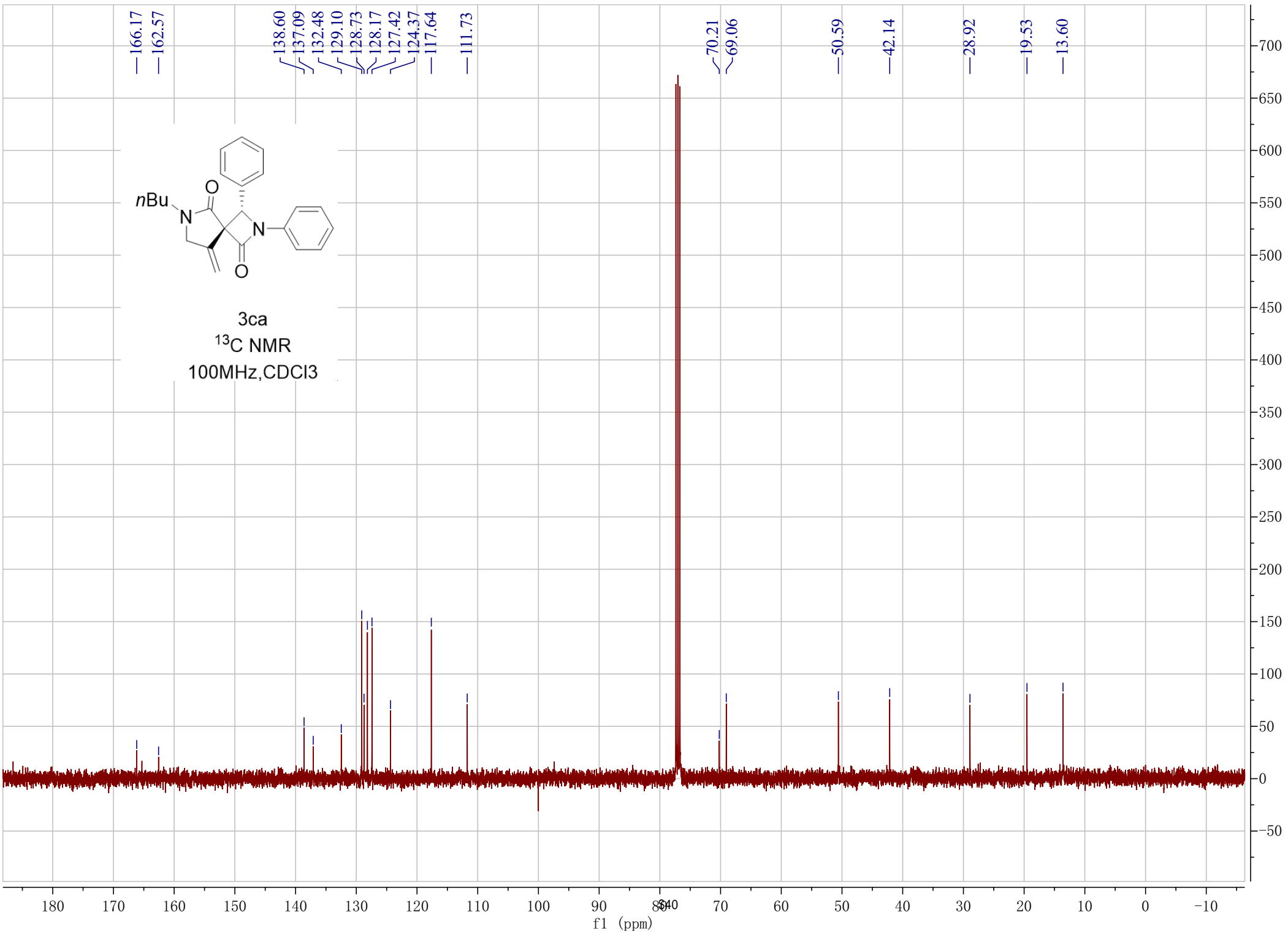


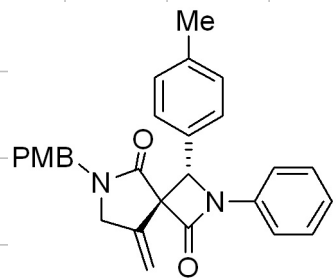


3ca
¹³C NMR
100MHz, CDCl₃

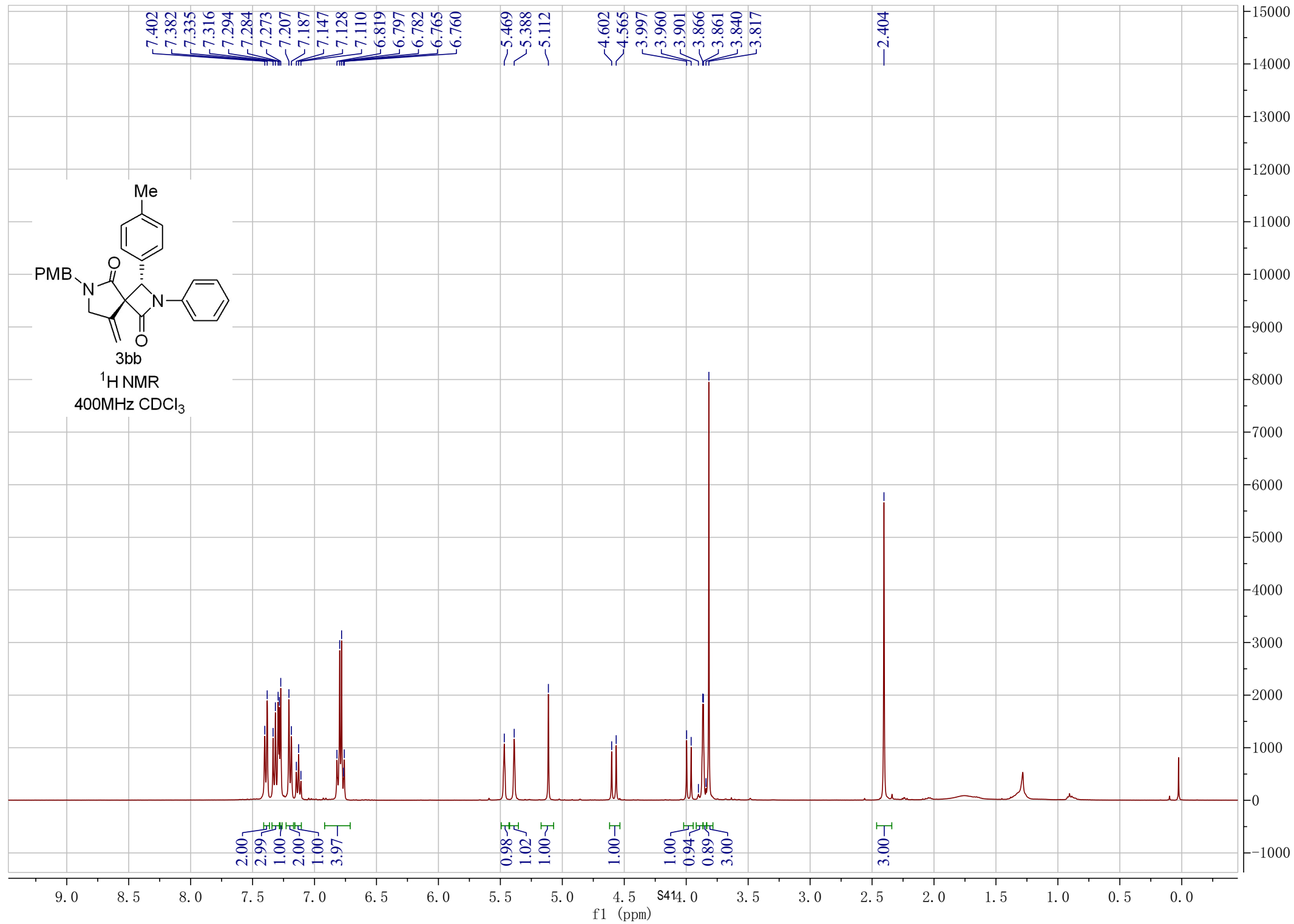
166.17
162.57
138.60
137.09
132.48
129.10
128.73
128.17
127.42
124.37
117.64
111.73

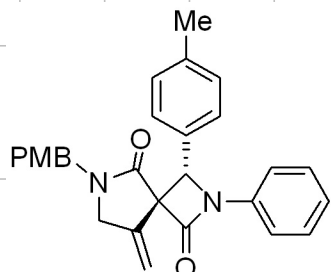
70.21
69.06
50.59
42.14
28.92
19.53
13.60





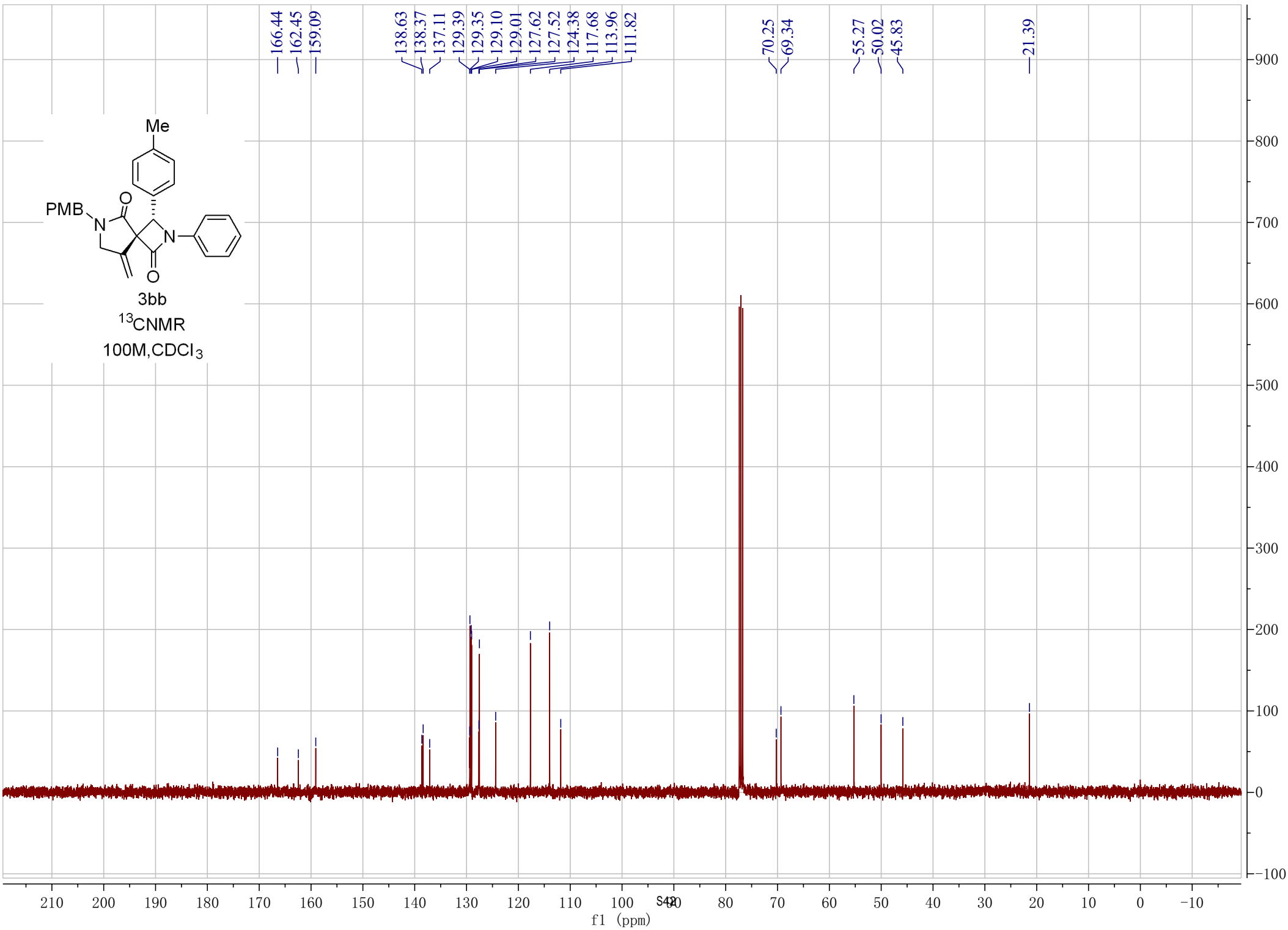
3bb
¹H NMR
400MHz CDCl₃

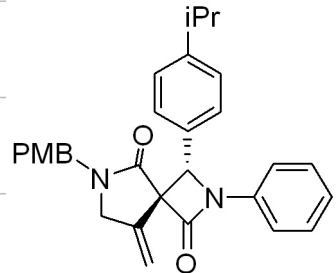




3bb

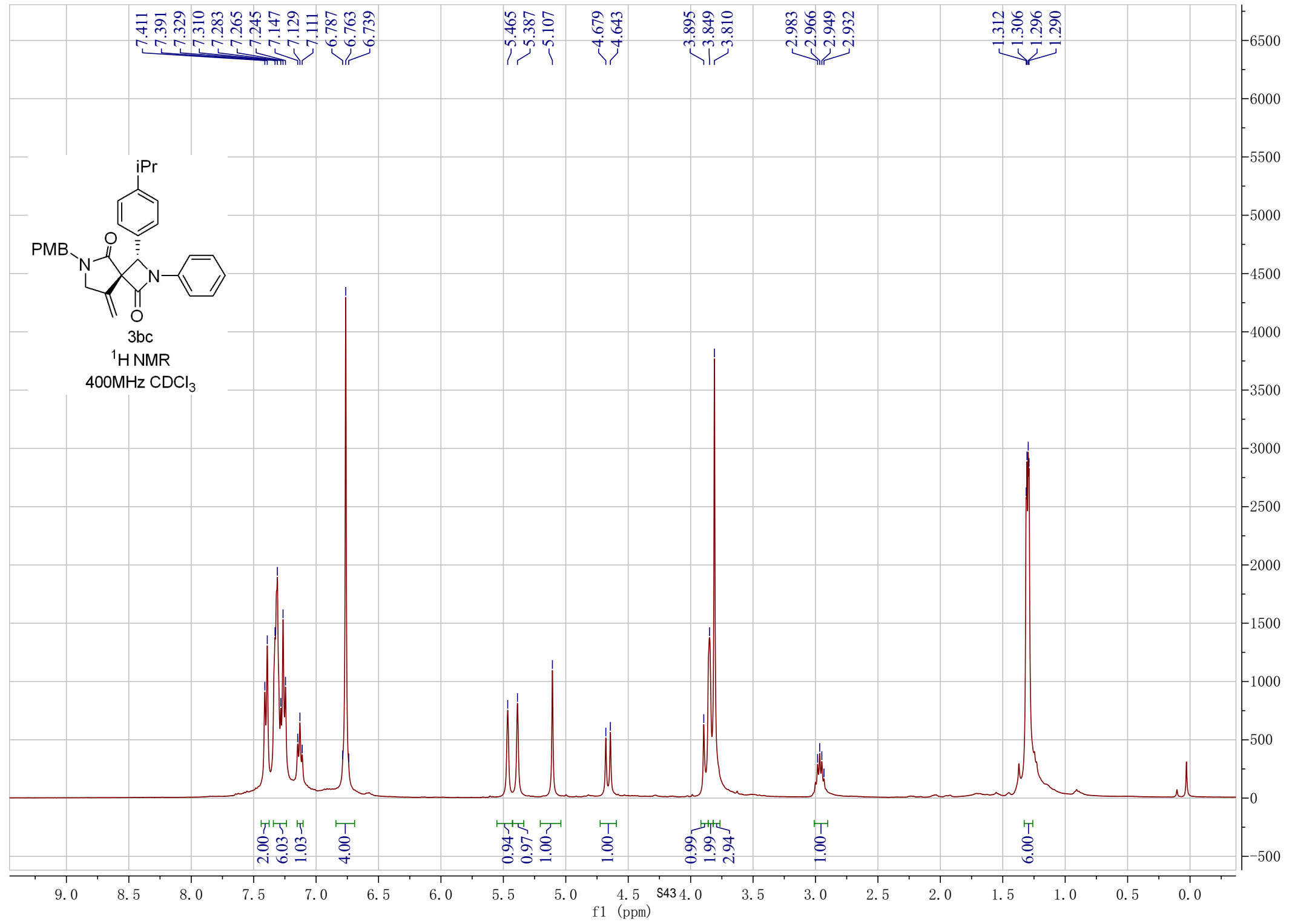
¹³CNMR
100M, CDCl₃

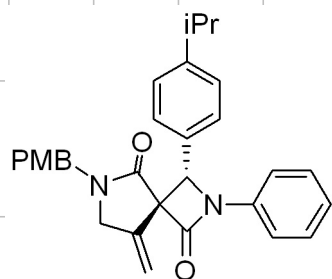




3bc

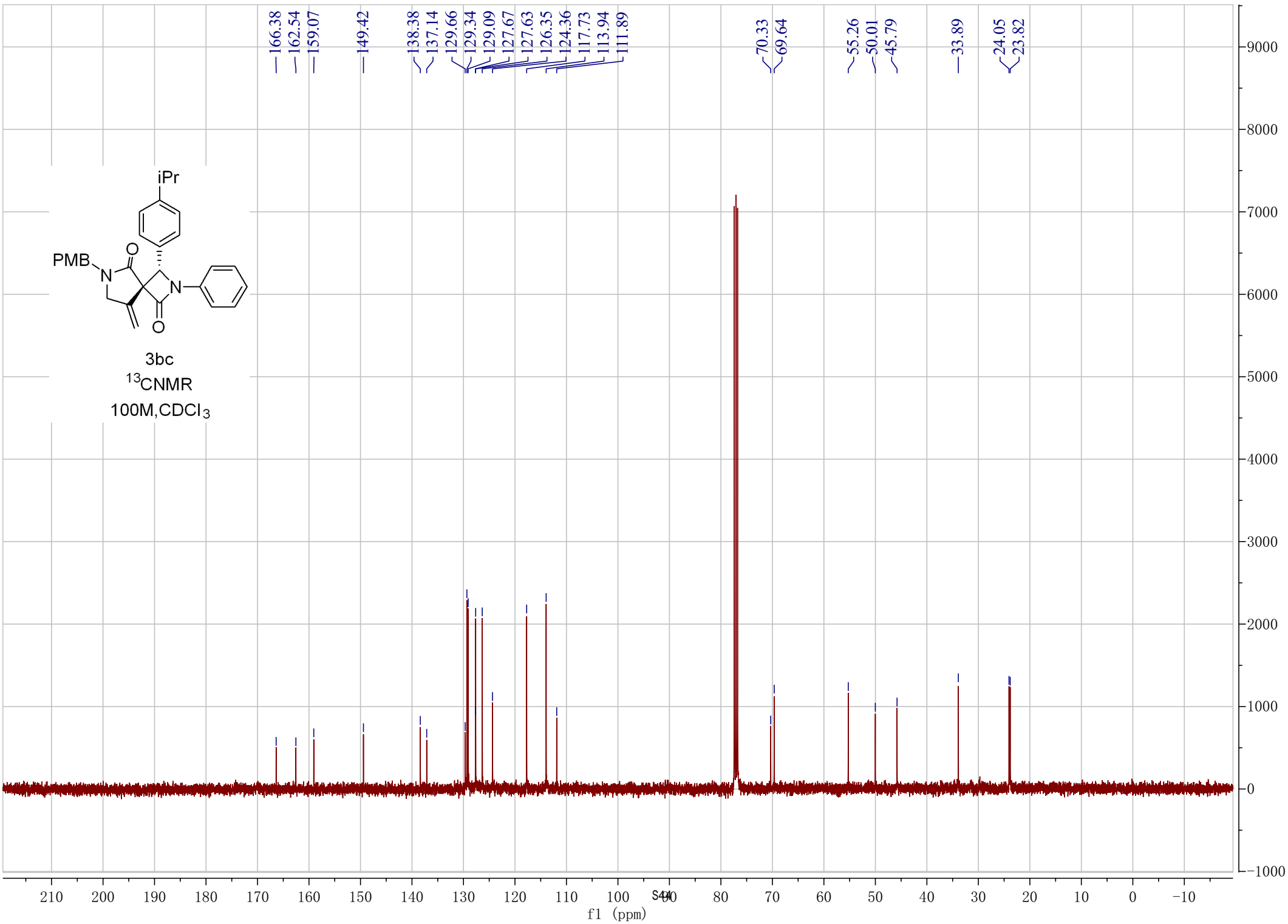
¹H NMR
400MHz CDCl₃

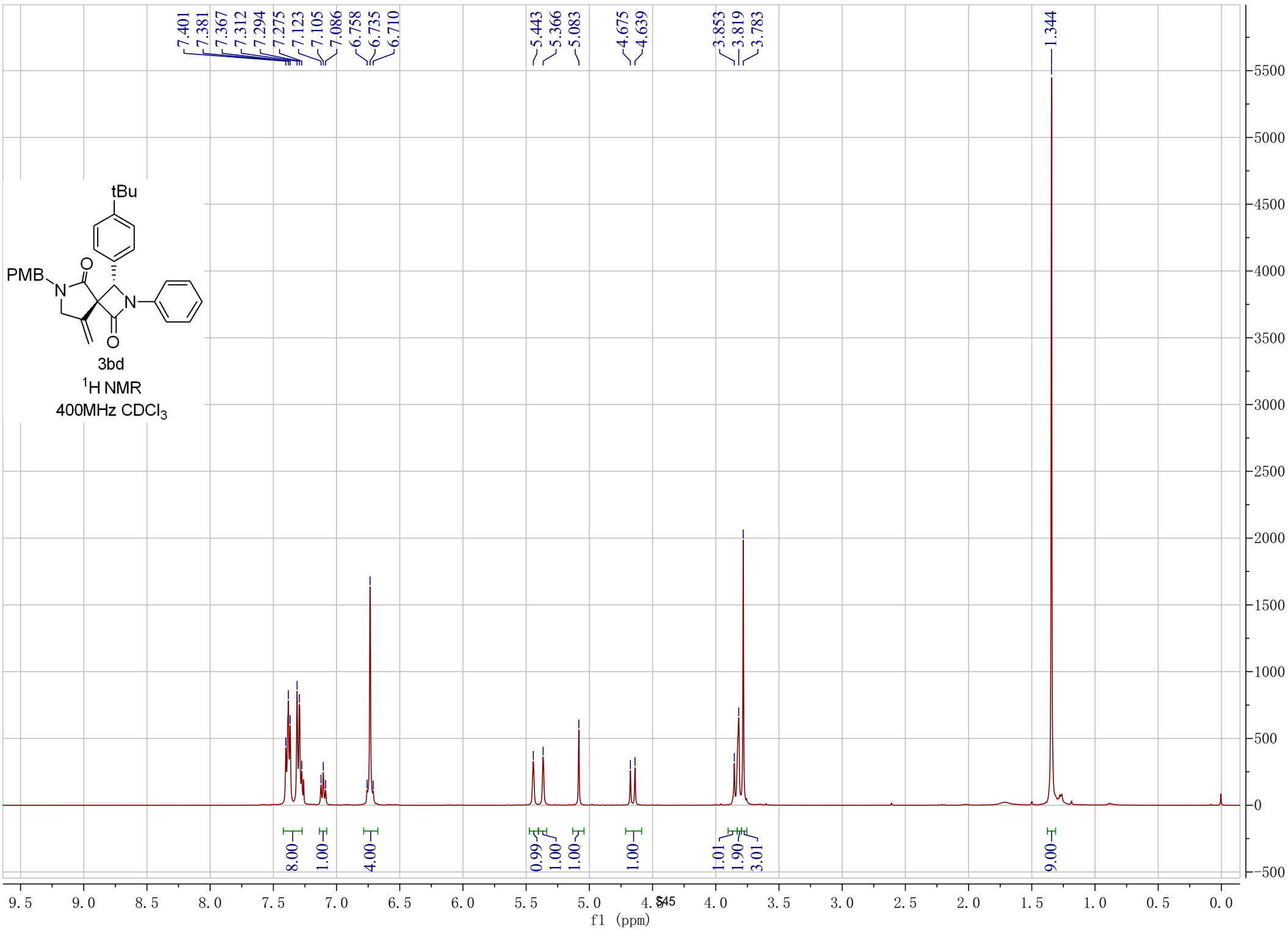


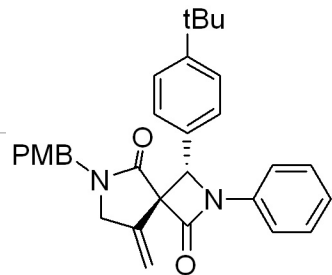


3bc

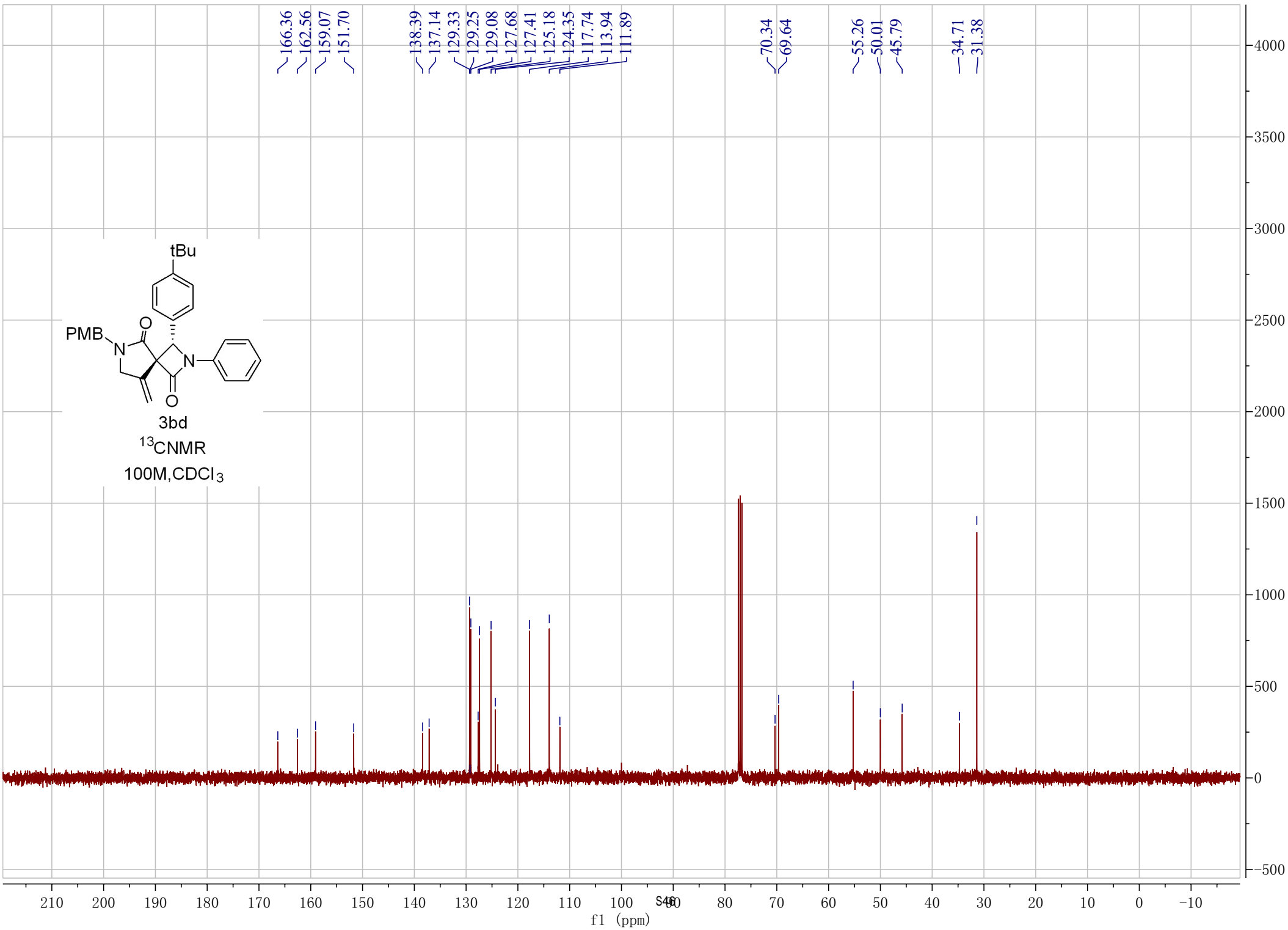
^{13}C NMR
100M, CDCl_3

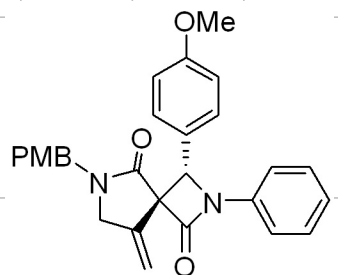






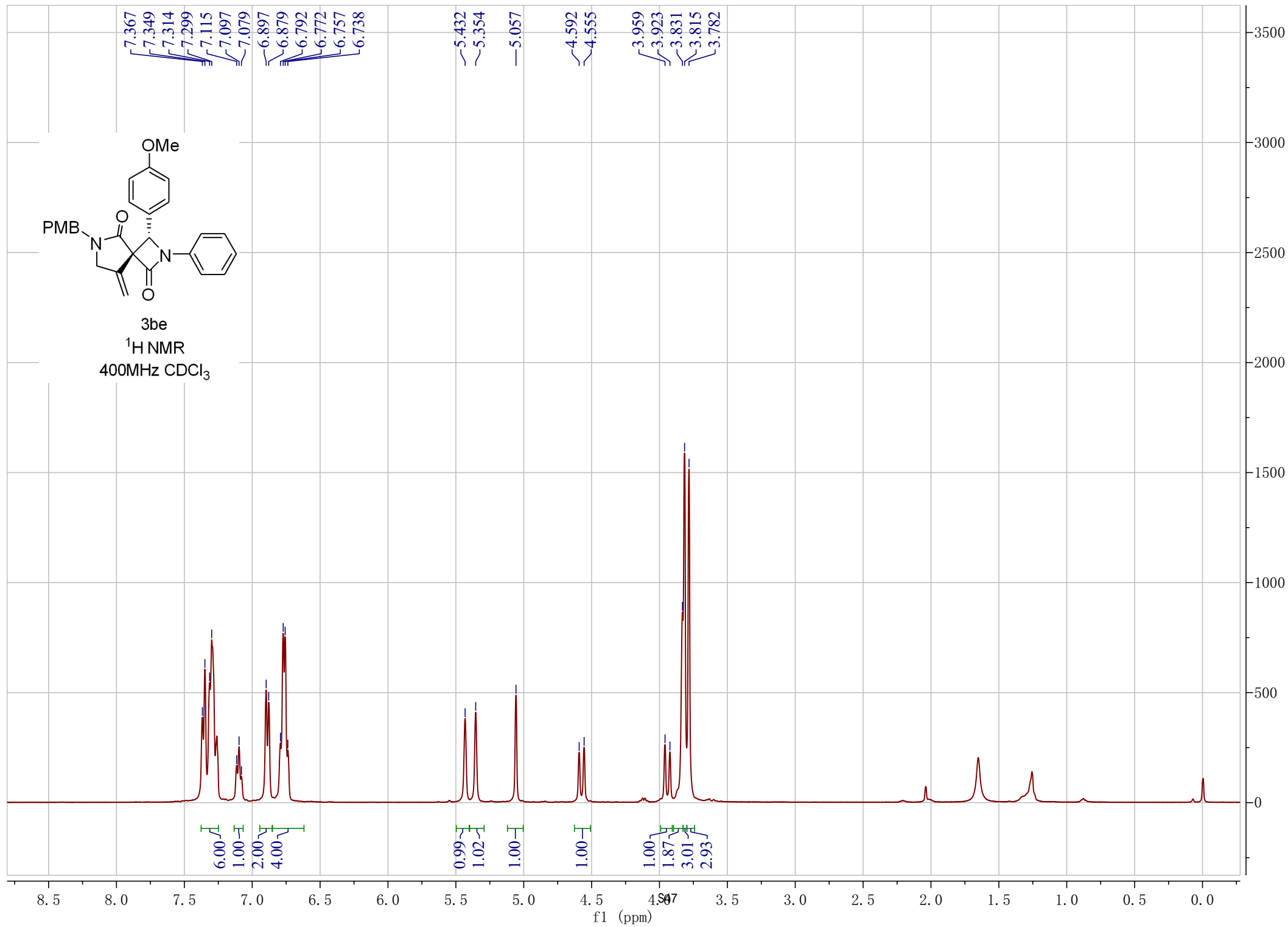
3bd
¹³CNMR
100M, CDCl₃

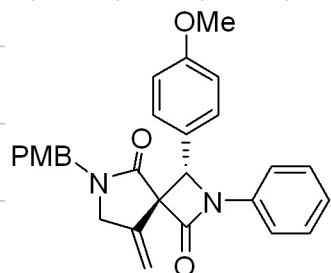




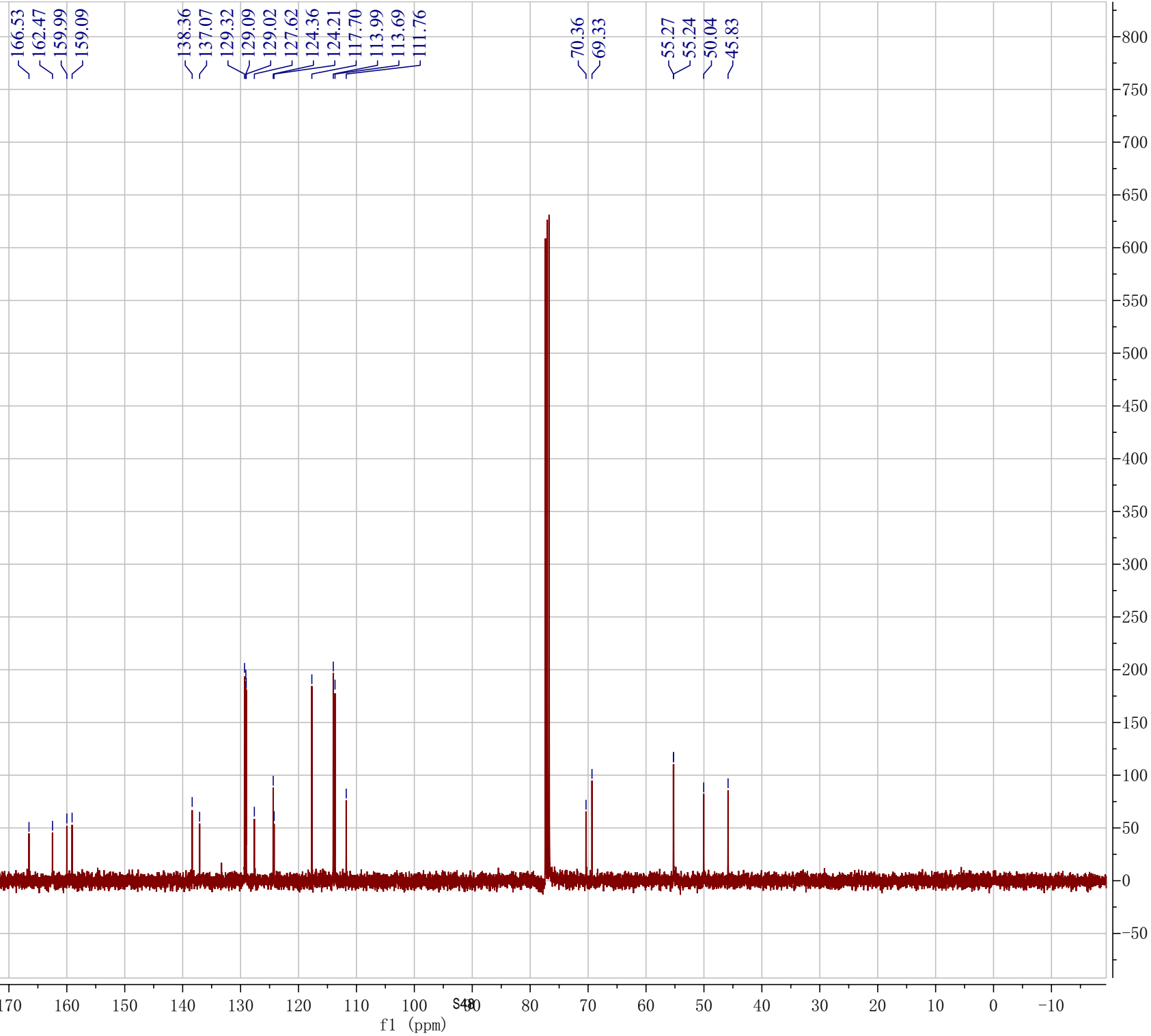
3be

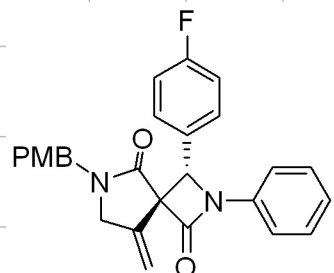
¹H NMR
400MHz CDCl₃



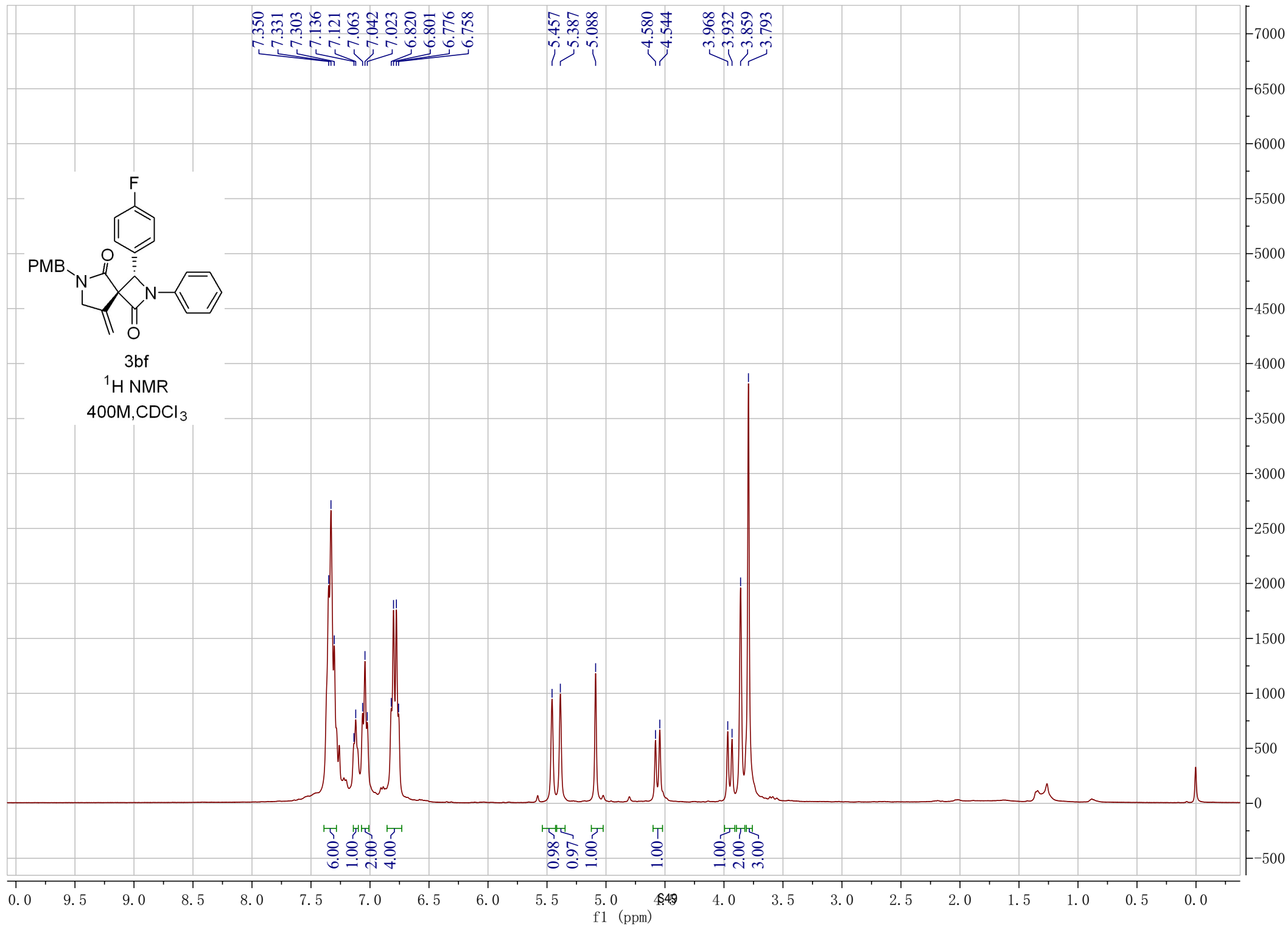


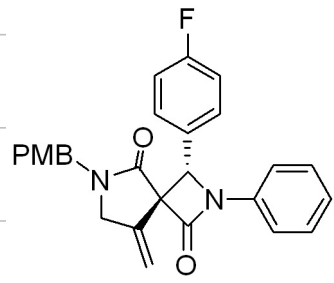
3be
 ^{13}C NMR
100M, CDCl_3





3bf
¹H NMR
400M, CDCl₃





3bf

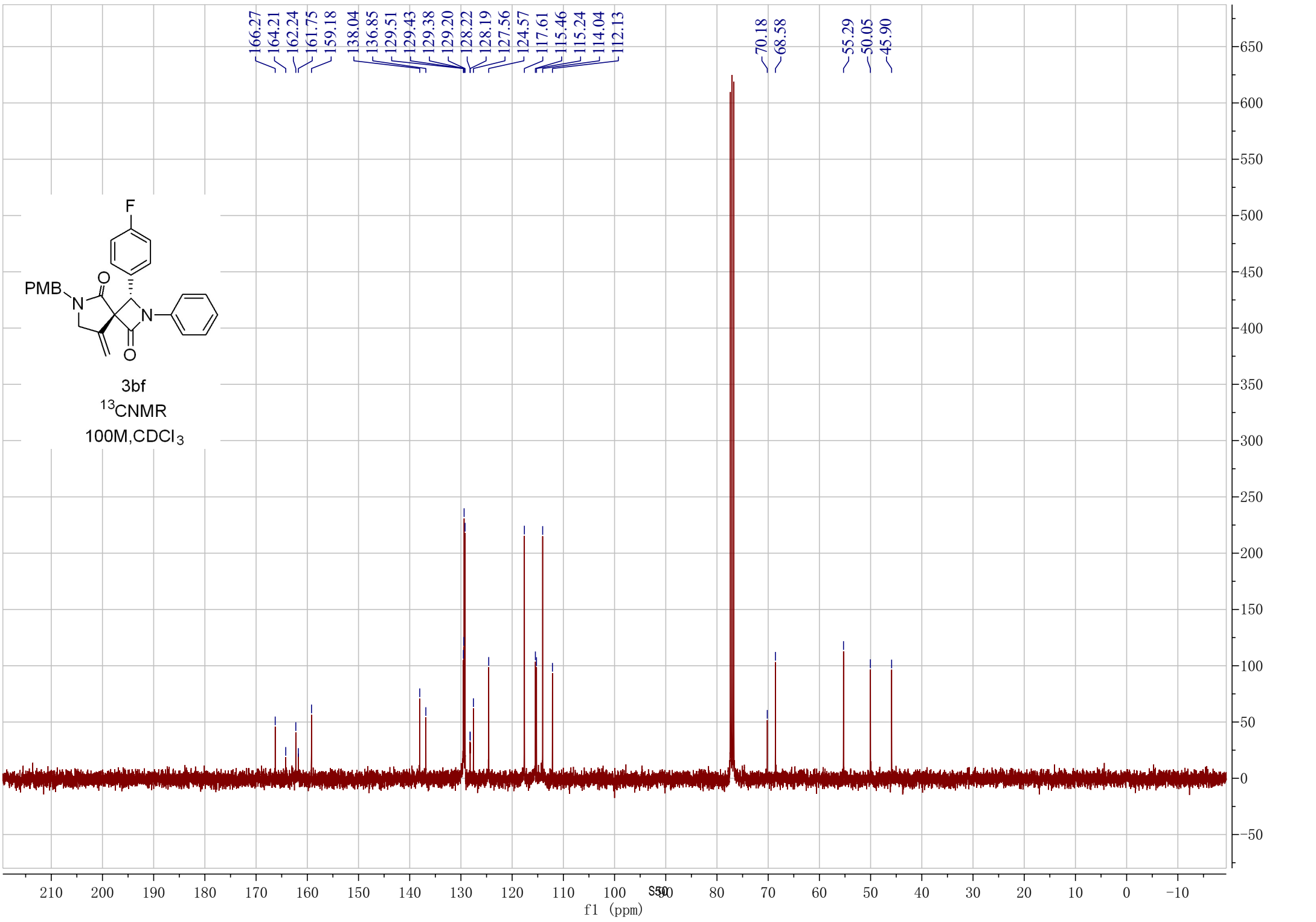
^{13}C NMR

100M, CDCl_3

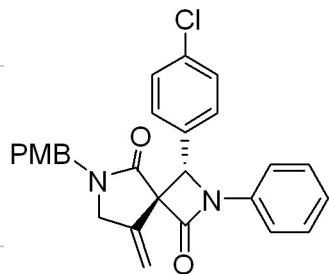
166.27
164.21
162.24
161.75
159.18
138.04
136.85
129.51
129.43
129.38
129.20
128.22
128.19
127.56
124.57
117.61
115.46
115.24
114.04
112.13

70.18
68.58

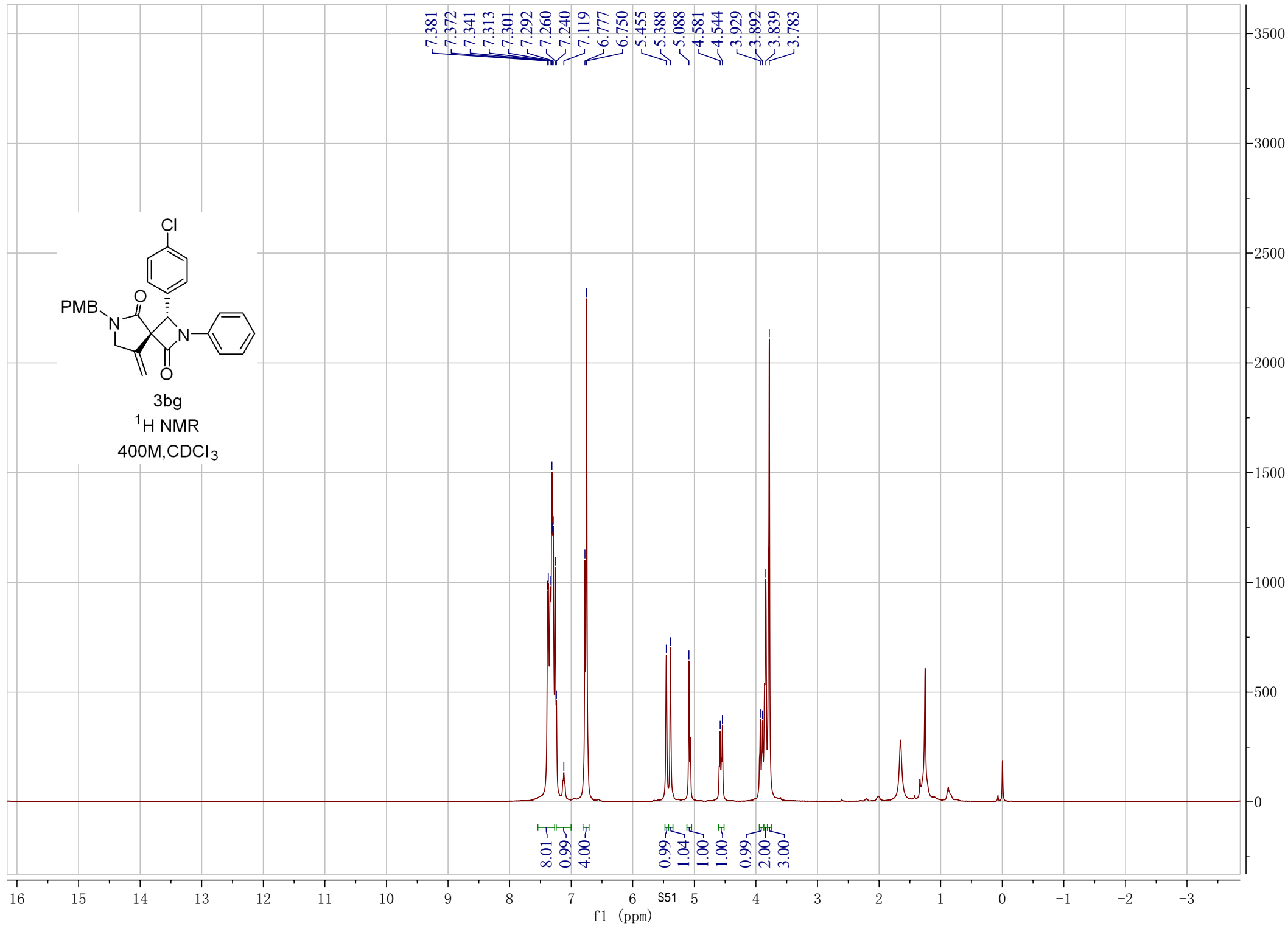
55.29
50.05
45.90

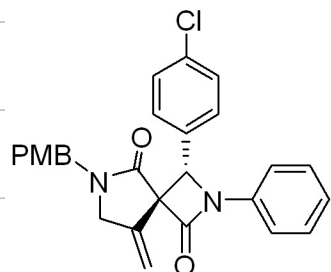


f1 (ppm)



3bg
¹H NMR
400M, CDCl₃

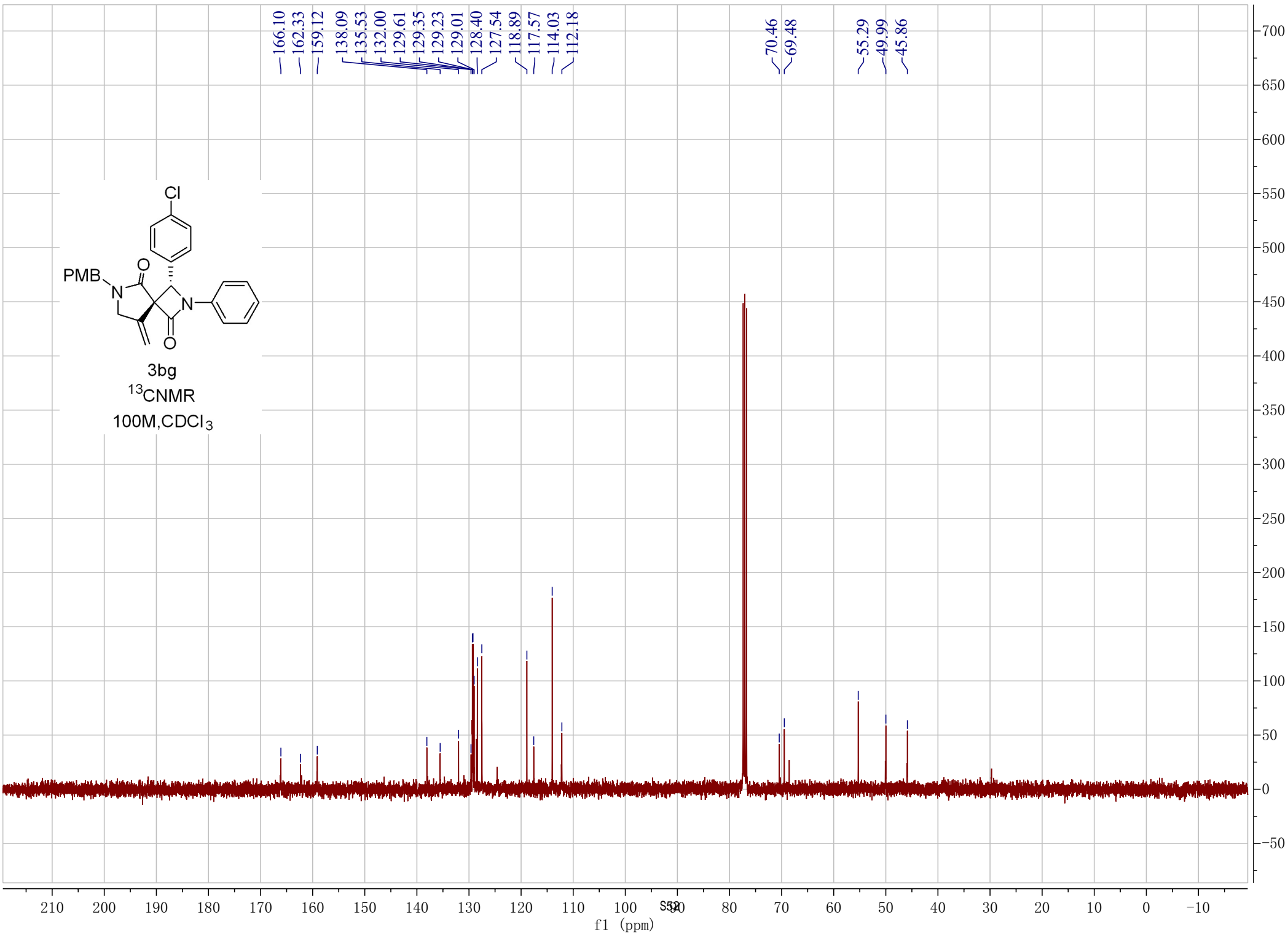


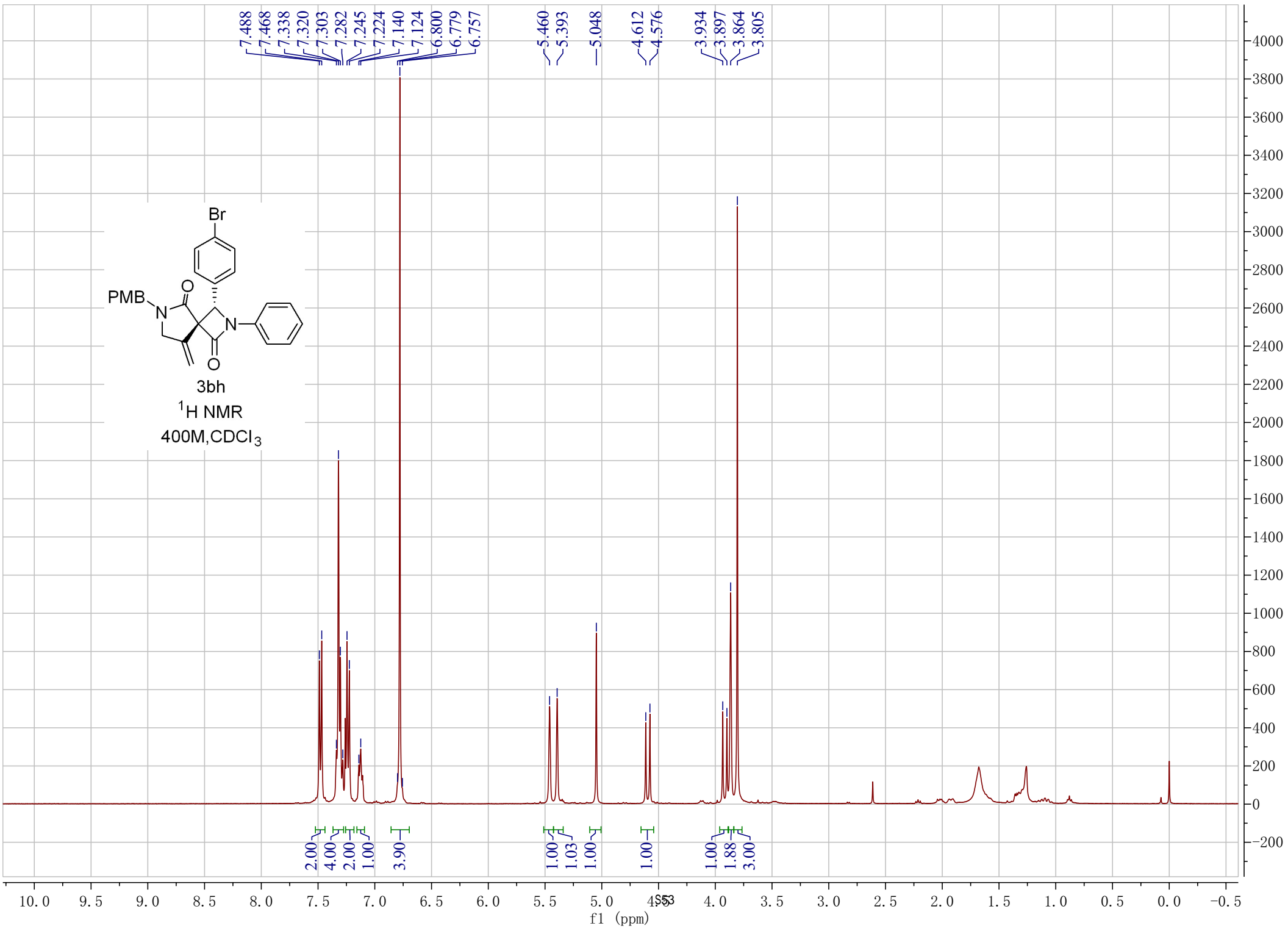


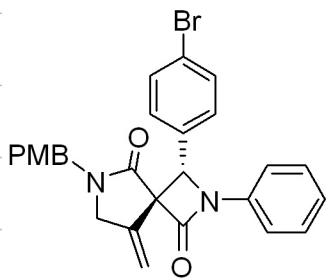
3bg

^{13}C NMR

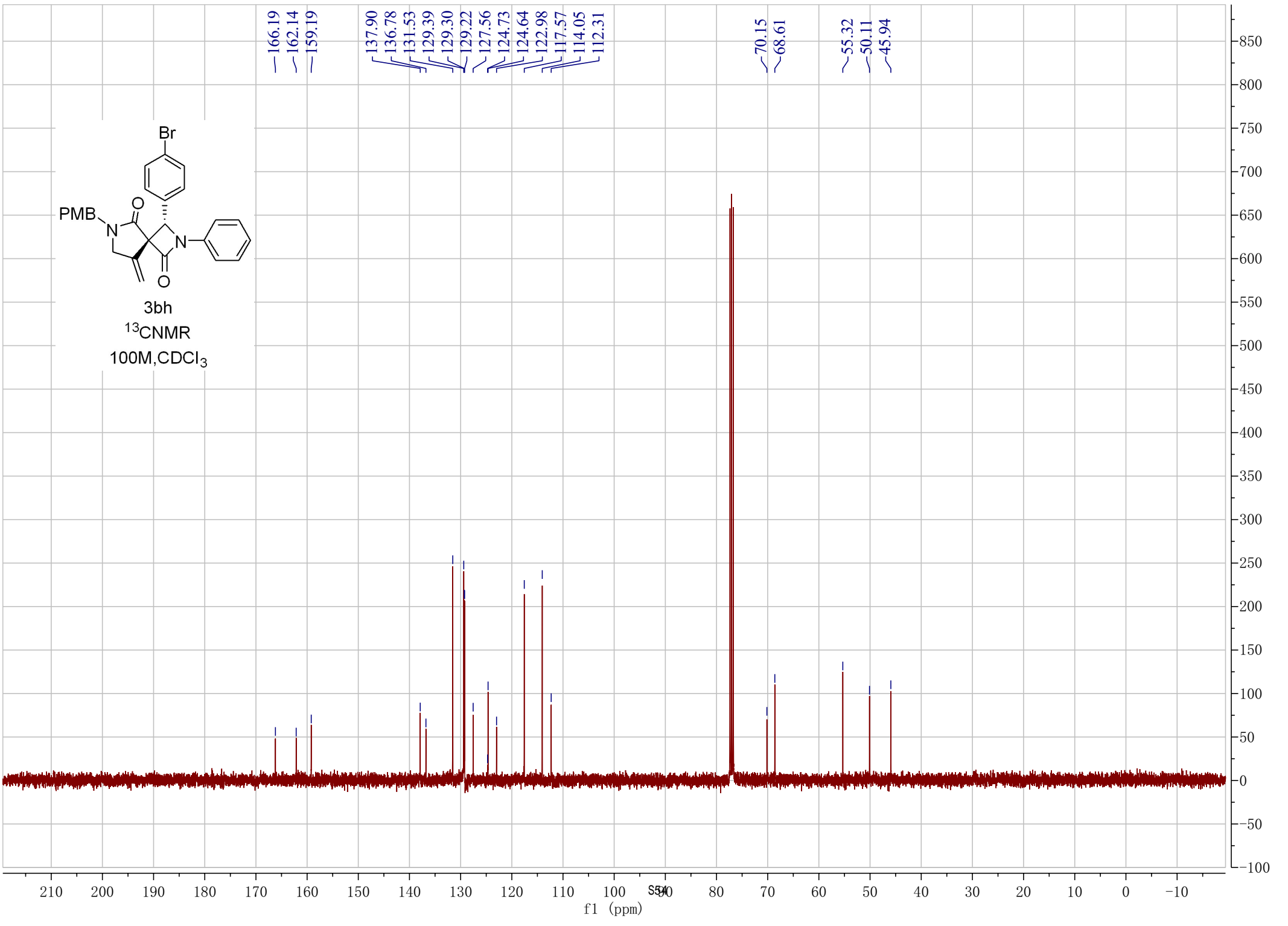
100M, CDCl_3

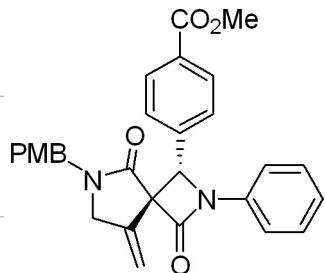






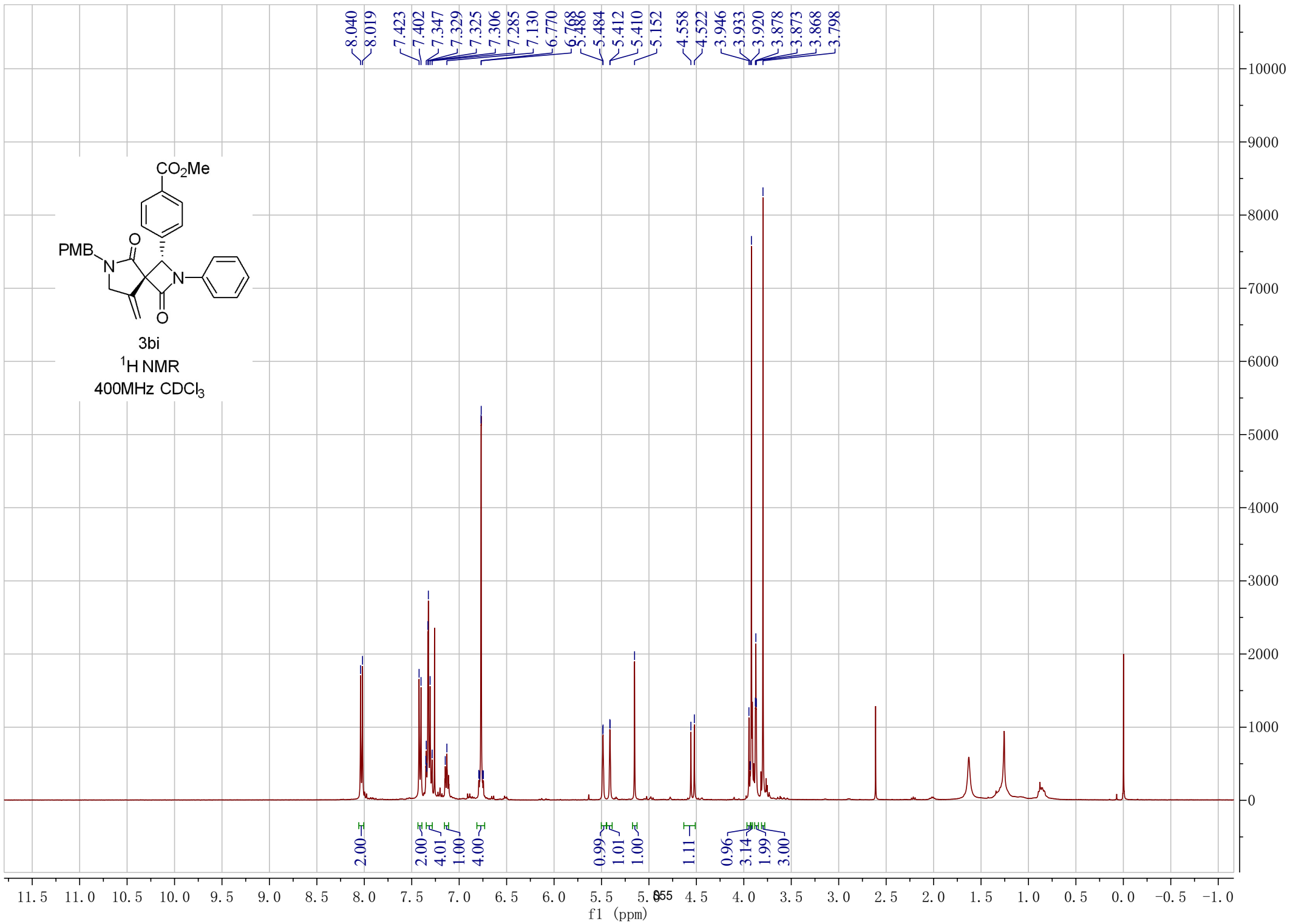
3b
¹³CNMR
100M, CDCl₃

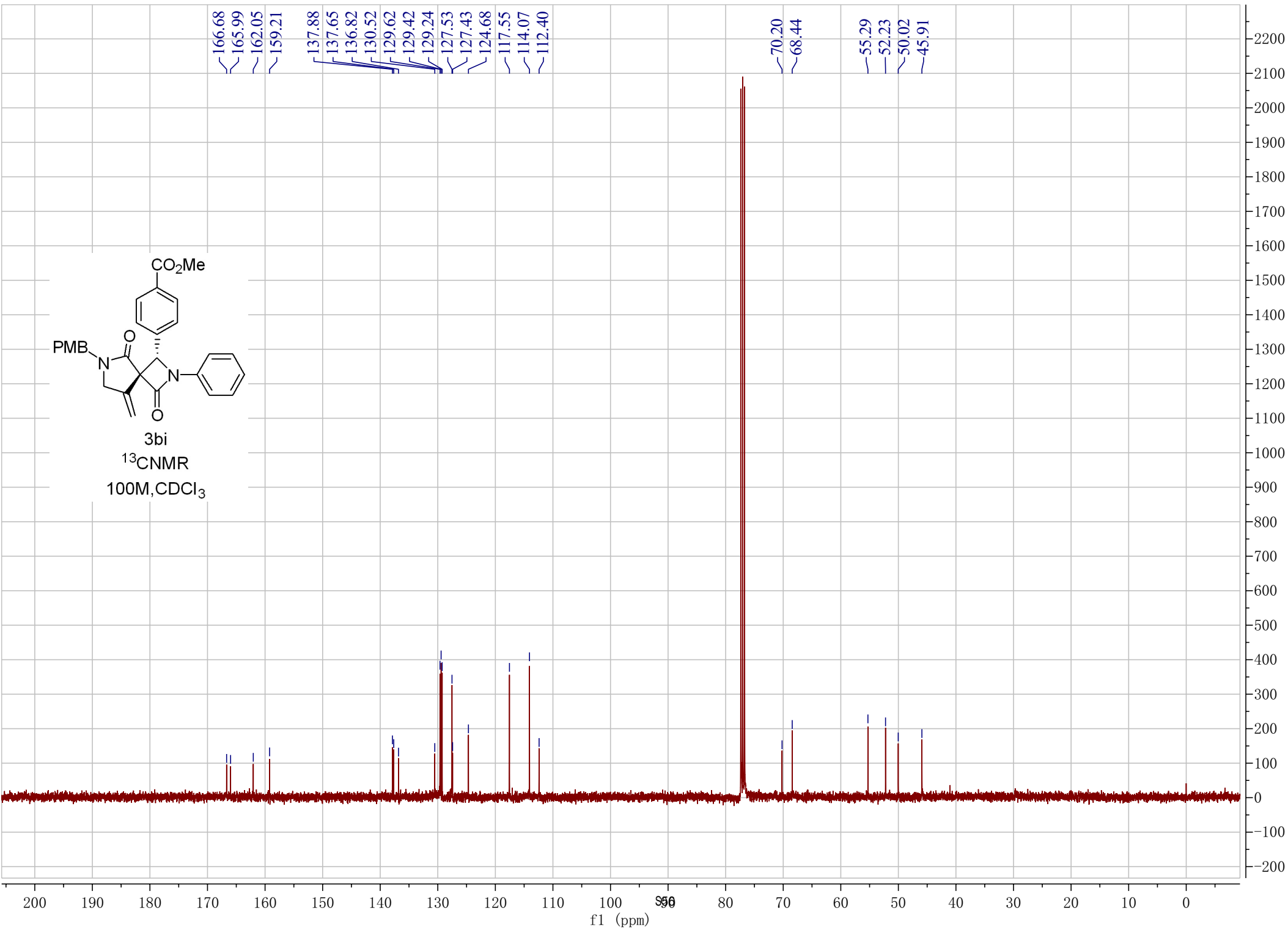


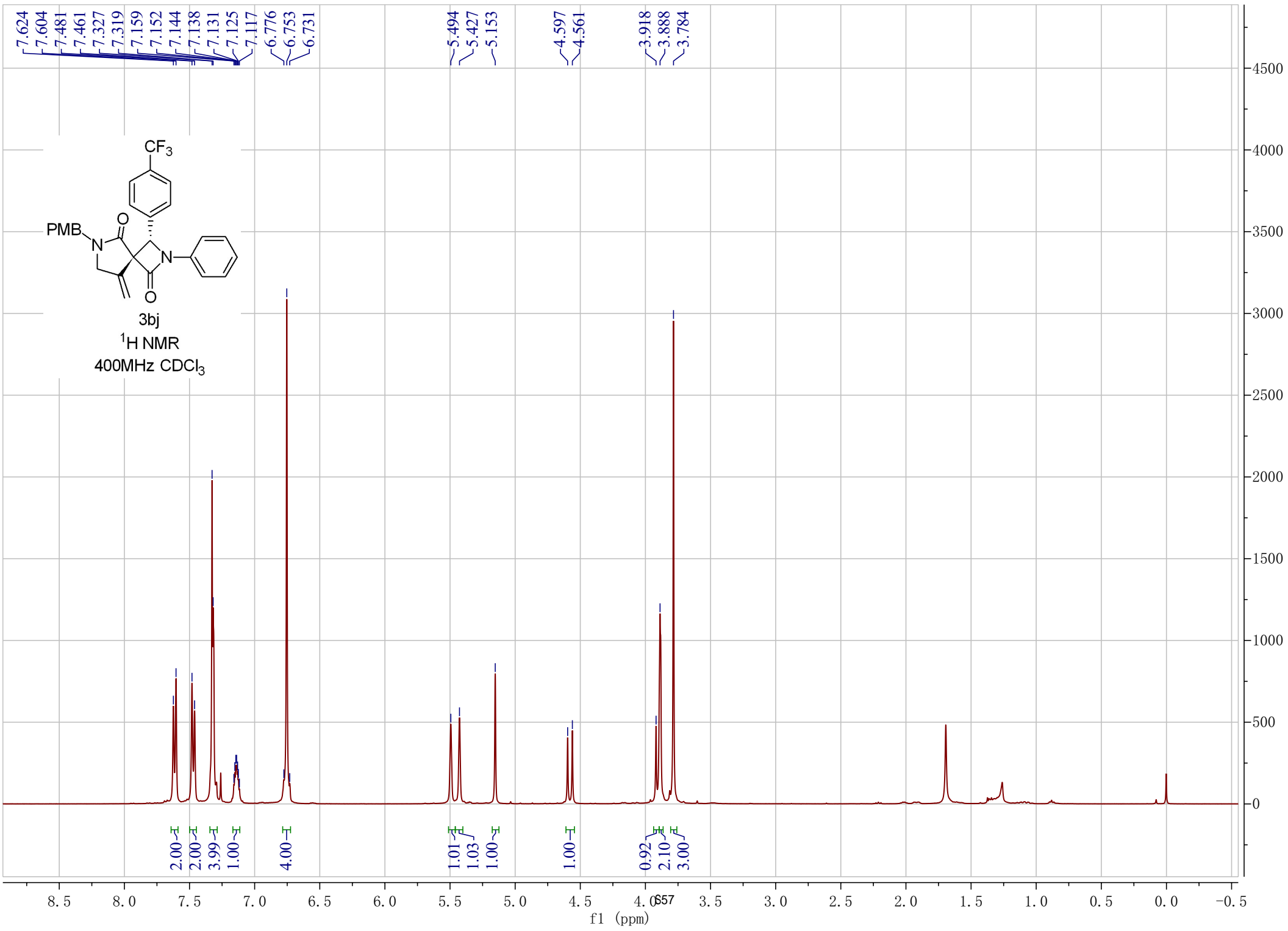


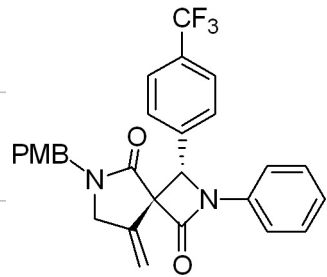
3bi

¹H NMR
400MHz CDCl₃







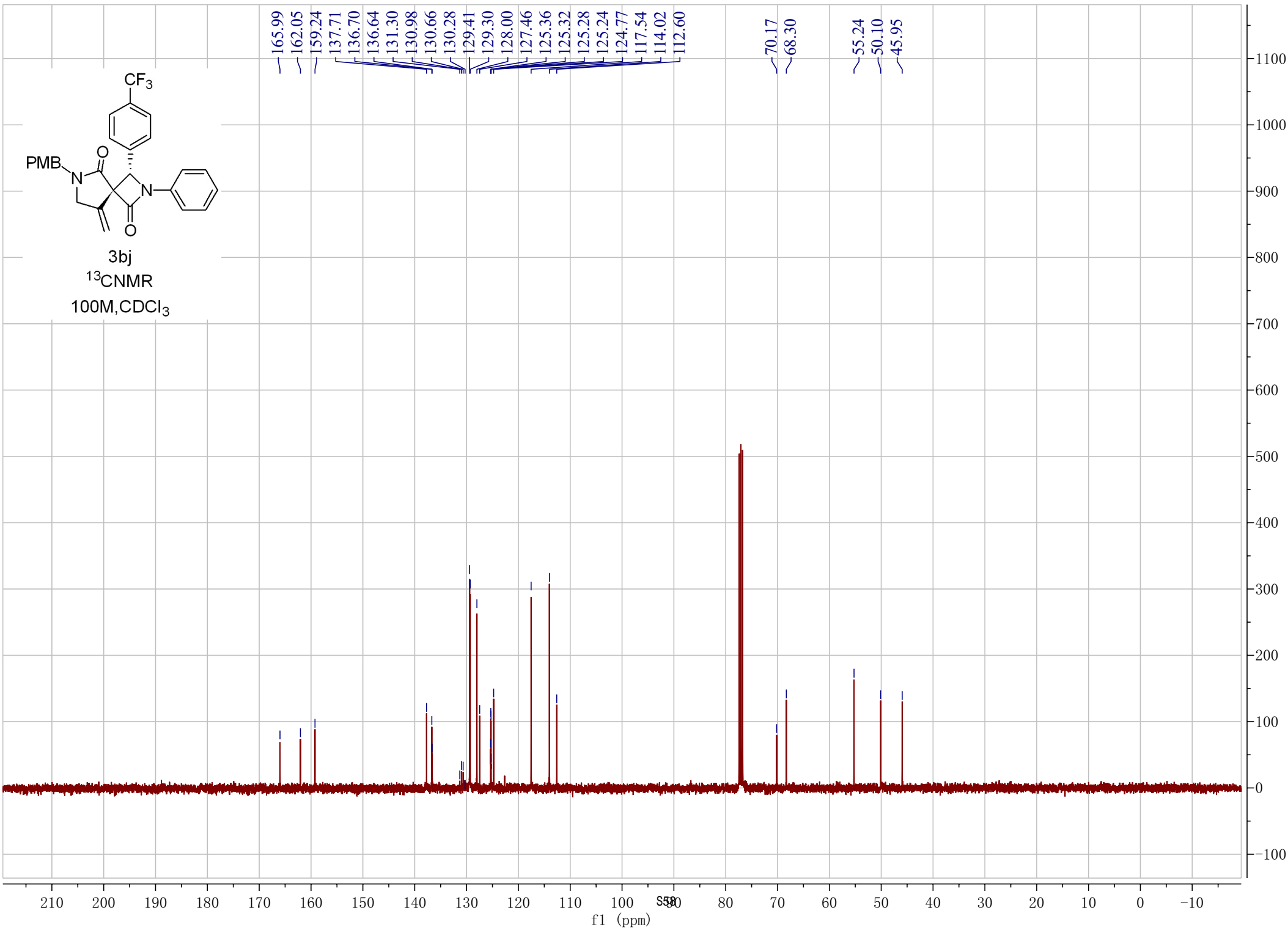


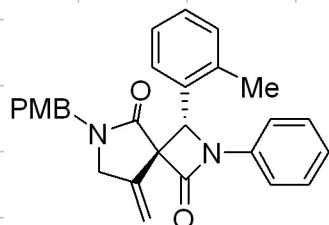
3bj
 ^{13}C NMR
100M, CDCl_3

165.99
162.05
159.24
137.71
136.70
136.64
131.30
130.98
130.66
130.28
129.41
129.30
128.00
127.46
125.36
125.32
125.28
125.24
124.77
117.54
114.02
112.60

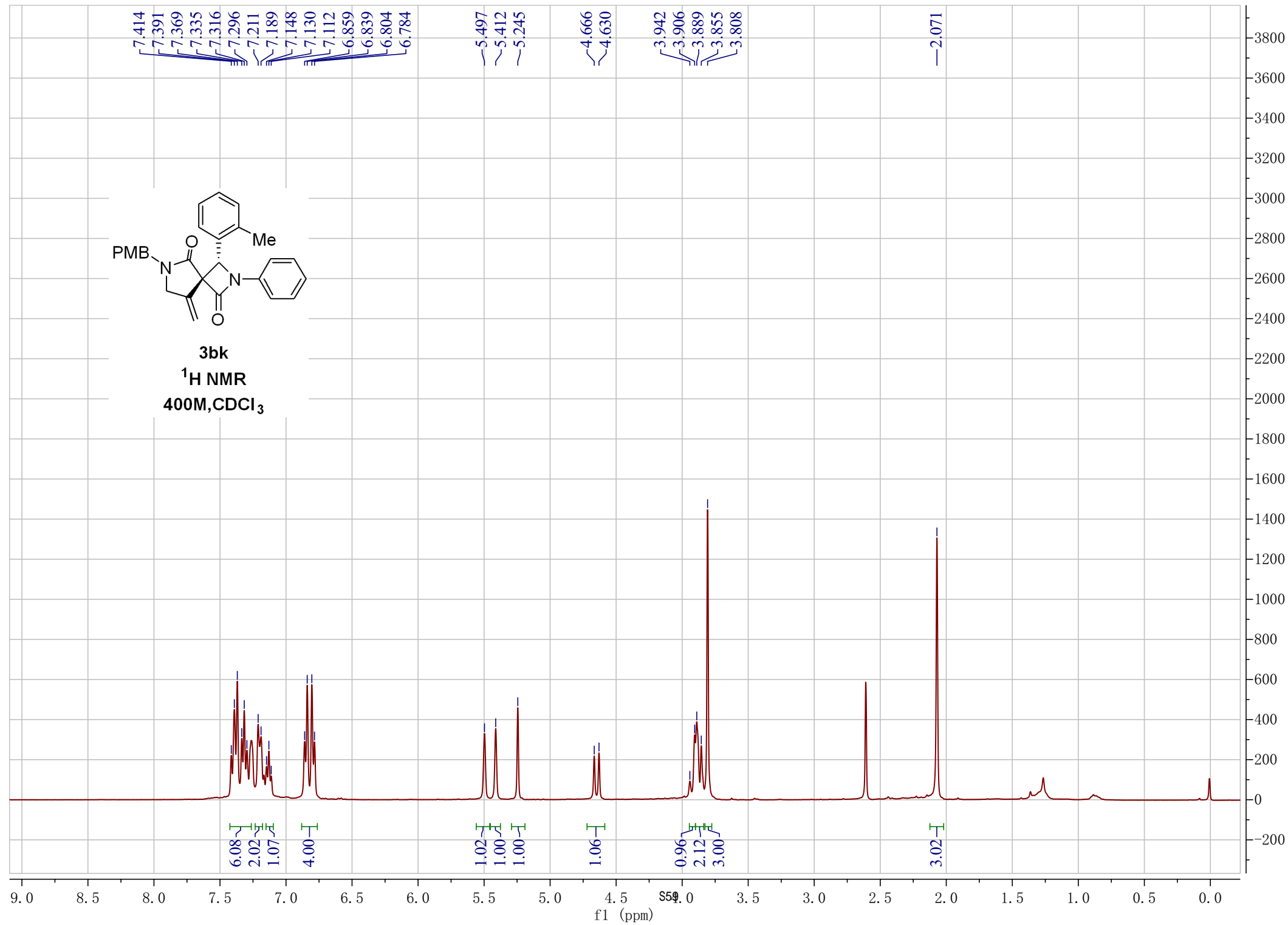
70.17
68.30

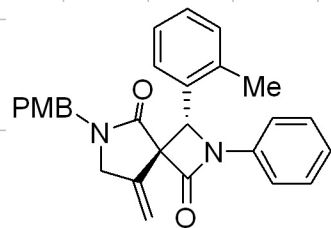
55.24
50.10
45.95



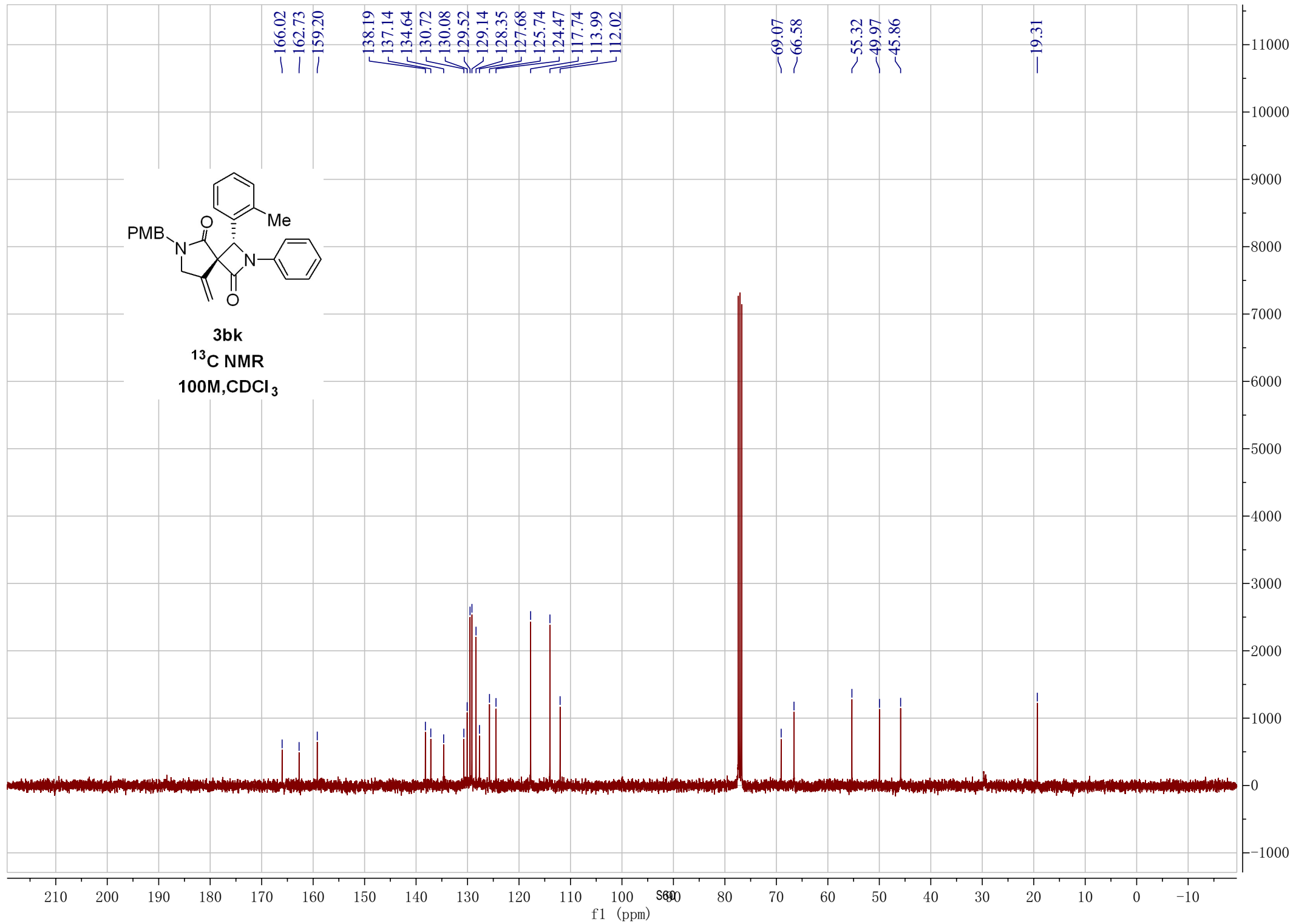


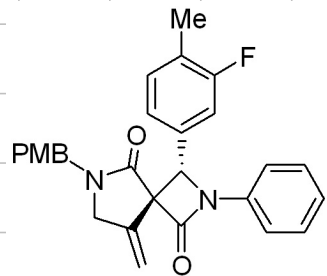
3bk
¹H NMR
400M, CDCl₃



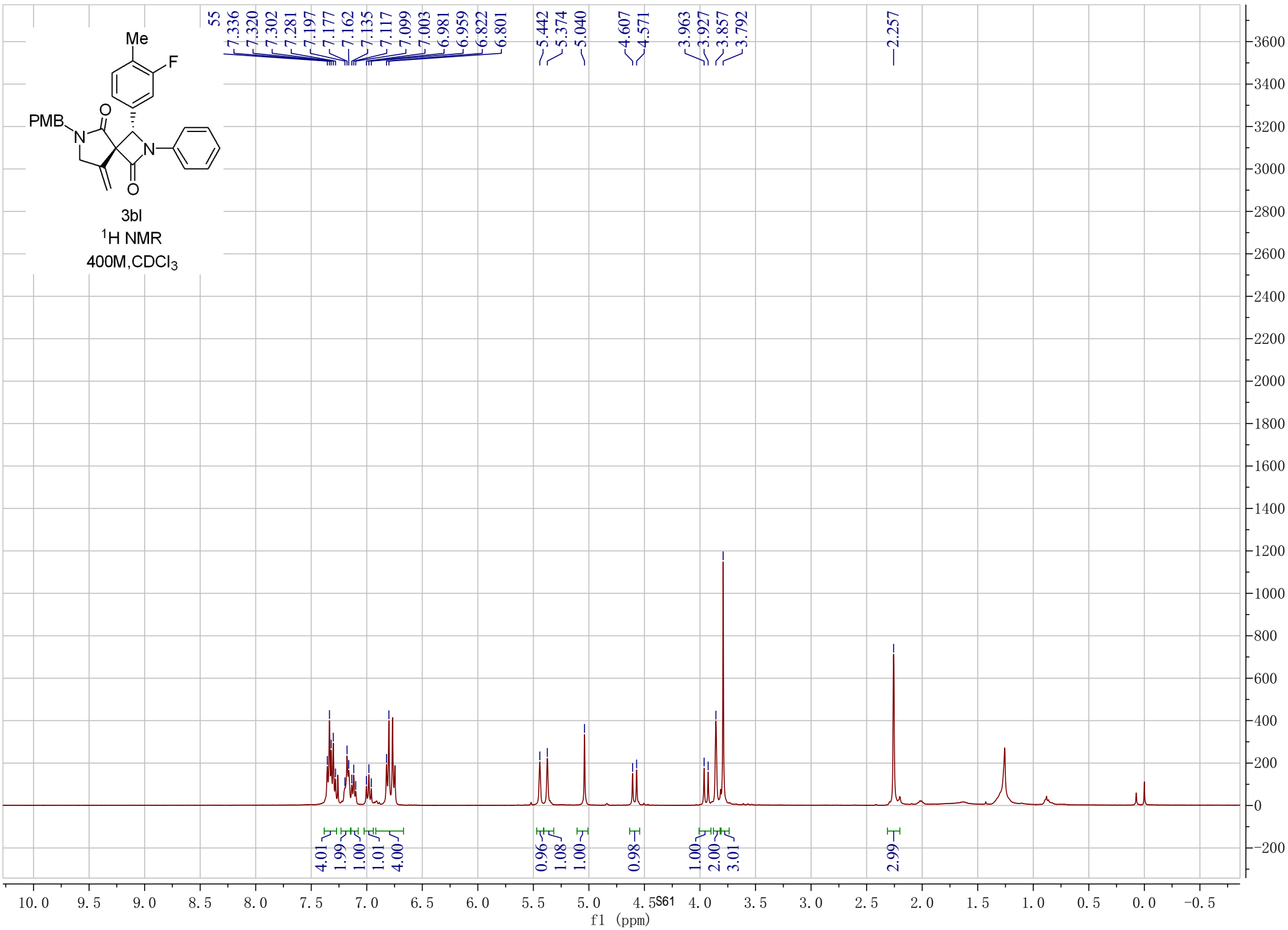


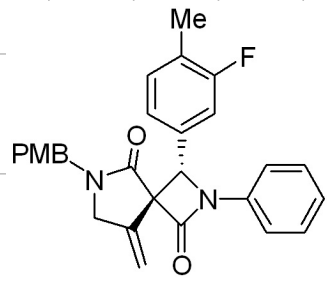
3bk
¹³C NMR
100M, CDCl₃



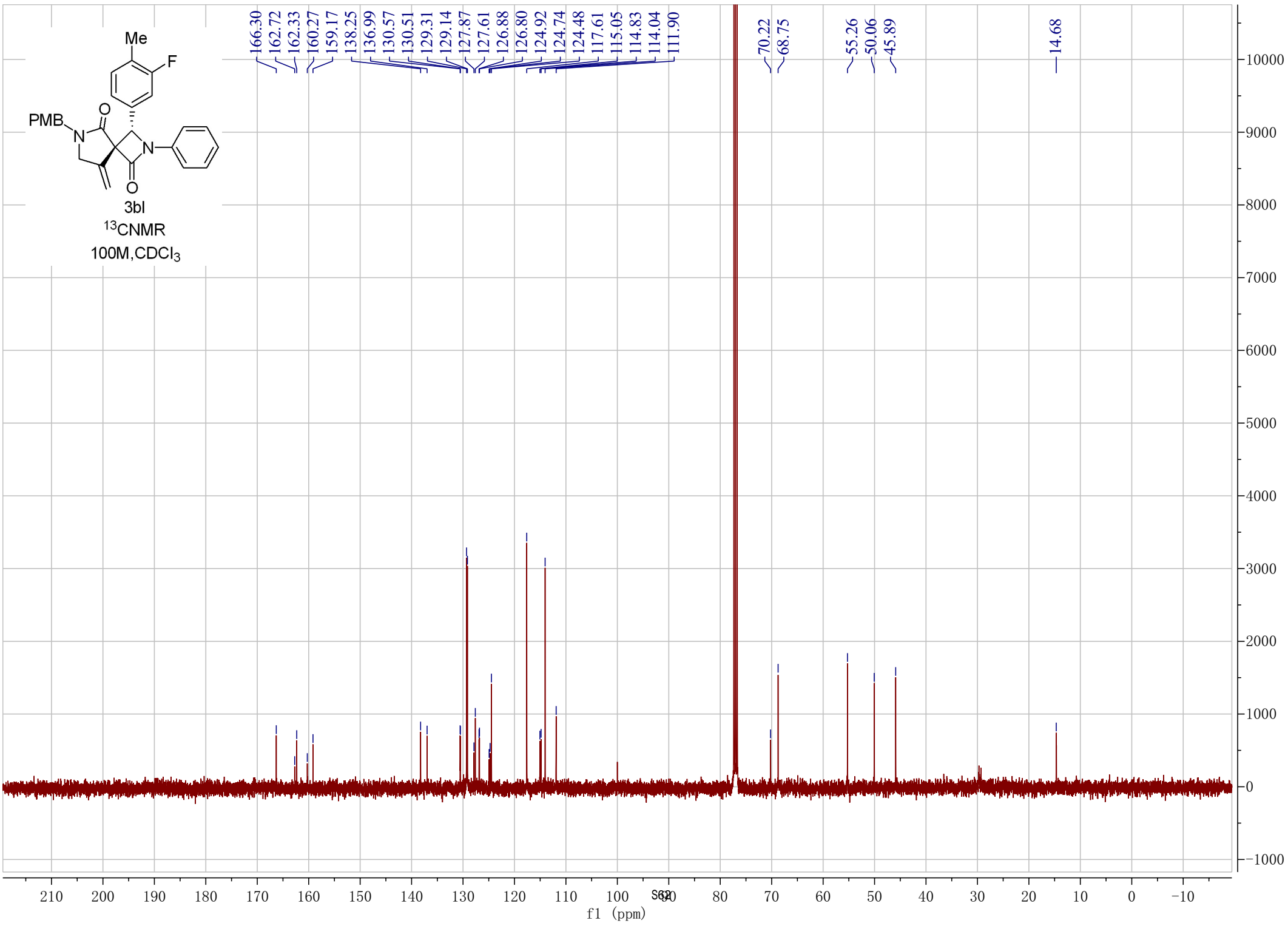


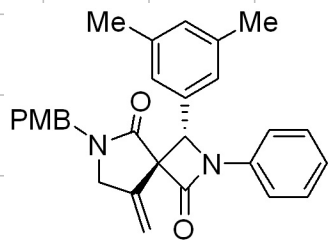
3bl
¹H NMR
400M, CDCl₃



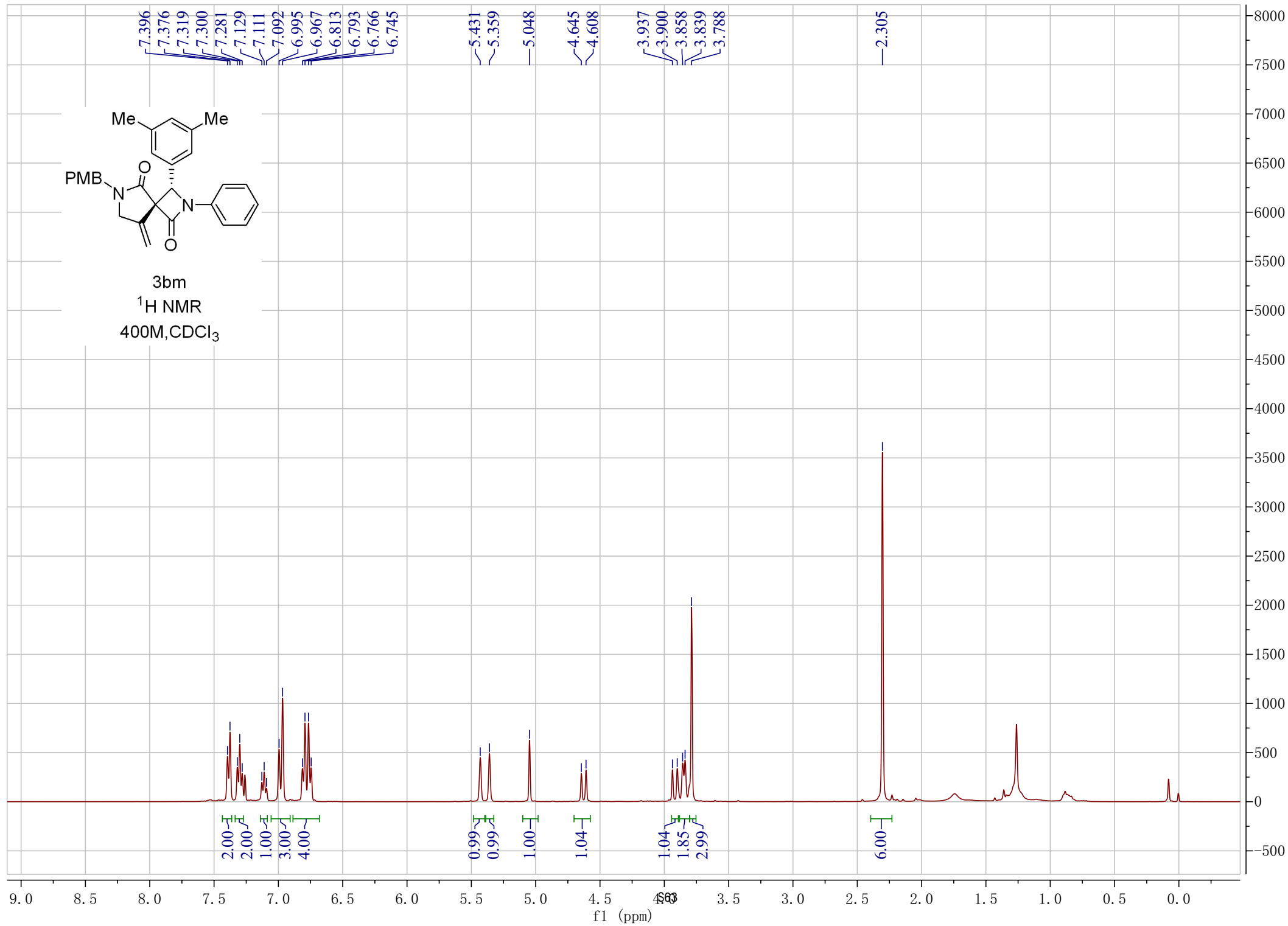


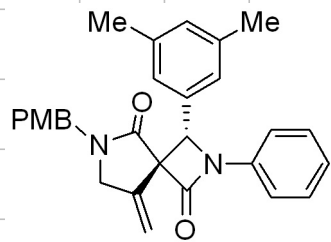
3bl
¹³CNMR
100M, CDCl₃



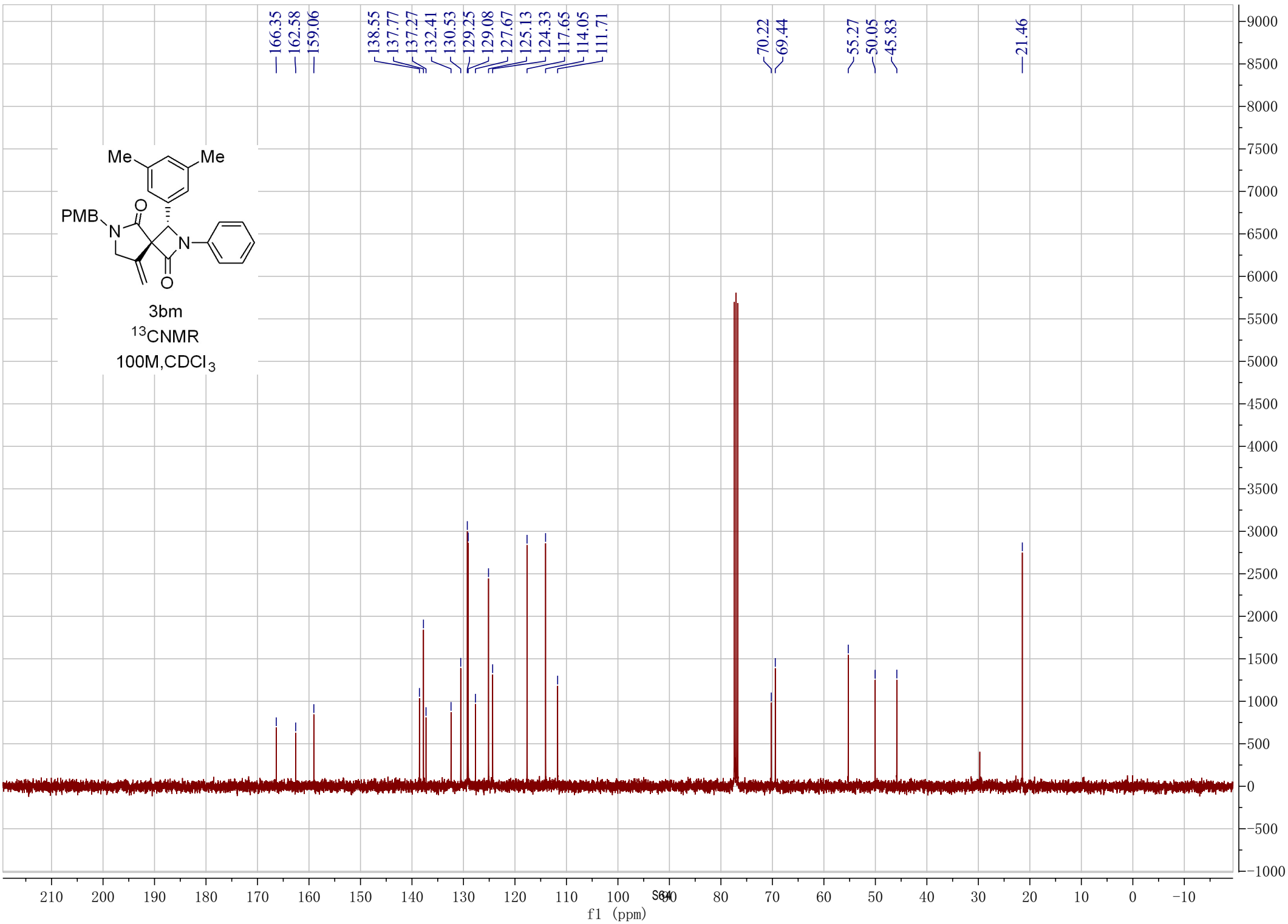


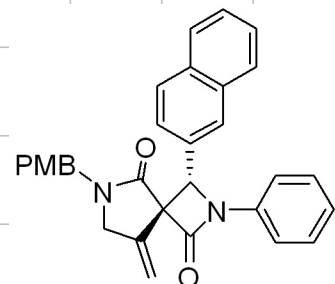
3bm
¹H NMR
400M, CDCl₃



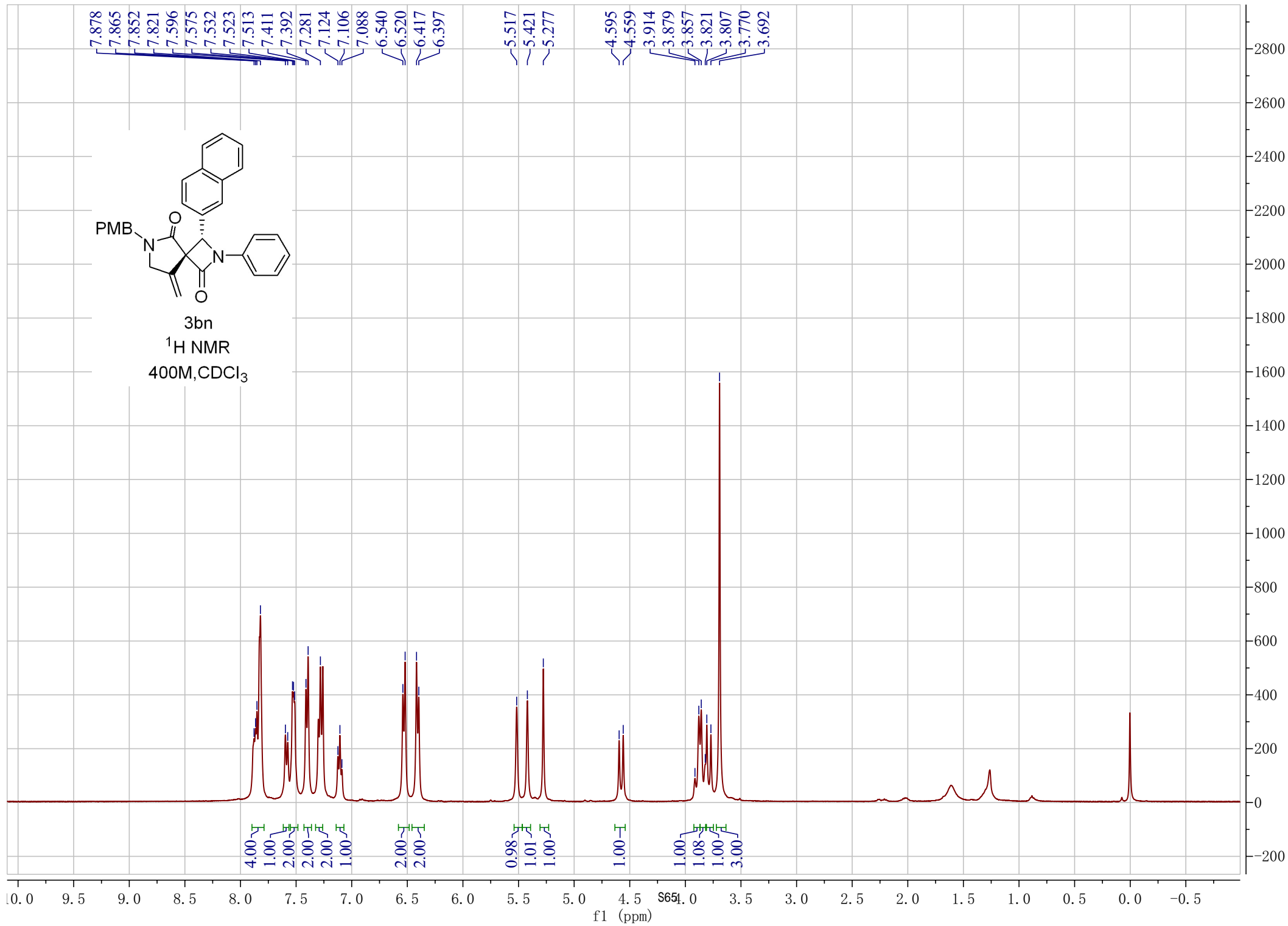


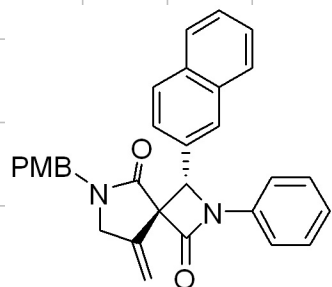
3bm
¹³CNMR
100M, CDCl₃



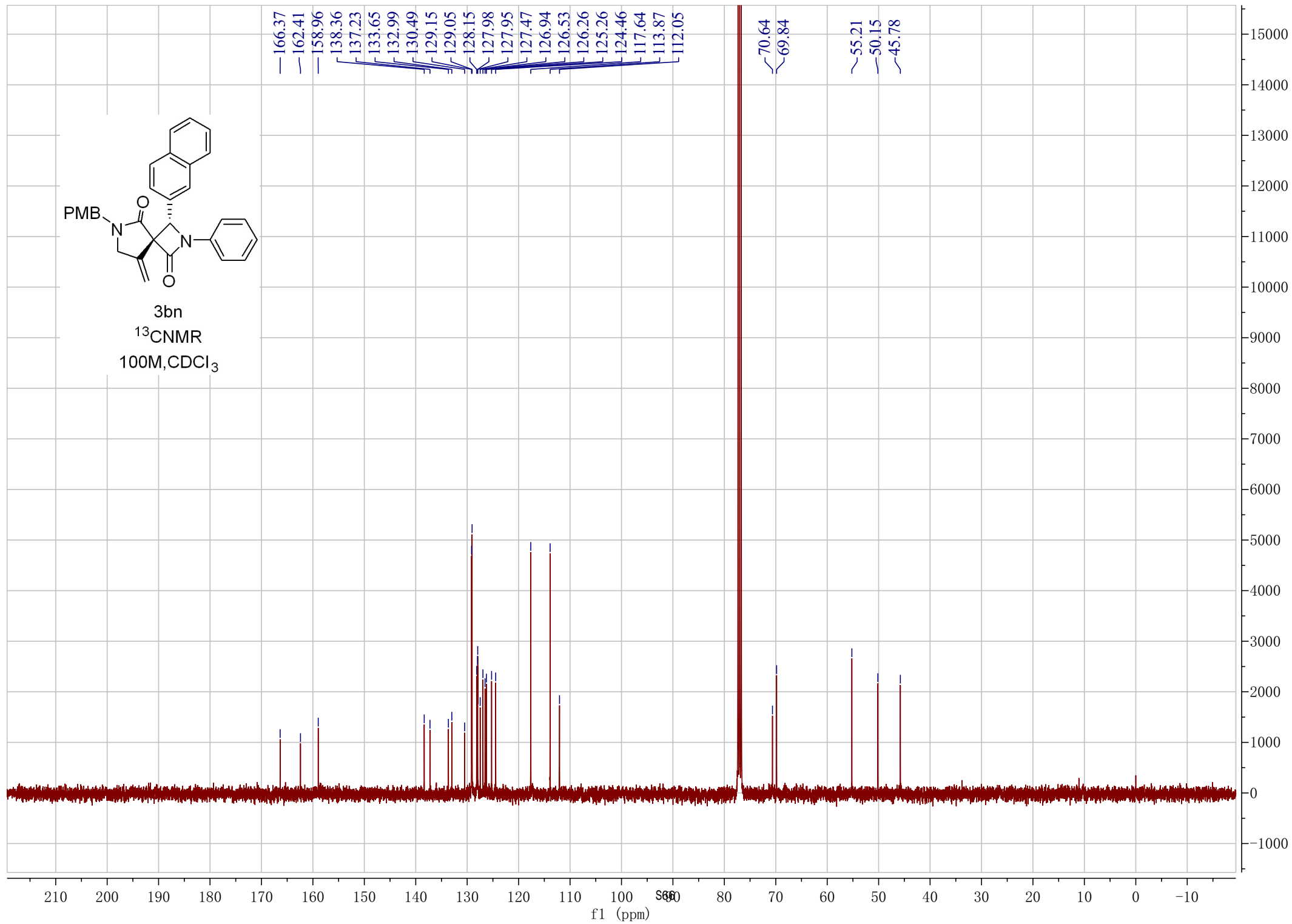


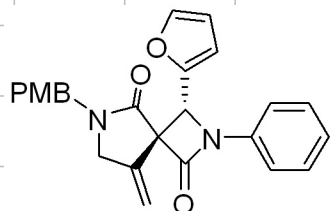
3bn
¹H NMR
400M, CDCl₃





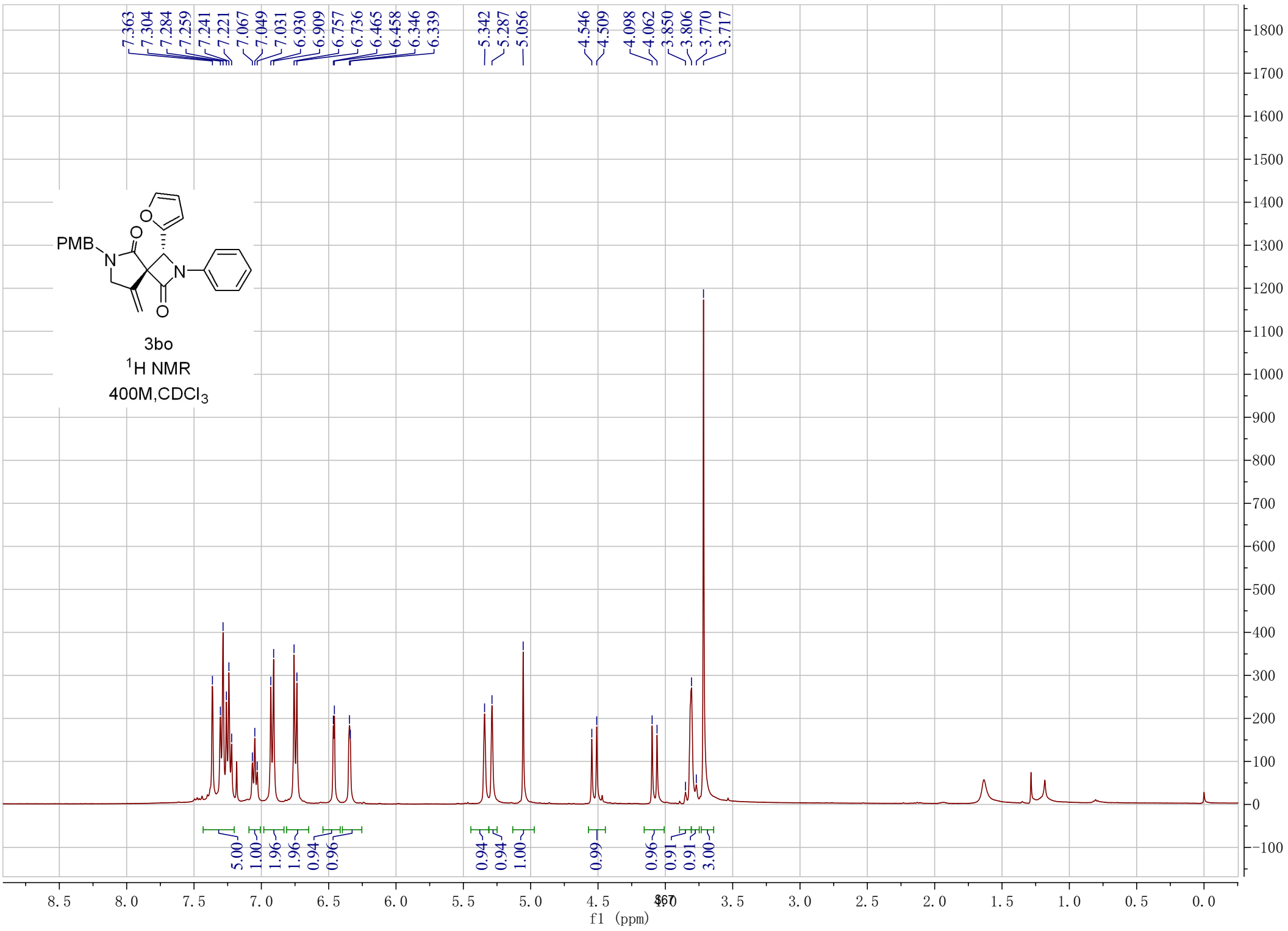
3bn
 ^{13}C NMR
100M, CDCl_3

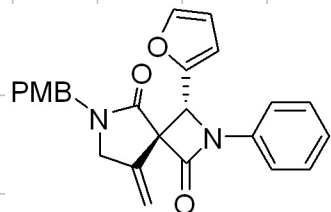




3bo
¹H NMR
400M, CDCl₃

7.363
7.304
7.284
7.259
7.241
7.221
7.067
7.049
7.031
6.930
6.909
6.757
6.736
6.465
6.458
6.346
6.339
5.342
5.287
5.056
4.546
4.509
4.098
4.062
3.850
3.806
3.770
3.717

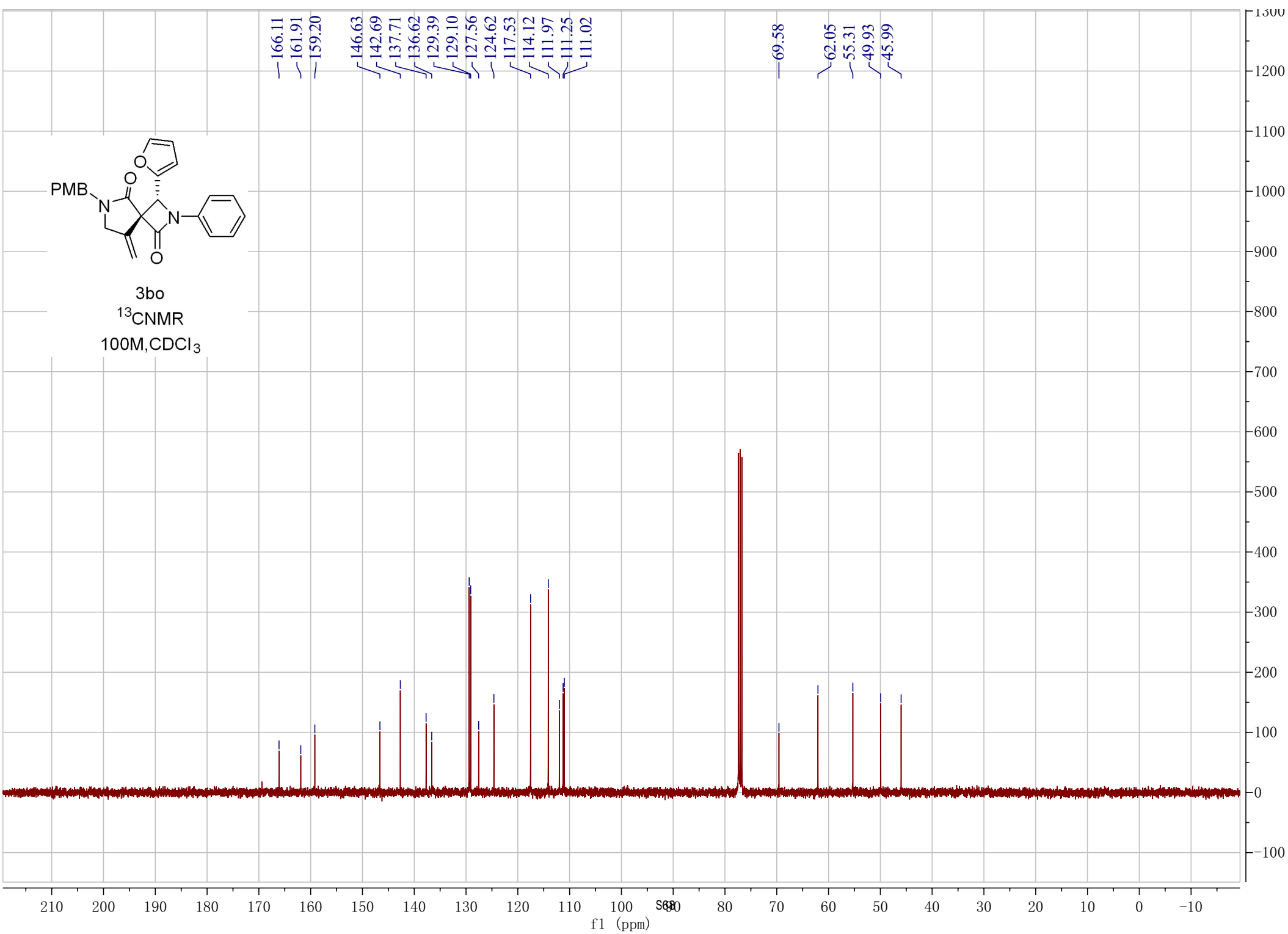


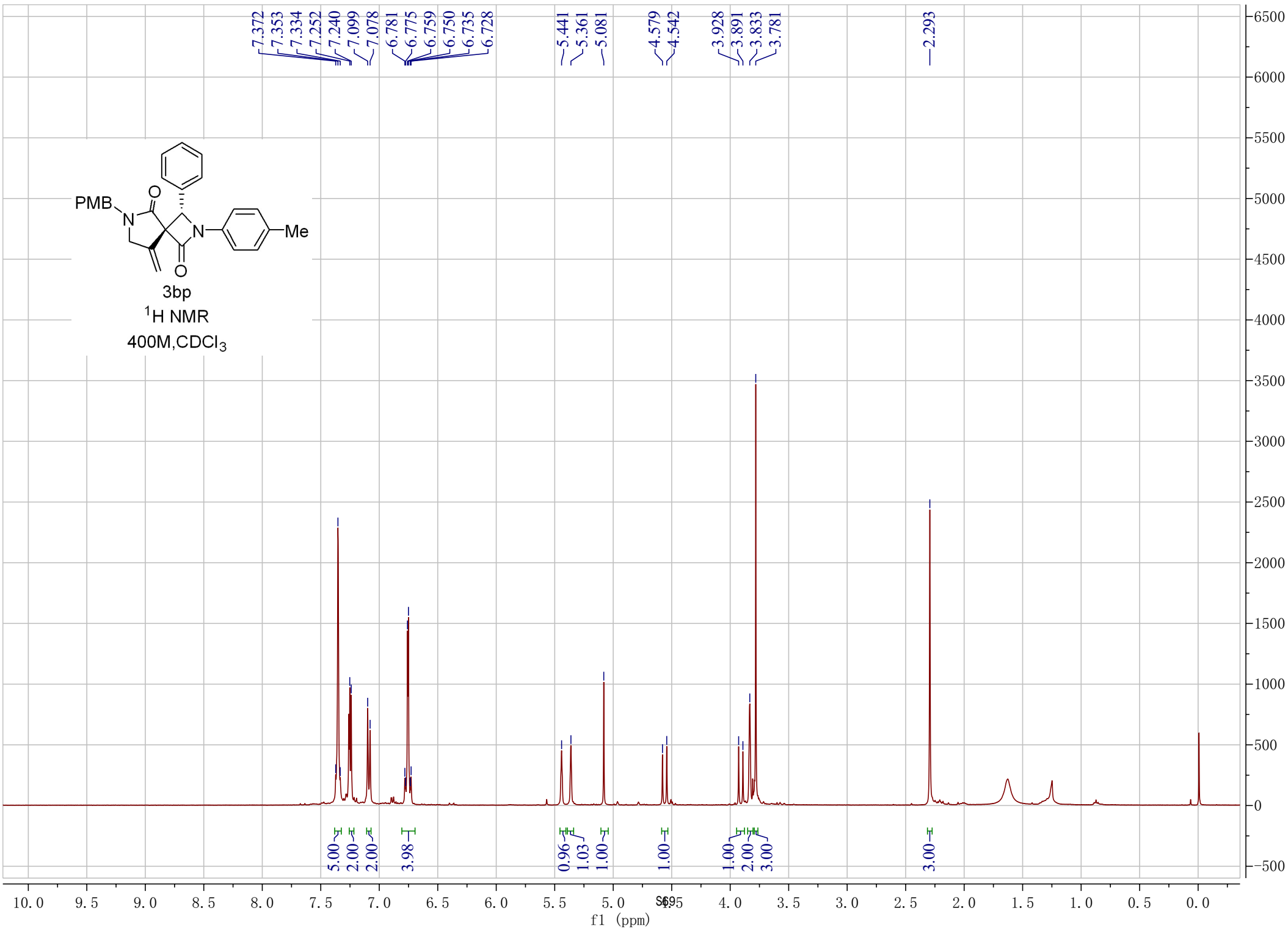
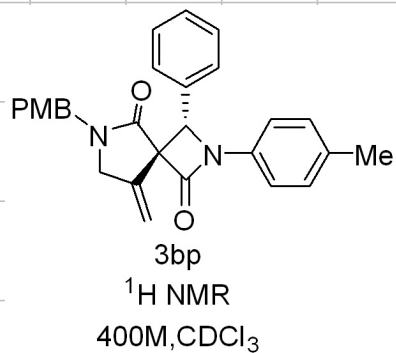


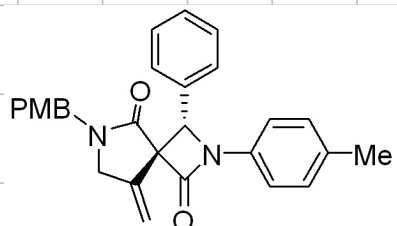
3bo
¹³CNMR
100M, CDCl₃

166.11
161.91
159.20
146.63
142.69
137.71
136.62
129.39
129.10
127.56
124.62
117.53
114.12
111.97
111.25
111.02

69.58
62.05
55.31
49.93
45.99







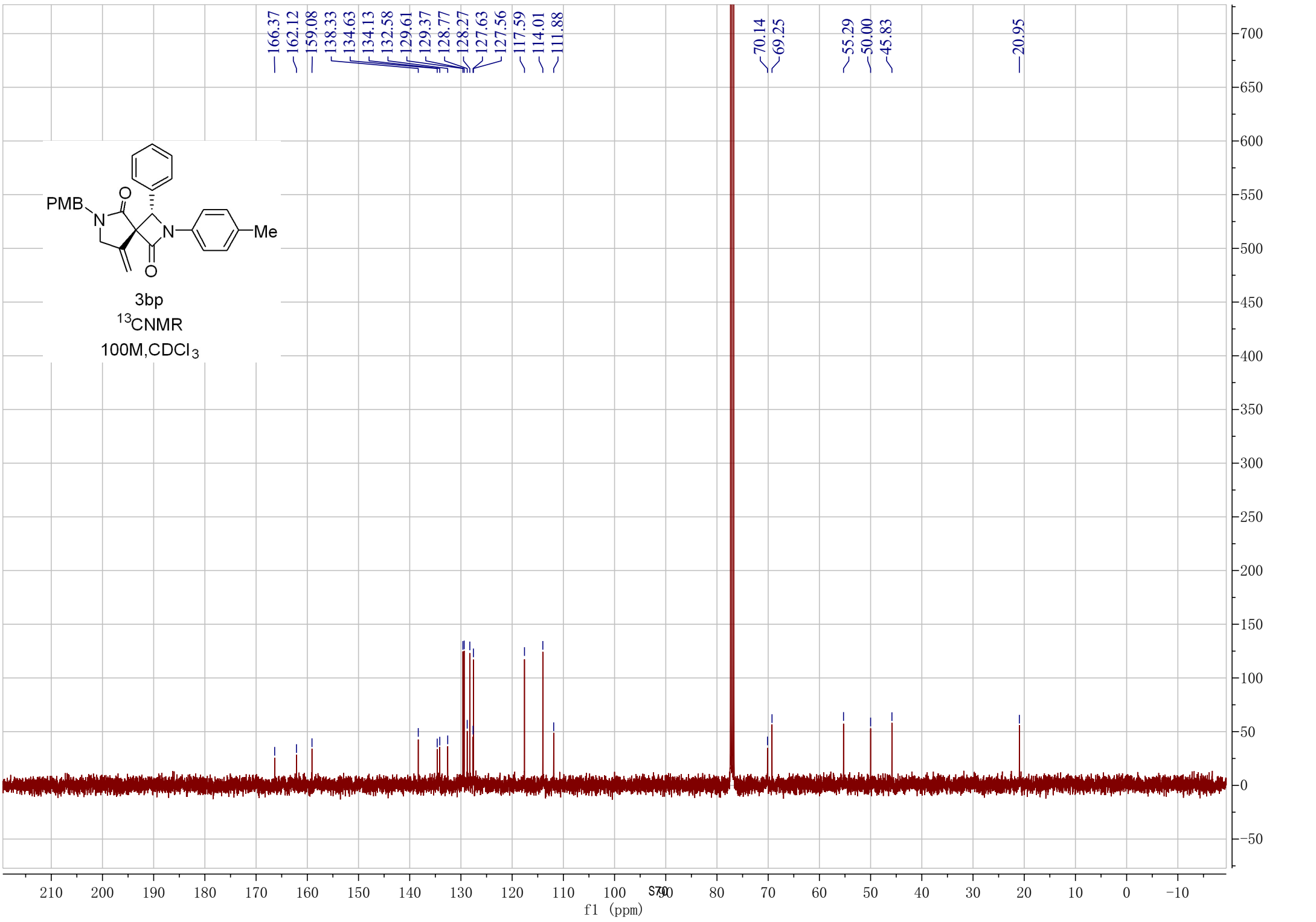
3bp
¹³CNMR
100M, CDCl₃

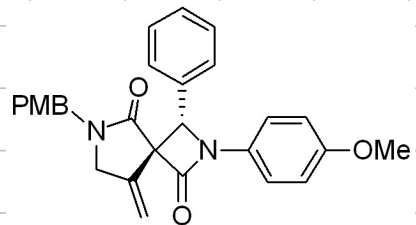
166.37
162.12
159.08
138.33
134.63
134.13
132.58
129.61
129.37
128.77
128.27
127.63
127.56
117.59
114.01
111.88

70.14
69.25

55.29
50.00
45.83

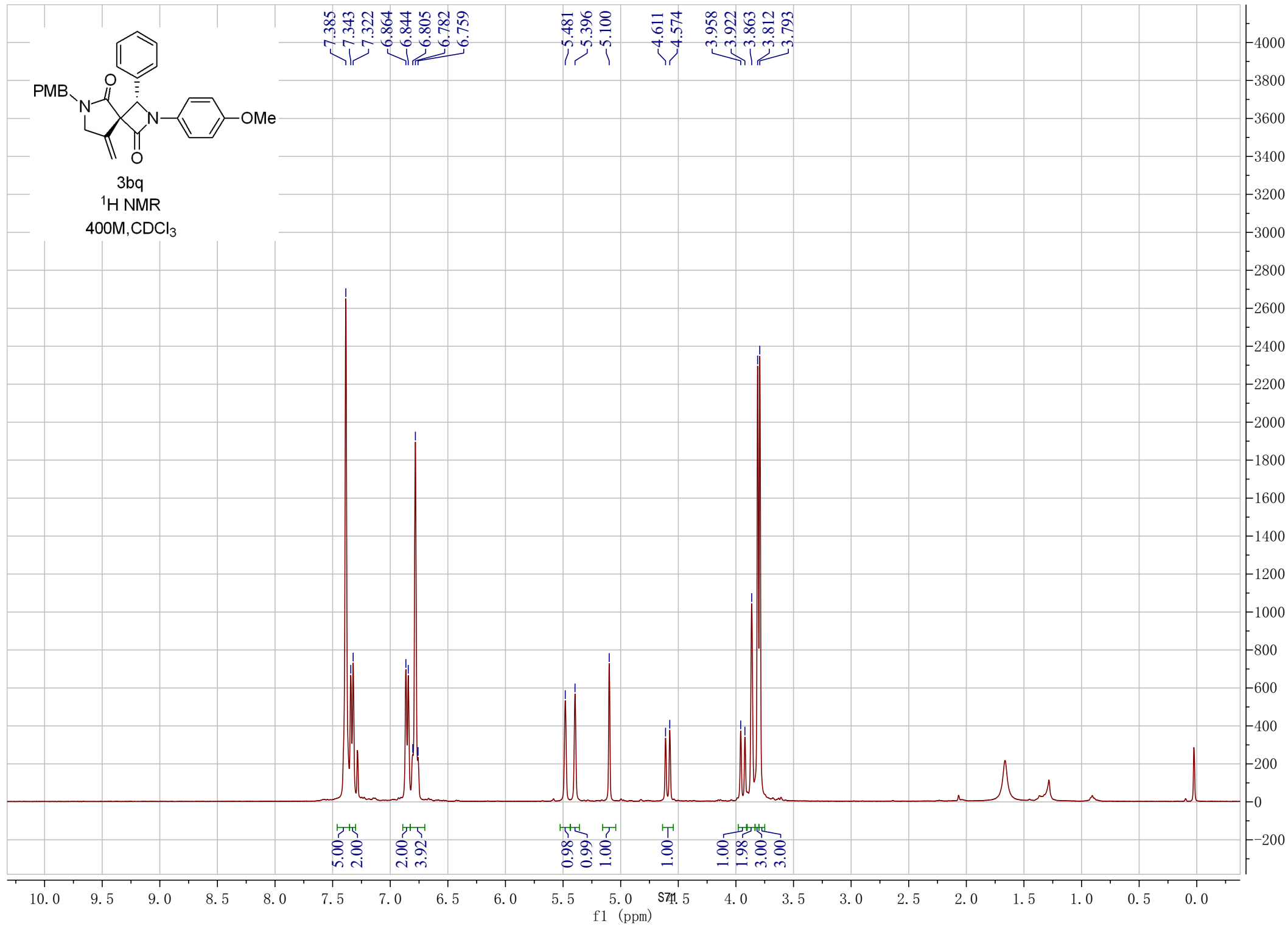
20.95

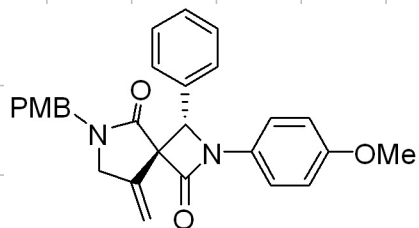




3bq

¹H NMR
400M, CDCl₃

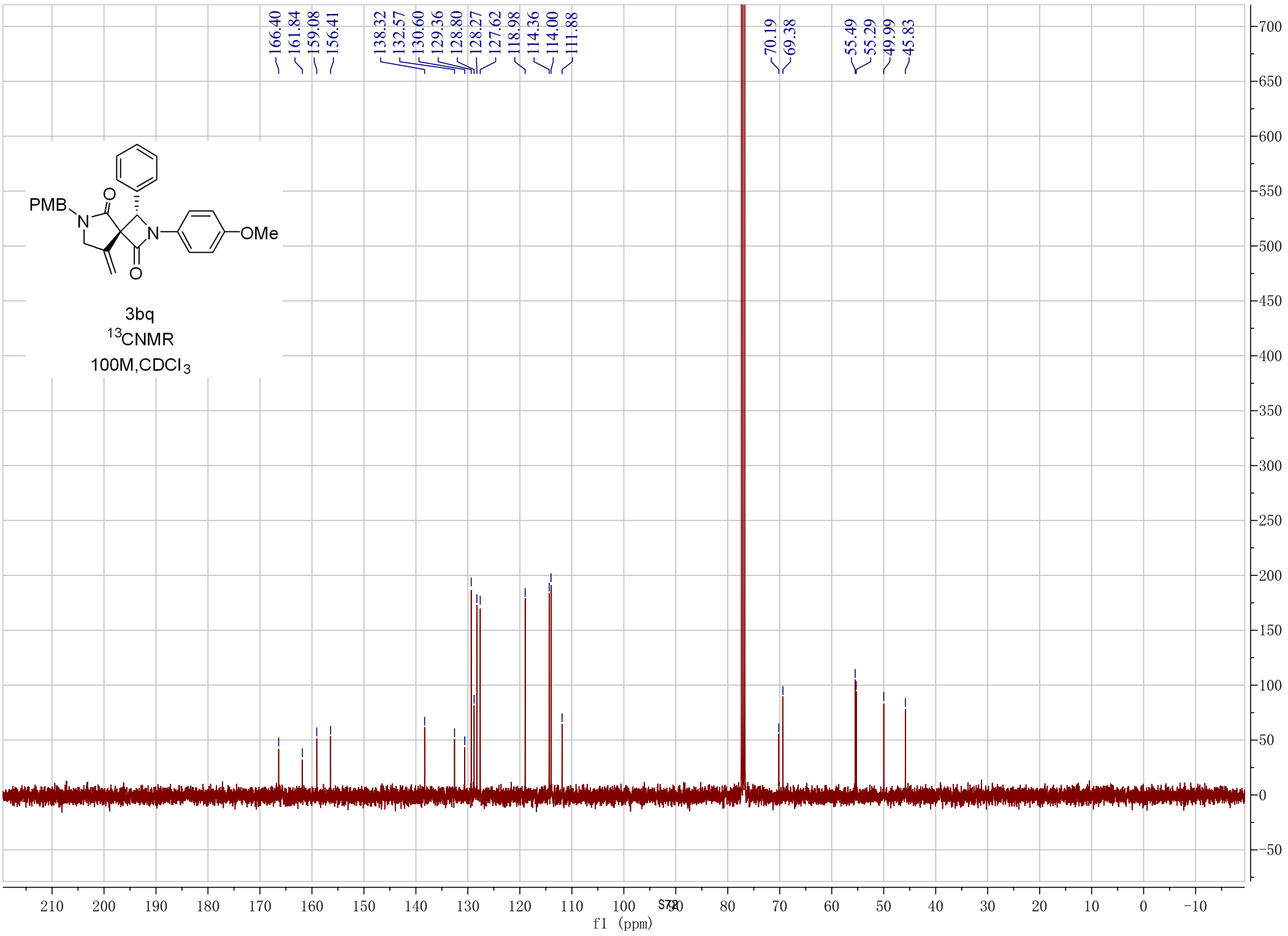


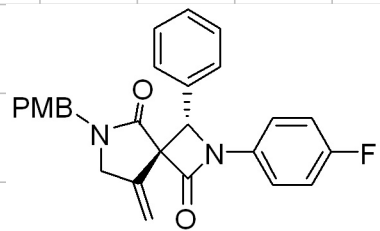


3bq
 ^{13}C NMR
100M, CDCl_3

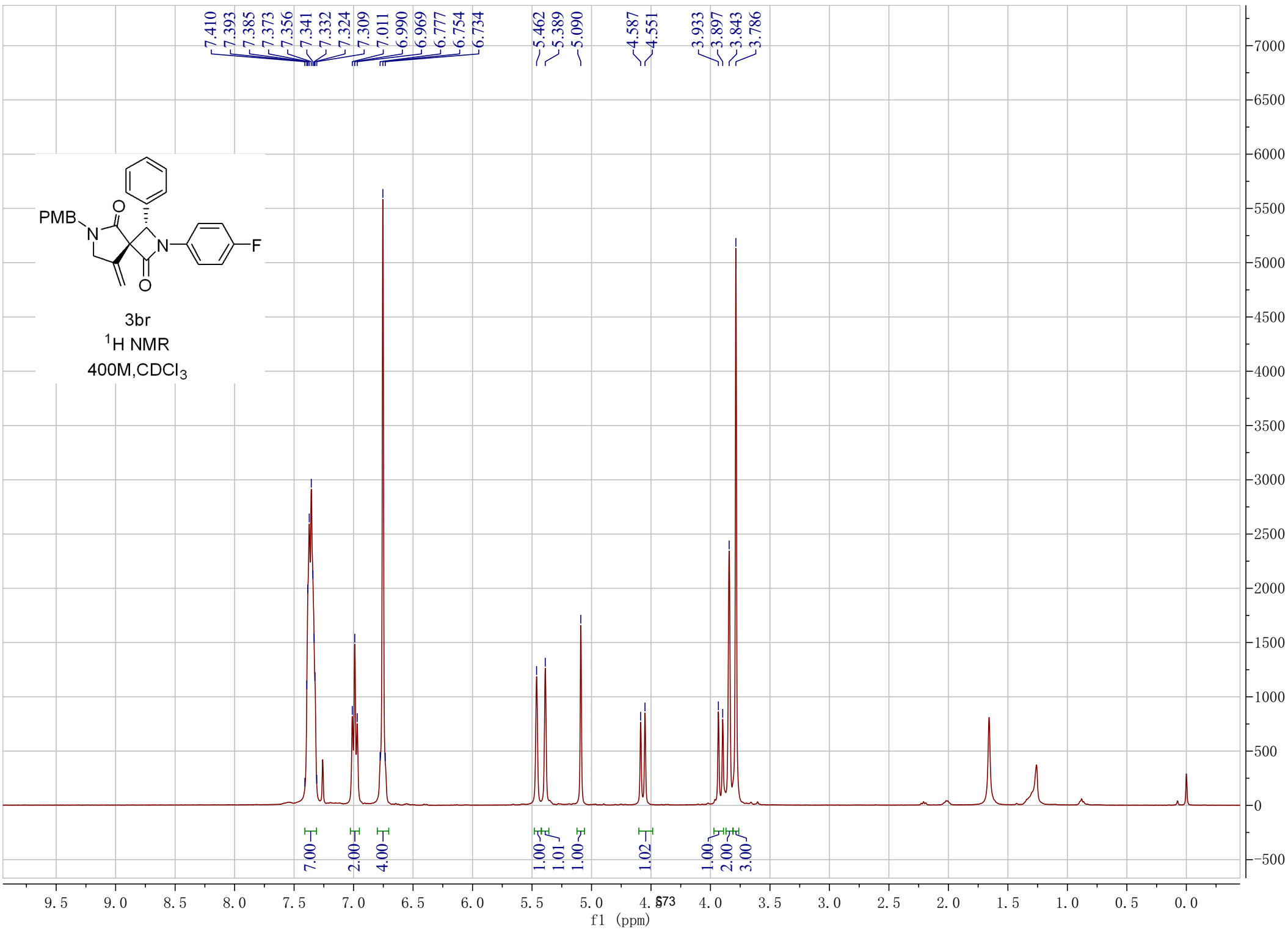
166.40
161.84
159.08
156.41
138.32
132.57
130.60
129.36
128.80
128.27
127.62
118.98
114.36
114.00
111.88

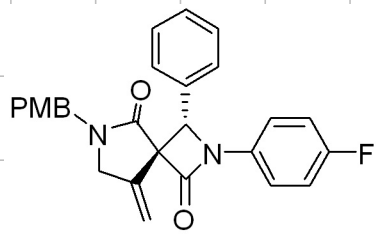
70.19
69.38
55.49
55.29
49.99
45.83





3br
¹H NMR
 400M, CDCl₃





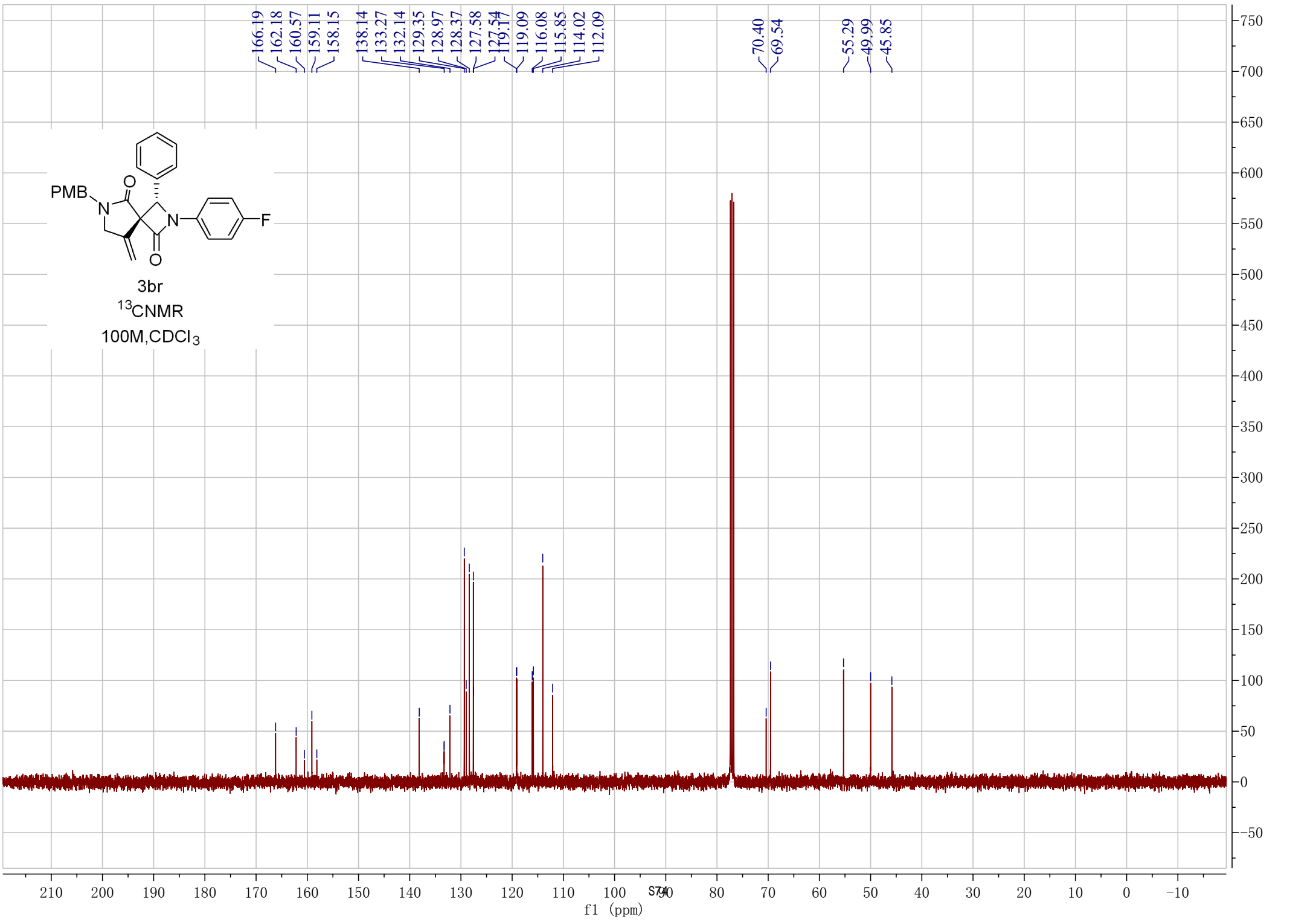
3br

¹³CNMR
100M, CDCl₃

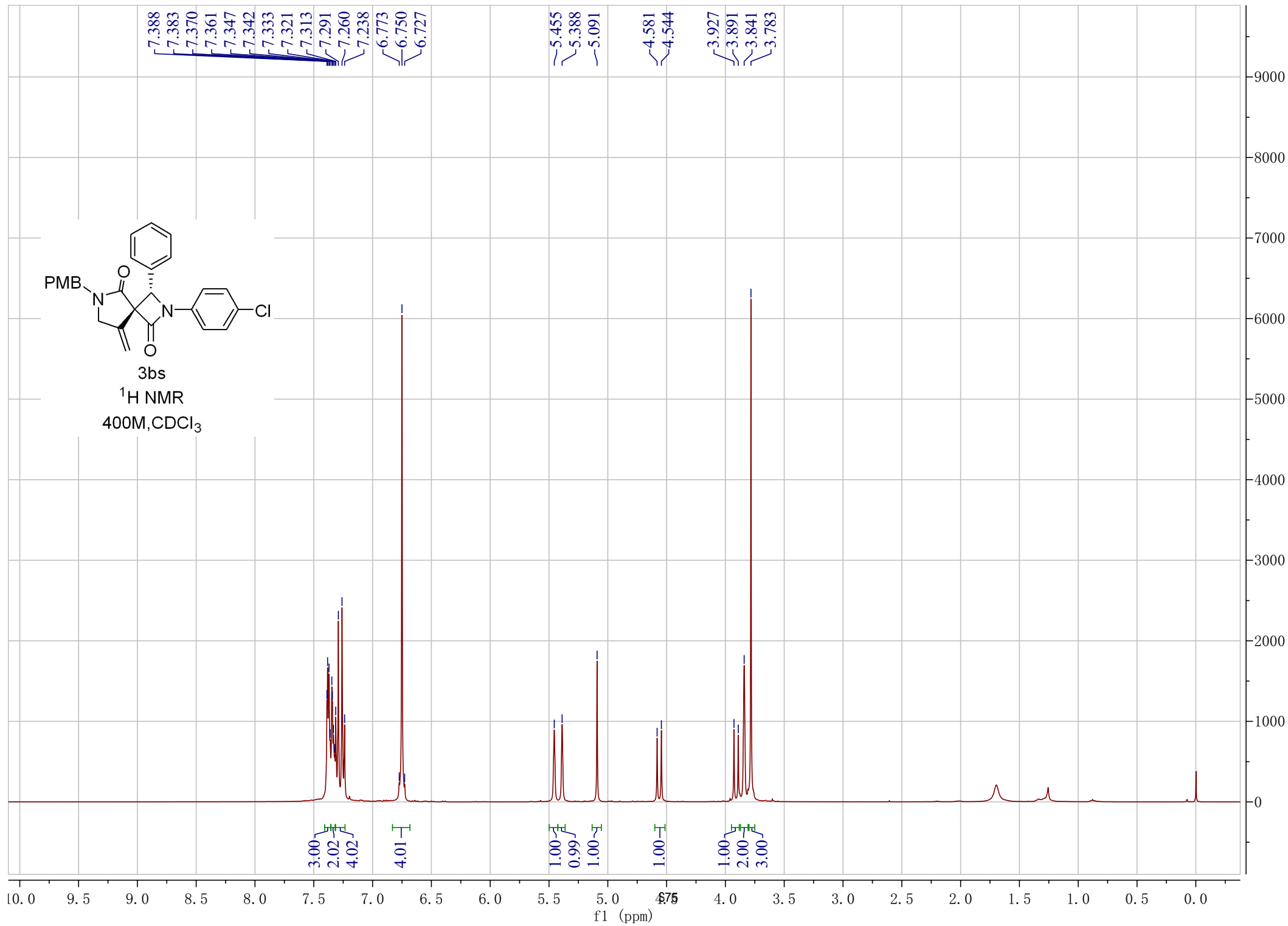
- 166.19
- 162.18
- 160.57
- 159.11
- 158.15
- 138.14
- 133.27
- 132.14
- 129.35
- 128.97
- 128.37
- 127.58
- 127.17
- 119.09
- 116.08
- 115.85
- 114.02
- 112.09

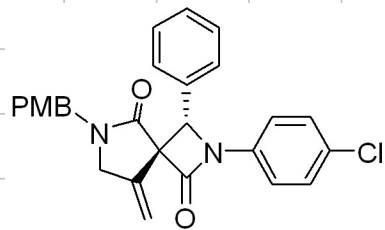
- 70.40
- 69.54

- 55.29
- 49.99
- 45.85



f1 (ppm)





3bs

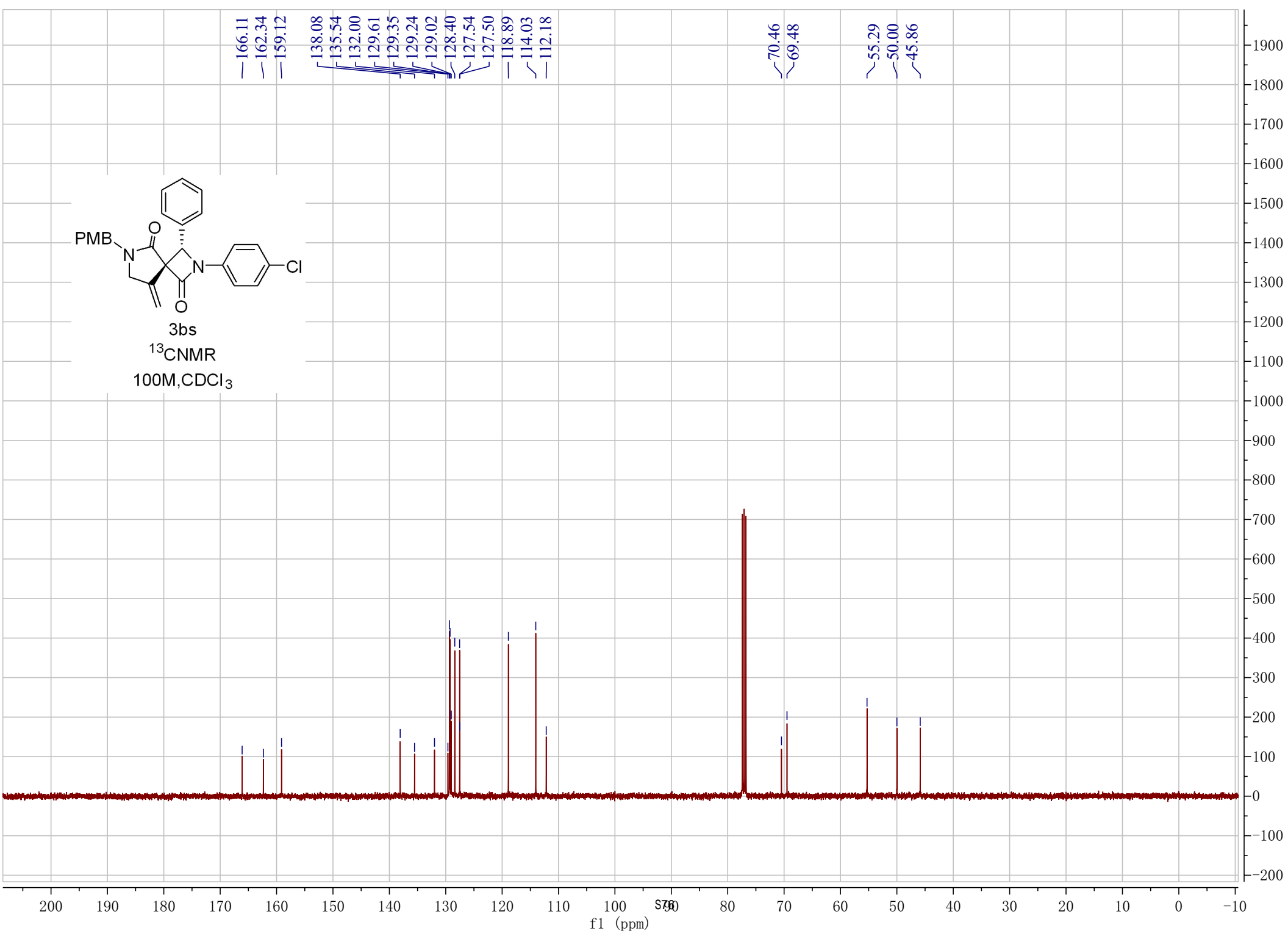
^{13}C NMR

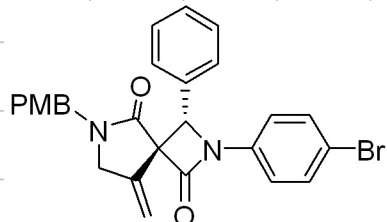
100M, CDCl_3

166.11
162.34
159.12
138.08
135.54
132.00
129.61
129.35
129.24
129.02
128.40
127.54
127.50
118.89
114.03
112.18

70.46
69.48

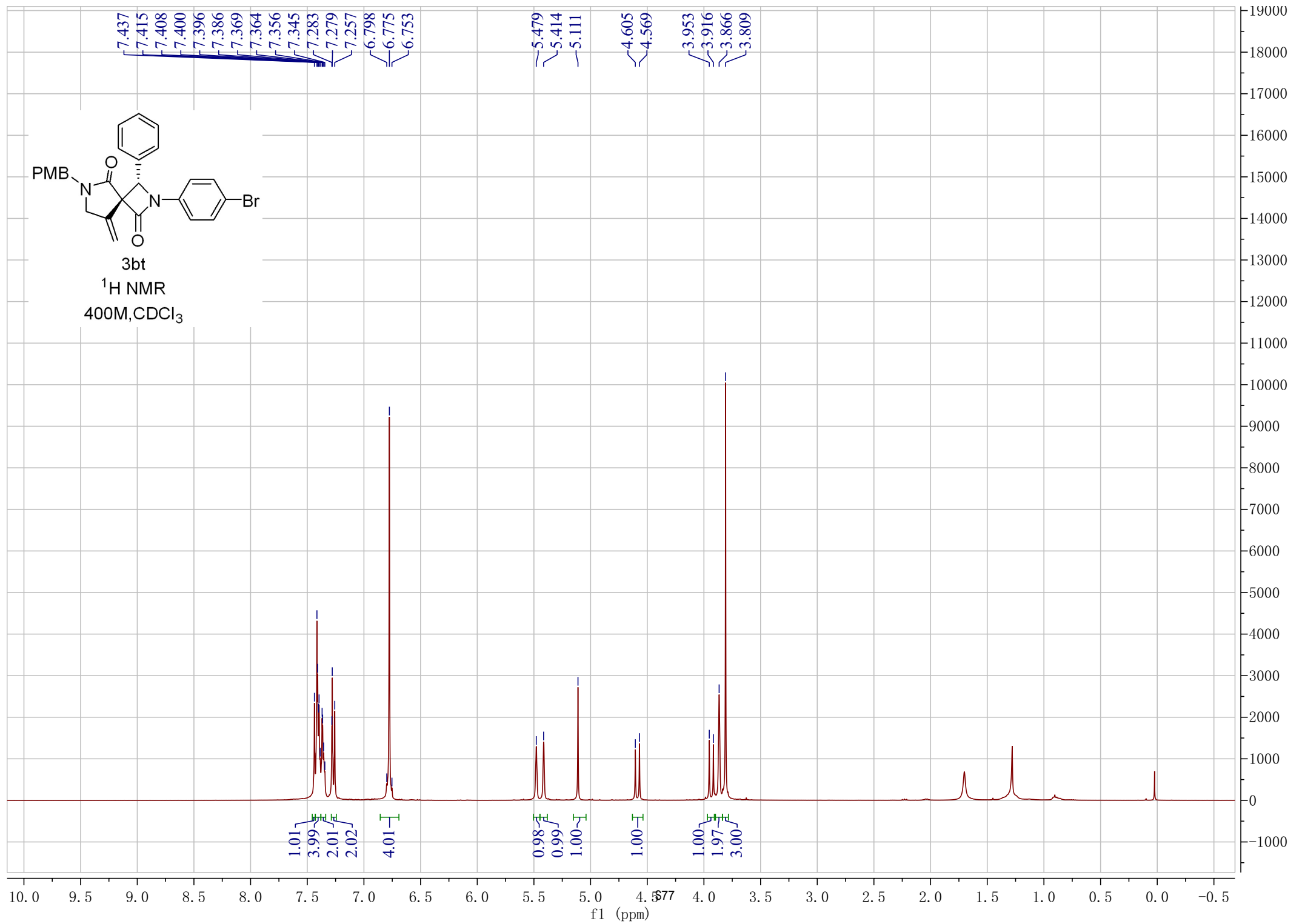
55.29
50.00
45.86

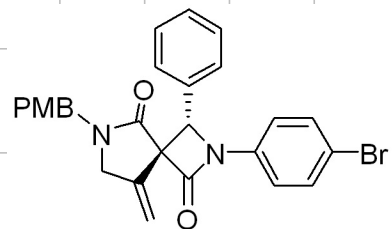




3bt

¹H NMR
400M, CDCl₃





3bt

^{13}C NMR
100M, CDCl_3

166.08
162.36
159.12
138.06
135.99
132.16
131.95
129.35
129.03
128.41
127.53
127.50
119.23
117.27
114.04
112.20

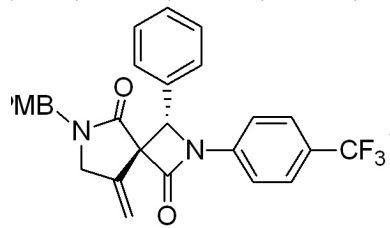
70.48
69.46

55.30
50.00
45.86

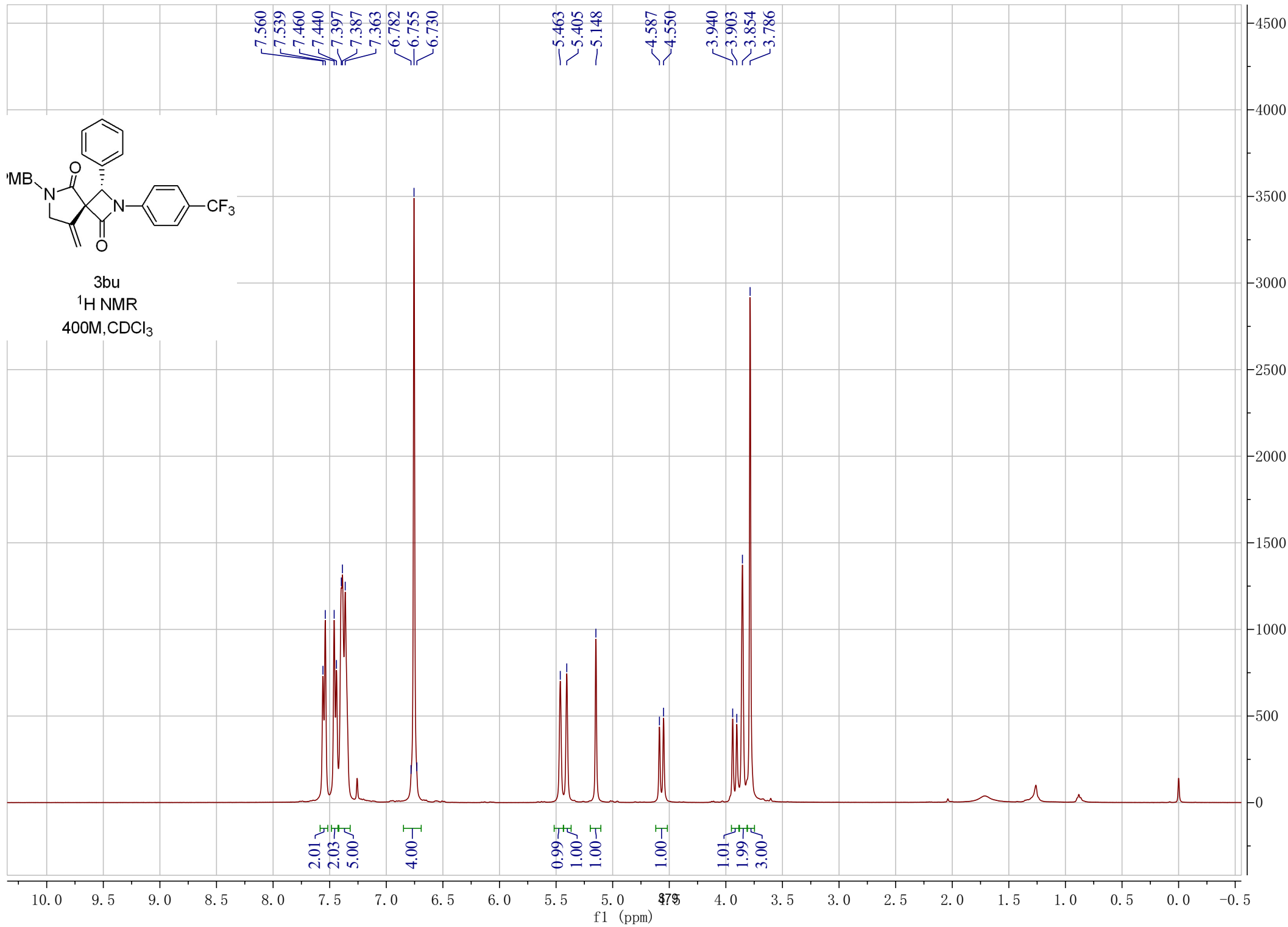
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10

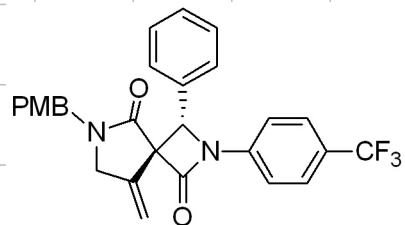
f1 (ppm)

S78



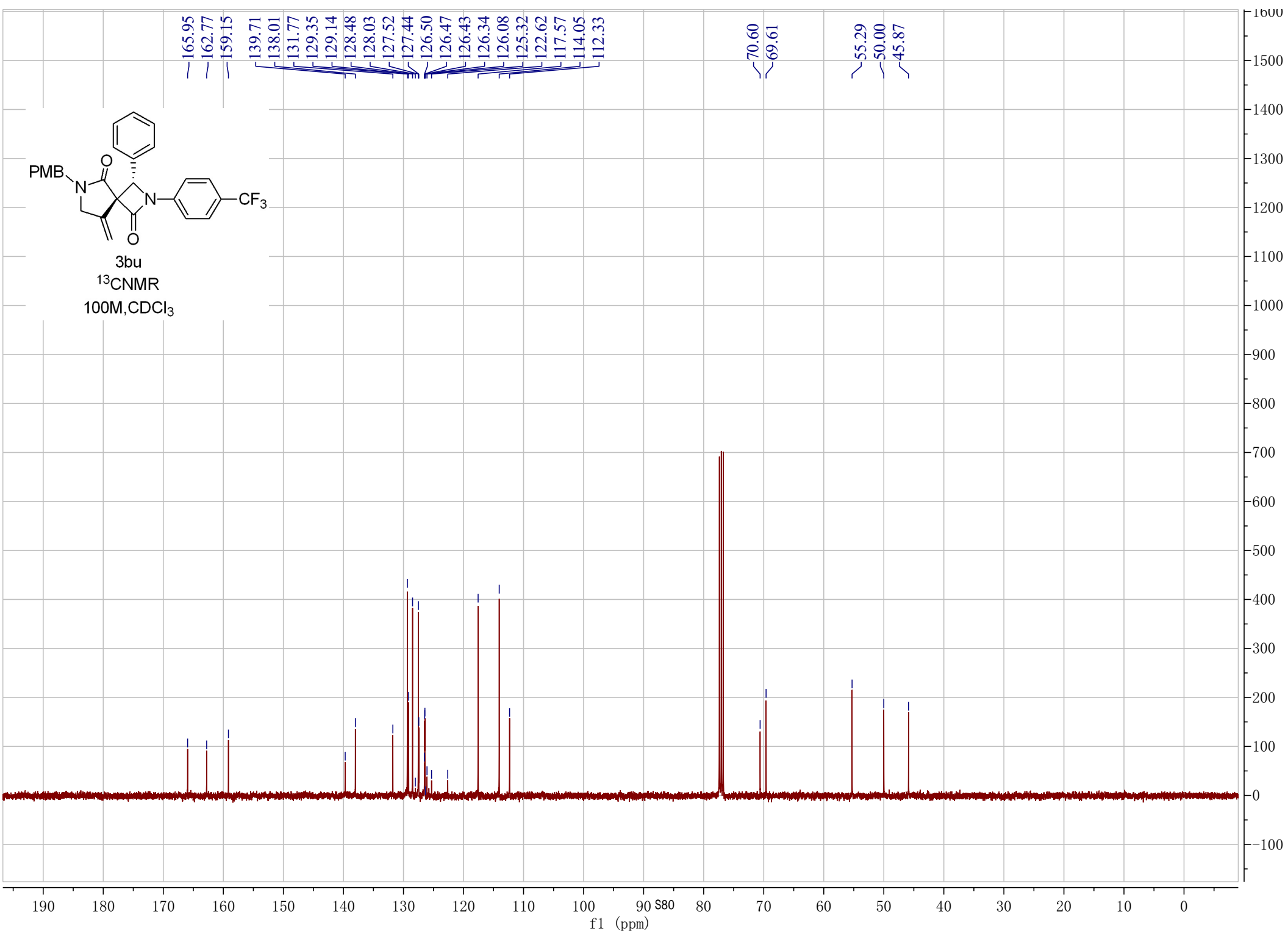
3bu
¹H NMR
400M, CDCl₃

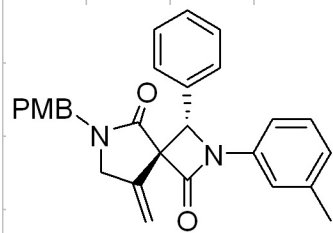




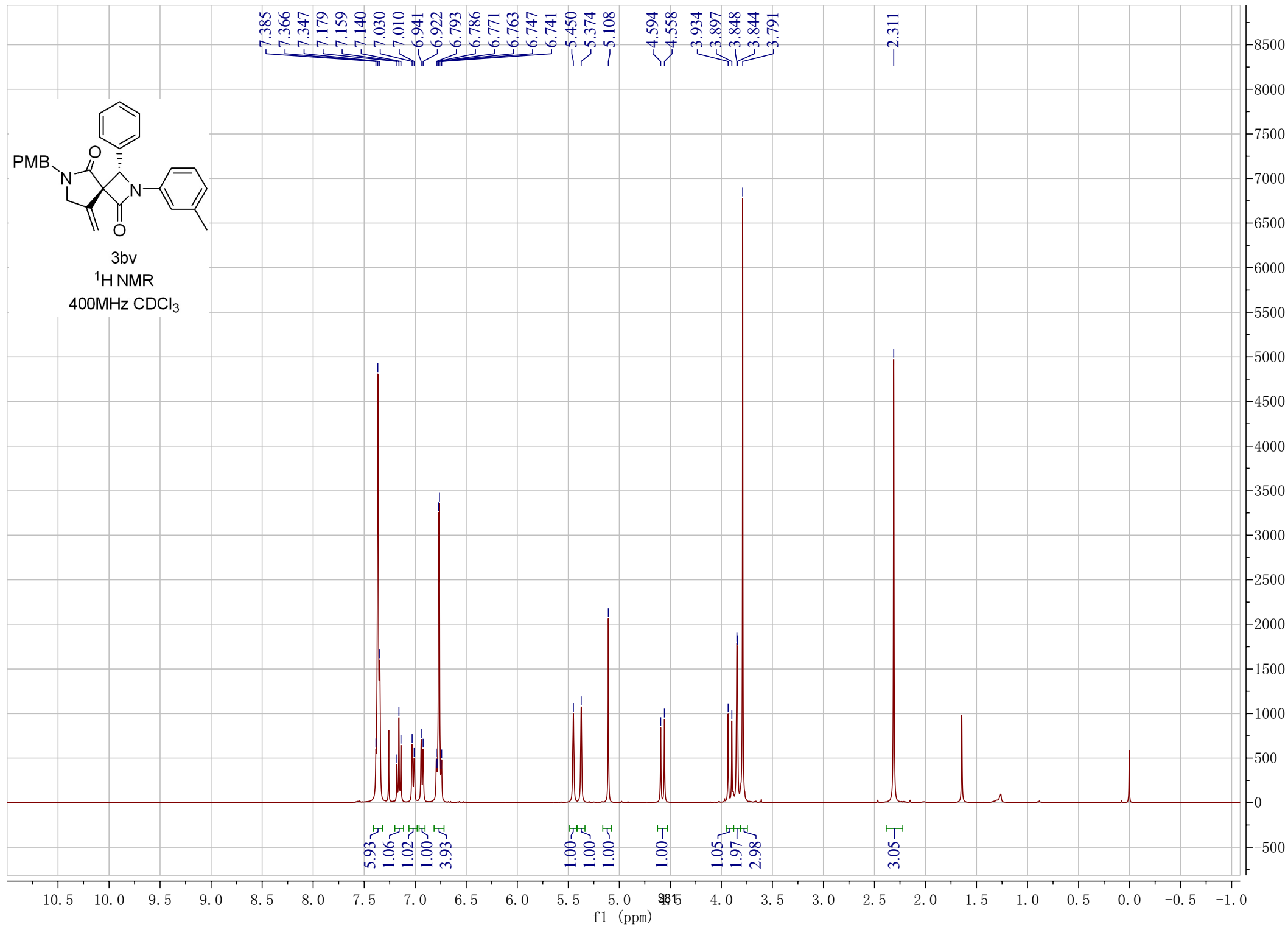
3bu
¹³CNMR
100M, CDCl₃

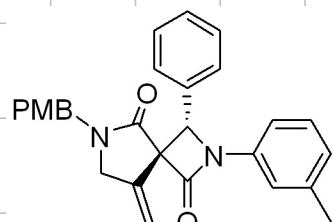
- 165.95
- 162.77
- 159.15
- 139.71
- 138.01
- 131.77
- 129.35
- 129.14
- 128.48
- 128.03
- 127.52
- 127.44
- 126.50
- 126.47
- 126.43
- 126.34
- 126.08
- 125.32
- 122.62
- 117.57
- 114.05
- 112.33
- 70.60
- 69.61
- 55.29
- 50.00
- 45.87



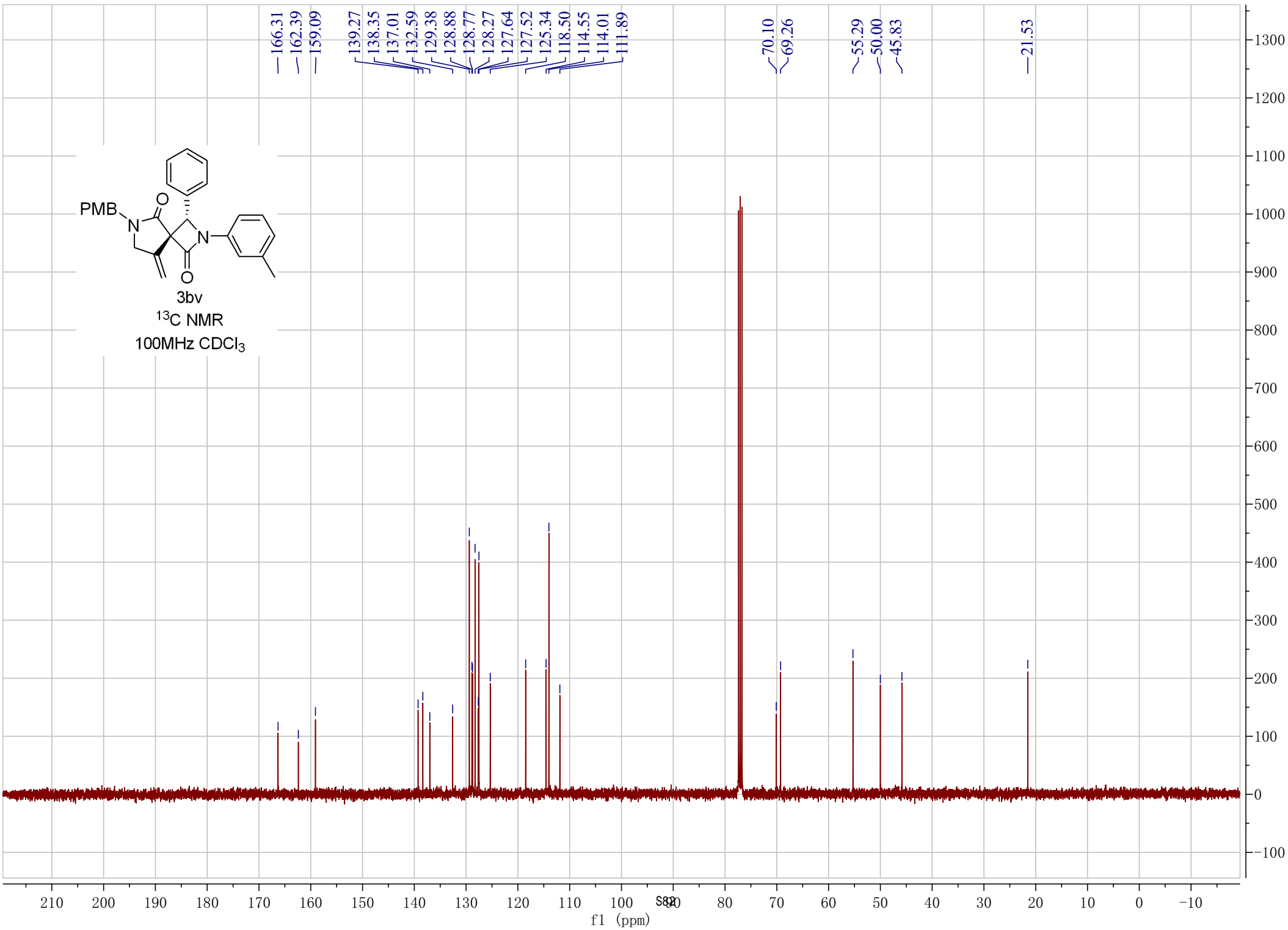


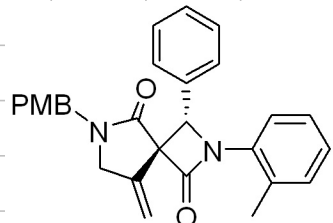
3b
¹H NMR
400MHz CDCl₃



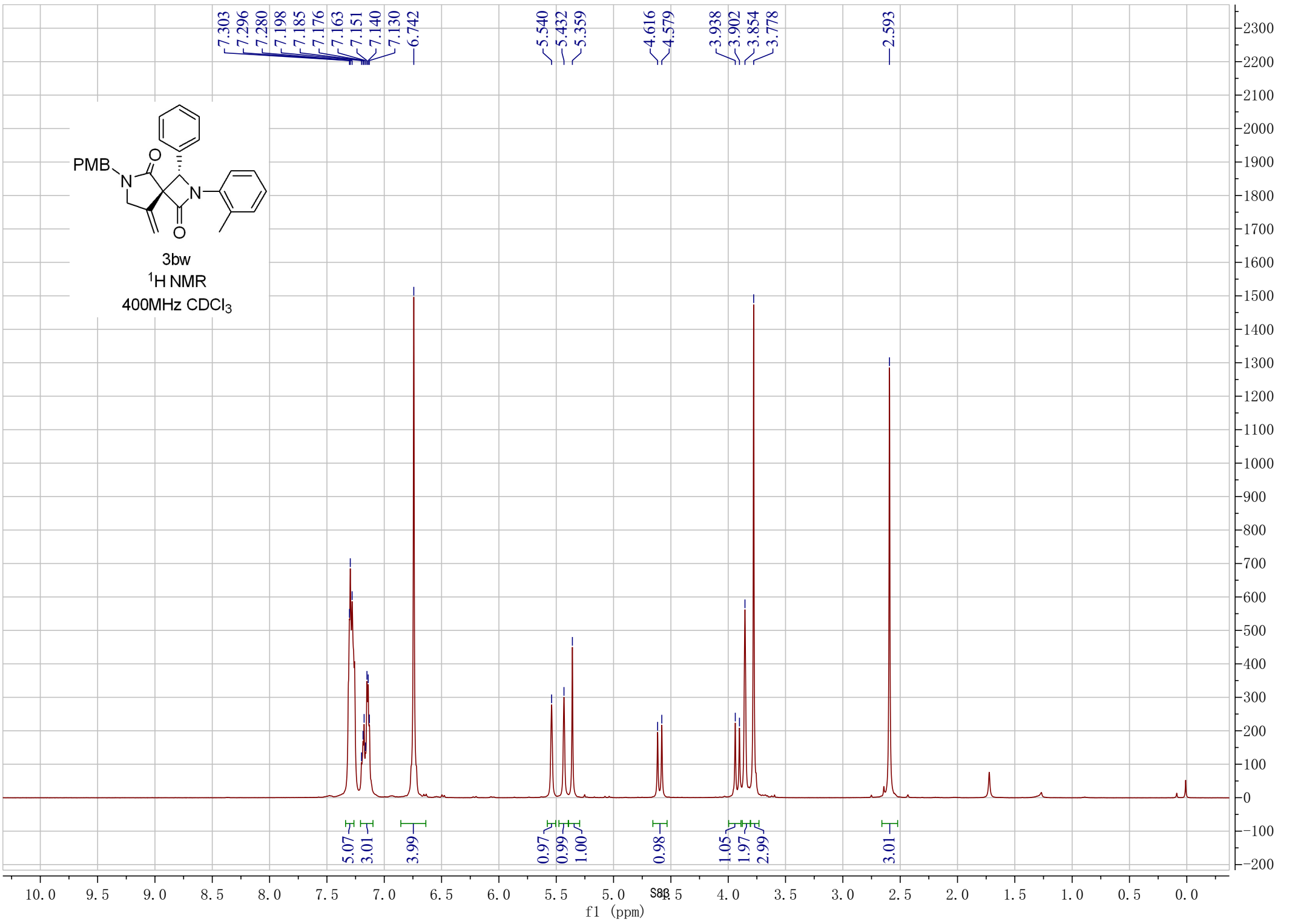


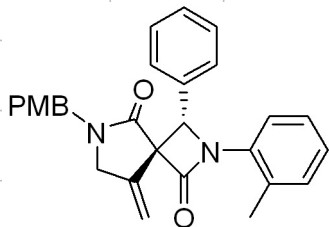
3bv
 ^{13}C NMR
100MHz CDCl_3



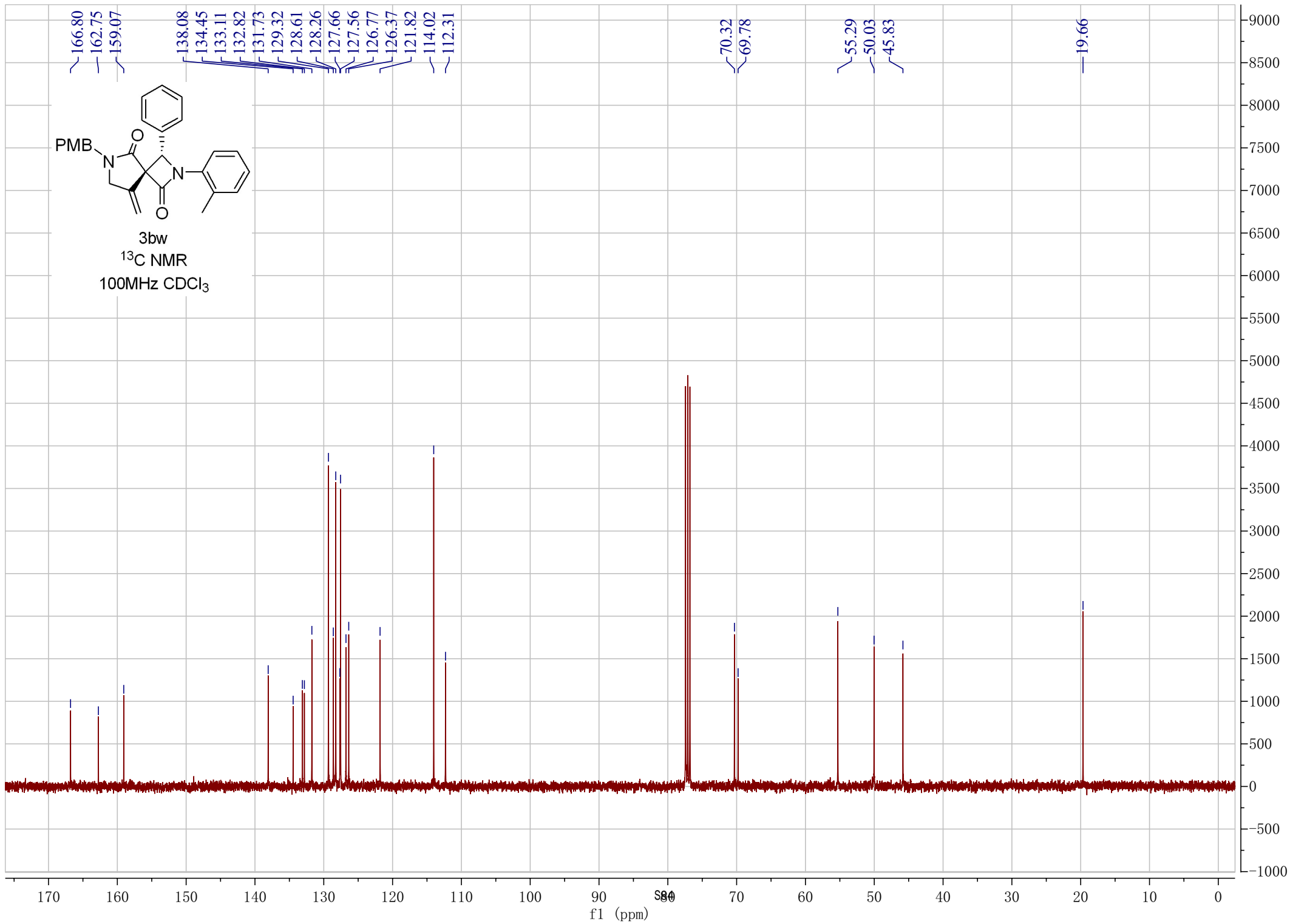


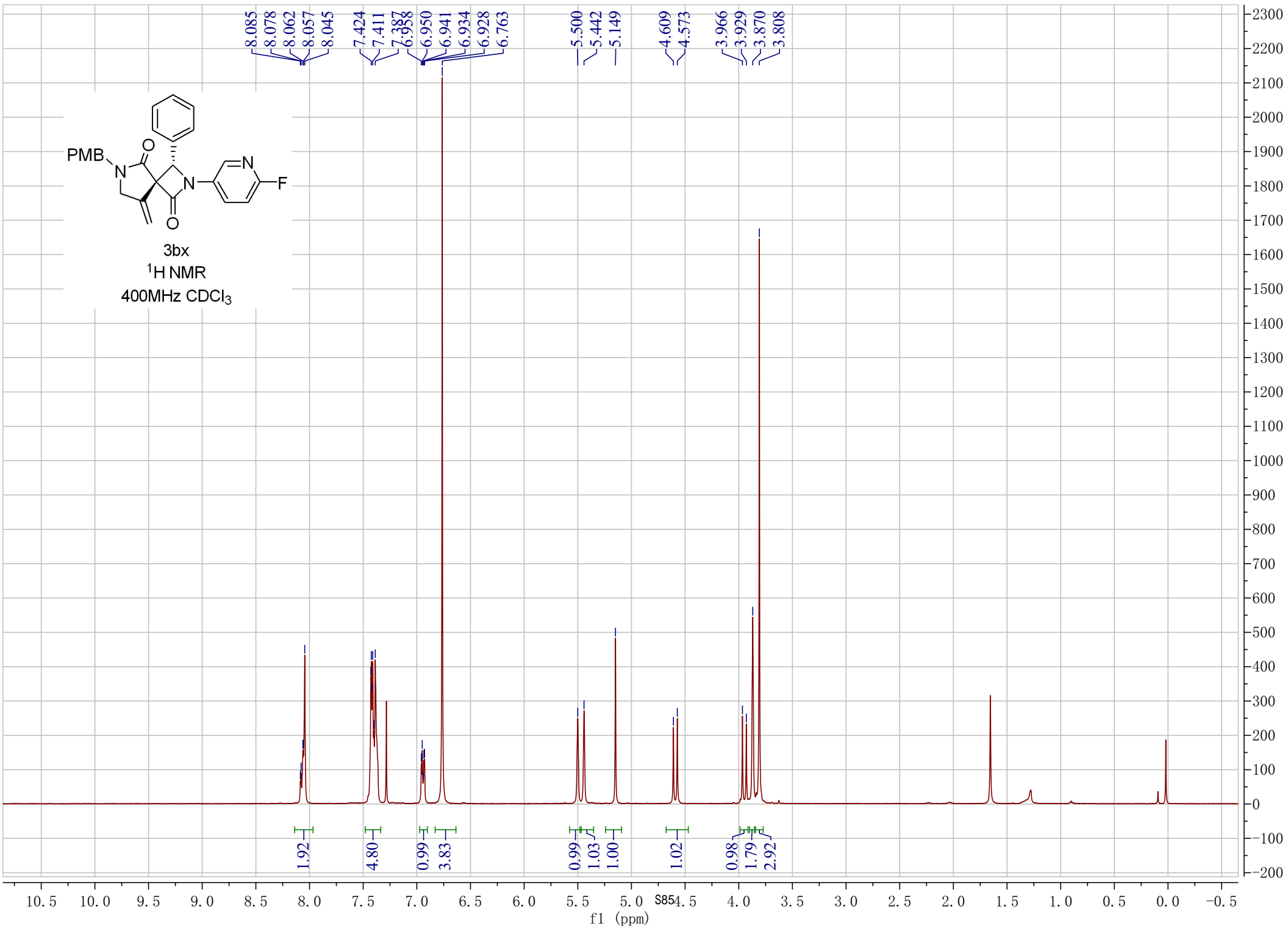
3bw
¹H NMR
400MHz CDCl₃

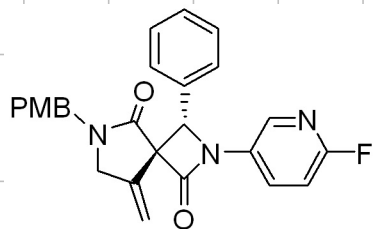




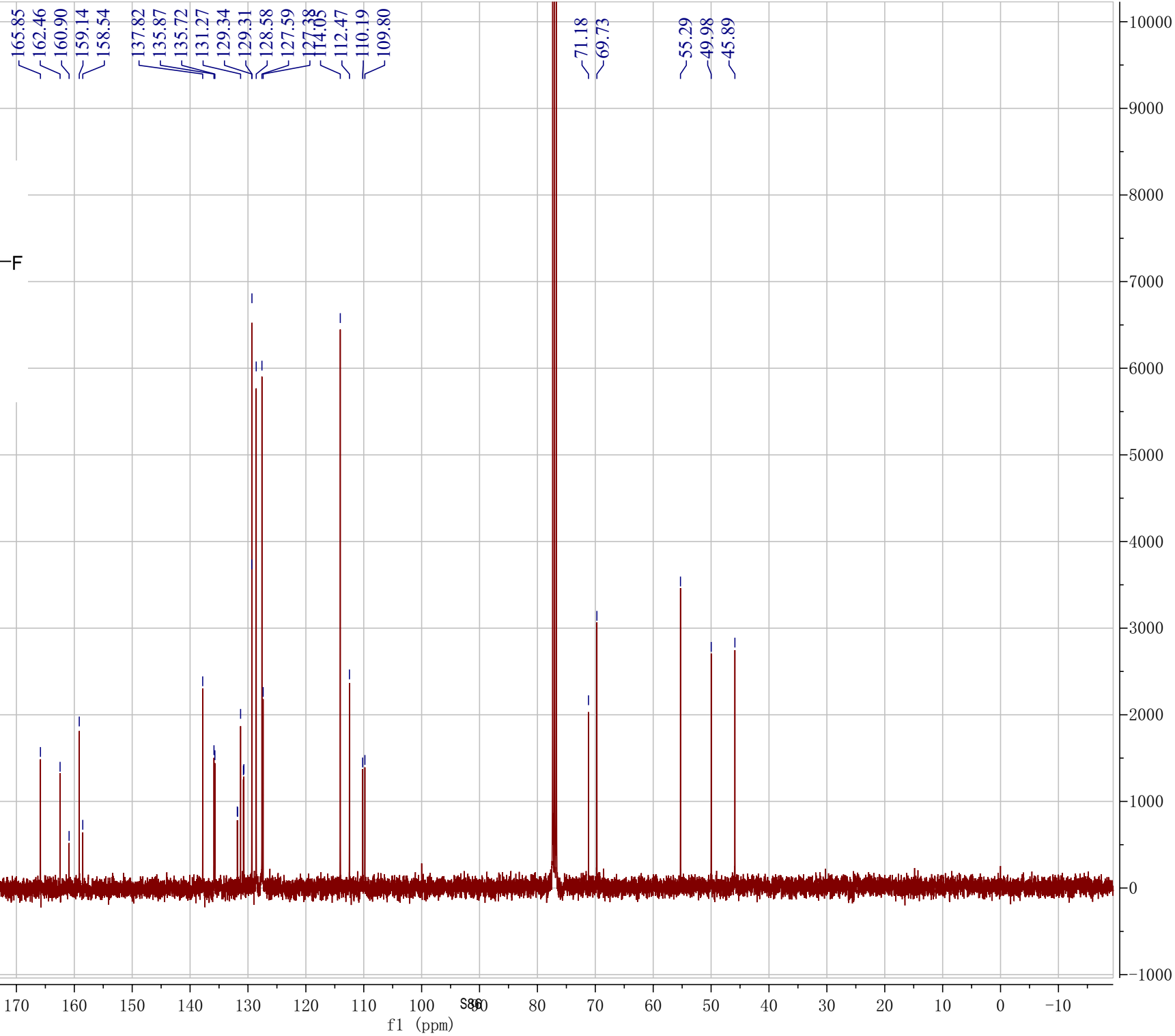
3bw
¹³C NMR
100MHz CDCl₃

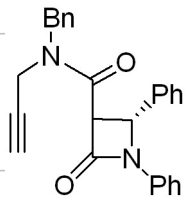




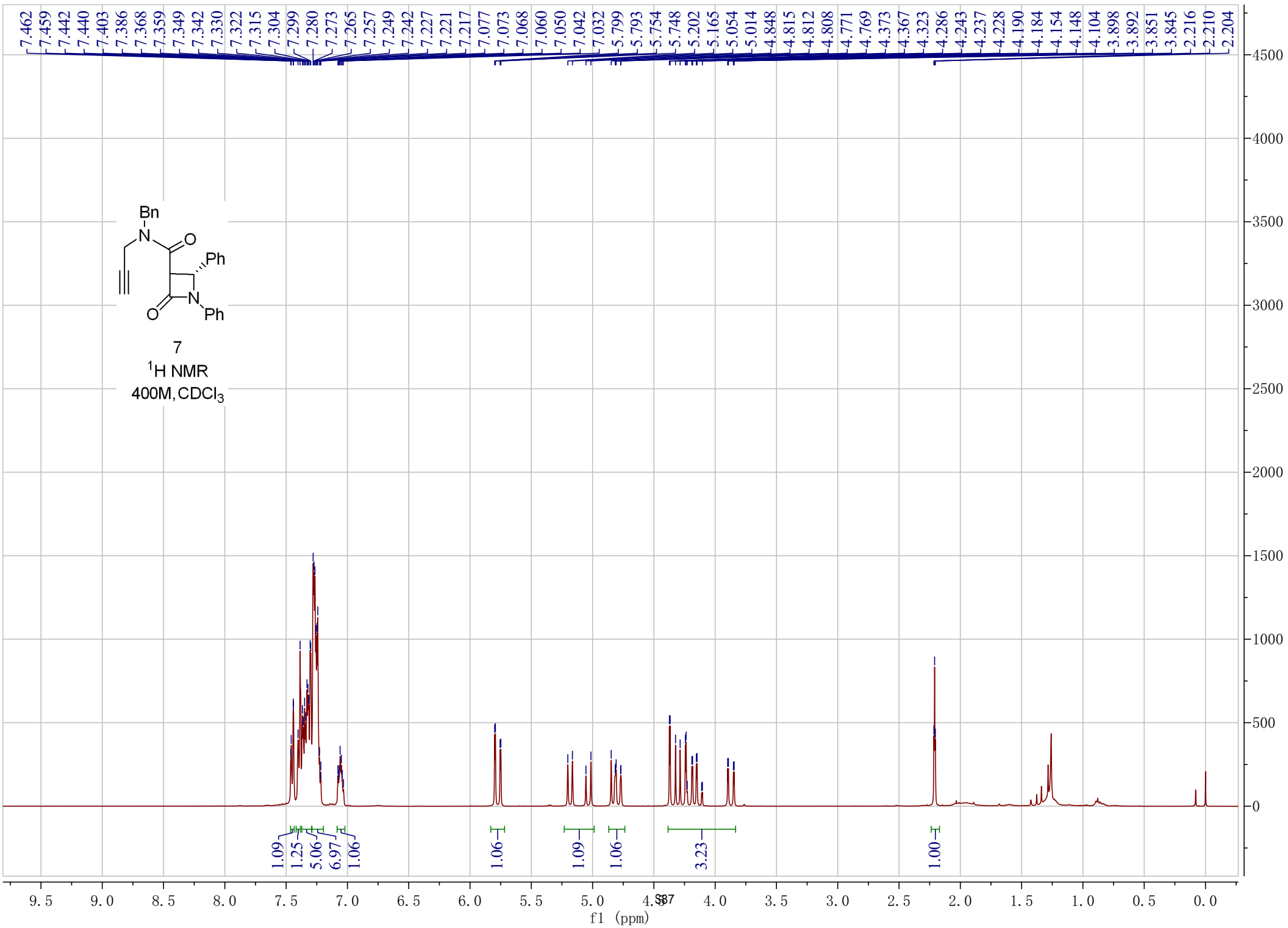


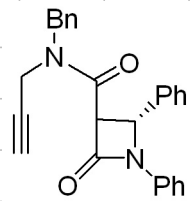
3bx
¹³C NMR
100MHz CDCl₃





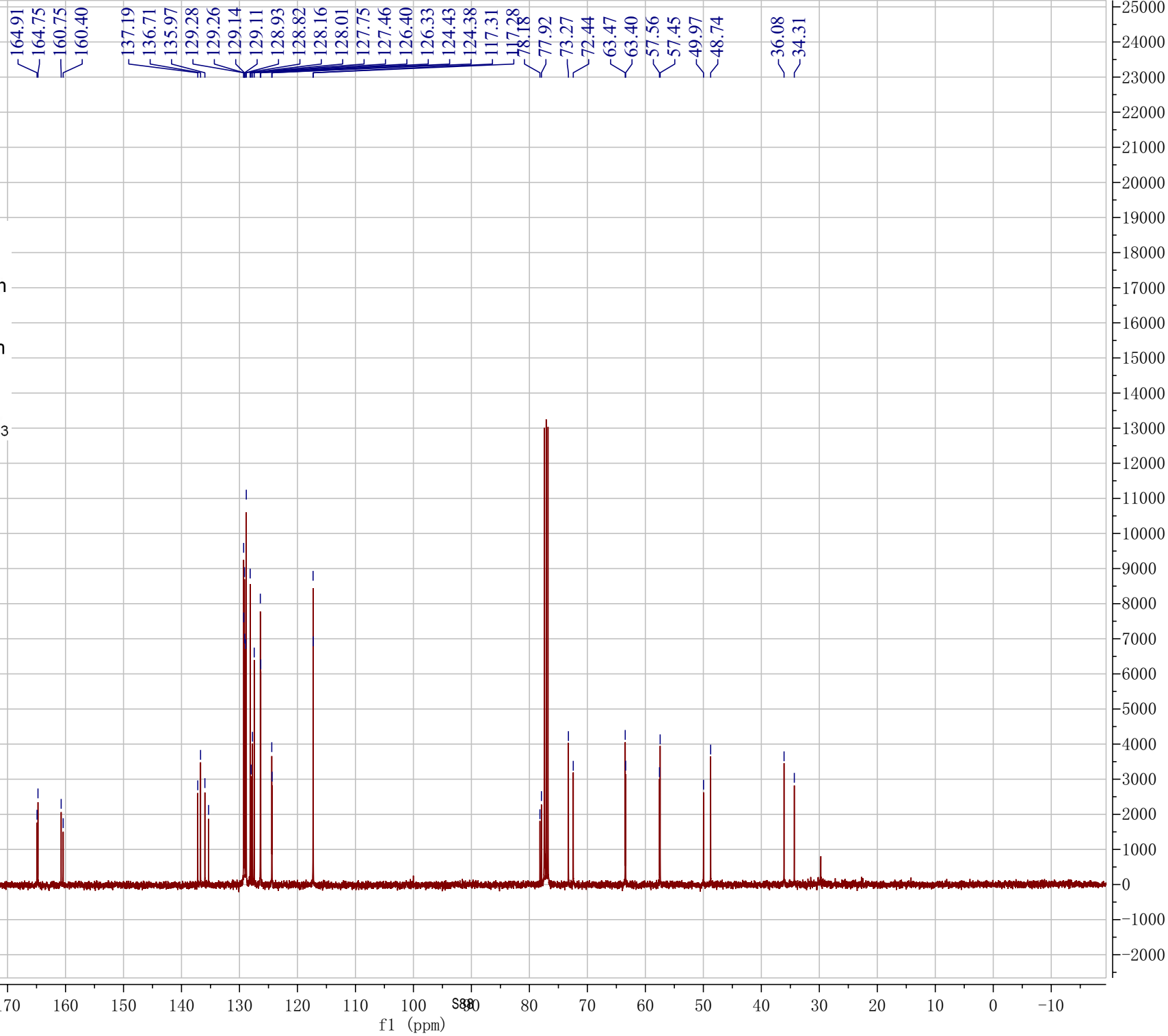
7
¹H NMR
400M, CDCl₃

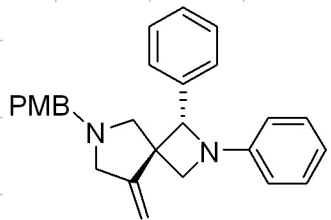




7

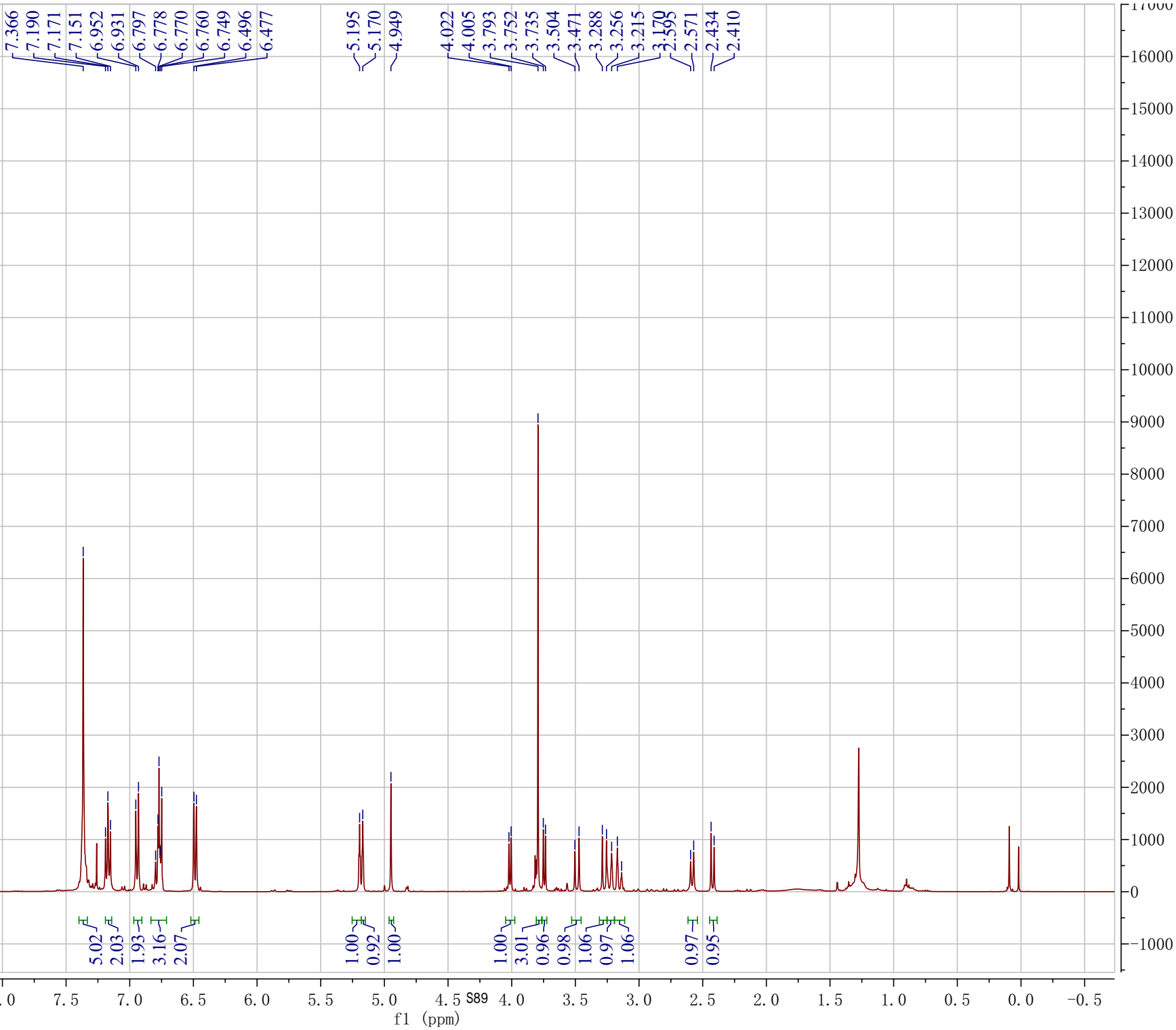
¹³C NMR
100MHz CDCl₃

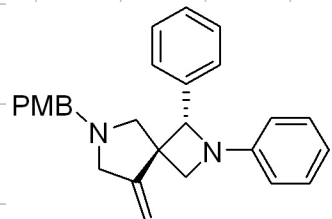




4

¹H NMR
400MHz CDCl₃

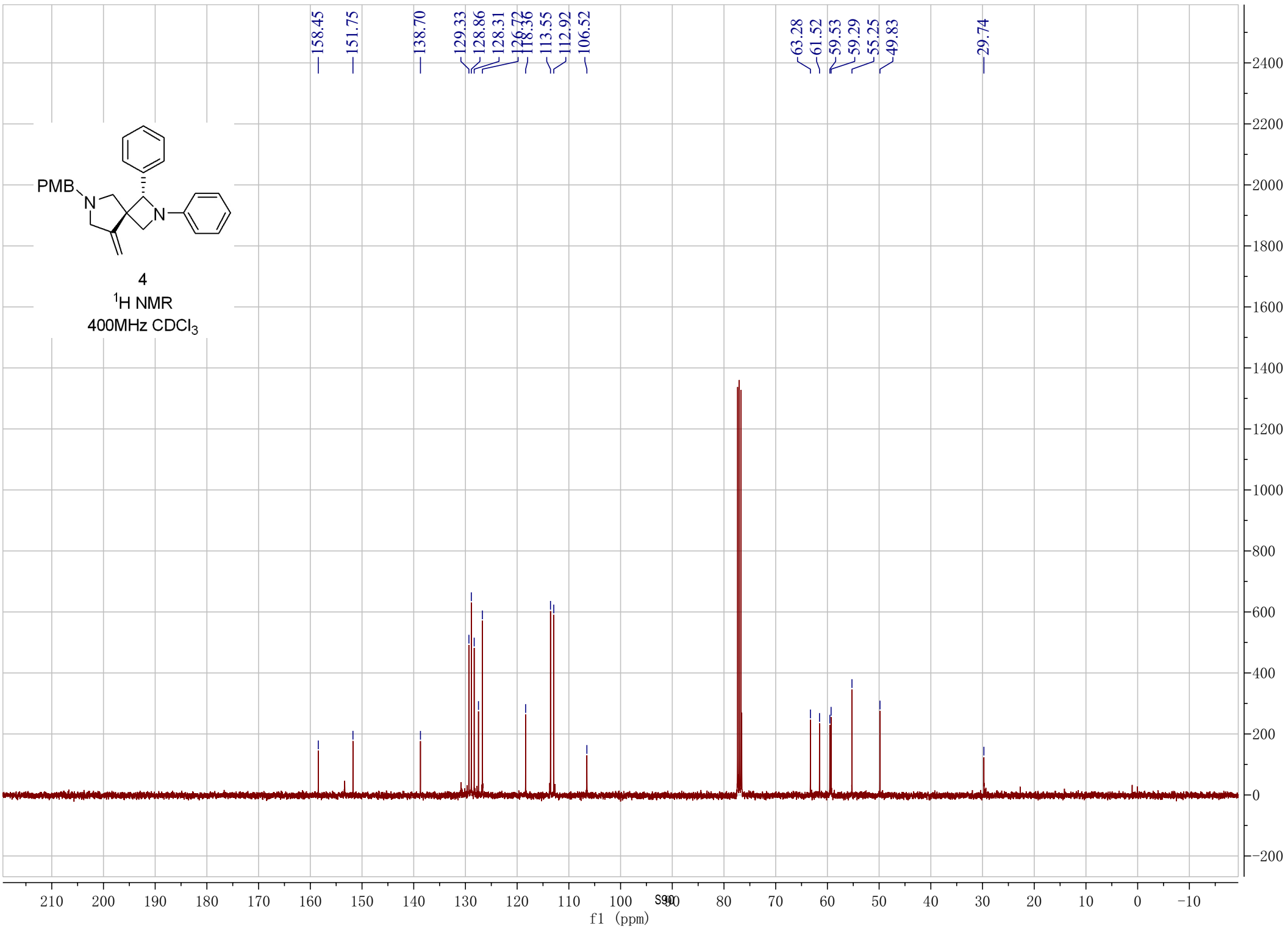


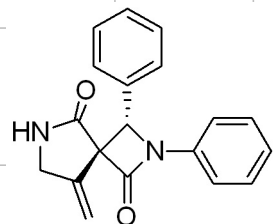


4

^1H NMR
400MHz CDCl_3

158.45
151.75
138.70
129.33
128.86
128.31
126.72
118.36
113.55
112.92
106.52
63.28
61.52
59.53
59.29
55.25
49.83
29.74





5
¹H NMR
400M, CDCl₃

8.094
7.372
7.352
7.333
7.319
7.286
7.278
7.143
7.125

5.459
5.404

3.988
3.952
3.936
3.900

1.00

9.12

1.05

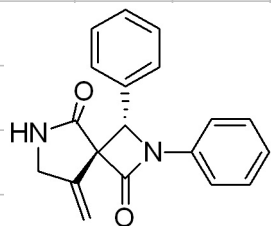
2.00

0.98

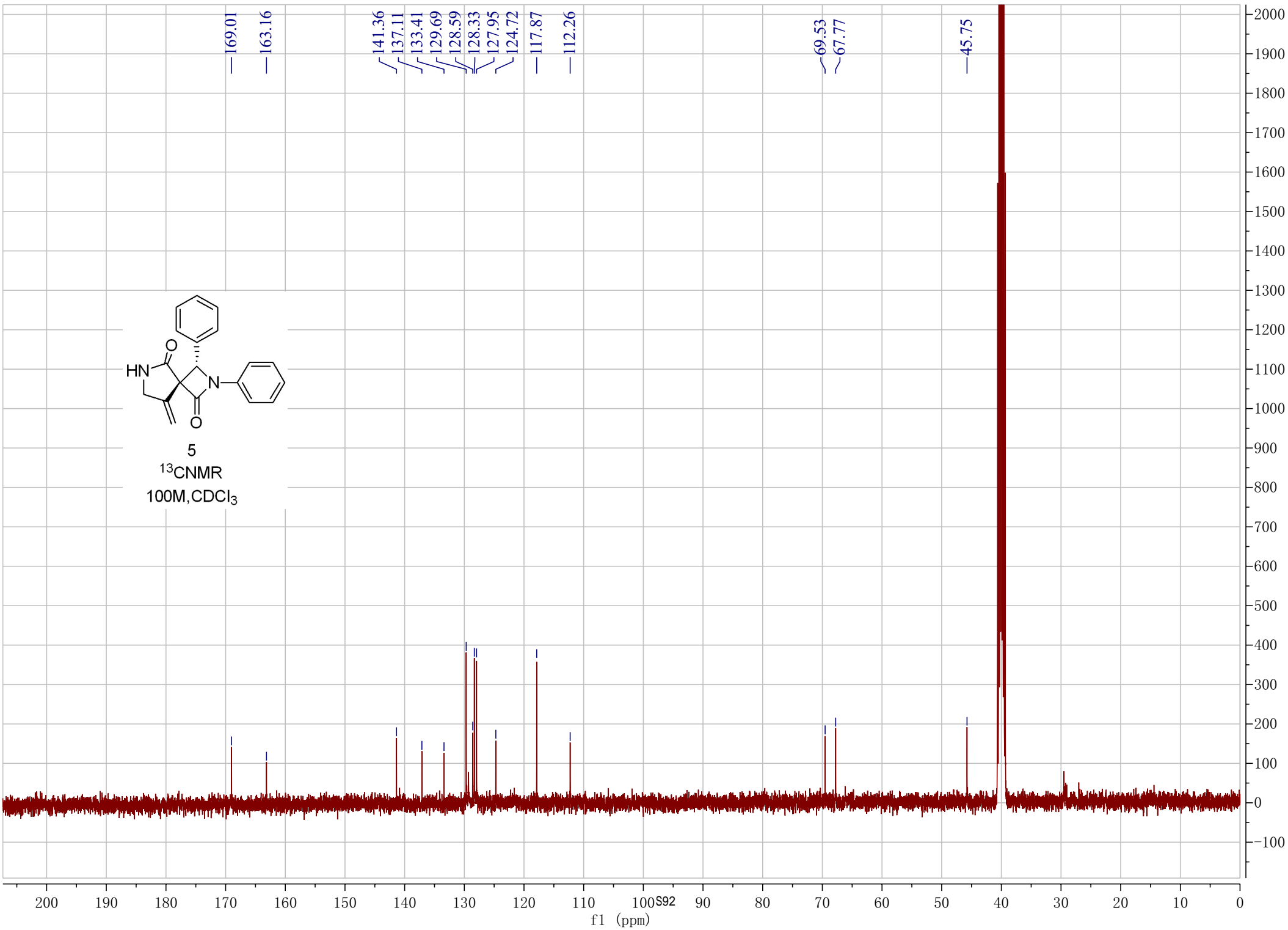
2.00

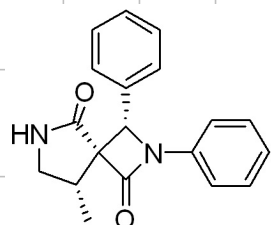
f1 (ppm)

9000
8000
7000
6000
5000
4000
3000
2000
1000
0



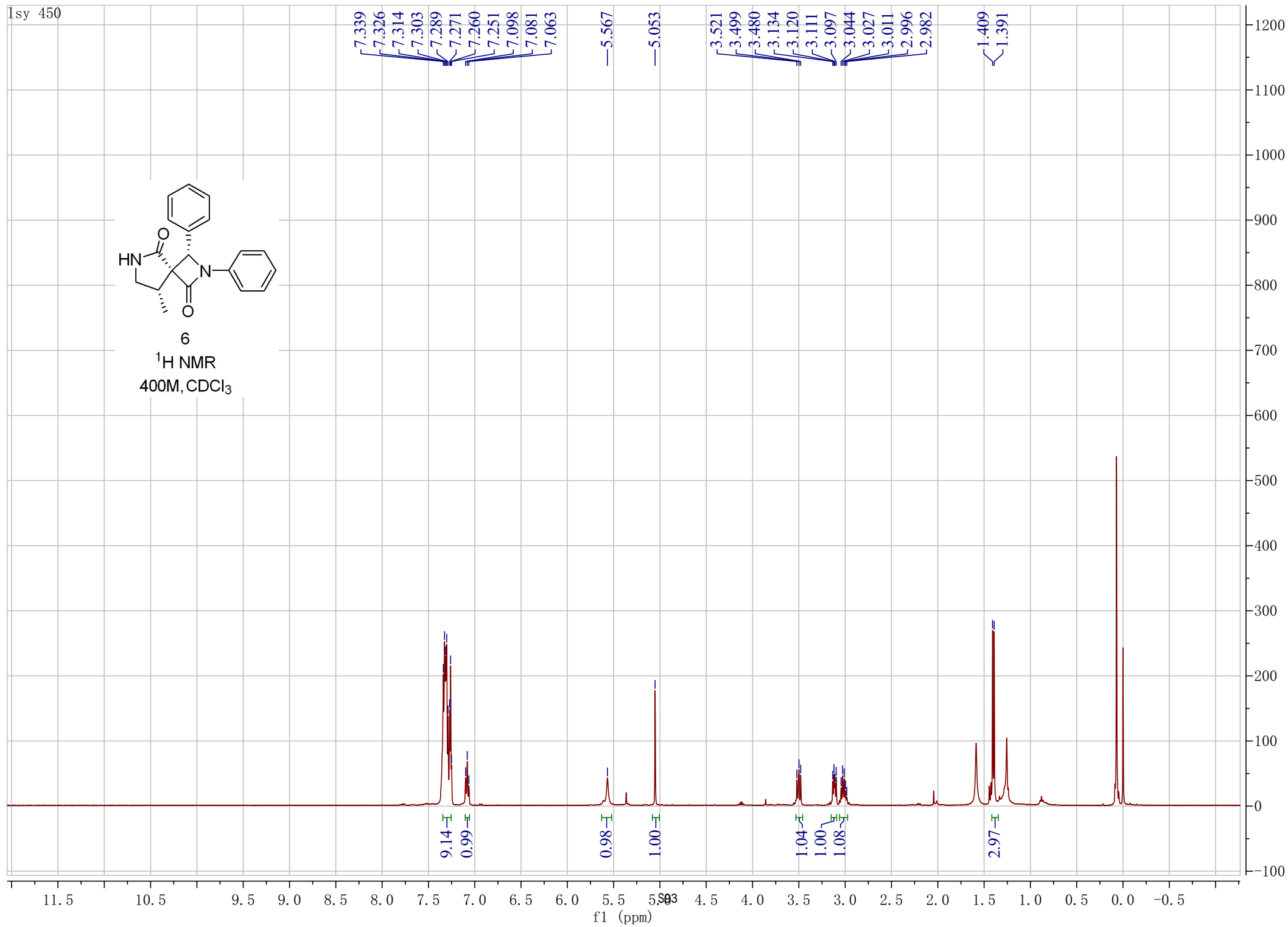
5
¹³CNMR
100M, CDCl₃

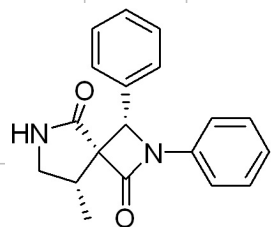




6

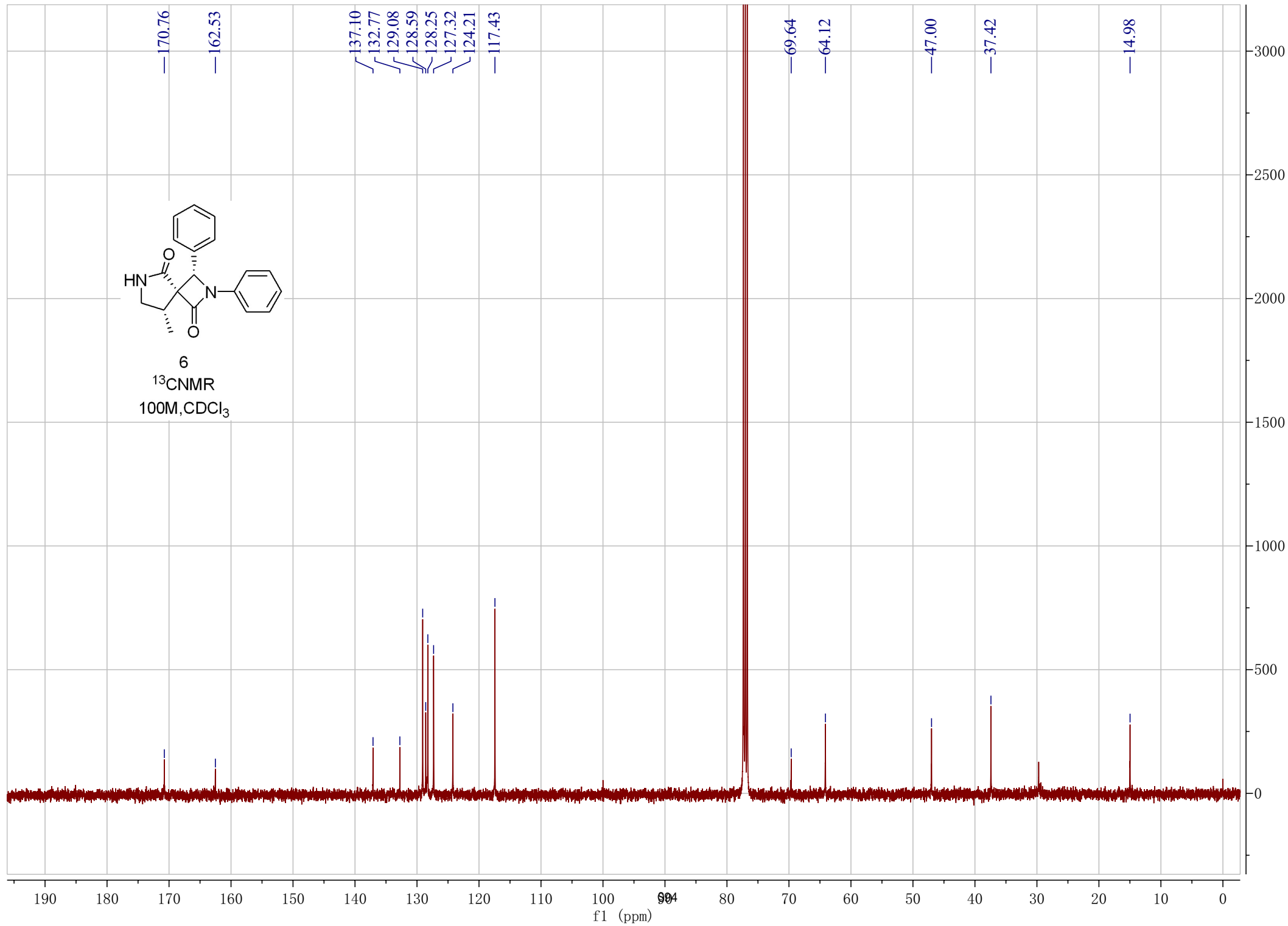
$^1\text{H NMR}$
400M, CDCl_3

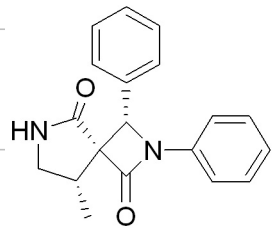




6

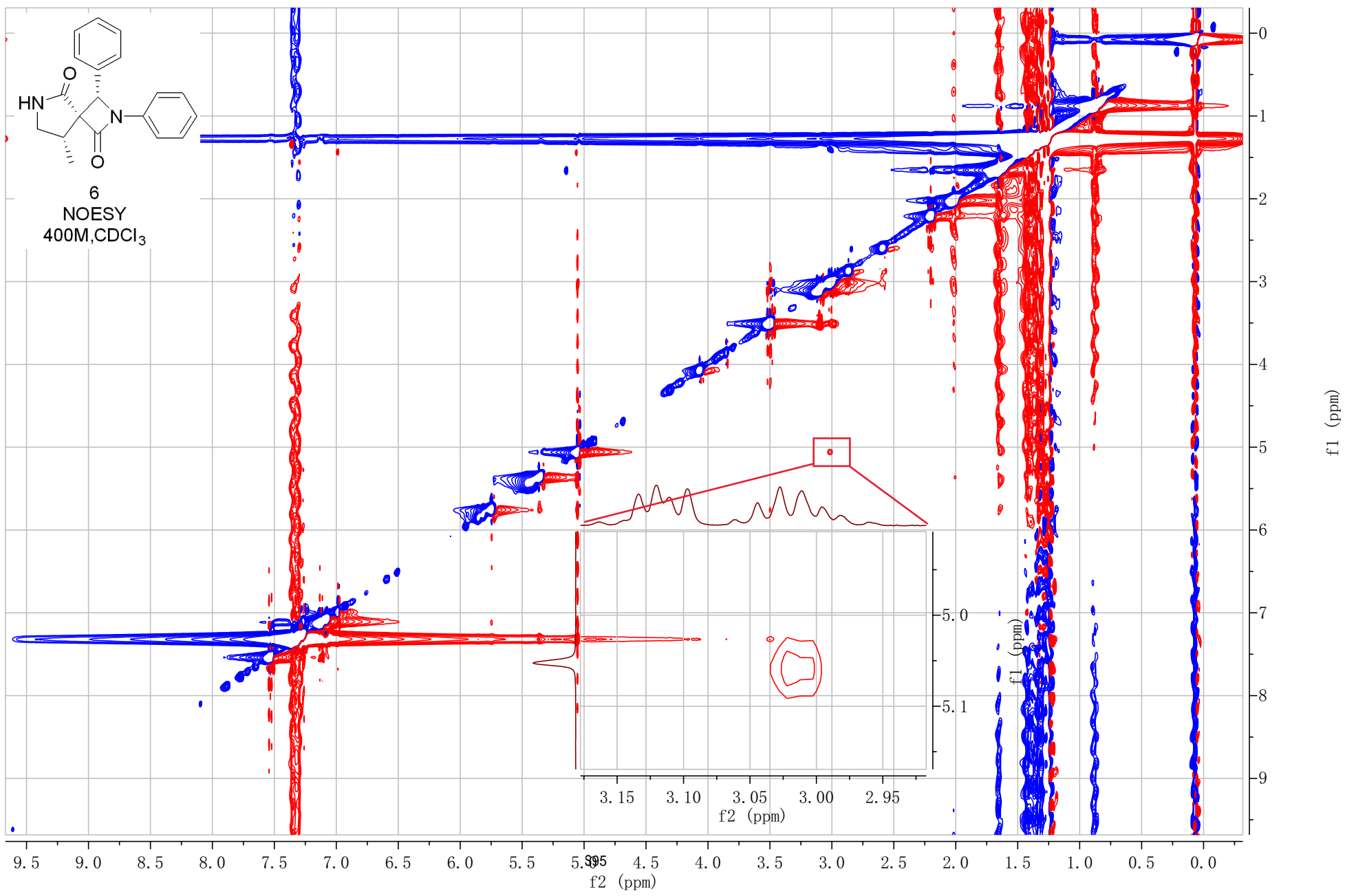
¹³CNMR
100M, CDCl₃





6

NOESY
400M, CDCl₃





SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : Isy-Bn-X-0701-AS20%

Data name : Isy-Bn-X-0701-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

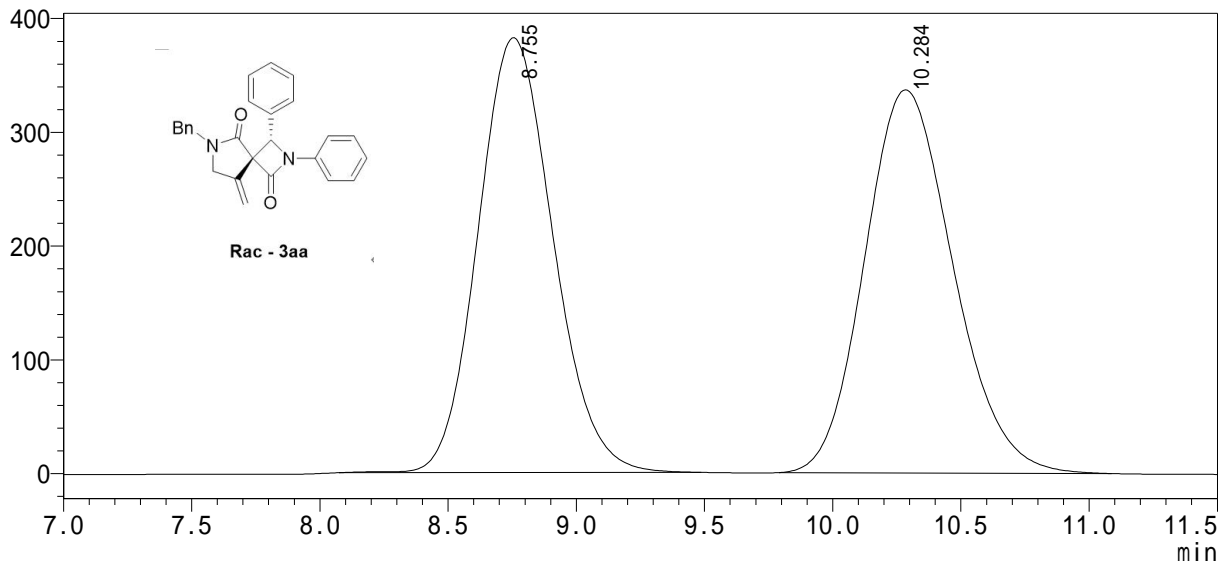
Ana. Date : 2023/7/1 10:56:48

Analyst : System Administrator

Pro. Date : 2023/7/1 11:18:32

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	8.755	7771542	382132	49.011		M	
2	10.284	8085096	336711	50.989		M	
Sum		15856639	718843				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0711-L23-Bn-AS20%

Data name : LSY-0711-L23-Bn-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

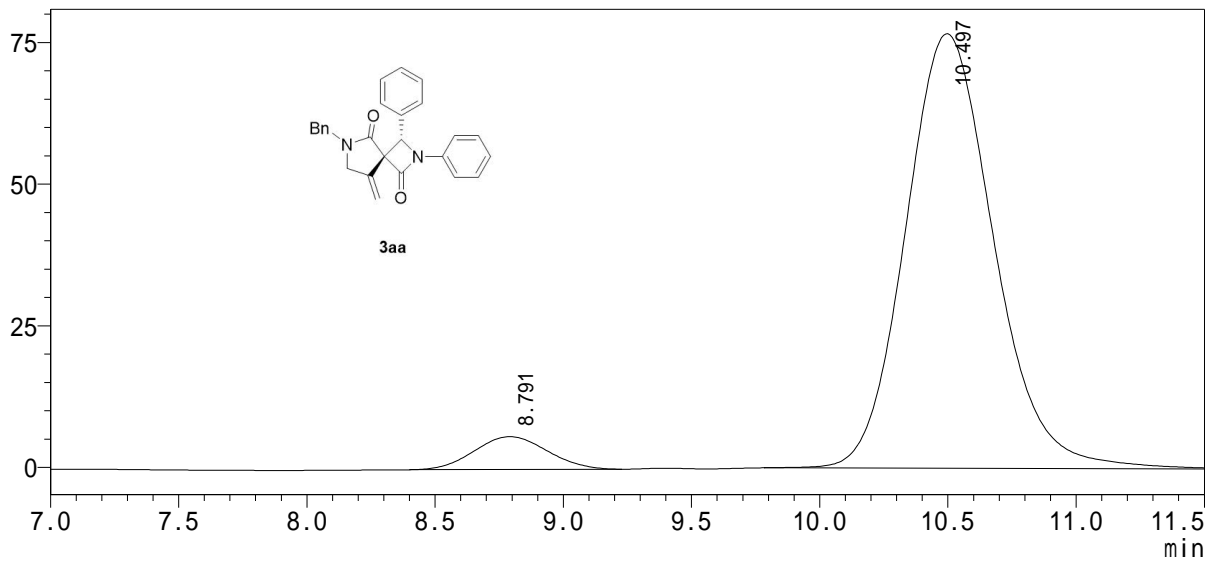
Ana. Date : 2023/7/11 21:35:04

Analyst : System Administrator

Pro. Date : 2023/7/14 16:38:00

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	8.791	114070	5791	5.857		M	
2	10.497	1833433	76706	94.143		M	
Sum		1947502	82498				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY0-0708-AS20%

Data name : LSY0-0708-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

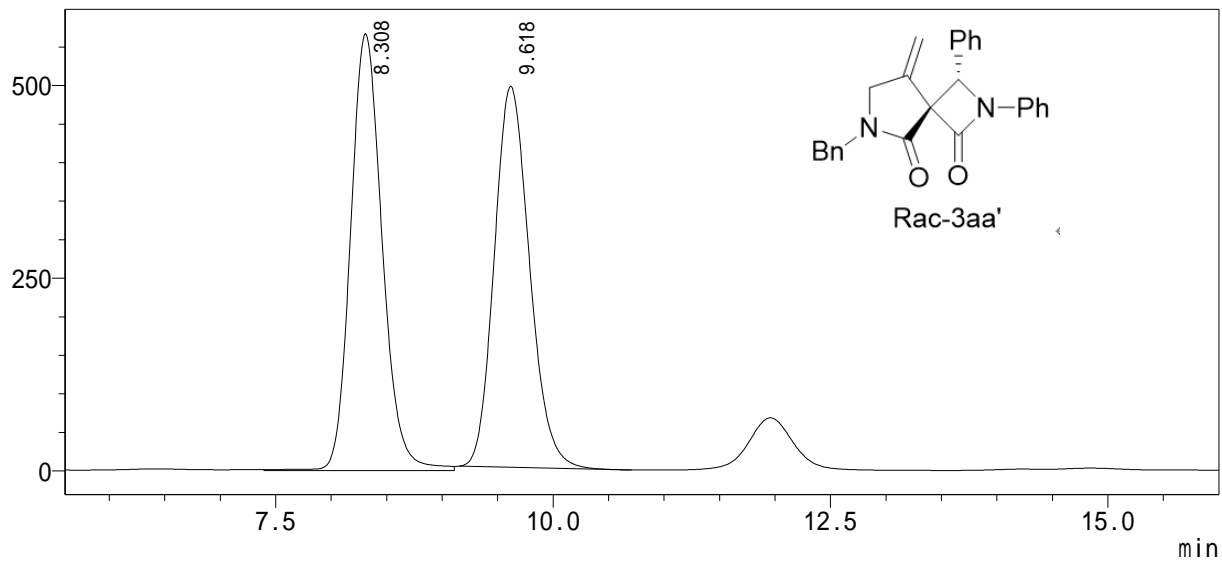
Ana. Date : 2023/7/8 20:07:17

Analyst : System Administrator

Pro. Date : 2024/7/8 9:04:37

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	8.308	11253183	567000	50.758			
2	9.618	10916930	494375	49.242		M	
Sum		22170113	1061376				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-Bn-118-B1-AS20%-0705

Data name : LSY-Bn-118-B1-AS20%-0705.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

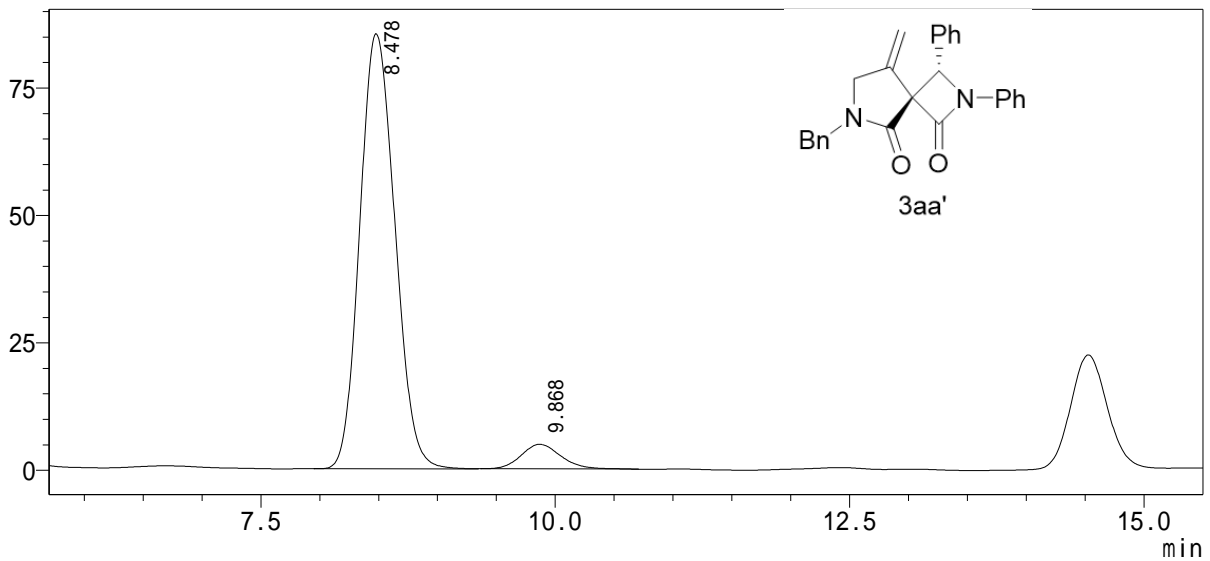
Ana. Date : 2023/7/5 19:18:27

Analyst : System Administrator

Pro. Date : 2024/7/9 11:30:46

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	8.478	1770862	85362	93.995		
2	9.868	113127	4832	6.005	M	
Sum		1883989	90195			



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0722-PMB-290-1-AS20%

Data name : LSY-0722-PMB-290-1-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

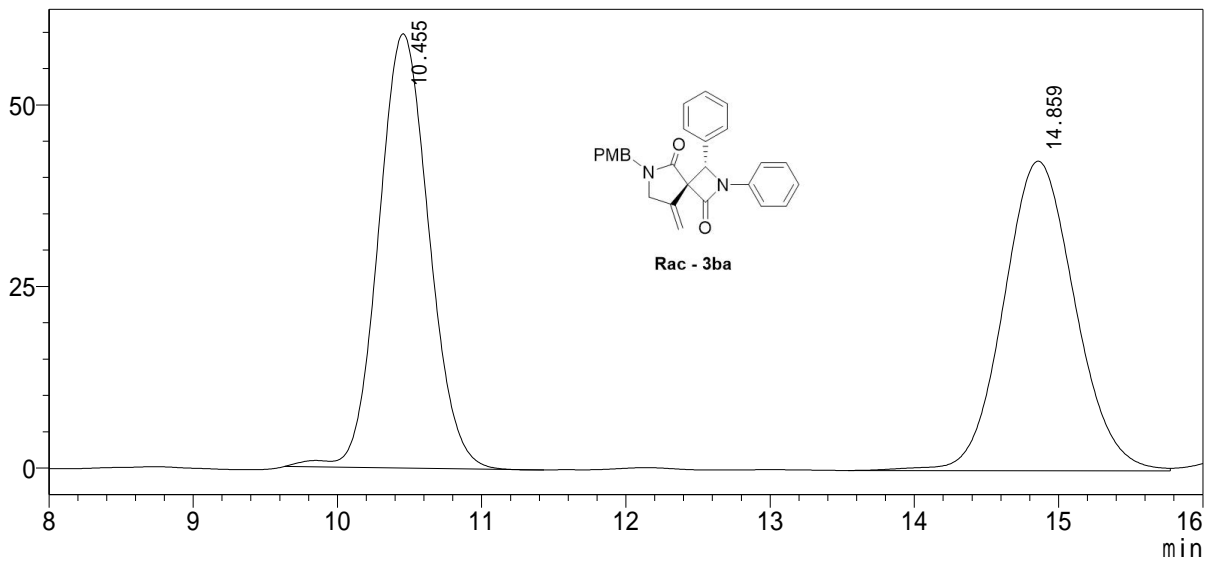
Ana. Date : 2023/7/22 20:02:29

Analyst : System Administrator

Pro. Date : 2024/5/29 15:10:43

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	10.455	1457084	59812	49.862		M
2	14.859	1465135	42640	50.138		
Sum		2922219	102452			



SHIMADZU

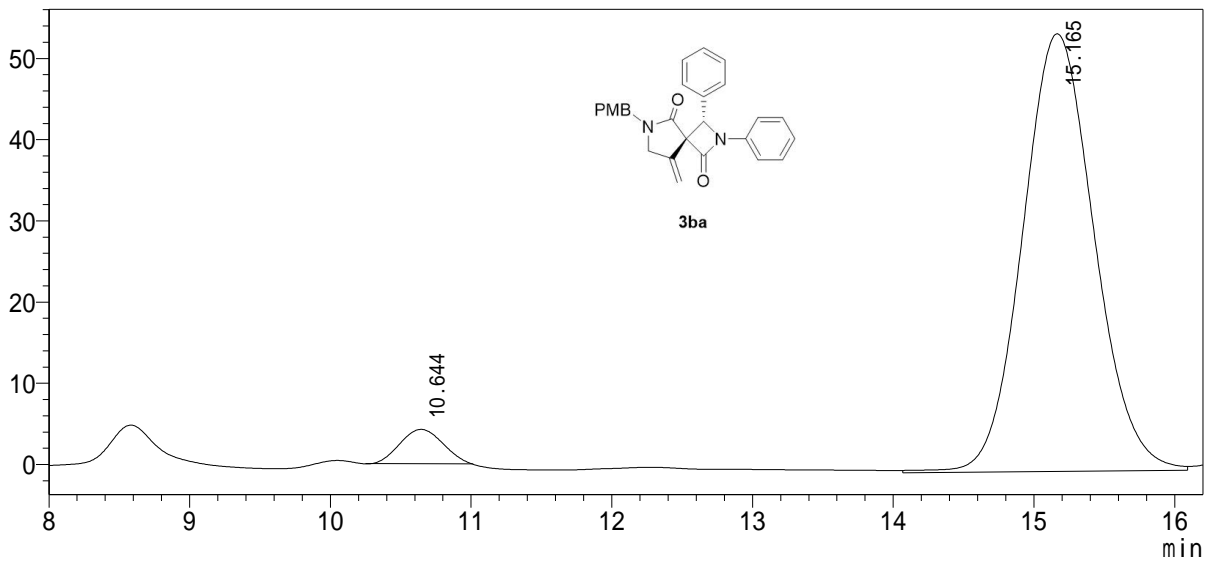
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-PMB-0720-289-1-S-AS20%
Data name : LSY-PMB-0720-289-1-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/20 20:57:27
Pro. Date : 2024/6/25 16:17:34
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	10.644	89049	4212	4.470		M	
2	15.165	1902995	53896	95.530		M	
Sum		1992044	58108				



SHIMADZU

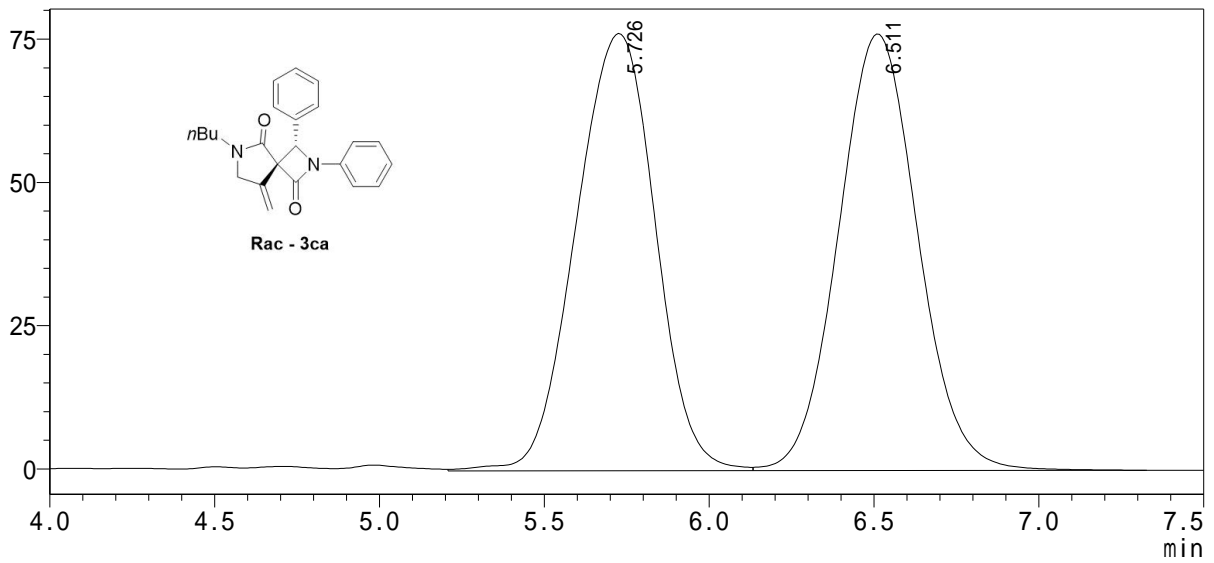
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0725-299-A-AS20%
Data name : LSY-0725-299-x-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/25 15:02:50
Analyst : System Administrator
Pro. Date : 2023/7/25 15:24:18
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	5.726	1275072	76291	50.072			
2	6.511	1271409	76171	49.928		V	
Sum		2546481	152462				



SHIMADZU

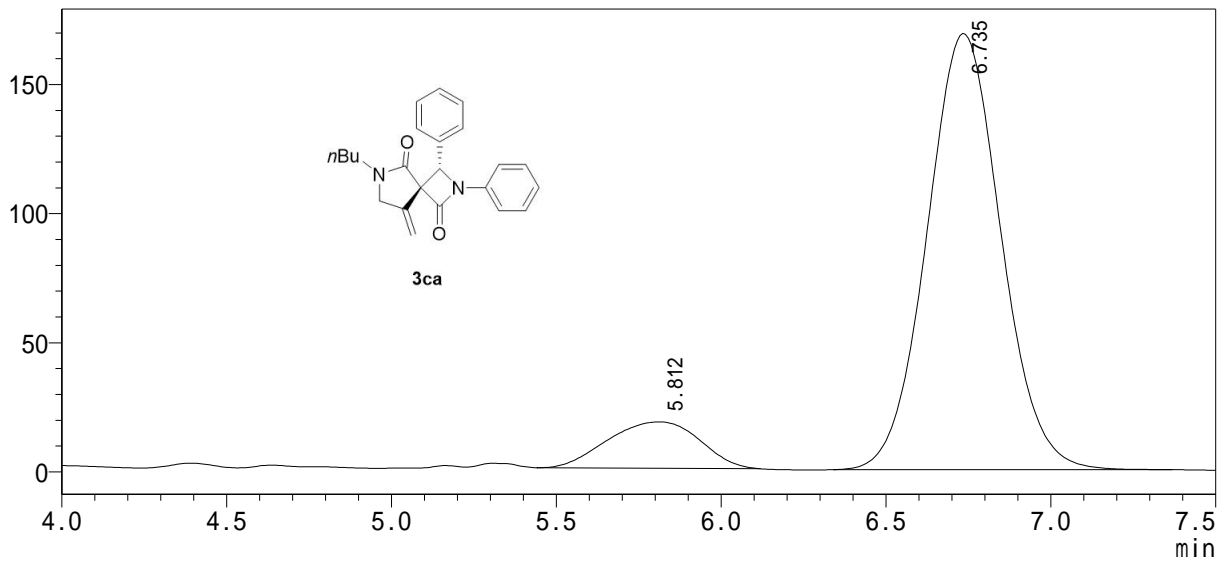
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-303-A1
Data name : LSY-0727-299-s-AS20%.lcm
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/27 15:58:20
Pro. Date : 2023/7/27 16:15:47
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	5.812	347867	17974	11.686		M
2	6.735	2628919	168940	88.314		M
Sum		2976786	186914			



SHIMADZU

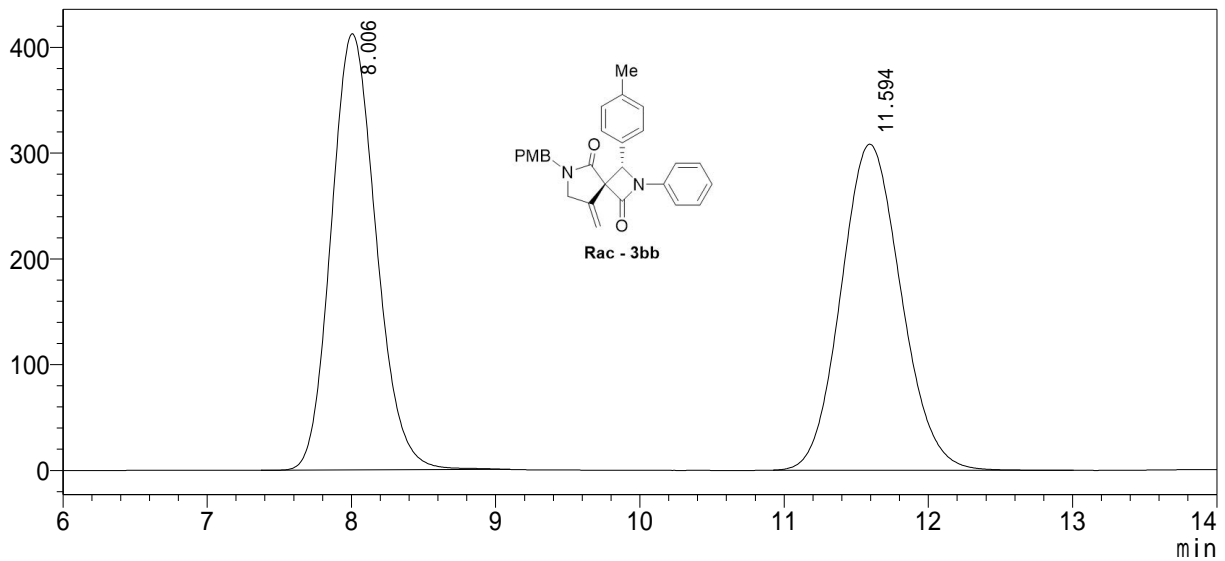
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0819-310-b2-X-AS20%
Data name : LSY-0819-310-b1-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/8/19 15:29:17
Pro. Date : 2023/8/19 15:57:56
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	8.006	8927607	412434	50.007		M	
2	11.594	8925212	308237	49.993		M	
Sum		17852819	720671				



SHIMADZU

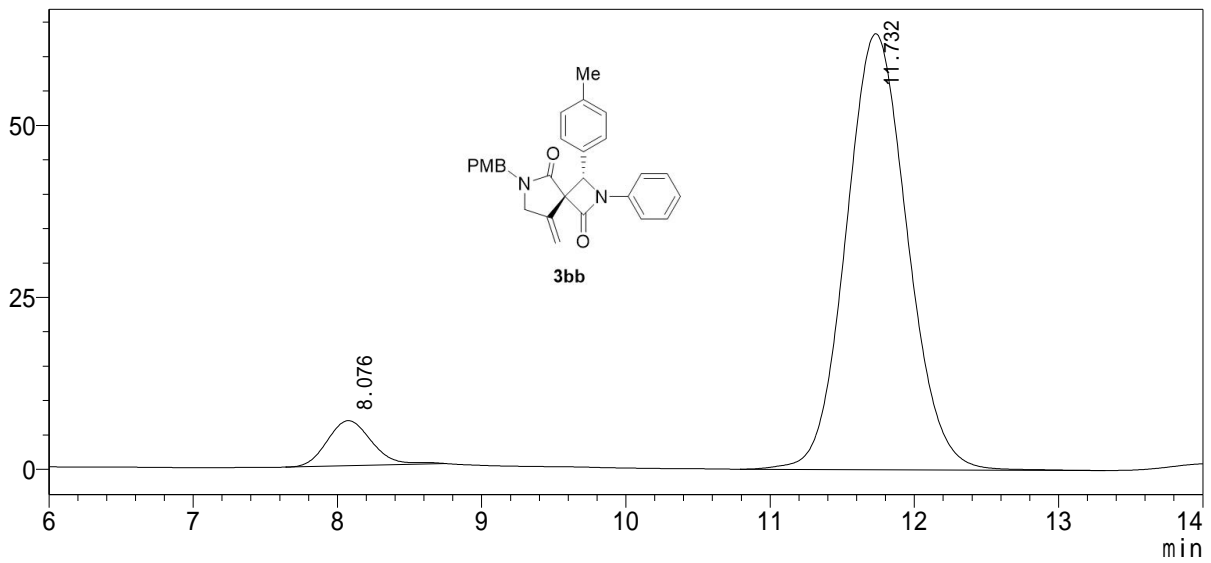
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0818-314-b2-s-AS20%
Data name : LSY-0818-314-b2-s-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/8/18 18:31:03
Pro. Date : 2023/11/1 17:14:20
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	8.076	140103	6537	6.974		M
2	11.732	1868754	63346	93.026		
Sum		2008857	69883			



SHIMADZU

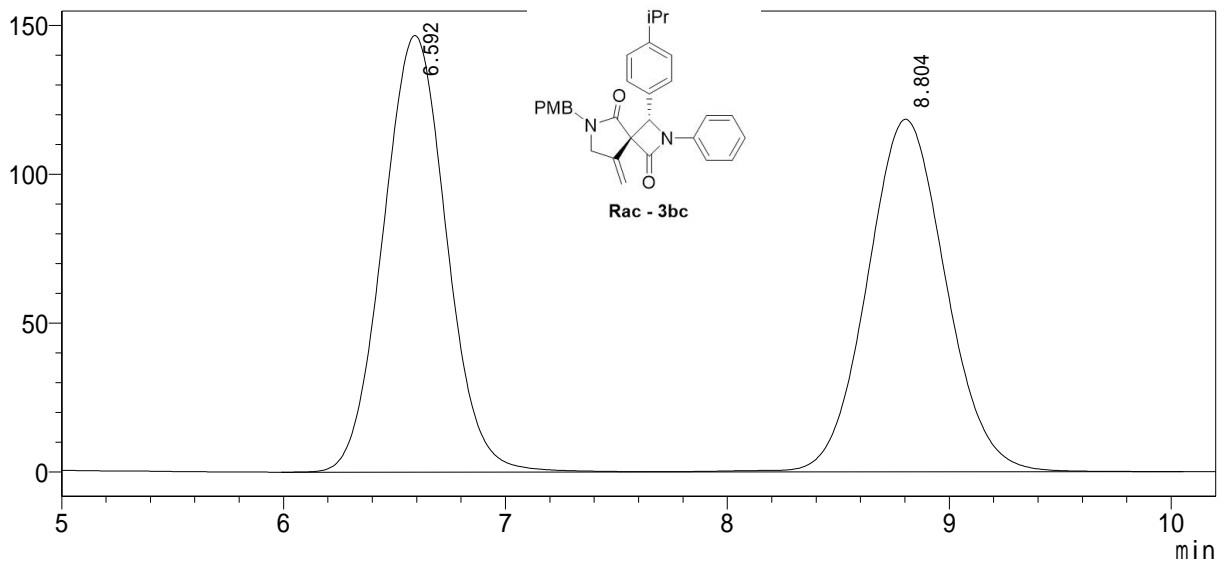
LabSolutions

HPLC Replot

<Sample Information>

Sample name : ISY-1031-419-ipr-AS20 %
Data name : ISY-1031-419-ipr-AS20 %.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/10/31 15:50:29
Pro. Date : 2023/11/1 16:06:24
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	6.592	2917819	146700	50.023			
2	8.804	2915078	118452	49.977		V	
Sum		5832897	265152				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0914-S-354-B2-AS20%

Data name : LSY-0914-S-354-B2-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

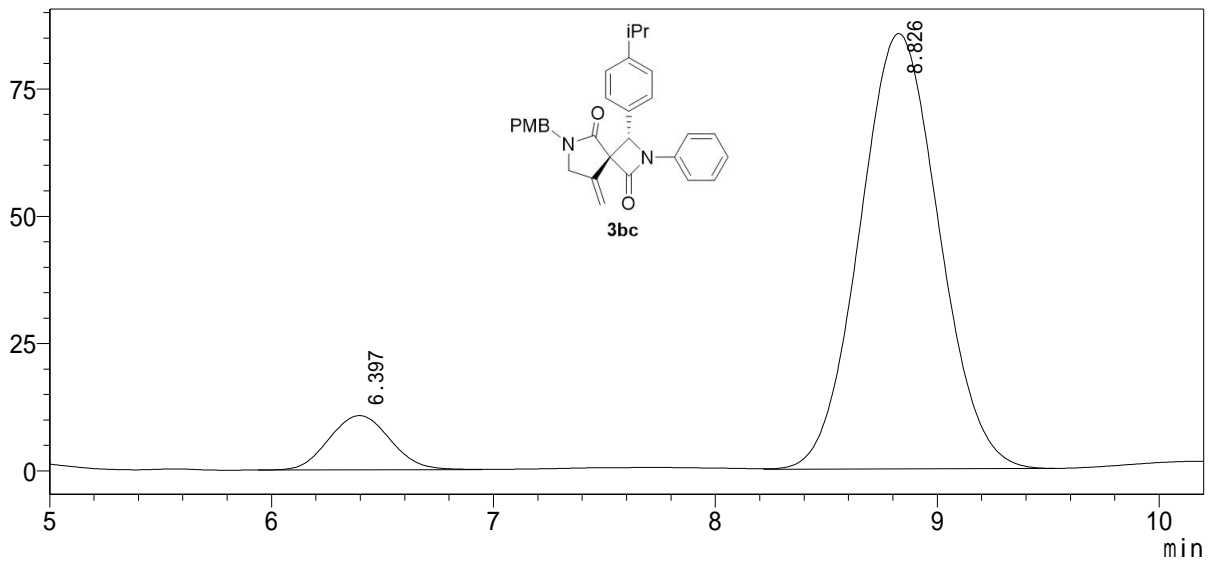
Ana. Date : 2023/9/14 16:59:16

Analyst : System Administrator

Pro. Date : 2023/9/14 17:10:10

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	6.397	204444	10662	8.791	V	
2	8.826	2121062	85522	91.209		
Sum		2325506	96185			



SHIMADZU

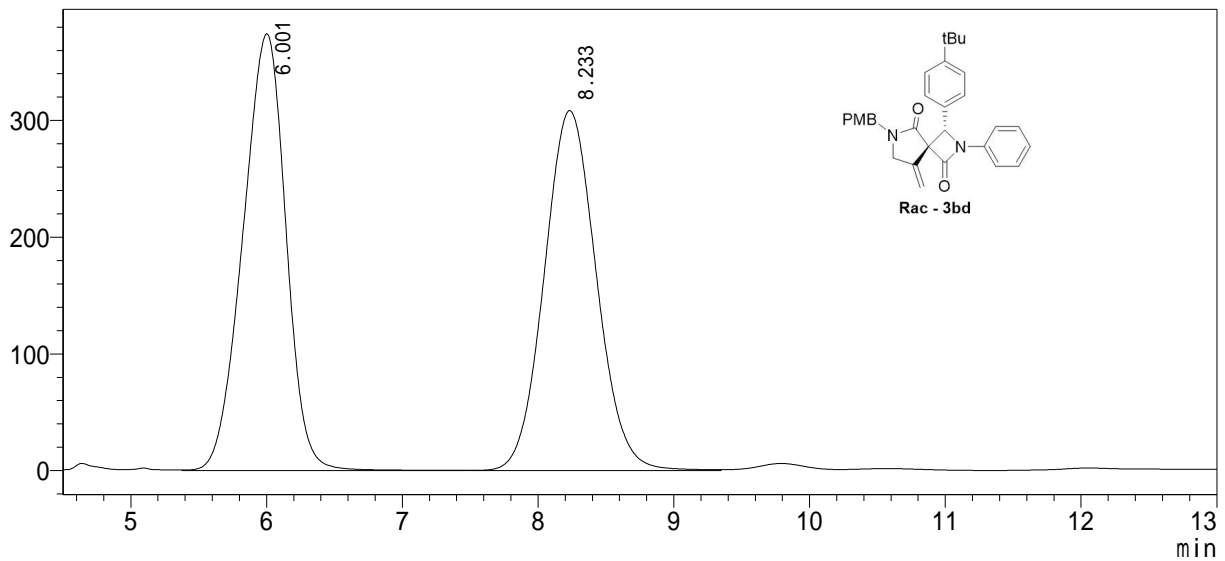
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0921-361-B1-X-AS20%
Data name : LSY-0921-361-B1-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/21 15:06:46
Pro. Date : 2024/5/29 15:14:52
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	6.001	8246536	374286	50.046			
2	8.233	8231454	308448	49.954	V		
Sum		16477990	682734				



SHIMADZU

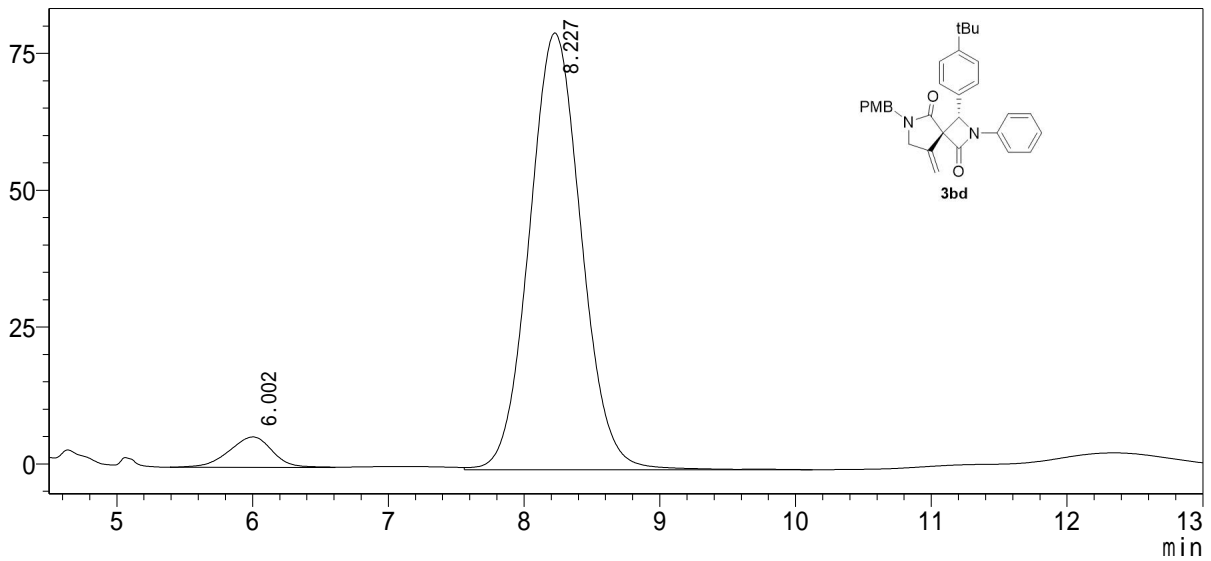
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0921-362-B1-1-AS20%
Data name : LSY-0921-362-B1-1-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/21 16:52:50
Analyst : System Administrator
Pro. Date : 2024/5/29 15:14:25
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	6.002	123807	5564	5.517		
2	8.227	2120319	79787	94.483	S	
Sum		2244126	85352			



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0927-367-B1-X-AS20%

Data name : LSY-0927-367-B1-X-AS20%001.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

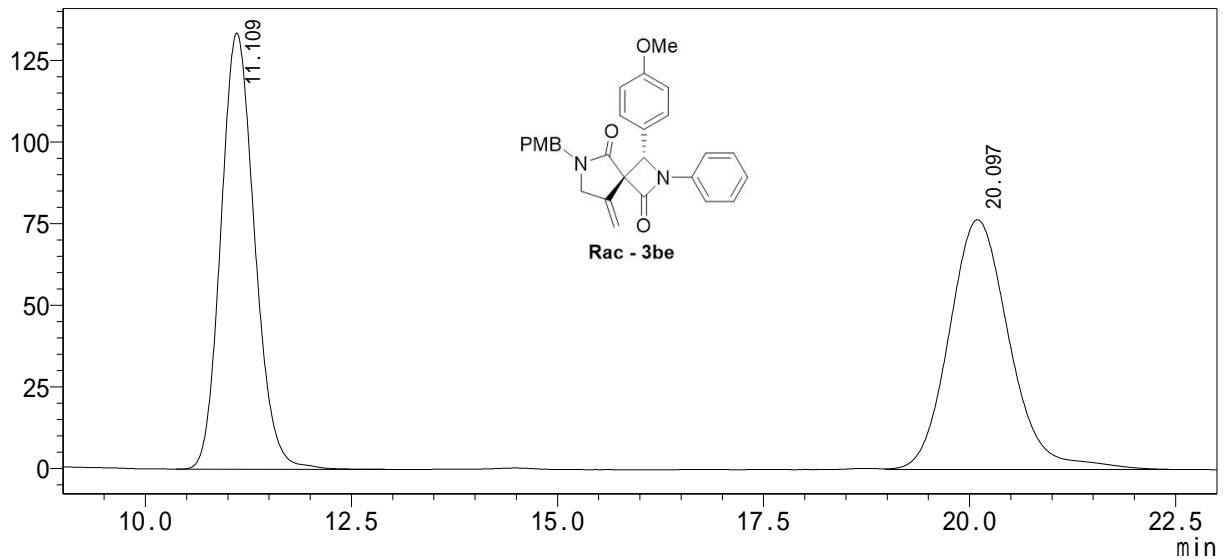
Ana. Date : 2023/9/27 16:11:38

Analyst : System Administrator

Pro. Date : 2023/9/27 17:21:50

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	11.109	3805717	133589	49.416			
2	20.097	3895707	76526	50.584			
Sum		7701424	210115				



SHIMADZU

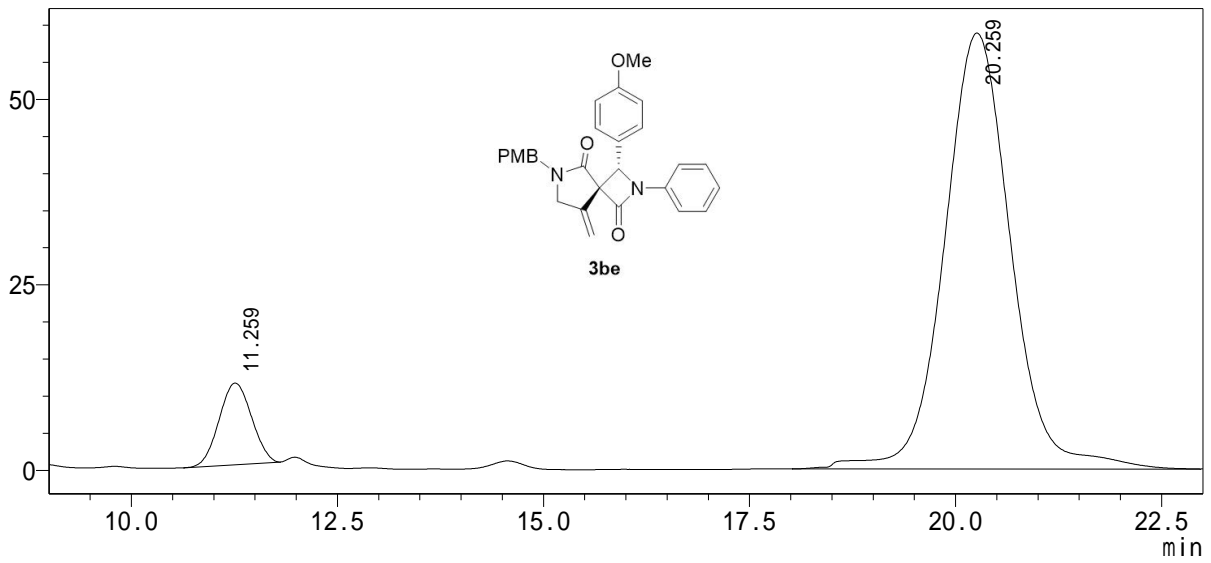
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : ISY-0928-370-B1-AS20%
Data name : ISY-0928-370-B1-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/28 14:30:29
Analyst : System Administrator
Pro. Date : 2023/9/28 15:09:09
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	11.259	301942	11010	8.386		M
2	20.259	3298402	58784	91.614		
Sum		3600343	69794			



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0921-361-B2-X-AS20%

Data name : LSY-0921-361-B2-X-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

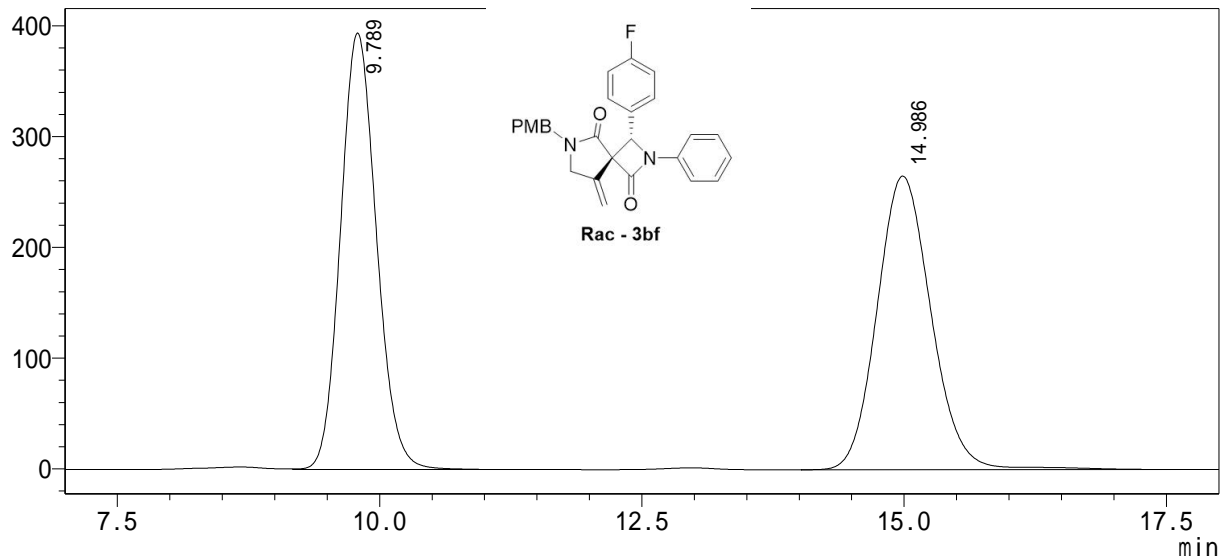
Ana. Date : 2023/9/21 15:34:42

Analyst : System Administrator

Pro. Date : 2023/9/21 21:59:33

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	9.789	9395084	394122	49.739			
2	14.986	9493682	265028	50.261			
Sum		18888766	659150				



SHIMADZU

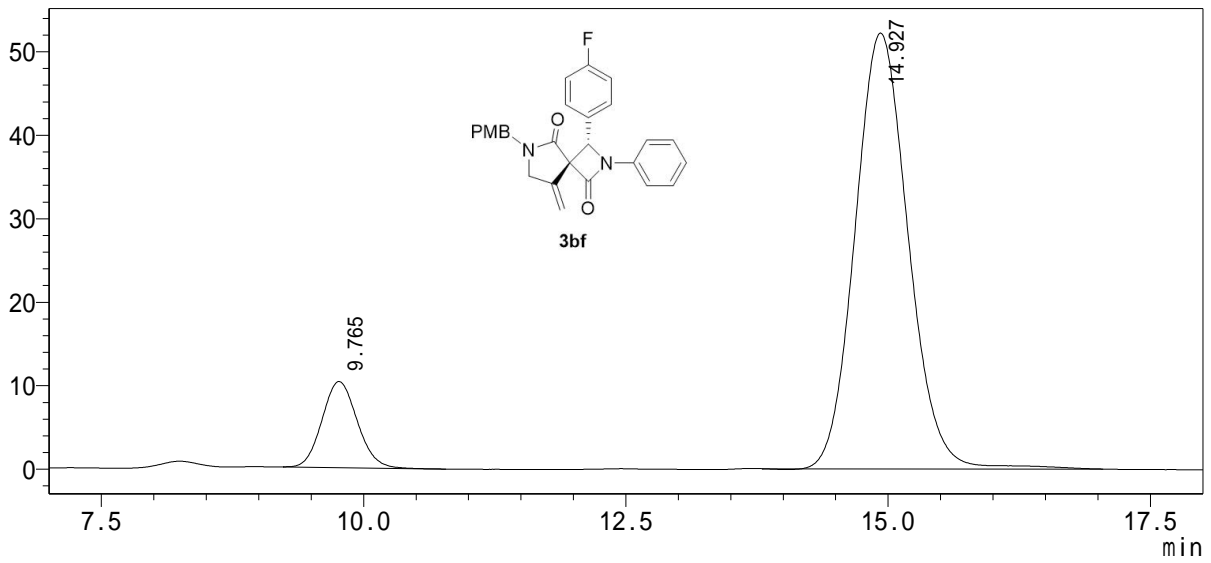
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0921-362-B2-S-AS20%
Data name : LSY-0921-362-B2-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/21 16:21:23
Pro. Date : 2023/9/21 16:48:57
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	9.765	240746	10311	11.588			
2	14.927	1836717	52208	88.412		M	
Sum		2077463	62519				



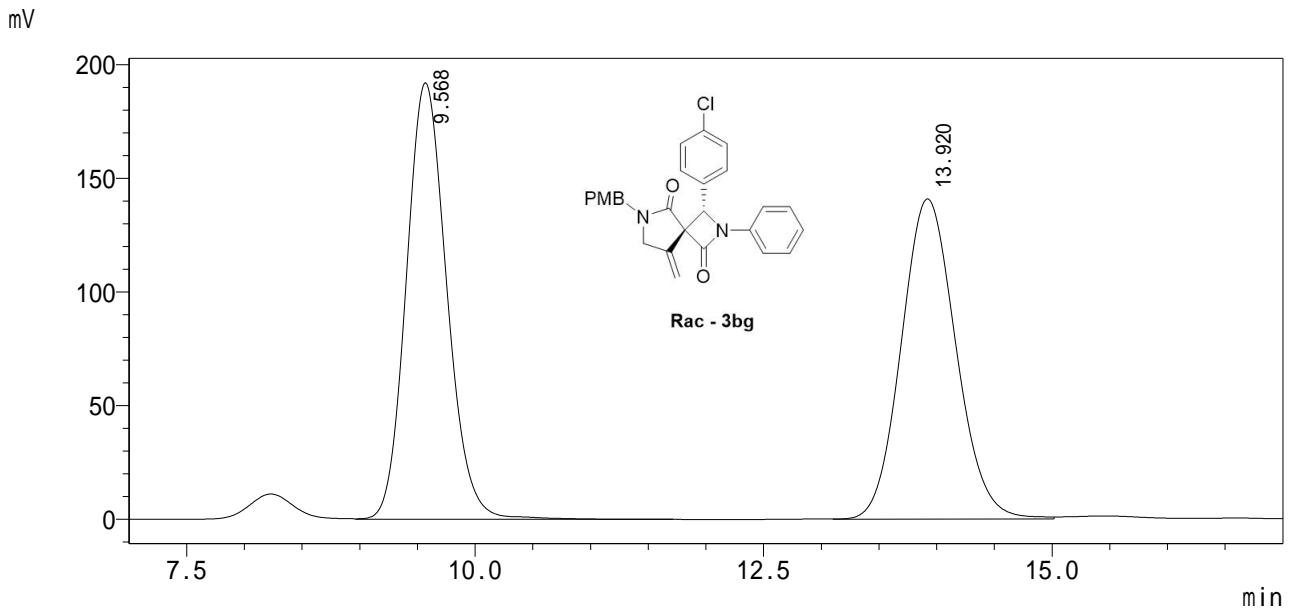
SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0921-363-B3-X-AS20%
Data name : LSY-0921-363-B3-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/21 17:13:10
Pro. Date : 2023/9/22 15:53:18
Analyst : System Administrator
Processor : System Administrator



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	9.568	4694542	192076	50.286			
2	13.920	4641093	140948	49.714			
Sum		9335635	333025				



SHIMADZU

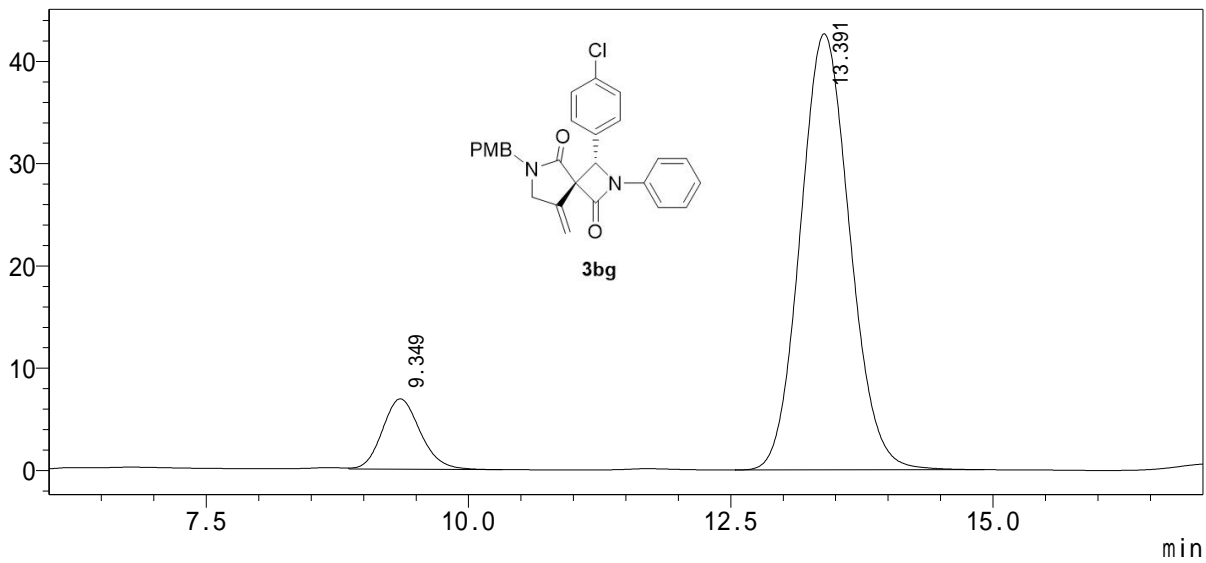
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : ISY-1102-425-B1-AS20 %
Data name : ISY-1102-425-B1-AS20 %.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/2 15:53:54
Pro. Date : 2024/5/6 15:31:33
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	9.349	173200	6871	11.013			
2	13.391	1399543	42650	88.987			
Sum		1572743	49521				



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0907-334-B1-X-AS20%

Data name : LSY-0907-334-B1-X-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

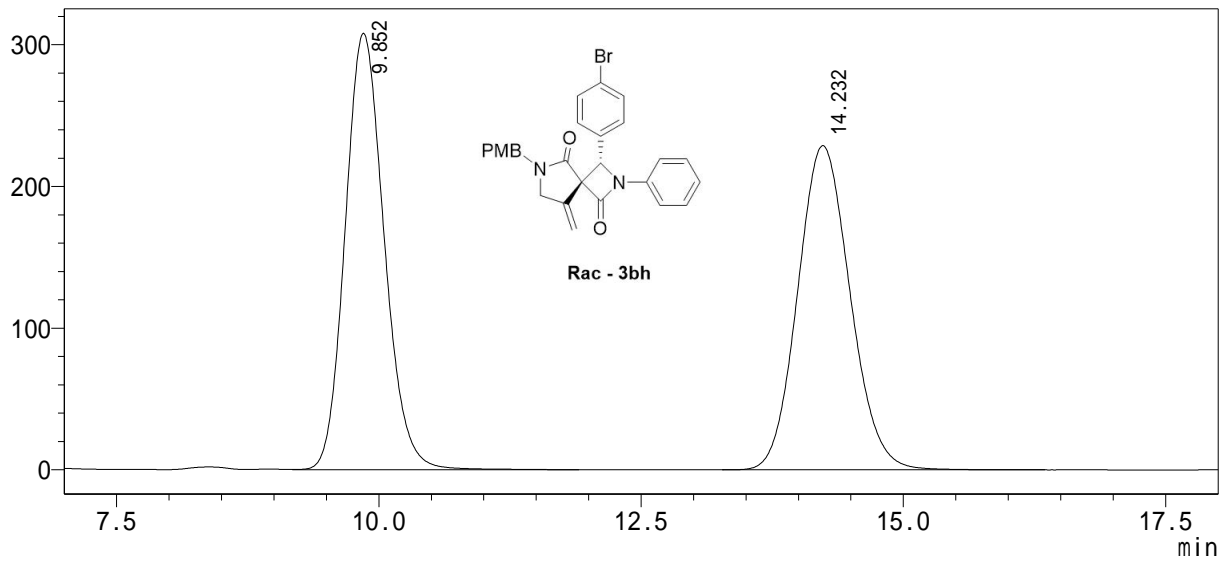
Ana. Date : 2023/9/7 15:49:12

Analyst : System Administrator

Pro. Date : 2023/11/1 16:31:42

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	9.852	7968900	308126	50.057			
2	14.232	7950609	228865	49.943			
Sum		15919509	536991				



SHIMADZU

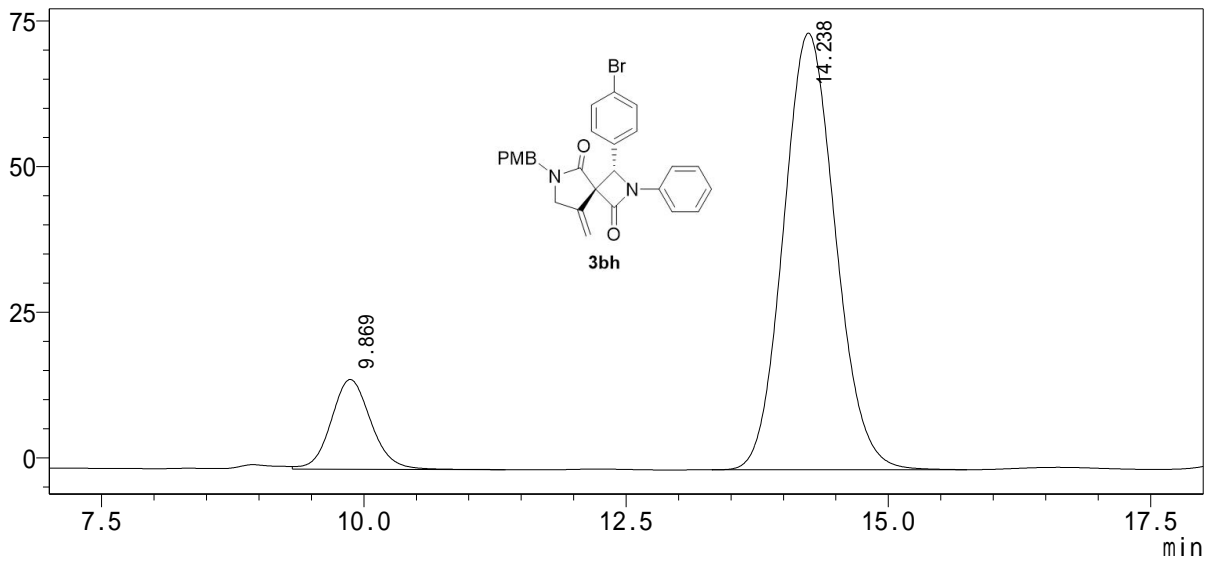
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0907-348-B1-S-AS20%
Data name : LSY-0907-348-B1-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/7 16:11:01
Analyst : System Administrator
Pro. Date : 2023/9/7 16:32:31
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	9.869	407679	15418	13.599			
2	14.238	2590203	74968	86.401			
Sum		2997882	90386				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0824-320-B1-AS20%

Data name : LSY-0824-320-B1-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

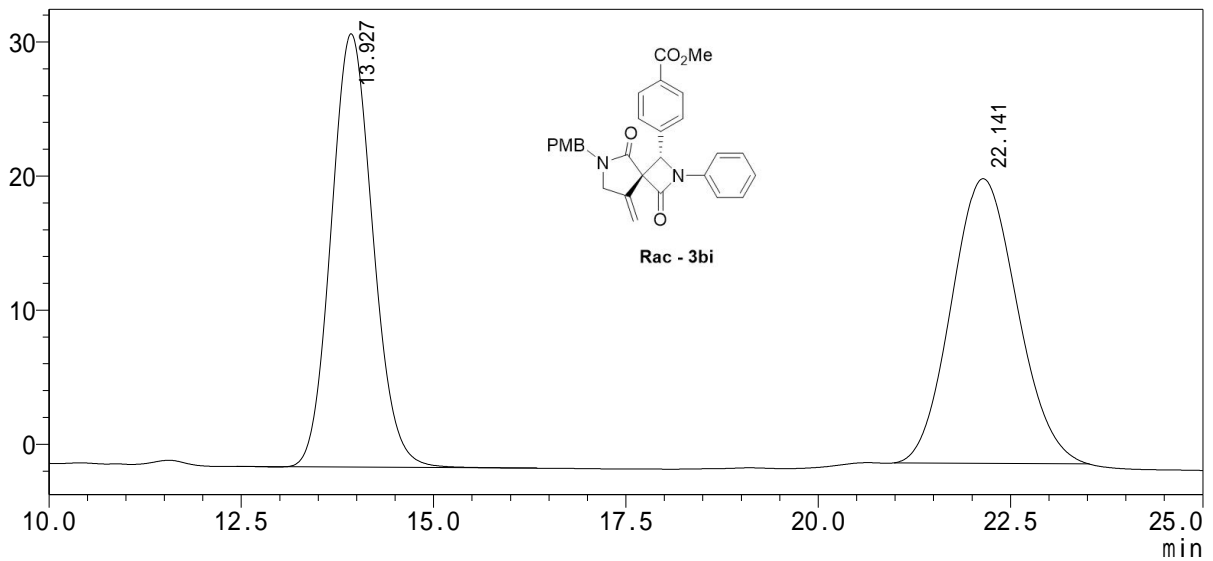
Ana. Date : 2023/8/24 15:46:54

Analyst : System Administrator

Pro. Date : 2023/8/24 16:19:02

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	13.927	1220408	32316	49.211		M	
2	22.141	1259532	21231	50.789		M	
Sum		2479940	53547				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0829-S-330-b1-AS20%

Data name : LSY-0829-S-330-b1-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

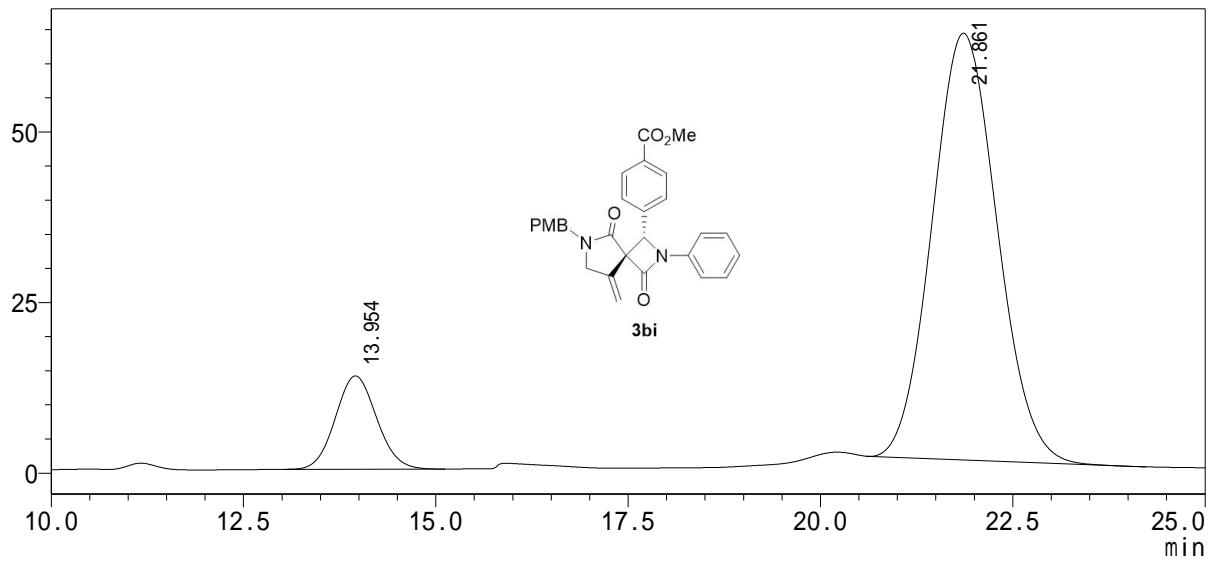
Ana. Date : 2023/8/29 16:33:48

Analyst : System Administrator

Pro. Date : 2023/11/1 16:34:59

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	13.954	511532	13669	12.240			
2	21.861	3667612	62537	87.760		M	
Sum		4179144	76206				



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0906-343-B2-AS20%

Data name : LSY-0906-343-B2-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

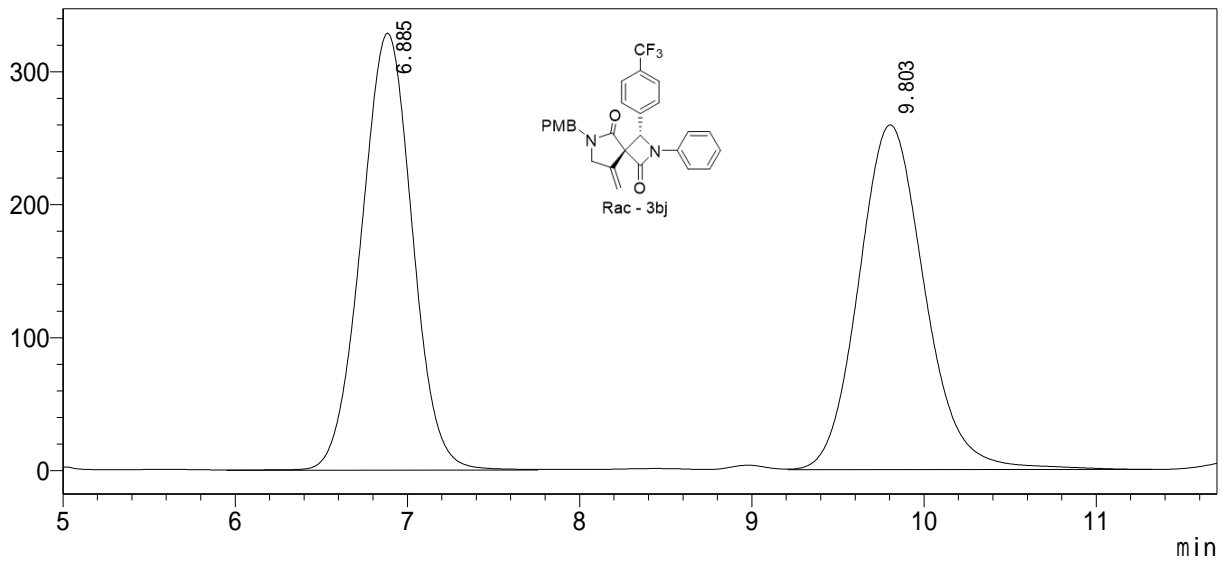
Ana. Date : 2023/9/6 16:18:58

Analyst : System Administrator

Pro. Date : 2024/5/29 14:25:25

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	6.885	6774490	328850	49.458			
2	9.803	6922952	259554	50.542			
Sum		13697442	588405				



SHIMADZU

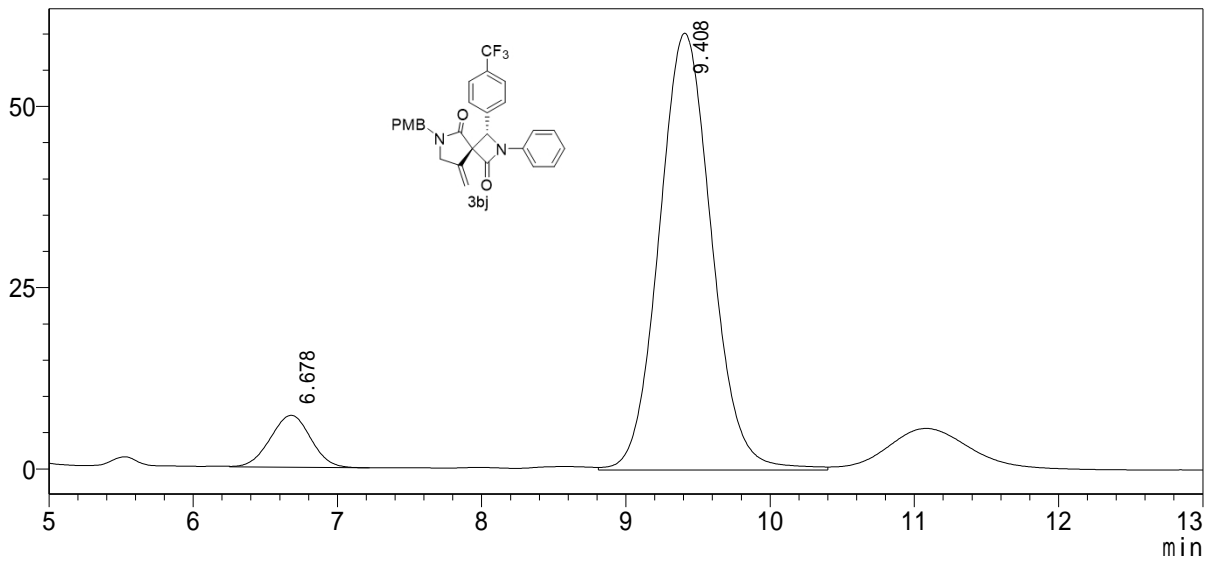
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0915-S-357-B1-AS20%
Data name : LSY-0915-S-357-B1-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/16 15:50:36
Pro. Date : 2024/5/29 11:31:06
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	6.678	140081	7171	8.432	V	
2	9.408	1521151	60232	91.568		
Sum		1661232	67403			



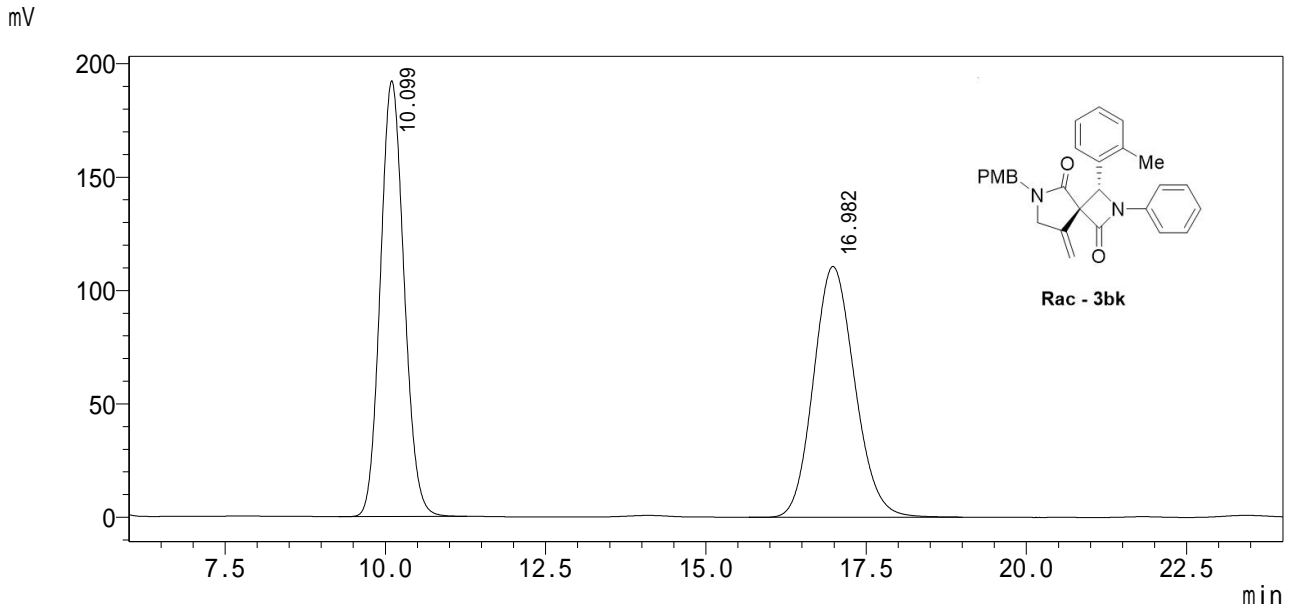
SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0726-301-A-AS20%
Data name : LSY-0726-301-A-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/26 19:55:37
Pro. Date : 2023/7/26 20:52:38
Analyst : System Administrator
Processor : System Administrator



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	10.099	4953103	192207	50.023		
2	16.982	4948507	110621	49.977	M	
Sum		9901610	302828			



SHIMADZU

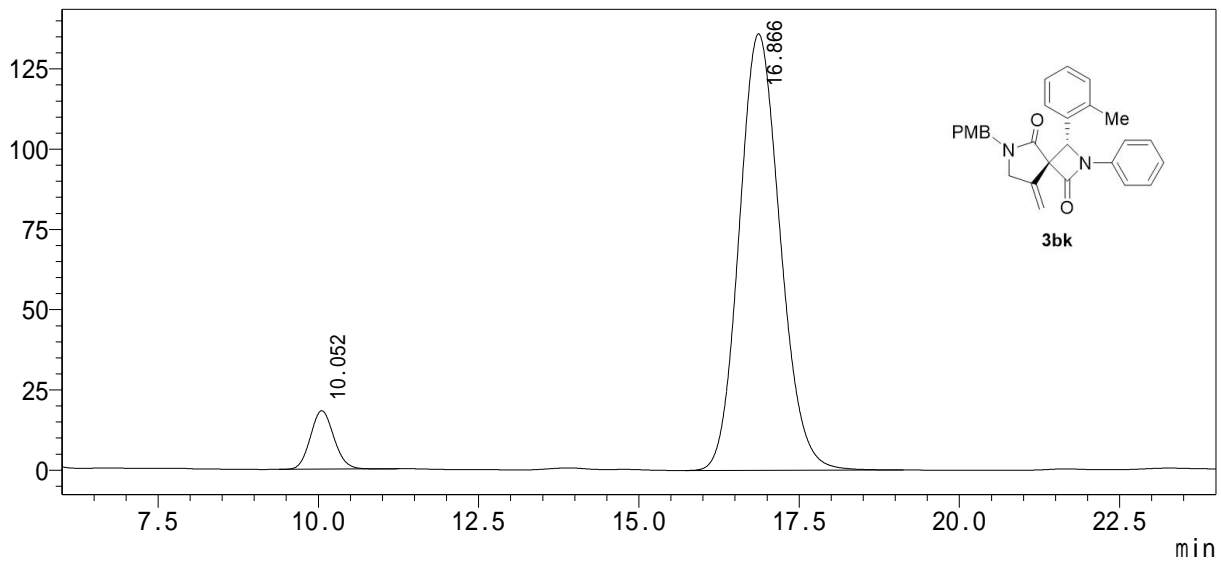
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0726-301-B-AS20%
Data name : LSY-0726-301-B-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/26 20:24:01
Pro. Date : 2024/5/9 14:34:02
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	10.052	463505	18177	7.131		M
2	16.866	6036796	136014	92.869		
Sum		6500301	154191			



SHIMADZU

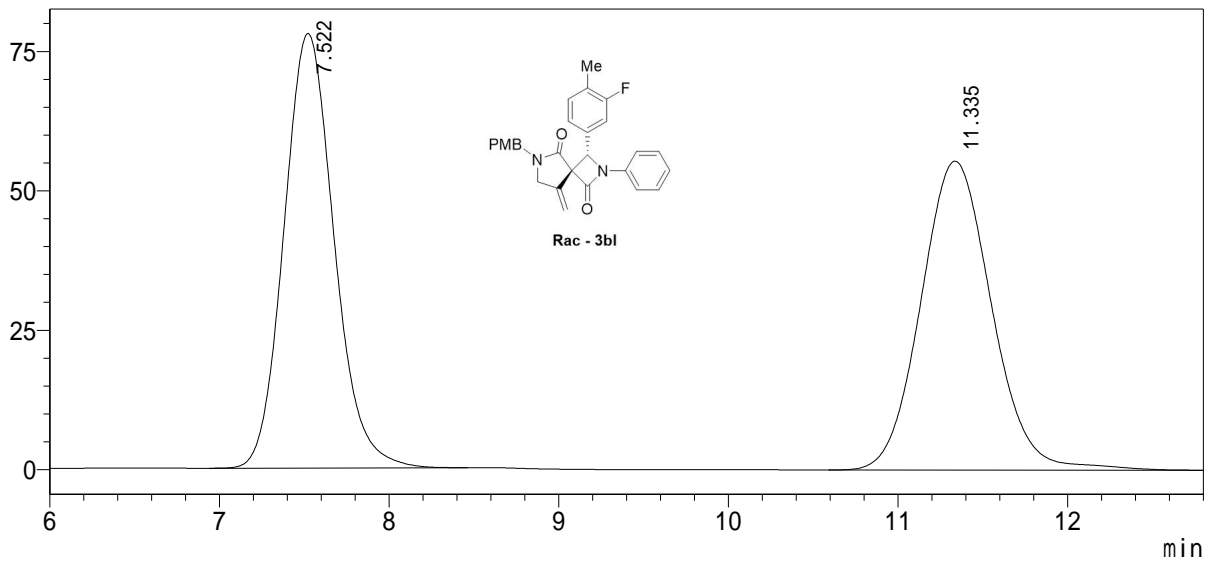
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0818-308-b1-AS20%
Data name : LSY-0818-308-b1-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/8/18 16:31:07
Pro. Date : 2023/8/18 17:14:58
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	7.522	1598310	77925	49.957			
2	11.335	1601061	55410	50.043			
Sum		3199371	133335				



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0818-314-b1-AS20%

Data name : LSY-0818-314-b1-S-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

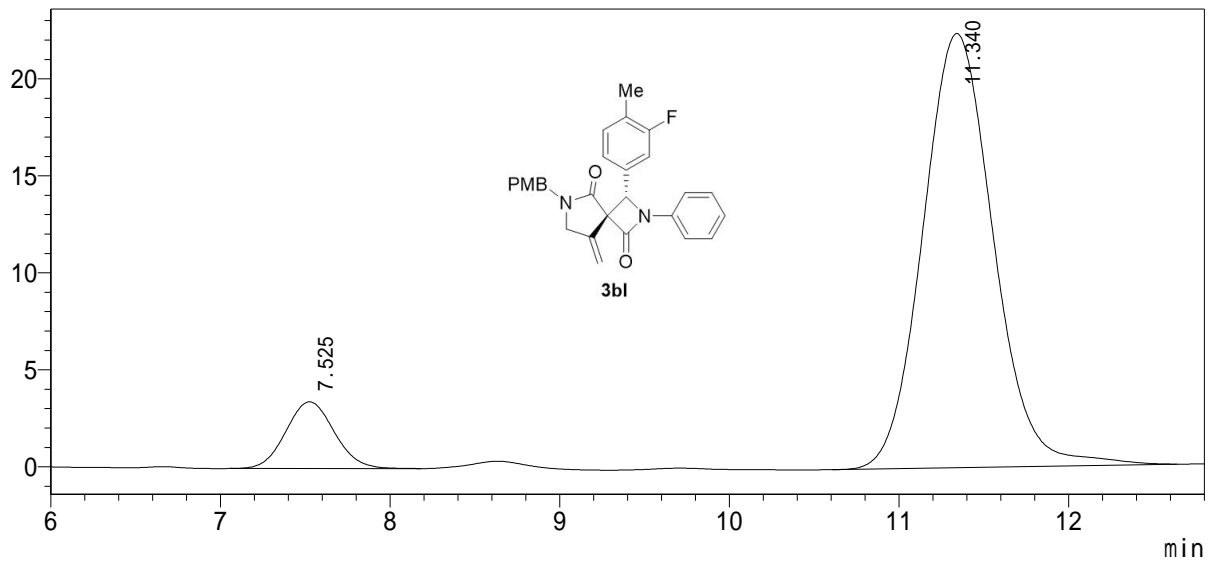
Ana. Date : 2023/8/18 16:51:31

Analyst : System Administrator

Pro. Date : 2023/8/18 17:14:25

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	7.525	68392	3442	9.574			
2	11.340	645952	22382	90.426			
Sum		714343	25824				



SHIMADZU

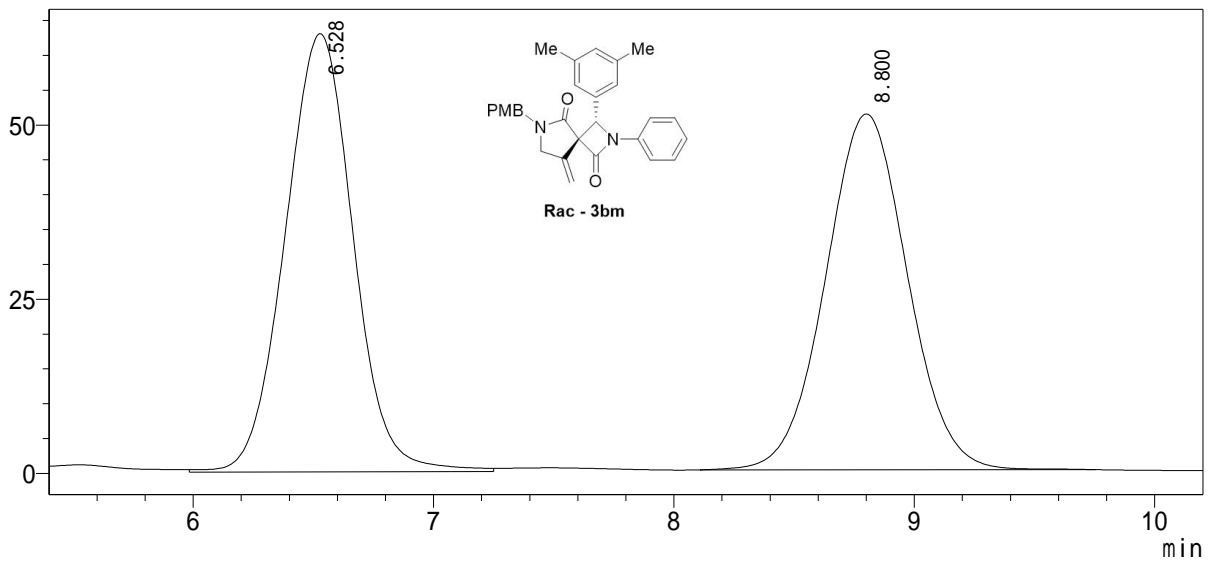
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0927-367-B2-X-AS20%
Data name : LSY-0927-367-B2-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/27 15:27:08
Analyst : System Administrator
Pro. Date : 2023/9/28 12:29:28
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	6.528	1235258	62887	50.567			
2	8.800	1207560	51084	49.433		M	
Sum		2442818	113971				



SHIMADZU

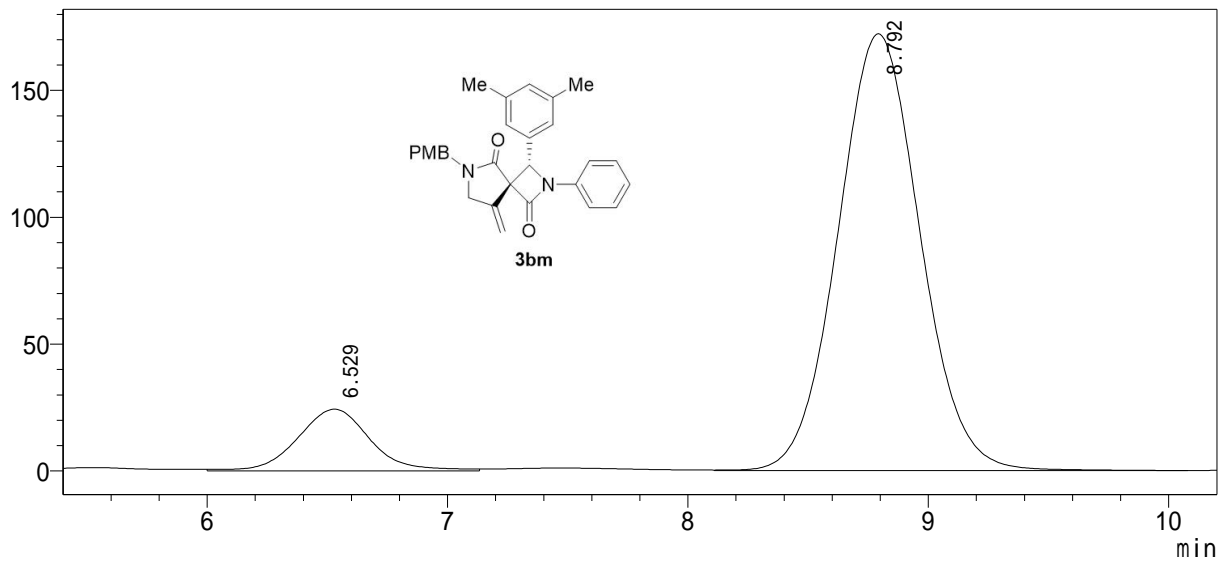
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0927-369-B2-S-AS20%
Data name : LSY-0927-369-B2-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/27 15:46:29
Analyst : System Administrator
Pro. Date : 2023/9/27 16:56:27
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	6.529	509435	24287	11.094			
2	8.792	4082427	172176	88.906			
Sum		4591862	196463				



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0818-310-b1-AS20%

Data name : LSY-0818-310-b2-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

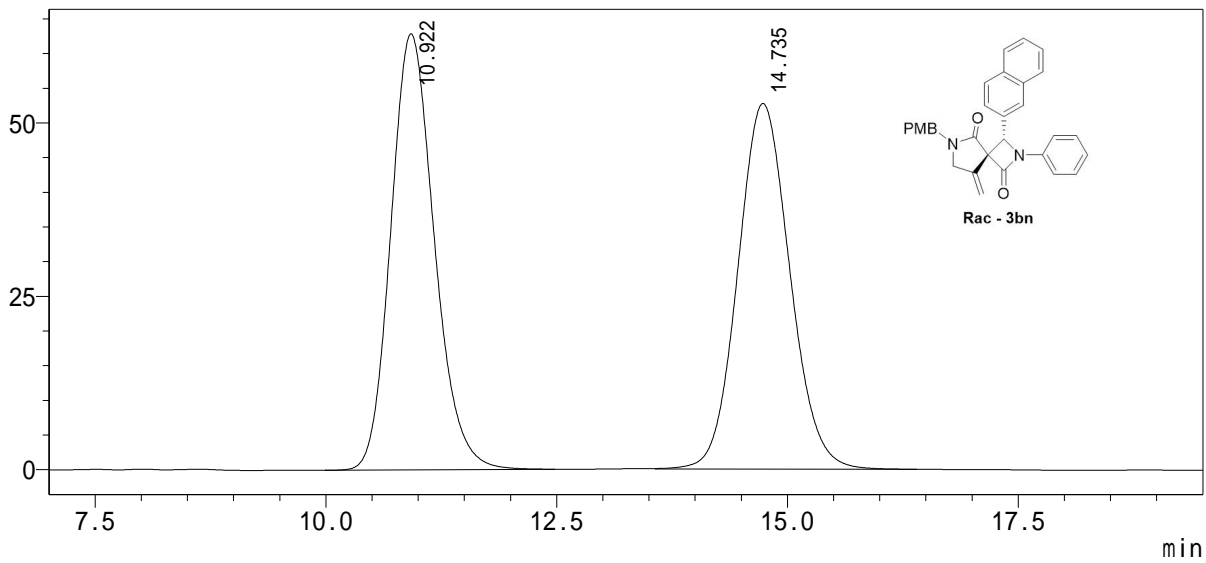
Ana. Date : 2023/8/18 17:17:12

Analyst : System Administrator

Pro. Date : 2024/5/6 16:33:39

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	10.922	2062282	62885	49.971			
2	14.735	2064694	52724	50.029		V	
Sum		4126976	115608				



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-0819-315-B1-S-AS20%

Data name : LSY-0819-315-B1-S-AS20%.lcd

Acq. name : AS-H-20%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

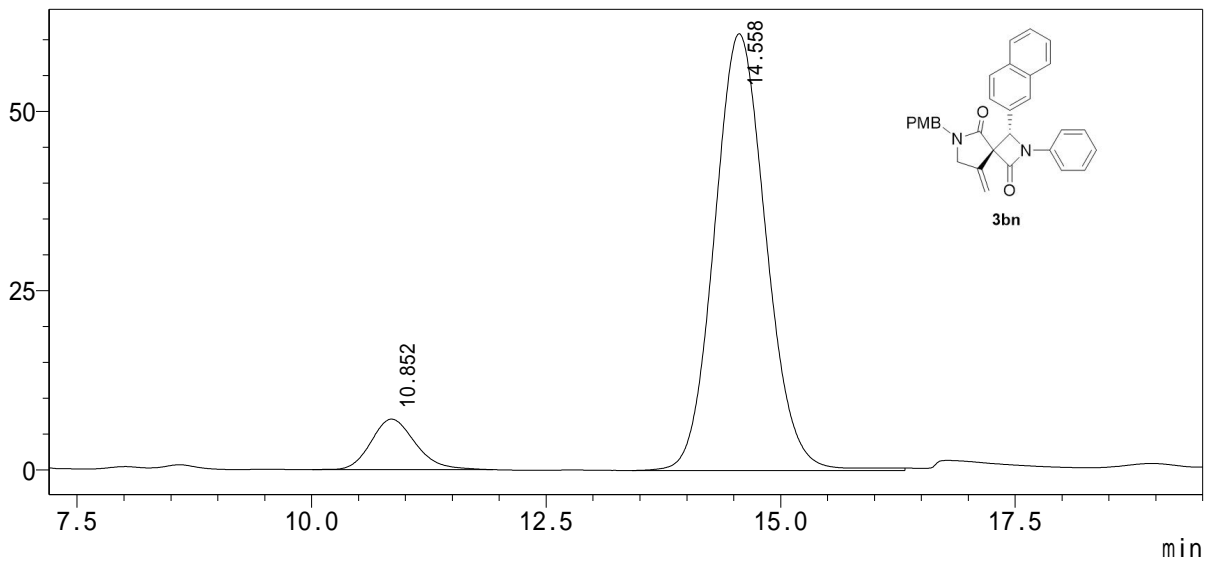
Ana. Date : 2023/8/19 16:13:40

Analyst : System Administrator

Pro. Date : 2024/6/19 17:04:11

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	10.852	231957	7048	9.059		M
2	14.558	2328457	60919	90.941		M
Sum		2560413	67968			



SHIMADZU

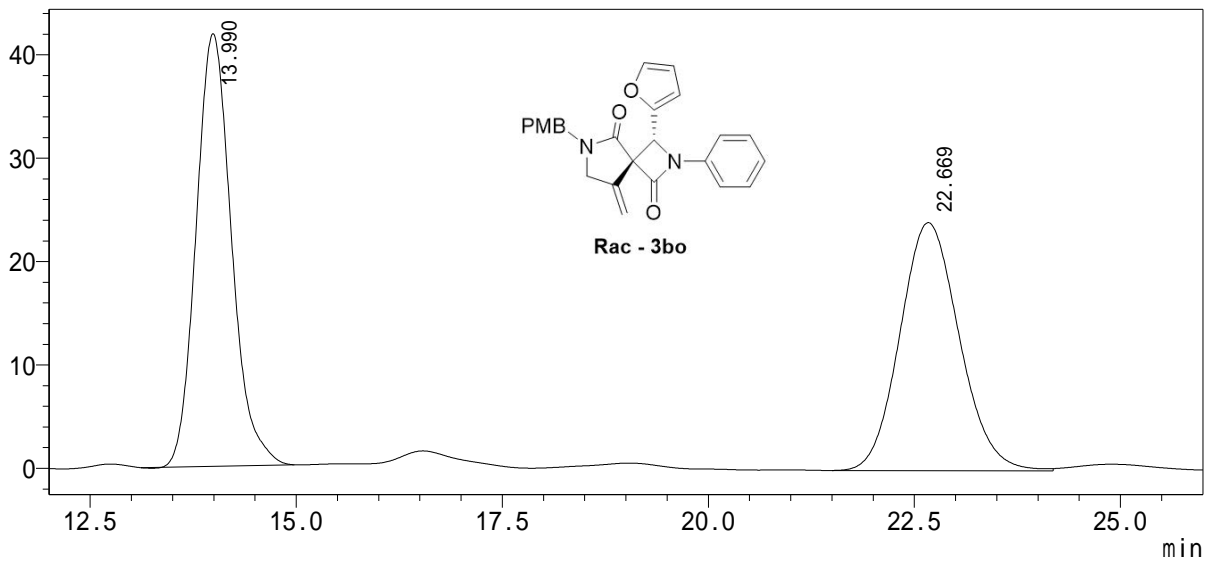
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0726-302-A-AS20%-1
Data name : LSY-0726-302-A-AS20%-1.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/26 21:42:59
Pro. Date : 2024/5/9 16:32:05
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	13.990	1248739	41847	50.983		M
2	22.669	1200607	23993	49.017		M
Sum		2449345	65840			



SHIMADZU

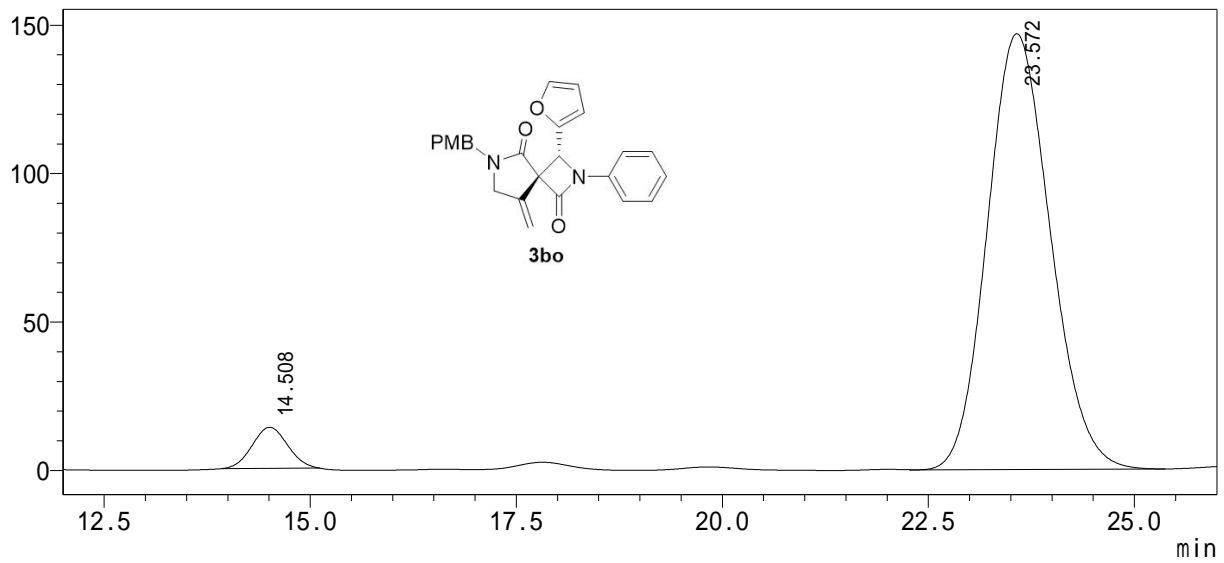
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-0726-302-B-AS20%-1
Data name : LSY-0726-302-B-AS20%-1.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/7/26 19:24:42
Analyst : System Administrator
Pro. Date : 2023/8/23 16:04:15
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	14.508	414084	13837	5.044		M	
2	23.572	7795313	146769	94.956		M	
Sum		8209397	160606				



SHIMADZU

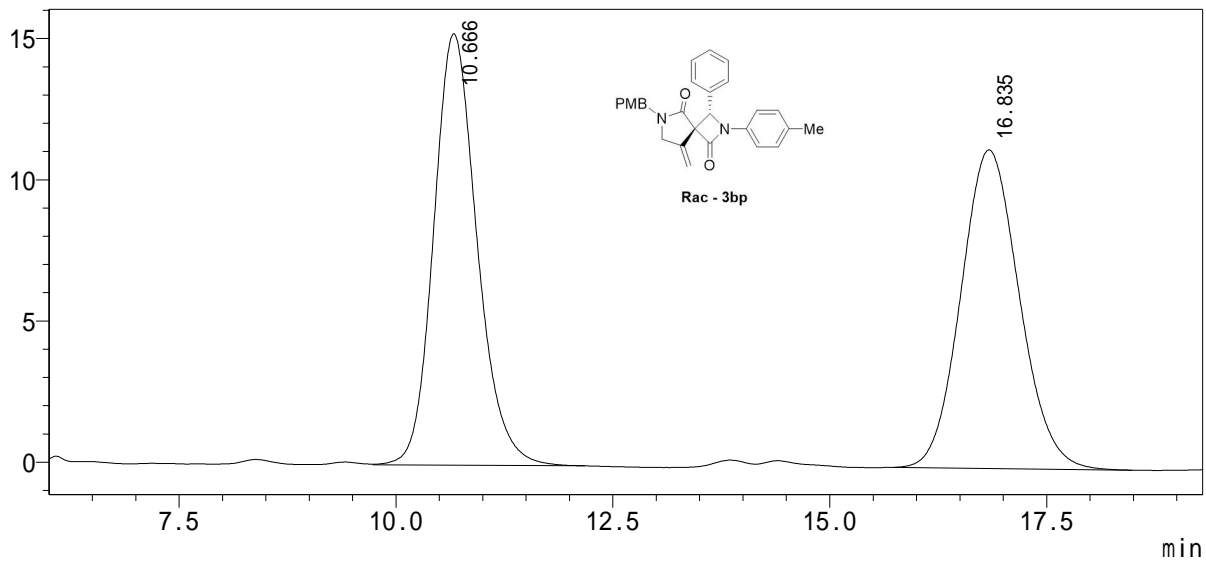
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1021-400-x-AS20%
Data name : LSY-1021-400-x-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/10/21 15:09:38
Pro. Date : 2023/10/30 22:02:58
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	10.666	531538	15276	50.170			
2	16.835	527929	11279	49.830			
Sum		1059468	26555				



SHIMADZU

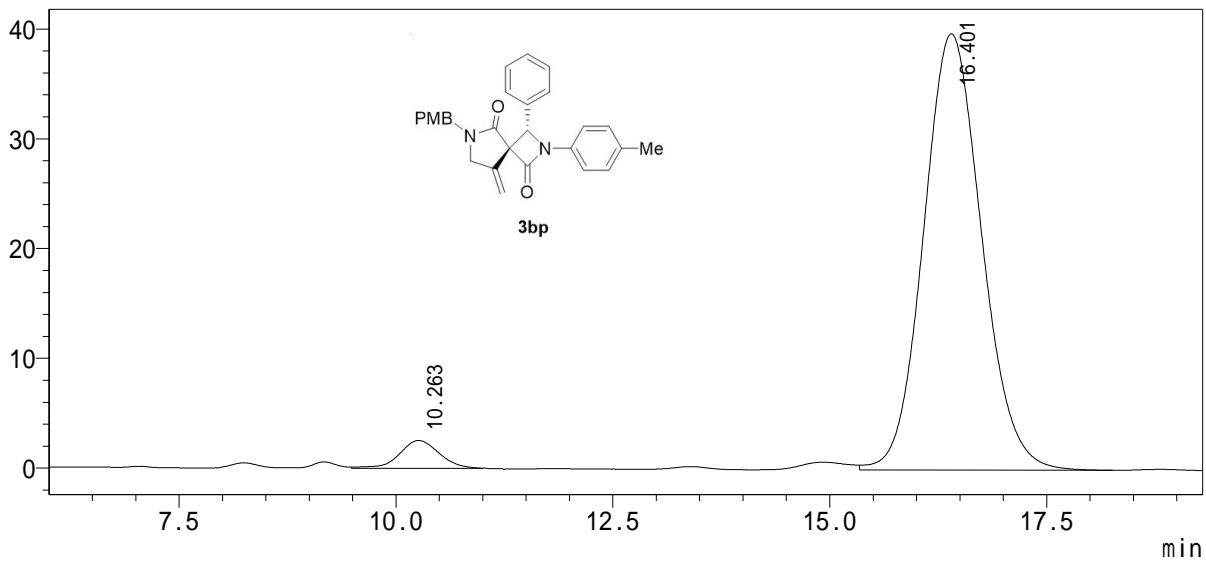
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1024-406-S-AS20%
Data name : LSY-1024-406-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/10/24 15:20:07
Pro. Date : 2023/10/24 15:49:32
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	10.263	80586	2529	4.177			
2	16.401	1848758	39749	95.823			
Sum		1929344	42278				



SHIMADZU

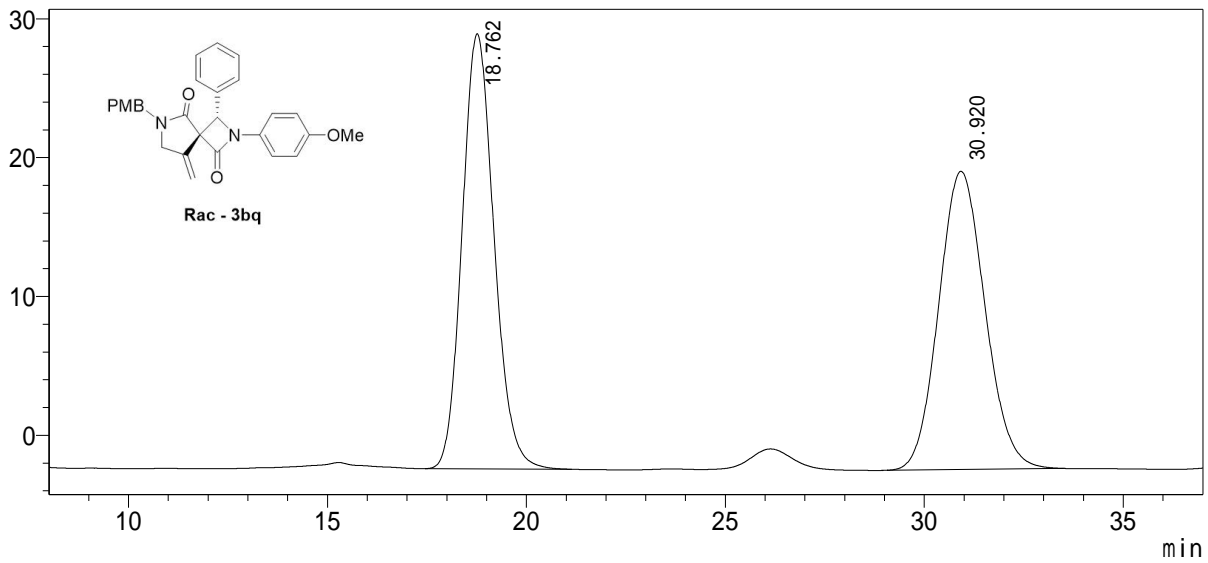
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-11250ME-X-AS20%-1
Data name : LSY-11250ME-X-AS20%-1.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/25 19:53:50
Pro. Date : 2023/12/10 15:33:29
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	18.762	1747354	31336	50.160			
2	30.920	1736237	21477	49.840			
Sum		3483591	52813				



SHIMADZU

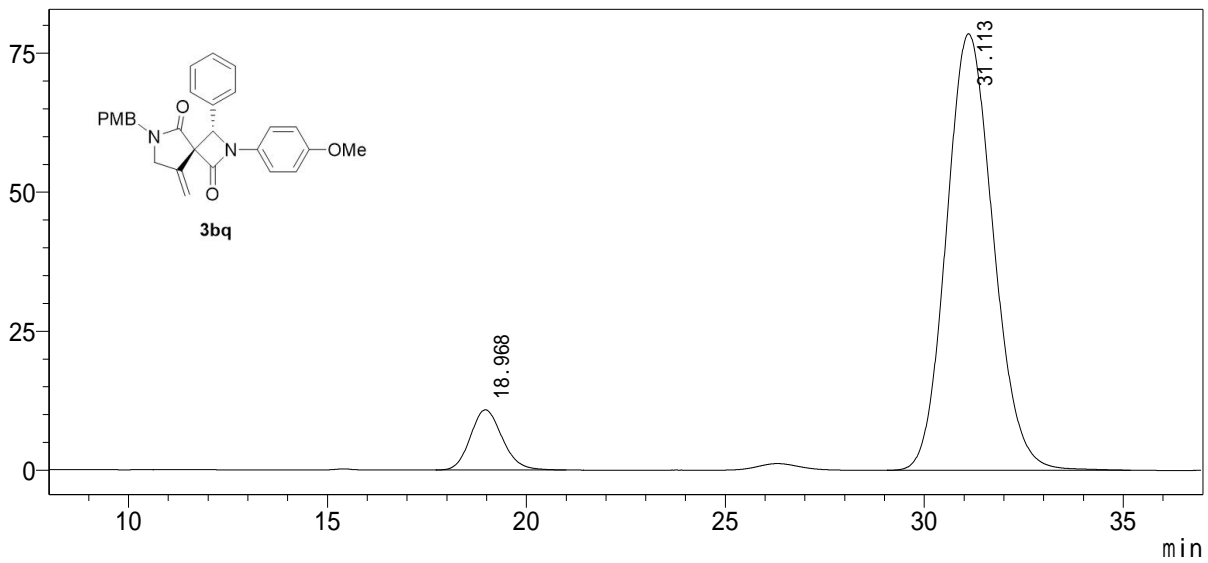
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-11250ME-S-AS20%-1
Data name : LSY-11250ME-S-AS20%-1.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/25 20:36:31
Analyst : System Administrator
Pro. Date : 2024/7/21 12:07:23
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	18.968	604231	10830	8.588			
2	31.113	6431644	78512	91.412			
Sum		7035875	89343				



SHIMADZU

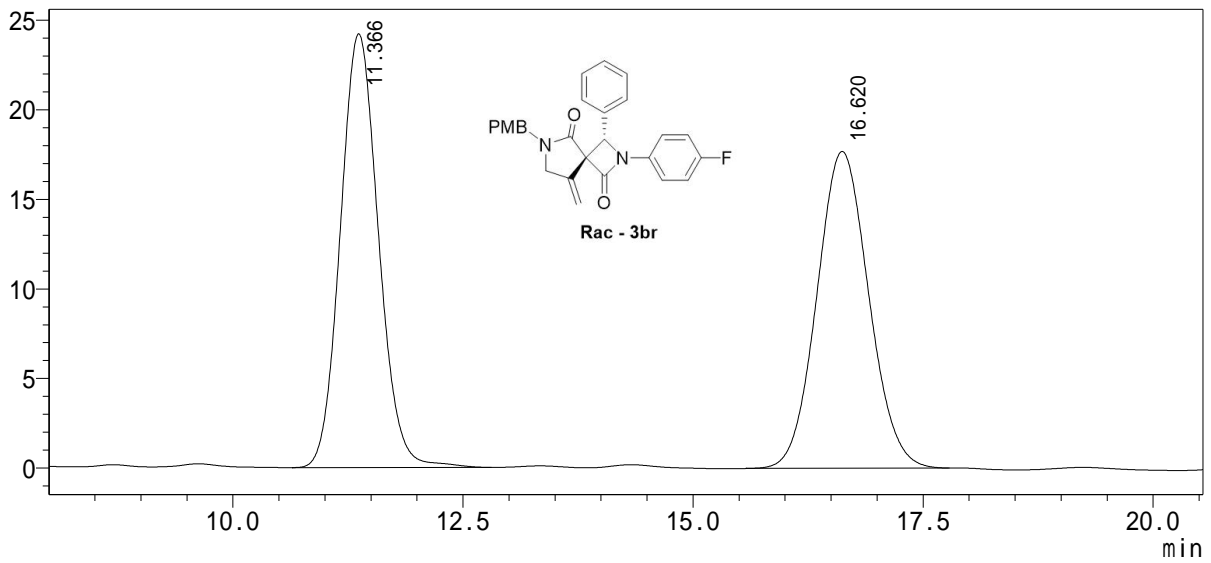
LabSolutions

HPLC Replot

<Sample Information>

Sample name : ISY-1102-424-1-AS20 %
Data name : ISY-1102-424-1-AS20 %.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/2 16:56:57
Pro. Date : 2023/11/2 17:18:32
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	11.366	697632	24203	50.227			
2	16.620	691332	17680	49.773			
Sum		1388964	41884				



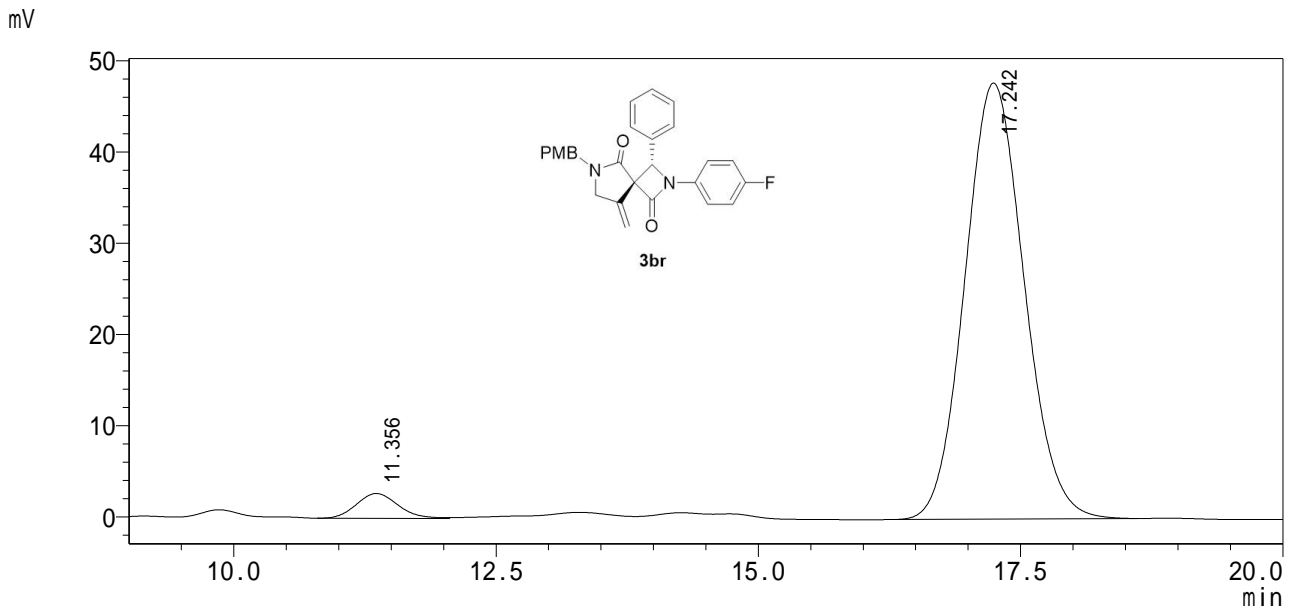
SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name :
Data name : LSY-0923-366-B2-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/9/23 15:58:18
Pro. Date : 2023/9/23 16:19:41
Analyst : System Administrator
Processor : System Administrator



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	11.356	75652	2729	3.872			
2	17.242	1878276	47820	96.128			
Sum		1953928	50549				



SHIMADZU

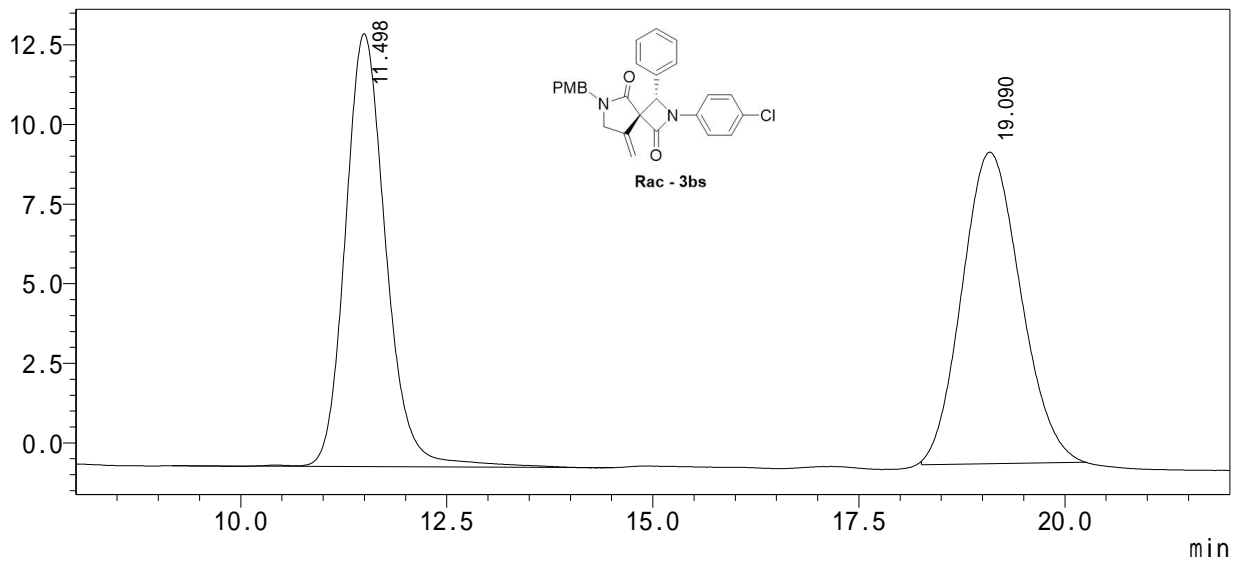
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-1125-393-X-AS20%-3
 : LSY-1124-444-S-AS20%
Data name : LSY-1125-393-X-AS20%-3.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2023/11/25 11:01:26 Analyst : System Administrator
Pro. Date : 2024/5/9 14:30:08 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	11.498	465180	13595	49.030		M
2	19.090	483588	9782	50.970		M
Sum		948768	23377			



SHIMADZU

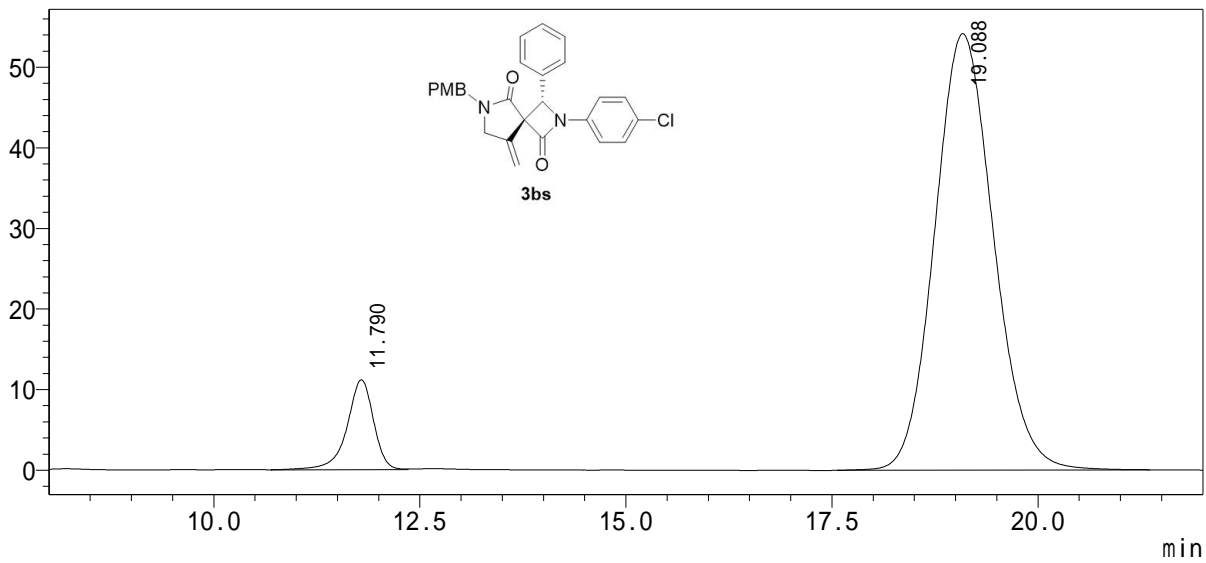
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1125-393-S-AS20%
 : LSY-1124-444-S-AS20%
Data name : LSY-1125-393-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1
 : 1 uL
 :
Ana. Date : 2023/11/25 10:34:42
Pro. Date : 2023/11/25 14:29:04
Sample Type : unknown
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	11.790	251576	11167	8.573			
2	19.088	2682873	54139	91.427			
Sum		2934449	65306				



SHIMADZU

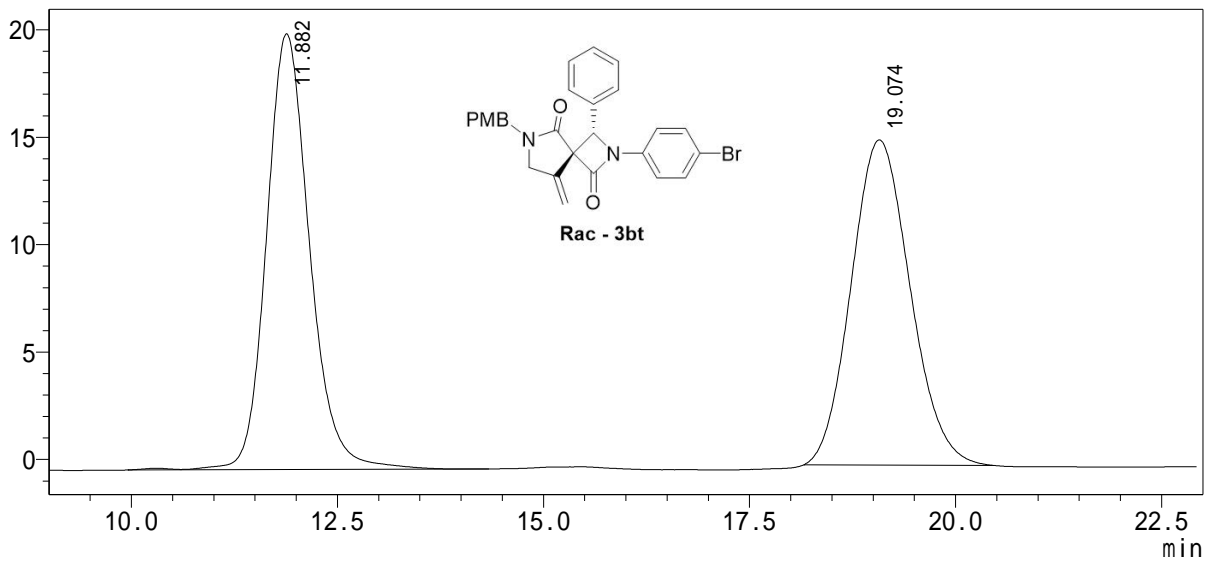
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1128-BR-N02-AS20%-X
Data name : LSY-1128-BR-N02-AS20%-X.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/28 10:23:27
Pro. Date : 2024/5/18 14:57:53
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	11.882	737699	20284	49.529		M	
2	19.074	751715	15138	50.471		M	
Sum		1489414	35421				



SHIMADZU

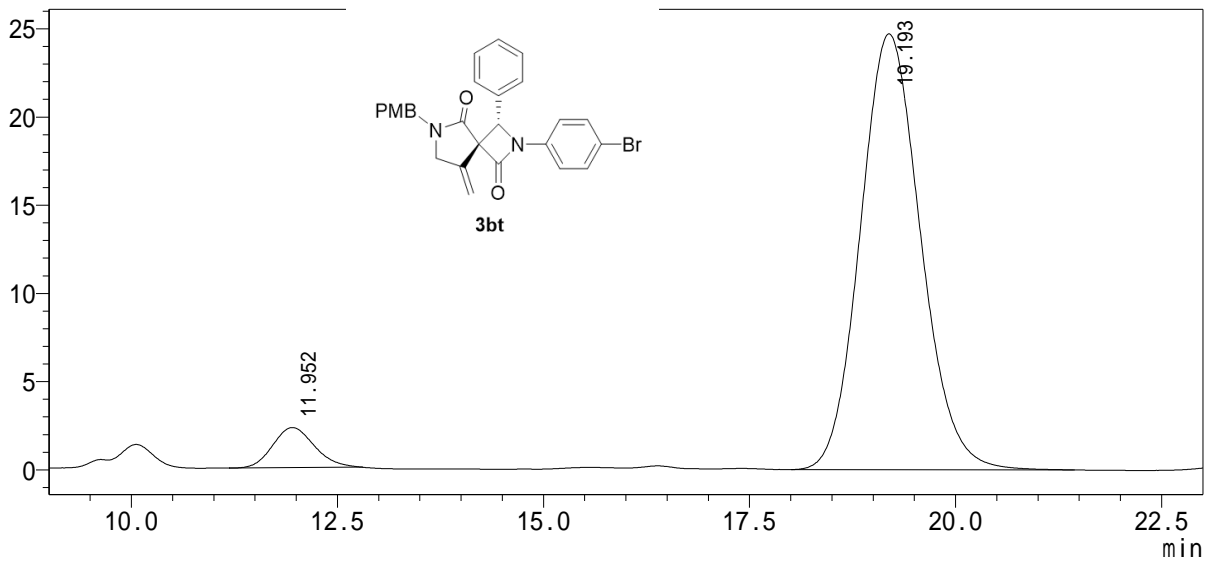
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1125-BR-N02-AS20%-1
Data name : LSY-1125-BR-N02-AS20%-1.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/25 21:16:19
Pro. Date : 2024/5/18 14:56:30
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	11.952	80296	2276	6.006		M
2	19.193	1256654	24716	93.994		
Sum		1336950	26992			



SHIMADZU

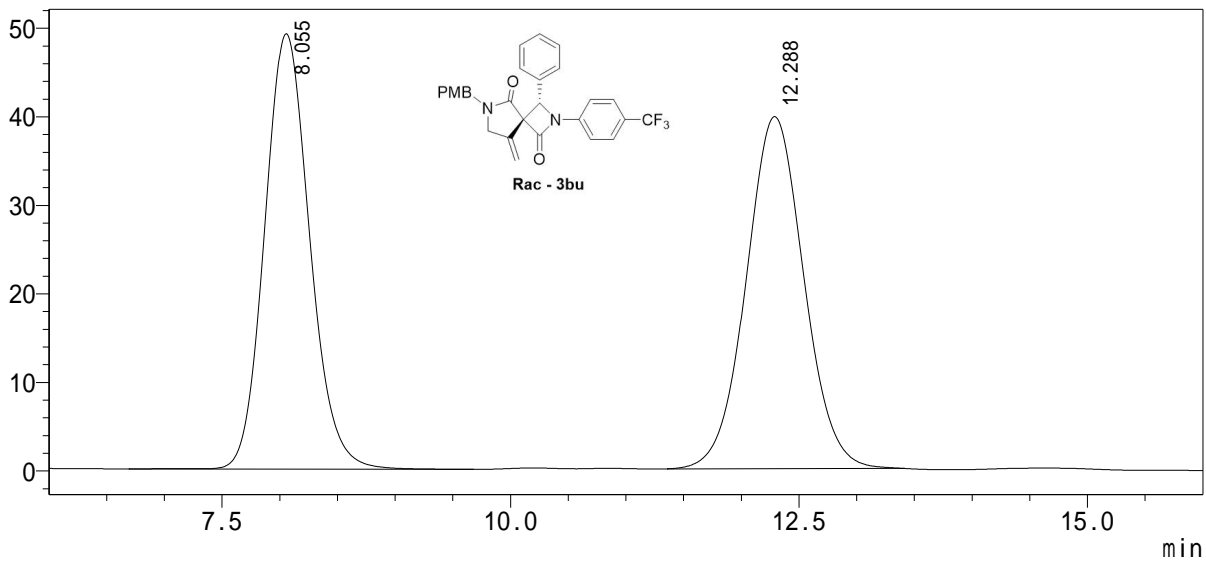
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1128-CF3-N02-AS20%-X1
Data name : LSY-1128-CF3-N02-AS20%-X1.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/28 16:42:44
Pro. Date : 2024/5/9 14:30:17
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	8.055	1333635	49190	49.132		M
2	12.288	1380764	39770	50.868		M
Sum		2714398	88960			



SHIMADZU

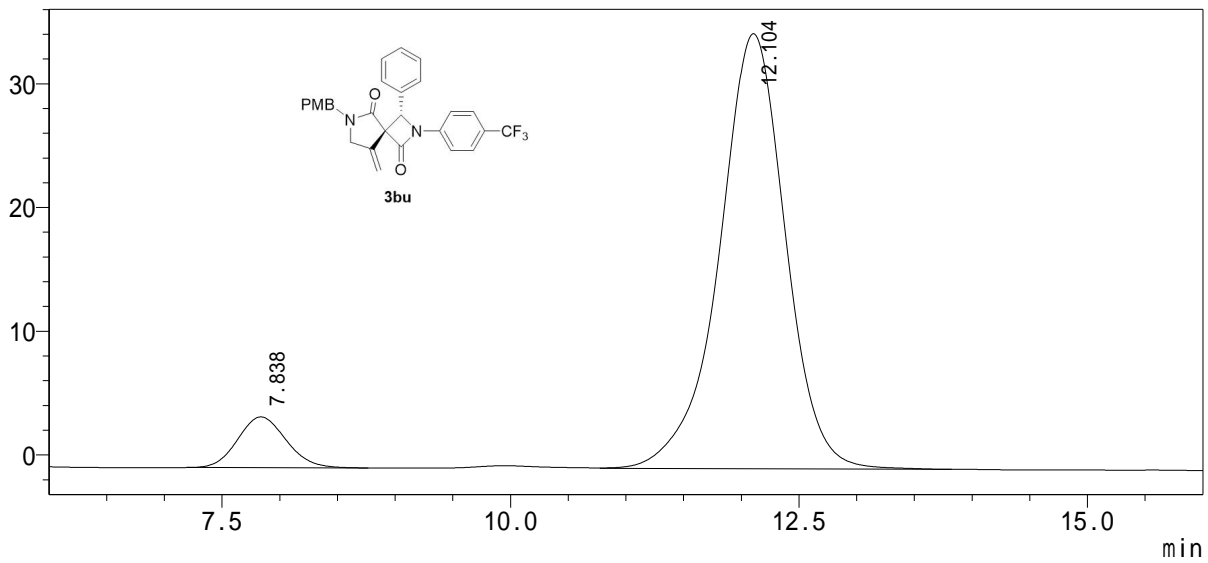
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1202-CF3-N02-S-AS20%
Data name : LSY-1202-CF3-N02-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/12/2 16:38:06
Analyst : System Administrator
Pro. Date : 2023/12/2 16:59:00
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	7.838	119508	4104	7.874			
2	12.104	1398251	35158	92.126			
Sum		1517759	39262				



SHIMADZU

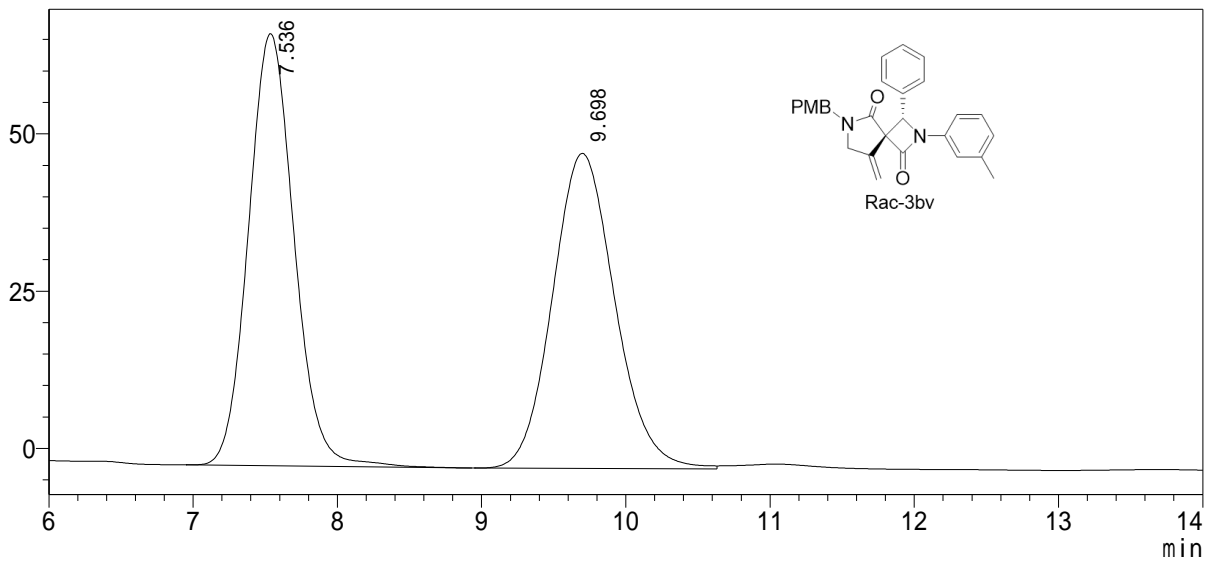
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : Isy-3-ME-NO2-1006-X-AS20%
 : Isy-3-ME-NO2-1006-X-AS20%
Data name : Isy-3-ME-NO2-1006-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2024/10/6 19:49:52 Analyst : System Administrator
Pro. Date : 2024/10/6 20:05:49 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	7.536	1511038	68696	50.122			
2	9.698	1503675	50085	49.878			
Sum		3014713	118781				



SHIMADZU

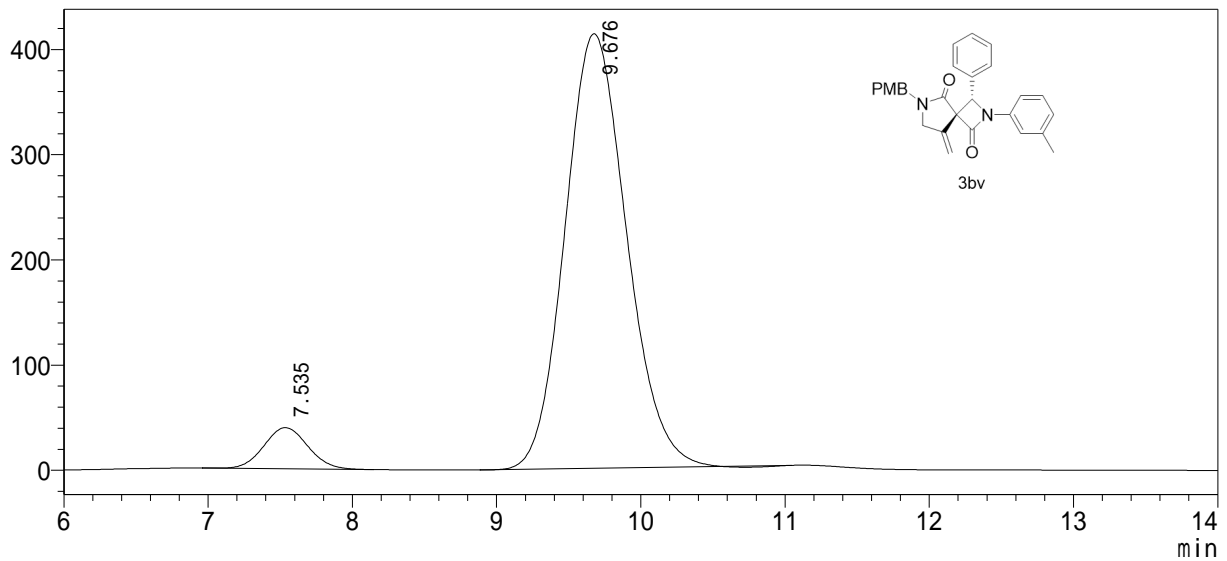
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : Isy-3-ME-NO2-1006-S-AS20%
 : Isy-3-ME-NO2-1006-S-AS20%
Data name : Isy-3-ME-NO2-1006-S-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2024/10/6 20:07:08 Analyst : System Administrator
Pro. Date : 2024/10/7 17:36:18 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	7.535	831201	39149	6.366		M
2	9.676	12224808	413109	93.634		M
sum		13056009	452258			



SHIMADZU

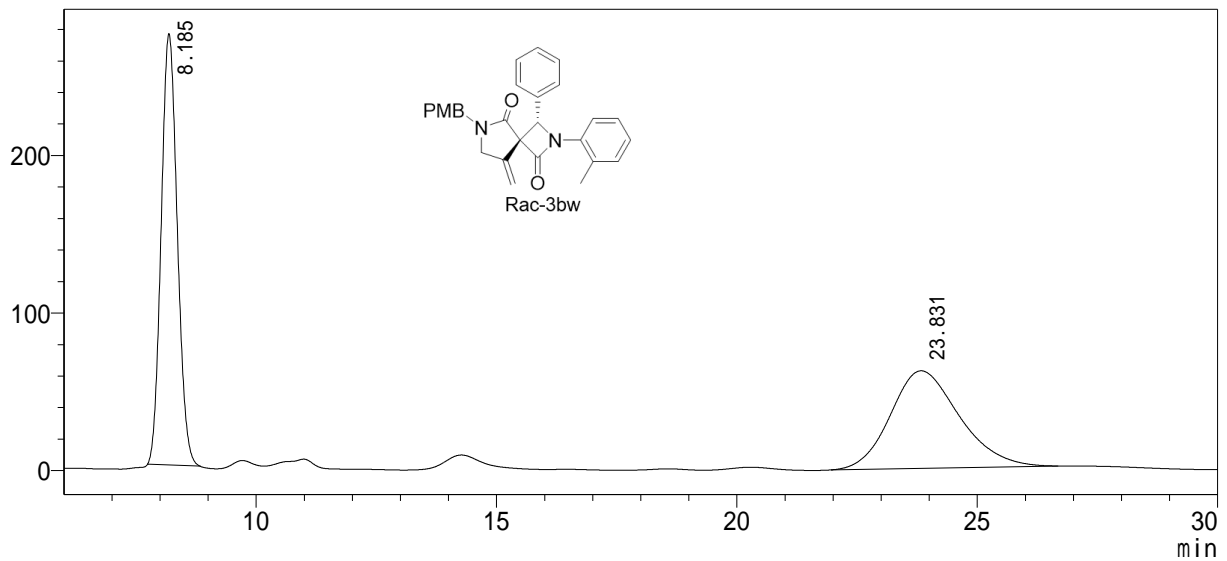
LabSolutions

HPLC Replot

<Sample Information>

Sample name : Isy-2-ME-NO2-1006-X-AS20%
 : Isy-2-ME-NO2-1006-X-AS20%
Data name : Isy-2-ME-NO2-1006-X-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2024/10/6 20:25:07 Analyst : System Administrator
Pro. Date : 2024/10/9 17:22:42 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	8.185	6369620	273691	50.766		M	
2	23.831	6177375	61933	49.234		M	
Sum		12546996	335624				



SHIMADZU

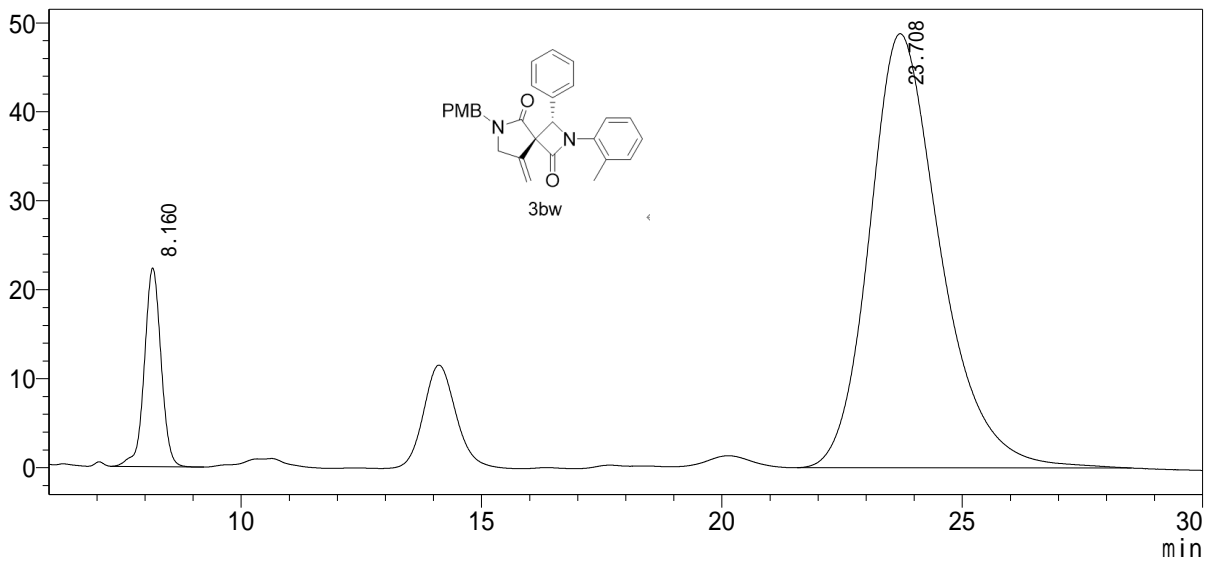
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-2-ME-S-1007-AS20%
 : LSY-2-ME-S-1007-AS20%
Data name : LSY-2-ME-S-1007-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1
 : 1 uL
Ana. Date : 2024/10/7 17:24:24
Pro. Date : 2024/10/7 18:07:56
Sample Type : unknown
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	8.160	541172	22340	9.753		M	
2	23.708	5007330	48798	90.247			
Sum		5548502	71138				



SHIMADZU

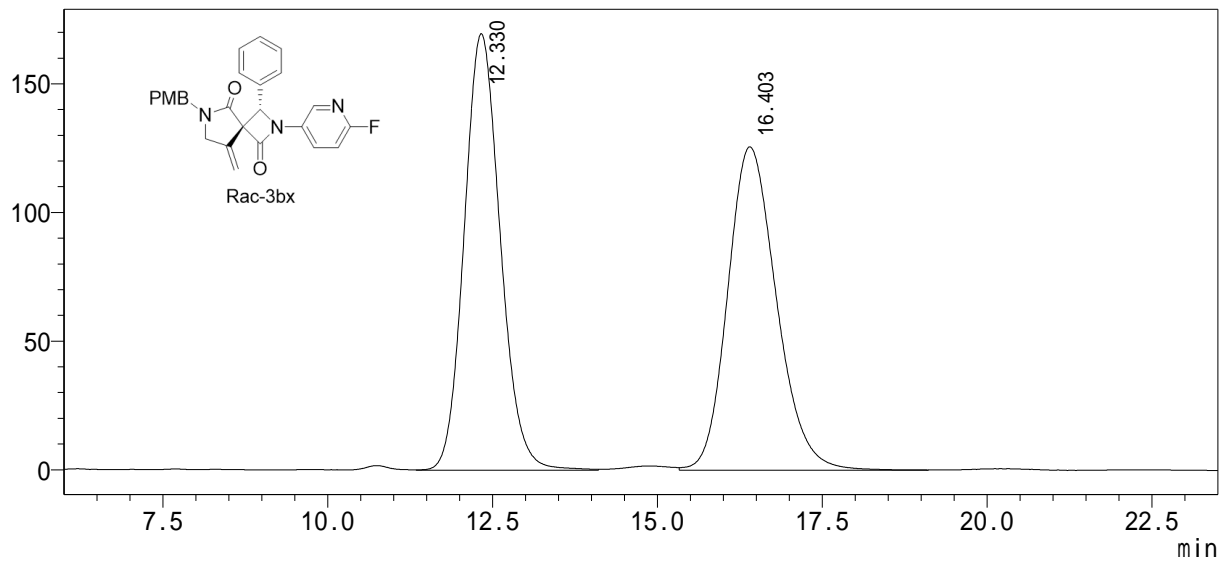
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-FBD-X-1007-AS20%
 : LSY-FBD-X-1007-AS20%
Data name : LSY-FBD-X-1007-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2024/10/7 16:32:41 Analyst : System Administrator
Pro. Date : 2024/10/7 18:39:22 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	12.330	6451298	169605	49.953			
2	16.403	6463488	125683	50.047		S	
Sum		12914786	295288				



SHIMADZU

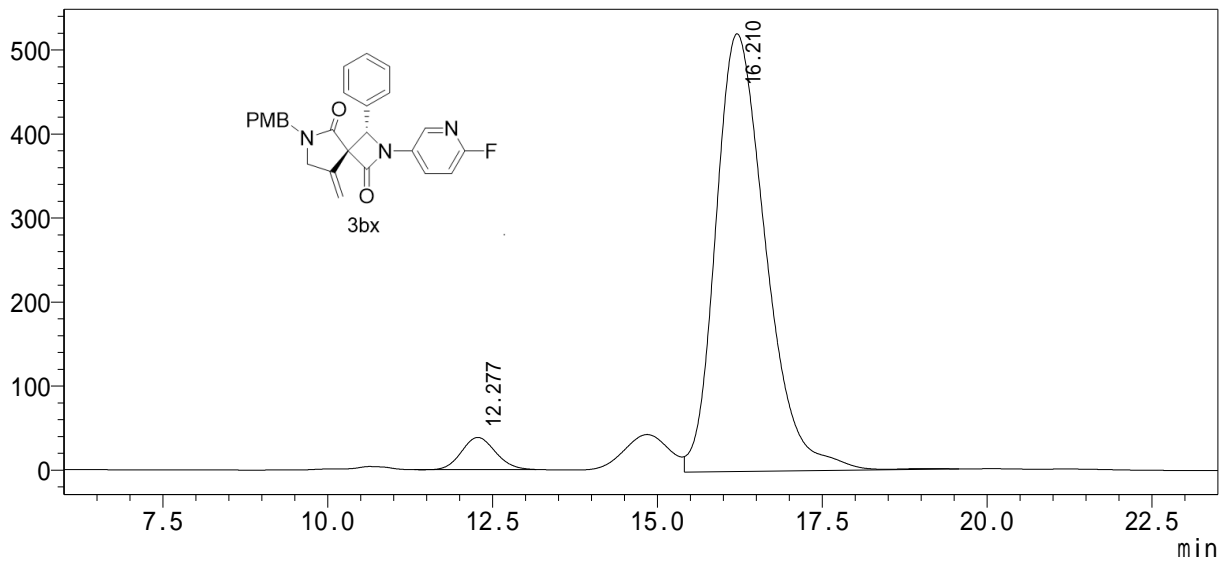
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-FBD-1-S-1007-AS20%
 : LSY-FBD-1-S-1007-AS20%
Data name : LSY-FBD-1-S-1007-AS20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2024/10/7 18:25:16 Analyst : System Administrator
Pro. Date : 2024/10/7 18:55:19 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	12.277	1369989	38245	4.762		M	
2	16.210	27397216	520975	95.238		M	
Sum		28767205	559220				



SHIMADZU

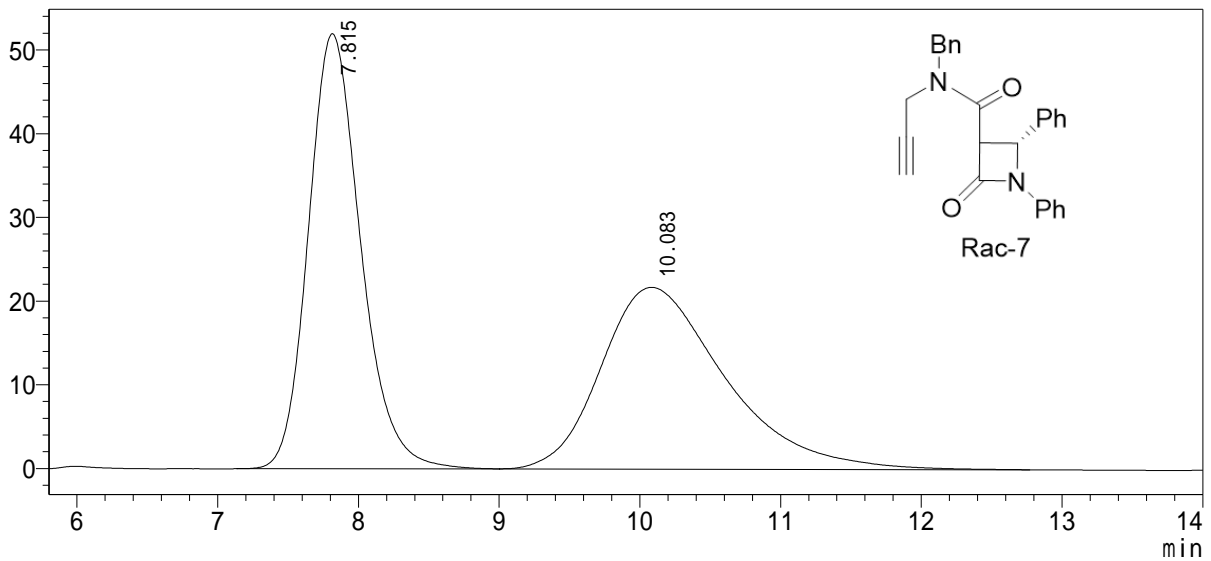
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : ISY-1107-433-X-AS20 %
Data name : ISY-1107-433-X-AS20 %.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/7 9:54:41
Pro. Date : 2024/5/30 16:41:34
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	7.815	1341278	51977	50.201			
2	10.083	1330527	21714	49.799			
Sum		2671805	73690				



SHIMADZU

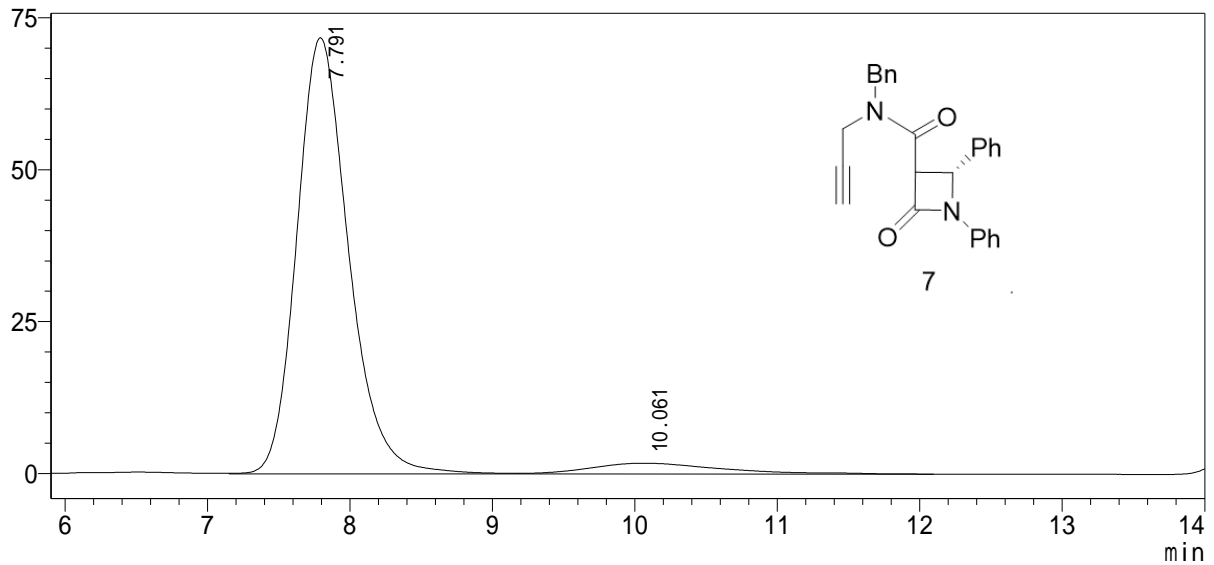
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : ISY-1107-434-S1-AS20 %
Data name : ISY-1107-434-S1-AS20 %.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/11/7 10:14:21
Analyst : System Administrator
Pro. Date : 2023/12/9 15:24:28
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	7.791	1810659	71746	94.145		
2	10.061	112612	1775	5.855	V	
Sum		1923270	73521			



SHIMADZU

LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1203-ALCL3-X-AD1%-1

Data name : LSY-1203-ALCL3-X-AD1%-1.lcd

Acq. name : AD-1%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

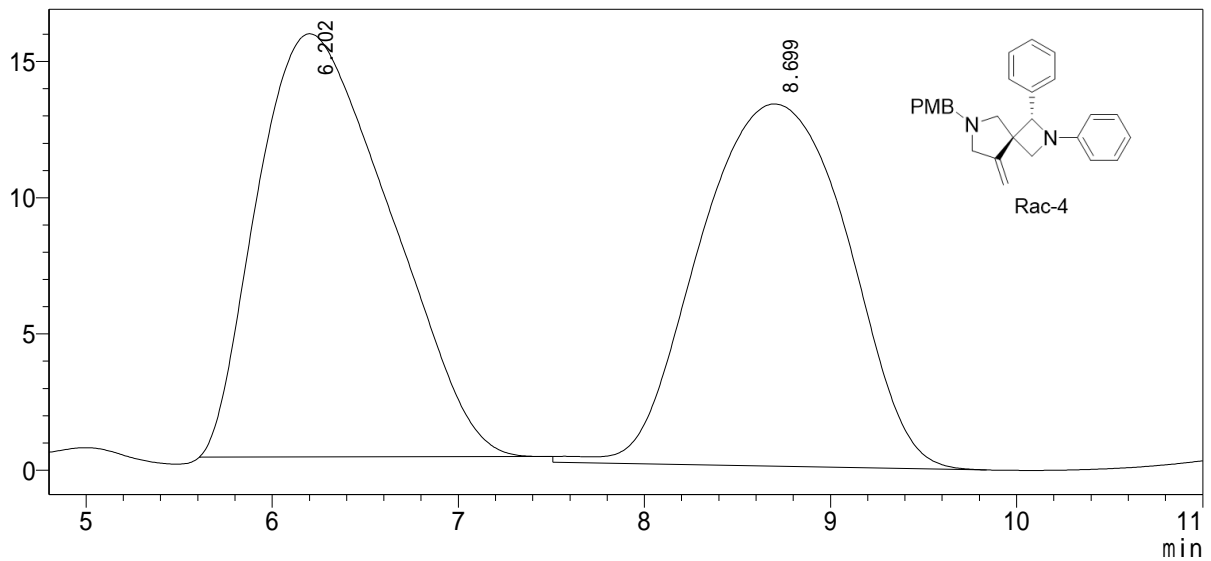
Ana. Date : 2023/12/3 12:33:11

Analyst : System Administrator

Pro. Date : 2024/7/7 15:01:10

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	6.202	766693	15536	50.926		M	
2	8.699	738802	13296	49.074		M	
Sum		1505496	28832				



SHIMADZU

LabSolutions

HPLC Reprot

<Sample Information>

Sample name : ALCL3-1204-S-AD1%

Data name : ALCL3-1204-S-AD1%.lcd

Acq. name : AD-1%.lcm

Location : 1-1
: 1 uL

Sample Type : unknown

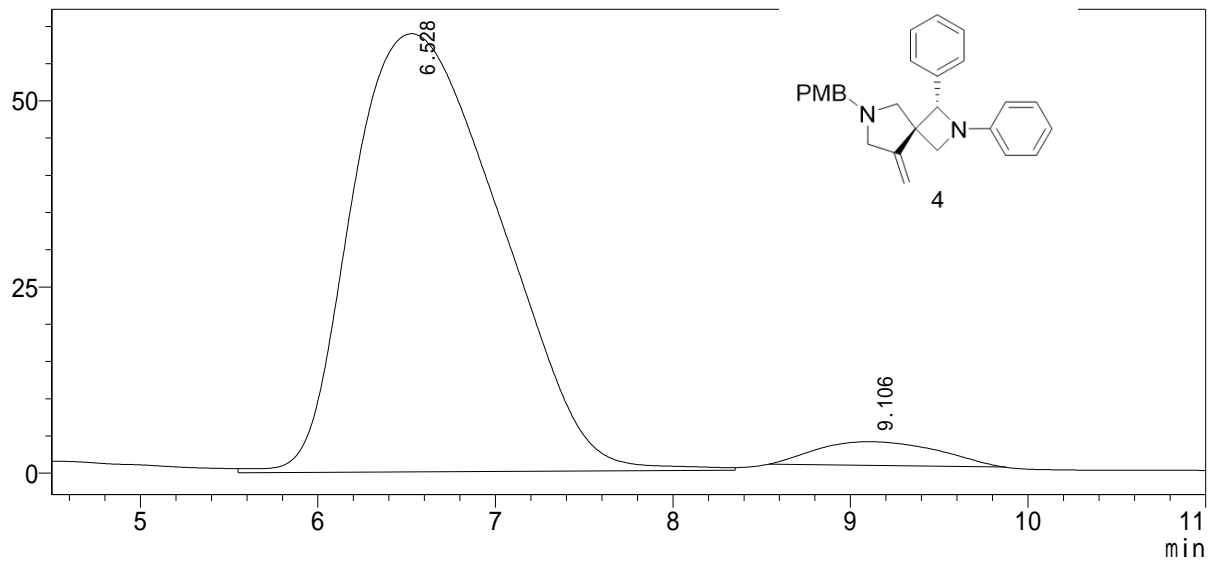
Ana. Date : 2023/12/4 9:52:38

Analyst : System Administrator

Pro. Date : 2024/7/8 8:57:32

Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	6.528	3400382	58848	95.709		M
2	9.106	152471	3173	4.291		M
Sum		3552852	62021			



SHIMADZU

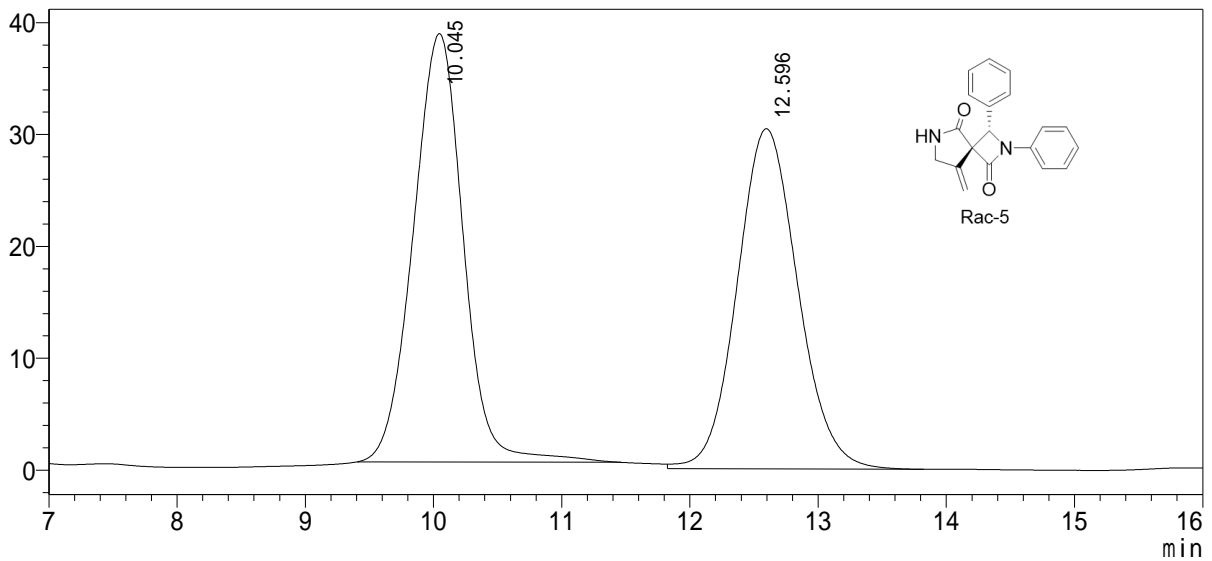
LabSolutions

HPLC Replot

<Sample Information>

Sample name : lsy-1121-444-x-as20%
 : KM010XX-ADH-80B
Data name : lsy-1121-444-x-as20%.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1
 : 1 uL
 : 1 uL
Ana. Date : 2023/11/21 19:29:49
Pro. Date : 2023/12/9 15:31:28
Sample Type : unknown
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	10.045	1037346	38282	50.891		M	
2	12.596	1001014	30408	49.109			
Sum		2038360	68690				



SHIMADZU

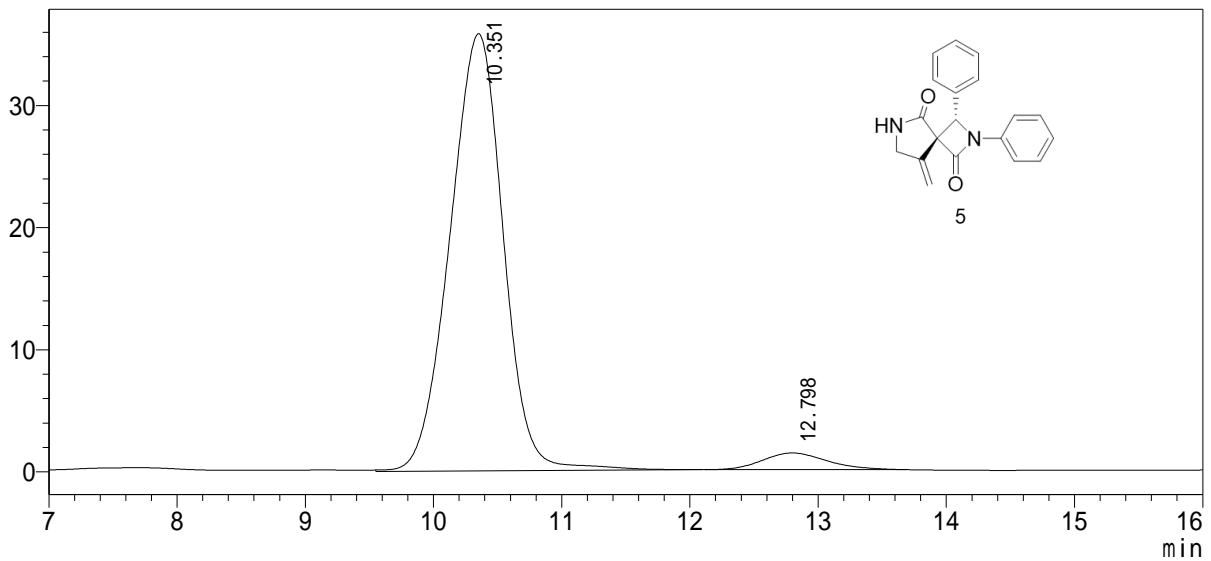
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-1124-444-S-AS20%-4
 : LSY-1124-444-S-AS20%
Data name : LSY-1124-444-S-AS20%-4.lcd
Acq. name : AS-H-20%.lcm
 :
Location : 1-1 Sample Type : unknown
 : 1 uL
Ana. Date : 2023/11/24 18:28:06 Analyst : System Administrator
Pro. Date : 2023/11/25 9:10:52 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	10.351	1032827	35791	95.552		M
2	12.798	48075	1369	4.448		M
Sum		1080902	37160			



SHIMADZU

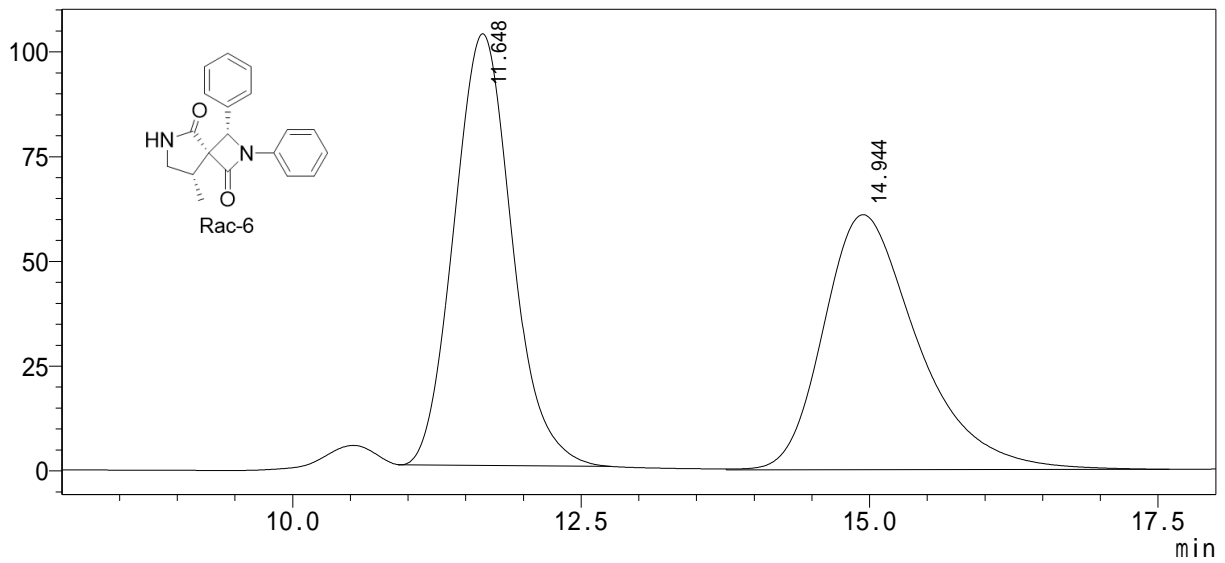
LabSolutions

HPLC Replot

<Sample Information>

Sample name : LSY-1212-450-X-AS20%
 Data name : LSY-1212-450-X-AS20%.lcd
 Acq. name : AS-H-20%.lcm
 Location : 1-1
 Ana. Date : 2023/12/12 14:40:03
 Pro. Date : 2024/5/9 15:32:04
 Sample Type : unknown
 Analyst : System Administrator
 Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%			
1	11.648	3597603	103038	50.924		M	
2	14.944	3466980	60867	49.076			
Sum		7064583	163905				



SHIMADZU

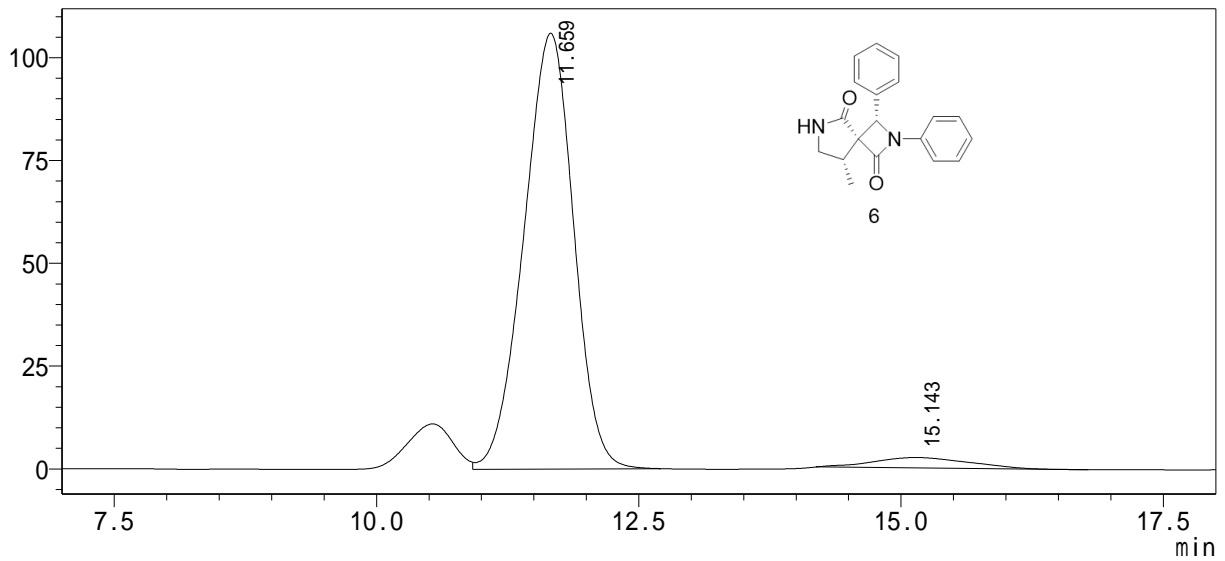
LabSolutions

HPLC Reprot

<Sample Information>

Sample name : LSY-1210-450-S-AS20%-3
Data name : LSY-1210-450-S-AS20%-3.lcd
Acq. name : AS-H-20%.lcm
Location : 1-1
Sample Type : unknown
Ana. Date : 2023/12/10 14:23:22
Pro. Date : 2024/5/9 15:44:24
Analyst : System Administrator
Processor : System Administrator

mV



SPD-20A

Entry	RT[min]	Area	Height	Area%		
1	11.659	3501159	105996	95.576		M
2	15.143	162067	2539	4.424		M
Sum		3663226	108534			