Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers

Supporting Information

A Non-Diazo Strategy to Cyclopropanation via Oxidatively Generated Gold Carbene: the Benefit of A ConformationallyRigid *P,N*-Bidentate Ligand

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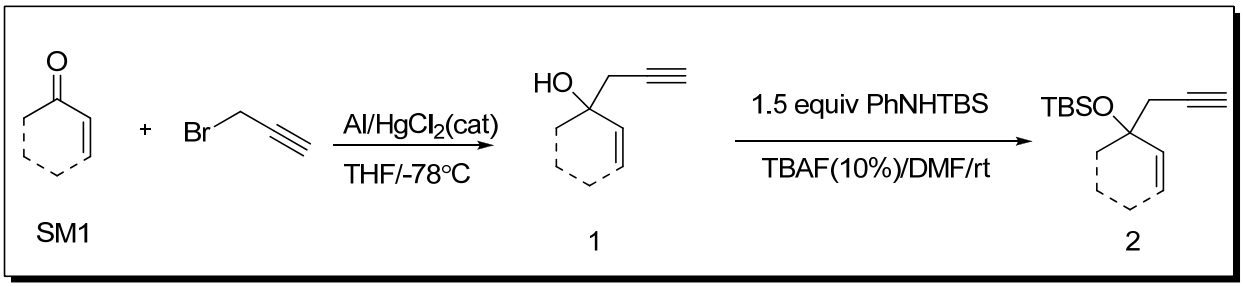
General. Ethyl acetate (ACS grade), hexanes (ACS grade), diethyl ether (ACS grade) and anhydrous 1, 2-dichloroethane (anhydride, 99.8%) were purchased from Fisher Scientific and used without further purification. Chlorobenzene (HPLC grade) was purchased from Acros without further purification. Methylene chloride and tetrahydrofuran were purified using MBraun Solvent Purifier. Commercially available reagents were used without further purification. Reactions were monitored by thin layer chromatography (TLC) using Sorbent Technologies' pre-coated silica gel plates. Flash column chromateography was performed over Sorbent Technologies' silica gel (230-400 mesh). ^{1}H NMR and ^{13}C NMR spectra were recorded on Varian 400 MHz, 500 MHz and 600 MHz spectrometers using residue solvent peaks as internal standards. Infrared spectra were recorded with a Perkin Elmer FT-IR spectrum 2000 spectro-meter and are reported in reciprocal centimeter (cm^{-1}). Mass spectra were recorded with Micromass $QTOF_2$ Quadrupole/Time-of-Flight Tandem mass spectrometer using electron spray ionization or Waters GCT Premier time-of-flight mass spectrometer with a field ionization (FI) ion source.

General procedure A for the preparation of 3-Silyloxy-1,5-enynes 1a-j and 3a,3b and 3f-i

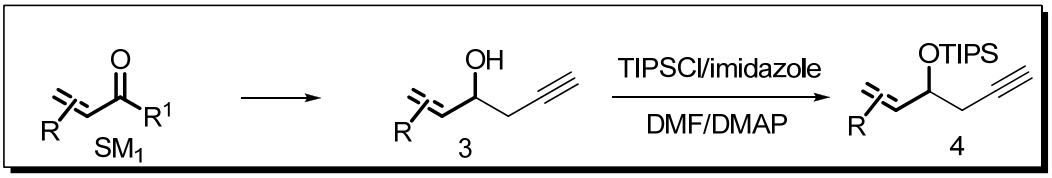


An aluminum amalgam was prepared from aluminum powder (0.5 g, 18.0 mmol) and a catalytic amount of mercuric chloride (10 mg) in 7.5 mL anhydrous THF by vigorouslystirring the mixture at rt for 1h under a N_2 atmosphere. A solution of propargyl bromide (1.9 mL, 18.0 mmol, 80% in toluene) in 12.5 mL of anhydrous THF was slowly added to the stirred suspension at such a rate as to maintain the temperature between 30-40°C. After the addition, stirring was continued until a dark grey solution was obtained. The propargyl aluminum sesquibromide solution thus obtained was added to a solution of enone (6.0 mmol) in 20.0 mL of anhydrous THF at -78°C under a N_2 atmosphere. The reaction mixture was stirred at -78°C for about 2h (monitored by TLC), quenched with saturated NH_4Cl (aq), and extracted with 4 x 30.0 mL of

ether. The combined ether extracts were washed with brine, dried and concentrated. The crude enynyl alcohol obtained was TLC pure and subjected to Silylation without further purification.

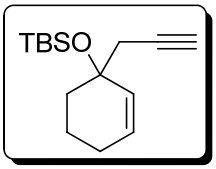
TBAF (1 M THF solution; 0.2 mL, 0.2 mmol) was added to a stirred solution of 1-(prop-2-ynyl)cyclohex-2-enol (2.0 mmol) and PhNHTBS (3.0 mmol) in DMF (4.0 mL) at 20–25 °C under an Ar atmosphere. After stirring at the same temperature for 4hours, the mixture was quenched with water (10.0 mL), which was extracted with Et_2O. The combined organic phase was washed with water, brine, dried (Na_2SO_4) and concentrated. The obtained crude product was purified by SiO_2 column chromatography (hexane) to 3-Silyloxy-1,5-enynes 1 (75%); colorless oil.

General procedure B for the preparation of triisopropylsilane protected 1,5-enynes-3-ol 3c-e and 3j



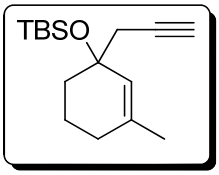
1,5-enynes-3-ol **3c** can be easily synthesis according to the above procedure. 1,5-enynes-3-ol **3c** (2.0 mmol) and imidazole (3 equivs, 6 mmol) with DMAP (0.2 mmol) were mixed in 6 mL of DMF at 20–25 °C under an Ar atmosphere. The mixture was stirred for 5minute, TIPSCl (3 mmol, 1.5 equivs) was added to the mixture and stirred for 10 hours. Then the mixture was quenched with water (10.0 mL), which was extracted with Et_2O. The combined organic phase was washed with water, brine, dried (Na_2SO_4) and concentrated. The obtained crude product was purified by SiO_2 column chromatography (hexane) to 3-Silyloxy-1,5-enynes **4c** (93%); colorless oil.

Data of SM

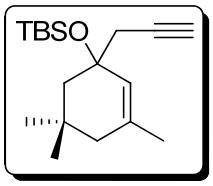


tert-butyldimethyl(1-(prop-2-ynyl)cyclohex-2-enyloxy)silane 1a: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.82 (dt, *J* = 10.1, 3.7 Hz, 1H), 5.69 (dt, *J* = 10.1, 2.3 Hz, 1H), 2.39 (t, *J* = 3.0 Hz, 2H), 2.06 – 1.89 (m, 3H), 1.81 – 1.67 (m, 3H), 1.69 – 1.54 (m, 1H), 0.86 (s, 9H), 0.09 (s, 3H), 0.05 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 132.00, 130.26, 81.54, 71.44, 69.92, 35.97,

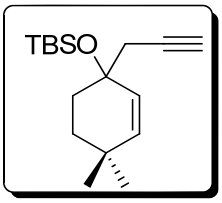
33.75, 25.77, 25.06, 19.05, 18.20, -2.08, -2.41. IR (cm^{-1}):3314, 2934, 2857, 1472, 1252, 1092, 1040, 832, 774. GCMS *m*/*z* 250(M^+), 193(M-^{t}Bu).



tert-butyldimethyl(3-methyl-1-(prop-2-ynyl)cyclohex-2-enyloxy)silane1b: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.41 (s, 1H), 2.37 (dd, *J* = 4.0, 2.7 Hz, 2H), 1.94 (t, *J* = 2.6 Hz, 1H), 1.89 (t, *J* = 6.2 Hz, 2H), 1.78 – 1.56 (m, 4H), 1.68 (s, 3H), 0.85 (s, 9H), 0.08 (s, 3H), -0.01 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 138.03, 126.56, 81.80, 71.95, 69.73, 35.66, 33.96, 30.01, 25.80, 23.61, 19.23, 18.17, -2.05, -2.54. IR (cm^{-1}):3315, 2945, 2933, 2858, 1472, 1254, 1045, 835, 773. GCMS *m*/*z* 264(M^+), 207(M-^{t}Bu).

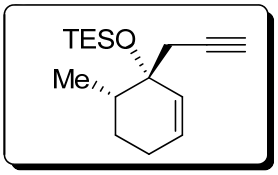


tert-butyldimethyl(3,5,5-trimethyl-1-(prop-2-ynyl)cyclohex-2-enyloxy)silane 1c: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.36 (q, *J* = 1.7 Hz, 1H), 2.43 (dd, *J* = 16.4, 2.7 Hz, 1H), 2.29 (dd, *J* = 16.4, 2.6 Hz, 1H), 1.93 (t, *J* = 2.6 Hz, 1H), 1.74 – 1.64 (m, 7H), 0.99 (s, 3H), 0.94 (s, 3H), 0.85 (s, 9H), 0.12 (s, 3H), 0.03 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 136.33, 125.17, 81.80, 73.19, 69.67, 48.00, 44.40, 34.68, 30.82, 30.23, 28.47, 25.86, 23.91, 18.19, -1.90, -2.39. IR (cm^{-1}): 3315, 2930, 2858, 1472, 1255, 1059, 836, 773. GCMS *m*/*z* 292(M^+), 235(M-^{t}Bu).

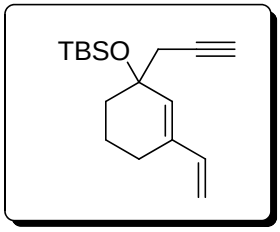


tert-butyl(4,4-dimethyl-1-(prop-2-ynyl)cyclohex-2-enyloxy)dimethylsilane 1d:^{1}H NMR (600 MHz, Chloroform-d) δ 5.51 (d, *J* = 2.6 Hz, 2H), 2.38 (qd, *J* = 16.4, 2.7 Hz, 2H), 1.96 (t, *J* = 2.6 Hz, 1H), 1.89 (ddd, *J* = 13.9, 11.0, 3.3 Hz, 1H), 1.74 (ddd, *J* = 13.4, 7.0, 3.3 Hz, 1H), 1.65 (ddd, *J* = 14.0, 11.0, 3.3 Hz, 1H), 1.41 (ddd, *J* = 13.4, 7.1, 3.3 Hz, 1H), 1.01 (s, 3H), 0.95 (s, 3H), 0.86 (s, 9H), 0.09 (s, 3H), 0.06 (s, 3H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 140.33, 129.29, 81.58, 71.63,

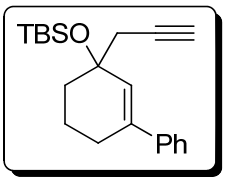
69.92, 33.58, 33.56, 33.05, 31.90, 29.30, 28.05, 25.74, 18.18, -2.11, -2.28. IR (cm^{-1}):3315, 2957, 2930, 1472, 1252, 1071, 835, 774. GCMS *m*/*z* 278(M^+), 221(M-^{t}Bu).



triethyl(6-methyl-1-(prop-2-ynyl)cyclohex-2-enyloxy)silane 1e: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.87 (dt, *J* = 10.0, 3.6 Hz, 1H), 5.71 (dt, *J* = 9.9, 2.2 Hz, 1H), 2.56 (dd, *J* = 16.4, 2.7 Hz, 1H), 2.37 (dd, *J* = 16.4, 2.7 Hz, 1H), 2.05 (dtd, *J* = 7.6, 4.3, 3.8, 2.3 Hz, 2H), 1.94 (t, *J* = 2.7 Hz, 1H), 1.88 (ddp, *J* = 13.3, 6.7, 3.4 Hz, 1H), 1.63 – 1.49 (m, 1H), 1.46 – 1.39 (m, 1H), 0.96 – 0.89 (m, 12H), 0.57 (q, *J* = 7.9 Hz, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 132.26, 131.48, 81.50, 73.24, 69.92, 35.99, 31.19, 26.22, 25.76, 14.99, 7.10, 6.83. IR (cm^{-1}):3314, 2956, 2877, 1459, 1240, 1090, 1015, 796, 725. GCMS *m*/*z* 264(M^+), 235(M-Et).

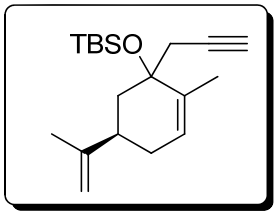


tert-butyldimethyl(1-(prop-2-ynyl)-3-vinylcyclohex-2-enyloxy)silane 1f :^{1}H NMR (500 MHz, Chloroform-d) δ 6.34 (dd, *J* = 17.5, 10.7 Hz, 1H), 5.68 (s, 1H), 5.22 (d, *J* = 17.5 Hz, 1H), 5.06 (d, *J* = 10.8 Hz, 1H), 2.42 (t, *J* = 2.3 Hz, 2H), 2.23 – 2.14 (m, 1H), 2.11 – 2.01 (m, 1H), 1.96 (t, *J* = 2.6 Hz, 1H), 1.87 – 1.72 (m, 3H), 1.71 – 1.64 (m, 1H), 0.86 (s, 9H), 0.08 (s, 3H), -0.00 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 139.35, 138.31, 132.86, 113.14, 81.29, 72.07, 70.10, 36.02, 33.72, 25.76, 23.74, 18.85, 18.18, -2.05, -2.52. IR (cm^{-1}): 3327, 2935, 2857, 1472, 1253, 1039, 835, 774. GCMS *m*/*z* 276(M^+), 219(M-^{t}Bu).

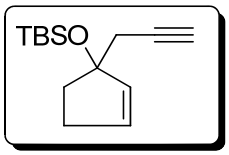


tert-butyldimethyl(3-phenyl-1-(prop-2-ynyl)cyclohex-2-enyloxy)silane 1g: ^{1}H NMR (600 MHz, Chloroform-d) δ 7.42 (d, *J* = 7.4 Hz, 2H), 7.35 (t, *J* = 7.7 Hz, 2H), 7.28 (t, *J* = 7.4 Hz, 1H), 6.05 (s, 1H), 2.50 (t, *J* = 2.4 Hz, 2H), 2.45 – 2.37 (m, 2H), 1.98 (t, *J* = 2.7 Hz, 1H), 1.95 – 1.69

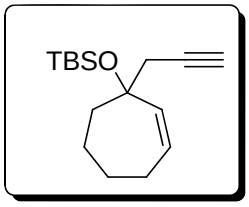
(m, 4H), 0.89 (s, 9H), 0.14 (s, 3H), 0.05 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 141.60, 139.77, 128.69, 128.33, 127.38, 125.46, 81.36, 72.06, 70.16, 35.62, 34.08, 27.67, 25.78, 19.42, 18.19, -1.93, -2.39. IR (cm^{-1}):3311, 2934, 2857, 1472, 1253, 1094, 1040, 834, 774. GCMS *m*/*z* 326(M$^+$), 269(M-^{t}Bu).



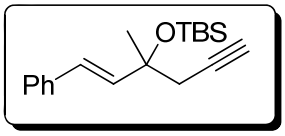
tert-butyldimethyl((5R)-2-methyl-5-(prop-1-en-2-yl)-1-(prop-2-ynyl)cyclohex-2-enyloxy)silane 1h: ^{1}H NMR (600 MHz, Chloroform-d) δ 5.42 (d, *J* = 5.2 Hz, 1H), 4.74 (d, *J* = 9.5 Hz, 2H), 2.71 – 2.59 (m, 1H), 2.50 – 2.30 (m, 3H), 2.13 – 2.03 (m, 1H), 2.00 (t, *J* = 2.7 Hz, 1H), 1.89 (ddt, *J* = 16.9, 11.2, 2.6 Hz, 1H), 1.75 (s, 3H), 1.71 (d, *J* = 2.4 Hz, 3H), 1.61 (t, *J* = 12.6 Hz, 1H), 0.90 (s, 9H), 0.14 (s, 3H), 0.08 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 148.92, 138.43, 123.23, 108.80, 81.52, 76.19, 70.71, 41.32, 39.94, 31.09, 31.03, 25.97, 20.72, 18.53, 17.43, -1.85, -2.78. IR (cm^{-1}):3313, 2944, 2956, 2928, 1472, 1251, 1094, 836, 774. GCMS *m*/*z* 304(M$^+$), 247(M-^{t}Bu).



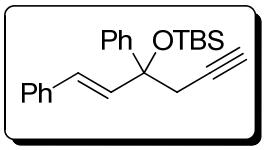
tert-butyldimethyl(1-(prop-2-ynyl)cyclopent-2-enyloxy)silane 1i :^{1}H NMR (500 MHz, Chloroform-d) δ 5.89 (dt, *J* = 4.9, 2.4 Hz, 1H), 5.75 (dt, *J* = 5.7, 2.2 Hz, 1H), 2.55 – 2.40 (m, 3H), 2.34-2.31 (m, 1H), 2.14 (ddd, *J* = 13.3, 8.7, 4.4 Hz, 1H), 1.95 – 1.79 (m, 2H), 0.85 (s, 9H), 0.06 (s, 3H), 0.03 (s, 3H). ^{13}C NMR (126 MHz, CDCl$_3$) δ 135.80, 133.67, 86.76, 81.88, 68.89, 37.66, 32.73, 31.36, 25.72, 18.04, -2.50, -2.98. IR (cm^{-1}):3315, 2957, 2930, 1472, 1360, 1253, 1085, 1005, 836, 774. GCMS *m*/*z* 236(M$^+$), 179(M-^{t}Bu).



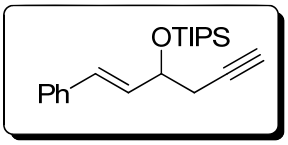
tert-butyldimethyl(1-(prop-2-ynyl)cyclohept-2-enyloxy)silane 1j: ^{1}H NMR (600 MHz, Chloroform-d) δ 5.72 (dt, *J* = 11.8, 5.8 Hz, 1H), 5.64 (d, *J* = 12.0 Hz, 1H), 2.43 (d, *J* = 2.6 Hz, 2H), 2.22 – 2.12 (m, 1H), 2.12-2.07 (m, 1H), 2.02 – 1.94 (m, 2H), 1.90 – 1.79 (m, 2H), 1.64-1.58 (m, 3H), 0.88 (s, 9H), 0.11 (s, 3H), 0.08 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 138.04, 130.95, 81.59, 77.36, 69.92, 38.96, 33.45, 27.88, 27.31, 25.82, 23.96, 18.31, -2.20, -2.31. IR (cm^{-1}):3314, 2929, 2857, 1472, 1251, 1098, 835, 774. GCMS *m*/*z* 264(M^{+}), 207(M-^{t}Bu).



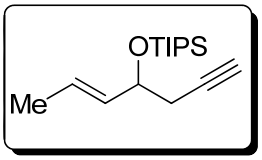
(*E*)-tert-butyldimethyl(3-methyl-1-phenylhex-1-en-5-yn-3-yloxy)silane 3a:^{1}H NMR (500 MHz, Chloroform-d) δ 7.39 (d, *J* = 7.3 Hz, 2H), 7.33 (t, *J* = 7.6 Hz, 2H), 7.24 (t, *J* = 7.5 Hz, 1H), 6.60 (d, *J* = 16.0 Hz, 1H), 6.37 (d, *J* = 16.0 Hz, 1H), 2.49 (d, *J* = 2.7 Hz, 2H), 2.01 (t, *J* = 2.7 Hz, 1H), 1.53 (s, 3H), 0.92 (s, 9H), 0.12 (s, 3H), 0.11 (s, 3H). ^{13}C NMR (126 MHz, CDCl$_3$) δ 136.99, 135.63, 128.55, 127.89, 127.42, 126.49, 103.73, 81.34, 74.44, 70.34, 34.58, 27.01, 25.84, 18.25, -2.12. IR (cm^{-1}):3312, 2930, 2857, 1472, 1253, 1107, 1020, 834, 775. GCMS *m*/*z* 300(M^{+}), 243(M-^{t}Bu).



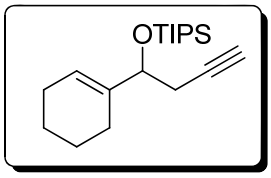
(*E*)-tert-butyl(1,3-diphenylhex-1-en-5-yn-3-yloxy)dimethylsilane 3b:^{1}H NMR (500 MHz, Chloroform-d) δ 7.53 (dd, *J* = 7.3, 1.6 Hz, 2H), 7.45 – 7.41 (m, 2H), 7.35 (t, *J* = 7.5 Hz, 4H), 7.28 (dd, *J* = 7.7, 5.7 Hz, 2H), 6.69 (d, *J* = 16.2 Hz, 1H), 6.52 (d, *J* = 16.2 Hz, 1H), 3.05 – 2.88 (m, 2H), 1.97 (t, *J* = 2.6 Hz, 1H), 0.99 (s, 9H), 0.04 (s, 3H), 0.03 (s, 3H). ^{13}C NMR (126 MHz, CDCl$_3$) δ 144.68, 136.60, 134.15, 129.57, 128.66, 128.66, 127.79, 127.76, 127.19, 126.61, 126.58, 80.77, 77.95, 71.40, 33.12, 26.05, 18.61, -2.17, -2.38. IR (cm^{-1}): 2929, 2857, 1644, 1494, 1255, 1095, 1069, 971, 835, 776. GCMS *m*/*z* 362(M^{+}), 305(M-^{t}Bu).



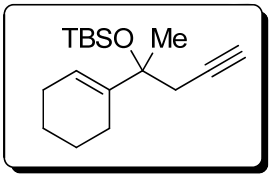
(*E*)-triisopropyl(1-phenylhex-1-en-5-yn-3-yloxy)silane 3c: ^{1}H NMR (500 MHz, Chloroform-d) δ 7.39 (d, *J* = 7.2 Hz, 2H), 7.33 (d, *J* = 7.5 Hz, 2H), 7.26 – 7.20 (m, 1H), 6.61 (d, *J* = 16.0 Hz, 1H), 6.31 (dd, *J* = 15.8, 6.4 Hz, 1H), 4.62 – 4.42 (m, 1H), 2.67 – 2.52 (m, 1H), 2.51 – 2.41 (m, 1H), 2.05 – 1.98 (m, 1H), 1.19 – 1.03 (m, 21H).^{13}C NMR (126 MHz, $CDCl_3$) δ 136.87, 131.70, 130.04, 128.52, 127.48, 126.54, 80.95, 72.17, 70.30, 29.02, 18.08, 18.05, 12.37. IR (cm^{-1}): 3312, 2944, 2867, 1464, 1089, 1066, 996, 882, 743. GCMS *m*/*z* 328(M^+), 285(M-^{i}Pr).



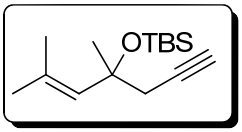
(E)-(hept-5-en-1-yn-4-yloxy)triisopropylsilane 3d: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.72 – 5.60 (m, 1H), 5.54 (dd, *J* = 15.4, 6.7 Hz, 1H), 4.30 (q, *J* = 6.6 Hz, 1H), 2.53 – 2.41 (m, 1H), 2.39 – 2.31 (m, 1H), 1.97 (d, *J* = 2.0 Hz, 1H), 1.70 (d, *J* = 6.3 Hz, 3H), 1.08-1.04 (m, 21H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 133.30, 126.22, 81.46, 72.19, 69.82, 28.91, 18.06, 18.01, 17.51, 12.34. IR (cm^{-1}): 3315, 2944, 2867, 1464, 1101, 1067, 968, 882. GCMS *m*/*z* 266(M^+), 223(M-^{i}pr).



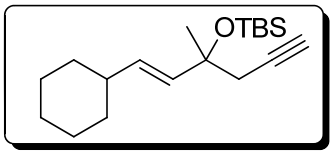
(1-cyclohexenylbut-3-ynyloxy)triisopropylsilane 3e: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.64 (d, *J* = 3.7 Hz, 1H), 4.24 (t, *J* = 6.7 Hz, 1H), 2.57 – 2.34 (m, 2H), 2.14 (dd, *J* = 14.0, 9.4 Hz, 1H), 2.02 (d, *J* = 6.1 Hz, 2H), 1.96 – 1.85 (m, 2H), 1.75 – 1.45 (m, 4H), 1.19 – 0.88 (m, 21H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 138.63, 123.94, 81.82, 76.18, 69.65, 26.89, 24.87, 22.67, 22.59, 22.54, 18.07, 18.04, 18.01, 12.32. IR (cm^{-1}):2941, 2867, 1641, 1464, 1090, 1064, 882, 812. GCMS *m*/*z* 306(M^+), 263(M-^{i}Pr).



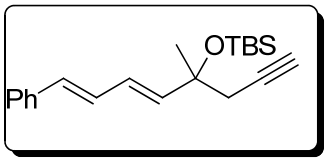
tert-butyl(2-cyclohexenylpent-4-yn-2-yloxy)dimethylsilane 3f: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.71 (dq, *J* = 3.7, 1.8 Hz, 1H), 2.42 (t, *J* = 2.4 Hz, 2H), 2.16 – 2.01 (m, 4H), 2.01-1.95 (m, 1H), 1.93 (t, *J* = 2.7 Hz, 1H), 1.76 – 1.47 (m, 4H), 1.44 (s, 3H), 0.87 (s, 9H), 0.09 (s, 3H), 0.04 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 141.02, 121.32, 81.98, 76.61, 69.78, 32.76, 26.11, 25.92, 25.22, 24.18, 23.03, 22.30, 18.38, -2.09, -2.70. IR (cm^{-1}):2931, 2858, 1472, 1256, 1115, 1015, 836, 774. GCMS *m*/*z* 278(M^+), 221(M-^{t}Bu).



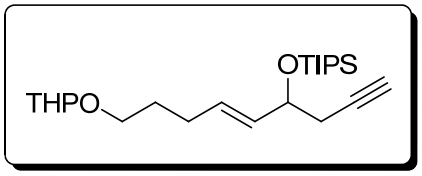
tert-butyl(4,6-dimethylhept-5-en-1-yn-4-yloxy)dimethylsilane 3g:^{1}H NMR (600 MHz, Chloroform-d) δ 5.34 (s, 1H), 2.48 (t, *J* = 2.3 Hz, 2H), 1.95 (t, *J* = 2.7 Hz, 1H), 1.80 (s, 3H), 1.70 (s, 3H), 1.48 (s, 3H), 0.87 (s, 9H), 0.08 (s, 3H), 0.06 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 134.67, 130.55, 82.15, 74.22, 69.59, 34.76, 29.25, 27.29, 25.96, 19.43, 18.29, -2.15, -2.40. IR (cm^{-1}): 3315, 2931, 2858, 1473, 1253, 1099, 1017, 836, 774. GCMS *m*/*z* 252(M^+), 195 (M-^{t}Bu).



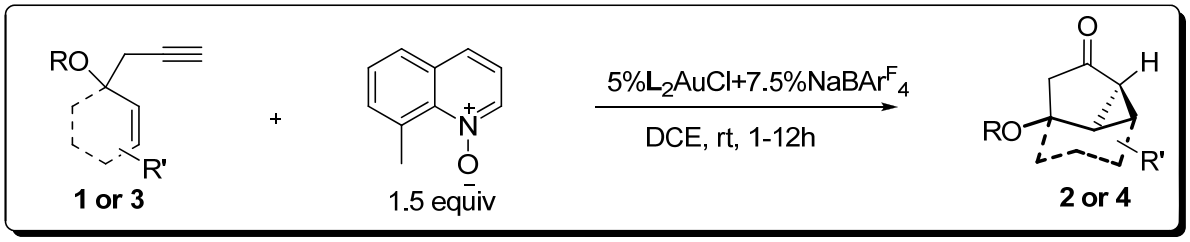
(E)-tert-butyl(1-cyclohexyl-3-methylhex-1-en-5-yn-3-yloxy)dimethylsilane 3h: ^{1}H NMR (600 MHz, Chloroform-d) δ 5.62 – 5.49 (m, 2H), 2.35 (t, *J* = 2.8 Hz, 2H), 1.98 – 1.91 (m, 2H), 1.72 (dt, *J* = 13.4, 3.8 Hz, 4H), 1.68 – 1.62 (m, 1H), 1.38 (s, 3H), 1.33 – 1.23 (m, 2H), 1.19 – 1.13 (m, 1H), 1.12 – 1.03 (m, 2H), 0.87 (s, 9H), 0.06 (s, 3H), 0.05 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 134.74, 133.22, 81.88, 74.01, 69.76, 40.35, 34.68, 32.89, 32.80, 26.75, 26.19, 26.03, 25.89, 25.81, 18.16, -2.08, -2.14. IR (cm^{-1}):2928, 2855, 1472, 1252, 1109, 1021, 836, 774. GCMS *m*/*z* 306(M^+), 249(M-^{t}Bu).



tert-butyldimethyl((5E,7E)-4-methyl-8-phenylocta-5,7-dien-1-yn-4-yloxy)silane 3i: ^{1}H NMR (500 MHz, Chloroform-d) δ 7.44 – 7.38 (m, 2H), 7.31 (dd, *J* = 8.5, 6.9 Hz, 2H), 7.25 – 7.19 (m, 1H), 6.78 (dd, *J* = 15.6, 10.5 Hz, 1H), 6.55 (d, *J* = 15.7 Hz, 1H), 6.40 (dd, *J* = 15.3, 10.5 Hz, 1H), 5.97 (d, *J* = 15.3 Hz, 1H), 2.45 (d, *J* = 2.7 Hz, 2H), 2.00 (t, *J* = 2.6 Hz, 1H), 1.48 (s, 3H), 0.91 (s, 9H), 0.10 (s, 3H), 0.09 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 139.94, 137.30, 132.39, 128.59, 128.57, 128.54, 127.44, 126.31, 81.36, 74.32, 70.29, 34.51, 26.97, 25.83, 18.23, -2.15. IR (cm^{-1}): 2930, 2857, 1472, 1253, 1100, 1018, 989, 835, 775. GCMS *m*/*z* 326(M^+), 269(M-^{t}Bu).

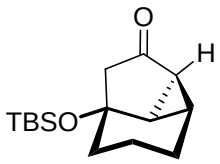


(E)-triisopropyl(9-(tetrahydro-2H-pyran-2-yloxy)non-5-en-1-yn-4-yloxy)silane 3j: ^{1}H NMR (500 MHz, Chloroform-d) δ 5.72 – 5.62 (m, 1H), 5.54 (ddd, *J* = 15.4, 7.2, 2.4 Hz, 1H), 4.57 (t, *J* = 3.7 Hz, 1H), 4.31 (q, *J* = 6.9 Hz, 1H), 3.86 (ddd, *J* = 11.0, 7.7, 3.2 Hz, 1H), 3.80 – 3.71 (m, 1H), 3.49 (dt, *J* = 10.8, 5.1 Hz, 1H), 3.39 (dt, *J* = 9.7, 6.6 Hz, 1H), 2.46 (ddd, *J* = 16.3, 6.2, 1.9 Hz, 1H), 2.39 – 2.27 (m, 1H), 2.13 (dt, *J* = 10.0, 6.9 Hz, 2H), 1.96 (q, *J* = 2.5 Hz, 1H), 1.89 – 1.79 (m, 1H), 1.76 – 1.65 (m, 3H), 1.58 – 1.46 (m, 4H), 1.08-1.03 (m, 21H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 132.44, 130.89, 130.86, 98.90, 98.87, 81.38, 72.23, 72.20, 69.94, 69.92, 66.97, 62.31, 30.75, 29.26, 29.25, 28.99, 28.97, 28.75, 25.50, 19.66, 18.07, 18.04, 17.69, 12.33. IR (cm^{-1}):2943, 2867, 1465, 1121, 1064, 1035, 970, 883. MS (ESI/$[M+Na]^+$): 417.31.



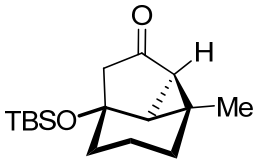
General procedure C for gold-catalyzed oxidative cyclopropanation: To a 3 dram vial containing 6 mL of DCE were added sequentially a 3-Silyloxy-1,5-enyne **1** or **3** (0.3 mmol), 8-

methylqunoline N-oxide (71.6 mg, 0.45 mmol), L_2AuCl (10.8mg, 0.015 mmol) and $NaBArF_4$ (19.8mg, 0.0225 mmol). The resulting mixture was stirred at room temperature and the reaction was monitored by TLC. Upon completion, the reaction mixture was concentrated under vacuum. The residue was purified by chromatography on silica gel (eluent: hexanes/ethyl acetate) to afford the desired product **2** or **4**.



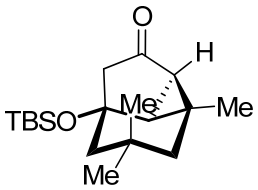
2a

The compound **2a** was prepared in 91% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 6h. ^{1}H NMR (500 MHz, Chloroform-d) δ 2.74 (d, *J* = 17.3 Hz, 1H), 2.46 (dd, *J* = 17.3, 1.9 Hz, 1H), 2.23 (dd, *J* = 8.3, 5.4 Hz, 1H), 1.97 – 1.88 (m, 2H), 1.84 (ddt, *J* = 14.7, 12.3, 5.9 Hz, 1H), 1.67-1.59 (m, 4H), 1.18 – 1.06 (m, 1H), 0.90 (s, 9H), 0.14 (s, 3H), 0.11 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 211.74, 74.55, 59.27, 36.33, 34.99, 34.58, 25.68, 23.93, 19.82, 19.37, 17.85, -2.18, -2.30. IR(cm^{-1}):2953, 2858, 1730, 1341, 1252, 1134, 1115, 835, 775. MS (ESI/$[M+H]^+$):267.21.



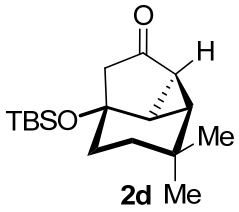
2b

The compound **2b** was prepared in 85% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 7h. ^{1}H NMR (500 MHz, Chloroform-d) δ 2.72 (d, *J* = 17.1 Hz, 1H), 2.40 (d, *J* = 17.1 Hz, 1H), 2.07 (d, *J* = 5.7 Hz, 1H), 1.96 (ddd, *J* = 14.5, 6.2, 1.8 Hz, 1H), 1.74 (d, *J* = 5.6 Hz, 1H), 1.72 – 1.53 (m, 4H), 1.17-1.07 (m, 1H)1.09 (s, 3H), 0.90 (s, 9H), 0.13 (s, 3H), 0.10 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 210.97, 75.01, 59.69, 43.34, 42.49, 36.75, 30.45, 27.69, 27.22, 25.69, 19.71, 17.85, -2.20, -2.33. IR(cm^{-1}):2954, 2857, 1726, 1473, 1252, 1160, 1096, 836, 775. MS (ESI/$[M+Na]^+$):303.22 .



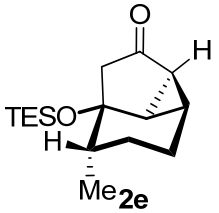
2c

The compound **2c** was prepared in 85% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 10 h. ^{1}H NMR (500 MHz, Chloroform-d) δ 2.49 (dd, *J* = 20.1, 1.0 Hz, 1H), 2.15 (d, *J* = 20.1 Hz, 1H), 1.96 (d, *J* = 4.7 Hz, 1H), 1.78 (d, *J* = 4.8 Hz, 1H), 1.69 (d, *J* = 13.5 Hz, 1H), 1.54 (d, *J* = 13.5 Hz, 1H), 1.46 (d, *J* = 15.6 Hz, 1H), 1.23 (s, 3H), 1.18 – 1.08 (m, 4H), 0.94 (s, 3H), 0.87 (s, 9H), 0.11 (s, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 211.83, 77.07, 56.17, 49.11, 43.35, 40.64, 38.58, 33.84, 32.77, 32.43, 27.10, 26.84, 25.66, 17.84, -2.11, -2.14. IR (cm^{-1}):2955, 2859, 1724, 1472, 1258, 1209, 1080, 836, 775. MS (ESI/$[M+Na]^+$):331.25 .



2d

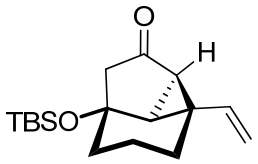
The compound **2d** was prepared in 80% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 8 h. ^{1}H NMR (600 MHz, Chloroform-d) δ 2.79 (d, *J* = 17.2 Hz, 1H), 2.44 (dd, *J* = 17.1, 1.8 Hz, 1H), 2.27 (dd, *J* = 8.3, 5.4 Hz, 1H), 1.95 (dd, *J* = 10.4, 5.5 Hz, 1H), 1.80 (ddd, *J* = 14.8, 12.6, 3.3 Hz, 1H), 1.49 (dt, *J* = 12.4, 3.4 Hz, 1H), 1.41 (dq, *J* = 15.0, 3.1 Hz, 1H), 1.31 (ddt, *J* = 10.3, 8.3, 2.1 Hz, 1H), 1.14 (s, 3H), 1.03 (s, 3H), 1.01 – 0.93 (m, 1H), 0.92(s, 9H), 0.15 (s, 3H), 0.12 (s, 3H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 211.43, 74.70, 60.10, 36.62, 35.90, 35.11, 34.47, 33.66, 30.27, 29.75, 28.51, 25.69, 17.86, -2.23, -2.32. IR(cm^{-1}):2957, 2931, 1725, 1472, 1254, 1118, 1010, 838, 775. MS (ESI/$[M+Na]^+$):317.24



2e

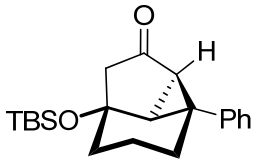
The compound **2e** was prepared in 92% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 10 h. ^{1}H NMR (500 MHz, Chloroform-d) δ 2.76 (d, *J* = 17.4 Hz, 1H), 2.53 (dd, *J* = 17.6, 1.8 Hz, 1H), 2.09 (dd, *J* = 8.3, 5.2 Hz, 1H), 1.93 (ddd, *J* = 19.7,

8.7, 5.6 Hz, 2H), 1.79 – 1.69 (m, 2H), 1.62 – 1.55 (m, 1H), 1.47 – 1.39 (m, 1H), 1.28 (tdd, *J* = 14.1, 6.7, 3.2 Hz, 1H), 1.06 (d, *J* = 6.8 Hz, 3H), 0.97 (t, *J* = 7.9 Hz, 9H), 0.63 (q, *J* = 7.9 Hz, 6H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 211.37, 76.63, 59.61, 37.37, 33.76, 31.89, 24.85, 22.98, 14.99, 12.99, 7.02, 6.57. IR (cm^{-1}): 2956, 2877, 1730, 1233, 1128, 1103, 783, 726. MS (ESI/$[M+Na]^+$): 303.22



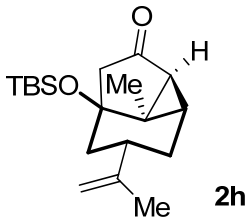
2f

The compound **2f** was prepared in 60% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 12 h. ^{1}H NMR (500 MHz, Chloroform-d) δ 5.39 (dd, *J* = 17.2, 10.6 Hz, 1H), 5.02 – 4.91 (m, 2H), 2.77 (d, *J* = 17.1 Hz, 1H), 2.45 (d, *J* = 17.2 Hz, 1H), 2.24 (d, *J* = 5.9 Hz, 1H), 2.06 – 1.88 (m, 3H), 1.83 – 1.75 (m, 1H), 1.69 (dd, *J* = 12.2, 3.8 Hz, 1H), 1.65 – 1.54 (m, 1H), 1.23 – 1.11 (m, 1H), 0.90 (s, 9H), 0.14 (s, 3H), 0.11 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 209.81, 142.91, 111.67, 75.10, 59.95, 42.14, 41.90, 36.42, 34.49, 25.68, 23.09, 19.25, 17.85, -2.20, -2.32. IR (cm^{-1}): 2954, 2930, 1731, 1472, 1151, 837, 775. MS (ESI/$[M+Na]^+$): 315.22



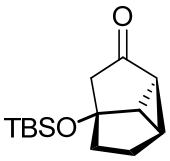
2g

The compound **2g** was prepared in 83% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 8 h. ^{1}H NMR (600 MHz, Chloroform-d) δ 7.30 (d, *J* = 6.3 Hz, 4H), 7.21 (td, *J* = 6.0, 2.7 Hz, 1H), 2.84 (d, *J* = 17.1 Hz, 1H), 2.58 (d, *J* = 6.1 Hz, 1H), 2.52 (d, *J* = 17.1 Hz, 1H), 2.26 (dd, *J* = 14.9, 5.3 Hz, 1H), 2.21 (d, *J* = 6.1 Hz, 1H), 1.91 (ddd, *J* = 14.7, 11.7, 7.1 Hz, 1H), 1.84 – 1.69 (m, 3H), 1.27 (dtd, *J* = 17.8, 13.0, 12.3, 6.3 Hz, 1H), 0.93 (s, 9H), 0.22 (s, 3H), 0.17 (s, 3H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 210.24, 145.95, 128.62, 127.55, 126.73, 75.02, 60.03, 41.90, 40.79, 38.75, 36.56, 28.74, 25.70, 25.65, 19.91, 17.88, -2.07, -2.21. IR(cm^{-1}):2954, 2930, 1730, 1472, 1215, 1110, 837, 775. MS (ESI/$[M+Na]^+$):365.20



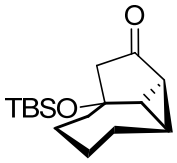
2h

The compound **2h** was prepared in 49% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 10 h. ^{1}H NMR (600 MHz, Chloroform-d) δ 4.73 – 4.64 (m, 2H), 2.76 (d, *J* = 17.2 Hz, 1H), 2.52 (dd, *J* = 17.2, 1.7 Hz, 1H), 2.06 (dd, *J* = 14.3, 5.8 Hz, 1H), 1.83 (ddd, *J* = 16.6, 11.4, 4.7 Hz, 1H), 1.73 (d, *J* = 10.6 Hz, 2H), 1.68 (s, 3H), 1.66 – 1.54 (m, 3H), 1.33 (s, 3H), 0.92 (s, 9H), 0.12 (s, 3H), 0.09 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 211.07, 148.23, 109.42, 76.24, 58.92, 41.20, 41.04, 39.45, 38.81, 32.60, 26.47, 25.74, 20.41, 18.16, 17.99, -2.04, -2.50. IR (cm^{-1}): 2957, 2930, 1724, 1462, 1253, 1121, 836, 775. MS (ESI/[M+Na]$^{+}$): 343.26



2i

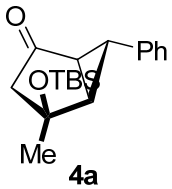
The compound **2i** was prepared in 84% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 6 h. ^{1}H NMR (500 MHz, Chloroform-d) δ 2.67 (dt, *J* = 17.7, 1.7 Hz, 1H), 2.61 (dd, *J* = 6.5, 5.1 Hz, 1H), 2.32 – 2.17 (m, 2H), 2.16 – 2.06 (m, 1H), 2.06 – 2.00 (m, 1H), 1.96 (ddd, *J* = 9.2, 6.9, 1.9 Hz, 1H), 1.79 (dd, *J* = 11.1, 6.1 Hz, 1H), 1.46-1.39 (m, 1H), 0.90 (s, 9H), 0.12 (s, 3H), 0.10 (s, 3H). ^{13}C NMR (126 MHz, CDCl$_3$) δ 212.02, 84.36, 55.75, 47.69, 40.78, 39.18, 28.01, 25.63, 22.89, 17.78, -2.66, -2.78. IR (cm^{-1}):2956, 2858, 1732, 1323, 1142, 916, 837, 776. MS (ESI/[M+H]$^{+}$):253.19 .



2j

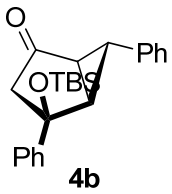
The compound **2j** was prepared in 93% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), time: 8 h. ^{1}H NMR (500 MHz, Chloroform-d) δ 2.53 (d, *J* = 19.7 Hz, 1H), 2.30 – 2.20 (m, 2H), 2.17 (dd, *J* = 19.7, 1.2 Hz, 1H), 2.06 (dd, *J* = 9.3, 4.8 Hz, 1H),

2.00 – 1.87 (m, 2H), 1.85 – 1.73 (m, 2H), 1.65 – 1.59 (m, 1H), 1.46 – 1.35 (m, 1H), 1.35 – 1.24 (m, 1H), 1.08 – 0.98 (m, 1H), 0.84 (s, 9H), 0.10 (s, 3H), 0.09 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 213.13, 79.92, 49.20, 40.70, 40.00, 36.25, 27.32, 26.50, 26.34, 25.63, 24.76, 17.89, -2.20, -2.25. IR(cm^{-1}): 2928, 2856, 1727, 1253, 1079, 832, 774. MS (ESI/$[M+Na]^+$):303.22.



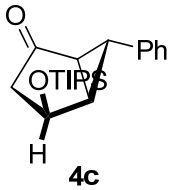
4a

4-(tert-butyldimethylsilyloxy)-4-methyl-6-phenylbicyclo[3.1.0]hexan-2-one 4a was prepared in 91% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 7.29 (t, *J* = 7.5 Hz, 2H), 7.22 (t, *J* = 7.3 Hz, 1H), 7.06 (d, *J* = 7.5 Hz, 2H), 2.72 (t, *J* = 3.5 Hz, 1H), 2.50 – 2.41 (m, 2H), 2.21 (dd, *J* = 5.5, 2.9 Hz, 1H), 2.17 (d, *J* = 17.9 Hz, 1H), 1.53 (s, 3H), 0.88 (s, 9H), 0.10 (s, 3H), 0.05 (s, 3H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 208.14, 138.34, 128.58, 126.71, 125.92, 75.54, 49.30, 42.80, 41.41, 30.55, 30.06, 25.68, 17.91, -2.52. IR(cm^{-1}): 2956, 2930, 1734, 1253, 1141, 1016, 836, 775. MS (ESI/$[M+Na]^+$): 339.22.



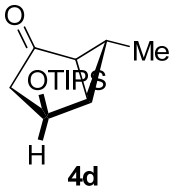
4b

4-(tert-butyldimethylsilyloxy)-4,6-diphenylbicyclo[3.1.0]hexan-2-one 4b was prepared in 88% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 7.52 (d, *J* = 7.7 Hz, 2H), 7.37 (t, *J* = 7.6 Hz, 2H), 7.31 (t, *J* = 7.4 Hz, 3H), 7.26 – 7.23 (m, 1H), 7.11 (d, *J* = 7.6 Hz, 2H), 2.91 (d, *J* = 3.4 Hz, 1H), 2.85 – 2.75 (m, 2H), 2.66 (d, *J* = 17.8 Hz, 1H), 2.37 (dd, *J* = 5.6, 2.7 Hz, 1H), 0.94 (s, 9H), -0.12 (s, 3H), -0.16 (s, 3H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 207.30, 146.74, 138.21, 128.65, 128.46, 127.66, 126.86, 125.90, 125.17, 78.84, 49.17, 42.70, 42.20, 31.04, 25.95, 18.27, -2.61, -2.85. IR (cm^{-1}): 2955, 2930, 1736, 1250, 1074, 938, 834, 777. MS (ESI/$[M+Na]^+$):401.23.



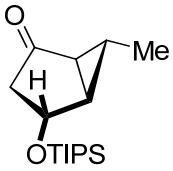
4c

6-phenyl-4-(triisopropylsilyloxy)bicyclo[3.1.0]hexan-2-one 4c was prepared in 80% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). dr=3; ^{1}H NMR (600 MHz, Chloroform-d) δ 7.29 (t, *J* = 7.6 Hz, 2H), 7.22 (t, *J* = 7.2 Hz, 1H), [7.10 (d, *J* = 7.5 Hz), 7.06 (d, *J* = 7.5 Hz), 2H], [4.97 – 4.82 (m), 4.71 (d, *J* = 5.3 Hz,) 1H], 2.87 – 2.79 (m, 1H), [2.58 (q, *J* = 5.0 Hz), 2.53 (t, *J* = 4.9 Hz), 1H], 2.50 – 2.44 (m, 1H), 2.27 – 2.07 (m, 2H), 1.18 – 1.02 (m, 21H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 210.61, 208.49, 138.40, 138.09, 128.61, 128.52, 126.81, 126.68, 126.30, 126.05, 69.72, 67.82, 44.21, 42.24, 40.77, 39.04, 37.99, 36.86, 29.38, 27.97, 17.97, 17.95, 17.90, 12.09, 12.07. IR (cm^{-1}): 2944, 2867, 1735, 1463, 1102, 1069, 884, 788, 750. MS (ESI/[M+Na]$^{+}$): 367.25.



4d

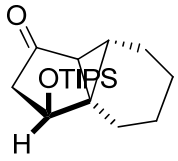
6-methyl-4-(triisopropylsilyloxy)bicyclo[3.1.0]hexan-2-one 4d was prepared in 54% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 4.77 – 4.65 (m, 1H), 2.31 (dd, *J* = 17.9, 8.5 Hz, 1H), 2.09 – 2.02 (m, 2H), 1.79 – 1.71 (m, 1H), 1.68 – 1.59 (m, 1H), 1.14 (d, *J* = 6.0 Hz, 3H), 1.12-1.04 (m, 21H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 209.61, 67.66, 42.28, 39.10, 36.60, 19.52, 17.89, 16.71, 12.09. IR (cm^{-1}): 2944, 2868, 1738, 1464, 1097, 1069, 942, 853. MS (ESI/[M+Na]$^{+}$): 305.23.



4d'

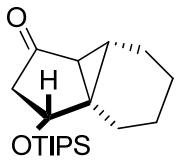
6-methyl-4-(triisopropylsilyloxy)bicyclo[3.1.0]hexan-2-one 4d' was prepared in 36% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 4.53 (d, *J* = 5.1 Hz, 1H), 2.31 (dd, *J* = 18.3, 5.3 Hz, 1H), 1.99 – 1.92 (m, 2H), 1.70 – 1.64 (m, 2H), 1.17 – 1.02 (m, 24H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 212.11, 69.42,

44.46, 39.10, 35.47, 21.03, 17.95, 17.93, 16.65, 12.08. IR (cm^{-1}):2945, 2868, 1736, 1464, 1160, 1062, 882, 765. MS (ESI/$[M+Na]^+$):305.23.



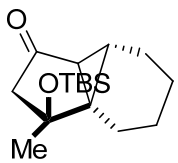
4e

The product **4e** was prepared in 34% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^1H NMR (600 MHz, Chloroform-d) δ 4.46 (t, *J* = 8.0 Hz, 1H), 2.32 (dd, *J* = 17.4, 8.3 Hz, 1H), 2.18 (dt, *J* = 13.8, 6.8 Hz, 1H), 2.11 (dd, *J* = 17.4, 7.7 Hz, 1H), 1.98 (dt, *J* = 13.1, 6.6 Hz, 1H), 1.90 (d, *J* = 7.2 Hz, 1H), 1.86 (dt, *J* = 13.3, 6.2 Hz, 1H), 1.69 – 1.57 (m, 3H), 1.44 (dq, *J* = 9.9, 5.7, 3.5 Hz, 1H), 1.36 – 1.28 (m, 1H), 1.27 – 1.15 (m, 2H), 1.06 (br, 20H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 209.96, 72.82, 42.79, 42.75, 40.49, 25.37, 24.72, 23.54, 21.87, 21.22, 18.05, 18.01, 12.38. IR (cm^{-1}): 2941, 2866, 1726, 1463, 1221, 1110, 882. MS (ESI/ $[M+Na]^+$):345.26.



4e'

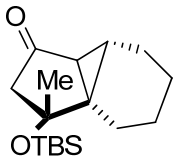
The product **4e'** was prepared in 58% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^1H NMR (600 MHz, Chloroform-d) δ 4.49 (d, *J* = 5.1 Hz, 1H), 2.41 (dd, *J* = 18.1, 5.2 Hz, 1H), 2.16 – 2.05 (m, 1H), 2.03 – 1.92 (m, 3H), 1.68 (s, 1H), 1.62 (dt, *J* = 14.6, 7.2 Hz, 1H), 1.44 (q, *J* = 7.1 Hz, 1H), 1.38 (d, *J* = 7.2 Hz, 1H), 1.33 – 1.21 (m, 2H), 1.22 – 1.14 (m, 1H), 1.06 (d, *J* = 4.1 Hz, 21H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 212.54, 73.45, 44.48, 40.88, 39.95, 25.93, 23.48, 23.10, 21.46, 21.21, 18.14, 18.08, 12.49. IR (cm^{-1}): 2943, 2867, 1726, 1144, 1064, 882. MS (ESI/$[M+Na]^+$):345.26.



4f

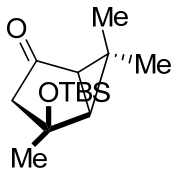
The product **4f** was prepared in 48% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^1H NMR (600 MHz, Chloroform-d) δ 2.37 (d, *J* = 16.8 Hz, 1H), 2.07

(dt, *J* = 14.0, 7.0 Hz, 1H), 2.02 – 1.92 (m, 2H), 1.91 – 1.86 (m, 1H), 1.81 (dt, *J* = 14.0, 6.0 Hz, 1H), 1.66 – 1.59 (m, 2H), 1.46 – 1.41 (m, 1H), 1.32 (s, 3H), 1.30 – 1.23 (m, 1H), 1.22-1.17 (m, 2H), 0.87 (s, 9H), 0.08 (s, 3H), 0.05 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 209.82, 77.40, 49.08, 43.70, 42.43, 27.40, 26.78, 25.64, 23.92, 21.89, 20.98, 20.91, 18.00, -2.45, -2.70. IR (cm^{-1}): 2931, 2858, 1727, 1249, 1158, 1113, 1023, 835, 774. MS (ESI/[M+Na]$^+$):317.22.



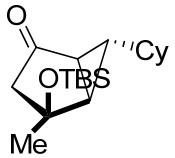
4f'

The product **4f'** was prepared in 47% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 2.19 (d, *J* = 17.7 Hz, 1H), 2.07 – 1.97 (m, 2H), 1.86 (dq, *J* = 15.0, 7.0 Hz, 2H), 1.73 – 1.61 (m, 3H), 1.48 – 1.43 (m, 1H), 1.36 (s, 3H), 1.33 – 1.25 (m, 3H), 1.12 (tt, *J* = 9.3, 4.9 Hz, 1H), 0.84 (s, 9H), 0.09 (s, 3H), 0.07 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 212.11, 79.75, 48.45, 44.54, 41.00, 27.52, 25.67, 23.68, 23.23, 22.00, 21.12, 20.82, 18.16, -2.30, -2.61. IR(cm^{-1}): 2931, 2859, 1726, 1468, 1252, 1193, 1018, 835, 774. MS (ESI/[M+Na]$^+$):317.22.



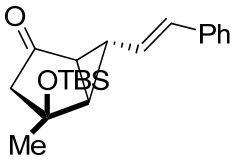
4g

The product **4g** was prepared in 70% yield according to the general procedure **C,** but the temperature is 60 °C. (Eluents; ethyl acetate: hexanes = 1:10), dr=2. ^{1}H NMR (600 MHz, Chloroform-d) δ [2.45 (d, *J* = 19.2 Hz), 2.33 (d, *J* = 19.4 Hz), 1H], 2.26 (d, *J* = 19.0 Hz, 1H), [1.97 (d, *J* = 5.2 Hz), 1.90 (d, *J* = 5.4 Hz), 1H], [1.83 (d, *J* = 5.2 Hz), 1.81 (d, *J* = 5.4 Hz), 1H], [1.49 (s),1.44(s), 3H), [1.43 (s), 1.25 (s), 3H)], 1.12 (s, 3H), [0.87 (s), 0.84 (s), 9H], 0.18 – 0.05 (m, 6H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 212.21, 210.56, 75.83, 53.72, 53.44, 48.62, 47.67, 44.38, 42.37, 32.39, 28.46, 28.37, 28.17, 26.62, 25.80, 25.61, 17.90, 17.88, 17.53, -2.22, -2.34. IR (cm^{-1}): 2957, 2931, 1729, 1255, 1138, 1013, 836, 774. MS (ESI/[M+Na]$^+$):291.21.



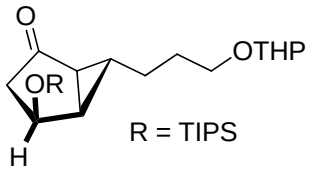
4h

The product **4h** was prepared in 85% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), dr=3. ^{1}H NMR (600 MHz, Chloroform-d) δ [2.26 (d, *J* = 17.3 Hz), 2.09 (d, *J* = 17.8 Hz), 1H], 2.04 – 1.95 (m, 2H), 1.84 – 1.62 (m, 6H), 1.47 – 1.38 (m, 4H), 1.21 – 1.02 (m, 5H), [0.88 (s), 0.85 (s), 9H], 0.77-0.71 (m, 1H), [0.12 (s), 0.10 (s), 0.07 (s), 6H]. ^{13}C NMR (151 MHz, cdcl$_3$) δ 209.71, 74.90, 49.15, 49.03, 40.69, 40.67, 40.62, 40.55, 36.40, 34.93, 34.05, 32.67, 32.41, 29.97, 26.29, 26.23, 26.11, 26.00, 25.89, 25.70, 25.61, 17.92, -2.37, -2.54. IR (cm^{-1}): 2928, 2855, 1731, 1253, 1146, 1016, 836,775. MS (ESI/[M+Na]$^{+}$):345.25.



4i

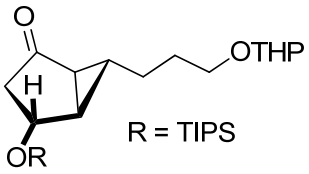
The product **4i** was prepared in 85% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10), dr=2.5. ^{1}H NMR (600 MHz, Chloroform-d) δ 7.33 – 7.28 (m, 4H), 7.22 (tt, *J* = 6.0, 3.0 Hz, 1H), 6.54 (t, *J* = 16.5 Hz, 1H), 5.68 (dd, *J* = 15.7, 8.8 Hz, 1H), 2.43 (dt, *J* = 8.8, 3.2 Hz, 1H), 2.36 (d, *J* = 17.9 Hz, 1H),[2.30 (t, *J* = 4.5 Hz), 2.26 (d, *J* = 5.1 Hz), 1H)], 2.19 – 2.05 (m, 2H), [,1.49 (s), 1.50 (s), 3H], [0.89 (s), 0.86 (s), 9H], 0.17 – 0.07 (m, 6H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 210.06, 207.96, 136.71, 136.53, 130.91, 130.67, 128.61, 128.59, 127.51, 127.46, 127.25, 127.22, 125.98, 125.93, 77.49, 75.35, 49.26, 48.71, 41.88, 41.22, 39.27, 37.21, 36.31, 30.73, 30.23, 30.04, 28.63, 28.56, 26.31, 25.69, 25.59, 17.93, -2.26, -2.33, -2.43, -2.47. IR (cm^{-1}): 2956, 2929, 1732, 1253, 1144, 1016, 835, 746. MS (ESI/[M+Na]$^{+}$):365.24.



4j

4-(tert-butyldimethylsilyloxy)-6-(3-(tetrahydro-2H-pyran-2-yloxy)propyl)bicycle [3.1.0]hexan-2-one **4j** was prepared in 56% yield according to the general procedure **C** (eluents: ethyl acetate:

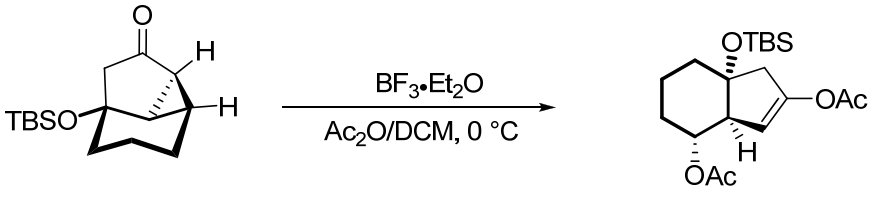
hexanes = 1:10):^{1}H NMR (500 MHz, Chloroform-d) δ 4.74 – 4.67 (m, 1H), 4.55 (d, *J* = 4.7 Hz, 1H), 3.84 (t, *J* = 9.5 Hz, 1H), 3.80 – 3.72 (m, 1H), 3.52 – 3.39 (m, 2H), 2.31 (dd, *J* = 17.8, 8.5 Hz, 1H), 2.15 – 2.02 (m, 2H), 1.85 – 1.61 (m, 6H), 1.58 – 1.46 (m, 5H), 1.40 (dd, *J* = 14.2, 7.1 Hz, 1H), 1.05 (t, *J* = 4.8 Hz, 21H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 209.46, 209.44, 98.85, 67.54, 66.66, 66.61, 62.38, 42.33, 37.80, 35.38, 30.72, 29.06, 28.58, 28.55, 25.44, 24.74, 19.65, 17.91, 17.89, 12.04. IR (cm^{-1}): 2943, 2867, 1734, 1464, 1200, 1101, 1034, 882. MS (ESI/ $[M+Na]^+$): 433.32.



4j'

4-(tert-butyldimethylsilyloxy)-6-(3-(tetrahydro-2H-pyran-2-yloxy)propyl)bicycle [3.1.0]hexan-2-one **4j'** was prepared in 38% yield according to the general procedure **C** (eluents: ethyl acetate: hexanes = 1:10).^{1}H NMR (600 MHz, Chloroform-d) δ 4.56-4.55(m, 1H), 4.52 (d, *J* = 5.2 Hz, 1H), 3.84 (t, *J* = 9.7 Hz, 1H), 3.78 – 3.70 (m, 1H), 3.49 (dd, *J* = 11.0, 5.6 Hz, 1H), 3.41 (q, *J* = 8.2 Hz, 1H), 2.33 (dd, *J* = 18.4, 5.3 Hz, 1H), 2.05 – 1.99 (m, 1H), 1.96 (d, *J* = 18.4 Hz, 1H), 1.84 – 1.78 (m, 1H), 1.77 – 1.64 (m, 4H), 1.57-1.50 (m, 4H), 1.47-1.39(m, 2H), 1.16 – 0.96 (m, 21H). ^{13}C NMR (151 MHz, $cdcl_3$) δ 211.99, 211.98, 98.97, 69.48, 66.71, 62.55, 62.52, 44.55, 37.89, 37.83, 34.31, 34.27, 30.74, 29.13, 29.09, 28.60, 28.58, 26.35, 26.33, 25.42, 19.74, 19.72, 17.94, 12.08, 12.05. IR (cm^{-1}): 2943, 2867, 1732, 1464, 1161, 1064, 882. MS (ESI/$[M+Na]^+$):433.32.

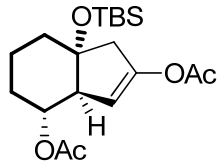
General Procedure D for Opening of Cyclopropyl Ketones **2a,2b and 4a**:



2a **5a,** 1h, 80%

The cyclopropyl ketone **2a** (0.1 mmoL) in 0.5 mL of dichloromethane was placed in a two-necked flask under N_2 atmosphere. Acetic anhydride (0.5 mL) and BF_3•OEt_2 (1 mmol) were added at the 0° C, and stirring was continued for 1h. The reaction mixture was then poured into 10 mL of dichloromethane containing 1 g of solid sodium bicarbonate and stirred for 5 min, at

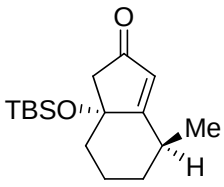
which time 10 mL of saturated aqueous sodium bicarbonate solution was added. The mixture was extracted with 2 X 10 mL portions of dichloromethane, and the organic layer was washed with 10 mL of water, followed by 20 mL of brine, and dried over anhydrous sodium sulfate. The solution was concentrated in vacuo to yield crude product, which was purified by flash chromatography' to give corresponding y-acetoxy enol acetate **5a** in 80% yield.



5a

7a-(tert-butyldimethylsilyloxy)-3a,4,5,6,7,7a-hexahydro-1H-indene-2,4-diyl diacetate 5a was isolated in 80% yield. ^{1}H NMR (600 MHz, Chloroform-d) δ 5.32 (s, 1H), 4.81 (q, *J* = 4.7 Hz, 1H), 2.77 – 2.71 (m, 1H), 2.61 (dt, *J* = 15.3, 2.3 Hz, 1H), 2.43 (d, *J* = 15.3 Hz, 1H), 2.12 (s, 3H), 2.03 (s, 3H), 1.92 – 1.77 (m, 2H), 1.69-1.60 (m, 2H), 1.60 (q, *J* = 2.8 Hz, 1H), 1.38-1.32 (m, 1H), 0.88 (s, 9H), 0.08 (d, *J* = 2.7 Hz, 6H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 170.65, 168.26, 149.54, 113.14, 80.18, 73.25, 53.75, 46.13, 35.42, 27.12, 25.68, 21.42, 21.07, 16.89, -2.62. IR (cm^{-1}): 2931, 2857, 1766, 1735, 1251, 1246, 1240, 1210, 1099, 836, 774. MS (ESI/[M+Na]$^{+}$): 391.24.

7a-(tert-butyldimethylsilyloxy)-4-methyl-5,6,7,7a-tetrahydro-1H-inden-2(4*H*)-one 5b

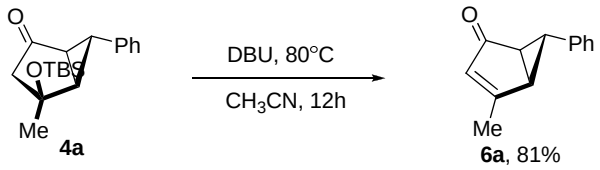


5**b**

The compound **5b** was prepared in 68% yield according to the general procedure **D** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (500 MHz, Chloroform-d) δ 5.76 (d, *J* = 1.7 Hz, 1H), 2.77-2.73 (m, 1H), 2.62 (d, *J* = 18.5 Hz, 1H), 2.40 (d, *J* = 18.4 Hz, 1H), 2.20 (dq, *J* = 13.6, 2.6 Hz, 1H), 2.01 – 1.85 (m, 2H), 1.63 – 1.56 (m, 2H), 1.35 (td, *J* = 13.4, 4.1 Hz, 1H), 1.16 (d, *J* = 6.6 Hz, 3H), 1.11 – 1.02 (m, 1H), 0.88 (s, 9H), 0.10 (s, 3H), 0.03 (s, 3H). ^{13}C NMR (126 MHz, CDCl$_3$) δ 205.34, 188.08, 124.23, 78.38, 50.53, 41.73, 36.25, 32.47, 25.78, 21.25, 18.23, 17.77, -2.52, -2.97. IR (cm^{-1}): 2932, 2858, 1720, 1624, 1252, 1056, 836, 775. MS (ESI/[M+ Na]$^{+}$): 303.22.

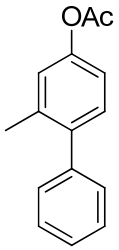
General Procedure E for deprotecting of Cyclopropyl Ketones 4a.

Cyclopropyl Ketones **4a** (32mg, 0.1 mmol) was treated with DBU (1 mmol) in CH_3CN (0. 5 mL) at 80 ° C for 12 h under N_2 atmosphere. Check through TLC and the reaction was diluted with Et_2O, washed with 1 M HC1 and brine (twice), and dried over Na_2SO_4. Solvent was removed under reduced pressure, and the resulting residue was purified by flash silica gel column chromatography to afford **6a** in 81% yield.



4-methyl-6-phenylbicyclo[3.1.0]hex-3-en-2-one **6a**: ^{1}H NMR (600 MHz, Chloroform-d) δ 7.29 (t, *J* = 7.5 Hz, 2H), 7.23 (t, *J* = 7.3 Hz, 1H), 7.09 (d, *J* = 7.5 Hz, 2H), 5.49 (s, 1H), 2.66 (t, *J* = 3.8 Hz, 1H), 2.57 (t, *J* = 3.1 Hz, 1H), 2.51 (t, *J* = 3.9 Hz, 1H), 2.20 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 204.36, 175.68, 138.79, 128.55, 127.23, 125.89, 124.70, 51.70, 36.06, 34.86, 18.75. IR (cm^{-1}):3032, 2917, 1691, 1605, 1498, 1380, 1273, 1031, 754. MS (ESI/[M+Na]$^+$):207.11.

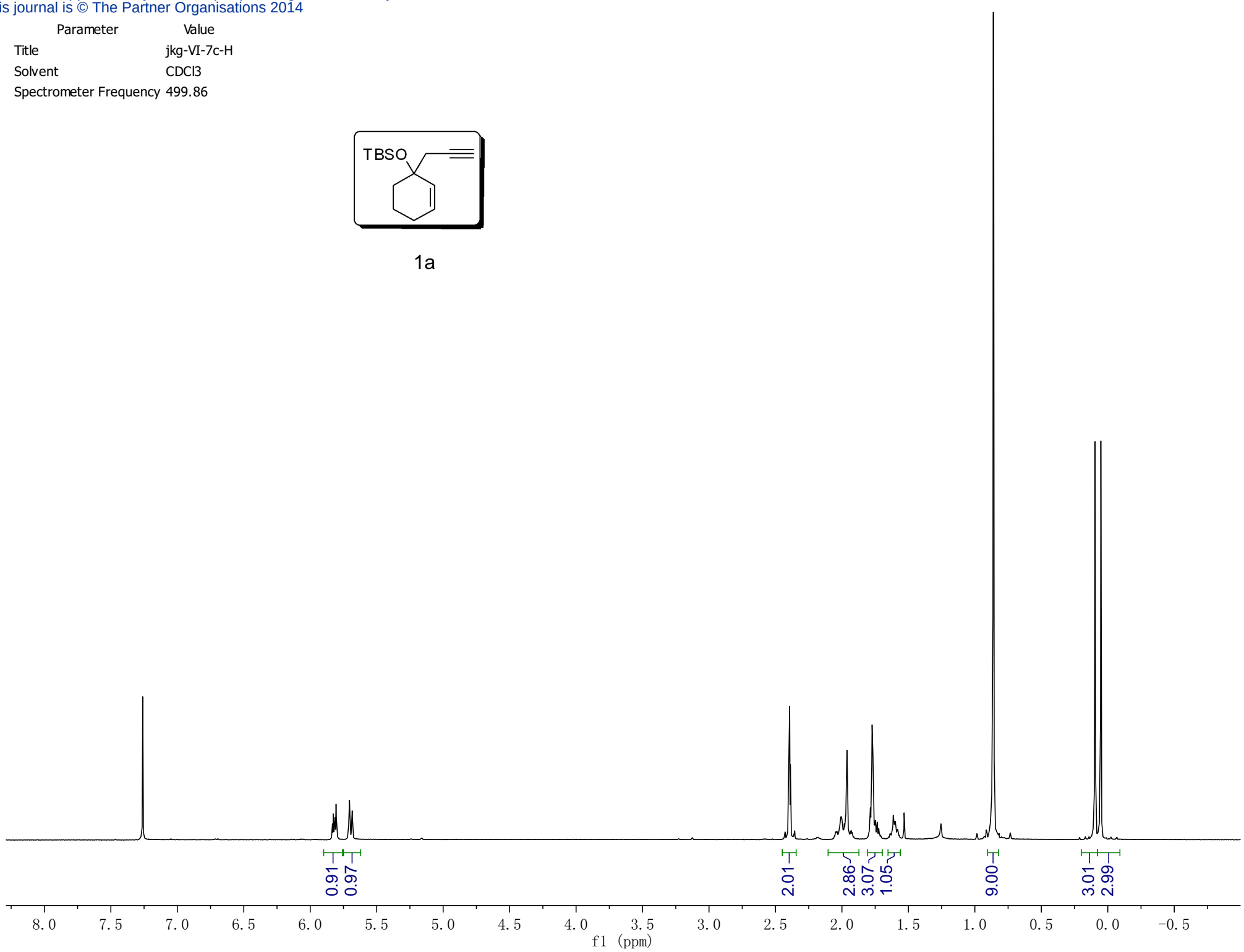
2-methylbiphenyl-4-yl acetate 6b



The compound **6b** was prepared in 45% yield from cyclopropyl ketone **4a** according to the general procedure **D** (eluents: ethyl acetate: hexanes = 1:10). ^{1}H NMR (600 MHz, Chloroform-d) δ 7.41 – 7.37 (m, 4H), 7.32 (dq, *J* = 5.7, 2.9 Hz, 1H), 7.30 (d, *J* = 7.8 Hz, 1H), 7.13 (d, *J* = 7.7 Hz, 1H), 6.95 (s, 1H), 2.40 (s, 3H), 2.08 (s, 3H). ^{13}C NMR (151 MHz, cdcl$_3$) δ 169.56, 147.54, 138.79, 137.61, 131.87, 130.57, 128.82, 128.24, 127.23, 127.21, 123.27, 21.04, 20.86. IR (cm^{-1}):1762, 1485, 1368, 1203, 1127, 755. MS (ESI/[M+Na]$^+$): 249.12.

Parameter	Value
Title	jkg-VI-7c-H
Solvent	CDCl3
Spectrometer Frequency	499.86

1a



Parameter	Value
Title	jkg-VI-7c-C
Solvent	CDCl3
Spectrometer Frequency	125.70

132.00
130.26
81.54
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
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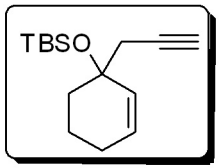
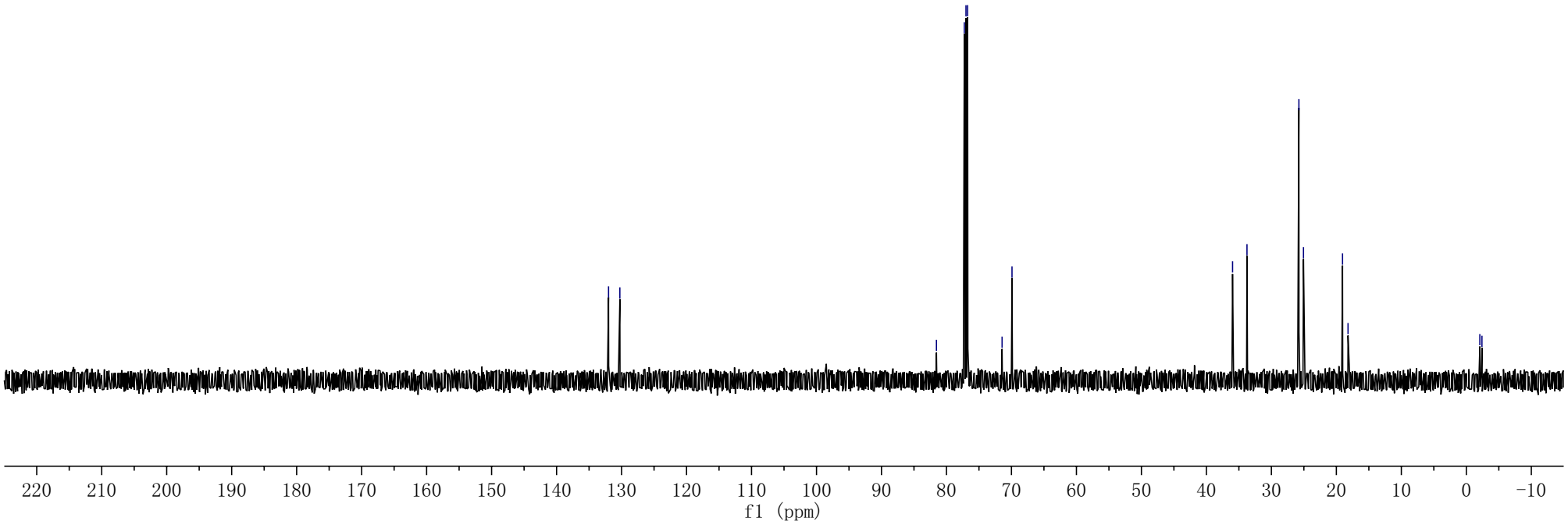
69.92
35.97
33.75
25.77
25.06
19.05
18.20
-2.08
-2.41

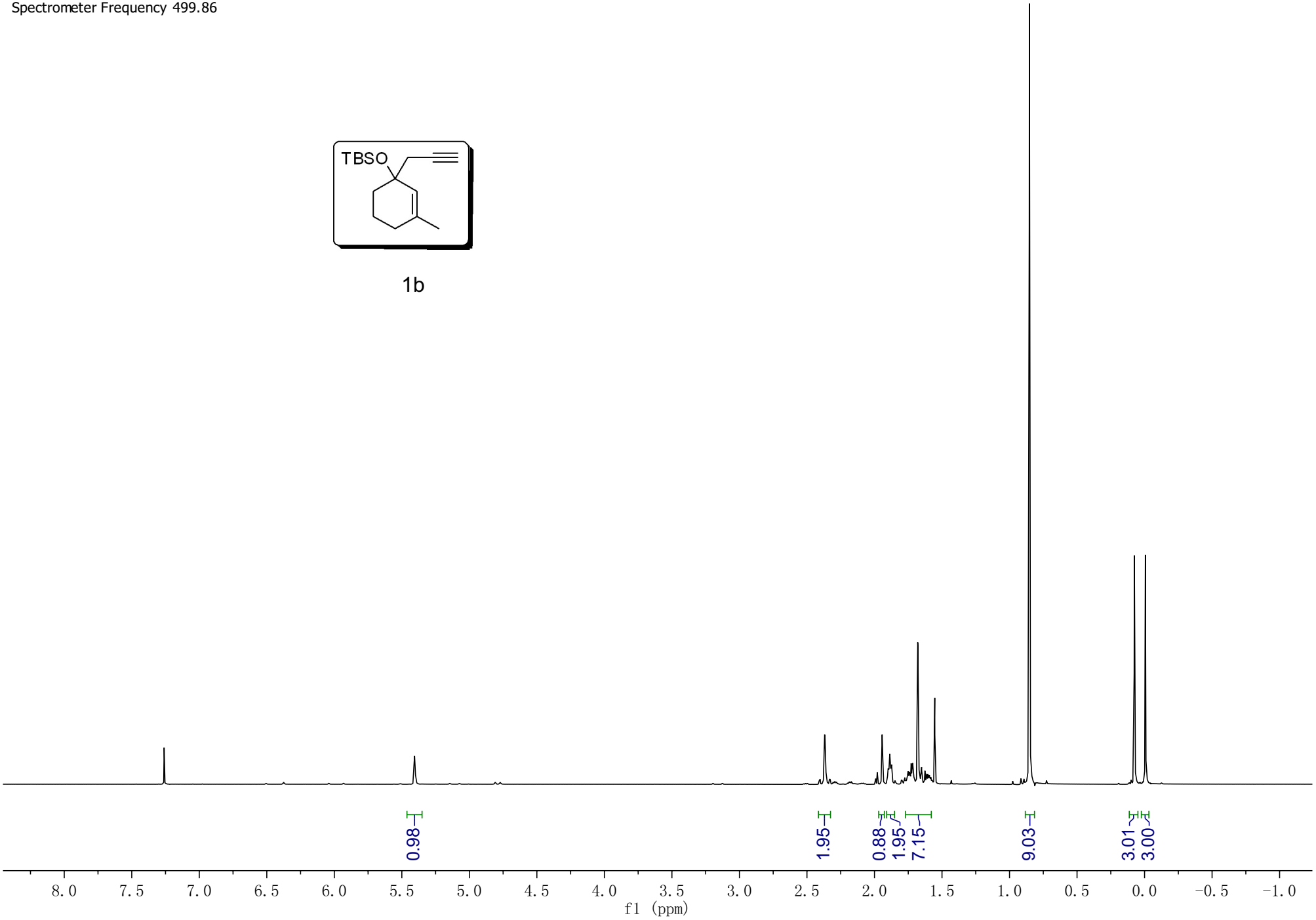


1a



Parameter	Value
Title	jkg-VI-32A-H
Solvent	CDCl3
Spectrometer Frequency	499.86

1b



Parameter	Value
Title	jkg-VI-32A-C
Solvent	CDCl3
Spectrometer Frequency	125.70

138.03
126.56
81.80
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
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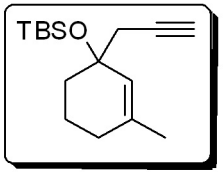
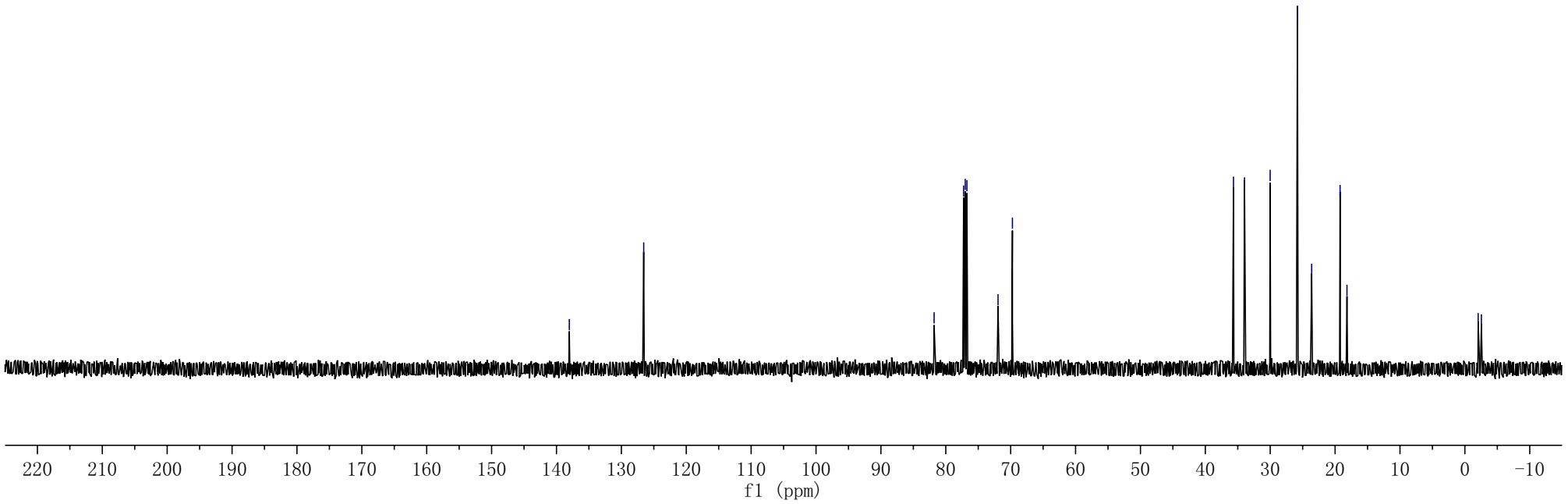
23.61
19.23
18.17
-2.05
-2.54

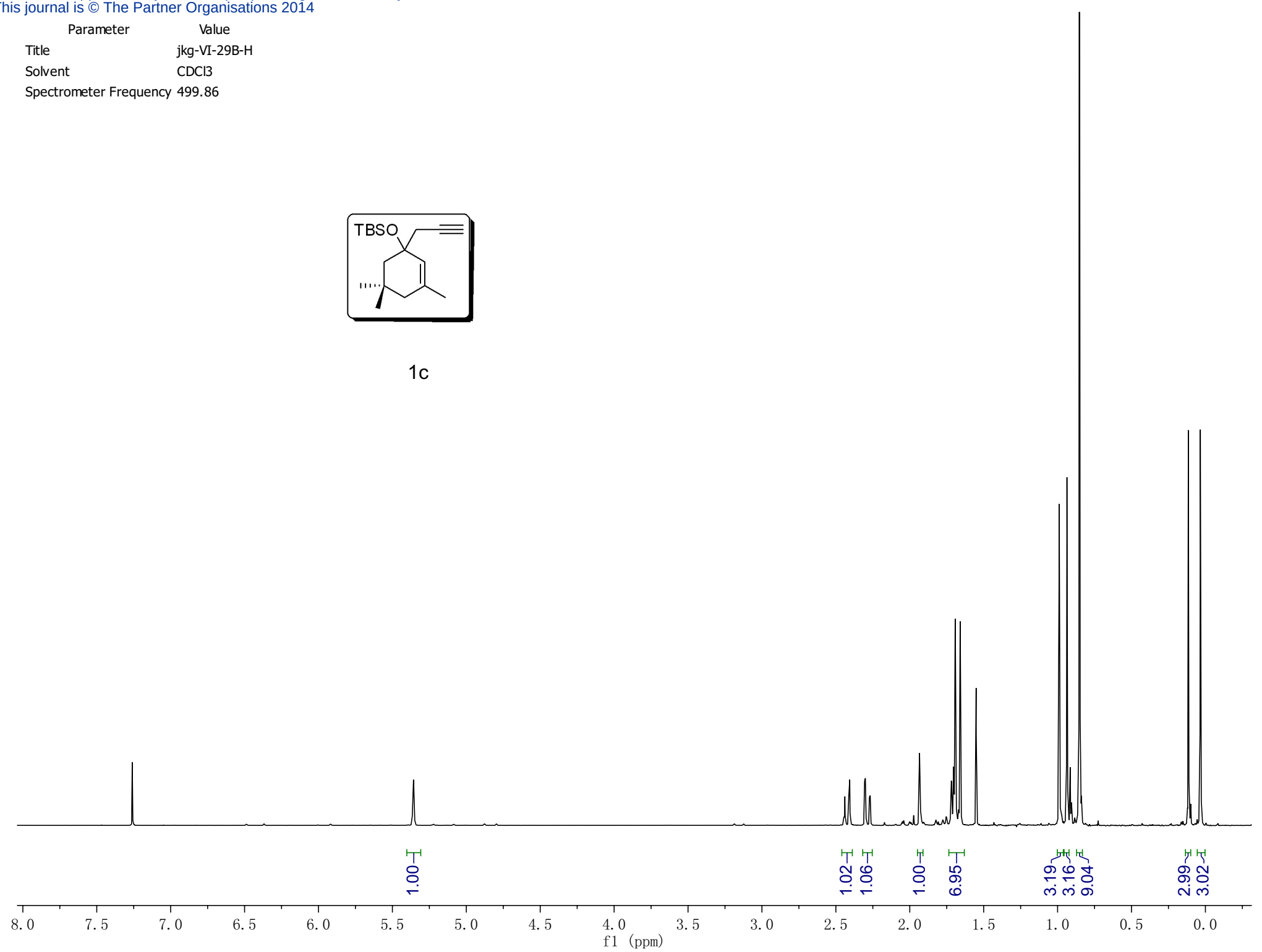


1b



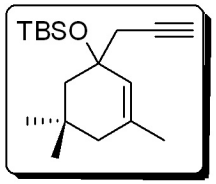
Parameter	Value
Title	jkg-VI-29B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

1c



Parameter	Value
Title	jkg-VI-29B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

136.33
125.17
81.80
77.25 CDCl3
77.00 CDCl3
76.74 CDCl3
73.19
69.67
48.00
44.40
34.68
30.82
30.23
28.47
25.86
23.91
18.19
-1.90
-2.39



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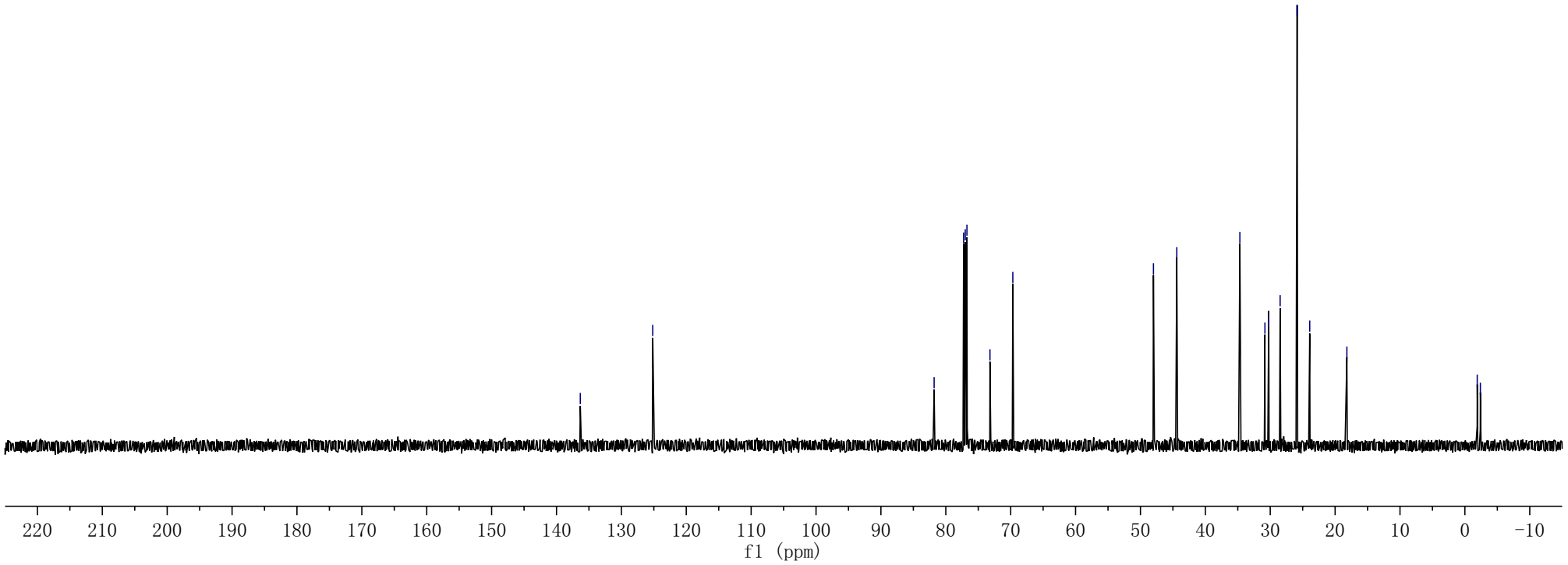
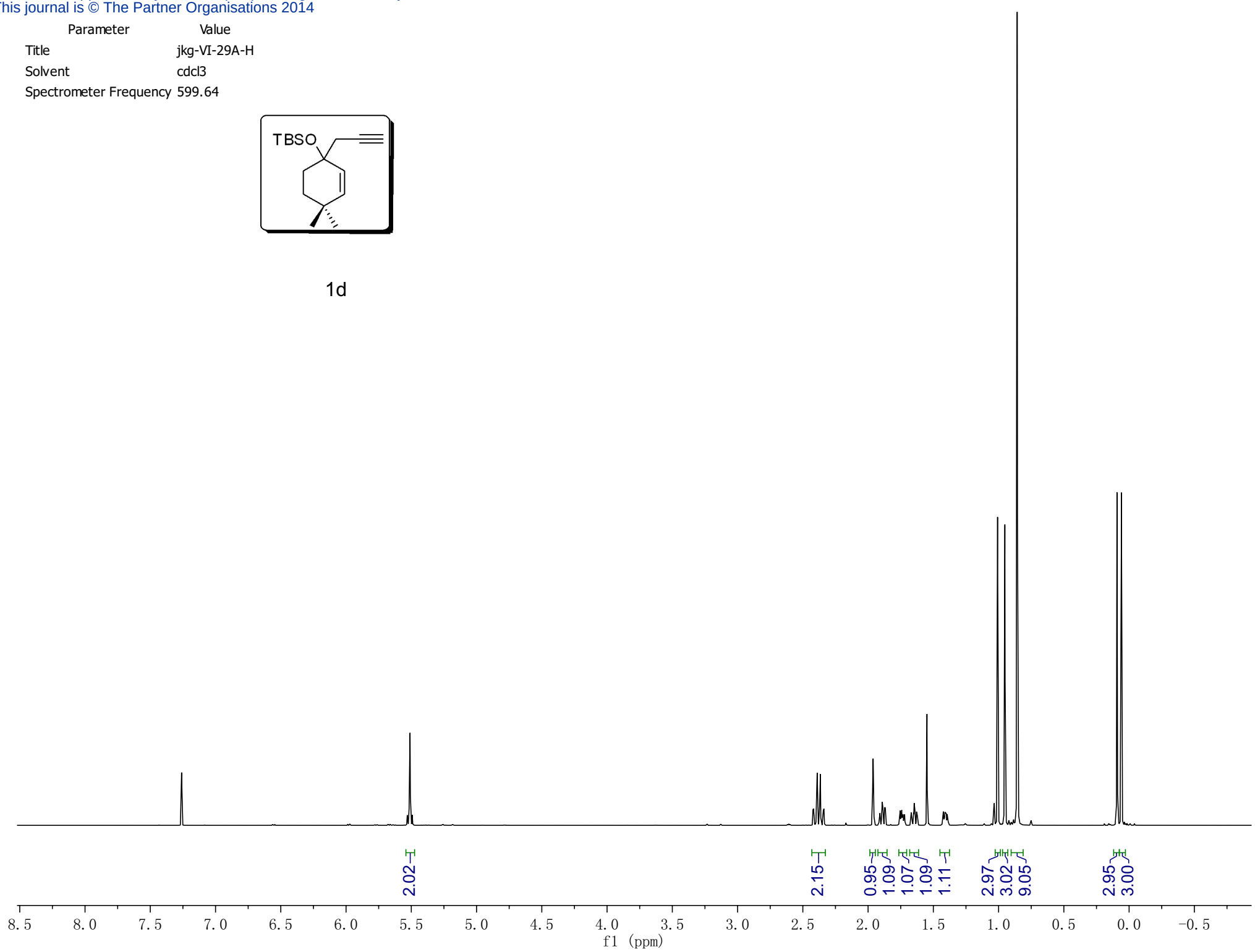


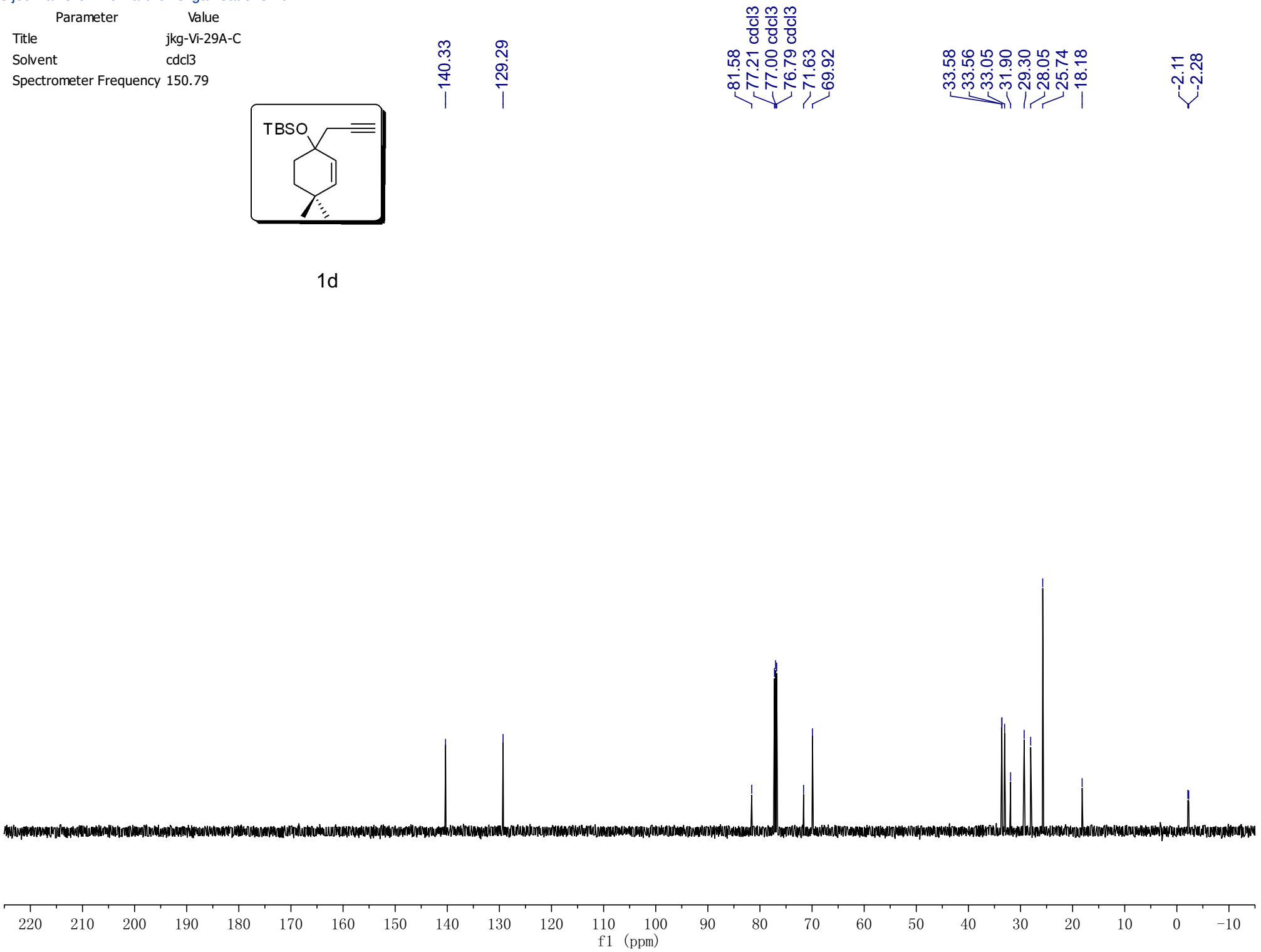
Parameter	Value
Title	jkg-VI-29A-H
Solvent	cdcl3
Spectrometer Frequency	599.64

1d



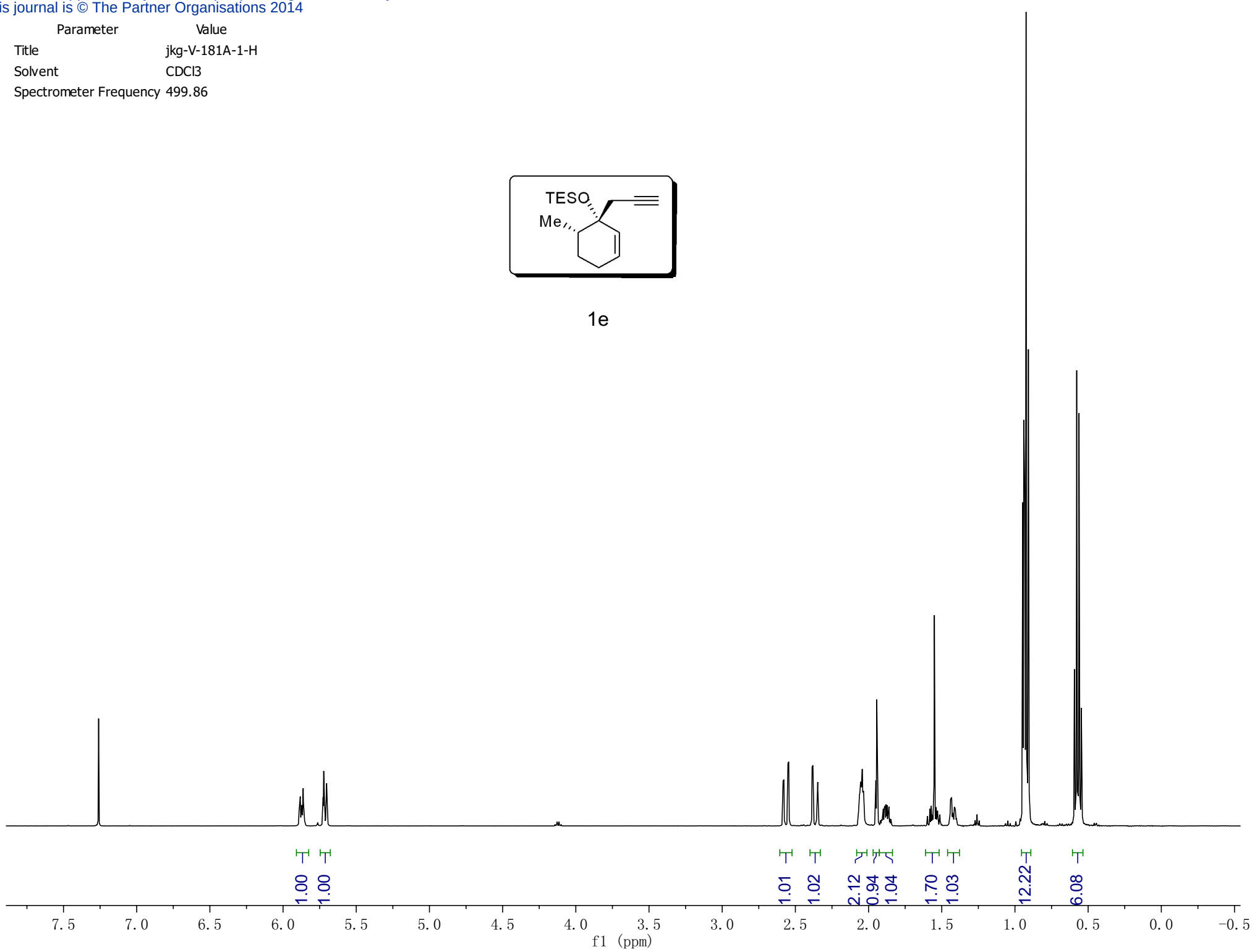
Parameter	Value
Title	jkg-Vi-29A-C
Solvent	cdcl3
Spectrometer Frequency	150.79

1d



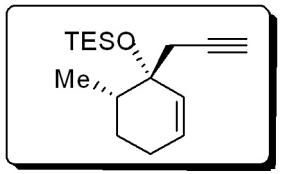
Parameter	Value
Title	jkg-V-181A-1-H
Solvent	CDCl3
Spectrometer Frequency	499.86

1e

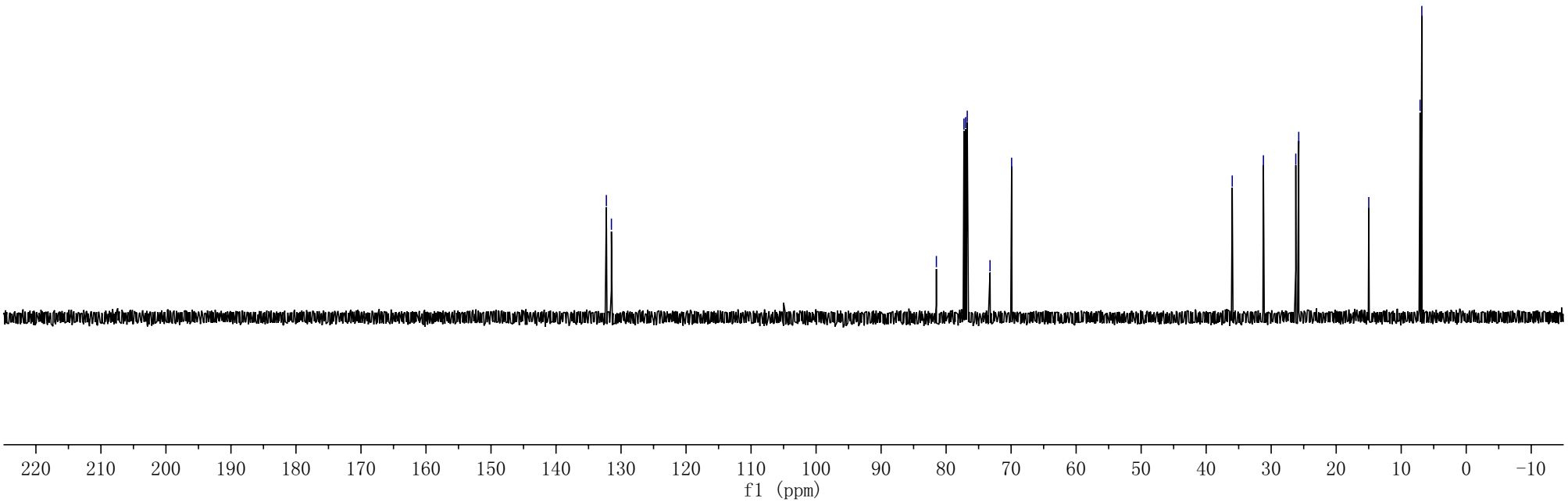


Parameter	Value
Title	jkg-V-181A-1-C
Solvent	CDCl3
Spectrometer Frequency	125.70

132.26
131.48
81.50
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
73.24
69.92
35.99
31.19
26.22
25.76
14.99
7.10
6.83

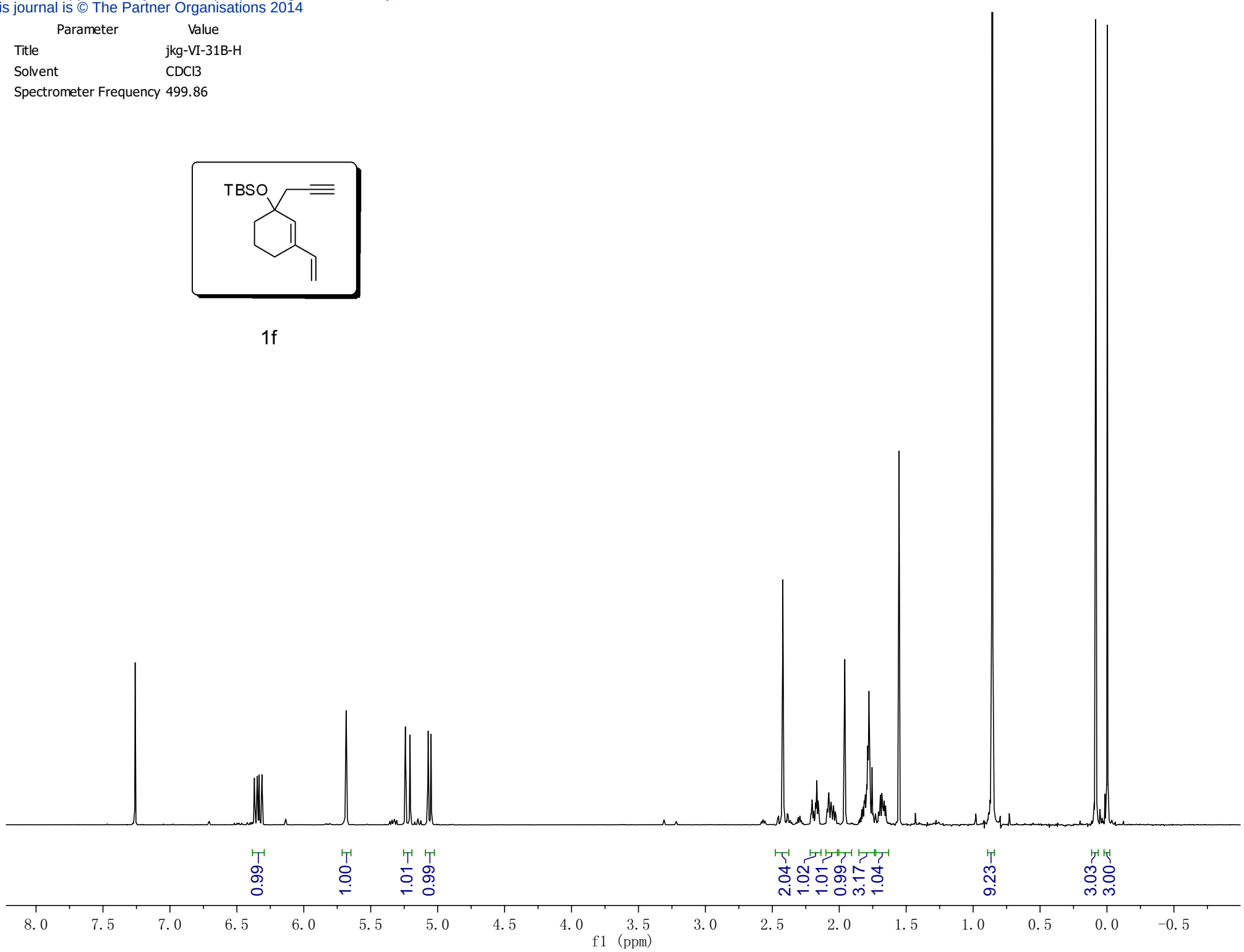


1e



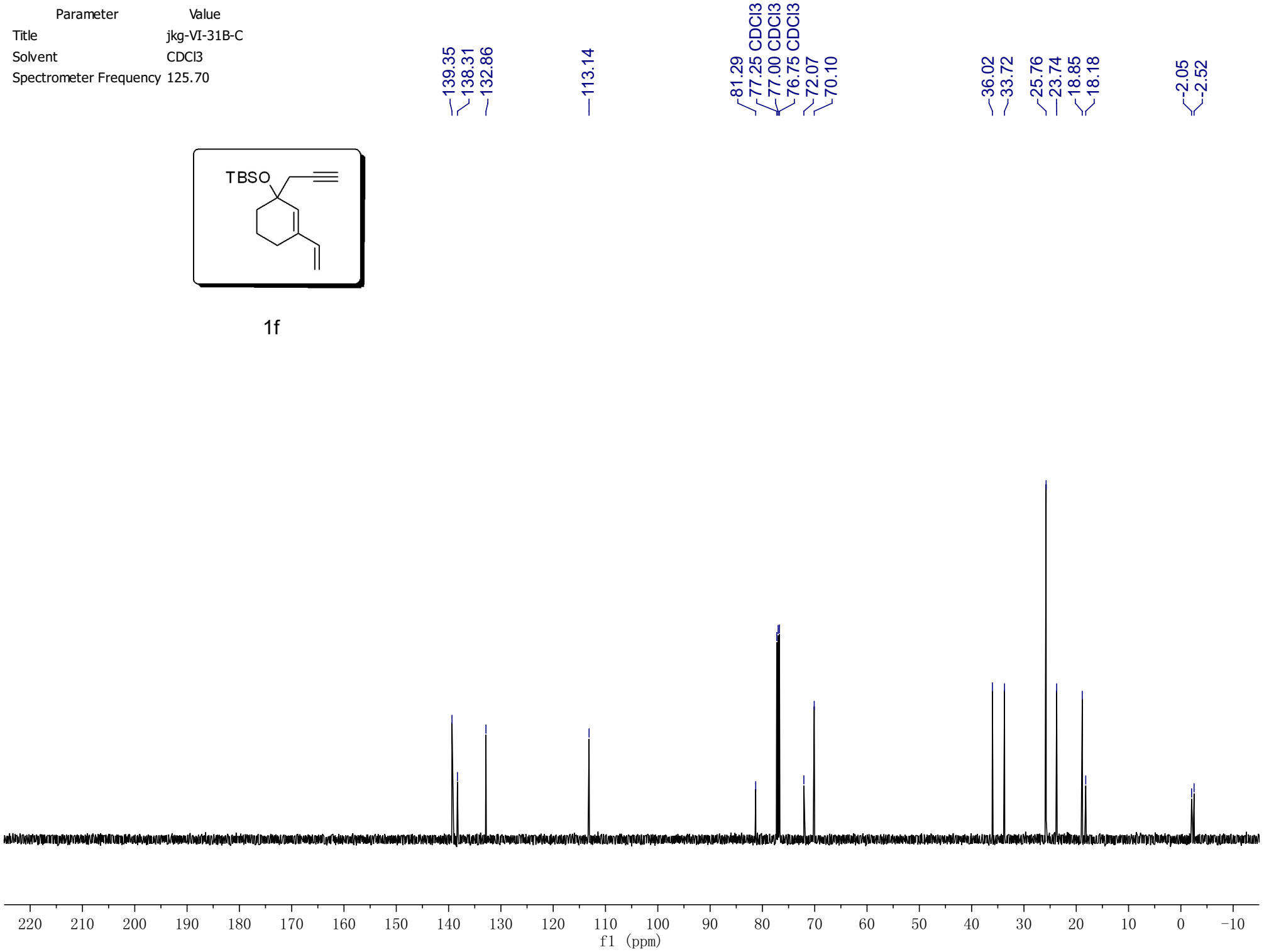
Parameter	Value
Title	jkg-VI-31B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

1f



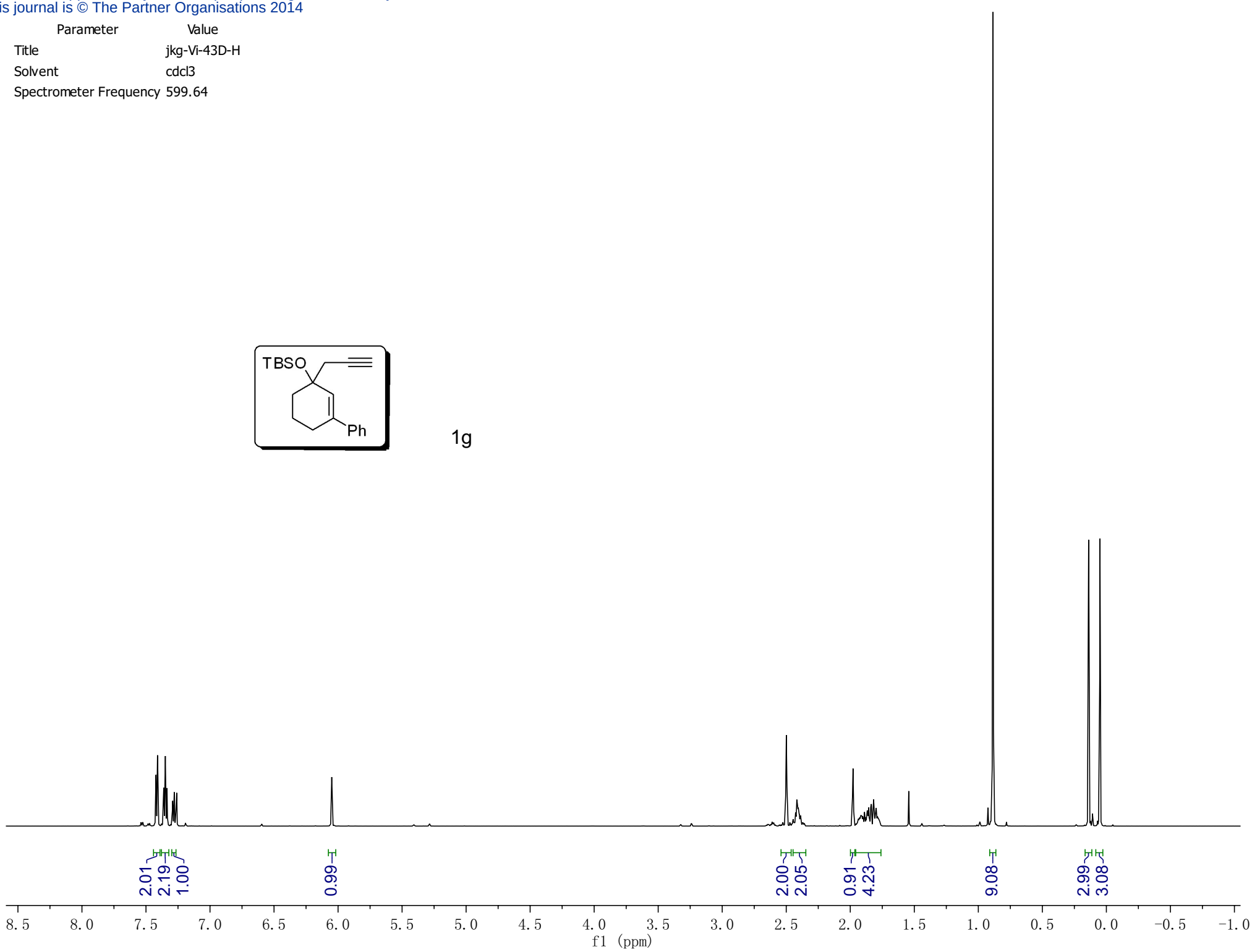
Parameter	Value
Title	jkg-VI-31B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

1f



Parameter	Value
Title	jkg-Vi-43D-H
Solvent	cdcl3
Spectrometer Frequency	599.64

1g



Parameter	Value
Title	jkg-Vi-43D-C
Solvent	cdcl3
Spectrometer Frequency	150.79

141.60
139.77
128.69
128.33
127.38
125.46
81.36
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
72.06
70.16
35.62
34.08
27.67
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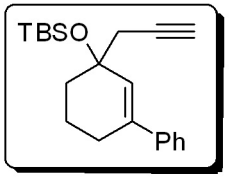
19.42
18.19
-1.93
-2.39



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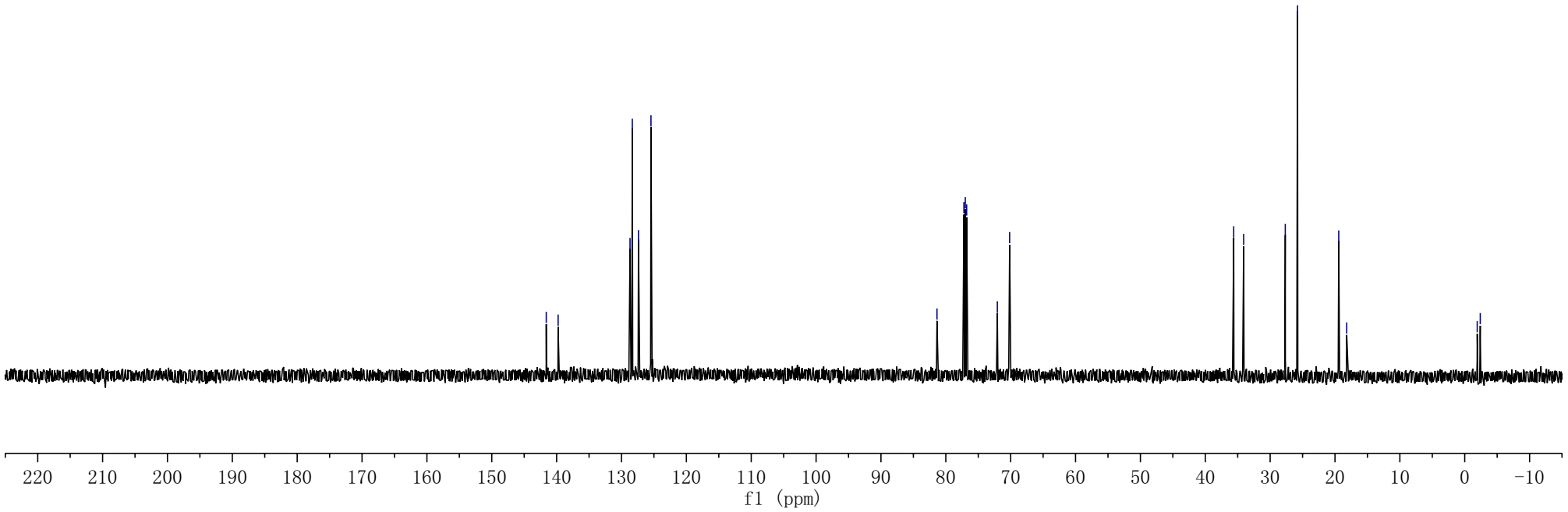
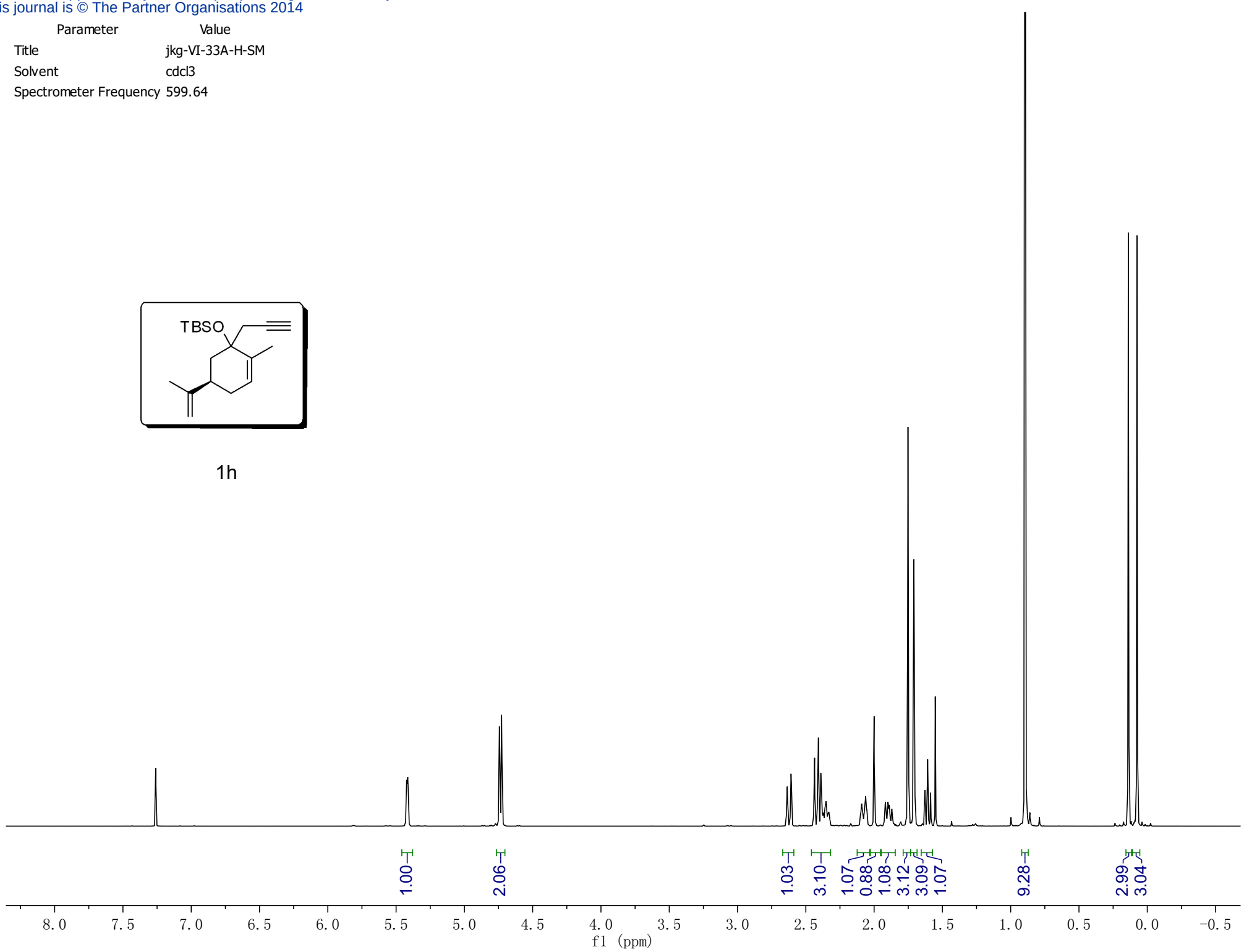


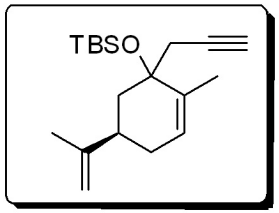
Parameter	Value
Title	jkg-VI-33A-H-SM
Solvent	cdcl3
Spectrometer Frequency	599.64

1h

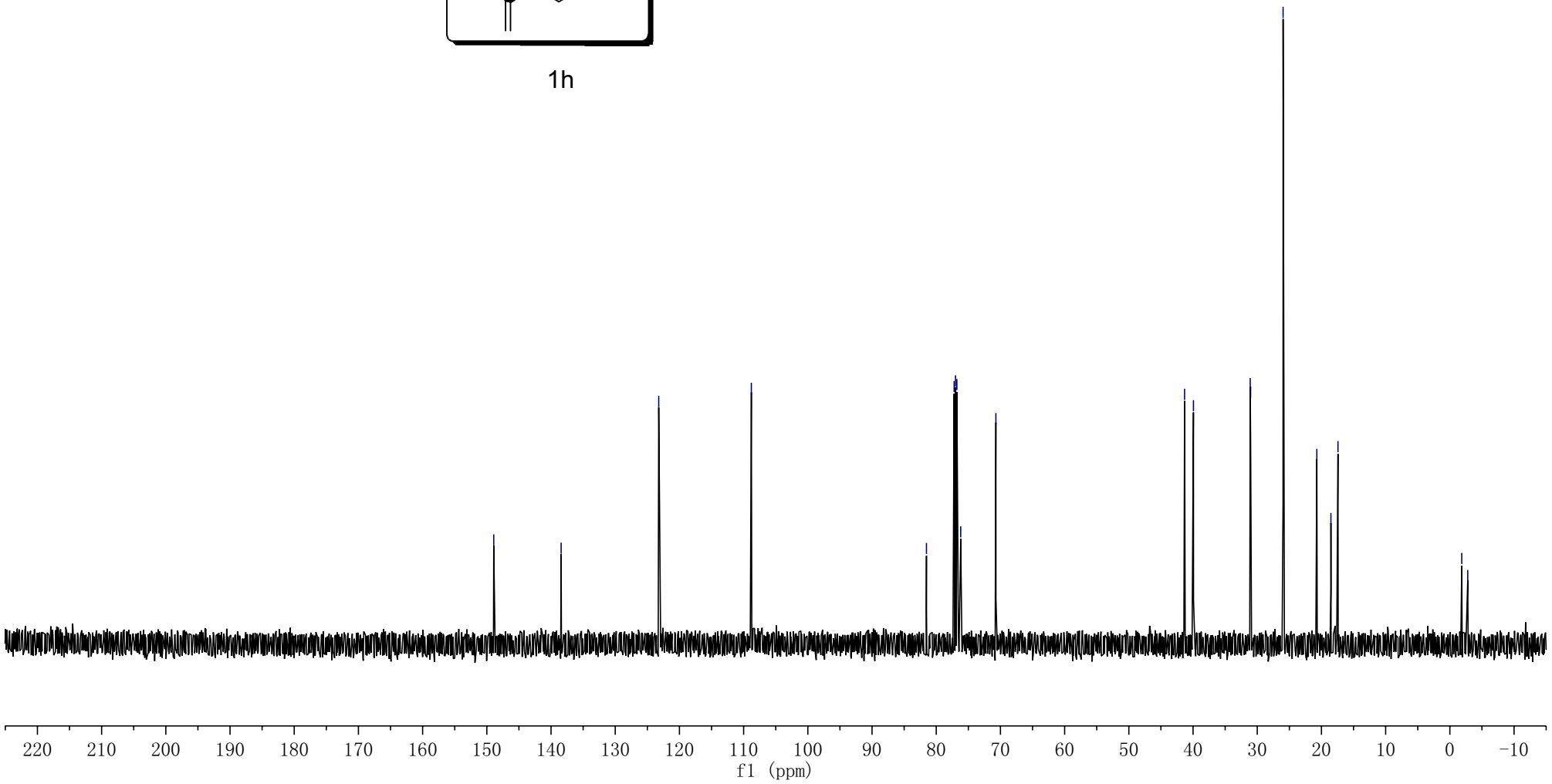


Parameter	Value
Title	jkg-VI-33A-C-SM
Solvent	cdcl3
Spectrometer Frequency	150.79

148.92
138.43
123.23
108.80
81.52
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
76.19
70.71
41.32
39.94
31.09
31.03
25.97
20.72
18.53
17.43
-1.85
-2.78

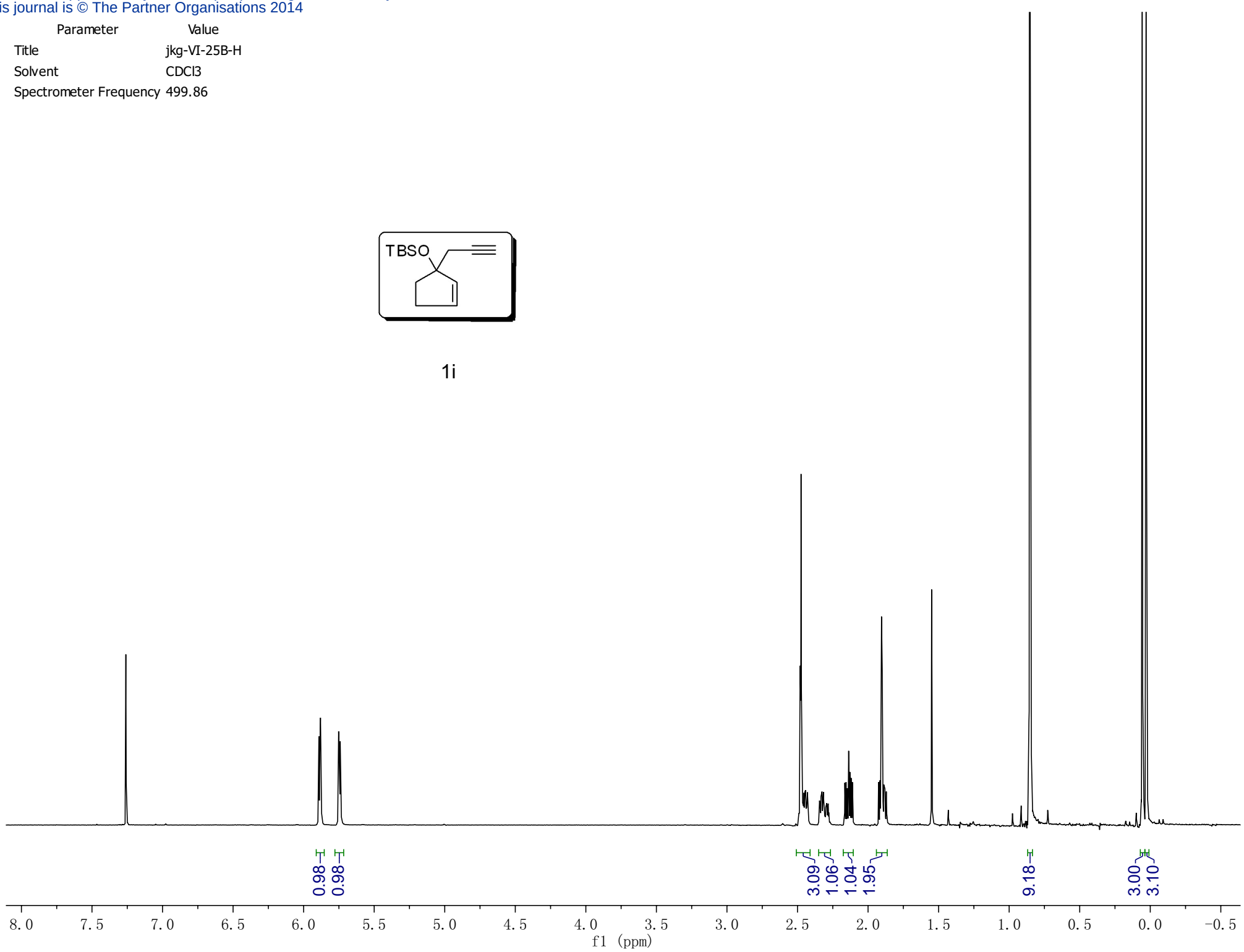


1h



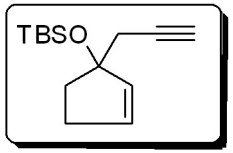
Parameter	Value
Title	jkg-VI-25B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

1i



Parameter	Value
Title	jkg-VI-25B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

135.80
133.67
86.76
81.88
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
68.89
37.66
32.73
31.36
25.72
18.04
-2.50
-2.98



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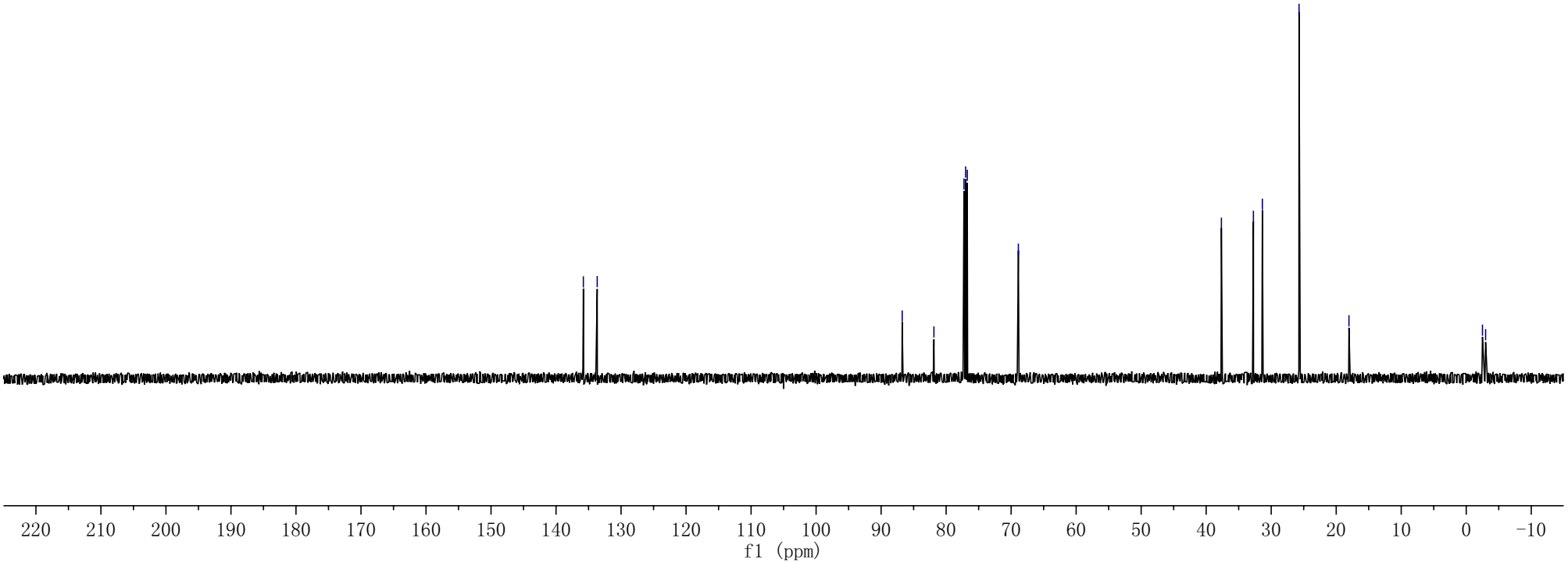
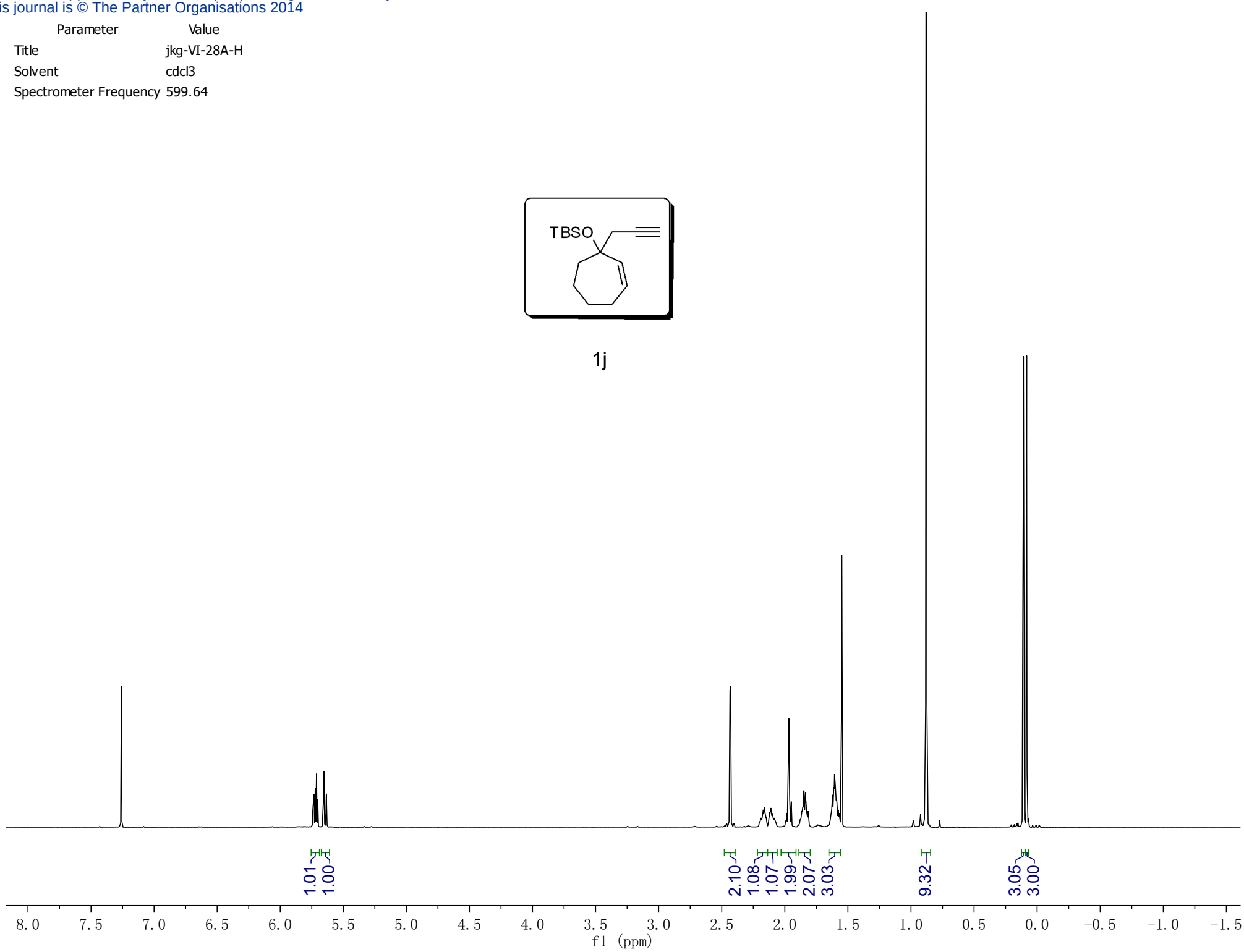


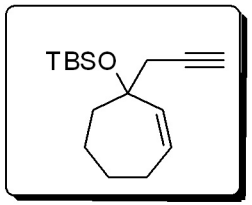
Parameter	Value
Title	jkg-VI-28A-H
Solvent	cdcl3
Spectrometer Frequency	599.64

1j

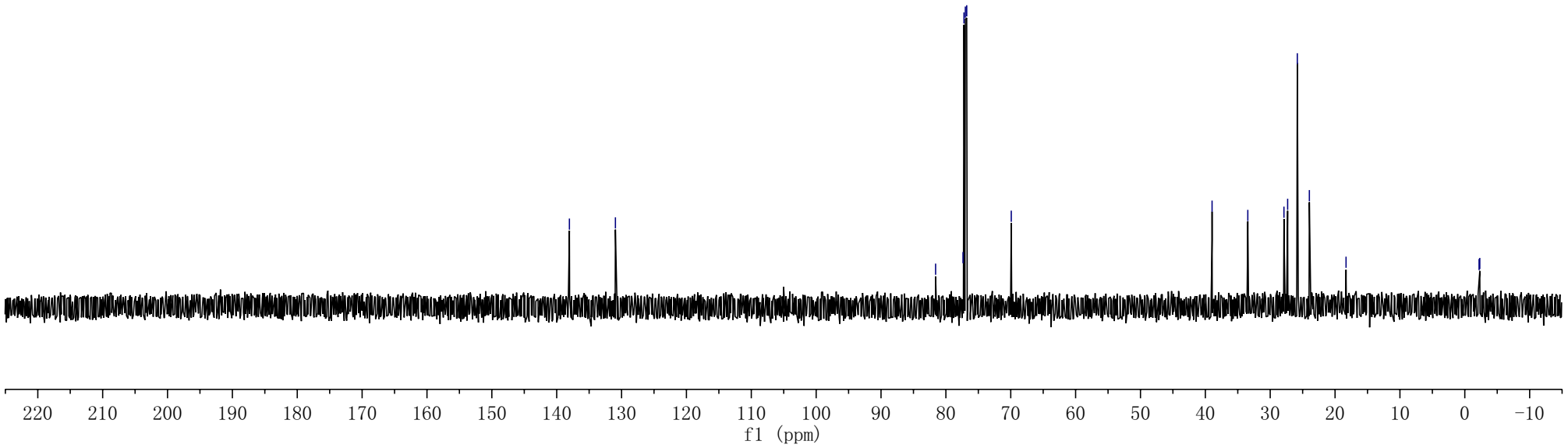


Parameter	Value
Title	jkg-VI-28A-C
Solvent	cdcl3
Spectrometer Frequency	150.79

138.04
130.95
81.59
77.36
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
69.92
38.96
33.45
27.88
27.31
25.82
23.96
18.31
-2.20
-2.31

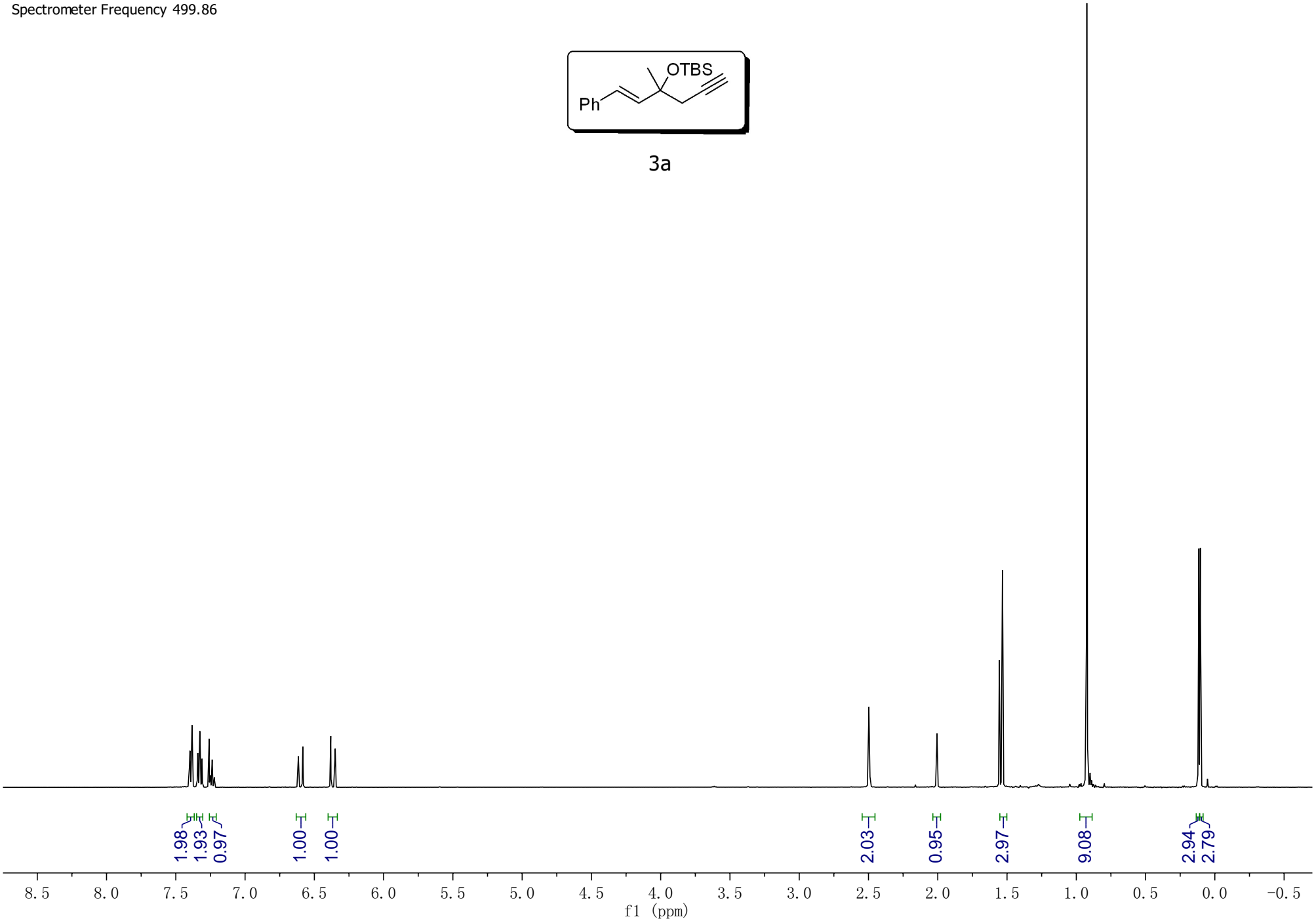


1j



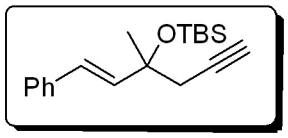
Parameter	Value
Title	jkg-VI-77A-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3a

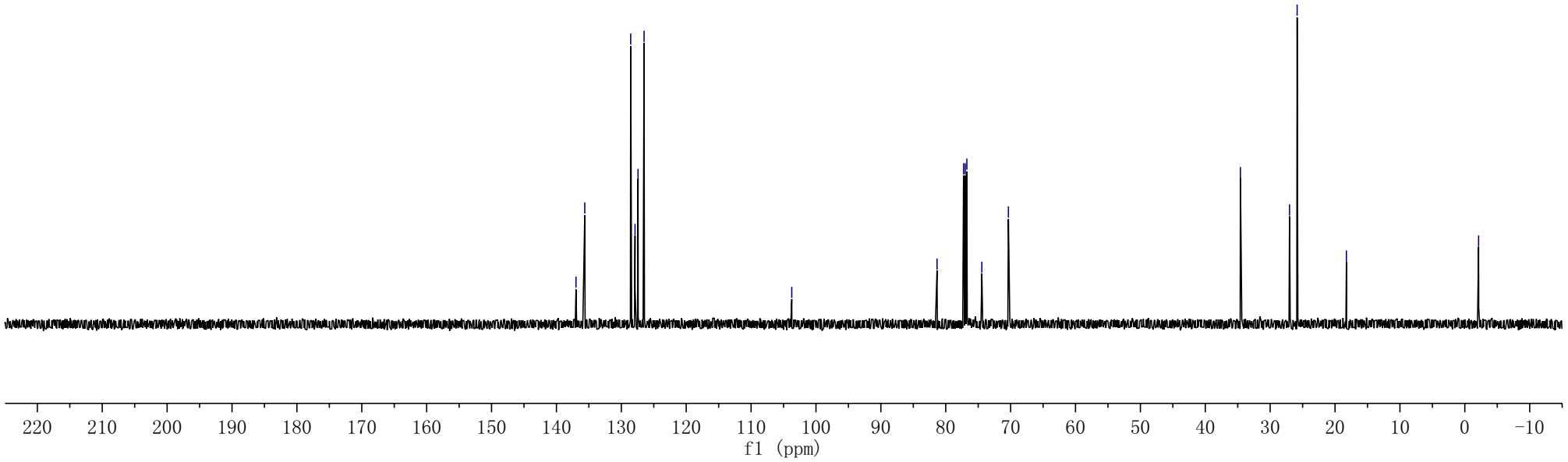


Parameter	Value
Title	jkg-VI-77A-C
Solvent	CDCl3
Spectrometer Frequency	125.70

136.99
135.63
128.55
127.89
127.42
126.49
103.73
81.34
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
74.44
70.34
34.58
27.01
25.84
18.25
-2.12

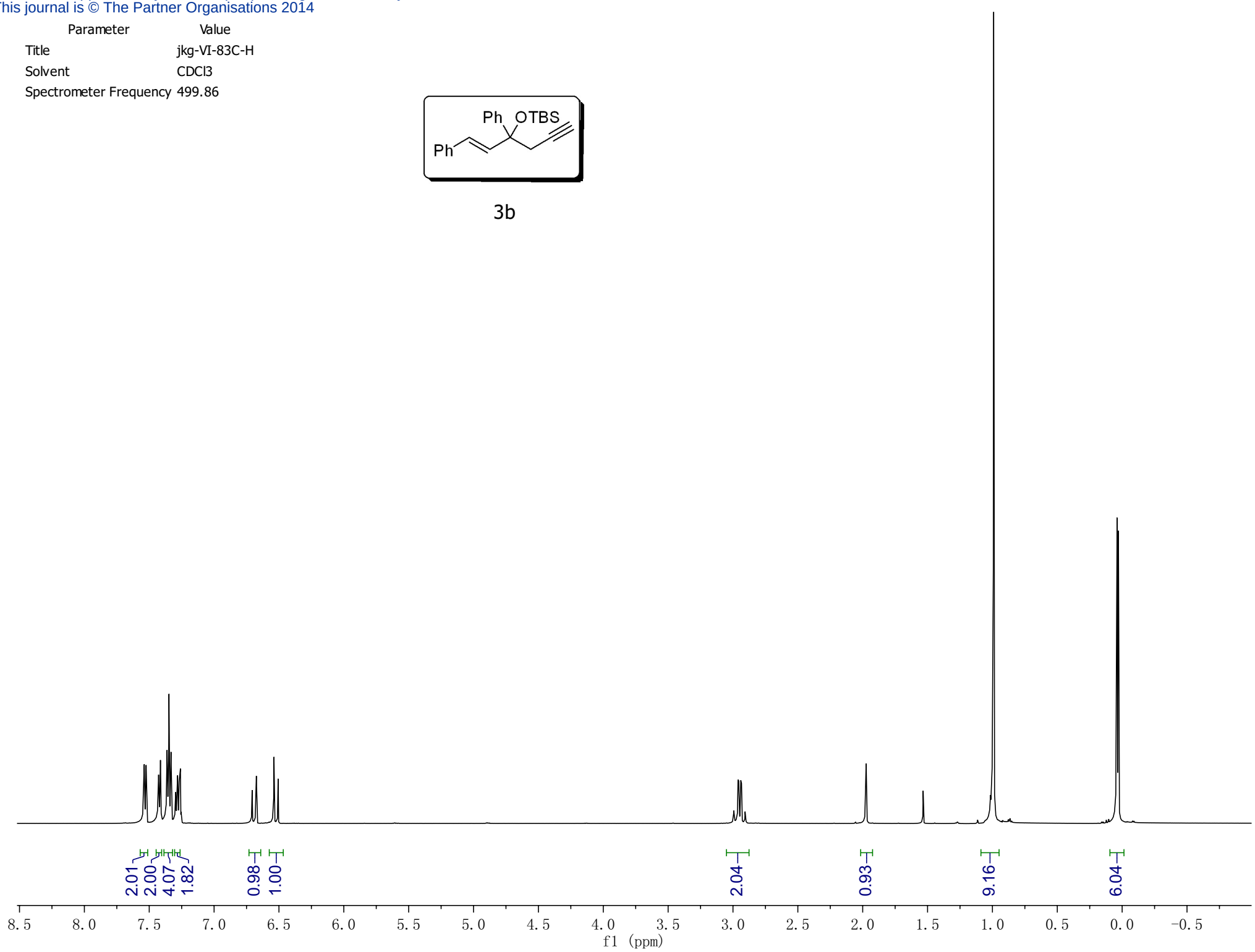


3a



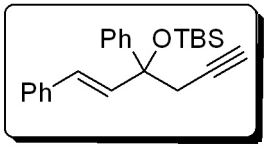
Parameter	Value
Title	jkg-VI-83C-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3b

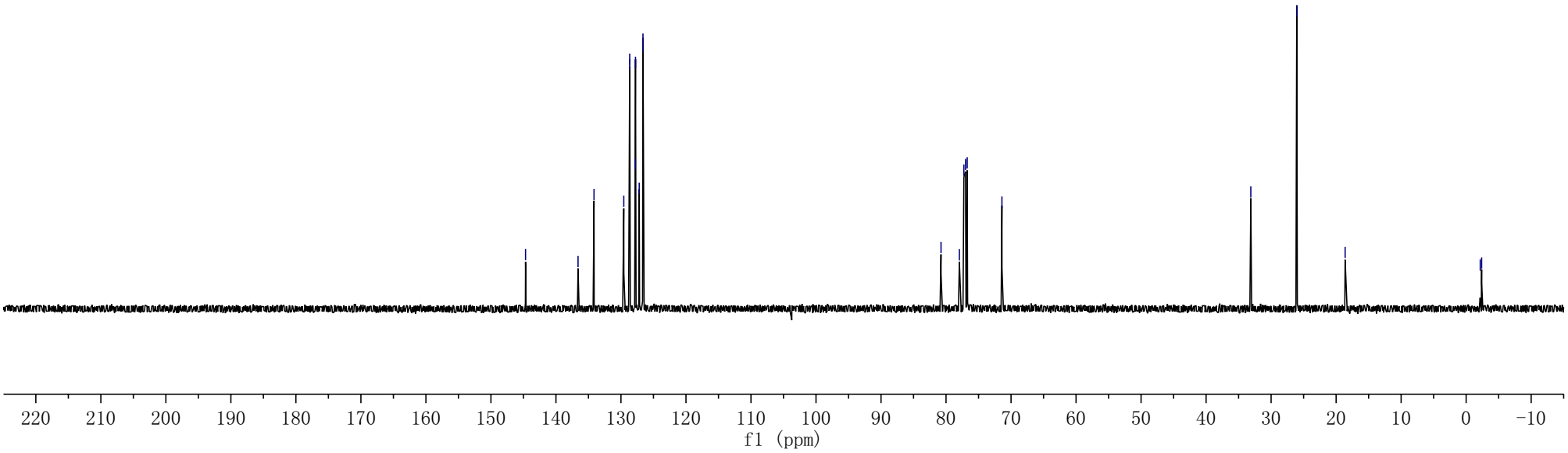


Parameter	Value
Title	jkg-VI-83C-C
Solvent	CDCl3
Spectrometer Frequency	125.70

144.68
136.60
134.15
129.57
128.66
128.66
127.79
127.76
127.19
126.61
126.58
80.77
77.95
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
71.40
33.12
26.05
18.61
-2.17
-2.38

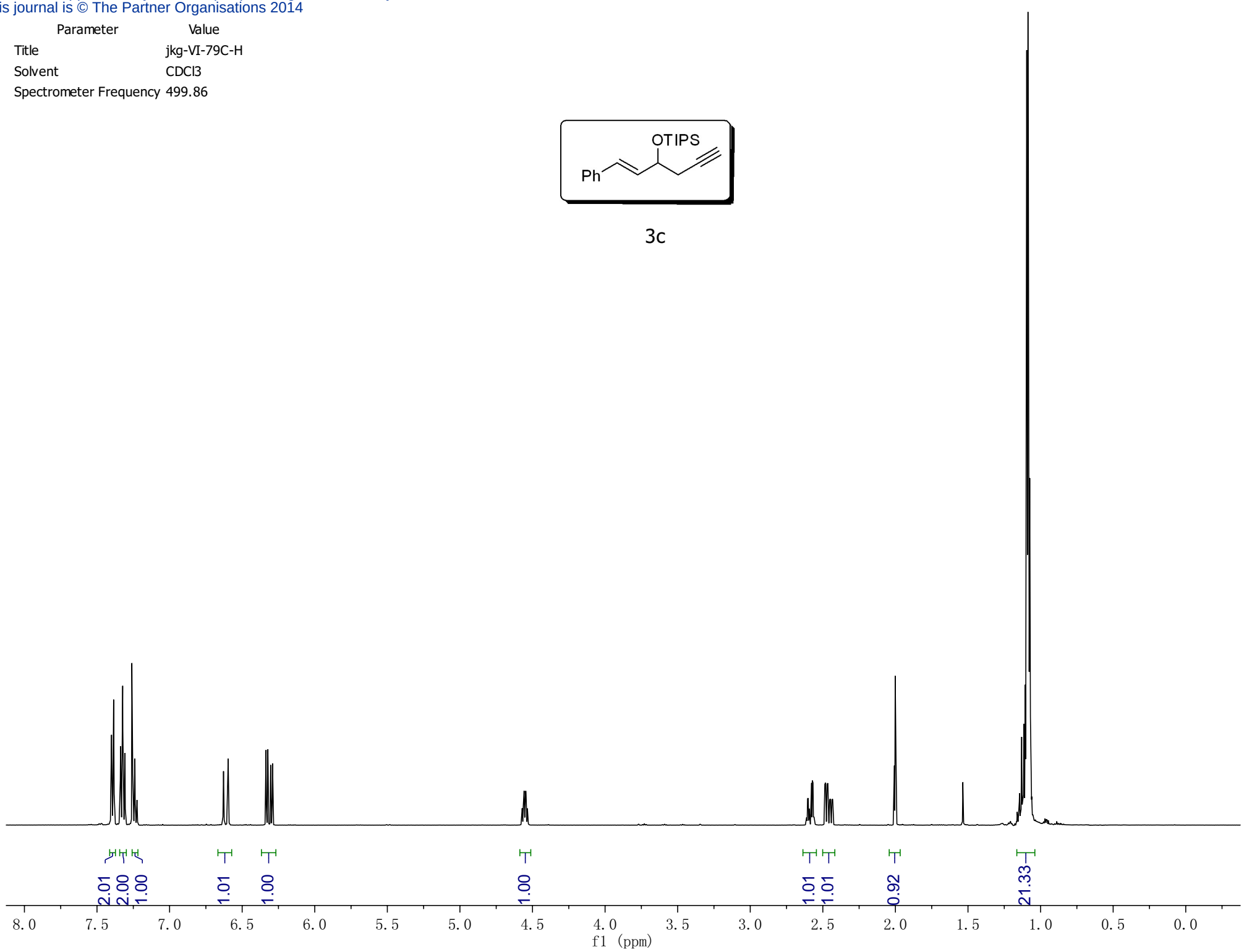


3b



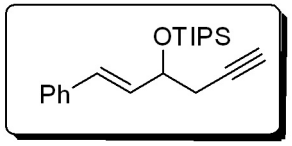
Parameter	Value
Title	jkg-VI-79C-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3c

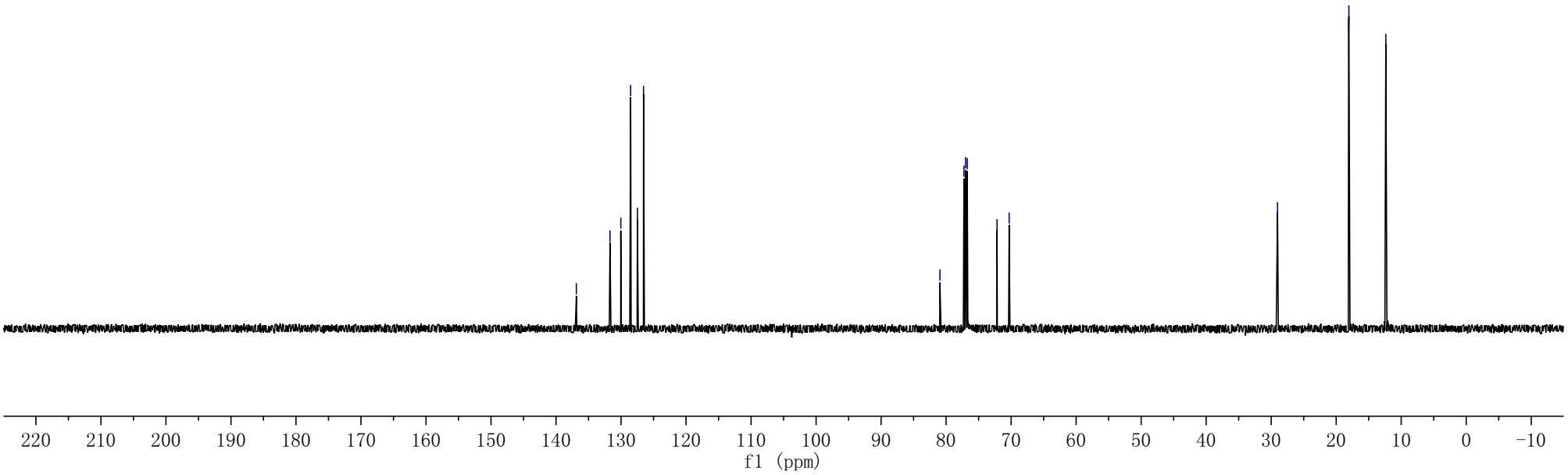


Parameter	Value
Title	jkg-VI-79C-C
Solvent	CDCl3
Spectrometer Frequency	125.70

136.87
131.70
130.04
128.52
127.48
126.54
80.95
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
72.17
70.30
29.02
18.08
18.05
12.37

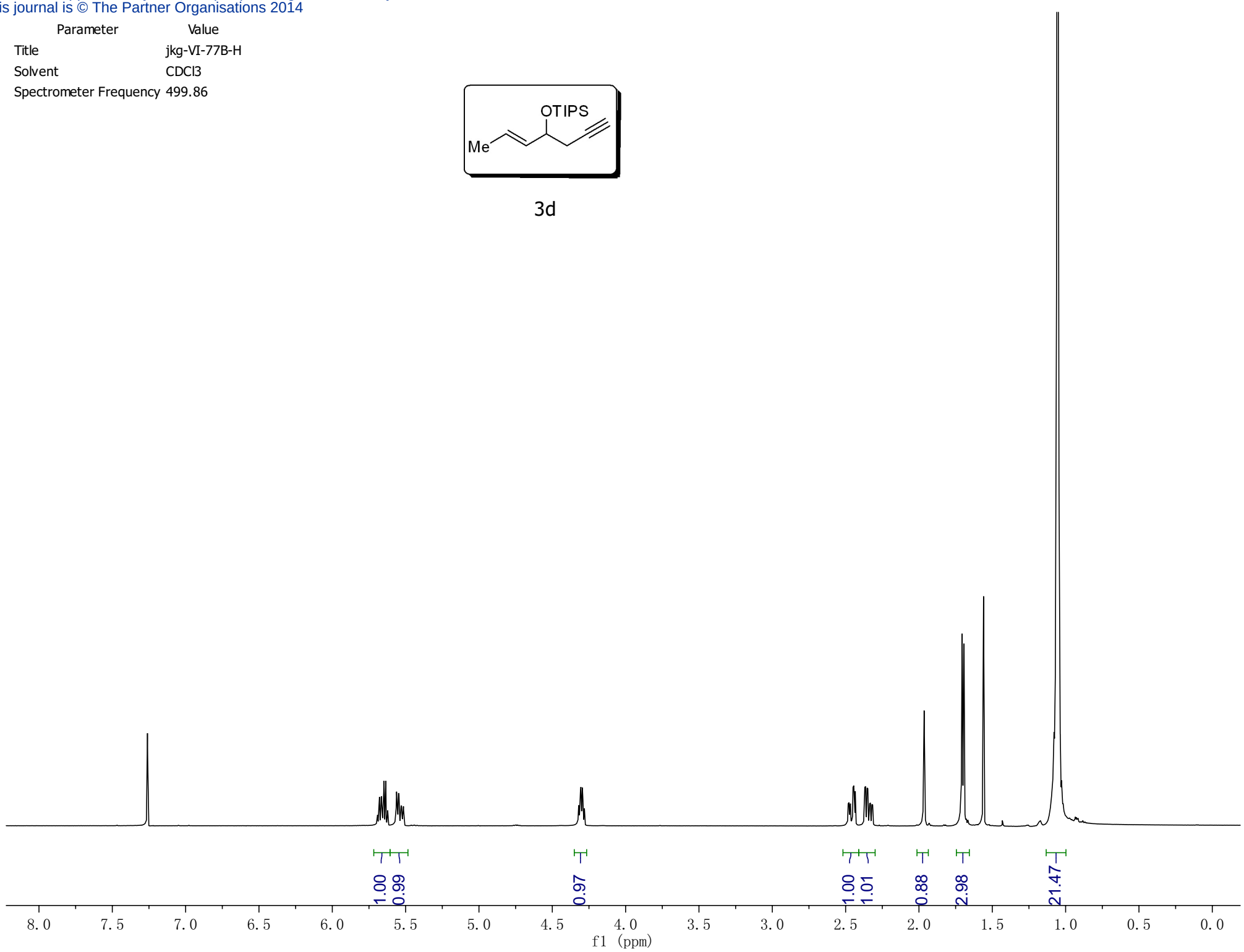


3c



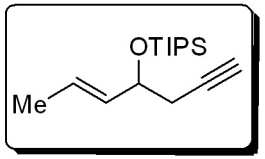
Parameter	Value
Title	jkg-VI-77B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3d

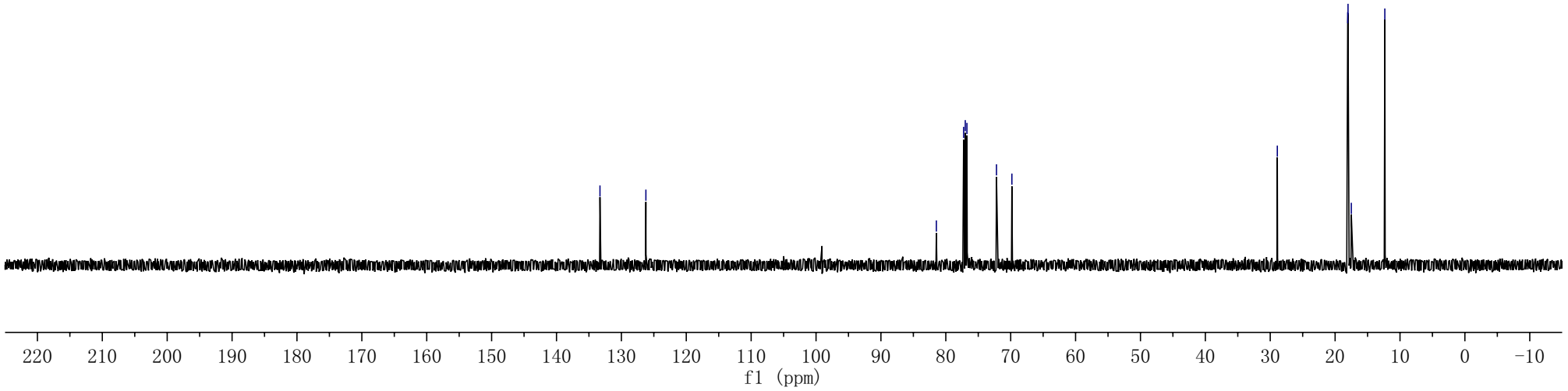


Parameter	Value
Title	jkg-VI-77B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

133.30
126.22
81.46
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
72.19
69.82
28.91
18.06
18.01
17.51
12.34

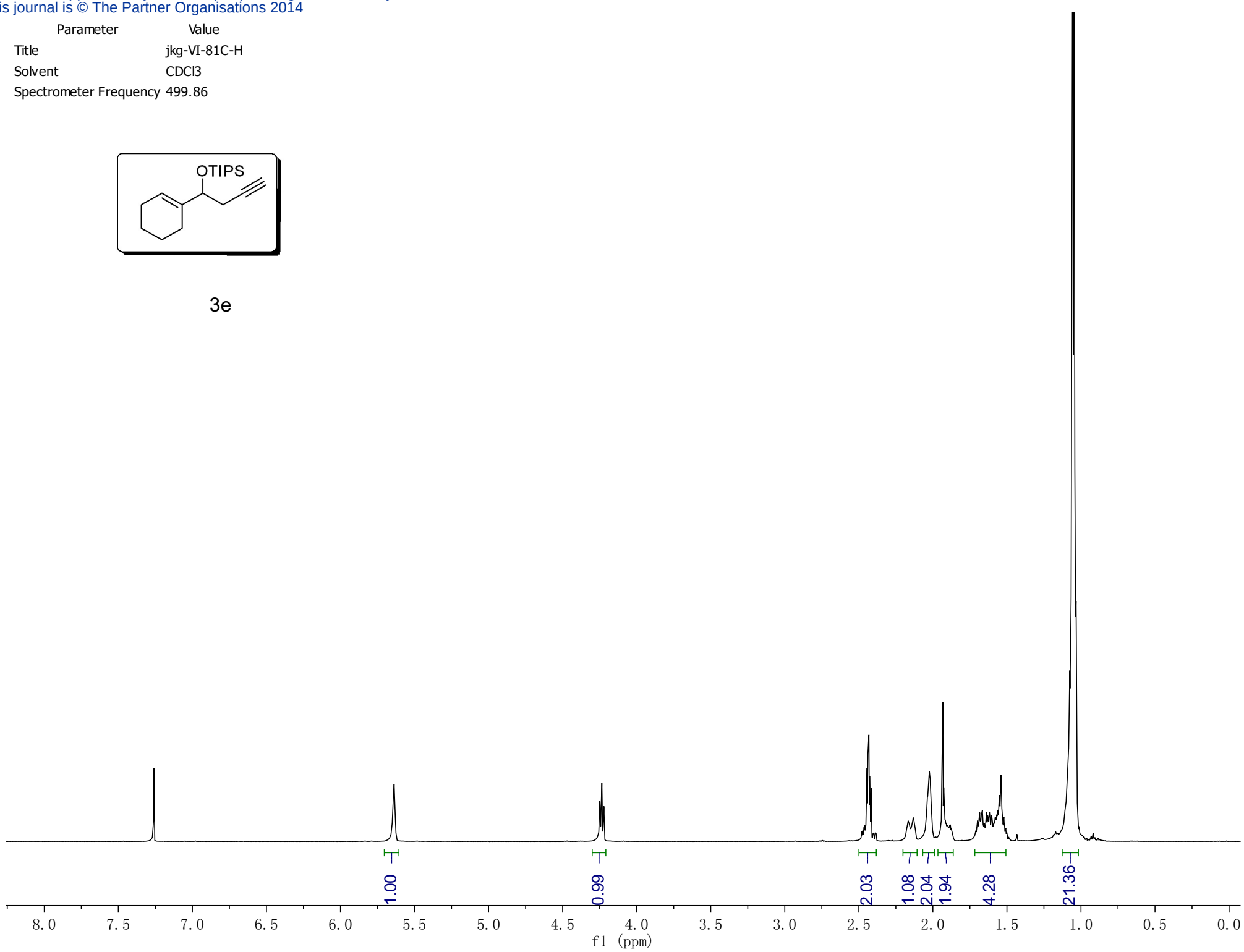


3d



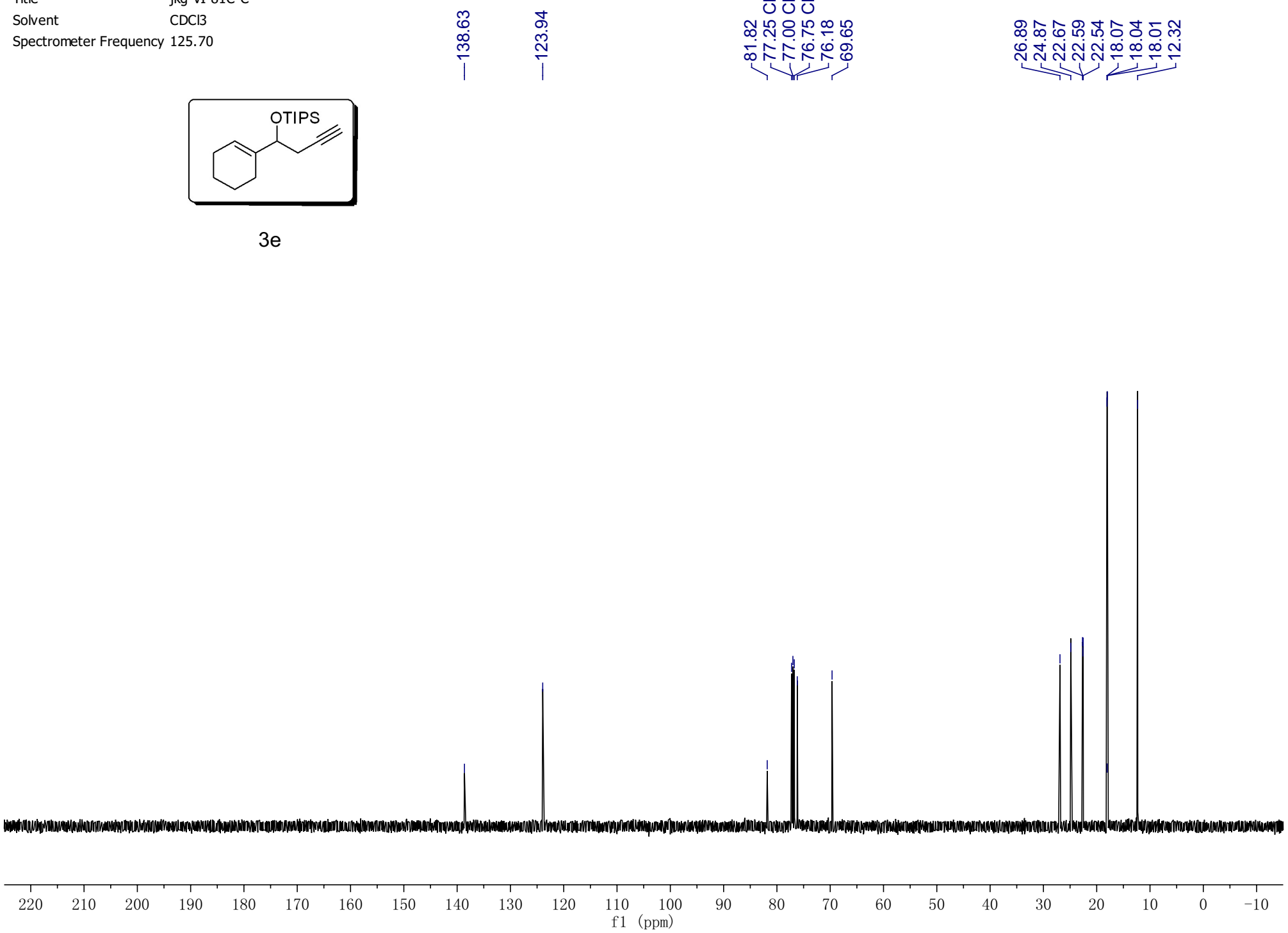
Parameter	Value
Title	jkg-VI-81C-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3e



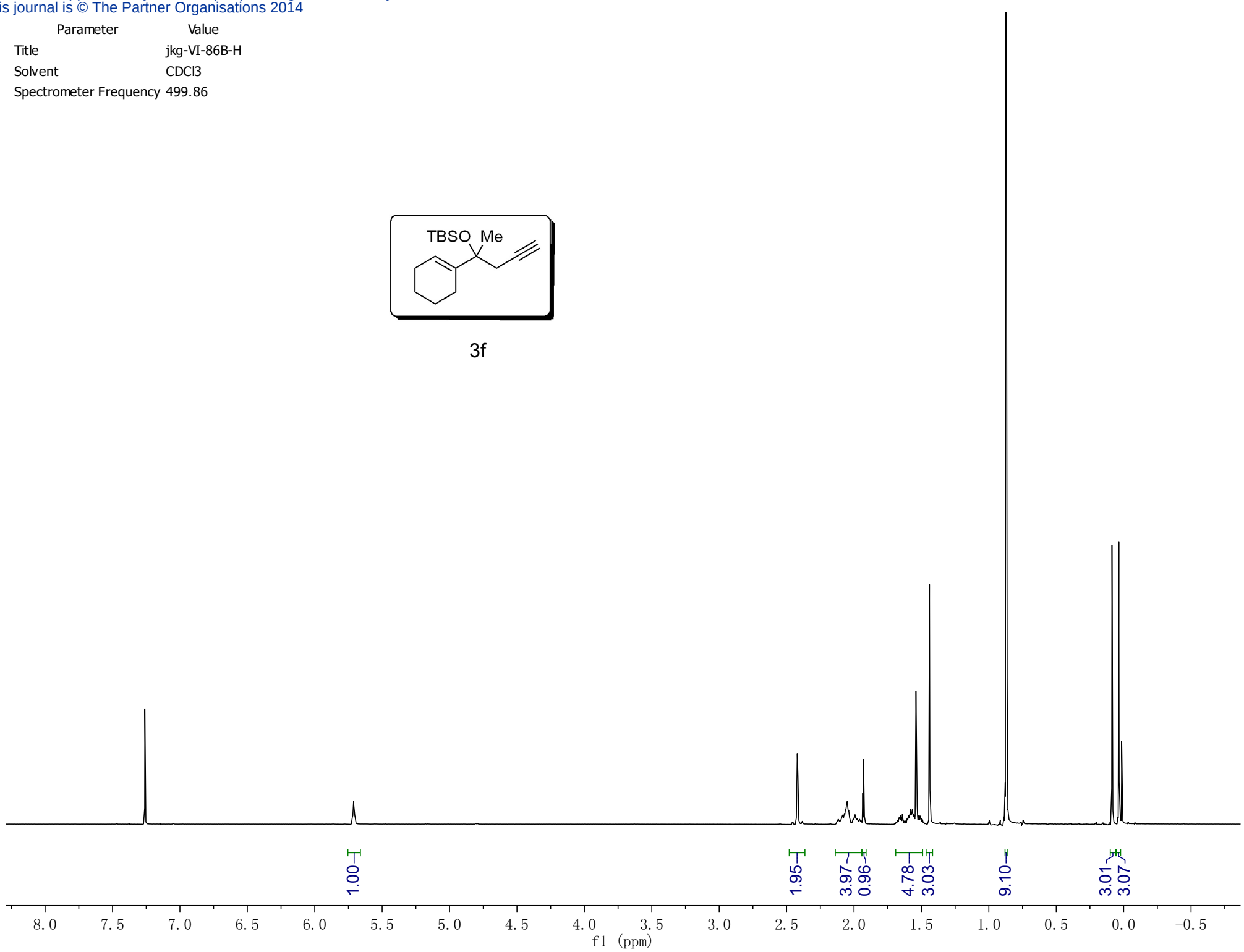
Parameter	Value
Title	jkg-VI-81C-C
Solvent	CDCl3
Spectrometer Frequency	125.70

3e



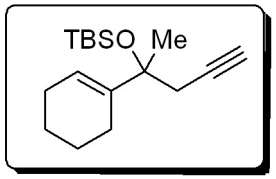
Parameter	Value
Title	jkg-VI-86B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3f

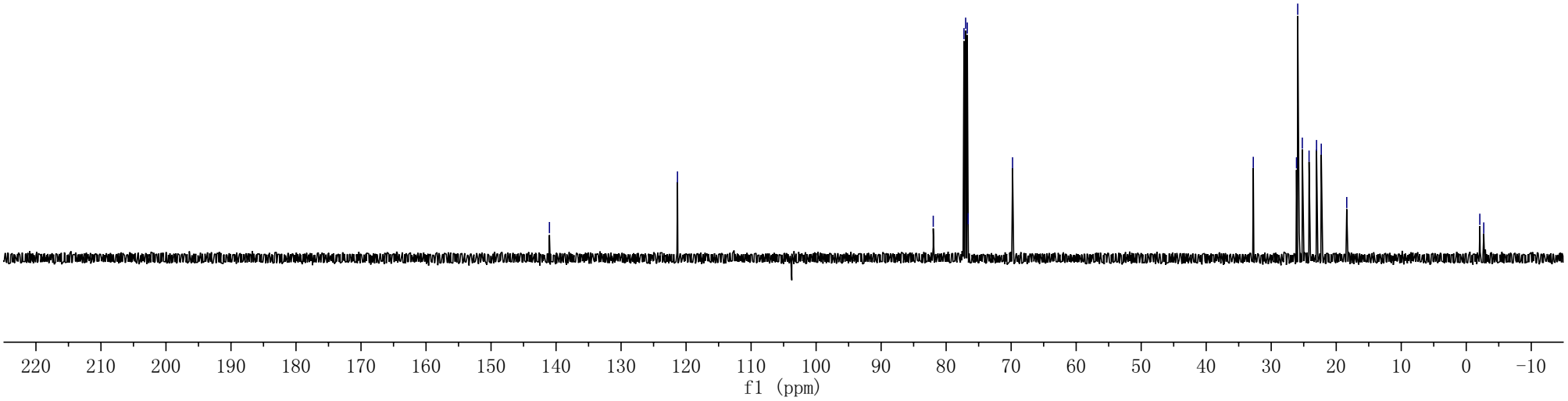


Parameter	Value
Title	jkg-VI-86B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

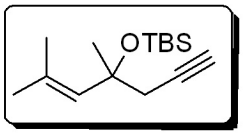
141.02
121.32
81.98
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
76.61
69.78
32.76
26.11
25.92
25.22
24.18
23.03
22.30
18.38
-2.09
-2.70



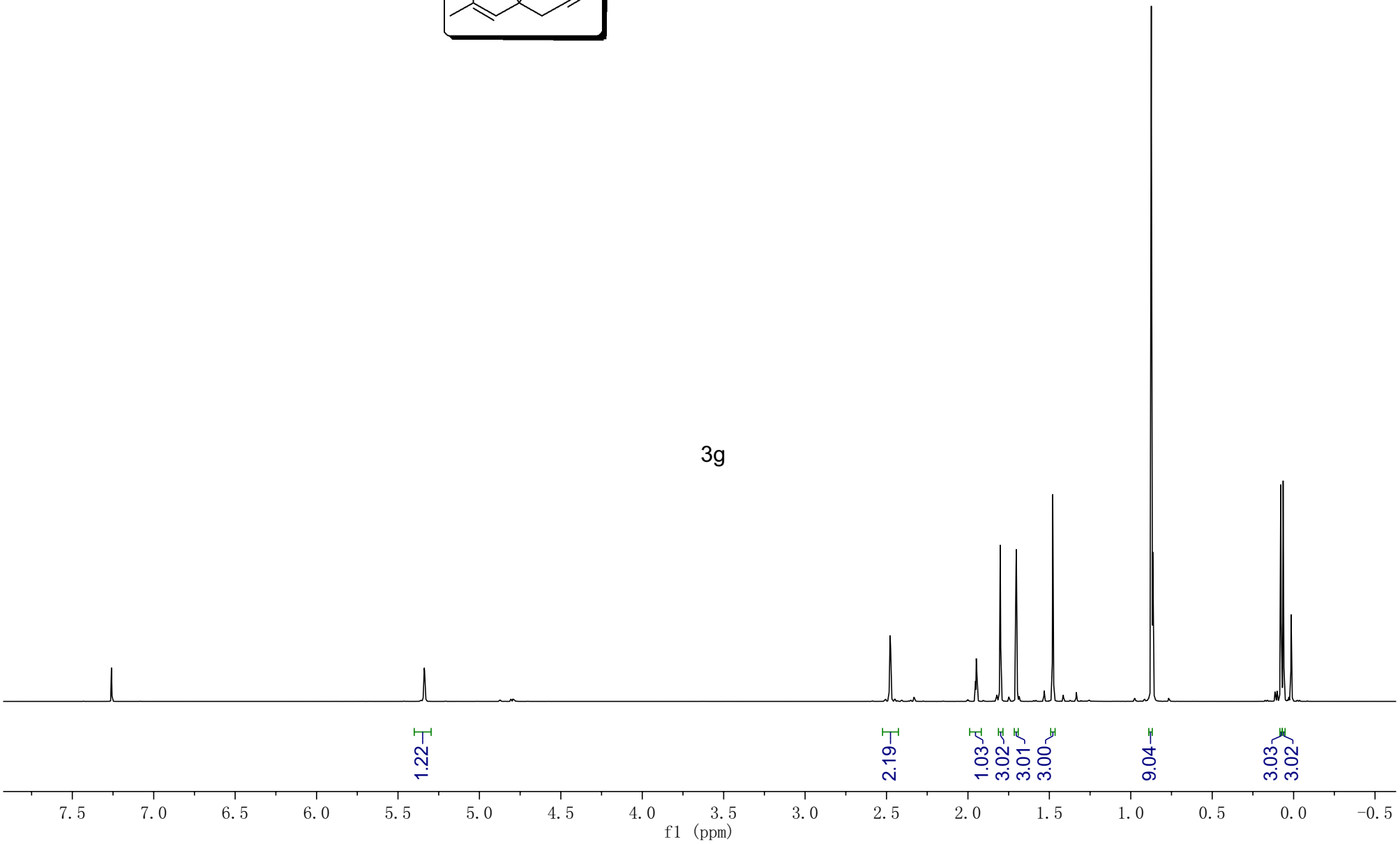
3f



Parameter	Value
Title	jkg-VI-80A-H
Solvent	cdcl3
Spectrometer Frequency	599.64

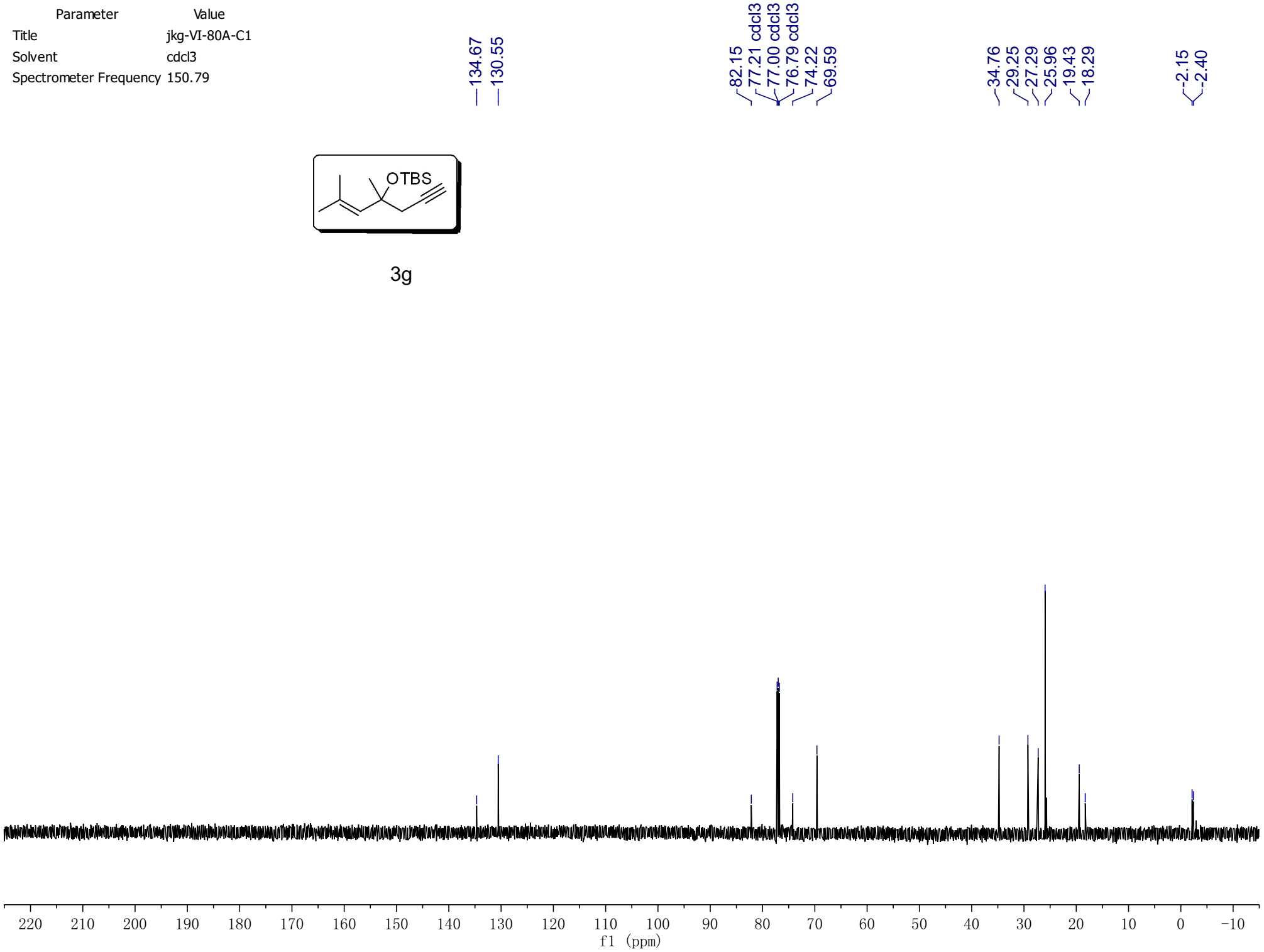


3g



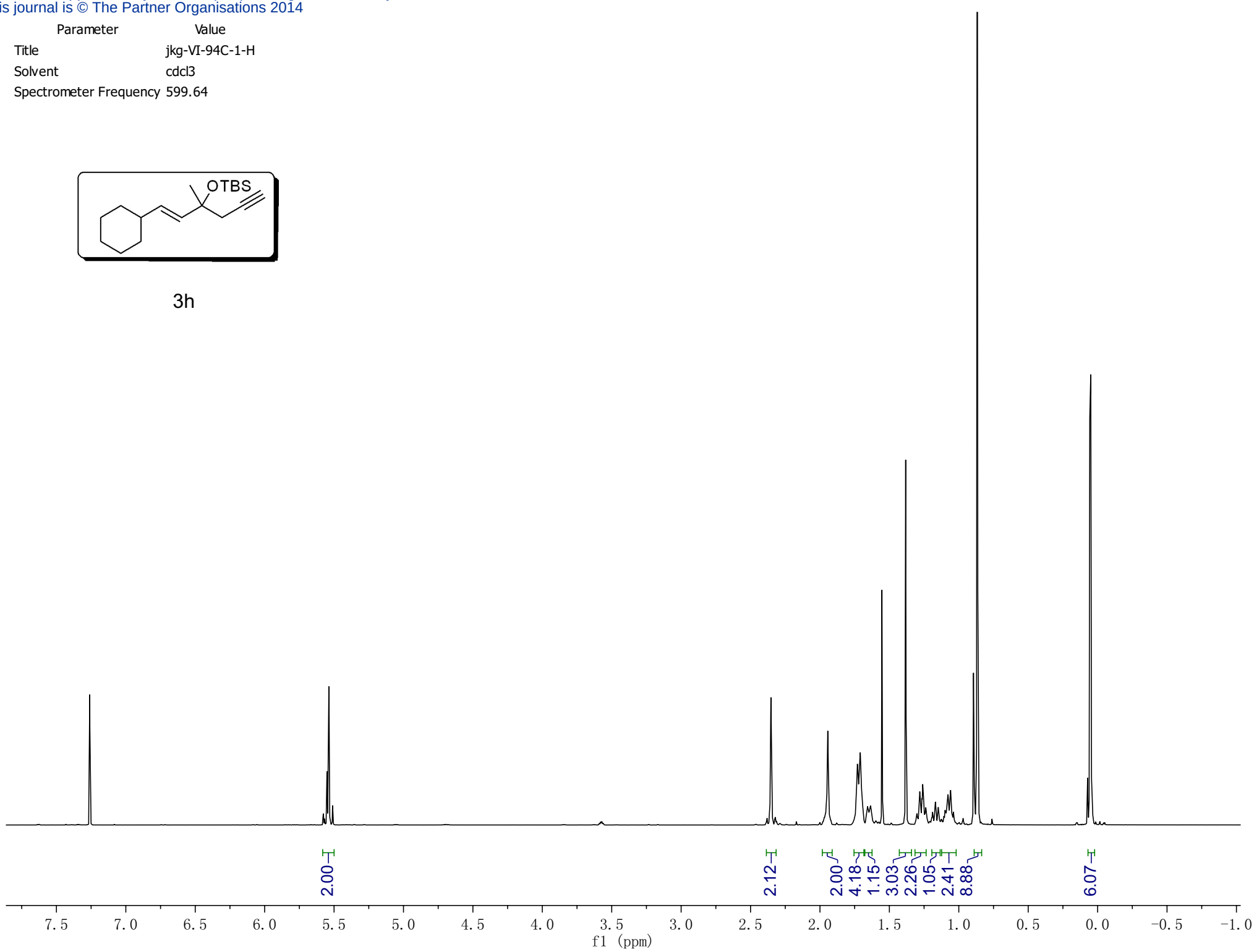
Parameter	Value
Title	jkg-VI-80A-C1
Solvent	cdcl3
Spectrometer Frequency	150.79

3g



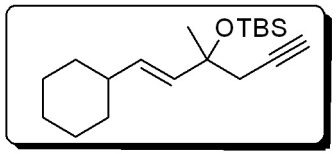
Parameter	Value
Title	jkg-VI-94C-1-H
Solvent	cdcl3
Spectrometer Frequency	599.64

3h

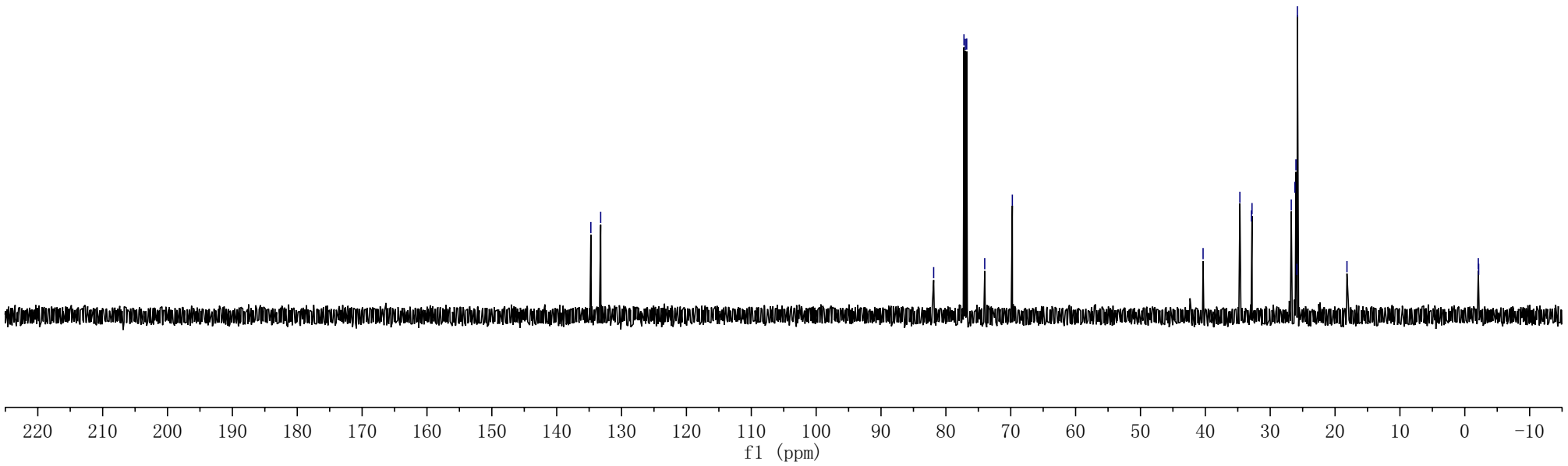


Parameter	Value
Title	jkg-VI-94C-1-C
Solvent	cdcl3
Spectrometer Frequency	150.79

134.74
133.22
81.88
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
74.01
69.76
40.35
34.68
32.89
32.80
26.75
26.19
26.03
25.89
25.81
18.16
-2.08
-2.14



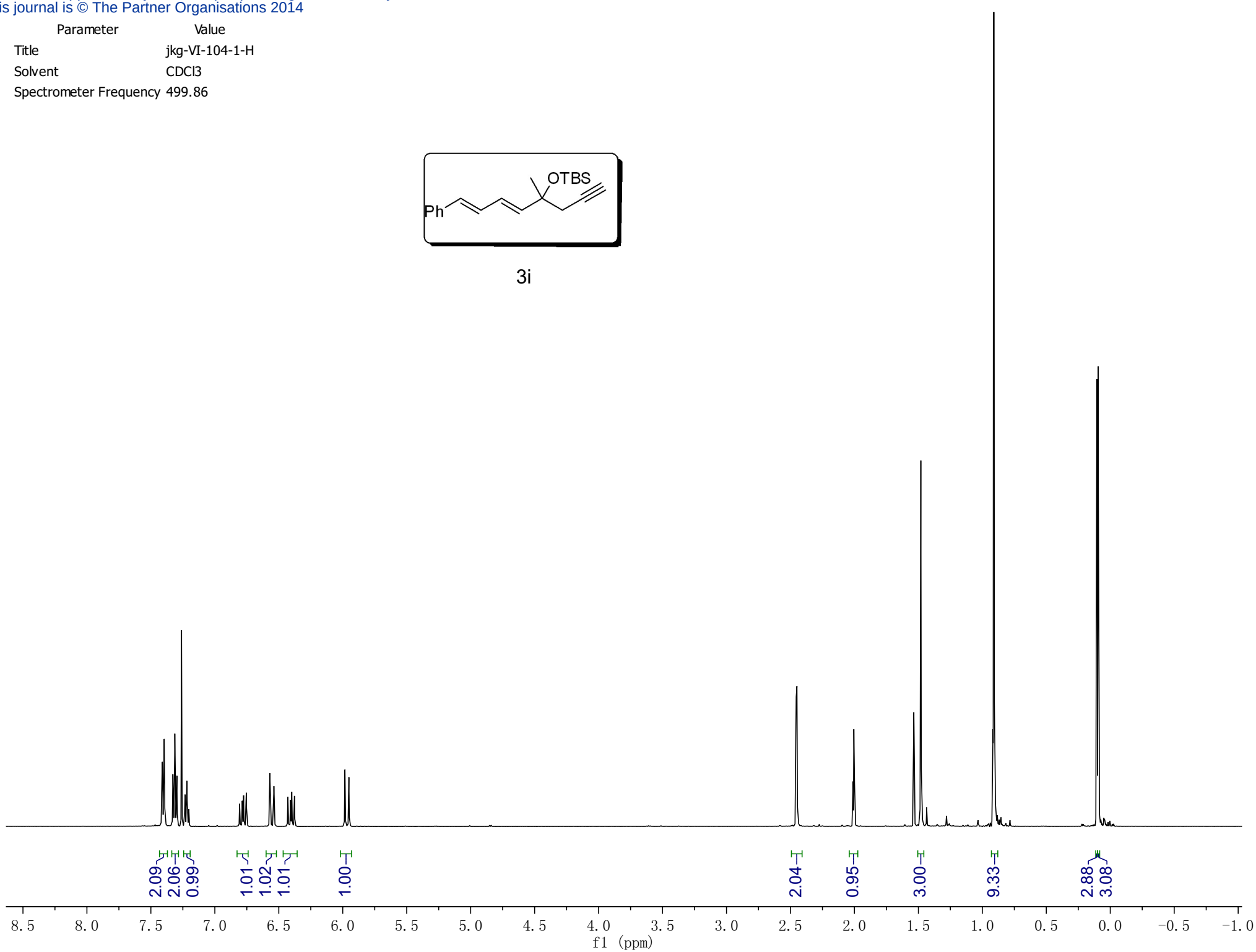
3h



Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers

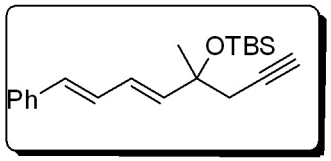
Parameter	Value
Title	jkg-VI-104-1-H
Solvent	CDCl3
Spectrometer Frequency	499.86

3i

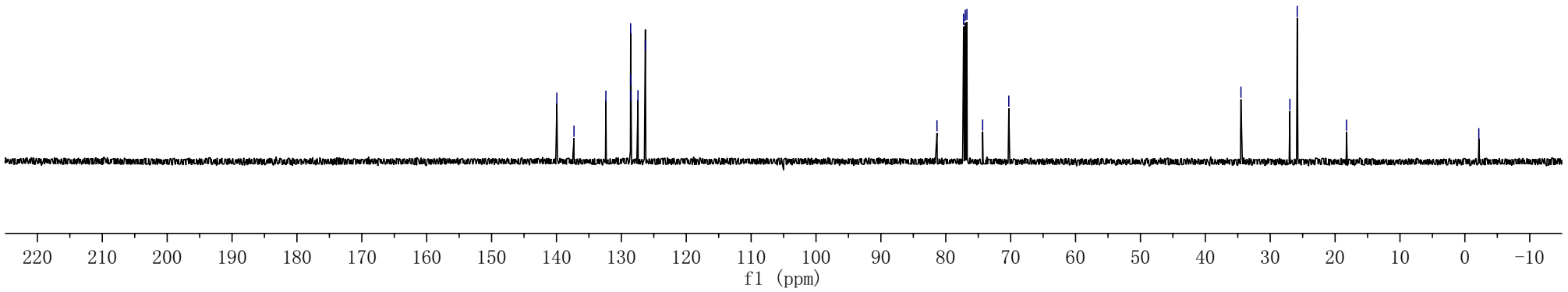


Parameter	Value
Title	jkg-VI-104-1-C
Solvent	CDCl3
Spectrometer Frequency	125.70

139.94
137.30
132.39
128.59
128.57
128.54
127.44
126.31
81.36
77.25 CDCl3
77.00 CDCl3
76.75 CDCl3
74.32
70.29
34.51
26.97
25.83
18.23
-2.15

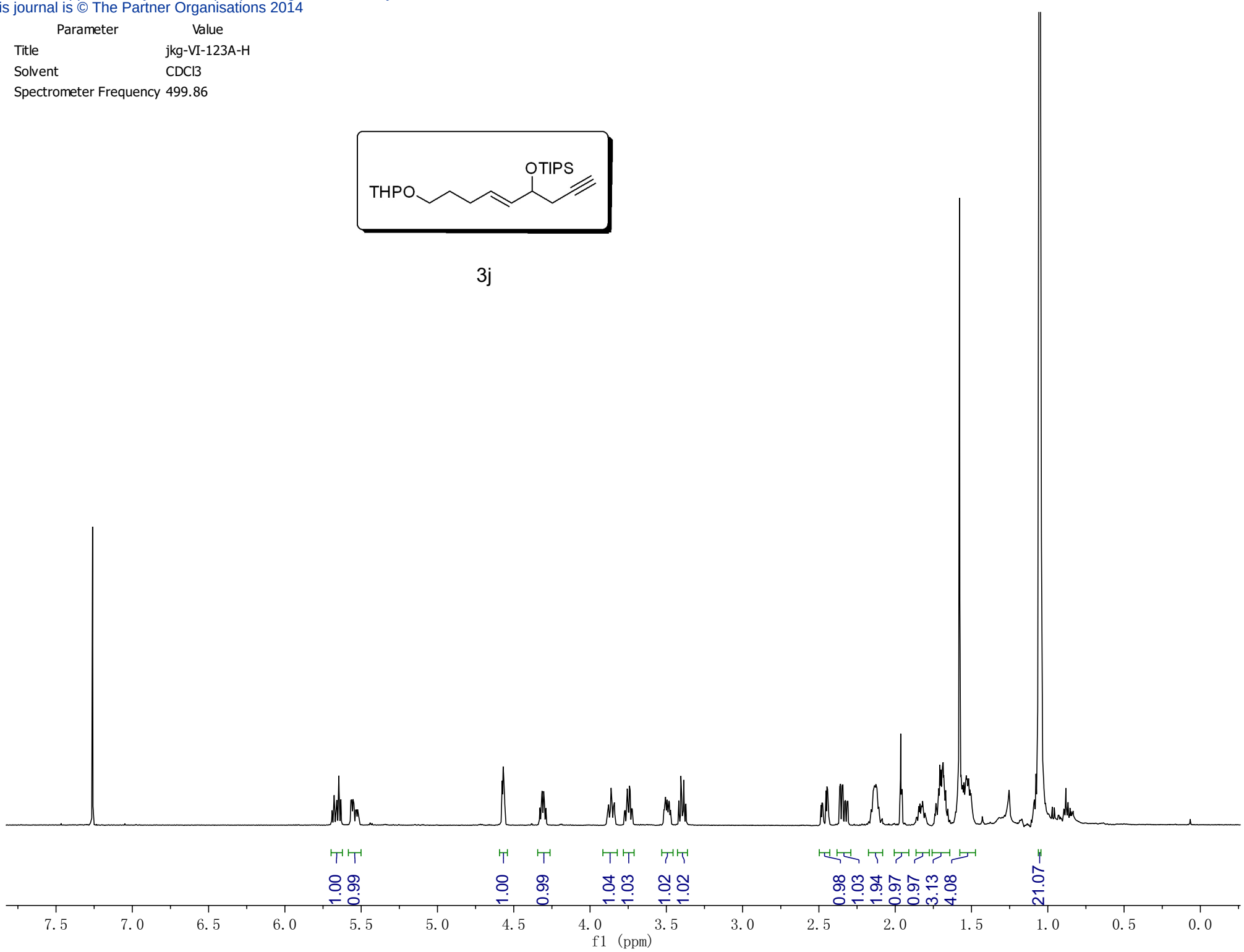


3i

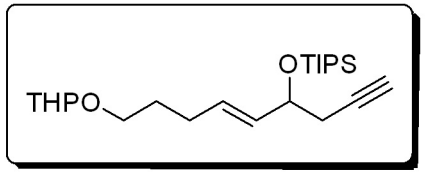


Parameter	Value
Title	jkg-VI-123A-H
Solvent	CDCl3
Spectrometer Frequency	499.86

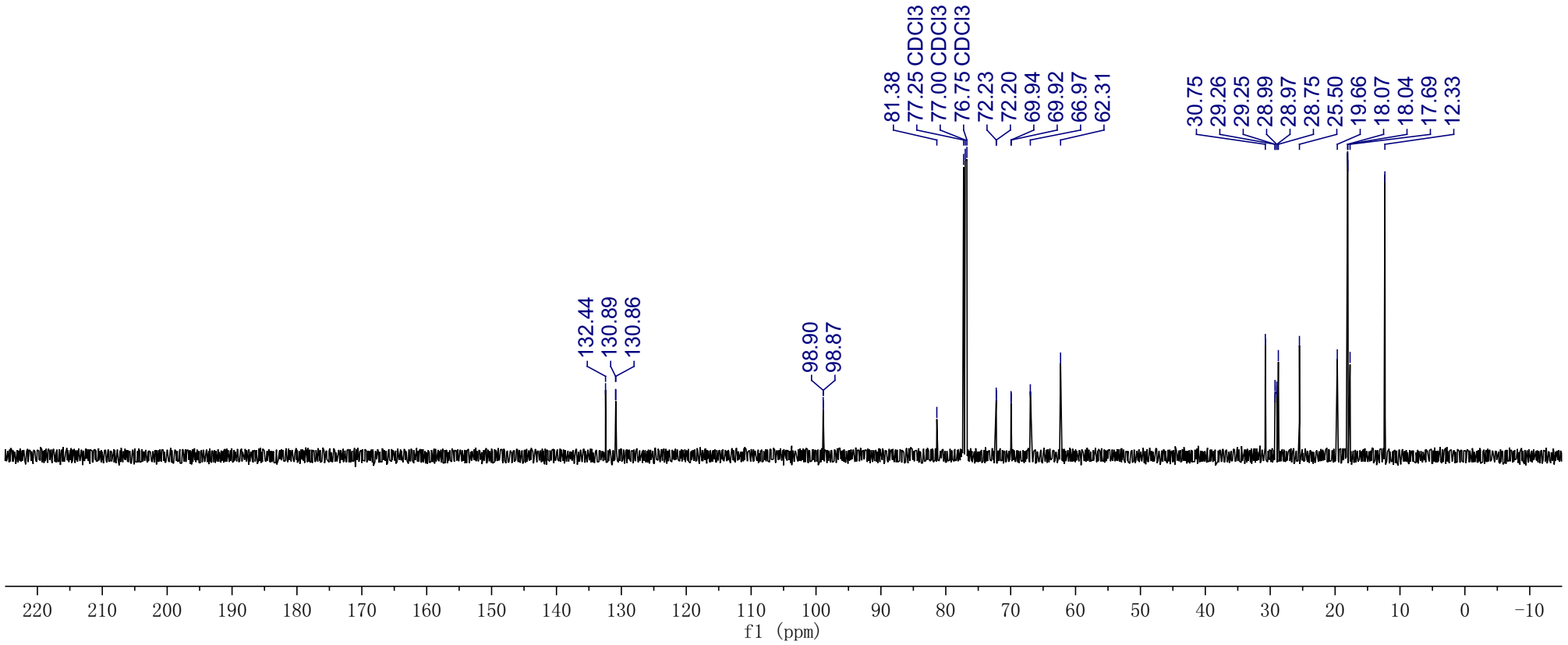
3j



Parameter	Value
Title	jkg-VI-123A-C
Solvent	CDCl3
Spectrometer Frequency	125.70

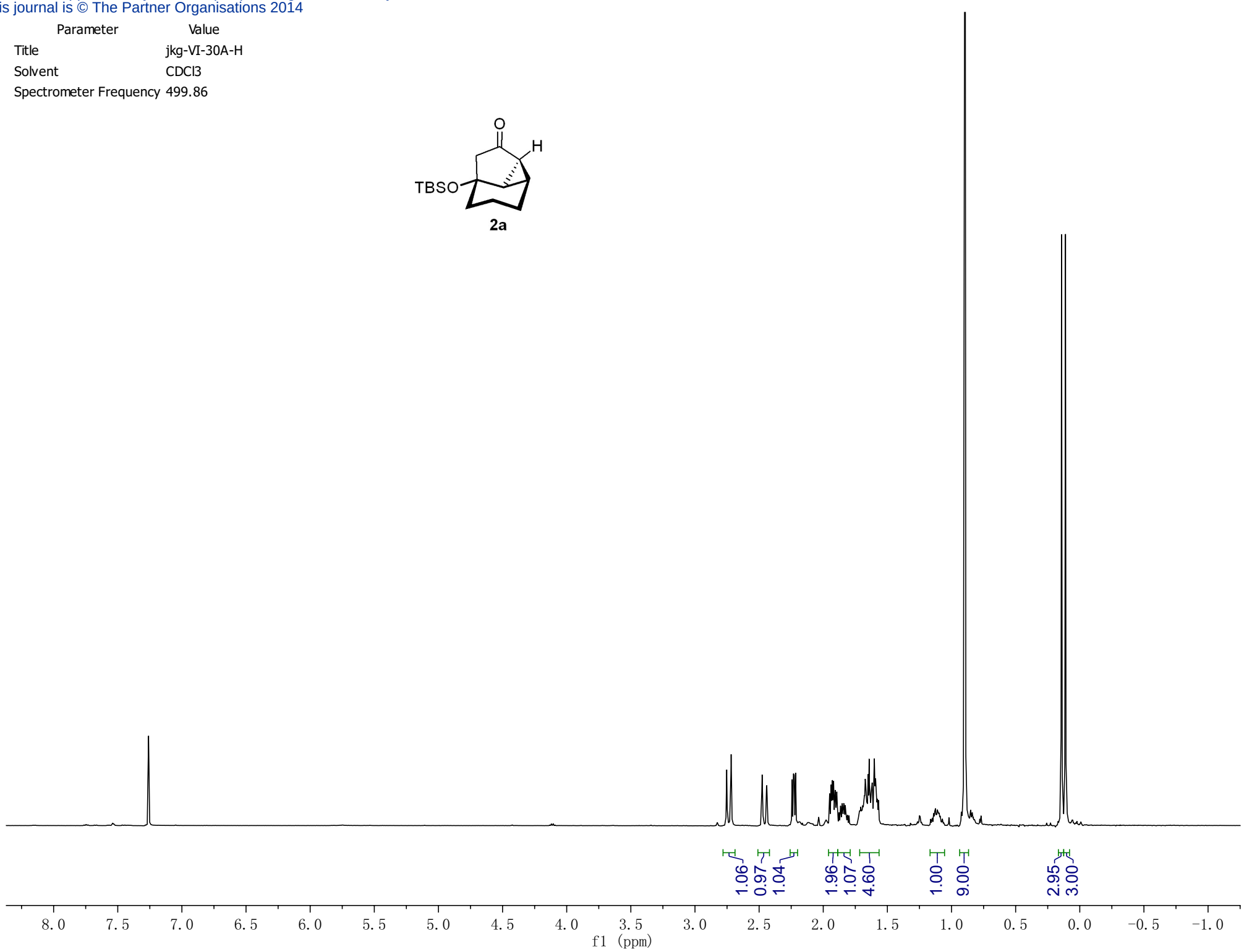


3j

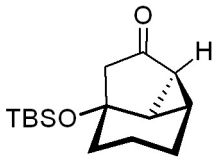


Parameter	Value
Title	jkg-VI-30A-H
Solvent	CDCl3
Spectrometer Frequency	499.86

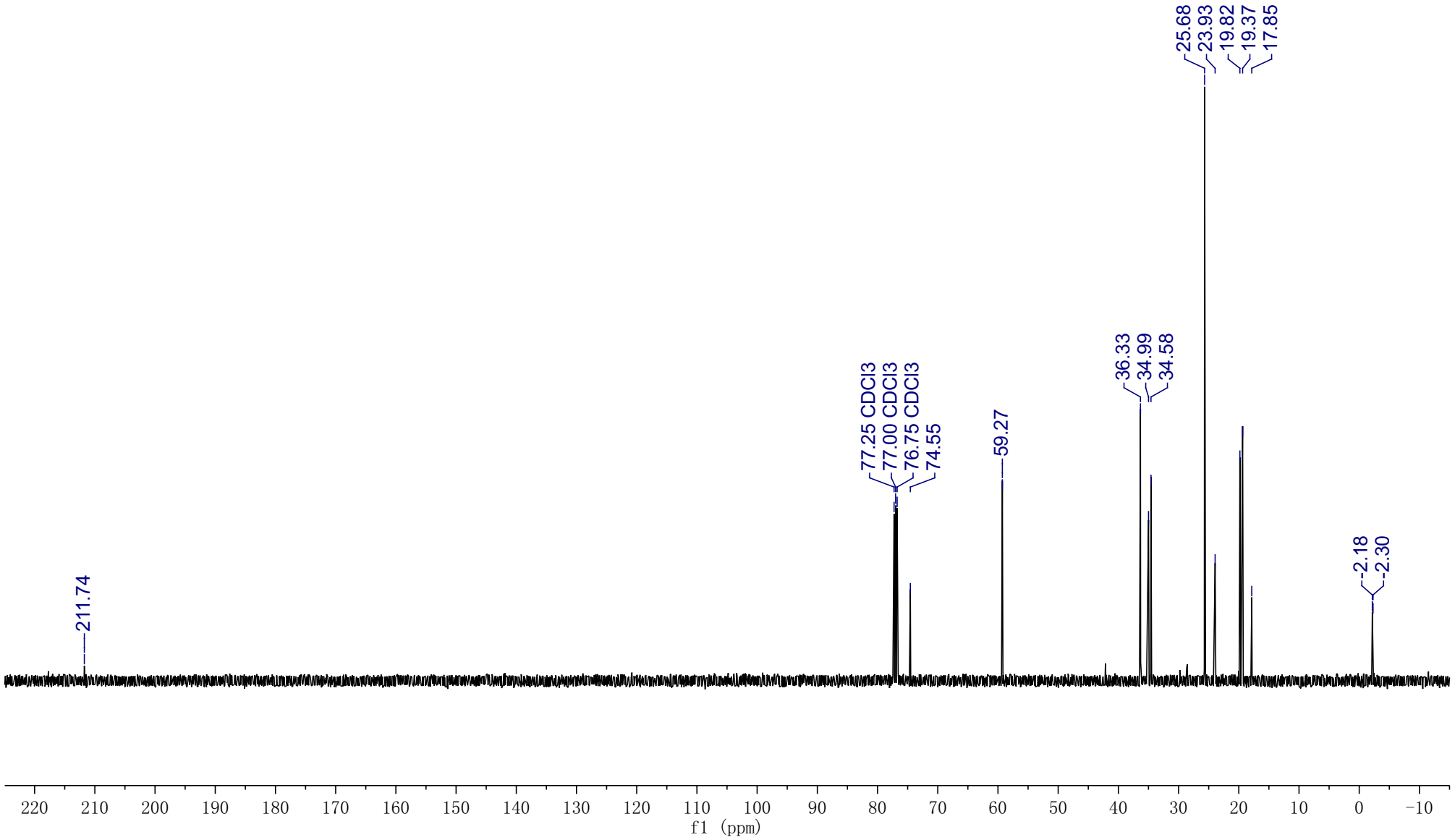
2a



Parameter	Value
Title	jkg-VI-30A-C
Solvent	CDCl3
Spectrometer Frequency	125.70

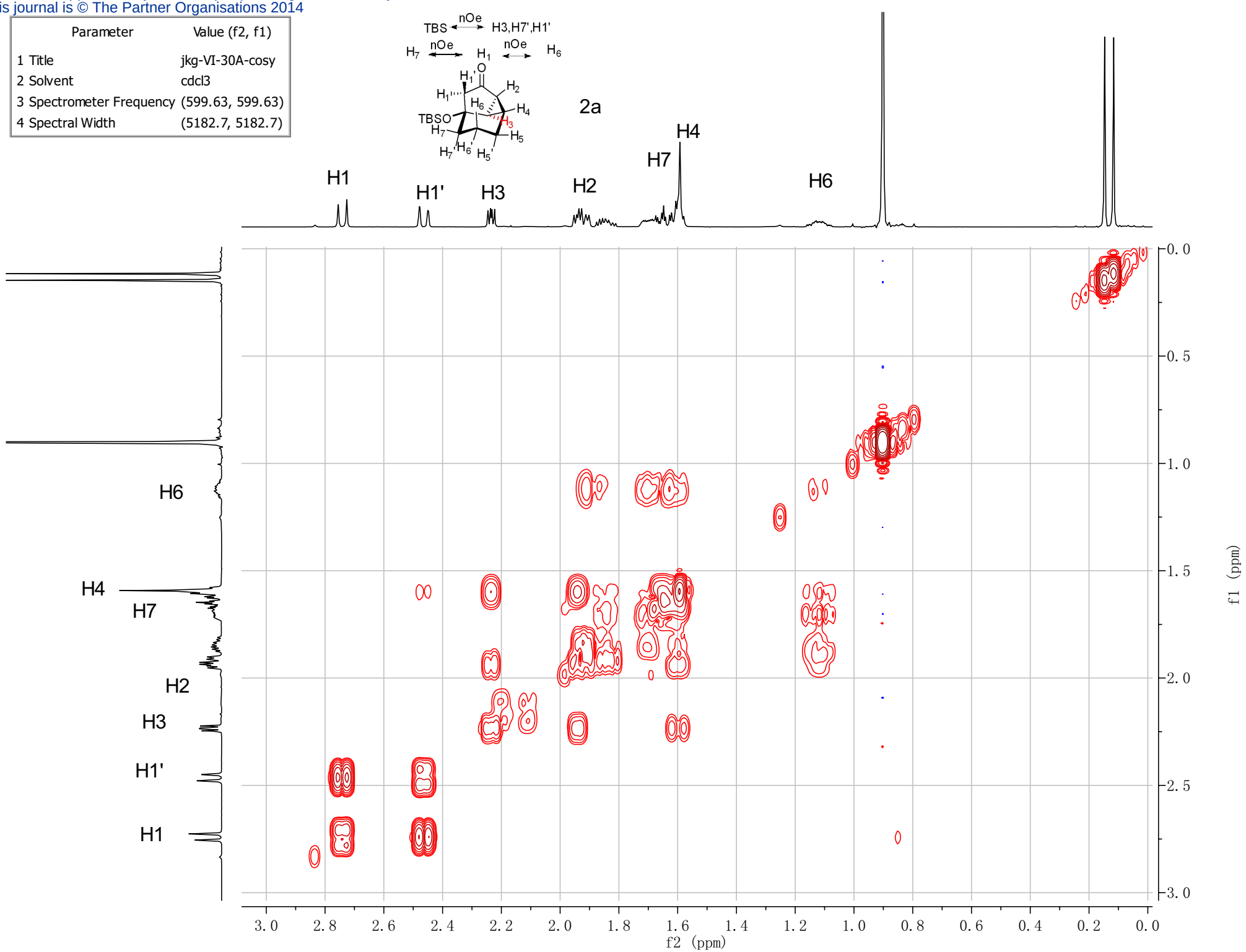


2a



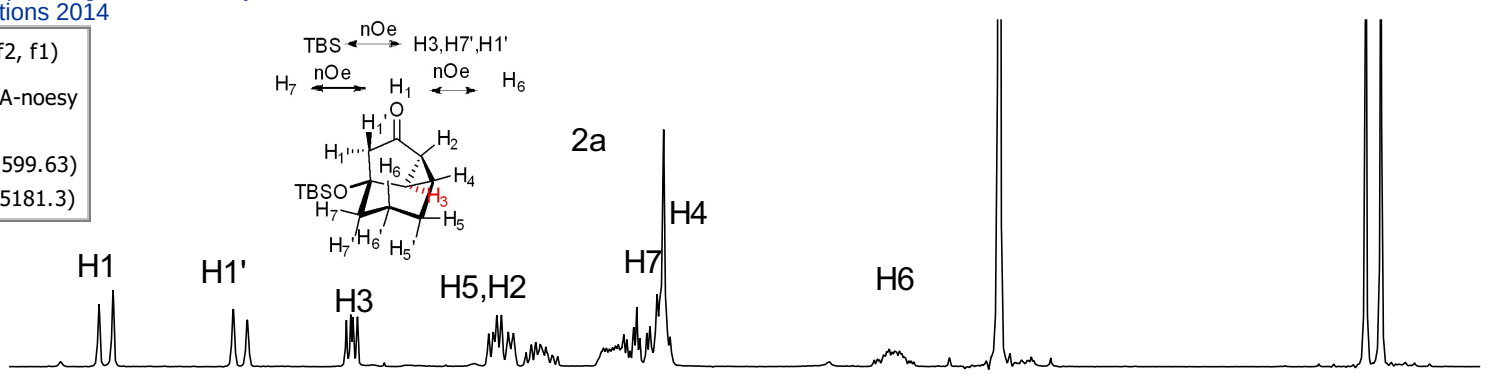
Parameter	Value (f2, f1)
1 Title	jkg-VI-30A-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5182.7, 5182.7)

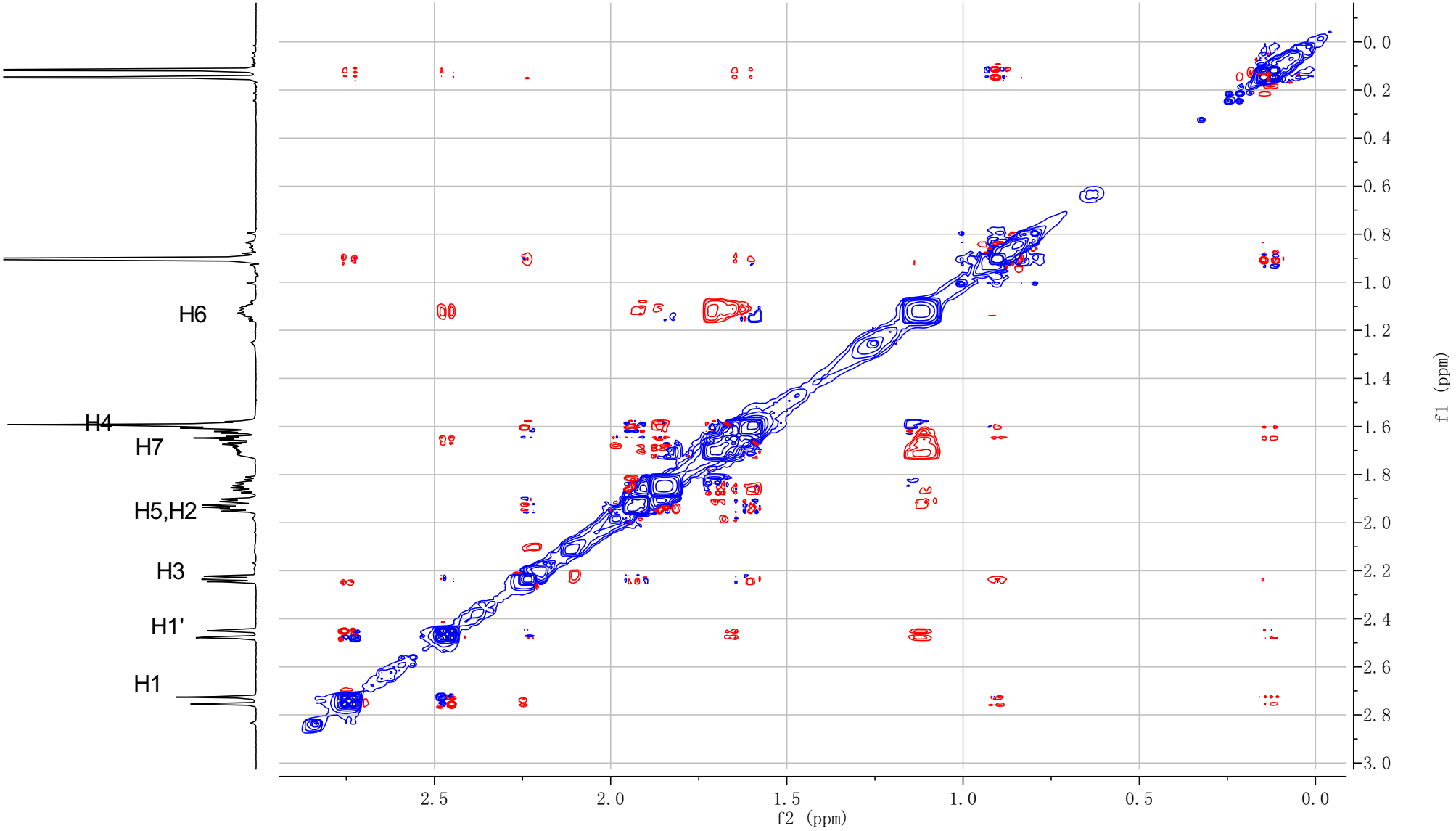
2a



Parameter	Value (f2, f1)
1 Title	jkg-VI-30A-noesy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5182.7, 5181.3)

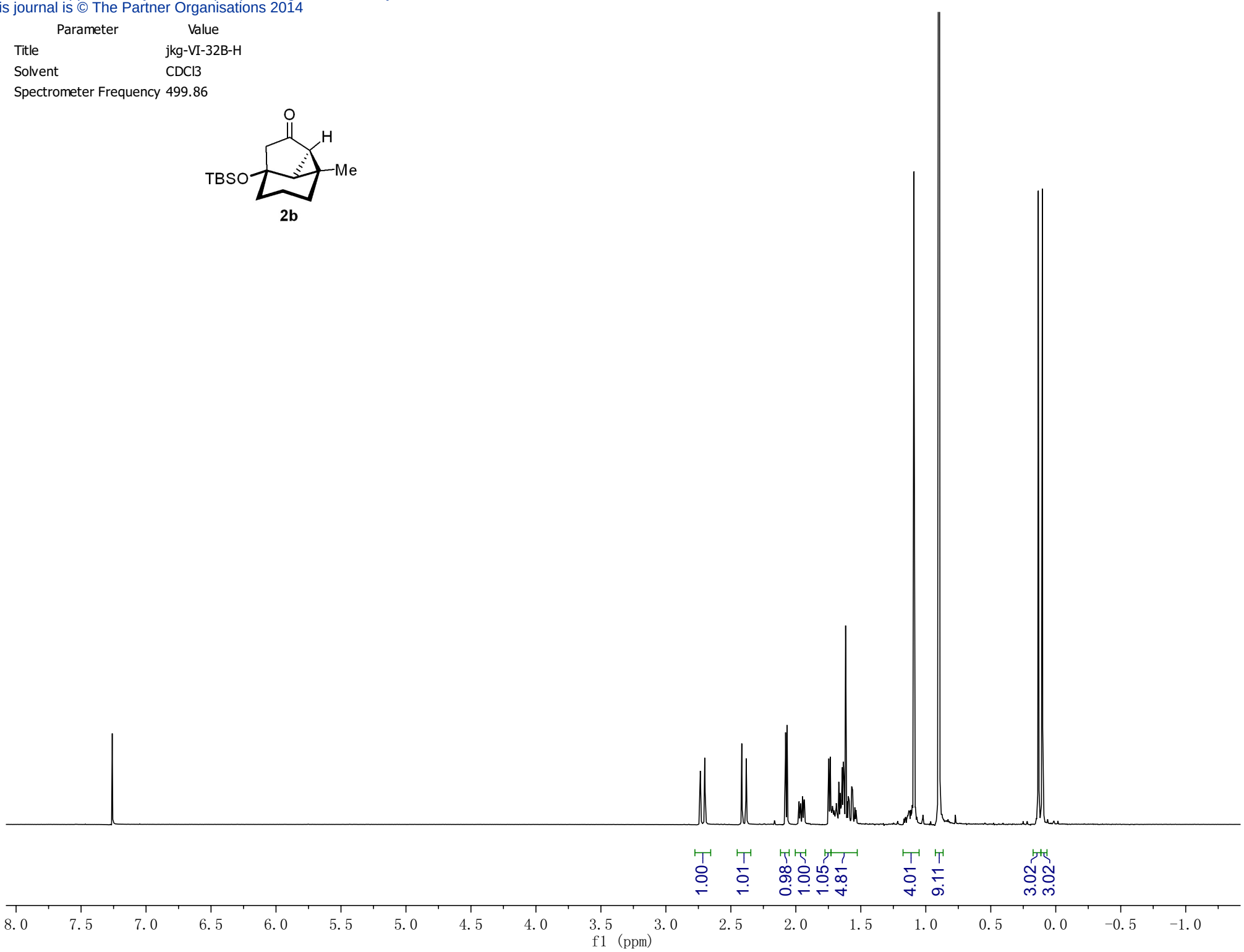
2a



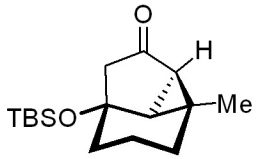


Parameter	Value
Title	jkg-VI-32B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

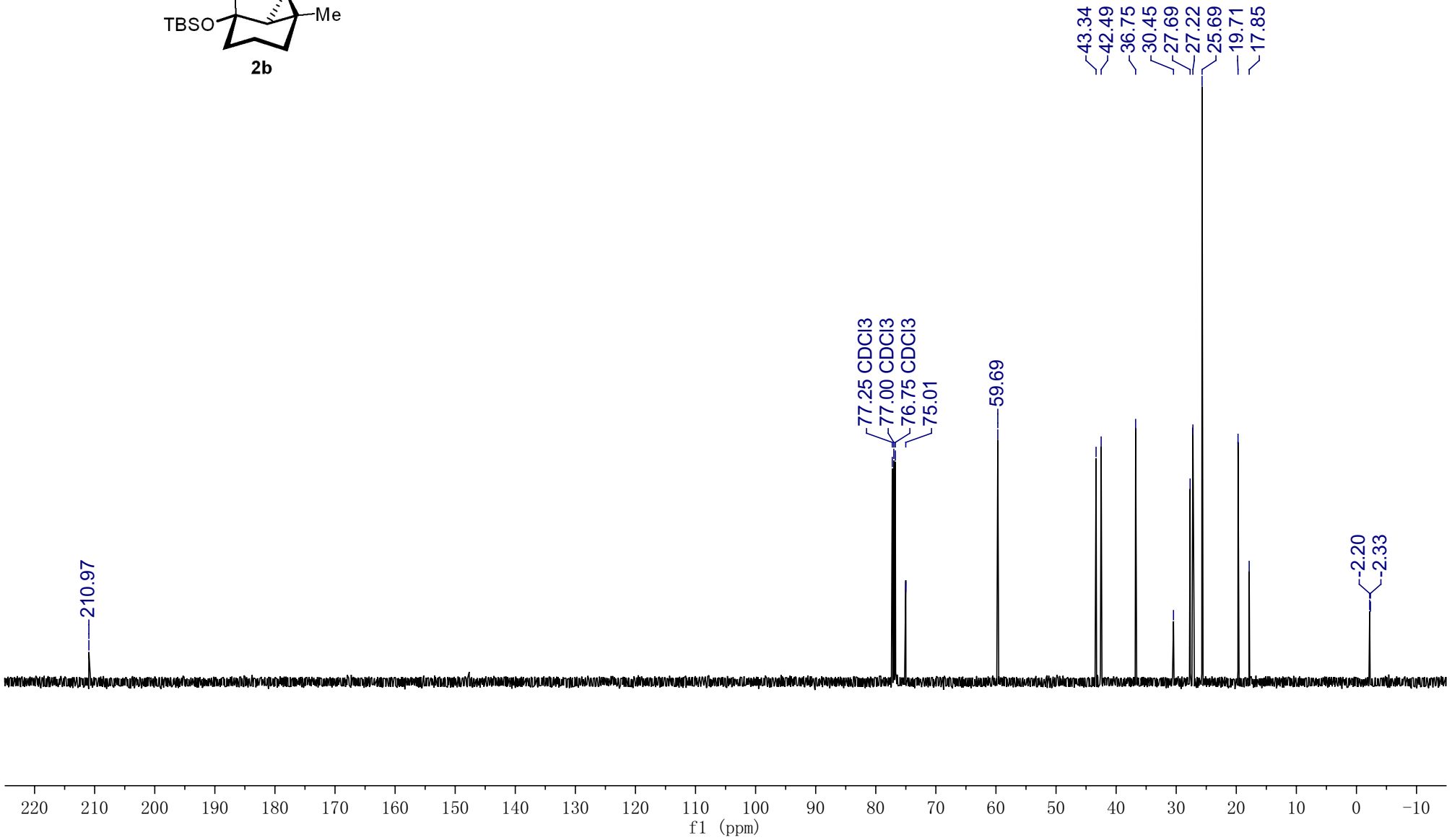
2b



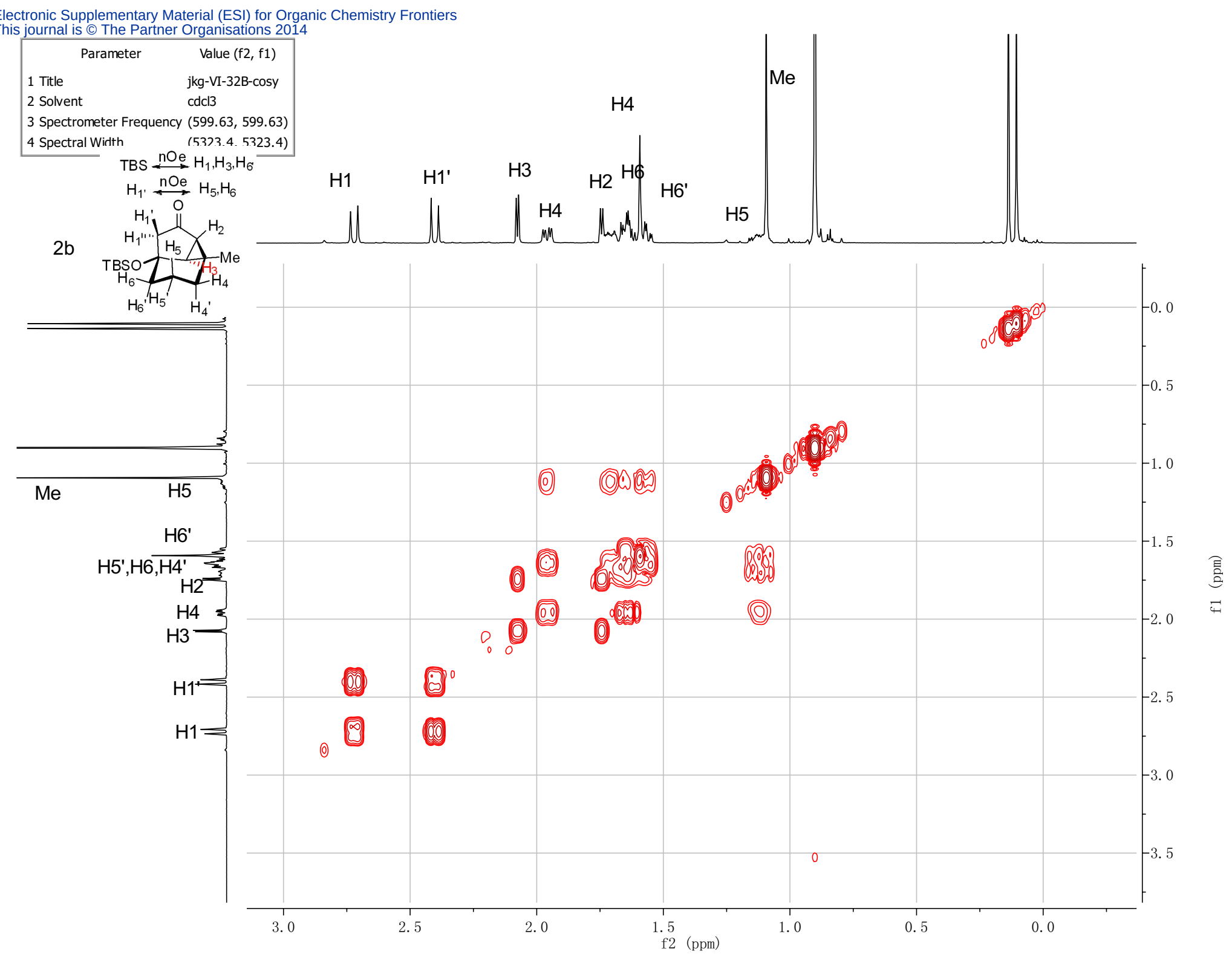
Parameter	Value
Title	jkg-VI-32B-C
Solvent	CDCl3
Spectrometer Frequency	125.70



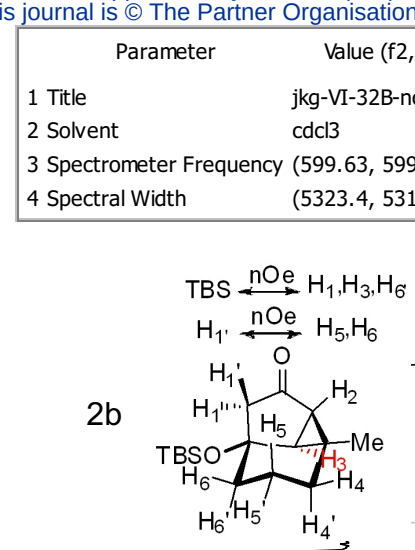
2b



Parameter	Value (f2, f1)
1 Title	jkg-VI-32B-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5323.4, 5323.4)

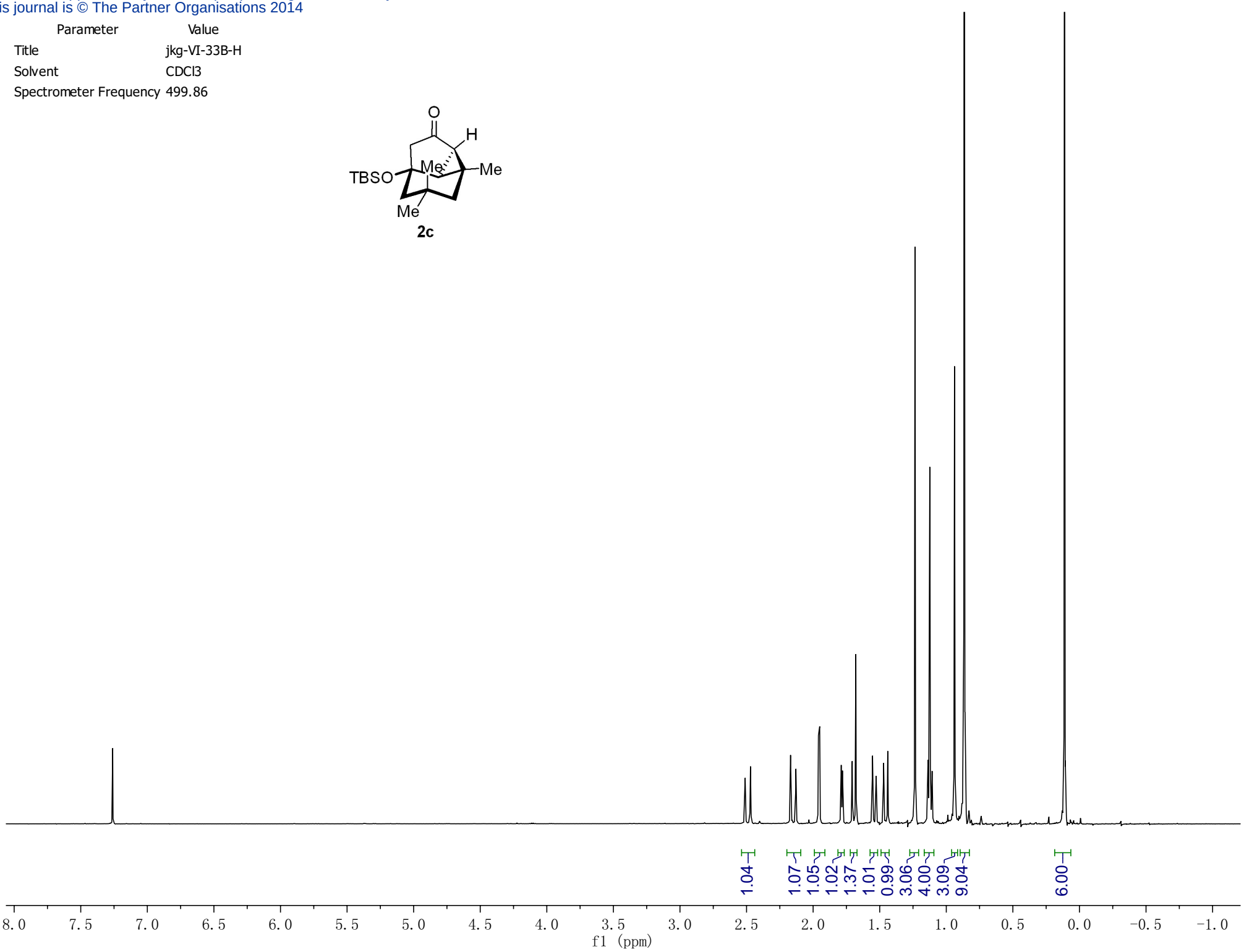


Parameter	Value (f2, f1)
1 Title	jkg-VI-32B-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5323.4, 5316.3)



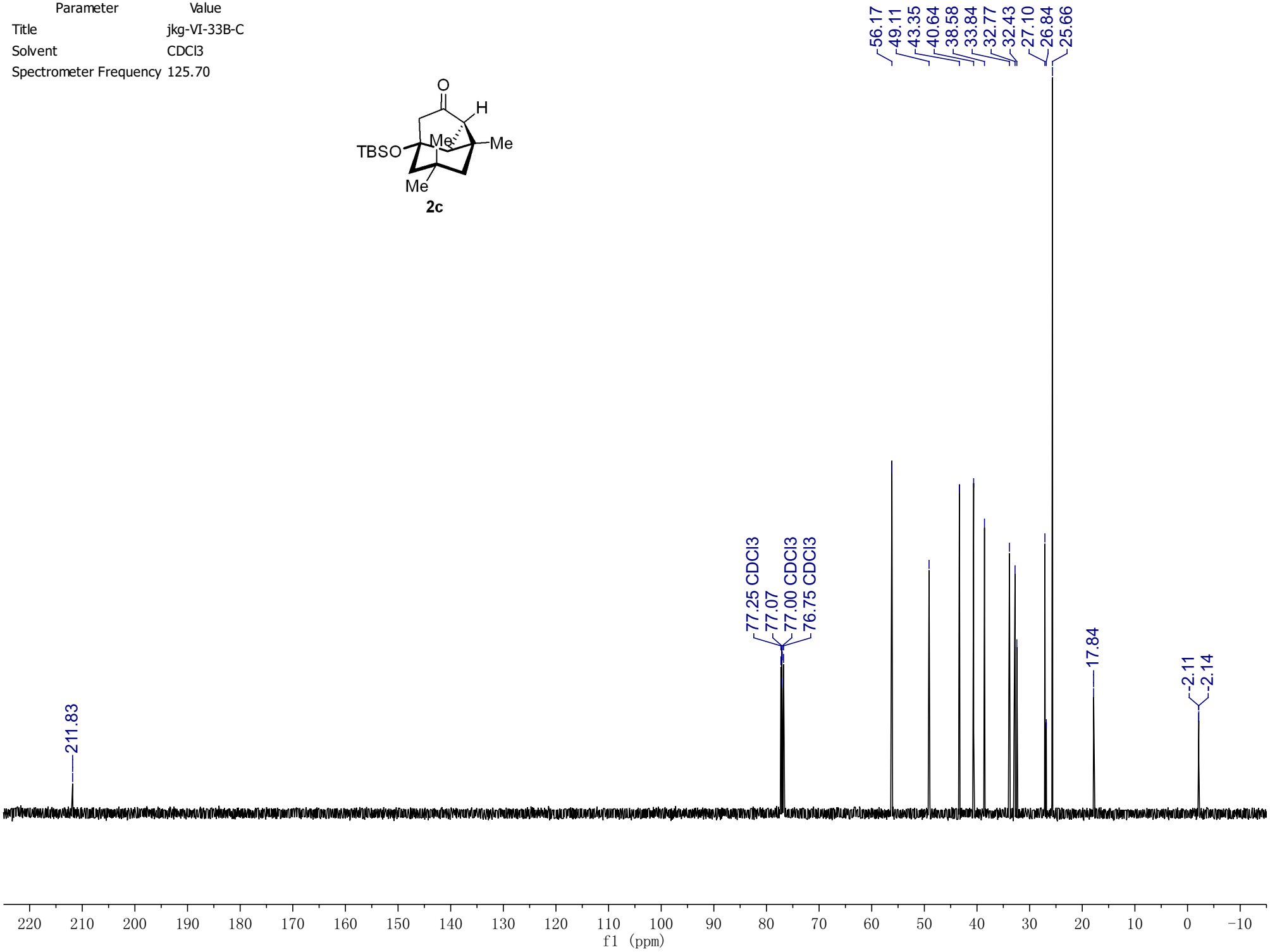
Parameter	Value
Title	jkg-VI-33B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

2c

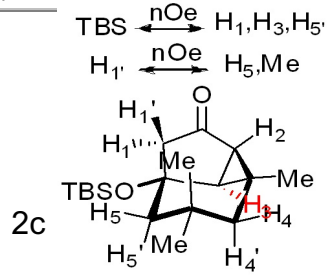


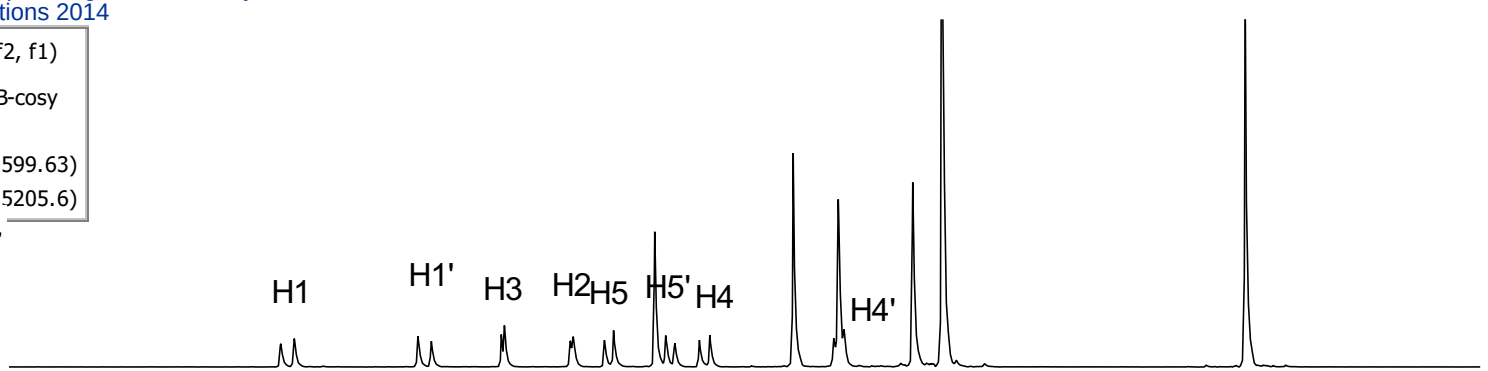
Parameter	Value
Title	jkg-VI-33B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

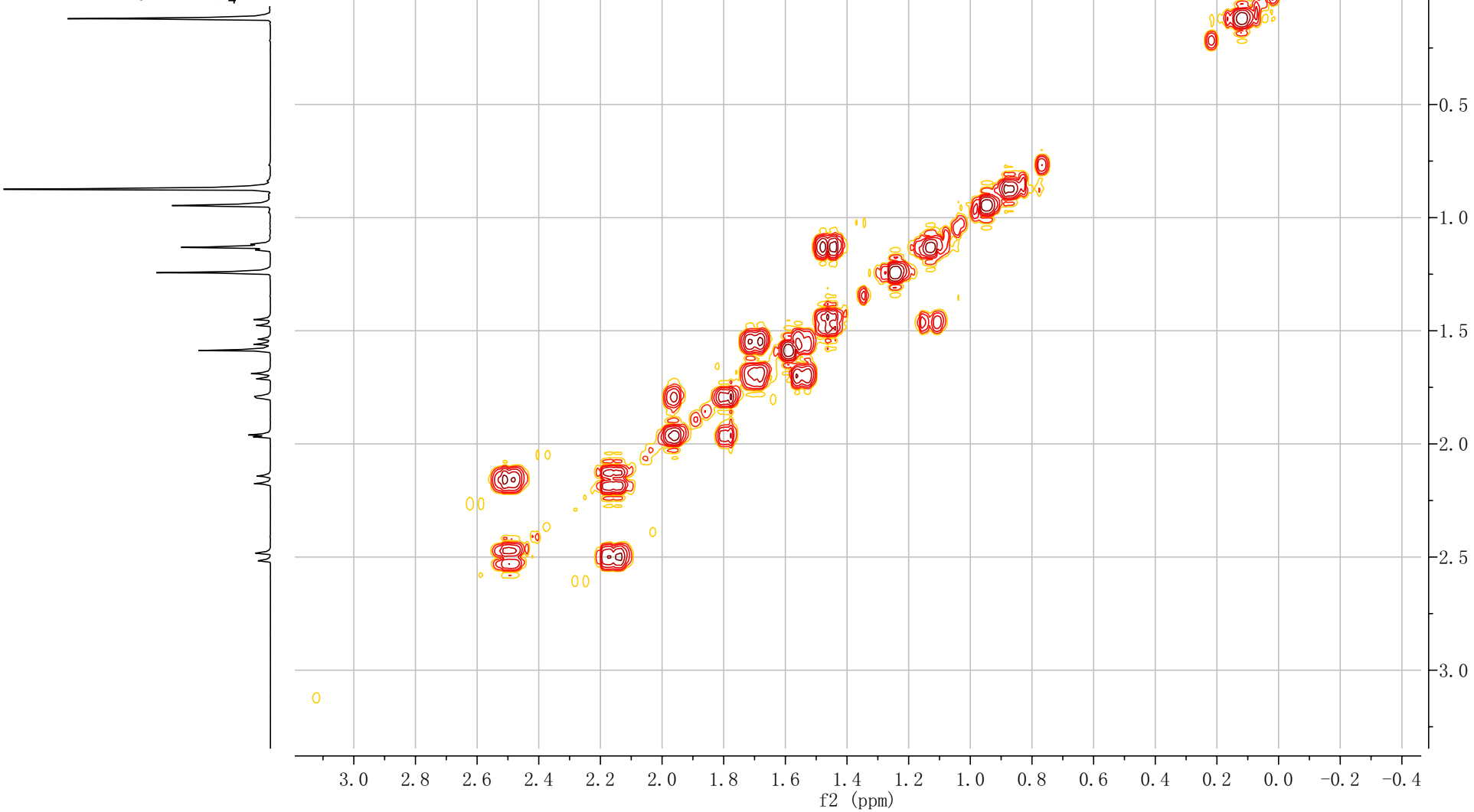
2c



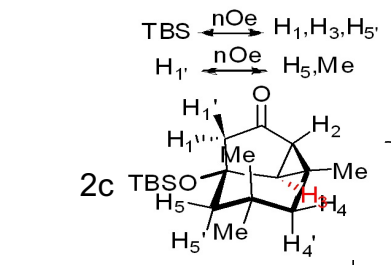
Parameter	Value (f2, f1)
1 Title	jkg-Vi-33B-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5205.6, 5205.6)

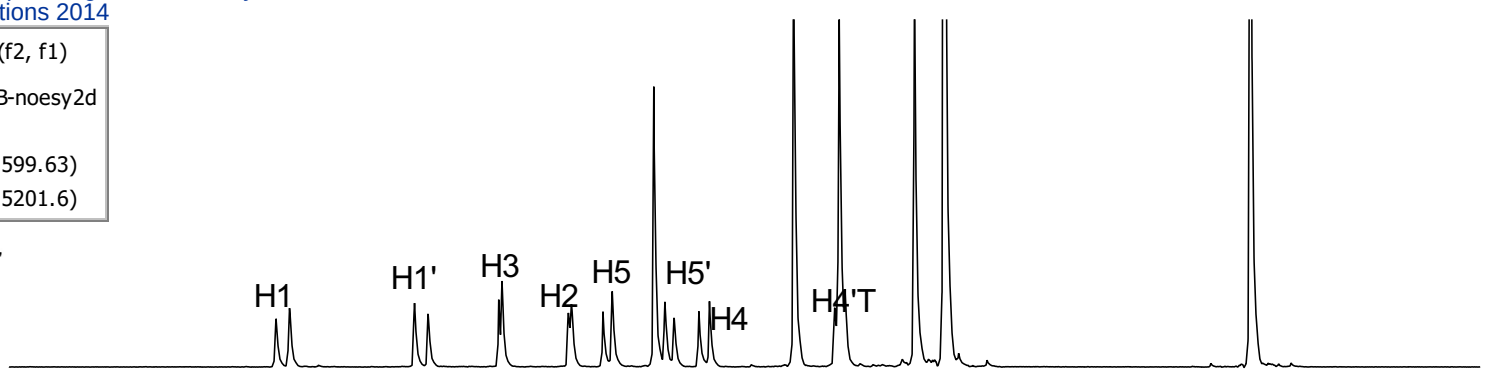


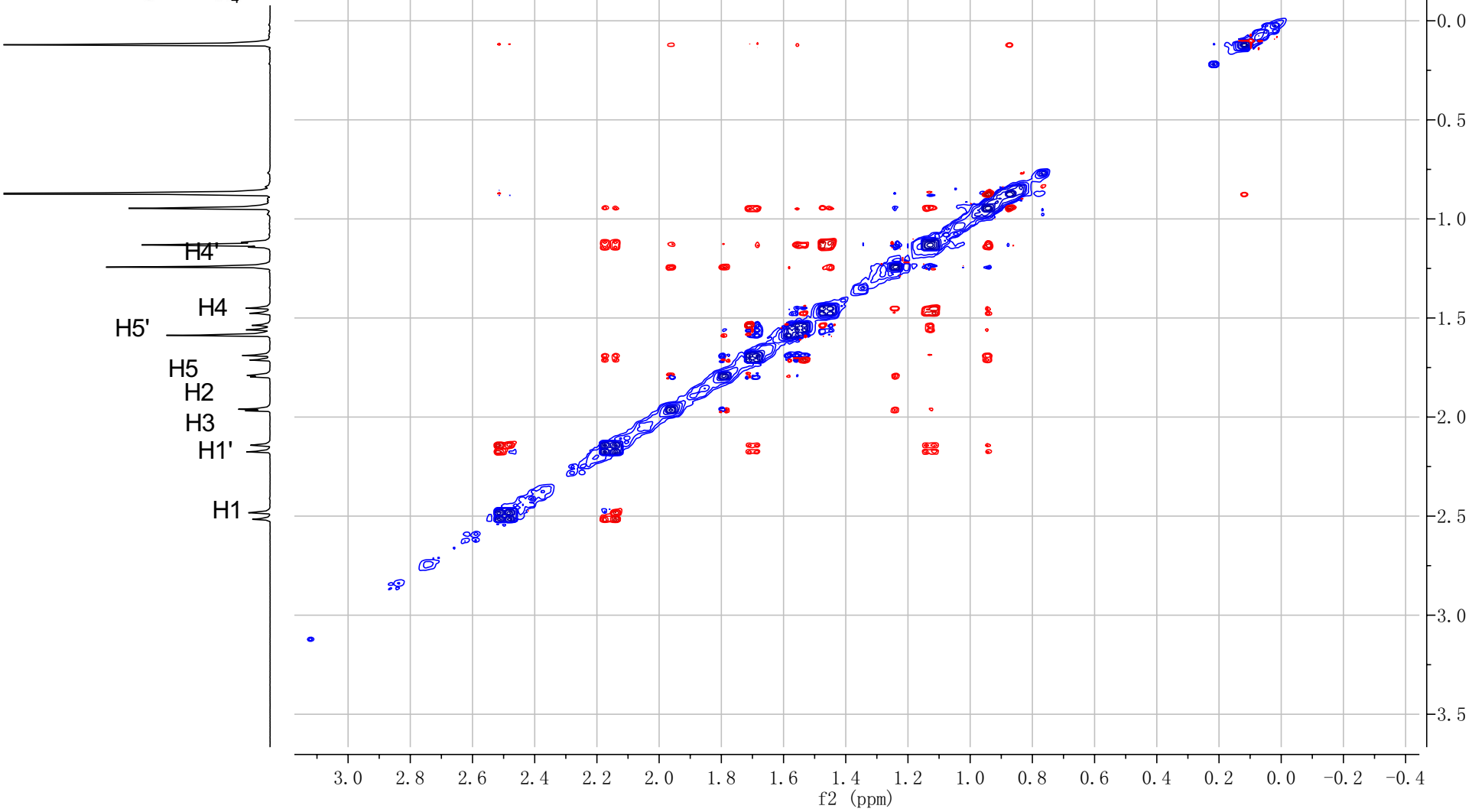




Parameter	Value (f2, f1)
1 Title	jkg-Vi-33B-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5205.6, 5201.6)

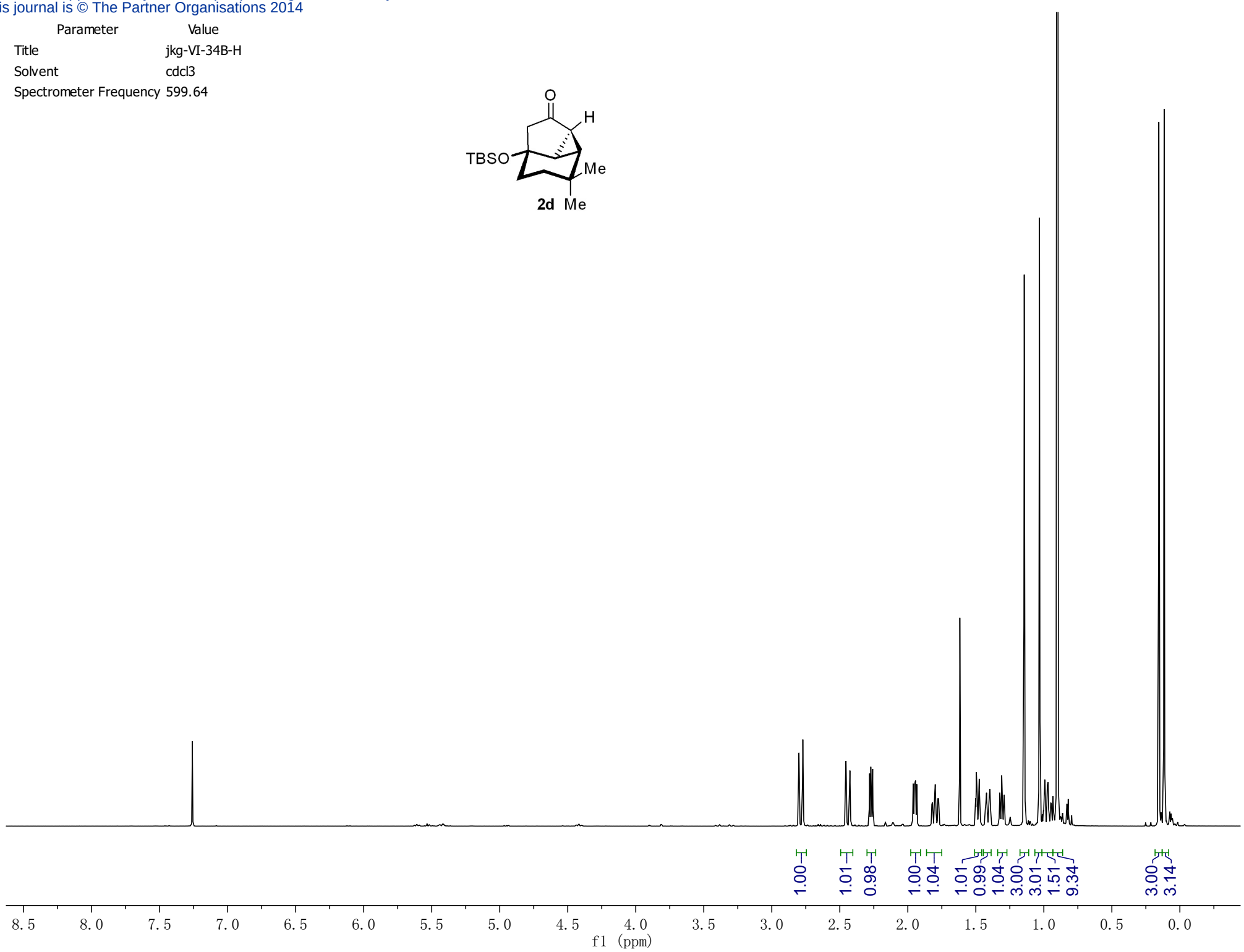




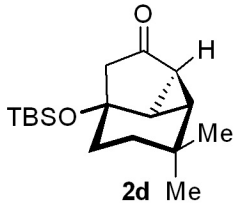


Parameter	Value
Title	jkg-VI-34B-H
Solvent	cdcl3
Spectrometer Frequency	599.64

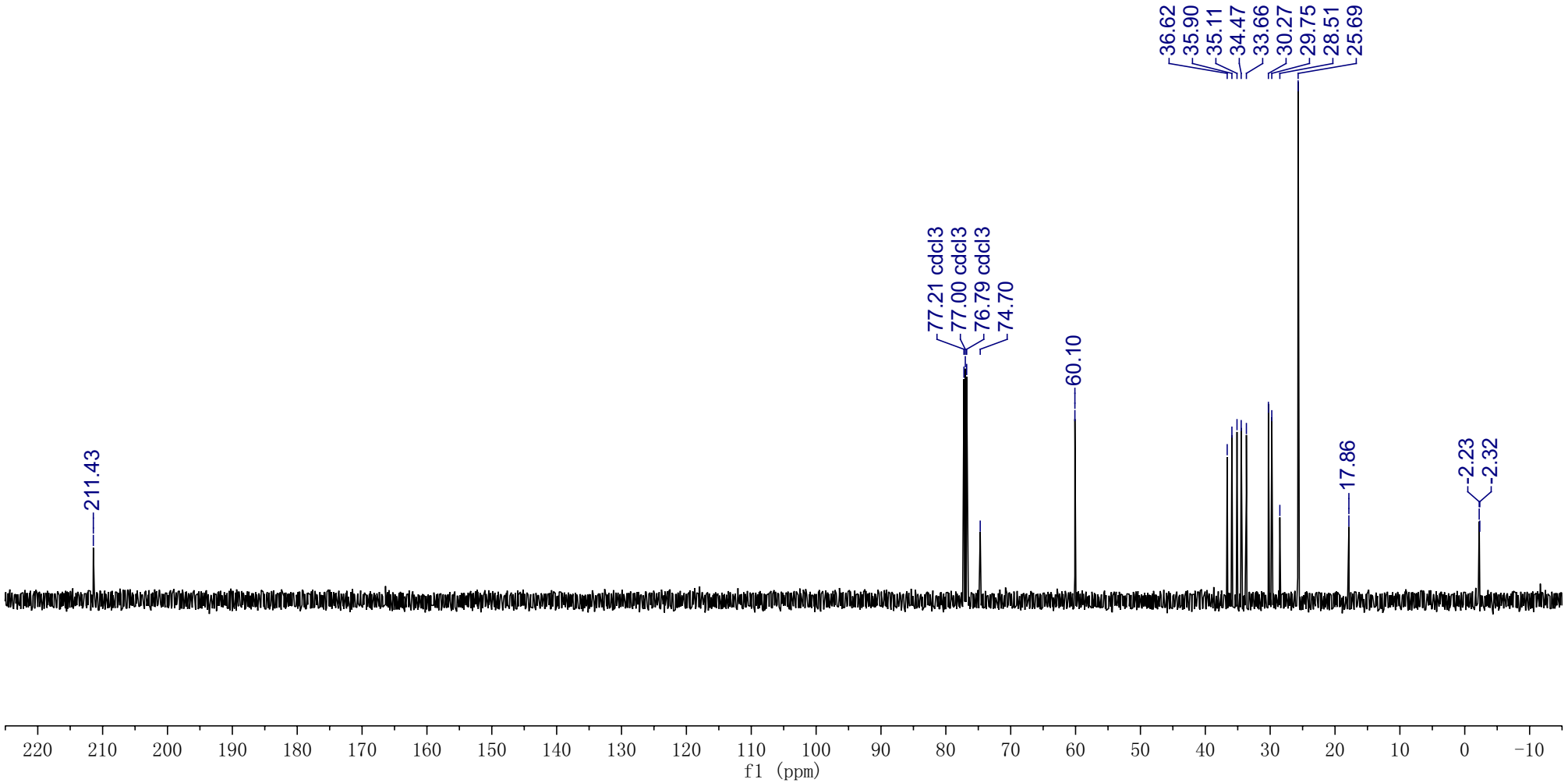
2d



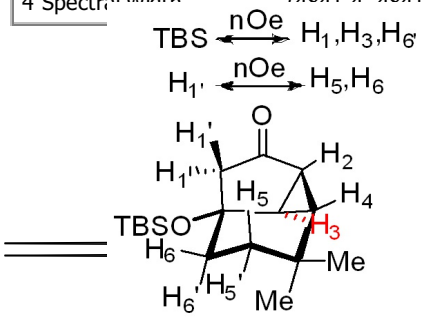
Parameter	Value
Title	jkg-VI-34B-C
Solvent	cdcl3
Spectrometer Frequency	150.79

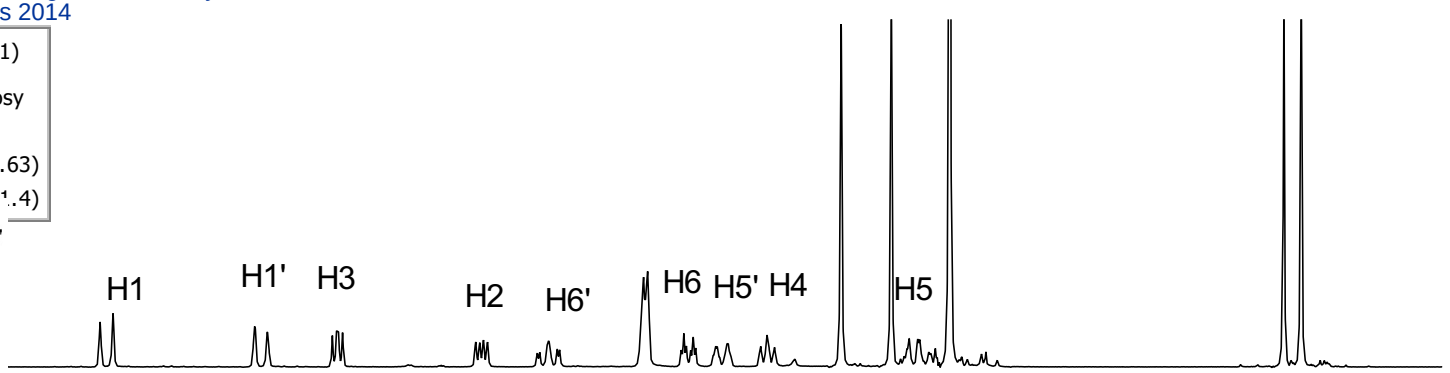


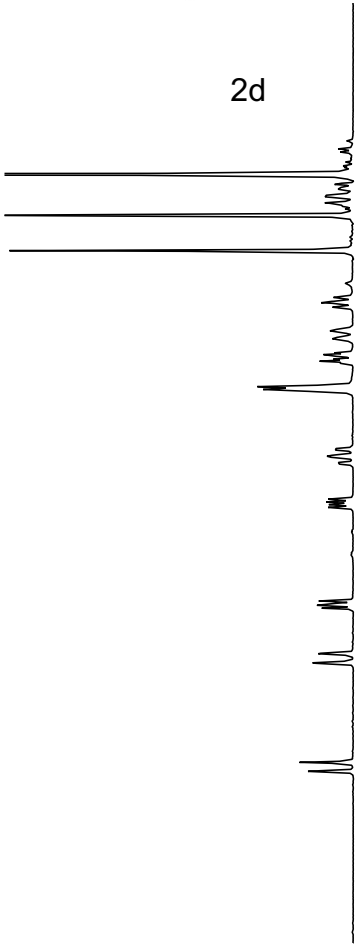
2d

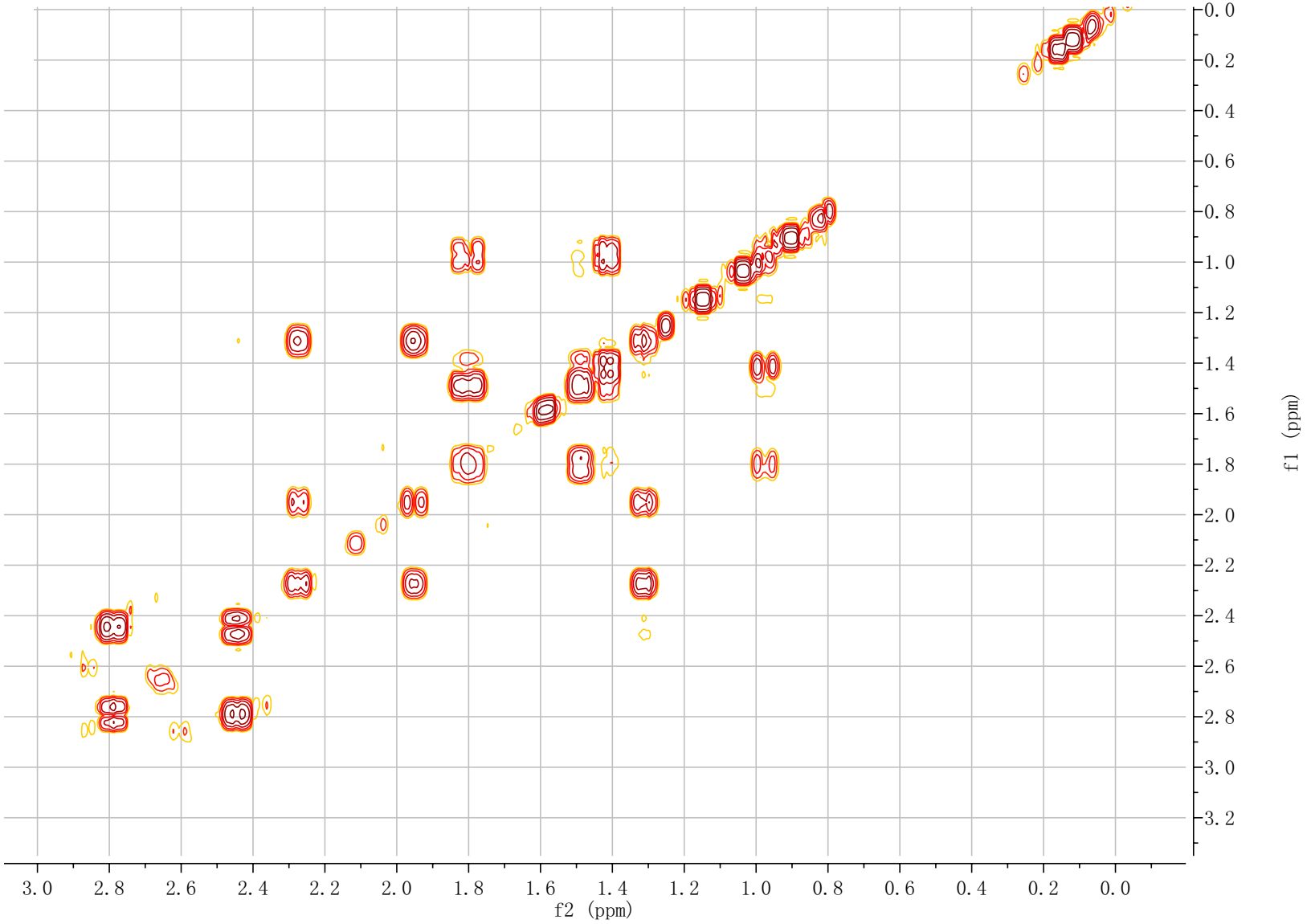


Parameter	Value (f2, f1)
1 Title	jkg-VI-34B-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4841.4)

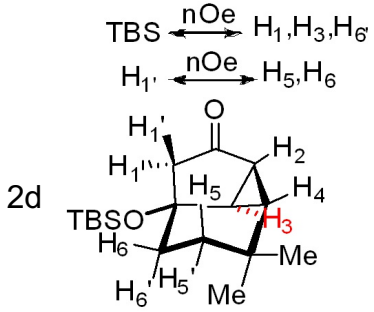


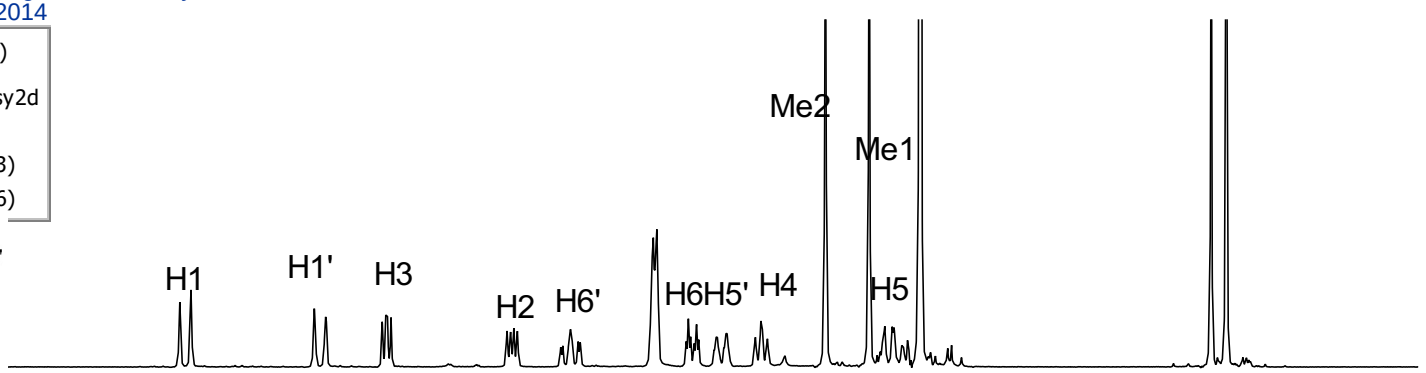


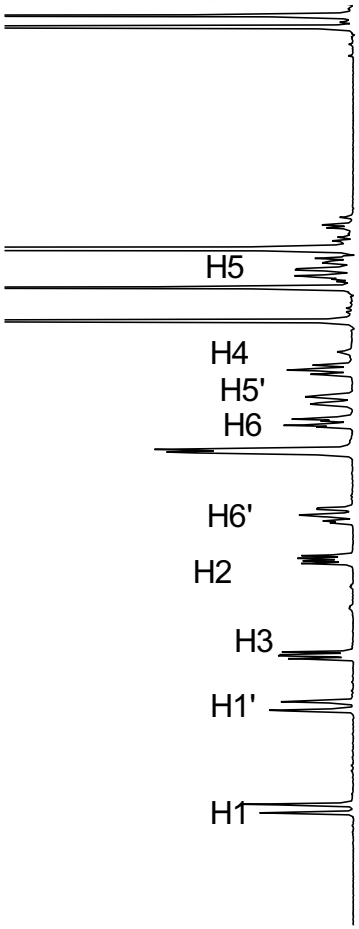


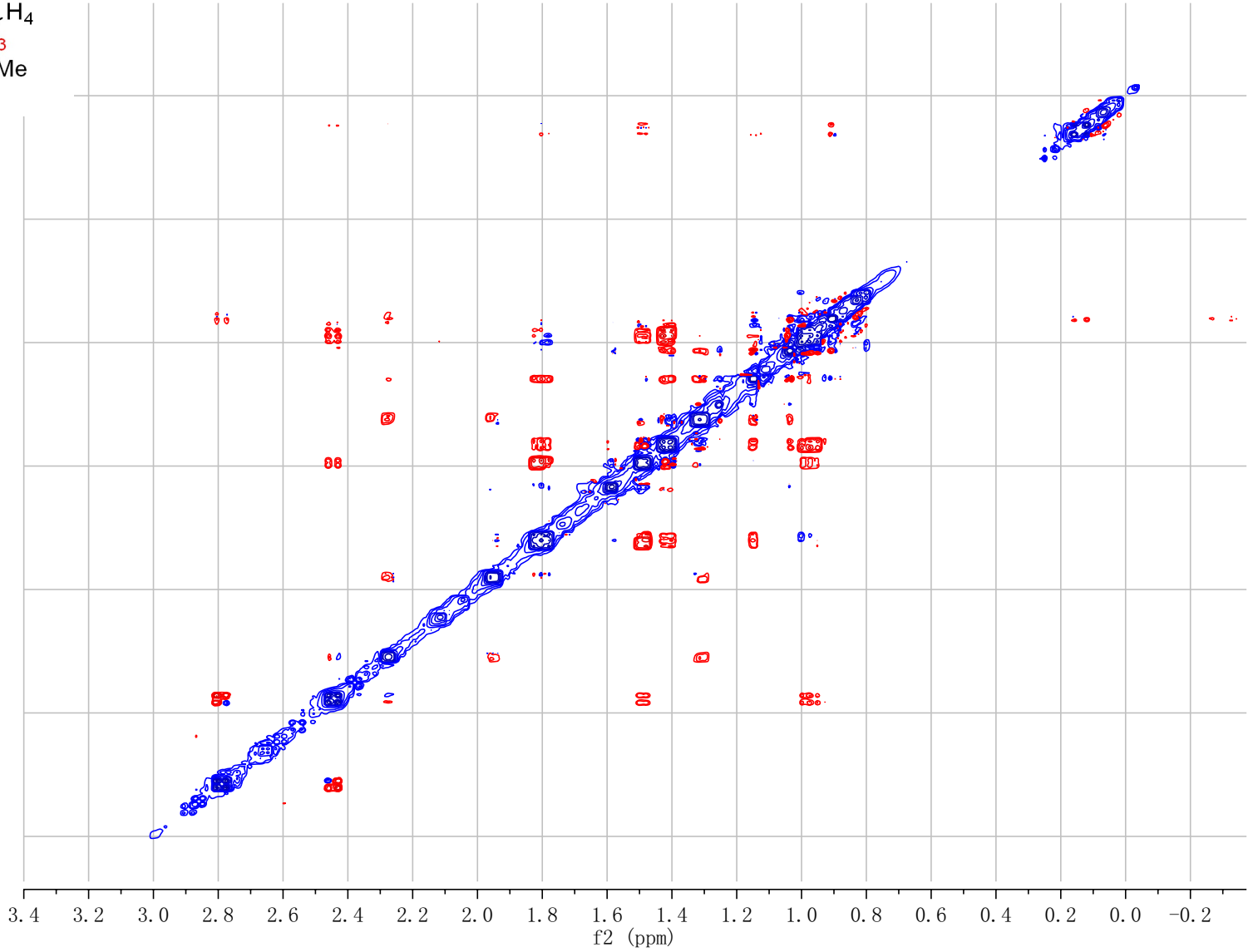


Parameter	Value (f2, f1)
1 Title	jkg-VI-34B-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4842.6)



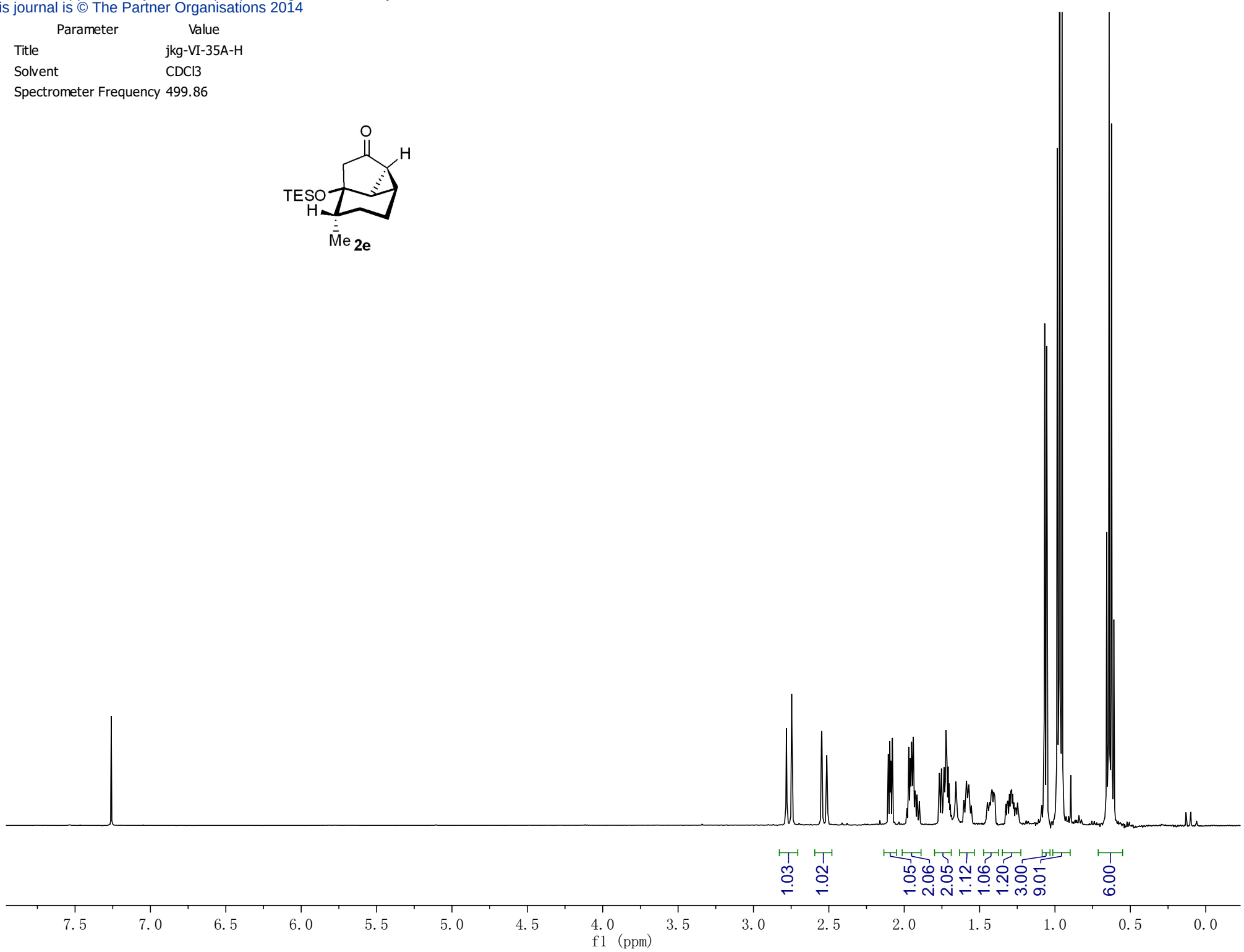






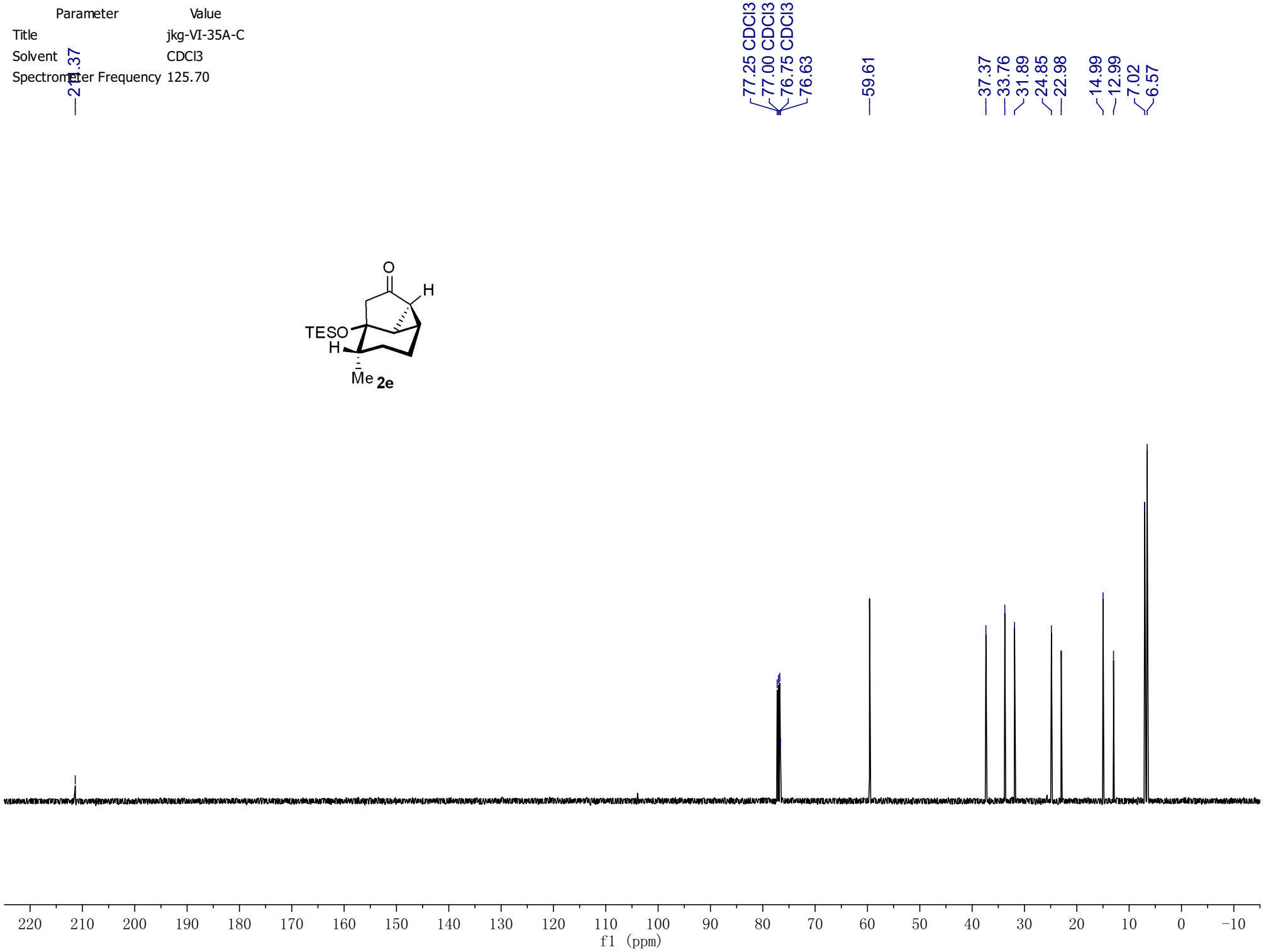
Parameter	Value
Title	jkg-VI-35A-H
Solvent	CDCl3
Spectrometer Frequency	499.86

2e

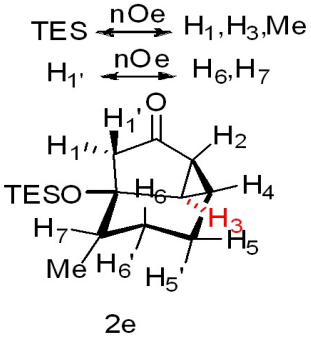


Parameter	Value
Title	jkg-VI-35A-C
Solvent	CDCl3
Spectrometer Frequency	125.70

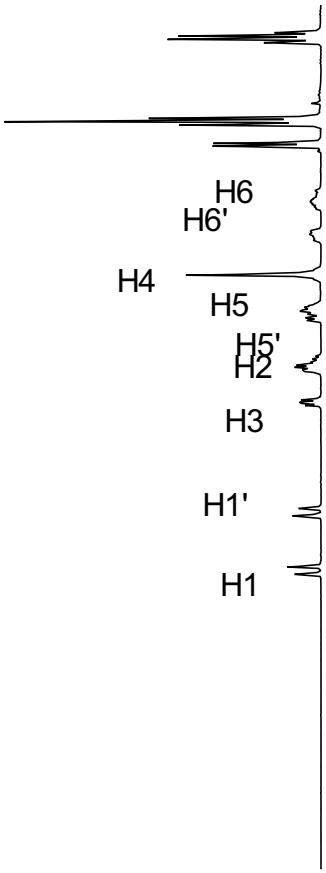
2e

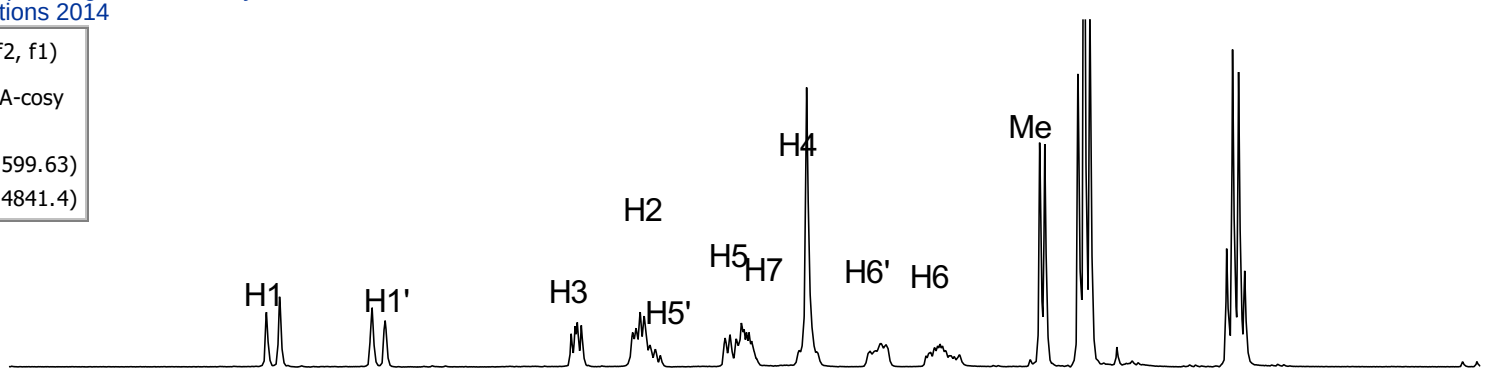


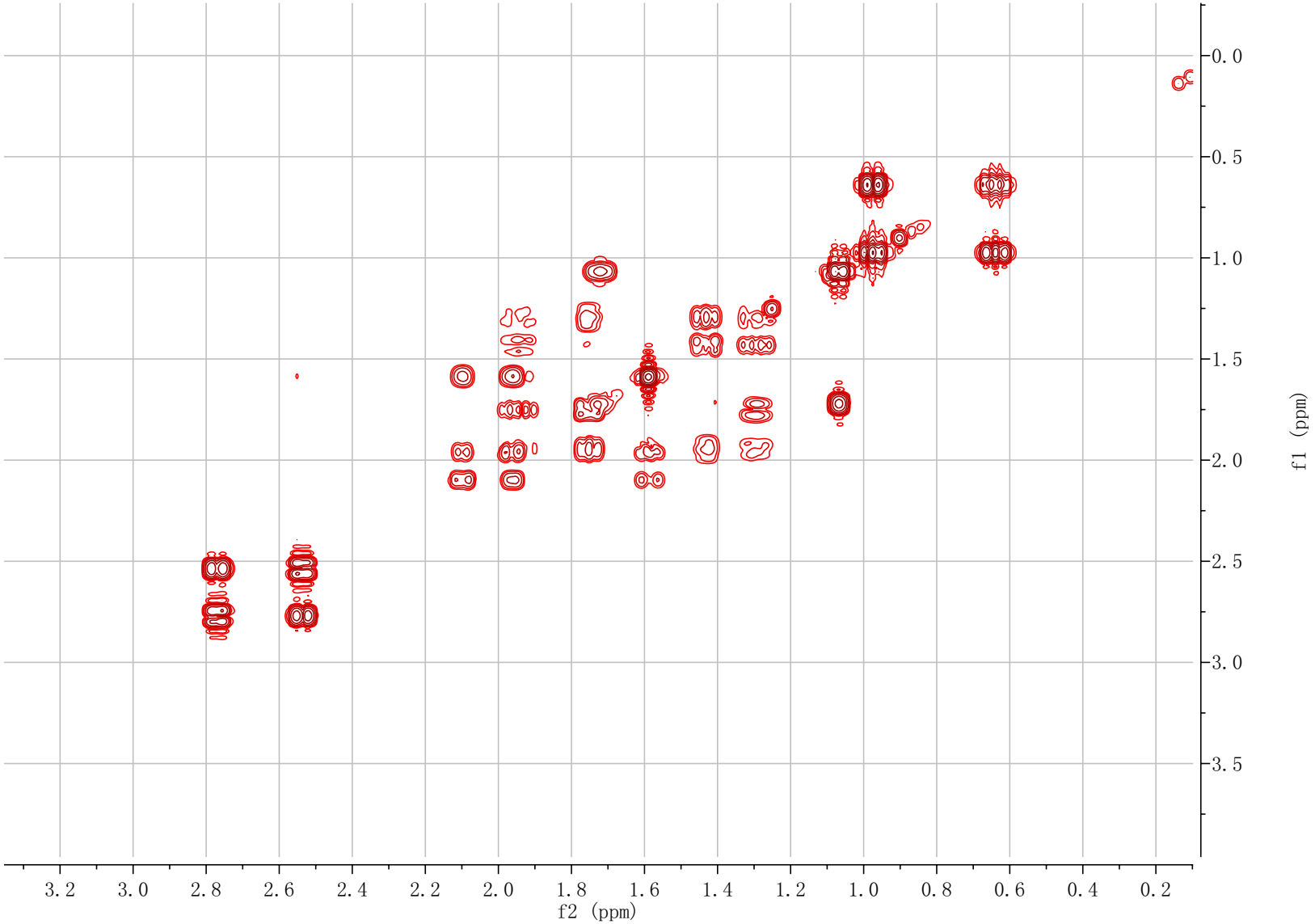
Parameter	Value (f2, f1)
1 Title	jkg-VI-35A-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4841.4)



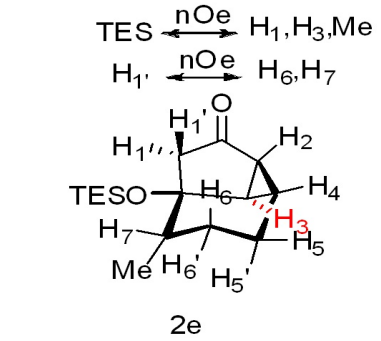
2e



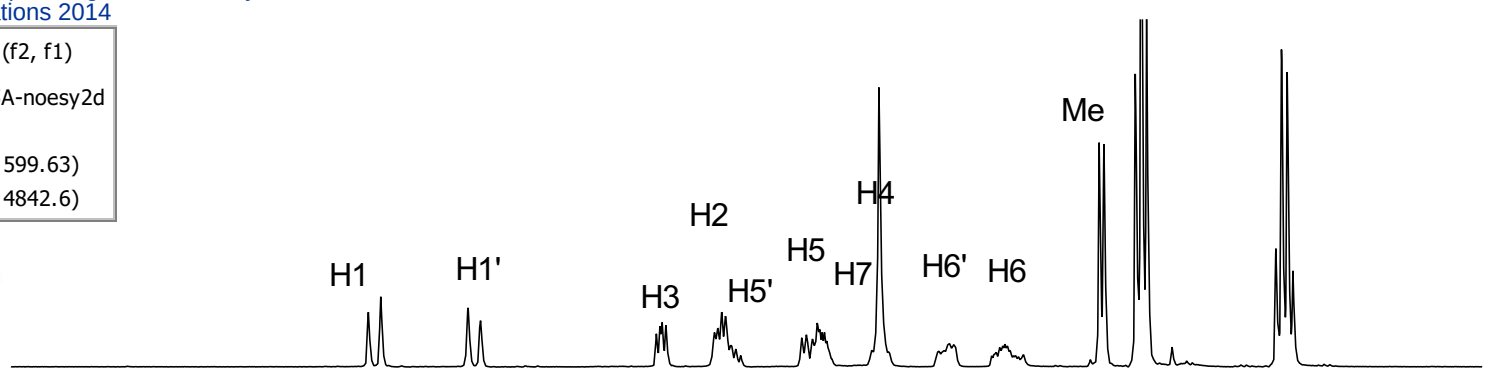


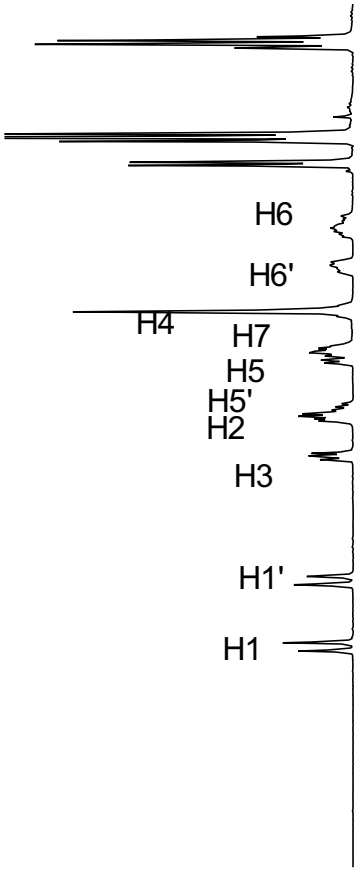


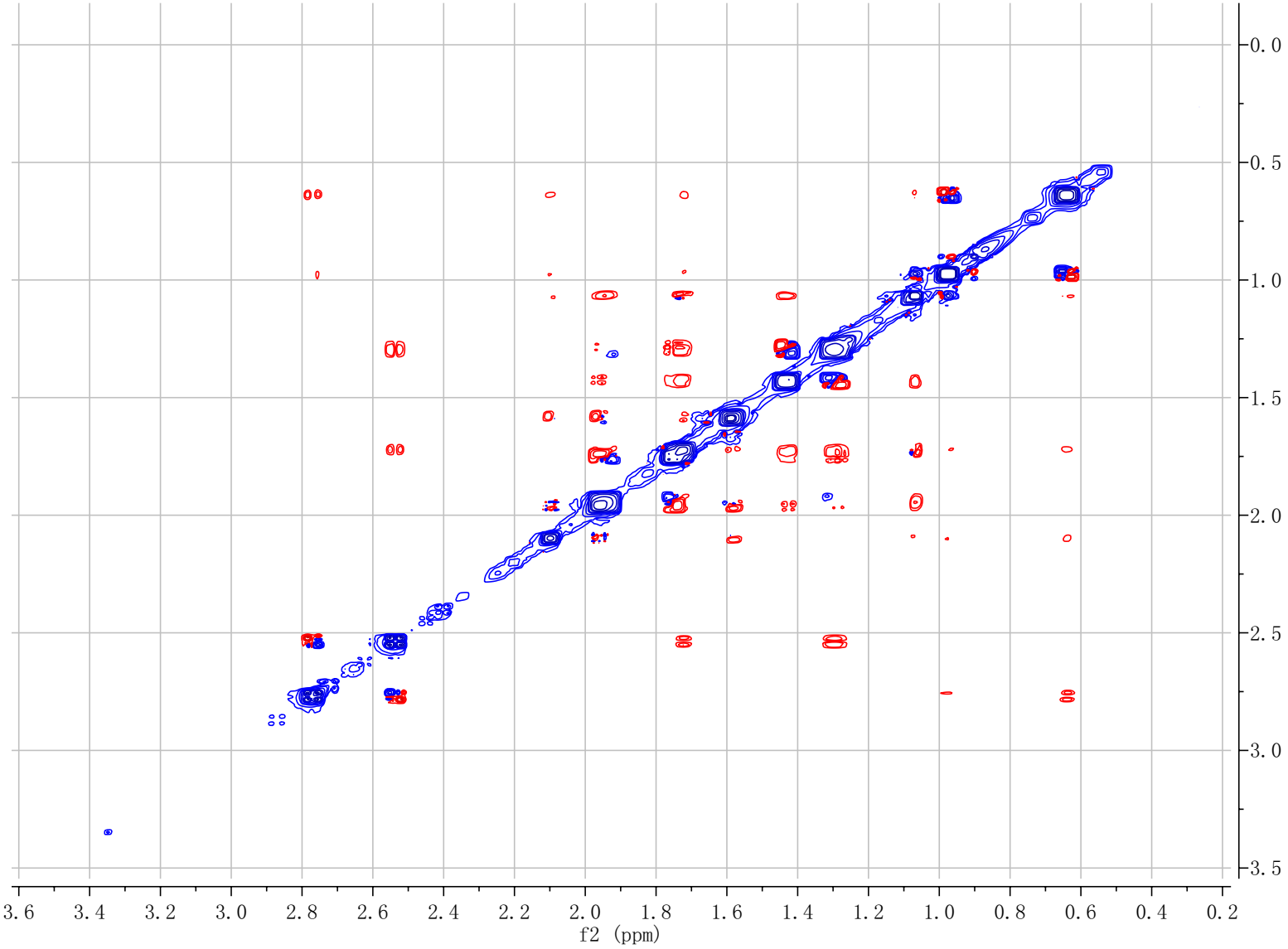
Parameter	Value (f2, f1)
1 Title	jkg-VI-35A-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4842.6)



2e

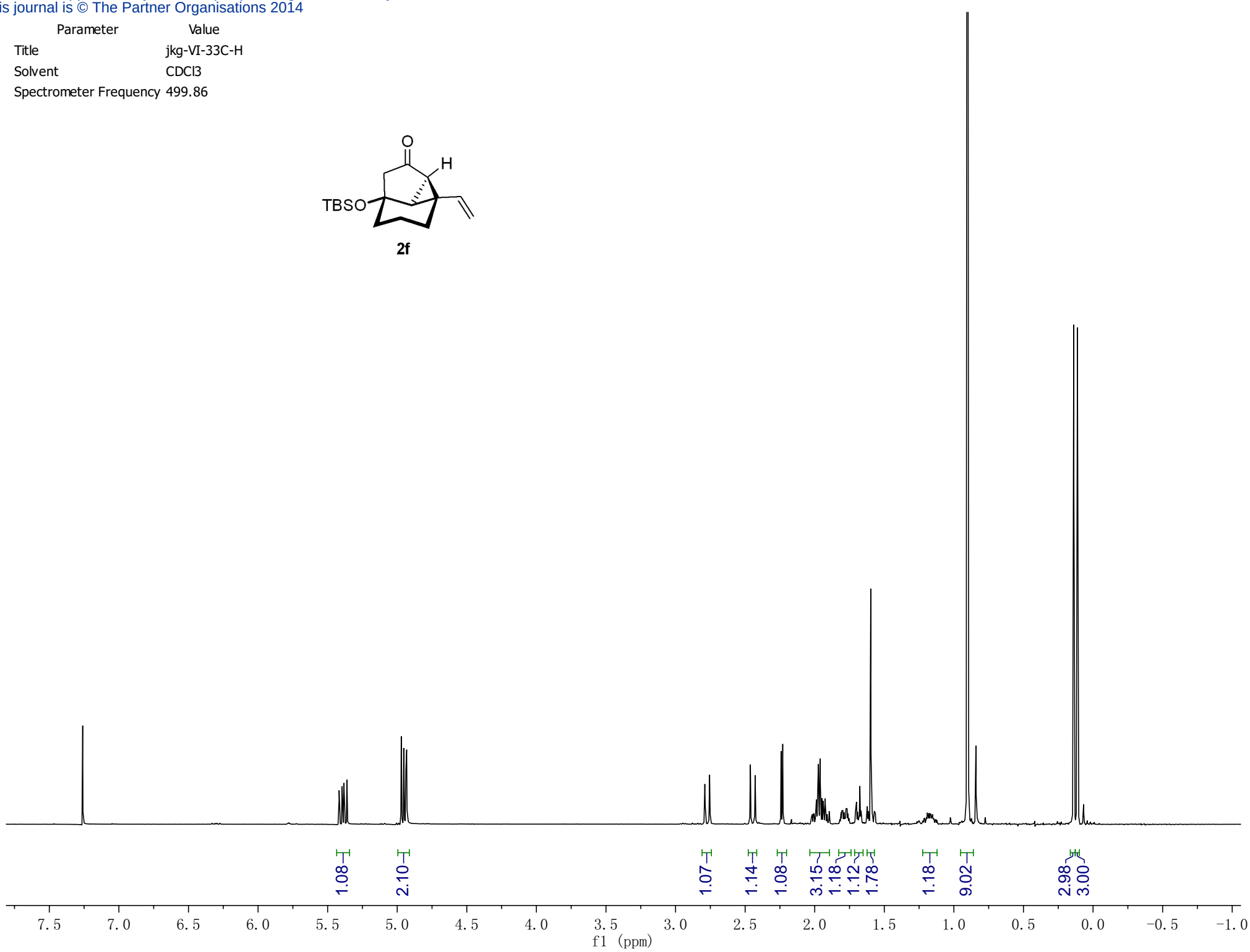




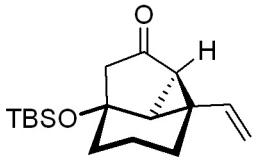


Parameter	Value
Title	jkg-VI-33C-H
Solvent	CDCl3
Spectrometer Frequency	499.86

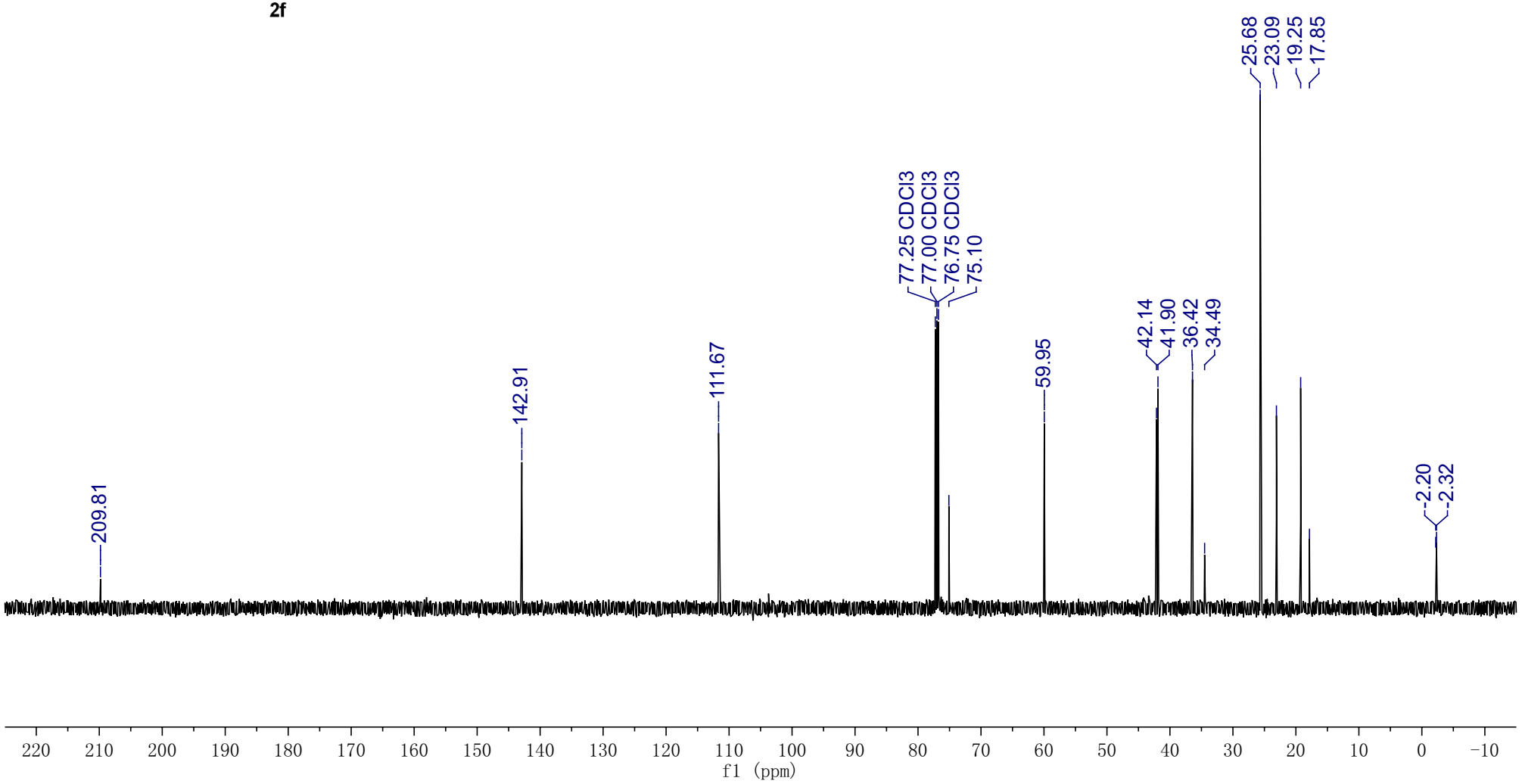
2f



Parameter	Value
Title	jkg-VI-33C-C
Solvent	CDCl3
Spectrometer Frequency	125.70

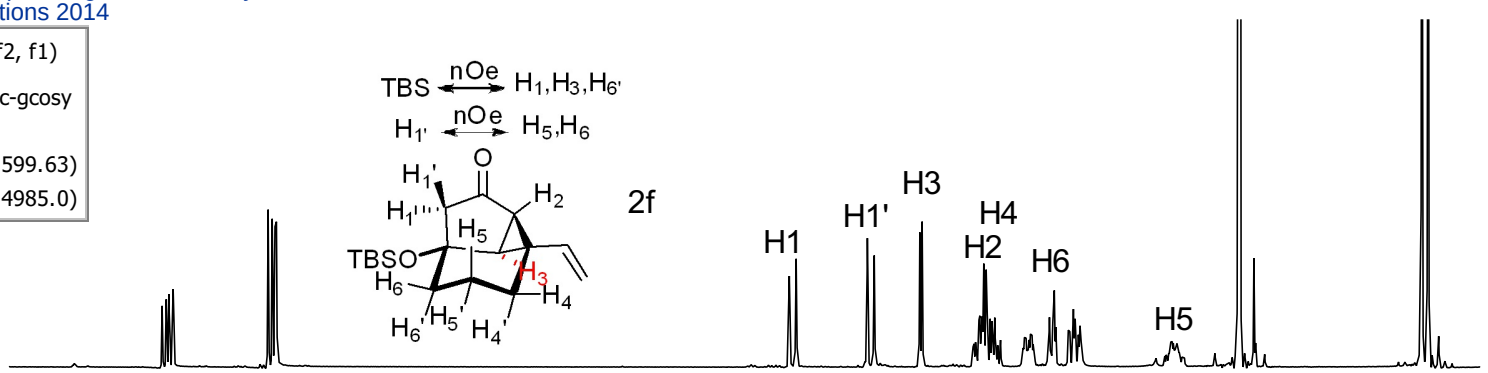


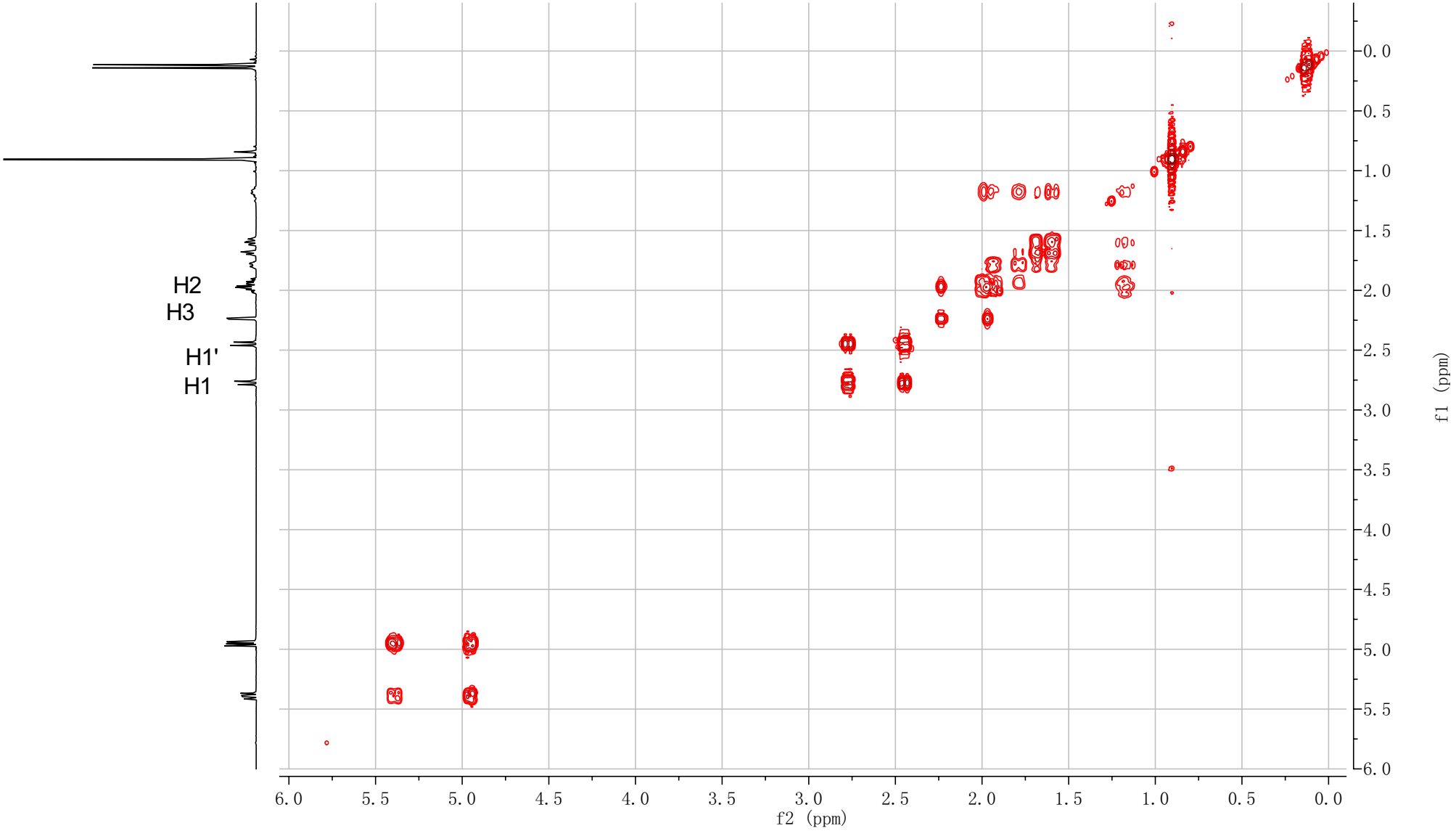
2f



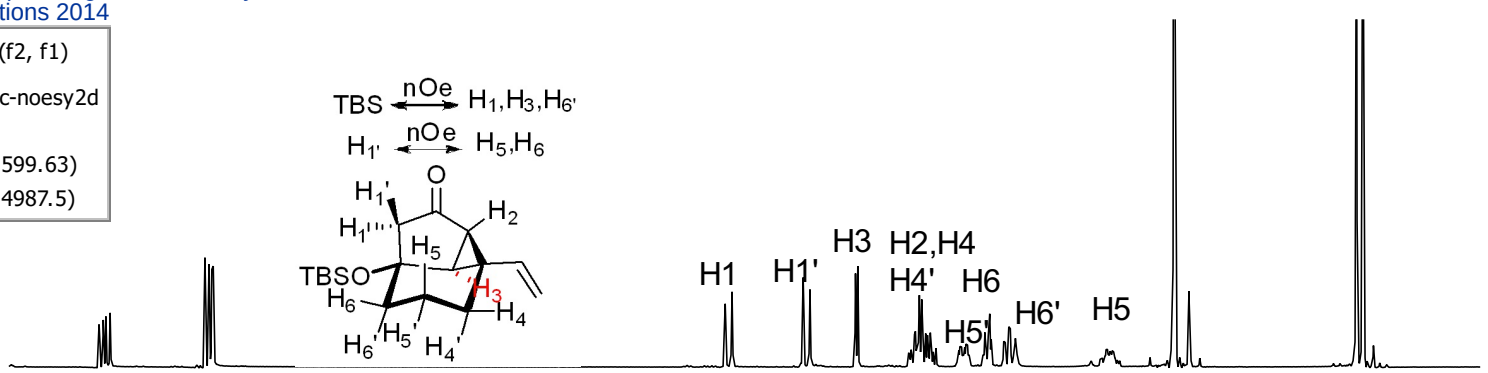
Parameter	Value (f2, f1)
1 Title	jkg-VI-33c-gcosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4985.0, 4985.0)

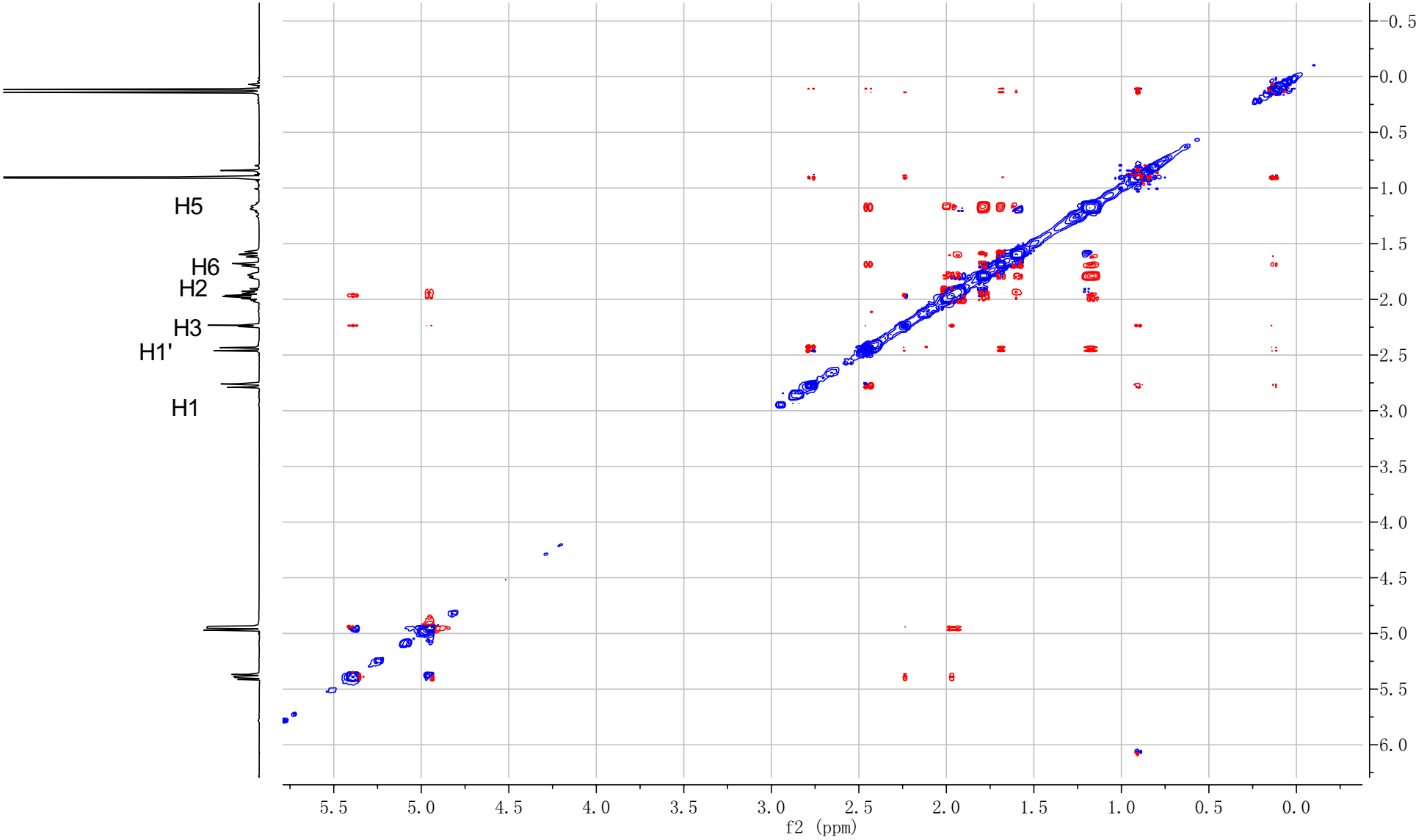
2f





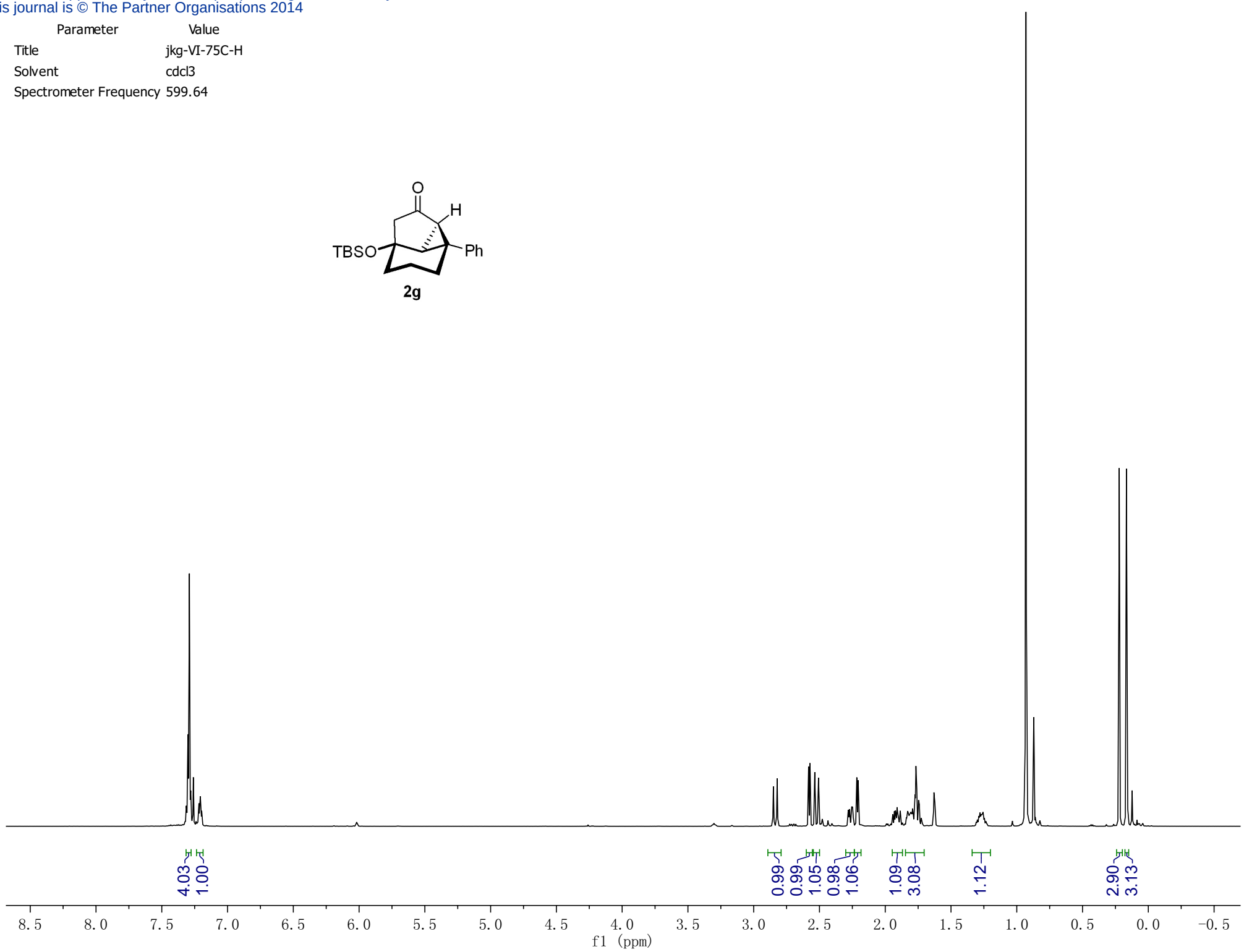
Parameter	Value (f2, f1)
1 Title	jkg-VI-33c-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4985.0, 4987.5)



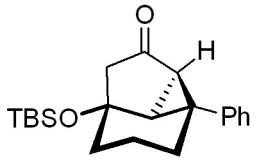


Parameter	Value
Title	jkg-VI-75C-H
Solvent	cdcl3
Spectrometer Frequency	599.64

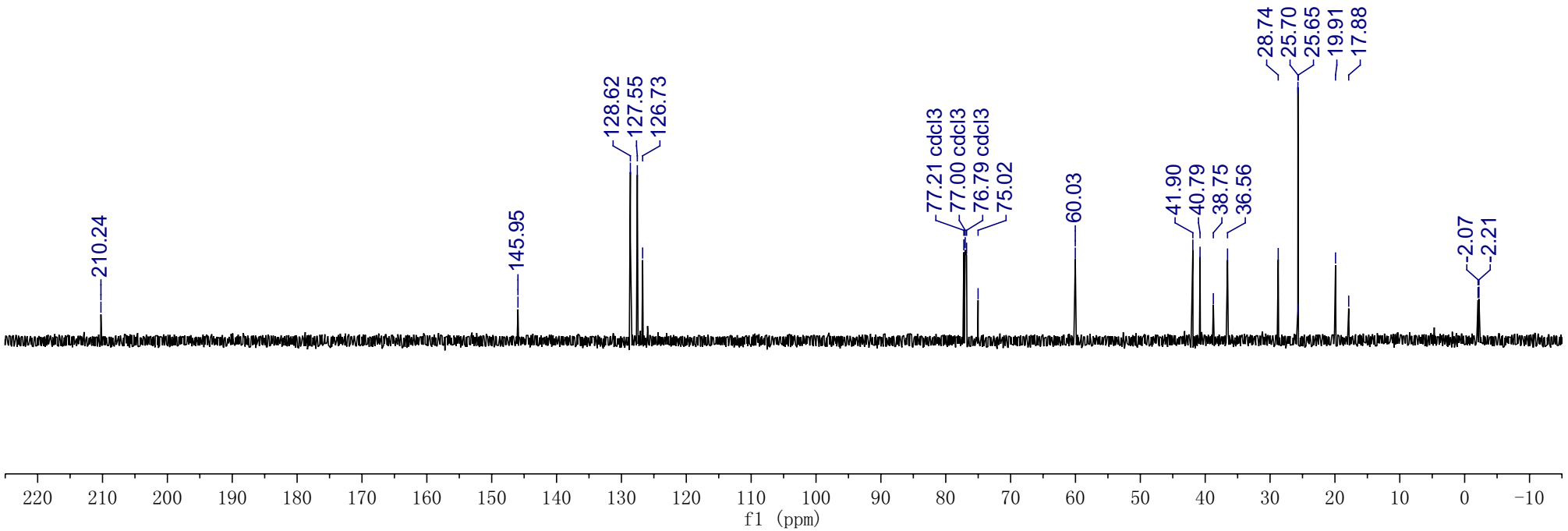
2g



Parameter	Value
Title	jkg-VI-75C-C
Solvent	cdcl3
Spectrometer Frequency	150.79

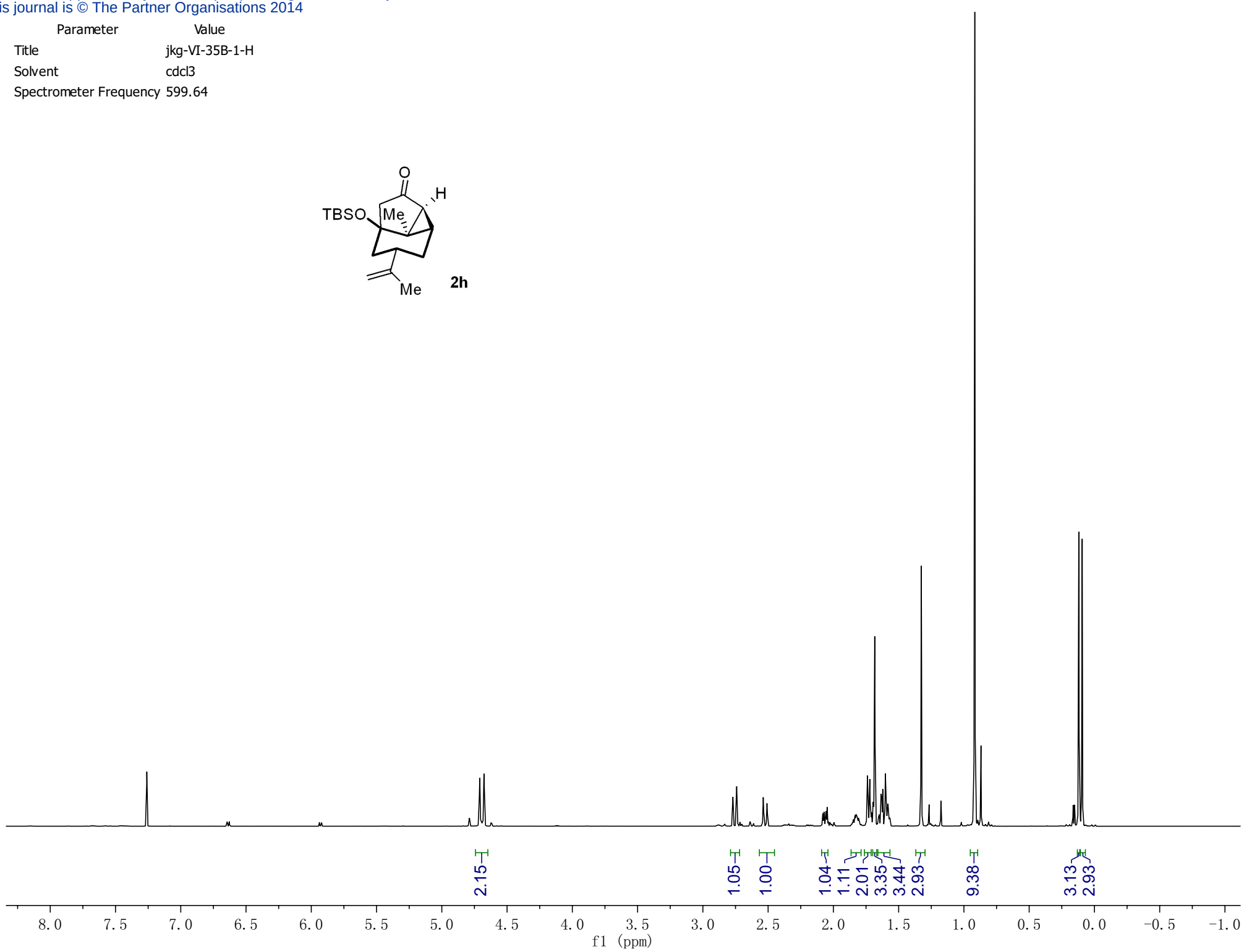


2g



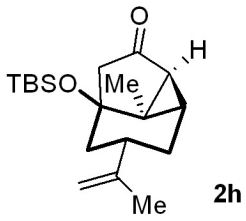
Parameter	Value
Title	jkg-VI-35B-1-H
Solvent	cdcl3
Spectrometer Frequency	599.64

2h

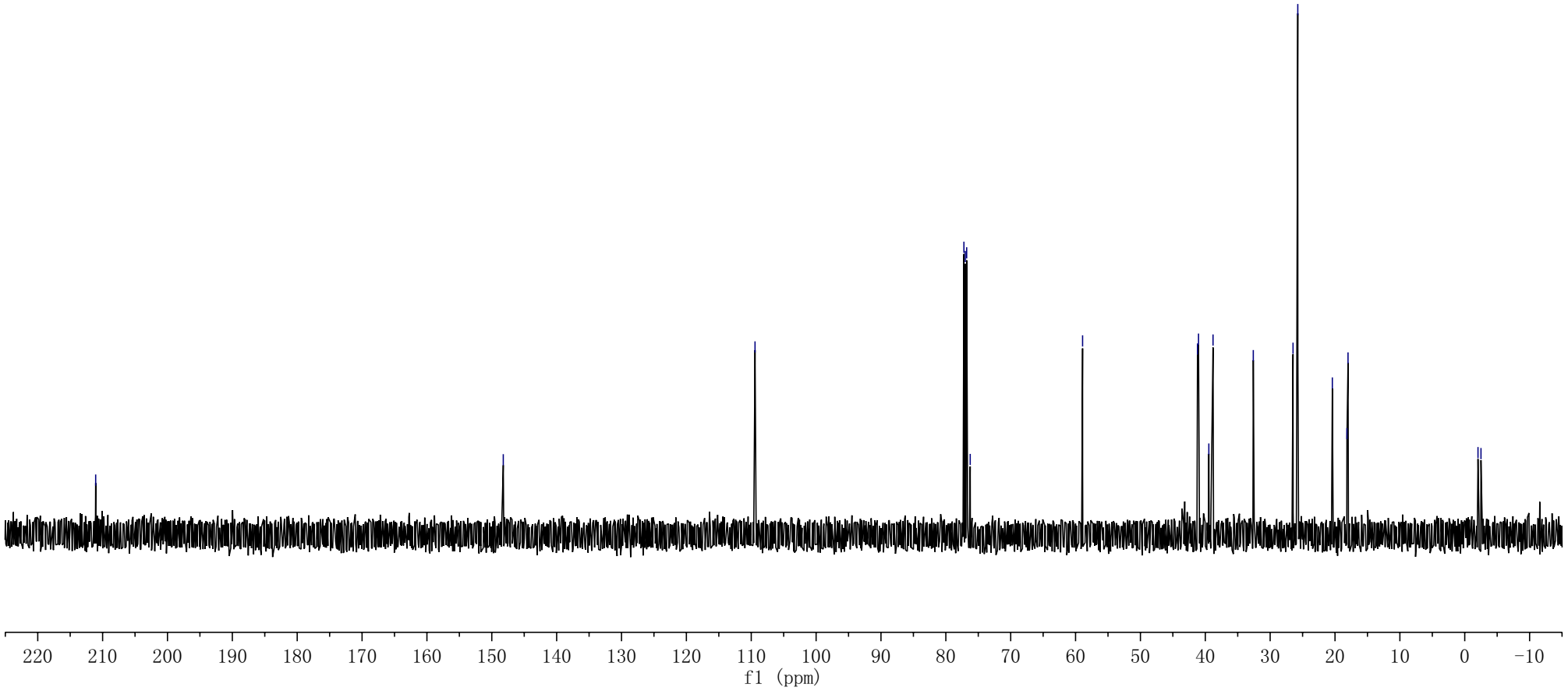


Parameter	Value
Title	jkg-VI-35B-1-C
Solvent	cdcl3
Spectrometer Frequency	150.79

211.07
148.23
109.42
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
76.24
58.92
41.20
41.04
39.45
38.81
32.60
26.47
25.74
20.41
18.16
17.99
-2.04
-2.50

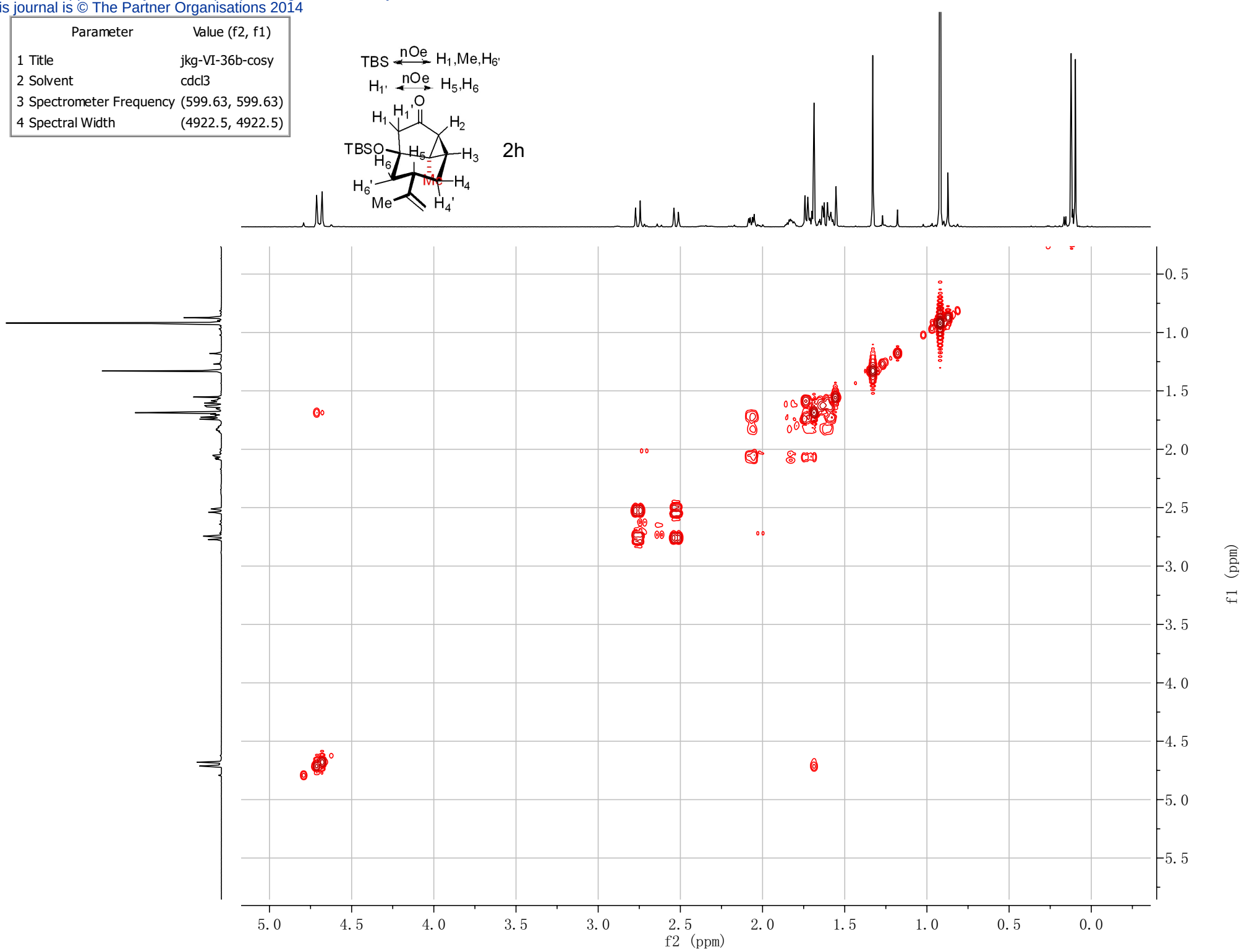


2h

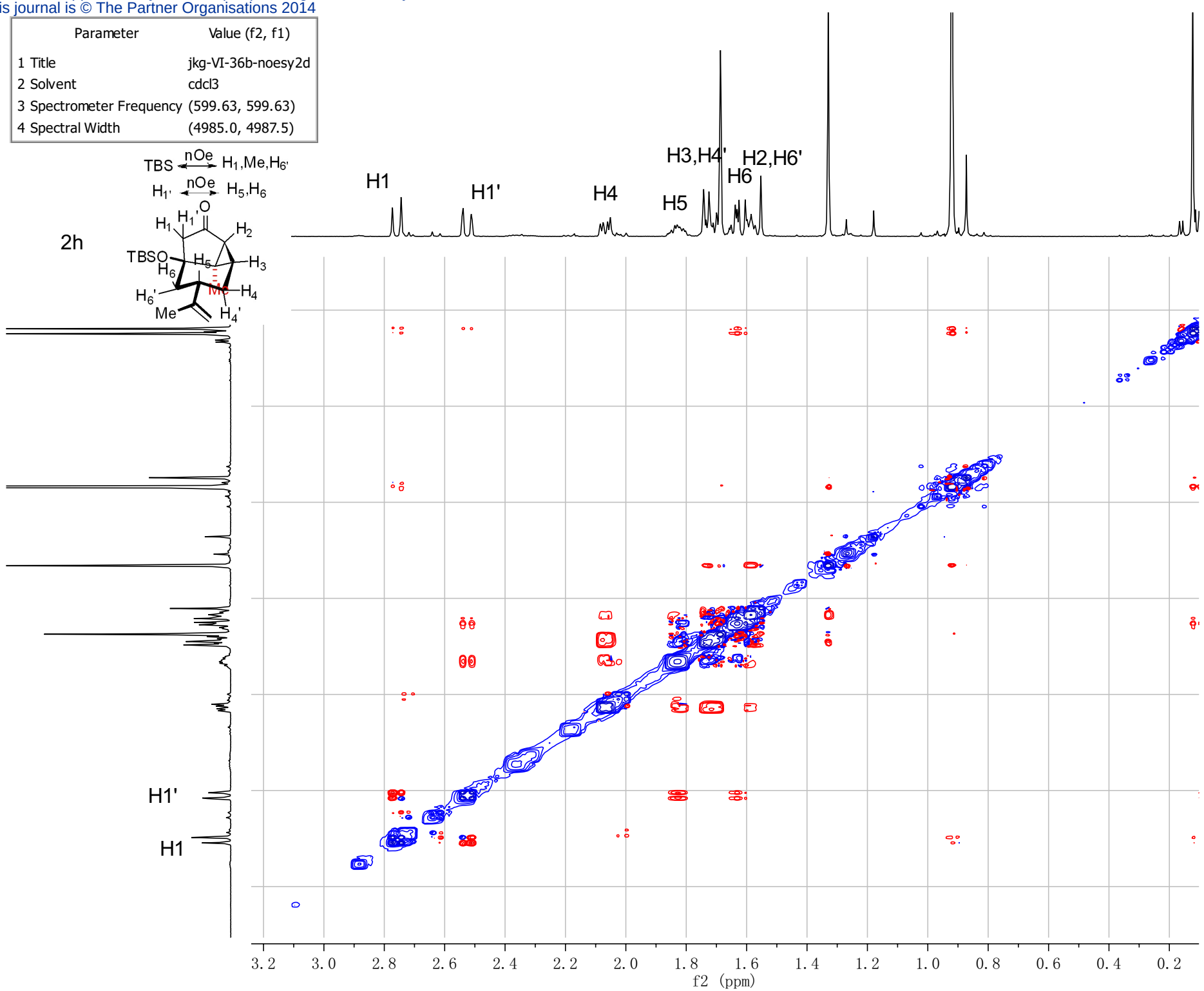


Parameter	Value (f2, f1)
1 Title	jkg-VI-36b-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4922.5, 4922.5)

2h

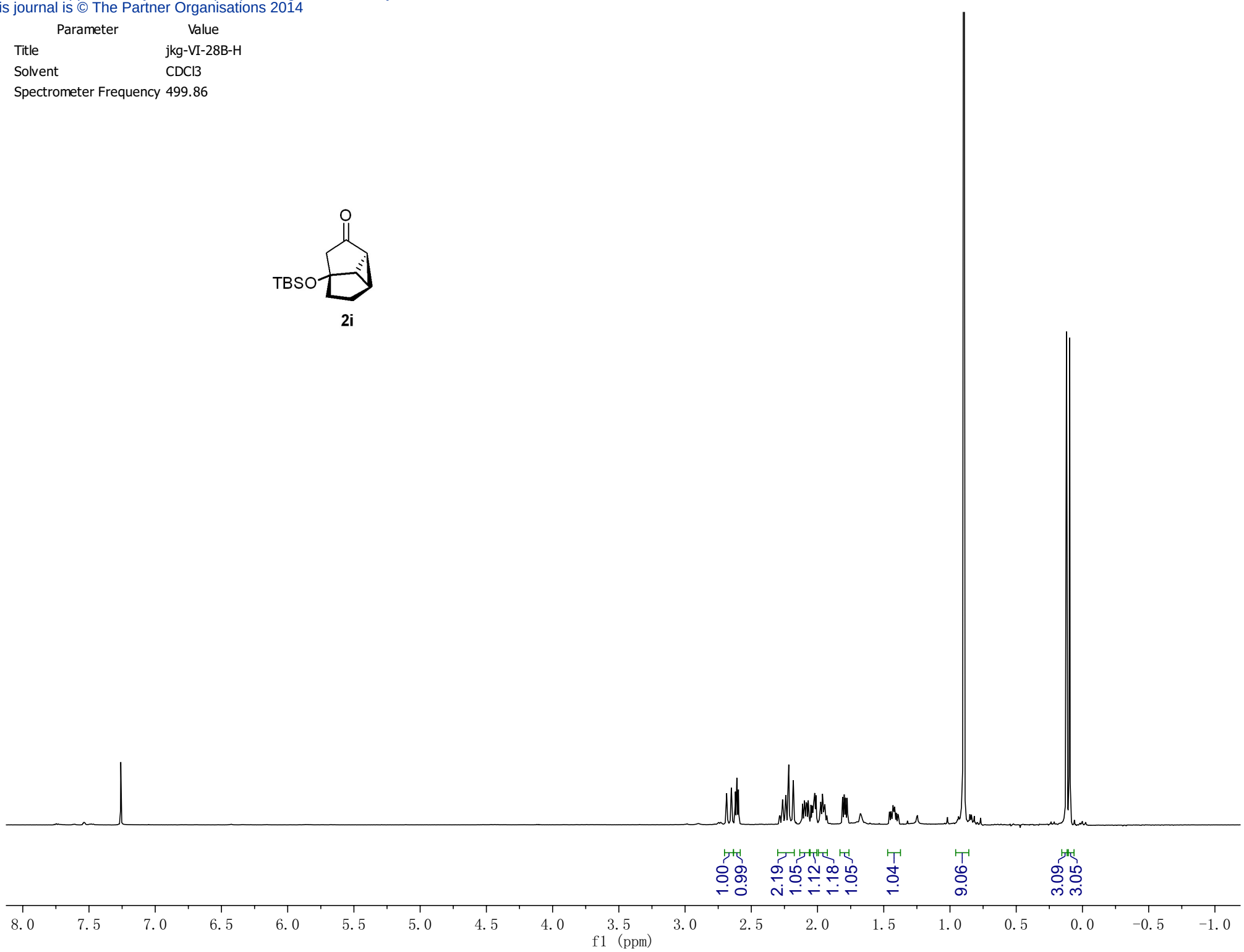


Parameter	Value (f2, f1)
1 Title	jkg-VI-36b-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4985.0, 4987.5)

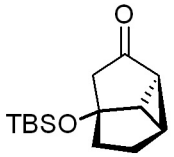


Parameter	Value
Title	jkg-VI-28B-H
Solvent	CDCl3
Spectrometer Frequency	499.86

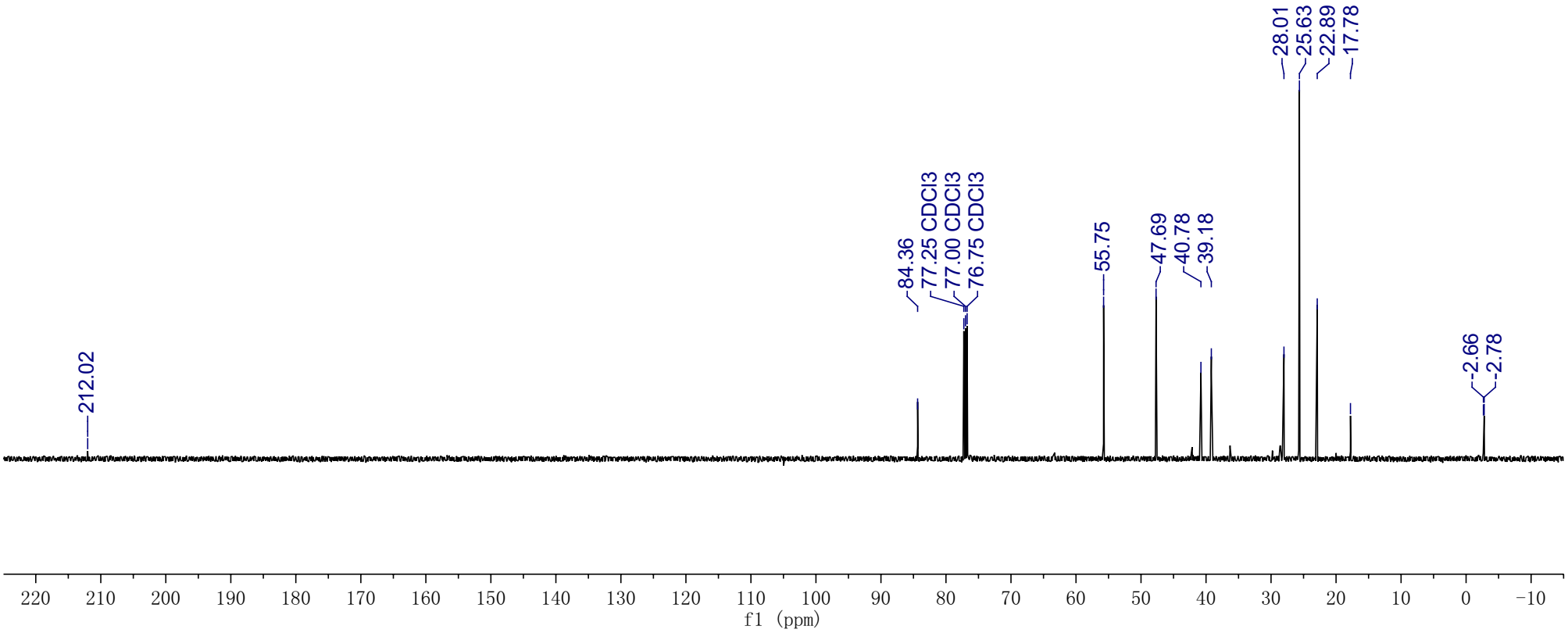
2i



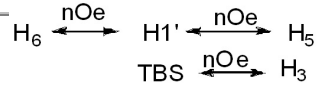
Parameter	Value
Title	jkg-VI-28B-C
Solvent	CDCl3
Spectrometer Frequency	125.70

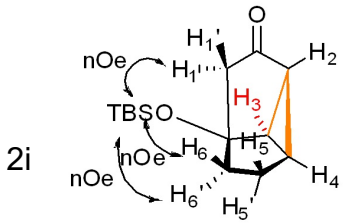


2i

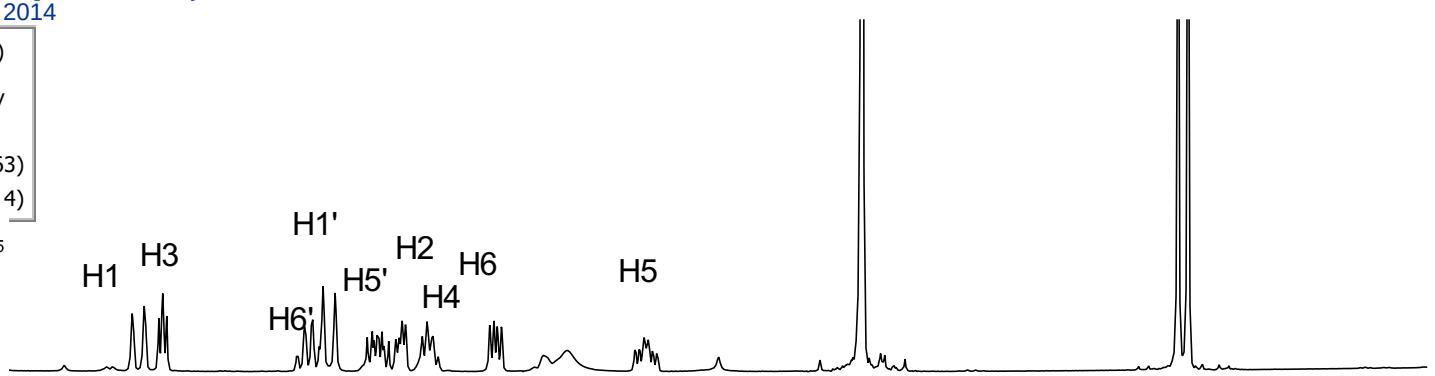


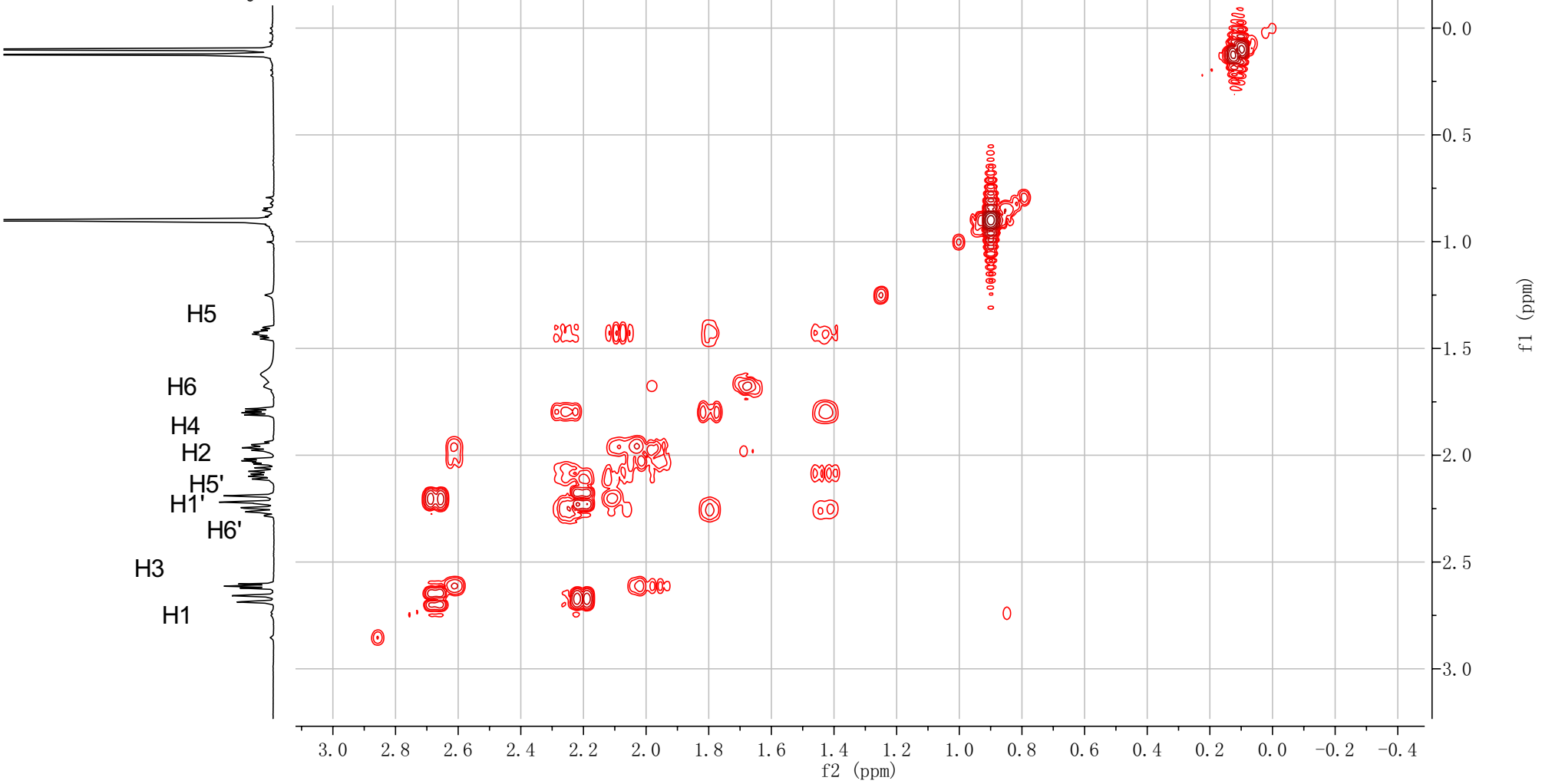
Parameter	Value (f2, f1)
1 Title	jkg-Vi-28B-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4841.4)



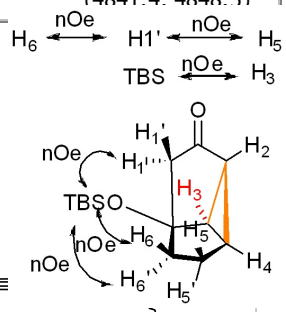


2i





Parameter	Value (f2, f1)
1 Title	jkg-Vi-28B-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4848.5)



2i

H1 H3 H6' H1' H5' H2 H4 H6 H5

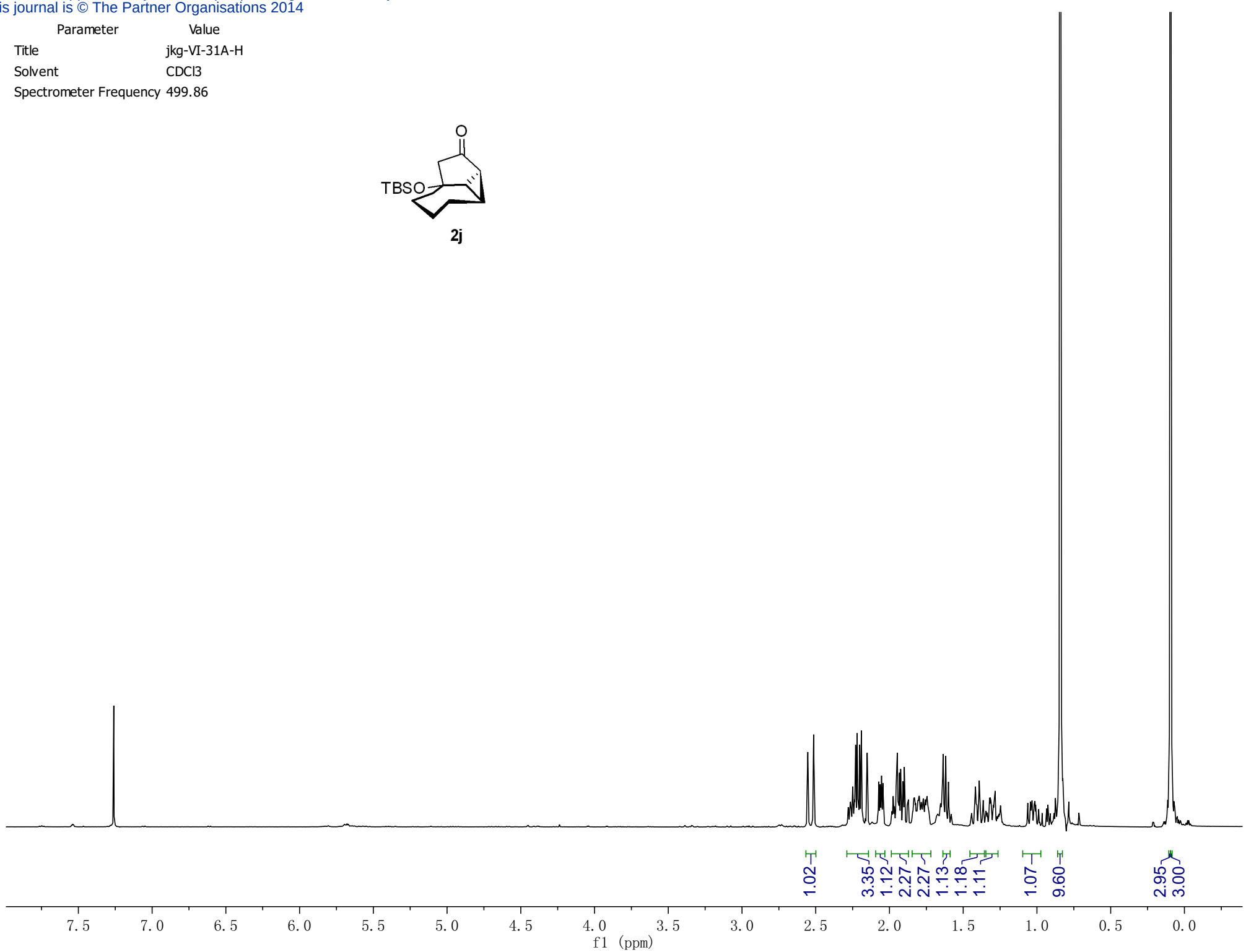
H5 H6 H4 H2 H5' H1' H6' H3 H1

3.2 3.0 2.8 2.6 2.4 2.2 2.0 1.8 1.6 1.4 1.2 1.0 0.8 0.6 0.4 0.2 0.0 -0.2
f2 (ppm)

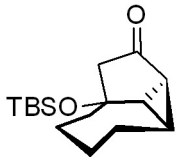
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5
f1 (ppm)

Parameter	Value
Title	jkg-VI-31A-H
Solvent	CDCl3
Spectrometer Frequency	499.86

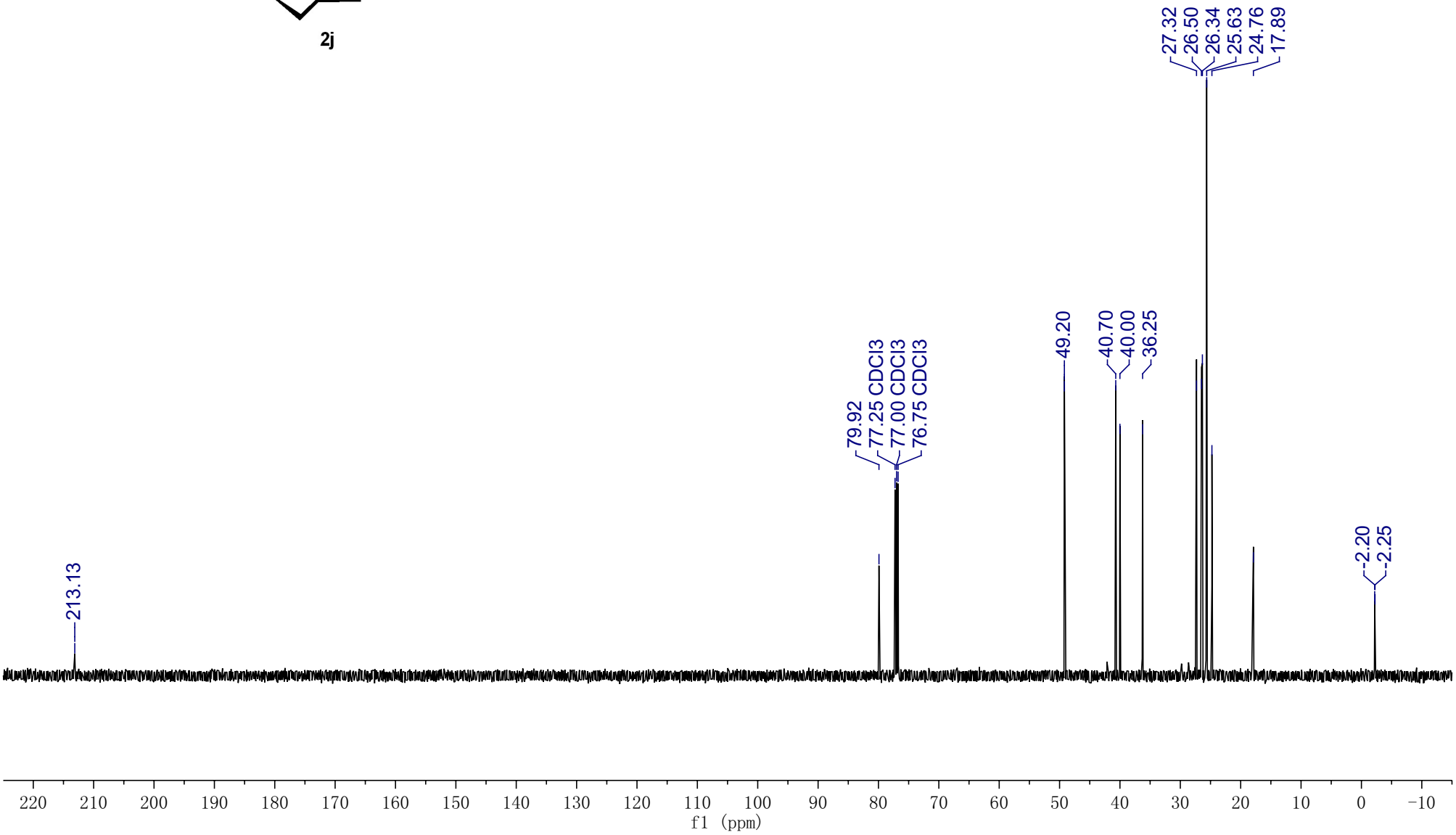
2j



Parameter	Value
Title	jkg-VI-31A-C
Solvent	CDCl3
Spectrometer Frequency	125.70

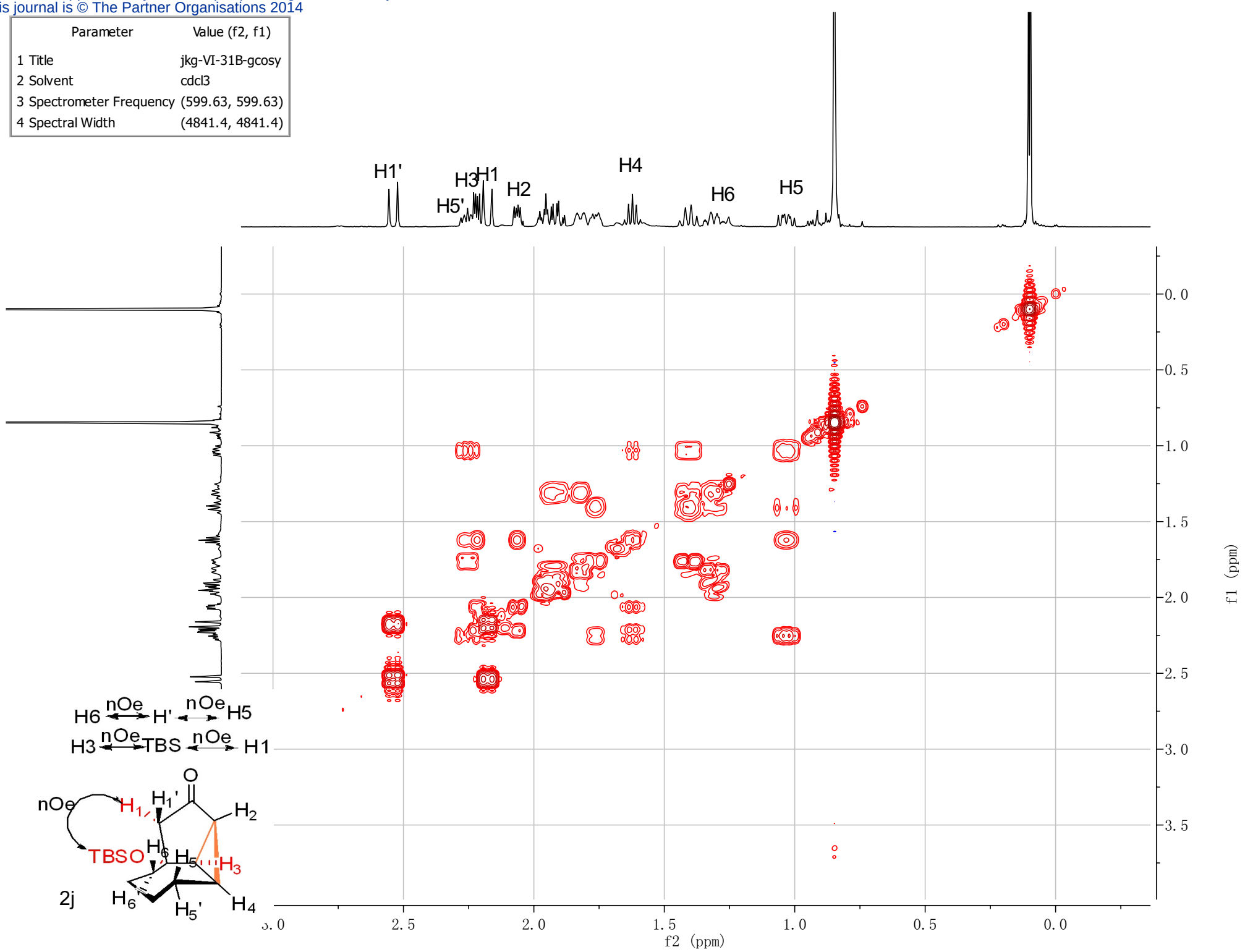


2j

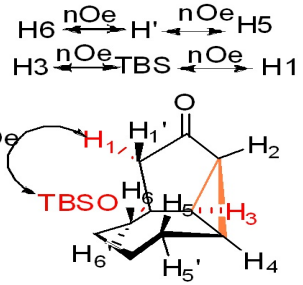


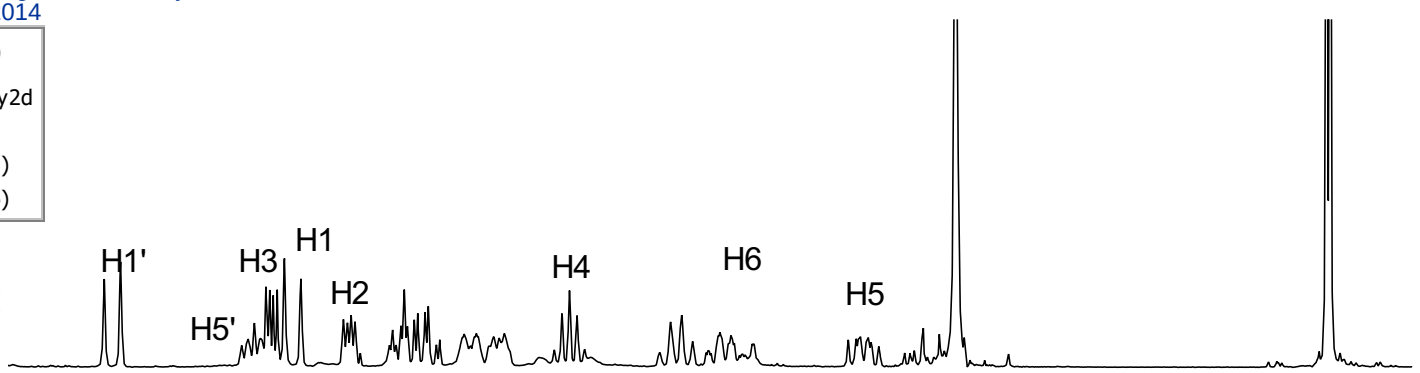
Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers

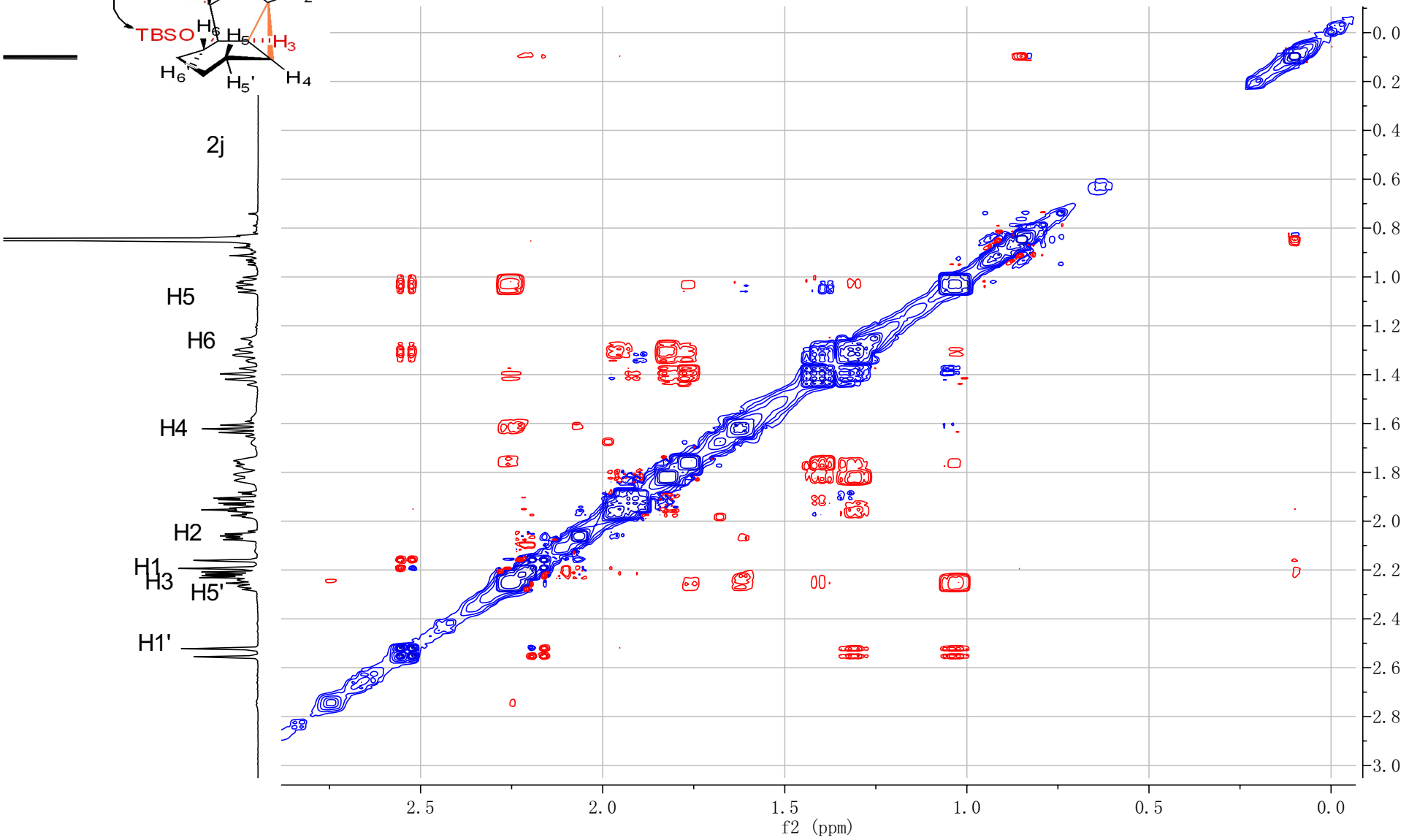
Parameter	Value (f2, f1)
1 Title	jkg-VI-31B-gcosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4841.4)



Parameter	Value (f2, f1)
1 Title	jkg-VI-31B-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4842.6)

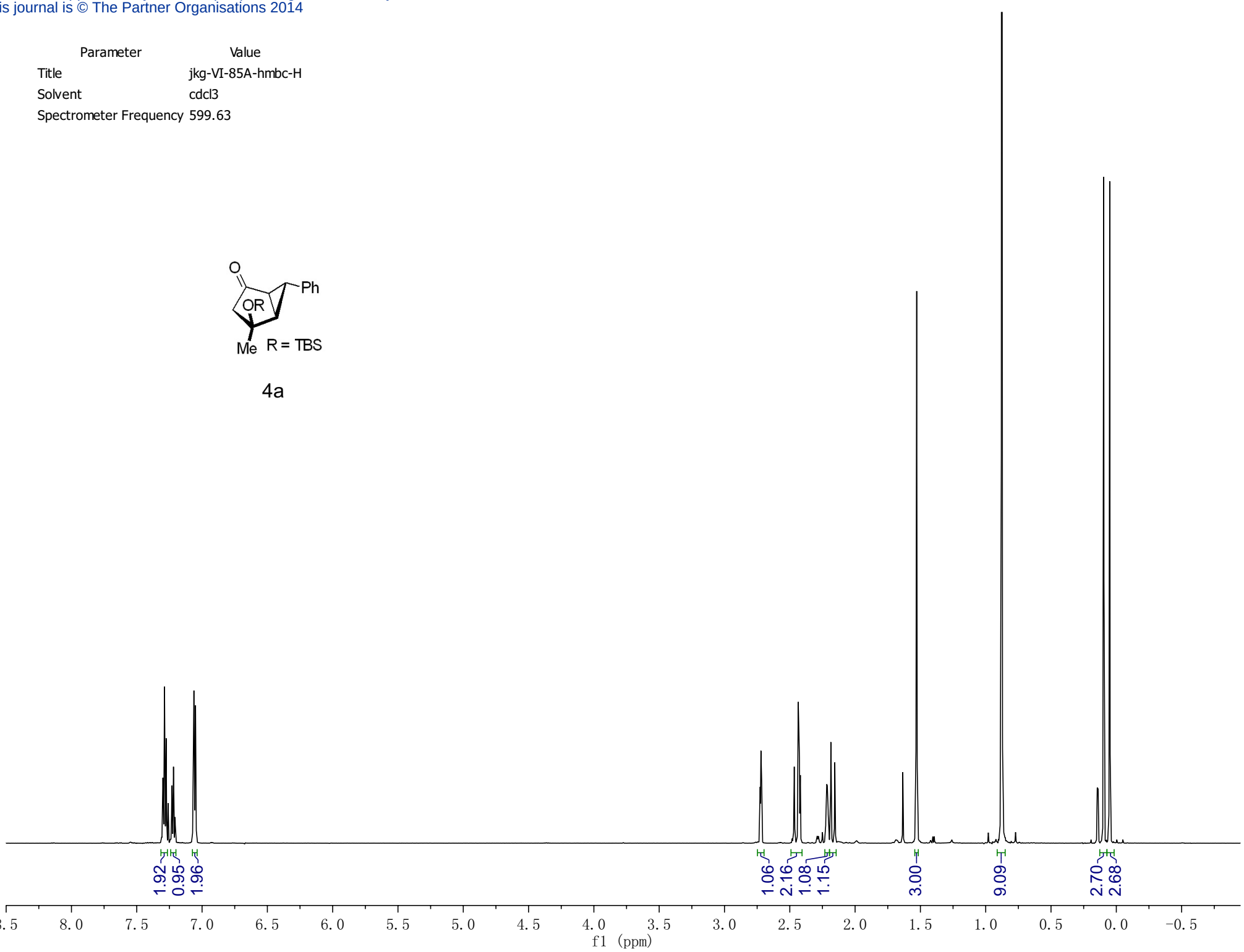






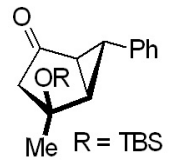
Parameter	Value
Title	jkg-VI-85A-hmbc-H
Solvent	cdcl3
Spectrometer Frequency	599.63

4a

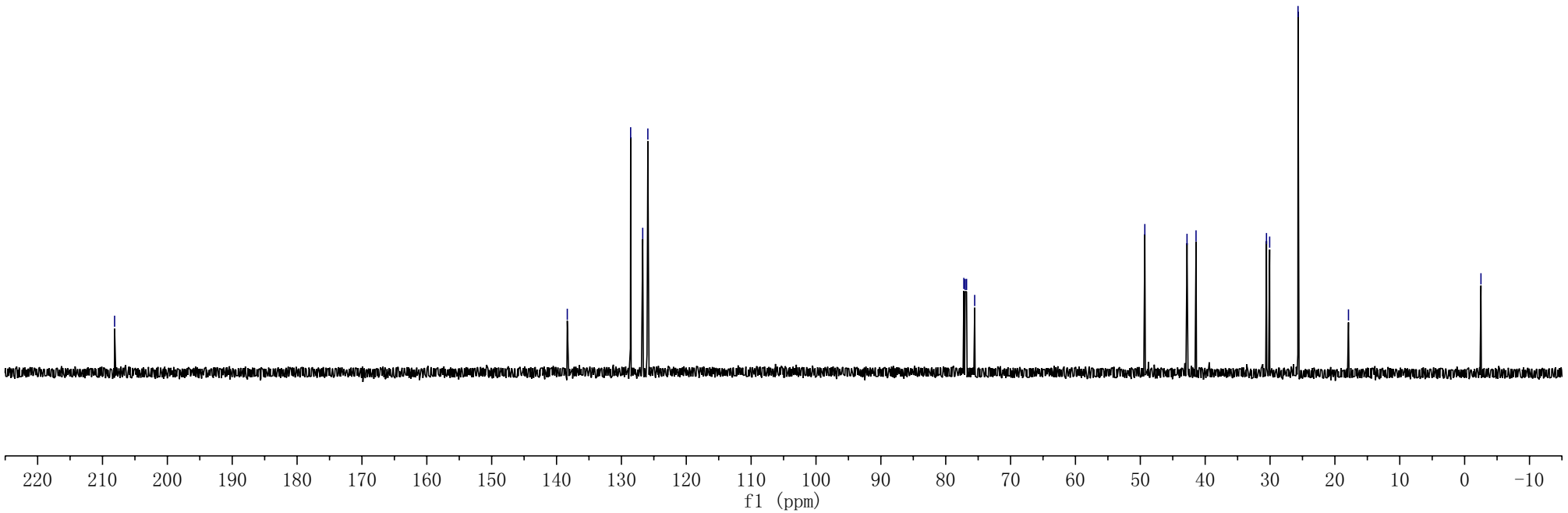


Parameter	Value
Title	jkg-VI-85A-C1
Solvent	cdcl3
Spectrometer Frequency	150.79

208.14
138.34
128.58
126.71
125.92
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
75.54
49.30
42.80
41.41
30.55
30.06
25.68
17.91
-2.52

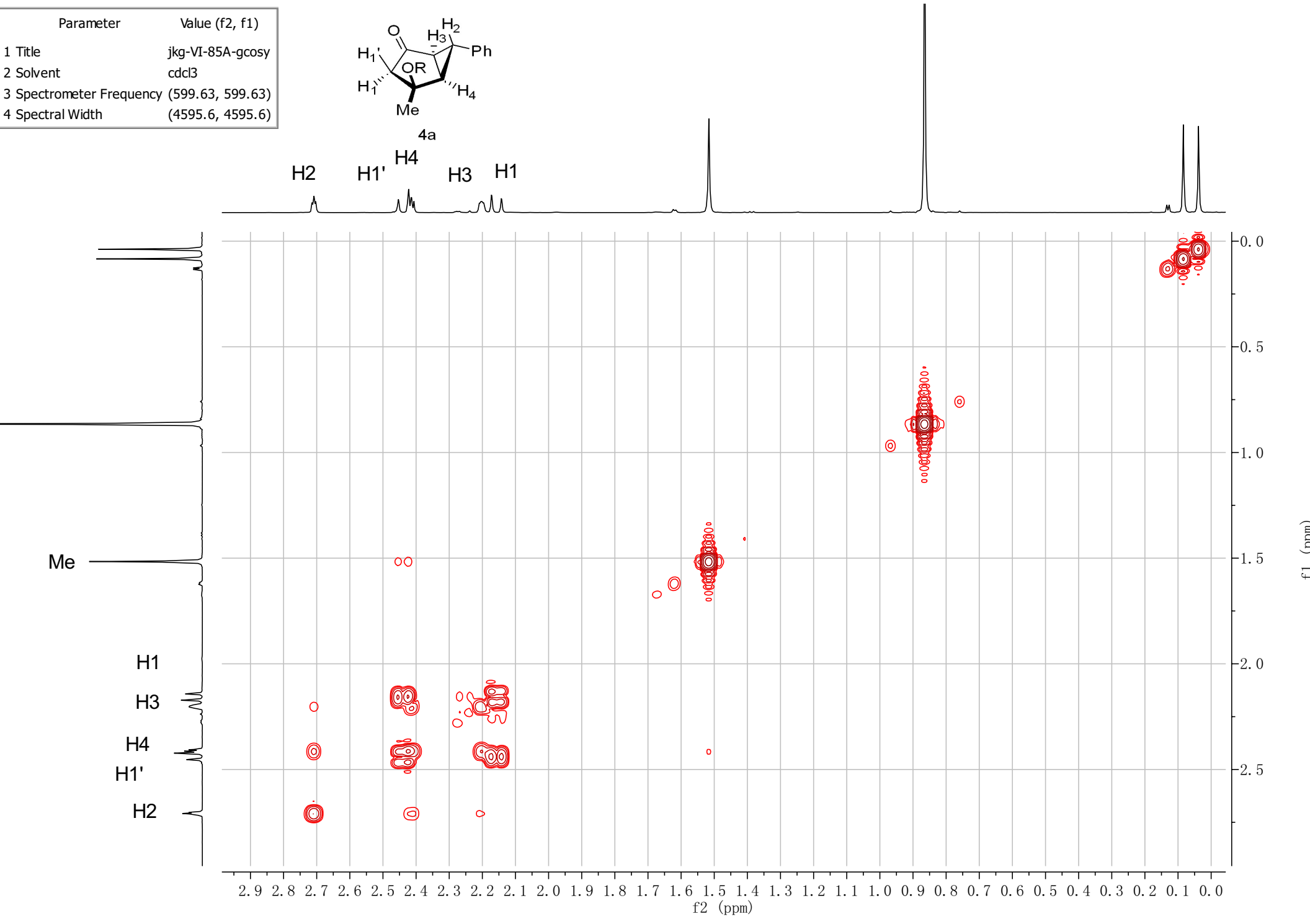


4a



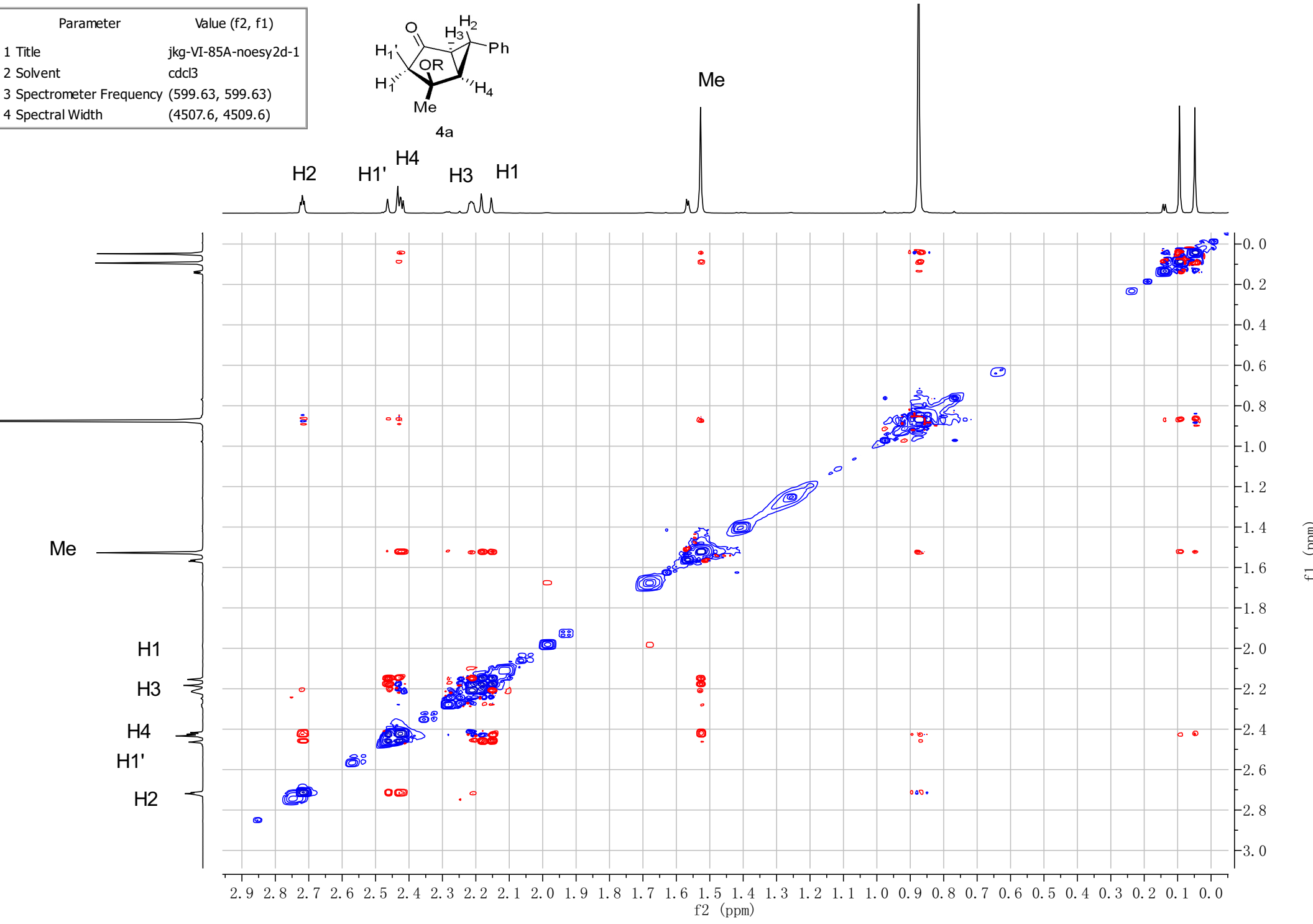
Parameter	Value (f2, f1)
1 Title	jkg-VI-85A-gcosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4595.6, 4595.6)

4a



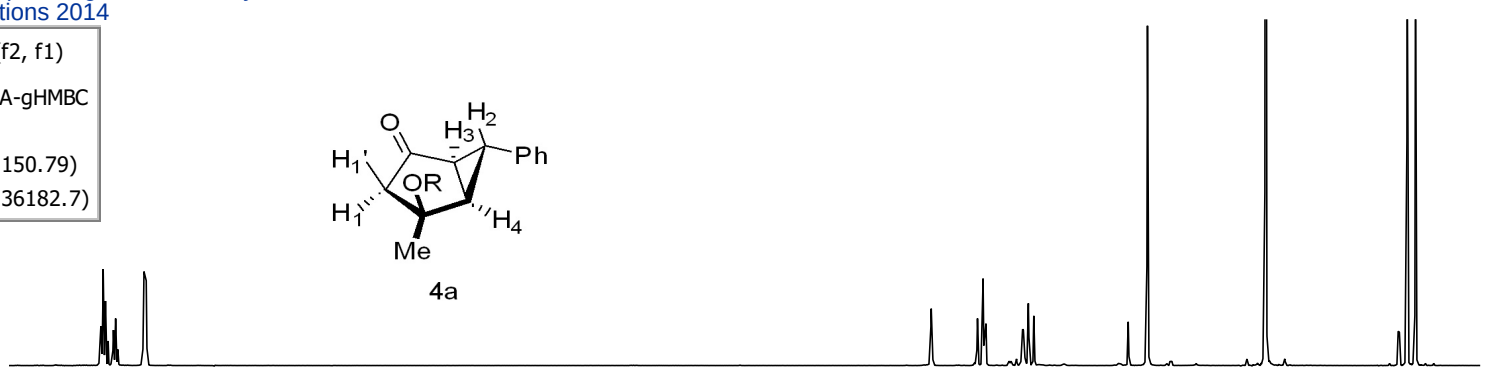
Parameter	Value (f2, f1)
1 Title	jkg-VI-85A-noesy2d-1
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4507.6, 4509.6)

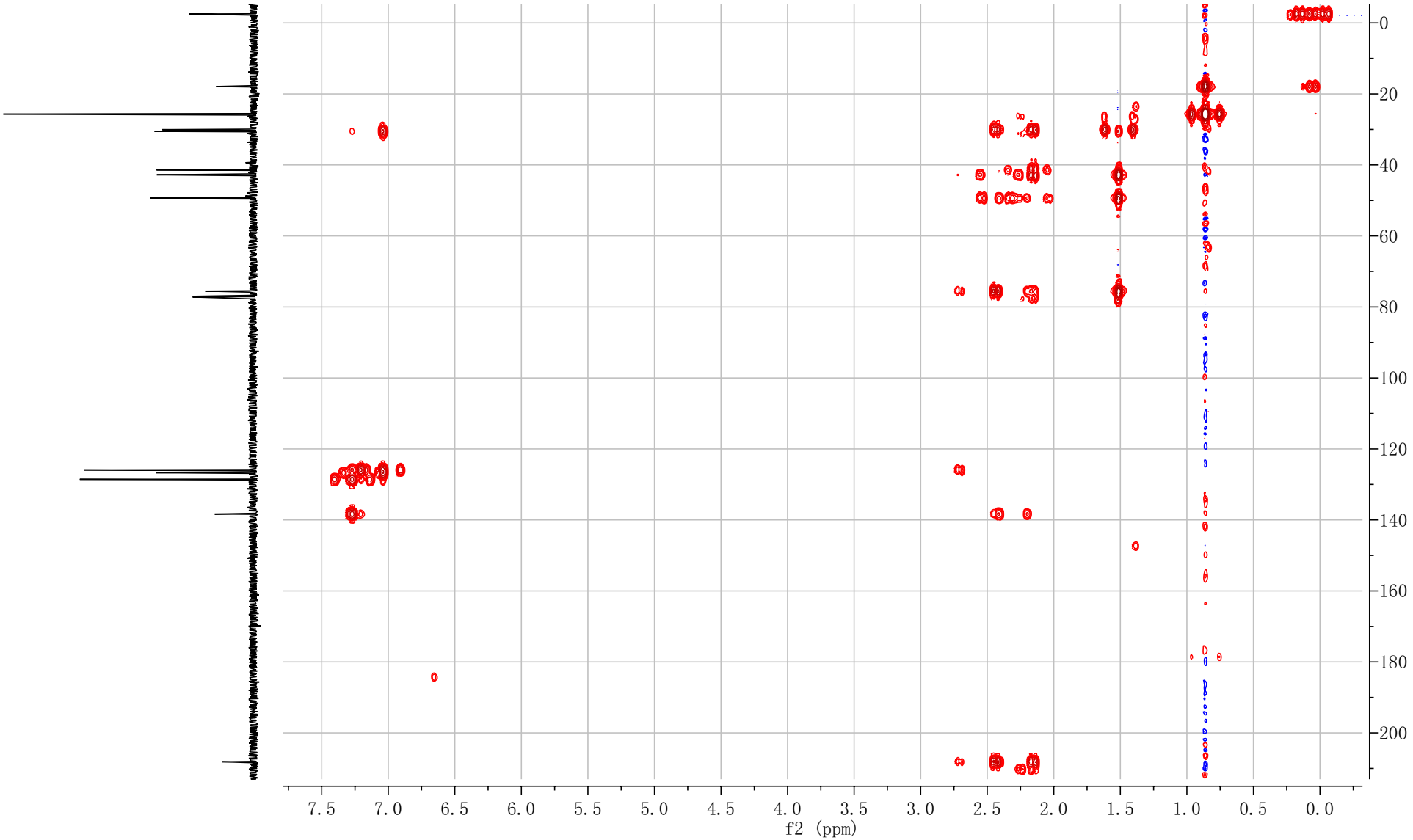
4a



Parameter	Value (f2, f1)
1 Title	jkg-VI-85A-gHMBC
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 150.79)
4 Spectral Width	(5656.1, 36182.7)

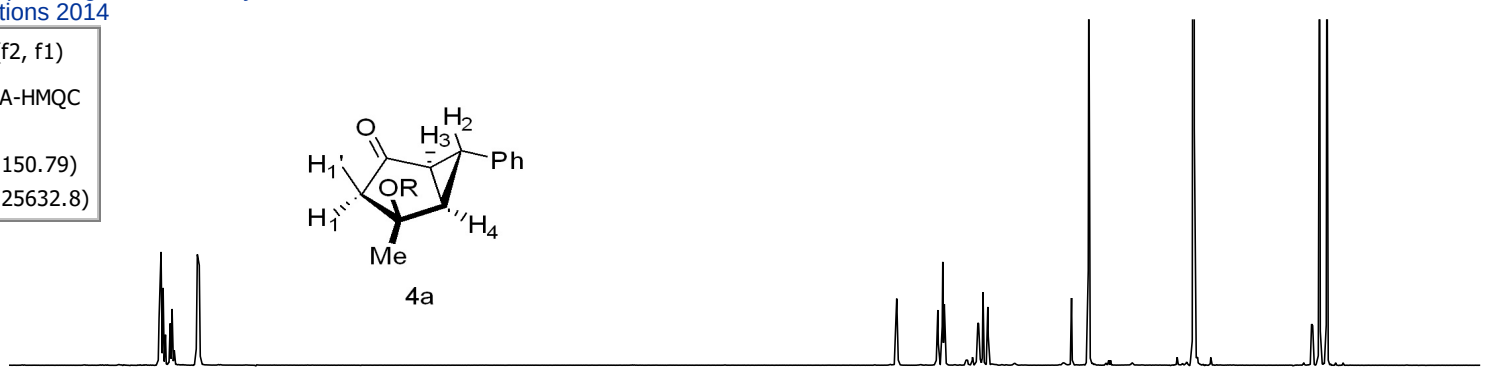
4a

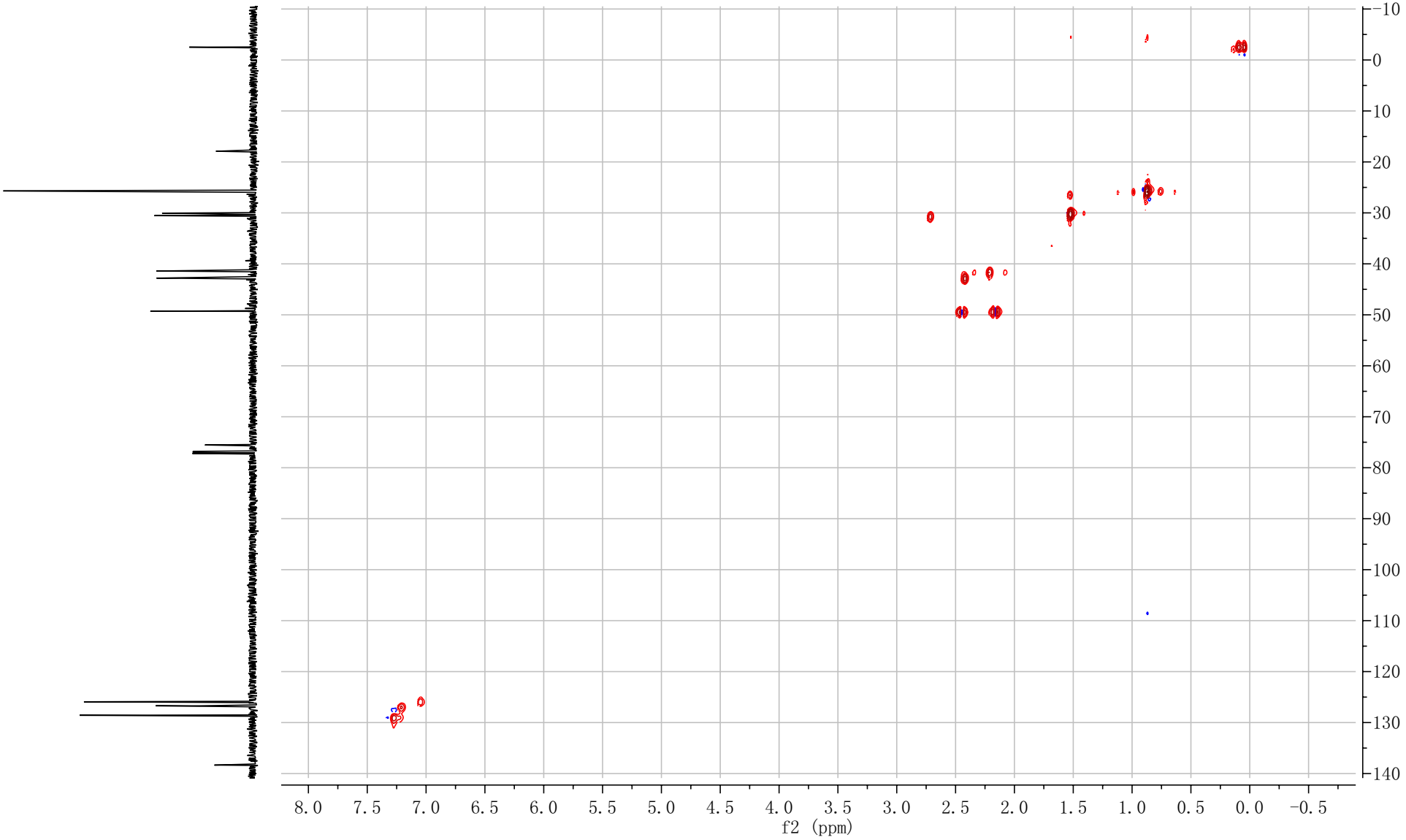




Parameter	Value (f2, f1)
1 Title	jkg-VI-85A-HMQC
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 150.79)
4 Spectral Width	(5629.0, 25632.8)

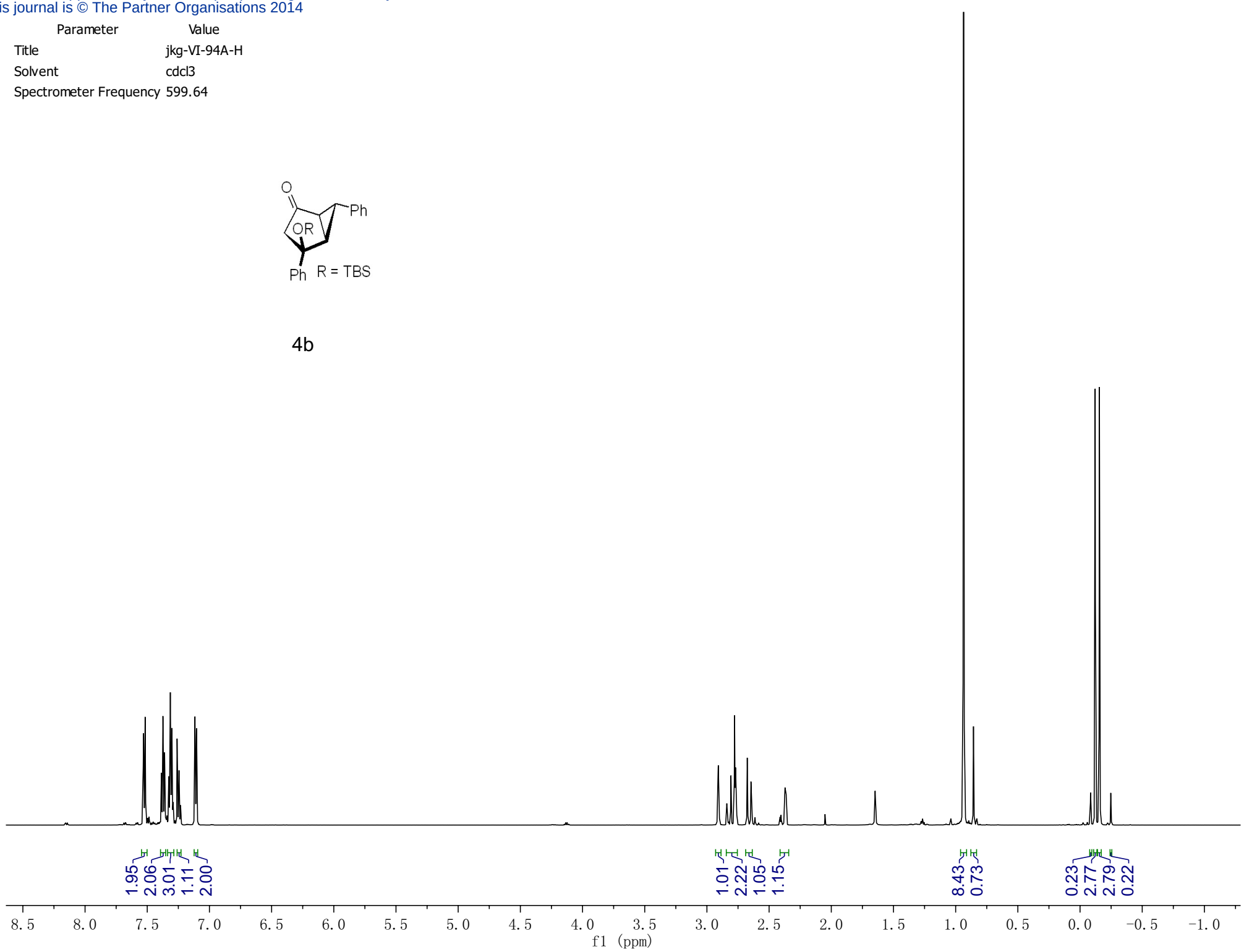
4a





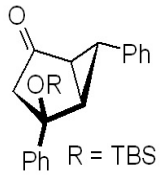
Parameter	Value
Title	jkg-VI-94A-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4b

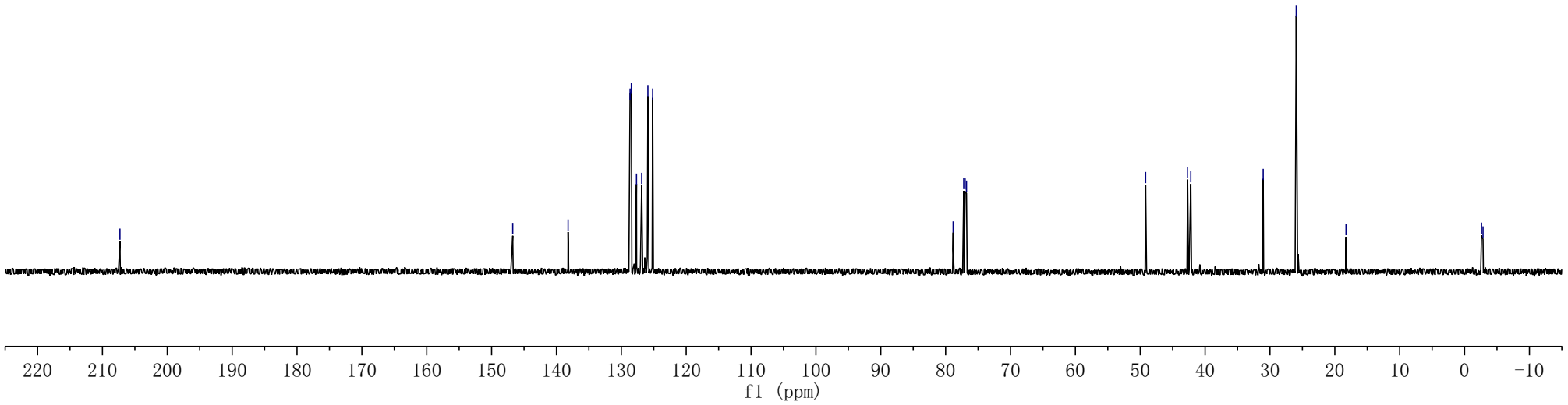


Parameter	Value
Title	jkg-VI-94A-C2
Solvent	cdcl3
Spectrometer Frequency	150.79

207.30
146.74
138.21
128.65
128.46
127.66
126.86
125.90
125.17
78.84
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
49.17
42.70
42.20
31.04
25.95
18.27
-2.61
-2.85

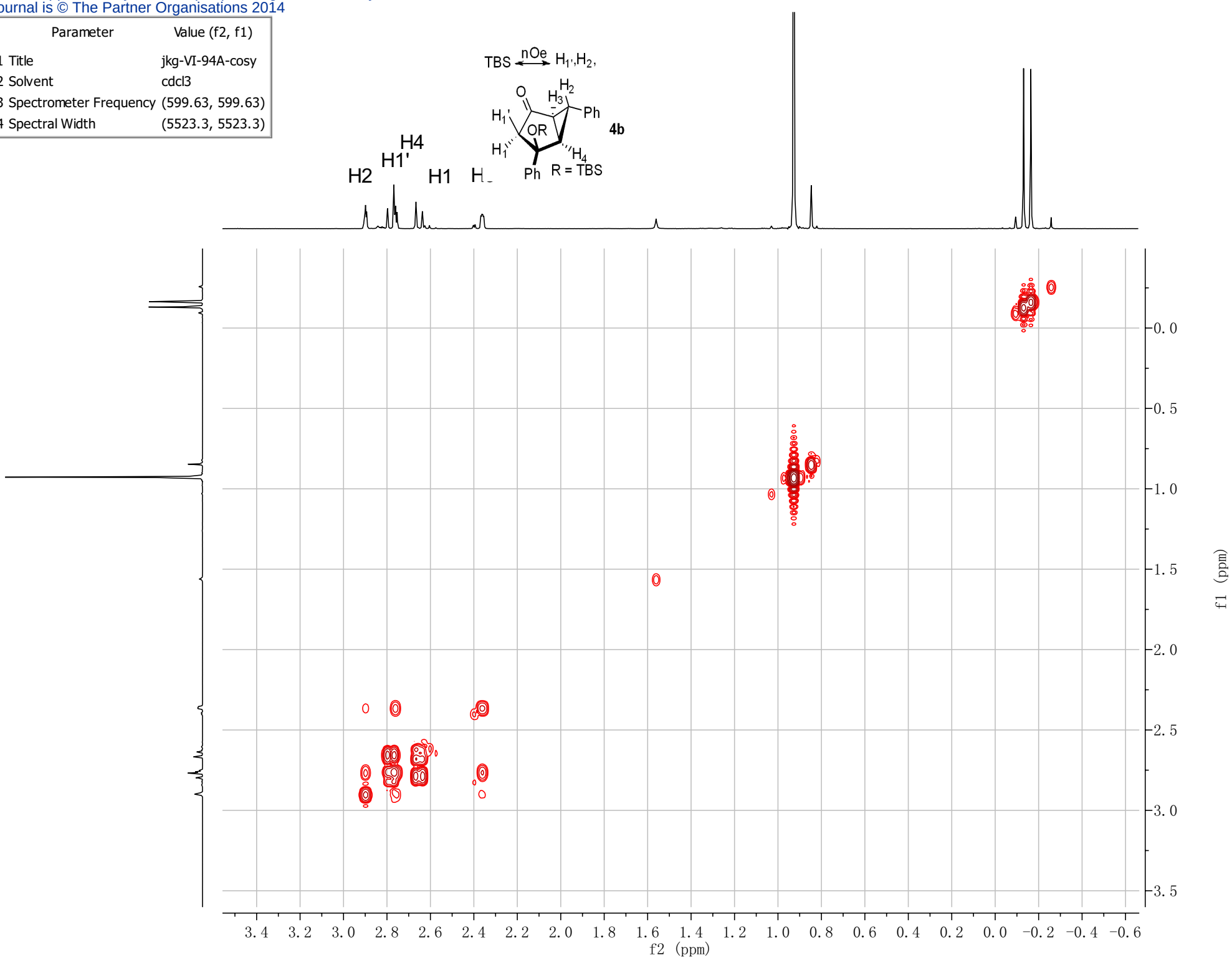


4b



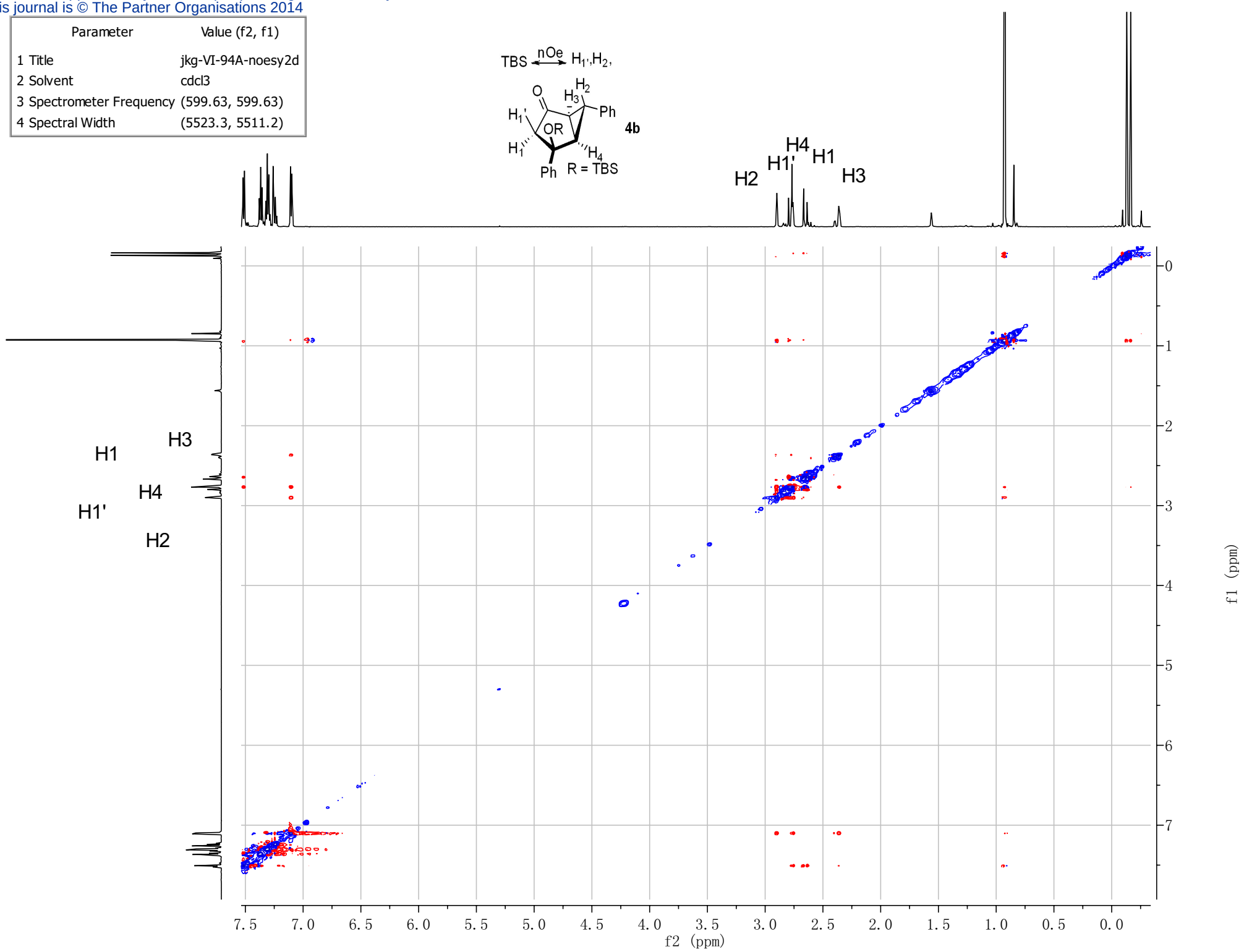
Parameter	Value (f2, f1)
1 Title	jkg-VI-94A-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5523.3, 5523.3)

4b



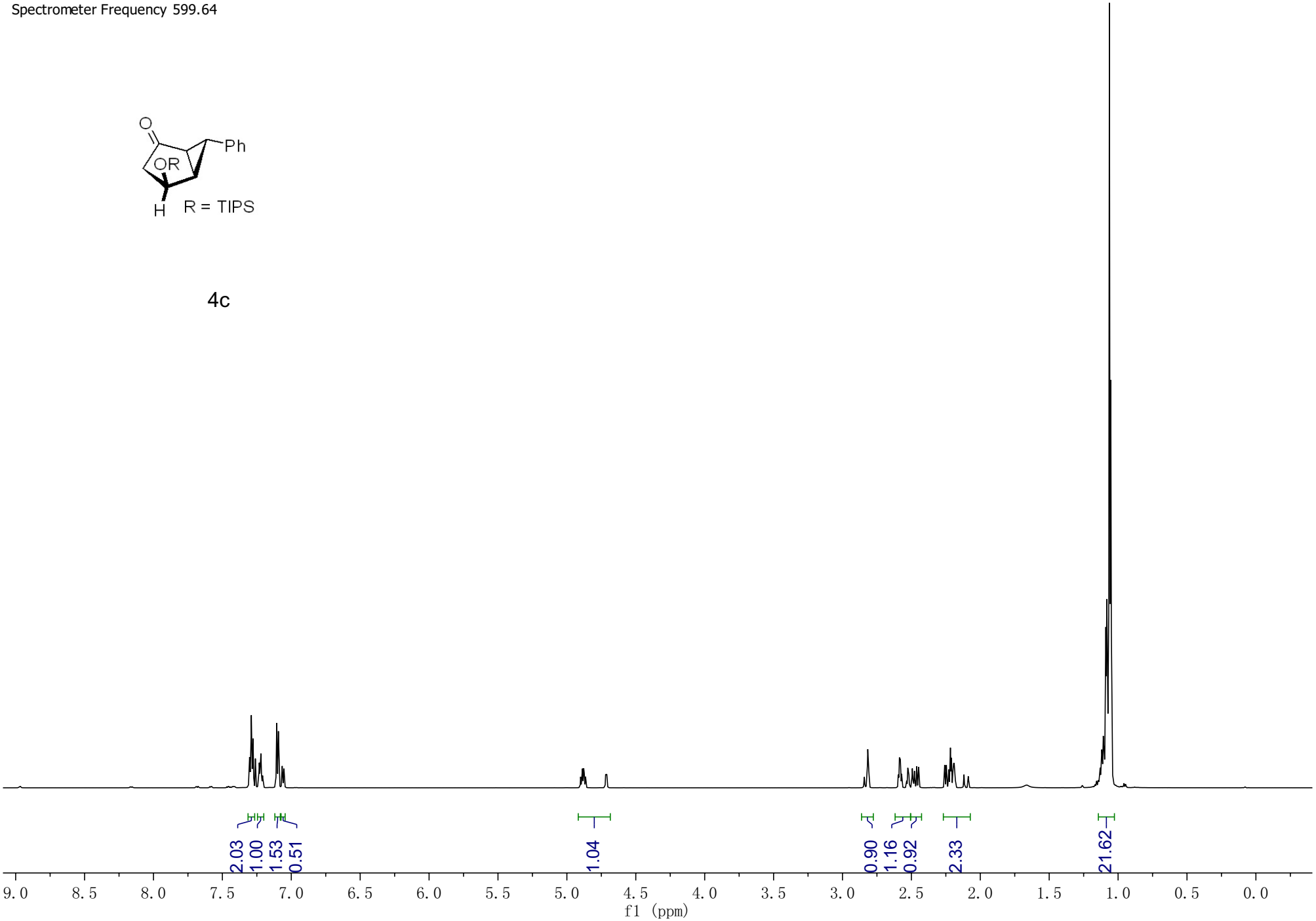
Parameter	Value (f2, f1)
1 Title	jkg-VI-94A-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5523.3, 5511.2)

4b



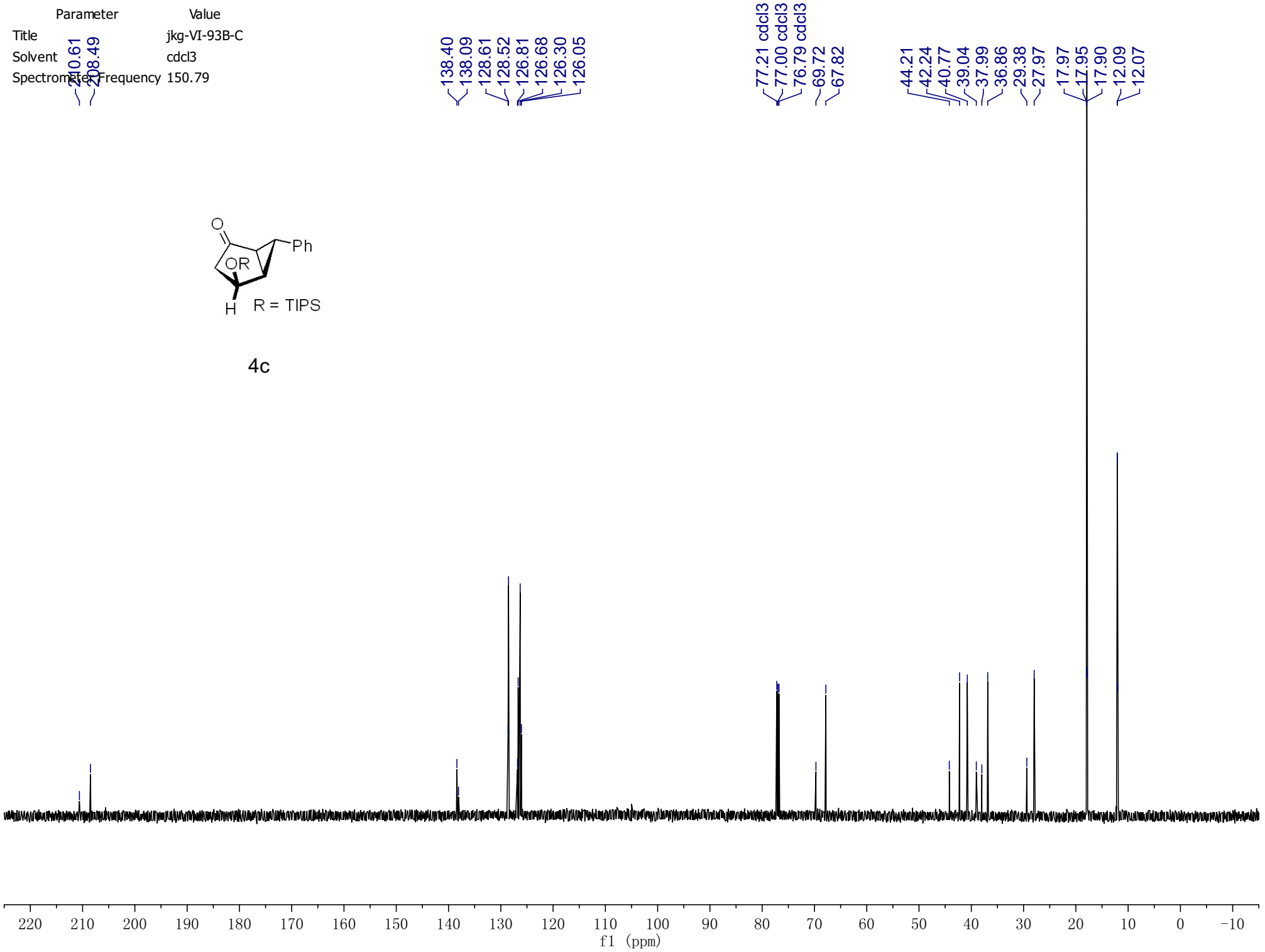
Parameter	Value
Title	jkg-VI-93B-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4c



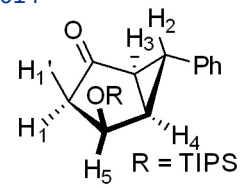
Parameter	Value
Title	jkg-VI-93B-C
Solvent	cdcl3
Spectrometer Frequency	150.79

4c

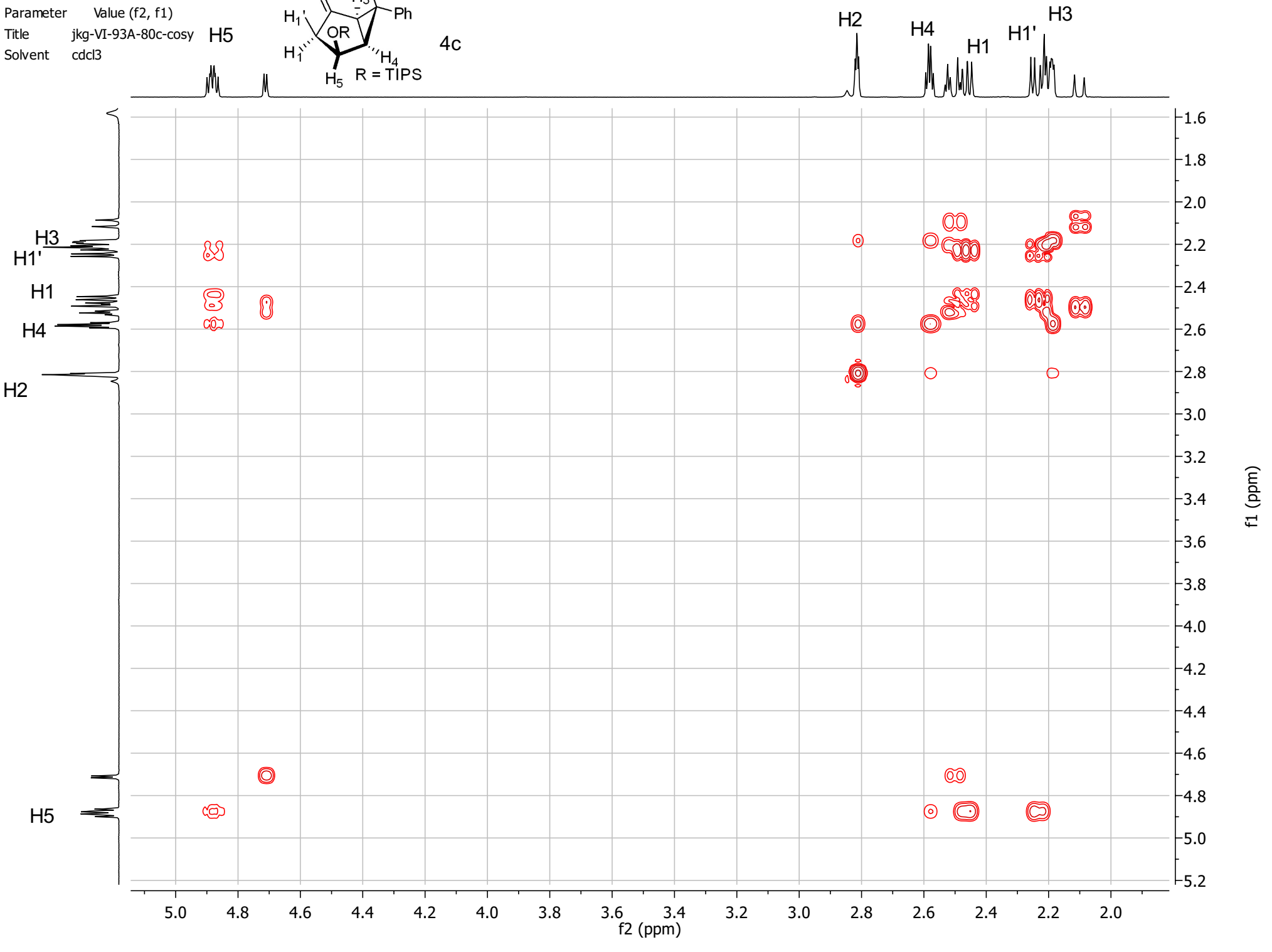


Parameters

Parameter	Value (f2, f1)
Title	jkg-VI-93A-80c-cosy
Solvent	cdcl3

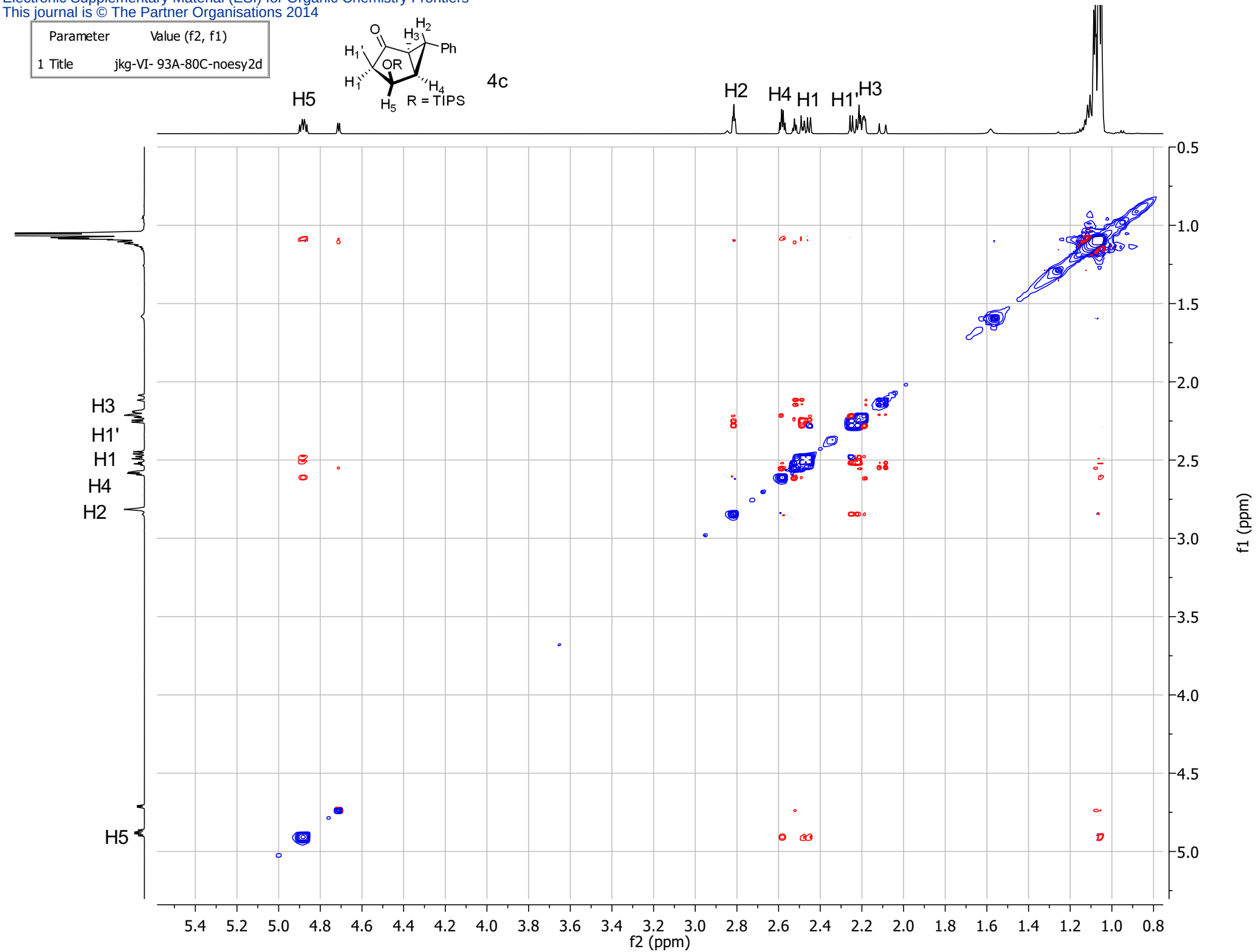


4c



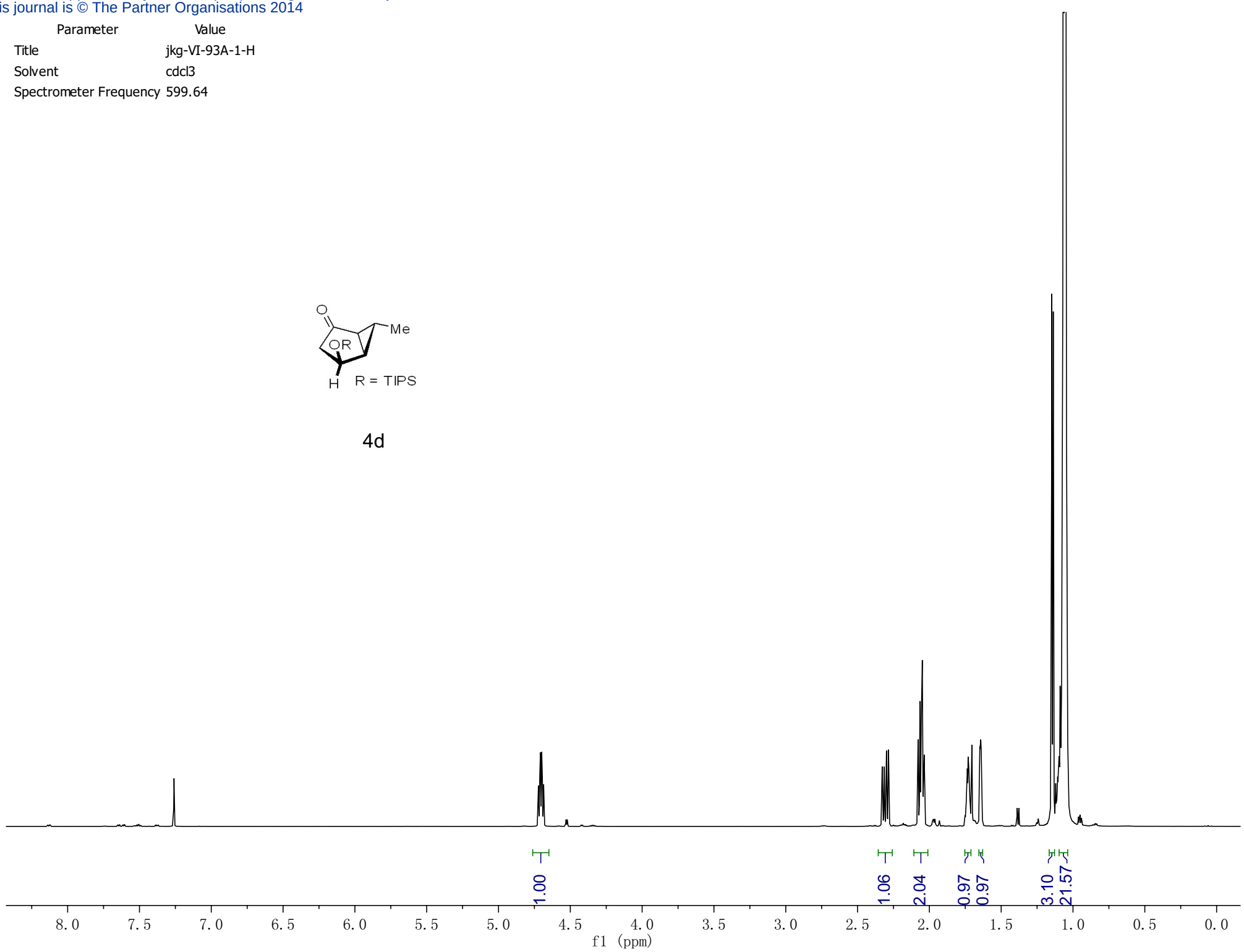
Parameter	Value (f2, f1)
1 Title	jkg-VI- 93A-80C-noesy2d

4c



Parameter	Value
Title	jkg-VI-93A-1-H
Solvent	cdcl3
Spectrometer Frequency	599.64

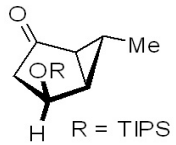
4d



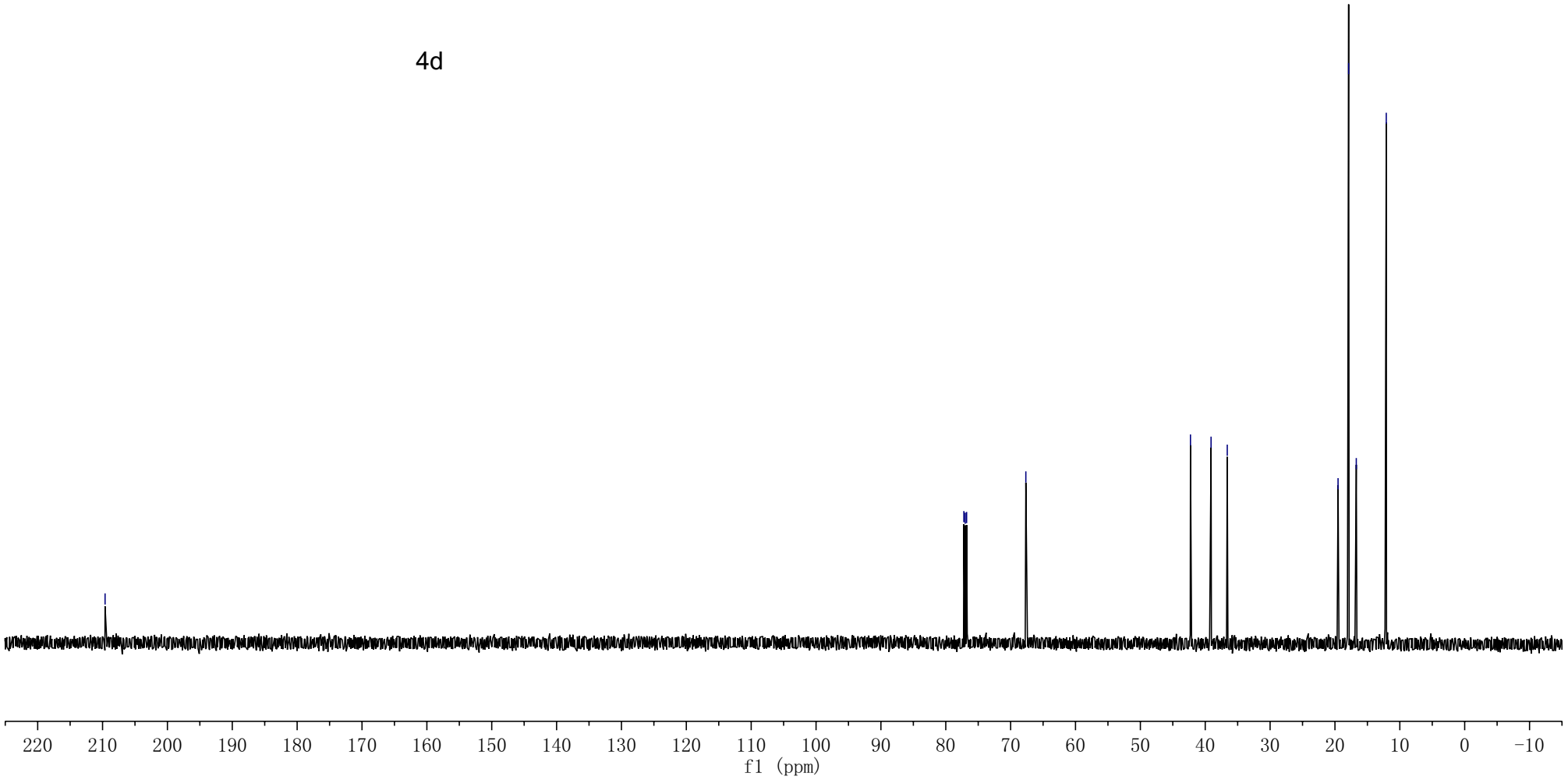
Parameter	Value
Title	jkg-VI-93A-1-C
Solvent	cdcl3
Spectrometer Frequency	150.79

209.61

77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
67.66
42.28
39.10
36.60
19.52
17.89
16.71
12.09



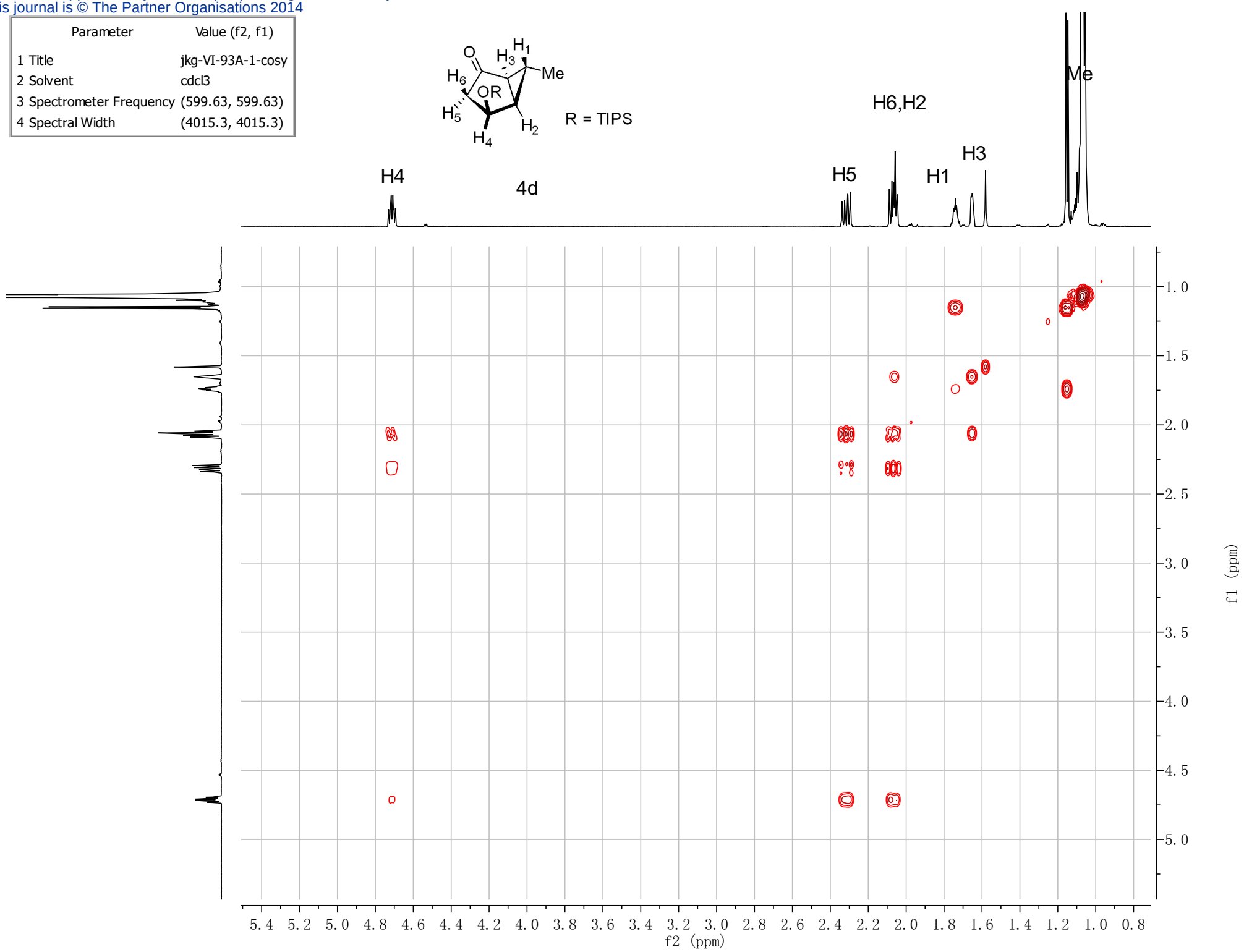
4d



Parameter	Value (f2, f1)
1 Title	jkg-VI-93A-1-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4015.3, 4015.3)

R = TIPS

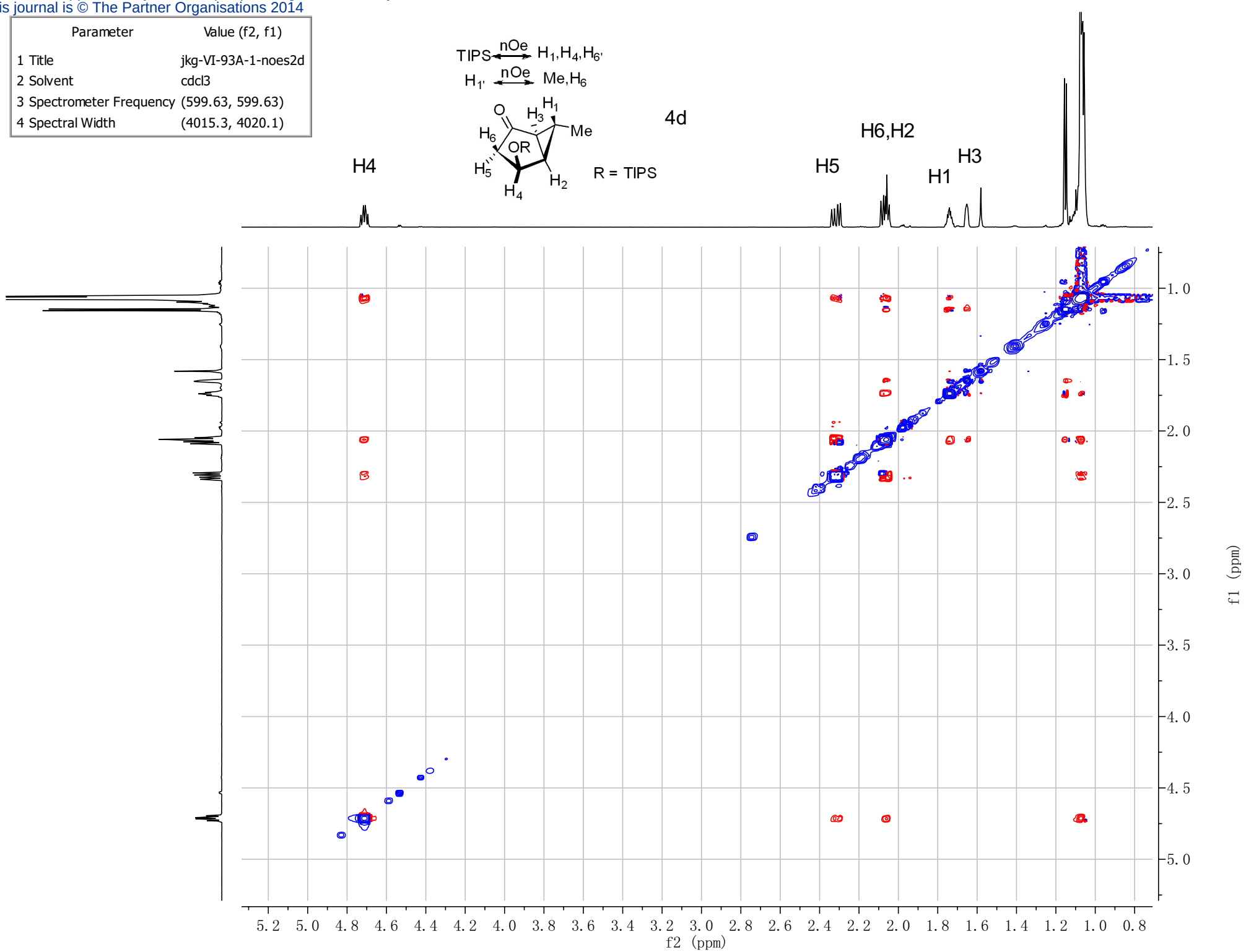
4d



Parameter	Value (f2, f1)
1 Title	jkg-VI-93A-1-noes2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4015.3, 4020.1)

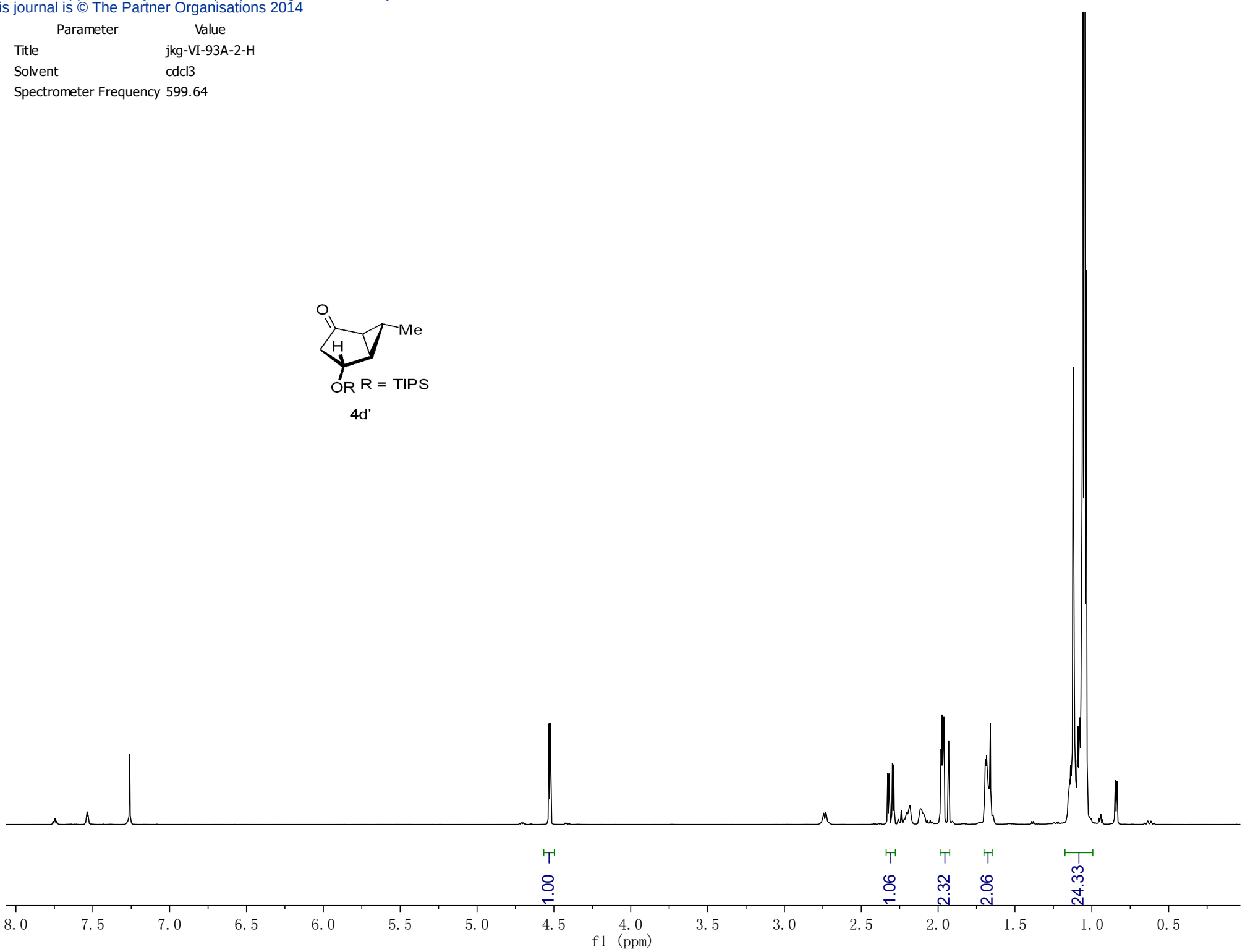
4d

R = TIPS



Parameter	Value
Title	jkg-VI-93A-2-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4d'



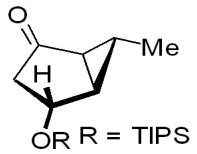
Parameter	Value
Title	jkg-VI-93A-2-C
Solvent	cdcl3
Spectrometer Frequency	150.79

212.11

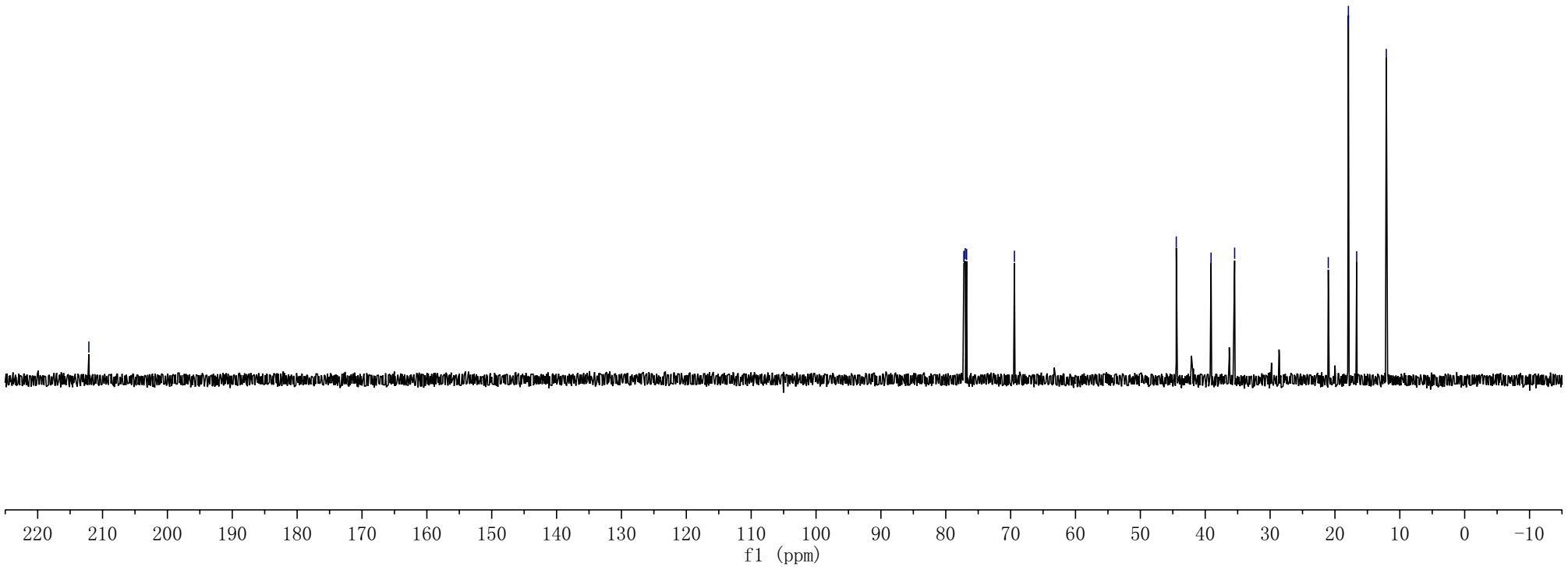
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
69.42

44.46
39.10
35.47

21.03
17.95
17.93
16.65
12.08

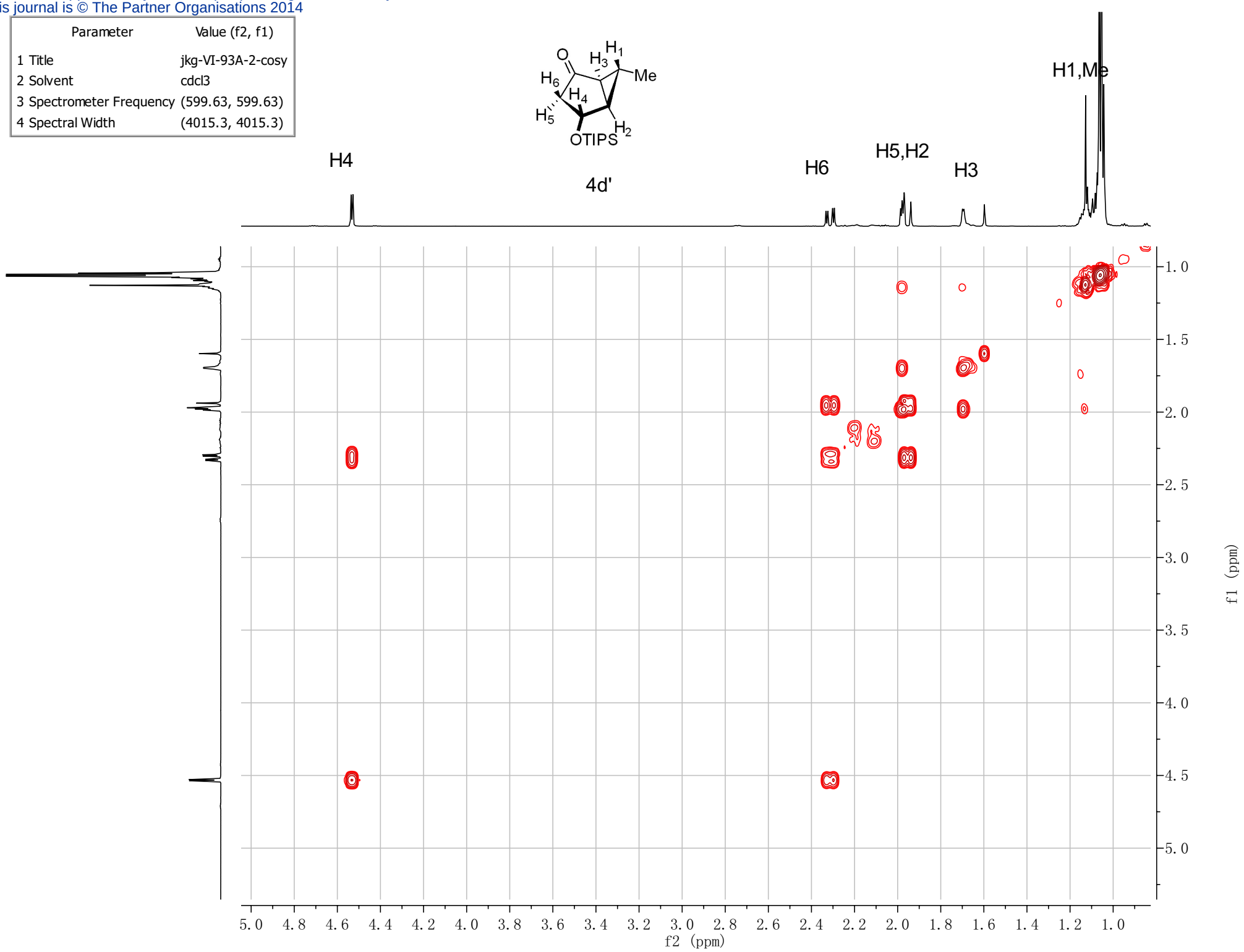


4d'



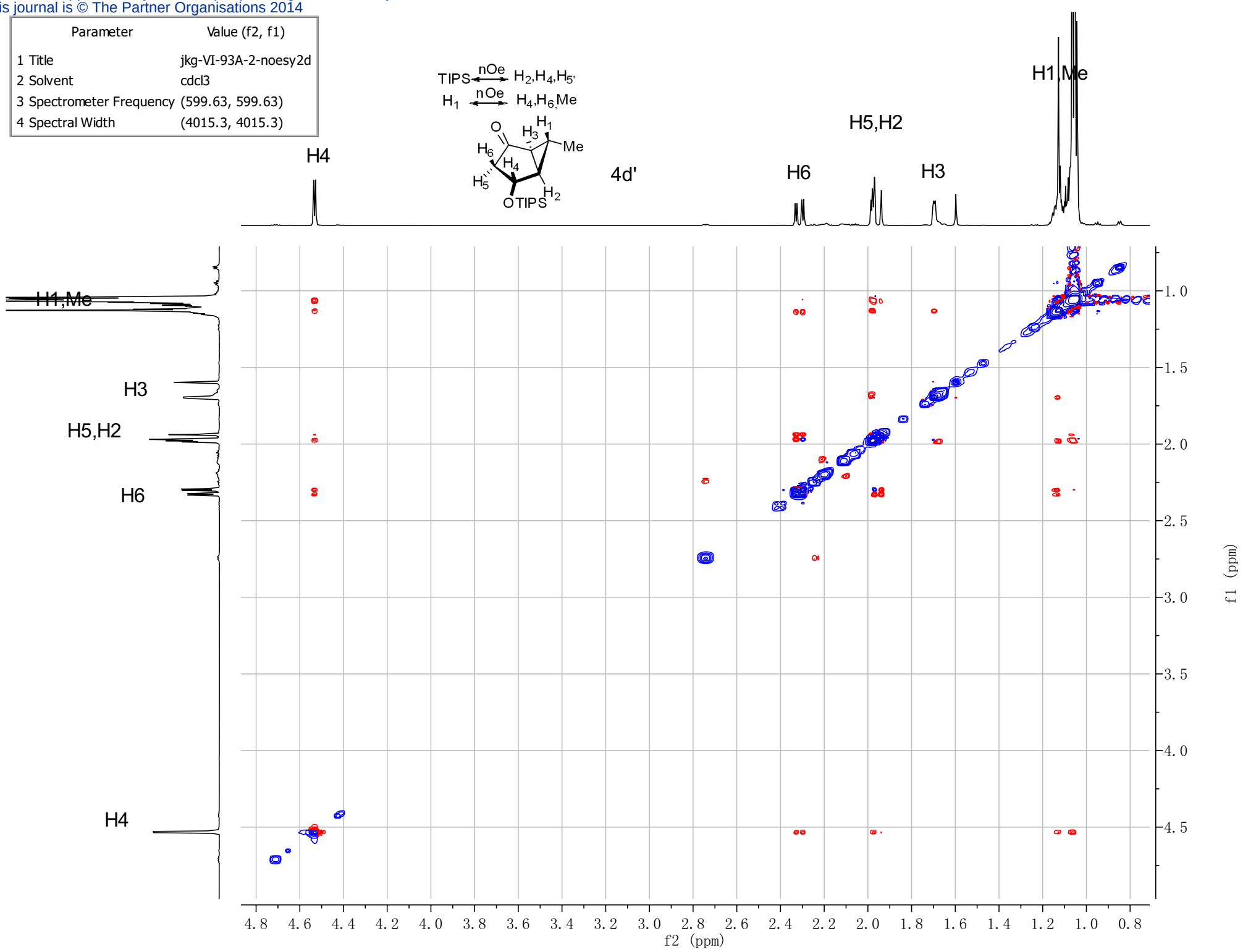
Parameter	Value (f2, f1)
1 Title	jkg-VI-93A-2-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4015.3, 4015.3)

4d'



Parameter	Value (f2, f1)
1 Title	jkg-VI-93A-2-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4015.3, 4015.3)

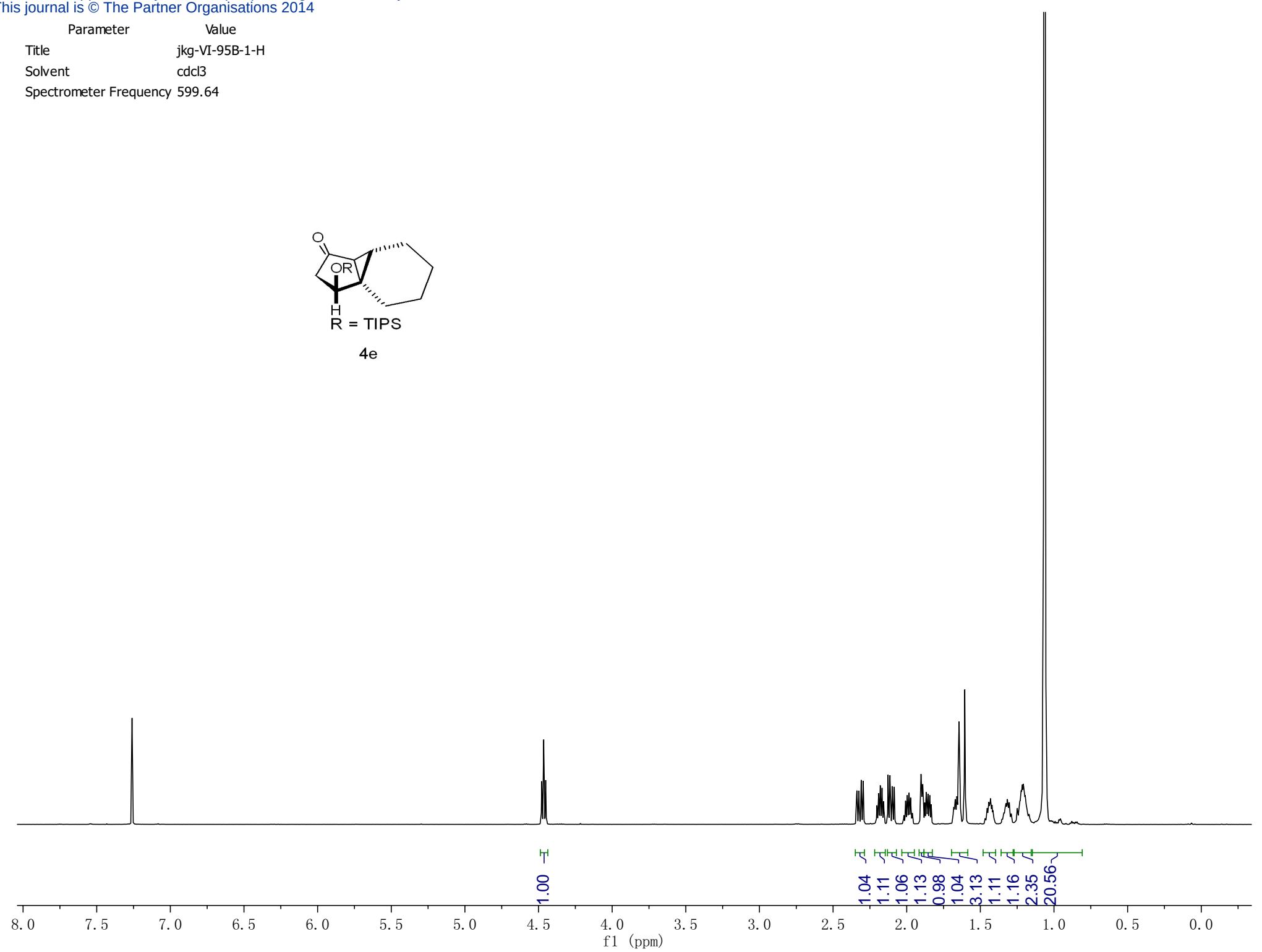
4d'



Parameter	Value
Title	jkg-VI-95B-1-H
Solvent	cdcl3
Spectrometer Frequency	599.64

R = TIPS

4e



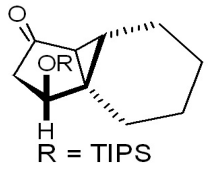
Parameter	Value
Title	jkg-VI-95B-1-C
Solvent	cdcl3
Spectrometer Frequency	150.79

209.96

77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
72.82

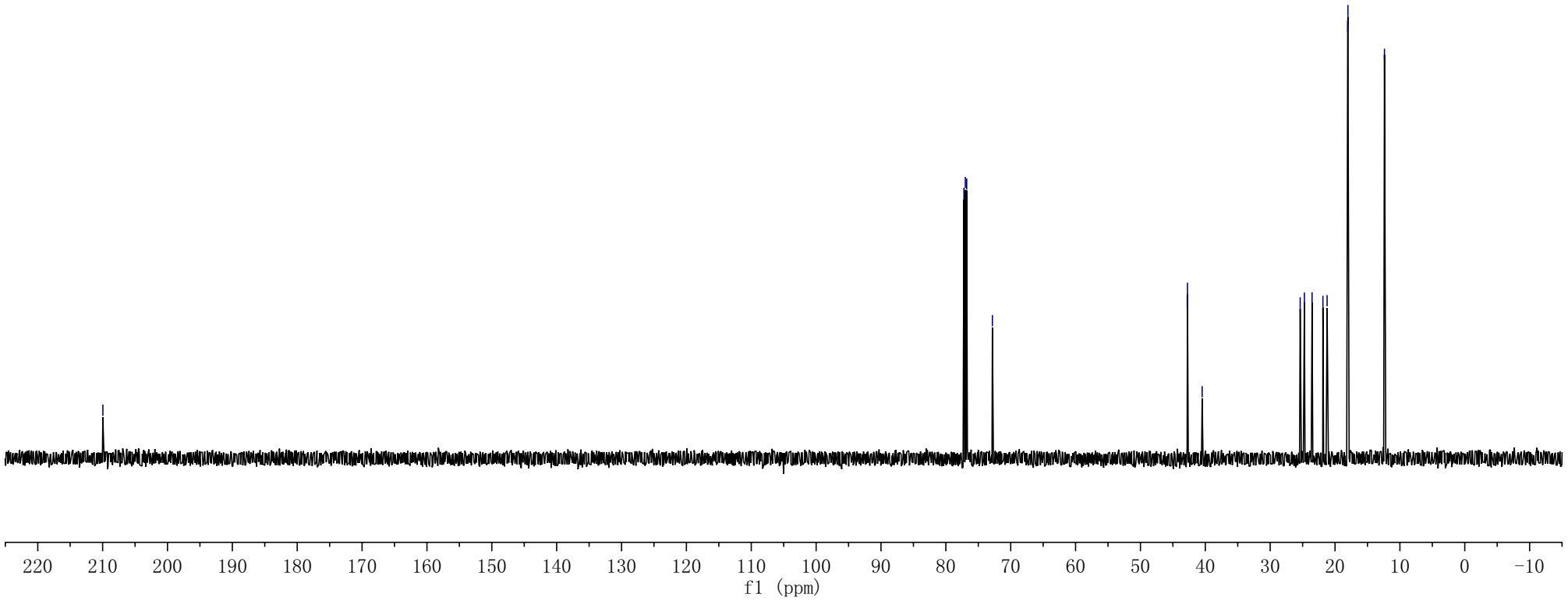
42.79
42.75
40.49

25.37
24.72
23.54
21.87
21.22
18.05
18.01
12.38



R = TIPS

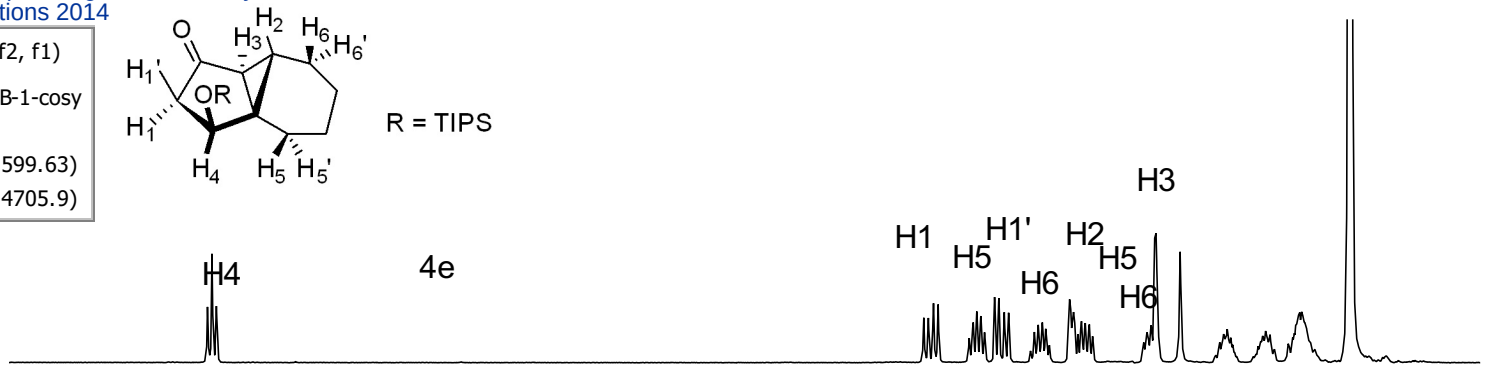
4e

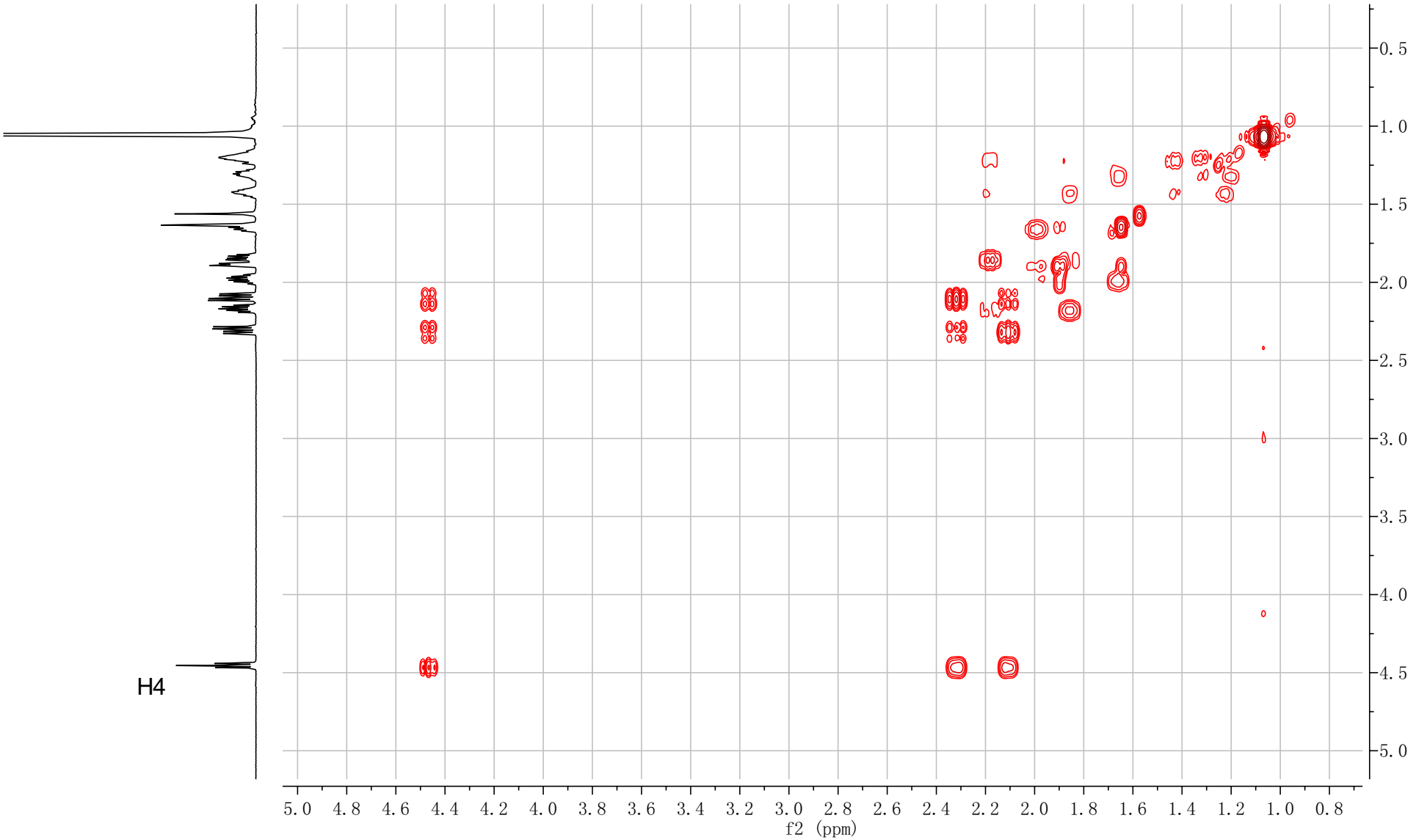


Parameter	Value (f2, f1)
1 Title	jkg-VI-95B-1-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4705.9, 4705.9)

R = TIPS

4e

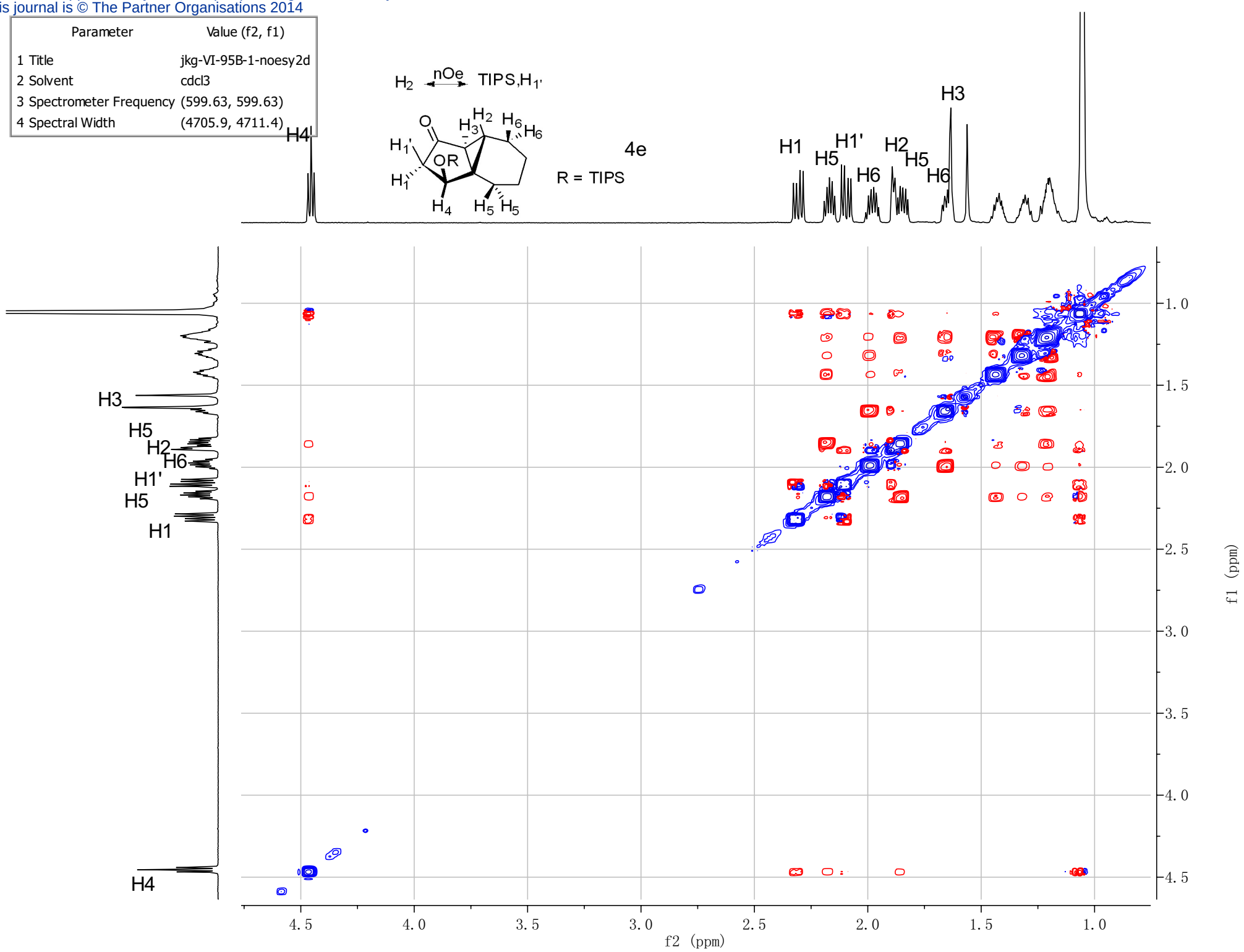




Parameter	Value (f2, f1)
1 Title	jkg-VI-95B-1-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4705.9, 4711.4)

4e

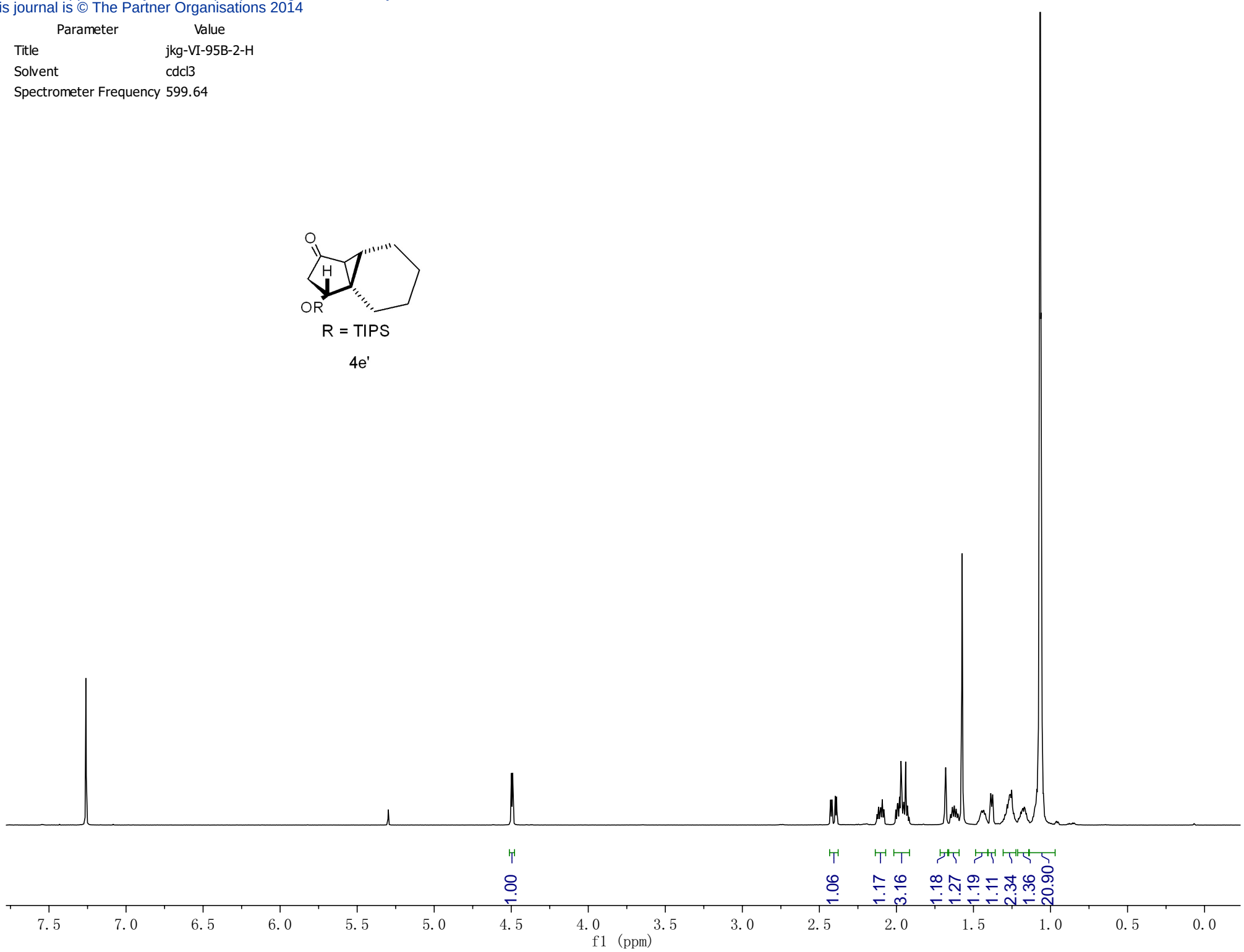
R = TIPS



Parameter	Value
Title	jkg-VI-95B-2-H
Solvent	cdcl3
Spectrometer Frequency	599.64

R = TIPS

4e'



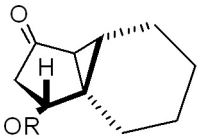
Parameter	Value
Title	jkg-VI-95B-2-C-1
Solvent	cdcl3
Spectrometer Frequency	150.79

212.54

77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
73.45

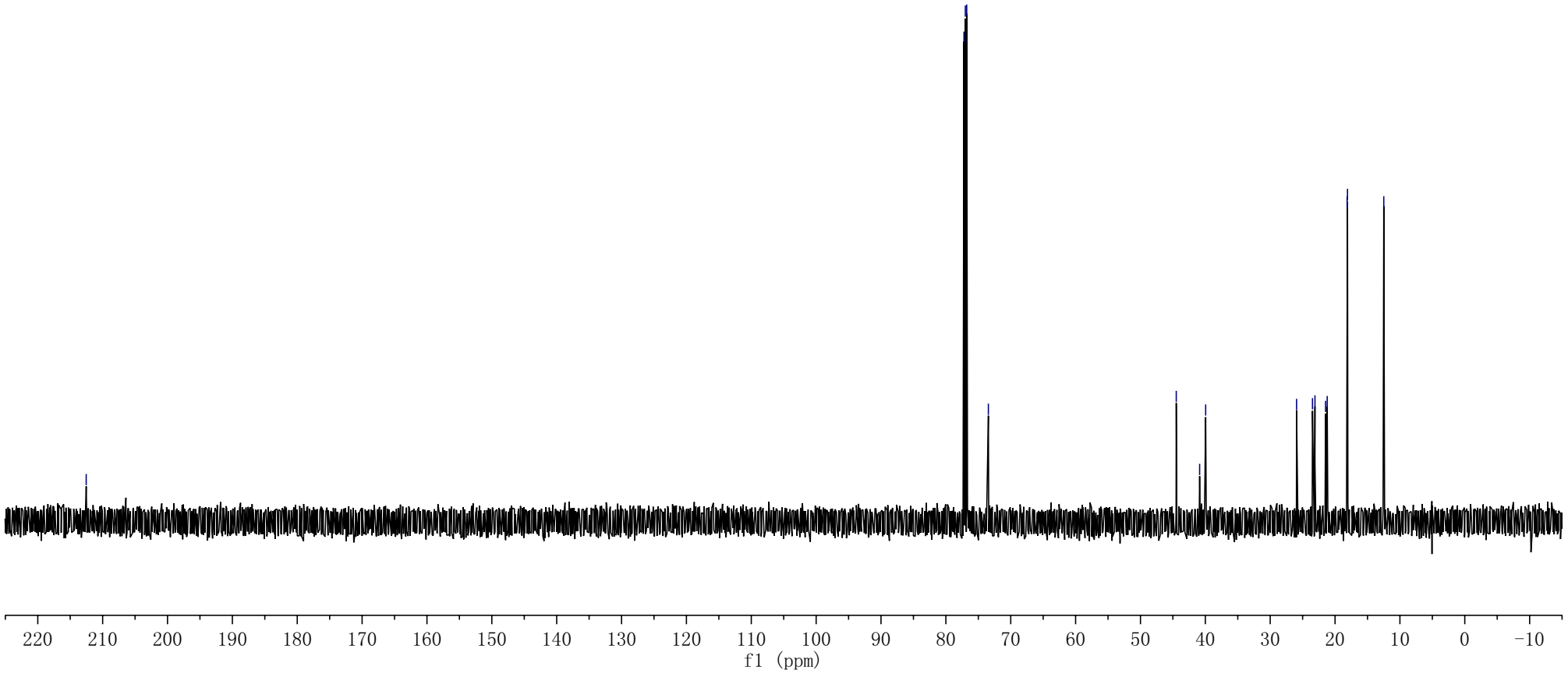
44.48
40.88
39.95

25.93
23.48
23.10
21.46
21.21
18.14
18.08
12.49



R = TIPS

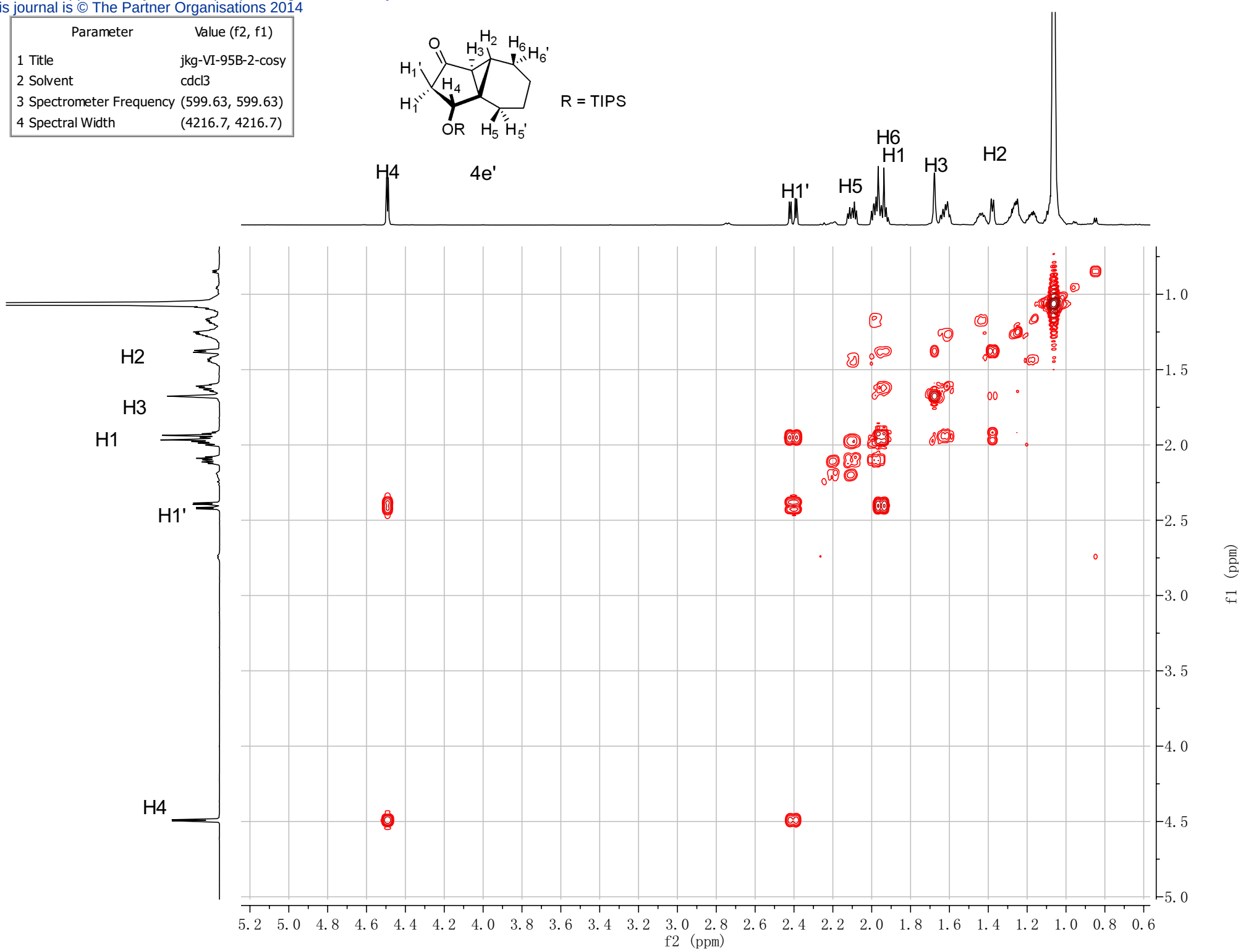
4e'



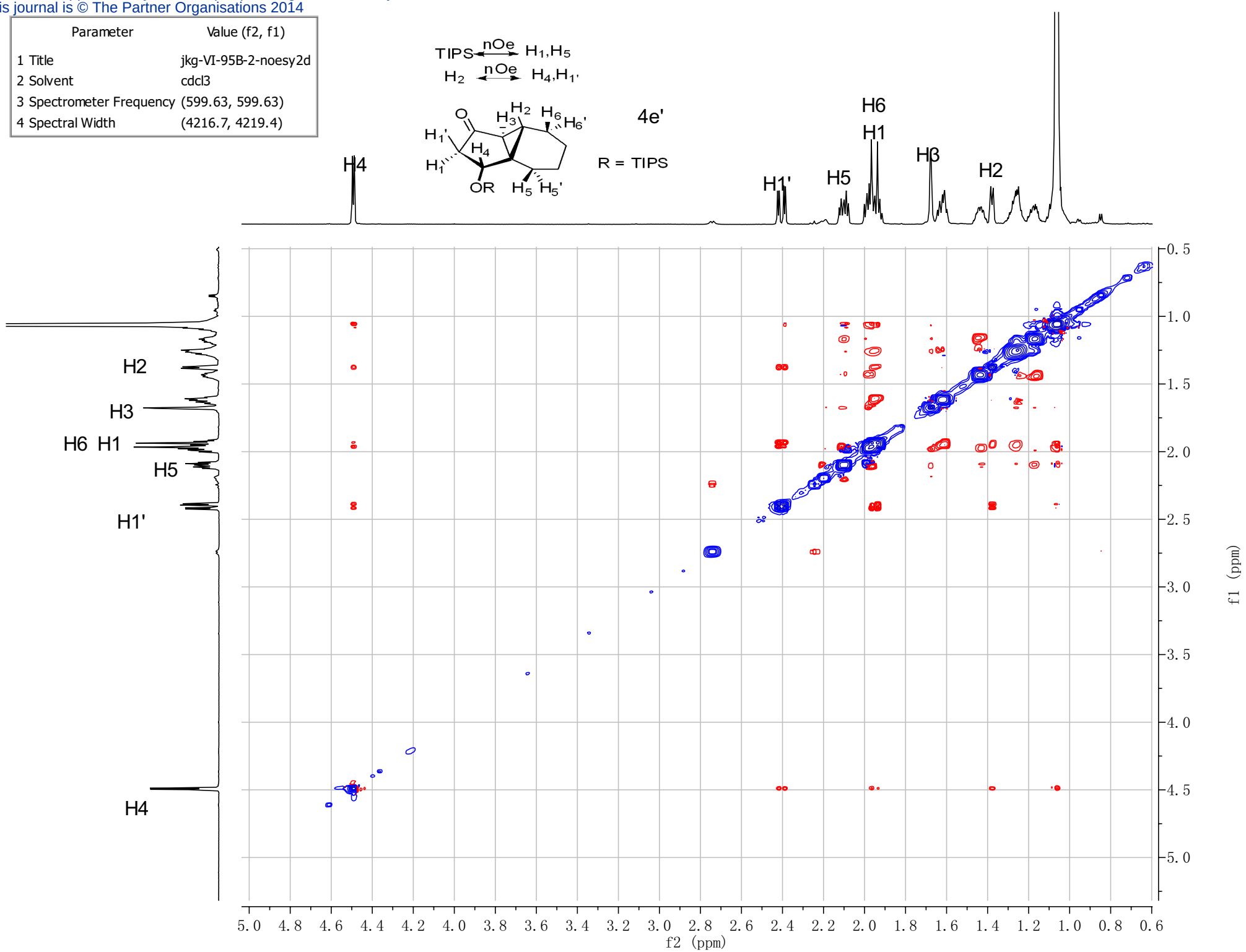
Parameter	Value (f2, f1)
1 Title	jkg-VI-95B-2-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4216.7, 4216.7)

R = TIPS

4e'



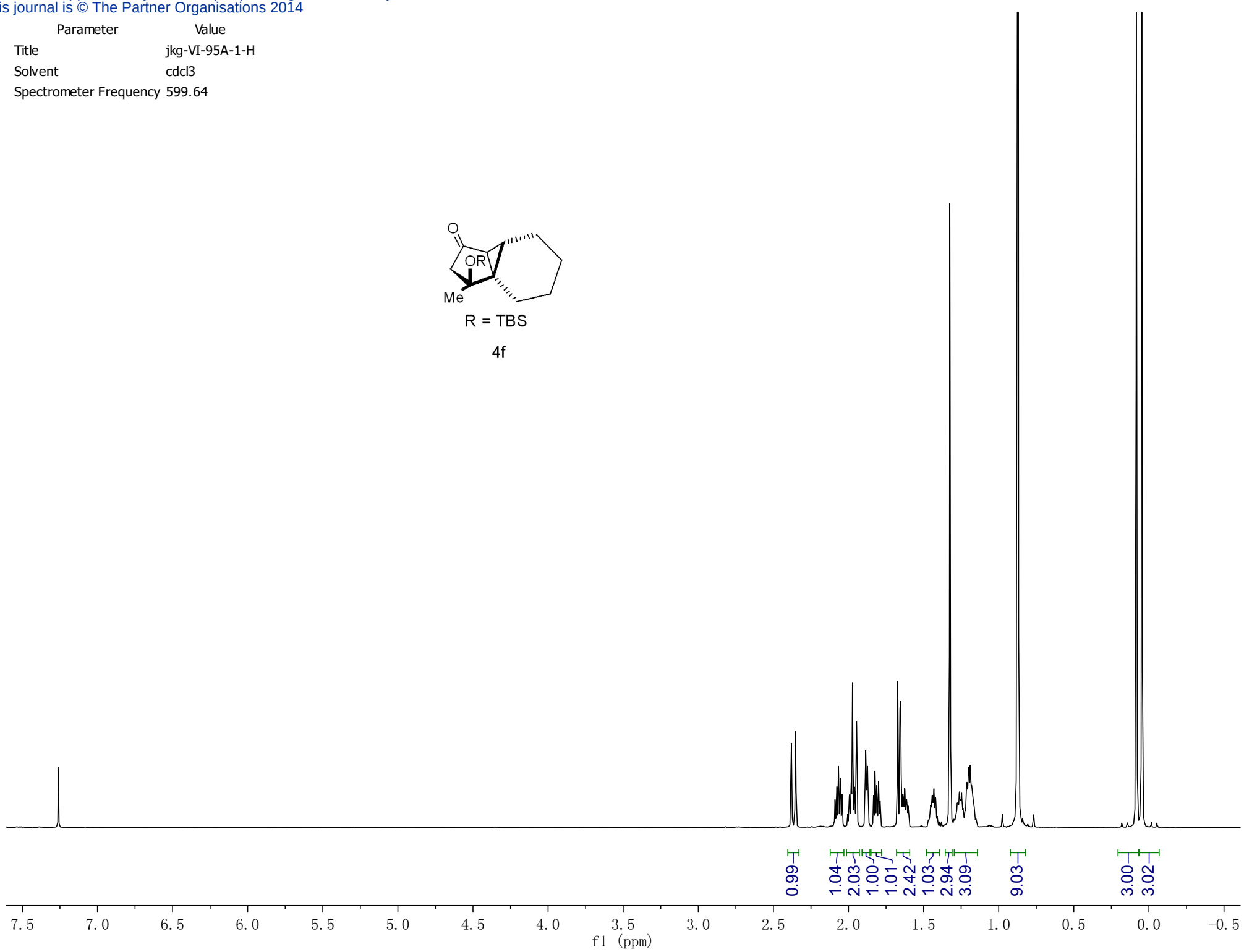
Parameter	Value (f2, f1)
1 Title	jkg-VI-95B-2-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4216.7, 4219.4)



Parameter	Value
Title	jkg-VI-95A-1-H
Solvent	cdcl3
Spectrometer Frequency	599.64

R = TBS

4f



Parameter	Value
Title	jkg-VI-95A-1-C
Solvent	cdcl3
Spectrometer Frequency	150.79

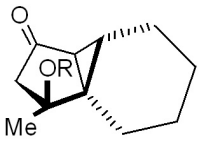
209.82

77.40
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3

49.08
43.70
42.43

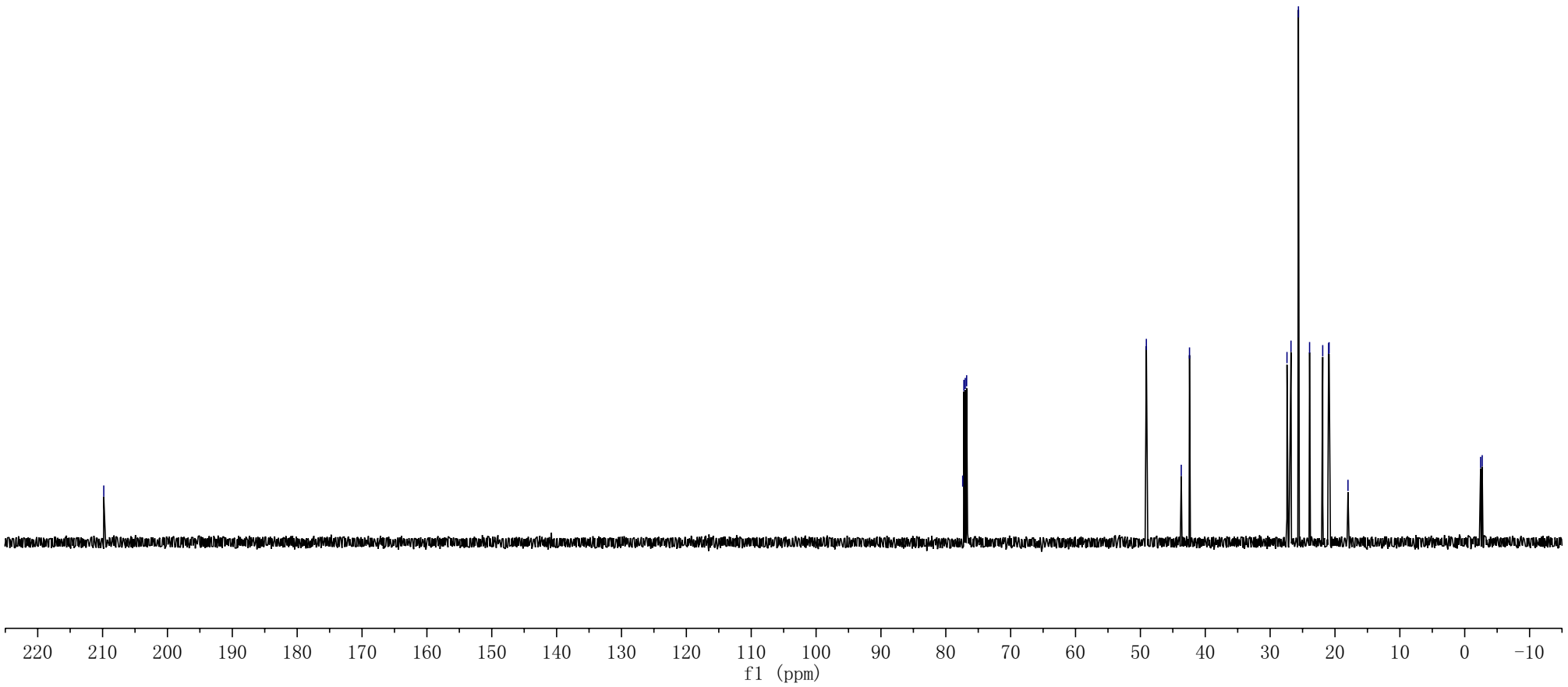
27.40
26.78
25.64
23.92
21.89
20.98
20.91
18.00

-2.45
-2.70

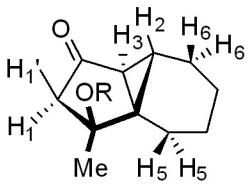


R = TBS

4f

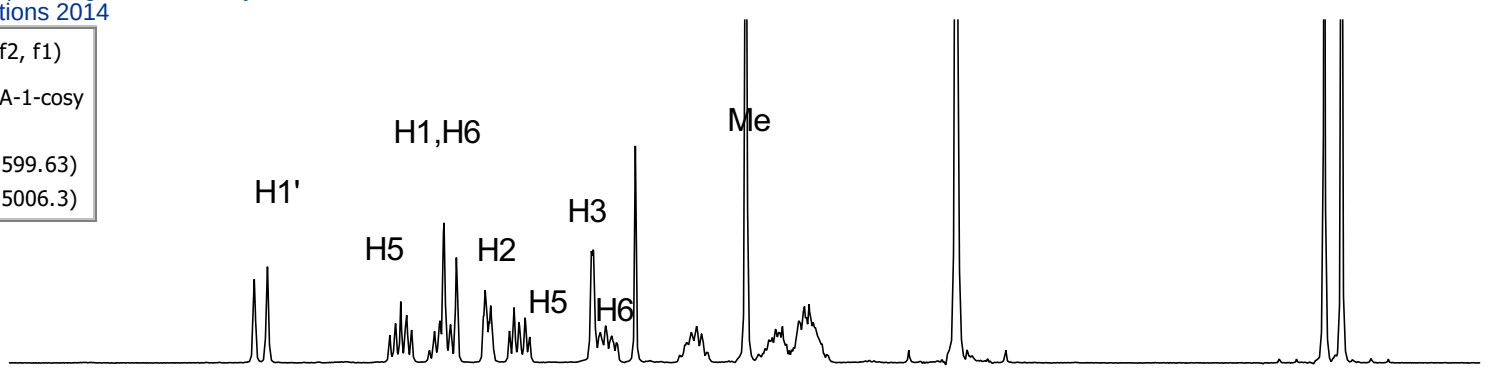


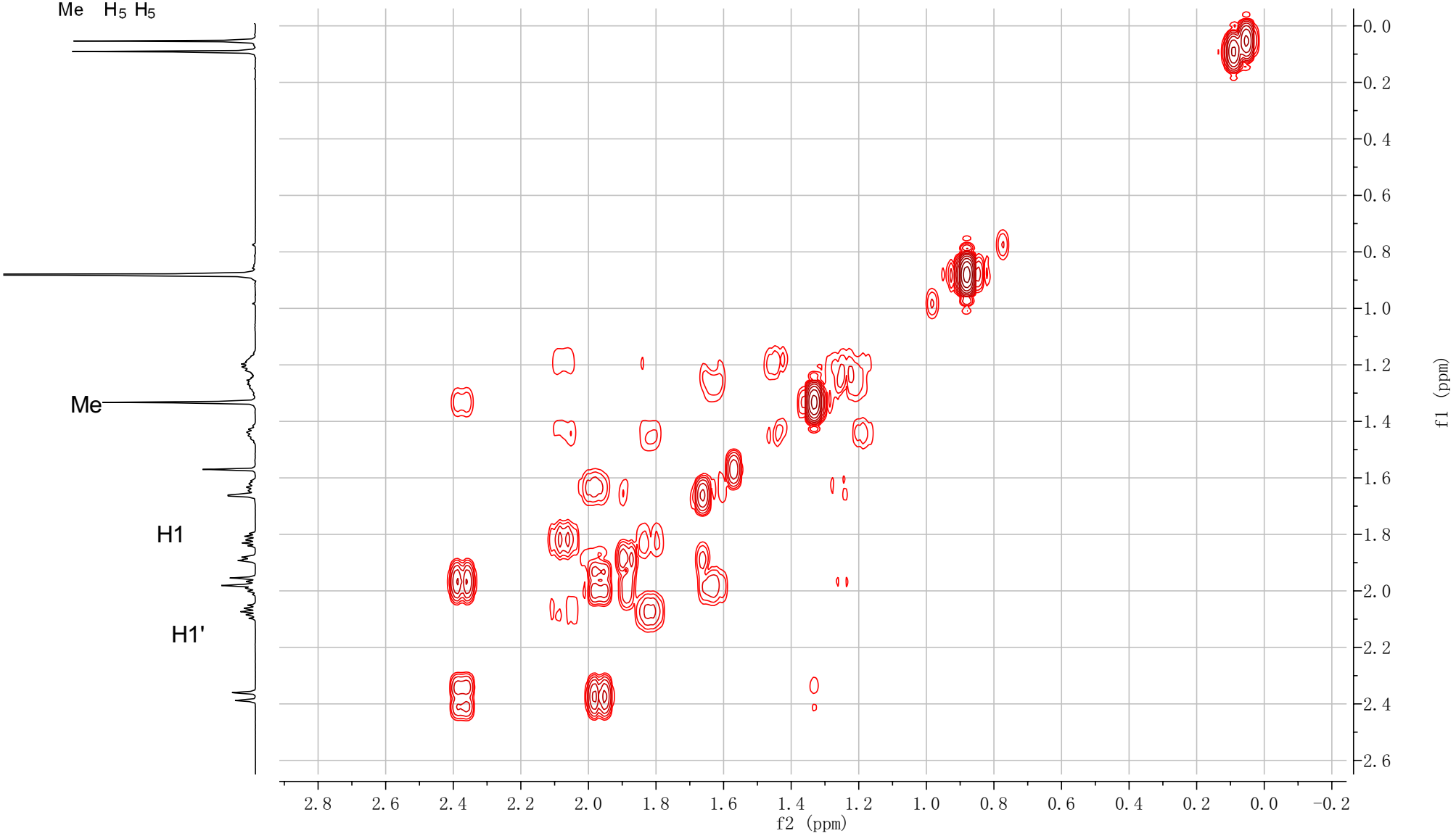
Parameter	Value (f2, f1)
1 Title	jkg-VI-95A-1-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5006.3, 5006.3)



4f

R = TBS





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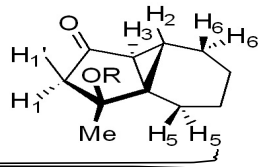
Parameter	Value (f2, f1)
1 Title	jkg-VI-95A-1-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5006.3, 5000.0)

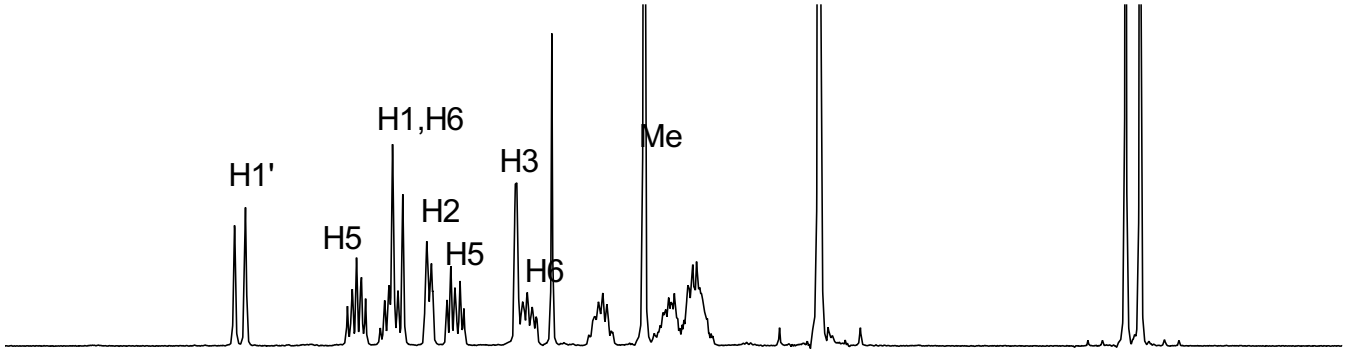
Me nOe H_1,H_5

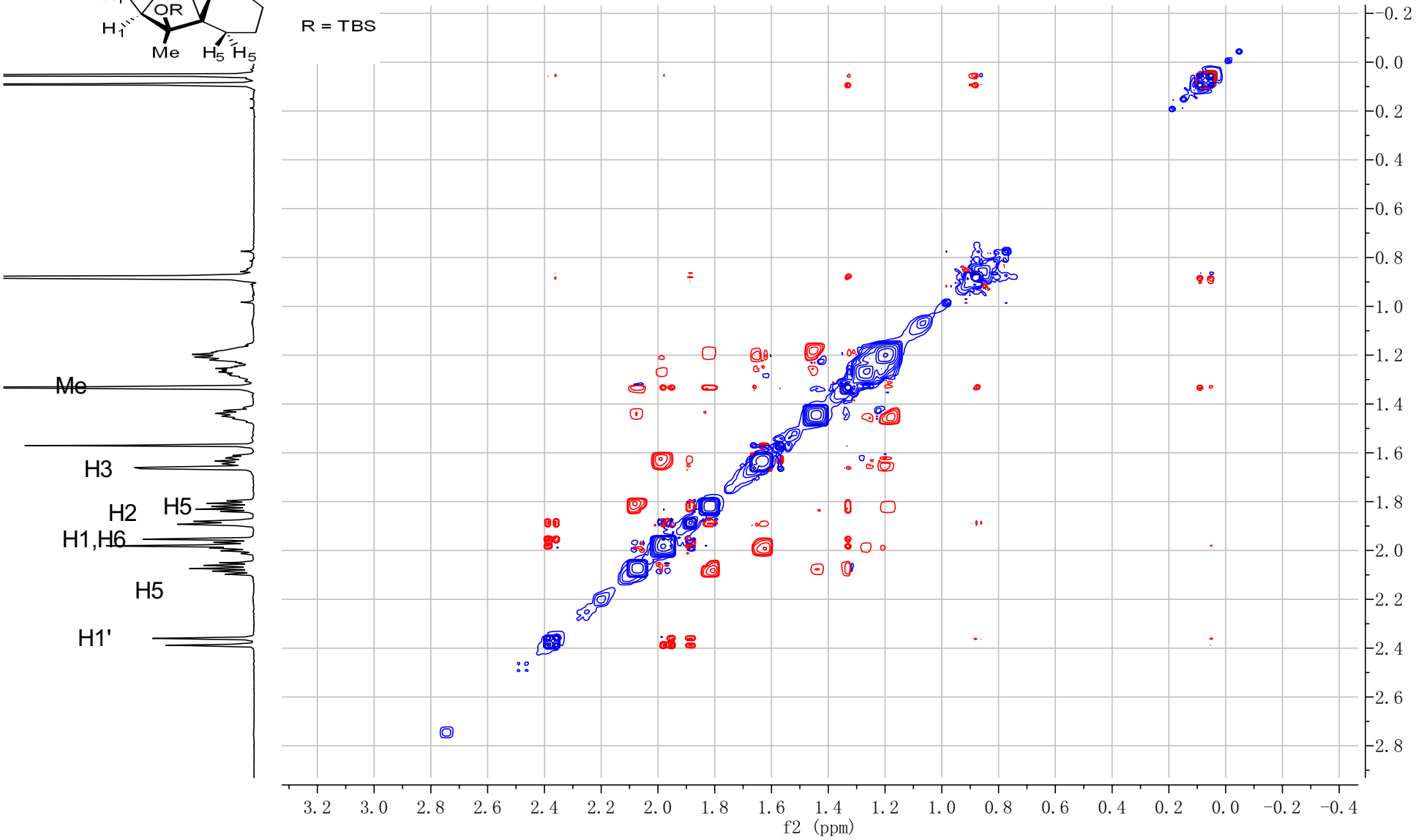
$H_{1'}$ nOe H_2,TIPS



4f

R = TBS

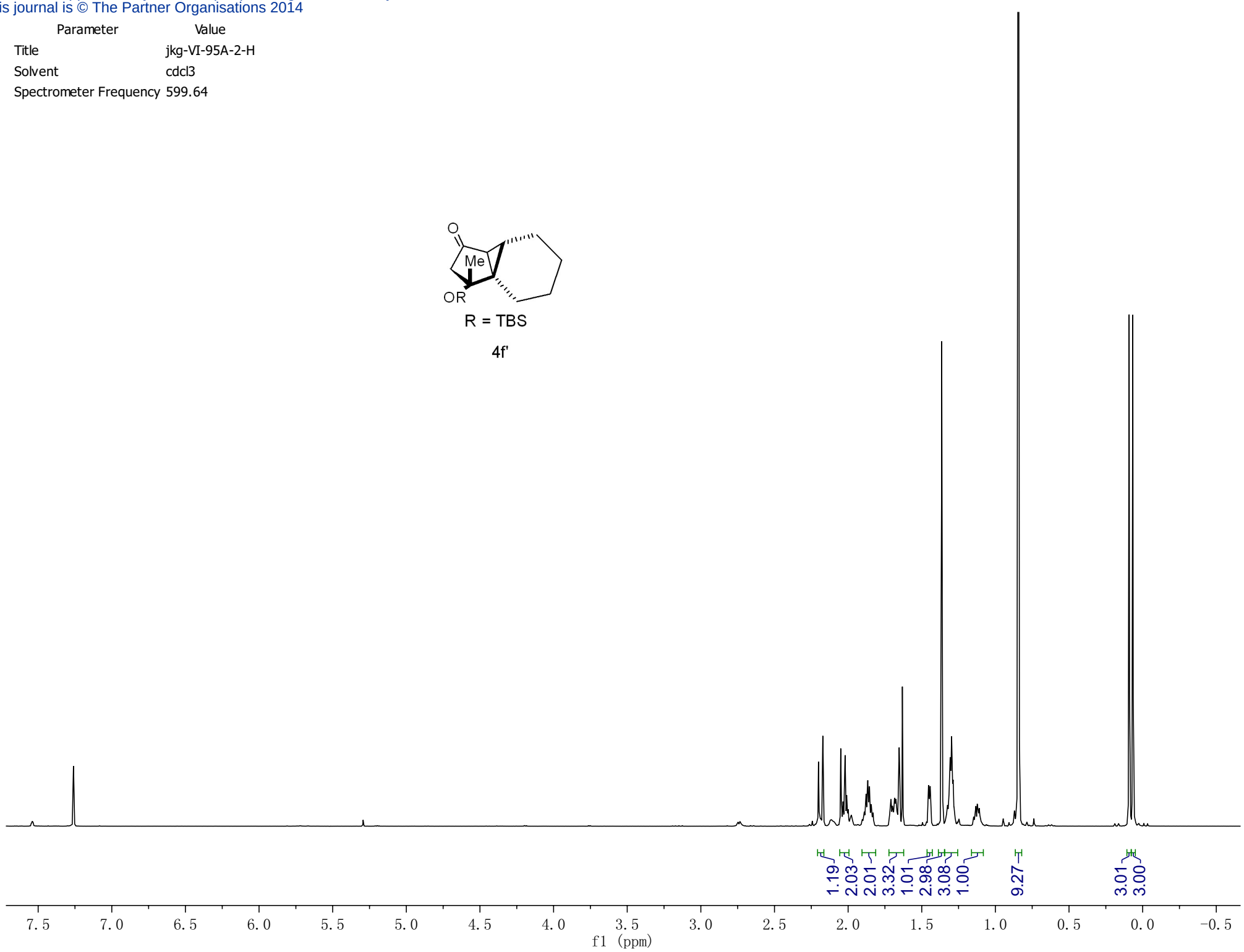




Parameter	Value
Title	jkg-VI-95A-2-H
Solvent	cdcl3
Spectrometer Frequency	599.64

R = TBS

4f'



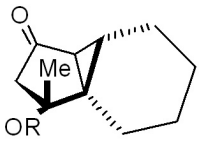
Parameter	Value
Title	jkg-VI-95A-2-C
Solvent	cdcl3
Spectrometer Frequency	150.79

212.11

79.75
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3

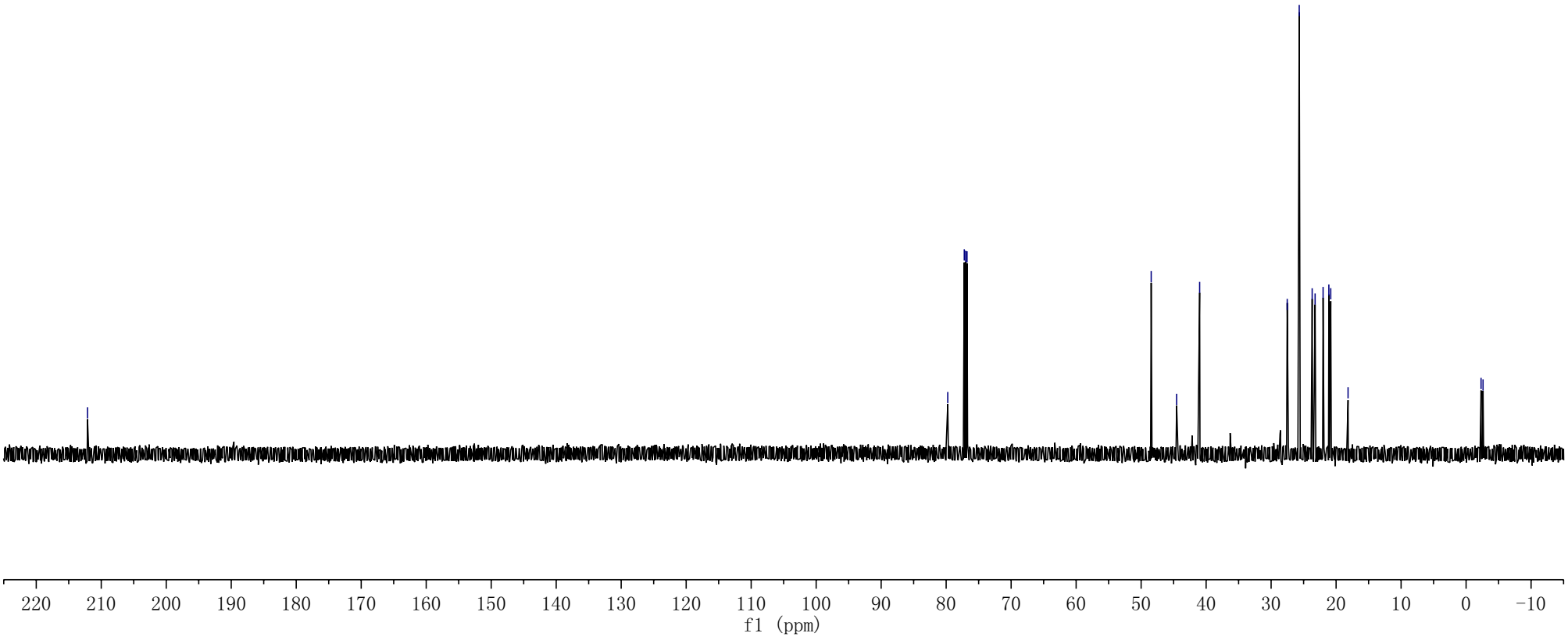
48.45
44.54
41.00
27.52
25.67
23.68
23.23
22.00
21.12
20.82
18.16

-2.30
-2.61



R = TBS

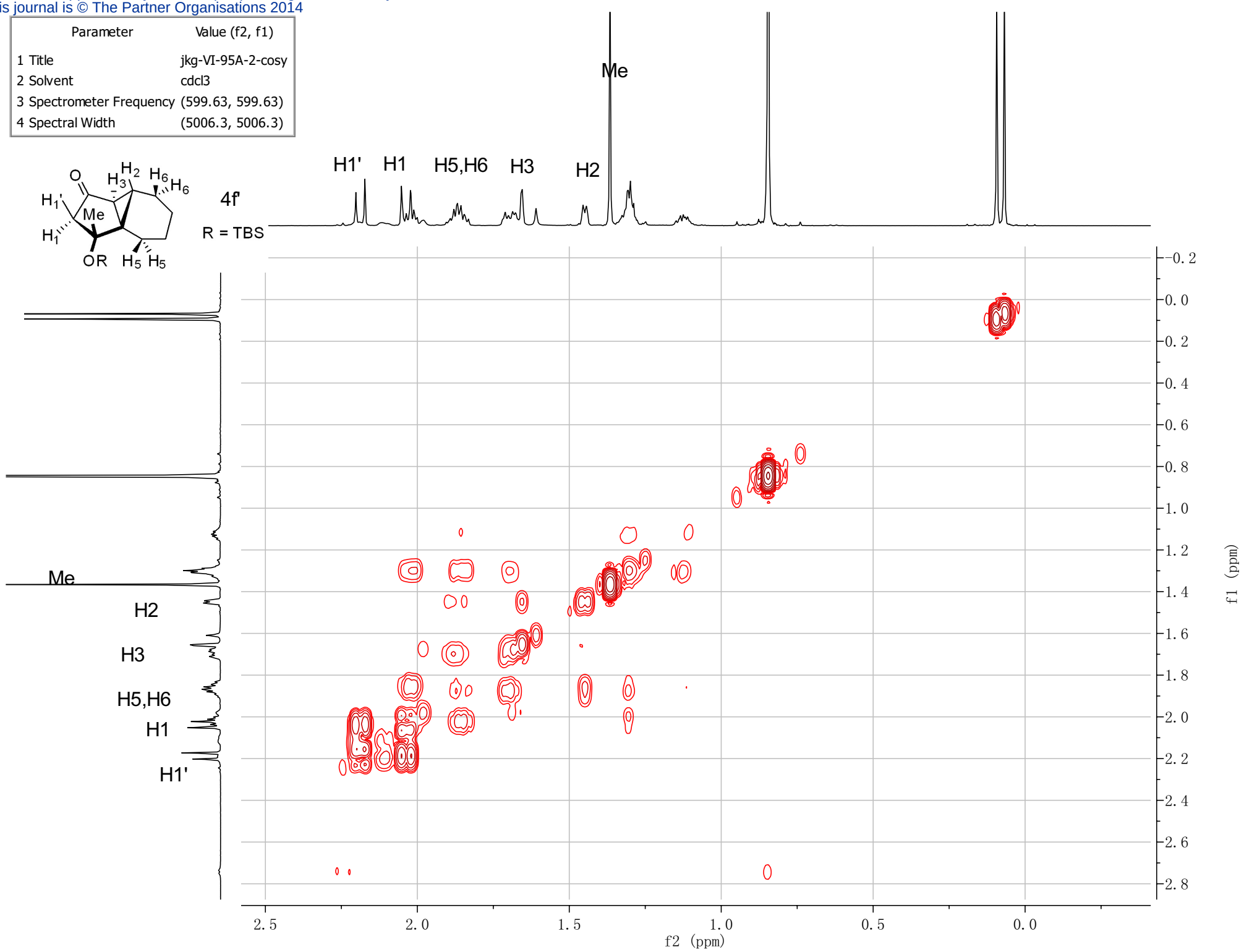
4f'



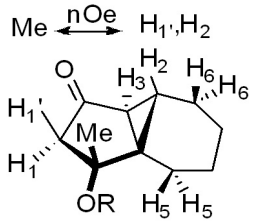
Parameter	Value (f2, f1)
1 Title	jkg-VI-95A-2-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5006.3, 5006.3)

4f'

R = TBS

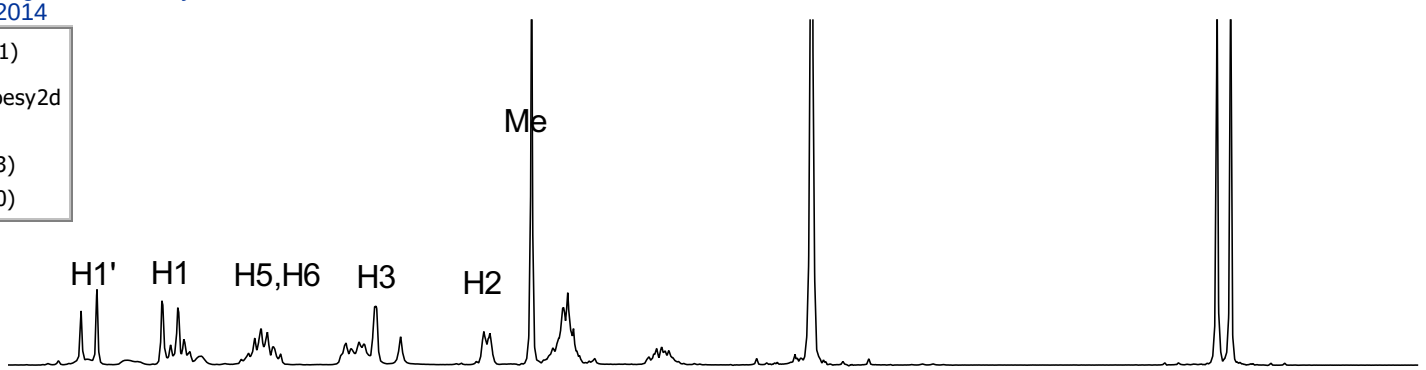


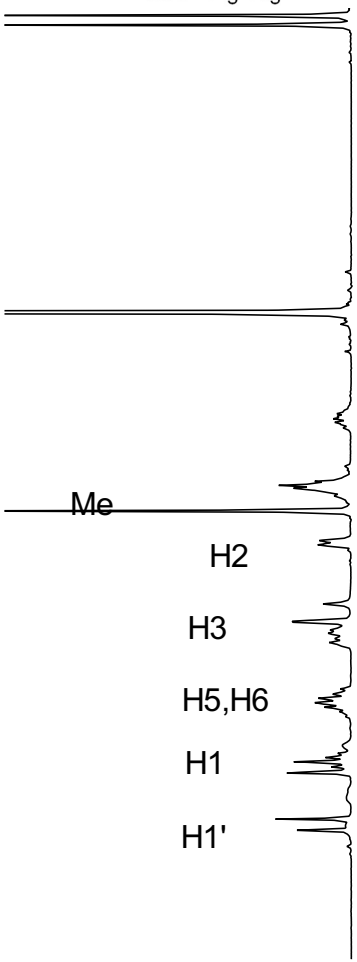
Parameter	Value (f2, f1)
1 Title	jkg-VI-95A-2-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5006.3, 5000.0)

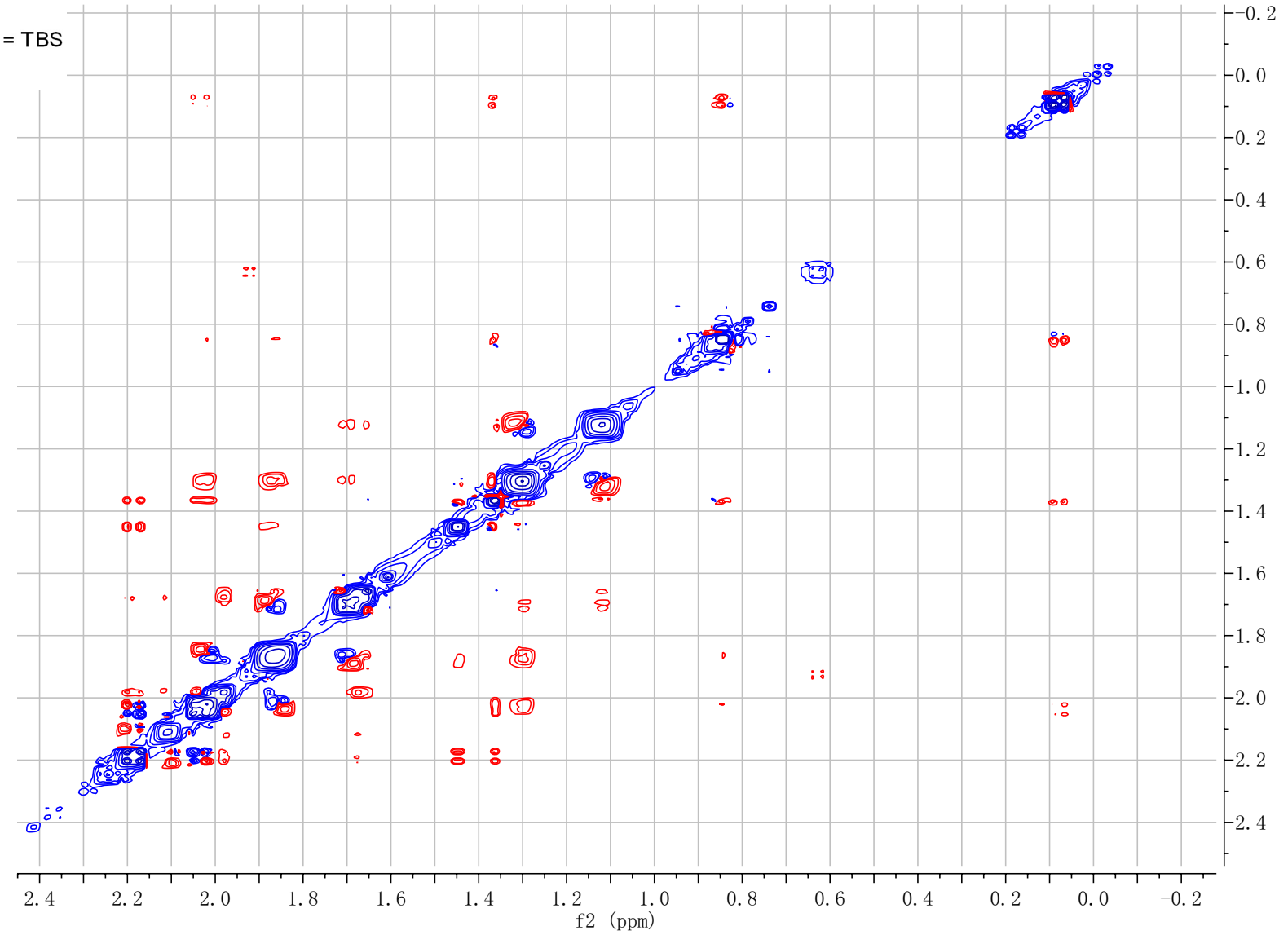


4f'

R = TBS

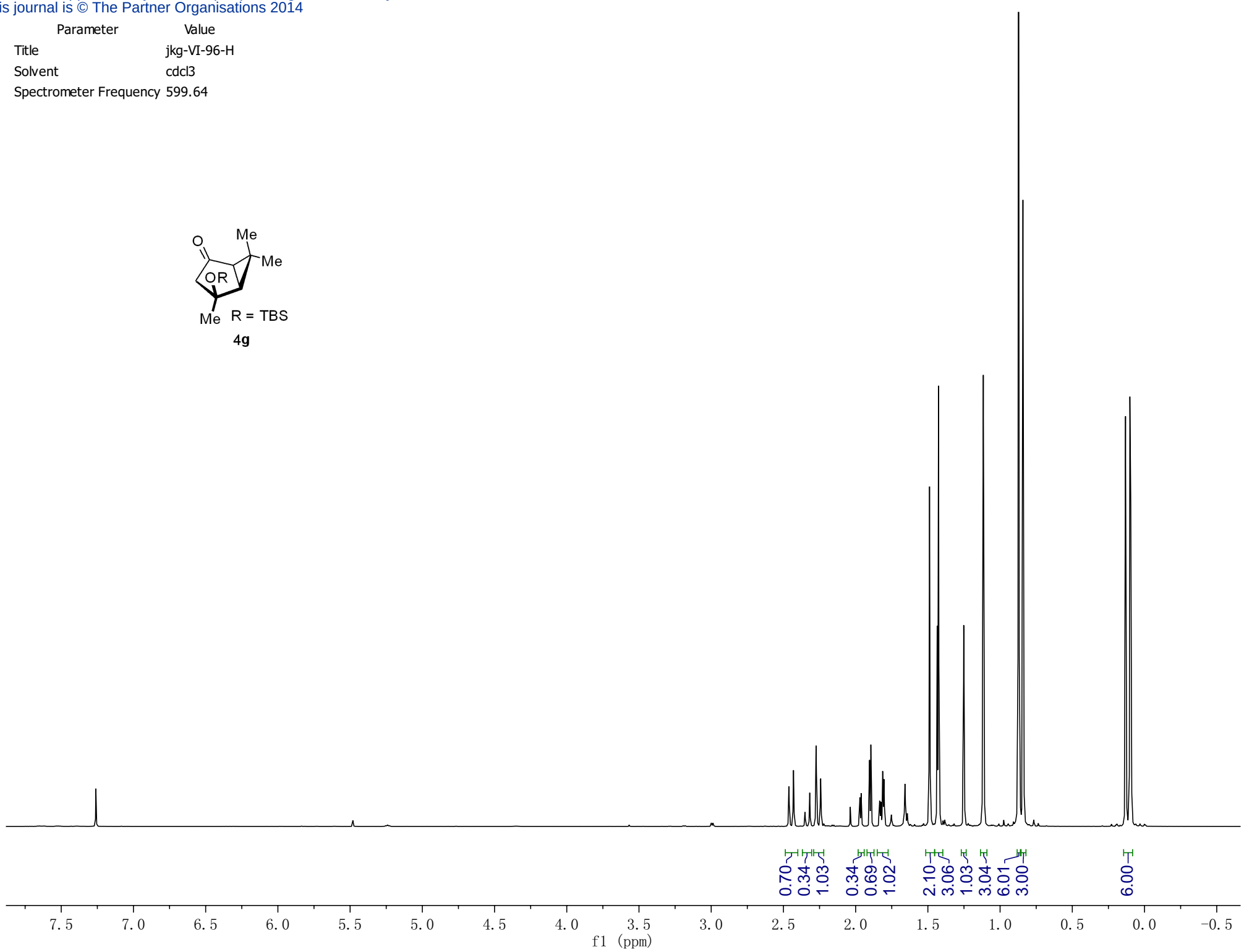






Parameter	Value
Title	jkg-VI-96-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4g



Parameter	Value
Title	jkg-VI-96-C
Solvent	cdcl3
Spectrometer Frequency	150.79

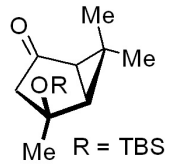
212.21
210.56

77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
75.83

53.72
53.44
48.62
47.67
44.38
42.37

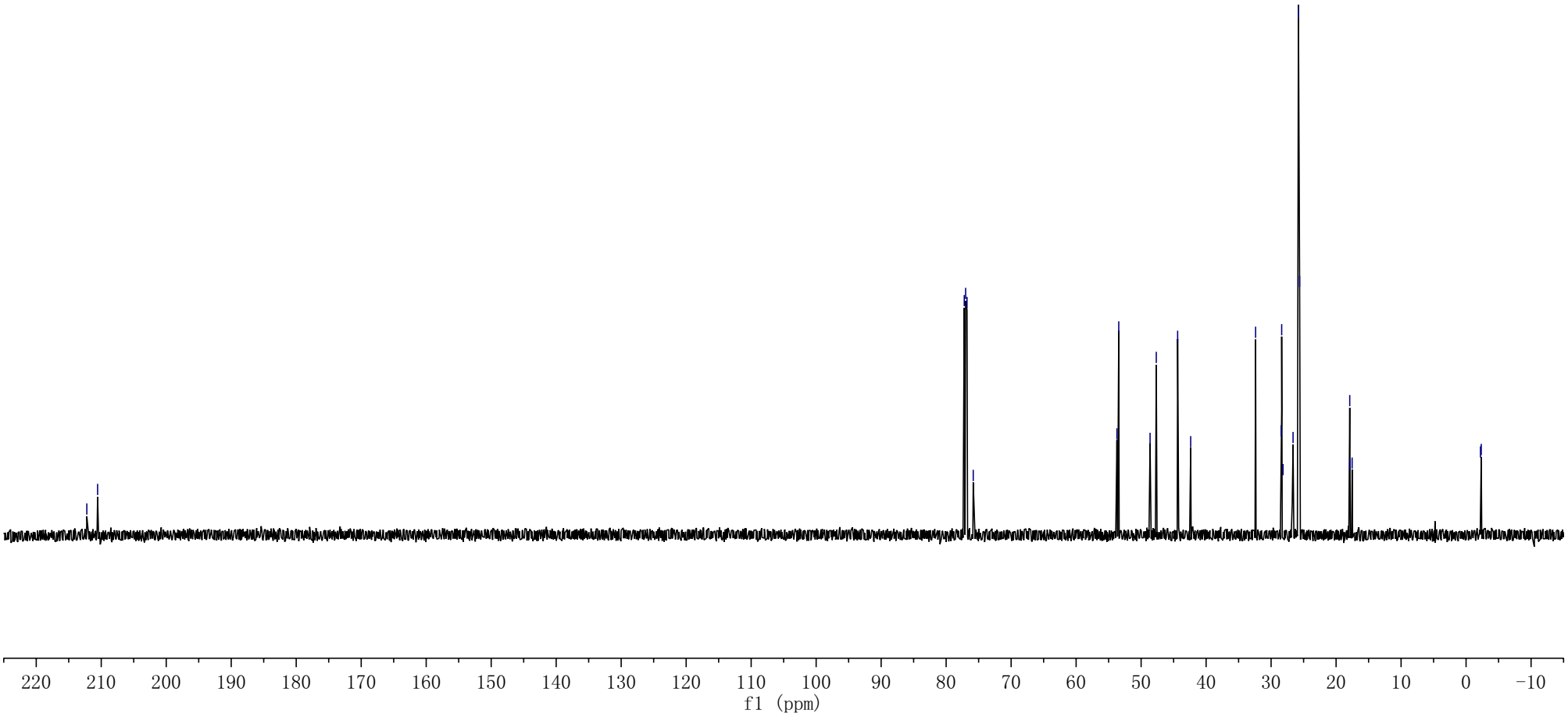
32.39
28.37
25.80
25.61
17.90
17.88
17.53

-2.22
-2.34

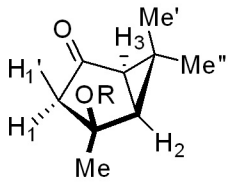


R = TBS

4g

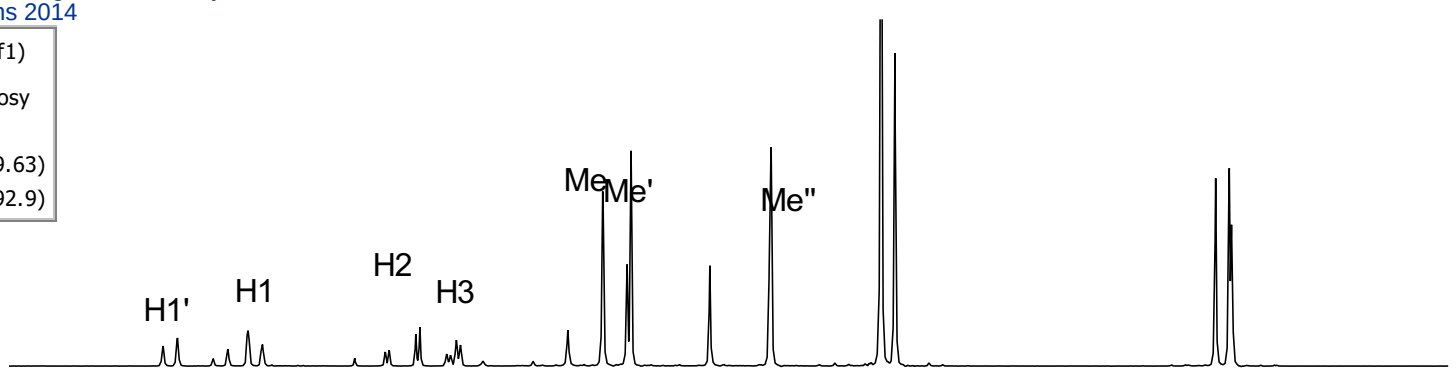


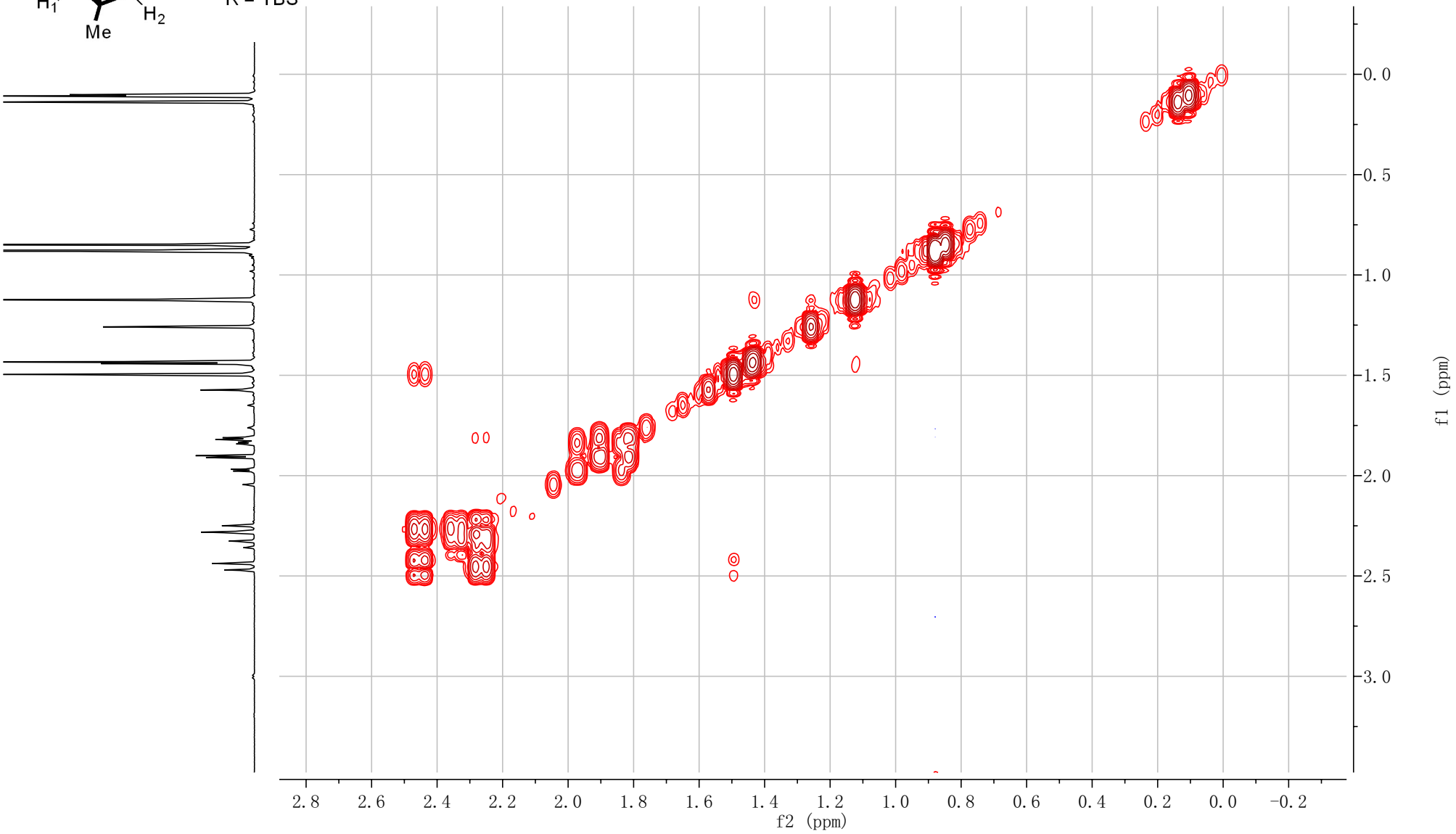
Parameter	Value (f2, f1)
1 Title	jkg-VI-96p-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5092.9, 5092.9)



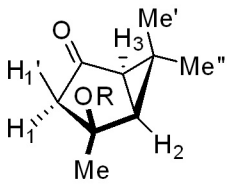
4g

R = TBS

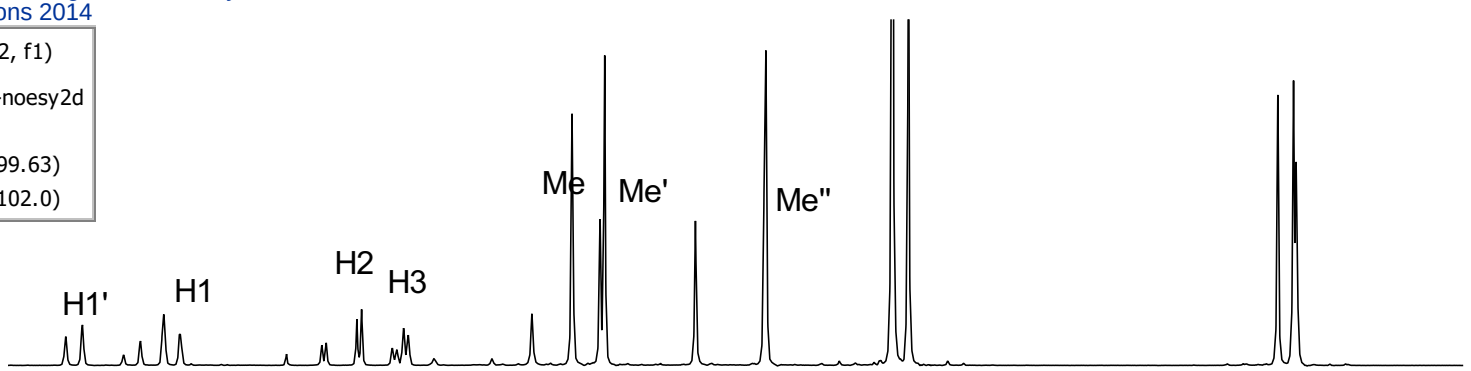


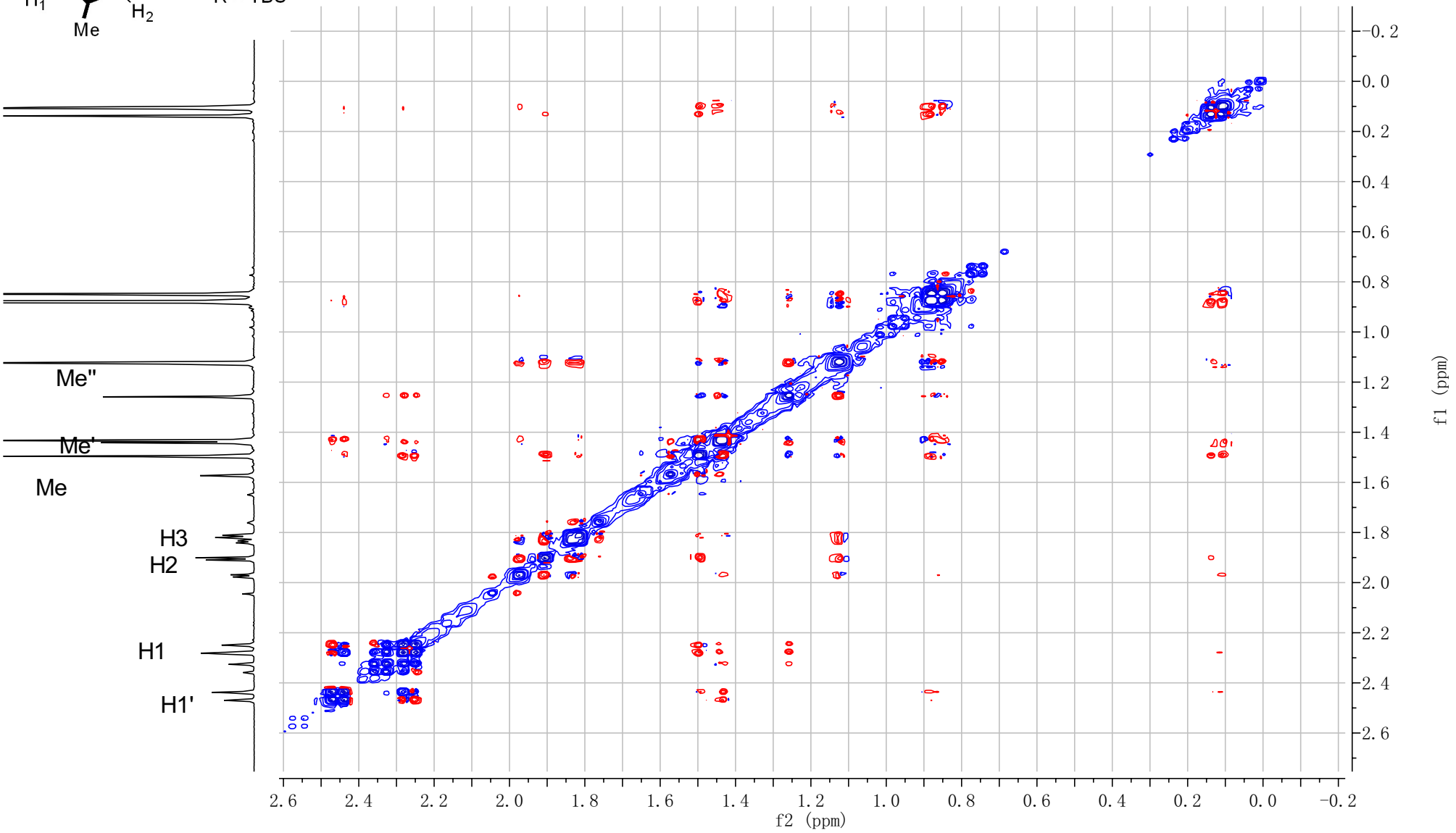


Parameter	Value (f2, f1)
1 Title	jkg-VI-96p-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5092.9, 5102.0)



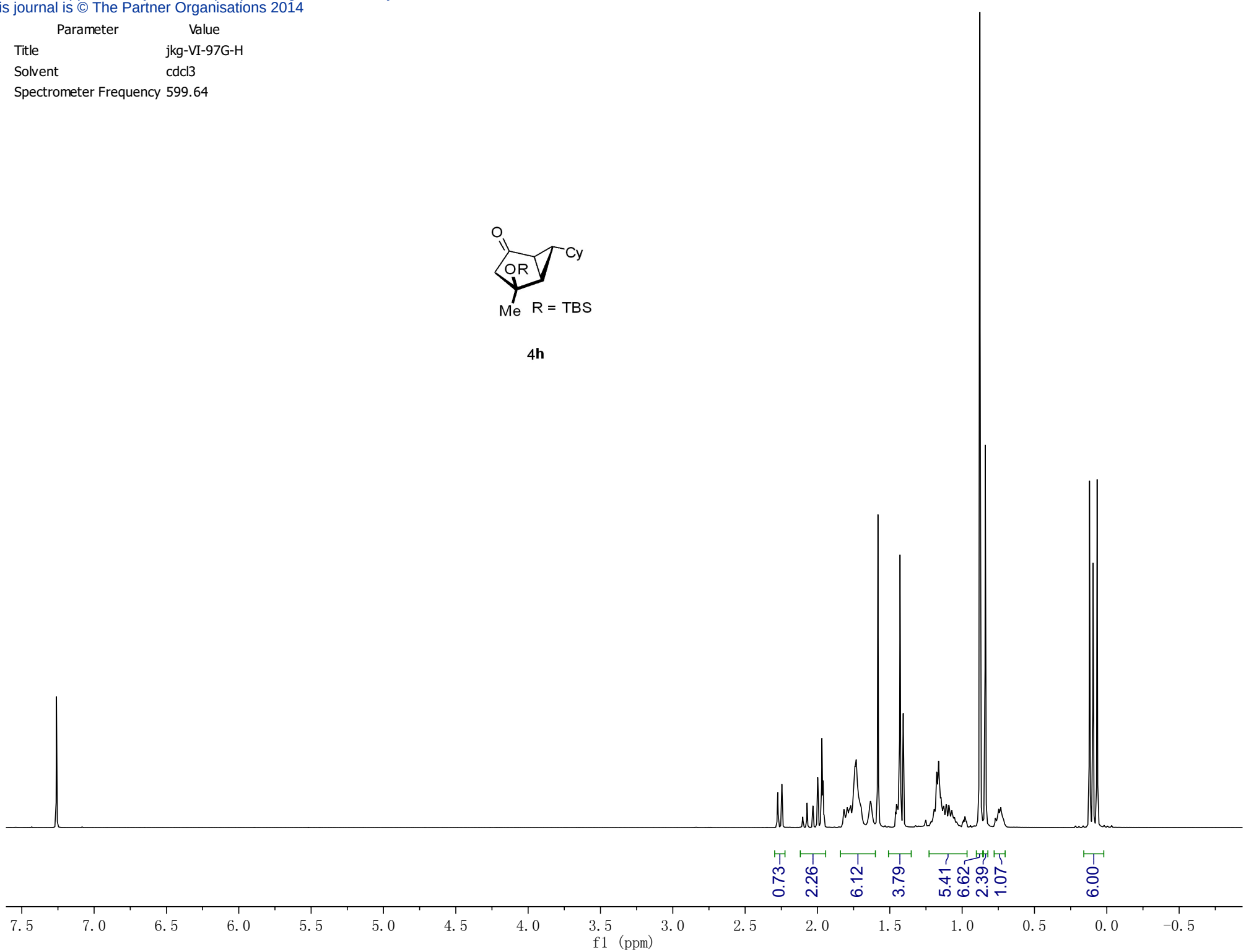
4g
R = TBS





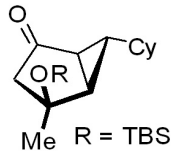
Parameter	Value
Title	jkg-VI-97G-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4h

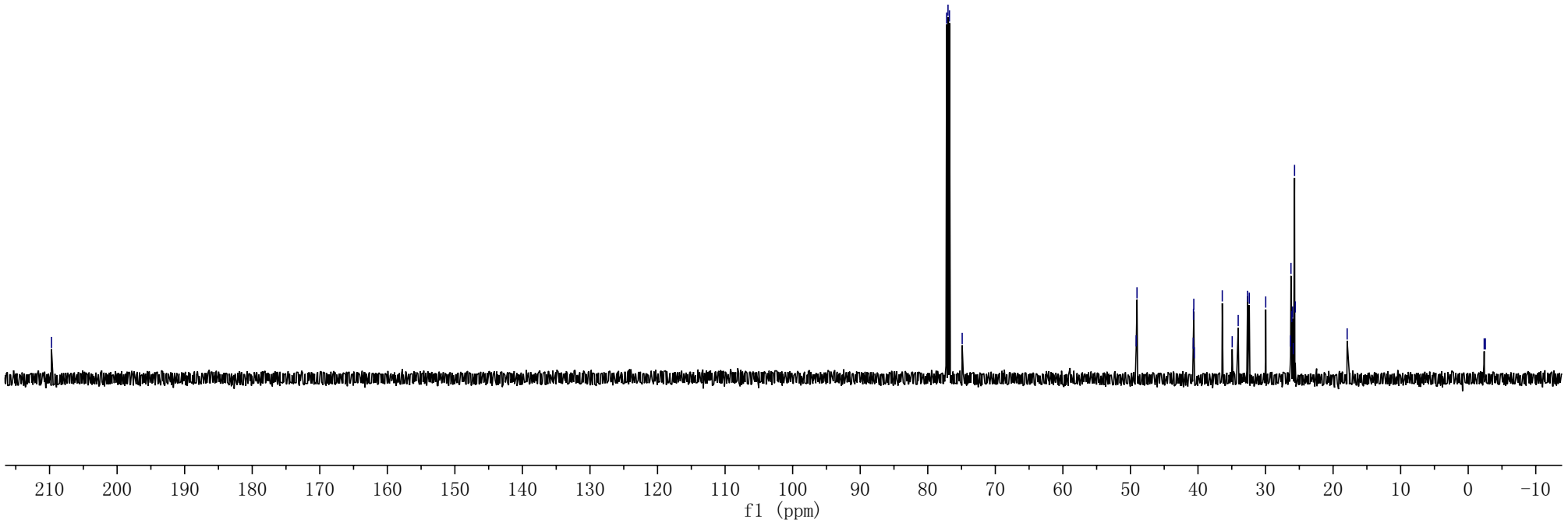


Parameter	Value
Title	jkg-VI-97G-C
Solvent	cdcl3
Spectrometer Frequency	150.79

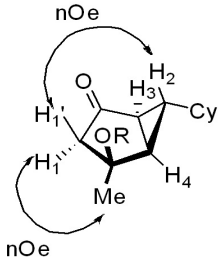
209.71
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
74.90
49.15
49.03
40.62
36.40
32.67
32.41
29.97
26.23
25.70
17.92
-2.37
-2.54



4h

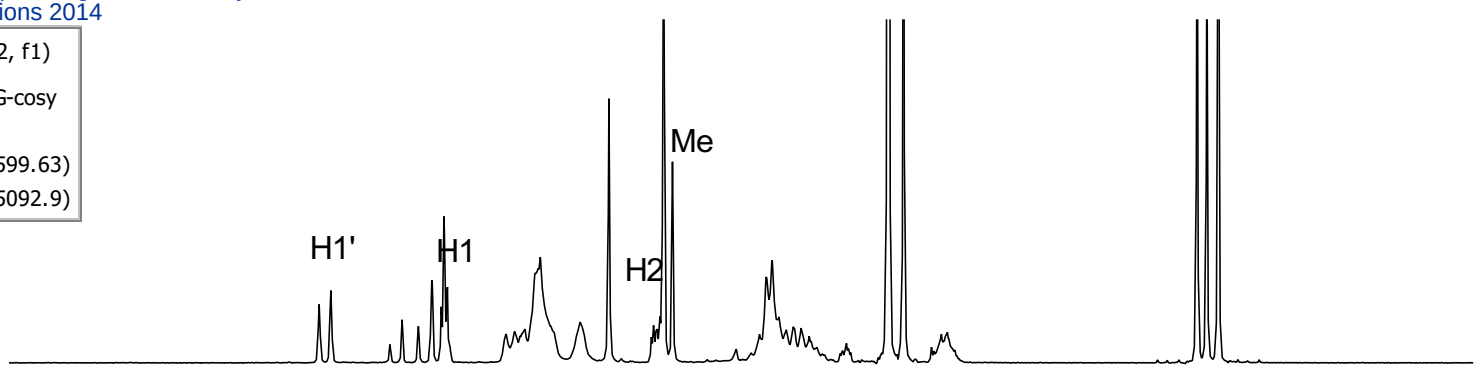


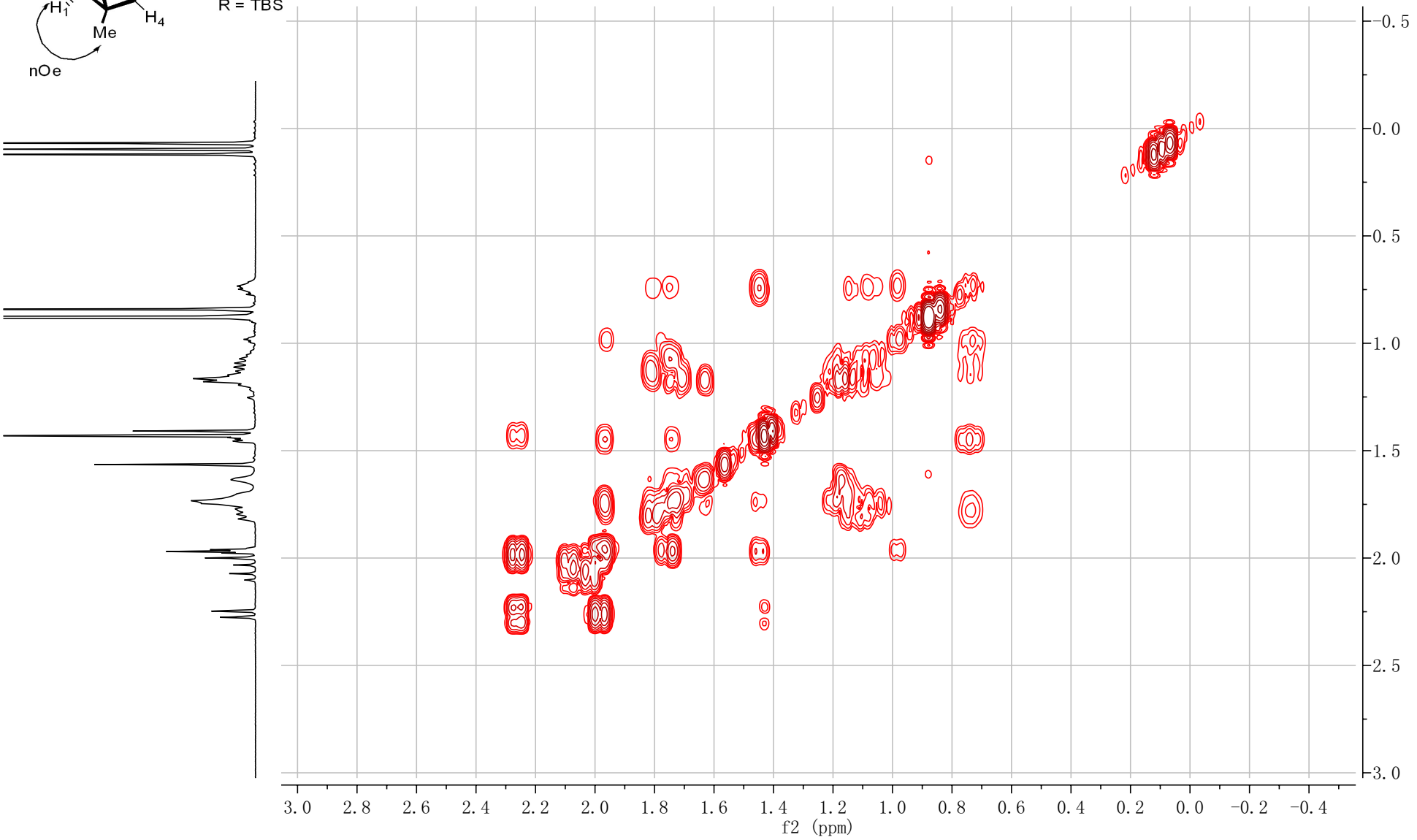
Parameter	Value (f2, f1)
1 Title	jkg-VI-97G-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5092.9, 5092.9)



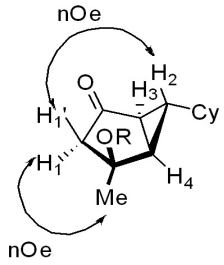
4h

R = TBS



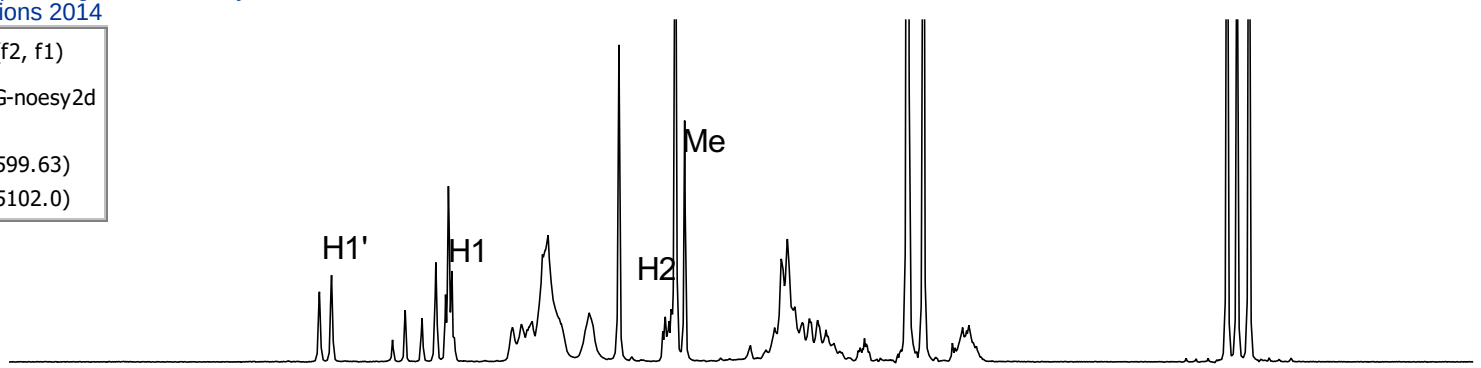


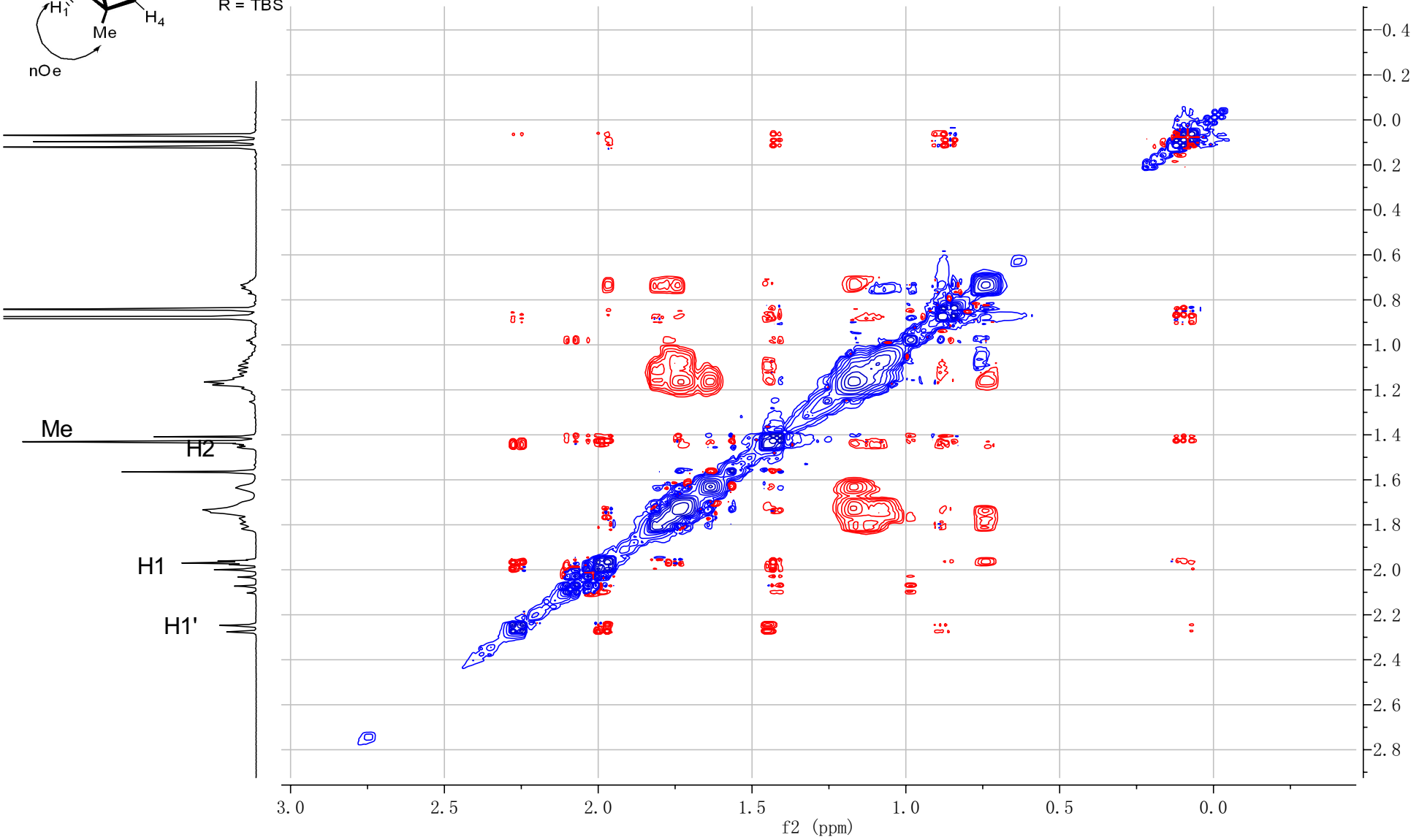
Parameter	Value (f2, f1)
1 Title	jkg-VI-97G-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5092.9, 5102.0)



4h

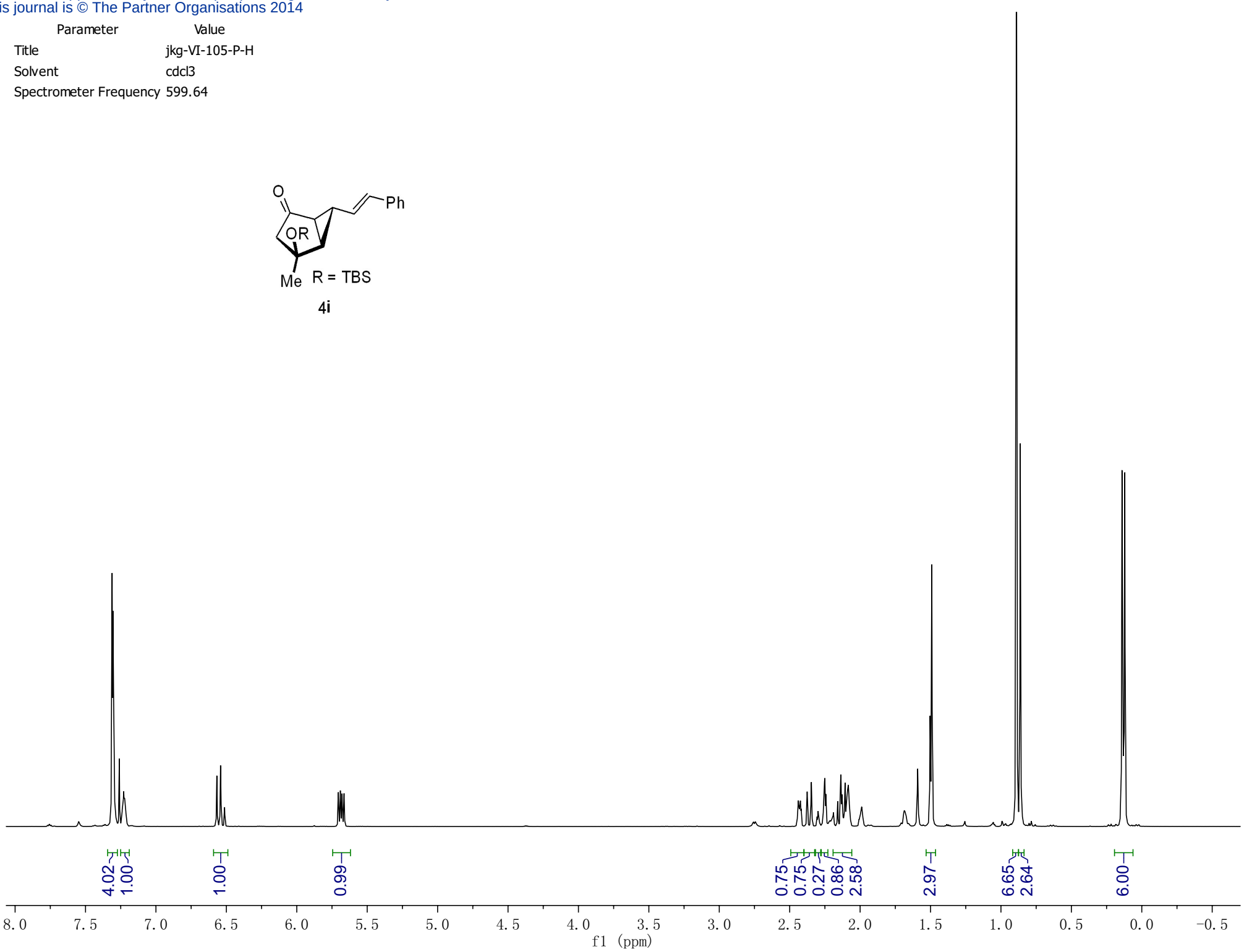
R = TBS





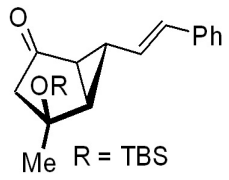
Parameter	Value
Title	jkg-VI-105-P-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4i

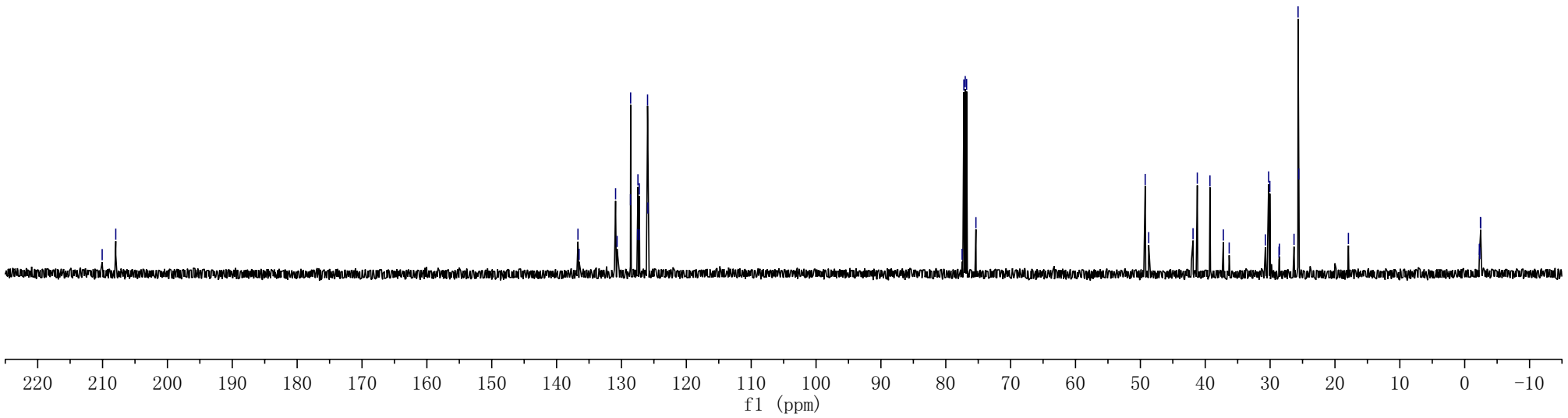


Parameter	Value
Title	jkg-VI-105-P-C
Solvent	cdcl3
Spectrometer Frequency	150.79

210.06
207.96
136.71
136.53
130.91
130.67
128.61
128.59
127.51
127.46
127.25
127.22
125.98
125.93
77.49
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
75.35
49.26
48.71
41.88
41.22
39.27
37.21
36.31
30.73
30.23
30.04
26.31
25.69
25.59
17.93
-2.26
-2.33
-2.43
-2.47



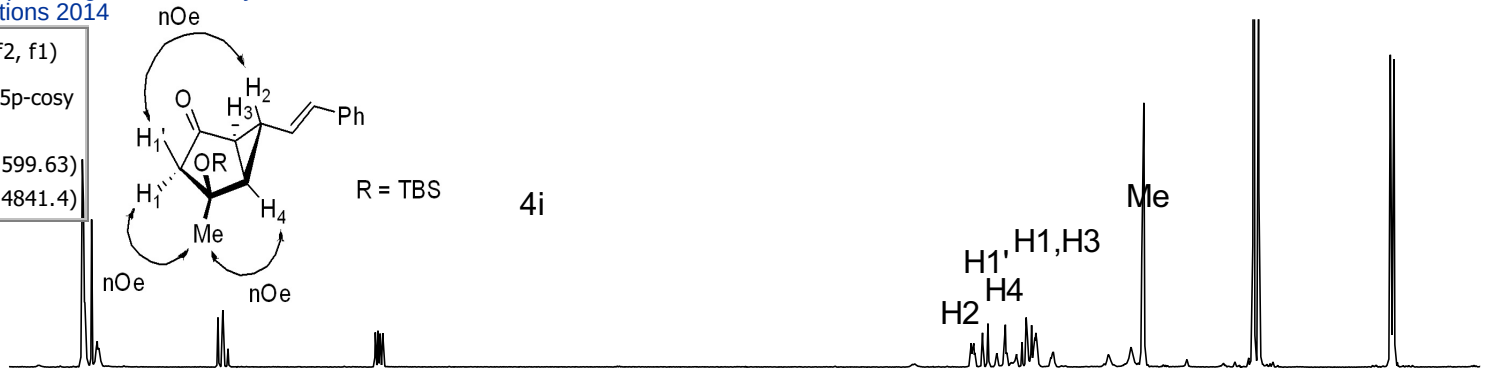
4i

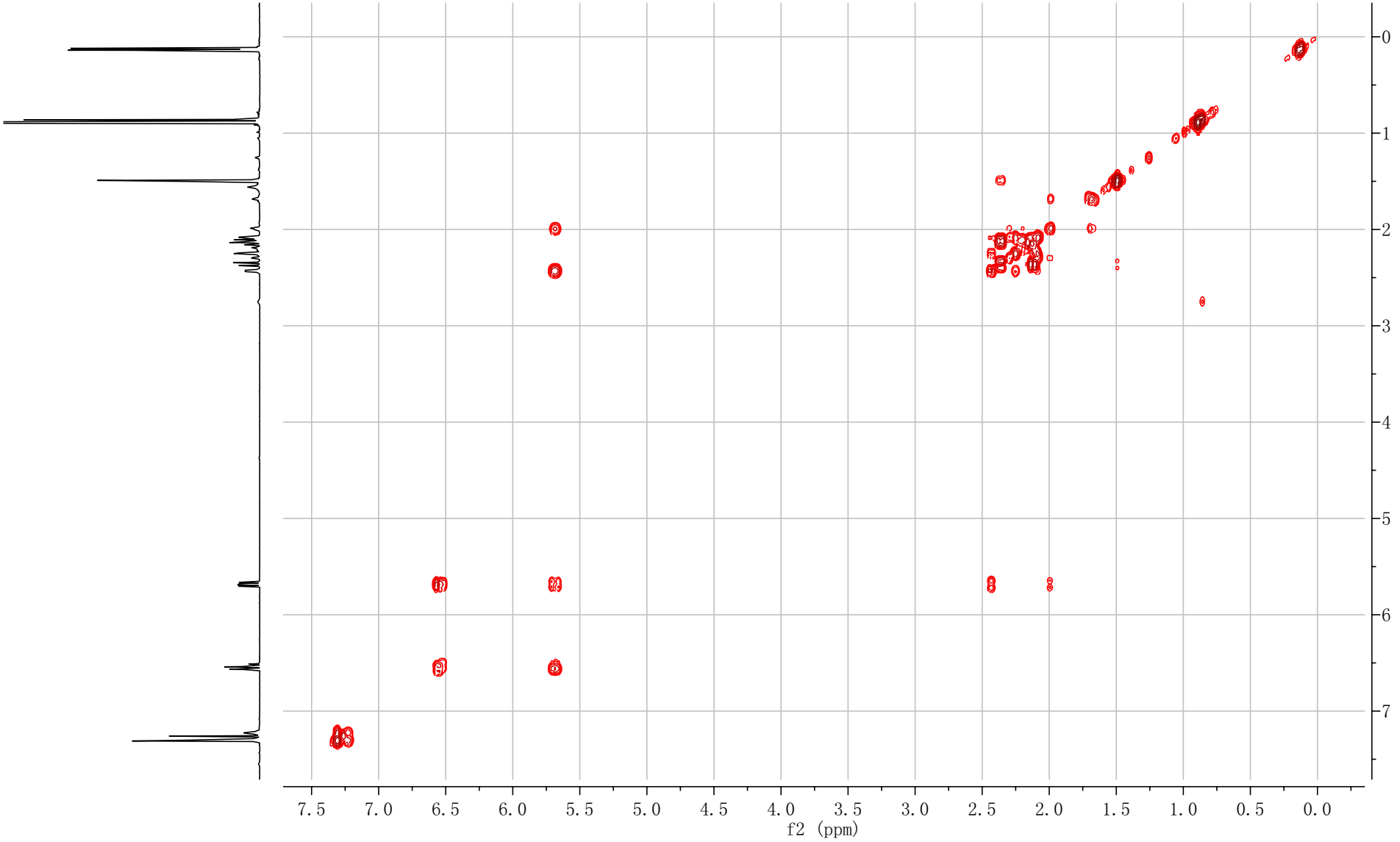


Parameter	Value (f2, f1)
1 Title	jkg-VI-105p-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4841.4)

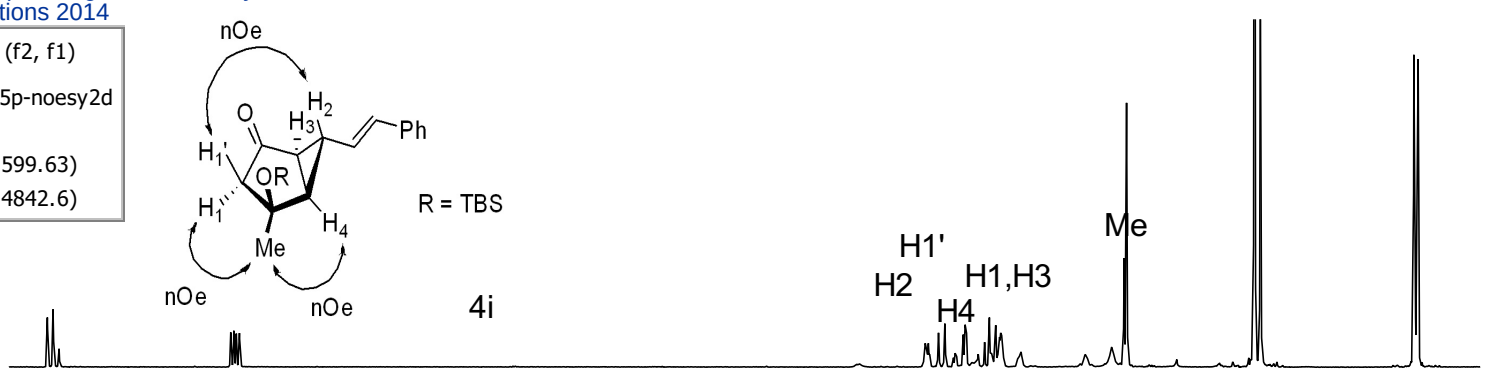
R = TBS

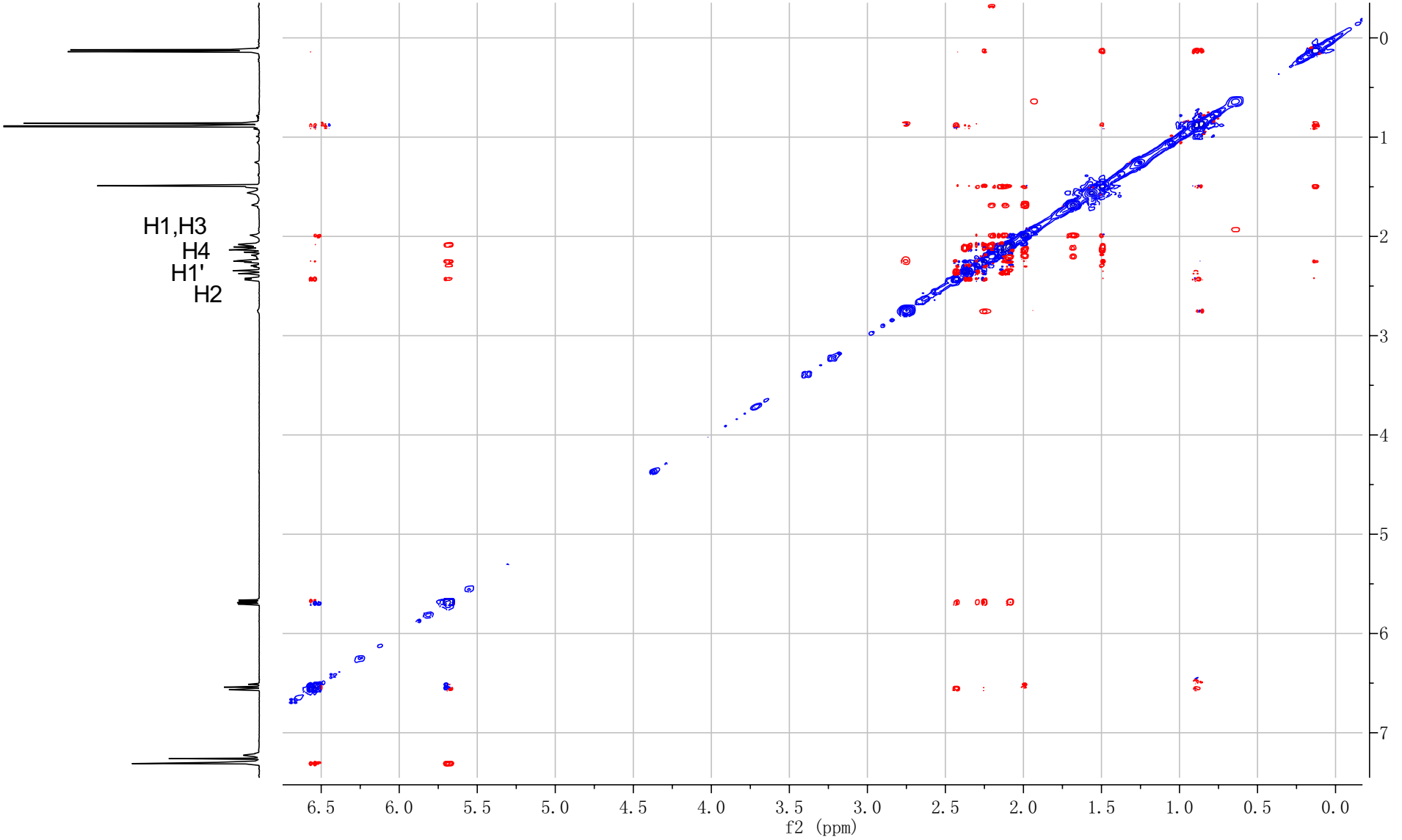
4i





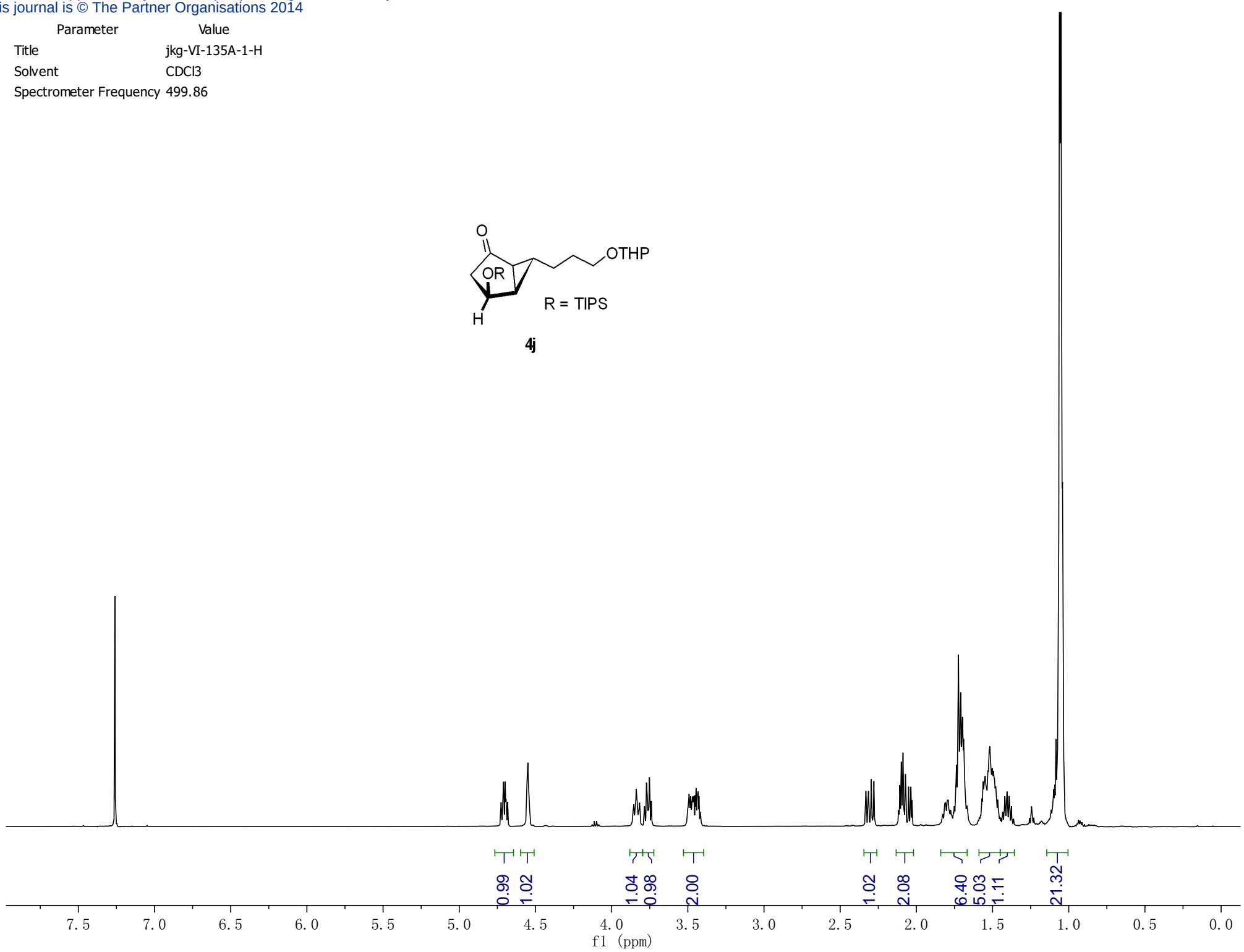
Parameter	Value (f2, f1)
1 Title	jkg-VI-105p-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4841.4, 4842.6)





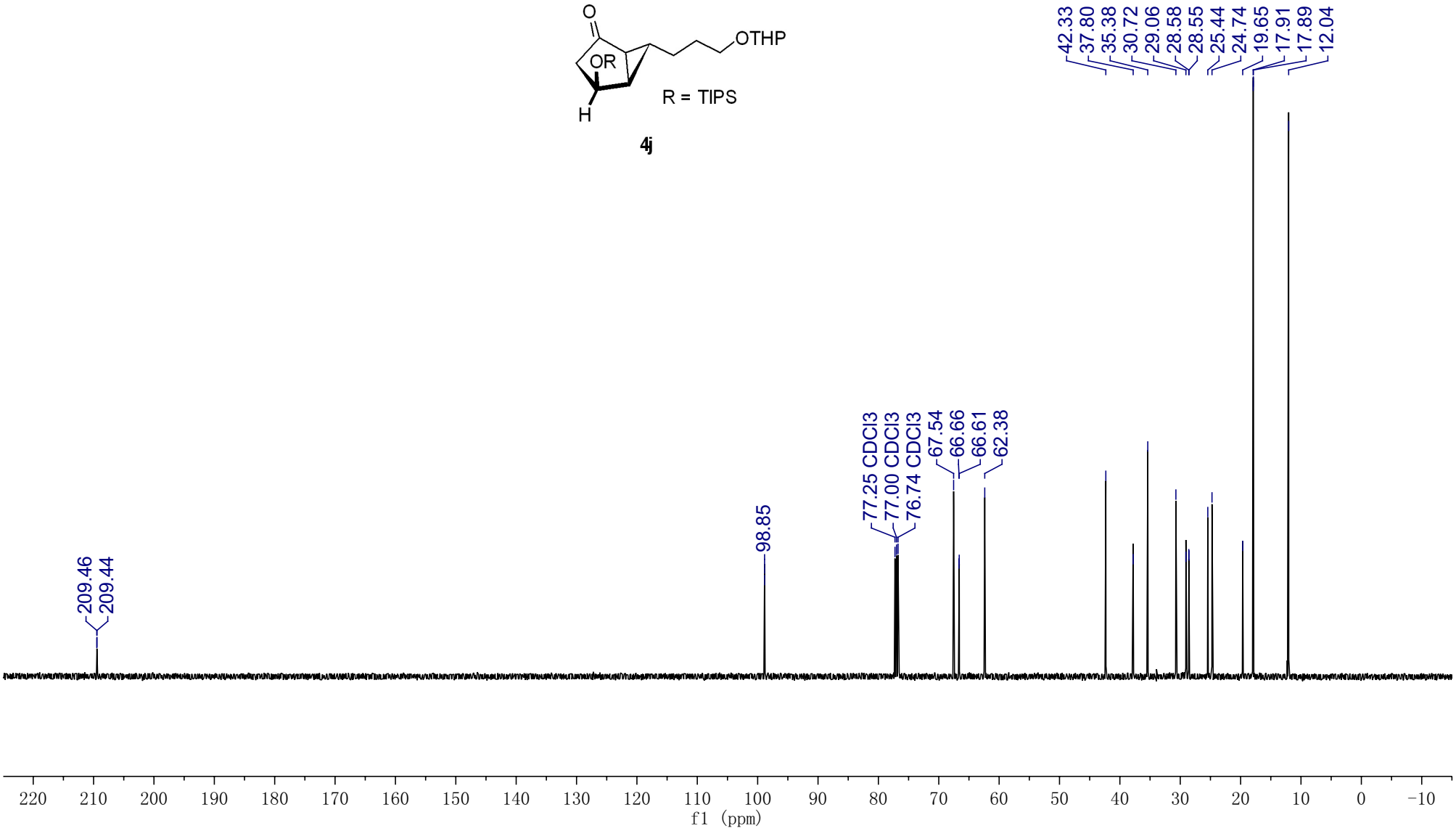
Parameter	Value
Title	jkg-VI-135A-1-H
Solvent	CDCl3
Spectrometer Frequency	499.86

4j



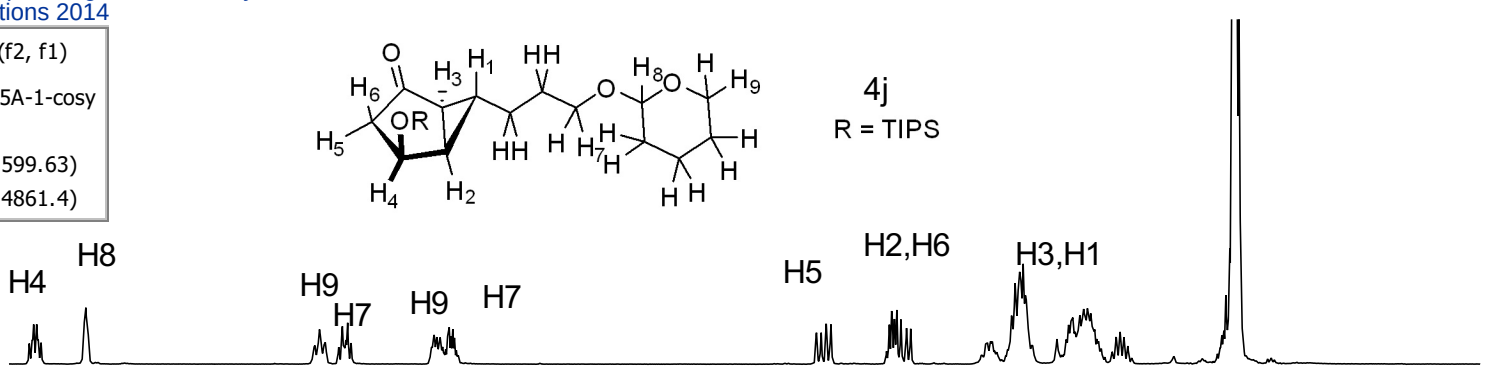
Parameter	Value
Title	jkg-VI-135A-1-C1
Solvent	CDCl3
Spectrometer Frequency	125.70

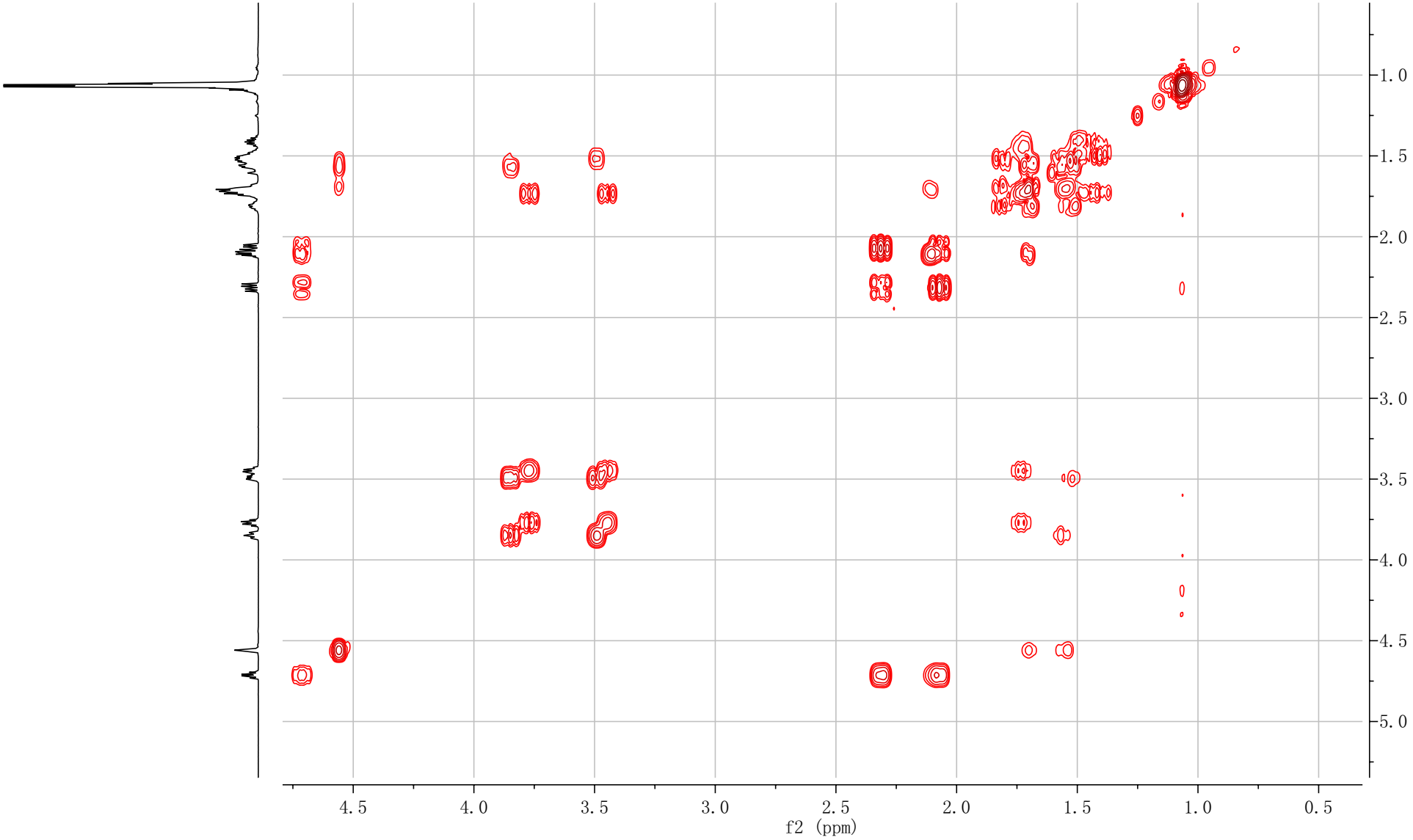
4j



Parameter	Value (f2, f1)
1 Title	jkg-VI-135A-1-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4861.4, 4861.4)

4j
R = TIPS





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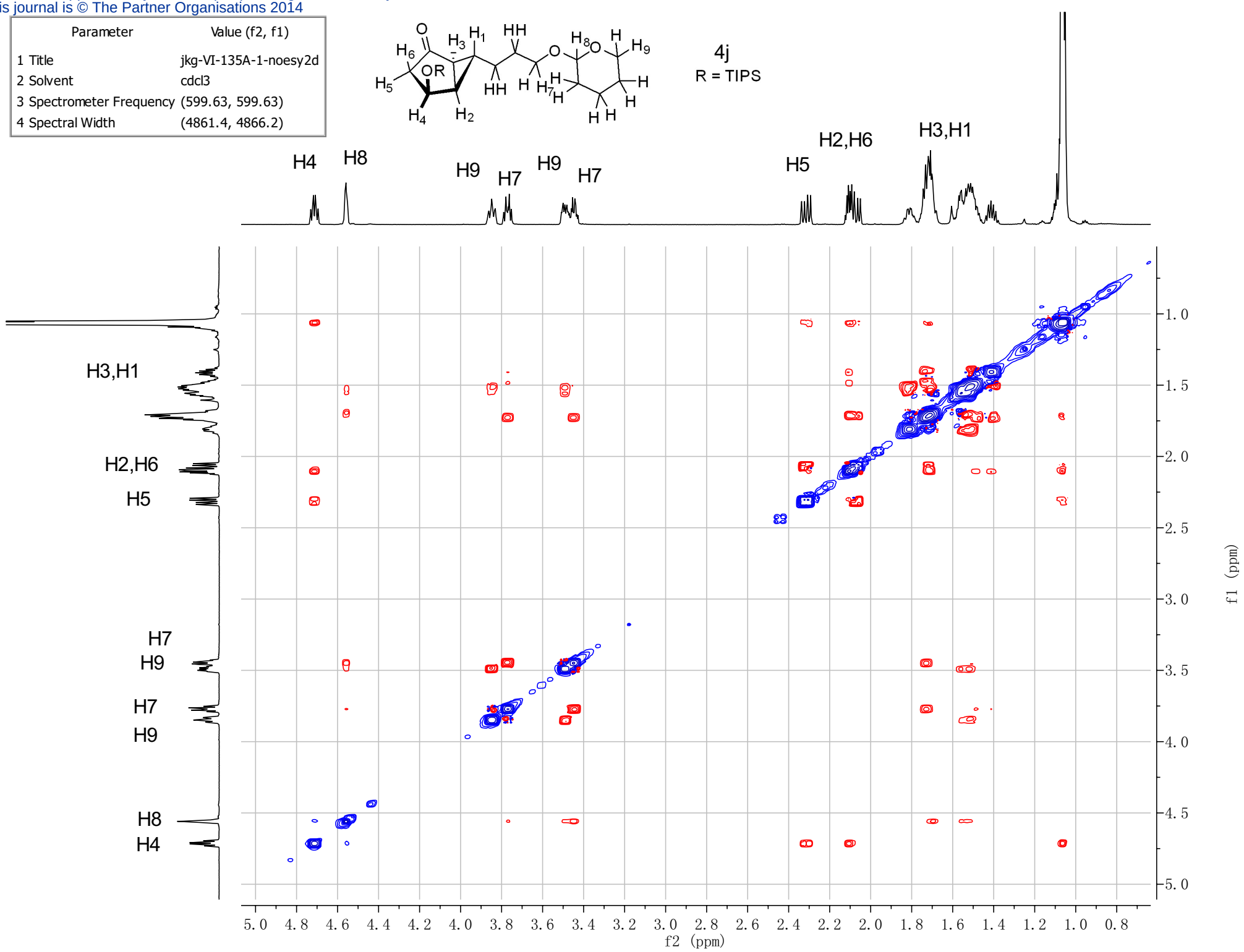
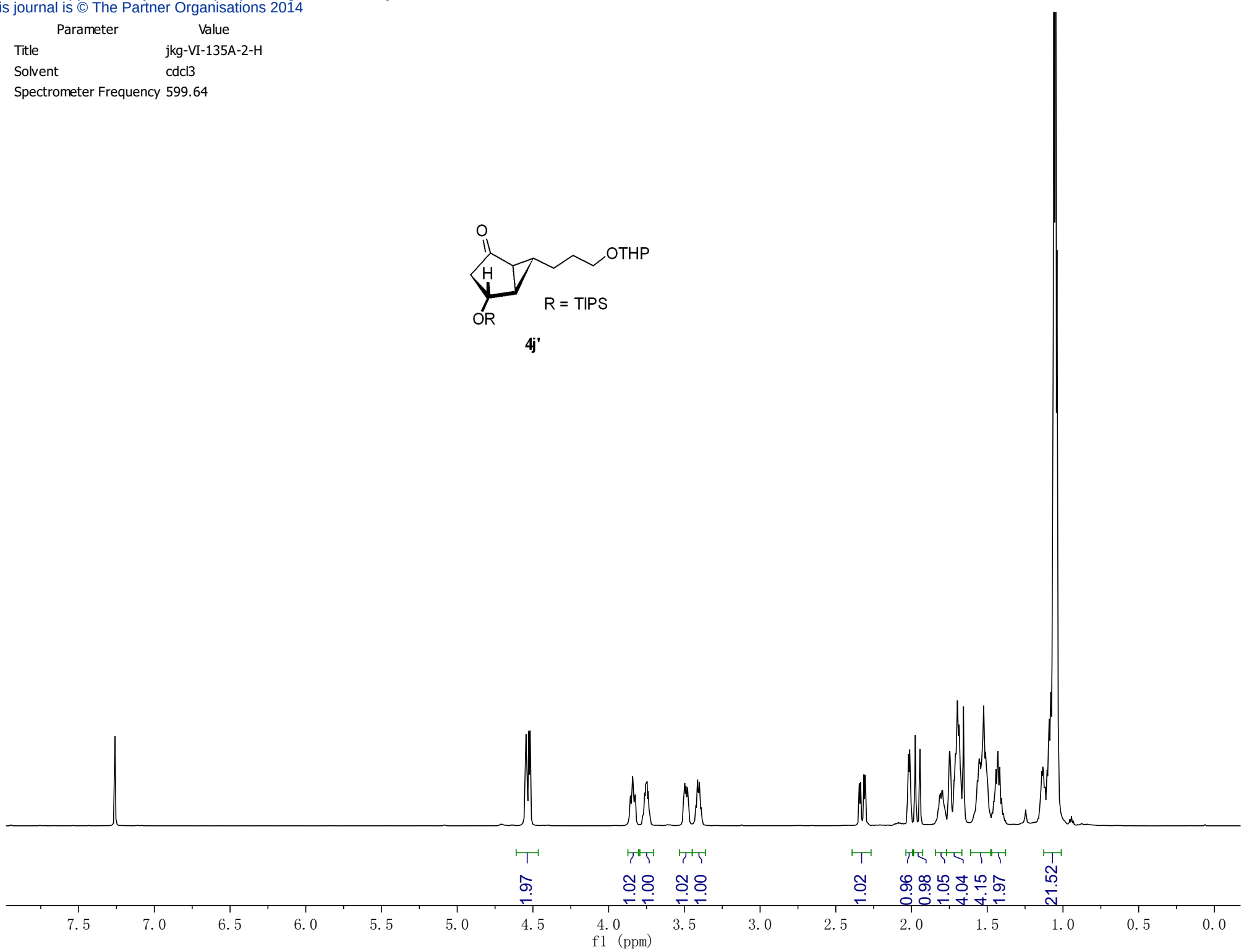
Parameter	Value (f2, f1)
1 Title	jkg-VI-135A-1-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4861.4, 4866.2)

4j
R = TIPS



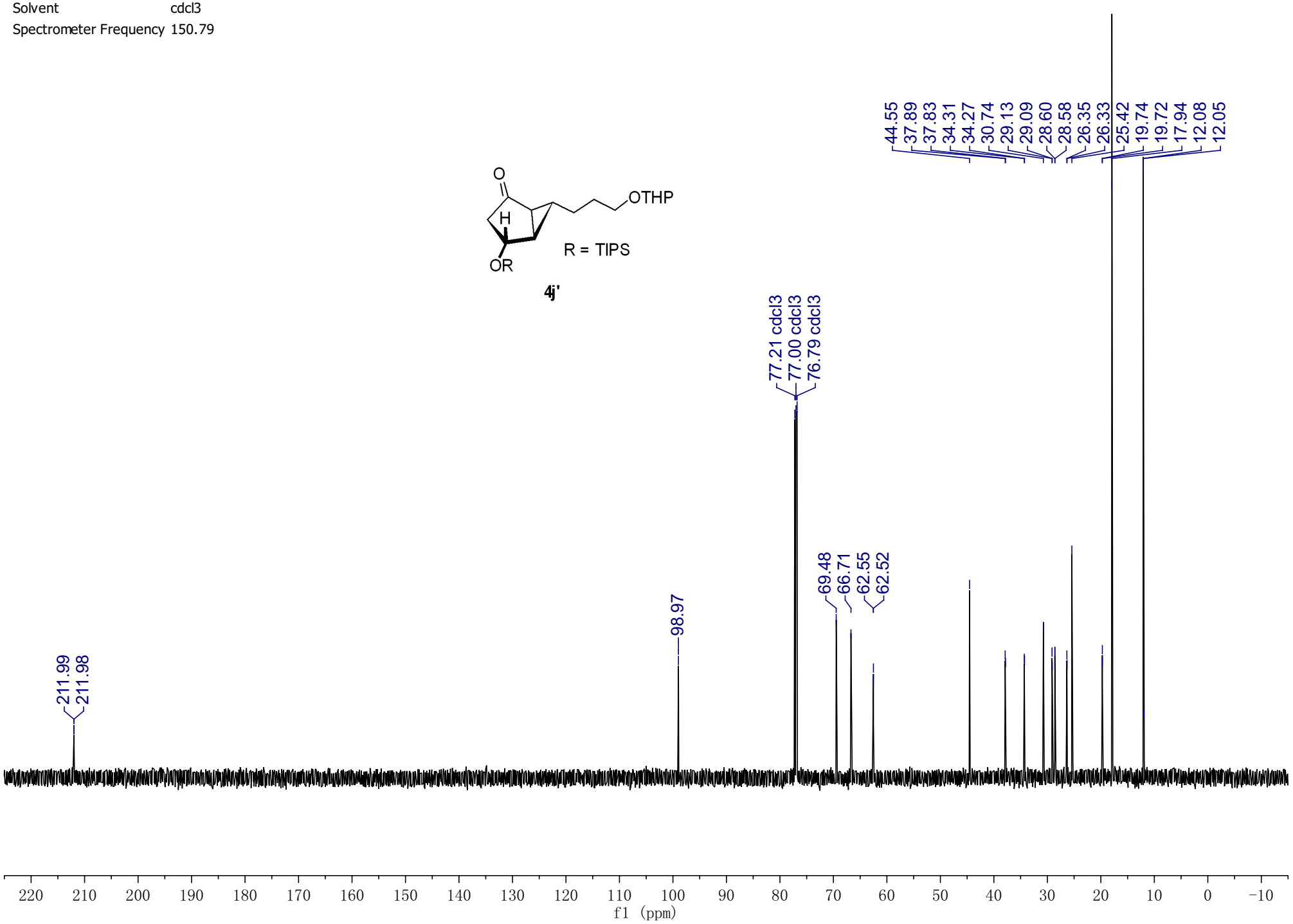
Parameter	Value
Title	jkg-VI-135A-2-H
Solvent	cdcl3
Spectrometer Frequency	599.64

4j'

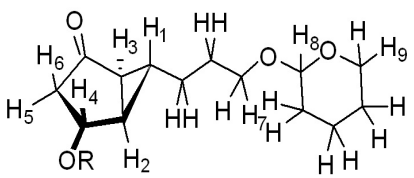


Parameter	Value
Title	jkg-VI-135A-2-C
Solvent	cdcl3
Spectrometer Frequency	150.79

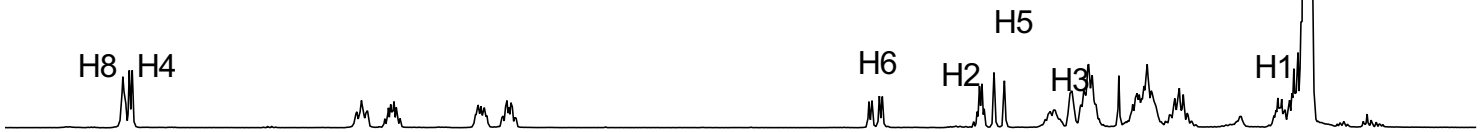
4j'

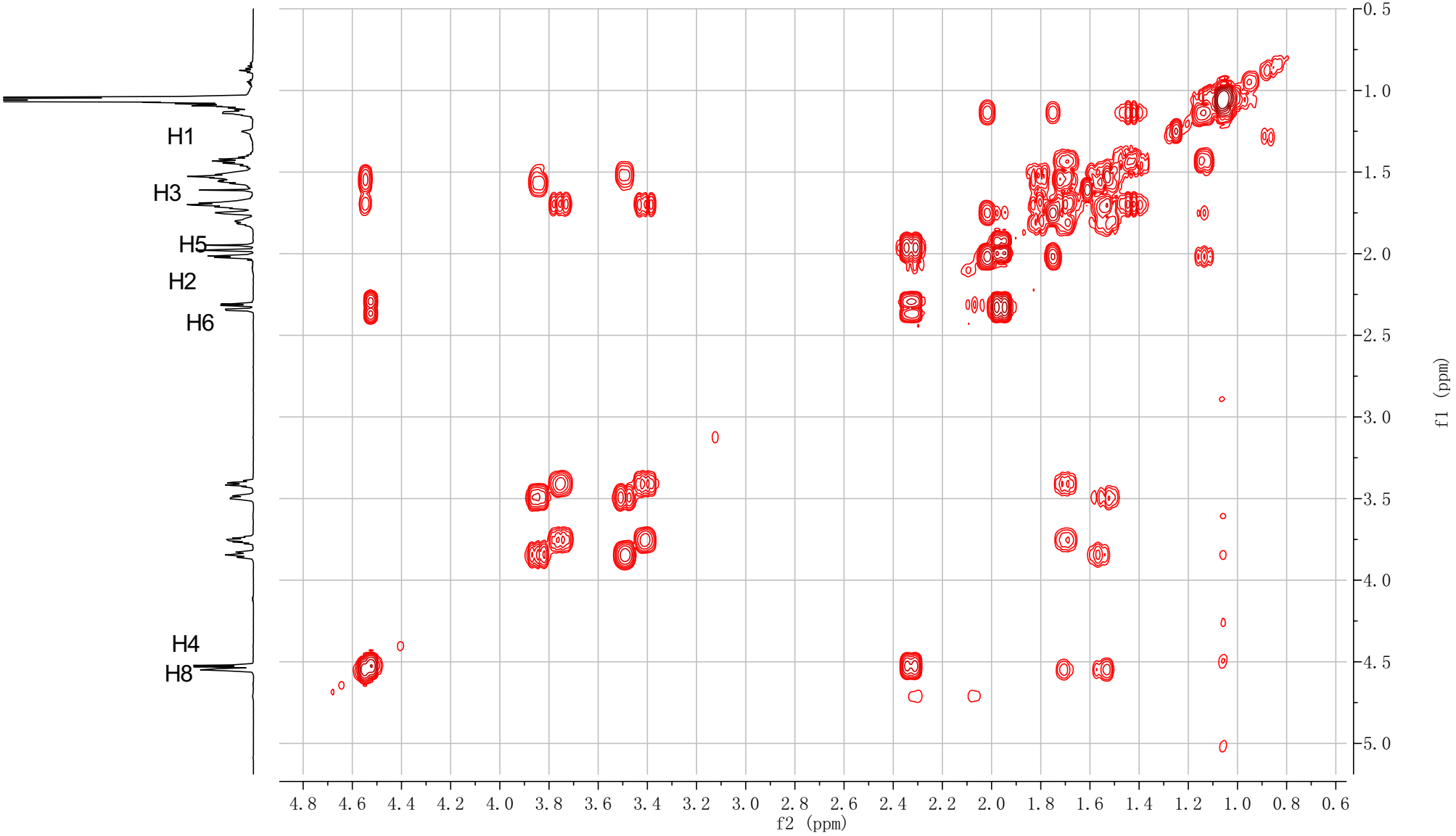


Parameter	Value (f2, f1)
1 Title	jkg-VI-135A-2-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5071.0, 5071.0)

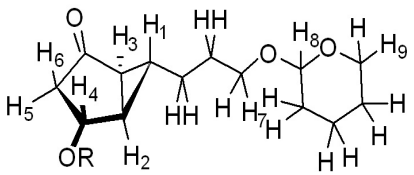


4j'
R = TIPS

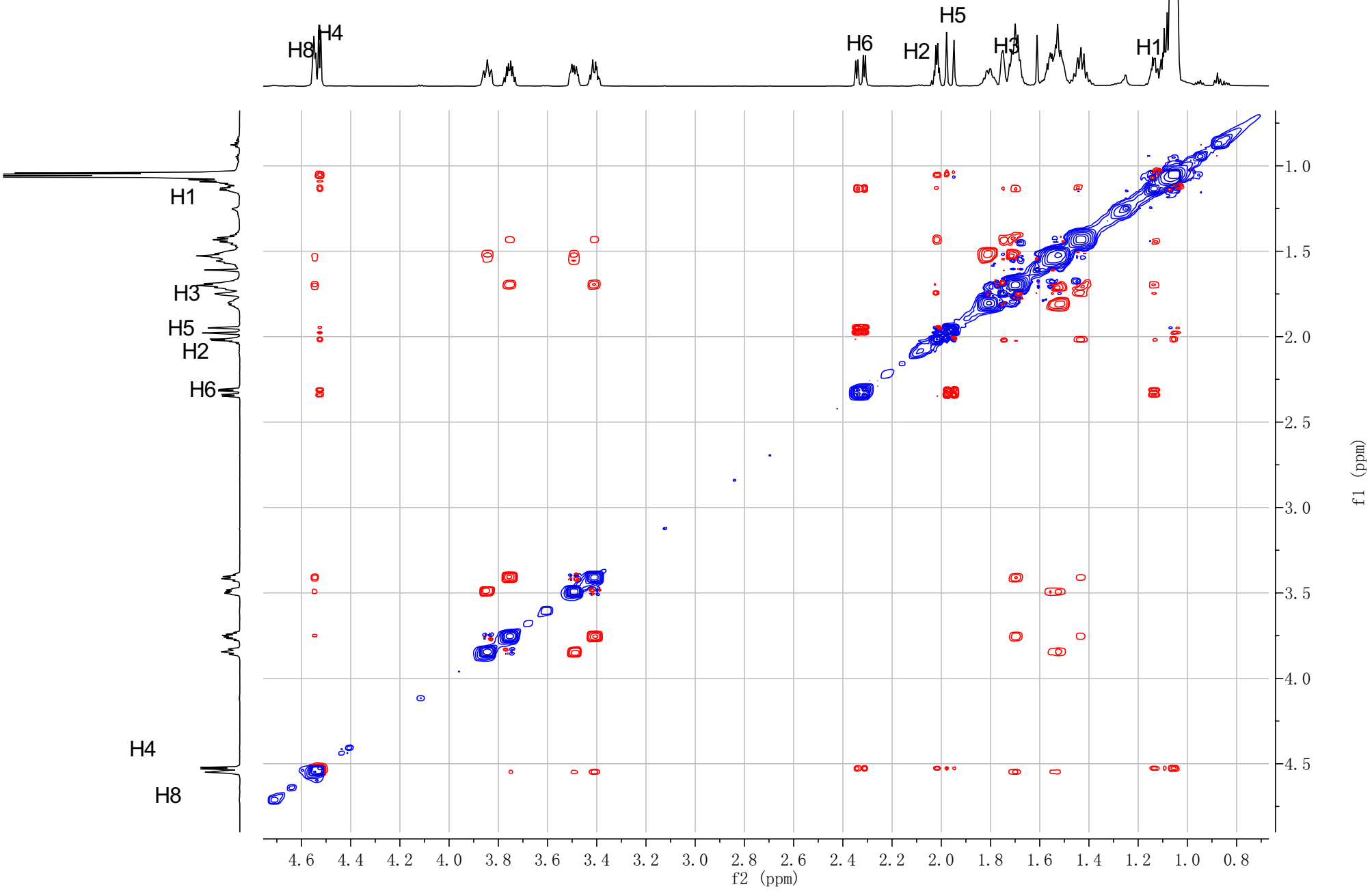




Parameter	Value (f2, f1)
1 Title	jkg-VI-135A-2-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5071.0, 5076.1)

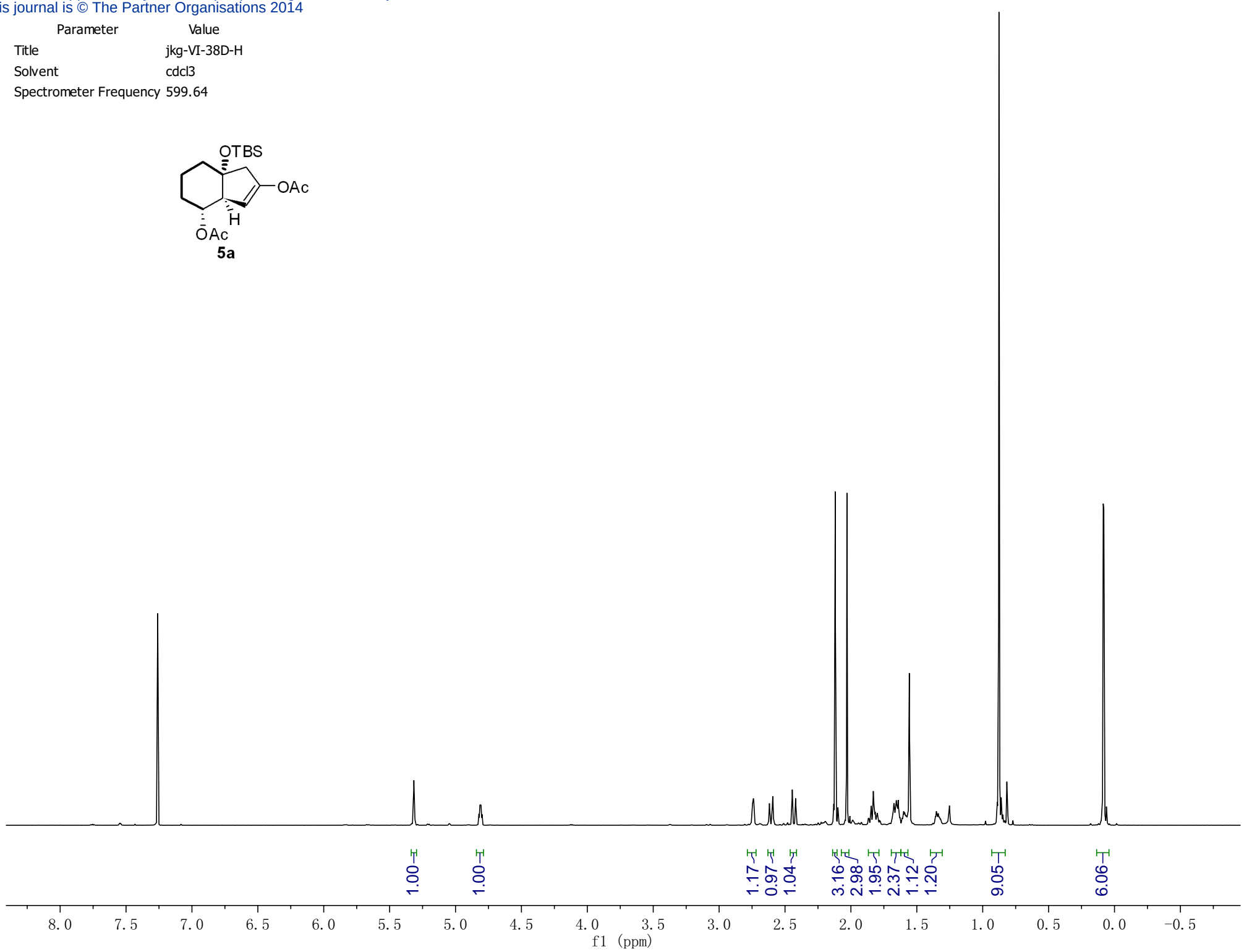


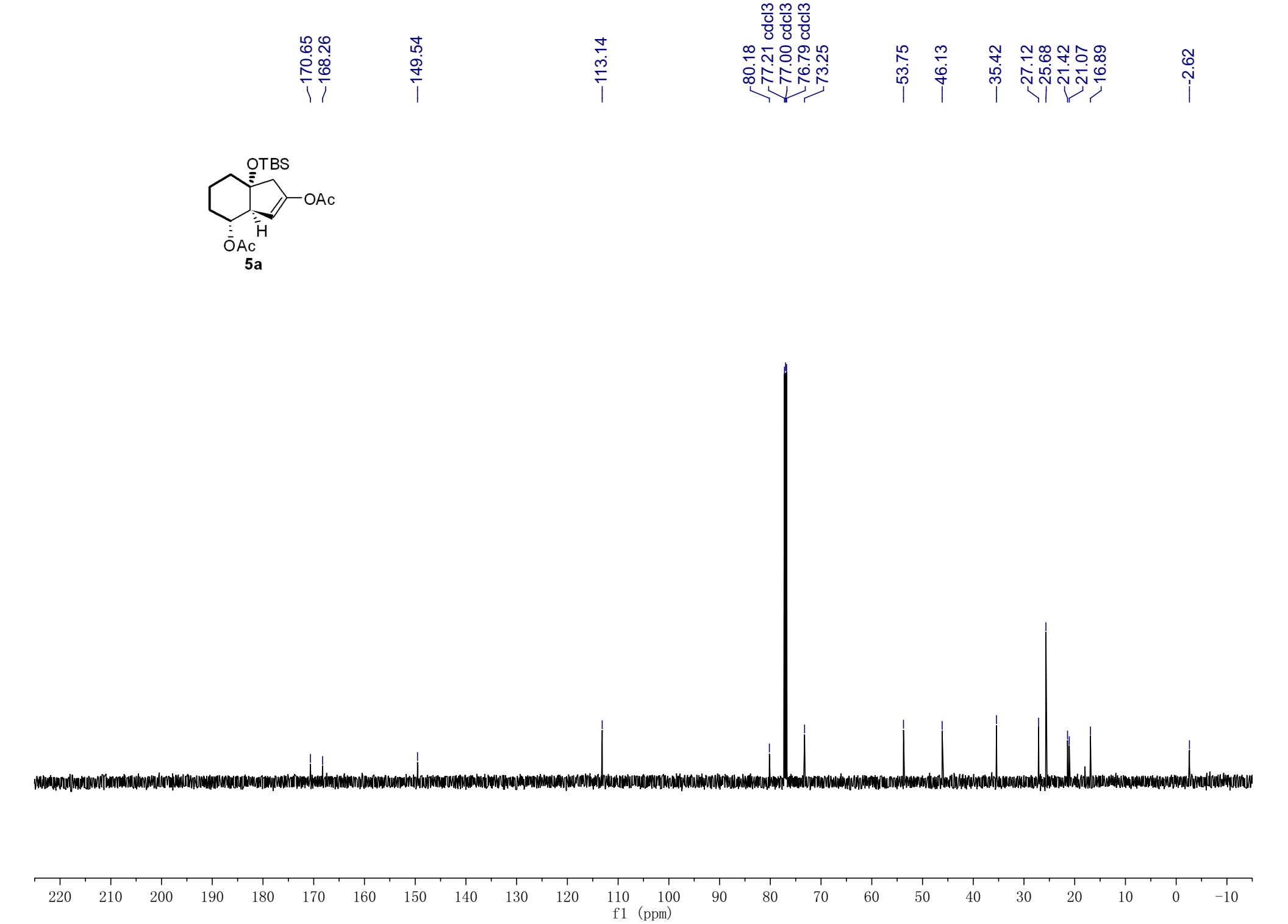
4j'
R = TIPS



Parameter	Value
Title	jkg-VI-38D-H
Solvent	cdcl3
Spectrometer Frequency	599.64

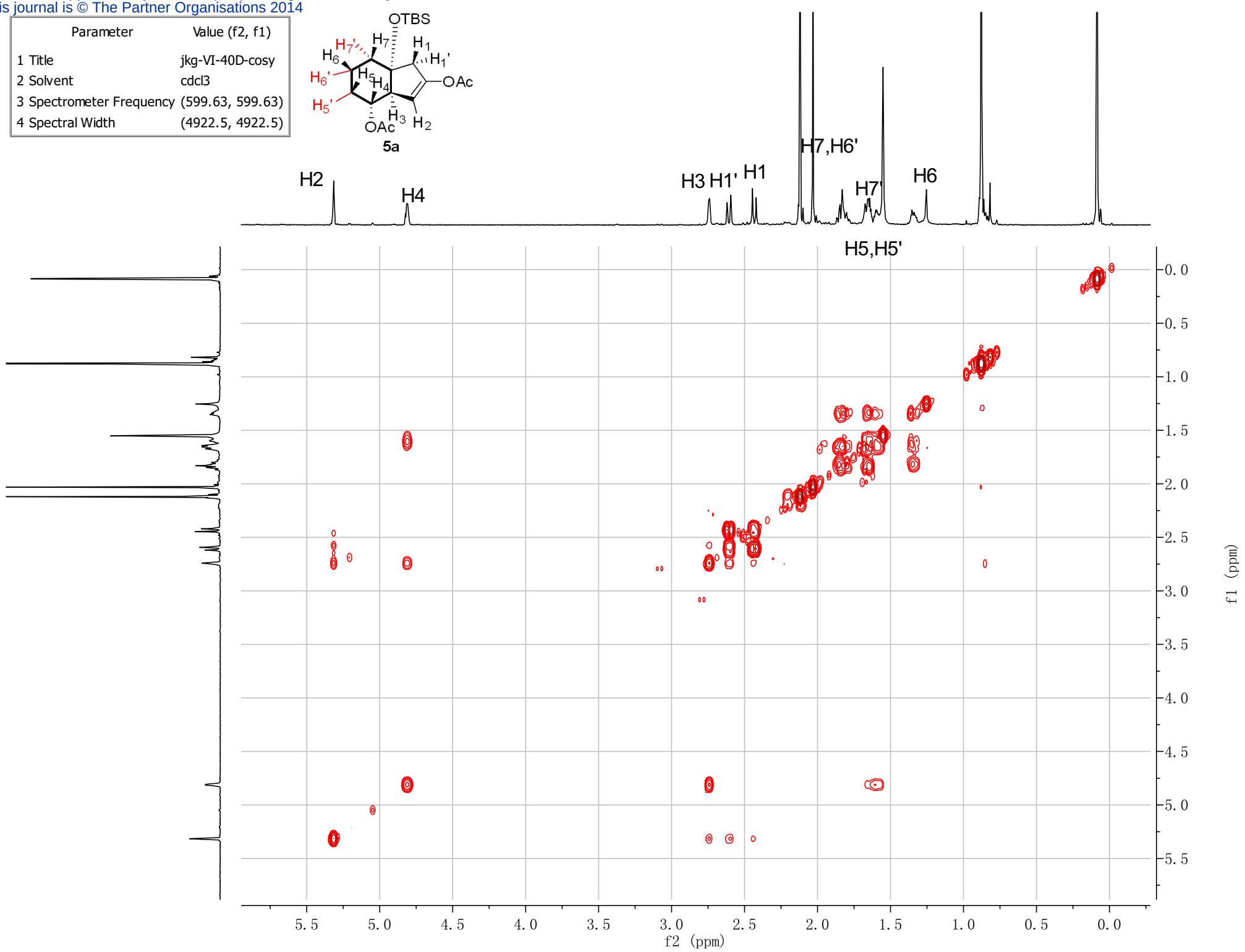
5a





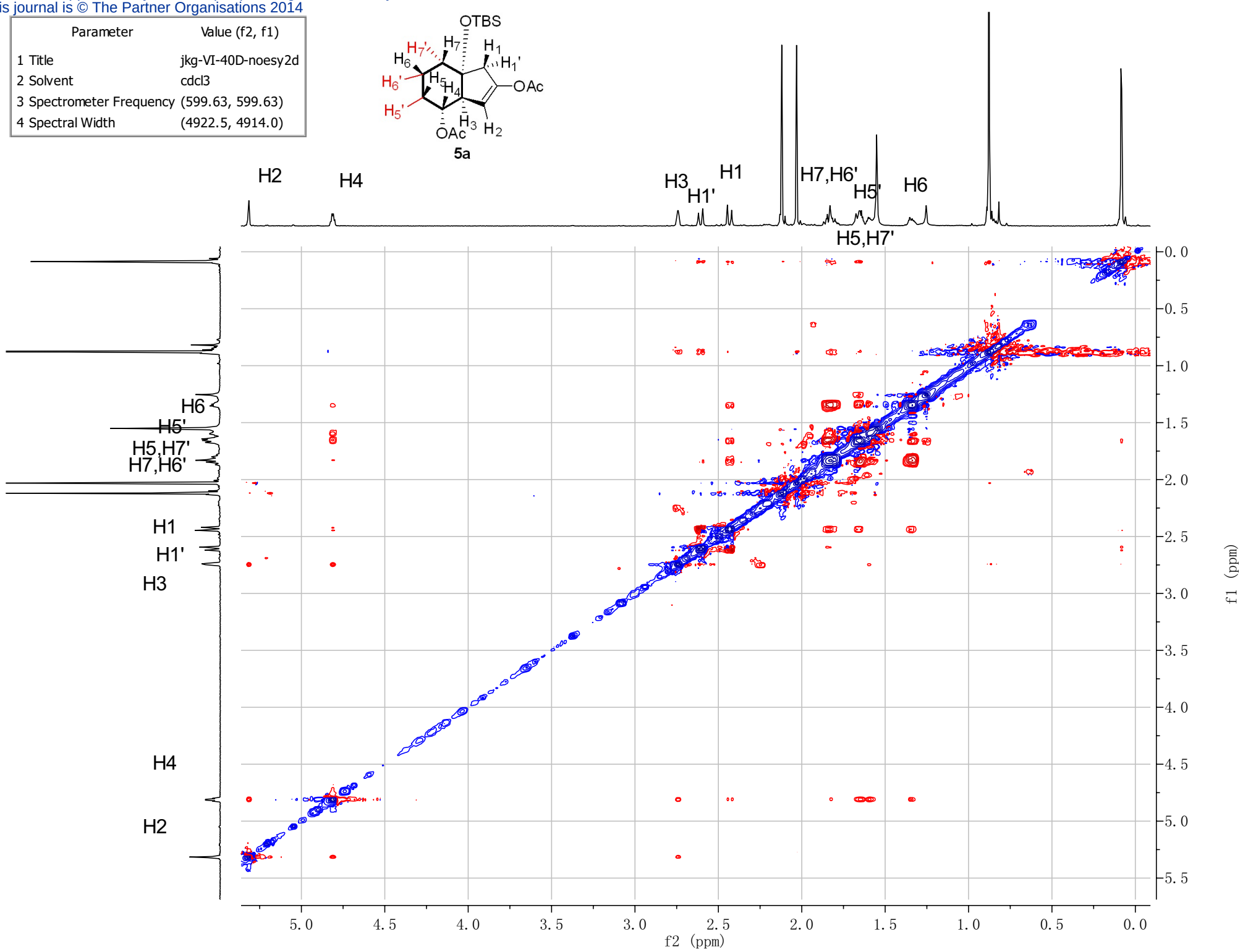
Parameter	Value (f2, f1)
1 Title	jkg-VI-40D-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4922.5, 4922.5)

5a



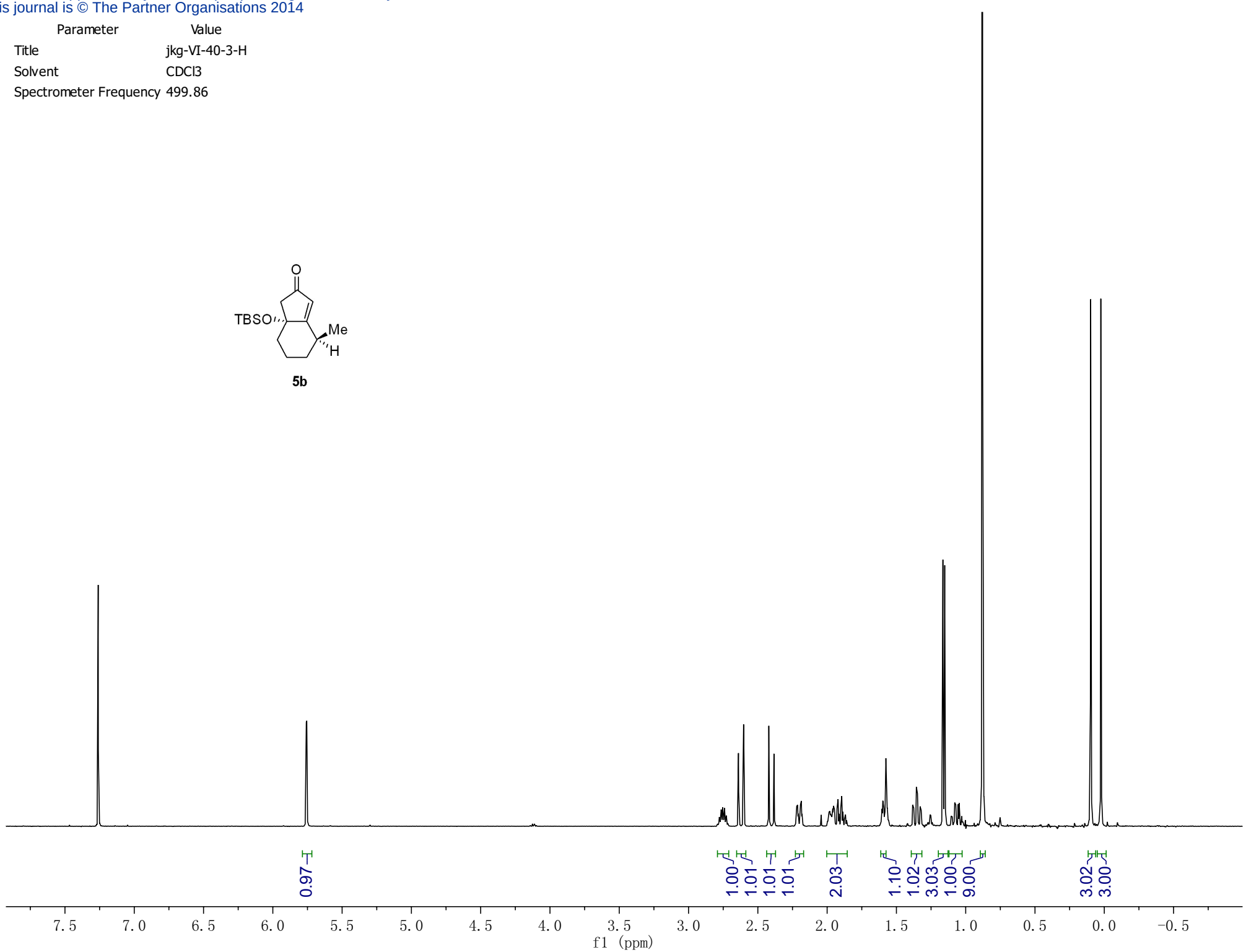
Parameter	Value (f2, f1)
1 Title	jkg-VI-40D-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(4922.5, 4914.0)

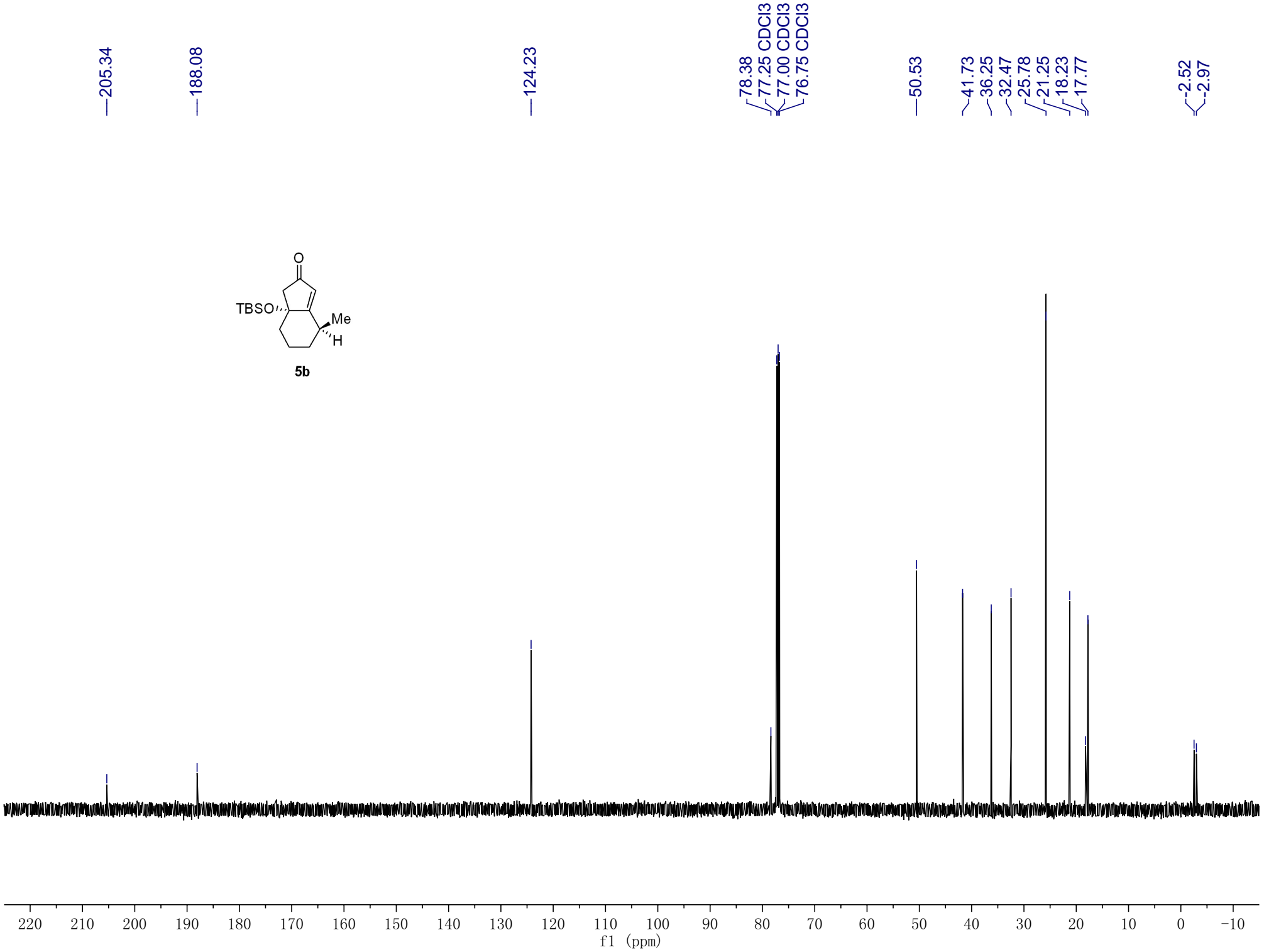
5a



Parameter	Value
Title	jkg-VI-40-3-H
Solvent	CDCl3
Spectrometer Frequency	499.86

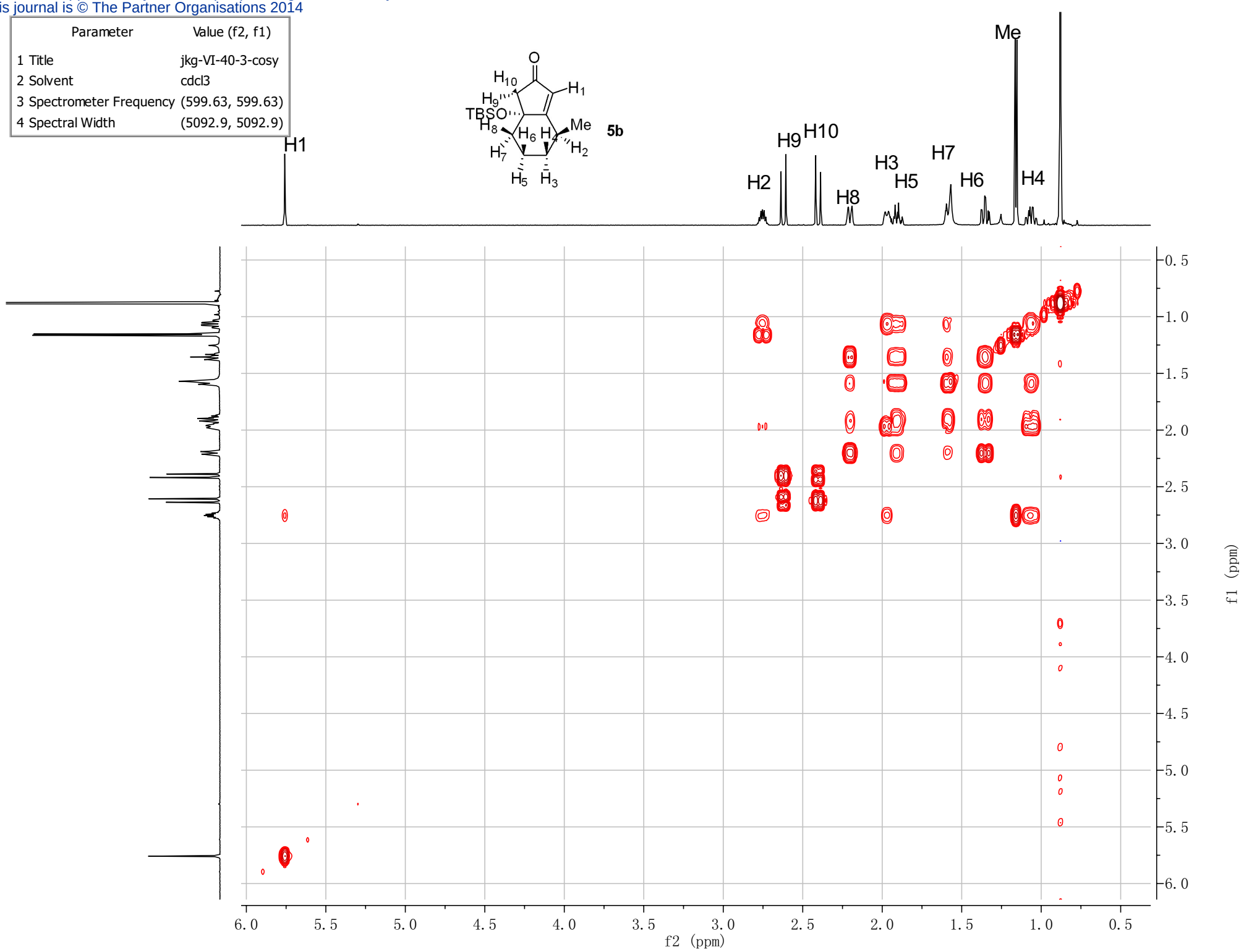
5b





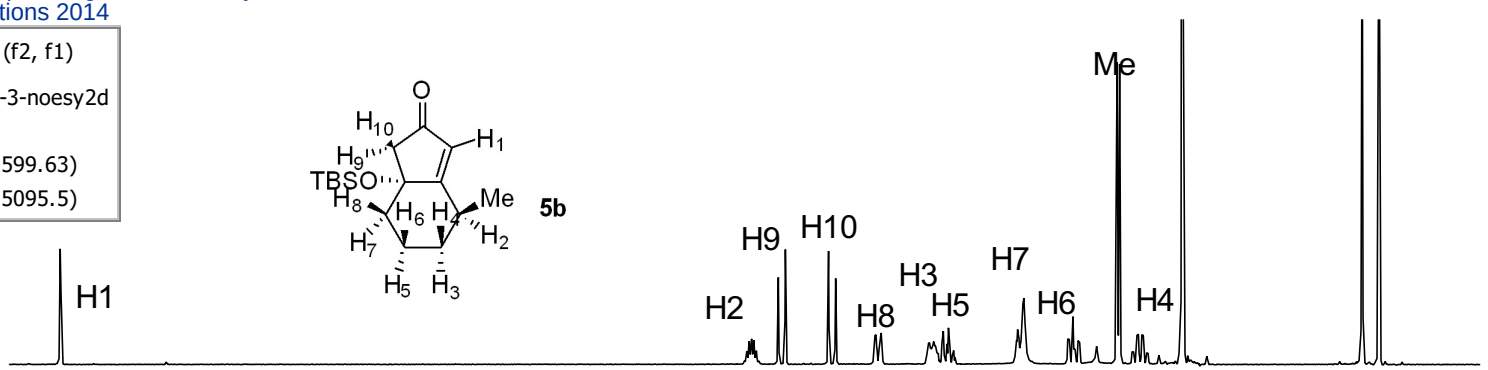
Parameter	Value (f2, f1)
1 Title	jkg-VI-40-3-cosy
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5092.9, 5092.9)

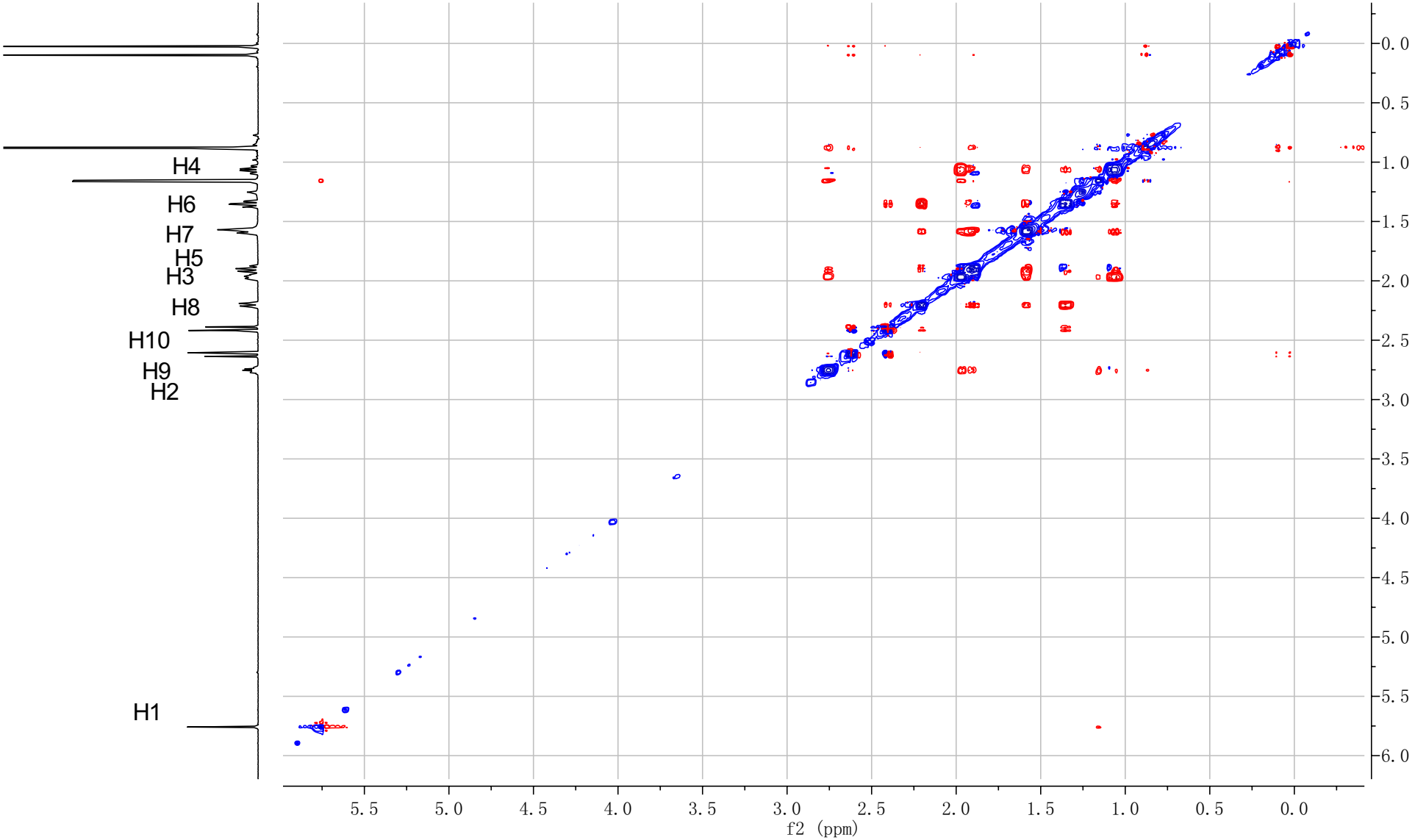
5b



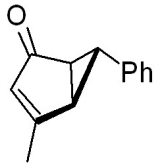
Parameter	Value (f2, f1)
1 Title	jkg-VI-40-3-noesy2d
2 Solvent	cdcl3
3 Spectrometer Frequency	(599.63, 599.63)
4 Spectral Width	(5092.9, 5095.5)

5b

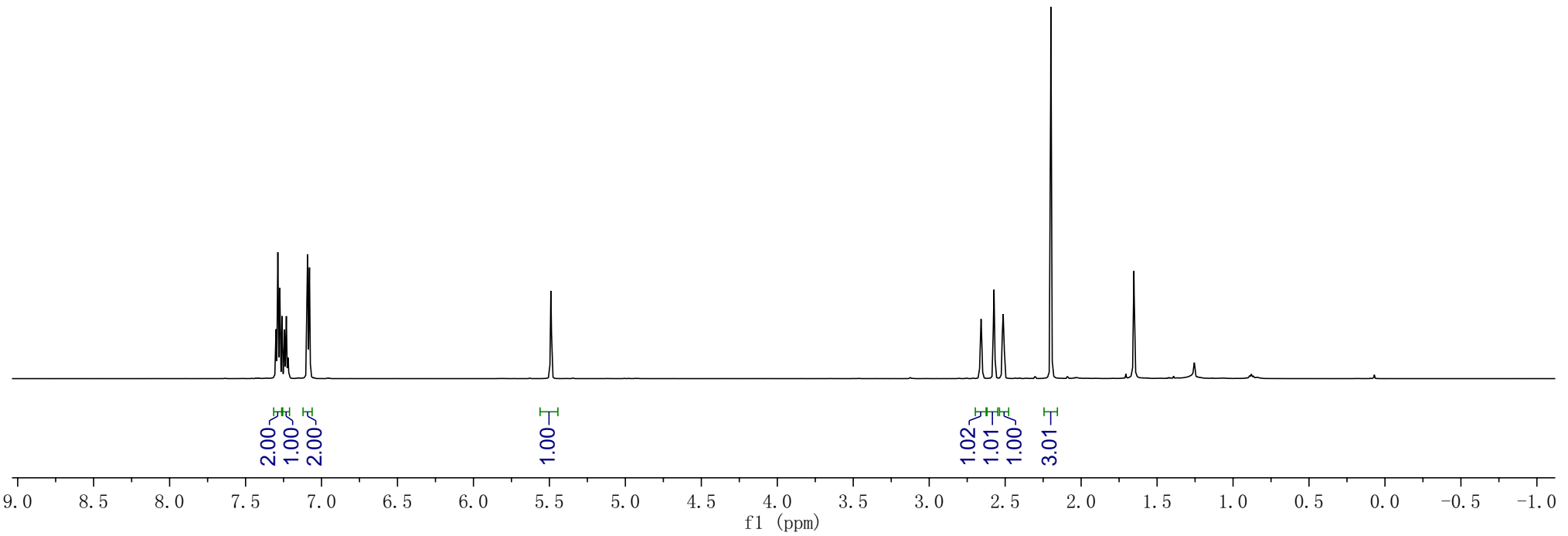




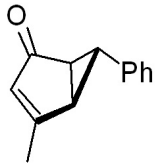
Parameter	Value
Title	jkg-VI-100C-H1
Solvent	cdcl3
Spectrometer Frequency	599.64



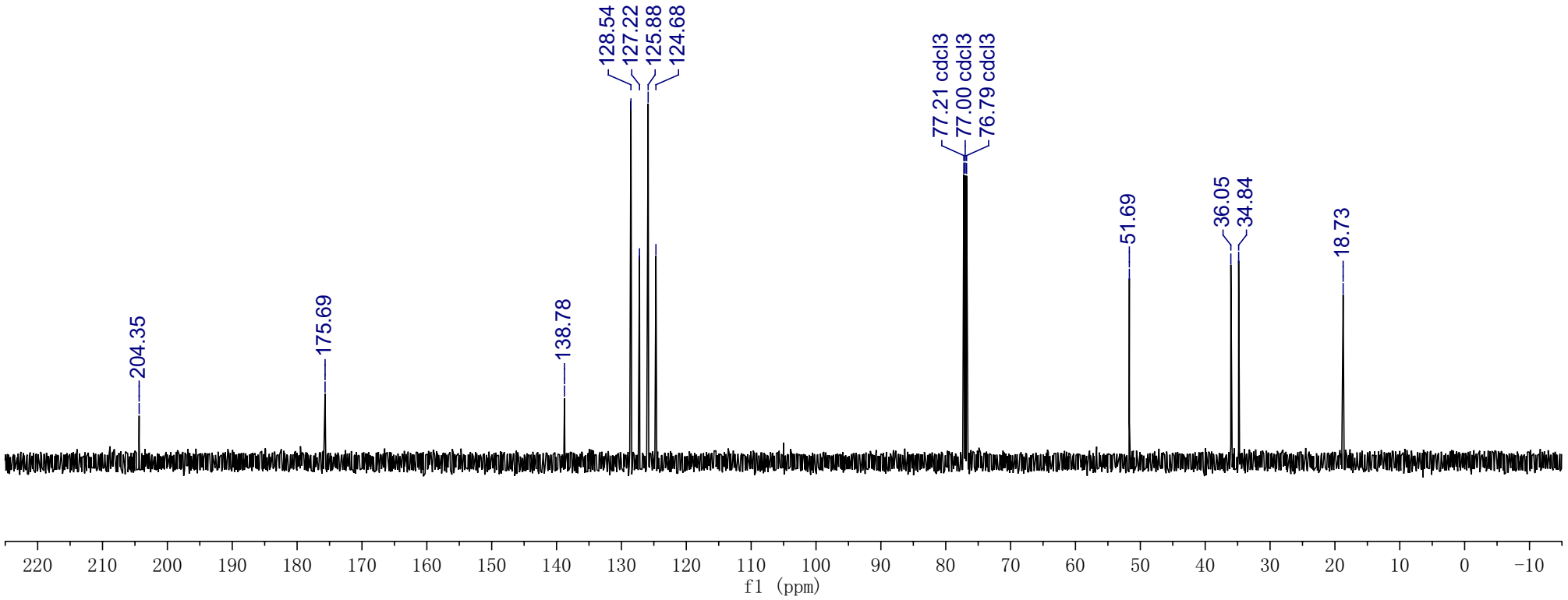
6a



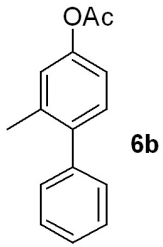
Parameter	Value
Title	jkg-VI-100C-C1
Solvent	cdcl3
Spectrometer Frequency	150.79



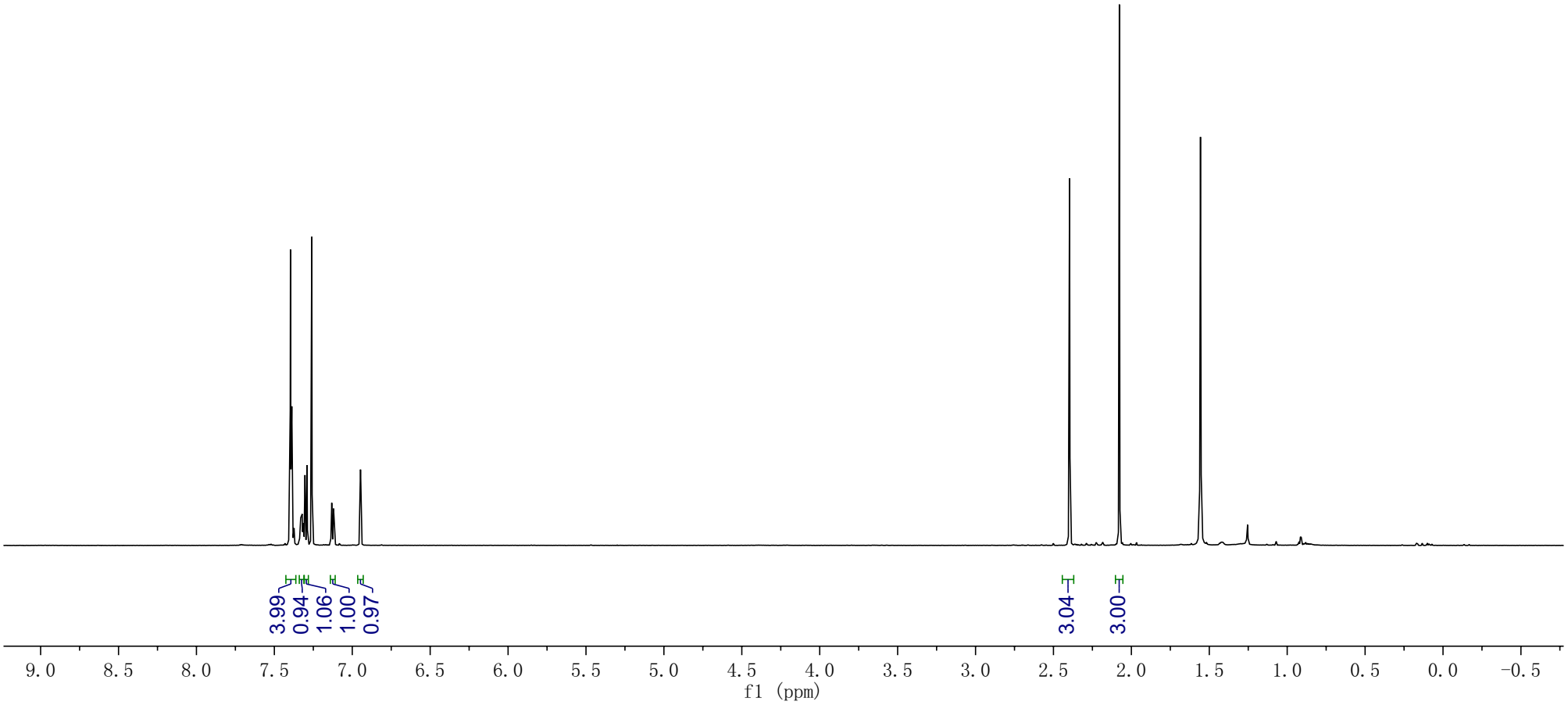
6a



Parameter	Value
Title	jkg-VI-90B-H
Solvent	cdcl3
Spectrometer Frequency	599.64

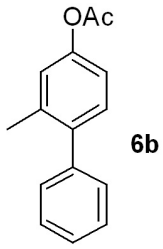


6b



Parameter	Value
Title	jkg-VI-90B-C
Solvent	cdcl3
Spectrometer Frequency	150.79

169.56
147.54
138.79
137.61
131.87
130.57
128.82
128.24
127.23
127.21
123.27
77.21 cdcl3
77.00 cdcl3
76.79 cdcl3
21.04
20.86



6b