

Supporting Information

**Efficient and practical synthesis of enantioenriched 2,3-dihydropyrroles through
gold-catalyzed anti-Markovnikov hydroamination of chiral homopropargyl
sulfonamides**

Yong-Fei Yu, Chao Shu, Bo Zhou, Jian-Qiao Li, Jin-Mei Zhou and Long-Wu Ye*

State Key Laboratory for Physical Chemistry of Solid Surfaces & The Key Laboratory
for Chemical Biology of Fujian Province, Department of Chemistry, Xiamen University,
Xiamen 361005, Fujian, P. R. China

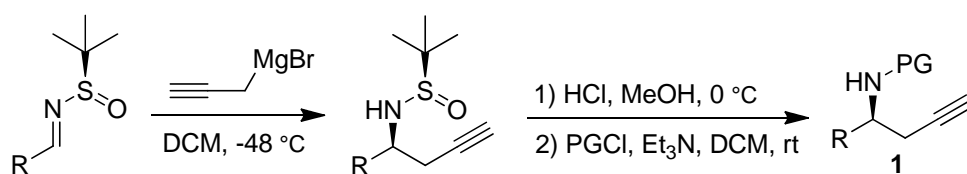
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General Information. Ethyl acetate (ACS grade), hexanes (ACS grade) and anhydrous 1, 2-dichloroethane (ACS grade) were obtained commercially and used without further purification. Methylene chloride, tetrahydrofuran and diethyl ether were purified according to standard methods unless otherwise noted. Commercially available reagents were used without further purification. Reactions were monitored by thin layer chromatography (TLC) using silicycle pre-coated silica gel plates. Flash column chromatography was performed over silica gel (300-400 mesh). Infrared spectra were recorded on a Nicolet AVATER FTIR330 spectrometer as thin film and are reported in reciprocal centimeter (cm^{-1}). Mass spectra were recorded with Micromass QTOF2 Quadrupole/Time-of-Flight Tandem mass spectrometer using electron spray ionization.

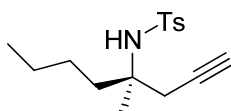
^1H NMR spectra were recorded on a Bruker AV-400 spectrometer and a Bruker AV-500 spectrometer in chloroform- d_3 . Chemical shifts are reported in ppm with the internal TMS signal at 0.0 ppm as a standard. The data is being reported as (s = singlet, d = doublet, t = triplet, m = multiplet or unresolved, brs = broad singlet, coupling constant(s) in Hz, integration).

^{13}C NMR spectra were recorded on on a Bruker AV-400 spectrometer and a Bruker AV-500 spectrometer in chloroform- d_3 . Chemical shifts are reported in ppm with the internal chloroform signal at 77.0 ppm as a standard.

Compounds **1a-1q**, **3a** and **1a'** were prepared according to the following procedures and their data were reported in our previous work.¹

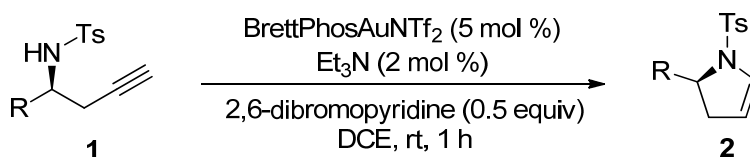


(R)-4-methyl-N-(4-methyloct-1-yn-4-yl)benzenesulfonamide (1r)



1r

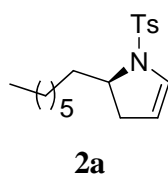
Compound **1r** was prepared according to the known procedures.² $[\alpha]_D^{20} = -30.5^\circ$ ($c = 1.0$, CHCl_3). 93% ee (determined by HPLC: Chiralpak OD-H Column, 2/98 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 31.27 min (major), 33.94 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.79 (d, 2H, $J = 8.4$ Hz), 7.28 (d, 2H, $J = 8.0$ Hz), 4.88 (s, 1H), 2.42 (s, 3H), 2.40 (d, 2H, $J = 2.4$ Hz), 2.03 (t, 1H, $J = 2.8$ Hz), 1.68 – 1.60 (m, 1H), 1.57 – 1.50 (m, 1H), 1.24 – 1.12 (m, 7H), 0.83 (t, 3H, $J = 6.4$ Hz); ^{13}C NMR (100 MHz, CDCl_3) δ 143.0, 140.1, 129.4, 127.0, 80.0, 71.6, 58.3, 39.6, 31.1, 25.6, 23.7, 22.8, 21.4, 13.9; IR (neat): 3280, 2936, 2928, 2871, 1456, 1315, 1258, 1090, 1001, 820, 655; MS (ESI, m/z) 316 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{16}\text{H}_{23}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 316.1347, found 316.1342.



General procedure for the synthesis of **2**:

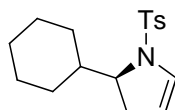
2,6-Dibromopyridine (35.5 mg, 0.15 mmol), Et₃N (2.0 mL, 0.003 mmol/mL in DCE) and BrettPhosAuNTf₂ (15.3 mg, 0.015 mmol) were added in this order to a solution of the homopropargyl sulfonamide **1** (0.30 mmol) in DCE (4.0 mL) at room temperature. The reaction mixture was stirred at room temperature and the progress of the reaction was monitored by TLC. The reaction typically took 1 h. Upon completion, the mixture was then concentrated and the residue was purified by chromatography on silica gel (eluent: hexanes/ethyl acetate) to afford the desired product **2**.

(*R*)-2-heptyl-1-tosyl-2,3-dihydro-1H-pyrrole (**2a**)



$[\alpha]_D^{20} = -437.2^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by HPLC: Chiralcel AS-H Column, 2/98 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 20.73 min (major), 17.86 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.66 (d, 2H, $J = 8.4$ Hz), 7.29 (d, 2H, $J = 8.0$ Hz), 6.30 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.07 (dt, 1H, $J = 2.0$ Hz, $J = 3.6$ Hz), 3.71 – 3.64 (m, 1H), 2.42 (s, 3H), 2.41 – 2.36 (m, 1H), 2.15 – 2.08 (m, 1H), 1.87 – 1.79 (m, 1H), 1.63 – 1.50 (m, 1H), 1.39 – 1.27 (m, 10H), 0.88 (t, 3H, $J = 7.0$ Hz); ^{13}C NMR (100 MHz, CDCl_3) δ 143.5, 133.8, 130.4, 129.5, 127.5, 111.9, 60.1, 36.2, 35.7, 31.8, 29.4, 29.2, 24.6, 22.6, 21.5, 14.0; IR (neat): 2926, 2856, 1597, 1456, 1340, 1162, 815, 708, 672, 590; MS (ESI, m/z) 344 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{18}\text{H}_{27}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 344.1660, found 344.1656.

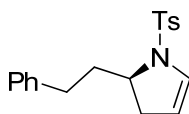
(S)-2-cyclohexyl-1-tosyl-2,3-dihydro-1H-pyrrole (2b)



2b

$[\alpha]_D^{20} = -417.4^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by HPLC: Chiralcel AS-H Column, 2/98 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 28.04 min (major), 33.17 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.66 (d, 2H, $J = 8.0$ Hz), 7.29 (d, 2H, $J = 8.0$ Hz), 6.29 (dt, 1H, $J = 2.0$ Hz, $J = 3.6$ Hz), 5.08 (dt, 1H, $J = 2.0$ Hz, $J = 3.6$ Hz), 3.64 – 3.59 (m, 1H), 2.42 (s, 3H), 2.24 – 2.12 (m, 2H), 1.77 – 1.58 (m, 7H), 1.29 – 0.95 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.4, 134.0, 130.9, 129.4, 127.6, 113.1, 64.4, 42.3, 31.5, 28.7, 26.5, 26.2, 26.1, 25.9, 21.5; IR (neat): 2924, 2851, 1621, 1596, 1343, 1160, 970, 813, 667, 592; MS (ESI, m/z) 328 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{23}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 328.1347, found 328.1349.

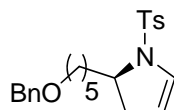
(R)-2-phenethyl-1-tosyl-2,3-dihydro-1H-pyrrole (2c)



2c

$[\alpha]_D^{20} = -310.1^\circ$ ($c = 0.4$, CHCl_3). 98% ee (determined by HPLC: Chiralcel AS-H Column, 5/95 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 22.99 min (major), 18.19 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.54 (d, 2H, $J = 8.4$ Hz), 7.31 – 7.18 (m, 7H), 6.32 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.09 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 3.69 – 3.62 (m, 1H), 2.82 – 2.75 (m, 1H), 2.65 – 2.58 (m, 1H), 2.47 – 2.41 (m, 1H), 2.40 (s, 3H), 2.27 – 2.15 (m, 2H), 1.98 – 1.93 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.5, 141.4, 133.4, 130.6, 129.5, 128.4, 128.3, 127.6, 125.8, 111.8, 59.4, 37.6, 35.6, 31.0, 21.5; IR (neat): 2924, 2854, 1620, 1596, 1348, 1163, 959, 814, 723, 700; MS (ESI, m/z) 350 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{19}\text{H}_{21}\text{NNO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 350.1191, found 350.1186.

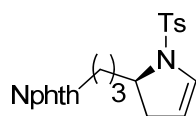
(*R*)-2-(5-(benzyloxy)pentyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2d)



2d

$[\alpha]_D^{20} = -213.4^\circ$ ($c = 1.0$, CHCl_3). 98% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 27.36 min (major), 22.63 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.65 (d, 2H, $J = 8.0$ Hz), 7.35 – 7.25 (m, 7H), 6.30 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.06 (dt, 1H, $J = 1.6$ Hz, $J = 4.0$ Hz), 4.50 (s, 2H), 3.70 – 3.65 (m, 1H), 3.47 (t, 2H, $J = 6.4$ Hz), 2.41 (s, 3H), 2.39 – 2.35 (m, 1H), 2.12 – 2.11 (m, 1H), 1.83 – 1.81 (m, 1H), 1.70 – 1.60 (m, 3H), 1.43 – 1.33 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.5, 138.6, 133.8, 130.4, 129.5, 128.3, 127.6, 127.5, 127.4, 111.9, 72.8, 70.3, 59.9, 36.1, 35.7, 29.6, 26.0, 24.4, 21.5; IR (neat): 2925, 2856, 1619, 1597, 1494, 1454, 1353, 958, 814, 735, 698, 666, 596; MS (ESI, m/z) 400 ($\text{M} + \text{H}^+$); HRESIMS Calcd for $[\text{C}_{23}\text{H}_{30}\text{NO}_3\text{S}]^+$ ($\text{M} + \text{H}^+$) 400.1946, found 400.1942.

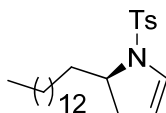
(*R*)-2-(3-(1-tosyl-2,3-dihydro-1H-pyrrol-2-yl)propyl)isoindoline-1,3-dione (2e)



2e

$[\alpha]_D^{20} = -173.2^\circ$ ($c = 0.4$, CHCl_3). 98% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.7 mL/min, 200 nm; TR = 60.36 min (major), 64.55 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.84 (dd, 2H, $J = 2.8$ Hz, $J = 5.4$ Hz), 7.71 (dd, 2H, $J = 2.8$ Hz, $J = 5.6$ Hz), 7.66 (d, 2H, $J = 8.4$ Hz), 7.30 (d, 2H, $J = 8.0$ Hz), 6.28 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.09 (dt, 1H, $J = 2.4$ Hz, $J = 4.0$ Hz), 3.80 – 3.72 (m, 3H), 2.42 (s, 3H), 2.40 – 2.34 (m, 1H), 2.09 – 2.04 (m, 1H), 1.85 – 1.79 (m, 2H), 1.69 – 1.63 (m, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ 168.4, 143.6, 133.9, 133.7, 132.1, 130.4, 129.5, 127.6, 123.2, 112.4, 59.2, 37.6, 35.7, 33.2, 23.8, 21.5; IR (neat): 2923, 2853, 1660, 1564, 1378, 980, 800, 786, 744, 719, 666, 650; MS (ESI, m/z) 433 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{22}\text{H}_{22}\text{N}_2\text{NaO}_4\text{S}]^+$ ($\text{M} + \text{Na}^+$) 433.1198, found 433.1193.

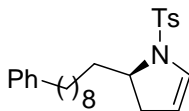
(R)-2-tetradecyl-1-tosyl-2,3-dihydro-1H-pyrrole (2f)



2f

$[\alpha]_D^{20} = -248.5^\circ$ ($c = 1.0$, CHCl_3). 98% ee (determined by HPLC: Chiralcel AS-H Column, 1/99 *i*-PrOH/hexane, 0.5 mL/min, 200 nm; TR = 15.71 min (major), 14.09 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.74 (d, 2H, $J = 8.4$ Hz), 7.29 (d, 2H, $J = 8.0$ Hz), 6.30 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.07 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 3.69 – 3.65 (m, 1H), 2.42 (s, 3H), 2.42 – 2.40 (m, 1H), 2.14 – 2.10 (m, 1H), 1.86 – 1.80 (m, 1H), 1.63 – 1.60 (m, 1H), 1.27 – 1.26 (m, 24H), 0.88 (t, 3H, $J = 6.8$ Hz); ^{13}C NMR (100 MHz, CDCl_3) δ 143.5, 134.0, 130.5, 129.5, 127.6, 111.8, 60.2, 36.2, 35.7, 31.9, 29.6(9), 29.6(6), 29.6(5), 29.6(1), 25.5(9), 29.5, 29.4, 24.7, 22.7, 21.5, 14.1; IR (neat): 2958, 2924, 2853, 1620, 1598, 1465, 1356, 1167, 958, 813, 718, 666, 595; MS (ESI, m/z) 442 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{25}\text{H}_{41}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 442.2756, found 442.2754.

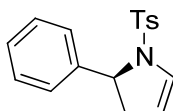
(R)-2-(9-phenylnonyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2g)



2g

$[\alpha]_D^{20} = -332.7^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by HPLC: Chiralcel AD-H Column, 5/95 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 21.65 min (major), 17.67 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.65 (d, 2H, $J = 8.0$ Hz), 7.29 – 7.24 (m, 4H), 7.18 – 7.14 (m, 3H), 6.30 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 5.06 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 3.70 – 3.63 (m, 1H), 2.60 (t, 2H, $J = 7.6$ Hz), 2.41 (s, 3H), 2.39 – 2.35 (m, 1H), 2.13 – 2.12 (m, 1H), 1.84 – 1.80 (m, 1H), 1.63 – 1.59 (m, 3H), 1.30 – 1.28 (m, 12H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.5, 142.9, 133.9, 130.4, 129.5, 128.3, 128.1, 127.5, 125.5, 111.8, 60.1, 36.2, 35.9, 35.7, 31.4, 29.4(9), 29.4(5), 29.4, 29.3, 24.6, 21.5; IR (neat): 2923, 2853, 1620, 1597, 1454, 1349, 1164, 959, 814, 722, 700; MS (ESI, m/z) 448 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{26}\text{H}_{35}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 448.2286, found 448.2290.

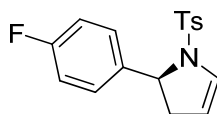
(S)-2-phenyl-1-tosyl-2,3-dihydro-1H-pyrrole (2h)



2h

$[\alpha]_D^{20} = -423.6^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 36.47 min (major), 29.49 min (minor)). This compound is known and the spectroscopic data match those reported.³ ^1H NMR (400 MHz, CDCl_3) δ 7.62 (d, 2H, $J = 8.0$ Hz), 7.32 – 7.23 (m, 7H), 6.52 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.51 (dt, 1H, $J = 1.6$ Hz, $J = 4.0$ Hz), 4.72 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 2.95 – 2.87 (m, 1H), 2.50 – 2.44 (m, 1H), 2.42 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.6, 142.7, 134.1, 130.8, 129.5, 128.5, 127.6, 127.5, 126.3, 110.0, 63.0, 40.7, 21.5.

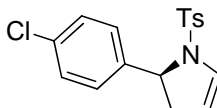
(S)-2-(4-fluorophenyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2i)



2i

$[\alpha]_D^{20} = -436.8^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 26.22 min (major), 19.71 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.61 (d, 2H, $J = 8.0$ Hz), 7.29 – 7.25 (m, 4H), 6.98 (t, 2H, $J = 8.4$ Hz), 6.52 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 5.11 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 4.71 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 2.94 – 2.87 (m, 1H), 2.47 – 2.40 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ 162.1 (d, $J = 245.0$ Hz), 143.8, 138.5 (d, $J = 3.2$ Hz), 134.0, 130.7, 129.6, 128.0 (d, $J = 8.0$ Hz), 127.5, 115.3 (d, $J = 21.0$ Hz), 109.9, 62.3, 40.6, 21.5; IR (neat): 2923, 2853, 1621, 1595, 1377, 1162, 960, 824, 663; MS (ESI, m/z) 340 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{16}\text{FNNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 340.0783, found 340.0788.

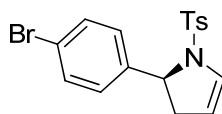
(S)-5-(4-chlorophenyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2j)



2j

$[\alpha]_D^{20} = -412.9^\circ$ ($c = 1.0$, CHCl_3). 97% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 30.65 min (major), 22.05 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.60 (d, 2H, $J = 8.0$ Hz), 7.29 – 7.23 (m, 6H), 6.51 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 5.10 (dt, 1H, $J = 2.0$ Hz, $J = 2.4$ Hz), 4.69 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 2.95 – 2.87 (m, 1H), 2.46 – 2.38 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.9, 141.2, 133.8, 133.2, 130.7, 129.6, 128.6, 127.7, 127.5, 109.9, 62.3, 40.5, 21.5; IR (neat): 2923, 2854, 1492, 1620, 1596, 1491, 1351, 1164, 961, 824, 661, 594; MS (ESI, m/z) 356 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{16}\text{ClNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 356.0488, found 356.0485.

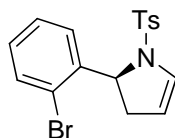
(S)-2-(4-bromophenyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2k)



2k

$[\alpha]_D^{20} = -415.1^\circ$ ($c = 1.0$, CHCl_3). 98% ee (determined by HPLC: Chiralcel AD-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 26.34 min (major), 18.22 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.60 (d, 2H, $J = 8.4$ Hz), 7.42 (d, 2H, $J = 8.8$ Hz), 7.28 (d, 2H, $J = 8.0$ Hz), 7.18 (d, 2H, $J = 8.4$ Hz), 6.51 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 5.10 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 4.68 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 2.95 – 2.88 (m, 1H), 2.45 – 2.39 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.9, 141.7, 133.9, 131.6, 130.8, 129.6, 128.1, 127.6, 121.4, 109.8, 62.4, 40.5, 21.5; IR (neat): 2923, 2853, 1621, 1595, 1487, 1351, 1165, 961, 812, 666, 594; MS (ESI, m/z) 400 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{16}\text{BrNNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 399.9983, found 399.9979.

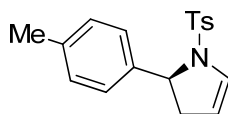
(S)-2-(2-bromophenyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2l)



2l

$[\alpha]_D^{20} = -431.5^\circ$ ($c = 1.0$, CHCl_3). 96% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 26.31 min (major), 18.56 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.70 (d, 2H, $J = 8.0$ Hz), 7.60 (d, 1H, $J = 8.0$ Hz), 7.51 (d, 1H, $J = 8.0$ Hz), 7.34 – 7.31 (m, 3H), 7.15 – 7.10 (m, 1H), 6.55 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.08 – 5.04 (m, 2H), 3.06 – 2.97 (m, 1H), 2.44 (s, 3H), 2.28 – 2.21 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 144.0, 142.1, 132.5, 130.8, 129.7, 128.8, 128.0, 127.8(4), 127.8(2), 121.4, 110.3, 62.0, 39.8, 21.6; IR (neat): 2922, 2855, 1622, 1594, 1470, 1435, 1347, 1159, 1098, 960, 661, 593, 548; MS (ESI, m/z) 400 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{16}\text{BrNNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 399.9983, found 399.9977.

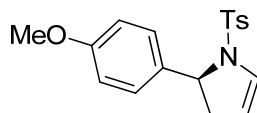
(S)-2-(*p*-tolyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2m)



2m

$[\alpha]_D^{20} = -430.4^\circ$ ($c = 1.0$, CHCl_3). 97% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 28.26 min (major), 17.83 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.61 (d, 2H, $J = 8.4$ Hz), 7.27 (d, 2H, $J = 8.0$ Hz), 7.21 (d, 2H, $J = 8.0$ Hz), 7.11 (d, 2H, $J = 8.0$ Hz), 6.51 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.10 (dt, 1H, $J = 1.6$ Hz, $J = 2.4$ Hz), 4.67 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 2.91 – 2.86 (m, 1H), 2.48 – 2.43 (m, 1H), 2.42 (s, 3H), 2.32 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.6, 139.7, 137.1, 134.0, 130.8, 129.5, 129.2, 127.6, 126.2, 110.0, 62.8, 40.6, 21.5, 21.1; IR (neat): 2922, 2855, 1619, 1597, 1515, 1350, 1163, 961, 811, 725, 706, 662, 594; MS (ESI, m/z) 336 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{18}\text{H}_{19}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 336.1034, found 336.1032.

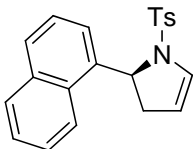
(S)-2-(4-methoxyphenyl)-1-tosyl-2,3-dihydro-1H-pyrrole (2n)



2n

$[\alpha]_D^{20} = -405.8^\circ$ ($c = 1.0$, CHCl_3). 98% ee (determined by HPLC: Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 63.94 min (major), 41.79 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.60 (d, 2H, $J = 8.4$ Hz), 7.28 – 7.22 (m, 4H), 6.84 – 6.82 (m, 2H), 6.50 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 5.10 (dt, 1H, $J = 1.6$ Hz, $J = 4.0$ Hz), 4.68 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 3.79 (s, 3H), 2.92 – 2.84 (m, 1H), 2.49 – 2.43 (m, 1H), 2.42 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 159.0, 143.5, 134.8, 134.2, 130.7, 129.5, 127.5, 113.9, 109.9, 62.6, 55.2, 40.6, 21.5; IR (neat): 2925, 2854, 1614, 1597, 1513, 1353, 1166, 963, 814, 708, 667, 599, 547 MS (ESI, m/z) 352 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{18}\text{H}_{19}\text{NNaO}_3\text{S}]^+$ ($\text{M} + \text{Na}^+$) 352.0983, found 352.0977.

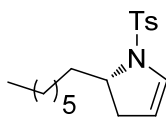
(S)-2-(naphthalen-1-yl)-1-tosyl-2,3-dihydro-1H-pyrrole (2o)



2o

$[\alpha]_D^{20} = -476.1^\circ$ ($c = 1.0$, CHCl_3). 98% ee (determined by Chiralcel AS-H Column, 2/98 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 71.93 min (major), 64.87 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.86 – 7.84 (m, 1H), 7.79 – 7.74 (m, 2H), 7.66 (d, 1H, $J = 6.8$ Hz), 7.61 (d, 2H, $J = 8.4$ Hz), 7.47 – 7.42 (m, 3H), 7.23 (d, 2H, $J = 7.6$ Hz), 6.65 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 5.38 (dd, 1H, $J = 6.4$ Hz, $J = 10.8$ Hz), 5.15 (dt, 1H, $J = 2.0$ Hz, $J = 4.0$ Hz), 3.14 – 3.05 (m, 1H), 2.50 – 2.46 (m, 1H), 2.39 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 143.7, 137.5, 134.1, 130.9, 129.5, 129.0, 128.1, 127.6, 126.0, 125.5, 125.4, 124.3, 122.9, 110.4, 61.0, 40.2, 21.5; IR (neat): 2925, 2854, 1621, 1596, 1352, 959, 904, 814, 799, 775, 705, 666, 595; MS (ESI, m/z) 372 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{21}\text{H}_{19}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 372.1034, found 372.1027.

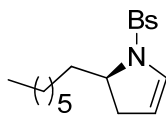
(S)-2-heptyl-1-tosyl-2,3-dihydro-1H-pyrrole (2a')



2a'

$[\alpha]_D^{20} = +438.5^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by HPLC: Chiralcel AS-H Column, 2/98 *i*-PrOH /hexane, 0.6 mL/min, 200 nm; TR = 17.37 min (major), 20.09 min (minor)).

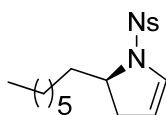
(R)-1-(4-bromophenylsulfonyl)-2-heptyl-2,3-dihydro-1H-pyrrole (2p)



2p

$[\alpha]_D^{20} = -395.0^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by Chiralcel AS-H Column, 2/98 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 18.71 min (major), 14.93 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.70 – 7.64 (m, 4H), 6.30 – 6.28 (m, 1H), 5.12 (dt, 1H, $J = 2.0$ Hz, $J = 4.4$ Hz), 3.66 (dt, 1H, $J = 1.6$ Hz, $J = 4.0$ Hz), 2.49 – 2.39 (m, 1H), 2.20 – 2.12 (m, 1H), 1.84 – 1.78 (m, 1H), 1.65 – 1.57 (m, 1H), 1.35 – 1.15 (m, 10H), 0.88 (t, 3H, $J = 7.6$ Hz); ^{13}C NMR (100 MHz, CDCl_3) δ 135.8, 132.4, 130.0, 128.9, 127.8, 112.5, 60.2, 36.1, 35.7, 31.8, 29.4, 29.2, 24.5, 22.6, 14.0; IR (neat): 2957, 2926, 2856, 1619, 1574, 1552, 1467, 1406, 1387, 1356, 1171, 1072, 1008, 823; MS (ESI, m/z) 408 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{24}\text{BrNNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 408.0609, found 408.0607.

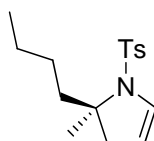
(R)-2-heptyl-1-(2-nitrophenylsulfonyl)-2,3-dihydro-1H-pyrrole (2q)



2q

$[\alpha]_D^{20} = -303.0^\circ$ ($c = 1.0$, CHCl_3). 99% ee (determined by Chiralcel AS-H Column, 10/90 *i*-PrOH/hexane, 0.8 mL/min, 200 nm; TR = 15.89 min (major), 13.01 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.94 – 7.90 (m, 1H), 7.73 – 7.65 (m, 2H), 7.60 – 7.57 (m, 1H), 6.37 (dt, 1H, $J = 1.6$ Hz, $J = 3.6$ Hz), 5.17 (dt, 1H, $J = 2.4$ Hz, $J = 4.0$ Hz), 4.18 – 4.08 (m, 1H), 2.73 – 2.64 (m, 1H), 2.31 – 2.24 (m, 1H), 1.82 – 1.73 (m, 1H), 1.66 – 1.57 (m, 1H), 1.36 – 1.18 (m, 10H), 0.88 (t, 3H, $J = 7.6$ Hz); ^{13}C NMR (100 MHz, CDCl_3) δ 148.7, 133.7, 131.3, 130.9, 130.3, 129.6, 123.9, 111.4, 60.4, 35.8, 35.7, 31.7, 29.4, 29.2, 24.3, 22.6, 14.0; IR (neat): 2925, 2856, 1627, 1598, 1358, 1340, 1172, 1156, 812, 706, 673, 589; MS (ESI, m/z) 375 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{17}\text{H}_{24}\text{N}_2\text{NaO}_4\text{S}]^+$ ($\text{M} + \text{Na}^+$) 375.1354, found 375.1347.

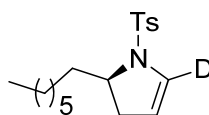
(R)-2-butyl-2-methyl-1-tosyl-2,3-dihydro-1H-pyrrole (2r)



2r

$[\alpha]_D^{20} = -46.5^\circ$ ($c = 1.0$, CHCl_3). 93% ee (determined by HPLC: Chiralcel AD-H Column, 2/98 *i*-PrOH/hexane, 0.6 mL/min, 200 nm; TR = 17.25 min (major), 15.85 min (minor)). ^1H NMR (400 MHz, CDCl_3) δ 7.70 (d, 2H, $J = 8.0$ Hz), 7.26 (d, 2H, $J = 8.0$ Hz), 6.46 – 6.44 (m, 1H), 4.93 – 4.91 (m, 1H), 2.64 – 2.61 (m, 1H), 2.41 (s, 3H), 2.35 – 2.31 (m, 1H), 1.91 – 1.85 (m, 1H), 1.67 – 1.61 (m, 1H), 1.32 – 1.22 (m, 7H), 0.86 (t, 3H, $J = 6.5$ Hz); ^{13}C NMR (125 MHz, CDCl_3) δ 142.8, 139.9, 130.6, 129.5, 126.6, 105.5, 69.8, 44.2, 41.1, 26.6, 26.2, 22.9, 22.4, 14.0; IR (neat): 2925, 2856, 1627, 1598, 1358, 1340, 1172, 1156, 812, 706, 673, 589; MS (ESI, m/z) 316 ($\text{M} + \text{Na}^+$); HRESIMS Calcd for $[\text{C}_{16}\text{H}_{23}\text{NNaO}_2\text{S}]^+$ ($\text{M} + \text{Na}^+$) 316.1347, found 316.1342.

Compound (**2a'**)



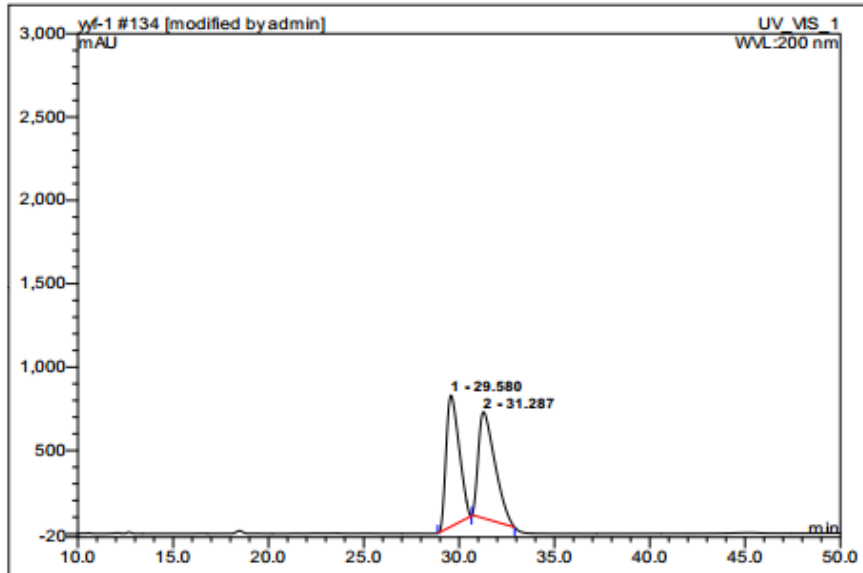
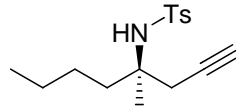
2a'

^1H NMR (400 MHz, CDCl_3) δ 7.66 (d, 2H, $J = 8.4$ Hz), 7.30 (d, 2H, $J = 8.4$ Hz), 6.32 – 6.30 (m, 0.12H), 5.08 – 5.06 (m, 1H), 3.70 – 3.63 (m, 1H), 2.42 (s, 3H), 2.41 – 2.36 (m, 1H), 2.15 – 2.09 (m, 1H), 1.87 – 1.79 (m, 1H), 1.66 – 1.53 (m, 1H), 1.37 – 1.22 (m, 10H), 0.89 (t, 3H, $J = 6.4$ Hz); ^{13}C NMR (100 MHz, CDCl_3) δ 143.5, 133.8, 130.4, 129.5, 127.6, 111.9, 60.1, 36.2, 35.7, 31.8, 29.4, 29.2, 24.6, 22.6, 21.5, 14.1.

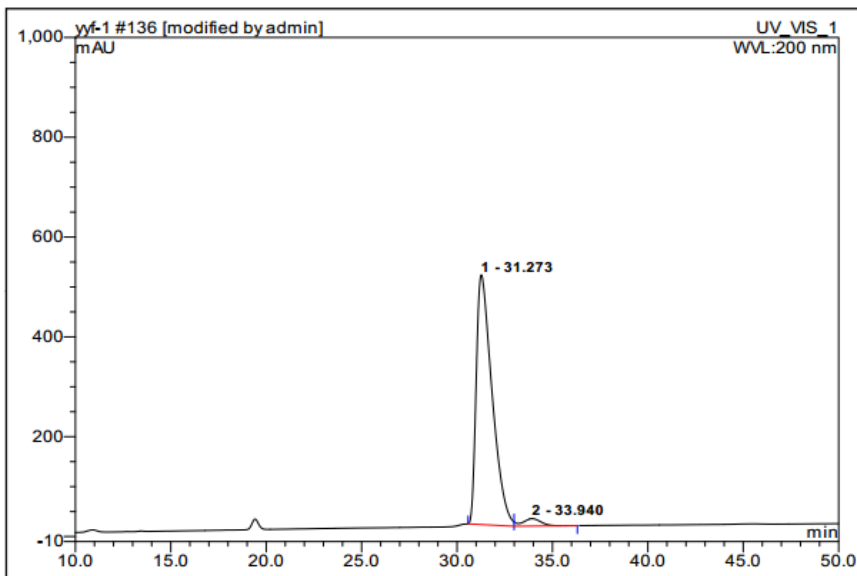
Reference:

- (a) Shu, C.; Li, L.; Yu, Y.-F.; Jiang, S.; Ye, L.-W. *Chem. Commun.* **2014**, 50, 2522.
(b) Shu, C.; Liu, M.-Q.; Wang, S.-S.; Li, L.; Ye, L.-W. *J. Org. Chem.* **2013**, 78, 3292.
(c) Yu, Y.-F.; Shu, C.; Shen, C.-H.; Li, T.-Y.; Ye, L.-W. *Chem. Asian J.* **2013**, 8, 2920.
- García-Muñoz, M. J.; Zacconi, F.; Foubelo, F.; Yus, M. *Eur. J. Org. Chem.* **2013**, 1287.
- Wisniewska, H. M.; Jarvo, E. R. *Chem. Sci.* **2011**, 2, 807.

Compound **1r**

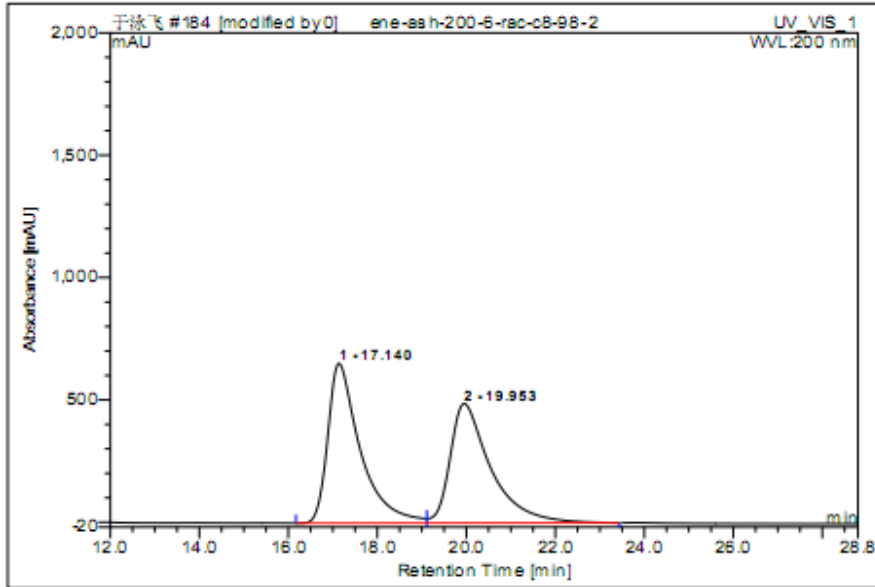
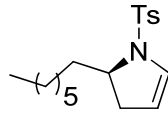


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	29.58	n.a.	786.287	621.525	49.06	n.a.	BMB*
2	31.29	n.a.	637.216	645.281	50.94	n.a.	BMB*
Total:			1423.503	1266.805	100.00	0.000	

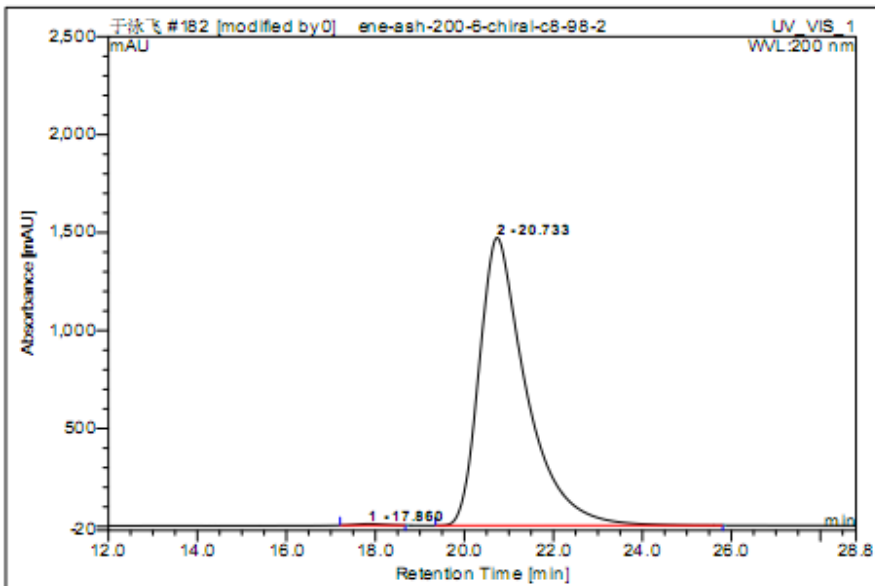


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	31.27	n.a.	500.139	480.745	96.59	n.a.	BM *
2	33.94	n.a.	14.944	16.957	3.41	n.a.	MB*
Total:			515.083	497.702	100.00	0.000	

Compound 2a

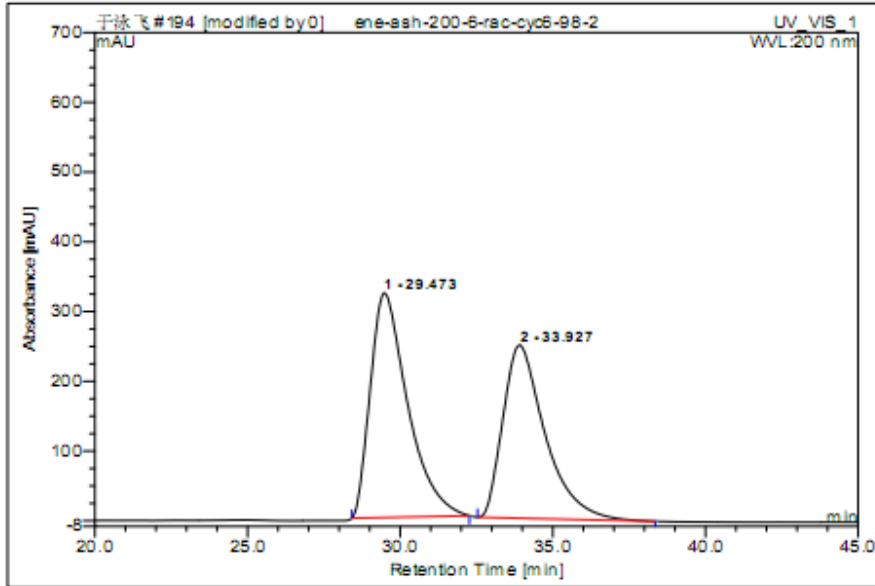
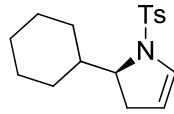


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.14	n.a.	653.050	552.804	51.76	n.a.	BM*
2	19.95	n.a.	488.036	515.241	48.24	n.a.	MB*
Total:			1141.086	1068.044	100.00	0.000	

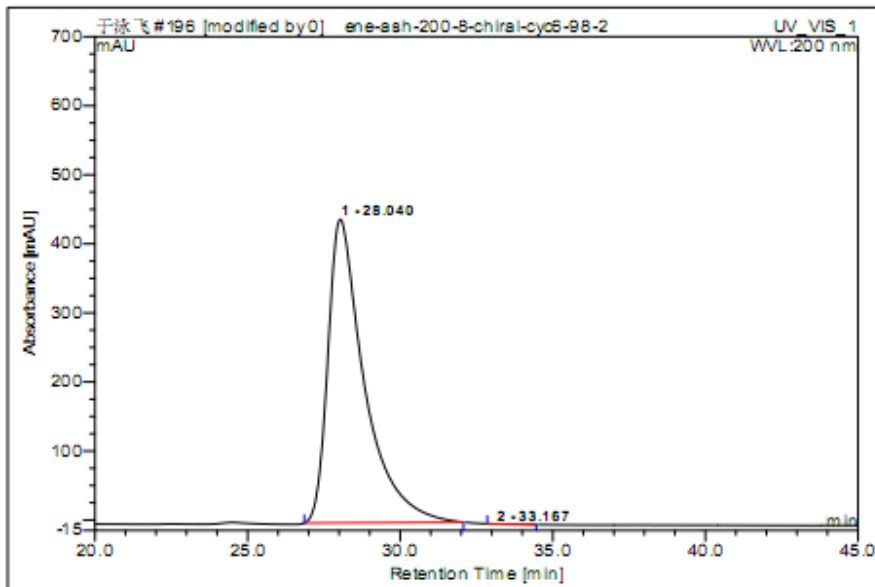


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.86	n.a.	7.700	5.442	0.30	n.a.	BMB*
2	20.73	n.a.	1469.200	1793.221	99.70	n.a.	BMB*
Total:			1476.900	1798.663	100.00	0.000	

Compound **2b**

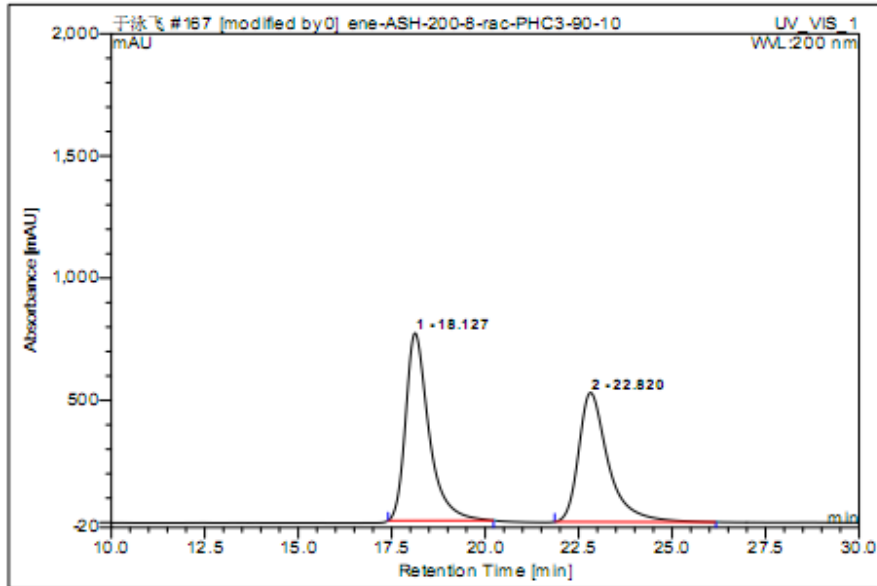
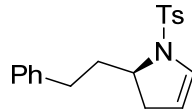


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	29.47	n.a.	321.927	455.190	53.41	n.a.	BMB*
2	33.93	n.a.	248.172	397.020	46.59	n.a.	BMB*
Total:			570.099	852.210	100.00	0.000	

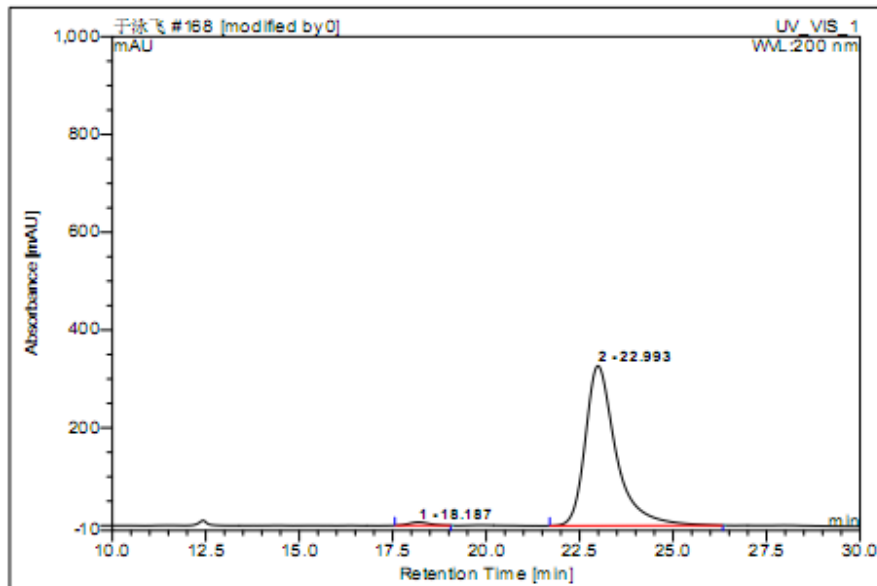


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	28.04	n.a.	439.434	606.485	99.99	n.a.	BMB*
2	33.17	n.a.	0.214	0.089	0.01	n.a.	BMB*
Total:			439.649	606.574	100.00	0.000	

Compound 2c

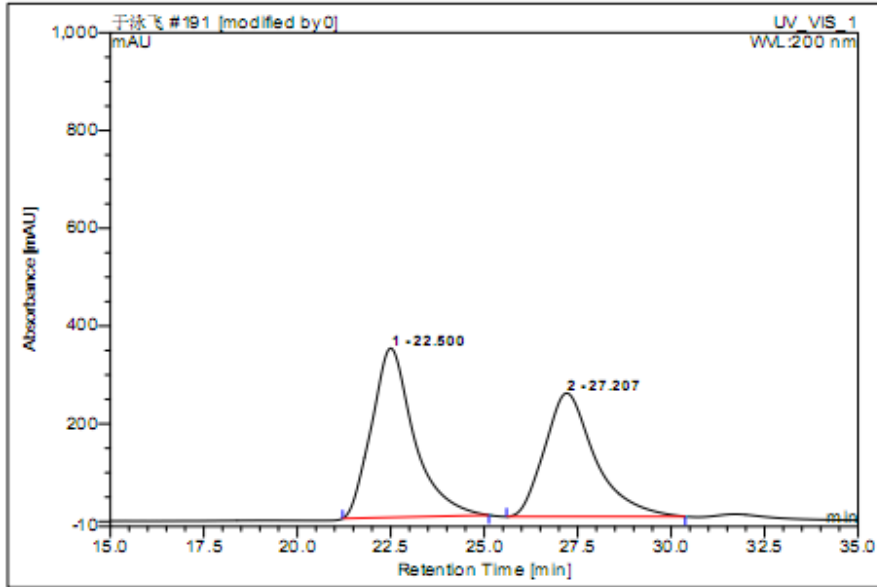
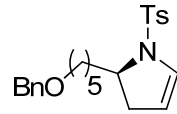


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.13	n.a.	767.113	557.216	53.38	n.a.	BMB*
2	22.82	n.a.	528.733	486.601	46.62	n.a.	BMB*
Total:			1295.846	1043.817	100.00	0.000	

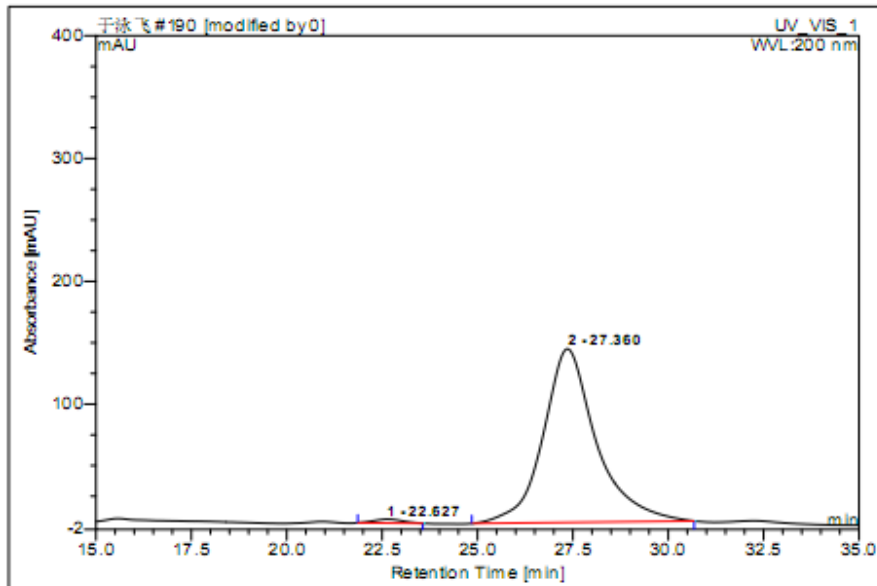


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.19	n.a.	6.797	4.296	1.36	n.a.	BMB*
2	22.99	n.a.	326.967	312.353	98.64	n.a.	BMB
Total:			333.764	316.649	100.00	0.000	

Compound **2d**

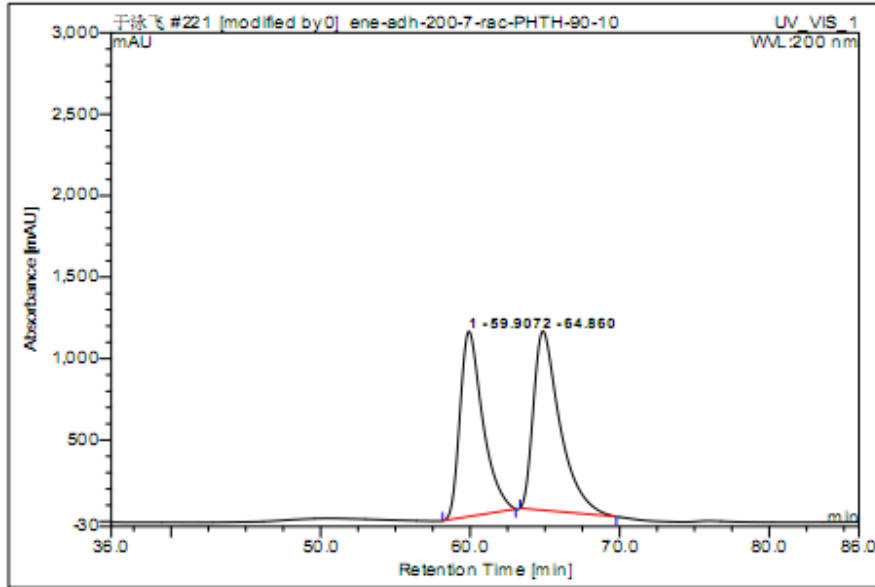
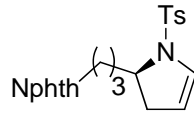


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	22.50	n.a.	345.968	455.526	53.53	n.a.	BMB*
2	27.21	n.a.	252.437	395.404	46.47	n.a.	BMB*
Total:			598.406	850.930	100.00	0.000	

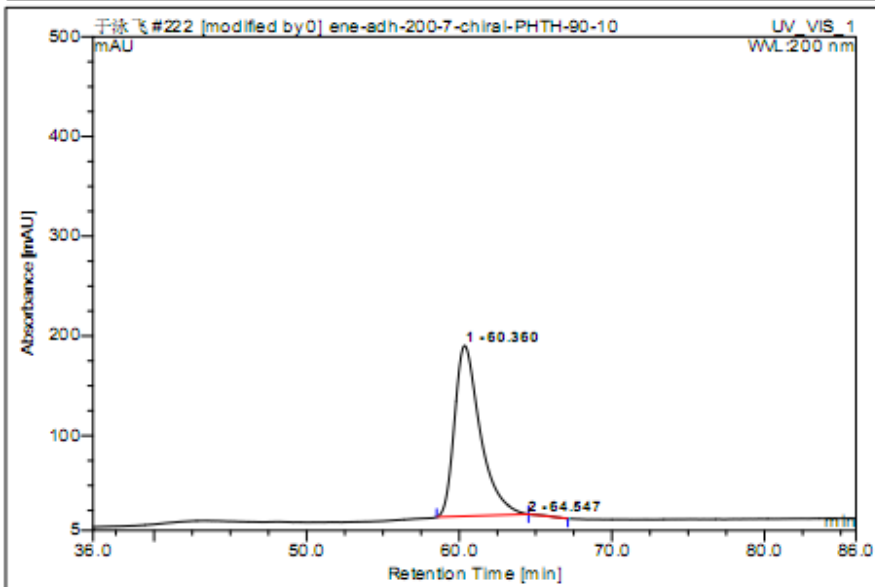


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	22.63	n.a.	3.179	2.751	1.19	n.a.	BMB*
2	27.36	n.a.	141.308	228.162	98.81	n.a.	BMB*
Total:			144.487	230.913	100.00	0.000	

Compound 2e

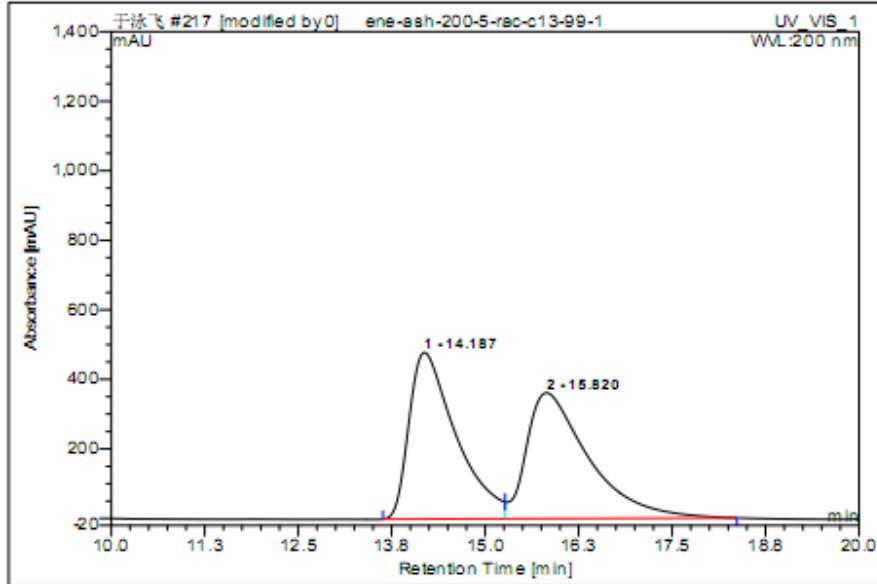
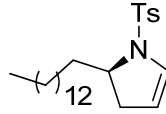


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	59.91	n.a.	1136.119	2012.106	47.11	n.a.	BMB*
2	64.86	n.a.	1099.132	2259.022	52.89	n.a.	BMB*
Total:			2235.251	4271.128	100.00	0.000	

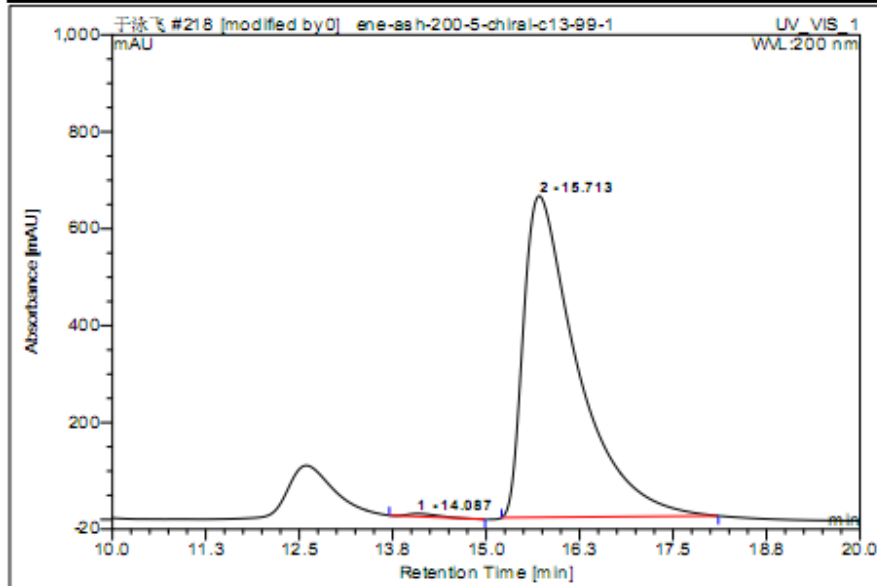


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	60.36	n.a.	170.950	334.165	99.91	n.a.	BMB*
2	64.55	n.a.	0.008	0.315	0.09	n.a.	bMB*
Total:			170.958	334.480	100.00	0.000	

Compound 2f

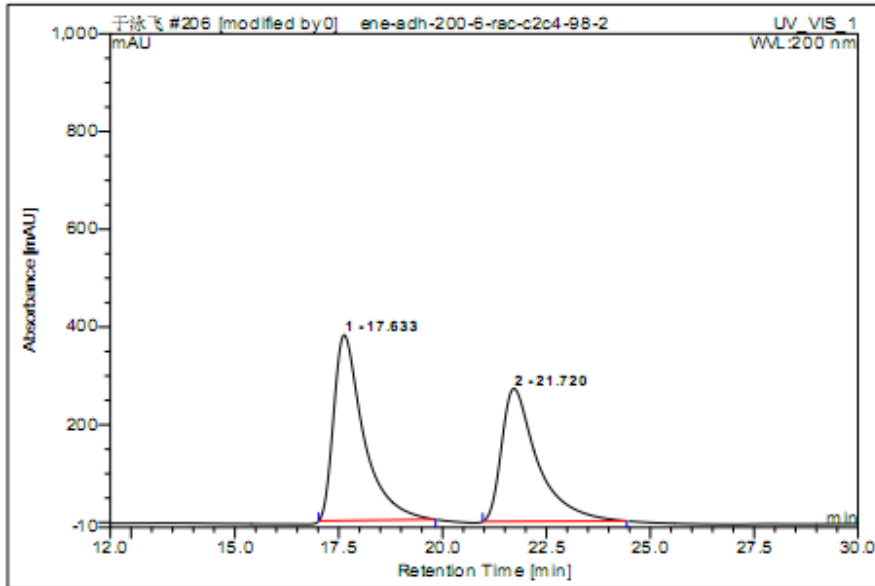
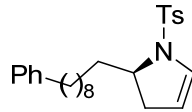


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	14.19	n.a.	478.861	347.352	49.97	n.a.	BM*
2	15.82	n.a.	361.754	347.816	50.03	n.a.	MB*
Total:			840.614	695.168	100.00	0.000	

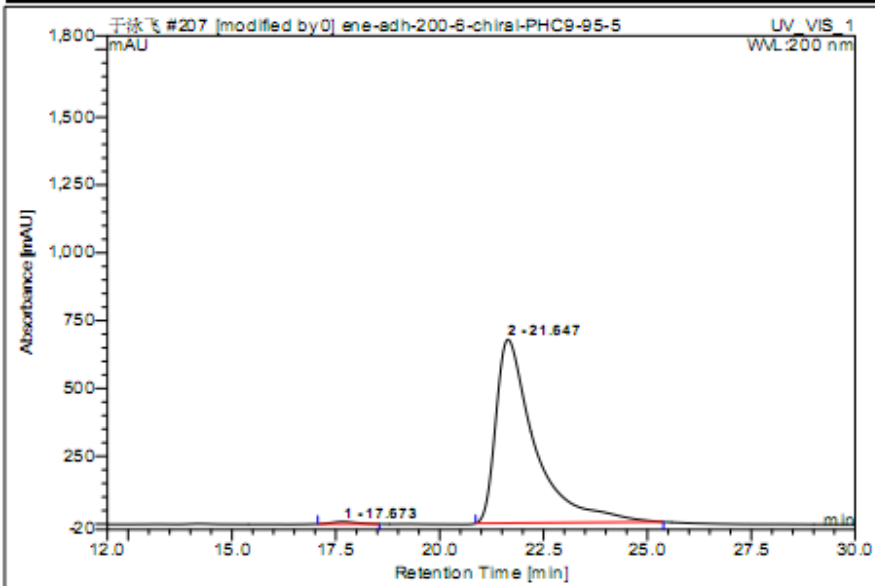


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	14.09	n.a.	6.032	2.705	0.49	n.a.	BMB*
2	15.71	n.a.	663.076	554.010	99.51	n.a.	BMB*
Total:			669.107	556.715	100.00	0.000	

Compound 2g

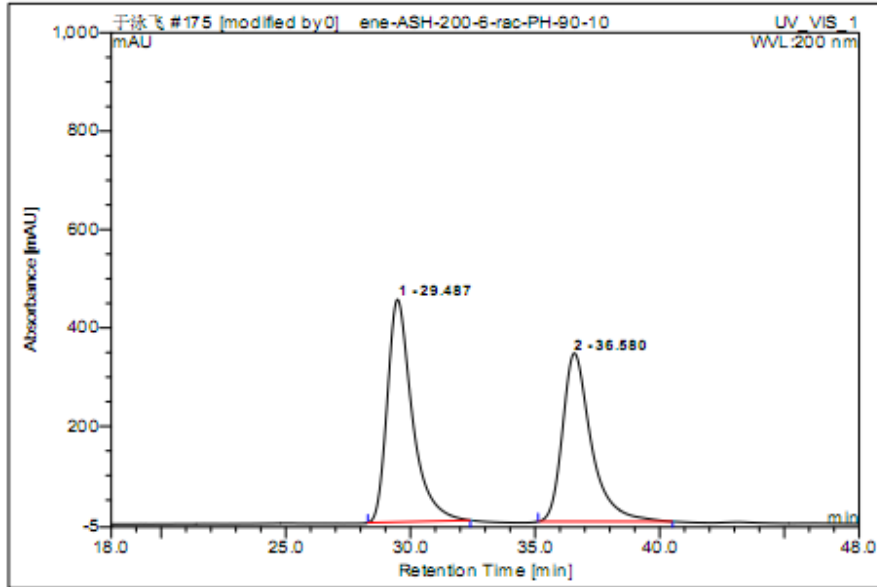
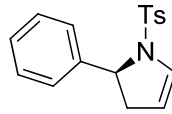


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.63	n.a.	379.623	317.179	53.81	n.a.	BMB*
2	21.72	n.a.	271.874	272.294	46.19	n.a.	BMB*
Total:			651.497	589.472	100.00	0.000	

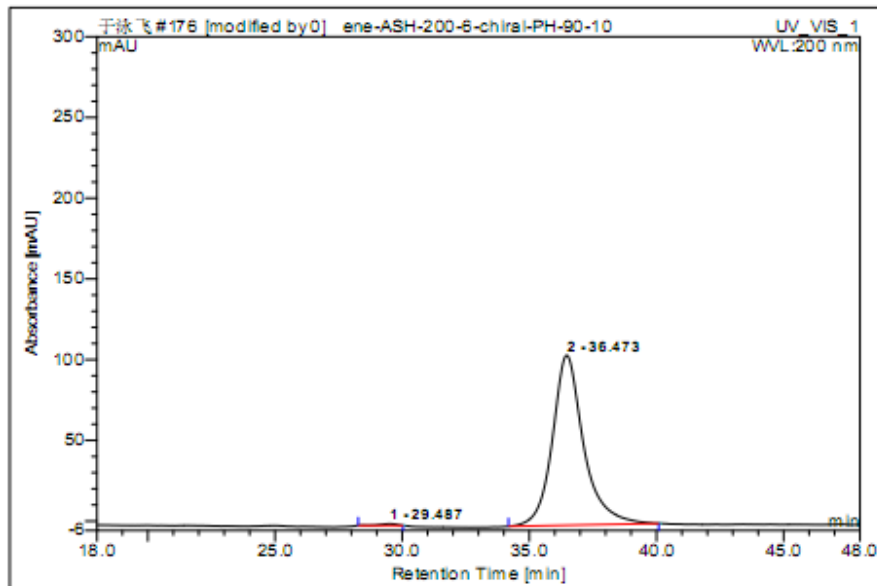


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.67	n.a.	8.185	5.640	0.76	n.a.	BMB*
2	21.65	n.a.	676.536	732.620	99.24	n.a.	BMB*
Total:			684.721	738.261	100.00	0.000	

Compound **2h**

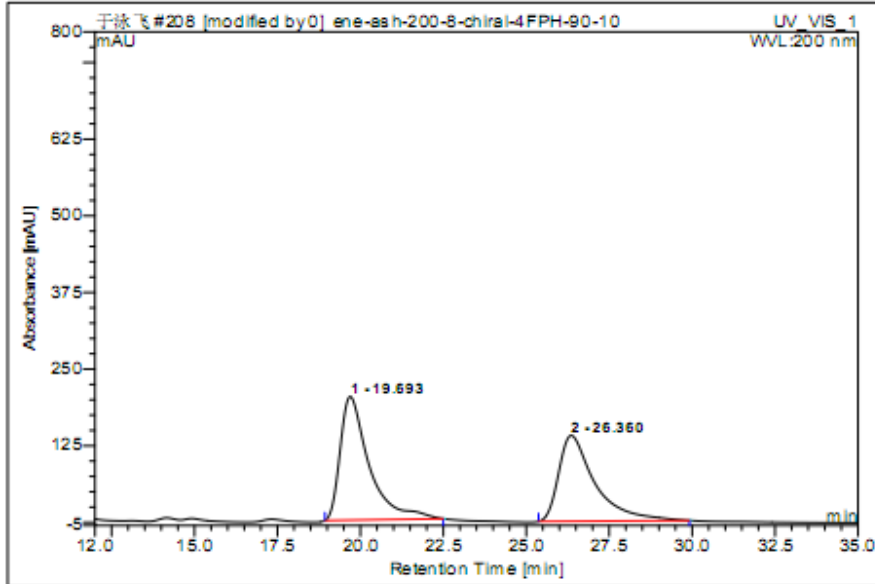
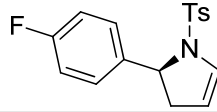


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	29.49	n.a.	452.422	525.044	53.41	n.a.	BMB*
2	36.58	n.a.	342.146	457.969	46.59	n.a.	BMB*
Total:			794.568	983.013	100.00	0.000	

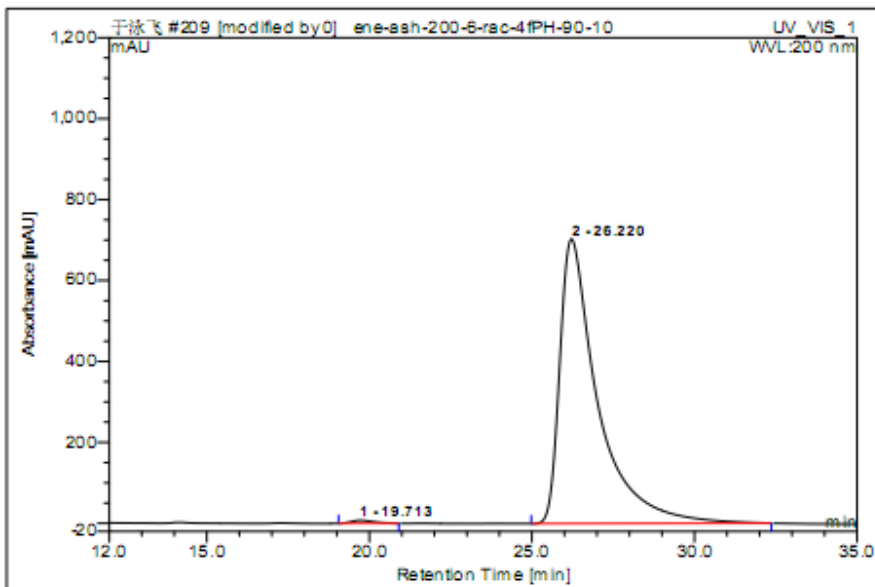


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	29.49	n.a.	1.115	0.851	0.56	n.a.	BMB*
2	36.47	n.a.	105.260	150.153	99.44	n.a.	BMB*
Total:			106.375	151.003	100.00	0.000	

Compound 2i

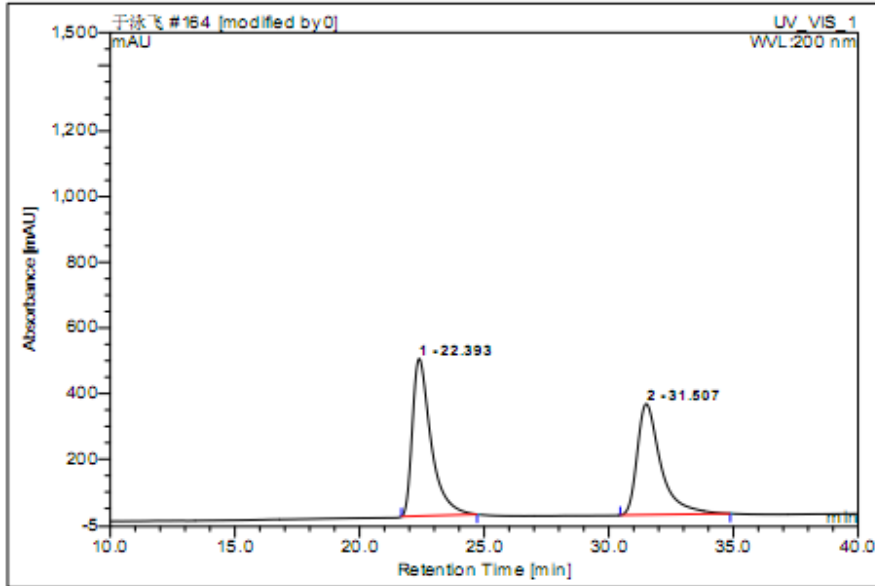
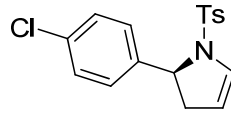


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	19.69	n.a.	201.499	204.078	53.52	n.a.	BMB*
2	26.36	n.a.	139.908	177.257	46.48	n.a.	BMB*
Total:			341.407	381.335	100.00	0.000	

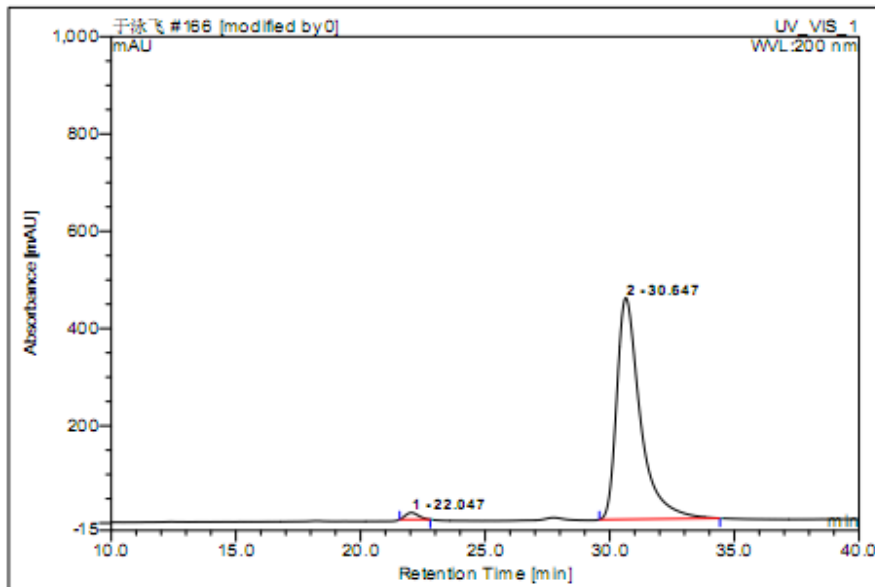


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	19.71	n.a.	7.647	6.036	0.63	n.a.	BMB*
2	26.22	n.a.	703.150	949.130	99.37	n.a.	BMB
Total:			710.797	955.166	100.00	0.000	

Compound 2j

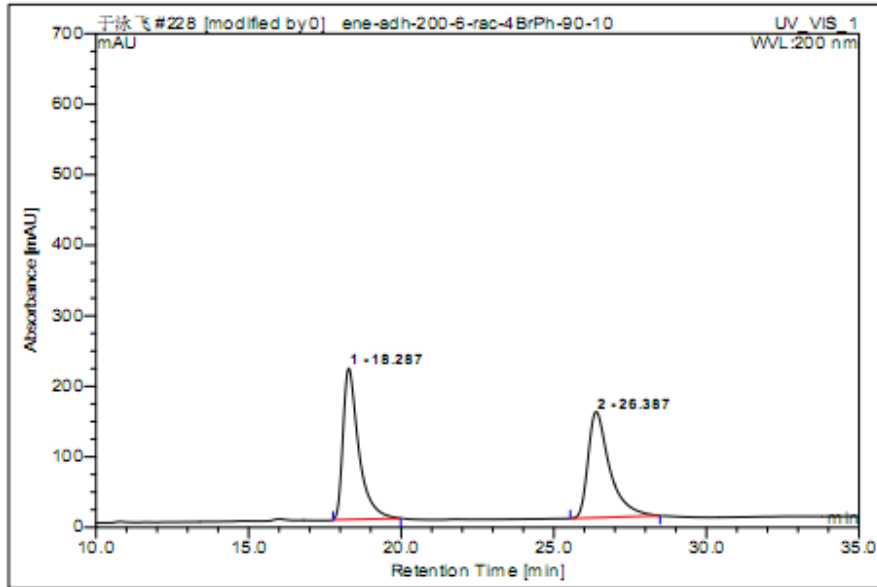
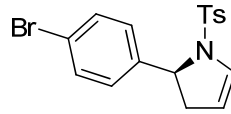


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	22.39	n.a.	479.394	416.341	52.94	n.a.	BMB*
2	31.51	n.a.	337.730	370.112	47.06	n.a.	BMB*
Total:			817.125	786.452	100.00	0.000	

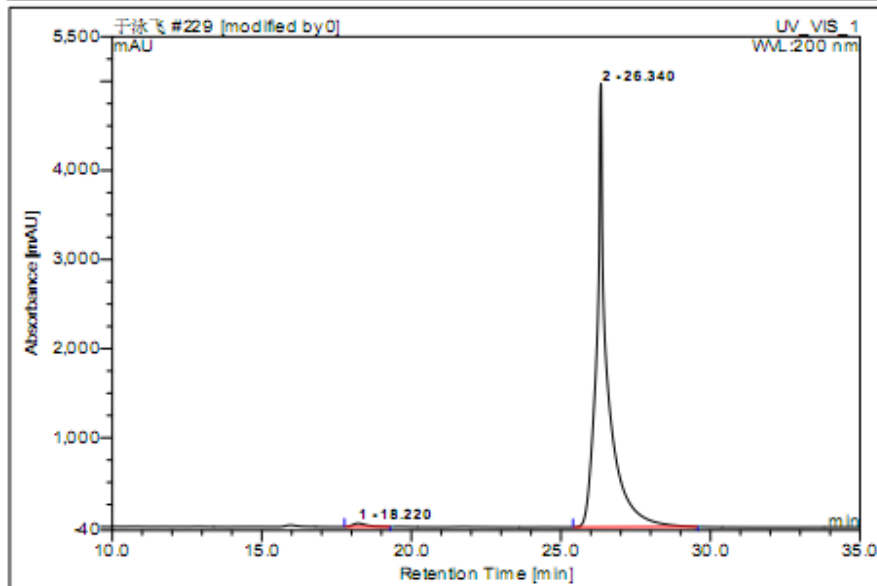


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	22.05	n.a.	14.100	8.576	1.69	n.a.	BMB*
2	30.65	n.a.	455.385	498.925	98.31	n.a.	BMB*
Total:			469.485	507.501	100.00	0.000	

Compound 2k

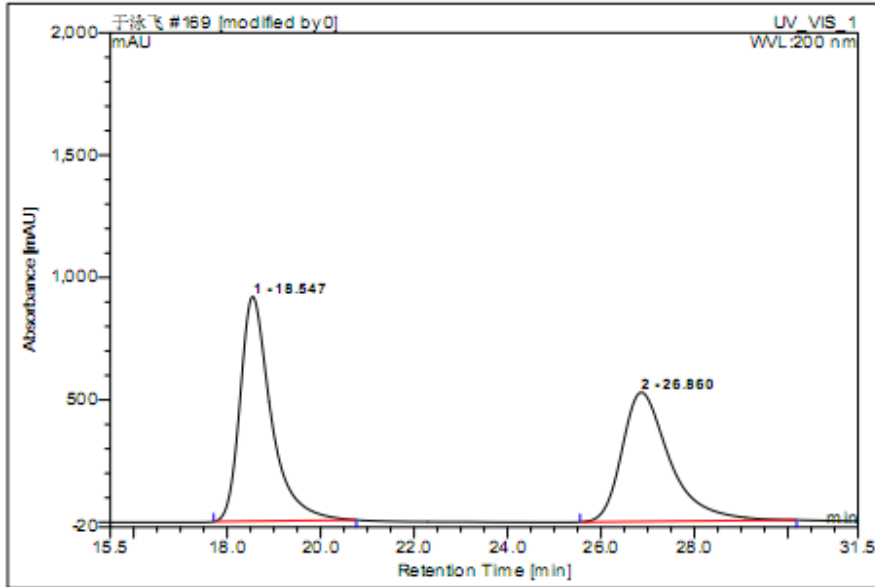
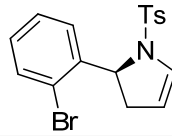


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.29	n.a.	214.249	127.963	50.86	n.a.	BMB*
2	26.39	n.a.	150.185	123.654	49.14	n.a.	BMB*
Total:			364.435	251.617	100.00	0.000	

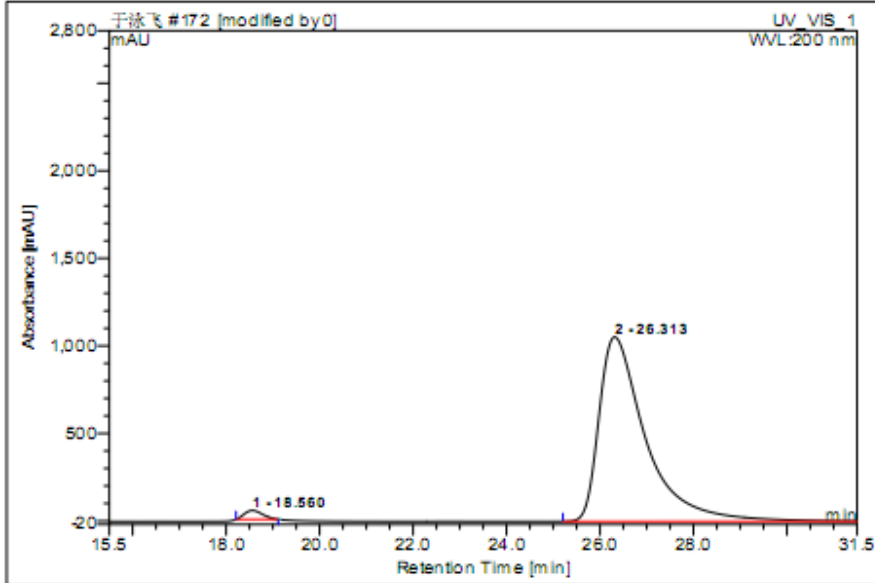


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.22	n.a.	39.271	21.080	1.02	n.a.	BMB*
2	26.34	n.a.	4975.066	2048.116	98.98	n.a.	BMB*
Total:			5014.337	2069.196	100.00	0.000	

Compound 2l

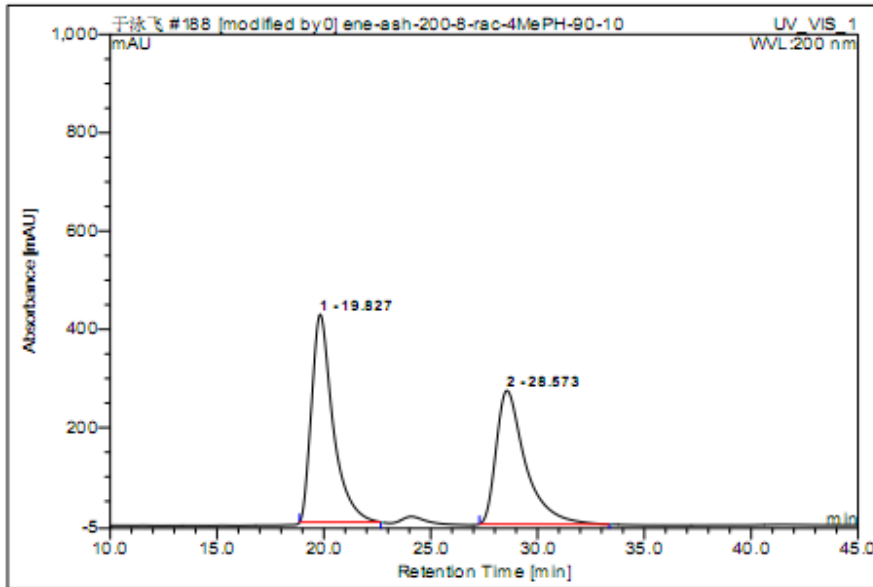
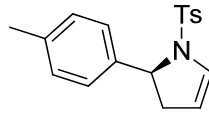


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.55	n.a.	917.616	705.955	52.96	n.a.	BMB*
2	26.86	n.a.	527.586	627.107	47.04	n.a.	BMB*
Total:			1445.203	1333.062	100.00	0.000	

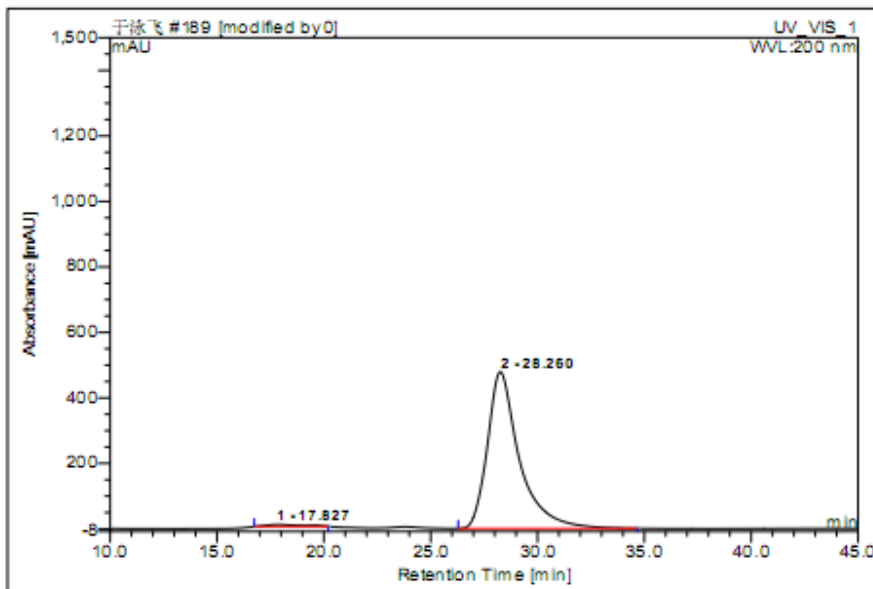


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	18.56	n.a.	50.823	23.034	1.85	n.a.	BMB*
2	26.31	n.a.	1053.556	1218.926	98.15	n.a.	BMB
Total:			1104.380	1241.960	100.00	0.000	

Compound **2m**

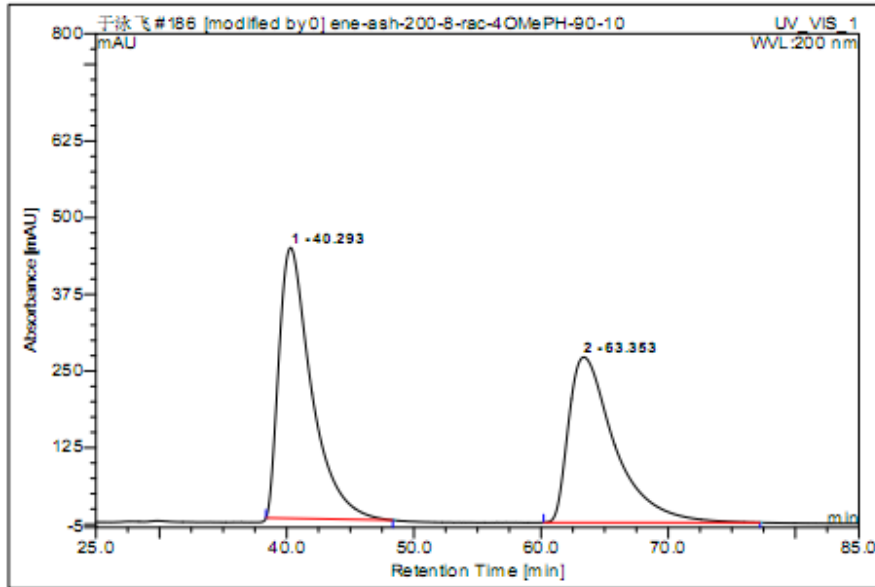
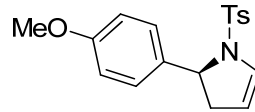


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	19.83	n.a.	422.584	491.713	53.25	n.a.	BMB*
2	28.57	n.a.	271.884	431.623	46.75	n.a.	BMB*
Total:			694.468	923.335	100.00	0.000	

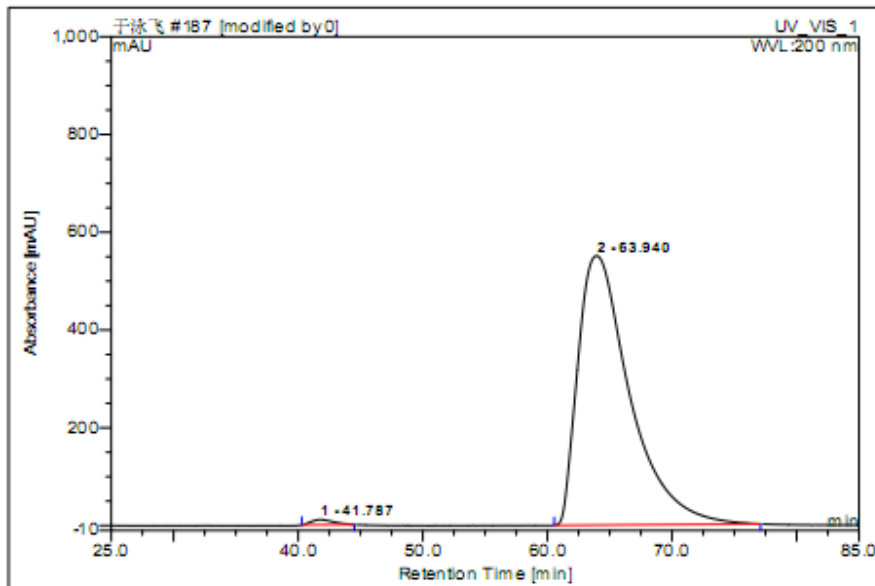


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.83	n.a.	6.378	13.150	1.56	n.a.	BMB*
2	28.26	n.a.	478.184	828.632	98.44	n.a.	BMB
Total:			484.562	841.782	100.00	0.000	

Compound **2n**

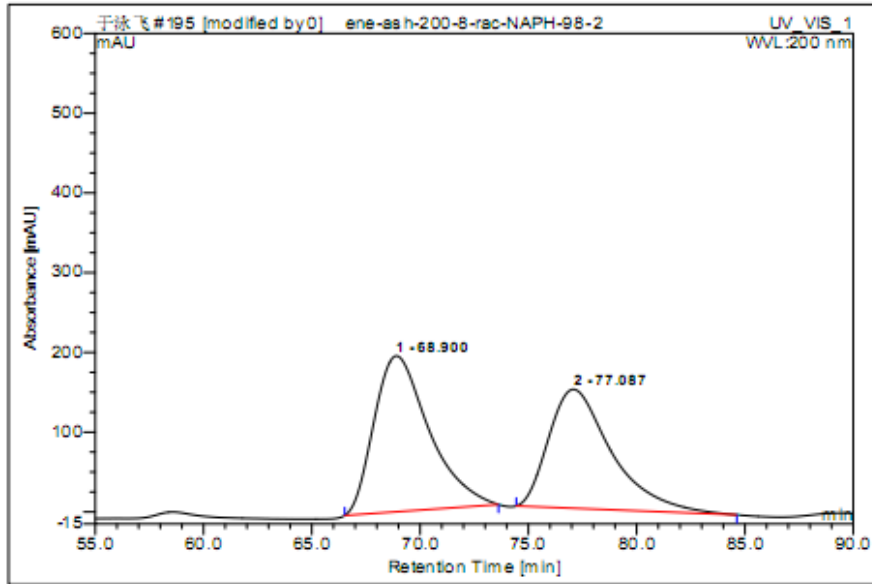
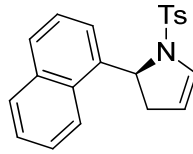


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	40.29	n.a.	441.211	1305.697	53.44	n.a.	BMB*
2	63.35	n.a.	269.841	1137.558	46.56	n.a.	BMB*
Total:			711.052	2443.255	100.00	0.000	

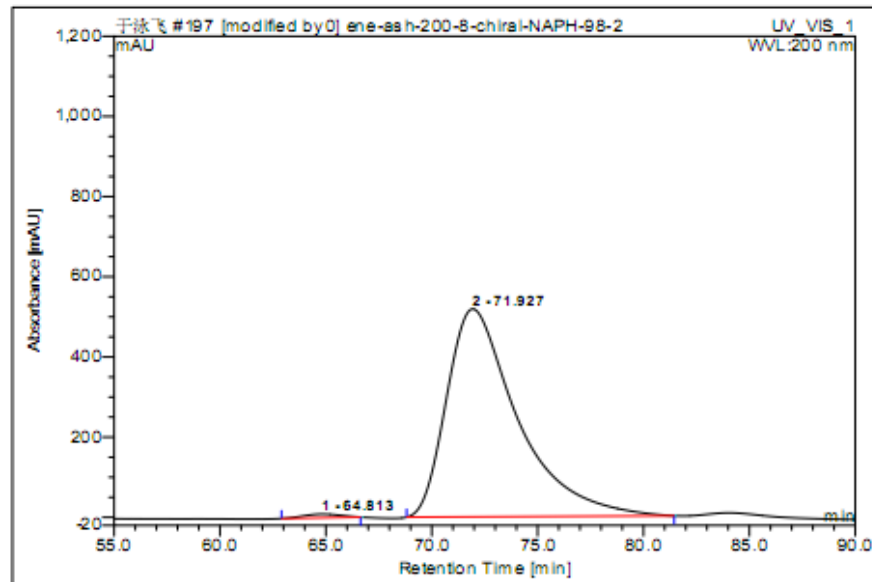


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	41.79	n.a.	10.547	21.779	0.81	n.a.	BMB*
2	63.94	n.a.	551.028	2653.289	99.19	n.a.	BMB
Total:			561.574	2675.068	100.00	0.000	

Compound 2o

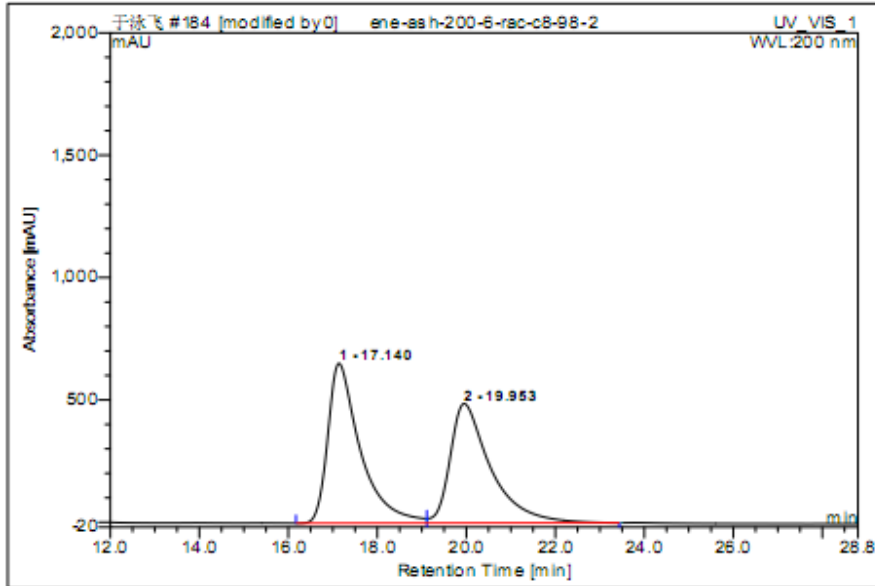
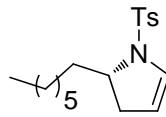


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	68.90	n.a.	195.463	575.424	53.44	n.a.	BMB*
2	77.09	n.a.	149.164	501.365	46.56	n.a.	BMB*
Total:			344.626	1076.789	100.00	0.000	

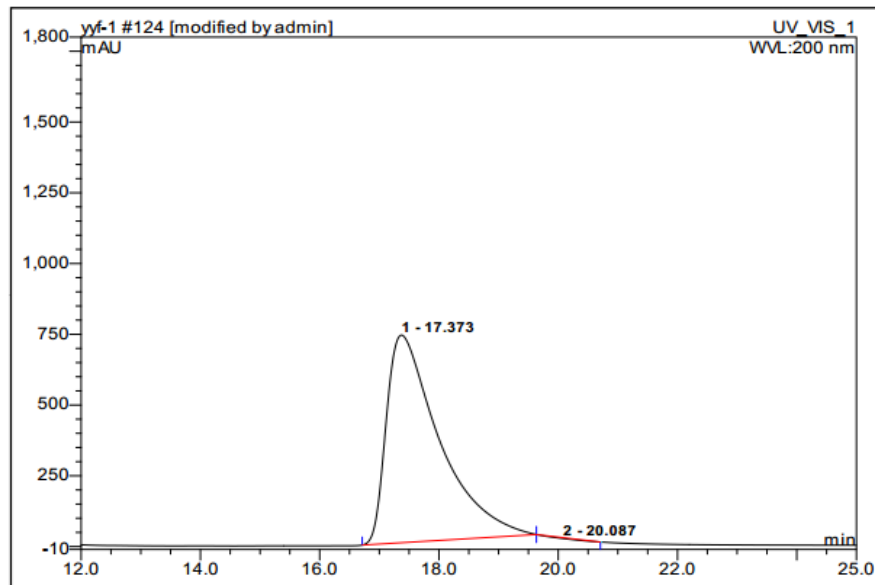


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	64.81	n.a.	9.282	18.569	0.92	n.a.	BMB*
2	71.93	n.a.	518.430	2009.789	99.08	n.a.	BMB*
Total:			527.712	2028.358	100.00	0.000	

Compound **2a'**

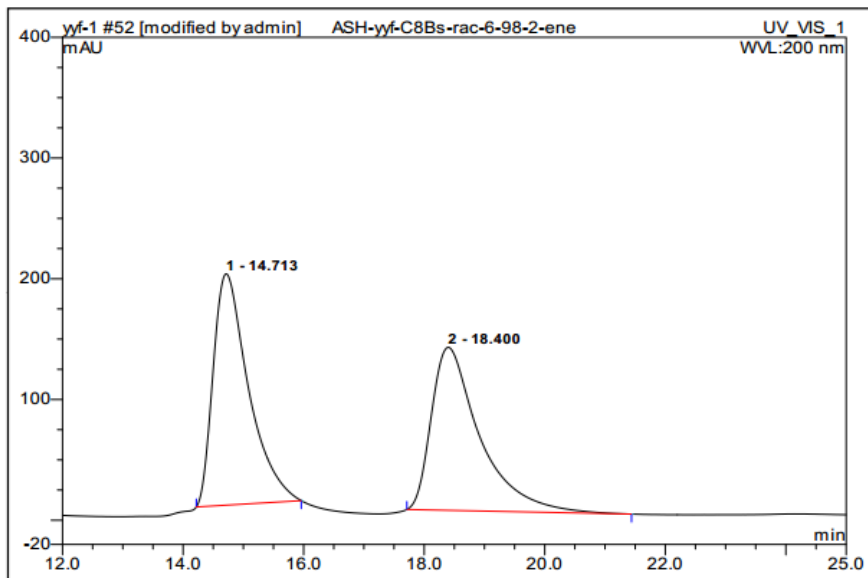
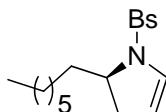


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.14	n.a.	653.050	552.804	51.76	n.a.	BM*
2	19.95	n.a.	488.036	515.241	48.24	n.a.	MB*
Total:			1141.086	1068.044	100.00	0.000	

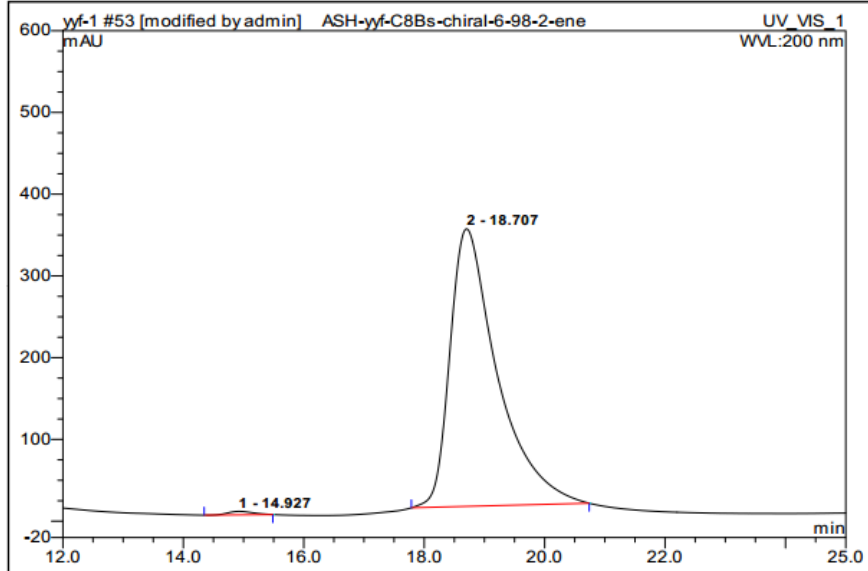


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	17.37	n.a.	733.329	753.760	99.69	n.a.	BMB*
2	20.09	n.a.	3.151	2.372	0.31	n.a.	bMB*
Total:			736.480	756.132	100.00	0.000	

Compound **2p**

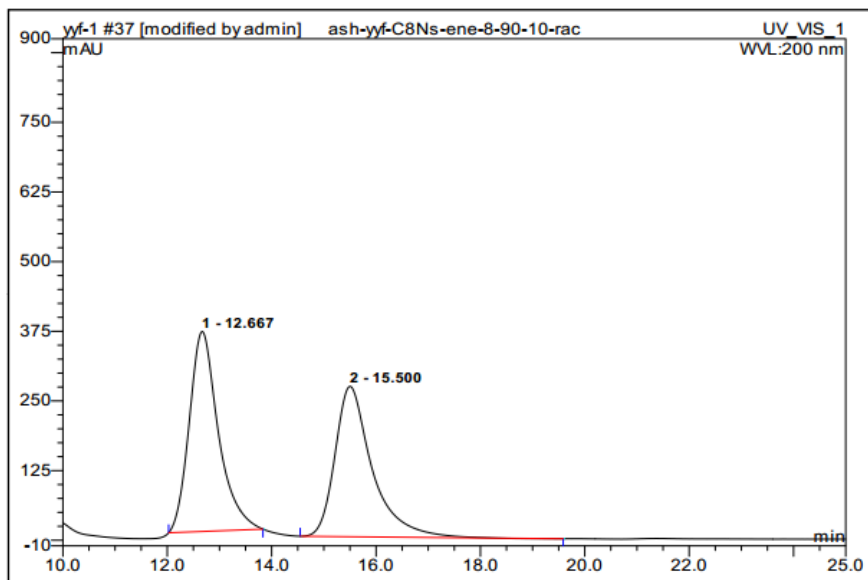
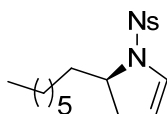


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	14.71	n.a.	191.598	130.000	50.88	n.a.	BMB*
2	18.40	n.a.	135.008	125.511	49.12	n.a.	BMB*
Total:			326.606	255.511	100.00	0.000	

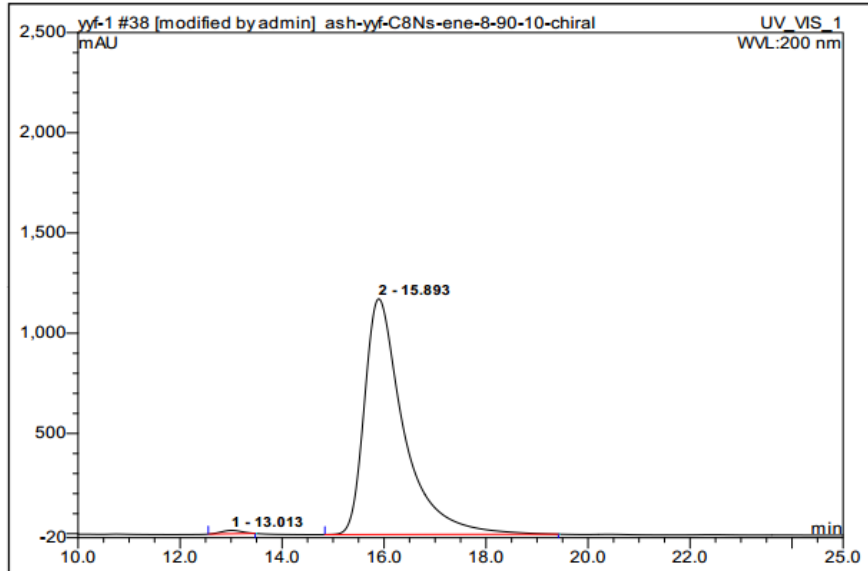


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	14.93	n.a.	4.269	2.062	0.66	n.a.	BMB*
2	18.71	n.a.	339.440	308.784	99.34	n.a.	BMB*
Total:			343.709	310.846	100.00	0.000	

Compound 2q

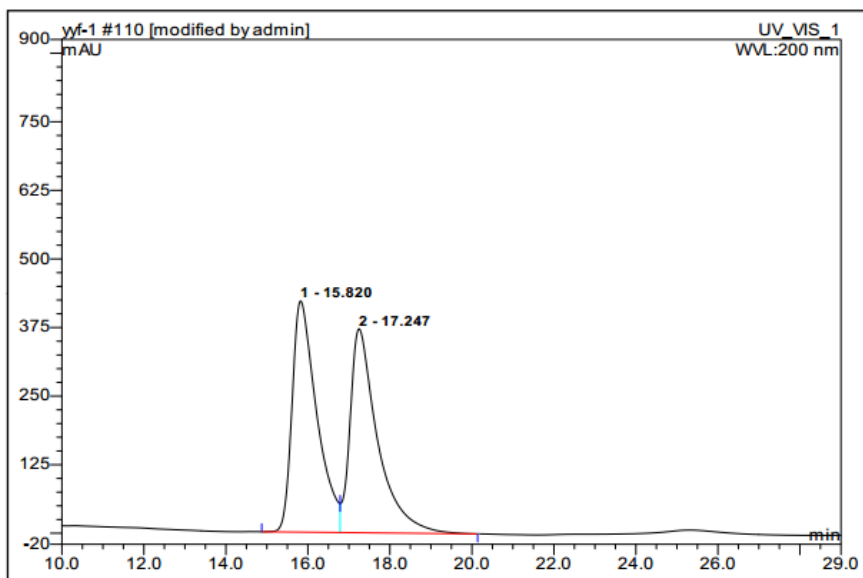
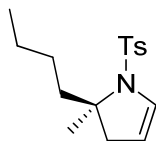


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	12.67	n.a.	358.751	231.928	51.03	n.a.	BMB*
2	15.50	n.a.	269.756	222.578	48.97	n.a.	BMB*
Total:			628.507	454.506	100.00	0.000	

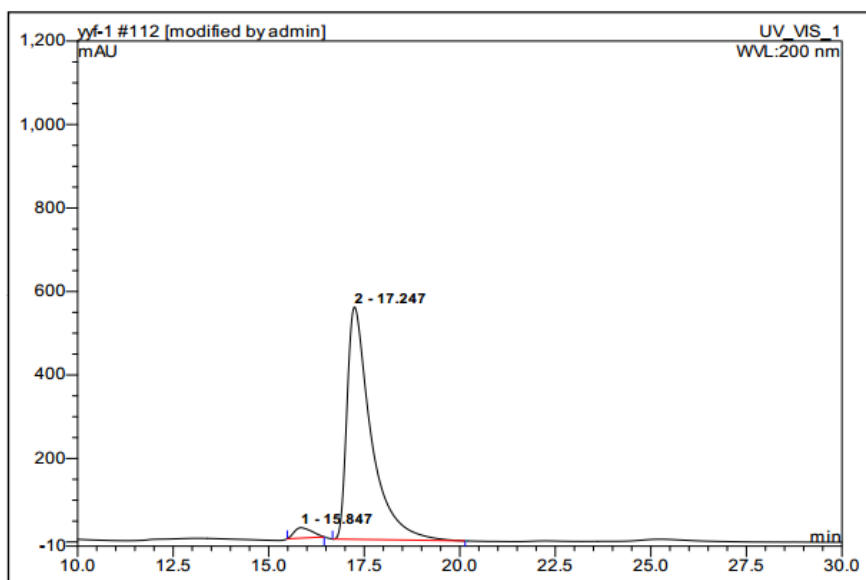


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	13.01	n.a.	16.993	8.019	0.76	n.a.	BMB*
2	15.89	n.a.	1175.672	1049.785	99.24	n.a.	BMB*
Total:			1192.666	1057.803	100.00	0.000	

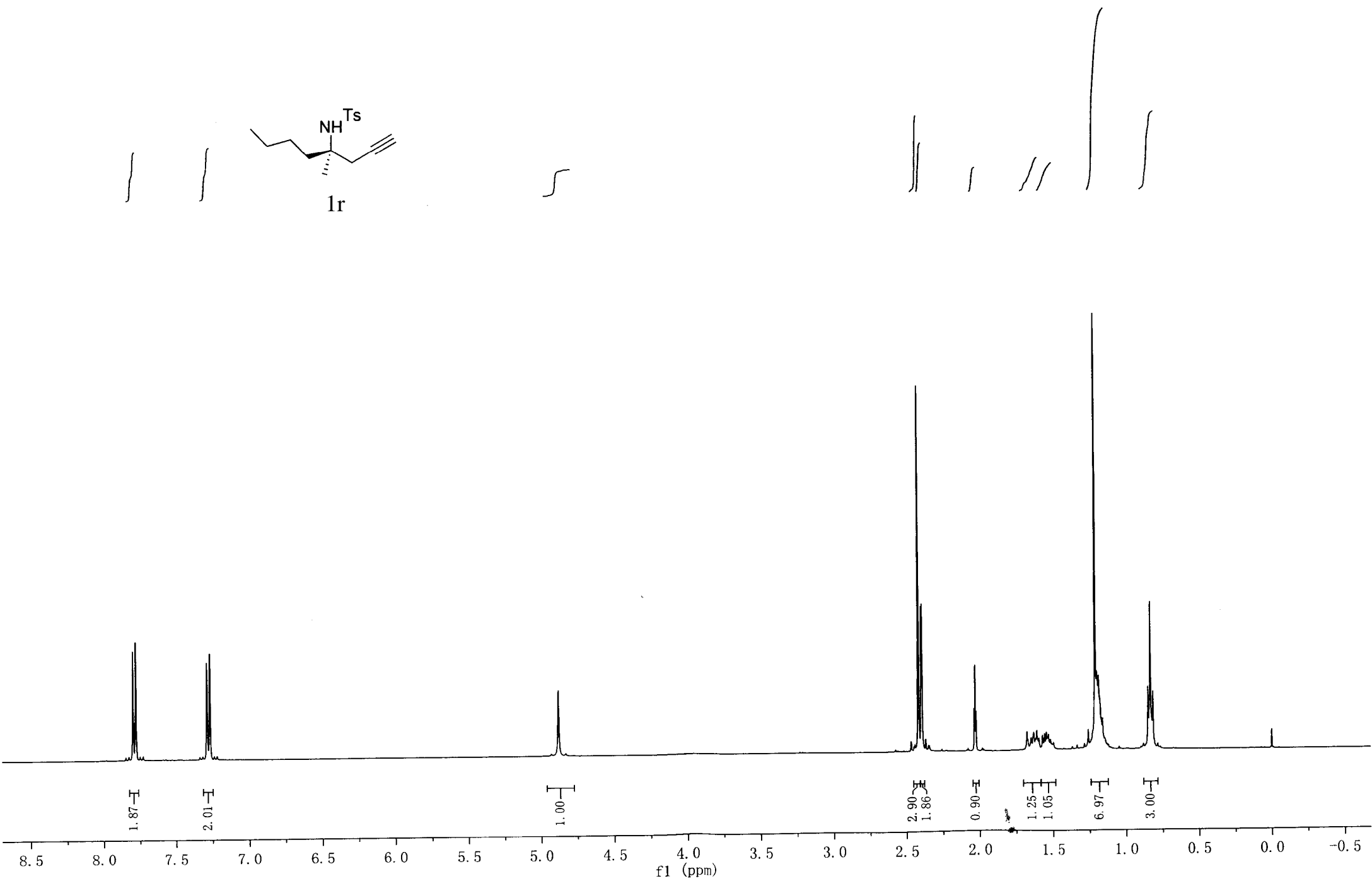
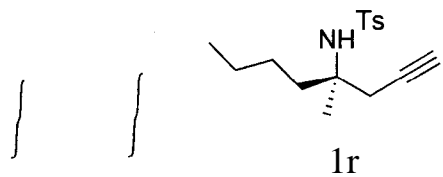
Compound **2r**

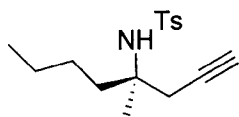


No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	15.82	n.a.	421.202	293.525	50.38	n.a.	BM
2	17.25	n.a.	371.530	289.100	49.62	n.a.	MB
Total:			792.732	582.624	100.00	0.000	

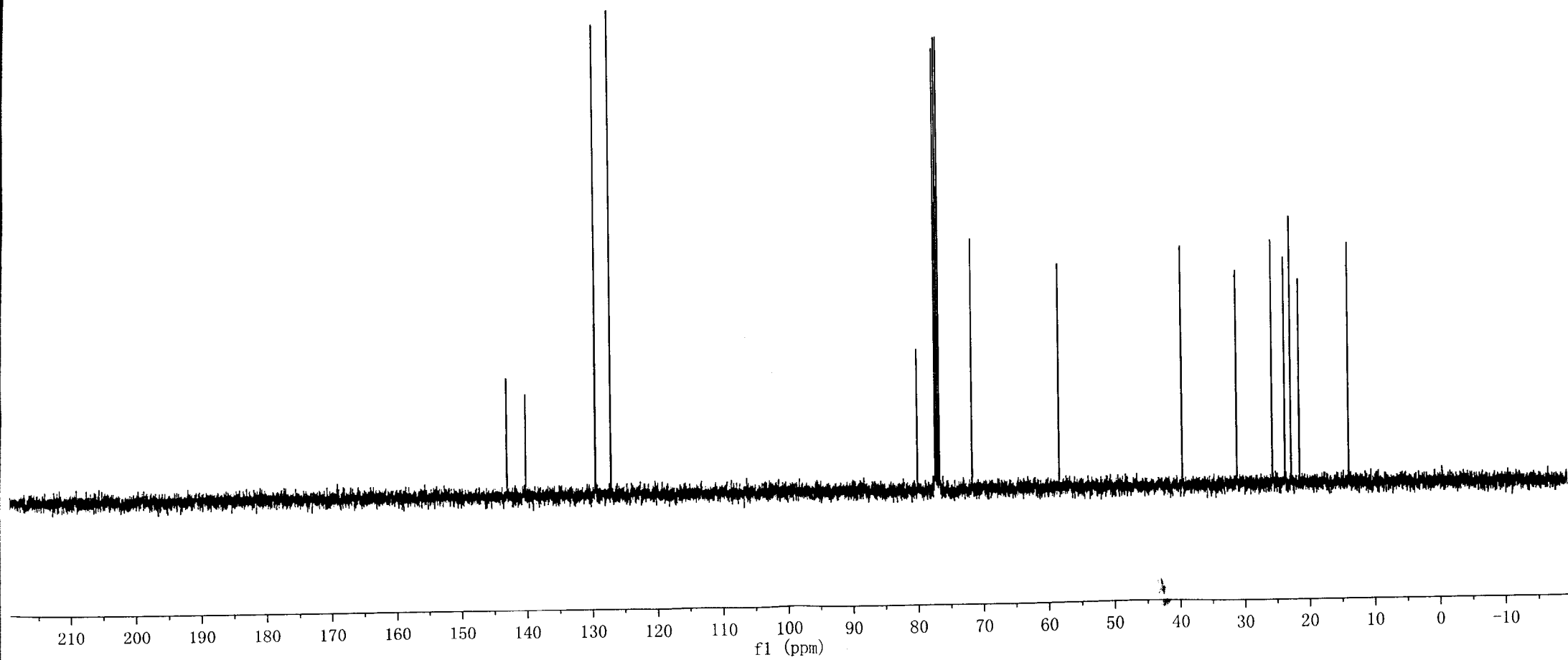


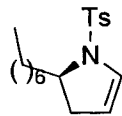
No.	Ret.Time min	Peak Name	Height mAU	Area mAU*min	Rel.Area %	Amount	Type
1	15.85	n.a.	24.920	13.292	3.18	n.a.	BMB*
2	17.25	n.a.	556.483	405.074	96.82	n.a.	BMB*
Total:			581.403	418.366	100.00	0.000	



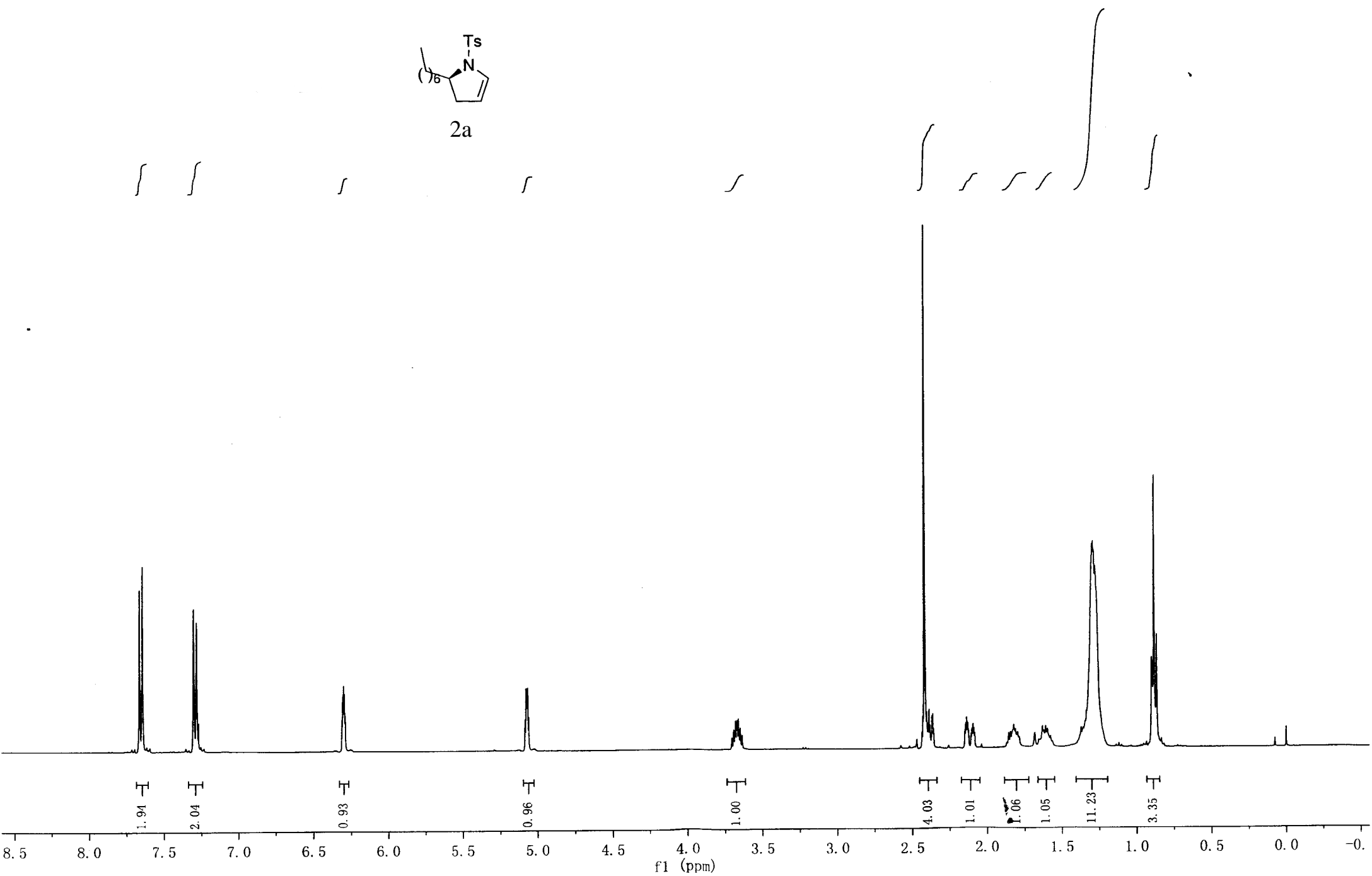


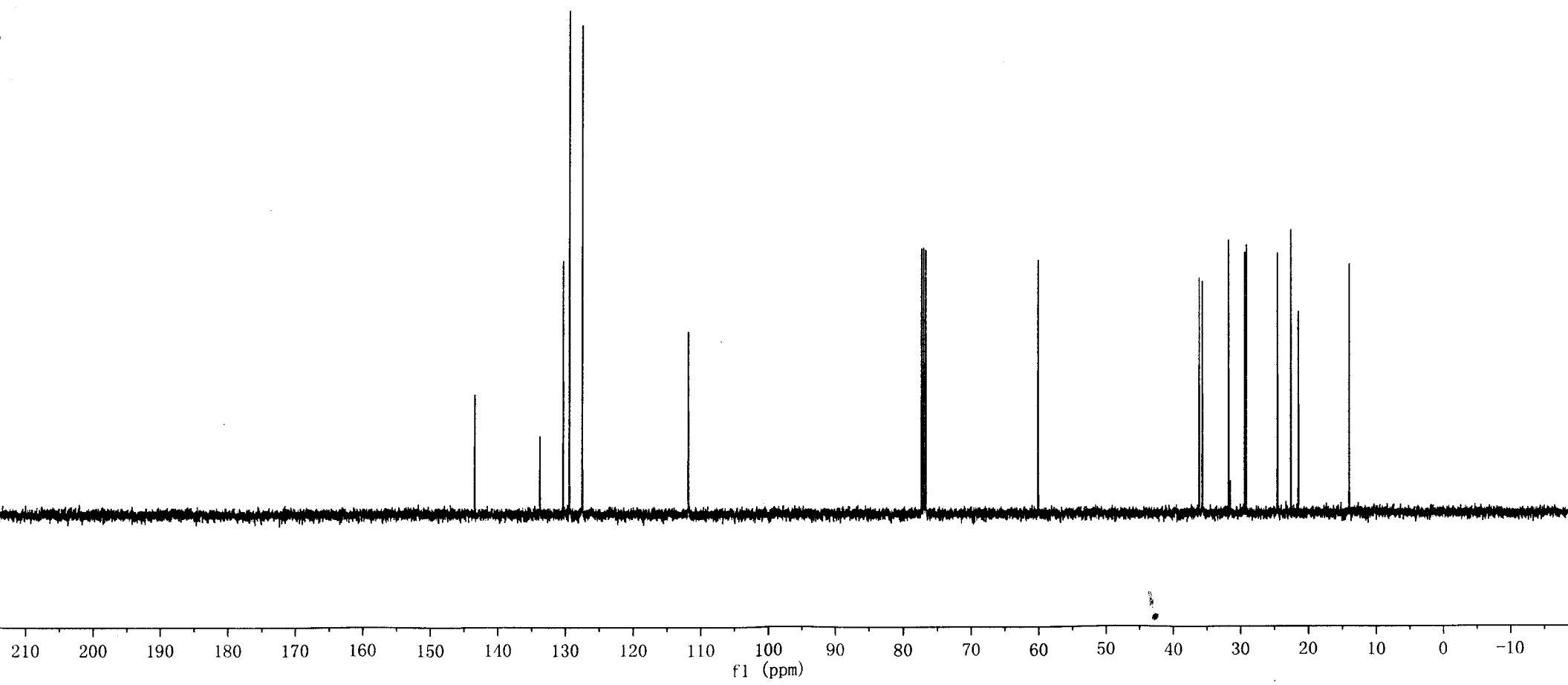
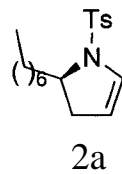
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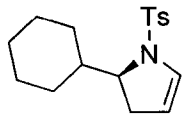




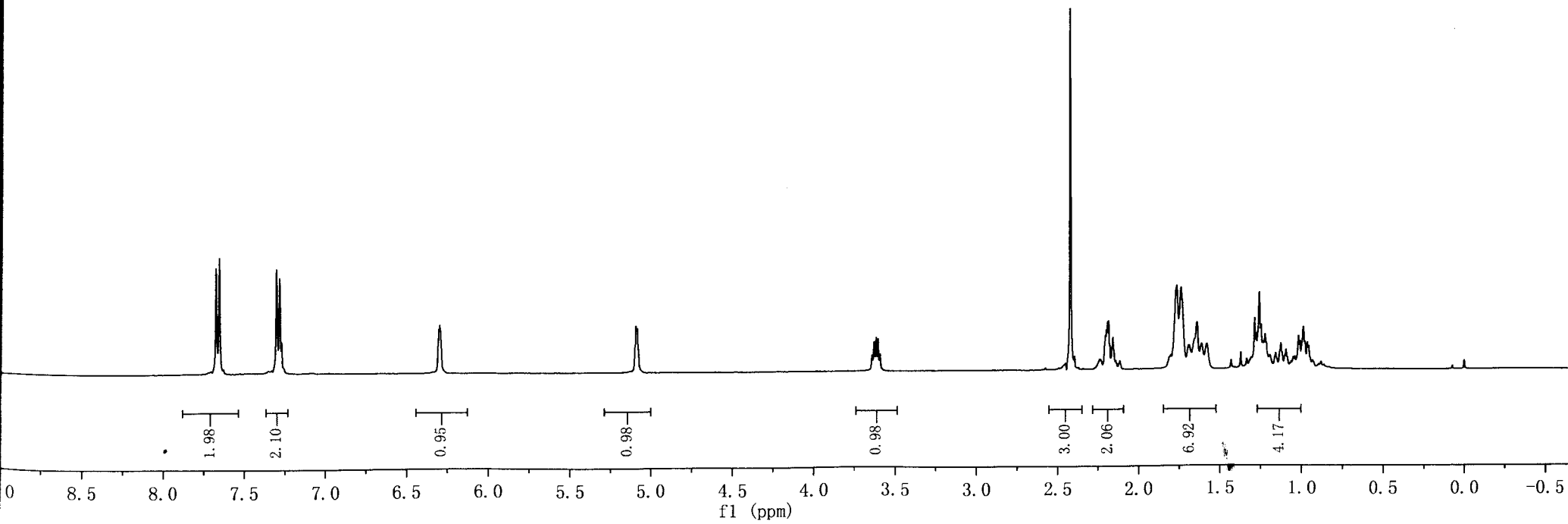
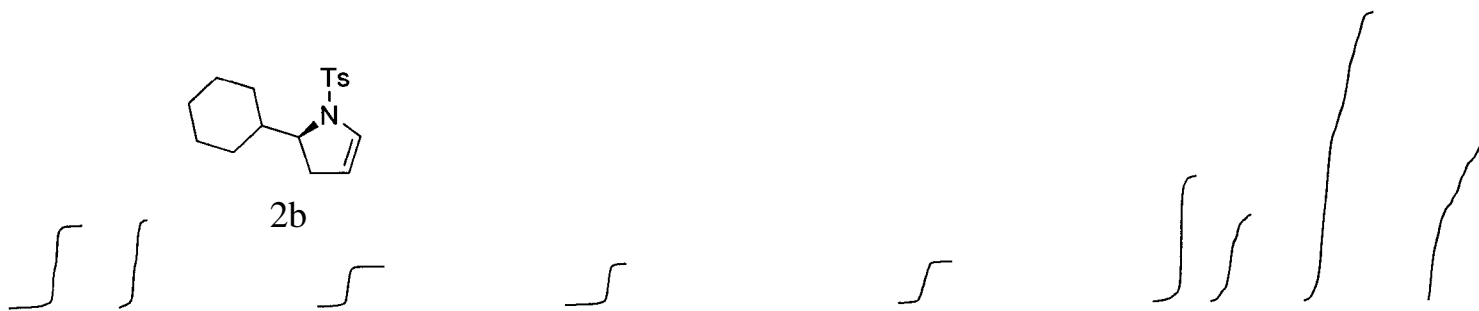
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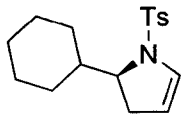




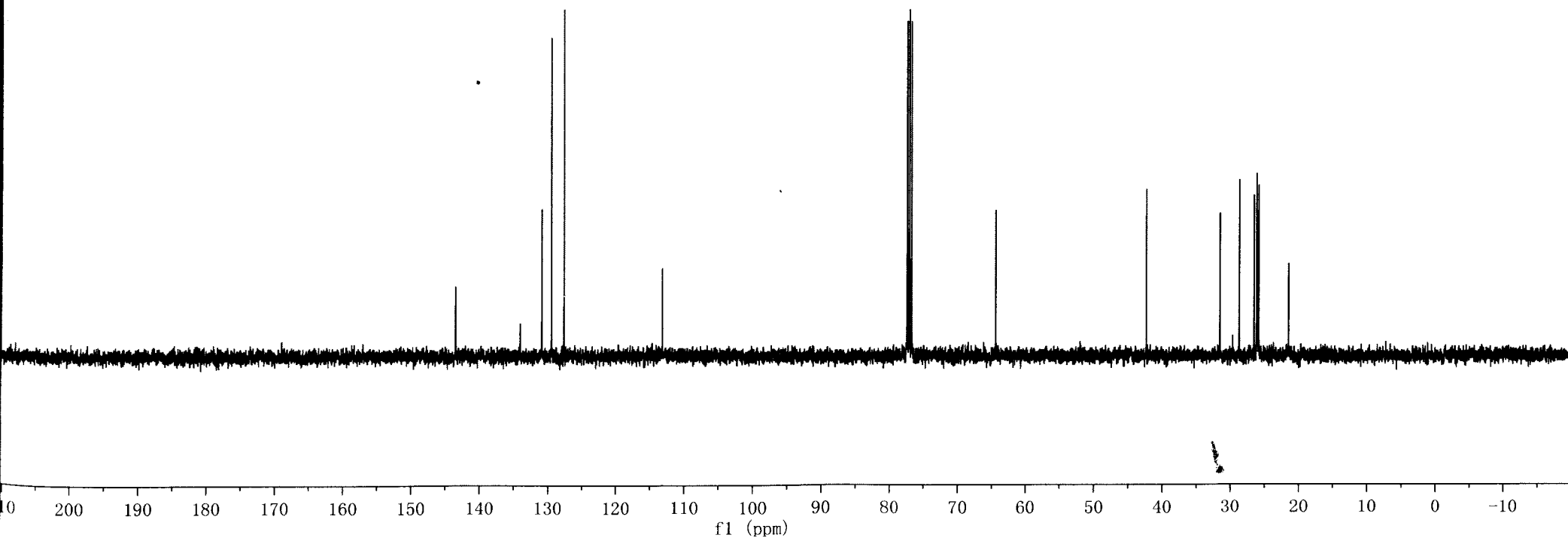


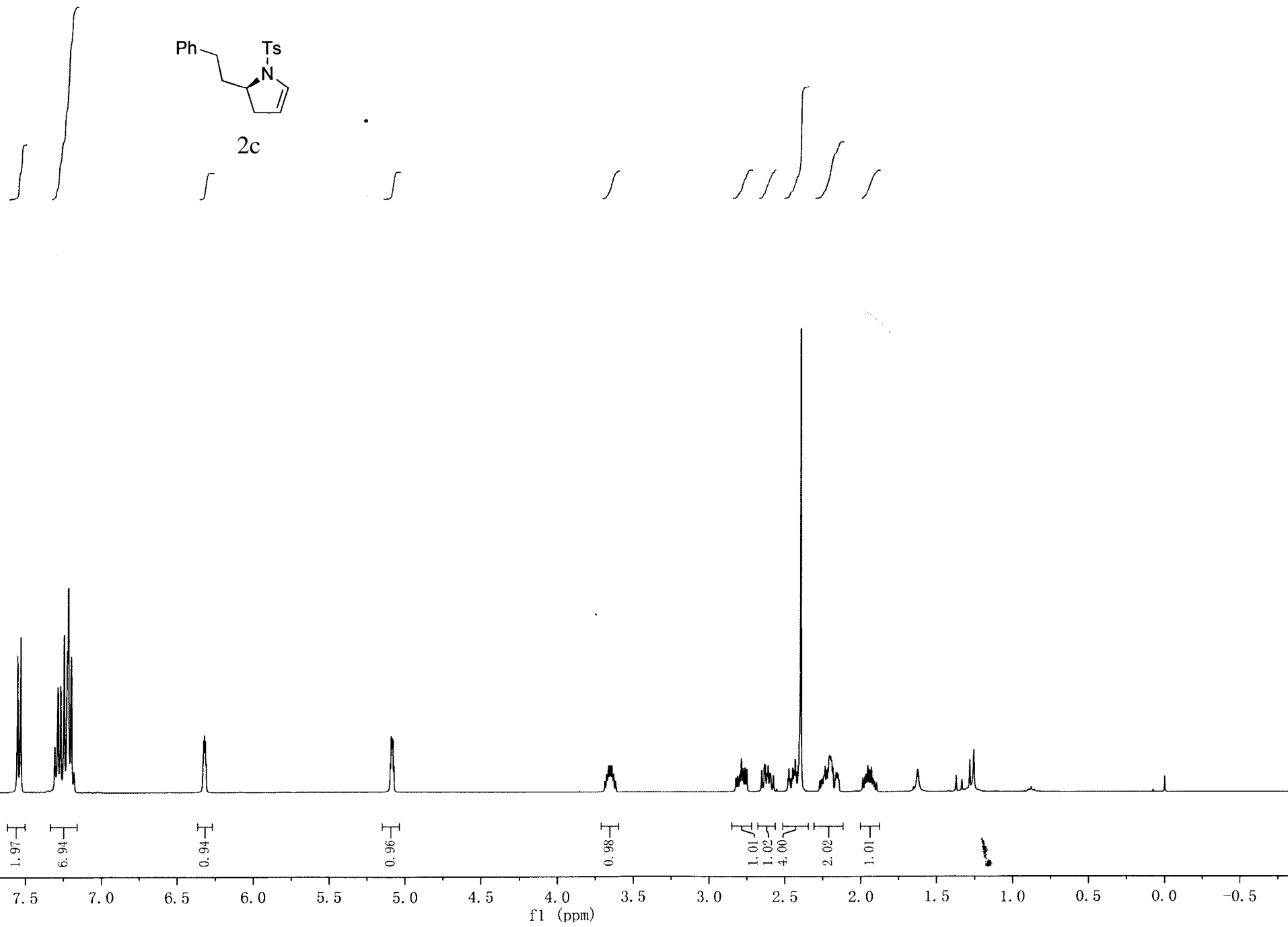
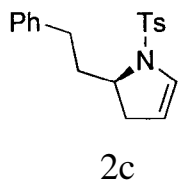
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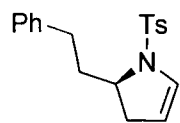




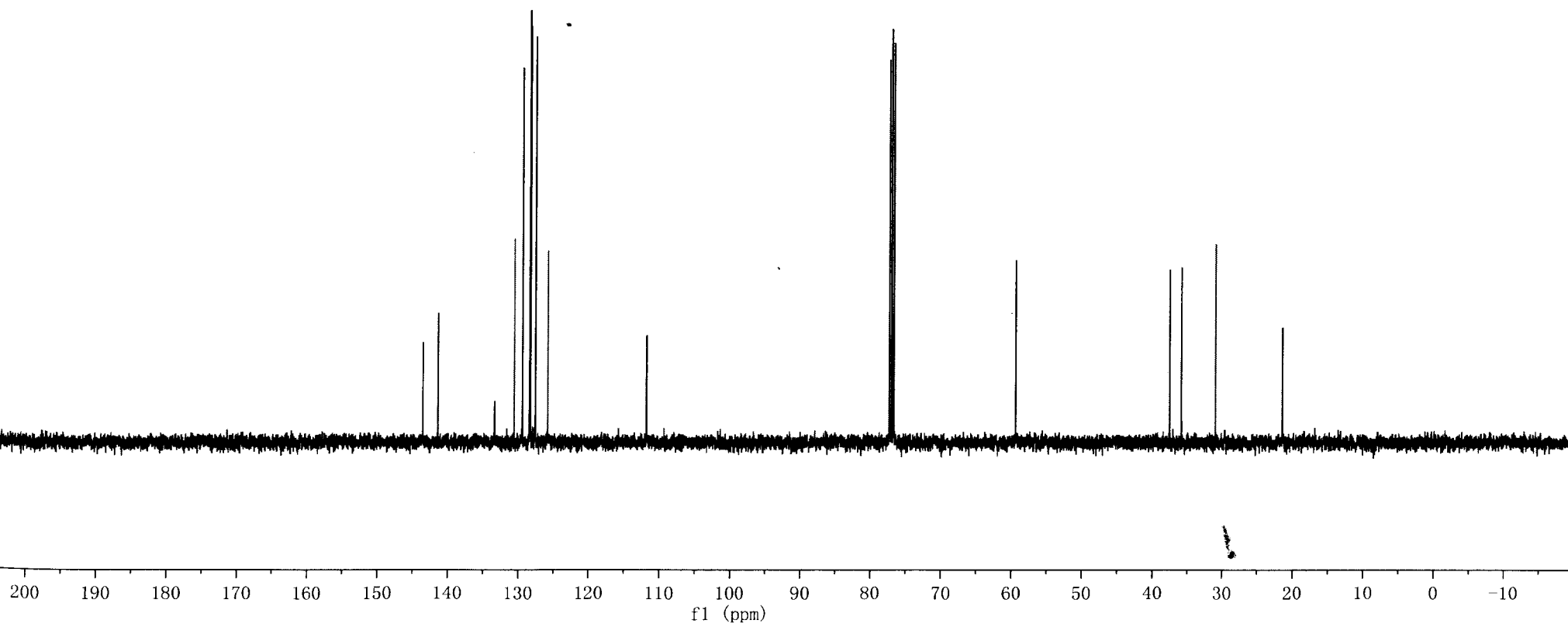
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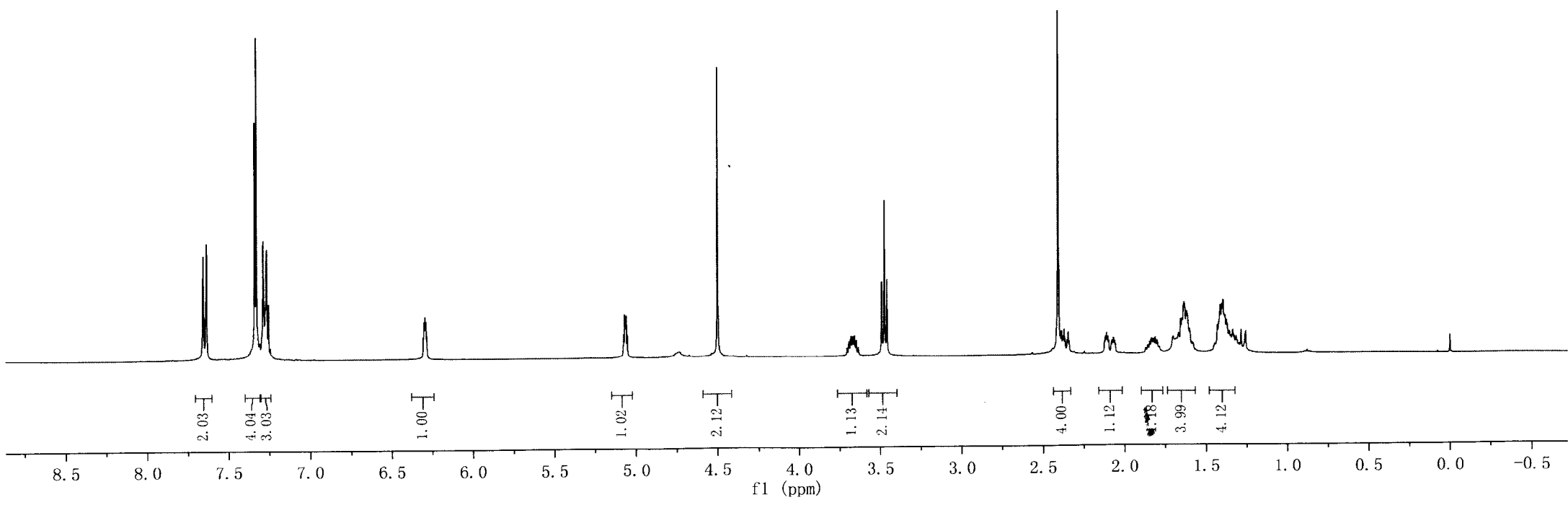
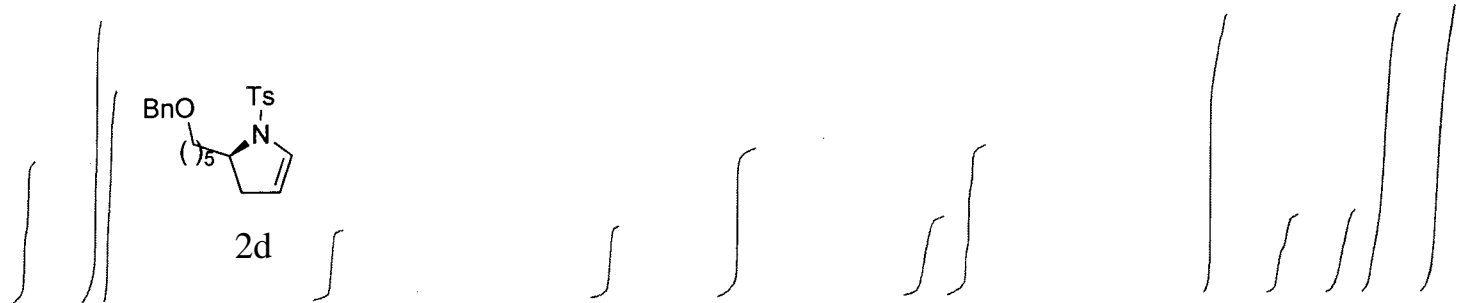


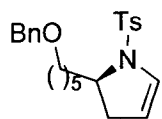




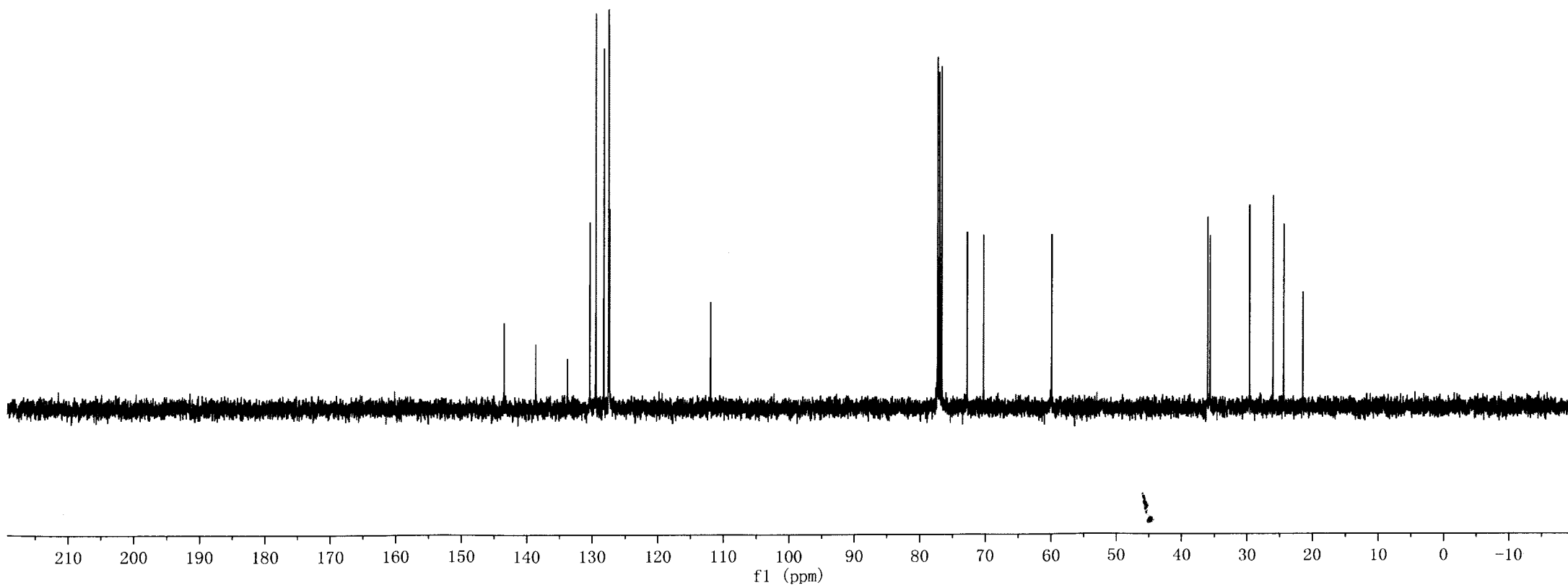
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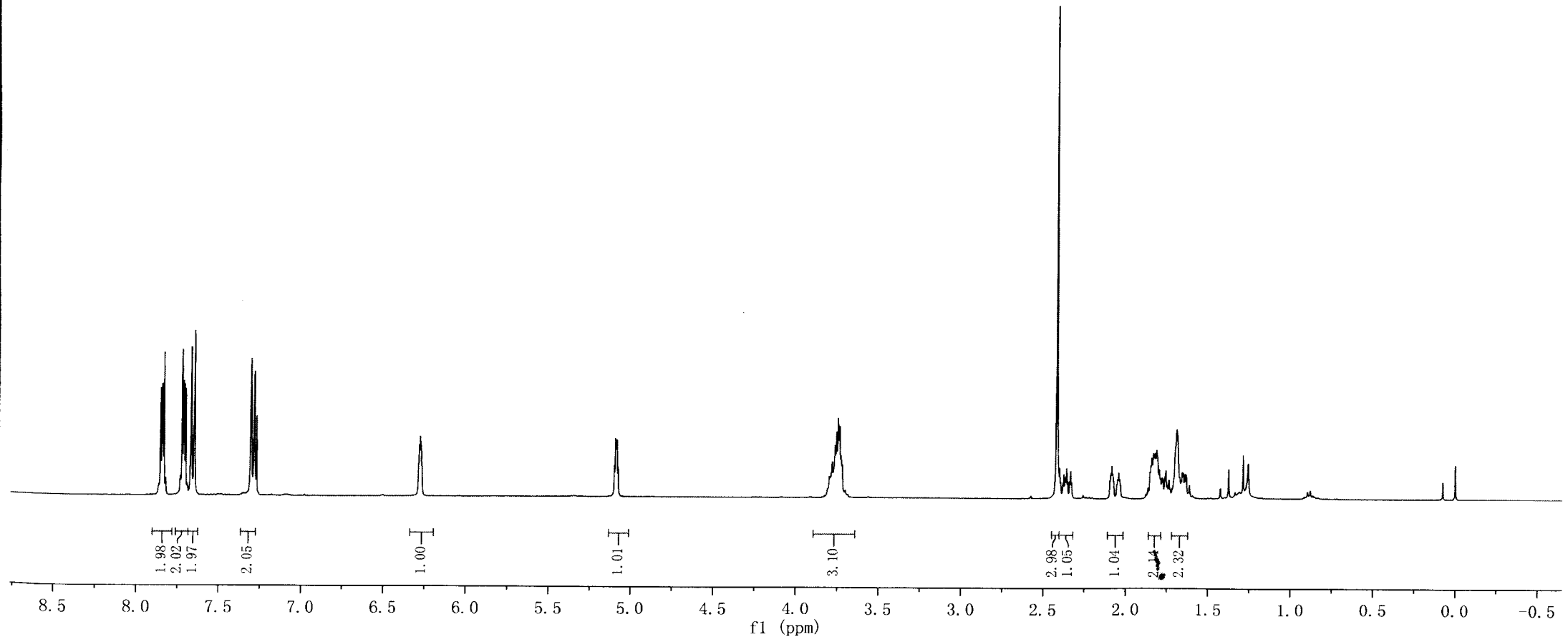
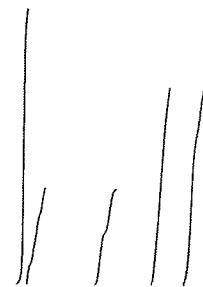
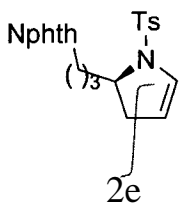
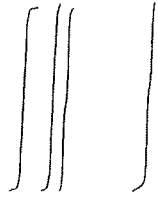


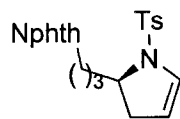




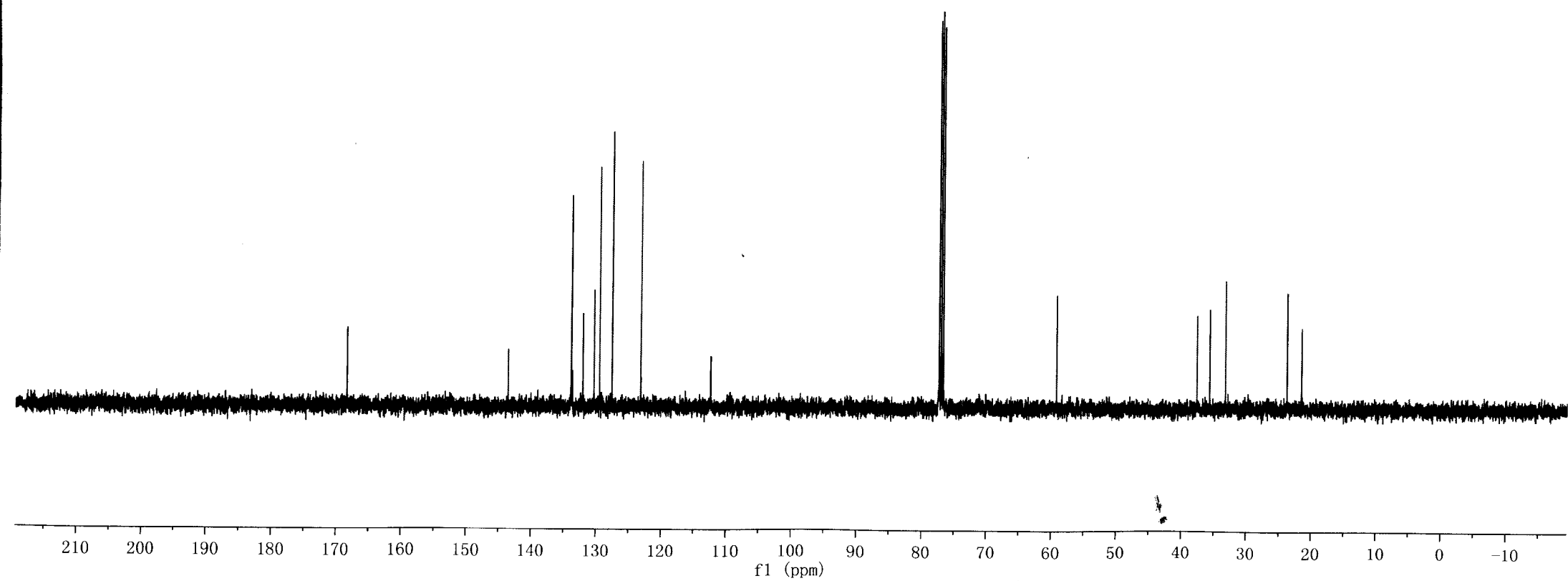
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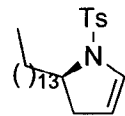






2e





2f

/ /

s

s

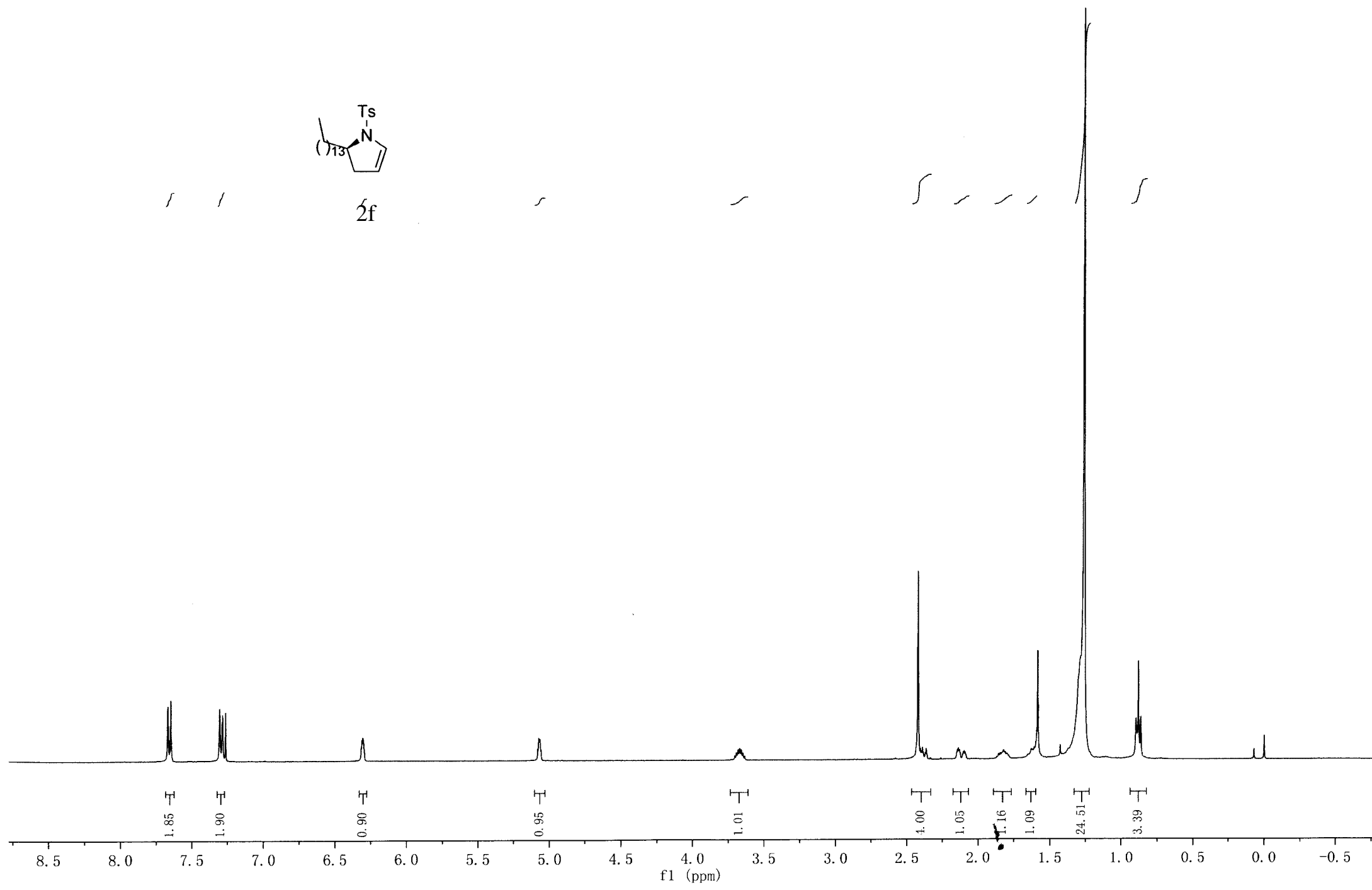
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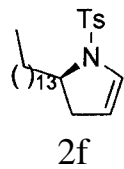
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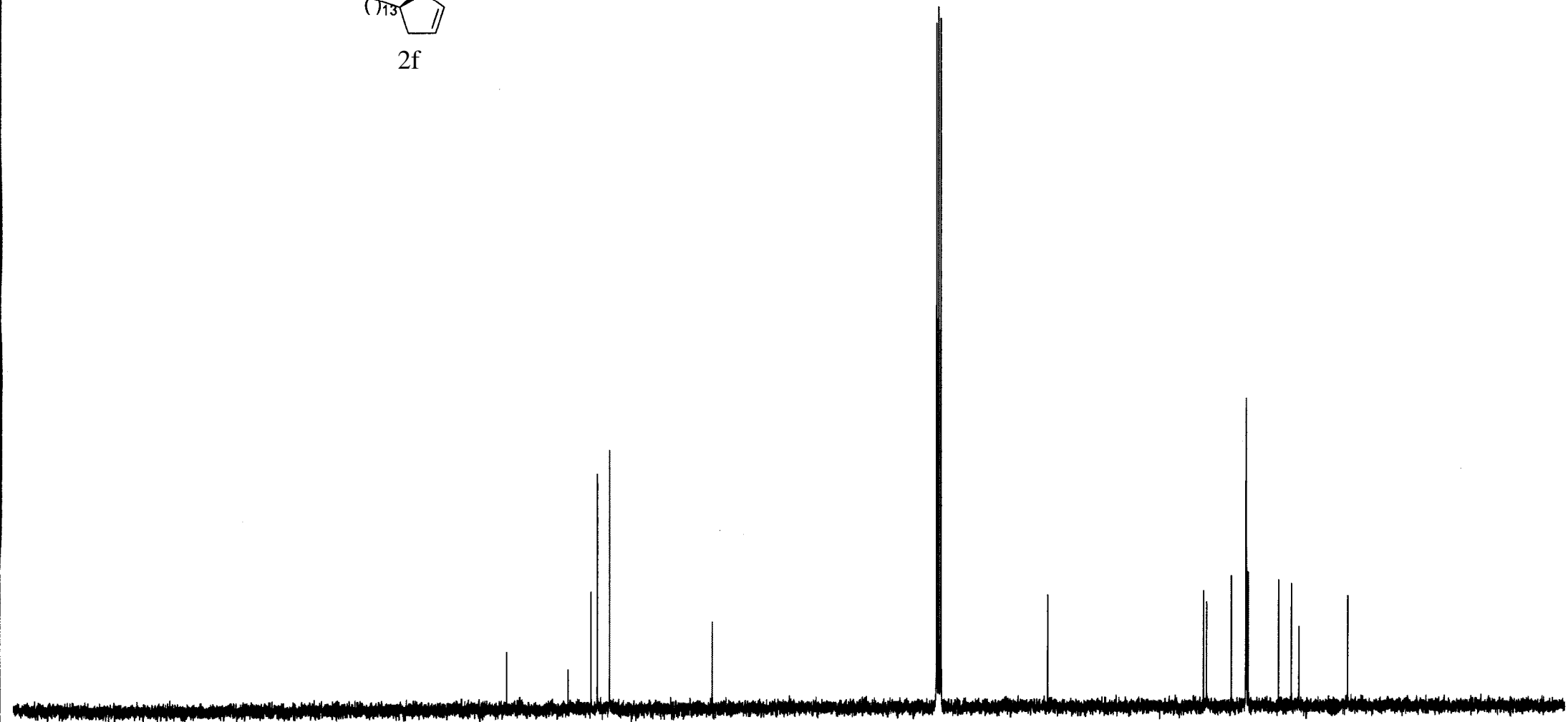
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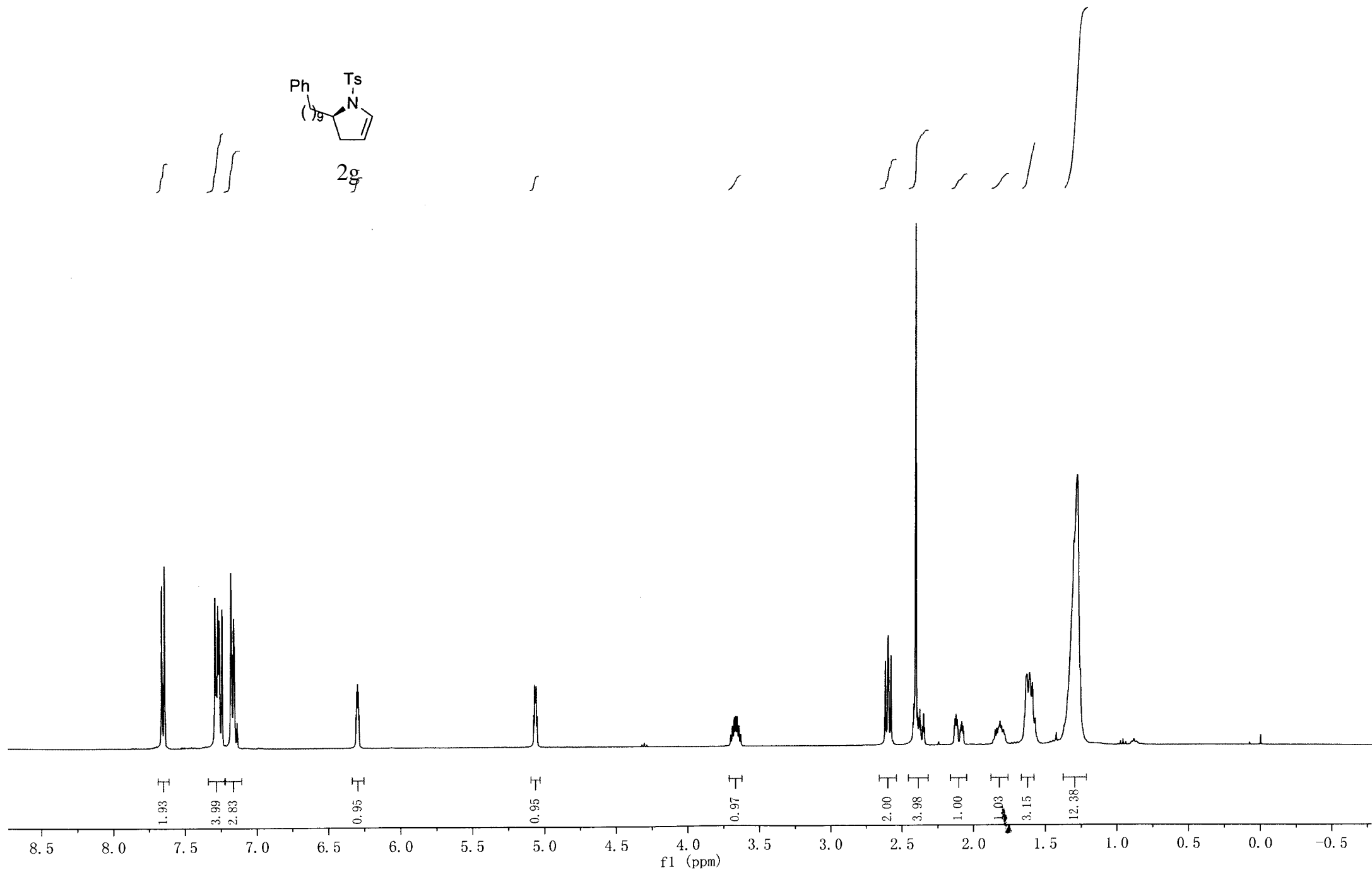
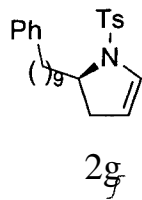


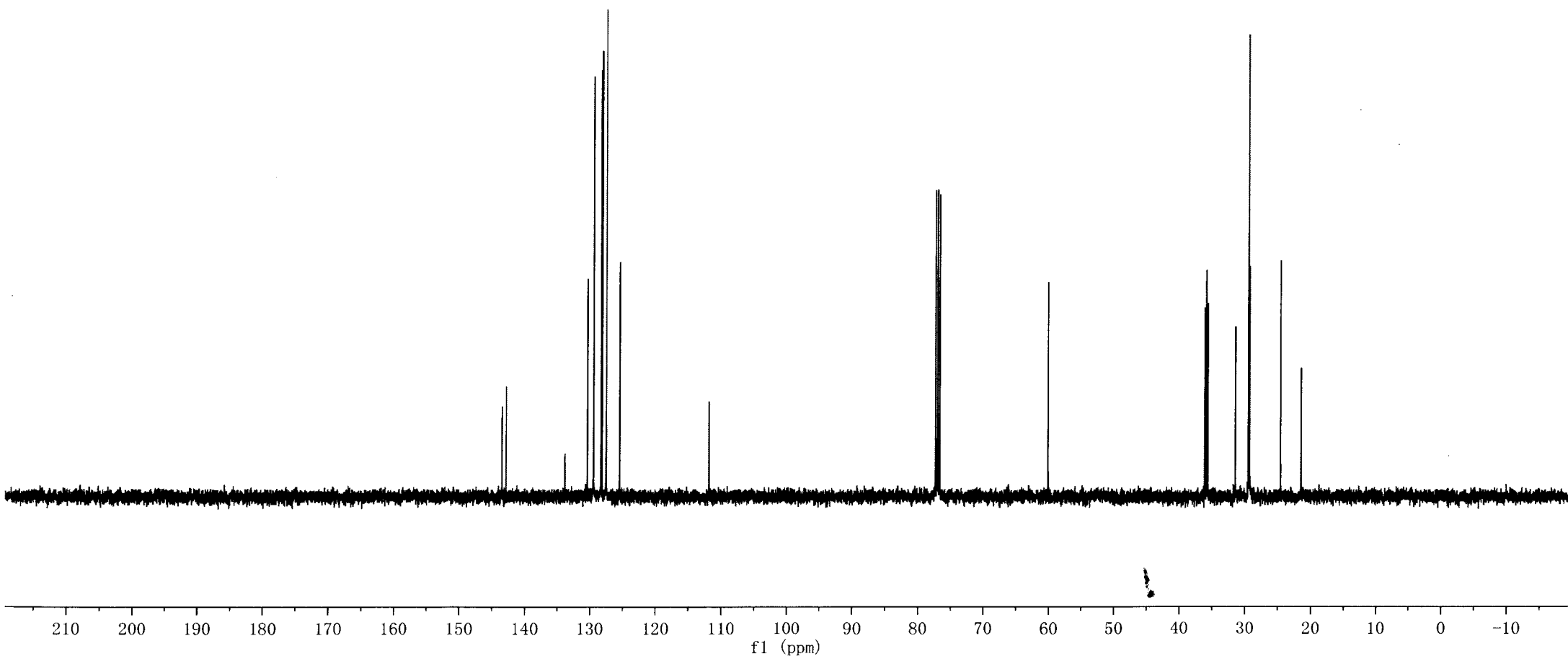
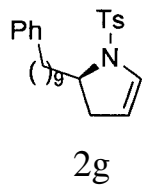


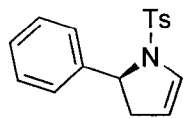
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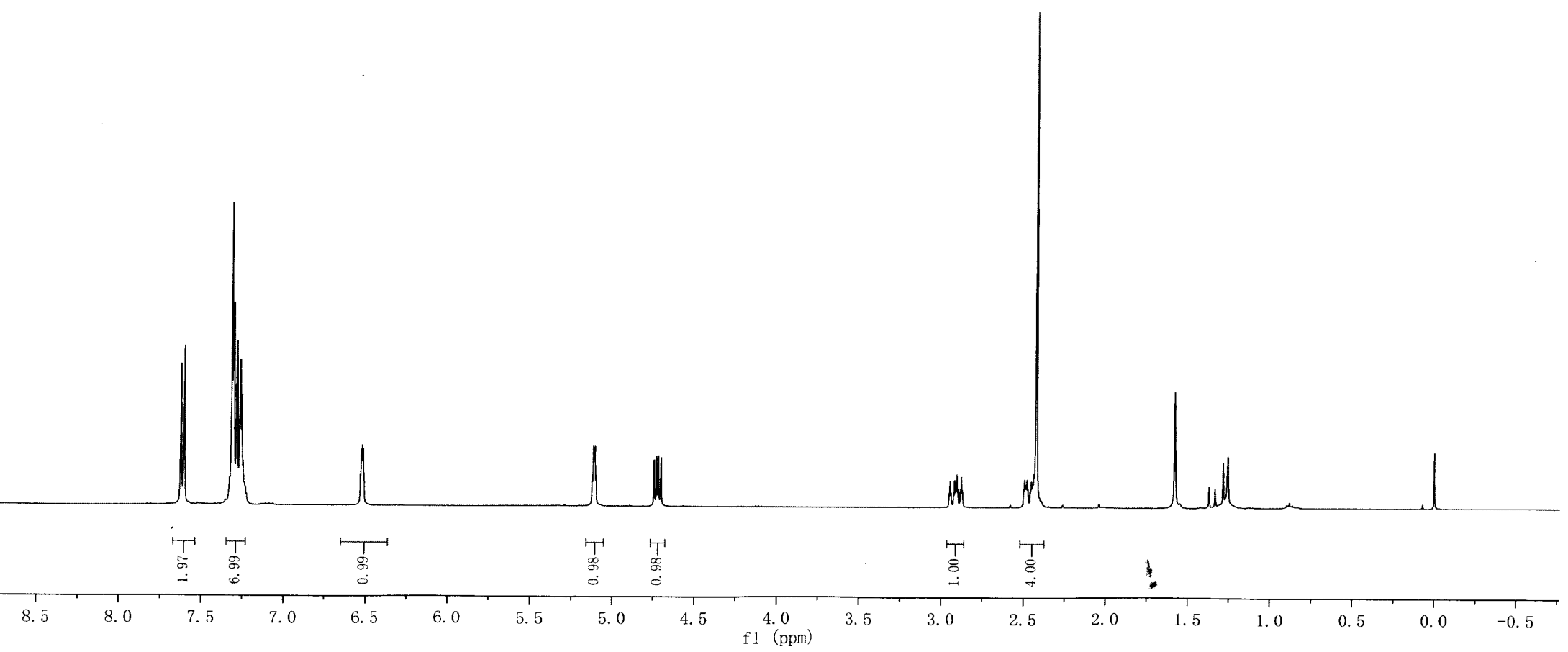
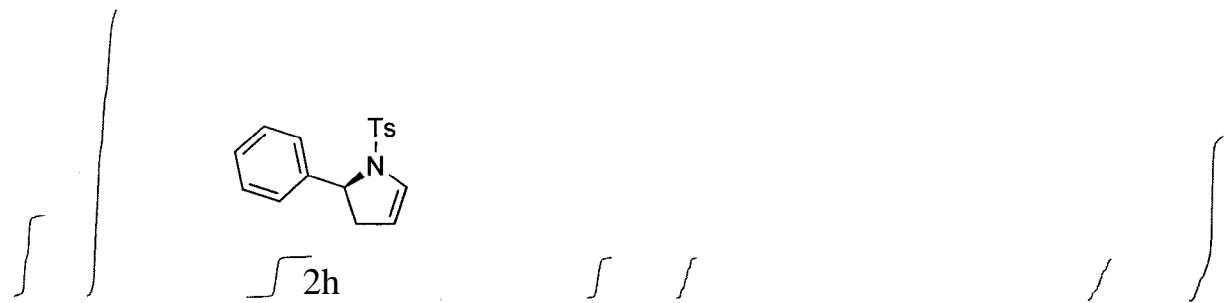


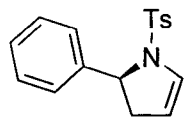




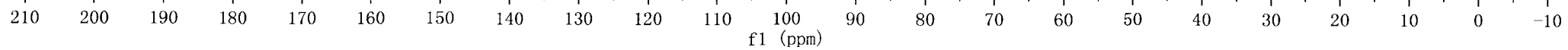


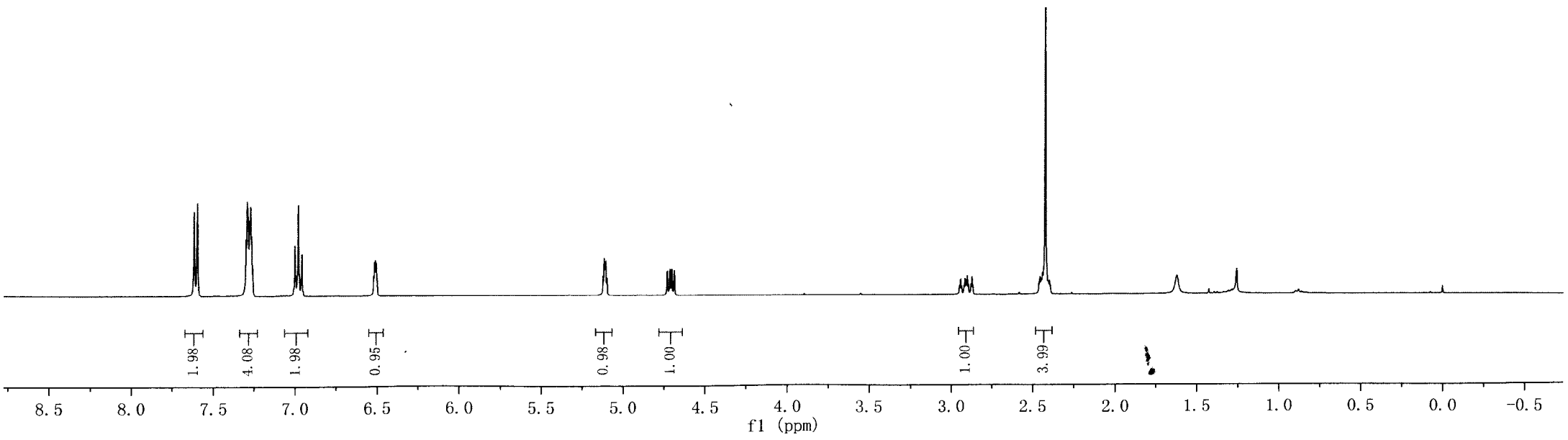
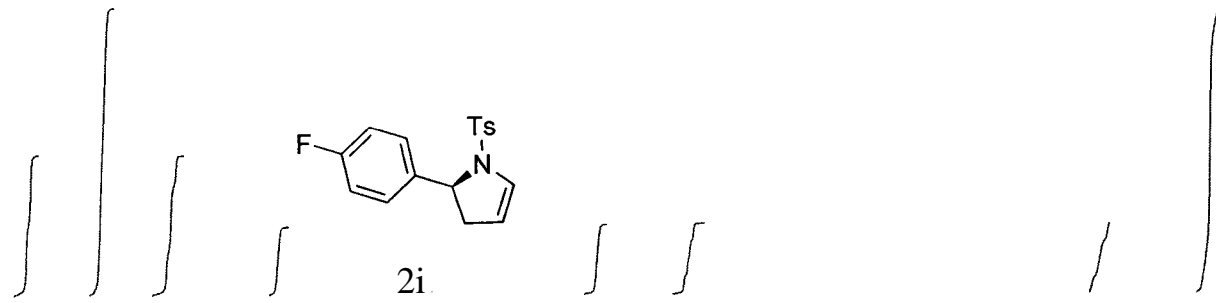
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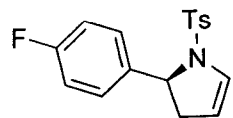




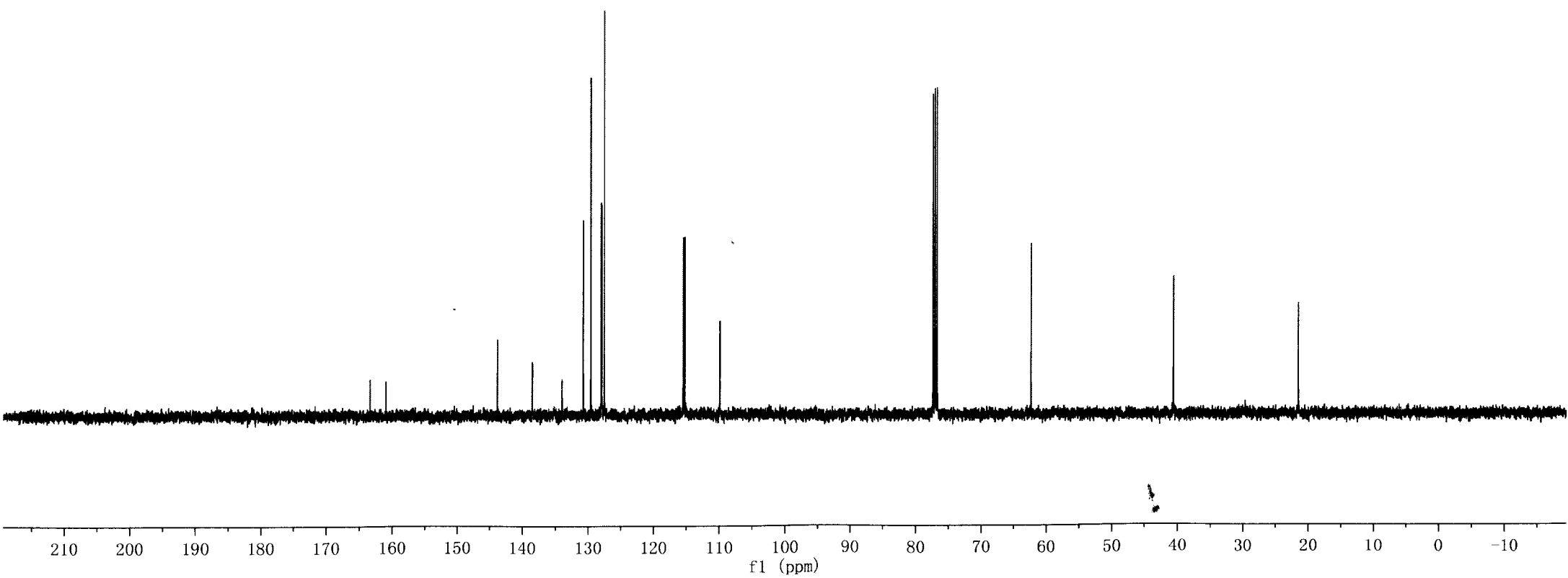
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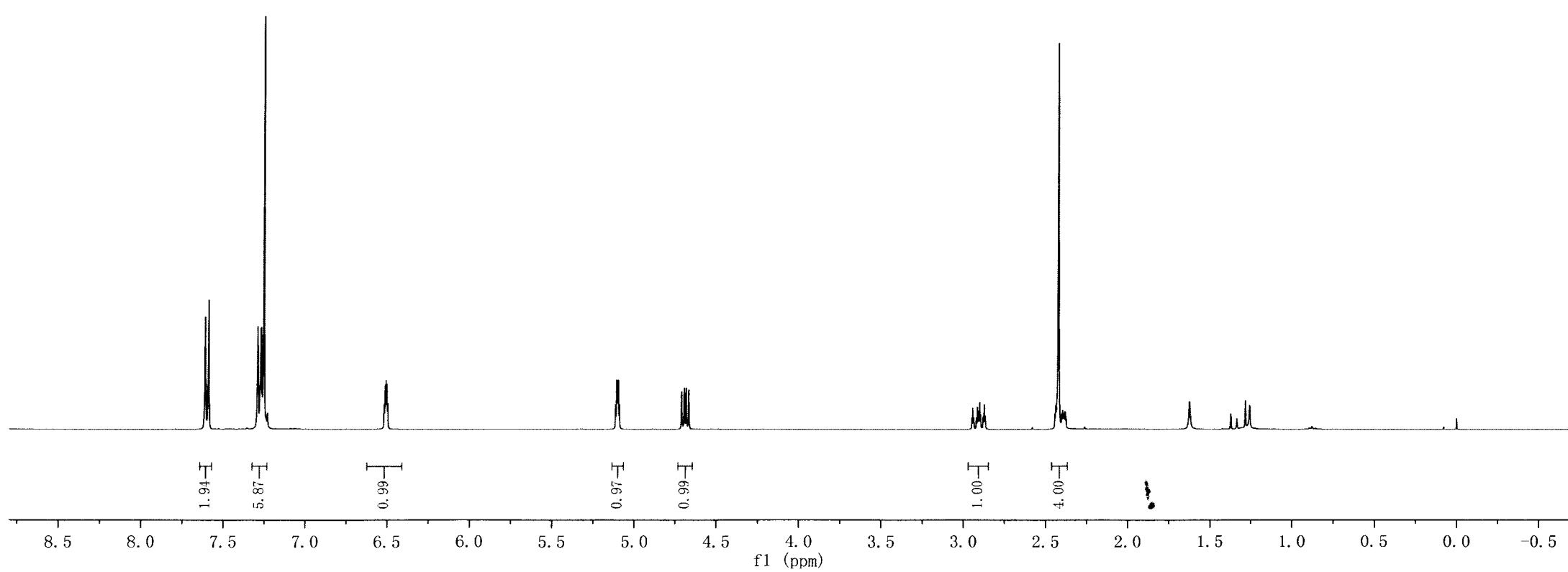
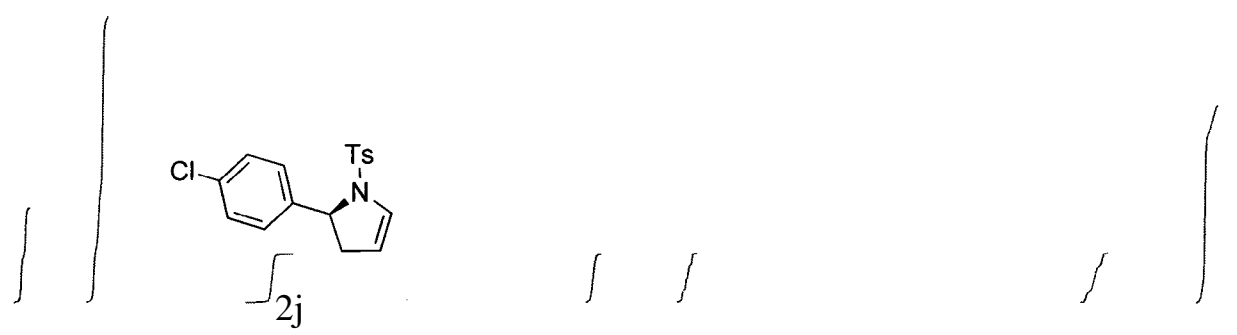


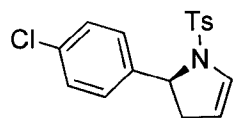




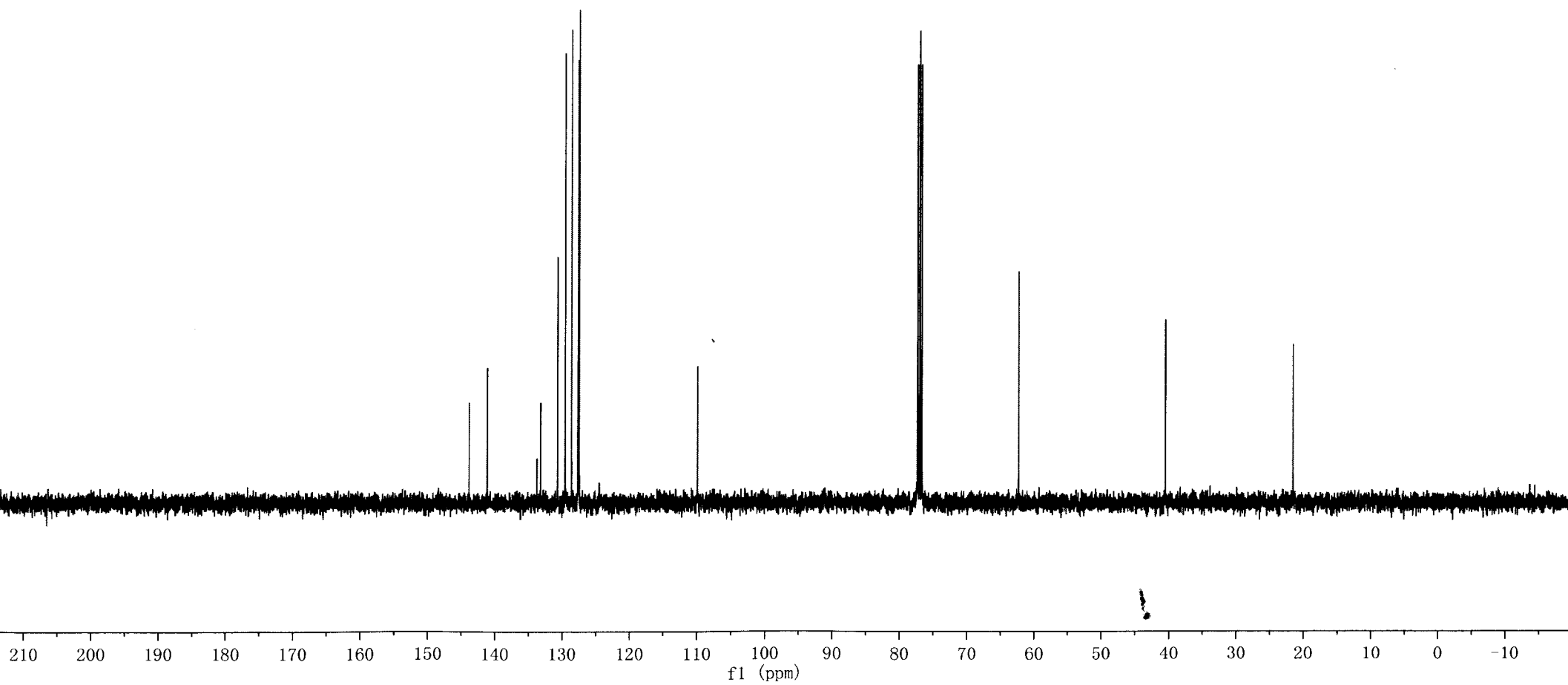
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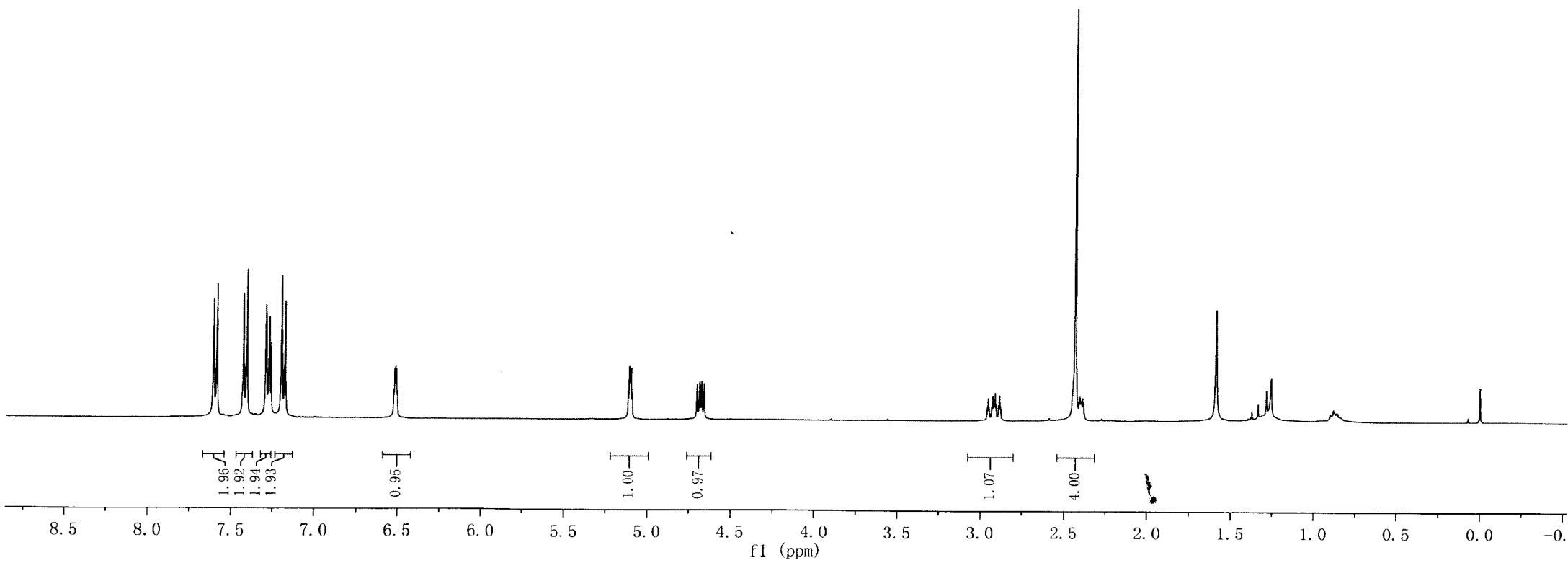
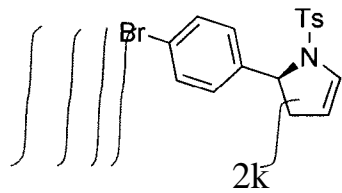


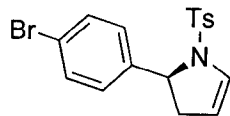




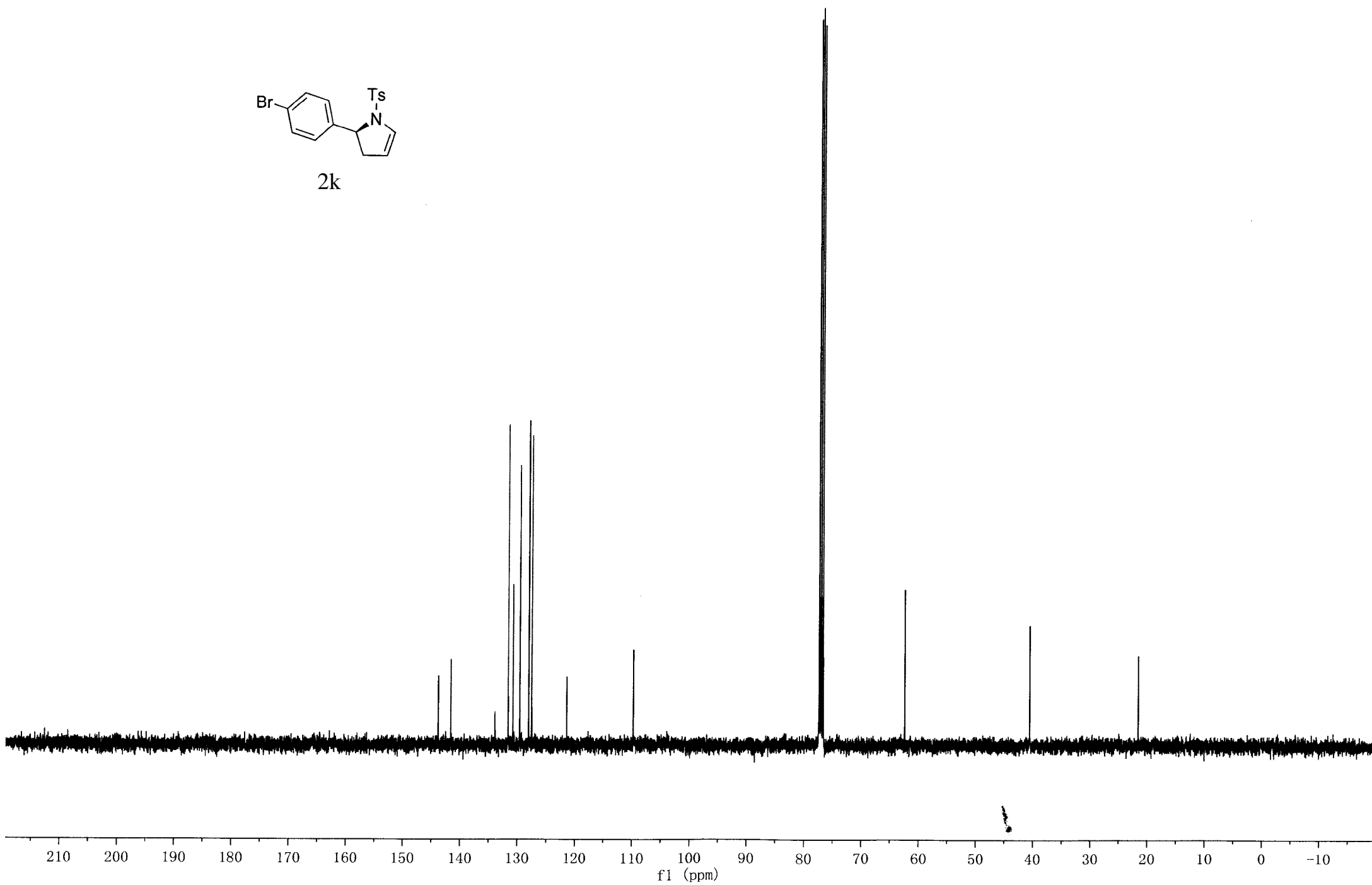
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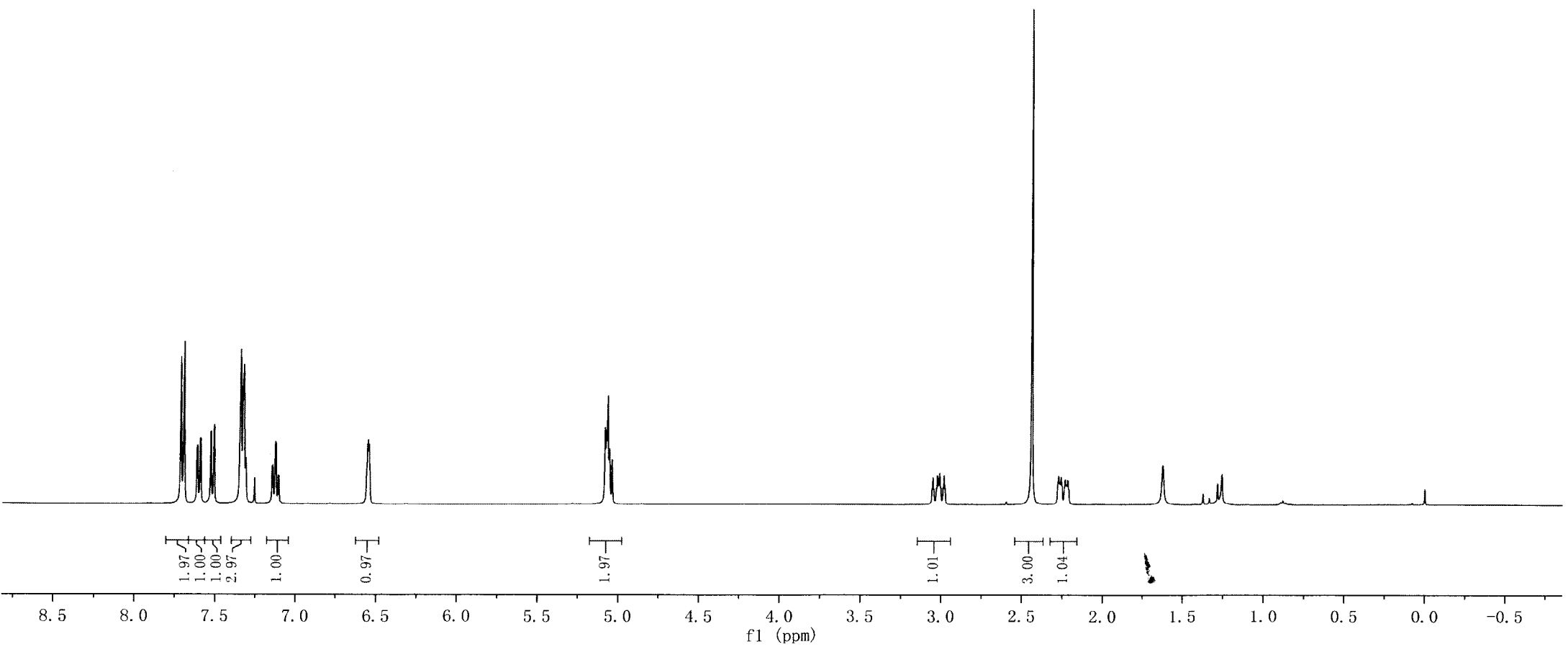
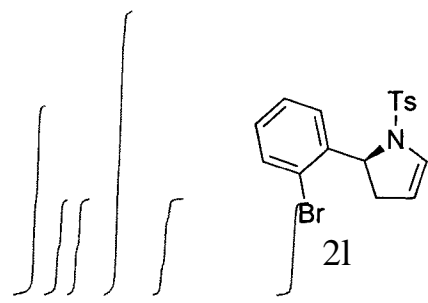


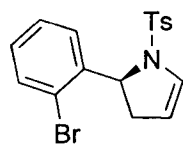




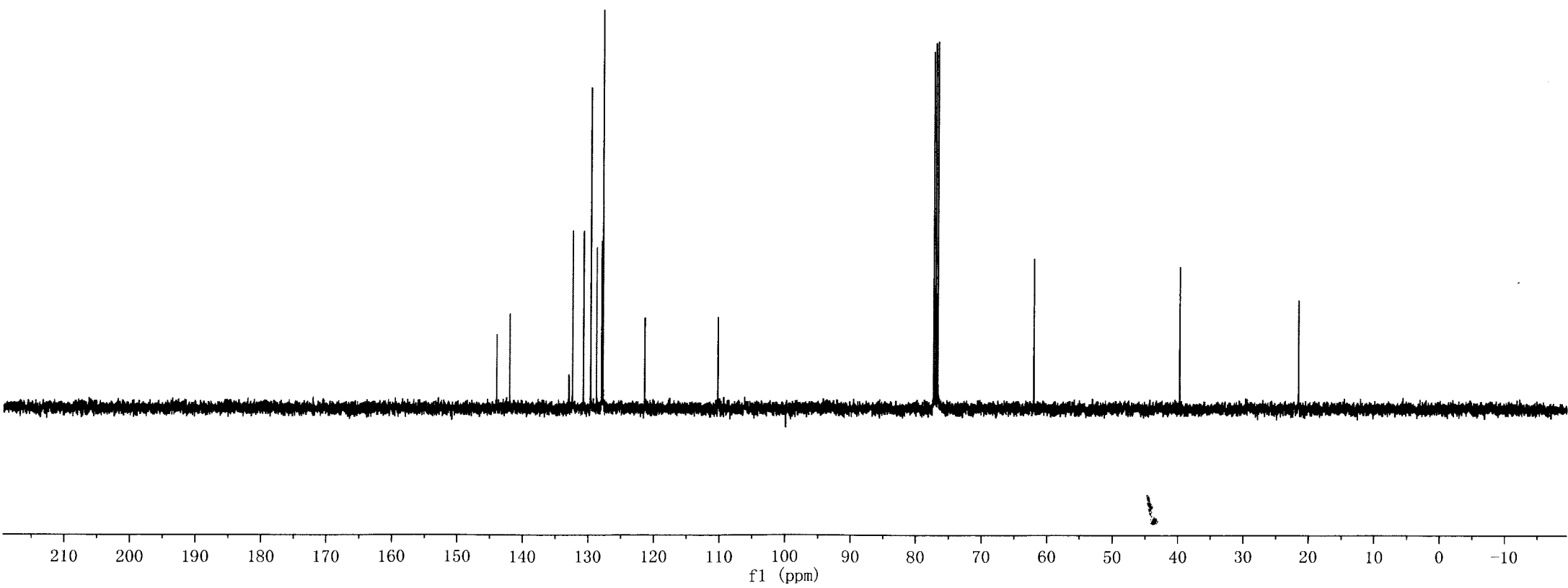
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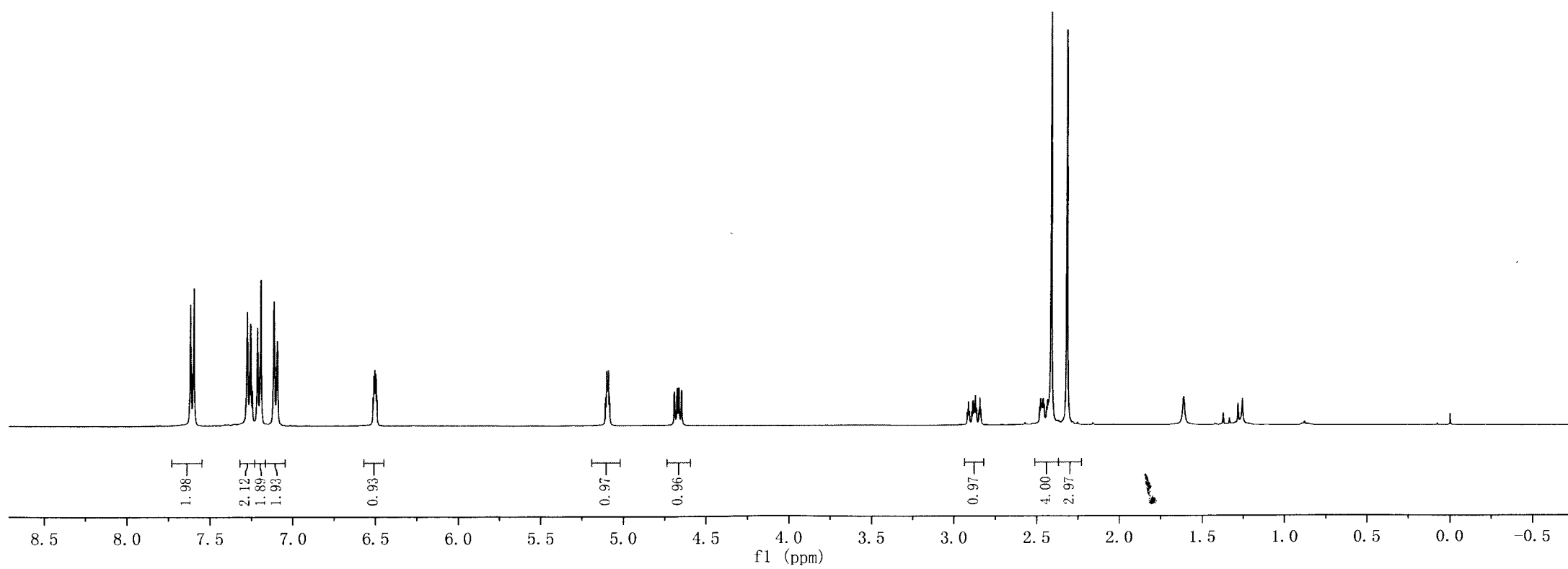
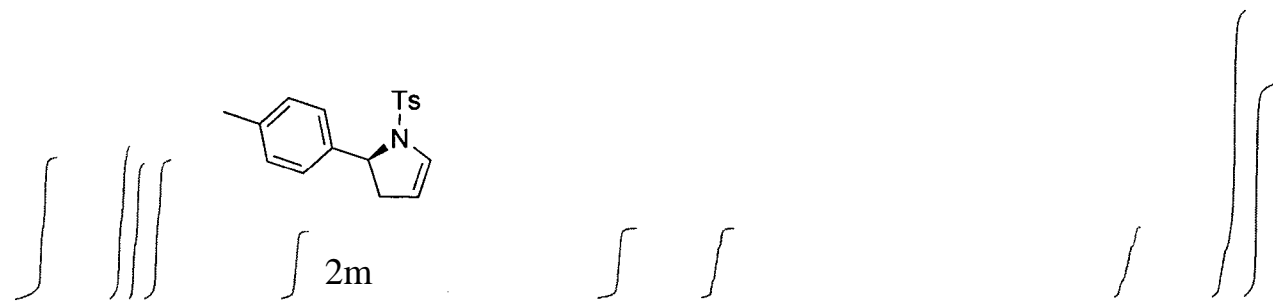


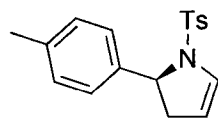




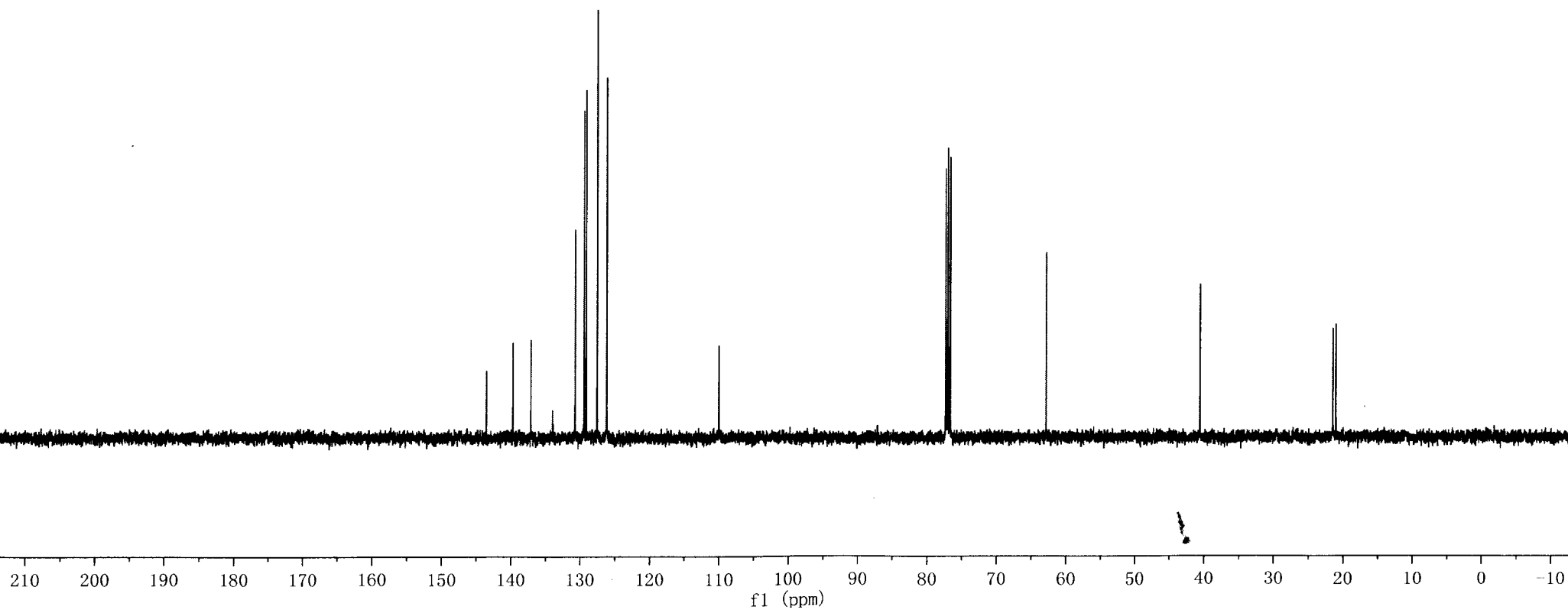
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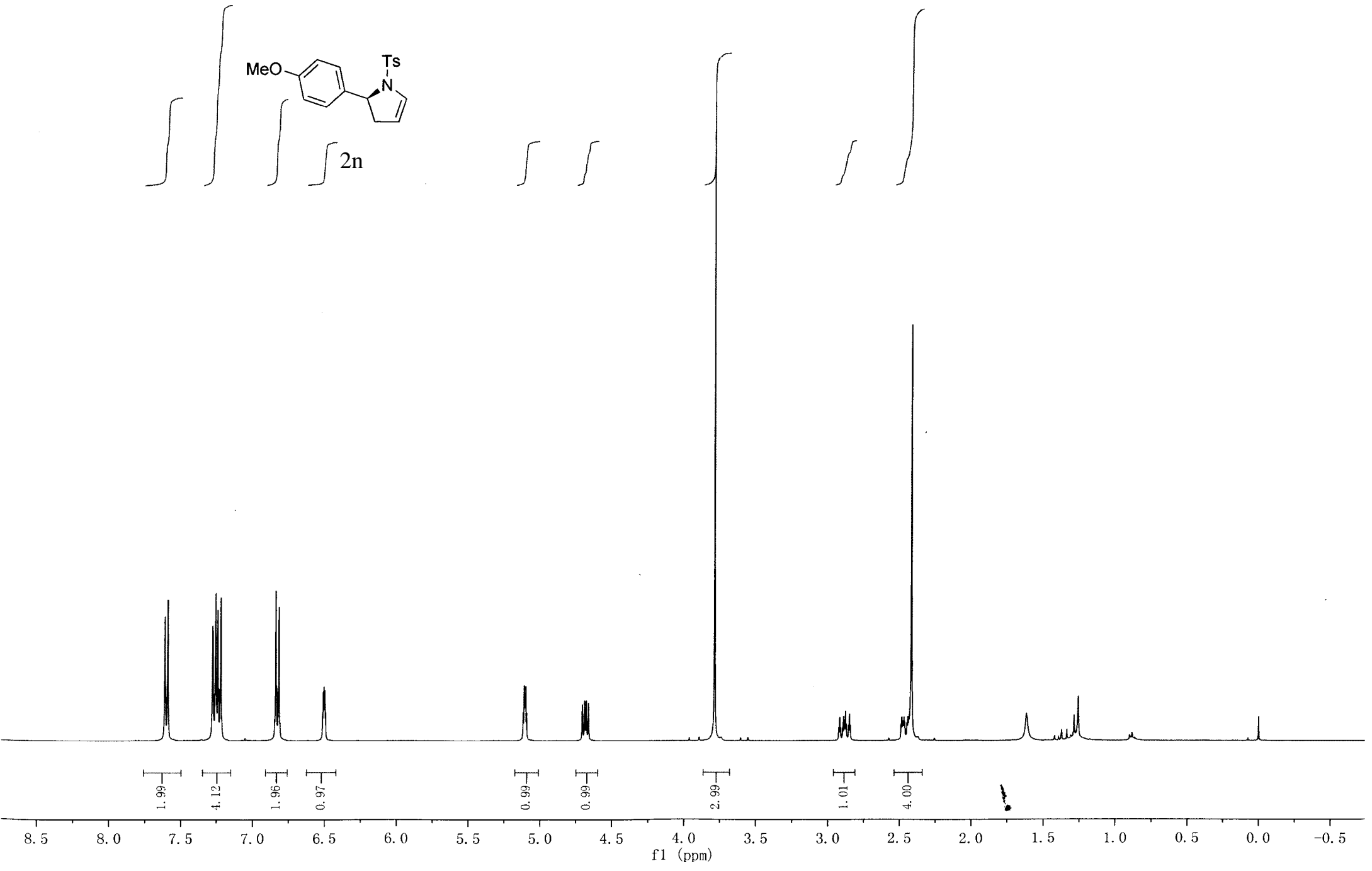
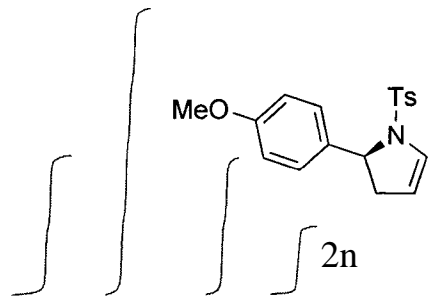


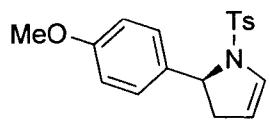




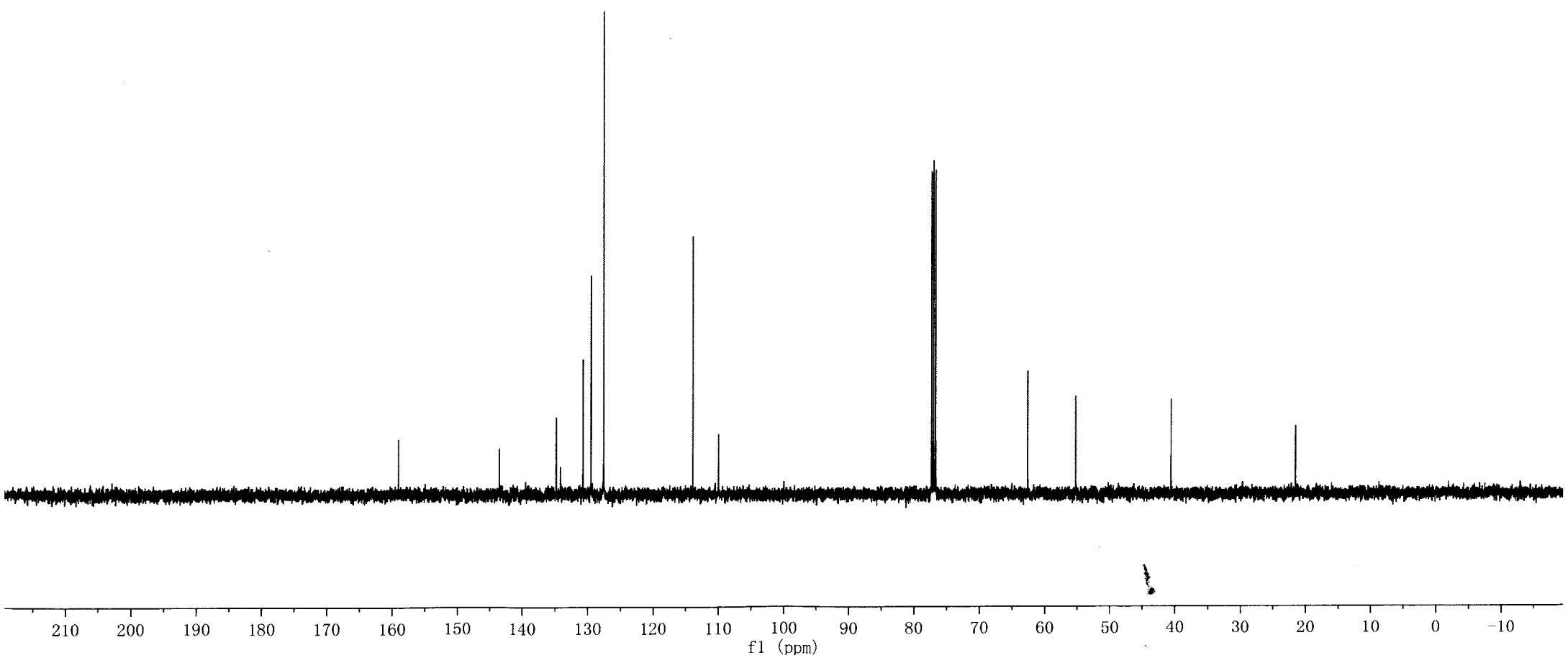
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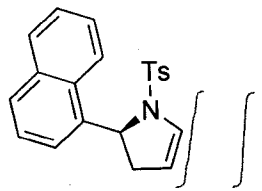
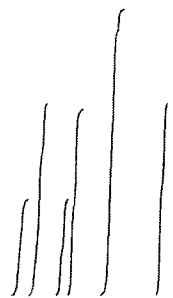




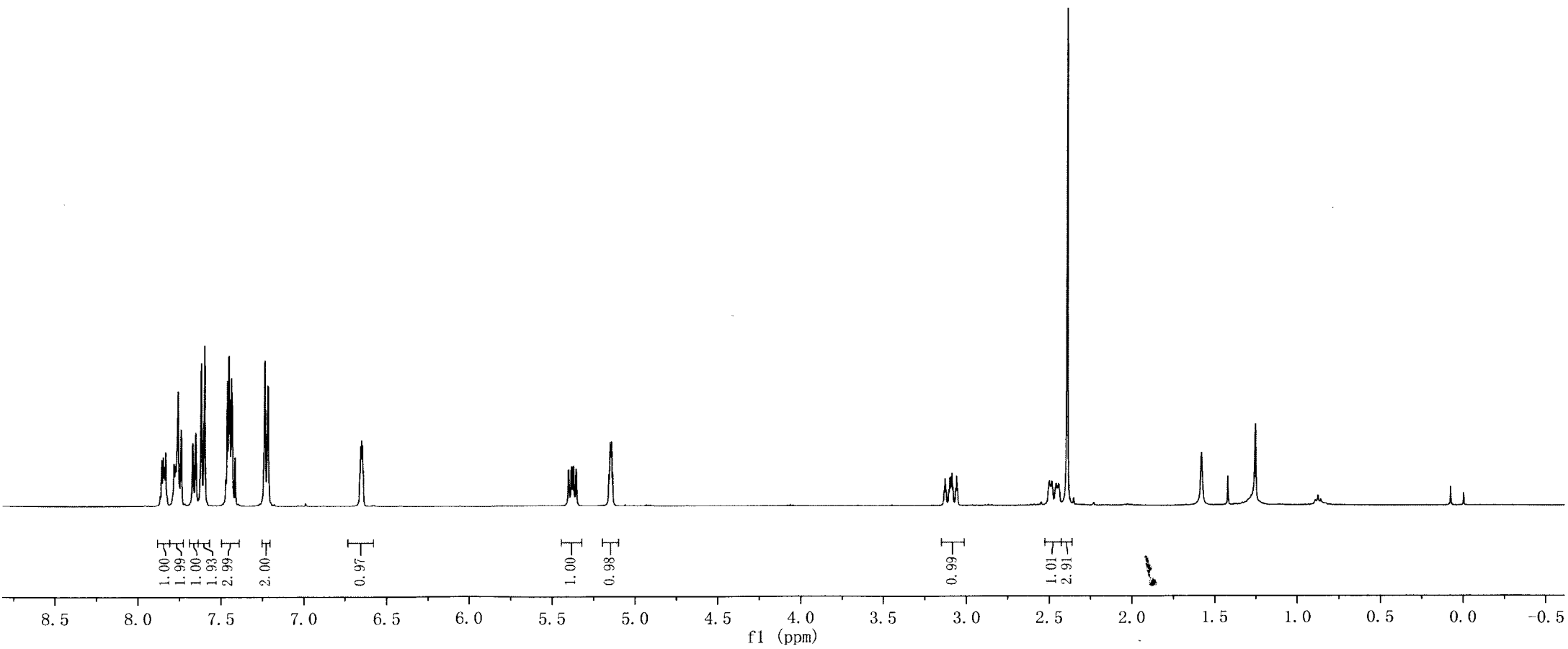


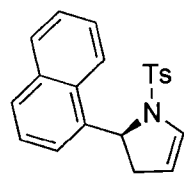
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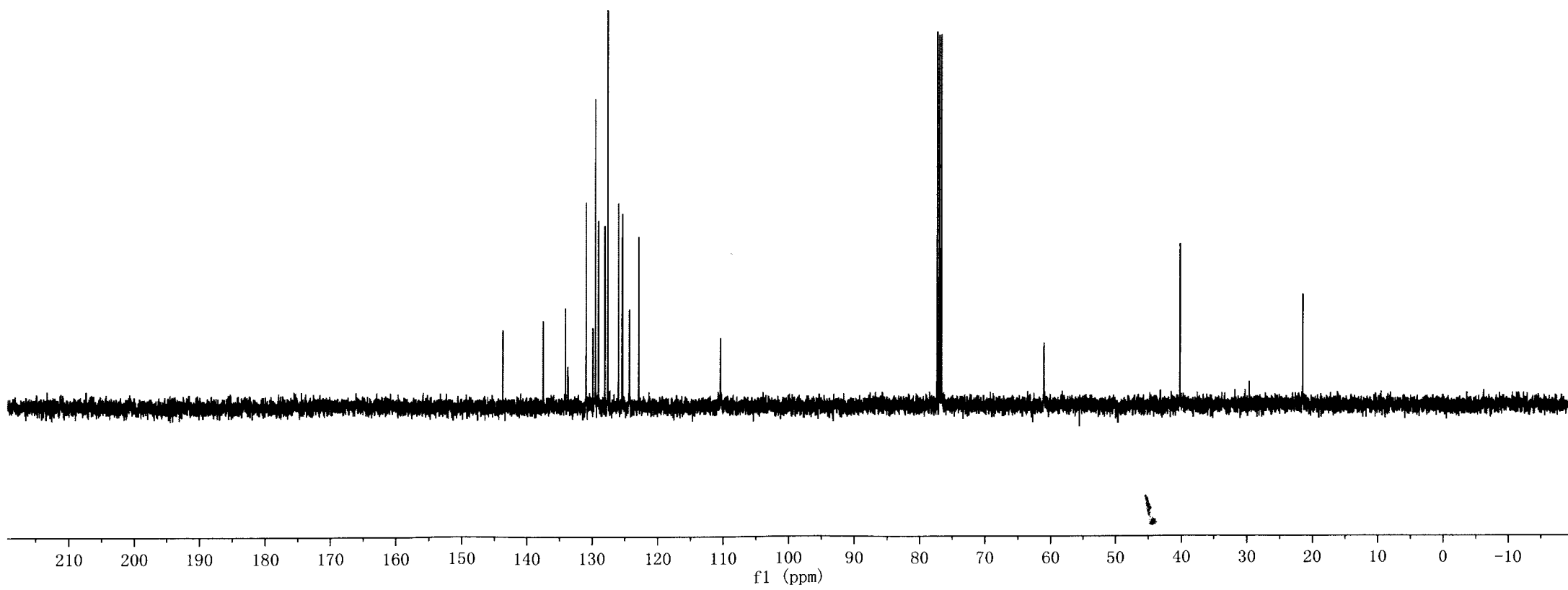


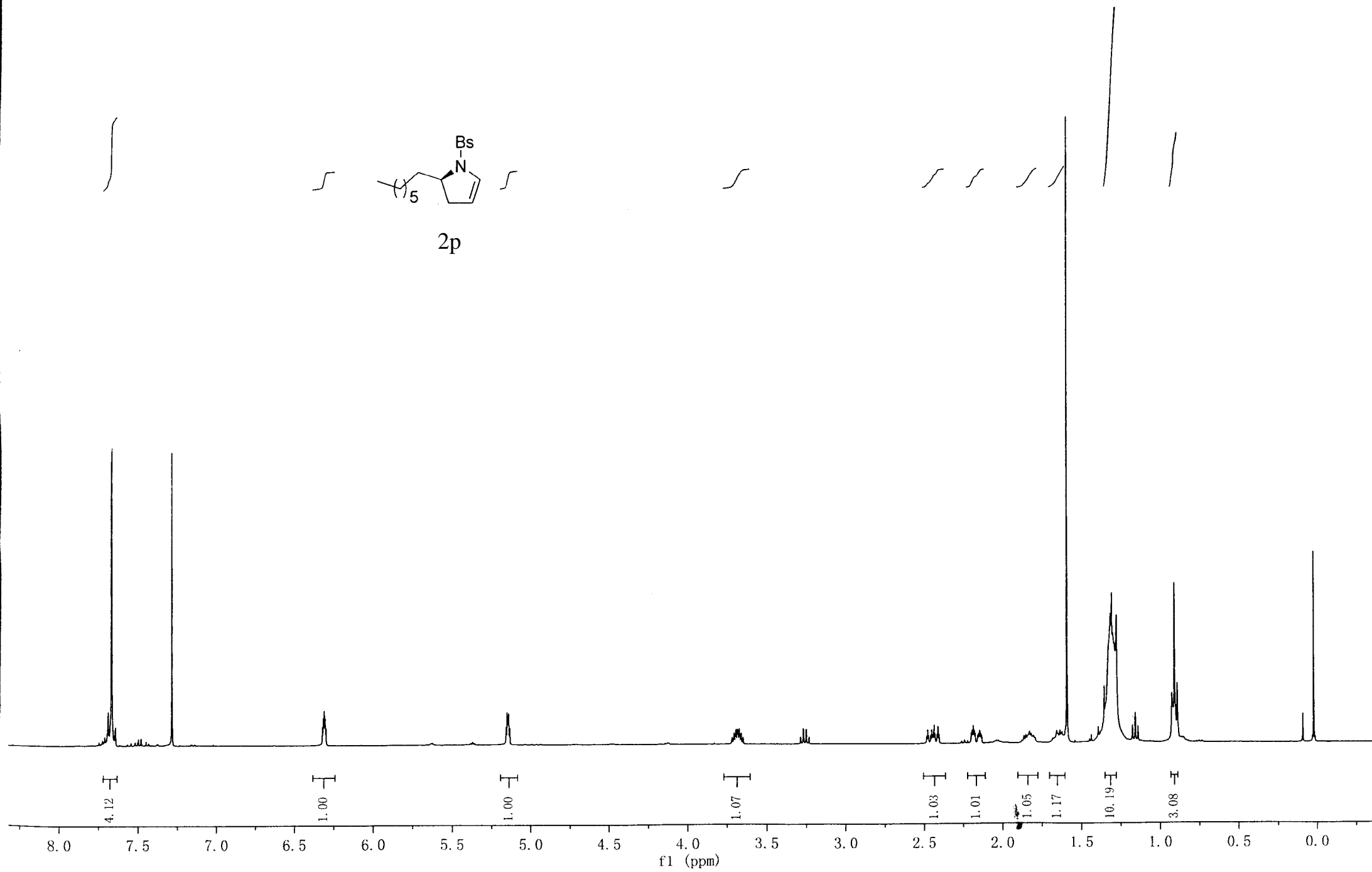
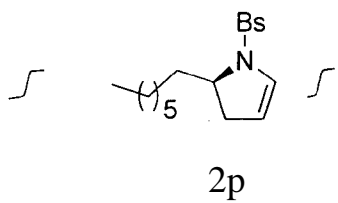
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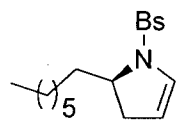




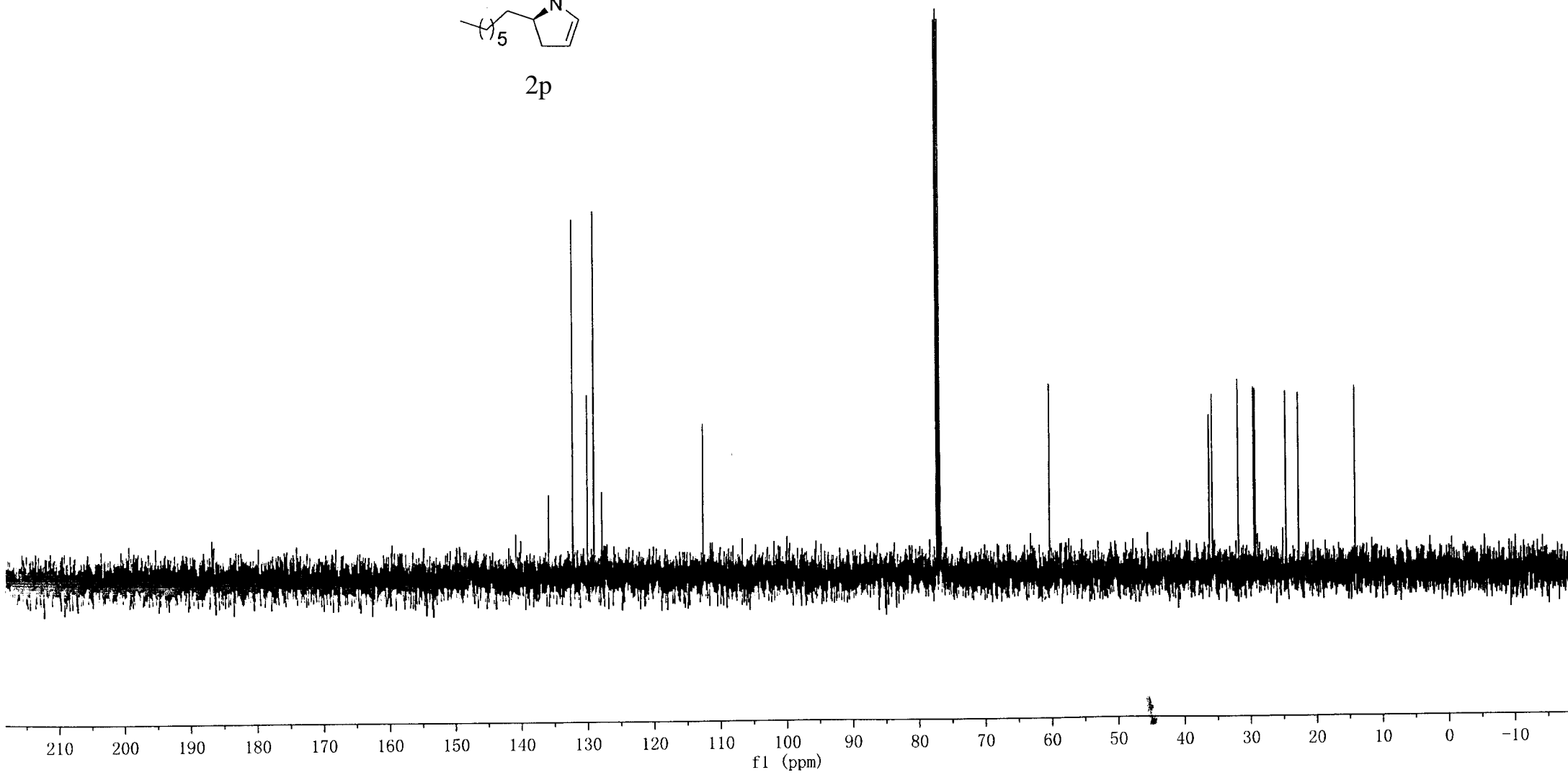
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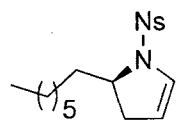




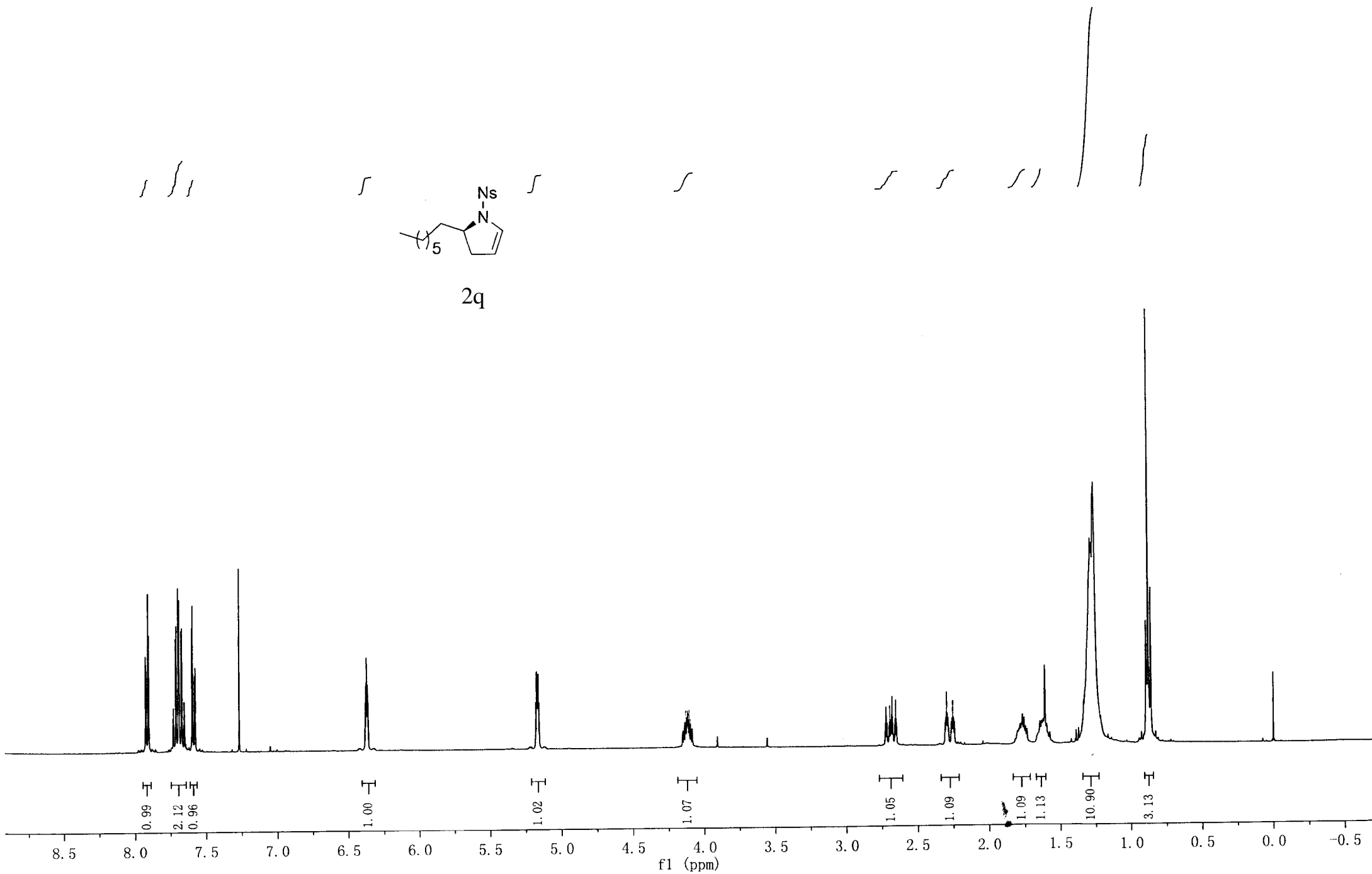


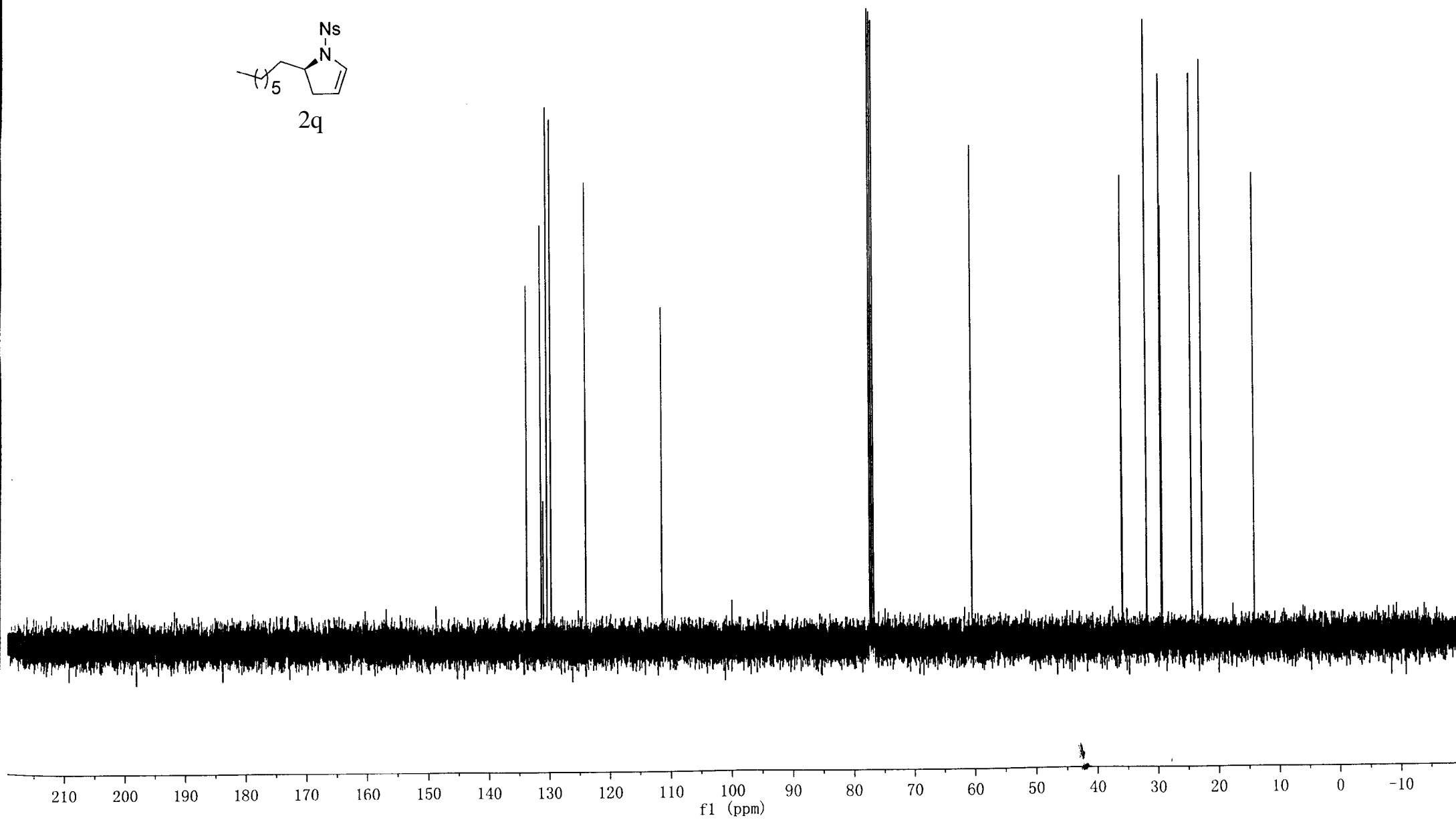
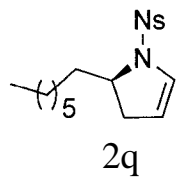
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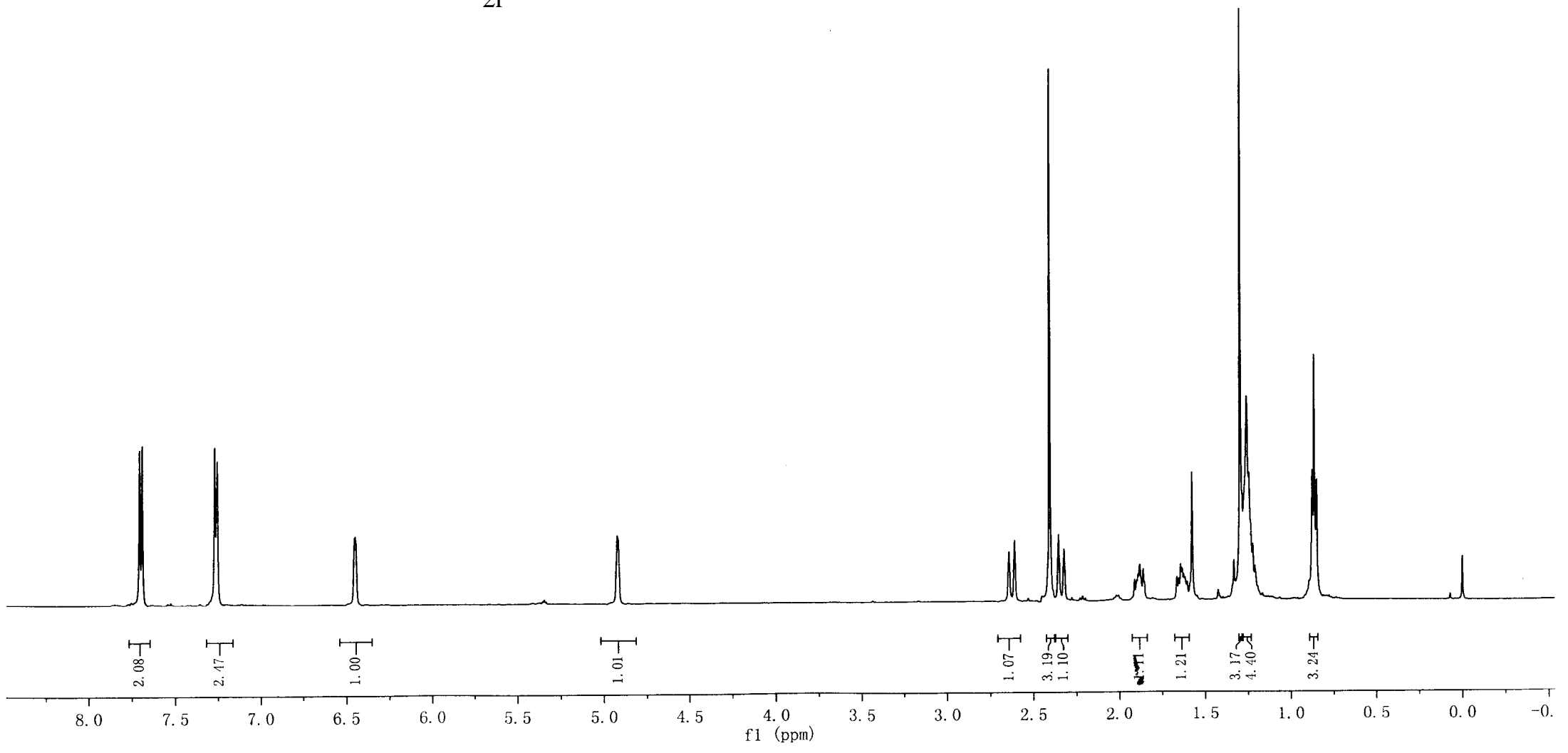
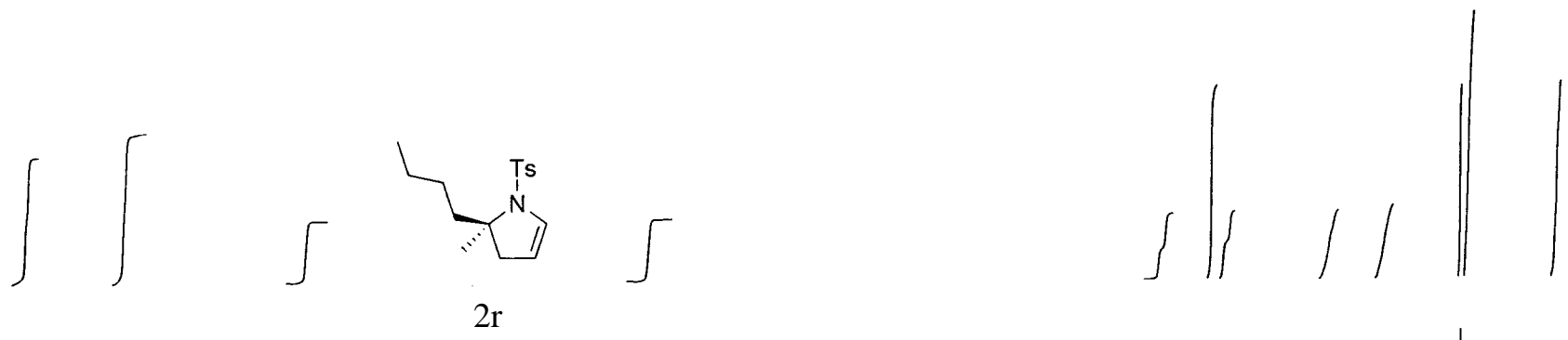


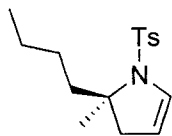


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2r

