

Supporting Information For

**CuI-Catalyzed Oxidative Cross Coupling of Oximes with
Tetrahydrofuran: a Direct Access to *O*-Tetrahydrofuran-2-yl Oxime
Ethers**

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1. General information:

Column chromatography was performed by employing silica gel. ^1H NMR spectra were recorded on 400 MHz or 400 MHz in DMSO-d_6 and ^{13}C NMR spectra were recorded on 100 MHz or 100 MHz in DMSO-d_6 . All new products were further characterized by HRMS (ESI) M/Z; copies of their ^1H NMR and ^{13}C NMR spectra are provided. Unless otherwise stated, all reagents and solvents were purchased from commercial suppliers and used without further purification.

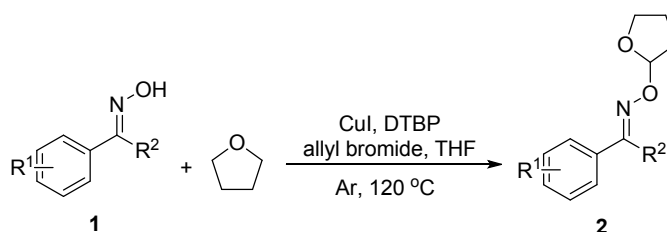
The ketoximes were in all cases prepared from the corresponding ketones according to literature procedures^{1,2} and used in the reaction without further purification.

(1) E. W. Bousquet, W. H. Carothers and W. L. McEwen, *Organic Synthesis*, Wiley

and Sons: New York, 1943; Collect. Vol II, pp 313-315.

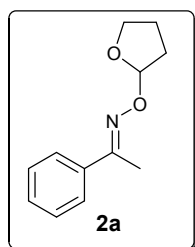
(2) H. Zhao, C. P. Vandebossche, S. G. Koenig, S. P. Singh and R. P. Bakale, *Org. Lett.*, 2008, **10**, 505.

2. Typical procedure for the synthesis of *O*-tetrahydrofuran-2-yl oxime ethers

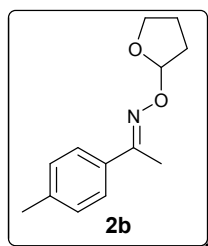


To a stirred solution of acetophenone oxime **1** (0.5 mmol) in THF (5 mL), CuI (10 mol%, 9.5 mg), allyl bromide (1.0 mmol, 121.0 mg) and DTBP (2.0 mmol, 293.0 mg) were added successively in a 25 mL round bottom flask. The mixture was stirred at 120 °C under argon. After completion of the reaction (detected by TLC), the reaction mixture was cooled to room temperature. Then the reaction was extracted with ethyl acetate (10 mL) and washed with H_2O (10 mL) and brine (10 mL). The organic layers were removed under reduced pressure to get the crude product, which was further purified by silica gel chromatography (petroleum/ethyl acetate as eluent) to yield **2**.

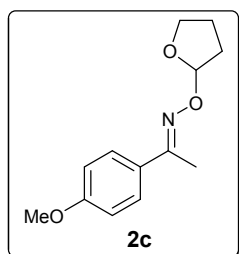
3. Spectroscopic data for *O*-tetrahydrofuran-2-yl oxime ethers



2a: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ 7.60 (s, 2H), 7.26 (s, 3H), 5.83 (s, 1H), 3.95-3.86 (m, 2H), 2.15 (s, 3H), 2.02-1.97 (m, 3H), 1.83 (s, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 155.8, 136.5, 129.1, 128.2, 126.2, 106.4, 67.9, 30.9, 23.9, 12.9. HRMS (ESI) $\text{C}_{12}\text{H}_{15}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 228.0995, found 228.0997.

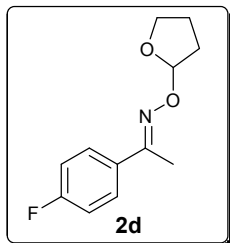


2b: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.59 (d, $J = 7.2$ Hz, 2H), 7.16 (d, $J = 7.6$ Hz, 2H), 5.91 (s, 1H), 4.05-3.95 (m, 2H), 2.36 (s, 3H), 2.23 (s, 3H), 2.11-2.06 (m, 3H), 1.93 (s, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 155.7, 139.0, 133.6, 128.9, 126.0, 106.3, 67.8, 30.8, 23.9, 21.2, 12.8. HRMS (ESI) $\text{C}_{13}\text{H}_{17}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 242.1151, found 242.1155.

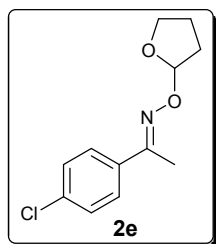


2c: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.63 (d, $J = 8.4$ Hz, 2H), 6.86 (d, $J = 8.0$ Hz, 2H), 5.89 (s, 1H), 4.02-3.91 (m, 2H), 3.80 (s, 3H), 2.20 (s, 3H), 2.09 (s, 3H),

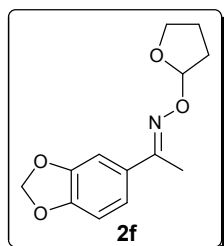
1.90 (s, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 160.3, 155.3, 130.5, 127.5, 113.6, 106.2, 67.8, 55.2, 30.8, 23.9, 12.7. HRMS (ESI) $\text{C}_{13}\text{H}_{17}\text{NNaO}_3$ $[\text{M}+\text{Na}]^+$ calcd 258.1101, found 258.1107.



2d: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.68-7.65 (m, 2H), 7.03 (t, $J = 8.4$ Hz, 2H), 5.89 (s, 1H), 4.02-3.94 (m, 2H), 2.21 (s, 3H), 2.14-2.03 (m, 3H), 1.91 (d, $J = 6.0$ Hz, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 163.3 (d, $J = 24.7$ Hz), 154.7, 132.5, 128.0 (d, $J = 8.2$ Hz), 115.1 (d, $J = 21.5$ Hz), 106.4, 67.9, 30.8, 23.9, 12.9. HRMS (ESI) $\text{C}_{12}\text{H}_{14}\text{FNNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 246.0901, found 246.0907.

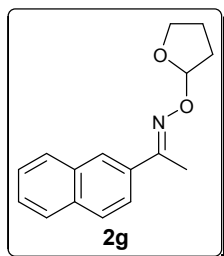


2e: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.62 (d, $J = 8.0$ Hz, 2H), 7.31 (d, $J = 8.0$ Hz, 2H), 5.90 (s, 1H), 4.03-3.94 (m, 2H), 2.21 (s, 3H), 2.12-2.05 (m, 3H), 1.91 (d, $J = 6.4$ Hz, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 154.7, 135.0, 134.9, 128.4, 127.5, 106.5, 67.9, 30.8, 23.9, 12.7. HRMS (ESI) $\text{C}_{12}\text{H}_{14}\text{ClNNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 262.0605, found 262.0606.

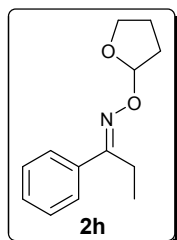


2f: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.25 (s, 1H), 7.11 (d, $J = 8.0$ Hz, 1H),

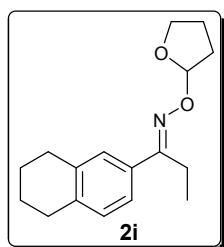
6.76 (d, $J = 8.0$ Hz, 1H), 5.94 (s, 2H), 5.87 (s, 1H), 4.01-3.92 (m, 2H), 2.17 (s, 3H), 2.08-2.02 (m, 3H), 1.89-1.86 (m, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 155.0, 148.4, 147.6, 130.6, 120.4, 107.7, 106.3, 101.1, 67.8, 30.7, 23.8, 12.8. HRMS (ESI) $\text{C}_{13}\text{H}_{15}\text{NNaO}_4$ $[\text{M}+\text{Na}]^+$ calcd 272.0893, found 272.0895.



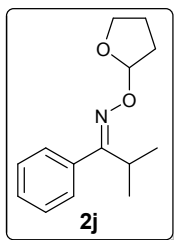
2g: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 8.02 (s, 1H), 7.96 (d, $J = 8.4$ Hz, 1H), 7.84-7.77 (m, 3H), 7.48-7.45 (m, 2H), 5.97 (s, 1H), 4.06-3.96 (m, 2H), 2.34 (s, 3H), 2.14-2.07 (m, 3H), 1.94-1.90 (m, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 155.6, 133.8, 133.7, 133.0, 128.5, 127.8, 127.6, 126.5, 126.2, 125.9, 123.7, 106.6, 68.0, 30.9, 24.0, 12.7. HRMS (ESI) $\text{C}_{16}\text{H}_{17}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 278.1151, found 278.1155.



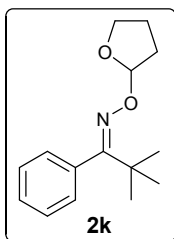
2h: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.66 (s, 2H), 7.35 (s, 3H), 5.90 (s, 1H), 4.03-3.95 (m, 2H), 2.75-2.73 (m, 2H), 2.10-2.05 (m, 3H), 1.93 (s, 1H), 1.14 (t, $J = 7.2$ Hz, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ : 160.8, 135.4, 129.0, 128.3, 126.4, 106.3, 67.8, 30.8, 23.9, 20.4, 11.2. HRMS (ESI) $\text{C}_{13}\text{H}_{17}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 242.1151, found 242.1155.



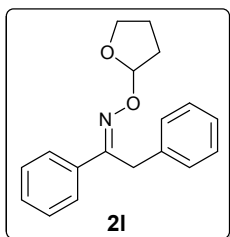
2i: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.38 (d, $J = 12.4$ Hz, 2H), 7.05 (d, $J = 7.6$ Hz, 1H), 5.90 (s, 1H), 4.03-3.95 (m, 2H), 2.78-2.70 (m, 6H), 2.10-2.06 (m, 3H), 1.93-1.90 (m, 1H), 1.80 (s, 4H), 1.14 (t, $J = 6.8$ Hz, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ : 160.9, 138.3, 137.0, 132.5, 129.0, 127.0, 123.5, 106.2, 67.7, 30.8, 29.4, 29.2, 23.9, 23.1, 20.3, 11.2. HRMS (ESI) $\text{C}_{17}\text{H}_{23}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 296.1621, found 296.1622.



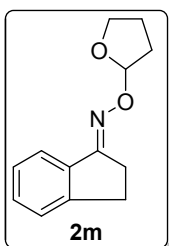
2j: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.35 (d, $J = 8.0$ Hz, 1H), 7.20 (d, $J = 6.4$ Hz, 1H), 5.76 (d, $J = 4.8$ Hz, 1H), 3.86 (d, $J = 4.8$ Hz, 2H), 2.89-2.84 (m, 1H), 1.95-1.93 (m, 1H), 1.79 (s, 3H), 1.18-1.04 (m, 6H). ^{13}C NMR (100 MHz, CDCl_3) δ : 164.2, 134.3, 127.8, 127.7, 127.5, 105.8, 67.6, 34.4, 30.4, 23.8, 20.0. HRMS (ESI) $\text{C}_{14}\text{H}_{19}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 256.1308, found 256.1307.



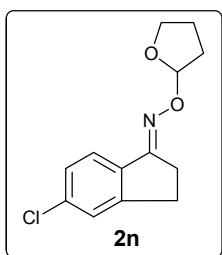
2k: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.36-7.27 (m, 3H), 7.03 (d, $J = 6.8$ Hz, 2H), 5.72 (d, $J = 5.2$ Hz, 1H), 3.85-3.75 (m, 2H), 1.89-1.85 (m, 1H), 1.72 (s, 3H), 1.18 (s, 9H). ^{13}C NMR (100 MHz, CDCl_3) δ : 167.5, 134.7, 127.5, 127.2, 105.6, 67.6, 37.3, 30.5, 28.2, 23.8. HRMS (ESI) $\text{C}_{15}\text{H}_{21}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 270.1465, found 270.1465.



2l: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.70 (s, 2H), 7.31 (d, $J = 14.0$ Hz, 3H), 7.28-7.12 (m, 4H), 5.98 (s, 1H), 4.13 (d, $J = 15.6$ Hz, 2H), 3.95-3.89 (m, 2H), 2.08 (d, $J = 5.6$ Hz, 2H), 1.97-1.88 (m, 2H). ^{13}C NMR (100 MHz, CDCl_3) δ : 157.2, 136.8, 135.6, 129.2, 128.5, 128.4, 128.3, 126.7, 126.2, 106.5, 67.9, 33.0, 30.8, 23.7. HRMS (ESI) $\text{C}_{18}\text{H}_{19}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 304.1308, found 304.1320.

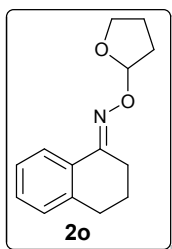


2m: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.75 (d, $J = 7.2$ Hz, 1H), 7.33-7.26 (m, 2H), 7.23 (t, $J = 7.2$ Hz, 1H), 5.88 (s, 1H), 4.03-3.94 (m, 2H), 3.03-2.95 (m, 2H), 2.88 (d, $J = 8.0$ Hz, 2H), 2.09-2.03 (m, 3H), 1.91 (d, $J = 5.2$ Hz, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 164.2, 148.3, 136.0, 130.3, 126.8, 125.4, 122.0, 106.4, 67.8, 30.9, 28.4, 26.6, 24.0. HRMS (ESI) $\text{C}_{13}\text{H}_{15}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 240.0995, found 240.1000.

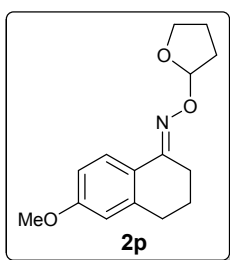


2n: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.65 (d, $J = 8.0$ Hz, 1H), 7.26 (s, 1H), 7.20 (d, $J = 8.0$ Hz, 1H), 5.85 (s, 1H), 4.01-3.94 (m, 2H), 2.98 (d, $J = 5.6$ Hz, 2H), 2.94-2.81 (m, 2H), 2.06 (d, $J = 11.2$ Hz, 3H), 1.93-1.90 (m, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 162.8, 149.8, 136.1, 134.6, 127.3, 125.5, 123.0, 106.4, 67.8, 30.8, 28.3,

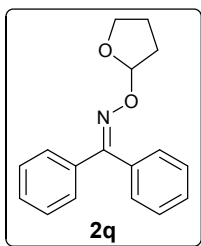
26.7, 23.9. HRMS (ESI) $C_{13}H_{14}ClNNaO_2$ $[M+Na]^+$ calcd 274.0605, found 274.0613.



2o: colorless oil; 1H NMR (400 MHz, $CDCl_3$) δ : 8.05 (d, $J = 7.6$ Hz, 1H), 7.26-7.21 (m, 1H), 7.21-7.14 (m, 1H), 7.11 (d, $J = 6.8$ Hz, 1H), 5.91 (s, 1H), 4.04-3.95 (m, 2H), 2.74 (d, $J = 5.6$ Hz, 4H), 2.10-2.06 (m, 3H), 1.92 (s, 1H), 1.85-1.82 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ : 155.2, 139.5, 130.5, 129.0, 128.3, 126.1, 124.6, 106.4, 67.9, 30.8, 29.7, 24.6, 23.9, 21.3. HRMS (ESI) $C_{14}H_{17}NNaO_2$ $[M+Na]^+$ calcd 254.1151, found 254.1154.

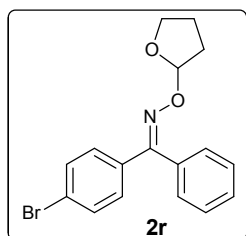


2p: yellow oil; 1H NMR (400 MHz, $CDCl_3$) δ : 7.98 (d, $J = 8.4$ Hz, 1H), 6.73 (d, $J = 8.8$ Hz, 1H), 6.61 (s, 1H), 5.88 (s, 1H), 4.02-3.93 (m, 2H), 3.79 (s, 3H), 2.70 (d, $J = 2.4$ Hz, 4H), 2.08 (s, 3H), 1.90 (s, 1H), 1.87-1.81 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ : 160.2, 155.1, 141.3, 126.3, 123.4, 112.7, 112.6, 106.3, 67.8, 55.2, 30.9, 30.0, 24.6, 24.0, 21.5. HRMS (ESI) $C_{15}H_{19}NNaO_3$ $[M+Na]^+$ calcd 284.1257, found 284.1256.

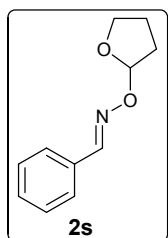


2q: yellow oil; 1H NMR (400 MHz, $CDCl_3$) δ : 7.52 (d, $J = 7.2$ Hz, 3H), 7.41 (s, 3H),

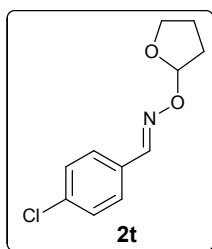
7.37-7.32 (m, 4H), 5.93 (s, 1H), 3.99-3.96 (m, 2H), 2.06-1.86 (m, 4H). ^{13}C NMR (100 MHz, CDCl_3) δ : 158.0, 136.4, 133.4, 129. , 129.2, 128.6, 128.1, 128.0, 127.8, 106.6, 67.9, 30.6, 23.8. HRMS (ESI) $\text{C}_{17}\text{H}_{17}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 290.1151, found 290.1146.



2r: yellow oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.55 (d, $J = 8.0$ Hz, 1H), 7.48 (d, $J = 6.8$ Hz, 1H), 7.45-7.35 (m, 4H), 7.31 (s, 2H), 7.23 (d, $J = 8.0$ Hz, 1H), 5.91 (s, 1H), 3.96 (d, $J = 5.6$ Hz, 1H), 2.03 (s, 1H), 1.97-1.87 (m, 2H). ^{13}C NMR (100 MHz, CDCl_3) δ : 157.1, 131.2, 131.1, 131.0, 129.6, 129.1, 128.8, 128.2, 128.0, 106.8, 68.0, 30.6, 23.8. HRMS (ESI) $\text{C}_{17}\text{H}_{16}\text{BrNNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 268.0257, found 268.0251.

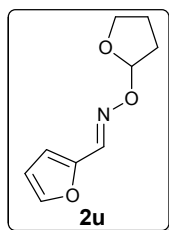


2s: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 8.09 (s, 1H), 7.61 (s, 2H), 7.37 (s, 3H), 5.89 (s, 1H), 4.04-3.97 (m, 2H), 2.07 (d, $J = 9.6$ Hz, 3H), 1.93 (d, $J = 6.4$ Hz, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 150.0, 132.0, 129.9, 128.6, 127.3, 106.6, 68.0, 30.8, 23.8. HRMS (ESI) $\text{C}_{11}\text{H}_{13}\text{NNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 214.0838, found 214.0842.



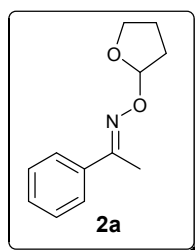
2t: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 8.04 (s, 1H), 7.54 (d, $J = 8.0$ Hz, 2H),

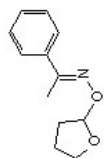
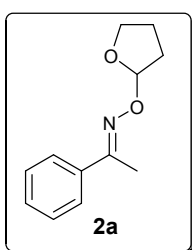
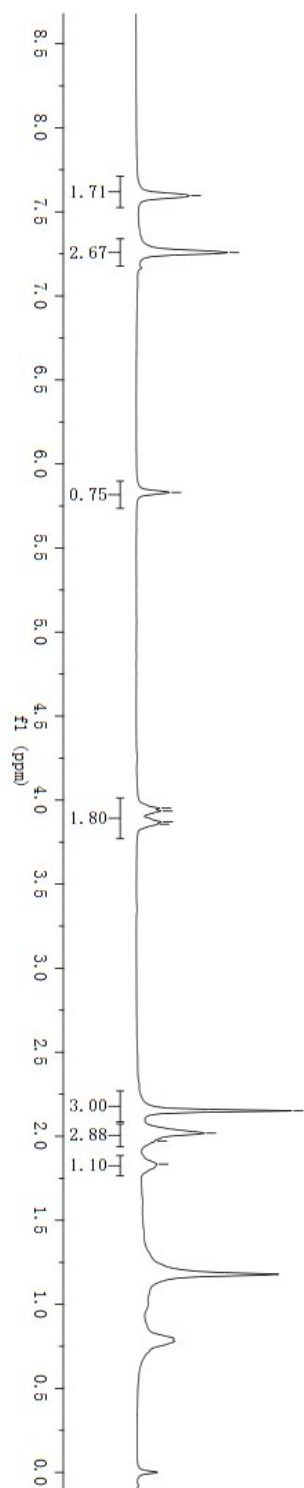
7.33 (d, $J = 8.0$ Hz, 2H), 5.86 (s, 1H), 4.03-3.95 (m, 2H), 2.07 (t, $J = 11.2$ Hz, 3H), 1.96-1.91 (m, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 148.8, 135.8, 130.6, 128.8, 128.4, 106.7, 68.0, 30.7, 23.8. HRMS (ESI) $\text{C}_{11}\text{H}_{12}\text{ClNNaO}_2$ $[\text{M}+\text{Na}]^+$ calcd 248.0449, found 248.0440.

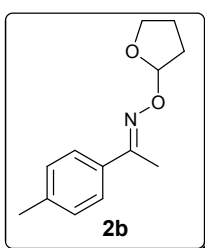
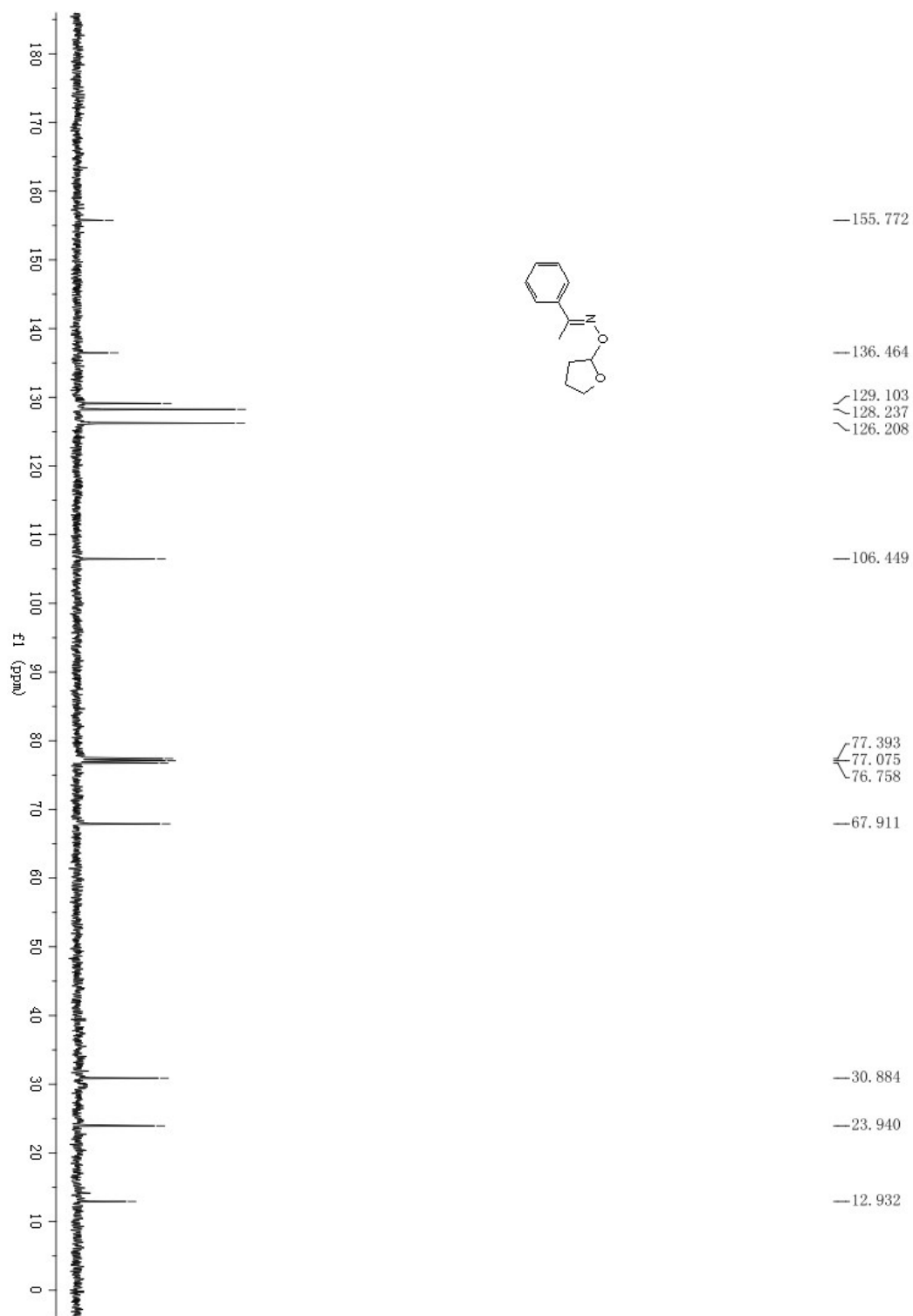


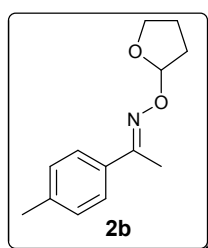
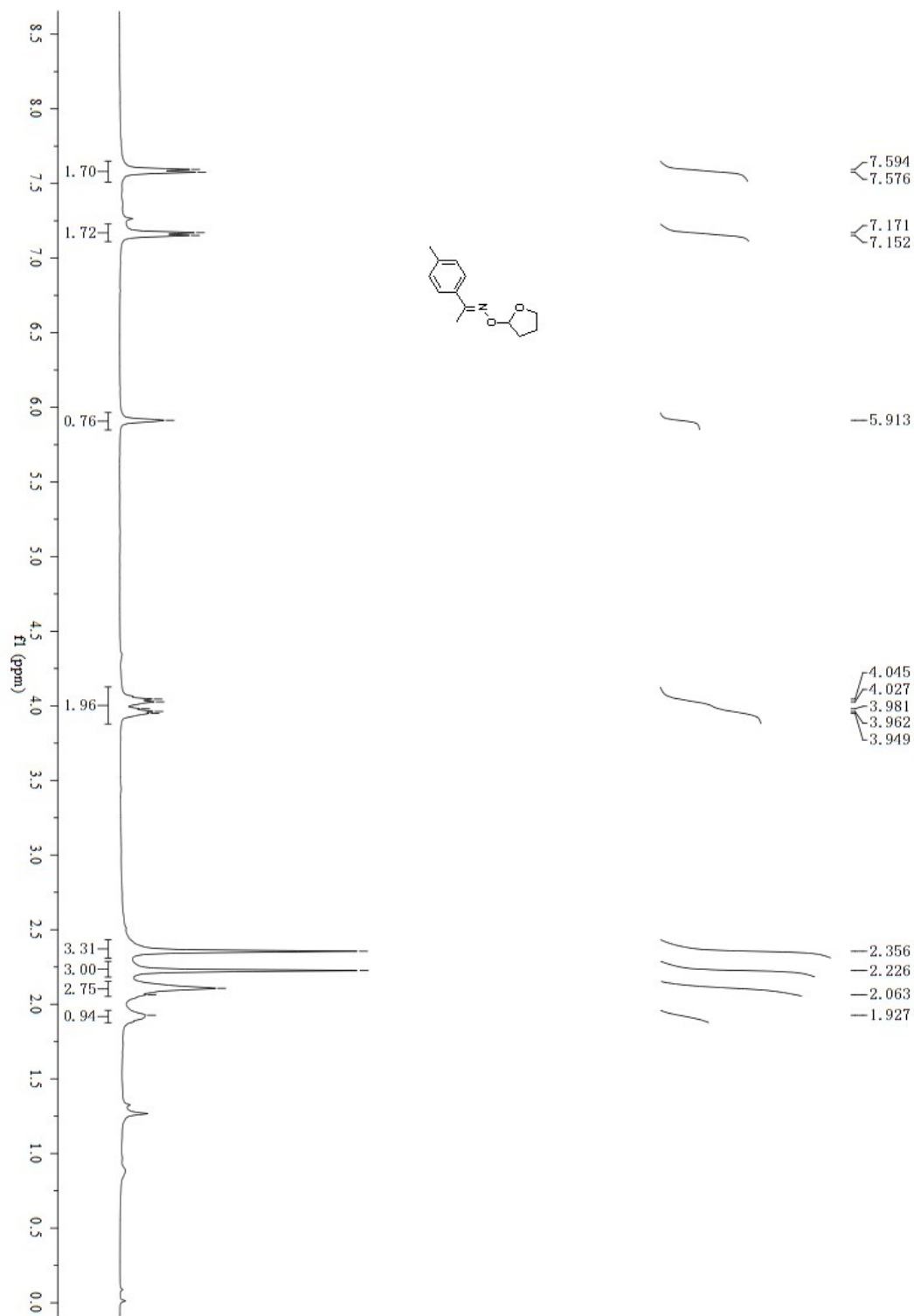
2u: colorless oil; ^1H NMR (400 MHz, CDCl_3) δ : 7.96 (s, 1H), 7.48 (s, 1H), 6.65 (s, 1H), 6.45 (s, 1H), 5.87 (d, $J = 4.2$ Hz, 1H), 4.02-3.95 (m, 2H), 2.14-1.99 (m, 3H), 1.97-1.91 (m, 1H). ^{13}C NMR (100 MHz, CDCl_3) δ : 152.0, 144.2, 140.2, 112.9, 111.6, 106.8, 67.9, 30.8, 23.7. HRMS (ESI) $\text{C}_9\text{H}_{11}\text{NNaO}_3$ $[\text{M}+\text{Na}]^+$ calcd 204.0631, found 204.0634.

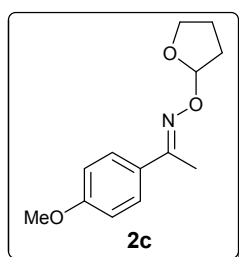
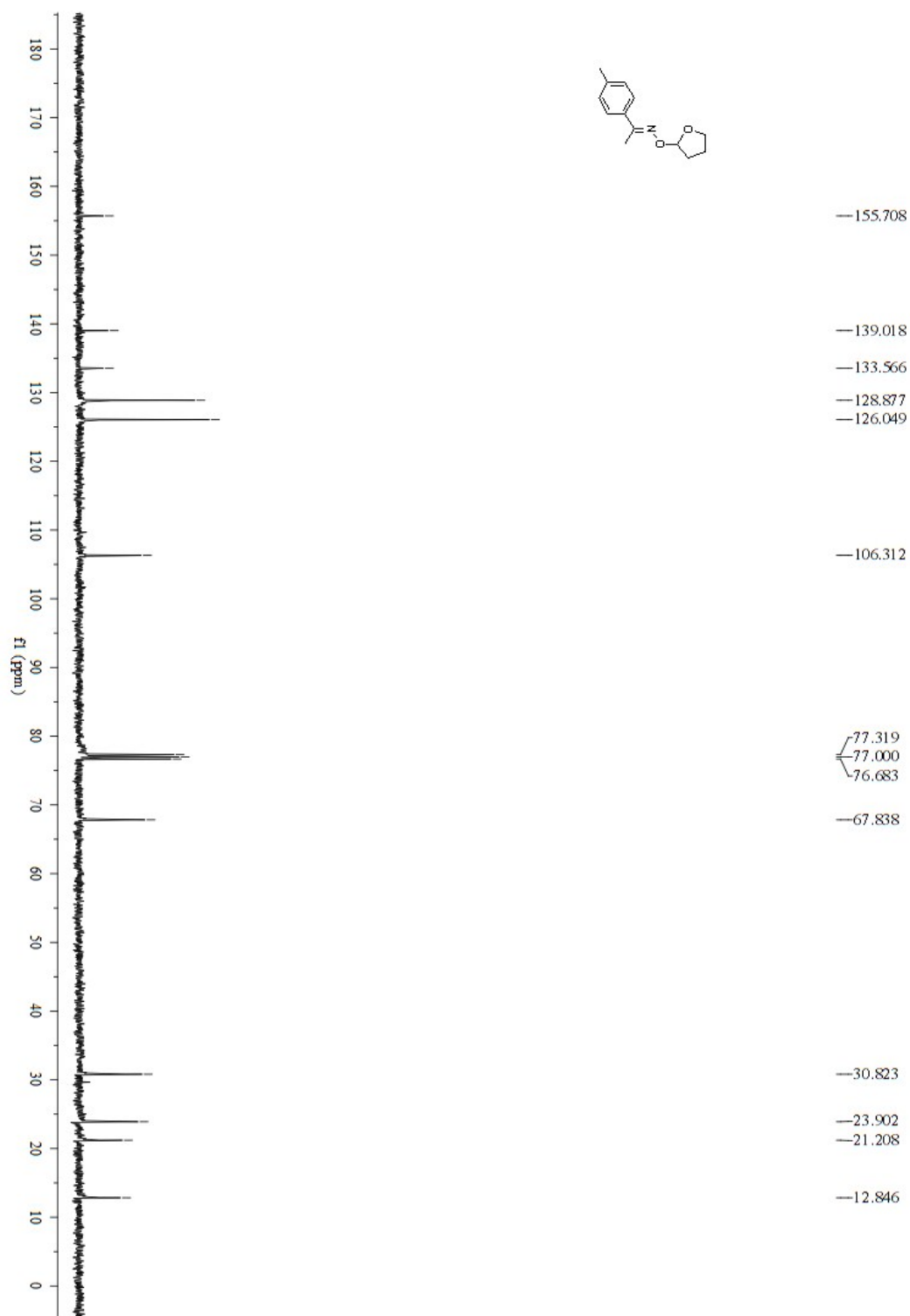
4. Appendix (copies of ^1H and ^{13}C NMR spectra)

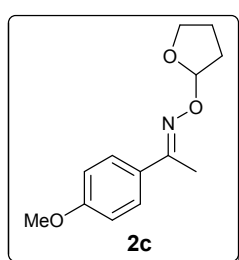
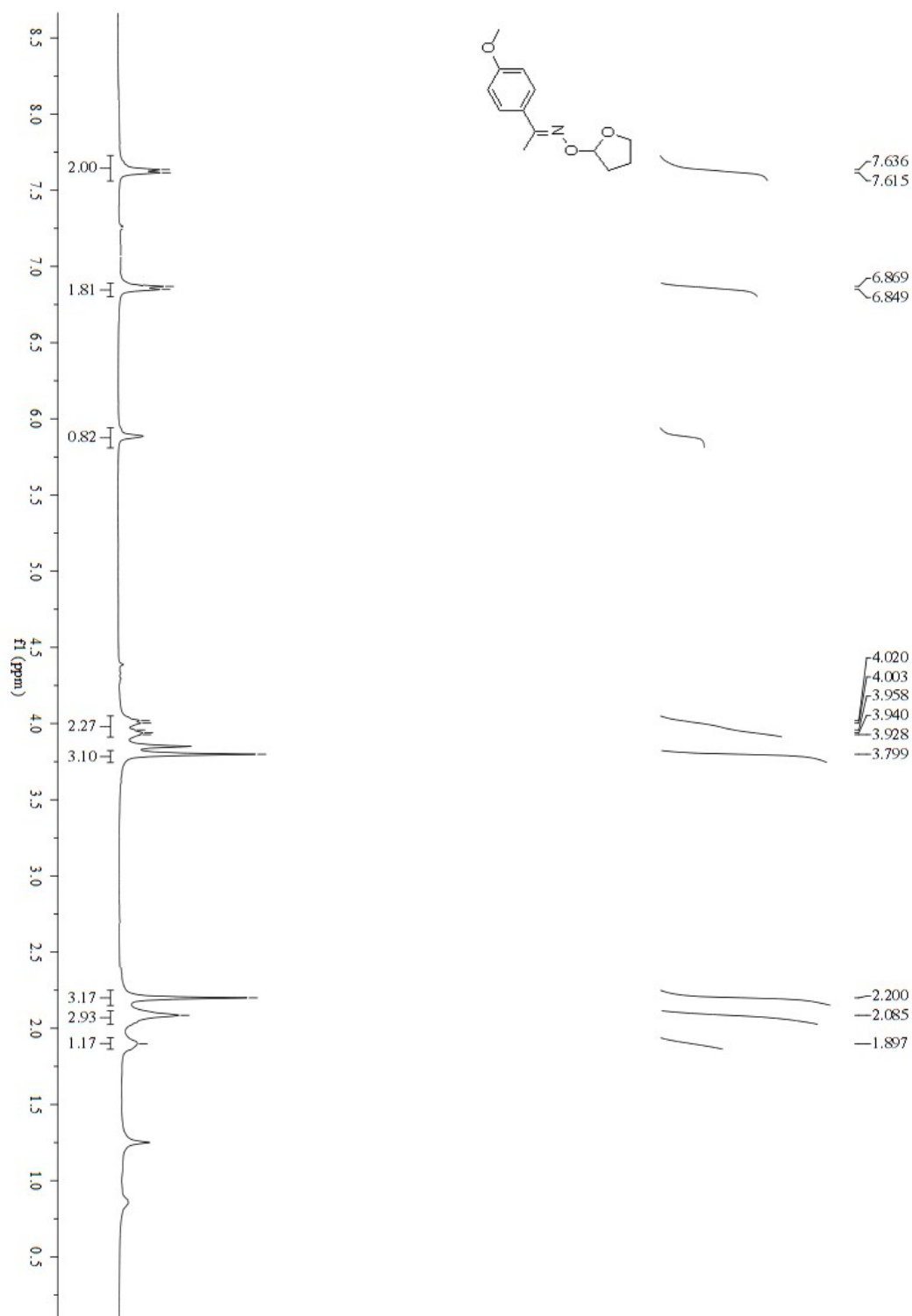


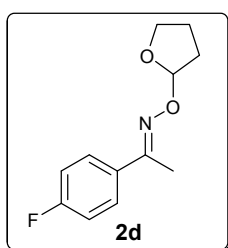
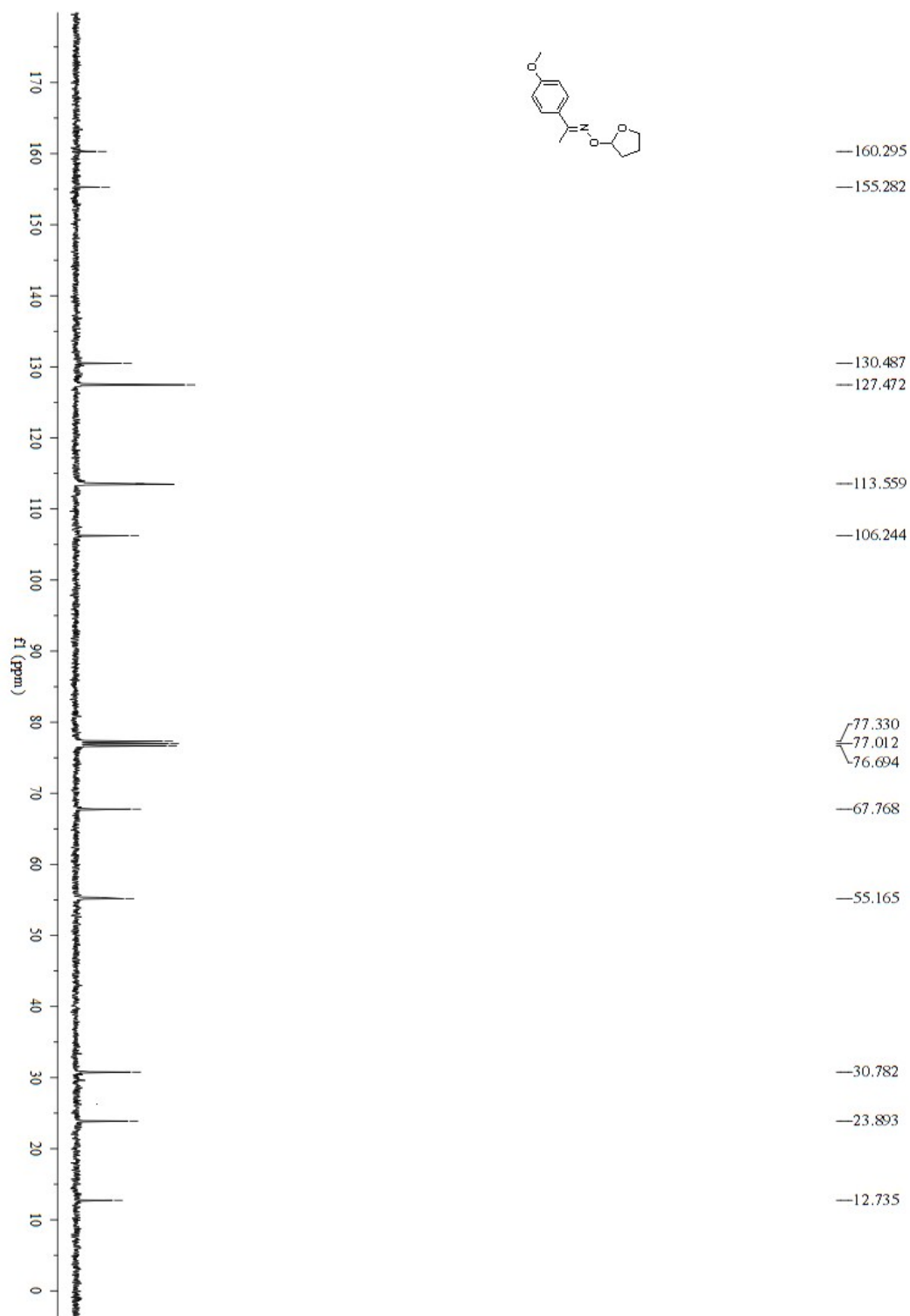


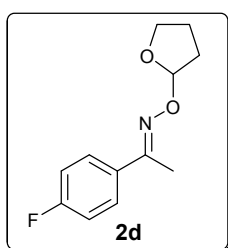
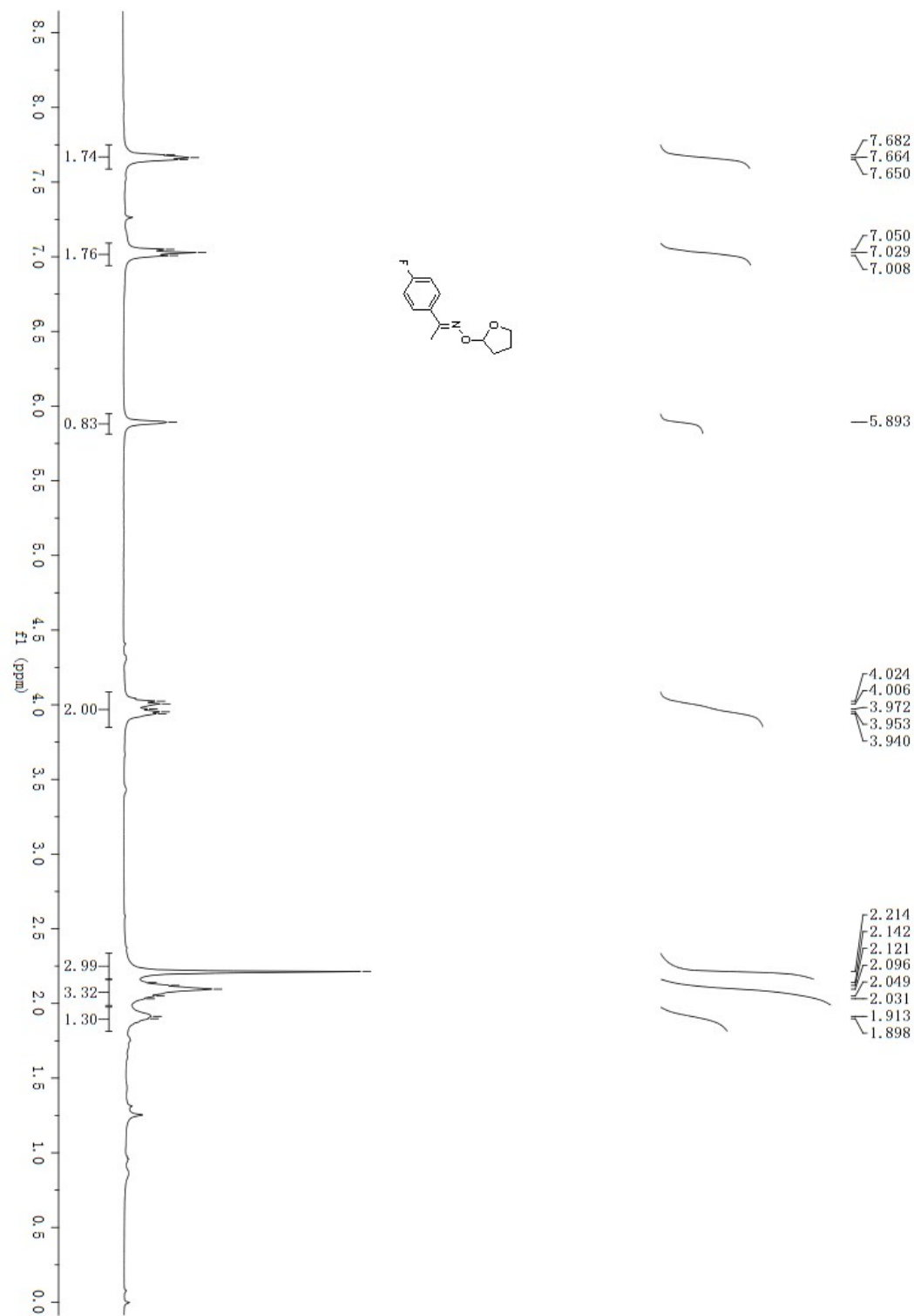


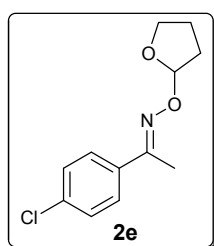
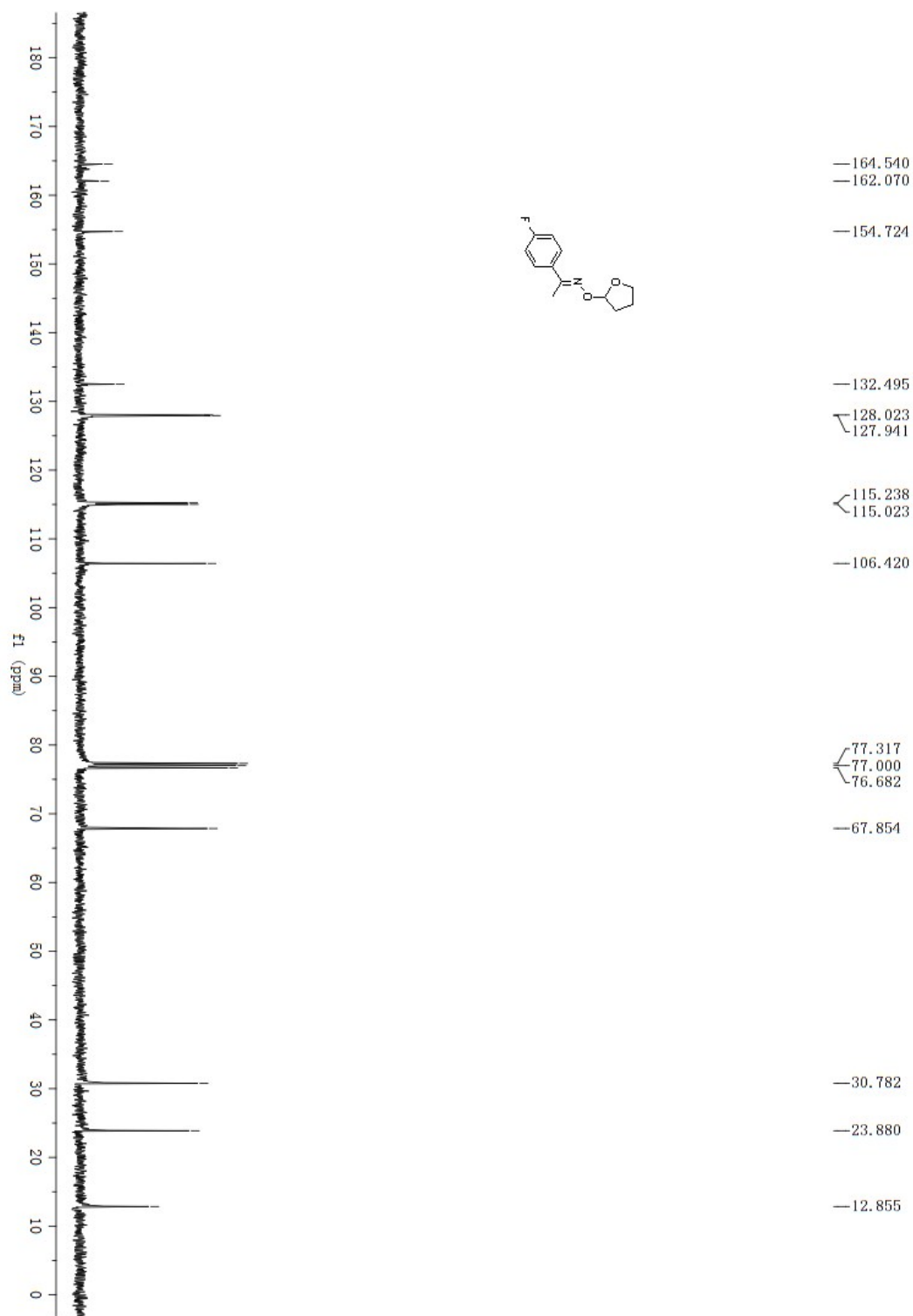


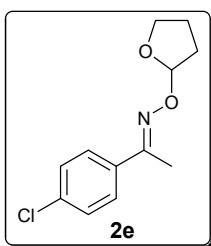
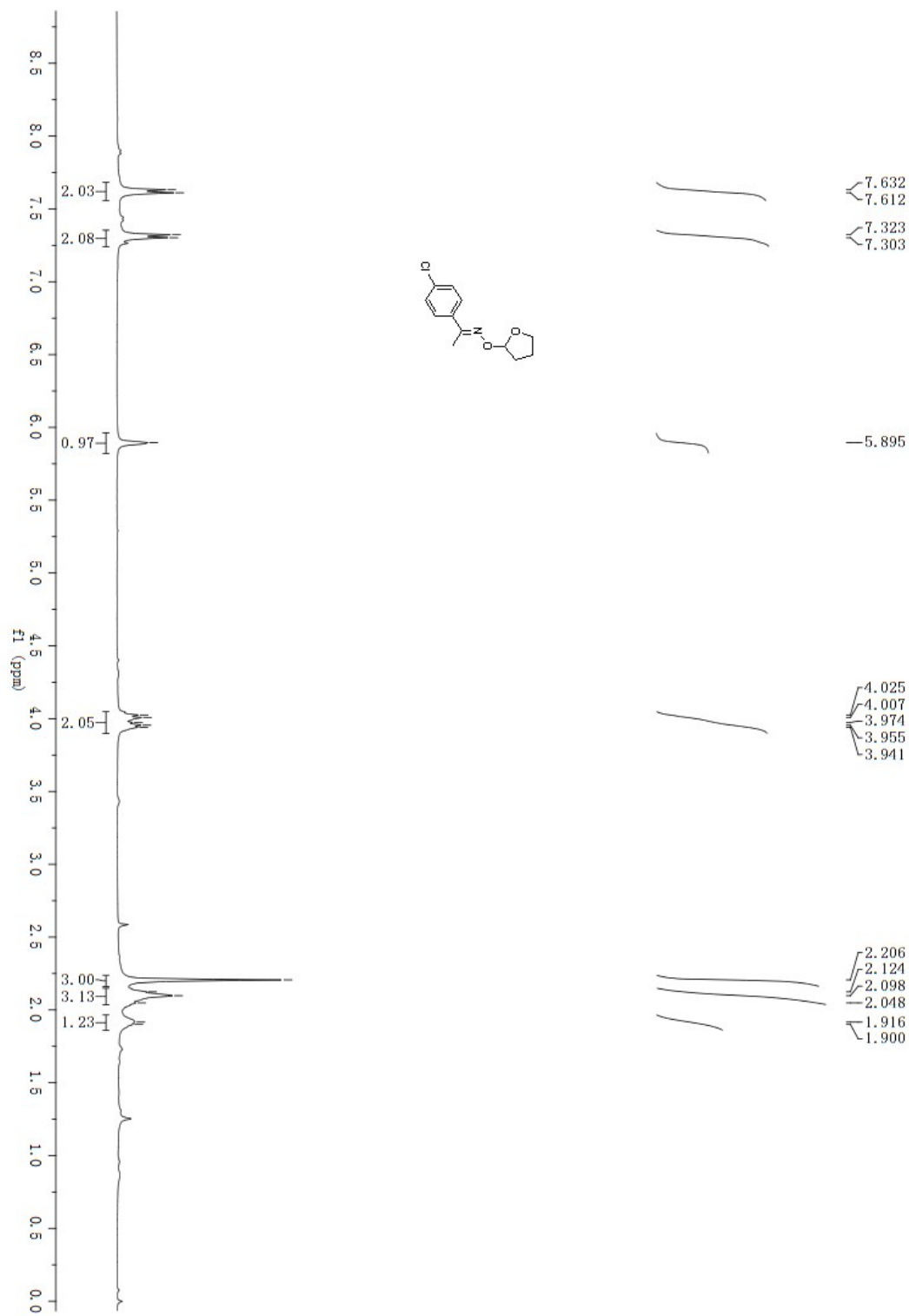


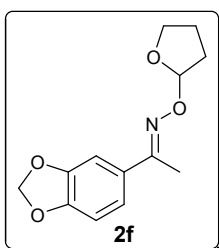
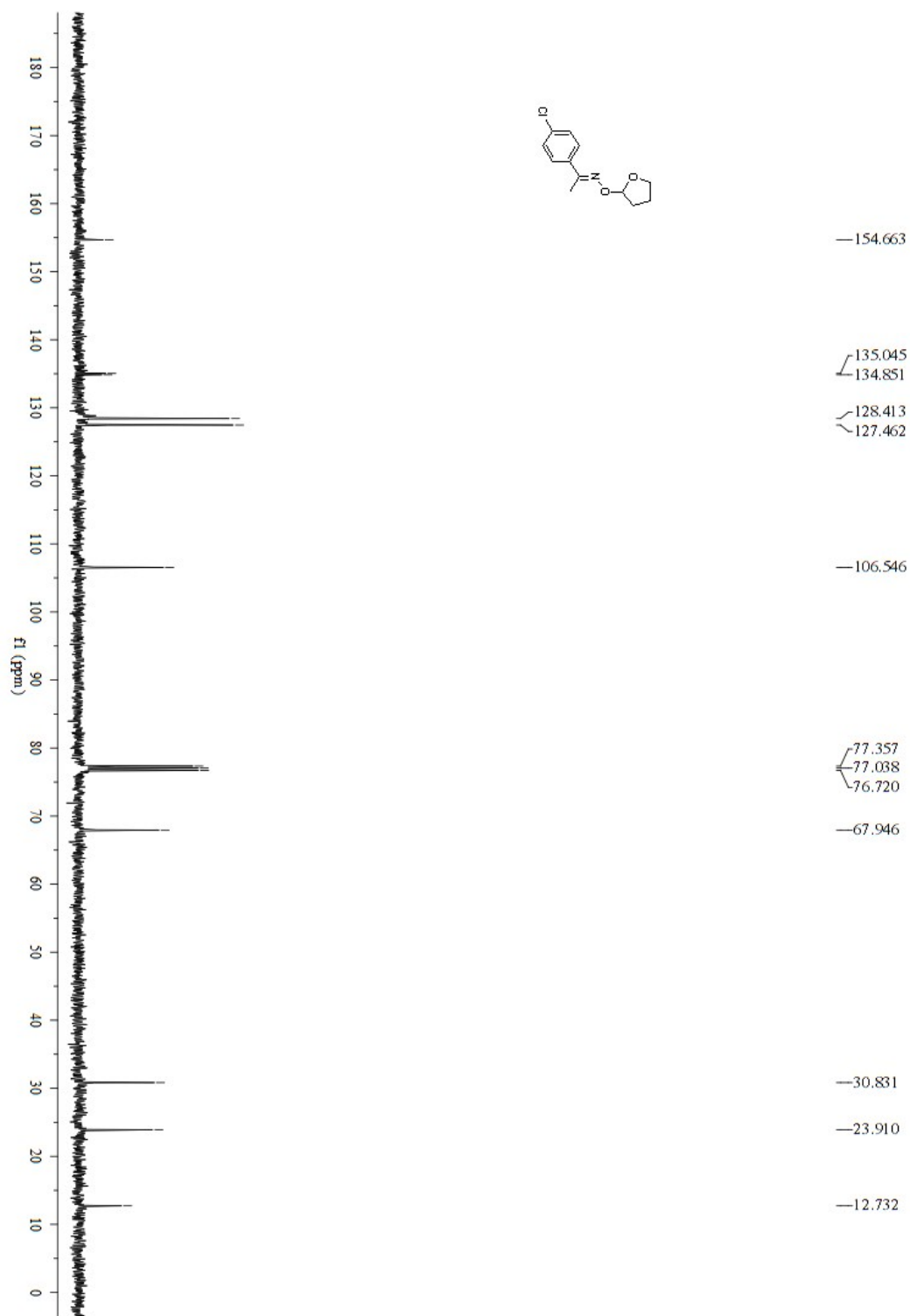


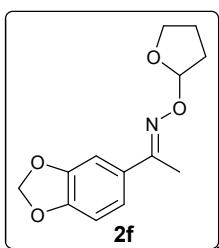
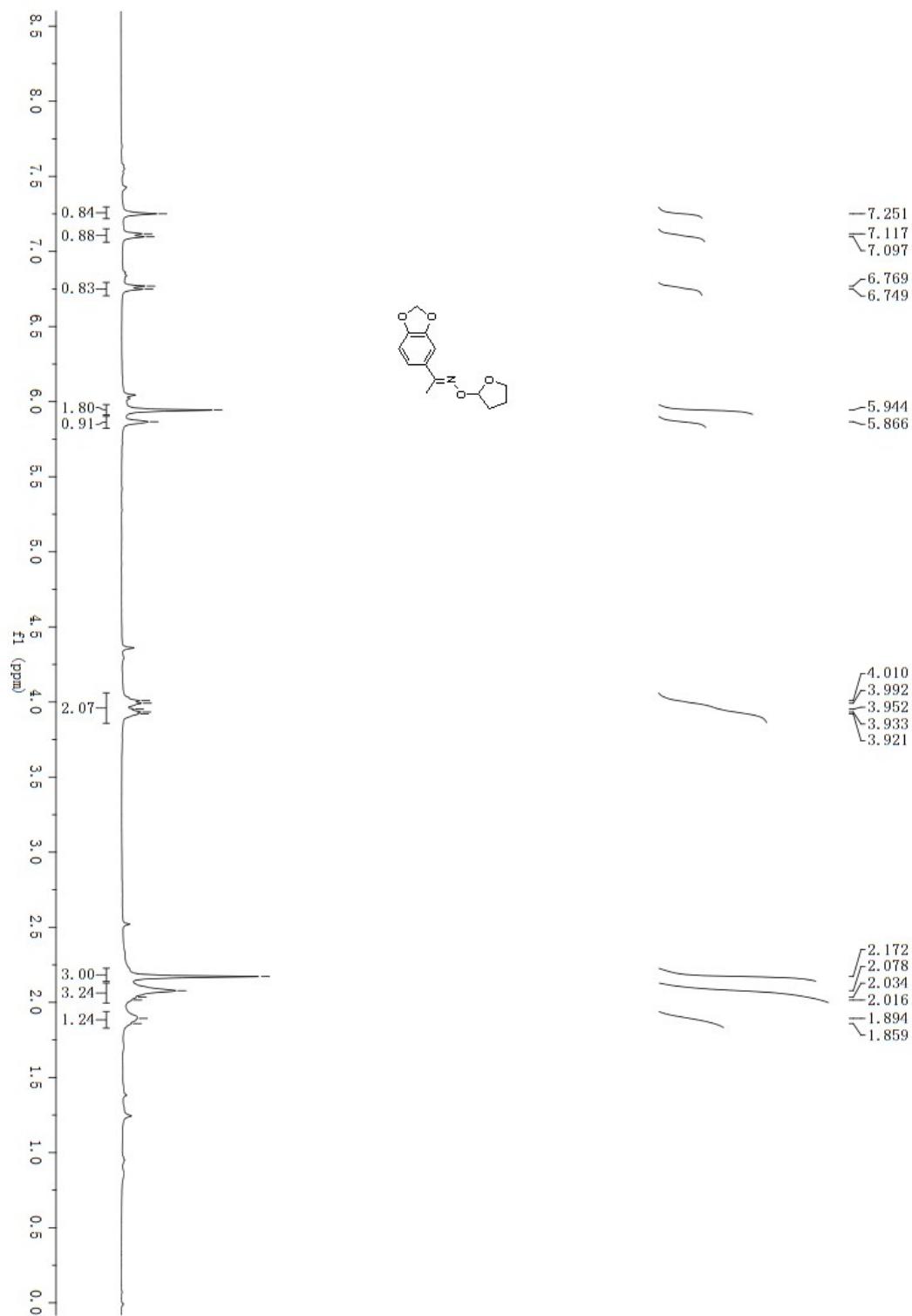


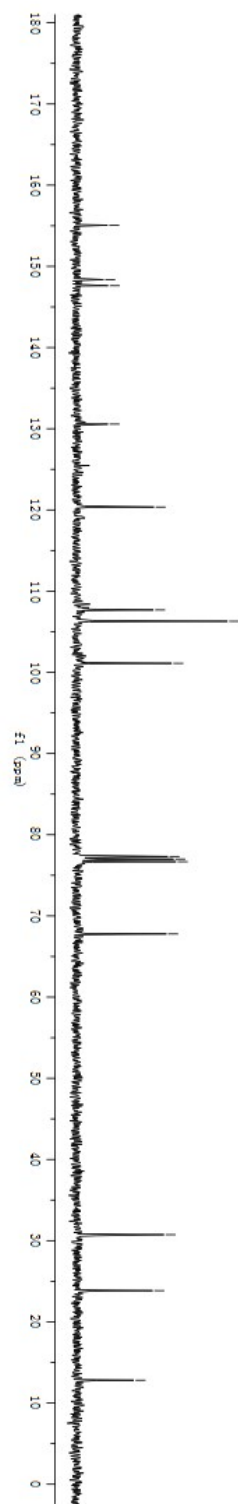












—155.079

—148.371

—147.622

—130.569

—120.358

—107.683

—106.287

—101.109

—77.318

—77.000

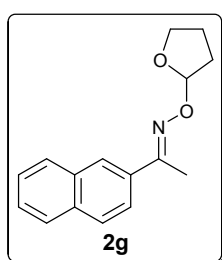
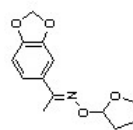
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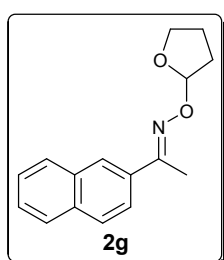
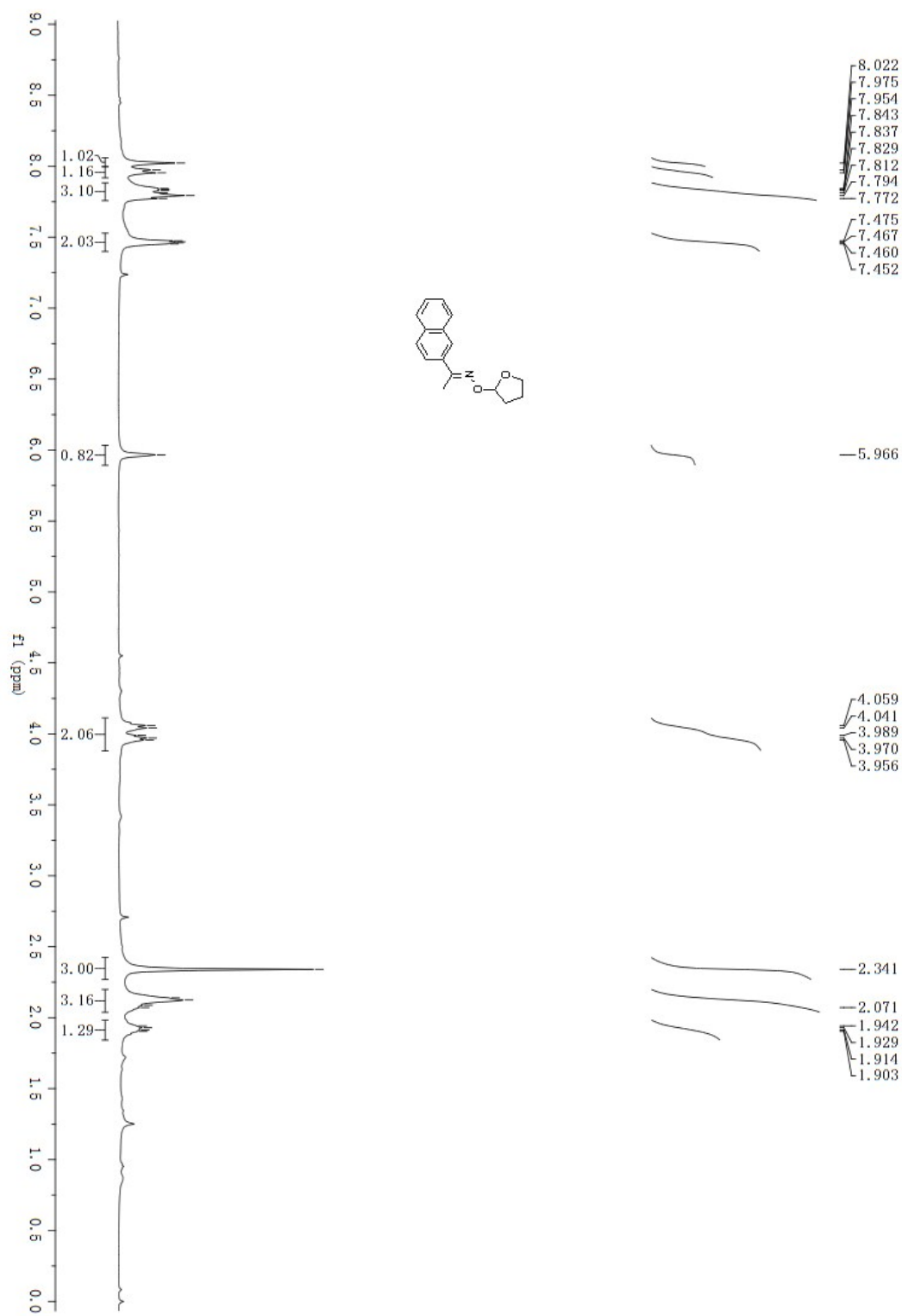
—67.776

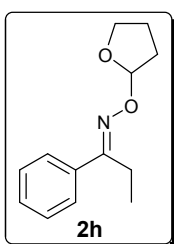
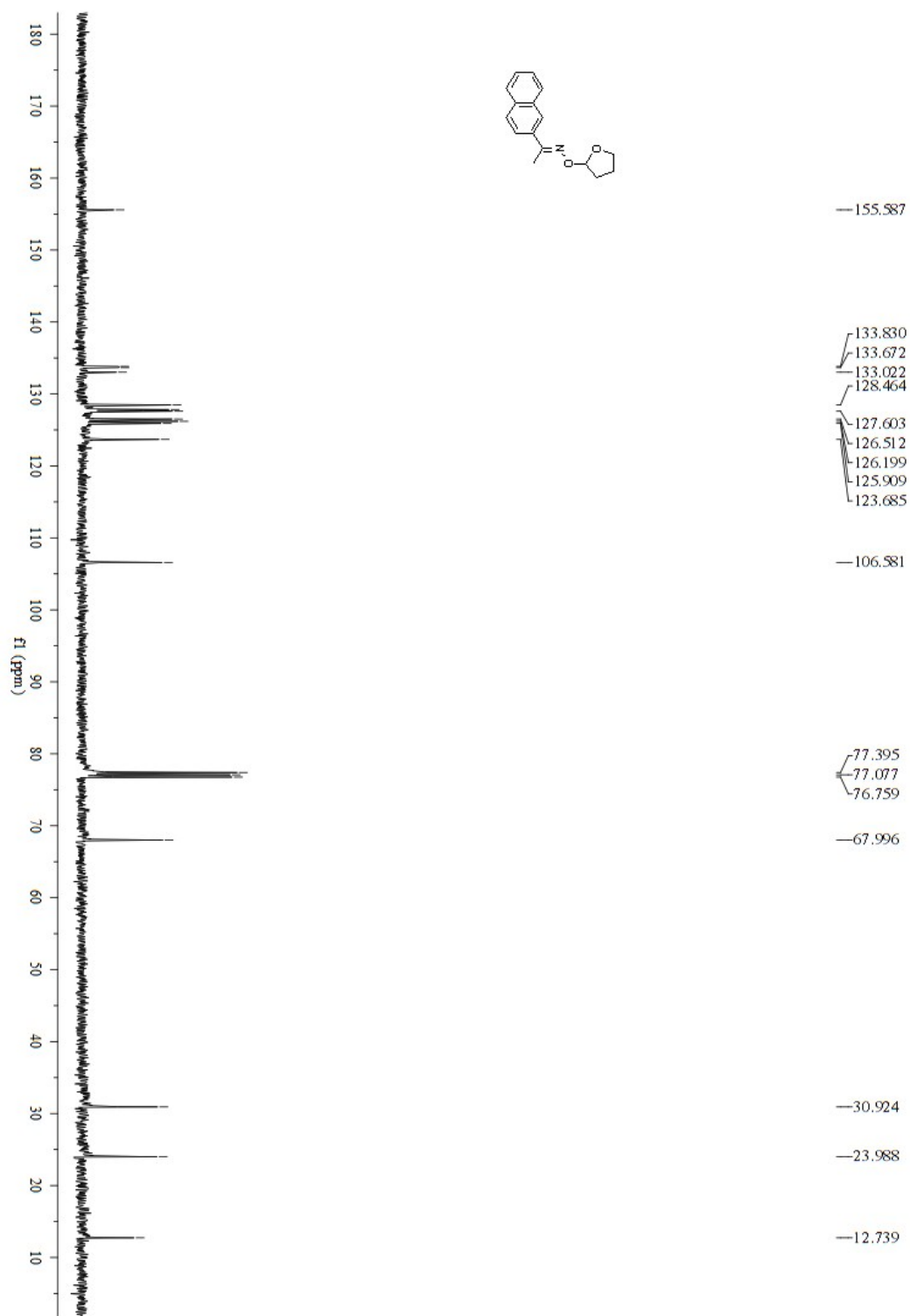
—30.742

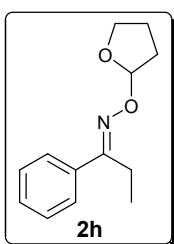
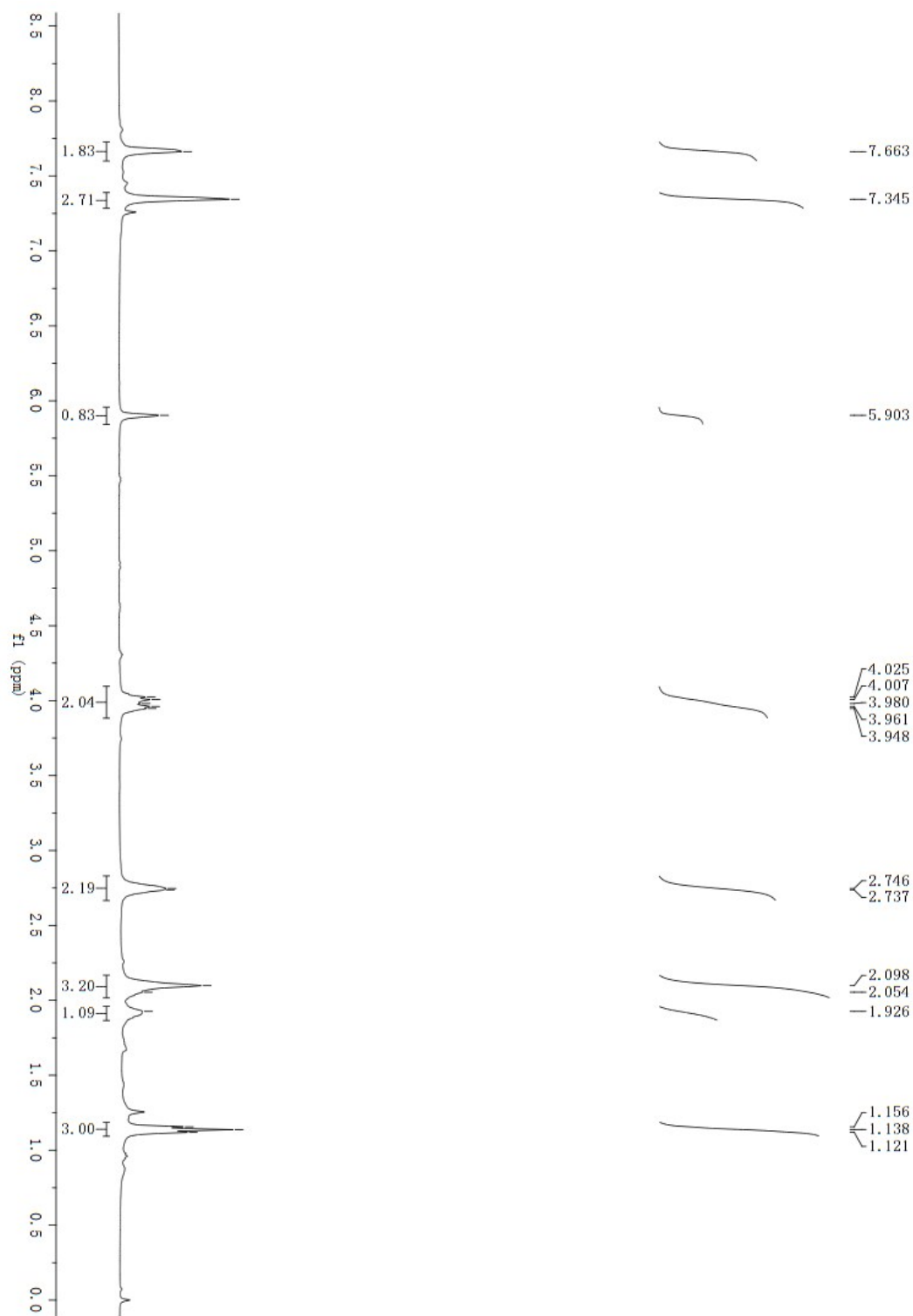
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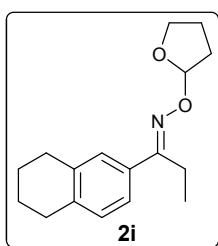
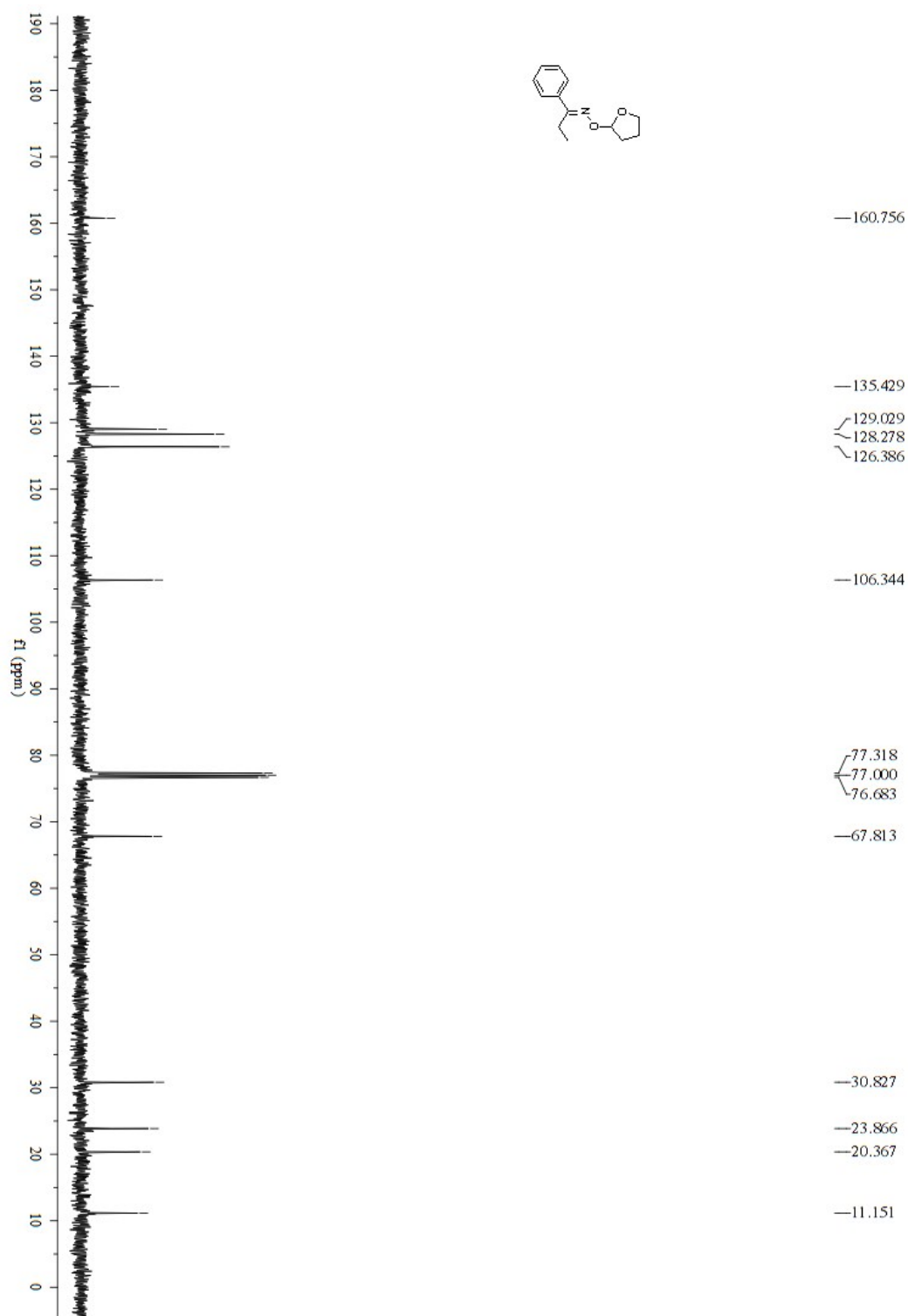
—12.813

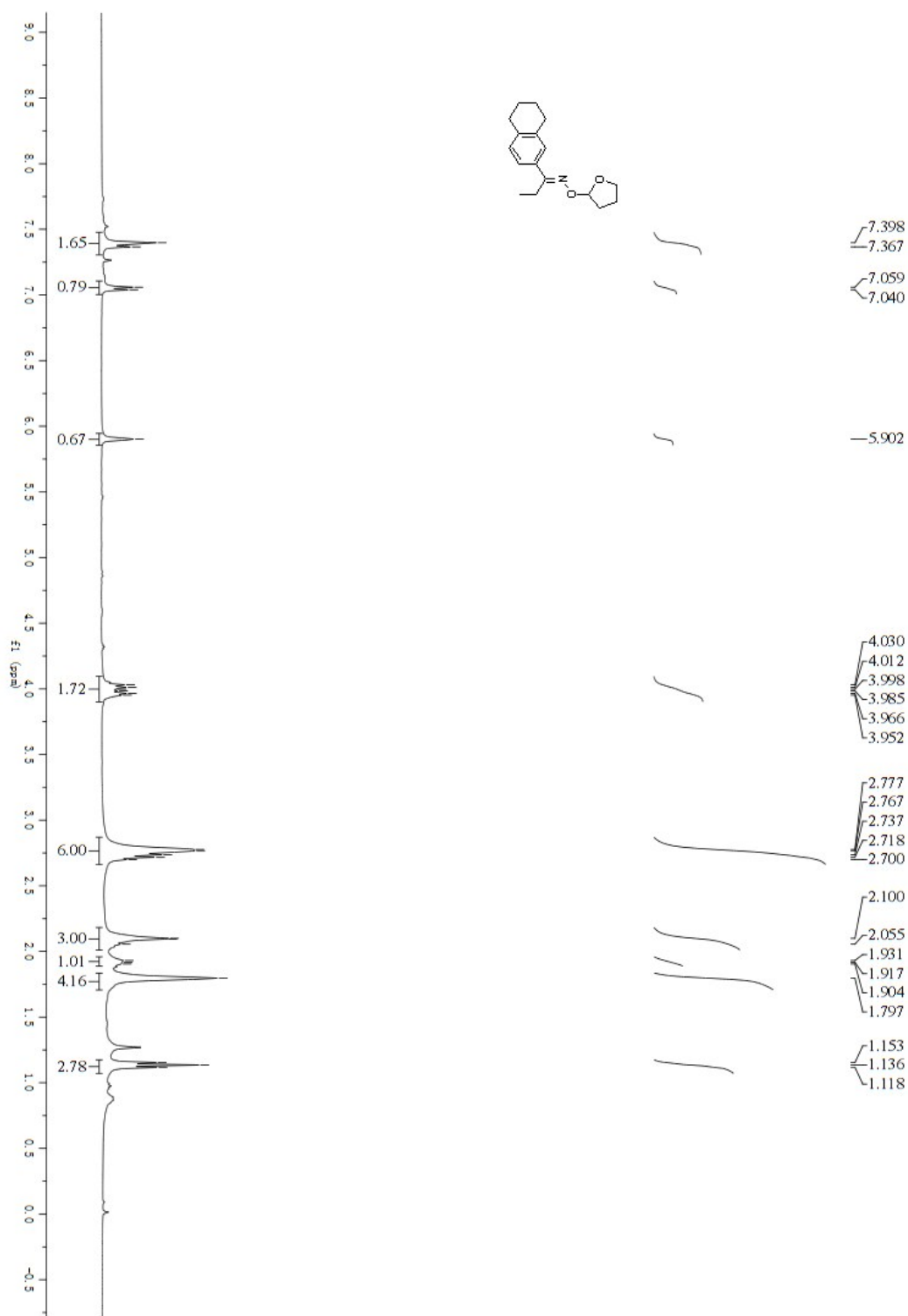
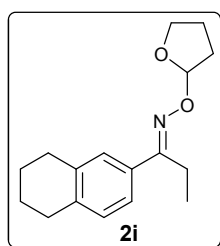


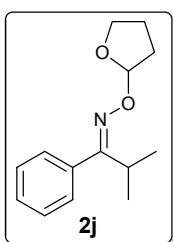
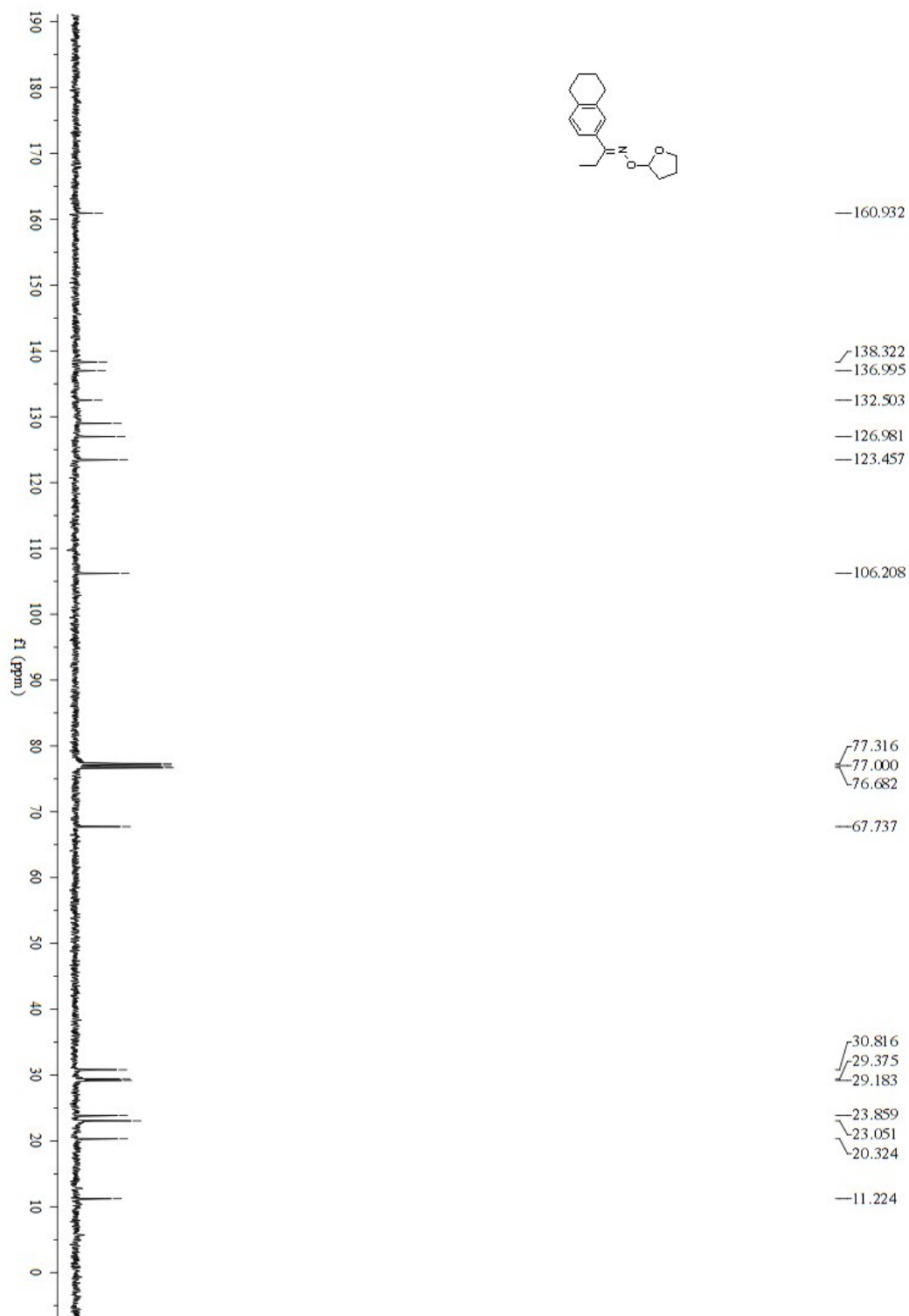


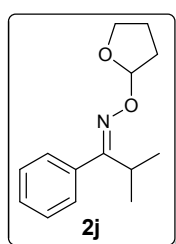
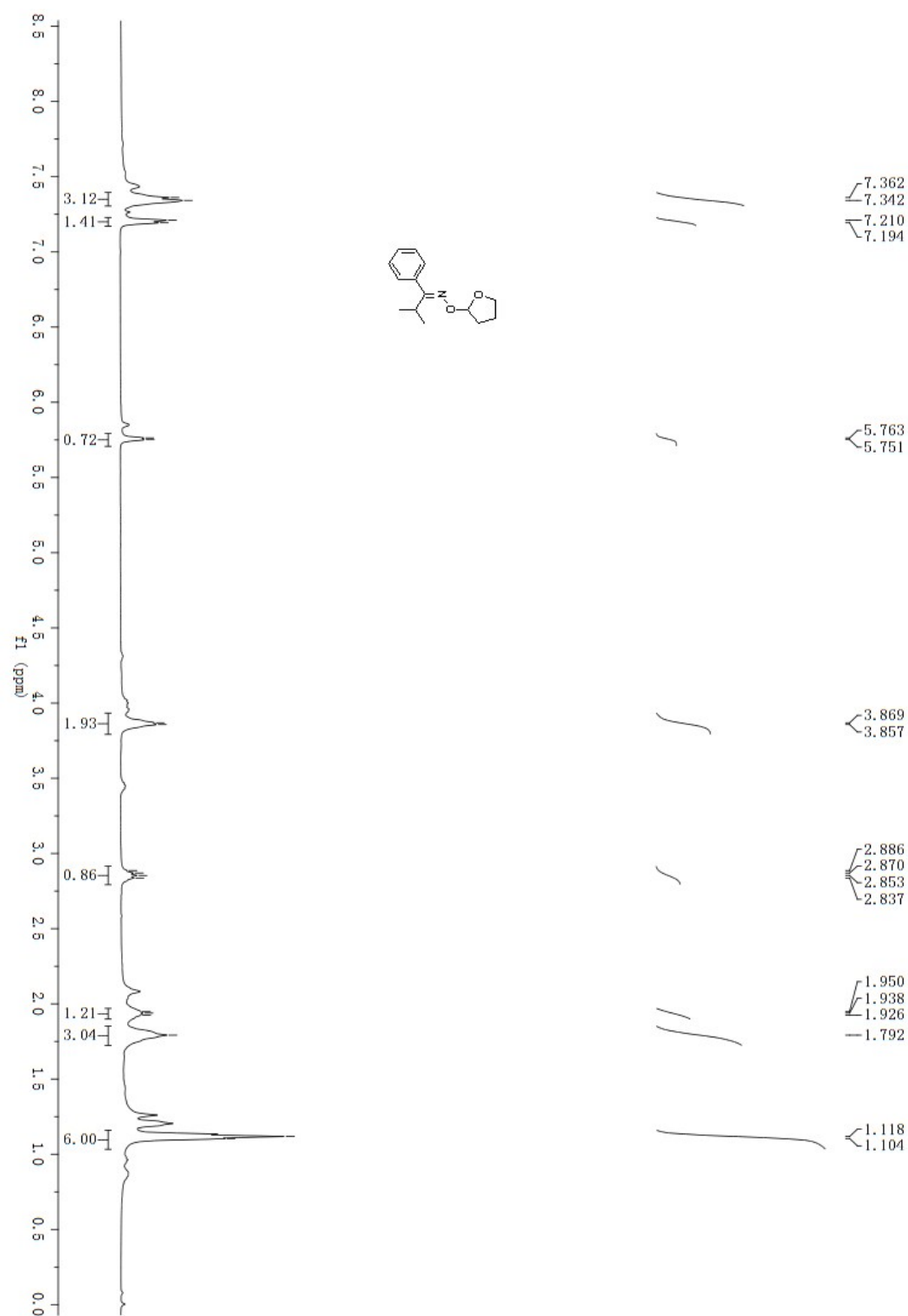


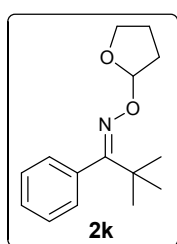
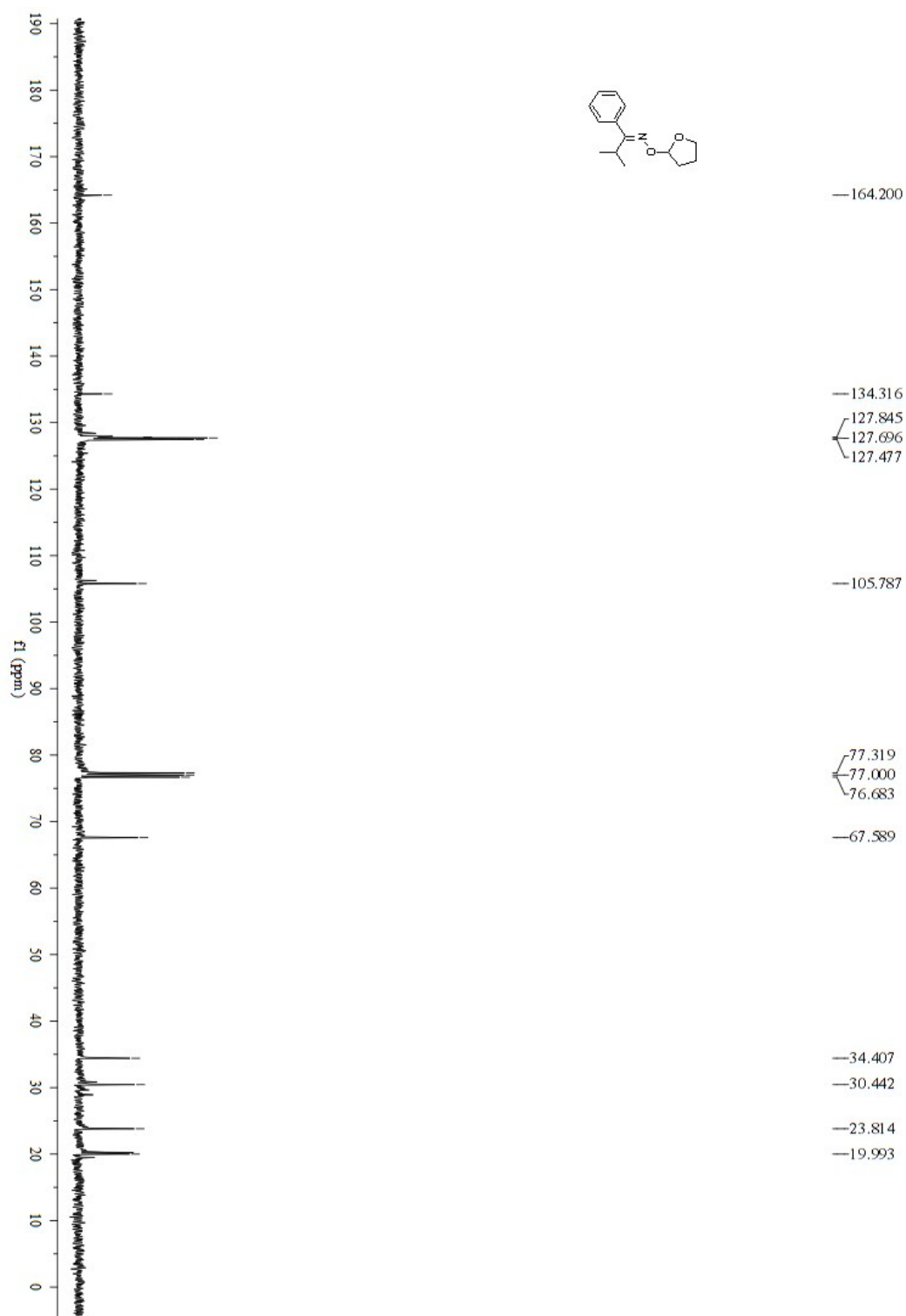


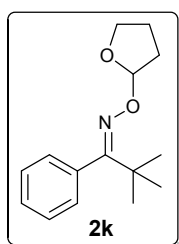
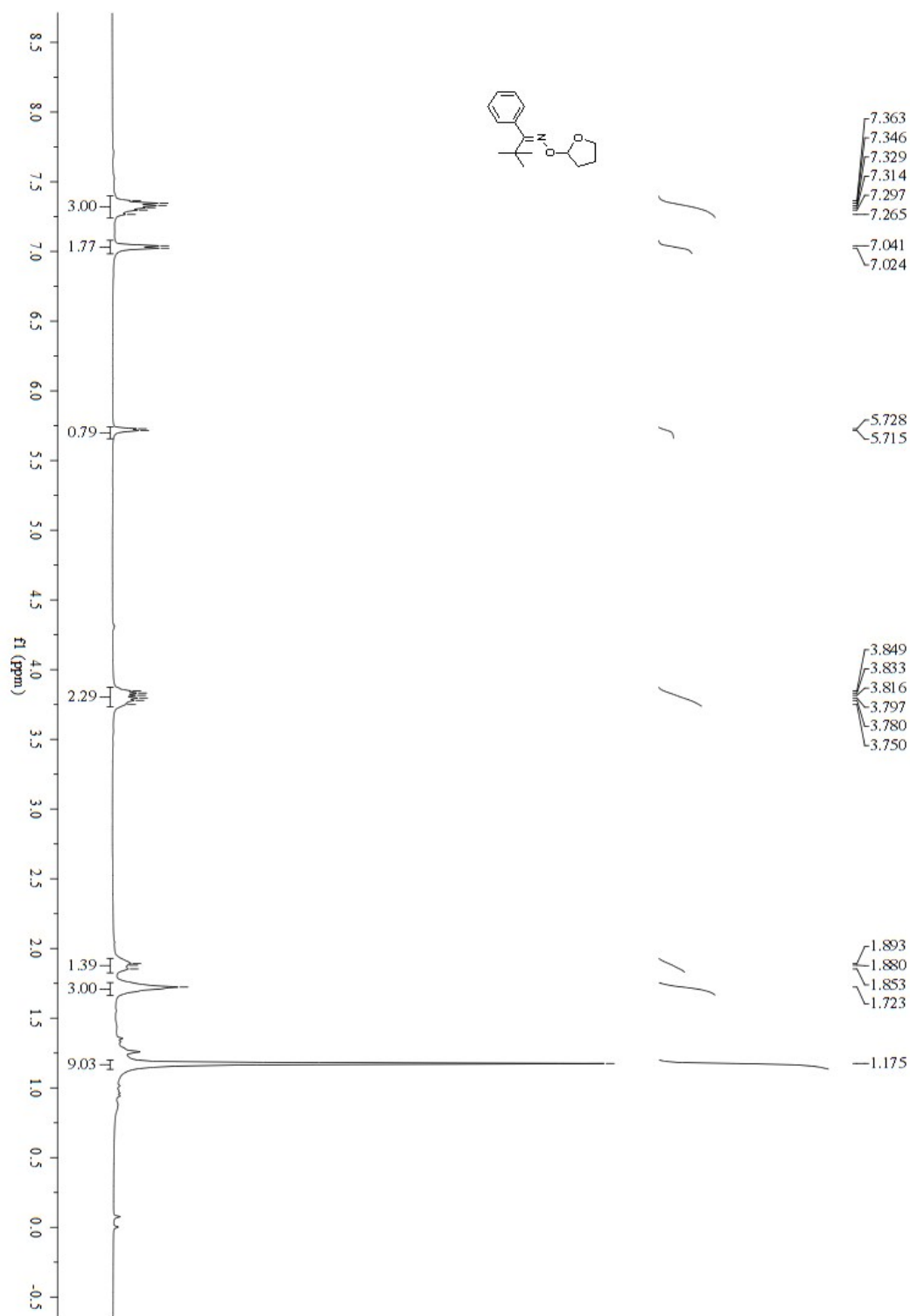


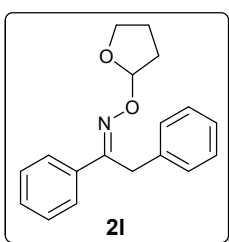
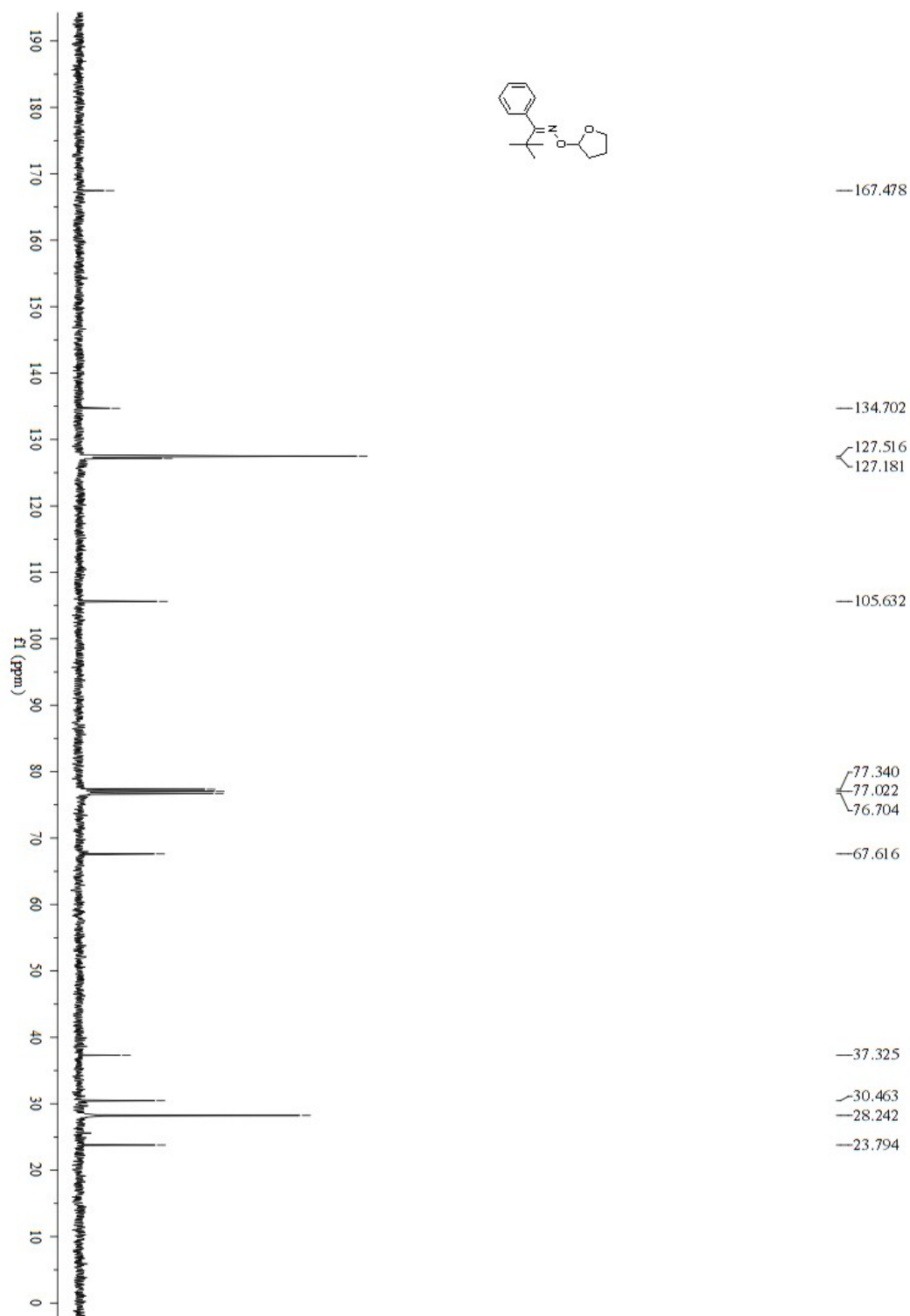


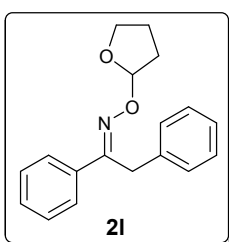
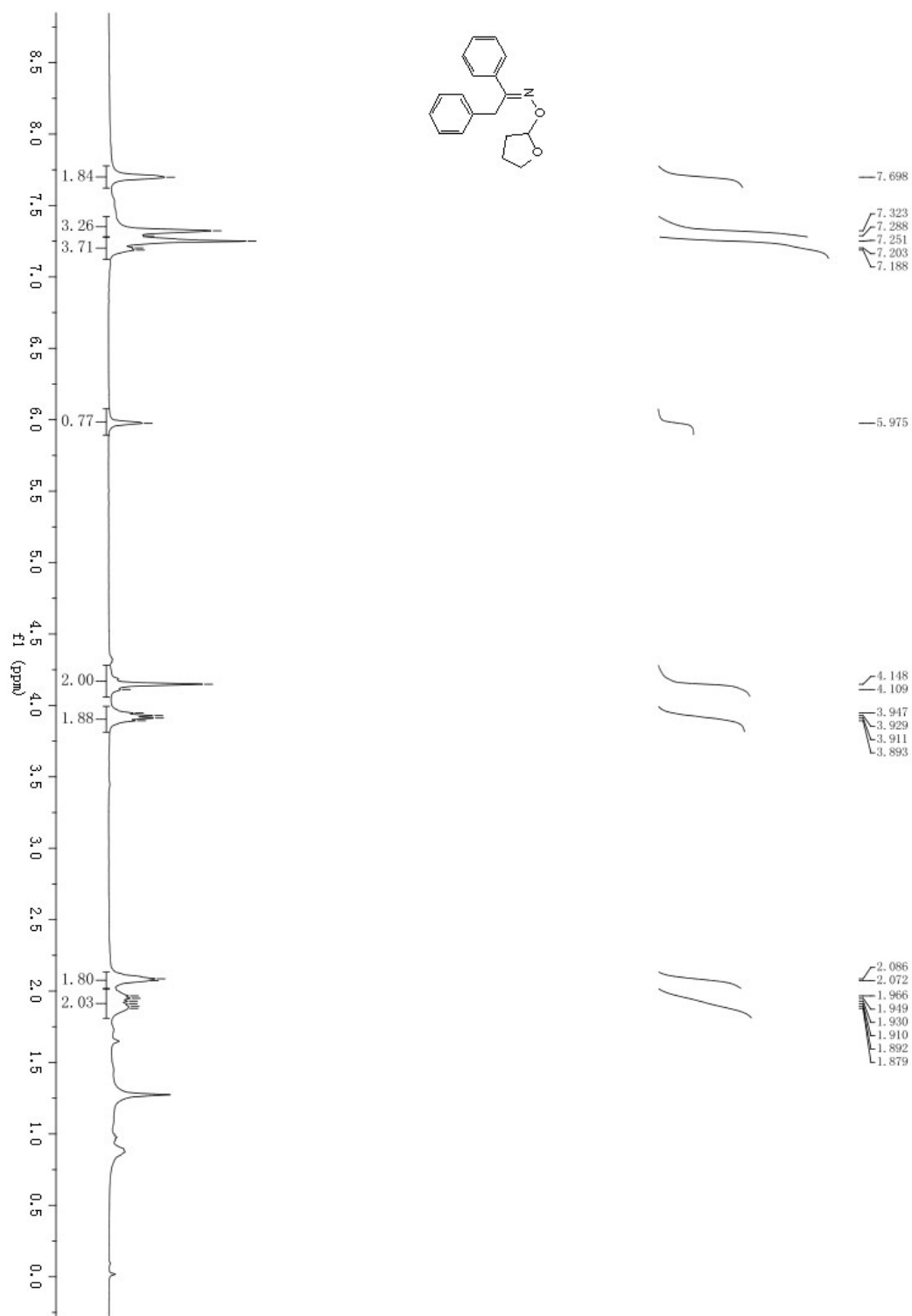


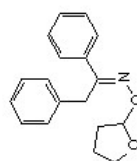
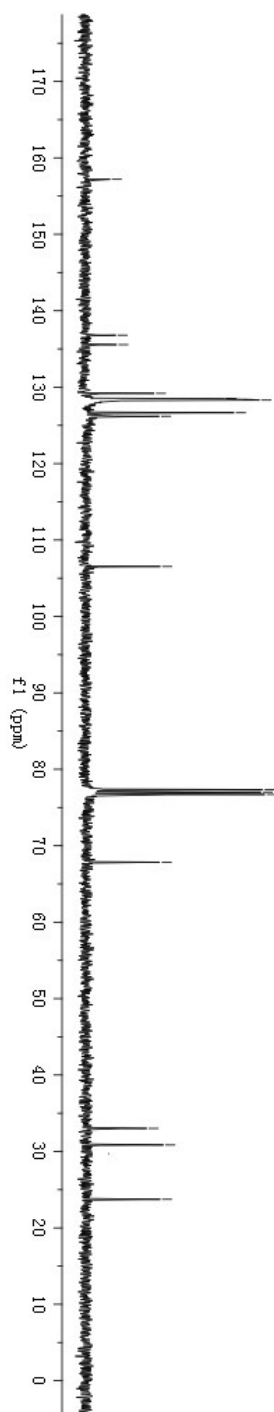












—157.190

—136.805

—135.563

—129.185

—128.496

—128.383

—128.307

—126.653

—126.197

—106.532

—77.347

—77.028

—76.710

—67.854

—33.013

—30.845

—23.732

