Supporting information

Visible-light-mediated selenocyclization of o-vinylanilides with diselenides

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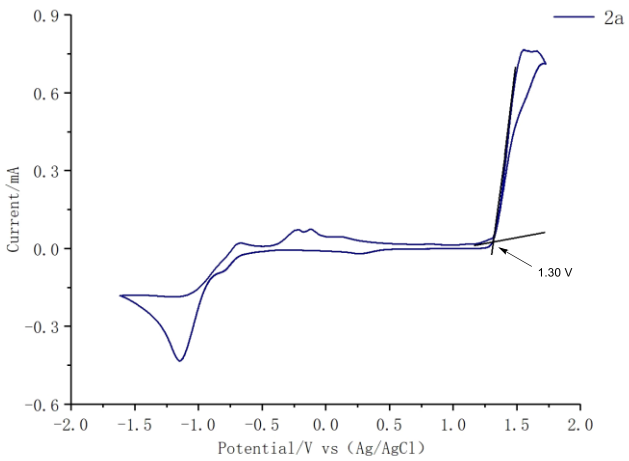
1. General information

All manipulations were carried out under air atmosphere. Commercially available reagents were used as received without purification. Column chromatography was carried out on silica gel (200-300 mesh). Analytical thin–layer chromatography was performed on glass plates of Silica Gel GF–254 with detection by UV. ^{1}H and ^{13}C NMR spectra were recorded on a Bruker advance Ⅲ 400M spectrometer. The chemical shift references were as follows: (^{1}H) $CDCl_3$, 7.26 ppm ($CHCl_3$), (^{13}C) $CDCl_3$, 77.00 ppm ($CDCl_3$). The yield of all compounds was obtained after separation. Cyclic voltammetry experiments were carried out in Chen hua Electrochemical Workstation curves were recorded using a three-electrode scheme. The working electrode was a glassy carbon electrode, a platinum electrode served as counter electrode. Ag/AgCl was used as the reference electrode. UV absorption spectra were measured by Shimadzu UV-3600, Japan.

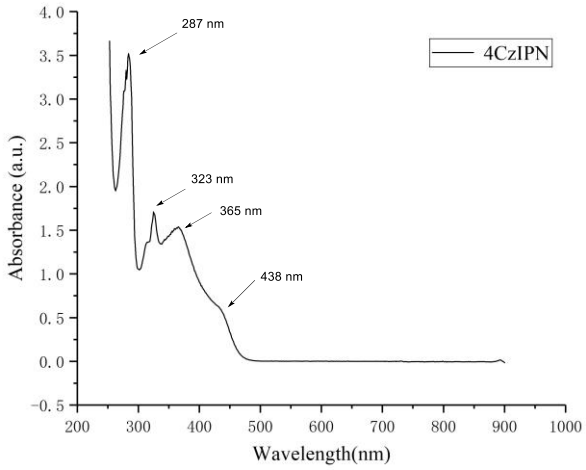
2. General experimental procedure for 3aa

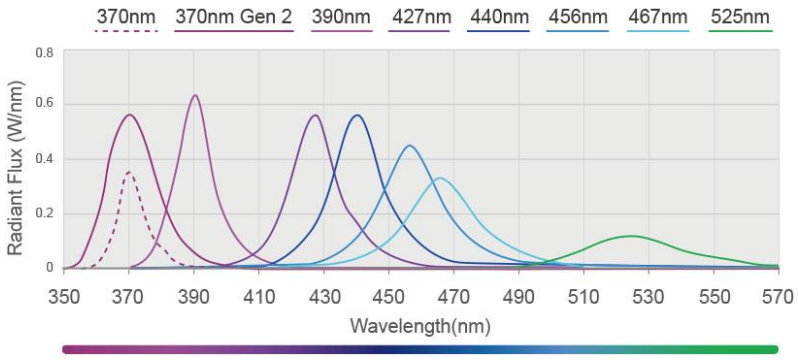
Take a 10 mL quartz tube equipped with a stirrer, weigh 0.2 mmol of **1a** and 0.16 mmol of **2a** with an analytical balance, add 2 mol% of 4CzIPN, and place it under a 40 W blue light source, and react for 4 h. The reaction was monitored by TLC, and at the end of the reaction, the reaction solution was extracted with 30 mL of CH_2Cl_2, and then analyzed by column chromatography using a ratio of petroleum ether: ethyl acetate = 10:1, and finally evaporated to obtain product **3aa.**

3. $E^{ox}_{1/2}$ of 2a



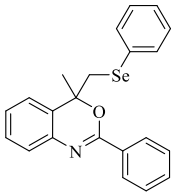
4. Emission spectra of light sources with UV of 4CzIPN



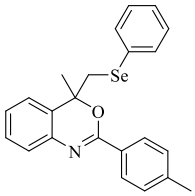


The figure from Company Official Website of Kessil.

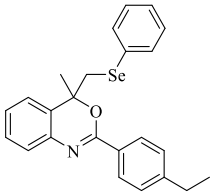
5. Characterization data for 3



4-methyl-2-phenyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3aa) [1]**:** colorless oil, (65.4 mg, 83% yield). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.13 (d, *J* = 8.4 Hz, 2H), 7.50 (t, *J* = 7.2 Hz, 1H), 7.43 (t, *J* = 7.2 Hz, 2H), 7.40 – 7.34 (m, 3H), 7.31 (t, *J* = 7.3 Hz, 1H), 7.20 – 7.10 (m, 5H), 3.58 (d, *J* = 12.8 Hz, 1H), 3.38 (d, *J* = 12.8 Hz, 1H), 1.89 (s, 3H).**^{13}C NMR** (100 MHz, $CDCl_3$) δ 157.5, 139.7, 132.8, 132.5, 131.3, 130.4, 129.1, 128.9, 128.7, 128.1, 128.0, 127.0, 126.5, 125.2, 123.6, 79.9, 39.8, 26.5.

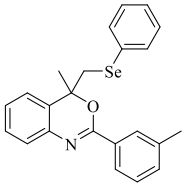


4-methyl-4-((phenylselanyl)methyl)-2-(p-tolyl)-4*H*-benzo[*d*][1,3]oxazine (3ba) [1]**:** colorless oil, (66.8 mg, 82% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.20 – 8.11 (m, 2H), 7.57 – 7.48 (m, 2H), 7.45 (d, *J* = 1.6 Hz, 2H), 7.36 (d, *J* = 8.0 Hz, 2H), 7.32 – 7.22 (m, 5H), 3.71 (d, *J* = 12.7 Hz, 1H), 3.50 (d, *J* = 12.7 Hz, 1H), 2.54 (s, 3H), 2.01 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.7, 142.0, 139.3, 133.1, 131.7, 130.8, 130.1, 129.2, 129.2, 129.1, 128.3, 127.2, 126.6, 125.4, 123.4, 83.2, 39.1, 26.7, 21.3.

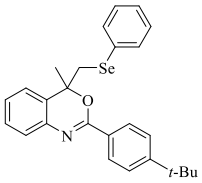


2-(4-ethylphenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ca): colorless oil, (80.8 mg, 96% yield). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.10 (d, *J* = 8.0 Hz, 2H), 7.45 – 7.40 (m, 2H), 7.39 – 7.34 (m, 2H), 7.28 (s, 1H), 7.22-7.13 (m, 5H), 3.61 (d, *J* = 12.8 Hz, 1H), 3.40 (d, *J* = 12.8 Hz, 1H), 2.75 (q, *J* = 7.6 Hz, 2H), 1.91 (s, 3H), 1.31 (t, *J* = 7.6 Hz, 3H).**^{13}C NMR** (100 MHz,

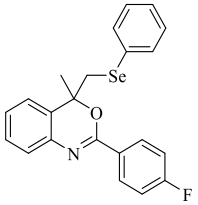
$CDCl_3$) δ 156.0, 147.6, 138.6, 132.5, 131.1, 130.2, 129.7, 128.6, 128.4, 127.8, 127.3, 126.6, 126.0, 124.8, 122.8, 79.4, 39.4, 28.5, 26.0, 15.0. **HRMS** (ESI, m/z) calcd for $C_{24}H_{24}NOSe^+$ $[M+H]^+$ 422.1023, found 422.1028.



4-methyl-4-((phenylselanyl)methyl)-2-(m-tolyl)-4*H*-benzo[*d*][1,3]oxazine (3da) [1]**:** colorless oil, (72.5 mg, 89% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.99 (d, *J* = 12.4 Hz, 2H), 7.44 (d, *J* = 7.7 Hz, 2H), 7.37 (d, *J* = 10.4 Hz, 4H), 7.19 (d, *J* = 7.1 Hz, 5H), 3.63 (d, *J* = 12.8 Hz, 1H), 3.44 (d, *J* = 12.8 Hz, 1H), 2.48 (s, 3H), 1.94 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.1, 138.5, 137.4, 132.5, 132.1, 131.8, 131.1, 130.1, 129.1, 128.6, 128.4, 128.1, 127.7, 126.6, 126.1, 124.8, 122.8, 79.6, 39.4, 26.2, 21.0.

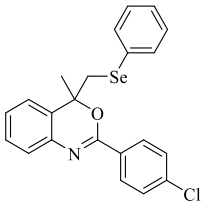


2-(4-(tert-butyl)phenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazi-ne (3ea) [1]**:** colorless oil, (72.9 mg, 81% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.05 (d, *J* = 8.6 Hz, 2H), 7.43 (d, *J* = 7.8 Hz, 2H), 7.37 (d, *J* = 9.4 Hz, 2H), 7.29 (d, *J* = 6.7 Hz, 2H), 7.11 (d, *J* = 5.4 Hz, 5H), 3.56 (d, *J* = 12.7 Hz, 1H), 3.35 (d, *J* = 13.6 Hz, 1H), 1.86 (s, 3H), 1.34 (s, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.9, 155.3, 139.9, 133.1, 131.7, 130.7, 129.3, 129.2, 128.9, 128.2, 127.2, 126.7, 125.4, 125.2, 123.4, 80.3, 40.0, 35.2, 31.4, 26.7.

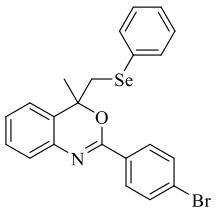


2-(4-fluorophenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3fa) [1]**:** colorless oil, (66.4 mg, 81% yield). **^{1}H NMR** (400

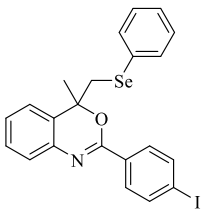
MHz, $CDCl_3$) δ 8.18 (dd, *J* = 8.7, 5.6 Hz, 2H), 7.46 (d, *J* = 7.7 Hz, 2H), 7.38 (d, *J* = 3.4 Hz, 2H), 7.23 (d, *J* = 7.3 Hz, 4H), 7.21 – 7.13 (m, 3H), 3.65 (d, *J* = 12.9 Hz, 1H), 3.43 (d, *J* = 12.9 Hz, 1H), 1.95 (s, 3H). **^{13}C NMR** (100 MHz, CDCl3) δ 164.8 (d, *J* = 251.4 Hz), 155.6, 138.2, 132.8, 131.4, 130.4 (d, *J* = 88.7 Hz), 130.2, 129.0, 129.0, 128.4, 127.0, 126.7, 125.0, 123.1, 115.2 (d, *J* = 22.3 Hz,), 80.4, 39.8, 26.5.



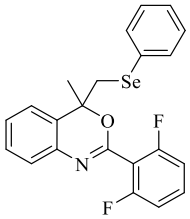
2-(4-chlorophenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ga) [1]: colorless oil, (73.4 mg, 86% yield). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 8.07 – 8.01 (m, 2H), 7.38 (d, *J* = 7.0 Hz, 4H), 7.32 (d, *J* = 3.6 Hz, 2H), 7.21 – 7.10 (m, 5H), 3.57 (d, *J* = 13.1 Hz, 1H), 3.35 (d, *J* = 12.9 Hz, 1H), 1.88 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.4, 138.8, 137.0, 133.0, 131.2, 130.5, 129.5, 129.2, 129.2, 128.9, 128.6, 127.2, 127.0, 125.5, 124.0, 80.4, 40.1, 26.8.



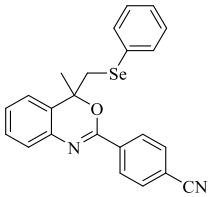
2-(4-bromophenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ha) [1]: colorless oil, (75.2 mg, 80% yield). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.97 (dd, *J* = 8.6, 1.5 Hz, 2H), 7.56 – 7.51 (m, 2H), 7.40 – 7.35 (m, 2H), 7.32 (d, *J* = 3.8 Hz, 2H), 7.22 – 7.11 (m, 5H), 3.56 (d, *J* = 13.1 Hz, 1H), 3.38 – 3.31 (m, 1H), 1.88 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.6, 140.4, 133.1, 131.8, 131.6, 130.6, 129.8, 129.4, 129.3, 129.0, 127.3, 127.1, 126.3, 125.6, 123.4, 80.5, 40.2, 26.9.



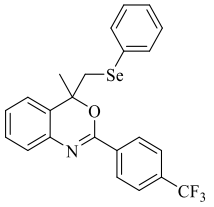
2-(4-iodophenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ia): colorless oil, (98.4 mg, 95% yield). **^{1}H NMR** (400 MHz, Chloroform-*d*) δ 7.86 – 7.75 (m, 4H), 7.39 (d, *J* = 5.6 Hz, 2H), 7.34 (d, *J* = 4.3 Hz, 2H), 7.18 (dt, *J* = 15.8, 5.5 Hz, 5H), 3.58 (d, *J* = 12.6 Hz, 1H), 3.37 (d, *J* = 10.8 Hz, 1H), 1.89 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.8, 138.9, 137.6, 133.1, 132.4, 131.8, 130.6, 129.8, 129.3, 129.1, 127.3, 127.1, 125.6, 123.4, 98.7, 80.5, 40.2, 26.9. **HRMS** (ESI, m/z) calcd for $C_{22}H_{19}INOSe^+$ $[M+H]^+$ 519.9671, found 519.9670.



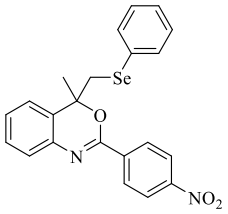
2-(2,6-difluorophenyl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ja): colorless oil, (62.5 mg, 73% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.46 (d, *J* = 9.3 Hz, 3H), 7.39 (d, *J* = 6.1 Hz, 2H), 7.29 (d, *J* = 7.6 Hz, 1H), 7.23 (d, *J* = 11.7 Hz, 4H), 7.09 – 7.03 (m, 2H), 3.67 (d, *J* = 12.9 Hz, 1H), 3.61 (d, *J* = 13.0 Hz, 1H), 1.97 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 161.0 (q, *J* = 6.2 Hz), 150.6, 137.5, 132.9, 131.7 (t, *J* = 20.5 Hz), 130.4, 129.1, 128.9, 127.9, 127.5, 127.0, 125.1, 123.6, 112.3 (t, *J* = 18.2 Hz), 111.8 (q, *J* = 5.5 Hz), 82.0, 39.4, 26.9. **HRMS** (ESI, m/z) calcd for $C_{22}H_{18}FNOSe^+$ $[M+H]^+$ 430.0516, found 430.0520.



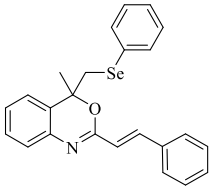
4-(4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazin-2-yl)benzonitrile (3ka): colorless oil, (63.4 mg, 76% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.10 (d, *J* = 8.4 Hz, 2H), 7.61 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 11.0 Hz, 4H), 7.17 (s, 1H), 7.11 – 7.03 (m, 4H), 3.51 (d, *J* = 13.1 Hz, 1H), 3.30 (d, *J* = 13.1 Hz, 1H), 1.84 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 153.8, 137.8, 136.3, 132.4, 131.5, 129.8, 128.8, 128.6, 128.3, 127.9, 127.1, 126.7, 125.3, 122.8, 118.2, 113.9, 80.3, 39.7, 26.5. **HRMS** (ESI, m/z) calcd for $C_{23}H_{19}N_2OSe^+$ $[M+H]^+$ 419.0632, found 419.0639.



4-methyl-4-((phenylselanyl)methyl)-2-(4-(trifluoromethyl)phenyl)-4*H*-benzo[*d*] [1,3]oxazine (3la) [1]: colorless oil, (68.3 mg, 74% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.12 (d, *J* = 8.1 Hz, 2H), 7.58 (d, *J* = 8.3 Hz, 2H), 7.34 – 7.25 (m, 4H), 7.16 – 7.11 (m, 1H), 7.10 – 7.02 (m, 4H), 3.51 (d, *J* = 13.0 Hz, 1H), 3.29 (d, *J* = 13.0 Hz, 1H), 1.83 (s, 3H).**^{13}C NMR** (100 MHz, $CDCl_3$) δ 154.7, 137.7, 132.5, 132.4 (q, *J* = 77.3 Hz), 132.2, 131.1, 129.8, 128.8, 128.7, 128.2, 127.9, 127.0, 126.7, 125.0 (q, *J* = 12.7 Hz), 124.7 (q, *J* = 271.5 Hz), 122.8, 80.4, 39.7, 26.4. 】

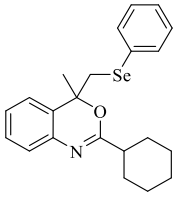


4-methyl-2-(4-nitrophenyl)-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ma): yellow oil, (65.6 mg, 75% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.29 (s, 4H), 7.47 – 7.40 (m, 4H), 7.30 (d, *J* = 8.3 Hz, 1H), 7.21 (dd, *J* = 13.1, 6.4 Hz, 4H), 3.65 (d, *J* = 13.1 Hz, 1H), 3.44 (d, *J* = 13.1 Hz, 1H), 1.98 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 154.1, 149.4, 138.4, 138.2, 132.8, 132.8, 130.2, 129.3, 129.1, 128.8, 128.8, 127.7, 127.2, 125.9, 123.3, 85.0, 43.0, 28.0. **HRMS** (ESI, m/z) calcd for $C_{22}H_{19}N_2O_3Se^+$ $[M+H]^+$ 439.0555, found 439.0559.

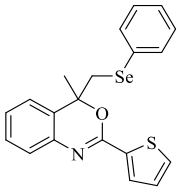


4-methyl-4-((phenylselanyl)methyl)-2-styryl-4*H*-benzo[*d*][1,3]oxazine (3na): colorless oil, (50.2 mg, 60% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.53 (d, *J* = 7.8 Hz, 2H), 7.44 (s, 3H), 7.41 (s, 3H), 7.27 (d, *J* = 6.3 Hz, 2H), 7.20 – 7.13 (m, 5H), 6.66 (s, 1H), 3.57 (d, *J* = 12.9 Hz, 1H), 3.36 (d, *J* = 13.0 Hz, 1H), 1.89 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 157.0, 139.3, 135.7, 133.2, 130.7, 129.8, 129.6, 129.3, 129.3,

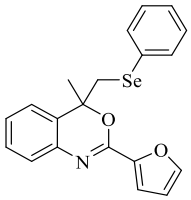
129.2, 129.0, 127.9, 127.3, 126.9, 125.3, 123.5, 122.1, 80.0, 40.0, 26.8. **HRMS** (ESI, m/z) calcd for $C_{24}H_{22}NOSe^+$ $[M+H]^+$ 420.0861, found 420.0865.



2-cyclohexyl-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3oa): white oil, (62.1 mg, 78% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.39 – 7.34 (m, 2H), 7.22 (s, 1H), 7.20 – 7.13 (m, 4H), 7.10 – 7.01 (m, 2H), 3.45 (d, *J* = 12.7 Hz, 1H), 3.28 (d, *J* = 12.7 Hz, 1H), 2.20 (s, 1H), 1.95 – 1.88 (m, 2H), 1.77 (s, 2H), 1.73 (s, 3H), 1.70 – 1.63 (m, 1H), 1.53 – 1.41 (m, 2H), 1.26 (d, *J* = 2.1 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 165.5, 138.7, 133.1, 131.0, 129.3, 129.1, 128.5, 127.2, 126.4, 124.8, 123.4, 79.5, 44.1, 40.1, 29.9, 29.8, 27.0, 26.1. **HRMS** (ESI, m/z) calcd for $C_{22}H_{26}NOSe^+$ $[M+H]^+$ 400.1174, found 400.1172.

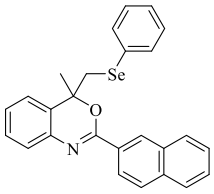


4-methyl-4-((phenylselanyl)methyl)-2-(thiophen-2-yl)-4*H*-benzo[*d*][1,3]oxazine (3pa) [1]: yellow oil, (76.8 mg, 96% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 3.7 Hz, 1H), 7.43 (d, *J* = 6.3 Hz, 1H), 7.36 (d, *J* = 7.6 Hz, 2H), 7.25 (s, 2H), 7.15 – 7.06 (m, 5H), 7.06 – 7.02 (m, 1H), 3.54 (d, *J* = 12.9 Hz, 1H), 3.32 (d, *J* = 12.8 Hz, 1H), 1.84 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 152.5, 138.4, 136.6, 132.9, 132.5, 130.1, 129.9, 129.7, 128.6, 128.3, 127.3, 126.6, 126.0, 124.7, 122.8, 80.1, 39.3, 26.0.

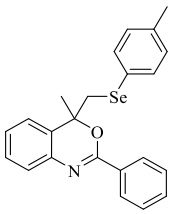


2-(furan-2-yl)-4-methyl-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3qa): colorless oil, (68.0 mg, 89% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.67 (s,

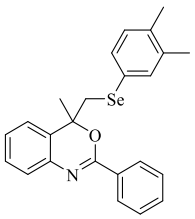
1H), 7.50 – 7.43 (m, 3H), 7.37 (d, *J* = 7.8 Hz, 1H), 7.27 – 7.21 (m, 4H), 7.19 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.14 (d, *J* = 3.5 Hz, 1H), 6.58 (dd, *J* = 3.5, 1.7 Hz, 1H), 3.63 (d, *J* = 12.9 Hz, 1H), 3.42 (d, *J* = 12.9 Hz, 1H), 1.95 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 149.0, 145.8, 145.3, 137.5, 132.4, 129.9, 128.7, 128.6, 128.2, 126.6, 126.3, 124.8, 122.8, 114.9, 111.4, 80.1, 39.1, 26.0. **HRMS** (ESI, m/z) calcd for $C_{20}H_{18}NO_2Se^+$ $[M+H]^+$ 384.0497, found 384.0498.



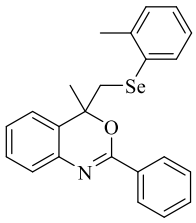
4-methyl-2-(naphthalen-2-yl)-4-((phenylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ra): white oil, (84.0 mg, 95% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.61 (s, 1H), 8.27 (d, *J* = 8.7 Hz, 1H), 7.95 (d, *J* = 7.7 Hz, 1H), 7.90 – 7.83 (m, 2H), 7.54 (s, 2H), 7.43 (s, 1H), 7.42 – 7.31 (m, 3H), 7.17 (d, *J* = 11.3 Hz, 2H), 7.08 (s, 3H), 3.60 (s, 1H), 3.42 (d, *J* = 14.5 Hz, 1H), 1.95 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.7, 138.9, 134.6, 132.5, 132.3, 130.0, 129.1, 128.8, 128.7, 128.6, 128.4, 128.3, 127.5, 127.3, 127.2, 126.6, 126.4, 126.0, 124.8, 124.2, 122.8, 80.1, 39.5, 26.3. **HRMS** (ESI, m/z) calcd for $C_{26}H_{22}NOSe^+$ $[M+H]^+$ 444.0861, found 444.0866.



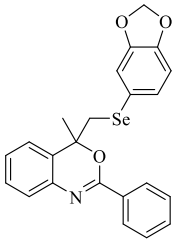
4-methyl-2-phenyl-4-((p-tolylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ab) [1]: colorless oil, (60.2 mg, 74% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.17 (d, *J* = 7.1 Hz, 2H), 7.55 – 7.45 (m, 3H), 7.39 – 7.33 (m, 4H), 7.21 (s, 2H), 7.00 (d, *J* = 7.8 Hz, 2H), 3.60 (d, *J* = 12.9 Hz, 1H), 3.38 (d, *J* = 12.8 Hz, 1H), 2.31 (s, 3H), 1.93 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.9, 138.5, 136.7, 133.0, 132.2, 130.9, 129.5, 128.6, 128.5, 127.8, 127.7, 126.3, 126.2, 124.9, 122.8, 79.7, 39.9, 26.2, 20.7.



4-(((3,4-dimethylphenyl)selanyl)methyl)-4-methyl-2-phenyl-4*H*-benzo[*d*][1,3]oxazi-ne (3ac): colorless oil, (75.7 mg, 90% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.20 (d, *J* = 7.0 Hz, 2H), 7.56 (t, *J* = 7.3 Hz, 1H), 7.49 (t, *J* = 7.4 Hz, 2H), 7.43 – 7.39 (m, 2H), 7.27 – 7.21 (m, 4H), 6.98 (d, *J* = 7.5 Hz, 1H), 3.62 (d, *J* = 12.9 Hz, 1H), 3.41 (d, *J* = 12.8 Hz, 1H), 2.24 (s, 3H), 2.18 (s, 3H), 1.96 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.5, 139.2, 137.7, 136.1, 134.9, 133.7, 132.8, 131.5, 131.1, 130.5, 129.2, 128.3, 128.3, 127.1, 126.8, 125.5, 123.5, 80.4, 40.6, 26.9, 19.8, 19.6. **HRMS** (ESI, m/z) calcd for $C_{24}H_{24}NOSe^+$ $[M+H]^+$ 422.1018, found 422.1017.

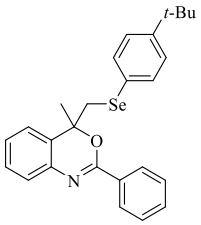


4-methyl-2-phenyl-4-((o-tolylselanyl)methyl)-4*H*-benzo[*d*][1,3]oxazine (3ad): colorless oil, (57.9 mg, 71% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.11 (d, *J* = 6.9 Hz, 2H), 7.44 (d, *J* = 7.2 Hz, 1H), 7.39 (t, *J* = 7.2 Hz, 2H), 7.33 – 7.28 (m, 3H), 7.13 (d, *J* = 9.7 Hz, 2H), 7.05 (d, *J* = 6.6 Hz, 2H), 6.97 – 6.92 (m, 1H), 3.52 (d, *J* = 12.6 Hz, 1H), 3.30 (d, *J* = 12.5 Hz, 1H), 2.33 (s, 3H), 1.86 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.9, 139.3, 138.4, 132.3, 132.2, 131.0, 131.0, 129.5, 128.6, 128.5, 127.8, 127.7, 126.8, 126.2, 126.1, 124.9, 122.7, 79.6, 38.6, 26.3, 22.2. **HRMS** (ESI, m/z) calcd for $C_{23}H_{22}NOSe^+$ $[M+H]^+$ 408.0862, found 408.0864.

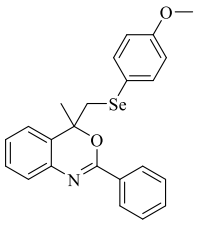


4-((benzo[d][1,3]dioxol-5-ylselanyl)methyl)-4-methyl-2-phenyl-4*H*-

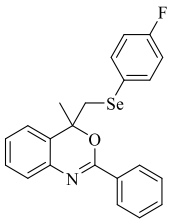
benzo[*d*][1,3]oxa-zine (3ae): white oil, (76.1 mg, 87% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.09 (d, *J* = 7.0 Hz, 2H), 7.47 – 7.36 (m, 3H), 7.30 (s, 2H), 7.17 – 7.07 (m, 2H), 6.89 – 6.79 (m, 2H), 6.53 (d, *J* = 8.0 Hz, 1H), 5.85 – 5.79 (m, 2H), 3.47 (d, *J* = 12.9 Hz, 1H), 3.26 (d, *J* = 12.9 Hz, 1H), 1.83 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.8, 147.4, 147.0, 138.5, 132.1, 130.9, 128.6, 128.3, 127.7, 127.6, 127.4, 126.1, 124.9, 122.8, 121.0, 114.0, 108.5, 100.7, 79.7, 40.7, 26.3. **HRMS** (ESI, m/z) calcd for $C_{23}H_{20}NO_3Se^+$ $[M+H]^+$ 438.0603, found 438.0602.



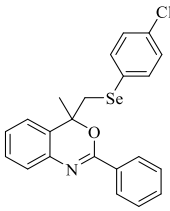
4-(((4-(tert-butyl)phenyl)selanyl)methyl)-4-methyl-2-phenyl-4*H*-benzo[*d*][1,3] oxazi-ne (3af) [1]: colorless oil, (65.7 mg, 73% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.14 (d, *J* = 7.0 Hz, 2H), 7.49 – 7.40 (m, 3H), 7.32 (d, *J* = 8.4 Hz, 4H), 7.15 (d, *J* = 8.2 Hz, 4H), 3.55 (d, *J* = 12.7 Hz, 1H), 3.35 (d, *J* = 12.7 Hz, 1H), 1.88 (s, 3H), 1.25 (s, 9H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 155.9, 149.9, 138.5, 132.6, 132.3, 130.9, 128.6, 128.5, 127.8, 127.7, 126.4, 126.2, 125.7, 124.9, 122.8, 79.7, 39.7, 34.1, 30.8, 26.2.



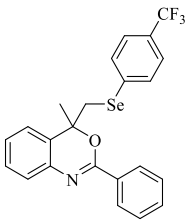
4-(((4-methoxyphenyl)selanyl)methyl)-4-methyl-2-phenyl-4*H*-benzo[*d*][1,3]oxazine (3ag) [1]: colorless oil, (70.0 mg, 83% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.11 (d, *J* = 8.2 Hz, 2H), 7.45 (d, *J* = 7.3 Hz, 1H), 7.39 (d, *J* = 7.0 Hz, 2H), 7.37 – 7.27 (m, 4H), 7.12 (d, *J* = 19.4 Hz, 2H), 6.63 (d, *J* = 5.4 Hz, 2H), 3.69 (s, 3H), 3.47 (d, *J* = 12.9 Hz, 1H), 3.26 (d, *J* = 11.7 Hz, 1H), 1.84 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 159.5, 156.7, 138.8, 135.9, 132.6, 131.6, 129.2, 129.0, 128.4, 128.3, 126.9, 125.4, 123.4, 120.6, 114.9, 80.6, 55.4, 41.3, 26.9.



4-(((4-fluorophenyl)selanyl)methyl)-4-methyl-2-phenyl-4*H*-benzo[*d*][1,3]oxazine (3ah) [1]: colorless oil, (58.3 mg, 71% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.02 (d, *J* = 8.2 Hz, 2H), 7.39 (d, *J* = 7.9 Hz, 1H), 7.34 (d, *J* = 7.5 Hz, 2H), 7.27 – 7.20 (m, 4H), 7.07 (s, 1H), 7.02 (s, 1H), 6.70 (t, *J* = 8.6 Hz, 2H), 3.43 (d, *J* = 12.9 Hz, 1H), 3.24 (d, *J* = 13.0 Hz, 1H), 1.78 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 162.2 (d, *J* = 246.8 Hz), 156.3, 138.7, 135.4(d, *J* = 78.9 Hz), 132.3, 131.4, 129.0, 128.5, 128.1, 127.9, 126.6, 125.2, 124.7 (d, *J* = 3.3 Hz), 123.1, 116.0 (d, *J* = 21.2 Hz), 80.1, 40.8, 26.7.

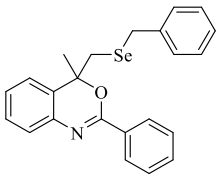


4-(((4-chlorophenyl)selanyl)methyl)-4-methyl-2-phenyl-4*H*-benzo[*d*][1,3]oxazine (3ai) [1]: colorless oil, (64.9 mg, 76% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.08 (d, *J* = 7.0 Hz, 2H), 7.51 – 7.46 (m, 1H), 7.42 (t, *J* = 7.5 Hz, 2H), 7.32 (d, *J* = 4.5 Hz, 2H), 7.28 – 7.25 (m, 2H), 7.17 (t, *J* = 8.1 Hz, 1H), 7.11 (d, *J* = 6.4 Hz, 1H), 7.05 (d, *J* = 8.4 Hz, 2H), 3.54 (d, *J* = 12.9 Hz, 1H), 3.34 (d, *J* = 13.0 Hz, 1H), 1.88 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.6, 138.8, 134.5, 133.5, 132.4, 131.8, 129.4, 129.3, 128.7, 128.7, 128.5, 128.2, 127.0, 125.4, 123.4, 80.5, 40.6, 27.0.

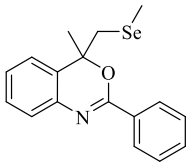


4-methyl-2-phenyl-4-(((4-(trifluoromethyl)phenyl)selanyl)methyl)-4*H*-benzo[*d*][1,3]-oxazine (3aj) [1]: red oil, (29.3 mg, 32% yield). **^{1}H NMR** (400 MHz,

$CDCl_3$) δ 8.03 (d, *J* = 8.5 Hz, 2H), 7.43 (d, *J* = 6.7 Hz, 1H), 7.37 (d, *J* = 8.4 Hz, 4H), 7.31 – 7.24 (m, 4H), 7.10 (d, *J* = 9.8 Hz, 2H), 3.55 (d, *J* = 13.1 Hz, 1H), 3.38 (d, *J* = 13.0 Hz, 1H), 1.86 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.3, 139.1, 135.8, 132.5, 132.1, 131.7, 129.4, 128.9 (q, *J* = 52.6 Hz), 128.6, 128.4, 128.1, 126.9,126.3 (q, *J* = 417.6 Hz) 125.8 (q, *J* = 3.7 Hz), 125.6, 123.4,, 80.1, 39.7, 26.5.



4-((benzylselanyl)methyl)-4-methyl-2-phenyl-4*H*-benzo[*d*][1,3]oxazine (3ak): colorless oil, (63.4 mg, 78% yield). **^{1}H NMR** δ 8.10 (d, *J* = 6.7 Hz, 2H), 7.41 – 7.33 (m, 3H), 7.25 (d, *J* = 2.4 Hz, 2H), 7.13 (d, *J* = 7.6 Hz, 3H), 7.04 (t, *J* = 6.6 Hz, 4H), 3.40 (d, *J* = 1.9 Hz, 2H), 2.97 (d, *J* = 13.1 Hz, 1H), 2.85 (d, *J* = 13.1 Hz, 1H), 1.72 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.4, 139.0, 138.6, 132.6, 131.4, 128.9, 128.9, 128.4, 128.2, 128.0, 127.0, 126.7, 126.5, 125.1, 123.3, 80.2, 34.7, 28.6, 26.2. **HRMS** (ESI, m/z) calcd for $C_{23}H_{22}NOSe^+$ $[M+H]^+$ 408.0861,found 408.0863.



4-methyl-4-((methylselanyl)methyl)-2-phenyl-4*H*-benzo[*d*][1,3]oxazine (3al)[2]: colorless oil, (64.7 mg, 98% yield). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.15 (d, *J* = 6.6 Hz, 2H), 7.43 (dt, *J* = 14.4, 6.9 Hz, 3H), 7.28 (d, *J* = 4.0 Hz, 2H), 7.17 (t, *J* = 3.5 Hz, 2H), 3.08 (d, *J* = 13.1 Hz, 1H), 2.96 (d, *J* = 13.1 Hz, 1H), 1.84 (s, 3H), 1.74 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 156.0, 138.6, 132.4, 131.0, 128.6, 128.6, 127.9, 127.6, 126.2, 124.8, 123.0, 80.0, 36.7, 25.9, 6.1.

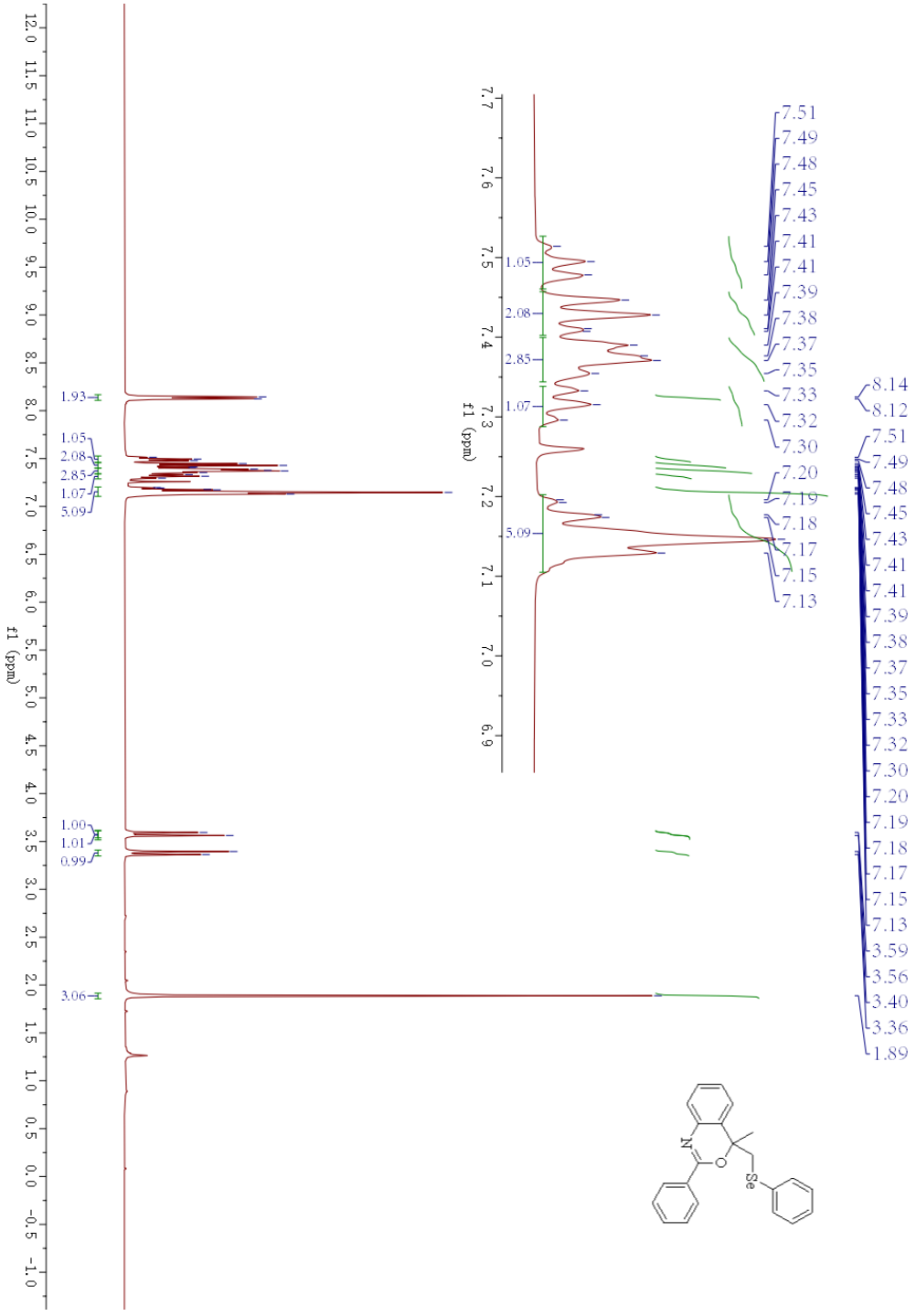
Reference

1. Y. T. Hong, J. Park, H. Y. Kim and K. Oh, Visible Light-Induced Redox-Neutral Selenocyclization of ortho-Vinylanilides: Oxygen-Controlled Synthesis of 4H-3,1-Benzoxazines, *Adv. Syn. Catal.*, 2024, **366**, 1212-1217.

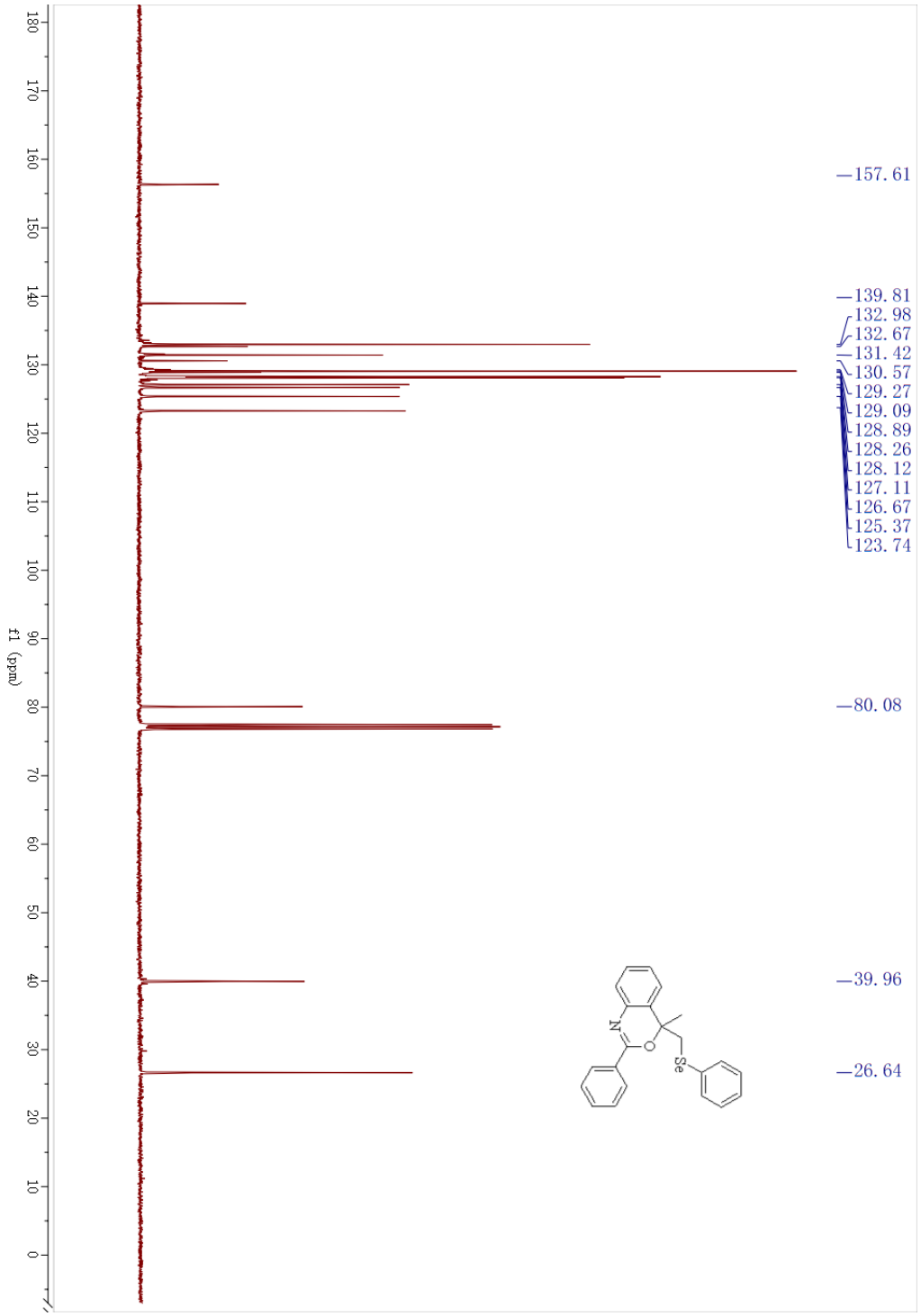
2. F. Lu, J. Xu, H. Li, K. Wang, D. Ouyang, L. Sun, M. Huang, J. Jiang, J. Hu, H. Alhumade, L. Lu and A. Lei, Electrochemical oxidative radical cascade cyclization of olefinic amides and thiophenols towards the synthesis of sulfurated benzoxazines, oxazolines and iminoisobenzofurans, *Green. Chem.*, 2021, **23**, 7982-7986.

6. ^{1}H NMR and ^{13}C NMR spectra of 3

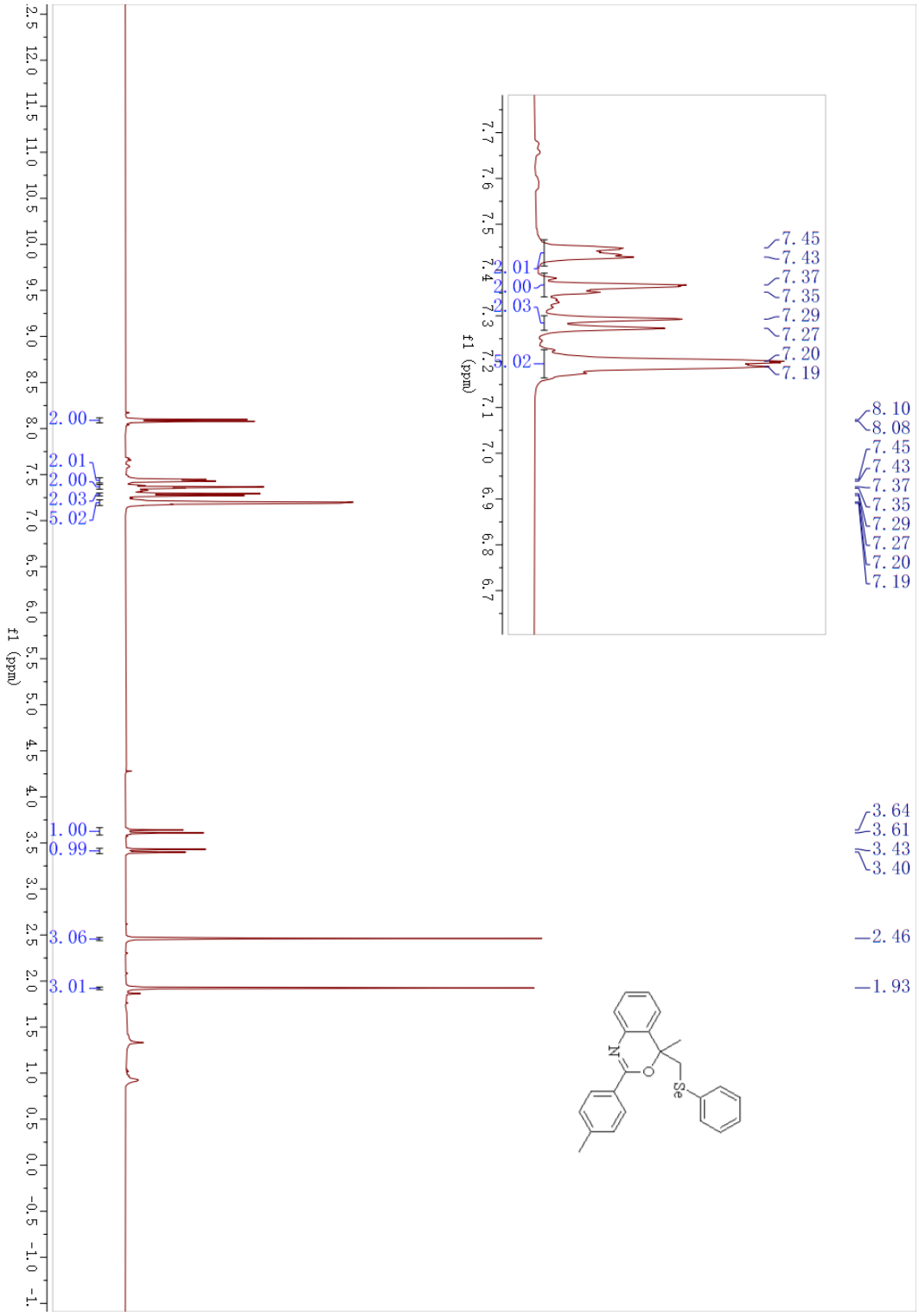
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3aa**



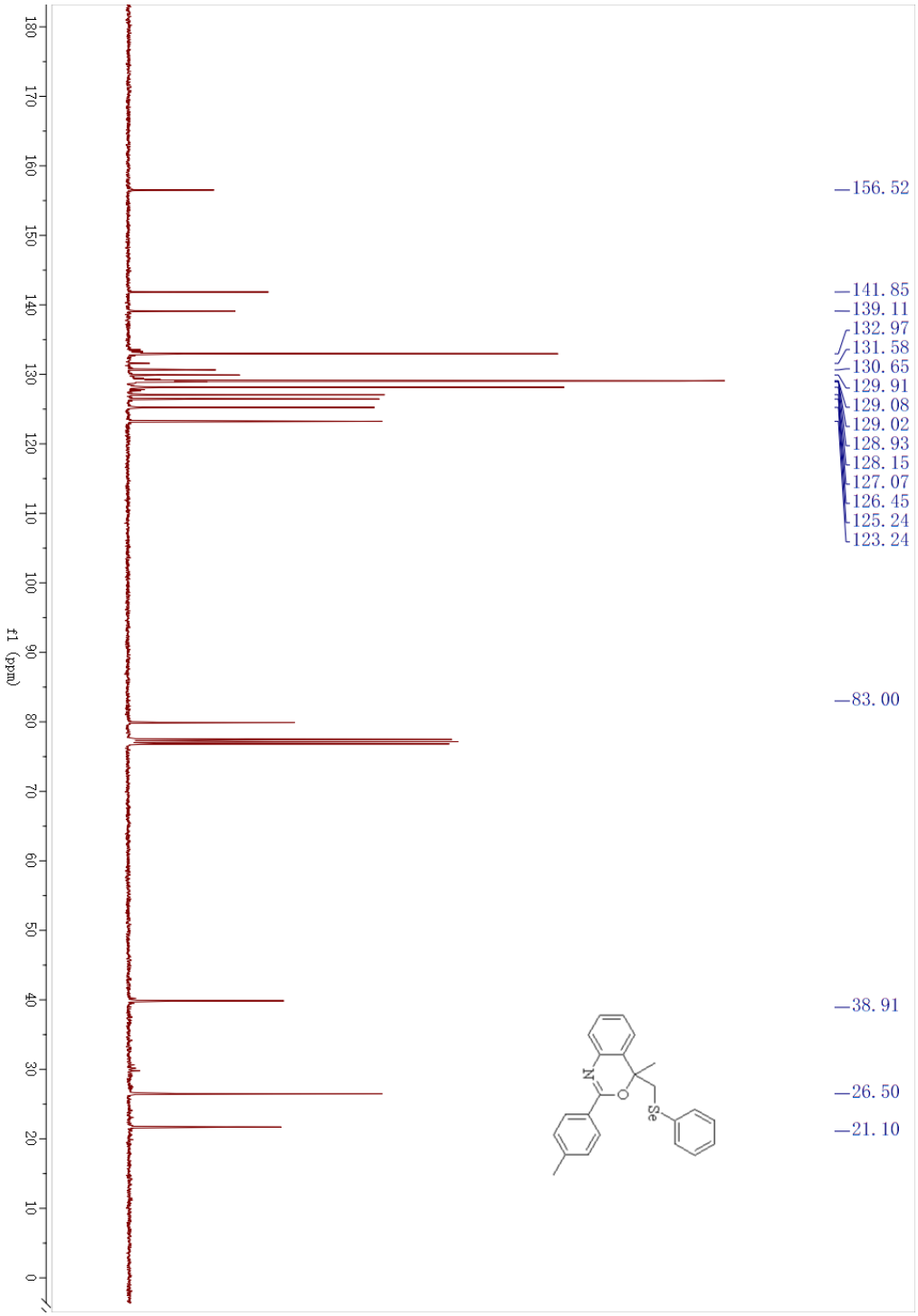
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3aa**



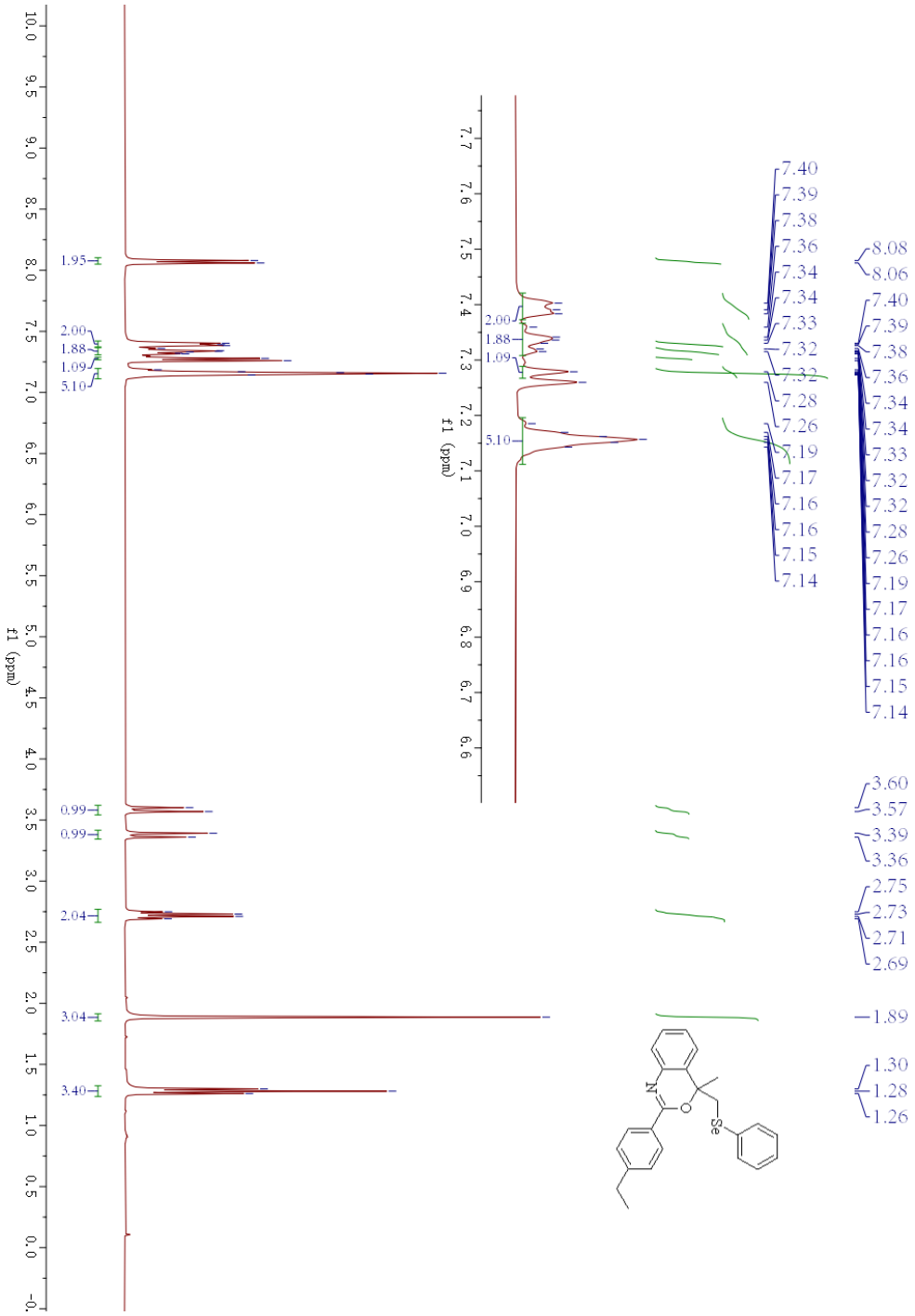
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ba**



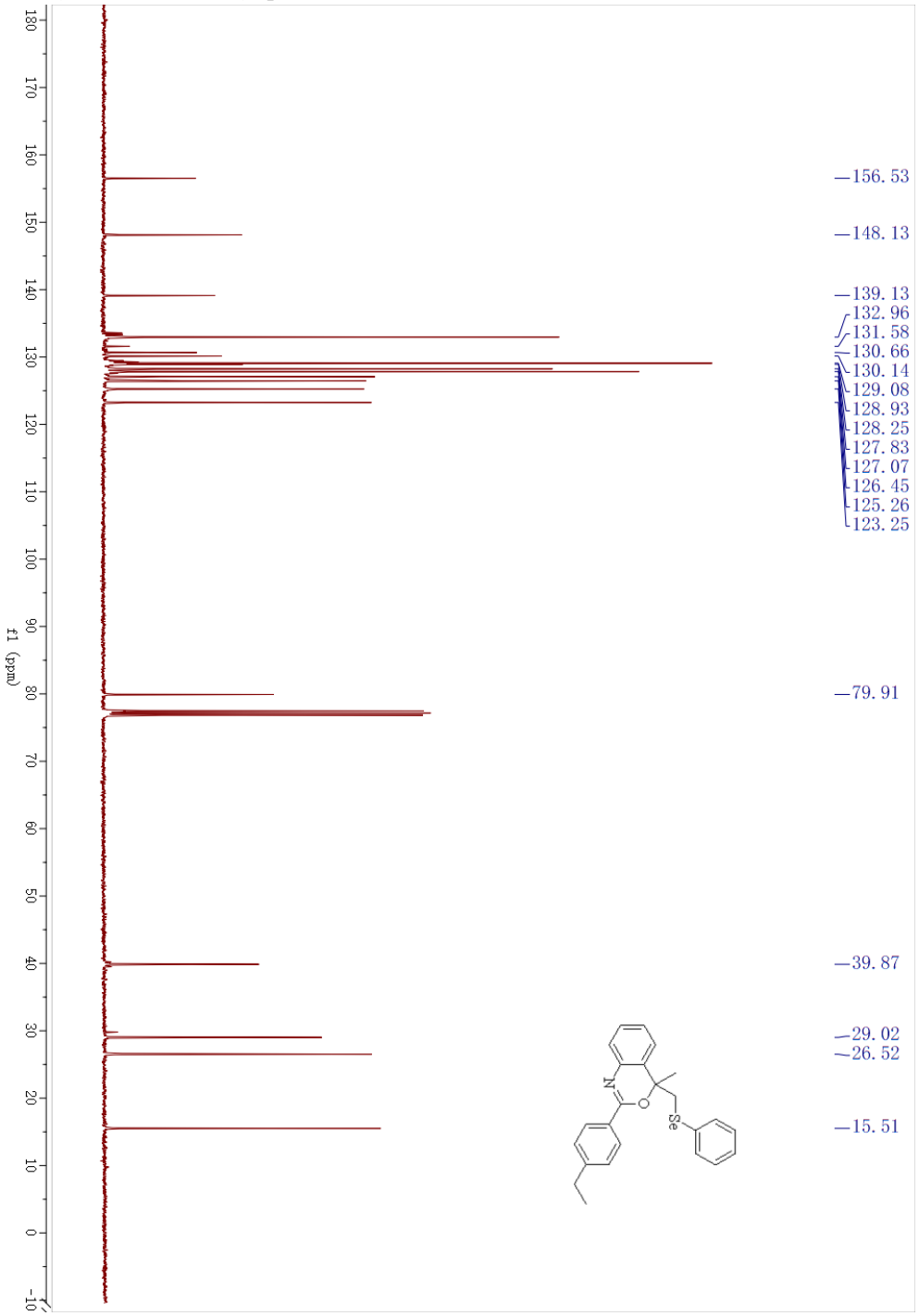
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ba**



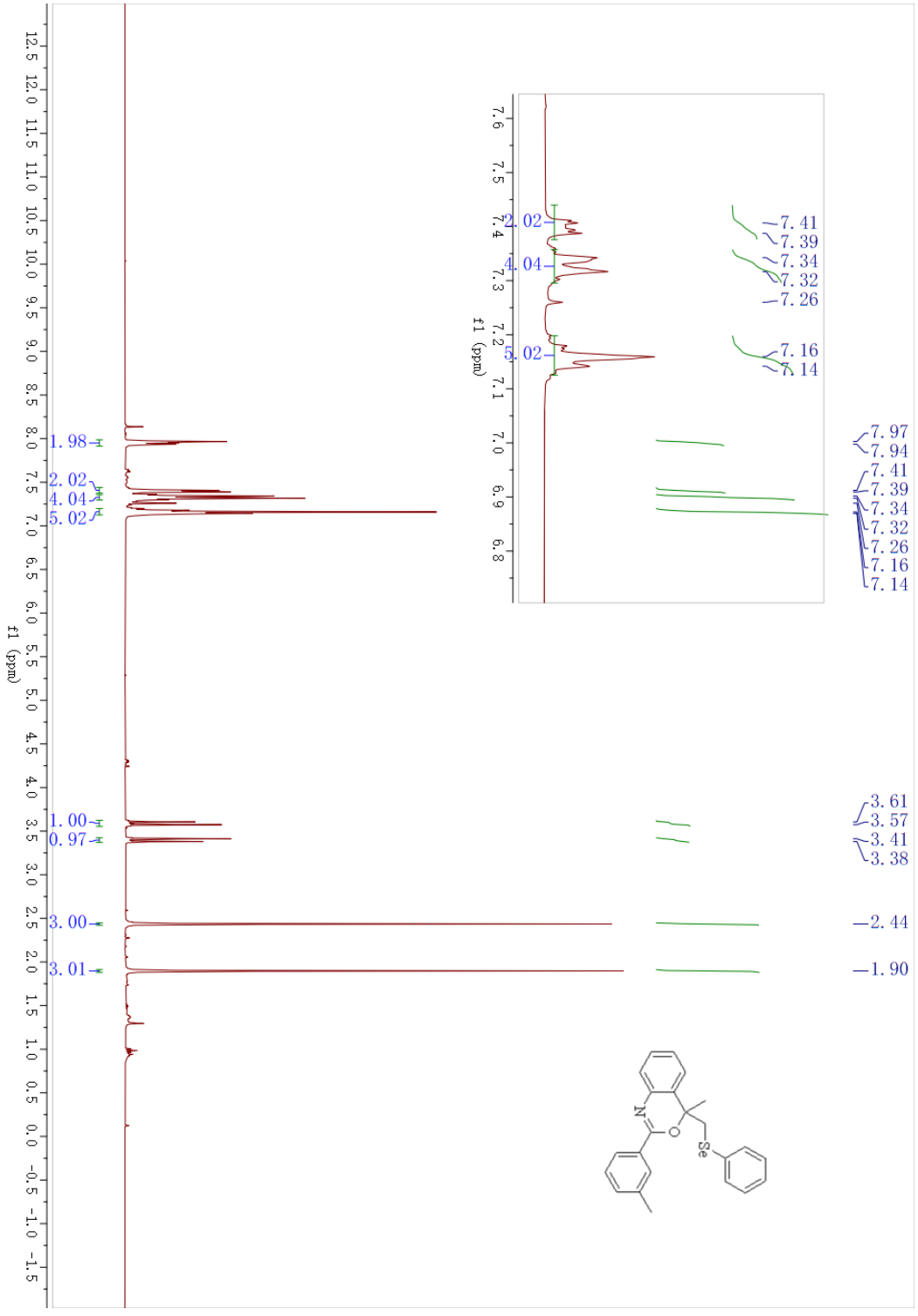
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ca**



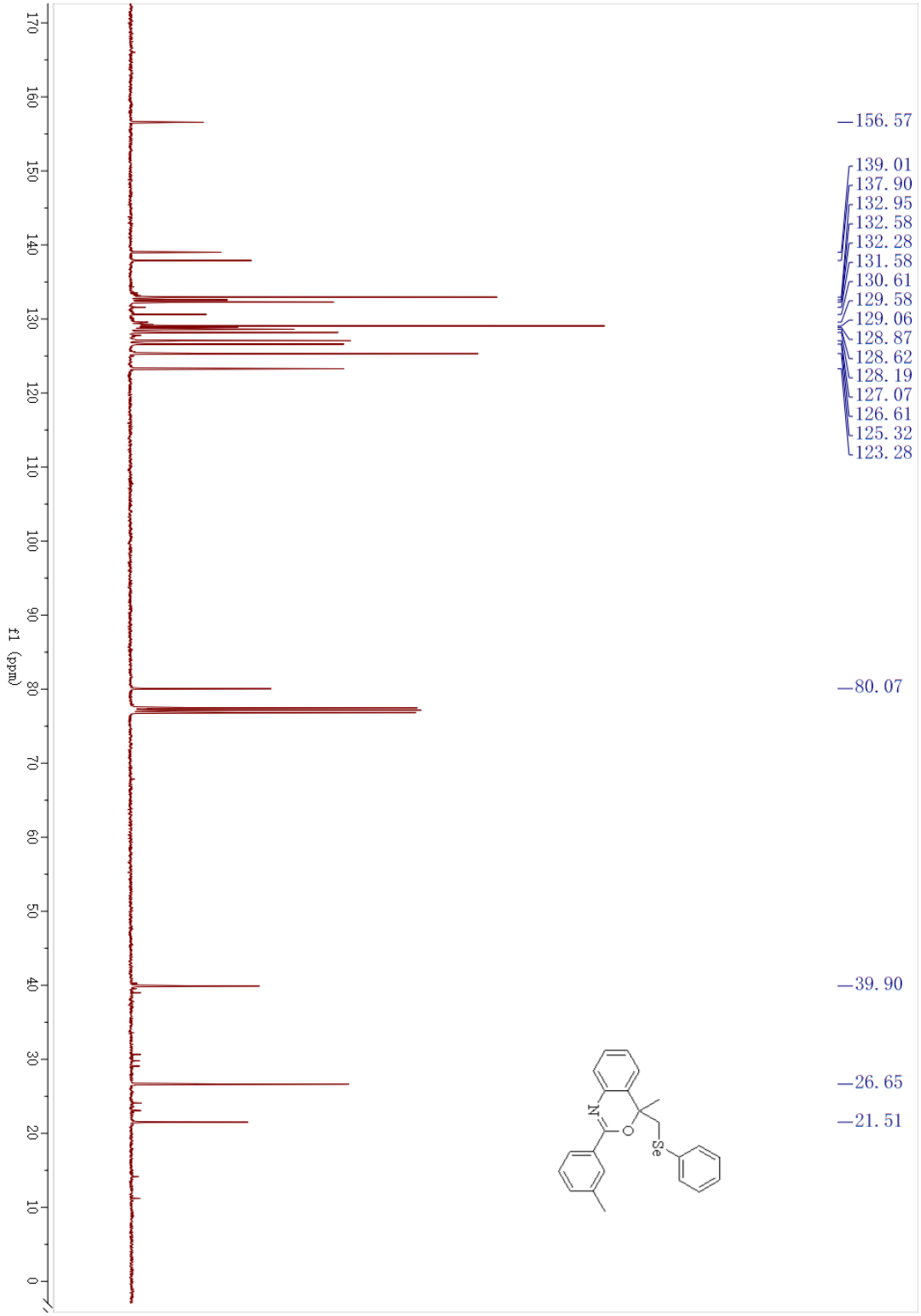
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ca**



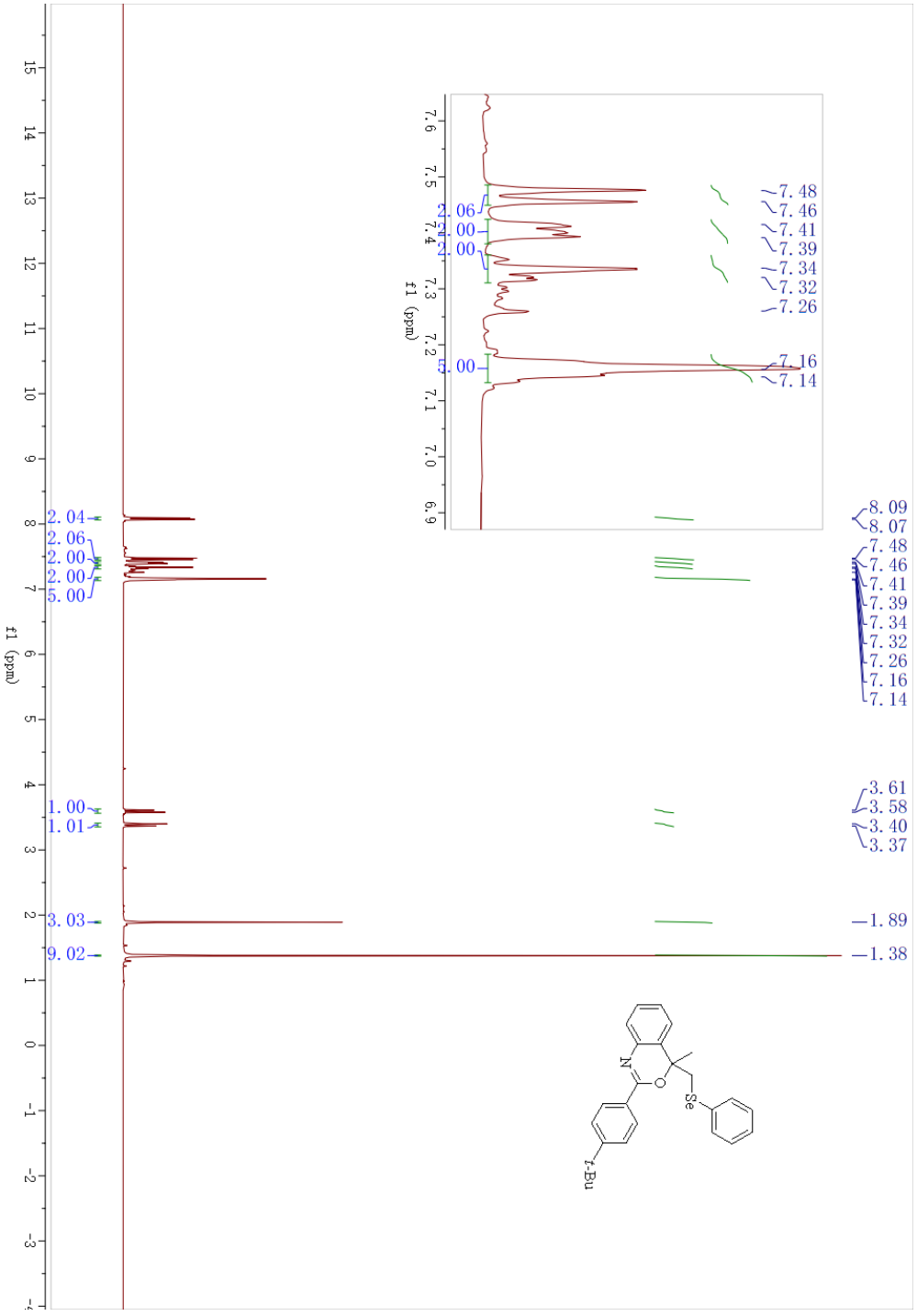
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3da**



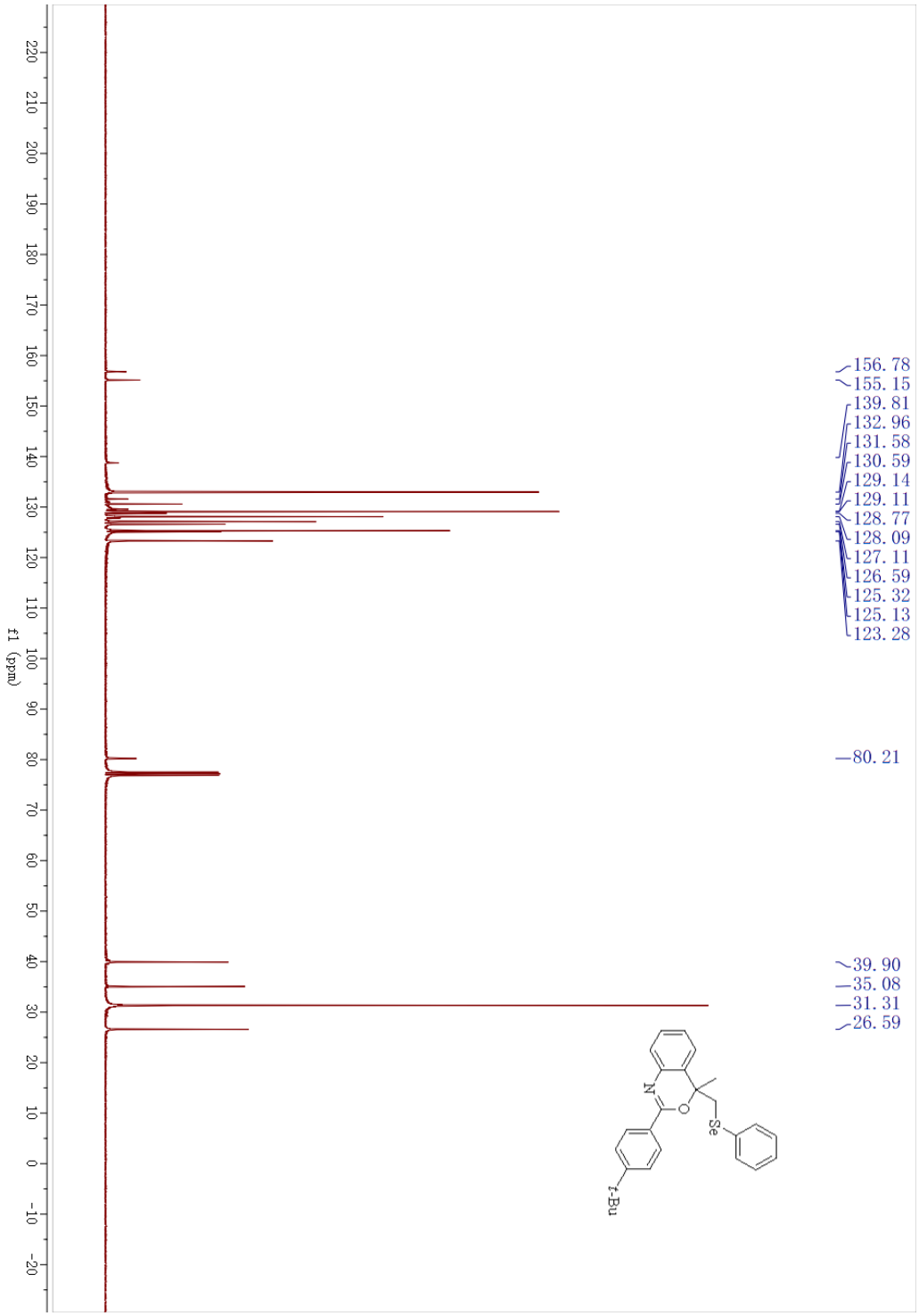
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3da**



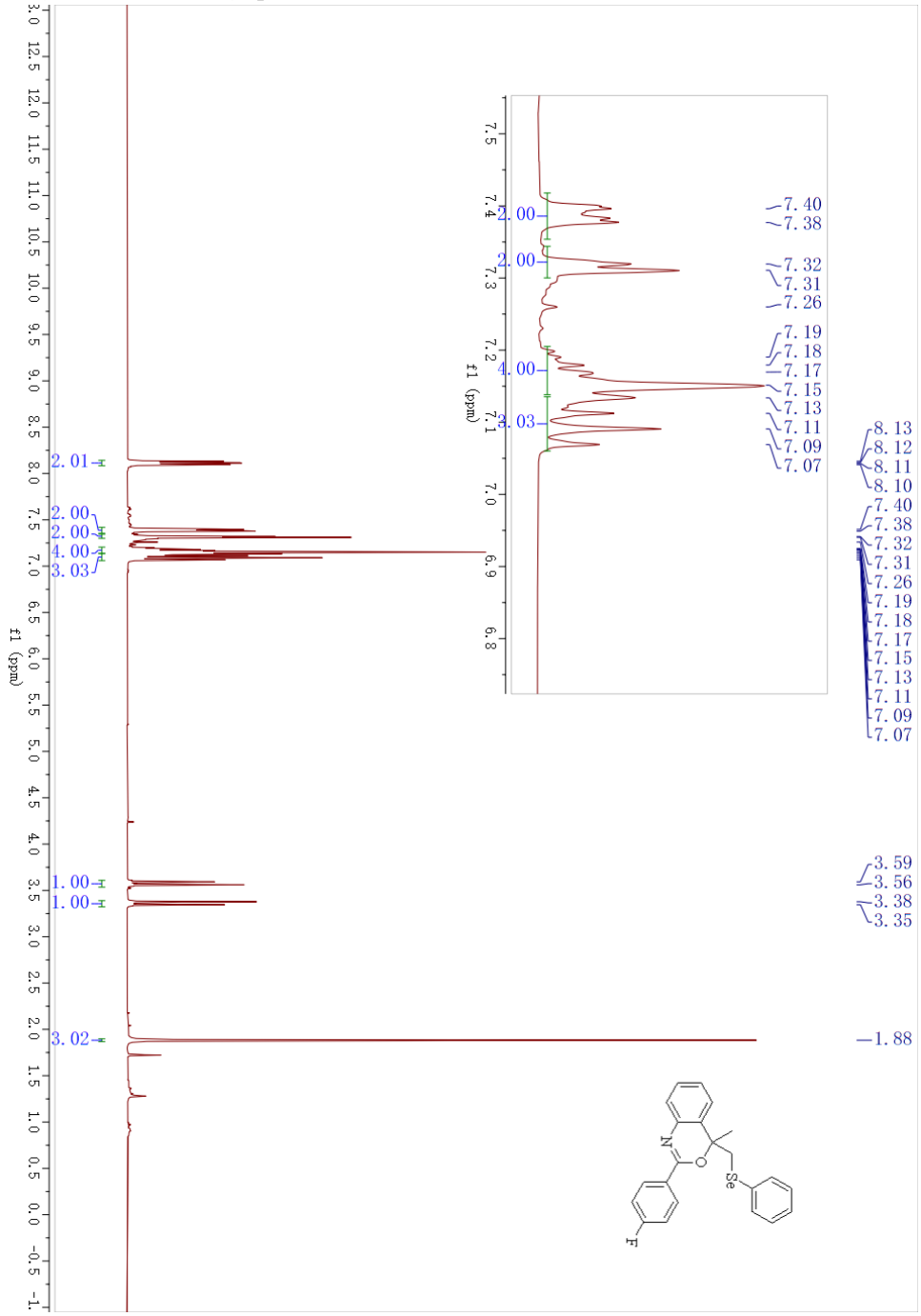
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ea**



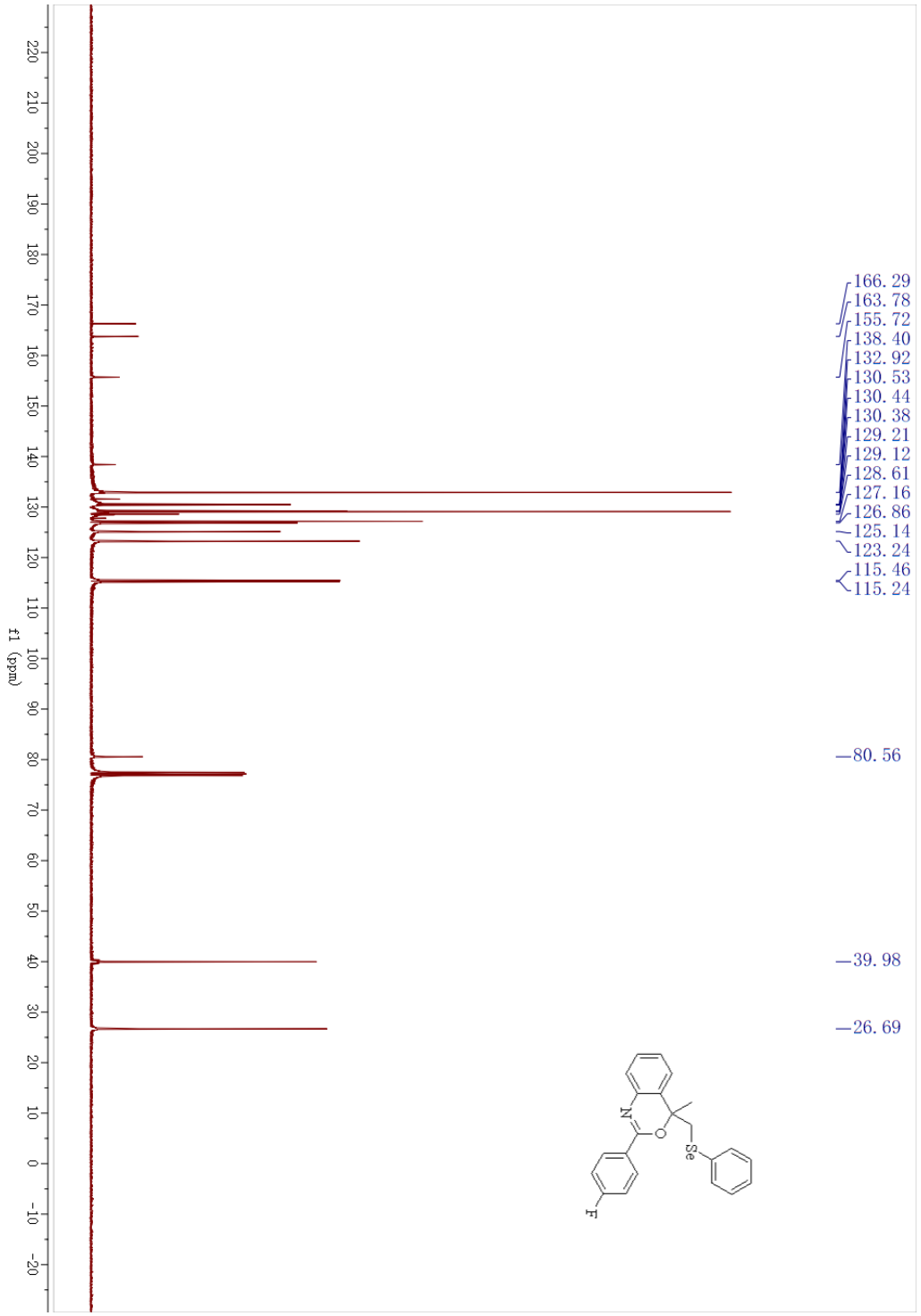
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ea**



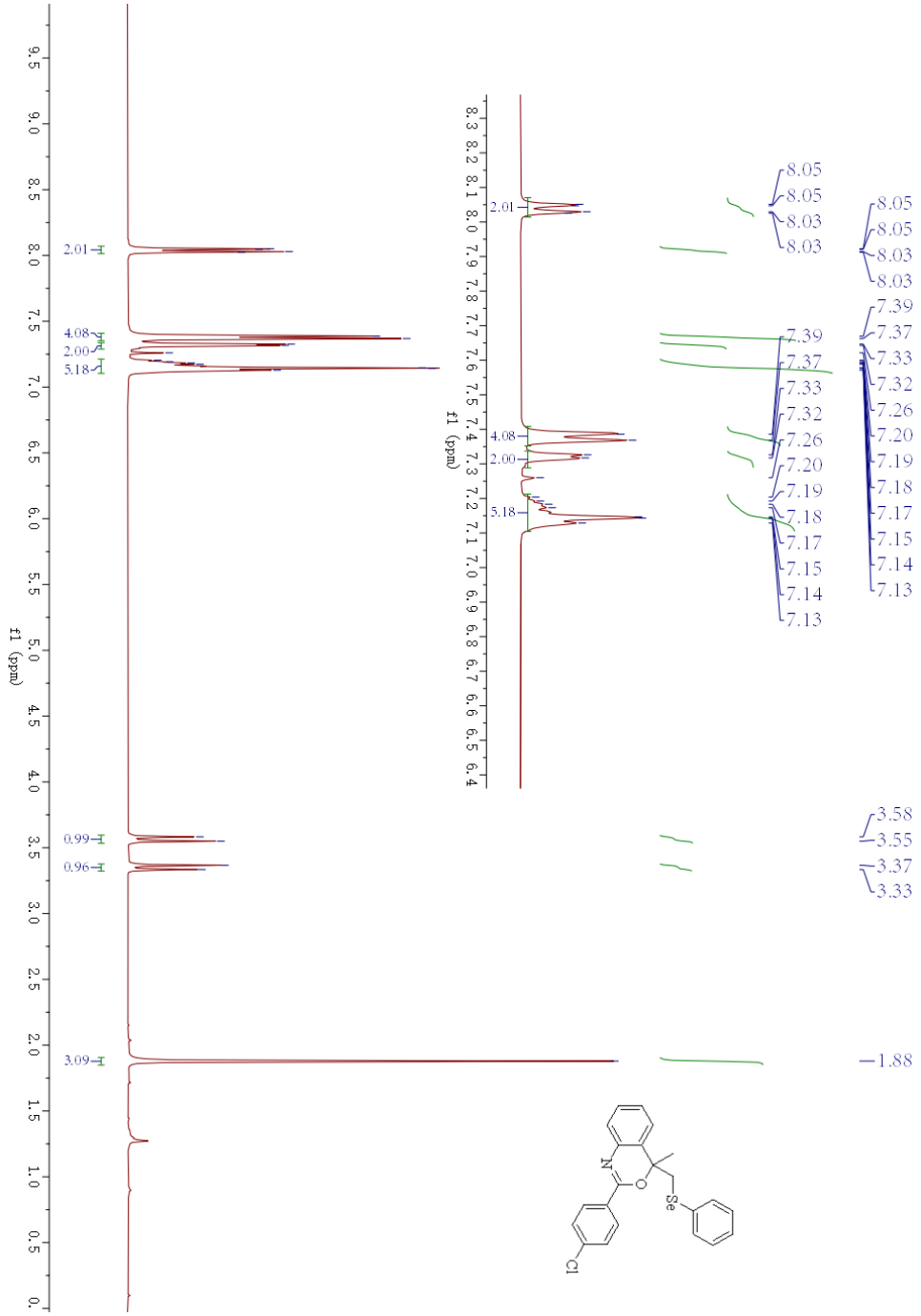
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3fa**



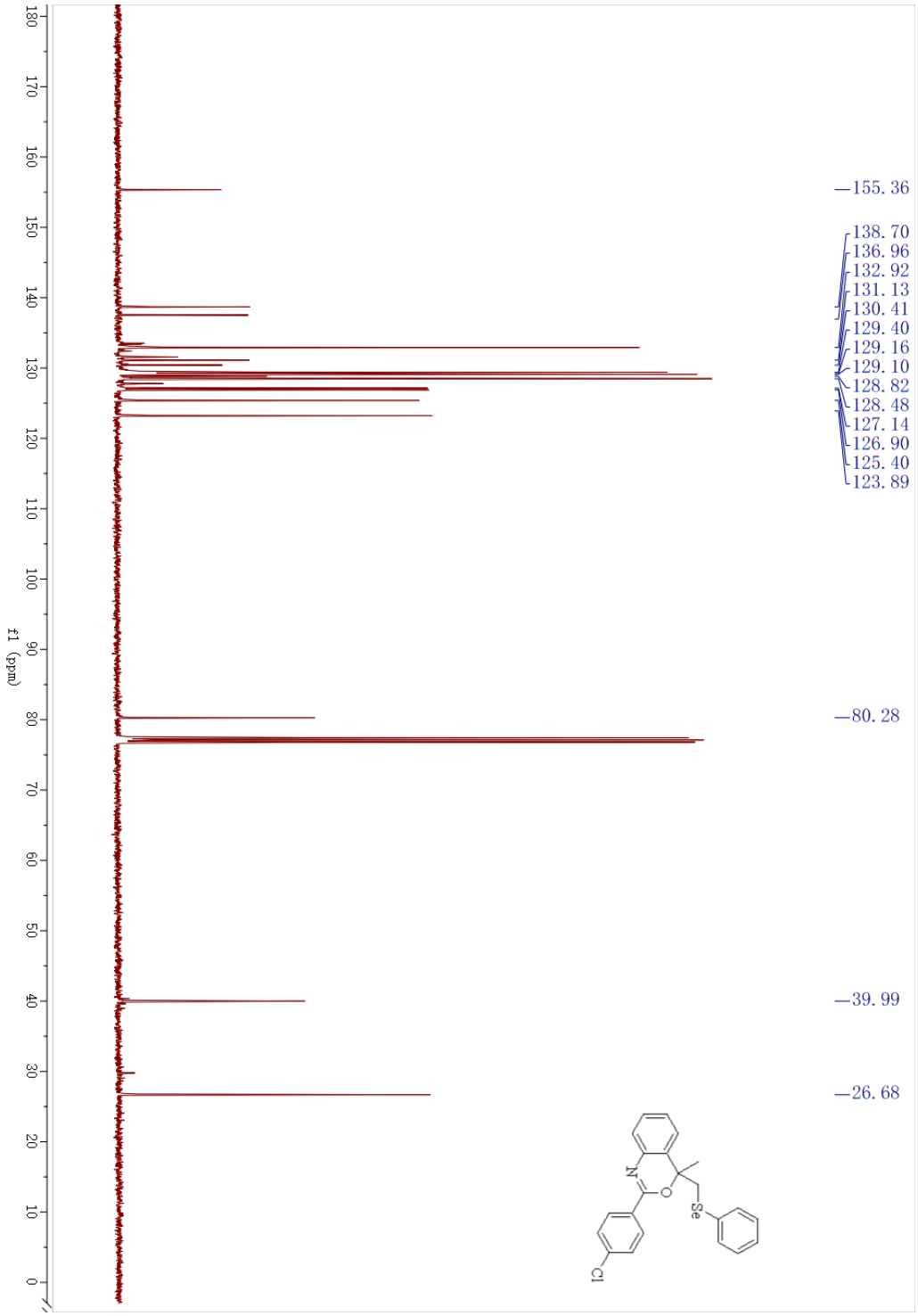
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3fa**



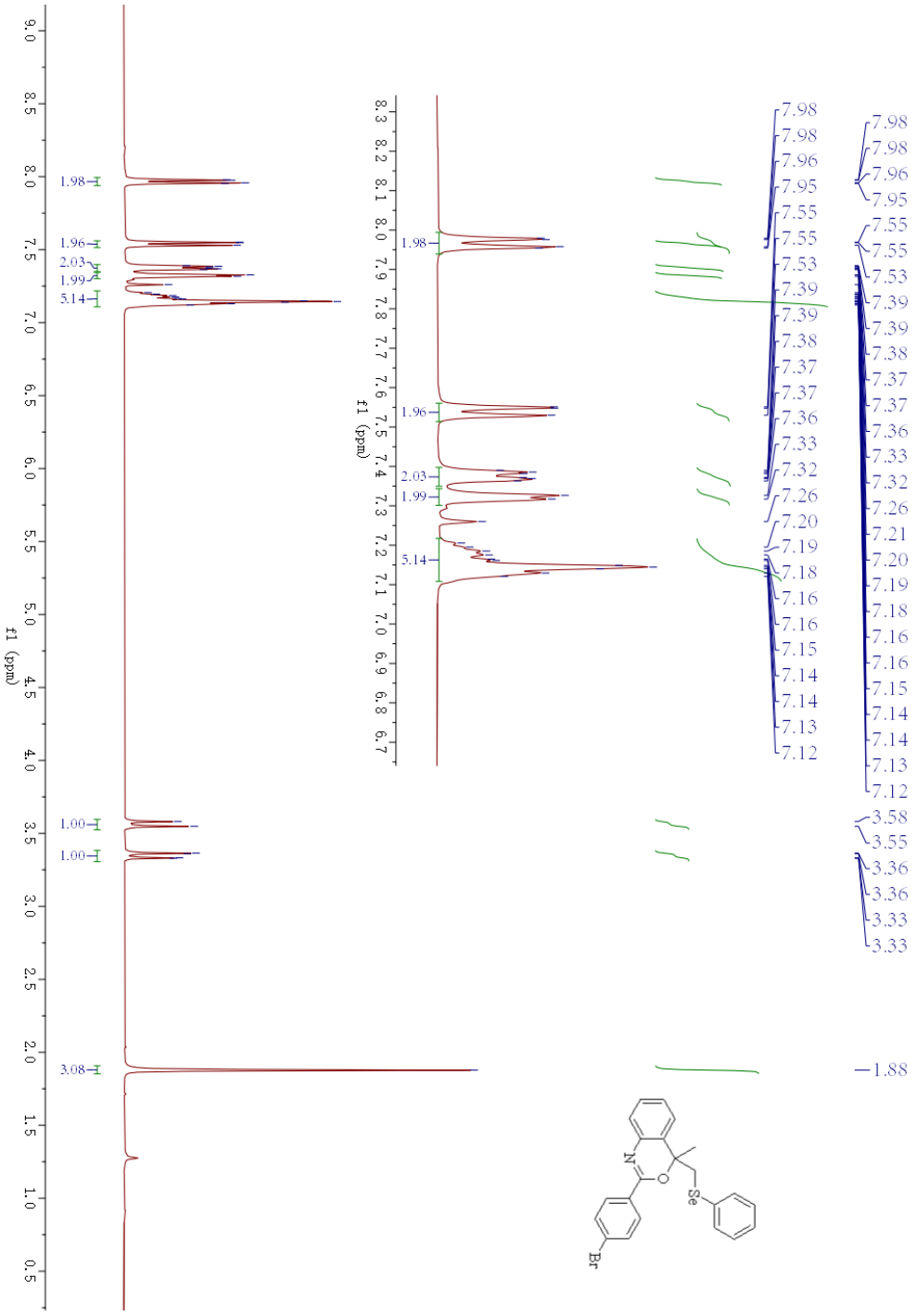
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ga**



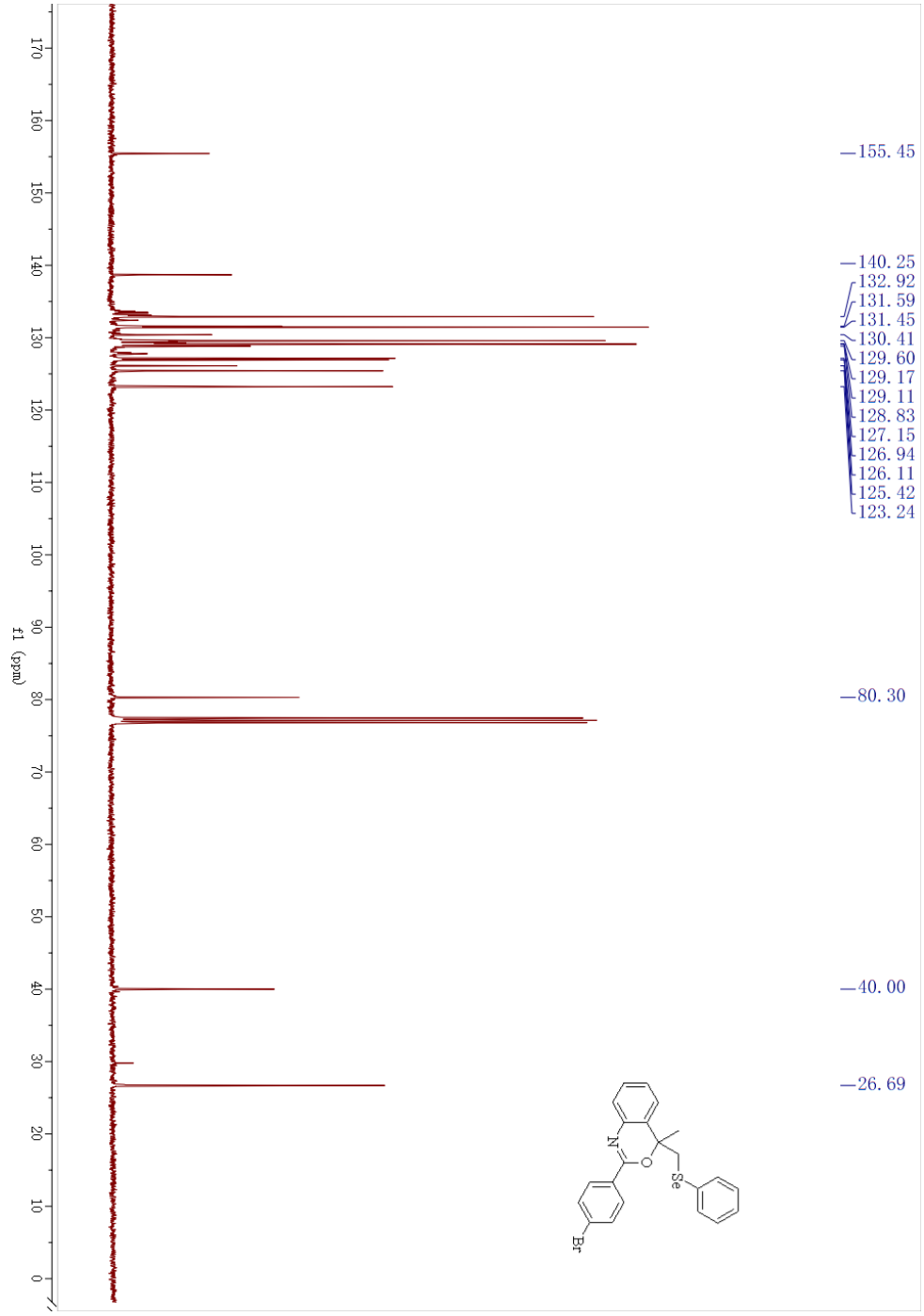
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ga**



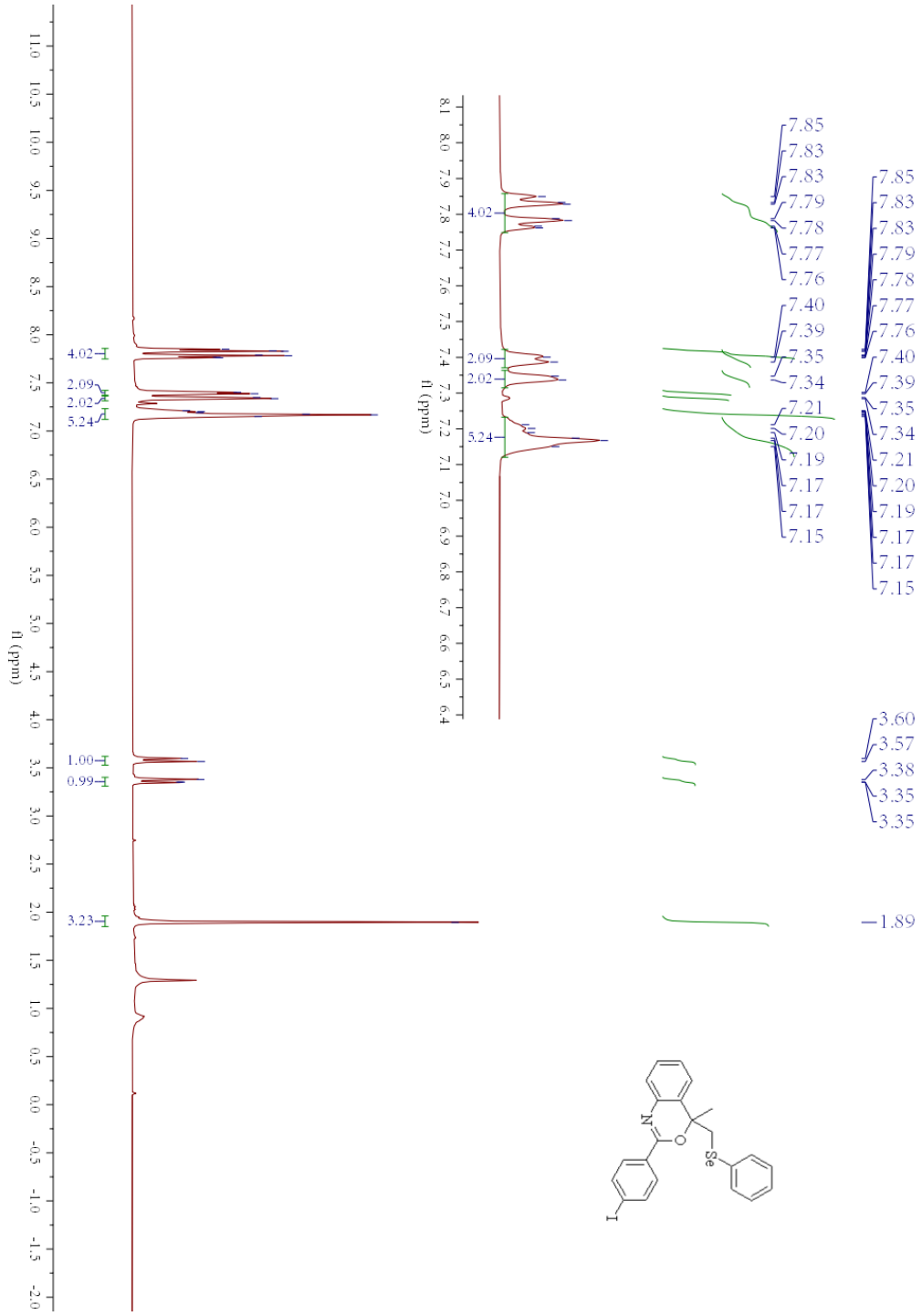
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ha**



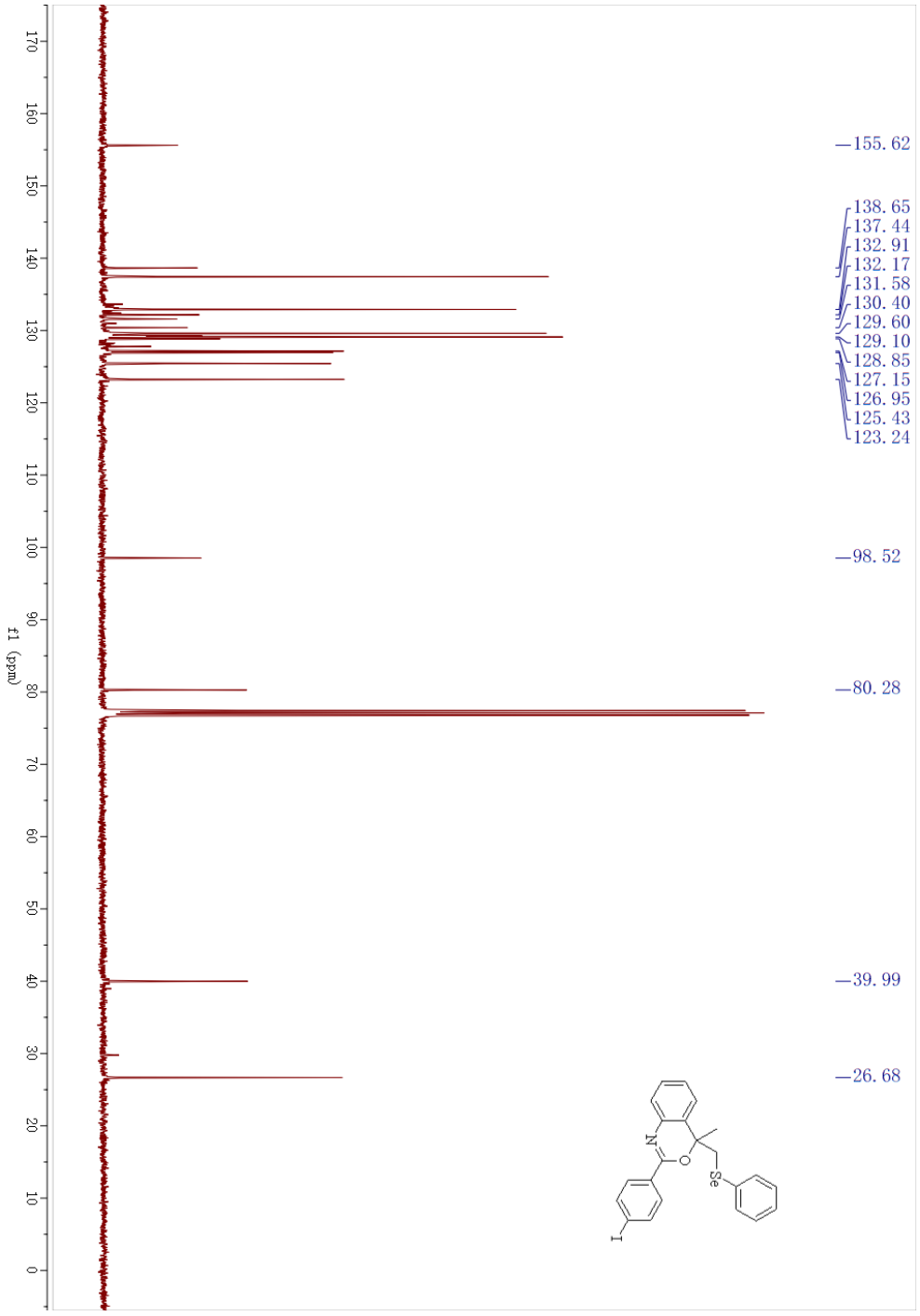
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ha**



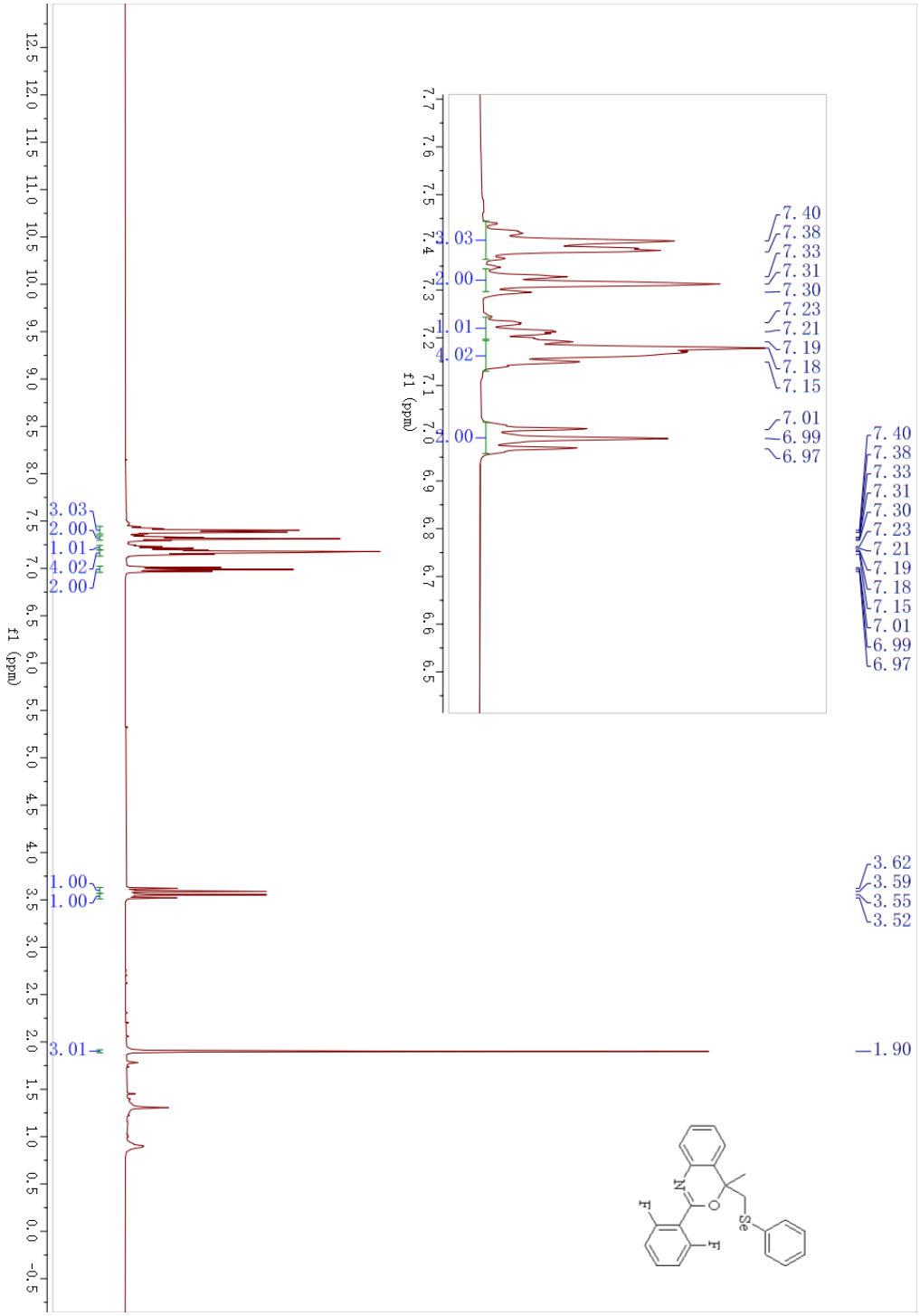
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ia**



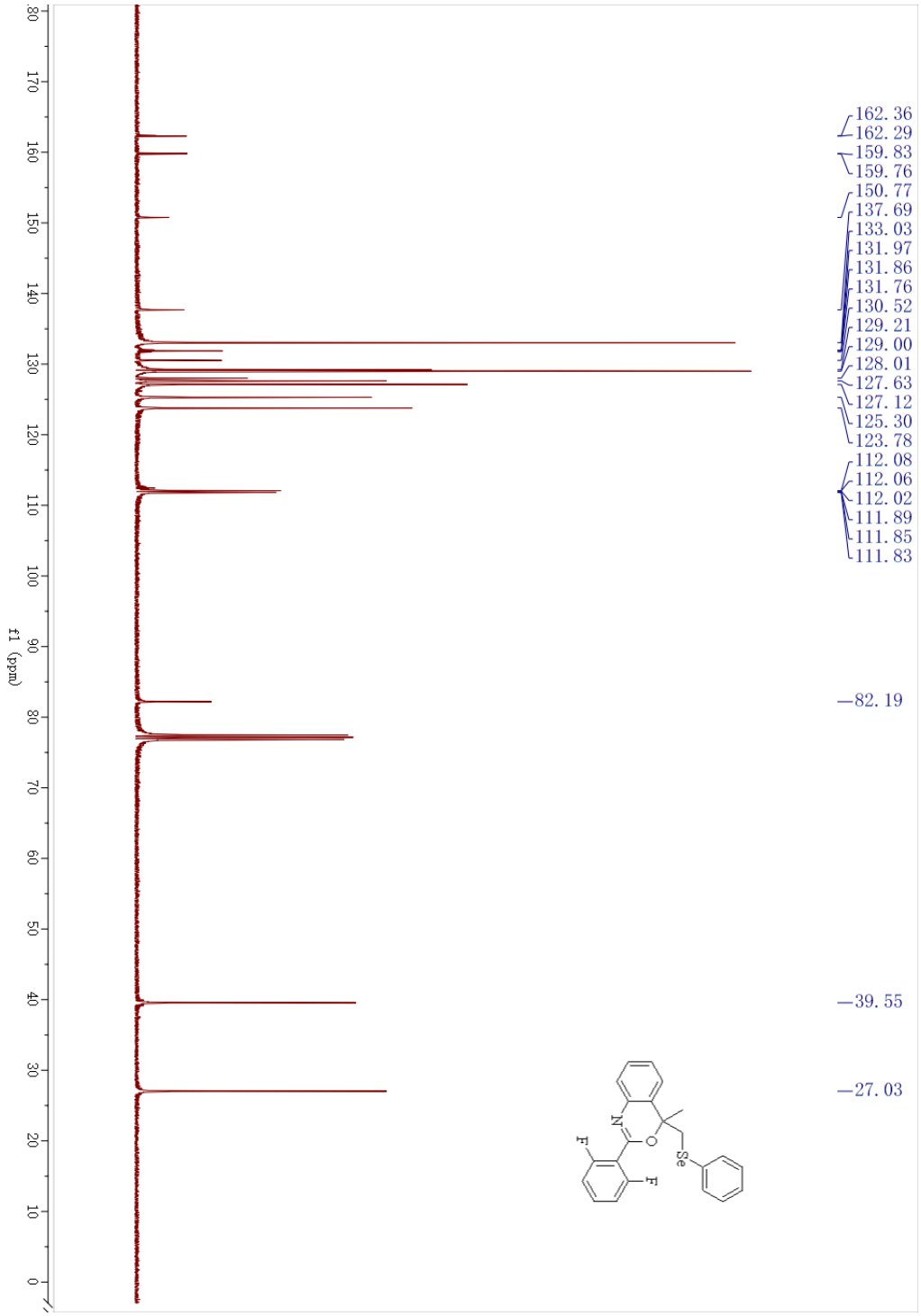
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ia**



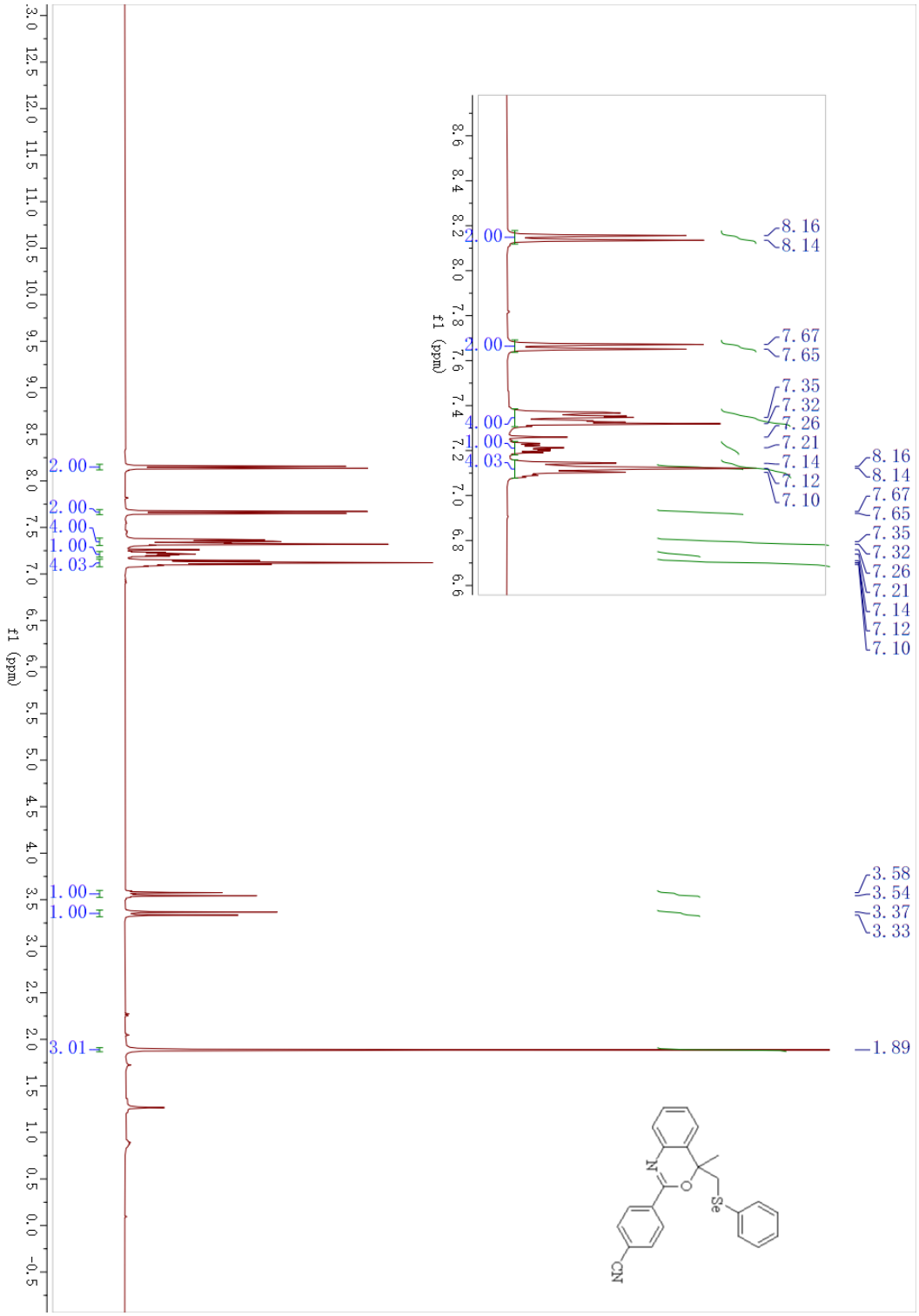
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ja**



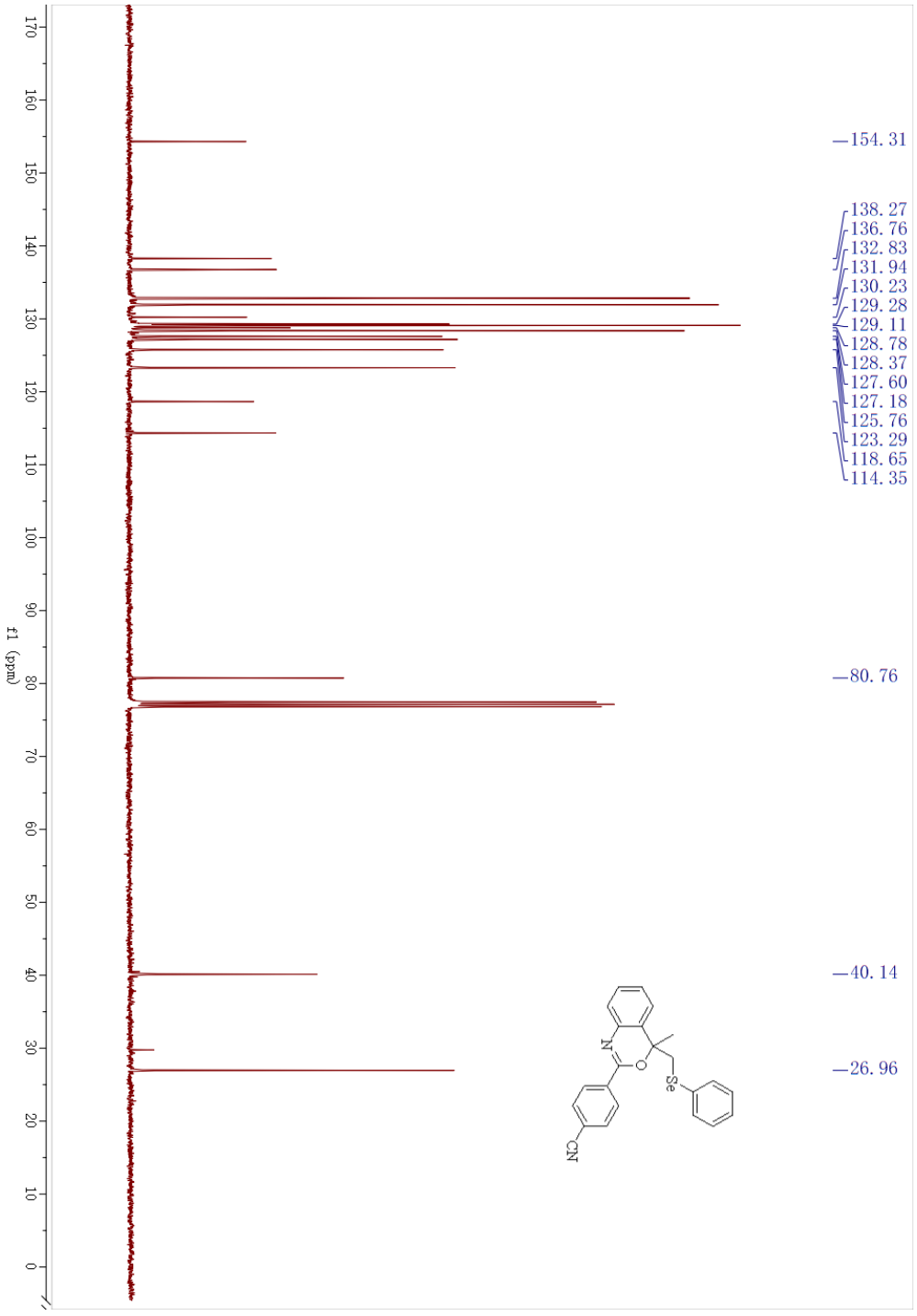
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ja**



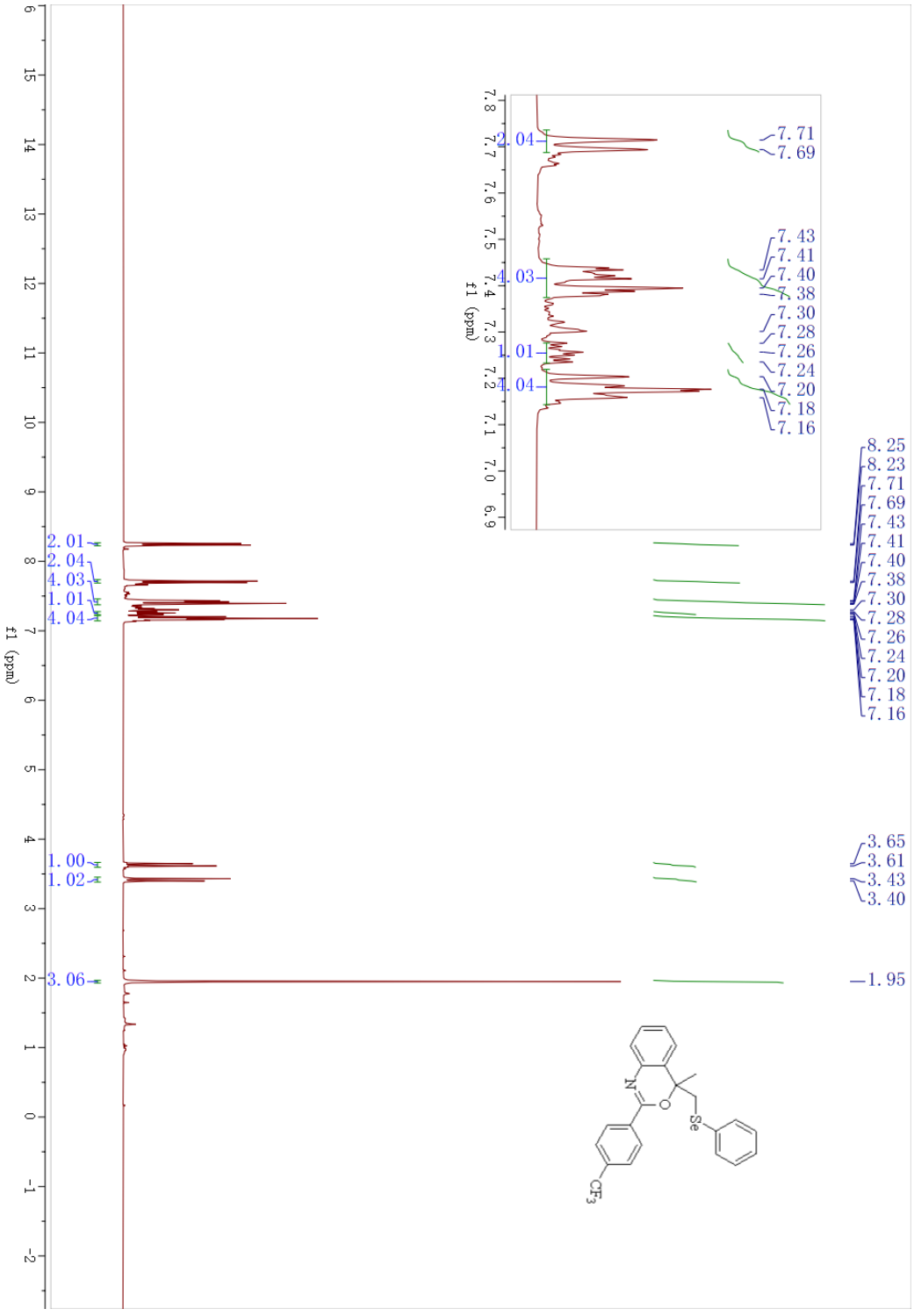
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ka**



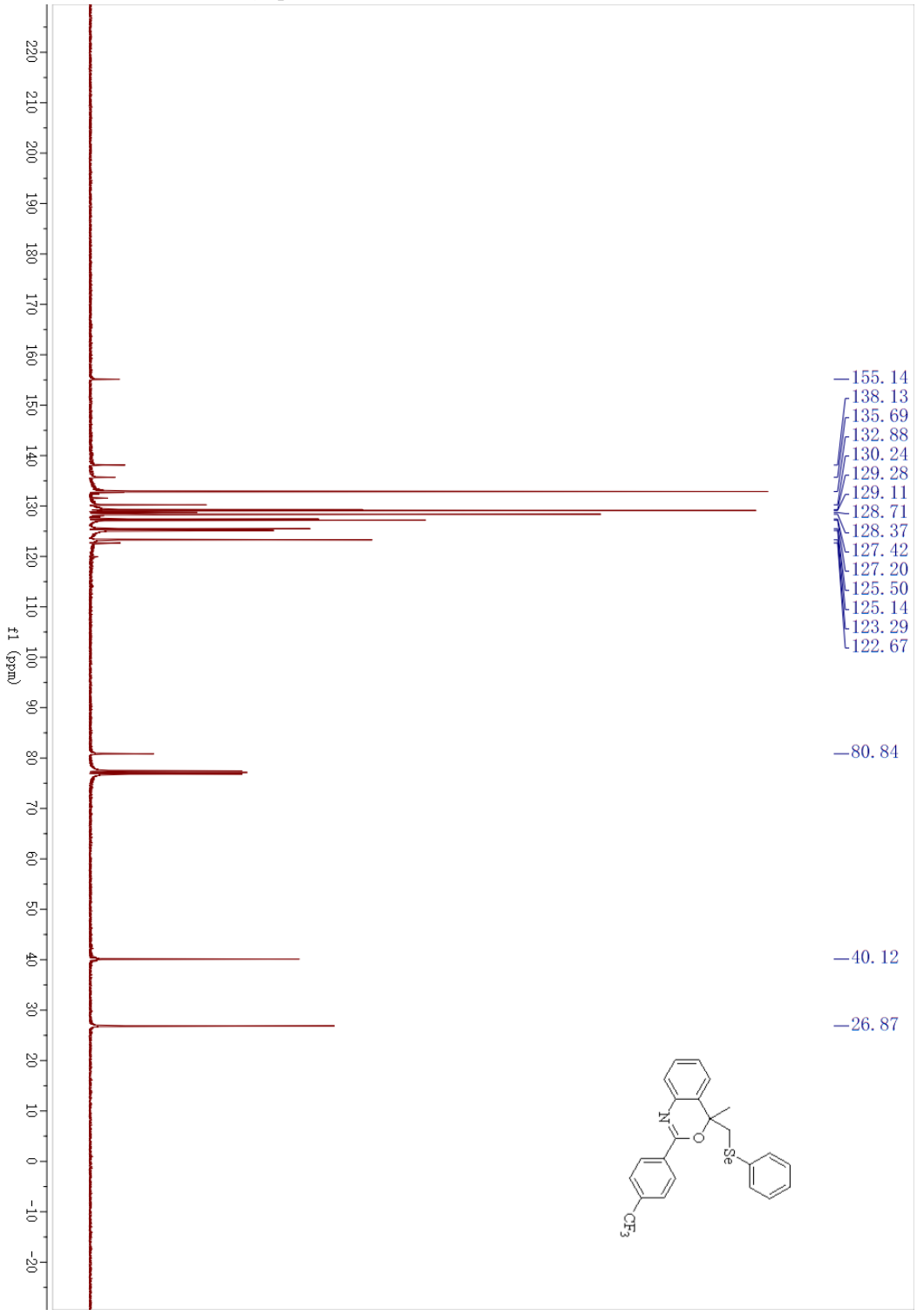
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ka**



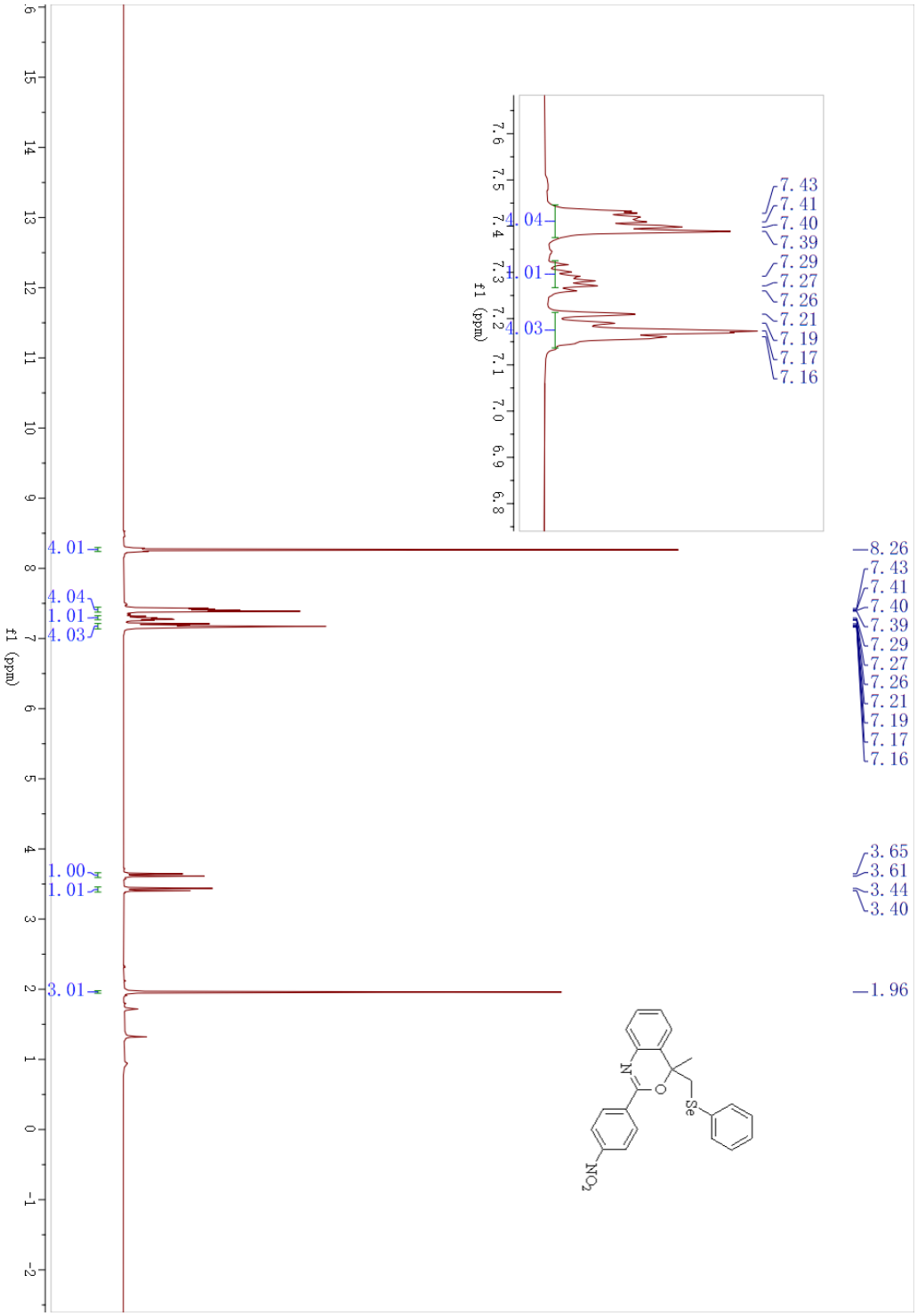
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3la**



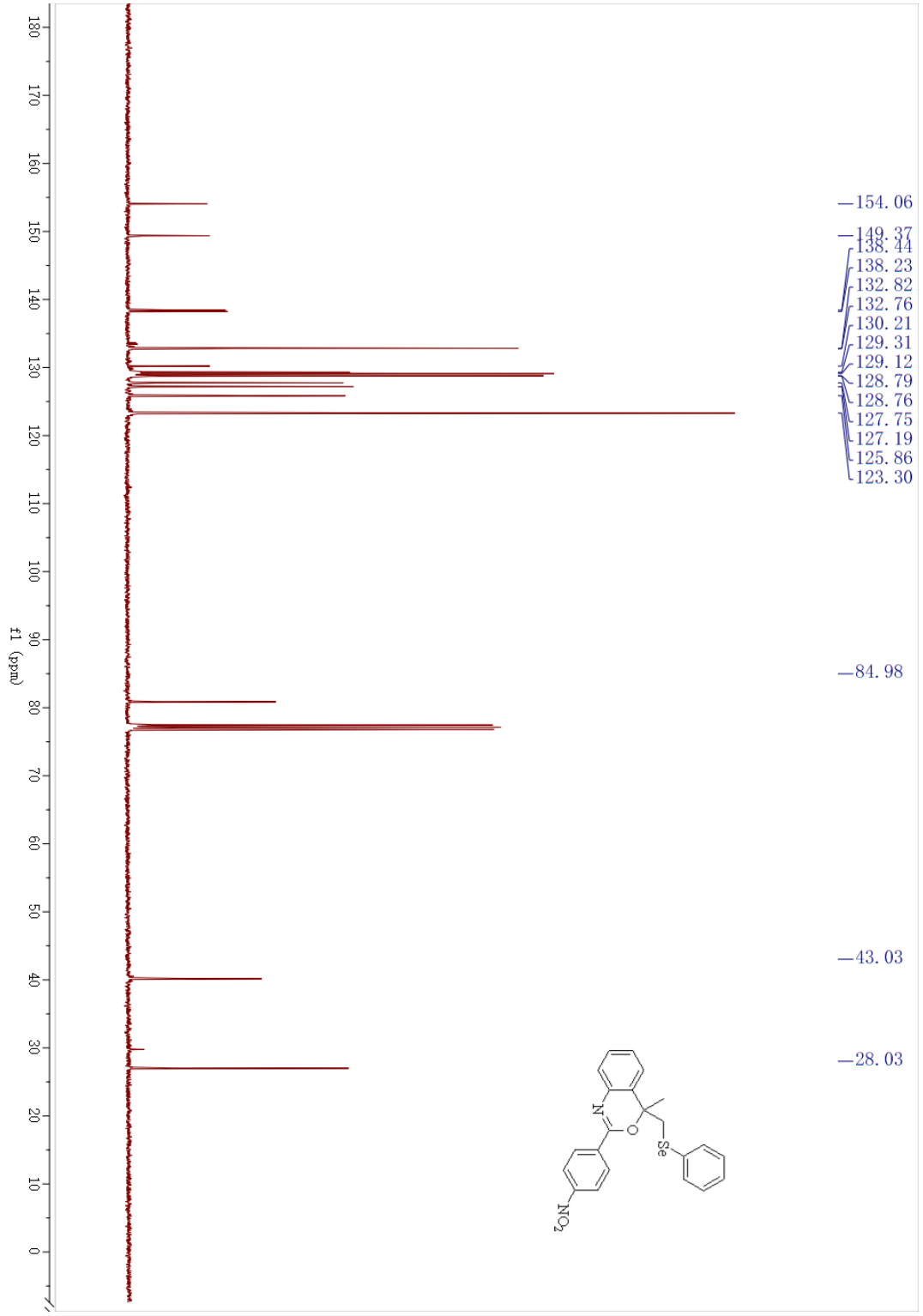
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3la**



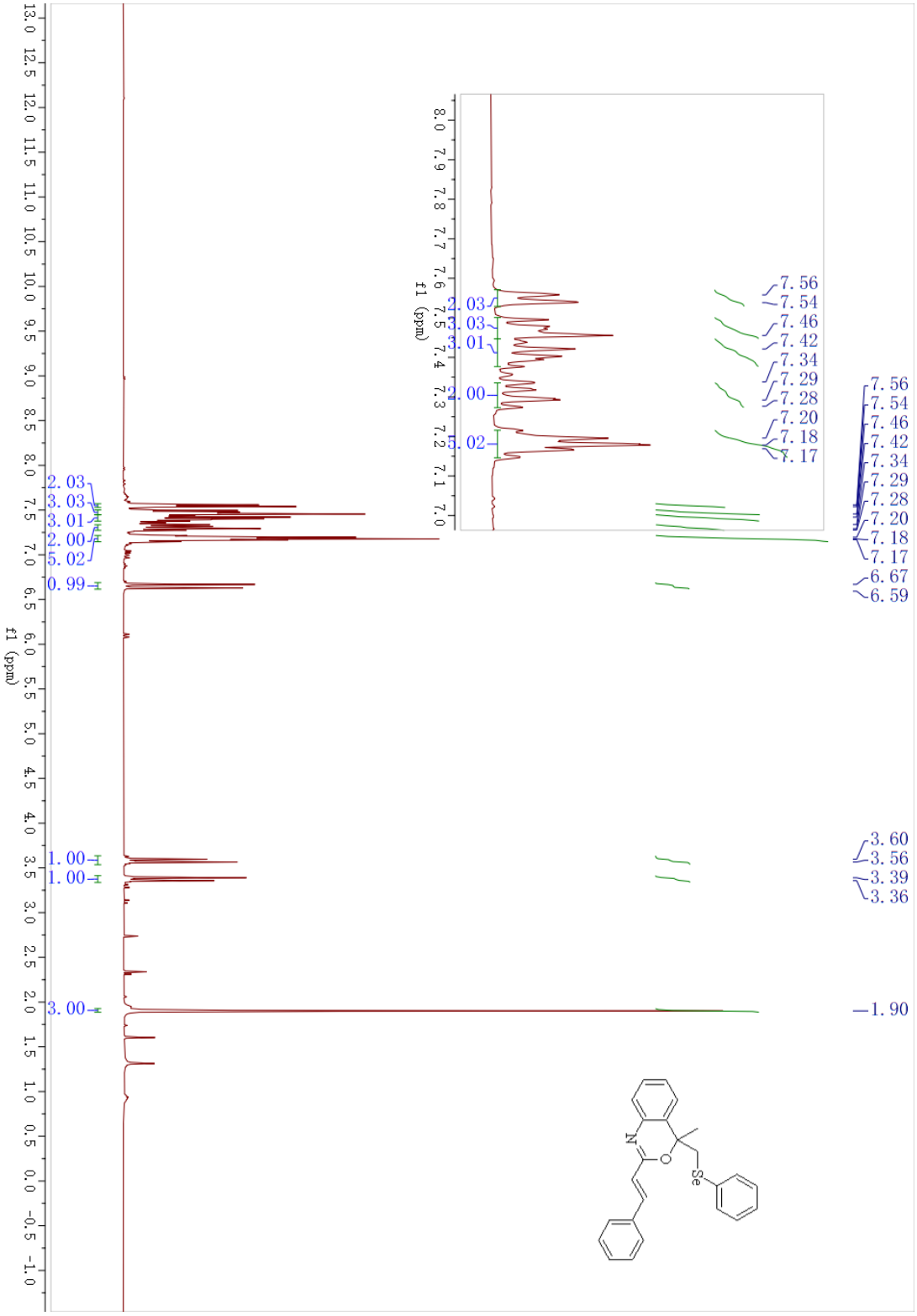
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ma**



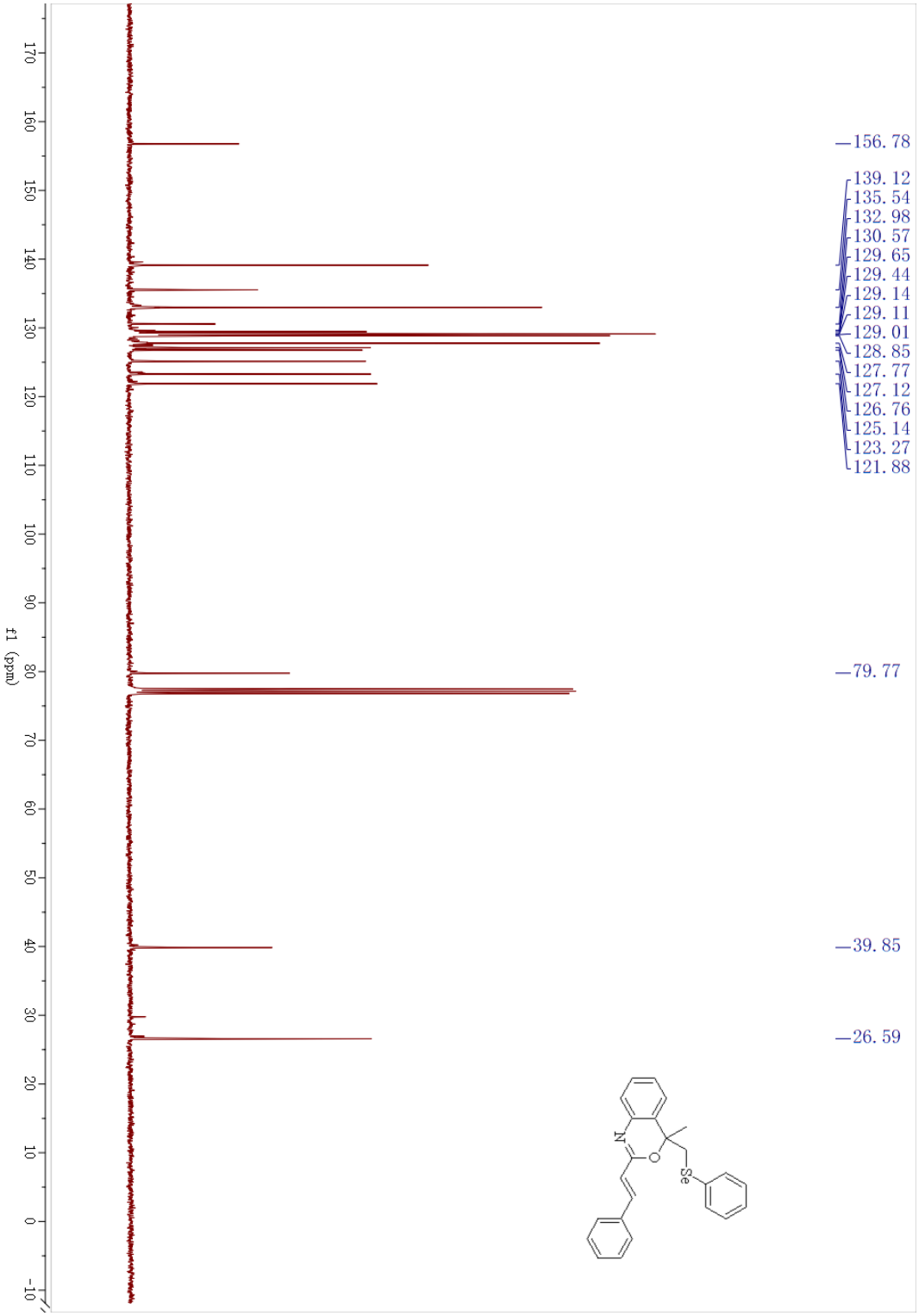
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ma**



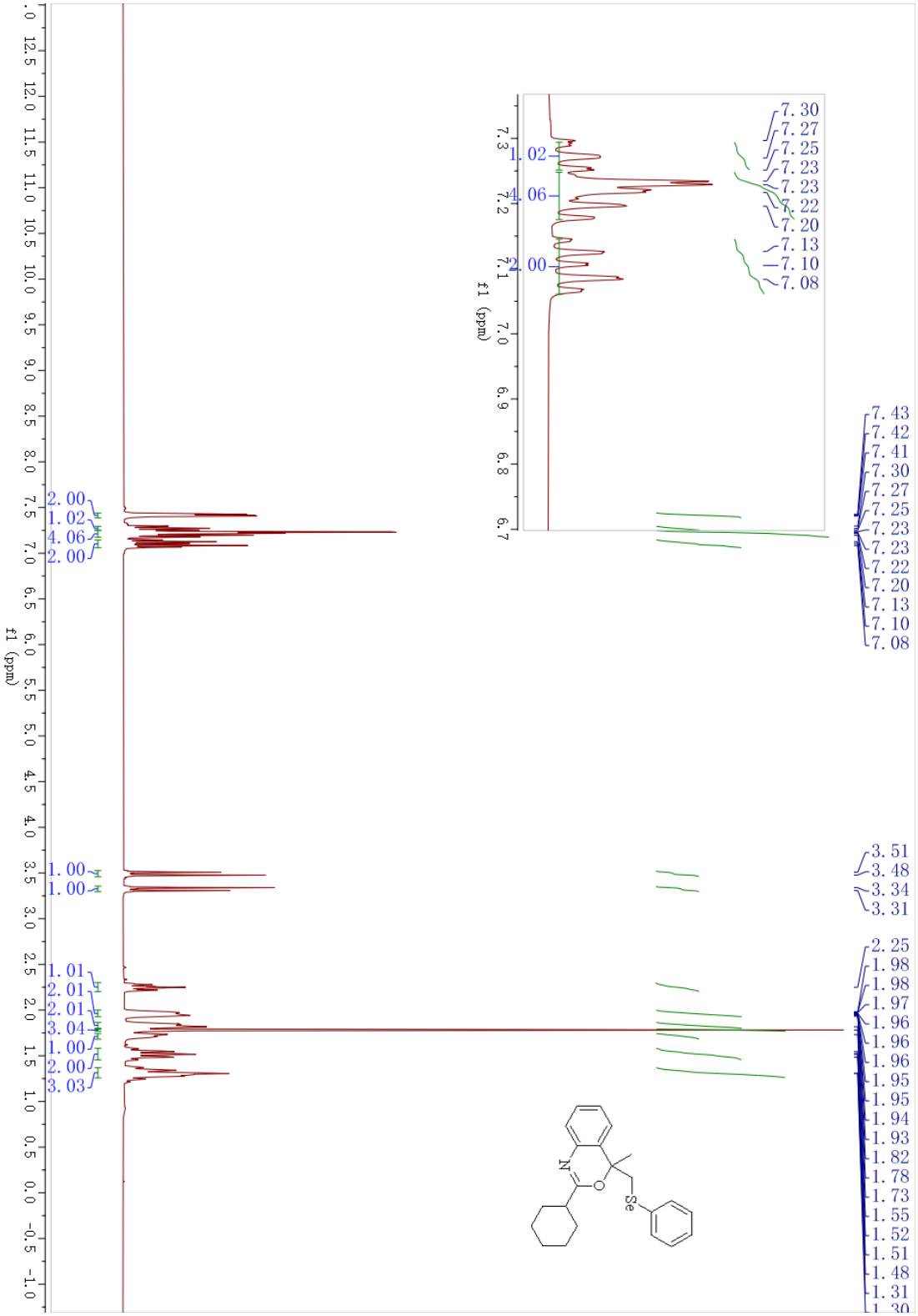
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3na**



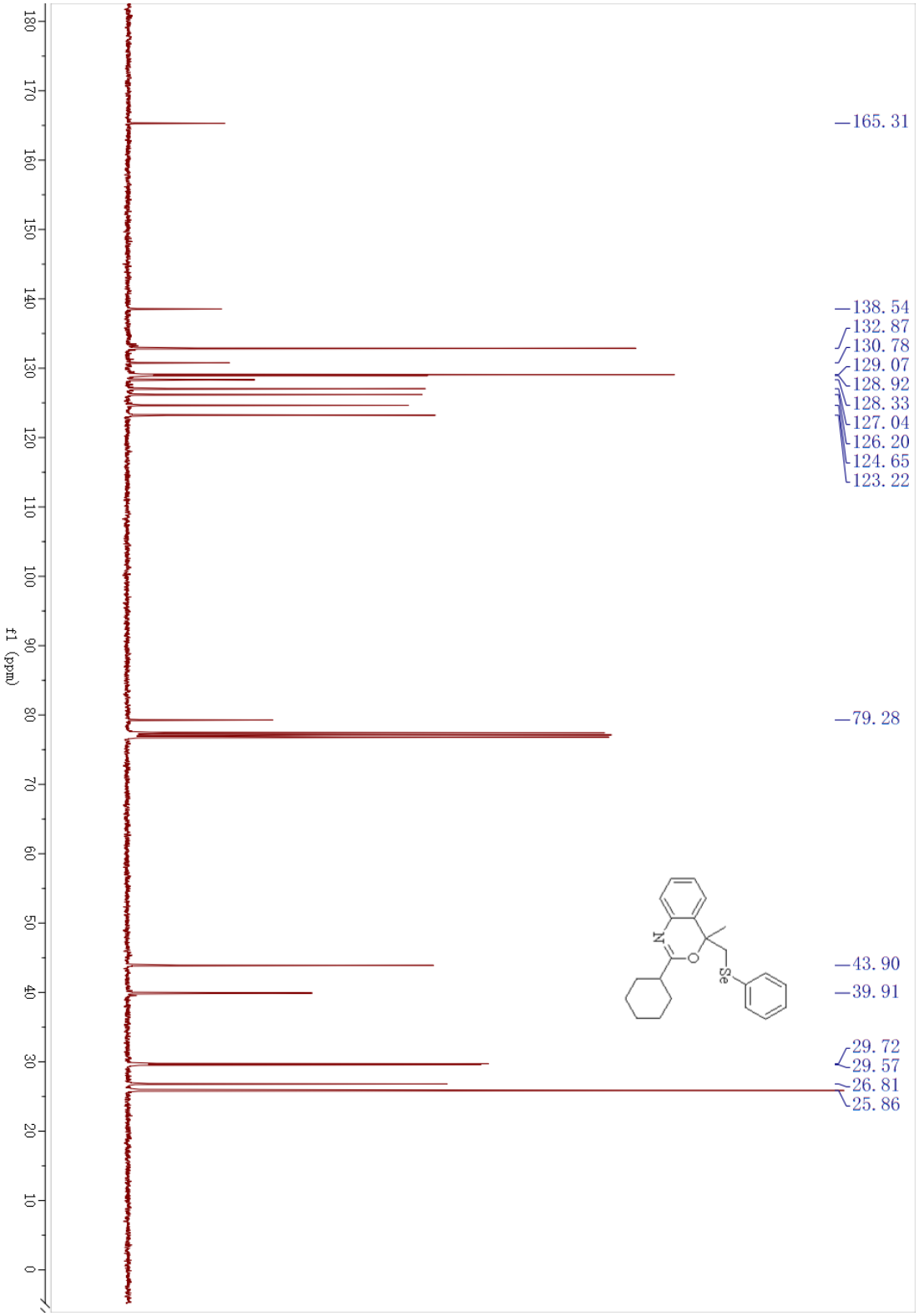
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3na**



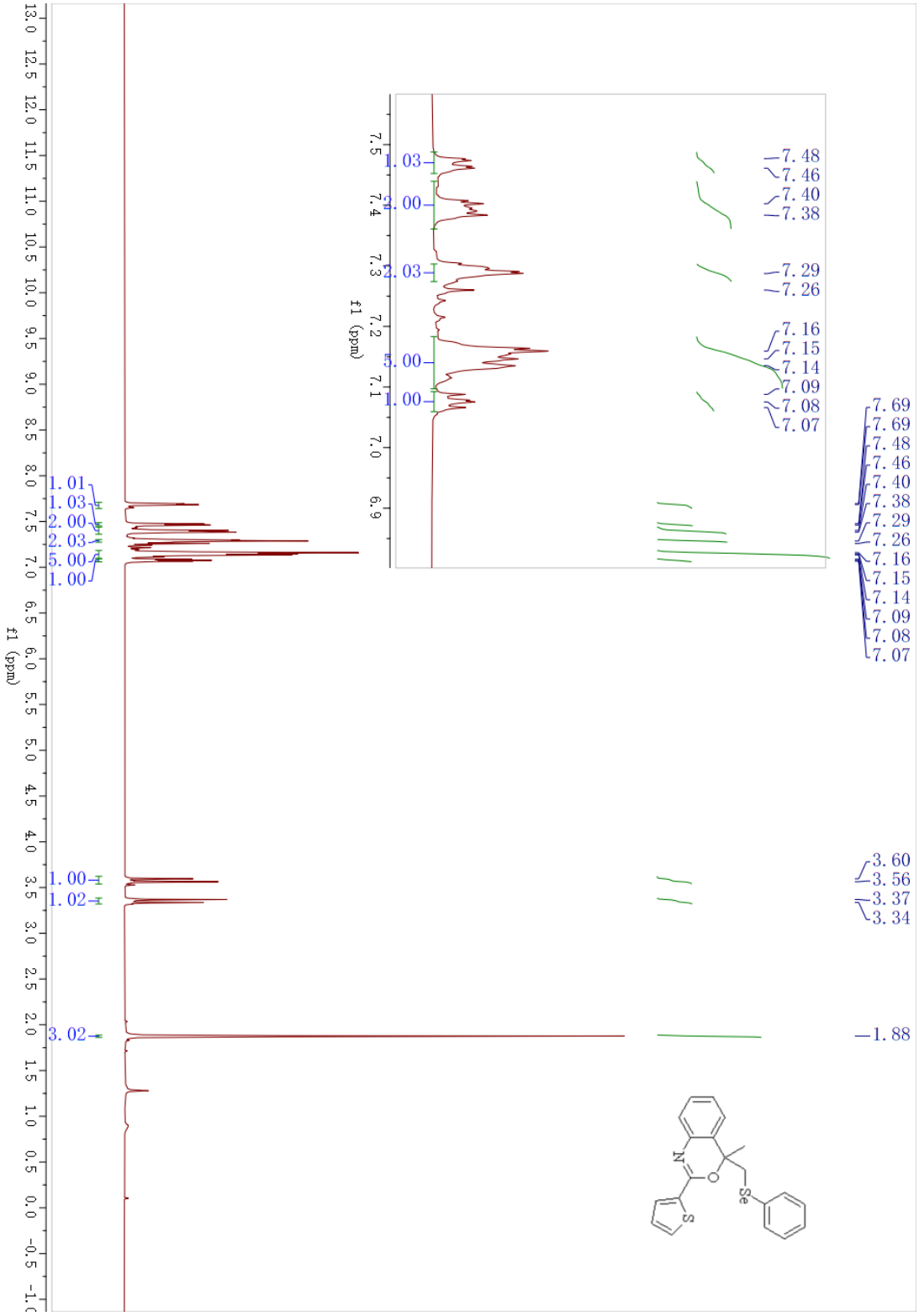
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3oa**



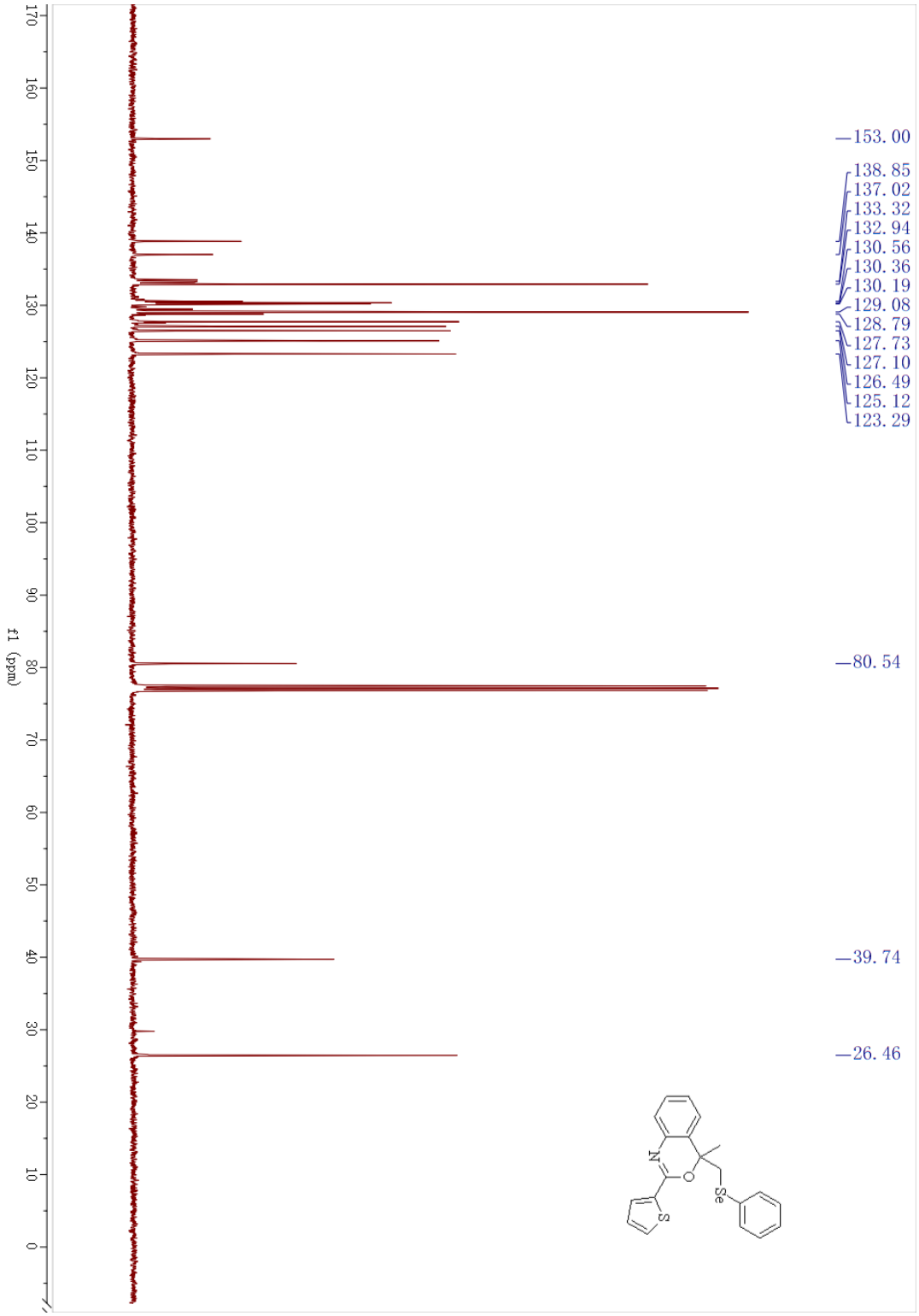
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3oa**



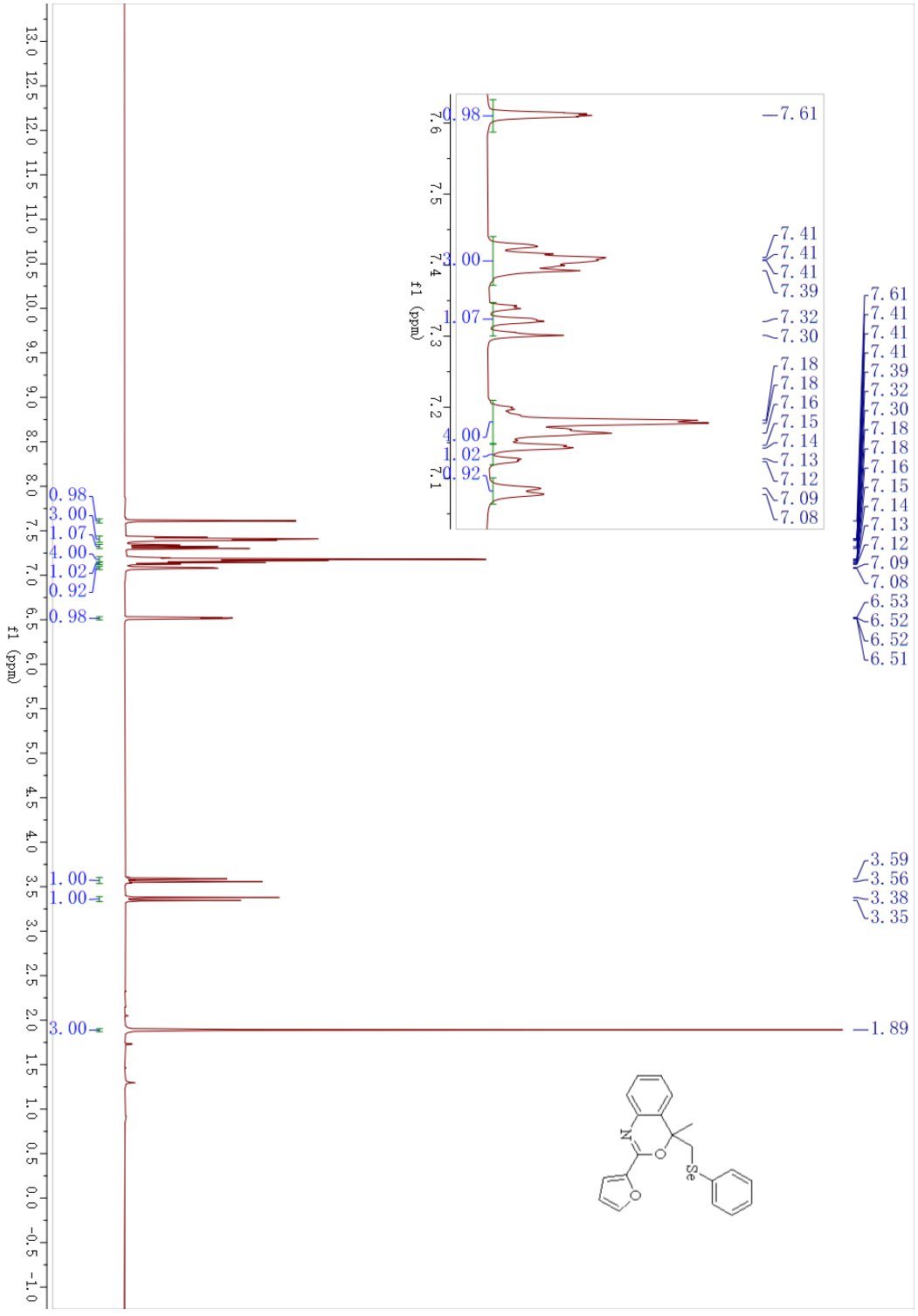
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3pa**



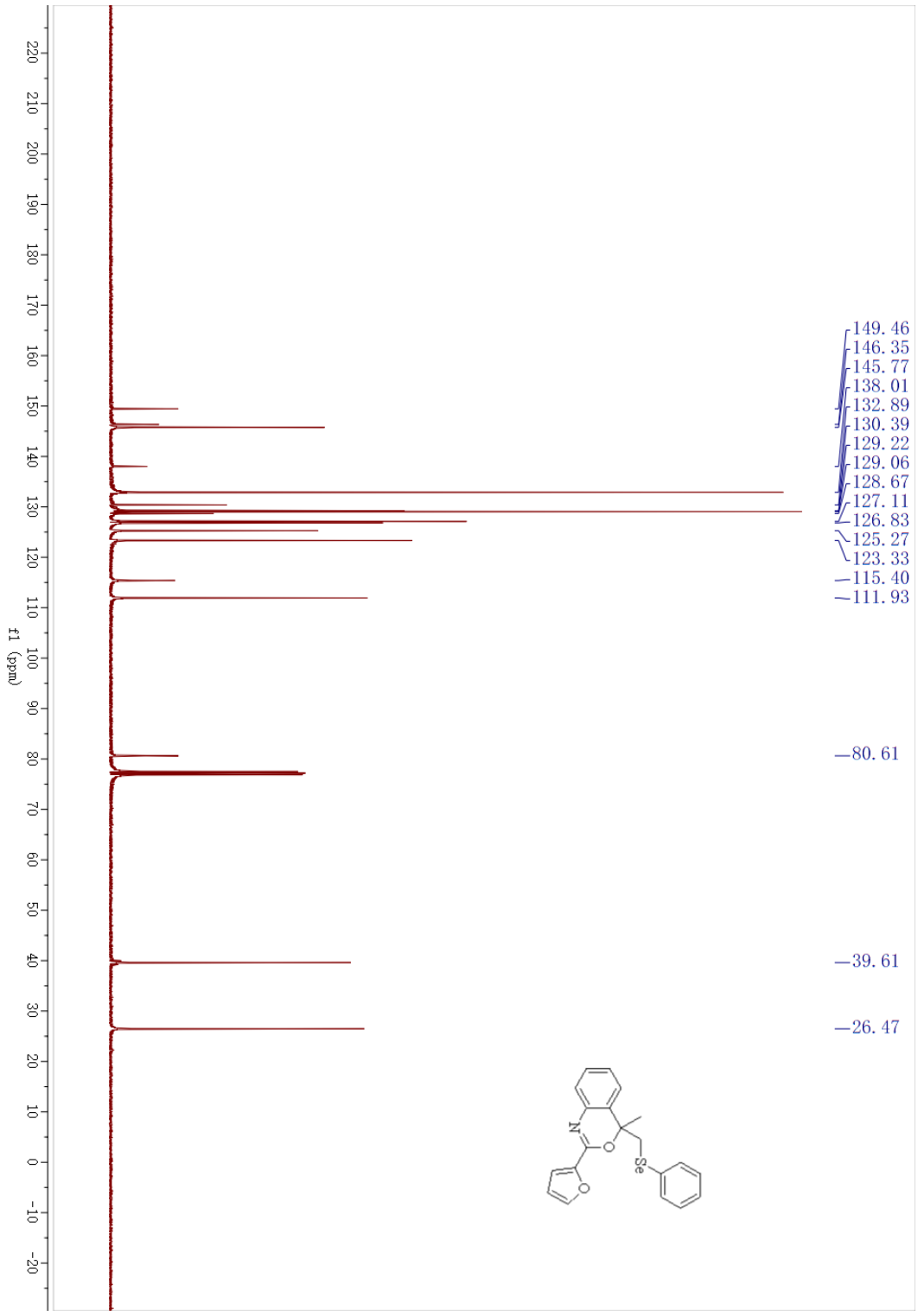
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3pa**



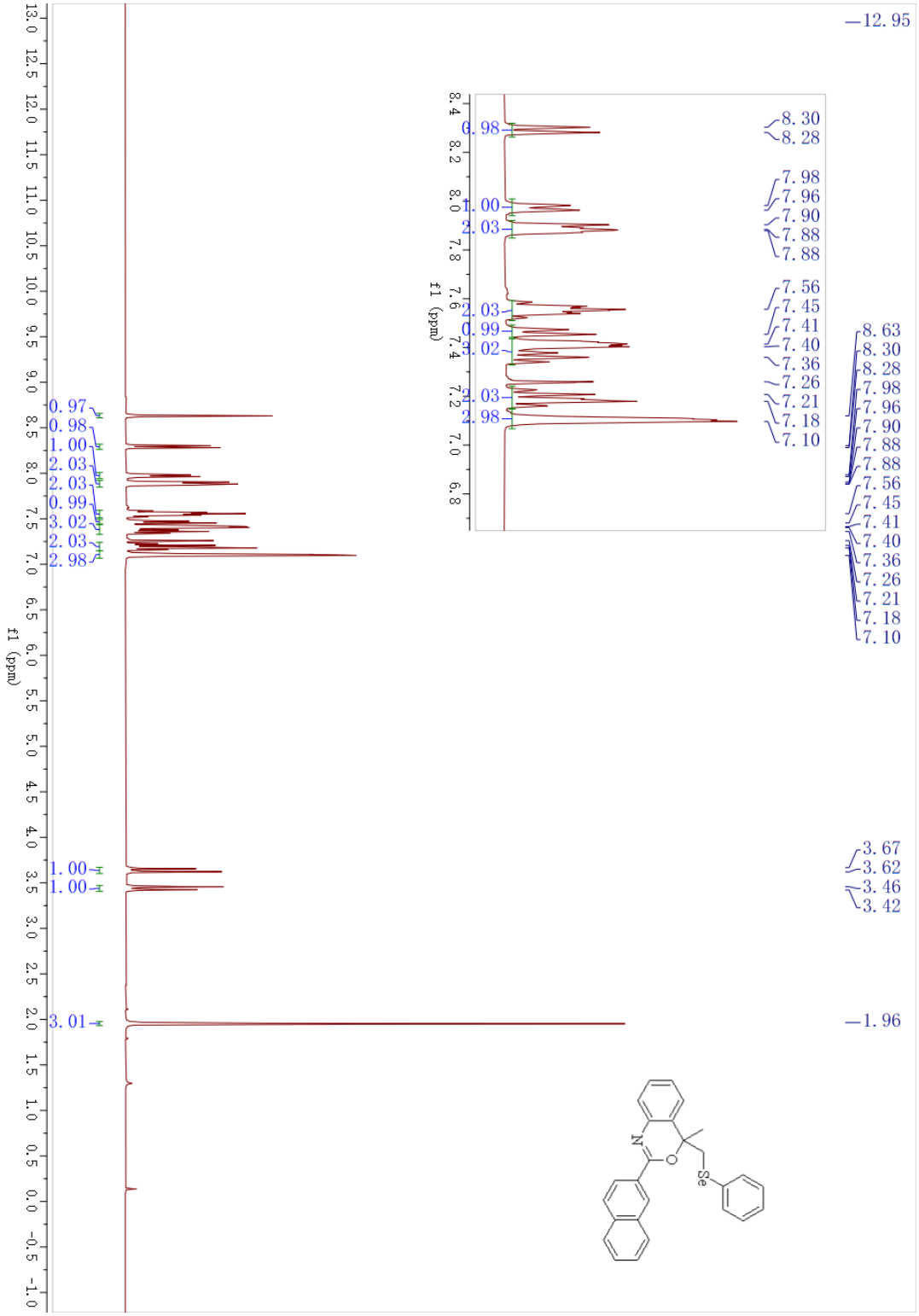
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3qa**



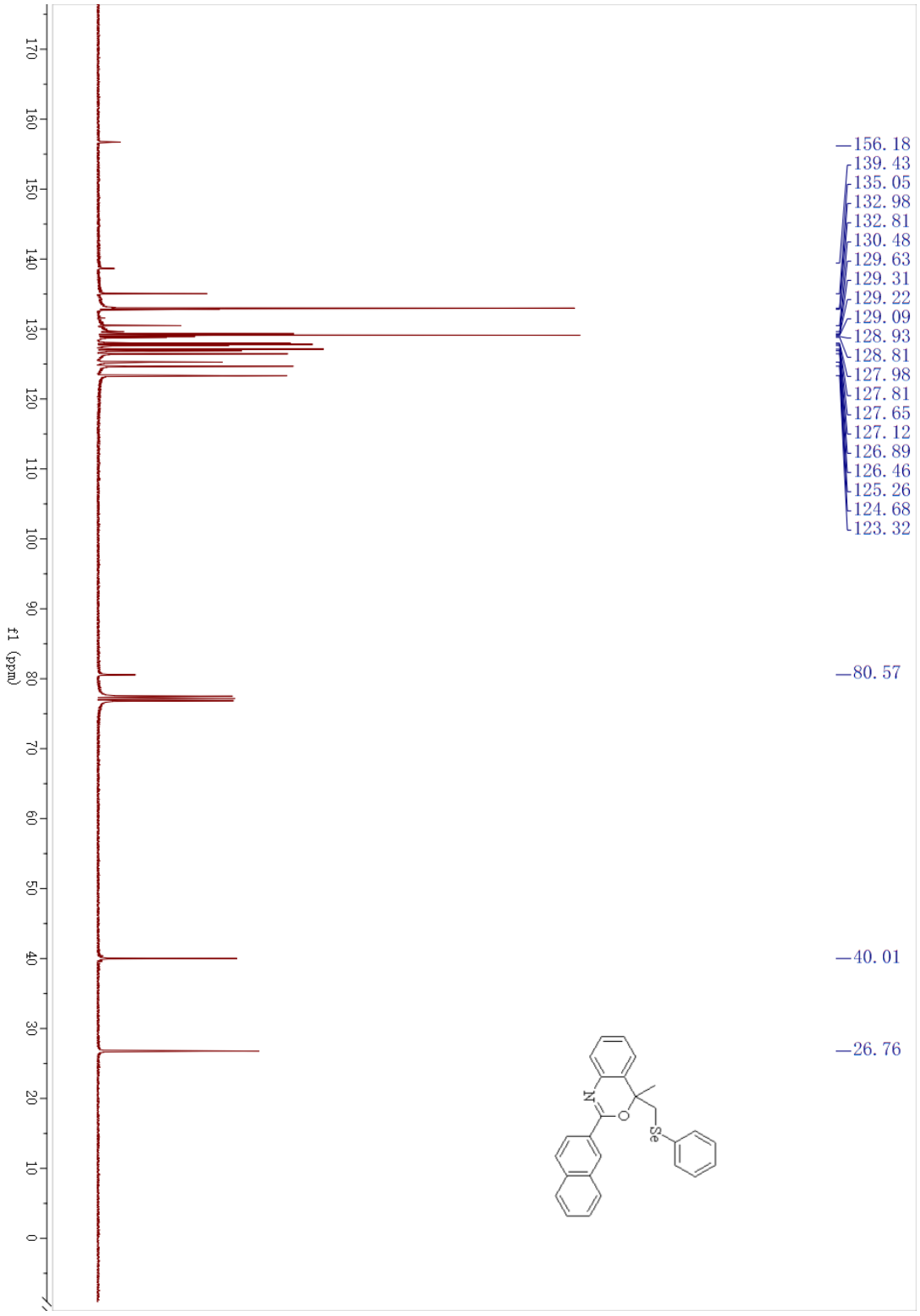
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3qa**



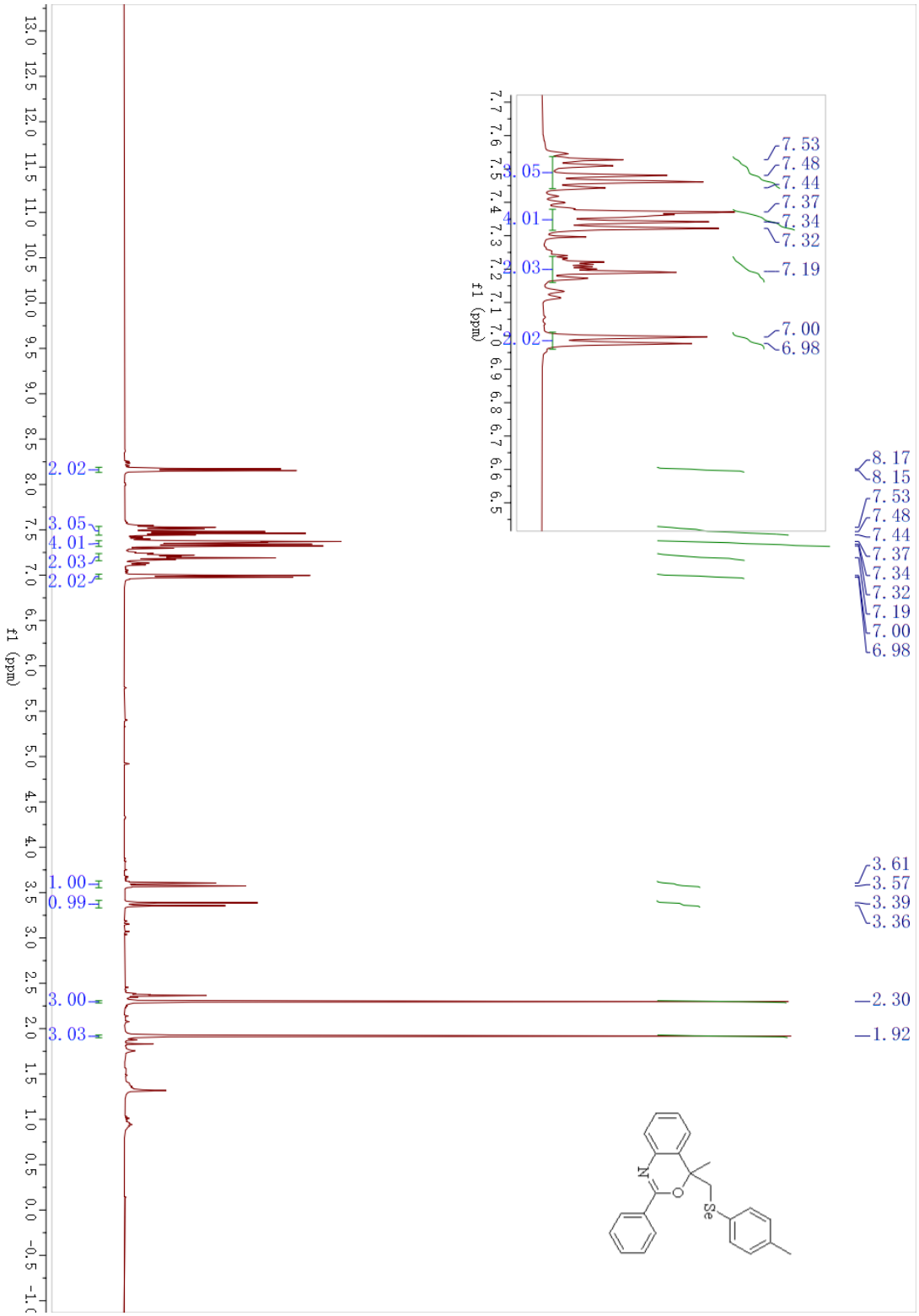
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ra**



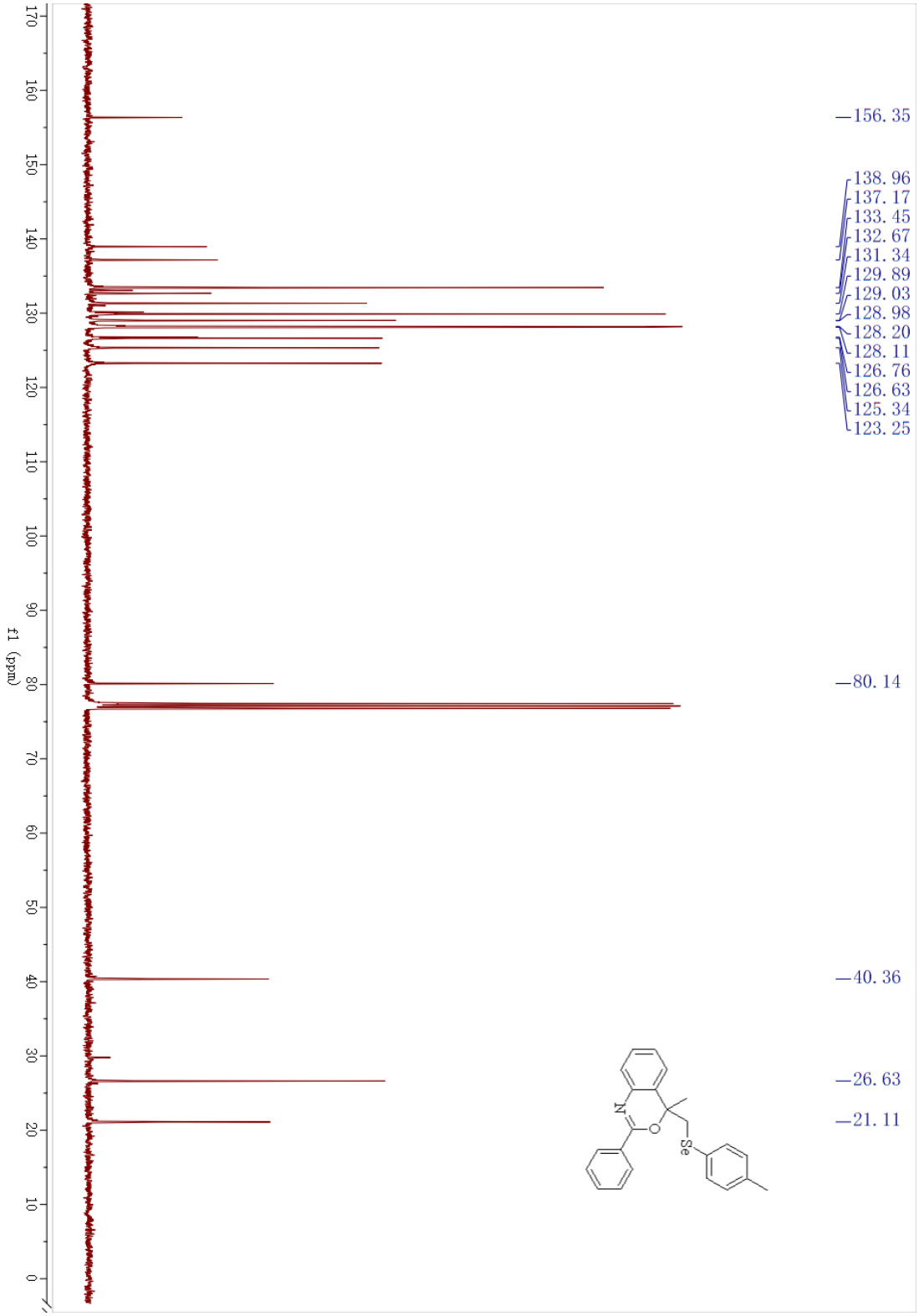
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ra**



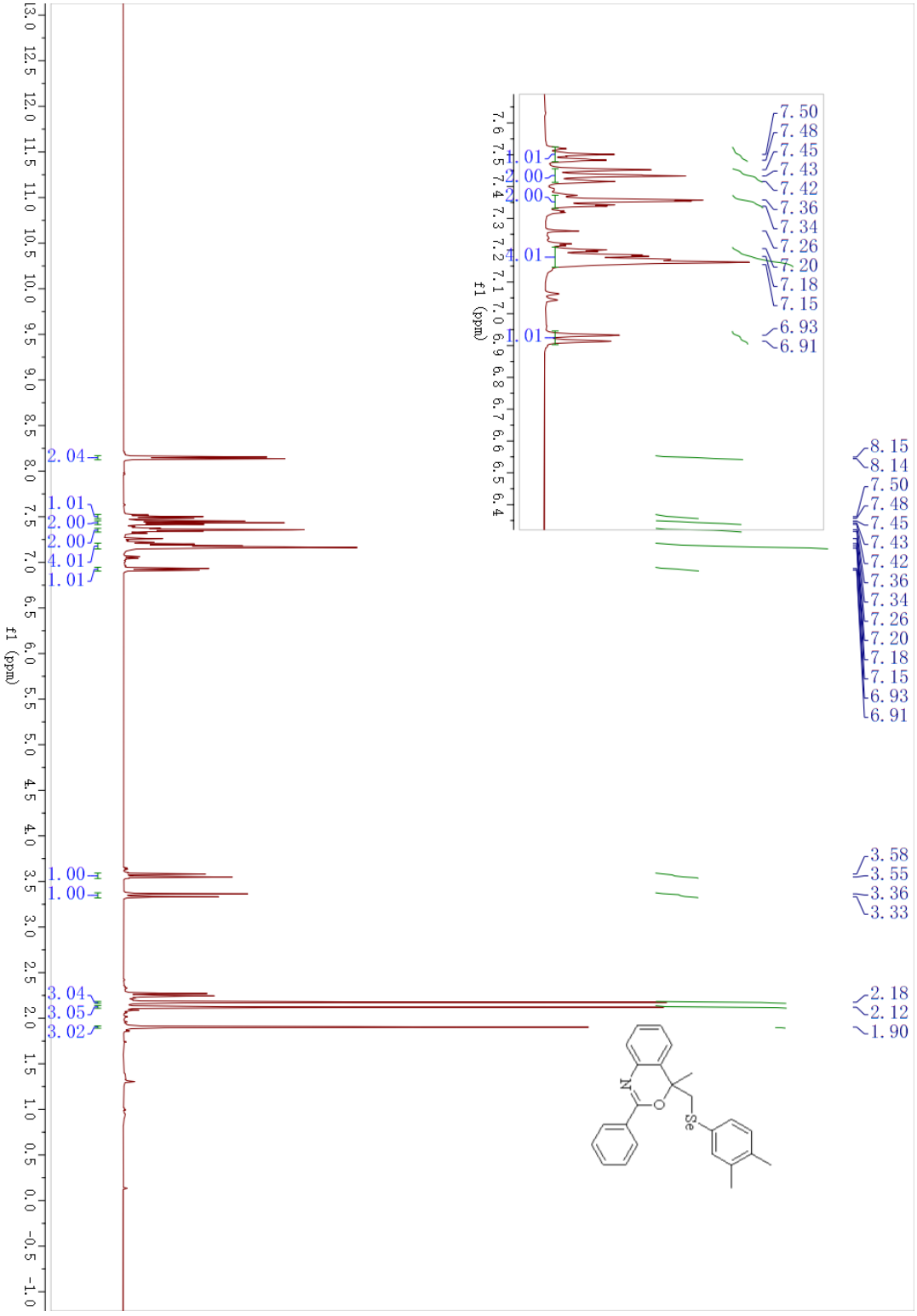
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ab**



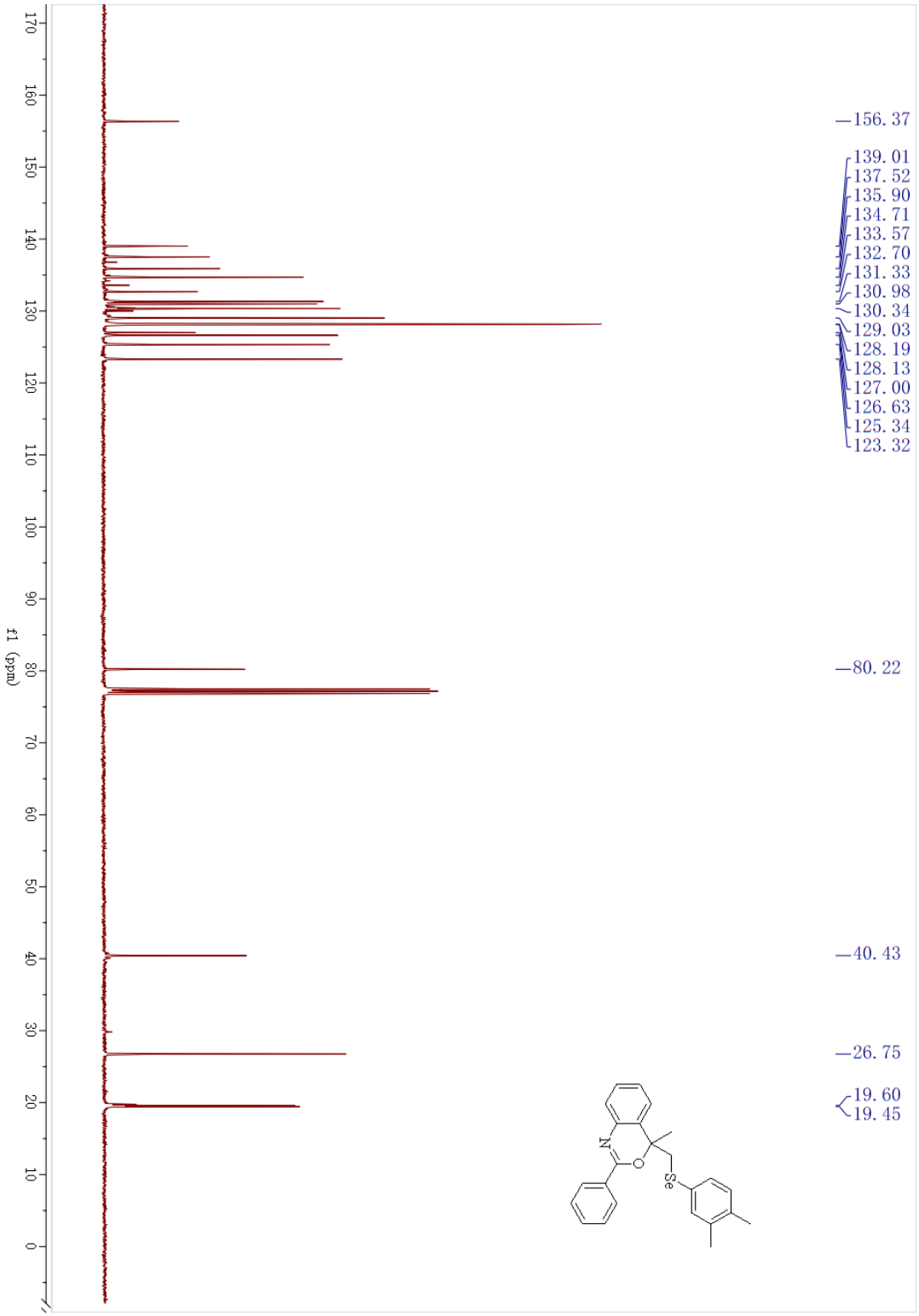
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ab**



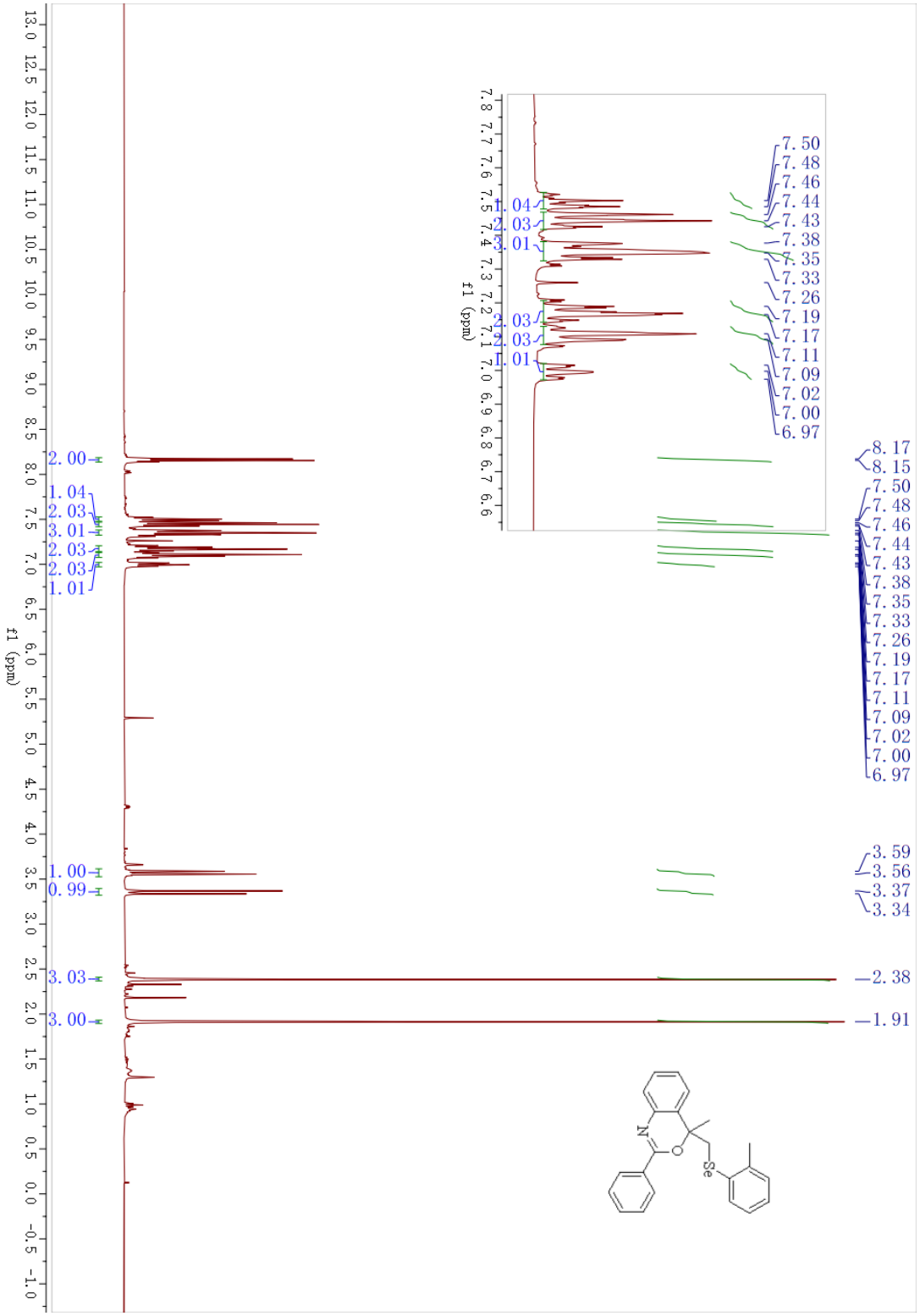
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ac**



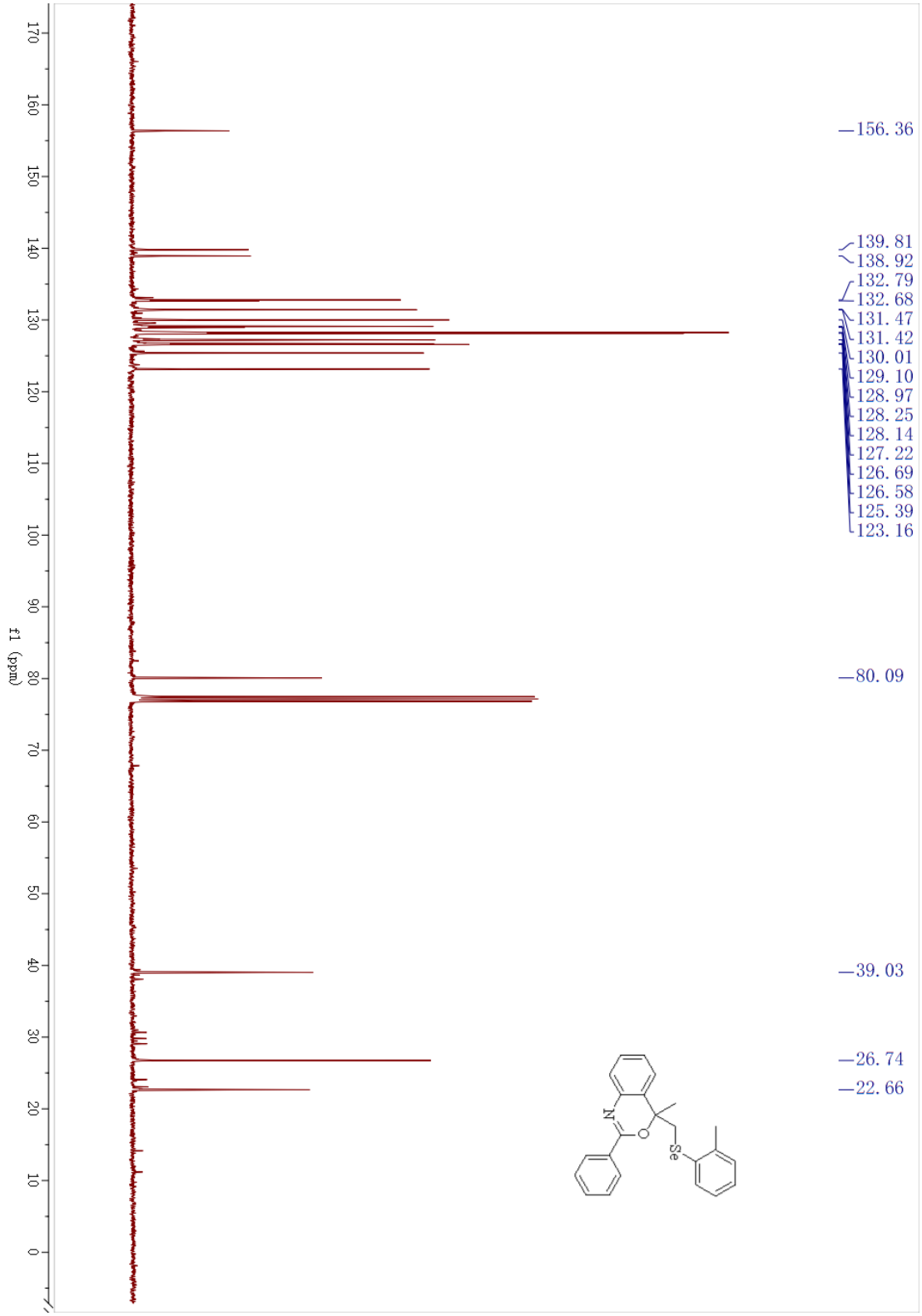
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ac**



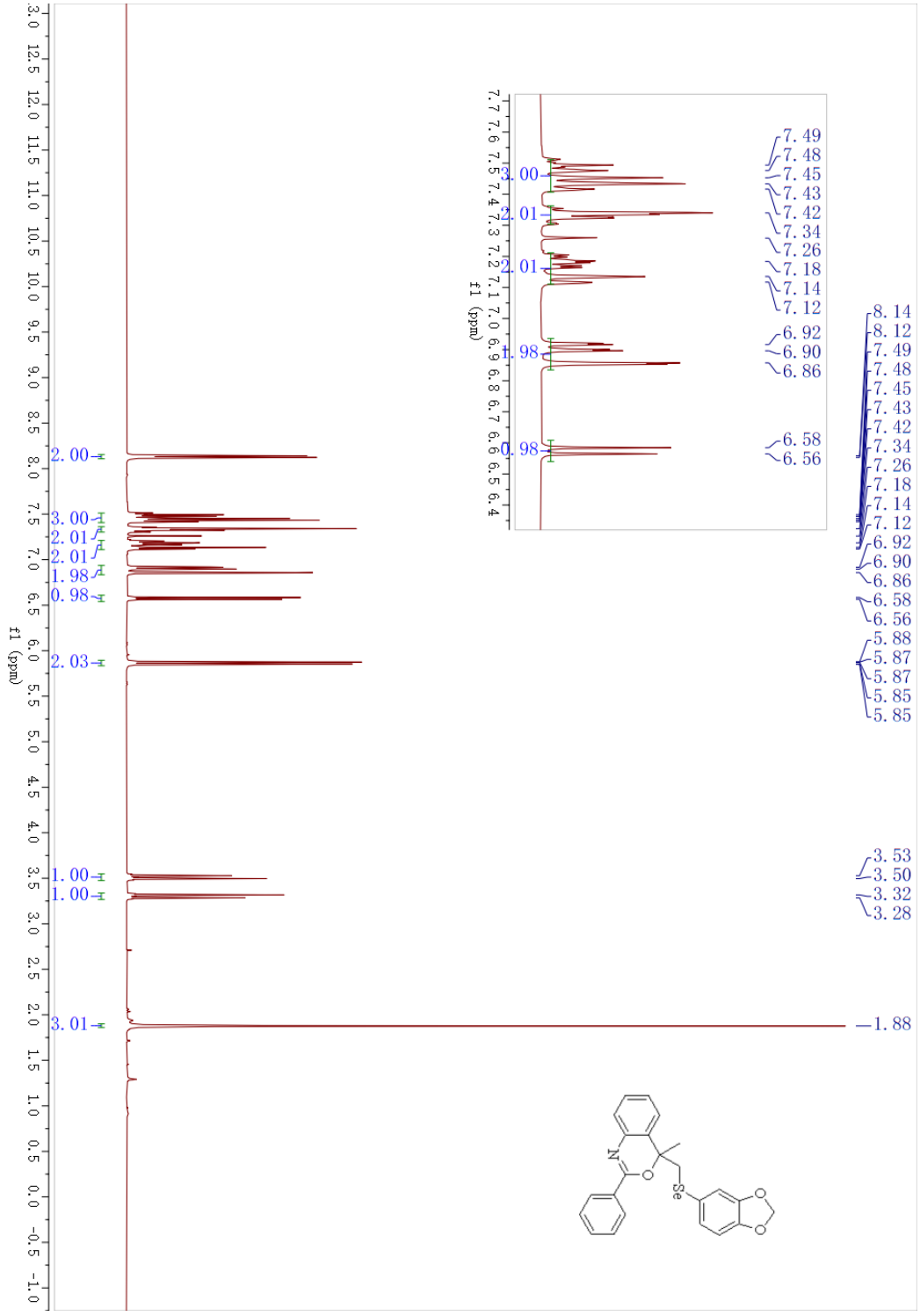
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ad**



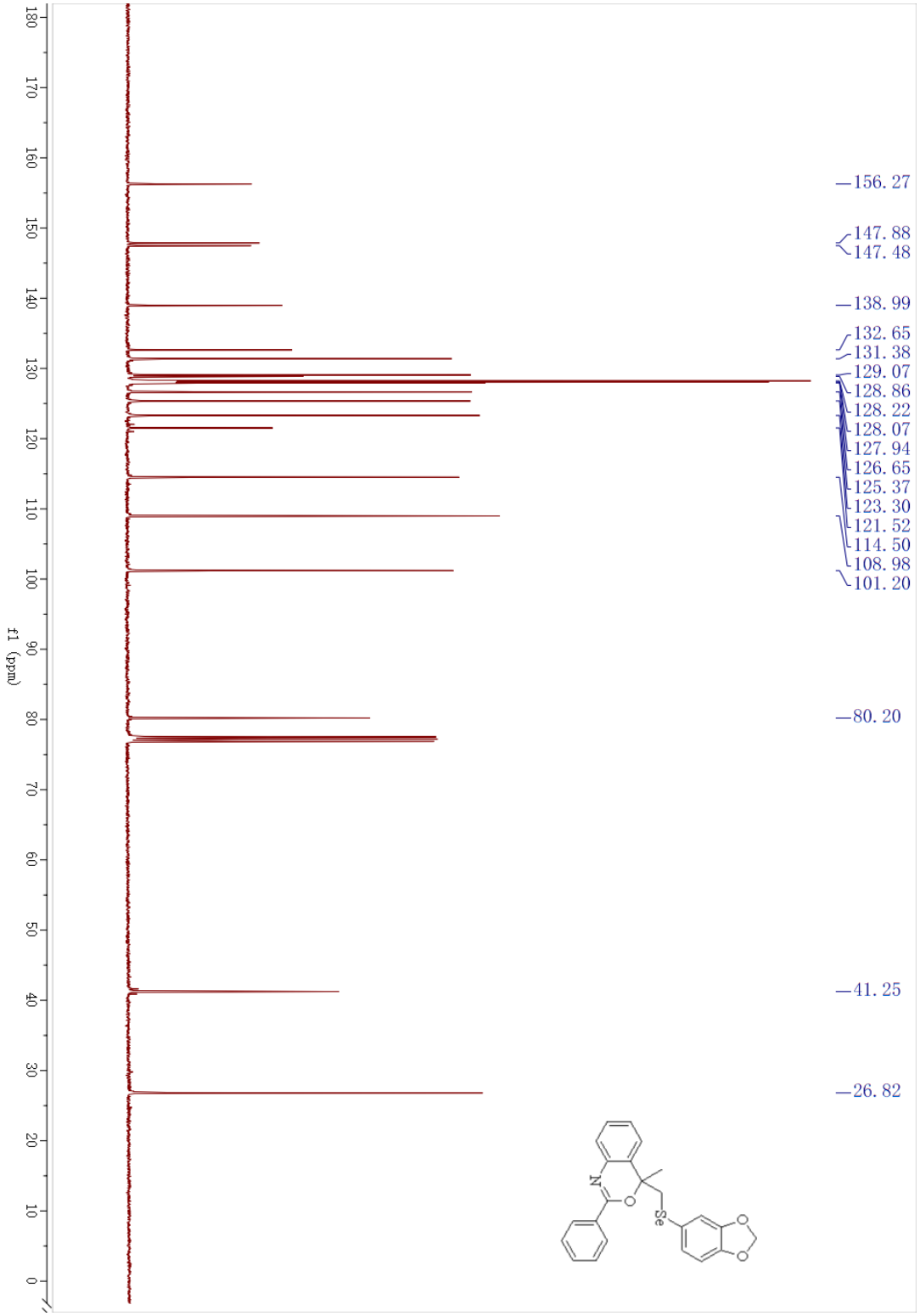
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ad**



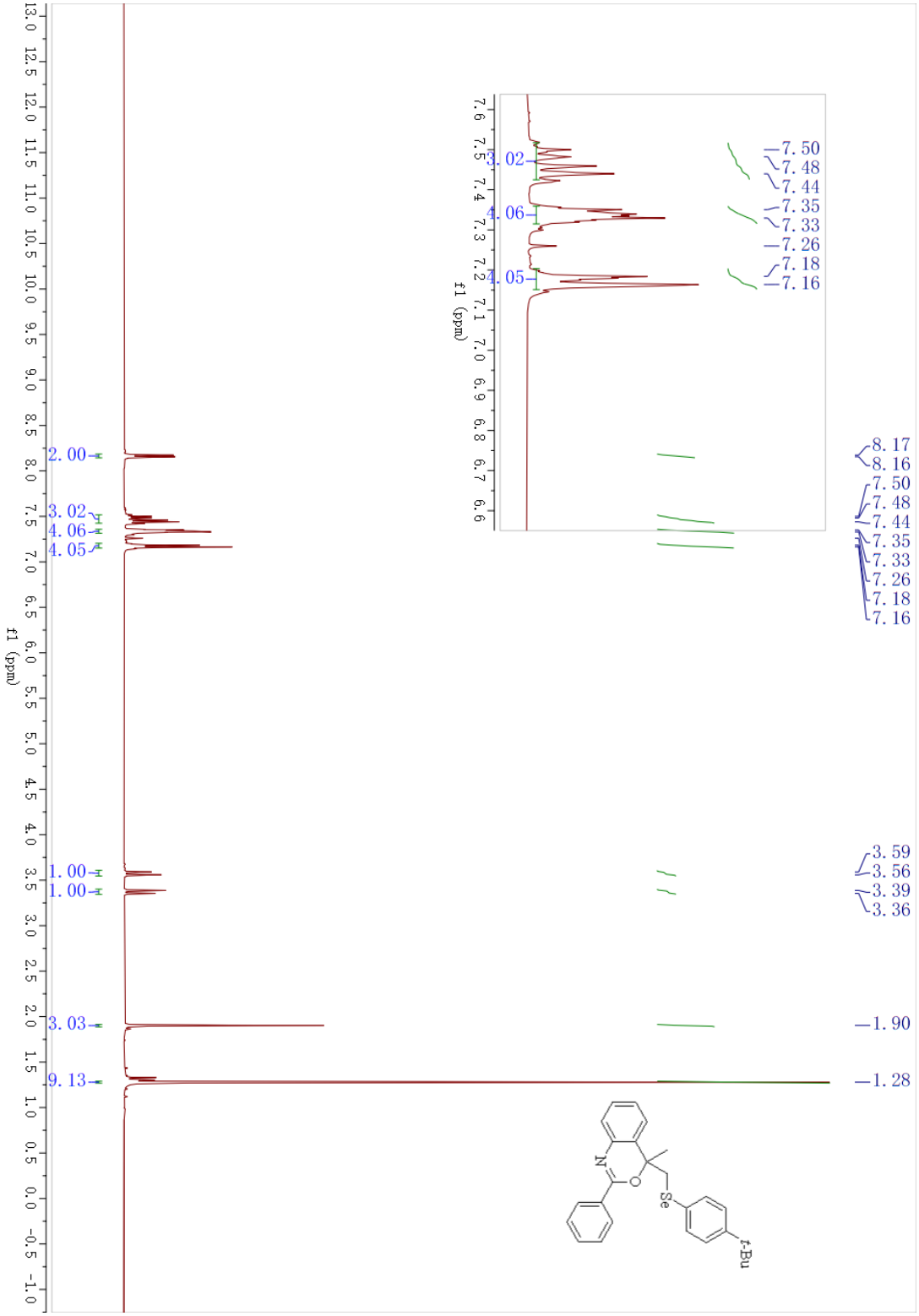
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ae**



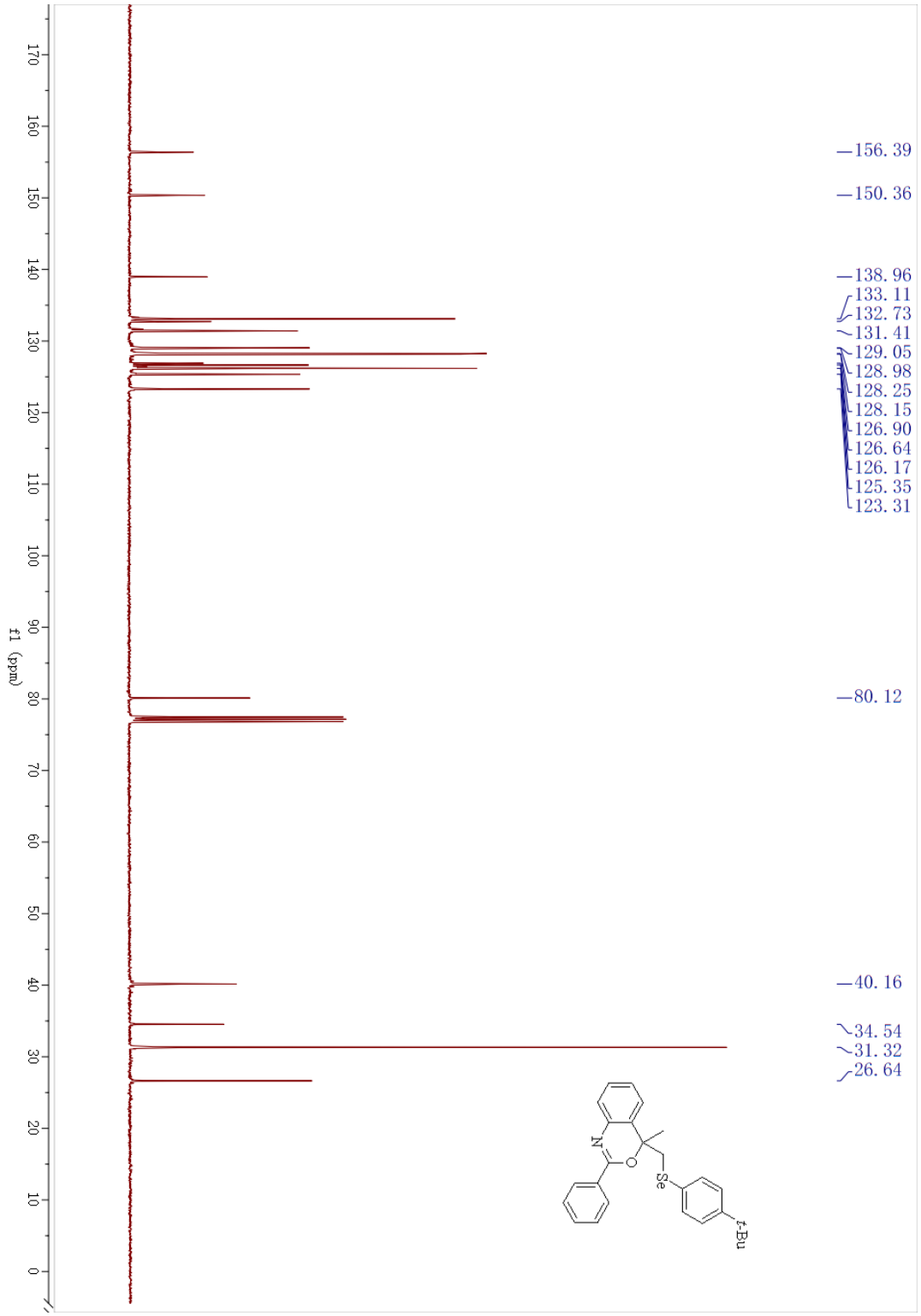
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ae**



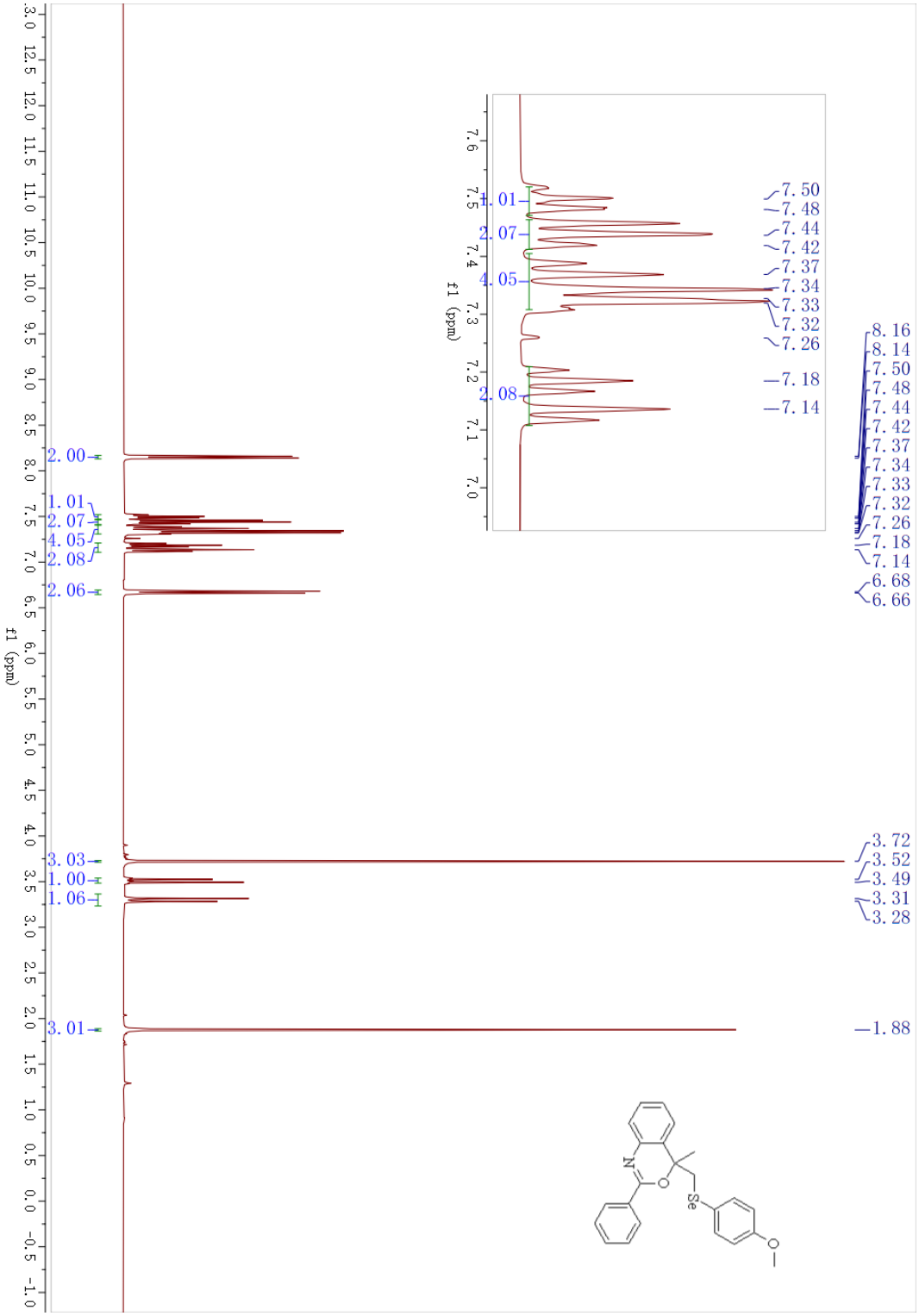
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3af**



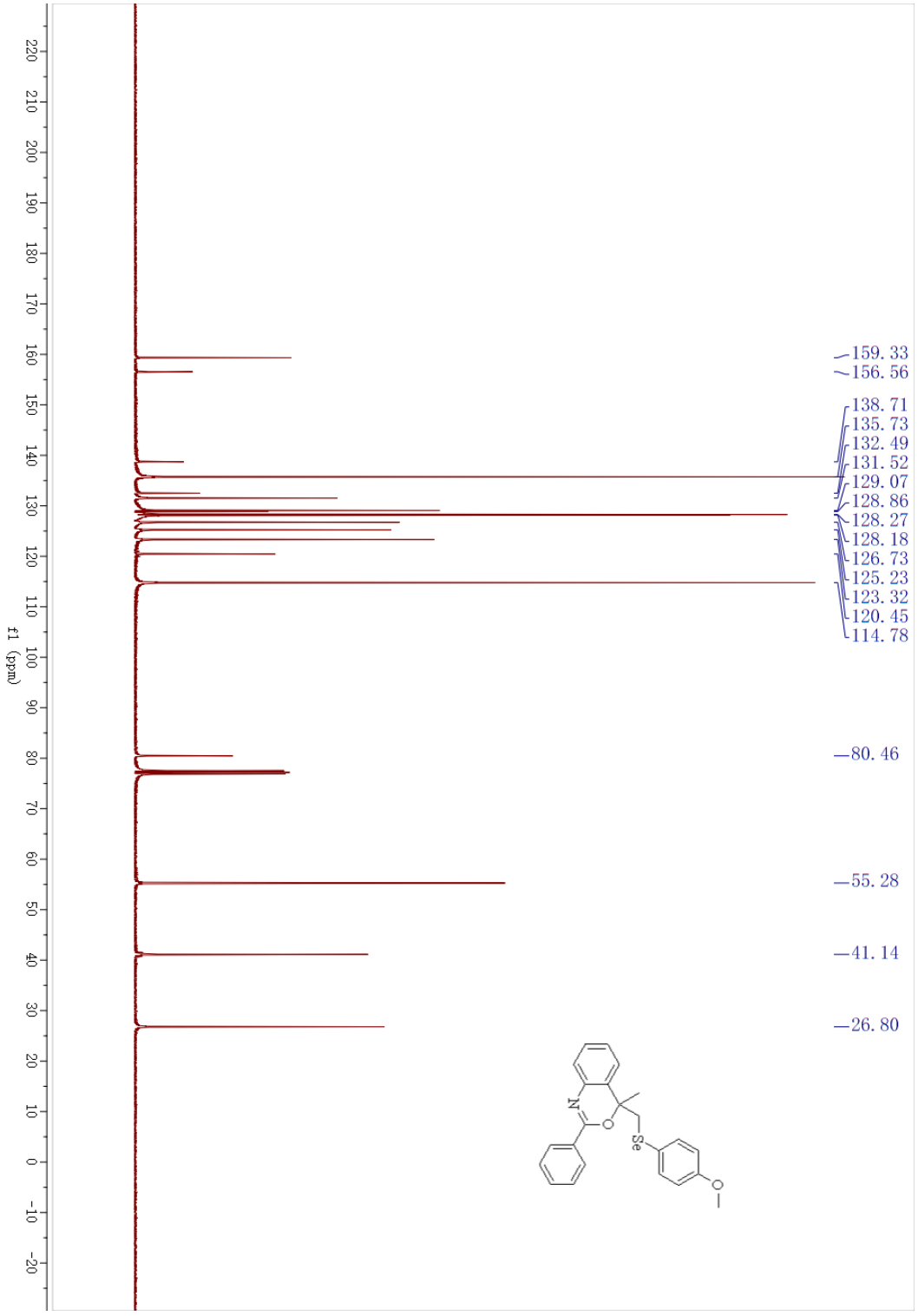
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3af**



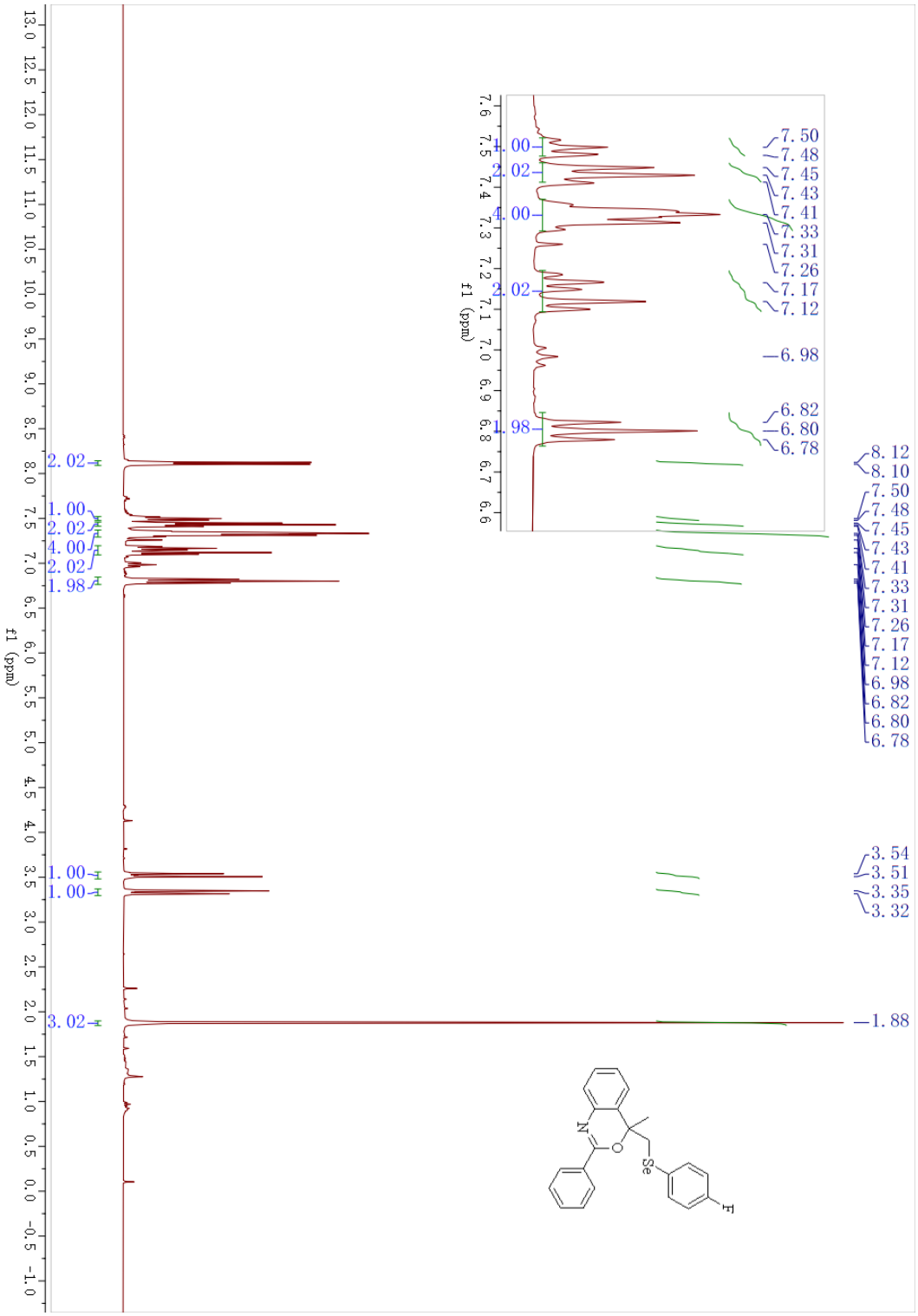
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ag**



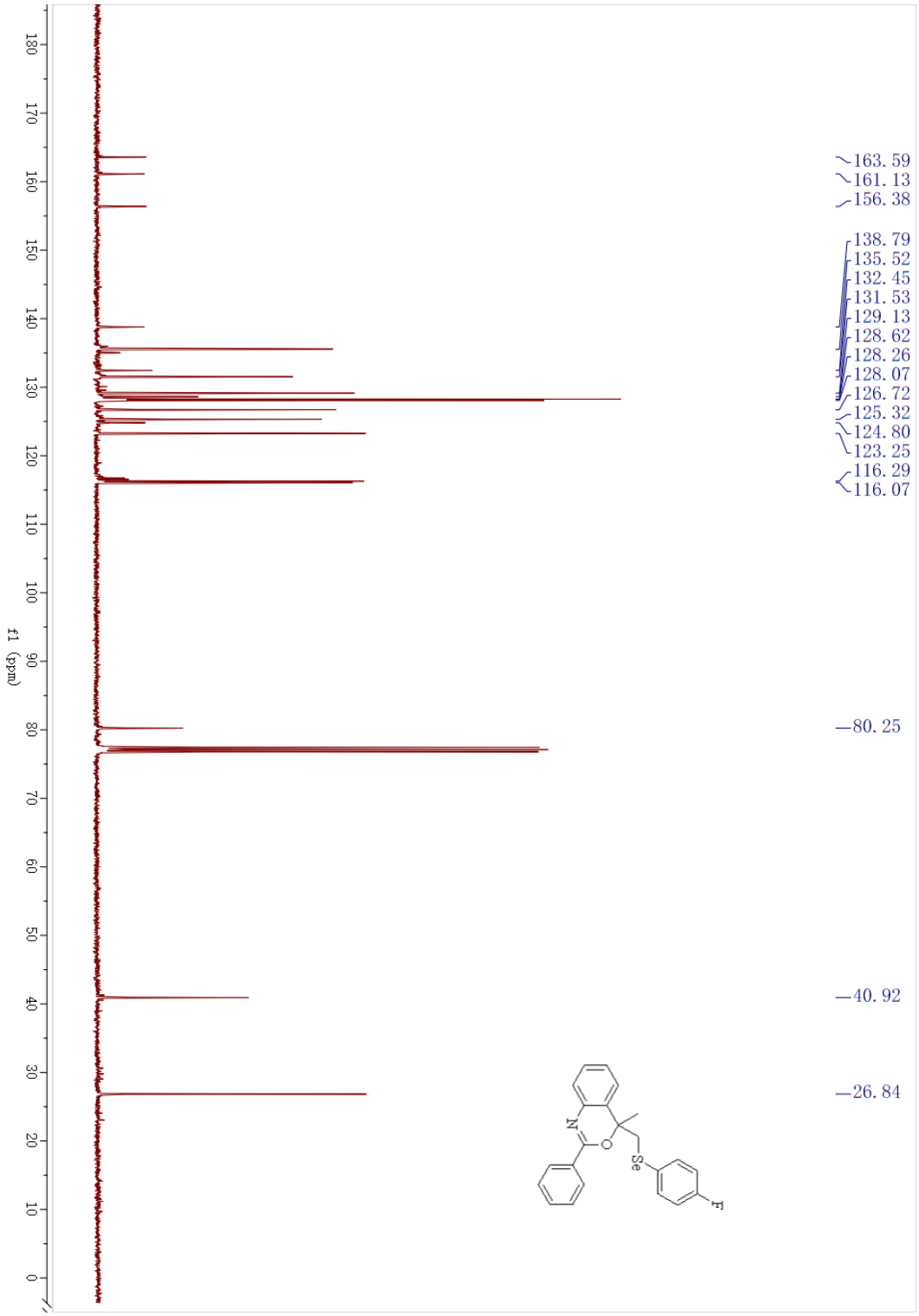
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ag**



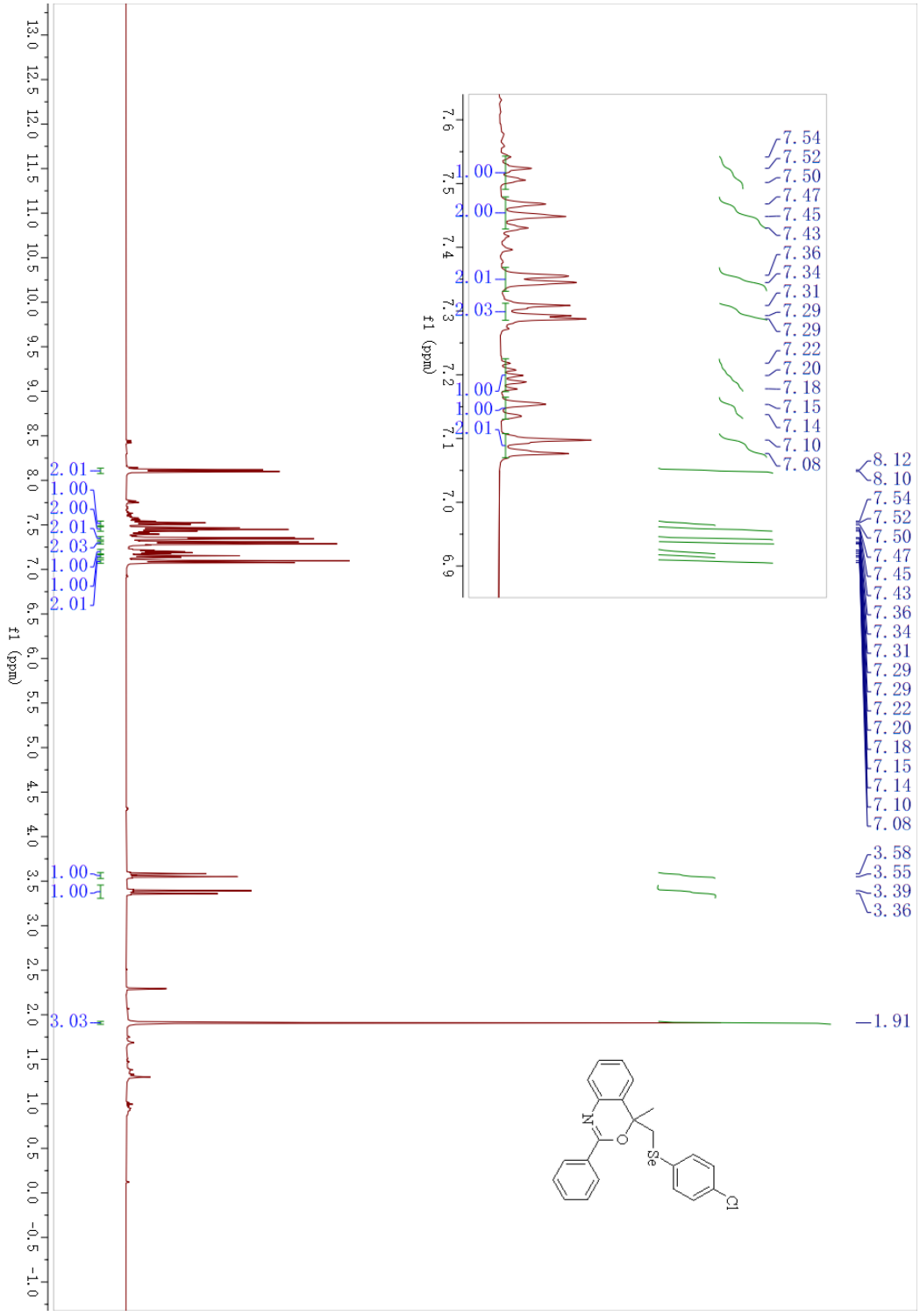
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ah**



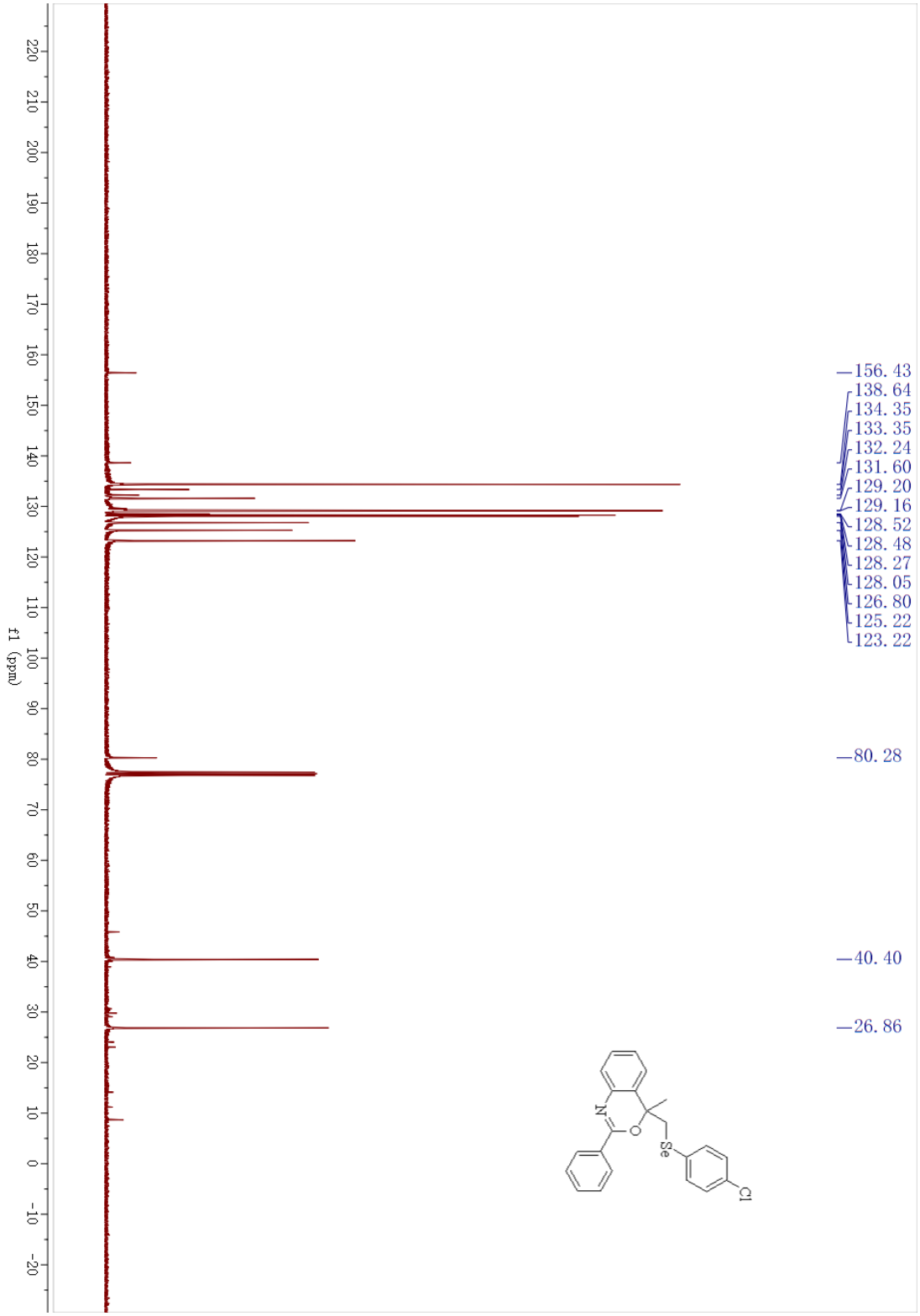
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ah**



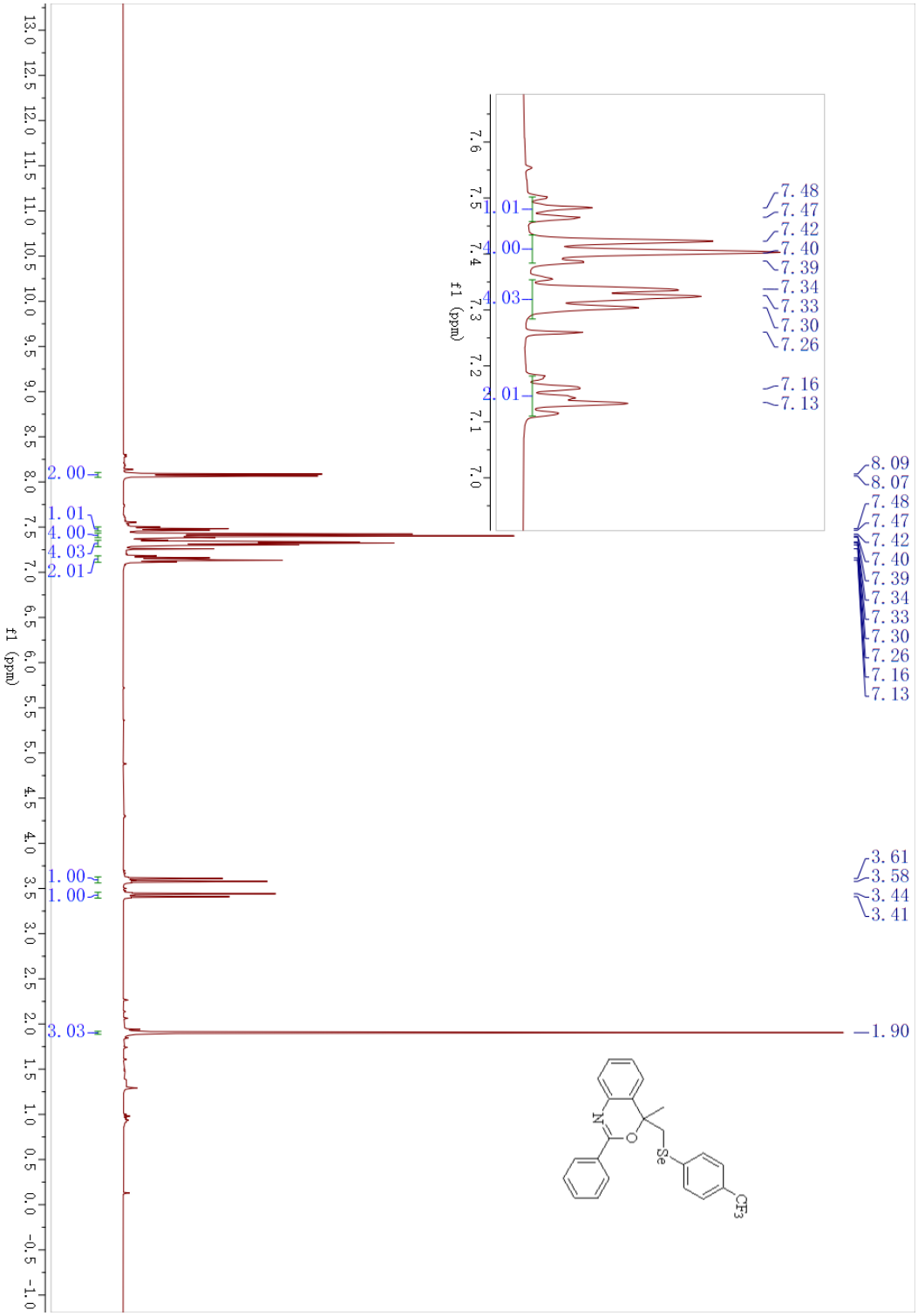
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ai**



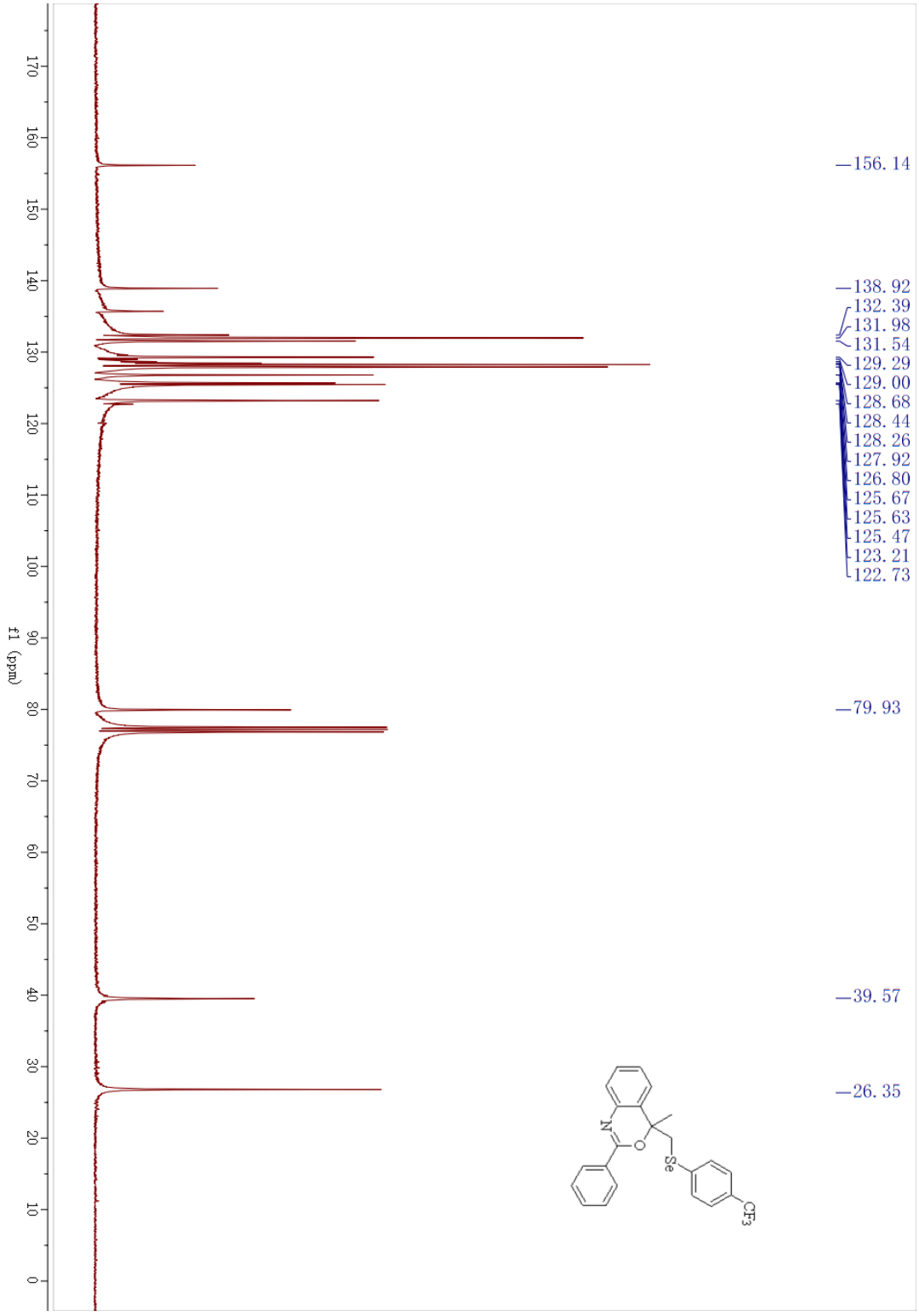
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ai**



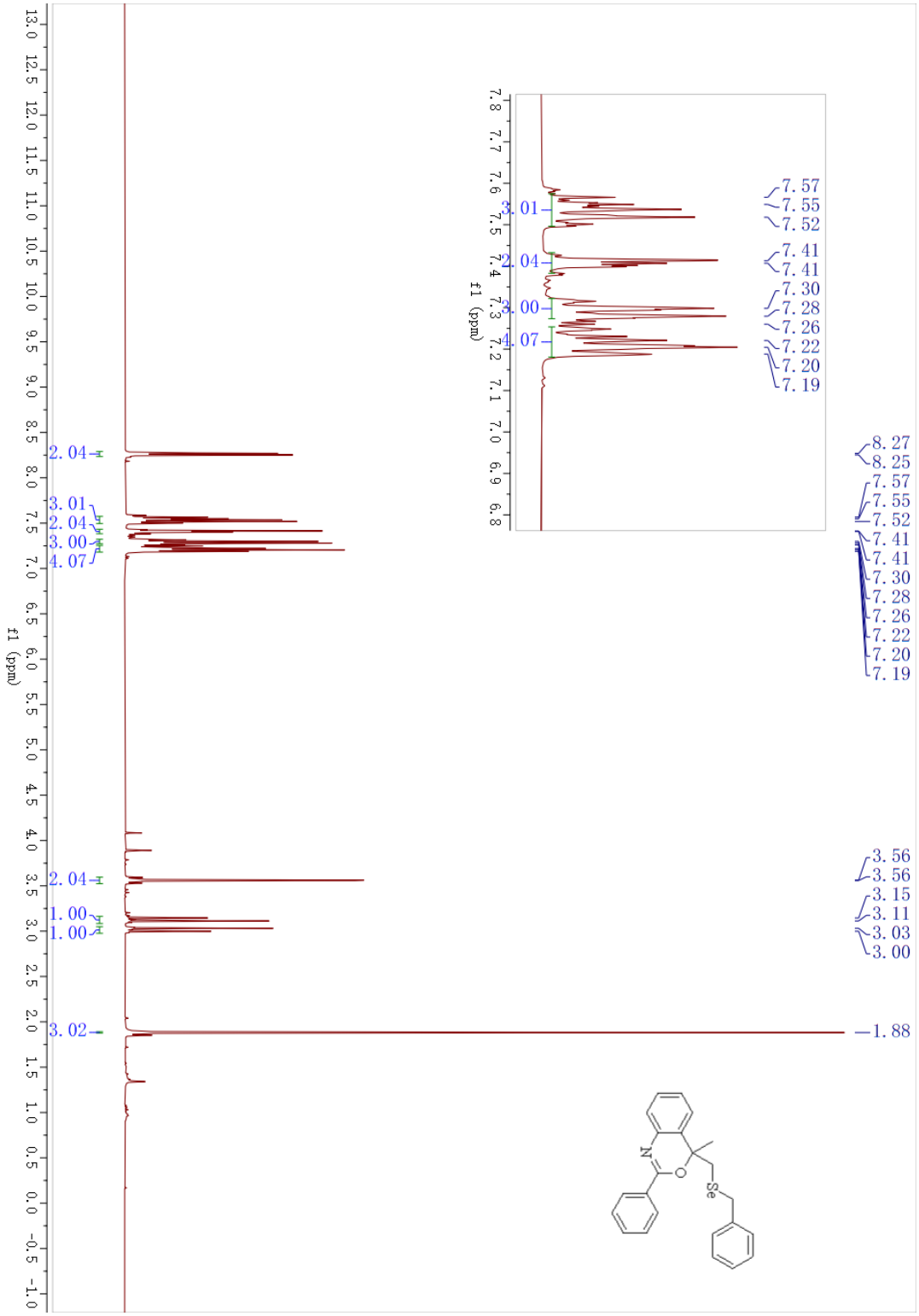
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3aj**



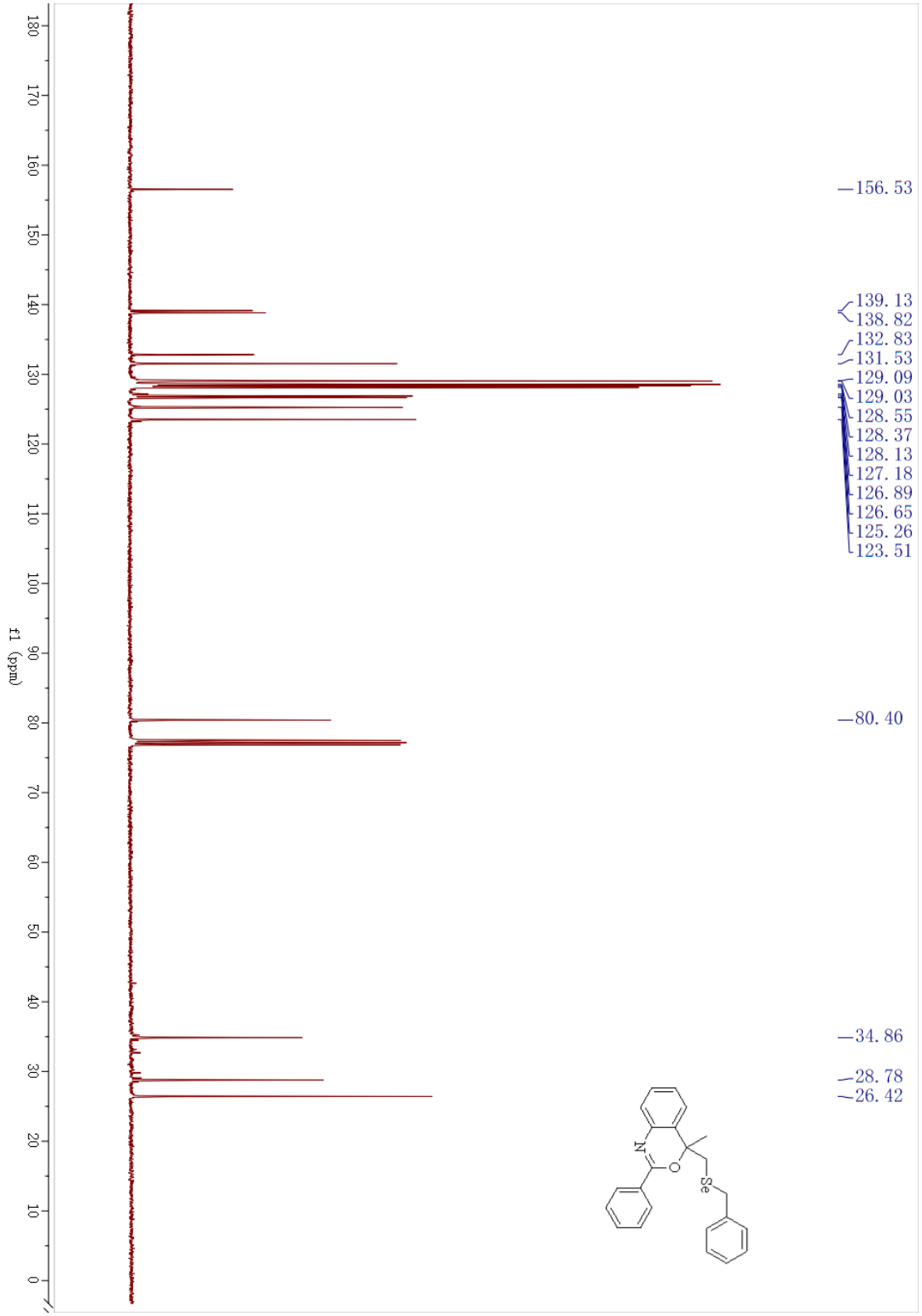
^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3aj**



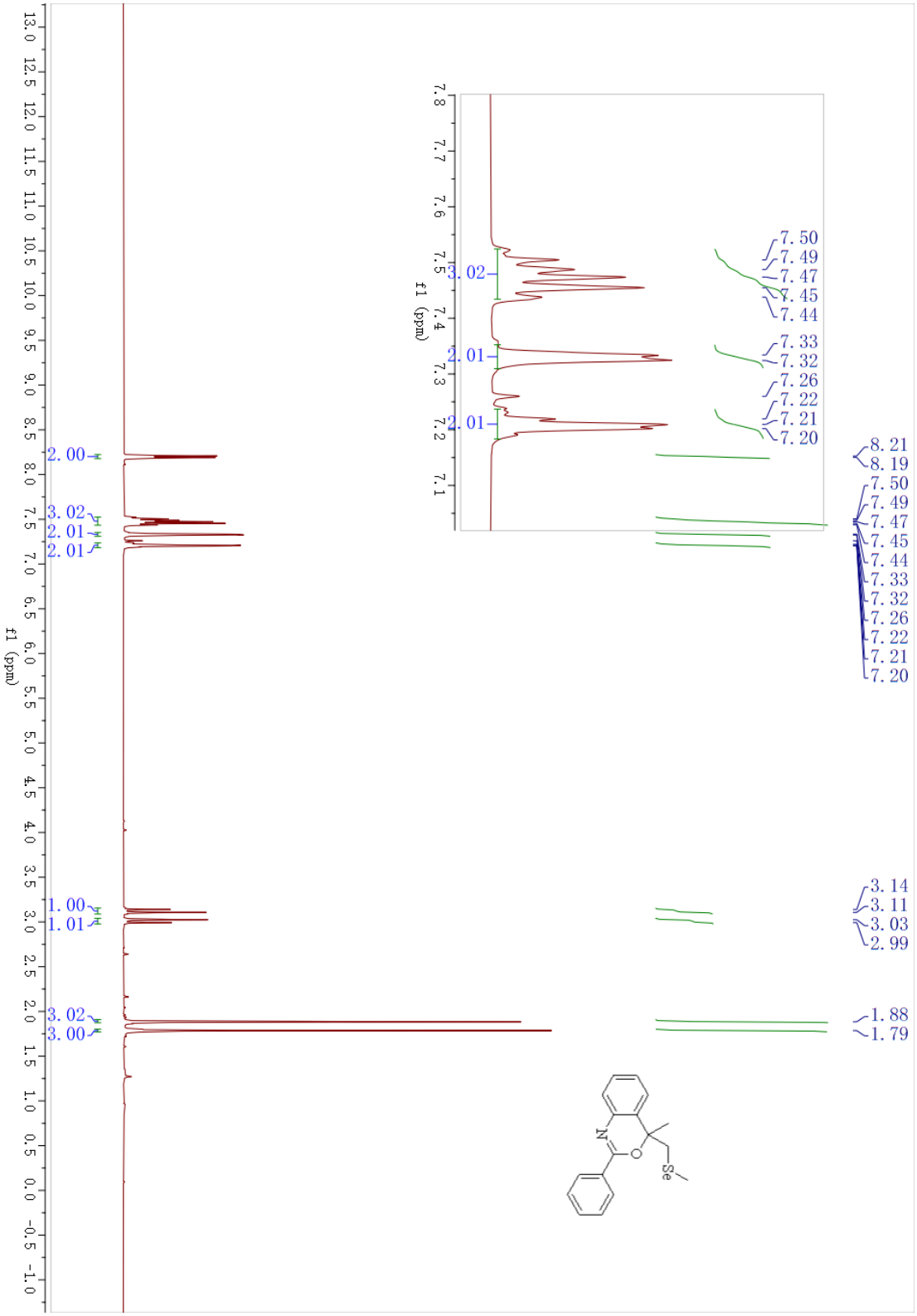
^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3ak**



^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3ak**



^{1}H NMR (400 MHz, $CDCl_3$) spectra of **3al**



^{13}C NMR (100 MHz, $CDCl_3$) spectra of **3al**