Supporting Information

Study on the Design, Synthesis, Bioactivity and Translocation of the Conjugates of Phenazine-1-carboxylic Acid and *N*-Phenyl Alanine Ester

Yiran Wu [1,2], Guoqing Mao [1,2], Gaoshan Xing [1,2], Yao Tian [1,2], Yong Hu [1,2], Changzhou Liao [1,2], Li Li [1,2], Xiang Zhu [1,2,3,*] and Junkai Li [1,2,*]

[1] Engineering Research Center of Ecology and Agricultural Use of Wetland, Ministry of Education, Hubei Key Laboratory of Waterlogging Disaster and Agricultural Use of Wetland, College of Agriculture, Yangtze University, Jingzhou 434025, China; wu18230085332@163.com (Y.W.); maoguoqing1688@163.com (G.M.); xinggaoshan6@163.com (G.X.); yaotien@163.com (Y.T.); yong251li@163.com (Y.H.); liaochangzhou58@163.com (C.L.); bohecha901@sina.com (L.L.)

[2] Institute of Pesticides, Yangtze University, Jingmi Road 88, Jingzhou 434025, China

[3] National Key Laboratory of Green Pesticide, Key Laboratory of Green Pesticide and Agricultural Bioengineering, Ministry of Education, Guizhou University, Guiyang 550025, China

* Correspondence: xiangzhu1992@yangtzeu.edu.cn (X.Z.); junkaili@sina.com (J.L.)

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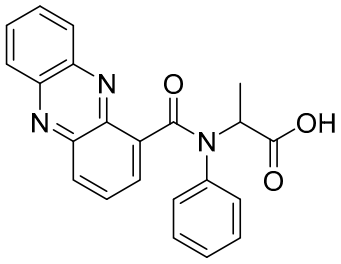
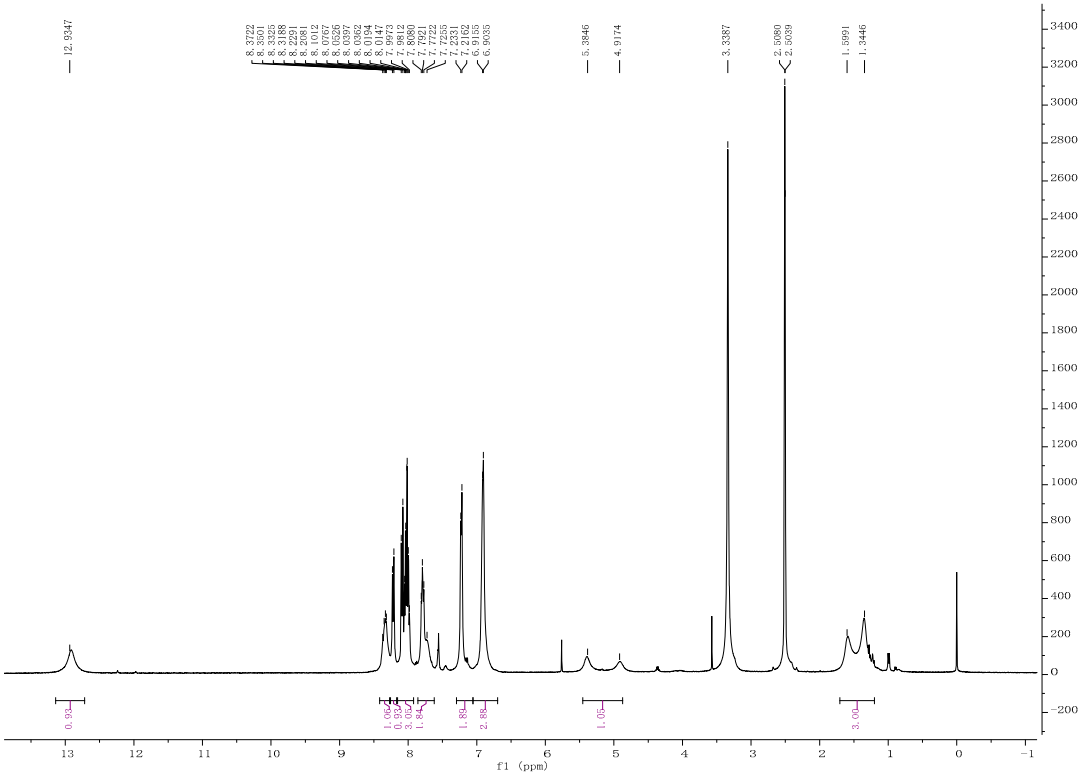
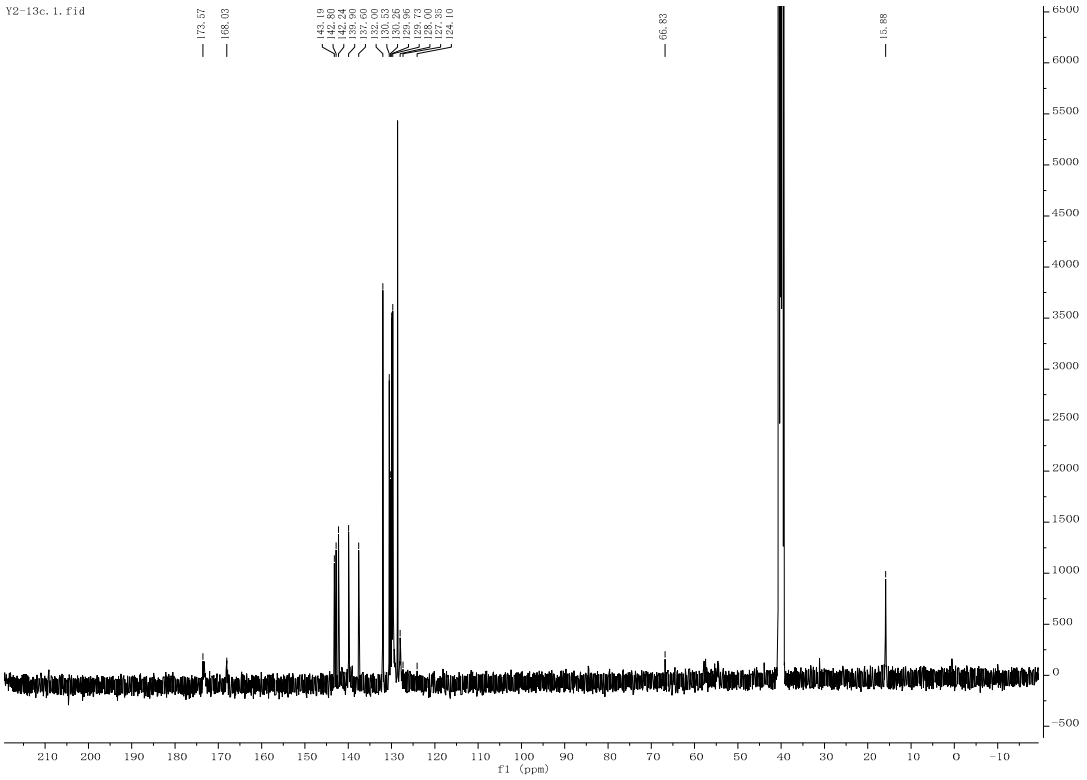
Compound **F1**,
N-(phenazine-1-carbonyl)-*N*-phenylalanine



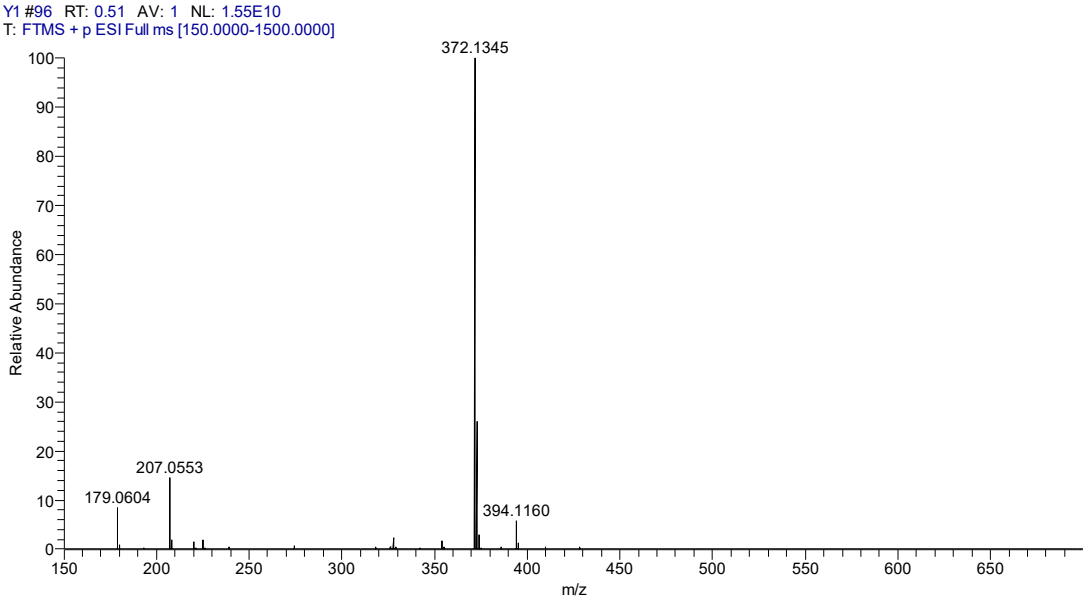
Yellow solid, yield 80.1%, m.p. 130.9-132.1℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 12.93 (s, 1H), 8.34 (dd, J = 14.2, 7.2 Hz, 1H), 8.22 (d, J = 8.4 Hz, 1H), 8.15 – 7.92 (m, 3H), 7.86 – 7.62 (m, 2H), 7.22 (d, J = 6.8 Hz, 2H), 7.05 – 6.70 (m, 3H), 5.15 (1H, two isomers), 1.47 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.57, 168.03, 143.19, 142.80, 142.24, 139.90, 137.60, 132.00, 130.53 (2C), 130.26 (2C), 129.96 (2C), 129.73, 128.60, 128.00, 127.35, 124.10 (2C), 66.83, 15.88. HRMS (ESI): calcd for $C_{23}H_{17}N_3O_3$ {$[M+H]^+$}, 372.1343; found, 372.1345.



The ^{1}H NMR spectrogram of compound **F1**

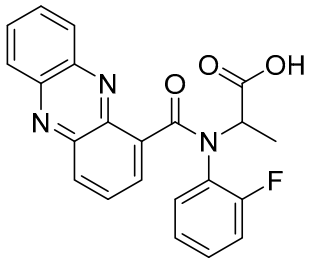


The ^{13}C NMR spectrogram of compound **F1**

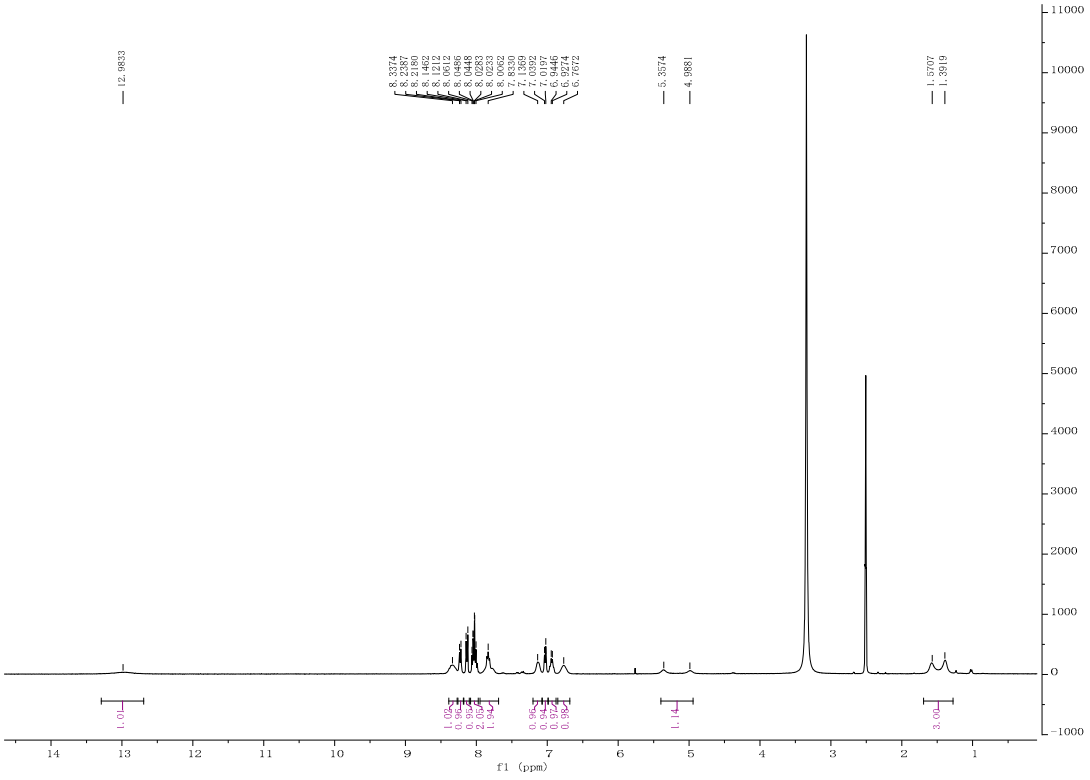


The HRMS spectrogram of compound **F1**

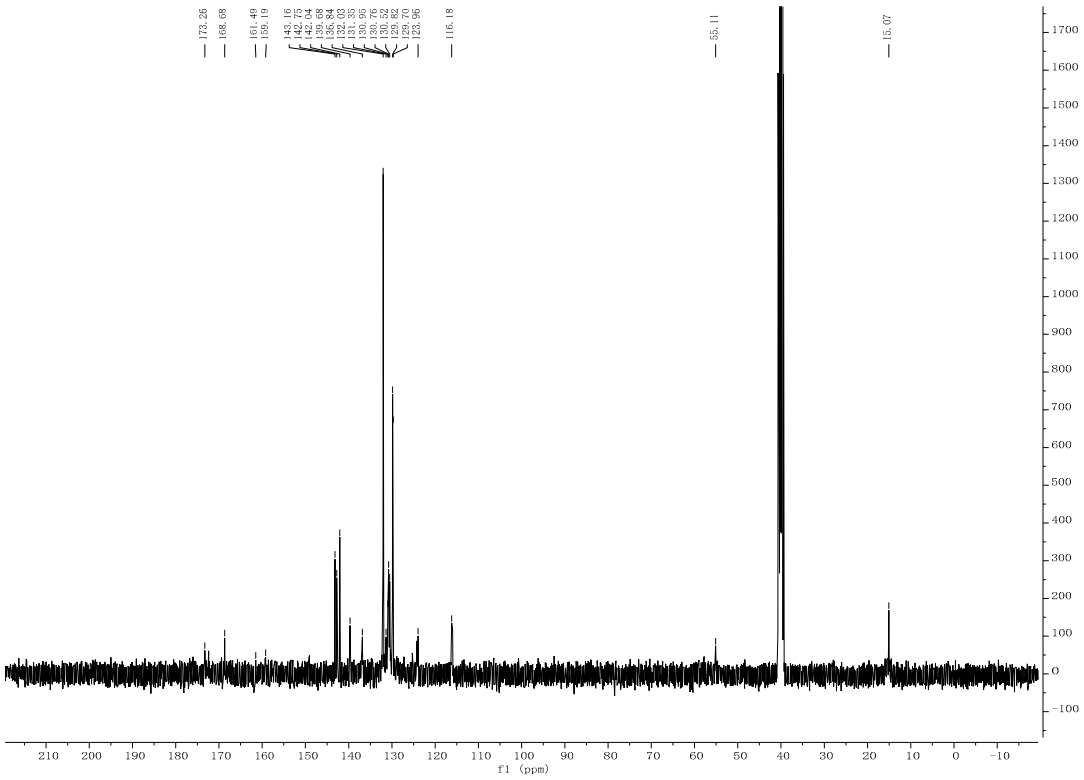
Compound **F2**,
N-(2-fluorophenyl)-*N*-(phenazine-1-carbonyl)alanine



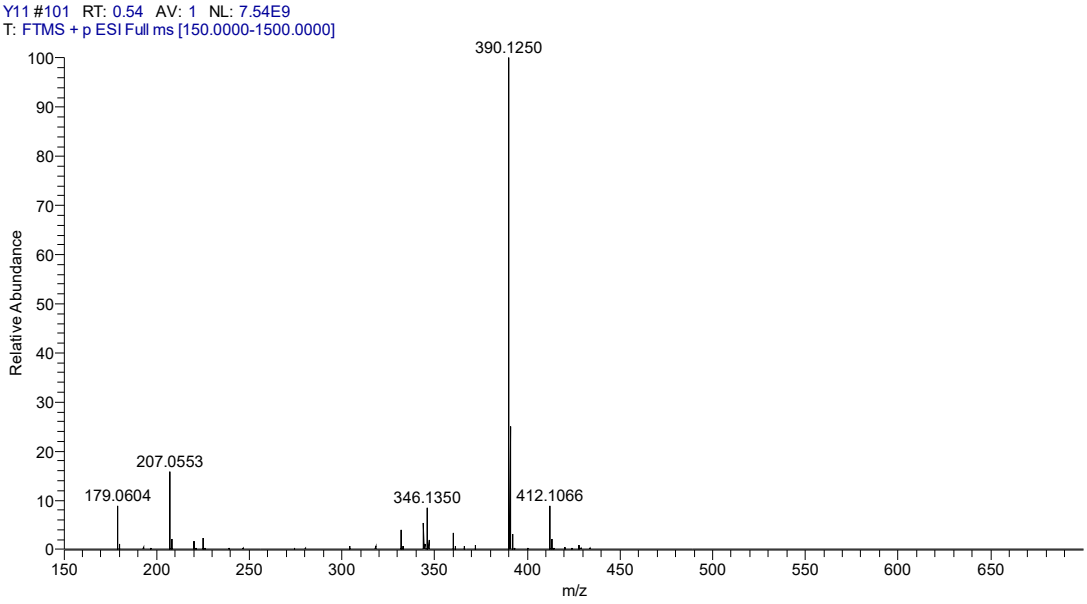
Yellow solid, yield 78.9%, m.p. 108.4-110.2℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 12.98 (s, 1H), 8.34 (s, 1H), 8.23 (d, J = 8.3 Hz, 1H), 8.13 (d, J = 10.0 Hz, 1H), 8.08 – 7.97 (m, 2H), 7.83 (s, 2H), 7.14 (s, 1H), 7.03 (d, J = 7.8 Hz, 1H), 6.94 (d, J = 6.9 Hz, 1H), 6.77 (s, 1H), 5.17 (1H, two isomers), 1.39 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.26, 168.68, 161.49, 159.19, （dd, $_{C=C-F}$=J= 232.3 Hz）143.16, 142.75, 142.04, 139.68, 136.84 (2C), 132.03 (2C), 131.35 (2C), 130.95, 130.76, 130.52, 129.82, 129.70, 123.96, 116.18, 55.11, 15.07. HRMS (ESI): calcd for $C_{22}H_{16}FN_3O_3$ {[M+H]$^+$}, 390.1248; found, 390.1250.



The ^{1}H NMR spectrogram of compound **F2**

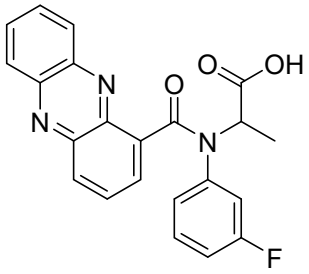


The ^{13}C NMR spectrogram of compound **F2**

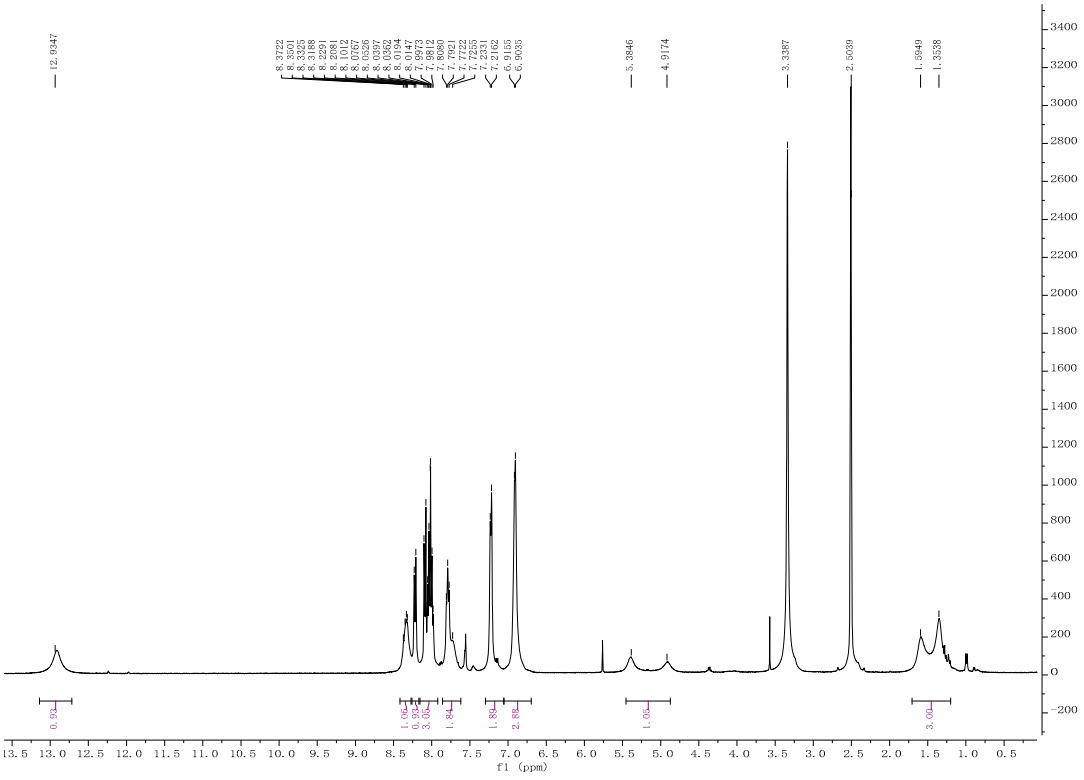


The HRMS spectrogram of compound **F2**

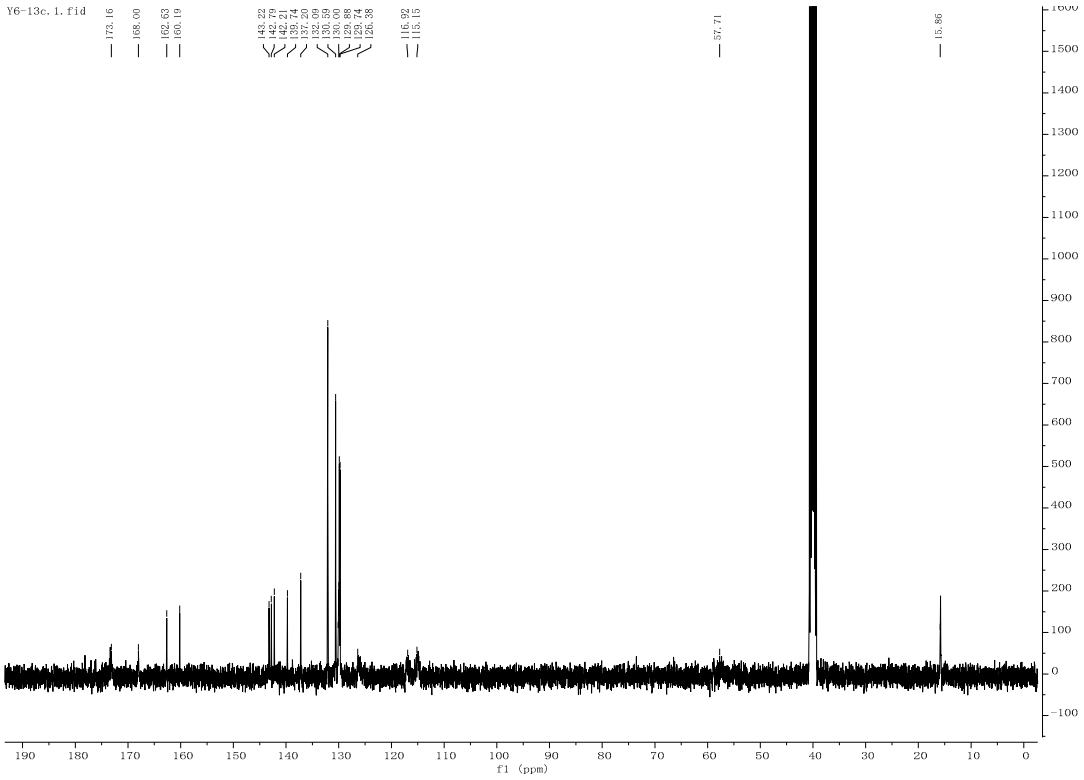
Compound **F3**,
N-(3-fluorophenyl)-*N*-(phenazine-1-carbonyl)alanine



Yellow solid, yield 80.1%, m.p. 106.2-107.1℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.96 (s, 1H), 8.33 (dd, J = 17.2, 9.4 Hz, 1H), 8.21 (d, J = 8.3 Hz, 1H), 8.12 (d, J = 10.0 Hz, 1H), 8.05 – 7.97 (m, 2H), 7.93 – 7.70 (m, 2H), 7.12 (s, 1H), 7.02 (d, J = 7.8 Hz, 1H), 6.92 (q, J = 7.1 Hz, 1H), 6.74 (s, 1H), 5.17 (1H, two isomers), 1.47 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.16, 168.00, 162.63, 160.19, (dd, $_{C=C-F}J$ = 246.44 Hz) 143.22, 142.79, 142.21, 139.74, 137.20, 132.09, 130.59 (2C), 130.00 (2C), 129.88 (2C), 129.74 (2C), 126.38, 116.92, 115.15, 57.71, 15.86. HRMS (ESI): calcd for $C_{22}H_{16}FN_3O_3$ {[M+H]$^+$}, 390.1248; found, 390.1248.



The ^{1}H NMR spectrogram of compound **F3**



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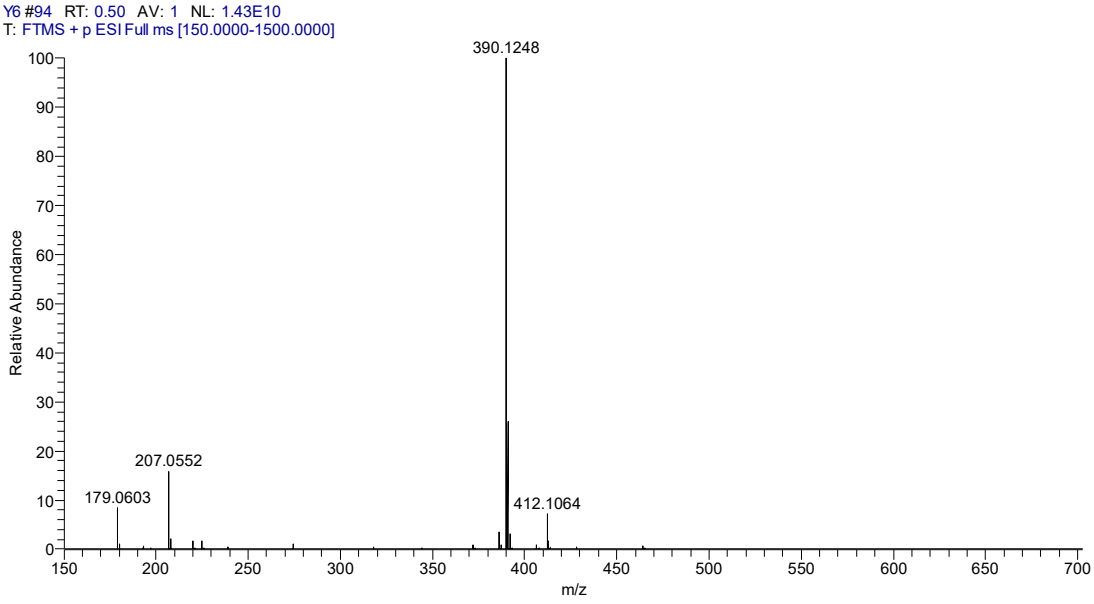
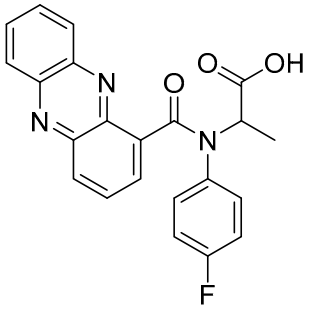
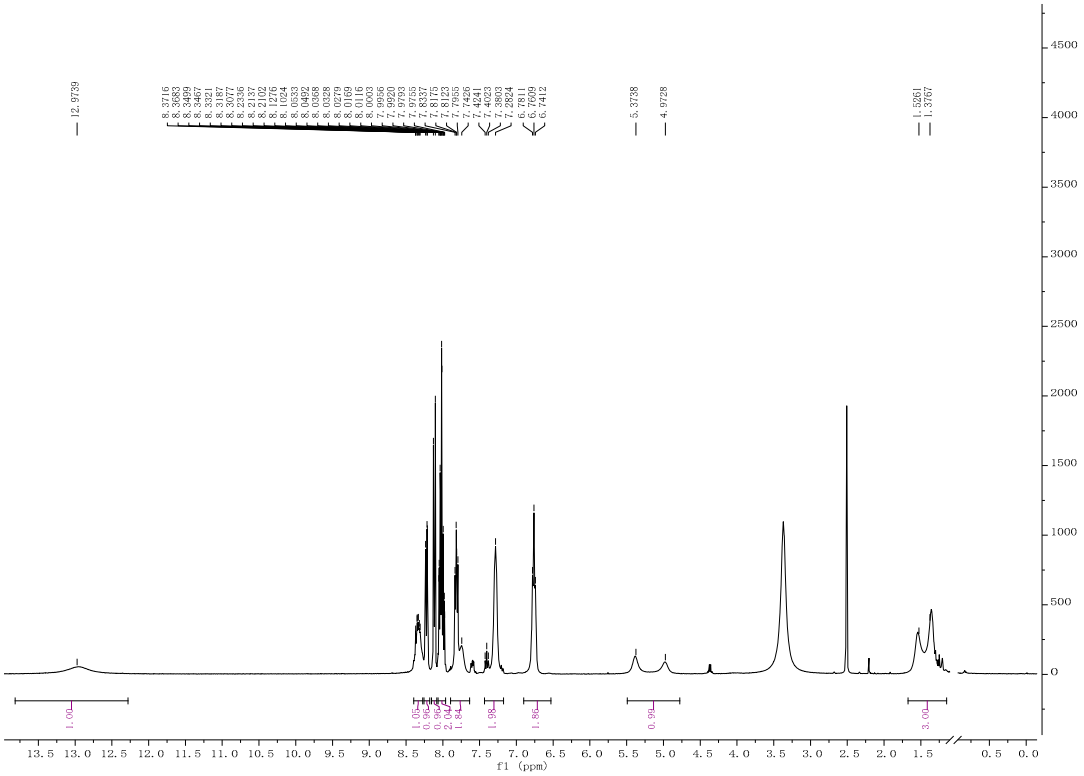


The HRMS spectrogram of compound **F3**

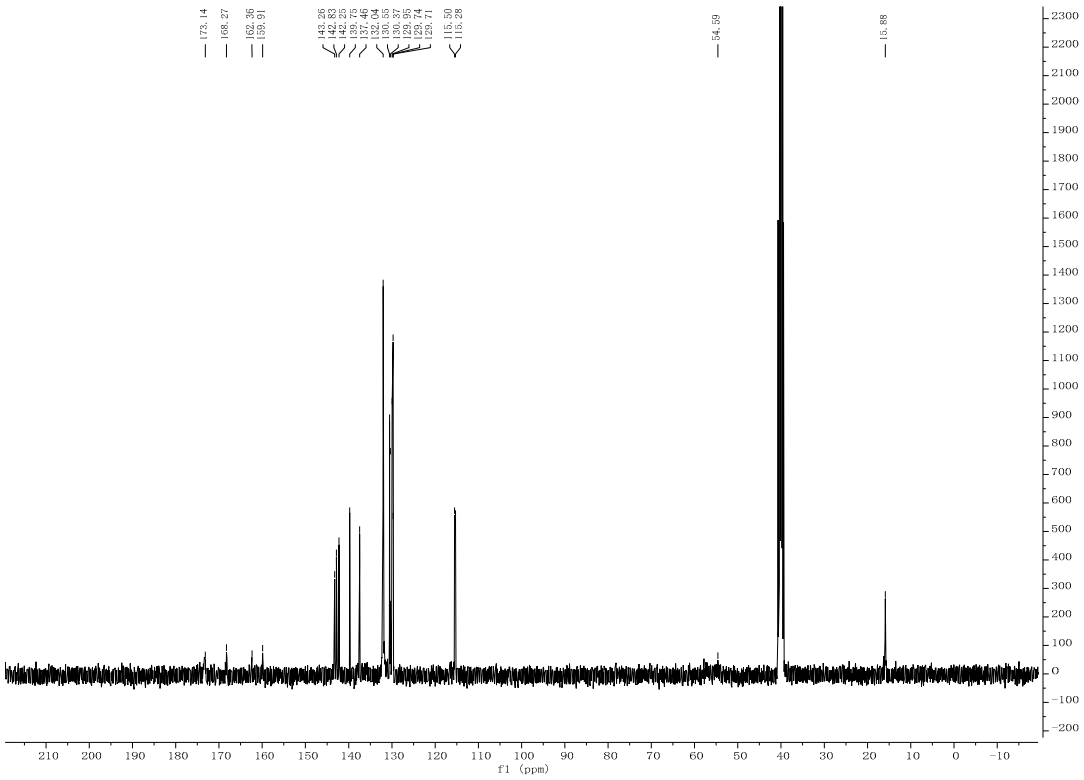
Compound **F4**,
N-(4-fluorophenyl)-*N*-(phenazine-1-carbonyl)alanine



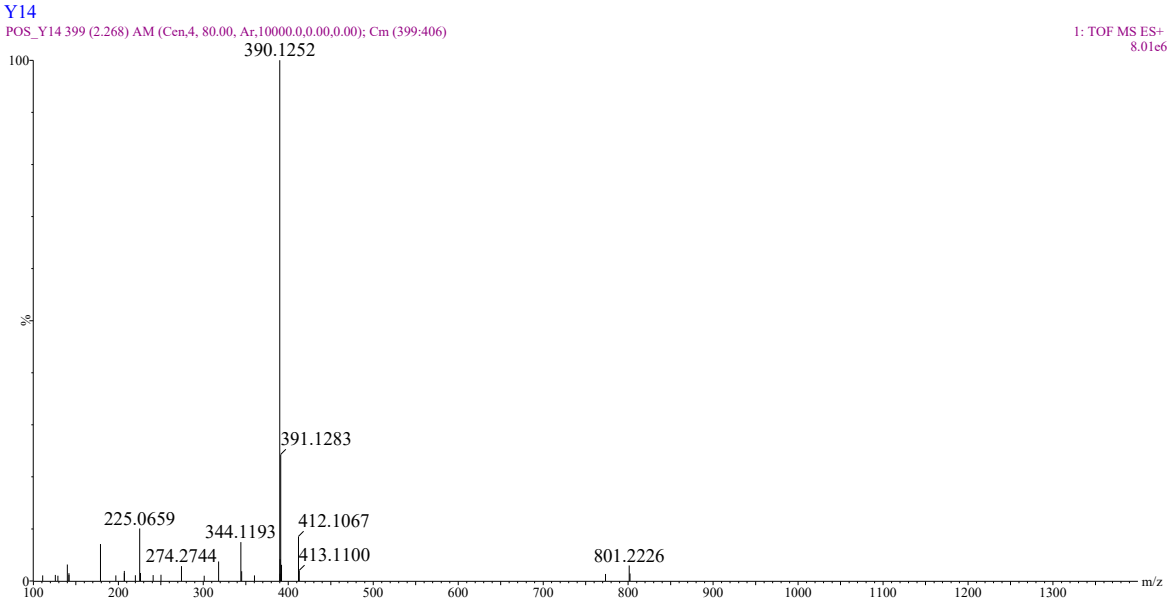
Yellow solid, yield 80.5%, m.p. 80.1-81.4℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.97 (s, 1H), 8.39 – 8.27 (m, 1H), 8.26 – 8.18 (m, 1H), 8.12 (d, J = 10.1 Hz, 1H), 8.01 (dddd, J = 14.4, 8.1, 6.6, 1.6 Hz, 2H), 7.81 (dd, J = 8.7, 6.6 Hz, 2H), 7.43 – 7.17 (m, 2H), 6.76 (t, J = 8.0 Hz, 2H), 5.17 (1H, two isomers), 1.45 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.14, 168.27, 162.36, 159.91, (dd, $_{C=C-F}$=J = 247.45 Hz) 143.26, 142.83, 142.25, 139.75, 137.46, 132.04, 130.55, 130.37, 129.95, 129.74, 129.71, 115.50, 115.28, 54.59, 15.88. HRMS (ESI): calcd for $C_{22}H_{16}FN_3O_3$ {$[M+H]^+$}, 390.1249; found, 390.1252.



The ^{1}H NMR spectrogram of compound **F4**

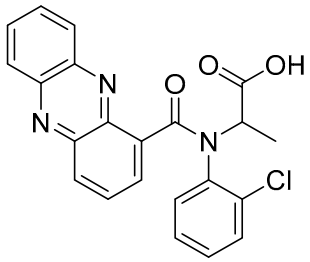


The ^{13}C NMR spectrogram of compound **F4**

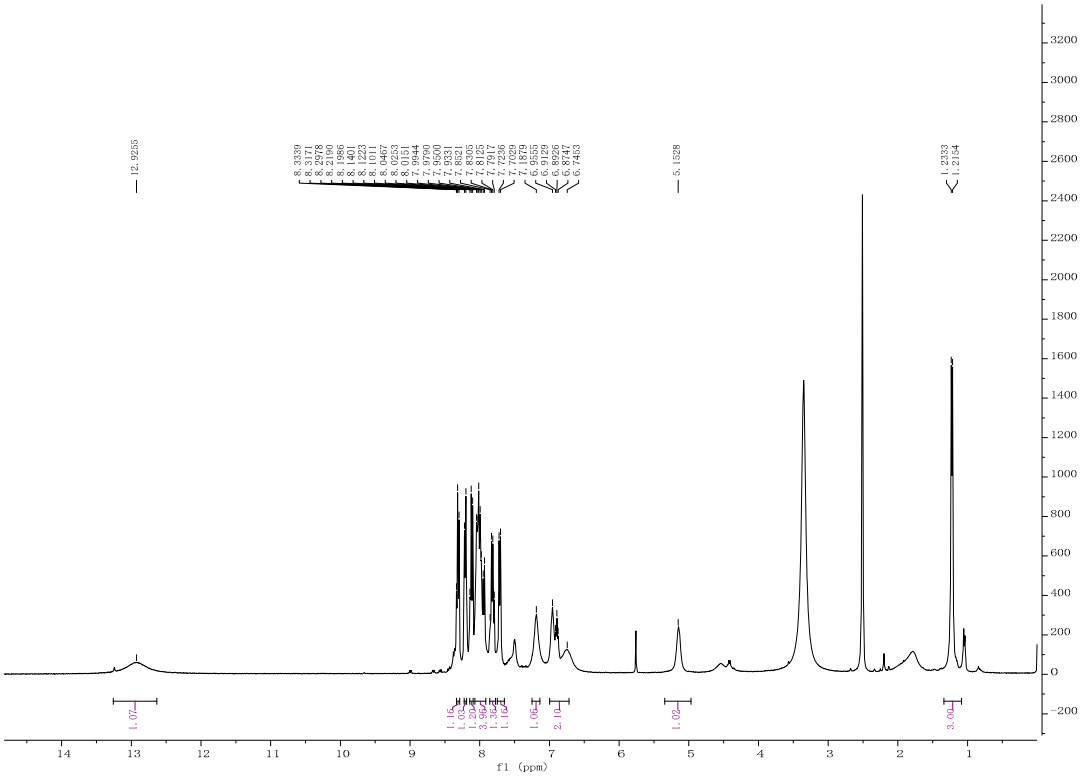


The HRMS spectrogram of compound **F4**

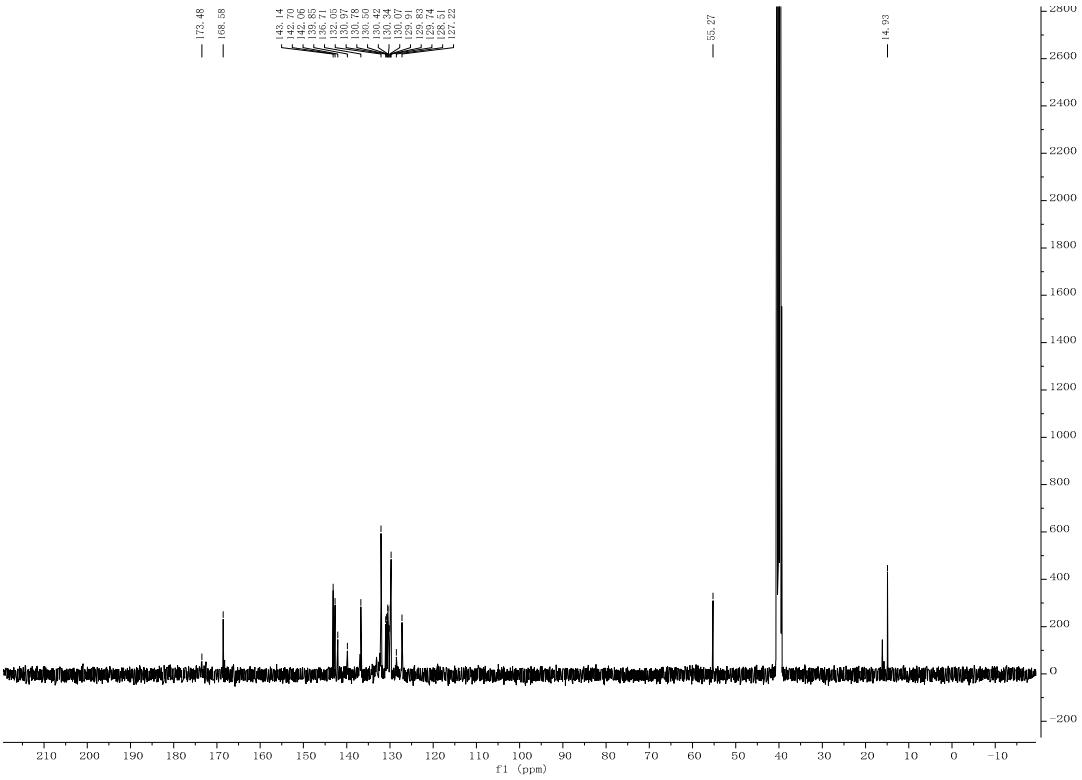
Compound **F5**,
N-(2-chlorophenyl)-*N*-(phenazine-1-carbonyl)alanine



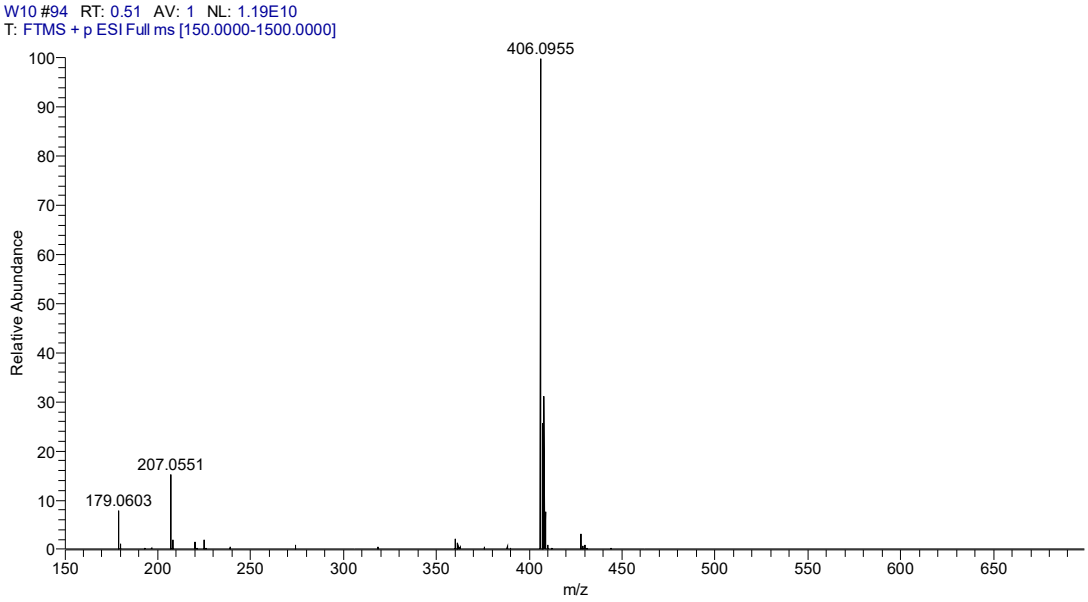
Yellow solid, yield 81.6%, m.p. 103.4-104.8℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.93 (s, 1H), 8.31 (d, J = 7.7 Hz, 1H), 8.21 (d, J = 8.2 Hz, 1H), 8.14 – 8.10 (m, 1H), 7.99 (ddd, J = 24.5, 15.5, 7.7 Hz, 4H), 7.82 (q, J = 8.5 Hz, 1H), 7.71 (d, J = 8.3 Hz, 1H), 7.19 (s, 1H), 7.00 – 6.72 (m, 2H), 5.15 (s, 1H), 1.22 (d, J = 7.2 Hz, 3H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.48, 168.58, 143.14, 142.70, 142.06, 139.85, 136.71, 132.05, 130.97, 130.78, 130.50, 130.42, 130.34, 130.07, 129.91, 129.83, 129.74, 128.51, 127.22, 55.27, 14.93. HRMS (ESI): calcd for $C_{22}H_{16}ClN_3O_3$ {$[M+H]^+$}, 406.0953; found, 406.0955.



The ^{1}H NMR spectrogram of compound **F5**

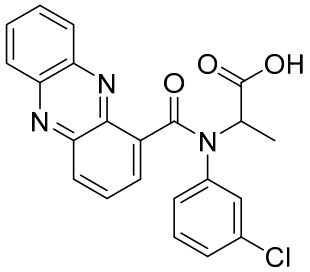


The ^{13}C NMR spectrogram of compound **F5**

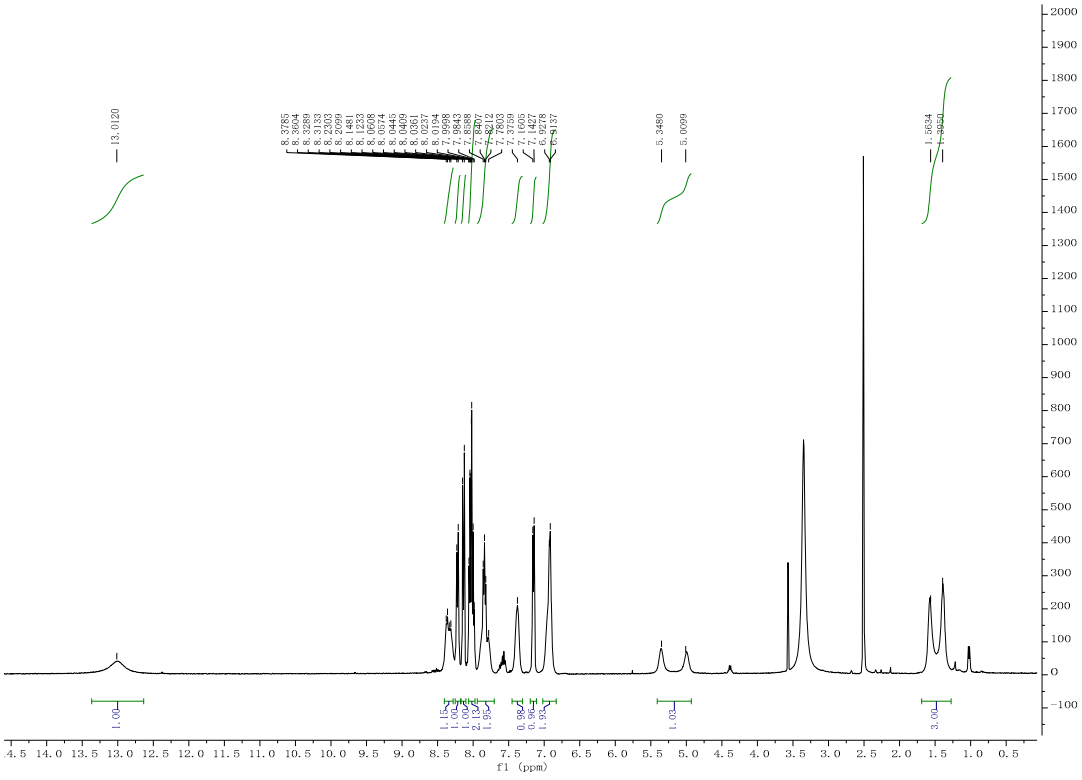


The HRMS spectrogram of compound **F5**

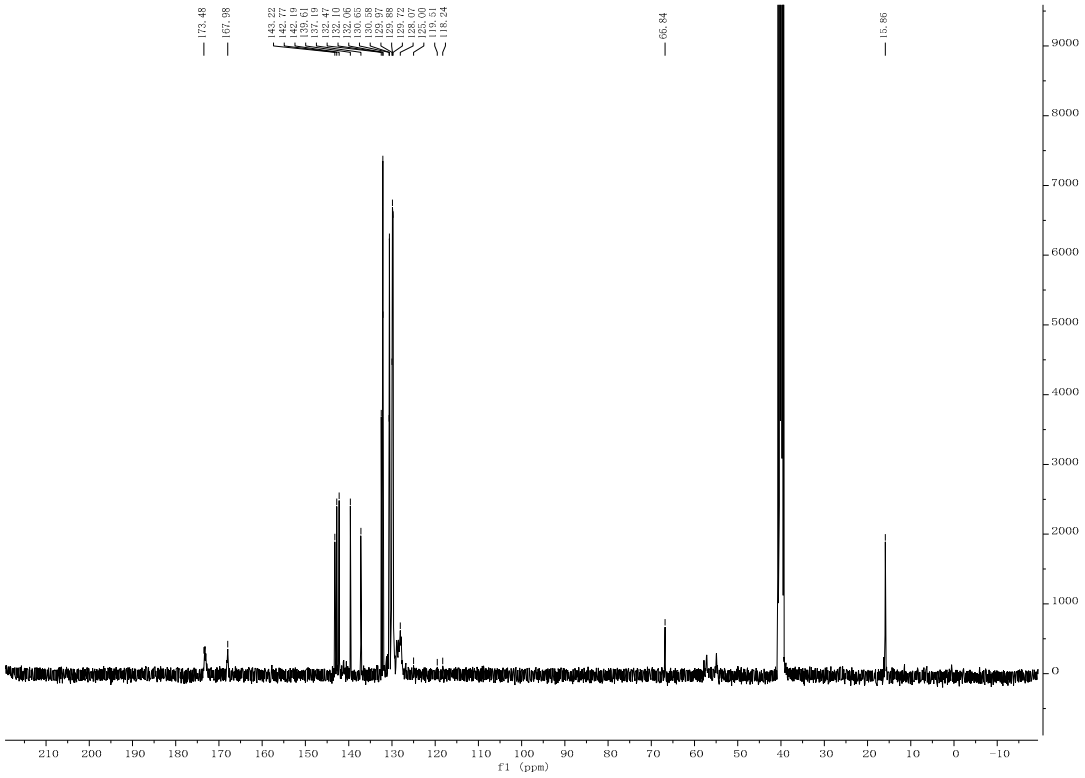
Compound **F6**,
N-(3-chlorophenyl)-*N*-(phenazine-1-carbonyl)alanine



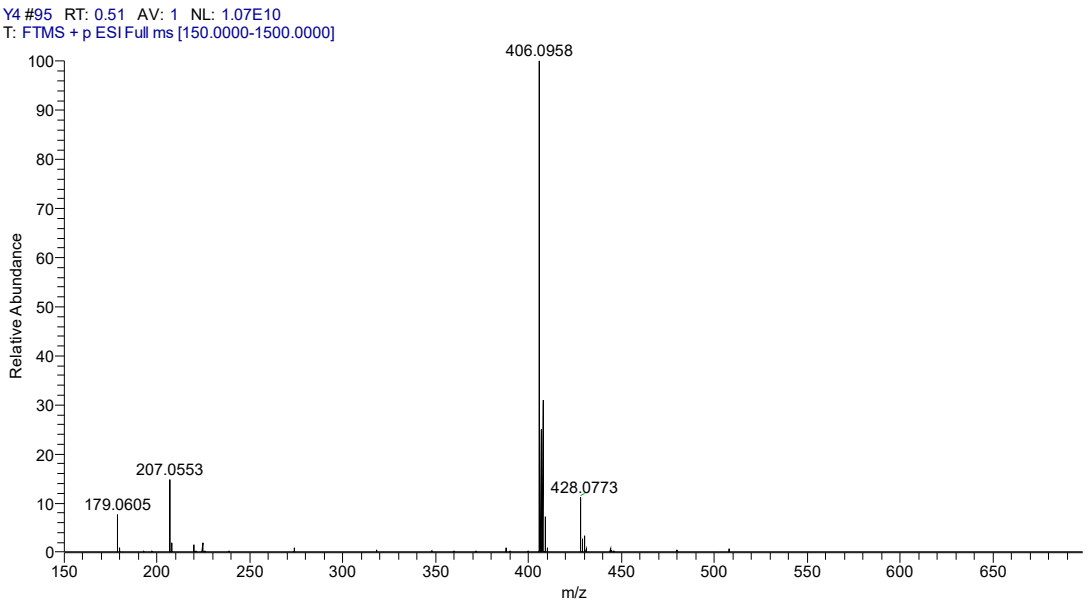
White solid, yield 79.9%, m.p. 118.3-119.4℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 13.01 (s, 1H), 8.35 (dd, J = 19.3, 6.8 Hz, 1H), 8.22 (d, J = 8.2 Hz, 1H), 8.14 (d, J = 9.9 Hz, 1H), 8.06 – 7.97 (m, 2H), 7.94 – 7.70 (m, 2H), 7.38 (s, 1H), 7.15 (d, J = 7.1 Hz, 1H), 7.02 – 6.83 (m, 2H), 5.18 (1H, two isomers), 1.48 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.48, 167.98, 143.22, 142.77, 142.19, 139.61, 137.19, 132.47, 132.10, 132.06, 130.65, 130.58, 129.97, 129.88, 129.72, 128.07, 125.00, 119.51, 118.24, 66.84, 15.86. HRMS (ESI): calcd for $C_{22}H_{16}ClN_3O_3$ {$[M+H]^+$}, 406.0953; found, 406.0958.



The ^{1}H NMR spectrogram of compound **F6**

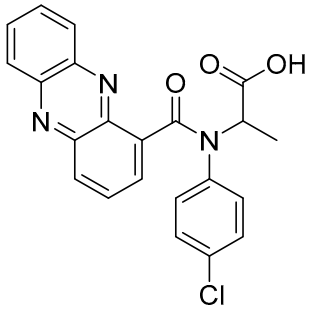


The ^{13}C NMR spectrogram of compound **F6**

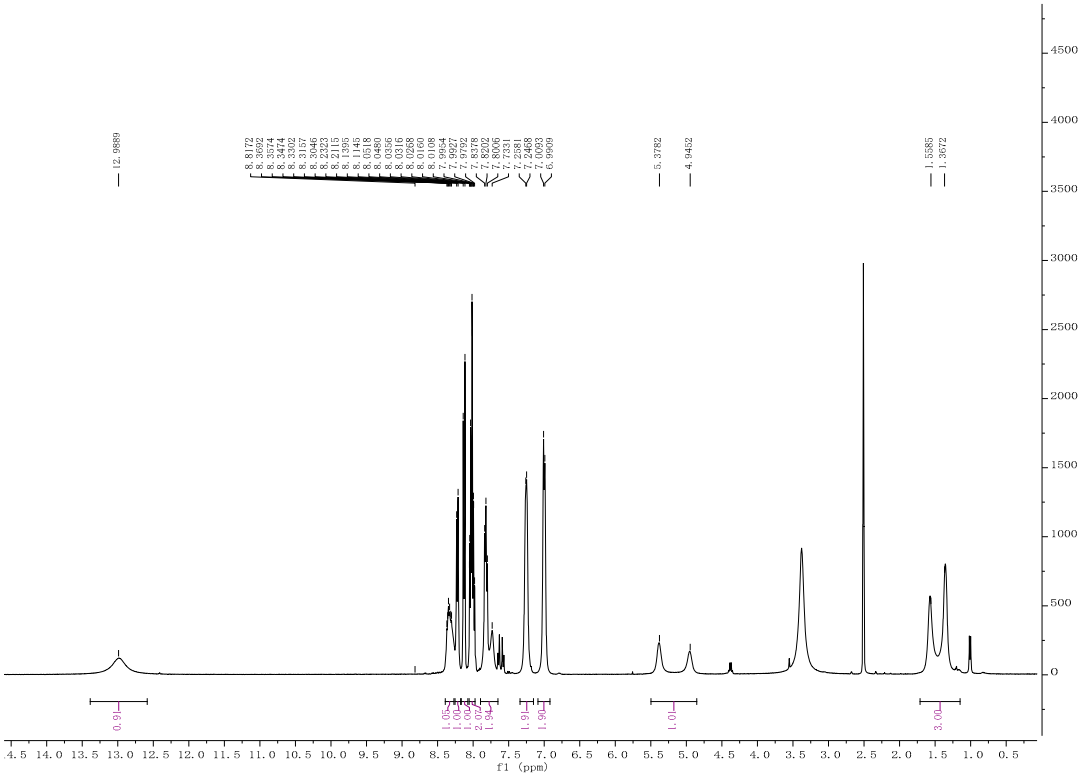


The HRMS spectrogram of compound **F6**

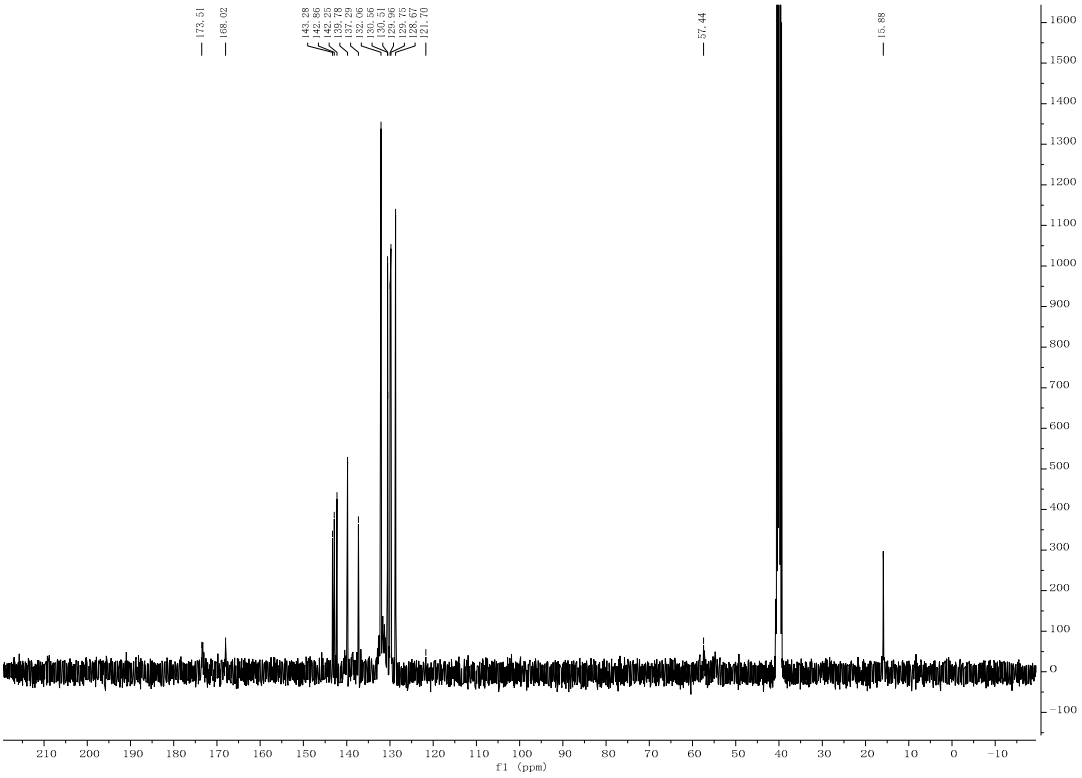
Compound **F7**,
N-(4-chlorophenyl)-*N*-(phenazine-1-carbonyl)alanine



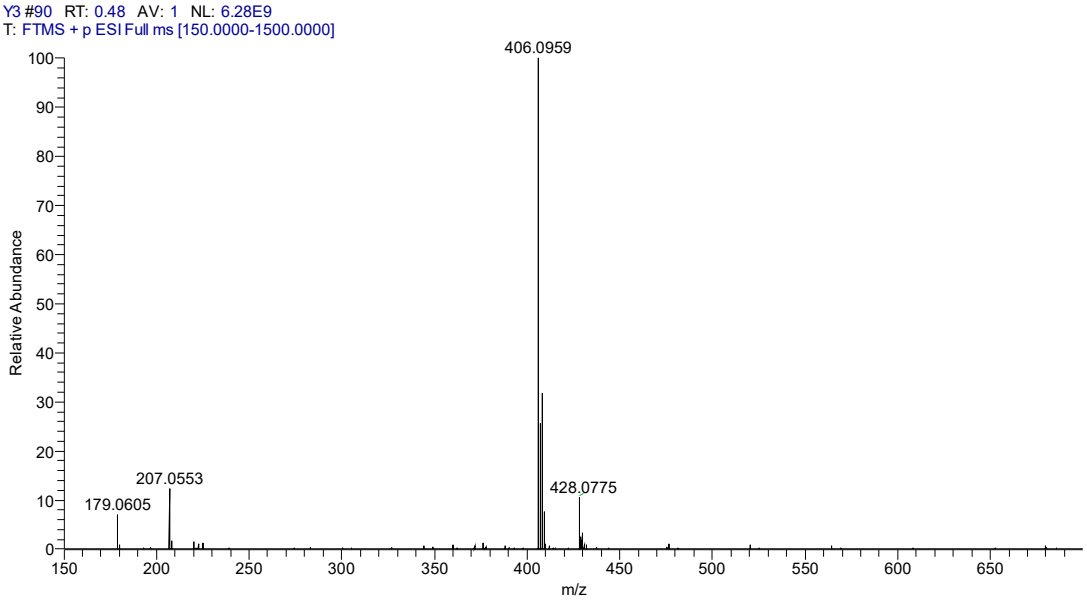
Yellow solid, yield 80.3%, m.p. 93.2-94.9℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 12.99 (s, 1H), 8.39 – 8.27 (m, 1H), 8.22 (d, J = 8.3 Hz, 1H), 8.13 (d, J = 10.0 Hz, 1H), 8.02 (dtd, J = 12.7, 6.5, 3.5 Hz, 2H), 7.90 – 7.65 (m, 2H), 7.34 – 7.15 (m, 2H), 7.00 (d, J = 7.4 Hz, 2H), 5.16 (1H, two isomers), 1.46 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.51, 168.02, 143.28, 142.86, 142.25, 139.78, 137.29, 132.06, 130.56 (2C), 130.51 (2C), 129.96 (4C), 129.75, 128.67, 121.70 (2C), 57.44, 15.88. HRMS (ESI): calcd for $C_{22}H_{16}ClN_3O_3$ {$[M+H]^+$}, 406.0953; found, 406.0959.



The ^{1}H NMR spectrogram of compound **F7**

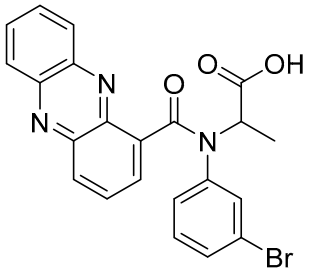


The ^{13}C NMR spectrogram of compound **F7**

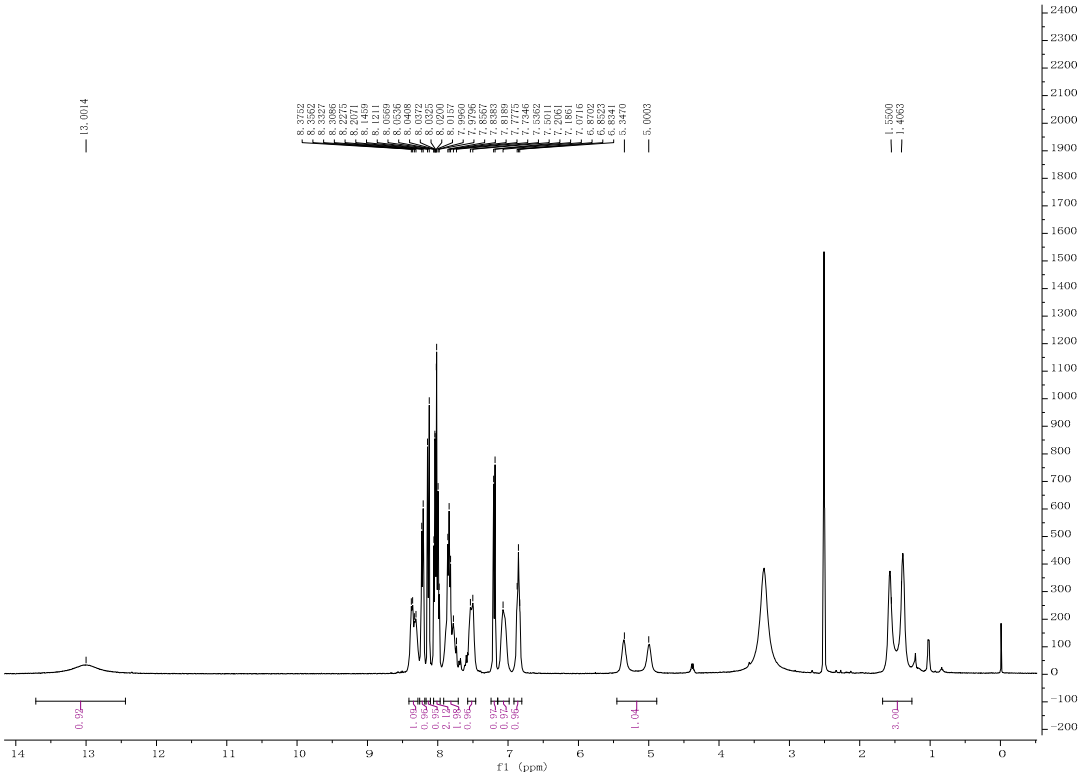


The HRMS spectrogram of compound **F7**

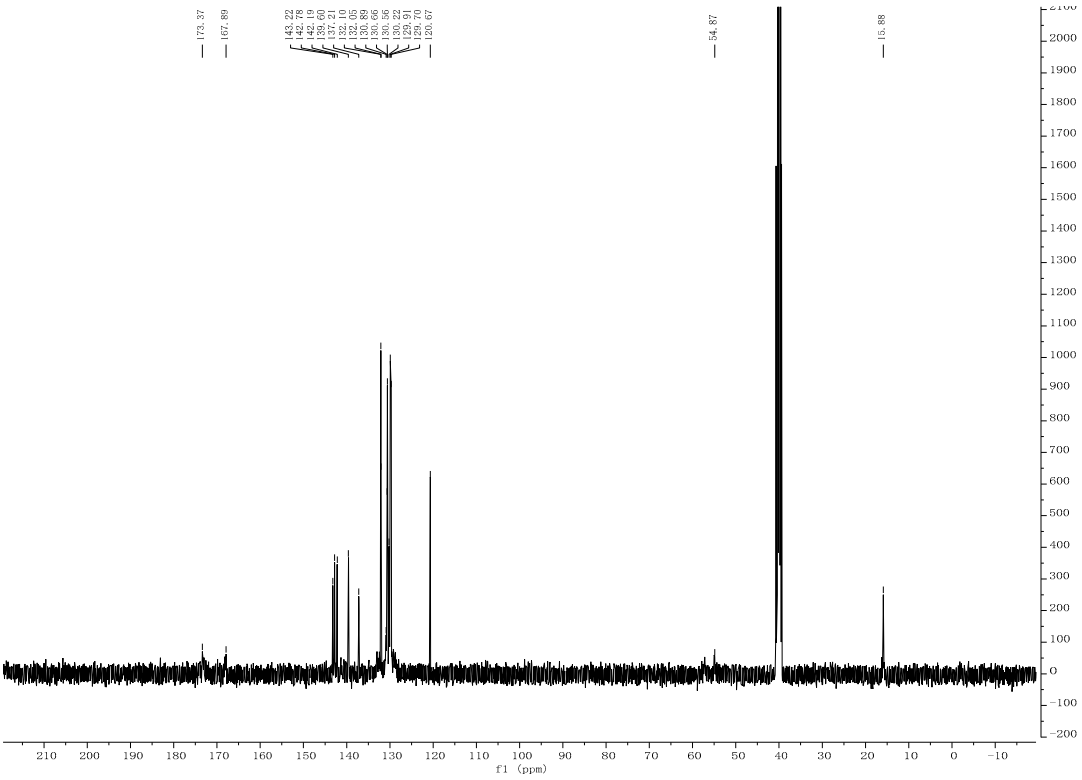
Compound **F8**,
N-(3-bromophenyl)-*N*-(phenazine-1-carbonyl)alanine



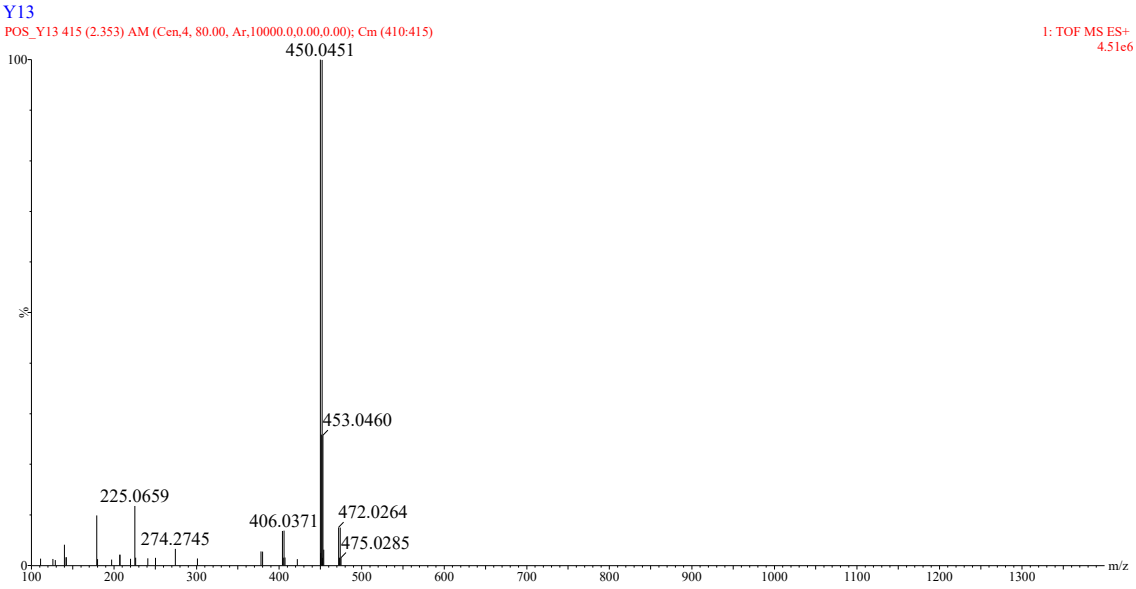
Brown solid, yield 80.2%, m.p. 116.5-117.3℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 13.00 (s, 1H), 8.34 (dd, J = 18.0, 8.6 Hz, 1H), 8.22 (d, J = 8.2 Hz, 1H), 8.13 (d, J = 9.9 Hz, 1H), 8.06 – 7.97 (m, 2H), 7.92 – 7.71 (m, 2H), 7.52 (d, J = 14.0 Hz, 1H), 7.20 (d, J = 8.0 Hz, 1H), 7.07 (s, 1H), 6.86 (d, J = 7.2 Hz, 1H), 5.17 (1H, two isomers), 1.48 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.37, 167.89, 143.22, 142.78, 142.19, 139.60, 137.21, 132.10 (2C), 132.05 (2C), 130.89, 130.66 (2C), 130.56, 130.22, 129.91, 129.70, 120.67 (2C), 54.87, 15.88. HRMS (ESI): calcd for $C_{22}H_{16}BrN_3O_3$ {$[M+H]^+$}, 450.0448; found, 450.0451.



The ^{1}H NMR spectrogram of compound **F8**

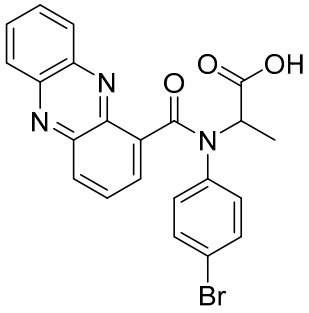


The ^{13}C NMR spectrogram of compound **F8**

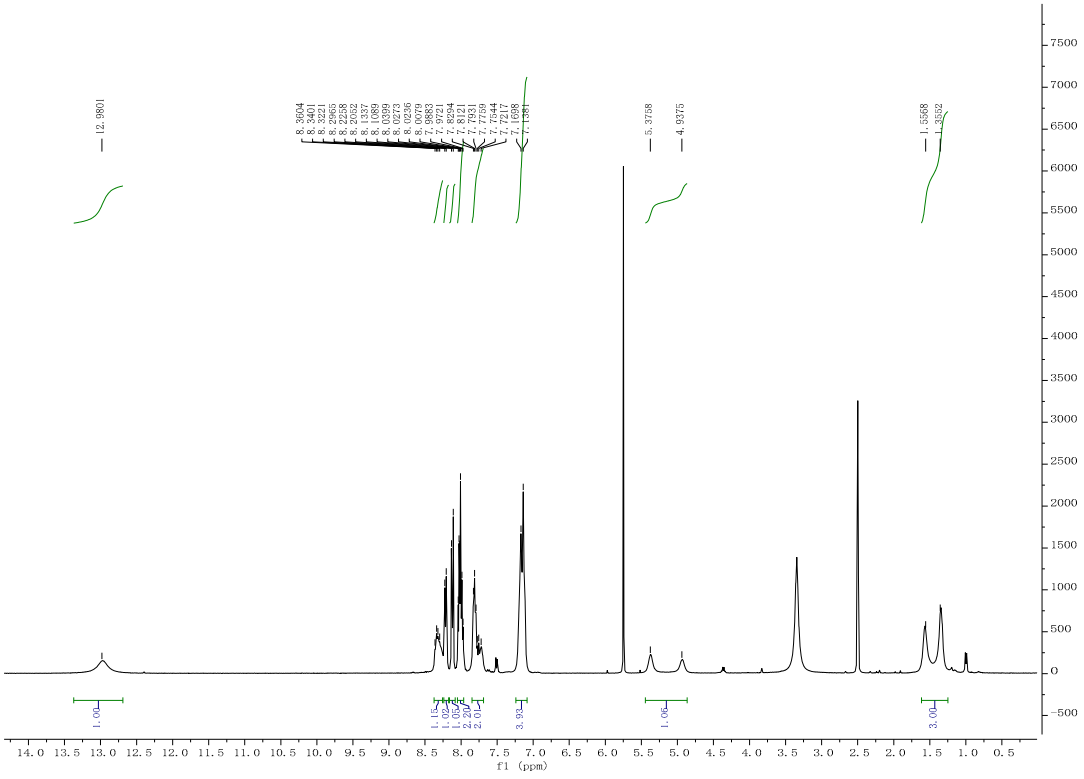


The HRMS spectrogram of compound **F8**

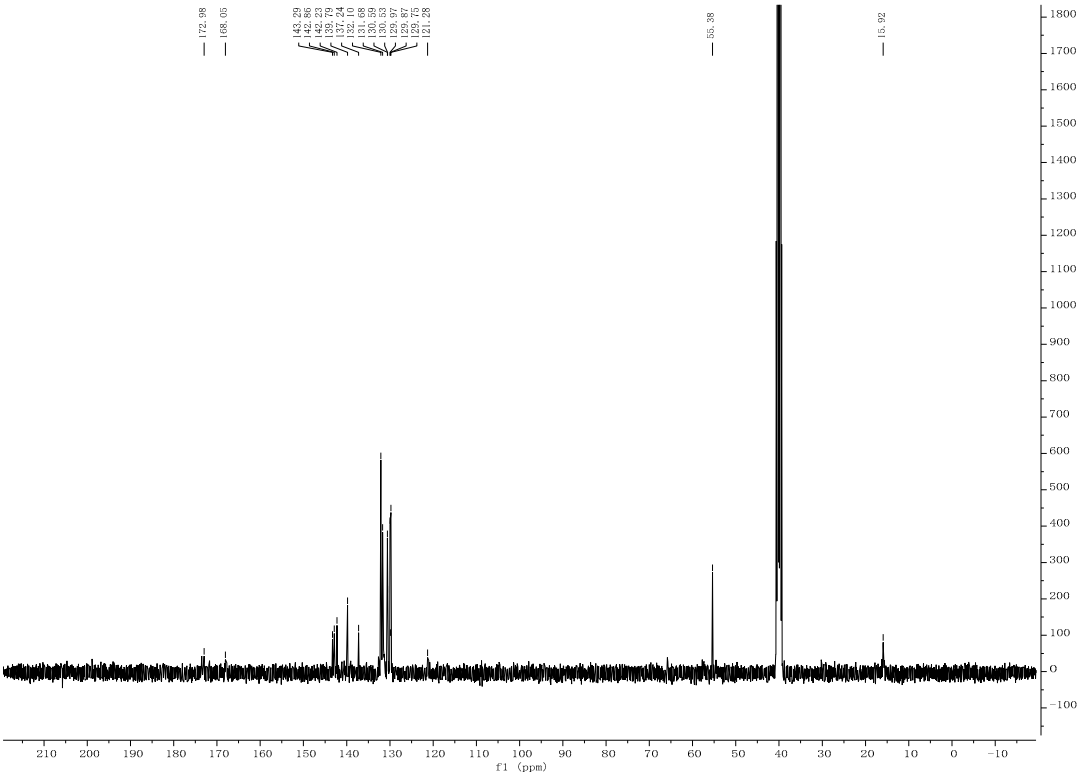
Compound **F9**,
N-(4-bromophenyl)-*N*-(phenazine-1-carbonyl)alanine



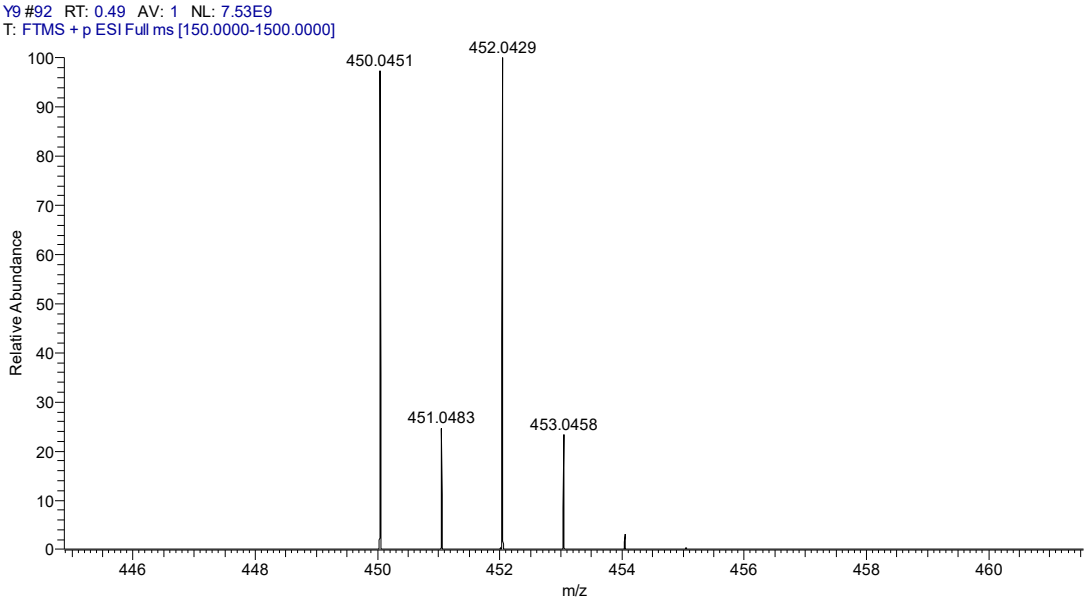
Brownness solid, yield 77.9%, m.p. 111.3-112.5℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 12.98 (s, 1H), 8.33 (dd, J = 16.4, 9.2 Hz, 1H), 8.22 (d, J = 8.3 Hz, 1H), 8.12 (d, J = 9.9 Hz, 1H), 8.05 – 7.96 (m, 2H), 7.85 – 7.69 (m, 2H), 7.15 (d, J = 12.7 Hz, 4H), 5.16 (1H, two isomers), 1.46 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 172.98, 168.05, 143.29, 142.86, 142.23, 139.79, 137.24, 132.10, 131.68, 130.59, 130.53, 129.97, 129.87, 129.75, 121.28, 55.38, 15.92. HRMS (ESI): calcd for $C_{22}H_{16}BrN_3O_3$ {$[M+H]^+$}, 450.0448; found, 450.0451.



The ^{1}H NMR spectrogram of compound **F9**

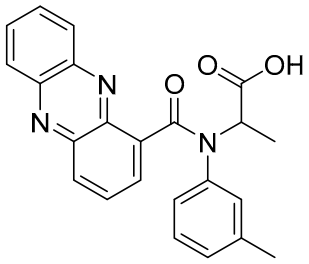


The ^{13}C NMR spectrogram of compound **F9**

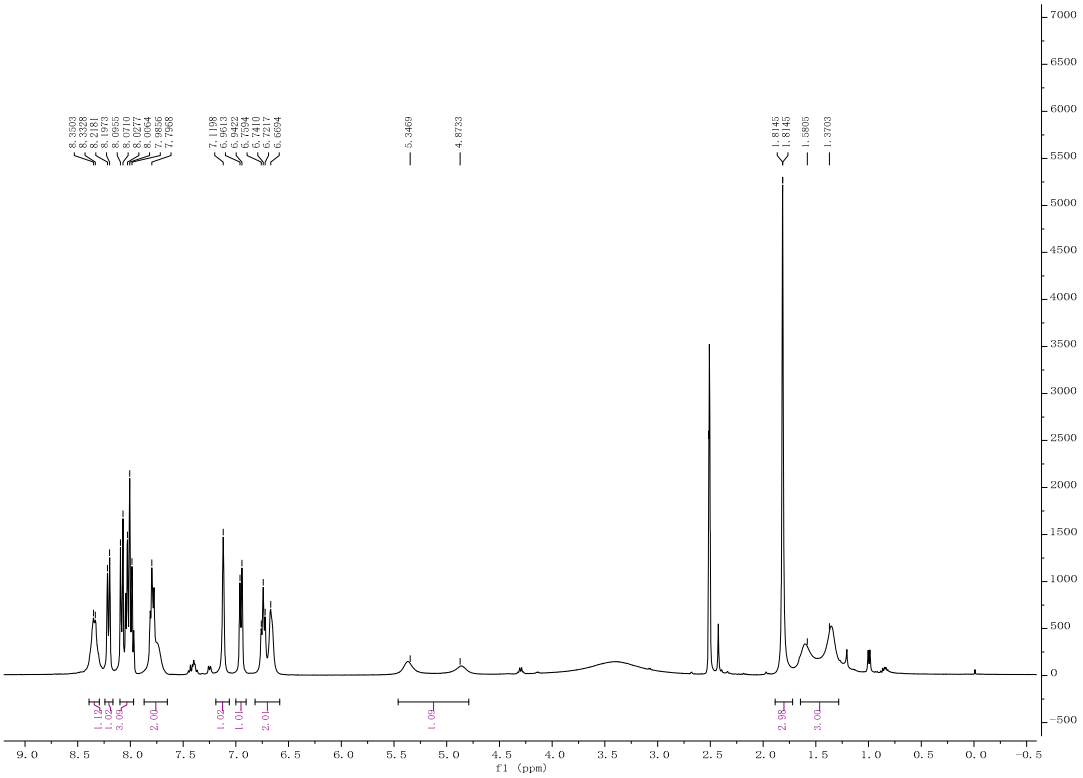


The HRMS spectrogram of compound **F9**

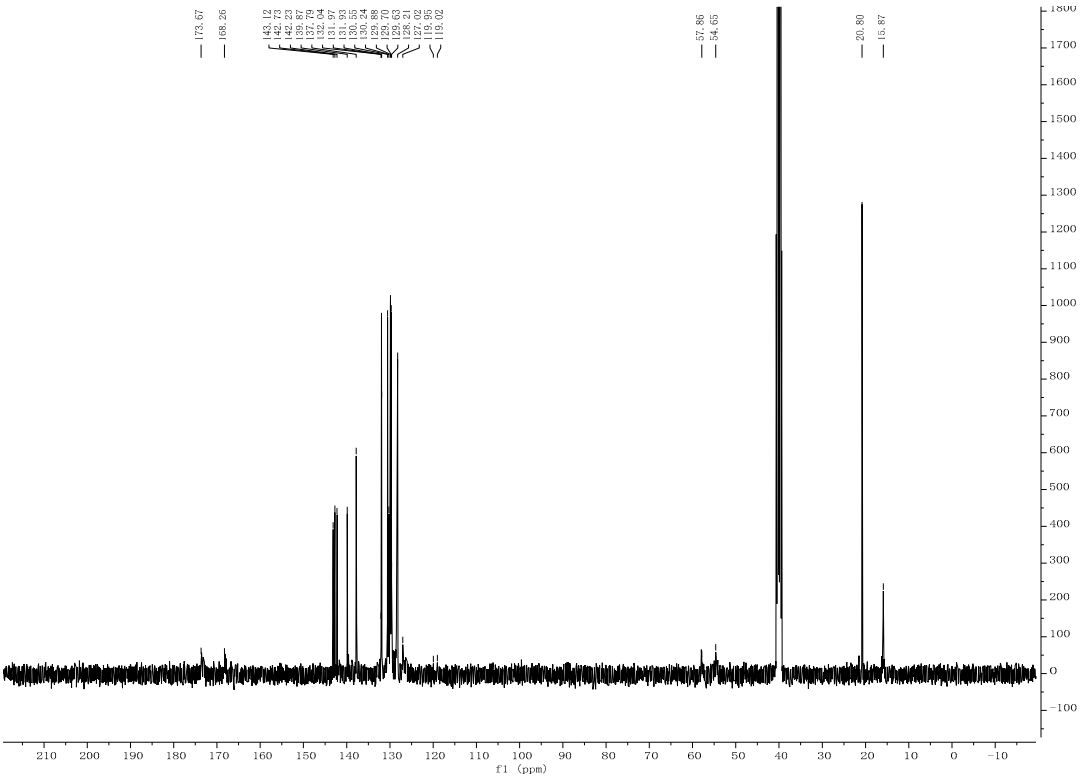
Compound **F10**,
N-(phenazine-1-carbonyl)-*N*-(m-tolyl)alanine



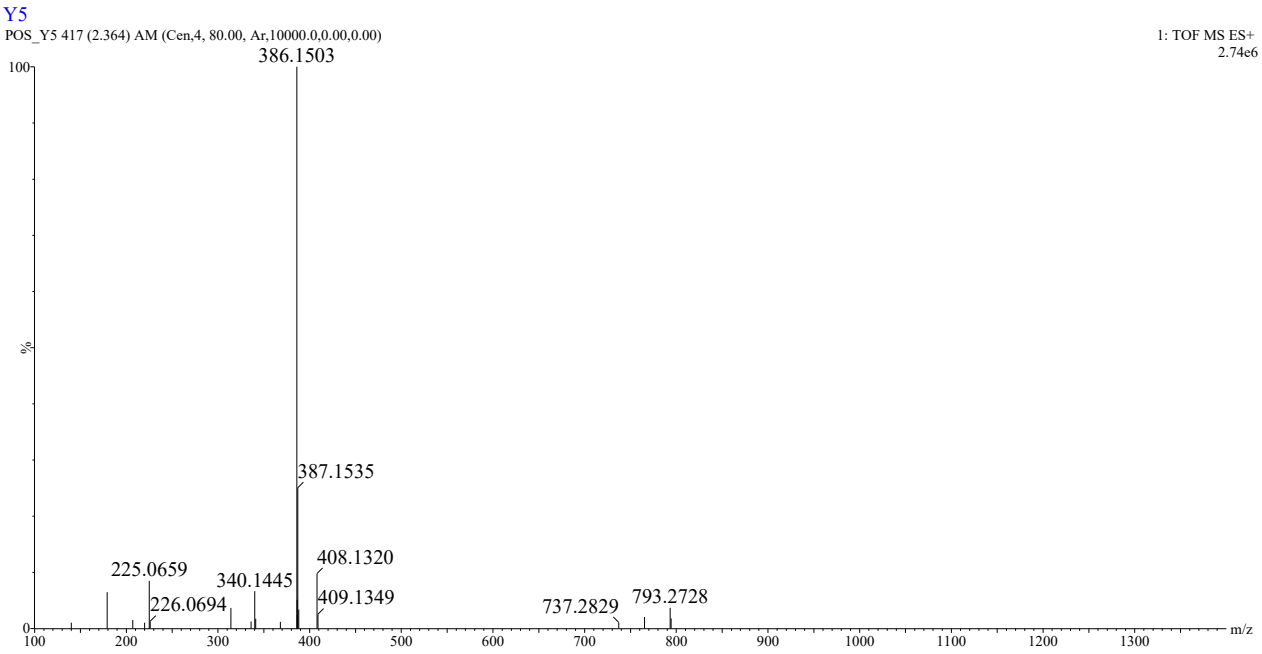
Purple solid, yield 80.2%, m.p. 94.2-95.3℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.39 – 8.30 (m, 1H), 8.21 (d, J = 8.3 Hz, 1H), 8.10 – 7.97 (m, 3H), 7.80 (s, 2H), 7.12 (s, 1H), 6.95 (d, J = 7.7 Hz, 1H), 6.75 (d, J = 7.4 Hz, 2H), 5.11 (1H, two isomers), 1.81 (s, 3H), 1.48 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.67, 168.26, 143.12, 142.73, 142.23, 139.87 (2C), 137.79, 132.04, 131.97, 131.93, 130.55, 130.24, 129.88, 129.70, 129.63, 128.21, 127.02, 119.95, 119.02, 57.86, 54.65, 20.80, 15.87. HRMS (ESI): calcd for $C_{23}H_{19}N_3O_3$ {$[M+H]^+$}, 386.1500; found, 386.1503.



The ^{1}H NMR spectrogram of compound **F10**

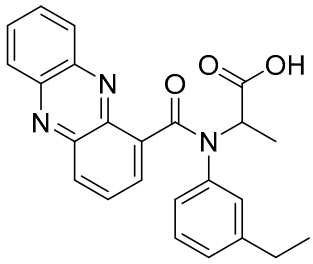


The ^{13}C NMR spectrogram of compound **F10**

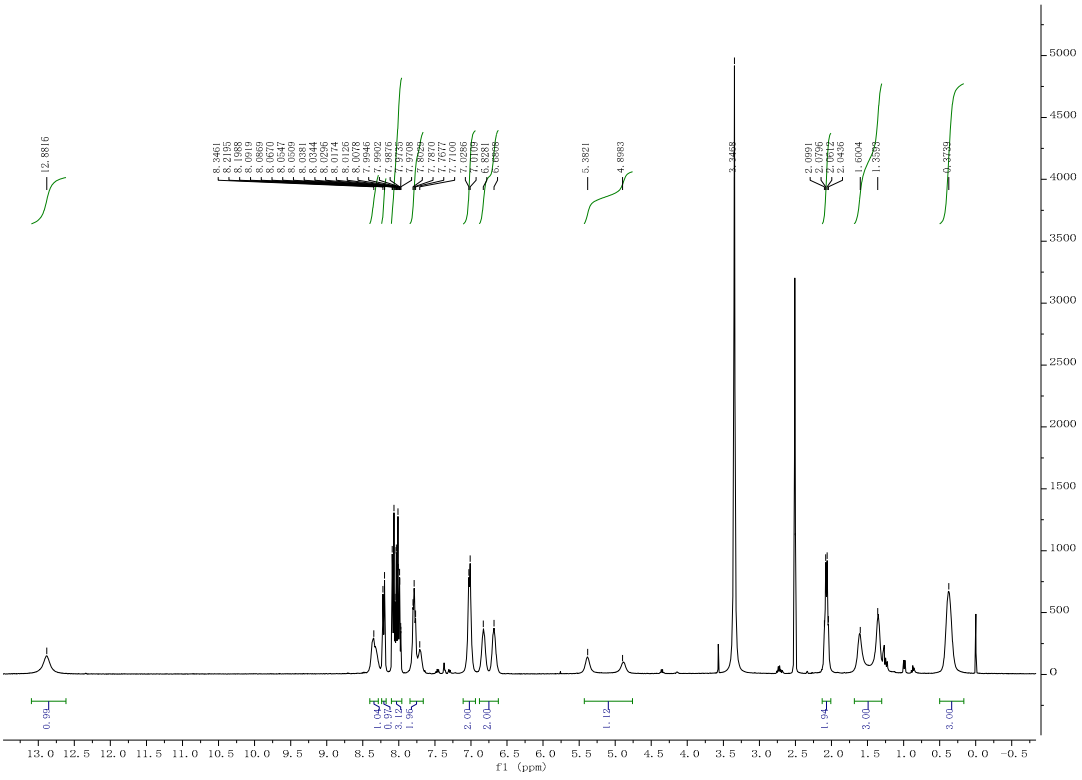


The HRMS spectrogram of compound **F10**

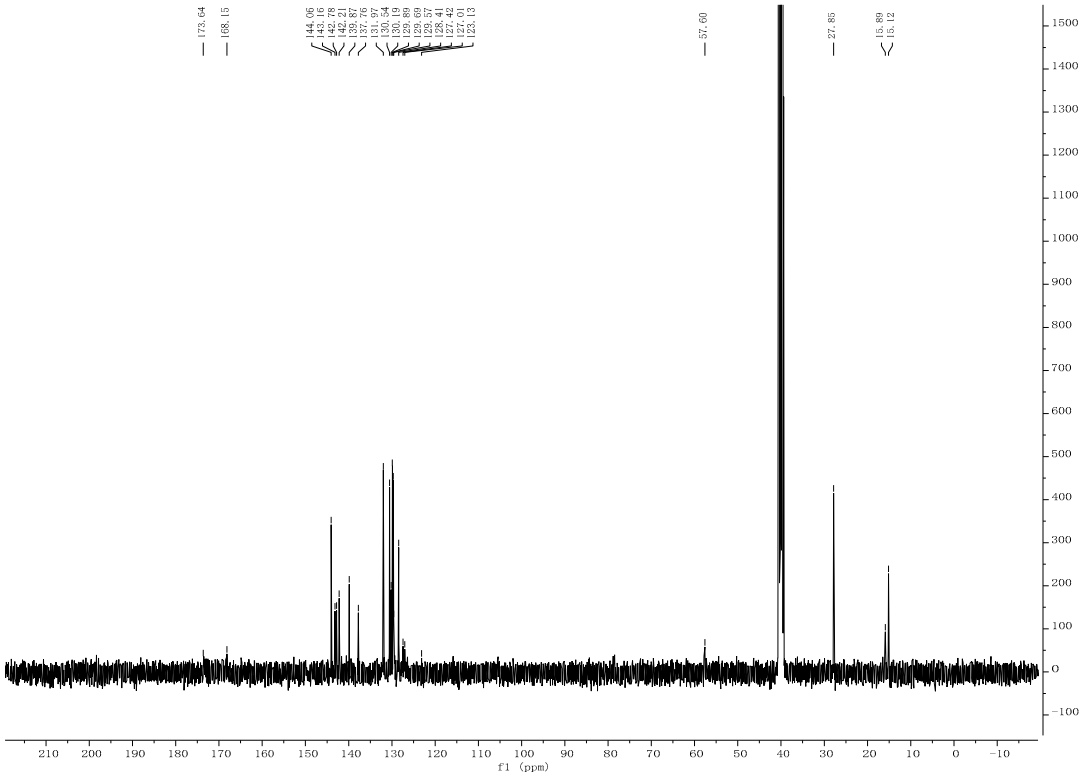
Compound **F11**,
N-(3-ethylphenyl)-*N*-(phenazine-1-carbonyl)alanine



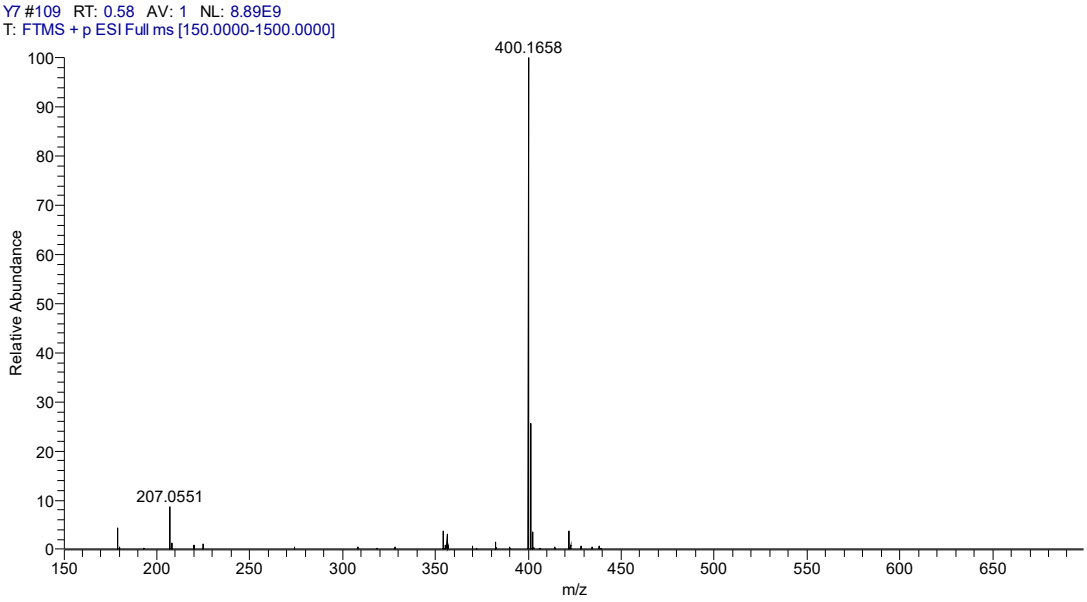
Yellow solid, yield 81.1%, m.p. 94.5-96.4℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.88 (s, 1H), 8.35 (s, 1H), 8.21 (d, J = 8.3 Hz, 1H), 8.10 – 7.96 (m, 3H), 7.85 – 7.66 (m, 2H), 7.02 (d, J = 7.1 Hz, 2H), 6.75 (d, J = 58.9 Hz, 2H), 5.38 (1H, two isomers), 2.07 (q, J = 7.0 Hz, 2H), 1.48 (3H, two isomers), 0.37 (s, 3H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.64, 168.15, 144.06, 143.16, 142.78, 142.21, 139.87, 137.76, 131.97, 130.54 (2C), 130.19, 129.89, 129.69, 129.57, 128.41 (2C), 127.42, 127.01, 123.13, 57.60, 27.85, 15.89, 15.12. HRMS (ESI): calcd for $C_{24}H_{21}N_3O_3$ {$[M+H]^+$}, 400.1656; found, 400.1658.



The ^{1}H NMR spectrogram of compound **F11**

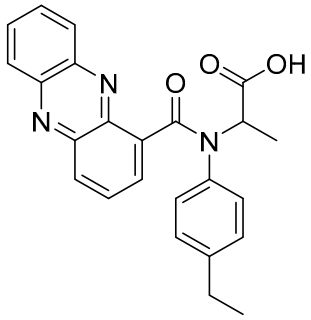


The ^{13}C NMR spectrogram of compound **F11**

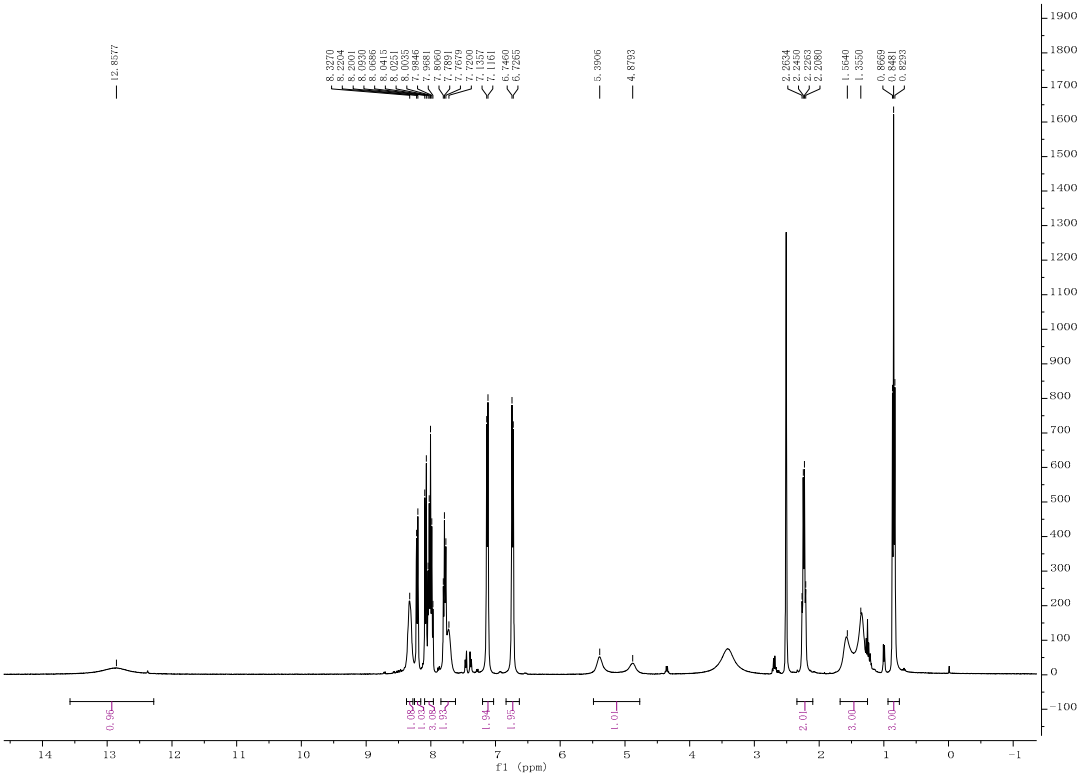


The HRMS spectrogram of compound **F11**

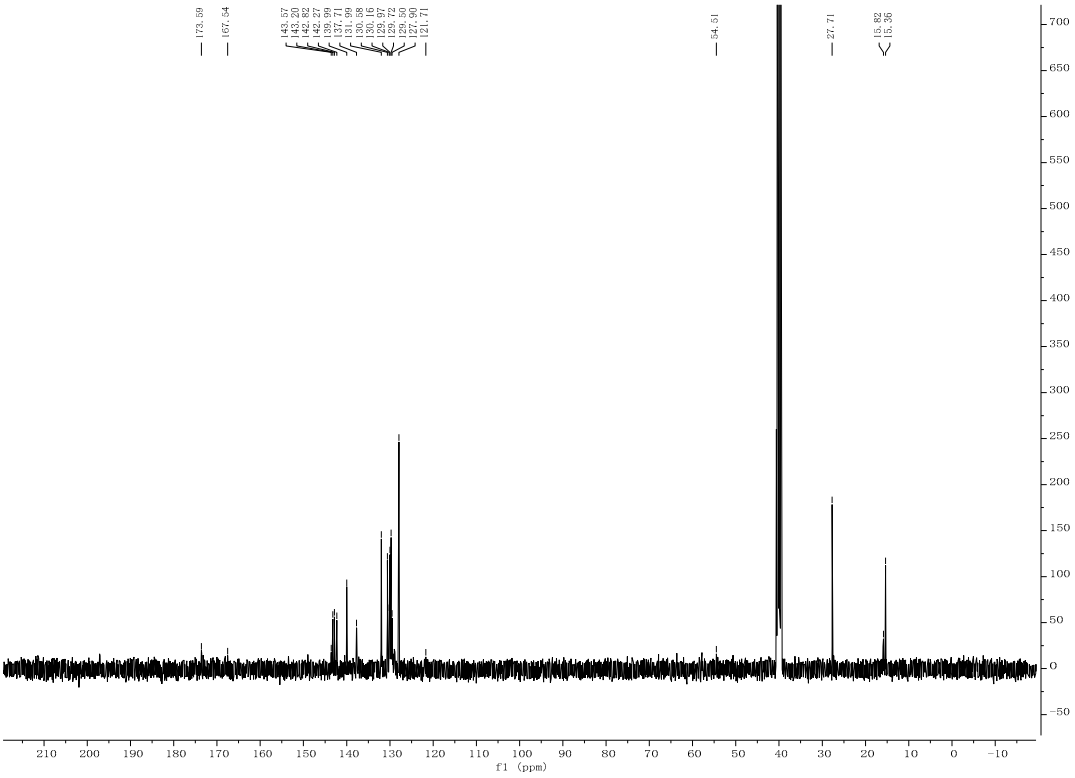
Compound **F12**,
N-(4-ethylphenyl)-*N*-(phenazine-1-carbonyl)alanine



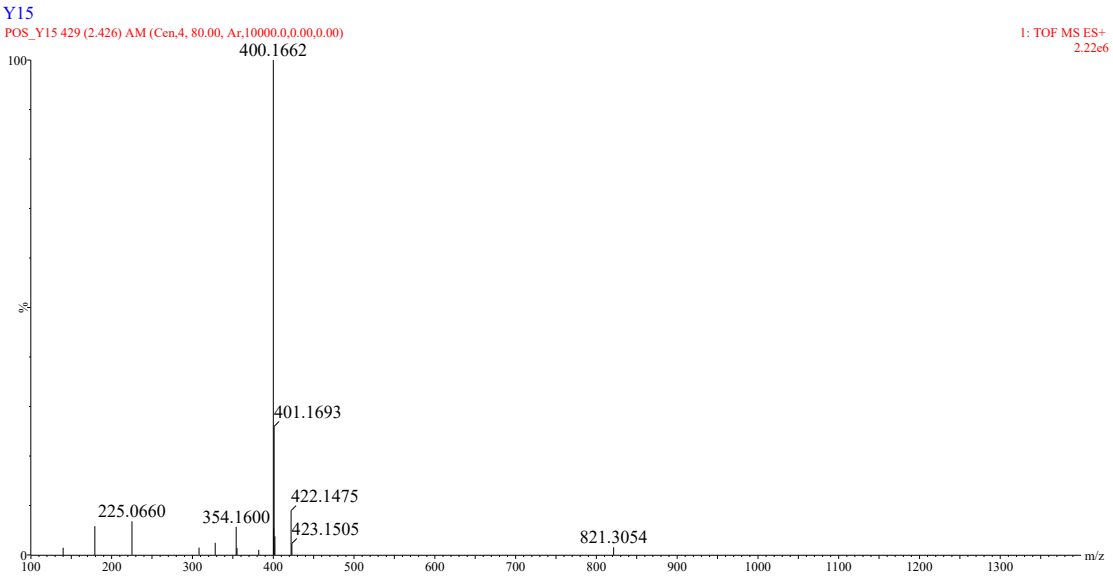
Yellow solid, yield 83.1%, m.p. 91.8-93.4℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.86 (s, 1H), 8.33 (s, 1H), 8.21 (d, J = 8.1 Hz, 1H), 8.10 – 7.96 (m, 3H), 7.84 – 7.62 (m, 2H), 7.13 (d, J = 7.9 Hz, 2H), 6.74 (d, J = 7.8 Hz, 2H), 5.13 (1H, two isomers), 2.24 (q, J = 7.4 Hz, 2H), 1.46 (3H, two isomers), 0.85 (t, J = 7.5 Hz, 3H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.59, 167.54, 143.57, 143.20, 142.82, 142.27, 139.99, 137.71, 131.99, 130.58, 130.16, 129.97, 129.72, 129.50, 127.90, 121.71, 54.51, 27.71, 15.82, 15.36. HRMS (ESI): calcd for $C_{24}H_{21}N_3O_3$ {[M+H]$^+$}, 400.1656; found, 400.1662.



The ^{1}H NMR spectrogram of compound **F12**

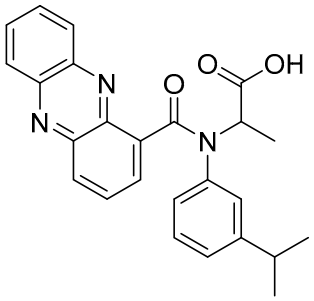


The ^{13}C NMR spectrogram of compound **F12**

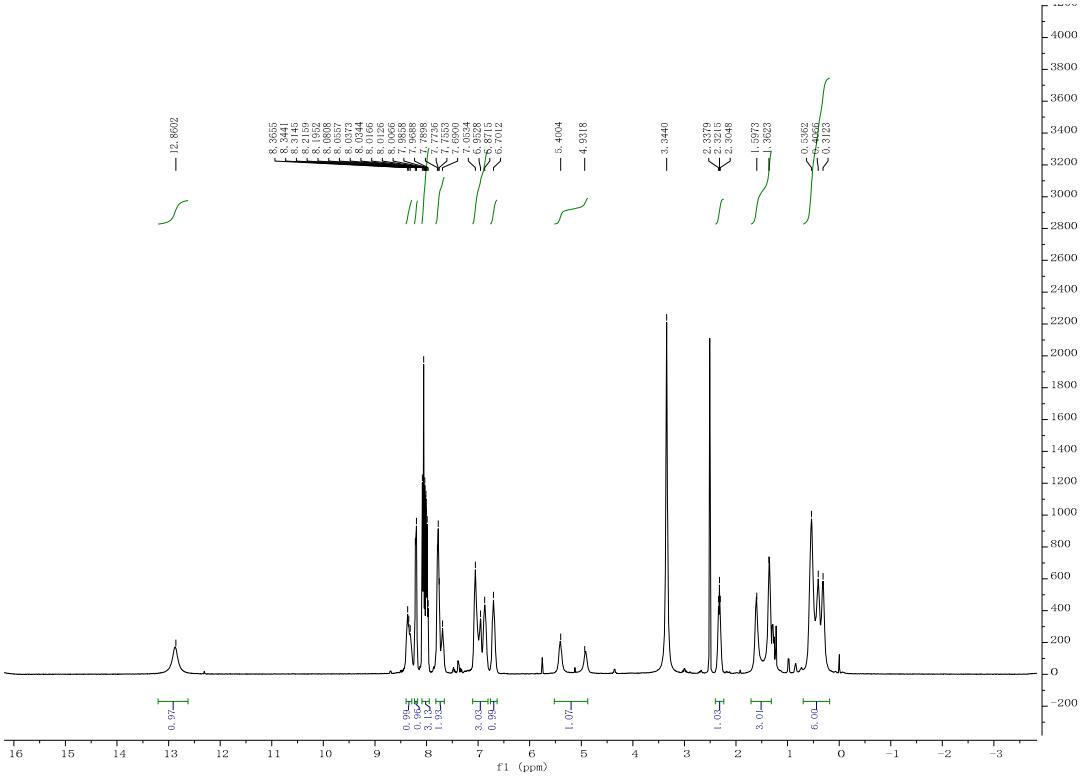


The HRMS spectrogram of compound **F12**

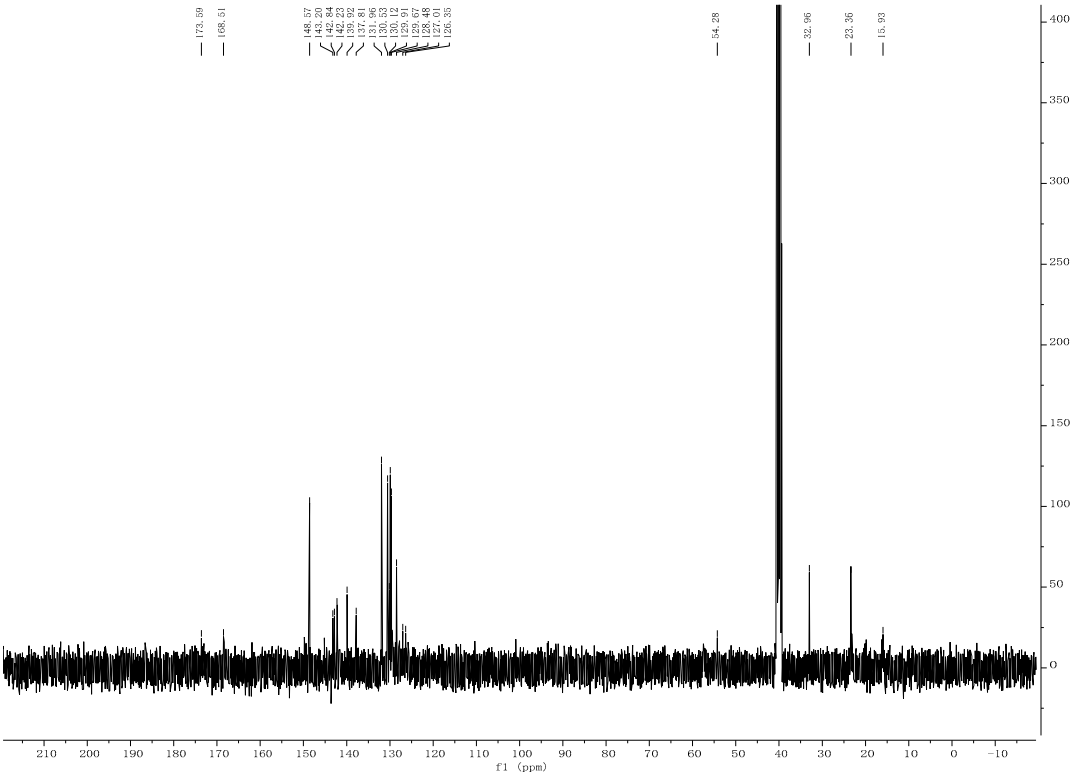
Compound **F13**,
N-(3-isopropylphenyl)-*N*-(phenazine-1-carbonyl)alanine



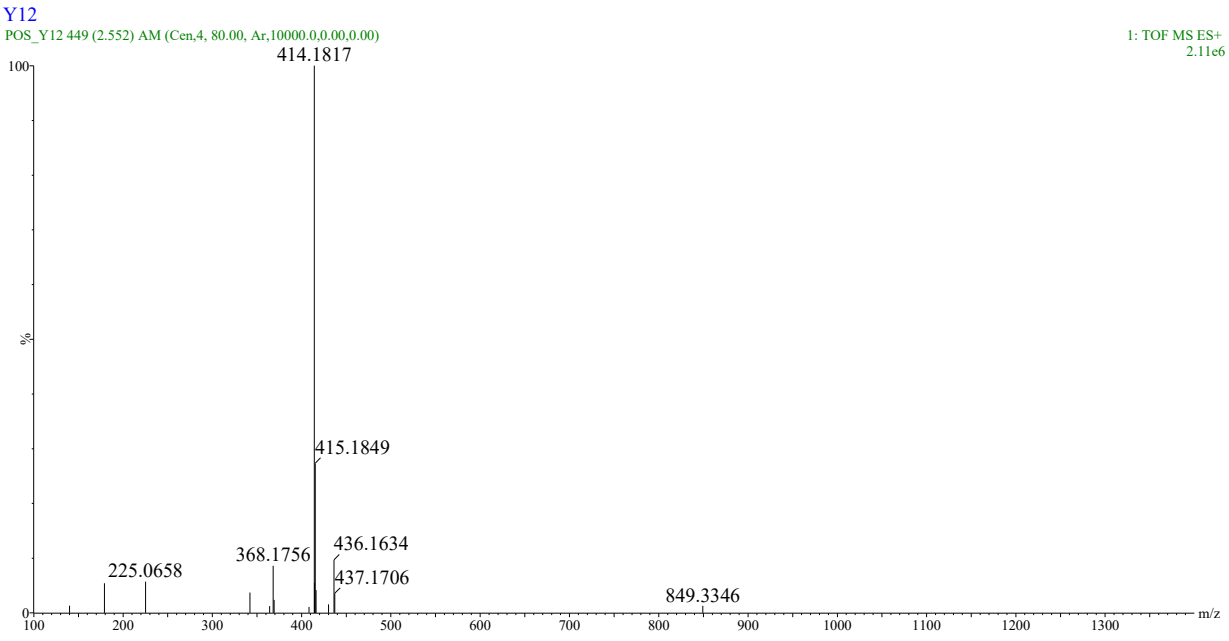
Brownness solid, yield 80.0%, m.p. 98.0-99.6℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.86 (s, 1H), 8.40 – 8.29 (m, 1H), 8.21 (d, J = 8.3 Hz, 1H), 8.09 – 7.95 (m, 3H), 7.82 – 7.65 (m, 2H), 7.11 – 6.81 (m, 3H), 6.70 (s, 1H), 5.17 (1H, two isomers), 2.32 (t, J = 6.6 Hz, 1H), 1.48 (3H, two isomers), 0.70 – 0.18 (m, 6H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.59, 168.51, 148.57, 143.20, 142.84, 142.23, 139.92, 137.81, 131.96 (2C), 130.53 (4C), 130.12 (2C), 129.91, 129.67, 128.48, 127.01, 126.35, 54.28, 32.96, 23.36, 15.93. HRMS (ESI): calcd for $C_{25}H_{23}N_3O_3$ {$[M+H]^+$}, 414.1813; found, 414.1817.



The ^{1}H NMR spectrogram of compound **F13**

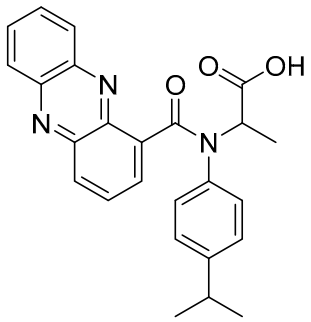


The ^{13}C NMR spectrogram of compound **F13**

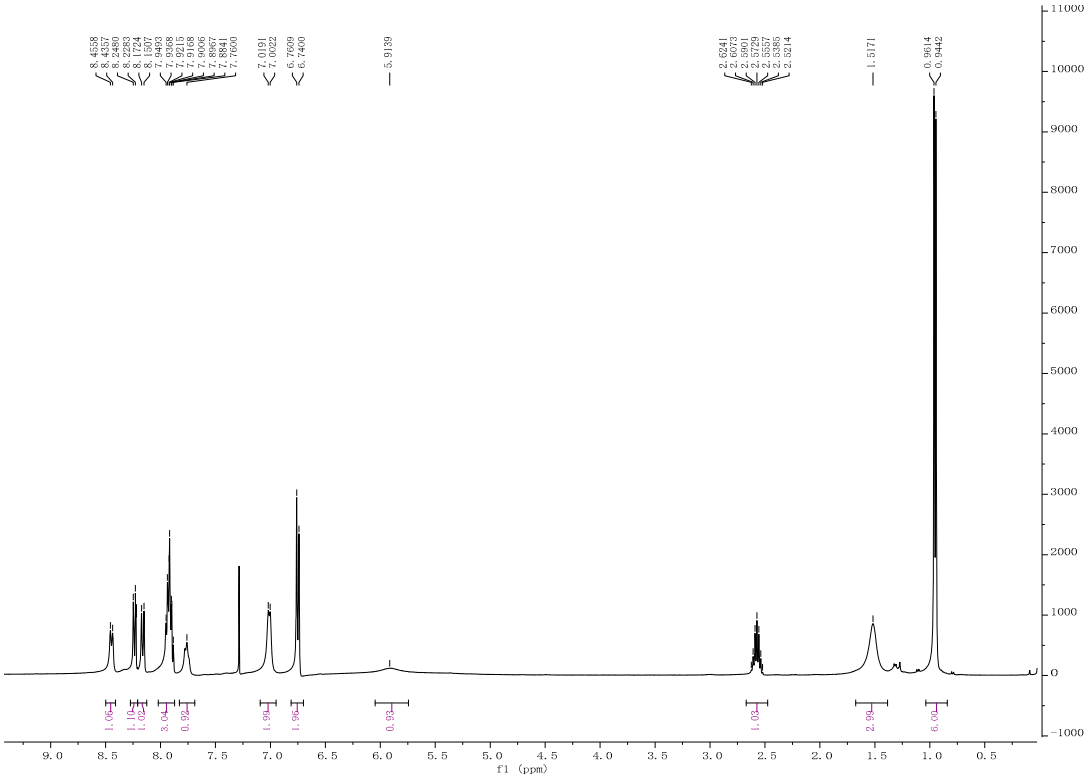


The HRMS spectrogram of compound **F13**

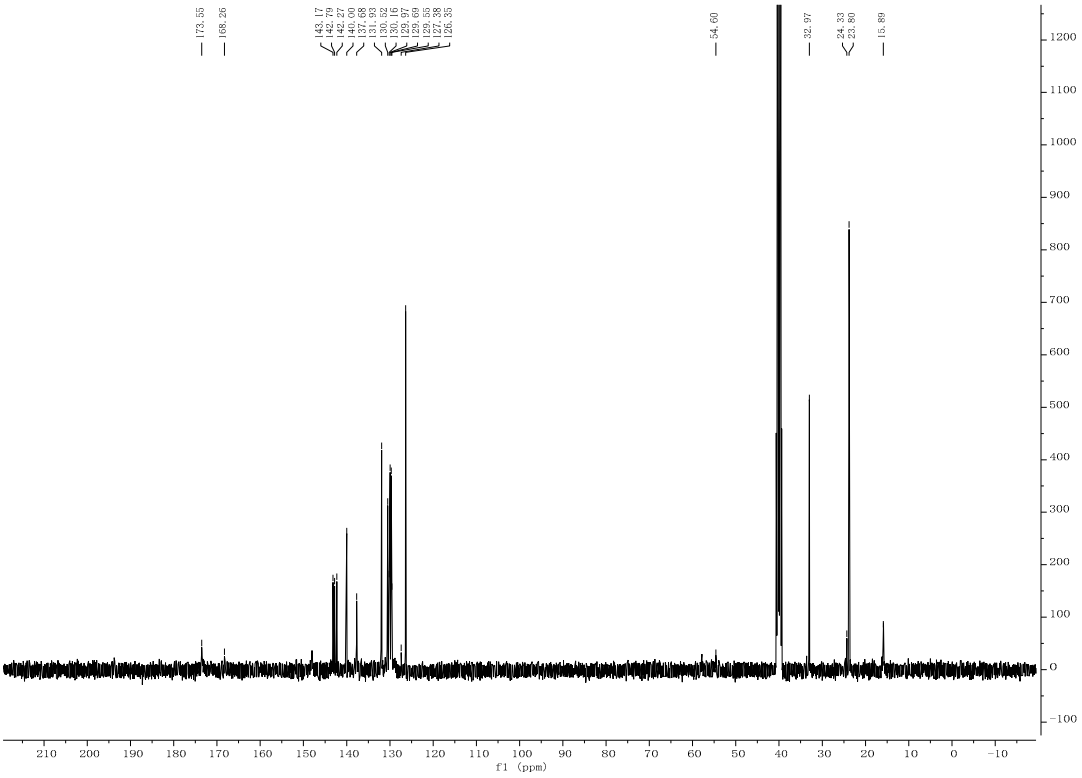
Compound **F14**,
N-(4-isopropylphenyl)-*N*-(phenazine-1-carbonyl)alanine



Yellow solid, yield 81.7%, m.p. 71.9-73.7°C; ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.45 (d, J = 8.1 Hz, 1H), 8.24 (d, J = 7.9 Hz, 1H), 8.16 (d, J = 8.7 Hz, 1H), 8.02 – 7.87 (m, 3H), 7.76 (s, 1H), 7.01 (d, J = 6.8 Hz, 2H), 6.75 (d, J = 8.4 Hz, 2H), 5.91 (s, 1H), 2.57 (sep, J = 6.8 Hz, 1H), 1.52 (s, 3H), 0.95 (d, J = 6.9 Hz, 6H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.55, 168.26, 143.17, 142.79, 142.27 (2C), 140.00, 137.68, 131.93, 130.52, 130.16, 129.97, 129.692 (2C), 129.55 (2C), 127.38 (2C), 126.35 (2C), 54.60, 32.97, 24.33, 23.80, 15.89. HRMS (ESI): calcd for $C_{25}H_{23}N_3O_3$ {[M+H]$^+$}, 414.1813; found, 414.1818.



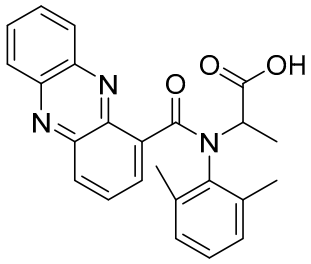
The ^{1}H NMR spectrogram of compound **F14**



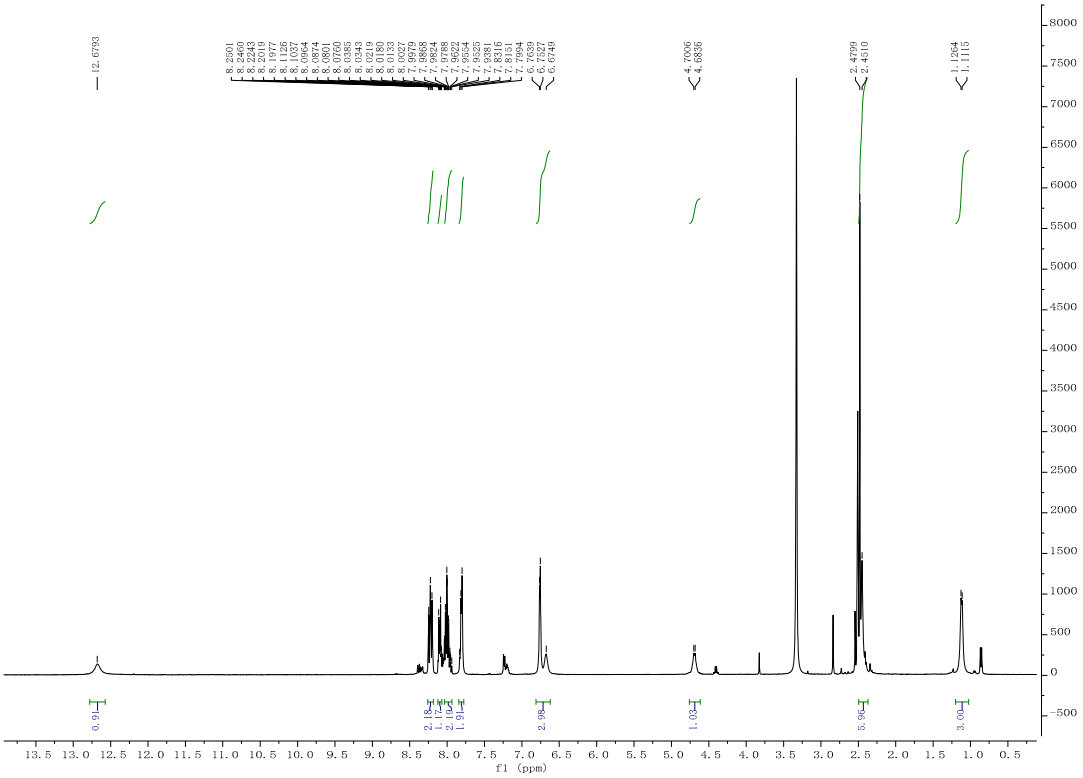
The ^{13}C NMR spectrogram of compound **F14**

The HRMS spectrogram of compound **F14**

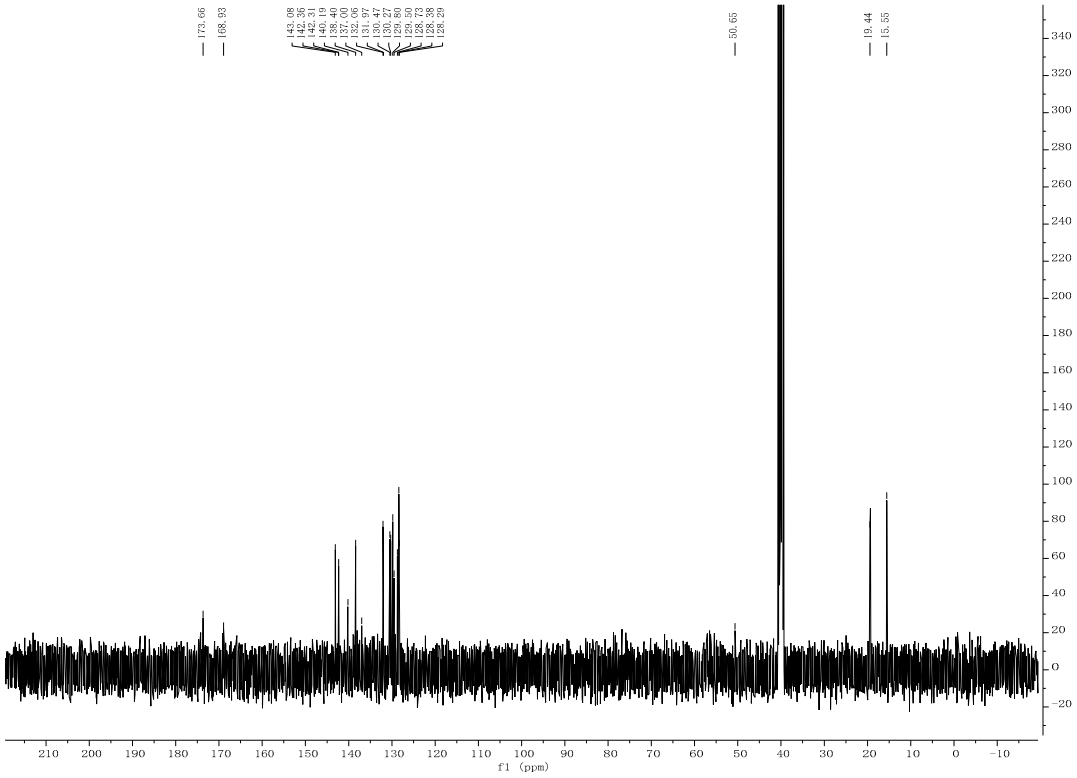
Compound **F15**,
N-(2,6-dimethylphenyl)-*N*-(phenazine-1-carbonyl)alanine



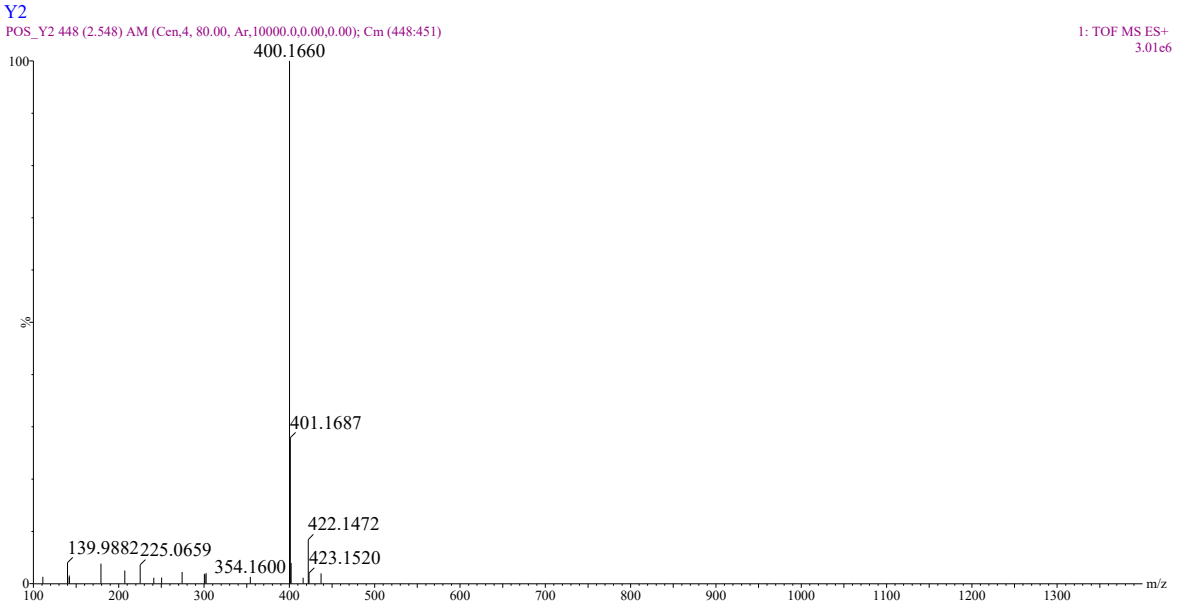
Yellow solid, yield 79.3%, m.p. 103.4-104.8℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 12.68 (s, 1H), 8.26 – 8.18 (m, 2H), 8.09 (td, J = 5.5, 4.6, 2.6 Hz, 1H), 8.03 – 7.94 (m, 2H), 7.81 (d, J = 6.3 Hz, 2H), 6.81 – 6.62 (m, 3H), 4.70 (1H, two isomers), 2.47 (d, J = 11.5 Hz, 6H), 1.12 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.66, 168.93, 143.08, 142.36, 142.31, 140.19, 138.40, 137.00 (2C), 132.06, 131.97, 130.47, 130.27 (2C), 129.80, 129.50 (2C), 128.73, 128.38, 128.29, 50.65, 19.44 (2C), 15.55. HRMS (ESI): calcd for $C_{24}H_{21}N_3O_3$ {$[M+H]^+$}, 400.1656; found, 400.1660.



The ^{1}H NMR spectrogram of compound **F15**

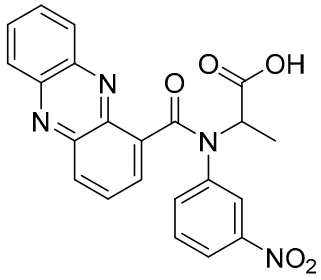


The ^{13}C NMR spectrogram of compound **F15**

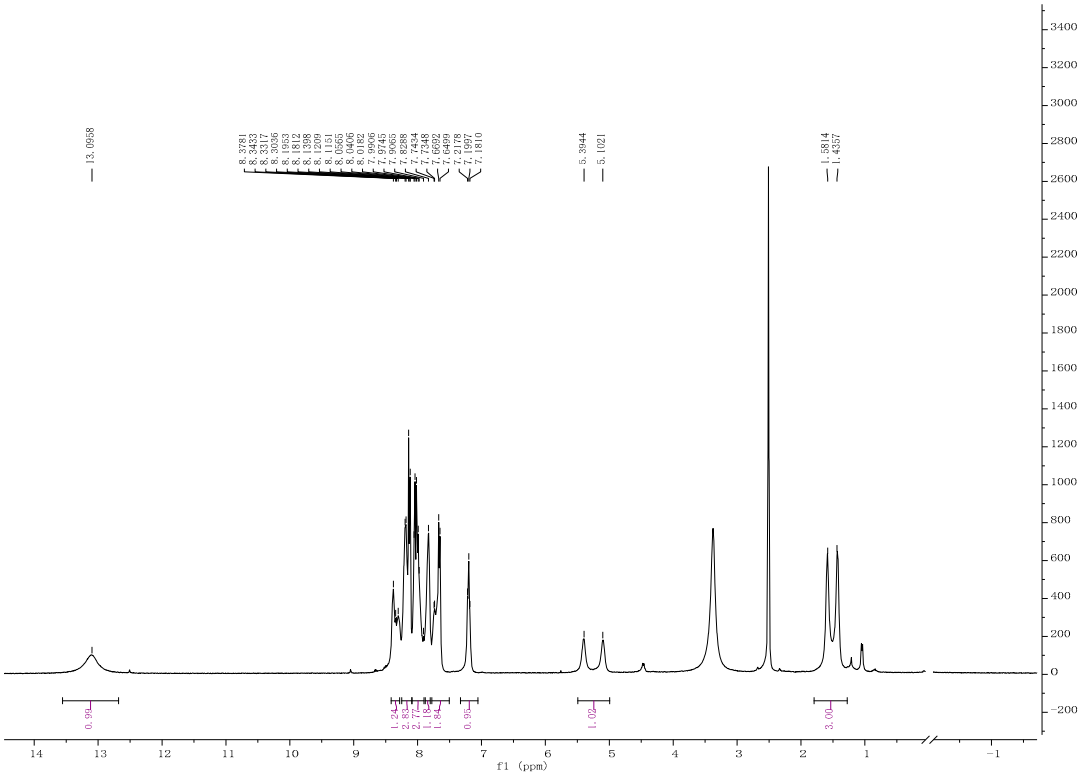


The HRMS spectrogram of compound **F15**

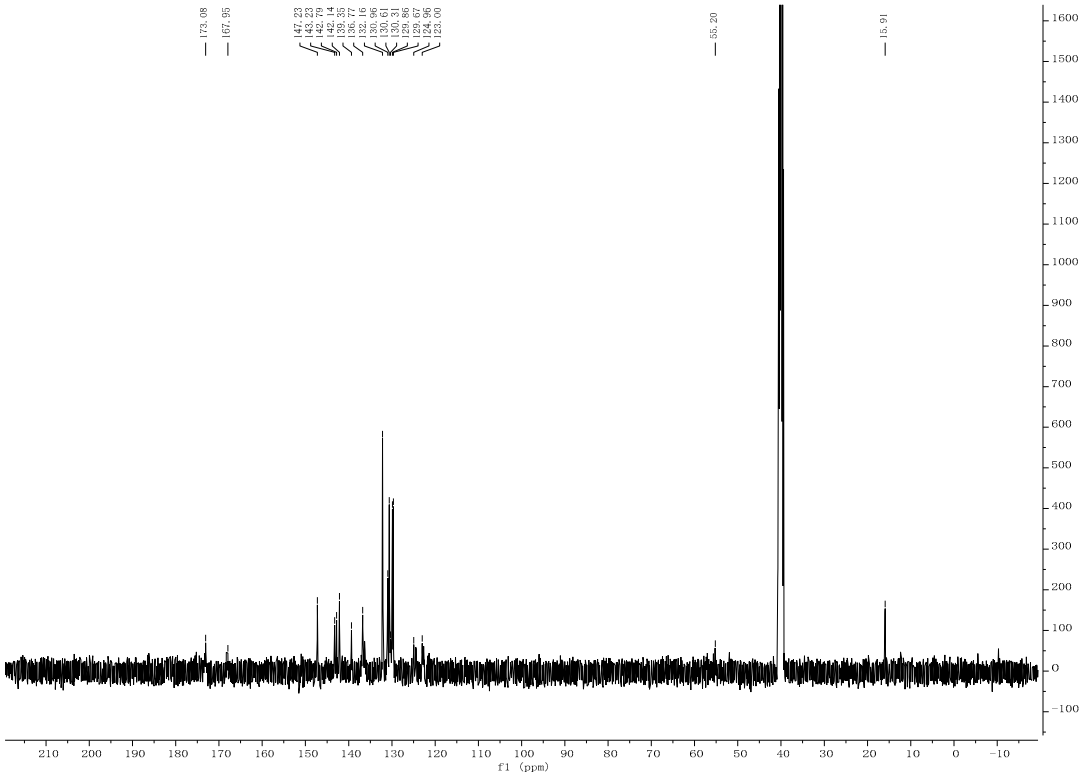
Compound **F16**,
N-(3-nitrophenyl)-*N*-(phenazine-1-carbonyl)alanine



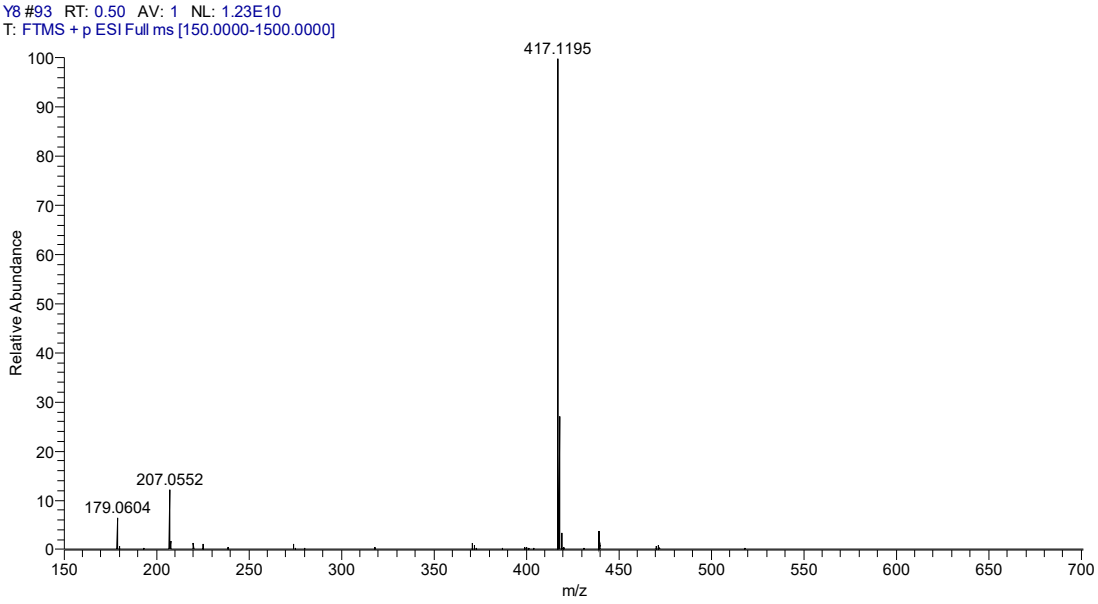
Yellow solid, yield 77.9%, m.p. 99.3-100.8℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 13.10 (s, 1H), 8.41 – 8.28 (m, 1H), 8.25 – 8.09 (m, 3H), 8.09 – 7.90 (m, 3H), 7.83 (s, 1H), 7.78 – 7.50 (m, 2H), 7.20 (t, J = 7.4 Hz, 1H), 5.25 (1H, two isomers), 1.51 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 173.08, 167.95, 147.23, 143.23, 142.79, 142.14, 139.35, 136.77, 132.16, 130.96 (2C), 130.61 (2C), 130.31 (2C), 129.86 (2C), 129.67, 124.96, 123.00, 55.20, 15.91. HRMS (ESI): calcd for $C_{22}H_{16}N_4O_5$ {[M+H]$^+$}, 417.1193; found, 417.1195.



The ^{1}H NMR spectrogram of compound **F16**

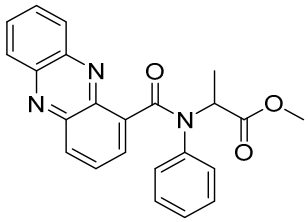


The ^{13}C NMR spectrogram of compound **F16**

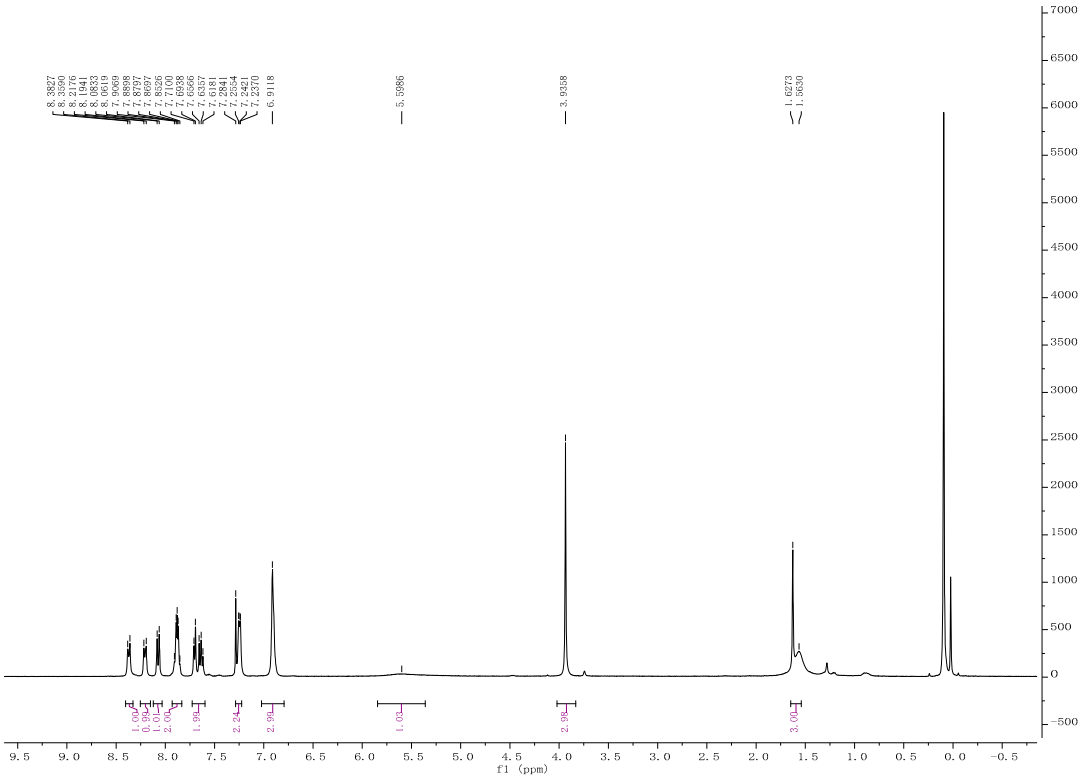


The HRMS spectrogram of compound **F16**

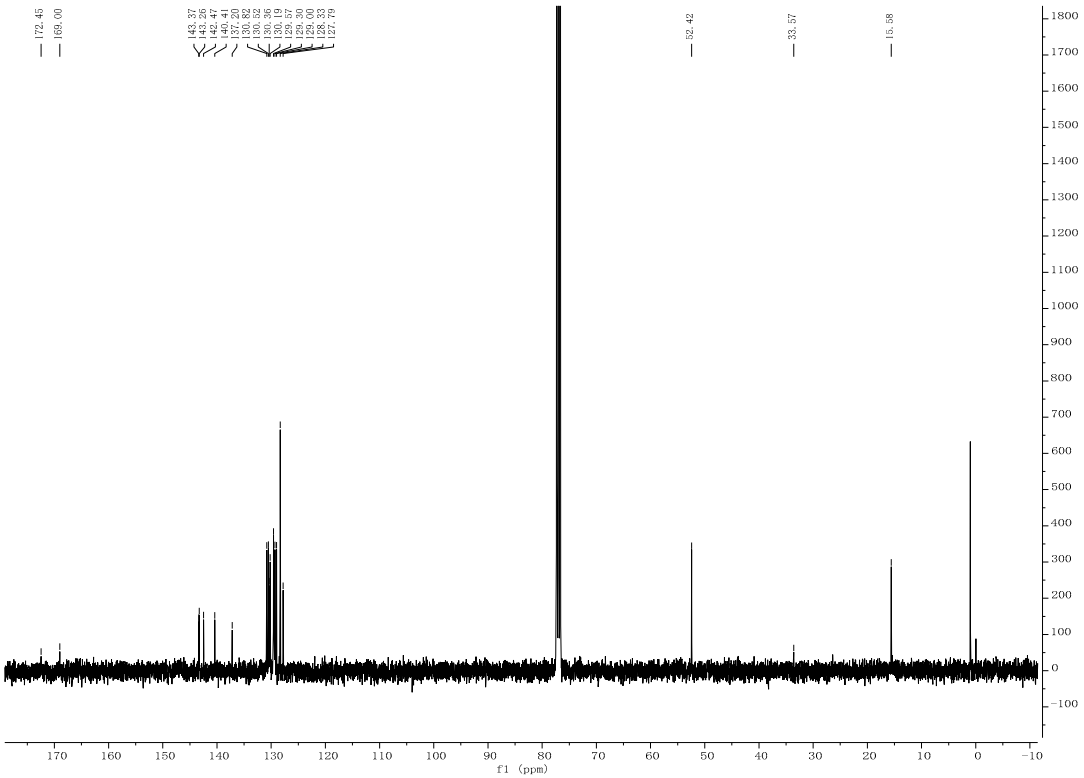
Compound **E1**, methyl *N*-(phenazine-1-carbonyl)-*N*-phenylalaninate



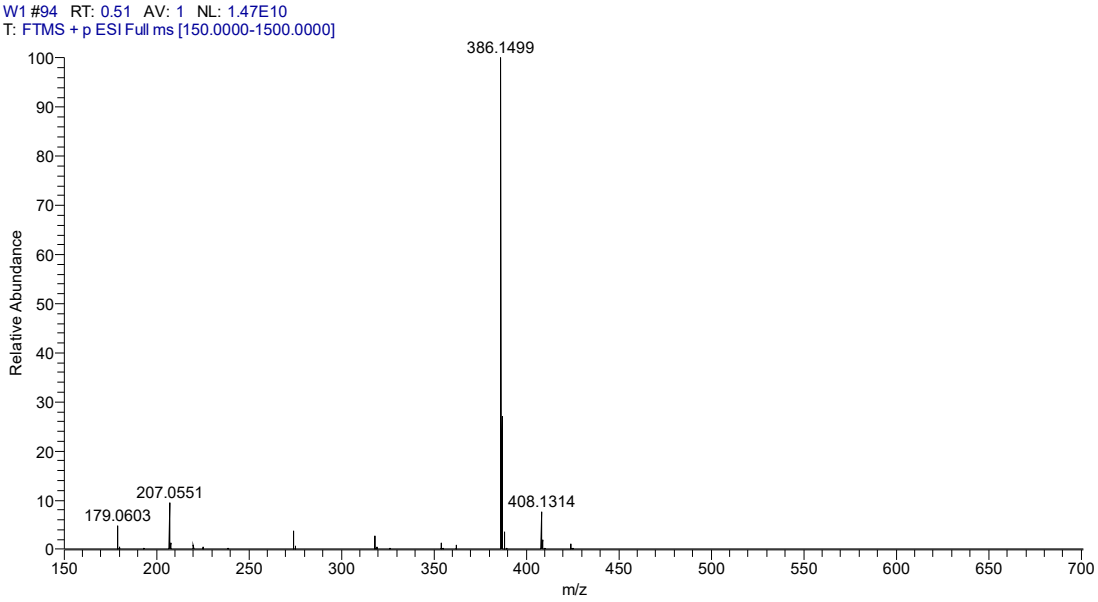
Yellow solid, yield 83.2%, m.p. 150.4-152.1℃; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (d, J = 9.5 Hz, 1H), 8.21 (d, J = 9.4 Hz, 1H), 8.07 (d, J = 8.6 Hz, 1H), 7.88 (p, J = 6.8 Hz, 2H), 7.73 – 7.60 (m, 2H), 7.29 – 7.22 (m, 2H), 6.91 (s, 3H), 5.60 (s, 1H), 3.94 (s, 3H), 1.60 (d, J = 25.7 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 169.00, 162.78, 143.37, 143.26, 142.47, 140.41, 137.20, 130.82, 130.52 (2C), 130.36 (2C), 130.19, 129.57 (2C), 129.30, 129.00, 128.33, 127.79 (2C), 52.42, 33.57, 15.58. HRMS (ESI): calcd for $C_{23}H_{19}N_3O_3$ {$[M+H]^+$}, 386.1499; found, 386.1499.



The ^{1}H NMR spectrogram of compound **E1**

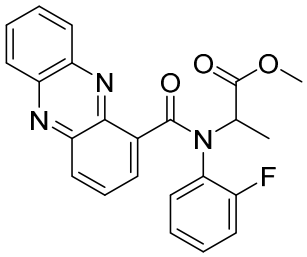


The ^{13}C NMR spectrogram of compound **E1**

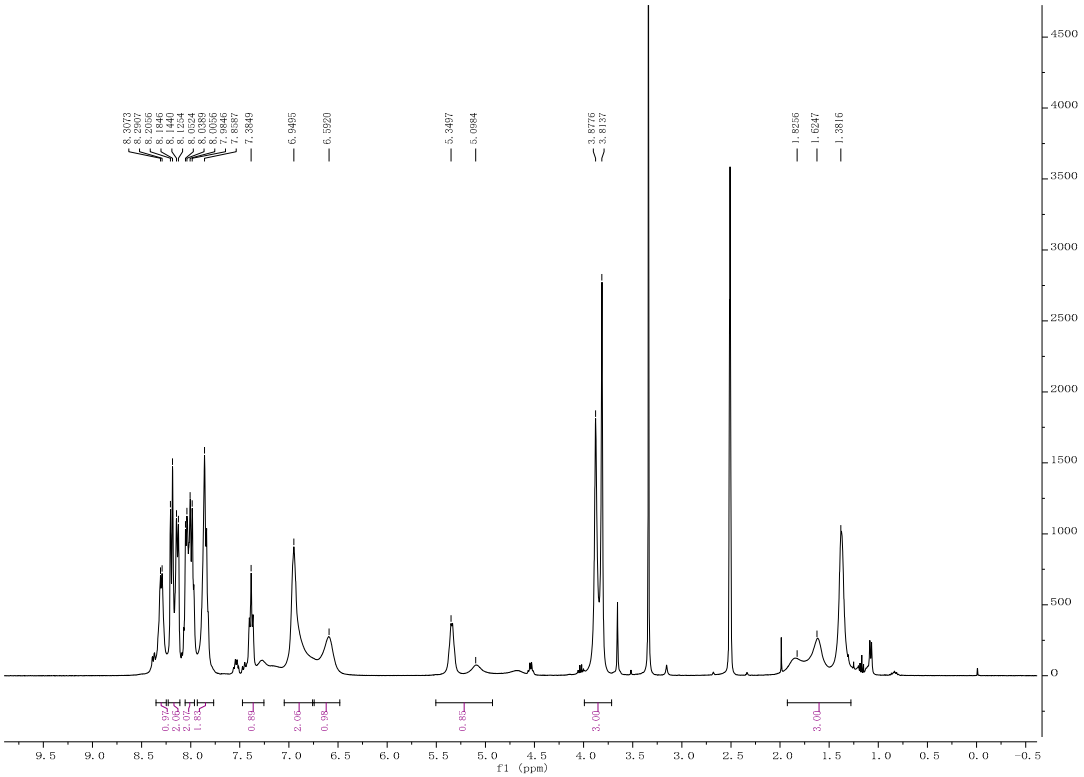


The HRMS spectrogram of compound **E1**

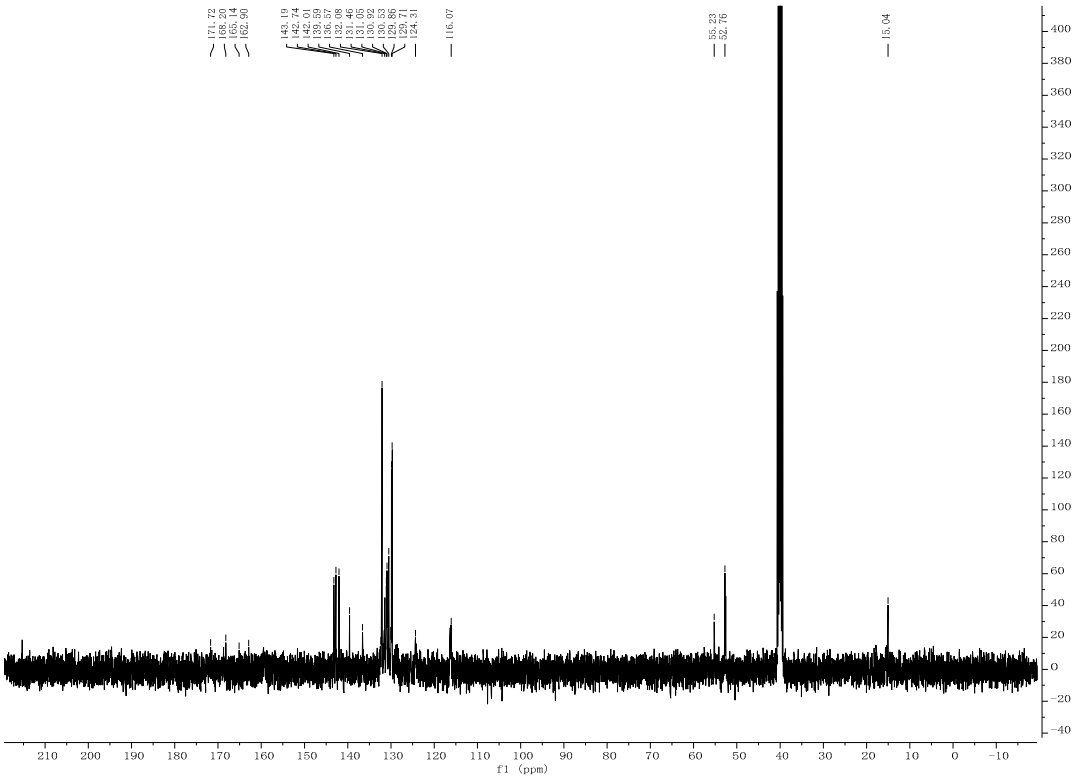
Compound **E2**, methyl *N*-(2-fluorophenyl)-*N*-(phenazine-1-carbonyl)alaninate



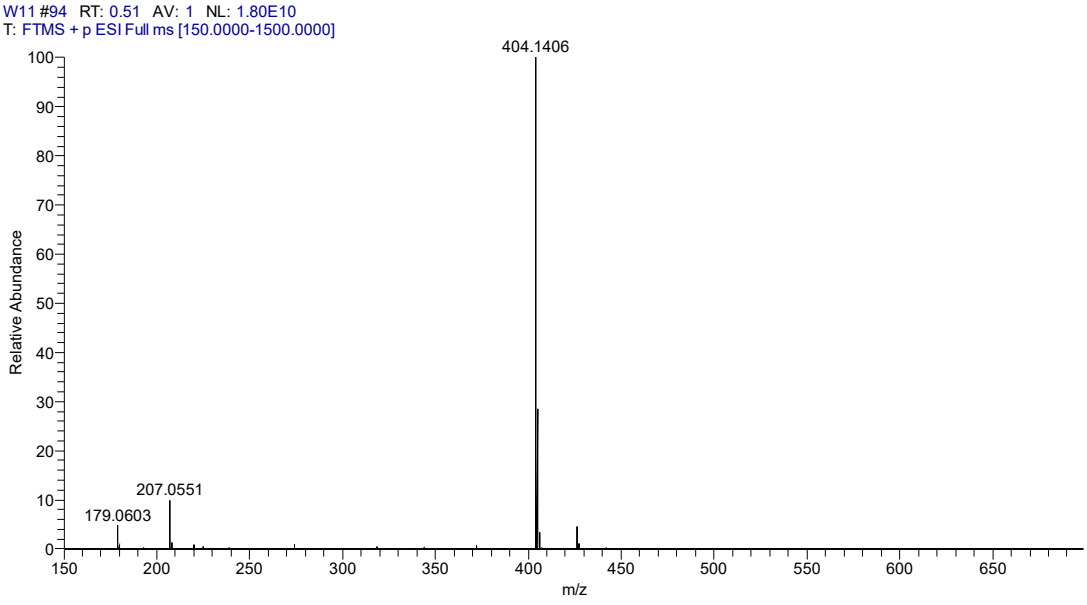
Yellow solid, yield 82.1%, m.p. 142.1-143.9℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.35 – 8.25 (m, 1H), 8.16 (dd, J = 24.2, 7.9 Hz, 2H), 8.02 (d, J = 27.1 Hz, 2H), 7.86 (s, 2H), 7.38 (s, 1H), 6.95 (s, 2H), 6.59 (s, 1H), 5.22 (1H, two isomers), 3.85 (d, J = 25.6 Hz, 3H), 1.62 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 171.72, 168.20, 165.14, 162.90(dd, C=C-F= J =226.24 Hz), 143.19, 142.74, 142.01, 139.59, 136.57, 132.08, 131.46 (2C), 131.05 (2C), 1+30.92, 130.53 (2C), 129.86, 129.71, 124.31, 116.07, 55.23, 52.76, 15.04. HRMS (ESI): calcd for $C_{23}H_{18}FN_3O_3$ {$[M+H]^+$}, 404.1405; found, 404.1406.



The ^{1}H NMR spectrogram of compound **E2**

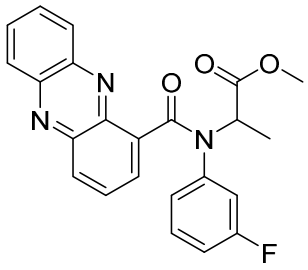


The ^{13}C NMR spectrogram of compound **E2**

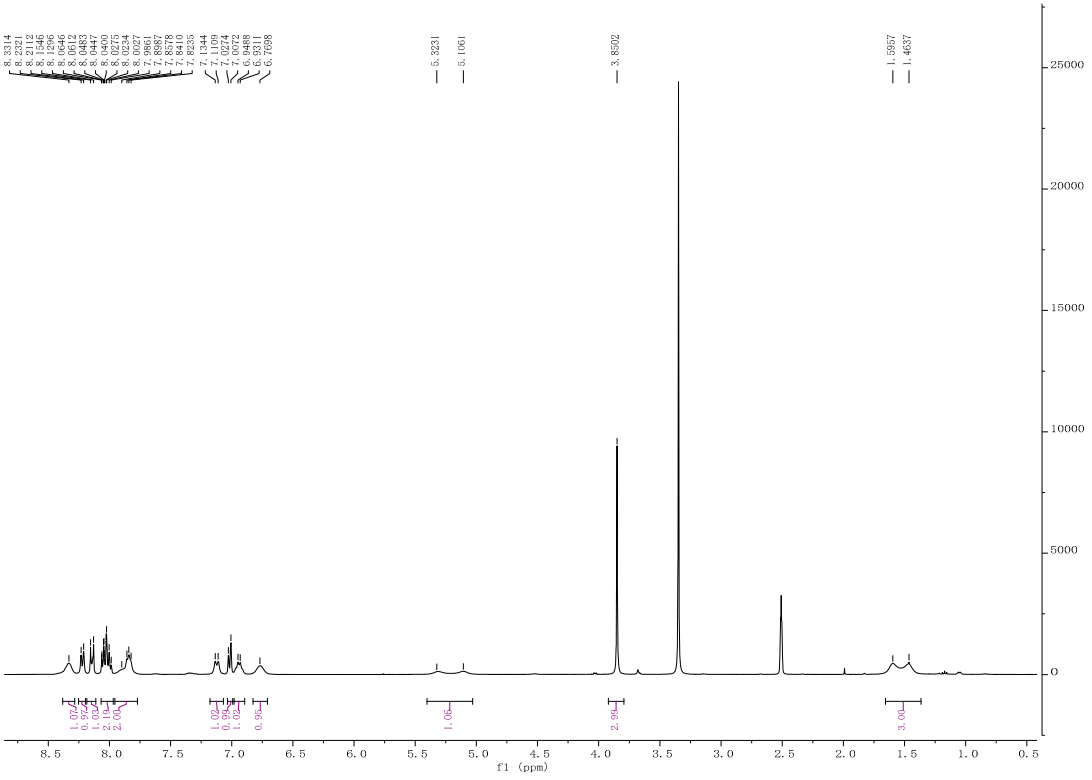


The HRMS spectrogram of compound **E2**

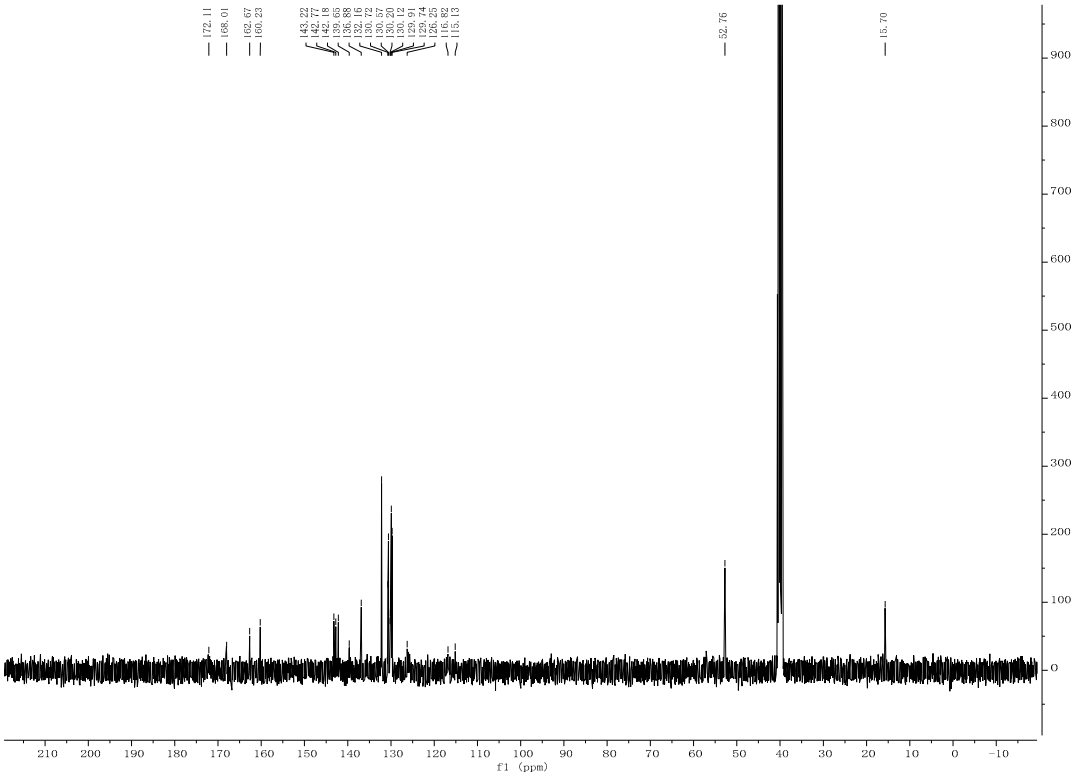
Compound **E3**,
methyl *N*-(3-fluorophenyl)-*N*-(phenazine-1-carbonyl)alaninate



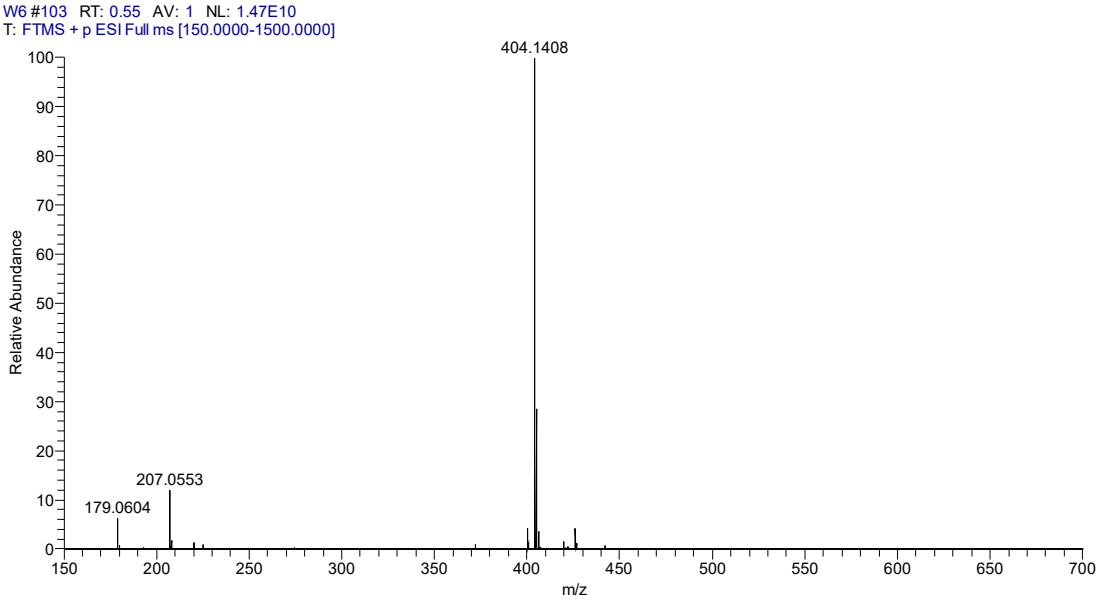
Yellow solid, yield 80.2%, m.p. 145.3-147.2℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.33 (s, 1H), 8.22 (d, J = 8.4 Hz, 1H), 8.14 (d, J = 10.0 Hz, 1H), 8.07 – 7.97 (m, 2H), 7.86 (q, J = 11.7, 7.0 Hz, 2H), 7.12 (d, J = 9.4 Hz, 1H), 7.02 (d, J = 8.1 Hz, 1H), 6.94 (d, J = 7.1 Hz, 1H), 6.77 (s, 1H), 5.21 (1H, two isomers), 3.85 (s, 3H), 1.53 (3H, two isomers).^{13}C NMR (101 MHz, DMSO-d_6) δ 172.11, 168.01, 162.67, 160.23, (dd, C=C-*f*=*J*= 246.44 Hz), 143.22, 142.77, 142.18, 139.65, 136.88, 132.16, 130.72, 130.57, 130.20, 130.12 (2C), 129.91, 129.74 (2C), 126.25, 116.82, 115.13, 52.76, 15.70. HRMS (ESI): calcd for $C_{23}H_{18}FN_3O_3$ {$[M+H]^+$}, 404.1405; found, 404.1408.



The ^{1}H NMR spectrogram of compound **E3**

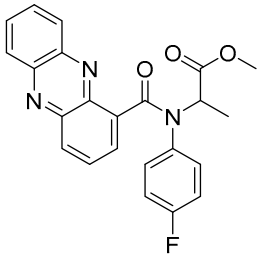


The ^{13}C NMR spectrogram of compound **E3**

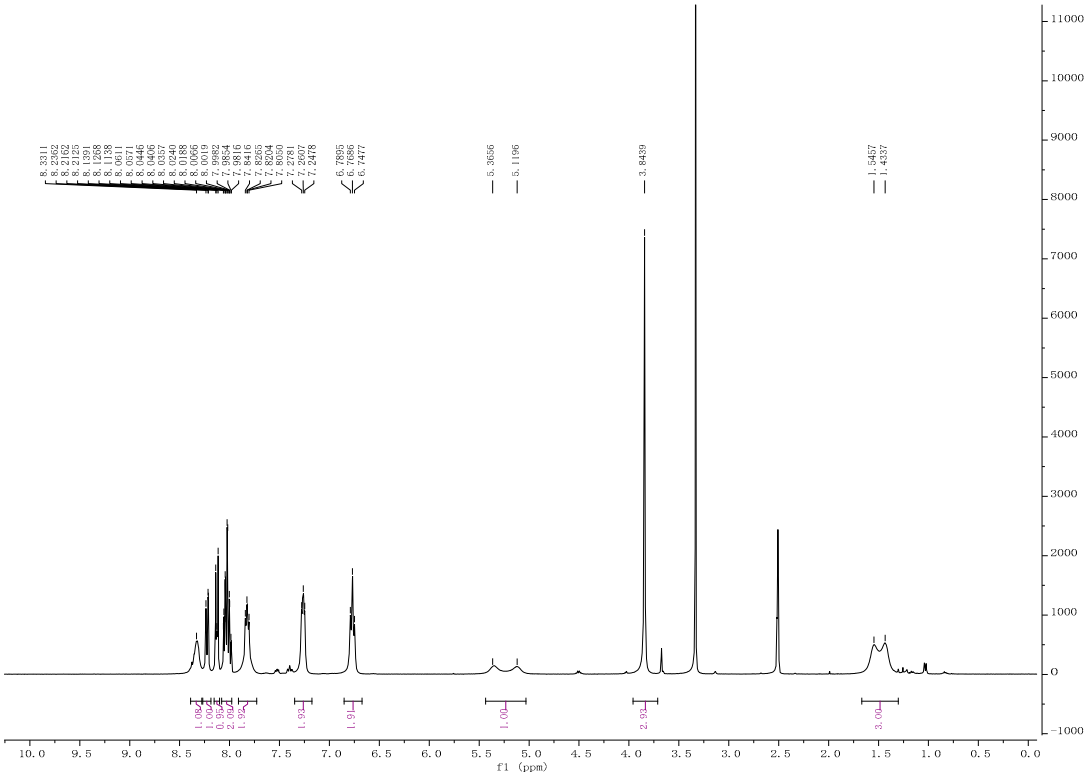


The HRMS spectrogram of compound **E3**

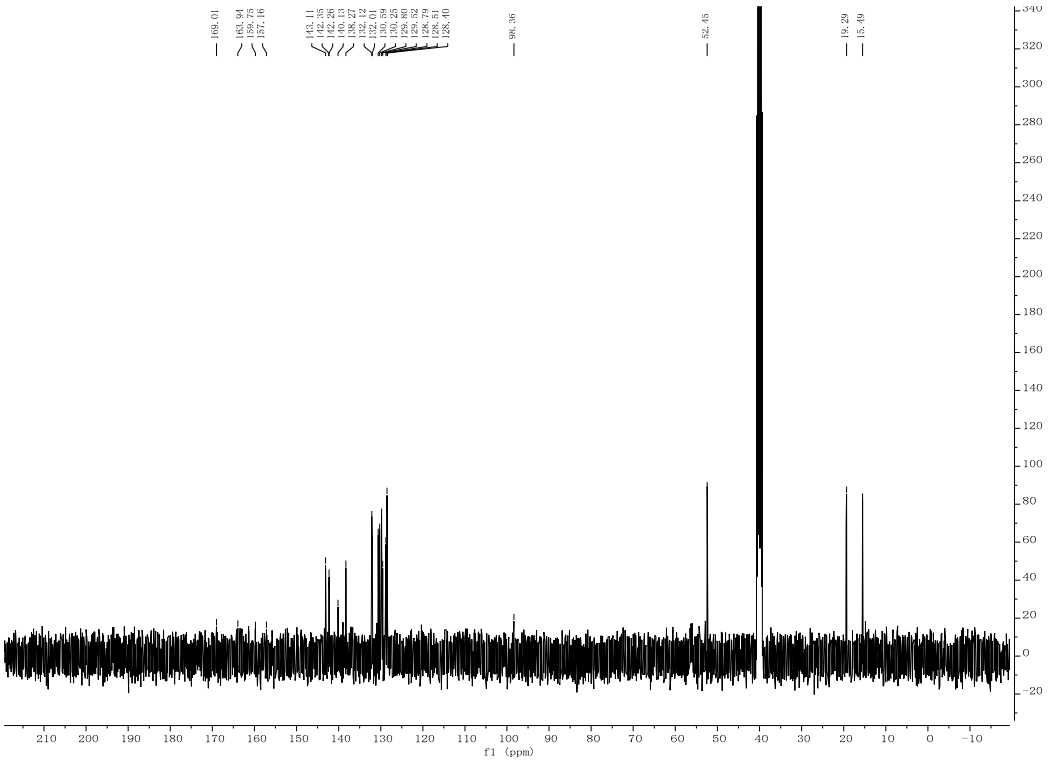
Compound **E4**,
methyl *N*-(4-fluorophenyl)-*N*-(phenazine-1-carbonyl)alaninate



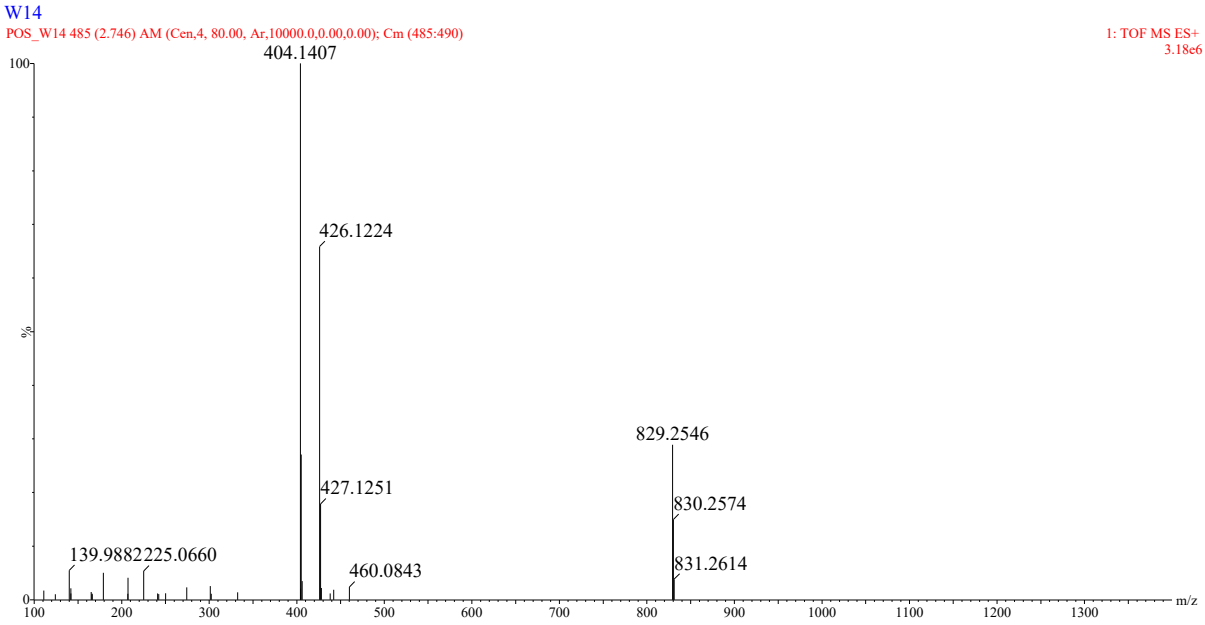
Yellow solid, yield 79.6%, m.p. 160.3-162.1℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.33 (s, 1H), 8.27 – 8.19 (m, 1H), 8.16 – 8.10 (m, 1H), 8.02 (dddd, J = 14.9, 8.1, 6.6, 1.6 Hz, 2H), 7.91 – 7.73 (m, 2H), 7.35 – 7.17 (m, 2H), 6.77 (t, J = 8.3 Hz, 2H), 5.24 (1H, two isomers), 3.84 (s, 3H), 1.49 (3H, two isomers).^{13}C NMR (101 MHz, DMSO-d_6) δ 169.01, 163.94, 159.75, 157.16 (dd, C=C-*f*=*J*= 261.59 Hz), 143.11, 142.35, 142.26, 140.13, 138.27, 132.12, 132.01, 130.59, 130.25 (2C), 129.80, 129.52, 128.79, 128.51, 128.40, 98.36 (2C), 52.45, 19.29, 15.49. HRMS (ESI): calcd for $C_{23}H_{18}FN_3O_3$ {$[M+H]^+$}, 404.1405; found, 404.1407.



The ^{1}H NMR spectrogram of compound **E4**

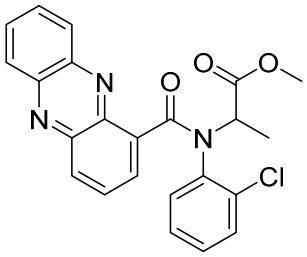


The ^{13}C NMR spectrogram of compound **E4**

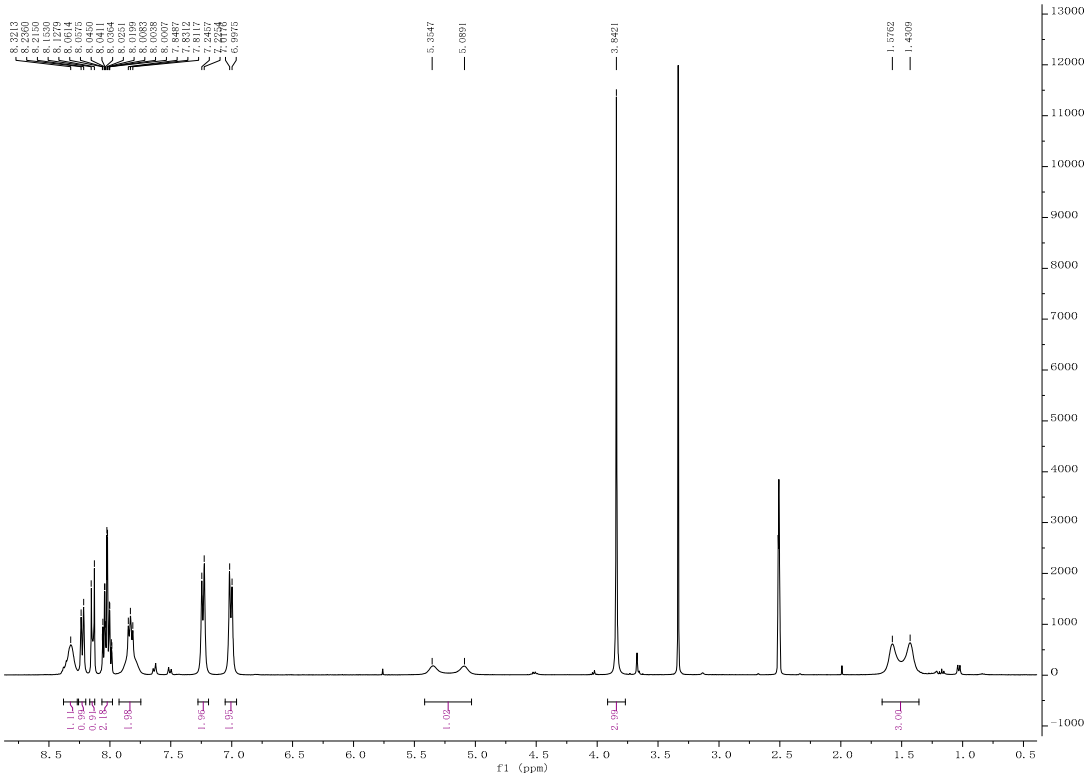


The HRMS spectrogram of compound **E4**

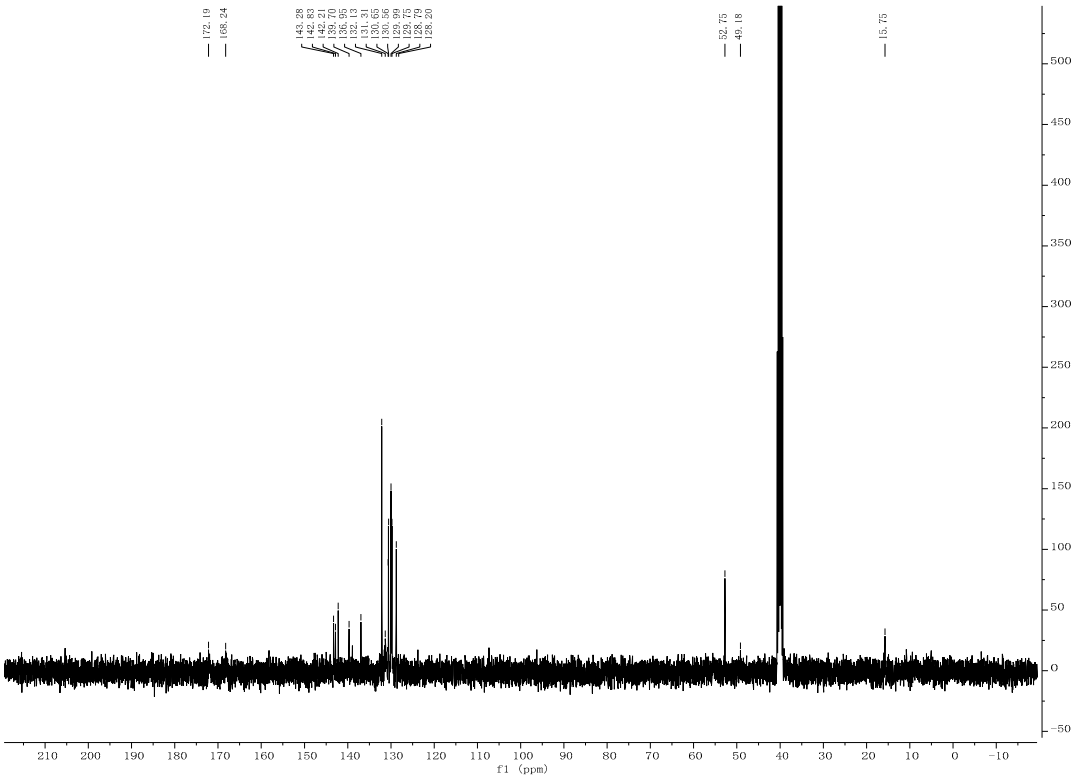
Compound **E5**,
methyl *N*-(2-chlorophenyl)-*N*-(phenazine-1-carbonyl)alaninate



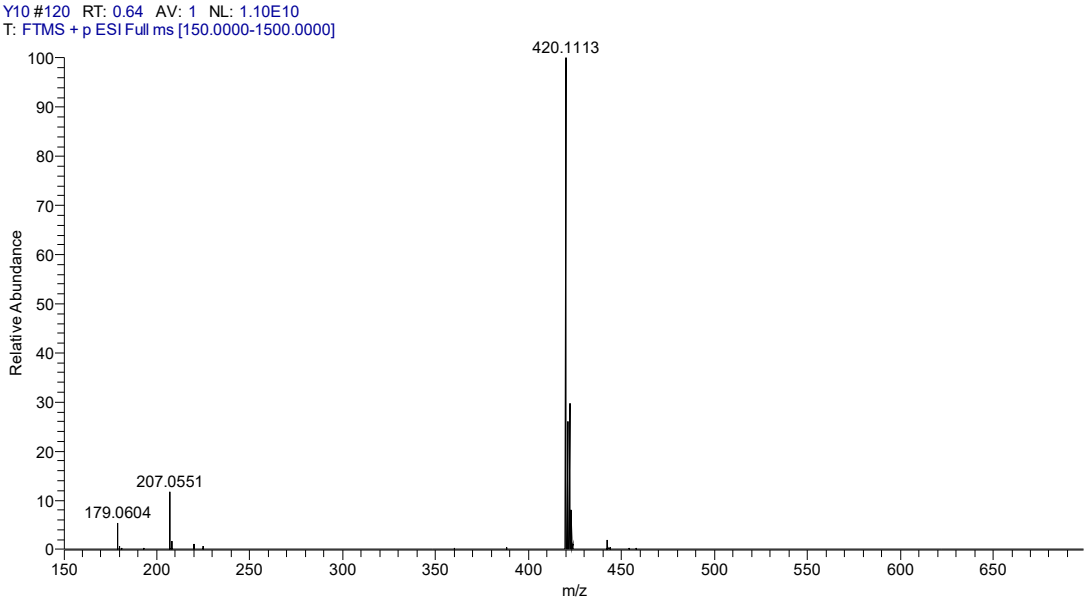
Yellow solid, yield 80.1%, m.p. 144.7-146.6℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.32 (s, 1H), 8.23 (d, J = 8.4 Hz, 1H), 8.14 (d, J = 10.1 Hz, 1H), 8.02 (dddd, J = 14.3, 7.9, 6.6, 1.5 Hz, 2H), 7.93 – 7.75 (m, 2H), 7.24 (d, J = 8.1 Hz, 2H), 7.01 (d, J = 8.1 Hz, 2H), 5.22 (1H, two isomers), 3.84 (s, 3H), 1.50 (3H, two isomers).^{13}C NMR (101 MHz, DMSO-d_6) δ 172.19, 168.24, 143.28, 142.83, 142.21, 139.70, 136.95, 132.13, 131.31, 130.65 (2C), 130.56 (2C), 129.99 (2C), 129.75 (2C), 128.79 (2C), 128.20, 52.75, 49.18, 15.75.HRMS (ESI): calcd for $C_{23}H_{18}ClN_3O_3$ {$[M+H]^+$},420.1109; found, 420.1113.



The ^{1}H NMR spectrogram of compound **E5**

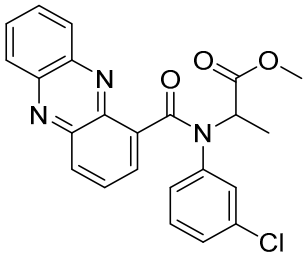


The ^{13}C NMR spectrogram of compound **E5**

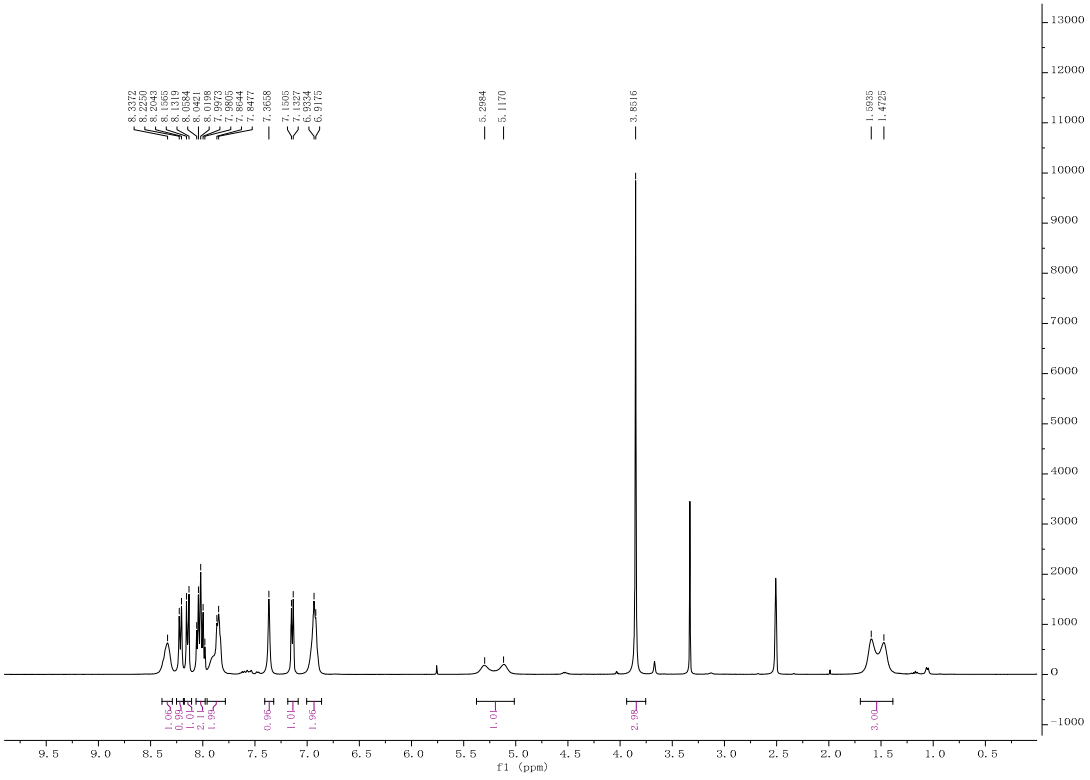


The HRMS spectrogram of compound **E5**

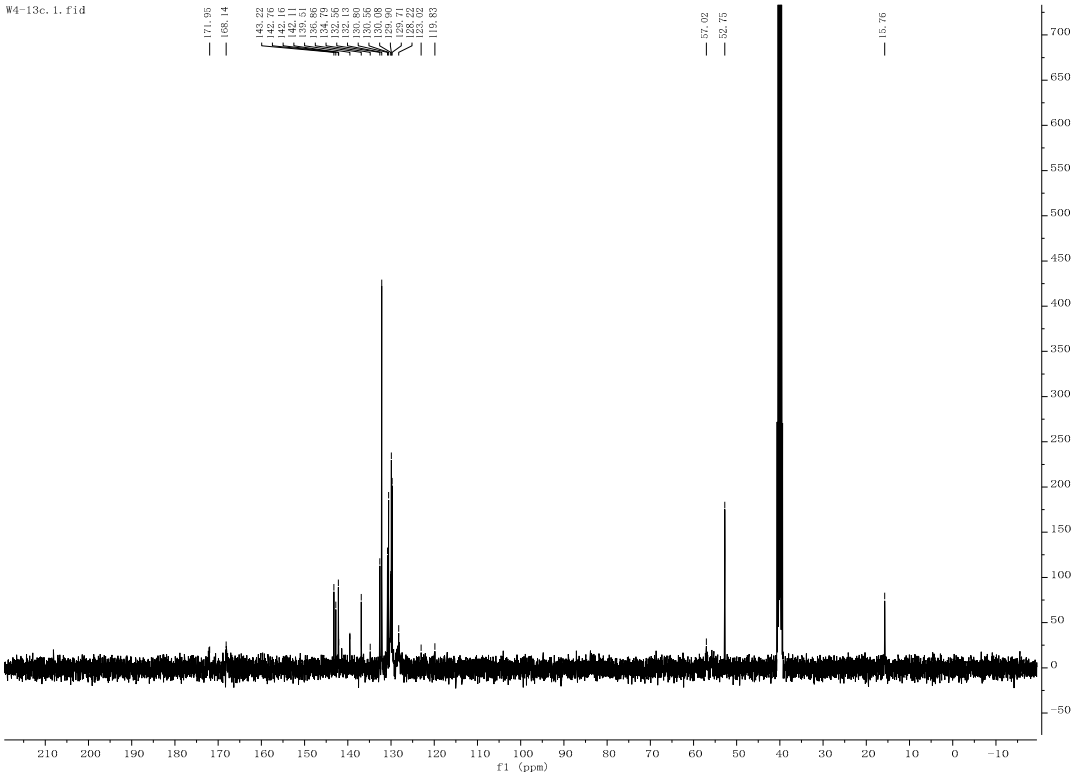
Compound **E6**,
methyl *N*-(3-chlorophenyl)-*N*-(phenazine-1-carbonyl)alaninate



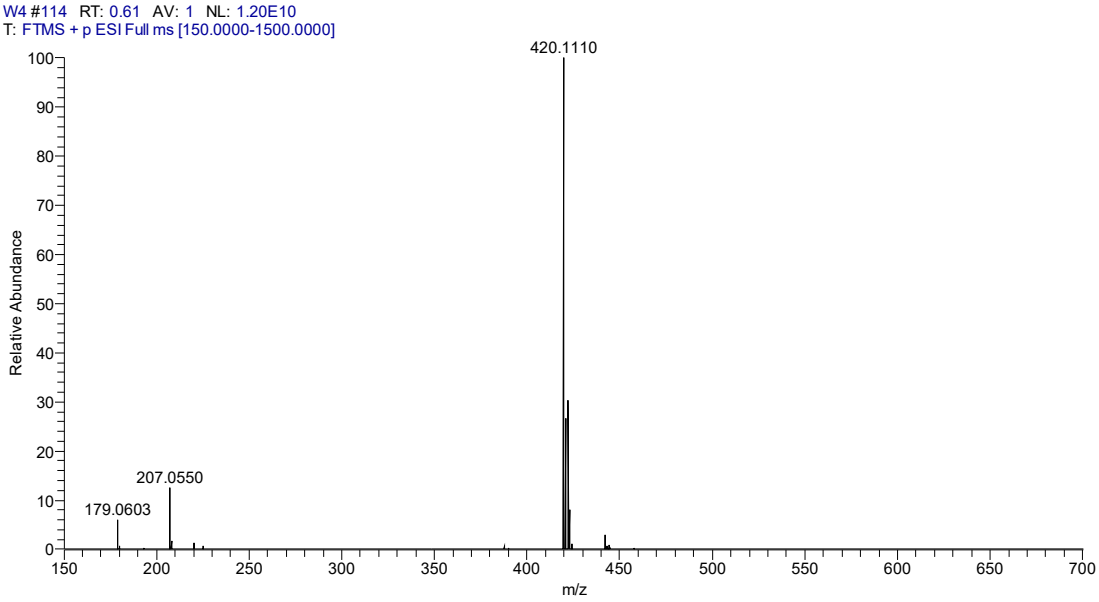
Yellow solid, yield 81.0%, m.p. 144.7-146.6℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.34 (s, 1H), 8.21 (d, J = 8.3 Hz, 1H), 8.14 (d, J = 9.8 Hz, 1H), 8.02 (dt, J = 15.7, 6.7 Hz, 2H), 7.96 – 7.78 (m, 2H), 7.37 (s, 1H), 7.14 (d, J = 7.1 Hz, 1H), 6.93 (d, J = 6.4 Hz, 2H), 5.21 (1H, two isomers), 3.85 (s, 3H), 1.53 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 171.95, 168.14, 143.22, 142.76, 142.16, 142.11, 139.51, 136.86, 134.79, 132.56, 132.13 (2C), 130.80, 130.56, 130.08, 129.90, 129.71, 128.22, 123.02, 119.83, 57.02, 52.75, 15.76. HRMS (ESI): calcd for $C_{23}H_{18}ClN_3O_3$ {$[M+H]^+$}, 420.1109; found, 420.1110.



The ^{1}H NMR spectrogram of compound **E6**

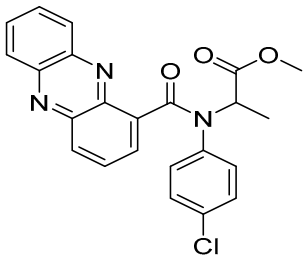


The ^{13}C NMR spectrogram of compound **E6**

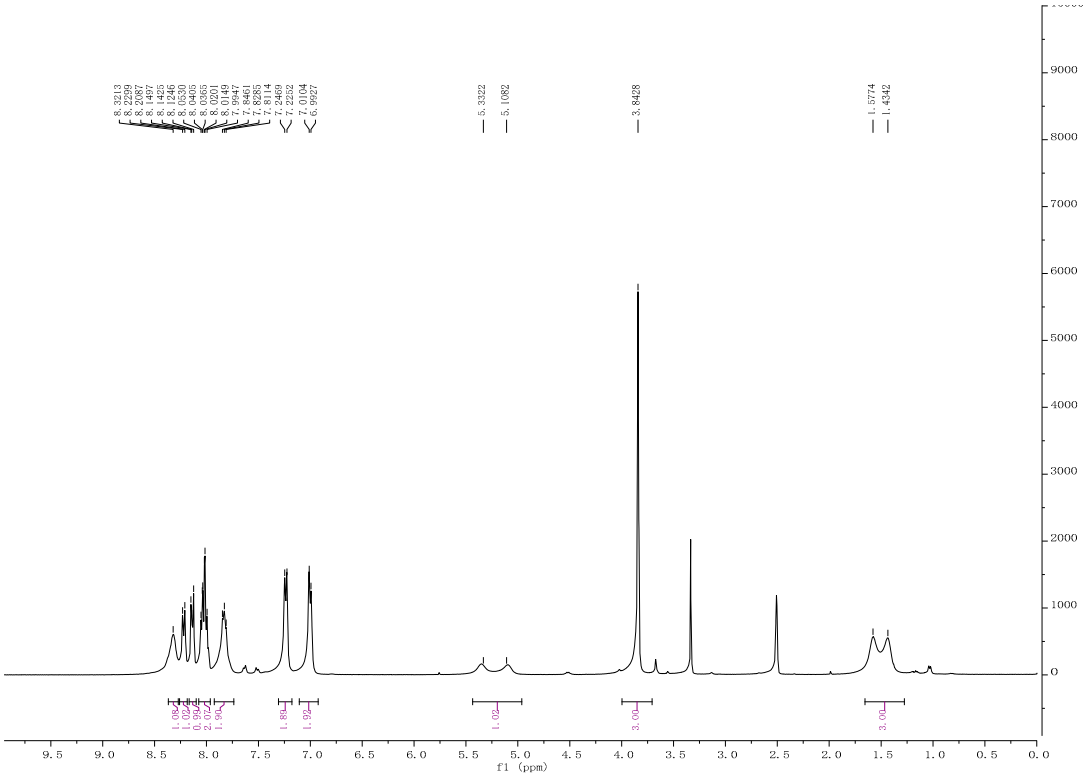


The HRMS spectrogram of compound **E6**

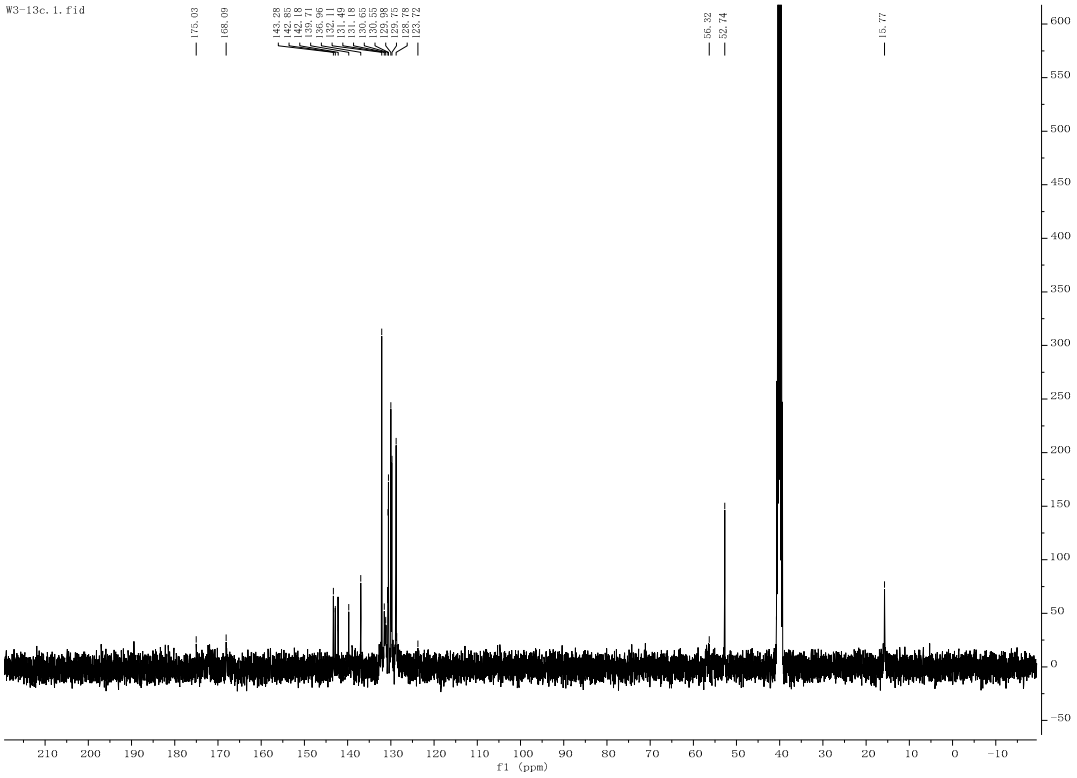
Compound **E7**,
methyl *N*-(4-chlorophenyl)-*N*-(phenazine-1-carbonyl)alaninate



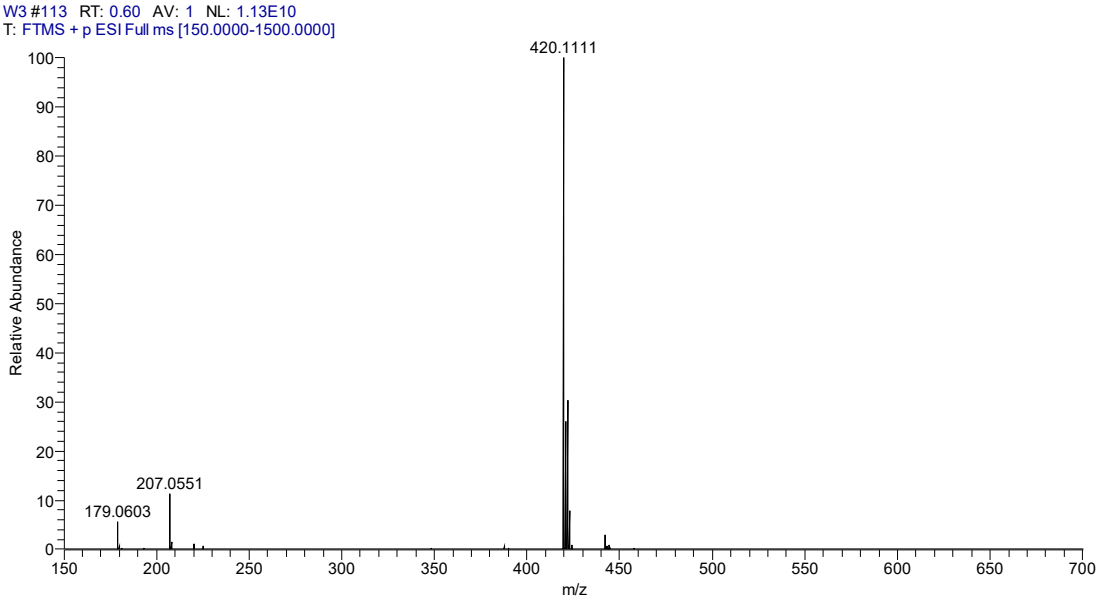
Yellow solid, yield 82.2%, m.p. 154.1-155.0℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.32 (s, 1H), 8.22 (d, J = 8.5 Hz, 1H), 8.17 – 8.10 (m, 1H), 8.08 – 7.96 (m, 2H), 7.92 – 7.74 (m, 2H), 7.23 (s, 2H), 7.00 (d, J = 7.1 Hz, 2H), 5.11 (1H, two isomers), 3.84 (s, 3H), 1.51 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 175.03, 168.09, 143.28, 142.85, 142.18, 139.71, 136.96, 132.11, 131.49 (2C), 131.18, 130.65 (2C), 130.55, 129.98 (2C), 129.75, 128.78, 123.72 (2C), 56.32, 52.74, 15.77. HRMS (ESI): calcd for $C_{23}H_{18}ClN_3O_3$ {$[M+H]^+$}, 420.1109; found, 420.1111.



The ^{1}H NMR spectrogram of compound **E7**

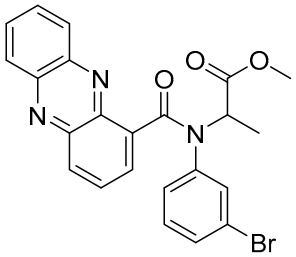


The ^{13}C NMR spectrogram of compound **E7**

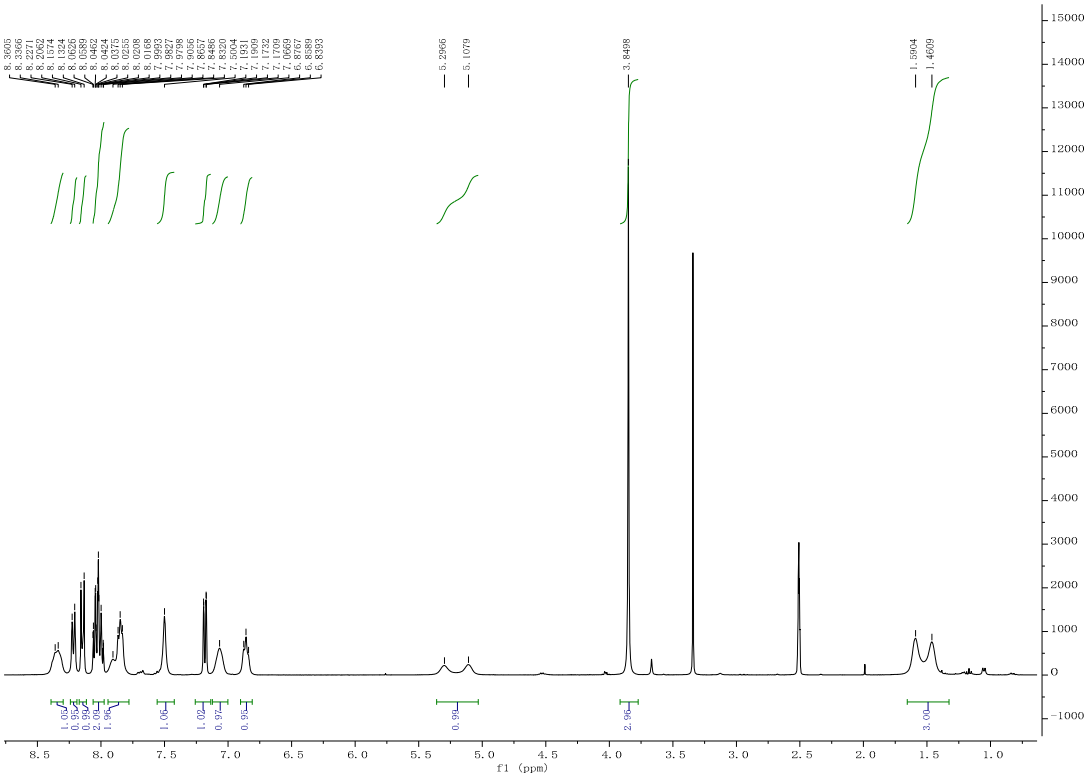


The HRMS spectrogram of compound **E7**

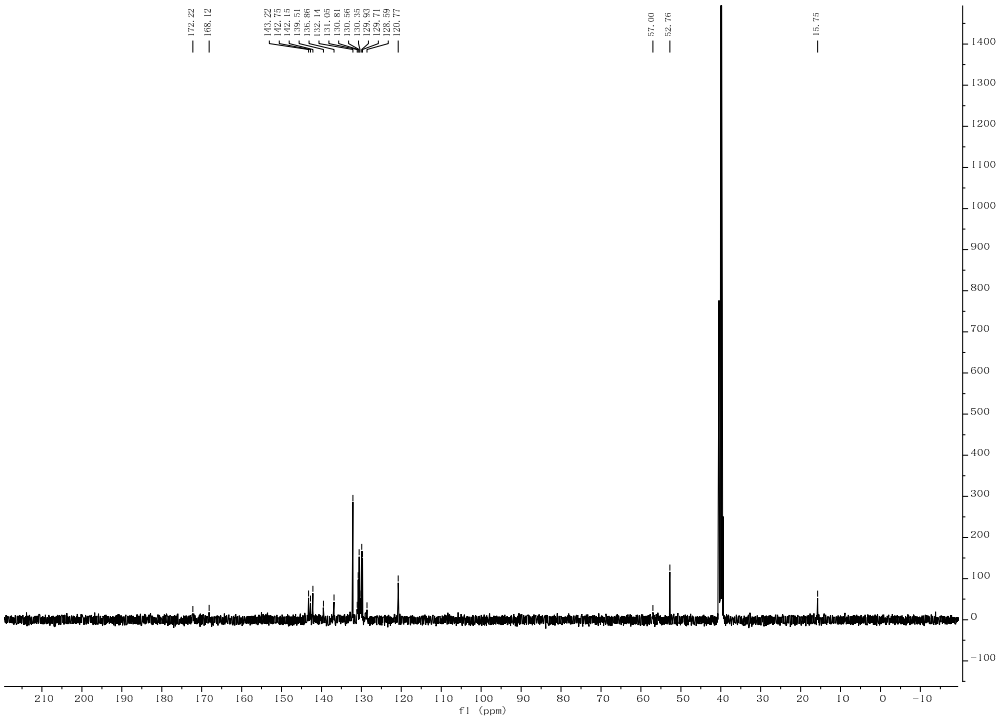
Compound **E8**,
methyl *N*-(3-bromophenyl)-*N*-(phenazine-1-carbonyl)alaninate



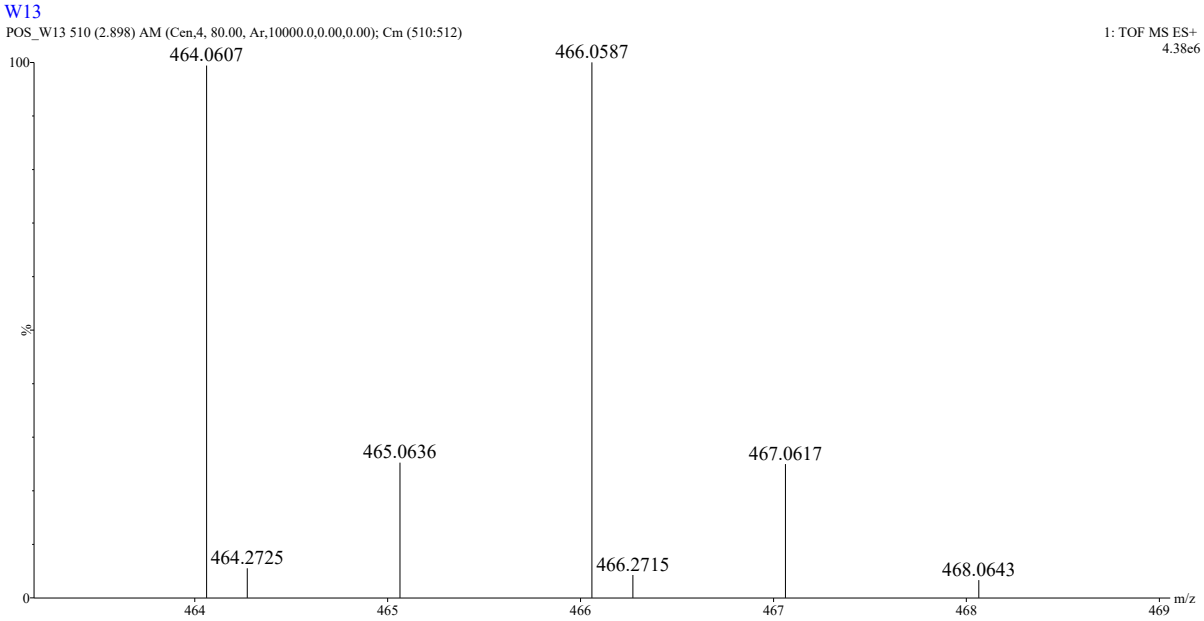
Yellow solid, yield 77.9%, m.p. 135.0-137.0℃;^{1}H NMR (400 MHz, DMSO-d_6) δ 8.39 – 8.30 (m, 1H), 8.22 (d, J = 8.3 Hz, 1H), 8.14 (d, J = 10.0 Hz, 1H), 8.06 – 7.98 (m, 2H), 7.94 – 7.78 (m, 2H), 7.50 (s, 1H), 7.26 – 7.14 (m, 1H), 7.07 (s, 1H), 6.86 (t, J = 7.5 Hz, 1H), 5.20 (1H, two isomers), 3.85 (s, 3H), 1.53 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 172.22, 168.12, 143.22, 142.75, 142.15, 139.51, 136.86, 132.14 (2C), 131.05, 130.81, 130.56, 130.35, 129.93, 129.71, 128.59, 120.77, 57.00, 52.76, 15.75. HRMS (ESI): calcd for $C_{23}H_{18}BrN_3O_3$ {$[M+H]^+$}, 464.0605; found, 464.0607.



The ^{1}H NMR spectrogram of compound **E8**

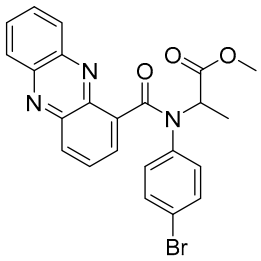


The ^{13}C NMR spectrogram of compound **E8**

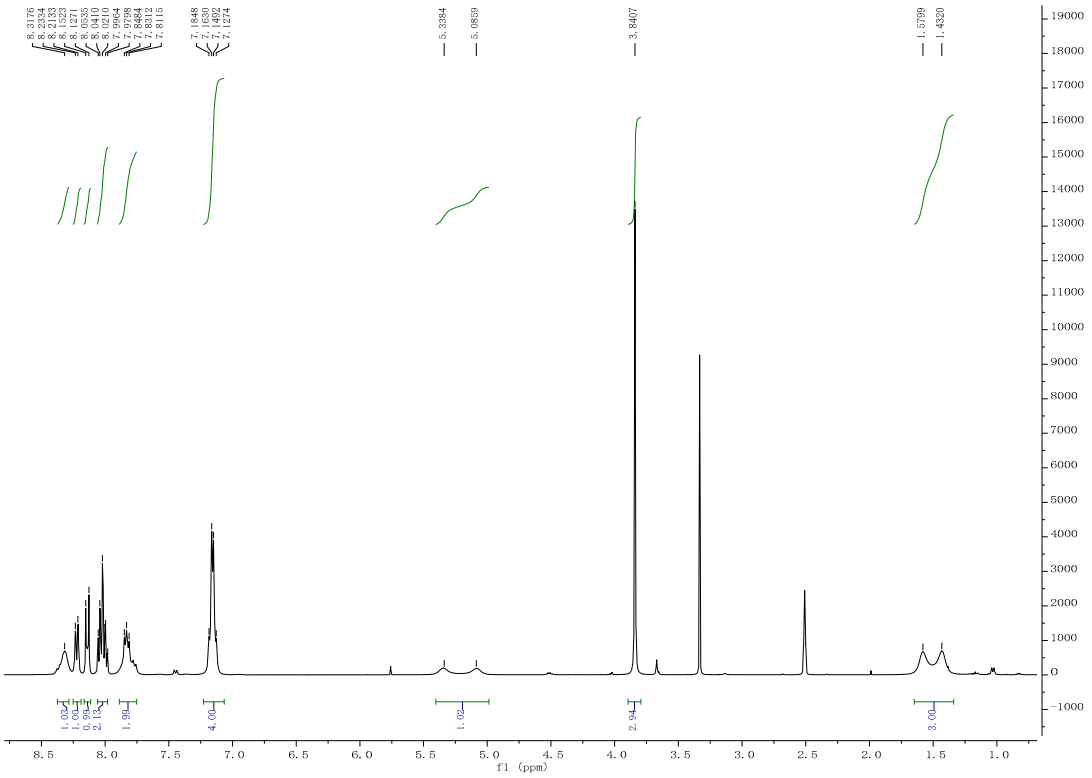


The HRMS spectrogram of compound **E8**

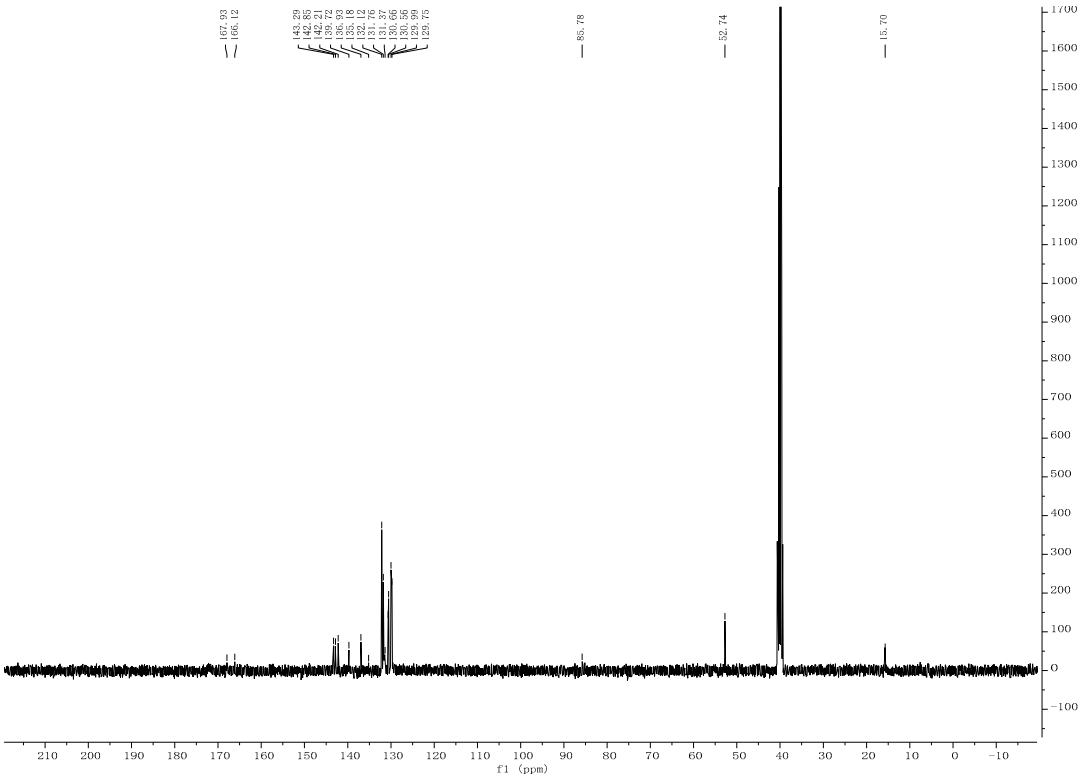
Compound **E9**,
methyl *N*-(4-bromophenyl)-*N*-(phenazine-1-carbonyl)alaninate



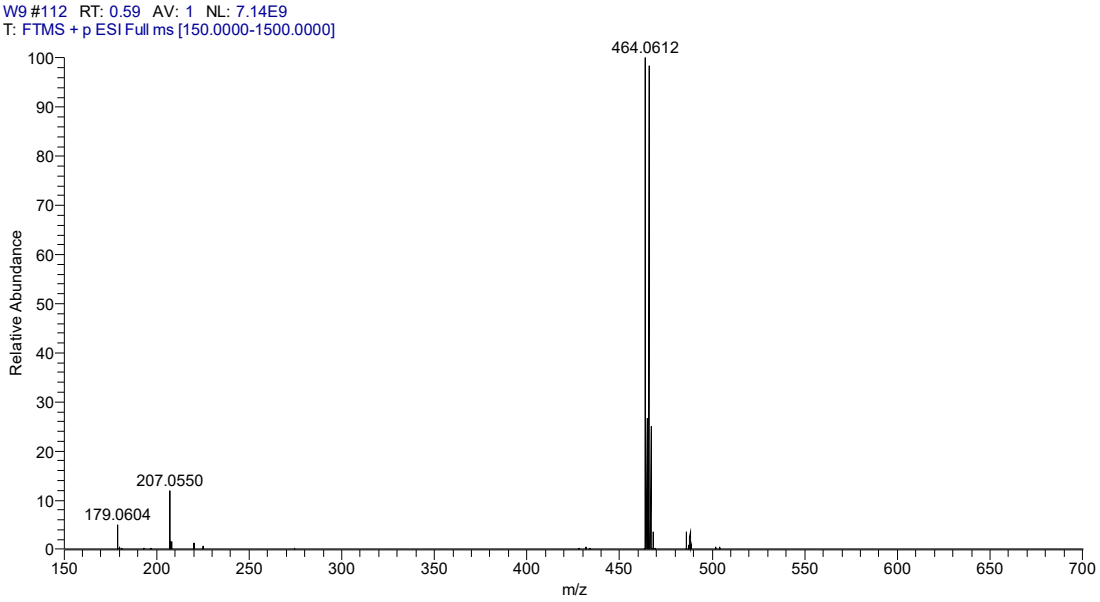
Yellow solid, yield 80.4%, m.p. 1172.0-173.8℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.32 (s, 1H), 8.22 (d, J = 8.0 Hz, 1H), 8.14 (d, J = 10.1 Hz, 1H), 8.06 – 7.98 (m, 2H), 7.89 – 7.75 (m, 2H), 7.16 (q, J = 8.7 Hz, 4H), 5.21 (1H, two isomers), 3.84 (s, 3H), 1.51 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 167.93, 166.12, 143.29, 142.85, 142.21, 139.72, 136.93, 135.18, 132.12 （2C）, 131.76, 131.37 (2C), 130.66 (2C), 130.56, 129.99, 129.75 (2C), 85.78, 52.74, 15.70. HRMS (ESI): calcd for $C_{23}H_{18}BrN_3O_3$ {$[M+H]^+$}, 464.0604; found, 464.0612.



The ^{1}H NMR spectrogram of compound **E9**

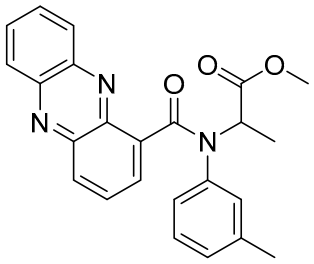


The ^{13}C NMR spectrogram of compound **E9**

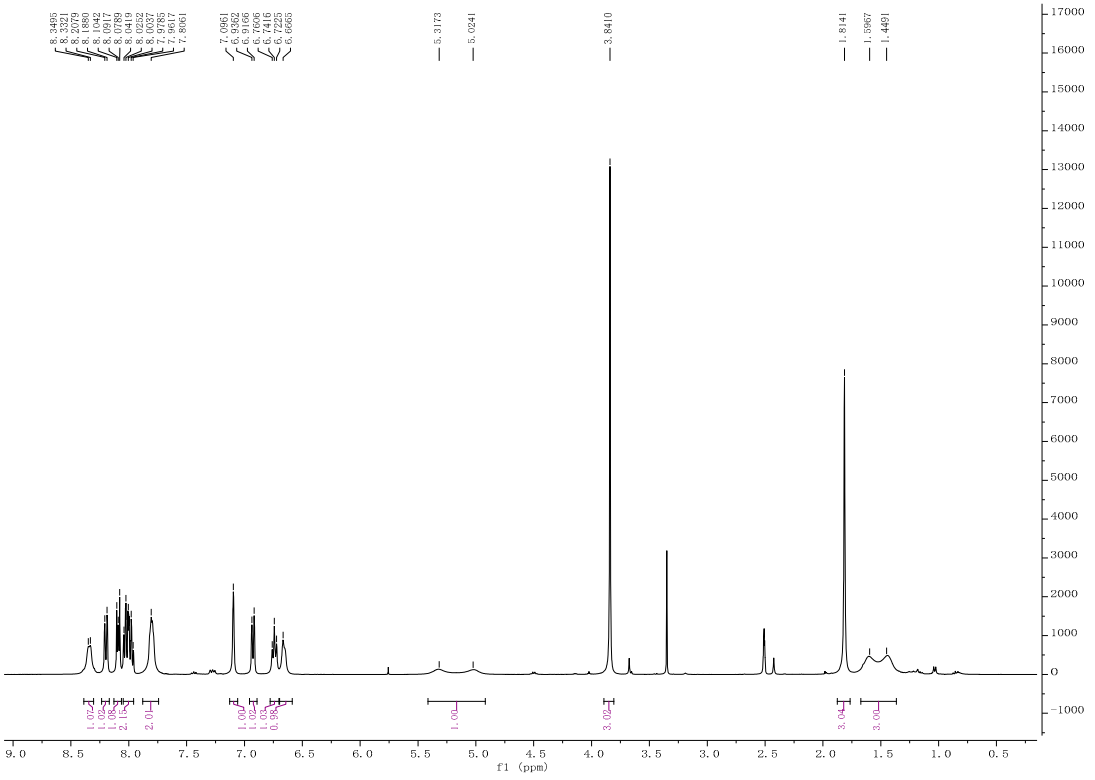


The HRMS spectrogram of compound **E9**

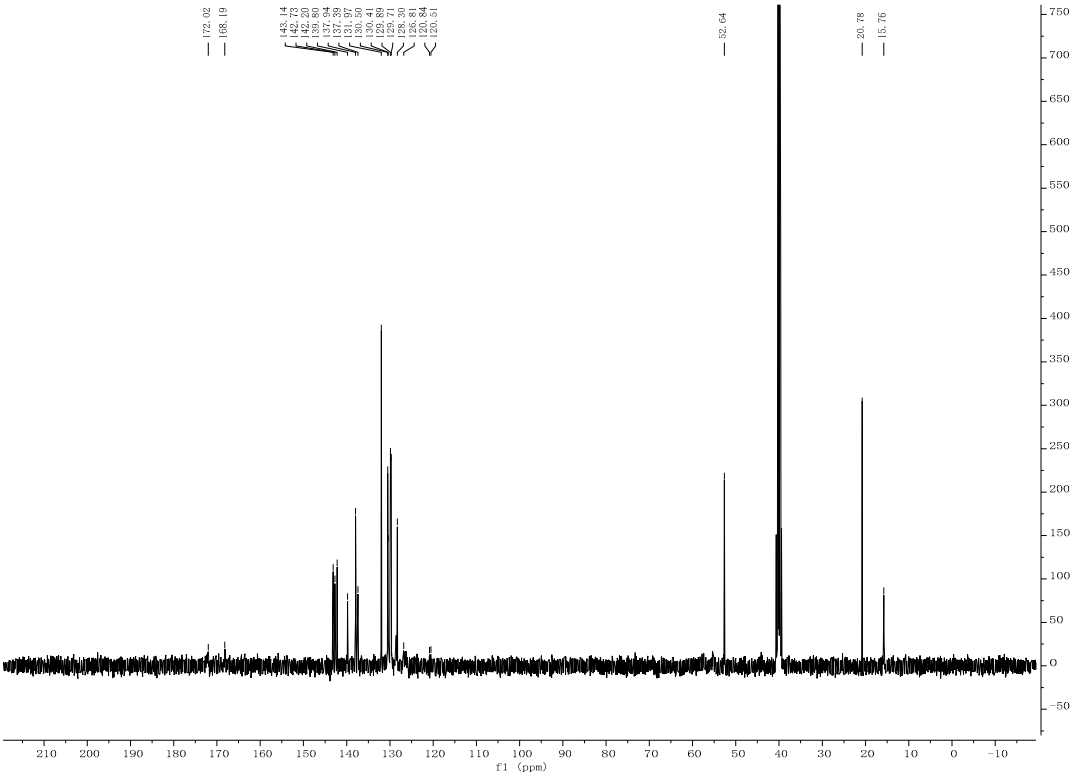
Compound **E10**,
methyl *N*-(phenazine-1-carbonyl)-*N*-(m-tolyl)alaninate



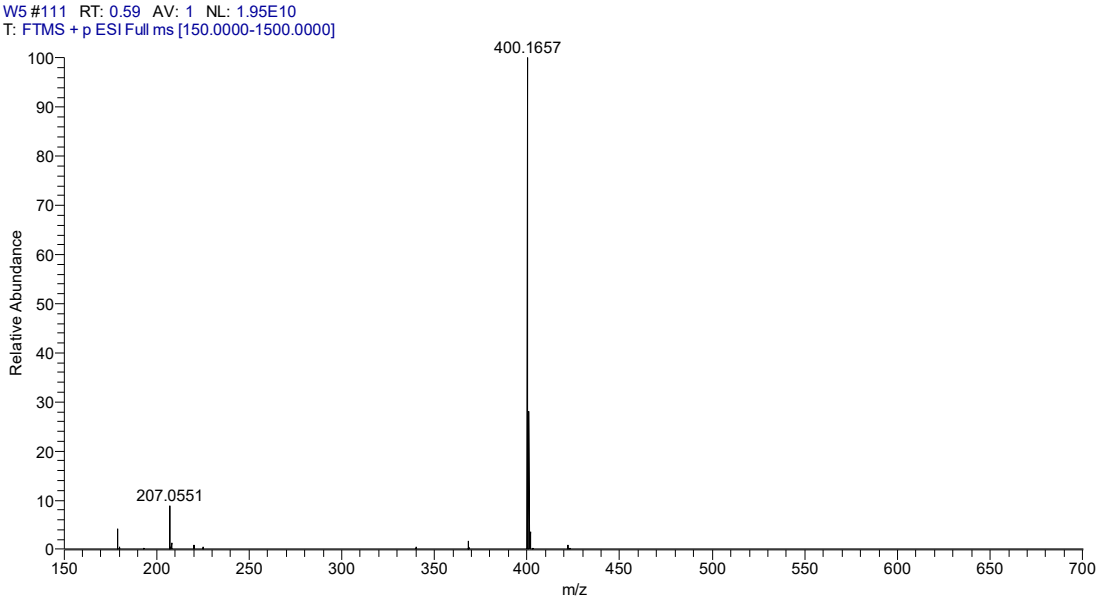
Brown solid, yield 81.1%, m.p. 168.3-170.1℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.34 (d, J = 7.0 Hz, 1H), 8.20 (d, J = 8.0 Hz, 1H), 8.13 – 8.06 (m, 1H), 8.05 – 7.96 (m, 2H), 7.81 (s, 2H), 7.10 (s, 1H), 6.93 (d, J = 7.9 Hz, 1H), 6.74 (t, J = 7.6 Hz, 1H), 6.67 (s, 1H), 5.17 (1H, two isomers), 3.84 (s, 3H), 1.81 (s, 3H), 1.52 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ: 172.02, 168.19, 143.14, 142.73, 142.20, 139.80, 137.94, 137.39, 131.97, 130.50 (2C), 130.41 (2C), 129.89, 129.71 (2C), 128.30, 126.81, 120.84, 120.51, 52.64, 20.78, 15.76. HRMS (ESI): calcd for $C_{24}H_{21}N_3O_3$ {$[M+H]^+$}, 400.1656; found, 400.1657.



The ^{1}H NMR spectrogram of compound **E10**

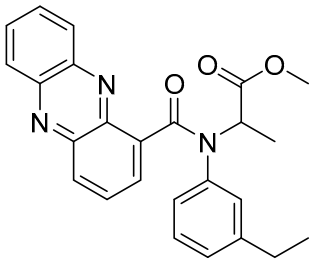


The ^{13}C NMR spectrogram of compound **E10**

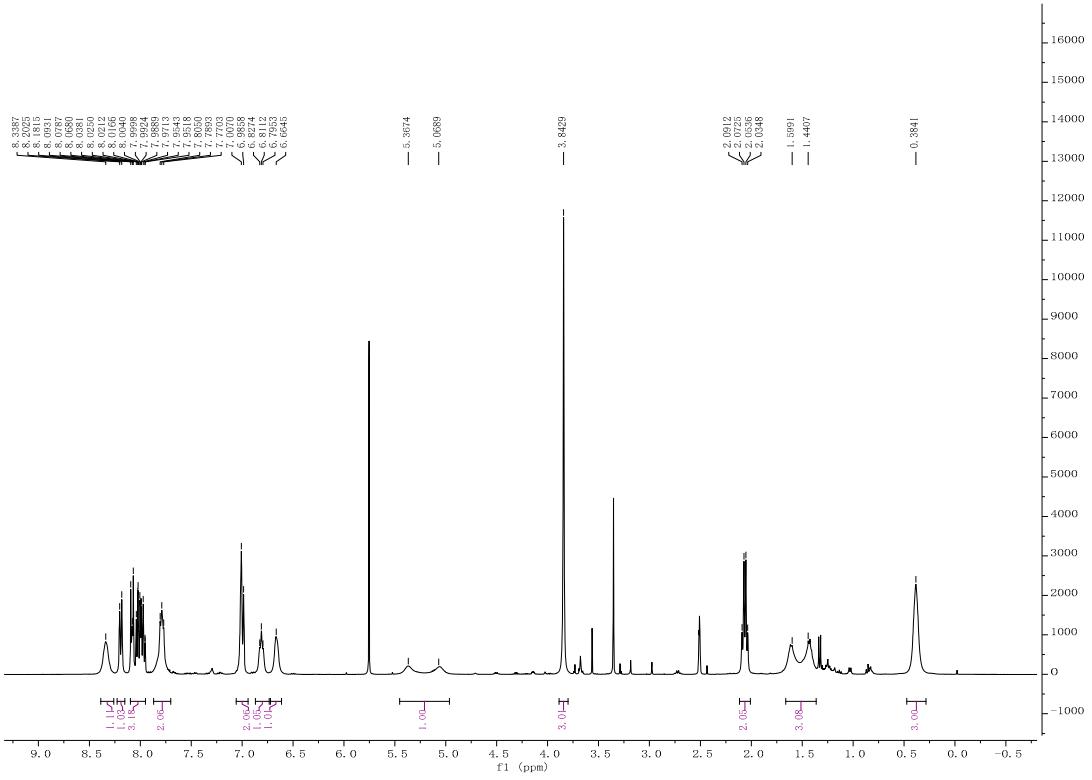


The HRMS spectrogram of compound **E10**

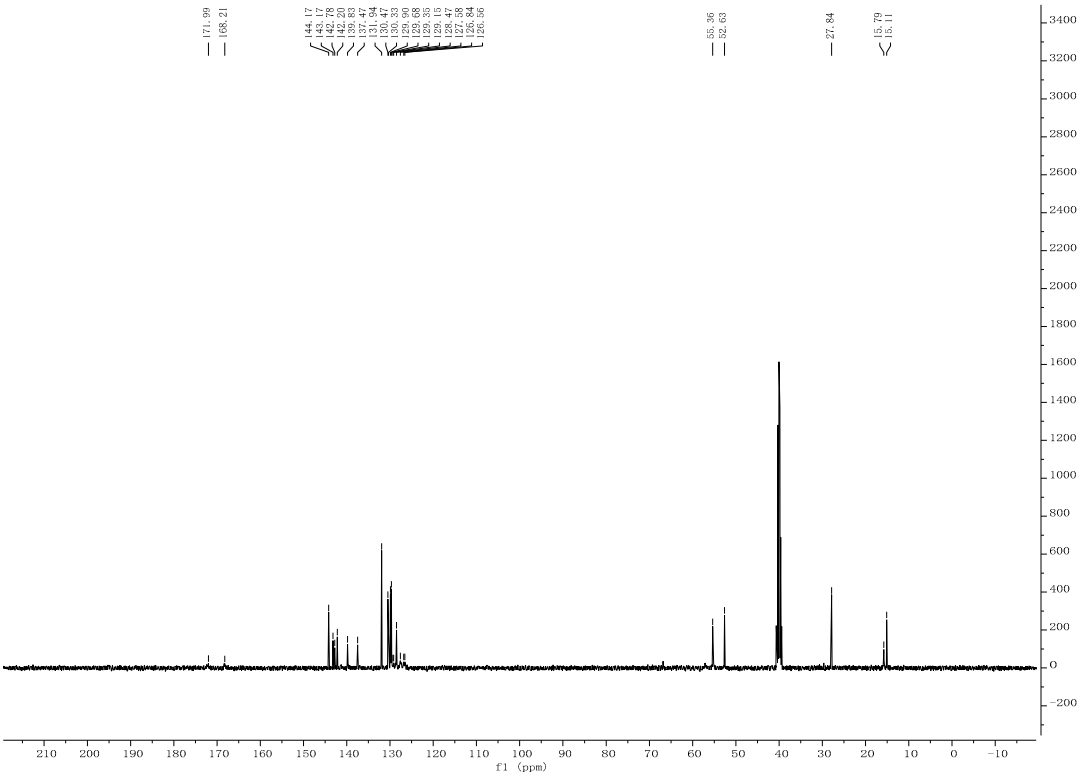
Compound **E11**,
methyl N-(3-ethylphenyl)-N-(phenazine-1-carbonyl)alaninate



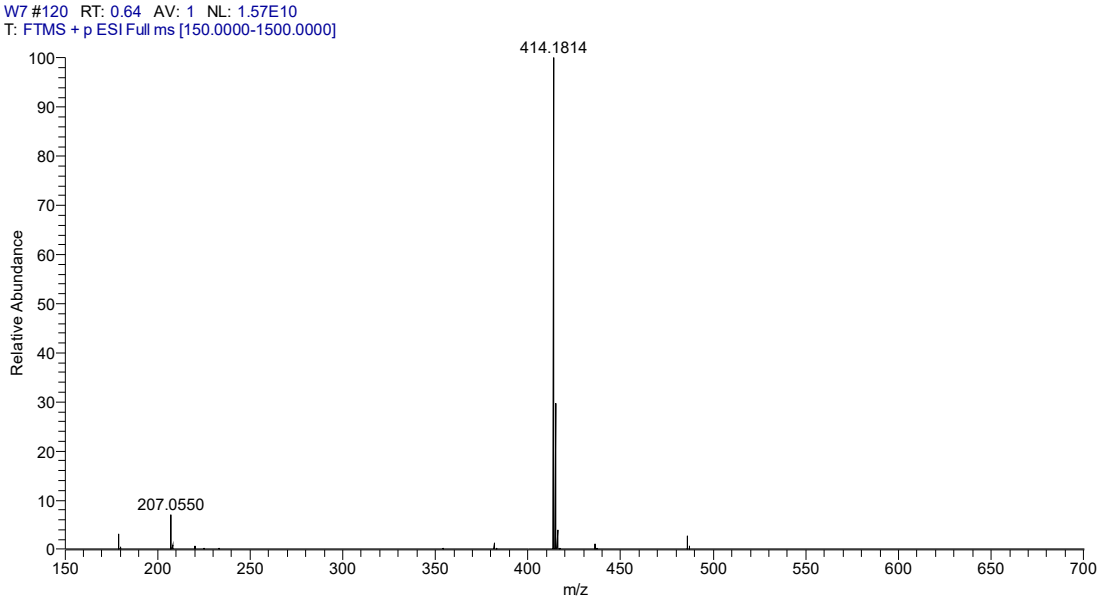
Yellow solid, yield 79.6%, m.p. 111.9-112.9°C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.34 (s, 1H), 8.19 (d, J = 8.4 Hz, 1H), 8.10 – 7.95 (m, 3H), 7.87 – 7.70 (m, 2H), 7.00 (d, J = 8.5 Hz, 2H), 6.83 (s, 1H), 6.66 (s, 1H), 5.37 (1H, two isomers), 3.84 (s, 3H), 2.06 (q, J = 7.5 Hz, 2H), 1.52 (3H, two isomers), 0.38 (s, 3H).^{13}C NMR (101 MHz, DMSO-d_6) δ 171.99, 168.21, 144.17, 143.17, 142.78, 142.20, 139.83, 137.47, 131.94, 130.47, 130.33, 129.90, 129.68, 129.35, 129.15, 128.47 (2C), 127.58, 126.84, 126.56, 55.36, 52.63, 27.84, 15.79, 15.11.HRMS (ESI): calcd for $C_{25}H_{23}N_3O_3$ {$[M+H]^+$}, 414.1812; found, 414.1814.



The ^{1}H NMR spectrogram of compound **E11**

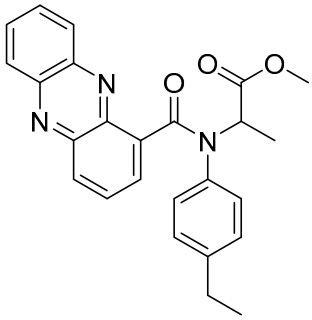


The ^{13}C NMR spectrogram of compound **E11**

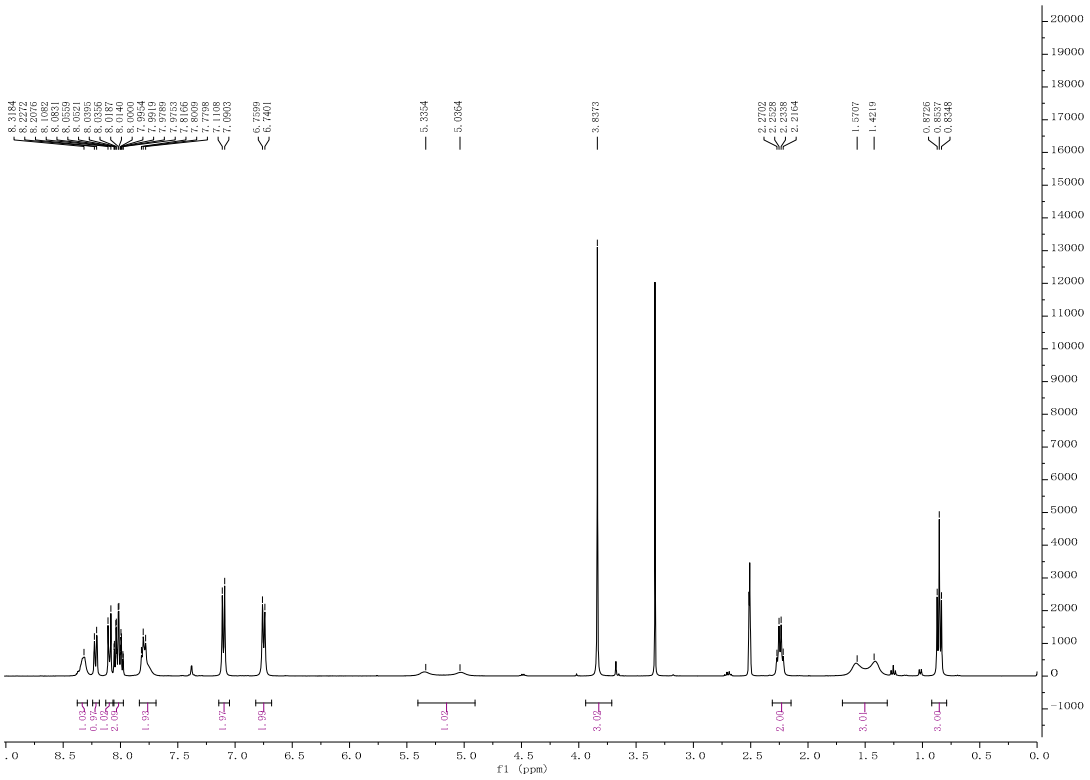


The HRMS spectrogram of compound **E11**

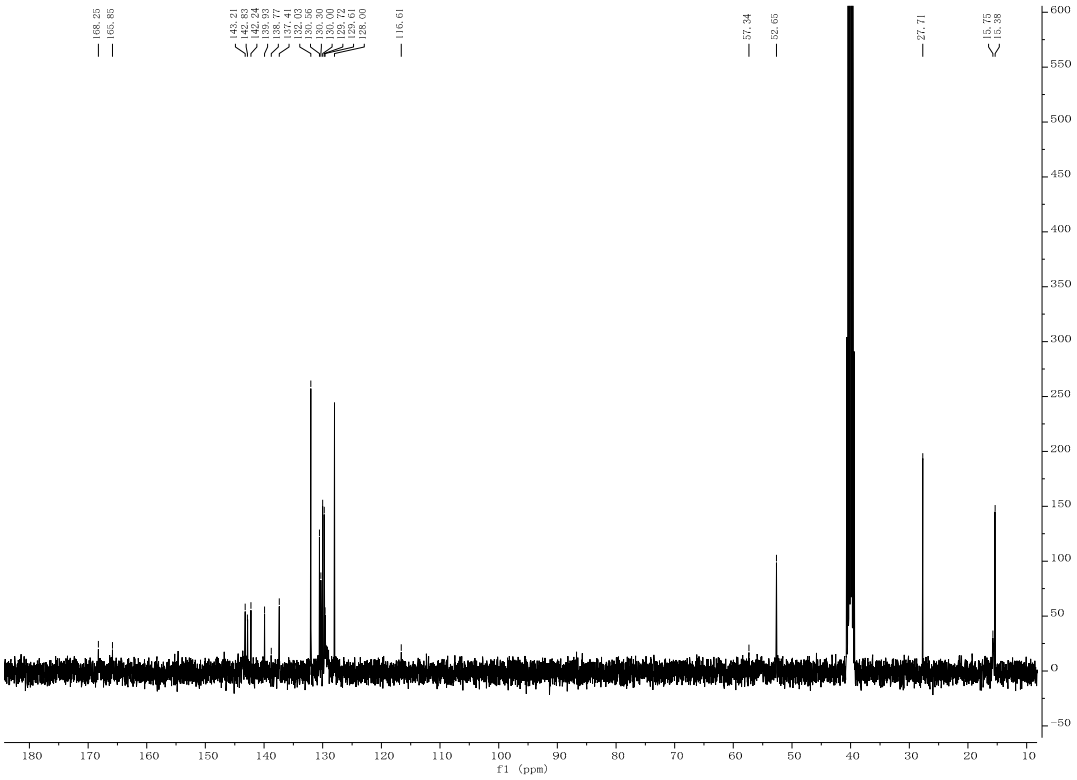
Compound **E12**,
methyl *N*-(4-ethylphenyl)-*N*-(phenazine-1-carbonyl)alaninate



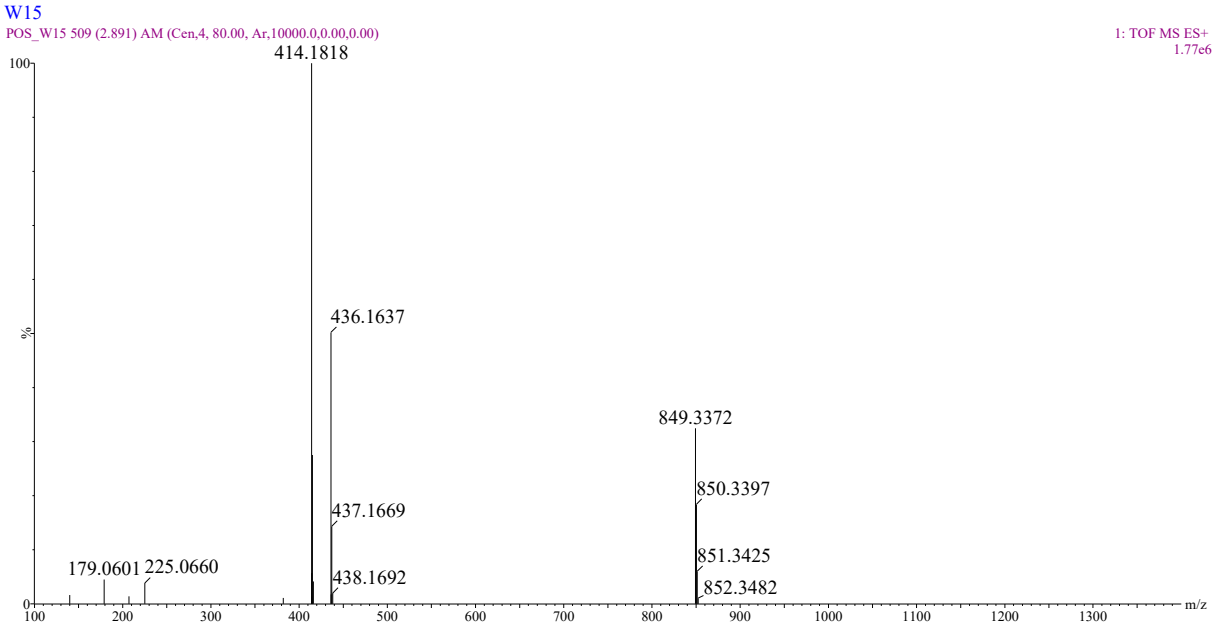
Yellow solid, yield 83.4%, m.p. 136.5-138.3°C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.32 (s, 1H), 8.22 (d, J = 7.8 Hz, 1H), 8.10 (d, J = 10.0 Hz, 1H), 8.06 – 7.97 (m, 2H), 7.83 – 7.69 (m, 2H), 7.10 (d, J = 8.2 Hz, 2H), 6.75 (d, J = 7.9 Hz, 2H), 5.19 (1H, two isomers), 3.84 (s, 3H), 2.24 (q, J = 7.0 Hz, 2H), 1.50 (3H, two isomers), 0.85 (t, J = 7.5 Hz, 3H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 168.25, 165.85, 143.21, 142.83, 142.24, 139.93, 138.77, 137.41, 132.03, 130.56, 130.30, 130.00 (2C), 129.72 (2C), 129.61, 128.00 (2C), 116.61, 57.34, 52.65, 27.71, 15.75, 15.38. HRMS (ESI): calcd for $C_{25}H_{23}N_3O_3$ {$[M+H]^+$}, 414.1813; found, 414.1818.



The ^{1}H NMR spectrogram of compound **E12**

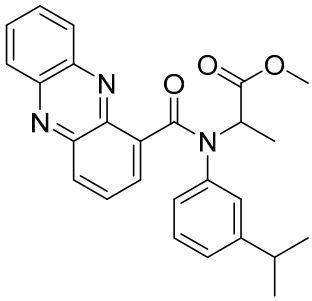


The ^{13}C NMR spectrogram of compound **E12**

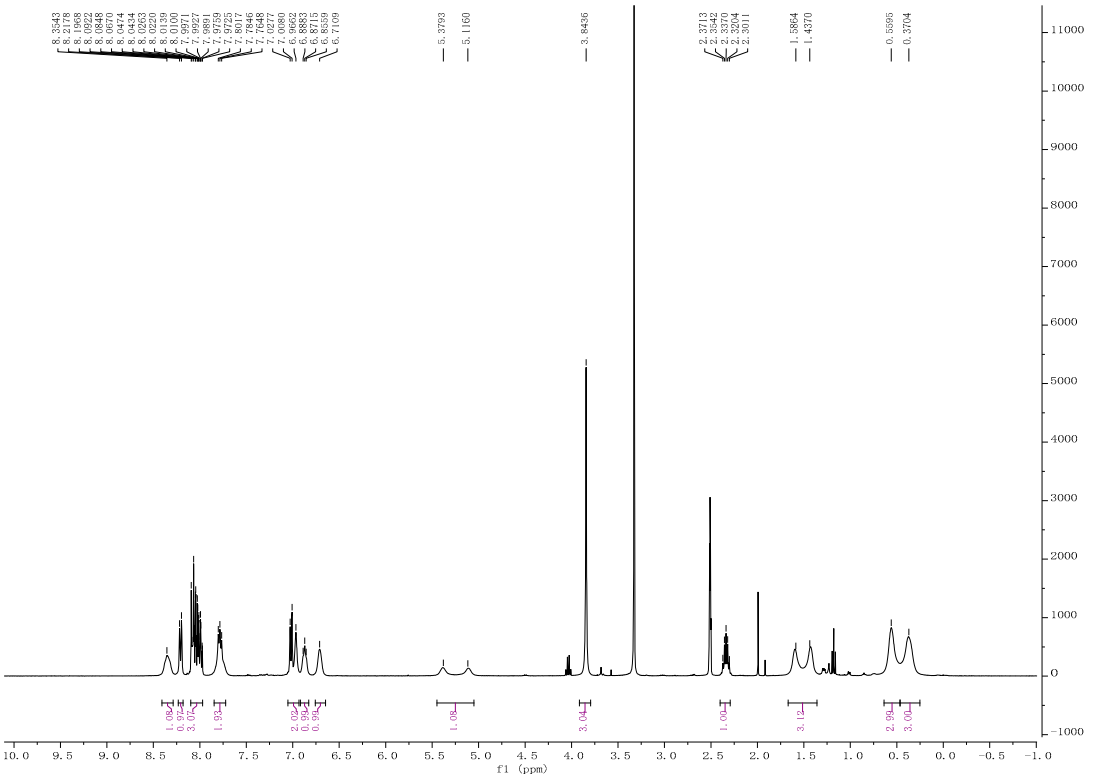


The HRMS spectrogram of compound **E12**

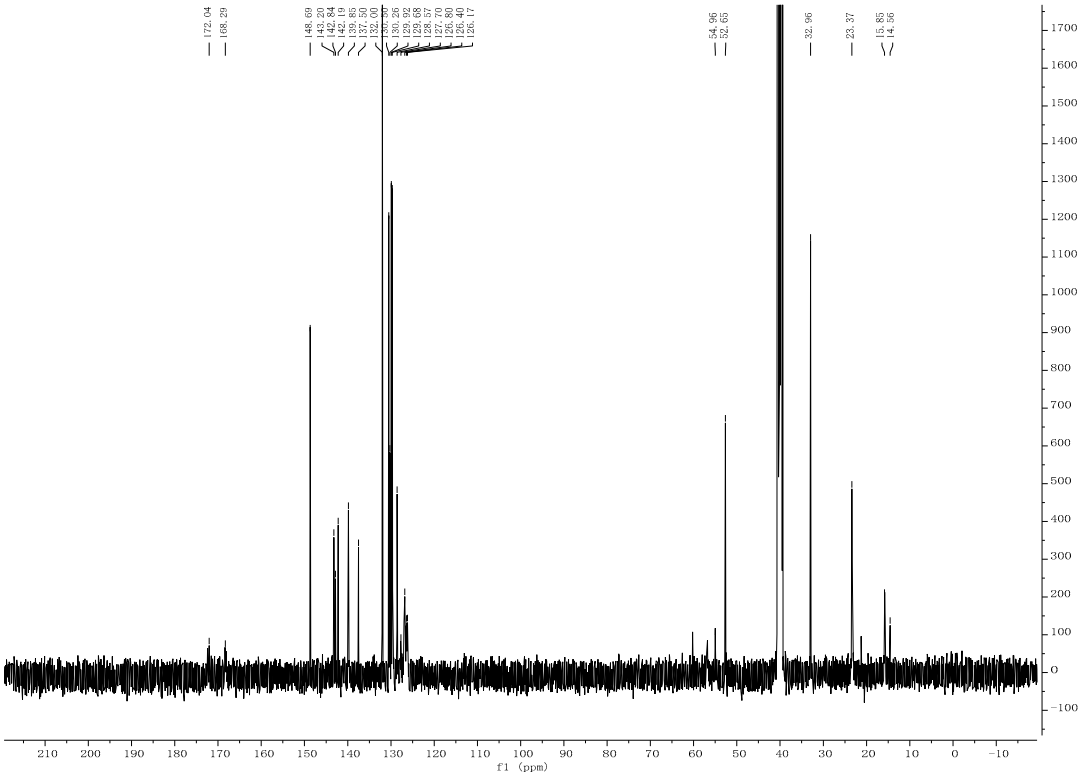
Compound **E13**,
methyl *N*-(3-isopropylphenyl)-*N*-(phenazine-1-carbonyl)alaninate



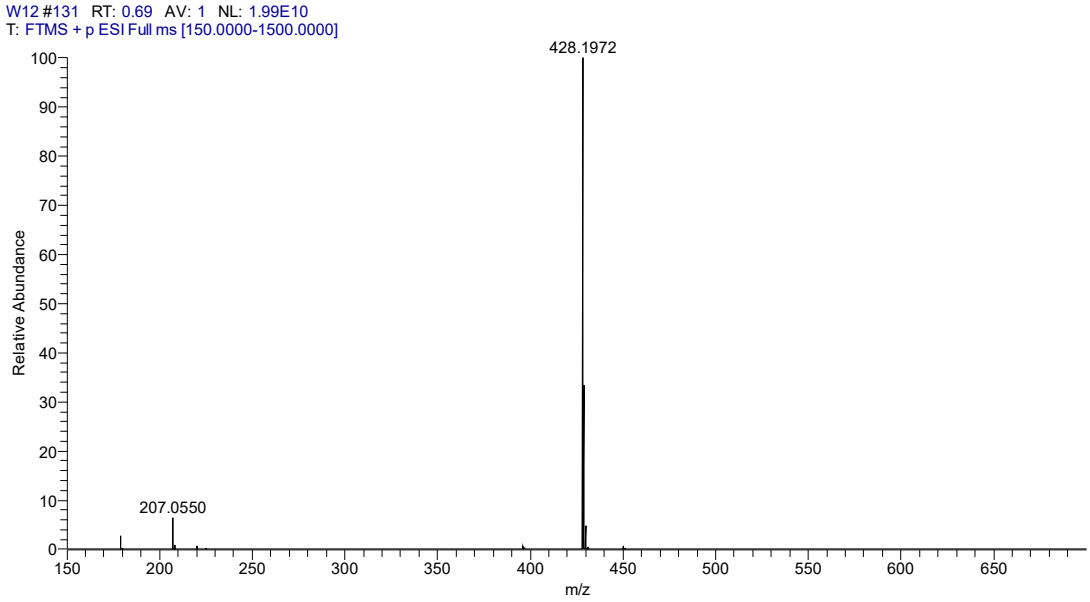
Yellow fluid, yield 83.4%; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.35 (s, 1H), 8.21 (d, J = 8.4 Hz, 1H), 8.10 – 7.97 (m, 3H), 7.85 – 7.72 (m, 2H), 7.05 – 6.93 (m, 2H), 6.87 (t, J = 6.5 Hz, 1H), 6.71 (s, 1H), 5.25 (1H, two isomers), 3.84 (s, 3H), 2.34 (p, J = 7.7, 7.3 Hz, 1H), 1.51 (3H, two isomers), 0.56 (s, 3H), 0.37 (s, 3H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 172.04, 168.29, 148.69, 143.20, 142.84, 142.19, 139.85, 137.50, 132.00, 130.50, 130.26, 129.92 (2C), 129.68 (2C), 128.57, 127.70, 126.80, 126.40, 126.17, 54.96, 52.65, 32.96, 23.37, 15.85, 14.56. HRMS (ESI): calcd for $C_{26}H_{25}N_3O_3$ {$[M+H]^+$}, 428.1969; found, 428.1972.



The ^{1}H NMR spectrogram of compound **E13**

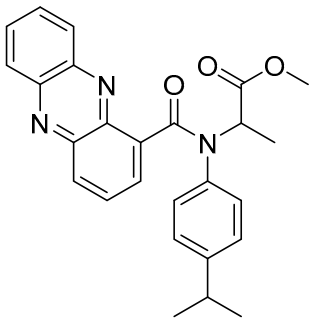


The ^{13}C NMR spectrogram of compound **E13**

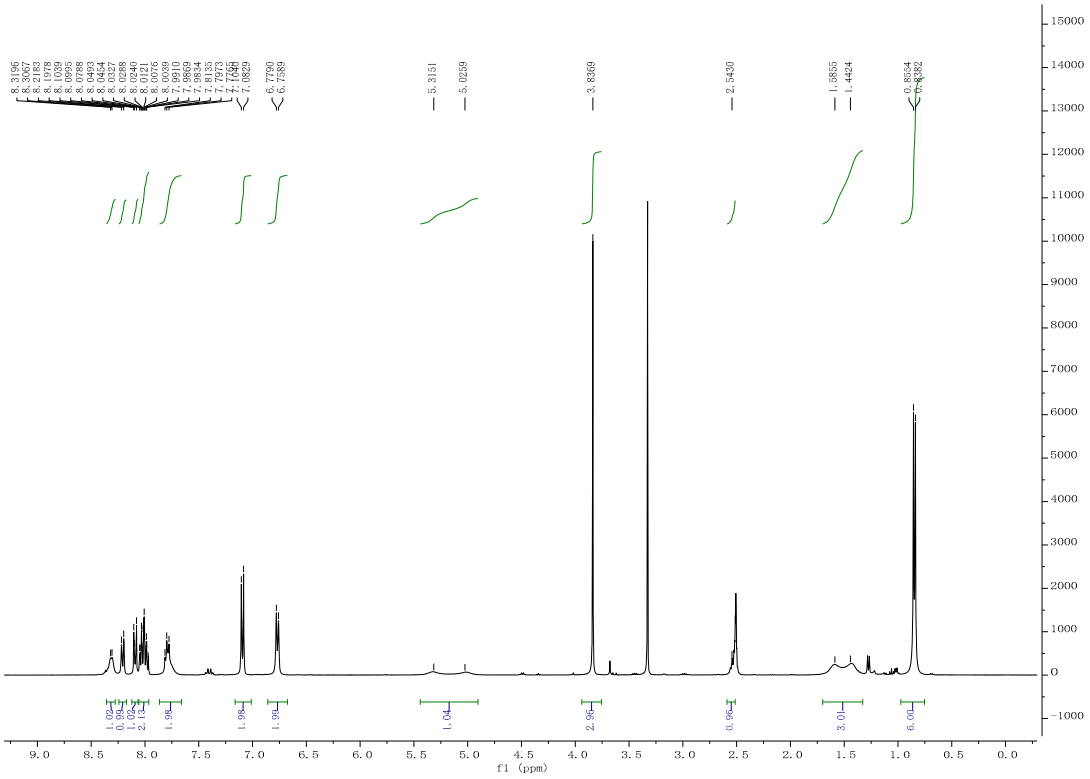


The HRMS spectrogram of compound **E13**

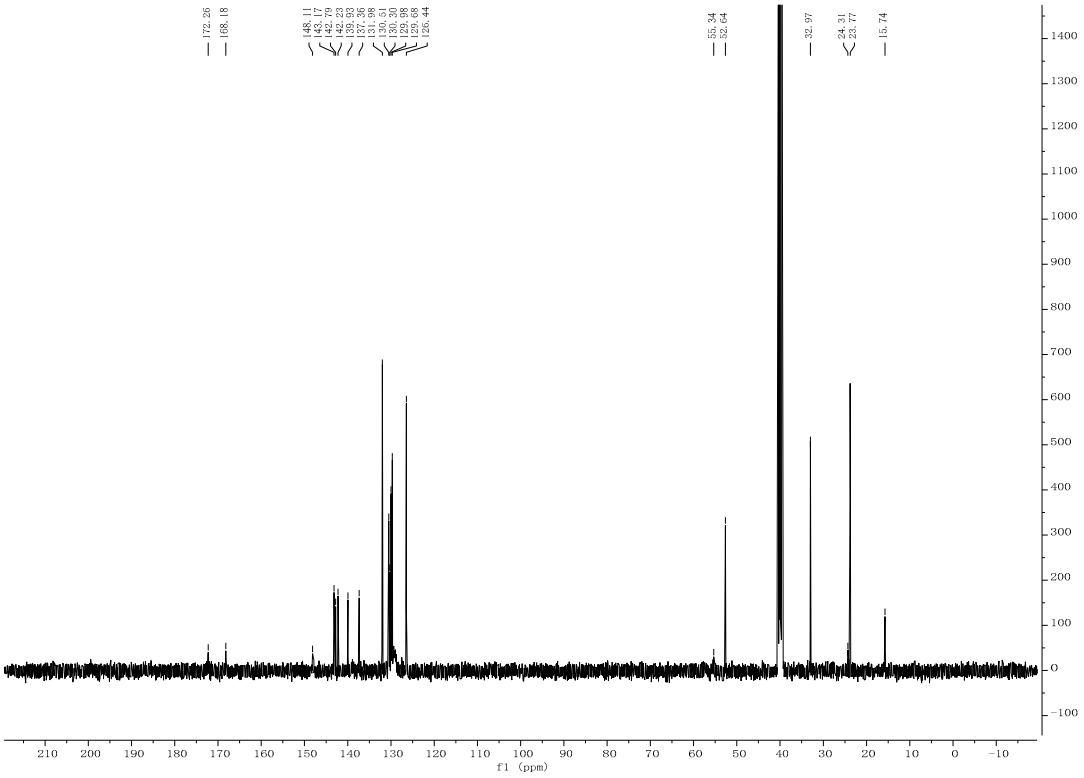
Compound **E14**,
methyl *N*-(4-isopropylphenyl)-*N*-(phenazine-1-carbonyl)alaninate



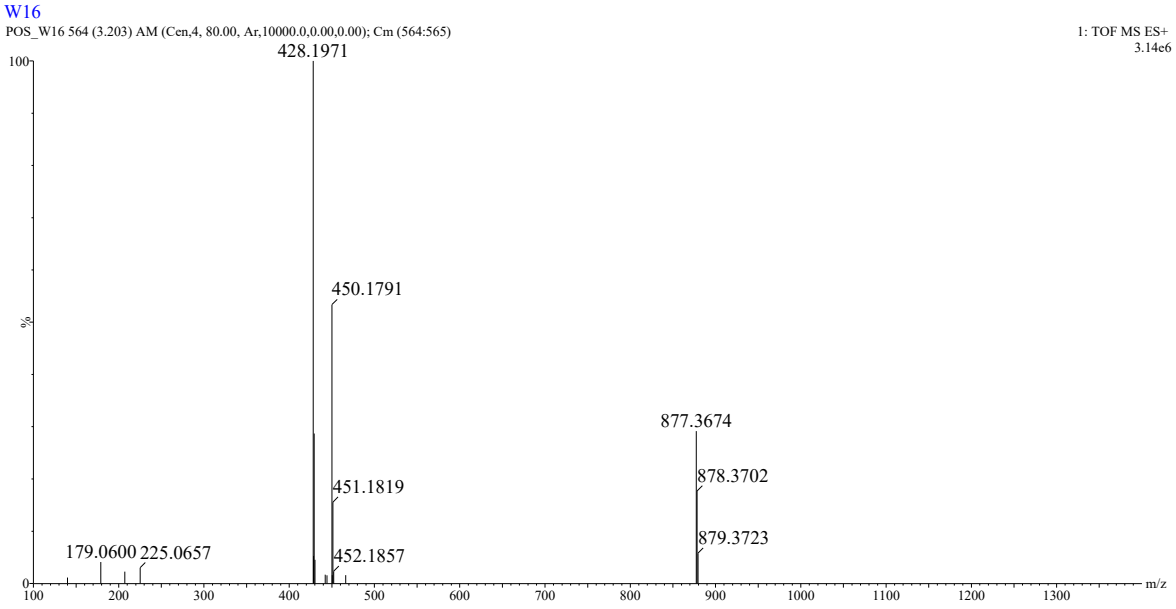
Yellow fluid, yield 82.7%; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.36 – 8.28 (m, 1H), 8.21 (d, J = 8.2 Hz, 1H), 8.12 – 8.06 (m, 1H), 8.01 (dddd, J = 16.3, 8.0, 6.6, 1.5 Hz, 2H), 7.86 – 7.66 (m, 2H), 7.09 (d, J = 8.4 Hz, 2H), 6.77 (d, J = 8.1 Hz, 2H), 5.17 (1H, two isomers), 3.84 (s, 3H), 2.54 (s, 1H), 1.51 (3H, two isomers), 0.85 (d, J = 6.9 Hz, 6H). ^{13}C NMR (101 MHz, DMSO-d_6) δ 172.26, 168.18, 148.11, 143.17, 142.79, 142.23, 139.93, 137.36, 131.98, 130.51 (2C), 130.30 (3C), 129.98 (2C), 129.68 (2C), 126.44 (2C), 55.34, 52.64, 32.97, 24.31, 23.77, 15.74. HRMS (ESI): calcd for $C_{26}H_{25}N_3O_3$ {$[M+H]^+$}, 428.1969; found, 428.1971.



The ^{1}H NMR spectrogram of compound **E14**

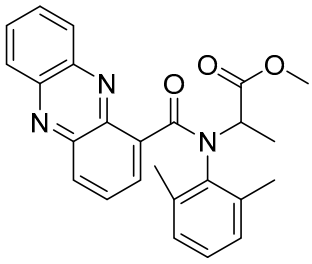


The ^{13}C NMR spectrogram of compound **E14**

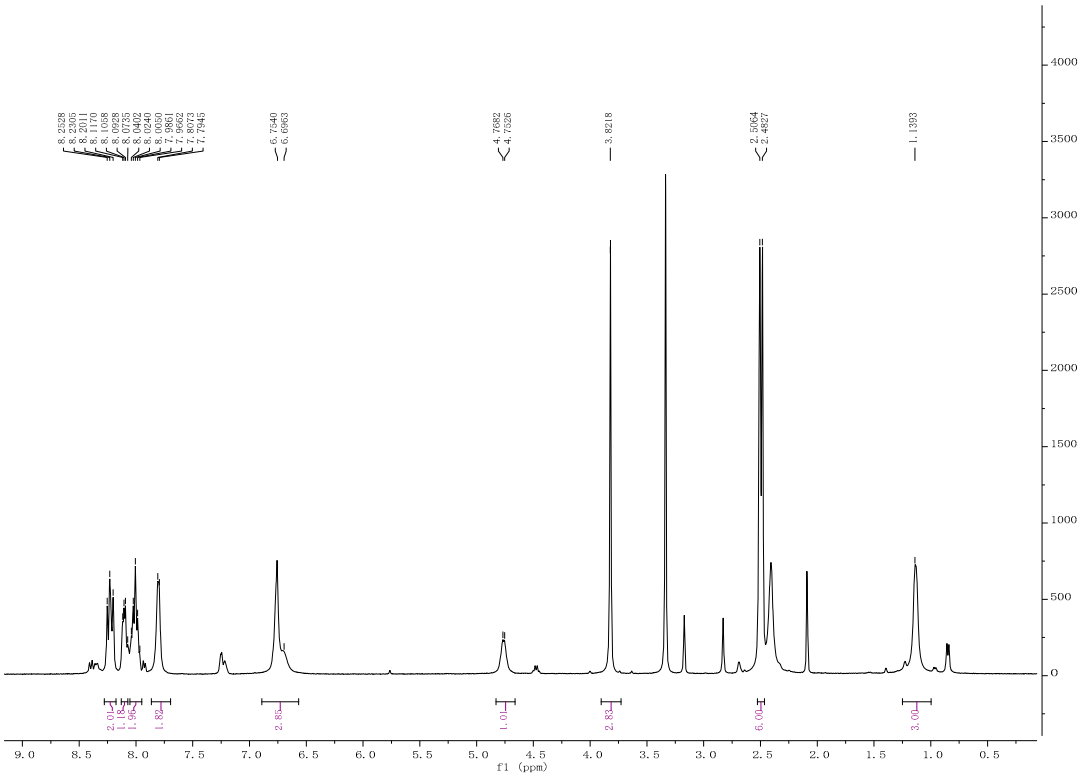


The HRMS spectrogram of compound **E14**

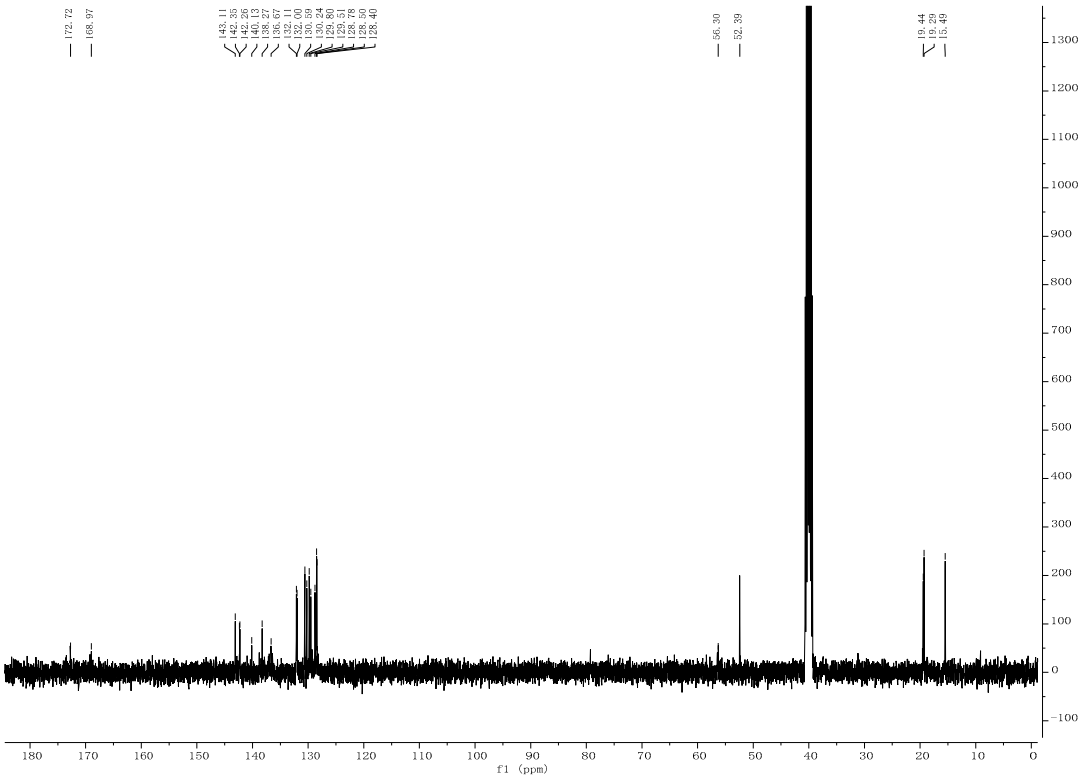
Compound **E15**,
methyl *N*-(2,6-dimethylphenyl)-*N*-(phenazine-1-carbonyl)alaninate



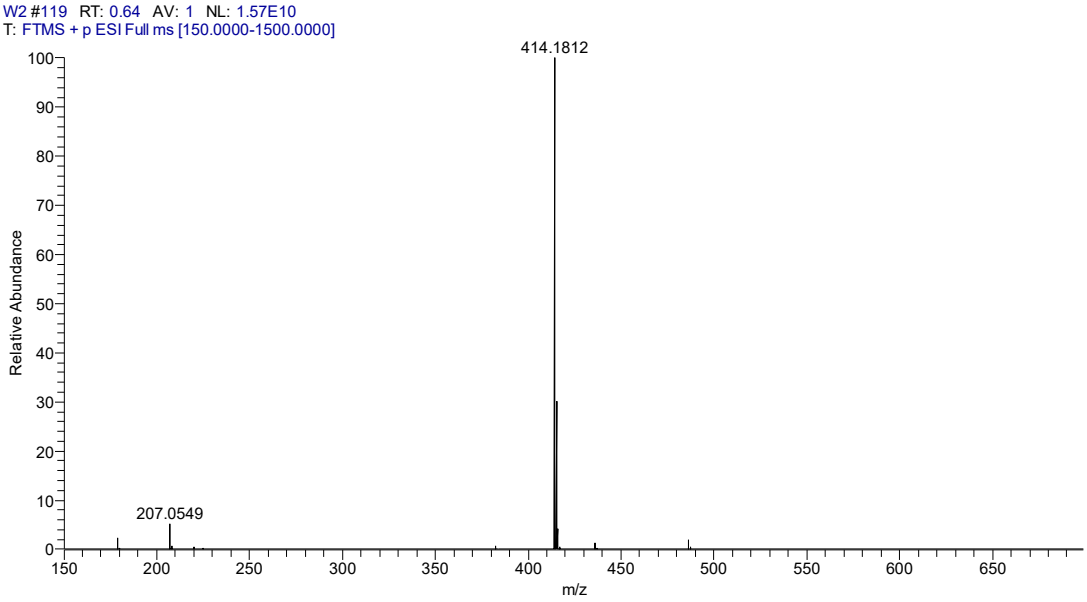
Yellow solid, yield 78.4%, m.p. 150.0-152.0 ℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.28 – 8.18 (m, 2H), 8.13 – 8.07 (m, 1H), 8.05 – 7.95 (m, 2H), 7.80 (d, J = 5.1 Hz, 2H), 6.75 (s, 3H), 4.75 (1H, two isomers), 3.82 (s, 3H), 2.49 (d, J = 9.5 Hz, 6H), 1.14 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 172.72, 168.97, 143.11, 142.35, 142.26, 140.13, 138.27, 136.67 (2C), 132.11, 132.00, 130.59, 130.24, 129.80 (2C), 129.51 (2C), 128.78, 128.50, 128.40, 56.30, 52.39, 19.44, 19.29, 15.49. HRMS (ESI): calcd for $C_{25}H_{23}N_3O_3$ {[M+H]$^+$}, 414.1812; found, 414.1812.



The ^{1}H NMR spectrogram of compound **E15**

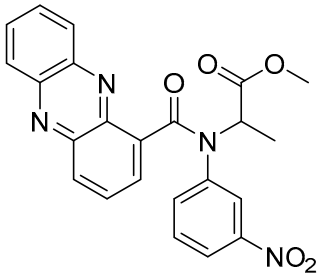


The ^{13}C NMR spectrogram of compound **E15**

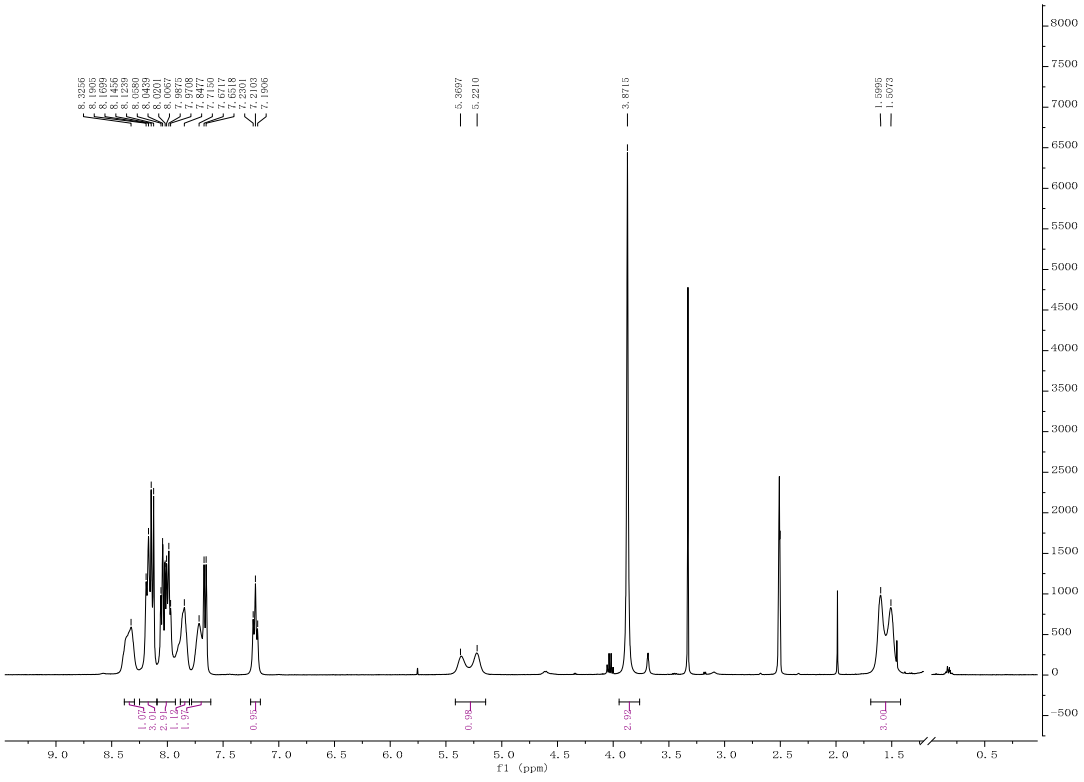


The HRMS spectrogram of compound **E15**

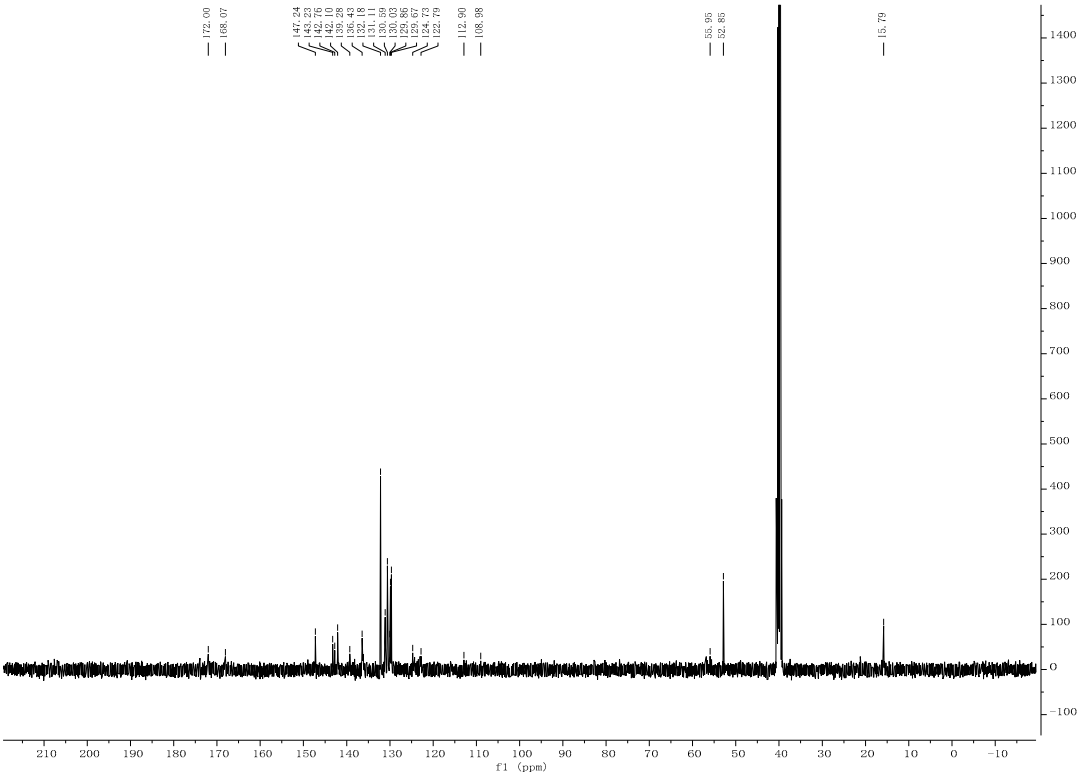
Compound **E16**,
methyl *N*-(3-nitrophenyl)-*N*-(phenazine-1-carbonyl)alaninate



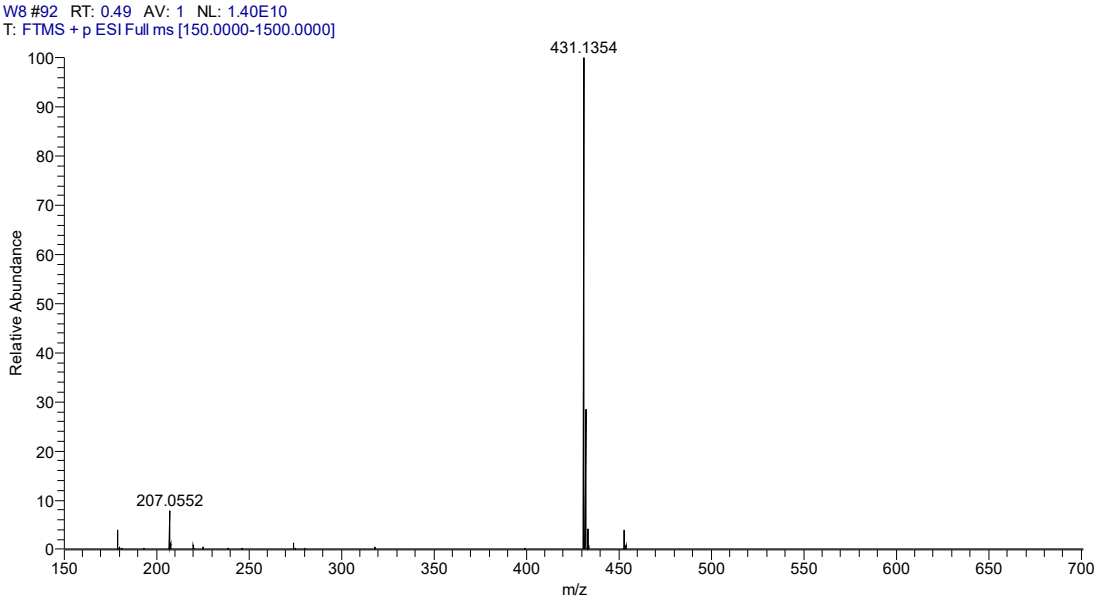
Yellow solid, yield 76.9%, m.p. 166.7-168.4 ℃; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.33 (s, 1H), 8.16 (dd, J = 18.2, 8.5 Hz, 3H), 8.01 (dt, J = 19.7, 6.2 Hz, 3H), 7.85 (s, 1H), 7.78 – 7.61 (m, 2H), 7.21 (t, J = 7.9 Hz, 1H), 5.30 (1H, two isomers), 3.87 (s, 3H), 1.55 (3H, two isomers). ^{13}C NMR (101 MHz, DMSO-d_6) δ 172.00, 168.07, 147.24, 143.23, 142.76, 142.10, 139.28, 136.43, 132.18, 131.11, 130.59, 130.03 (2C), 129.86, 129.67, 124.73, 122.79, 112.90 (2C), 108.98, 55.95, 52.85, 15.79. HRMS (ESI): calcd for $C_{23}H_{18}N_4O_5$ {$[M+H]^+$}, 431.135; found, 431.1354.



The ^{1}H NMR spectrogram of compound **E16**



The ^{13}C NMR spectrogram of compound **E16**



The HRMS spectrogram of compound **E16**