Supporting information

Expedient green-chemistry approaches for one-pot synthesis of two series of novel 1,5-benzodiazepines via domino condensations

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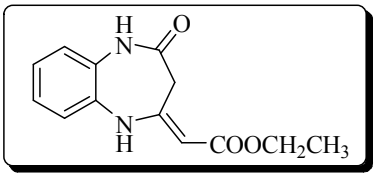
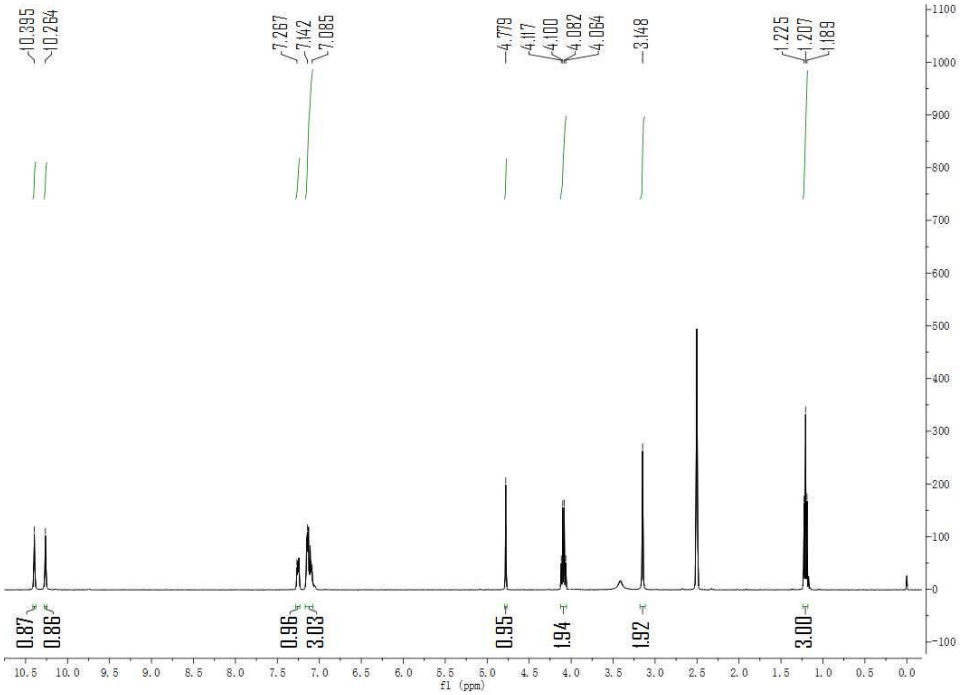
General information

Melting points of these products were determined in open capillaries. The ^{1}H NMR and ^{13}C NMR spectra were recorded on a 400 MHz (WIPM-NMR-400) nuclear magnetic resonance spectrometer operating at 400 and 100 MHz, using DMSO-d_6 as the solvent with TMS as internal standard. The signal multiplicities are represented by s (singlet), d (doublet), t (triplet), m (multiplet), and q (quartet). Low-resolution mass spectra were recorded on a Thermo DSQ II mass spectrometer. The IR spectra were recorded on a Thermo Scientific IR spectrophotometer in KBr pellets. The elemental analysis was performed using a Vario ELIII Elemental Analyser. The structure of **5db** was further determined by single-crystal X-ray diffraction on a Bruker Smart 1000 diffractometer. Commercially available chemicals and solvents were purchased from Aladdin and were used as received. The reactions were monitored by thin-layer chromatography (TLC) on pre-coated silica gel GF254 plates.

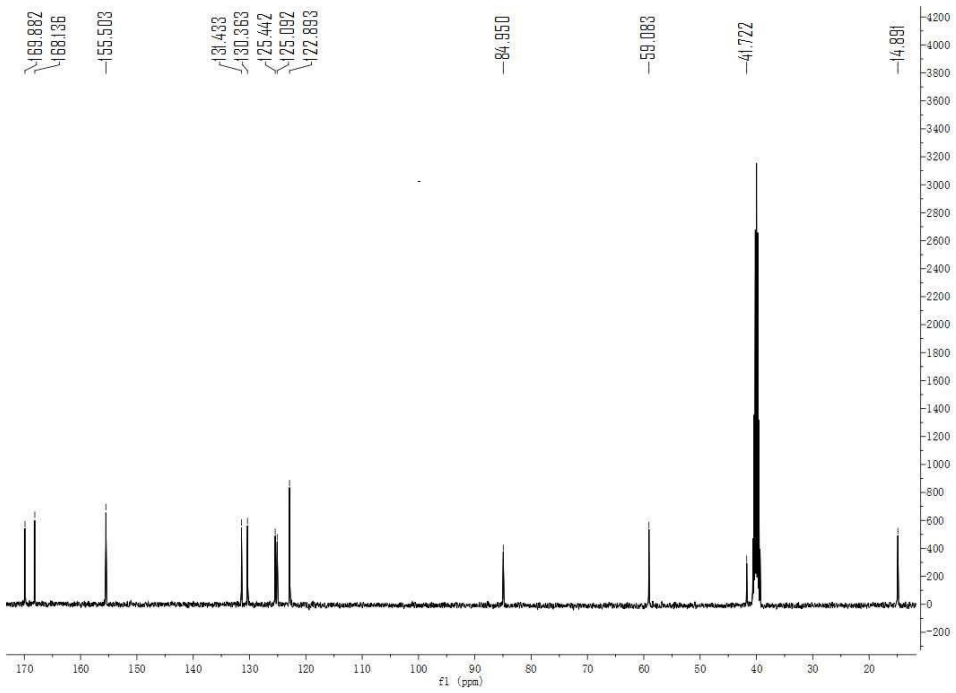
4a



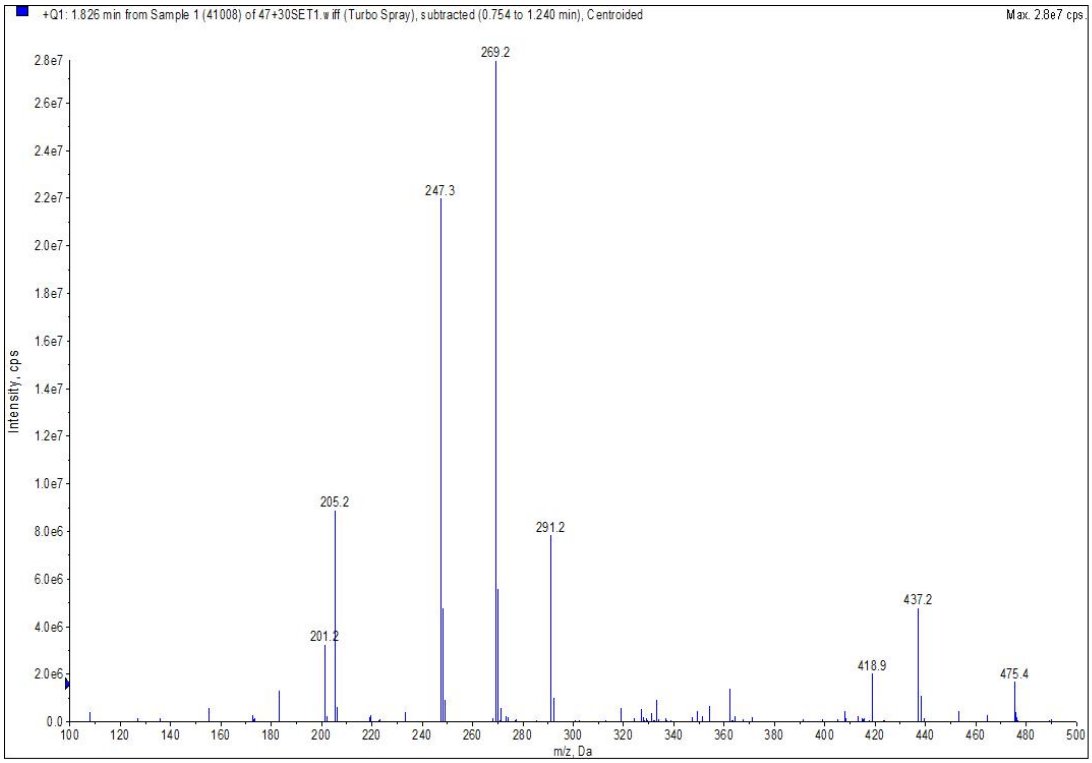
Pale yellow solid; 227 mg, 92%; mp 232-234 °C; IR (KBr): 3211, 1690, 1620, 1503 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 1.21 (t, J=7.1Hz, 3H), 3.12 (s, 2H), 4.09 (q, J=7.1 Hz, 2H), 4.78 (s, 1H), 7.09-7.27 (m, 4H), 10.26 (s, 1H), 10.40 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.89, 41.72, 59.08, 84.95, 122.89, 125.09, 125.44, 130.36, 131.43, 155.50, 168.14, 169.88; Found C, 63.26; H, 5.57; N, 11.48%; M+1 (mass spectrum), 247.3. $C_{13}H_{14}N_2O_3$ requires C, 63.40; H, 5.73; N, 11.38%; M, 246.26.



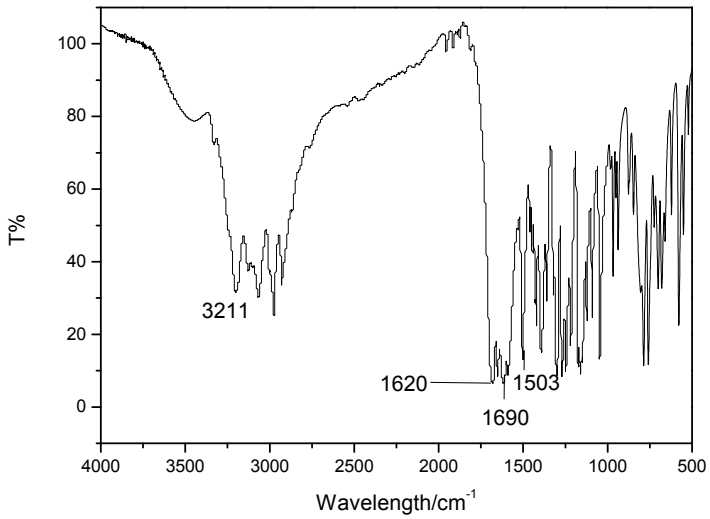
^{1}H NMR spectra of compound **4a**



^{13}C NMR spectra of compound **4a**

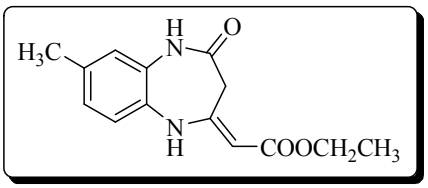


MS of compound **4a**

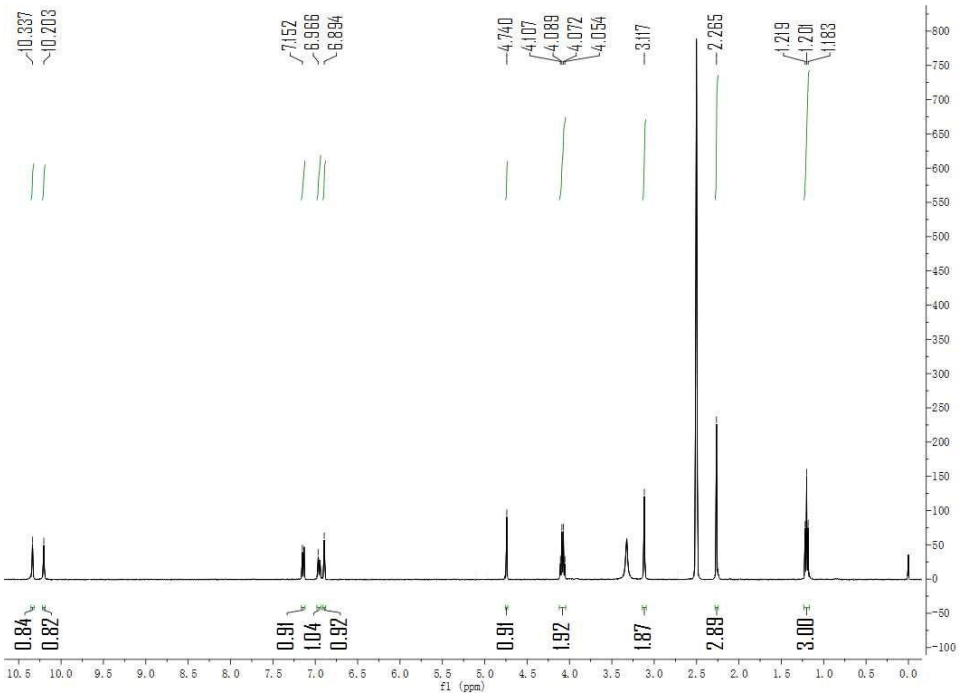


IR spectra of compound **4a**

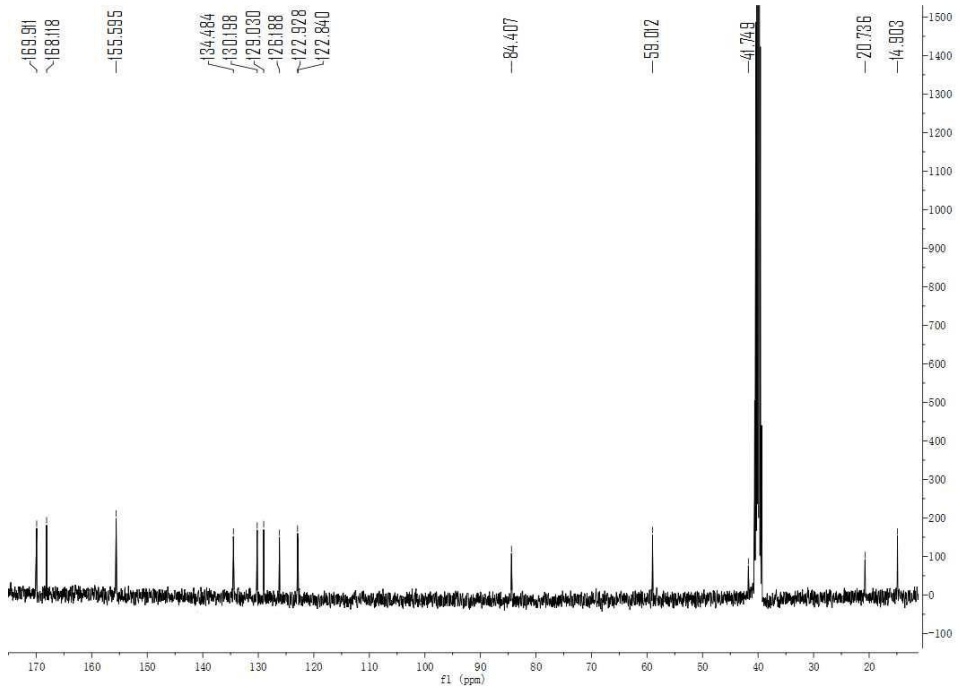
4b



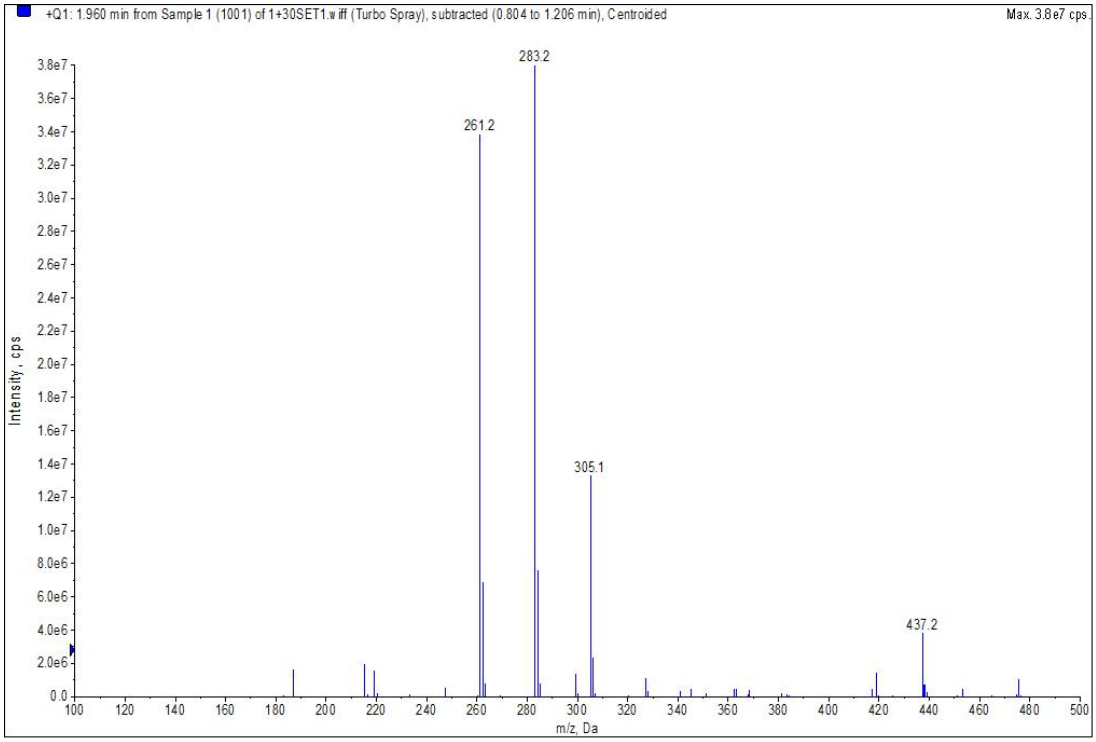
White solid; 247 mg, 95%; mp 244-246 °C; IR (KBr): 3210, 1693, 1621, 1502 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 1.20 (t, J=7.1Hz, 3H), 2.26 (s, 3H), 3.12 (s, 2H), 4.08 (q, J=7.1 Hz, 2H), 4.74 (s, 1H), 6.89-7.15 (m, 3H), 10.20 (s, 1H), 10.34 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.90, 20.74, 41.75, 59.01, 84.41, 122.84, 122.93, 126.19, 129.03, 130.20, 134.48, 155.60, 168.12, 169.91; Found C, 64.49; H, 5.97; N, 10.84%; M+1 (mass spectrum), 261.2. $C_{14}H_{16}N_2O_3$ requires C, 64.60; H, 6.20; N, 10.76%; M, 260.29.



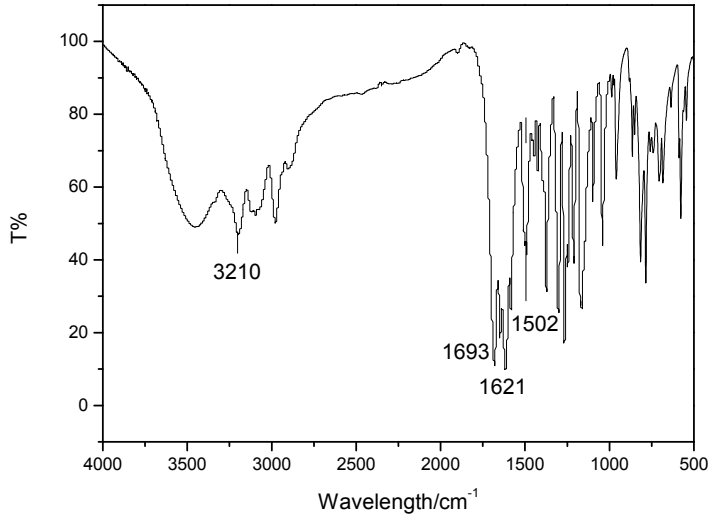
^{1}H NMR spectra of compound **4b**



^{13}C NMR spectra of compound **4b**

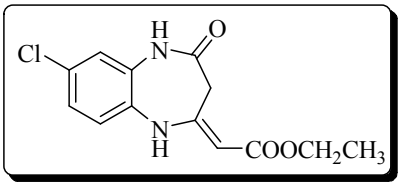


MS of compound **4b**



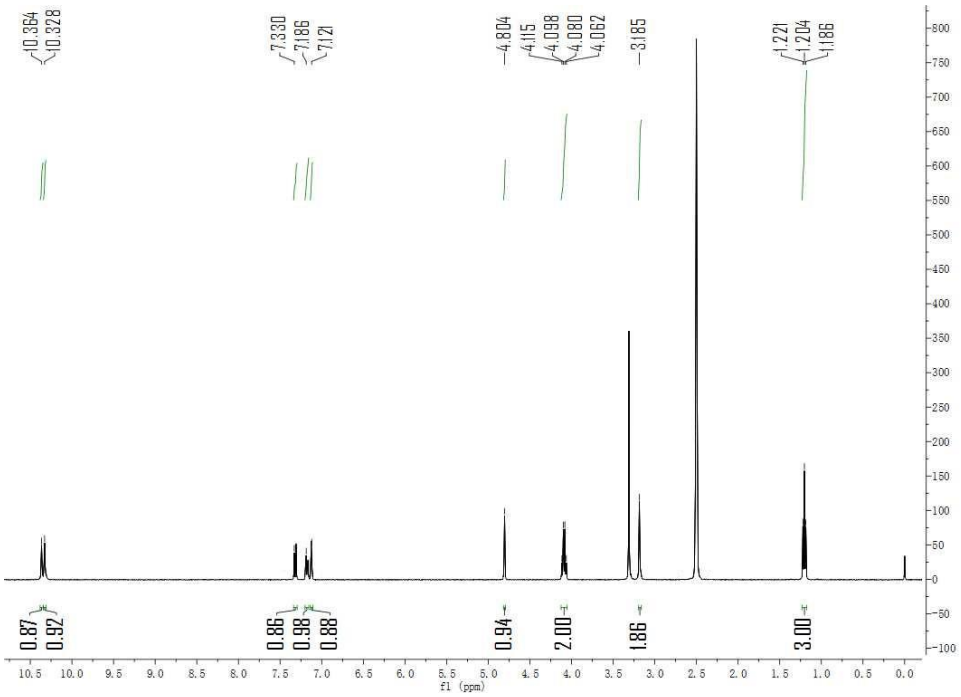
IR spectra of compound **4b**

4c

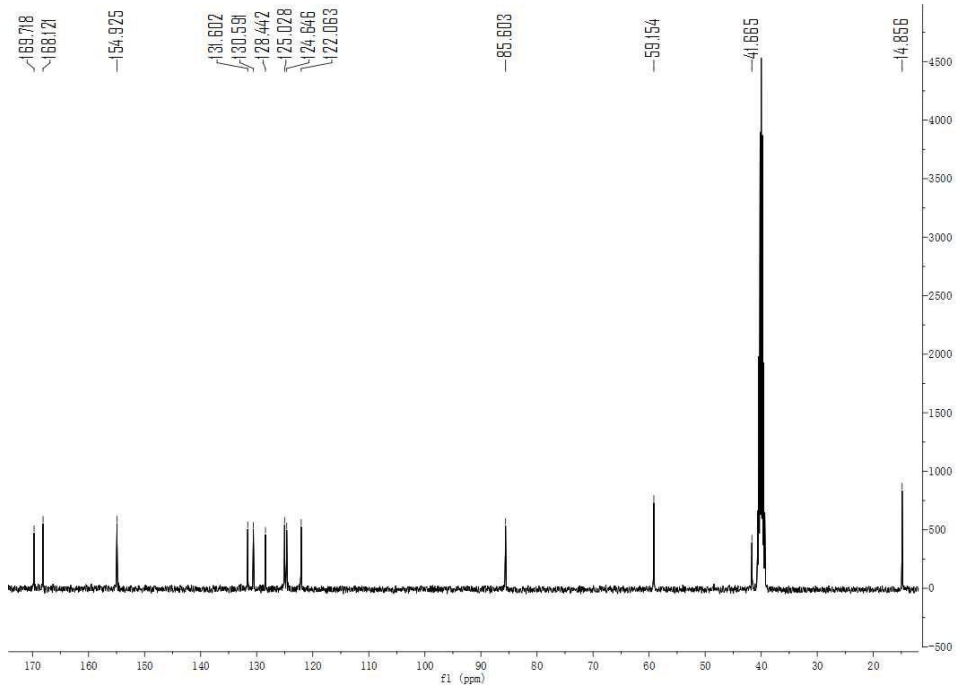


Pale gray solid; 250 mg, 89%; mp 258-260 °C; IR (KBr): 3212, 1691, 1629, 1500 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 1.20 (t, J=7.1Hz, 3H), 3.19 (s, 2H),

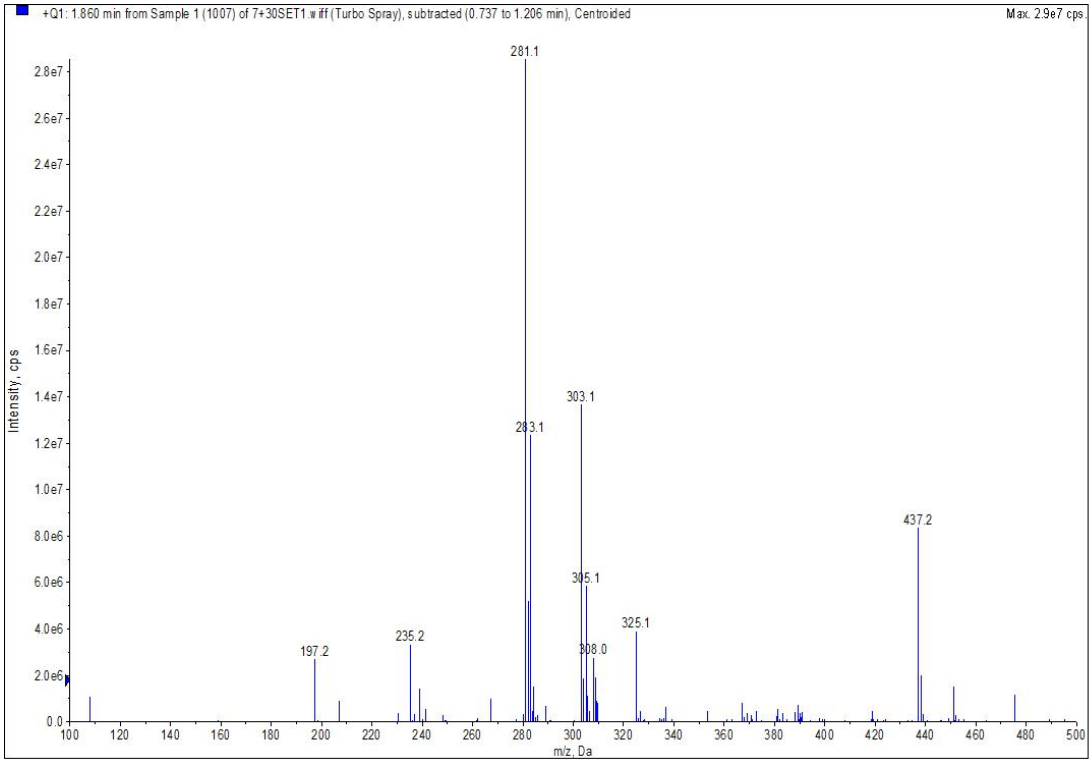
4.09 (q, *J*=7.1 Hz, $2H_2$), 4.80 (s, 1H), 7.12-7.33 (m, 3H), 10.33 (s, 1H), 10.36 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.86, 41.66, 59.15, 85.60, 112.66, 124.65, 125.03, 128.44, 130.59, 131.60, 154.93, 168.12, 169.72; Found C, 55.70; H, 4.83; N, 9.87%; M+1 (mass spectrum), 281.1. $C_{13}H_{13}ClN_2O_3$ requires C, 55.62; H, 4.67; N, 9.98%; M, 280.71.



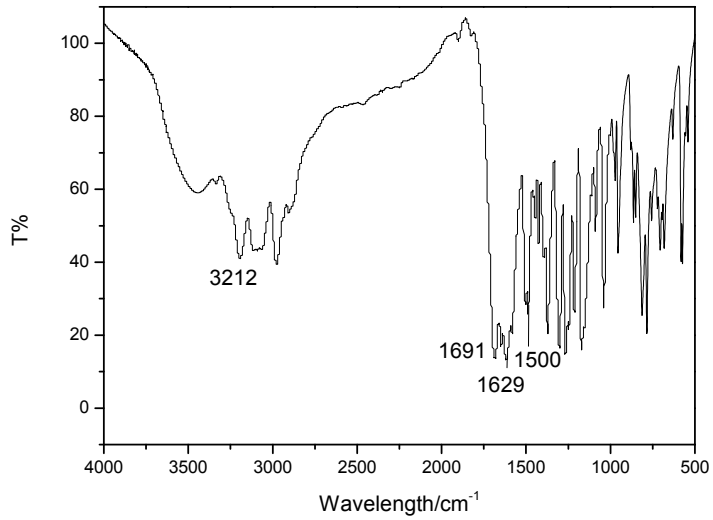
^{13}C NMR spectra of compound **4c**



^{13}C NMR spectra of compound **4c**

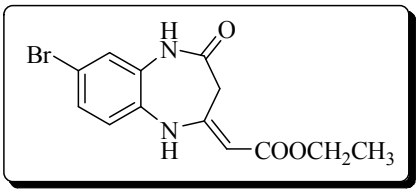


MS of compound **4c**



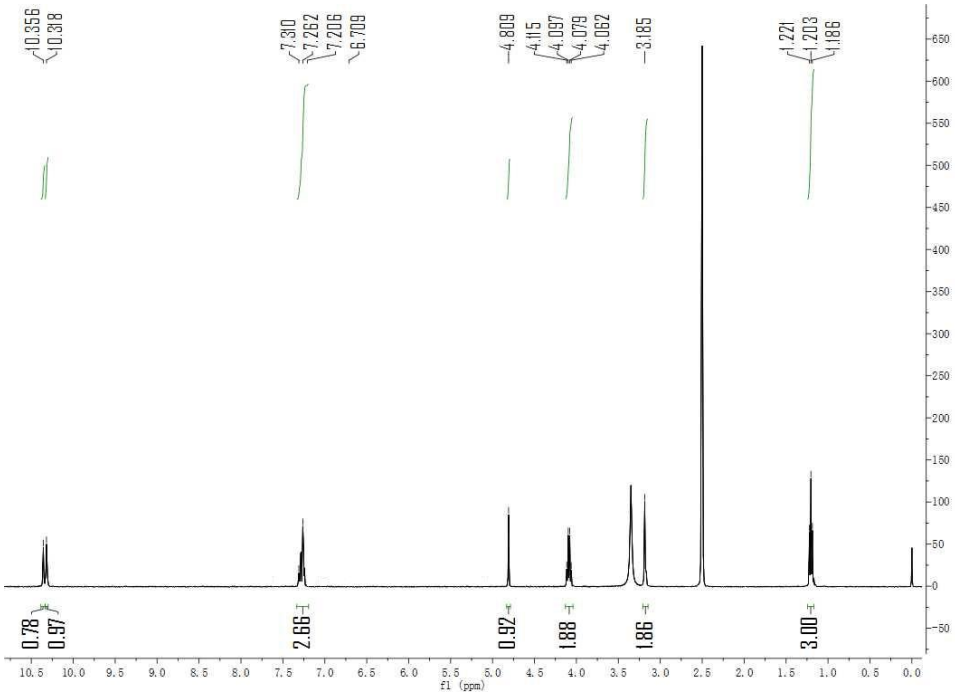
IR spectra of compound **4c**

4d

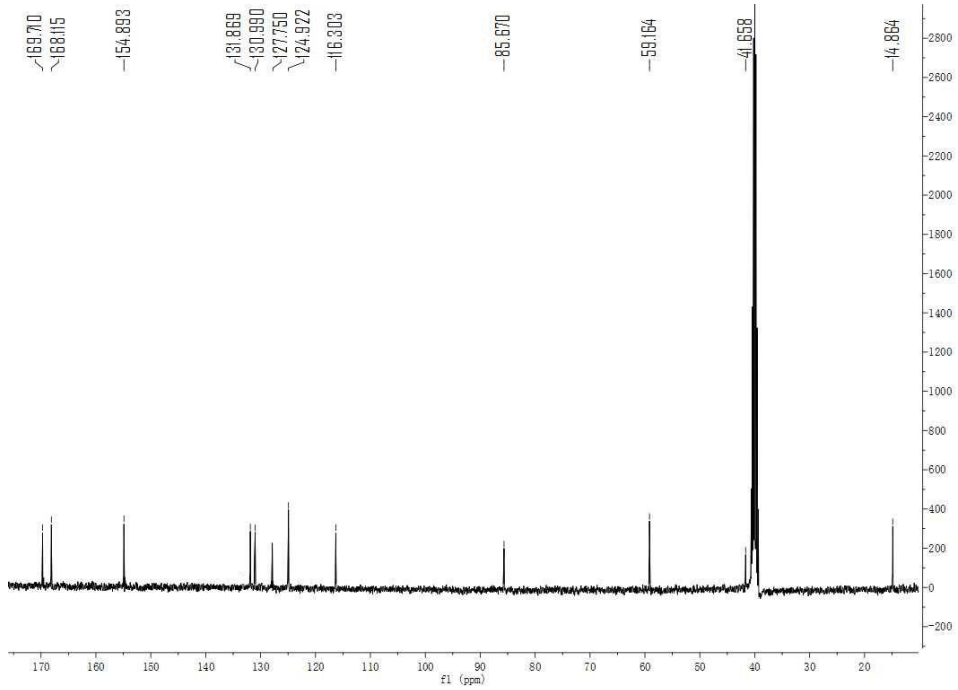


Pale gray solid; 293 mg, 90%; mp 252-254 °C; IR (KBr): 3211, 1694, 1621, 1503 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 1.20 (t, J=7.1Hz, 3H), 3.19 (s, 2H),

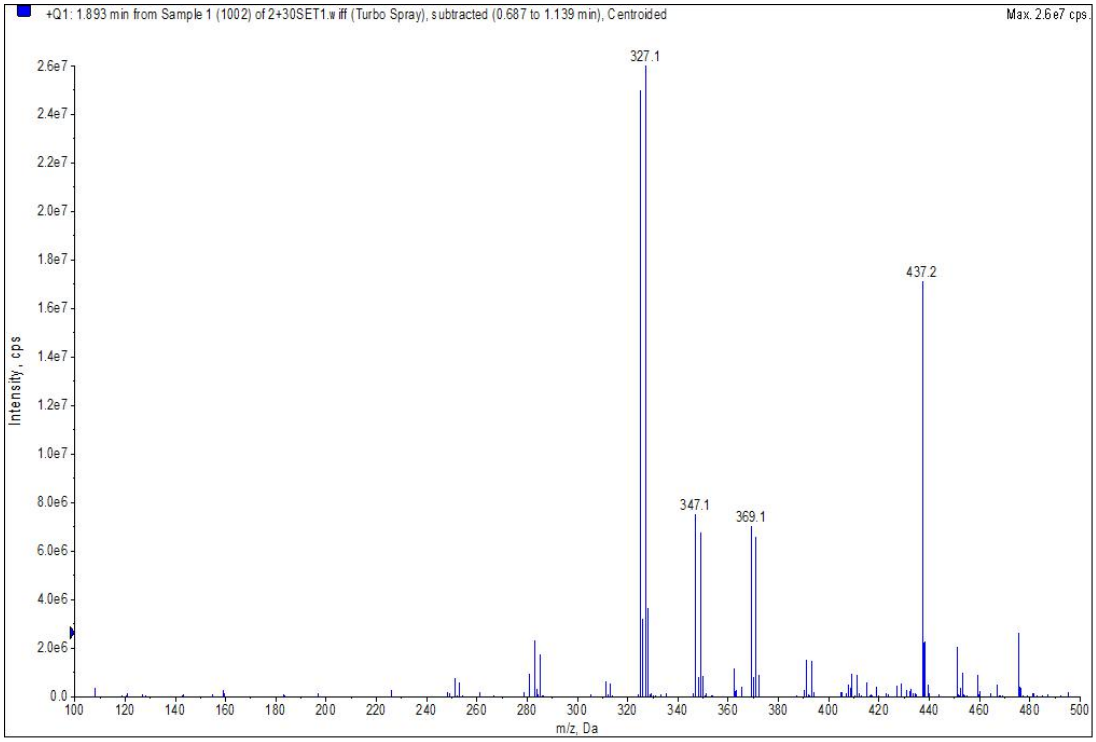
4.09 (q, *J*=7.1 Hz, 2H), 4.81 (s, 1H), 7.21-7.31 (m, 3H), 10.32 (s, 1H), 10.36 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.86, 41.66, 59.16, 85.67, 116.30, 124.92, 127.75, 130.99, 131.87, 154.89, 168.12, 169.71; Found C, 48.09; H, 4.17; N, 8.48%; M+1 (mass spectrum), 327.1. $C_{12}H_{13}BrN_2O_3$ requires C, 48.02; H, 4.03; N, 8.62%; M, 325.1



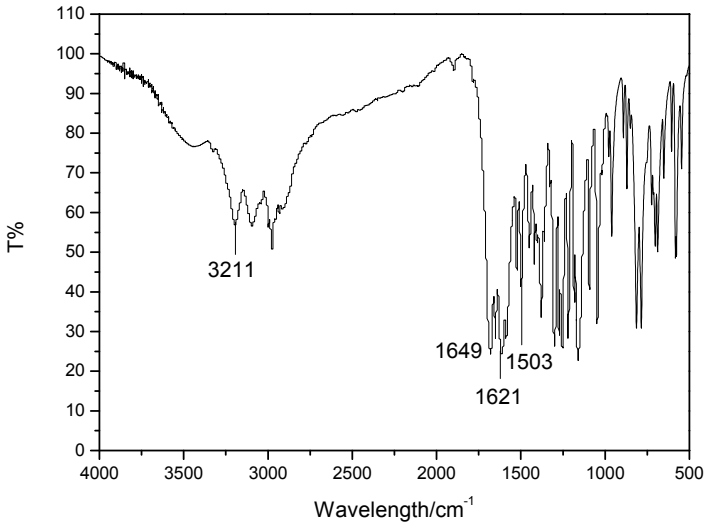
^{1}H NMR spectra of compound **4d**



^{13}C NMR spectra of compound **4d**

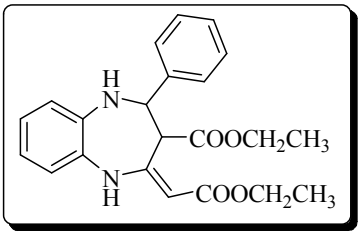


MS of compound **4d**



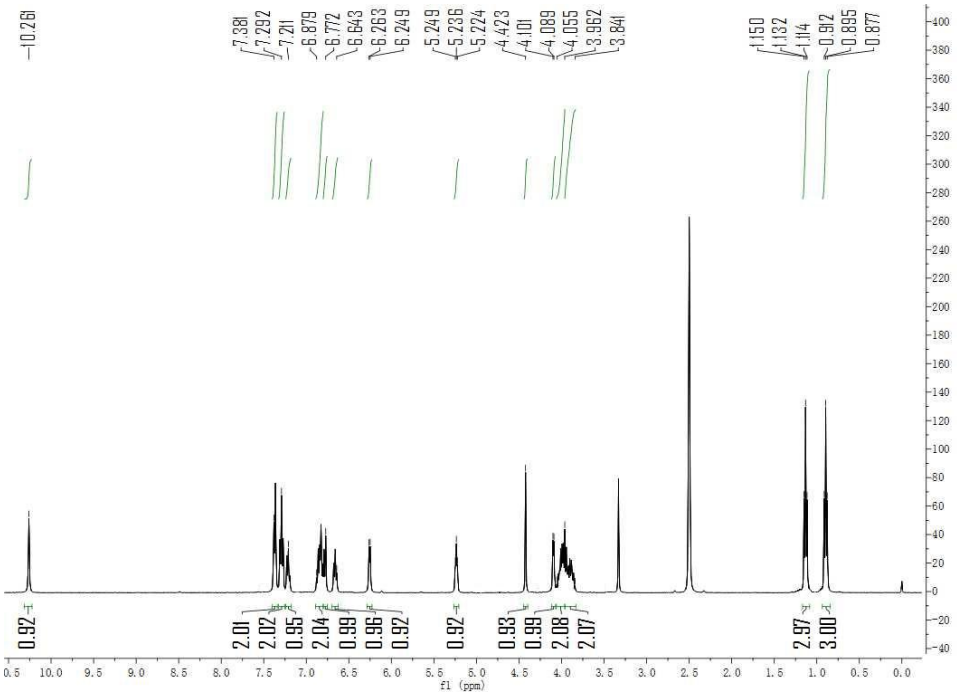
IR spectra of compound **4d**

5aa

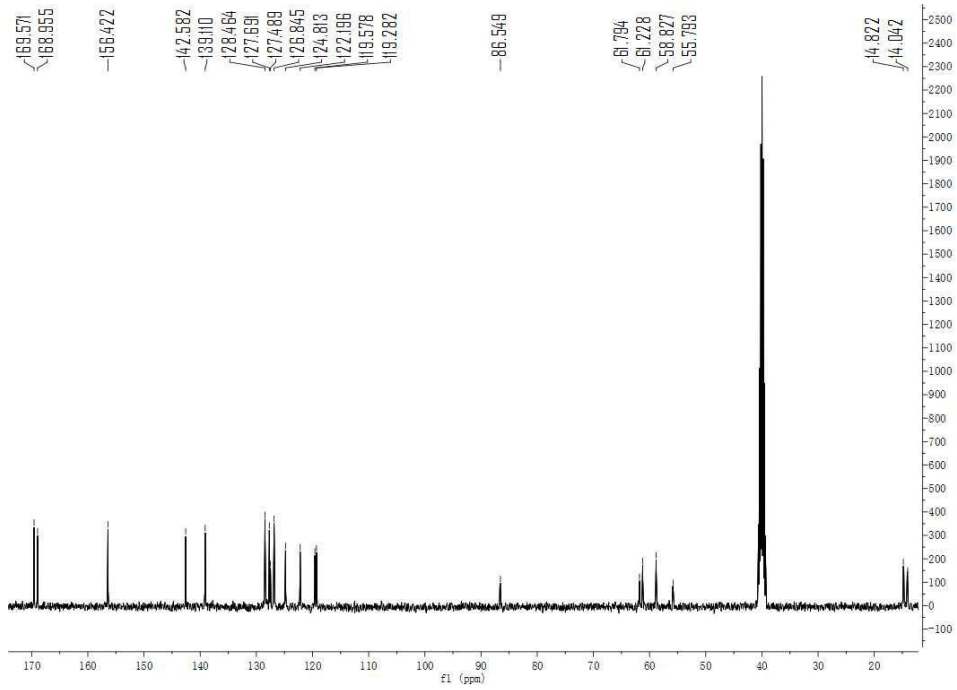


Pale yellow solid; 342 mg, 90%; mp 96-98 °C; IR (KBr): 3329, 1733, 1632, 1502 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.89 (t, J=7.0 Hz, 3H), 1.13(t, J=7.1

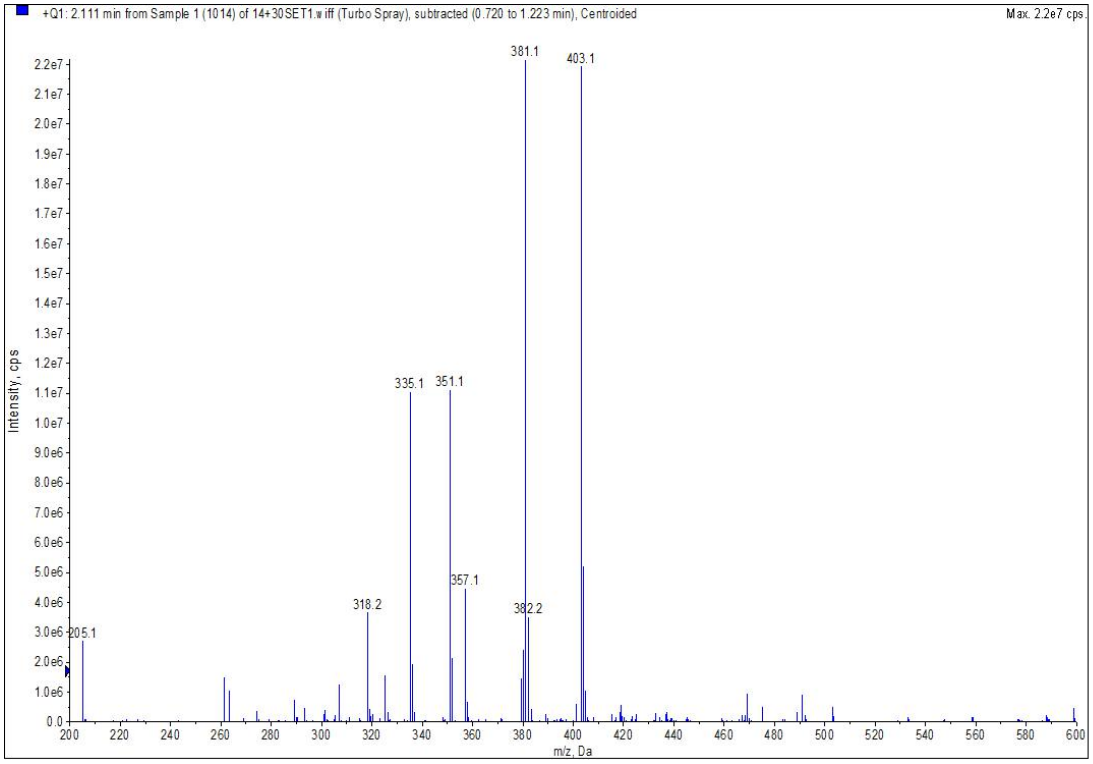
Hz, 3H), 3.84-3.96 (m, 2H), 3.96-4.06 (m, 2H), 4.10 (d, *J*=4.7 Hz, 1H), 4.42 (s, 1H), 5.24 (t, *J*=5.0 Hz, 1H), 6.26 (d, *J*=5.3 Hz, 1H), 6.64-6.88 (m, 4H), 7.21-7.38 (m, 5H), 10.26 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.04, 14.82, 55.79, 58.83, 61.23, 61.79, 86.55, 119.28, 119.58, 112.20, 124.81, 126.85, 127.49, 127.69, 128.46, 139.11, 142.58, 156.42, 168.95, 169.57; Found C, 69.49; H, 6.31; N, 7.33%; M+1 (mass spectrum), 381.1. $C_{22}H_{24}N_2O_4$ requires C, 69.46; H, 6.36; N, 7.36%; M, 380.44.



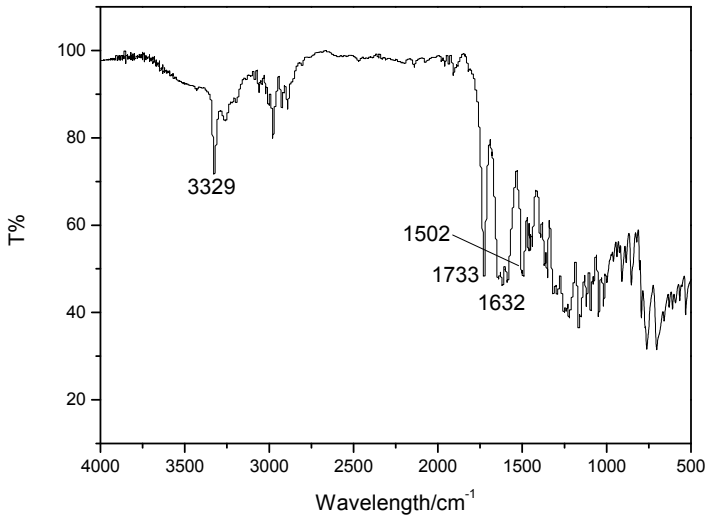
^{1}H NMR spectra of compound **5aa**



^{13}C NMR spectra of compound **5aa**

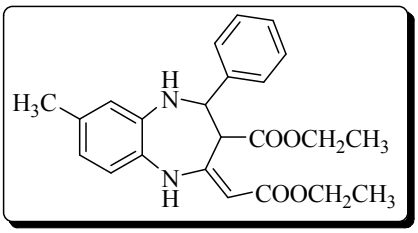


MS of compound **5aa**

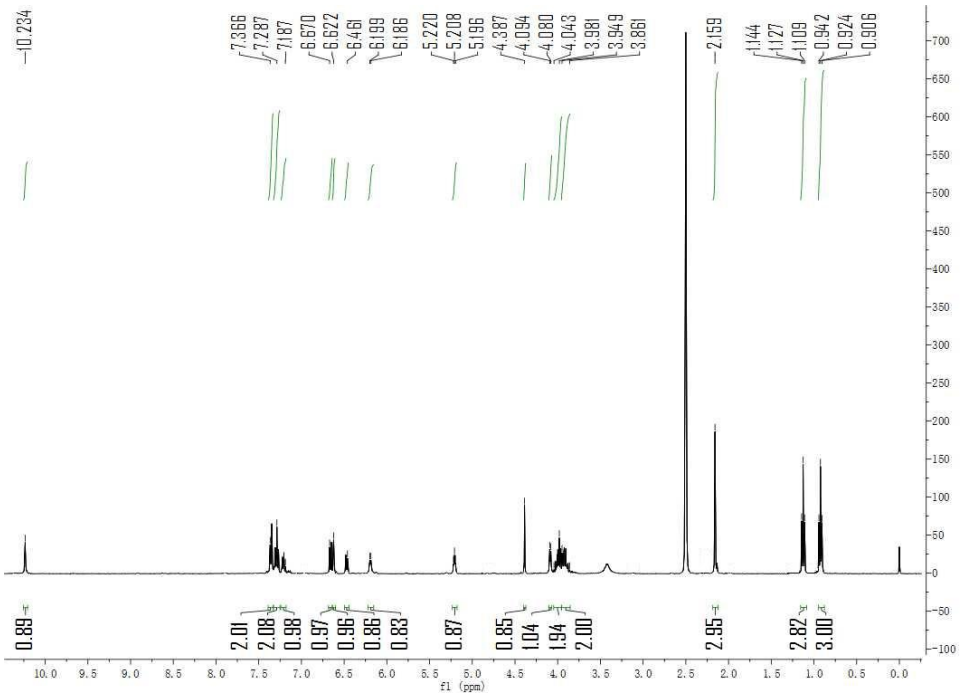


IR spectra of compound **5aa**

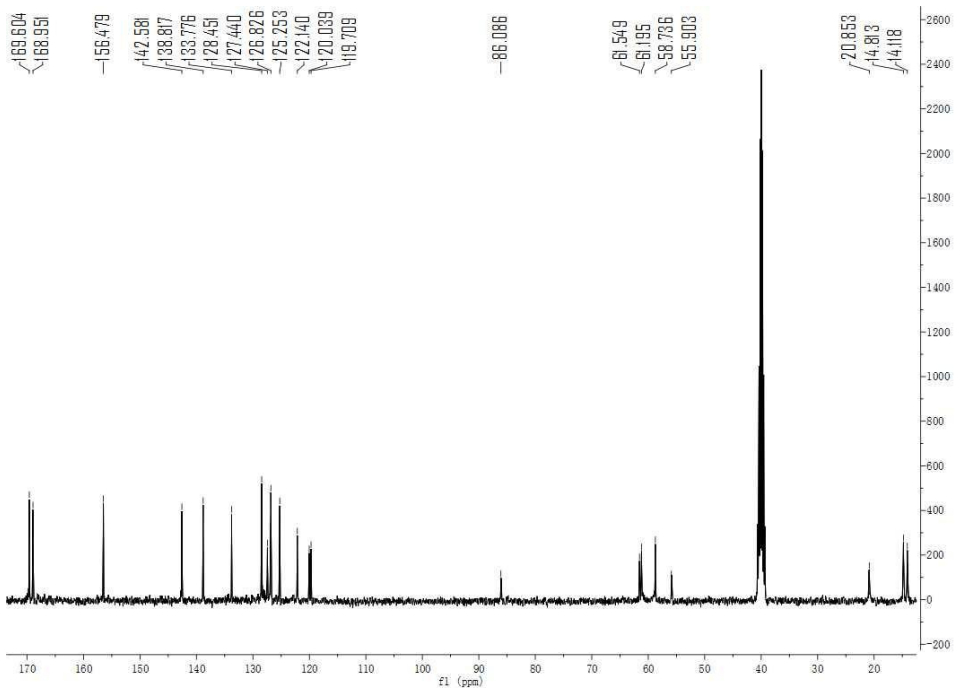
5ba



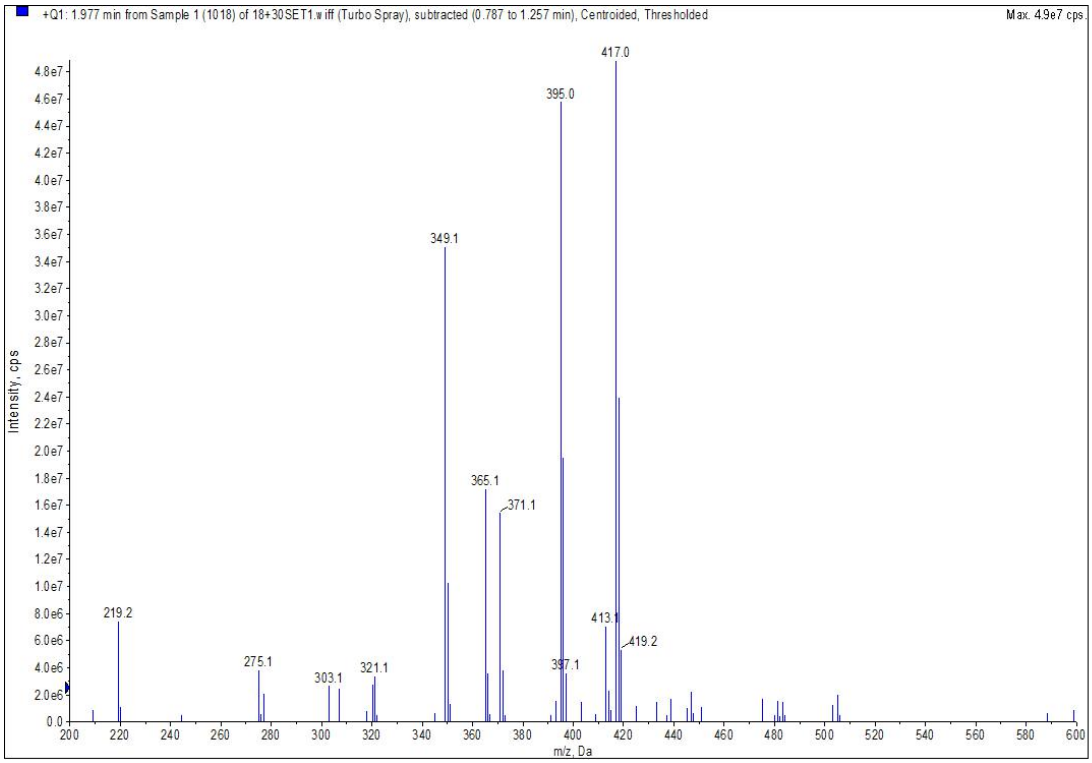
Pale yellow solid; 363 mg, 92%; mp 132-134 °C; IR (KBr): 3356, 1741, 1635, 1501 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.92 (t, J=7.1 Hz, 3H), 1.13 (t, J=7.1 Hz, 3H), 2.16 (s, 3H), 3.86-3.95 (m, 2H), 3.98-4.04 (m, $2H_2$), 4.09 (d, J=5.4 Hz, 1H), 4.39 (s, 1H), 5.21 (t, J=4.8 Hz, 1H), 6.19 (d, J=5.1 Hz, 1H), 6.46-6.67 (m, 3H), 7.19-7.37 (m, 5H), 10.23 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.12, 14.81, 20.85, 55.90, 58.74, 61.20, 61.55, 86.09, 119.71, 120.04, 122.14, 125.25, 126.83, 127.44, 128.45, 133.78, 138.82, 142.58, 156.48, 168.95, 169.60; Found C, 70.17; H, 6.73; N, 6.90%; M+1 (mass spectrum), 395.0. $C_{23}H_{26}N_2O_4$ requires C, 70.03; H, 6.64; N, 7.10%; M, 394.46.



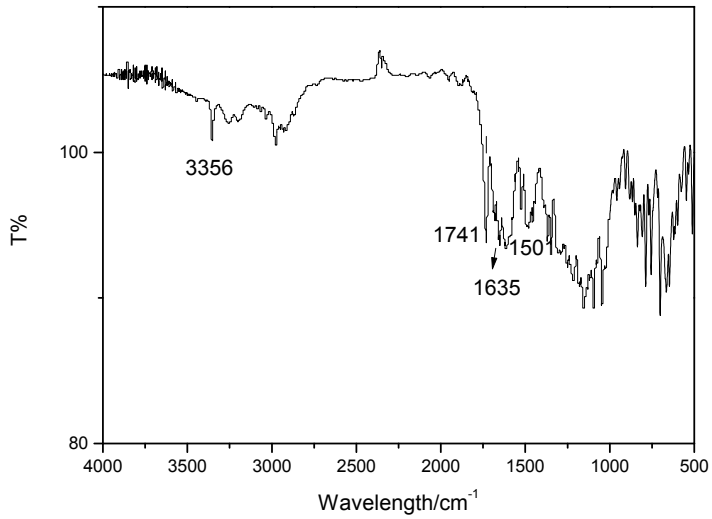
^1H NMR spectra of compound **5ba**



^{13}C NMR spectra of compound **5ba**

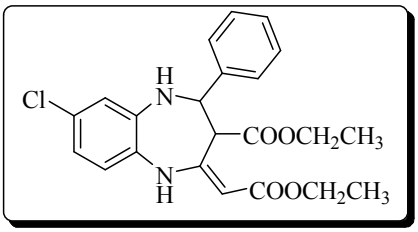


MS of compound **5ba**

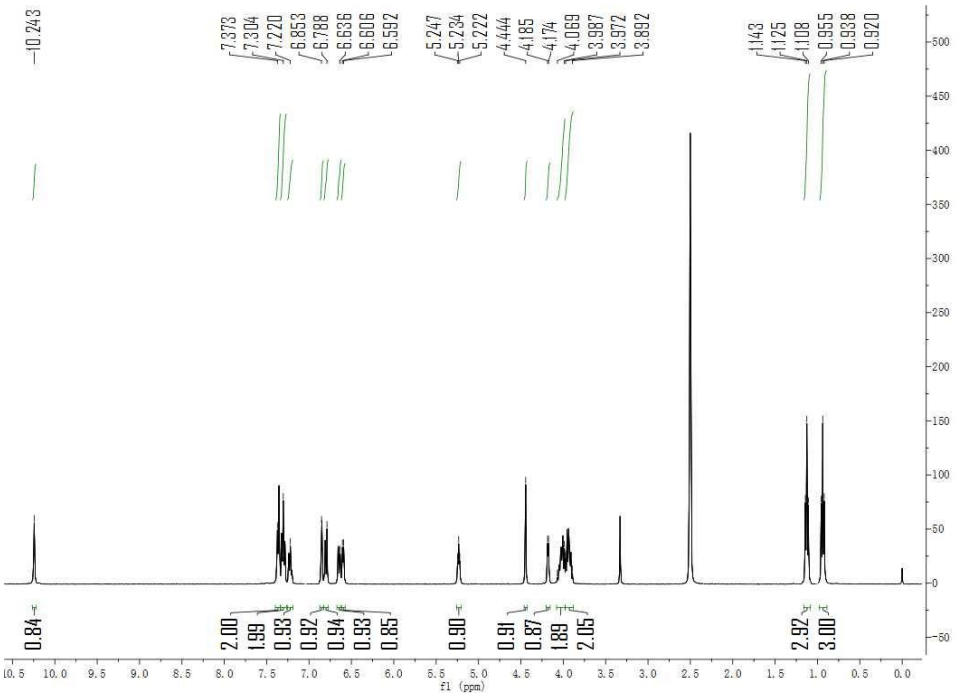


IR spectra of compound **5ba**

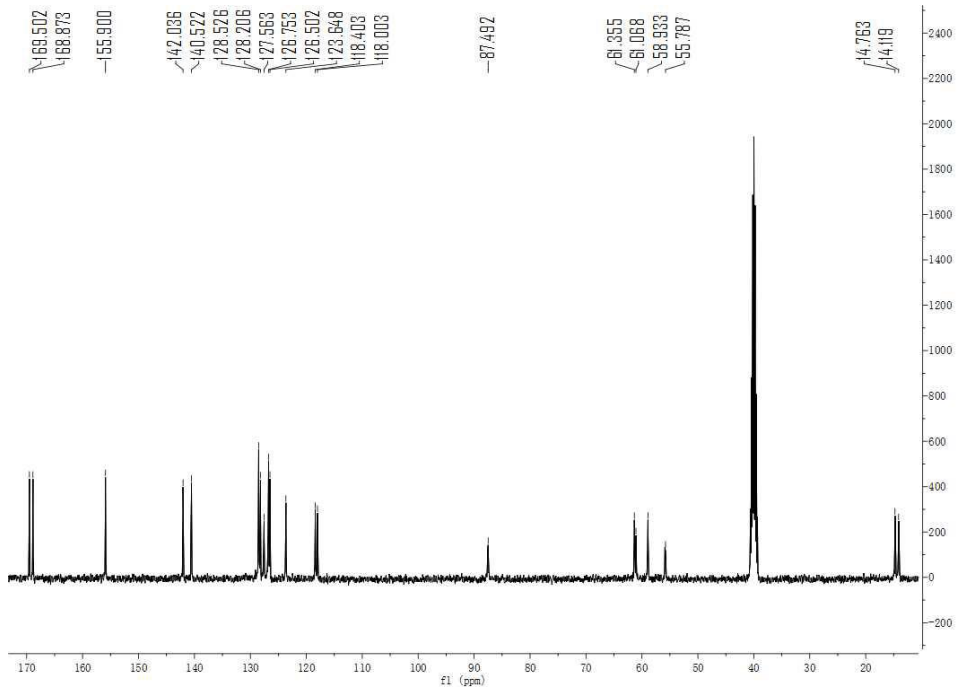
5ca



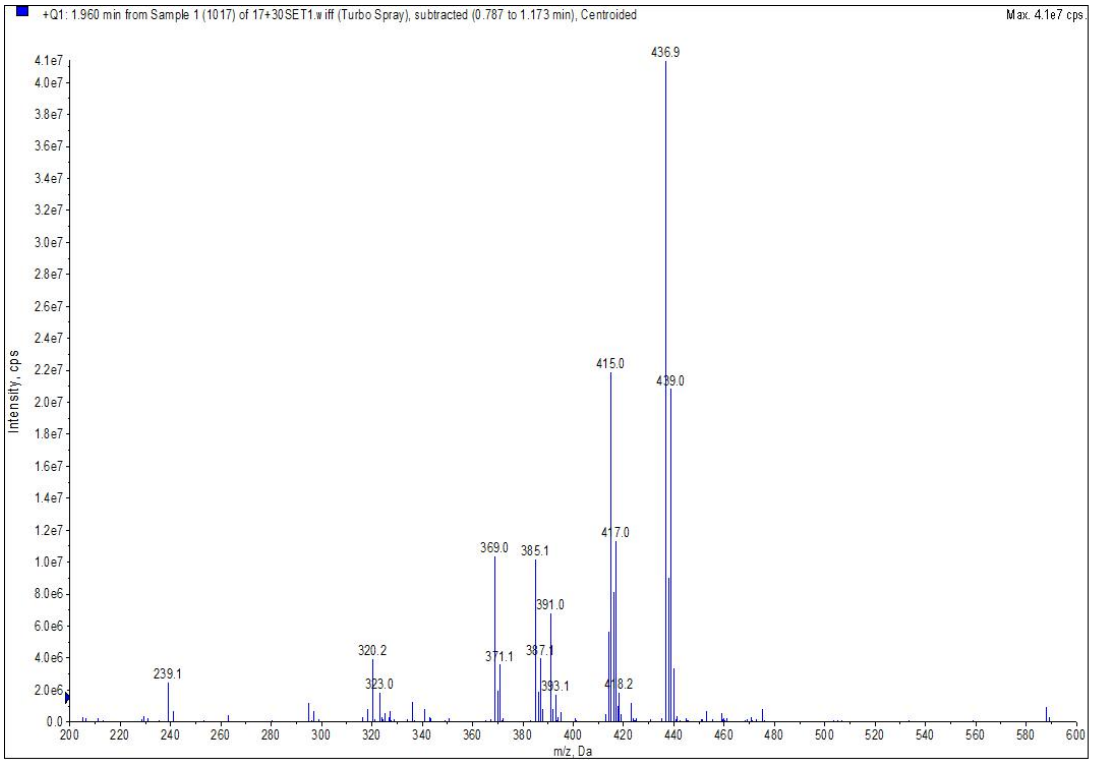
White solid; 357 mg, 86%; mp 132-134 °C; IR (KBr): 3347, 1731, 1621, 1513 cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.0 Hz, 3H), 1.13 (t, J=7.1 Hz, 3H), 3.89-3.97 (m, 2H), 3.99-4.07 (m, 2H), 4.18 (d, J=4.6 Hz, 1H), 4.44 (s, 1H), 5.23 (t, J=5.0 Hz, 1H), 6.60 (d, J=5.6 Hz, 1H), 6.64-6.85 (m, 3H), 7.22-7.37 (m, 5H), 10.24 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.12, 14.76, 55.79, 58.93, 61.07, 61.35, 87.49, 118.00, 118.40, 123.65, 126.50, 126.75, 127.56, 128.21, 128.53, 140.52, 142.04, 155.90, 168.87, 169.50; Found C, 64.10; H, 6.11; N, 6.62%; M+1 (mass spectrum), 415.1. $C_{22}H_{23}ClN_2O_4$ requires C, 63.69; H, 5.59; N, 6.75%; M, 414.88.



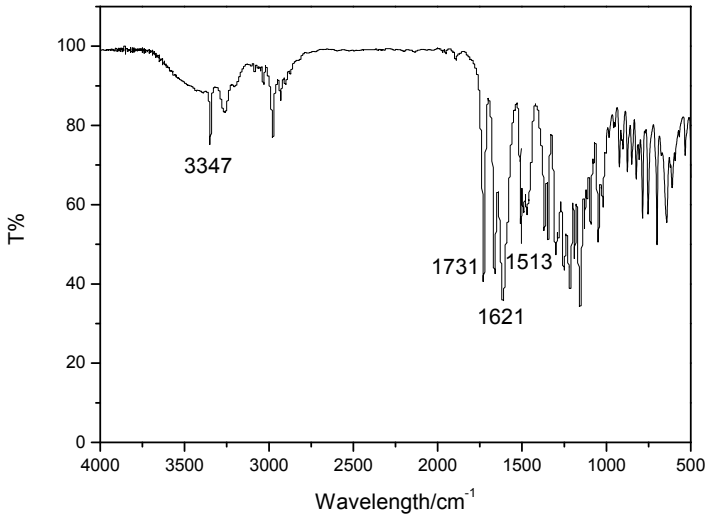
^{1}H NMR spectra of compound **5ca**



^{13}C NMR spectra of compound **5ca**

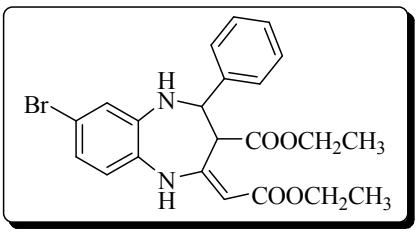


MS of compound **5ca**



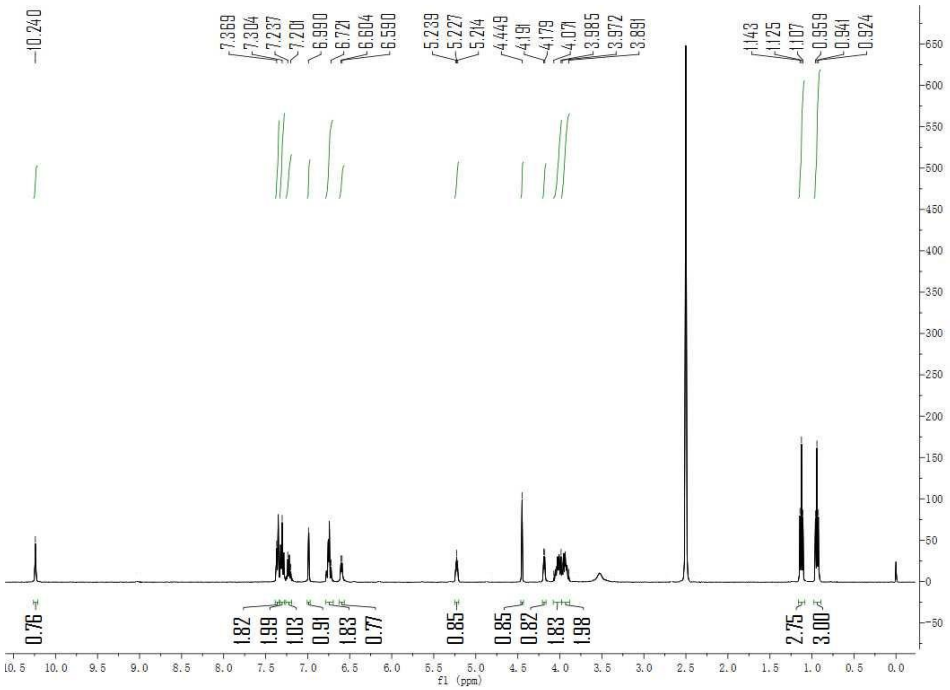
IR spectra of compound **5ca**

5da

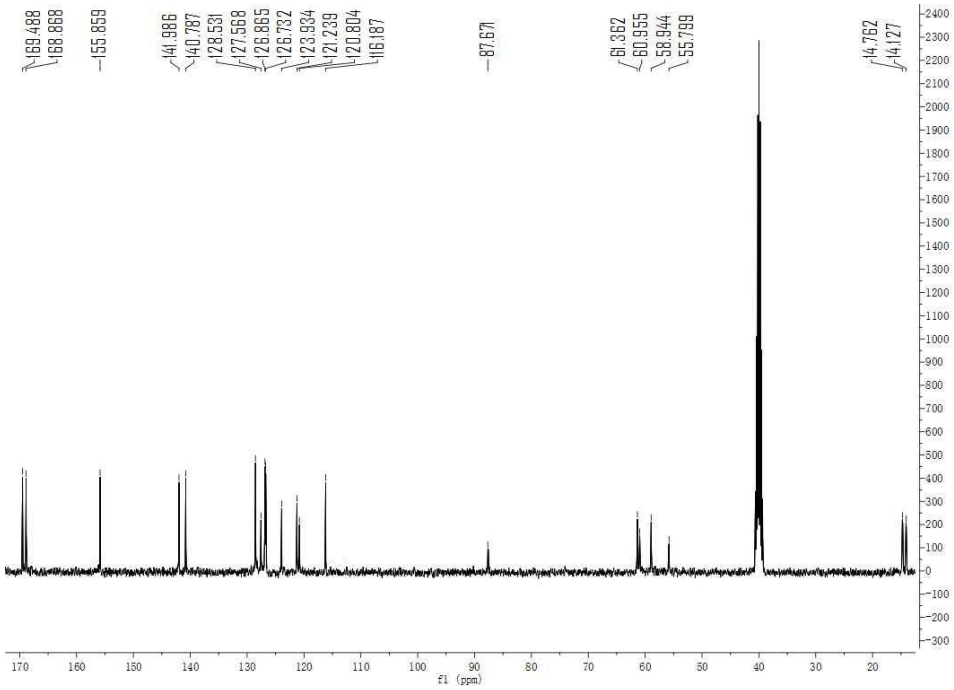


White solid; 404 mg, 88%; mp 133-135 °C; IR (KBr): 3356, 1732, 1625, 1522 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.1 Hz, 3H), 1.12 (t, J=7.1 Hz,

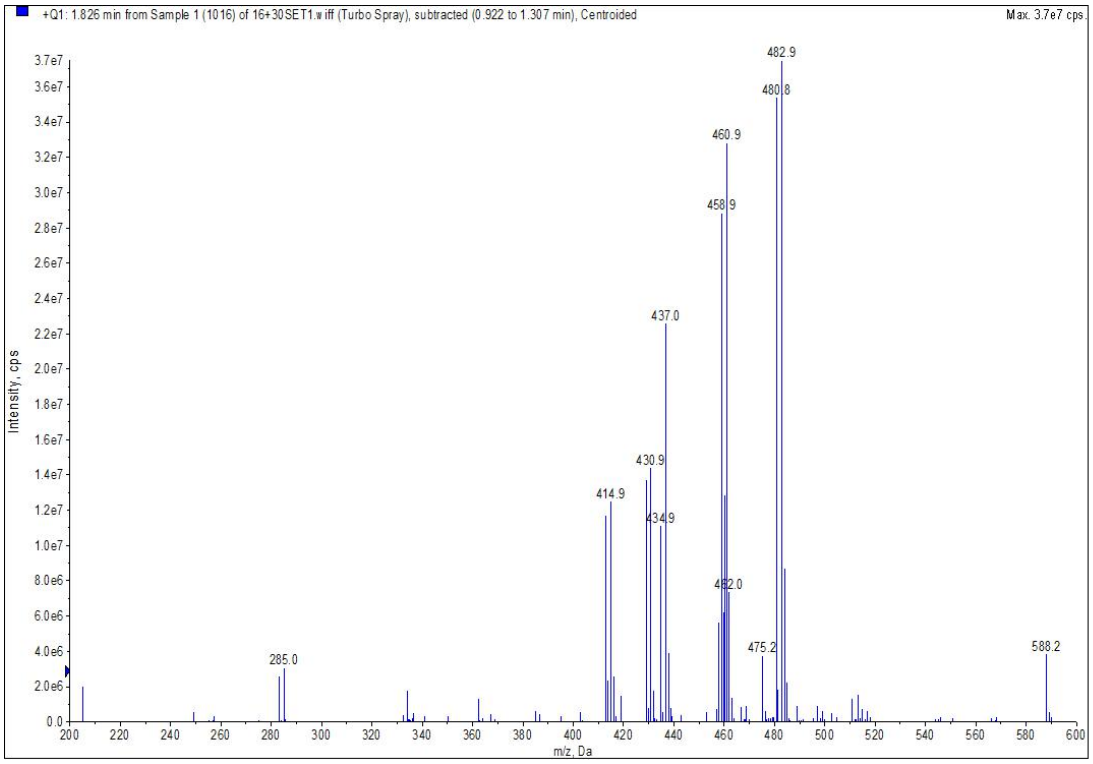
3H), 3.89-3.97 (m, 2H), 3.99-4.07 (m, 2H), 4.19 (d, *J*=4.7 Hz, 1H), 4.45 (s, 1H), 5.23 (t, *J*=4.9 Hz, 1H), 6.60 (d, *J*=5.6 Hz, 1H), 6.72-6.99 (m, 3H), 7.20-7.37 (m, 5H), 10.24 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.13, 14.76, 55.80, 58.94, 60.96, 61.36, 87.67, 116.19, 128.80, 121.24, 123.93, 126.73, 126.87, 127.57, 128.53, 140.79, 141.99, 155.86, 168.87, 169.49; Found C, 57.48; H, 4.93; N, 6.24%; M+1 (mass spectrum), 460.9. $C_{22}H_{23}BrN_2O_4$ requires C, 57.53; H, 5.05; N, 6.10%; M, 459.33.



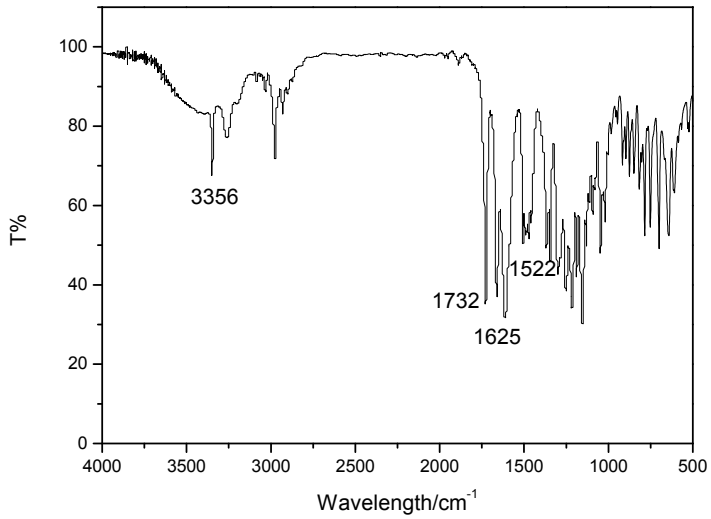
^{1}H NMR spectra of compound **5da**



^{13}C NMR spectra of compound **5da**

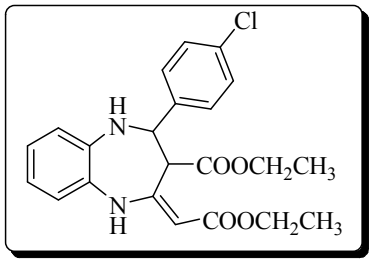


MS of compound **5da**



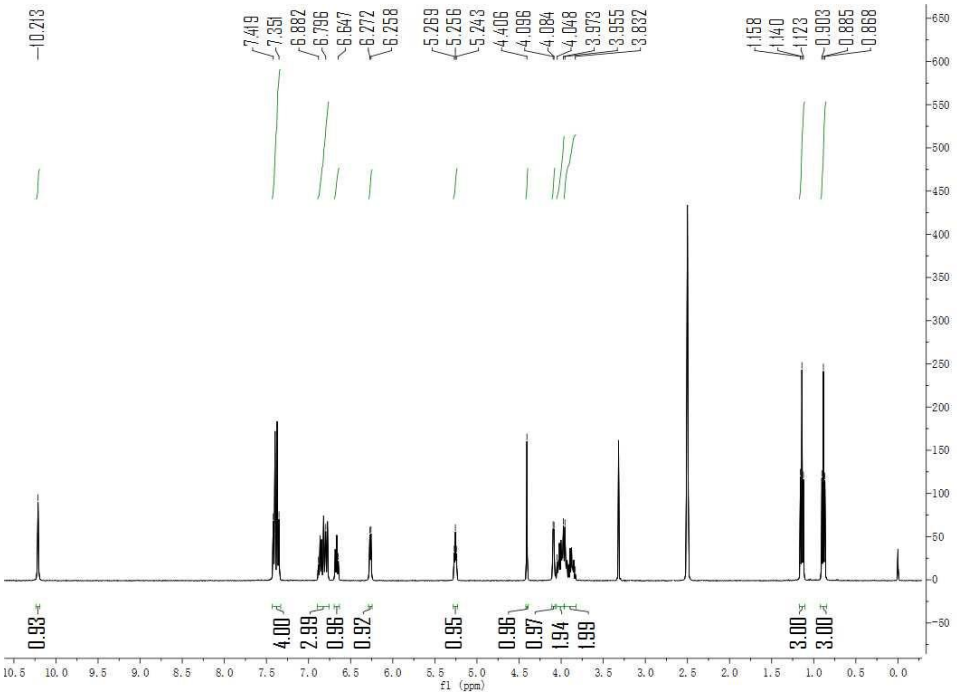
IR spectra of compound **5da**

5ab

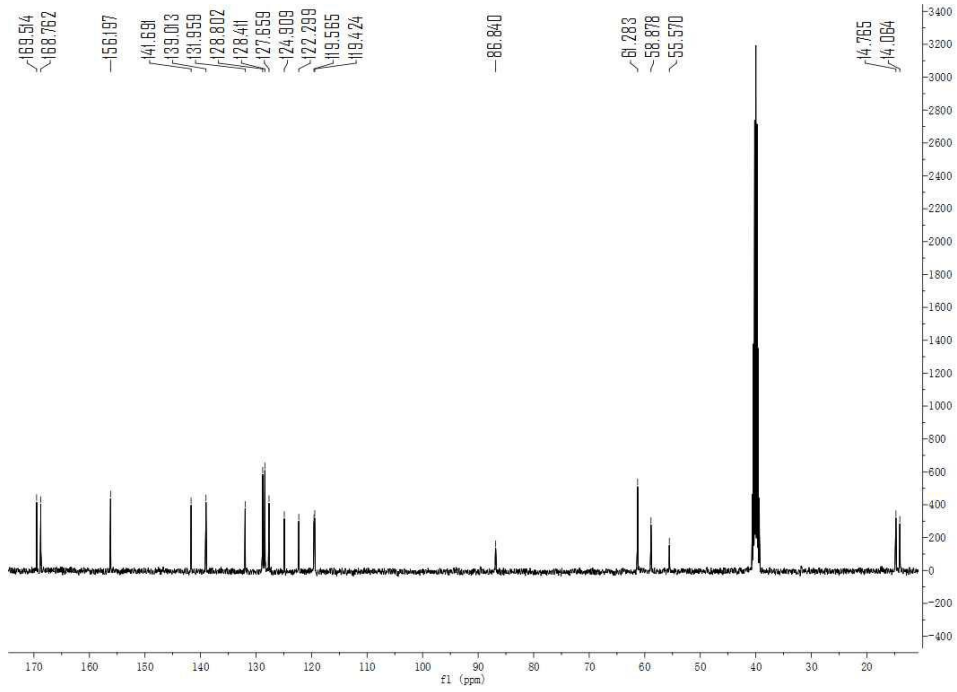


Pale yellow solid; 373 mg, 90%; mp 150-152 °C; IR (KBr): 3374, 1730, 1630, 1503

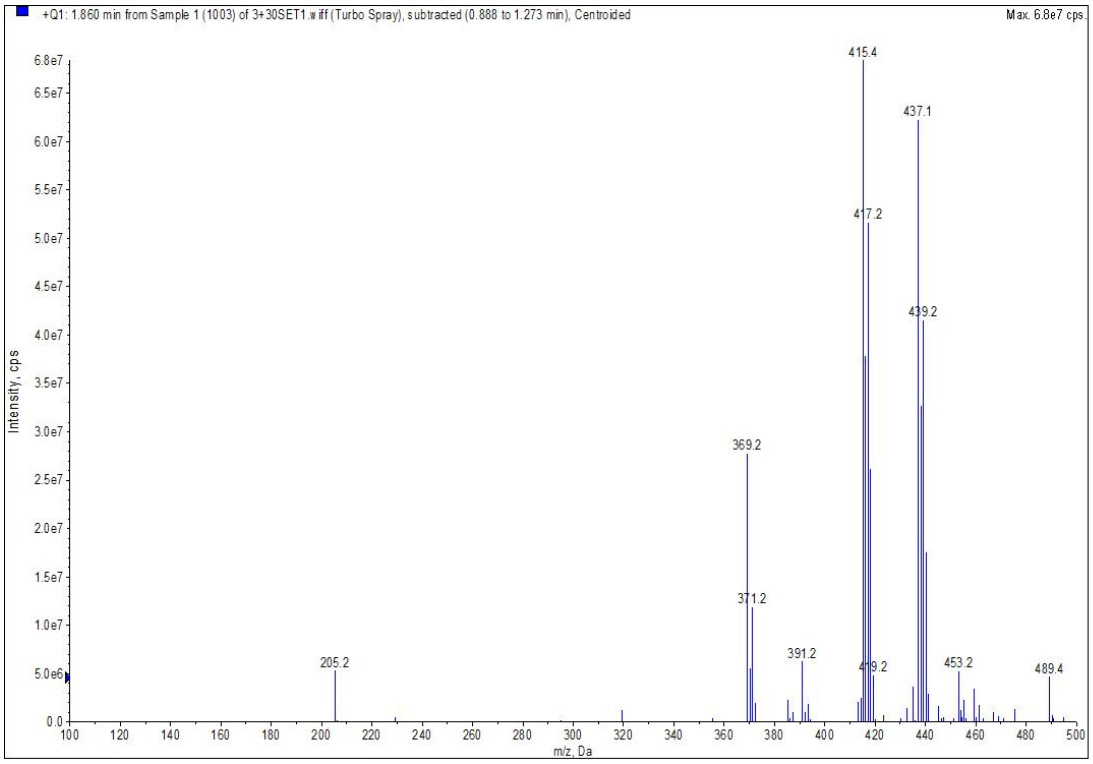
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.89 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 3.83-3.96 (m, 2H), 3.97-4.05 (m, 2H), 4.09 (d, J=4.6 Hz, 1H), 4.41 (s, 1H), 5.26 (t, J=5.1 Hz, 1H), 6.27 (d, J=5.7 Hz, 1H), 6.65-6.88 (m, 4H), 7.35-7.42 (m, 4H), 10.21 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.06, 14.76, 55.57, 58.88, 61.28, 86.84, 119.42, 119.57, 122.30, 124.91, 127.66, 128.41, 128.80, 131.96, 139.01, 141.69, 156.20, 168.76, 169.51; Found C, 63.73; H, 5.65; N, 6.67%; M+1 (mass spectrum), 415.4. $C_{22}H_{23}ClN_2O_4$ requires C, 63.69; H, 5.59; N, 6.75%; M, 414.88.



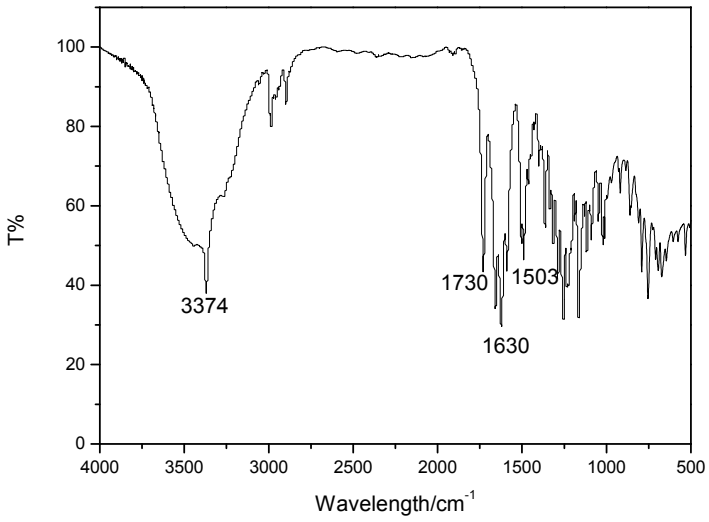
^{1}H NMR spectra of compound **5ab**



^{13}C NMR spectra of compound **5ab**

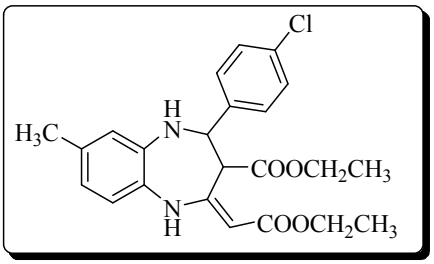


MS of compound **5ab**



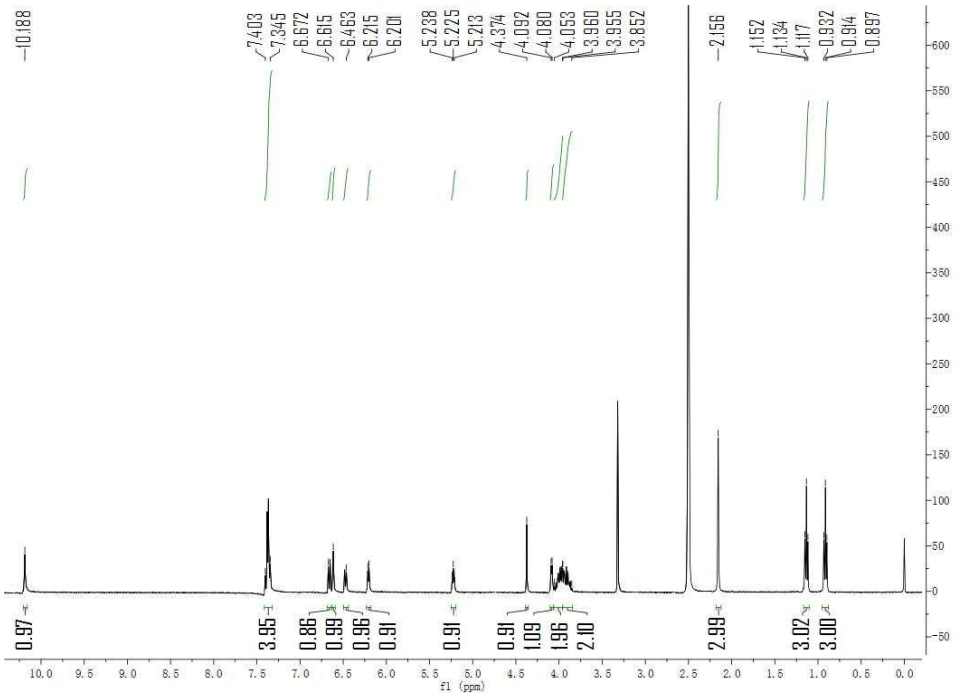
IR spectra of compound **5ab**

5bb

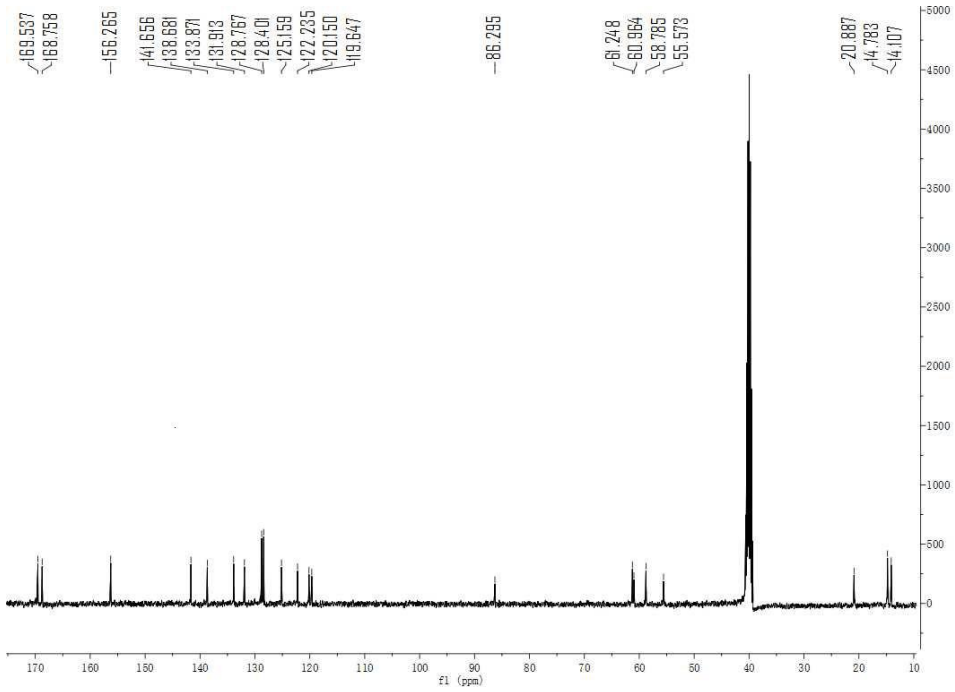


Pale yellow solid; 403 mg, 94%; mp 116-118 °C; IR (KBr): 3383, 1721, 1621, 1501

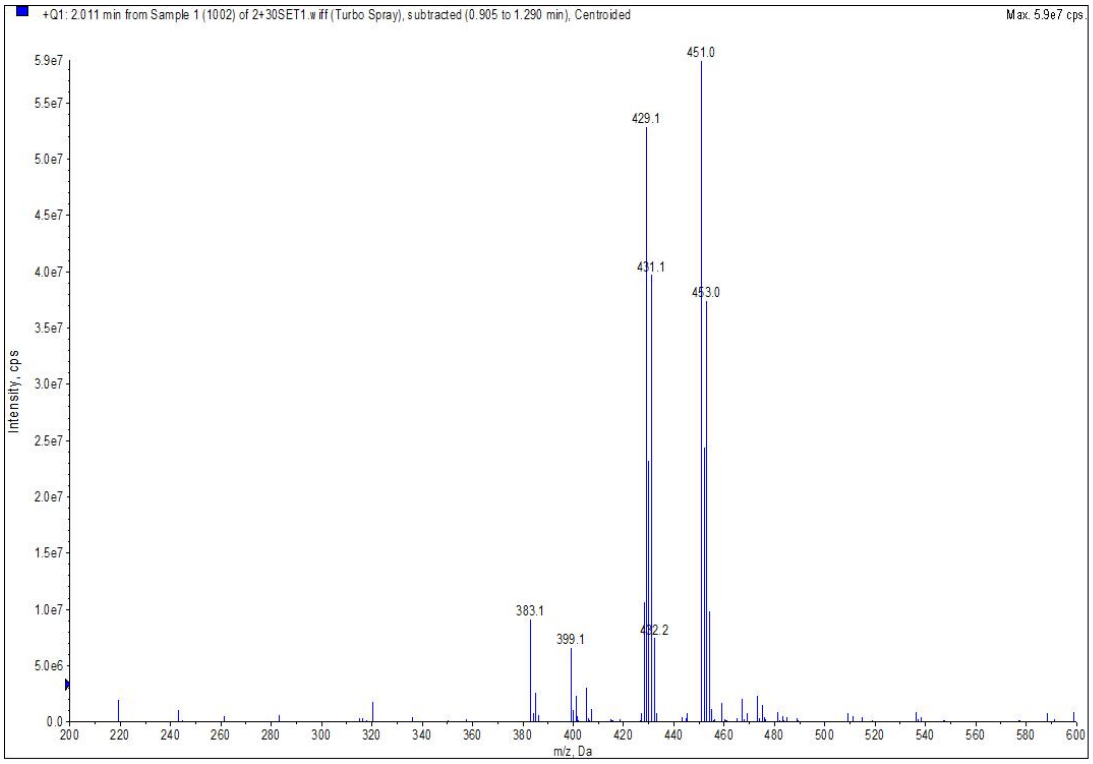
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.91 (t, J=7.1 Hz, 3H), 1.13 (t, J=7.1 Hz, 3H), 2.16 (s, 3H), 3.85-3.96 (m, 2H), 3.96-4.05 (m, 2H), 4.09 (d, J=4.6 Hz, 1H), 4.37 (s, 1H), 5.23 (t, J=5.0 Hz, 1H), 6.21 (d, J=5.4 Hz, 1H), 6.46-6.67 (m, 3H), 7.35-7.40 (m, 4H), 10.19 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.11, 14.78, 20.89, 55.57, 58.78, 60.96, 61.25, 86.30, 119.65, 120.15, 122.24, 125.16, 128.40, 128.77, 131.91, 133.87, 138.68, 141.66, 156.26, 168.76, 169.54; Found C, 64.35; H, 6.01; N, 6.37%; M+1 (mass spectrum), 429.1. $C_{23}H_{25}ClN_2O_4$ requires C, 64.41; H, 5.88; N, 6.53%; M, 428.91.



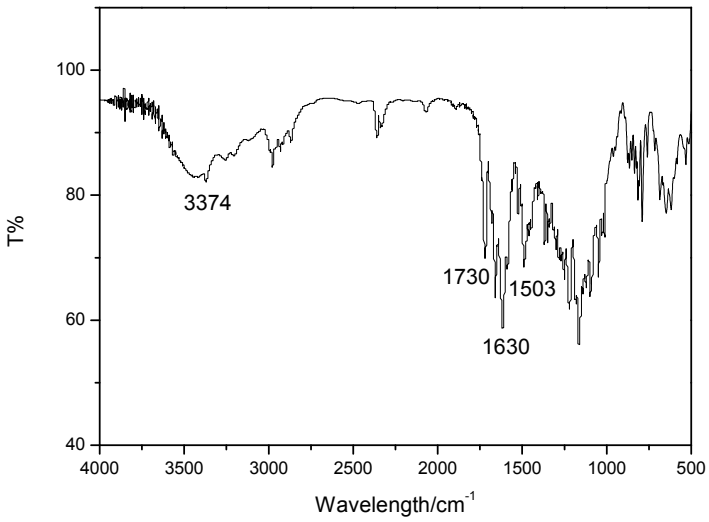
^{1}H NMR spectra of compound **5bb**



^{13}C NMR spectra of compound **5bb**

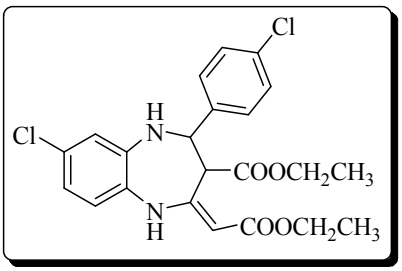


MS of compound **5bb**



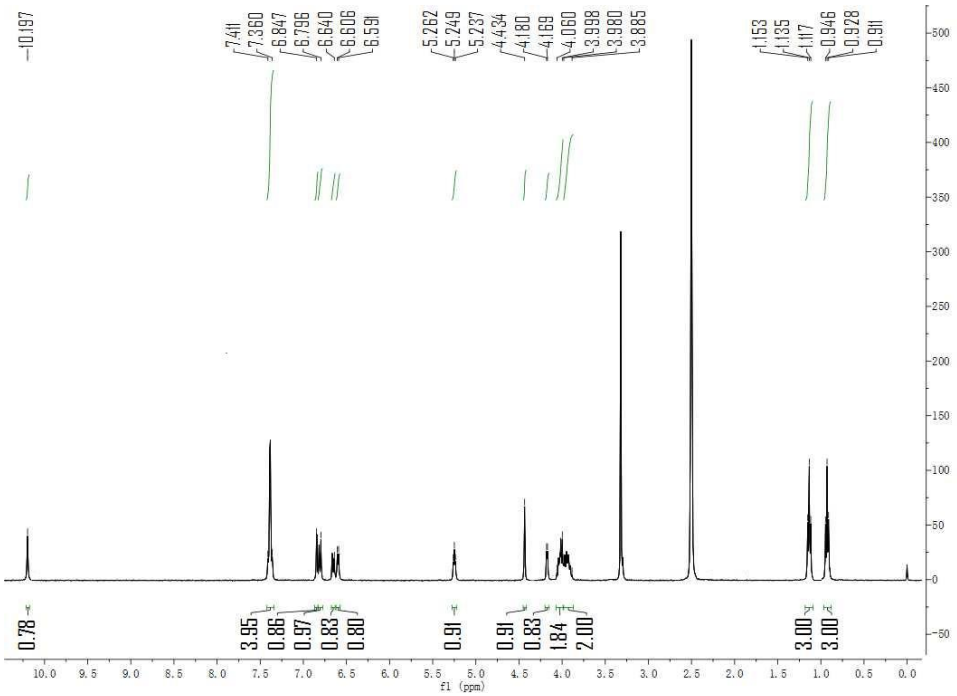
IR spectra of compound **5bb**

5cb

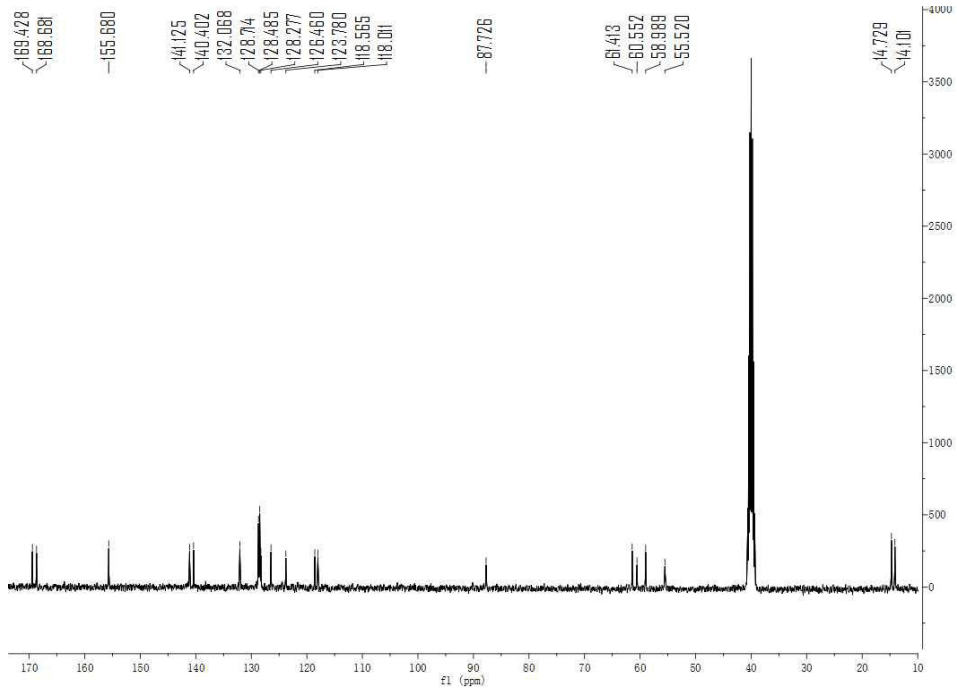


White solid; 391 mg, 87%; mp 138-140 °C; IR (KBr): 3356, 1739, 1630, 1494 cm^{-1};

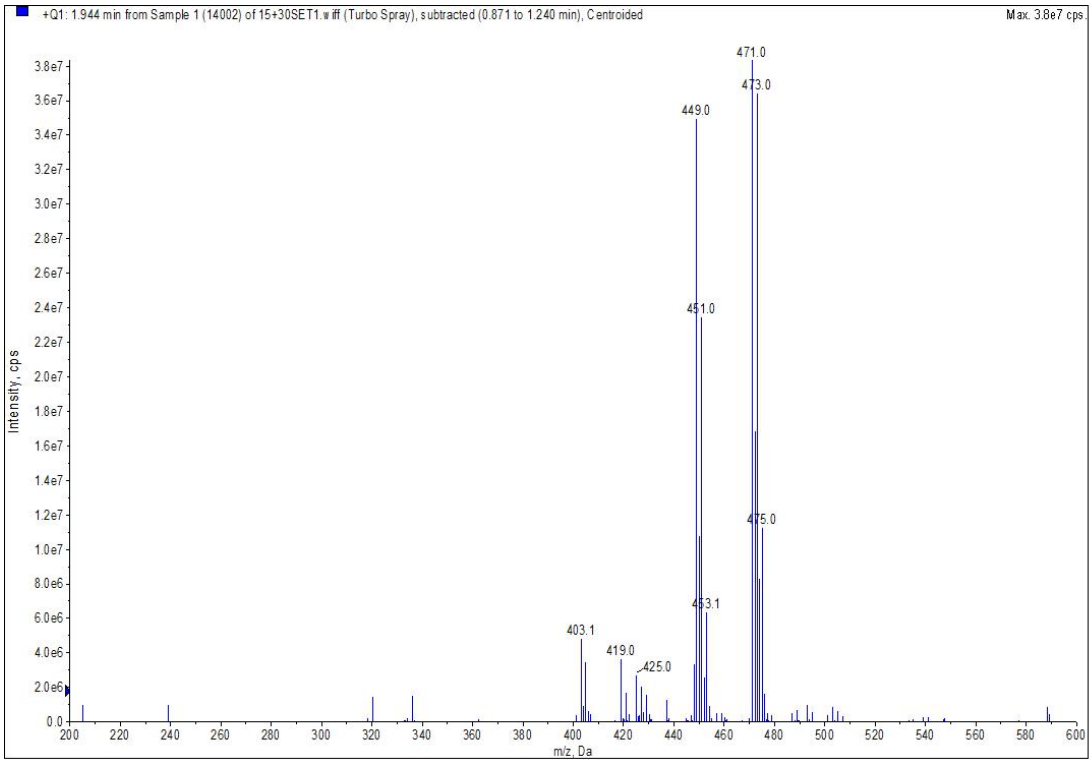
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.0 Hz, 3H), 1.13 (t, J=7.1 Hz, 3H), 3.89-3.98 (m, 2H), 4.00-4.06 (m, 2H,), 4.17 (d, J=4.3 Hz, 1H), 4.43 (s, 1H), 5.25 (t, J=5.0 Hz, 1H), 6.60 (d, J=5.8 Hz, 1H), 6.64-6.85 (m, 3H), 7.36-7.41 (m, 4H), 10.20 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.10, 14.73, 55.52, 58.99, 60.55, 61.41, 87.73, 118.01, 118.57, 123.78, 126.46, 128.28, 128.49, 128.71, 132.07, 140.40, 141.12, 155.68, 168.68, 169.43; Found C, 58.67; H, 4.81; N, 6.37%; M+1 (mass spectrum), 451.0. $C_{22}H_{22}Cl_2N_2O_4$ requires C, 58.81; H, 4.94; N, 6.23%; M, 449.33.



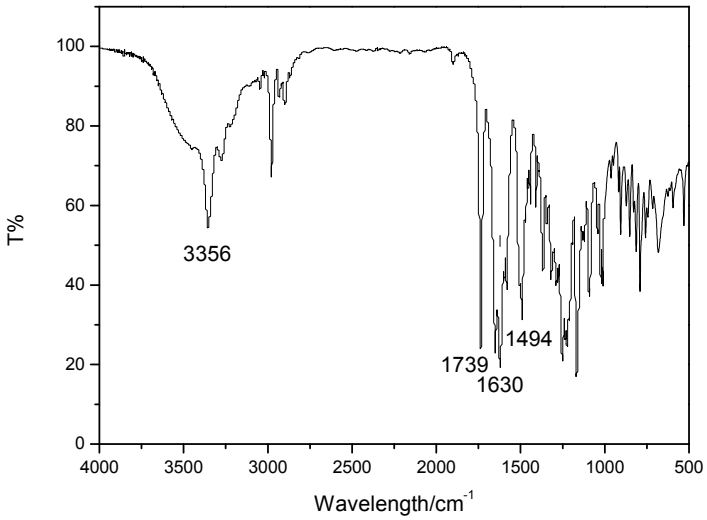
^{1}H NMR spectra of compound **5cb**



^{13}C NMR spectra of compound **5cb**

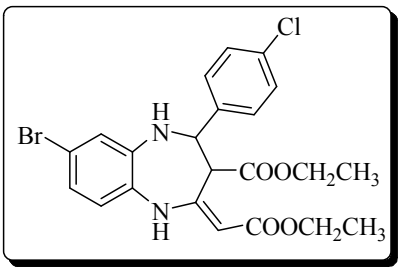


MS of compound **5cb**



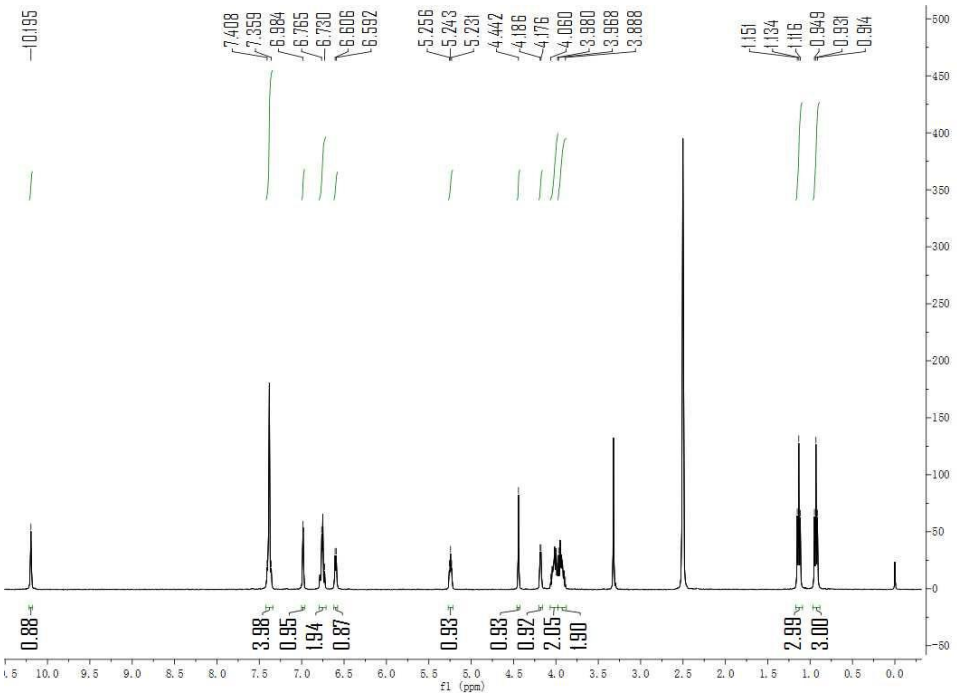
IR spectra of compound **5cb**

5db

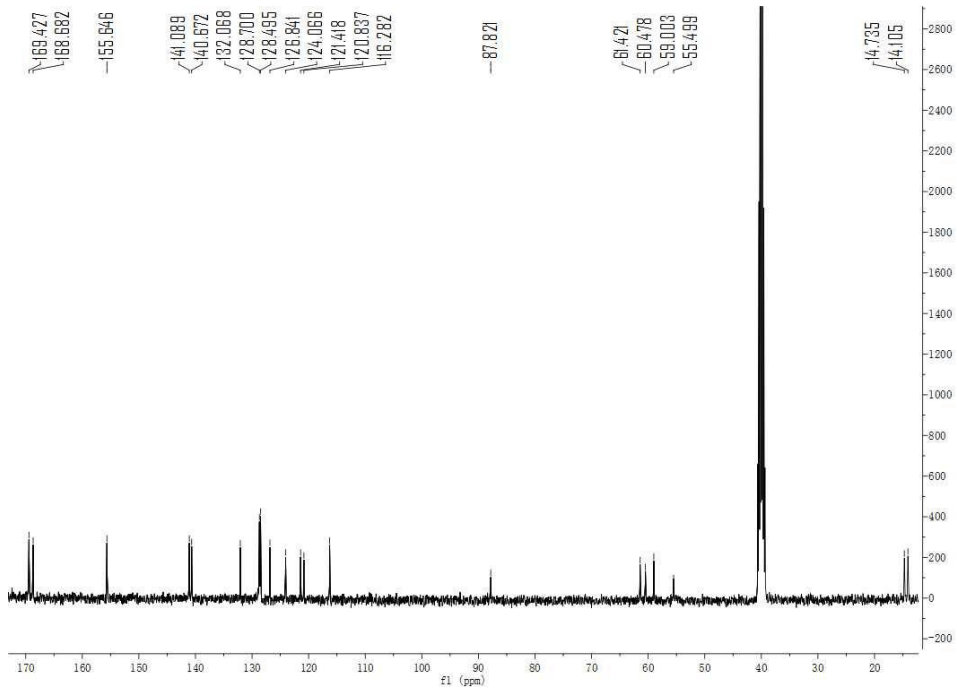


White solid; 439 mg, 89%; mp 122-124 °C; IR (KBr): 3374, 1731, 1621, 1495 cm^{-1};

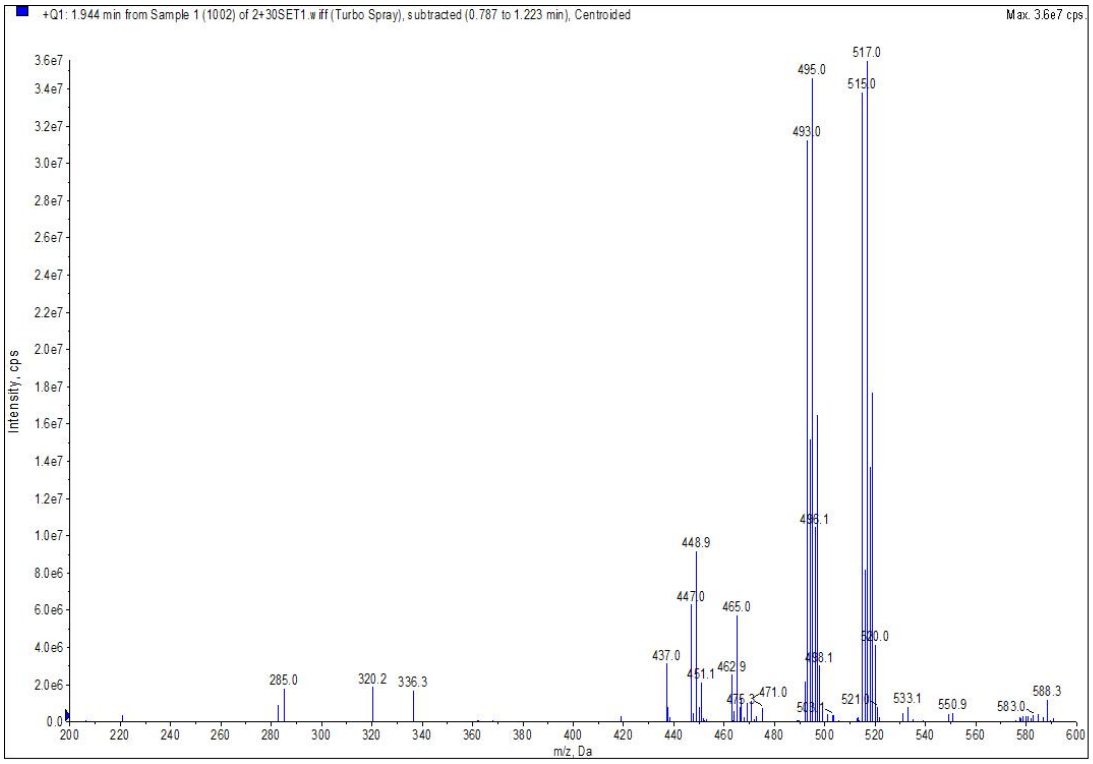
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.1 Hz, 3H), 1.13 (t, J=7.1 Hz, 3H), 3.89-3.97 (m, 2H), 3.98-4.06 (m, 2H), 4.18 (d, J=4.3 Hz, 1H), 4.44 (s, 1H), 5.24 (t, J=5.1 Hz, 1H), 6.60 (d, J=5.7 Hz, 1H), 6.73-6.98 (m, 3H), 7.36-7.41 (m, 4H), 10.20 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.11, 14.73, 55.50, 59.00, 60.48, 61.42, 87.82, 116.28, 120.84, 121.42, 124.07, 126.84, 128.49, 128.70, 132.07, 140.67, 141.09, 155.65, 168.68, 169.43; Found C, 53.40; H, 4.34; N, 5.80%; M+1 (mass spectrum), 494.1. $C_{22}H_{22}BrClN_2O_4$ requires C, 53.51; H, 4.49; N, 5.67%; M, 493.78.



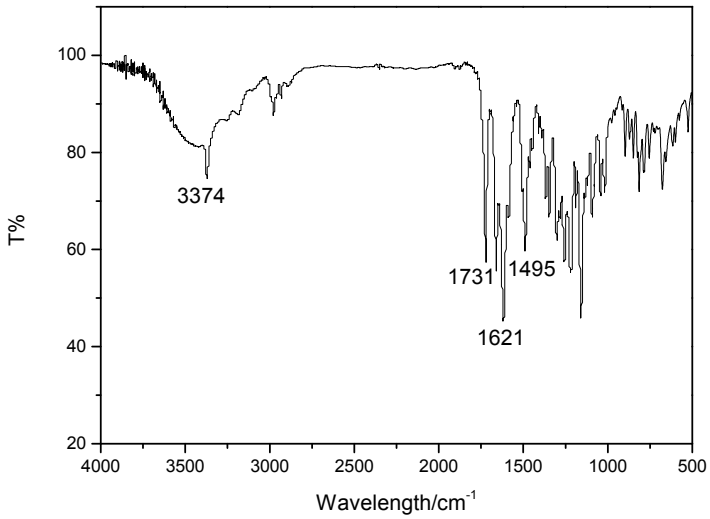
^{1}H NMR spectra of compound **5db**



^{13}C NMR spectra of compound **5db**

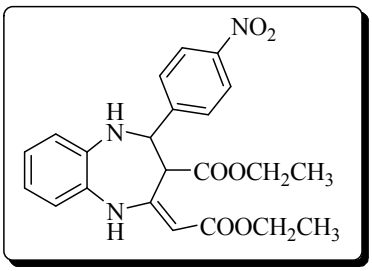


MS of compound **5db**



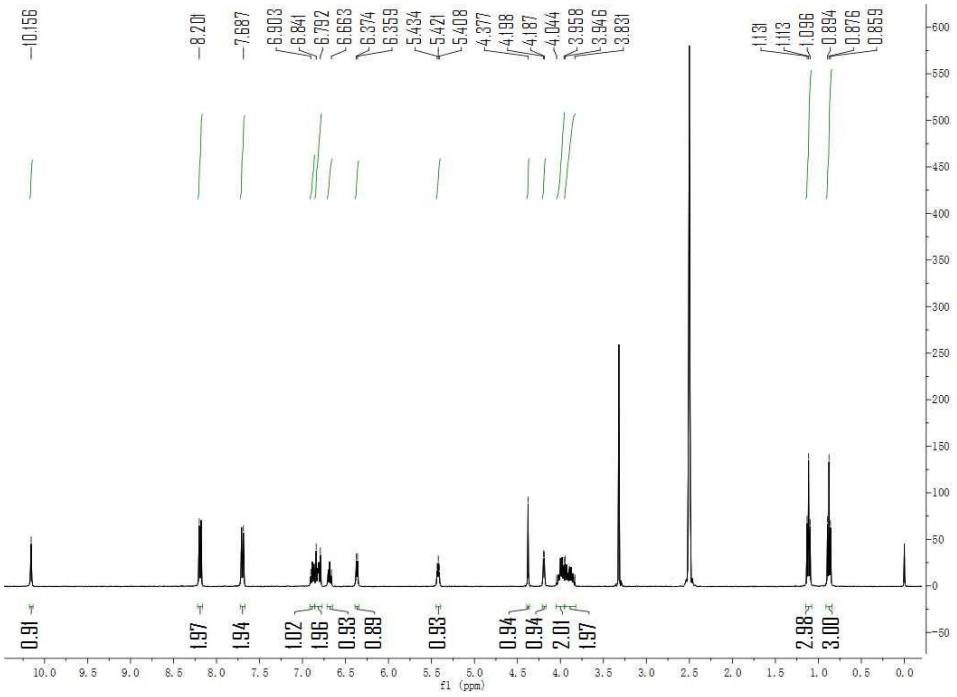
IR spectra of compound **5db**

5ac

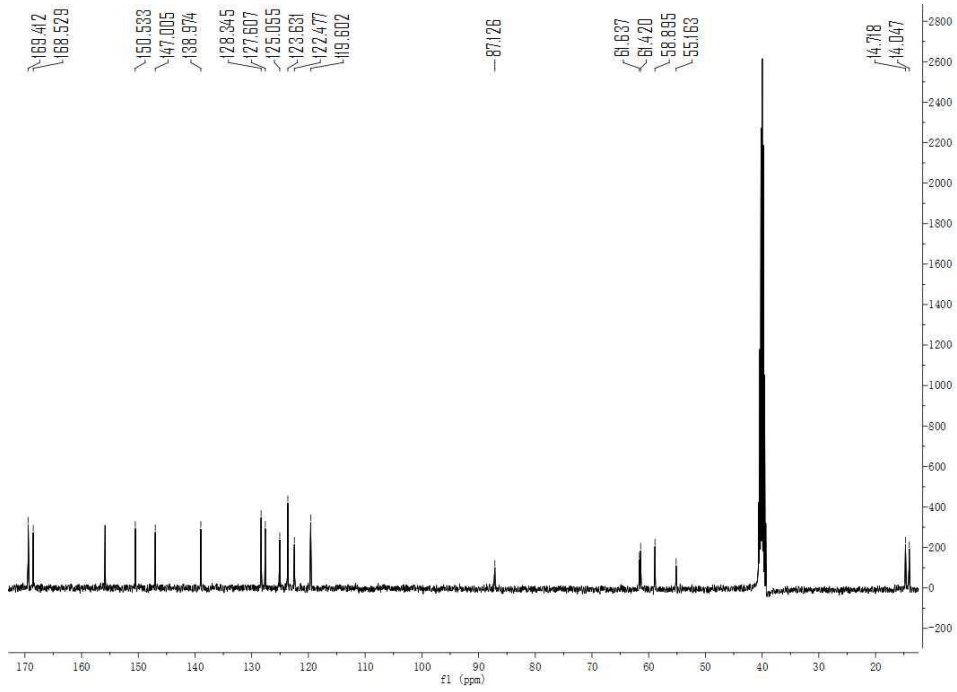


Tangerine solid; 391 mg, 92%; mp 180-182 °C; IR (KBr): 3410, 1730, 1633, 1512

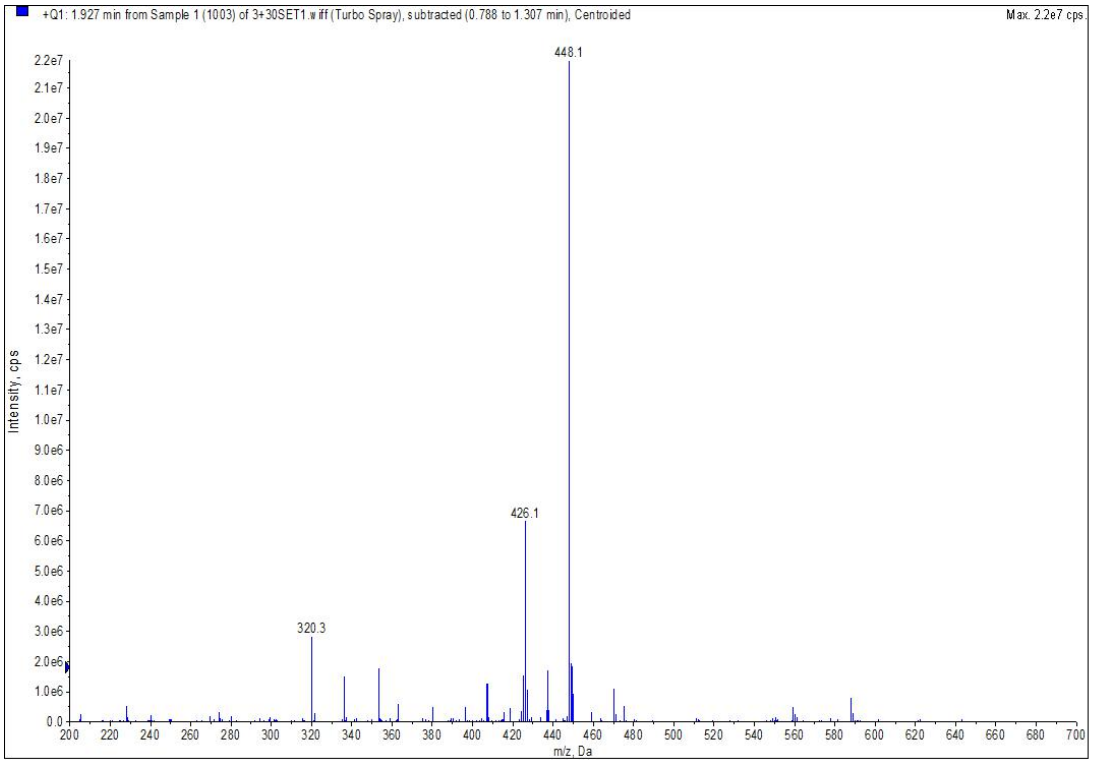
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.88 (t, J=7.1 Hz, 3H), 1.11 (t, J=7.1 Hz, 3H), 3.83-3.95 (m, 2H), 3.96-4.04 (m, 2H), 4.19 (d, J=4.3 Hz, 1H), 4.38 (s, 1H), 5.42 (t, J=5.1 Hz, 1H), 6.37 (d, J=6.0 Hz, 1H), 6.66-6.90 (m, 4H), 7.69-7.20 (m, 4H), 10.16 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.05, 14.72, 55.16, 58.89, 61.42, 61.64, 87.13, 119.60, 122.48, 123.63, 125.05, 127.61, 128.35, 138.97, 147.01, 150.53, 155.85, 168.53, 169.41; Found C, 62.05; H, 5.59; N, 9.75%; M+1 (mass spectrum), 426.1. $C_{22}H_{23}N_3O_6$ requires C, 62.11; H, 5.45; N, 9.88%; M, 425.43.



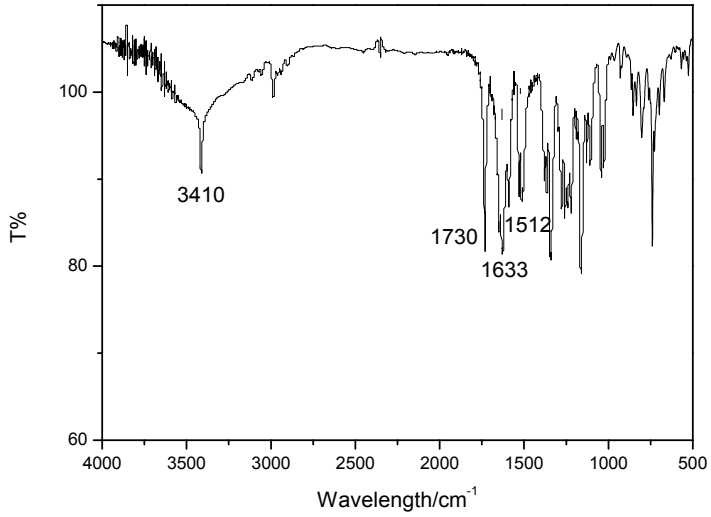
^{1}H NMR spectra of compound **5ac**



^{13}C NMR spectra of compound **5ac**

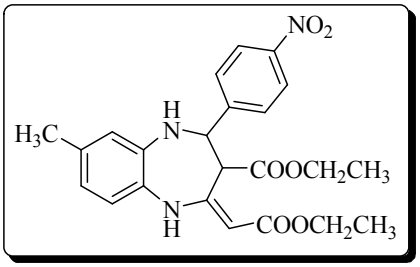


MS of compound **5ac**



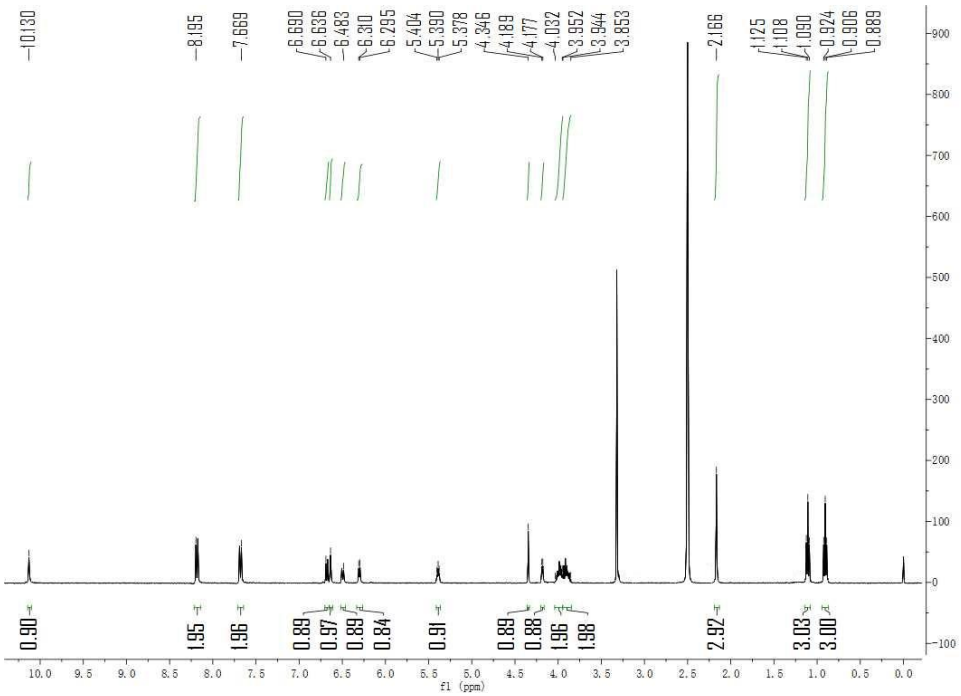
IR spectra of compound **5ac**

5bc

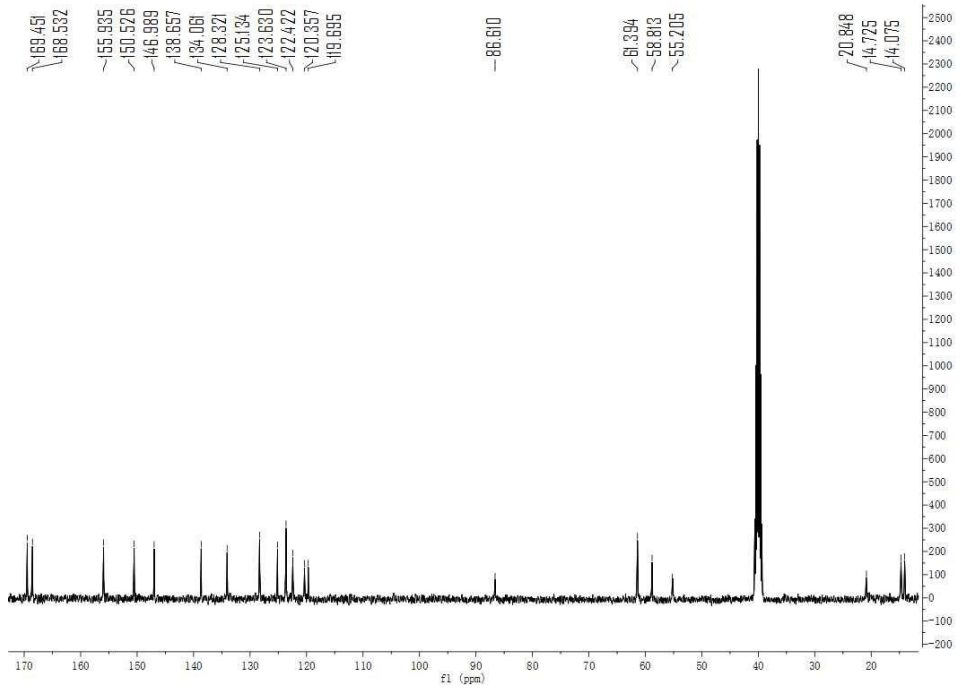


Tangerine solid; 422 mg, 96%; mp 160-162 °C; IR (KBr): 3409, 1731, 1630, 1508

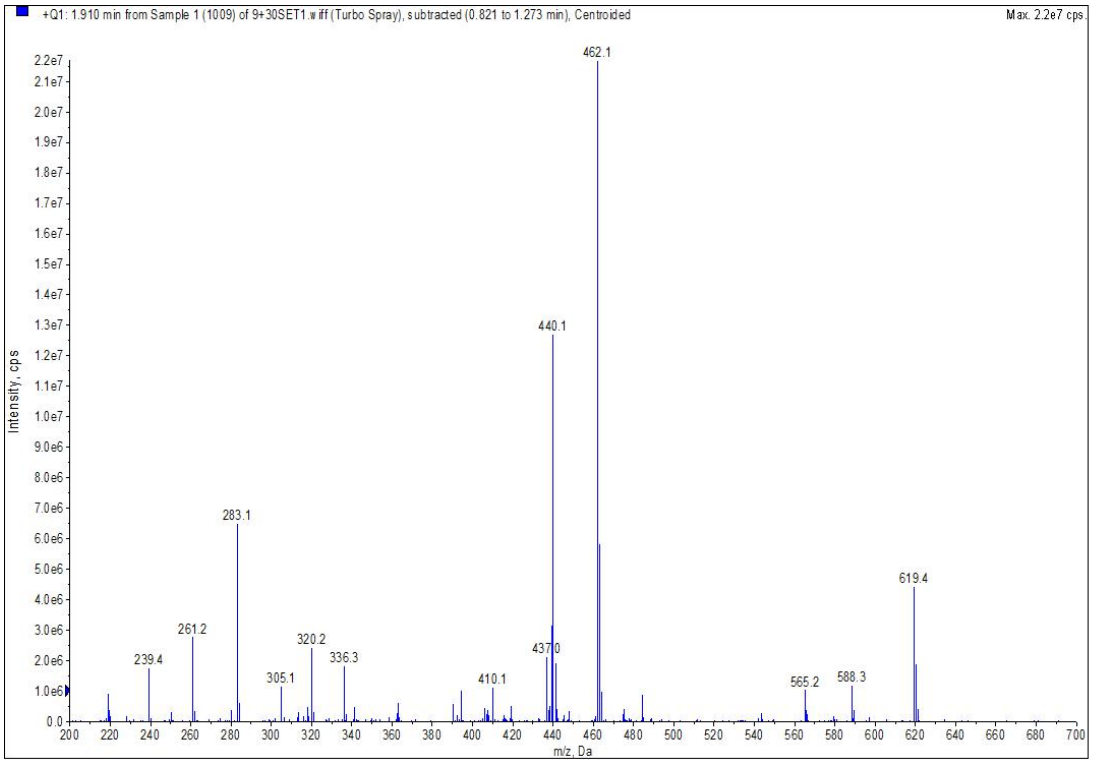
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.91 (t, J=7.1 Hz, 3H), 1.11 (t, J=7.1 Hz, 3H), 2.17 (s, 3H), 3.85-3.94 (m, 2H), 3.95-4.03 (m, 2H), 4.18 (d, J=4.6 Hz, 1H), 4.35 (s, 1H), 5.39 (t, J=5.2 Hz, 1H), 6.30 (d, J=6.0 Hz, 1H), 6.48-6.69 (m, 3H), 7.67-8.20 (m, 4H), 10.13 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.08, 14.73, 20.85, 55.21, 58.81, 61.39, 86.61, 119.69, 120.36, 122.42, 123.63, 125.13, 128.32, 134.06, 138.66, 146.99, 150.53, 155.94, 168.53, 169.45; Found C, 62.99; H, 5.78; N, 9.41%; M+1 (mass spectrum), 440.1. $C_{23}H_{25}N_3O_6$ requires C, 62.86; H, 5.73; N, 9.56%; M, 439.46.



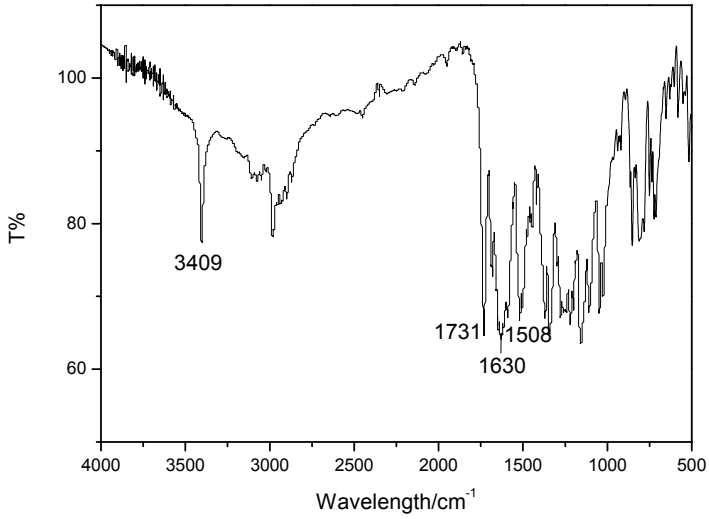
^{1}H NMR spectra of compound **5bc**



^{13}C NMR spectra of compound **5bc**

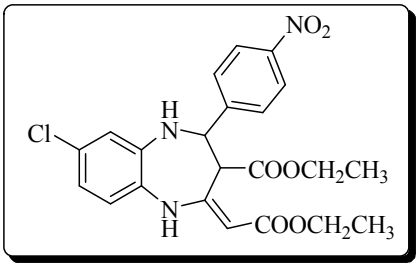


MS of compound **5bc**



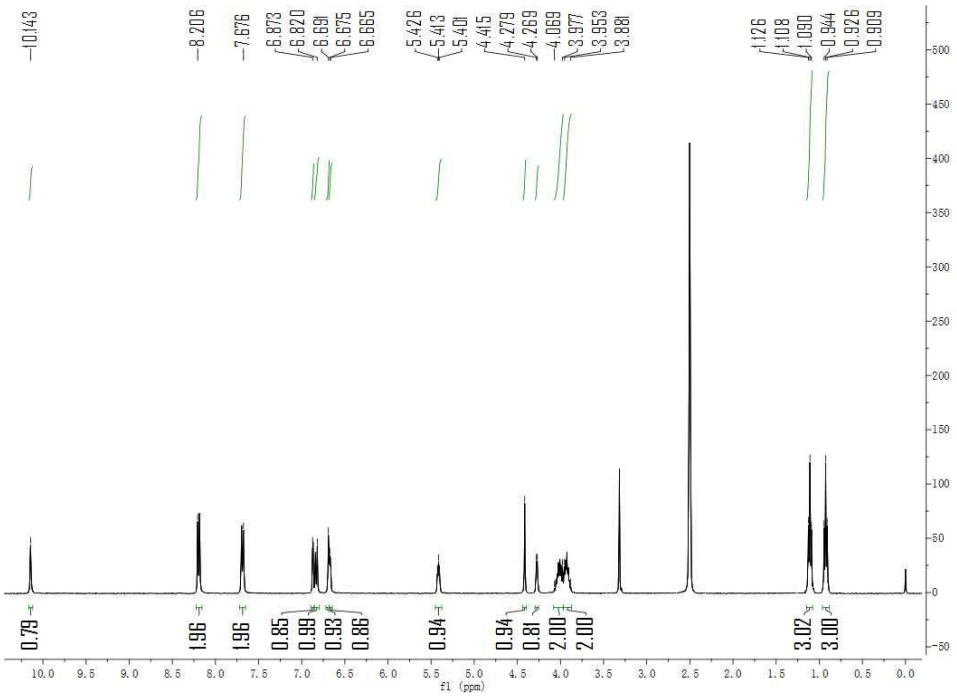
IR spectra of compound **5bc**

5cc

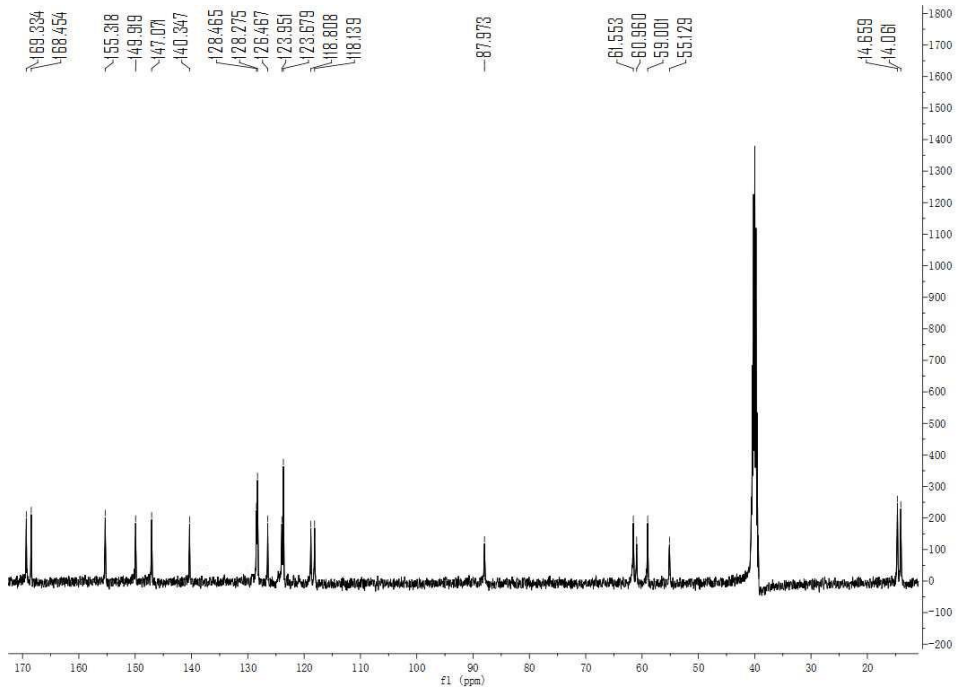


Tangerine solid; 409 mg, 89%; mp 184-186 °C; IR (KBr): 3410, 1739, 1632, 1515

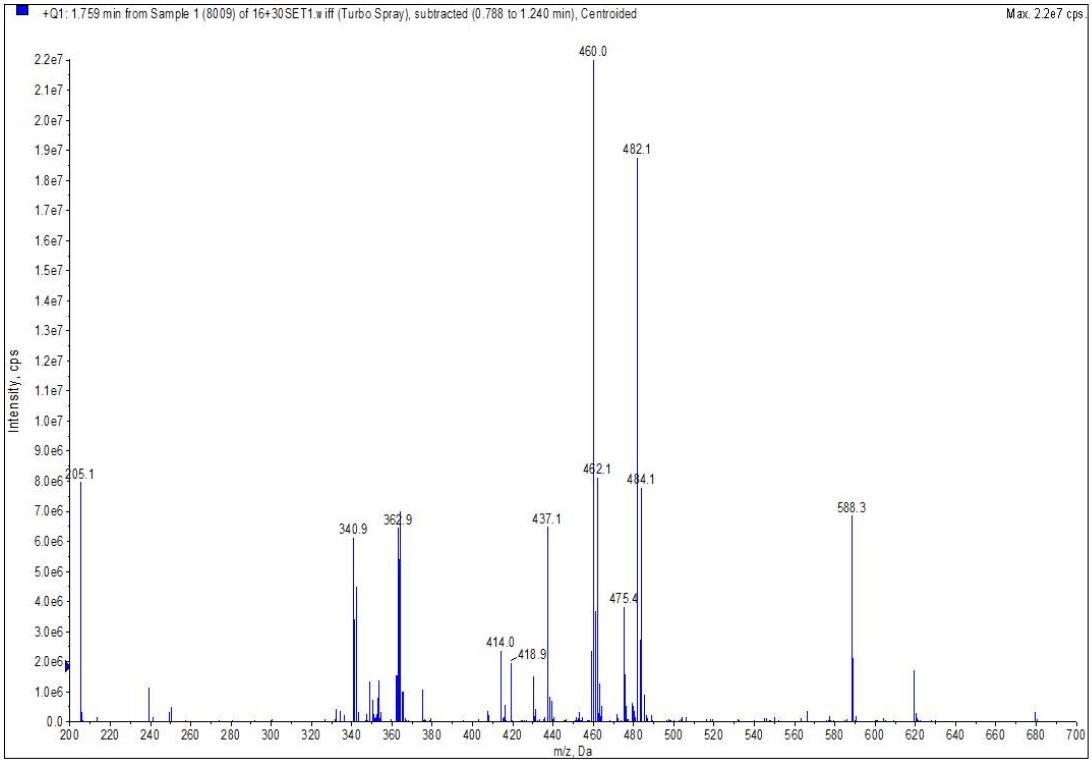
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.0 Hz, 3H), 1.11 (t, J=7.1 Hz, 3H), 3.88-3.95 (m, 2H), 3.98-4.07 (m, 2H), 4.27 (d, J=4.1 Hz, 1H), 4.42 (s, 1H), 5.41 (t, J=5.0 Hz, 1H), 6.67 (d, J=4.1 Hz, 1H), 6.67-6.87 (m, 3H), 7.68-8.21 (m, 4H), 10.14 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.06, 14.66, 55.13, 59.00, 60.96, 61.55, 87.97, 118.14, 118.81, 123.68, 123.95, 126.47, 128.28, 128.46, 140.35, 147.07, 149.92, 155.32, 168.45, 169.33; Found C, 57.63; H, 5.06; N, 9.03%; M+1 (mass spectrum), 460.0. $C_{22}H_{22}ClN_3O_6$ requires C, 57.46; H, 4.82; N, 9.14%; M, 459.88.



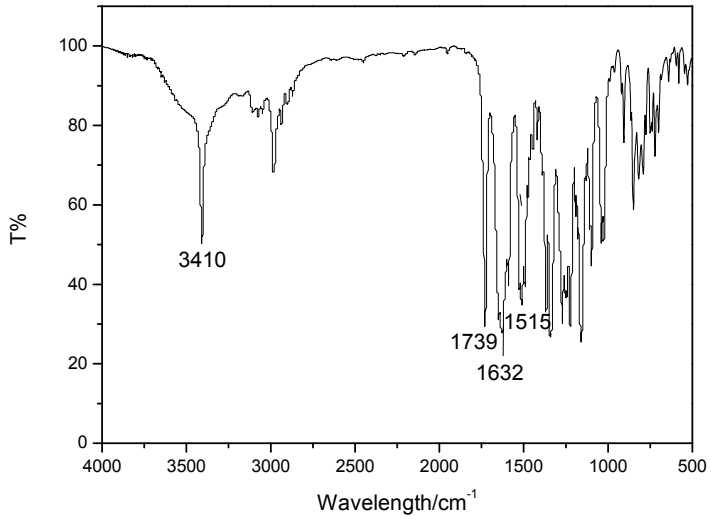
^{1}H NMR spectra of compound **5cc**



^{13}C NMR spectra of compound **5cc**

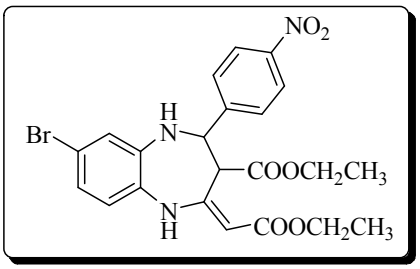


MS of compound **5cc**

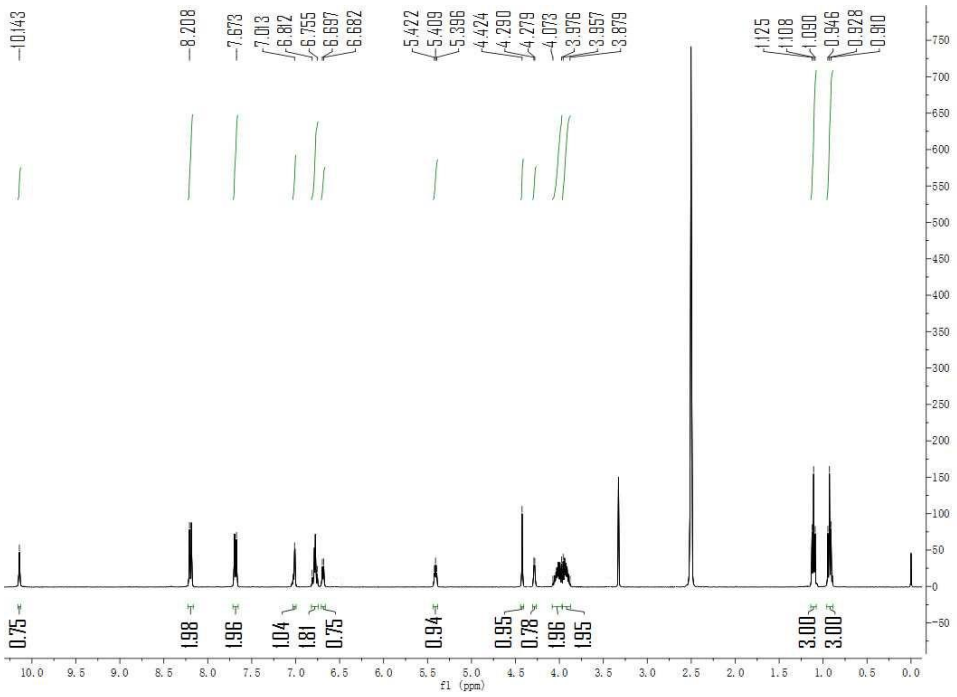


IR spectra of compound **5cc**

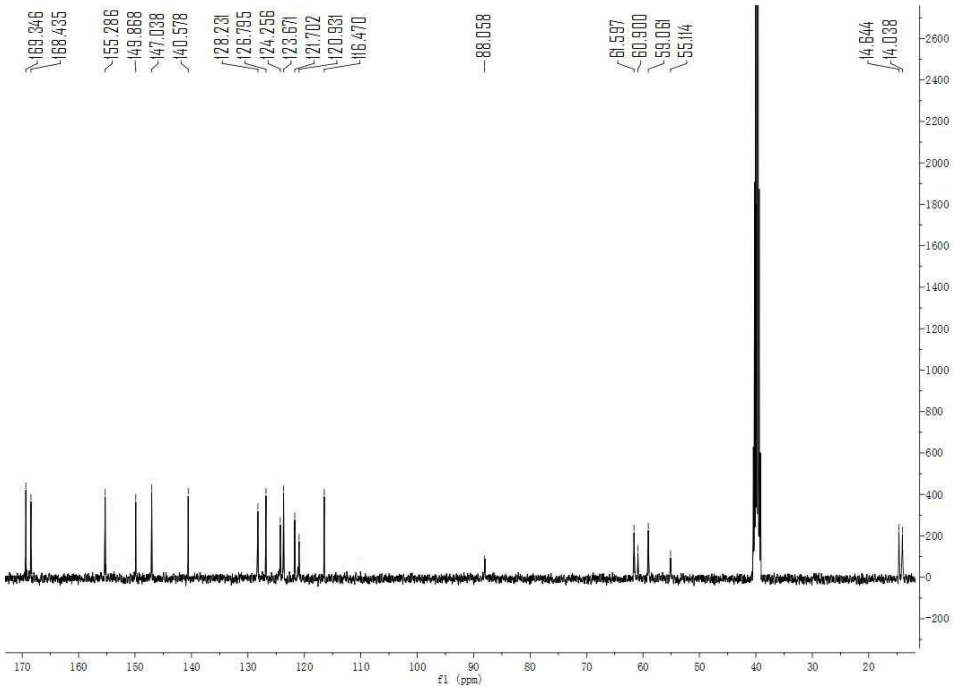
5dc



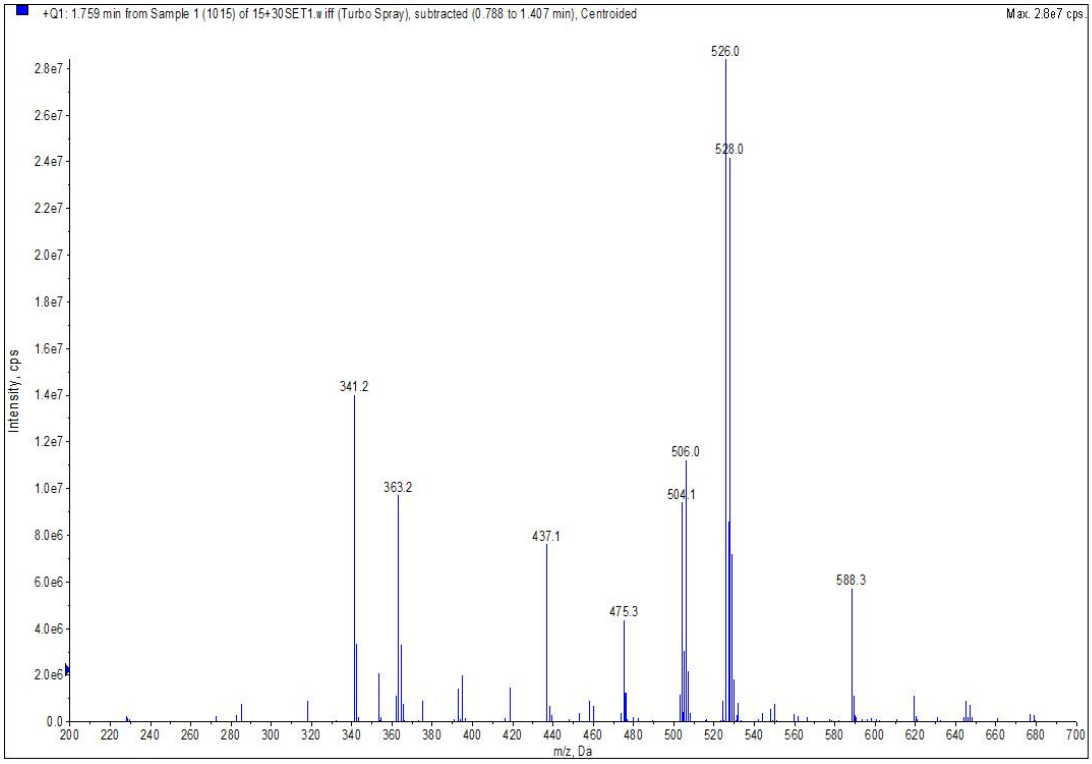
Tangerine solid; 454 mg, 90%; mp 172-174 °C; IR (KBr): 3411, 1733, 1639, 1512 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.0 Hz, 3H), 1.11 (t, J=7.1 Hz, 3H), 3.88-3.96 (m, 2H), 3.98-4.07 (m, 2H), 4.28 (d, J=4.2 Hz, 1H), 4.42 (s, 1H), 5.41 (t, J=5.2 Hz, 1H), 6.69 (d, J=6.0 Hz, 1H), 6.75-7.01 (m, 3H), 7.67-8.21 (m, 4H), 10.14 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.04, 14.64, 55.11, 59.06, 60.90, 61.60, 88.06, 116.47, 120.93, 121.70, 123.67, 124.26, 126.79, 128.23, 140.58, 147.04, 149.87, 155.29, 168.44, 169.35; Found C, 52.25; H, 4.24; N, 8.43%; M+1 (mass spectrum), 506.0. $C_{22}H_{22}BrN_3O_6$ requires C, 52.39; H, 4.40; N, 8.33%; M, 504.33.



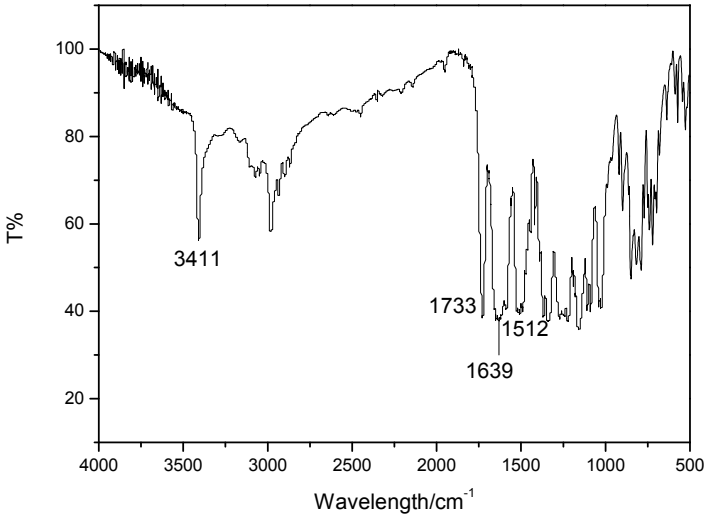
^1H NMR spectra of compound **5dc**



^{13}C NMR spectra of compound **5dc**

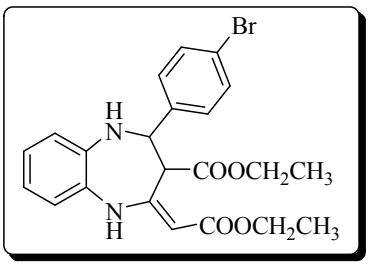


MS of compound **5dc**

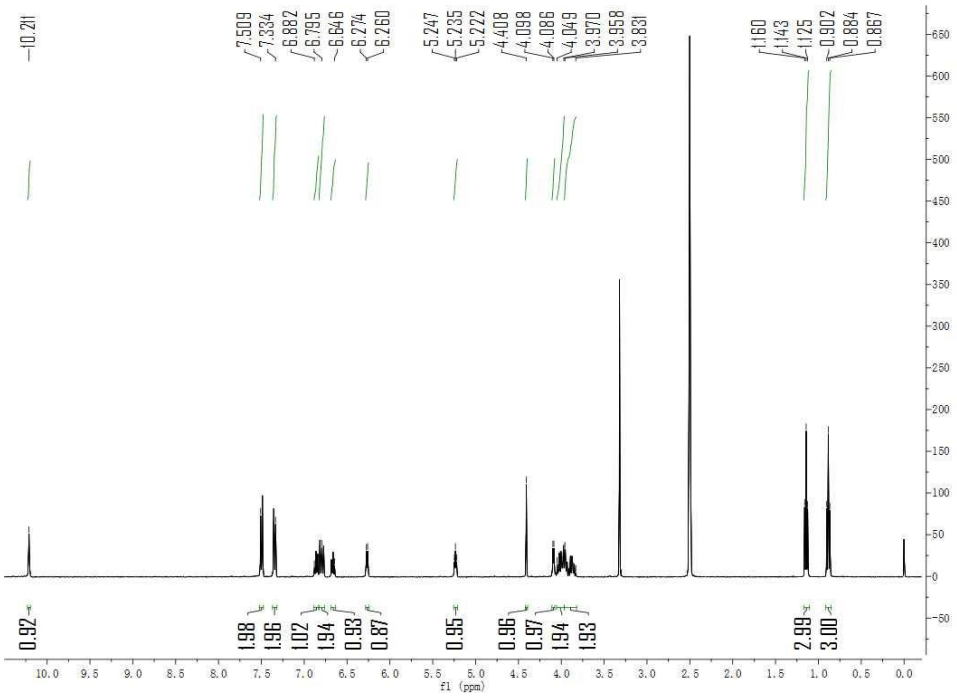


IR spectra of compound **5dc**

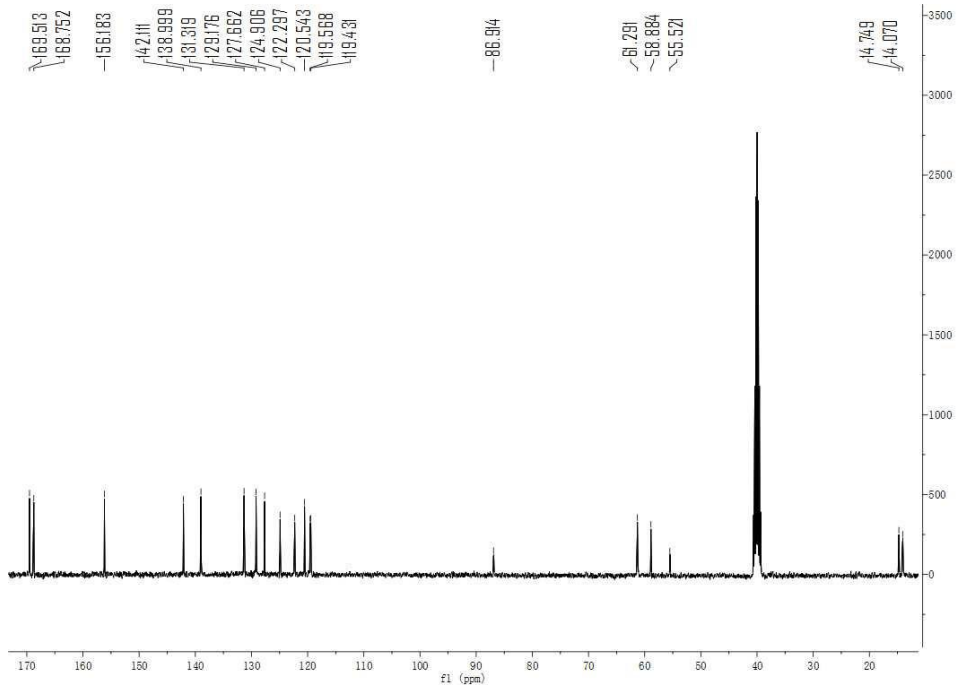
5ad



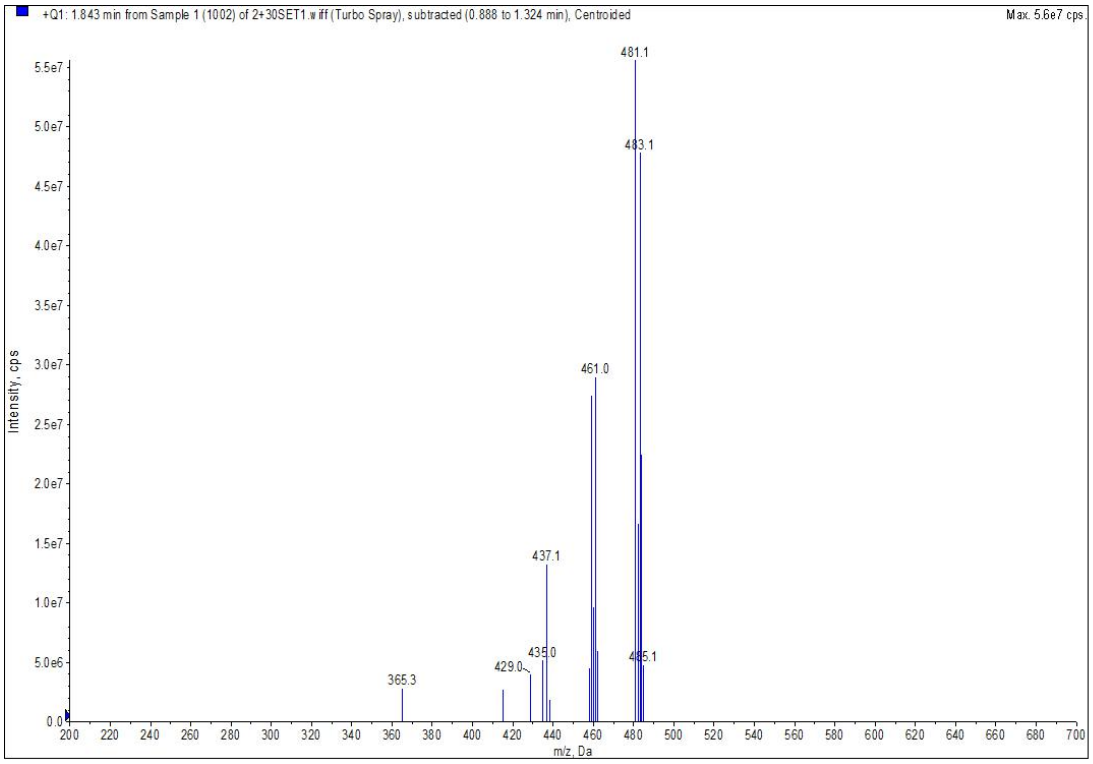
White solid; 418 mg, 91%; mp 148-150 °C; IR (KBr): 3383, 1739, 1621, 1504 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.88 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 3.83-3.96 (m, 2H), 3.97-4.05 (m, 2H), 4.09 (d, J=4.7 Hz, 1H), 4.41 (s, 1H), 5.23 (t, J=5.1 Hz, 1H), 6.27 (d, J=5.7 Hz, 1H), 6.65-6.88 (m, 4H), 7.33-7.51 (m, 4H), 10.21 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.04, 14.75, 55.52, 58.88, 61.29, 86.91, 119.43, 119.57, 120.54, 122.30, 124.91, 127.66, 129.18, 131.32, 139.00, 142.11, 156.18, 168.75, 169.51; Found C, 57.48; H, 5.01; N, 6.14%; M+1 (mass spectrum), 461.0. $C_{22}H_{23}BrN_2O_4$ requires C, 57.53; H, 5.05; N, 6.10%; M, 459.33.



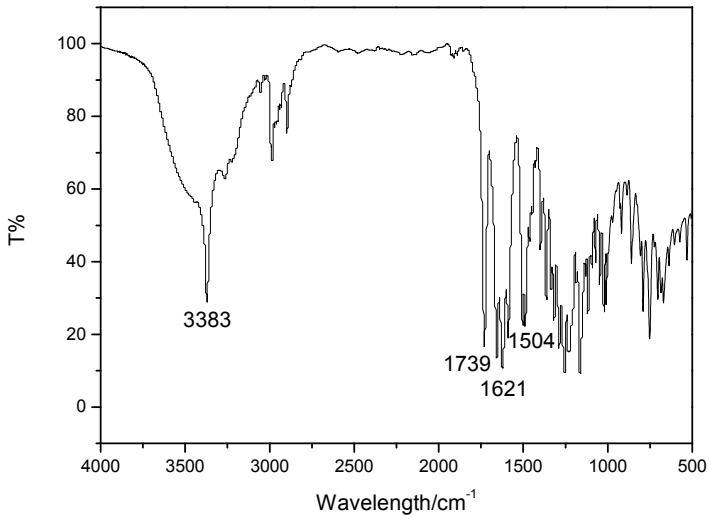
^1H NMR spectra of compound **5ad**



^{13}C NMR spectra of compound **5ad**

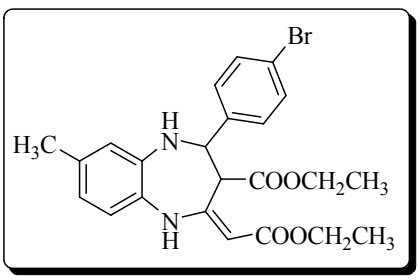


MS of compound **5ad**



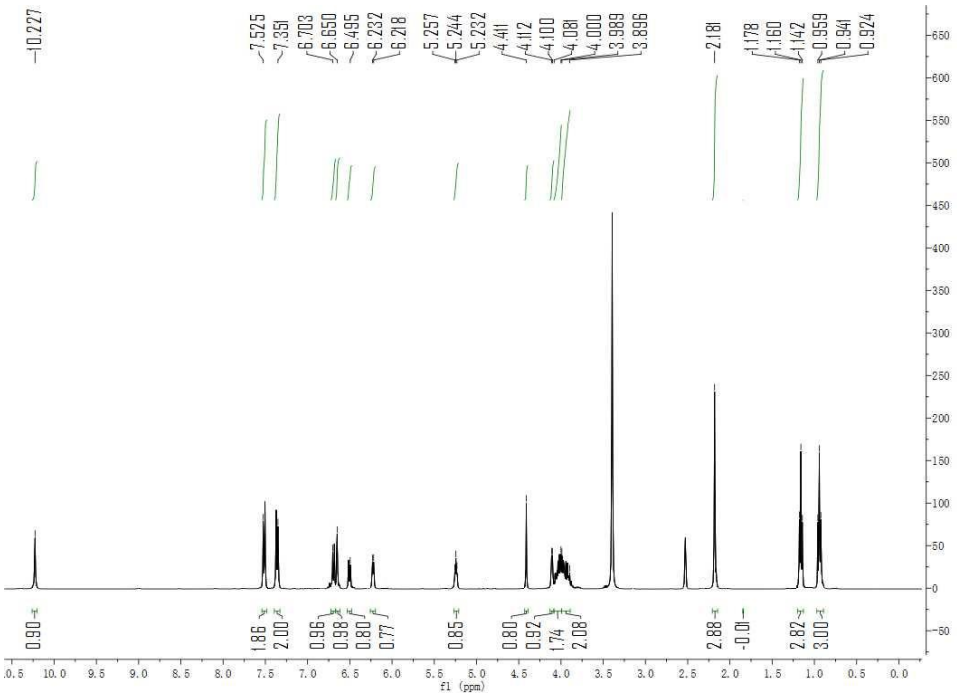
IR spectra of compound **5ad**

5bd

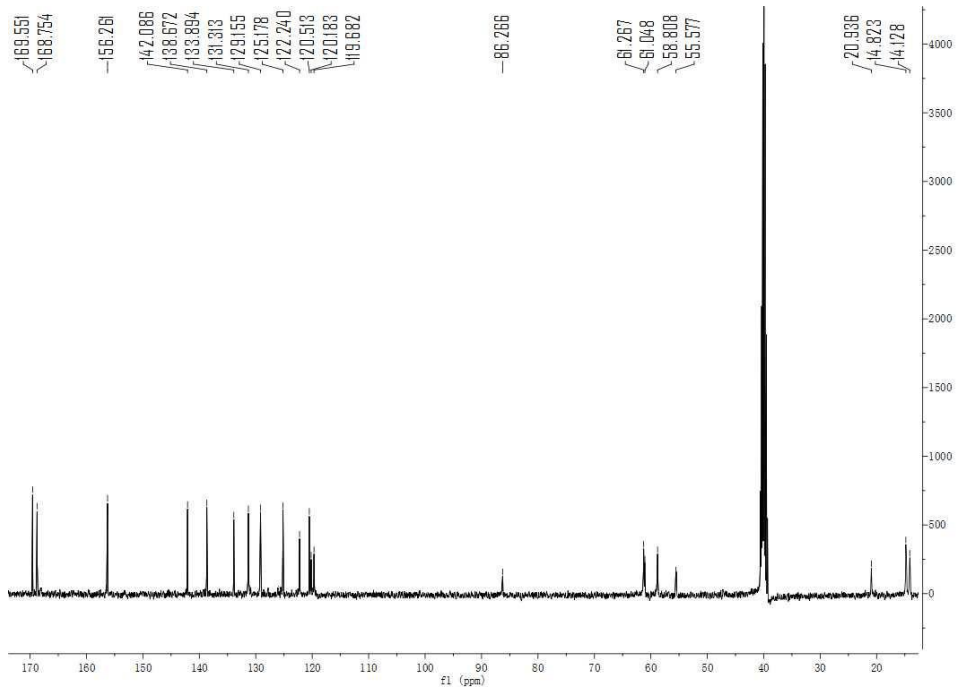


Yellow solid; 445 mg, 94%; mp 118-120 °C; IR (KBr): 3356, 1731, 1630, 1501 cm^{-1};

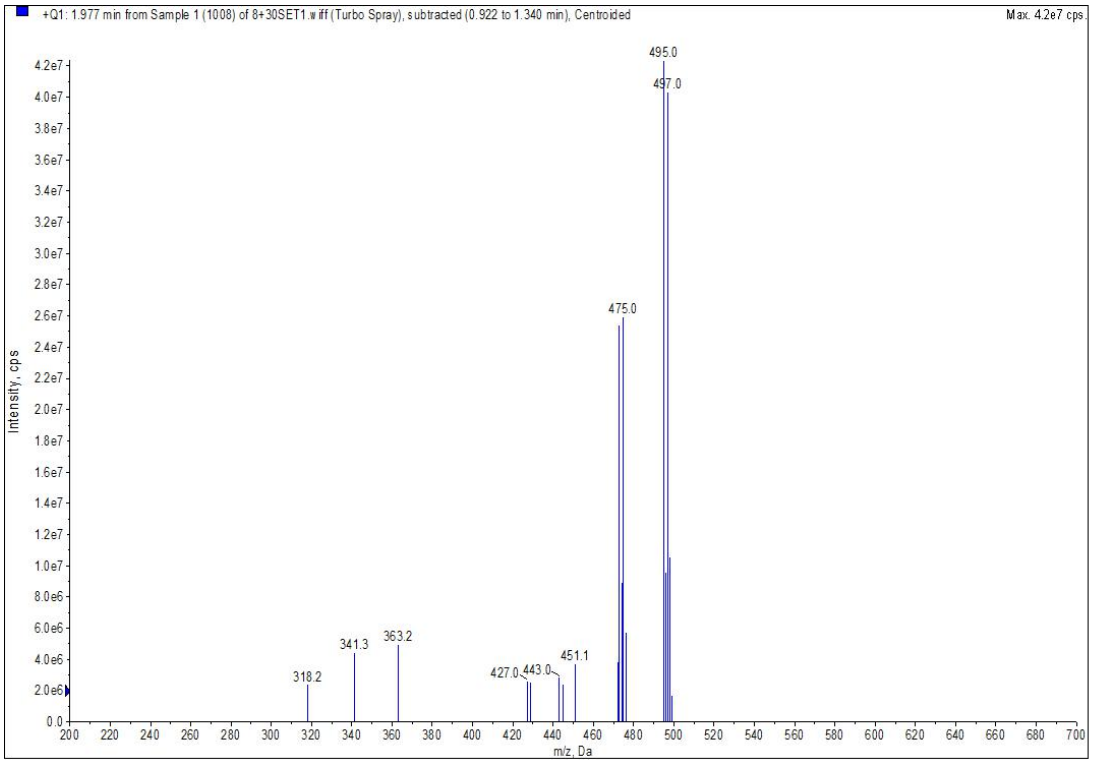
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.1 Hz, 3H), 1.16 (t, J=7.1 Hz, 3H), 2.18 (s, 3H), 3.90-3.99 (m, 2H), 4.00-4.08 (m, 2H), 4.11 (d, J=4.6 Hz, 1H), 4.41 (s, 1H), 5.24 (t, J=5.0 Hz, 1H), 6.22 (d, J=5.6 Hz, 1H), 6.50-6.70 (m, 3H), 7.35-7.53 (m, 4H), 10.23 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.13, 14.82, 20.94, 55.58, 58.81, 61.05, 61.27, 86.27, 119.68, 120.18, 120.51, 122.24, 125.18, 129.16, 131.31, 133.89, 138.67, 142.09, 156.26, 168.75, 169.55; Found C, 58.50; H, 5.46; N, 5.79%; M+1 (mass spectrum), 475.0. $C_{22}H_{23}BrN_2O_4$ requires C, 58.36; H, 5.32; N, 5.92%; M, 473.36.



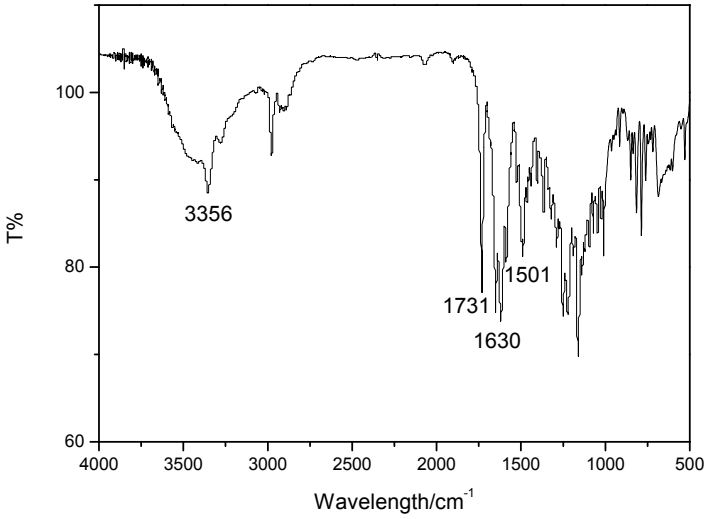
^{1}H NMR spectra of compound **5bd**



^{13}C NMR spectra of compound **5bd**

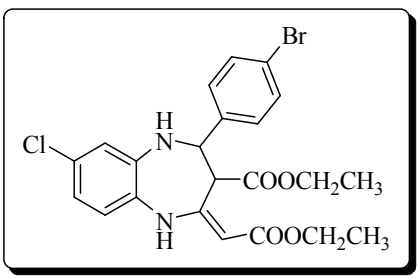


MS of compound **5bd**



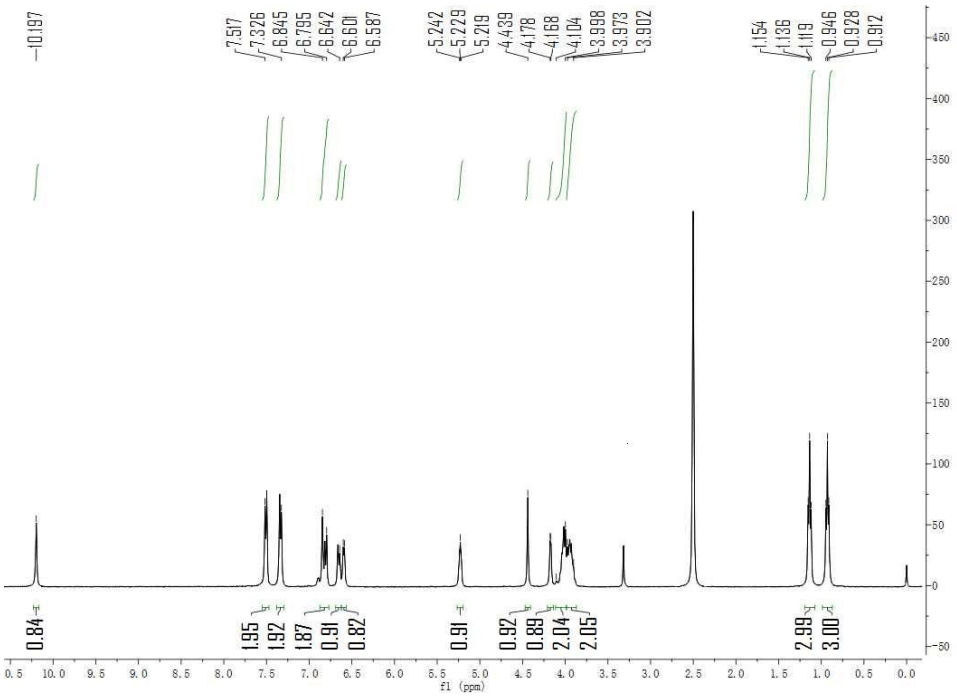
IR spectra of compound **5bd**

5cd

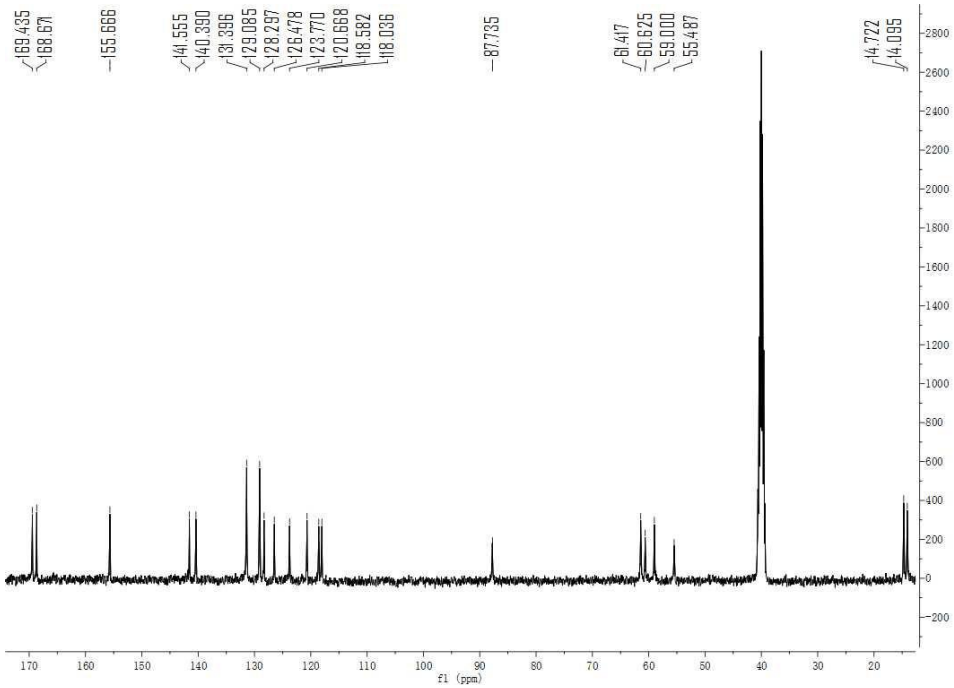


White solid; 435 mg**,** 88%; mp 130-132 °C; IR (KBr): 3352, 1740, 1630, 1512 cm^{-1};

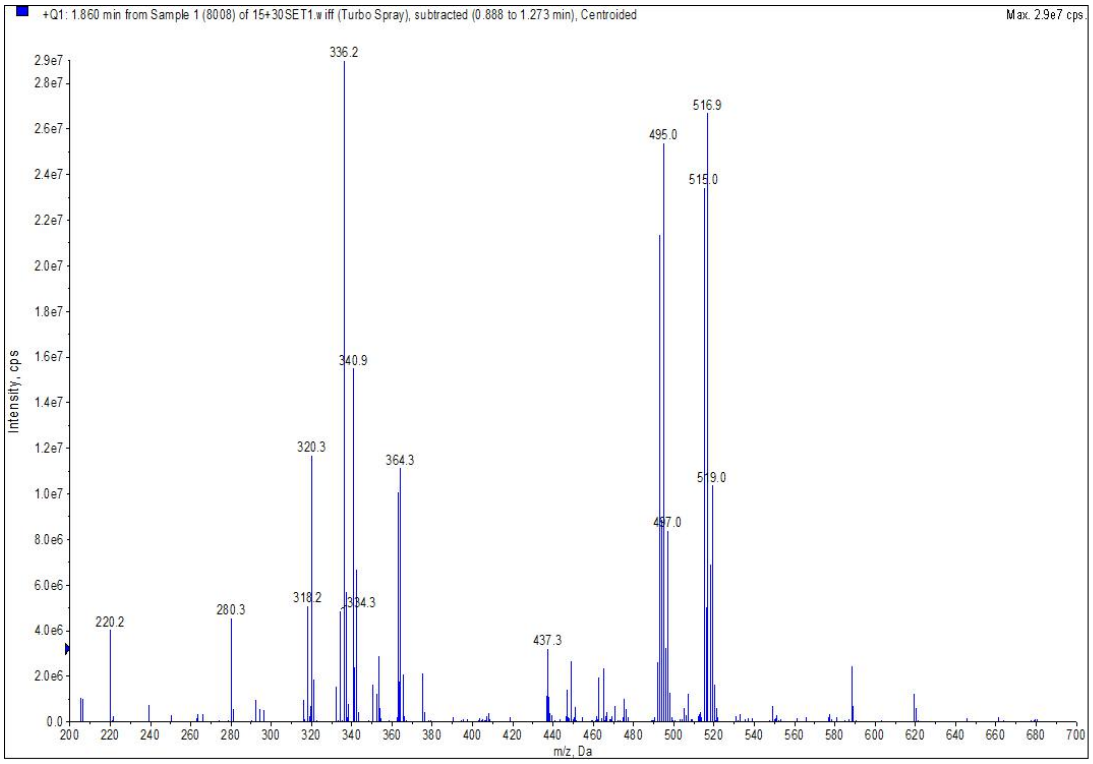
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=6.9 Hz, 3H), 1.14 (t, J=6.9 Hz, 3H), 3.90-3.97 (m, 2H), 4.00-4.10 (m, 2H), 4.17 (d, J=3.7 Hz, 1H), 4.44 (s, 1H), 5.23 (t, J=4.5 Hz, 1H), 6.59 (d, J=5.6 Hz, 1H), 6.64-6.85 (m, 3H), 7.33-7.52 (m, 4H), 10.20 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.09, 14.72, 55.49, 59.00, 60.63, 61.42, 87.74, 118.04, 118.58, 120.67, 123.77, 126.48, 128.30, 129.09, 131.40, 140.39, 141.56, 155.67, 168.67, 169.44; Found C, 53.55; H, 4.98; N, 5.59%; M+1 (mass spectrum), 495.0. $C_{22}H_{22}BrClN_2O_4$ requires C, 53.51; H, 4.49; N, 5.67%; M, 493.78.



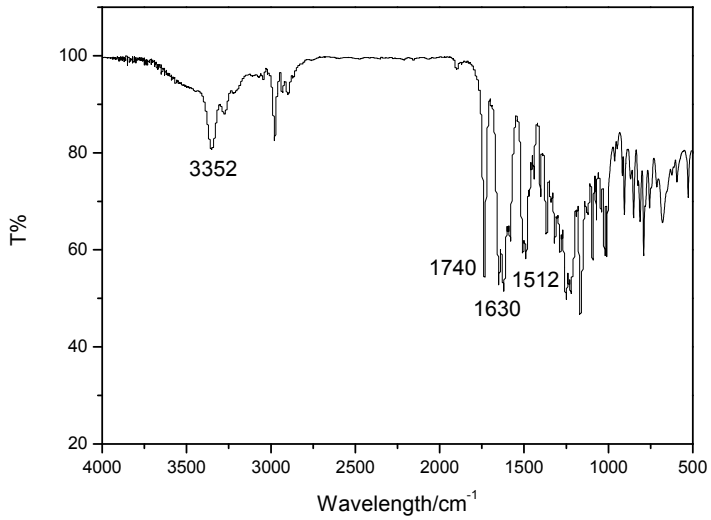
^{1}H NMR spectra of compound **5cd**



^{13}C NMR spectra of compound **5cd**

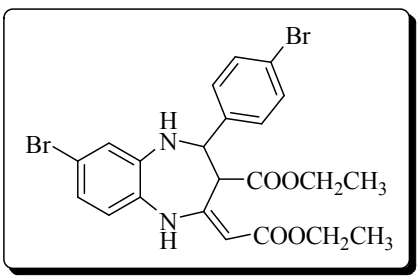


MS of compound **5cd**



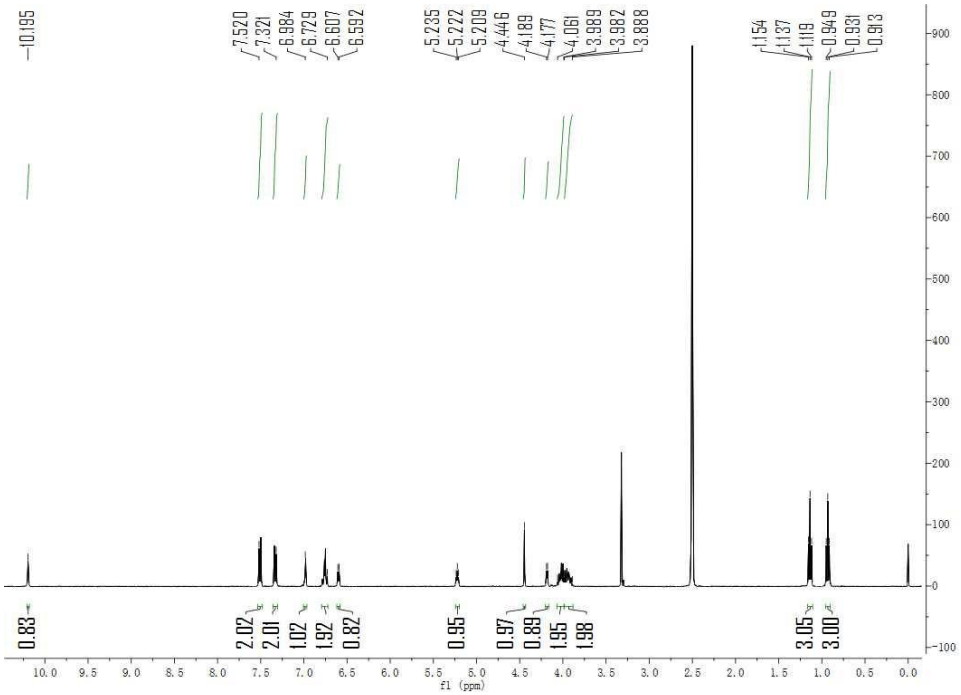
IR spectra of compound **5cd**

5dd

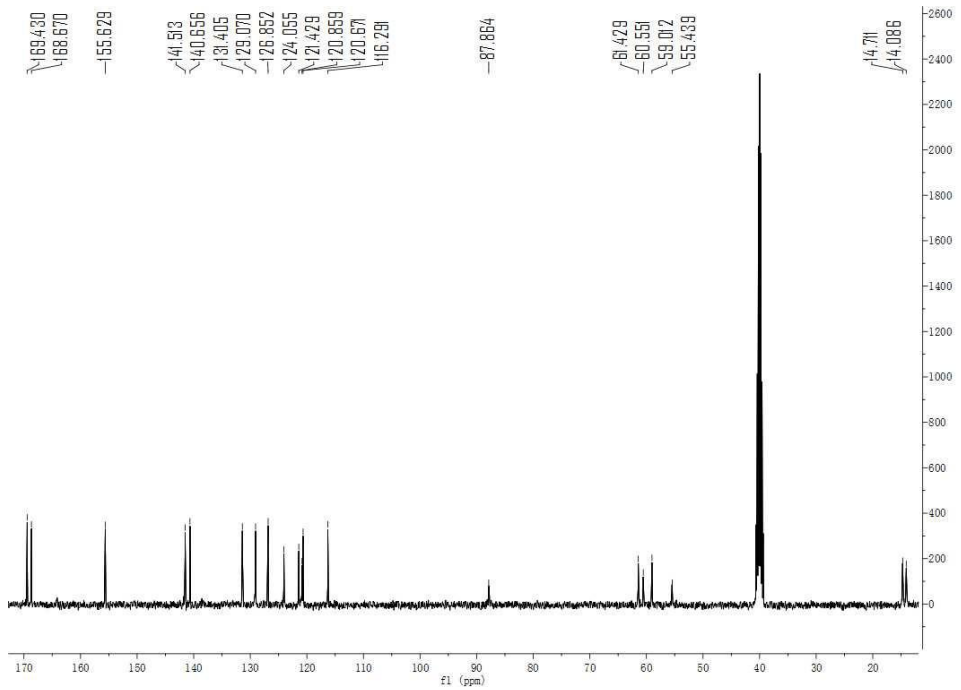


White solid; 468 mg, 87%; mp 132-134 °C; IR (KBr): 3356, 1738, 1623, 1503 cm^{-1};

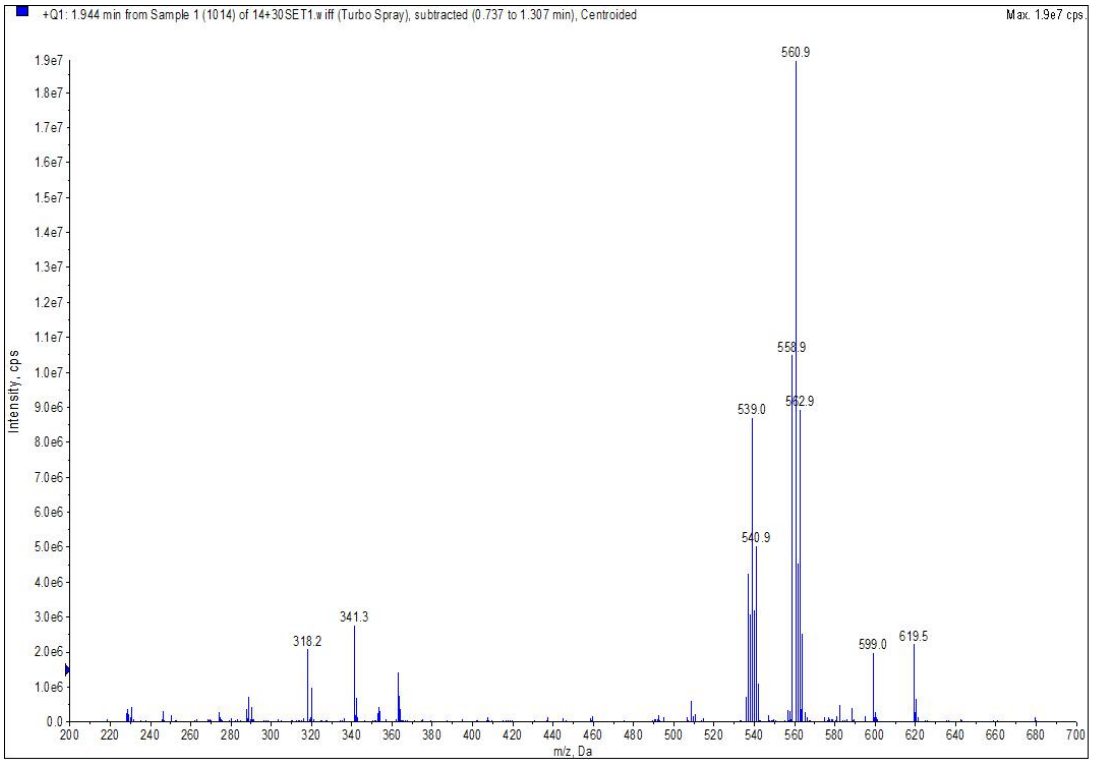
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 3.89-3.98 (m, 2H), 3.99-4.06 (m, 2H), 4.18 (d, J=4.7 Hz, 1H), 4.45 (s, 1H), 5.22 (t, J=5.2 Hz, 1H), 6.60 (d, J=5.9 Hz, 1H), 6.73-6.98 (m, 3H), 7.32-7.52 (m, 4H), 10.20 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.09, 14.71, 55.44, 59.01, 60.55, 61.43, 87.86, 116.29, 120.67, 120.86, 121.43, 124.06, 126.85, 129.07, 131.41, 140.66, 141.51, 155.63, 168.67, 169.43; Found C, 49.11; H, 4.21; N, 5.12%; M+1 (mass spectrum), 539.0. $C_{22}H_{22}BrClN_2O_4$ requires C, 49.09; H, 4.12; N, 5.20%; M, 538.23.



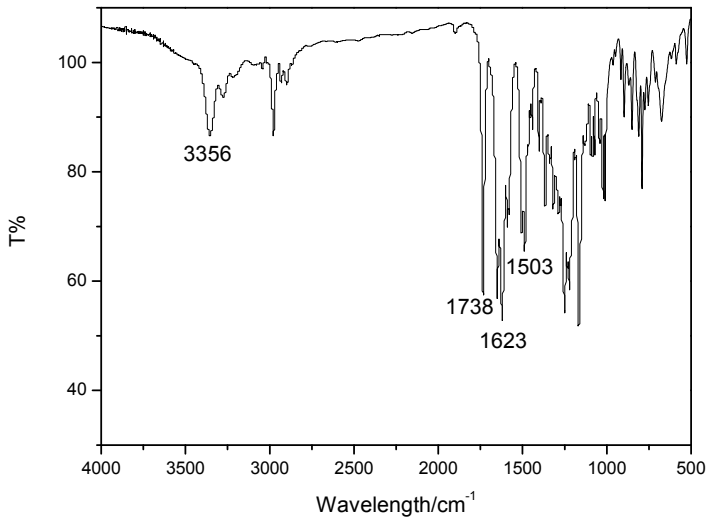
^{1}H NMR spectra of compound **5dd**



^{13}C NMR spectra of compound **5dd**

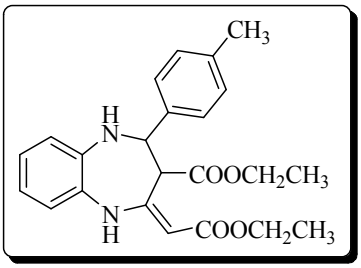


MS of compound **5dd**



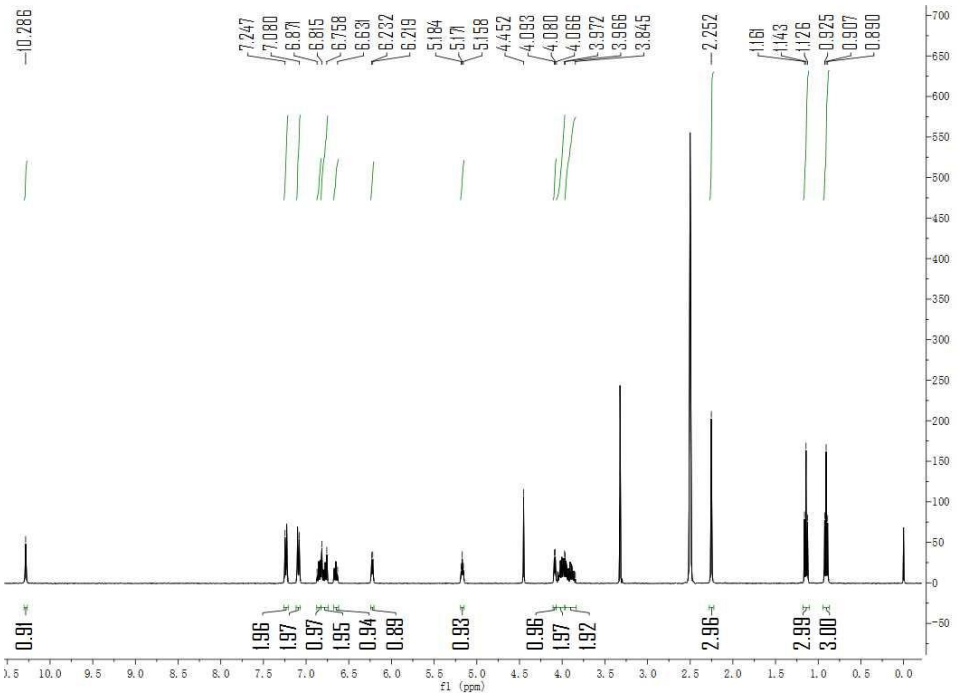
IR spectra of compound **5dd**

5ae

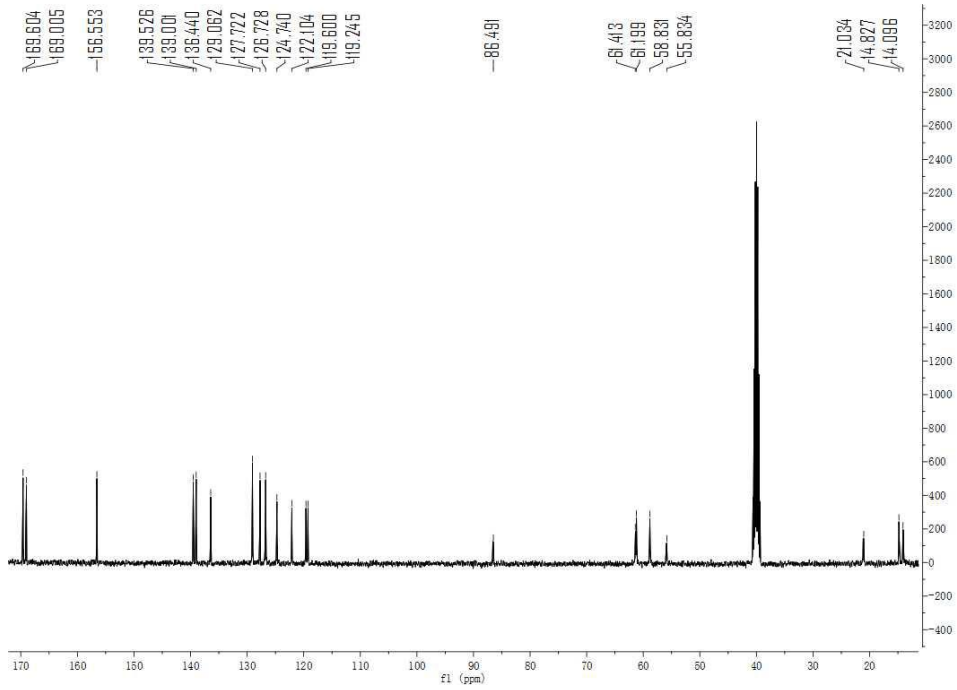


White solid; 363 mg, 92%; mp 130-132 °C; IR (KBr): 3375, 1713, 1630, 1512 cm^{-1};

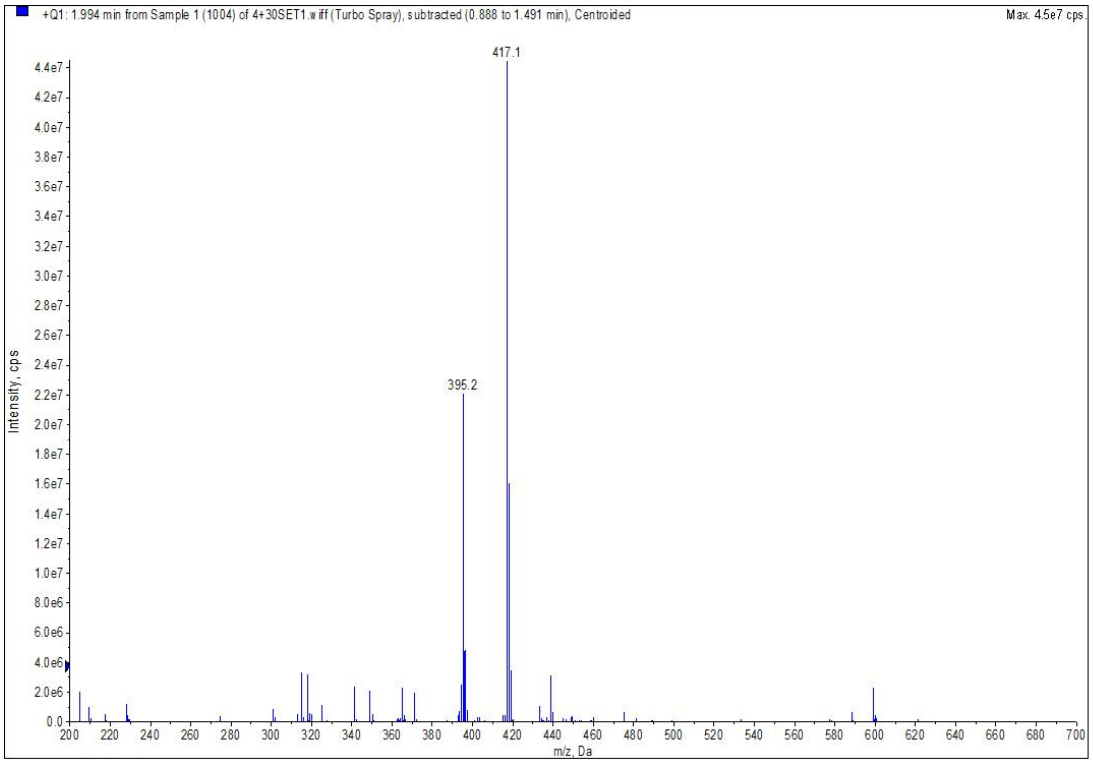
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.91 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 2.25 (s, 3H), 3.85-3.96 (m, 2H), 3.97-4.07 (m, 2H), 4.09 (d, J=5.0 Hz, 1H), 4.45 (s, 1H), 5.17 (t, J=5.2 Hz, 1H), 6.23 (d, J=5.4 Hz, 1H), 6.63-6.87 (m, 4H), 7.08-7.25 (m, 4H), 10.29 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.10, 14.83, 21.03, 55.83, 58.83, 61.20, 61.41, 86.49, 119.25, 119.60, 122.10, 124.74, 126.73, 127.72, 129.06, 136.44, 139.00, 139.53, 156.55, 169.01, 169.60; Found C, 69.94; H, 6.49; N, 7.25%; M+1 (mass spectrum), 395.2. $C_{23}H_{26}N_2O_4$ requires C,70.03; H, 6.64; N, 7.10%; M, 394.46.



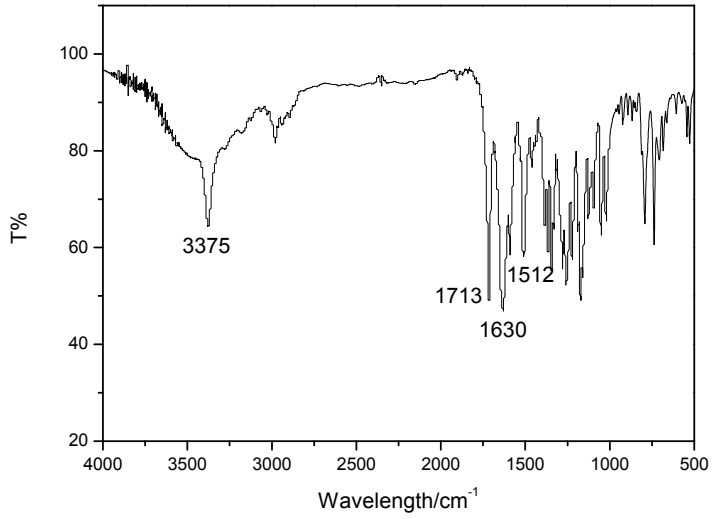
^{1}H NMR spectra of compound **5ae**



^{13}C NMR spectra of compound **5ae**

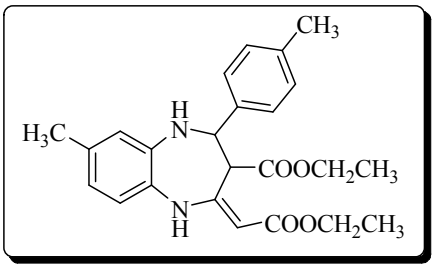


MS of compound **5ae**



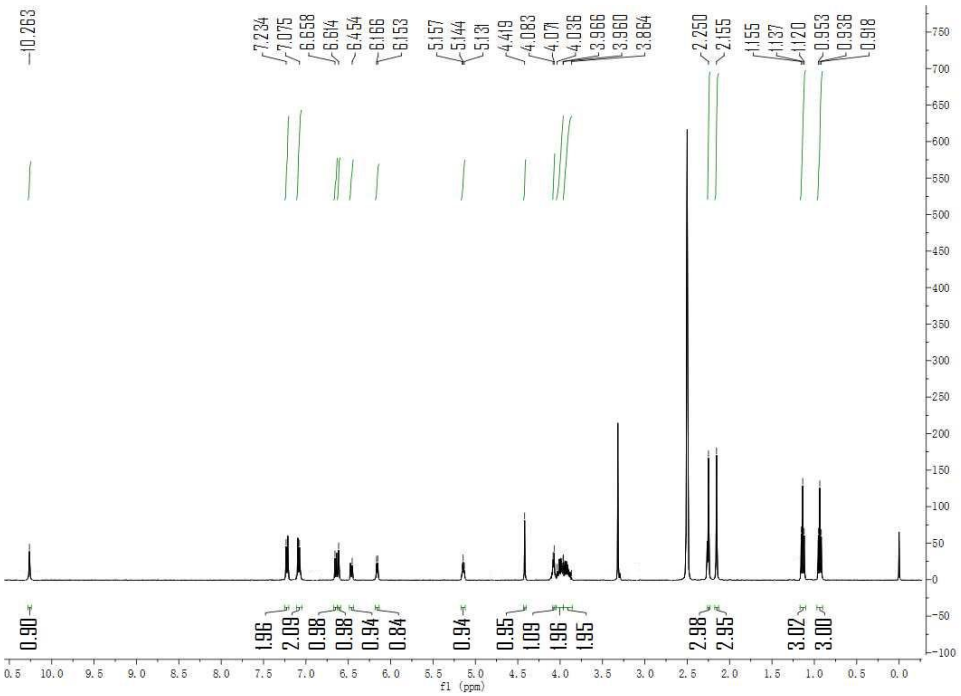
IR spectra of compound **5ae**

5be

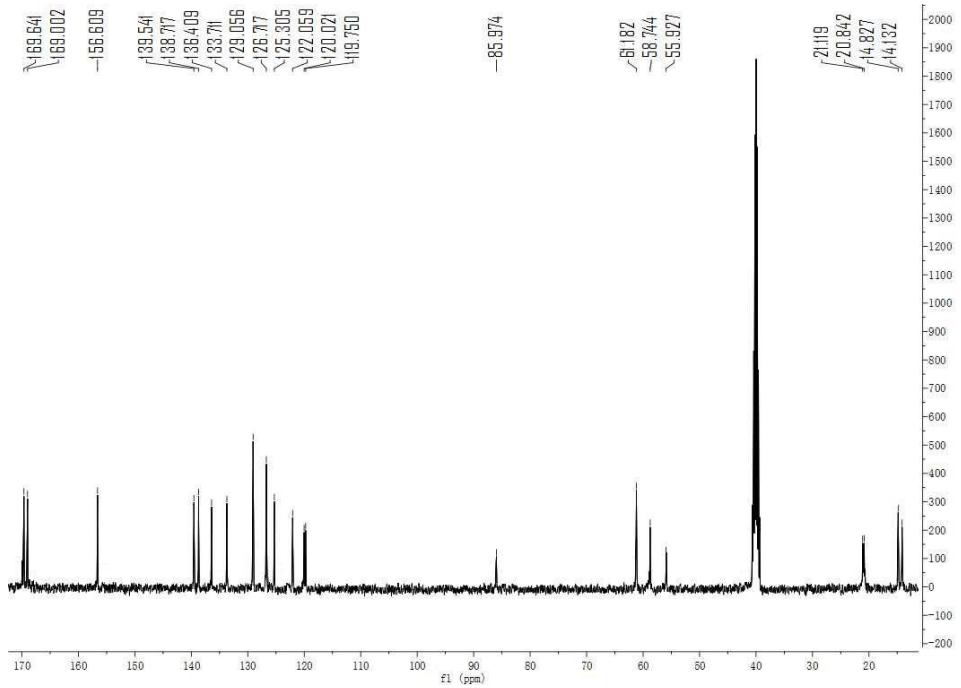


White solid; 384 mg, 94%; mp 114-116 °C; IR (KBr): 3356, 1733, 1625, 1501 cm^{-1};

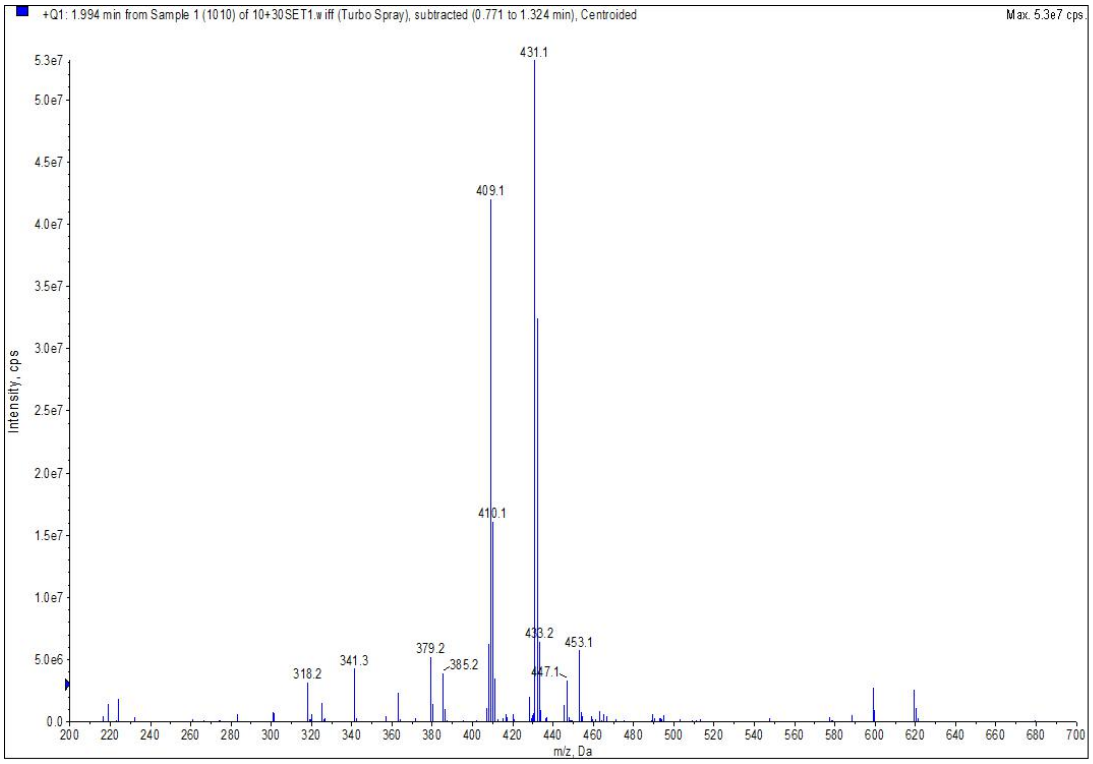
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 2.16 (s, 3H), 2.25 (s, 3H), 3.86-3.96 (m, 2H), 3.97-4.04 (m, 2H$_2$), 4.08 (d, J=4.9 Hz, 1H), 4.42 (s, 1H), 5.14 (t, J=5.3 Hz, 1H), 6.16 (d, J=5.4 Hz, 1H), 6.45-6.66 (m, 3H), 7.08-7.23 (m, 4H), 10.26 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.13, 14.83, 20.84, 21.12, 55.93, 58.74, 61.18, 85.97, 119.75, 120.02, 122.06, 125.31, 126.72, 129.06, 133.71, 136.41, 138.72, 139.54, 156.61, 169.00, 169.64; Found C, 70.71; H, 7.08; N, 6.64%; M+1 (mass spectrum), 409.1. $C_{24}H_{28}N_2O_4$ requires C,70.57; H, 6.91; N, 6.86%; M, 408.49.



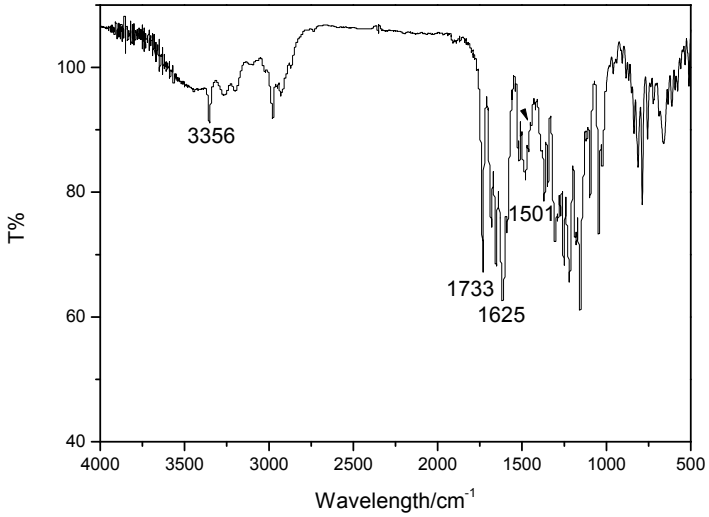
^{1}H NMR spectra of compound **5be**



^{13}C NMR spectra of compound **5be**

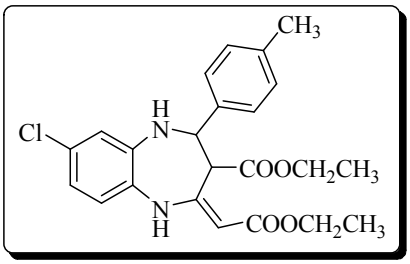


MS of compound **5be**



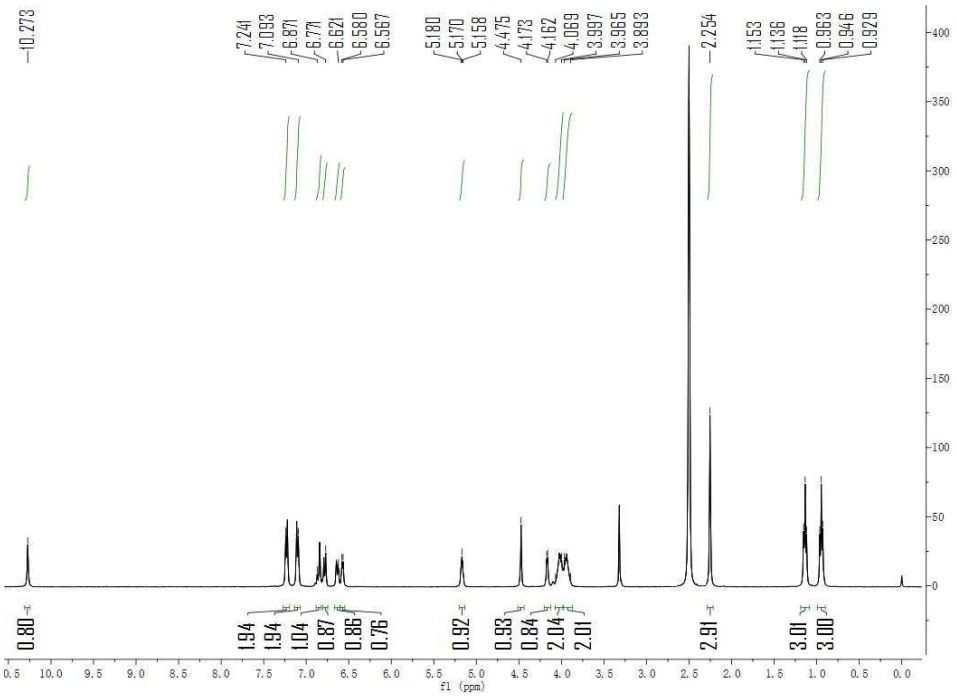
IR spectra of compound **5be**

5ce

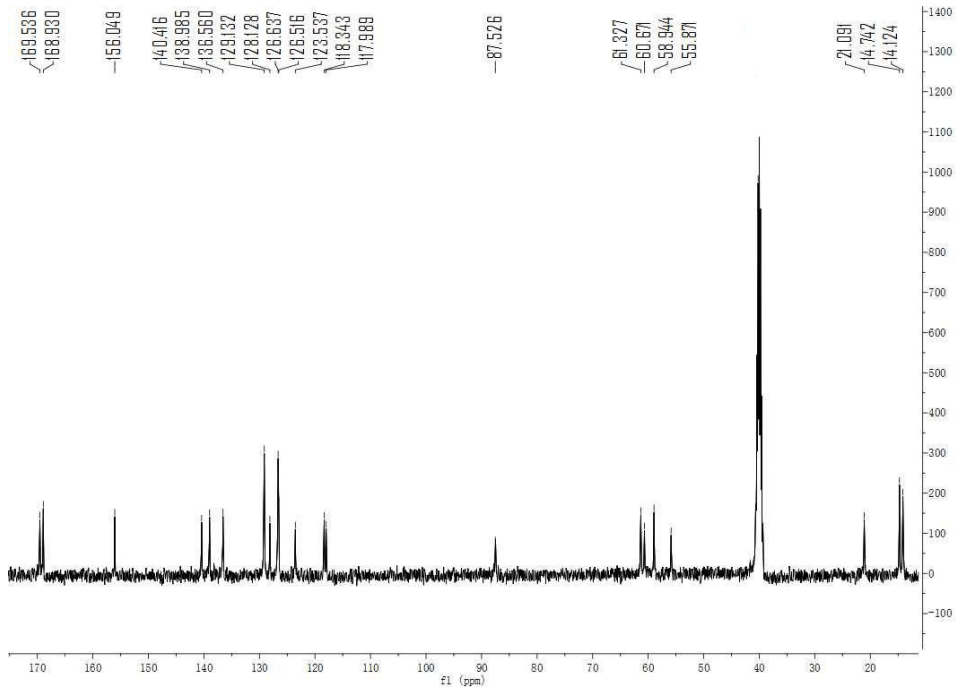


White solid; 382 mg, 89%; mp 138-140 °C; IR (KBr): 3392, 1721, 1639, 1512 cm^{-1};

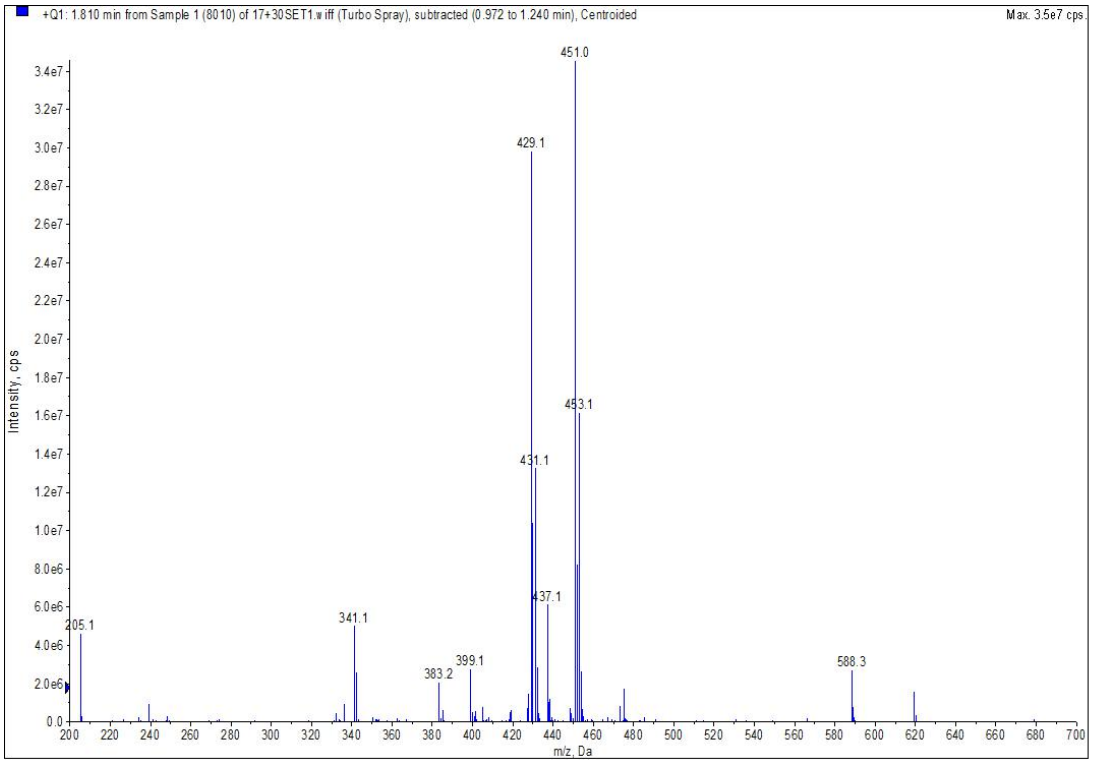
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.95 (t, J=6.9 Hz, 3H), 1.14 (t, J=7.0 Hz, 3H), 2.25 (s, 3H), 3.89-3.96 (m, 2H), 3.99-4.07 (m, 2H), 4.17 (d, J=4.6 Hz, 1H), 4.48 (s, 1H), 5.17 (t, J=4.4 Hz, 1H), 6.57 (d, J=5.4 Hz, 1H), 6.58-6.87 (m, 3H), 7.09-7.24 (m, 4H), 10.27 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.12, 14.74, 21.09, 55.87, 58.94, 60.67, 61.33, 87.53, 117.99, 118.34, 123.54, 126.52, 126.64, 128.13, 129.13, 136.56, 138.99, 140.42, 156.05, 168.93, 169.54; Found C, 64.34; H, 5.70; N, 6.62%; M+1 (mass spectrum), 429.1. $C_{23}H_{25}ClN_2O_4$ requires C,64.41; H, 5.88; N, 6.53%; M, 428.91.



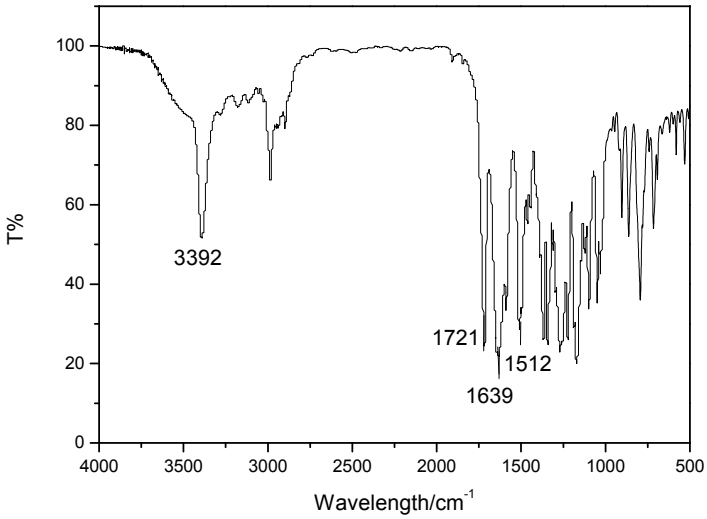
^{1}H NMR spectra of compound **5ce**



^{13}C NMR spectra of compound **5ce**

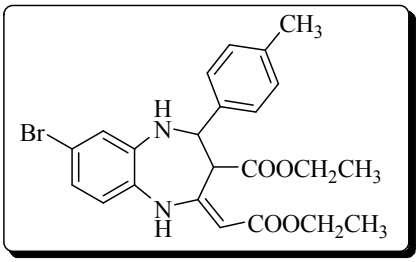


MS of compound **5ce**



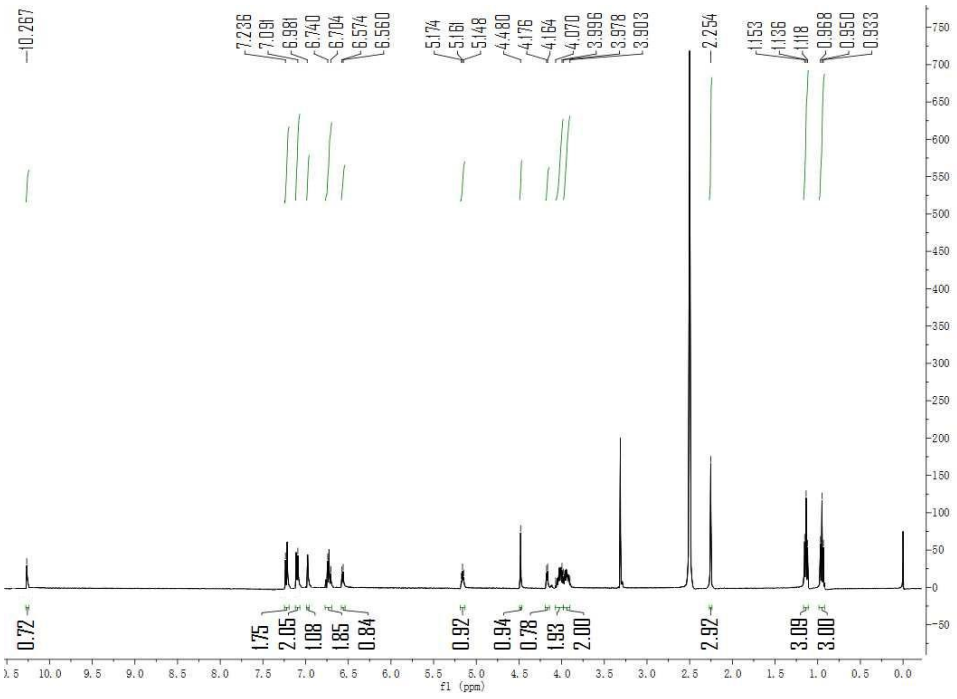
IR spectra of compound **5ce**

5de

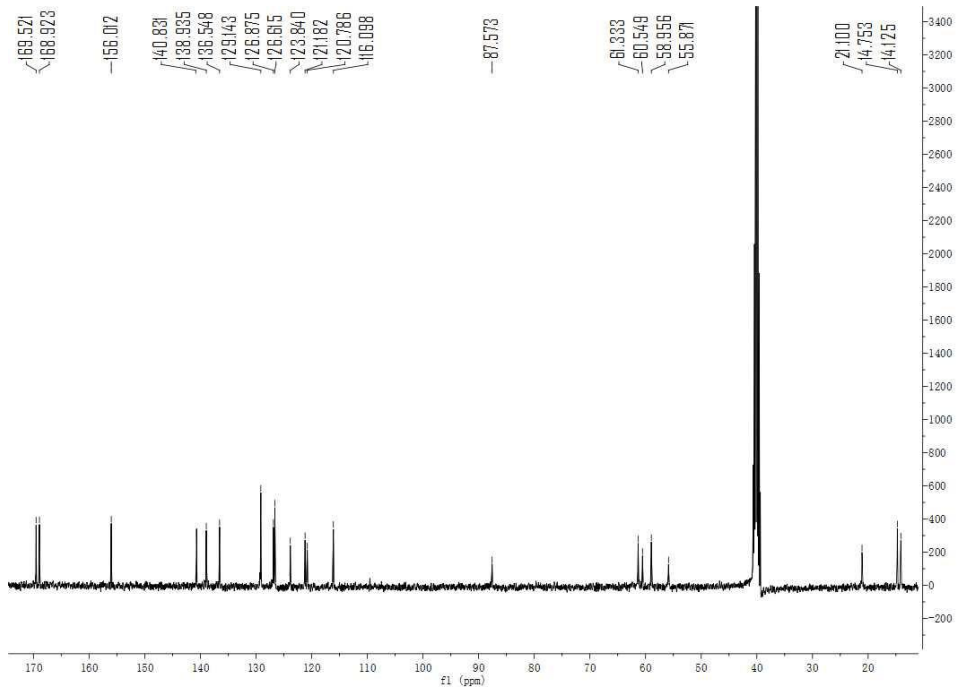


White solid; 412 mg, 87%; mp 110-112 °C; IR (KBr): 3365, 1739, 1632, 1503 cm^{-1};

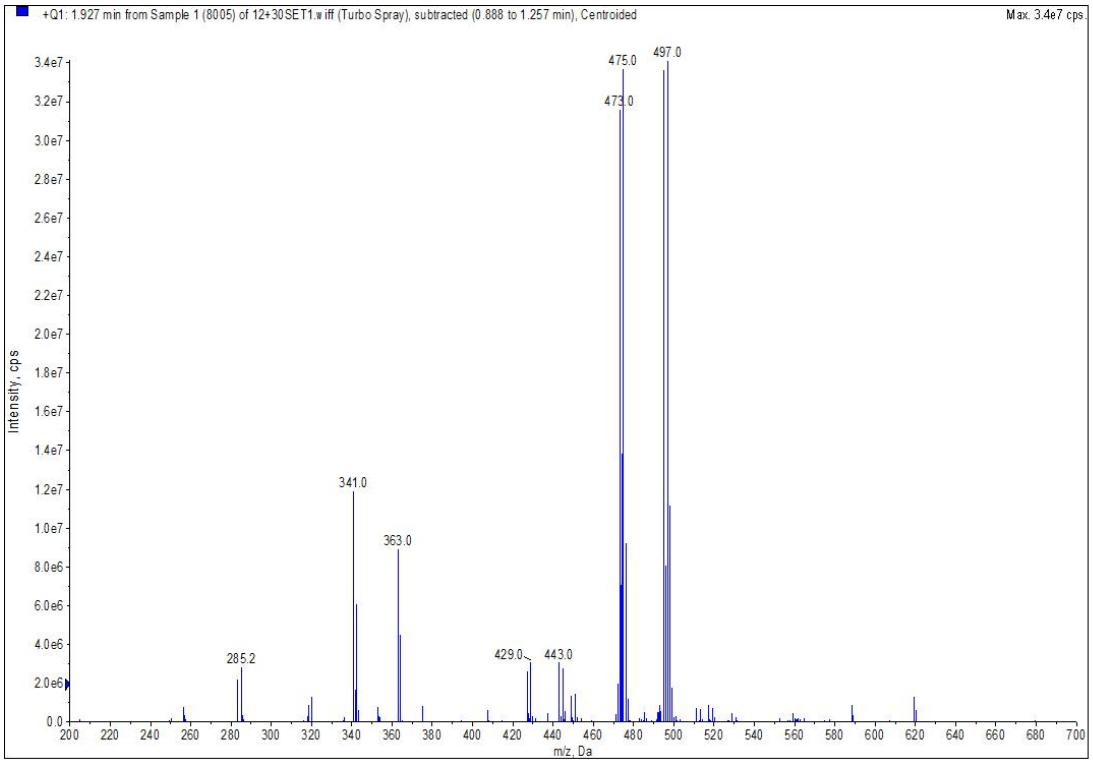
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.95 (t, J=6.9 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 2.25 (s, 3H), 3.90-3.99 (m, 2H), 4.00-4.07 (m, 2H), 4.18 (d, J=4.8 Hz, 1H), 4.48 (s, 1H), 5.16 (t, J=5.0 Hz, 1H), 6.58 (d, J=5.6 Hz, 1H), 6.70-6.98 (m, 3H), 7.09-7.24 (m, 4H), 10.27 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.13, 14.75, 21.10, 55.87, 58.96, 60.55, 61.33, 87.57, 116.10, 120.79, 121.18, 123.84, 126.62, 126.88, 129.14, 136.55, 138.94, 140.83, 156.01, 168.92, 169.52; Found C, 58.29; H, 5.18; N, 6.15%; M+1 (mass spectrum), 475.0. $C_{23}H_{25}BrN_2O_4$ requires C, 58.36; H, 5.32; N, 5.92%; M, 473.36.



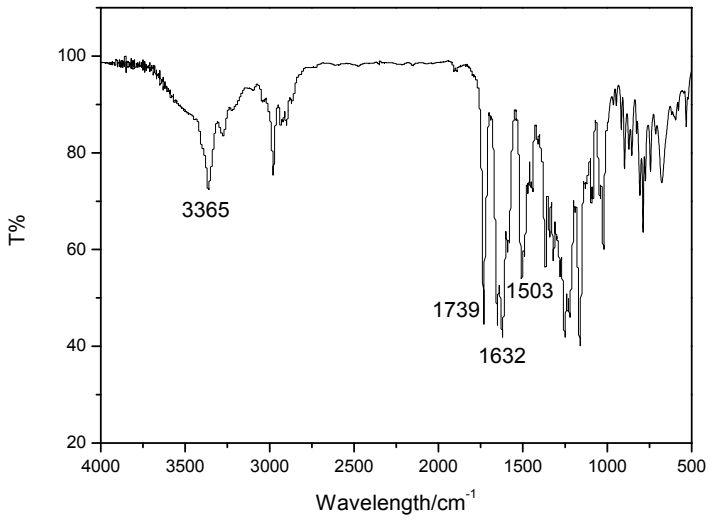
^{1}H NMR spectra of compound **5de**



^{13}C NMR spectra of compound **5de**

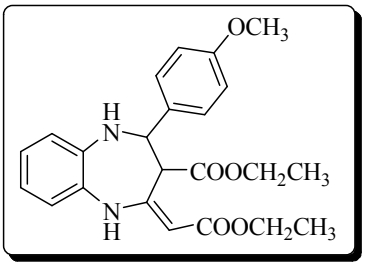


MS of compound **5de**



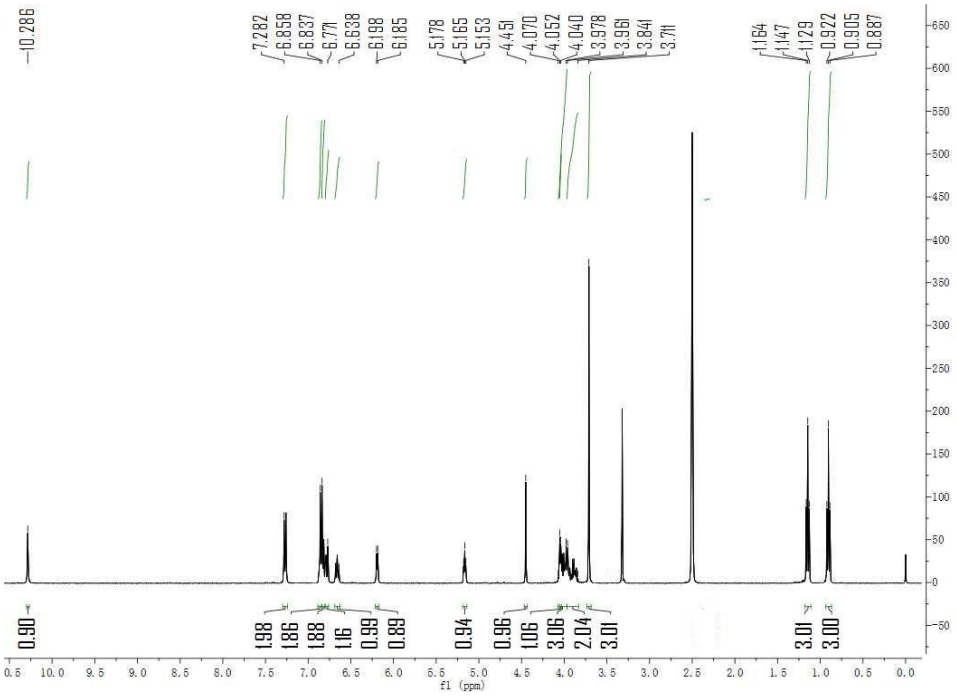
IR spectra of compound **5de**

5af

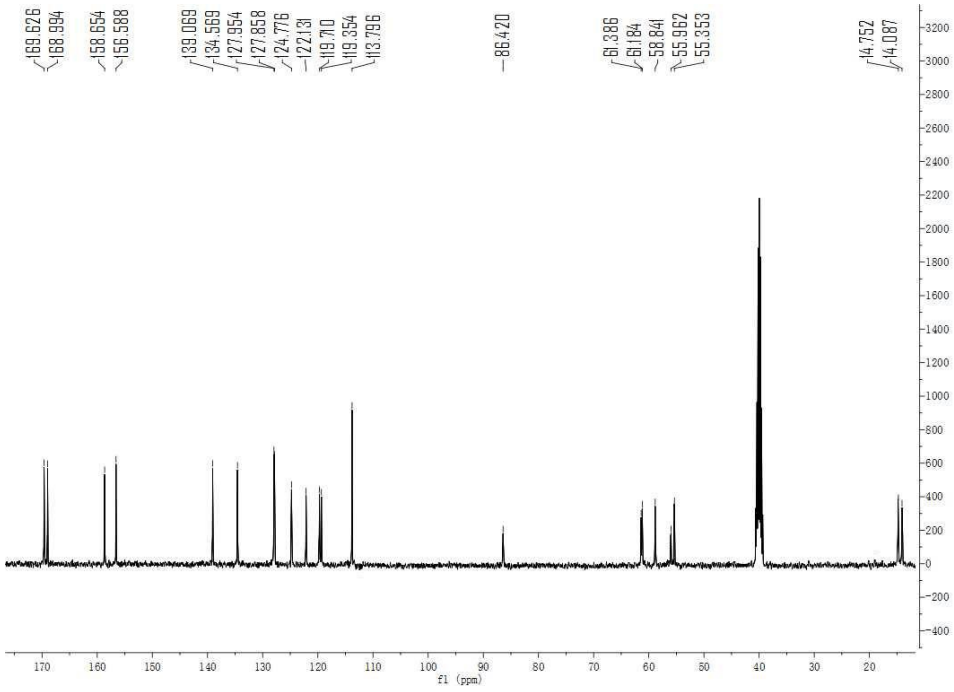


Yellow solid; 374 mg, 91%; mp 140-142 °C; IR (KBr): 3357, 1722, 1648, 1512 cm^{-1};

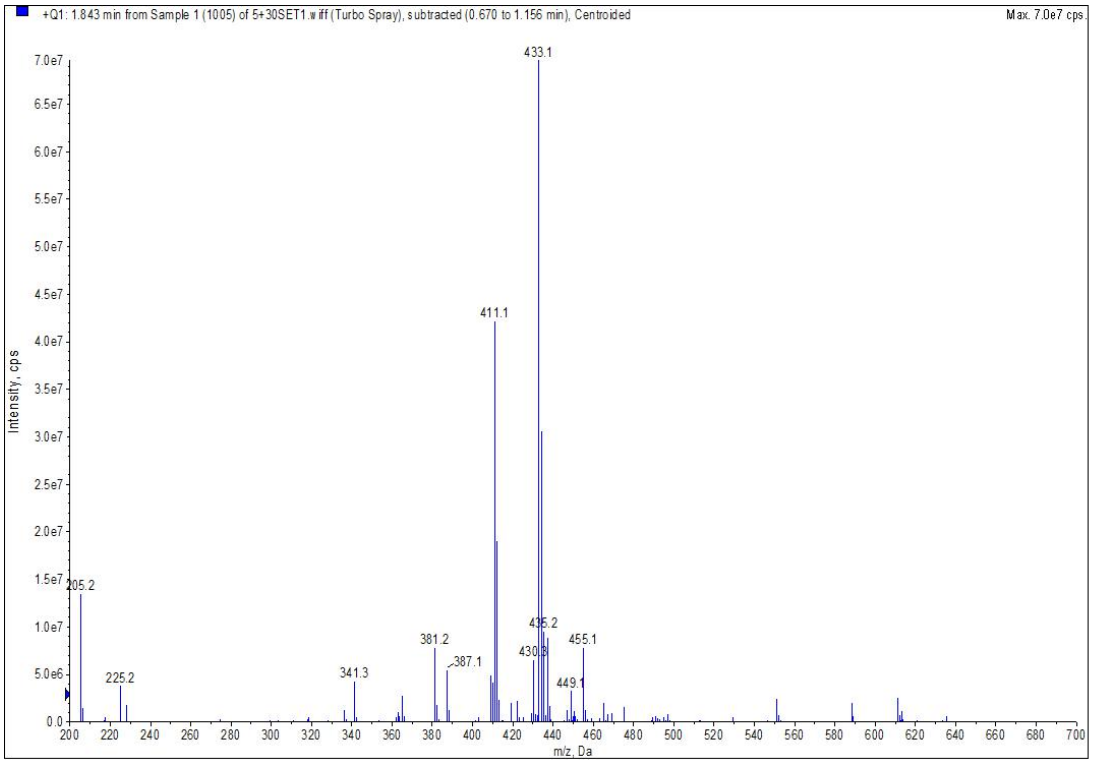
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.90 (t, J=7.1 Hz, 3H), 1.15 (t, J=7.1 Hz, 3H), 3.84-3.96 (m, 2H), 3.98-4.07 (m, 2H), 4.05 (d, J=4.8 Hz, 1H), 4.45 (s, 1H), 5.17 (t, J=5.1 Hz, 1H), 6.19 (d, J=5.3 Hz, 1H), 6.64-6.84 (m, 4H), 6.86-7.28 (m, 4H), 10.29 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.09, 14.75, 55.35, 55.96, 58.84, 61.18, 61.39, 86.42, 119.35, 119.71, 122.13, 124.78, 127.86, 127.95, 134.57, 139.07, 156.59, 158.65, 168.99, 169.63; Found C, 67.19; H, 6.15; N, 6.90%; M+1 (mass spectrum), 411.1. $C_{23}H_{26}N_2O_5$ requires C, 67.30; H, 6.38; N, 6.82%; M, 410.46.



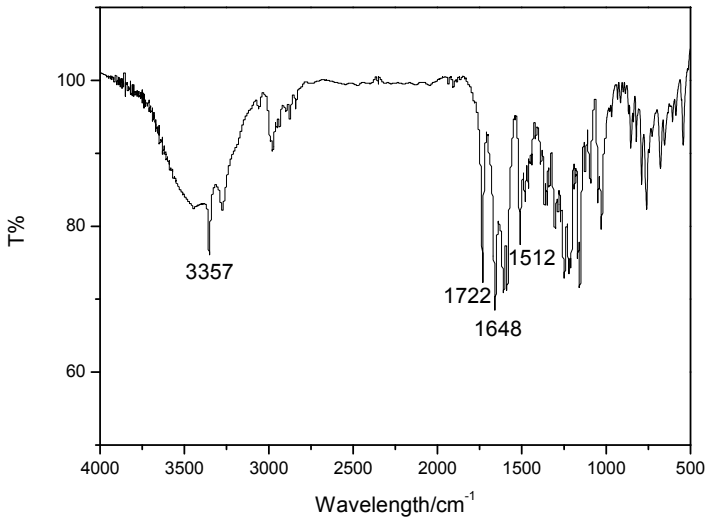
^{1}H NMR spectra of compound **5af**



^{13}C NMR spectra of compound **5af**

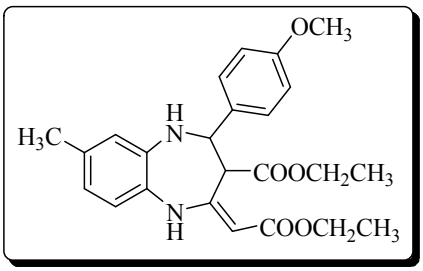


MS of compound **5af**



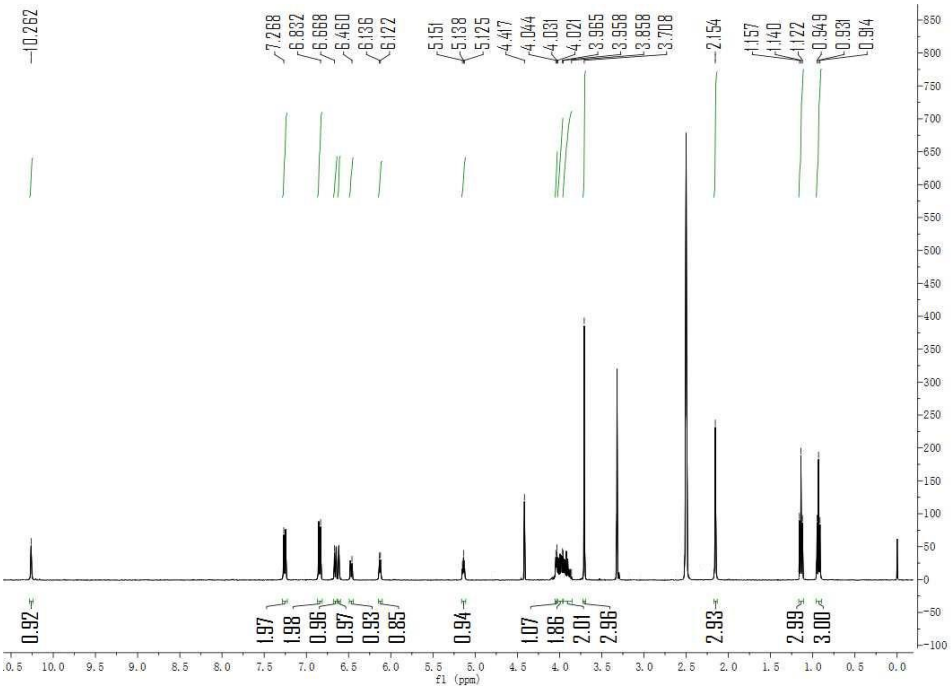
IR spectra of compound **5af**

5bf

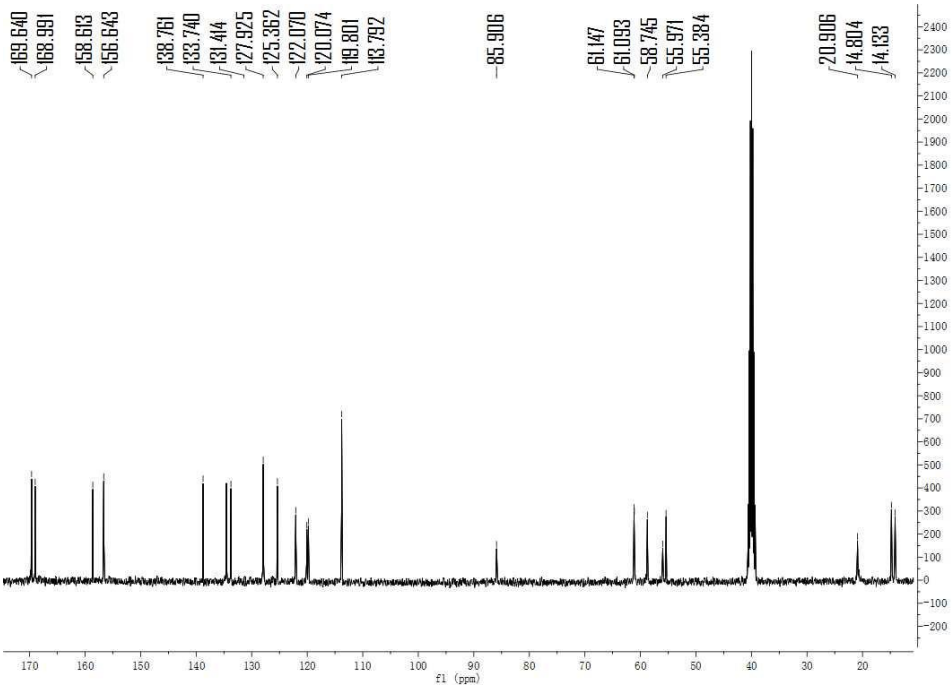


Pale yellow solid; 399 mg, 94%; mp 114-116 °C; IR (KBr): 3348, 1732, 1625, 1515

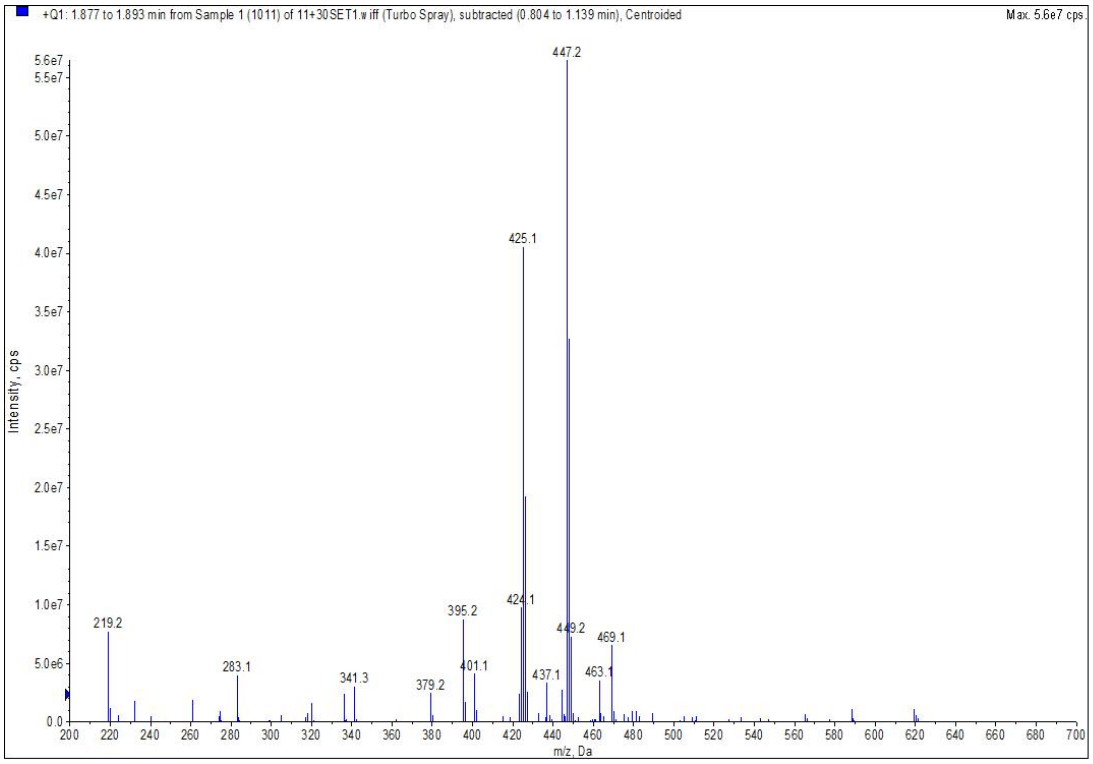
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 2.15 (s, 3H), 3.71 (s, 3H), 3.86-3.96 (m, 2H), 3.97-4.02 (m, 2H), 4.04 (d, J=5.3 Hz, 1H), 4.42 (s, 1H), 5.14 (t, J=5.2 Hz, 1H), 6.13 (d, J=5.3 Hz, 1H), 6.46-6.67 (m, 3H), 6.83-7.27 (m, 4H), 10.26 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.13, 14.80, 20.91, 55.38, 55.97, 58.75, 60.09, 61.15, 85.91, 113.79, 119.80, 120.07, 122.07, 125.36, 127.93, 131.41, 133.74, 138.76, 156.64, 158.61, 168.99, 169.64; Found C, 67.99; H, 6.81; N, 6.49%; M+1 (mass spectrum), 425.1. $C_{24}H_{28}N_2O_5$ requires C, 67.91; H, 6.65; N, 6.60%; M, 424.49.



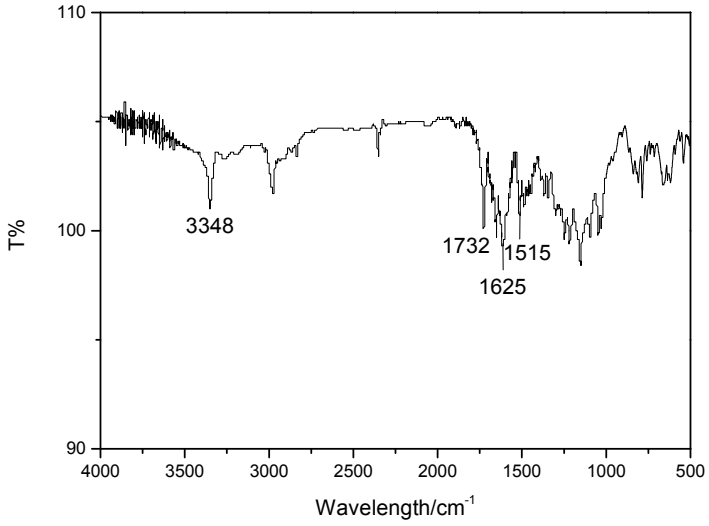
^{1}H NMR spectra of compound **5bf**



^{13}C NMR spectra of compound **5bf**

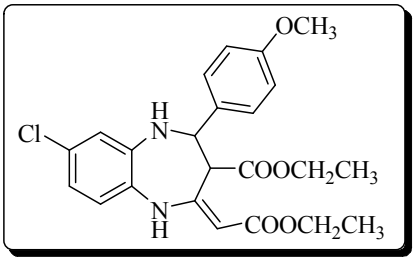


MS of compound **5bf**



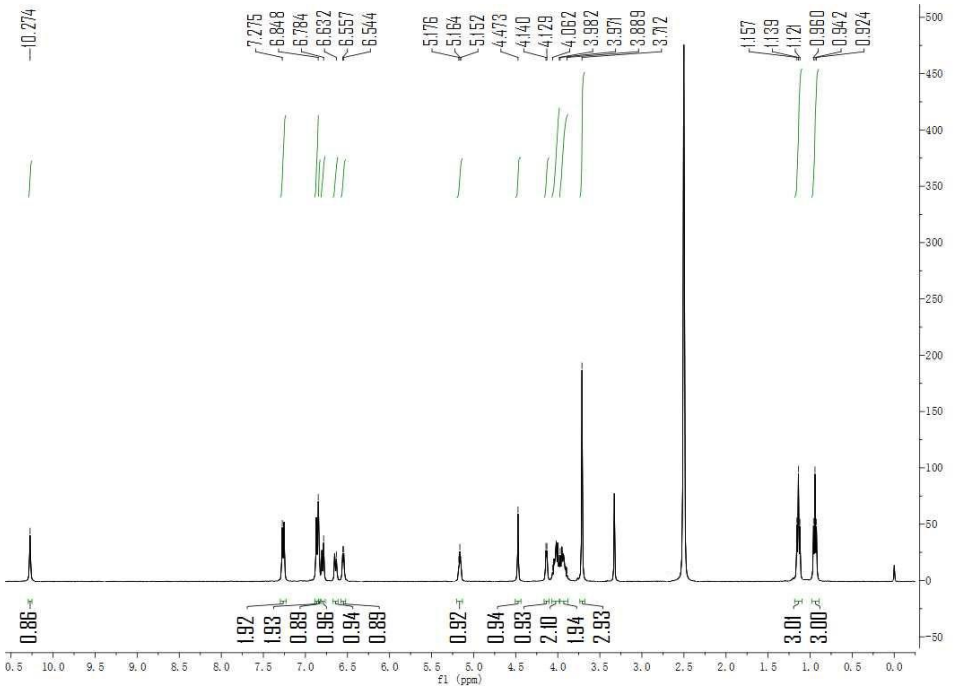
IR spectra of compound **5bf**

5cf

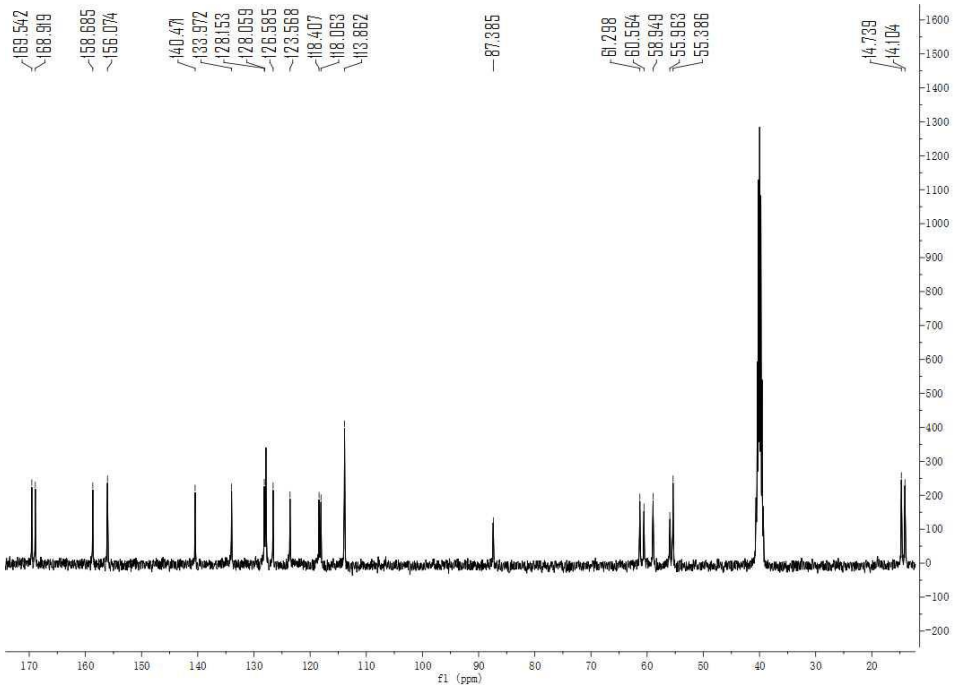


White solid; 392 mg, 88%; mp 146-148 °C; IR (KBr): 3339, 1741, 1630, 1513 cm^{-1};

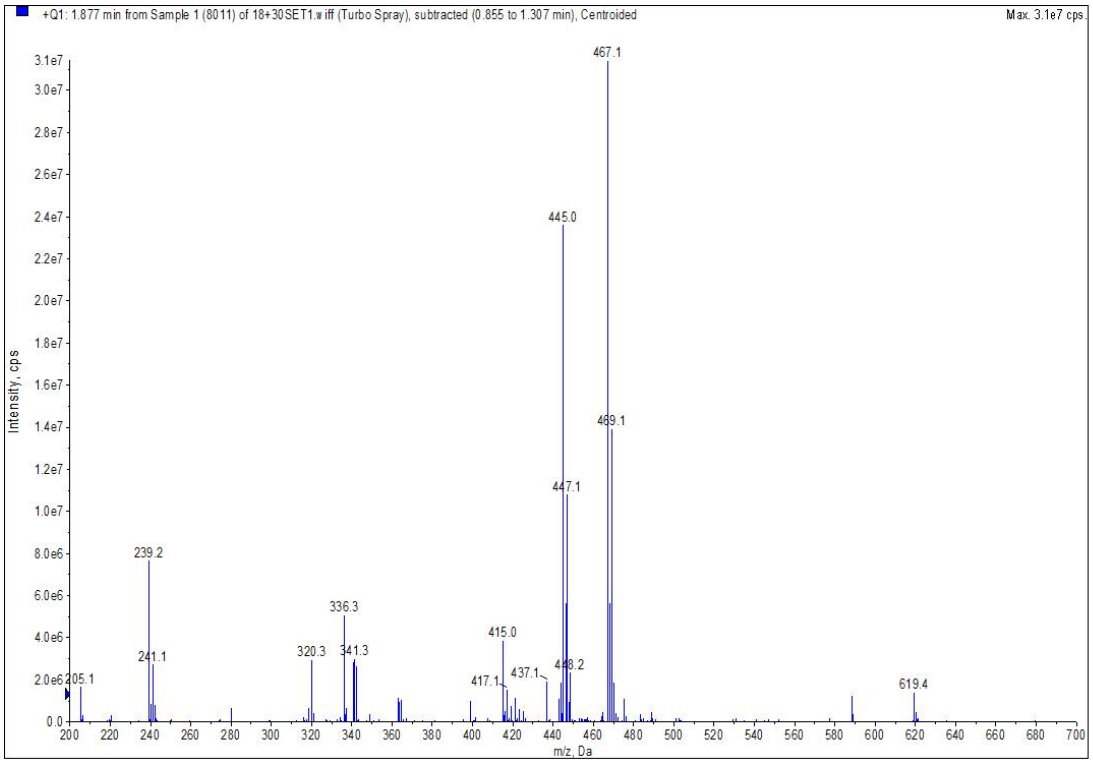
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.0 Hz, 3H), 1.14 (t, J=7.0 Hz, 3H), 3.71 (s, 3H), 3.89-3.97 (m, 2H), 3.98-4.06 (m, 2H), 4.13 (d, J=4.3 Hz, 1H), 4.47 (s, 1H), 5.16 (t, J=5.0 Hz, 1H), 6.55 (d, J=5.4 Hz, 1H), 6.63-6.85 (m, 3H), 6.85-7.28 (m, 4H), 10.27 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.10, 14.74, 55.39, 55.96, 58.95, 60.56, 61.30, 87.39, 113.86, 118.06, 118.41, 123.57, 126.59, 128.06, 128.15, 133.97, 140.47, 156.07, 158.69, 168.92, 169.54; Found C, 62.16; H, 5.79; N, 6.16%; M+1 (mass spectrum), 445.0. $C_{23}H_{25}ClN_2O_5$ requires C, 62.09; H, 5.66; N, 6.30%; M, 444.91.



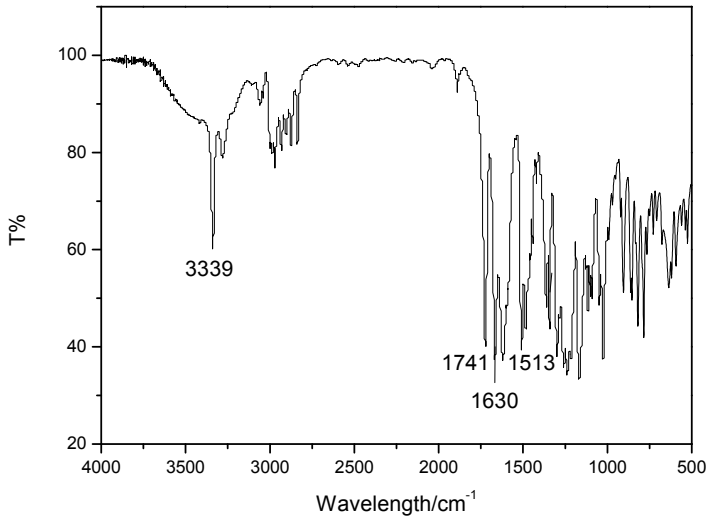
^{1}H NMR spectra of compound **5cf**



^{13}C NMR spectra of compound **5cf**

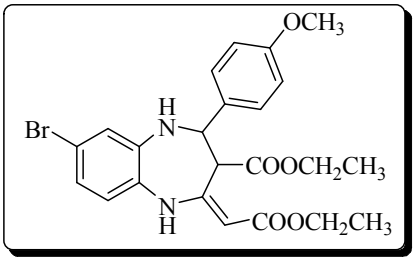


MS of compound **5cf**



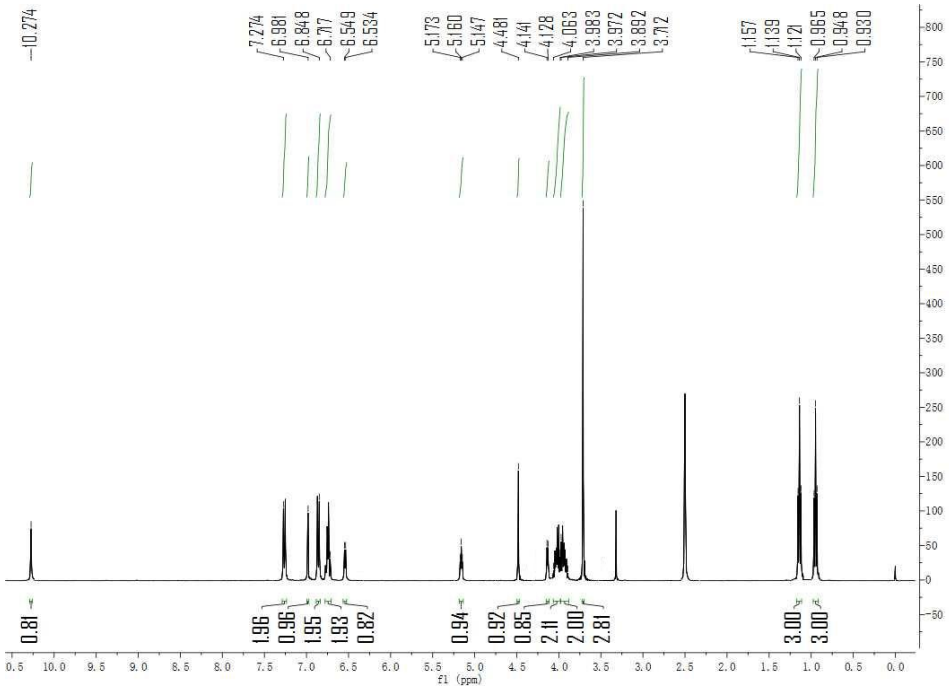
IR spectra of compound **5cf**

5df

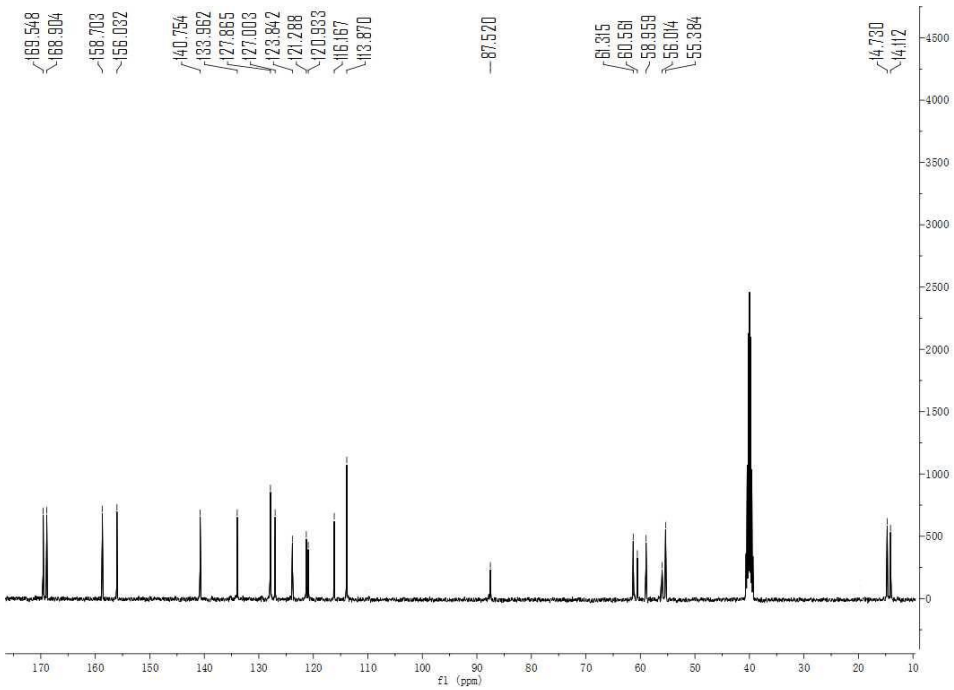


Pale gray solid; 436 mg, 89%; mp 148-150 °C; IR (KBr): 3338, 1745, 1628, 1503

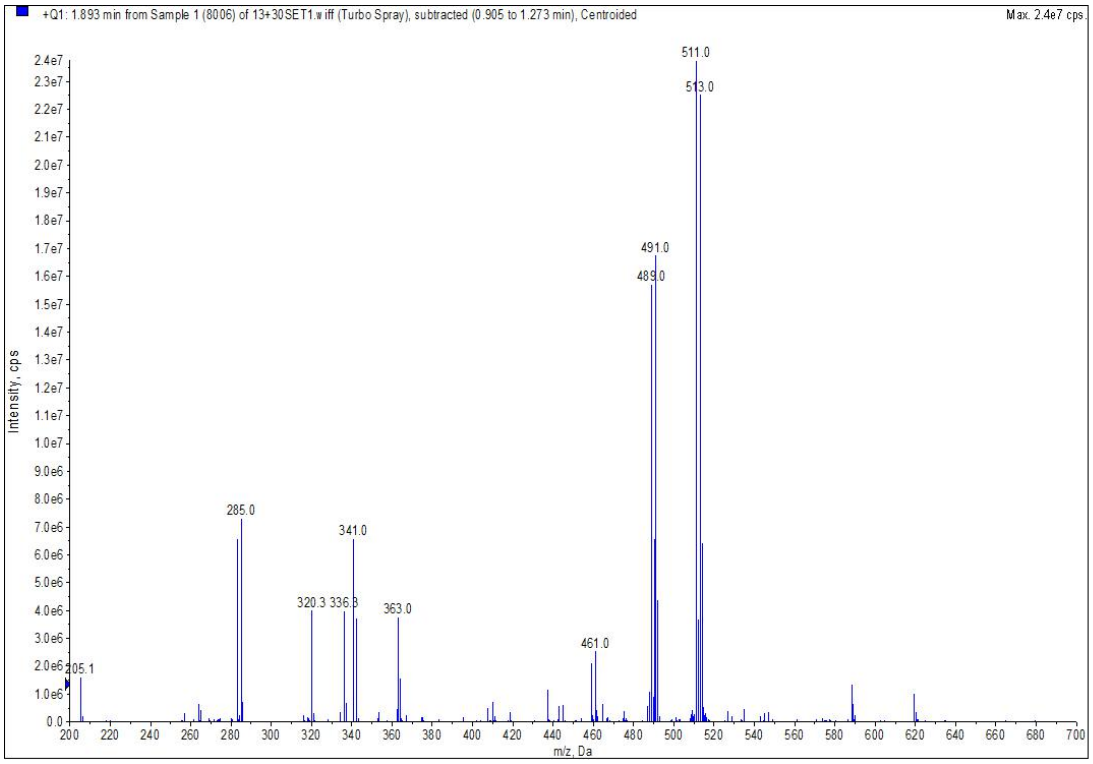
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.95 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz, 3H), 3.71 (s, 3H), 3.89-3.97 (m, 2H), 3.98-4.06 (m, 2H), 4.13 (d, J=4.9 Hz, 1H), 4.48 (s, 1H), 5.16 (t, J=5.2 Hz, 1H), 6.54 (d, J=5.7 Hz, 1H), 6.72-6.98 (m, 3H), 6.85-7.27 (m, 4H), 10.27 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.11, 14.73, 55.38, 56.01, 58.96, 60.56, 61.32, 87.52, 113.87, 116.17, 120.93, 121.29, 123.84, 127.00, 127.87, 133.96, 140.75, 156.03, 158.70, 168.90, 169.55; Found C, 56.36; H, 4.97; N, 5.86%; M+1 (mass spectrum), 491.0. $C_{23}H_{25}BrN_2O_5$ requires C, 56.45; H, 5.15; N, 5.72%; M, 489.36



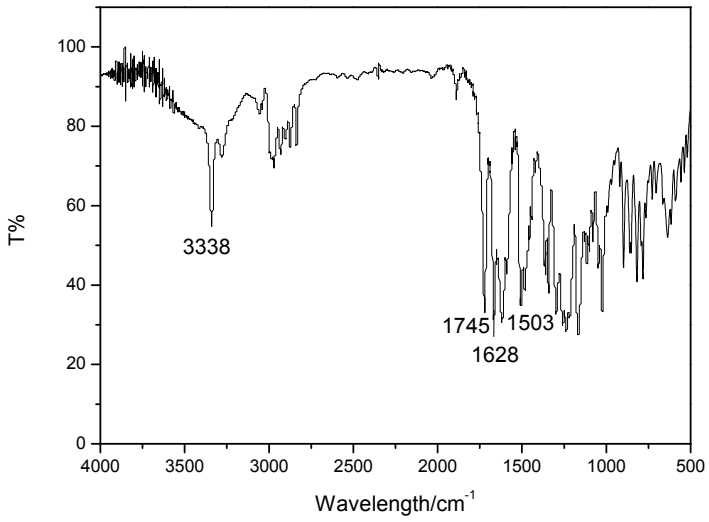
^{1}H NMR spectra of compound **5df**



^{13}C NMR spectra of compound **5df**

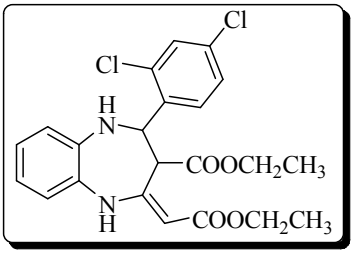


MS of compound **5df**



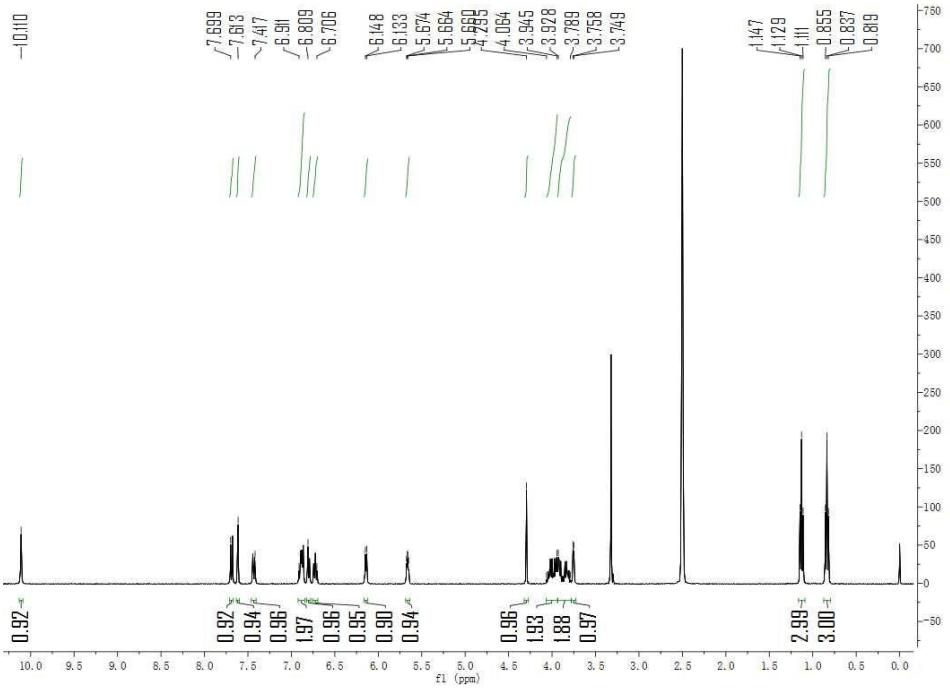
IR spectra of compound **5df**

5ag

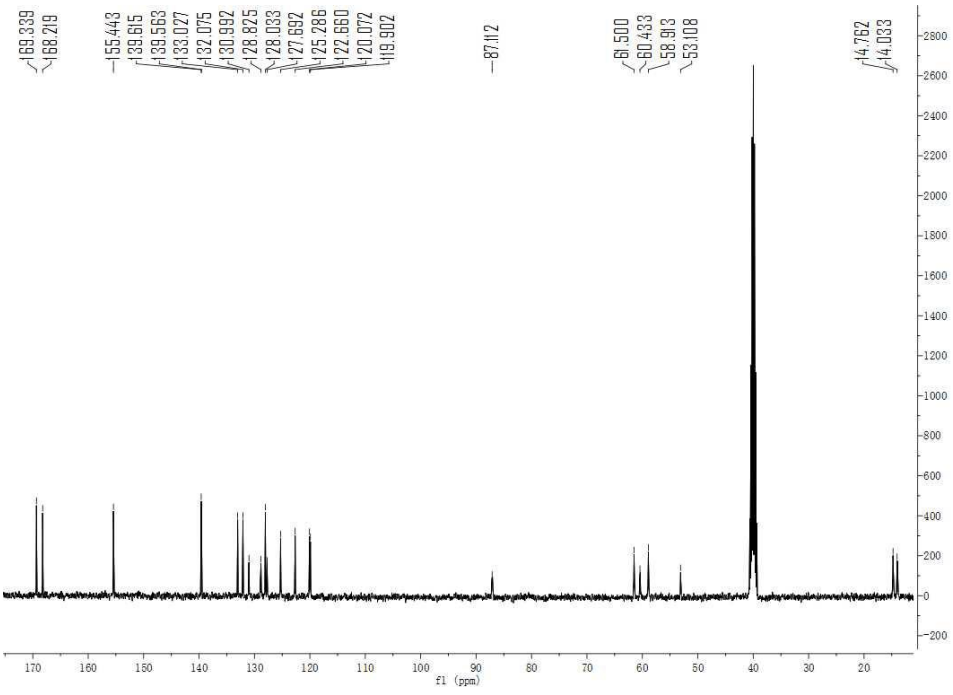


Pale yellow solid; 422 mg, 94%; mp 122-124 °C; IR (KBr): 3383, 1731, 1634, 1512

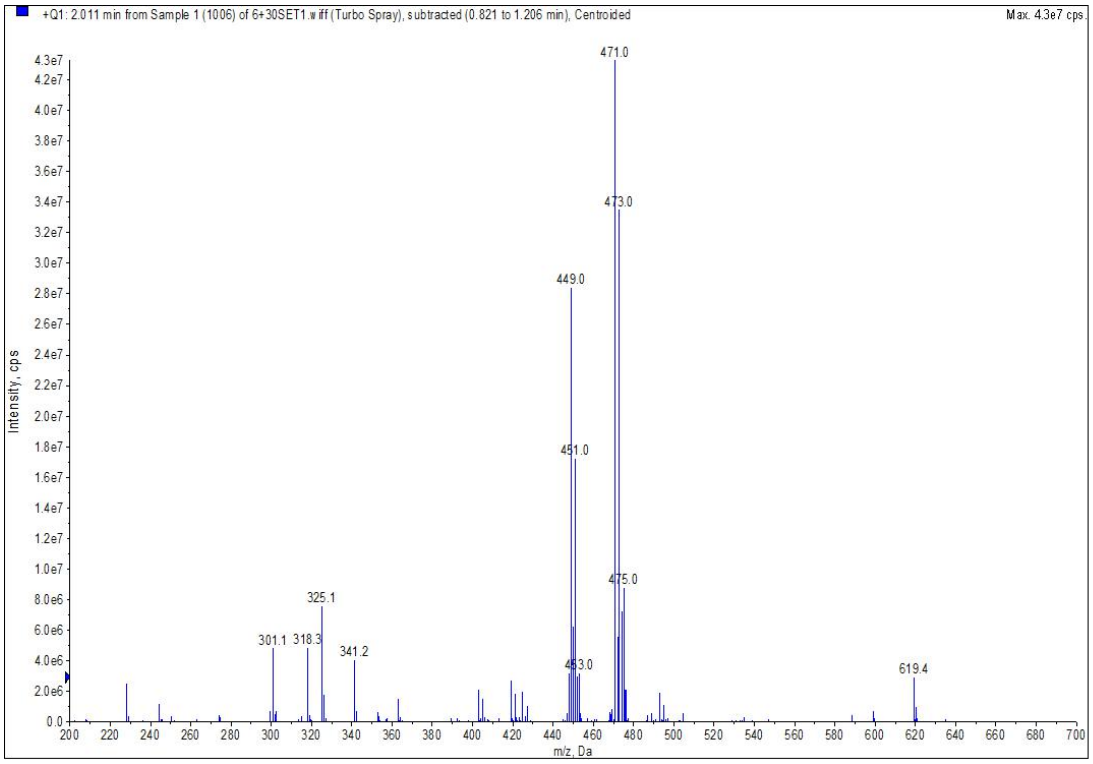
cm^{-1}; ^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.84 (t, J=7.1 Hz, 3H), 1.13 (t, J=7.1 Hz, 3H), 3.75 (d, J=3.4 Hz, 1H), 3.79-3.93 (m, 2H), 3.95-4.06 (m, 2H), 4.30 (s, 1H), 5.66 (m, 1H), 6.14 (d, J=6.0 Hz, 1H), 6.70-6.91 (m, 4H), 7.42-7.70 (m, 3H), 10.11 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.03, 14.76, 53.11, 58.91, 60.43, 61.50, 87.11, 119.90, 120.07, 122.66, 125.29, 127.69, 128.03, 128.83, 130.99, 132.08, 133.03, 139.56, 139.62, 155.44, 168.22, 169.34; Found C, 58.84; H, 4.89; N, 6.19%; M+1 (mass spectrum), 451.0. $C_{22}H_{22}Cl_2N_2O_4$ requires C, 58.81; H, 4.94; N, 6.23%; M, 449.33.



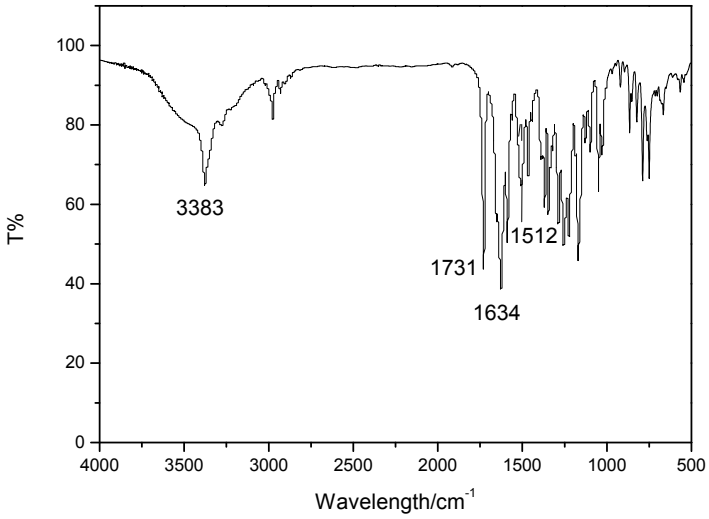
^{1}H NMR spectra of compound **5ag**



^{13}C NMR spectra of compound **5ag**

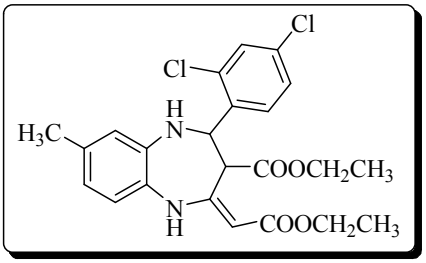


MS of compound **5ag**



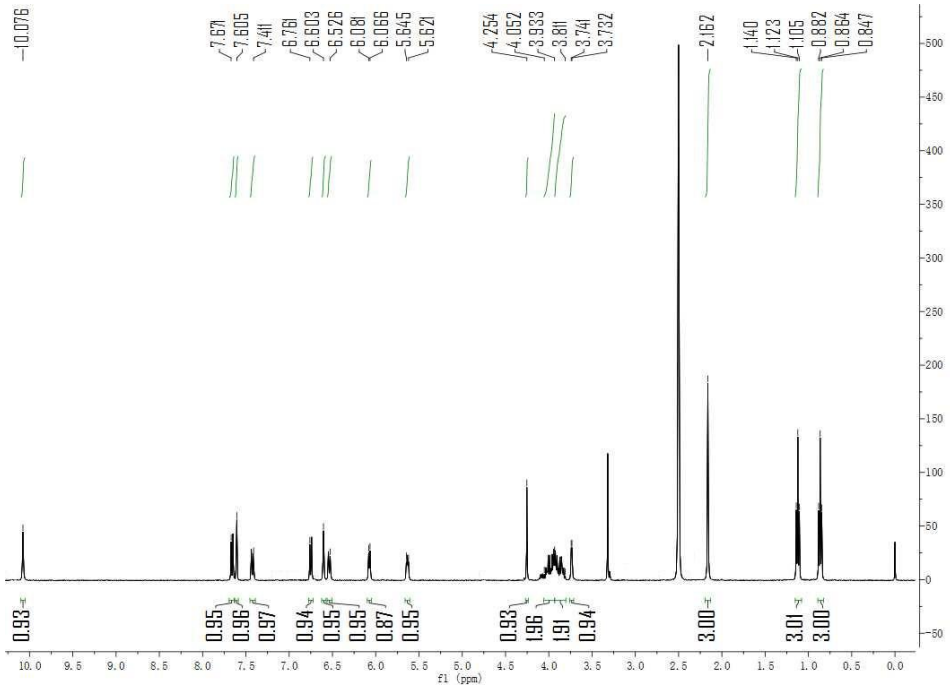
IR spectra of compound **5ag**

5bg

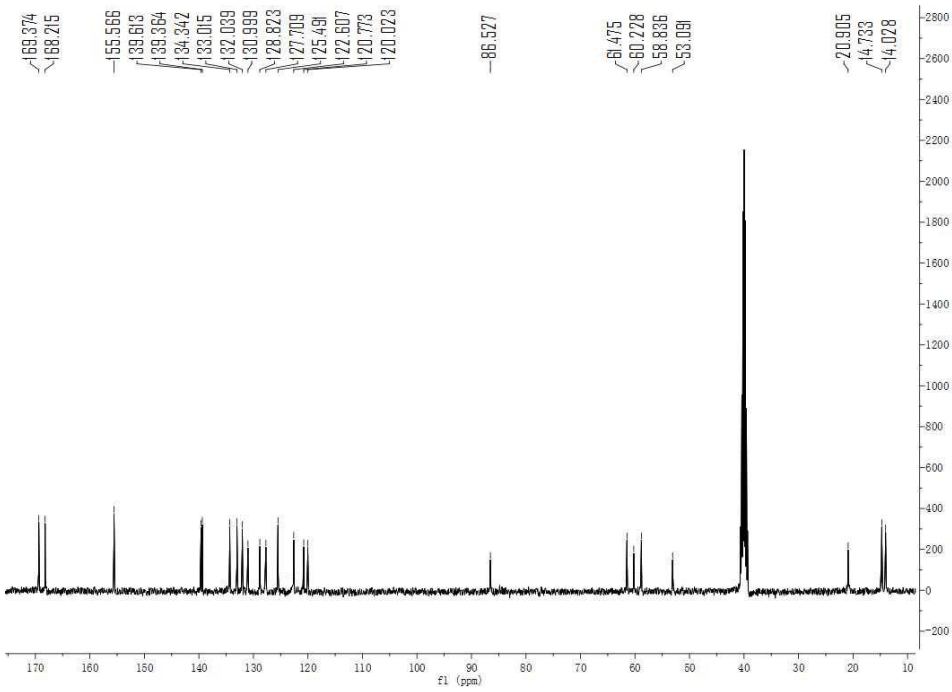


White solid; 440 mg, 95%; mp 156-158 °C; IR (KBr): 3338, 1732, 1626, 1502 cm^{-1};

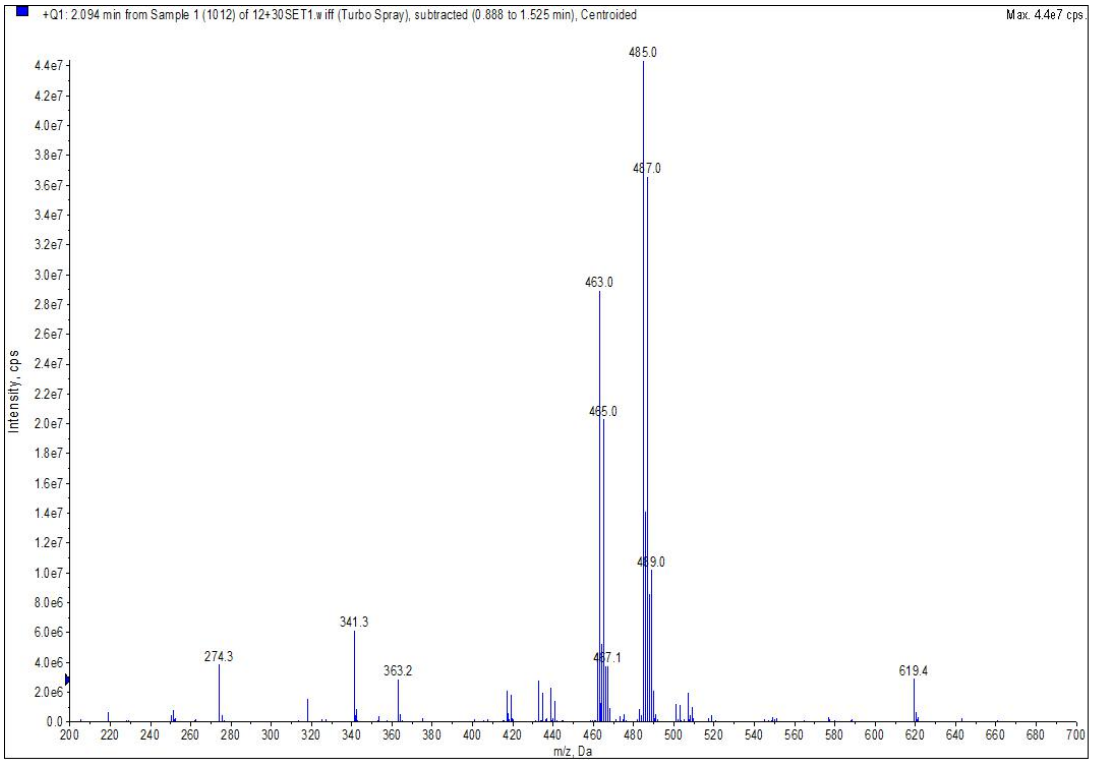
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.86 (t, J=7.1 Hz, 3H), 1.12 (t, J=7.1 Hz, 3H), 2.16 (s, 3H), 3.74 (d, J=3.5 Hz, 1H), 3.81-3.93 (m, 2H), 3.93-4.05 (m, 2H), 4.25 (s, 1H), 5.63 (m, 1H), 6.07 (d, J=6.1 Hz, 1H), 6.53-6.76 (m, 3H), 7.41-7.67 (m, 3H), 10.08 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.03, 14.73, 20.91, 53.09, 58.84, 60.23, 61.48, 86.53, 120.02, 120.77, 122.61, 125.49, 127.71, 128.82, 131.00, 132.04, 133.02, 134.34, 139.36, 139.61, 155.57, 168.22, 169.37; Found C, 59.76; H, 5.31; N, 5.85%; M+1 (mass spectrum), 465.0. $C_{23}H_{24}Cl_2N_2O_4$ requires C, 59.62; H, 5.22; N, 6.05%; M, 463.35.



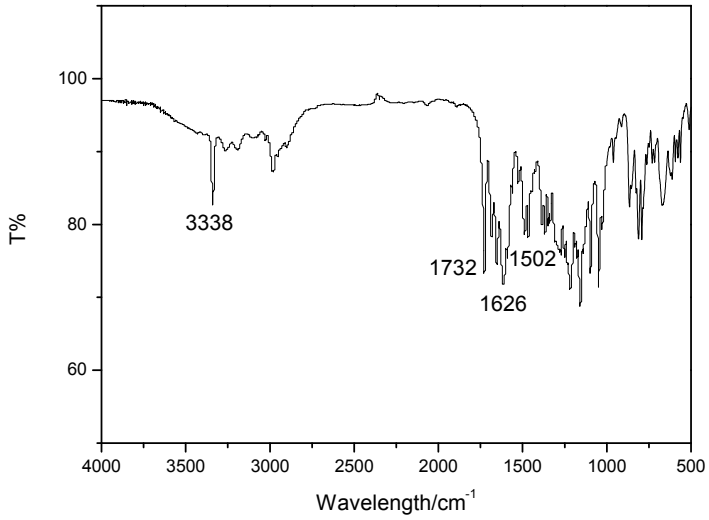
^{1}H NMR spectra of compound **5bg**



^{13}C NMR spectra of compound **5bg**

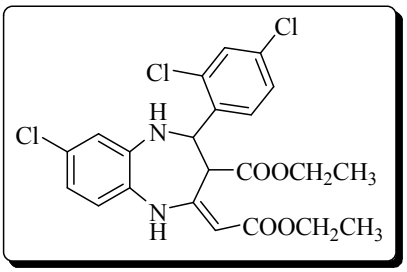


MS of compound **5bg**



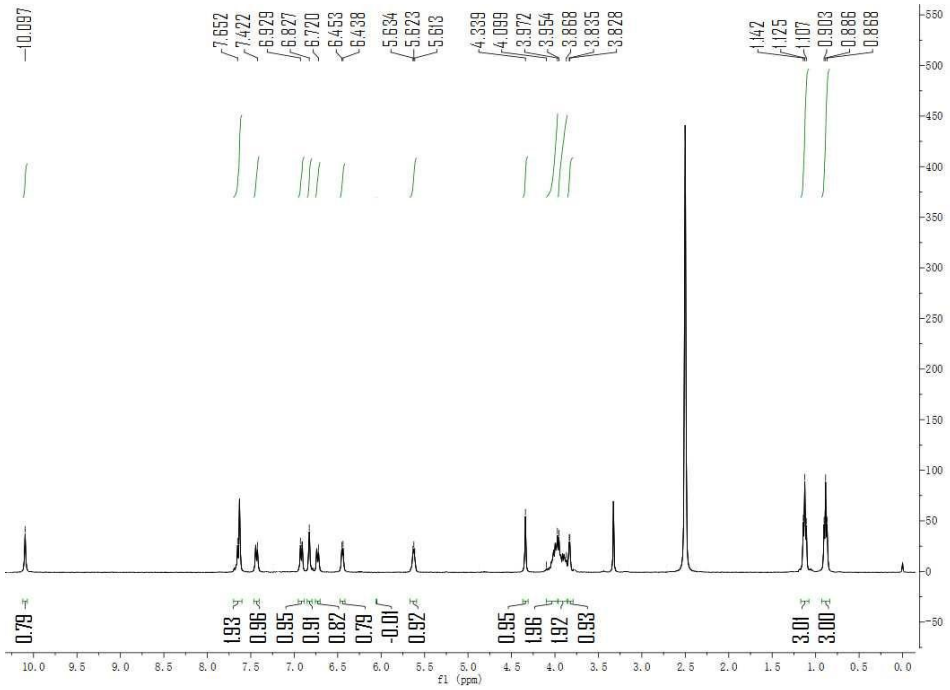
IR spectra of compound **5bg**

5cg

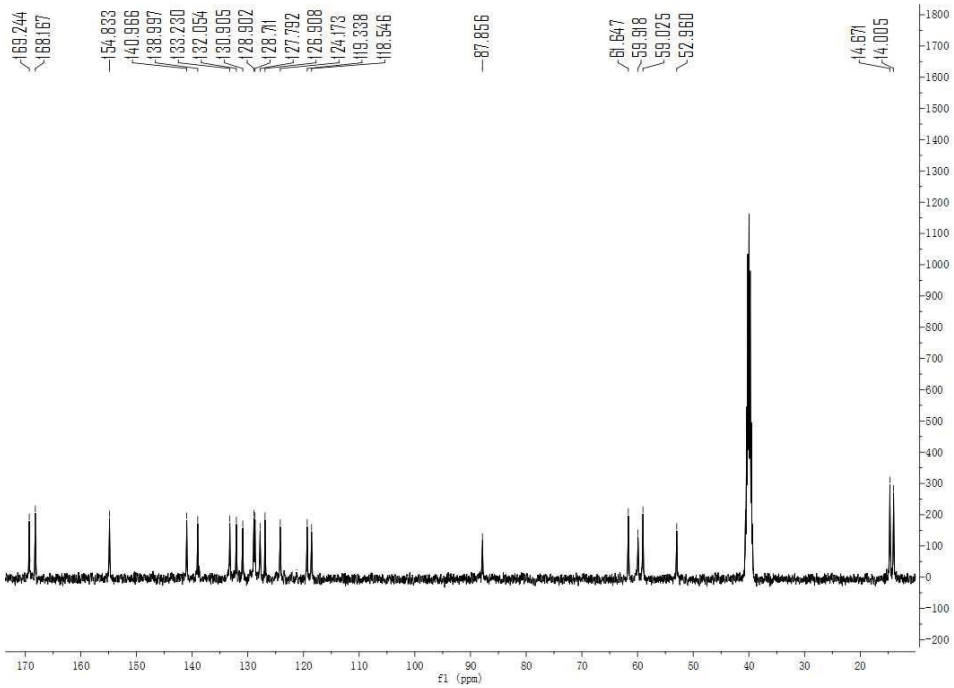


White solid; 426 mg, 88%; mp 152-154 °C; IR (KBr): 3384, 1732, 1648, 1514 cm^{-1};

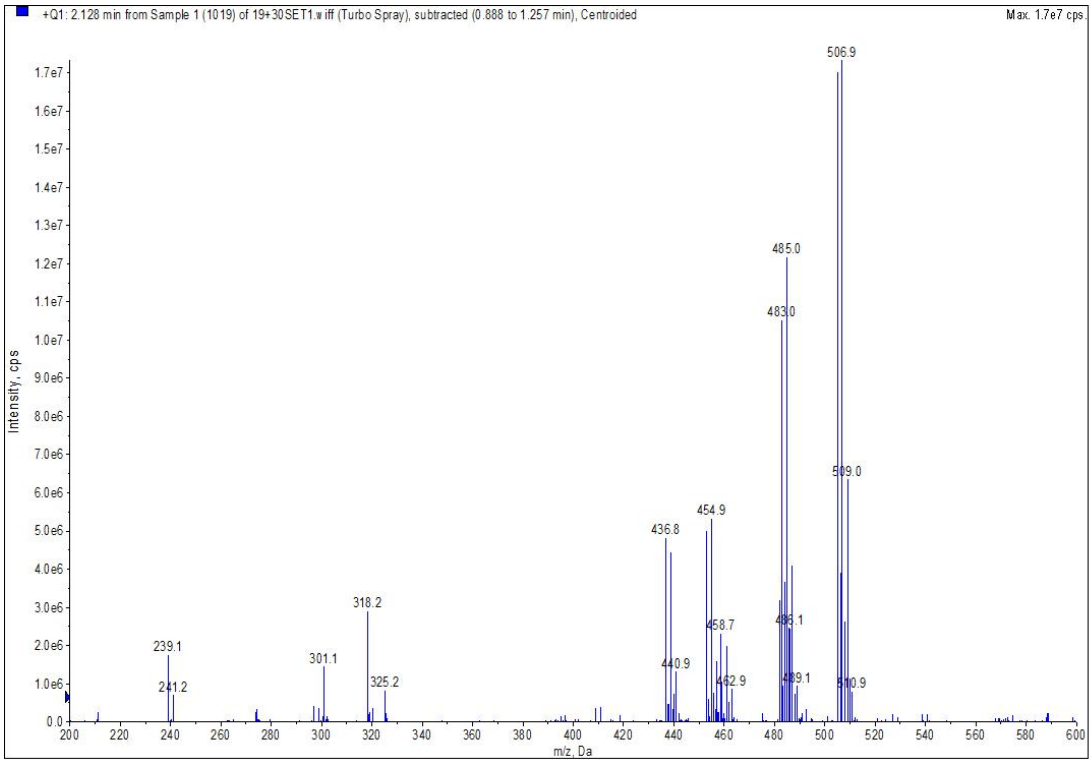
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.89 (t, J=6.9 Hz, 3H), 1.12 (t, J=7.0 Hz, 3H), 3.83 (d, J=2.7 Hz, 1H), 3.87-3.95 (m, 2H), 3.97-4.10 (m, 2H), 4.34 (s, 1H), 5.62 (m, 1H), 6.45 (d, J=5.6 Hz, 1H), 6.72-6.93 (m, 3H), 7.42-7.65 (m, 3H), 10.10 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.01, 14.67, 52.96, 59.03, 59.92, 61.65, 87.86, 118.55, 119.34, 124.17, 126.91, 127.79, 128.71, 128.90, 130.91, 132.05, 133.23, 139.00, 140.97, 154.83, 168.17, 169.24; Found C, 54.76; H, 4.51; N, 5.66%; M+1 (mass spectrum), 485.0. $C_{22}H_{21}Cl_3N_2O_4$ requires C, 54.62; H, 4.38; N, 5.79%; M, 483.77.



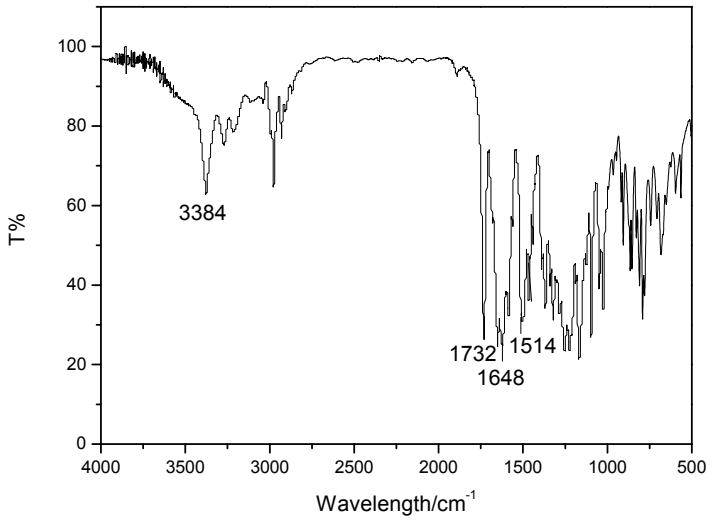
^{1}H NMR spectra of compound **5cg**



^{13}C NMR spectra of compound **5cg**

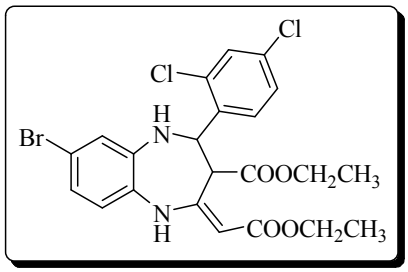


MS of compound **5cg**



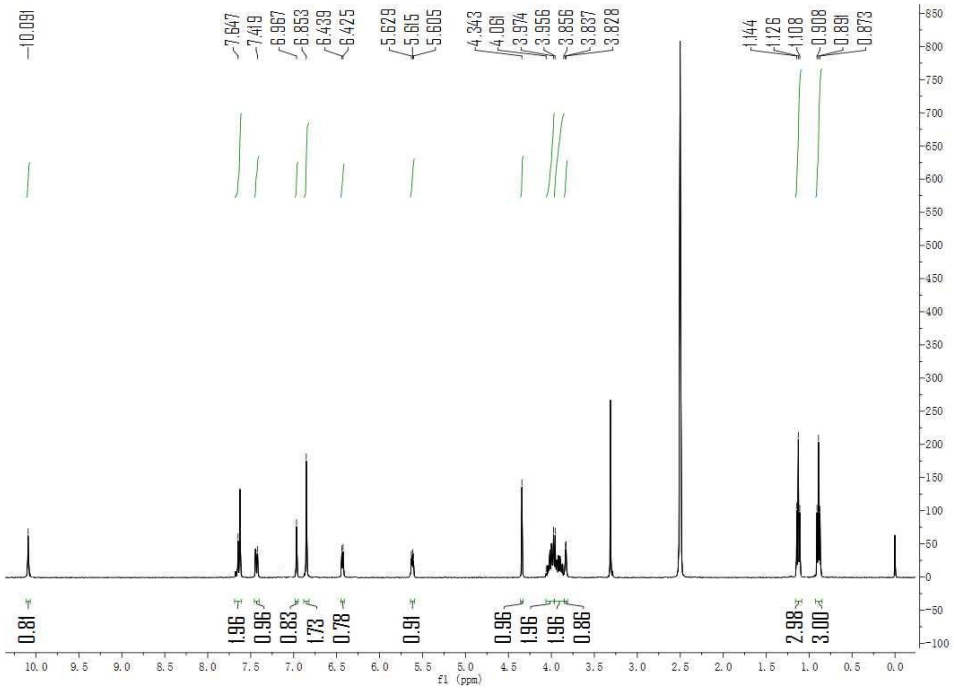
IR spectra of compound **5cg**

5dg

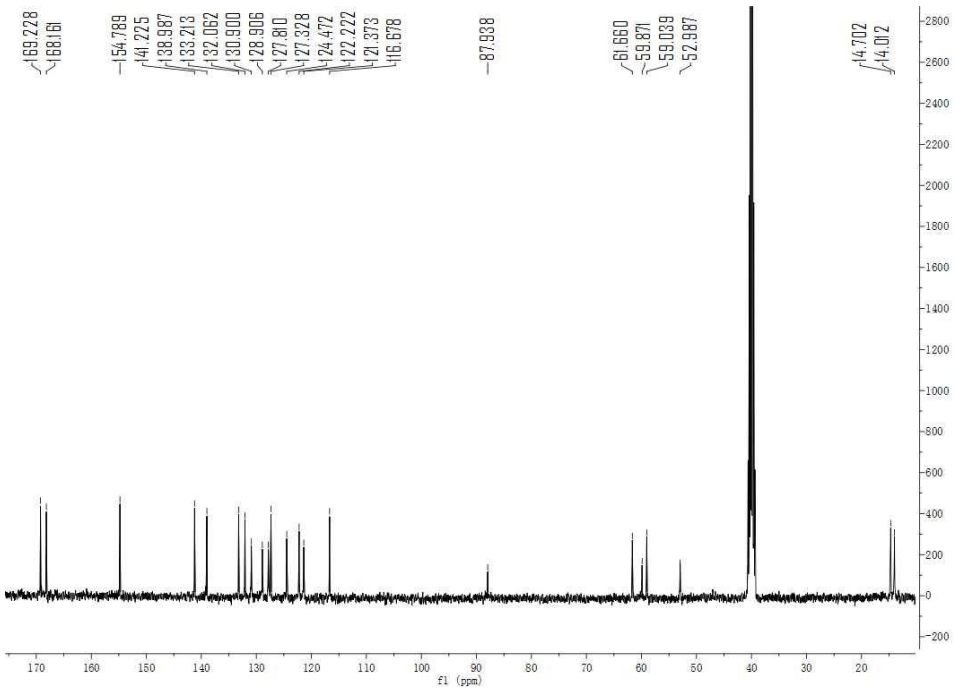


White solid; 481 mg, 91%; mp 158-160 °C; IR (KBr): 3385, 1735, 1631, 1506 cm^{-1};

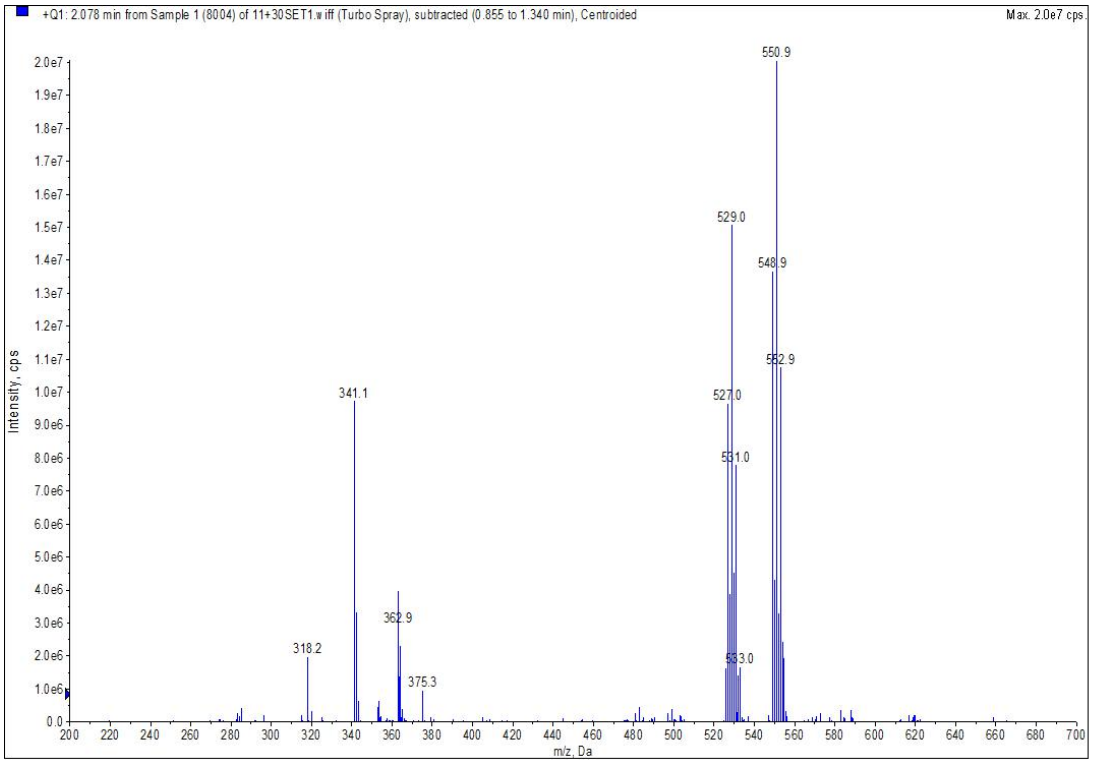
^{1}H NMR (400 MHz, DMSO-d_6, TMS): δ 0.89 (t, J=7.1 Hz, 3H), 1.13 (t, J=7.0 Hz, 3H), 3.83 (d, J=3.5 Hz, 1H), 3.86-3.96 (m, 2H), 3.97-4.06 (m, 2H), 4.34 (s, 1H), 5.62 (m, 1H), 6.43 (d, J=5.9 Hz, 1H), 6.85-6.97 (m, 3H), 7.42-7.65 (m, 3H), 10.09 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.01, 14.70, 52.99, 59.04, 59.87, 61.66, 87.94, 121.37, 122.22, 124.47, 127.33, 127.81, 128.91, 130.90, 132.06, 133.21, 138.99, 141.23, 154.79, 168.16, 169.23; Found C, 49.97; H, 3.89; N, 5.44%; M+1 (mass spectrum), 529.0. $C_{22}H_{21}BrCl_2N_2O_4$ requires C, 50.02; H, 4.01; N, 5.30%; M, 528.22.



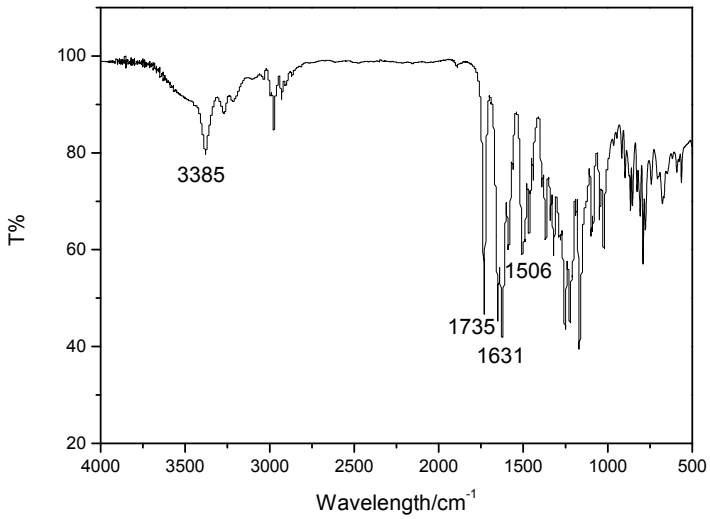
^{1}H NMR spectra of compound **5dg**



^{13}C NMR spectra of compound **5dg**

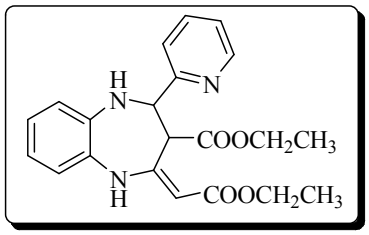


MS of compound **5dg**



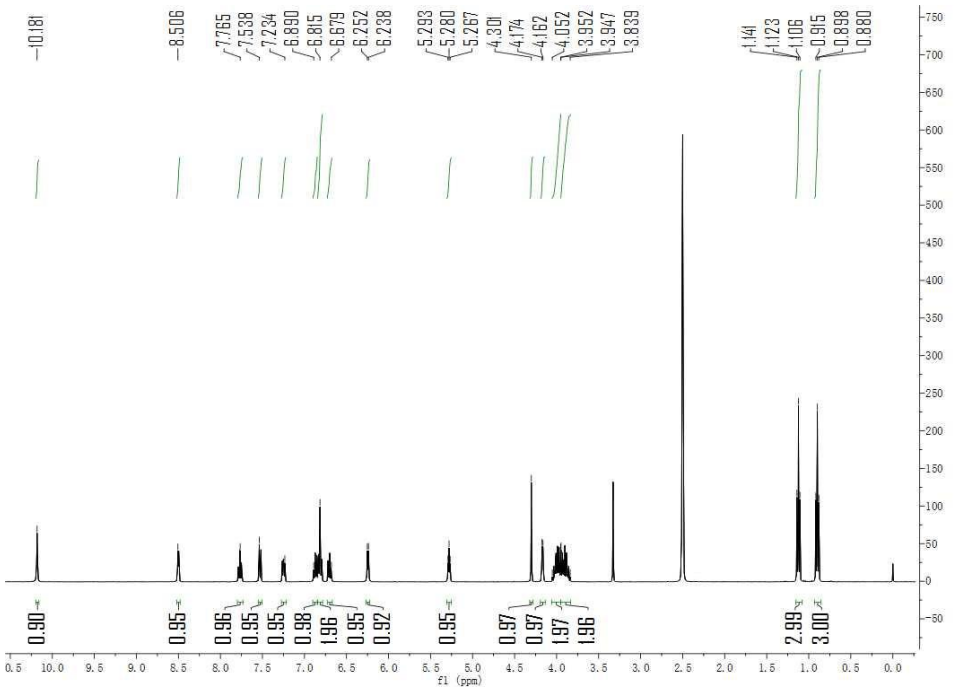
IR spectra of compound **5dg**

5ah

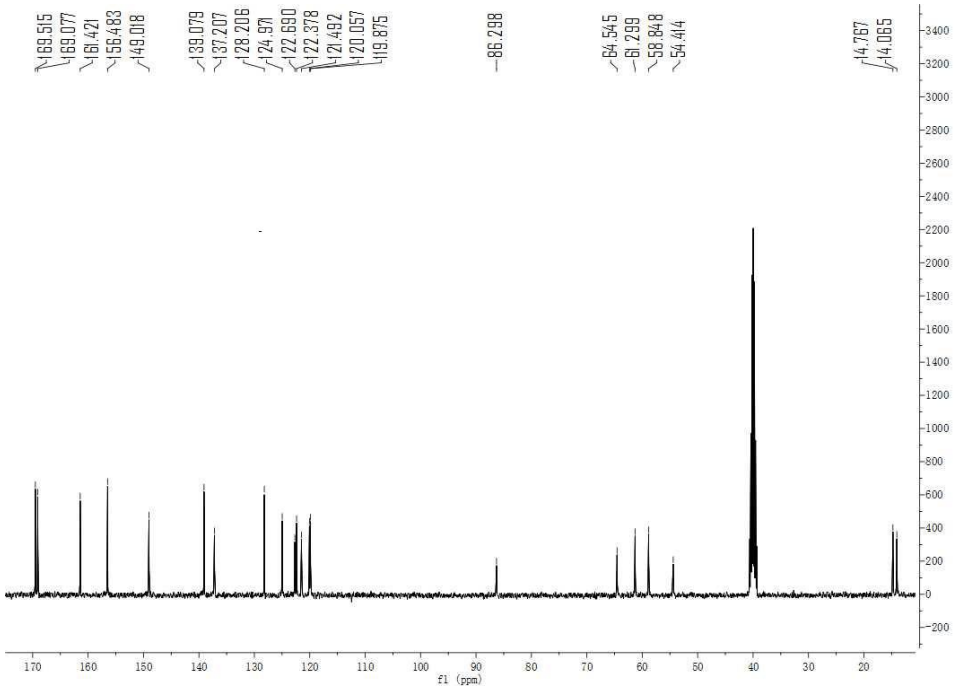


Pale yellow solid; 343 mg, 90%; mp 112-114 °C; IR (KBr): 3292, 1739, 1638, 1512 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.90 (t, J=7.1 Hz, 3H), 1.13 (t, J=7.1

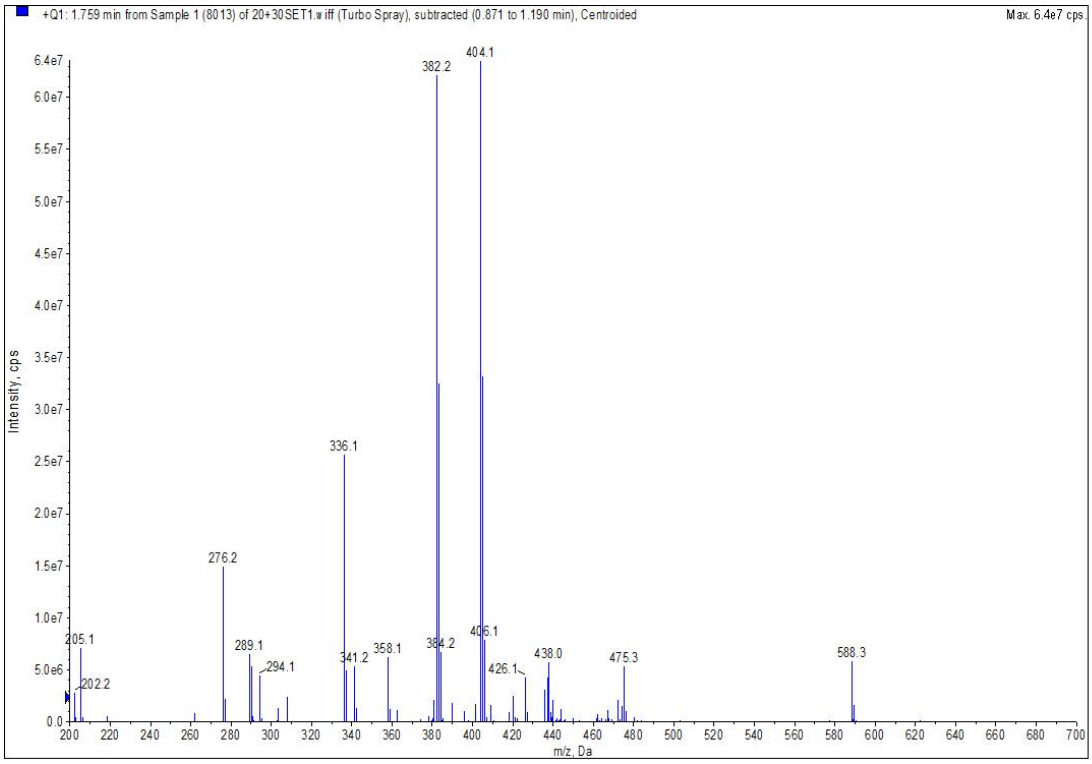
Hz, 3H), 3.84-3.95 (m, 2H), 3.95-4.05 (m, 2H), 4.17 (d, *J*=4.8 Hz, 1H), 4.30 (s, 1H), 5.28 (t, *J*=5.2 Hz, 1H), 6.24 (d, *J*=5.6 Hz, 1H), 6.68-6.89 (m, 4H), 7.23-8.51 (m, 4H), 10.18(s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.07, 14.77, 54.41, 58.85, 61.30, 64.55, 86.30, 119.88, 120.06, 121.49, 122.38, 122.69, 124.97, 128.21, 137.21, 139.08, 149.02, 156.48, 161.42, 169.08, 169.52; Found C, 66.02; H, 5.94; N, 11.06%; M+1 (mass spectrum), 382.2. $C_{21}H_{23}N_3O_4$ requires C, 66.13; H, 6.08; N, 11.02%; M, 381.43.



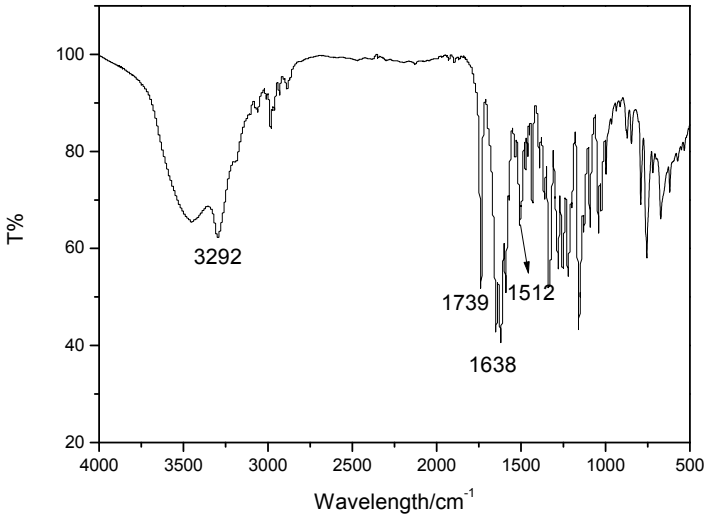
^{1}H NMR spectra of compound **5ah**



^{13}C NMR spectra of compound **5ah**

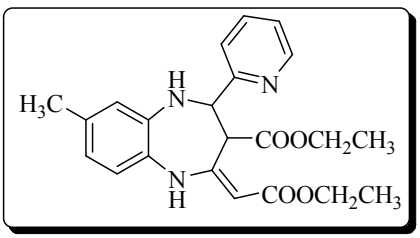


MS of compound **5ah**



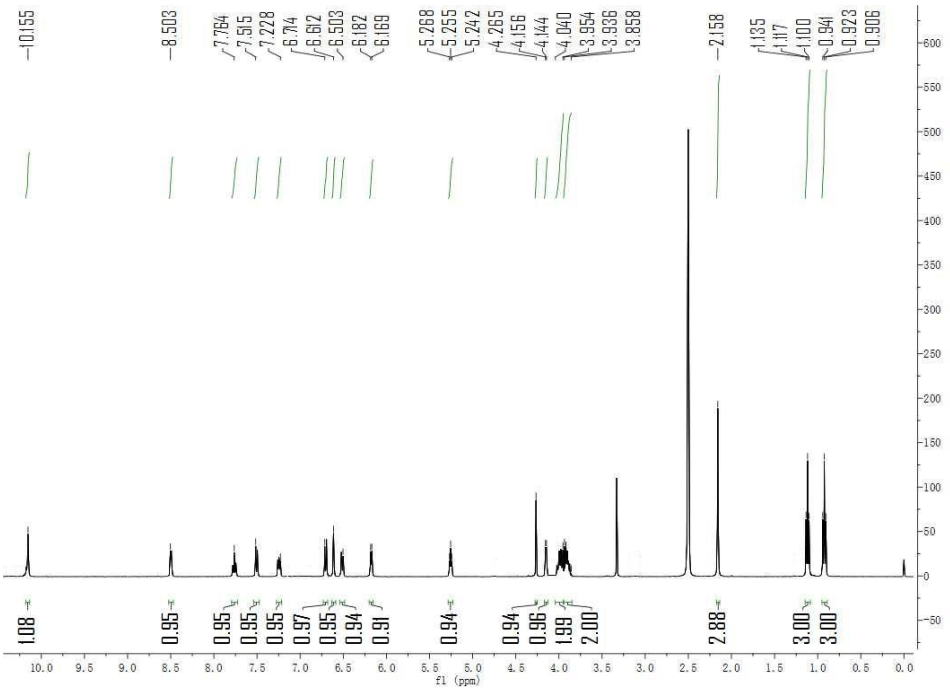
IR spectra of compound **5ah**

5bh

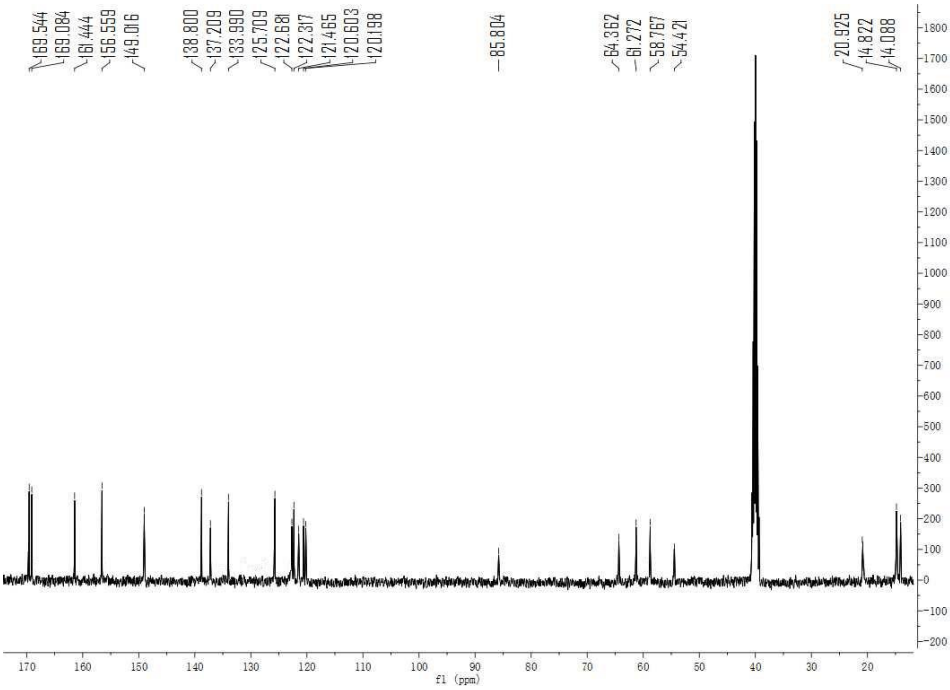


Pale yellow solid; 368 mg, 93%; mp 116-118 °C; IR (KBr): 3301, 1732, 1639, 1516 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.92 (t, J=7.1 Hz, 3H), 1.12 (t, J=7.1

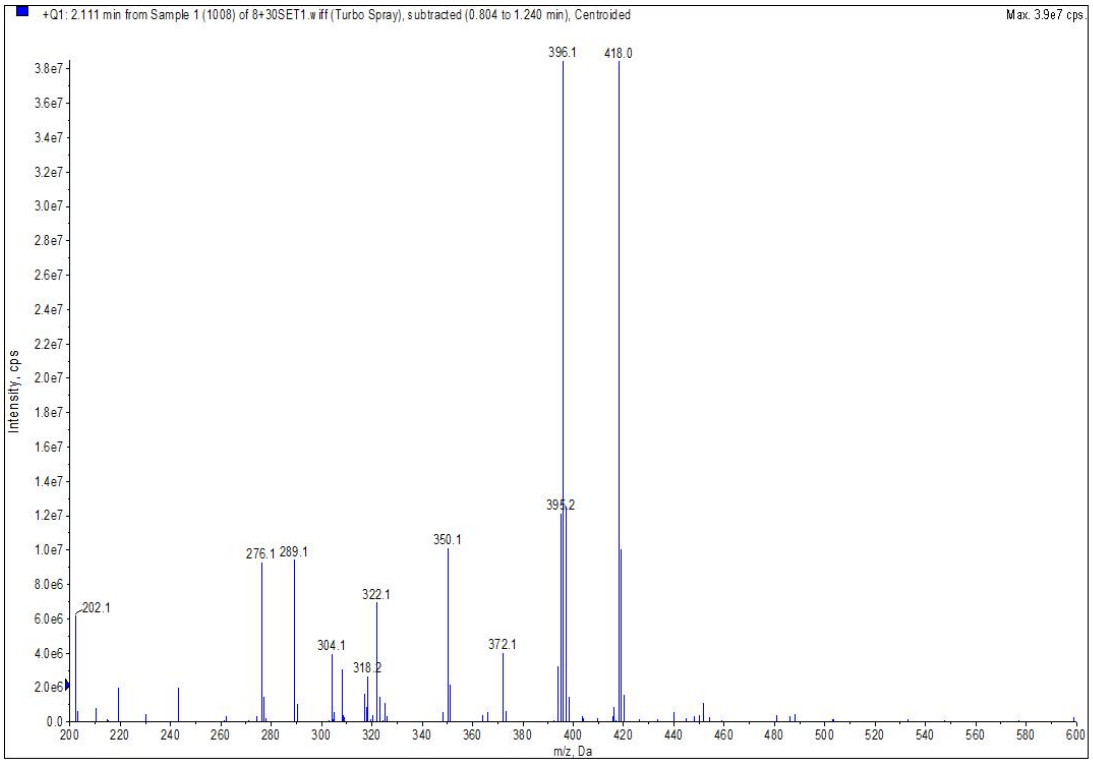
Hz, 3H), 2.16 (s, 3H), 3.86-3.94 (m, 2H), 3.95-4.04 (m, 2H), 4.15 (d, *J*=4.7 Hz, 1H), 4.27 (s, 1H), 5.26 (t, *J*=5.2 Hz, 1H), 6.18 (d, *J*=5.5 Hz, 1H), 6.50-6.71 (m, 3H), 7.23-8.50 (m, 4H), 10.16(s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.09, 14.82, 20.93, 54.42, 58.77, 61.27, 64.36, 85.80, 120.20, 120.60, 121.47, 122.32, 122.68, 125.71, 133.99, 137.21, 138.80, 149.02, 156.56, 161.44, 169.08, 169.54; Found C, 66.86; H, 6.43; N, 10.55%; M+1 (mass spectrum), 396.1. $C_{22}H_{25}N_3O_4$ requires C, 66.82; H, 6.37; N, 10.63%; M, 395.45.



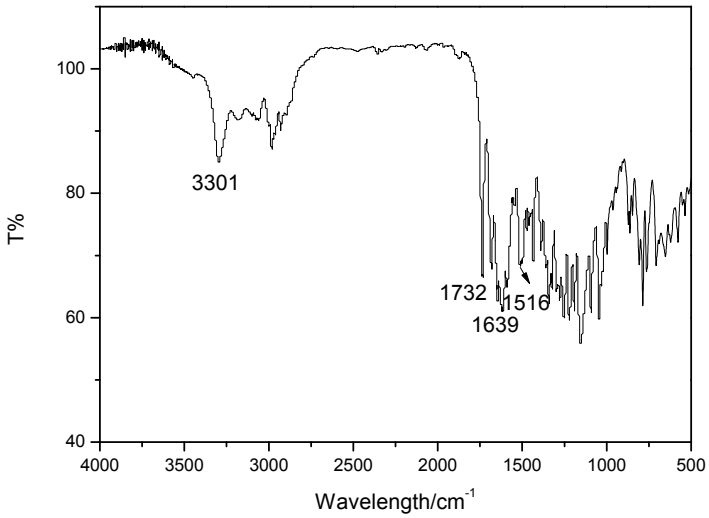
^{1}H NMR spectra of compound **5bh**



^{13}C NMR spectra of compound **5bh**

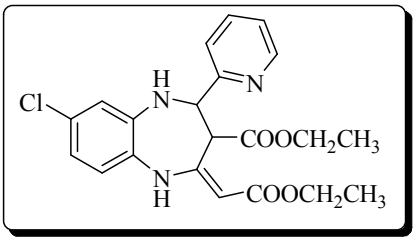


MS of compound **5bh**



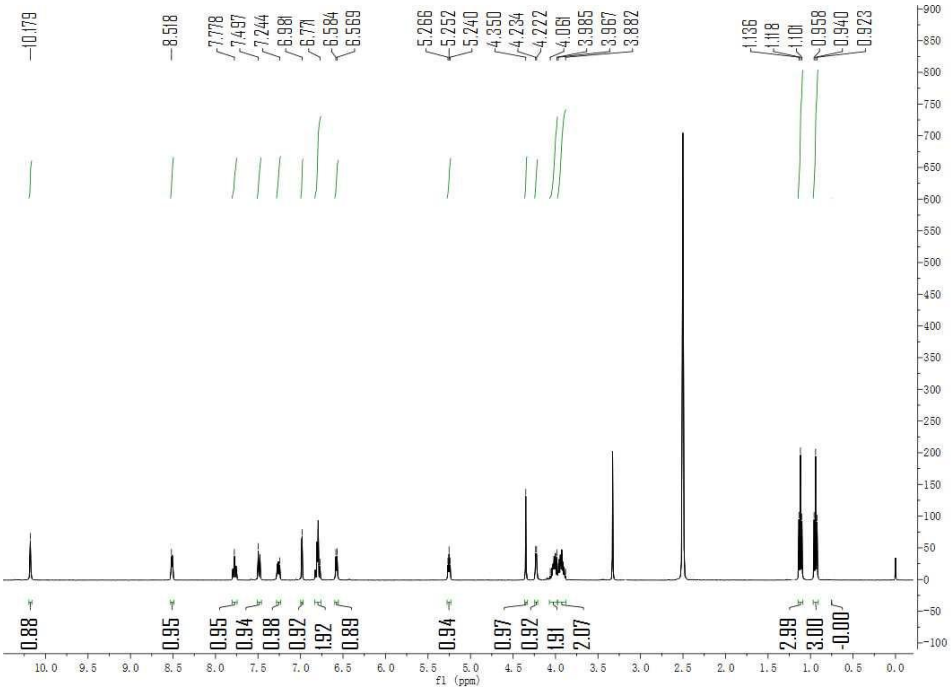
IR spectra of compound **5bh**

5ch

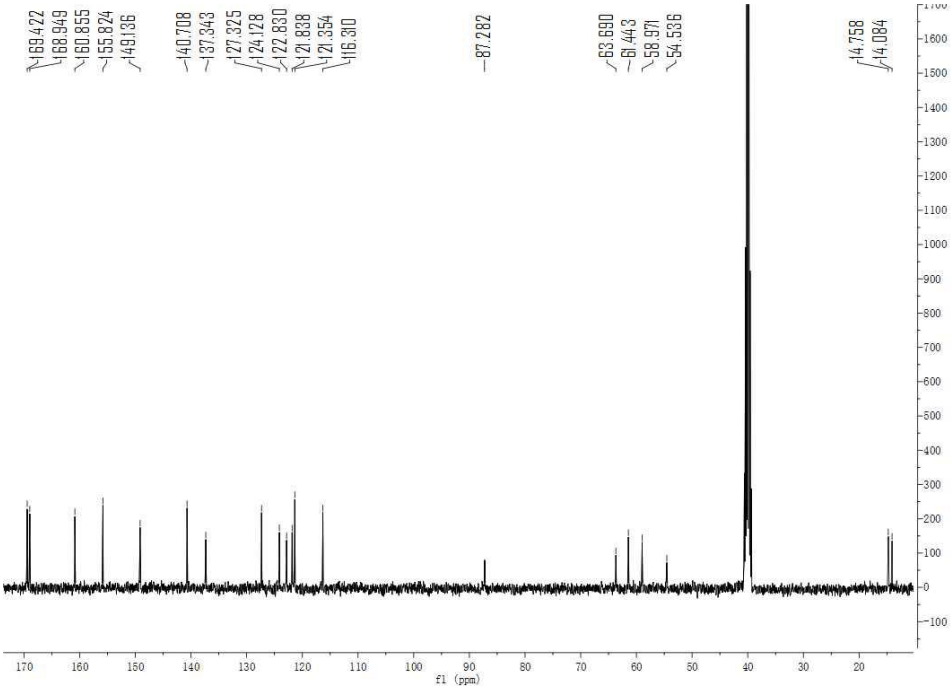


White solid; 362 mg, 87%; mp: 140-142 °C; IR (KBr): 3392, 1741, 1630, 1518 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.1 Hz, 3H), 1.12 (t, J=7.1 Hz,

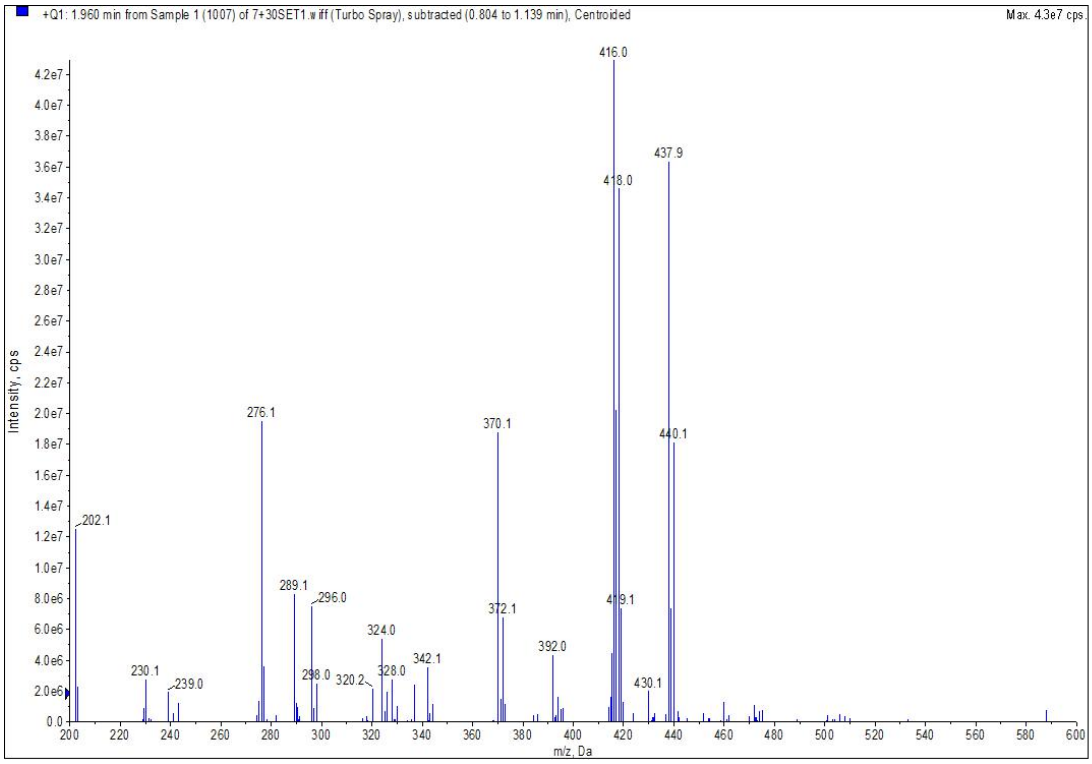
3H), 3.88-3.97 (m, 2H), 3.99-4.06 (m, 2H), 4.23 (d, *J*=4.7 Hz, 1H), 4.35 (s, 1H), 5.25 (t, *J*=5.2 Hz, 1H), 6.58 (d, *J*=5.7 Hz, 1H), 6.77-6.98 (m, 3H), 7.24-8.52 (m, 4H), 10.18(s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.08, 14.76, 54.54, 58.97, 61.44, 63.69, 87.28, 116.31, 121.35, 121.84, 122.83, 124.13, 127.33, 137.34, 140.71, 149.14, 155.82, 160.86, 168.95, 169.42; Found C, 61.77; H, 5.45; N, 9.94%; M+1 (mass spectrum), 416.0. $C_{21}H_{22}ClN_3O_4$ requires C, 61.65; H, 5.33; N, 10.10%; M, 415.87.



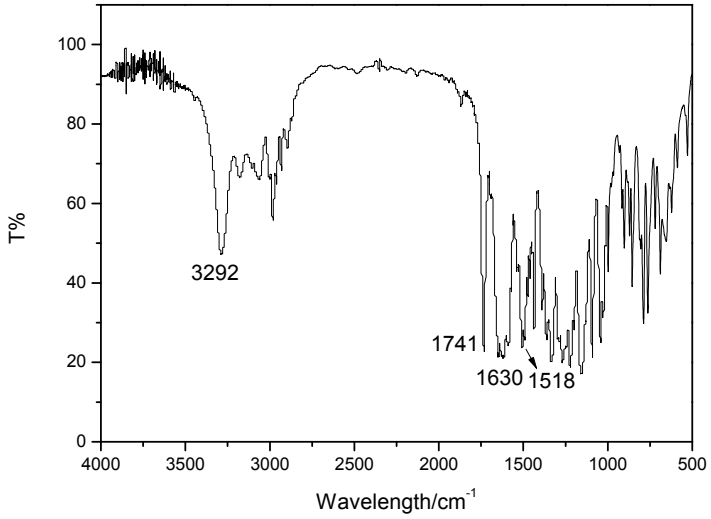
^{1}H NMR spectra of compound **5ch**



^{13}C NMR spectra of compound **5ch**

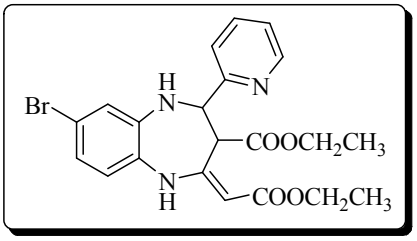


MS of compound **5ch**



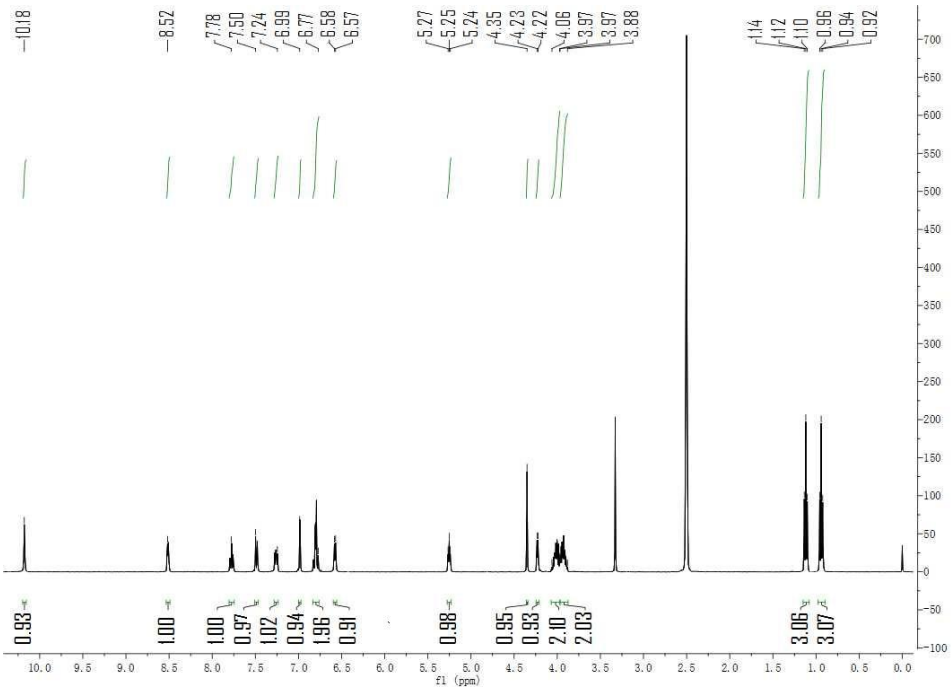
IR spectra of compound **5ch**

5dh

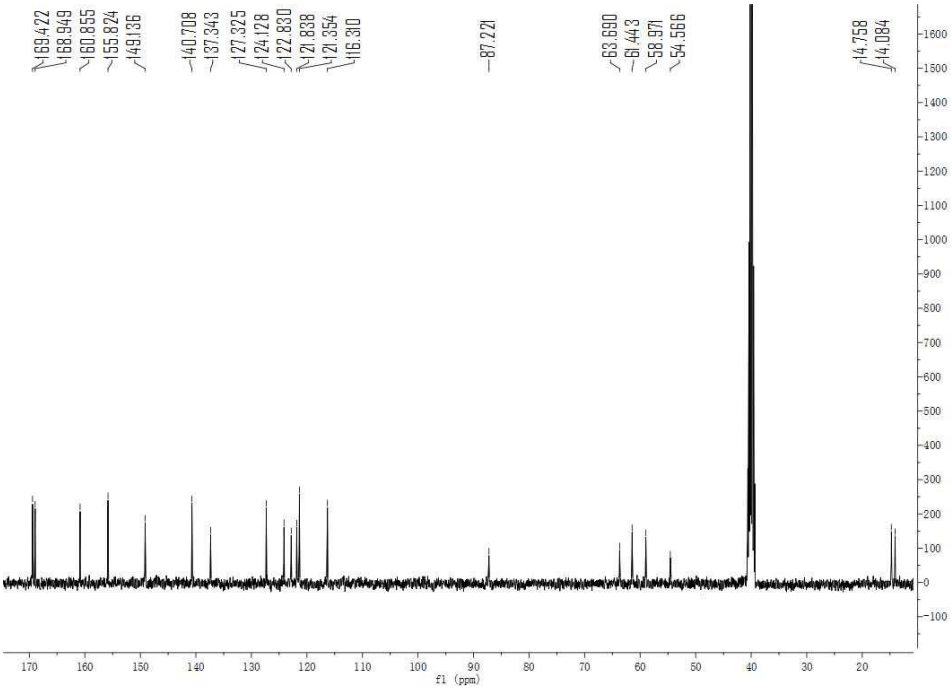


White solid; 400 mg, 87%; mp 142-144 °C; IR (KBr): 3292, 1721, 1630, 1504 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.1 Hz, 3H), 1.12 (t, J=7.1 Hz,

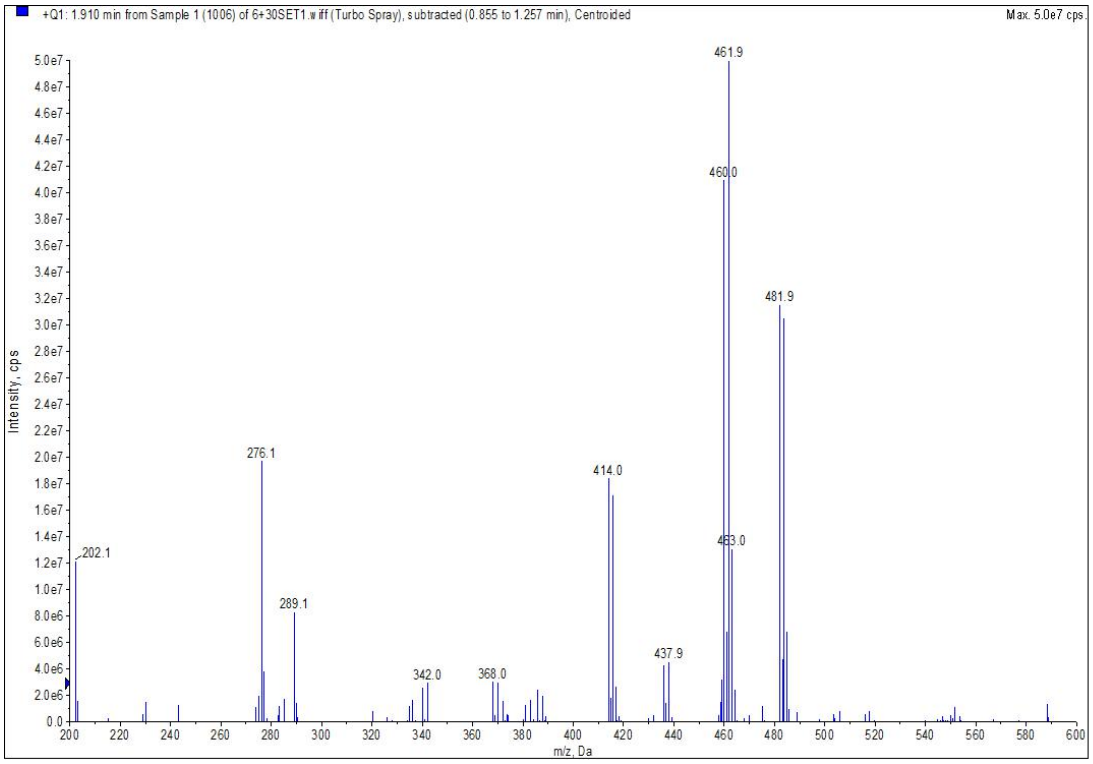
3H), 3.88-3.97 (m, 2H), 3.97-4.06 (m, 2H), 4.23 (d, *J*=4.7 Hz, 1H), 4.35 (s, 1H), 5.25 (t, *J*=5.2 Hz, 1H), 6.58 (d, *J*=5.7 Hz, 1H), 6.77-6.99 (m, 3H), 7.24-8.52 (m, 4H), 10.18(s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.08, 14.76, 54.57, 58.97, 61.44, 63.69, 87.22, 116.31, 121.35, 121.84, 122.83, 124.13, 127.33, 137.34, 140.71, 149.14, 155.82, 160.86, 168.95, 169.42; Found C, 54.65; H, 4.69; N, 9.27%; M+1 (mass spectrum), 461.9. $C_{21}H_{22}BrN_3O_4$ requires C, 54.79; H, 4.82; N, 9.13%; M, 460.32.



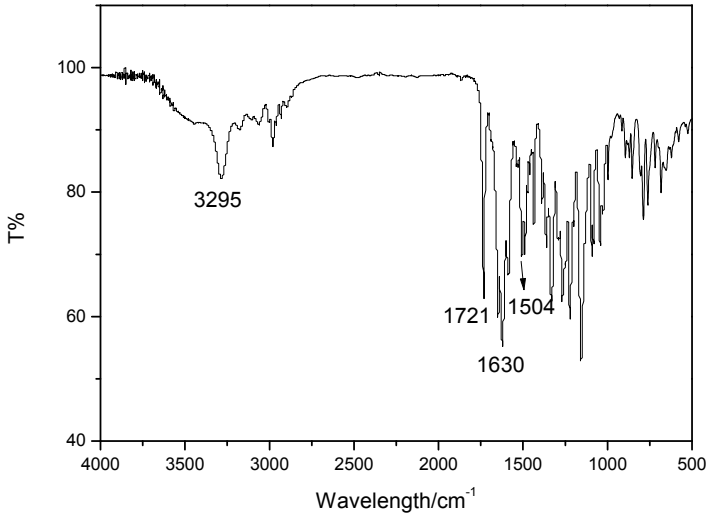
^{1}H NMR spectra of compound **5dh**



^{13}C NMR spectra of compound **5dh**

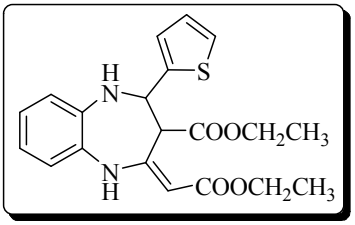


MS of compound **5dh**



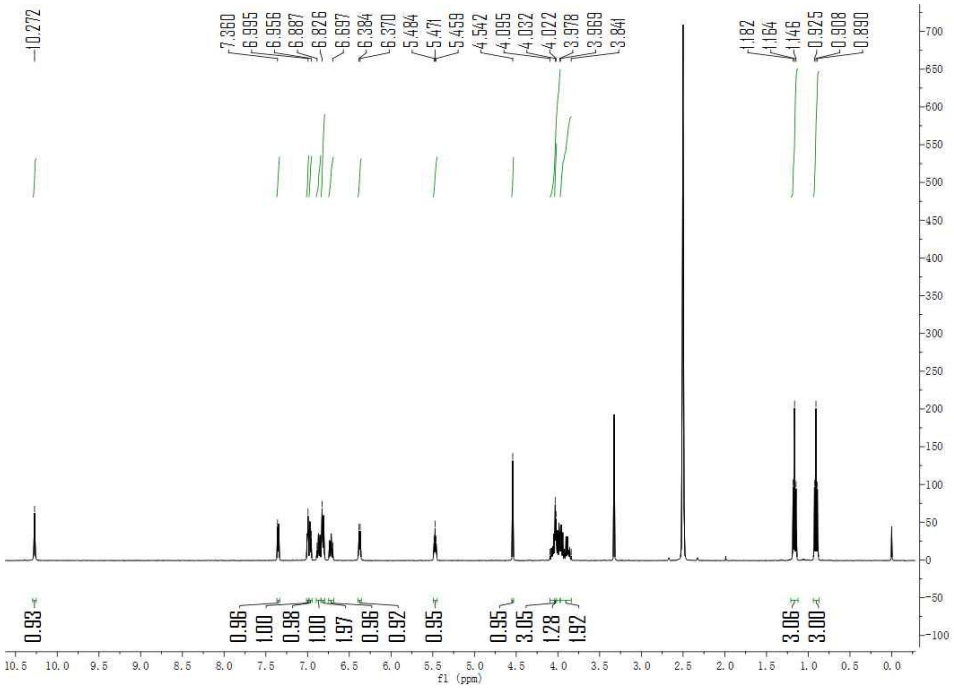
IR spectra of compound **5dh**

5ai

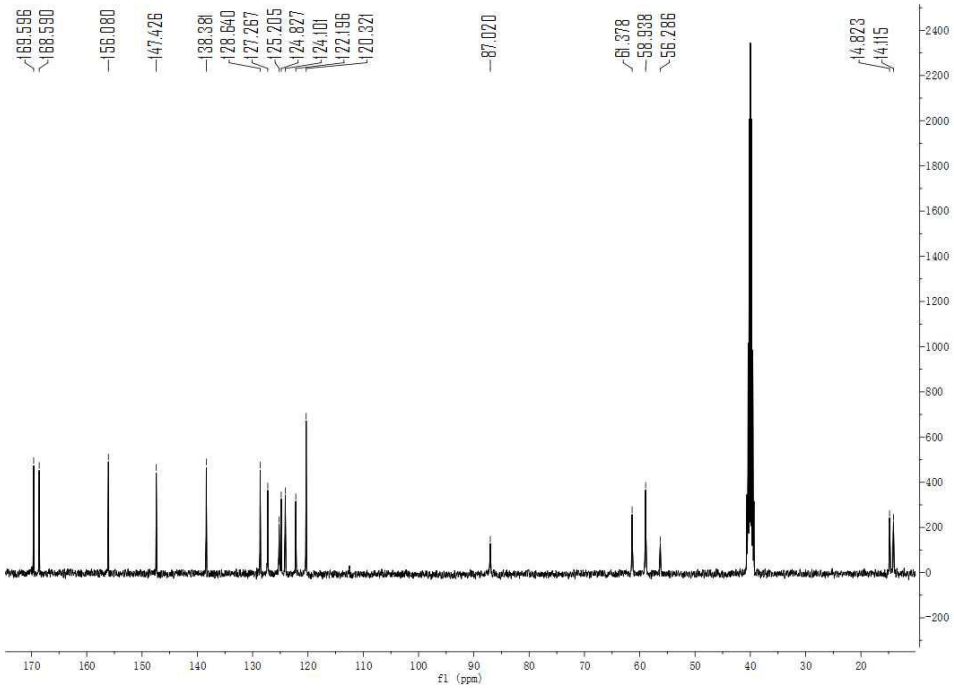


Yellow solid; 344 mg, 89%; mp 96-98 °C; IR (KBr): 3292, 1721, 1630, 1504 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.91 (t, J=7.1 Hz, 3H), 1.16 (t, J=7.1 Hz, 3H),

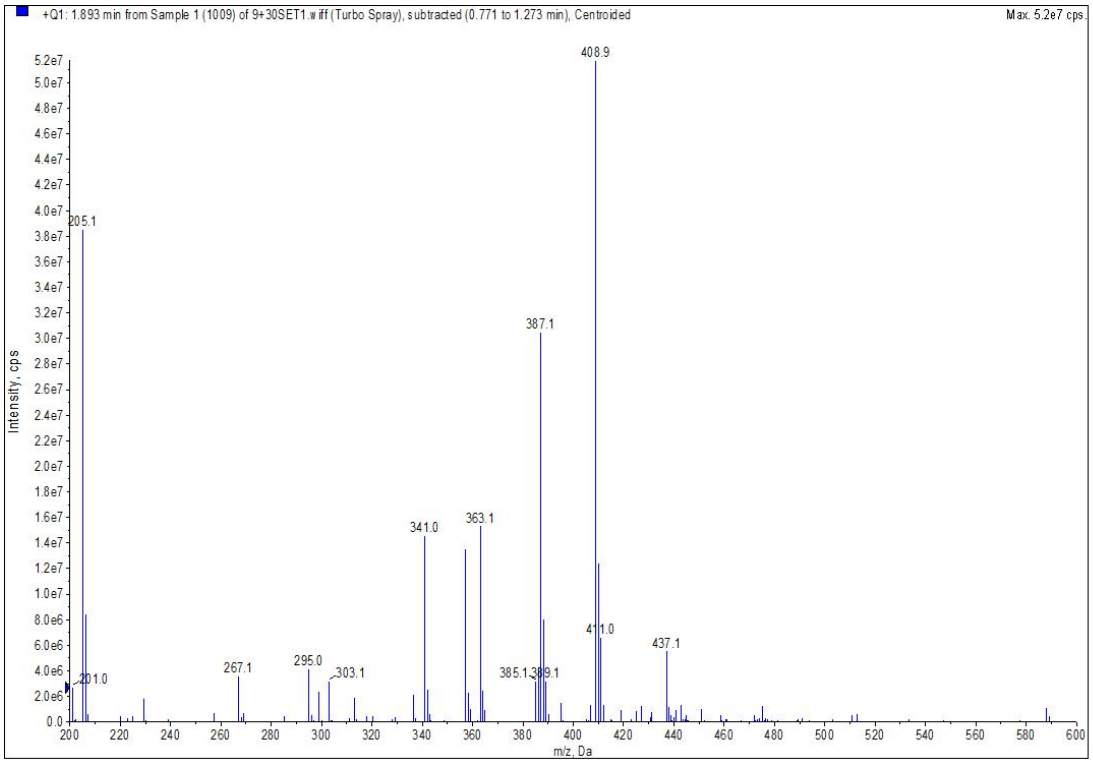
3.84-3.97 (m, 2H), 3.98-4.10 (m, 2H), 4.03 (d, *J*=4.0 Hz, 1H), 4.54 (s, 1H), 5.47 (t, *J*=5.0 Hz, 1H), 6.38 (d, *J*=5.5 Hz, 1H), 6.70-6.89 (m, 4H), 6.96-7.36 (m, 3H), 10.27 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.12, 14.82, 56.29, 58.94, 61.38, 87.02, 120.32, 122.20, 124.10, 124.83, 125.21, 127.27, 128.64, 138.38, 147.43, 156.08, 168.59, 169.59; Found C, 62.05; H, 5.59; N, 7.38%; M+1 (mass spectrum), 387.1. $C_{20}H_{22}N_2O_4S$ requires C, 62.16; H, 5.74; N, 7.25%; M, 386.46.



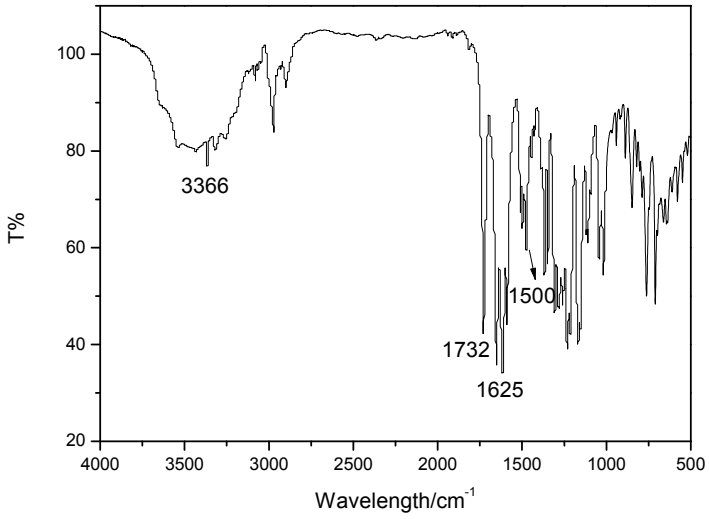
^{1}H NMR spectra of compound **5ai**



^{13}C NMR spectra of compound **5ai**

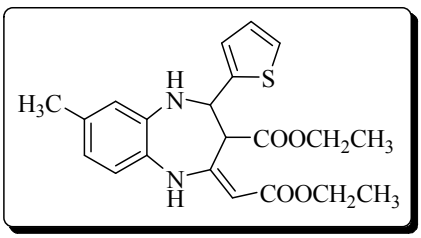


MS of compound **5ai**



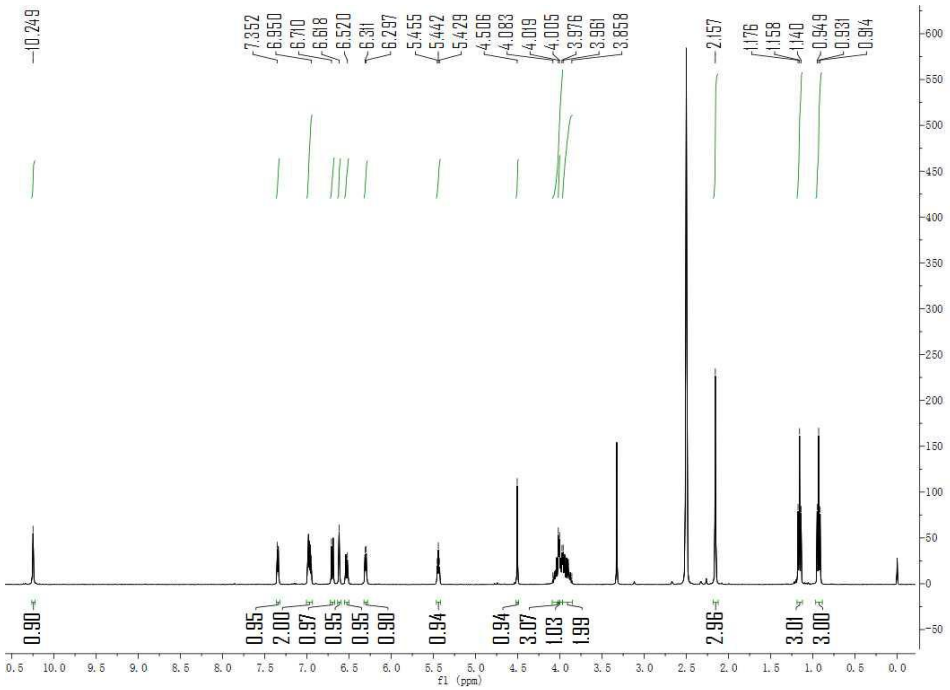
IR spectra of compound **5ai**

5bi

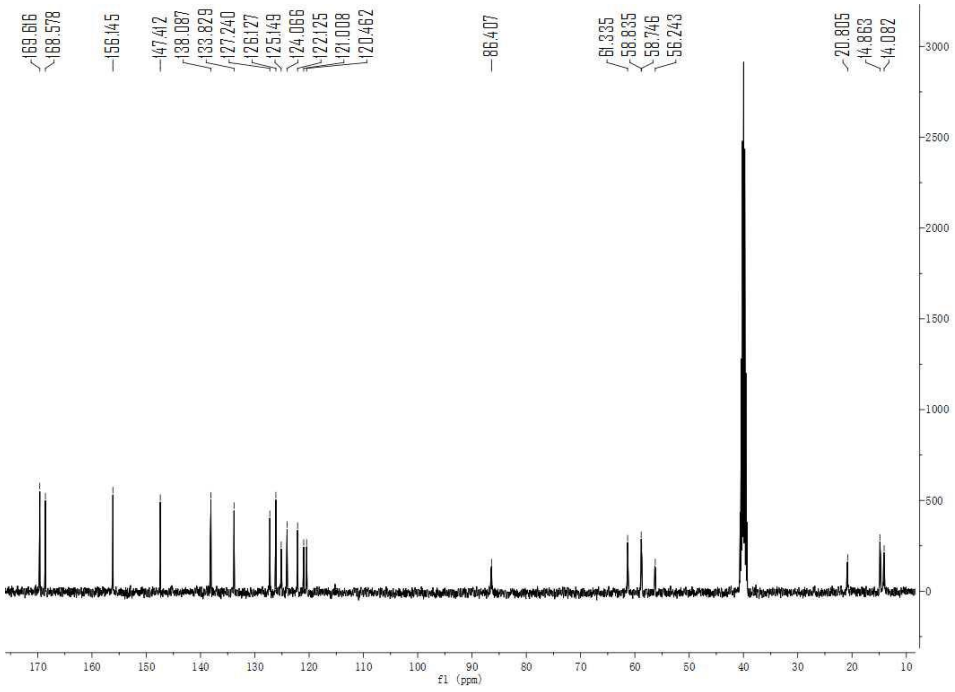


Yellow solid; 364 mg, 91%; mp 116-118 °C; IR (KBr): 3356, 1739, 1622, 1506 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.93 (t, J=7.1 Hz, 3H), 1.16 (t, J=7.1 Hz,

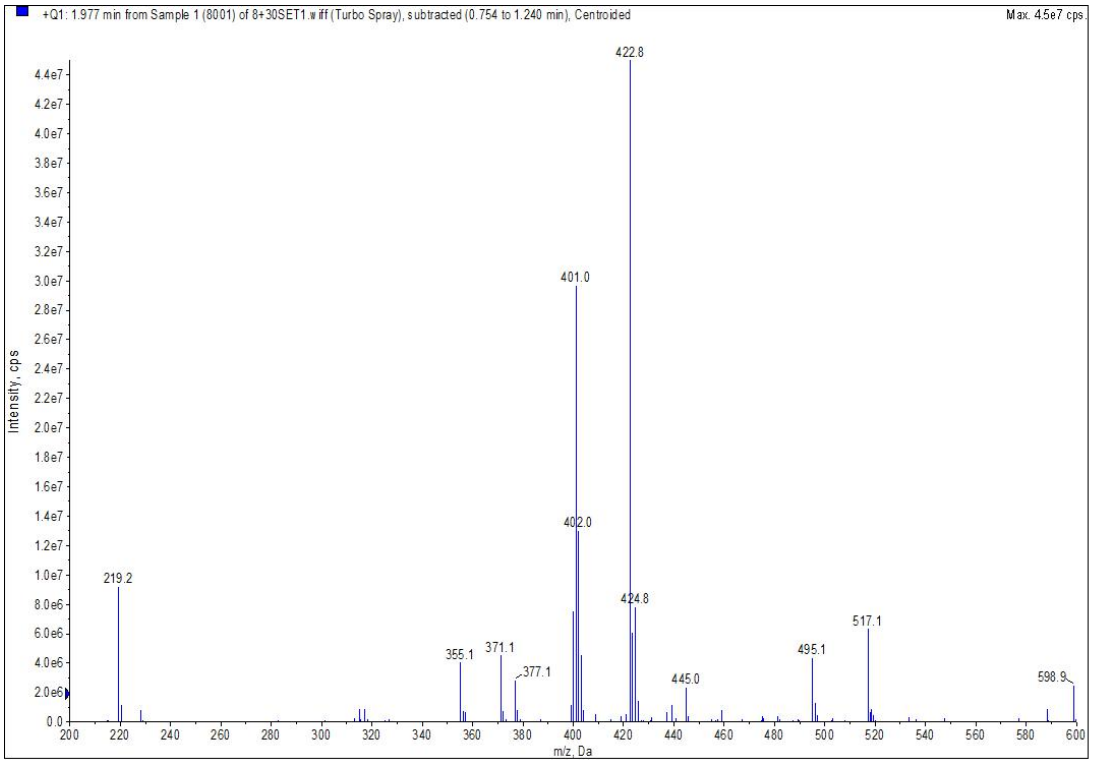
3H), 2.16 (s, 3H), 3.86-3.96 (m, 2H), 3.98-4.08 (m, 2H), 4.01 (d, *J*=5.9 Hz, 1H), 4.51 (s, 1H), 5.44 (t, *J*=5.1 Hz, 1H), 6.30 (d, *J*=5.5 Hz, 1H), 6.52-6.71 (m, 3H), 6.95-7.35 (m, 3H), 10.25 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.08, 14.86, 20.81, 56.24, 58.75, 58.84, 61.34, 86.41, 120.46, 121.01, 122.13, 124.07, 125.15, 126.13, 127.24, 133.83, 138.09, 147.41, 156.15, 168.58, 169.62; Found C, 63.12; H, 6.19; N, 6.86%; M+1 (mass spectrum), 401.0. $C_{21}H_{24}N_2O_4S$ requires C, 62.98; H, 6.04; N, 6.99%; M, 400.49.



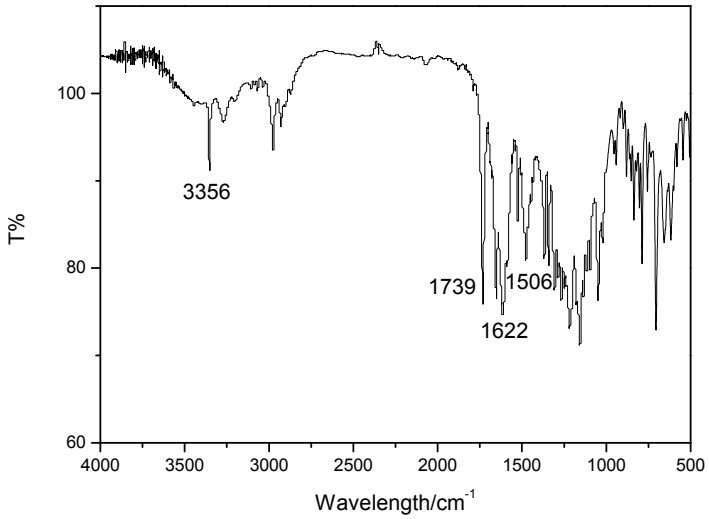
^{1}H NMR spectra of compound **5bi**



^{13}C NMR spectra of compound **5bi**

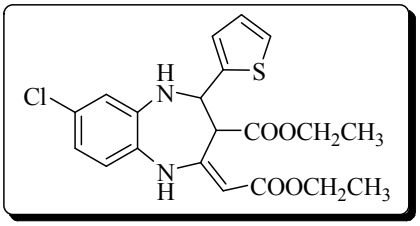


MS of compound **5bi**



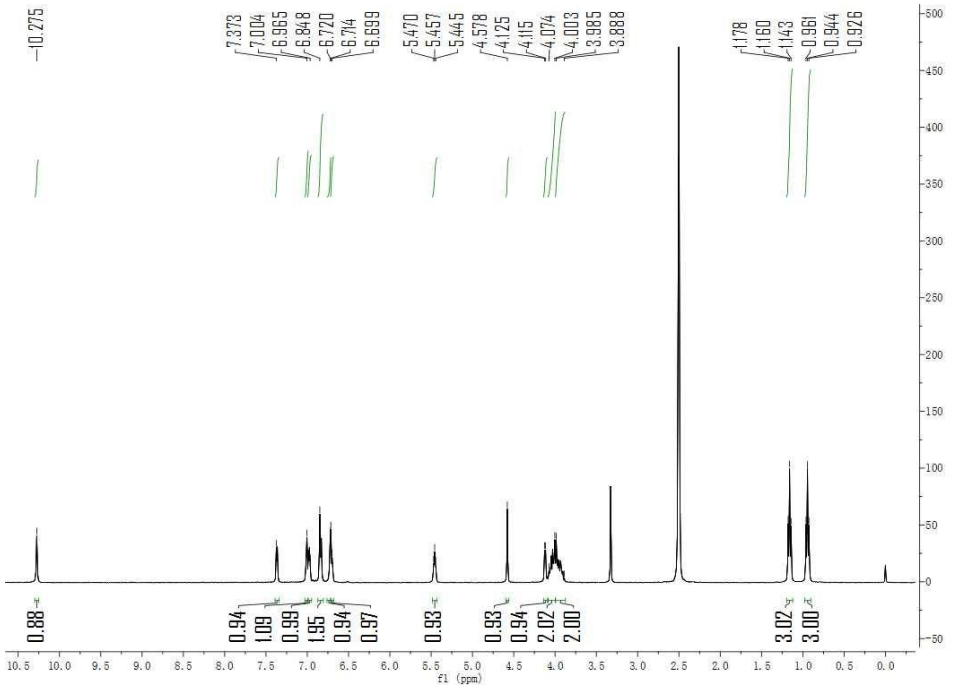
IR spectra of compound **5bi**

5ci

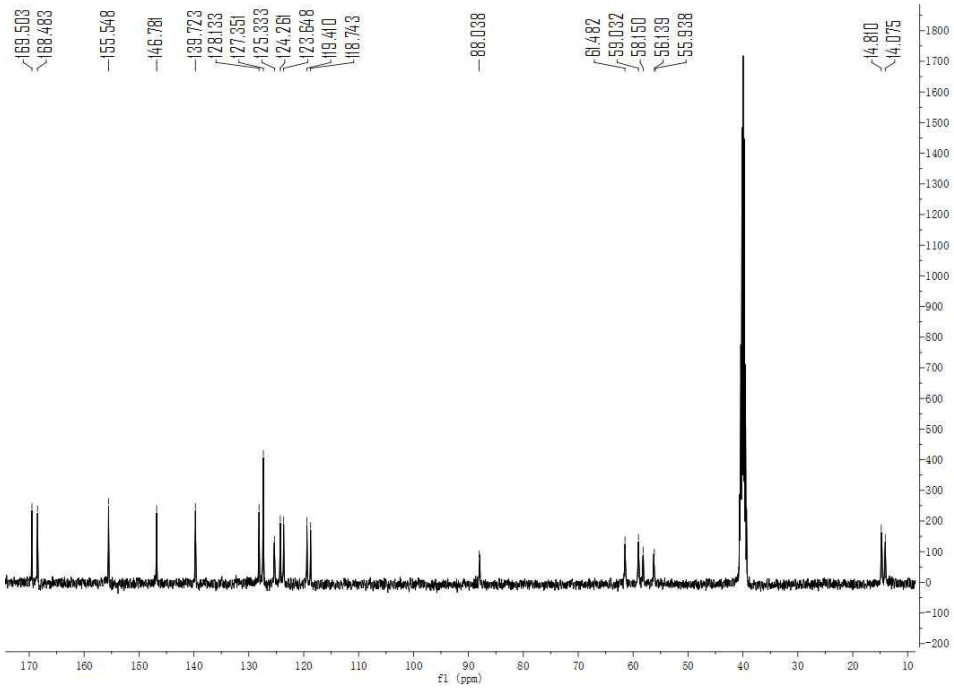


Yellow solid; 354 mg, 84%; mp 106-108 °C; IR (KBr): 3348, 1730, 1621, 1503 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.94 (t, J=7.0 Hz, 3H), 1.16 (t, J=7.1 Hz,

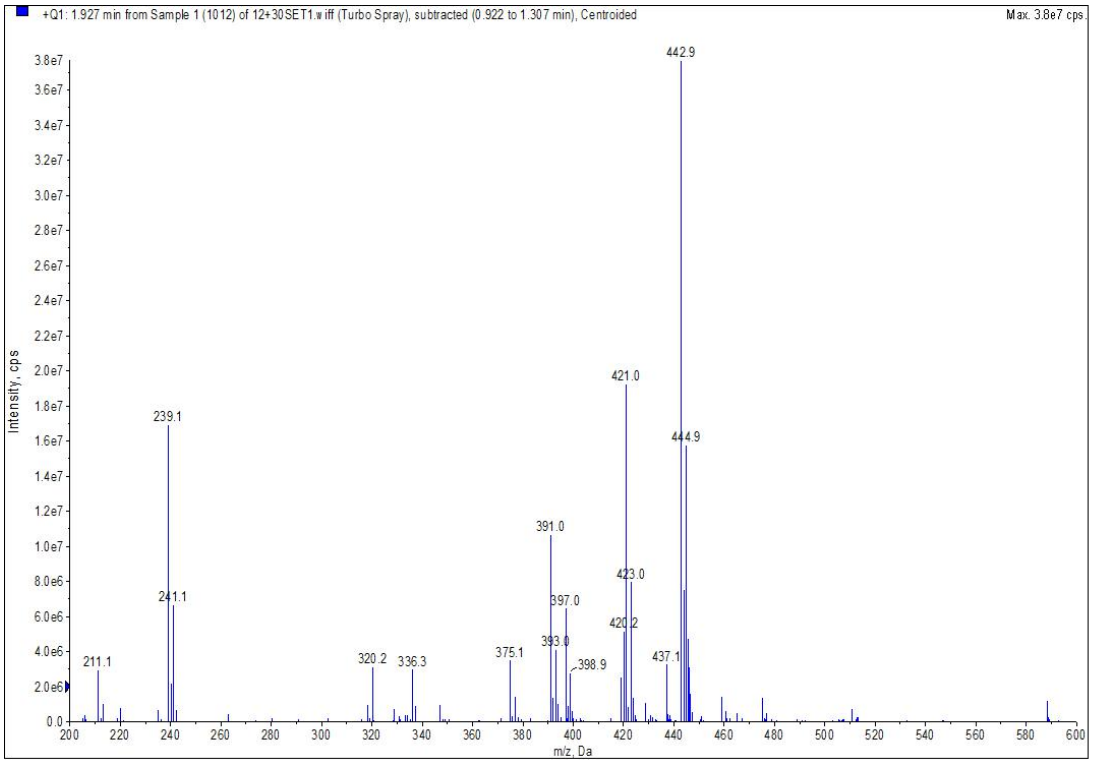
3H), 3.89-3.98 (m, 2H), 4.00-4.07 (m, 2H), 4.12 (d, *J*=4.3 Hz, 1H), 4.58 (s, 1H), 5.46 (t, *J*=5.0 Hz, 1H), 6.70 (d, *J*=5.6 Hz, 1H), 6.72-6.85 (m, 3H), 6.97-7.37 (m, 3H), 10.28 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.08, 14.81, 56.14, 58.15, 59.03, 61.48, 88.04, 118.74, 119.41, 123.65, 124.26, 125.33, 127.35, 128.13, 139.72, 146.78, 155.54, 168.48, 169.50; Found C, 57.21; H, 5.08; N, 6.51%; M+1 (mass spectrum), 421.0. $C_{20}H_{21}ClN_2O_4S$ requires C, 57.07; H, 5.03; N, 6.66%; M, 420.91.



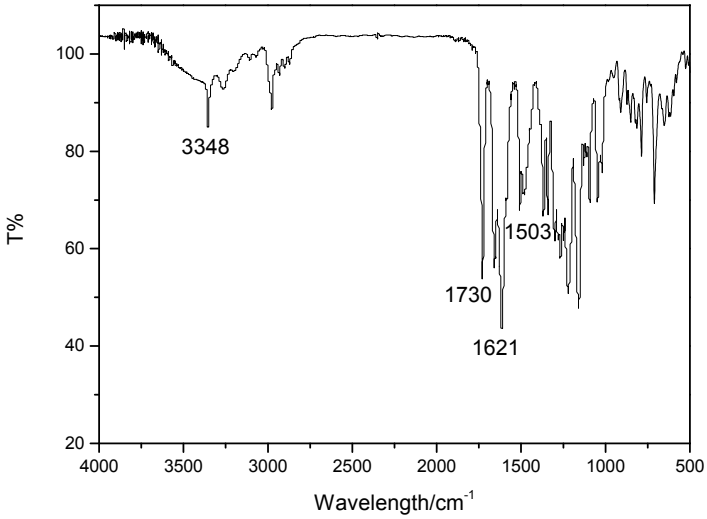
^{1}H NMR spectra of compound **5ci**



^{13}C NMR spectra of compound **5ci**

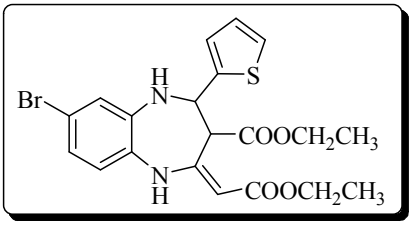


MS of compound **5ci**



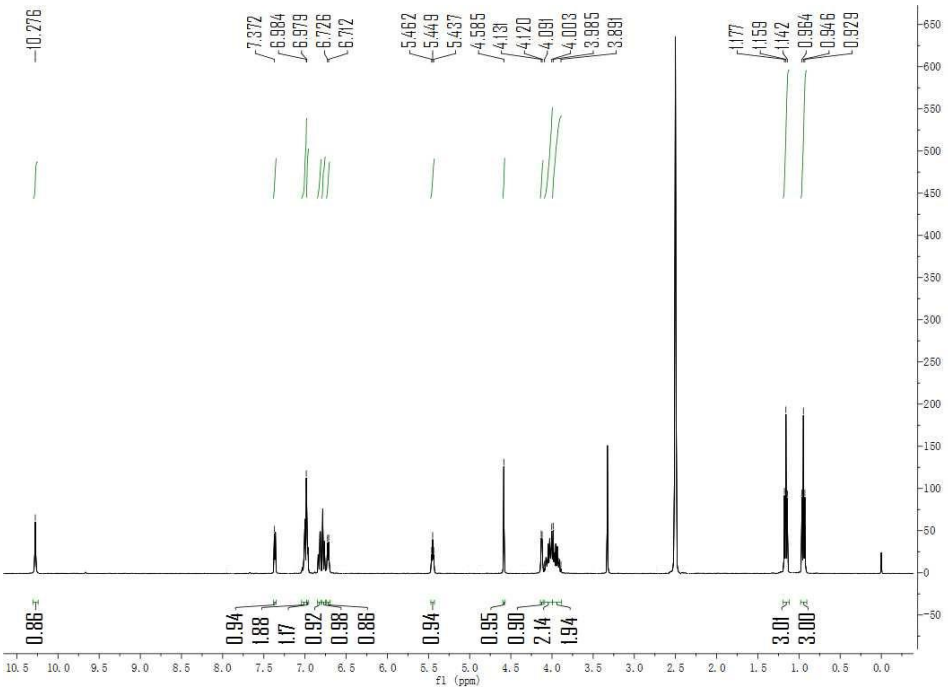
IR spectra of compound **5ci**

5di

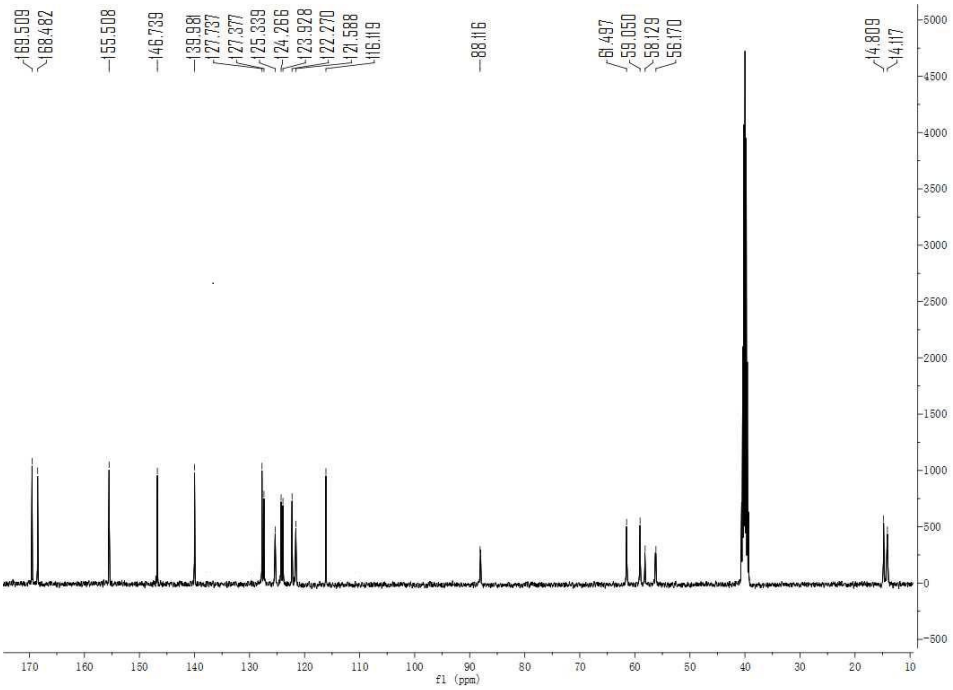


Yellow solid; 447 mg, 96%; mp 128-130 °C; IR (KBr): 3347, 1721, 1612, 1499 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.95 (t, J=7.1 Hz, 3H), 1.16 (t, J=7.1 Hz,

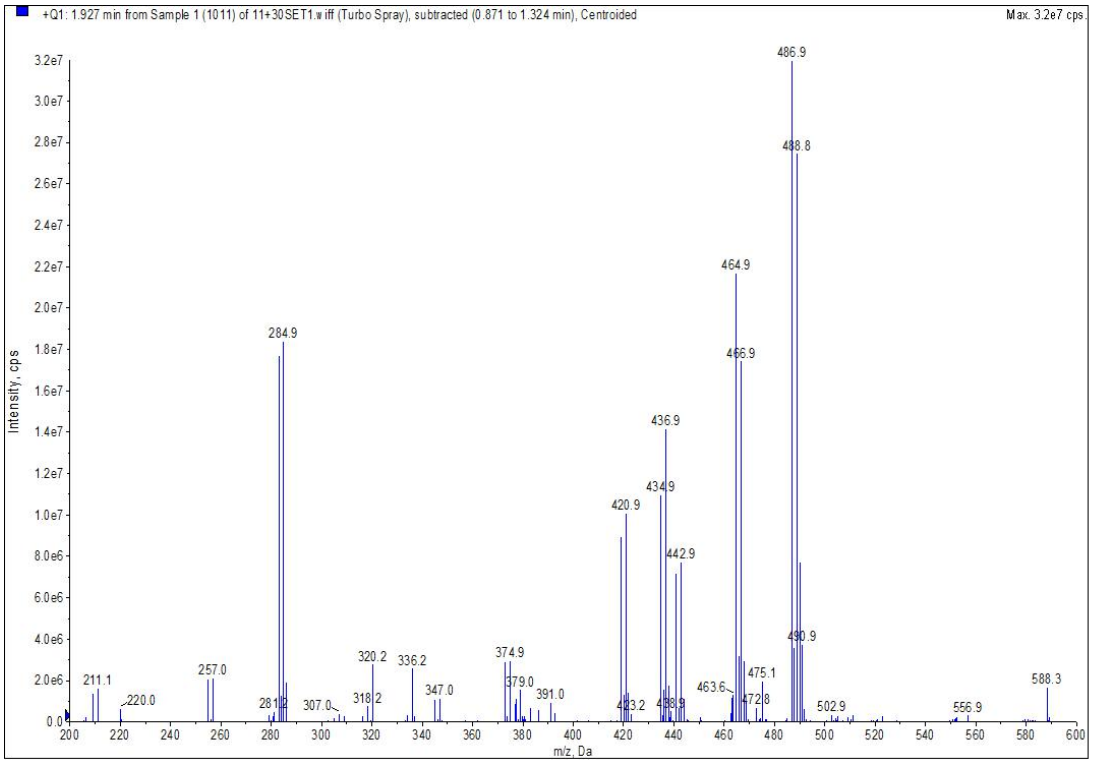
3H), 3.89-3.98 (m, 2H), 4.00-4.09 (m, 2H), 4.13 (d, *J*=4.6 Hz, 1H), 4.59 (s, 1H), 5.45 (t, *J*=5.0 Hz, 1H), 6.72 (d, *J*=5.6 Hz, 1H), 6.76-6.98 (m, 3H), 6.98-7.37 (m, 3H), 10.28 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.12, 14.81, 56.17, 58.13, 59.05, 61.50, 88.12, 116.12, 121.59, 122.27, 123.93, 124.27, 125.34, 127.38, 127.74, 139.98, 146.74, 155.51, 168.48, 169.51; Found C, 51.79; H, 4.79; N, 5.91%; M+1 (mass spectrum), 467.0. $C_{20}H_{21}BrN_2O_4S$ requires C, 51.62; H, 4.55; N, 6.02%; M, 465.36.



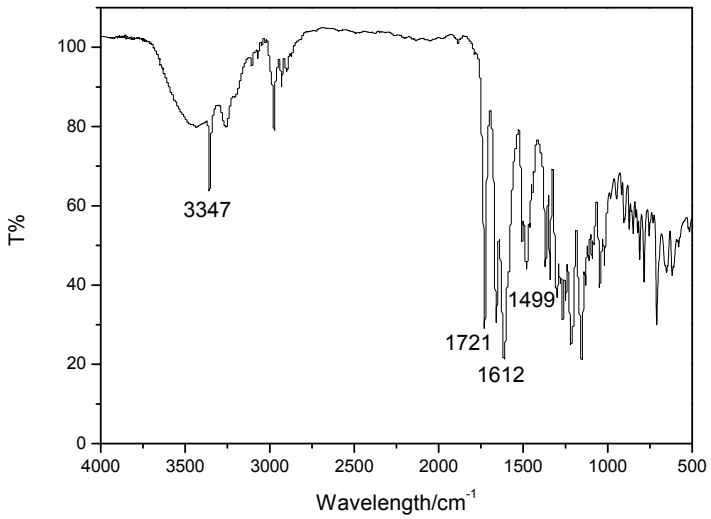
^{1}H NMR spectra of compound **5di**



^{13}C NMR spectra of compound **5di**

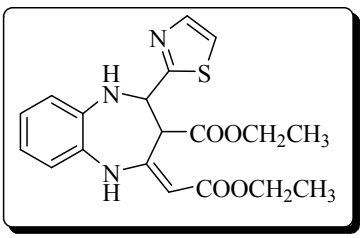


MS of compound **5di**



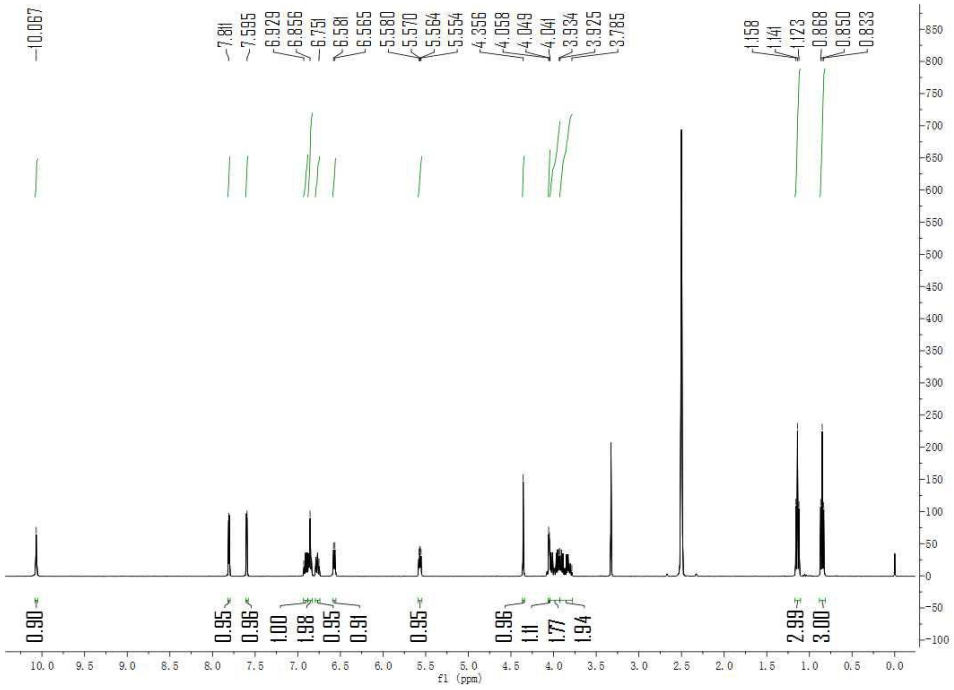
IR spectra of compound **5di**

5aj

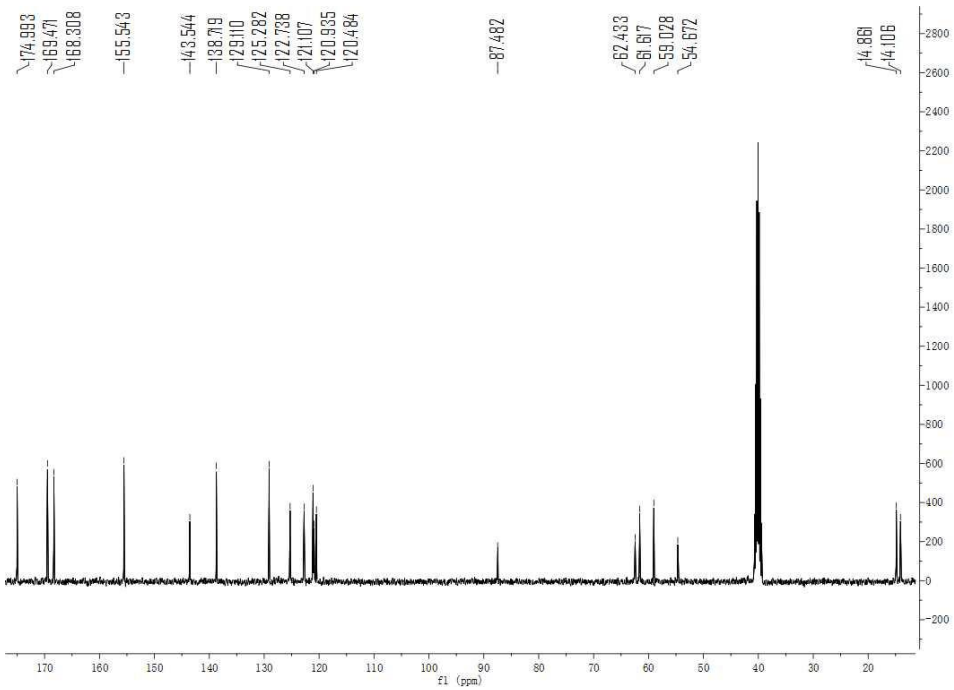


White solid; 349 mg, 90%; mp 152-154 °C; IR (KBr): 3311, 1739, 1648, 1505 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.85 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz,

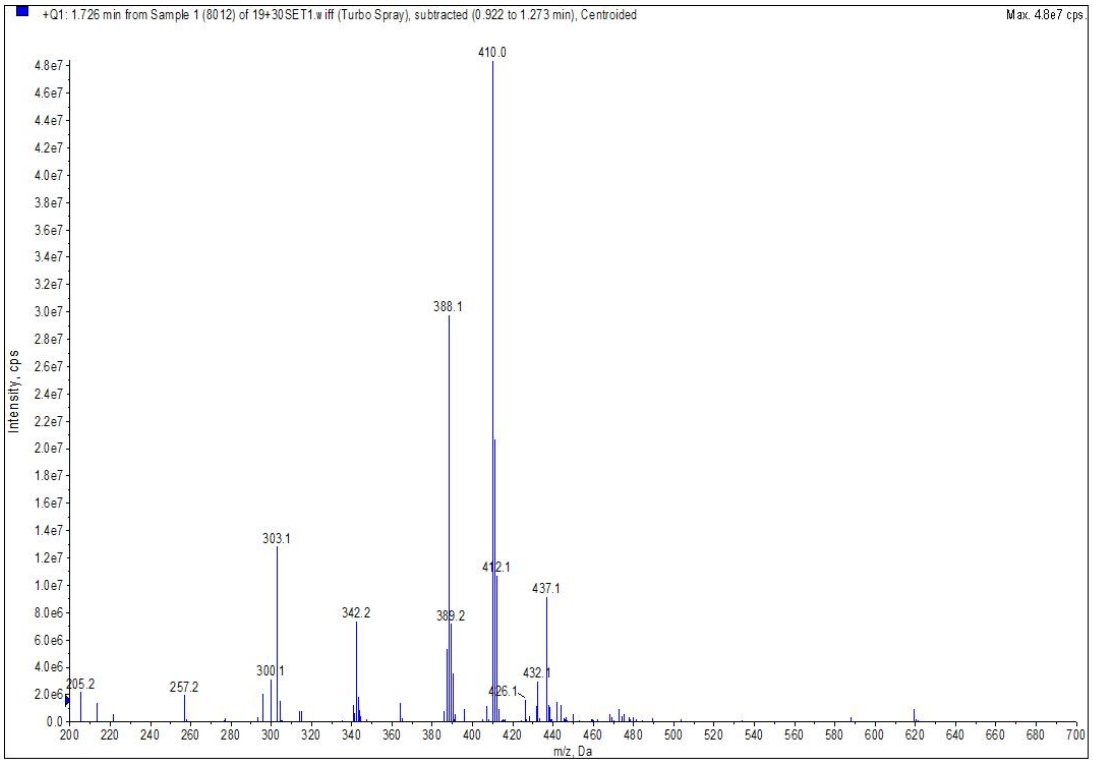
3H), 3.79-3.92 (m, 2H), 3.93-4.04 (m, 2H), 4.05 (d, *J*=3.8 Hz, 1H), 4.36 (s, 1H), 5.57 (dd, *J*=6.3, 3.8 Hz, 1H), 6.57 (d, *J*=6.3 Hz, 1H), 6.75-6.93 (m, 4H), 7.59-7.81 (m, 2H), 10.07 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.11, 14.86, 54.67, 59.03, 61.62, 62.43, 87.48, 120.48, 120.94, 121.11, 122.74, 125.28, 129.11, 138.72, 143.54, 155.54, 168.31, 169.47, 174.99; Found C, 58.76; H, 5.25; N, 10.95%; M+1 (mass spectrum), 388.1. $C_{19}H_{21}N_3O_4S$ requires C, 58.90; H, 5.41; N, 10.85%; M, 387.45.



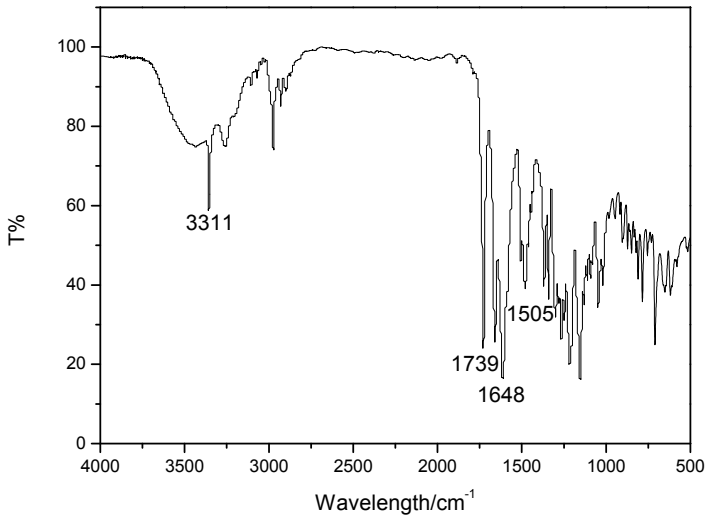
^{1}H NMR spectra of compound **5aj**



^{13}C NMR spectra of compound **5aj**

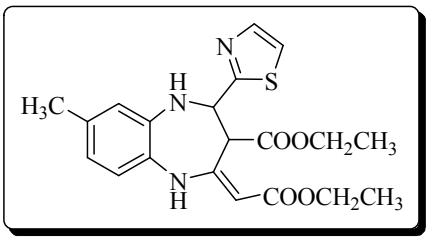


MS of compound **5aj**



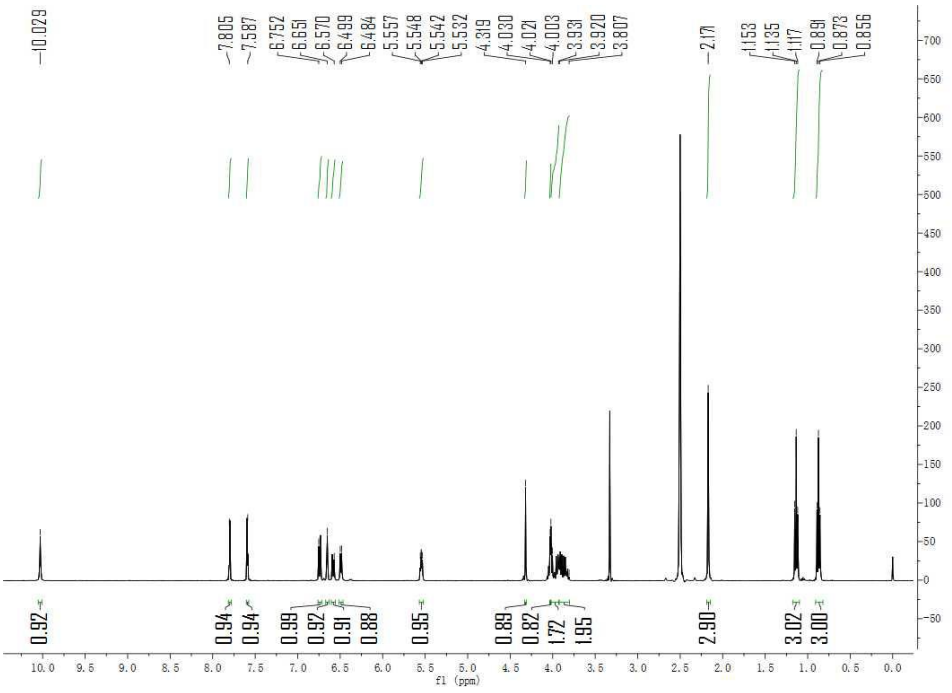
IR spectra of compound **5aj**

5bj

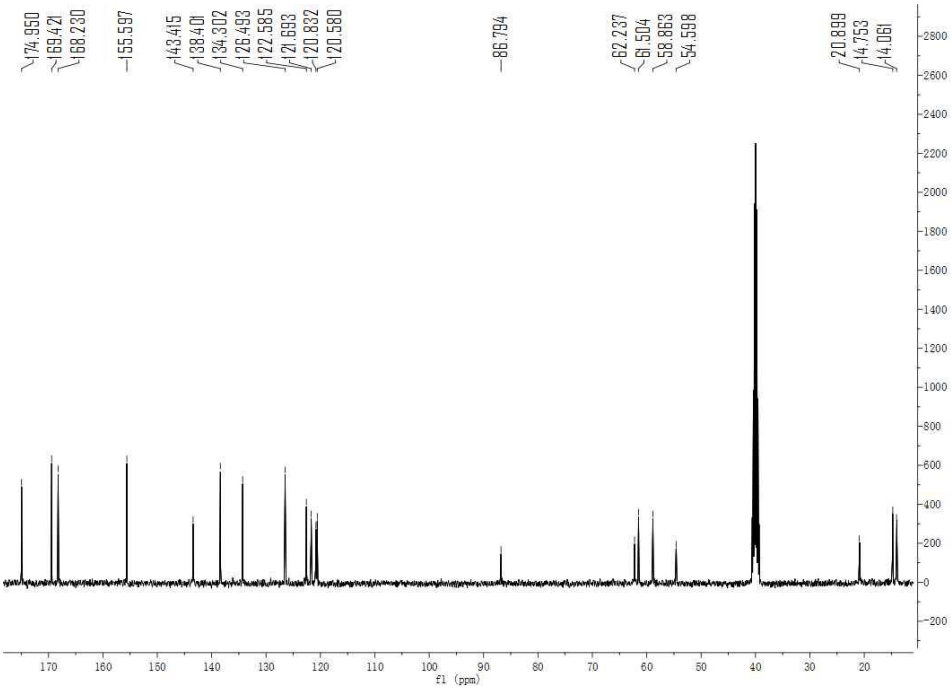


Yellow solid; 377 mg, 94%; mp 172-174 °C; IR (KBr): 3315, 1733, 1621, 1503 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.89 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1 Hz,

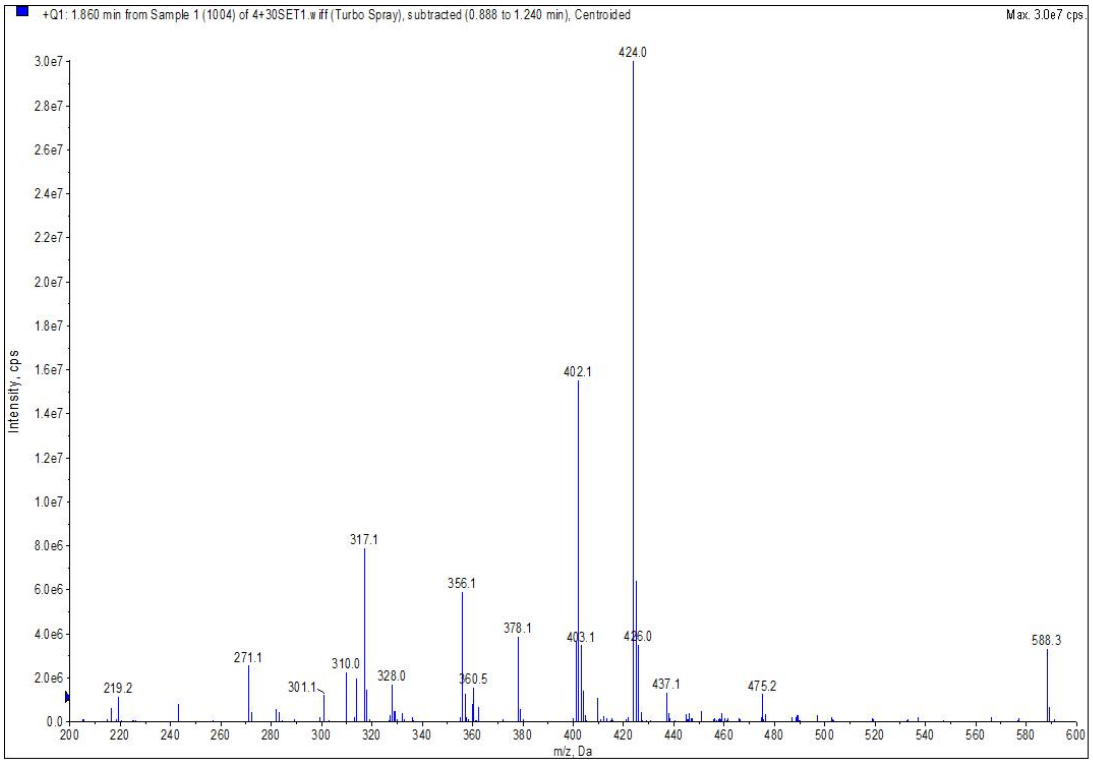
3H), 2.17 (s, 3H), 3.81-3.92 (m, 2H), 3.93-4.00 (m, 2H), 4.03 (d, *J*=3.8 Hz, 1H), 4.32 (s, 1H), 5.54 (dd, *J*=6.3, 3.8 Hz, 1H), 6.49 (d, *J*=6.3 Hz, 1H), 6.57-6.75 (m, 3H), 7.59-7.81 (m, 2H), 10.03 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.06, 14.75, 20.89, 54.60, 58.86, 61.50, 62.24, 86.79, 120.58, 120.83, 121.69, 122.59, 126.49, 134.30, 138.40, 143.42, 155.60, 168.23, 169.42, 174.95; Found C, 59.78; H, 5.73; N, 10.51%; M+1 (mass spectrum), 402.1. $C_{20}H_{23}N_3O_4S$ requires C, 59.83; H, 5.77; N, 10.47%; M, 401.48.



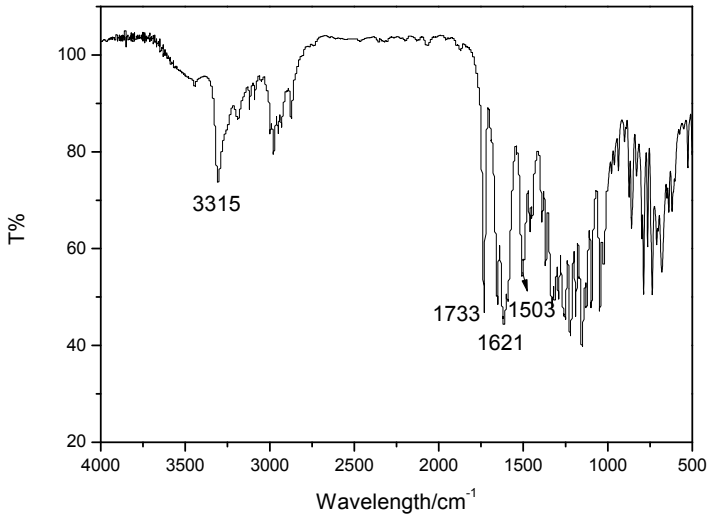
^{1}H NMR spectra of compound **5bj**



^{13}C NMR spectra of compound **5bj**

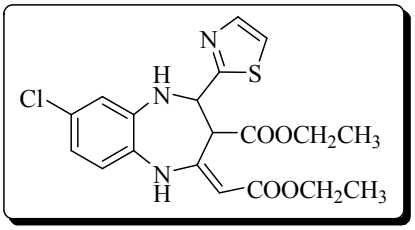


MS of compound **5bj**



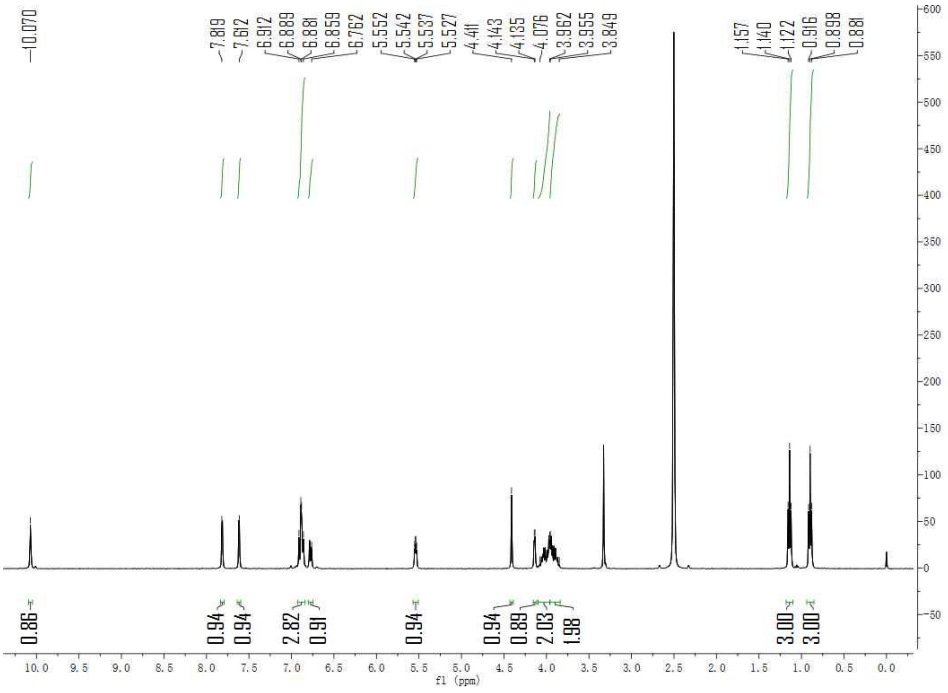
IR spectra of compound **5bj**

5cj

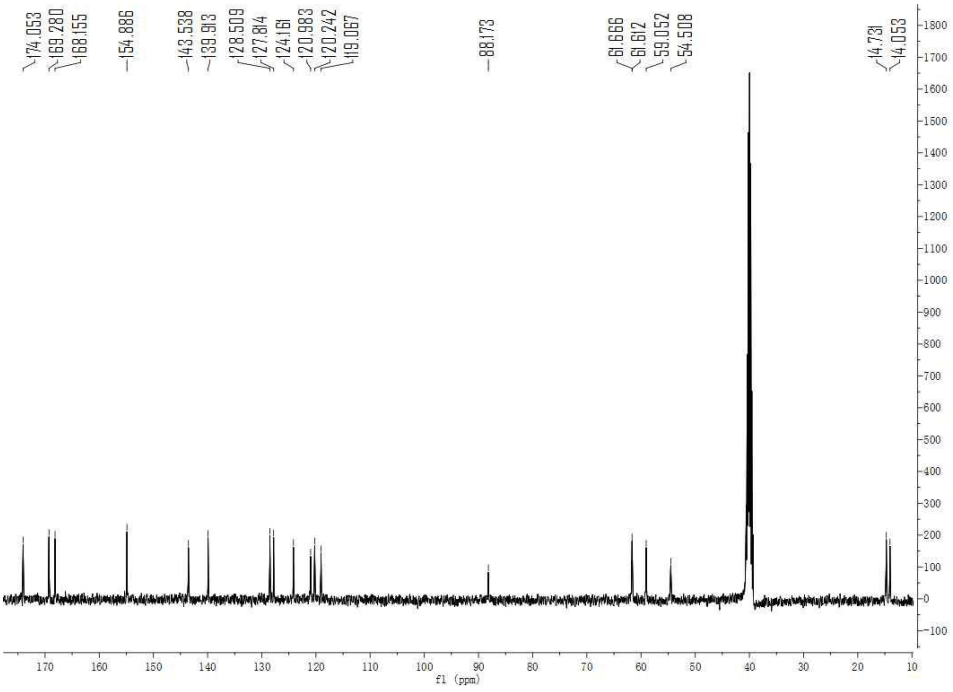


Pale yellow solid; 376 mg, 89%; mp 178-180 °C; IR (KBr): 3305, 1730, 1625, 1513 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.90 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1

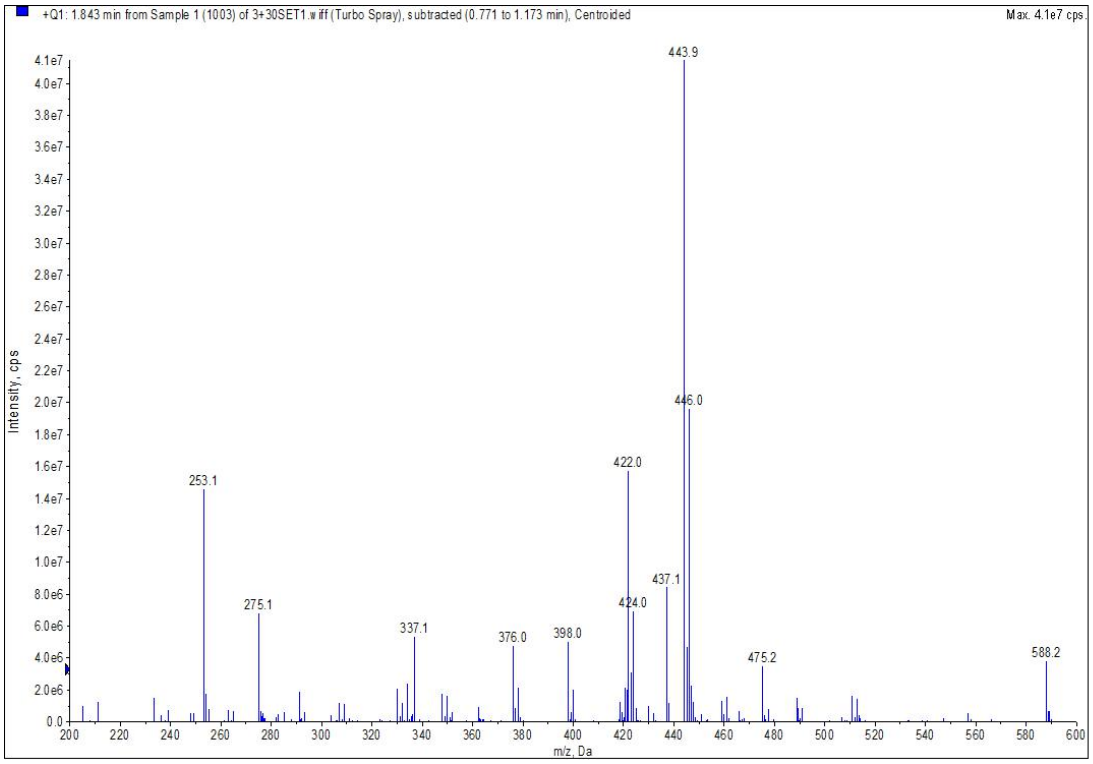
Hz, 3H), 3.85-3.95 (m, 2H), 3.96-4.08 (m, 2H), 4.14 (d, *J*=3.5 Hz, 1H), 4.41 (s, 1H), 5.54 (dd, *J*=6.1, 3.9 Hz, 1H), 6.78 (dd, *J*=8.4, 2.1 Hz, 1H), 6.86-6.91 (m, 3H), 7.61-7.82 (m, 2H), 10.07 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.05, 14.73, 54.51, 59.05, 61.61, 61.67, 88.17, 119.07, 120.24, 120.98, 124.16, 127.81, 128.51, 139.91, 143.54, 154.87, 168.16, 169.28, 174.05; Found C, 54.23; H, 4.92; N, 9.83%; M+1 (mass spectrum), 422.0. $C_{19}H_{20}ClN_3O_4S$ requires C, 54.09; H, 4.78; N, 9.96%; M, 421.9.



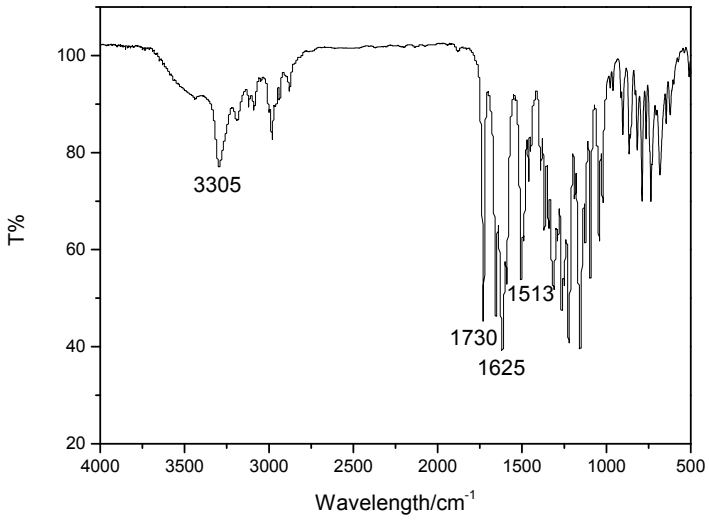
^{1}H NMR spectra of compound **5cj**



^{13}C NMR spectra of compound **5cj**

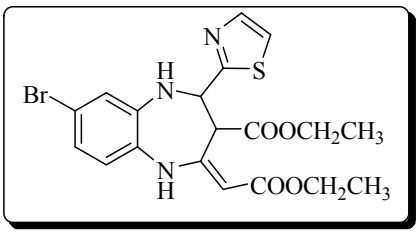


MS of compound **5cj**



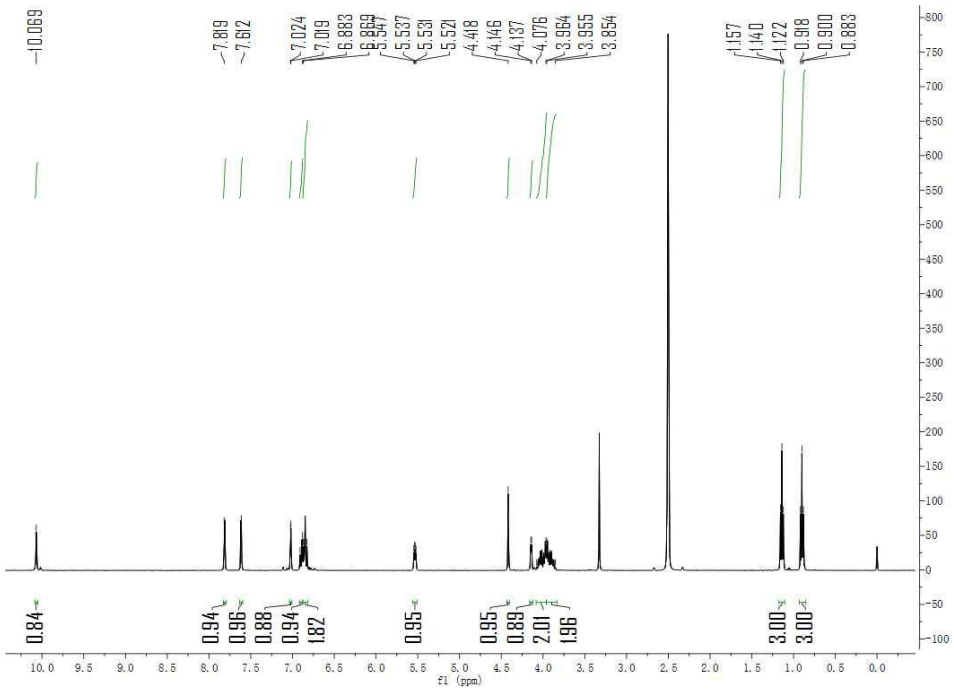
IR spectra of compound **5cj**

5dj

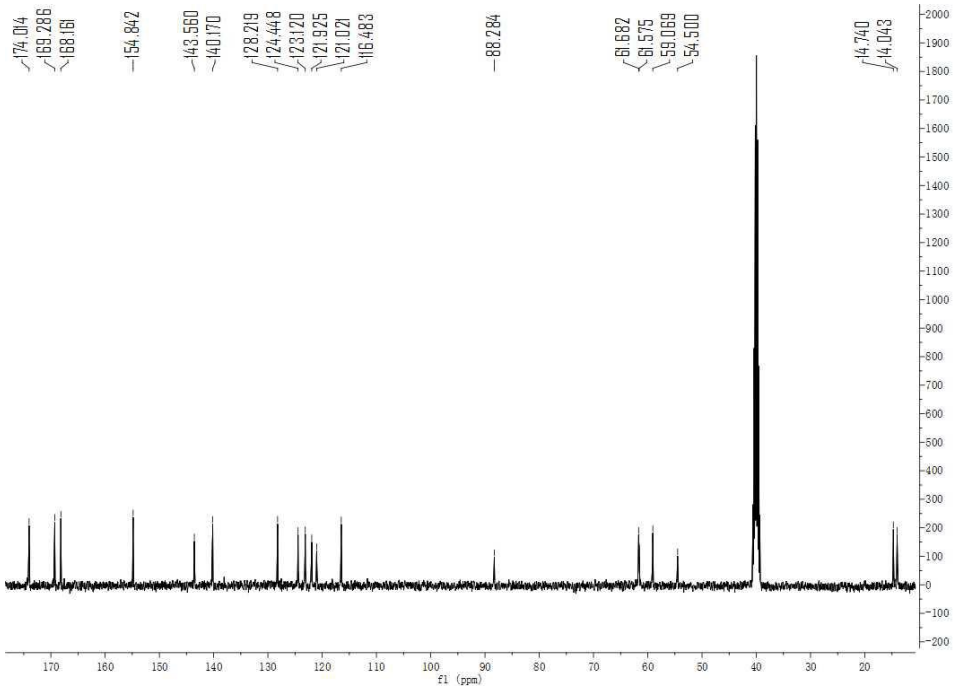


Pale yellow solid; 415 mg, 89%; mp 182-184 °C; IR (KBr): 3301, 1732, 1625, 1506 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.90 (t, J=7.1 Hz, 3H), 1.14 (t, J=7.1

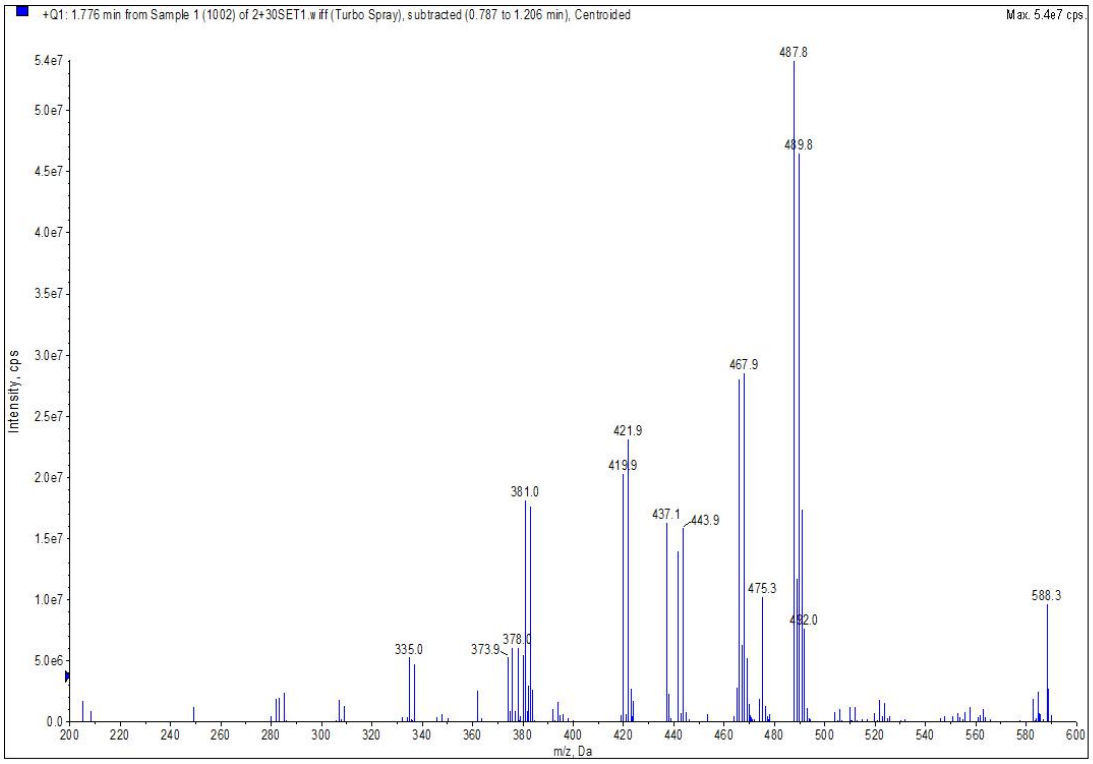
Hz, 3H), 3.85-3.95 (m, 2H), 3.96-4.08 (m, 2H), 4.14 (d, *J*=3.7 Hz, 1H), 4.42 (s, 1H), 5.53 (dd, *J*=6.3, 4.0 Hz, 1H), 6.83-7.02 (m, 3H), 6.90 (dd, *J*=8.4, 2.1 Hz, 1H), 7.61-7.82 (m, 2H), 10.07 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.04, 14.74, 54.50, 59.07, 61.58, 61.68, 88.28, 116.48, 121.02, 121.93, 123.12, 124.45, 128.22, 140.17, 143.56, 154.84, 168.16, 169.29, 174.01; Found C, 54.13; H, 4.86; N, 9.88%; M+1 (mass spectrum), 467.9. $C_{19}H_{20}BrN_3O_4S$ requires C, 54.09; H, 4.78; N, 9.96%; M, 466.35.



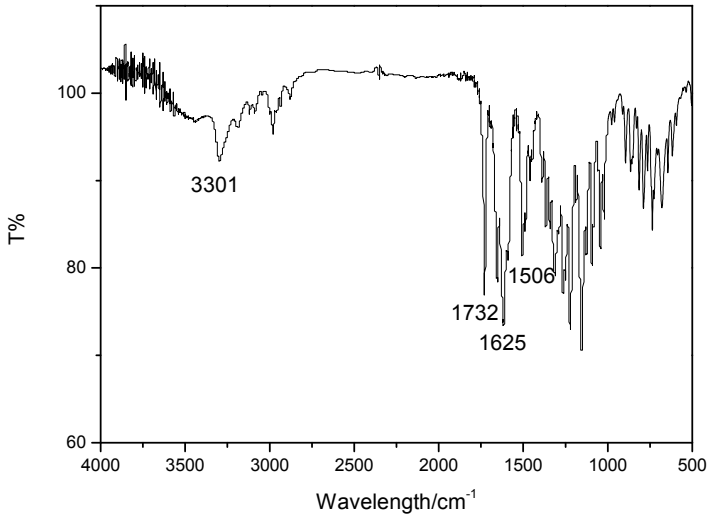
^{1}H NMR spectra of compound **5dj**



^{13}C NMR spectra of compound **5dj**

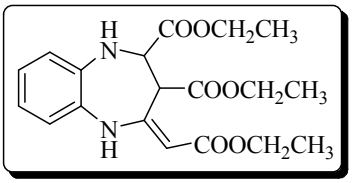


MS of compound **5dj**



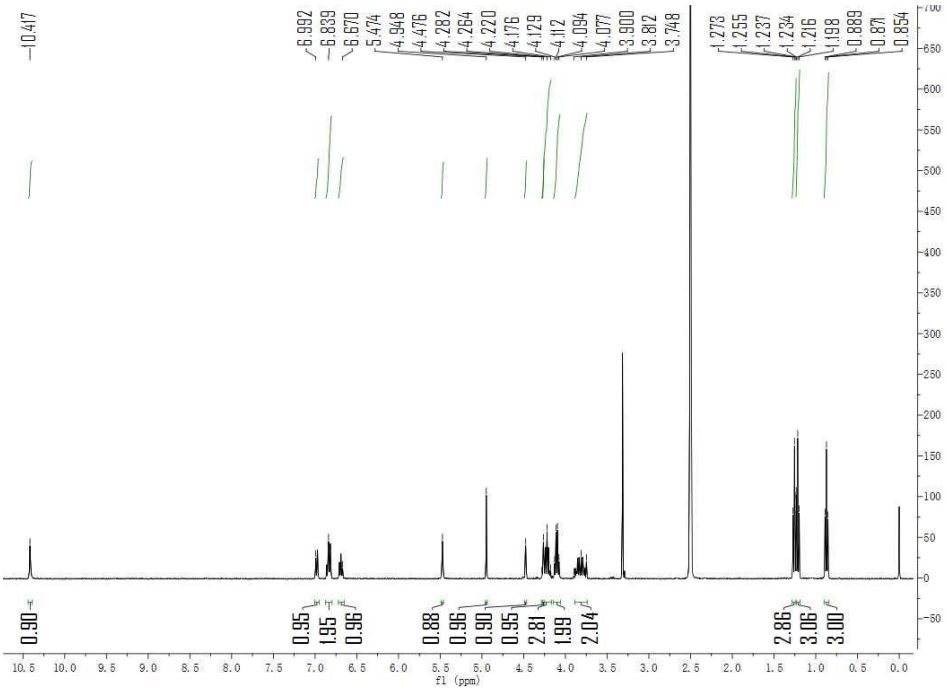
IR spectra of compound **5dj**

5ak

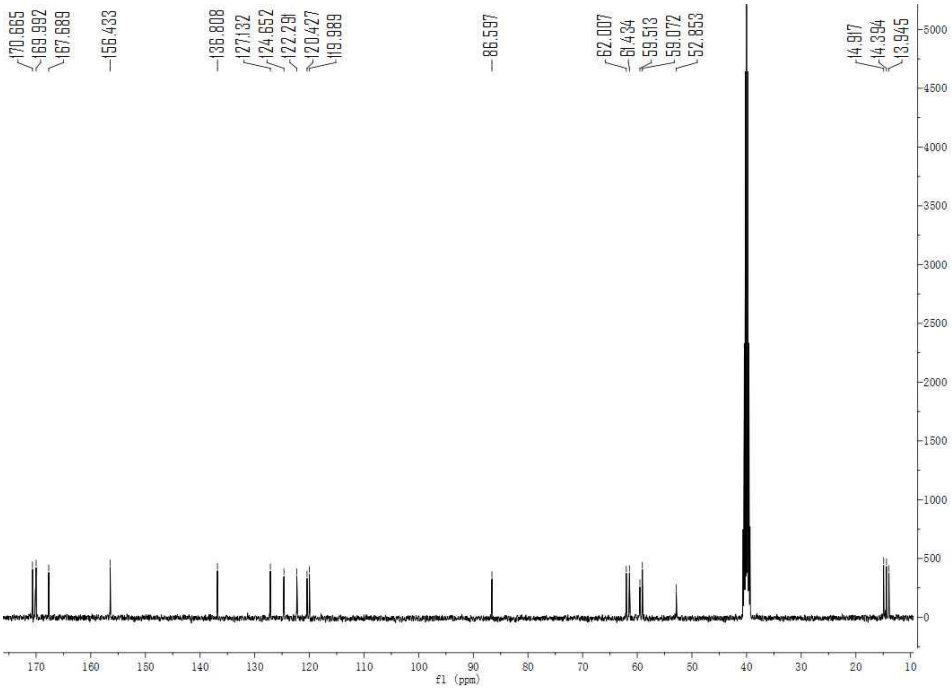


Light yellow solid; 294 mg, 78%; mp 96-98 °C; IR (KBr): 3357, 1748, 1658, 1513 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.87 (t, J=7.1 Hz, 3H), 1.22 (t, J=7.2 Hz, 3H), 1.25 (t, J=7.2 Hz, 3H), 3.75-3.90 (m, 2H), 4.10 (q, J=7.0 Hz, 2H), 4.18-4.28

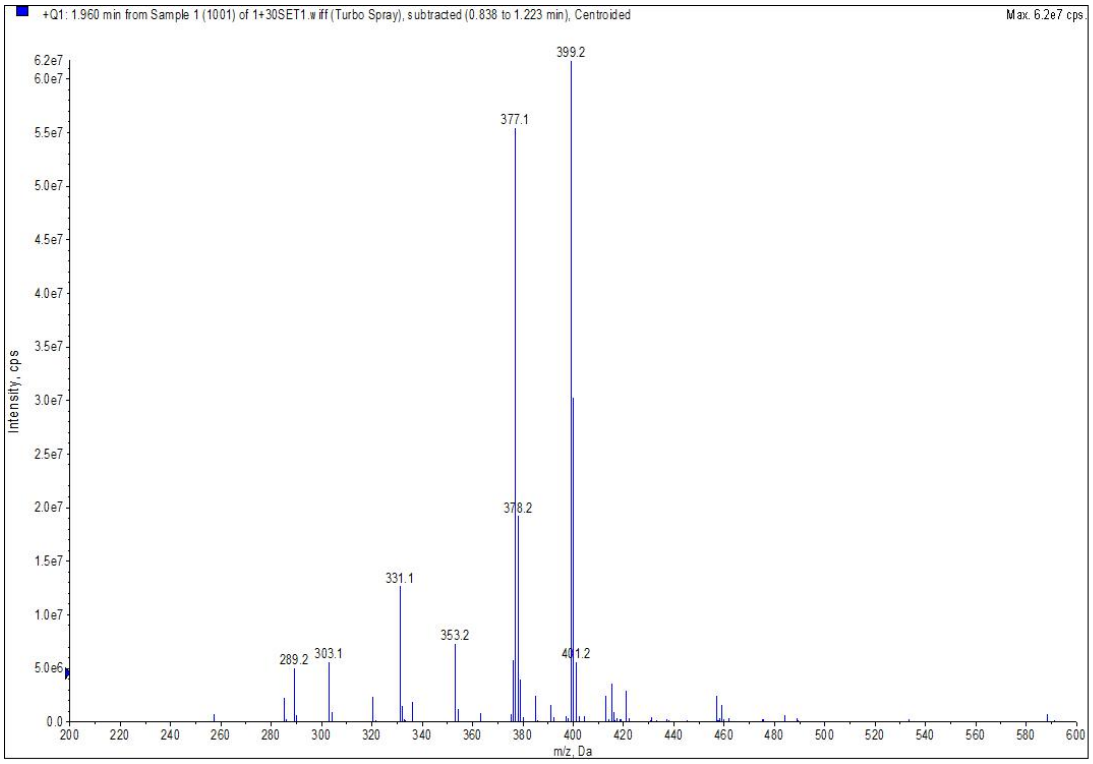
(m, 2H), 4.26 (s, 1H), 4.48 (s, 1H), 4.95 (s, 1H), 5.47 (s, 1H), 6.67-6.99 (m, 4H), 10.42 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 13.95, 14.39, 14.92, 52.85, 59.07, 59.51, 61.43, 62.01, 86.60, 120.00, 120.43, 122.29, 124.65, 127.13, 136.81, 156.43, 167.69, 169.99, 170.67; Found C, 60.65; H, 6.52; N, 7.36%; M+1 (mass spectrum), 377.1. $C_{19}H_{24}N_2O_6$ requires C, 60.63; H, 6.43; N, 7.44%; M, 376.40.



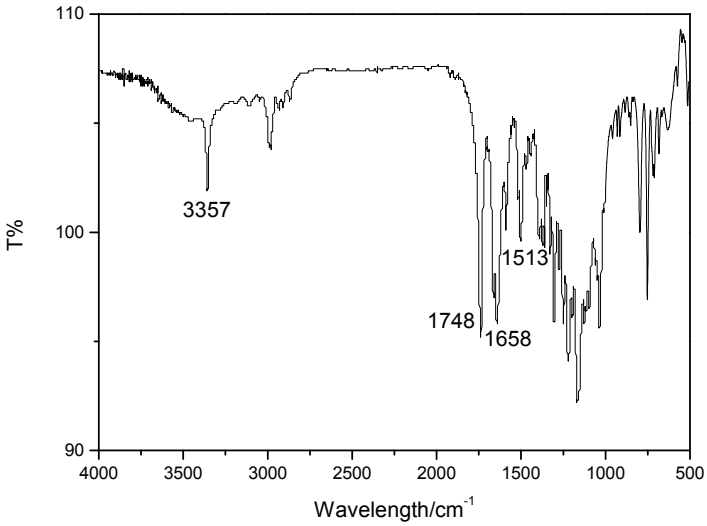
^{1}H NMR spectra of compound **5ak**



^{13}C NMR spectra of compound **5ak**

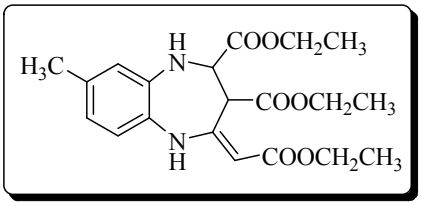


MS of compound **5ak**



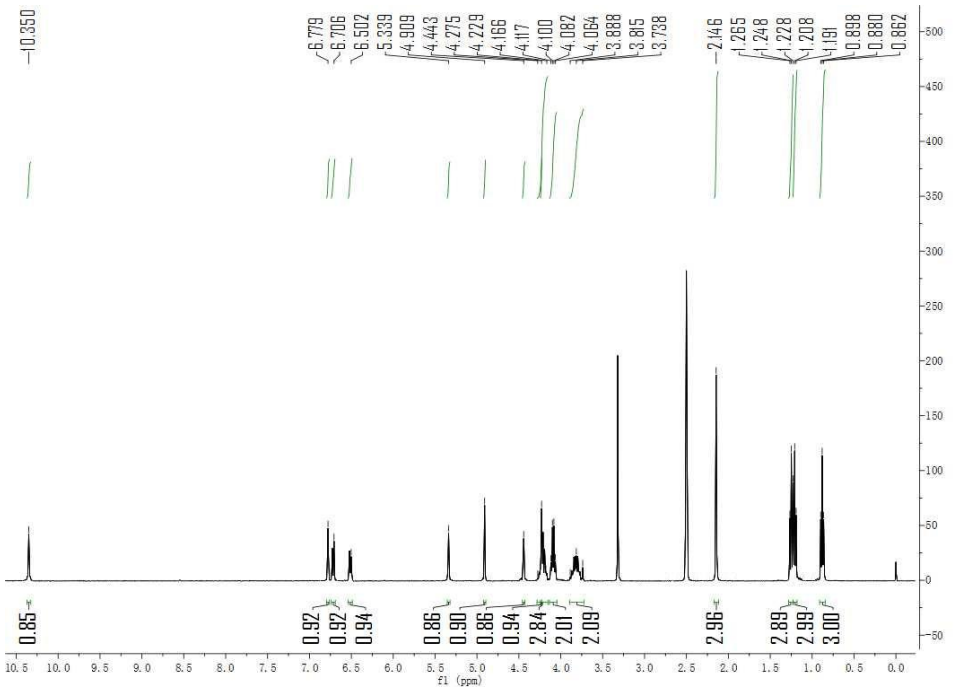
IR spectra of compound **5ak**

5bk

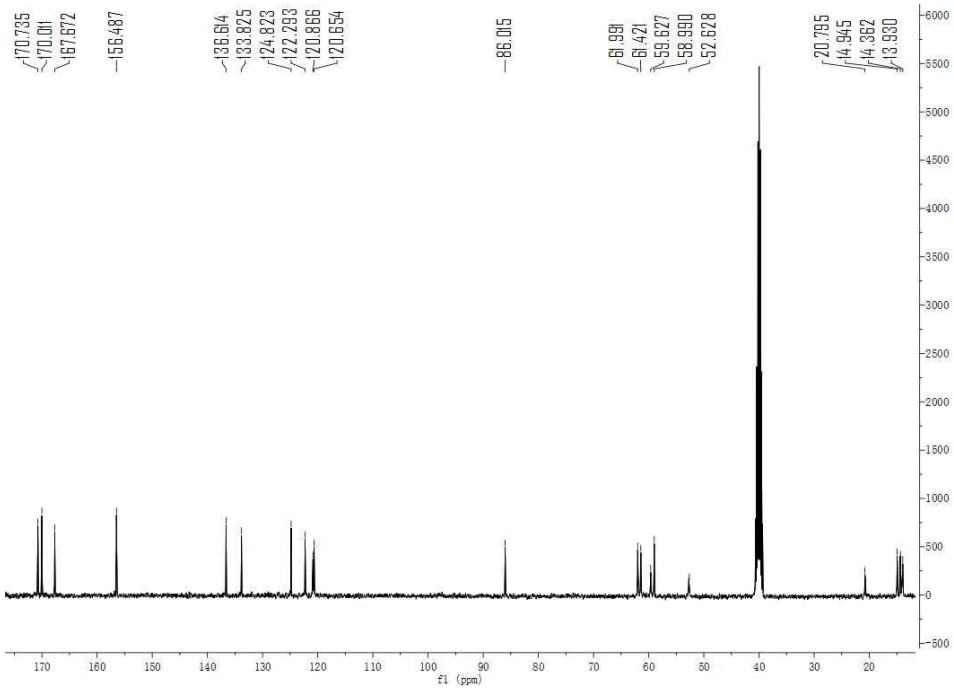


Light yellow solid; 320 mg, 82%; mp 86-88 °C; IR (KBr): 3374, 1740, 1641, 1517 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.88 (t, J=7.1 Hz, 3H), 1.21 (t, J=7.4

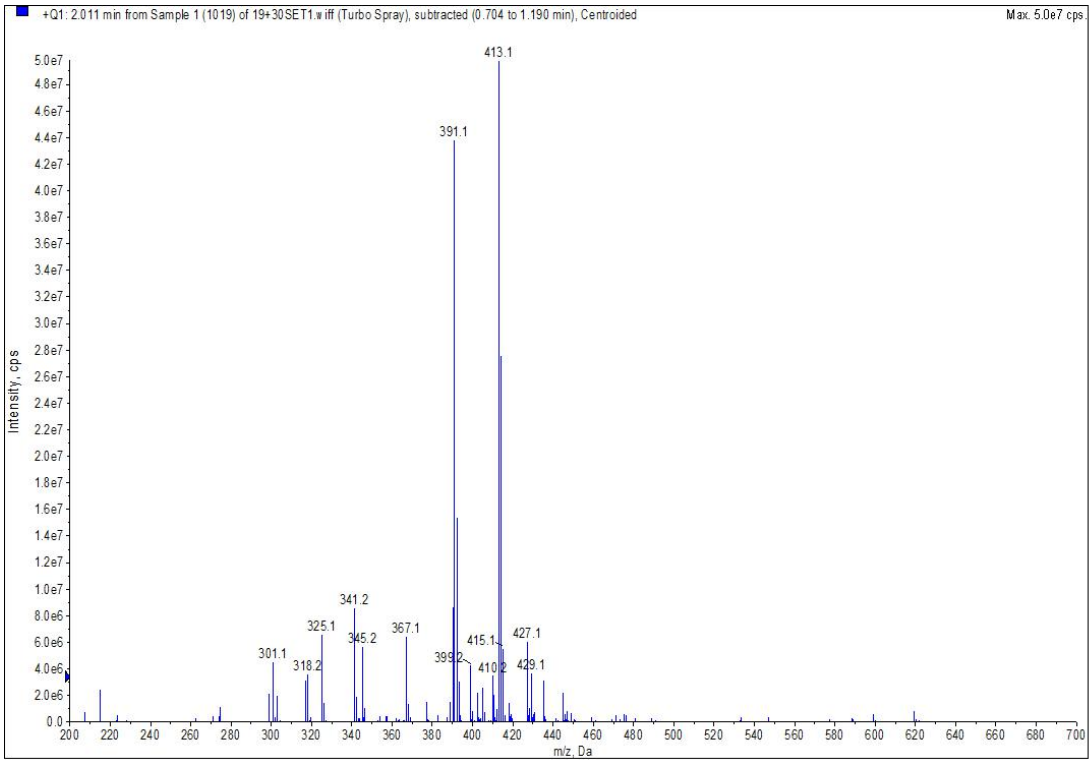
Hz, 3H), 1.25 (t, *J*=7.5 Hz, 3H), 2.15 (s, 3H), 3.74-3.89 (m, 2H), 4.09 (q, *J*=7.0 Hz, 2H), 4.17-4.28 (m, 2H), 4.23 (s, 1H), 4.44 (s, 1H), 4.91 (s, 1H), 5.34 (s, 1H), 6.50-6.78 (m, 3H), 10.35 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 13.93, 14.36, 14.95, 20.80, 52.63, 58.99, 59.63, 61.42, 61.99, 86.02, 120.65, 120.87, 122.29, 124.82, 133.83, 136.61, 156.49, 167.67, 170.01, 170.74; Found C, 61.44; H, 6.56; N, 7.33%; M+1 (mass spectrum), 391.1. $C_{20}H_{26}N_2O_6$ requires C, 61.53; H, 6.71; N, 7.18%; M, 390.43.



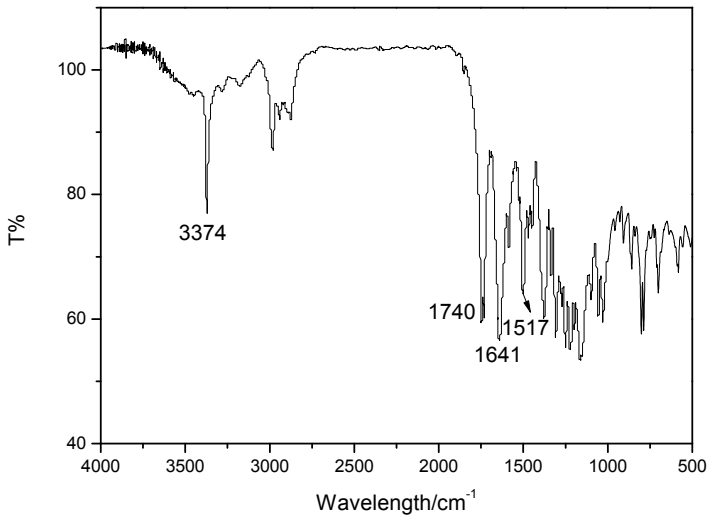
^{1}H NMR spectra of compound **5bk**



^{13}C NMR spectra of compound **5bk**

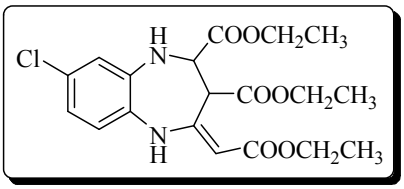


MS of compound **5bk**



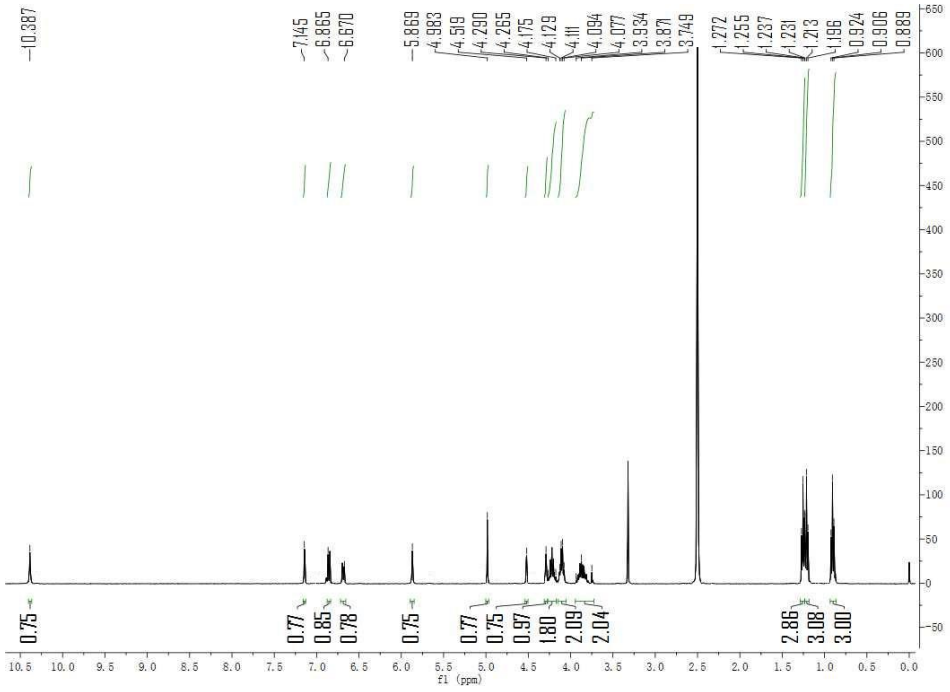
IR spectra of compound **5bk**

5ck

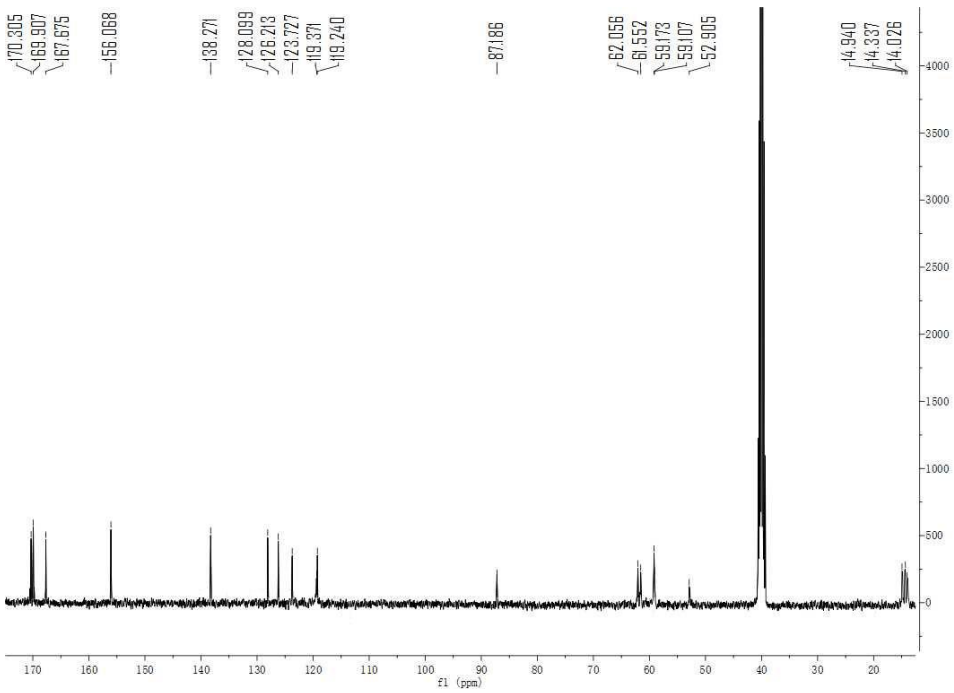


Light yellow solid; 283 mg, 69%; mp 120-122 °C; IR (KBr): 3358, 1739, 1646, 1503 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.91 (t, J=7.0 Hz, 3H), 1.21 (t, J=7.1 Hz, 3H), 1.25 (t, J=7.1 Hz, 3H), 3.75-3.93 (m, 2H), 4.10 (q, J=7.0 Hz, 2H), 4.18-4.27

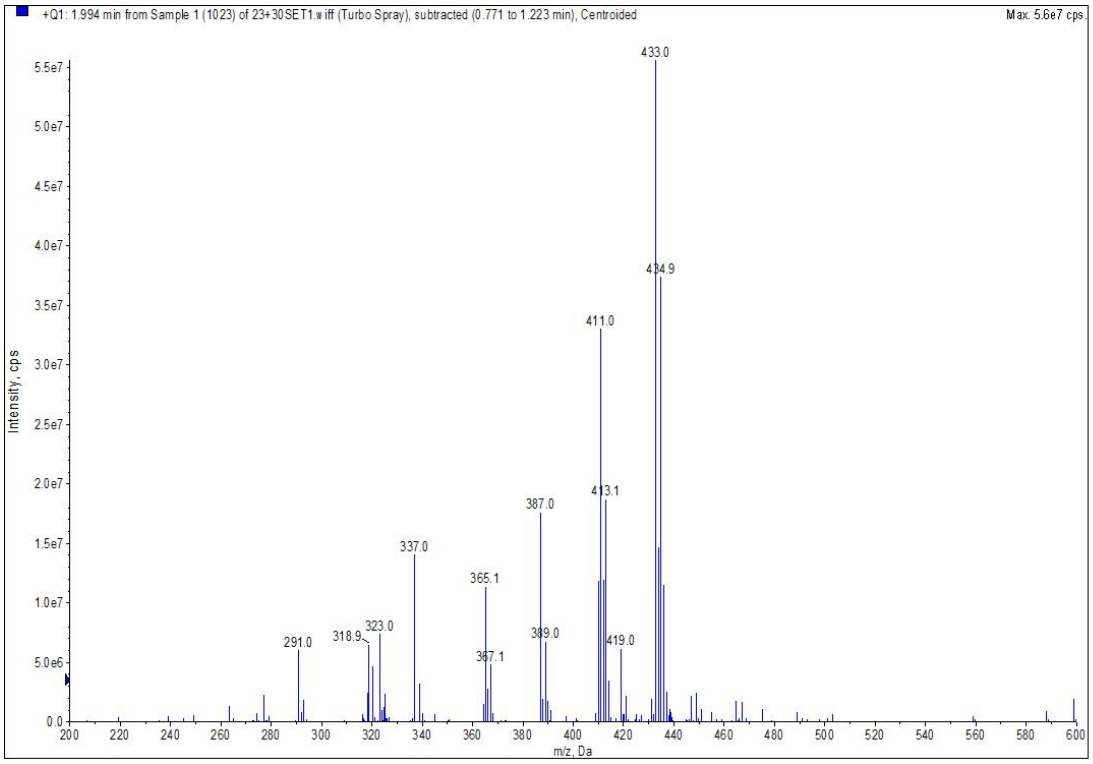
(m, 2H), 4.29 (s, 1H), 4.52 (s, 1H), 4.98 (s, 1H), 5.87 (s, 1H), 6.67-7.15 (m, 3H), 10.39 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 14.03, 14.34, 14.94, 52.91, 59.11, 59.17, 61.55, 62.06, 87.19, 119.24, 119.37, 123.73, 126.21, 128.10, 138.27, 156.07, 167.68, 169.91, 170.31; Found C, 55.68; H, 5.81; N, 6.63%; M+1 (mass spectrum), 411.0. $C_{19}H_{23}ClN_2O_6$ requires C, 55.54; H, 5.64; N, 6.82%; M, 410.85.



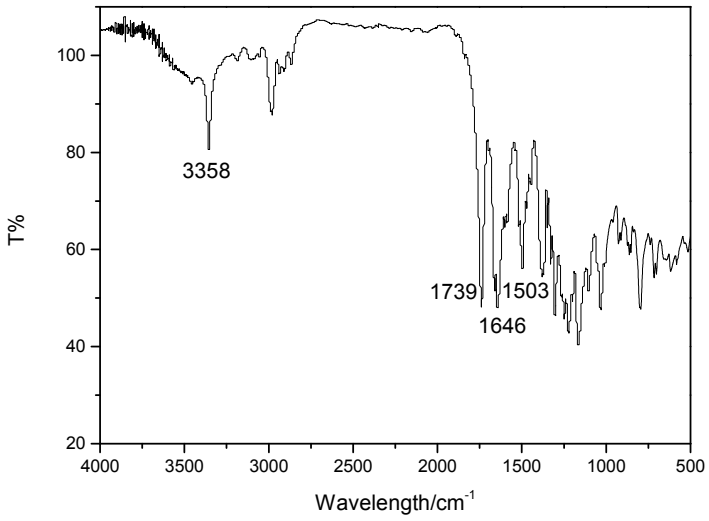
^{1}H NMR spectra of compound **5ck**



^{13}C NMR spectra of compound **5ck**

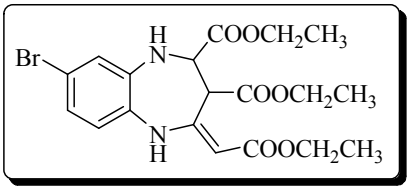


MS of compound **5ck**



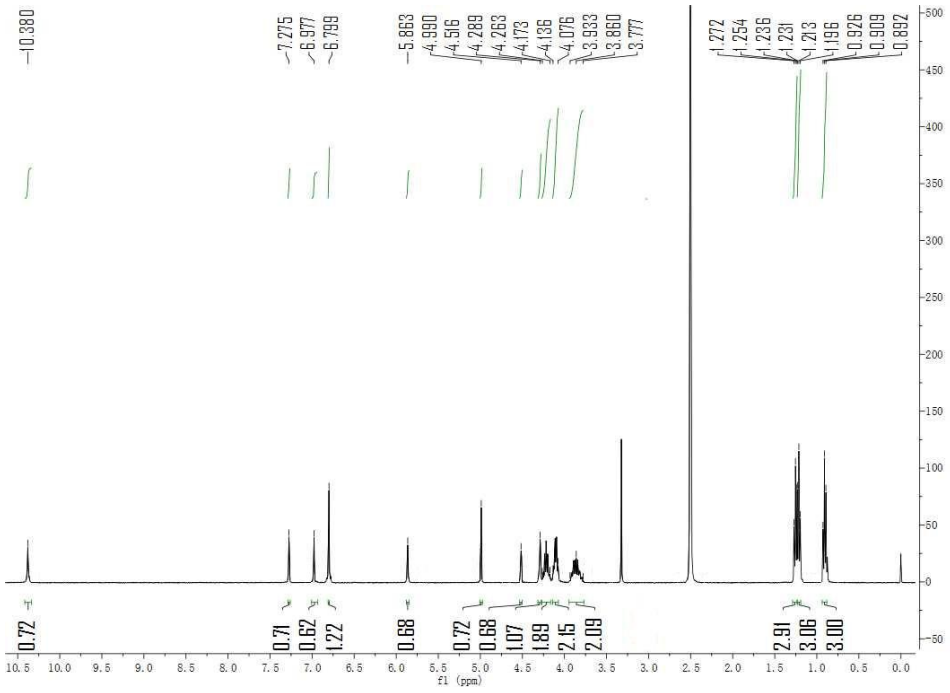
IR spectra of compound **5ck**

5dk

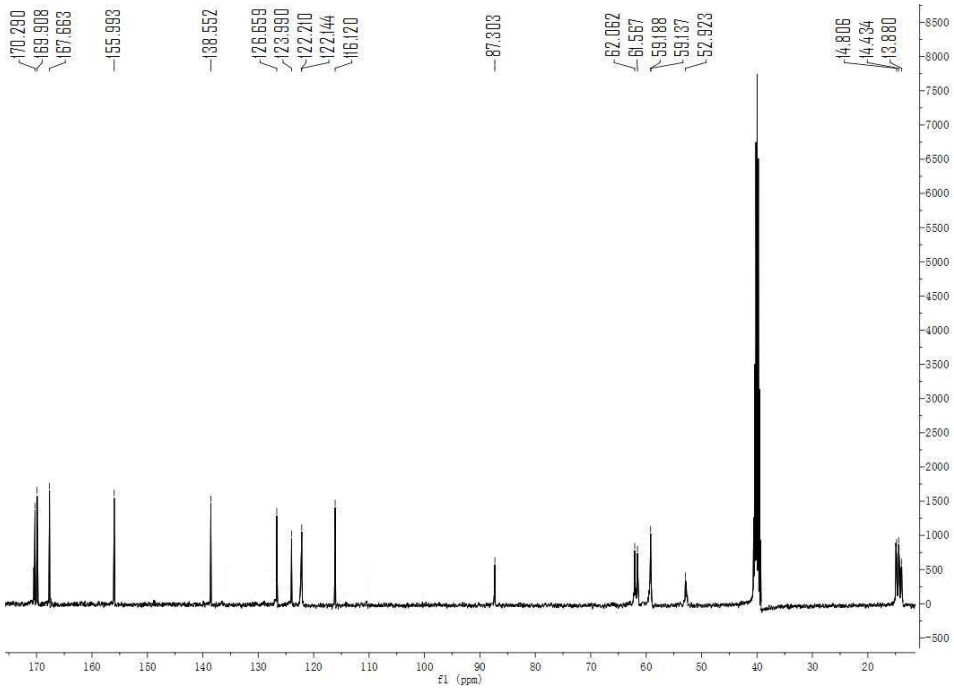


Light yellow solid; 323 mg, 71%; mp 110-112 °C; IR (KBr): 3366, 1739, 1651, 1512 cm^{-1}; ^1H NMR (400 MHz, DMSO-d_6, TMS): δ 0.91 (t, J=6.9 Hz, 3H), 1.21 (t, J=7.1 Hz, 3H), 1.25 (t, J=7.1 Hz, 3H), 3.78-3.93 (m, 2H), 4.09-4.14 (m, 2H), 4.17-4.26 (m,

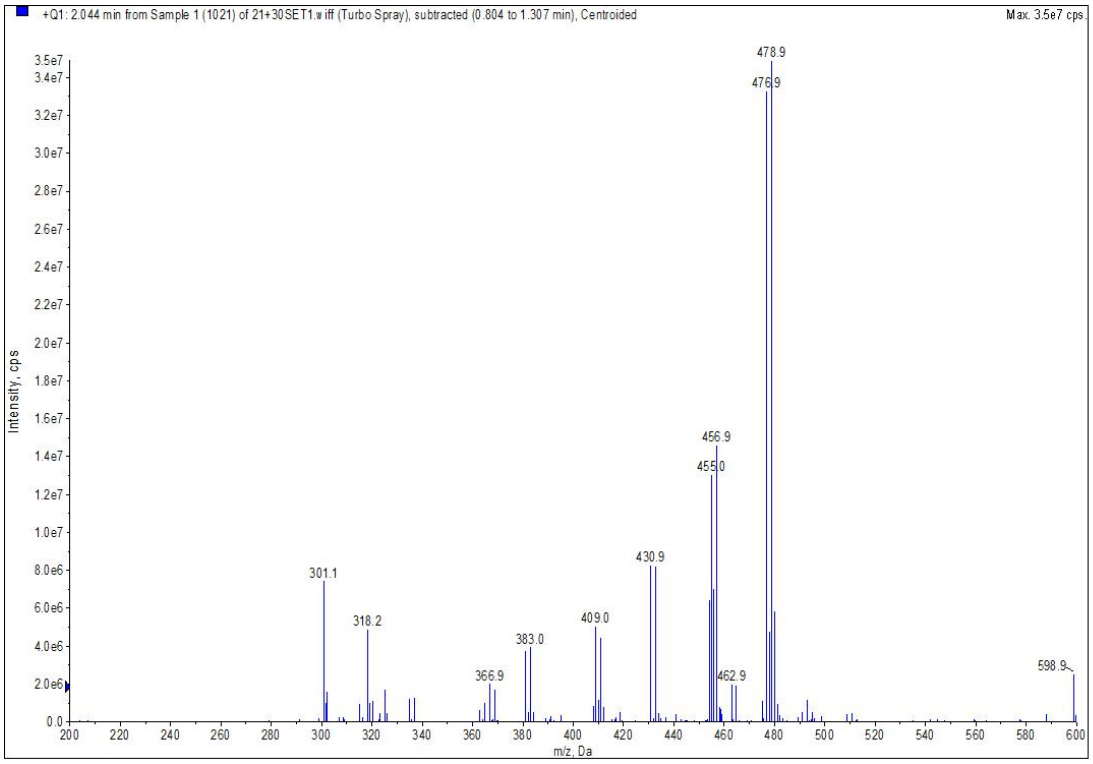
2H), 4.29 (s, 1H), 4.52 (s, 1H), 4.99 (s, 1H), 5.86 (s, 1H), 6.80-7.28 (m, 3H), 10.38 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6, TMS): δ 13.88, 14.43, 14.81, 52.92, 59.14, 59.19, 61.57, 62.06, 87.30, 116.12, 122.14, 122.21, 123.99, 126.66, 138.55, 155.99, 167.66, 169.91, 170.29; Found C, 50.05; H, 4.91; N, 6.24%; M+1 (mass spectrum), 457.1. $C_{19}H_{23}BrN_2O_6$ requires C, 50.12; H, 5.09; N, 6.15%; M, 455.30.



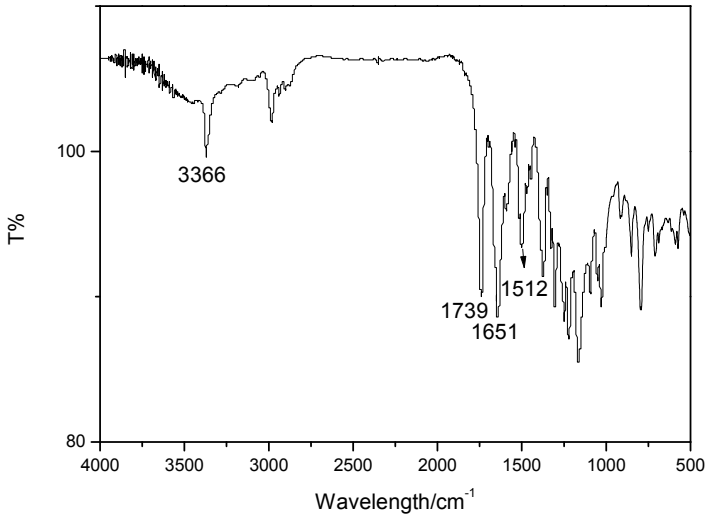
^{1}H NMR spectra of compound **5dk**



^{13}C NMR spectra of compound **5dk**



MS of compound **5dk**



IR spectra of compound **5dk**