

Ruthenium-catalyzed oxidative *ortho*-benzoxylation of acetanilides with aromatic acids

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Electronic Supplementary Information (ESI)

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Experimental Section

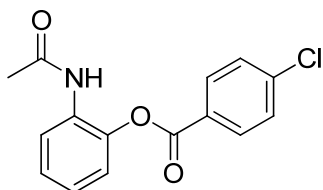
General Procedure for the Benzylation of Acetanilides with Aromatic Acids Catalyzed by Ruthenium Complex.

[RuCl₂(*p*-cymene)]₂ (0.03 mmol, 3 mol %), AgSbF₆ (0.15 mmol, 15 mol %), (NH₄)₂S₂O₈ (2.0 mmol), acetanilide **1** (1.20 mmol) and aromatic acid **2** (1.00 mmol) were taken in a 15 mL pressure tube, which was equipped with a magnetic stirrer and septum. The pressure tube was evacuated and purged with nitrogen gas three times (*Note:* AgSbF₆ is moisture sensitive. Thus, AgSbF₆ was taken inside the nitrogen glove box). To the tube was then added 1,2-dichloroethane (4.0 mL) as the solvent via syringe and again the tube was evacuated and purged with nitrogen gas three times. Then, the septum was taken out and immediately a screw cap was used to cover the tube. The reaction mixture was allowed to stir at 100 °C for 24 h. After cooling to ambient temperature, the reaction mixture was diluted with CH₂Cl₂ and then filtered through Celite and silica gel. The filtrate was concentrated, and the crude residue was purified through a silica gel column (hexanes and ethyl acetate) to give pure **3**. For the preparation of compounds **3m**, **3n** and **3p**, oxidant Ag₂CO₃ (1.0 mmol) was used and CH₂Cl₂ (4.0 mL) was used as a solvent (*Note:* Ag₂CO₃ is moisture-sensitive. Thus, Ag₂CO₃ was added inside the nitrogen glove box.)

Spectral data and copies of ¹H and ¹³C NMR spectra of all compounds **3a-x** are listed below.

Spectral Data of Compounds 3a-x.

2-Acetamidophenyl 4-chlorobenzoate (3a).



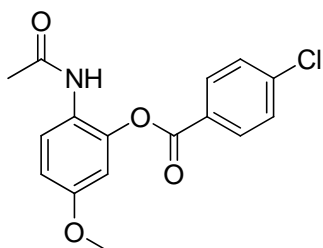
Colorless solid; eluent (30% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.07 (d, $J = 8.0$ Hz, 2 H), 8.03 (t, $J = 8.0$ Hz, 1 H), 7.45 (d, $J = 8.0$ Hz, 2 H), 7.24 – 7.19 (m, 1 H), 7.13 (d, $J = 8.0$ Hz, 2 H), 2.03 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.3, 163.8, 141.1, 140.8, 131.6, 129.9, 129.2, 127.1, 126.8, 125.3, 123.7, 122.2, 24.4.

HRMS (ESI): calc. for $[(\text{C}_{15}\text{H}_{12}\text{ClNO}_3)\text{Na}]$ ($\text{M}+\text{Na}$) 312.0403, measured 312.0414.

2-Acetamido-5-methoxyphenyl 4-chlorobenzoate (3b).



Colorless solid; eluent (30% ethyl acetate in hexanes).

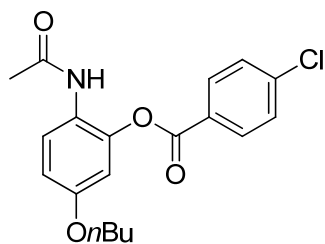
IR (ATR) $\tilde{\nu}$ (cm^{-1}): 3334, 2929, 1739, 1688, 1532, 1217 and 686.

^1H NMR (CDCl_3 , 400 MHz): δ 8.04 (d, $J = 8.0$ Hz, 2 H), 7.65 (d, $J = 8.0$ Hz, 1 H), 7.42 (d, $J = 8.0$ Hz, 2 H), 7.01 (bs, 1 H), 6.74 (dd, $J = 8.0, 4.0$ Hz, 1 H), 6.68 (d, $J = 8.0$ Hz, 1 H), 3.72 (s, 3 H), 1.95 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.6, 163.8, 157.6, 143.5, 140.7, 131.6, 129.1, 127.1, 126.2, 122.5, 112.2, 108.1, 55.6, 23.8

HRMS (ESI): calc. for $[(\text{C}_{16}\text{H}_{14}\text{ClNO}_4)\text{H}]$ ($\text{M}+\text{H}$) 320.0690, measured 320.0689

2-Acetamido-5-butoxyphenyl 4-chlorobenzoate (3c).



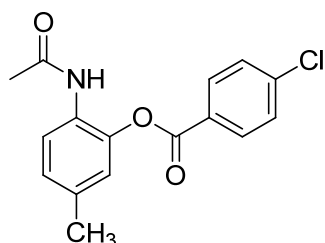
Yellow solid; eluent (40% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.05 (d, $J = 8.0$ Hz, 2 H), 7.64 (d, $J = 8.0$ Hz, 1 H), 7.44 (d, $J = 8.0$ Hz, 2 H), 6.93 (s, 1 H), 6.75 (dd, $J = 8.0, 4.0$ Hz, 1 H), 6.68 (d, $J = 8.0$ Hz, 1 H), 3.87 (t, $J = 8.0$ Hz, 2 H), 1.97 (s, 3 H), 1.72 – 1.65 (m, 2 H), 1.45 – 1.35 (m, 2 H), 0.89 (t, $J = 8.0$ Hz, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.6, 163.8, 157.3, 143.5, 140.7, 131.6, 129.2, 127.1, 126.2, 122.3, 112.8, 108.5, 68.1, 31.1, 23.9, 19.1, 13.8.

HRMS (ESI): calc. for $[(\text{C}_{19}\text{H}_{20}\text{ClNO}_4)\text{H}]$ (M+H)362.1159, measured 362.1167.

2-Acetamido-5-methylphenyl 4-chlorobenzoate (3d).



Colorless solid; eluent (30% ethyl acetate in hexanes).

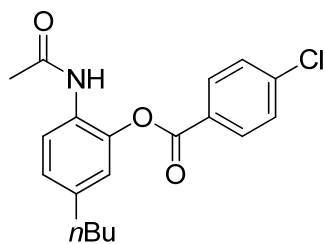
IR (ATR) $\tilde{\nu}$ (cm^{-1}): 3353, 2928, 1722, 1681, 1524, and 752.

^1H NMR (CDCl_3 , 400 MHz): δ 7.97 (d, $J = 8.0$ Hz, 1 H), 7.75 (d, $J = 8.0, 3$ H), 7.45 (d, $J = 8.0$ Hz, 2 H), 7.08 (d, $J = 8.0, 1$ H), 6.98 (s, 1 H), 2.33 (s, 3 H), 2.32 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.3, 164.0, 141.5, 140.8, 135.8, 131.6, 129.2, 127.4, 124.1, 122.6, 24.3, 20.9.

HRMS (ESI): calc. for $[(\text{C}_{16}\text{H}_{14}\text{ClNO}_3)\text{Na}]$ (M+Na) 326.0560, measured 326.0565.

2-Acetamido-5-butylphenyl 4-chlorobenzoate (3e).



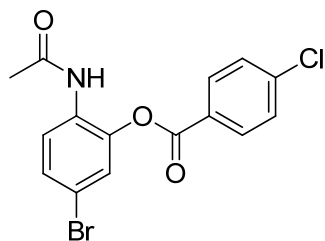
Colorless solid; eluent (30% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.06 (d, $J = 8.0$ Hz, 2 H) 7.81 (d, $J = 8.0$ Hz, 1 H) 7.44 (d, $J = 8.0$ Hz, 2 H), 7.03 (t, $J = 8.0$ Hz, 2 H), 6.94 (s, 1 H) 2.53 (t, $J = 8.0$ Hz, 2 H), 1.99 (s, 3 H), 1.56 – 1.48 (m, 2 H), 1.31 – 1.25 (m, 2 H), 0.85 (t, $J = 8.0$ Hz, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.3, 164.0, 141.5, 140.9, 140.7, 131.6, 129.2, 127.2, 127.2, 126.7, 124.1, 121.9, 35.0, 33.3, 24.2, 22.2, 13.9.

HRMS (ESI): calc. for $[(\text{C}_{19}\text{H}_{20}\text{ClNO}_3)\text{H}]$ ($\text{M}+\text{Na}$) 346.1210, measured 346.1222.

2-Acetamido-5-bromophenyl 4-chlorobenzoate (3f).



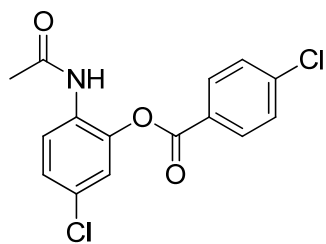
Yellow solid; eluent (25% ethyl acetate in hexanes).

^1H NMR ($\text{DMSO}-d_6$, 400 MHz): δ 9.66 (s, 1 H), 8.13 (dd, $J = 8.0, 4.0$ Hz, 2 H), 7.84 (d, $J = 8.0$ Hz, 1 H), 7.70 (dd, $J = 8.0, 4.0$ Hz, 2 H), 7.61 (s, 1 H), 7.47 (d, $J = 8.0$ Hz, 1 H), 2.00 (s, 3 H).

^{13}C NMR ($\text{DMSO}-d_6$, 100 MHz): δ 168.6, 163.4, 142.4, 138.9, 131.9, 130.4, 129.0, 128.0, 126.2, 125.6, 115.4, 23.5.

HRMS (ESI): calc. for $[(\text{C}_{15}\text{H}_{11}\text{BrClNO}_3)\text{Na}]$ ($\text{M}+\text{Na}$) 389.9509, measured 389.9506.

2-Acetamido-5-chlorophenyl 4-chlorobenzoate (3g).



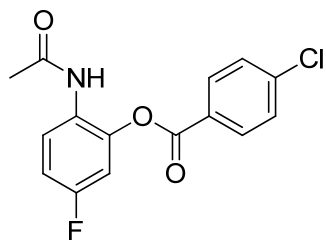
Colorless solid; eluent (25% ethyl acetate in hexanes).

^1H NMR (DMSO- d_6 , 400 MHz): δ 9.66 (s, 1 H), 8.13 (d, J = 8.0 Hz, 2 H), 7.88 (d, J = 8.0 Hz, 1 H), 7.69 (d, J = 8.0 Hz, 2 H), 7.49 (d, J = 4.0 Hz, 1 H), 7.34 (dd, J = 8.0, 4.0 Hz, 1 H), 2.00 (s, 3 H).

^{13}C NMR (DMSO- d_6 , 100 MHz): δ 168.6, 163.3, 142.3, 138.9, 131.9, 130.0, 129.0, 128.0, 127.8, 126.1, 125.3, 123.4, 23.5.

HRMS (ESI): calc. for $[(\text{C}_{15}\text{H}_{11}\text{Cl}_2\text{NO}_3)\text{Na}]$ ($\text{M}+\text{Na}$) 346.0014, measured 346.0021.

2-Acetamido-5-fluorophenyl 4-chlorobenzoate (3h).



Colorless solid; eluent (25% ethyl acetate in hexanes).

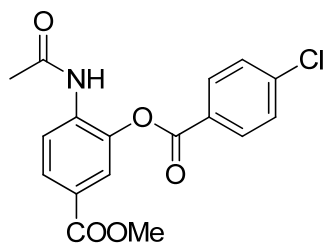
IR (ATR) $\tilde{\nu}$ (cm^{-1}): 3348, 1724, 1682, 1265 and 753.

^1H NMR (CDCl_3 , 400 MHz): δ 8.03 (d, J = 8.0 Hz, 2 H), 7.86 (t, J = 8.0 Hz, 1 H), 7.44 (d, J = 8.0 Hz, 2 H), 7.14 (s, 1 H), 6.91 (bs, 2 H), 1.99 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.4, 163.4, 158.1, 141.0, 131.6, 129.3, 126.7, 126.1 and 126.06 (F coupling), 125.4 and 125.3 (F coupling), 113.6 and 113.4 (F coupling), 110.3 and 110.0 (F coupling), 24.1.

HRMS (ESI): calc. for $[(\text{C}_{15}\text{H}_{11}\text{ClFNO}_3)\text{Na}]$ ($\text{M}+\text{Na}$) 330.0309, measured 330.0315.

Methyl 4-acetamido-3-((4-chlorobenzoyl)oxy)benzoate (3i).



Colorless solid; eluent (35% ethyl acetate in hexanes).

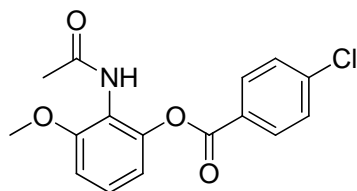
IR (ATR) $\tilde{\nu}$ (cm⁻¹): 3366, 2928, 1700, 1597, 1261 and 673.

¹H NMR (CDCl₃, 400 MHz): δ 8.32 (bs, 1 H), 8.06 (d, J = 8.0 Hz, 2 H), 7.88 (dd, J = 8.0, 4.0 Hz, 1 H), 7.80 (s, 1 H), 7.46 (d, J = 8.0 Hz, 2 H), 7.36 (d, J = 8.0 Hz, 1 H), 3.82 (s, 3 H), 2.07 (s, 3 H).

¹³C NMR (CDCl₃, 100 MHz): δ 165.8, 163.6, 141.1, 134.4, 131.6, 131.5, 129.3, 128.8, 128.3, 126.7, 123.6, 52.2, 24.8.

HRMS (ESI): calc. for [(C₁₇H₁₄ClNO₅)Na] (M+Na) 370.0458, measured 370.0454.

2-Acetamido-3-methoxyphenyl 4-chlorobenzoate (3j).



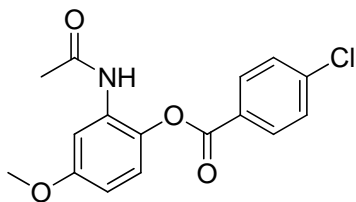
Colorless solid; eluent (30% ethyl acetate in hexanes).

¹H NMR (DMSO-*d*₆, 400 MHz): δ 9.24 (s, 1 H), 8.05 (d, J = 8.0 Hz, 2 H), 7.68 (d, J = 8.0 Hz, 2 H), 7.33 (t, J = 8.0 Hz, 1 H), 7.01 (d, J = 8.0 Hz, 1 H), 6.94 (d, J = 8.0 Hz, 1 H), 3.82 (s, 3 H), 1.87 (s, 3 H).

¹³C NMR (DMSO-*d*₆, 100 MHz): δ 168.1, 162.9, 155.3, 147.0, 138.9, 131.4, 129.1, 128.1, 126.9, 119.2, 115.1, 109.2, 55.9, 22.5.

HRMS (ESI): calc. for [(C₁₆H₁₄ClNO₄)H] (M+H) 320.0690, measured 320.0690.

2-Acetamido-4-methoxyphenyl 4-chlorobenzoate (3k).



Colorless solid; eluent (30% ethyl acetate in hexanes).

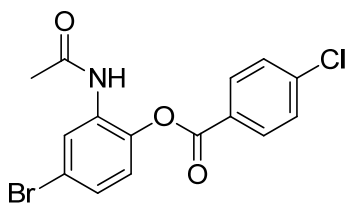
IR (ATR) $\tilde{\nu}$ (cm⁻¹): 3450, 2917, 1724, 1685 and 853.

¹H NMR (CDCl₃, 400 MHz): δ 8.06 (d, J = 8.0 Hz, 2 H), 7.74 (s, 1 H), 7.44 (d, J = 8.0 Hz, 2 H), 7.13 (b, 1 H), 7.02 (d, J = 12.0, 1 H), 6.64 (d, J = 8.0 Hz, 1 H), 3.75 (s, 3 H), 2.03 (s, 3 H).

¹³C NMR (CDCl₃, 100 MHz): δ 168.2, 164.2, 157.8, 140.7, 134.1, 131.6, 130.6, 129.2, 127.2, 122.5, 110.7, 108.0, 55.7, 24.6.

HRMS (ESI): calc. for [(C₁₆H₁₄ClNO₄)H] (M+H) 320.0690, measured 320.0690.

2-Acetamido-4-bromophenyl 4-chlorobenzoate (3l).



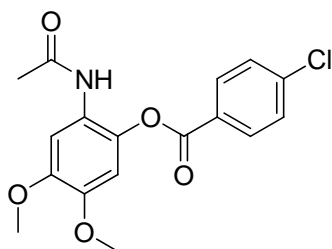
Colorless solid; eluent (30% ethyl acetate in hexanes).

¹H NMR (CDCl₃, 400 MHz): δ 8.33 (s, 1 H), 8.05 (d, J = 8.0 Hz, 2 H), 7.46 (d, J = 8.0 Hz, 2 H), 7.23 (d, J = 8.0, Hz, 1 H), 7.17 (s, 1 H), 7.00 (d, J = 8.0, Hz, 1 H), 2.04 (s, 3 H).

¹³C NMR (CDCl₃, 100 MHz): δ 168.1, 163.5, 141.1, 139.5, 131.6, 131.2, 129.3, 127.8, 126.7, 125.8, 123.5, 119.7, 24.5.

HRMS (ESI): calc. for [(C₁₅H₁₁BrClNO₃)Na] (M+Na) 389.9509, measured 389.9508.

2-Acetamido-4,5-dimethoxyphenyl 4-chlorobenzoate (3m).



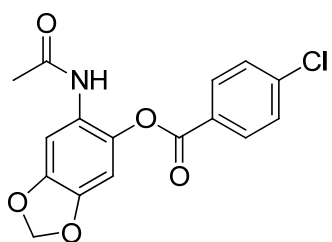
Colorless solid; eluent (50% ethyl acetate in hexanes).

$^1\text{H NMR}$ (DMSO- d_6 , 400 MHz): δ 9.41 (s, 1 H), 8.12 (d, $J = 8.0$ Hz, 2 H) 7.68 (d, $J = 8.0$ Hz, 2 H), 7.34 (s, 1 H), 6.95 (s, 1 H), 3.75 (s, 3 H), 3.72 (s, 3 H), 1.94 (s, 3 H).

$^{13}\text{CNMR}$ (DMSO- d_6 , 100 MHz): δ 168.3, 163.7, 146.1, 145.8, 138.7, 135.8, 131.7, 129.0, 128.4, 123.0, 108.6, 107.2, 55.9, 55.8, 23.2.

HRMS (ESI): calc. for $[(\text{C}_{17}\text{H}_{16}\text{ClNO}_5)\text{H}]$ (M+H) 350.0795, measured 350.0805.

6-Acetamidobenzo[d][1,3]dioxol-5-yl 4-chlorobenzoate (3n).



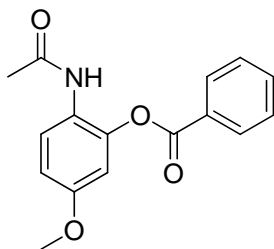
Yellow solid; eluent (40% ethyl acetate in hexanes).

$^1\text{H NMR}$ (DMSO- d_6 , 400 MHz): δ 9.42 (s, 1 H), 8.11 (d, $J = 8.0$ Hz, 2 H) 7.68 (d, $J = 8.0$ Hz, 2 H), 7.25 (s, 1 H), 6.98 (s, 1 H), 6.06 (s, 2 H), 1.93 (s, 3 H).

$^{13}\text{CNMR}$ (DMSO- d_6 , 100 MHz): δ 168.4, 163.7, 144.6, 144.0, 138.7, 136.6, 131.7, 129.0, 123.9, 106.2, 104.2, 101.8, 23.2.

HRMS (ESI): calc. for $[(\text{C}_{16}\text{H}_{12}\text{ClNO}_5)\text{H}]$ (M+H) 334.0482, measured 334.0491.

2-Acetamido-5-methoxyphenyl benzoate (3o).



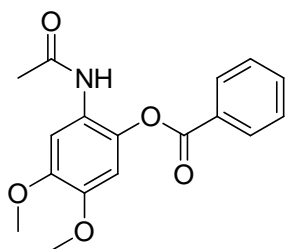
Brown solid; eluent (35% ethyl acetate in hexanes).

^1H NMR (DMSO- d_6 , 400 MHz): δ 9.40 (s, 1 H), 8.12 (d, J = 8.0 Hz, 2 H), 7.74 (t, J = 8.0 Hz, 1 H), 7.61 (t, J = 8.0 Hz, 2 H), 7.56 (d, J = 8.0 Hz, 1 H), 6.91 (s, 1 H), 6.86 (d, J = 8.0 Hz, 1 H), 3.75 (s, 3 H), 1.92 (s, 3 H).

^{13}C NMR (DMSO- d_6 , 100 MHz): δ 168.3, 164.1, 156.7, 144.1, 133.9, 129.9, 129.3, 128.8, 128.4, 127.7, 126.3, 123.5, 111.6, 108.7, 55.6, 23.1.

HRMS (ESI): calc. for $[(\text{C}_{16}\text{H}_{15}\text{NO}_4)\text{H}]$ (M+H) 286.1079, measured 286.1086.

2-Acetamido-4,5-dimethoxyphenyl benzoate (3p).



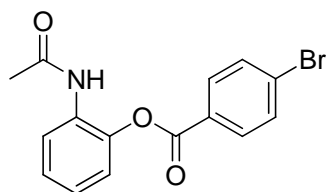
Brown solid; eluent (55% ethyl acetate in hexanes).

^1H NMR (DMSO- d_6 , 400 MHz): δ 9.41 (s, 1 H), 8.12 (d, J = 8.0 Hz, 2 H), 7.73 (t, J = 8.0 Hz, 1 H), 7.61 (t, J = 8.0 Hz, 2 H), 7.33 (s, 1 H), 6.94 (s, 1 H), 3.75 (s, 3 H), 3.73 (s, 3 H), 1.94 (s, 3 H).

^{13}C NMR (DMSO- d_6 , 100 MHz): δ 168.3, 164.5, 146.1, 145.9, 136.1, 133.7, 129.9, 129.5, 128.8, 123.0, 108.7, 107.2, 55.9, 55.8, 23.2.

HRMS (ESI): calc. for $[(\text{C}_{17}\text{H}_{17}\text{NO}_5)\text{H}]$ (M+H) 316.1185, measured 316.1190.

2-Acetamidophenyl 4-bromobenzoate (3q).



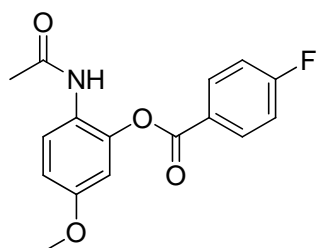
Colorless solid; eluent (25% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.02 (d, $J = 8.0$ Hz, 1 H), 7.98 (d, $J = 8.0$ Hz, 2 H), 7.61 (d, $J = 8.0$ Hz, 2 H), 7.23 – 7.20 (m, 1 H), 7.16 (bs, 1 H), 7.12 (d, $J = 8.0$ Hz, 2 H), 2.02 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.4, 164.0, 141.2, 132.2, 131.6, 129.8, 129.5, 127.6, 126.7, 125.2, 123.8, 122.1, 24.3.

HRMS (ESI): calc. for $[(\text{C}_{15}\text{H}_{12}\text{BrNO}_3)\text{H}]$ (M+H) 334.0079, measured 334.0080.

2-Acetamido-5-methoxyphenyl 4-fluorobenzoate (3r).



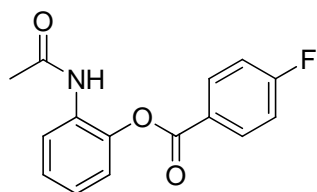
Yellow solid; eluent (30% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.20 (dd, $J = 8.0, 4.0$ Hz, 2 H), 7.71 (d, $J = 8.0$ Hz, 1 H), 7.18 (t, $J = 8.0$ Hz, 2 H), 7.00 (bs, 1 H), 6.81 (dd, $J = 8.0, 4.0$ Hz, 1 H), 6.73 (s, 1 H), 3.77 (s, 3 H), 2.02 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.6, 167.7, 165.2, 157.7, 143.6, 133.0 and 132.9 (F coupling), 126.2, 124.9, 122.6, 116.2 and 116.0 (F coupling), 112.2, 108.1, 55.6, 23.9.

HRMS (ESI): calc. for $[(\text{C}_{16}\text{H}_{14}\text{FNO}_4)\text{H}]$ (M+H) 304.0985, measured 304.0992.

2-Acetamidophenyl 4-fluorobenzoate (3s).



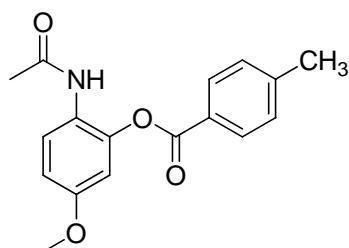
Colorless solid; eluent (30% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.16 (t, $J = 8.0$ Hz, 2 H), 8.04 (d, $J = 8.0$ Hz, 1 H), 7.22 (t, $J = 8.0$ Hz, 1 H), 7.19 – 7.13 (m, 4 H), 2.03 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.3, 167.7, 165.2, 163.7, 141.2, 133.0 and 132.9 (F coupling), 129.9, 126.7, 125.2, 123.7, 122.2, 116.2 and 116.0 (F coupling), 24.5.

HRMS (ESI): calc. for $[(\text{C}_{15}\text{H}_{12}\text{FNO}_3)\text{Na}]$ (M+Na) 296.0699, measured 296.0696.

2-Acetamido-5-methoxyphenyl 4-methylbenzoate (3t).



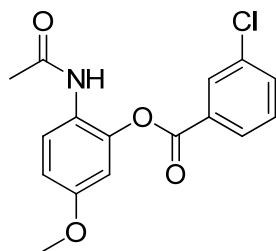
Yellow solid; eluent (30% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.01 (d, $J = 8.0$ Hz, 2 H), 7.74 (d, $J = 8.0$ Hz, 1 H), 7.26 (d, $J = 8.0$ Hz, 2 H), 6.99 (s, 1 H), 6.75 (dd, $J = 8.0, 4.0$ Hz, 1 H), 6.70 (d, $J = 8.0$ Hz, 1 H), 3.72 (s, 3 H), 2.39 (s, 3 H), 1.97 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.5, 164.7, 157.4, 145.1, 143.3, 130.3, 129.5, 125.84, 125.8, 122.8, 112.0, 108.1, 55.6, 24.0, 21.8.

HRMS (ESI): calc. for $[(\text{C}_{17}\text{H}_{17}\text{NO}_4)\text{Na}]$ (M+Na) 322.1055, measured 322.1067.

2-Acetamido-5-methoxyphenyl 3-chlorobenzoate (3u).



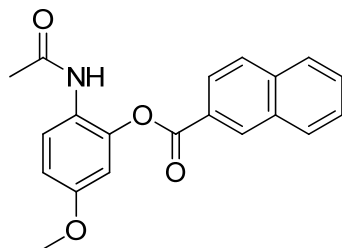
Colorless solid; eluent (35% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.09 (s, 1 H), 8.01(d, $J = 8.0$ Hz, 1 H), 7.69 (d, $J = 8.0$, Hz, 1 H), 7.58 (d, $J = 8.0$ Hz, 1 H), 7.41 (t, $J = 8.0$ Hz, 1 H), 6.94 (bs, 1 H), 6.77 (dd, $J = 8.0, 4.0$ Hz, 1 H), 6.70 (d, $J = 8.0$ Hz, 1 H), 3.73 (s, 3 H), 1.99 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.6, 157.6, 143.4, 135.0, 134.1, 130.4, 130.3, 130.1, 128.4, 126.2, 122.5, 112.3, 108.0, 55.7, 24.0.

HRMS (ESI): calc. for $[(\text{C}_{16}\text{H}_{14}\text{ClNO}_4)\text{H}]$ ($\text{M}+\text{H}$) 320.0689, measured 320.0691.

2-Acetamido-5-methoxyphenyl 2-naphthoate (3v).



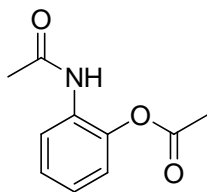
Yellow solid; eluent (30% ethyl acetate in hexanes).

^1H NMR (CDCl_3 , 400 MHz): δ 8.74 (s, 1 H), 8.12 (dd, $J = 8.0, 4.0$ Hz, 1 H), 7.96 (d, $J = 8.0$ Hz, 1 H), 7.90 (t, $J = 8.0$ Hz, 2 H), 7.77 (d, $J = 8.0$ Hz, 1 H), 7.61 (t, $J = 8.0$ Hz, 1 H), 7.56 (t, $J = 8.0$, Hz, 1 H), 7.19 (bs, 1 H), 6.82 (d, $J = 8.0$ Hz, 1 H), 6.80 (s, 1 H), 3.78 (s, 3 H), 2.01 (s, 3 H).

^{13}C NMR (CDCl_3 , 100 MHz): δ 168.7, 164.9, 157.5, 143.5, 135.9, 132.4, 132.3, 129.5, 128.9, 128.6, 127.8, 127.0, 126.0, 125.8, 125.2, 122.8, 112.1, 108.1, 55.6, 23.9.

HRMS (ESI): calc. for $[(\text{C}_{20}\text{H}_{17}\text{NO}_4)\text{Na}]$ ($\text{M}+\text{Na}$) 358.1055, measured 355.1057.

2-Acetamidophenyl acetate (3w).



Brown solid; eluent (50% ethyl acetate in hexanes).

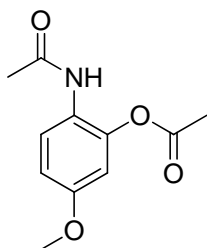
IR (ATR) $\tilde{\nu}$ (cm⁻¹): 3279, 2929, 1741, 1653, 1259, 888 and 747.

¹H NMR (CDCl₃, 400 MHz): δ 8.08 (d, J = 8.0 Hz, 1 H), 7.25 (bs, 1 H), 7.20 (d, J = 8.0 Hz, 1 H), 7.10 (d, J = 8.0 Hz, 2 H), 2.33 (s, 3 H), 2.14 (s, 3 H).

¹³C NMR (CDCl₃, 100 MHz): δ 168.8, 168.3, 140.7, 129.6, 126.4, 124.8, 123.1, 122.04, 24.4, 21.0.

HRMS (ESI): calc. for [(C₁₀H₁₁NO₃)Na] (M+Na) 216.0637, measured 216.0642.

2-Acetamido-5-methoxyphenyl acetate (3x).



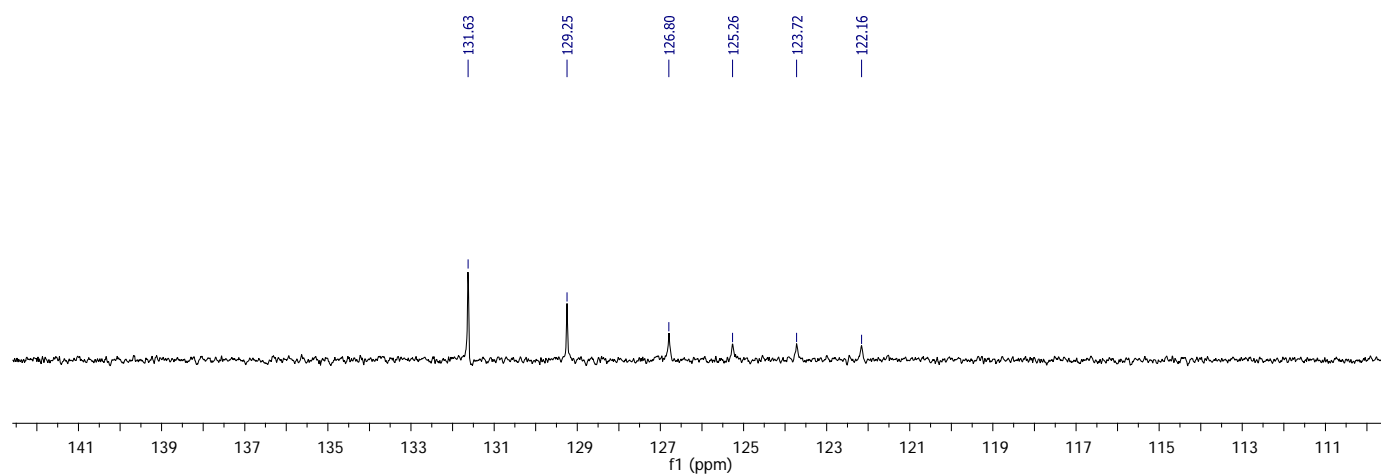
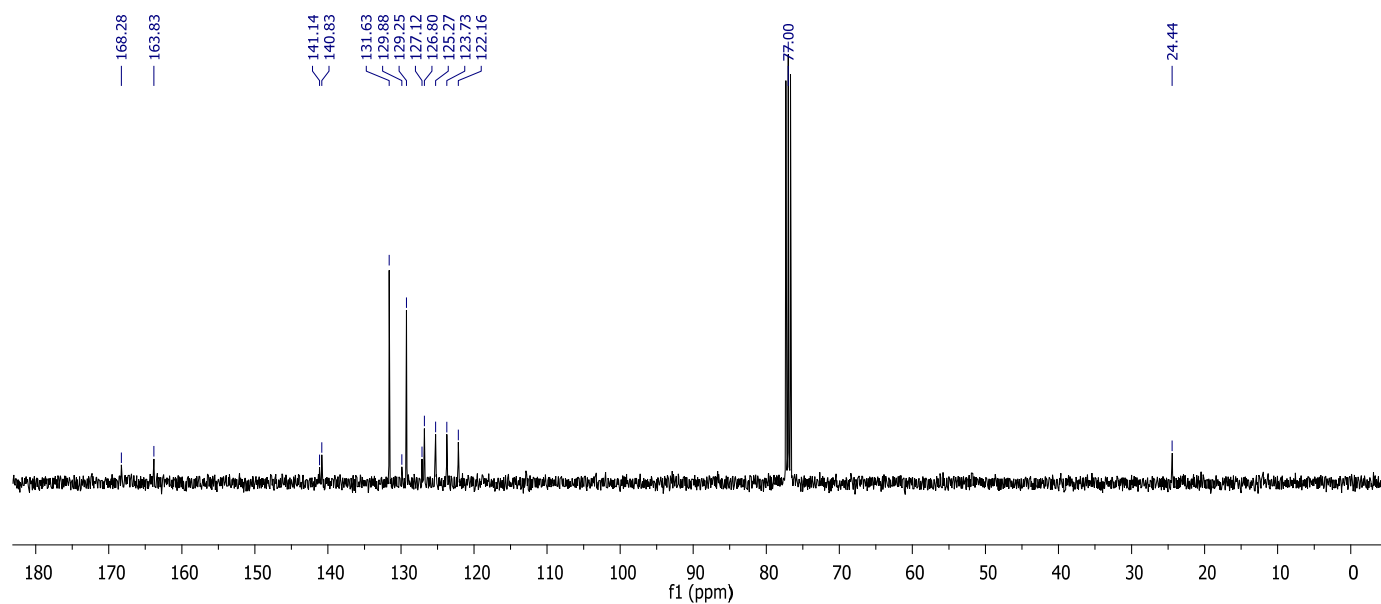
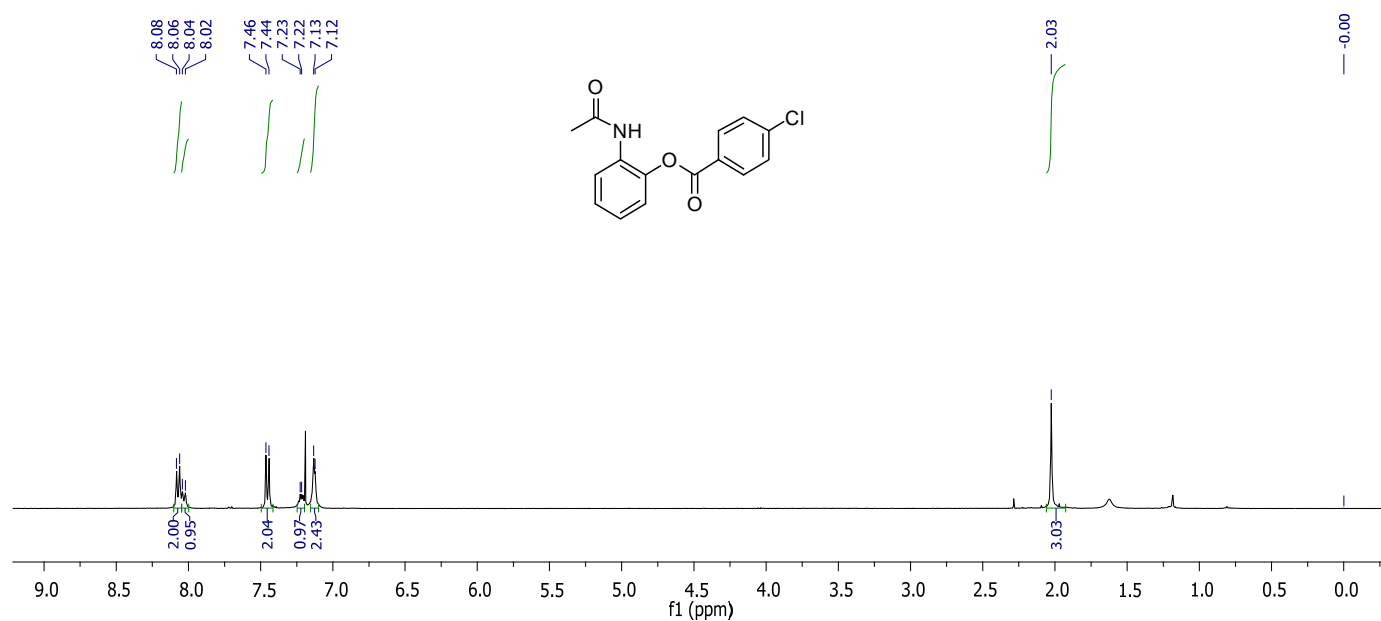
Pale yellow solid; eluent (60% ethyl acetate in hexanes).

¹H NMR (DMSO-*d*₆, 400 MHz): δ 9.25 (s, 1 H), 7.62 (d, J = 8.0 Hz, 1 H), 6.80 (dd, J = 8.0, 4.0 Hz, 1 H), 6.73 (d, J = 4.0 Hz, 1 H), 3.72 (s, 3 H), 2.26 (s, 3 H), 2.01 (s, 3 H).

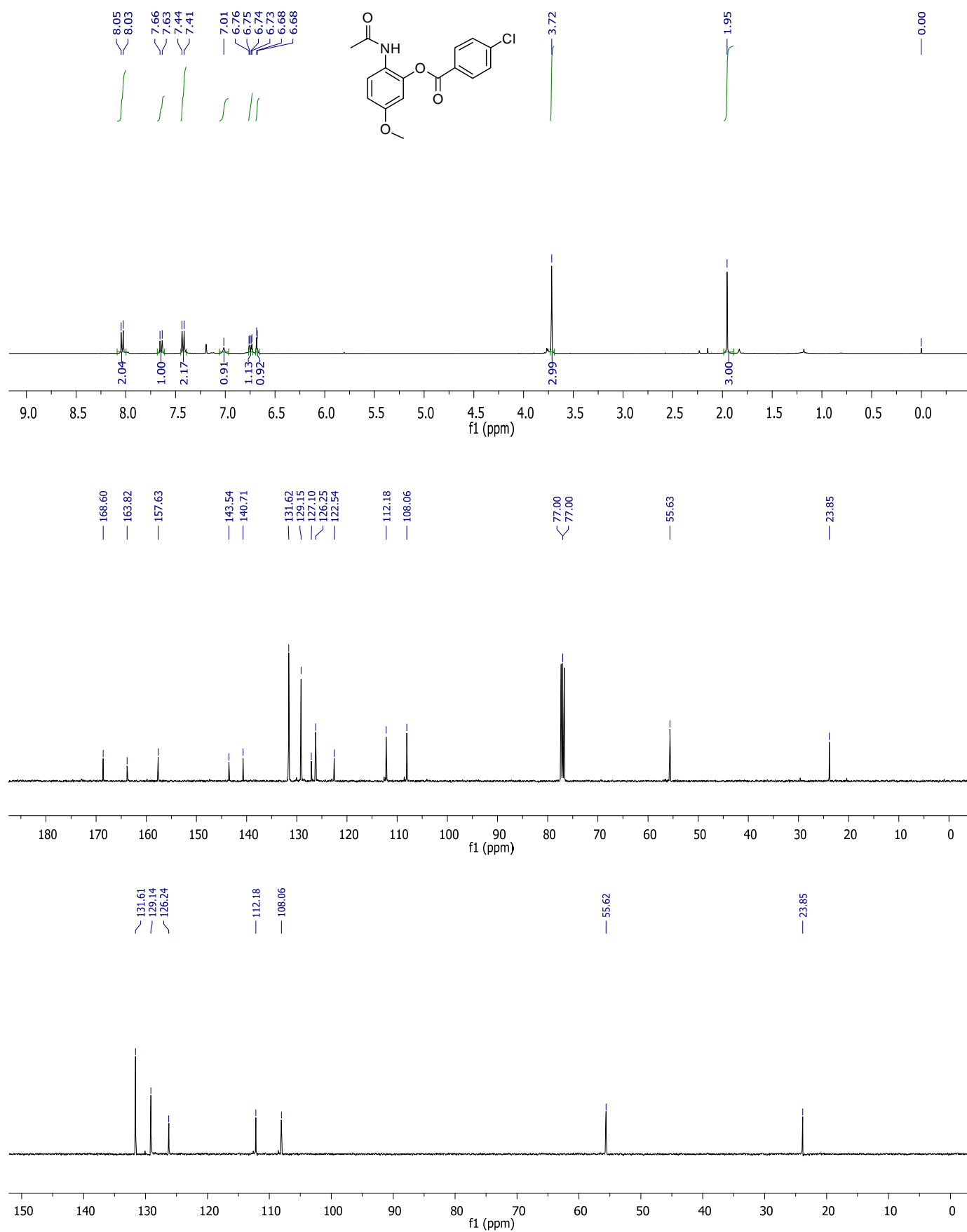
¹³C NMR (DMSO-*d*₆, 100 MHz): δ 168.8, 168.2, 156.2, 143.1, 125.4, 123.5, 111.2, 108.7, 55.5, 23.3, 21.1.

HRMS (ESI): calc. for [(C₁₁H₁₃NO₄)Na] (M+Na) 246.0742, measured 246.0753.

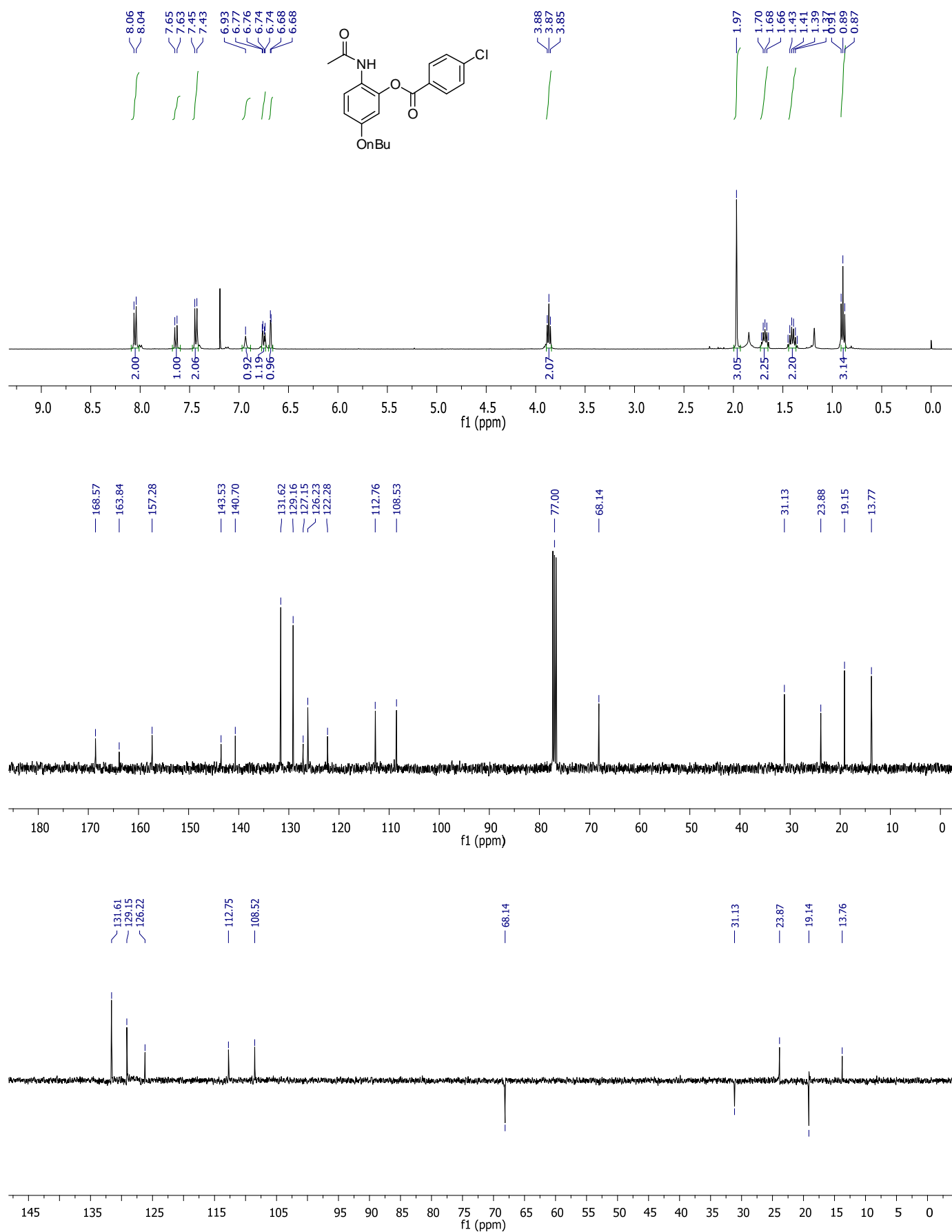
Spectral data of compound **3a**.



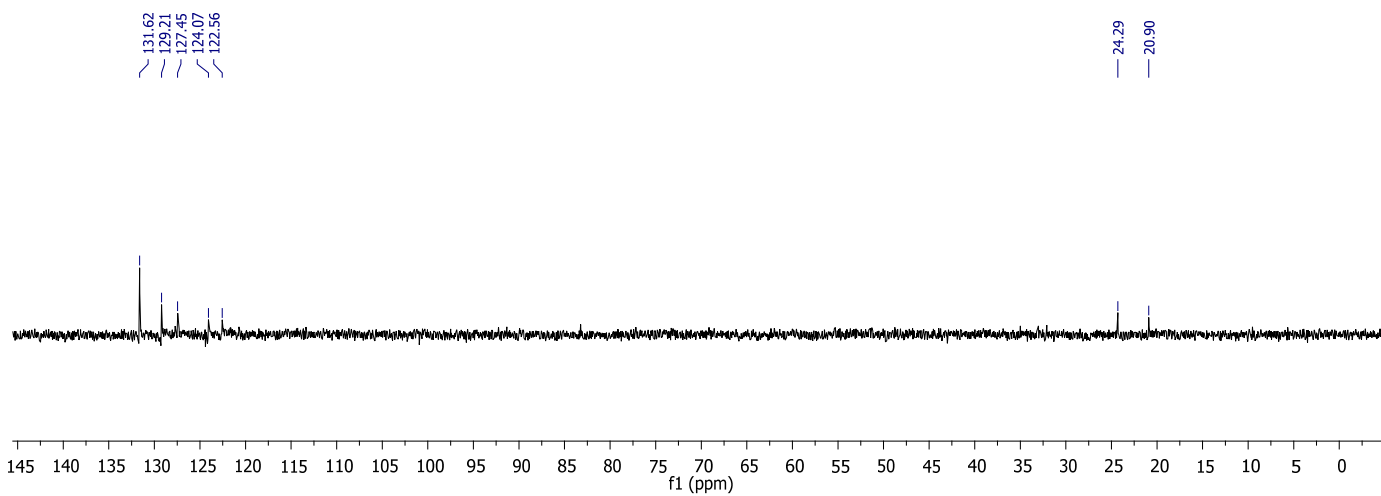
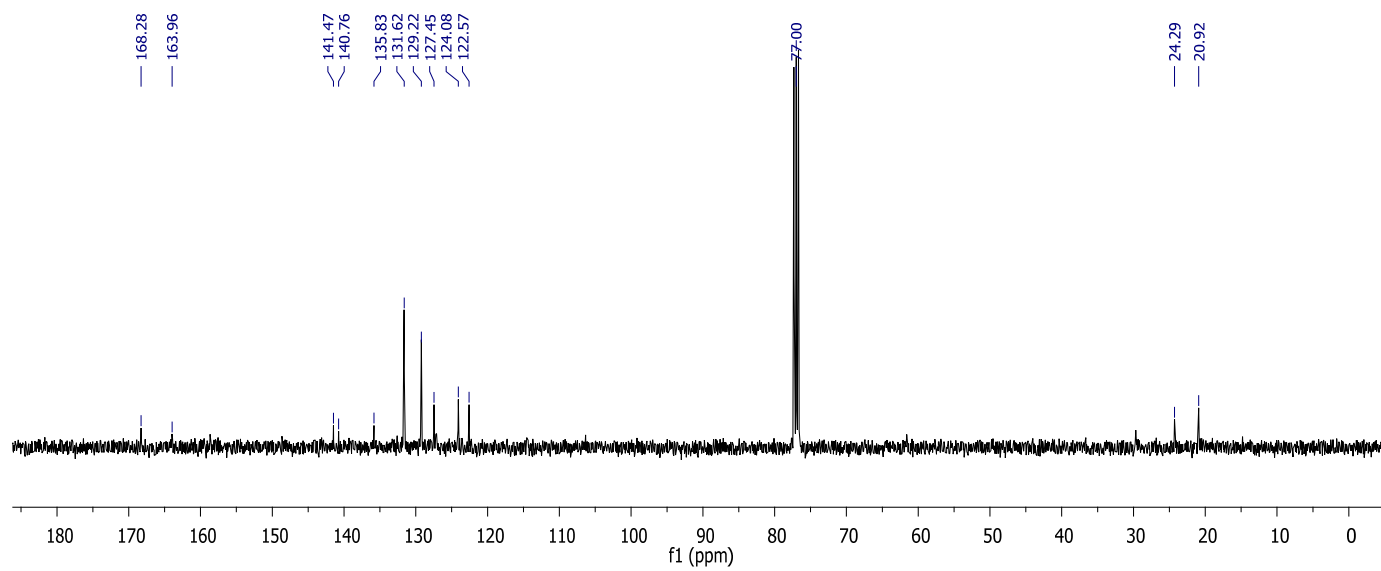
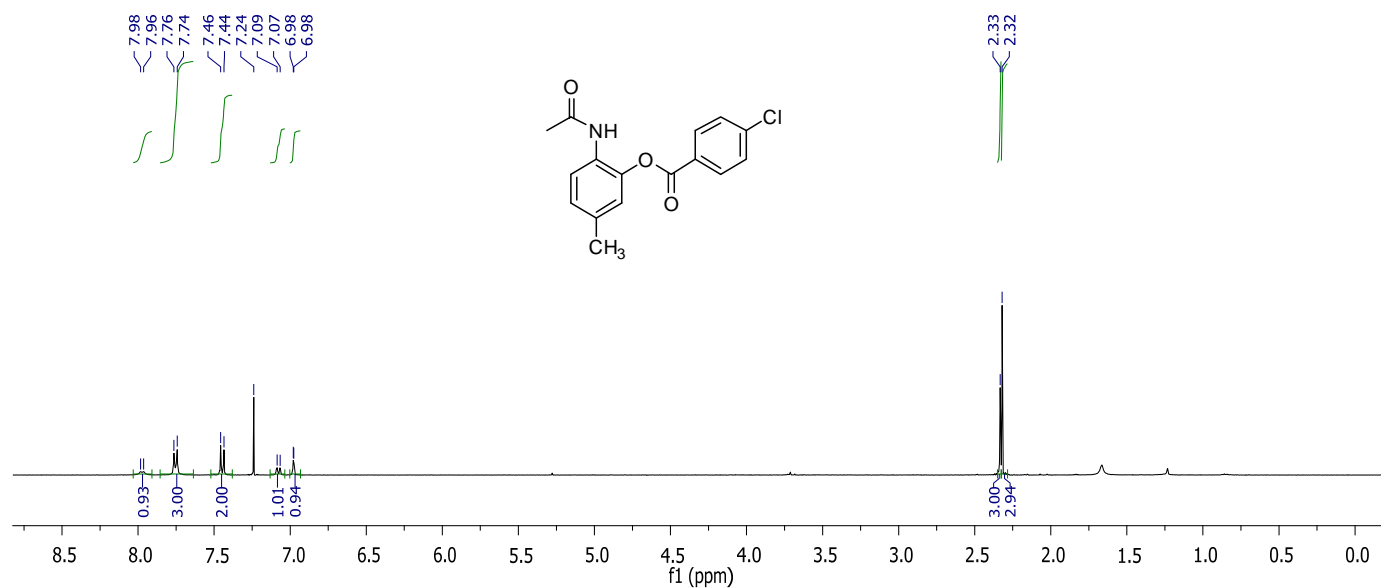
Spectral data of compound **3b**.



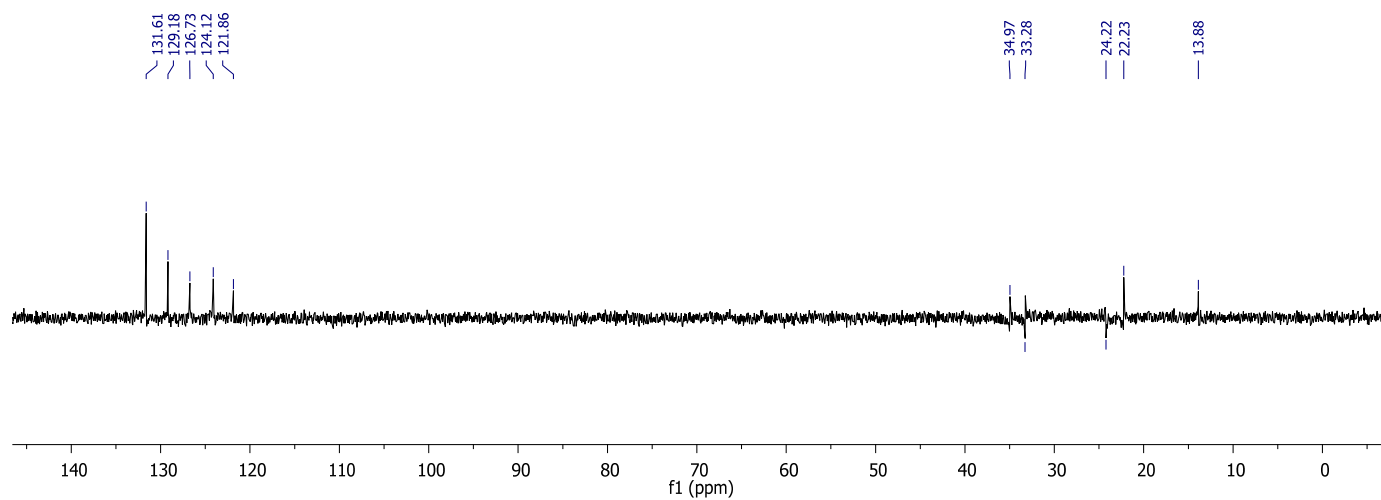
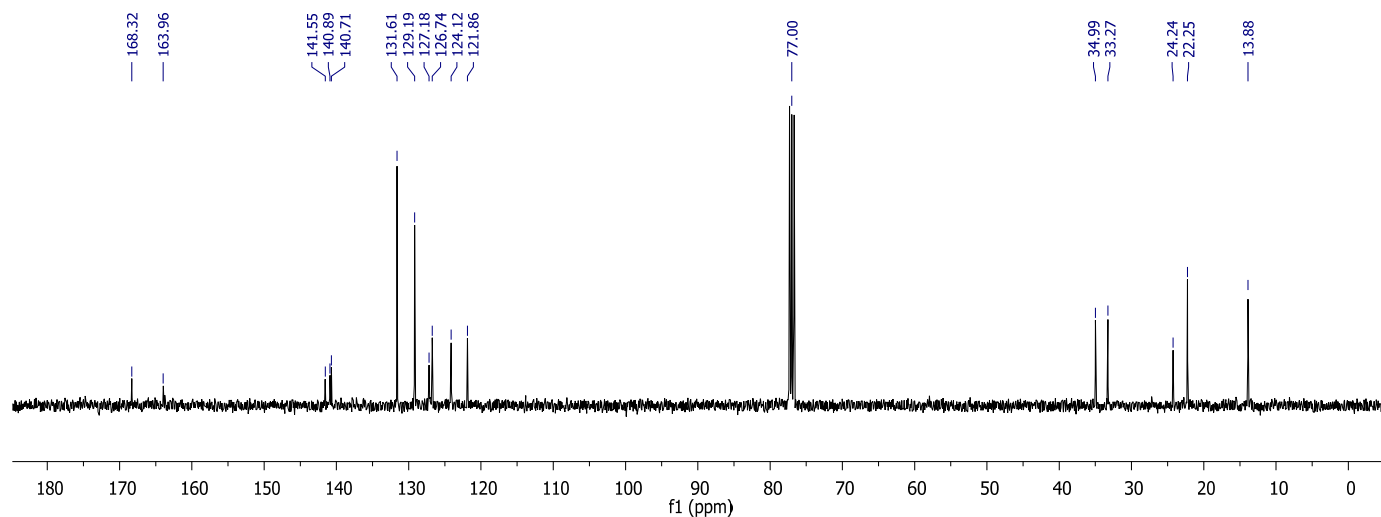
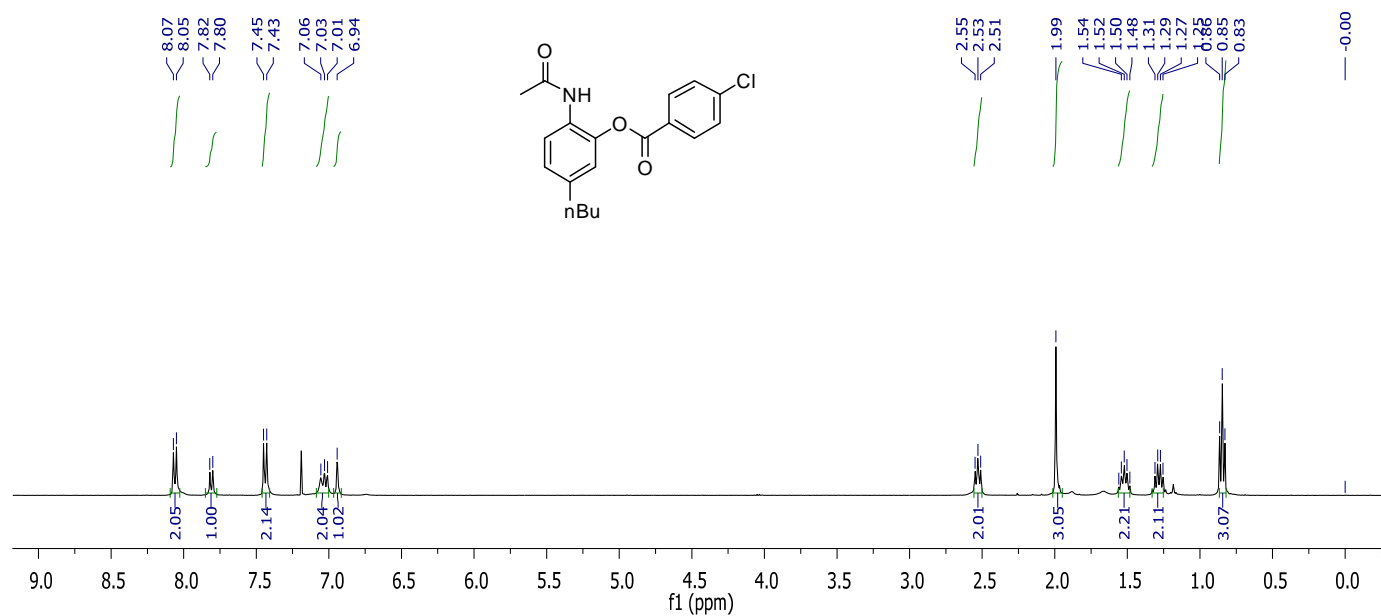
Spectral data of compound **3c**.



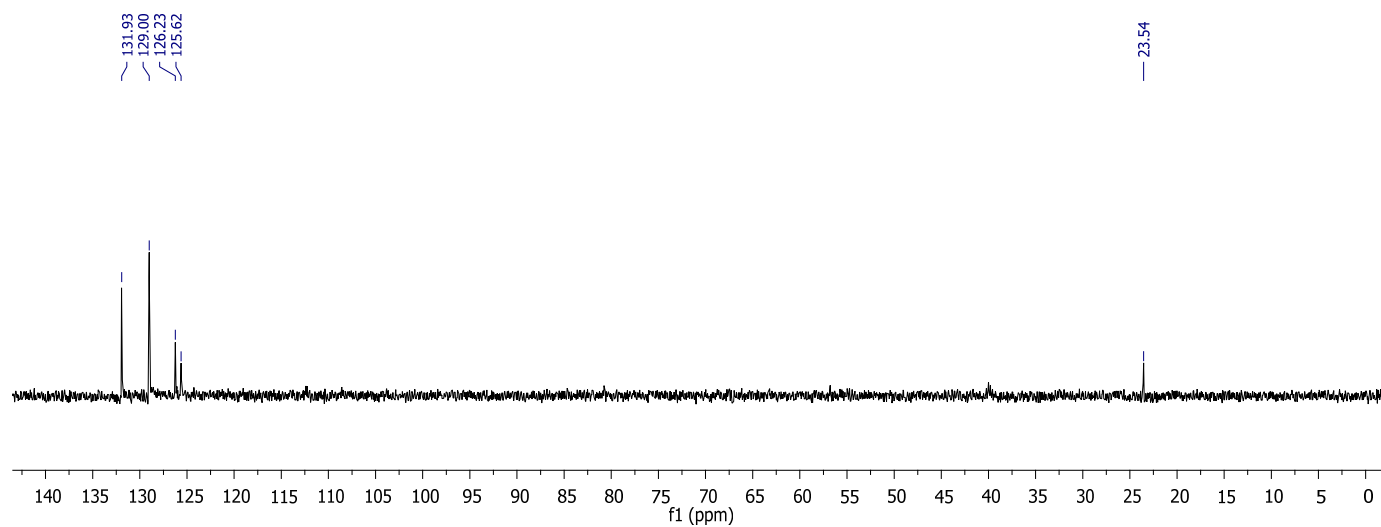
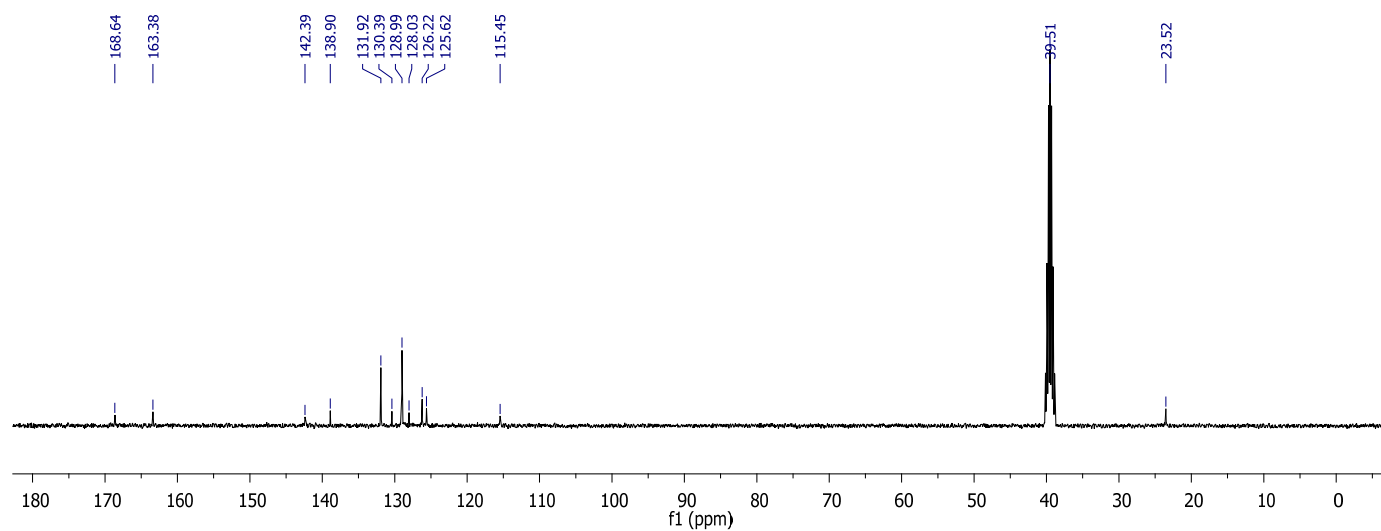
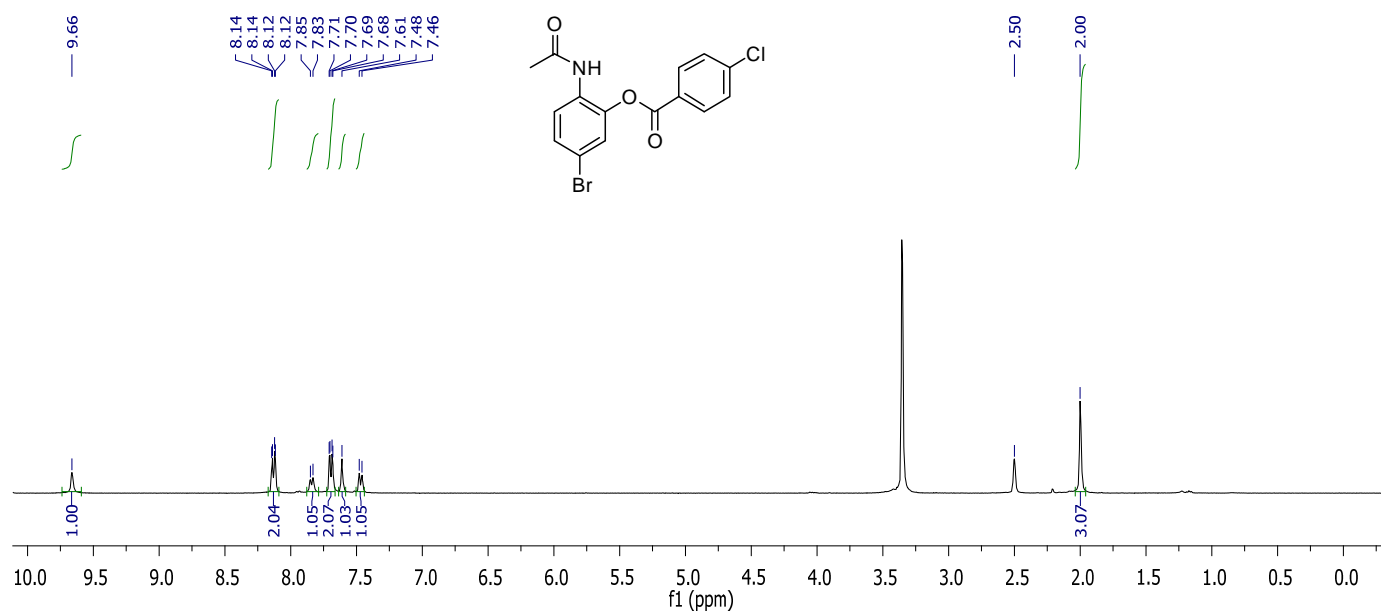
Spectral data of compound **3d**.



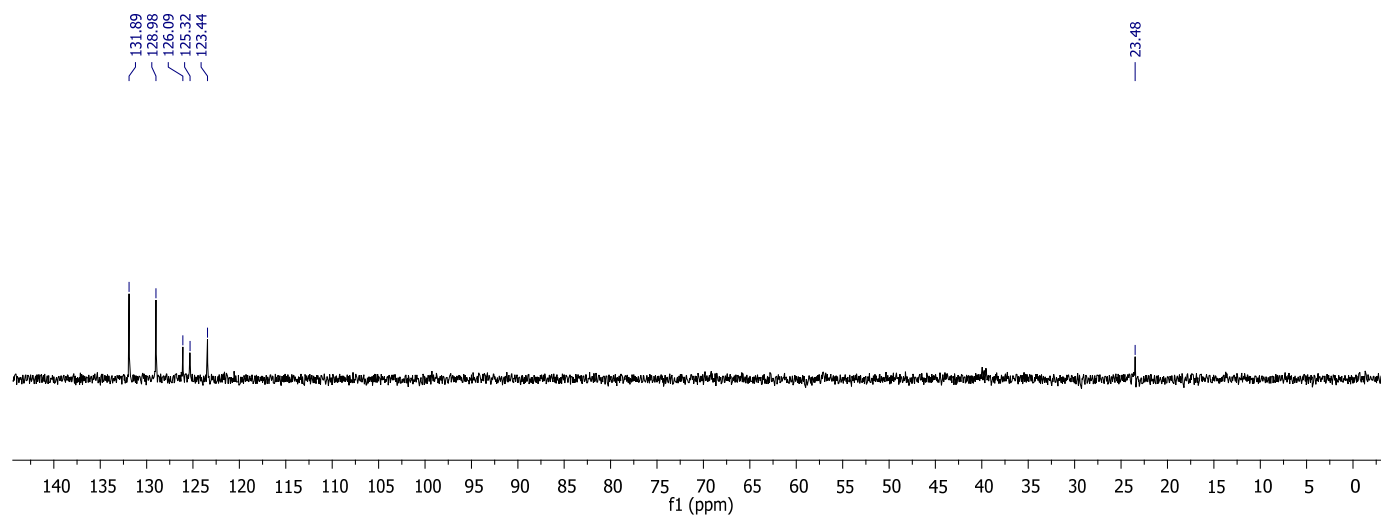
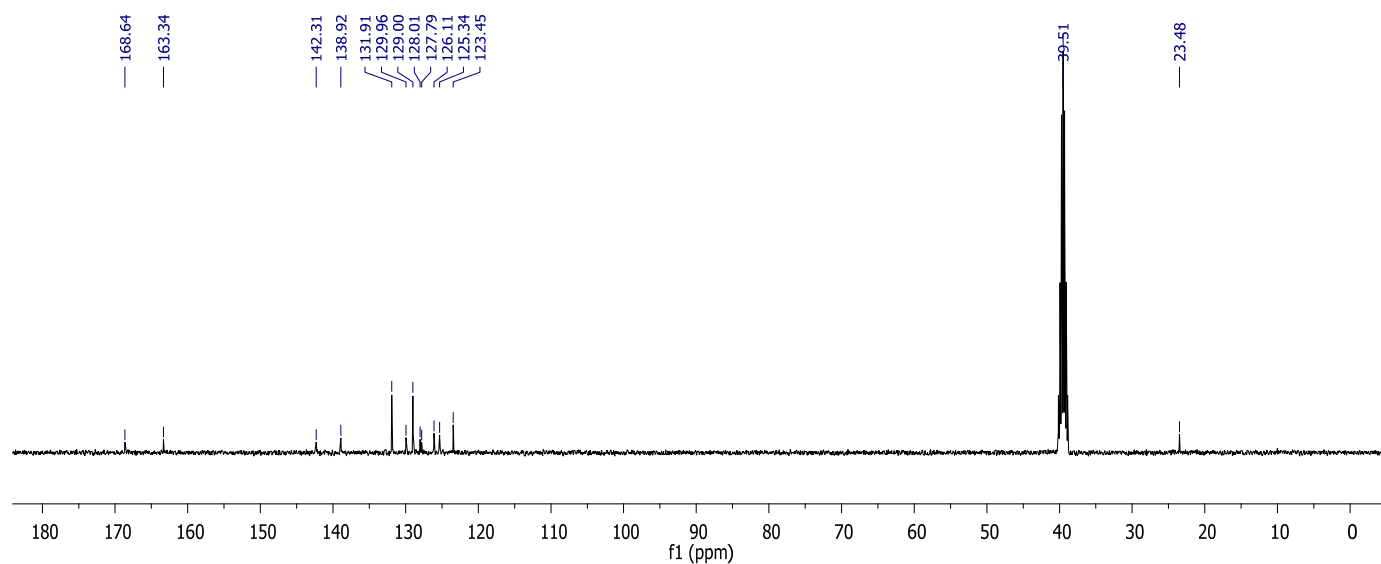
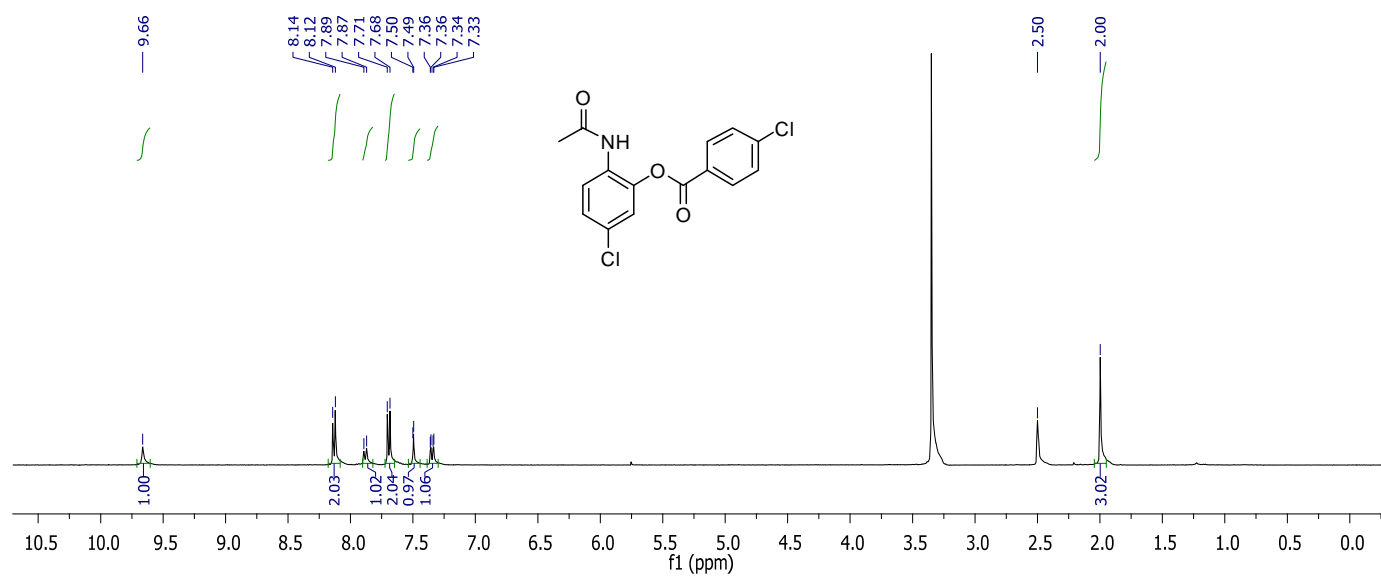
Spectral data of compound **3e**.



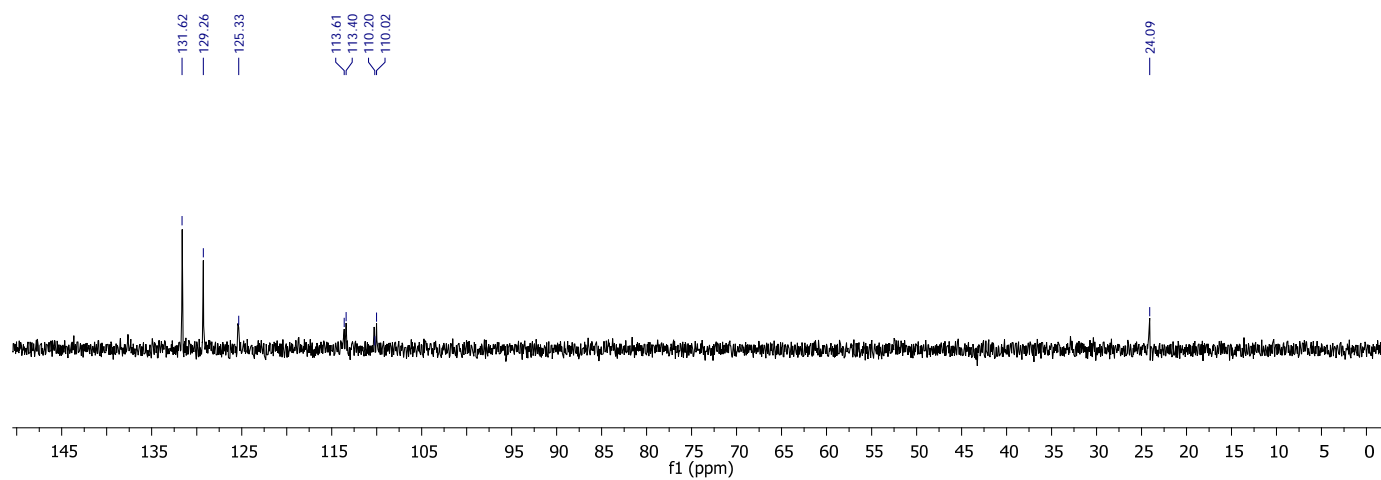
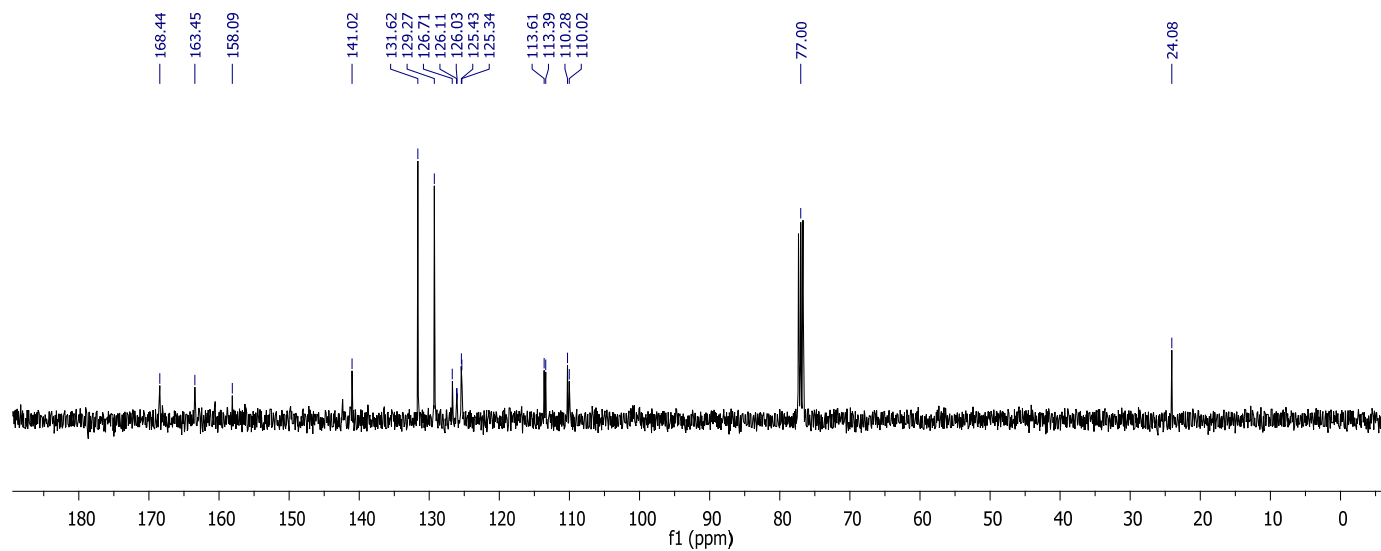
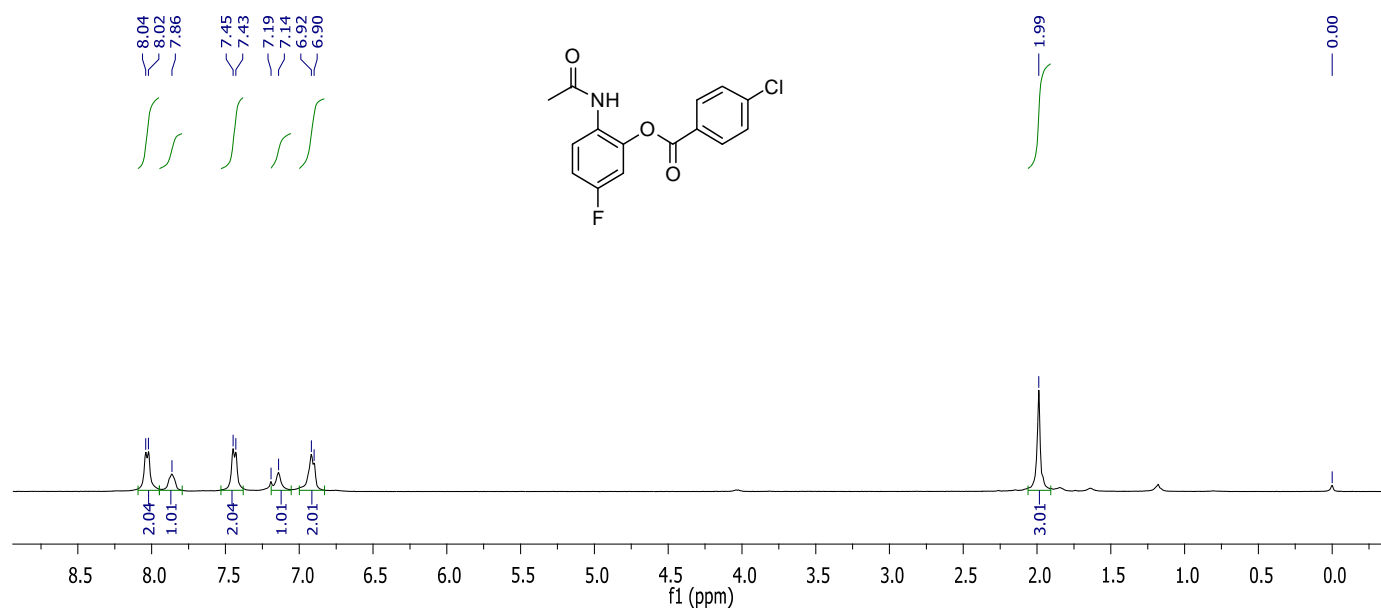
Spectral data of compound **3f**.



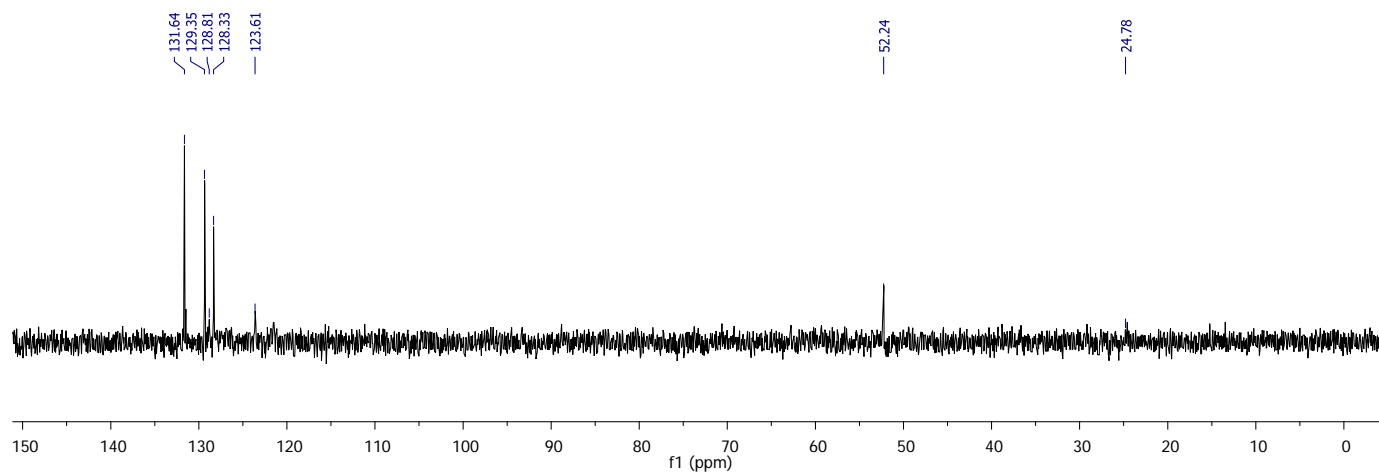
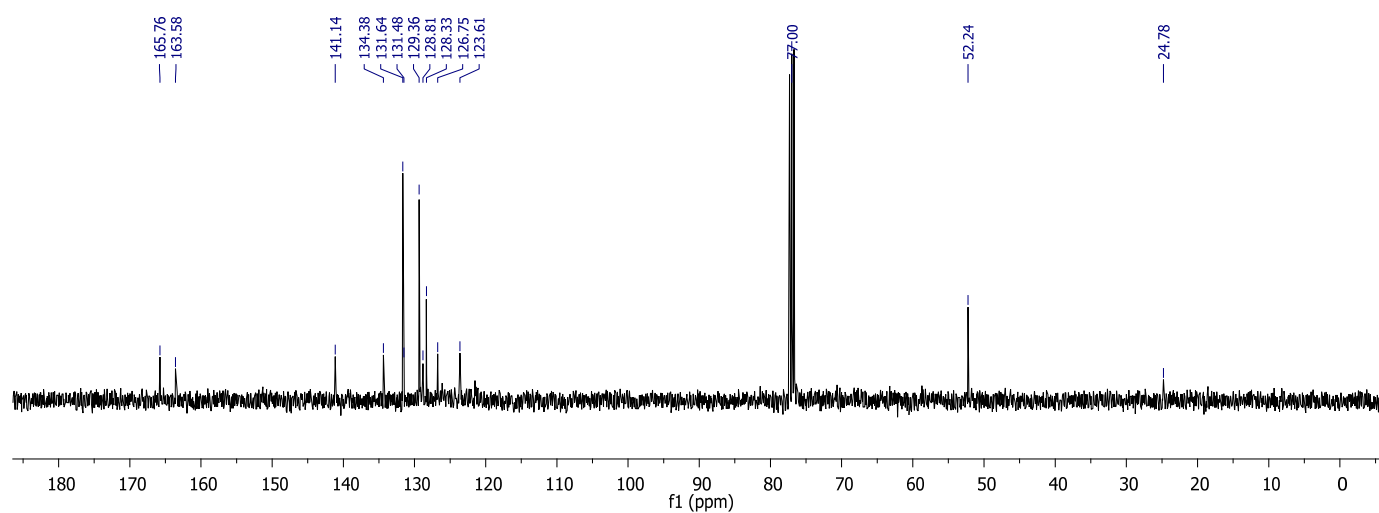
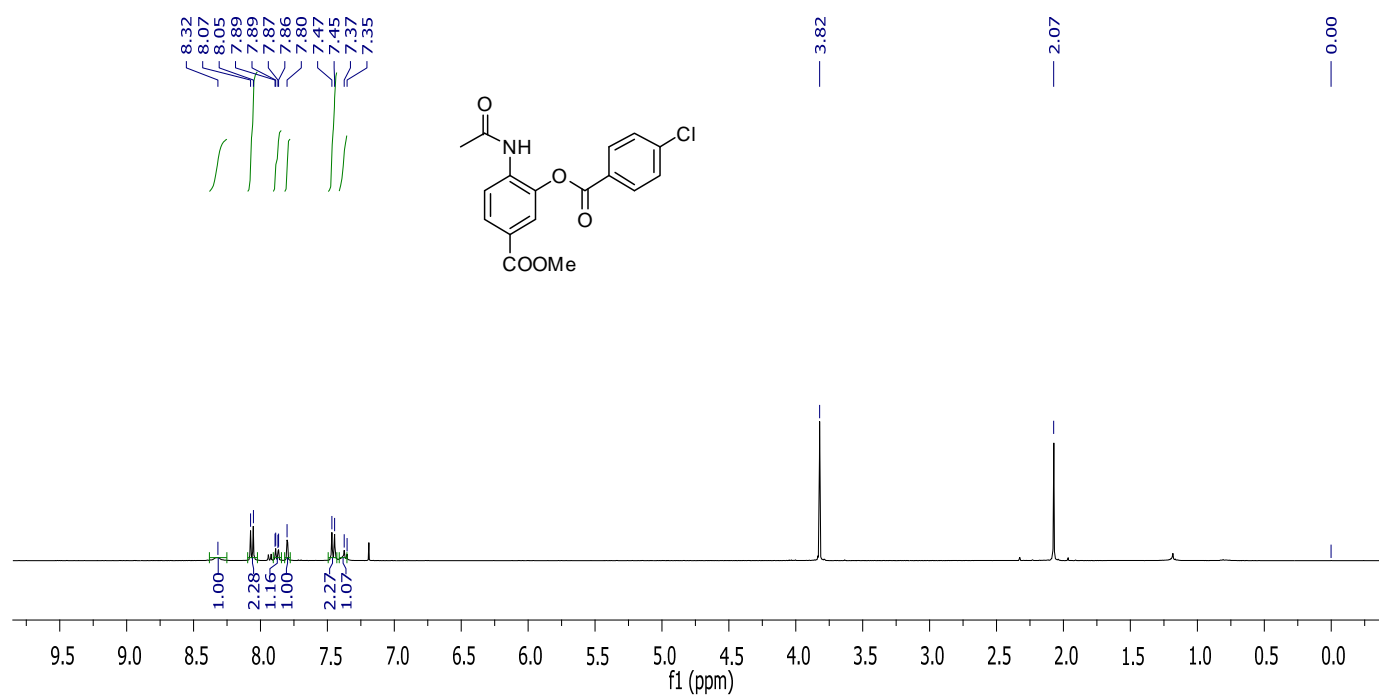
Spectral data of compound **3g**.



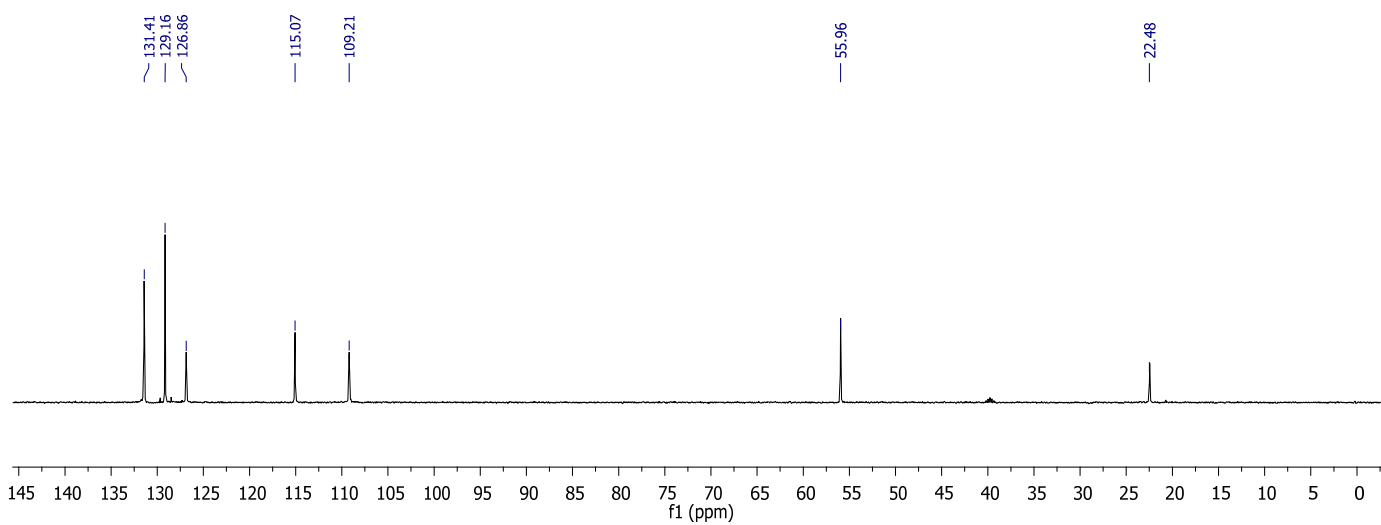
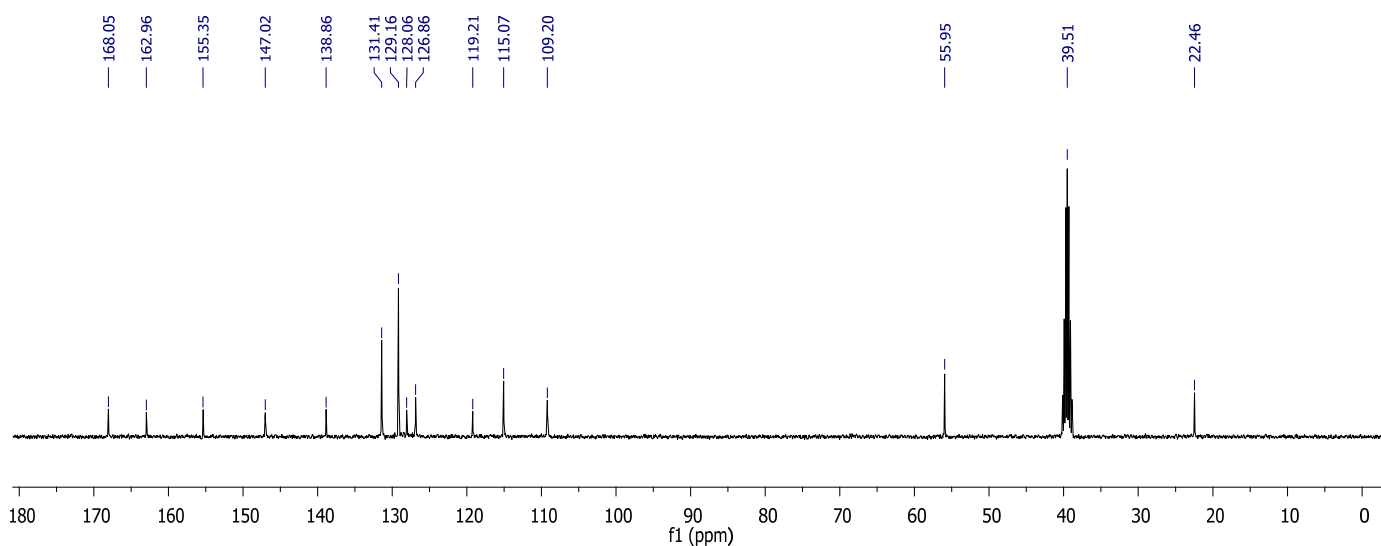
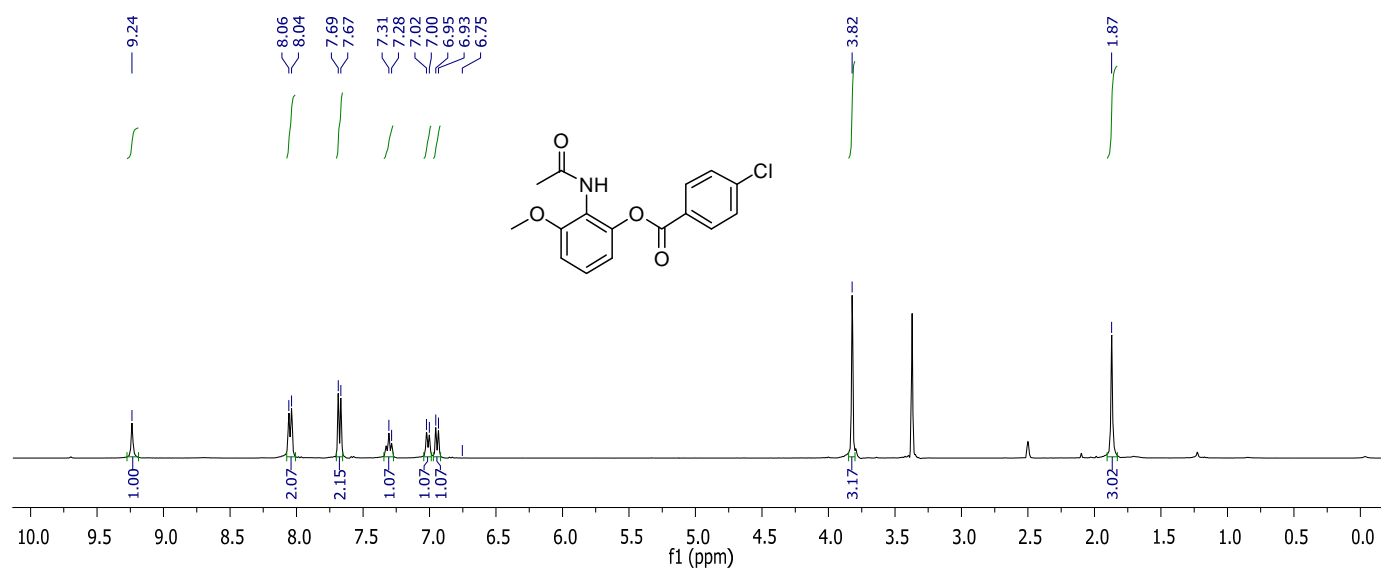
Spectral data of compound **3h**.



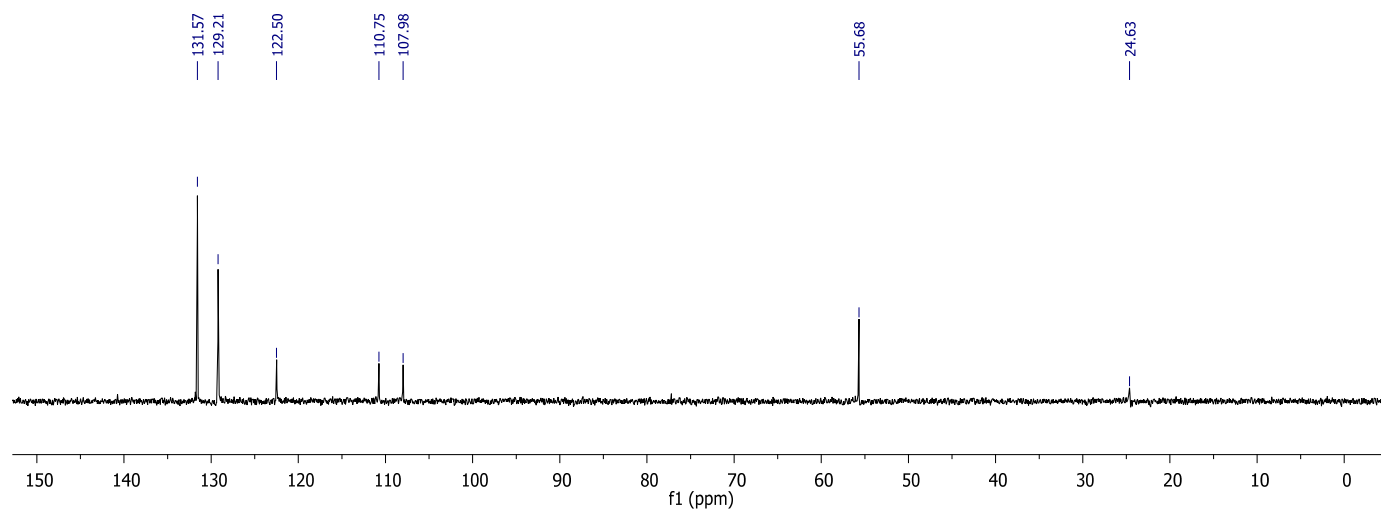
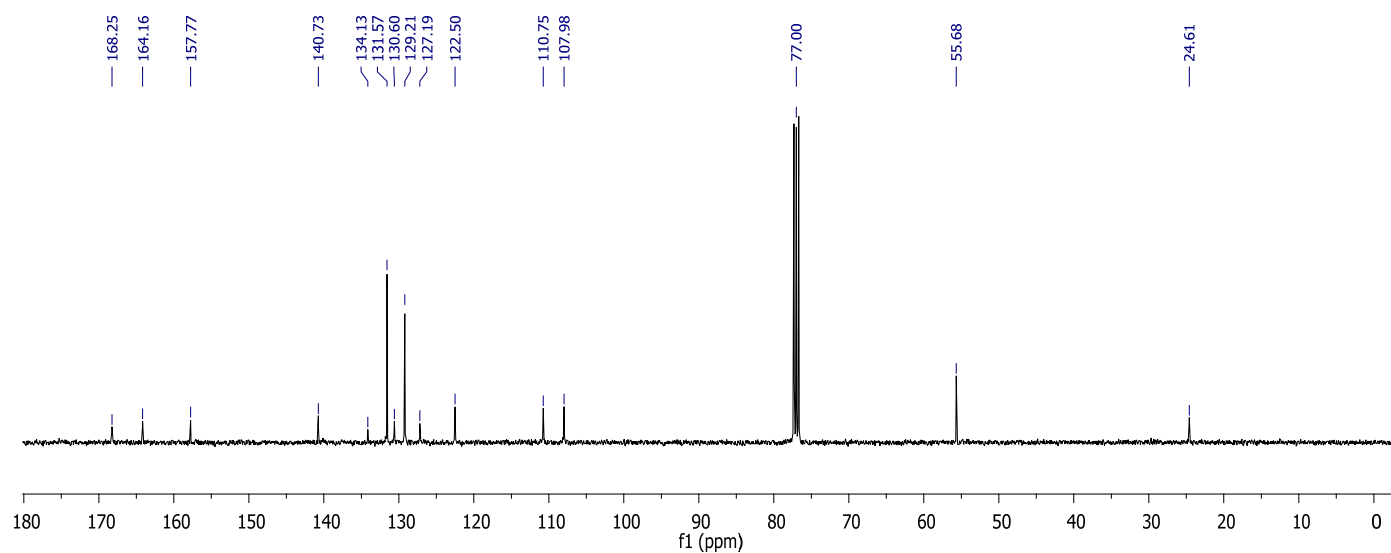
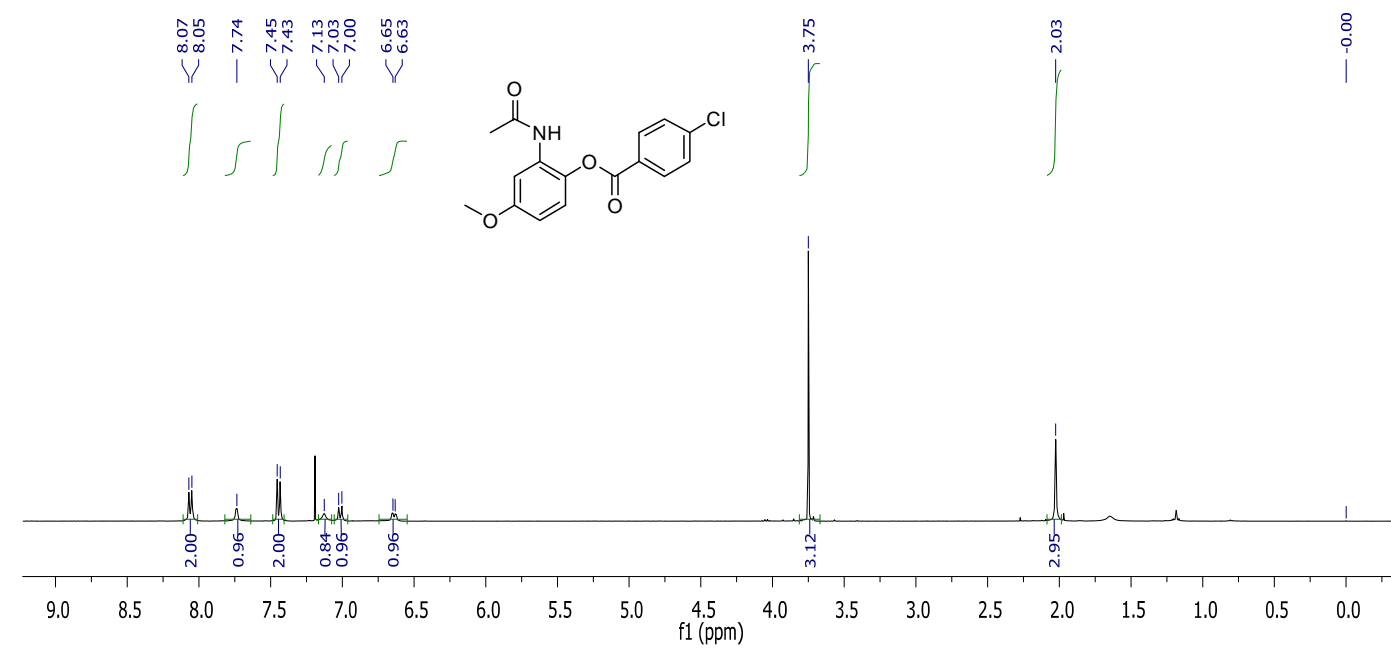
Spectral data of compound **3i**.



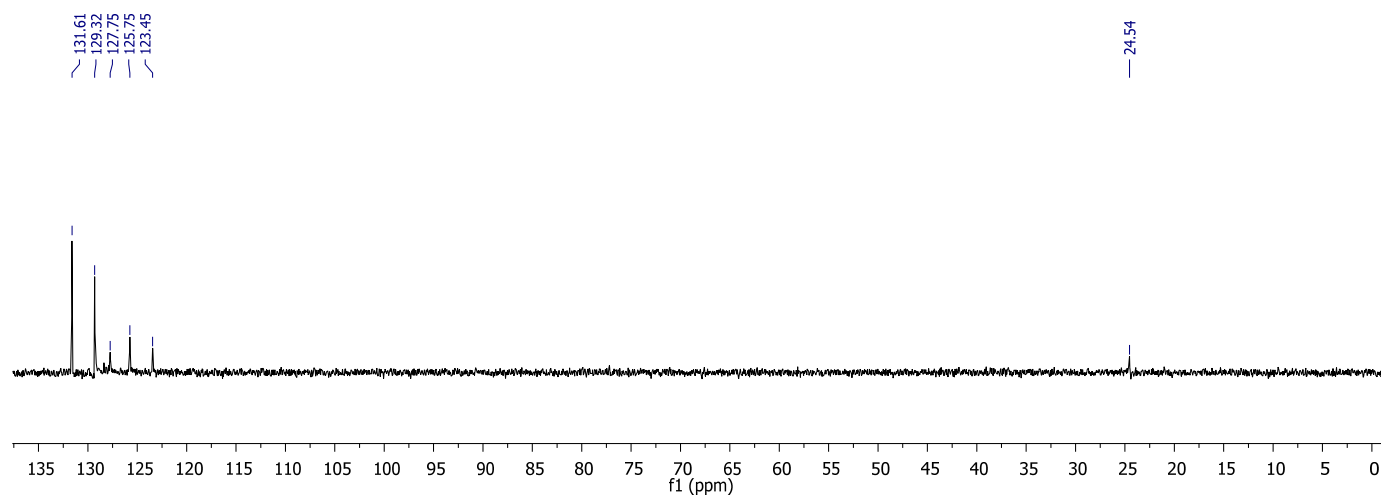
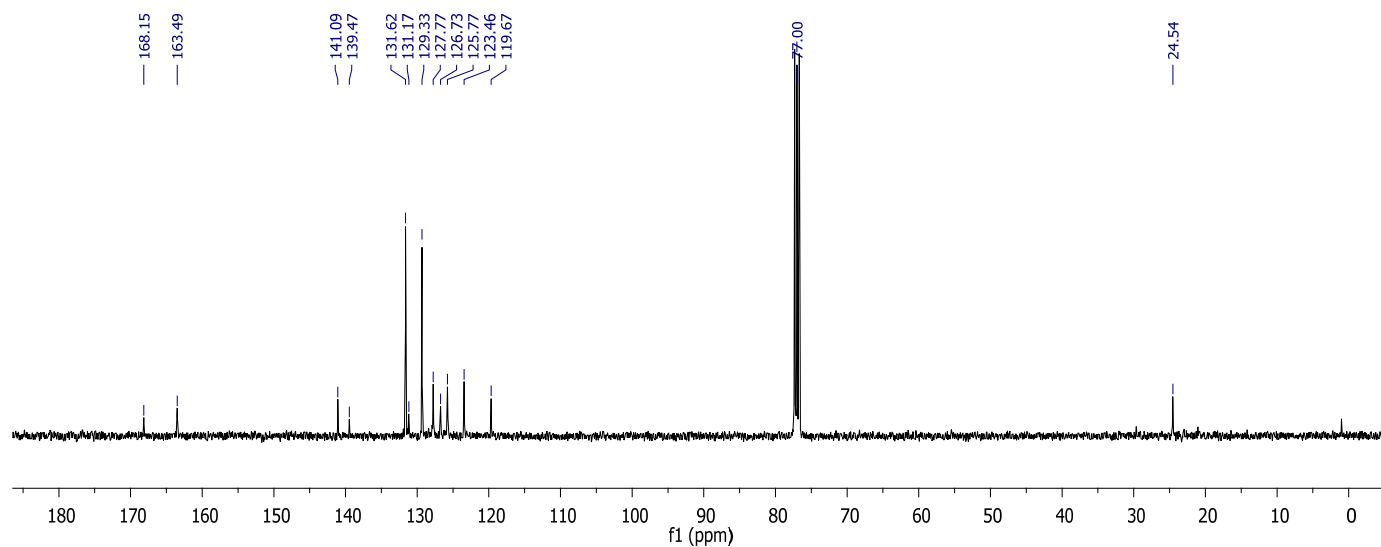
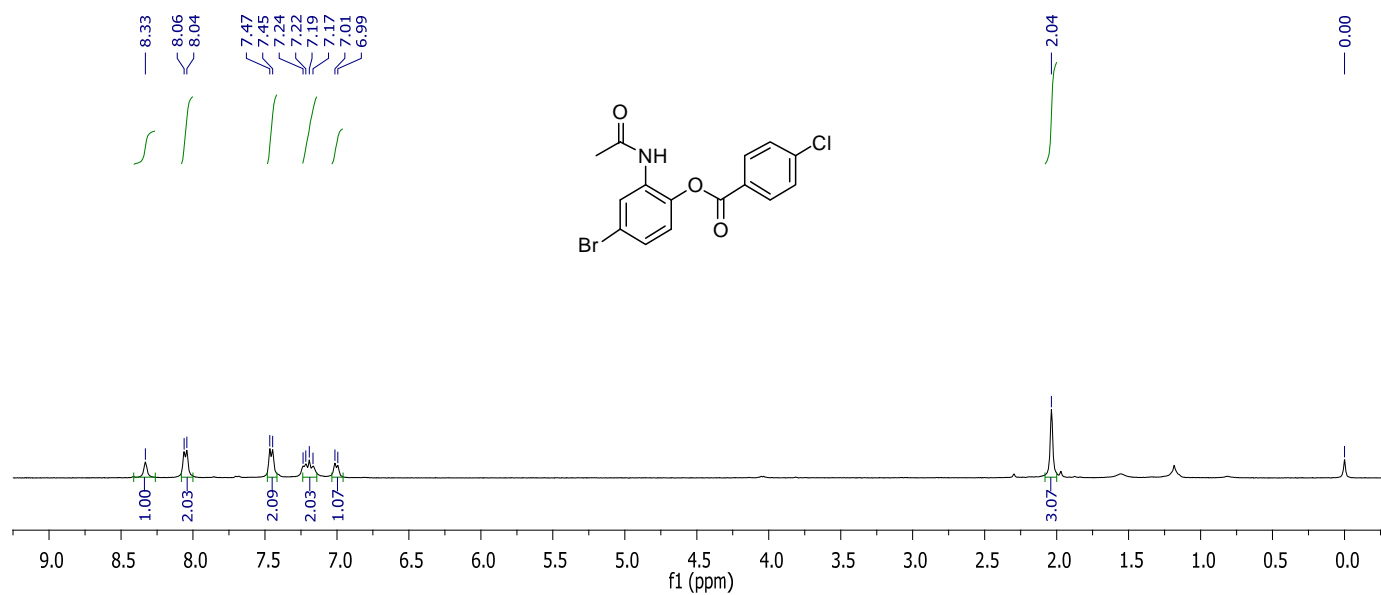
Spectral data of compound **3j**.



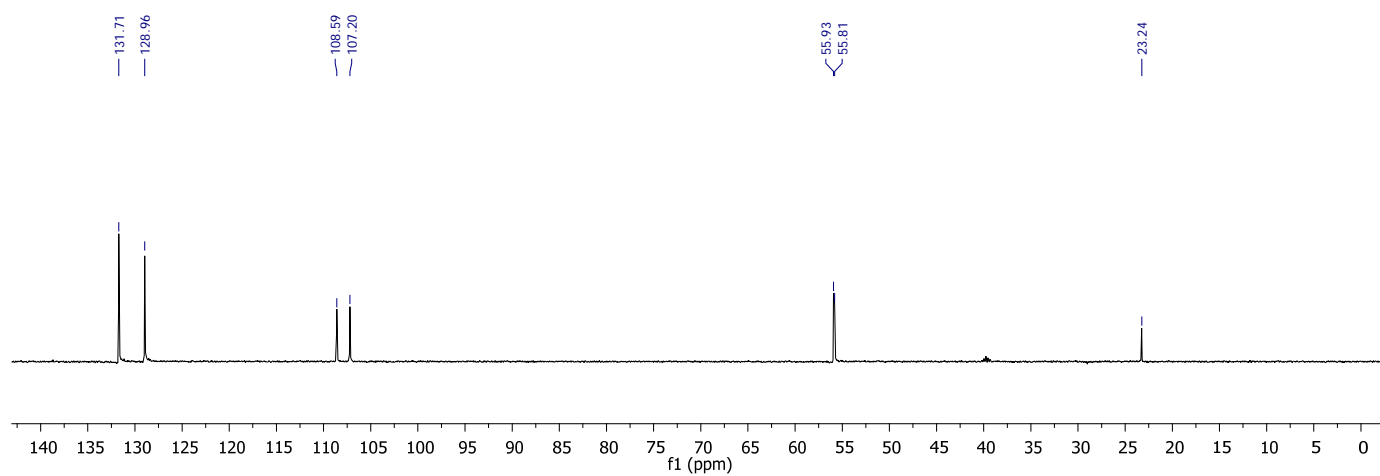
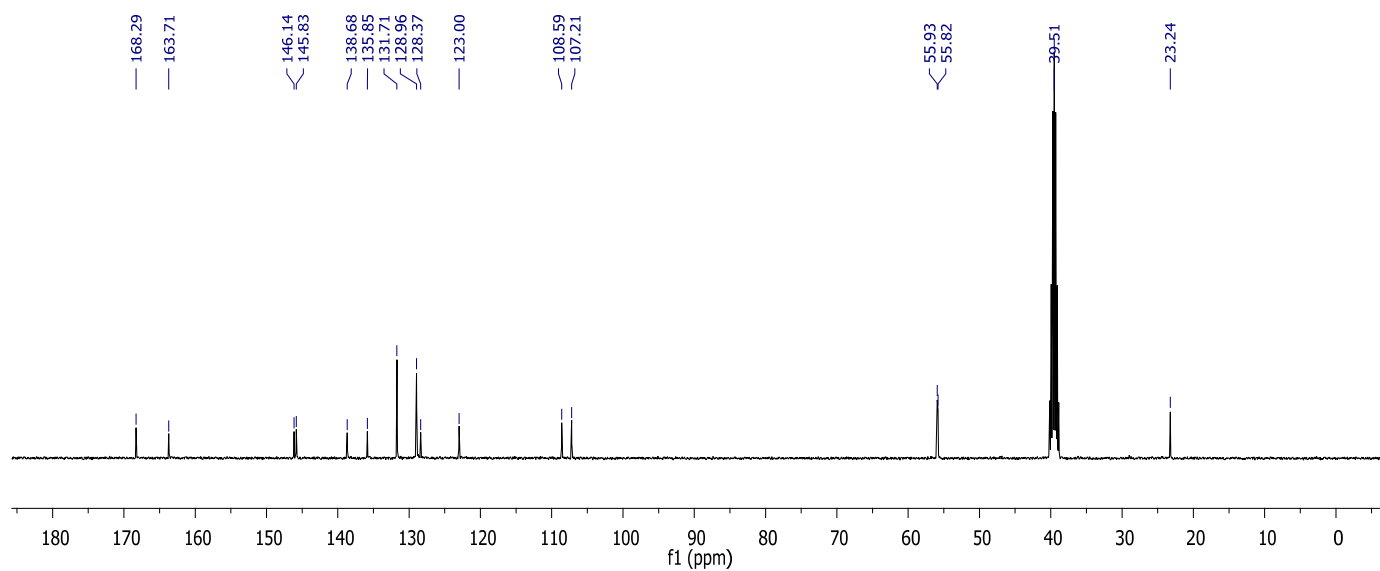
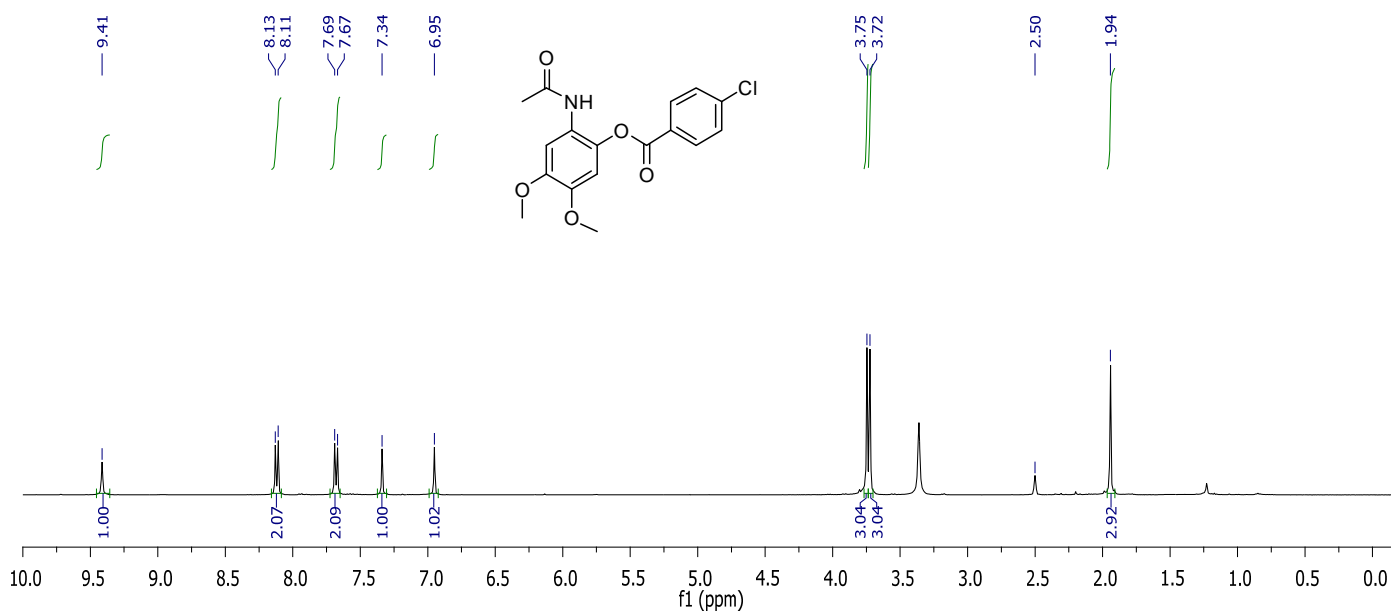
Spectral data of compound **3k**.



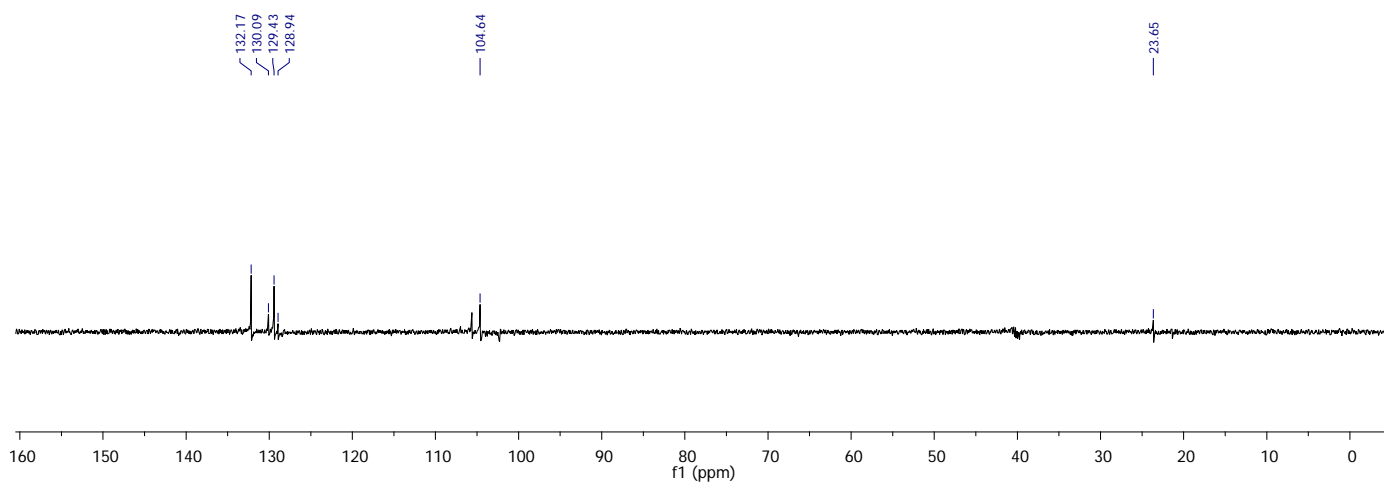
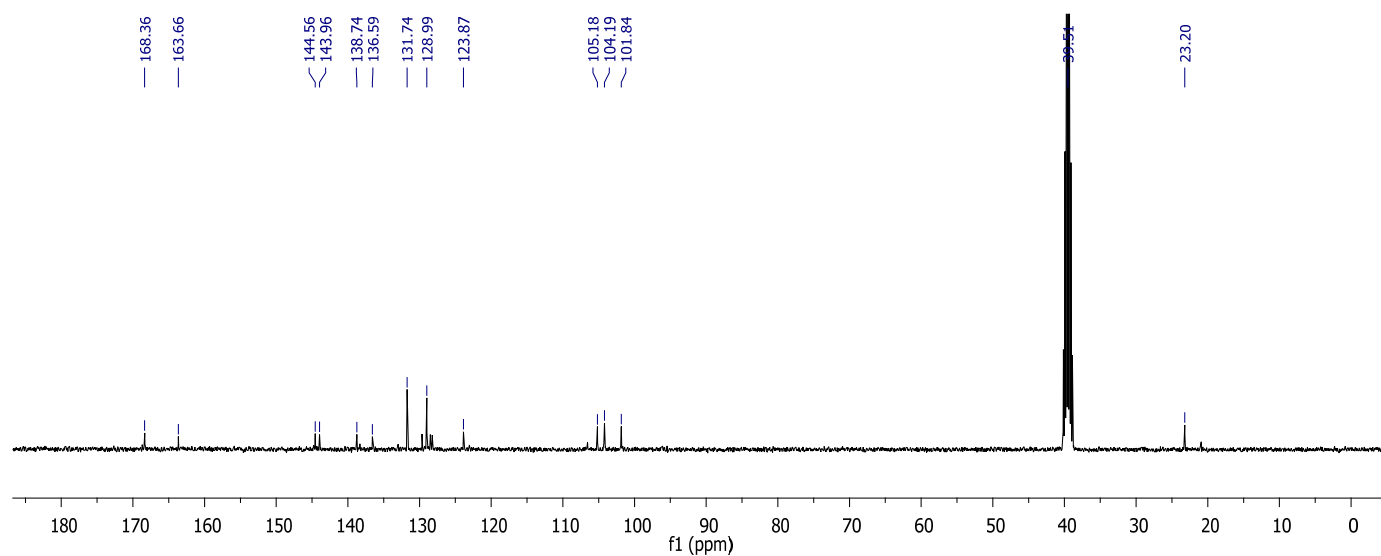
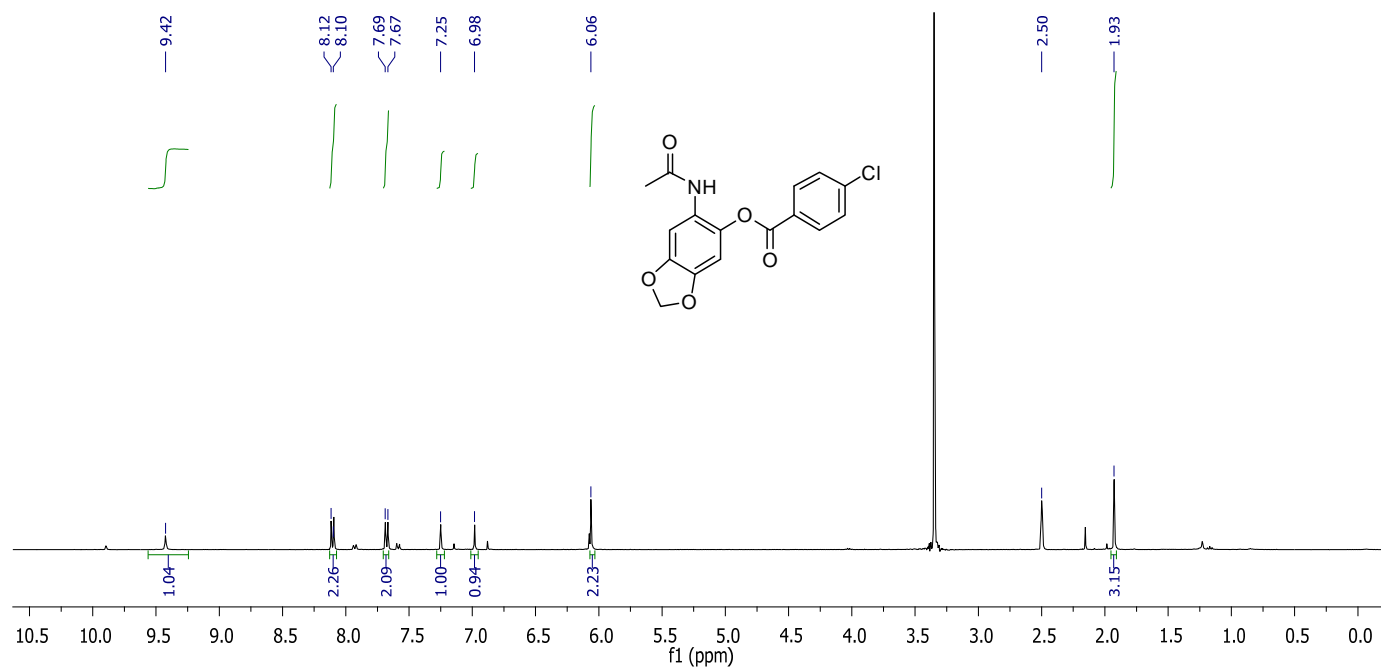
Spectral data of compound **31**.



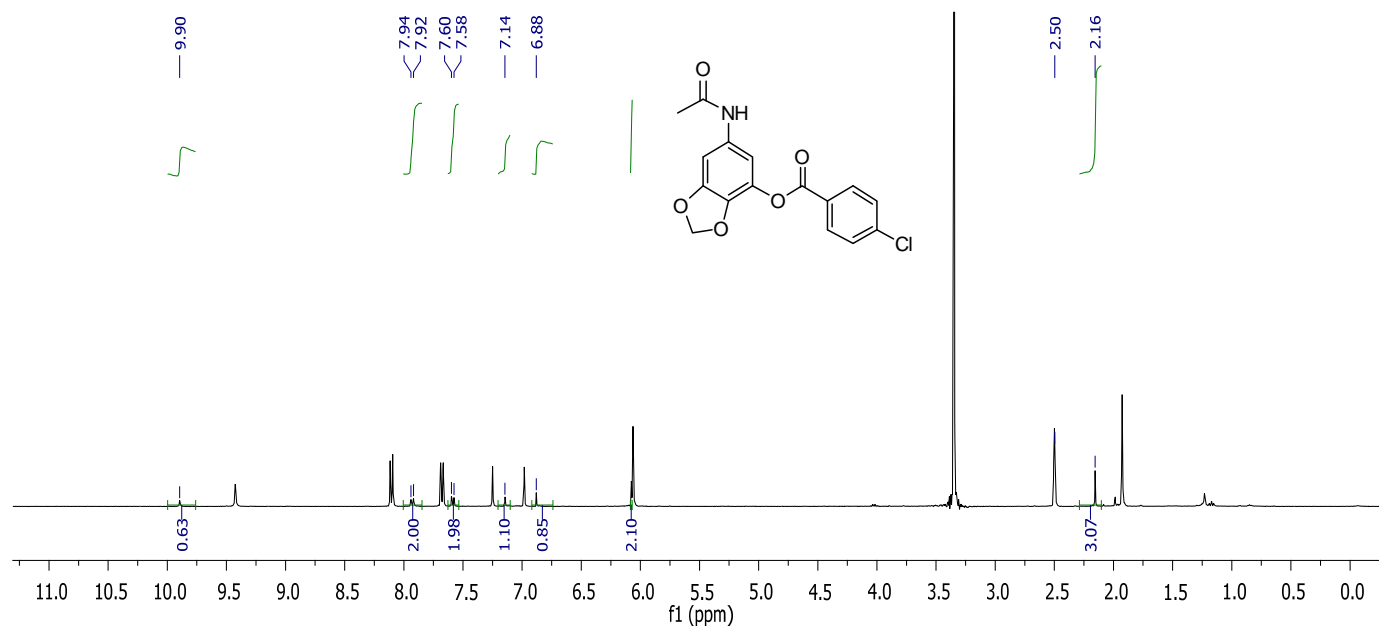
Spectral data of compound **3m**.



Spectral data of compound **3n**.

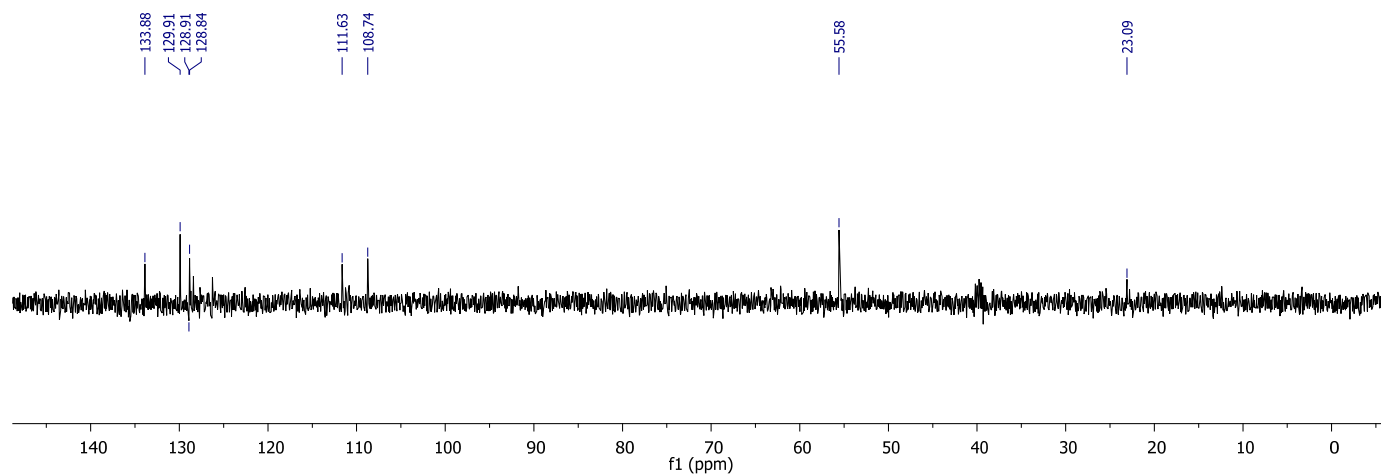
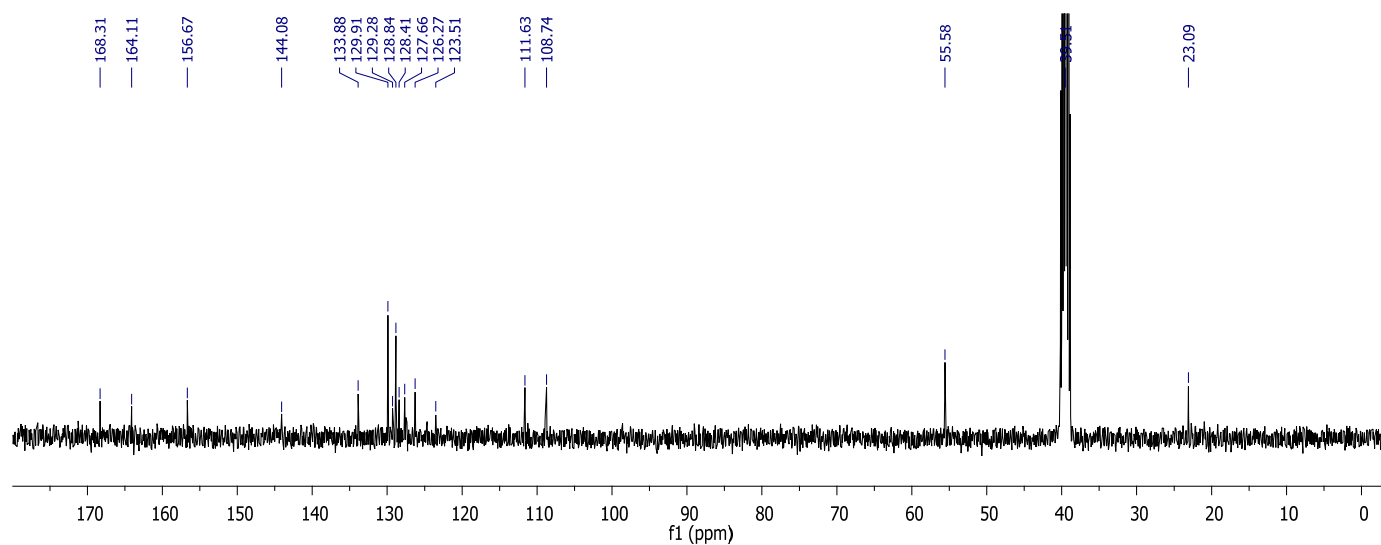
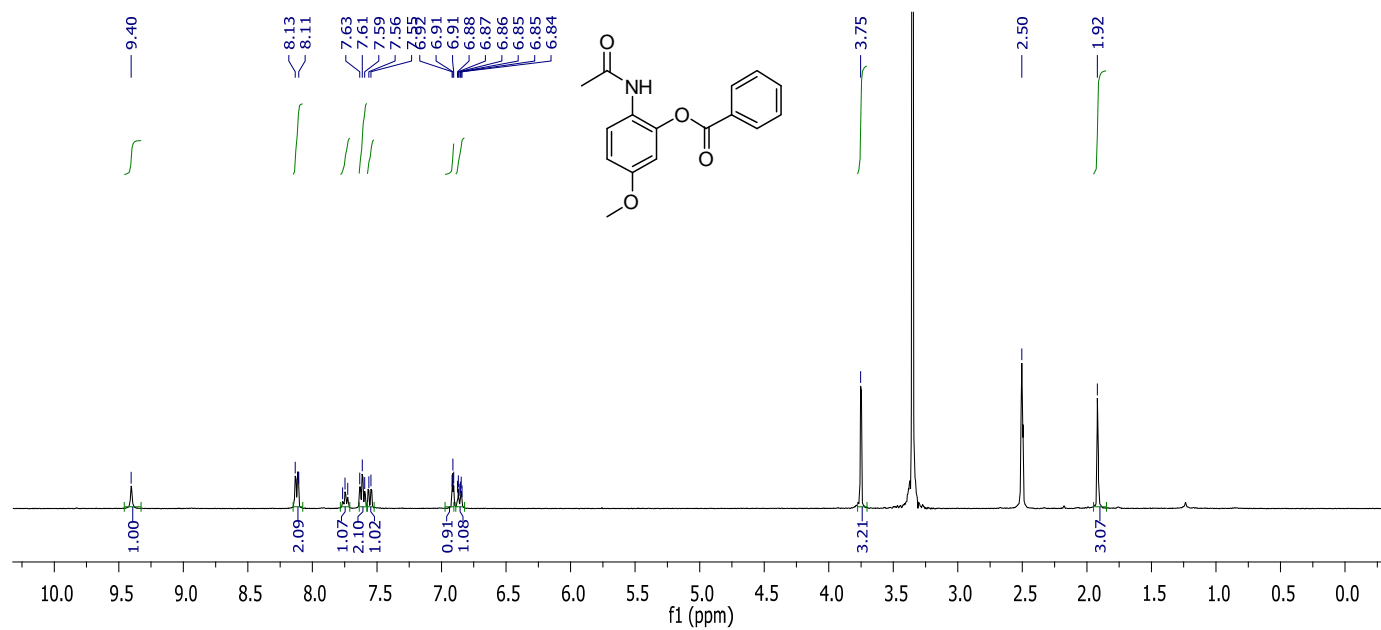


^1H NMR Spectrum of Compound **3n'**.

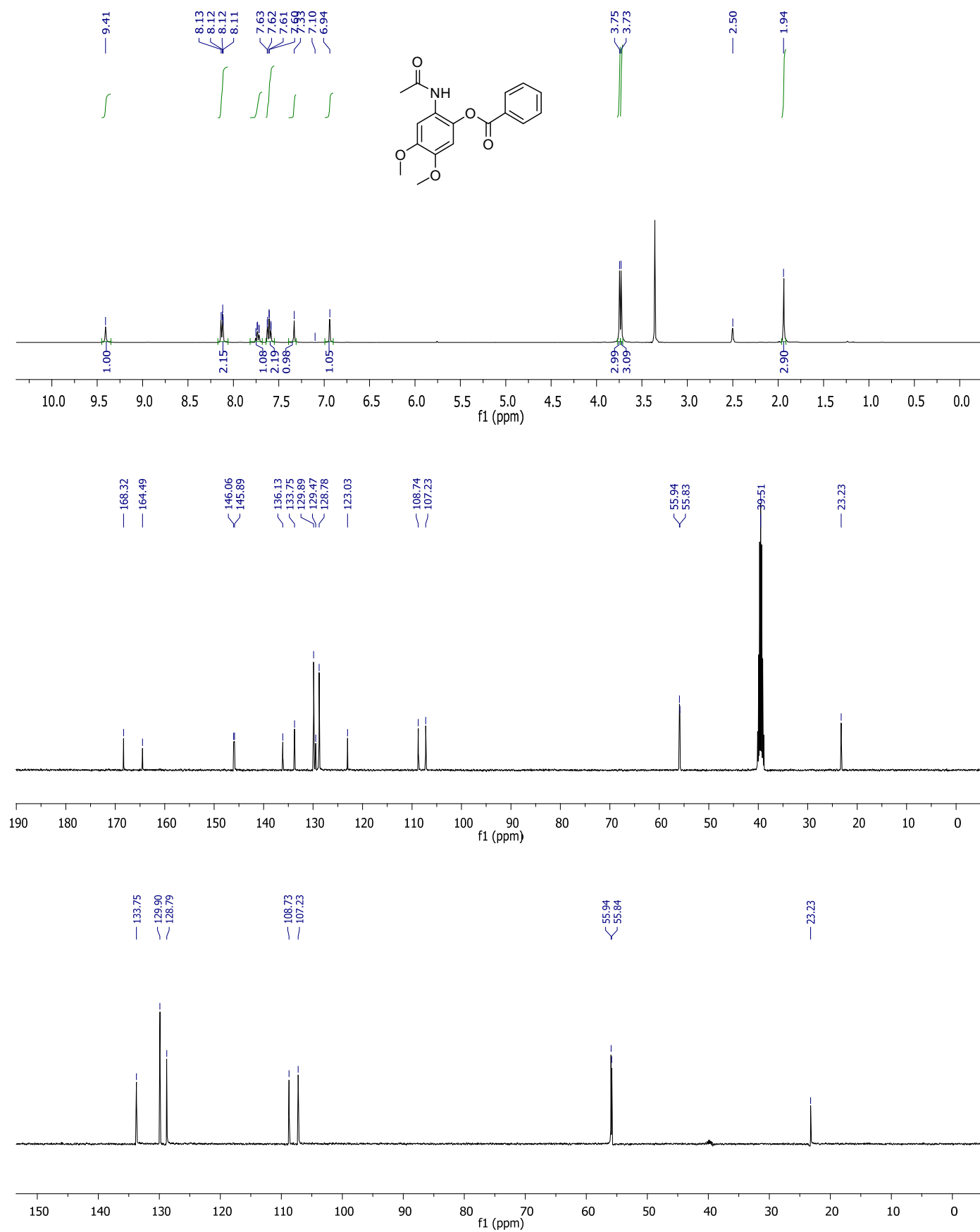


The benzylation of **1n** with 4-chlorobenzoic acid (**2a**) gave two regioisomer products. One is major and another one is minor (10:1). The major product is *ortho*-benzylation of **1n**. The regiochemistry of benzylation product **3o'** was confirmed by ^1H NMR spectroscopy. Two clear singlets were observed in the aromatic region of the NMR spectrum. These results clearly revealed that the regiochemistry of compound **3n'** was correct.

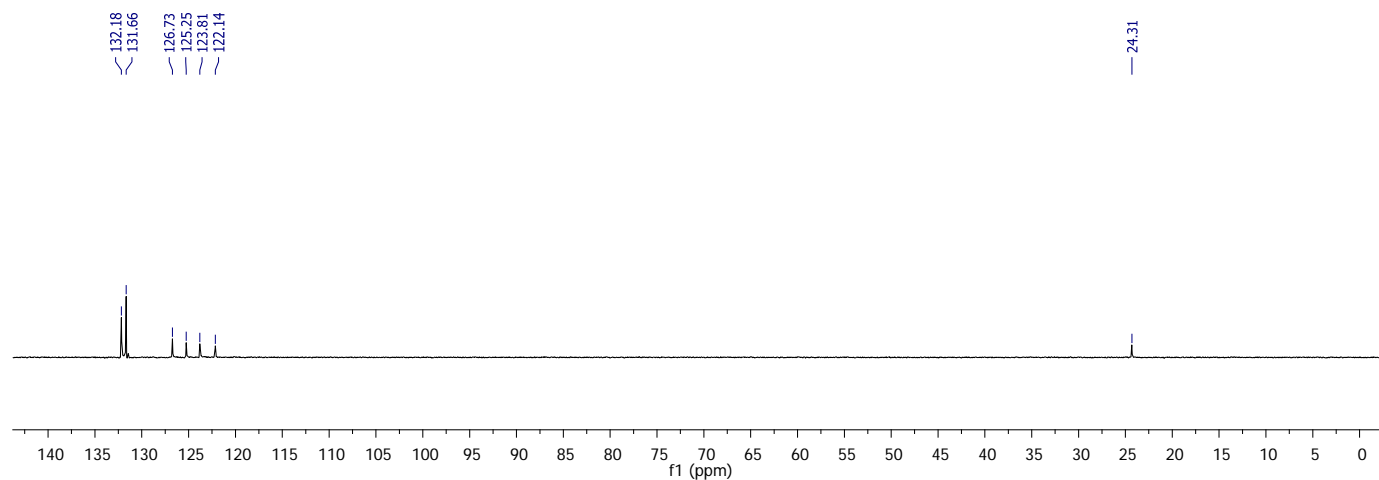
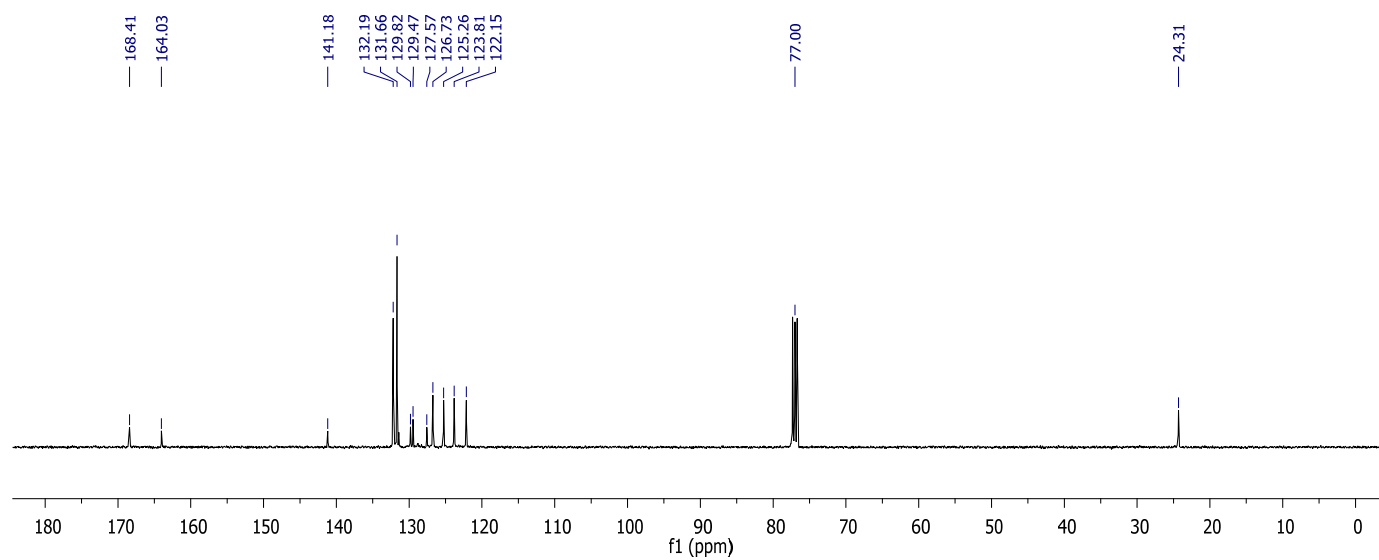
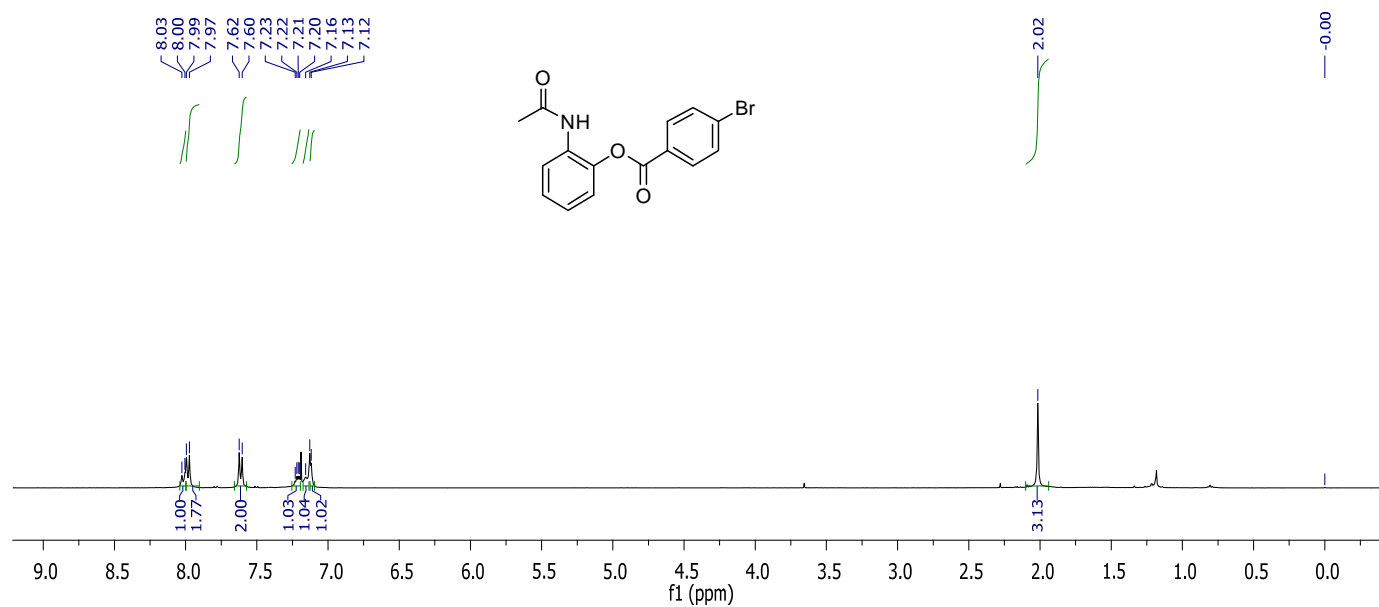
Spectral data of compound **30**.



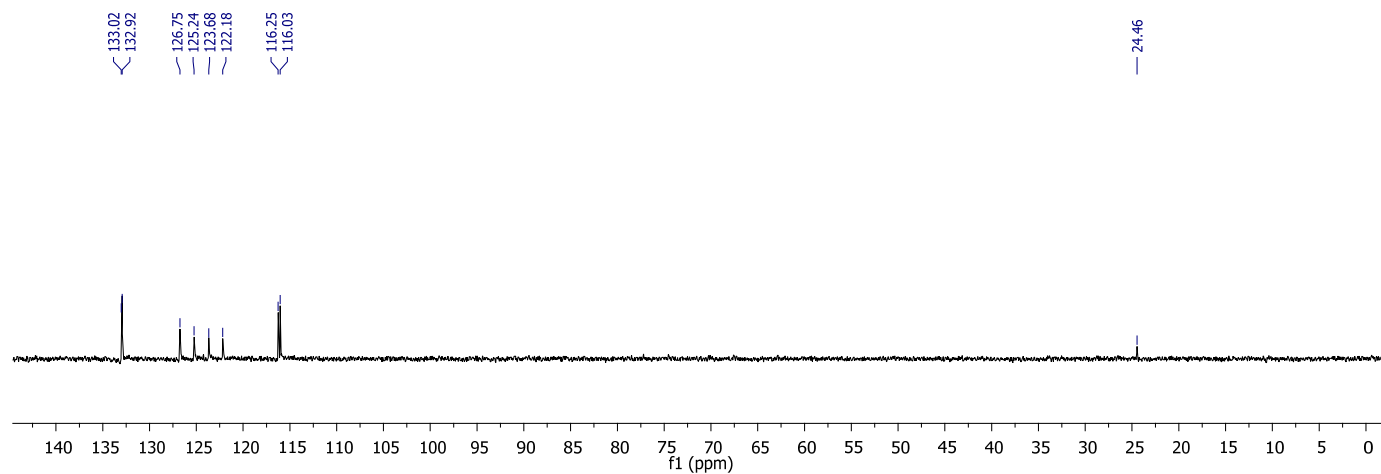
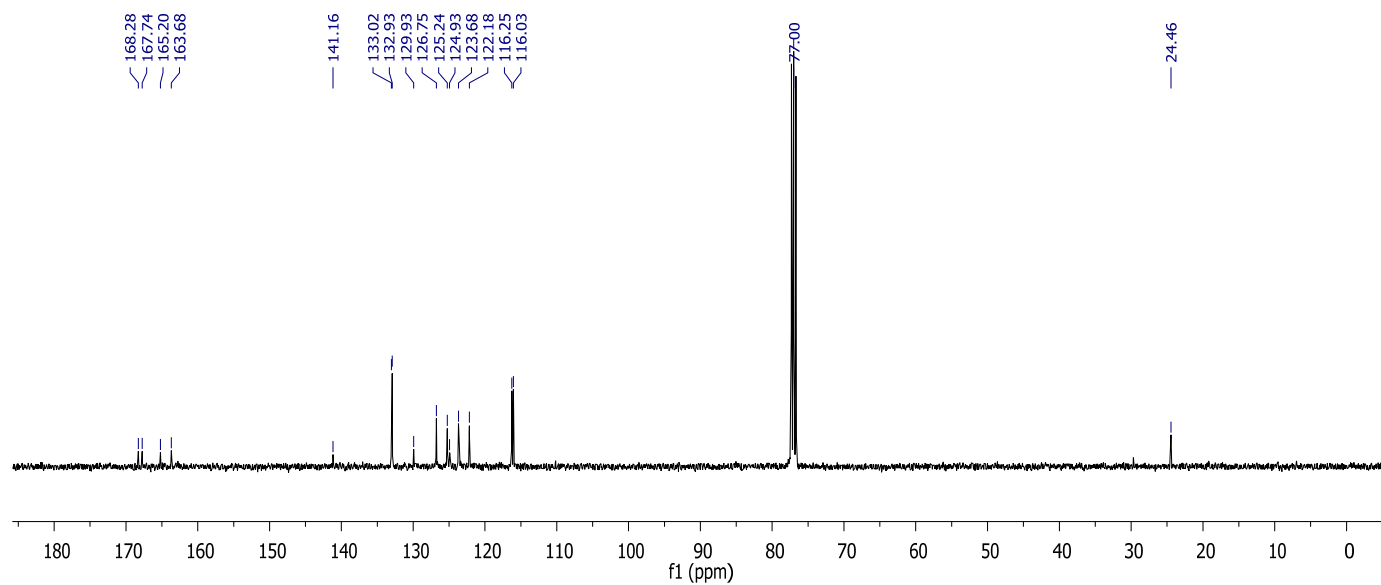
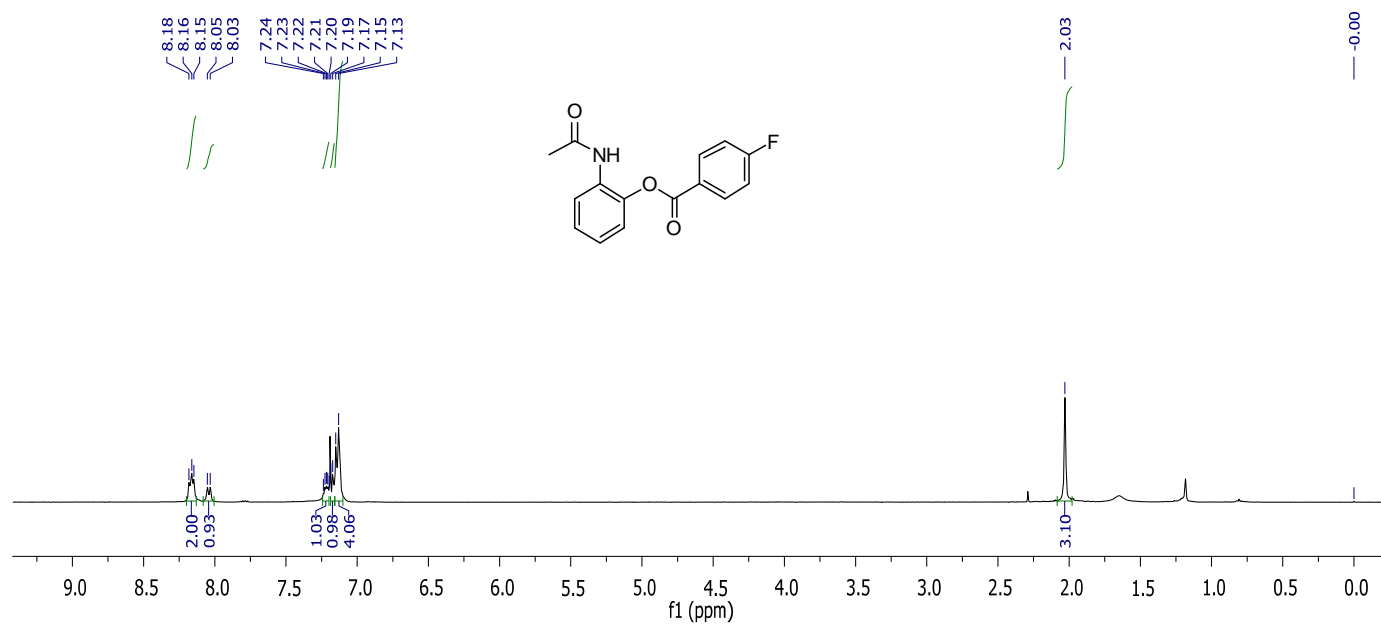
Spectral data of compound **3p**.



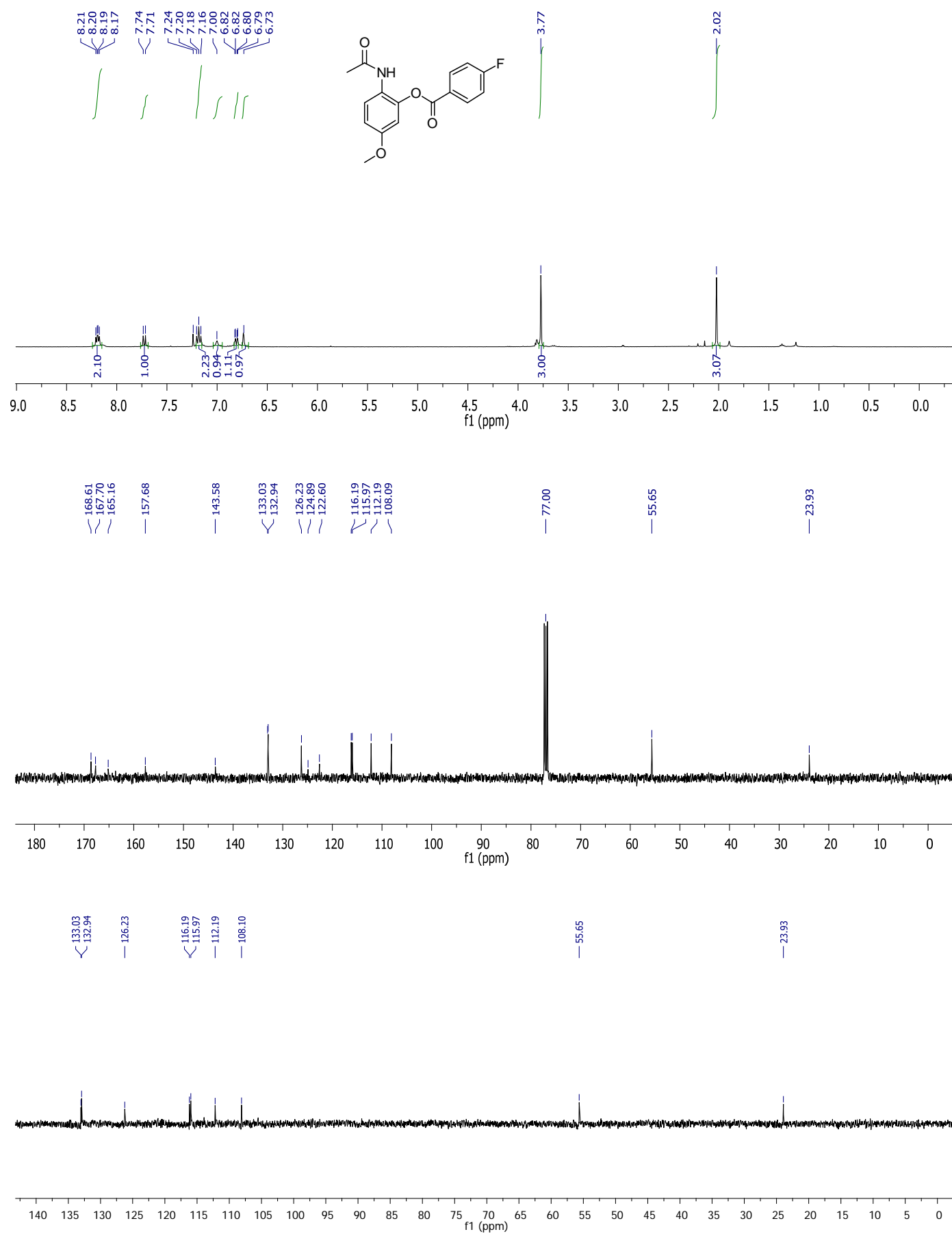
Spectral data of compound **3q**.



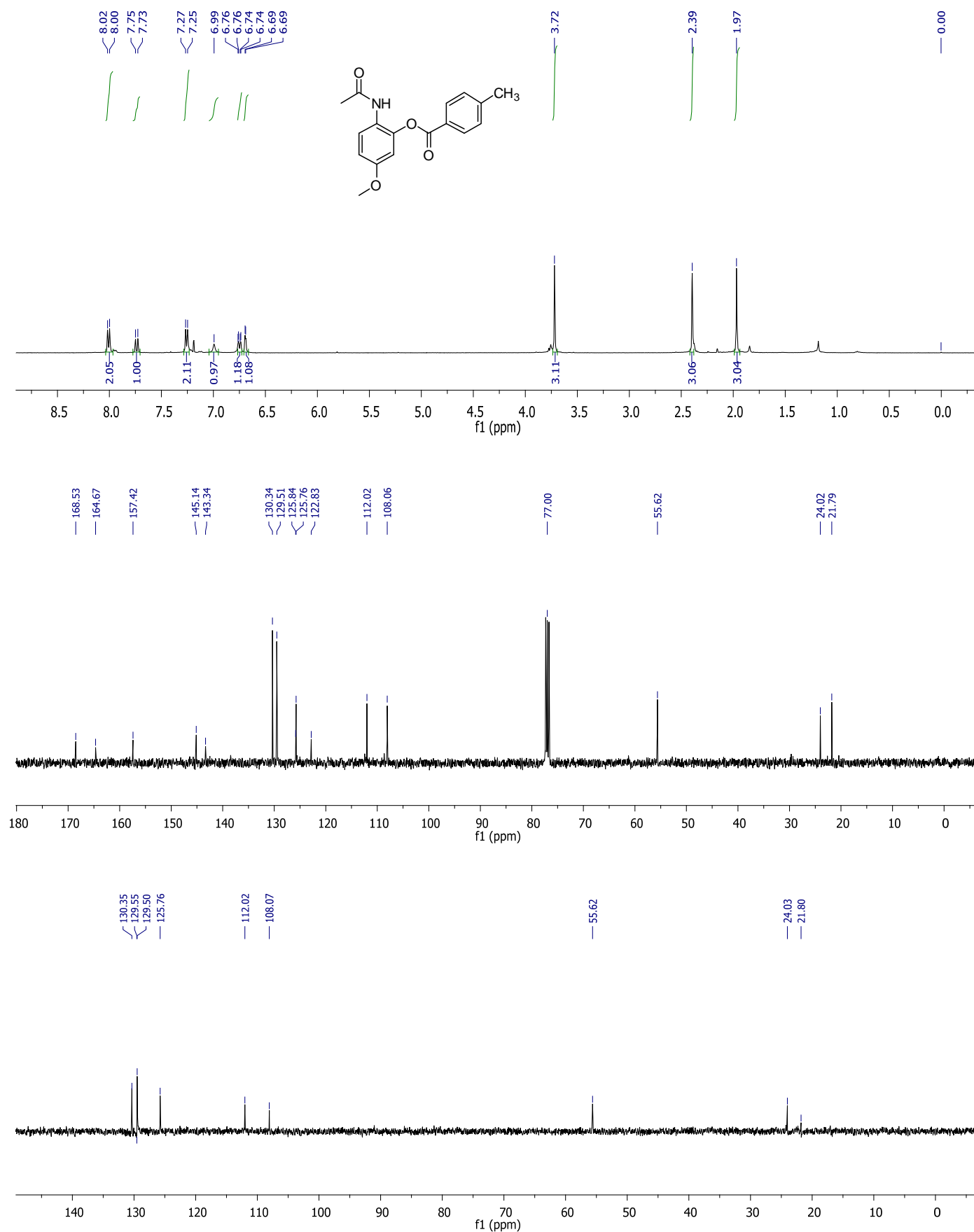
Spectral data of compound **3r**.



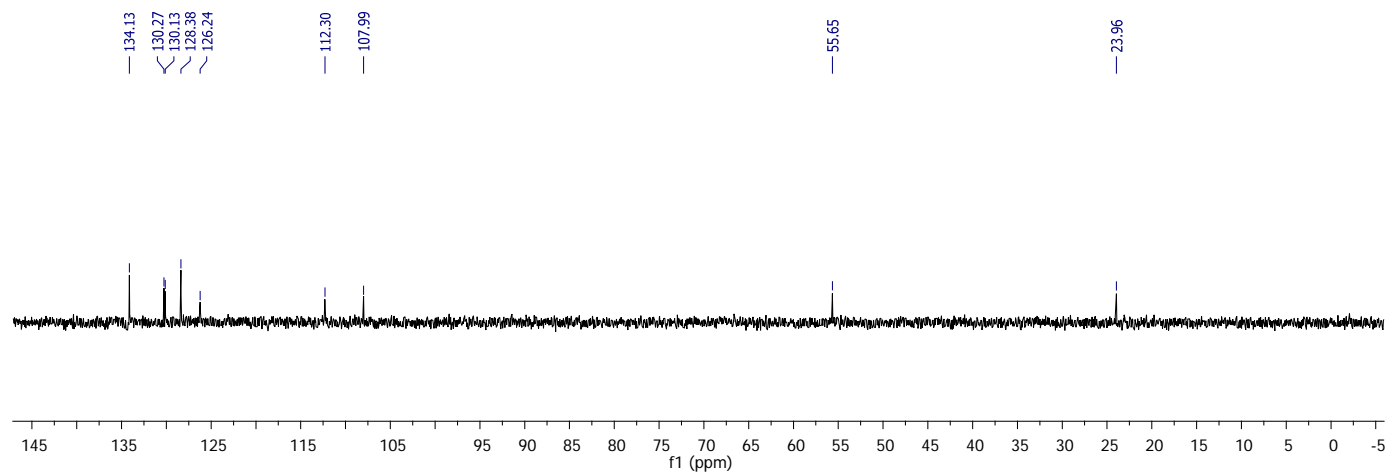
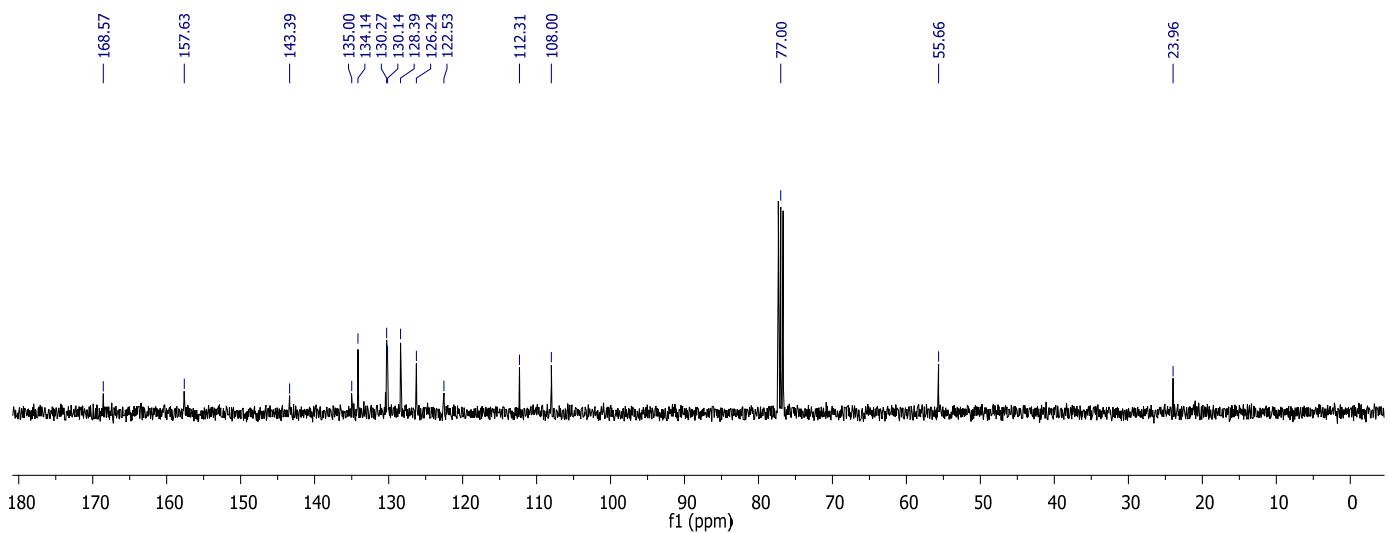
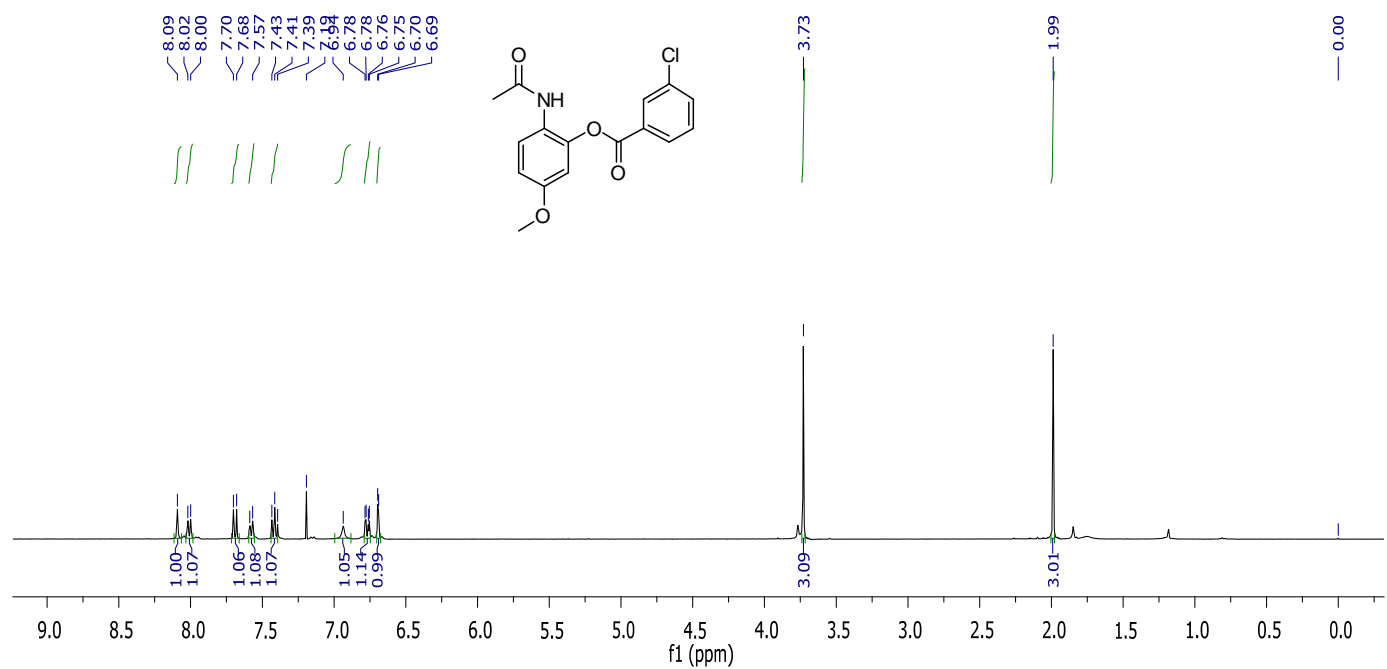
Spectral data of compound **3s**.



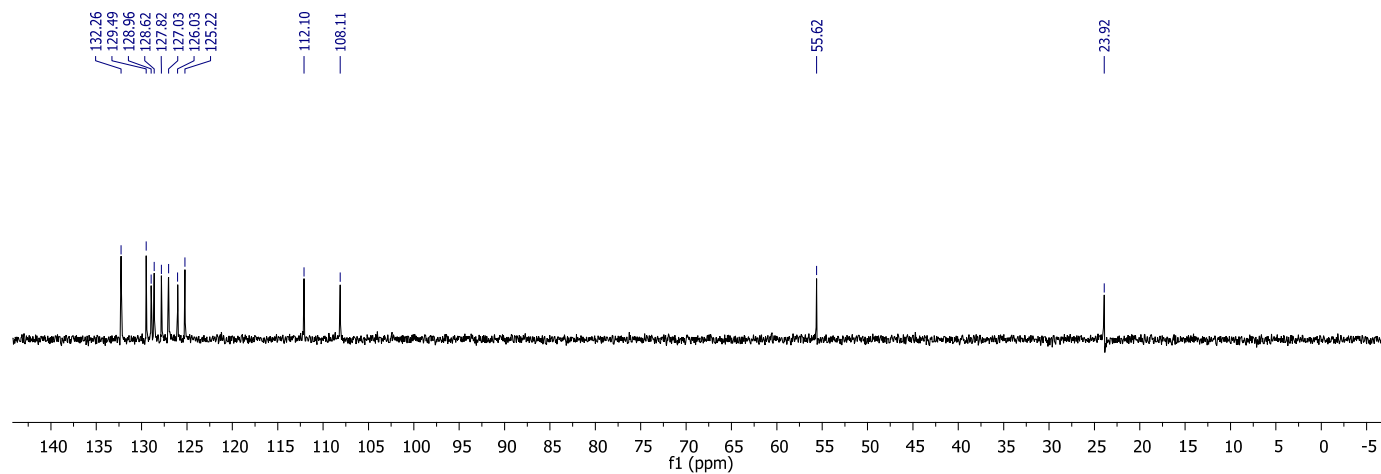
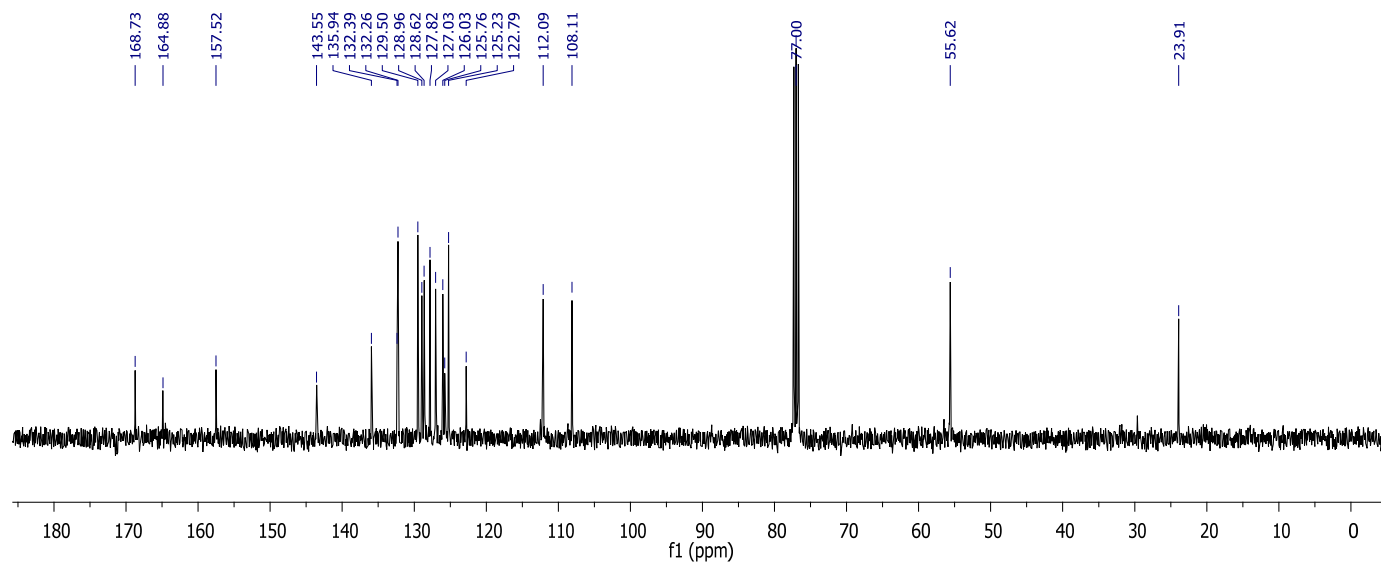
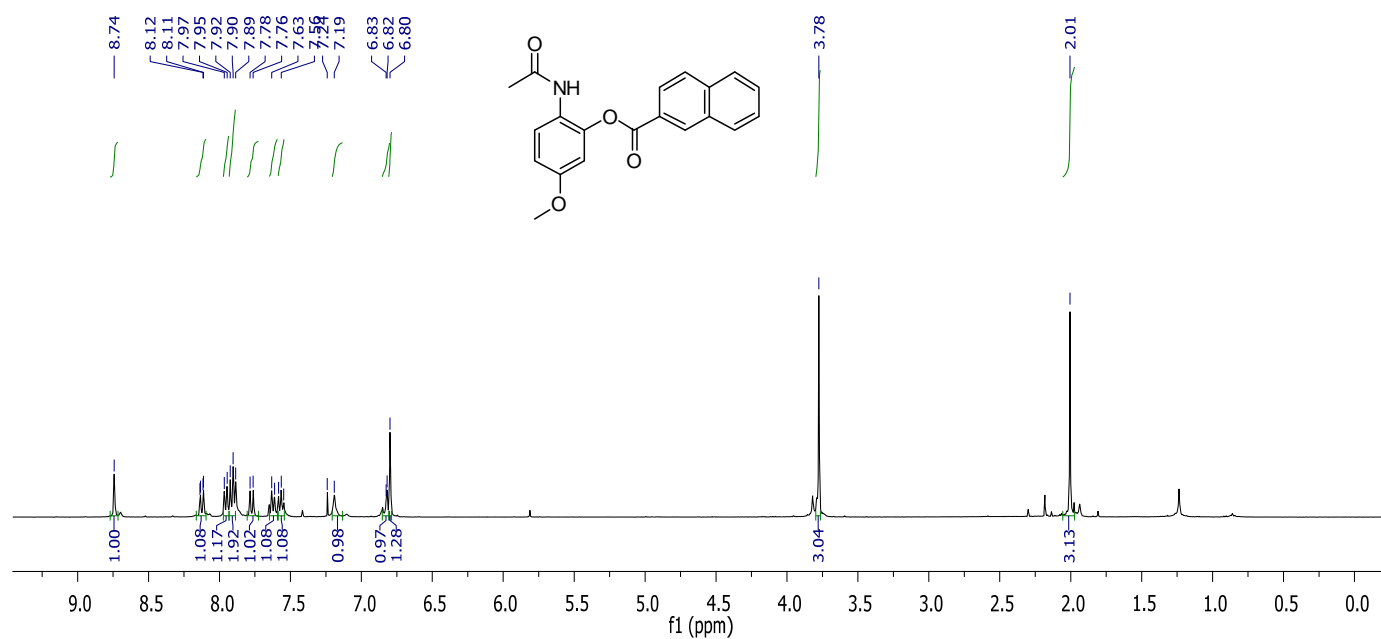
Spectral data of compound **3t**.



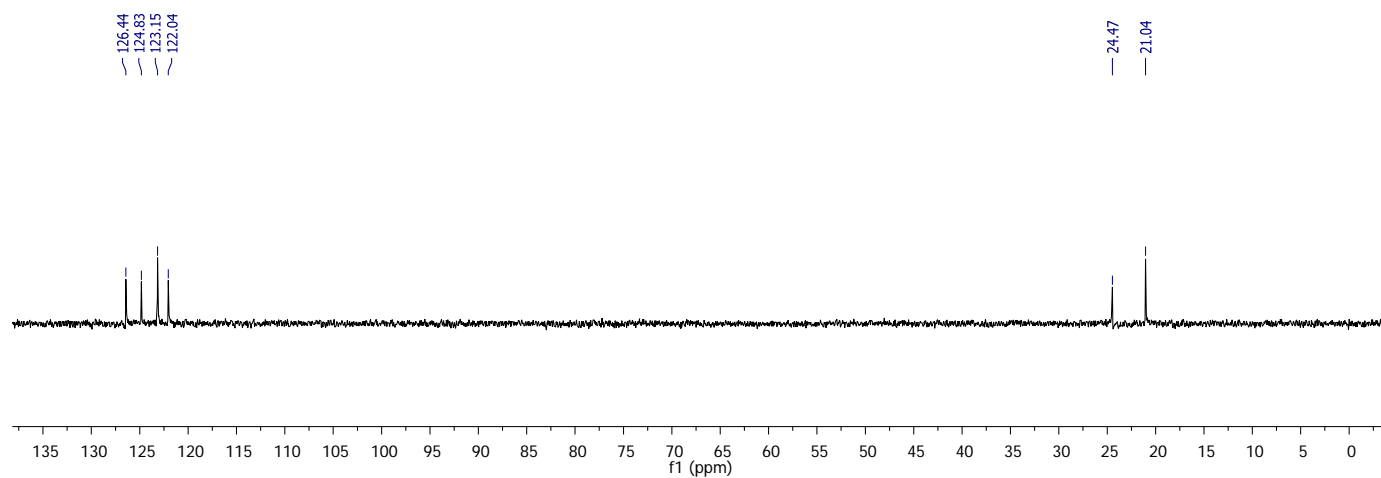
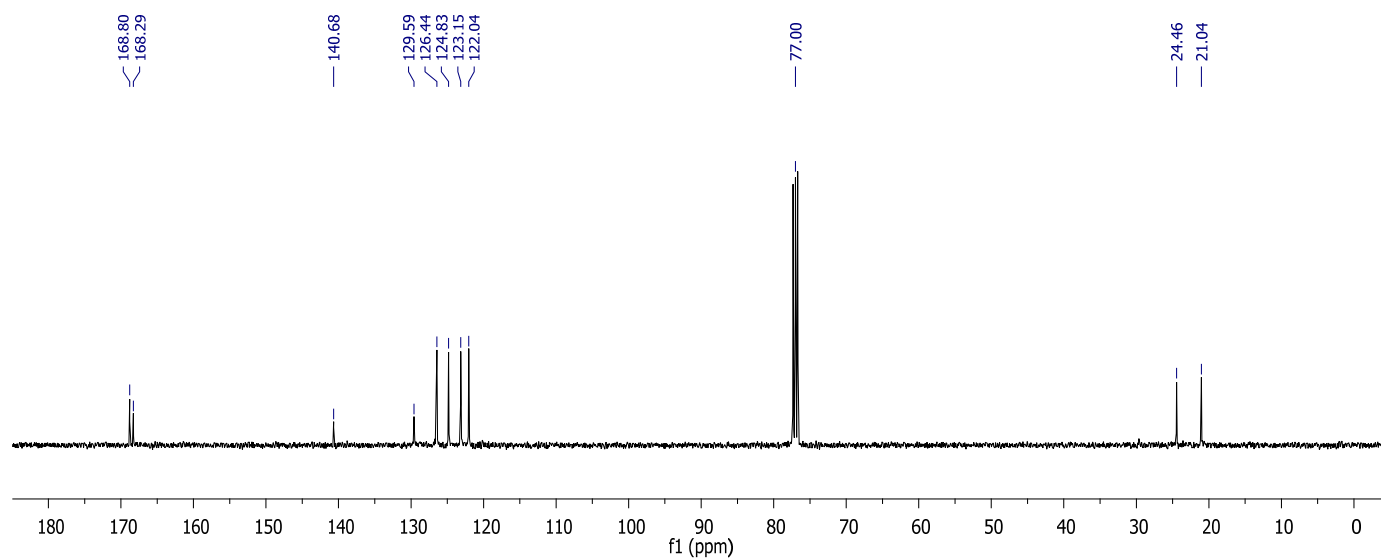
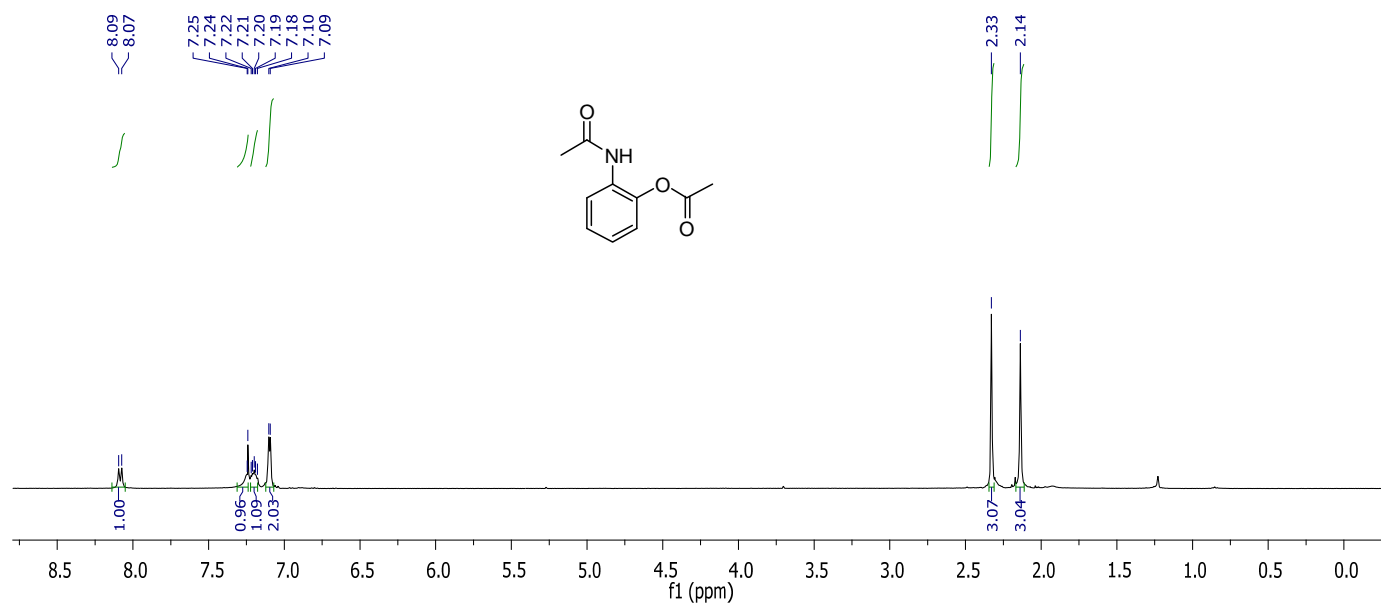
Spectral data of compound **3u**.



Spectral data of compound **3v**.



Spectral data of compound **3w**.



Spectral data of compound **3x**.

