Electronic Supplementary Material (ESI) for New Journal of Chemistry

Supporting Information

Transition Metal-Free Chemoselective Synthesis of Quinaldic Acid Derivatives via One-Pot Assembly: Assessment of their Photophysical Properties

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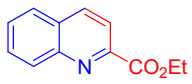
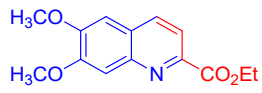
1. Experimental data of all the synthesized compounds.



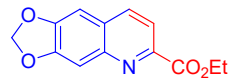
Ethyl quinoline-2-carboxylate (1A). Yield = 68% (0.073 g from 0.100 g) as a brown oil; R_f = 0.4 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1721 (CO_2Et), 1622 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.50 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.57 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.64–7.66 (m, 1H, ArH), 7.78–7.80 (m, 1H, ArH), 7.88 (d, J = 8.2 Hz, 1H, ArH), 8.19 (d, J = 8.5 Hz, 1H, ArH), 8.31 (dd, J_1 = 8.5 Hz, J_2 = 5.9 Hz, 2H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.4, 62.3, 121.1, 127.6, 128.6, 129.4, 130.3, 130.8, 137.3, 147.6, 148.3, 165.5 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{11}NO_2$ [M+H$^+$]: 202.0863, found: 202.0869.



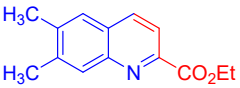
Ethyl 6,7-dimethoxyquinoline-2-carboxylate (1B). Yield = 95% (0.162 g from 0.100 g) as a grey solid; m.p. 74–76 °C; R_f = 0.25 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1716 (CO_2Et), 1616 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.46 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.02 (s, 6H, $(OCH_3)_2$), 4.52 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.06 (s, 1H, ArH), 7.59 (s, 1H, ArH), 8.05 (d, J = 8.3 Hz, 1H, ArH), 8.09 (d, J = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 56.3, 56.4,

62.1, 104.6, 109.1, 119.9, 125.8, 135.0, 144.9, 145.9, 151.6, 153.2, 165.8 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_4$ [M+H$^+$]: 262.1074, found: 262.1080.

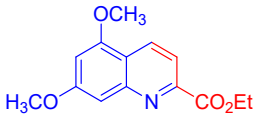
Ethyl [1,3]dioxolo[4,5-*g*]quinoline-6-carboxylate (1C). Yield = 82% (0.122 g from 0.100 g) as a brown solid; m.p. 120–122 °C; R_f = 0.35 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1722 (CO_2Et), 1634 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.48 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.53 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 6.15 (s, 2H, -OCH_2O-), 7.09 (s, 1H, ArH), 7.57 (s, 1H, ArH), 8.04 (d, *J* = 8.4 Hz, 1H, ArH), 8.07 (d, *J* = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 62.1, 102.2, 102.4, 106.8, 120.0, 127.3, 135.7, 146.1, 146.2, 149.7, 151.5, 165.6 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{11}NO_4$ [M+H$^+$]: 246.0761, found: 246.0769.



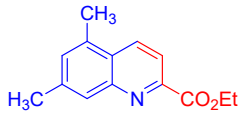
Ethyl 2,3-dihydro-[1,4]dioxino[2,3-*g*]quinoline-7-carboxylate (1D). Yield = 71% (0.120 g from 0.100 g) as a yellow solid; m.p. 124–128 °C; R_f = 0.57 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1731 (CO_2Et), 1632 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.47 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.39 (s, 4H, -OCH_2CH_2O-), 4.52 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.24 (s, 1H, ArH), 7.74 (s, 1H, ArH), 8.01 (d, *J* = 8.4 Hz, 1H, ArH), 8.07 (d, *J* = 8.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 62.1, 64.4, 64.5, 111.5, 115.6, 119.6, 125.8, 135.4, 144.3, 146.3, 146.7, 147.6, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{13}NO_4$ [M+H$^+$]: 260.0917, found: 260.0921.



Ethyl 6,7-dimethylquinoline-2-carboxylate (1E). Yield = 82% (0.156 g from 0.100 g) as a light brown solid; m.p. 75–77 °C; R_f = 0.28 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1709 (CO_2Et), 1604 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.48 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 2.46 (s, 3H, $ArCH_3$), 2.48 (s, 3H, $ArCH_3$), 4.54 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.60 (s, 1H, ArH), 8.06 (s, 1H, ArH), 8.09 (d, *J* = 8.4 Hz, 1H, ArH), 8.15 (d, *J* = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 20.3, 20.6, 62.2, 120.5, 126.8, 128.2, 130.1, 136.1, 139.1, 140.8, 146.9, 147.4, 165.8 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_2$ [M+H$^+$]: 230.1176, found: 230.1190.



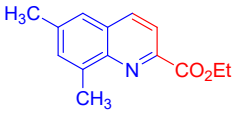
Ethyl 5,7-dimethoxyquinoline-2-carboxylate (1F). Yield = 42% (0.072 g from 0.100 g) as an off-white solid; m.p. 98–100 °C; R_f = 0.57 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1720 (CO_2Et), 1625 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.48 (t, *J* = 7.2 Hz, 3H, $CO_2CH_2CH_3$), 3.94 (s, 3H, OCH_3), 3.98 (s, 3H, OCH_3), 4.54 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 6.58 (s, 1H, ArH), 7.21 (s, 1H, ArH), 8.00 (d, *J* = 8.6 Hz, 1H, ArH), 8.56 (d, *J* = 8.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 55.9, 56.0, 62.3, 100.1, 100.6, 118.4, 118.4, 132.1, 148.8, 150.0, 155.8, 161.9, 165.8 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_4$ [M+H$^+$]: 262.1074, found: 262.1077.



Ethyl 5,7-dimethylquinoline-2-carboxylate (1G). Yield = 71% (0.135 g from 0.100 g) as an-off white solid; m.p. 70–72 °C; R_f = 0.27 (hexane/EtOAc, 90:10, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1713 (CO_2Et), 1612 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.49 (t, *J* = 7.1 Hz, 3H,

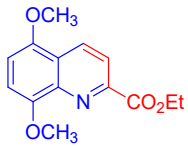
$CO_2CH_2CH_3$), 2.53 (s, 3H, $ArCH_3$), 2.68 (s, 3H, $ArCH_3$), 4.55 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.31 (s, 1H, ArH), 7.95 (s, 1H, ArH), 8.13 (d, *J* = 8.7 Hz, 1H, ArH), 8.39 (d, *J* = 8.6 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 18.6, 21.9, 62.2, 120.0, 127.0, 127.9, 131.5, 133.5, 134.1, 140.4, 147.8, 148.4, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_2$ [M+H$^+$]: 230.1176, found: 230.1180.

Ethyl 7,8-dimethylquinoline-2-carboxylate (1H). Yield = 81% (0.154 g from 0.100 g) as an off-white solid; m.p. 80–82 °C; R_f = 0.91 (hexane/EtOAc, 100:0, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1729 (CO_2Et), 1614 (C=N); ^1H NMR (600 MHz, $CDCl_3$) δ = 1.50 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 2.53 (s, 3H, $ArCH_3$), 2.85 (s, 3H, $ArCH_3$), 4.52 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.46 (d, *J* = 8.3 Hz, 1H, ArH), 7.62 (d, *J* = 8.3 Hz, 1H, ArH), 8.09 (d, *J* = 8.4 Hz, 1H, ArH), 8.20 (d, *J* = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 13.5, 14.5, 20.8, 62.0, 119.8, 124.5, 127.8, 131.6, 136.1, 137.2, 138.2, 146.8, 147.2, 166.0 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_2$ [M+H$^+$]: 230.1176, found: 230.1179.

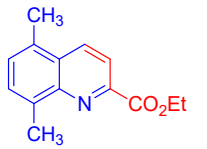


Ethyl 6,8-dimethylquinoline-2-carboxylate (1I). Yield = 93% (0.176 g from 0.100 g) as a brown solid; m.p. 66–68 °C; R_f = 0.57 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1731 (CO_2Et), 1624 (C=N); ^1H NMR (600 MHz, $CDCl_3$) δ = 1.49 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 2.52 (s, 3H, $ArCH_3$), 2.86 (s, 3H, $ArCH_3$), 4.51 (q, *J* = 7.2 Hz, 2H, $CO_2CH_2CH_3$), 7.47 (s, 2H, ArH), 8.11 (d, *J* = 8.5 Hz, 1H, ArH), 8.14 (d, *J* = 8.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.4, 17.8, 21.9, 61.9, 120.9, 124.4, 129.6, 132.8, 136.5, 138.5, 138.6, 145.6, 146.4, 165.9 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_2$ [M+H$^+$]: 230.1176, found: 230.1180.

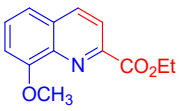
Ethyl 5,8-dimethoxyquinoline-2-carboxylate (1J). Yield = 42% (0.072 g from 0.100 g) as a light yellow solid; m.p. 84–86 °C; R_f = 0.36 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1734 (CO_2Et), 1570 (C=N); ^1H NMR (600 MHz, $CDCl_3$) δ = 1.50 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 3.98 (s, 3H, OCH_3), 4.04 (s, 3H, OCH_3), 4.52 (q, *J* = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 6.86 (d, *J* = 8.5 Hz, 1H, ArH), 6.96 (d, *J* = 8.5 Hz, 1H, ArH), 8.21 (d, *J* = 8.6 Hz, 1H, ArH), 8.69 (d, *J* = 8.7 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.4, 56.0, 56.1, 62.4, 105.9, 107.4, 121.0, 123.0, 132.4, 140.0, 147.6, 148.4, 150.1, 165.8 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_4$ [M+H$^+$]: 262.1074, found: 262.1084.



Ethyl 5,8-dimethylquinoline-2-carboxylate (1K). Yield = 64% (0.121 g from 0.100 g) as a brown oil; R_f = 0.57 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1703 (CO_2Et), 1619 (C=N); ^1H NMR (600 MHz, $CDCl_3$) δ = 1.49 (t, *J* = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 2.66 (s, 3H, $ArCH_3$), 2.85 (s, 3H, $ArCH_3$), 4.52 (q, *J* = 7.2 Hz, 2H, $CO_2CH_2CH_3$), 7.34 (d, *J* = 7.1 Hz, 1H, ArH), 7.50 (d, *J* = 7.1 Hz, 1H, ArH), 8.16 (d, *J* = 8.7 Hz, 1H, ArH), 8.40 (d, *J* = 8.6 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.4, 17.8, 18.6, 62.0, 120.4, 128.7, 128.8, 129.9, 132.1, 133.8, 136.8, 146.7, 147.2, 165.9 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_2$ [M+H$^+$]: 230.1176, found: 230.1178.

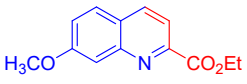


Ethyl 8-methoxyquinoline-2-carboxylate (1L). Yield = 50% (0.094 g from 0.100 g) as a brown oil; R_f = 0.3 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1714 (CO_2Et), 1624 (C=N); ^1H NMR (600

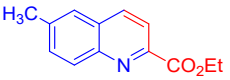


MHz, $CDCl_3$) δ = 1.51 (t, J = 7.2 Hz, 3H, $CO_2CH_2CH_3$), 4.09 (s, 3H, OCH_3), 4.53 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.09 (d, J = 6.6 Hz, 1H, ArH), 7.44 (d, J = 8.2 Hz, 1H, ArH), 7.57 (t, J = 8.0 Hz, 1H, ArH), 8.21 (d, J = 8.5 Hz, 1H, ArH), 8.27 (d, J = 8.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.2, 56.2, 62.4, 108.2, 119.3, 121.8, 129.2, 130.6, 137.3, 139.7, 147.2, 156.2, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_3$ [M+H$^+$]: 232.0968, found: 232.0974.

Ethyl 7-methoxyquinoline-2-carboxylate (1M). Yield = 84% (0.157 g from 0.100 g) as an off-white solid; m.p. 62–64 °C; R_f = 0.42 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1716 (CO_2Et), 1619 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.48 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 3.96 (s, 3H, OCH_3), 4.55 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.29 (dd, J_1 = 9.0 Hz, J_2 = 2.5 Hz, 1H, ArH), 7.61 (d, J = 2.5 Hz, 1H, ArH), 7.74 (d, J = 8.9 Hz, 1H, ArH), 8.05 (d, J = 8.3 Hz, 1H, ArH), 8.20 (d, J = 8.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 55.8, 62.3, 108.3, 119.2, 122.3, 124.9, 128.5, 136.8, 148.4, 149.6, 161.3, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_3$ [M+H$^+$]: 232.0968, found: 232.0974.

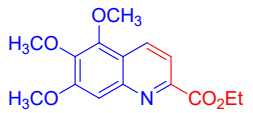


Ethyl 6-methoxyquinoline-2-carboxylate (1N). Yield = 52% (0.098 g from 0.100 g) as a yellow solid; m.p. 126–128 °C; R_f = 0.58 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1728 (CO_2Et), 1614 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.48 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 3.95 (s, 3H, OCH_3), 4.54 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.10 (d, J = 2.8 Hz, 1H, ArH), 7.42 (dd, J_1 = 9.3 Hz, J_2 = 2.8 Hz, 1H, ArH), 8.15 (d, J = 2.2 Hz, 2H, ArH), 8.19 (d, J = 9.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 55.8, 62.2, 104.7, 121.6, 123.5, 130.9, 132.4, 135.7, 143.9, 145.9, 159.5, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_3$ [M+H$^+$]: 232.0968, found: 232.0972.

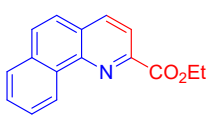


Ethyl 6-methylquinoline-2-carboxylate (1O). Yield = 71% (0.142 g from 0.100 g) as a light brown solid; m.p. 88–90 °C; R_f = 0.20 (hexane/EtOAc, 95:5, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1721 (CO_2Et), 1561 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.49 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 2.57 (s, 3H, $ArCH_3$), 4.55 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.60–7.64 (m, 2H, ArH), 8.15 (d, J = 8.5 Hz, 1H, ArH), 8.20 (d, J = 9.7 Hz, 2H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 21.9, 62.3, 121.2, 126.4, 129.5, 130.5, 132.7, 136.5, 139.0, 146.3, 147.5, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_2$ [M+H$^+$]: 216.1019, found: 216.1022.

Ethyl 5,6,7-trimethoxyquinoline-2-carboxylate (1P). Yield = 80% (0.128 g from 0.100 g) as a white solid; m.p. 84–86 °C; R_f = 0.51 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1713 (CO_2Et), 1612 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.48 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.01 (s, 6H, $(OCH_3)_2$), 4.07 (s, 3H, OCH_3), 4.55 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 7.45 (s, 1H, ArH), 8.05 (d, J = 8.6 Hz, 1H, ArH), 8.47 (d, J = 8.6 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 56.4, 61.4, 61.8, 62.2, 105.4, 119.1, 121.1, 131.5, 142.5, 145.6, 146.6, 147.7, 156.7, 165.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{15}H_{17}NO_5$ [M+H$^+$]: 292.1179, found: 292.1183.



Ethyl benzo[*h*]quinoline-2-carboxylate (1Q). Yield = 68% (0.120 g from 0.100 g) as an off white solid; m.p. 78–80 °C; R_f = 0.75 (hexane/EtOAc, 90:10, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1729 (CO_2Et), 1564 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.54 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.57 (q, J = 7.1 Hz,



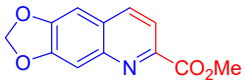
2H, $CO_2CH_2CH_3$), 7.72–7.76 (m, 2H, ArH), 7.78–7.80 (m, 1H, ArH), 7.92 (dd, J_1 = 10.7 Hz, J_2 = 8.7 Hz, 2H, ArH), 8.31 (q, J = 6.9 Hz, 2H, ArH), 9.43 (d, J = 6.8 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 62.1, 122.3, 124.9, 125.2, 127.7, 128.0, 128.2, 128.9, 130.2, 131.8, 133.9, 136.7, 146.3, 146.8, 165.8 ppm; HRMS (ESI) *m/z*: calcd. for $C_{16}H_{13}NO_2$ [M+H$^+$]: 252.1019, found: 252.1026.

Ethyl 7-ethyl-7*H*-pyrido[2,3-*c*]carbazole-3-carboxylate (1R). Yield = 38% (0.057 g from 0.100 g) as a light brown solid; m.p. 118–120 °C; R_f = 0.37 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1698 (CO_2Et), 1620 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.53 (t, J = 7.3 Hz, 7.1 Hz, 6H, $CO_2CH_2CH_3$, -NCH_2CH_3), 4.54 (q, J = 7.3 Hz, 2H, $CO_2CH_2CH_3$), 4.59 (q, J = 7.1 Hz, 2H, -NCH_2CH_3), 7.42–7.44 (m, 1H, ArH), 7.55 (t, J = 7.6 Hz, 1H, ArH), 7.61 (d, J = 8.2 Hz, 1H, ArH), 7.95 (d, J = 9.2 Hz, 1H, ArH), 8.36 (d, J = 9.1 Hz, 1H, ArH), 8.39 (d, J = 8.6 Hz, 1H, ArH), 8.52 (d, J = 8.0 Hz, 1H, ArH), 9.16 (d, J = 8.6 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 38.1, 62.1, 109.9, 114.2, 115.0, 120.7, 121.8, 121.9, 123.8, 125.1, 126.7, 129.6, 131.7, 138.2, 139.3, 144.2, 144.4, 165.9 ppm; HRMS (ESI) *m/z*: calcd. for $C_{20}H_{18}N_2O_2$ [M+H$^+$]: 319.1441, found: 319.1448.

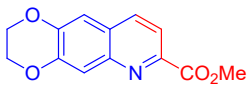
Ethyl 6-chloroquinoline-2-carboxylate (1S). Yield = 44% (0.041 g from 0.05 g) as an off-white solid; m.p. 70–72 °C; R_f = 0.69 (hexane/EtOAc, 85:15, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1710 (CO_2Et), 1622 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.49 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.56 (q, J = 7.2 Hz, 2H, $CO_2CH_2CH_3$), 7.72 (dd, J_1 = 9.0 Hz, J_2 = 2.4 Hz, 1H, ArH), 7.87 (d, J = 2.3 Hz, 1H, ArH), 8.20 – 8.24 (m, 2H, ArH), 8.26 (d, J = 9.1 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.5, 62.6, 122.1, 126.4, 129.9, 131.5, 132.5, 134.7, 136.5, 146.1, 148.6, 165.3 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{10}ClNO_2$ [M+H$^+$]: 236.0473, found: 236.0479.

Ethyl 6-nitroquinoline-2-carboxylate (1T). Yield = 16% (0.055 g from 0.200 g) as a light yellow solid; m.p. 172–174 °C; R_f = 0.71 (hexane/EtOAc, 85:15, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1712 (CO_2Et), 1617 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.51 (t, J = 7.2 Hz, 3H, $CO_2CH_2CH_3$), 4.59 (q, J = 7.2 Hz, 2H, $CO_2CH_2CH_3$), 8.34 (d, J = 8.5 Hz, 1H, ArH), 8.46 (d, J = 9.3 Hz, 1H, ArH), 8.52 – 8.56 (m, 2H, ArH), 8.86 (d, J = 2.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.4, 62.9, 122.8, 123.7, 124.3, 128.2, 132.8, 139.4, 146.8, 149.6, 151.6, 164.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{10}N_2O_4$ [M+H$^+$]: 247.0713, found: 247.0713.

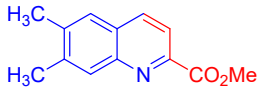
Methyl 6,7-dimethoxyquinoline-2-carboxylate (2B). Yield = 93% (0.150 g from 0.100 g) as a brown solid; m.p. 138–140 °C; R_f = 0.54 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1719 (CO_2Me), 1620 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.04 (s, 6H, $(OCH_3)_2$), 4.06 (s, 3H, CO_2Me), 7.08 (s, 1H, ArH), 7.61 (s, 1H, ArH), 8.08 (d, J = 8.3 Hz, 1H, ArH), 8.12 (d, J = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.1, 56.3, 56.4, 104.7, 109.0, 119.9, 125.9, 135.1, 144.8, 145.6, 151.7, 153.3, 166.3 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_4$ [M+H$^+$]: 248.0917, found: 248.0923.



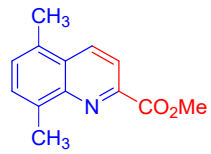
Methyl [1,3]dioxolo[4,5-*g*]quinoline-6-carboxylate (2C). Yield = 67% (0.113 g from 0.100 g) as a brown solid; m.p. 165–167 °C; R_f = 0.24 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1733 (CO_2Me), 1615 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.05 (s, 3H, CO_2Me), 6.15 (s, 2H, -OCH_2O-), 7.09 (s, 1H, ArH), 7.56 (s, 1H, ArH), 8.08 (q, J = 7.7 Hz, 2H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.2, 102.3, 102.5, 106.7, 120.1, 127.4, 135.8, 145.8, 146.2, 149.8, 151.6, 166.2 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_9NO_4$ [M+H$^+$]: 232.0604, found: 232.0607.



Methyl 2,3-dihydro-[1,4]dioxino[2,3-*g*]quinoline-7-carboxylate (2D). Yield = 74% (0.127 g from 0.100 g) as a brown solid; m.p. 132–134 °C; R_f = 0.5 (hexane/EtOAc, 85:15, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1705 (CO_2Me), 1624 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.05 (s, 3H, CO_2Me), 4.39 (s, 4H, -OCH_2CH_2O-), 7.25 (s, 1H, ArH), 7.73 (s, 1H, ArH), 8.03 (d, J = 8.5 Hz, 1H, ArH), 8.09 (d, J = 8.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.2. 64.4, 64.5, 111.6, 115.4, 119.7, 125.9, 135.5, 144.2, 146.3, 146.3, 147.7, 166.3 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{11}NO_4$ [M+H$^+$]: 246.0761, found: 246.0766.

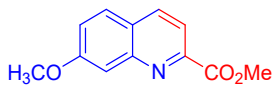


Methyl 6,7-dimethylquinoline-2-carboxylate (2E). Yield = 62% (0.110 g from 0.100 g) as a yellow solid; m.p. 155–157 °C; R_f = 0.48 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1714 (CO_2Me), 1615 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 2.48 (s, 6H, Ar(CH_3)$_2$), 4.07 (s, 3H, CO_2Me), 7.61 (s, 1H, ArH), 8.07 (s, 1H, ArH), 8.11 (d, J = 8.4 Hz, 1H, ArH), 8.17 (d, J = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 20.4, 20.6, 53.2, 120.5, 126.8, 128.2, 130.0, 136.1, 139.3, 140.9, 146.9, 147.1, 166.4 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_2$ [M+H$^+$]: 216.1019, found: 216.1021.



Methyl 5,8-dimethylquinoline-2-carboxylate (2K). Yield = 59% (0.105 g from 0.100 g) as a yellow solid; m.p. 44-46 °C; R_f = 0.59 (hexane/EtOAc, 85:15, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1705 (CO_2Me), 1624 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ =2.68 (s, 3H, $ArCH_3$), 2.85 (s, 3H, $ArCH_3$), 4.07 (s, 3H, CO_2Me), 7.36 (d, J = 7.1 Hz, 1H, ArH), 7.52 (d, J = 7.1 Hz, 1H, ArH), 8.19 (d, J = 8.7 Hz, 1H, ArH), 8.43 (d, J = 8.7 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 17.9, 18.7, 53.1, 120.5, 128.9, 130.1, 132.2, 134.0, 135.4, 136.7, 146.3, 147.2, 166.5 ppm; HRMS (ESI) *m/z*: calcd. for $C_{13}H_{13}NO_2$ [M+H$^+$]: 216.1019, found: 216.1019.

Methyl 7-methoxyquinoline-2-carboxylate (2M). Yield = 71% (0.107 g from 0.100 g) as a brown solid; m.p. 100–102 °C; R_f = 0.38 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1705 (CO_2Me), 1622 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 3.96 (s, 3H, OCH_3), 4.08 (s, 3H, CO_2Me), 7.30 (dd, J_1 = 9.0 Hz, J_2 = 2.5 Hz, 1H, ArH), 7.60 (d, J = 2.5 Hz, 1H, ArH), 7.76 (d, J = 9.0 Hz, 1H, ArH), 8.08 (d, J = 8.4 Hz, 1H, ArH), 8.22 (d, J = 8.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.3, 55.8, 108.2, 119.2, 122.5, 125.0, 128.6, 137.0, 148.0, 149.5, 161.4, 166.2 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{11}NO_3$ [M+H$^+$]: 218.0812, found: 218.0819.



Methyl 6-methoxyquinoline-2-carboxylate (2N). Yield = 55% (0.096 g from 0.100 g) as a brown solid; m.p. 92–94 °C; R_f = 0.53 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1707 (CO_2Me), 1619 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 3.96 (s, 3H, OCH_3). 4.07 (s, 3H, CO_2Me), 7.11 (d, J = 2.8 Hz, 1H, ArH), 7.43 (dd, J_1 = 9.5 Hz, J_2 = 2.8 Hz, 1H, ArH), 8.17 (s, 2H, ArH), 8.19 (d, J = 9.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.2. 55.8, 104.8, 121.7, 123.7, 131.0, 132.3, 135.8, 143.8, 145.5, 159.6, 166.2 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{11}NO_3$ [M+H$^+$]: 218.0812, found: 218.0813.

Methyl 5,6,7-trimethoxyquinoline-2-carboxylate (2P). Yield = 85% (0.128 g from 0.100 g) as an off solid; m.p. 116–118 °C; R_f = 0.24 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1719 (CO_2Me), 1615 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.01 (s, 6H, $(OCH_3)_2$), 4.04 (s, 6H, OCH_3, CO_2Me), 7.44 (s, 1H, ArH), 8.07 (d, J = 8.6 Hz, 1H, ArH), 8.49 (d, J = 8.5 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.2, 56.4, 61.4, 61.8, 105.3, 119.1, 121.2, 131.6, 142.6, 145.5, 146.6, 147.3, 156.8, 166.2 ppm; HRMS (ESI) *m/z*: calcd. for $C_{14}H_{15}NO_5$ [M+H$^+$]: 278.1023, found: 278.1023.

Methyl benzo[*h*]quinoline-2-carboxylate (2Q). Yield = 49% (0.081 g from 0.100 g) as a brown solid; m.p. 64–66 °C; R_f = 0.77 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1719 (CO_2Me), 1600 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.11 (s, 3H, CO_2Me), 7.72–7.76 (m, 2H, ArH), 7.78–7.80 (m, 1H, ArH), 7.92 (t, J = 8.8 Hz, 2H, ArH), 8.30 – 8.34 (m, 2H, ArH), 9.42 (d, J = 8.2 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 53.1, 122.3, 124.8, 125.1, 127.7, 128.0, 128.3, 128.9, 130.3, 131.7, 133.9, 136.8, 146.3, 146.5, 166.4 ppm; HRMS (ESI) *m/z*: calcd. for $C_{15}H_{11}NO_2$ [M+H$^+$]: 238.0863, found: 238.0864.

1-Ethyl 6-methyl (*Z*)-2-chloro-4-hydroxy-5-methylenehex-2-enedioate (1U). Yield = 36% (0.065 g from 0.120 g) as a colourless oil; R_f = 0.5 (hexane/EtOAc, 80:20, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 3699 (OH), 1723 (CO_2Et), 1626 (C=C); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.32 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 3.41 (s, 1H, OH), 3.80 (s, 3H, CO_2Me), 4.28 (q, J = 5.3 Hz, 2H, $CO_2CH_2CH_3$), 5.32 (d, J = 5.0 Hz, 1H, CH), 5.92 (s, 1H, =CHH), 6.31 (s, 1H, =CHH), 7.16 (d, J = 7.9 Hz, 1H, CH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.2, 52.4, 62.8, 70.0, 125.9, 127.8, 138.3, 140.4, 162.1, 166.5 ppm; HRMS (ESI) *m/z*: calcd. for $C_{10}H_{13}ClO_5$ [M+H$^+$]: 249.0524, found: 249.0537.

Ethyl (*Z*)-2-azido-5-oxopent-2-enoate-ethyl oxazole-4-carboxylate (1V-V'). Yield = 74% (0.075 g from 0.100 g) as a greenish oil; R_f = 0.5 (hexane/EtOAc, 80:20, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 2674 (C-H), 2101(N_3), 1720 (CO_2Et); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.38 (t, J = 7.2 Hz, 3H, $CO_2CH_2CH_3$), 1.42 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 4.38 (q, J = 7.2 Hz, 2H, $CO_2CH_2CH_3$), 4.45 (q, J = 7.1 Hz, 2H, $CO_2CH_2CH_3$), 6.15 (d, J = 7.7 Hz, 1H, CO_2EtCCH-CHO), 6.79 (s, 1H, ArH), 8.52 (s, 1H, ArH), 10.13 (d, J = 7.7 Hz, 1H, –CHO) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.1, 14.2, 62.4, 63.6, 105.5, 119.7, 142.3, 155.8, 158.1, 160.1, 162.3, 189.8 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{14}N_4O_6$ [M+H$^+$]: 311.0986, found: 311.0994.

Ethyl 3,3,5-triacetyl-4-methyl-7-oxabicyclo[2.2.1]hept-5-ene-2-carboxylate (1W). Yield = 49% (0.092 g from 0.100 g) as a brown solid; m.p. 84–86 °C; R_f = 0.67 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1725 (CO_2Et), 1604 (C=O), 1670 (C=C); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.29 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 1.68 (s, 3H, CH_3), 2.15 (s, 3H, $COCH_3$), 2.27 (s, 3H, $COCH_3$), 2.46 (s, 3H, $COCH_3$), 2.96 (s, 1H, $COCH_3$), 4.09 (s, 1H, CH), 4.17–4.22 (m, 1H, $CO_2CH_2CH_3$), 4.32–4.37 (m, 1H, $CO_2CH_2CH_3$), 4.69 (d, J = 8.9 Hz, 1H, CH), 5.05 (d, J = 8.9 Hz, 1H, CH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 10.9, 14.4, 15.5, 29.3, 29.5, 54.5, 63.1, 91.4, 92.5, 117.3, 140.1, 145.2, 166.1, 171.2, 193.5, 201.2 ppm; HRMS (ESI) *m/z*: calcd. for $C_{16}H_{20}O_6$ [M+H$^+$]: 309.1333, found: 309.1333.

2-ethyl 3,5-dimethyl 3-acetyl-4-methyl-7-oxabicyclo[2.2.1]hept-5-ene-2,3,5-tricarboxylate (1X). Yield = 17% (0.036 g from 0.100 g) as a colorless oil; R_f = 0.27 (hexane/EtOAc, 90:10, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1729 (CO_2Et), 1644 (C=O), 1700 (C=C); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.32 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 1.58 (s, 3H, CH_3), 2.22 (s, 3H, $COCH_3$), 2.97 (d, J = 5.0 Hz, 1H, CH), 3.66 (s, 3H, CO_2Me), 3.79 (s, 3H, CO_2Me), 3.83-3.86 (m, 1H, CH), 4.28–4.33 (m, 2H, $CO_2CH_2CH_3$), 5.23 (d, J = 8.7 Hz, 1H, CH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.2, 15.0, 29.8, 48.6, 51.2, 52.5, 57.7, 62.1, 68.4, 73.8, 85.7, 105.9, 165.6, 165.6, 169.2, 170.4 ppm; HRMS (ESI) *m/z*: calcd. for $C_{16}H_{20}O_8$ [M+H$^+$]: 341.1231, found: 341.1214.

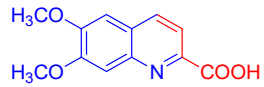
Triethyl 3-acetyl-4-methyl-7-oxabicyclo[2.2.1]hept-5-ene-2,3,5-tricarboxylate (1Y). Yield = 36% (0.081 g from 0.100 g) as a white solid; m.p. 75–77 °C; R_f = 0.66 (hexane/EtOAc, 90:10, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1707 (CO_2Et), 1649 (C=O), 1699 (C=C); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.21 (t, J = 7.1 Hz, 3H, $CO_2CH_2CH_3$), 1.30–1.34 (m, 6H, $(CH_2CH_3)_2$), 1.68 (s, 3H, CH_3), 2.22 (s, 3H, $COCH_3$), 2.95 (d, J = 4.9 Hz, 1H, CH), 3.86–3.89 (m, 1H, CH), 4.05–4.09 (m, 1H, $CO_2CH_2CH_3$), 4.12–4.17 (m, 1H, $CO_2CH_2CH_3$), 4.18–4.22 (m, 1H, $CO_2CH_2CH_3$), 4.26–4.33 (m, 3H, $CO_2CH_2CH_3$), 5.23 (d, J = 8.8 Hz, 1H, CH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 14.1, 14.2, 14.3, 14.4, 15.1, 48.4, 57.9, 59.9, 61.4, 62.1, 68.5, 73.9, 85.7, 106.1, 165.2, 165.7, 169.0, 169.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{18}H_{24}O_8$ [M+H$^+$]: 369.1544, found: 369.1522.

(6,7-dimethoxyquinolin-2-yl)methanol (5). Yield = 96% (0.116 g from 0.145 g) as a white solid; m.p. 154–156 °C; R_f = 0.42 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 3137 (OH), 2901 (C-H), 1622 (C=N), 1246 (C-O); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 2.99 (s, 1H, -CH_2OH), 4.01 (s, 3H, OCH_3), 4.04 (s, 3H, OCH_3), 4.88 (s, 2H,–CH_2OH), 7.06 (s, 1H, ArH), 7.18 (d, J = 8.3 Hz, 1H, ArH), 7.41 (s, 1H, ArH), 7.99 (d, J = 8.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 56.2, 56.3, 64.3, 105.3, 107.3, 116.9, 123.1, 135.4, 143.8, 149.8, 152.8, 156.9 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{13}NO_3$ [M+H$^+$]: 220.0968, found: 220.0975.

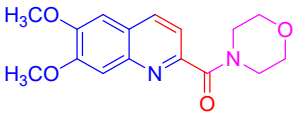
6,7-Dimethoxyquinoline-2-carbaldehyde (6). Yield = 95% (0.094 g from 0.100 g) as a white solid; m.p. 140–142 °C; R_f = 0.81 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 2815 (C-H), 1694 (C=O), 1614 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.05 (s, 6H, $O(CH_3)_2$), 7.10 (s, 1H, ArH), 7.51 (s, 1H, ArH), 7.91 (d, J = 8.2 Hz, 1H, ArH), 8.11 (d, J = 8.3 Hz, 1H, ArH), 10.16 (s, 1H, CHO) ppm; ^{13}C NMR (150 MHz,

$CDCl_3$) δ = 56.3, 56.4, 105.0, 108.5, 116.4, 126.7, 135.1, 145.2, 150.8, 152.1, 153.4, 193.7 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{11}NO_3$ [M+H$^+$]: 218.0812, found: 218.0818.

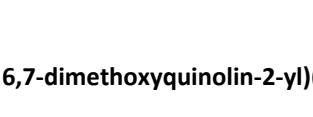
6,7-Dimethoxyquinoline-2-carboxylic acid (7). Yield = 93% (0.083 g from 0.100 g) as a light yellow solid; m.p. 212–214 °C; R_f = 0.4 (Pure MeOH); IR (neat): ν_{max} (cm)$^{-1}$ = 3443 (OH), 1665 (C=O); ^{1}H NMR (600 MHz, DMSO-d_6) δ = 3.92 (s, 6H, $(OCH_3)_2$), 7.42 (s, 1H, ArH), 7.48 (s, 1H, ArH), 7.94 (d, *J* = 8.3 Hz, 1H, ArH), 8.33 (d, *J* = 8.4 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, DMSO-d_6) δ = 56.0, 105.4, 107.0, 119.2, 125.5, 136.2, 143.0, 145.0, 151.3, 153.4, 165.9 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{11}NO_4$ [M+H$^+$]: 234.0761, found: 234.0761.



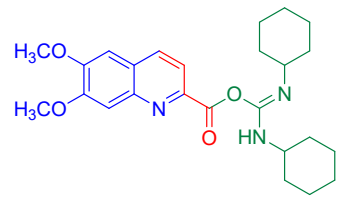
6,7-dimethoxyquinolin-2-yl)(morpholino)methanone (8). Yield = 56% (0.036 g from 0.050 g) as a yellow solid; m.p. 160–162 °C; R_f = 0.33 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1718 (C=O), 1624 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 3.71–3.77 (m, 4H, -CH_2CH_2-), 3.84 – 3.89 (m, 4H, -CH_2CH_2-), 4.04 (d, *J* = 4.9 Hz, 6H, ArH), 7.07 (s, 1H, ArH), 7.39 (s, 1H, ArH), 7.61 (d, *J* = 8.3 Hz, 1H, ArH), 8.09 (d, *J* = 8.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 42.9, 48.0, 56.3, 56.4, 67.0, 67.3, 105.0, 108.2, 119.4, 124.2, 135.3, 143.7, 150.9, 151.1, 153.2, 168.2 ppm; HRMS (ESI) *m/z*: calcd. for $C_{16}H_{18}N_2O_4$ [M+H$^+$]: 303.1339, found: 303.1340.

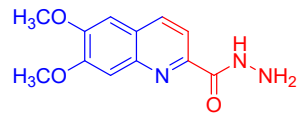


6,7-dimethoxyquinolin-2-yl)(piperidin-1-yl)methanone (9). Yield = 87% (0.033 g from 0.030 g) as a brown oil; R_f = 0.30 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1703 (C=O), 1618 (C=N); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 1.54–1.57 (m, 2H, CH_2), 1.68–1.72 (m, 4H, CH_2), 3.48–3.51 (m, 2H, CH_2), 3.78 (t, *J* = 5.1 Hz, 2H, CH_2), 4.02 (d, *J* = 3.3 Hz, 6H, CH_2), 7.05 (s, 1H, ArH), 7.40 (s, 1H, ArH), 7.49 (d, *J* = 8.2 Hz, 1H, ArH), 8.06 (d, *J* = 8.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 24.7, 25.6, 26.6, 43.4, 48.5, 56.2, 56.3, 105.0, 108.2, 118.7, 123.9, 135.1, 143.9, 150.6, 152.3, 153.0, 168.3 ppm; HRMS (ESI) *m/z*: calcd. for $C_{17}H_{20}N_2O_3$ [M+H$^+$]: 301.1547, found: 301.1548.

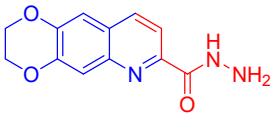


(*Z*)-(*Z*)-N,N'-dicyclohexylcarbamimidic 6,7-dimethoxyquinoline-2-carboxylic anhydride (10). Yield = 38% (0.021 g from 0.030 g) as a white solid; R_f = 0.61 (hexane/EtOAc, 50:50, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 1672 (C=N), 1619 (C=O); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 0.89–0.95 (m, 2H, CH), 1.08–1.26 (m, 8H, CH), 1.32–1.35 (m, 1H, CH), 1.48–1.55 (m, 3H, CH), 1.79–1.82 (m, 2H, CH), 1.91–1.94 (m, 1H, CH), 1.96–2.00 (m, 3H, CH), 3.51–3.56 (m, 1H, CH), 4.03 (d, *J* = 7.5 Hz, 6H, $(OCH_3)_2$), 4.18–4.22 (m, 1H, CH), 6.30 (s, 1H, NH), 7.06 (s, 1H, ArH), 7.38 (s, 1H, ArH), 7.63 (d, *J* = 8.3 Hz, 1H, ArH), 8.07 (d, *J* = 8.3 Hz, 1H, ArH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 24.6, 25.1, 25.5, 25.7, 26.3, 30.9, 32.6, 34.1, 49.2, 49.8, 56.3, 56.4, 57.1, 104.9, 108.2, 118.3, 124.6, 135.2, 143.9, 151.0, 151.5, 153.2, 154.3, 156.9, 169.1 ppm; HRMS (ESI) *m/z*: calcd. for $C_{25}H_{33}N_3O_4$ [M+H$^+$]: 440.2544, found: 440.2544.

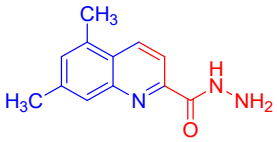




6,7-dimethoxyquinoline-2-carbohydrazide (11). Yield = 90% (0.018 g from 0.02 g) as a white solid; m.p. 180–182 °C; R_f = 0.23 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 3387 (NH), 1600 (C=O); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.04 (s, 6H, (OCH_3)$_2$), 4.12 (s, 2H, NH_2), 7.07 (s, 1H, ArH), 7.35 (s, 1H, ArH), 8.11 (q, J = 6.5 Hz, 2H, ArH), 9.10 (s, 1H, NH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 56.3, 56.4, 104.9, 107.9, 117.4, 125.8, 135.4, 143.8, 146.8, 151.2, 153.3, 165.5 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{13}N_3O_3$ [M+H$^+$]: 248.1030, found: 248.0972.



2,3-dihydro-[1,4]dioxino[2,3-*g*]quinoline-7-carbohydrazide (12). Yield = 92% (0.017 g from 0.02 g) as a white solid; m.p. 165–167 °C; R_f = 0.28 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 3300 (NH), 1600 (C=O); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 4.10 (d, J = 4.6 Hz, 2H, NH_2), 4.39 (s, 4H, -OCH_2CH_2O-), 7.24 (s, 1H, ArH), 7.48 (s, 1H, ArH), 8.10 (q, J = 9.2 Hz, 2H, ArH), 9.11 (s, 1H, NH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 64.4, 64.5, 111.8, 114.4, 117.3, 125.9, 135.7, 143.2, 145.8, 147.4, 147.7, 165.4 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{11}N_3O_3$ [M+H$^+$]: 246.0873, found: 246.0874.



5,7-dimethylquinoline-2-carbohydrazide (13). Yield = 87% (0.02 g from 0.02 g) as a yellow solid; m.p. 156–158 °C; R_f = 0.54 (hexane/EtOAc, 70:30, v/v); IR (neat): ν_{max} (cm)$^{-1}$ = 3324 (NH), 1602 (C=O); ^{1}H NMR (600 MHz, $CDCl_3$) δ = 2.52 (s, 3H, ArCH_3), 2.66 (s, 3H, ArCH_3), 4.14 (s, 2H, NH_2), 7.28 (s, 1H, ArH), 7.69 (s, 1H, ArH), 8.19 (d, J = 7.2 Hz, 1H, ArH), 8.40 (d, J = 8.6 Hz, 1H, ArH), 9.21 (s, 1H, NH) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ = 18.7, 21.9, 117.7, 126.9, 127.1, 131.04, 133.8, 134.4, 140.4, 147.4, 148.4, 165.3 ppm; HRMS (ESI) *m/z*: calcd. for $C_{12}H_{13}N_3O$ [M+H$^+$]: 216.1131, found: 216.1131.

2. ^{1}H-NMR and ^{13}C-NMR of the synthesized products.

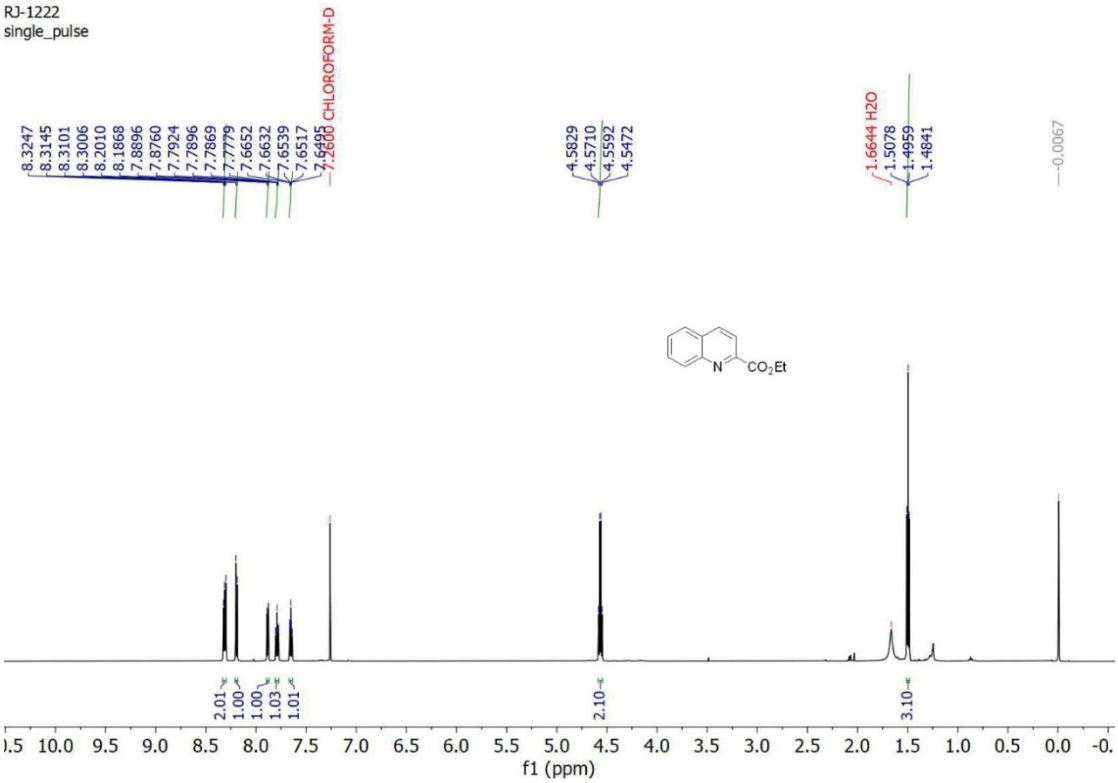


Figure S1. ^{1}H-NMR spectrum of **1A** in $CDCl_3$.

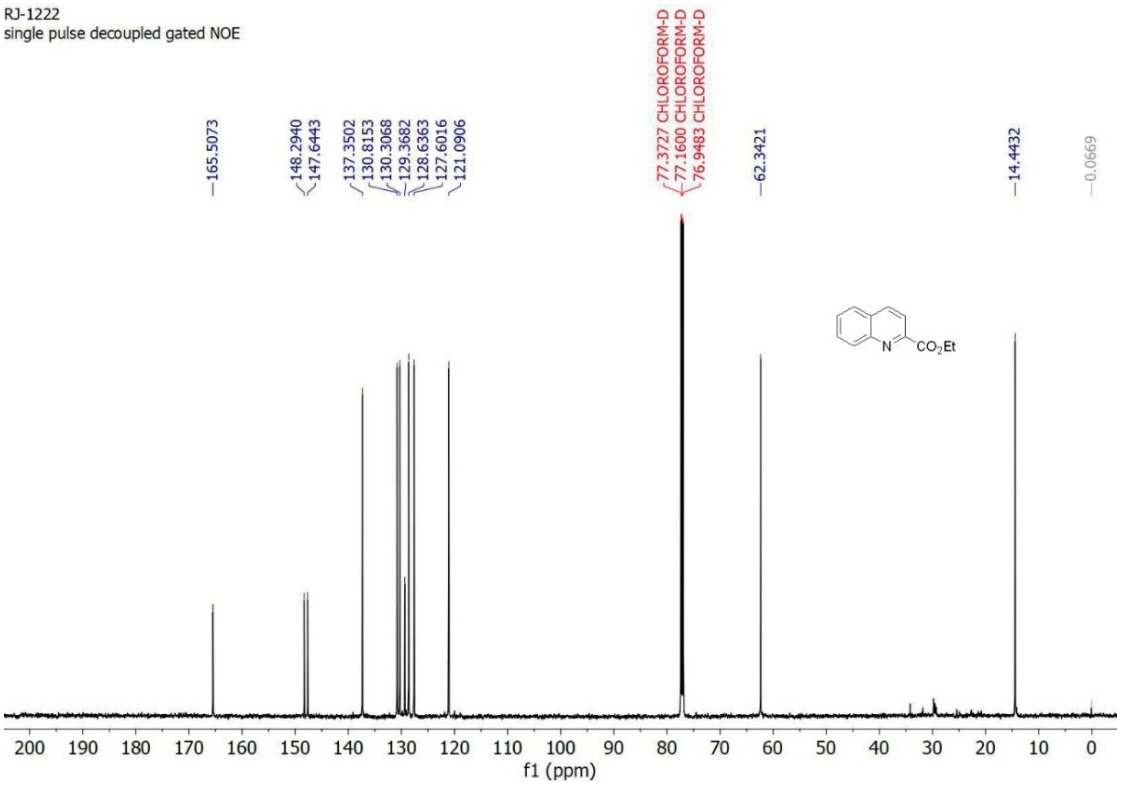


Figure S2. ^{13}C-NMR spectrum of **1A** in $CDCl_3$.

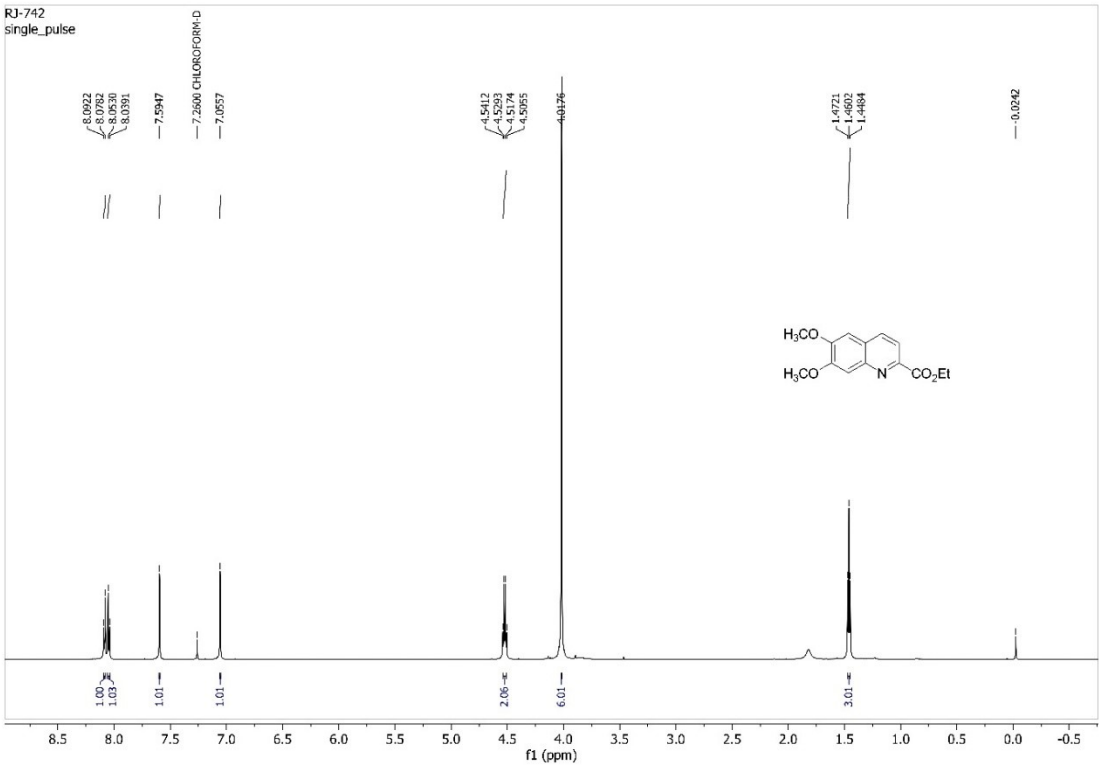


Figure S3. ^{1}H-NMR spectrum of **1B** in $CDCl_3$.

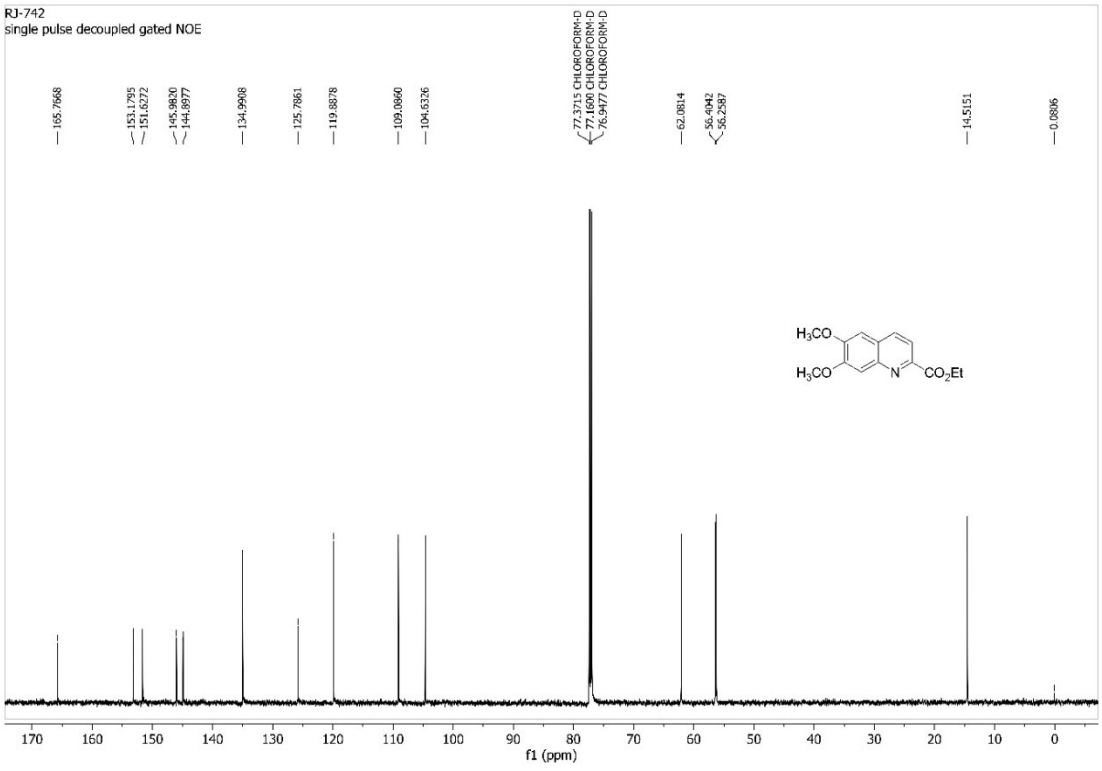


Figure S4. ^{13}C-NMR spectrum of **1B** in $CDCl_3$.

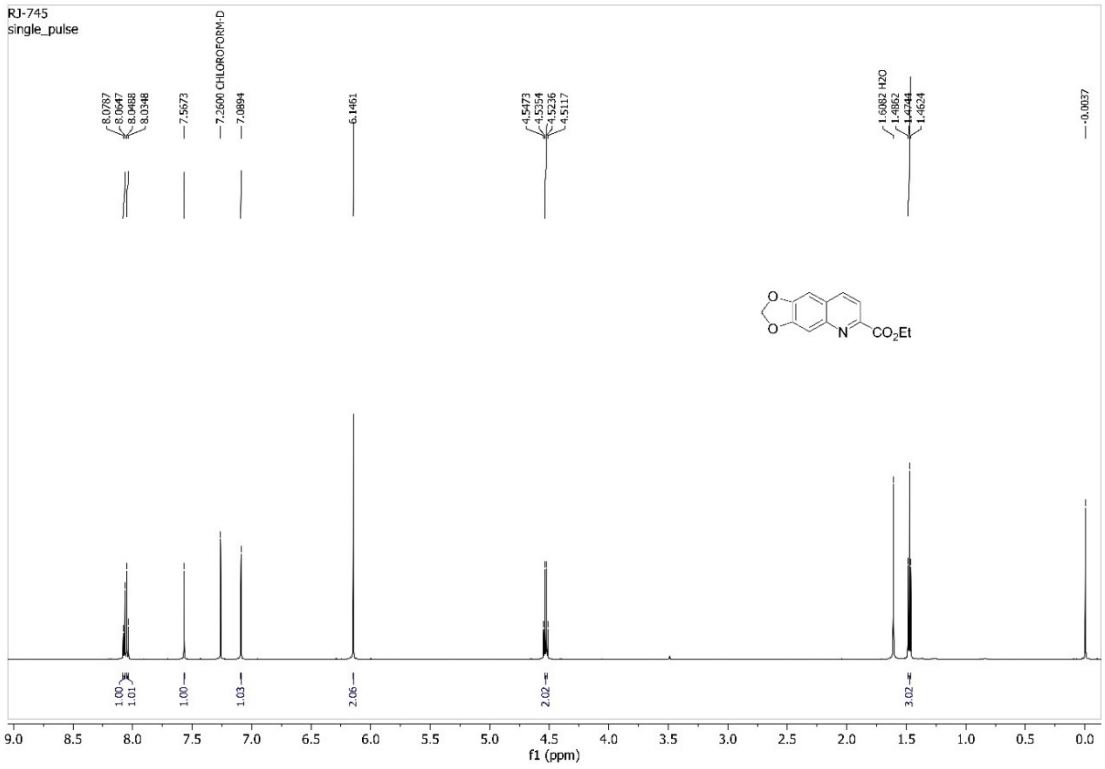


Figure S5. ^{1}H-NMR spectrum of **1C** in $CDCl_3$.

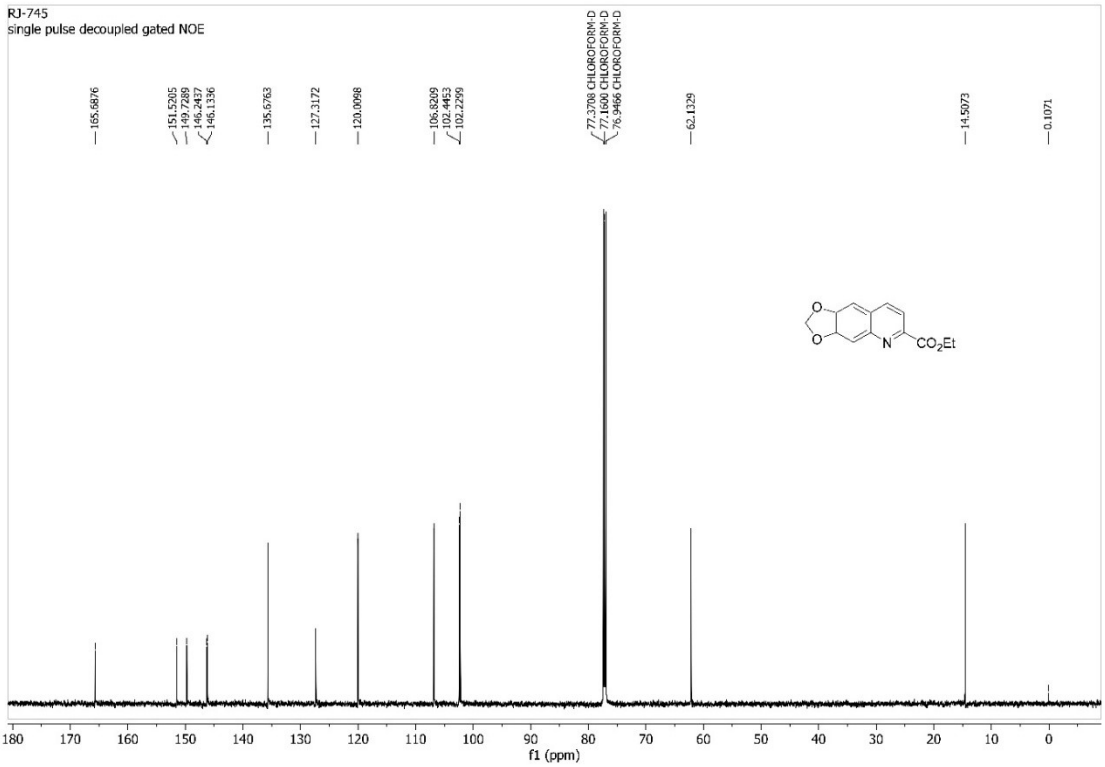


Figure S6. ^{13}C-NMR spectrum of **1C** in $CDCl_3$.

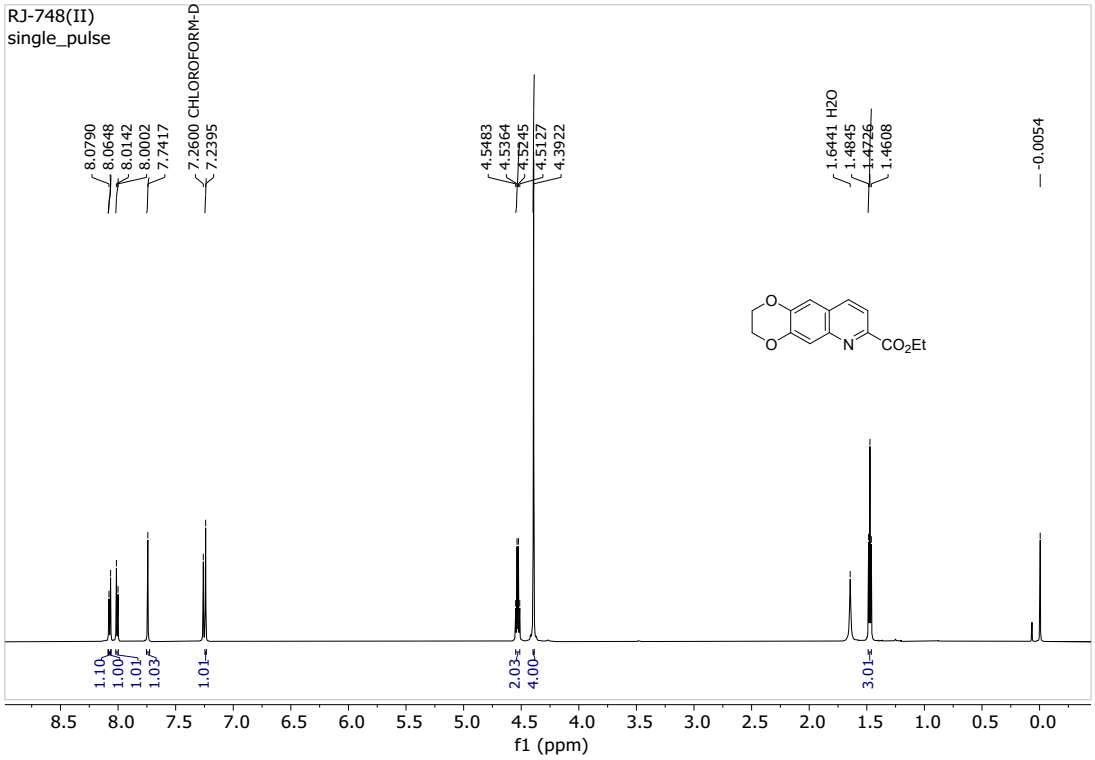


Figure S7. ^{1}H-NMR spectrum of **1D** in $CDCl_3$.

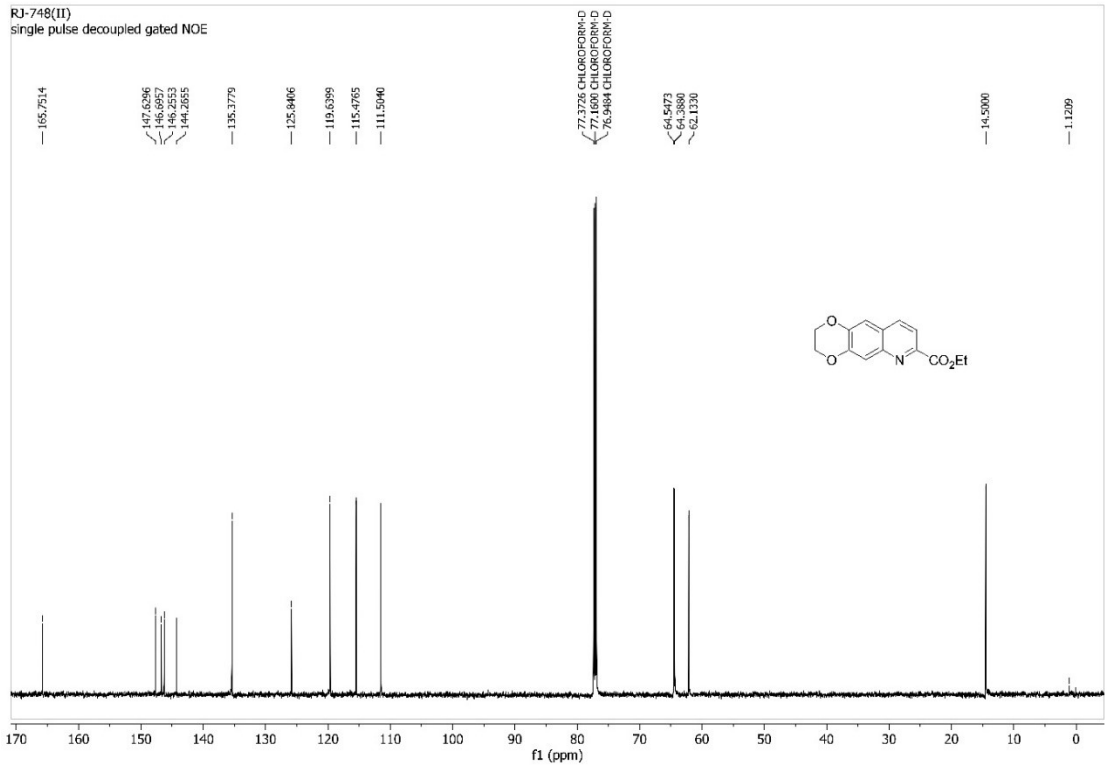


Figure S8. ^{13}C-NMR spectrum of **1D** in $CDCl_3$.

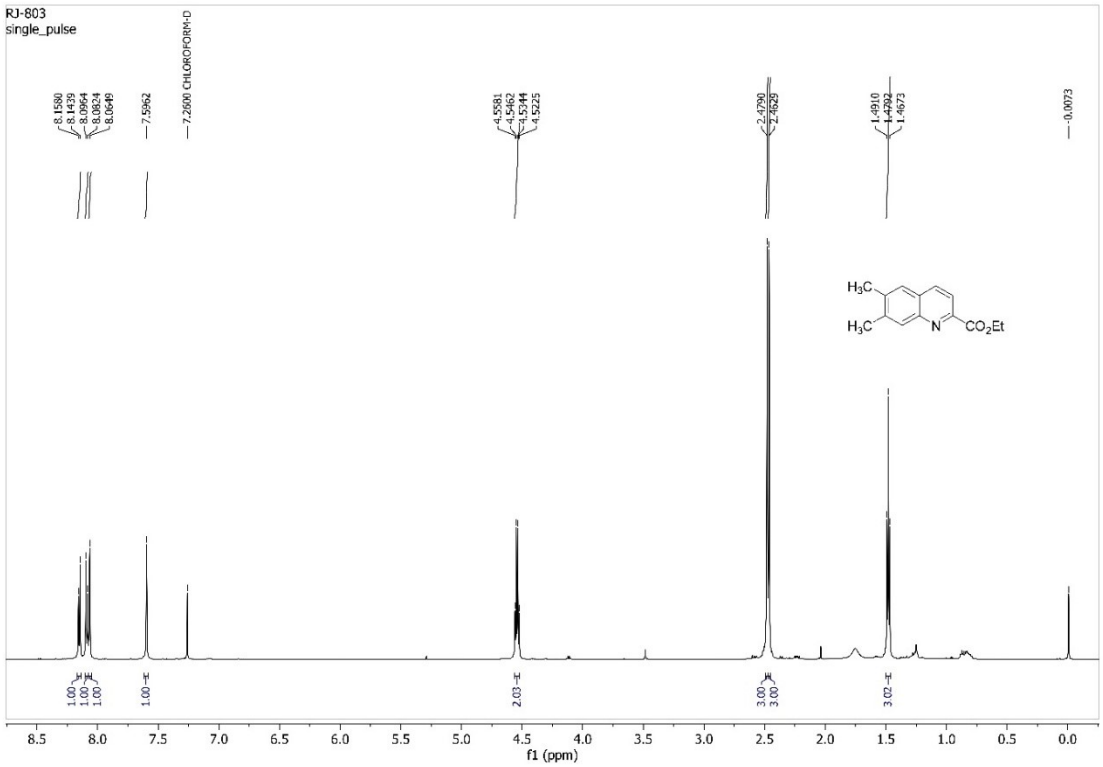


Figure S9. ^{1}H-NMR spectrum of **1E** in $CDCl_3$.

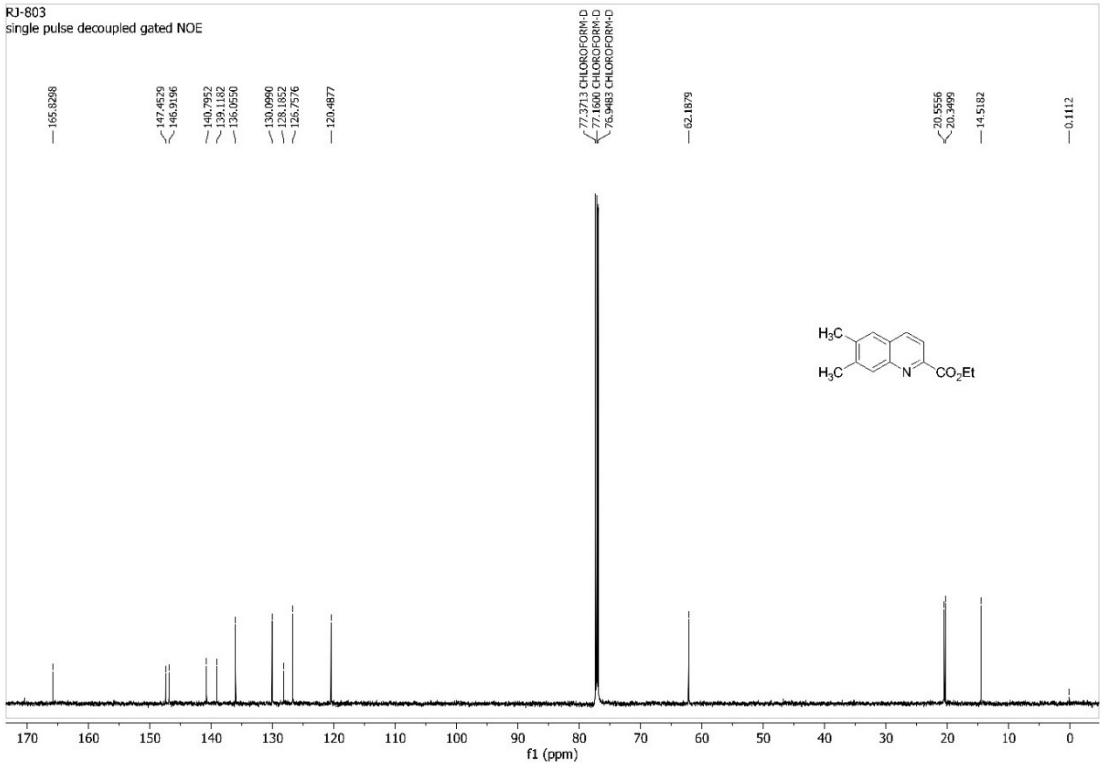


Figure S10. ^{13}C-NMR spectrum of **1E** in $CDCl_3$.

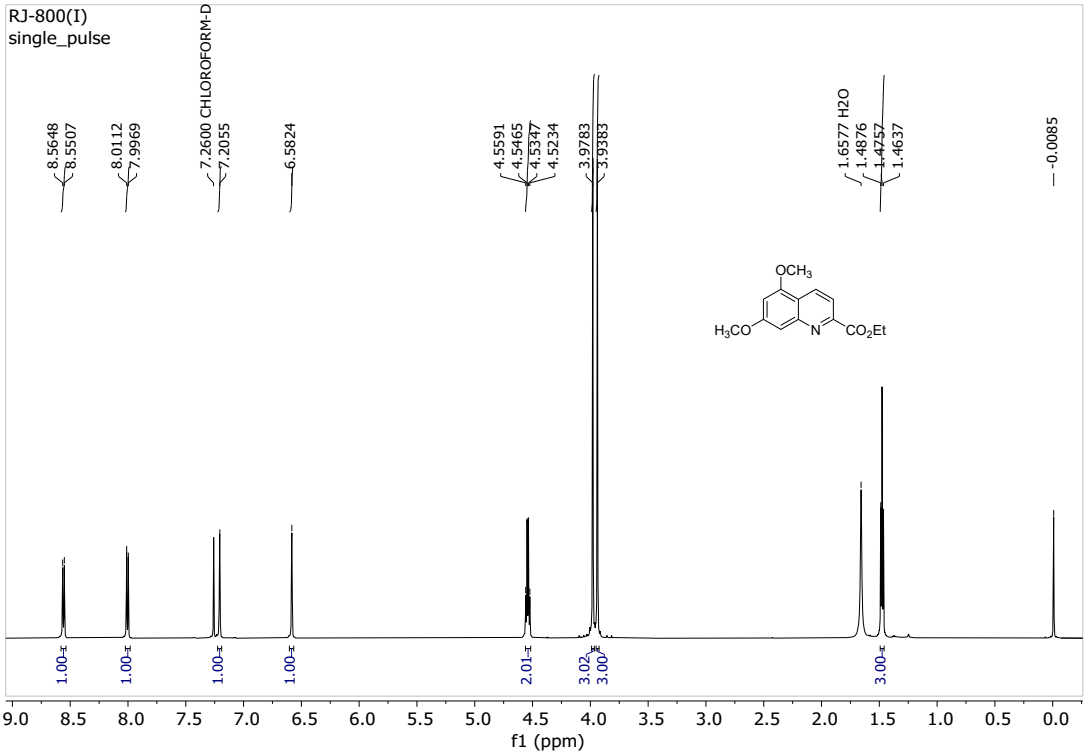


Figure S11. ^{1}H-NMR spectrum of **1F** in $CDCl_3$.

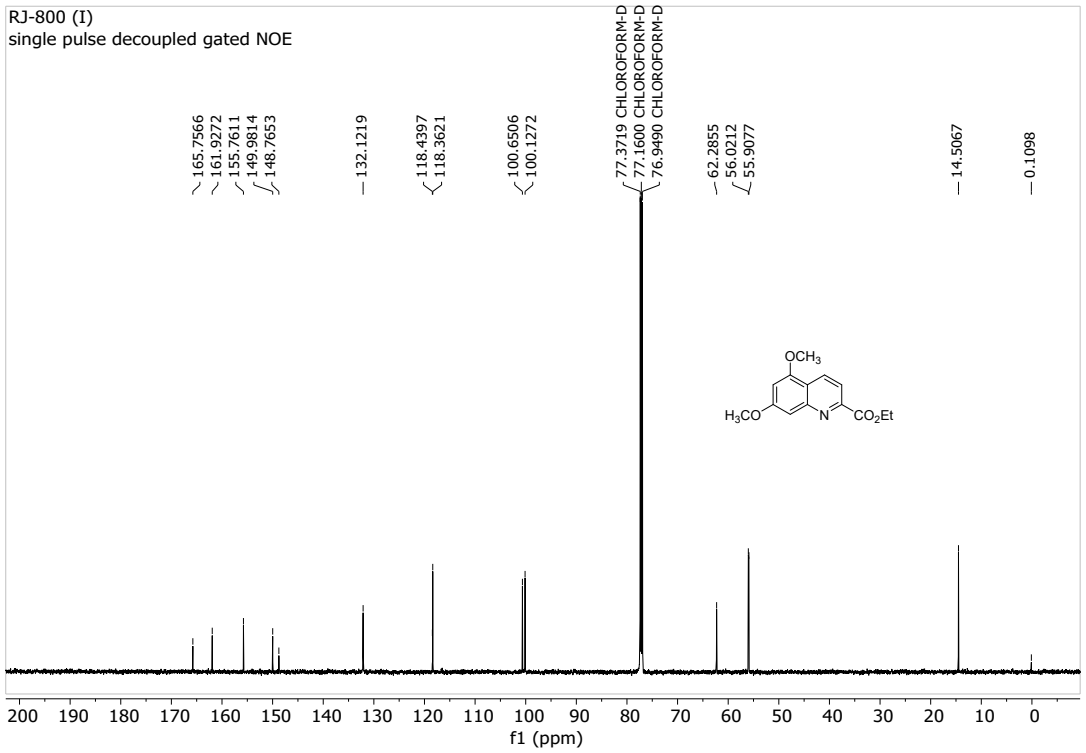


Figure S12. ^{13}C-NMR spectrum of **1F** in $CDCl_3$.

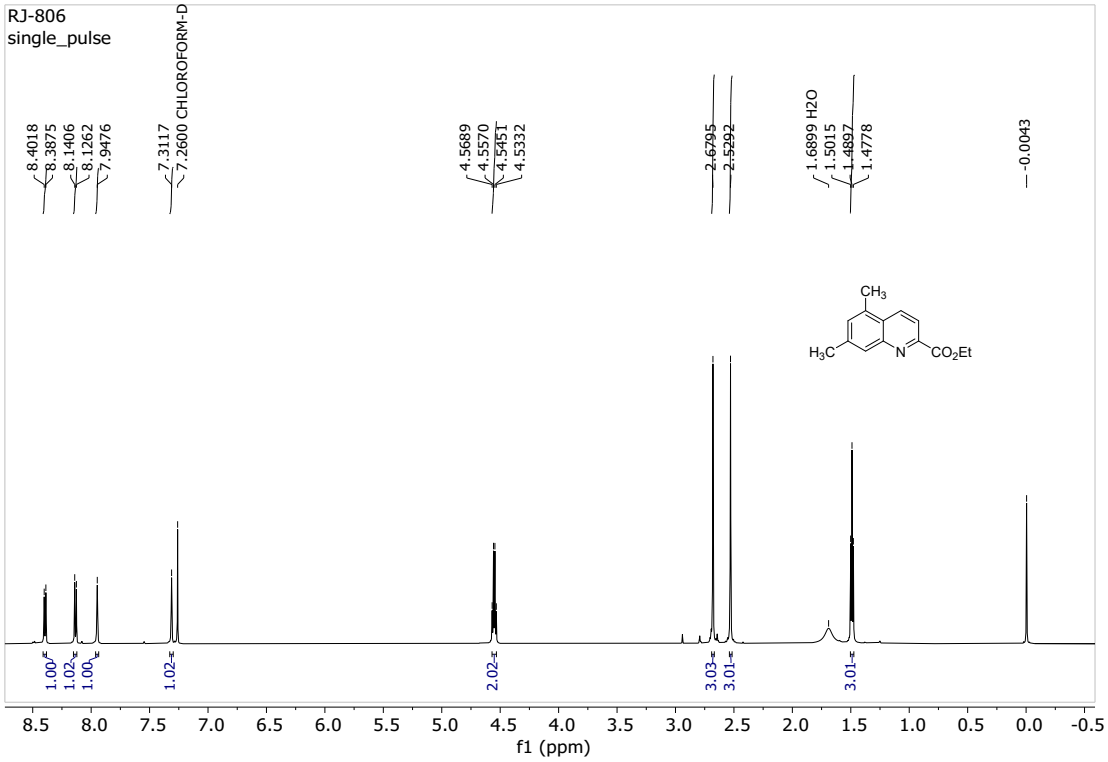


Figure S13. ^{1}H-NMR spectrum of **1G** in $CDCl_3$.

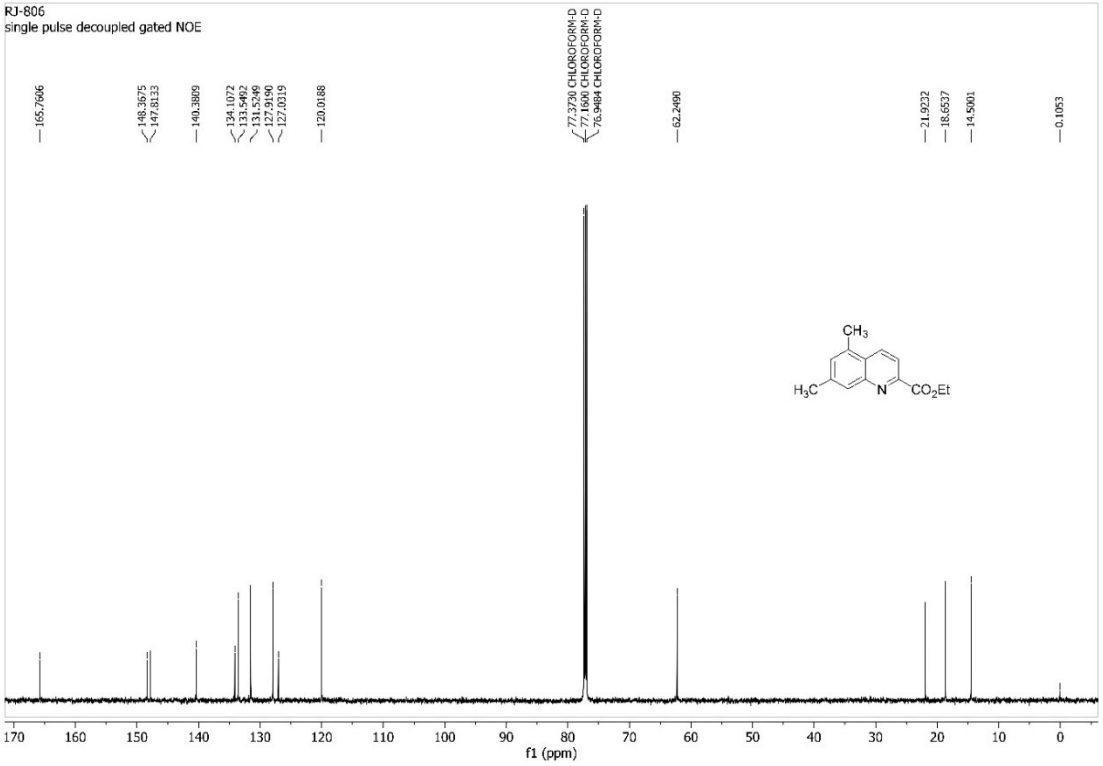


Figure S14. ^{13}C-NMR spectrum of **1G** in $CDCl_3$.

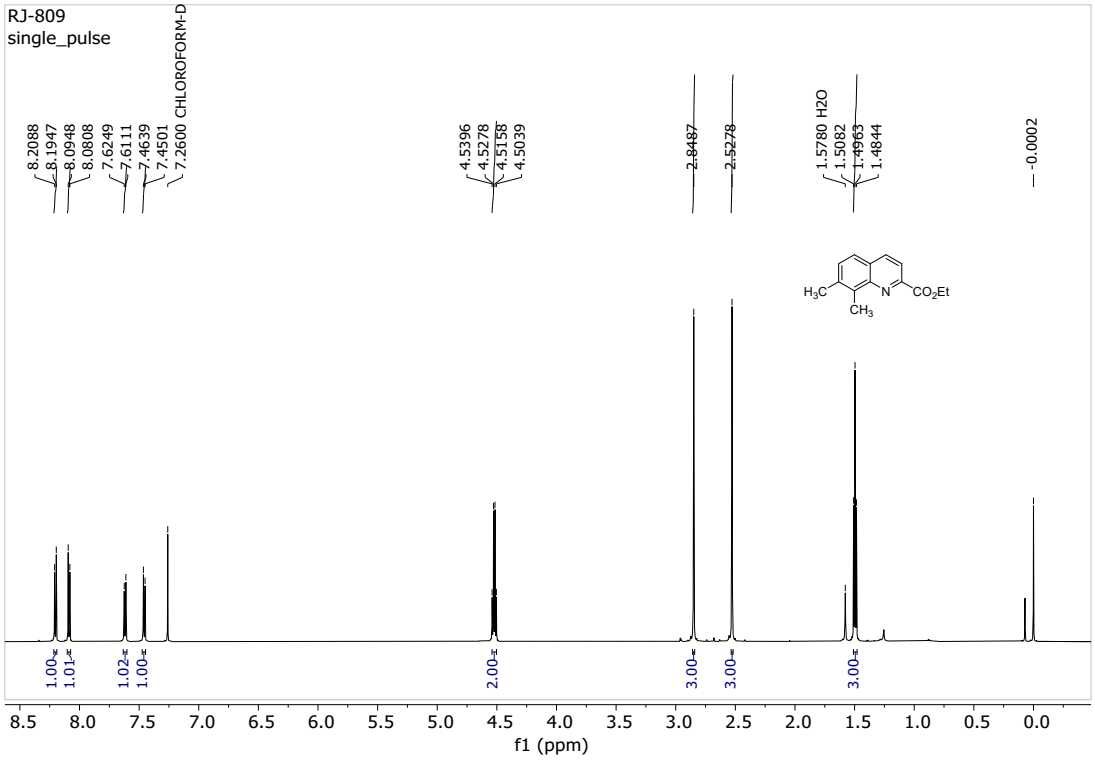


Figure S15. ^{1}H-NMR spectrum of **1H** in $CDCl_3$.

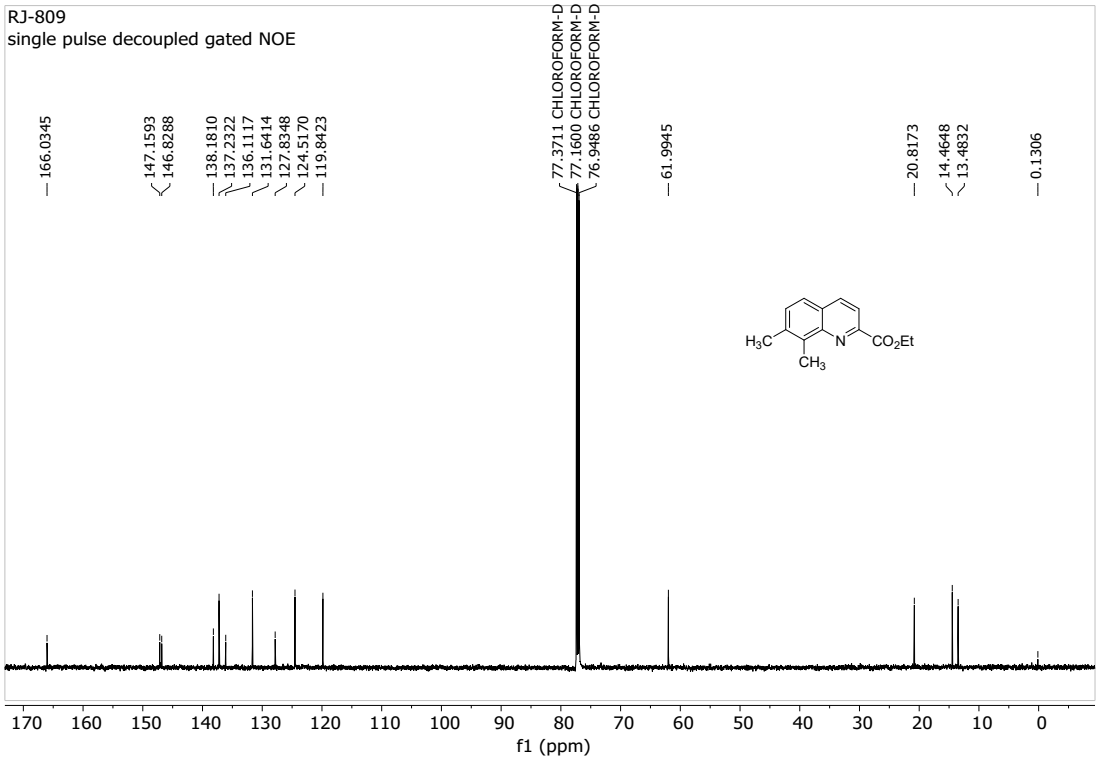


Figure S16. ^{13}C-NMR spectrum of **1H** in $CDCl_3$.

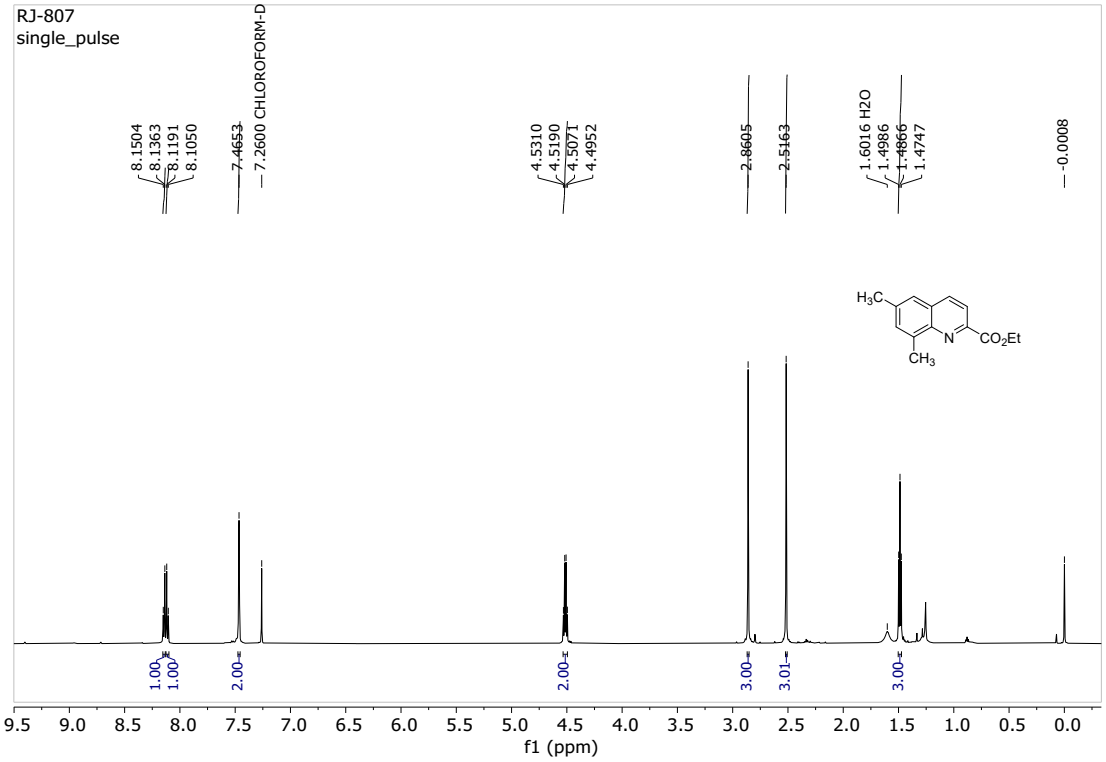


Figure S17. ^{1}H-NMR spectrum of **1l** in $CDCl_3$.

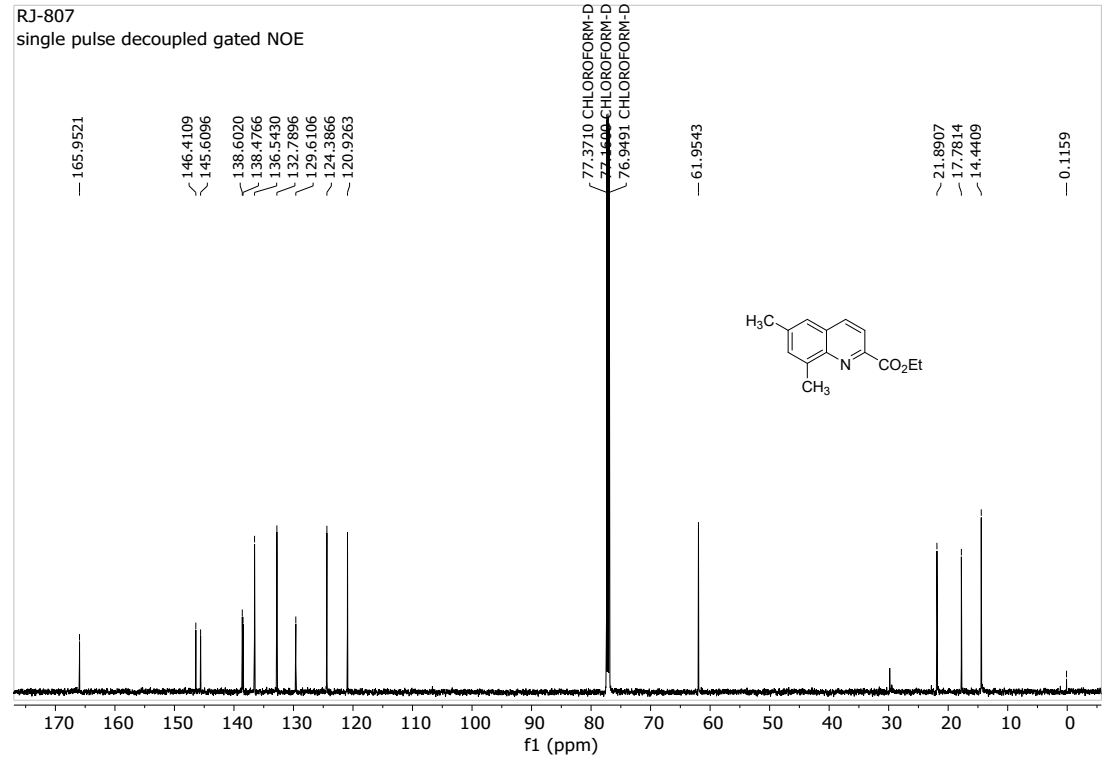


Figure S18. ^{13}C-NMR spectrum of **1l** in $CDCl_3$.

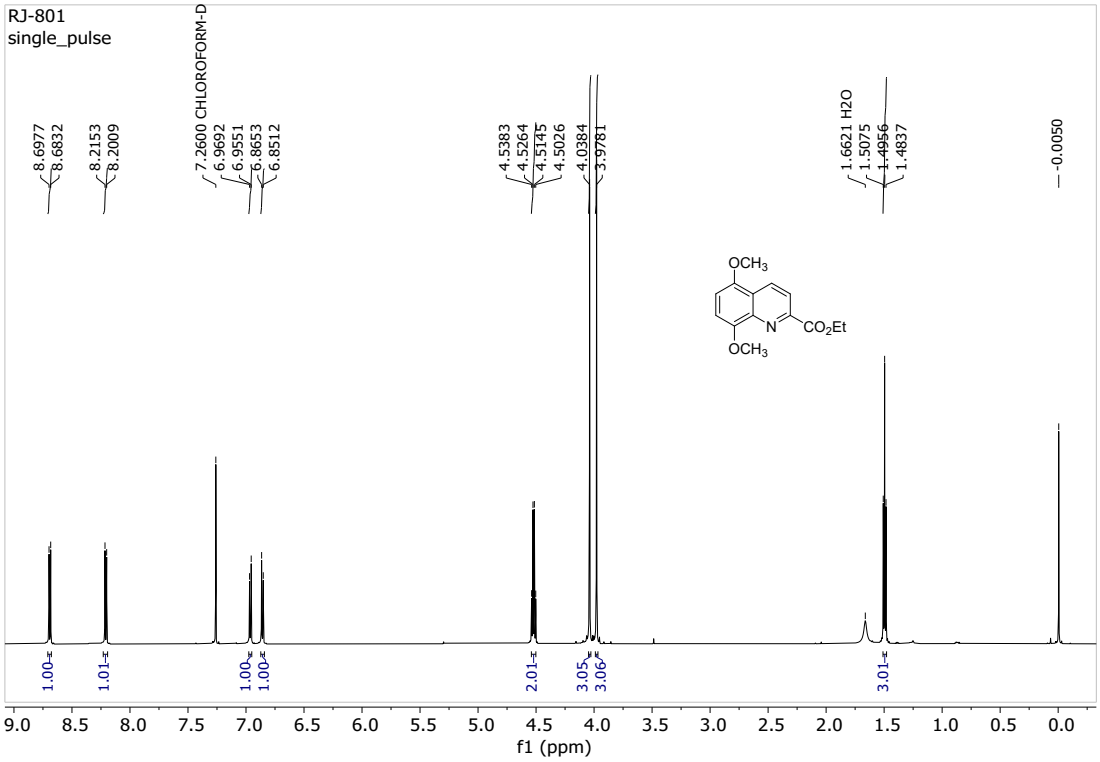


Figure S19. ^{1}H-NMR spectrum of **1J** in $CDCl_3$.

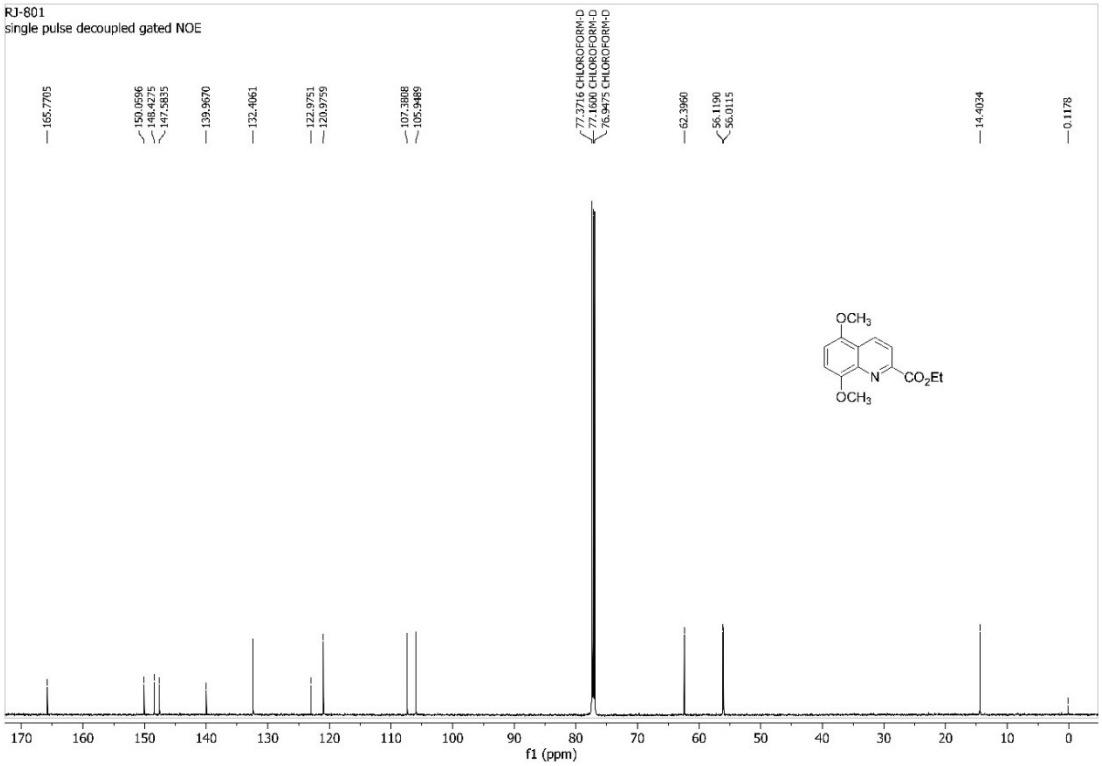


Figure S20. ^{13}C-NMR spectrum of **1J** in $CDCl_3$.

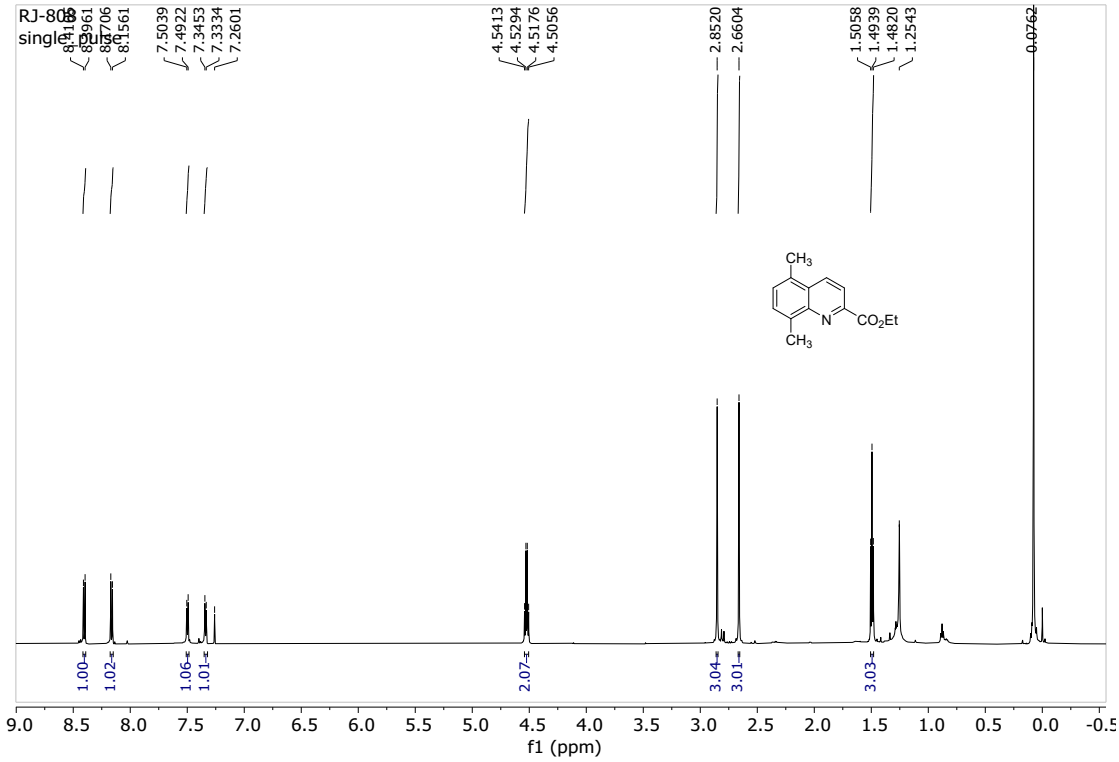


Figure S21. ^{1}H-NMR spectrum of **1K** in $CDCl_3$.

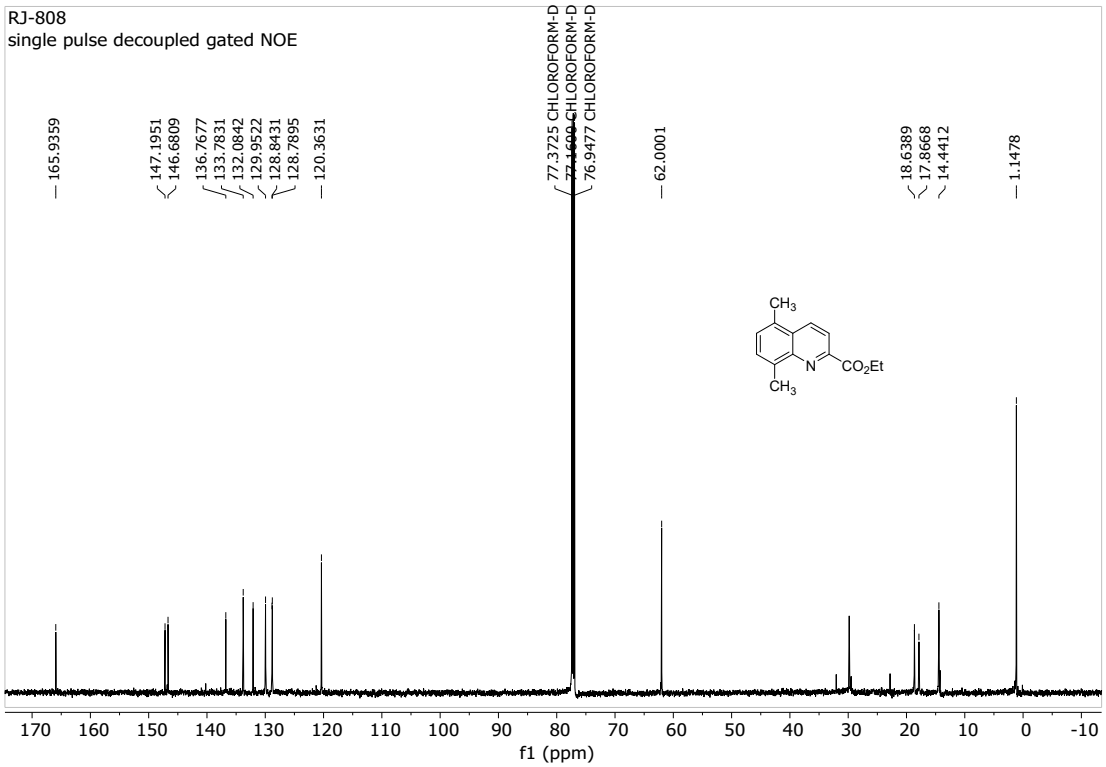


Figure S22. ^{13}C-NMR spectrum of **1K** in $CDCl_3$.

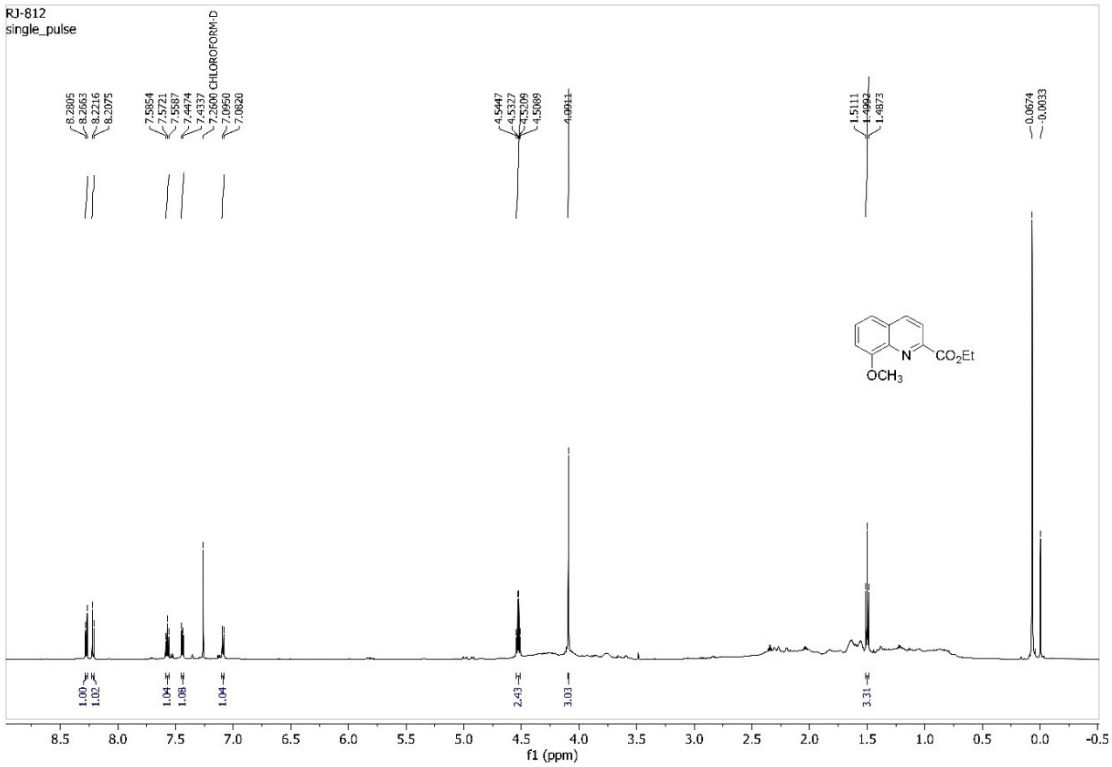


Figure S23. ^{1}H-NMR spectrum of **1L** in $CDCl_3$.

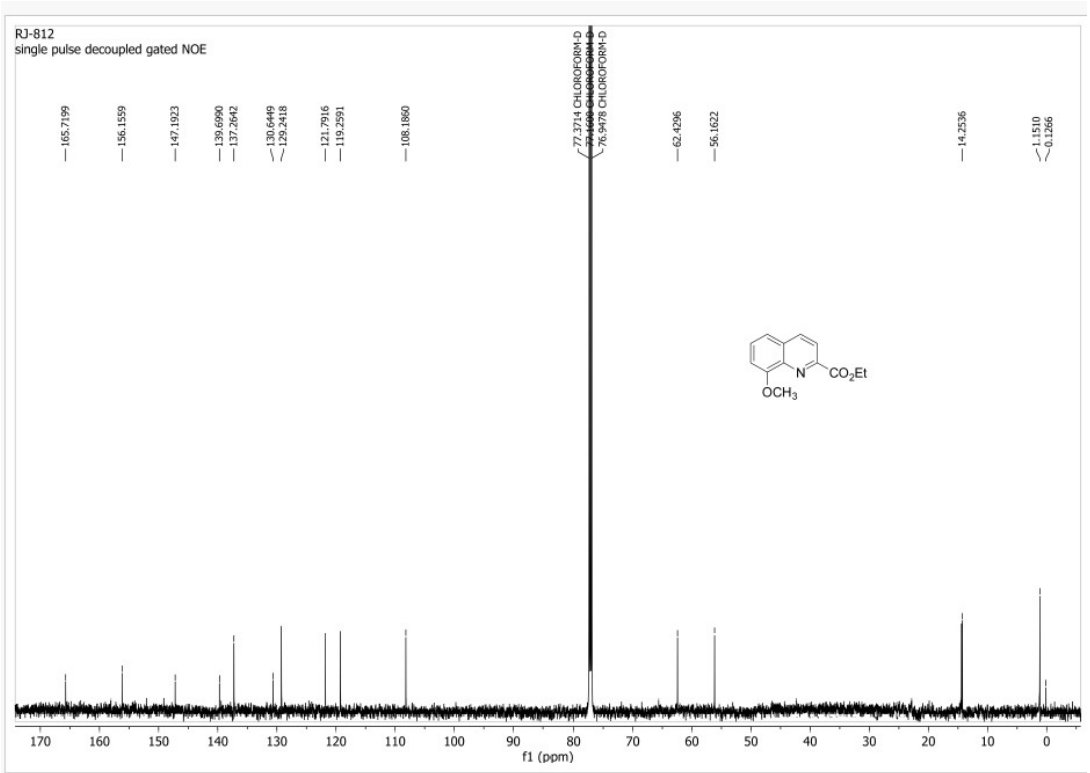


Figure S24. ^{13}C-NMR spectrum of **1L** in $CDCl_3$.

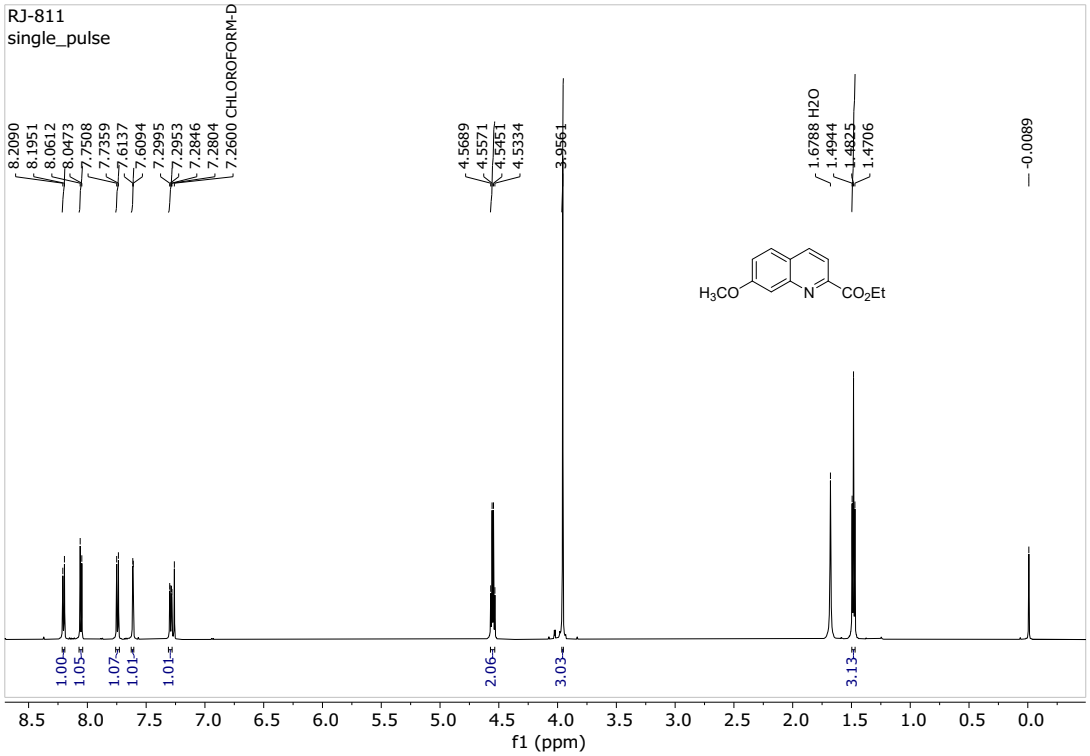


Figure S25. ^{1}H-NMR spectrum of **1M** in $CDCl_3$.

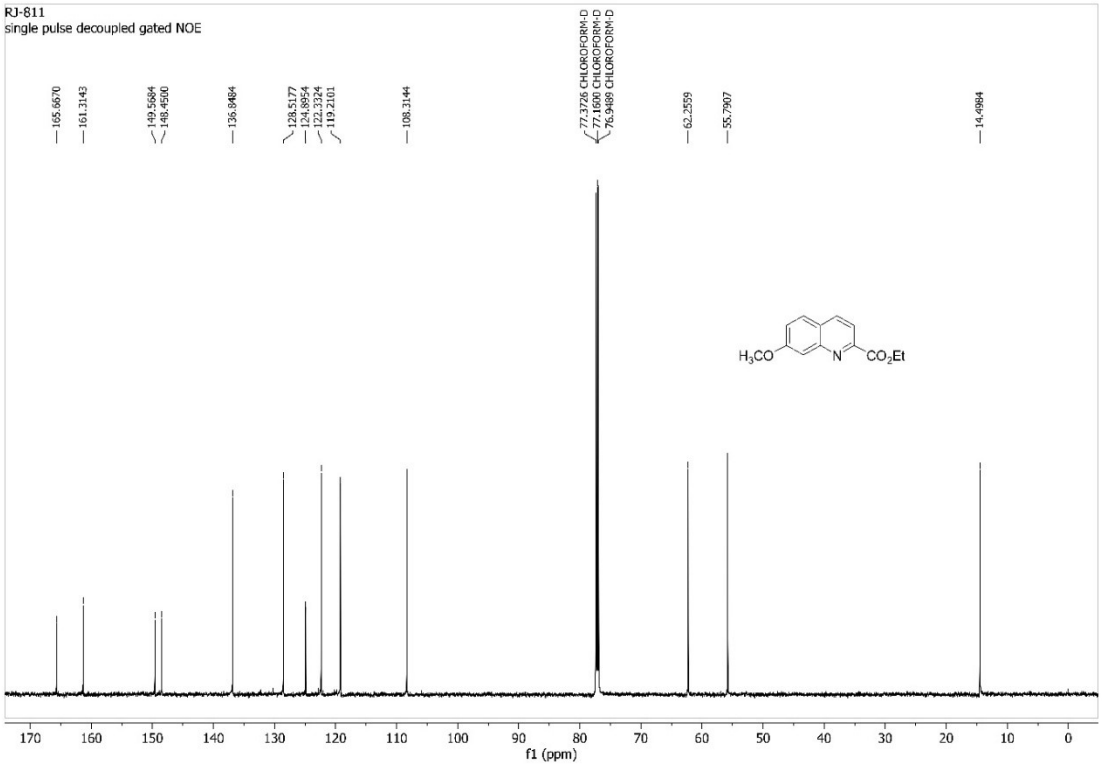


Figure S26. ^{13}C-NMR spectrum of **1M** in $CDCl_3$.

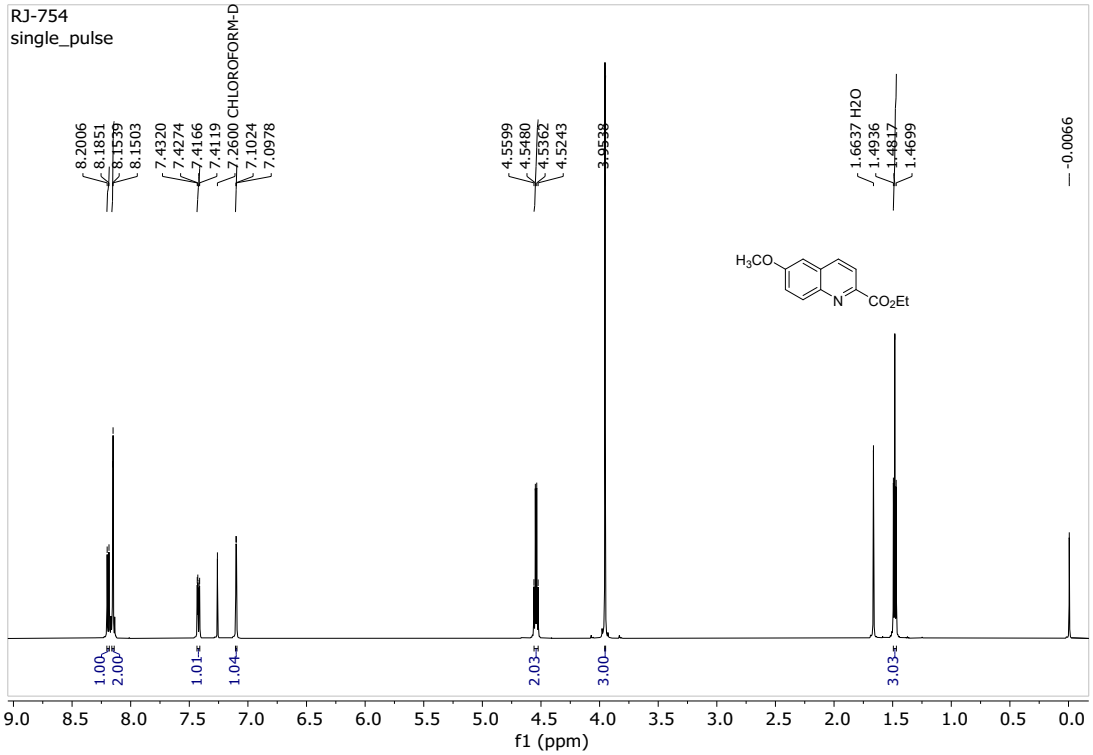


Figure S27. ^{1}H-NMR spectrum of **1N** in $CDCl_3$.

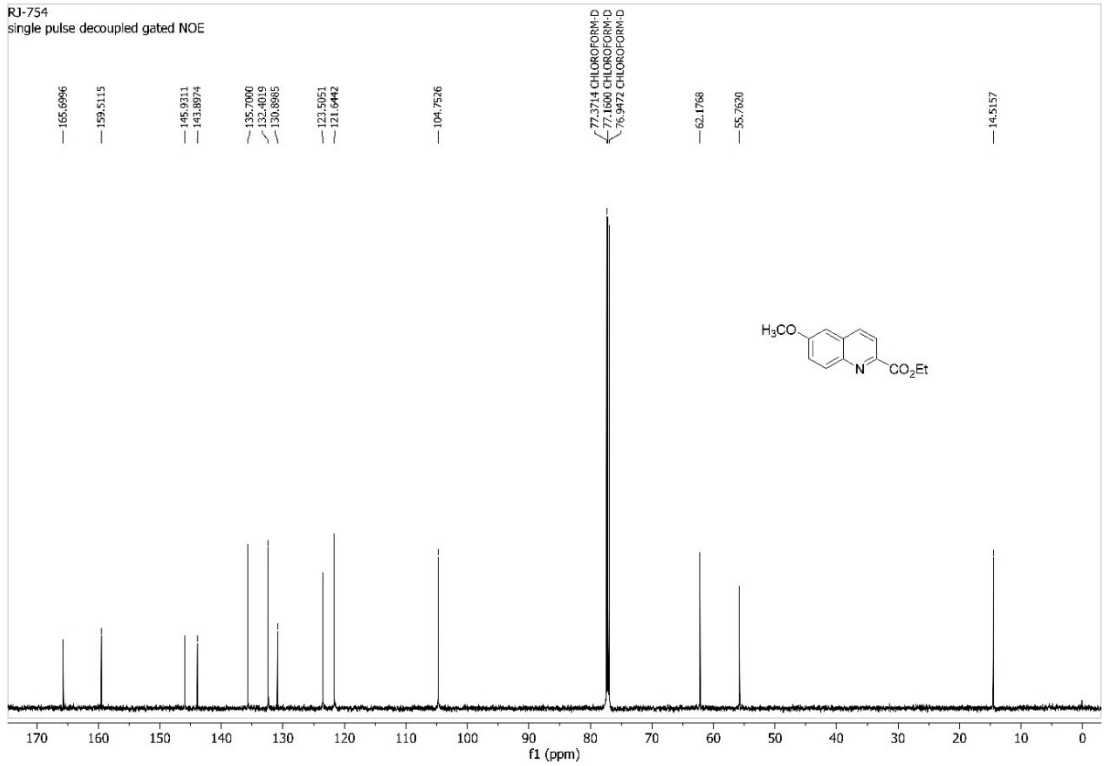


Figure S28. ^{13}C-NMR spectrum of **1N** in $CDCl_3$.

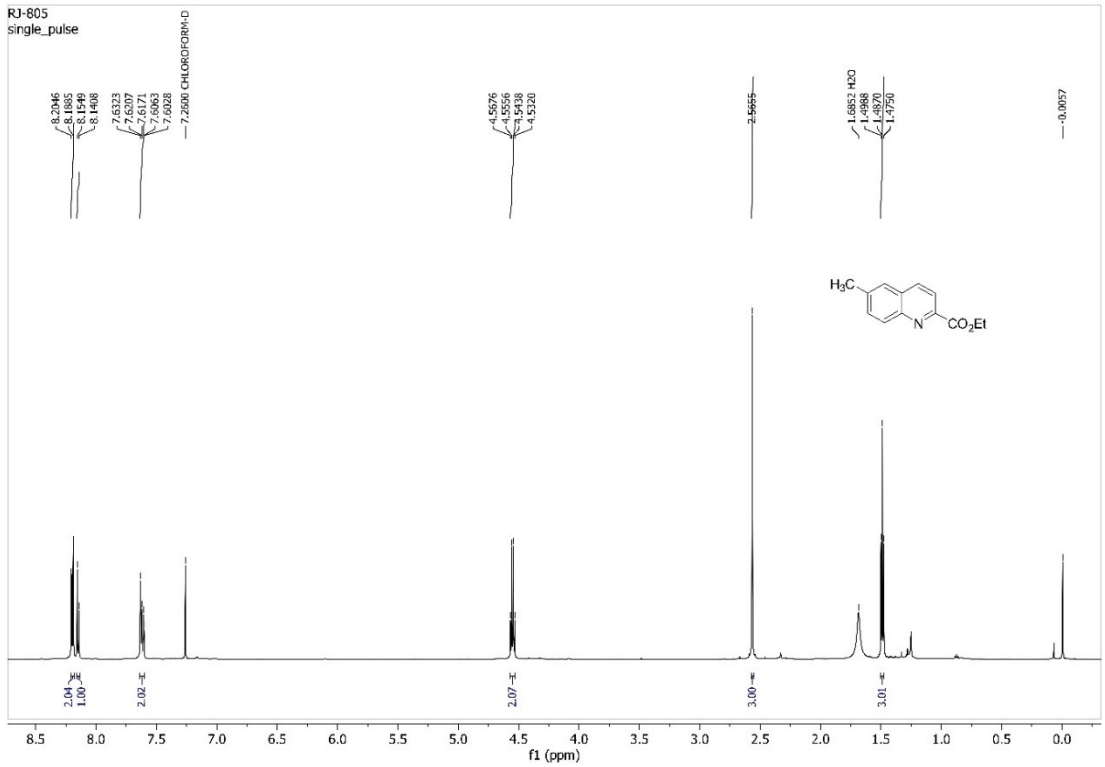


Figure S29. ^{1}H-NMR spectrum of **1O** in $CDCl_3$.

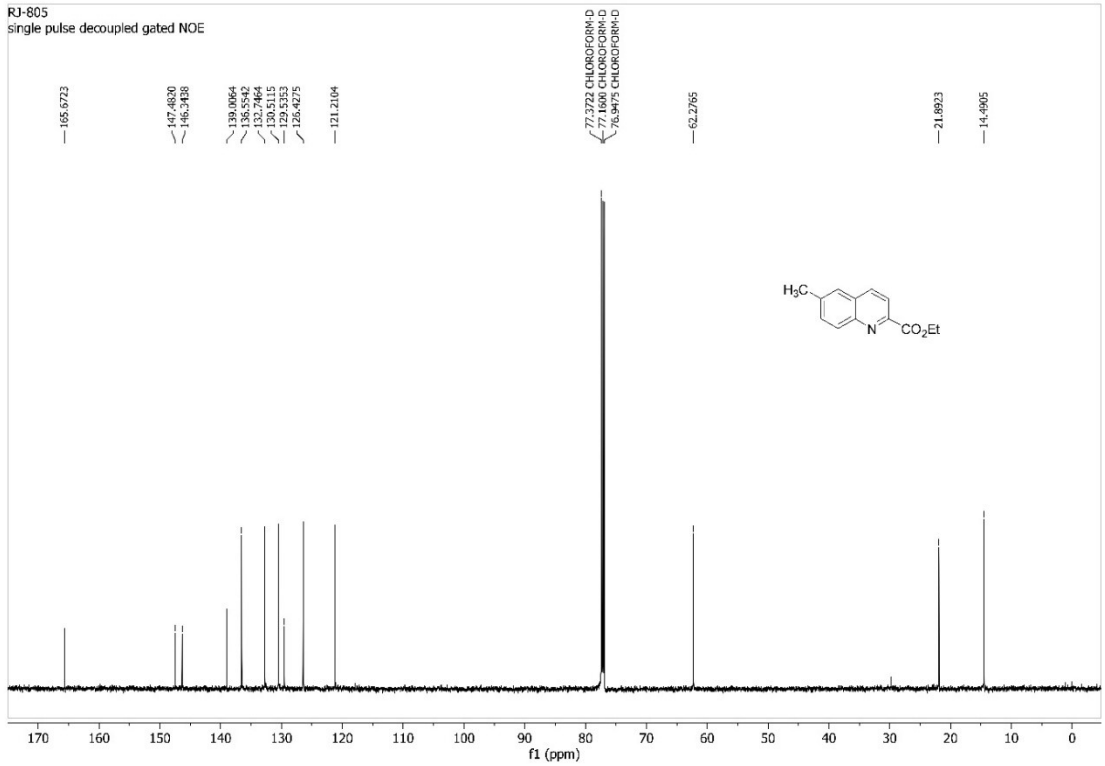


Figure S30. ^{13}C-NMR spectrum of **1O** in $CDCl_3$.

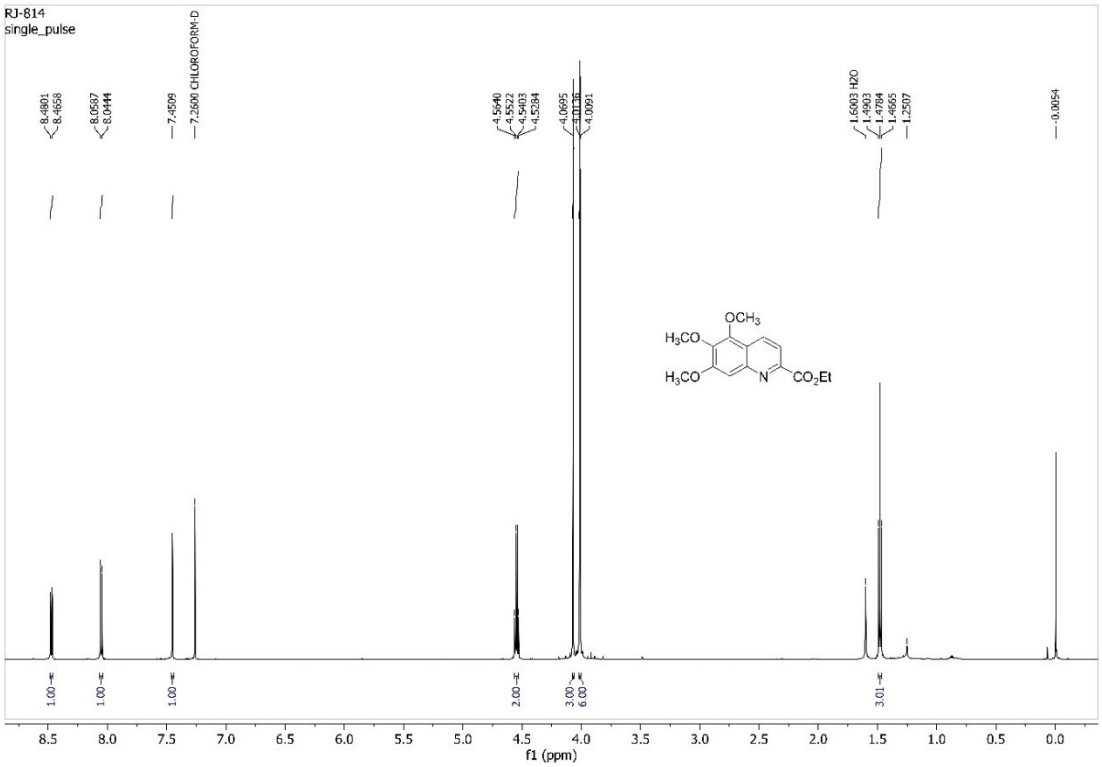


Figure S31. ^{1}H-NMR spectrum of **1P** in $CDCl_3$.

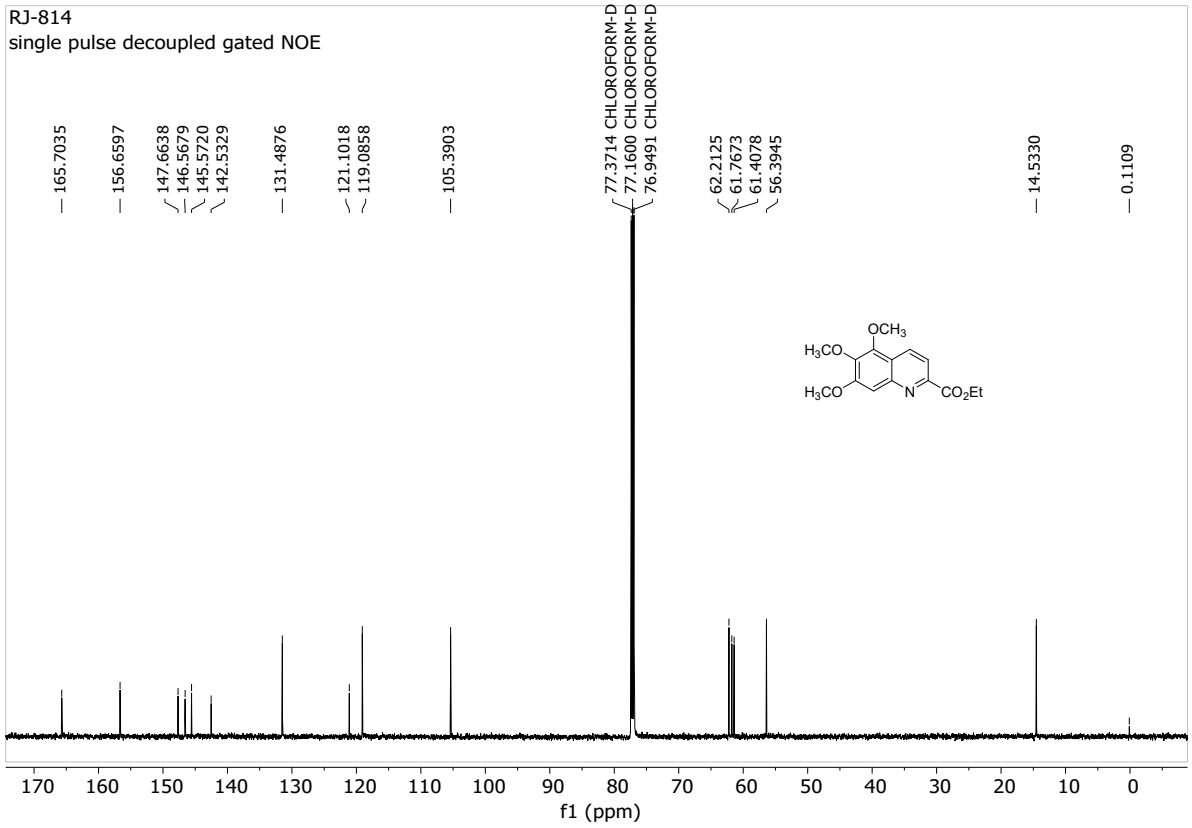


Figure S32. ^{13}C-NMR spectrum of **1P** in $CDCl_3$.

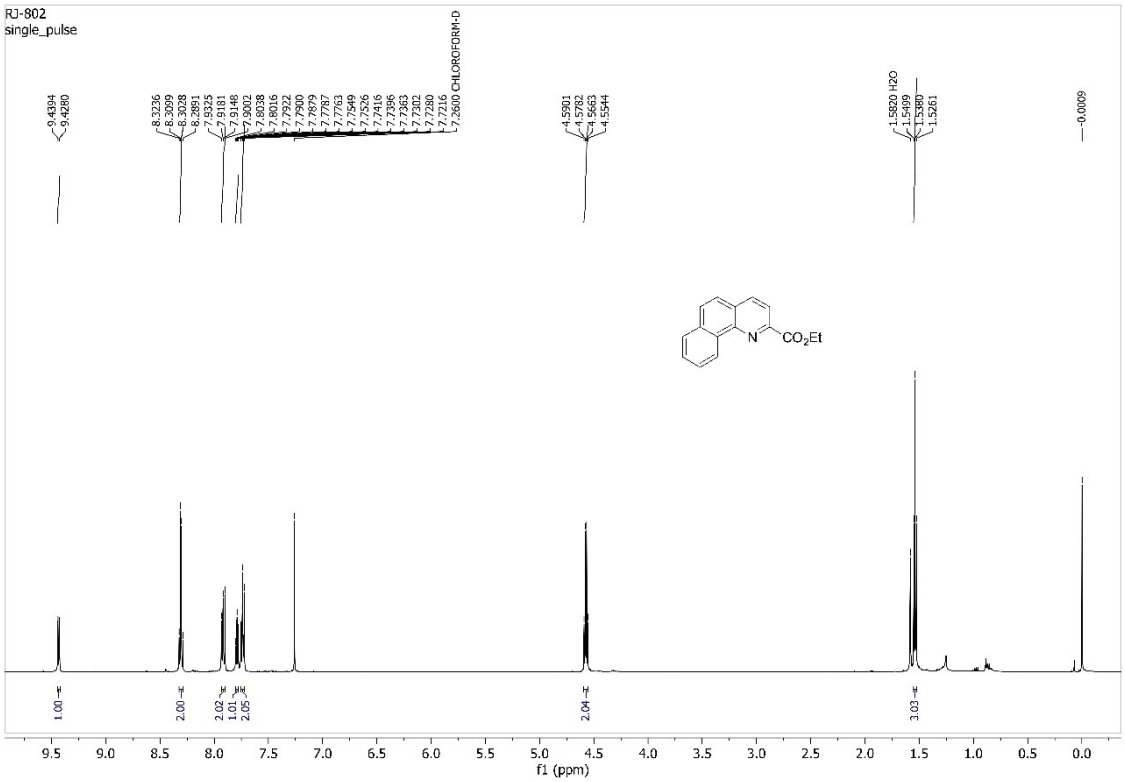


Figure S33. ^{1}H-NMR spectrum of **1Q** in $CDCl_3$.

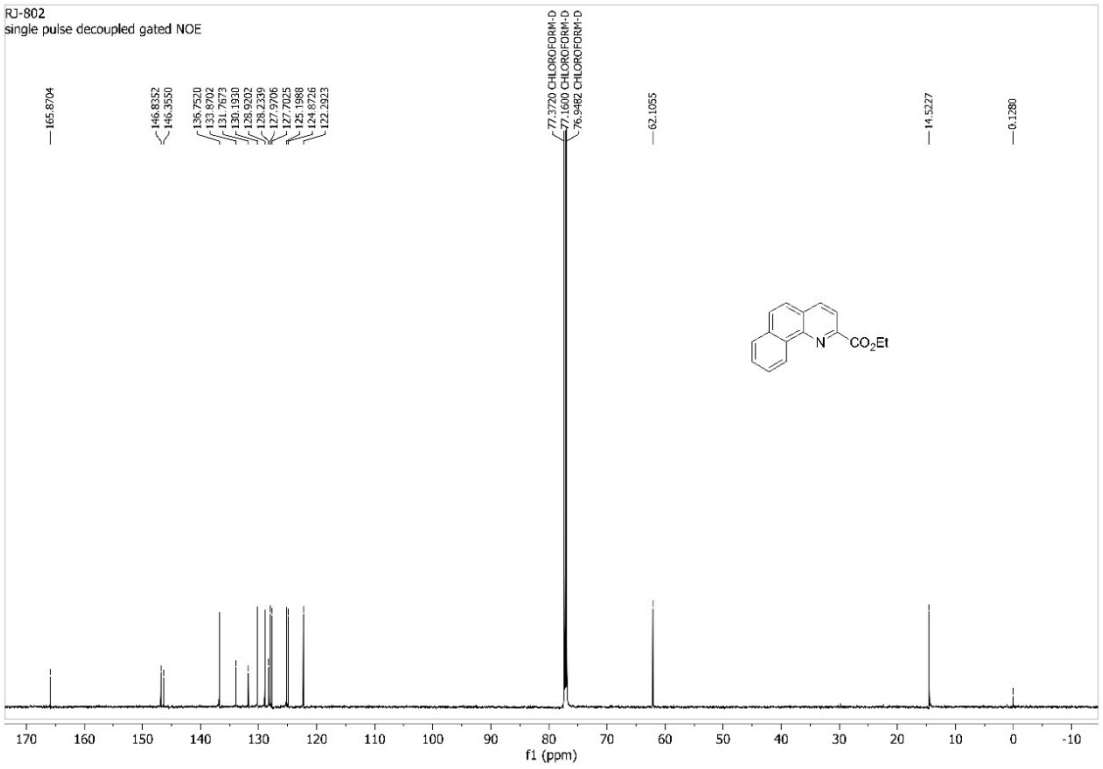


Figure S34. ^{13}C-NMR spectrum of **1Q** in $CDCl_3$.

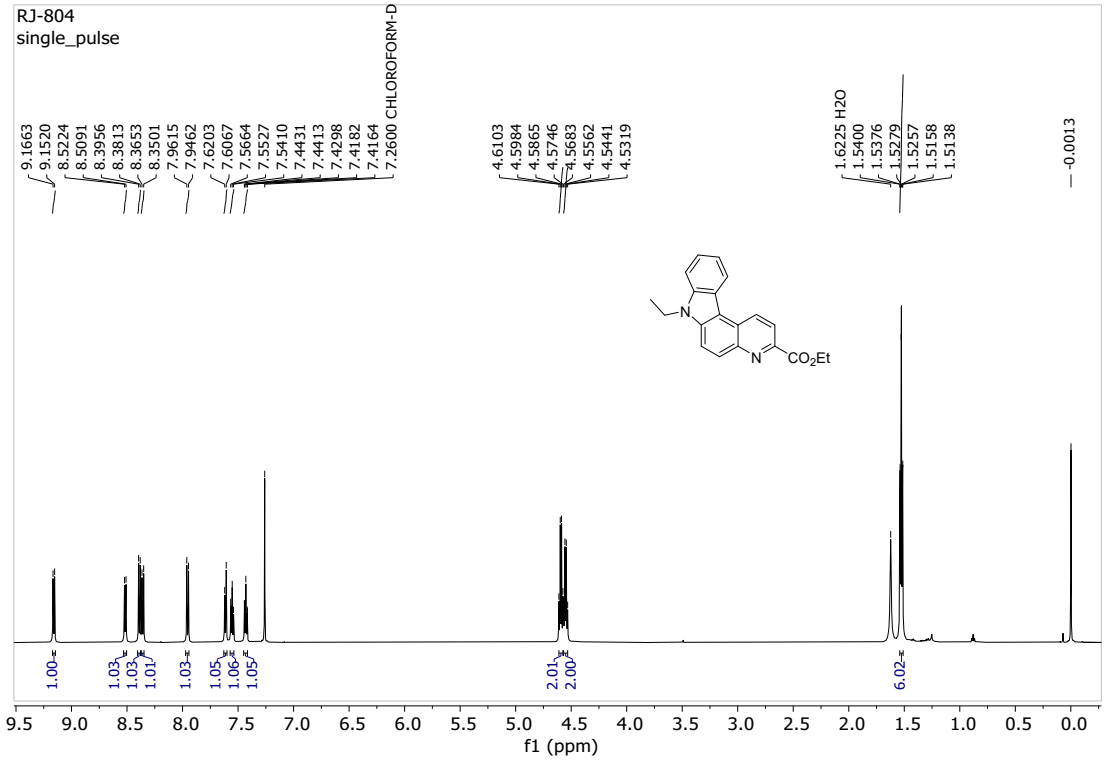


Figure S35. ^{1}H-NMR spectrum of **1R** in $CDCl_3$.

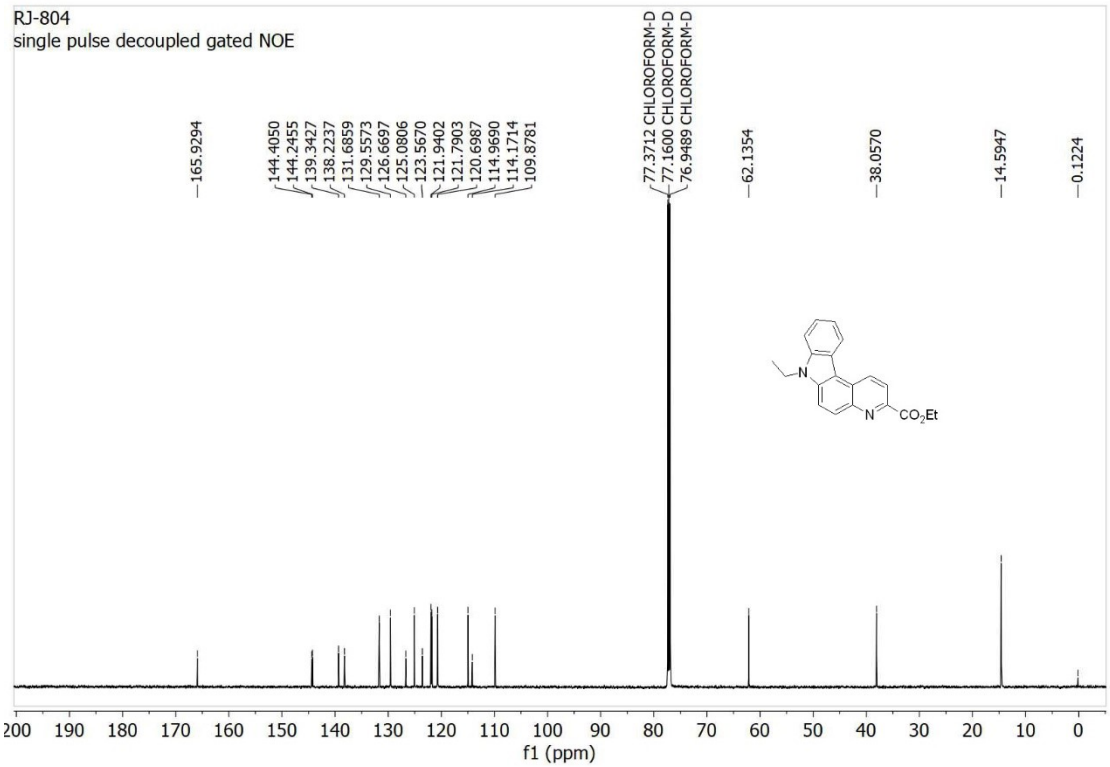


Figure S36. ^{13}C-NMR spectrum of **1R** in $CDCl_3$.

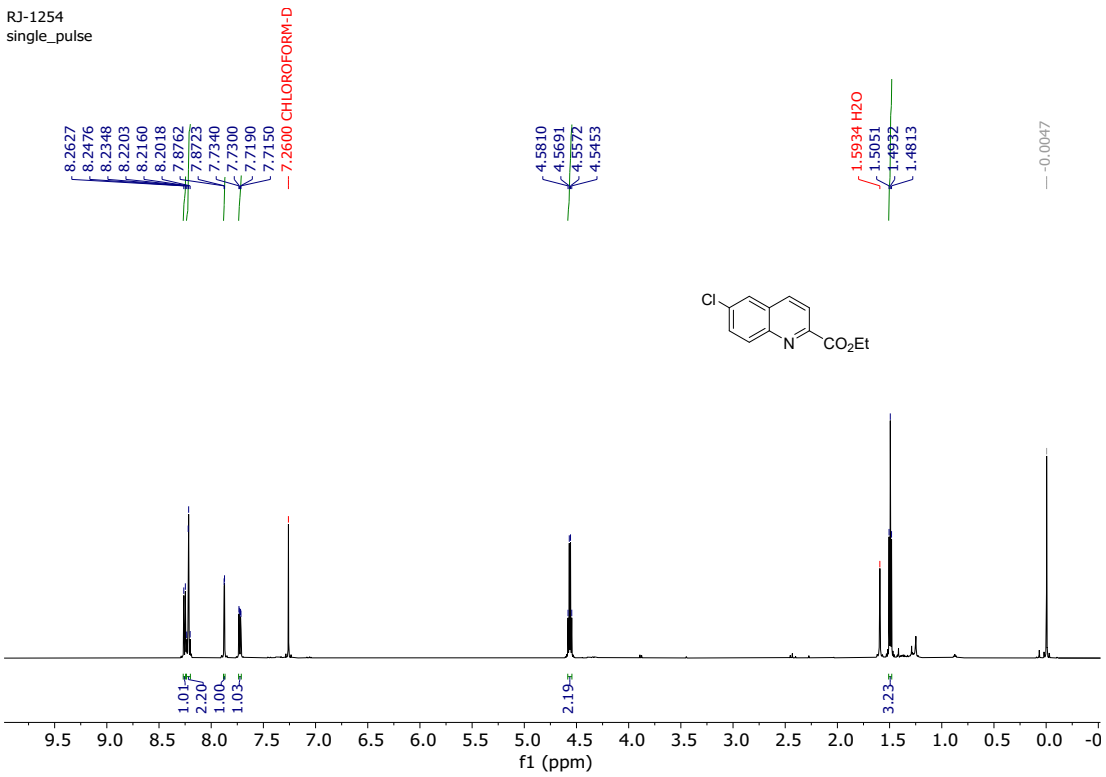


Figure S37. ^{1}H-NMR spectrum of **1S** in $CDCl_3$.

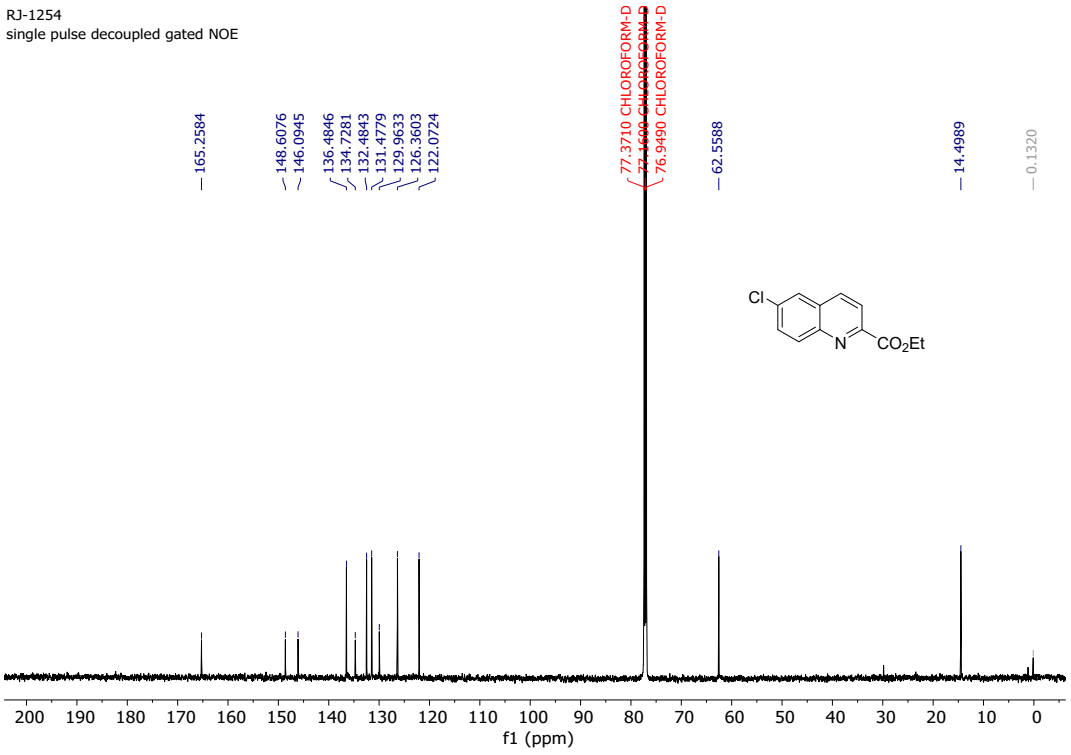


Figure S38. ^{13}C-NMR spectrum of **1S** in $CDCl_3$.

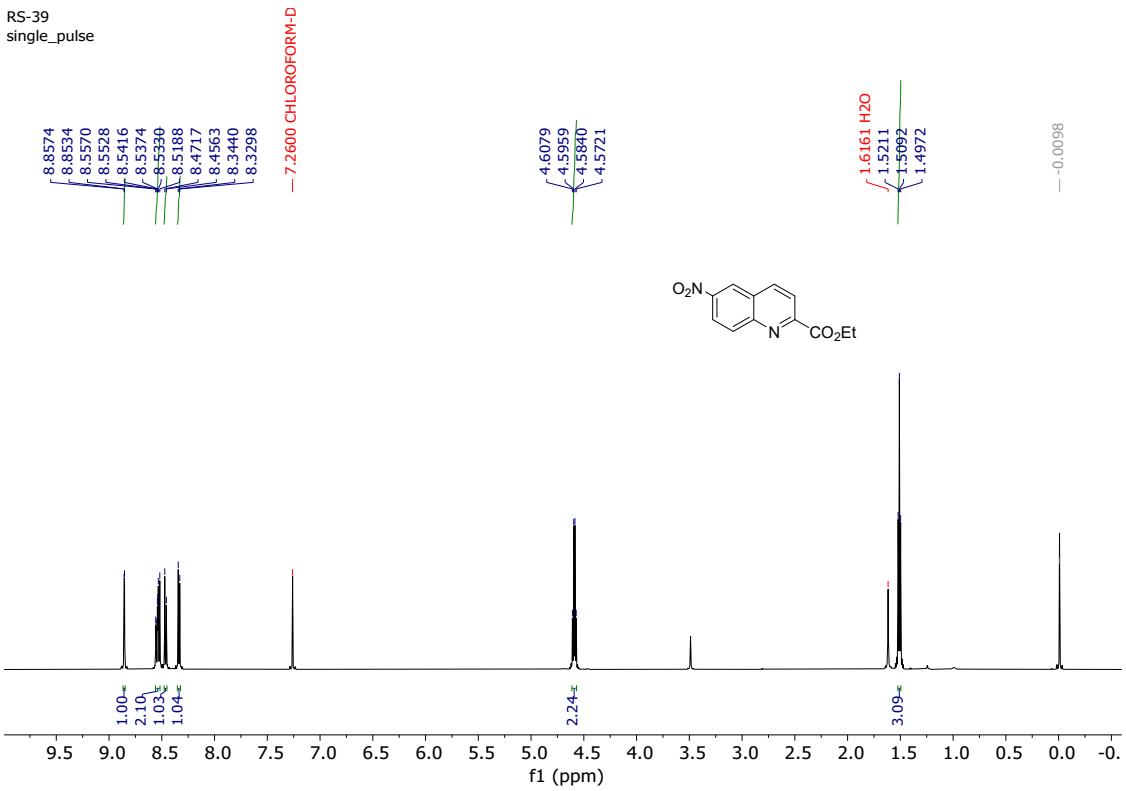


Figure S39. ^{1}H-NMR spectrum of **1T** in $CDCl_3$.

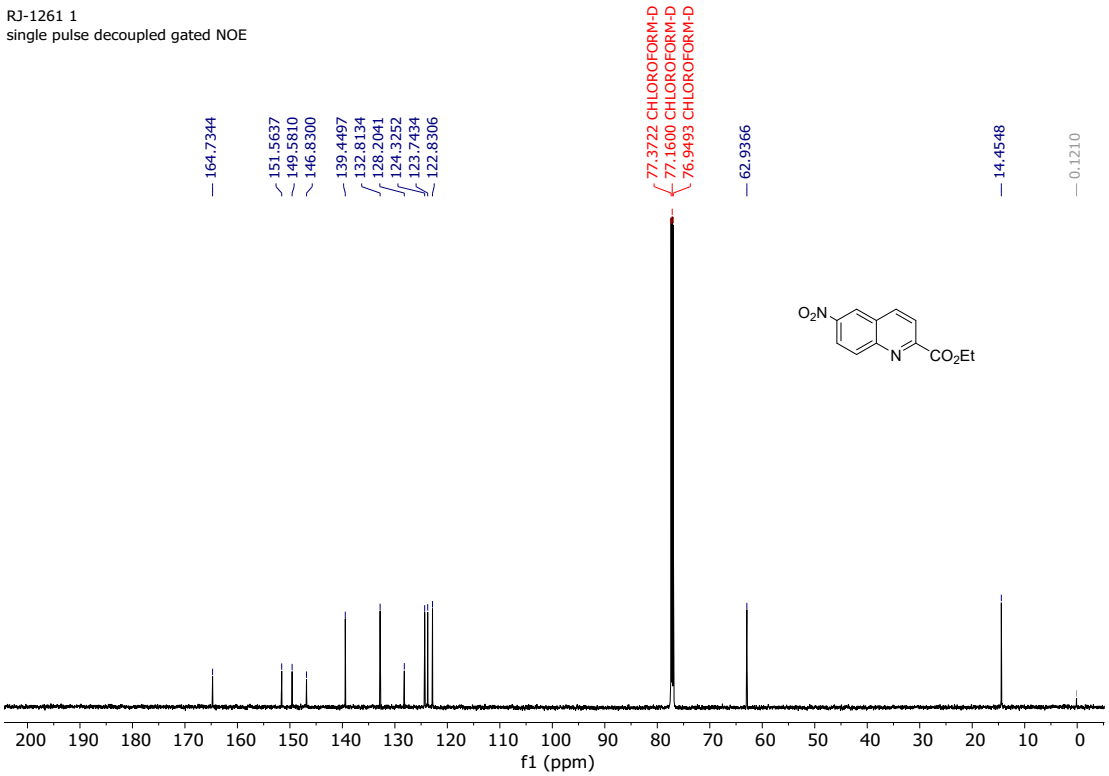


Figure S40. ^{13}C-NMR spectrum of **1T** in $CDCl_3$.

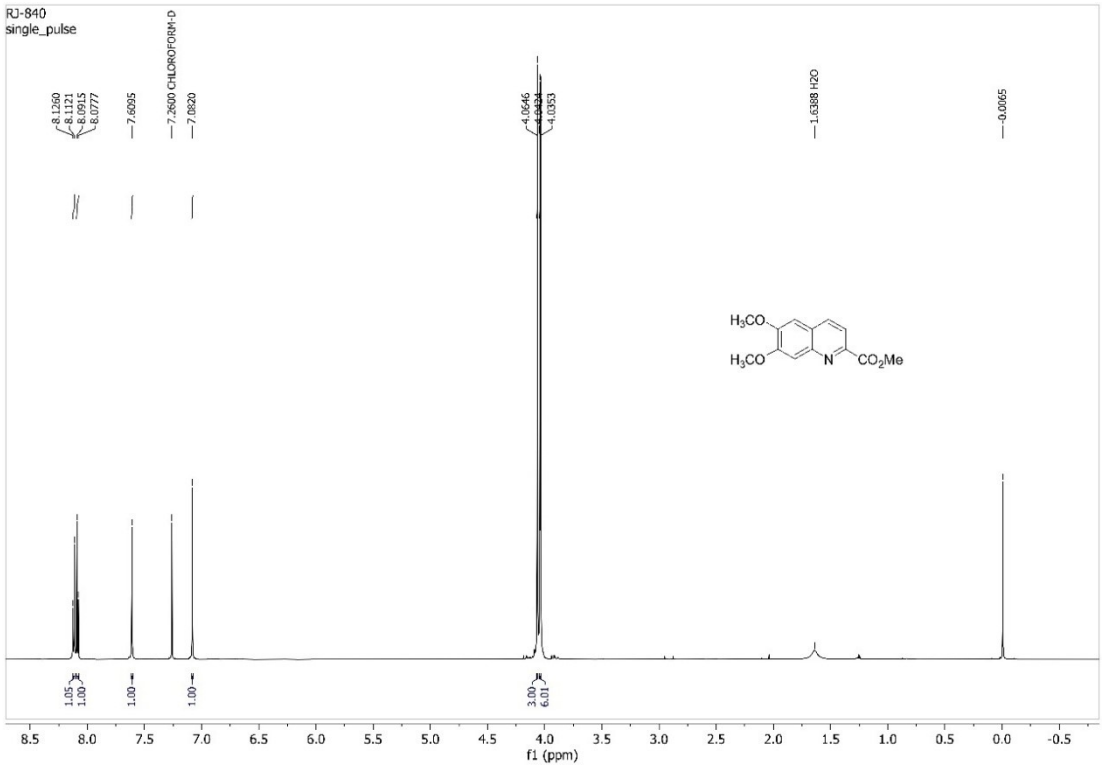


Figure S41. ^{1}H-NMR spectrum of **2B** in $CDCl_3$.

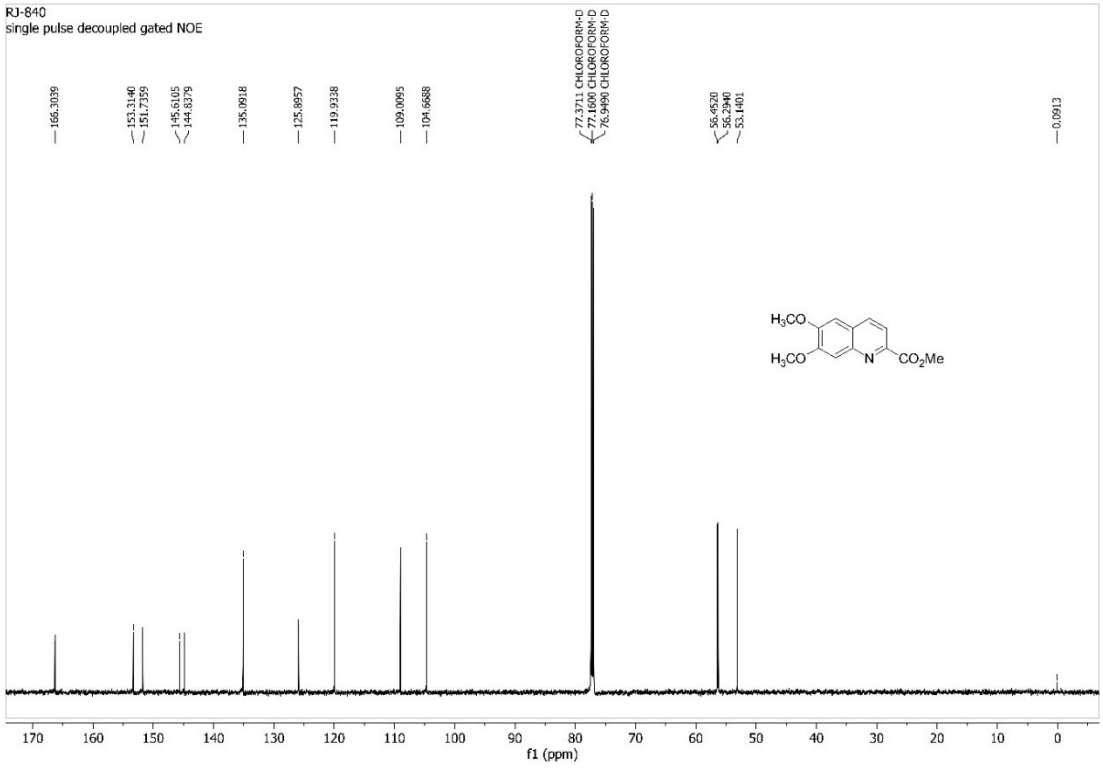


Figure S42. ^{13}C-NMR spectrum of **2B** in $CDCl_3$.

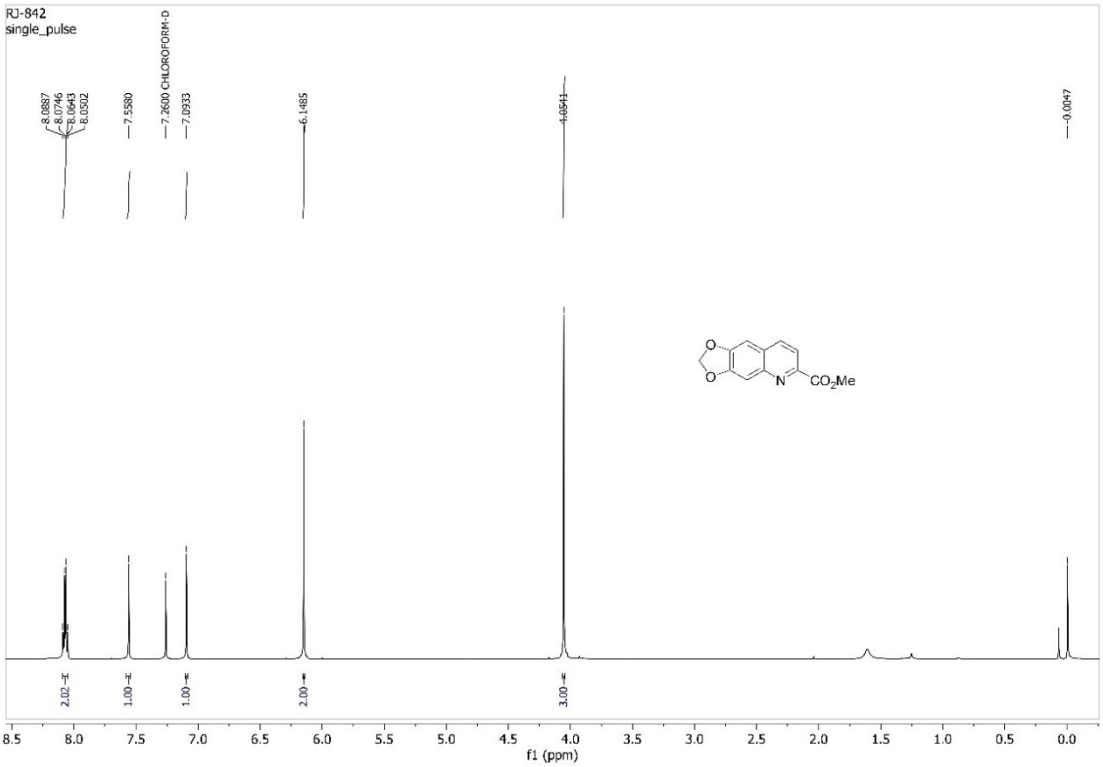


Figure S43. ^{1}H-NMR spectrum of **2C** in $CDCl_3$.

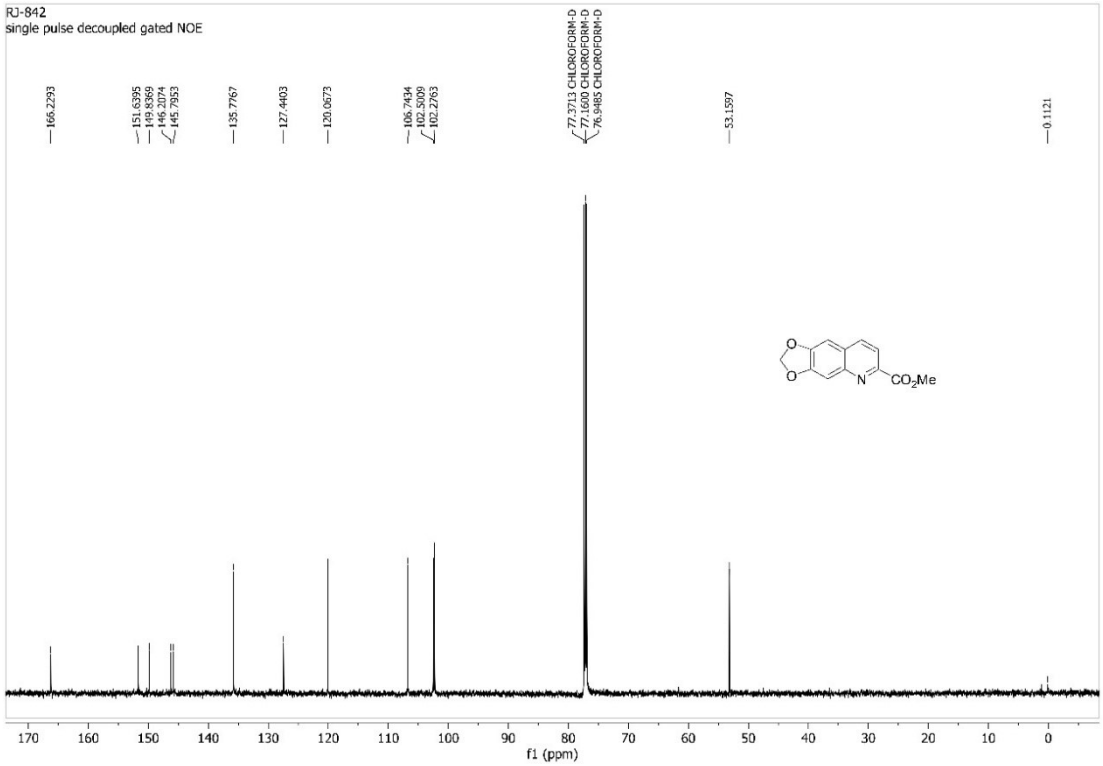


Figure S44. ^{13}C-NMR spectrum of **2C** in $CDCl_3$.

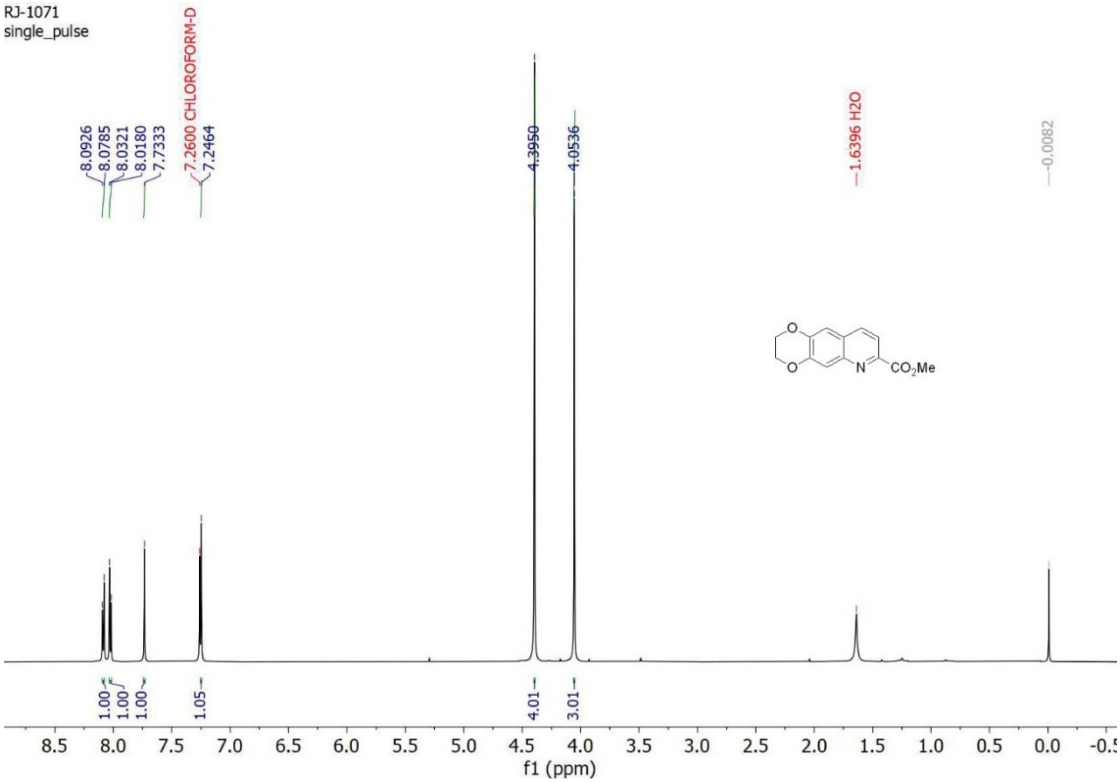


Figure S45. ^{1}H-NMR spectrum of **2D** in $CDCl_3$.

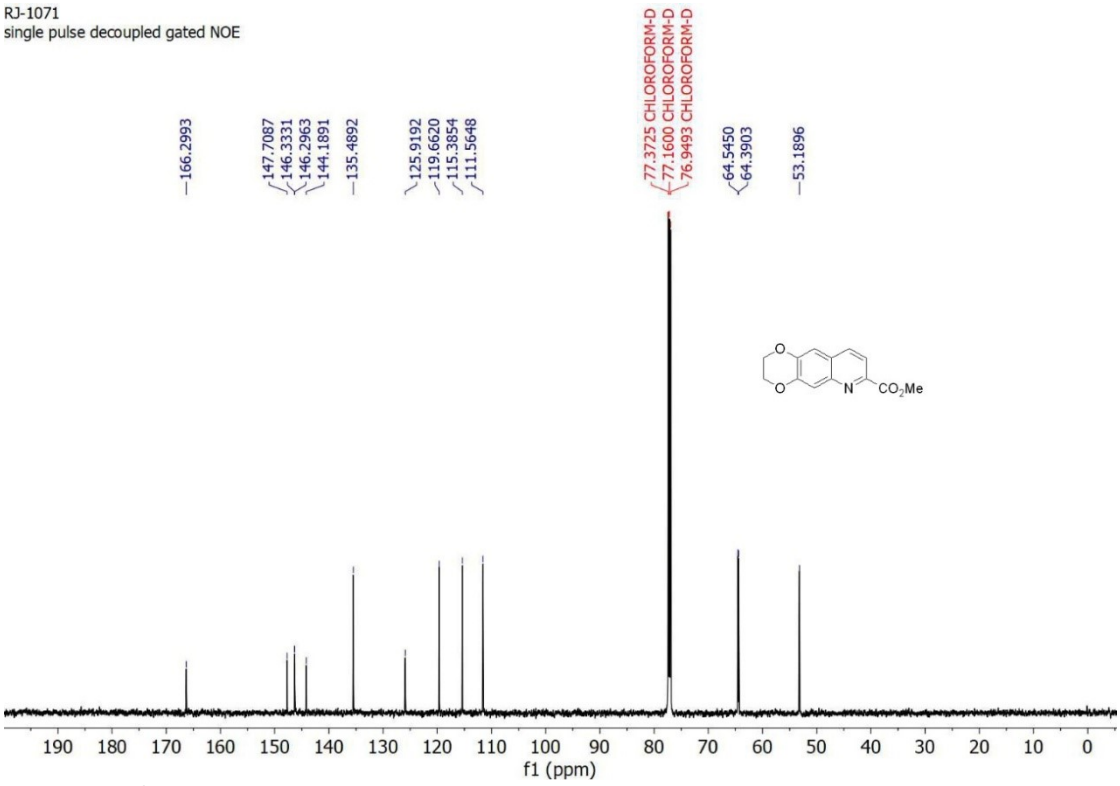


Figure S46. ^{13}C-NMR spectrum of **2D** in $CDCl_3$.

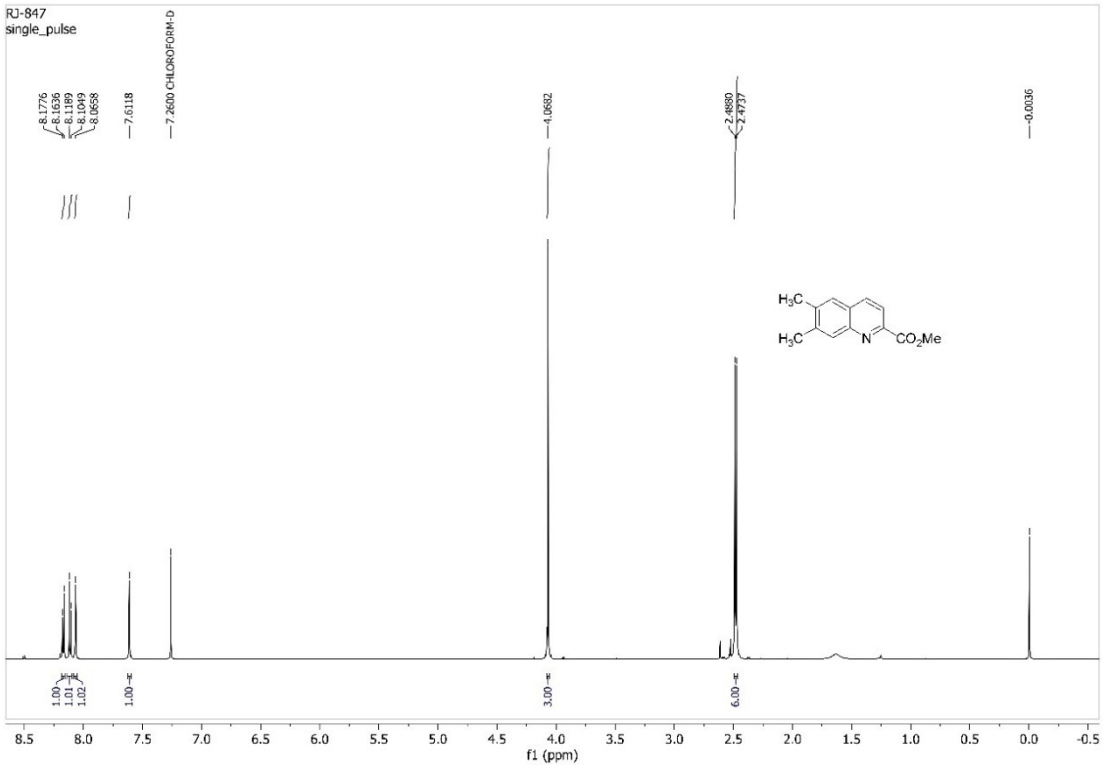


Figure S47. ^{1}H-NMR spectrum of **2E** in $CDCl_3$.

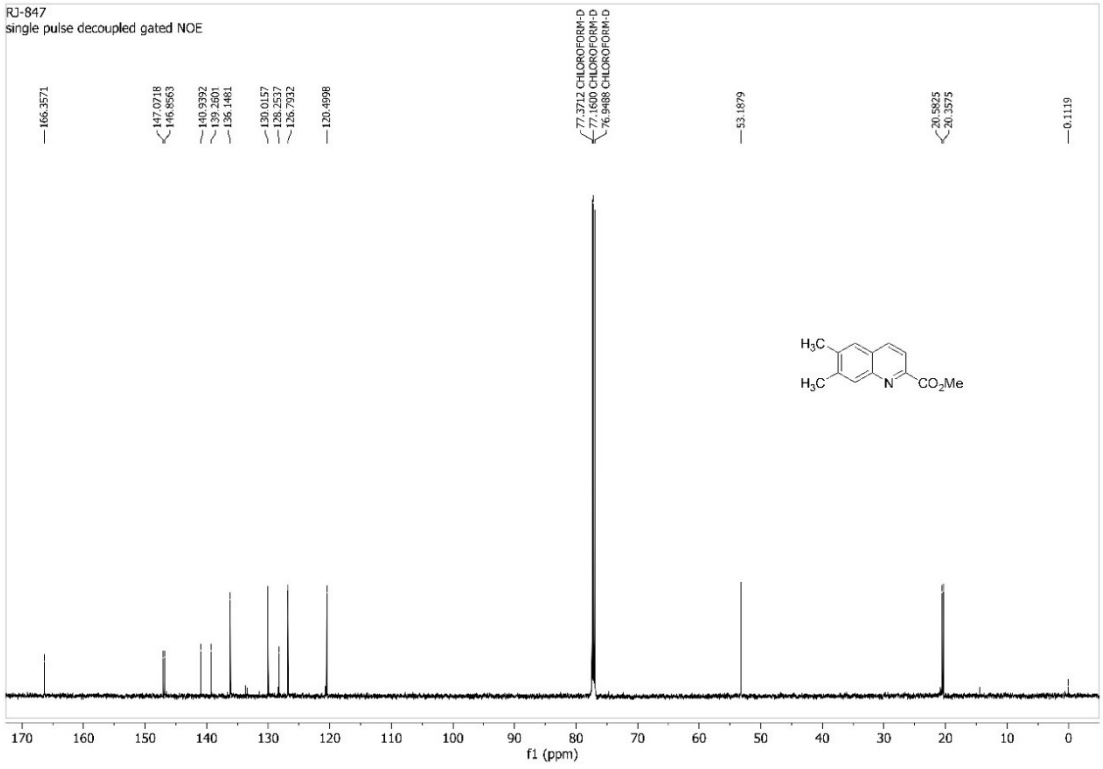


Figure S48. ^{13}C-NMR spectrum of **2E** in $CDCl_3$.

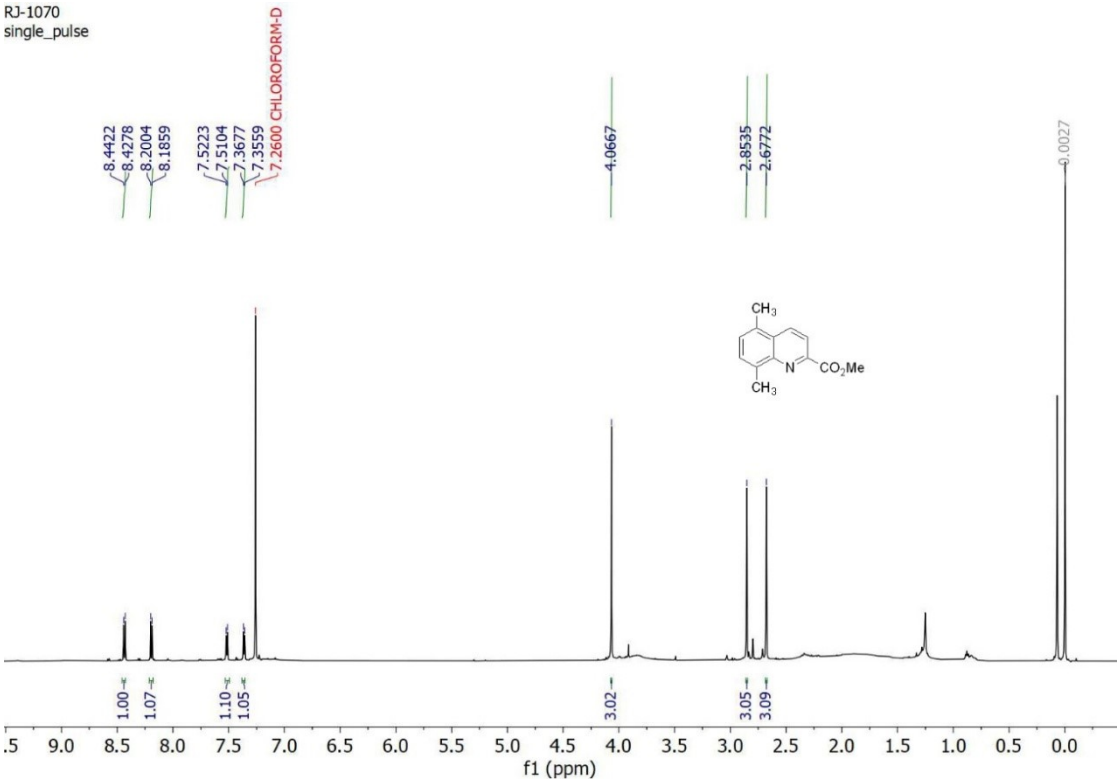


Figure S49. ^{1}H-NMR spectrum of **2K** in $CDCl_3$.

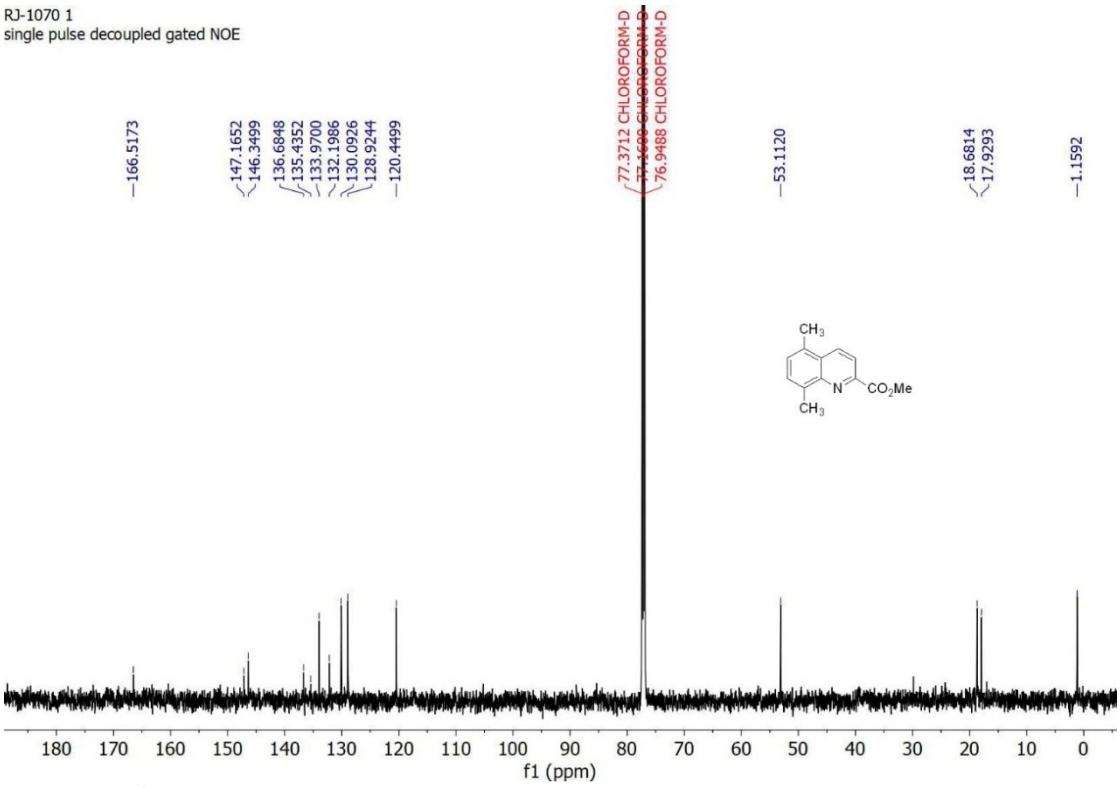


Figure S50. ^{13}C-NMR spectrum of **2K** in $CDCl_3$.

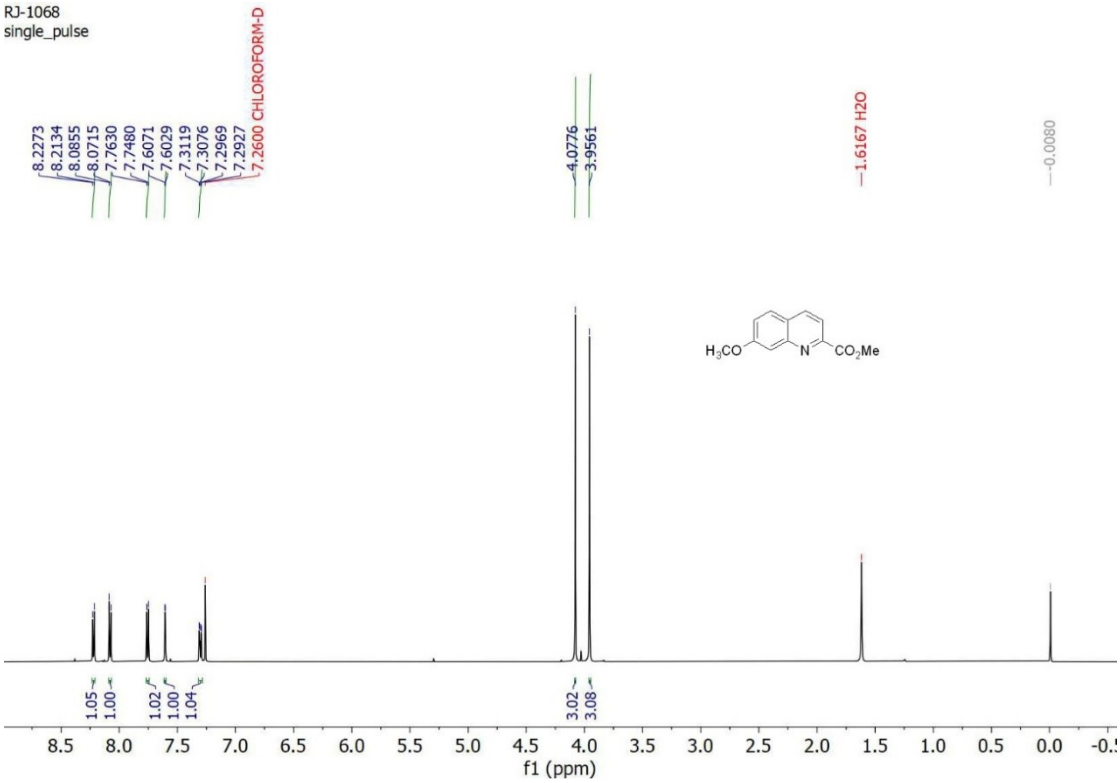


Figure S51. ^{1}H-NMR spectrum of **2M** in $CDCl_3$.

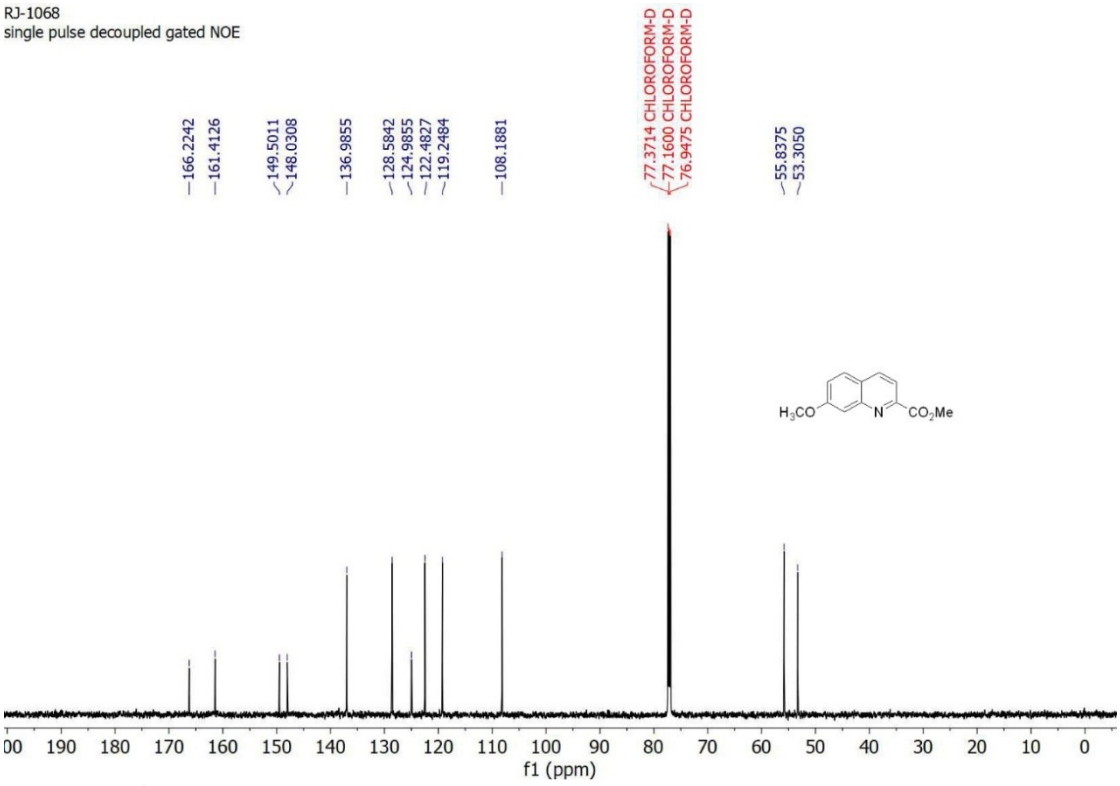


Figure S52. ^{13}C-NMR spectrum of **2M** in $CDCl_3$.

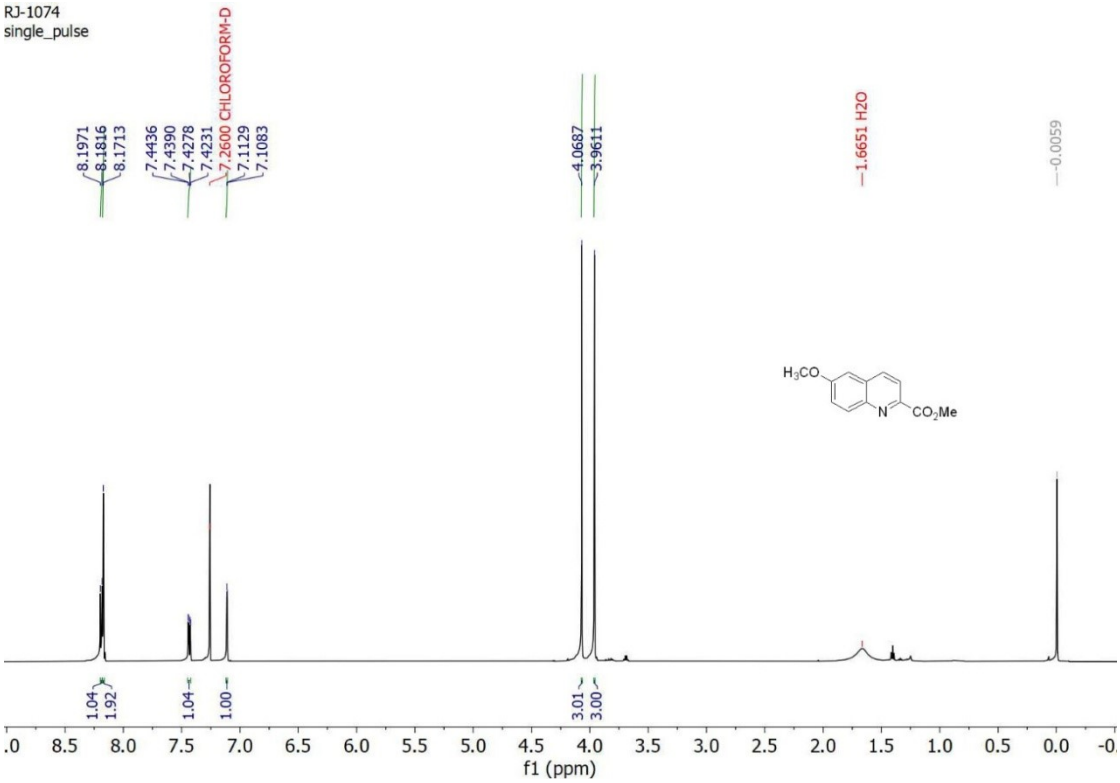


Figure S53. ^{1}H-NMR spectrum of **2N** in $CDCl_3$.

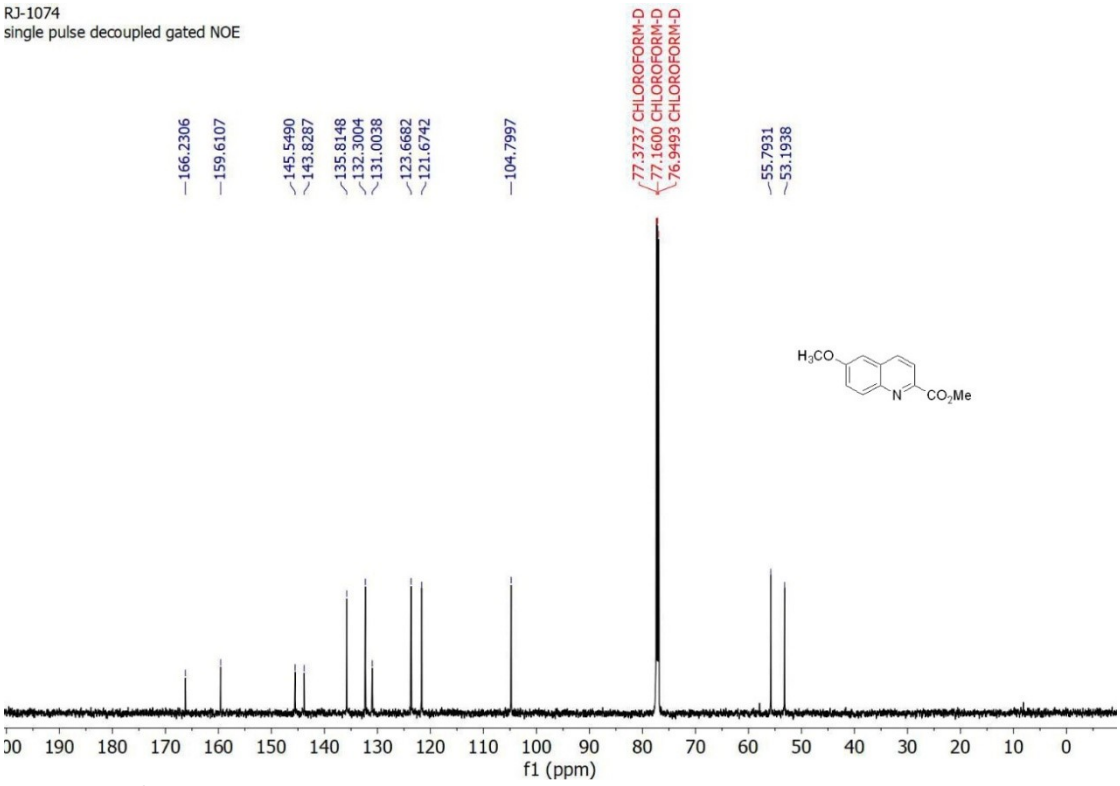


Figure S54. ^{13}C-NMR spectrum of **2N** in $CDCl_3$.

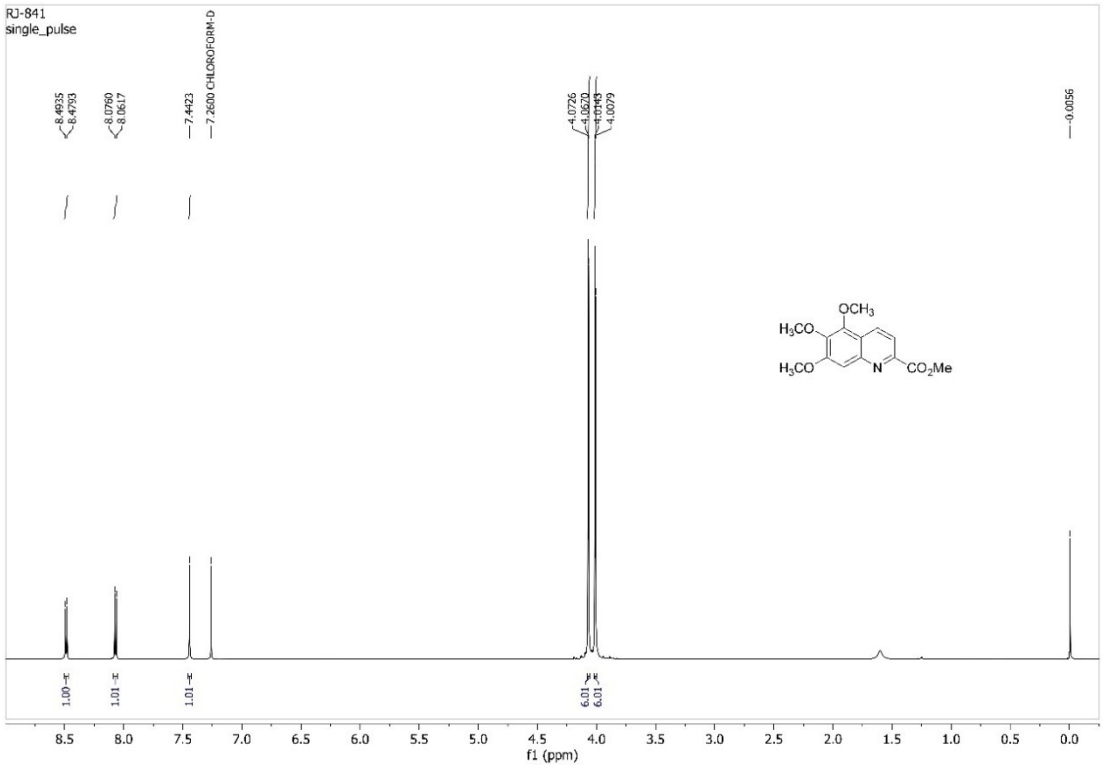


Figure S55. ^{1}H-NMR spectrum of **2P** in $CDCl_3$.

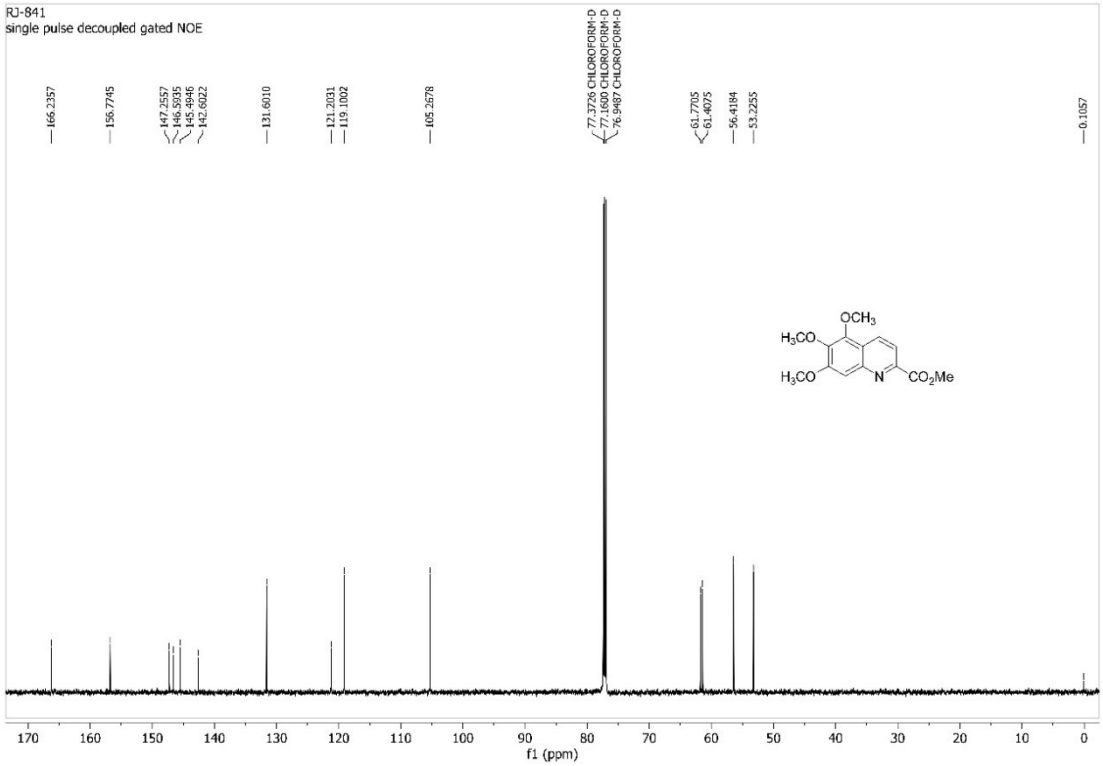


Figure S56. ^{13}C-NMR spectrum of **2P** in $CDCl_3$.

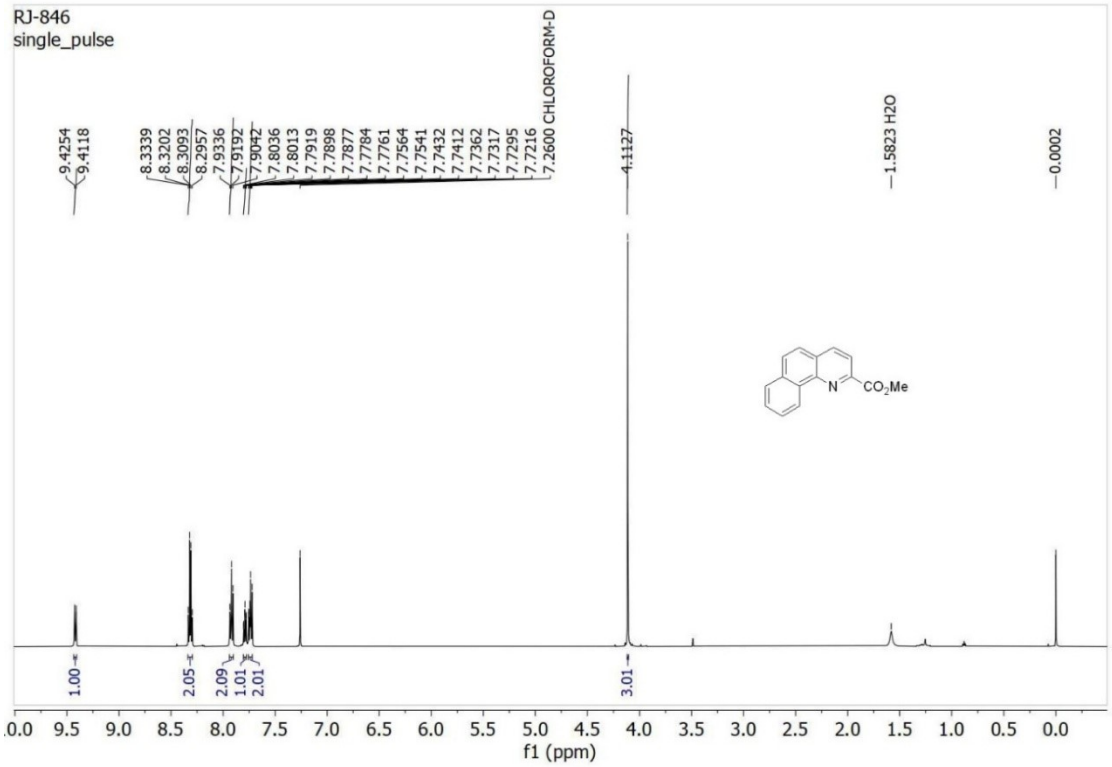


Figure S57. ^{1}H-NMR spectrum of **2Q** in $CDCl_3$.

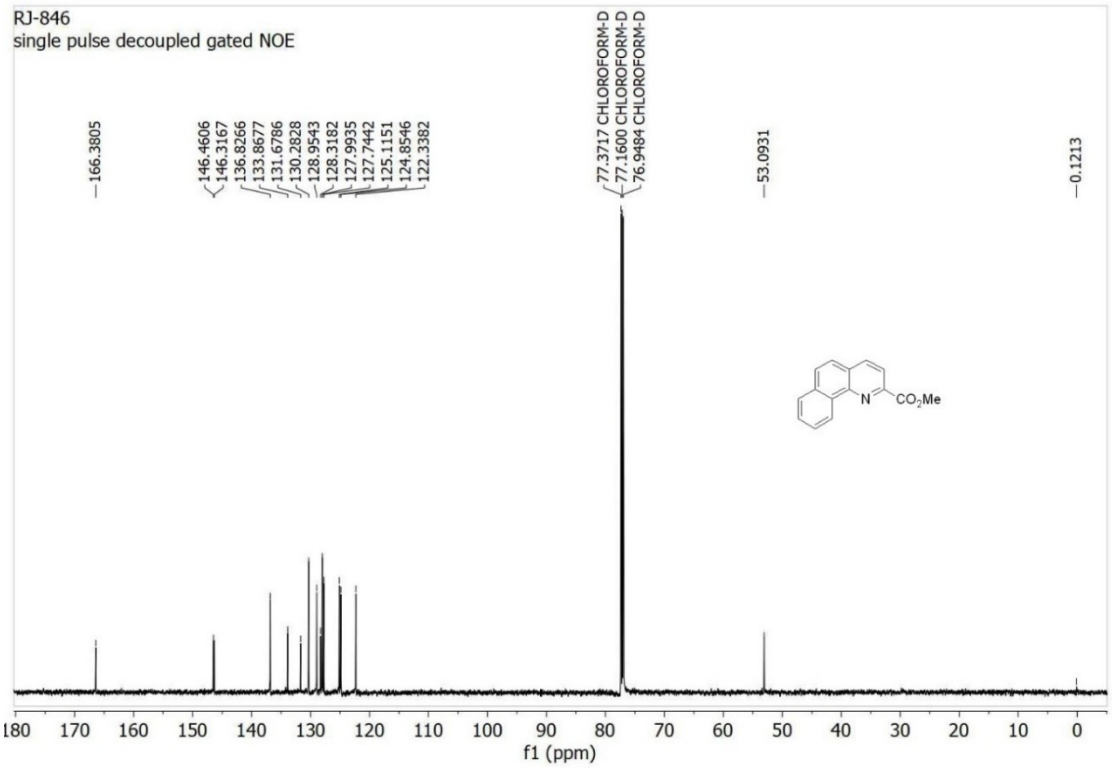


Figure S58. ^{13}C-NMR spectrum of **2Q** in $CDCl_3$.

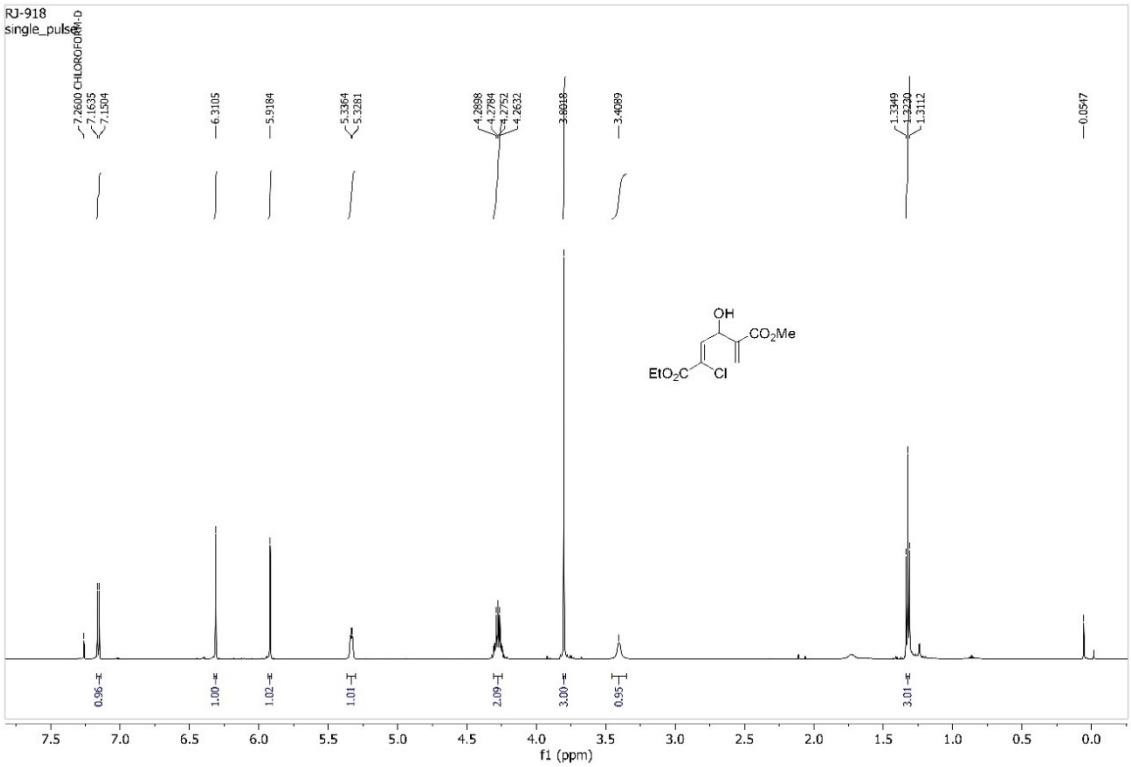


Figure S59. ^{1}H-NMR spectrum of **1U** in $CDCl_3$.

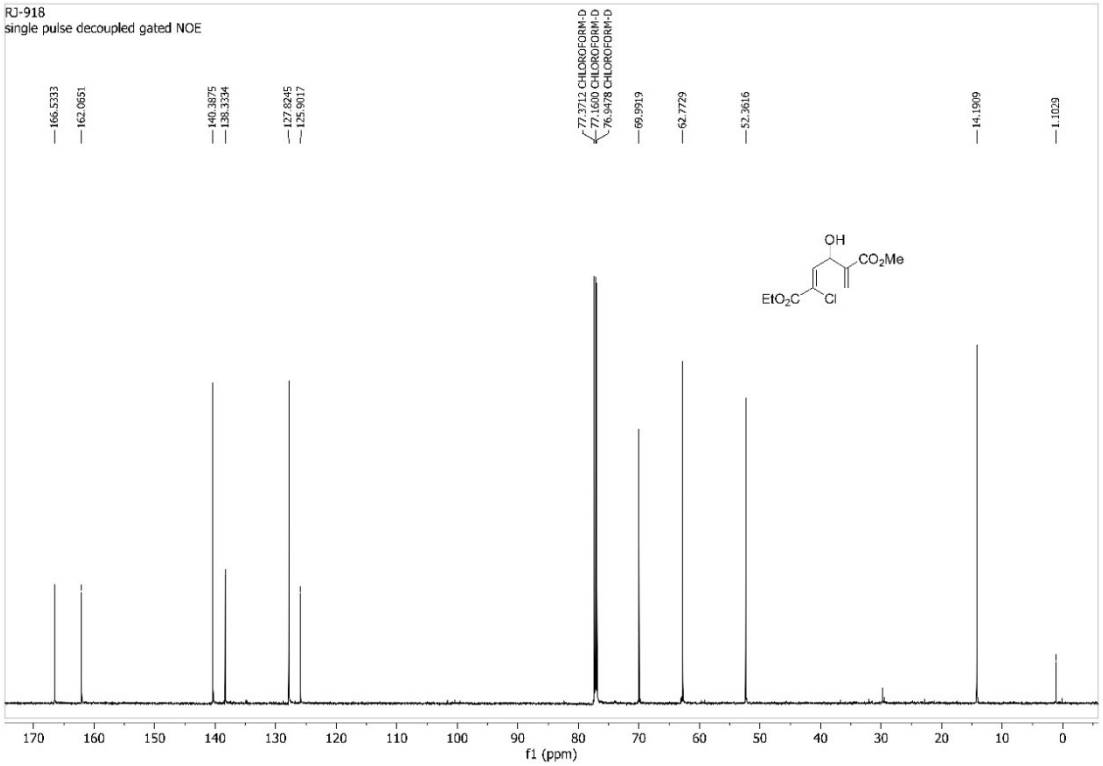
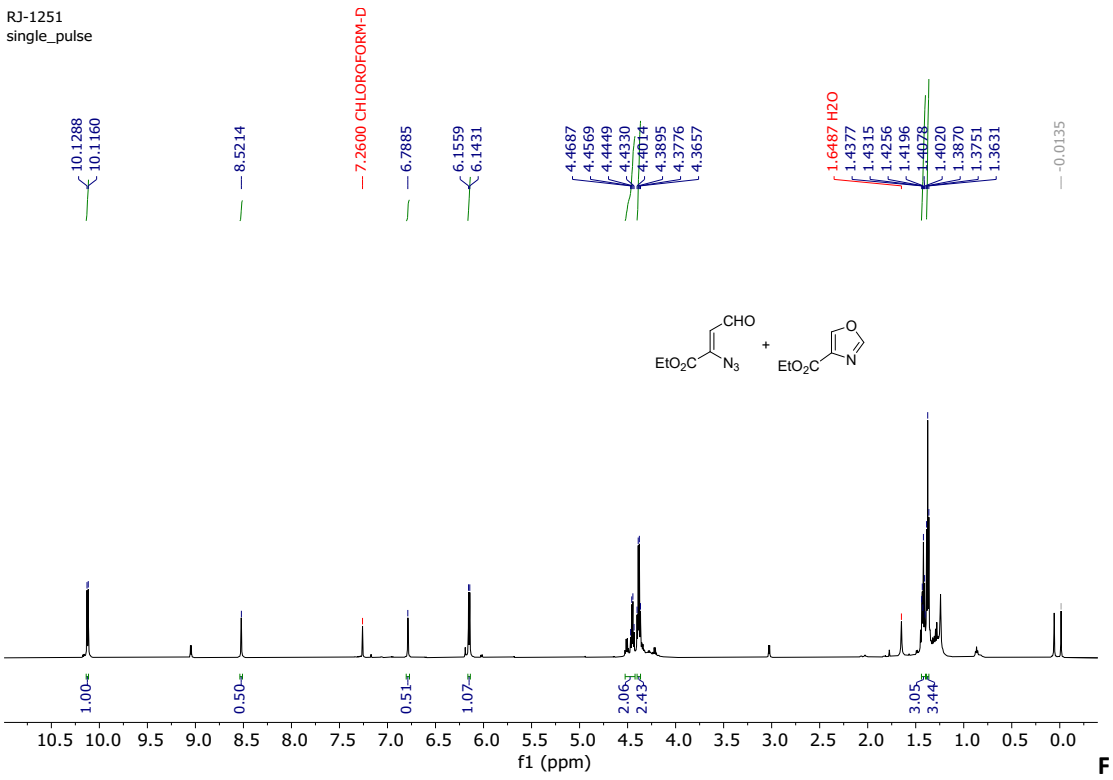
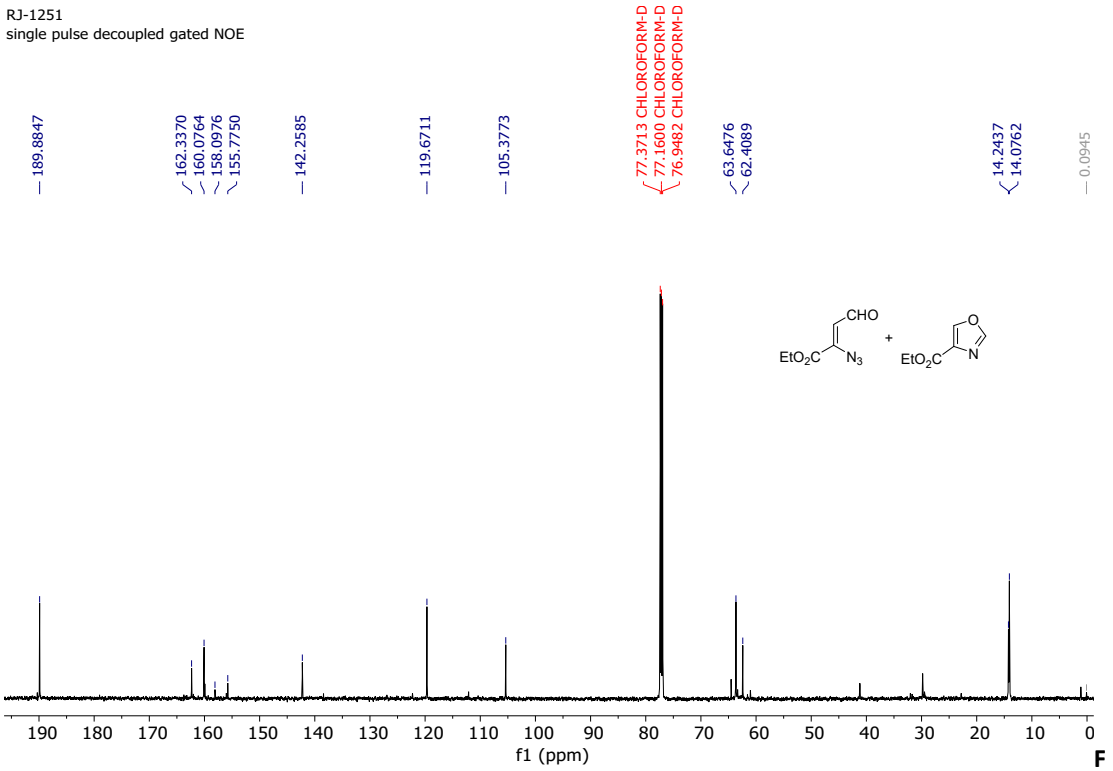


Figure S60. ^{13}C-NMR spectrum of **1U** in $CDCl_3$.



igure S61. ^{1}H-NMR spectrum of **1V-V'** in $CDCl_3$.



igure S62. ^{13}C-NMR spectrum of **1V-V'** in $CDCl_3$.

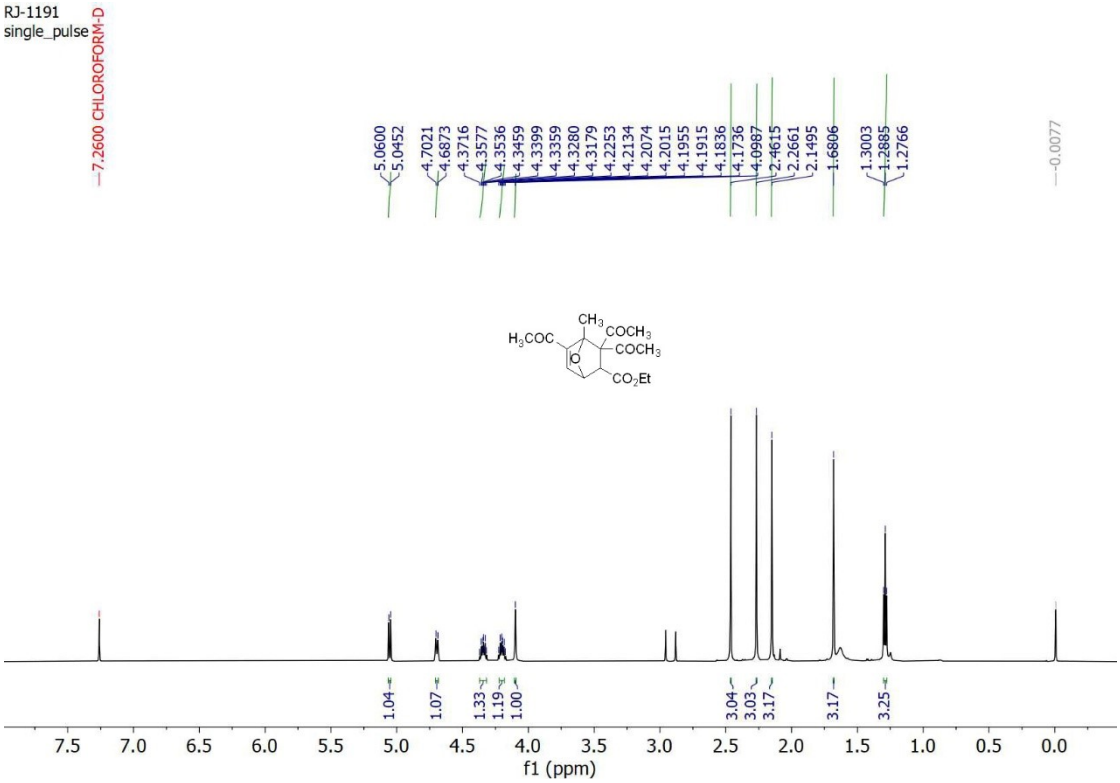


Figure S63. ^{1}H-NMR spectrum of **1W** in $CDCl_3$.

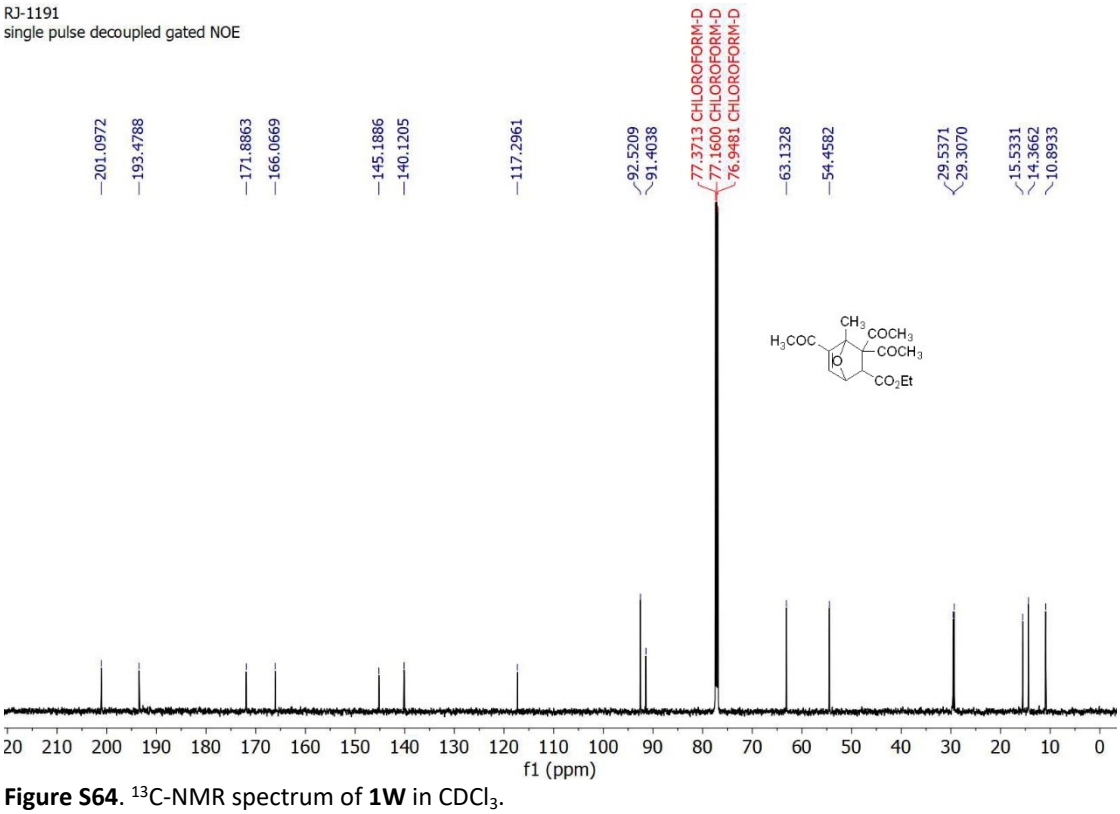


Figure S64. ^{13}C-NMR spectrum of **1W** in $CDCl_3$.

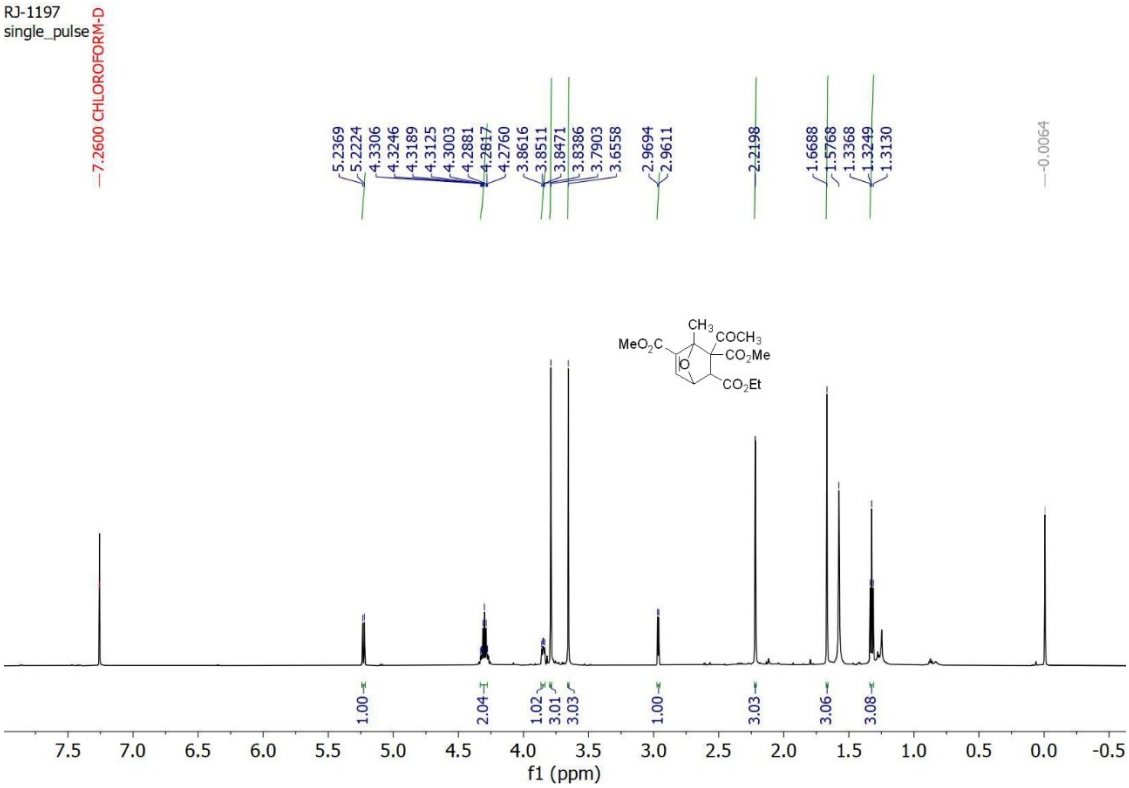


Figure S65. ^{1}H-NMR spectrum of **1X** in $CDCl_3$.

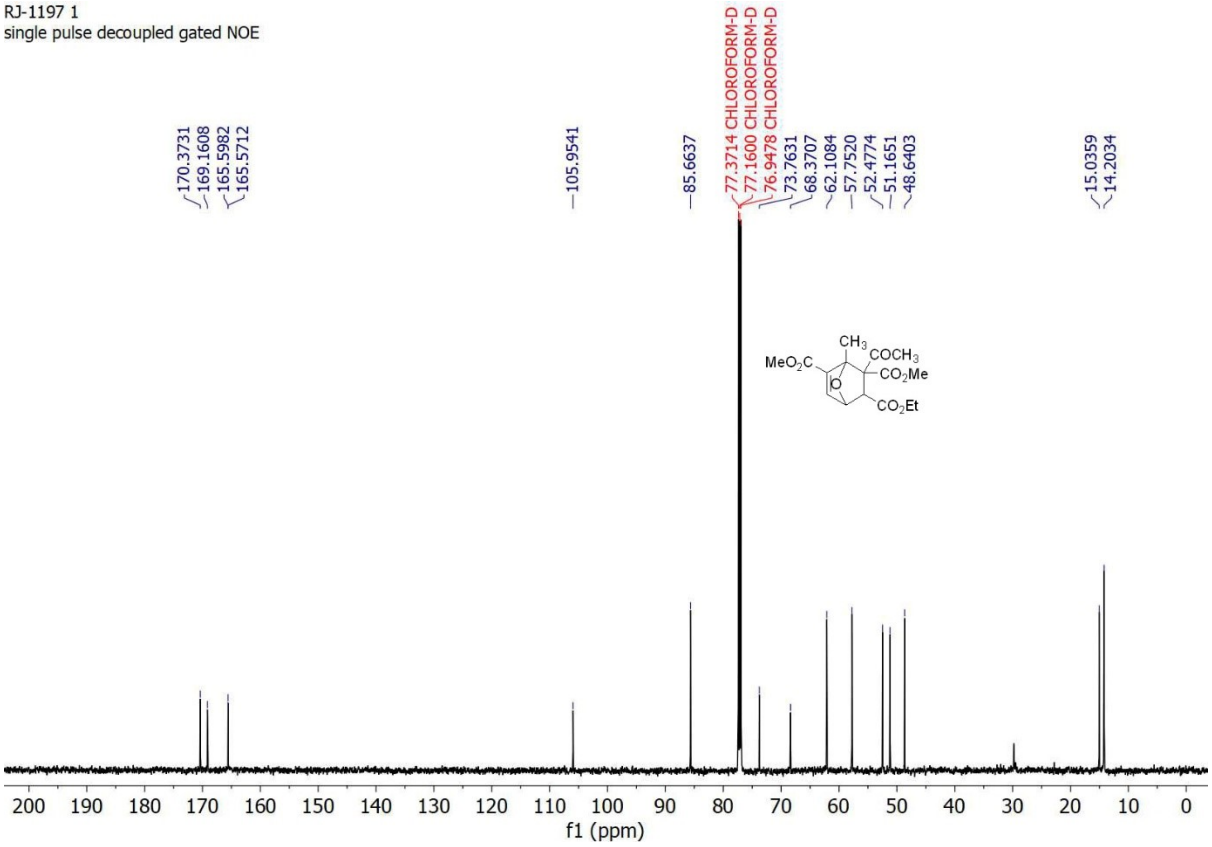


Figure S66. ^{13}C-NMR spectrum of **1X** in $CDCl_3$.

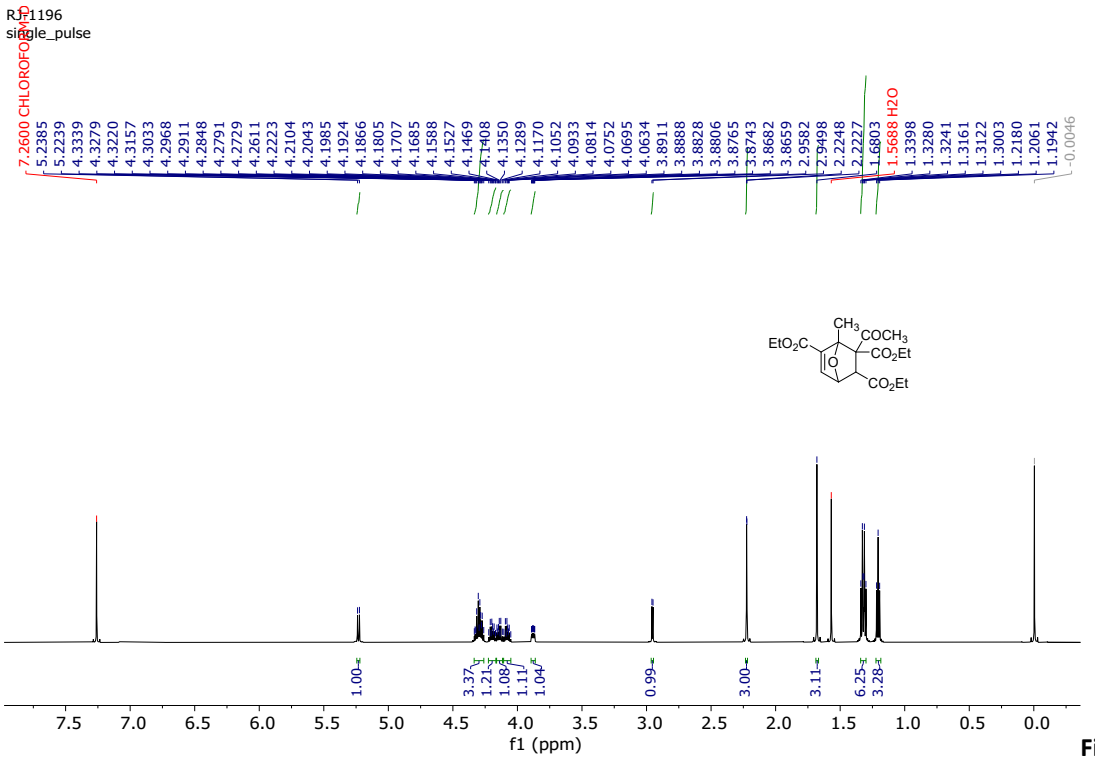


Figure S67. ^{1}H-NMR spectrum of **1Y** in $CDCl_3$.

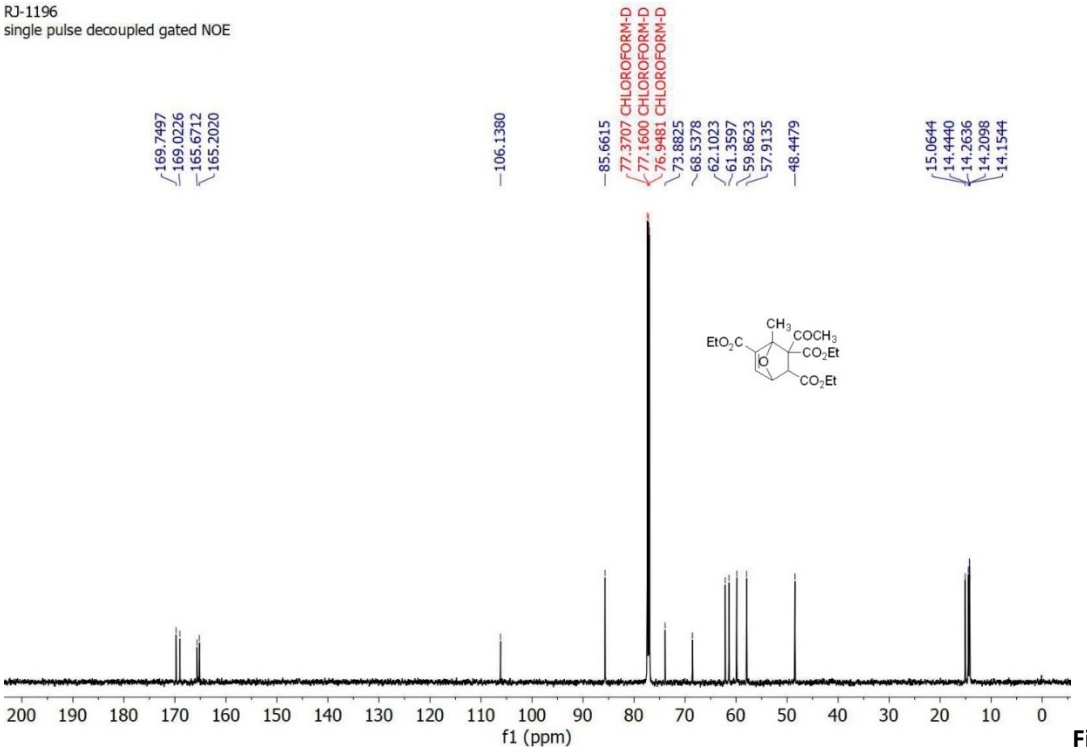
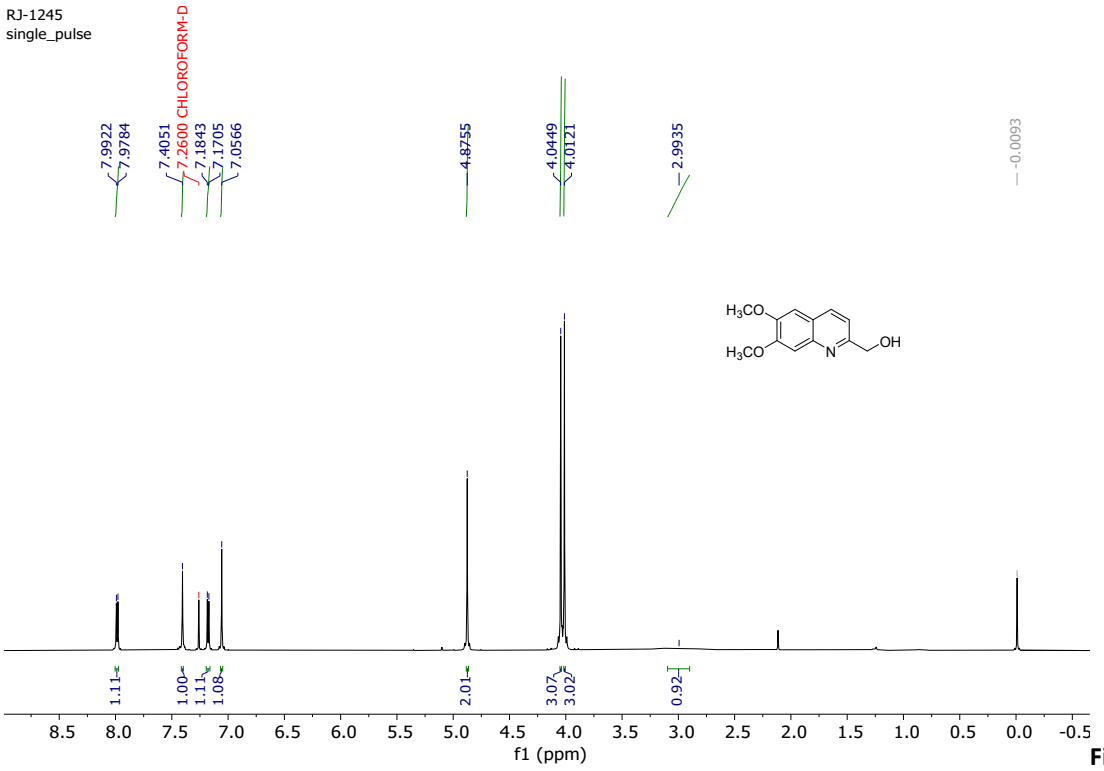


Figure S68. ^{13}C-NMR spectrum of **1Y** in $CDCl_3$.



Fi

gure S69. ^{1}H-NMR spectrum of **5** in $CDCl_3$.

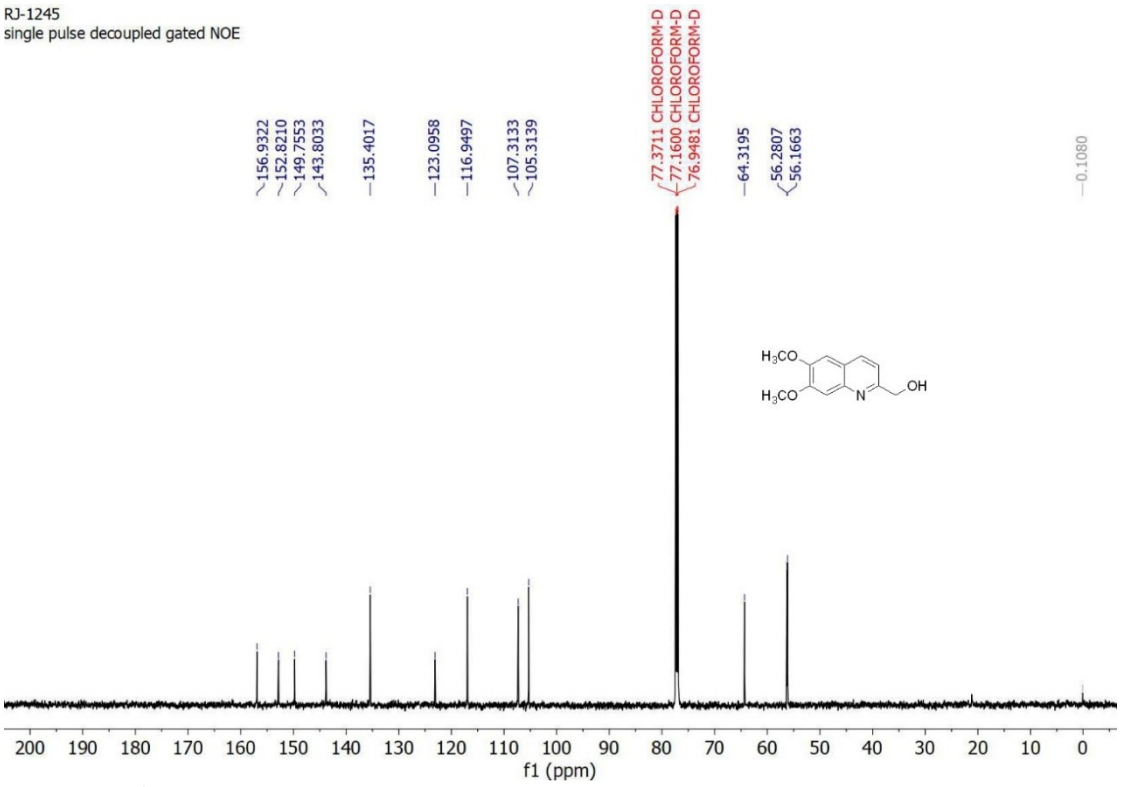


Figure S70. ^{13}C-NMR spectrum of **5** in $CDCl_3$.

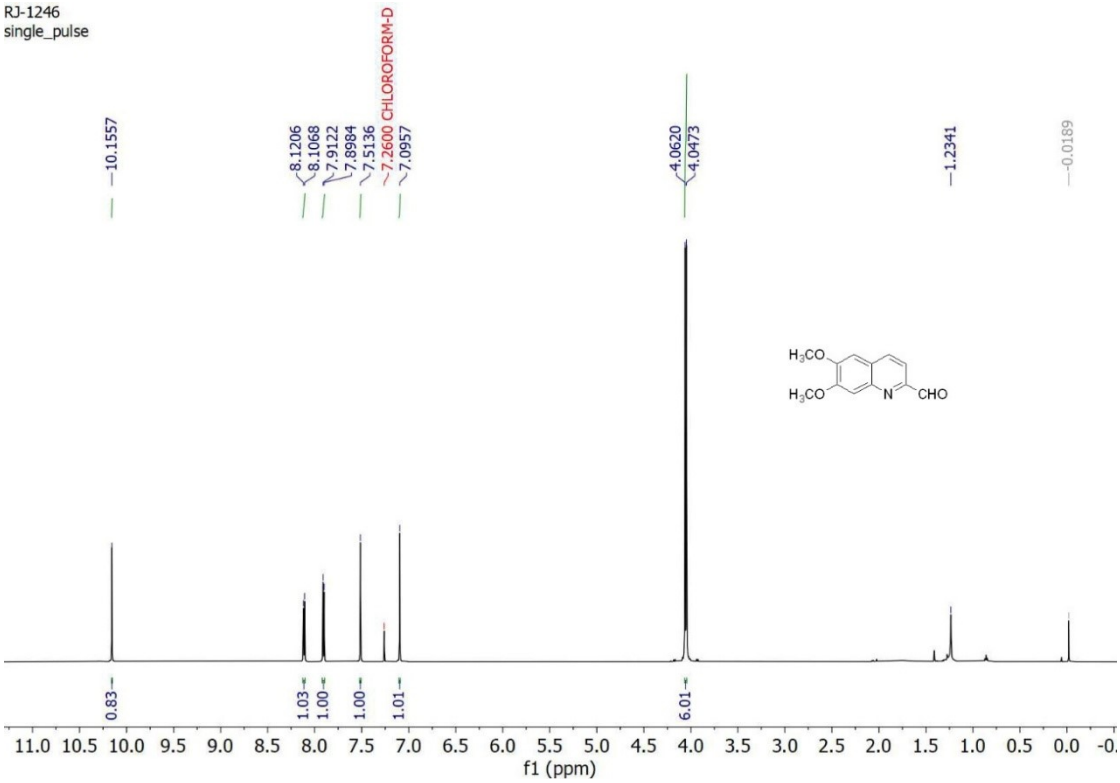


Figure S71. ^{1}H-NMR spectrum of **6** in $CDCl_3$.

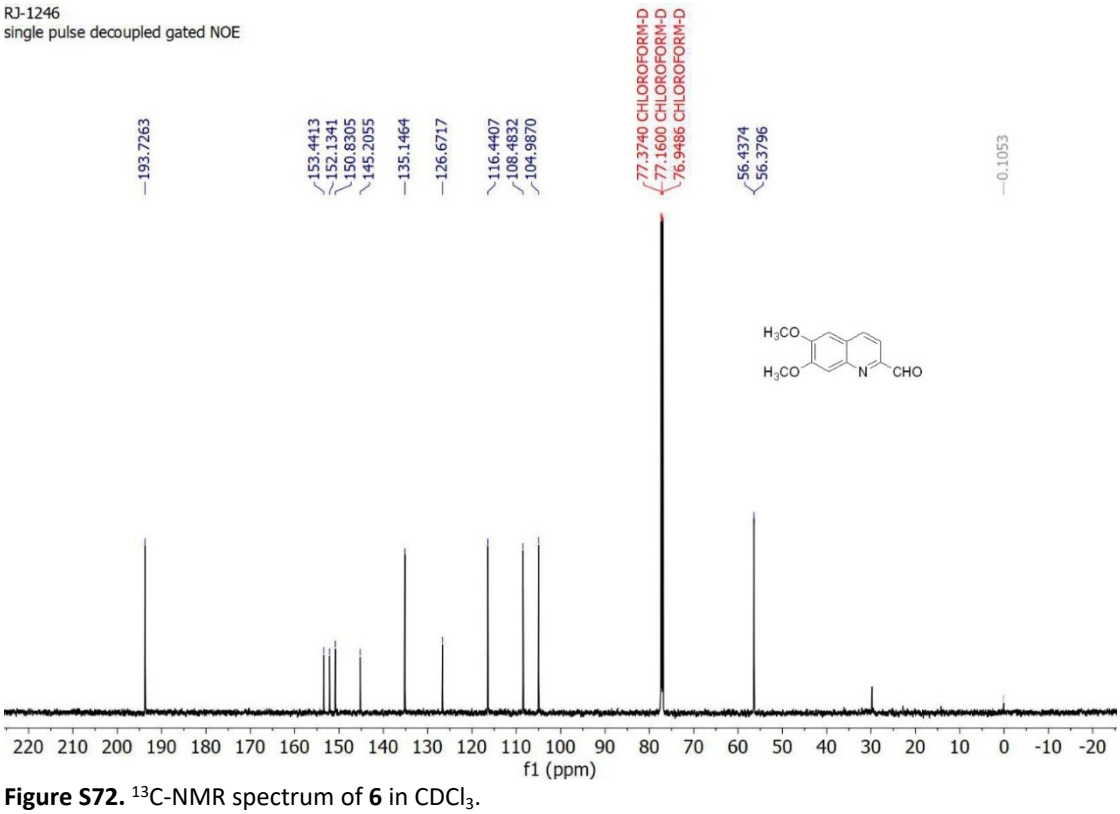


Figure S72. ^{13}C-NMR spectrum of **6** in $CDCl_3$.

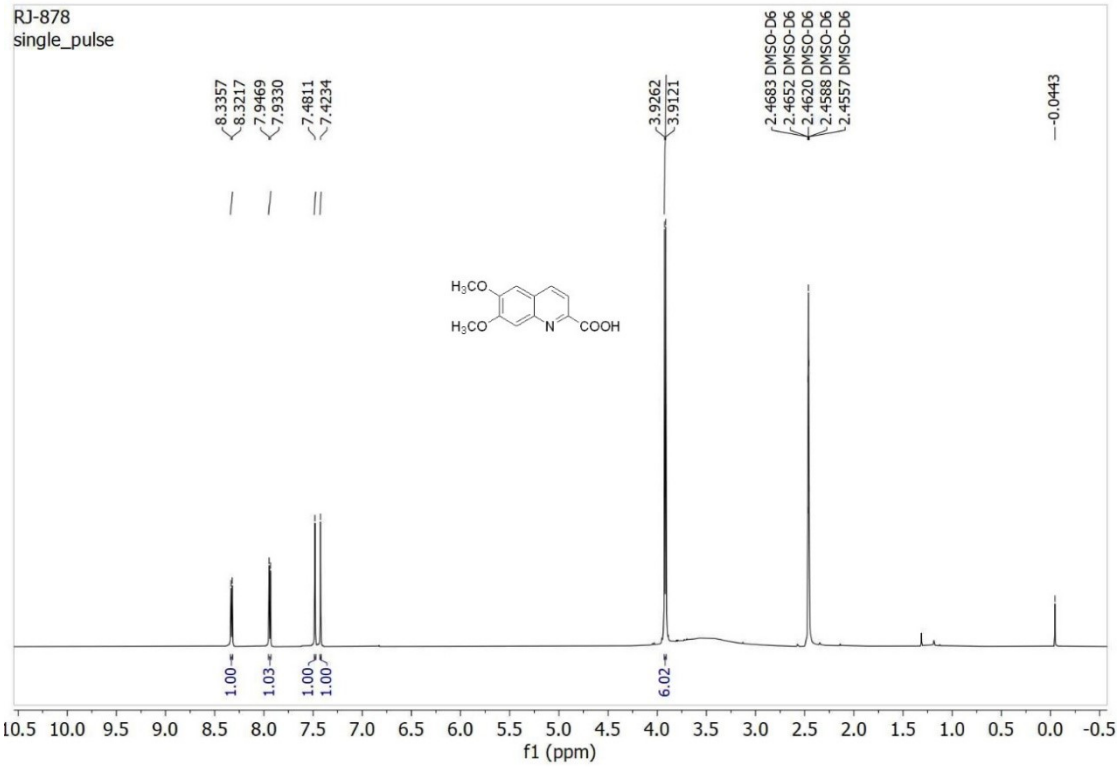


Figure S73. ^{1}H-NMR spectrum of **7** in DMSO-d_6.

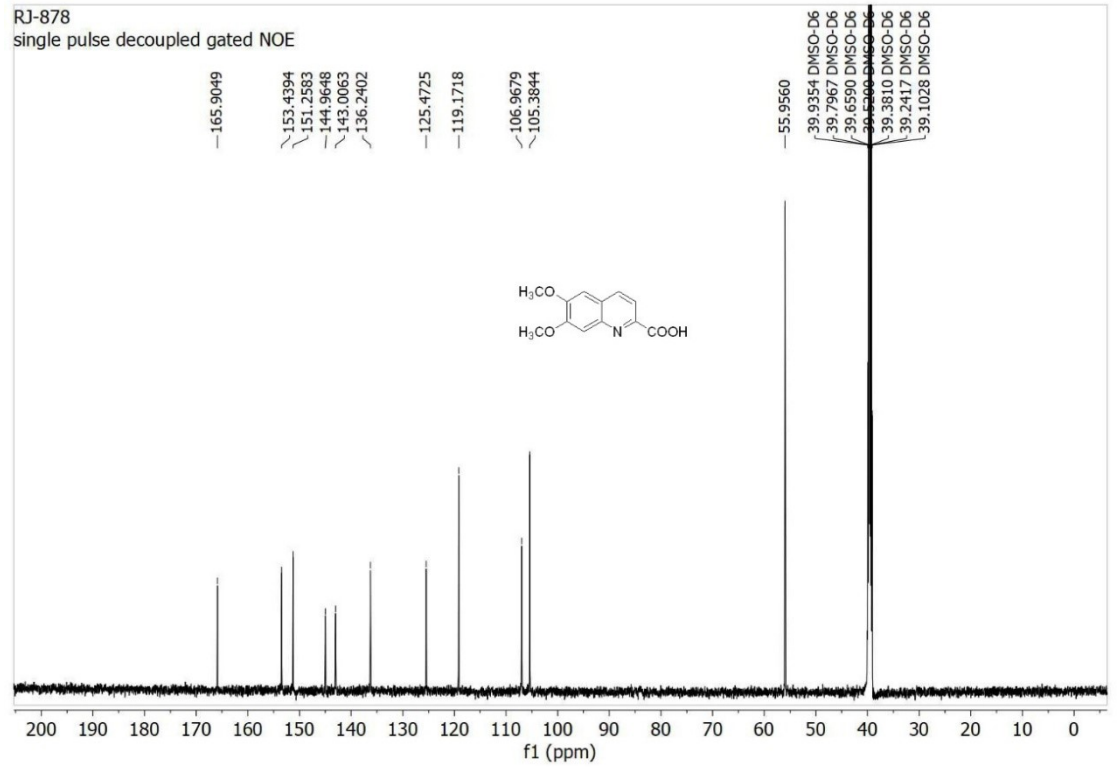


Figure S74. ^{13}C-NMR spectrum of **7** in DMSO-d_6.

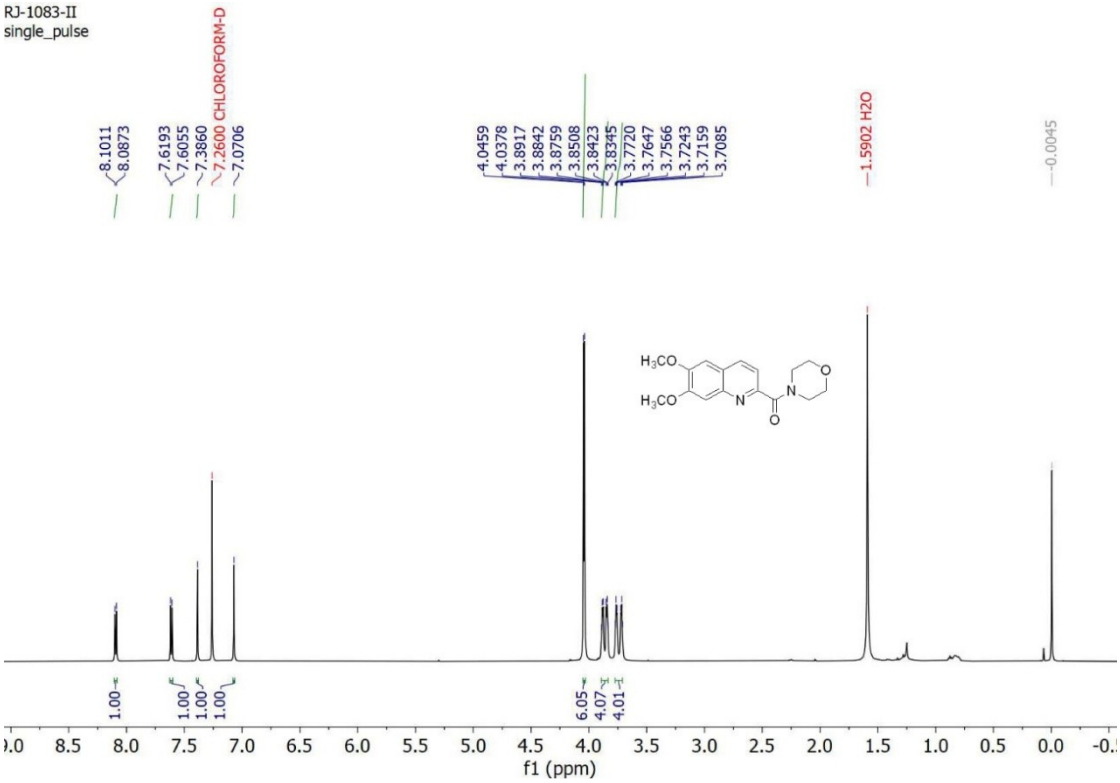


Figure S75. ^{1}H-NMR spectrum of **8** in $CDCl_3$.

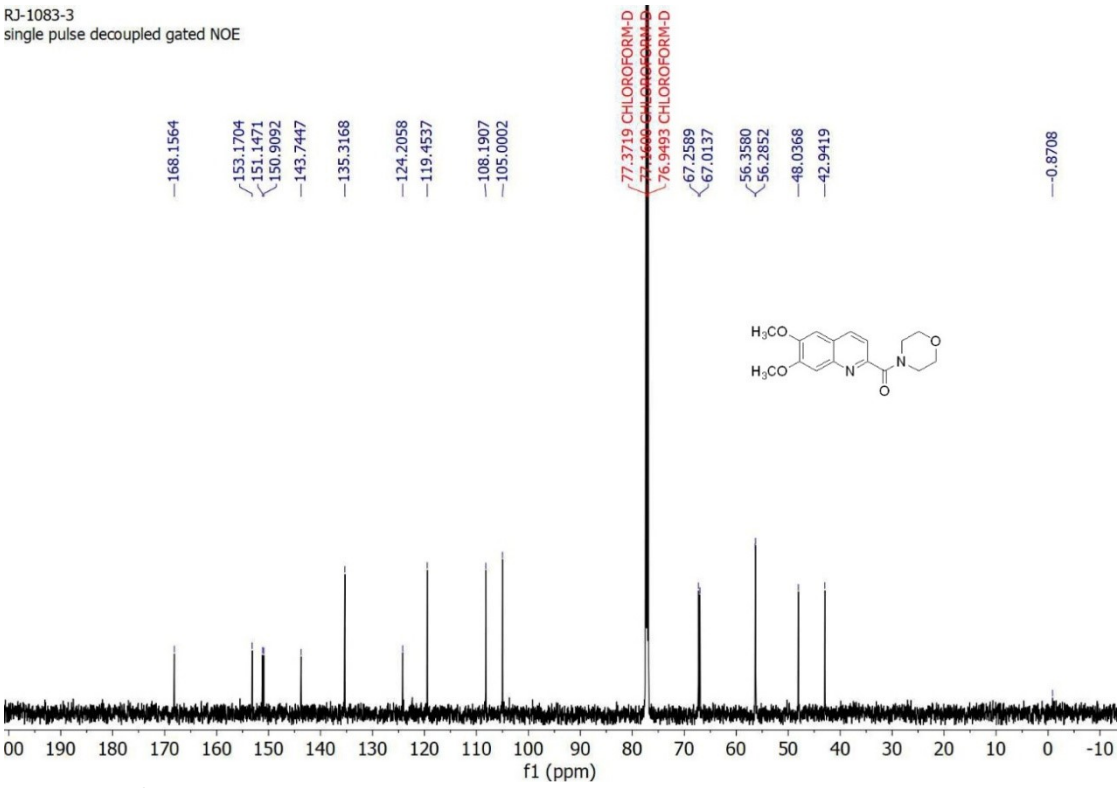


Figure S76. ^{13}C-NMR spectrum of **8** in $CDCl_3$.

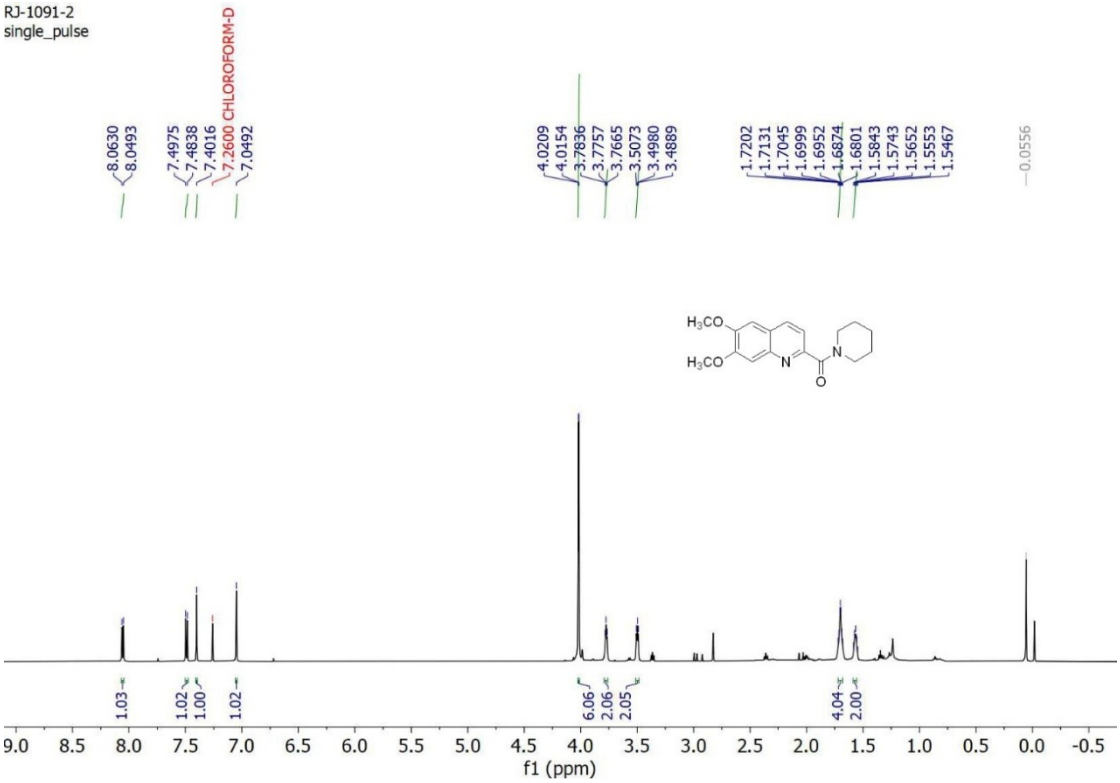


Figure S77. ^{1}H-NMR spectrum of **9** in $CDCl_3$.

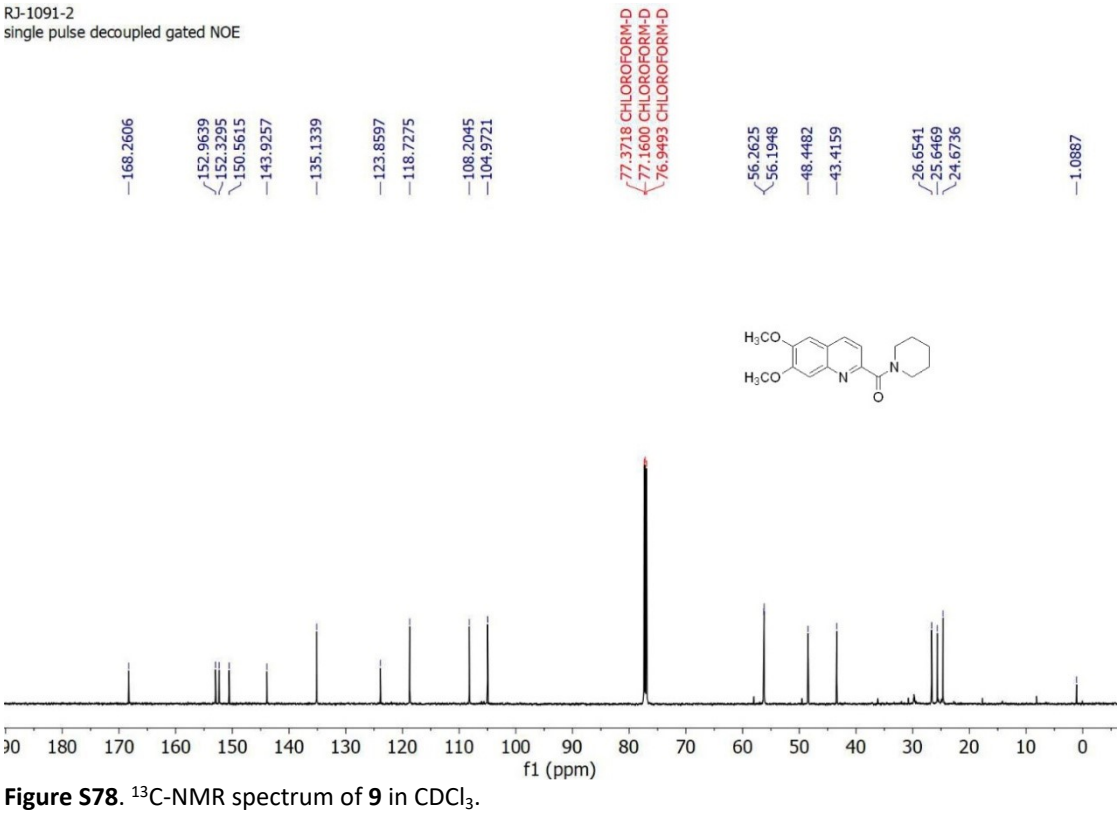


Figure S78. ^{13}C-NMR spectrum of **9** in $CDCl_3$.

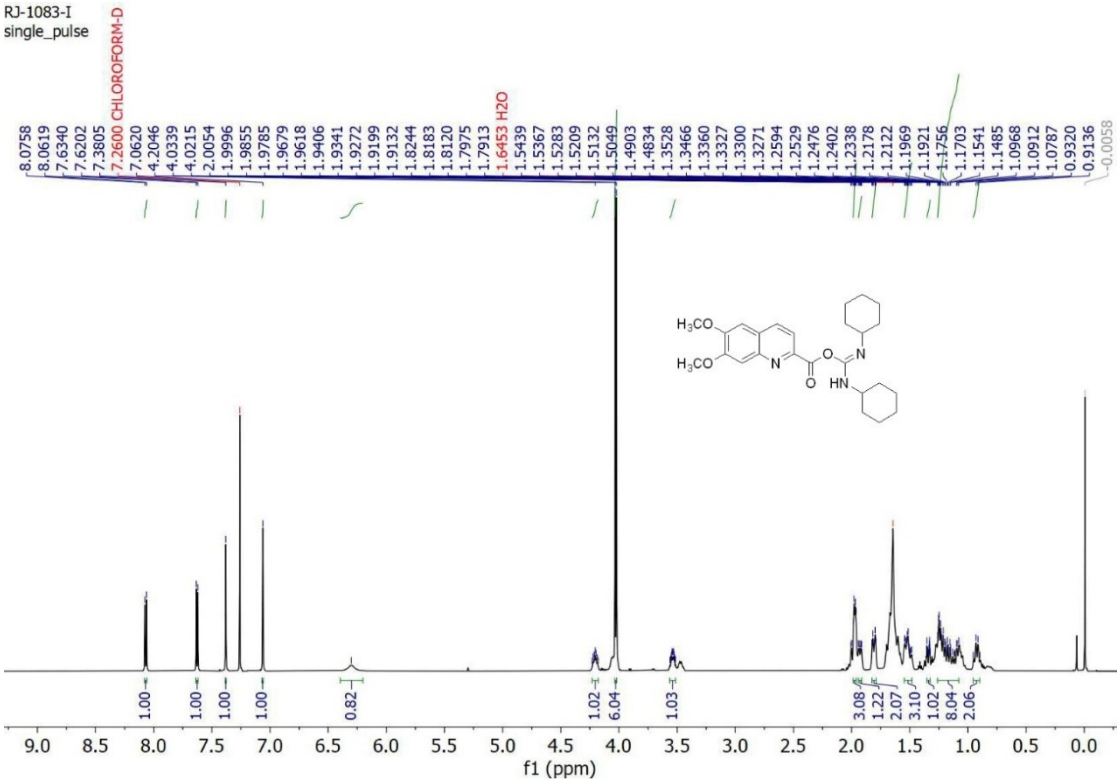


Figure S79. ^{1}H-NMR spectrum of **10** in $CDCl_3$.

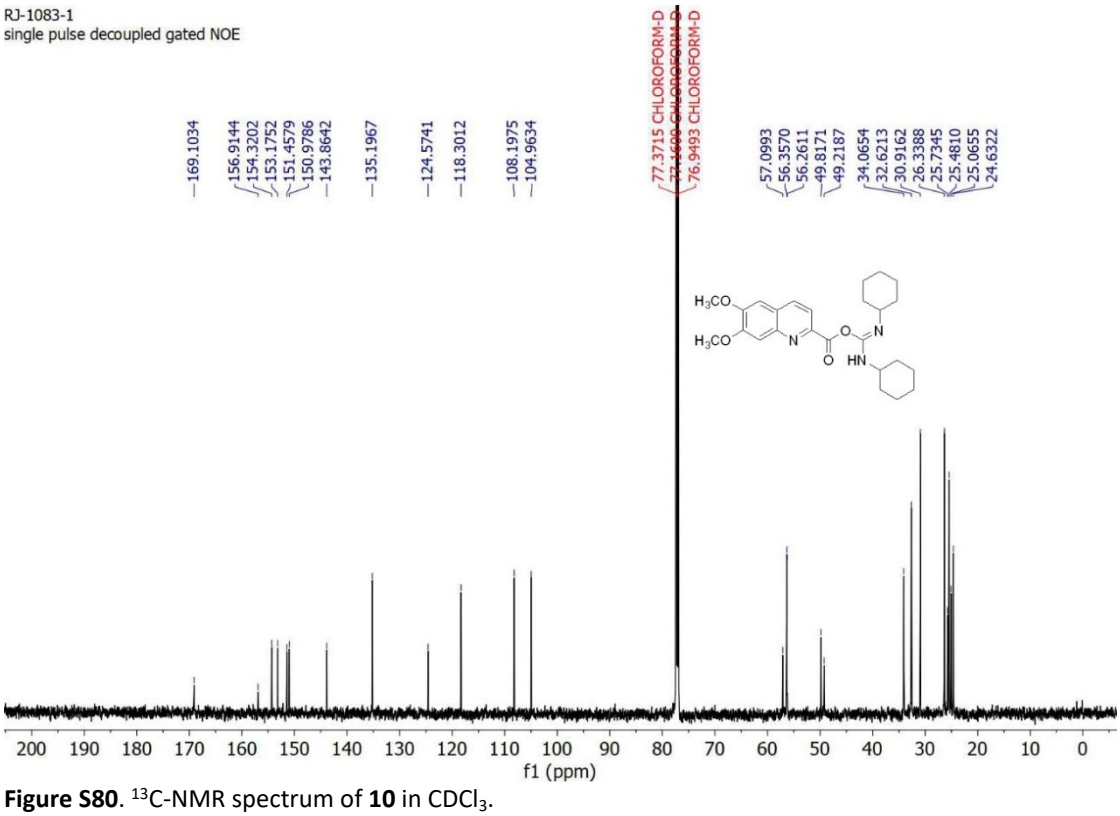


Figure S80. ^{13}C-NMR spectrum of **10** in $CDCl_3$.

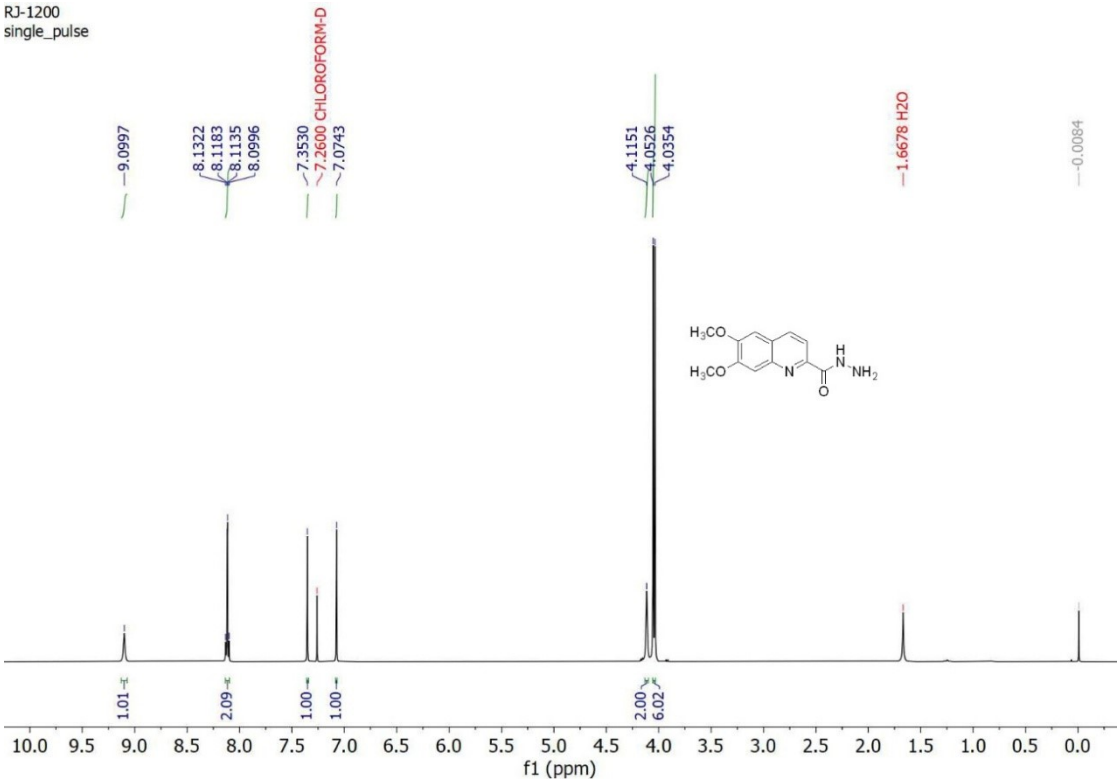


Figure S81. ^{1}H-NMR spectrum of **11** in $CDCl_3$.

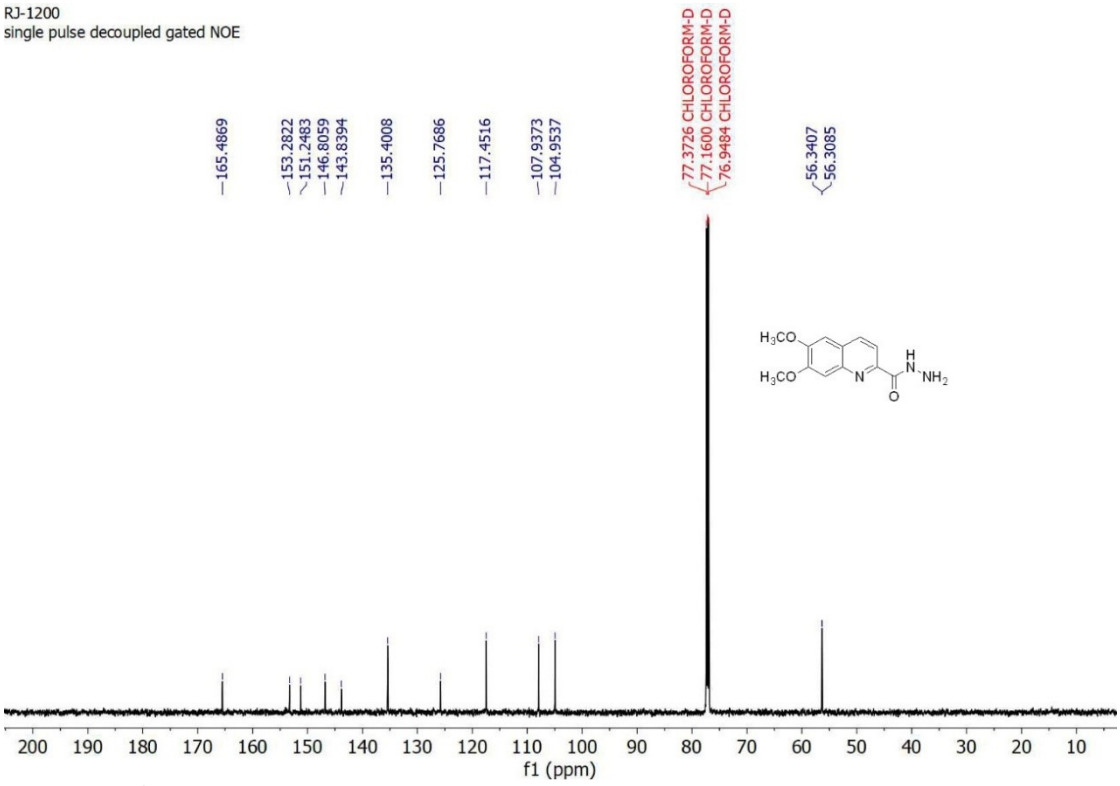


Figure S82. ^{13}C-NMR spectrum of **11** in $CDCl_3$.

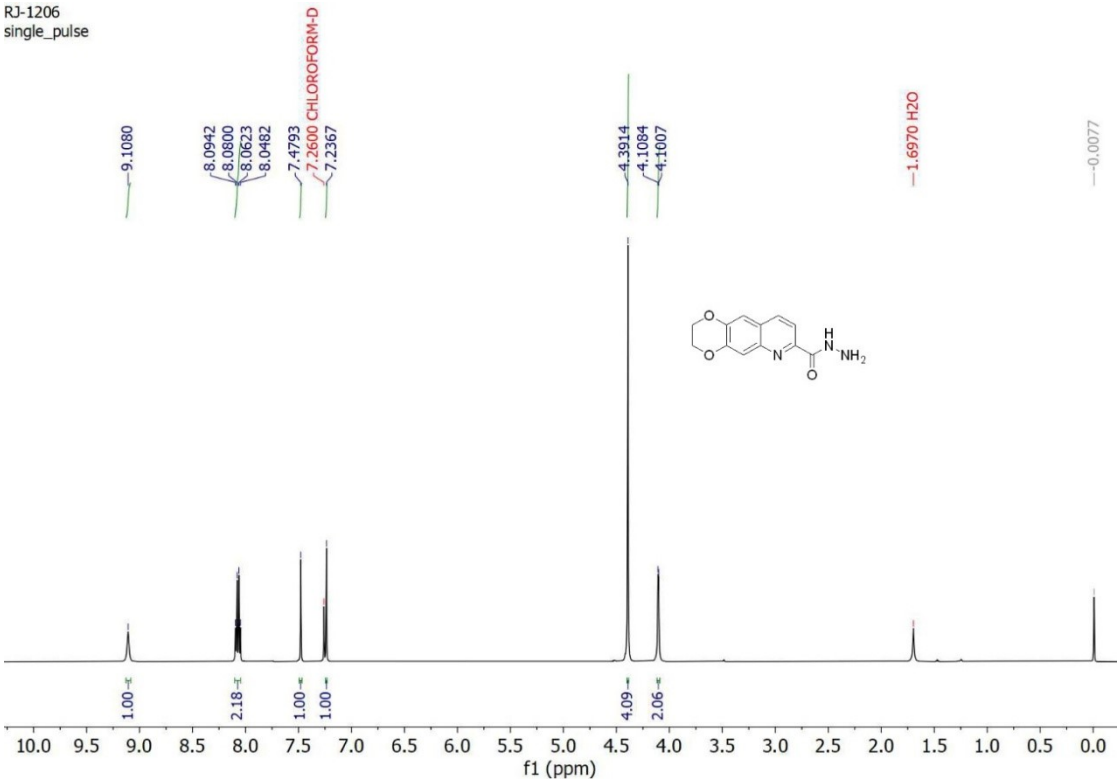


Figure S83. ^{1}H-NMR spectrum of **12** in $CDCl_3$.

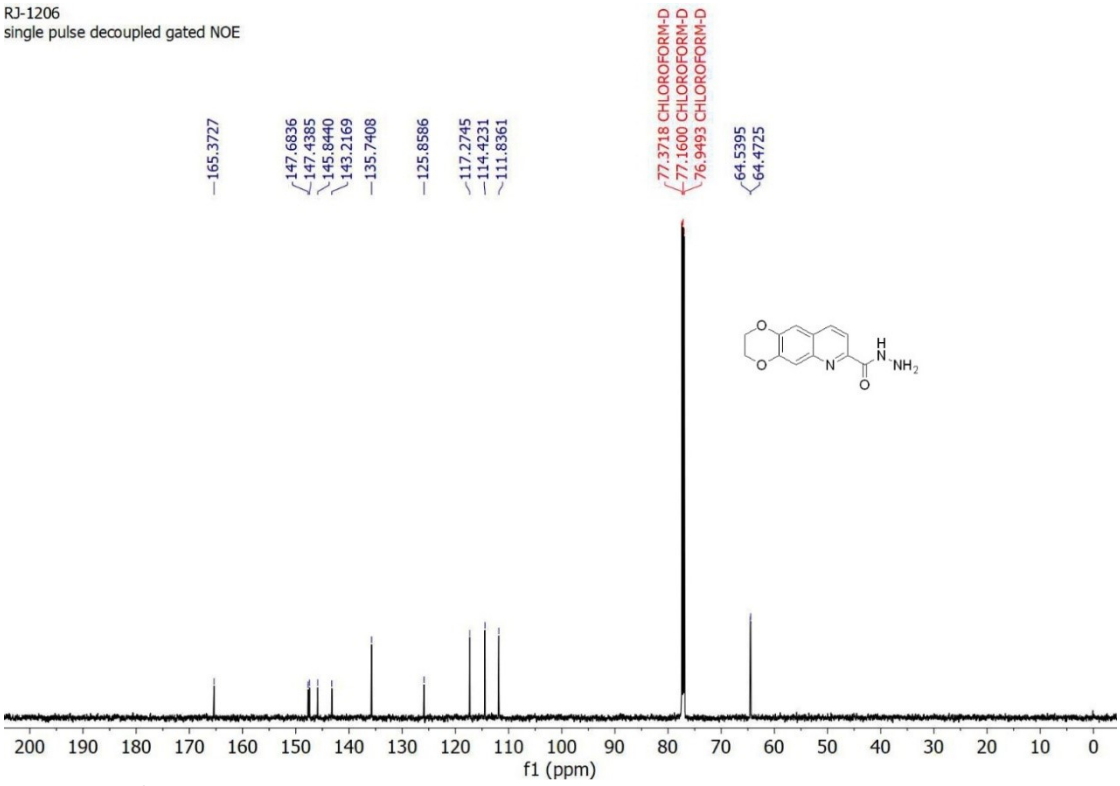


Figure S84. ^{13}C-NMR spectrum of **12** in $CDCl_3$.

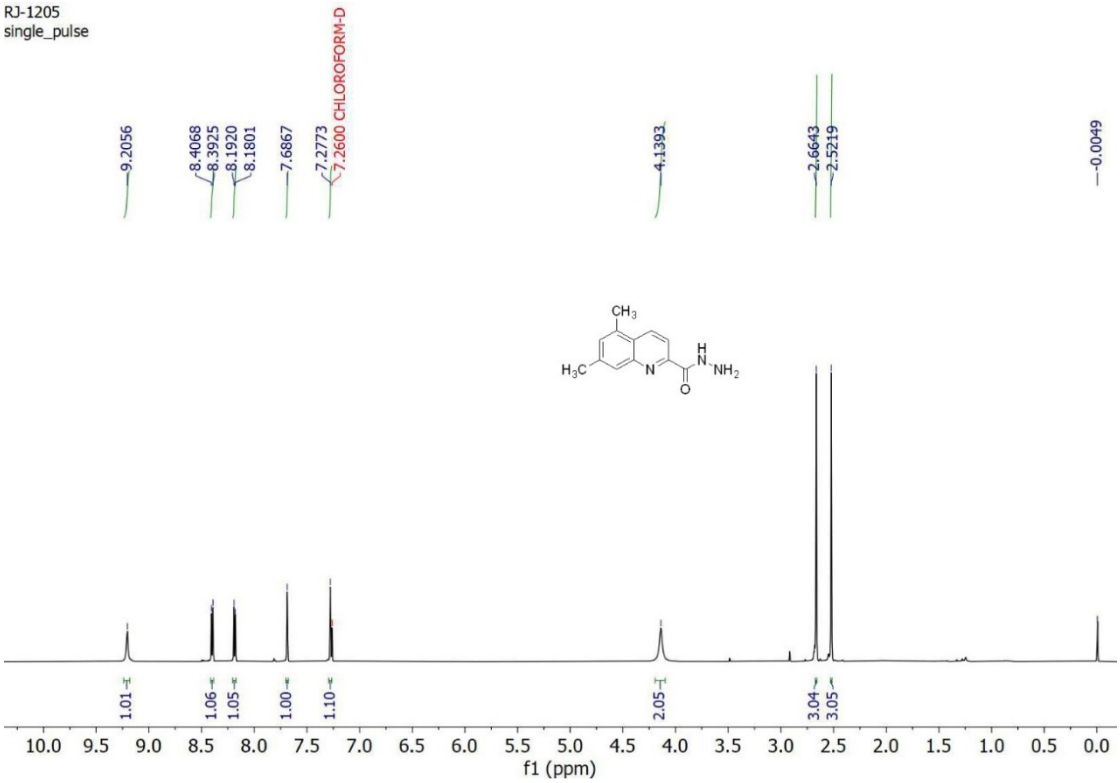


Figure S85. ^{1}H-NMR spectrum of **13** in $CDCl_3$.

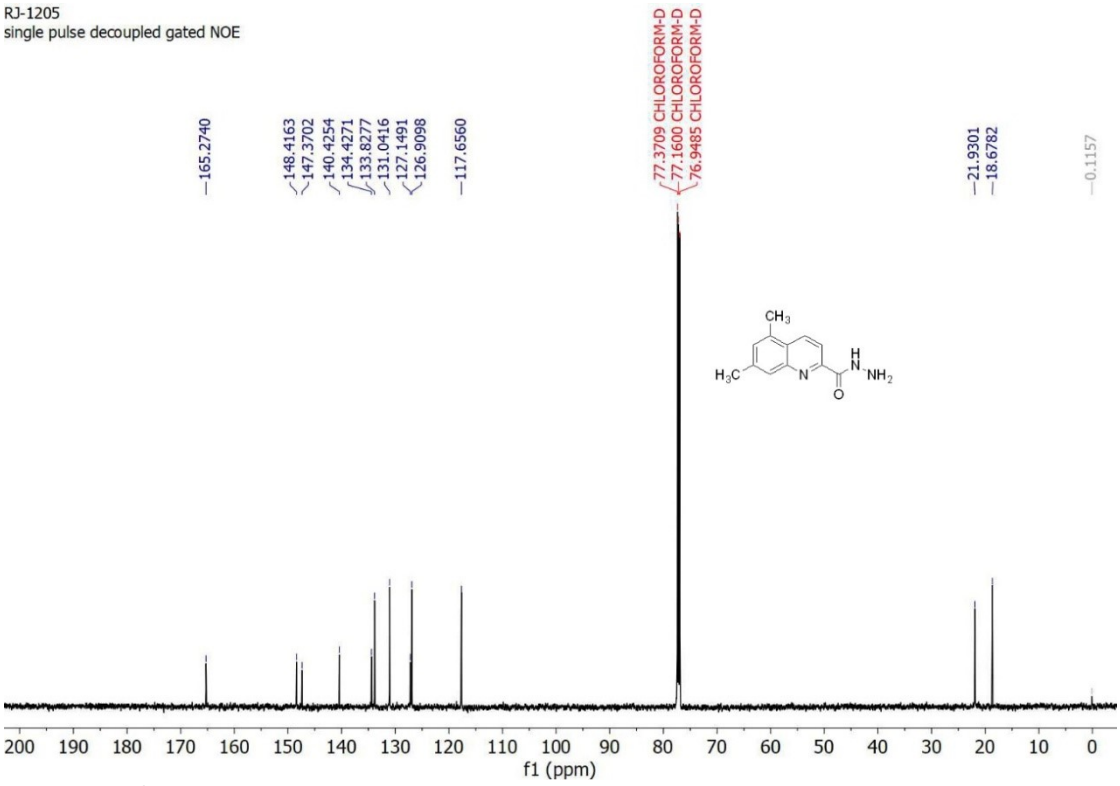


Figure S86. ^{13}C-NMR spectrum of **13** in $CDCl_3$.

3. GC-MS spectrum of intermediates.

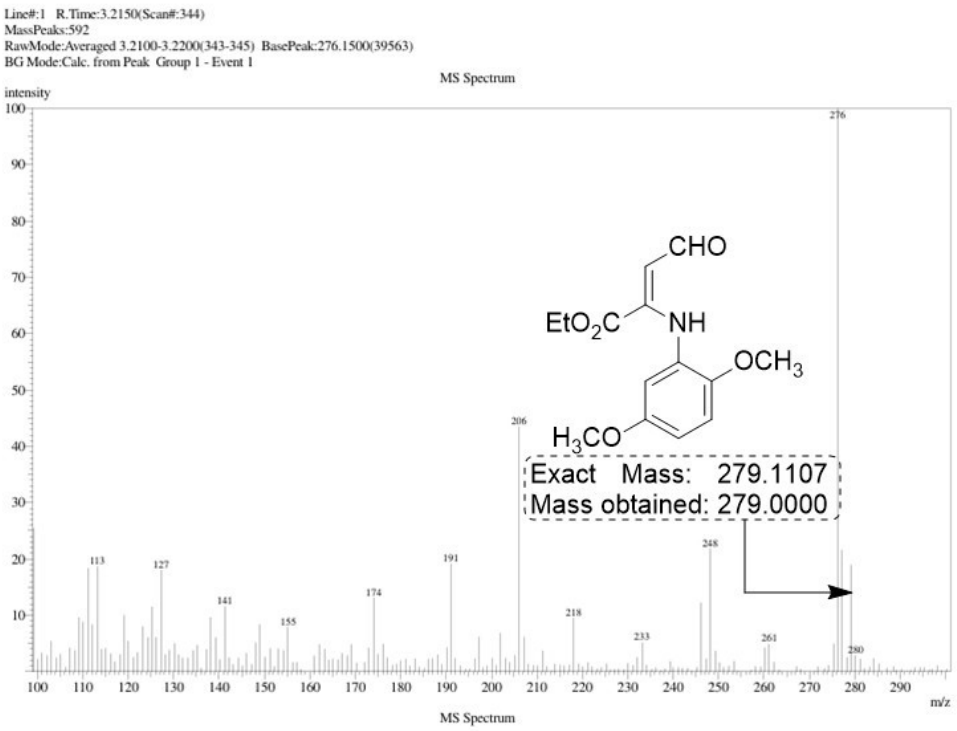


Figure S87. GC-MS spectrum of ethyl (*Z*)-2-((2,5-dimethoxyphenyl)amino)-4-oxobut-2-enoate intermediate (**1J**).

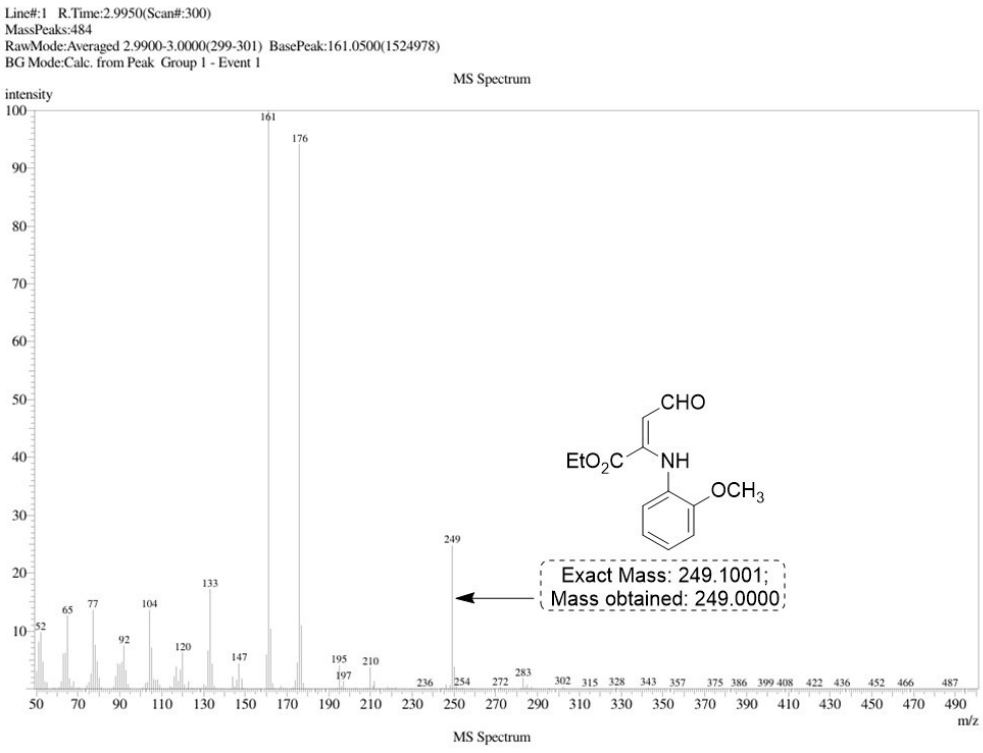


Figure S88. GC-MS spectrum of ethyl (*Z*)-2-((2-methoxyphenyl)amino)-4-oxobut-2-enoate intermediate (**1L**).

4. HRMS spectra of synthesized compounds.

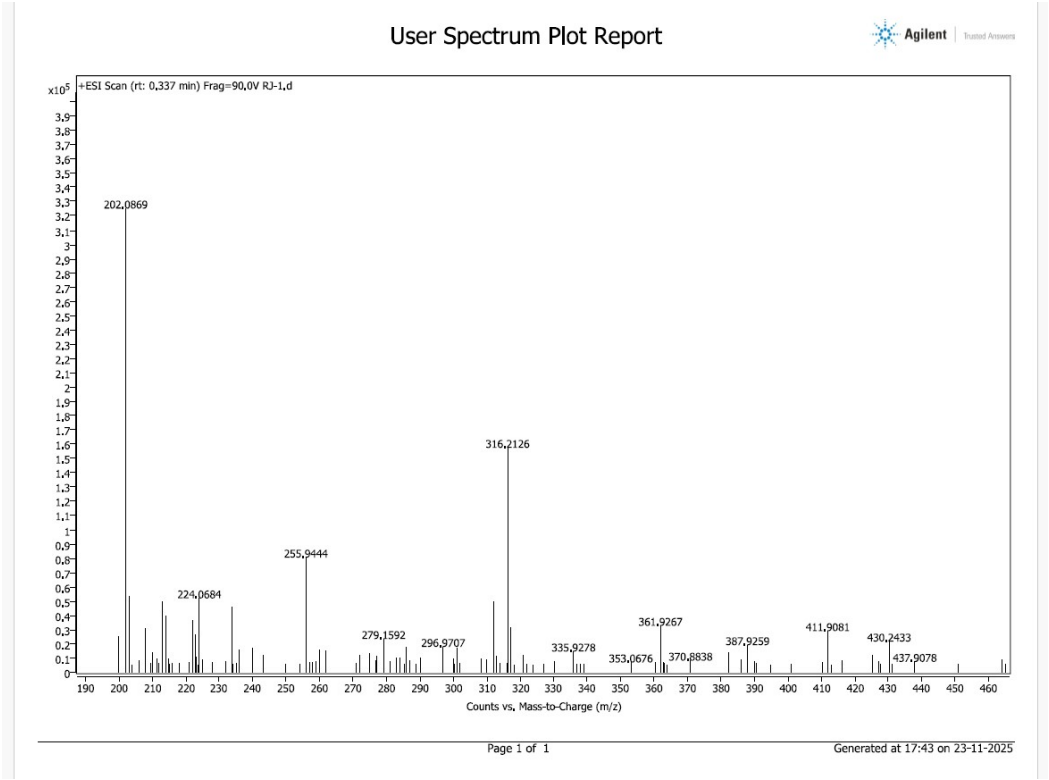


Figure S89. HRMS spectrum of **1A**.

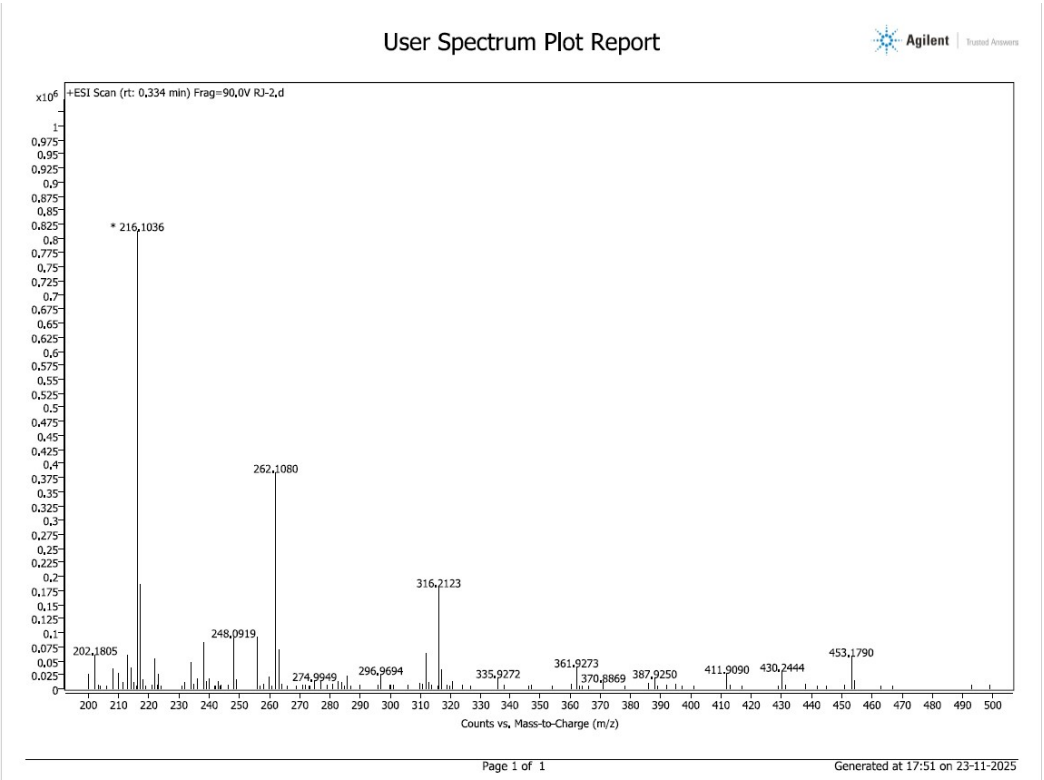


Figure S90. HRMS spectrum of **1B**.

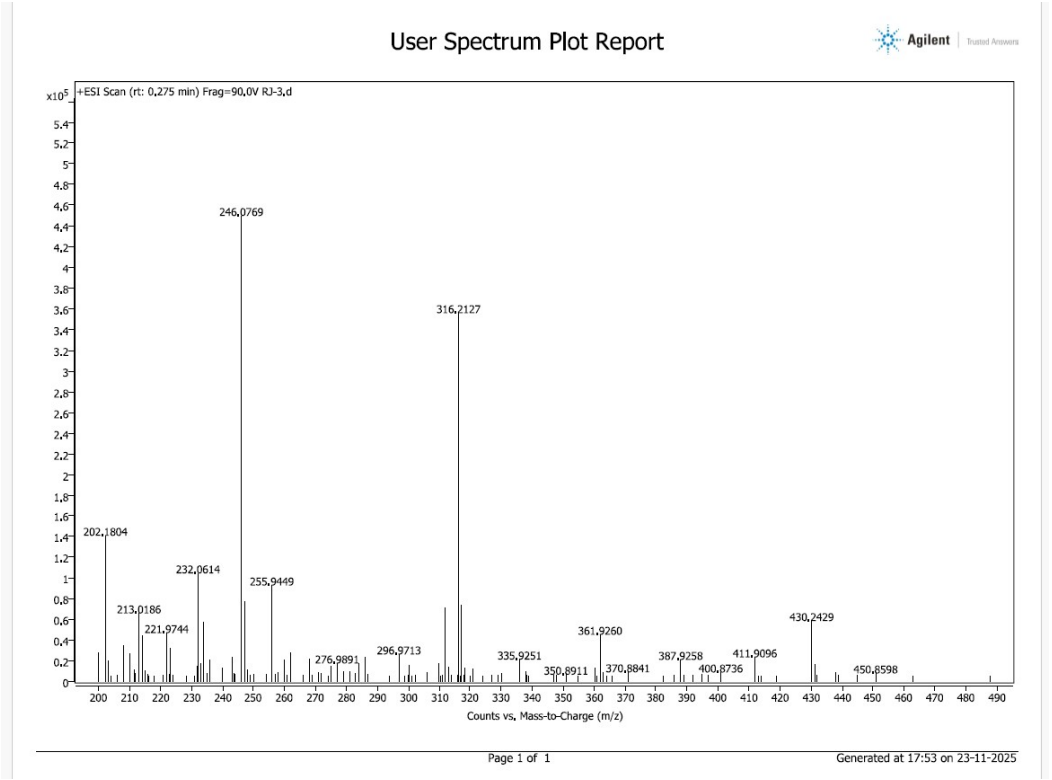


Figure S91. HRMS spectrum of **1C**.

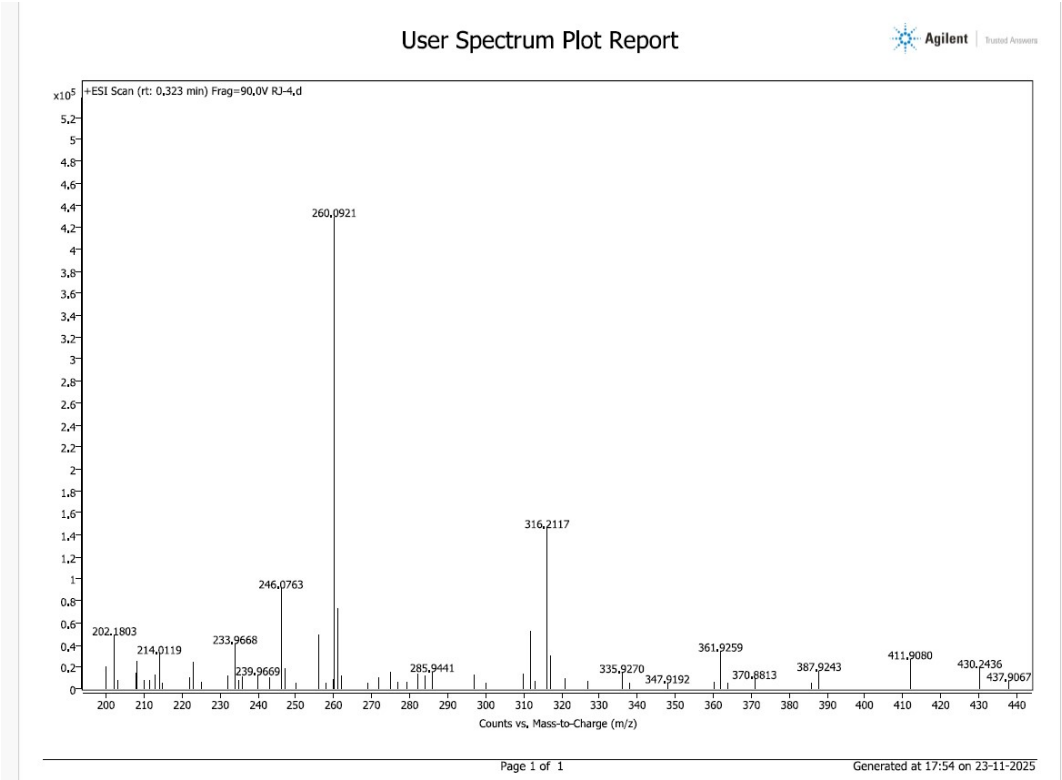


Figure S92. HRMS spectrum of **1D**.

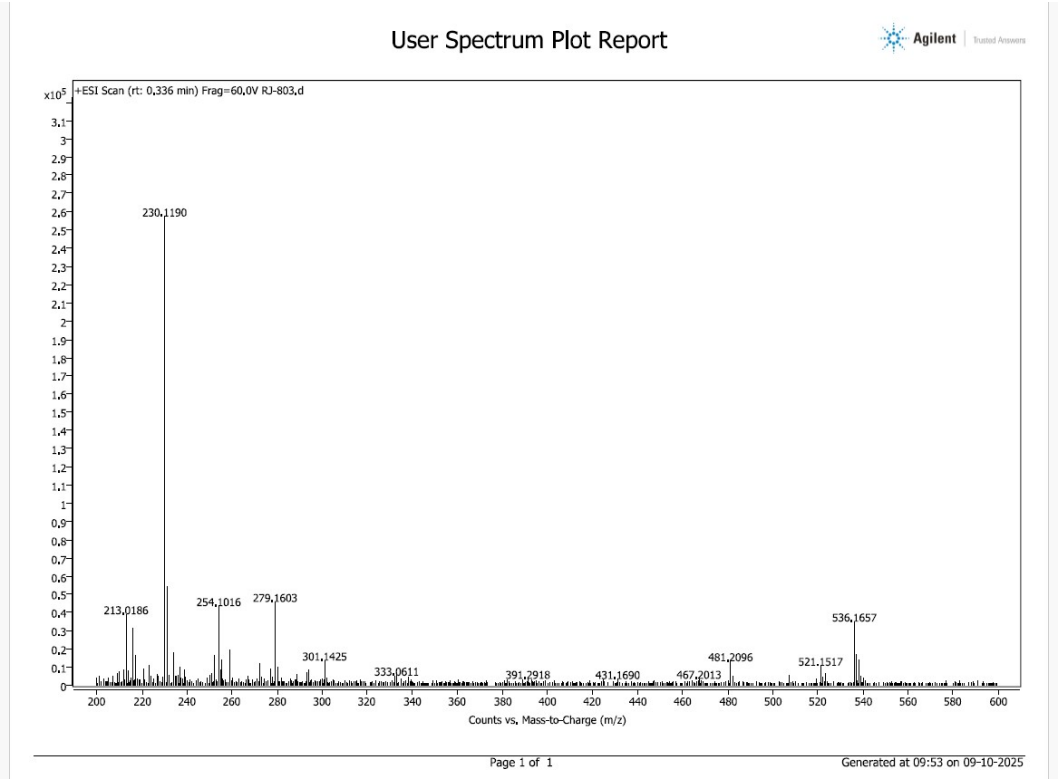


Figure S93. HRMS spectrum of **1E**.

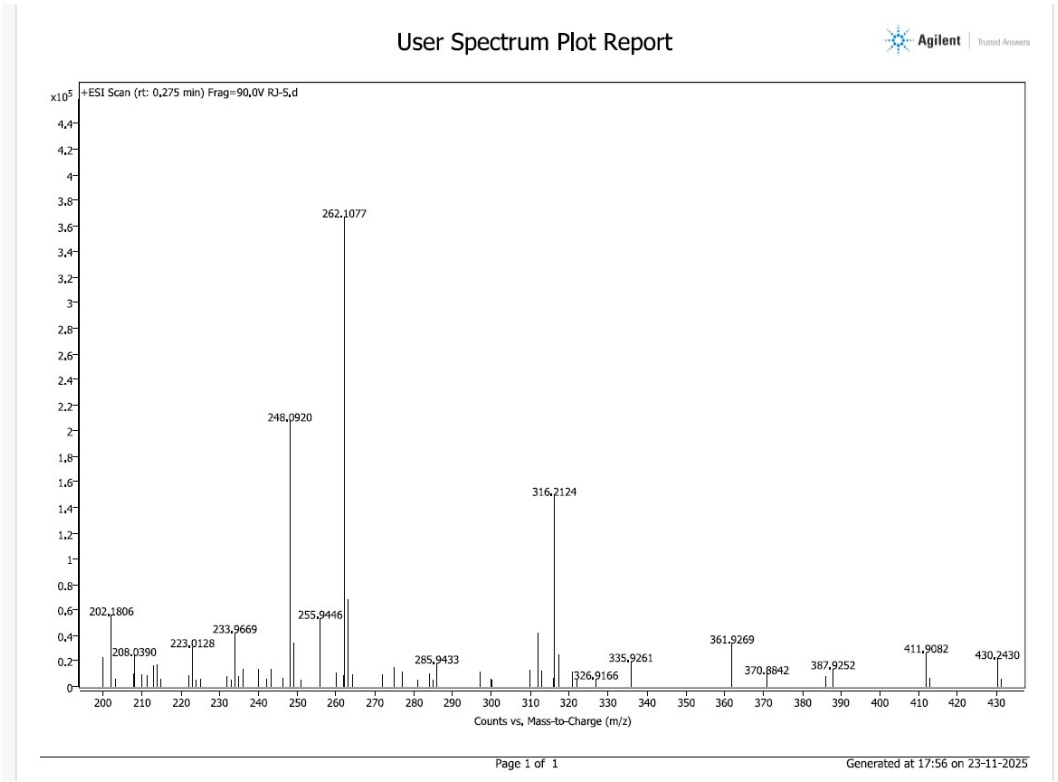


Figure S94. HRMS spectrum of **1F**.

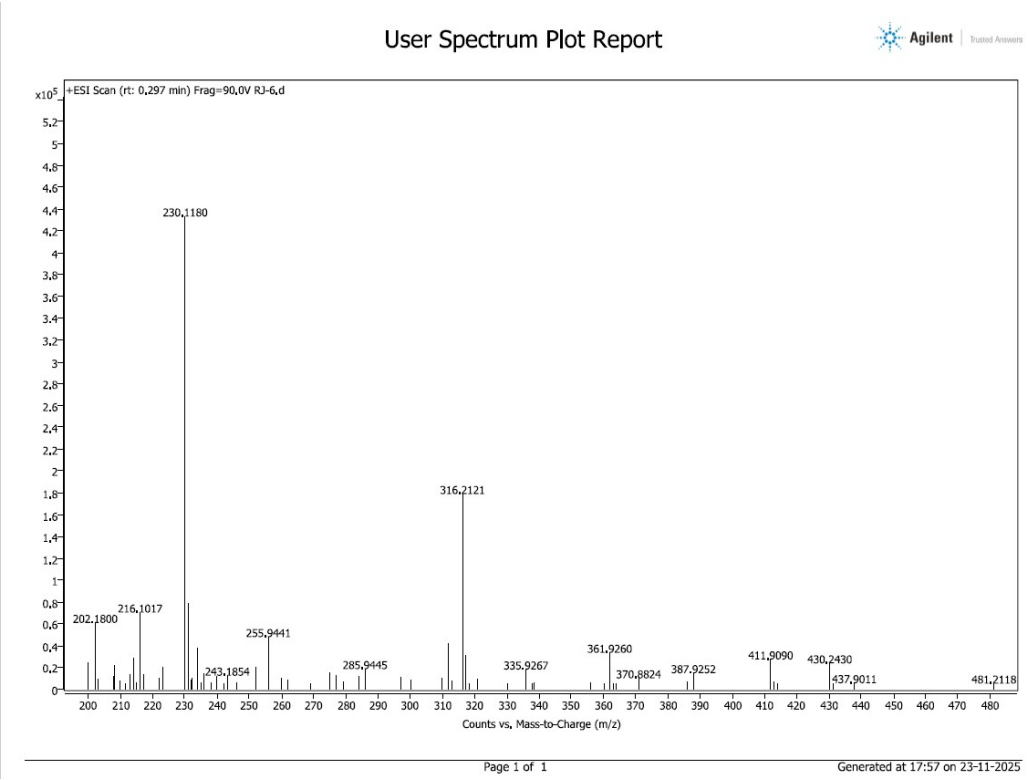


Figure S95. HRMS spectrum of **1G**.

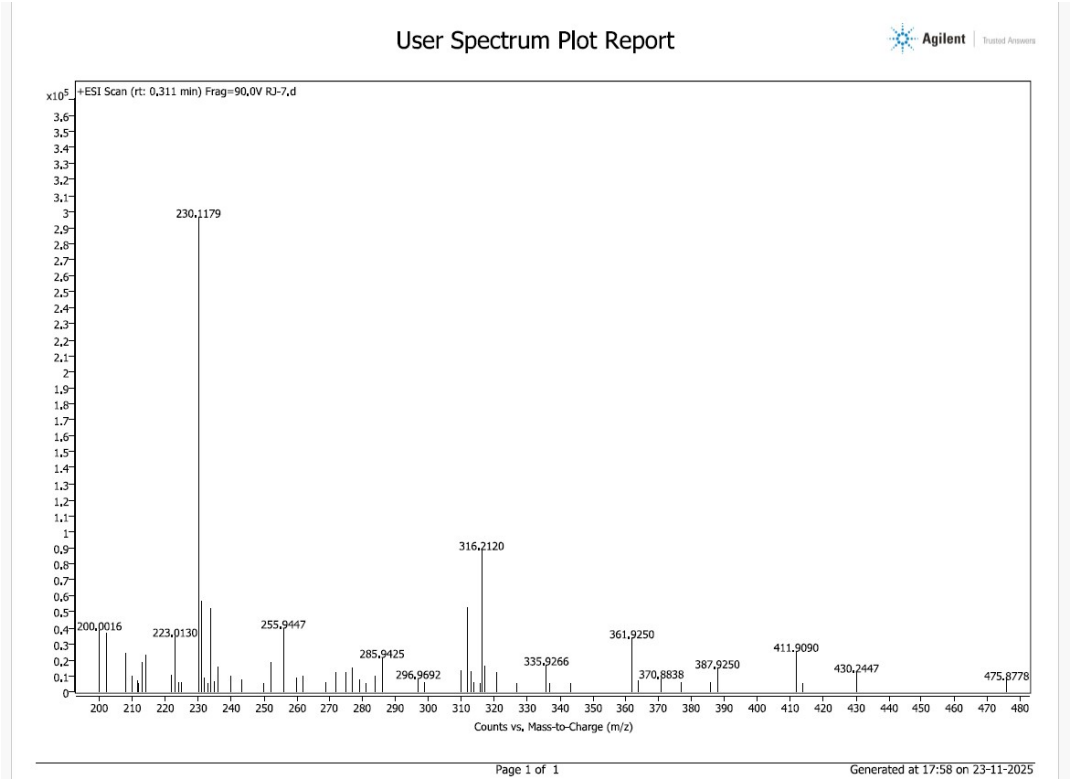


Figure S96. HRMS spectrum of **1H**.

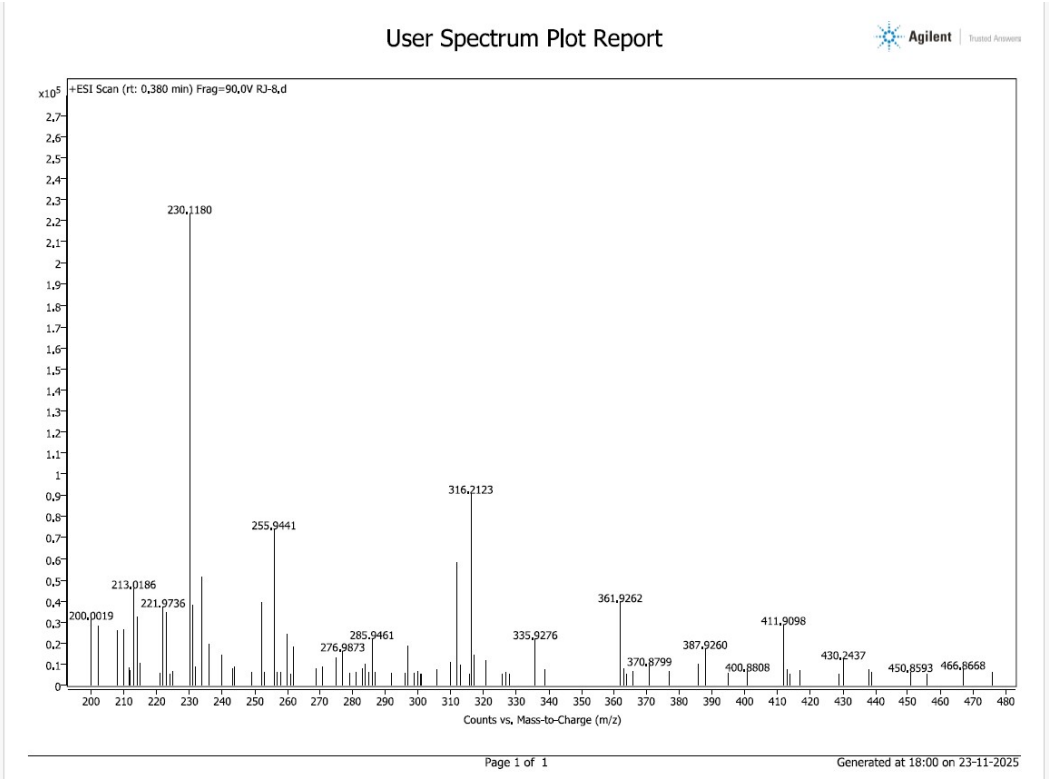


Figure S97. HRMS spectrum of **1I**.

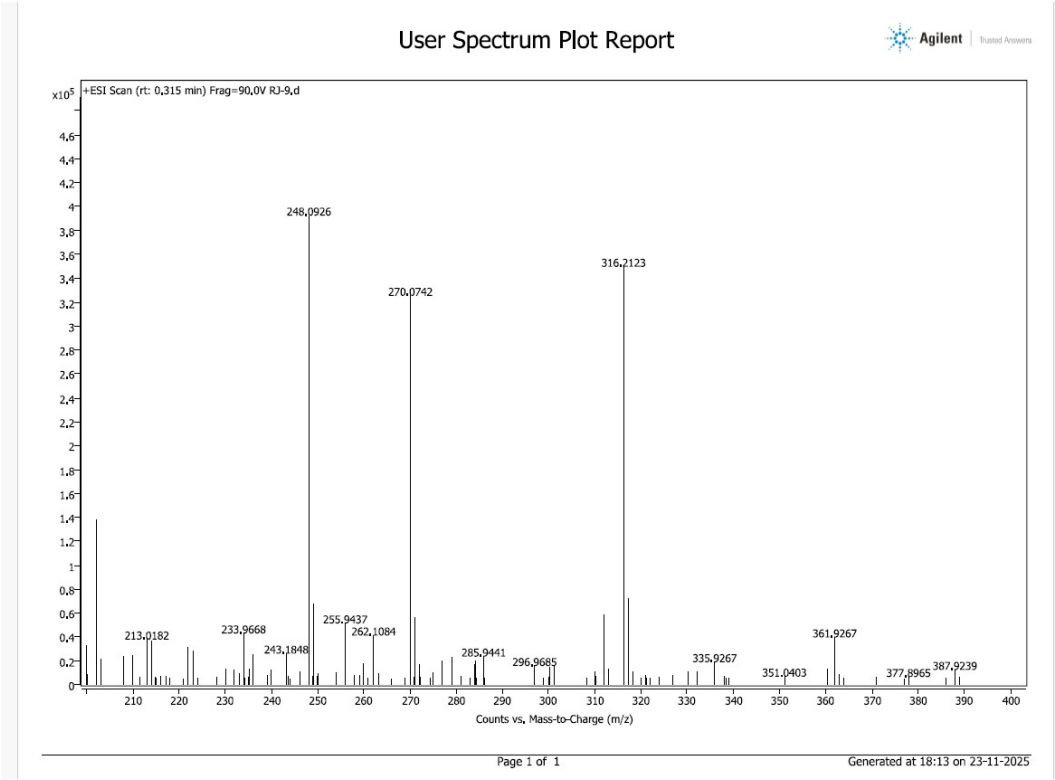


Figure S98. HRMS spectrum of **1J**.

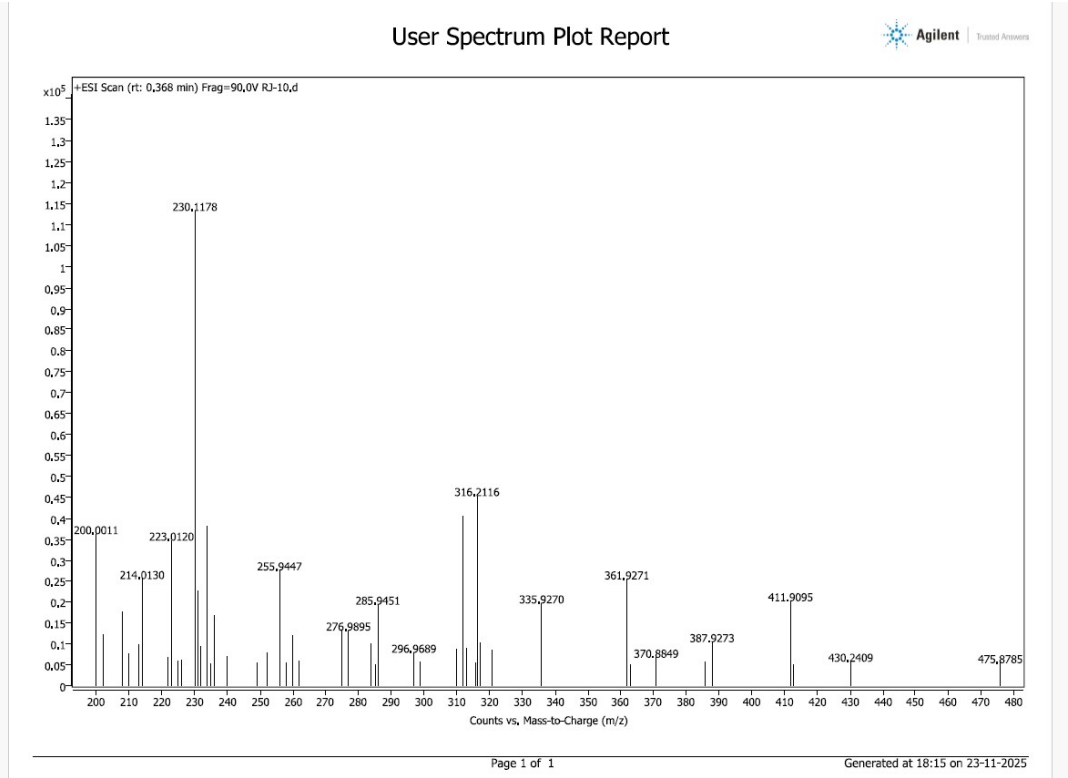


Figure S99. HRMS spectrum of **1K**.

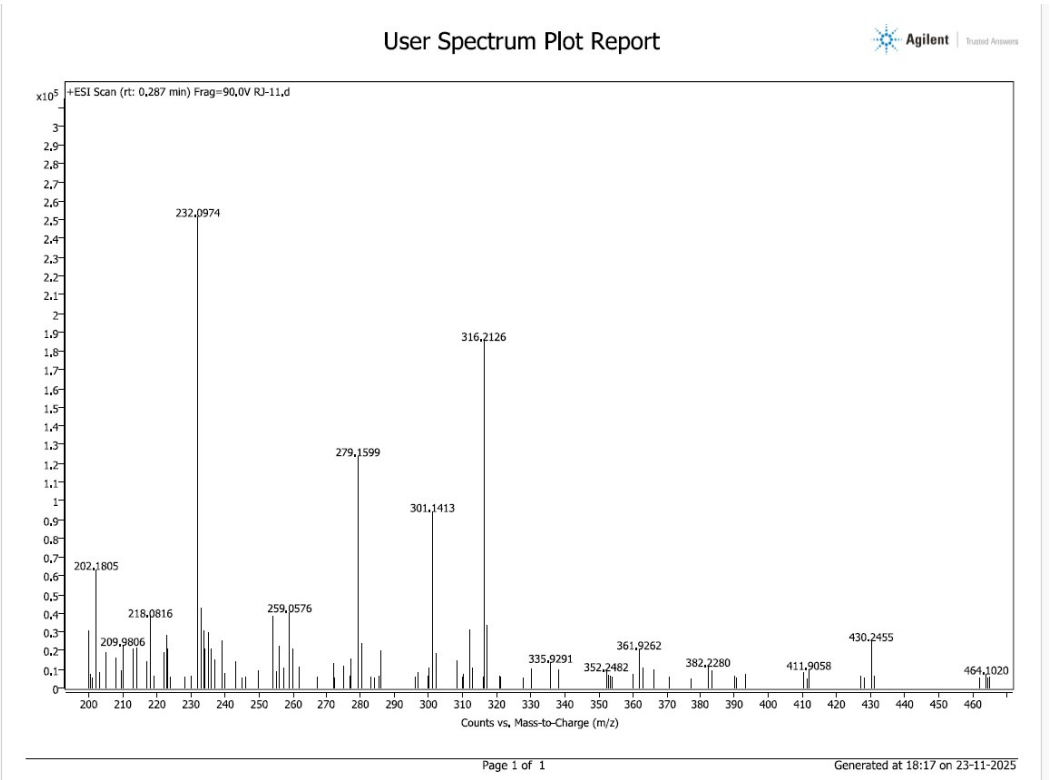


Figure S100. HRMS spectrum of **1L**.

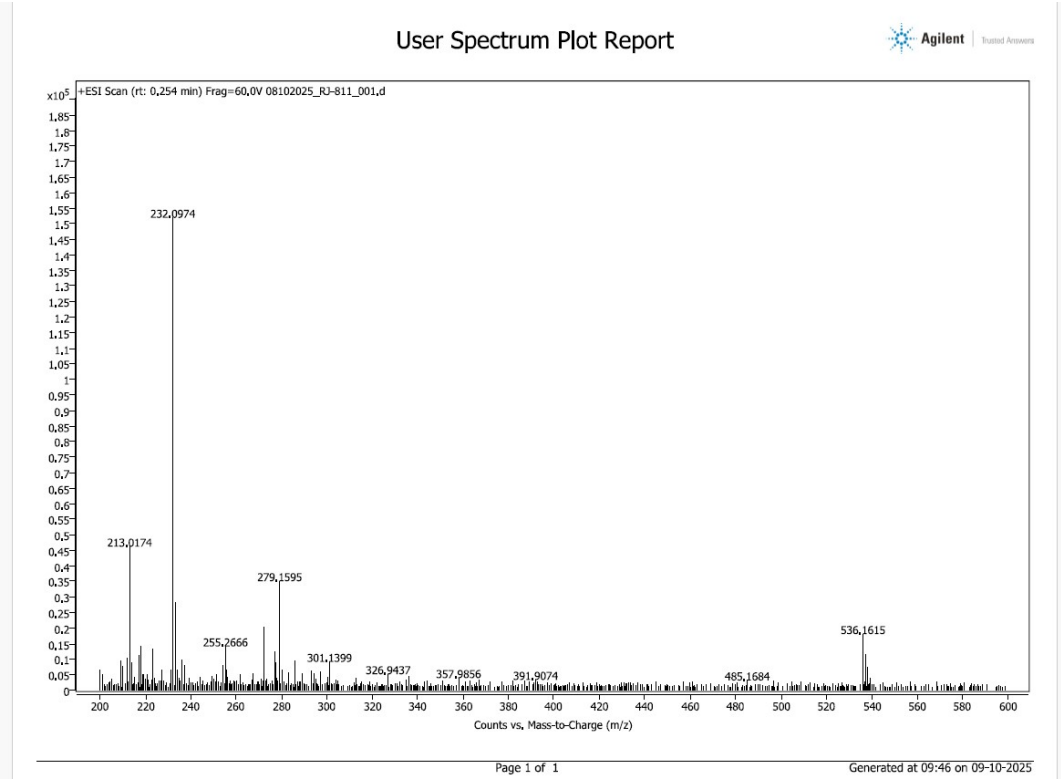


Figure S101. HRMS spectrum of **1M**.

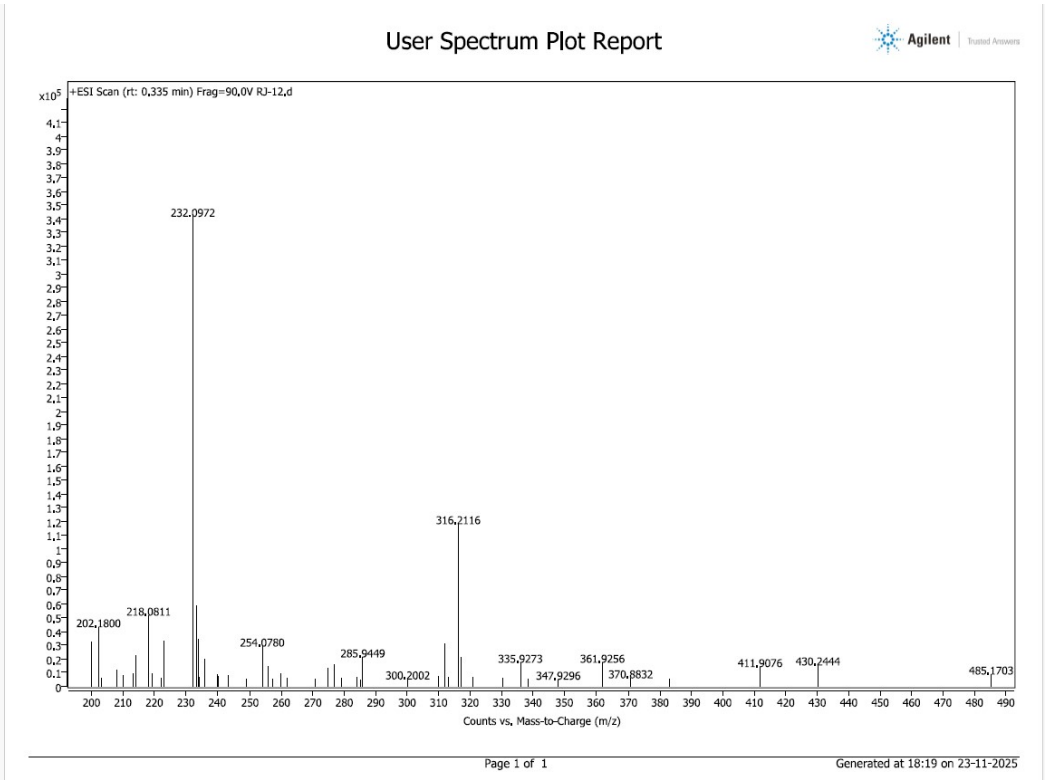


Figure S102. HRMS spectrum of **1N**.

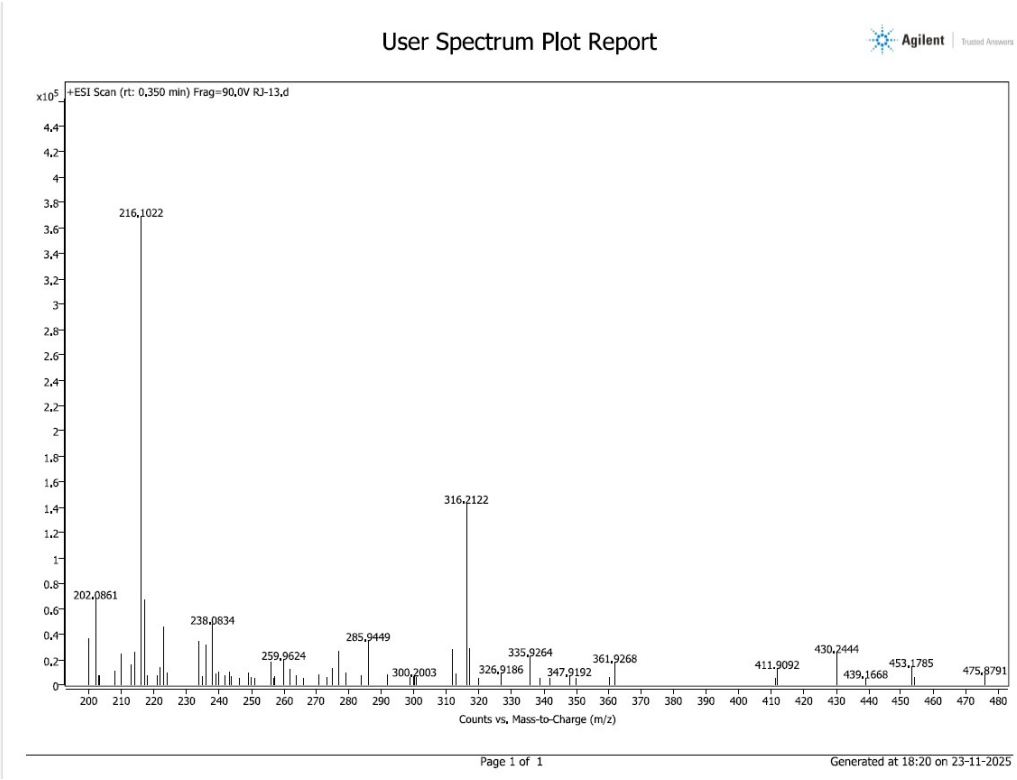


Figure S103. HRMS spectrum of **1O**.

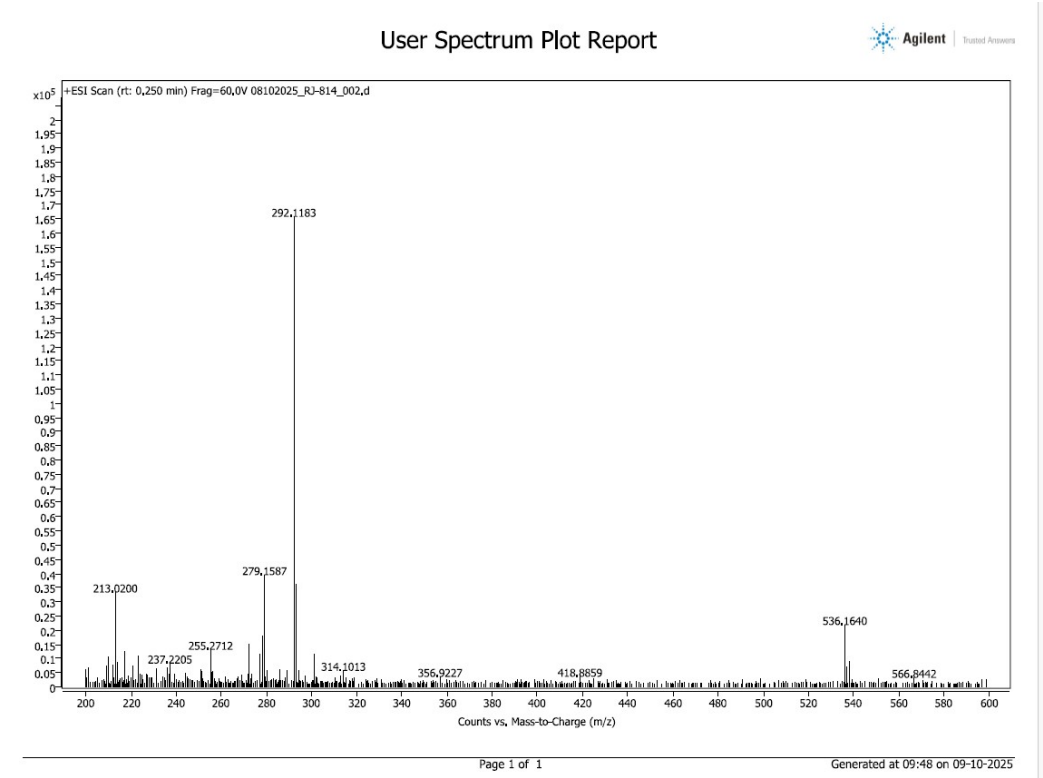


Figure S104. HRMS spectrum of **1P**.

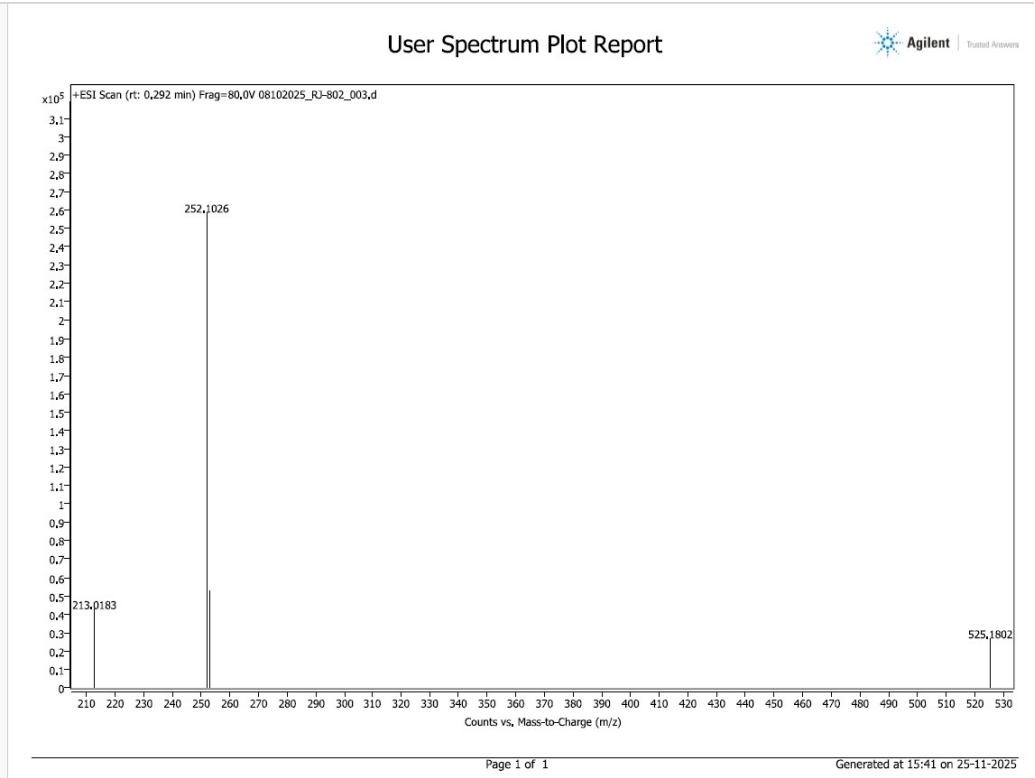


Figure S105. HRMS spectrum of **1Q**.

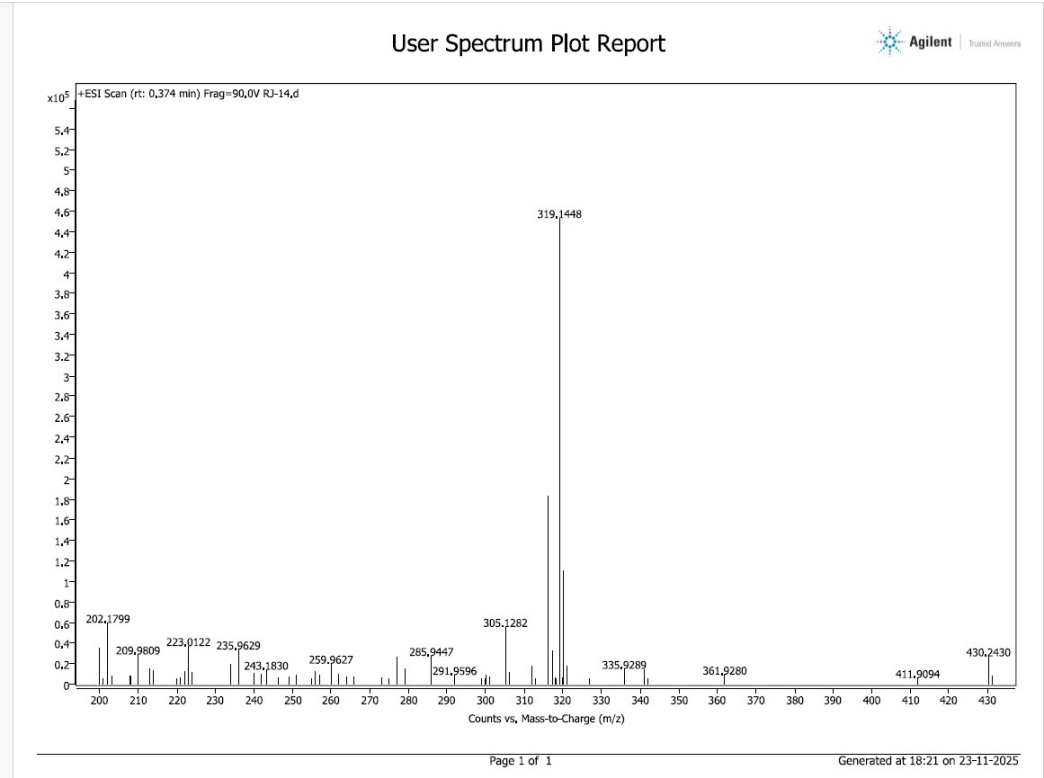


Figure S106. HRMS spectrum of **1R**.

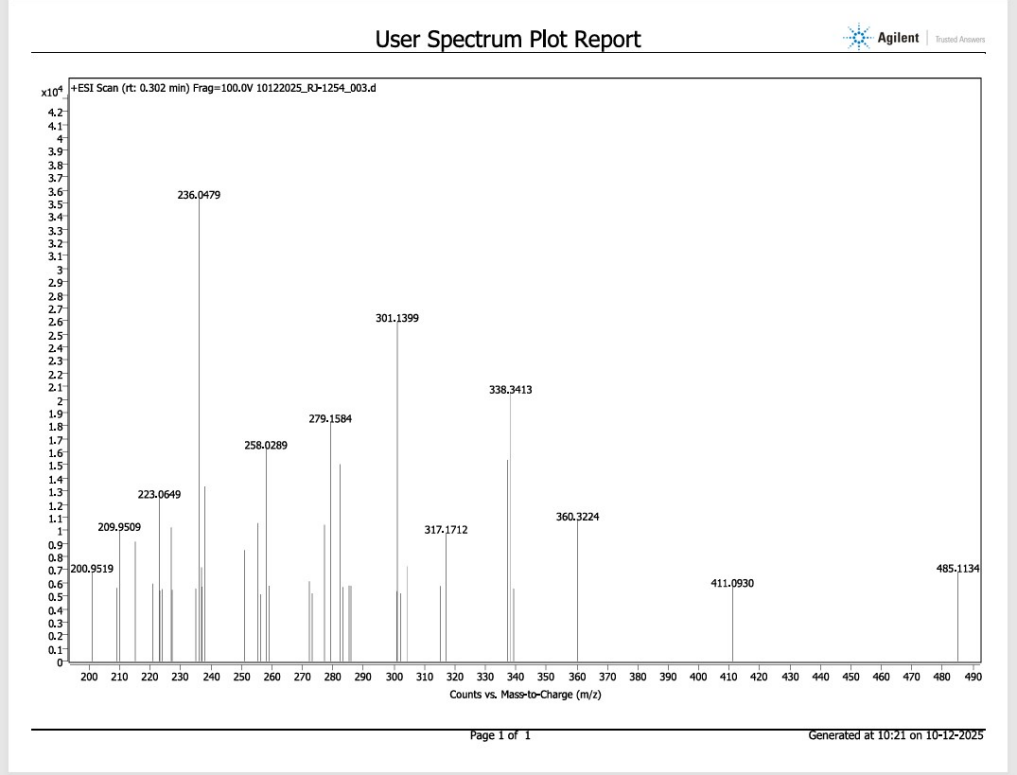


Figure S107. HRMS spectrum of **1S**.

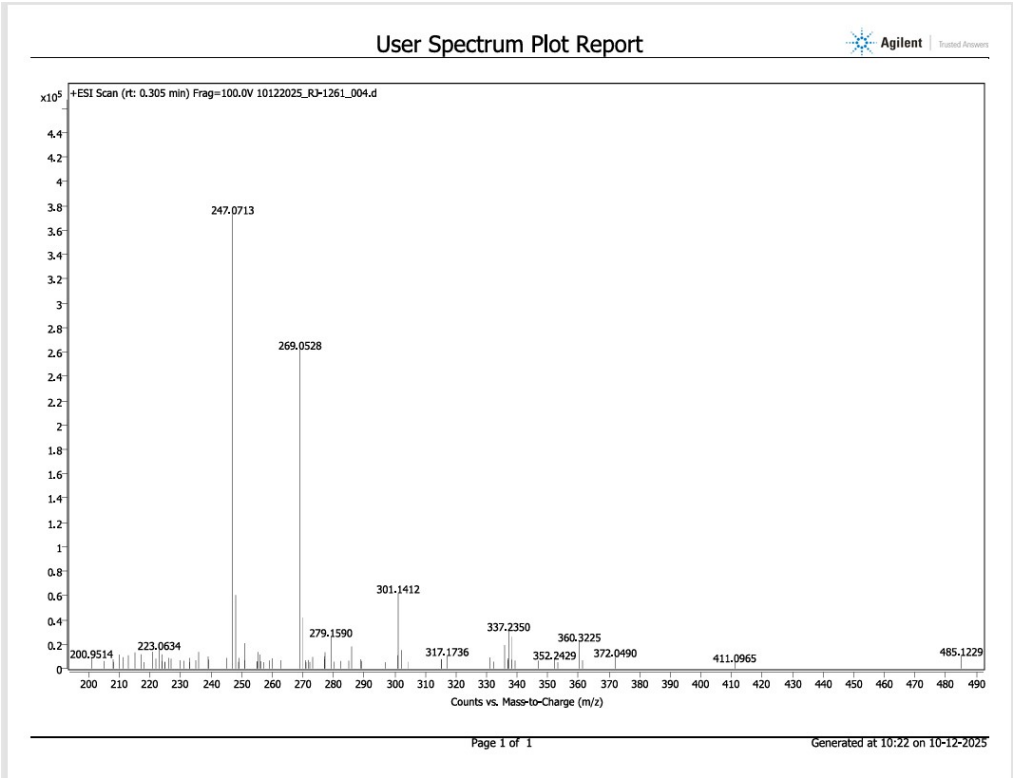


Figure S108. HRMS spectrum of **1T**.

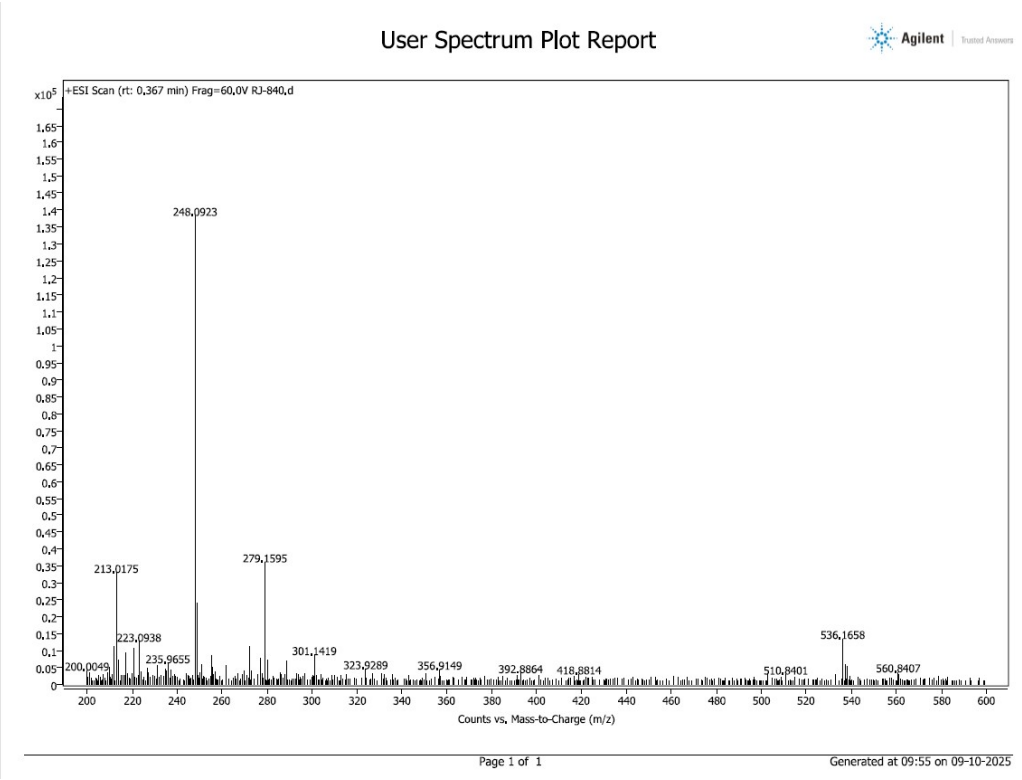


Figure S109. HRMS spectrum of **2B**.

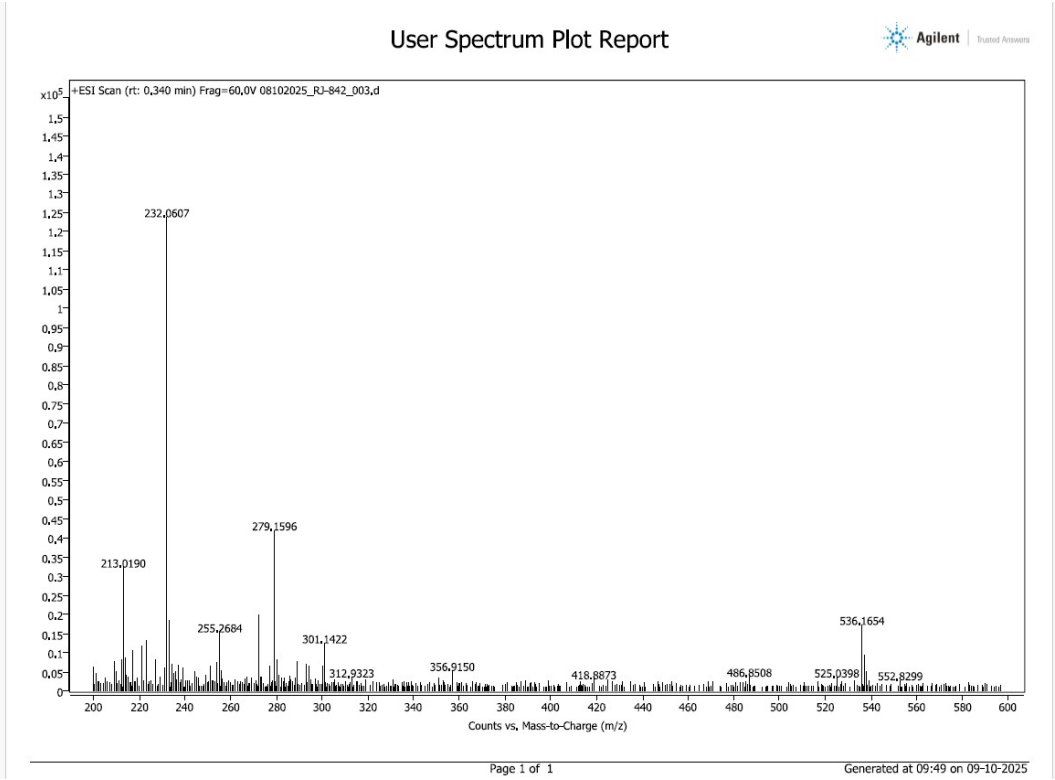


Figure S110. HRMS spectrum of **2C**.

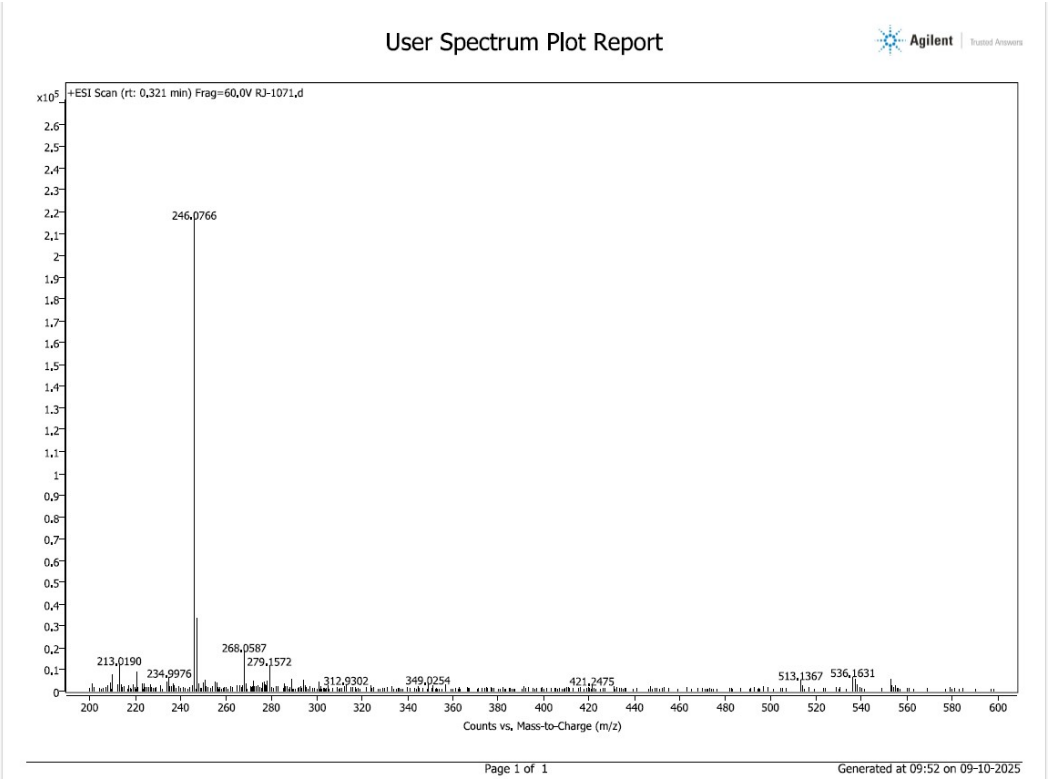


Figure S111. HRMS spectrum of **2D**.

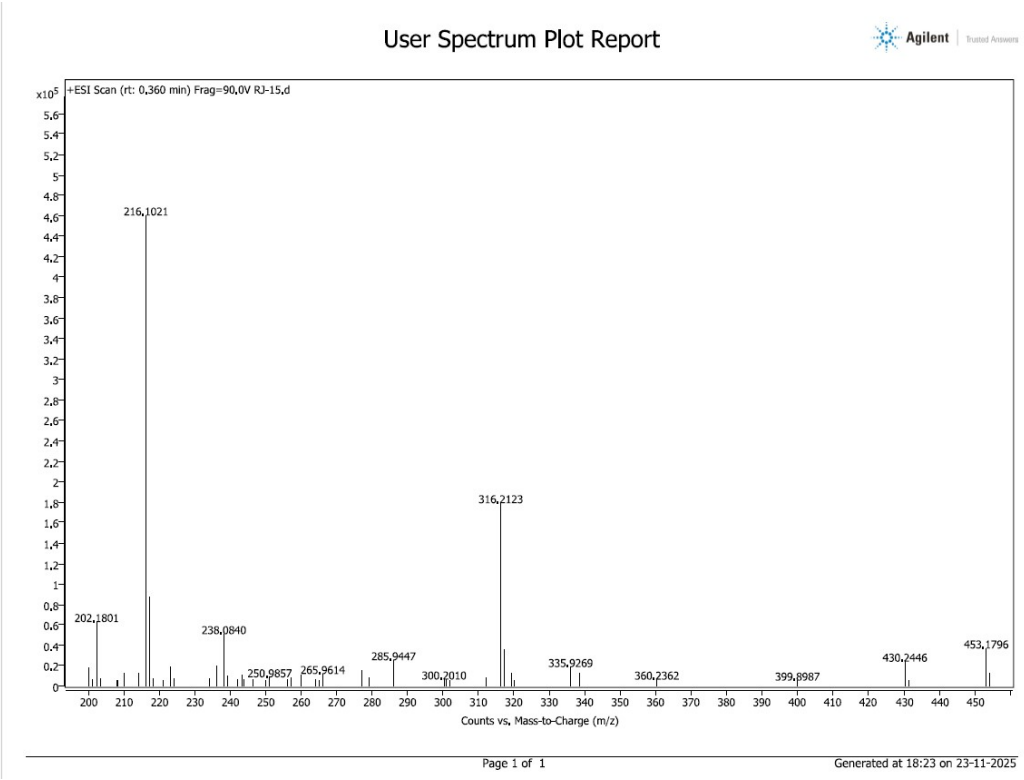


Figure S112. HRMS spectrum of **2E**.

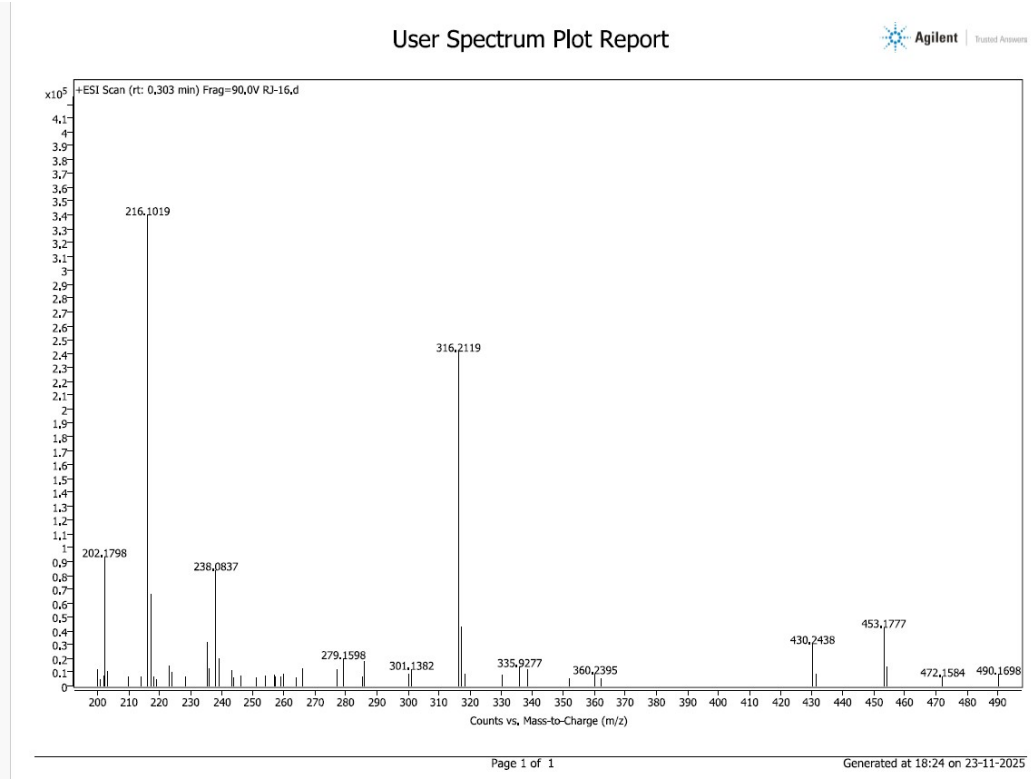


Figure S113. HRMS spectrum of **2K**.

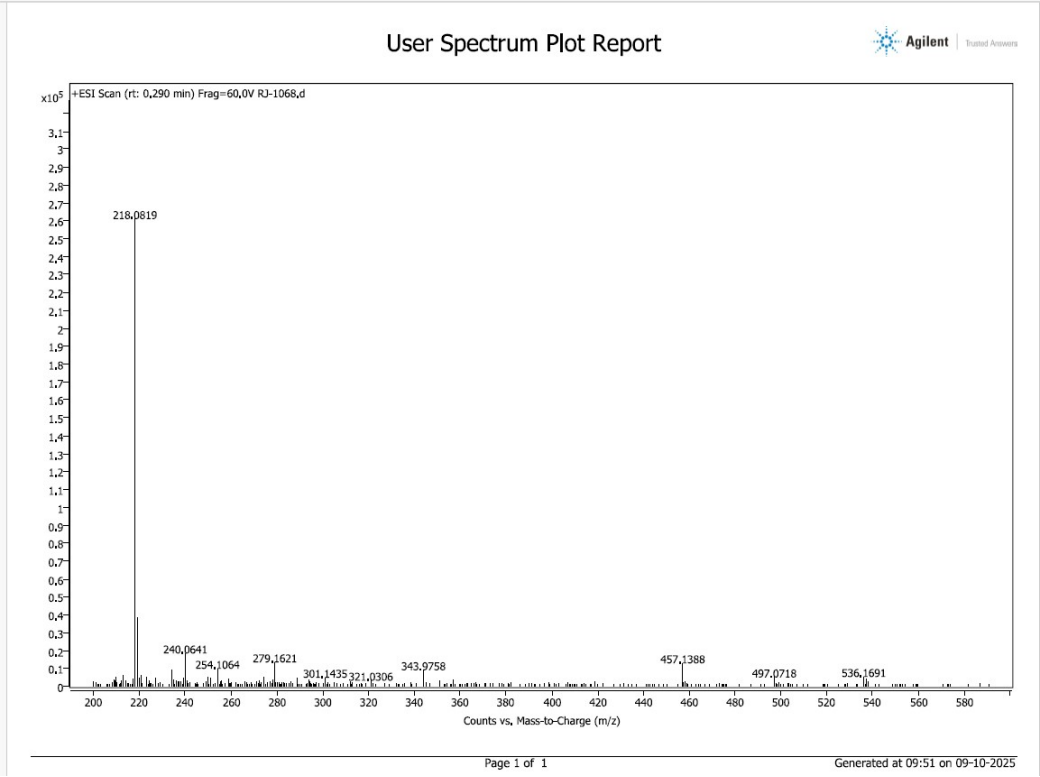


Figure S114. HRMS spectrum of **2M**.

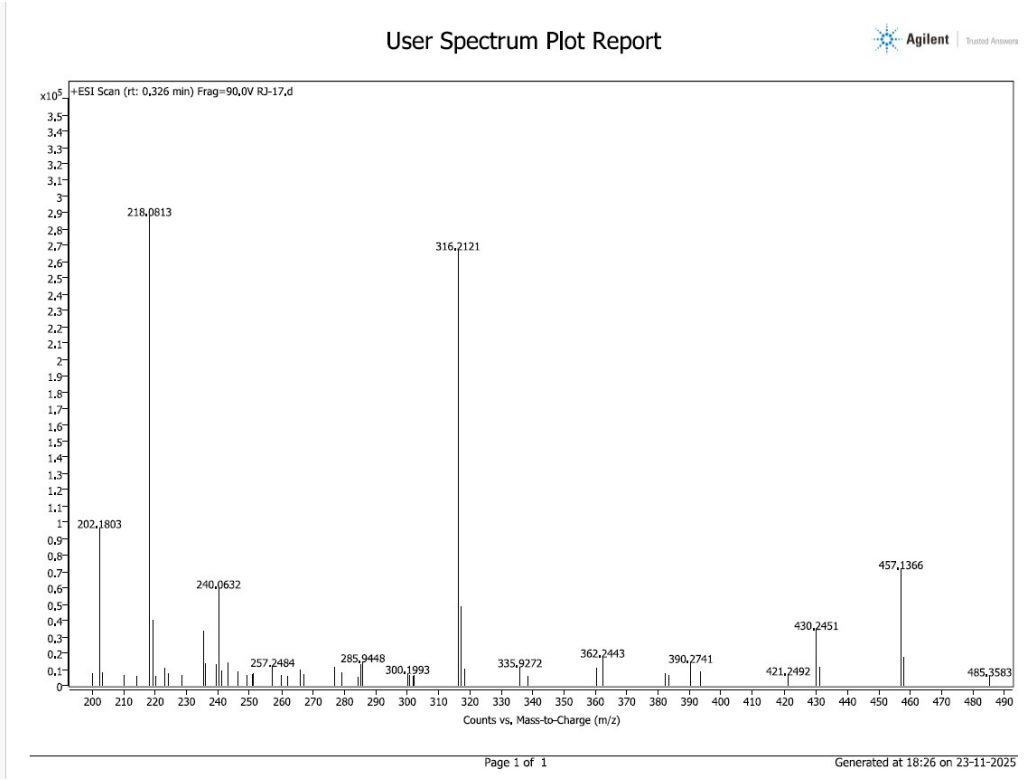


Figure S115. HRMS spectrum of **2N**.

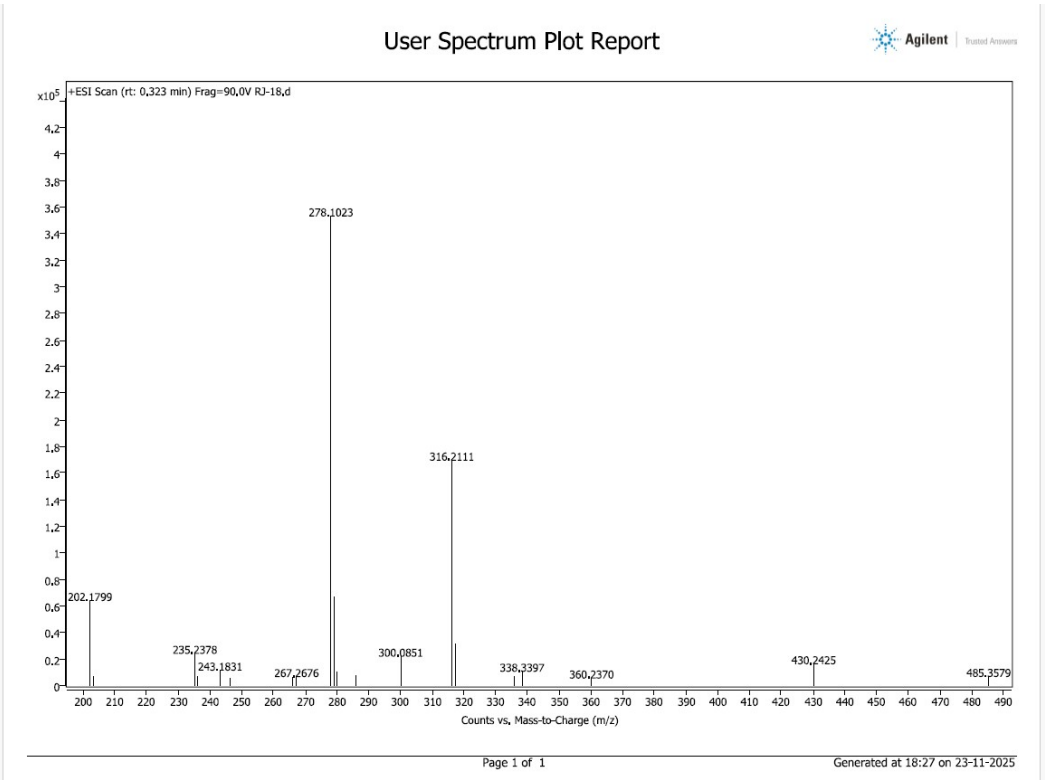


Figure S116. HRMS spectrum of **2P**.

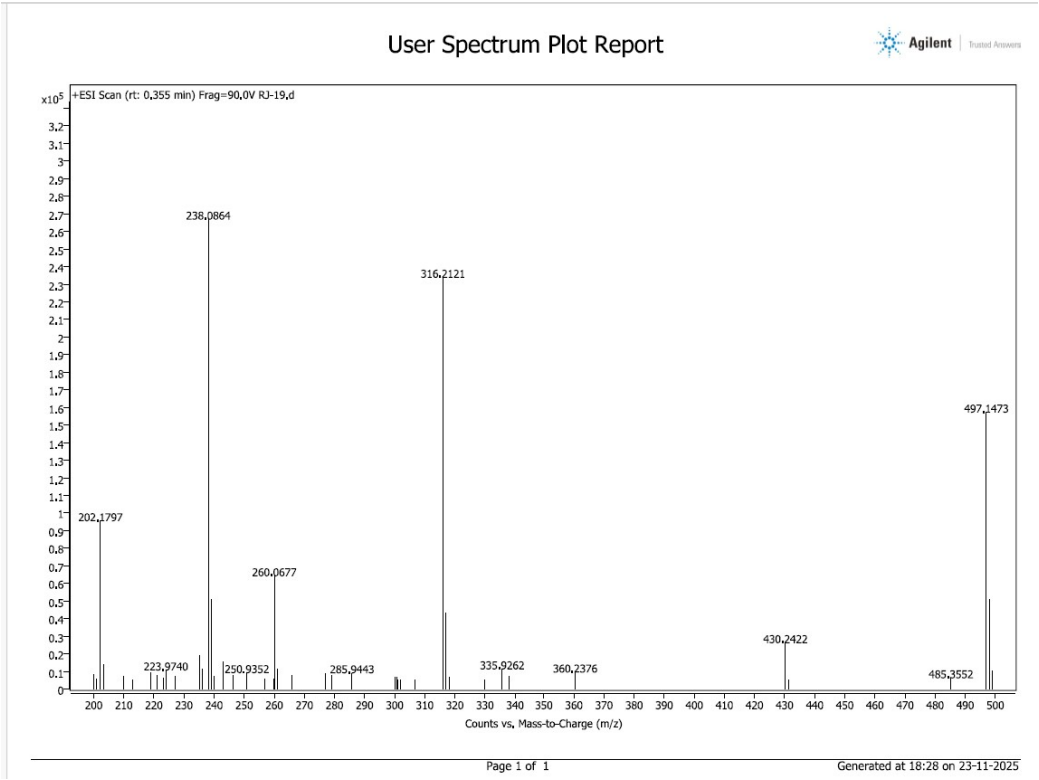


Figure S117. HRMS spectrum of **2Q**.

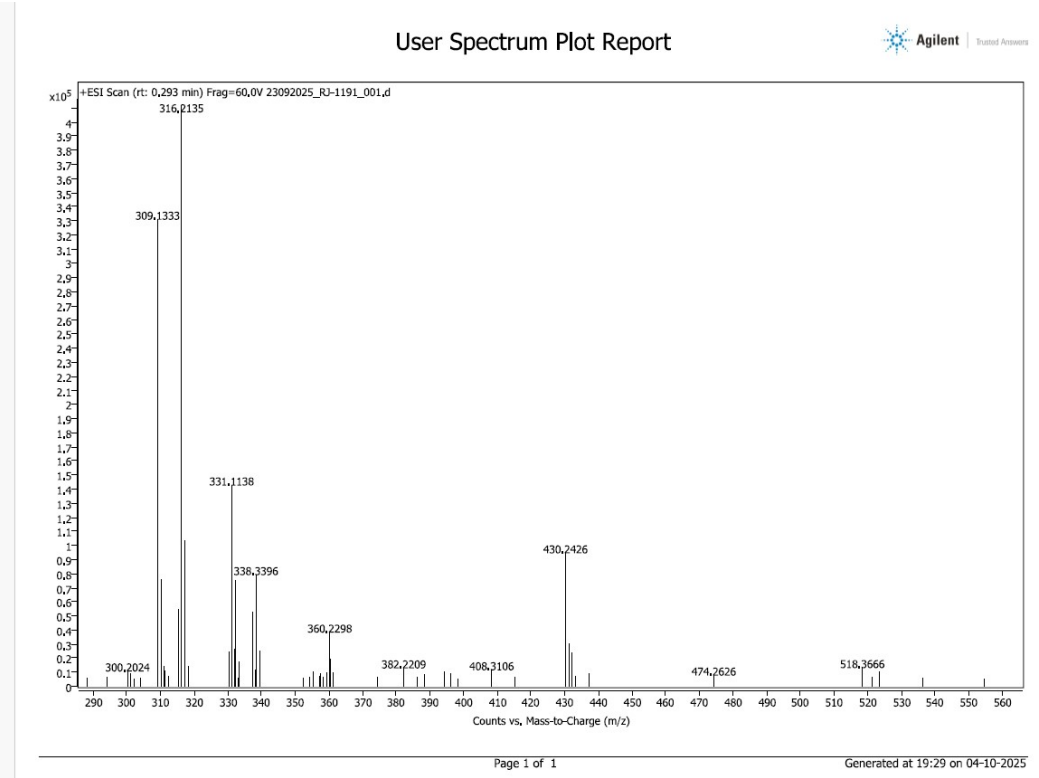


Figure S118. HRMS spectrum of **1W**.

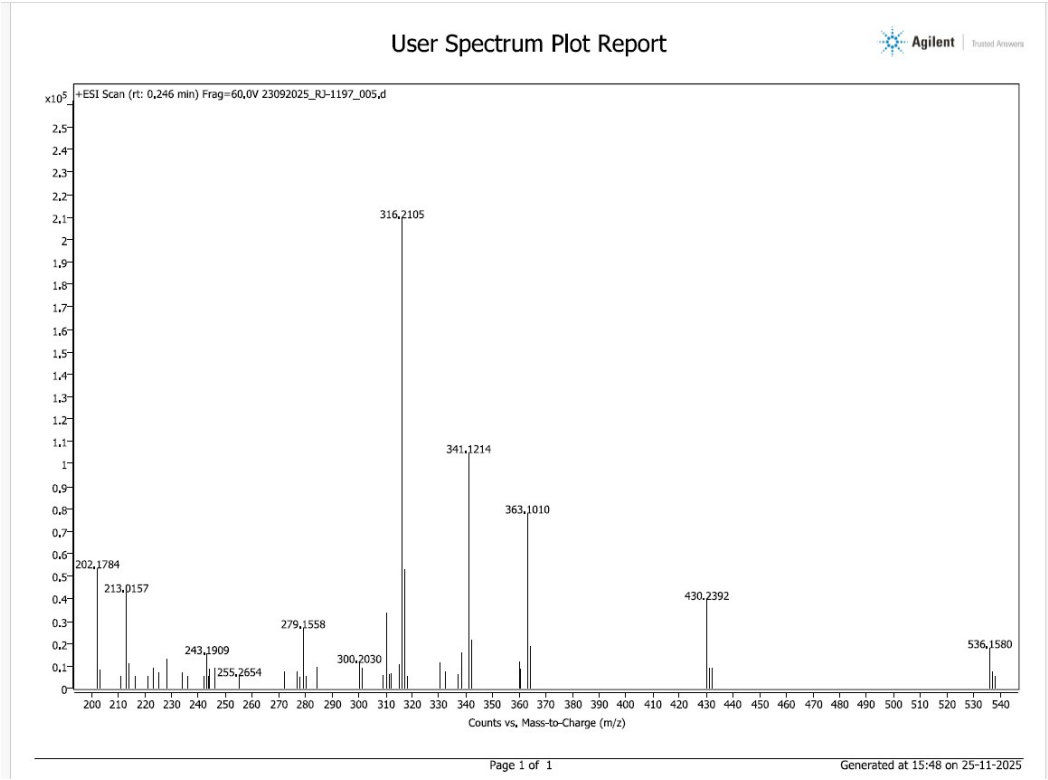


Figure S119. HRMS spectrum of **1X.**

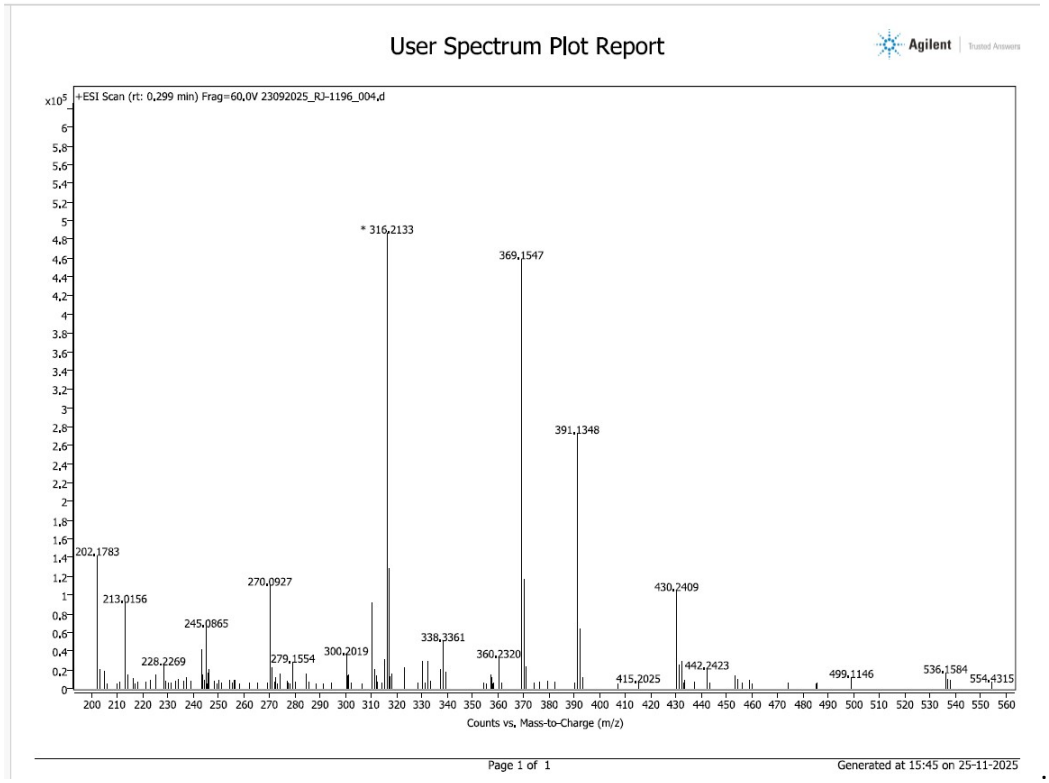


Figure S120. HRMS spectrum of **1Y.**

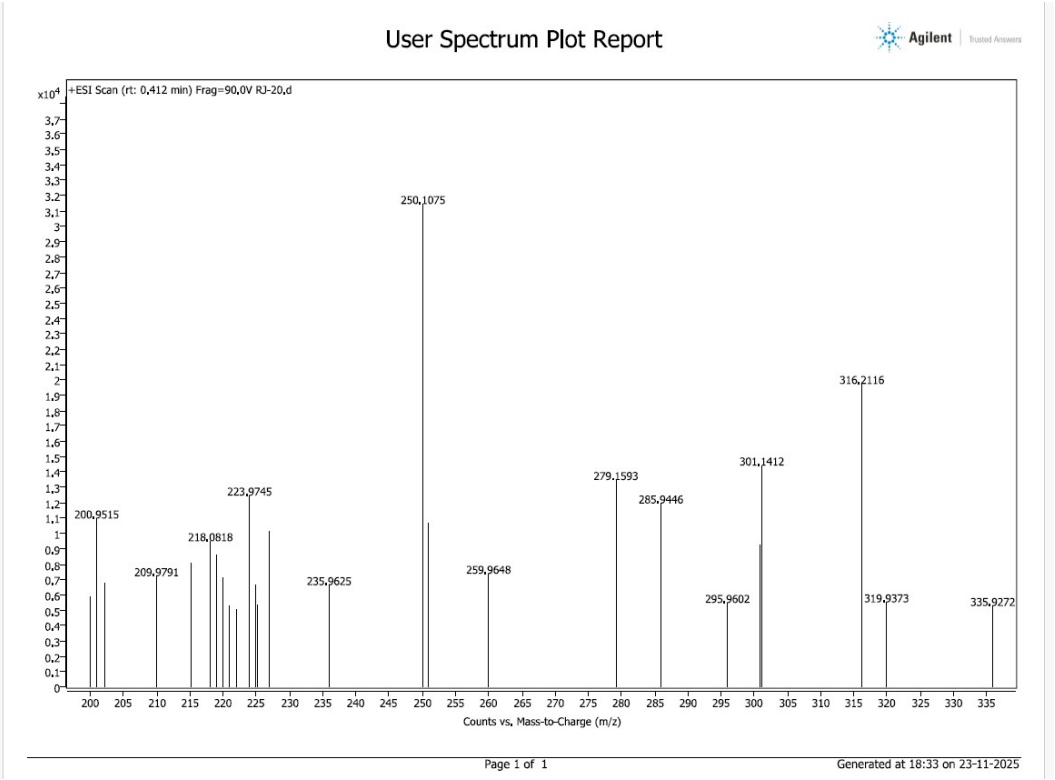


Figure S121. HRMS spectrum of **6**.

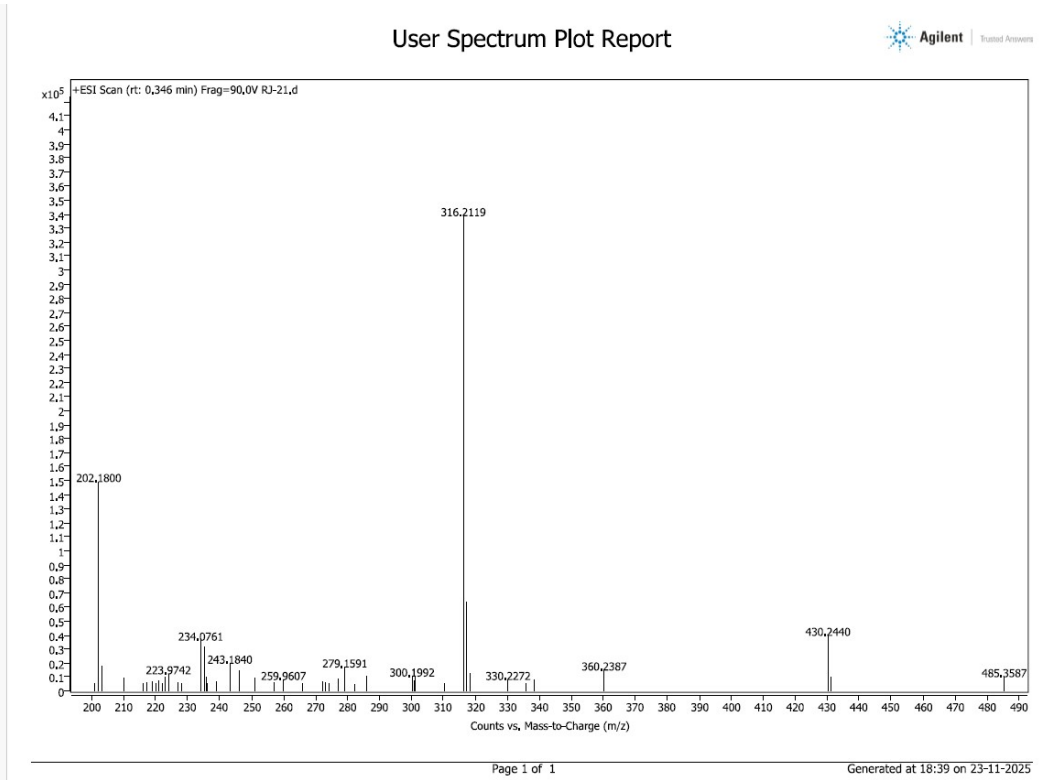


Figure S122. HRMS spectrum of **7**.

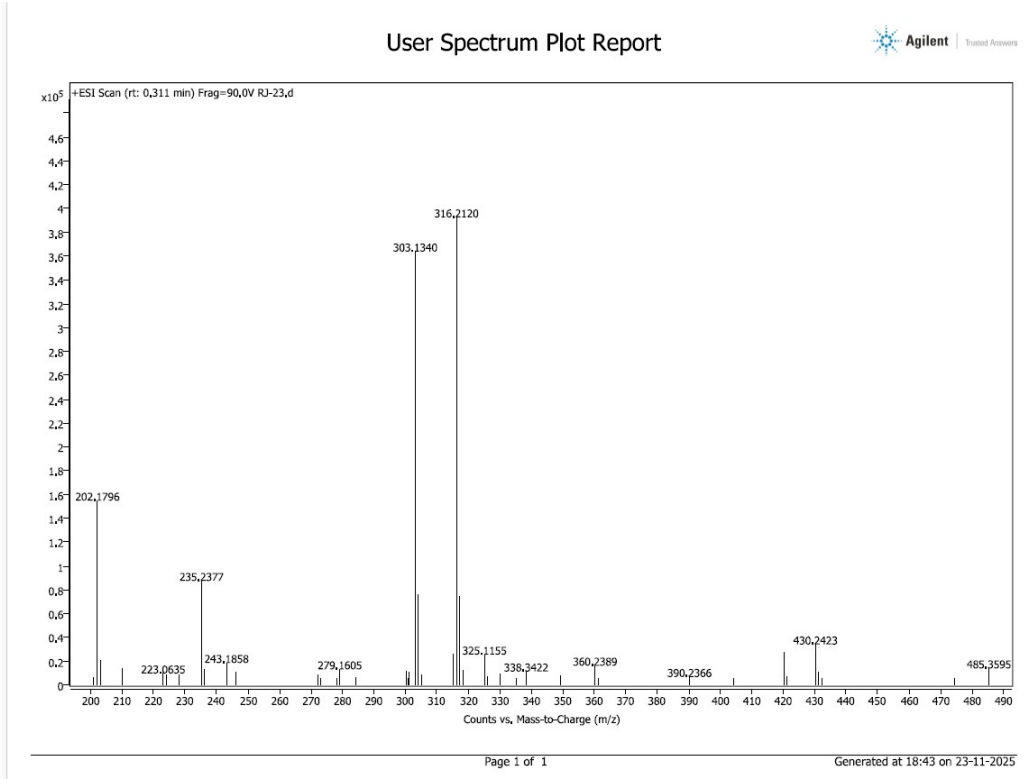


Figure S123. HRMS spectrum of **8**.

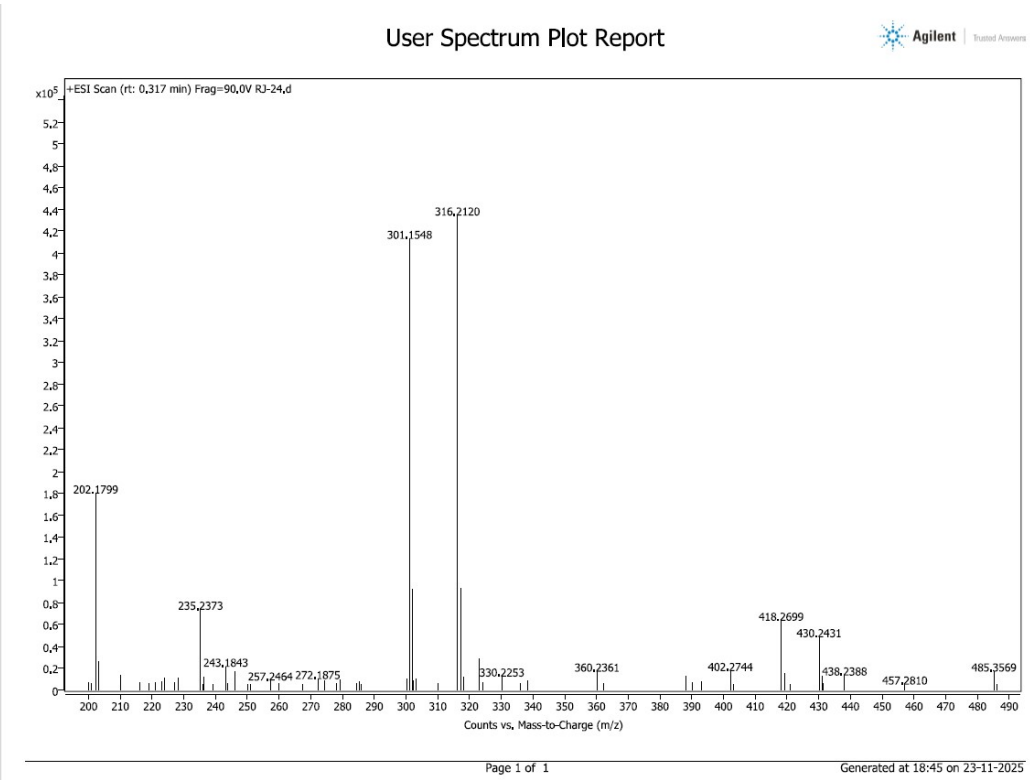


Figure S124. HRMS spectrum of **9**.

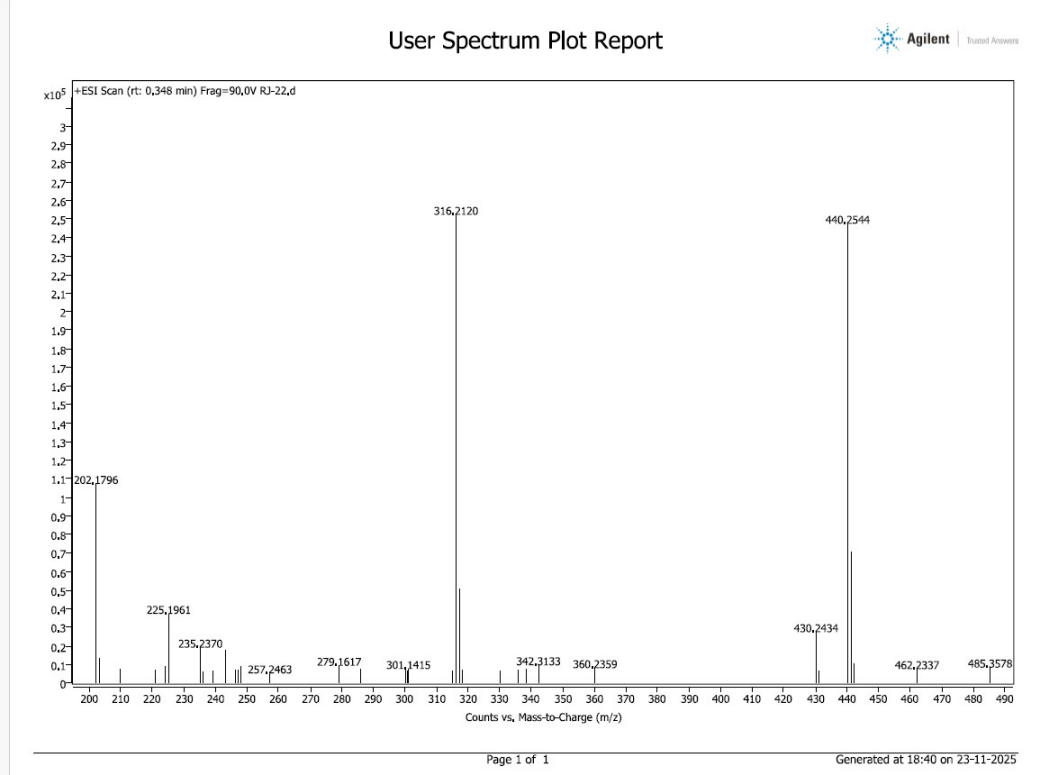


Figure S125. HRMS spectrum of **10**.

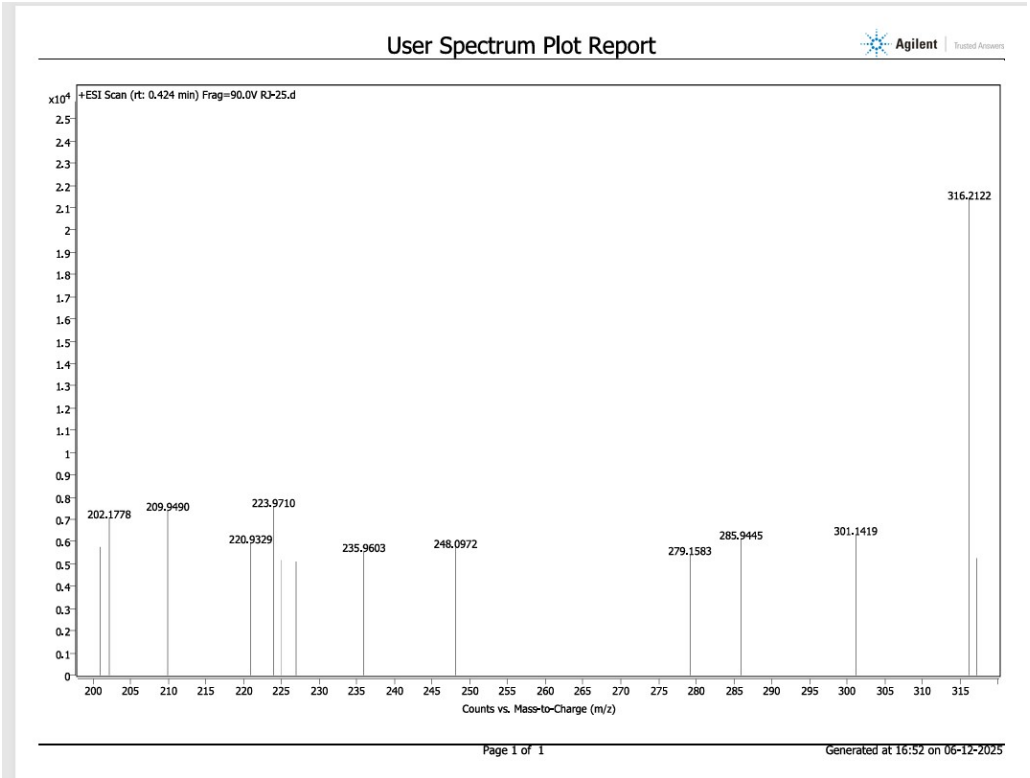


Figure S126. HRMS spectrum of **11**.

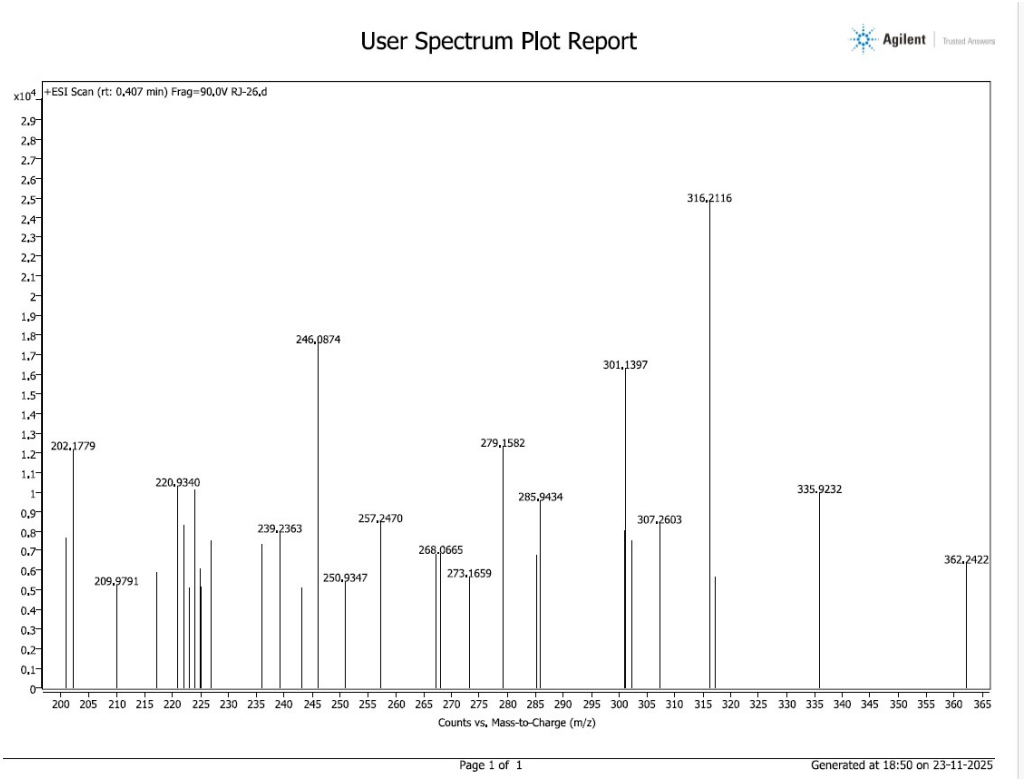


Figure S127. HRMS spectrum of **12**.

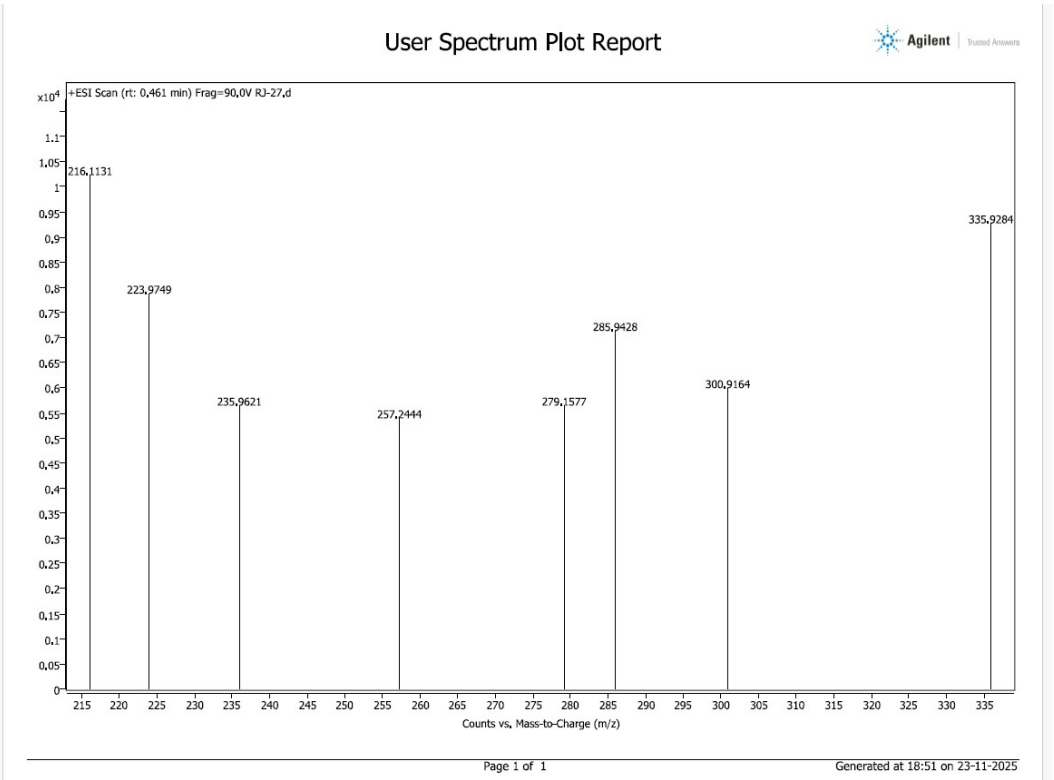


Figure S128. HRMS spectrum of **13**.

5. Photophysical spectra's of synthesised compounds.

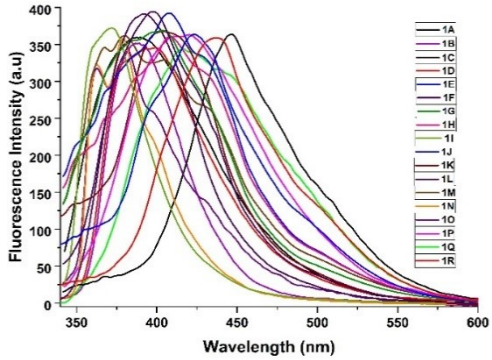


Figure S129. Emission spectrums of ethyl quinoline-2-carboxylate derivatives excited (λ_{Ex}) at 330 nm.

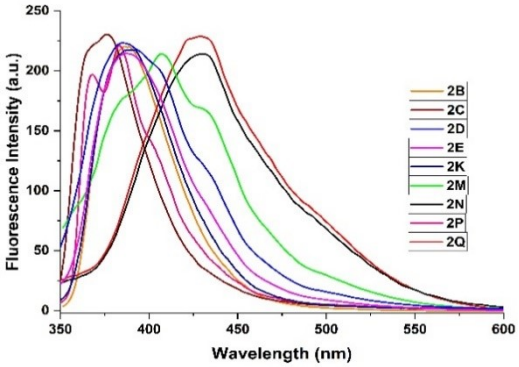
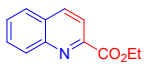
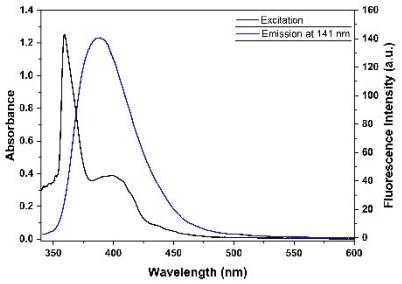
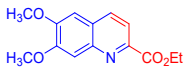


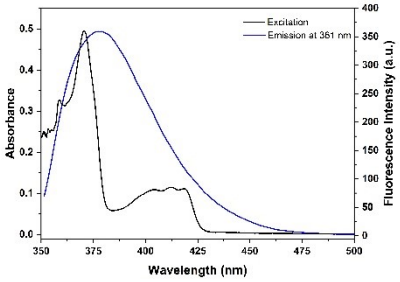
Figure S130. Emission spectrums of methyl quinoline-2-carboxylate derivatives excited (λ_{Ex}) at 330 nm.

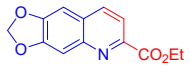
Figure S131. Photophysical properties and graphical data of quinoline-2-carboxylate derivatives.

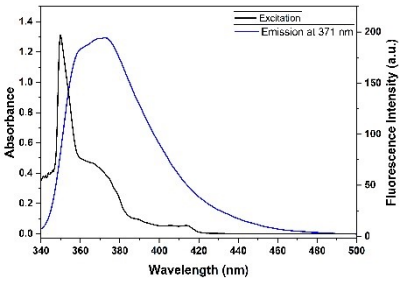
1A	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	388	141	0.10

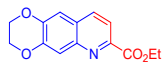


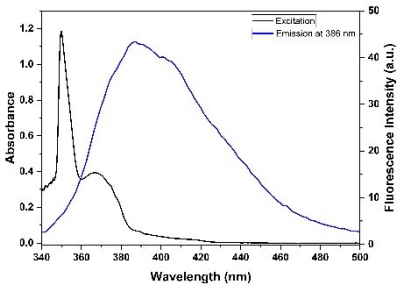
1B	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	370	361	0.15

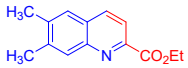


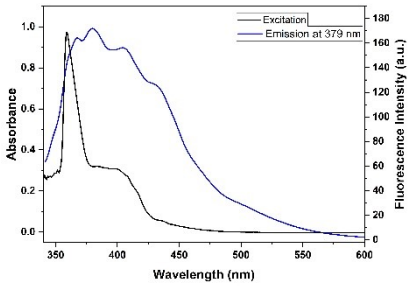
1C	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	371	195	0.14

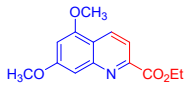


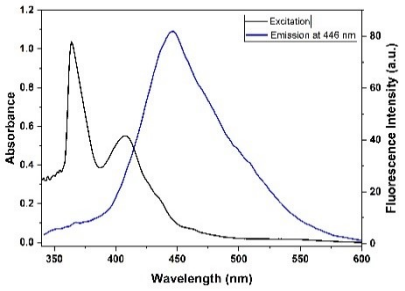
1D	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	386	44	0.14

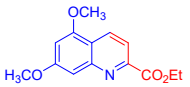


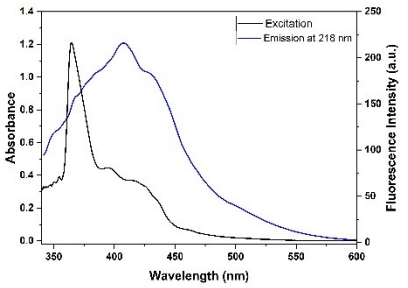
1E	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	379	173	0.24

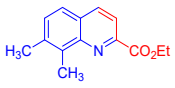


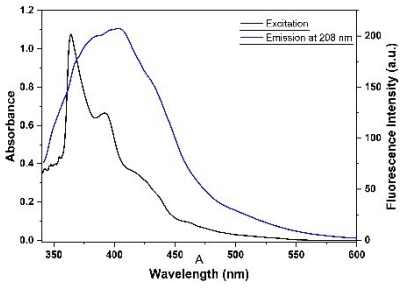
1F	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	446	82	0.32



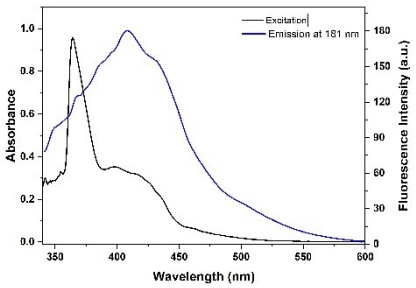
1G	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	407	218	0.25

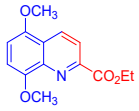


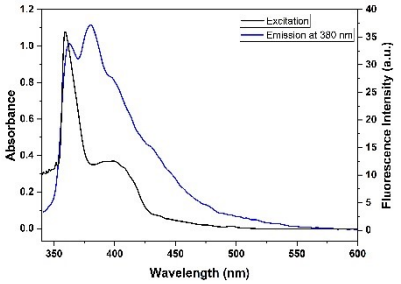
1H	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	403	208	0.23

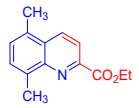


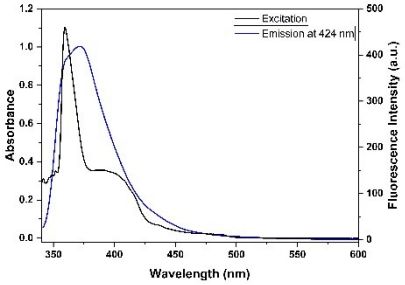
1I	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	408	181	0.29

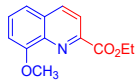


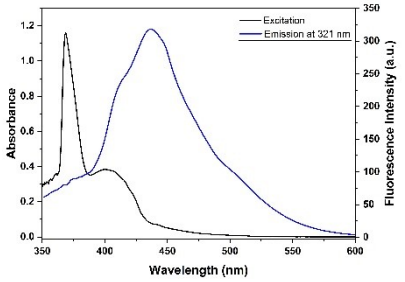
1J	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	380	37	0.14

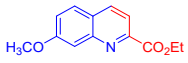


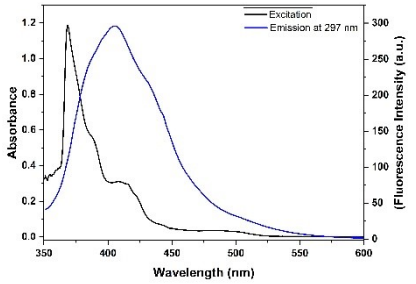
1K	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	370	424	0.26

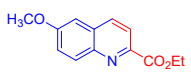


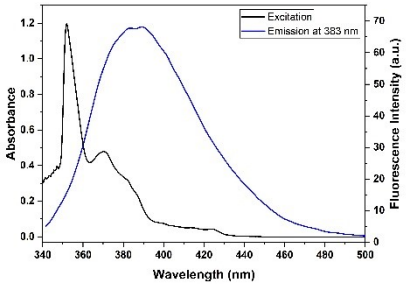
1L	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	436	321	0.29

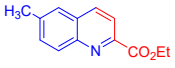


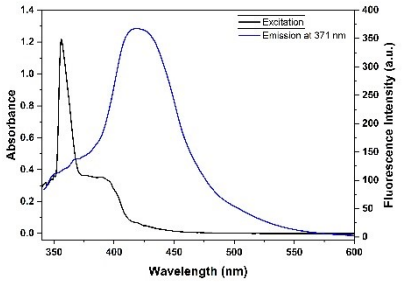
1M	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	401	297	0.29

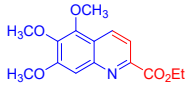


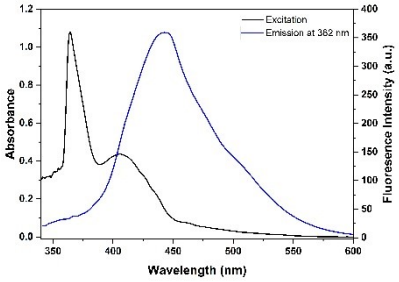
1N	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	383	68	0.21

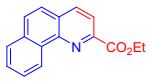


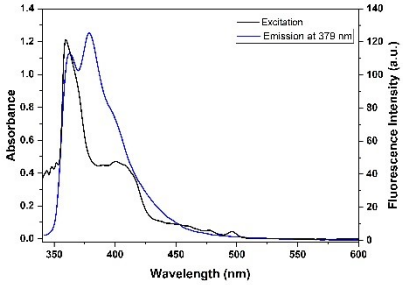
1O	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	418	371	0.31

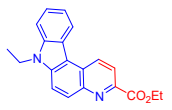


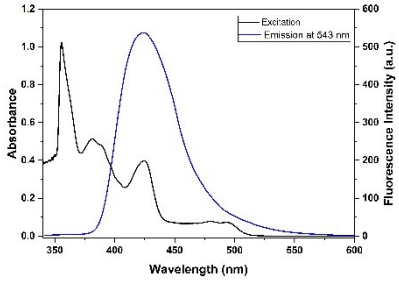
1P	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	442	362	0.25

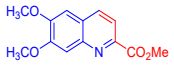


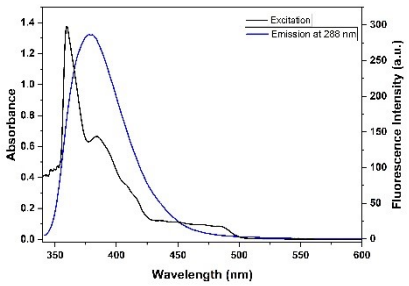
1Q	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	379	126	0.13

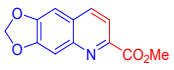


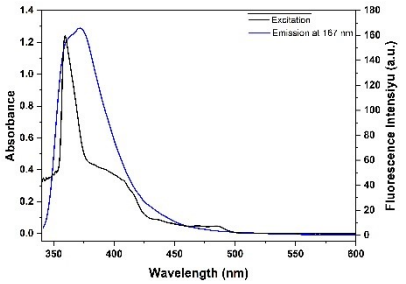
1R	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	422	543	0.33

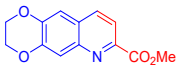


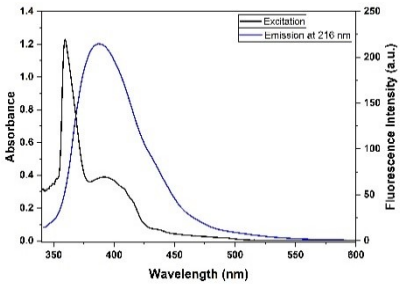
2B	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	380	288	0.17

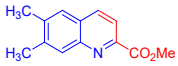


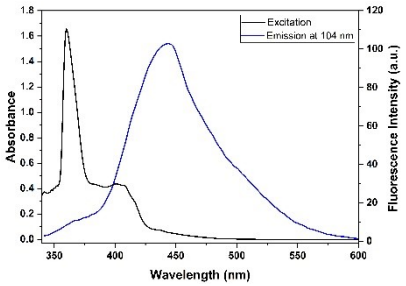
2C	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	370	167	0.15

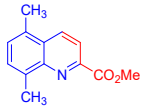


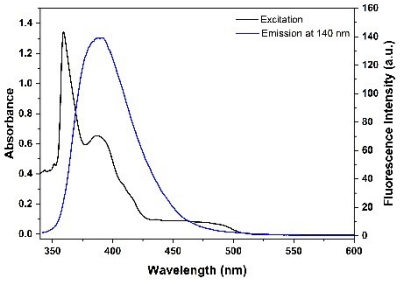
2D	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	387	216	0.19

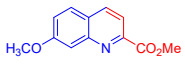


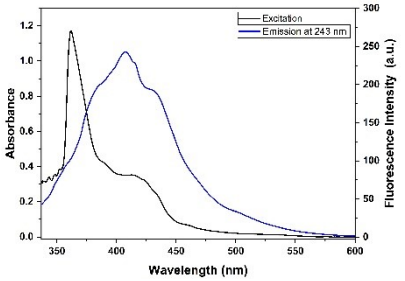
2E	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	443	104	0.13

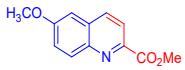


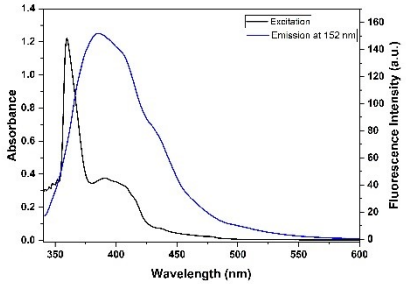
2K	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	387	140	0.12

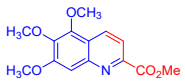


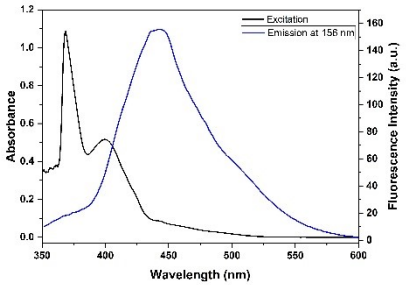
2M	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	407	243	0.21

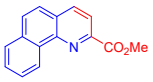


2N	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	384	152	0.23



2P	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	441	156	0.16



2Q	UV-Vis	Fluorescence		Φ_F
	λ_{Ex} (nm)	λ_{Em} (nm)	Intensity	
	330	379	144	0.12