Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information

Profiling Structural Diversity and Activity of 2-Alkyl-4(1*H*)-quinolone *N*-oxides of *Pseudomonas* and *Burkholderia*

Dávid Szamosvári,[†] Michaela Prothiwa,[†] Cora Lisbeth Dieterich [†] and Thomas Böttcher *

Department of Chemistry, Konstanz Research School Chemical Biology,
Zukunftskolleg, University of Konstanz, 78457 Konstanz, Germany.
E-mail: Thomas.Boettcher@uni-konstanz.de

[†] These authors contributed equally

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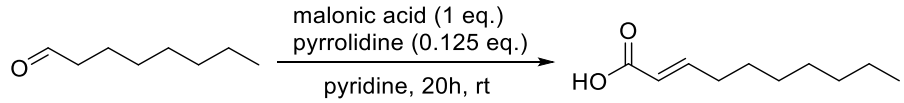
1. Materials and Methods

Chemicals and solvents for the synthesis were purchased from Sigma-Aldrich, Acros Organics, Carl Roth or VWR Chemicals and were used without further purification. For silica gel chromatography, distilled technical grade solvents and silica gel 60 A (Carl Roth) was used. Thin layer chromatography (TLC) was performed using aluminum sheets "TLC Silica gel 60 F254" from Merck Millipore® and analyzed with UV-light or by permanganate staining. NMR spectra were obtained on Bruker Avance-III 400 and Bruker Avance-III 600 NMR spectrometers at ambient temperature. Multiplicities are given as follows: s - singlet, d - doublet, t - triplet, q - quartet, quint. - quintet, m - multiplet. Chemical shifts (δ) are given in parts per million (ppm) relative to the solvent residual signal with $CDCl_3$ δ_H = 7.26 ppm and δ_C = 77.16 ppm, DMSO-d_6 δ_H = 2.50 ppm and δ_C = 39.52 ppm, CD_3OD δ_H = 3.31 ppm and δ_C = 49.00 ppm.[1] The obtained data were processed and analyzed with Bruker Topspin 3.5 software. Low-resolution mass spectra were measured on a Bruker Amazon SL IonTrap mass spectrometer. High-resolution mass spectrometry data were obtained on a Hybrid FT Mass Spectrometer LTQ Orbitrap Velos (Thermo Scientific). MS/MS analysis was performed by a Finnigan™ TSQ® Quantum (Thermo Scientific) mass spectrometer.

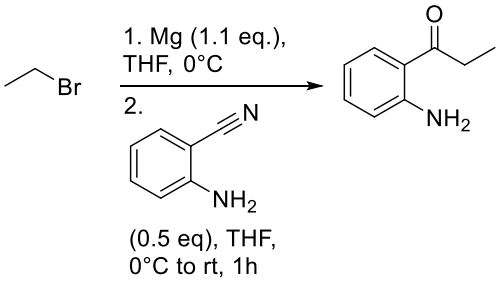
2. Synthesis

(*E*)-Dec-2-enoic acid (**5**)



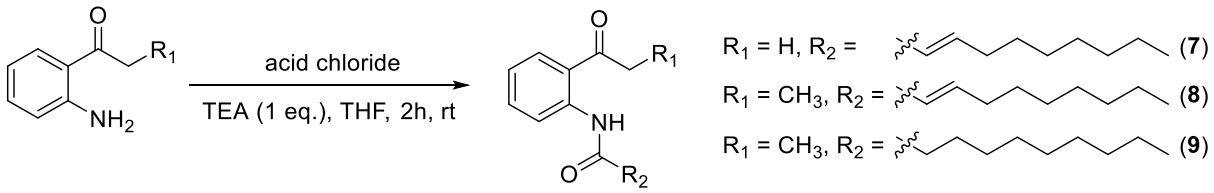
Malonic acid (6.67 g, 64.0 mmol, 1 eq.) was dissolved in pyridine (26.7 mL) and octanal (10.0 mL, 64.0 mmol, 1 eq.) was added. Then, pyrrolidine (666 µL, 8.0 mmol, 0.125 eq.) was added. The solution turned yellow, heated up and the formation of gas was observed. The solution was stirred overnight at room temperature. The reaction was quenched by pouring it on iced water (500 mL). 30 mL of conc. HCl were added dropwise until a pH of 1 was reached. The aqueous phase was extracted with 5 x 100 mL ethyl acetate and the combined organic phases were washed with brine (3 x 100 mL) and dried over $MgSO_4$. The solvent was evaporated and the product was obtained as a colorless oil in 93% yield. ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 0.89 (t, 3H, *J* = 6.9 Hz, H-10), 1.19-1.40 (m, 8H, H-6 - H-9), 1.47 (m, 2H, H-5), 2.23 (dt, 2H, *J* = 7.0, Hz *J* = 7.1 Hz, H-4), 5.82 (d, 1H, *J* = 15.6 Hz, H-2), 7.09 (m, 1H, H-3). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 14.2 (C-10), 22.8, 29.2, 29.2, 32.5 (C-9 - C-6), 28.02 (C-5), 31.9 (C-4), 120.5 (C-2), 152.8 (C-3), 171.8 (C-1).

1-(2-Aminophenyl)propan-1-one (**6**)



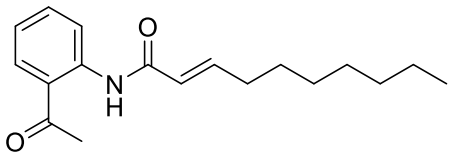
Bromoethane (3.7 mL, 50.0 mmol, 1 eq.) was dissolved in 30 mL dry THF and added dropwise to a three-necked flask with magnesium (1.337 g, 55.0 mmol, 1.1 eq.) under nitrogen atmosphere. The reaction was stirred without external heating until no exothermic formation of the Grignard reagent was noticed by temperature chance. 2-Aminobenzonitrile (2.953 g, 25.0 mmol, 0.5 eq.) was dissolved in dry THF and added slowly to the Grignard reagent at 0°C. The solution turned green, then reddish until a yellow precipitate was formed. The reaction mixture was stirred for 1 h at room temperature and was neutralized with 1 M HCl. After extraction with ethyl acetate, the combined organic phases were washed with sat. aq. $NaHCO_3$ and brine and dried over $MgSO_4$. The solvent was evaporated, followed by purification by column chromatography (petroleum ether: ethyl acetate 5:1). The product was obtained as a yellow oil in 15% yield. R_f = 0.53 (petrol ether/ethyl acetate 5:1). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 1.22 (t, 3H, *J* = 7.3 Hz, CH_3), 2.98 (q, 2H, *J* = 7.3 Hz, CH_2), 6.28 (s, br, 2H, NH_2), 6.65 (t, 1H, *J* = 6.3 Hz, H-5), 6.66 (d, 1H, *J* = 7.6 Hz, H-3), 7.26 (t, 1H, *J* = 8.2 Hz, H-4), 7.76 (d, 1H, *J* = 8.3 Hz, H-6). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 8.8 (CH_3), 32.3 (CH_2), 115.8 (C-5), 117.4 (C-3), 117.9 (C-1), 131.1 (C-6), 134.1 (C-4), 150.3 (C-2-NH_2), 203.4 (C=O). ESI-HRMS: m/z = 150.0910 $[M+H]^+$, calc. for $C_9H_{11}NO + H^+$ = 150.0913.

General procedure for the formation of *N*-acyl-ortho-acylanilines **7**, **8** and **9**



In the cases of **7** and **8**, the (*E*)-dec-2-enoyl chloride was synthesized by dissolving (*E*)-dec-2-enoic acid (**5**) (1 eq.) in dry DCM (20 mL/10 mmol) and oxalylchloride (2 M in DCM, 2 eq.) was added, and the formation of gas was observed after a few drops of DMF were added. The mixture was stirred for 1 h at room temperature. The solvent was evaporated under reduced pressure at 30°C and the remaining crude acid chloride used directly for the amidation. In the case of **9**, commercially available decanoyl chloride was used. The acid chloride was suspended in dry THF (10 mL/10 mmol) and added to a mixture of 2´-aminoacetophenone or 1-(2-aminophenyl)propan-1-one (**6**) (1 eq.) and triethylamine (1 eq.) in dry THF (20 mL/10 mmol) at room temperature *via* a dropping funnel and stirred for 90 min. The reaction mixture was poured onto dest. H_2O, extracted with DCM and washed with brine. After drying over $MgSO_4$, the solvent was evaporated and the product purified by column chromatography.

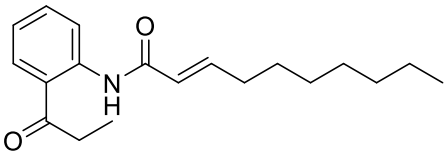
(*E*)-N-(2-Acetylphenyl)dec-2-enamide (**7**)



The compound was obtained as yellow oil in 41% yield after purification by column chromatography with petroleum ether/ethyl acetate 7:1. R_f = 0.5 (petroleum ether/ethyl acetate 7:1). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 0.89 (m, 3H, H-10), 1.25 - 1.36 (m, 8H, H-6 - H-9), 1.50 (m, 2H, H-5), 2.08 (s, 3H, CO-C**H**$_3$), 2.25 (m, 2H, H-4), 6.00 (d, 1H, *J* = 15.4 Hz, H-2), 6.99 (m, 1H, H-3), 7.11 (t, 1H, *J* = 7.4 Hz, H-5'), 7.56 (t, 1H, *J* = 7.8 Hz, H-4'), 7.90 (d, 1H, *J* = 8.1 Hz, H-6'), 8.85 (d, 1H, *J* = 8.7 Hz, H-3'), 11.83 (s, br, 1H, NH). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 14.2 (C-10), 22.8, 28.8, 29.3, 31.9 (C-6 - C-9), 29.2 (CO-**C**H_3), 28.4 (C-5), 32.4 (C-4), 121.0 (C-3'), 121.9 (C-5'), 122.3 (C-1'), 125.4 (C-2), 131.8(C-6'), 135.3 (C-4'), 141.6

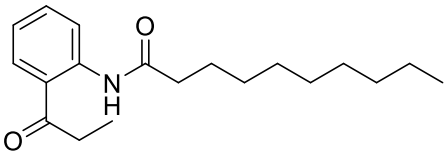
(C-2'), 146.6 (C-3), 165.3 (C-1), 201.5 (C-3), 203.0 (CO). ESI-HRMS: m/z = 288.1953 $[M+H]^+$, calc. for $C_{18}H_{25}NO_2 + H^+ = 288.1958$.

(*E*)-*N*-(2-Propionylphenyl)dec-2-enamide (**8**)



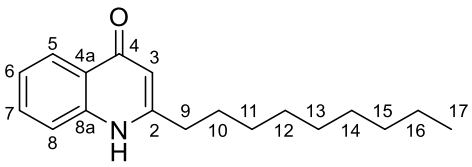
The compound was obtained as yellow oil in 62% yield after purification by column chromatography with petroleum ether/ethyl acetate 7:1. R_f = 0.55 (petroleum ether/ethyl acetate 5:1). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 0.89 (t, 3H, *J* = 6.8 Hz, H-10), 1.20 – 1.37 (m, 8H, H-6 - H-9), 1.23 (t in m, 3H, *J* = 7.14 Hz, CH_2-C**H**$_3$), 1.50 (m, 2H, H-5), 2.25 (m, 2H, H-4), 3.08 (q, 2H, *J* = 7.22 Hz, CO-CH_2), 6.02 (d, 1H, *J* = 15.36 Hz, H-2), 6.99 (dt, 1H, *J* = 15.39 Hz, *J* = 7.00 Hz, H-3), 7.10 (t, 1H, *J* = 7.51 Hz, H-4'), 7.54 (t, 1H, *J* = 8.14 Hz, H-5'), 7.93 (d, 1H, *J* = 8.14 Hz, H-3'), 8.85 (d, 1H, *J* = 8.52 Hz, H-6'), 11.87 (s, br, 1H, NH). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 8.6 (CH_2-**C**H_3), 14.2 (C-10), 22.8, 29.2, 29.3, 31.9 (C-6, C-7, C-8, C-9), 28.4 (C-5), 32.3 (C-4), 33.3 (CO-**C**H_2), 121.2 (C-6'), 121.6 (C-2'), 122.3 (C-4'), 125.4 (C-2), 130.8 (C-3'), 135.0 (C-5'), 141.5 (C-1'), 146.6 (C-3), 165.2 (C-1), 205.6 (CO). ESI-HRMS: m/z = 302.2101 $[M+H]^+$, calc. for $C_{19}H_{27}NO_2 + H^+ = 302.2115$.

N-(2-Propionylphenyl)decanamide (**9**)

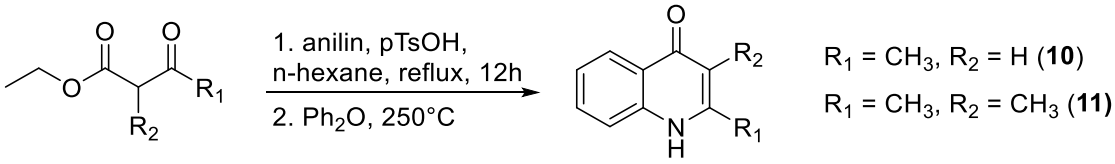


The compound was obtained as slightly yellow oil in 99% yield after purification by column chromatography with petroleum ether/ethyl acetate 10:1. R_f = 0.4 (petroleum ether/ethyl acetate 10:1). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 0.87 (t, 3H, *J* = 7.0 Hz, H-10), 1.19 – 1.44 (m, 12H, H-4 - H-9), 1.23 (t, 3H, *J* = 7.1 Hz, CO-CH_2-C**H**$_3$), 1.75 (m, 2H, H-3), 2.44 (t, 2H, *J* = 7.4 Hz, H-2), 3.07 (q, 2H, *J* = 7.2 Hz, CO-C**H**$_2$-CH_3), 7.10 (m, 1H, H-4´), 7.54 (m, 1H, H-5´), 7.92 (dd, 1H, *J* = 8.1 Hz, J = 1.4 Hz, H-3´), 8.77 (d, 1H, *J* = 8.6 Hz, H-6´), 11.75 (s, br, 1H, NH). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 8.6 (CO-CH_2-**C**H_3), 14.2 (C-10), 22.8, 29.38, 29.41, 29.49, 29.6, 32.0 (C-4 – C-9), 25.7 (C-3), 33.3 (CO-**C**H_2-CH_3), 39.0 (C-2), 121.0 (C-6´), 121.6 (C-2´), 122.3 (C-4´), 130.7 (C-3´), 135.0 (C-5´), 141.3 (C-1´), 172.9 (C-1), 205.5 (**C**O-CH_2-CH_3). ESI-HRMS: m/z = 304.2260 $[M+H]^+$, calc. for $C_{19}H_{29}NO_2 + H^+ = 304.2271$.

General numbering for the following 2-nonyl- and 2-nonenyl-4(1*H*)-quinolones and -4-quinolines

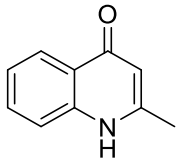


General procedure for the formation of 4-quinolones **10** and **11**



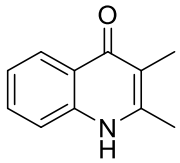
The β-keto ethyl ester (1 eq.) was dissolved in n-hexane (10 g/100 mL). Aniline (1 eq.) and *p*TsOH (2 mol %) were added, and molecular sieve was poured into the flask. The reaction mixture was refluxed overnight. The molecular sieve was filtered off, washed and the solvent evaporated. The crude enamine was dissolved in diphenyl ether (1 g/10 mL) and refluxed for 30 min (**10**) or 4 h (**11**) at 250°C. The resulting brownish solution was poured into *n*-hexane. In the case of **10**, an insoluble brown oil appeared. The supernatant was decanted off and the oil dissolved in acetone. The solution was filtered into petrol ether, causing the formation of a white precipitate that was filtered off, washed with petrol ether and dried. In the case of **11**, a brown precipitated formed right after the crude reaction mixture was poured in *n*-hexane which was filtered off and washed thoroughly with *n*-hexane to yield the pure product.

2-Methylquinolin-4(1*H*)-one (**10**)



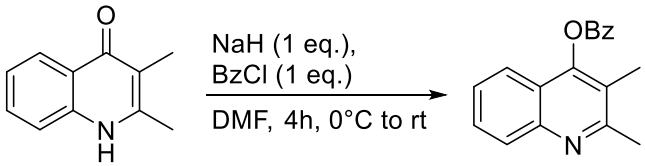
The compound was obtained as off-white solid in 23 % yield. ^{1}H-NMR (DMSO-d_6 399.79 MHz) δ (ppm): 2.47 (s, 3H, CH_3), 6.21 (s, 1H, H-3), 7.39 (t, 1H, *J* = 7.7 Hz, H-6), 7.55 (d, 1H, *J* = 8.3 Hz, H-8), 7.68 (t, 1H, *J* = 7.8 Hz, H-7), 8.21 (d, 1H, *J* = 8.1 Hz, H-5). ^{13}C-NMR (DMSO-d_6 100.52 MHz) δ (ppm): 19.9 (**C**H_3), 109.6 (C-3), 119.0 (C-5), 125.3 (C-4a), 125.0 (C-6), 126.0 (C-7), 133.4 (C-8), 141.6 (C-8a), 153.0 (C-2), 180.4 (C-4). ESI-HRMS: m/z = 160.0756 $[M+H]^+$, calc. for $C_{10}H_9NO + H^+$ = 160.0757.

2,3-Dimethylquinolin-4(1*H*)-one (**11**)



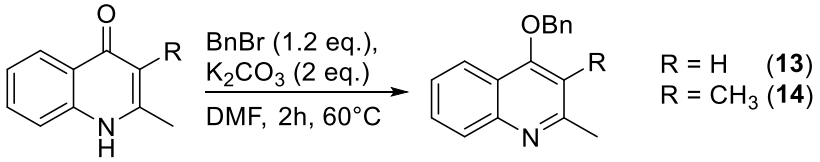
The compound was obtained as brown solid in 56 % yield. ^{1}H-NMR (DMSO-d_6 399.79 MHz) δ (ppm): 1.97 (s, 3H, C-3-CH_3), 2.37 (s, 3H, C-2-CH_3), 7.24 (t, 1H, *J* = 7.5 Hz, H-6), 7.47 (d, 1H, *J* = 8.3 Hz, H-8), 7.56 (t, 1H, *J* = 7.6 Hz, H-7), 8.05 (d, 1H, *J* = 8.2 Hz, H-5), 11.44 (s, br, 1H, NH). ^{13}C-NMR (DMSO-d_6 100.52 MHz) δ (ppm): 10.5 (C-3-**C**H_3), 18.0 (C-2-**C**H_3), 114.2 (C-3), 117.5 (C-8), 122.3 (C-6), 123.0 (C-4a), 125.1 (C-5), 130.9 (C-7), 139.1 (C-8a), 146.1 (C-2), 175.9 (C-4). ESI-HRMS: m/z = 174.0910 $[M+H]^+$, calc. for $C_{11}H_{11}NO + H^+$ = 174.0913; m/z = 369.1566 $[2M+Na]^+$, calc. for 2 $C_{11}H_{11}NO + Na^+$ = 369.1573.

2,3-Dimethylquinolin-4-yl benzoate (**12**)



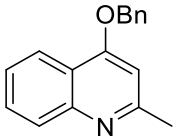
Sodium hydride (60% dispersion in mineral oil, 0.277 g, 11.55 mmol, 1 eq.) was dissolved in 20 mL dry DMF under nitrogen atmosphere and cooled to 0°C. 2,3-Dimethylquinolin-4(1*H*)-one (**11**) (2.0 g, 11.55 mmol, 1 eq.) was added portion wise and the mixture was stirred for 20 min at room temperature. Benzylchloride (1.33 mL, 11.55 mmol, 1 eq.) was dissolved in 5 mL dry DMF and added dropwise at 0°C. The mixture was stirred for 4 h at room temperature and turned bright yellow. 200 mL dest. H_2O were added, the mixture turned milky white and was extracted with 300 mL chloroform. The combined organic phases were dried over Na_2SO_4 and the solvent was evaporated. Purification by column chromatography (DCM/MeOH, 10:1) yielded the product as an off-white solid with 58% yield. R_f = 0.5 (DCM). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 2.32 (s, 3H, C-3-CH_3), 2.78 (s, 3H, C-2-CH_3), 7.46 (t, 1H, *J* = 7.7 Hz, H-6), 7.60 (t, 2H, 7.66, *J* = 7.90 Hz, H-3´), 7.66 (t, 1H, *J* = 7.9 Hz, H-7), 7.70 (m, 1H, H-4´), 7.76 (m, 2H, H-5), 8.07 (d, 1H, *J* = 8.5 Hz, H-8), 8.34 (d, 2H, *J* = 7.7 Hz, H-2´). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 12.9 (C-3-CH_3), 24.2 (C-2-CH_3), 121.0 (C-5), 121.8 (C-3), 122.0 (C-4a), 126.4 (C-6), 128.6 (C-1´), 128.7 (C-8), 129.1 (2C, C-3´), 129.3 (C-7), 130.6 (2C, C-2´), 134.4 (C-4´), 147.3 (C-8a), 152.1 (C-4), 160.3 (C-2), 164.0 (COO). ESI-HRMS: m/z = 278.1163 $[M+H]^+$, calc. for $C_{18}H_{15}NO_2 + H^+$ = 278.1176.

General procedure for benzyl protection of 4-quinolones **10** and **11**



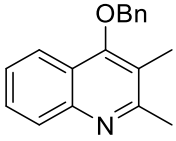
The 4-quinolone (1 eq.) was dissolved in DMF (20 mL/1 mmol). K_2CO_3 (2 eq.) was added and the resulting mixture was stirred at 40 °C for 45 min. Benzyl bromide (1.2 eq.) was added dropwise and the solution was stirred for 2 h at 50°C. The reaction mixture was poured onto ice water and a milky suspension formed. The mixture was extracted with ethyl acetate and the combined organic phases were dried over $MgSO_4$. The crude products were purified by column chromatography.

4-(Benzyloxy)-2-methylquinoline (**13**)



The compound was purified by column chromatography with ethyl acetate and obtained as an off-white solid in a yield of 90%. R_f = 0.43 (ethyl acetate). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 2.70 (s, 3H, CH_3), 5.26 (s, 2H, O-CH_2), 6.70 (s, 1H, H-3), 7.35 – 7.53 (m, 5H, CH_2-C_6**H**$_5$), 7.43 (m, 1H, H-6), 7.66 (t, 1H, *J* = 7.9 Hz, H-7), 7.96 (d, 1H, *J* = 8.6 Hz, H-8), 8.21 (d, 1H, *J* = 8.1 Hz, H-5). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 26.1 (**C**H_3), 70.2 (O-**C**H_2), 101.7 (C-3), 120.1 (C-4a), 121.9 (C-5), 125.0 (C-6), 127.6 (2C, C-2´), 128.2 (C-4´), 128.5 (C-8), 128.9 (2C, C-3´), 129.9 (C-7), 136.0 (C-1´), 149.0 (C-8a), 160.2 (C-2), 161.5 (C-4). ESI-HRMS: m/z = 250.1216 $[M+H]^+$, calc. for $C_{17}H_{15}NO + H^+$ = 250.1226.

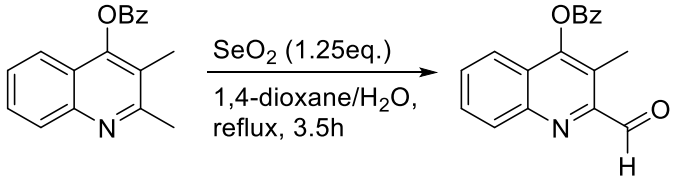
4-(Benzyloxy)-2,3-dimethylquinoline (**14**)



The compound was purified by column chromatography with petroleum ether/ethyl acetate 1:1 and obtained as an off-white solid in a yield of 78%. R_f = 0.5 (petroleum ether/ethyl acetate 1:1). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 2.34 (s, 3H, C-3-C**H**$_3$), 2.70 (s, 3H, C-2-C**H**$_3$), 5.05 (s, 2H, O-C**H**$_2$), 7.36 – 7.48

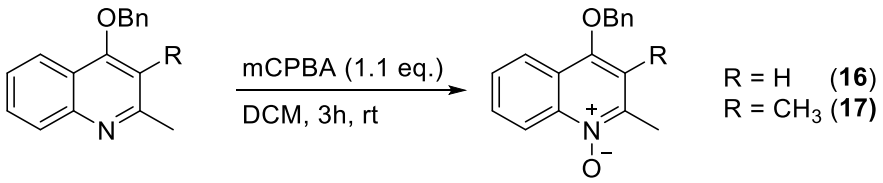
(m, 3H, H-3´ and H-4´), 7.45 (t, 1H, *J* = 7.8 Hz, H-6), 7.48 -7.53 (m, 2H, H-2´), 7.62 (t, 1H, *J* = 7.5 Hz, H-7), 8.02 (m, 2H, H-5 and H-8). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 12.5 (C-3-**C**H_3), 24.3 (C-2-**C**H_3), 76.2 (O-**C**H_2), 121.8 (C-3), 121.8 (C-5), 122.7 (C-4a), 125.6 (C-6), 128.1 (2C, C-2´), 128.5 (C-7), 128.8 (3C, C-3´ and C-4´), 128.8 (C-8), 136.8 (C-1´), 148.0 (C-8a), 159.5 (C-4), 160.9 (C-2). ESI-HRMS: m/z = 264.1371 $[M+H]^+$, calc. for $C_{18}H_{17}NO + H^+$ = 264.1383.

Synthesis of 2-formyl-3-methylquinolin-4-yl benzoate (**15**)



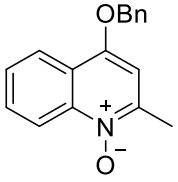
2,3-Dimethylquinolin-4-yl benzoate (**12**) (750 mg, 2.7 mmol, 1 eq.) was dissolved in 25 mL 1,4-dioxane and 2.5 mL dest. H_2O. Selenium dioxide (375 mg, 3.38 mmol, 1.25 eq.) was added and the solution was kept under reflux for 3.5 h. After the mixture reached room temperature, the solid was filtered off and the pH adjusted to 6 with aq. $NaHCO_3$. The solution was poured onto dest. H_2O and extracted with chloroform. The combined organic phases were dried over Na_2SO_4, the solvent evaporated and the product purified by column chromatography with chloroform. The product was obtained as an off-white solid in 60% yield. R_f = 0.42 (chloroform). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 2.65 (s, 3H, C**H**$_3$), 7.60 (m, 2H, H-3´), 7.65 (t, 1H, *J* = 7.5 Hz, H-6), 7.74 (t, 1H, *J* = 7.6 Hz, H-4´), 7.78 (t, 1H, *J* = 7.4 Hz, H-7), 7.86 (d, 1H, *J* = 8.4 Hz, H-5), 8.26 (d, 1H, *J* = 8.58 Hz, H-8), 8.34 (d, 2H, *J* = 8.0 Hz, H-2´), 10.35 (s, 1H, CHO). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 11.5 (**C**H_3), 121.3 (C-5), 123.4 (C-3), 123.8 (C-4a), 128.1 (C-1´), 129.1 (C-6), 129.9 (2C, C-3´), 130.1 (C-7), 130.4 (C-8), 130.8 (2C, C-2´), 134.6 (C-4´), 147.6 (C-8a), 151.9 (C-4), 153.9 (C-2), 163.8 (**C**OO), 195.1 (**C**HO). ESI-HRMS: m/z = 292.0962 $[M+H]^+$, calc. for $C_{18}H_{13}NO_3 + H^+$ = 292.0968; m/z = 324.1219 $[M + CH_3OH + H]^+$, calc. for $C_{18}H_{13}NO_3$+ $CH_3OH + H^+$ = 324.1230.

General procedure for the generation of quinolone *N*-oxides **16** and **17**



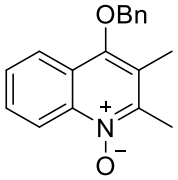
The benzyl protected 4-quinolone (1 eq.) was dissolved in dry DCM (1 mmol/20 mL) and *m*CPBA (1.1 eq.) was added. The mixture was stirred at room temperature for 3 h. The organic phase was washed twice with 0.5 M Na_2CO_3 and once with dest. H_2O. The organic phase was dried over $MgSO_4$, the solvent was evaporated and the residue purified by column chromatography.

4-(Benzyloxy)-2-methylquinoline *N*-oxide (**16**)



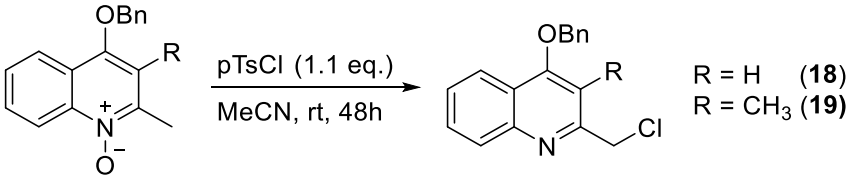
The compound was purified by column chromatography with ethyl acetate/methanol 9:1, then ethyl acetate/methanol 9:1 + 0.5% acetic acid. The product was obtained as an off-white solid in 69% yield. R_f = 0.13 (ethyl acetate/methanol 9:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 2.72 (s, 3H, CH_3), 5.26 (s, 2H, O-CH_2), 7.36 – 7.51 (m, 5H, -CH_2-C_6**H**$_5$), 6.72 (s, 1H, H-3), 7.57 (t, 1H, *J* = 7.7 Hz, H-6), 7.78 (t, 1H, *J* = 7.65 Hz, H-7), 8.23 (d, 1H, *J* = 8.3 Hz, H-5), 8.78 (d, 1H, *J* = 8.8 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 19.6 (CH_3), 70.9 (O-CH_2), 102.8 (C-3), 119.8 (C-8), 122.0 (C-4a), 122.7 (C-5), 127.2 (C-6), 127.6 (2C, C-3´), 128.7 (C-4´), 129.0 (2C, C-2´), 131.1 (C-7), 135.4 (C-1´), 141.5 (C-8a), 146.5 (C-2), 152.7 (C-4). ESI-HRMS: m/z = 266.1170 $[M+H]^+$, calc. for $C_{17}H_{15}NO_2$ + H^+ = 266.1176; m/z = 531.2268 $[2M+H]^+$, calc. for $C_{34}H_{30}N_2O_4$ + H^+ = 531.2278.

4-(Benzyloxy)-2,3-dimethylquinoline 1-oxide (**17**)



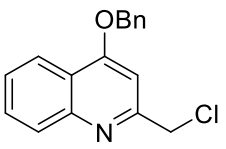
The compound was purified by column chromatography with ethyl acetate/methanol 9:1, then ethyl acetate/methanol 9:1 + 0.5% acetic acid. The product was obtained as an off-white solid in 61% yield. R_f = 0.23 (ethyl acetate/methanol 9:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 2.36 (s, 3H, C-3-C**H**$_3$), 2.77 (s, 3H, C-2-C**H**$_3$), 5.06 (s, 2H, O-C**H**$_2$), 7.49 – 7.39 (m, 5H, -CH_2-C_6**H**$_5$), 7.58 (t, 1H, *J* = 7.7 Hz, H-6), 7.73 (t, 1H, *J* = 7.8 Hz, H-7), 8.03 (d, 1H, *J* = 8.3 Hz, H-5), 8.77 (d, 1H, *J* = 8.7 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 13.4 (C-3-**C**H_3), 15.7 (C-2-**C**H_3), 76.8 (O-**C**H_2), 120.3 (C-8), 122.5 (C-5), 123.3 (C-3), 123.9 (C-4a), 127.9 (C-6), 128.3 (2C, C-2´), 128.9 (C-4´), 128.9 (2C, C-3´), 133.3 (C-8), 130.2 (C-7), 136.1 (C-1´), 140.8 (C-8a), 148.7 (C-2, only HMBC), 151.6 (C-4, only HMBC). ESI-HRMS: m/z = 280.1320 $[M+H]^+$, calc. for $C_{18}H_{17}NO_2$ + H^+ = 280.1332; m/z = 559.2571 $[2M+H]^+$, calc. for $C_{36}H_{34}N_2O_4$ + H^+ = 559.2591.

General synthesis for the synthesis of a quinolone chloride **18** and **19**



The protected *N*-oxide (1 eq.) was dissolved in dry acetonitrile and *p*-toluenesulfonyl chloride (1.1 eq.) was added. The yellow solution was stirred for 48 h until the TLC showed a completion of the reaction. The mixture was dissolved in ethyl acetate, washed with 10% aq. K_2CO_3 and dried over $MgSO_4$. The solvent was evaporated and the pure product obtained after purification by column chromatography with ethyl acetate.

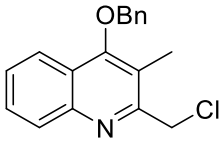
4-(Benzyloxy)-2-(chloromethyl)quinolone (**18**)



The compound was obtained as light-brown solid in 60% yield. R_f = 0.93 (ethyl acetate). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 4.82 (s, 2H, C**H**$_2$-Cl), 5.36 (s, 2H, O-C**H**$_2$), 7.08 (s, 1H, H-3), 7.39 – 7.57 (m, 5H, CH_2-C_6**H**$_5$), 7.54 (m, 1H, H-6), 7.74 (t, 1H, *J* = 7.65 Hz, H-7), 8.04 (d, 1H, *J* = 8.4 Hz, H-8), 8.27 (d, 1H, *J* = 8.2 Hz, H-5). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 47.8 (**C**H_2-Cl), 70.7 (O-**C**H_2), 100.3 (C-3), 120.9 (C-4a),

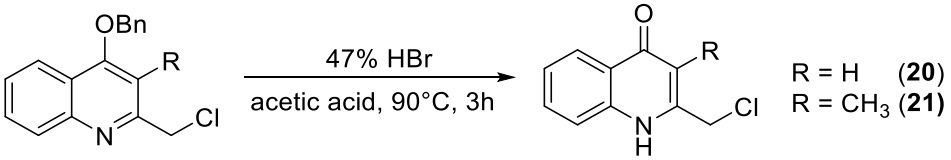
122.1 (C-5), 126.3 (C-6), 127.8 (2C, C-2´), 128.7 (C-8), 128.7 (C-4´), 129.0 (2C, C-3´), 130.6 (C-7), 135.7 (C-1´), 148.5 (C-8a, only HMBC), 158.0 (C-2), 162.5 (C-4).

4-(Benzyloxy)-2-(chloromethyl)-3-methylquinoline (**19**)



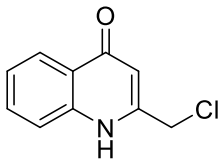
The compound was obtained as light-brown solid in 75% yield. R_f = 0.95 (ethyl acetate). ^{1}H-NMR ($CDCl_3$ 399.79 MHz) δ (ppm): 2.50 (s, 3H, C**H**$_3$), 4.87 (s, 2H, C**H**$_2$-Cl), 5.09 (s, 2H, O-C**H**$_2$), 7.37 – 7.55 (m, 5H, CH_2-C_6**H**$_5$), 7.52 (m, 1H, H-6), 7.68 (t, 1H, *J* = 7.9 Hz, H-7), 8.04 (d, 1H, *J* = 8.3 Hz, H-5), 8.08 (d, 1H, *J* = 8.8 Hz, H-8). ^{13}C-NMR (CDCl3 100.52 MHz) δ (ppm): 11.7 (**C**H$_3$), 46.5 (**C**H$_2$-Cl), 76.5 (O-**C**H$_2$), 121.9 (C-5), 122.0 (C-3), 123.7 (C-4a), 127.0 (C-6), 128.2 (2C, C-3´), 128.7 (C-4´), 128.9 (2C, C-2´), 129.4 (C-7), 129.5 (C-8), 136.5 (C-1´), 147.8 (C-8a), 157.6 (C-2), 161.0 (C-4). ESI-HRMS: m/z = 298.0985 $[M+H]^+$, calc. for $C_{18}H_{16}ClNO + H^+$ = 298.0993.

General procedure for the deprotection of **18** and **19**



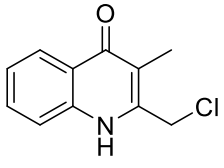
The benzyl protected 4-quinolone was dissolved in glacial acetic acid (1 mmol/ 6 mL) and heated to 50°C. HBr (47%, 3 ml/ 1 mmol) was added and the mixture was stirred for 3 h at 90°C. After reaching room temperature, dest. H_2O was added and the mixture was extracted with ethyl acetate. The aqueous phase was set to a pH of 7 with 10% $NaHCO_3$ solution and extracted with ethyl acetate again. The combined organic phases were dried over $MgSO_4$ and the solvent was evaporated. The remaining solid was dissolved in a small amount of ethyl acetate and dropped into petroleum ether. The resulting solid was filtered off to yield the pure products.

2-(Chloromethyl)quinolin-4(1*H*)-one (**20**)



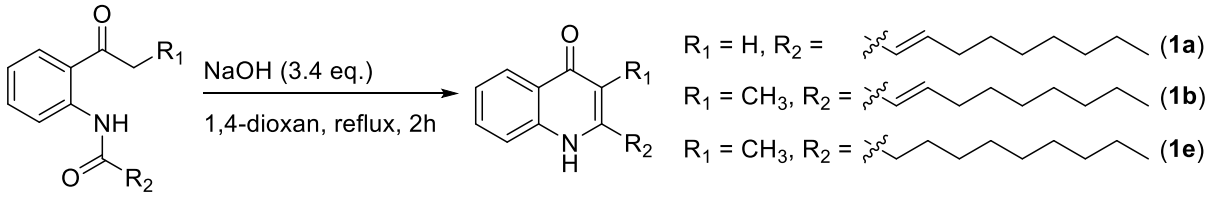
The compound was obtained as white solid in 93% yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 4.53 (s, 2H, CH_2), 6.40 (s, 1H, H-3), 7.41 (t, 1H, *J* = 7.6 Hz, H-6), 7.59 (d, 1H, *J* = 8.4, H-8), 7.72 (t, 1H, *J* = 7.8 Hz, H-7), 8.21 (d, 1H, *J* = 8.4 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 28.2 (**C**H$_2$), 109.8 (C-3), 119.4 (C-8), 125.5 (C-6), 125.8 (C-4a), 126.0 (C-5), 134.0 (C-7), 141.8 (C-8a), 151.3 (C-2), 180.9 (C-4). ESI-MS: m/z = 158.00 $[M-Cl]^+$, calc. for $C_{10}H_8NO^+$ = 158.06.

2-(Chloromethyl)-3-methylquinolin-4(1*H*)-one (**21**)



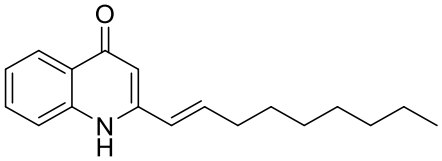
The compound was obtained as white solid in 80% yield. ^{1}H-NMR (DMSO-d_6 399.79 MHz) δ (ppm): 2.05 (s, 3H, C**H**$_3$), 4.65 (s, 2H, C**H**$_2$), 7.29 (m, 1H, H-6), 7.51 (d, 1H, *J* = 8.2, H-8), 7.63 (m, 1H, H-7), 8.07 (d, 1H, *J* = 8.2 Hz, H-5). ^{13}C-NMR (DMSO-d_6 100.52 MHz) δ (ppm): 9.9 (-**C**H$_3$), 28.2 (**C**H$_2$), 115.9 (C-3), 118.0 (C-8), 123.0 (C-4a), 123.1 (C-6), 125.1 (C-5), 131.8 (C-7), 139.2 (C-8a), 144.4 (C-2), 176.5 (C-4). ESI-HRMS: m/z = 172.0760 $[M-Cl]^+$, calc. for $C_{11}H_{10}NO^+$ = 172.0757.

General procedure for the synthesis of 4-quinolones **1a**, **1b** and **1e** *via* Camps-cyclization reaction[2]



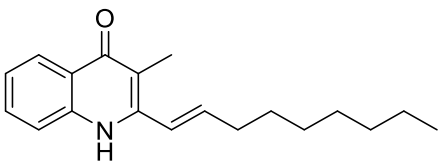
The amide (1 eq.) and crushed NaOH (3.4 eq.) were dissolved in dry 1,4-dioxane (40 ml/ 1 mmol). The solution was refluxed under nitrogen atmosphere for 2 h. After the reaction mixture was allowed to reach room temperature, dest. H_2O (30 ml/ 1 mmol) and *n*-hexane (200 ml/ 1 mmol) were added, and the aqueous phase turned cloudy. The mixture was sonicated for 2 min and the pH of the aqueous phase adjusted to 6 with 1 M HCl. The resulting precipitate was filtered off, washed with *n*-hexane and dissolved in ethanol. The solvent was evaporated, and the resulting solid was suspended in ethyl acetate. The precipitate was filtered off and washed with ethyl acetate to give the product.

(*E*)-Δ^1-2-(non-1-enyl)-4(1*H*)-quinolone **1a**



The product was obtained as yellow solid in 44% yield. ^{1}H-NMR (DMSO-d_6 399.79 MHz) δ (ppm): 0.87 (t, 3H, *J* = 7.0 Hz, H-17), 1.21-1.38 (m, 8H, H-13 - H-16), 1.49 (m, 2H, H-12), 2.26 (m, 2H, H-11), 6.11 (s, 1H, H-3), 6.31 (d, 1H, *J* = 16.1 Hz, H-9), 6.78 (dt, 1H, *J* = 16.1 Hz, *J* = 6.8 Hz, H-10), 7.27 (m, 1H, H-6), 7.62 (m, 2H, H-7, H-8), 8.02 (d, 1H, *J* = 8.0 Hz, H-5), 11.30 (s, br, 1H, -NH). ^{13}C-NMR (DMSO-d_6 100.52 MHz) δ (ppm): 13.9 (C-17), 22.1, 28.5 (2C), 31.2 (C-13 - C-16), 28.1 (C-12), 32.4 (C-11) 106.2 (C-3), 118.1 (C-8), 122.8 (C-6), 123.9 (C-9), 124.7 (C-5), 125.0 (C-4a), 131.7 (C-7), 138.8 (C-10), 140.1 (C-8a), 147.0 (C-2), 177.0 (C-4). ESI-HRMS: m/z = 270.1847 $[M+H]^+$, calc. for $C_{18}H_{23}NO + H^+$ = 270.1852; m/z = 561.3444 $[2M+Na]^+$, calc. for 2 $C_{18}H_{23}NO + Na^+$ = 561.3451.

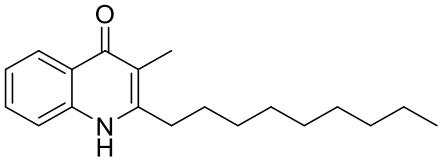
(*E*)-Δ^1-3-methyl-2-(non-1-enyl)-4(1*H*)-quinolone **1b**



The product was obtained as yellow solid in 26.5% yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.92 (t, 3H, *J* = 6.8 Hz, H-17), 1.27 - 1.48 (m, 8H, H-13 - H-16), 1.59 (m, 2H, H-12), 2.19 (s, 3H, C**H**$_3$), 2.38 (m, 2H, H-11), 6.56 (m, 1H, H-10), 6.70 (d, 1H, *J* = 16.2 Hz, H-9), 7.34 (d, 1H, *J* = 7.4 Hz, H-6), 7.63 (m, 1H, H-7), 7.67 (m, 1H, H-8), 8.22 (d, 1H, *J* = 8.4 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 10.9 (**C**H$_3$),

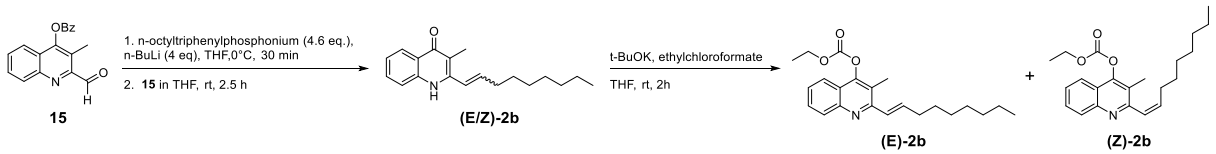
14.4 (C-17), 23.7, 33.0 (C-15, C-16), 30.3, 30.3(C-13, C-14), 29.9 (C-12), 34.4 (C-11) 116.0 (C-3), 119.0 (C-8), 123.7 (C-9), 124.4 (C-4a), 124.5 (C-6), 126.1 (C-5), 132.9 (C-7), 140.8 (C-8a), 141.6 (C-10), 147.0 (C-2), 179.6 (C-4). ESI-HRMS: m/z = 284.1994 $[M+H]^+$, calc. for $C_{19}H_{25}NO + H^+$ = 284.2009

3-Methyl-2-nonyl-4(1*H*)-quinolone **1e**



The product was obtained as white solid in 82% yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.88 (t, 3H, *J* = 6.9 Hz, H-17), 1.22 - 1.40 (m, 10H, H-12 - H-16), 1.44 (m, 2H, H-11), 1.71 (m, 2H, H-10), 2.15 (s, 3H, C**H**$_3$), 2.80 (m, 2H, H-9), 7.34 (m, 1H, H-6), 7.53 (d, 1H, *J* = 8.3 Hz, H-8), 7.62 (m, 1H, H-7), 8.23 (d, 1H, *J* = 8.3 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 10.8 (**C**H$_3$), 14.4 (C-17), 23.7, 33.0, 29.9, 30.36, 30.44, 30.5, 30.6 (C-10 – C-16), 33.4 (C-9) 116.2 (C-3), 118.7 (C-8), 124.4 (C-4a), 124.5 (C-6), 126.2 (C-5), 132.6 (C-7), 140.6 (C-8a), 153.3 (C-2), 179.5 (C-4). ESI-HRMS: m/z = 286.2156 $[M+H]^+$, calc. for $C_{19}H_{27}NO + H^+$ = 286.2165.

Synthesis of (*E*)-ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **(*E*)-2b** and (*Z*)-ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **(*Z*)-2b**



Octyltriphenylphosphonium iodide (794 mg, 1.38 mmol, 4.6 eq.) was dissolved in 7 mL dry THF. *n*-Butyl lithium (1.6 M in hexane, 850 µL, 1.36 mmol, 4 eq.) was added at 0°C and the resulting red solution was stirred at 0°C for 30 min. 2-Formyl-3-methylquinolin-4-yl benzoate (**15**) (100 mg, 0.34 mmol, 1 eq.) was dissolved in 4 mL dry THF, added dropwise at 0°C and the reaction mixture was stirred at room temperature for 2.5 h. The reaction mixture was poured onto sat. aq. NH_4Cl, the aqueous phase was extracted with chloroform and dried over Na_2SO_4. The solvent was evaporated and the residue purified by column chromatography with ethyl acetate. The intermediate 3-methyl-2-(non-1-en-1-yl)quinolin-4(1*H*)-one (**(*E*/*Z*)-2b**) was isolated as inseparable *E*/*Z* mixture in a yield of 71%. R_f = 0.48 (ethyl acetate).

Note: In some cases, a part of the product was isolated as Bz-protected 3-methyl-2-(non-1-en-1-yl)quinolin-4-yl benzoate in an inseparable *E*/*Z* mixture (R_f = 0.94 (ethyl acetate)). For deprotection, the 3-methyl-2-(non-1-en-1-yl)quinolin-4-yl benzoate (1 eq.) and KOH (1.15 eq.) were dissolved in a mixture of MeOH/H_2O (5:1) and stirred for 2 h at room temperature. The solution was neutralized with 1 M HCl and the solvent evaporated. The residue was dissolved in ethyl acetate, washed with water and dried over Na_2SO_4. The obtained **(*E*/*Z*)-2b** was used without further purification in the subsequent ethyl carbonate protection.

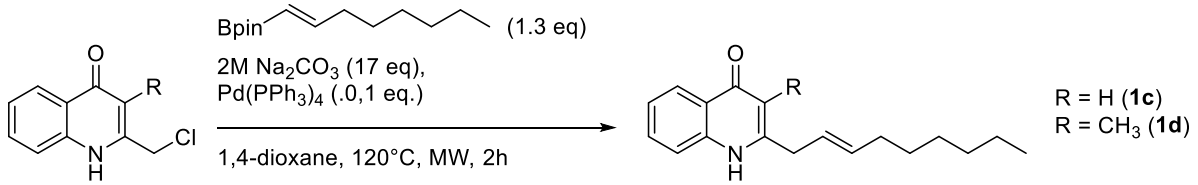
Separation of the *E*/*Z*-isomers of **(*E*/*Z*)-2b** was achieved by ethyl carbonate protection as described under general procedure for ethyl carbonate protection of 4-quinolones. The protected 4(1*H*)-quinolones were purified and the isomers separated by column chromatography with petrol ether/ethyl acetate 9:1.

(*E*)-ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **(*E*)-2b**: 29 % yield, (R_f = 0.42 (petrol ether/ethyl acetate 9:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.90 (t, 3H, *J* = 7.0 Hz, H-17), 1.28 - 1.42 (m, 8H, H-13 - H-16), 1.45 (t, *J* = 7.0 Hz, 3H, C**H**$_3$-CH_2-O), 1.57 (m, 2H, H-12), 2.36 (m, 2H, H-11), 2.37 (s,

3H, C-3-CH_3), 4.37 (q, 2H, *J* = 7.1 Hz, CH_3-C**H**$_2$-O), 6.81 (d, 1H, *J* = 15.2 Hz, H-9), 7.11 (dt, 1H, *J* = 15.2 Hz, *J* = 7.4 Hz, H-10), 7.47 (t, 1H, *J* = 8.0 Hz, H-6), 7.63 (t, 1H, *J* = 7.9 Hz, H-7), 7.79 (d, 1H, *J* = 8.4 Hz, H-5), 8.06 (d, 1H, *J* = 8.4 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 12.0 (C-3-**C**H_3), 14.2 (C-17), 14.3 (**C**H_3-CH_2-O), 22.8, 31.9 (C-15, C-16), 29.0 (C-12), 29.3 (C-13), 29.4 (C-14), 33.3 (C-11), 65.6 (CH_3-**C**H_2-O), 120.4 (C-3), 120.6 (C-5), 121.5 (C-4a), 126.2 (C-9), 126.4 (C-6), 129.2 (C-7), 129.3 (C-8), 140.4 (C-10), 147.7 (C-8a), 151.8 (C-4), 152.5 (-OCOO), 156.9 (C-2). ESI-MS: m/z = 356.2209 $[M+H]^+$, calc. for $C_{22}H_{29}NO_3$ + H^+ = 356.2220.

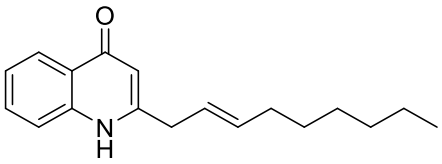
(*Z*)-ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **(*Z*)-2b**: 11 % yield, (R_f = 0.32 (petrol ether/ethyl acetate 9:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.85 (t, 3H, *J* = 7.0 Hz, H-17), 1.19 - 1.35 (m, 8H, H-13 - H-16), 1.40 - 1.51 (m, 5H, H-12 and C**H**$_3$-CH_2-O), 2.32 (s, 3H, C-3-C**H**$_3$), 2.49 (m, 2H, H-11), 4.39 (q, 2H, *J* = 7.0 Hz, CH_3-C**H**$_2$-O), 6.07 (dt, 1H, *J* = 11.8 Hz, *J* = 7.4 Hz, H-10), 6.65 (d, 1H, *J* = 11.7 Hz, H-9), 7.51 (t, 1H, *J* = 7.7 Hz, H-6), 7.66 (t, 1H, *J* = 7.3 Hz, H-7), 7.82 (d, 1H, *J* = 8.4 Hz, H-5), 8.08 (d, 1H, *J* = 8.3 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 12.4 (C-3-**C**H_3), 14.2 (C-17), 14.4 (**C**H_3-CH_2-O), 22.7, 31.9 (C-15, C-16), 29.0 (C-11), 29.4 (C-12), 29.3, 29.6 (C-13, C-14), 65.6 (CH_3-**C**H_2-O), 120.5 (C-5), 121.3 (C-4a), 121.6 (C-3), 126.2 (C-9), 126.7 (C-6), 129.1 (C-7), 129.5 (C-8), 139.6 (C-10), 147.5 (C-8a), 151.6 (C-4), 152.5 (-OCOO), 158.5 (C-2). ESI-MS: m/z = 356.2207 $[M+H]^+$, calc. for $C_{22}H_{29}NO_3$ + H^+ = 356.2220.

General procedure for the synthesis of (*E*)-2-(non-2-en-1-yl)quinolin-4(1*H*)-one (**1c**) and (*E*)-3-methyl-2-(non-2-en-1-yl)quinolin-4(1*H*)-one (**1d**) via Suzuki Miyaura coupling reaction[3]



The 2-(chloromethyl)-quinolin-4(1*H*)-one (1 eq.) was dissolved in dry 1,4-dioxane (8 mL/1 mmol). (*E*)-4,4,5,5-tetramethyl-2-(oct-1-en-1-yl)-1,3,2-dioxaborolane (1.3 eq.), 2 M Na_2CO_3 (17 eq.) and $Pd(PPh_3)_4$ (0.1 eq.) were added. The microwave vial was sealed, and the reaction mixture was microwaved at 120°C for 2 h. The mixture was filtered through celite and washed thoroughly with ethyl acetate. The organic phase was washed with brine and dried over $MgSO_4$. The product was purified by column chromatography with ethyl acetate.

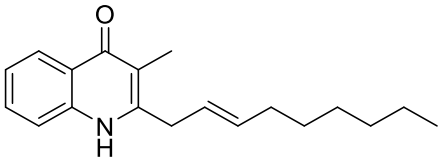
(E)-Δ^2-2-(non-1-enyl)-4(1*H*)-quinolone **1c**



The compound was obtained with slight impurities. By dissolving the product, dropping it in dest. H_2O and letting it precipitate over night at 4°C, the pure product could be filtered off and obtained as white solid in 28% yield. R_f = 0.63 (ethyl acetate). ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.86 (t, 3H, *J* = 6.7 Hz, C-17), 1.22 – 1.33 (m, 6H, H-14 - H-16), 1.39 (m, 2H, H-13), 2.07 (m, 2H, H-12), 3.40 (d, 2H, *J* = 6.7 Hz, H-9), 5.60 (m, 1H, H-10), 5.70 (m, 1H, H-11), 6.21 (s, 1H, H-3), 7.37 (t, 1H, *J* = 7.6 Hz, H-6), 7.56 (d, 1H, *J* = 8.4 Hz, H-8), 7.67 (t, 1H, *J* = 7.8 Hz, H-7), 8.20 (d, 1H, *J* = 8.2 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 14.4 (C-17), 23.6, 32.8 (C-15, C-16), 29.9 (C-14), 30.3 (C-13), 33.5 (C-12), 37.8 (C-9), 108.9

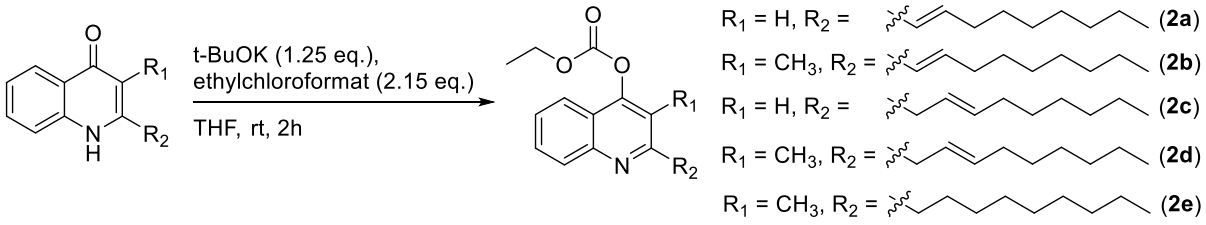
(C-3), 119.1 (C-8), 125.0 (C-6), 125.3 (C-10), 125.5 (C-4a), 126.0 (C-5), 133.4 (C-7), 136.4 (C-11), 141.6 (C-8a), 155.6 (C-2), 180.7 (C-4). ESI-HRMS: m/z = 270.1844 $[M+H]^+$, calc. for $C_{18}H_{23}NO + H^+$ = 270.1852.

(E)-Δ^2-3-methyl-2-(non-1-enyl)-4(1*H*)-quinolone **1d**



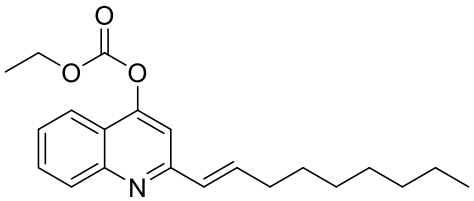
The compound was obtained as white solid in 56 % yield. R_f = 0.42 (ethyl acetate). ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.85 (t, 3H, *J* = 6.8 Hz, C-17), 1.20 – 1.31 (m, 6H, H-14 - H-16), 1.35 (m, 2H, H-13), 2.04 (m, 2H, H-12), 2.15 (s, 3H, C-3-C**H**$_3$), 3.51 (d, 2H, *J* = 3.9 Hz, H-9), 5.52 – 5.64 (m, 2H, H-10, H-11), 7.35 (t, 1H, *J* = 7.7 Hz, H-6), 7.54 (d, 1H, *J* = 8.4 Hz, H-8), 7.63 (t, 1H, *J* = 7.7 Hz, H-7), 8.24 (d, 1H, *J* = 8.15 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 10.7 (C-3-**C**H$_3$), 14.3 (C-17), 23.6, 32.8 (C-15, C-16), 29.8, 30.3 (C-13, C-14), 33.5 (C-12), 36.4 (C-9), 116.7 (C-3), 118.7 (C-8), 124.5 (C-4a), 124.6 (C-6), 125.1 (C-10), 126.2 (C-5), 132.7 (C-7), 135.2 (C-11), 140.6 (C-8a), 151.2 (C-2), 179.6 (C-4). ESI-HRMS: m/z = 284.2005 $[M+H]^+$, calc. for $C_{19}H_{25}NO + H^+$ = 284.2009

General procedure for the synthesis of ethyl carbonate protected 4(1*H*)-quinolones **2a**, **2c**, **2d** and **2e**



The 4(1*H*)-quinolone (1 eq.) was dissolved in dry THF (5 ml/1 mmol), *t*BuOK (1.25 eq.) and ethylchloroformat (2.15 eq.) were added. The solution was stirred for 2 h at room temperature and then quenched with dest. H_2O. The THF was evaporated and the mixture diluted with H_2O. The aqueous phase was extracted with ethyl acetate and dried over $MgSO_4$. The solvent was evaporated and the product was purified by column chromatography.

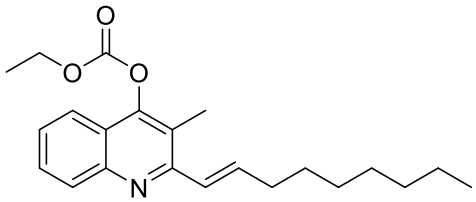
(*E*)-ethyl (2-(non-1-en-1-yl)quinolin-4-yl) carbonate **2a**



The compound was obtained after purification by column chromatography with DCM/petrol ether 2:1 as yellow oil in 74% yield. R_f = 0.75 (DCM: petrol ether 2:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.86 (t, 3H, *J* = 6.9 Hz, H-17), 1.23-1.34 (m, 8H, H-13 - H-16), 1.50 (m, 2H, H-12), 1.36 (t, *J* = 7.1 Hz, 3H, C**H**$_3$-CH$_2$-O), 2.30 (m, 2H, H-11), 4.36 (q, 2H, *J* = 7.1 Hz, CH$_3$-C**H**$_2$-O), 6.66 (d, 1H, *J* = 15.9 Hz, H-9), 6.94 (dt, 1H, *J* = 15.9 Hz, *J* = 7.0 Hz, H-10), 7.60 (t, 1H, *J* = 7.6 Hz, H-6), 7.75 (s, 1H, H-3), 7.79 (t, 1H, *J* = 7.7 Hz, H-7), 7.90 (d, 1H, *J* = 8.3 Hz, H-5), 7.99 (d, 1H, *J* = 8.5 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 13.9 (C-17), 13.9 (**C**H$_3$-CH$_2$-O), 22.1, 28.5, 31.2 (C-14 - C-16), 28.3 (C-13), 28.6 (C-12), 32.3 (C-11), 65.5 (CH$_3$-**C**H$_2$-O), 110.5 (C-3), 120.5 (C-4a), 120.8 (C-5), 126.7 (C-6), 128.8 (C-8), 130.3 (C-9), 130.5 (C-7), 138.8

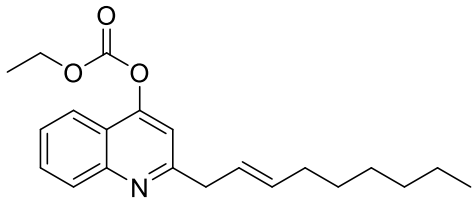
(C-10), 149.0 (C-8a), 152.0 (O**C**OO), 154.0 (C-4), 157.0 (C-2). ESI-HRMS: m/z = 342.2050 $[M+H]^+$, calc. for $C_{21}H_{27}NO_3 + H^+ = 342.2064$.

(*E*)-ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **2b**



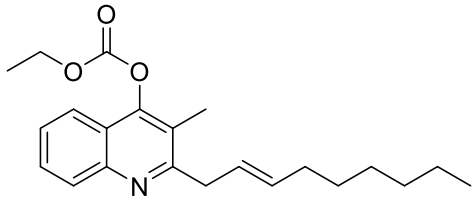
The compound was obtained after purification by column chromatography with DCM/petrol ether 2:1 as yellow oil in 91% yield. NMR and HRMS data are in accordance with **(*E*)-2b**.

(*E*)-ethyl (2-(non-2-en-1-yl)quinolin-4-yl) carbonate **2c**



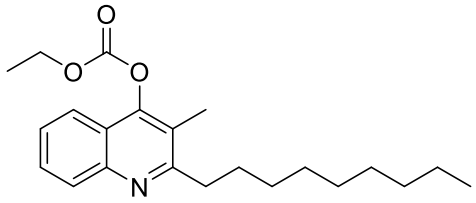
The compound was obtained after purification by column chromatography with petrol ether/ethyl acetate 9:1 as yellow oil in 64% yield. R_f = 0.9 (petrol ether/ethyl acetate 9:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.87 (t, 3H, *J* = 7.1 Hz, H-17), 1.21 - 1.40 (m, 8H, H-13 - H-16), 1.42 (t, *J* = 7.15 Hz, 3H, C**H**$_3$-CH_2-O), 2.05 (m, 2H, H-12), 3.71 (d, 2H, *J* = 5.65 Hz, H-9), 4.39 (q, 2H, *J* = 7.1 Hz, CH_3-C**H**$_2$-O), 5.68 (m, 2H, H-10, H-11), 7.33 (s, 1H, H-3), 7.51 (t, 1H, *J* = 7.6 Hz, H-6), 7.71 (t, 1H, *J* = 7.8 Hz, H-7), 7.98 (d, 1H, *J* = 8.4 Hz, H-5), 8.07 (d, 1H, *J* = 8.5 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 14.1 (C-17), 14.2 (**C**H_3-CH_2-O), 22.7, 31.8 (C-15, C-16), 28.9, 29.3, (C-13, C-14), 32.7 (C-12), 42.9 (C-9), 65.5 (CH_3-**C**H_2-O), 111.9 (C-3), 120.6 (C-4a), 121.0 (C-5), 126.2 (C-10), 126.3 (C-6), 129.0 (C-8), 130.2 (C-7), 134.2 (C-11), 149.5 (C-8a), 152.4 (O**C**OO), 154.5 (C-4), 162.5 (C-2). ESI-MS: m/z = 342.19 $[M+H]^+$, calc. for $C_{21}H_{27}NO_3 + H^+ = 342.21$.

(*E*)-ethyl (3-methyl-2-(non-2-en-1-yl)quinolin-4-yl) carbonate **2d**



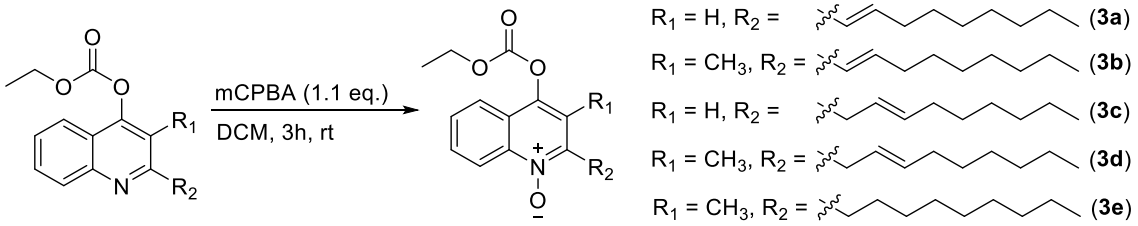
The compound was obtained after purification by column chromatography with petrol ether/ethyl acetate 9:1 as yellow oil in 48% yield. R_f = 0.9 (petrol ether/ethyl acetate 9:1).^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.86 (t, 3H, *J* = 7.1 Hz, H-17), 1.22 - 1.37 (m, 8H, H-13 - H-16), 1.42 (t, *J* = 7.1 Hz, 3H, C**H**$_3$-CH_2-O), 2.01 (m, 2H, H-12), 2.31 (s, 3 H, C-3-C**H**$_3$), 3.75 (d, 2H, *J* = 6.3 Hz, H-9), 4.38 (q, 2H, *J* = 7.2 Hz, CH_3-C**H**$_2$-O), 5.50 (td, *J* = 12.6 Hz, *J* = 15.6 Hz, 1H, H-11), 5.68 (td, *J* = 13.5 Hz, *J* = 15.55 Hz, 1H, H-10), 7.50 (t, 1H, *J* = 7.8 Hz, H-6), 7.65 (t, 1H, *J* = 7.9 Hz, H-7), 7.81 (d, 1H, *J* = 8.2 Hz, H-5), 8.06 (d, 1H, *J* = 8.5 Hz, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 12.0 (C-3-**C**H_3), 14.2 (C-17), 14.3 (**C**H_3-CH_2-O), 22.7, 31.8 (C-15, C-16), 29.0, 29.4, (C-13, C-14), 32.7 (C-12), 40.8 (C-9), 65.7 (CH_3-**C**H_2-O), 120.6 (C-5), 121.5 (C-4a), 121.8 (C-3), 125.8 (C-10), 126.6 (C-6), 129.0 (C-8), 129.2 (C-7), 133.3 (C-11), 147.6 (C-8a), 152.0 (C-4), 152.4 (O**C**OO), 161.9 (C-2). ESI-HRMS: m/z = 356.2219 $[M+H]^+$, calc. for $C_{22}H_{29}NO_3 + H^+ = 356.2220$.

Ethyl (3-methyl-2-nonylquinolin-4-yl) carbonate **2e**



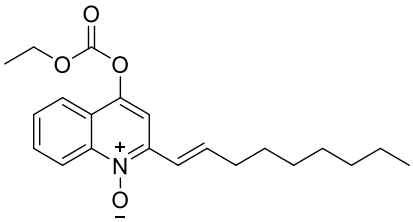
The compound was obtained after purification by column chromatography with ethyl acetate 9:1 (R_f = 0.9 (ethyl acetate) and a second column chromatography with DCM/petrol ether 2:1 as colorless oil in 60% yield. R_f = 0.7 (DCM/petrol ether 2:1).^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.88 (t, 3H, *J* = 7.0 Hz, H-17), 1.24 - 1.33 (m, 8H, H-13 - H-16), 1.36 (m, 2H, H-12), 1.44 (C**H**$_3$-CH$_2$-O), 1.47 (m, 2H, H-11), 1.79 (m, 2H, H-10), 2.36 (s, 3 H, C-3-C**H**$_3$), 3.04 (m, 2H, H-9), 4.39 (q, 2H, *J* = 7.1 Hz, CH$_3$-C**H**$_2$-O), 7.52 (m, 1H, H-6), 7.67 (m, 1H, H-7), 7.82 (d, 1H, *J* = 8.3 Hz, H-5), 8.12 (s, br, 1H, H-8). ^{13}C-NMR ($CDCl_3$ 100.53 MHz) δ (ppm): 12.2 (C-3-**C**H$_3$), 14.4 (C-17), 14.5 (**C**H$_3$-CH$_2$-O), 22.9, 29.2, 29.5, 29.76, 29.77, 30.1, 32.1 (C-10 - C-16), 36.8 (C-9), 65.9 (CH$_3$-**C**H$_2$-O), 120.8 (C-5), 121.5 (C-4a), 121.6 (C-3), 126.8 (C-6), 129.0 (C-8), 129.9 (C-7), 148.0 (C-8a), 152.4 (C-4), 152.5 (-O**C**OO), 163.9 (C-2). ESI-HRMS: m/z = 358.2367 [M+H]$^+$, calc. for $C_{22}H_{31}NO_3$ + H$^+$ = 358.2377.

General procedure for the generation of ethyl carbonate protected quinolone *N*-oxides according to Woschek at al.[4]



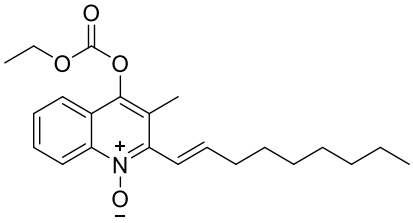
The ethyl carbonate protected 4-quinolone (1 eq.) was dissolved in dry DCM (20 mL/ 1 mmol) and *m*CPBA (1.1 eq.) was added. The mixture was stirred at room temperature for 3 h. The organic phase was washed twice with 0.5 M Na_2CO_3 and once with dest. H_2O. The organic phase was dried over $MgSO_4$ and the solvent was evaporated. The residue was purified by column chromatography. The identity and purity of the compounds were confirmed by ^{1}H-NMR spectroscopy and the compounds used immediately in the next step since instability is reported.

(*E*)-4-((ethoxycarbonyl)oxy)-2-(non-1-en-1-yl)quinoline *N*-oxide **3a**



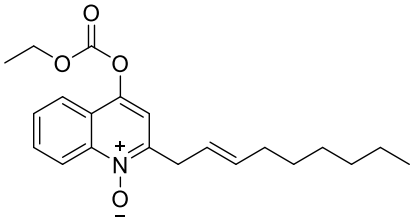
The compound was purified by column chromatography with petroleum ether/ethyl acetate 1:1 and obtained as colorless oil in 77% yield. R_f = 0.41 (petroleum ether/ethyl acetate 1:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.89 (t, 3H, *J* = 6.5 Hz, H-17), 1.23-1.42 (m, 8H, H-13, - H-16), 1.45 (t, *J* = 7.5 Hz, 3H, C**H**$_3$-CH$_2$-O), 1.55 (m, 2H, H-12), 2.38 (m, 2H, H-11), 4.41 (q, 2H, *J* = 7.2 Hz, CH$_3$-C**H**$_2$-O), 6.79 (dt, 1H, *J* = 16.2 Hz, *J* = 7.1 Hz, H-10), 7.37 (d, 1H, *J* = 16.2 Hz, H-9), 7.55 (s, 1H, H-3), 7.62 (t, 1H, *J* = 7.85 Hz, H-6), 7.77 (t, 1H, *J* = 7.4 Hz, H-7), 7.96 (d, 1H, *J* = 8.1 Hz, H-5), 8.79 (d, 1H, *J* = 8.7 Hz, H-8). ESI-HRMS: m/z = 358.2002 [M+H]$^+$, calc. for $C_{21}H_{27}NO_4$ + H$^+$ = 358.2013.

(*E*)-4-((ethoxycarbonyl)oxy)-3-methyl-2-(non-1-en-1-yl)quinoline *N*-oxide **3b**



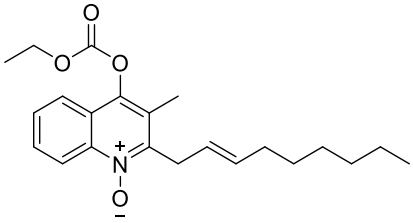
The compound was purified by column chromatography with petroleum ether/ethyl acetate 1:1 and obtained as slightly yellow oil in 11% yield. R_f = 0.56 (petroleum ether/ethyl acetate 1:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.89 (m, 3H, H-17), 1.25-1.36 (m, 8H, H-13 - H-16), 1.44 (t, *J* = 7.15 Hz, 3H, C**H**$_3$-CH$_2$-O), 1.58 (m, 2H, H-12), 2.38 (s, 3H, C-3-C**H**$_3$), 2.39 (m, 2H, H-11), 4.39 (q, 2H, *J* = 7.2 Hz, CH$_3$-C**H**$_2$-O), 6.74 (d, 1H, *J* = 16.1 Hz, H-9), 7.37 (dt , 1H, *J* = 16.2 Hz, *J* = 7.15 Hz, H-10), 7.61 (t, 1H, *J* = 7.7 Hz, H-6), 7.72 (t, 1H, *J* = 7.7 Hz, H-7), 7.80 (d, 1H, *J* = 8.25 Hz, H-5), 8.74 (d, 1H, *J* = 8.8 Hz, H-8).

(*E*)-4-((ethoxycarbonyl)oxy)-2-(non-2-en-1-yl)quinoline *N*-oxide **3c**



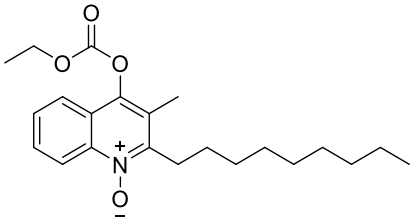
The compound was purified by column chromatography with ethyl acetate/methanol 10:1 and ethyl acetate/methanol 10:1 + 0.5% acetic acid. The compound was obtained as colorless oil in 34% yield. R_f = 0.13 (ethyl acetate/methanol 10:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.87 (t, 3H, *J* = 6.7 Hz, H-17), 1.22 - 1.47 (m, 8H, H-13 - H-16), 1.44 (t, *J* = 7.2 Hz, 3H, C**H**$_3$-CH$_2$-O), 2.09 (q, 2H, *J* = 7.6 Hz, H-12), 3.84 (d, 2H, *J* = 6.2 Hz, H-9), 4.39 (q, 2H, *J* = 7.2 Hz, CH$_3$-C**H**$_2$-O), 5.71 (m, 2H, H-10, H-11), 7.35 (s, 1H, H-3), 7.63 (t, 1H, *J* = 7.65 Hz, H-6), 7.79 (t, 1H, *J* = 7.65 Hz, H-7), 7.98 (d, 1H, *J* = 8.23 Hz, H-5), 8.79 (d, 1H, *J* = 8.71 Hz, H-8). ESI-MS: m/z = 358.20 $[M+H]^+$, calc. for $C_{21}H_{27}NO_4 + H^+$ = 358.20.

(*E*)-4-((ethoxycarbonyl)oxy)-3-methyl-2-(non-2-en-1-yl)quinoline *N*-oxide **3d**



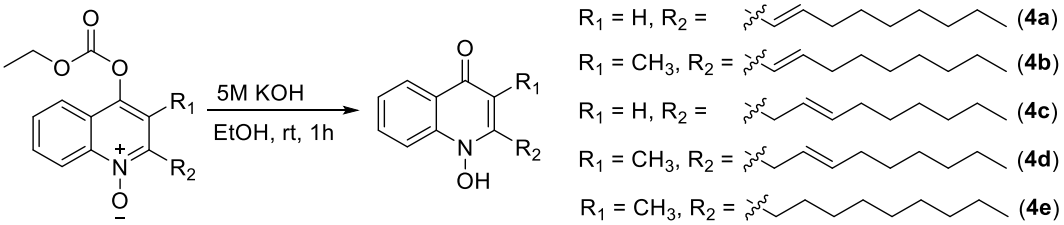
The compound was purified by column chromatography with petroleum ether/ethyl acetate 1:1 and obtained as slightly yellow oil in 16% yield. R_f = 0.41 (petroleum ether/ethyl acetate 1:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.88 (t, 3H, *J* = 7.0 Hz, H-17), 1.21 - 1.35 (m, 8H, H-13 - H-16), 1.43 (t, *J* = 7.1 Hz, 3H, C**H**$_3$-CH$_2$-O), 1.99 (m, 2H, H-12), 2.35 (s, 3H, C-3-C**H**$_3$), 3.95 (d, 2H, *J* = 5.1 Hz, H-9), 4.39 (q, 2H, *J* = 7.1 Hz, CH$_3$-C**H**$_2$-O), 5.64 (m, 2H, H-10, H-11), 7.62 (t, 1H, *J* = 7.7 Hz, H-6), 7.73 (t, 1H, *J* = 7.5 Hz, H-7), 7.82 (d, 1H, *J* = 8.25 Hz, H-5), 8.77 (d, 1H, *J* = 8.8 Hz, H-8). ESI-HRMS: m/z = 372.2169 $[M+H]^+$, calc. for $C_{22}H_{29}NO_4 + H^+$ = 372.2169.

4-((Ethoxycarbonyl)oxy)-3-methyl-2-nonylquinoline *N*-oxide **3e**



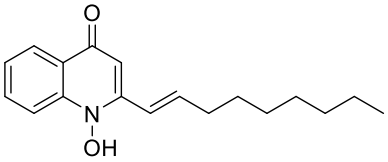
The compound was purified by column chromatography with petroleum ether/ethyl acetate 1:1 and obtained as colorless oil in 58% yield. R_f = 0.5 (petroleum ether/ethyl acetate 1:1). ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.87 (t, 3H, *J* = 6.7 Hz, H-17), 1.21 - 1.33 (m, 8H, H-13 - H-16), 1.37 (m, 2H, H-12), 1.43 (t, *J* = 7.1 Hz, 3H, C**H**$_3$-CH$_2$-O), 1.50 (m, 2H, H-11), 1.74 (m, 2H, H-10), 2.35 (s, 3H, C-3-CH$_3$), 3.20 (m, 2H, H-9), 4.39 (q, 2H, *J* = 7.1 Hz, CH$_3$-C**H**$_2$-O), 7.61 (m, 1H, H-6), 7.73 (m, 1H, H-7), 7.82 (d, 1H, *J* = 8.3 Hz, H-5), 8.75 (d, 1H, *J* = 8.9 Hz, H-8). ESI-HRMS: m/z = 372.2169 $[M+H]^+$, calc. for $C_{22}H_{29}NO_4$ + H^+ = 372.2169.

General procedure for the generation of quinolone *N*-oxides



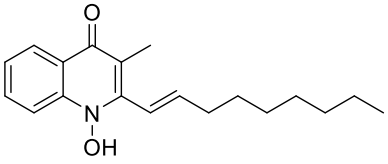
The ethyl carbonate protected quinolone *N*-oxide (1 eq.) was dissolved in ethanol (10 mL/ 1 mmol) and 5 M KOH solution (17 eq.) was added. The reaction mixture turned yellow and was stirred for 1 h at room temperature. Afterwards, dest. H_2O was added and the pH was adjusted to 1 with conc. HCl. The precipitate was filtered off, washed with water and gave the pure product.

(*E*)-Δ^1-2-(non-1-enyl)-4(1*H*)-quinolone *N*-oxide **4a**



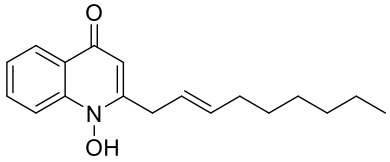
The compound was obtained as yellow solid in 96 % yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.92 (t, 3H, *J* = 7.0 Hz, H-17), 1.24 - 1.48 (m, 8H, H-13 - H-16), 1.58 (m, 2H, H-12), 2.41 (m, 2H, H-11), 6.85 (s, 1H, H-3), 6.91 (m, 1H, H-10), 7.07 (d, 1H, *J* = 16.0 Hz, H-9), 7.63 (t, *J* = 7.8 Hz, 1H, H-6), 7.91 (t, 1H, *J* = 7.6 Hz, H-7), 8.25 (d, 1H, *J* = 8.7 Hz, H-8), 8.30 (d, 1H, *J* = 8.4 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 14.4 (C-17), 23.7, 30.3, 30.3, 33.0 (C-13 - C-16), 29.6 (C-12), 34.7 (C-11), 102.7 (C-3), 117.7 (C-8), 121.0 (C-9), 124.2 (C-4a), 125.4 (C-5), 127.5 (C-6), 134.4 (C-7), 141.5 (C-8a), 146.5 (C-10), 151.5 (C-2), 169.1 (C-4, only HMBC). ESI-HRMS: m/z = 286.1792 $[M+H]^+$, calc. for $C_{18}H_{23}NO_2$ + H^+ = 286.1802; m/z = 571.3517 $[2M+H]^+$, calc. for 2 $C_{18}H_{23}NO_2$ + H^+ = 571.3530.

(*E*)-Δ^1-3-methyl-2-(non-1-enyl)-4(1*H*)-quinolone *N*-oxide **4b**



The compound was obtained as yellow solid in 97 % yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.93 (t, 3H, *J* = 6.9 Hz, H-17), 1.27-1.40 (m, 6H, H-14 - H-16), 1.46 (m, 2H, H-13), 1.63 (m, 2H, H-12), 2.42 – 2.52 (m, 2H, H-11), 2.48 (s, 3H, C-3-C**H$_3$**), 6.61 (m, 1H, H-10), 6.75 (d, 1H, *J* = 16.4 Hz, H-9), 7.80 (t, *J* = 7.8 Hz, 1H, H-6), 8.06 (t, 1H, *J* = 7.6 Hz, H-7), 8.31 (d, 1H, *J* = 8.7 Hz, H-8), 8.46 (d, 1H, *J* = 8.5 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 13.9 (C-3-**C**H$_3$), 14.4 (C-17), 23.7, 33.0 (C-15, C-16), 29.6 (C-12), 30.2, 30.3 (C-13, C-14), 34.8 (C-11), 116.0 (C-3), 117.3 (C-8), 119.8 (C-9), 121.5 (C-4a), 124.8 (C-5), 128.9 (C-6), 135.5 (C-7), 139.7 (C-8a) 149.6 (C-10), 154.0 (C-2), 165.8 (C-4, only HMBC). ESI-HRMS: m/z = 300.1945 $[M+H]^+$, calc. for $C_{19}H_{25}NO_2 + H^+$ = 300.1958.

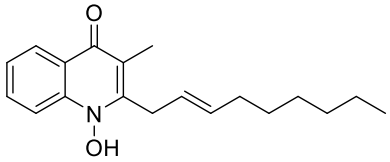
(*E*)-Δ^2-2-(non-1-enyl)-4(1*H*)-quinolone *N*-oxide **4c**



The compound was obtained as yellow solid in 69 % yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.89 (t, 3H, *J* = 6.8 Hz, H-17), 1.25 - 1.37 (m, 6H, H-14 - H-16), 1.42 (m, 2H, H-13), 2.10 (m, 2H, H-12), 3.65 (d, 2H, *J* = 6.3 Hz, H-9), 5.62 – 5.79 (m, 2H, H-10, H-11), 6.37 (s, 1H, H-3), 7.52 (t, *J* = 7.7 Hz, 1H, H-6), 7.83 (t, 1H, *J* = 7.8 Hz, H-7), 8.11 (d, 1H, *J* = 8.7 Hz, H-8), 8.26 (d, 1H, *J* = 8.1 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 14.4 (C-17), 23.7, 30.0, 32.8 (C-14 - C-16), 30.3 (C-13), 33.6 (C-12), 34.9 (C-9, only HMBC), 107.2 (C-3), 116.9 (C-8), 124.4 (C-10), 125.2 (C-4a), 125.9 (C-5), 126.2 (C-6), 133.8 (C-7), 137.0 (C-11), 141.9 (C-8a), 155.3 (C-2), 173.3 (C-4, only HMBC). ESI-HRMS: m/z = 286.1792 $[M+H]^+$, calc. for $C_{18}H_{23}NO_2 + H^+$ = 286.1802.

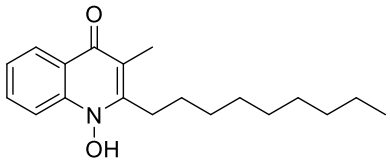
Note: The duplet signal of the H-9 disappeared in methanol-d_4 after a few hours and the multiplicity of the double bond signal was altered. Further, the carbon signal of the C-9 was only visible in the HSQC and HMBC spectra. The compound was stable in DMSO.

(*E*)-Δ^2-3-methyl-2-(non-1-enyl)-4(1*H*)-quinolone *N*-oxide **4d**



The compound was obtained as off-white solid in 53 % yield. ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.86 (t, 3H, *J* = 7.0 Hz, H-17), 1.21 - 1.33 (m, 6H, H-14 - H-16), 1.37 (m, 2H, H-13), 2.06 (m, 2H, H-12), 2.49 (s, 3H, C-3-C**H$_3$**), 4.06 (d, 2H, *J* = 5.7 Hz, H-9), 5.65 (m, 2H, H-10, H-11), 7.85 (t, *J* = 7.85 Hz, 1H, H-6), 8.10 (t, 1H, *J* = 7.8 Hz, H-7), 8.35 (d, 1H, *J* = 8.7 Hz, H-8), 8.49 (d, 1H, *J* = 8.6 Hz, H-5). ^{13}C-NMR (CD_3OD 100.52 MHz) δ (ppm): 12.0 (C-3-**C**H$_3$), 14.3 (C-17), 23.6, 32.7 (C-15, C-16), 29.8 (C-14), 30.1 (C-13), 33.2 (C-9), 33.6 (C-12), 116.5 (C-3), 117.6 (C-8), 121.5 (C-4a), 122.3 (C-10), 124.8 (C-5), 129.4 (C-6), 135.6 (C-7), 137.1 (C-11), 139.7 (C-8a), 157.9 (C-2), 166.1 (C-4). ESI-HRMS: m/z = 300.1952 $[M+H]^+$, calc. for $C_{19}H_{25}NO_2 + H^+$ = 300.1958.

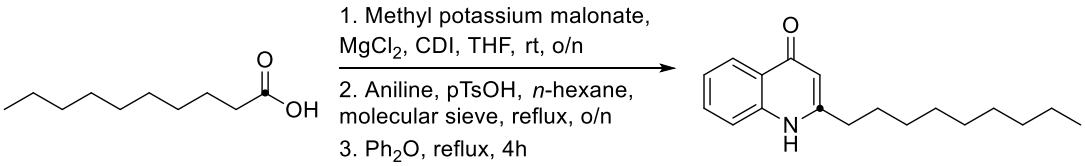
3-Methyl-2-nonyl-4(*H*)-quinolone *N*-oxide **4e**



The compound was obtained as white solid in 92 % yield. ^{1}H-NMR ($CDCl_3$ 400.13 MHz) δ (ppm): 0.92 (t, 3H, *J* = 7.1 Hz, H-17), 1.25 - 1.46 (m, 10H, H-12 - H-16), 1.53 (m, 2H, H-11), 1.74 (m, 2H, H-10), 2.25 (s, 3H, C-3-C**H**$_3$), 3.06 (m, 2H, H-9), 7.45 (m, 1H, H-6), 7.77 (m, 1H, H-7), 7.99 (d, 1H, *J* = 8.7 Hz, H-8), 8.31 (d, 1H, *J* = 8.2 Hz, H-5). ^{13}C-NMR ($CDCl_3$ 100.52 MHz) δ (ppm): 11.6 (C-3-**C**H$_3$), 14.4 (C-17), 23.7, 30.4, 30.4, 30.6, 30.8, 33.0 (C-11 - C-16), 28.8 (C-10), 29.8 (C-9), 115.8 (C-3), 115.9 (C-8), 124.5 (C-4a), 125.1 (C-6), 126.2 (C-5), 133.1 (C-7), 140.9 (C-8a), 154.3 (C-2), 175.8 (C-4). ESI-HRMS: m/z = 302.2107 $[M+H]^+$, calc. for $C_{19}H_{27}NO_2 + H^+$ = 302.2115, 603.4151 $[2M+H]^+$, calc. for $C_{38}H_{54}N_2O_4 + H^+$ = 603.4156.

Compounds **1f** (NQ) and **4f** (NQNO) were synthesized as described in the literature.[5] The same method was applied for the synthesis of **1g** (NQ-2-^{13}C), and **4g** (NQNO-2-^{13}C) as detailed below.

Synthesis of 2-nonyl-4(1*H*)-quinolone-2-^{13}C (NQ-2-^{13}C) (**1g**)



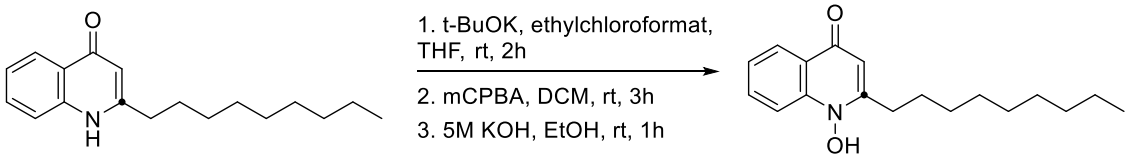
Magnesium chloride (285.7 mg, 3.00 mmol, 1.04 eq.) and methyl potassium malonate (676.1 mg, 4.33 mmol, 1.5 eq.) were dissolved in 10 ml dry THF under nitrogen atmosphere and heated for 4 h at 50°C. Separately, decanoic acid-1-^{13}C (500 mg, 2.886 mmol, 1 eq.) was dissolved in 10 mL dry THF and 1,1'-carbonyldiimidazol (CDI, 561.5 mg, 3.463 mmol, 1.2 eq.) was added slowly within 20 min at 4°C until all CDI was dissolved. The mixture was stirred for 1 h at room temperature and then transferred into a dropping funnel and added slowly to the aforementioned solution of decanoic acid-1-^{13}C at room temperature. The combined solutions were stirred overnight at room temperature. The next day, the THF was evaporated and the residue dissolved in ethyl acetate. The organic phase was washed with sat. aq. $KHSO_4$, sat. aq. $NaHCO_3$ and brine. The organic phase was dried over Na_2SO_4 and the solvent evaporated leaving the crude methyl 3-oxododecanoate-3-^{13}C as colorless oil and was used in the next step without further purification.

The crude methyl 3-oxododecanoate-3-^{13}C (660 mg, 2.88 mmol, 1 eq.) was dissolved in 20 ml *n*-hexane. Aniline (268 mg, 2.88 mmol, 1 eq.) and *p*TsOH (2 mol %) were added, and molecular sieve was poured into the flask. The reaction mixture was refluxed overnight. The molecular sieve was filtered off, washed and the solvent was evaporated. The residue was purified by column chromatography with petrol ether/ethyl acetate 9:1 (R_f = 0.8 (petrol ether/ethyl acetate 9:1)). The methyl (*Z*)-3-(phenylamino)dodec-2-enoate-3-^{13}C was obtained as light brown oil.

The methyl (Z)-3-(phenylamino)dodec-2-enoate-3-^{13}C was dissolved in 5 ml diphenyl ether and refluxed for 4 h at 250°C. The resulting brownish solution was poured into *n*-hexane and the solution cooled at -20 °C for 30 min. The precipitated was filtered off and washed thoroughly with *n*-hexane. The 2-nonyl-4-quinolone-2-^{13}C (**1g**) was obtained as off-white solid (324 mg) in 41.6% yield over 3 steps.

2-Nonyl-4(1*H*)-quinolone-2-^{13}C (**1g**): ^{1}H-NMR (DMSO-d_6 400.13 MHz) δ (ppm): 0.84 (m, 3H, H-17), 1.18-1.35 (m, 12H, H-11 – H-16), 1.66 (m, 2H, H-10), 2.57 (dt, 2H, *J* = 7.1 Hz, *J* = 6.6 Hz, H-9), 5.91 (s, 1H, H-3), 7.26 (m, 1H, H-6), 7.52 (d, 1H, *J* = 8.3 Hz, H-8), 7.60 (m, 1H , H-7), 8.03 (d, 1H, *J* = 7.9 Hz, H-5), 11.45 (s, 1H, NH). ^{13}C-NMR (DMSO-d_6 100.62 MHz) δ (ppm): 13.9 (C-17), 22.0, 28.3 (d, 1C, *J* = 1.7 Hz), 28.5 (d, 1C, *J* = 3.4 Hz), 28.6, 28.7, 28.8, 31.2 (C-10 – C-16), 33.2 (d, 1C, *J* = 44.3 Hz, C-9), 107.6 (d, 1C, *J* = 65.0 Hz, C-3), 117.8 (C-8), 122.6 (C-6), 124.6 (C-4a), 124.7 (C-5), 131.4 (C-7), 141.1 (d, 1C, *J* = 204.0 Hz, C-8a), 153.5 (C-2), 176.8 (C-4). ESI-HRMS: m/z = 273.2035 $[M+H]^+$, calc. for $C_{17}{}^{13}CH_{25}NO + H^+$ = 273.2042; 545.4000 $[2M+H]^+$, calc. for $C_{34}{}^{13}C_2H_{50}N_2O_2 + H^+$ = 545.4012.

Synthesis of 2-nonyl-4(1*H*)-quinolone *N*-oxide-2-^{13}C (NQNO-2-^{13}C) (**4g**)



2-Nonyl-4-quinolone-2-^{13}C (**1g**) (200 mg, 0.735 mmol, 1 eq.) was dissolved in 7.5 ml dry THF and *t*BuOK (103 mg, 0.919 mmol, 1.25 eq.) and ethylchloroformat (171.5 mg, 1.58 mmol, 2.15 eq.) were added. The solution was stirred for 2 h at room temperature and then quenched with dest. H_2O. THF was evaporated and the mixture diluted with H_2O. The aqueous phase was extracted with ethyl acetate and dried over $MgSO_4$. The solvent was evaporated and the product was purified by column chromatography with DCM/petrol ether 2:1 (R_f = 0.78 (DCM/petrol ether 2:1)).

Ethyl carbonate protected ethyl (2-nonylquinolin-4-yl) carbonate-2-^{13}C (220 mg, 0.64 mmol, 1 eq.) was dissolved in 10 ml dry DCM and *m*CPBA (121 mg, 0.7 mmol, 1.1 eq.) was added. The mixture was stirred at room temperature for 3 h. The organic phase was washed twice with 0.5 M Na_2CO_3 and once with dest. H_2O. The organic phase was dried over $MgSO_4$ and the solvent was evaporated. The residue was purified by column chromatography with ethyl acetate (R_f = 0.7 (ethyl acetate)).

The ethyl carbonate protected 4-((ethoxycarbonyl)oxy)-2-nonylquinoline-*N*-oxide-2-^{13}C (160 mg, 0.443 mmol, 1 eq.) was dissolved in 30 ml ethanol and 1.48 ml 5 M KOH solution (17 eq.) was added. The reaction mixture turned yellow and was stirred for 1 h at room temperature. Afterwards, dest. H_2O was added and the pH was adjusted to 1 with conc. HCl. The precipitate was filtered off, washed with water and dried. The 2-nonyl-4(1*H*)-quinolone *N*-oxide-2-^{13}C (**4f**) was obtained as white solid (110 mg) in 63.7% yield over 3 steps.

2-Nonyl-4(1*H*)-quinolone *N*-oxide-2-^{13}C (**4f**): ^{1}H-NMR (CD_3OD 399.79 MHz) δ (ppm): 0.89 (m, 3H, H-17), 1.22-1.42 (m, 10H, H-12 – H-16), 1.46 (m, 2H, H-11) 1.78 (m, 2H, H-10), 2.93 (m, 2H, H-9), 6.34 (s, 1H, H-3), 7.51 (m, 1H, H-6), 7.82 (m, 1H, H-7), 8.09 (d, *J* = 8.6 Hz, 1H, H-8), 8.26 (d, *J* = 8.2 Hz, 1H, H-5). ^{13}C-NMR (CD_3OD 100.95 MHz) δ (ppm): 14.4 (C-17), 28.9 (C-10), 23.7, 30.4 (3C), 30.6, 33.0 (C-11 - C-16), 32.5 (d, 1C, *J* = 46.5 Hz, C-9), 107.5 (d, 1C, *J* = 64.0 Hz, C-3), 116.8 (C-8), 125.4 (C-4a), 125.9 (C-5), 126.0 (C-6), 133.7 (C-7), 142.0 (d, 1C, *J* = 3.7 Hz, C-8a), 156.4 (C-2), 174.1 (C-4, only in HMBC). ESI-HRMS: m/z = 289.1981 $[M+H]^+$, calc. for $C_{17}{}^{13}CH_{25}NO_2 + H^+$ = 289.1992; 577.3893 $[2M+H]^+$, calc. for $C_{34}{}^{13}C_2H_{50}N_2O_4 + H^+$ = 577.3910.

3. Analytical methods

Bacterial strains

Strain	medium
Burkholderia thailandensis DSM13276	LB
Pseudomonas aeruginosa PAO1	LB
Pseudomonas aeruginosa PA14	LB

Quantification of quinolones in bacterial cultures

In general, quinolone levels were determined in 3 biological replicates. Per sample 60 µL of an overnight culture was added in 4 mL growth medium. For blood containing samples, the medium was supplemented with 5 % defibrinated sheep blood (Thermo Scientific, Art. Nr. 13275509). Cultures were incubated for 24 h at 37 °C in a shaking incubator at 180 rpm. Then, samples were centrifuged at 4500 g for 5 min, the culture supernatants sterile filtered and quinolones extracted as described in the next section.

Extraction of quinolones from culture supernatants

NQNO-2-^{13}C was added as internal standard in a final concentration of 10 µg/L (10 mg/L NQNO-2-^{13}C stock solution in MeOH) to the culture supernatant as extraction control and vortexed for 5 sec. Next, 300 µL of culture supernatant was added in 1.5 mL glass vials (LABSOLUTE, Art. Nr. 7612960) with caps containing a PTFE membrane (LABSOLUTE, Art. Nr. 7623097). Then, exactly 300 µL ethyl acetate was added and immediately vortexed for 5 seconds. Afterwards, 100 µL of the upper ethyl acetate layer was transferred via pipetting into mass spec vials containing a glass insert (MACHEREY-NAGEL, Art. Nr. 702007). This step is critical for reproducibility and requires wetting of the pipette tip with ethyl acetate before pipetting the samples. In case of poor separation of the layers, the glass vials were inserted in 15 mL polypropylene centrifuge tubes and centrifuged at low speed. The ethyl acetate was evaporated by a gentle stream of nitrogen and the dried sample stored at -80 °C if necessary. For LC-MS analysis, 100 µL of sample solvent (MeOH/H_2O 1:1) was added and vortexed for 5 seconds.

Calibration curves for absolute quantitation

MeOH stocks of all calibration and internal standards (Table S2) were prepared at 1 mg/mL in glass vials and stored at -80 °C for up to 3 months. Calibration standards for absolute quantitation were prepared in triplicates by 1:3 serial dilution in LB medium containing internal standard (NQNO-2-^{13}C in a final concentration of 10 µg/mL) for extraction control. 300 µL of each calibration standard dilution in LB medium was added into a 1.5 mL mass spec vial, then 300 µL ethyl acetate was added and immediately vortexed for 5 sec. Extraction of quinolones was performed as previously described. For LC-MS analysis, the sample was reconstituted in 100 µl of sample solvent (MeOH/H_2O 1:1) and vortexed for 5 sec.

LC-MS/MS analysis

Ultra-high performance liquid chromatography was performed on a Dionex Ultimate 3000 UHPLC (Thermo Fisher Scientific, Waltham, MA) using a Nucleodur C18 Gravity-SB 150 x 2 mm, 3 µm column (Macherey-Nagel). The flow rate was 0.5 mL/min and the column temperature was held at 40 °C. The injection volume was 5 µL. Eluent A was 0.1% formic acid in water and eluent B was 0.1% formic acid in acetonitrile. The gradient was 20-100 % B in 10 min, 100 % B for 2 min, 100-20 % B in 1 min and 20 % B for 2 min. MS/MS analysis was performed by a Finnigan™ TSQ® Quantum (Thermo Scientific) mass spectrometer. As ion source a heated-electrospray ionization (HESI-II probe, Thermo Scientific) was used. In the optimized conditions the ion spray voltage was 3500 V, vaporizer temperature 300 °C, capillary temperature 380 °C, sheath gas pressure 60 psi, ion sweep gas pressure 2 psi, aux gas 10 psi. The instrument was tuned with ^{13}C-isotop labeled NQNO (NQNO-2-^{13}C) via split flow injection. The tube lens offset was 80 V and skimmer offset 0.

Fragmentation pattern of quinolone standards were acquired in product ion full scan mode using a fixed collision energy of 30 eV to fragment the corresponding precursor ion before recording the fragments in a mass range of *m/z* 130-350. Quantitation of quinolones was performed in SRM (Selected Reaction Monitoring) scan mode. MS/MS spectra were acquired in positive mode with fixed collision

energy of 30 eV and dwell time of 0.04 sec. The software Quan Browser Thermo Xcalibur 3.1.66.10 was used for quantitative analysis. The peak area of the respective product ion was fitted by linear regression versus the known concentrations to generate standard curve. The isotope-labelled internal standard NQNO-2-^{13}C was spiked into bacterial supernatants to verify a proper extraction process. Only samples with NQNO-2-^{13}C concentration deviations < 20% were accepted for quantification.

4. Biological experiments

Bacterial strains and cultures

The MRSA strains Mu50 (ATCC 700699, Institute Pasteur, France) and USA300 (ATCC-BAA-1556 *S. aureus* FPR3757) were maintained in LB medium at 37°C. All strains were freshly inoculated from glycerol stocks into overnight cultures prior to use in the corresponding experiments.

MIC values determination

An overnight culture of *S. aureus* USA300 and Mu50 was diluted 1:1000 with fresh LB-media. In a round bottom 96-well plate 1 µl of a compound stock in DMSO and 99 µl of the bacteria suspension were added. The plate was incubated at 37°C and 180 rpm. After 8/20 h of incubation, 100 µL of a 0.02% resazurin solution (20 mg of resazurin were added to 100 mL sterile LB media. After sonication, the solution was sterile filtered and can be stored for up to 2 weeks at 4°C) were added and the plate was incubated for another 2 h at 37°C and 180 rpm. An inhibition was considered positive if the solution remained blue. Wells that showed a pink or violet color or were colourless were considered negative for inhibition. MIC values were determined in triplicates.

Growth curves

For the growth measurement of *S. aureus* over time, in a sterile tube (13 ml, PP) LB media was inoculated with an overnight culture of the respective strain 1:1000 to reach 3 ml total volume. Compounds were added from a DMSO stock. The cultures were incubated at 37°C and 180 rpm. The growth as observed by hourly measurement of the OD_{600} value (Eppendorf BioPhotometer plus) of 100 µl culture in plastic cuvettes (Sarstedt UV-transparent cuvettes for use >220 nm, 12.5 x 12.5 x 45mm) in triplicates.

Formation of *S. aureus* small colony morphology

From an overnight culture of *S. aureus* USA300 was made a 1:20 000 dilution in LB-medium. From this suspension, 20 µl was added at a Müller-Hinton agar plate (Ø = 14 cm) and plated with a Drigalski spatula. Filter discs were placed on the plate and 5 µl of a compound stock in DMSO was added on the discs. The plates were incubated for 1 d at 37°C.

5. References

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6. Tables

Table S1 Relative abundance of detected fragments of each standard after fragmentation by CID at 30 V.

Subtype	Fragments [m/z, (% relative abundance)]
Δ^1-AQ	184 (100%), 159 (50%), 172 (25%), 186 (20%)
Δ^2-AQ	159 (100%), 172 (25%), 184 (20%), 198 (18%)
AQ	159 (100%), 172 (45%)
Δ^1-AQNO	198 (100%), 184 (80%), 158 (25%), 172 (20%)
Δ^2-AQNO	159 (100%), 184 (95%), 158 (90%), 198 (60%), 172 (45%)
AQNO	159 (100%), 186 (30%), 172 (25%)
Δ^1-MAQ	184 (100%), 173 (50 %), 198 (25%)
Δ^2-MAQ	173 (100%), 184 (25%), 186 (20%), 198 (10%)
MAQ	173 (100%), 186 (30%)
Δ^1-MAQNO	184 (100%), 212 (30%), 186 (15%), 173 (10%)
Δ^2-MAQNO	172 (100%), 173 (80%), 184 (60%), 198 (50%), 212 (20%)
MAQNO	173 (100%), 200 (30%), 186 (25%)

Table S2 Quantitative parameters of calibration standards and internal standard. Extraction and absolute quantification of standards was performed in triplicates. LLOQ = lower limit of quantification, LOD = limit of detection.

calibration standard	rt	transition	calibration equation; R-value; concentrations	LLOQ (µg/L)	LOD (µg/L)
MNQ	**8.17**	286/173	Y = -546824+259057*X+271.317*X^2 R^2 = 0.9929 3, 9, 27, 81, 243, 728 µg/mL	3	< 0.1
MNQNO	**8.06**	302/173	Y = -6591.52+6119.4*X+146.582*X^2 R^2 = 0.9967 3, 9, 27, 81, 243, 728 µg/mL	3	< 0.1
NQ	**7.54**	272/159	Y = -125503+142837*X+340.381*X^2 R^2 = 0.9974 3, 9, 81, 243, 728 µg/mL	3	< 0.1
NQNO	**7.30**	288/159	Y = -22810.2+25621.5*X+17.9626*X^2 R^2 = 0.9958 1, 3, 9, 27, 81, 243, 728 µg/mL	1	< 0.1
Δ^1-MNQ	**8.34**	284/184	Y = -159307+53925.5*X+346.83*X^2 R^2 = 0.9908 3, 9, 27, 81, 243, 728 µg/mL	3	1
Δ^1-MNQNO	**7.89**	300/184	Y = 79.584+1383.84*X+96.7206*X^2 R^2 = 0.9995 9, 27, 81, 243, 728 µg/mL	9	3
Δ^1-NQ	**7.50**	270/184	Y = -98244.2+109528*X+345.002*X^2 R^2 = 0.9991 1, 3, 9, 27, 81, 243, 728 µg/mL	1	0.3
Δ^1-NQNO	**6.85**	286/198	Y = -32365.9+78430.4*X+121.112*X^2 R^2 = 0.9943 1, 3, 9, 27, 81, 243, 728 µg/mL	1	0.1
Δ^2-MNQ	**7.74**	284/173	Y = -46805.7+20843.4*X+50.1844*X^2 R^2 = 0.9983 3, 9, 27, 81, 243, 728 µg/mL	3	< 0.1
Δ^2-MNQNO	**7.58**	300/173	Y = -264925+10984.3*X+15.4559*X^2 R^2 = 0.9928 27, 81, 243, 728 µg/mL	27	9
Δ^2-NQ	**7.18**	270/159	Y = 97535.6+2.36478e+006*X-546.794*X^2 R^2 = 0.9952 0.2, 2, 20, 200, 2000 µg/mL	0.2	< 0.2
Δ^2-NQNO	**6.94**	286/159	Y = -19767.6+18752.5*X+25.5457*X^2 R^2 = 0.9970 3, 9, 27, 81, 243 µg/mL	3	< 0.1

internal standard	rt	transition
NQNO-2-^{13}C	**7.25**	289/160

Table S3 Retention times (rt) and mass transitions of alkyl quinolones detected in culture supernatants.

Quinolone	rt	transition
Δ^2-MHQ (C_7)	**6.41**	256/173
Δ^2-MNQ (C_9)	**7.71**	284/173
Δ^2-MDQ (C_{10})	**8.34**	298/173
Δ^2-MUQ (C_{11})	**8.95**	312/173
MPQ (C_5)	**5.26**	230/173
MHQ (C_7)	**6.83**	258/173
MNQ (C_9)	**8.15**	286/173
MUQ (C_{11})	**9.40**	314/173
Δ^2-MHQNO (C_7)	**6.32**	272/173
Δ^2-MNQNO (C_9)	**7.56**	300/173
Δ^2-MDQNO (C_{10})	**8.17**	314/173
Δ^2-MUQNO (C_{11})	**8.77**	328/173
MPQNO (C_5)	**5.36**	246/173
MHQNO (C_7)	**6.78**	274/173
MNQNO (C_9)	**8.06**	302/173
Δ^1-NQ (C_9)	**7.51**	270/184
Δ^1-UQ (C_{11})	**8.81**	298/184
Δ^2-HxQ (C_6)	**4.66**	228159
Δ^2-HQ (C_7)	**5.77**	242/159
Δ^2-NQ (C_9)	**7.17**	270/159
HxQ (C_6)	**5.17**	230/159
HQ (C_7)	**6.09**	244/159
OQ (C_8)	**6.84**	258/159
NQ (C_9)	**7.54**	272/159
UQ (C_{11})	**8.86**	300/159
Δ^1-HQNO (C_7)	**5.53**	258/198
Δ^1-OQNO (C_8)	**6.21**	272/198
Δ^1-NQNO (C_9)	**6.83**	286/198
Δ^1-DQNO (C_{10})	**7.12**	300/198
Δ^2-HQNO (C_7)	**5.67**	258/159
Δ^2-NQNO (C_9)	**6.93**	286/159
PQNO (C_5)	**4.52**	232/159
HxQNO (C_6)	**5.31**	246/159
HQNO (C_7)	**6.01**	260/159
OQNO (C_8)	**6.70**	274/159
NQNO (C_9)	**7.27**	286/159

Table S4 Concentration of alkyl quinolones detected in culture supernatants of *B. thailandensis*. Standard deviation in brackets. Experiment was performed in biological triplicates. LLOQ = lower limit of quantification.

Δ^1-MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^1-MAQ-NO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^1-AQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^1-AQNO	
Chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^2-MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	388.2 (24.8)
C8	---
C9	1181.2 (89.5)
C10	27.8 (5.1)
C11	22.34 (3.29)
C12	---

Δ^2-MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	102.6 (9.7)
C8	---
C9	1221.3 (29.9)
C10	35.3 (5.6)
C11	26.0 (7.2)
C12	---

Δ^2-AQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	9.8 (1.2)
C8	---
C9	122.9 (13.4)
C10	---
C11	---
C12	---

Δ^2-AQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	3.8 (0.4)
C8	---
C9	125.9 (9.4)
C10	---
C11	---
C12	---

MAQ	
chain	**conc (µg/L)**
C5	3.4 (0.2)
C6	---
C7	17.6 (1.8)
C8	---
C9	19.6 (1.9)
C10	---
C11	2.3 (0.0) (<LLOQ)
C12	---

MAQNO	
chain	**conc (µg/L)**
C5	5.5 (0.5)
C6	---
C7	35.1 (2.1)
C8	---
C9	75.4 (6.3)
C10	---
C11	---
C12	---

AQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	1.4 (0.1) (<LLOQ)
C8	---
C9	2.6 (0.3) (<LLOQ)
C10	---
C11	---
C12	---

AQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	2.2 (0.3) (<LLOQ)
C8	---
C9	6.2 (0.6)
C10	---
C11	---
C12	---

Table S5 Concentration of alkyl quinolones detected in culture supernatants of *P. aeruginosa* PAO1. Standard deviation in brackets. Experiment was performed in biological triplicates. LLOQ = lower limit of quantification.

Δ¹-MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ¹-MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ¹-AQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	4.9 (0.6)
C10	---
C11	0.5 (0.1) (<LLOQ)
C12	---

Δ¹-AQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	680.2 (38.4)
C8	225.0 (22.1)
C9	874.2 (100.9)
C10	38.1 (6.6)
C11	---
C12	---

Δ²-MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ²-MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ²-AQ	
chain	**conc (µg/L)**
C5	---
C6	13.6 (2.7)
C7	---
C8	---
C9	21.6 (2.3)
C10	---
C11	---
C12	---

Δ²-AQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	77.1 (21.8)
C8	---
C9	215.7 (38.9)
C10	---
C11	---
C12	---

MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

AQ	
chain	**conc (µg/L)**
C5	---
C6	3.5 (0.1)
C7	58.8 (13.3)
C8	4.9 (0.9)
C9	45.5 (3.6)
C10	---
C11	6.3 (0.1)
C12	---

AQNO	
chain	**conc (µg/L)**
C5	150.8 (40.4)
C6	191.5 (54.1)
C7	4516.1 (671.9)
C8	927.1 (192.4)
C9	1358.5 (144.9)
C10	---
C11	---
C12	---

Table S6 Concentration of alkyl quinolones detected in culture supernatants of *P. aeruginosa* PA14. Standard deviation in brackets. Experiment was performed in biological triplicates. LLOQ = lower limit of quantification.

Δ^1-MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^1-MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^1-AQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	13.1 (3.7)
C10	---
C11	1.4 (0.6)
C12	---

Δ^1-AQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	441.7 (55.4)
C8	125.9 (21.0)
C9	688.0 (126.8)
C10	18.2 (5.5)
C11	---
C12	---

Δ^2-MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^2-MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

Δ^2-AQ	
chain	**conc (µg/L)**
C5	---
C6	59.6 (29.2)
C7	---
C8	---
C9	123.2 (105.5)
C10	---
C11	---
C12	---

Δ^2-AQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	52.6 (12.3)
C8	---
C9	170.1 (46.4)
C10	---
C11	---
C12	---

MAQ	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

MAQNO	
chain	**conc (µg/L)**
C5	---
C6	---
C7	---
C8	---
C9	---
C10	---
C11	---
C12	---

AQ	
chain	**conc (µg/L)**
C5	---
C6	20.1 (12.2)
C7	70.1 (13.8)
C8	6.3 (1.4)
C9	109.9 (34.3)
C10	---
C11	18.1 (7.3)
C12	---

AQNO	
chain	**conc (µg/L)**
C5	112.6 (26.8)
C6	152.3 (37.4)
C7	4089.9 (643.4)
C8	742.9 (174.7)
C9	1298.2 (364.0)
C10	---
C11	---
C12	---

7. Figures

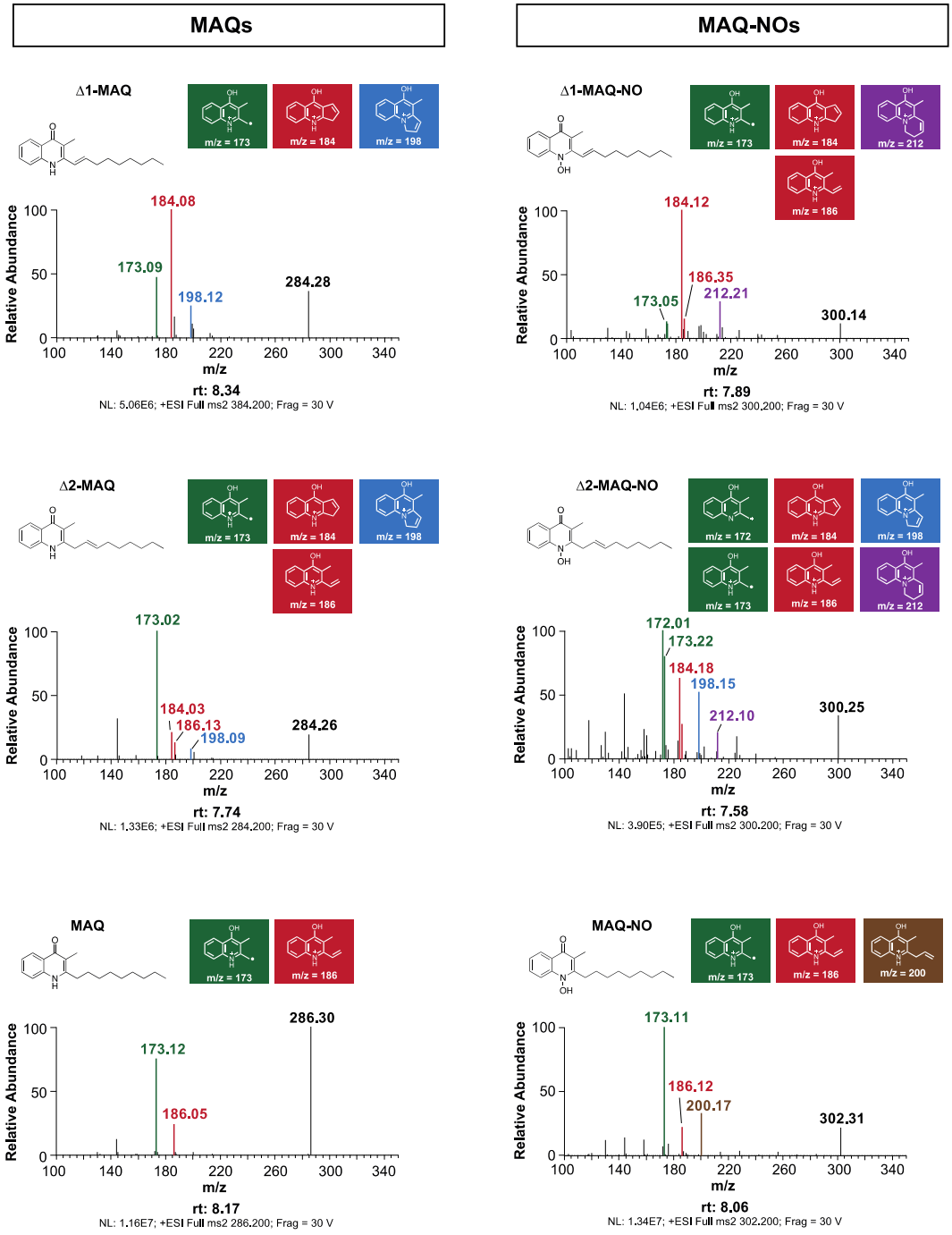


Figure S1 Spectra of methylated alkyl quinolone standards after fragmentation at 30 V. Chemical structures of fragments predicted using chemical dissociation rules and reported structures.[6]

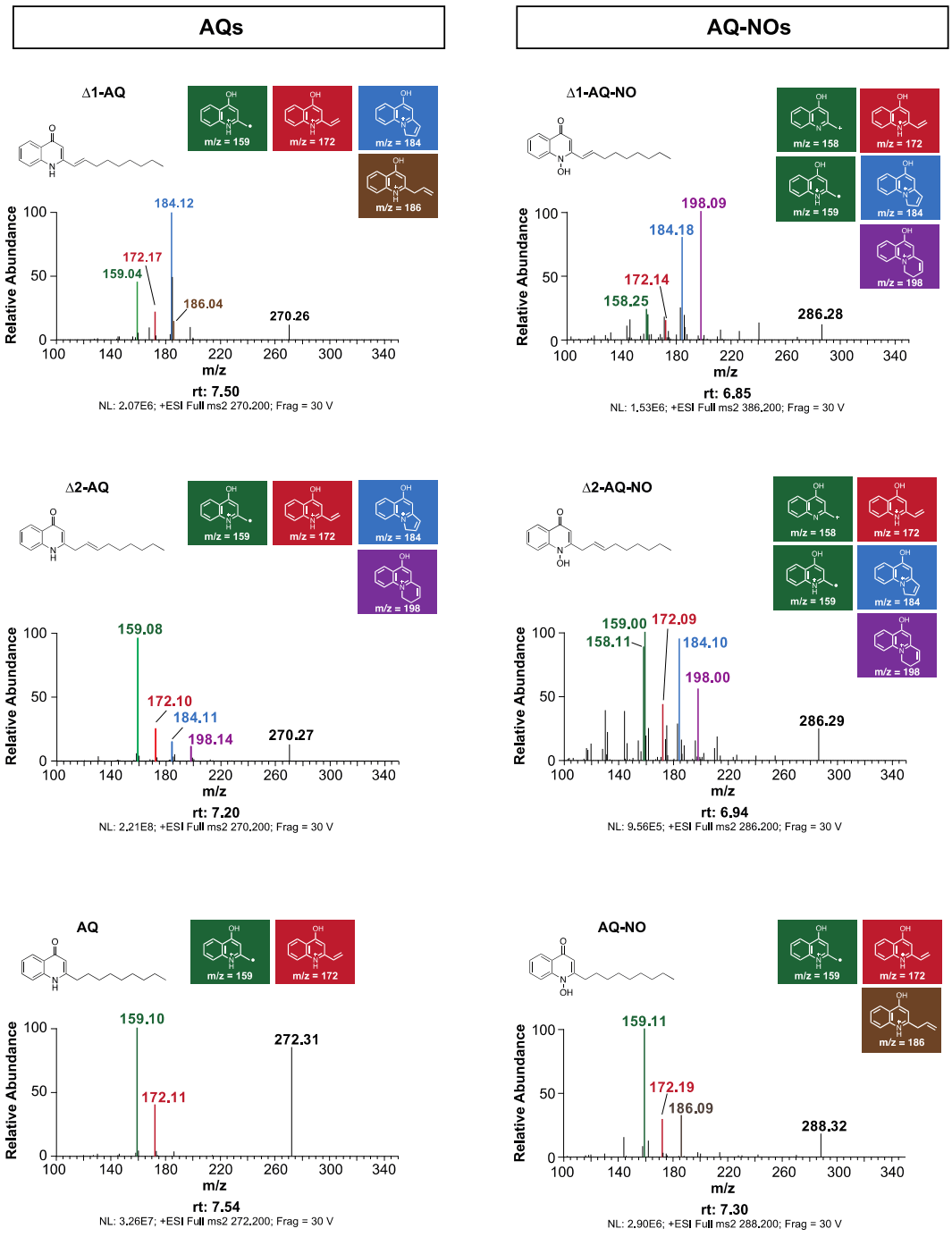


Figure S2 Spectra of alkyl quinolone standards after fragmentation at 30 V. Chemical structures of fragments predicted using chemical dissociation rules and reported structures.[6]

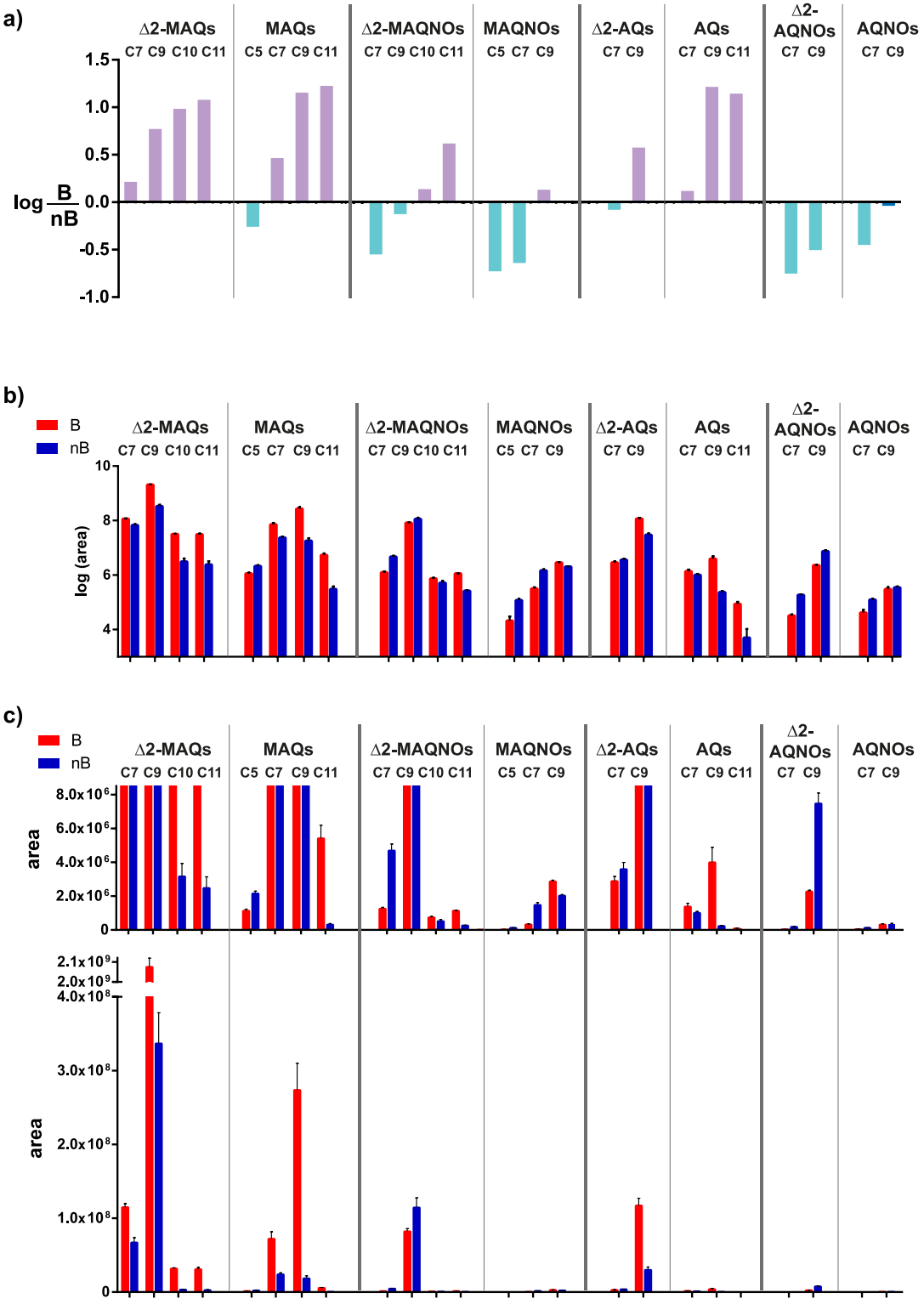


Figure S3 Quinolones in supernatants of *B. thailandensis* grown in medium supplemented with blood or no blood. Integrated area of recorded selective mass transitions in fold change (a) logarithmic scale (b) and normal scale (c). Experiment was performed in biological triplicates. B = blood, nB = no blood.

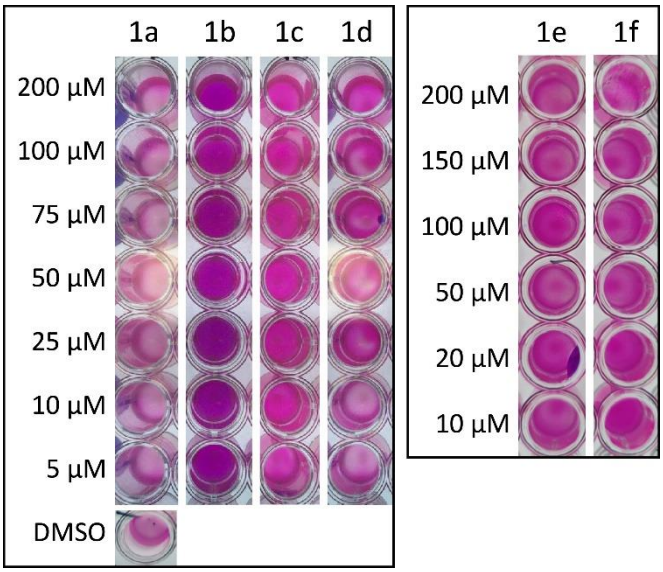


Figure S4 Resazurin assay of *S. aureus* USA300 over an incubation period of 8 h.

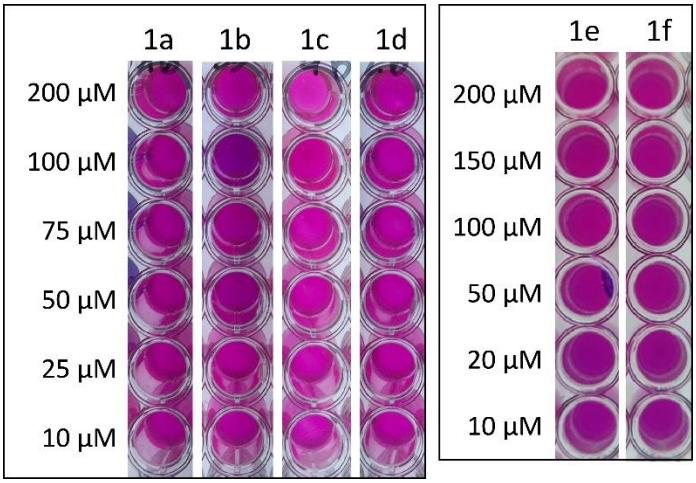


Figure S5 Resazurin assay of *S. aureus* Mu50 over an incubation period of 8 h.

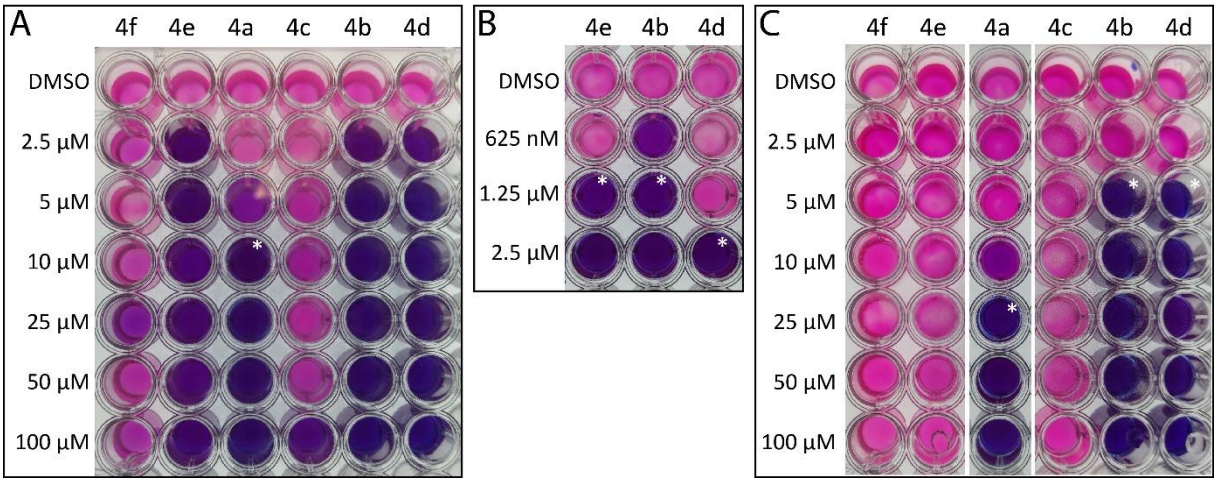


Figure S6 Resazurin assay of *S. aureus* USA300 over an incubation period of 8 h (A and B) and 20 h (C). MIC values are indicated by a white star.

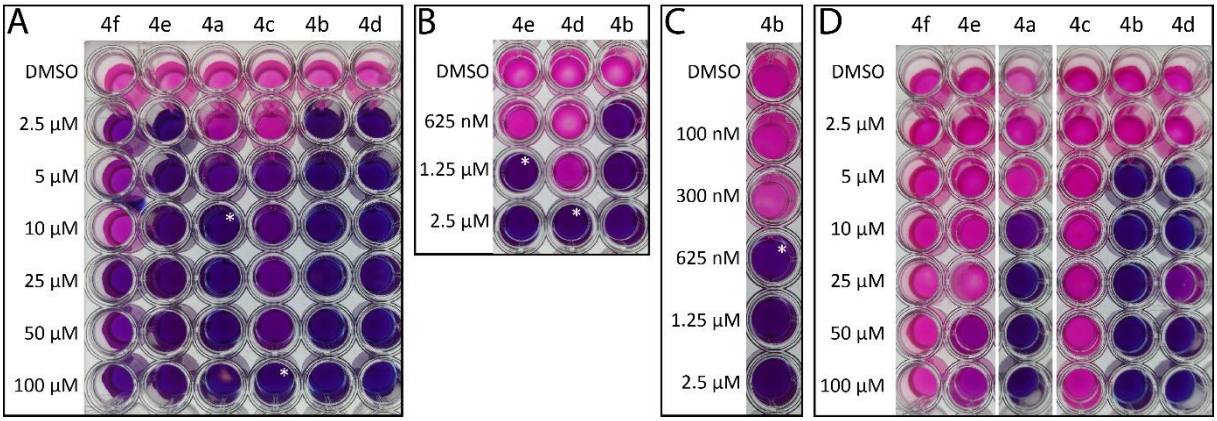


Figure S7 Resazurin assay of *S. aureus* Mu50 over an incubation period of 8 h (A-C) and 20 h (D). MIC values are indicated by a white star.

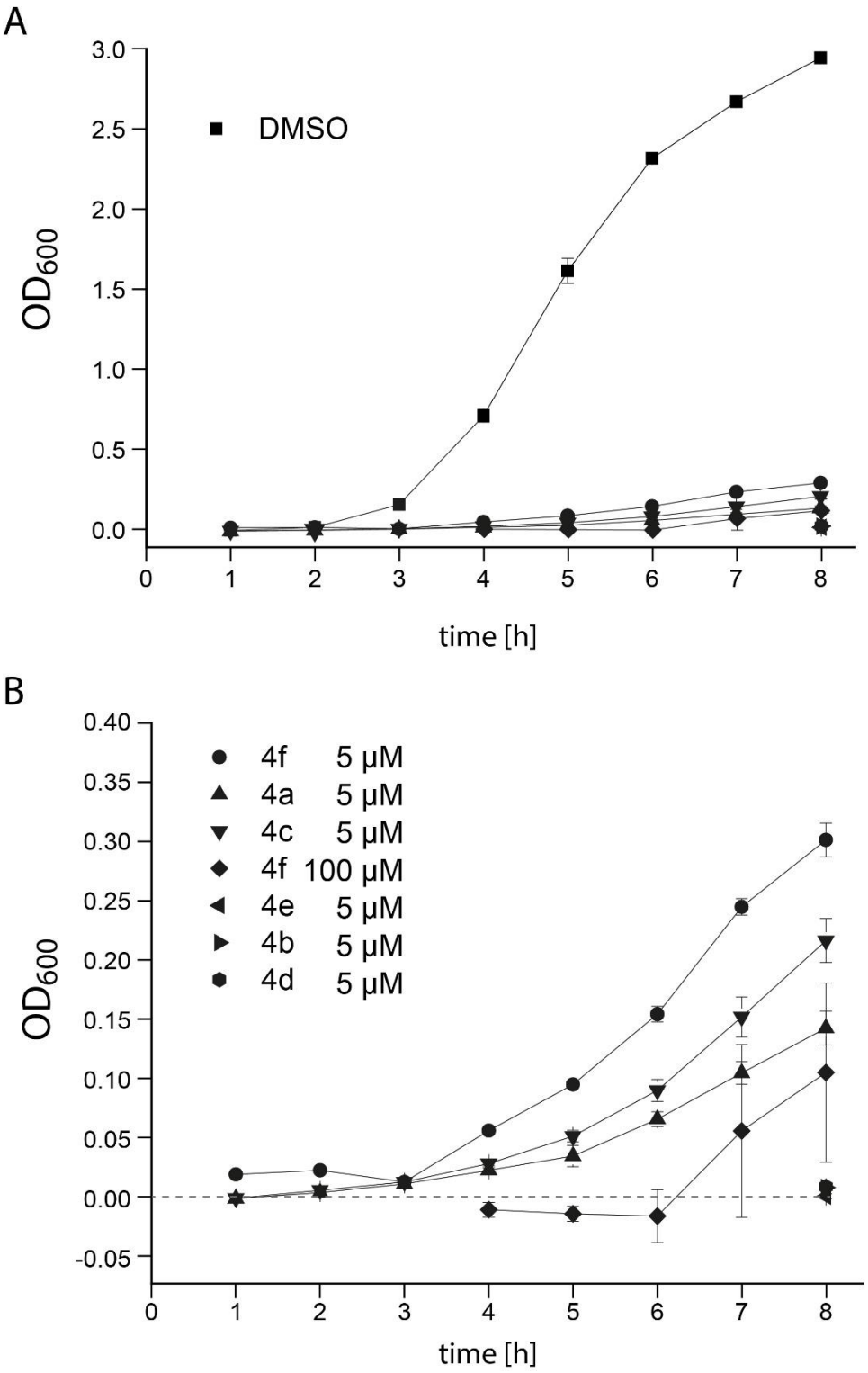


Figure S8 Growth curves of *S. aureus* USA300. A) Growth curves with compounds **4a**-**4f** and DMSO as control. B) detailed view of growth curves with compounds **4a**-**4f**.

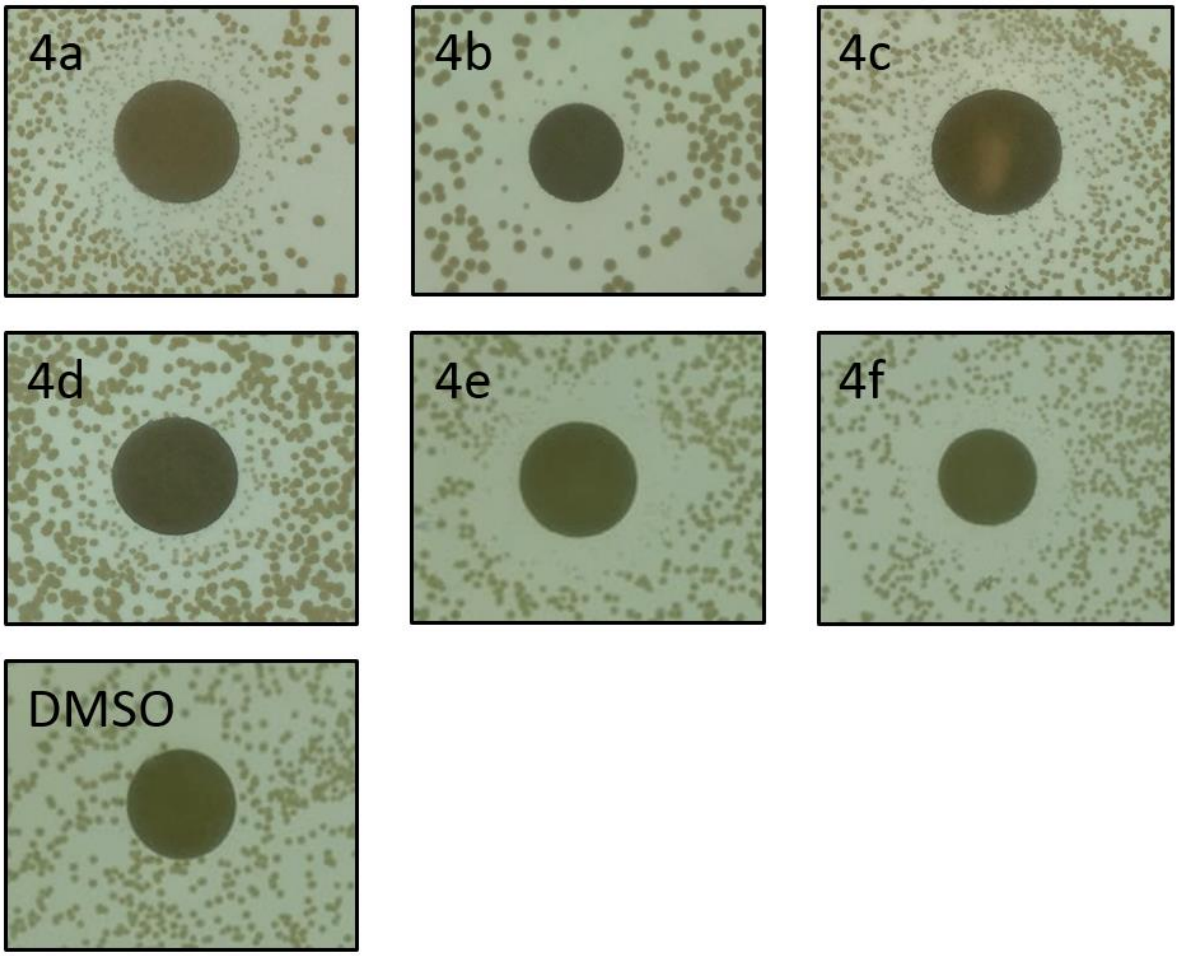
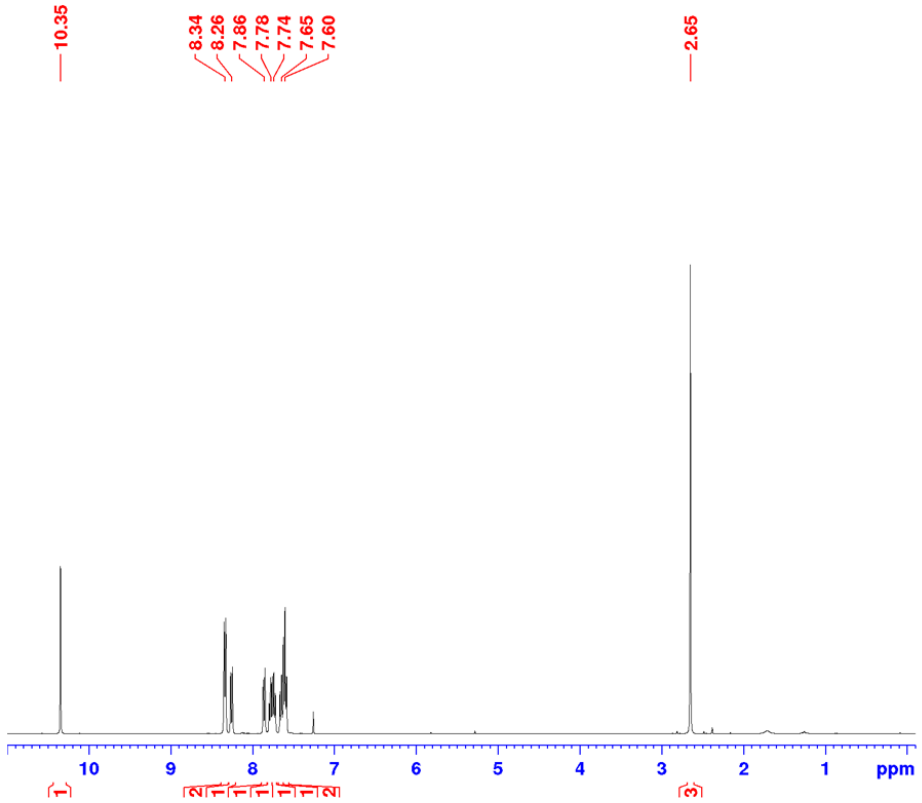


Figure S9 Small colony morphology of *S. aureus* USA300 induced by **4a**, **4b**, **4c**, **4d**, **4e**, and **4f**. Compounds were tested in the dosage range of 25-125 nmol.

8. NMR spectra

2-Formyl-3-methylquinolin-4-yl benzoate **15** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in $CDCl_3$

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PROCNO                     1

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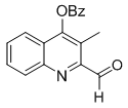
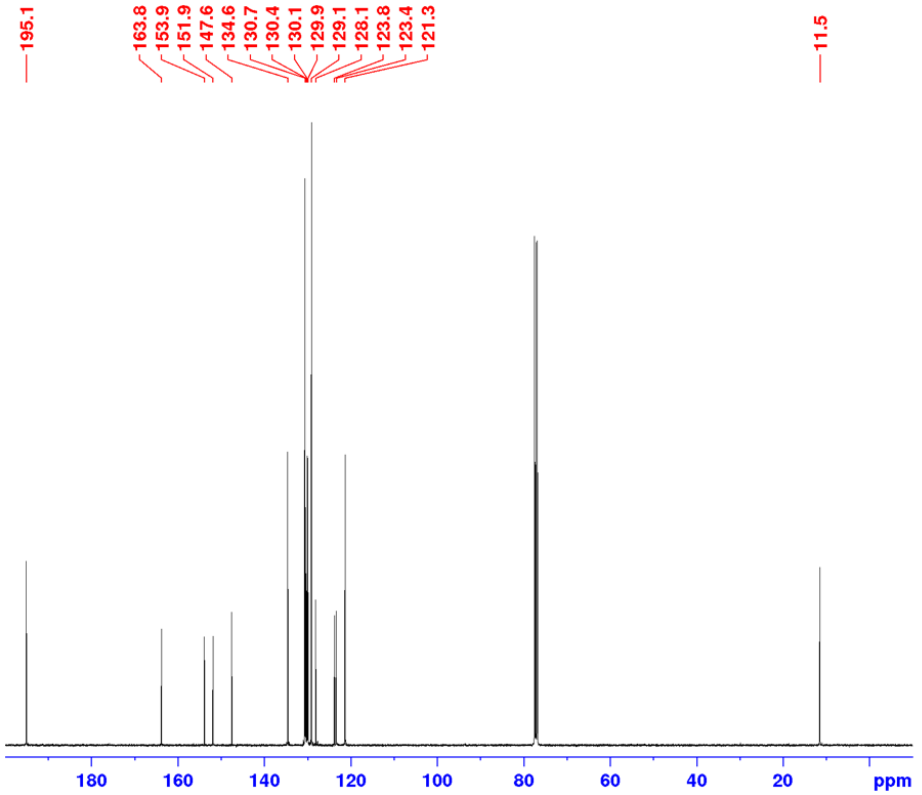
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                   32
DS                    2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9845889 sec
RG                  101
DW               60.800 usec
DE               10.00 usec
TE                300.0 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1        400.1324710 MHz
NUC1                   1H
P1                 14.20 usec
PLW1        23.01399994 W

F2 - Processing parameters
SI                 65536
SF          400.1300097 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```



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Current Data Parameters
NAME      180525-codie-CD044
EXPNO                      6
PROCNO                     1

F2 - Acquisition Parameters
Date_           20180526
Time               7.50
INSTRUM          isa400
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                 6144
DS                    4
SWH          24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG                 2050
DW               20.800 usec
DE               10.00 usec
TE                300.0 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1        100.6228298 MHz
NUC1                   13C
P1                 9.00 usec
PLW1        56.00000000 W

======== CHANNEL f2 ========
SFO2        400.1316005 MHz
NUC2                   1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2        23.00000000 W
PLW12        0.57256001 W
PLW13        0.28799000 W

F2 - Processing parameters
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SF          100.6127580 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
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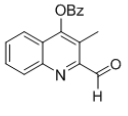
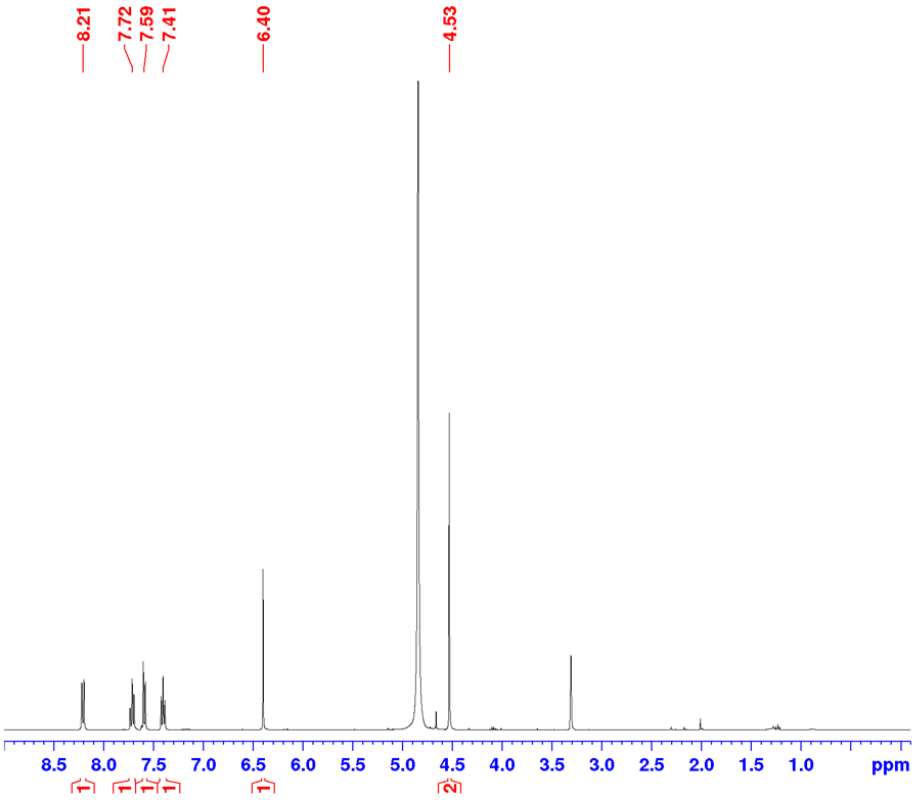


2-(Chloromethyl)quinolin-4(1*H*)-one **20** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD

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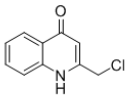
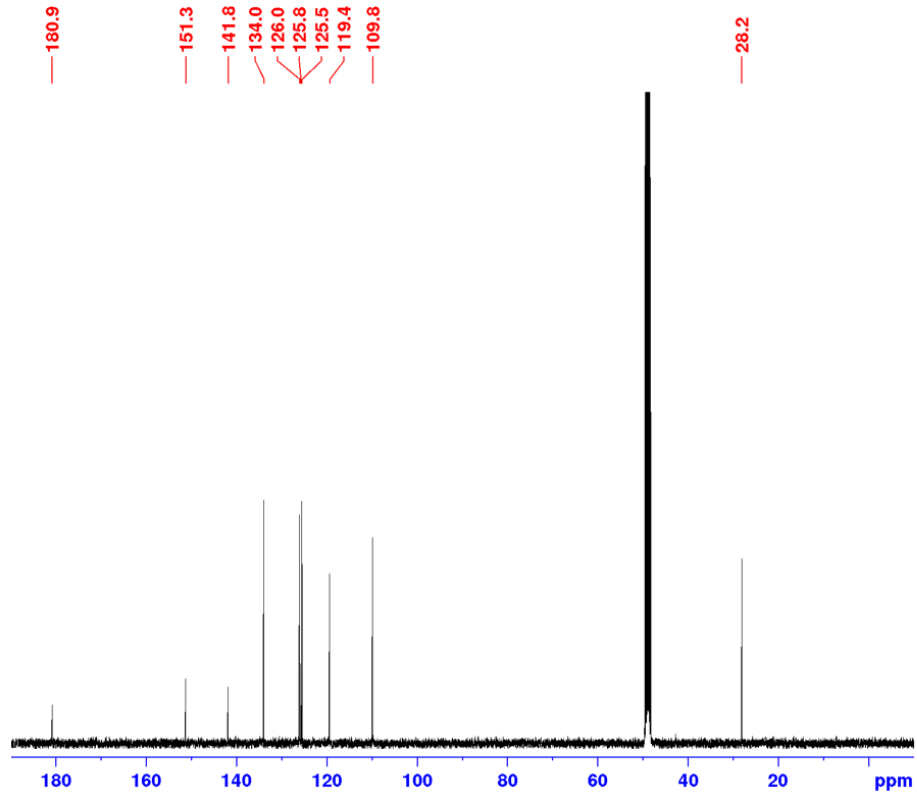
Current Data Parameters
NAME      180508codie-53
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20180508
Time              19.30
INSTRUM         ayita400
PROBHD    5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT             MeOD
NS                    16
DS                     2
SWH            7978.724 Hz
FIDRES         0.121746 Hz
AQ             4.1069226 sec
RG                   256
DW              62.667 usec
DE              10.00 usec
TE                300.0 K
D1           1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         399.7924689 MHz
NUC1                   1H
P1                 12.75 usec
PLW1         14.00000000 W

F2 - Processing parameters
SI                 65536
SF           399.7900077 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```



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NAME      180508codie-53
EXPNO                  5
PROCNO                 1

F2 - Acquisition Parameters
Date_           20180508
Time              22.40
INSTRUM         ayita400
PROBHD    5 mm PABBO BB-
PULPROG           zgpg30
TD                 65536
SOLVENT             MeOD
NS                  1024
DS                     4
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ             1.3631488 sec
RG                  2050
DW              20.800 usec
DE              10.00 usec
TE                300.0 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         100.5373282 MHz
NUC1                  13C
P1                 9.75 usec
PLW1         32.00000000 W

======== CHANNEL f2 ========
SFO2         399.7915992 MHz
NUC2                   1H
CPDPRG[2          waltz16
PCPD2             90.00 usec
PLW2         14.00000000 W
PLW12         0.28097001 W
PLW13         0.14133000 W

F2 - Processing parameters
SI                 65536
SF           100.5271365 MHz
WDW                   EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
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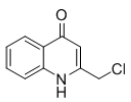
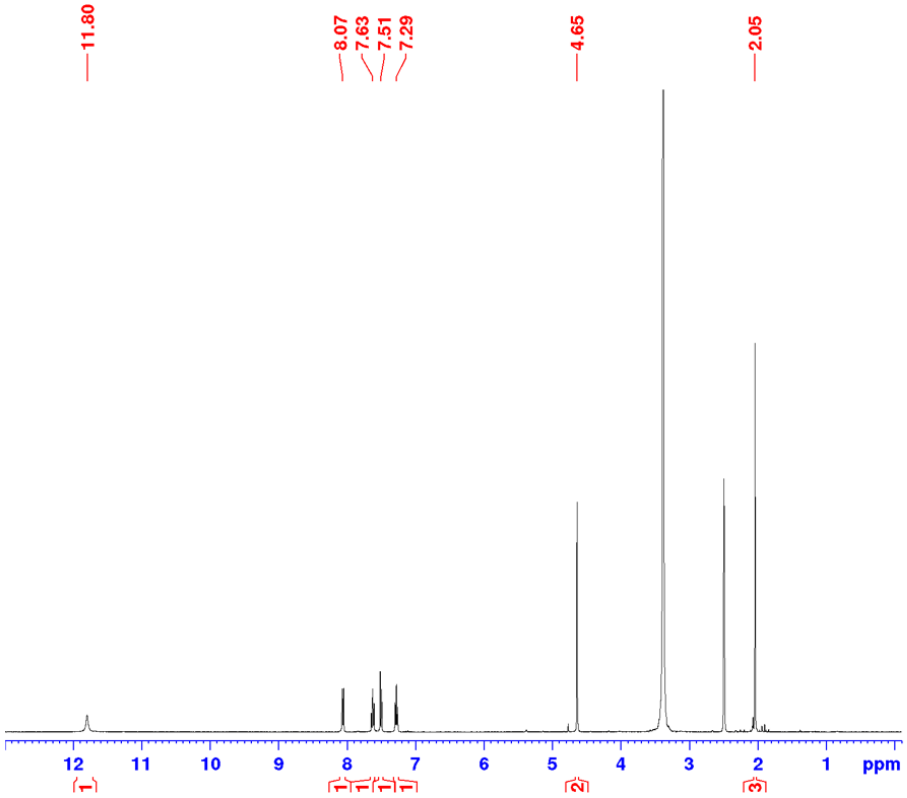


2-(Chloromethyl)-3-methylquinolin-4(1*H*)-one **21** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in DMSO-d_6

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Current Data Parameters
NAME      180420codie_FastTrack-24
EXPNO                1
PROCNO               1

F2 - Acquisition Parameters
Date_             20180420
Time                19.20
INSTRUM           isa400
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT              DMSO
NS                      8
DS                      2
SWH              8223.685 Hz
FIDRES           0.125483 Hz
AQ               3.9845889 sec
RG                    101
DW                60.800 usec
DE                10.00 usec
TE                300.1 K
D1             1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1          400.1324710 MHz
NUC1                    1H
P1                   14.20 usec
PLW1         23.01399994 W

F2 - Processing parameters
SI                  65536
SF            400.1300033 MHz
WDW                    EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
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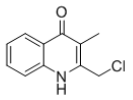

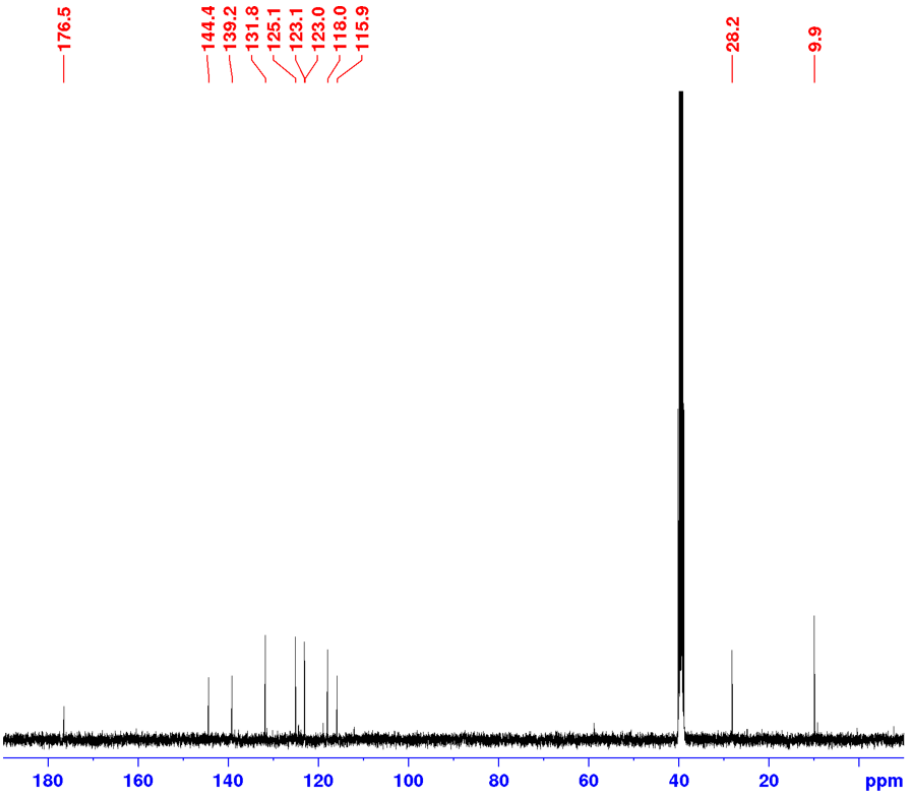


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NAME      180421codie-23
EXPNO                5
PROCNO               1

F2 - Acquisition Parameters
Date_             20180421
Time                18.17
INSTRUM          ayita400
PROBHD   5 mm PABBO BB-
PULPROG            zgpg30
TD                 65536
SOLVENT              DMSO
NS                  1024
DS                     4
SWH             24038.461 Hz
FIDRES           0.366798 Hz
AQ               1.3631488 sec
RG                  2050
DW                20.800 usec
DE                10.00 usec
TE                300.0 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1          100.5373282 MHz
NUC1                   13C
P1                   9.75 usec
PLW1         32.00000000 W

======== CHANNEL f2 ========
SFO2          399.7915992 MHz
NUC2                    1H
CPDPRG[2          waltz16
PCPD2               90.00 usec
PLW2         14.00000000 W
PLW12         0.28097001 W
PLW13         0.14133000 W

F2 - Processing parameters
SI                  65536
SF            100.5273178 MHz
WDW                    EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
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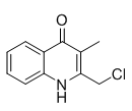
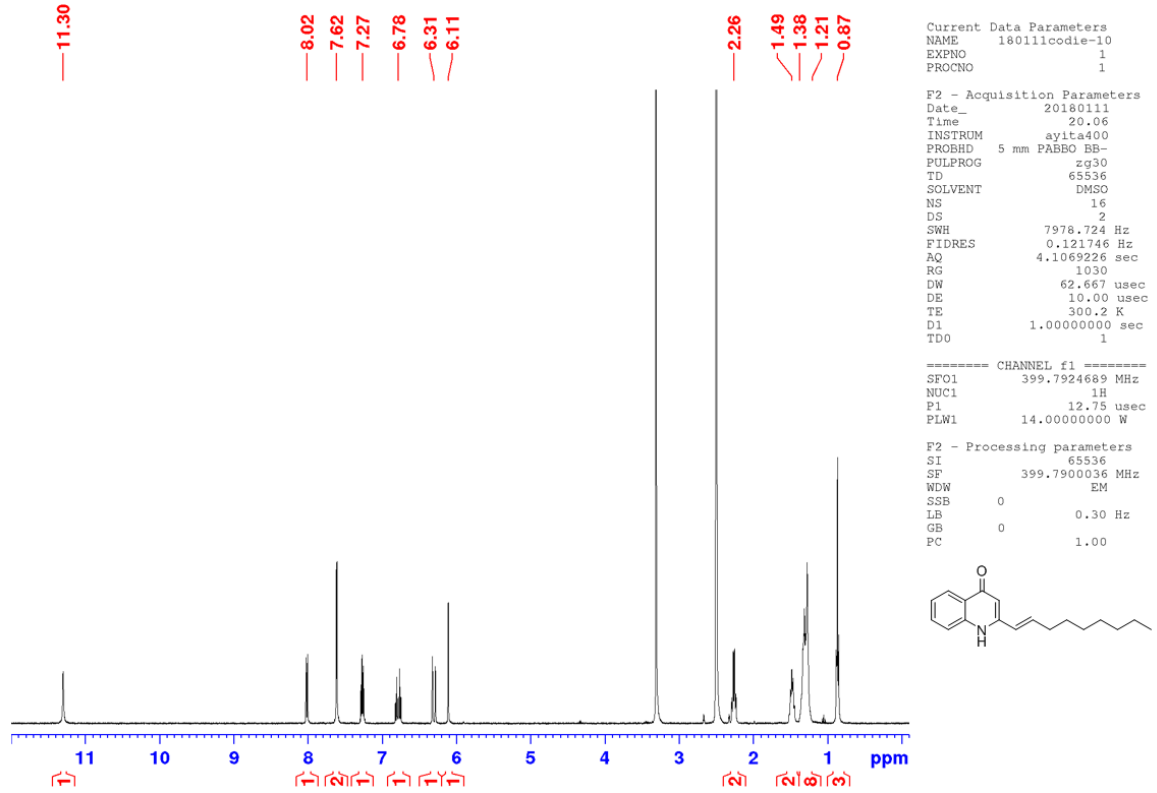
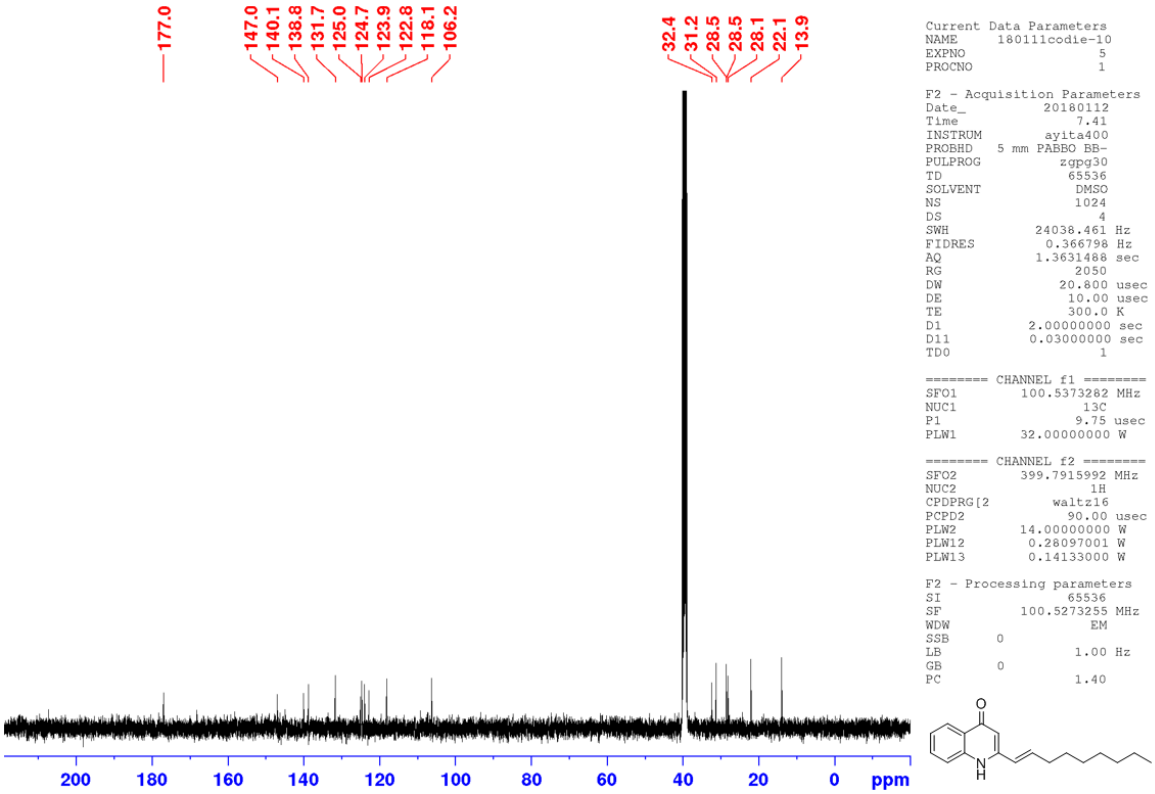
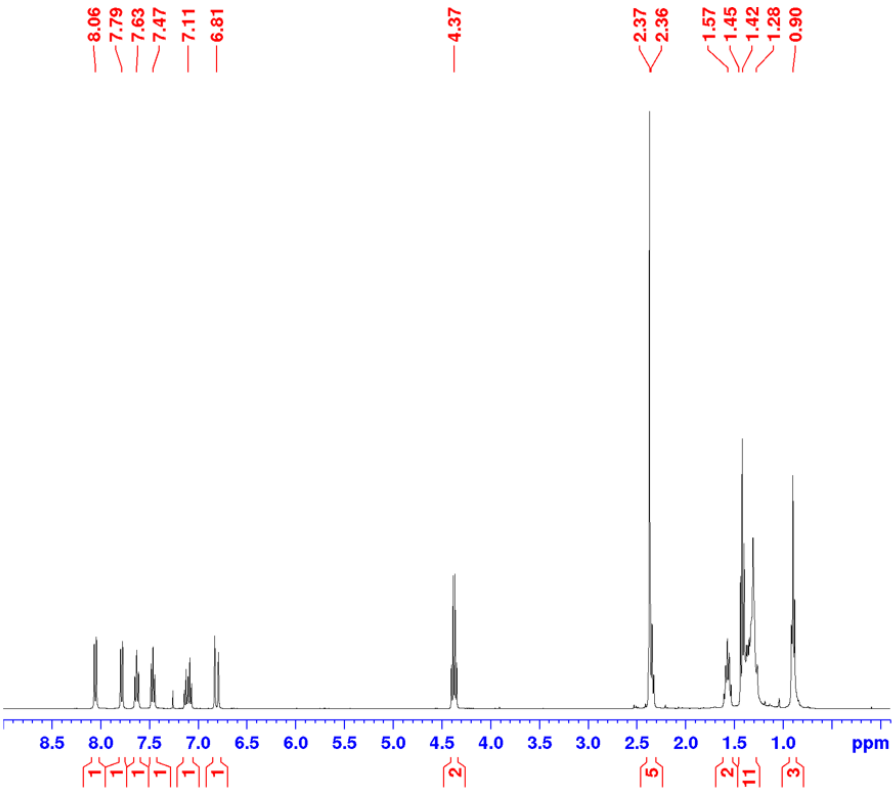


(*E*)-Δ^1-2-(non-1-enyl)-4(1*H*)-quinolone **1a** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in DMSO-d_6





(*E*)-Ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **(*E*)-2b** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in $CDCl_3$




```
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EXPNO                 1
PROCNO                1

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Time              16.11
INSTRUM           isa400
PROBHD   5 mm PABBO BB-
PULPROG            zg30
TD                65536
SOLVENT           CDCl3
NS                    8
DS                    2
SWH            8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9845889 sec
RG                   32
DW               60.800 usec
DE               10.00 usec
TE                300.1 K
D1           1.00000000 sec
TD0                   1

======== CHANNEL f1 ========
SFO1         400.1324710 MHz
NUC1                   1H
P1                14.20 usec
PLW1         23.01399994 W

F2 - Processing parameters
SI                65536
SF           400.1300103 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
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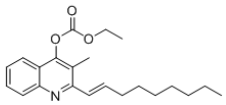

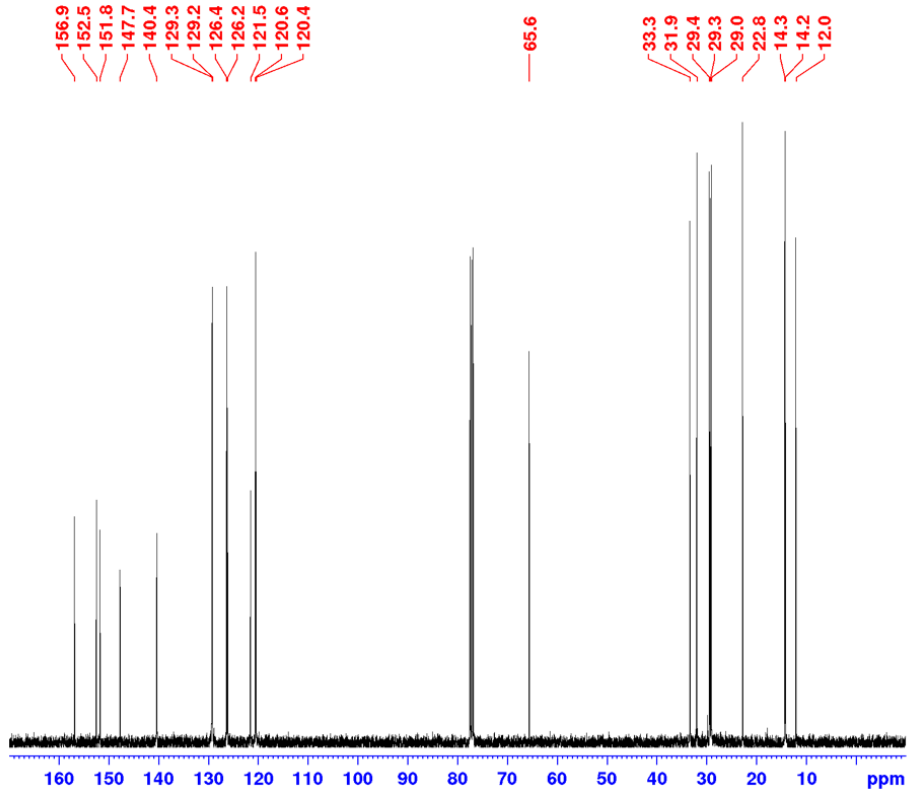


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PROCNO                1

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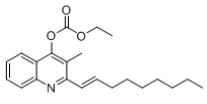
Time              16.28
INSTRUM           isa400
PROBHD   5 mm PABBO BB-
PULPROG          zgpg30
TD                65536
SOLVENT           CDCl3
NS                  128
DS                    4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631488 sec
RG                 2050
DW               20.800 usec
DE               10.00 usec
TE                300.0 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1

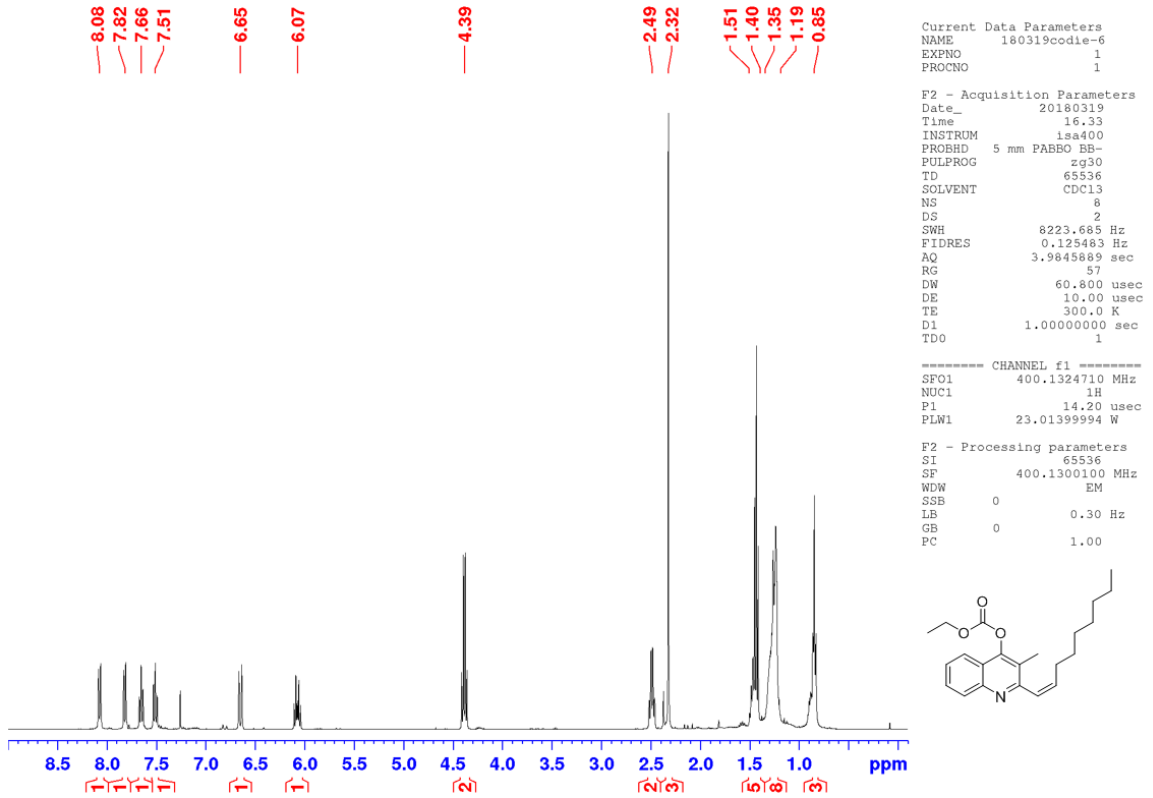
======== CHANNEL f1 ========
SFO1         100.6228298 MHz
NUC1                  13C
P1                9.00 usec
PLW1         56.00000000 W

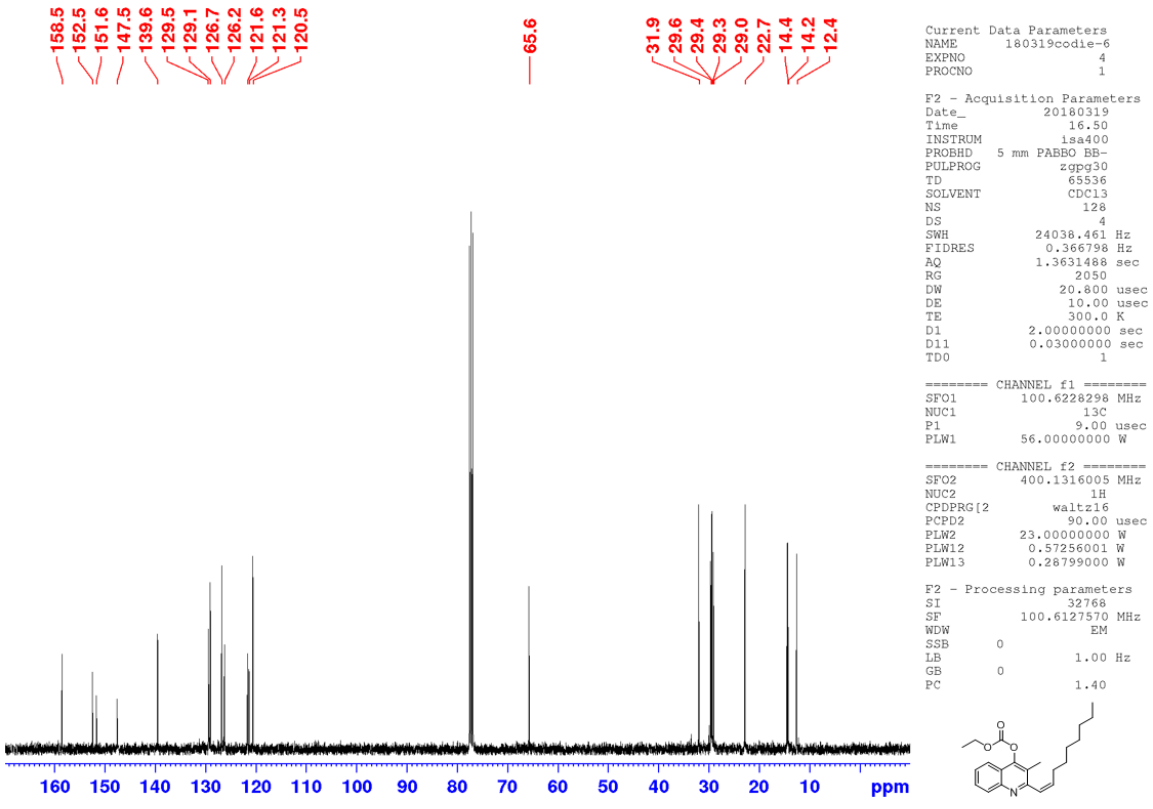
======== CHANNEL f2 ========
SFO2         400.1316005 MHz
NUC2                   1H
CPDPRG[2          waltz16
PCPD2            90.00 usec
PLW2         23.00000000 W
PLW12         0.57256001 W
PLW13         0.28799000 W

F2 - Processing parameters
SI                32768
SF           100.6127605 MHz
WDW                  EM
SSB       0
LB                1.00 Hz
GB        0
PC                1.40
```

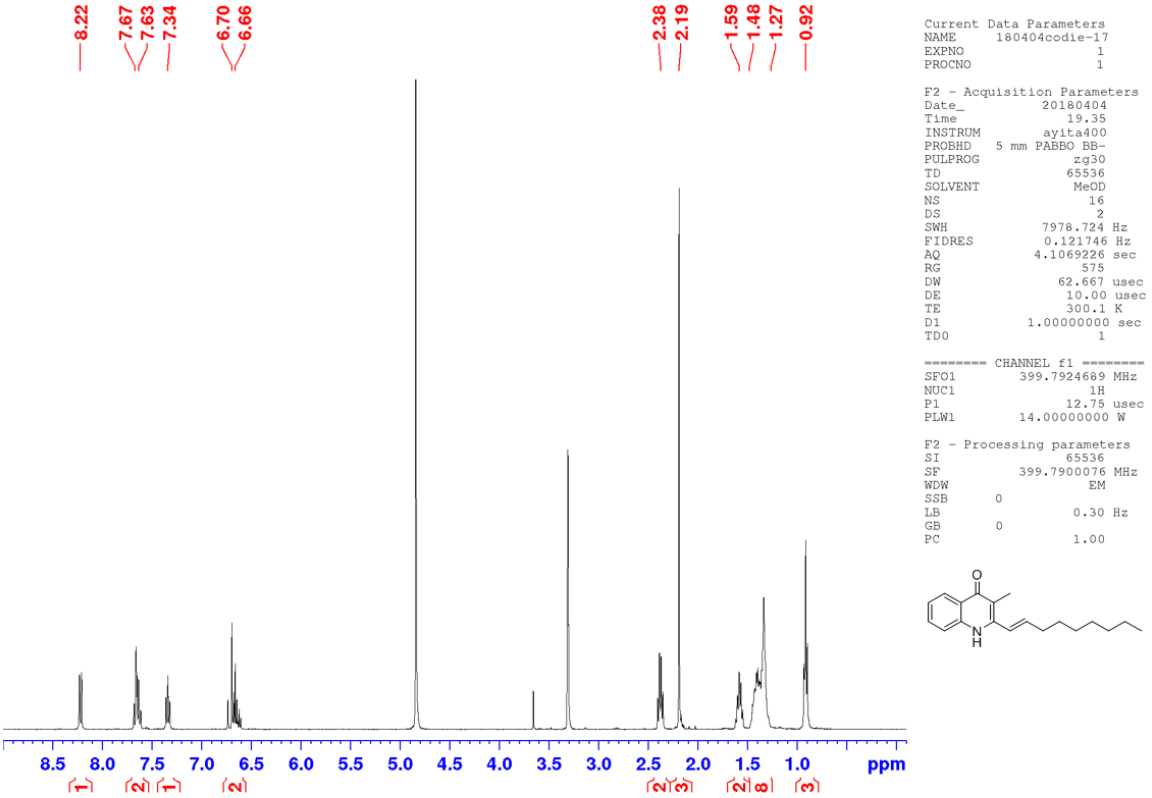


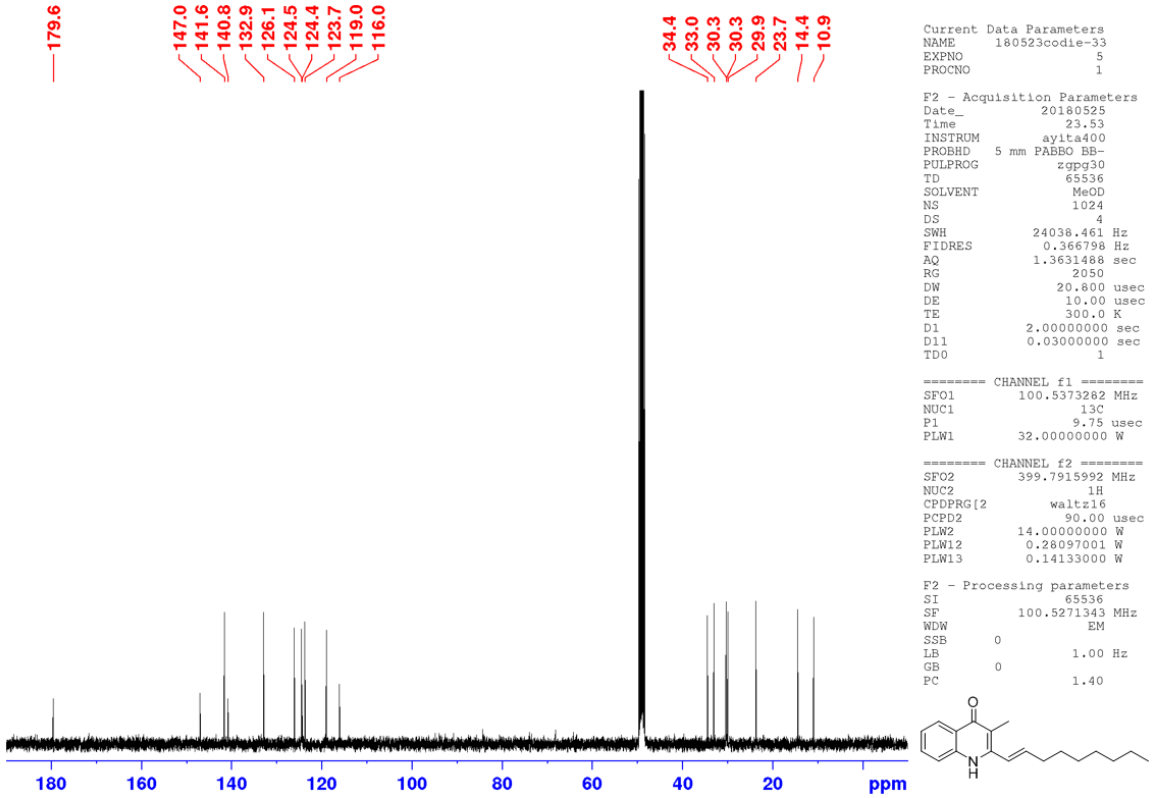
(*Z*)-Ethyl (3-methyl-2-(non-1-en-1-yl)quinolin-4-yl) carbonate **(*Z*)-2b** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in $CDCl_3$



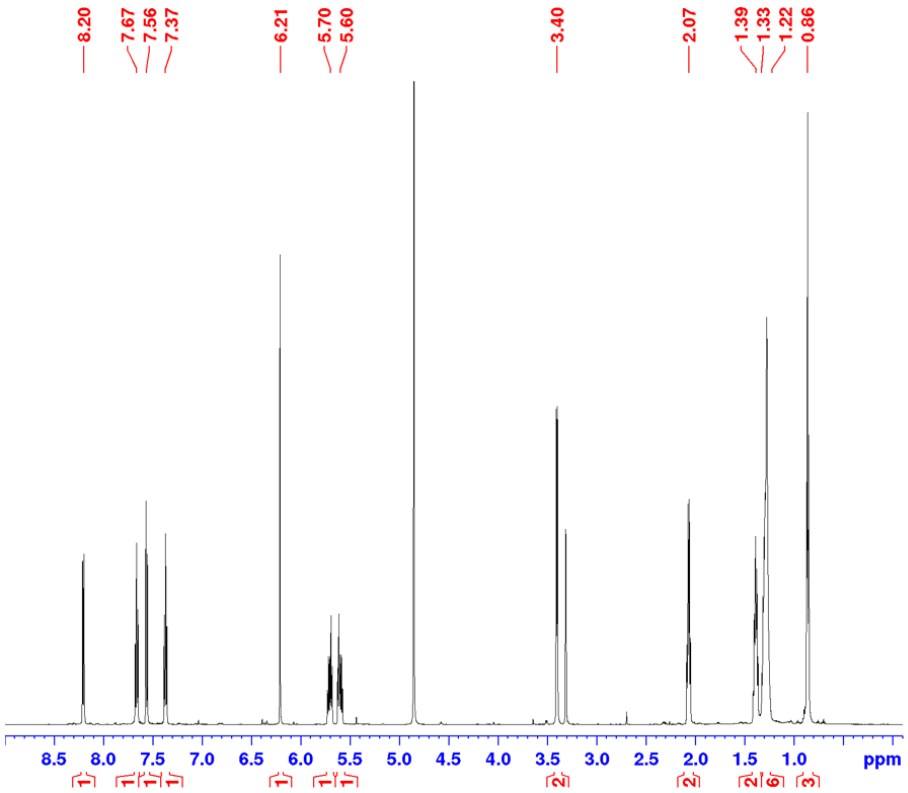


(*E*)-Δ^1-3-methyl-2-(non-1-enyl)-4(1*H*)-quinolone **1b** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD





(*E*)-Δ^2-2-(non-2-enyl)-4(1*H*)-quinolone **1c** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD

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PROCNO                     1

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Time                   11.44
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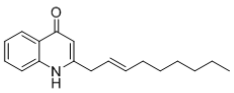
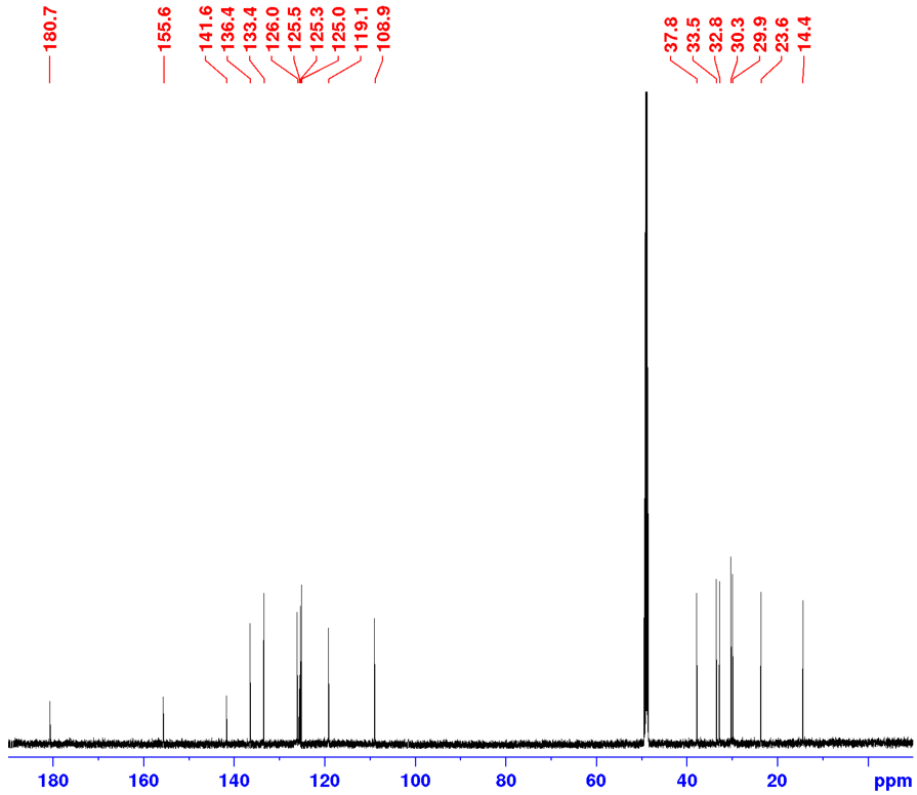
PROBHD    5 mm PAQXI 1H/
PULPROG                zg30
TD                    65536
SOLVENT                MeOD
NS                       16
DS                        2
SWH               12019.230 Hz
FIDRES             0.183399 Hz
AQ                2.7262976 sec
RG                       64
DW                  41.600 usec
DE                  11.00 usec
TE                   300.0 K
D1              1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            600.1737063 MHz
NUC1                      1H
P1                     10.35 usec
PLW1           10.00000000 W

F2 - Processing parameters
SI                    65536
SF               600.1700125 MHz
WDW                      EM
SSB          0
LB                    0.30 Hz
GB           0
PC                    1.00
```





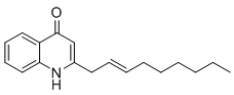

```
Current Data Parameters
NAME      180601-codie-CD119
EXPNO                      5
PROCNO                     1

F2 - Acquisition Parameters
Date_               20180601
Time                   13.20
INSTRUM                spect
PROBHD    5 mm PAQXI 1H/
PULPROG            zgpg30
TD                    65536
SOLVENT                MeOD
NS                     1024
DS                        4
SWH               36057.691 Hz
FIDRES             0.550197 Hz
AQ                0.9087659 sec
RG                     2050
DW                  13.867 usec
DE                  11.00 usec
TE                   300.0 K
D1              2.00000000 sec
D11             0.03000000 sec
TD0                       1

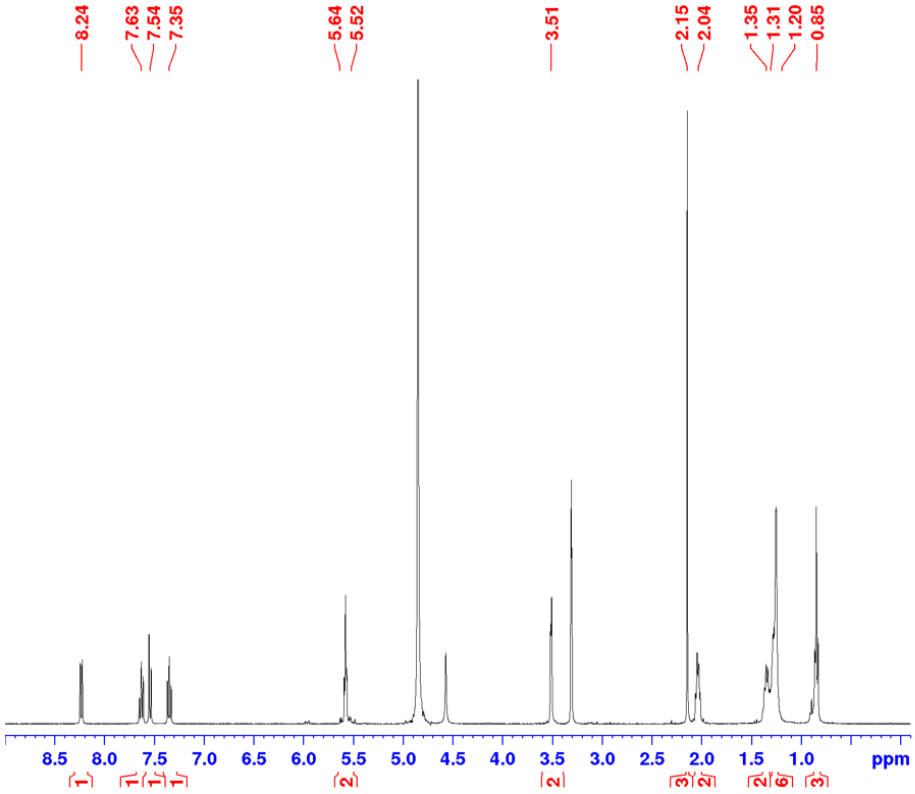
======== CHANNEL f1 ========
SFO1            150.9279571 MHz
NUC1                      13C
P1                     14.62 usec
PLW1           132.00000000 W

======== CHANNEL f2 ========
SFO2            600.1724007 MHz
NUC2                      1H
CPDPRG[2             waltz16
PCPD2                  70.00 usec
PLW2           10.00000000 W
PLW12           0.21862000 W
PLW13           0.10712000 W

F2 - Processing parameters
SI                    32768
SF               150.9126569 MHz
WDW                      EM
SSB          0
LB                    1.00 Hz
GB           0
PC                    1.40
```



(*E*)-Δ^2-3-methyl-2-(non-2-enyl)-4(1*H*)-quinolone **1d** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD

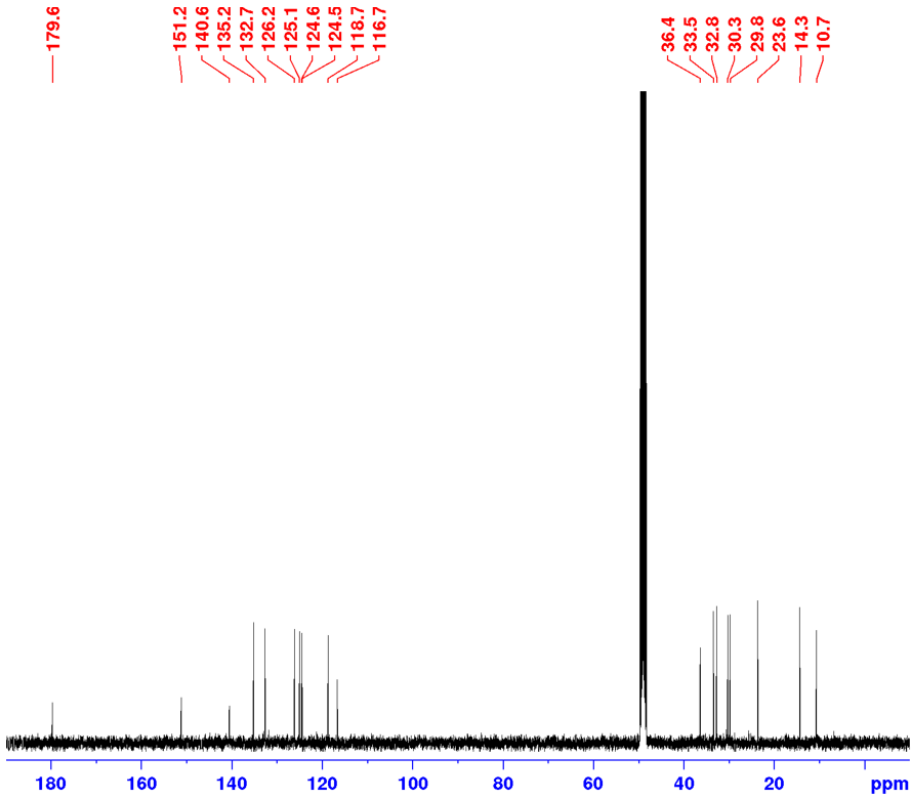



```
Current Data Parameters
NAME      180425codie-18
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20180425
Time              20.16
INSTRUM         ayita400
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT             MeOD
NS                    16
DS                     2
SWH             7978.724 Hz
FIDRES          0.121746 Hz
AQ              4.1069226 sec
RG                   256
DW                62.667 usec
DE                10.00 usec
TE                300.0 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         399.7924689 MHz
NUC1                   1H
P1                  12.75 usec
PLW1         14.00000000 W

F2 - Processing parameters
SI                 65536
SF           399.7900076 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```




```
Current Data Parameters
NAME      180425codie-18
EXPNO                  5
PROCNO                 1

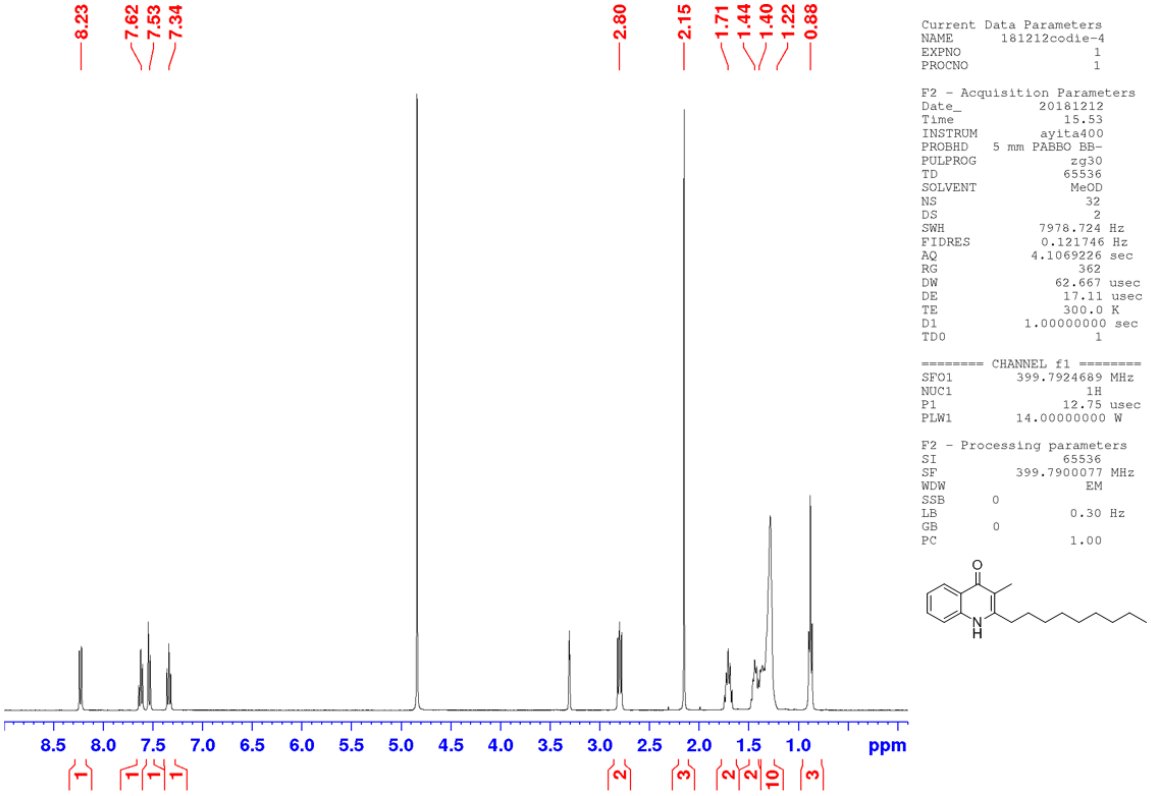
F2 - Acquisition Parameters
Date_           20180425
Time              22.46
INSTRUM         ayita400
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 65536
SOLVENT             MeOD
NS                  1024
DS                     4
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ              1.3631488 sec
RG                  2050
DW                20.800 usec
DE                10.00 usec
TE                300.0 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                    1

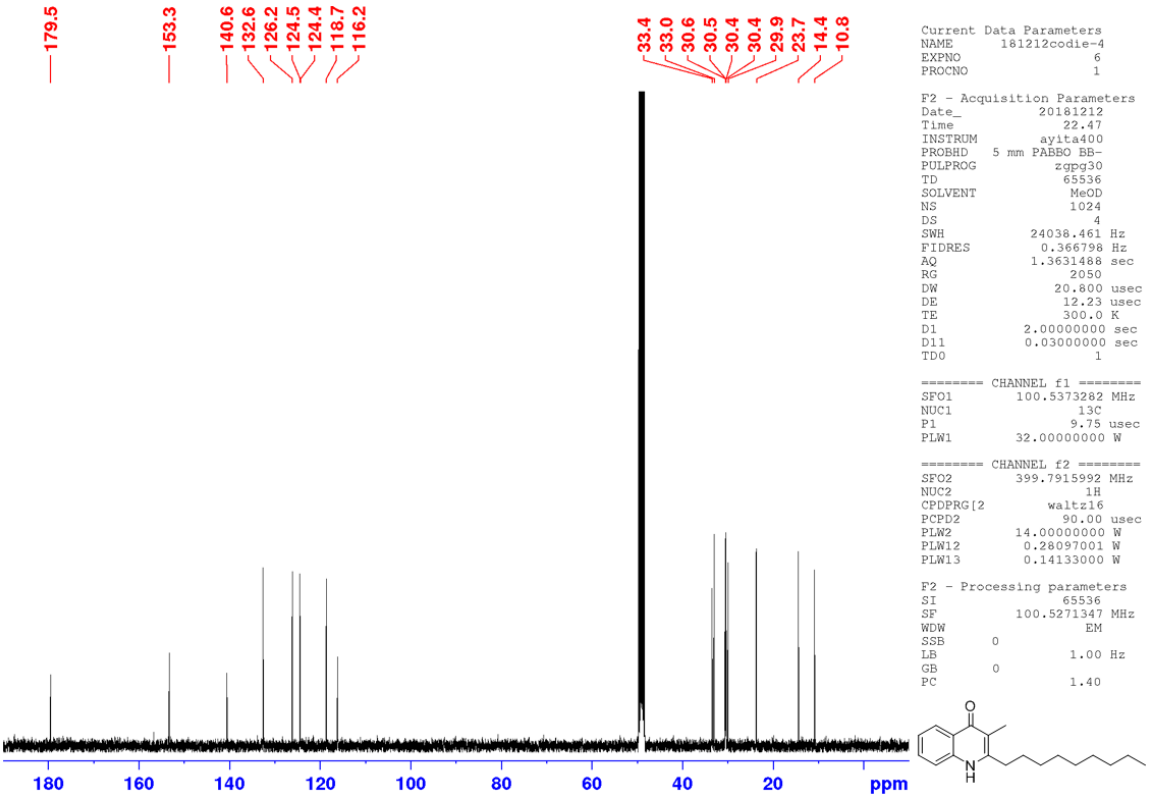
======== CHANNEL f1 ========
SFO1         100.5373282 MHz
NUC1                  13C
P1                  9.75 usec
PLW1         32.00000000 W

======== CHANNEL f2 ========
SFO2         399.7915992 MHz
NUC2                   1H
CPDPRG[2          waltz16
PCPD2              90.00 usec
PLW2         14.00000000 W
PLW12         0.28097001 W
PLW13         0.14133000 W

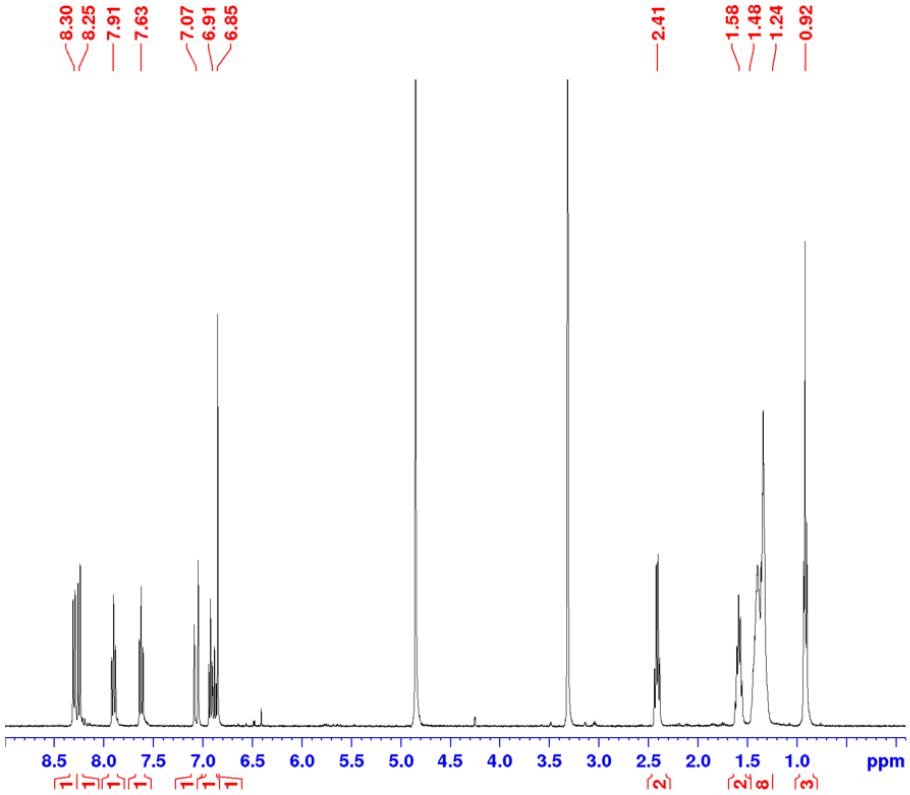
F2 - Processing parameters
SI                 65536
SF           100.5271348 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

3-Methyl-2-nonyl-4(1*H*)-quinolone **1e** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD





(*E*)-Δ^1-2-(non-1-enyl)-4(1*H*)-quinolone *N*-oxide **4a** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD

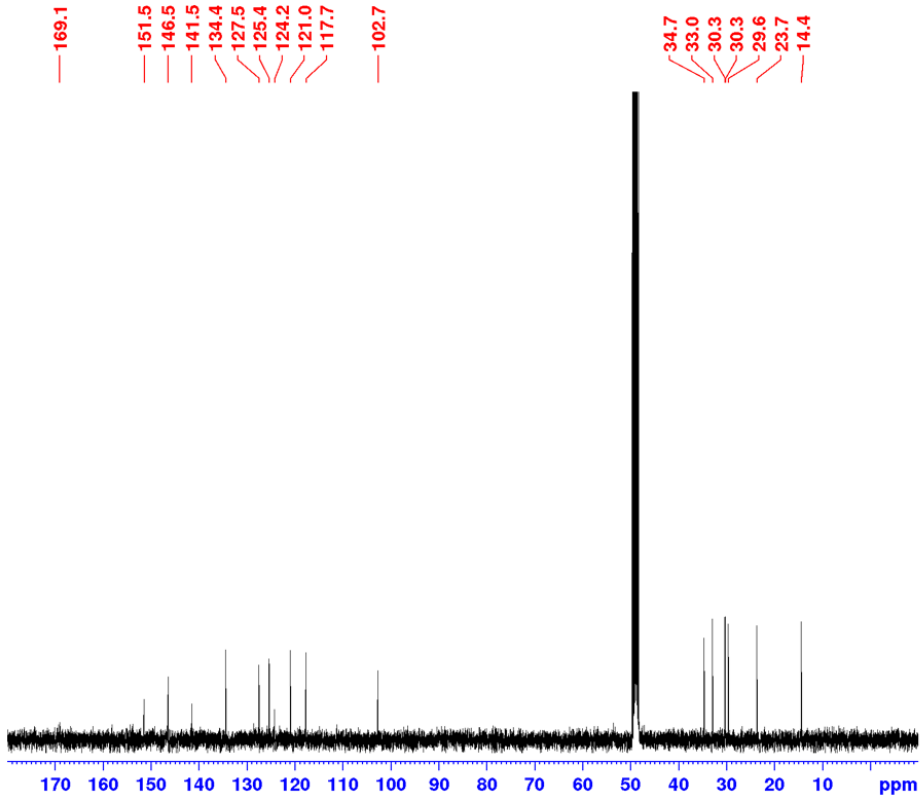



```
Current Data Parameters
NAME      180523codie-32
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20180524
Time               10.31
INSTRUM         ayita400
PROBHD   5 mm PABBO BB-
PULPROG             zg30
TD                 65536
SOLVENT             MeOD
NS                    16
DS                     2
SWH             7978.724 Hz
FIDRES          0.121746 Hz
AQ              4.1069226 sec
RG                   812
DW                62.667 usec
DE                10.00 usec
TE                 300.1 K
D1            1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1         399.7924689 MHz
NUC1                   1H
P1                  12.75 usec
PLW1         14.00000000 W

F2 - Processing parameters
SI                 65536
SF          399.7900077 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```




```
Current Data Parameters
NAME      180523codie-32
EXPNO                  5
PROCNO                 1

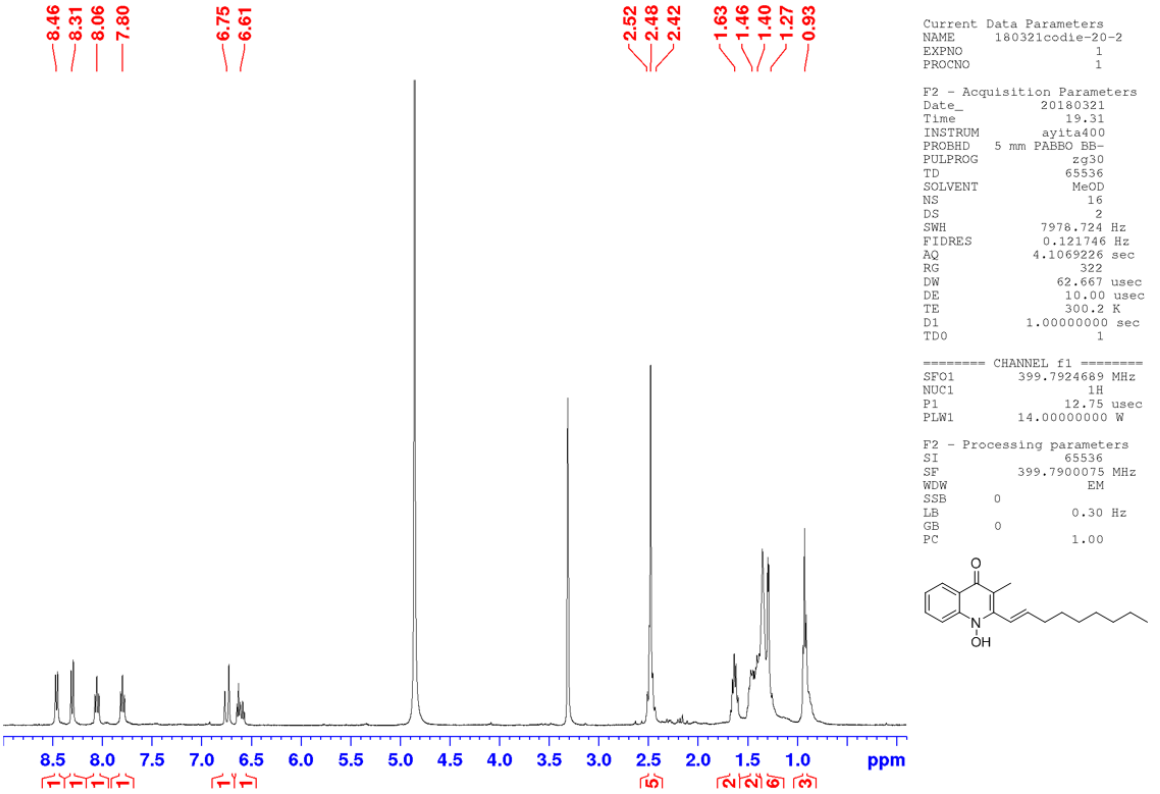
F2 - Acquisition Parameters
Date_           20180526
Time               19.39
INSTRUM         ayita400
PROBHD   5 mm PABBO BB-
PULPROG           zgpg30
TD                 65536
SOLVENT             MeOD
NS                  1024
DS                     4
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ              1.3631488 sec
RG                  2050
DW                20.800 usec
DE                10.00 usec
TE                 300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                    1

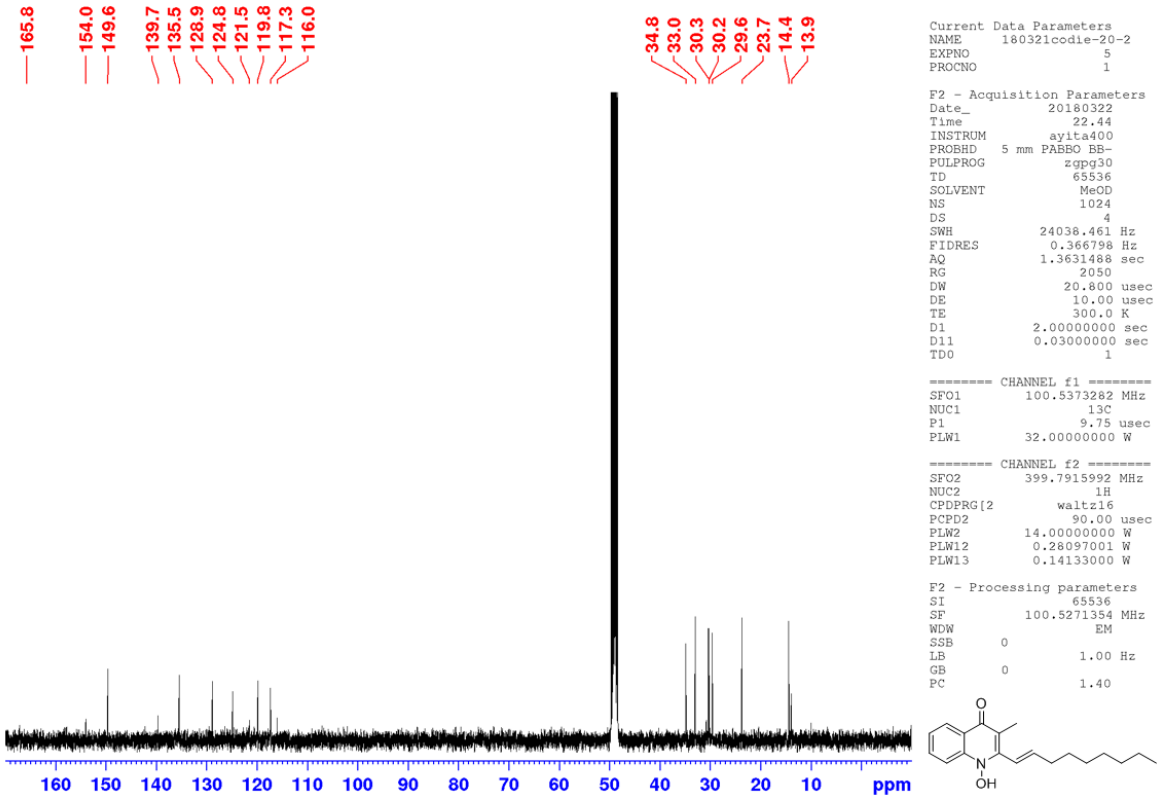
======== CHANNEL f1 ========
SFO1         100.5373282 MHz
NUC1                  13C
P1                  9.75 usec
PLW1         32.00000000 W

======== CHANNEL f2 ========
SFO2         399.7915992 MHz
NUC2                   1H
CPDPRG[2         waltz16
PCPD2             90.00 usec
PLW2         14.00000000 W
PLW12         0.28097001 W
PLW13         0.14133000 W

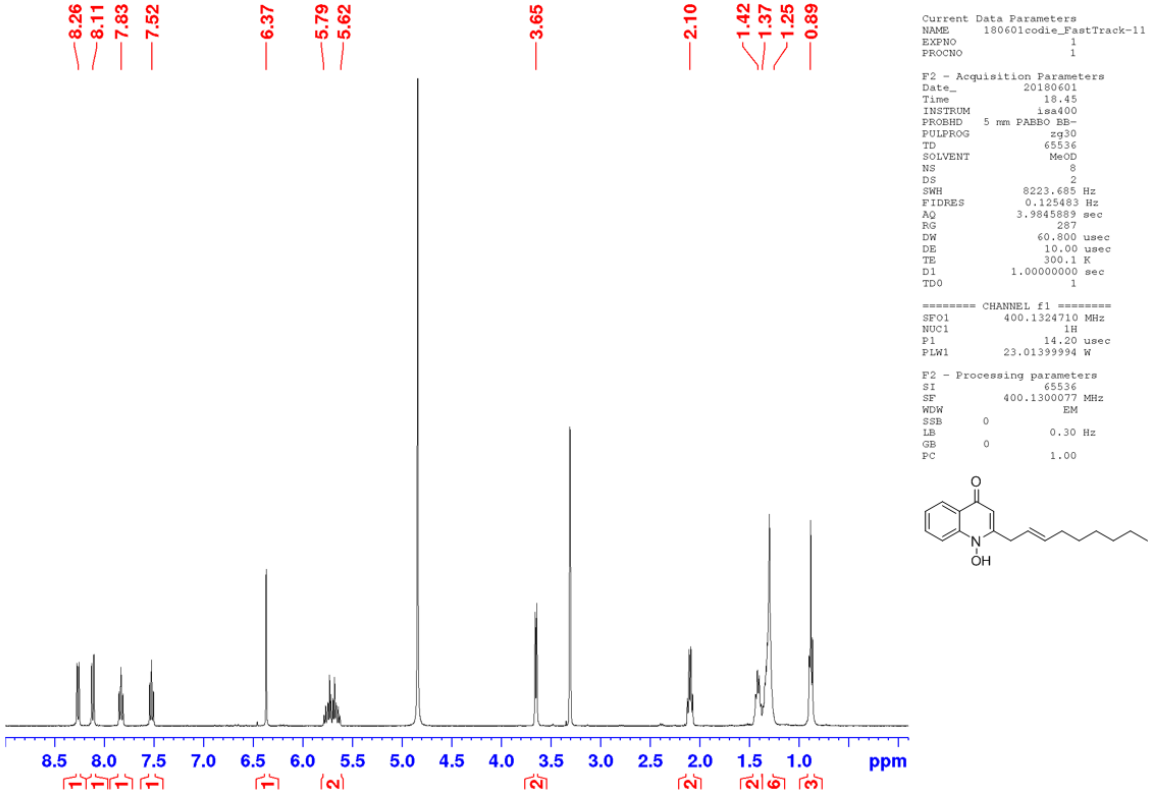
F2 - Processing parameters
SI                 65536
SF          100.5271342 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

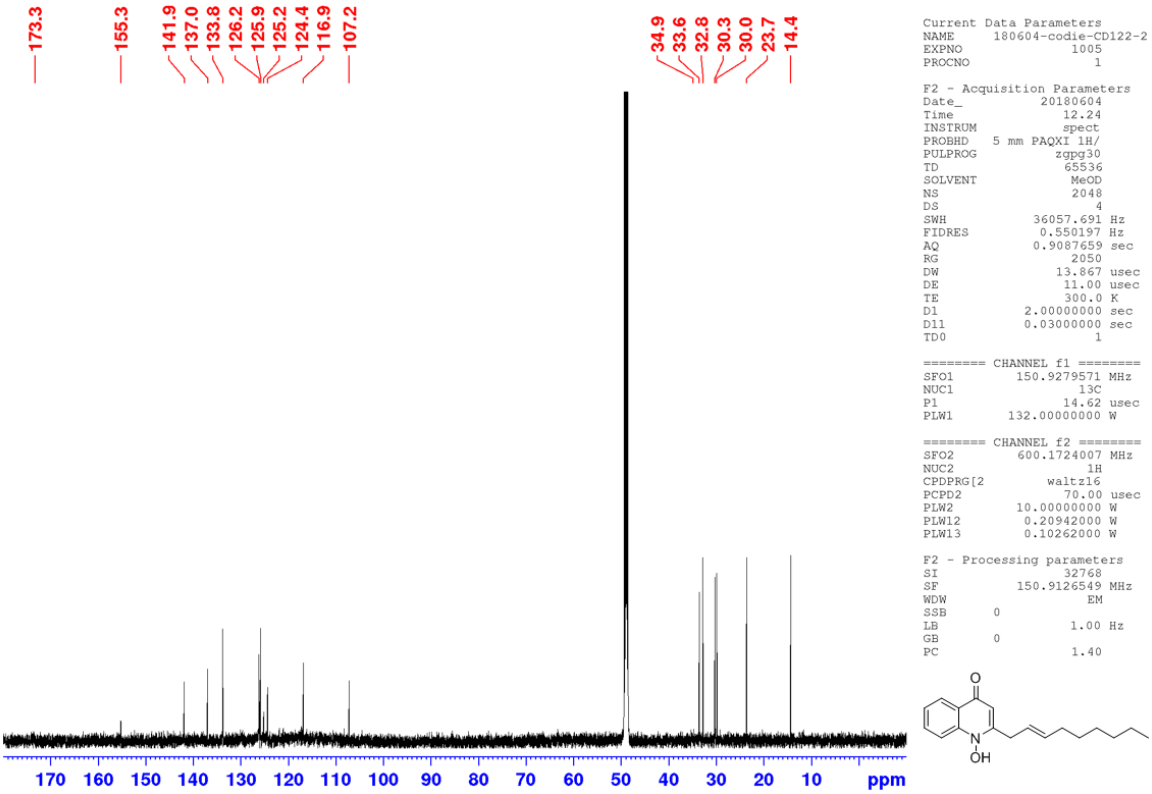
(*E*)-Δ^1-3-methyl-2-(non-1-enyl)-4(1*H*)-quinolone *N*-oxide **4b** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD



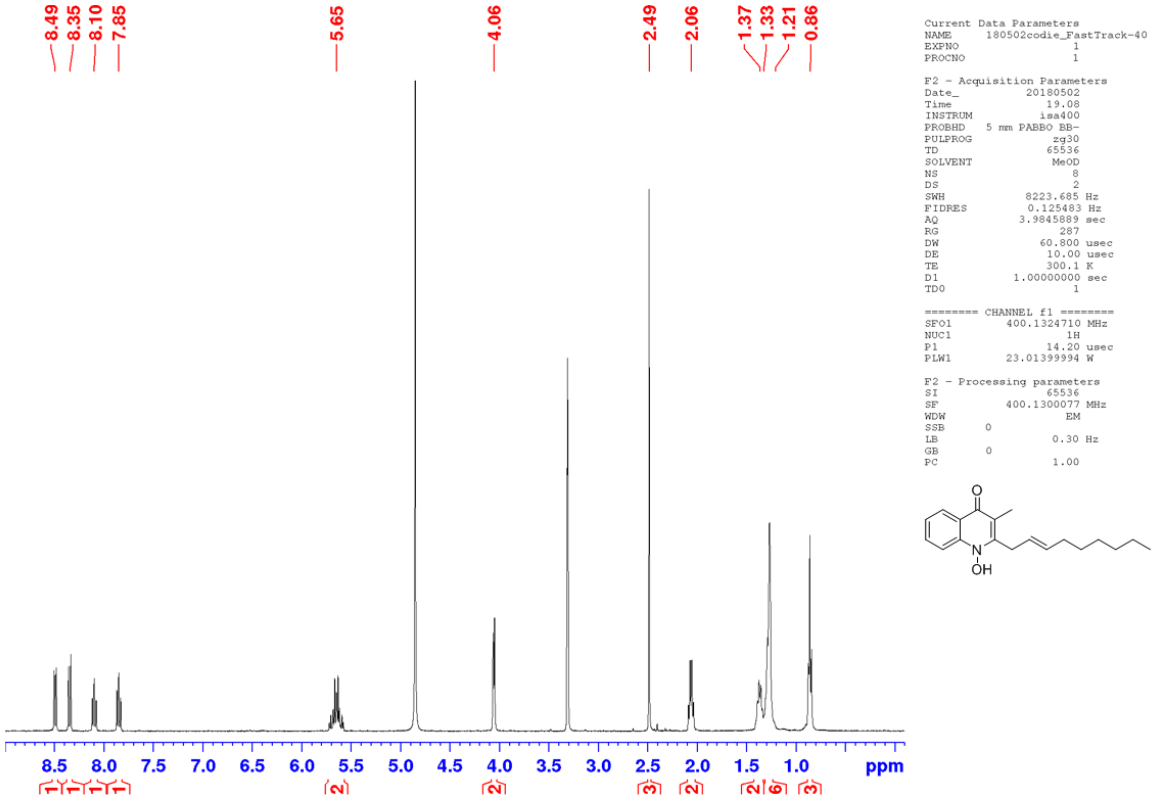


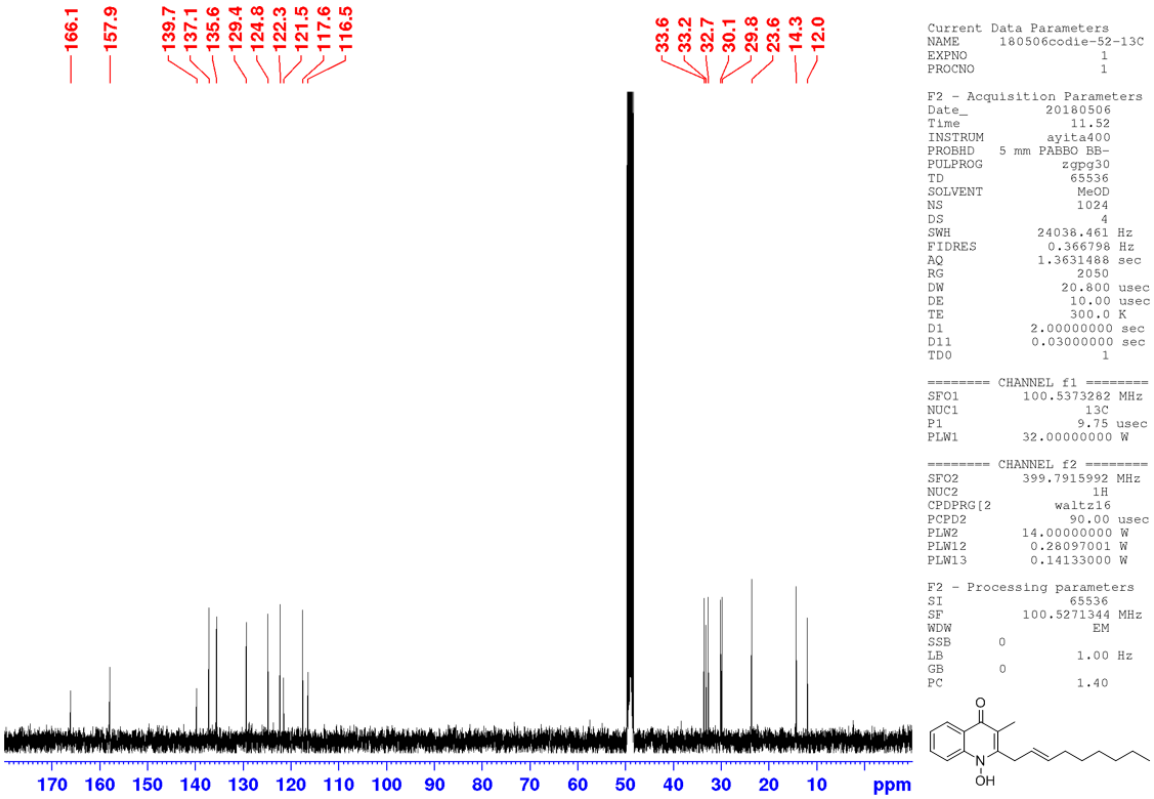
(*E*)-Δ^2-2-(non-2-enyl)-4(1*H*)-quinolone *N*-oxide **4c** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD



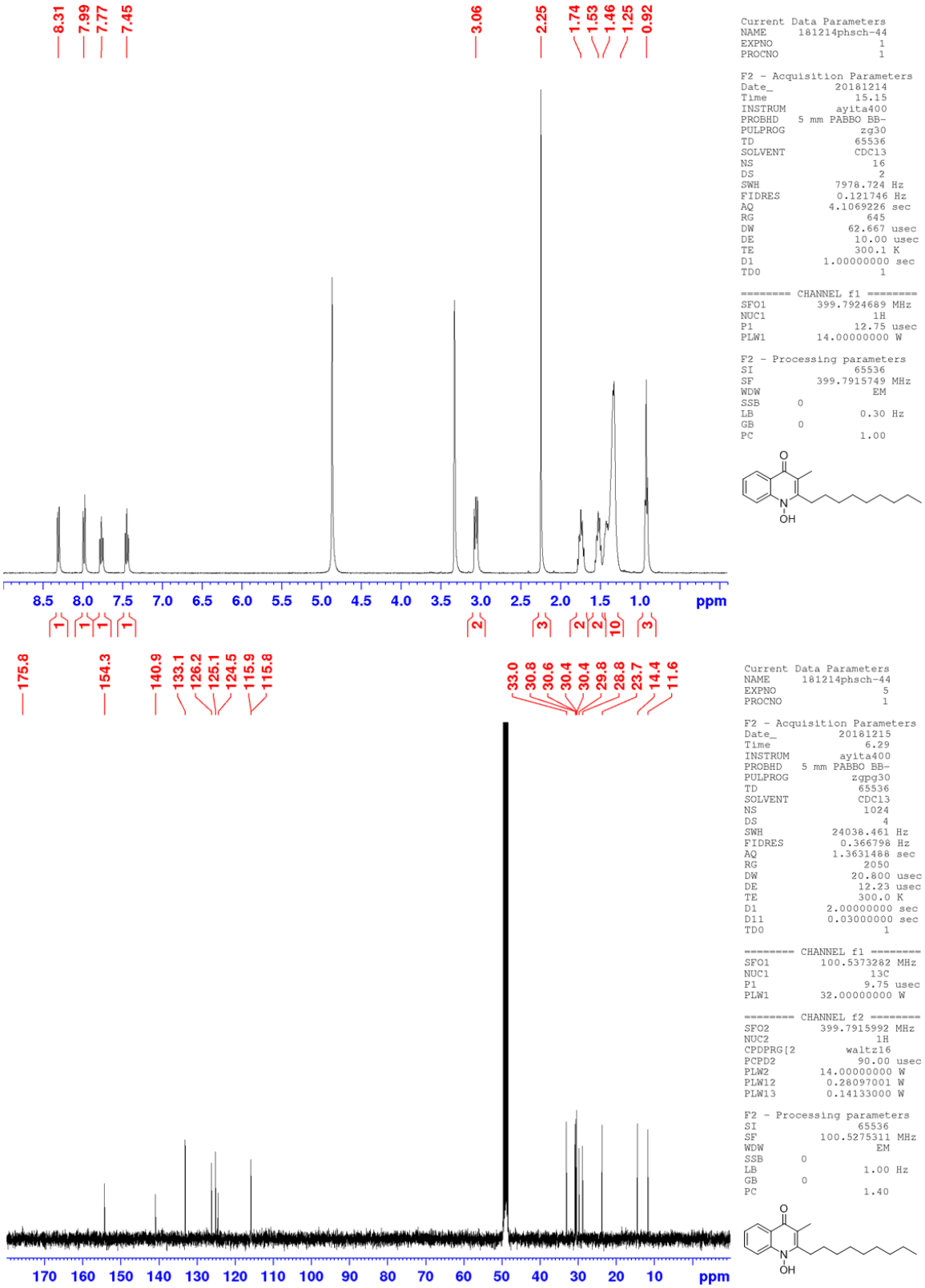


(*E*)-Δ^2-3-methyl-2-(non-2-enyl)-4(1*H*)-quinolone *N*-oxide **4d** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD

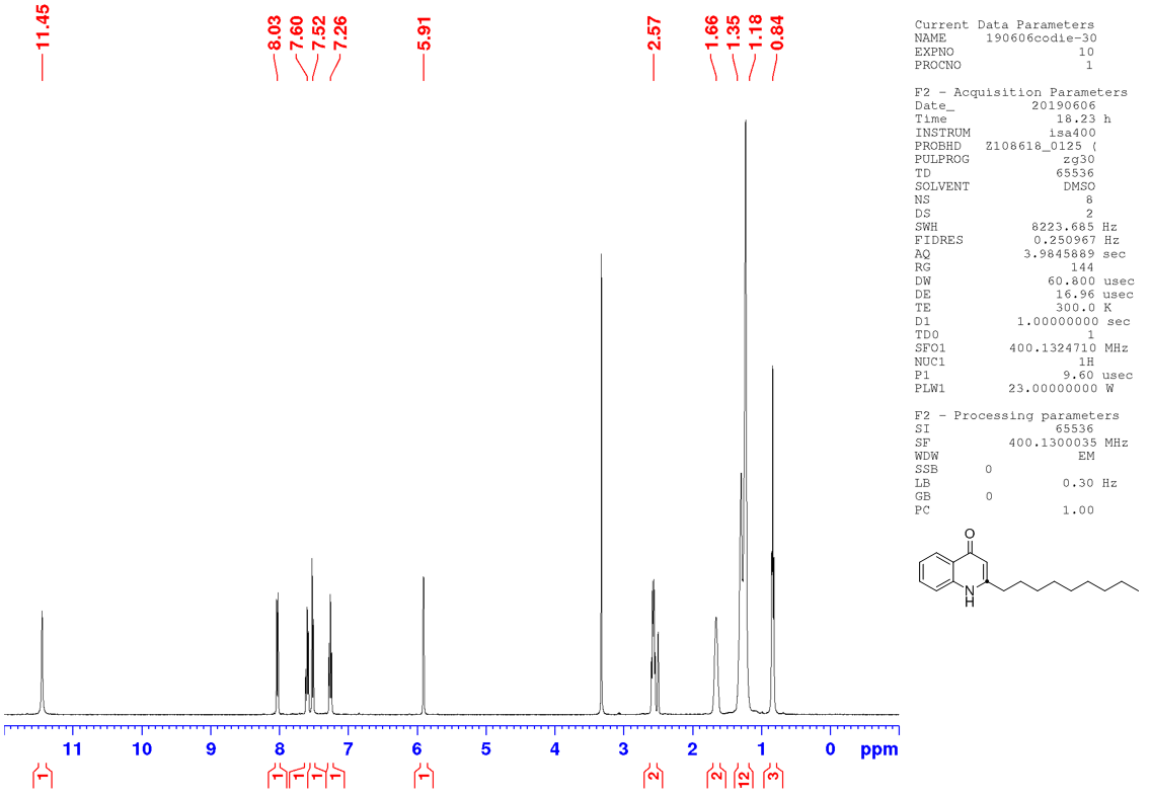




3-Methyl-2-(nonyl)-4(1*H*)-quinolone *N*-oxide **4e** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD



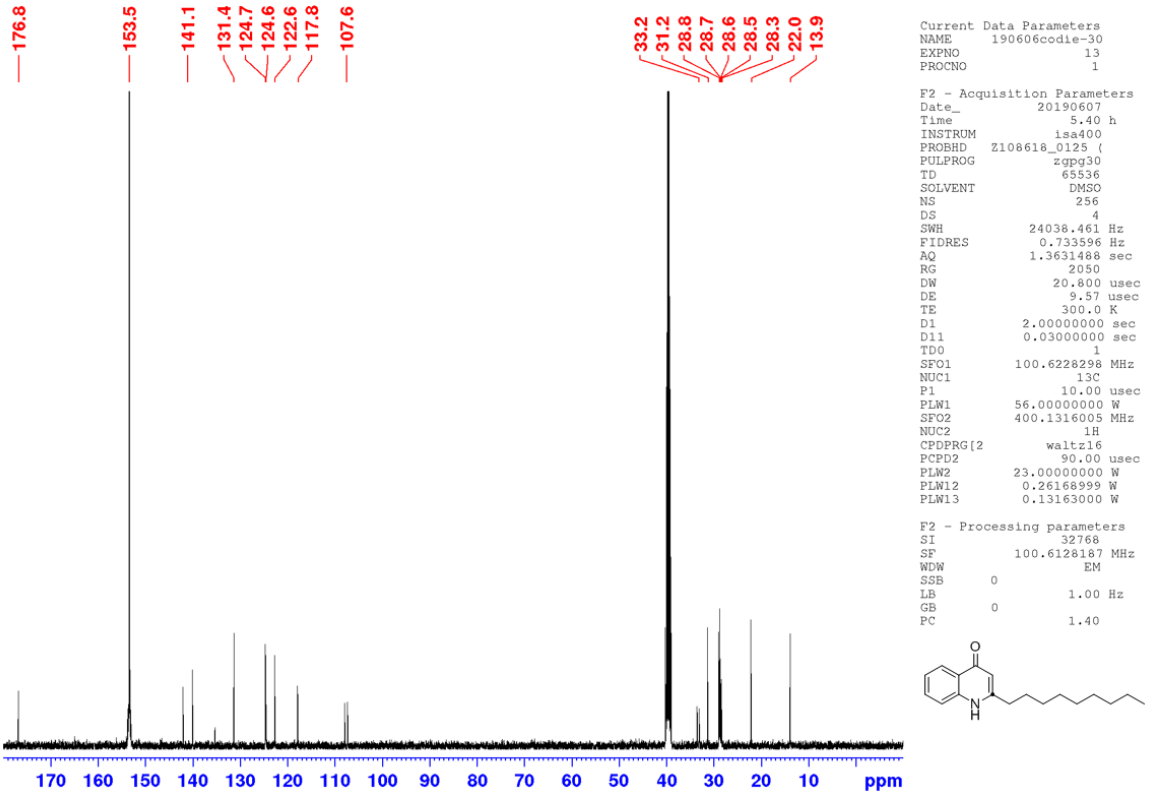
2-Nonyl-4(1*H*)-quinolone-2-^{13}C **1f** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in DMSO-d_6




```
Current Data Parameters
NAME      190606codie-30
EXPNO                 10
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190606
Time              18.23 h
INSTRUM           isa400
PROBHD    Z108618_0125 (
PULPROG             zg30
TD                 65536
SOLVENT             DMSO
NS                     8
DS                     2
SWH             8223.685 Hz
FIDRES          0.250967 Hz
AQ              3.9845889 sec
RG                   144
DW                60.800 usec
DE                16.96 usec
TE                300.0 K
D1             1.00000000 sec
TD0                    1
SFO1          400.1324710 MHz
NUC1                  1H
P1                 9.60 usec
PLW1          23.00000000 W

F2 - Processing parameters
SI                 65536
SF           400.1300035 MHz
WDW                   EM
SSB       0
LB                 0.30 Hz
GB        0
PC                 1.00
```

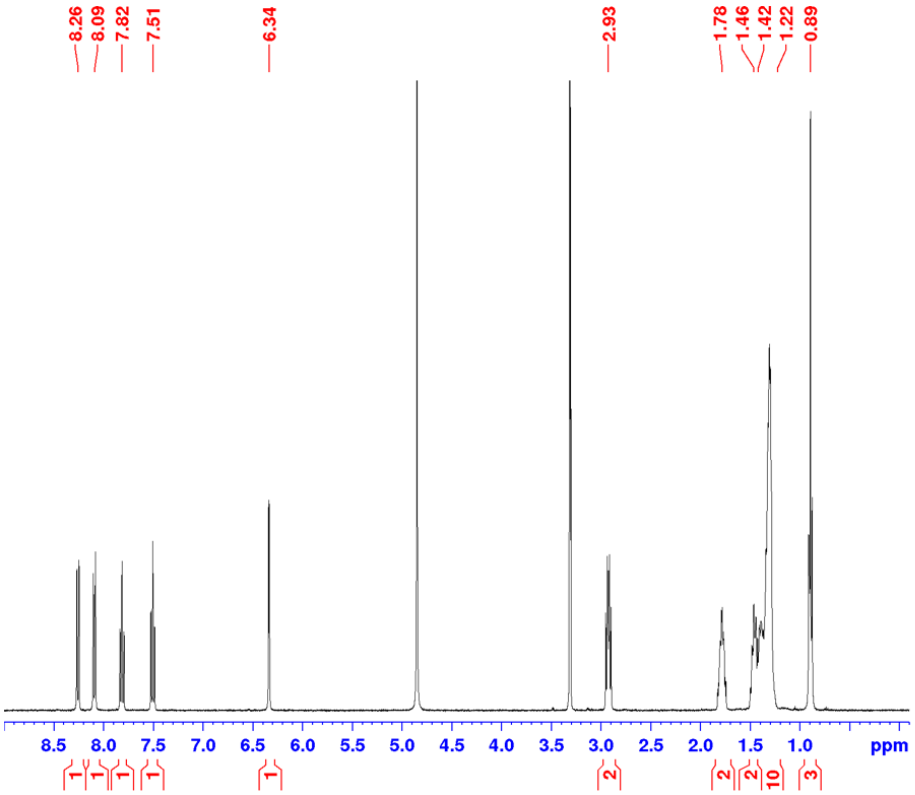




```
Current Data Parameters
NAME      190606codie-30
EXPNO                 13
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190607
Time              5.40 h
INSTRUM           isa400
PROBHD    Z108618_0125 (
PULPROG           zgpg30
TD                 65536
SOLVENT             DMSO
NS                   256
DS                     4
SWH            24038.461 Hz
FIDRES          0.733596 Hz
AQ              1.3631488 sec
RG                  2050
DW                20.800 usec
DE                 9.57 usec
TE                300.0 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                    1
SFO1          100.6228298 MHz
NUC1                  13C
P1                10.00 usec
PLW1          56.00000000 W
SFO2          400.1316005 MHz
NUC2                  1H
CPDPRG[2          waltz16
PCPD2             90.00 usec
PLW2          23.00000000 W
PLW12          0.26168999 W
PLW13          0.13163000 W

F2 - Processing parameters
SI                 32768
SF           100.6128187 MHz
WDW                   EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

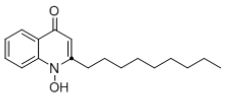
2-Nonyl-4(1*H*)-quinolone *N*-oxide-2-^{13}C **4f** - ^{1}H-NMR (above) and ^{13}C-NMR (below) in CD_3OD

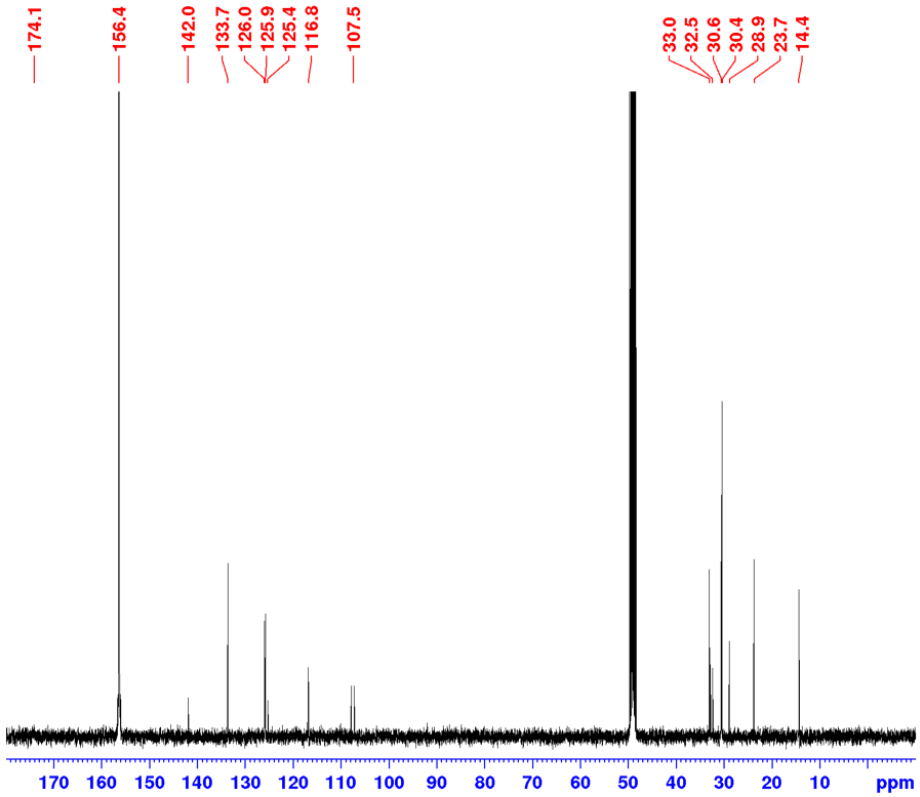



```
Current Data Parameters
NAME      190614codie-11
EXPNO                  1
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190614
Time              13.46 h
INSTRUM           isa400
PROBHD   Z863001_0018 (
PULPROG            zg30
TD                65536
SOLVENT            MeOD
NS                    8
DS                    2
SWH            8223.685 Hz
FIDRES        0.250967 Hz
AQ            3.9845889 sec
RG                  575
DW               60.800 usec
DE               16.26 usec
TE                300.0 K
D1           1.00000000 sec
TD0                   1
SFO1        400.1324710 MHz
NUC1                1H
P1               12.90 usec
PLW1        16.00000000 W

F2 - Processing parameters
SI                65536
SF          400.1300074 MHz
WDW                  EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

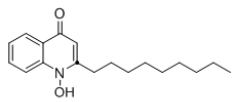





```
Current Data Parameters
NAME      190614codie-11
EXPNO                  5
PROCNO                 1

F2 - Acquisition Parameters
Date_           20190615
Time              1.33 h
INSTRUM           isa400
PROBHD   Z863001_0018 (
PULPROG          zgpg30
TD                65536
SOLVENT            MeOD
NS                 1024
DS                    4
SWH           24038.461 Hz
FIDRES        0.733596 Hz
AQ            1.3631488 sec
RG                 2050
DW               20.800 usec
DE               12.38 usec
TE                300.0 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0                   1
SFO1        100.6228298 MHz
NUC1                13C
P1                9.00 usec
PLW1        56.00000000 W
SFO2        400.1316005 MHz
NUC2                1H
CPDPRG[2        waltz16
PCPD2            90.00 usec
PLW2        16.00000000 W
PLW12        0.32870999 W
PLW13        0.16534001 W

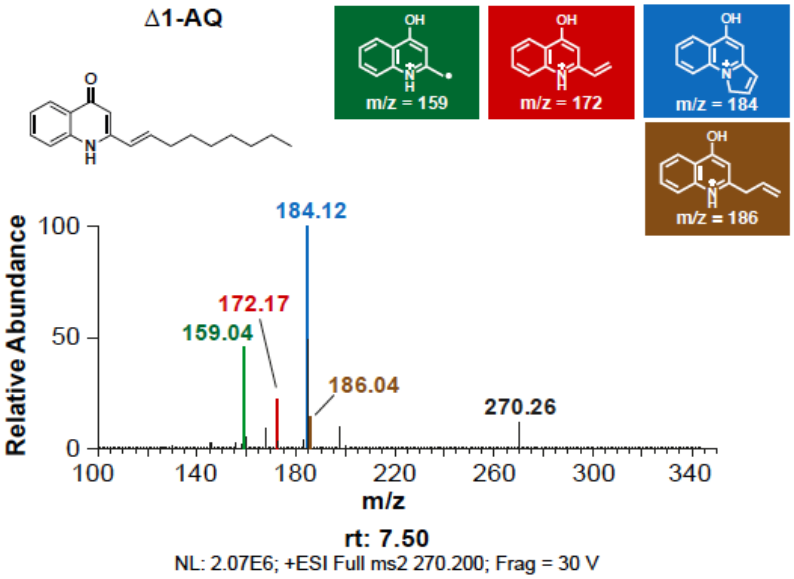
F2 - Processing parameters
SI                32768
SF          100.6126274 MHz
WDW                  EM
SSB       0
LB             1.00 Hz
GB        0
PC                1.40
```



9. MS^2 Assignments

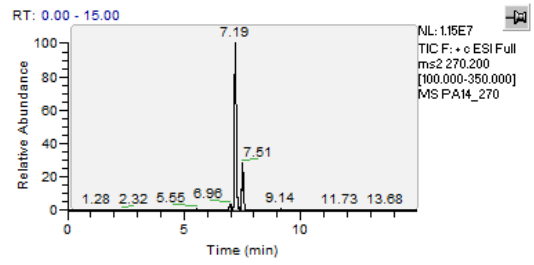
MS^2 assignemt of Δ^1-AQs

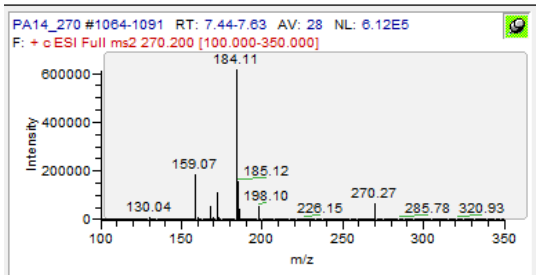
Reference spectrum:



[M+H]+	rt
270	7.51

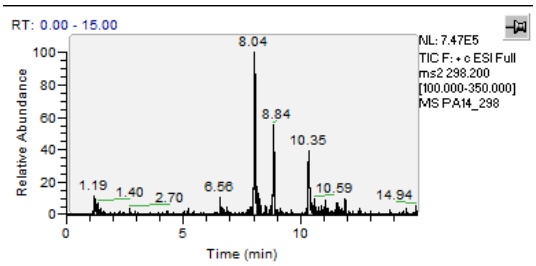
C9

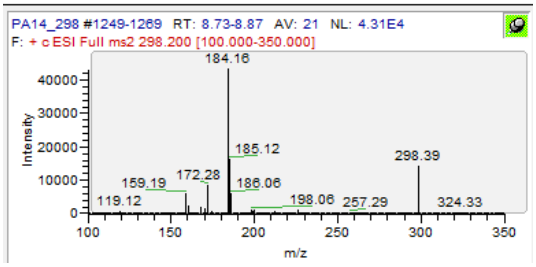




[M+H]+	rt
298	8.84

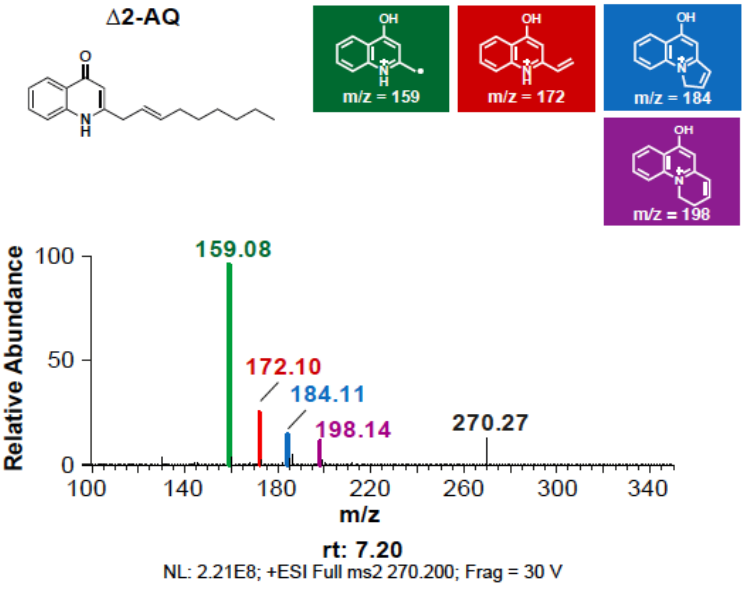
C11





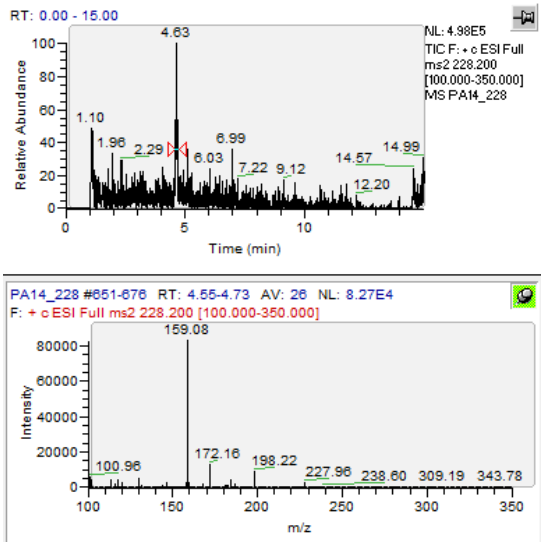
MS^2 assignemt of Δ^2-AQs

Reference spectrum:



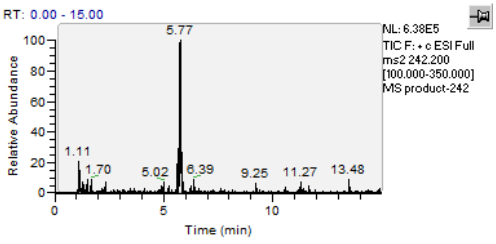
[M+H]$^+$	rt
228	4.6

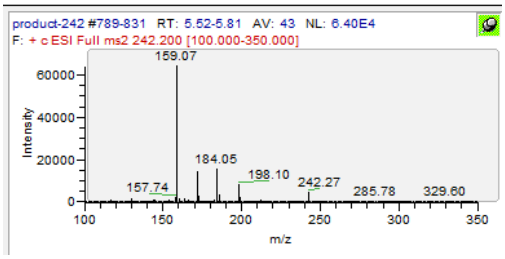
C6



[M+H]$^+$	rt
242	5.77

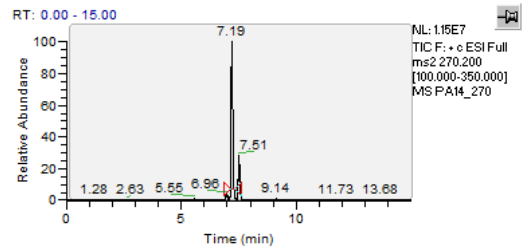
C7

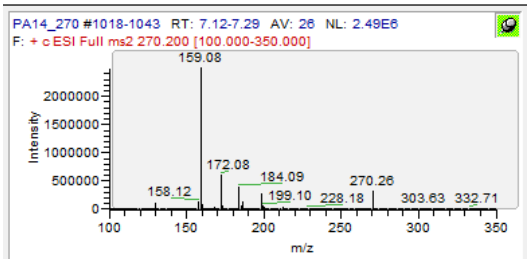




[M+H]+	rt
270	7.19

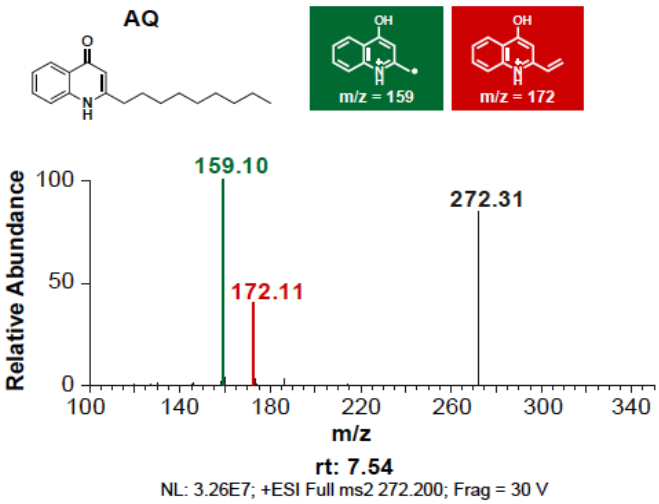
C9





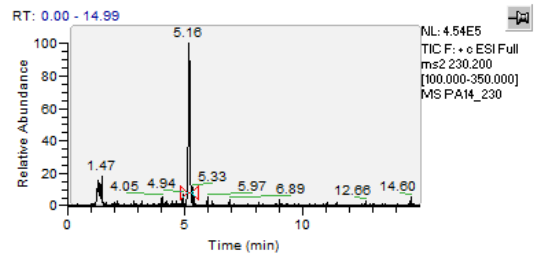
MS^2 assignemt of AQs

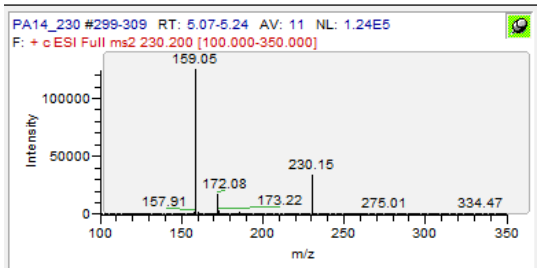
Reference spectrum:



[M+H]$^+$	rt
230	5.17

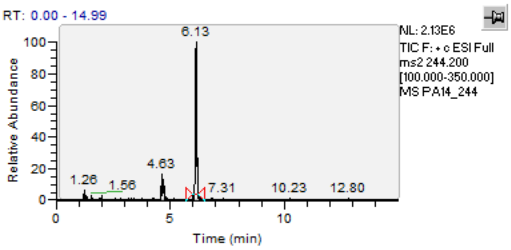
C6

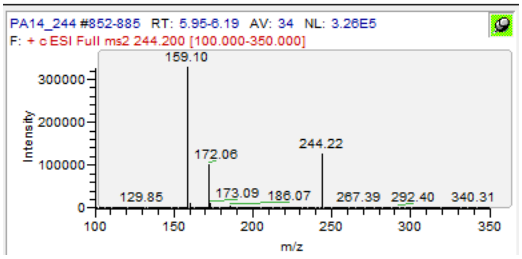




[M+H]$^+$	rt
244	6.12

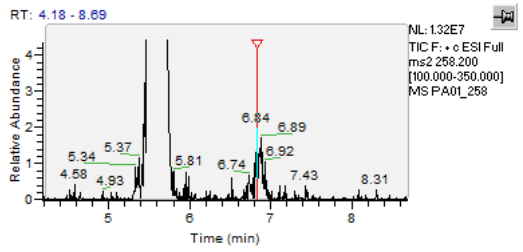
C7

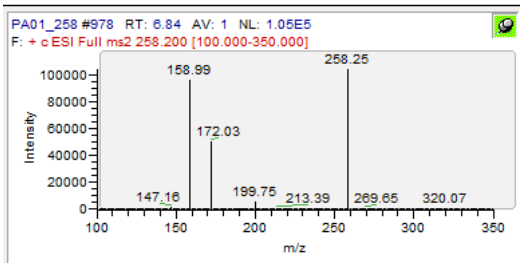




[M+H]+	rt
258	6.84

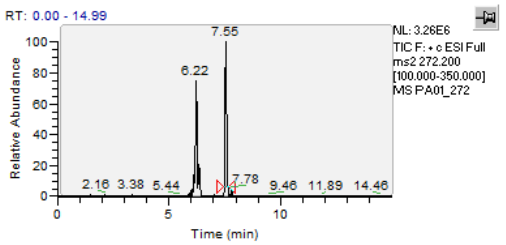
C8

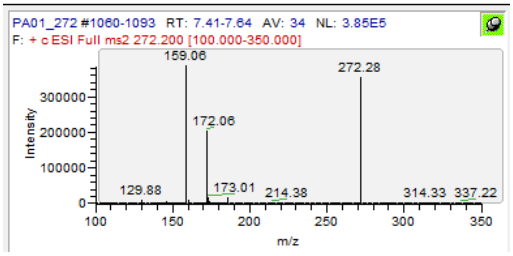




[M+H]+	rt
272	7.55

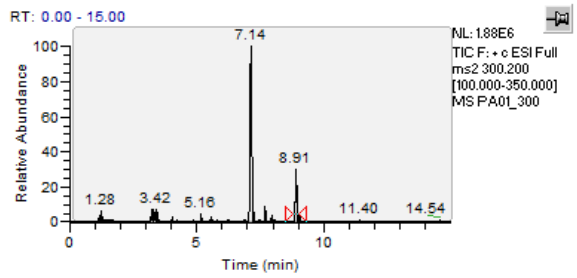
C9

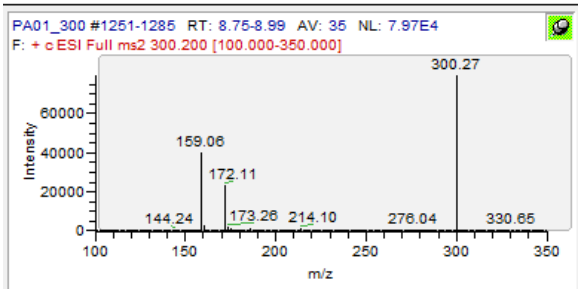




[M+H]+	rt
300	8.91

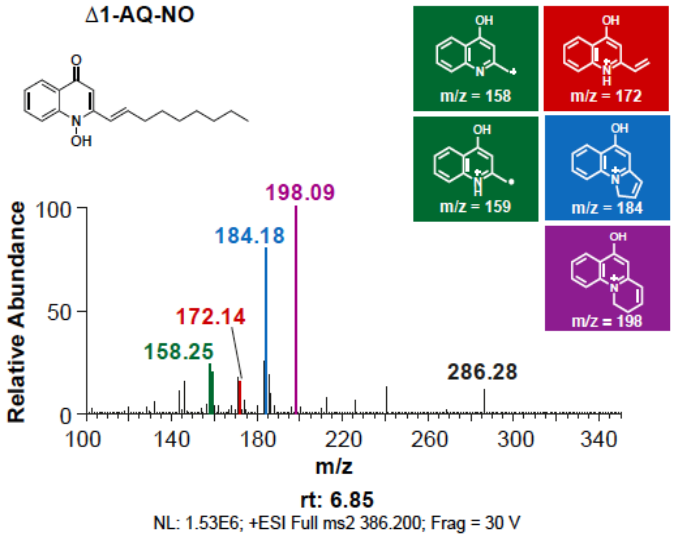
C11





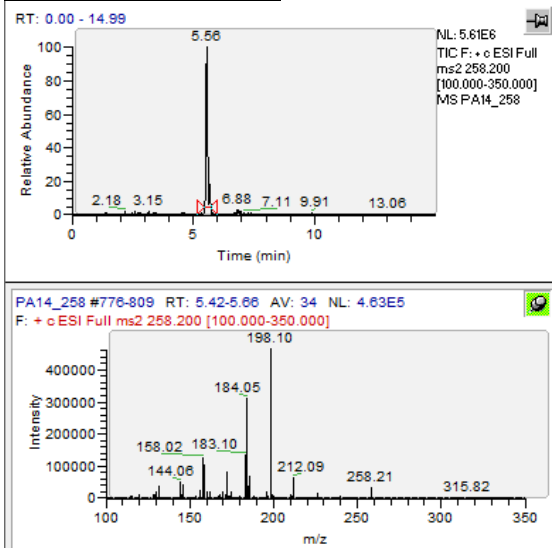
MS^2 assignemt of Δ^1-AQNOs

Reference spectrum:



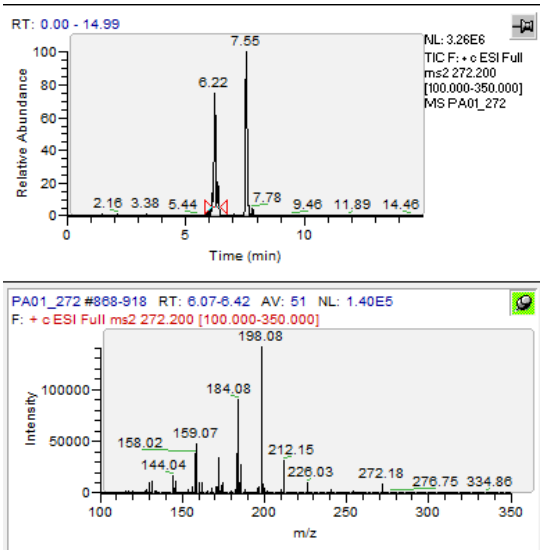
[M+H]$^+$	rt
258	5.55

C7



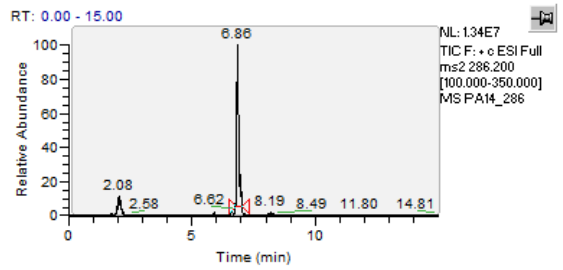
[M+H]$^+$	rt
272	6.22

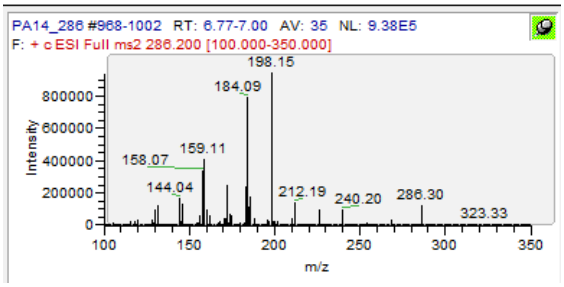
C8



$[M+H]^+$	rt
286	6.85

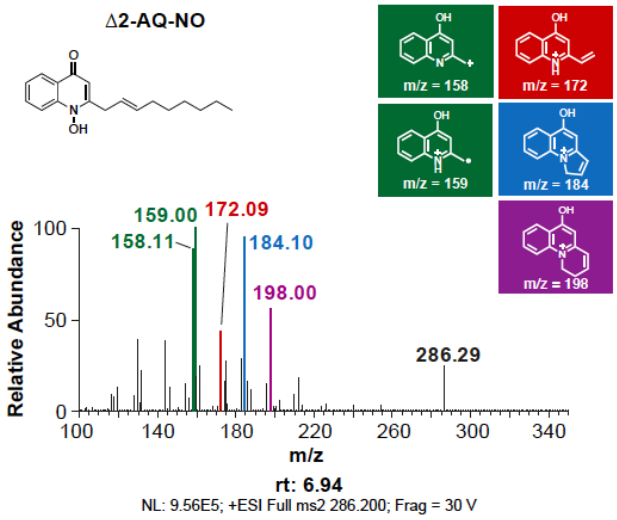
C9





MS^2 assignemt of Δ^2-AQNOs

Reference spectrum:

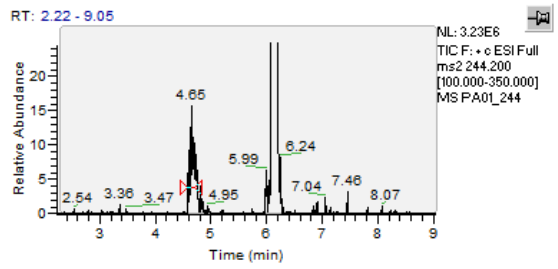


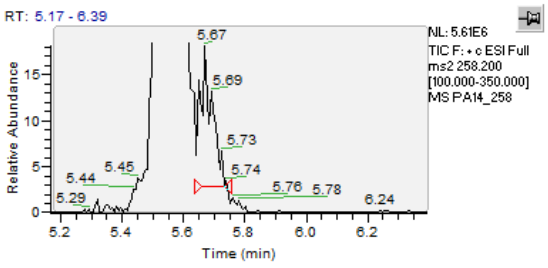
[M+H]$^+$	rt
244	4.56

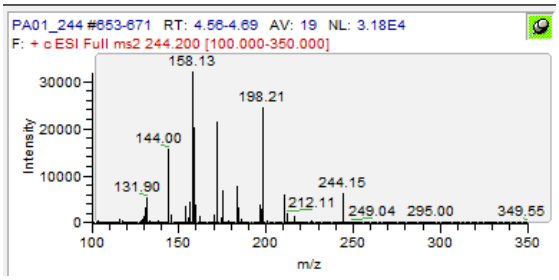
C5

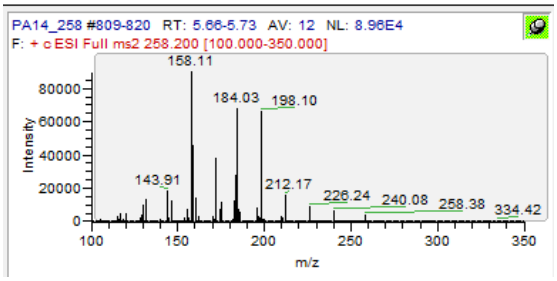
[M+H]$^+$	rt
258	5.67

C7



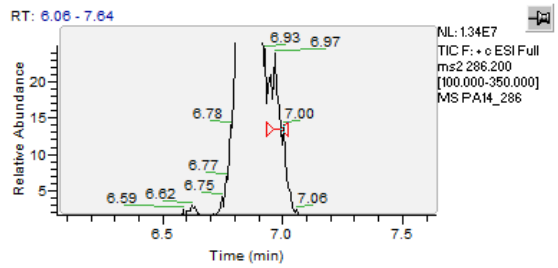


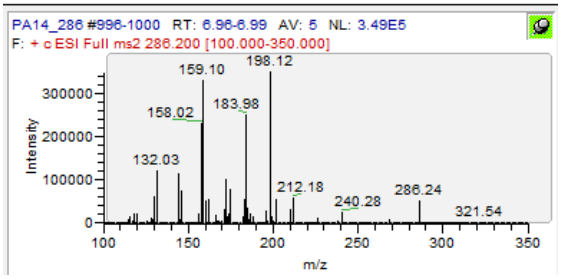




[M+H]+	rt
286	6.97

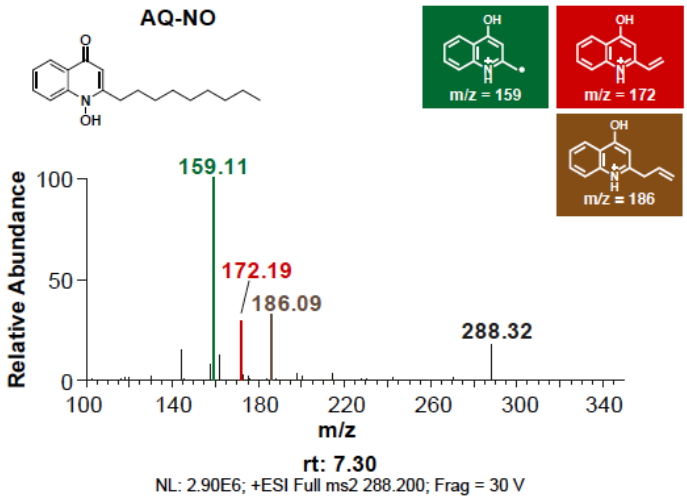
C9





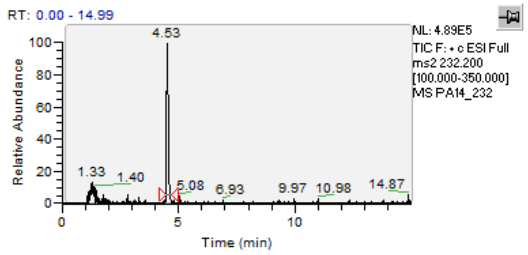
MS^2 assignemt of AQNOs

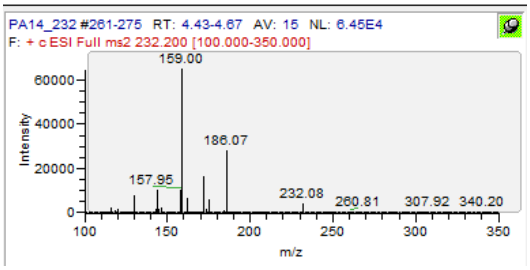
Reference spectrum:



[M+H]$^+$	rt
232	4.53

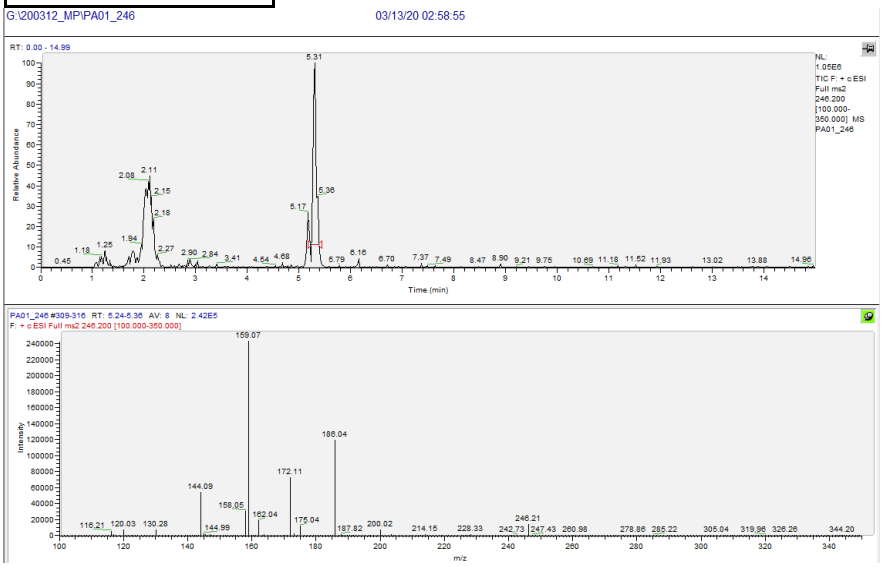
C5





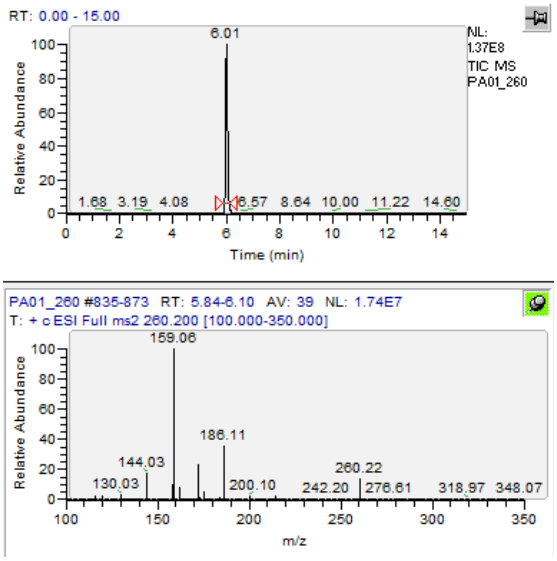
[M+H]+	rt
246	5.31

C6



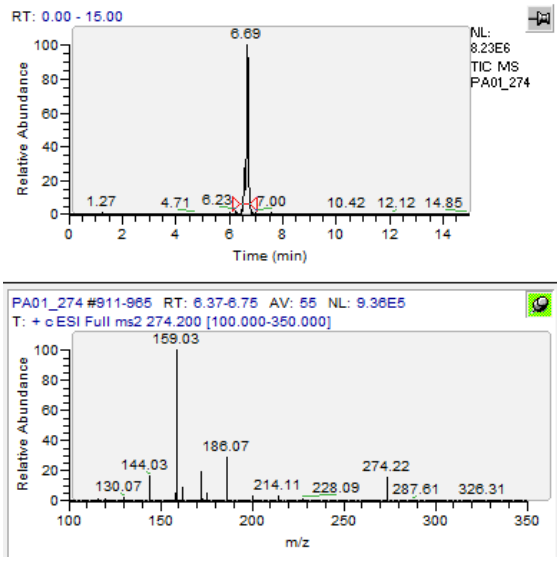
[M+H]+	rt
260	6.01

C7



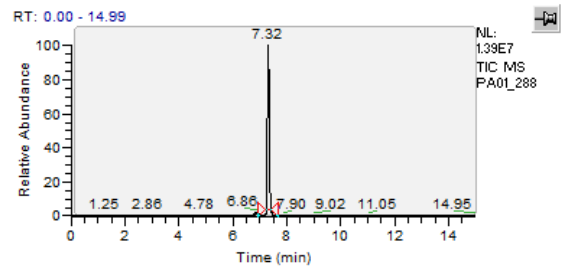
[M+H]+	rt
274	6.69

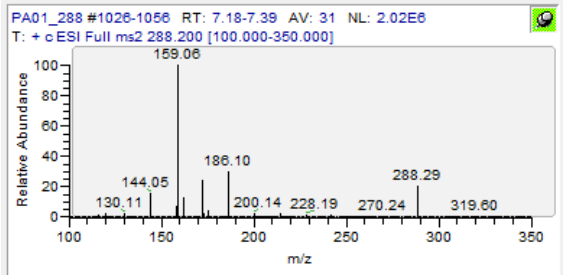
C8



[M+H]+	rt
288	7.31

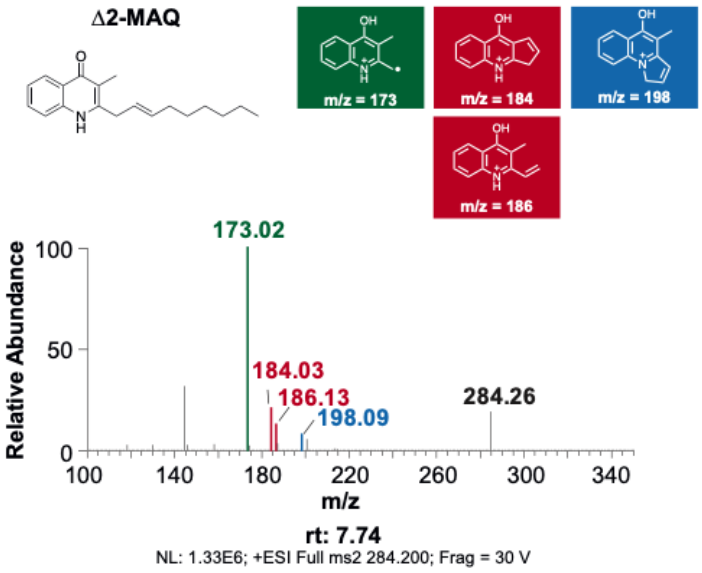
C9





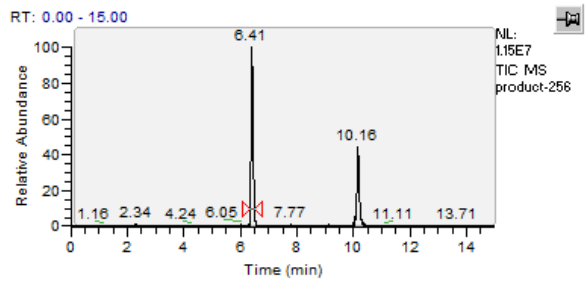
MS^2 assignemt of Δ^2-MAQs

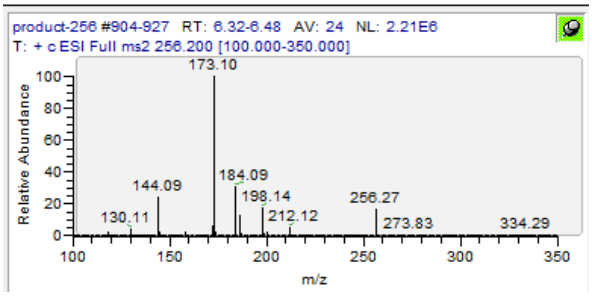
Reference spectrum:



C7

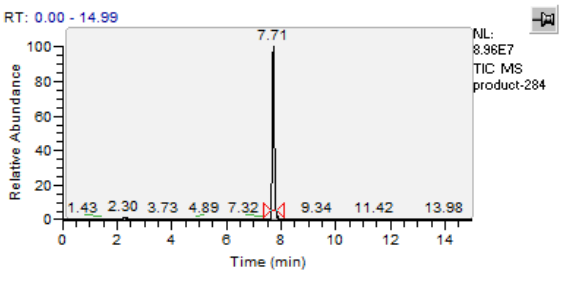
[M+H]$^+$	rt
256	6.41

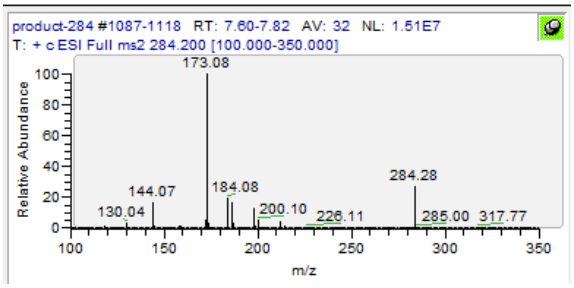




C9

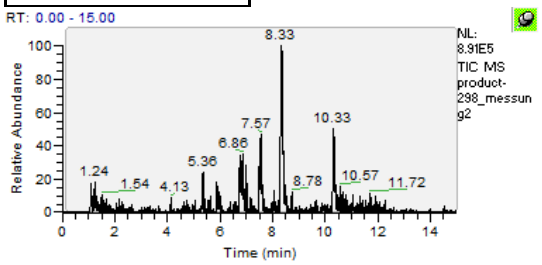
[M+H]$^+$	rt
284	7.71

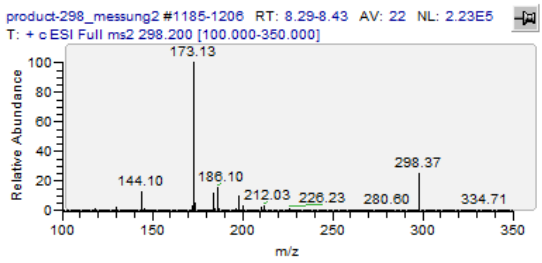




[M+H]+	rt
298	8.34

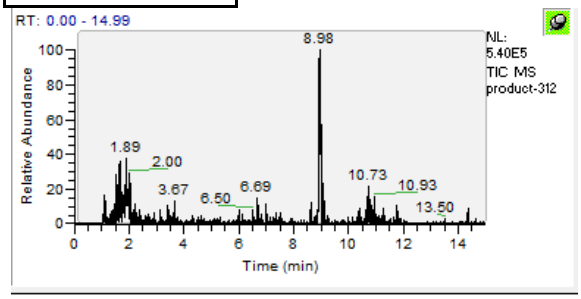
C10

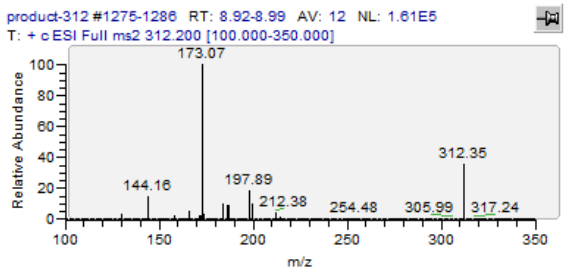




[M+H]+	rt
312	8.95

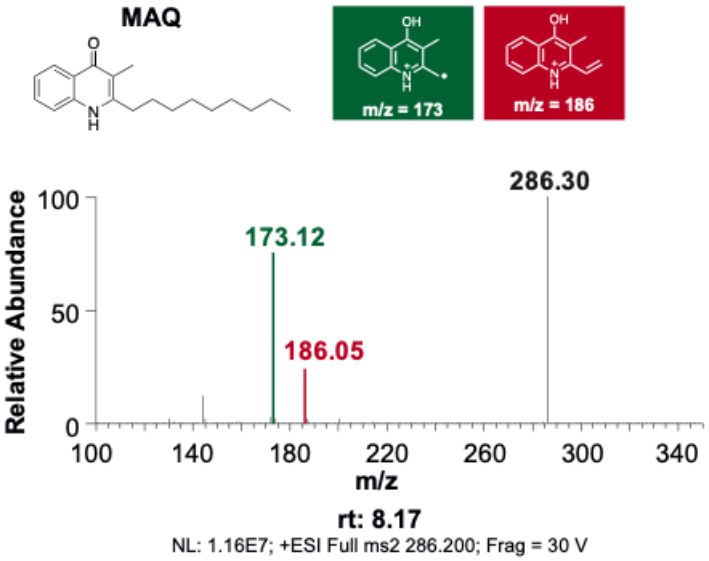
C11





MS^2 assignemt of MAQs

Reference spectrum:

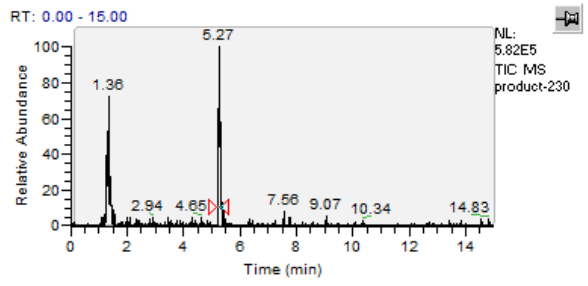


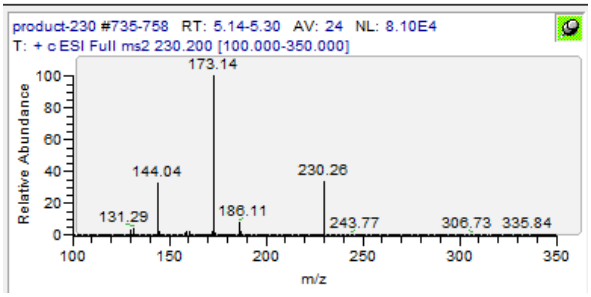
rt: 8.17

NL: 1.16E7; +ESI Full ms2 286.200; Frag = 30 V

[M+H]$^+$	rt
230	5.26

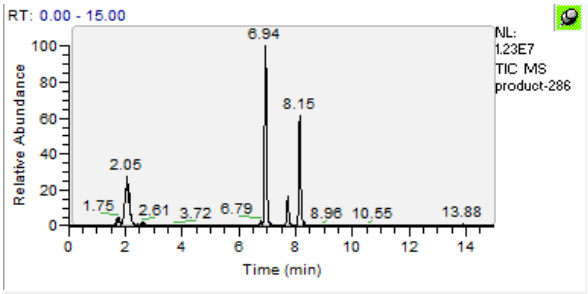
C5

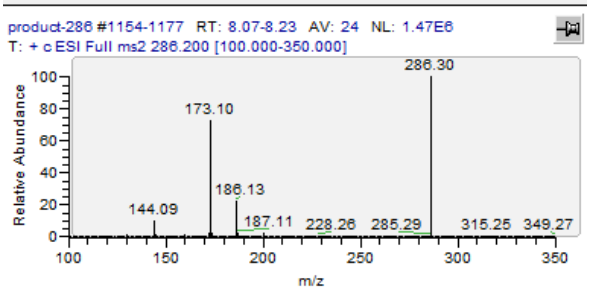




[M+H]$^+$	rt
286	8.15

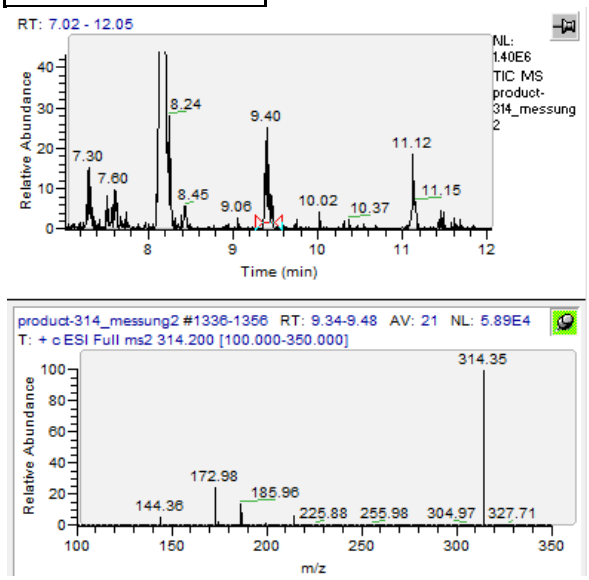
C7





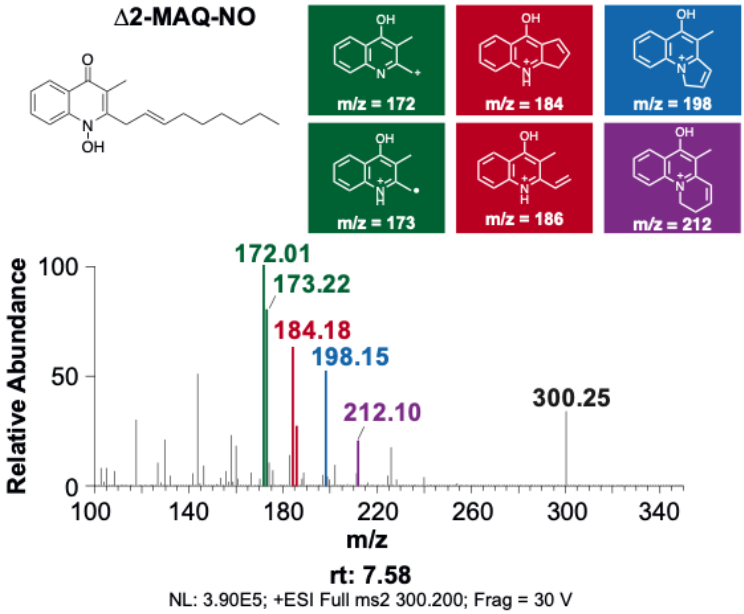
[M+H]+	rt
314	9.4

C9



MS^2 assignemt of Δ^2-MAQNOs

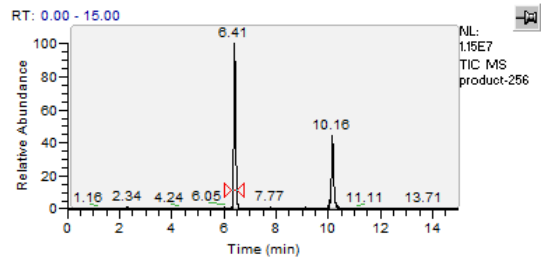
Reference spectrum:

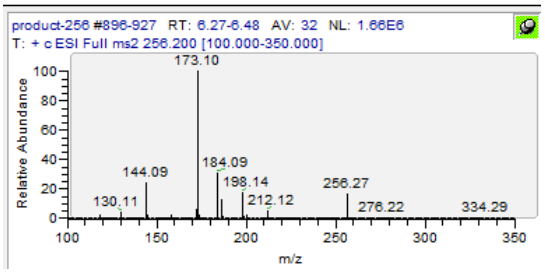


NL: 3.90E5; +ESI Full ms2 300.200; Frag = 30 V

[M+H]$^+$	rt
256	6.41

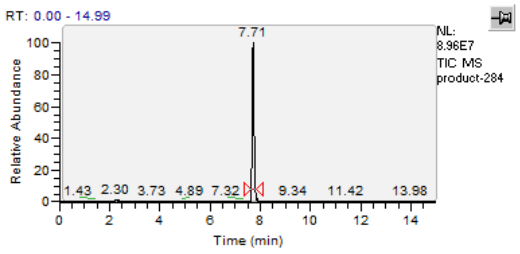
C7

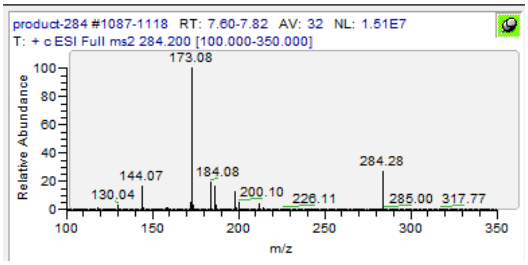




[M+H]$^+$	rt
284	7.71

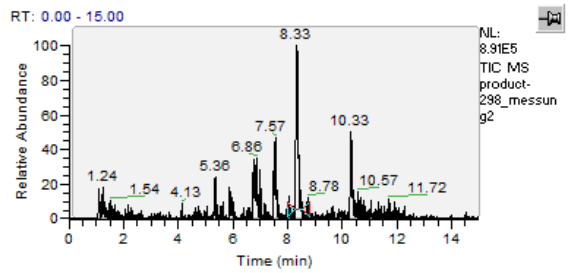
C9

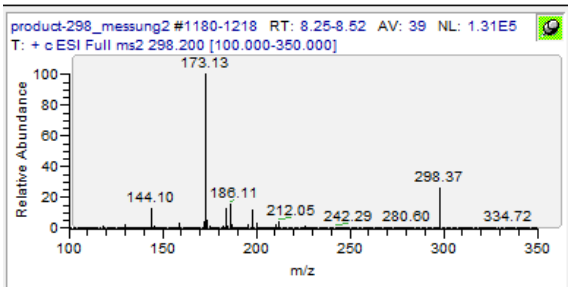




[M+H]+	rt
298	8.34

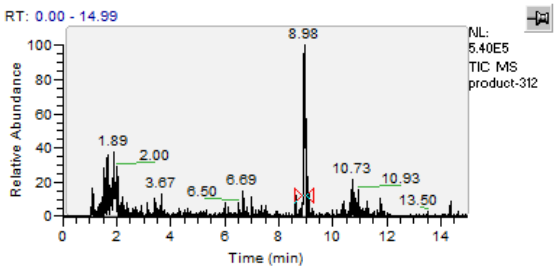
C10

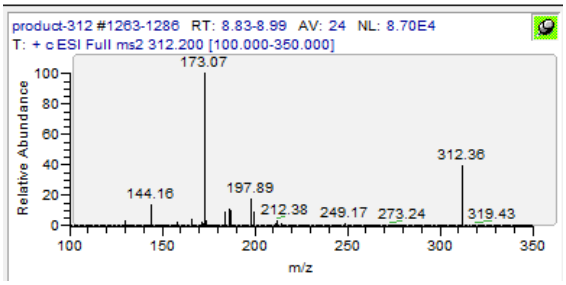




[M+H]+	rt
312	8.95

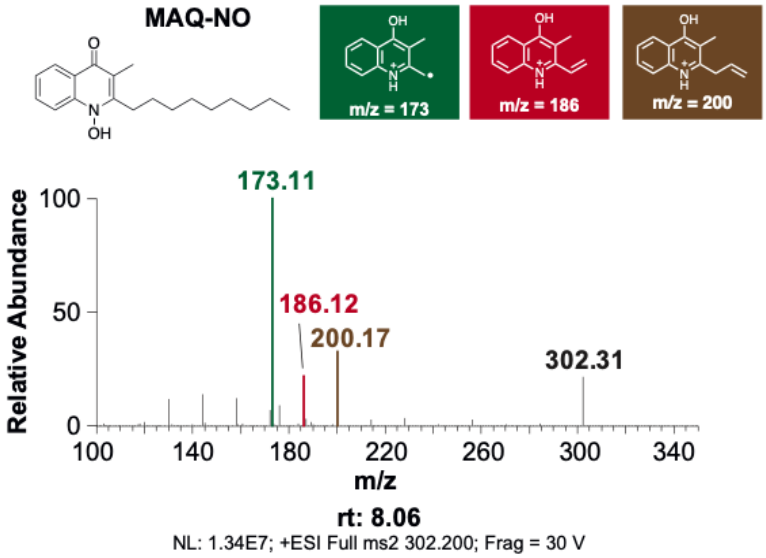
C11





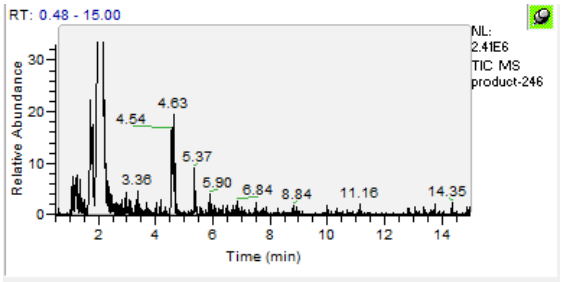
MS^2 assignemt of MAQNOs

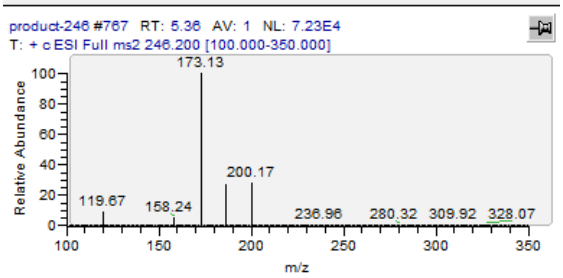
Reference spectrum:



[M+H]$^+$	rt
246	5.36

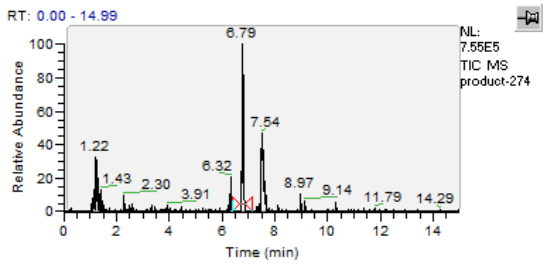
C5

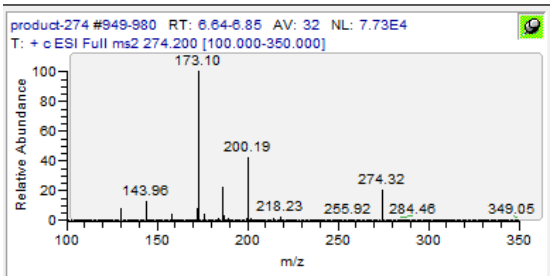




[M+H]$^+$	rt
274	6.78

C7





[M+H]+	rt
302	8.06

C9