Supporting Information for:

Radical-mediated Divergent Cyclization of Benzamides toward Perfluorinated or Cyanated Isoquinolinediones

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General. All manipulations of oxygen- and moisture-sensitive materials were conducted

with a Schlenk technique under a nitrogen or argon atmosphere. Solvent were purified and dried in a standard manner. Flash column chromatography was performed using EM Silica gel 60 (300-400 mesh). Visualization was accomplished with UV light (254 nm) and/or an aqueous alkaline $KMnO_4$ solution followed by heating. ^1H NMR and ^{13}C NMR spectra were recorded on 400 or 500 MHz NMR spectrometer with trimethylsilane resonance as the internal standard. Unless otherwise noted, reagents were commercially available and were used without further purification. Preparation of *N*-alkyl-*N*-methacryloyl benzamides **1** were prepared according to literature procedures.[1]

General Procedure for the Synthesis of *N*-alkyl-*N*-methacryloyl benzamides (according to literature procedures[1])**.** An oven dried reaction tube equipped with a magnetic stirring bar was charged with the acyl chloride (1 equiv.) in dichloromethane (0.7 M). Et_3N (2.0 equiv.) was added at 0°C followed by amine or amine hydrochloride (2.0 equiv.). The reaction mixture was warmed to room temperature and then was stirred overnight (for amine hydrochloride, a longer reaction time (24-36 h) is needed). The corresponding amide was isolated after addition of 5 mL of saturated Na_2CO_3 solution and extraction with dichoromethane. It was used without any purification in the next step. Methacryloyl chloride (2 equiv) was added on a mixture of amide (1 equiv), triethylamine (2 equiv) and DMAP (0.1 equiv) in dichoromethane (0.13 M). The resulted mixture was stirred at 35 ^oC for 10-12 h. The reaction was quenched with saturated aqueous Na_2CO_3 (5 mL), then the mixture was extracted with dichoromethane (3 x 5 mL). The combined organic layers were dried over $MgSO_4$, filtered, and concentrated *in vacuo*. The residue was purified by column chromatography on silica gel (petroleum ether/ethyl acetate as the eluant)

affording the corresponding *N*-alkyl-*N*-methacryloyl benzamides.

General Procedure for the Synthesis of Perfluoroalkylatedi Isoquinoline-1,3(2H,4H)-diones (Products 3a-u). To a mixture of methacryloyl benzamide **1** (0.3 mmol), AIBN (0.06 mmol), DTBP (0.6 mmol), K_3PO_4 (0.6 mmol) in DMF (2.0 mL) was added perfluoroalkyl iodine (0.6 mmol) under N_2 atmosphere, and then the resulting solution was stirred at 100 ^oC for 10-12 h. Then the resulted mixture was diluted with Et_2O, and washed with water and then brine. The organic layer was dried over anhydrous $MgSO_4$ and concentrated in *vacuo*. The residue was purified by flash chromatography (petroleum ether/ethyl acetate 10:1 as the eluant) on silica gel to afford the corresponding perfluorinated isoquinoline-1,3-diones (products **3a-u)** in a yield listed in Scheme 1 and 2.

2,4-Dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3a). Eluent: Petroleum ether/ethyl acetate (10:1).Yellowish oil (82.1 mg, 65%): ^1H NMR (400 MHz, $CDCl_3$) δ: 8.30 (d, *J* = 7.9 Hz, 1H), 7.67 (t, *J* = 7.6 Hz, 1H), 7.52 – 7.43 (m, 2H), 3.51– 3.35 (m, 1H), 3.42 (s, 3H), 2.78 (ddd, *J* = 28.1, 15.3, 8.2 Hz, 1H), 1.69 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:174.7, 163.8, 140.6, 133.8, 129.3, 128.1, 125.7, 124.0, 120.5 – 106.1 (m), 43.3, 40.5 (t, *J* = 19.6 Hz), 31.9, 27.5, 23.4; HRMS *m/z* (ESI-TOF) calcd for $C_{16}H_{13}F_9NO_2$ $[M+H]^+$ 422.0798, found: 422.0796.

2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3b).[1c] Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (101.3 mg, 73%): ^1H NMR (400 MHz, $CDCl_3$) δ: 8.32 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.66 (td, *J* = 7.7, 1.4 Hz, 1H), 7.52 – 7.46 (m, 1H), 7.43 (d, *J* = 7.9 Hz, 1H), 4.12 – 3.98 (m, 2H), 3.53 (dd, *J* = 33.6,

15.3 Hz, 1H), 2.94 – 2.70 (m, 1H), 1.67 (s, 3H), 1.63 – 1.57 (m, 2H), 1.42 – 1.35 (m, 2H), 0.95 (t, *J* = 7.3 Hz, 3H).

2-Benzyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dion e (3c).[1c] Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (84.9 mg, 57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.29 (dd, *J* = 7.9, 1.0 Hz, 1H), 7.66 (td, *J* = 7.9, 1.3 Hz, 1H), 7.51 – 7.45 (m, 1H), 7.44 – 7.39 (m, 3H), 7.30 – 7.22 (m, 3H), 5.22 (q, *J* = 13.9 Hz, 2H), 3.46 (dd, *J* = 33.5, 15.4 Hz, 1H), 2.85 – 2.70 (m, 1H), 1.65 (s, 3H).

Ethyl 2-(4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-1,3-dioxo-3,4-dihydroiso -quinolin-2(1H)-yl)acetate (3d). Eluent: Petroleum ether/ethyl acetate (8:1). Yellowish oil (42.9 mg, 29%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.30 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.70 (td, *J* = 7.8, 1.3 Hz, 1H), 7.53 – 7.44 (m, 2H), 4.86 (d, *J* = 16.7 Hz, 1H), 4.70 (d, *J* = 16.7 Hz, 1H), 4.25 – 4.16 (m, 2H), 3.47 (dd, *J* = 33.4, 15.4 Hz, 1H), 2.91 – 2.75 (m, 1H), 1.72 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.1,1 67.7, 163.1, 140.7, 134.1, 128.1, 125.8, 123.6, 120.4-105.7 (m), 61.6, 43.6, 41.6, 39.7 (t, *J* = 19.7 Hz), 32.3, 13.9; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.1 (t, *J* = 3.4 Hz, 3F),-108.1 (d, J_{F-F} = 272 Hz, 1F), -114.1 (d, J_{F-F} = 276 Hz, 1F), -124.4 (br, 2F), -125.2~-126.8 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{17}F_9NO_4$ $[M+H]^+$ 494.1009, found: 494.1008.

2-Butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-di one (3e).[1c] Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (107.3 mg, 75%):^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.17 (d, *J* = 8.1 Hz, 1H), 7.28 (d, *J* = 7.0 Hz, 1H), 7.21 (s, 1H), 4.05 – 3.96 (m, 2H), 3.43 (dd, *J* = 33.6, 15.2 Hz, 1H), 2.76 (ddd, *J* = 27.6, 15.3, 8.6 Hz, 1H), 2.46 (s, 3H), 1.66 (s, 3H), 1.62 – 1.55 (m, 2H), 1.41 – 1.34 (m, 2H), 0.95 (t, *J* = 7.3 Hz, 3H).

2-Butyl-6-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H, 4H)-dione (3f). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (106.5 mg, 72%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.24 (d, *J* = 8.8 Hz, 1H), 7.00 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.85 (d, *J* = 2.0 Hz, 1H), 4.04 – 3.95 (m, 2H), 3.90 (s, 3H), 3.43 (dd, *J* = 33.4, 15.3 Hz, 1H), 2.79 – 2.65 (m, 1H), 1.66 (s, 3H), 1.61 – 1.56 (m, 2H), 1.37 (dd, *J* = 15.2, 7.5 Hz, 2H), 0.94 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:174.3, 163.8, 163.1, 142.9, 131.7, 121.0-105.5 (m), 117.2, 113.5, 111.2, 55.6, 43.5, 40.4 (t, *J* = 19.7 Hz), 32.3, 29.6, 23.4, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.0 (t, *J* = 8.0 Hz, 3F), -108.8 (d, $J_{F\text{-}F}$ = 268 Hz, 1F), -114.9 (d, $J_{F\text{-}F}$ = 273 Hz, 1F), -124.6 (br, 2F), -125.2~ -126.3 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{21}F_9NO_3$ $[M+H]^+$ 494.1373, found: 494.1371.

6-Fluoro-2,4-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl) isoquinoline-1,3 -(2H,4H)-dione (3g). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (72.4 mg, 55%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.33 (dd, *J* = 8.8, 5.8 Hz, 1H), 7.23 – 7.17 (m, 1H), 7.13 (dd, *J* = 9.2, 2.1 Hz, 1H), 3.53 – 3.40 (m, 4H), 2.72 (ddd, *J* = 28.1, 15.4, 8.1 Hz, 1H), 1.69 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.1, 166.7 (d, *J* = 257.0 Hz), 162.8, 143.6 (d, *J* = 8.8 Hz), 132.4 (d, *J* = 9.8 Hz), 120.5, 116.1 (d, *J* = 22.2 Hz), 112.6 (d, *J* = 6.4 Hz), 109.8-105.1(m), 43.5, 40.6 (t, *J* = 19.6 Hz), 31.8, 27.4, 23.4; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.2 (t, *J* = 9.4 Hz, 3F), -103.5 (s, 1F), -107.3 (d, $J_{F\text{-}F}$ = 273.2 Hz, 1F), -112.7 (d, $J_{F\text{-}F}$ = 273.7 Hz, 1F), -124.8 (br, 2F), -125.1~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{16}H_{12}F_{10}NO_2$ $[M+H]^+$ 440.0703, found: 440.0701.

2-Butyl-6-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4 H)-dione (3h).[1c] Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (95.4, 64%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.24 (d, *J* = 8.5 Hz, 1H), 7.47 (dd, *J* = 8.5, 1.9 Hz, 1H),

7.42 (s, 1H), 4.06 – 3.94 (m, 2H), 3.53 – 3.39 (m, 1H), 2.81 – 2.65 (m, 1H), 1.68 (s, 3H), 1.63 – 1.55 (m, 2H), 1.38 (dd, *J* = 15.1, 7.7 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H).

6-Bromo-2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3i). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (92.5 mg, 57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.15 (d, *J* = 8.5 Hz, 1H), 7.63 (dd, *J* = 8.5, 1.5 Hz, 1H), 7.57 (s, 1H), 4.07 – 3.93 (m, 2H), 3.45 (dd, *J* = 33.7, 15.2 Hz, 1H), 2.81 – 2.61 (m, 1H), 1.67 (s, 3H), 1.62 – 1.54 (m, 2H), 1.37 (dd, *J* = 14.7, 7.4 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:173.6, 162.8, 142.4, 131.6, 131.0, 128.9, 123.1, 43.3, 40.5 (t, *J* = 19.9 Hz), 32.0, 29.5, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.1 (t, *J* = 9.8 Hz, 3F), -108.7 (d, $J_{F\text{-}F}$ = 262.6 Hz, 1F), -113.9 (d, $J_{F\text{-}F}$ = 269.3 Hz, 1F), -124.6 (br, 2F), -125.1~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{18}F_9NO_2$ $[M+H]^+$ 542.0372, found: 542.0370.

2-Butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-(trifluoromethyl)isoquinoline-1,3(2H,4H)-dione (3j). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (81.2 mg, 51%): Yellowish oil: ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.40 (d, *J* = 8.2 Hz, 1H), 7.72 (d, *J* = 8.3 Hz, 1H), 7.64 (s, 1H), 4.07 – 3.94 (m, 2H), 3.47 (dd, *J* = 33.2, 15.2 Hz, 1H), 2.85 – 2.68 (m, 1H), 1.68 (s, 3H), 1.56 (dd, *J* = 15.0, 7.3 Hz, 2H), 1.36 (td, *J* = 14.8, 7.2 Hz, 2H), 0.93 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 173.5, 162.3, 141.4, 135.1 (q, *J* = 30.3 Hz), 130.3, 128.6, 127.1, 124.8 (q, *J* = 10.1 Hz), 122.9, 119.8 – 105.4 (m), 43.5, 40.9, 40.5 (t, *J* = 20.2 Hz), 31.9, 29.5, 20.1, 13.6; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -63.4 (s, 3F), -81.2 (t, *J* = 9.8 Hz, 3F), -107.3 (d, $J_{F\text{-}F}$ = 273.3 Hz, 1F), -112.6 (d, $J_{F\text{-}F}$ = 273.0 Hz, 1F), -124.9 (br, 2F), -125.1~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{18}F_{12}NO_2$ $[M+H]^+$ 532.1141, found: 532.1145.

2-Butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-phenylisoquinoline-1,3(2H,4H)-dione (3k). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (69.5 mg, 43%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.37 (d, *J* = 8.2 Hz, 1H), 7.71 (dd, *J* = 8.2, 1.6 Hz, 1H), 7.62 (dd, *J* = 9.9, 1.8 Hz, 3H), 7.53 (t, *J* = 7.3 Hz, 2H), 7.49 – 7.46 (m, 1H), 4.13 – 4.00 (m, 2H), 3.53 (dd, *J* = 33.5, 15.3 Hz, 1H), 2.94 – 2.79 (m, 1H), 1.74 (s, 3H), 1.67 – 1.61 (m, 2H), 1.45 – 1.38 (m, 2H), 0.98 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:174.3, 163.4, 146.7, 141.1, 139.6, 129.9, 129.1, 128.7, 127.4, 127.0, 124.4 , 122.9, 120.1 – 116.2 (m), 43.6, 40.6(t, *J* = 19.7 Hz), 40.4, 32.3, 29.6, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.1 (t, *J* = 8.1 Hz, 3F), -107.6 (d, $J_{F\text{-}F}$ = 264 Hz, 1F), -114.3 (d, $J_{F\text{-}F}$ = 270 Hz, 1F), -124.5 (br, 2F), -125.4~ -126.1 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{25}H_{23}F_9NO_2$ $[M+H]^+$ 540.1580, found: 540.1577.

2-Butyl-5-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3l). Eluent: Petroleum ether/ethyl acetate (10:1).Yellowish oil (31.1 mg, 21%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.96 (d, *J* = 2.8 Hz, 1H), 7.45 (t, *J* = 8.7 Hz, 1H), 7.16 (d, *J* = 8.7, 2.8 Hz, 1H), 4.06 – 3.97 (m, 2H), 3.93(s, 3H), 3.39 (dd, *J* = 33.5, 15.4 Hz, 1H), 2.78 – 2.63 (m, 1H), 1.63 (s, 3H), 1.61 – 1.56 (m, 2H), 1.38 (dd, *J* = 15.2, 7.7 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H).^{13}C NMR (101 MHz, $CDCl_3$)δ:175.3, 163.5, 156.9, 128.9, 128.4, 125.8, 122.1, 120.2 – 106.0 (m), 115.9, 55.6, 42.9, 40.7 (t, *J* = 19.6 Hz), 37.1, 29.5, 27.4, 20.2, 13.8; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.1 (t, *J* = 9.8 Hz, 3F), -111.6 (d, $J_{F\text{-}F}$ = 272.6 Hz, 1F), -113.6 (d, $J_{F\text{-}F}$ = 272.6 Hz, 1F), -125.0 (br, 2F), -125.2~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{21}F_9NO_3$ $[M+H]^+$ 494.1373, found: 494.1371.

2-Butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3l'). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (57.7 mg,

39%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 2.8 Hz, 1H), 7.34 (d, *J* = 8.7 Hz, 1H), 7.22 (dd, *J* = 8.7, 2.8 Hz, 1H). δ 4.22 – 3.96 (m, 2H), 3.91 (s, 2H), 3.40 (dd, *J* = 33.9, 15.3 Hz, 1H), 2.90 – 2.57 (m, 1H). 1.62 (s, 3H), 1.62 – 1.56 (m, 2H), 1.43 – 1.37 (m, 2H), 0.96 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.3, 163.8, 163.1, 142.9, 131.7, 121.0 – 105.5 (m), 117.2, 113.5, 111.2, 55.6, 43.5, 40.4 (t, *J* = 19.8 Hz), 32.3, 29.6, 23.4, 20.2, 13.8; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.2 (t, *J* = 9.8 Hz, 3F), -107.4 (d, $J_{F\text{-}F}$ = 272.5 Hz, 1F), -112.7 (d, $J_{F\text{-}F}$ = 272.6 Hz, 1F), -124.8 (br, 2F), -125.0~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{21}F_9NO_3$ $[M+H]^+$ 494.1373, found: 494.1369.

2-Butyl-8-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3m). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (85.0 mg, 57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.54 (d, *J* = 2.1 Hz, 1H), 7.38 (d, *J* = 6.6 Hz, 1H), 7.26 (d, *J* = 1.9 Hz, 1H), 4.06 – 3.94 (m, 2H), 3.46 (dd, *J* = 33.3, 15.5 Hz, 1H), 2.81 – 2.65 (m, 1H), 1.68 (s, 3H), 1.62 – 1.57 (m, 2H), 1.38 (dd, *J* = 15.0, 7.6 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:173.0, 161.1, 143.7, 136.8, 133.0, 132.2, 124.9, 121.4, 119.1 – 105.8 (m), 43.6, 40.6 (t, *J* = 19.2 Hz), 32.4, 29.4, 23.4, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.2 (t, *J* = 9.9 Hz, 3F), -108.0 (d, $J_{F\text{-}F}$ = 273.6 Hz, 1F), -112.8 (d, $J_{F\text{-}F}$ = 274.3 Hz, 1F), -124.9 (br, 2F), -125.1~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{18}F_9ClNO_2$ $[M+H]^+$ 498.0877, found: 498.0875.

2-Butyl-4,8-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3n). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (90.2 mg, 63%):^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.50 (t, *J* = 7.7 Hz, 1H), 7.31 (d, *J* = 11.0 Hz, 1H), 7.28 (s, 1H), 4.04 – 3.96 (m, 2H), 3.45 (dd, *J* = 33.6, 15.3 Hz, 1H), 2.82 (s, 3H), 2.80 – 2.66 (m, 1H), 1.67 (s, 3H), 1.64 – 1.59 (m, 2H), 1.43 – 1.37 (m, 2H), 0.96 (t, *J* = 7.3 Hz, 3H); ^{13}C

NMR (101 MHz, $CDCl_3$) δ:173.9, 163.9, 143.1, 132.4, 132.0, 124.1, 122.5, 121.4, 118.7 – 105.9 (m), 43.4, 40.5 (t, J = 19.7 Hz), 39.4, 32.6, 29.6, 24.2, 20.3, 13.7; ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.1 (t, J = 9.8 Hz, 3F), -109.0 (d, J_{F-F} = 269 Hz, 1F), -114.7 (d, J_{F-F} = 272 Hz, 1F), -124.6 (br, 2F), -125.2~ -126.7 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{21}F_9NO_2$ $[M+H]^+$ 478.1424, found: 478.1425.

2-Butyl-4,5,7-trimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3o). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (79.5 mg, 54%):^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.07 (s, 1H), 7.26 (s, 1H), 4.09 – 3.92 (m, 2H), 3.51 (dd, J = 35.4, 15.7 Hz, 1H), 3.26 – 3.10 (m, 1H), 2.56 (d, J = 2.2 Hz, 3H), 2.38 (d, J = 2.0 Hz, 3H), 1.73 (d, J = 2.6 Hz, 3H), 1.62 – 1.54 (m, 2H), 1.42 – 1.32 (m, 2H), 0.94 (td, J = 7.3, 2.5 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:175.6, 163.9, 139.4, 137.7, 135.5, 135.1, 128.5, 125.1, 118.9 – 109.7 (m), 44.3, 40.8 (t, J = 19.2 Hz), 37.4, 29.5, 28.2, 22.3, 20.7, 20.2, 13.8; ^{19}F NMR (470 MHz, $CDCl_3$) δ: -81.2 (t, J = 9.9 Hz, 3F), -109.0 (d, J_{F-F} = 268 Hz, 1F), -114.7 (d, J_{F-F} = 270 Hz, 1F), -124.6 (br, 2F), -125.2~ -126.7 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{21}H_{23}F_9NO_2$ $[M+H]^+$ 492.1580, found: 492.1577.

2-Butyl-6,8-dichloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione (3p). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (81.2 mg, 51%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.56 (d, J = 1.8 Hz, 1H), 7.35 (s, 1H), 3.98 (dd, J = 12.2, 7.0 Hz, 2H), 3.47 (dd, J = 33.0, 15.8 Hz, 1H), 2.77 – 2.62 (m, 1H), 1.69 (s, 3H), 1.61 – 1.55 (m, 2H), 1.38 (dd, J = 14.3, 7.2 Hz, 2H), 0.95 (t, J = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:172.4, 160.4, 144.9, 139.3, 137.9, 132.2, 125.2, 129.9, 118.8 – 109.1(m), 43.7, 41.1, 40.6 (t, J = 19.9 Hz), 32.3, 29.4, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -81.2 (t, J = 9.9 Hz, 3F), -108.0 (d, J_{F-F} = 273.6 Hz, 1F), -112.8 (d, J_{F-F} = 274.3

Hz, 1F), -124.9 (br, 2F), -125.1~ -126.9 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{17}Cl_2F_9NO_2$ $[M+H]^+$ 532.0488, found: 532.0489.

2-Butyl-4-(2,2,3,3,4,4,4-heptafluorobutyl)-4,8-dimethylisoquinoline-1,3(2H,4H)-dione (3q). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (74.3 mg, 58%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.49 (t, *J* = 7.7 Hz, 1H), 7.30 (d, *J* = 10.6 Hz, 1H), 7.27 (s, 1H), 4.03 – 3.94 (m, 2H), 3.43 (dd, *J* = 33.5, 15.4 Hz, 1H), 2.81 (s, 3H), 2.77 – 2.65 (m, 1H), 1.67 (s, 3H), 1.57 (dd, *J* = 15.4, 7.7 Hz, 2H), 1.42 – 1.36 (m, 2H), 0.95 (t, *J* = 7.3 Hz, 3H); ^{3}C NMR (101 MHz, $CDCl_3$) δ:173.9, 163.9, 143.1, 141.9, 132.4, 132.0, 124.1, 122.5, 119.3 – 113.6 (m), 45.8, 43.3, 40.6 (t, *J* = 18,8 Hz), 32.6, 29.6, 24.2, 20.3, 13.8; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -80.4 (t, *J* = 12.1Hz, 3F), -108.6 (d, $J_{F\text{-}F}$ = 341.5 Hz, 1F), -113.5 (d, $J_{F\text{-}F}$ = 341.7 Hz, 1F), -126.6~ -129.1 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{21}F_7NO_2$ $[M+H]^+$ 428.1456, found: 428.1452.

2-Butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione (3r). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (104.0mg, 60%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.17 (d, *J* = 8.1 Hz, 1H), 7.28 (d, *J* = 7.9 Hz, 1H), 7.20 (s, 1H), 4.06 – 3.95 (m, 2H), 3.42 (dd, *J* = 33.5, 15.4 Hz, 1H), 2.82 – 2.67 (m, 1H), 2.46 (s, 3H), 1.65 (s, 3H), 1.61 – 1.56 (m, 2H), 1.38 (dd, *J* = 15.0, 7.7 Hz, 2H), 0.94 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.4, 163.5, 144.5, 140.7, 129.4, 129.1, 126.0, 121.7, 120.3 – 109.1(m), 43.3, 40.5(t, *J* = 19.8 Hz), 32.1, 29.6, 21.9, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -80.9 (t, *J* = 13.5 Hz, 3F), -107.6 (d, $J_{F\text{-}F}$ = 341.2 Hz, 1F), -112.4 (d, $J_{F\text{-}F}$ = 341.6 Hz, 1F), -121.8 (br, 2F), 122.9 (br, 2F), 123.9 (br, 2F), -125.2~ -127.2 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{22}H_{21}F_{13}NO_2$ $[M+H]^+$ 578.1360, found: 578.1359.

2-Isopropyl-4-methyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione (3s). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (88.9 mg, 54%):^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.27 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.64 (td, *J* = 7.8, 1.4 Hz, 1H), 7.49 – 7.44 (m, 1H), 7.41 (d, *J* = 7.9 Hz, 1H), 5.23 (dt, *J* = 13.9, 6.9 Hz, 1H), 3.42 (dd, *J* = 33.6, 15.3 Hz, 1H), 2.81 – 2.66 (m, 1H), 1.67 (s, 3H), 1.48 (dd, *J* = 6.8, 2.7 Hz, 6H).^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.4, 163.8, 140.6, 133.4, 129.3, 127.9, 125.5, 124.7, 118.9 – 108.4(m), 45.7, 43.6, 40.6 (t, *J* = 19.5 Hz), 31.9, 20.3, 19.2 (d, *J* = 4.1 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ: -80.8 (t, *J* = 13.5 Hz, 3F), -107.6 (d, $J_{F\text{-}F}$ = 341.3 Hz, 1F), -112.4 (d, $J_{F\text{-}F}$ = 341.5 Hz, 1F), -121.7 (br, 2F), 122.8 (br, 2F), 123.9 (br, 2F), -125.1~ -127.0 (m, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{17}F_{13}NO_2$ $[M+H]^+$ 550.1047, found: 550.1049.

2-Butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluorononyl)-4,8-dimethylisoquinoline-1,3(2H,4H)-dione (3t). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (87.3 mg, 43%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49 (t, *J* = 7.7 Hz, 1H), 7.34 – 7.25 (m, 2H), 4.00 (td, *J* = 7.3, 4.5 Hz, 2H), 3.45 (dd, *J* = 33.5, 15.3 Hz, 1H), 2.81 (s, 3H), 2.79 – 2.67 (m, 1H), 1.67 (s, 3H), 1.62 – 1.57 (m, 2H), 1.39 (dd, *J* = 14.9, 7.7 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H).^{13}C NMR (101 MHz, $CDCl_3$) δ:173.9, 163.9, 143.1, 142.0, 132.3, 132.0, 124.0, 122.5, 119.5 – 110.5(m), 43.4, 40,7 (t, *J* = 19.7 Hz), 32.6, 29.6, 24.2, 20.2, 13.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -80.8 (t, *J* = 10.2 Hz, 3F), -107.6 (d, $J_{F\text{-}F}$ = 273.5 Hz, 1F), -112.4 (d, $J_{F\text{-}F}$ = 273.1 Hz, 1F), -120.7 ~ -122.5 (m, 6F), -122.4 (br, 2F), -123.8 (br, 2F), -126.4 (br, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{24}H_{21}F_{17}NO_2$ $[M+H]^+$ 678.1296, found: 678.1295.

2-Butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-henicosafluoroundecyl)-4,6-dim

ethylisoquinoline-1,3(2H,4H)-dione (3u). Eluent: Petroleum ether/ethyl acetate (10:1). Yellowish oil (102.6 mg, 44%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.18 (d, *J* = 8.1 Hz, 1H), 7.29 (d, *J* = 8.0 Hz, 1H), 7.22 (s, 1H), 4.07 – 3.97 (m, 2H), 3.44 (dd, *J* = 33.6, 15.2 Hz, 1H), 2.84 – 2.69 (m, 1H), 2.46 (s, 3H), 1.66 (s, 3H), 1.63 – 1.57 (m, 2H), 1.39 (dd, *J* = 14.9, 7.7 Hz, 2H), 0.95 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ:174.4, 163.5, 144.5, 140.7, 129.3, 129.0, 126.0, 121.7, 122.0 – 105.9 (m), 46.4, 43.3, 40.4 (t, *J* = 19.5 Hz), 32.1, 29.6, 21.7, 20.1, 13.6; ^{19}F NMR (376 MHz, $CDCl_3$) δ: -80.9 (t, *J* = 12.7 Hz, 3F), -107.5 (d, $J_{F\text{-}F}$ = 341.2 Hz, 1F), -112.4 (d, $J_{F\text{-}F}$ = 341.5 Hz, 1F), -121.7 (br, 10F), -122.7 (br, 2F), -123.8 (br, 2F), -126.1 (br, 2F); HRMS *m/z* (ESI-TOF) calcd for $C_{26}H_{21}F_{21}NO_2$ $[M+H]^+$ 778.1232, found: 778.1229.

General Procedure for the Synthesis of Cyanated Isoquinoline-1,3(2H,4H)-diones (Products 4a-x). To a mixture of methacryloyl benzamide **1** (0.3 mmol), AIBN (0.06 mmol), CuI (0.003 mmol, 10 mol%), K_3PO_4 (0.6 mmol) in DMF (2.0 mL) was added perfluoroalkyl iodine (0.6 mmol), and then the resulting solution was stirred at 90 ^{o}C for 10-12 h under air atmosphere. Then the resulted mixture was diluted with Et_2O, and washed with water and then brine. The organic layer was dried over anhydrous $MgSO_4$ and concentrated in *vacuo*. The residue was purified by flash chromatography (petroleum ether/ethyl acetate 5:1 as the eluant) on silica gel to afford the corresponding cyanated isoquinoline-1,3-diones (products **4a-x)** in a yield listed in Scheme 3 and 4.

3,3-(2,4-Dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4a). Eluent: Petroleum ether/ethyl acetate (5:1). Yellowish solid (54.2 mg, 67%), mp: 95.2 – 96.1 ^{o}C. ^{1}HNMR (400 MHz, $CDCl_3$) δ: 8.33 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.71 – 7.65 (m, 1H), 7.52 (t, *J* = 7.3 Hz, 2H), 3.42 (s, 3H), 2.77 (d, *J* = 14.5 Hz, 1H), 2.29 (d, *J* =

14.5 Hz, 1H), 1.65 (s, 3H), 1.17 (s, 3H), 1.03 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.6, 163.9, 141.0, 133.8, 129.4, 128.2, 126.6, 124.7, 123.2, 50.4, 45.9, 33.1, 30.6, 29.2, 27.7, 27.3; HRMS *m/z* (ESI-TOF) calcd for $C_{16}H_{19}N_2O_2$ $[M+H]^+$ 271.1442, found: 271.1440.

3-(2-Butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropane nitrile (4b). Eluent: Petroleum ether/ethyl acetate (5:1). Colorless oil (70.2 mg, 75%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.32 (d, *J* = 7.8 Hz, 1H), 7.68 (dd, *J* = 11.0, 4.2 Hz, 1H), 7.52 (t, *J* = 7.3 Hz, 2H), 4.05 – 4.00 (m, 2H), 2.77 (d, *J* = 14.6 Hz, 1H), 2.36 (d, *J* = 14.6 Hz, 1H), 1.68 – 1.57 (m, 5H), 1.48 – 1.36 (m, 2H), 1.16 (s, 3H), 1.14 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H) ; ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.4, 163.6, 140.9, 133.8, 129.4, 128.2, 126.7, 124.8, 123.4, 49.5, 45.9, 40.7, 33.6, 30.6, 29.7, 29.6, 27.2, 20.4, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{25}N_2O_2$ $[M+H]^+$ 313.1911, found: 313.1909.

3-(2-Isopropyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylprop anenitrile (4c). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless solid (57.3mg, 64%), mp: 93.2 – 94.0 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.30 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.71 – 7.61 (m, 1H), 7.51 (dd, *J* = 7.5, 5.2 Hz, 2H), 5.24 (dt, *J* = 13.9, 6.9 Hz, 1H), 2.78 (d, *J* = 14.6 Hz, 1H), 2.35 (d, *J* = 14.6 Hz, 1H), 1.60 (s, 3H), 1.50 (d, *J* = 6.9Hz, 3H), 1.49 (d, *J* = 6.9 Hz, 3H), 1.21 (s, 3H), 1.15 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.7, 164.0, 140.7, 133.6, 129.4, 128.2, 126.6, 125.3, 123.6, 49.0, 46.3, 45.7, 33.8, 30.6, 29.9, 27.1, 19.5, 19.3; HRMS *m/z* (ESI-TOF) calcd for $C_{18}H_{23}N_2O_2$ $[M+H]^+$ 299.1755, found: 299.1753.

3-(2-Benzyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropan enitrile (4d). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (60.2 mg, 58%, d.r.

= 1:1): ^{1}H NMR (500 MHz, $CDCl_3$) δ: 8.34 (d, *J* = 7.8 Hz, 1H), 7.71 – 7.63 (m, 1H), 7.50 (ddd, *J* = 19.6, 10.0, 6.0 Hz, 4H), 7.32 – 7.21 (m, 3H), 5.31 (dd, *J* = 13.7, 6.3 Hz, 1H), 5.14 (dd, *J* = 17.7, 13.8 Hz, 1H), 2.79 (d, *J* = 14.6 Hz, 0.5H), 2.63 (d, *J* = 14.7 Hz, 0.5H), 2.42 (d, *J* = 14.7 Hz, 0.5H), 2.25 (d, *J* = 14.6 Hz, 0.5H), 1.62 (s, 1.5H), 1.61 (s, 1.5H), 0.95 (s, 1.5H), 0.94 (s, 1.5H), 0.80 (s, 1.5H), 0.79 (s, 1.5H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 175.6, 175.2, 163.7, 163.7, 141.2, 140.8, 136.6, 133.7, 129.6, 129.5, 129.2, 129.1, 128.4, 128.3, 128.2, 128.1, 127.5, 127.4, 126.8, 126.6, 48.9, 47.7, 46.1, 45.9, 43.9, 43.8, 35.3, 35.2, 33.8, 33.6, 33.0, 25.7, 23.1; HRMS *m/z* (ESI-TOF) calcd for $C_{22}H_{23}N_2O_2$ $[M+H]^+$ 347.1755, found: 347.1752.

3-(2-Butyl-4,6-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4e). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (75.3 mg, 77%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.19 (d, *J* = 8.5 Hz, 1H), 7.31 (d, *J* = 7.6 Hz, 2H), 4.06 – 3.96 (m, 2H), 2.76 (d, *J* = 14.6 Hz, 1H), 2.47 (s, 3H), 2.36 (d, *J* = 14.6 Hz, 1H), 1.56 (s, 5H), 1.46 – 1.35 (m, 2H), 1.19 (s, 3H), 1.11 (s, 3H), 0.96 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.7, 163.7, 144.8, 140.6, 129.5, 129.2, 127.3, 123.6, 121.4, 49.2, 45.9, 40.5, 33.6, 30.7, 26.7, 22.0, 20.4, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{27}N_2O_2$ $[M+H]^+$ 327.2068, found: 327.2066.

3-(2-Butyl-6-methoxy-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4f). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (75.9 mg, 74%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.26 (dd, *J* = 8.8, 1.2 Hz, 1H), 7.02 (d, *J* = 8.8 Hz, 1H), 6.95 (s, 1H), 4.03 – 3.95 (m, 2H), 3.93 (d, *J* = 1.2 Hz, 3H), 2.77 (d, *J* = 14.6 Hz, 1H), 2.33 (d, *J* = 14.6 Hz, 1H), 1.66 – 1.54 (m, 5H), 1.40 (dq, *J* = 14.2, 7.1 Hz,2H), 1.21 (s, 3H), 1.12 (s, 3H), 1.01 – 0.92 (m, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.6, 164.0,

163.3, 142.9, 131.8, 123.7, 117.7, 114.1, 112.1, 55.7, 49.3, 46.1, 40.5, 33.8, 30.6, 29.9, 29.7, 26.7, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{27}N_2O_3$ $[M+H]^+$ 343.2017, found: 343.2018.

3-(2-Butyl-6-fluoro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4g). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (66.4 mg, 67%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.35 (dd, *J* = 8.7, 5.9 Hz, 1H), 7.20 (ddd, *J* = 11.4, 8.7, 2.3 Hz, 2H), 4.10 – 3.89 (m, 2H), 2.77 (d, *J* = 14.7 Hz, 1H), 2.28 (d, *J* = 14.7 Hz, 1H), 1.65 – 1.55 (m, 5H), 1.41 (dq, *J* = 14.7, 7.3 Hz, 2H), 1.18 (s, 3H), 1.17 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.9, 166.2 (d, *J* = 128.6 Hz), 162.7, 143.9 (d, *J* = 4.3 Hz), 132.6 (d, *J* = 4.9 Hz), 123.2, 121.3 (d, *J* = 1.3 Hz), 116.2 (d, *J* = 11.1 Hz), 113.6 (d, *J* = 11.6 Hz), 49.7, 46.1, 40.7, 33.5, 30.6, 29.8, 29.6, 27.2, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}FN_2O_2$ $[M+H]^+$ 331.1817, found: 331.1814.

3-(2-Butyl-6-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4h). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (73.7 mg, 71%): ^{1}H NMR (500 MHz, $CDCl_3$) δ: 8.25 (d, *J* = 9.0 Hz, 1H), 7.52 – 7.44 (m, 2H), 4.07 – 3.92 (m, 2H), 2.76 (d, *J* = 14.7 Hz, 1H), 2.30 (d, *J* = 14.7 Hz, 1H), 1.66 – 1.58 (m, 5H), 1.46 – 1.35 (m, 2H), 1.17 (s, 3H), 1.16 (s, 3H), 0.97 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ: 174.7, 162.8, 142.6, 140.5, 131.0, 128.7, 126.9, 123.3, 121.4, 49.5, 46.0, 39.3, 33.4, 30.5, 29.6, 27.3, 20.3, 13.7; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}ClN_2O_2$ $[M+H]^+$ 347.1521, found: 347.1520.

3-(6-Bromo-2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4i). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (68.0 mg, 58%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.17 (d, *J* = 8.9 Hz, 1H), 7.65 (dt, *J* = 6.1, 1.8 Hz,

2H), 4.10 – 3.95 (m, 2H), 2.76 (d, *J* = 14.7 Hz, 1H), 2.30 (d, *J* = 14.7 Hz, 1H), 1.62 (d, *J* = 4.0 Hz, 5H), 1.40 (dd, *J* = 13.8, 6.5 Hz, 2H), 1.18 (s, 3H), 1.17 (s, 3H), 0.96 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.7, 162.5, 141.7, 135.2, 130.4, 124.9, 123.9, 123.9, 123.0, 121.5, 49.5, 46.2, 40.9, 39.5, 33.5, 29.6(d, *J* = 17.9 Hz), 27.2, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}BrN_2O_2$ $[M+H]^+$ 391.1016, found: 391.1019.

3-(2-Butyl-4-methyl-1,3-dioxo-6-(trifluoromethyl)-1,2,3,4-tetrahydroisoquinolin-4-yl)-2, 2-dimethylpropanenitrile (4j). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (65.0 mg, 57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.45 (d, *J* = 8.0 Hz, 1H), 7.76 (d, *J* = 8.0 Hz, 2H), 4.16 – 3.92 (m, 2H), 2.81 (d, *J* = 14.7 Hz, 1H), 2.36 (d, *J* = 14.7 Hz, 1H), 1.68 – 1.58 (m, 5H), 1.47 – 1.35 (m, 2H), 1.17 (s, 3H), 1.16 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H); ^{13}CNMR (101 MHz, $CDCl_3$) δ: 174.7, 162.5, 141.7, 135.2 (q, *J* = 33.4 Hz), 124.9 (q, *J* = 3.6 Hz), 123.9 (q, *J* = 3.8 Hz), 123.3 (q, *J* = 274.3 Hz), 123.9, 121.4, 49.4, 46.2, 40.9, 39.4, 33.5, 30.5, 29.7, 29.5, 27.5, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{24}F_3N_2O_2$ $[M+H]^+$ 381.1785, found: 381.1788.

3-(2-Butyl-4-methyl-6-nitro-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethyl propanenitrile (4k). Eluent: Petroleum ether/ethyl acetate (5:1). Yellowish solid (53.6 mg, 50%), mp: 65.5-66.4 ^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.52 (d, *J* = 8.7 Hz, 1H), 8.38 (s, 1H), 8.33 (dd, *J* = 8.6, 2.1 Hz, 1H), 4.10 – 3.96 (m, 2H), 2.82 (d, *J* = 14.8 Hz, 1H), 2.43 (d, *J* = 14.8 Hz, 1H), 1.71 – 1.58 (m, 5H), 1.49 – 1.36 (m, 2H), 1.21 (s, 3H), 1.19 (s, 3H), 0.98 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.3, 162.0, 150.9, 142.5, 131.3, 129.5, 123.0, 122.9, 122.2, 49.5, 46.3, 41.1, 33.5, 30.5, 30.0, 29.5, 27.1, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}N_3O_4$ $[M+H]^+$ 358.1762, found: 358.1760.

3-(2-Butyl-7-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4l). Eluent: Petroleum ether/ethyl acetate (7:1). Yellowish oil (57.1 mg, 55%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.29 (d, *J* = 2.3 Hz, 1H), 7.63 (dd, *J* = 8.5, 2.3 Hz, 1H), 7.46 (d, *J* = 8.4 Hz, 1H), 4.08 – 3.96 (m, 2H), 2.78 (d, *J* = 14.7 Hz, 1H), 2.32 (d, *J* = 14.7 Hz, 1H), 1.62 – 1.56 (m, 5H), 1.44 – 1.36 (m, 2H), 1.17 (s, 3H), 1.16 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 174.9, 162.5, 139.1, 134.5, 133.9, 129.2, 128.3, 126.4, 125.4, 49.2, 45.8, 40.9, 33.7, 30.5, 29.8, 29.5, 27.2, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}ClN_2O_2$ $[M+H]^+$ 347.1521, found: 347.1519.

3-(2-Butyl-4-methyl-1,3-dioxo-7-(trifluoromethyl)-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4m). Eluent: Petroleum ether/ethyl acetate (7:1). Yellowish oil (55.9 mg, 49%):^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.61 (s, 1H), 7.91 (d, *J* = 8.1 Hz, 1H), 7.68 (d, *J* = 8.2 Hz, 1H), 4.12 – 3.98 (m, 2H), 2.83 (d, *J* = 14.7 Hz, 1H), 2.38 (d, *J* = 14.7 Hz, 1H), 1.69 – 1.58 (m, 5H), 1.46 – 1.39 (m, 2H), 1.18 (s, 3H), 1.17(s, 3H), 0.98 (t, *J* = 7.3 Hz, 3H); ^{13}CNMR (101 MHz, $CDCl_3$) δ: 174.6, 162.5, 144.5, 130.9 (q, *J* = 33.7 Hz), 130.9 (q, *J* = 3.4 Hz), 127.6, 126.8 (q, *J* = 3.8 Hz), 125.5, 124.3 (q, *J* = 273.6 Hz), 123.1, 49.1, 46.2, 40.9, 33.6, 30.5, 29.8, 29.5, 27.3, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{24}F_3N_2O_2$ $[M+H]^+$ 381.1785, found: 381.1787.

3-(2-Butyl-4-methyl-7-nitro-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4n). Eluent: Petroleum ether/ethyl acetate (5:1). Yellowish oil (43.9 mg, 41%): ^{1}H NMR (500 MHz, $CDCl_3$) δ 9.15 (d, *J* = 2.4 Hz, 1H), 8.49 (dd, *J* = 8.6, 2.5 Hz, 1H), 7.74 (d, *J* = 8.7 Hz, 1H), 4.16 – 3.94 (m, 2H), 2.84 (d, *J* = 14.8 Hz, 1H), 2.40 (d, *J* = 14.8 Hz, 1H), 1.68 – 1.60 (m, 5H), 1.47 – 1.37 (m, 2H), 1.21 (s, 3H), 1.17(s, 3H), 0.98 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ: 174.1, 161.7, 147.7, 147.1, 128.4, 127.7,

126.5, 124.8, 123.1, 49.2, 46.5, 41.1, 33.5, 30.5, 30.0, 29.5 27.1, 20.3, 13.7; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}N_3O_4$ $[M+H]^+$ 358.1762, found: 358.1765.

3-(2-Butyl-8-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4o). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (55.0 mg, 53%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.32 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.68 (td, *J* = 7.8, 1.4 Hz, 1H), 7.52 (d, *J* = 7.5 Hz, 1H), 4.07 – 3.97 (m, 2H), 2.77 (d, *J* = 14.6 Hz, 1H), 2.35 (d, *J* = 14.6 Hz, 1H), 1.65 – 1.57 (m, 5H), 1.46 – 1.37 (m, 2H), 1.16 (s, 3H), 1.15 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.4, 163.6, 140.9, 133.8, 129.4, 128.2, 126.7, 124.8, 123.4, 49.5, 45.9, 40.6, 33.6, 30.6, 29.7, 29.6, 27.2, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{24}ClN_2O_2$ $[M+H]^+$ 347.1521, found: 347.1519.

3-(2-Butyl-4,8-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4p). Eluent: Petroleum ether/ethyl acetate (7:1). Yellowish oil (57.7 mg, 59%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.52 (t, *J* = 7.7 Hz, 1H), 7.40 (d, *J* = 7.8 Hz, 1H), 7.31 (d, *J* = 7.5 Hz, 1H), 4.06 – 3.91 (m, 2H), 2.83 (s, 3H), 2.76 (d, *J* = 14.6 Hz, 1H), 2.33 (d, *J* = 14.6 Hz, 1H), 1.65 – 1.54 (m, 5H), 1.48 – 1.36 (m, 2H), 1.17 (s, 3H), 1.16 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.1, 164.1, 143.2, 142.2, 132.6, 132.2, 125.0, 123.5, 123.1, 49.8, 45.9, 40.6, 34.0, 30.6, 29.8, 29.6, 27.1, 24.3, 20.4, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{20}H_{27}N_2O_2$ $[M+H]^+$ 327.2068, found: 327.2065.

3-(2-Butyl-4,5,7-trimethyl-3-methylene-1-oxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile (4q). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless solid (58.2 mg, 57%), mp: 58.6-59.5 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.11 (s, 1H), 7.28 (s, 1H), 4.01 (dd, *J* = 8.2, 7.0 Hz, 2H), 2.75 (s, 2H), 2.65 (s, 3H), 2.40 (s, 3H), 1.71 (d, *J* = 7.4 Hz, 3H), 1.65 – 1.58 (m, 2H), 1.40 (dd, *J* = 15.0, 7.5 Hz, 2H), 1.18 (s, 3H), 1.10 (s,

3H), 0.96 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 176.8, 164.1, 139.7, 137.9, 135.0, 128.6, 125.7, 123.2, 121.4, 47.2, 45.9, 40.9, 39.4, 30.8, 29.5, 29.3, 26.6, 22.9, 20.7, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{21}H_{29}N_2O_2$ $[M+H]^+$ 341.2224, found: 341.2223.

2-((2,4-Dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)-2-methylbutane nitrile (4r). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (48.6 mg, 57%; d.r. = 7:3): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.35 – 8.28 (m, 1H), 7.72 – 7.63 (m, 1H), 7.56 – 7.46 (m, 2H), 3.41 (d, *J* = 2.9 Hz, 3H), 2.85 (d, *J* = 14.4 Hz, 0.7H), 2.67 (d, *J* = 14.6 Hz, 0.3H), 2.41 (d, *J* = 14.6 Hz, 0.3H), 2.15 (d, *J* = 14.4 Hz, 0.7H), 1.64 (d, *J* = 4.9 Hz, 3H), 1.55 – 1.47 (m, 2H), 1.05 (s, 1H), 0.99 – 0.93 (m, 3H), 0.82 (s, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.9, 175.4, 164.0, 163.9, 141.5, 140.9, 133.9, 133.6, 129.4, 129.3, 126.7, 126.5, 124.8, 124.6, 122.4, 122.2, 49.1, 48.2, 45.9, 45.7, 35.5, 35.3, 34.9, 34.3, 33.5, 33.2, 27.3, 27.2, 25.6, 23.5, 9.0, 8.9; HRMS *m/z* (ESI-TOF) calcd for $C_{17}H_{21}N_2O_2$ $[M+H]^+$ 285.1598, found: 285.1599.

2-((6-fluoro-2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)-2-methylbutanenitrile (4s). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (45.3 mg, 50%; d.r. = 1:1) : ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.35 (dt, *J* = 8.6, 6.1 Hz, 1H), 7.24 – 7.11 (m, 2H), 3.40 (s, 3H), 2.85 (d, *J* = 14.5 Hz, 0.5H), 2.66 (d, *J* = 14.7 Hz, 0.5H), 2.32 (d, *J* = 14.7 Hz, 0.5H), 2.07 (d, *J* = 14.5 Hz, 0.5 H), 1.64 (s, 1.5 H), 1.63 (s, 1.5 H), 1.56 – 1.33 (m, 2H), 1.06 (s, 1.5H), 1.01 – 0.94 (m, 3H), 0.89 (s, 1.5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.5, 174.9, 166.3 (d, *J* = 257.2 Hz), 166.0 (d, *J* = 257.0 Hz), 163.0, 162.9, 144.5 (d, *J* = 4.2 Hz), 144.0 (d, *J* = 4.4 Hz), 132.5 (t, *J* = 11.1 Hz), 122.1 (d, *J* = 8.4 Hz), 121.4 (d, *J* = 1.3 Hz), 116.3 (d, *J* = 17.8 Hz), 116.1 (d, *J* = 17.7 Hz), 113.7 (d, *J* = 23.2

Hz), 113.3 (d, *J* = 29.0 Hz), 49.3, 48.5, 46.2, 45.9, 35.5, 35.3, 35.1, 34.1, 33.3, 33.2, 27.4, 27.3, 25.7, 23.5, 9.0, 8.9; HRMS *m/z* (ESI-TOF) calcd for $C_{17}H_{20}FN_2O_2$ $[M+H]^+$ 303.1504, found: 303.1507.

1-((2,4-Dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile (4t). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless solid (63.4 mg, 68%), mp: 77.5-76.2 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.32 (dd, *J* = 8.1, 1.3 Hz, 1H), 7.67 (td, *J* = 7.6, 1.3 Hz, 1H), 7.55 – 7.47 (m, 2H), 3.42 (s, 3H), 2.75 (d, *J* = 14.5 Hz, 1H), 2.30 (d, *J* = 14.5 Hz, 1H), 1.71 – 1.63 (m, 9H), 1.51 – 1.36 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.8, 164.0, 141.5, 133.7, 129.4, 128.1, 126.6, 124.7, 121.4, 50.5, 45.7, 37.8, 37.0, 36.2, 33.4, 29.5, 27.3, 24.8, 22.8; HRMS *m/z* (ESI-TOF) calcd for $C_{19}H_{23}N_2O_2$ $[M+H]^+$ 311.1755, found: 311.1756.

1-((2-Butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4u). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (76.2 mg, 72%): ^{1}H NMR (400 MHz, CDCl3) δ: 8.30 (d, *J* = 7.9 Hz, 1H), 7.70 – 7.61 (m, 1H), 7.55 – 7.45 (m, 2H), 4.10 – 3.95 (m, 2H), 2.75 (d, *J* = 14.6 Hz, 1H), 2.35 (d, *J* = 14.6 Hz, 1H), 1.72 – 1.51 (m, 13H), 1.47 – 1.33 (m, 4H), 0.96 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.6, 163.7, 141.3, 133.7, 129.4, 128.1, 126.7, 124.7, 121.5, 49.7, 45.7, 40.6, 38.2, 37.0, 35.7, 33.9, 29.6, 24.8, 23.1, 22.5, 20.4, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{22}H_{29}N_2O_2$ $[M+H]^+$ 353.2224, found: 353.2221.

1-((2-Benzyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile (4v). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (66.1 mg, 57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.34 (dd, *J* = 7.9, 1.0 Hz, 1H), 7.73 – 7.63 (m, 1H), 7.58 – 7.45 (m, 4H), 7.36 – 7.20 (m, 3H), 5.34 (d, *J* = 13.7 Hz, 1H), 5.14 (d, *J* = 13.7 Hz,

1H), 2.69 (d, *J* = 14.6 Hz, 1H), 2.36 (d, *J* = 14.6 Hz, 1H), 1.69 – 1.46 (m, 8H), 1.31 – 1.19 (m, 5H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.5, 163.8, 141.2, 136.7, 133.9, 129.6, 129.3, 128.4, 128.2, 127.5, 126.9, 124.5, 121.6, 50.0, 45.8, 43.8, 38.1, 37.0, 35.1, 33.7, 24.7, 22.5; HRMS *m/z* (ESI-TOF) calcd for $C_{25}H_{27}N_2O_2$ $[M+H]^+$ 387.2068, found: 387.2071.

1-((2-Butyl-7-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile (4w). Eluent: Petroleum ether/ethyl acetate (7:1). Colorless oil (58.1 mg, 50%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.28 (d, *J* = 2.3 Hz, 1H), 7.62 (dd, *J* = 8.4, 2.3 Hz, 1H), 7.46 (d, *J* = 8.5 Hz, 1H), 4.10 – 3.92 (m, 2H), 2.76 (d, *J* = 14.7 Hz, 1H), 2.31 (d, *J* = 14.7 Hz, 1H), 1.68 – 1.51 (m, 11H), 1.48 – 1.37 (m, 6H), 0.97 (t, *J* = 1.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 175.1, 162.6, 139.6, 134.4, 133.8, 129.1, 128.3, 126.3, 121.6, 49.4, 45.6, 40.8, 36.9, 34.0, 29.5, 24.7, 22.7, 22.5, 20.3, 13.8; HRMS *m/z* (ESI-TOF) calcd for $C_{22}H_{28}ClN_2O_2$ $[M+H]^+$ 387.1834, found: 387.1836.

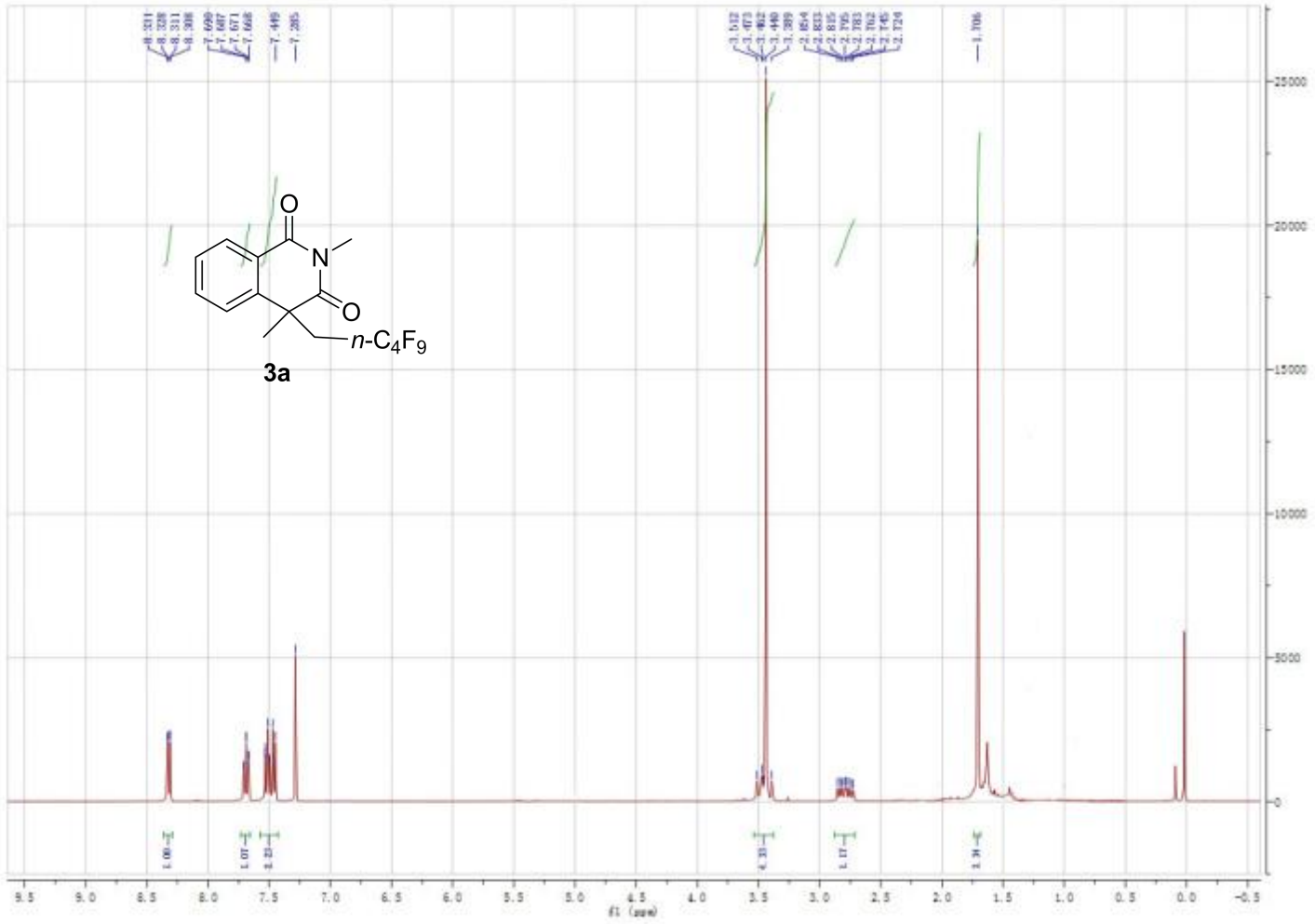
Methyl 3-(2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanoate (4x). Eluent: Petroleum ether/ethyl acetate (5:1). Colorless oil (51.8 mg, 57%): ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.26 (d, *J* = 7.9 Hz, 1H), 7.64 – 7.55 (m, 1H), 7.41 (dd, *J* = 17.3, 7.8 Hz, 2H), 3.39 (s, 3H), 3.21 (s, 3H), 2.69 (d, *J* = 14.6 Hz, 1H), 2.56 (d, *J* = 14.6 Hz, 1H), 1.58 (s, 3H), 0.98 (s, 3H), 0.91 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 176.9, 176.3, 164.2, 142.0, 133.1, 129.0, 127.4, 126.7, 124.7, 51.6, 51.1, 45.9, 41.6, 33.5, 28.6, 27.2, 23.7; HRMS *m/z* (ESI-TOF) calcd for $C_{17}H_{22}NO_4$ $[M+H]^+$ 304.1544, found: 304.1541.

1 (a) Kong, W.; Casimiro, M.; Fuentes, N.; Merino, E.; Nevado, C. *Angew. Chem. Int. Ed.,*

2013, *52*, 13086. (b) Zhang, M.; Xie, P.; Zhao, W.; Niu, B.; Wu, W.; Bian, Z.; Pittman, C. U. Jr.; Zhou, A. *J. Org. Chem.*, **2015**, *80*, 4176. (c) Tang, S.; Deng, Y.-L.; Li, J.; Wang, W.; Ding, G.; Wang, M.; Xiao, Z.; Wang, Y.; Sheng, R. *J. Org. Chem.* **2015**, *80*, 12599.

1 Copies of ^{1}H NMR, ^{19}F NMR and ^{13}C NMR spectra

2,4-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3a).



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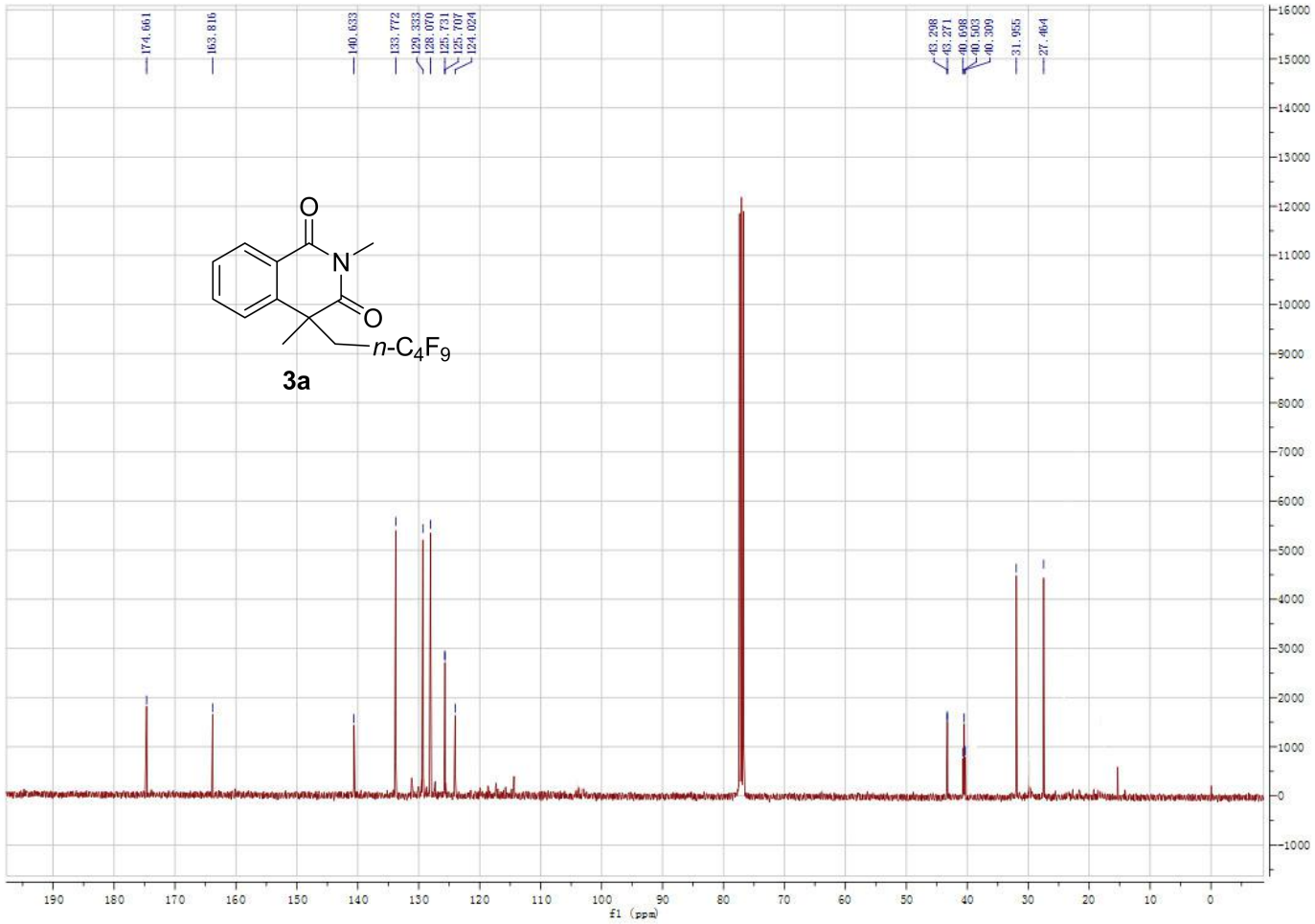
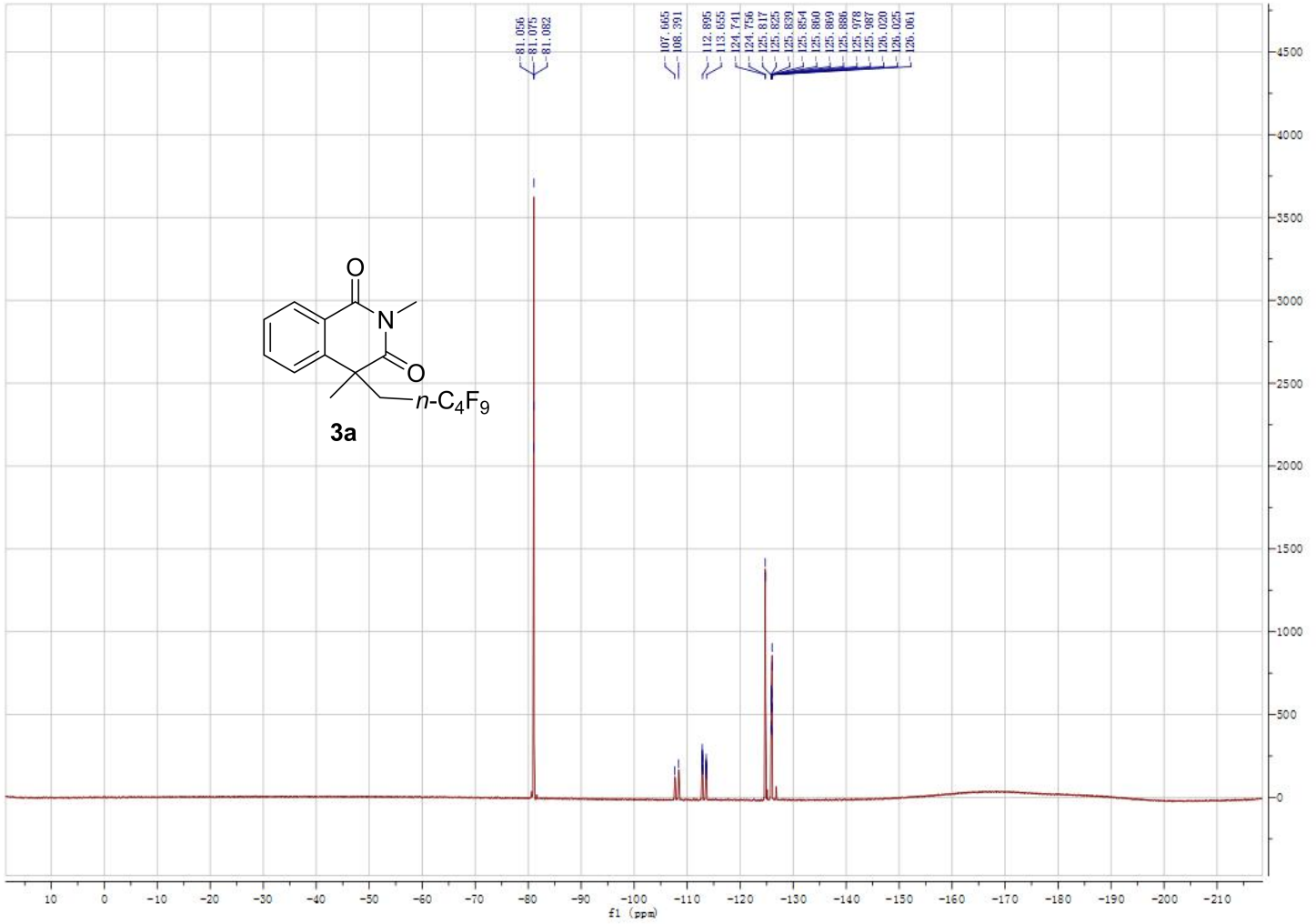
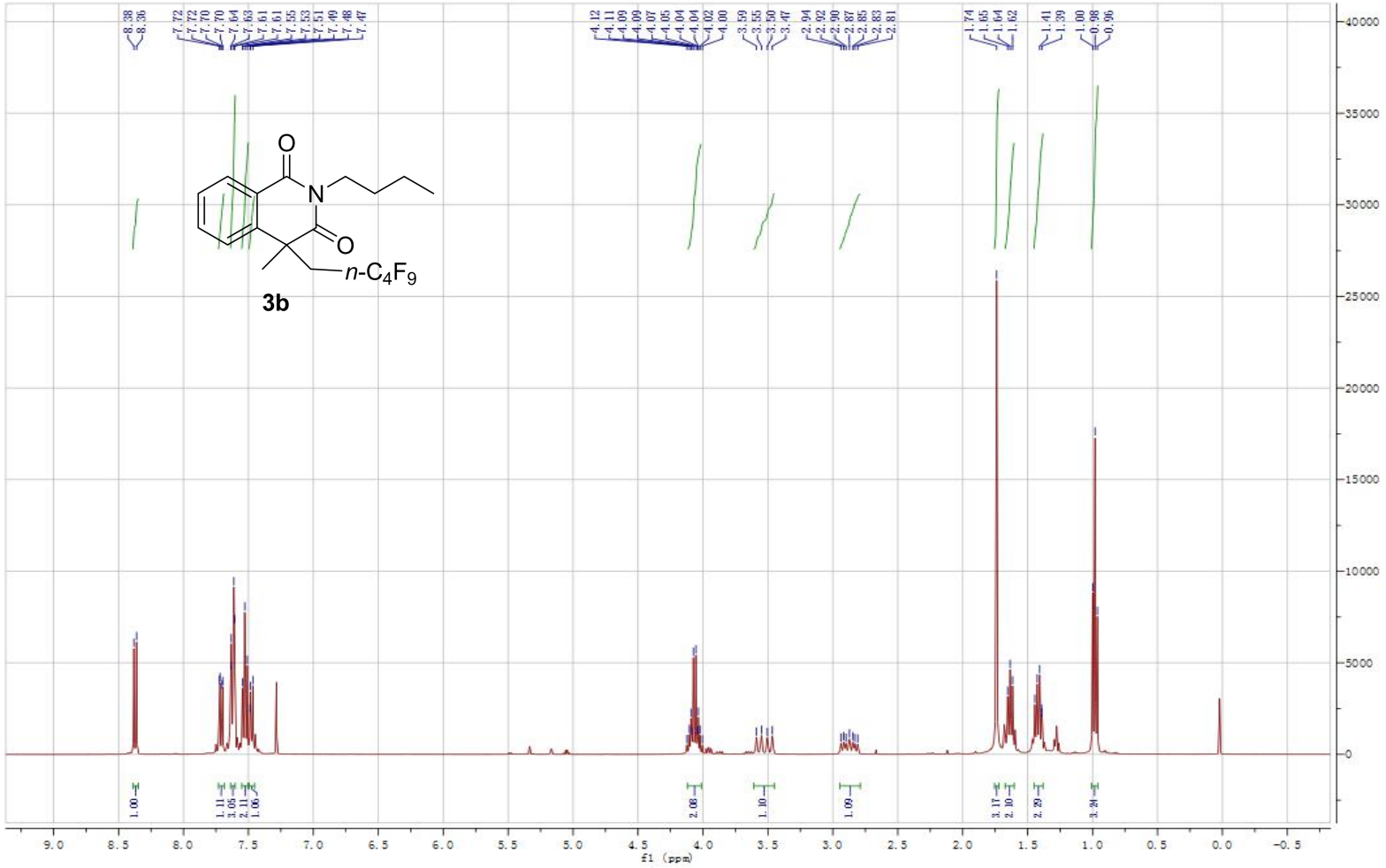


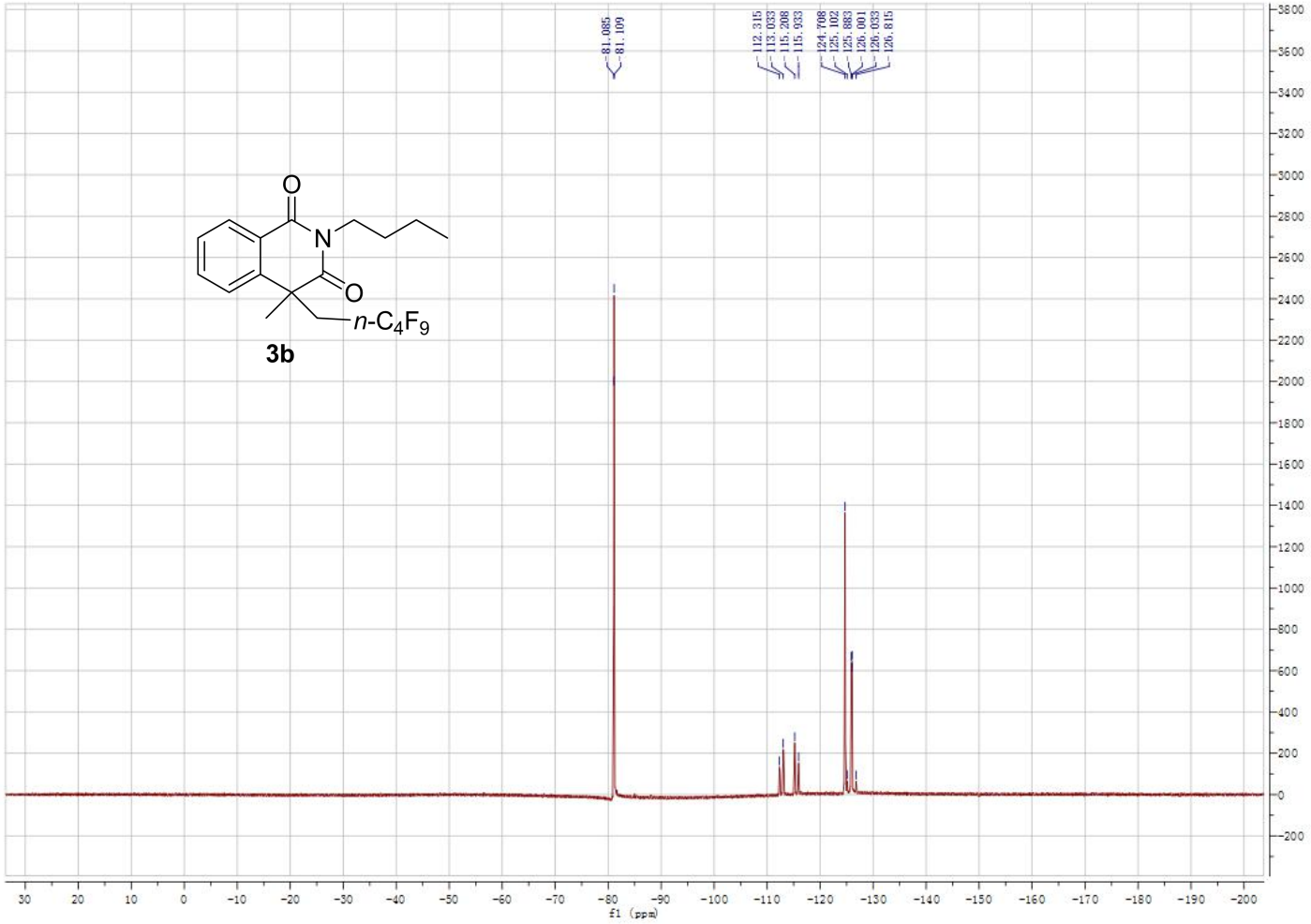
2,4-dimethyl-4-(2,2,3,3,4,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3a).



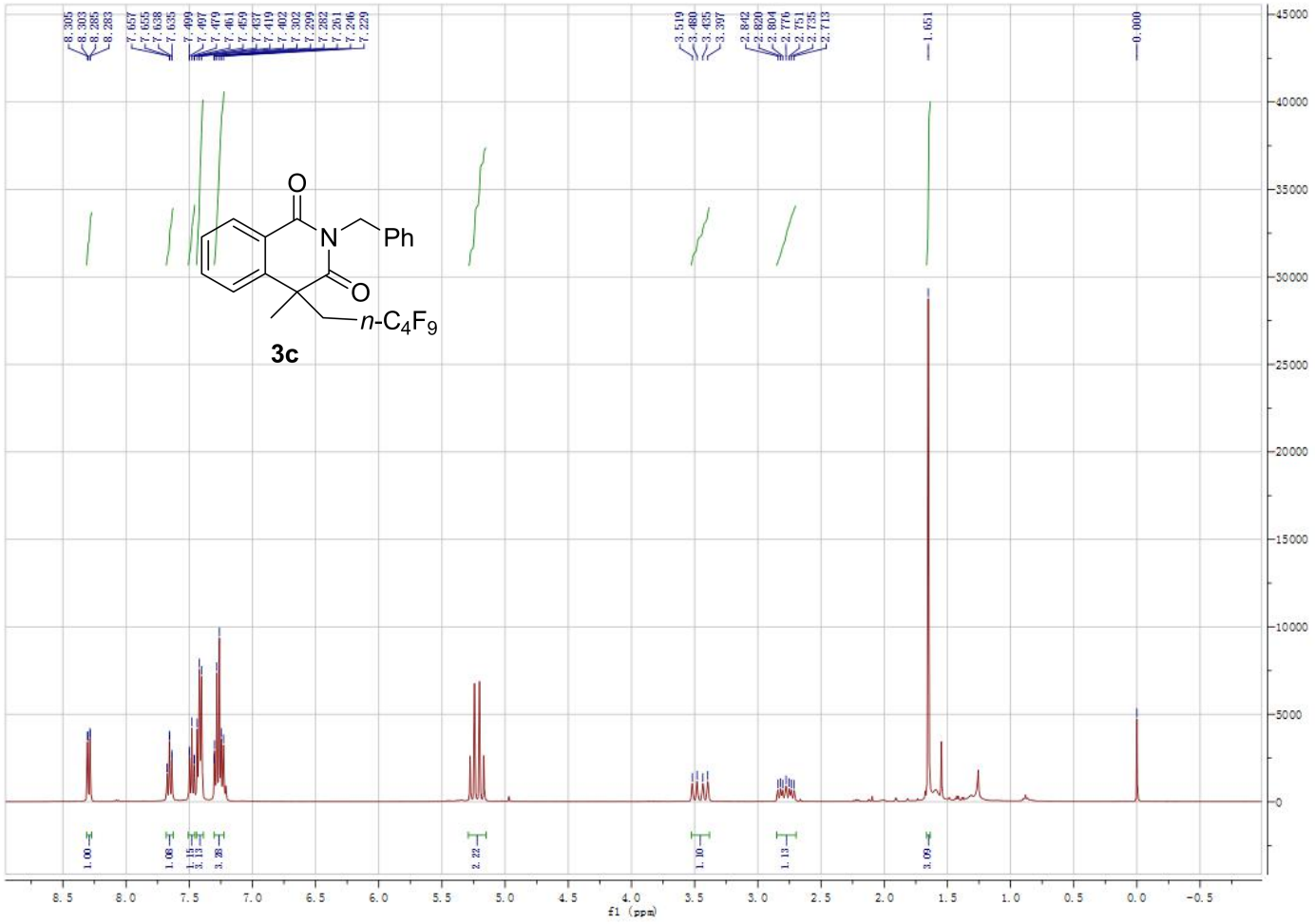
2-Butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2*H*,4*H*)-dione(3b).[1c]



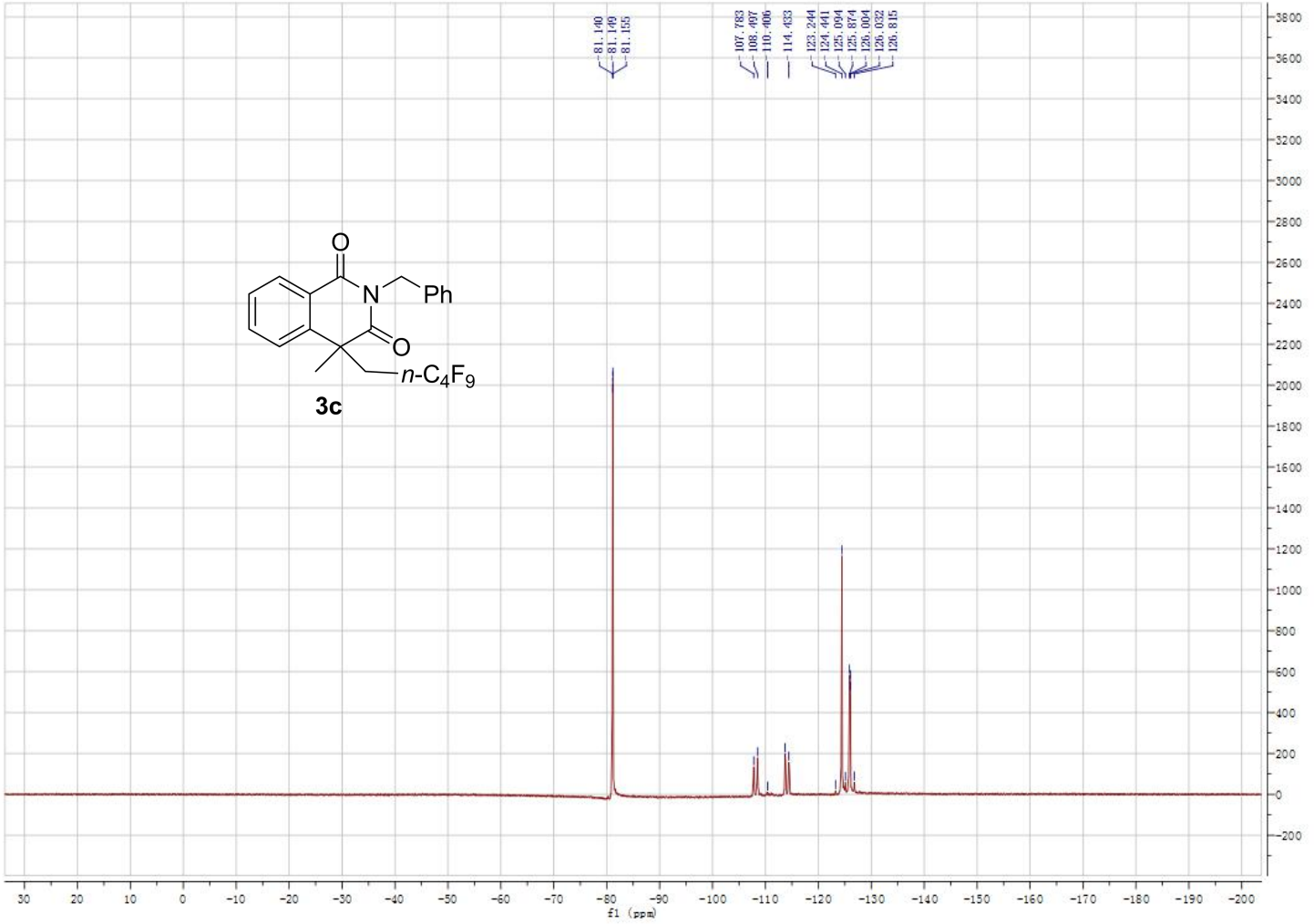
2-Butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2*H*,4*H*)-dione(3b).[1c]



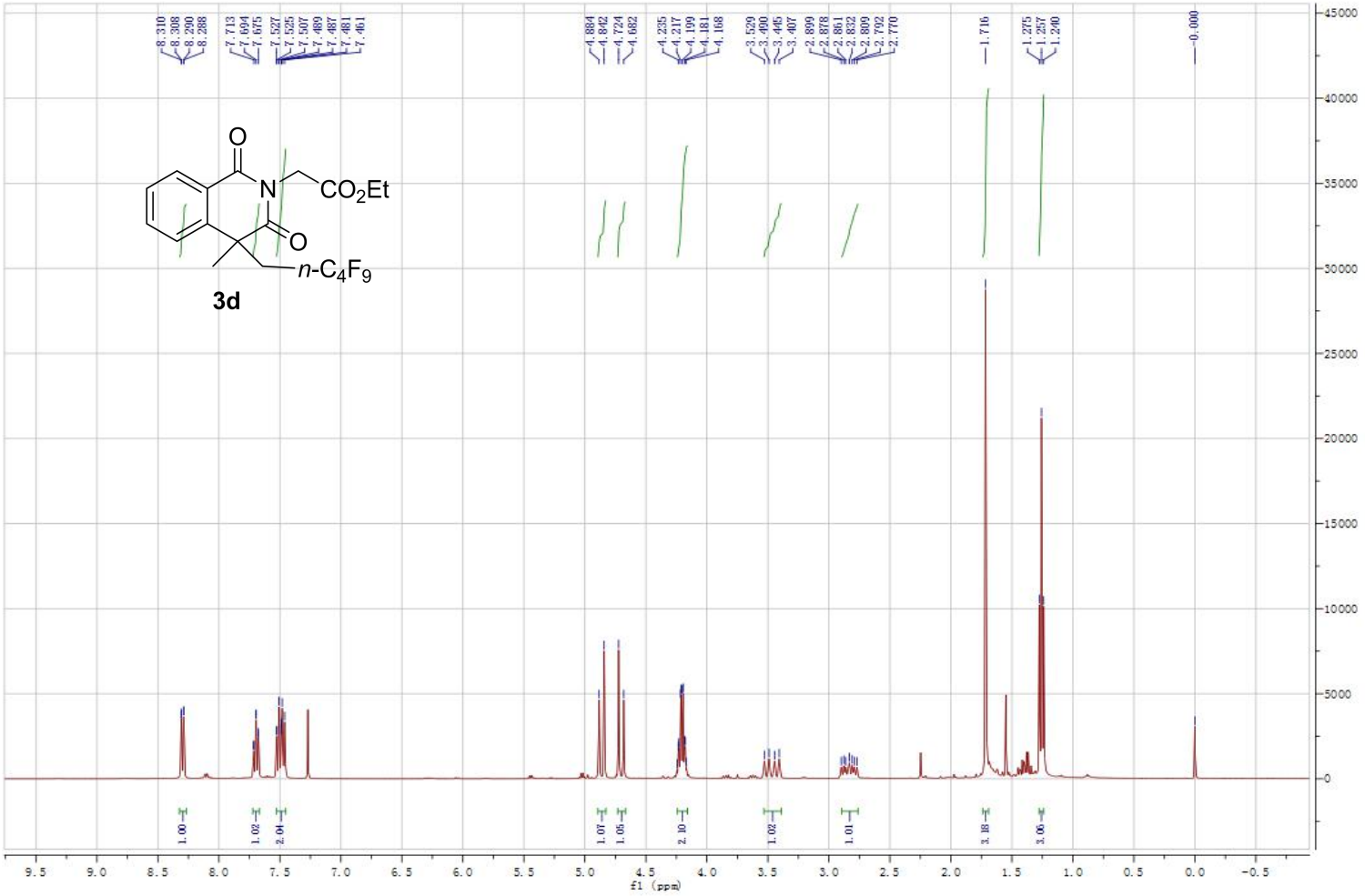
2-benzyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3c).[1c]



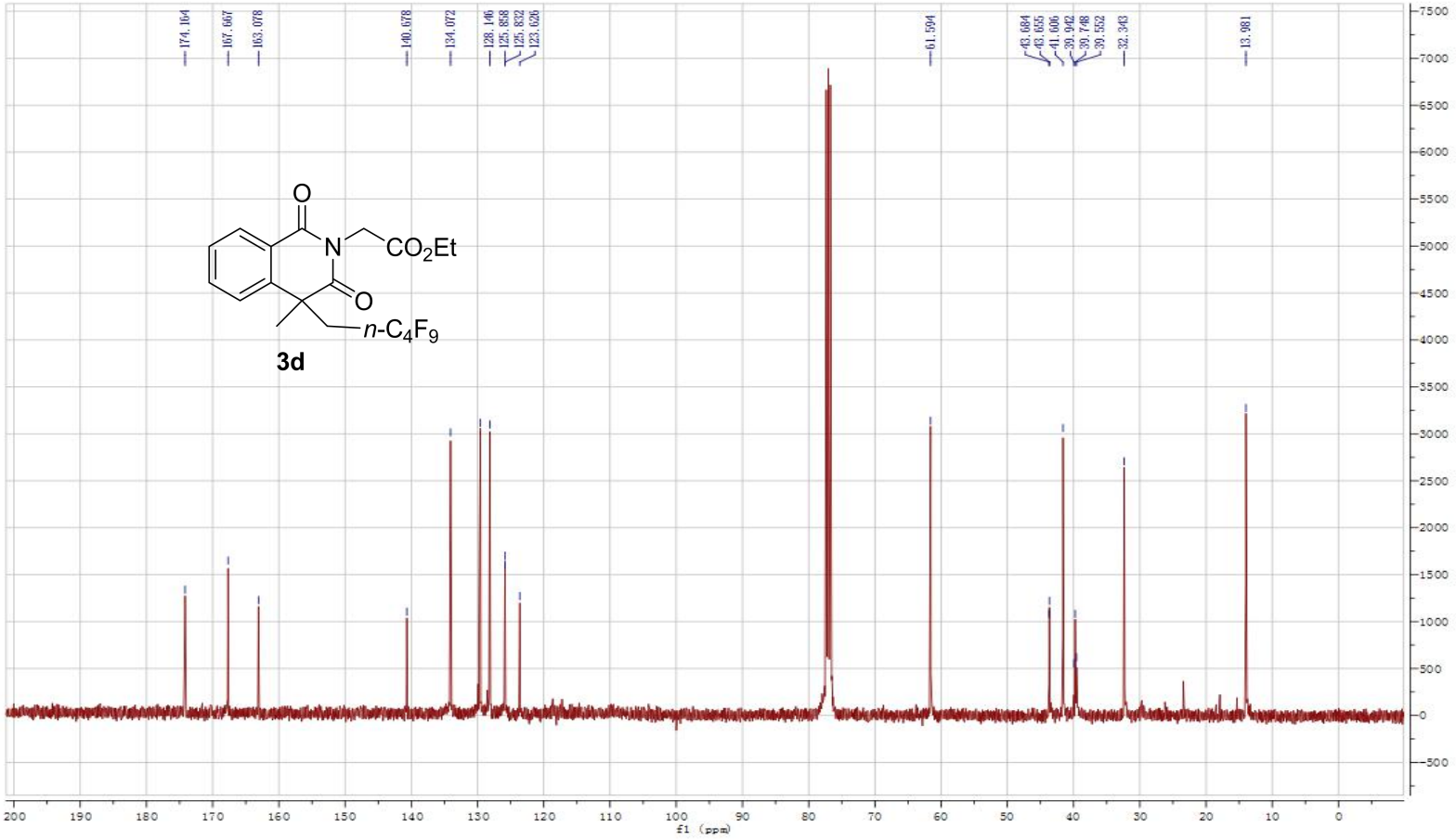
2-benzyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3c).[1c]



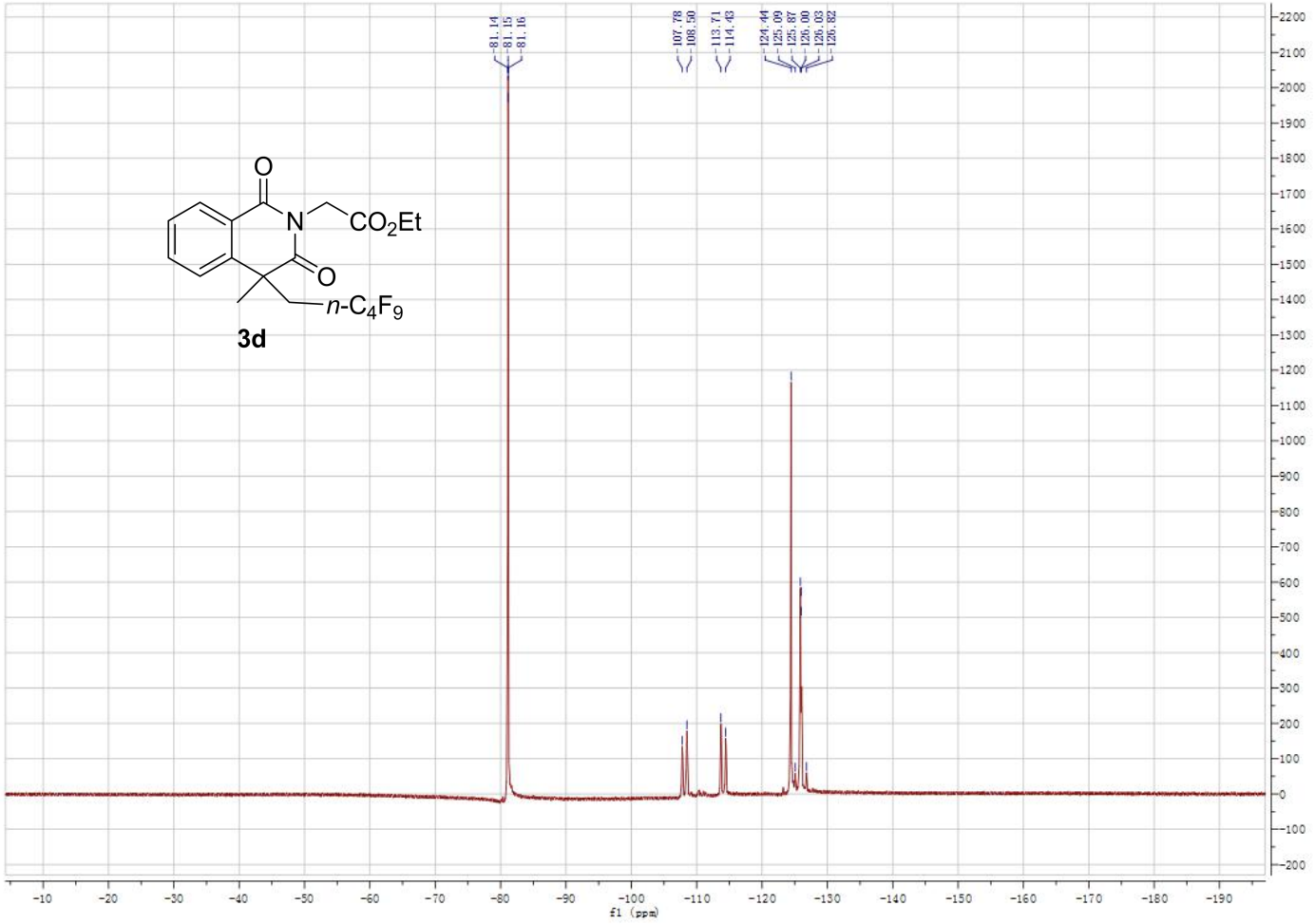
Ethyl 2-(4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-1,3-dioxo-3,4-dihydroisoquinolin-2(1H)-yl)acetate(3d).



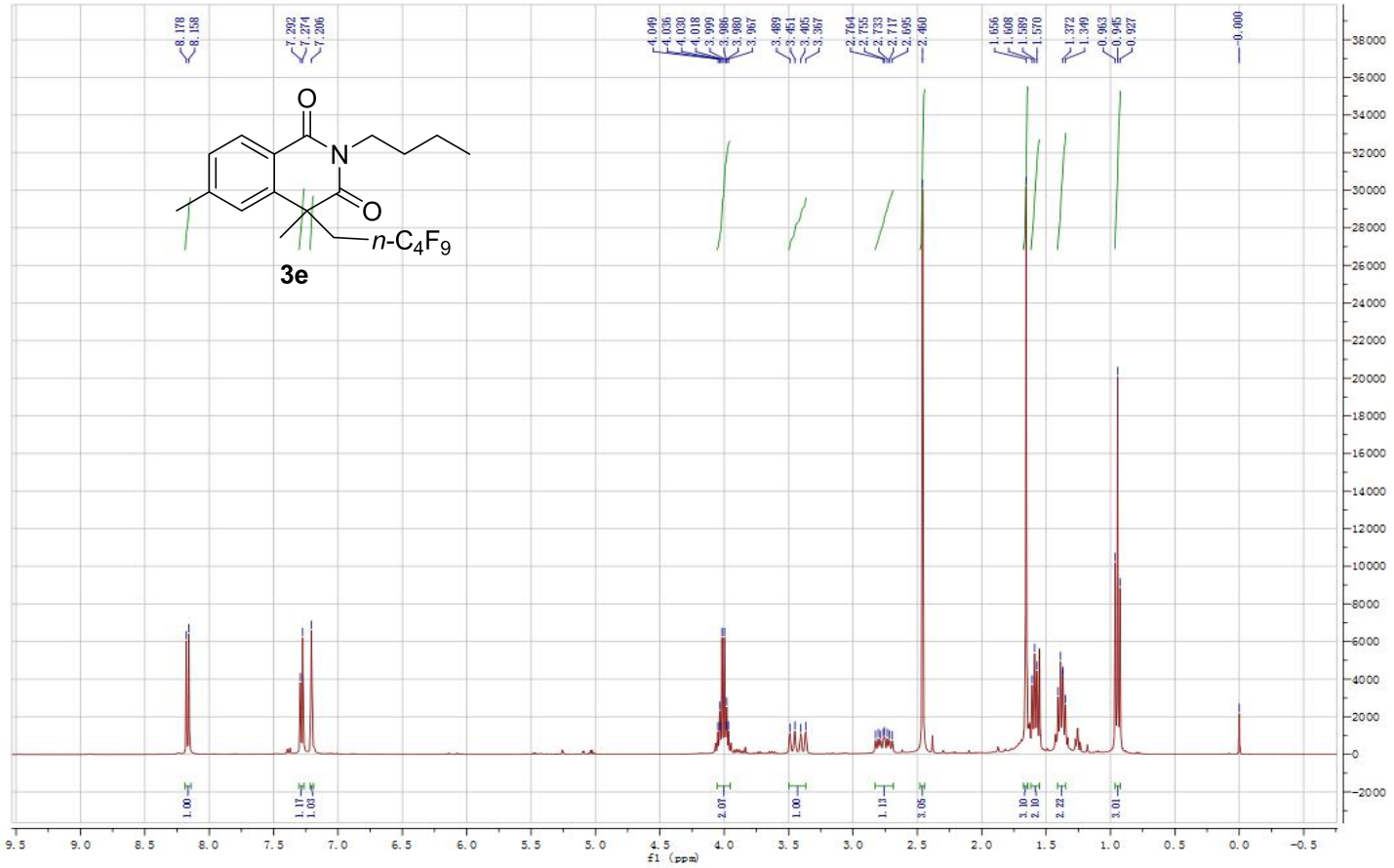
Ethyl 2-(4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-1,3-dioxo-3,4-dihydroisoquinolin-2(1H)-yl)acetate(3d).



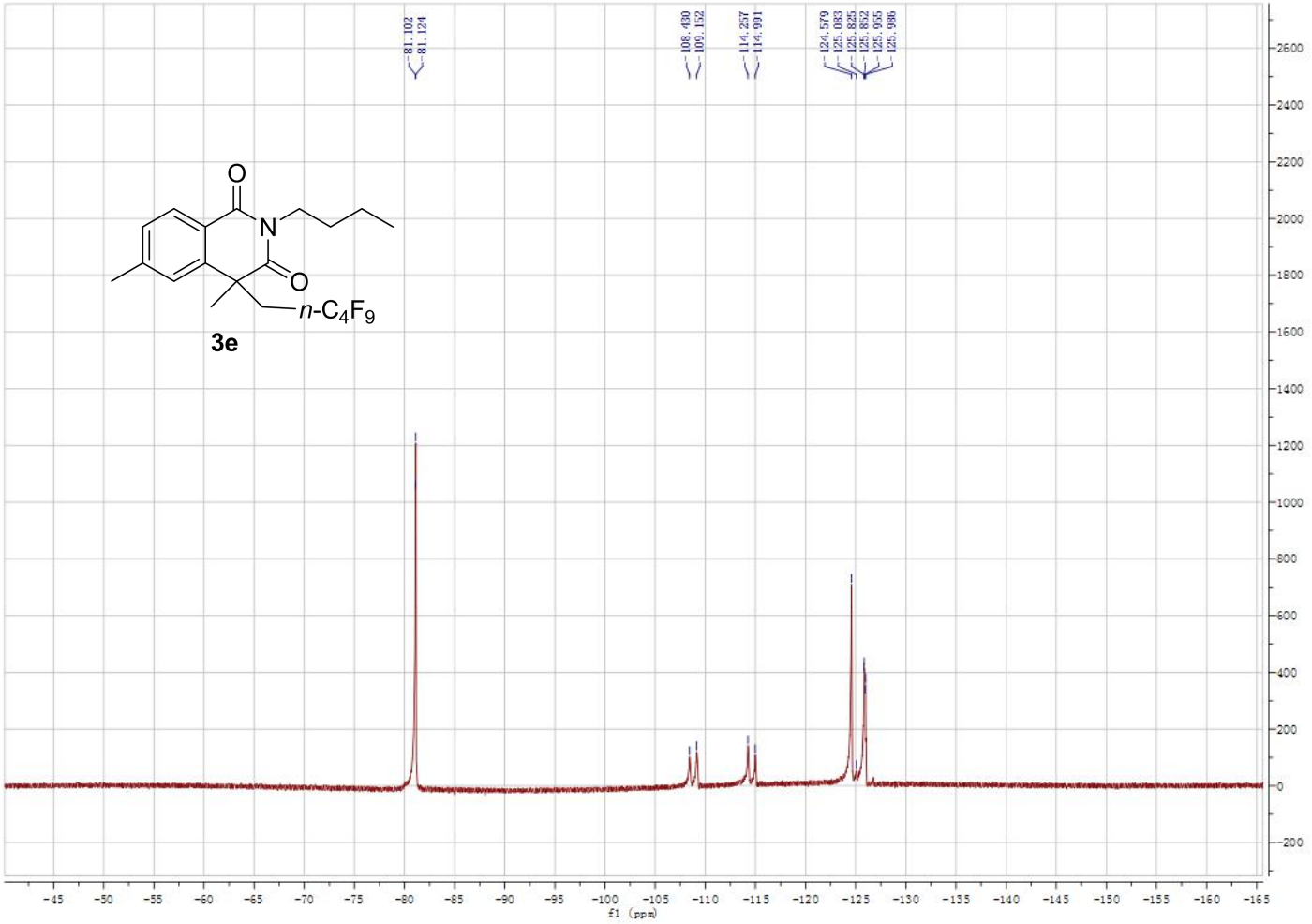
Ethyl 2-(4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-1,3-dioxo-3,4-dihydroisoquinolin-2(1H)-yl)acetate(3d).



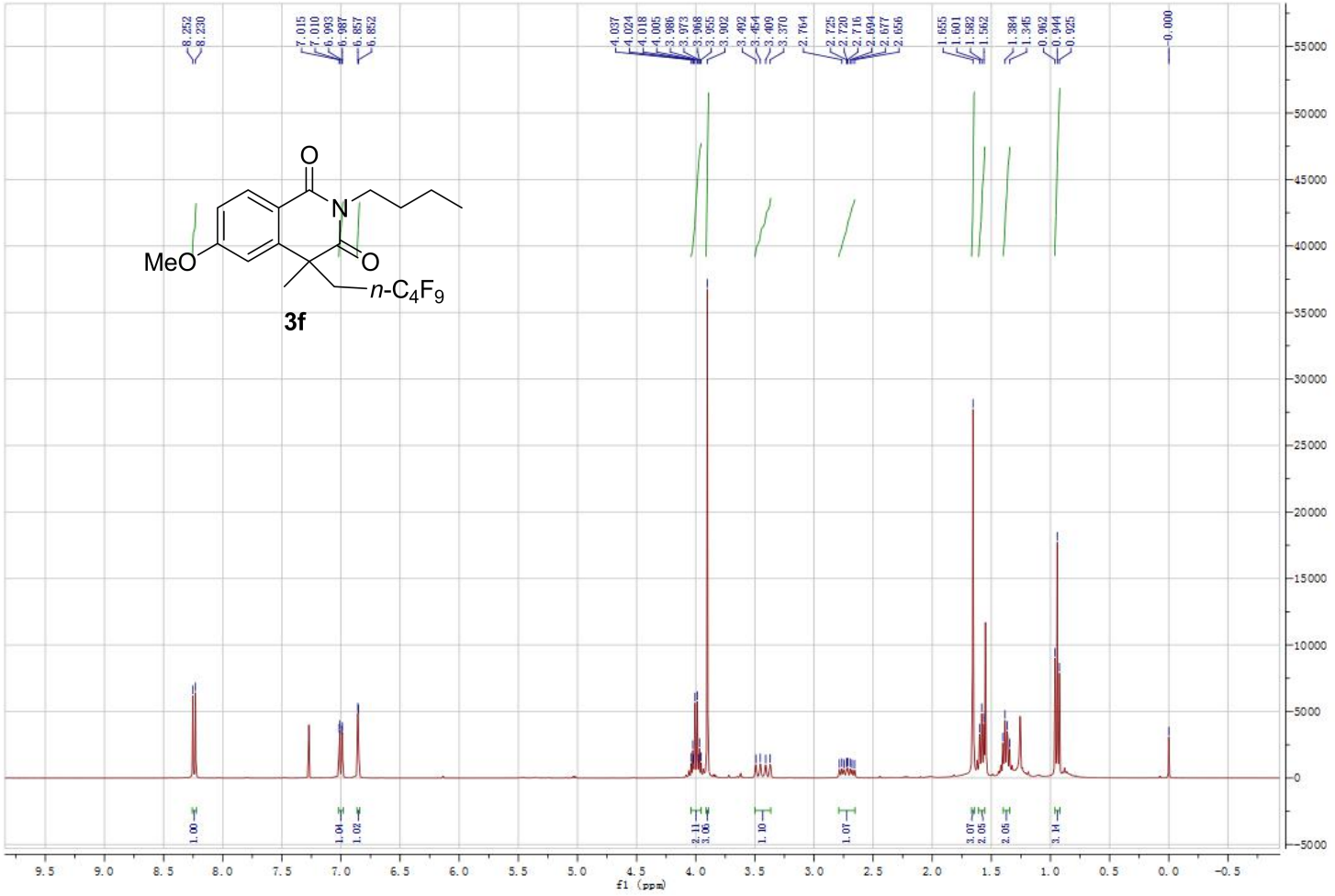
2-Butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3e).[1c]



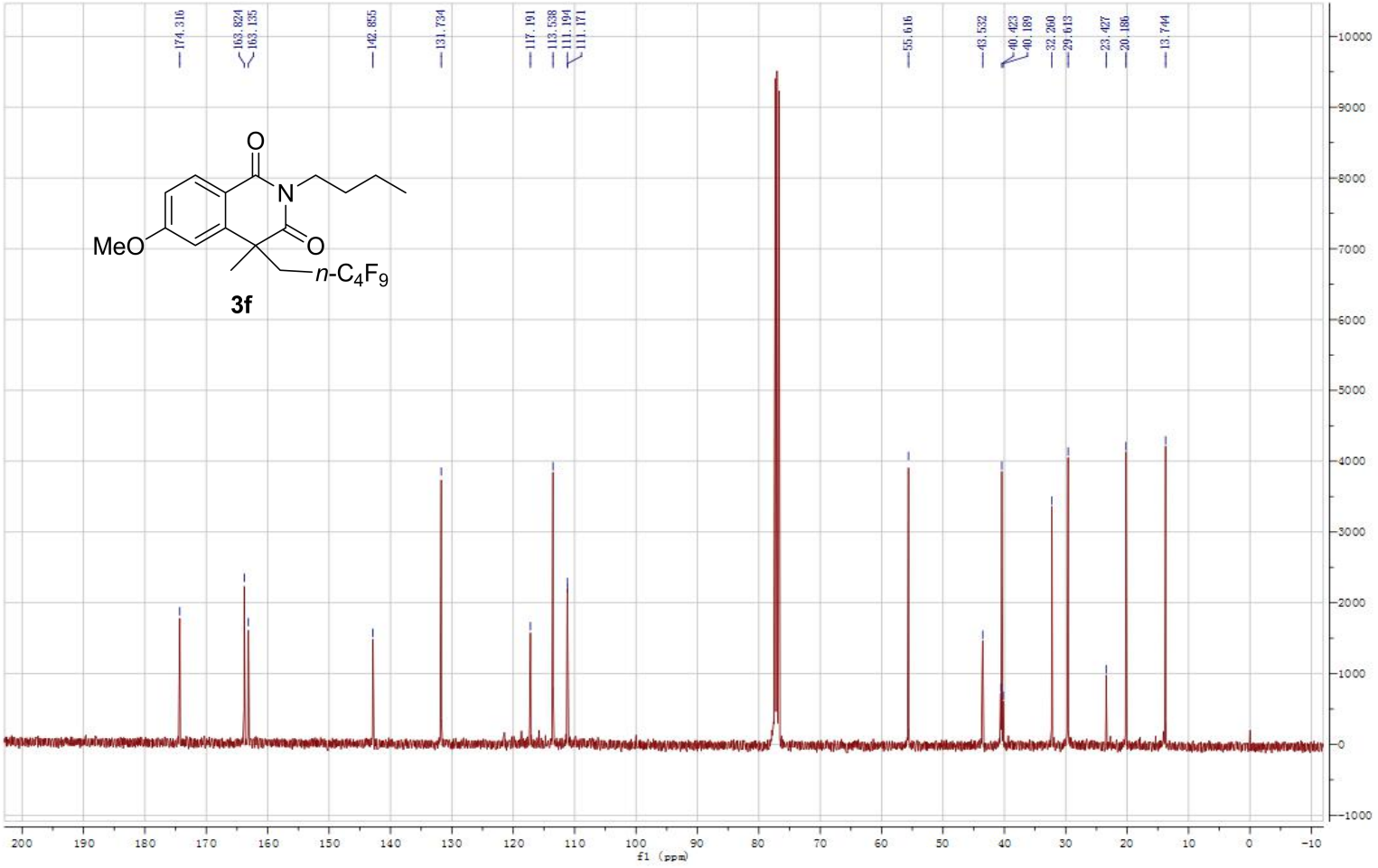
2-Butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3e).[1c]



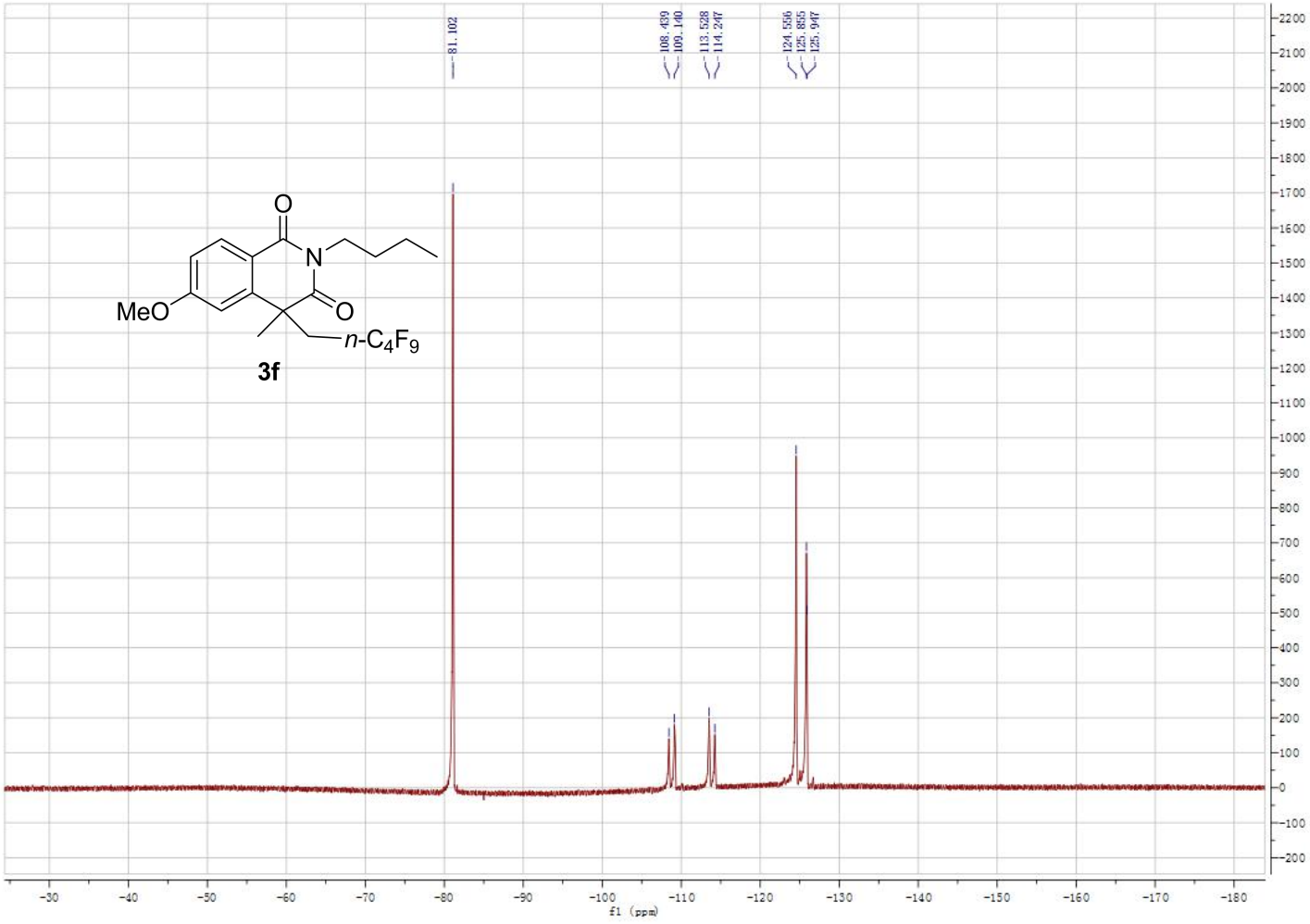
2-Butyl-6-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3f).



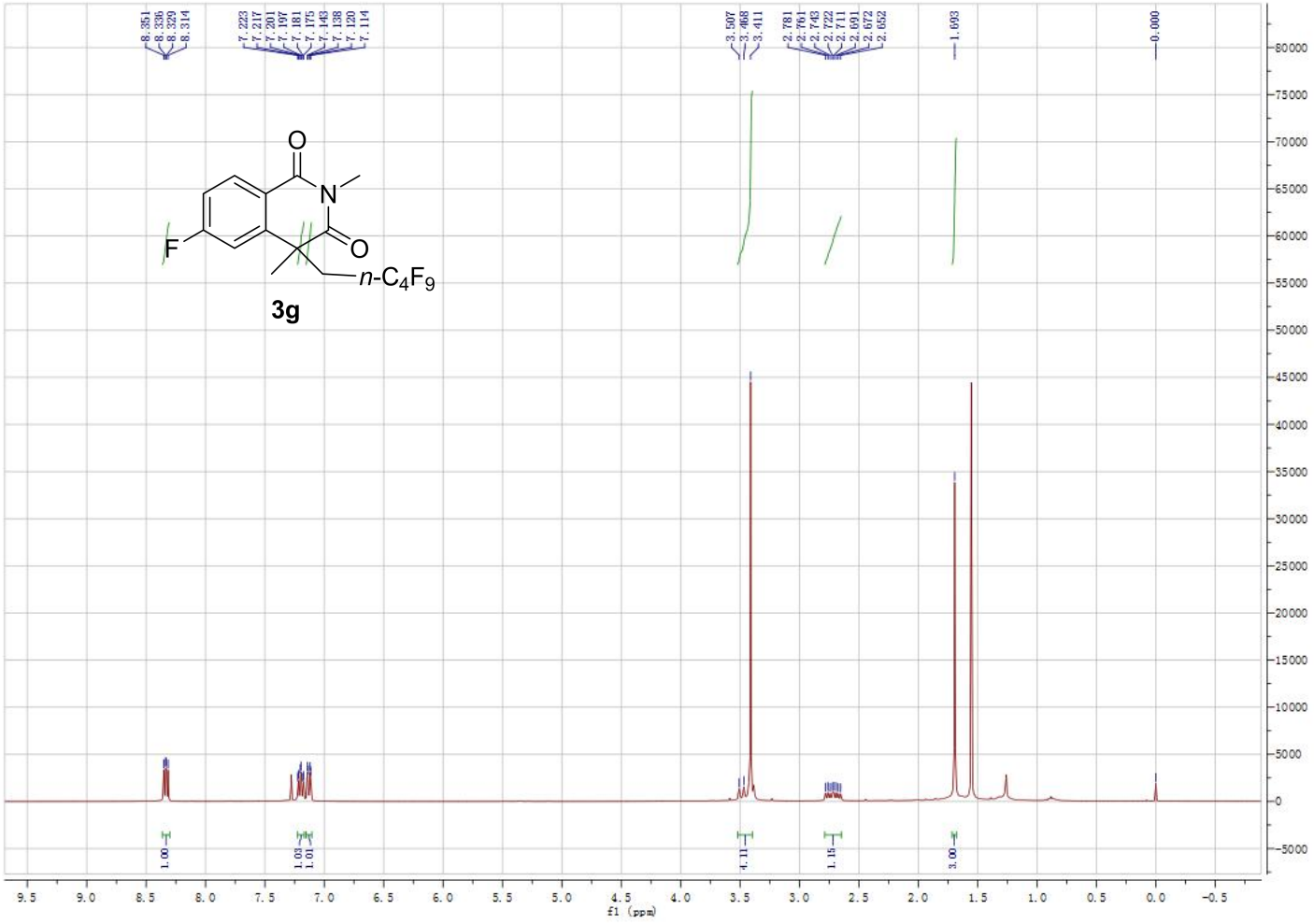
2-Butyl-6-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2*H*,4*H*)-dione(3f).



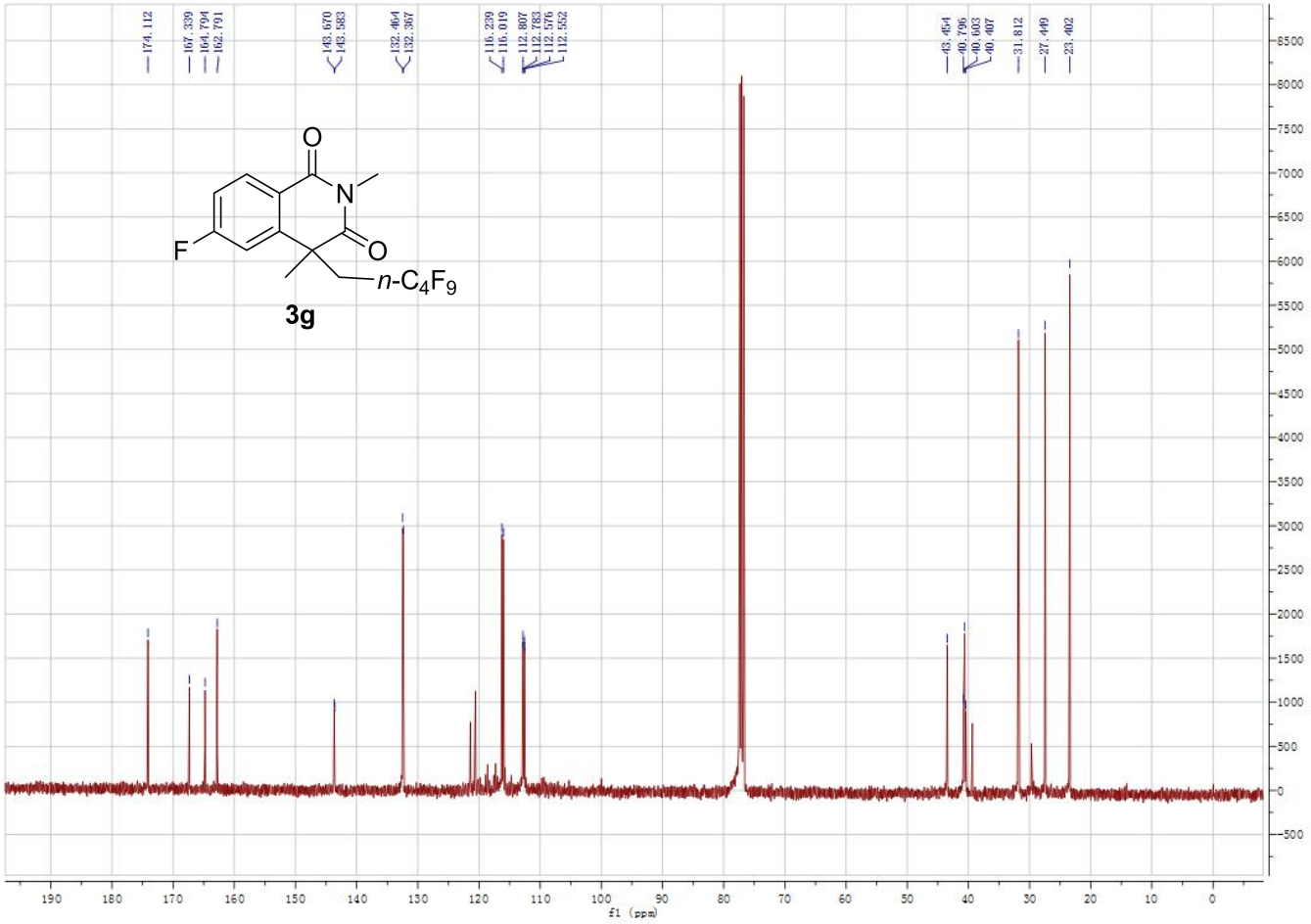
2-Butyl-6-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2*H*,4*H*)-dione(3f).



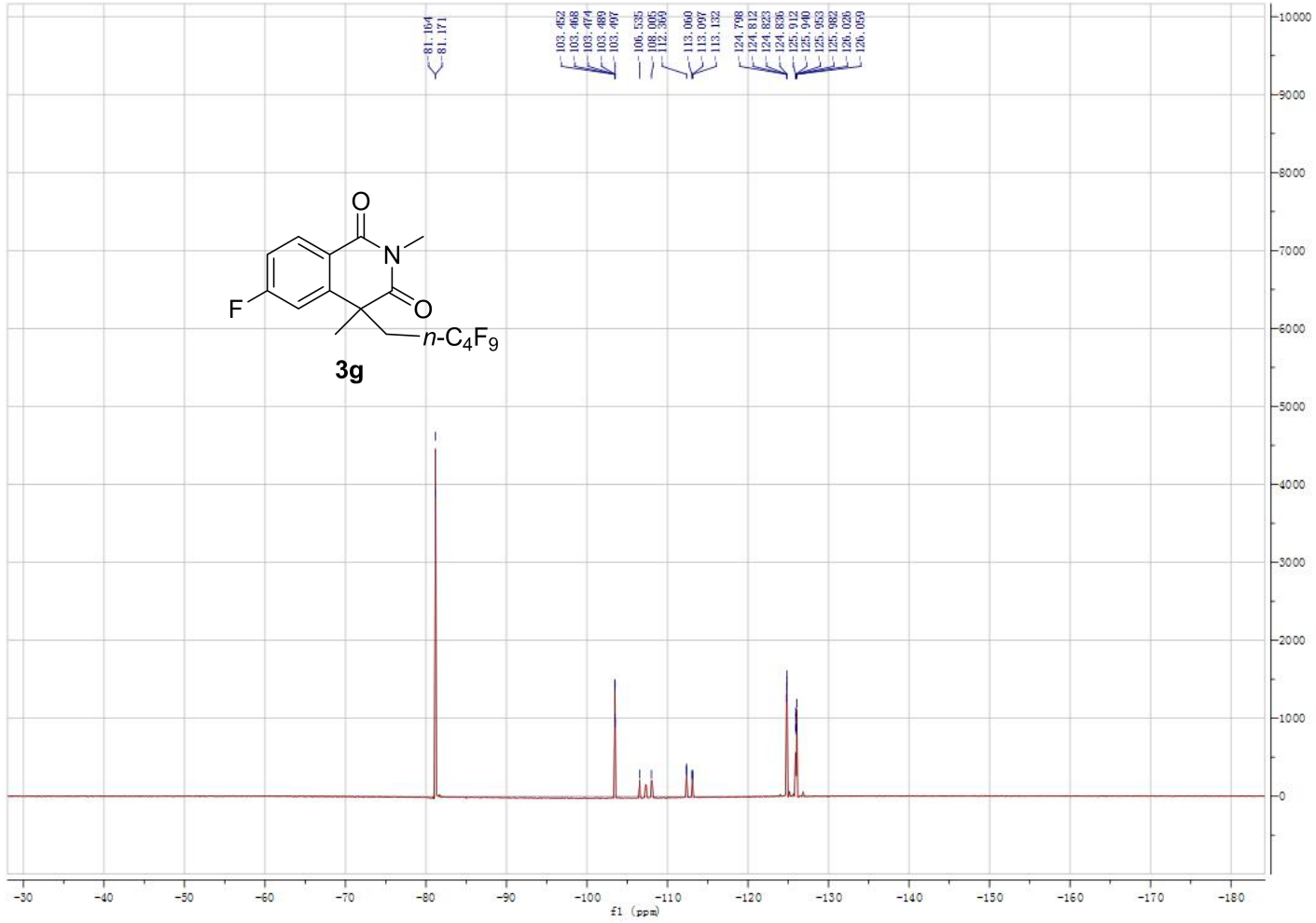
6-fluoro-2,4-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3g).



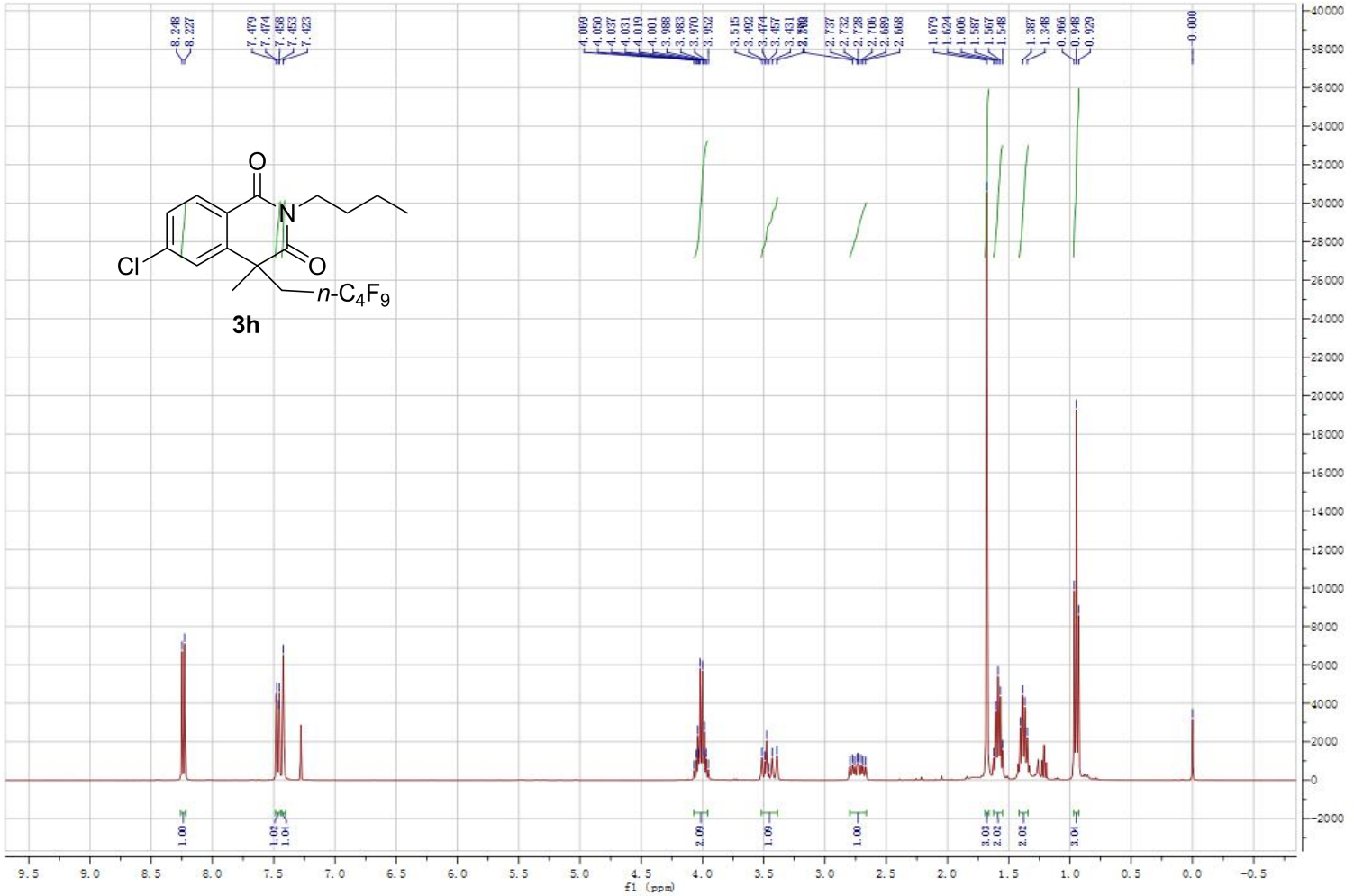
6-Fluoro-2,4-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3g).



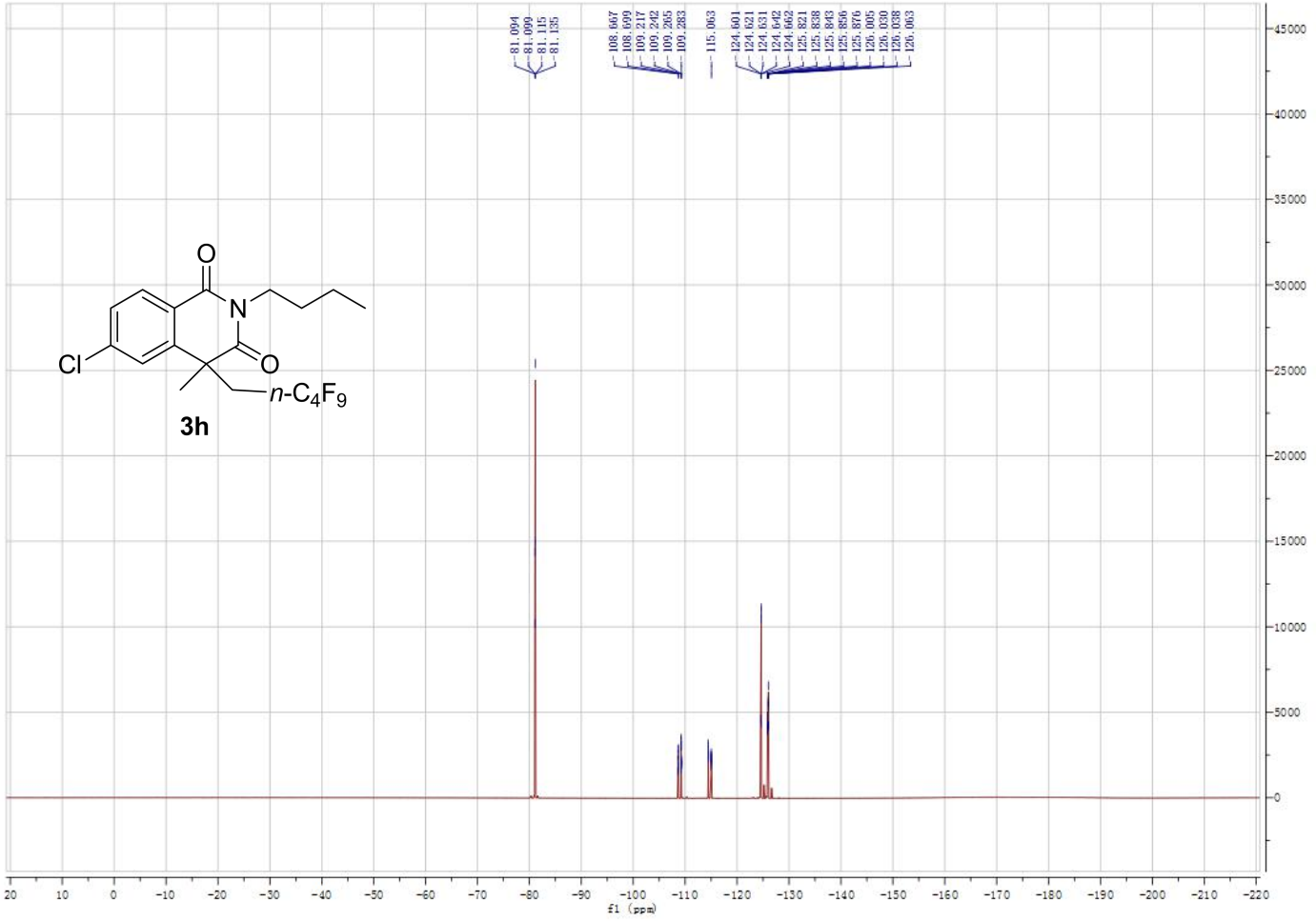
6-Fluoro-2,4-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3g).



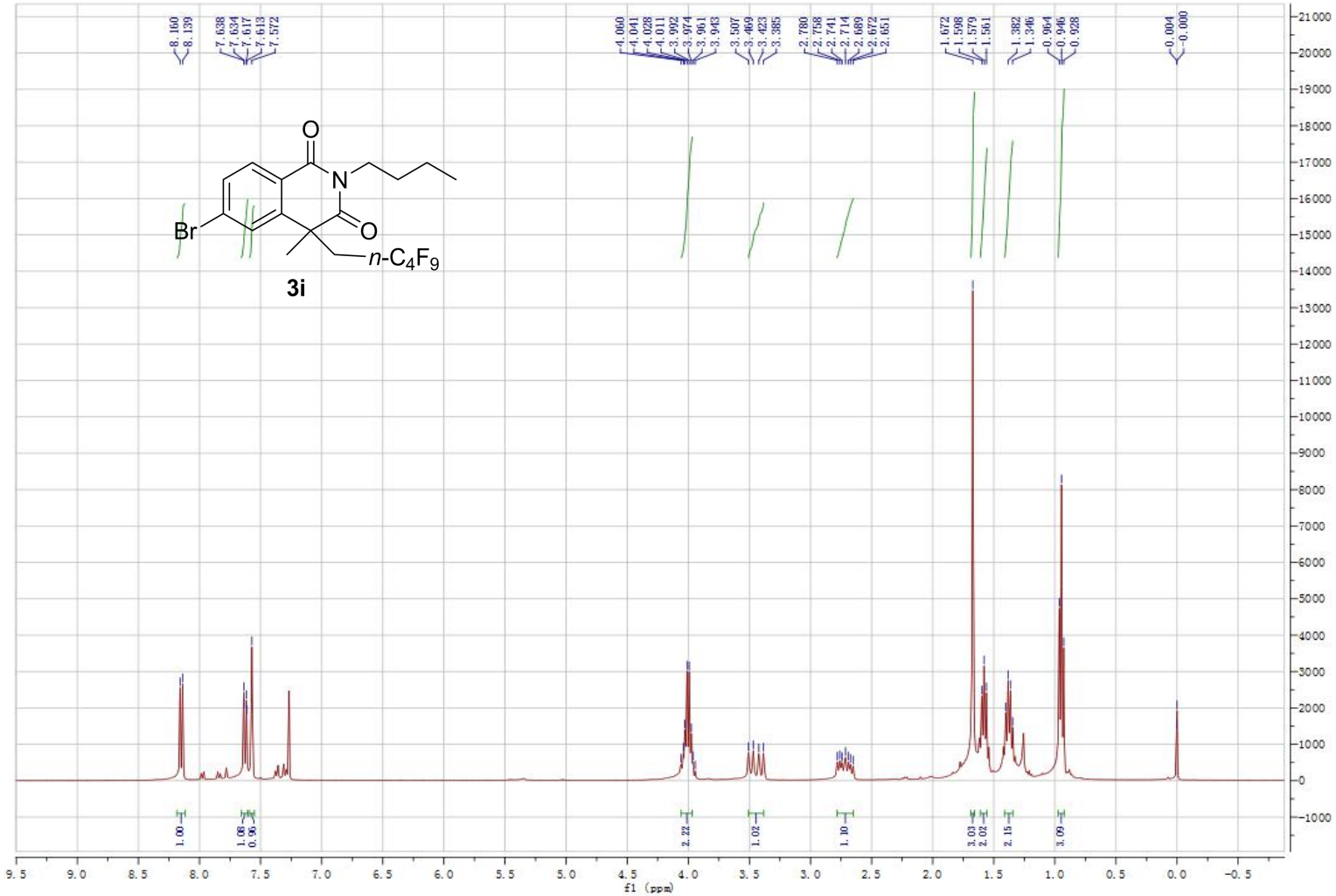
2-butyl-6-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3h).[1c]



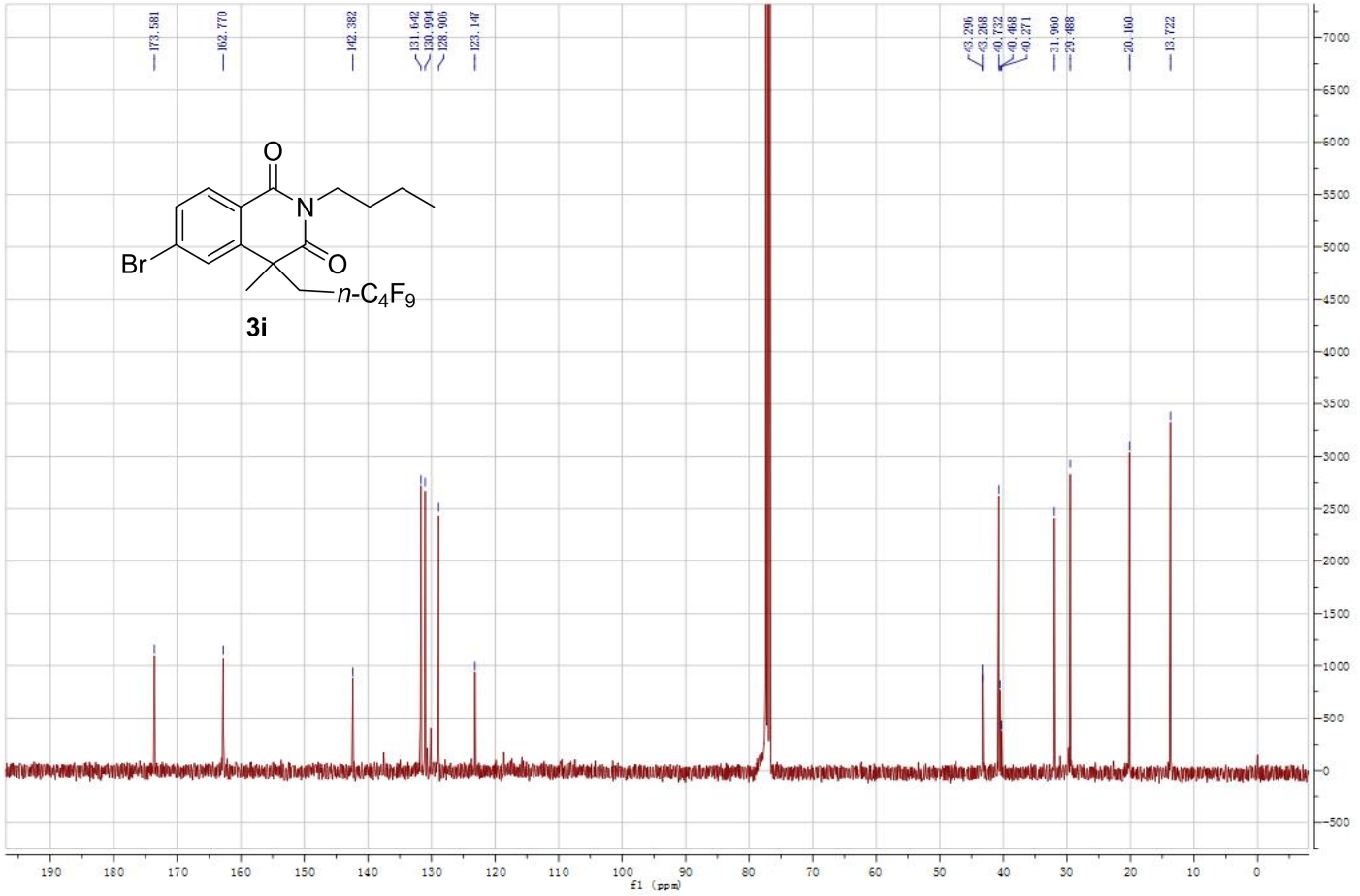
2-butyl-6-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3h).[1c]



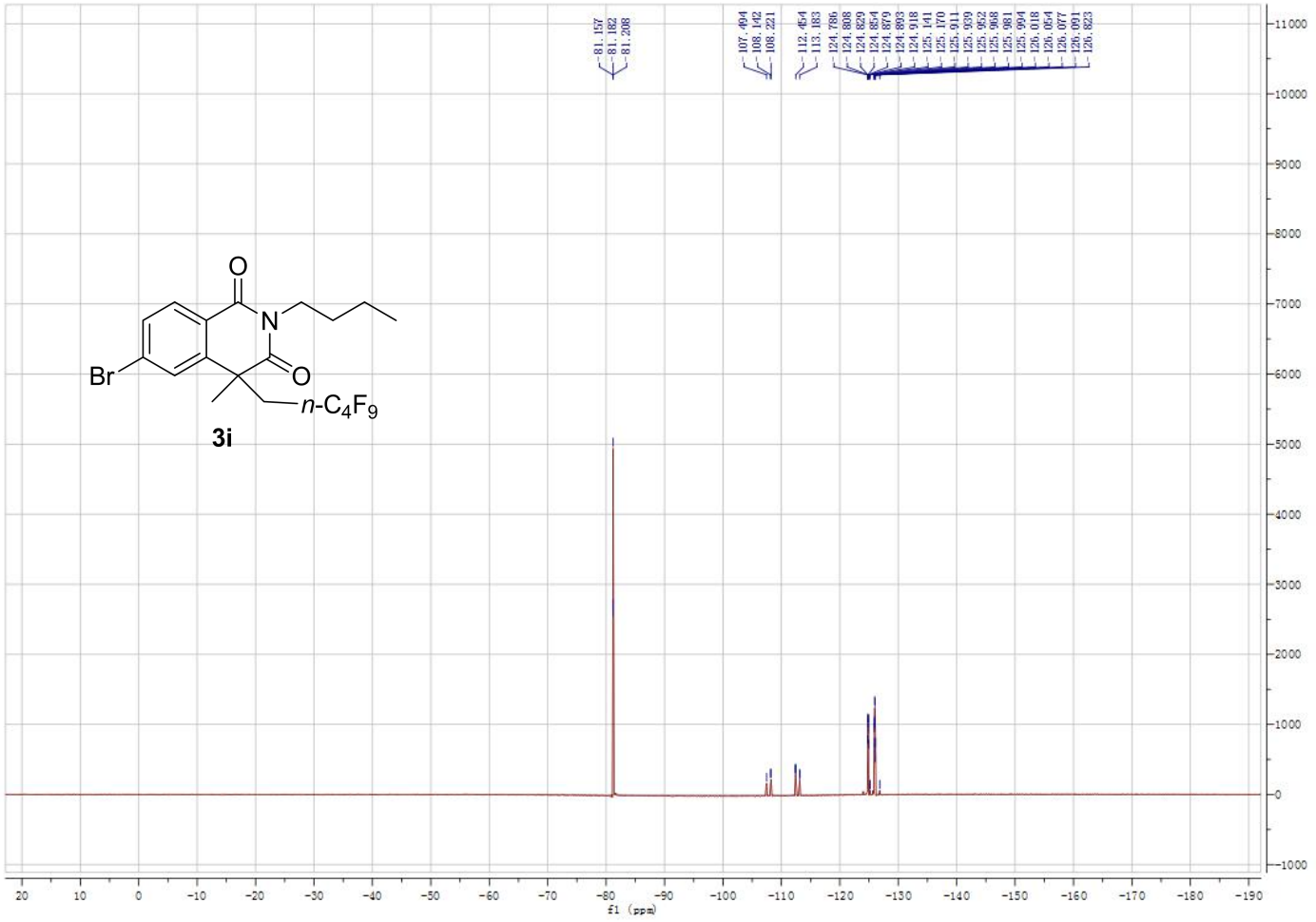
6-Bromo-2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3i).



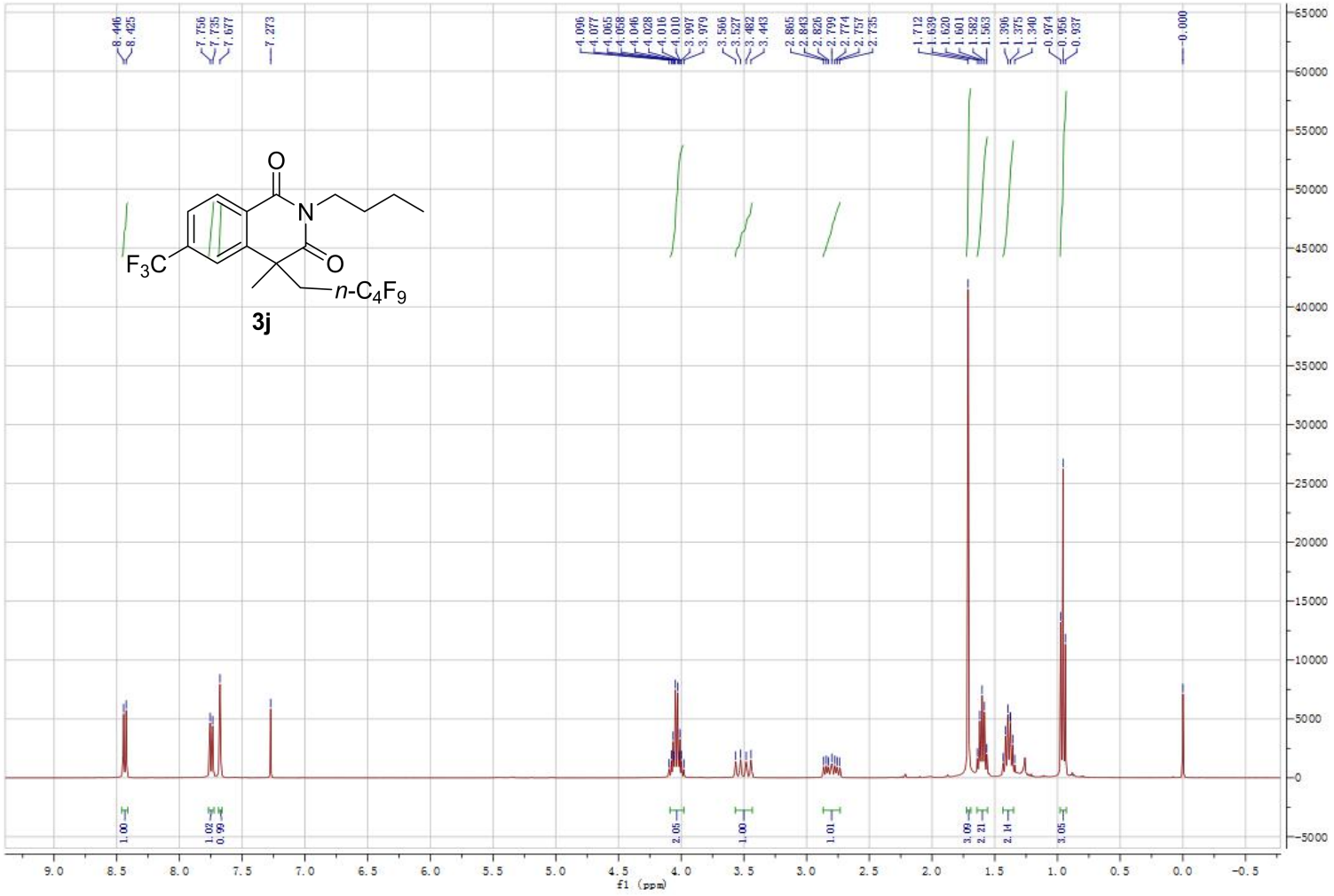
6-Bromo-2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3i).



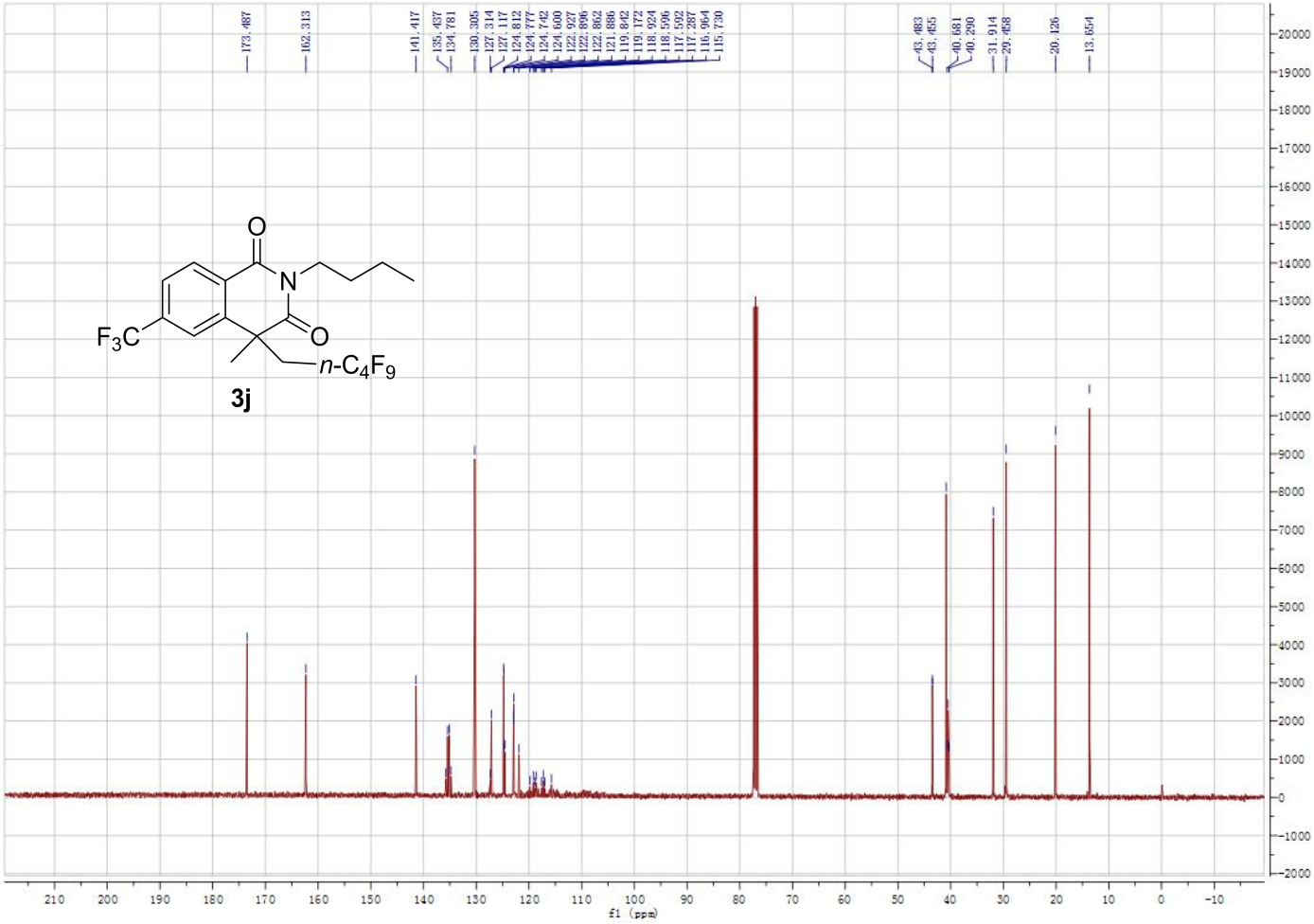
6-Bromo-2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3i).



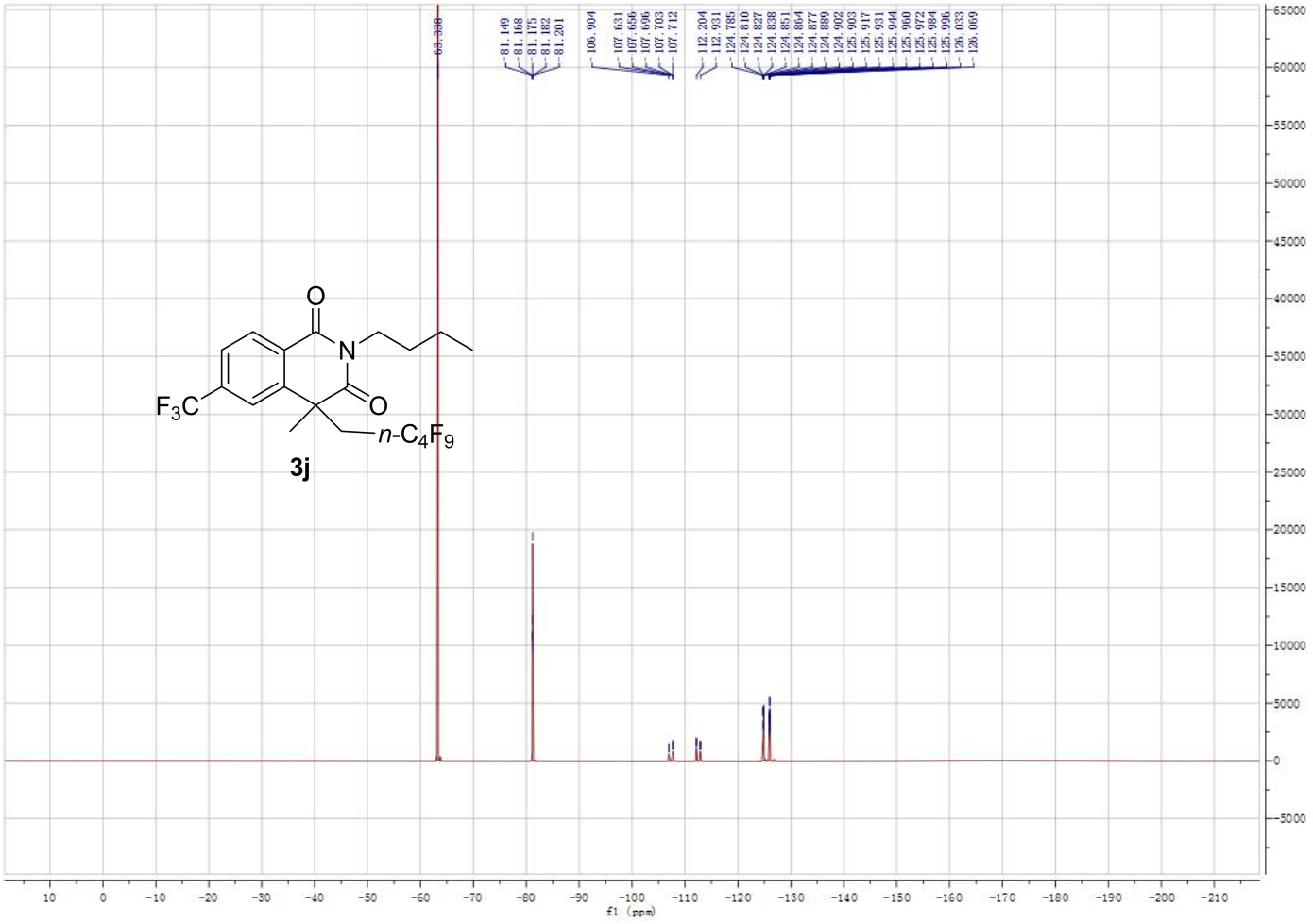
2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-(trifluoromethyl)isoquinoline-1,3(2*H*,4*H*)-dione(3j).



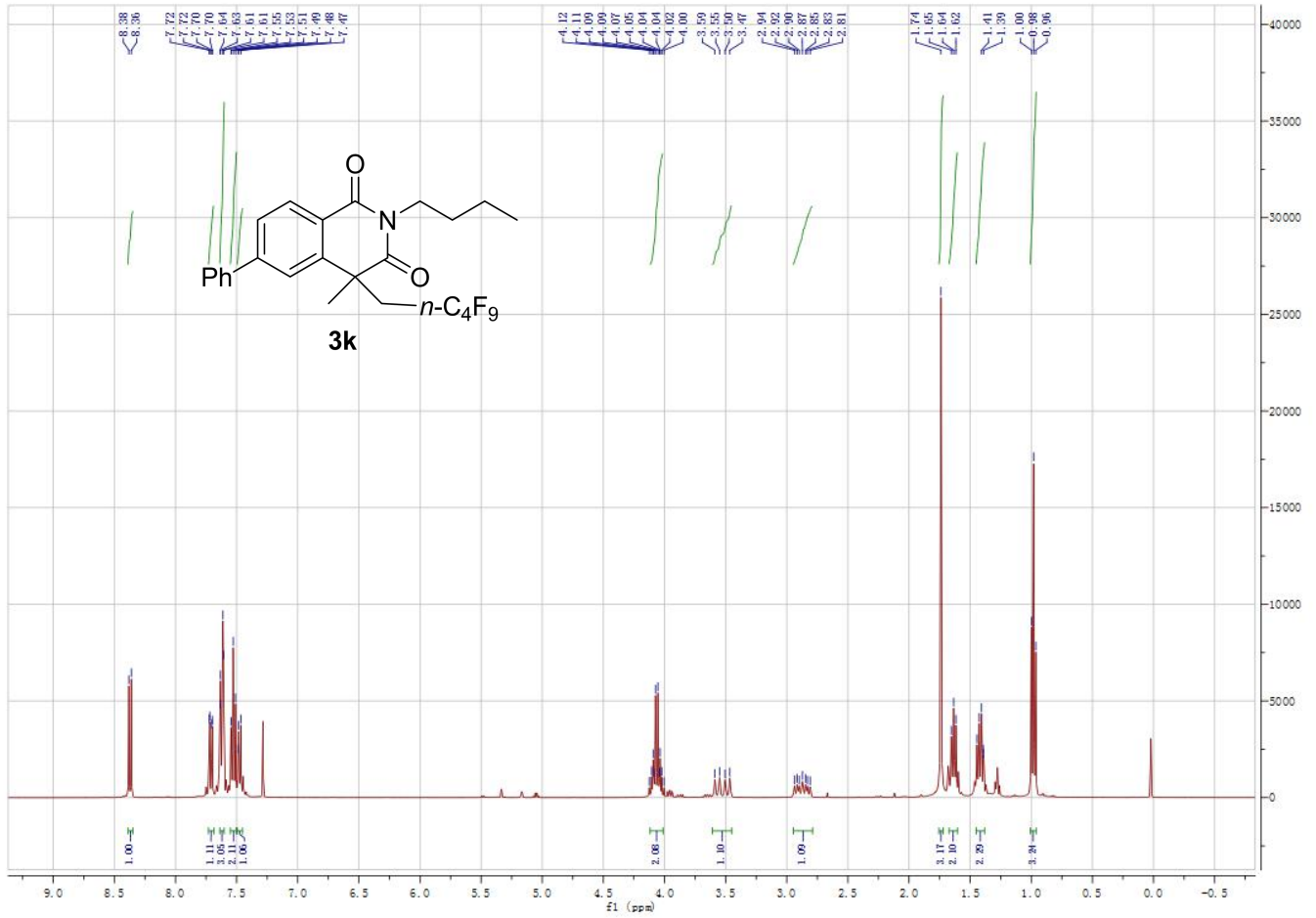
2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-(trifluoromethyl)isoquinoline-1,3(2*H*,4*H*)-dione(3j).



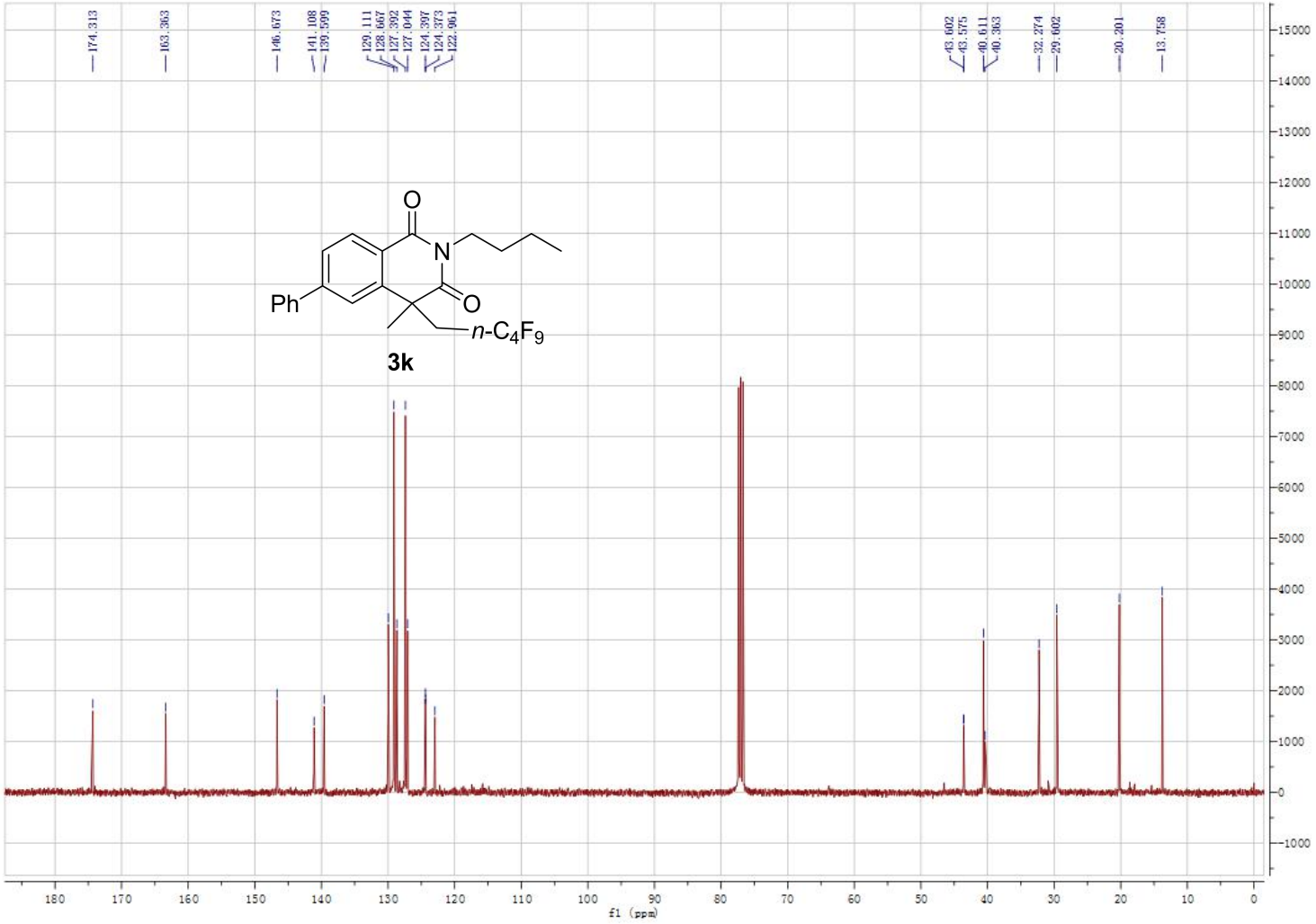
2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-(trifluoromethyl)isoquinoline-1,3(2*H*,4*H*)-dione(3j).



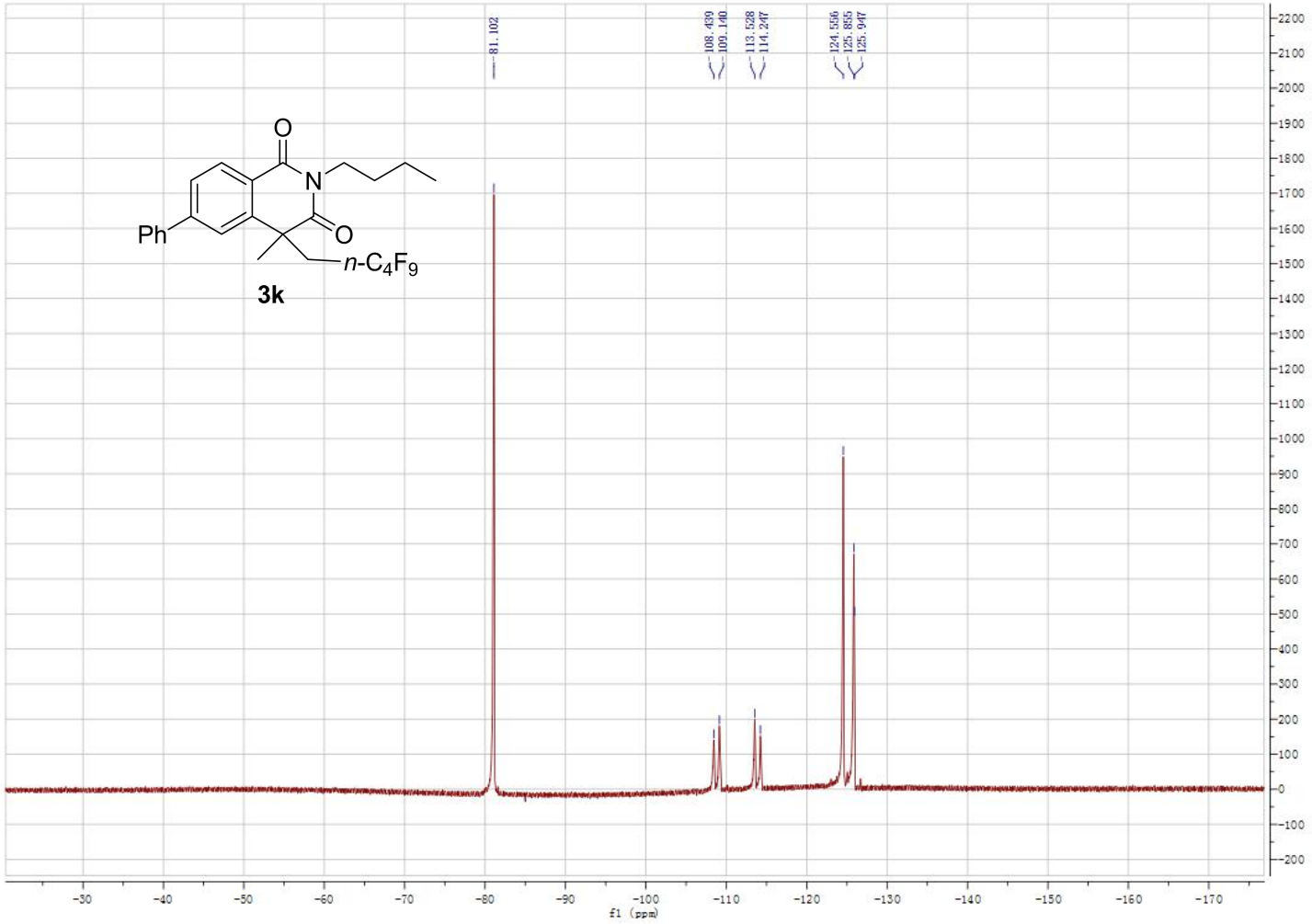
2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-phenylisoquinoline-1,3(2H,4H)-dione (3k).



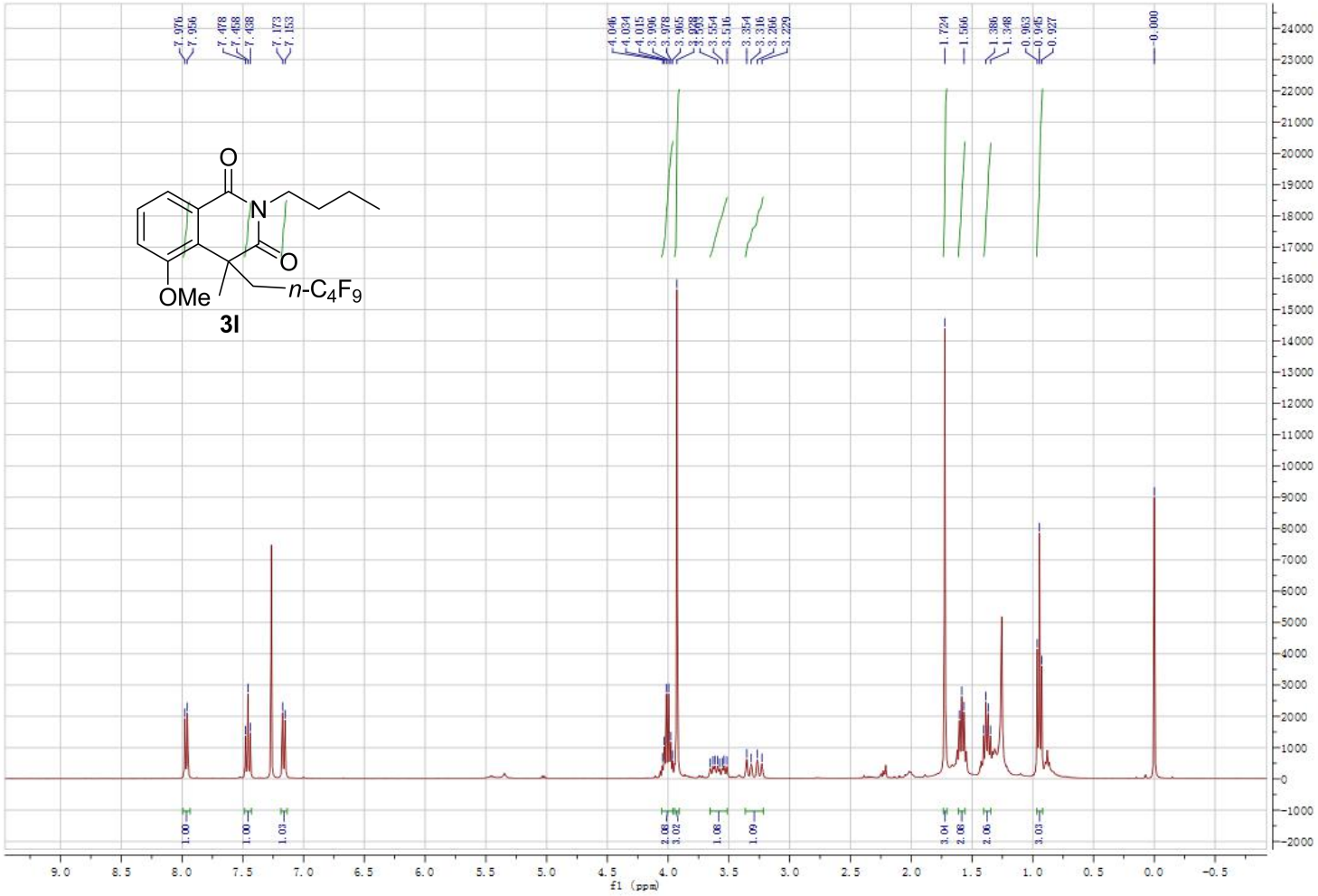
2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-phenylisoquinoline-1,3(2H,4H)-dione (3k).



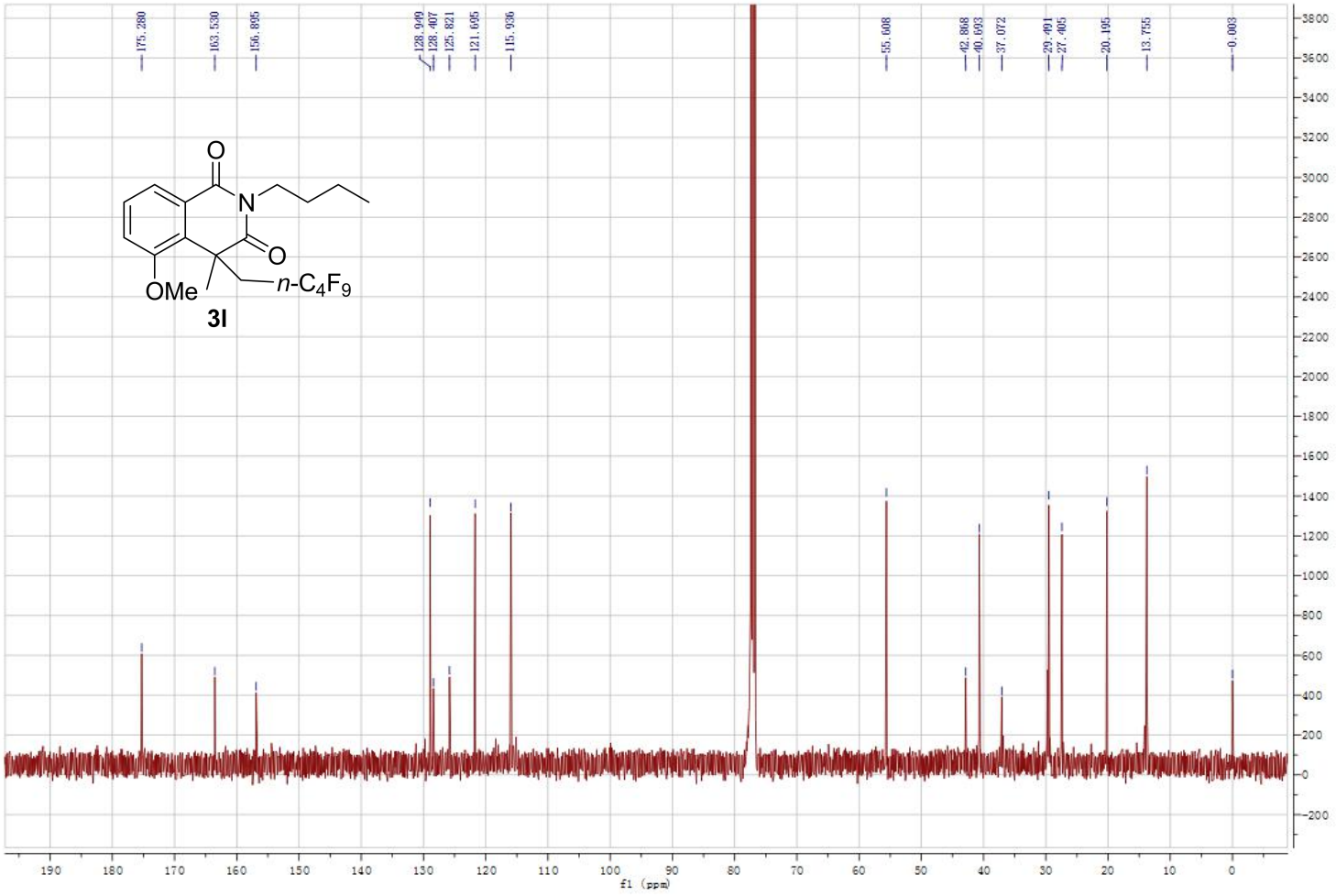
2-butyl-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)-6-phenylisoquinoline-1,3(2H,4H)-dione (3k).



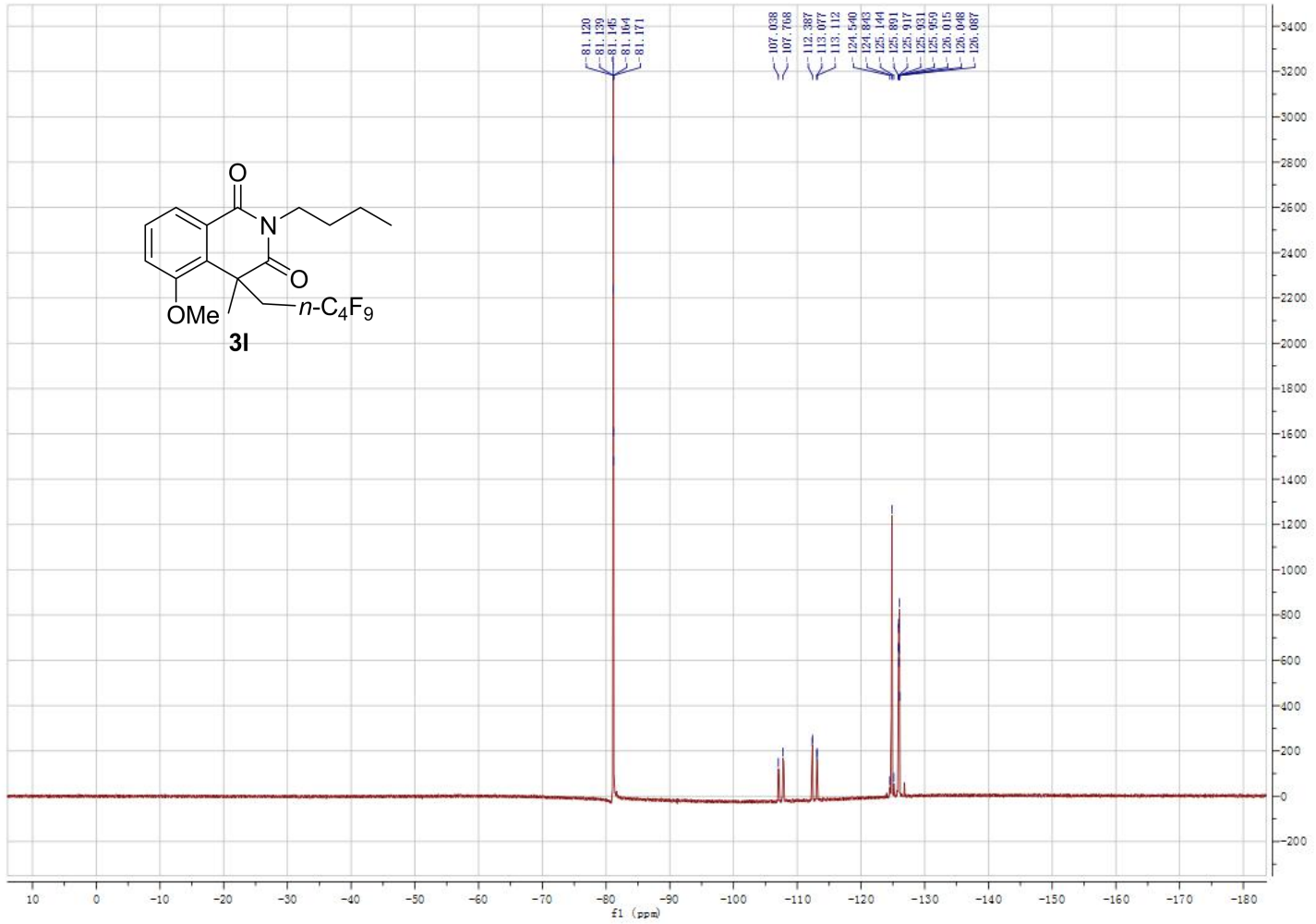
2-butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3l).



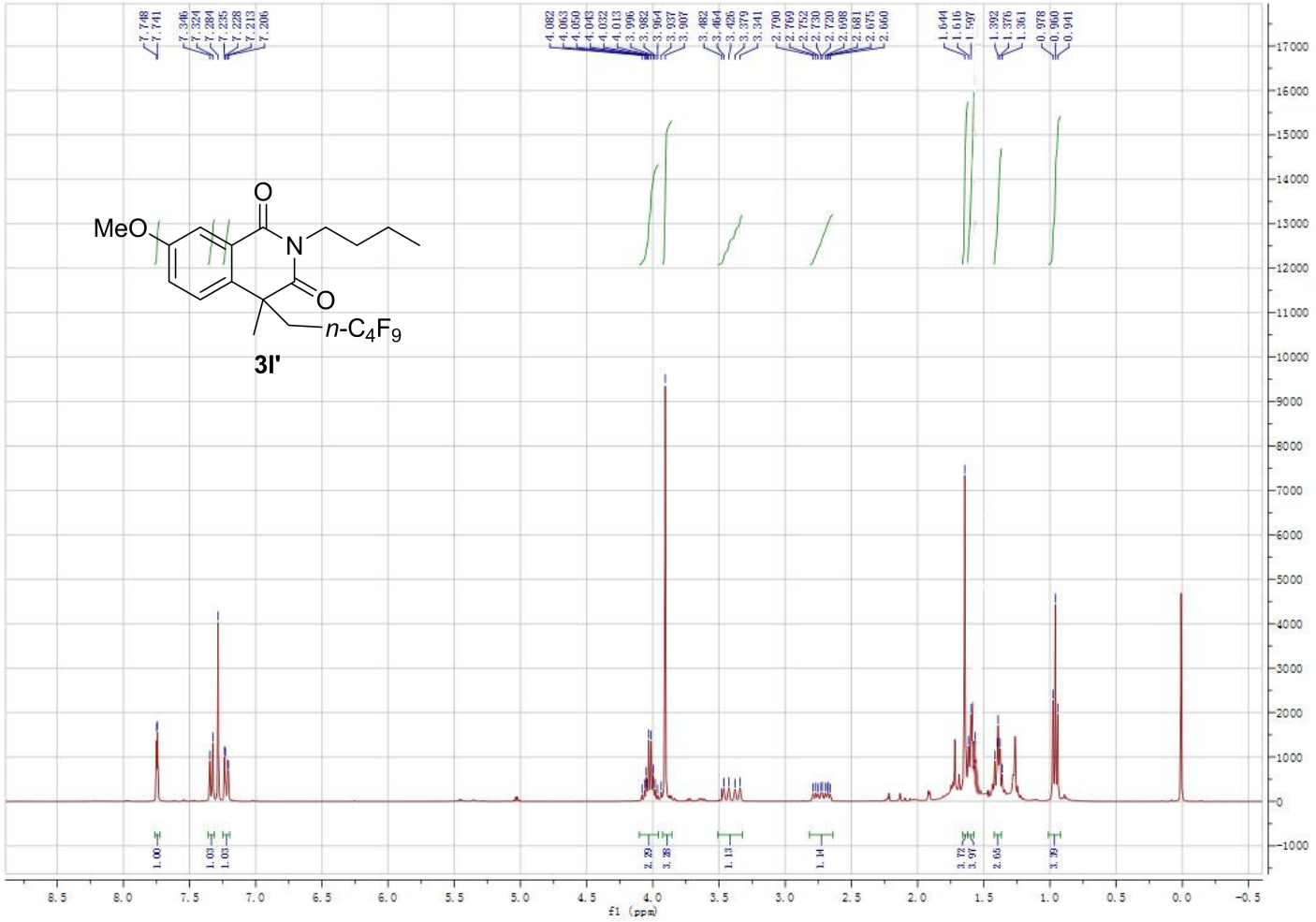
2-butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3l).



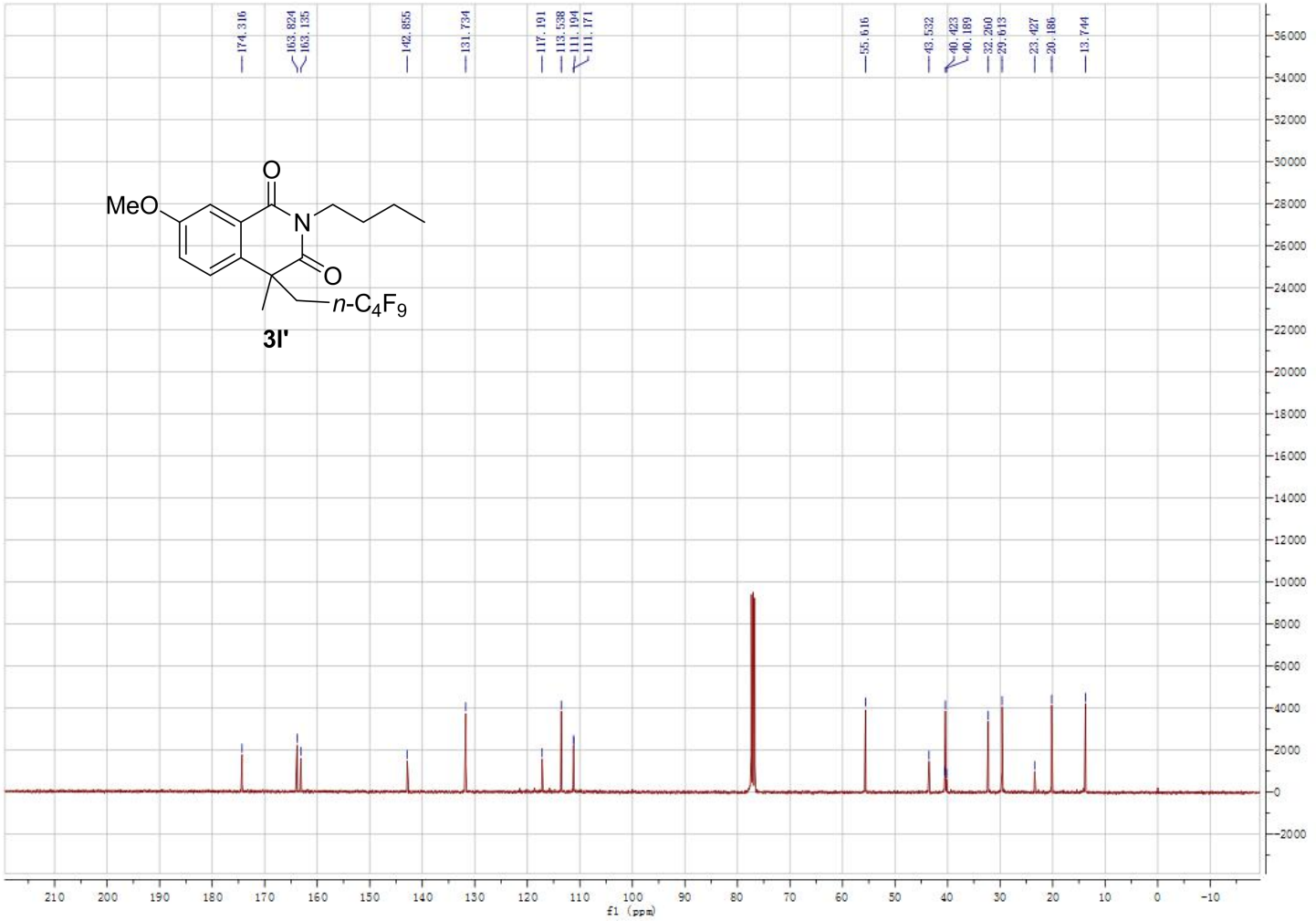
2-butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3l).



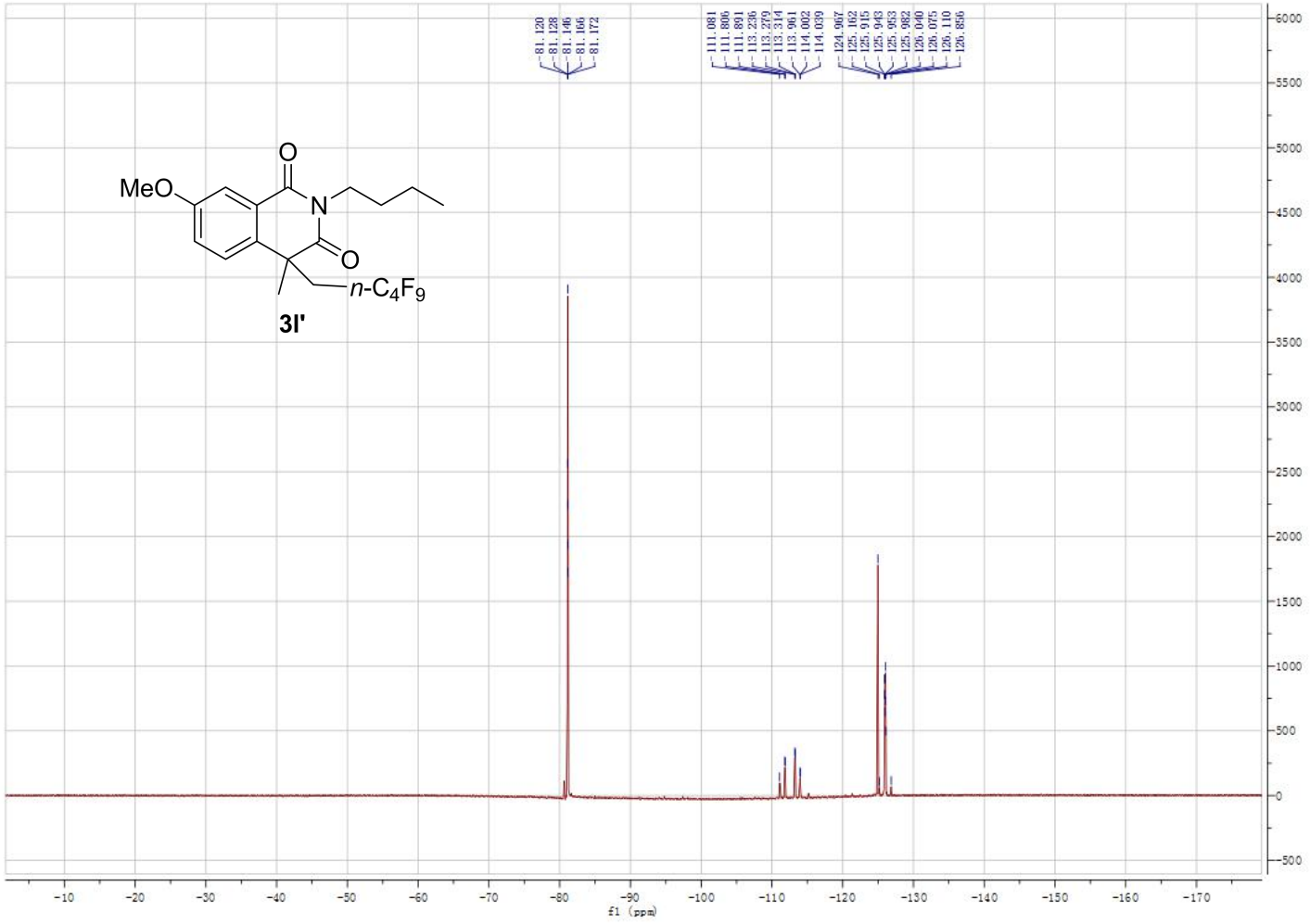
2-butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3l')



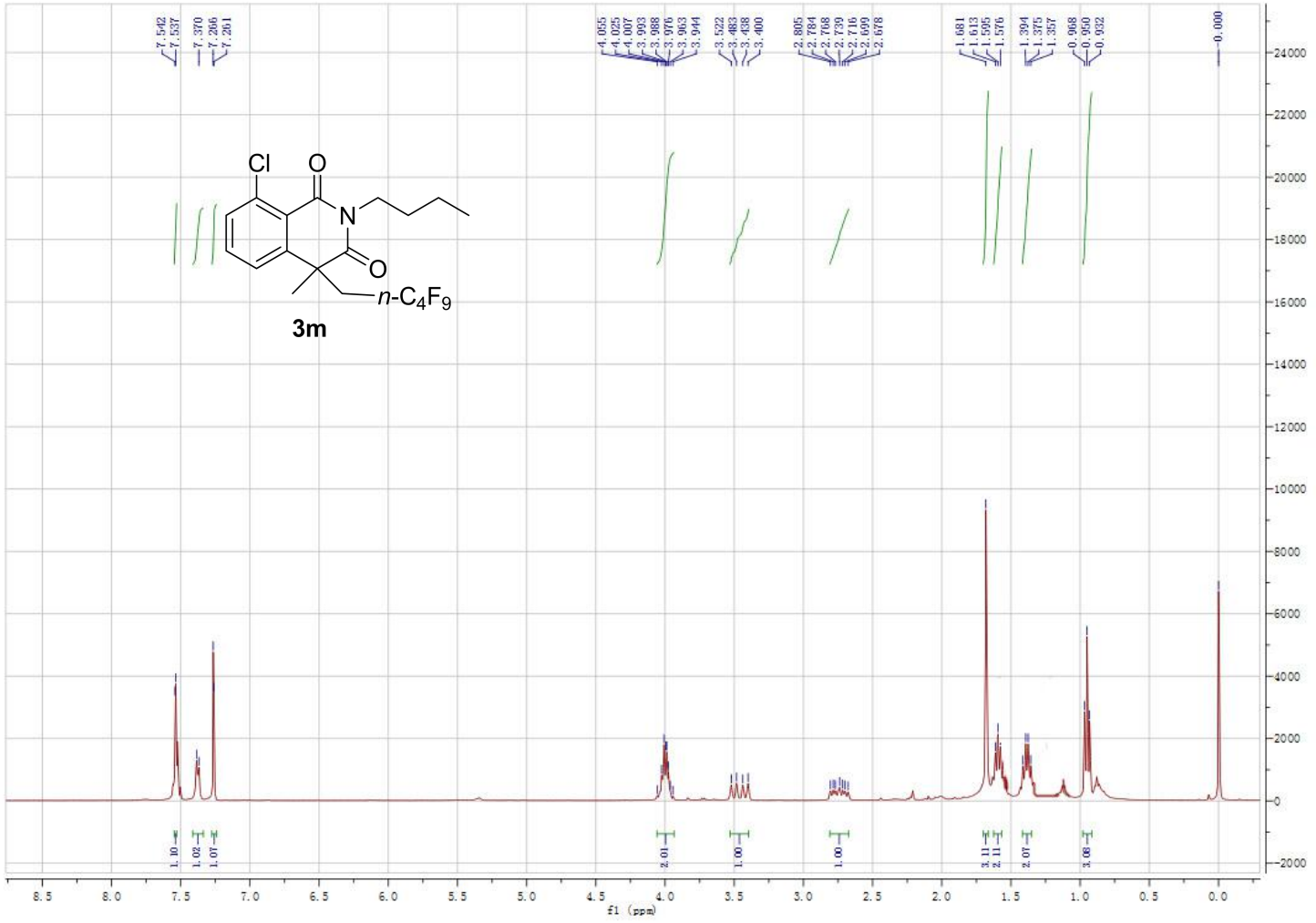
2-butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3l')



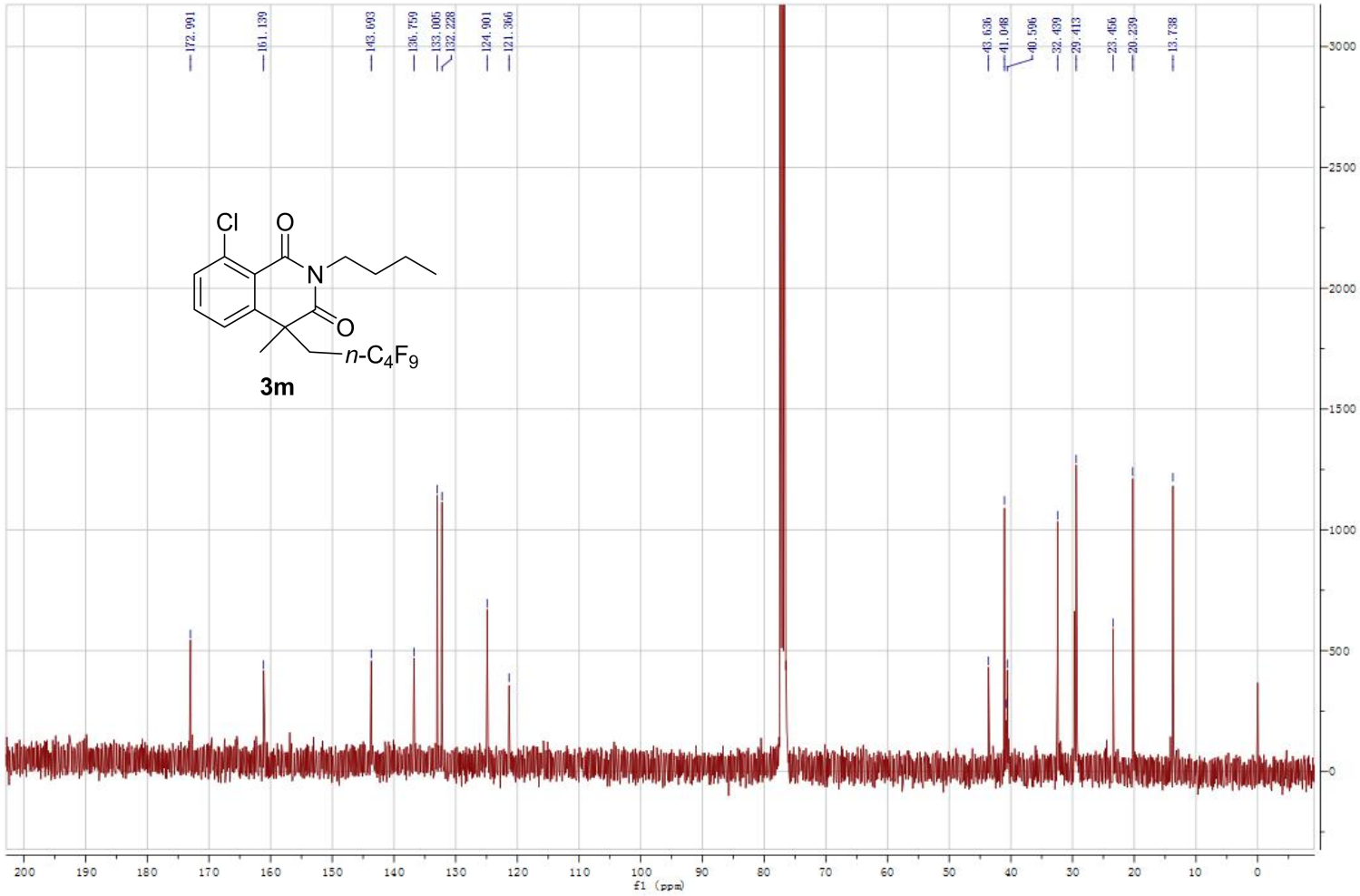
2-butyl-7-methoxy-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3l')



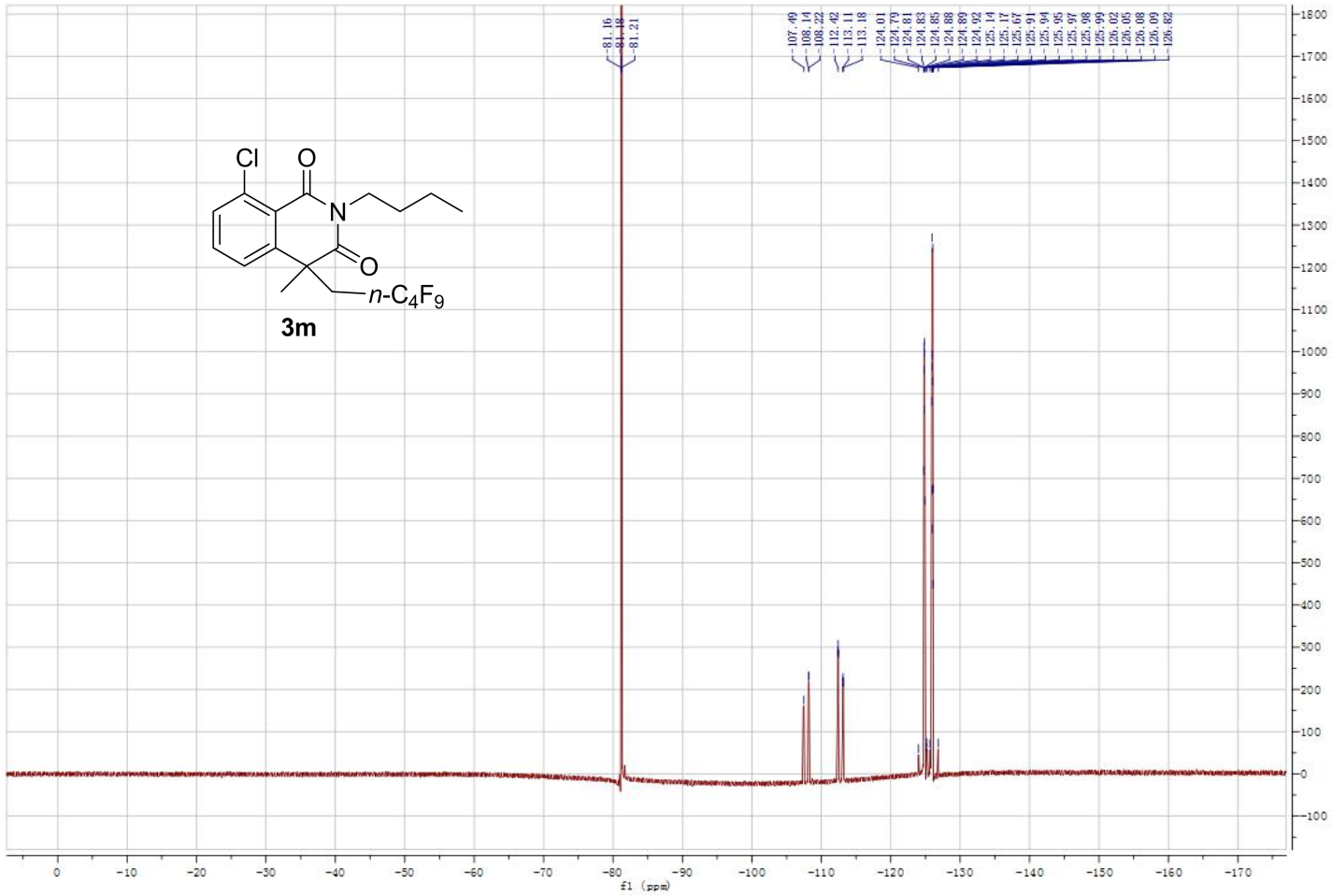
2-butyl-8-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3m).



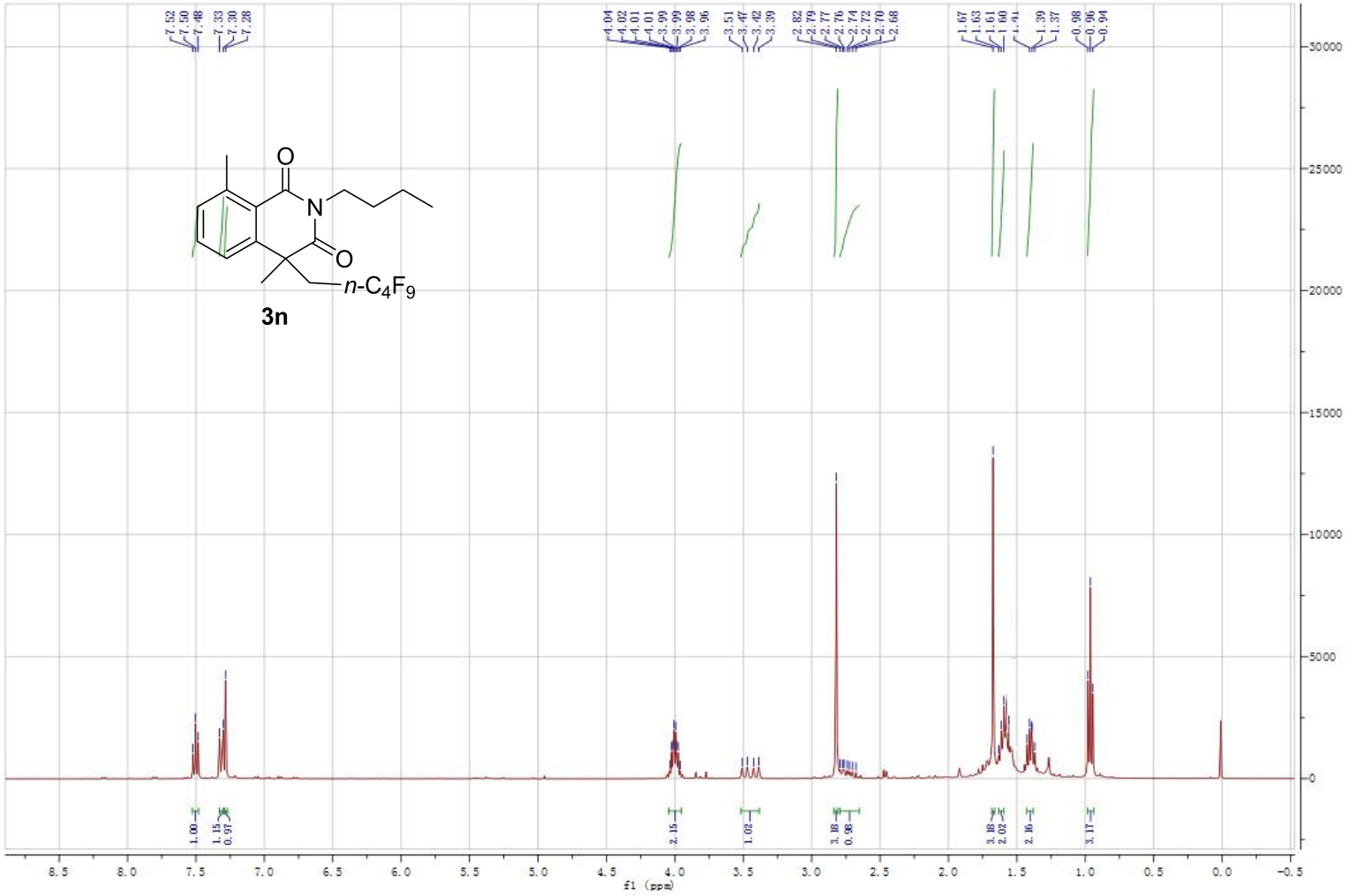
2-butyl-8-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3m).



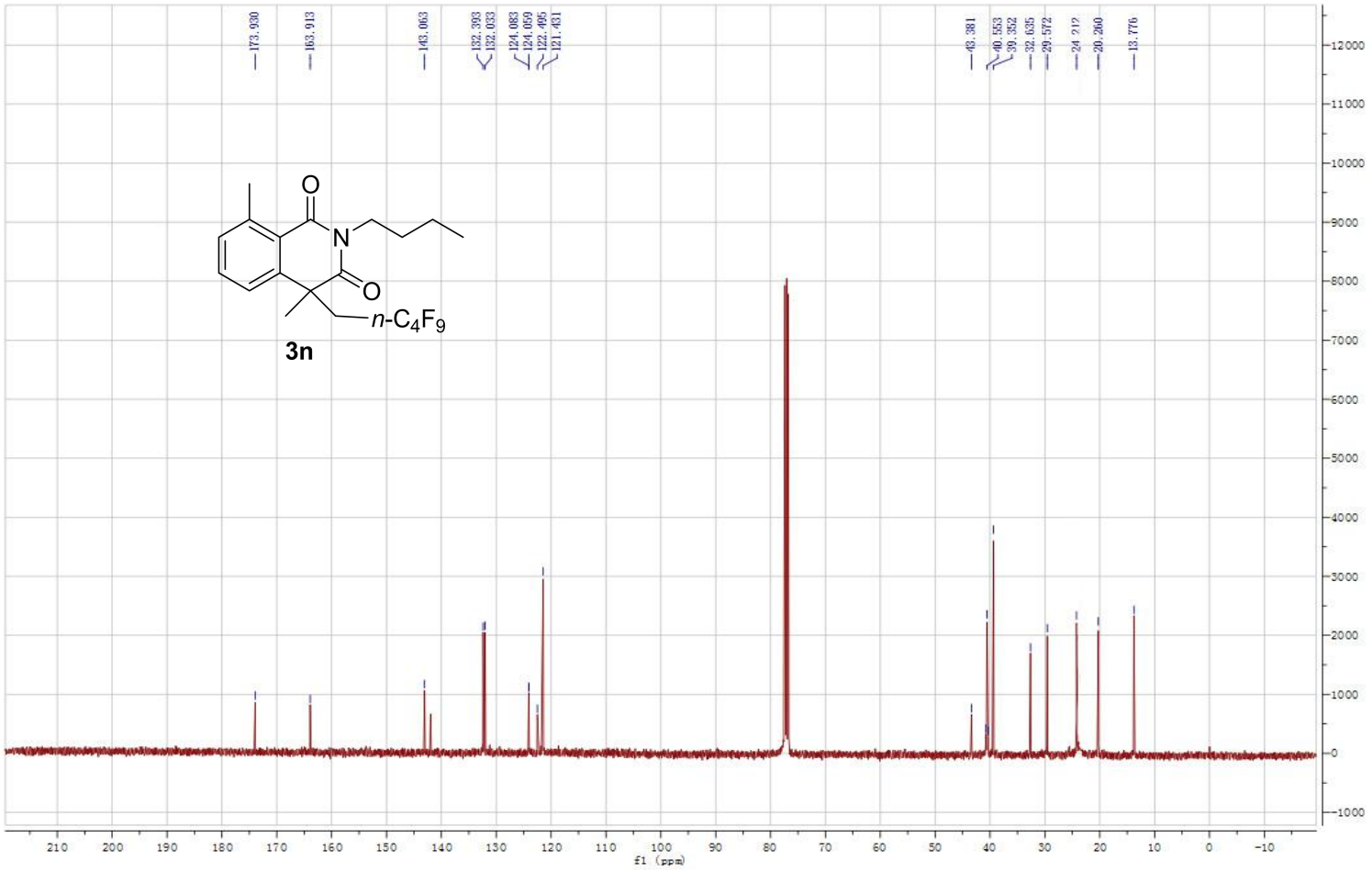
2-butyl-8-chloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3m).



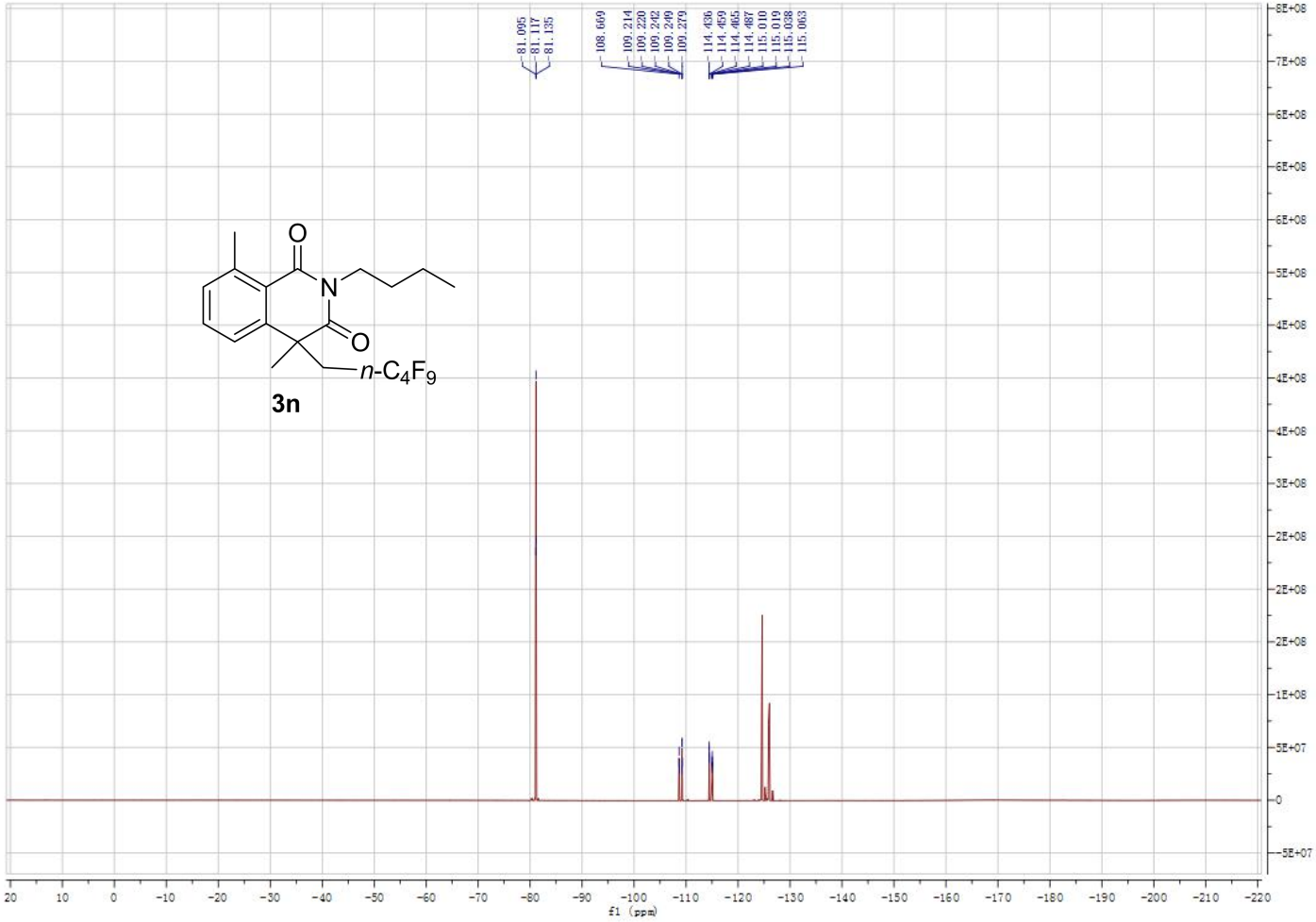
2-butyl-4,8-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3n).



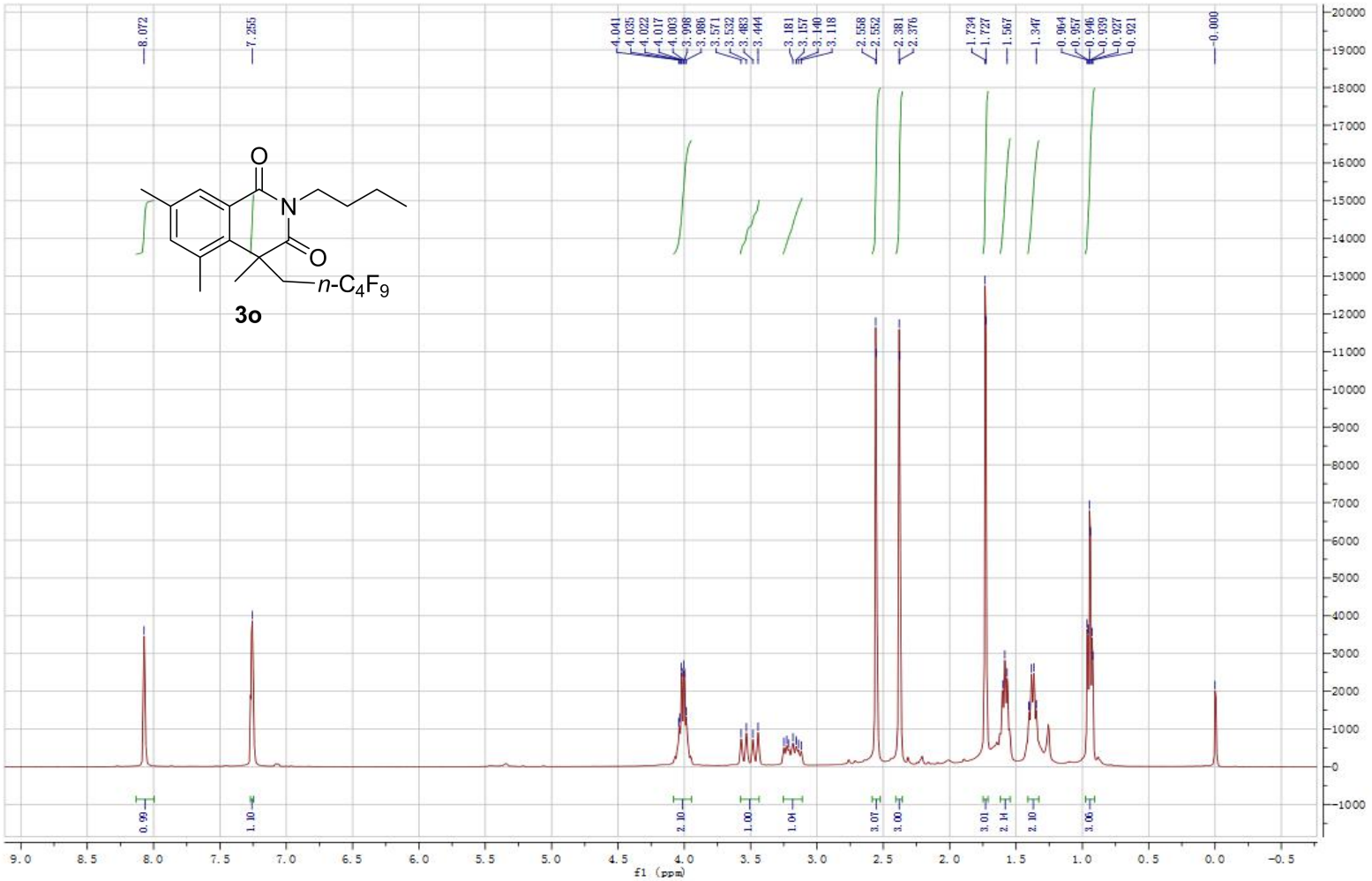
2-Butyl-4,8-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3n).



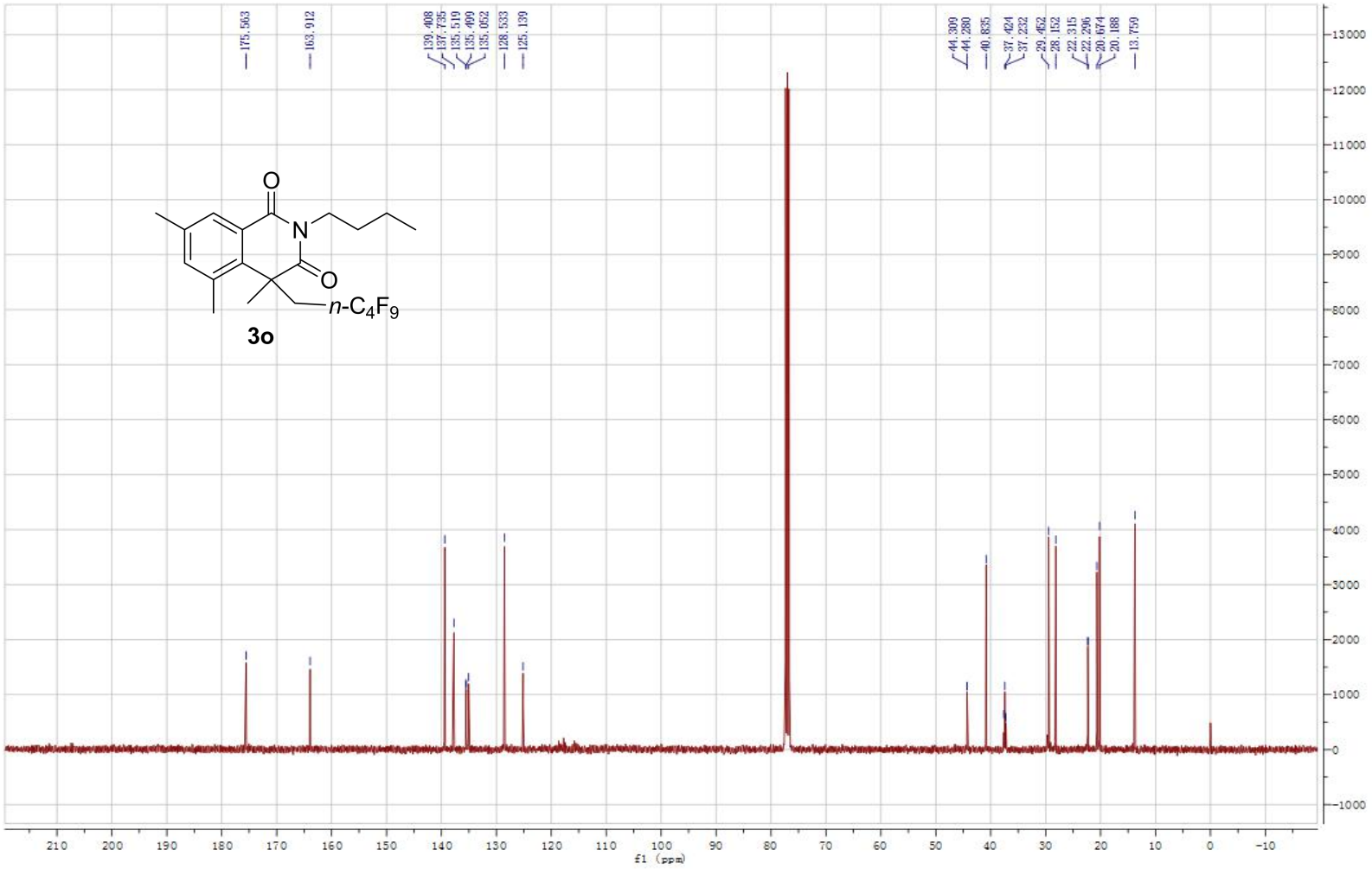
2-Butyl-4,8-dimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3n).



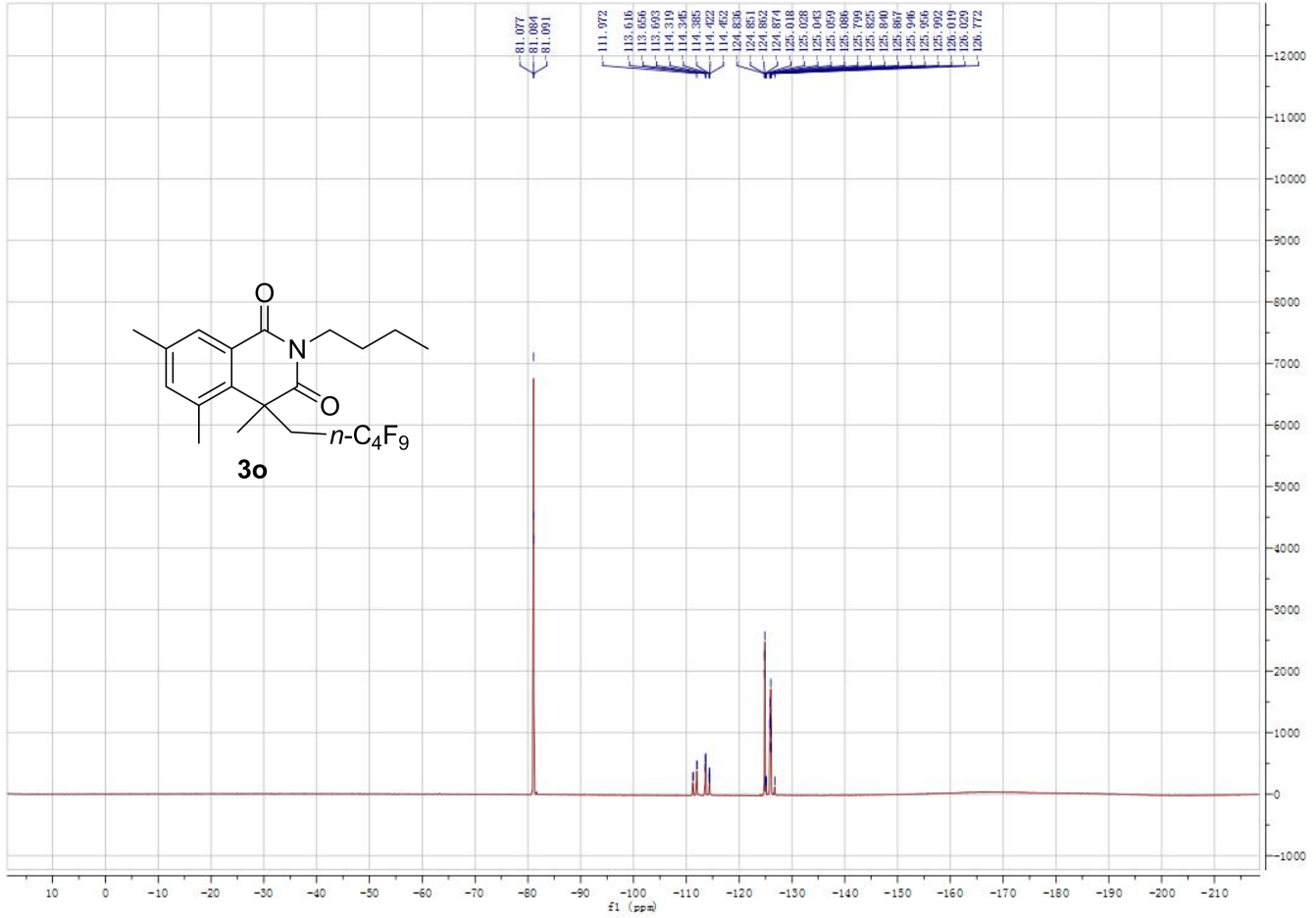
2-butyl-4,5,7-trimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3o).



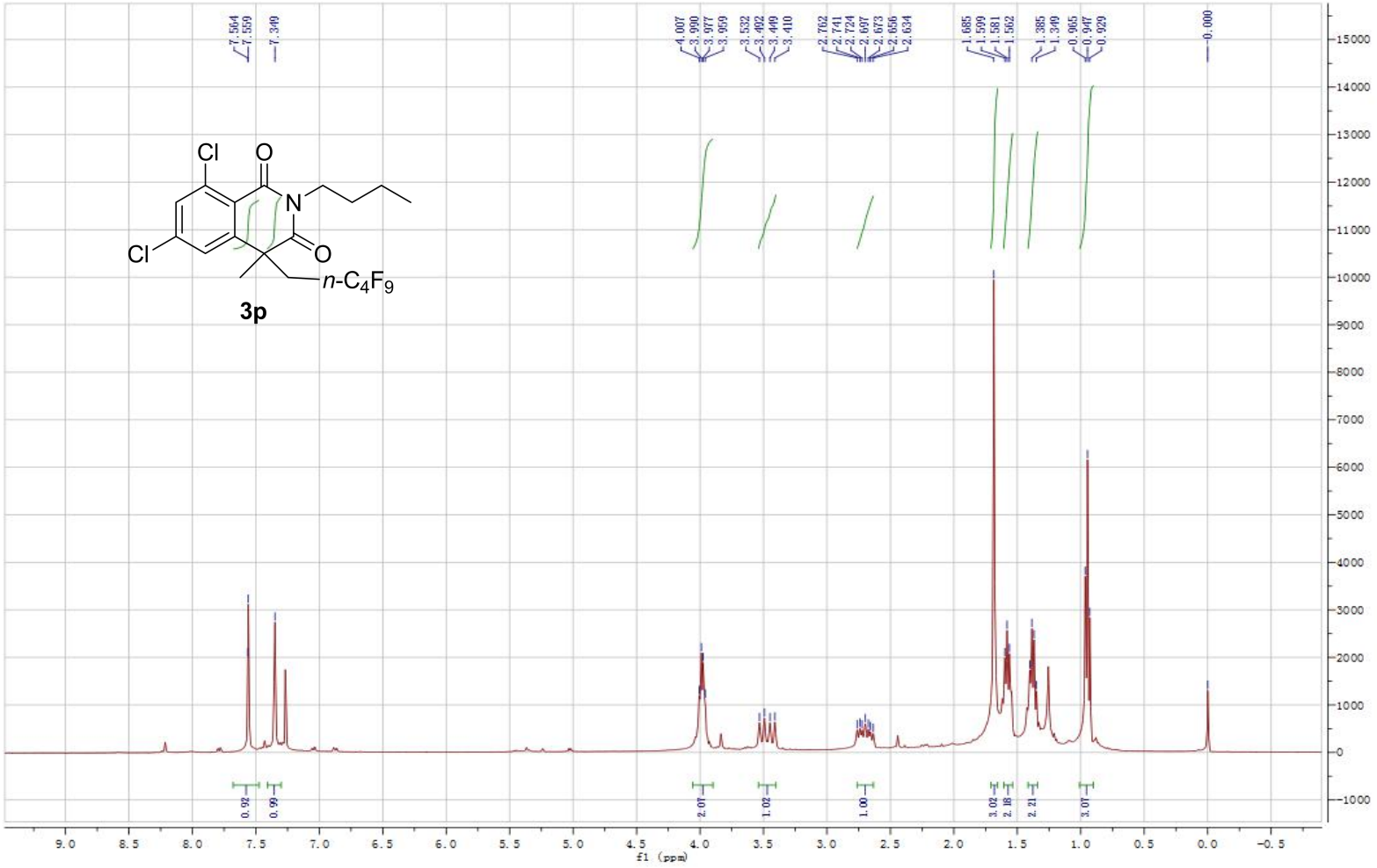
2-butyl-4,5,7-trimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3o).



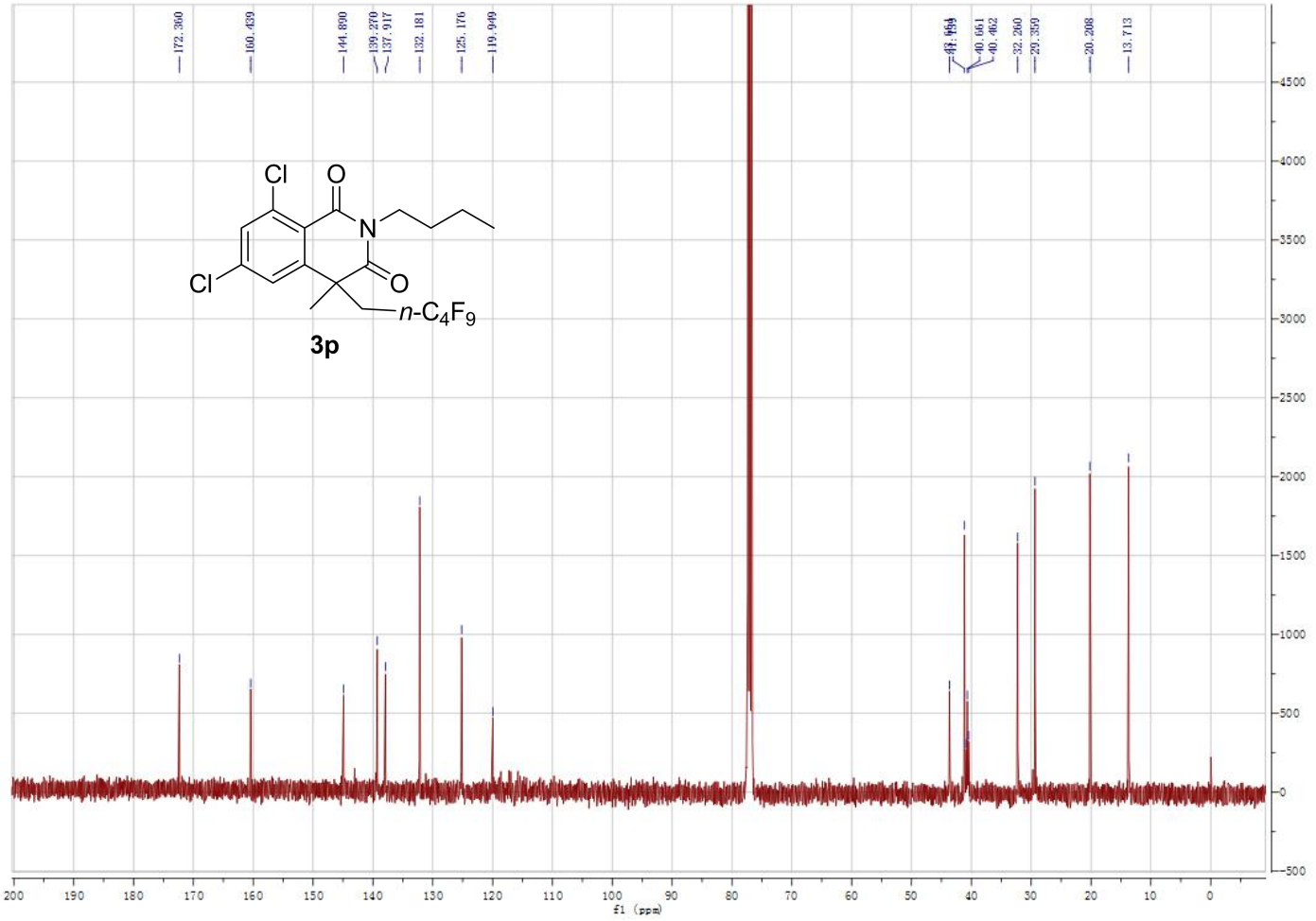
2-butyl-4,5,7-trimethyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3o).



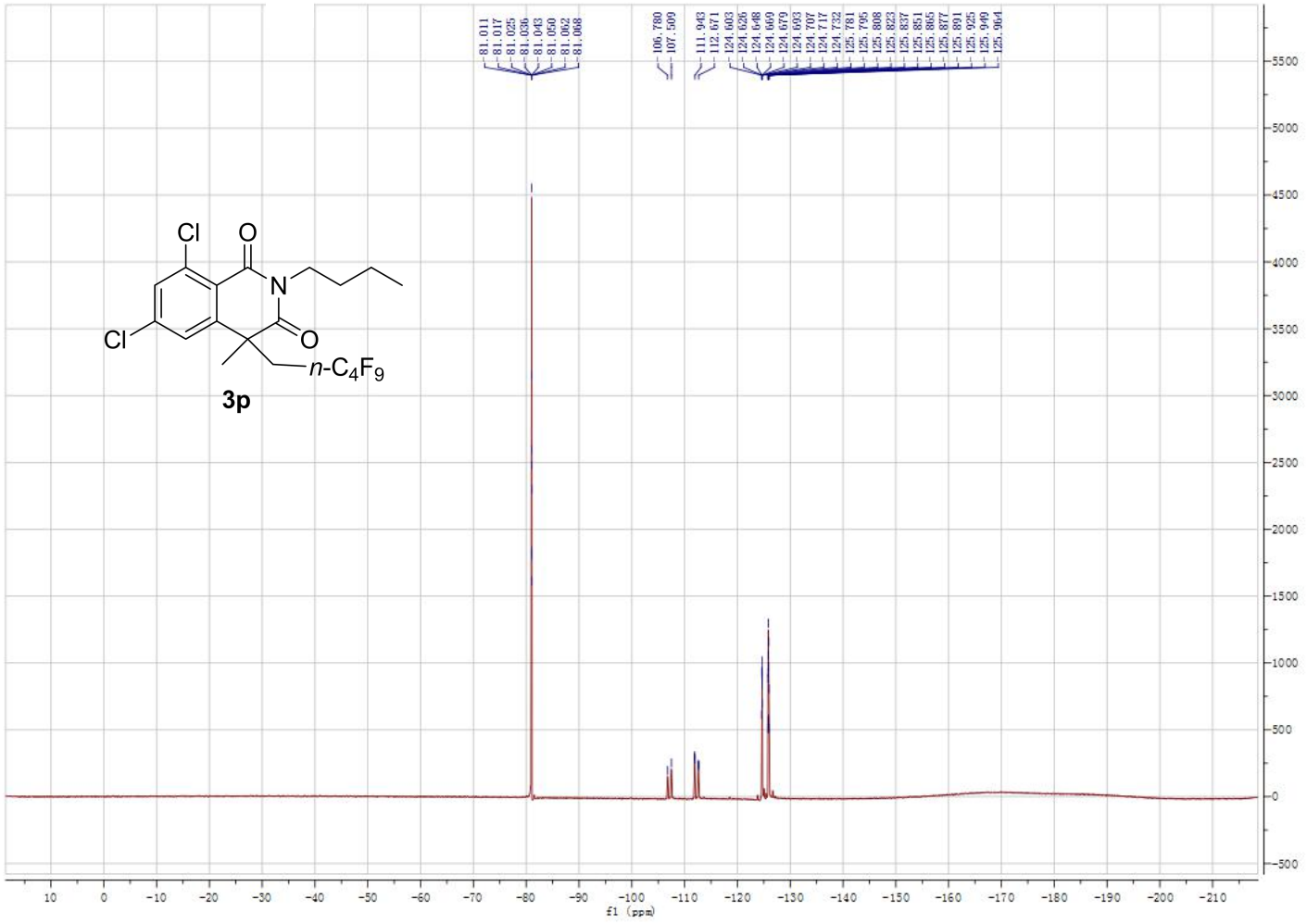
2-butyl-6,8-dichloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3p).



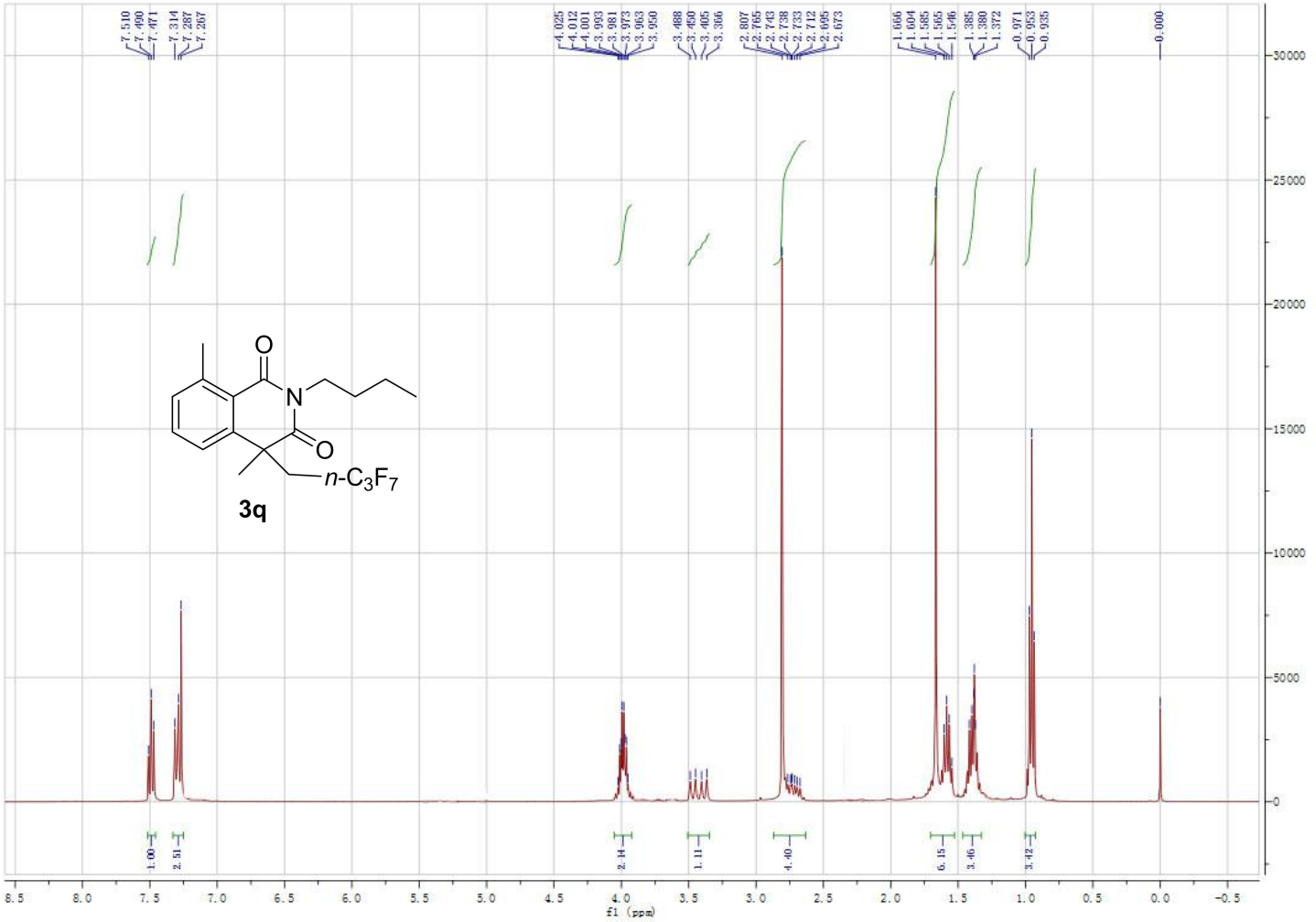
2-butyl-6,8-dichloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3p).



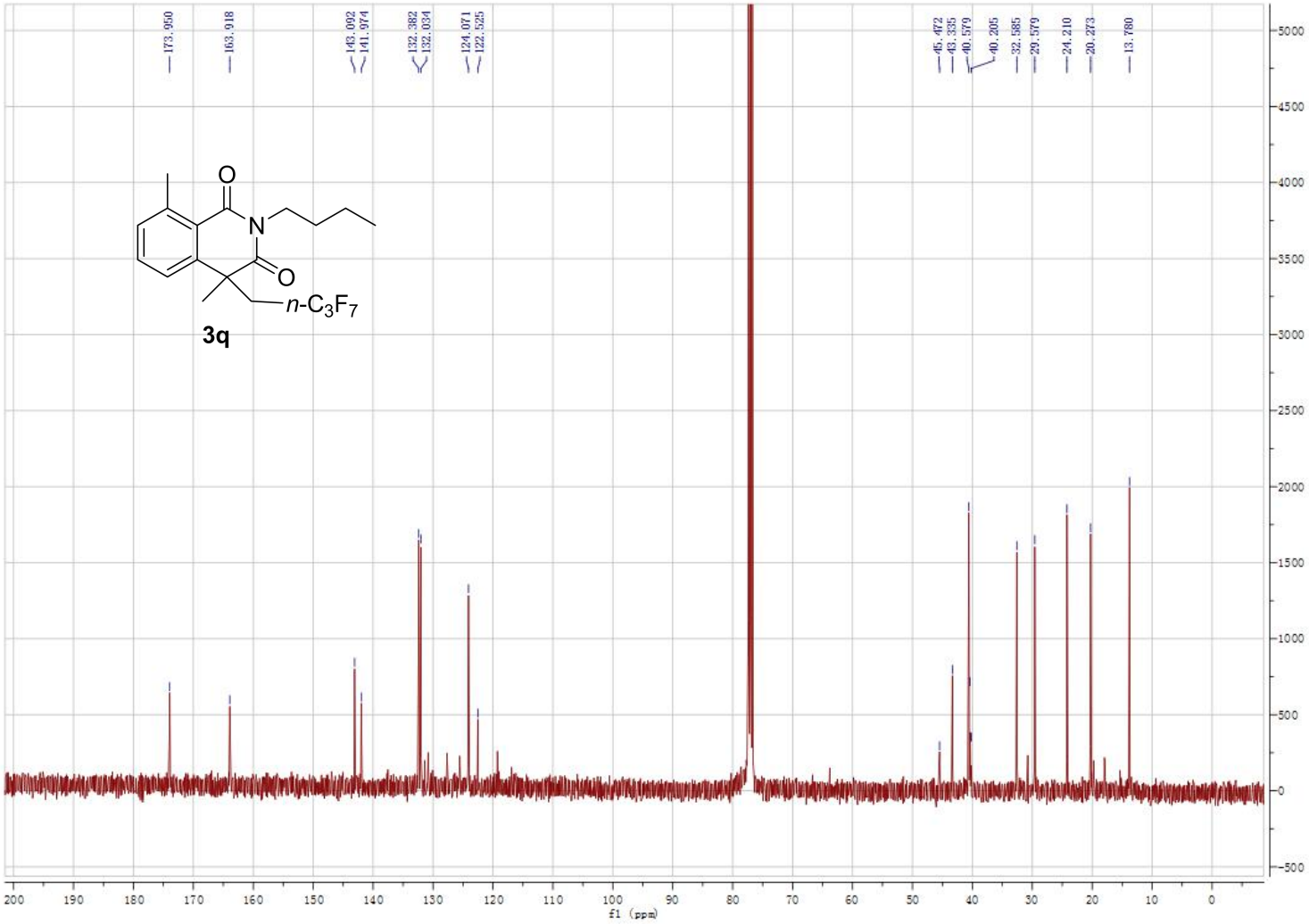
2-butyl-6,8-dichloro-4-methyl-4-(2,2,3,3,4,4,5,5,5-nonafluoropentyl)isoquinoline-1,3(2H,4H)-dione(3p).



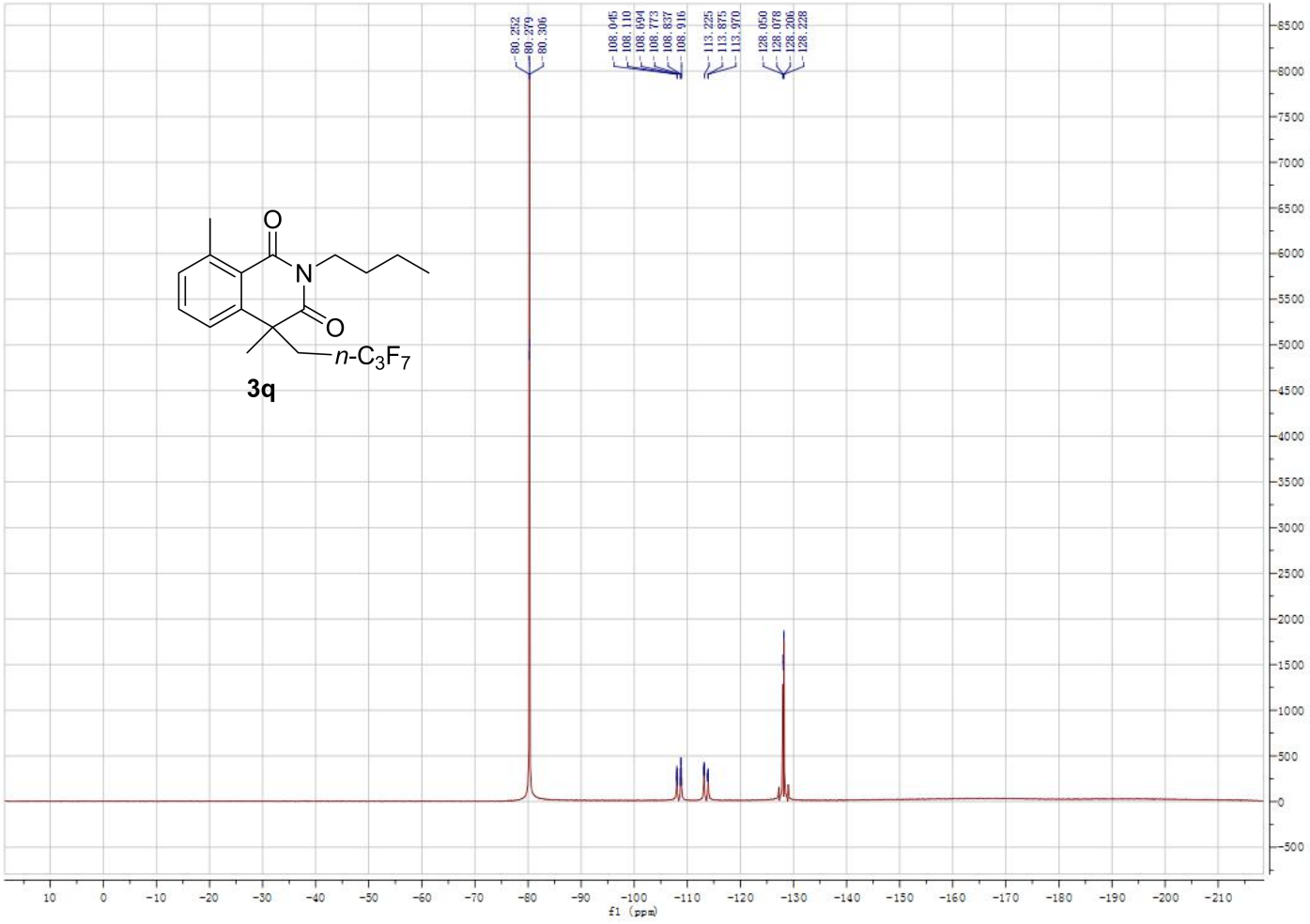
2-butyl-4-(2,2,3,3,4,4,4-heptafluorobutyl)-4,8-dimethylisoquinoline-1,3(2H,4H)-dione(3q).



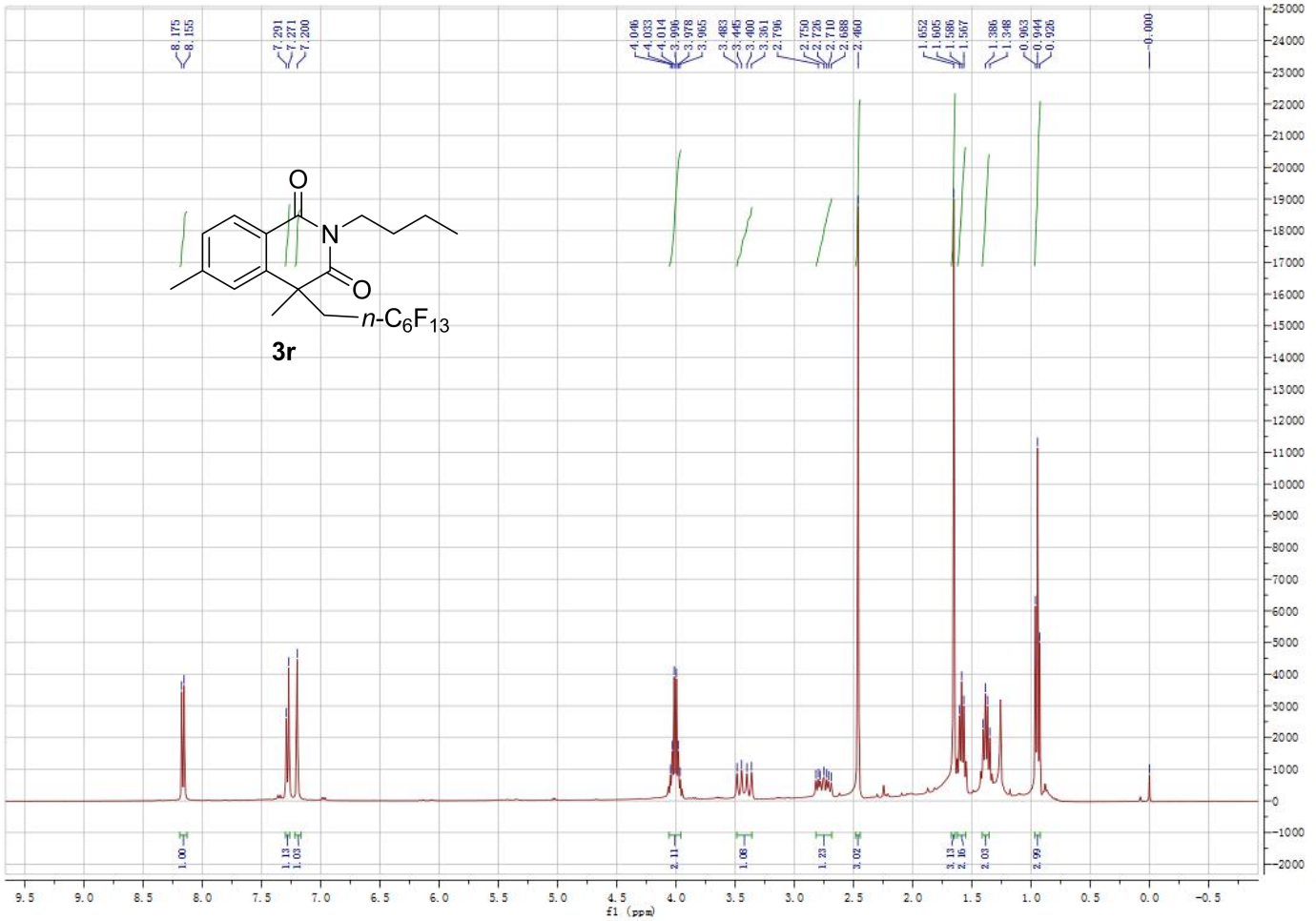
2-butyl-4-(2,2,3,3,4,4,4-heptafluorobutyl)-4,8-dimethylisoquinoline-1,3(2H,4H)-dione(3q).



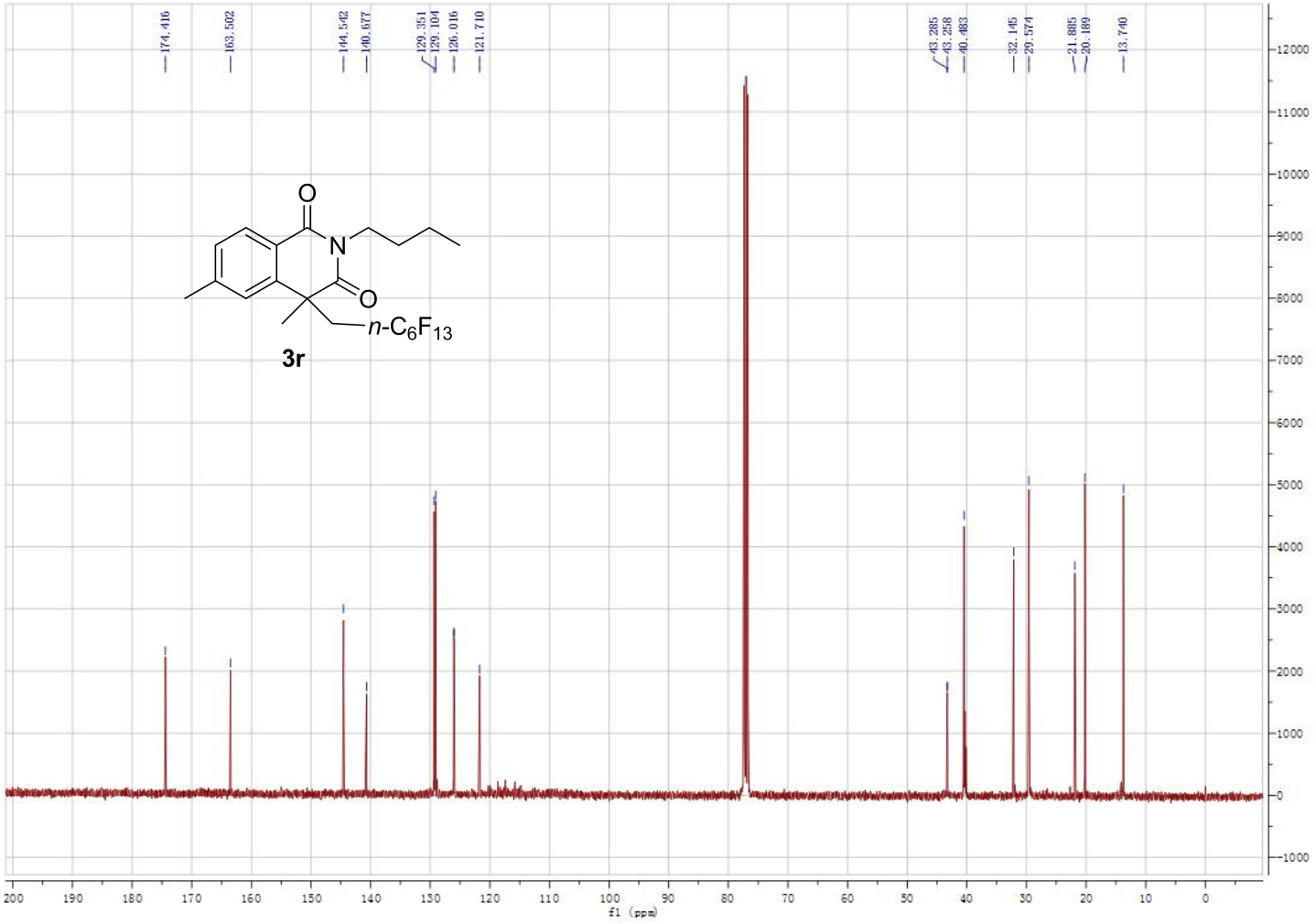
2-butyl-4-(2,2,3,3,4,4,4-heptafluorobutyl)-4,8-dimethylisoquinoline-1,3(2H,4H)-dione(3q).



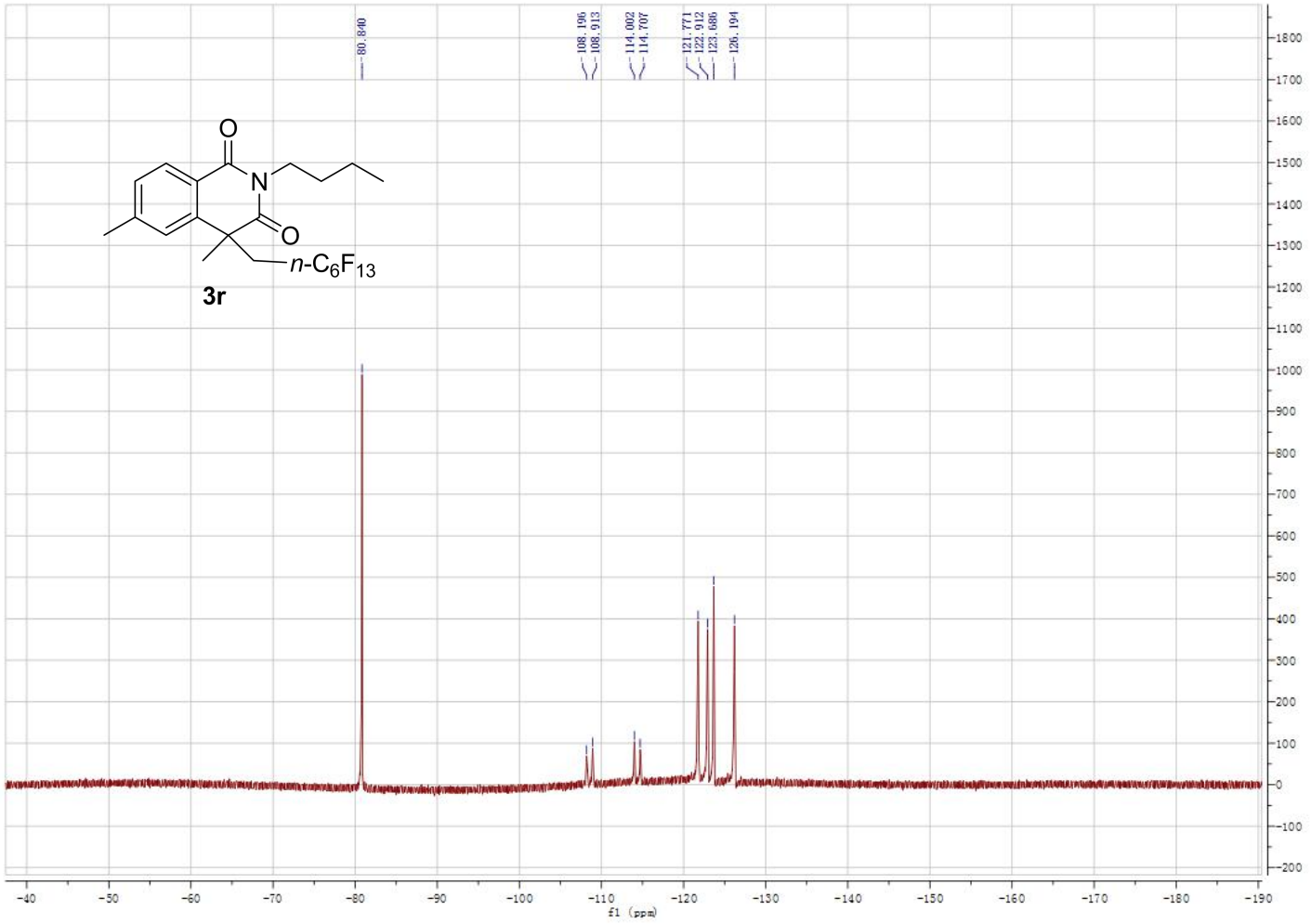
2-butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione(3r).



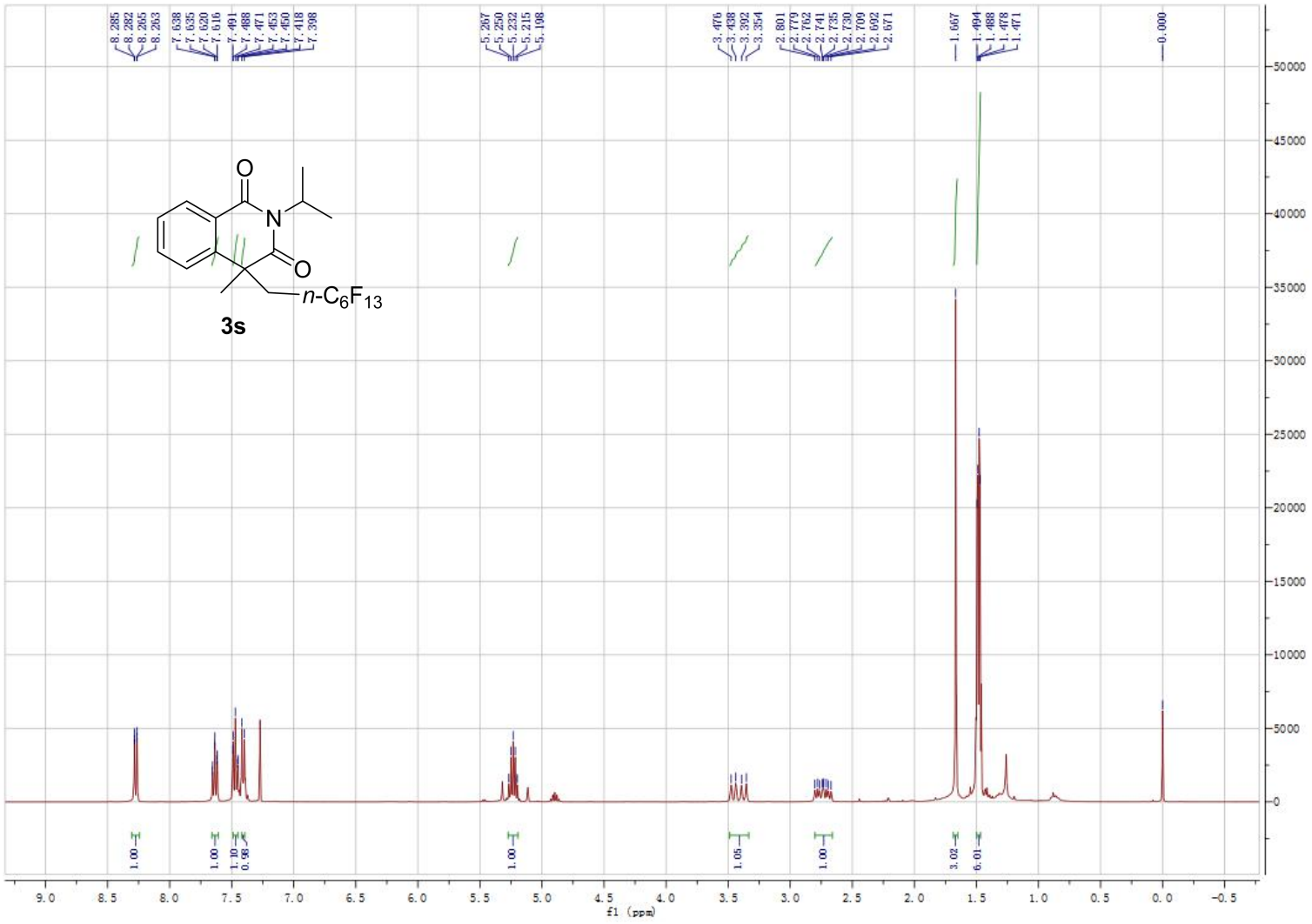
2-butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione(3r).



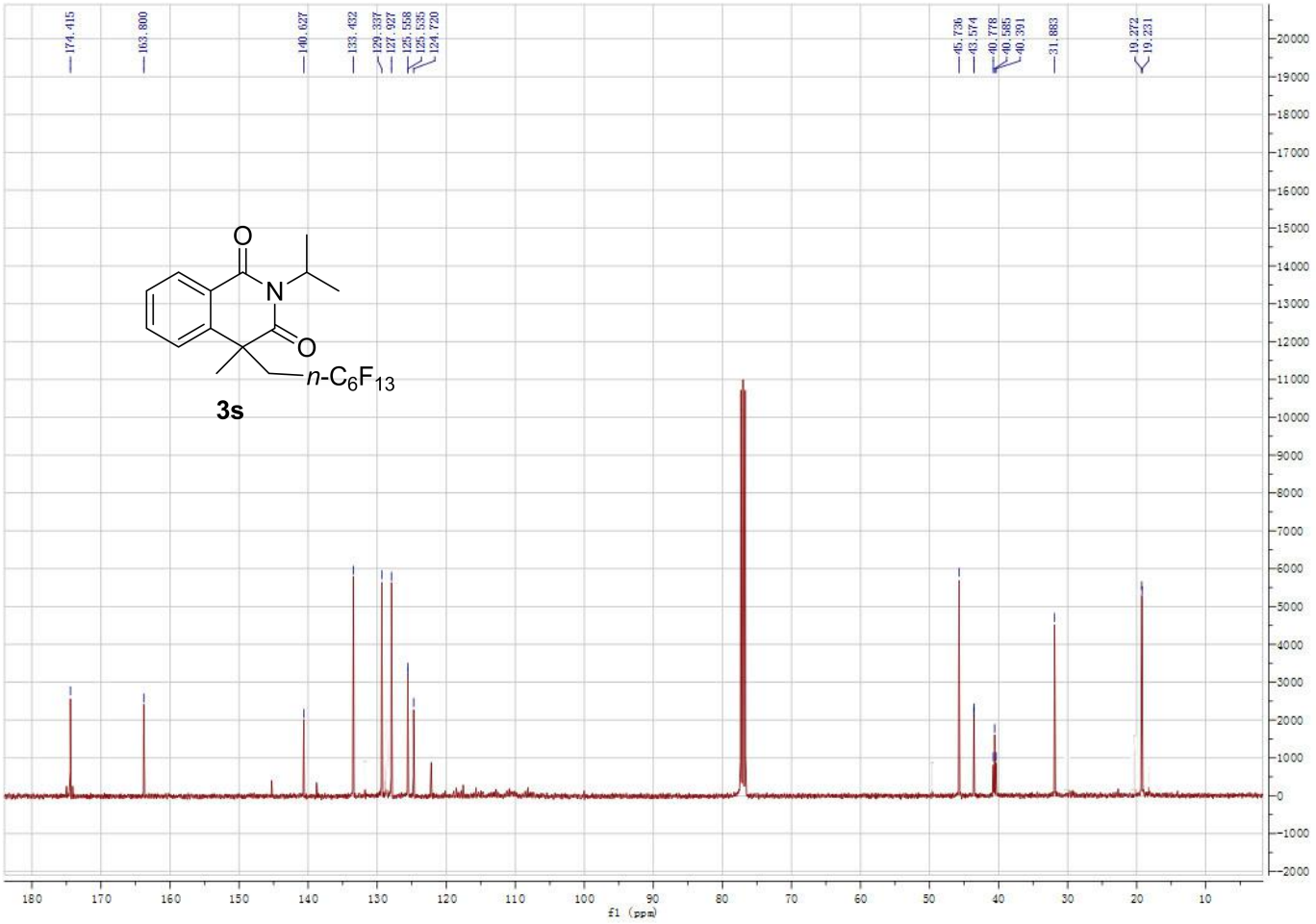
2-butyl-4,6-dimethyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione(3r).



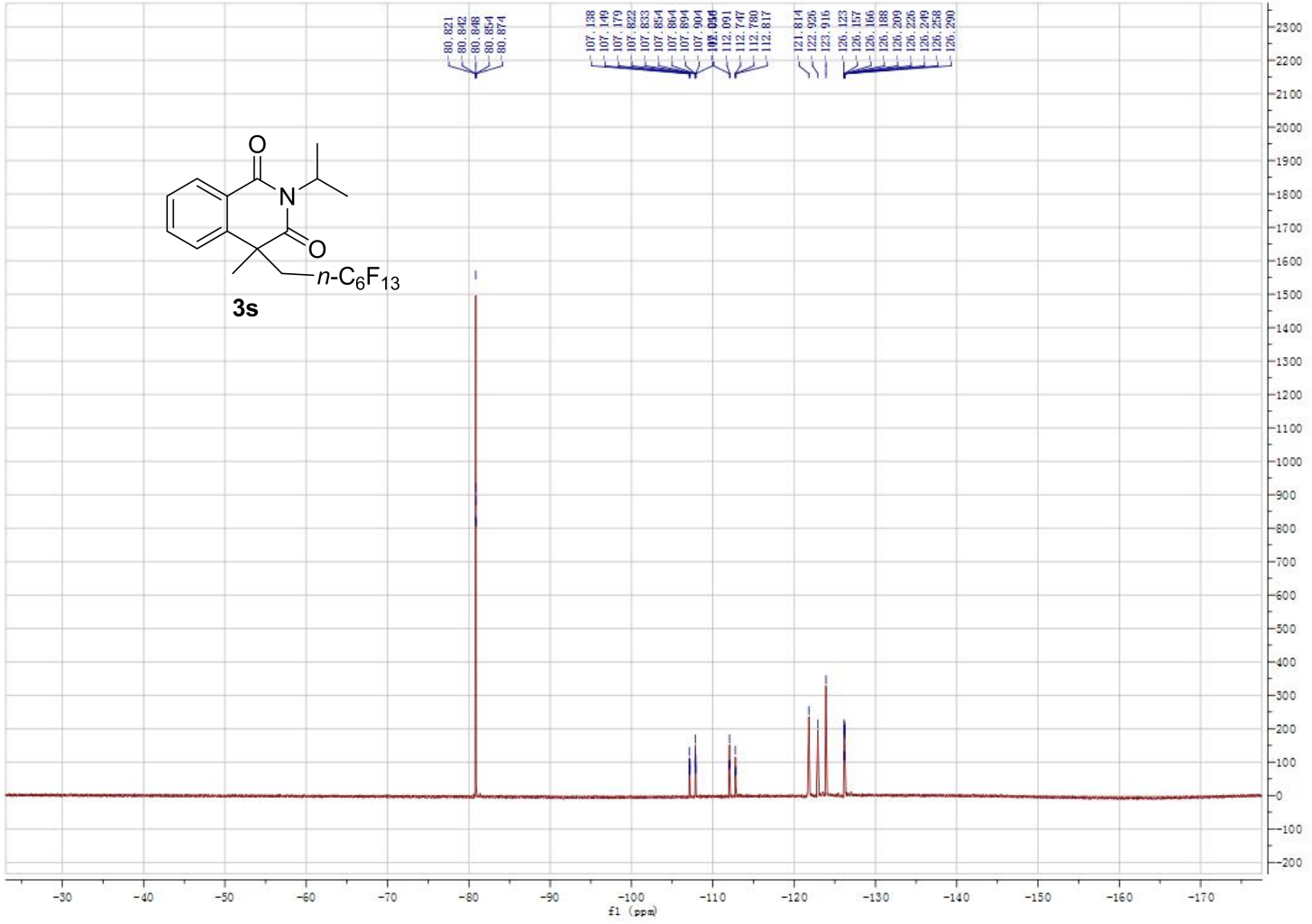
2-isopropyl-4-methyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione(3s).



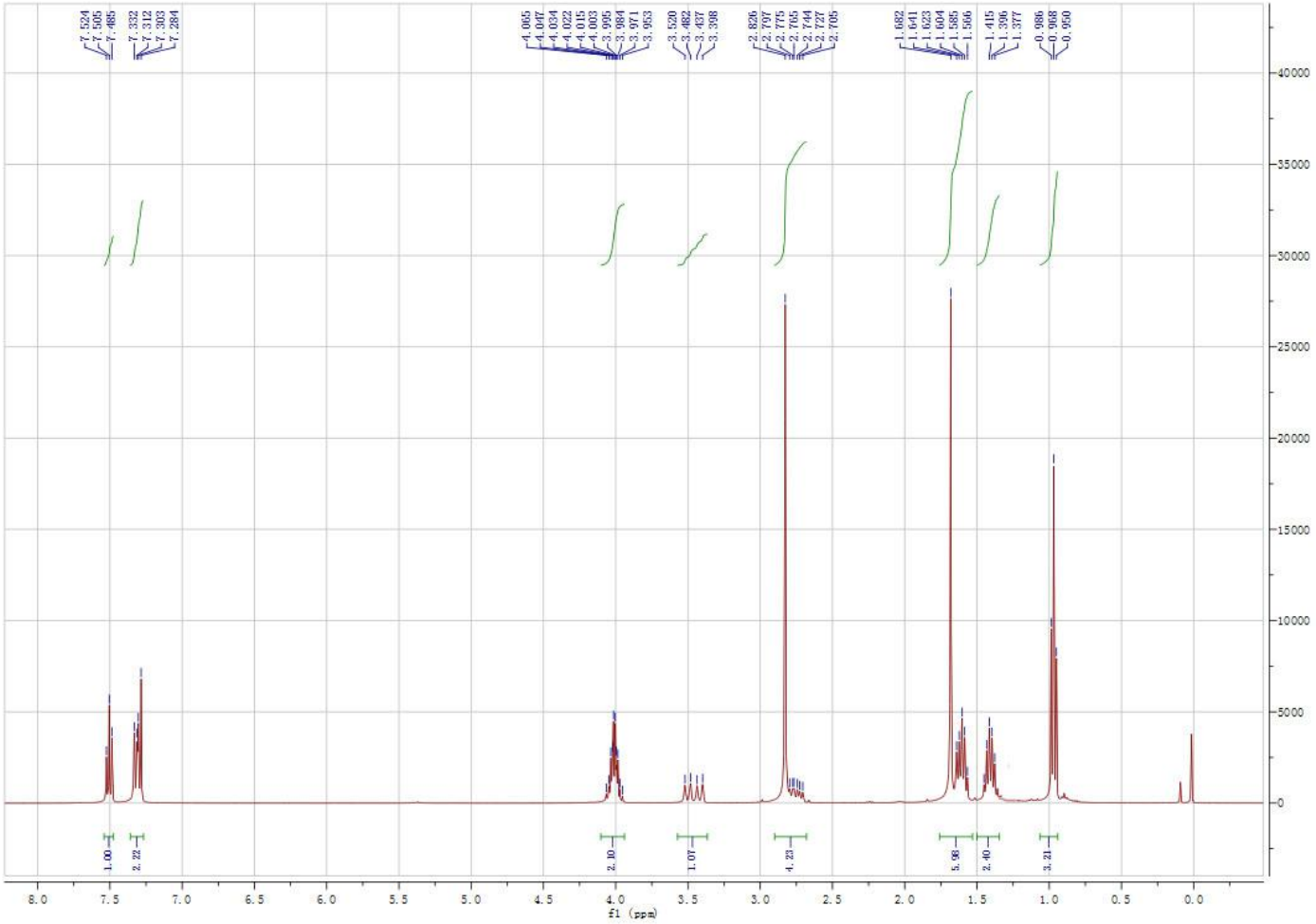
2-isopropyl-4-methyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione(3s).



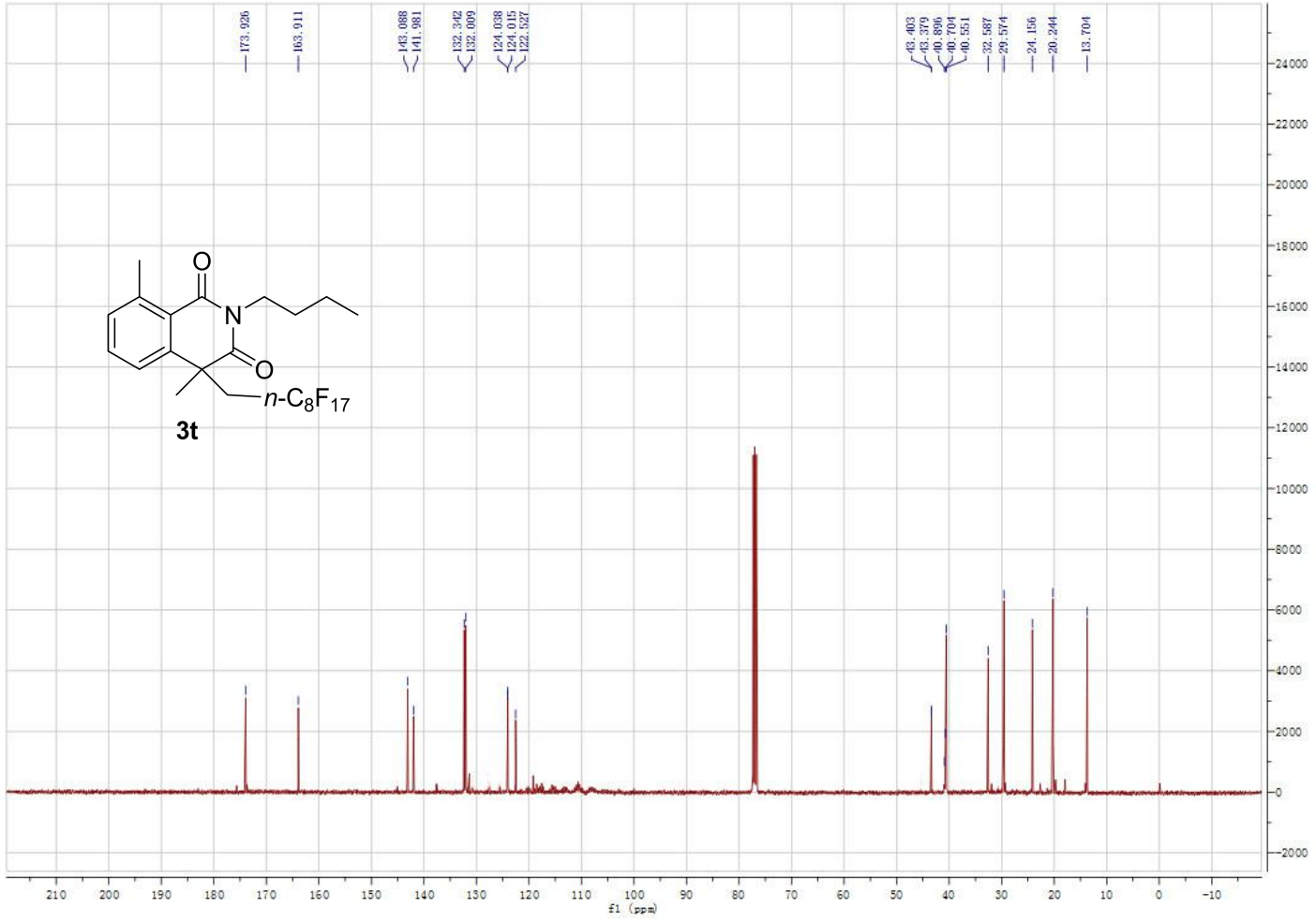
2-isopropyl-4-methyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)isoquinoline-1,3(2H,4H)-dione(3s).



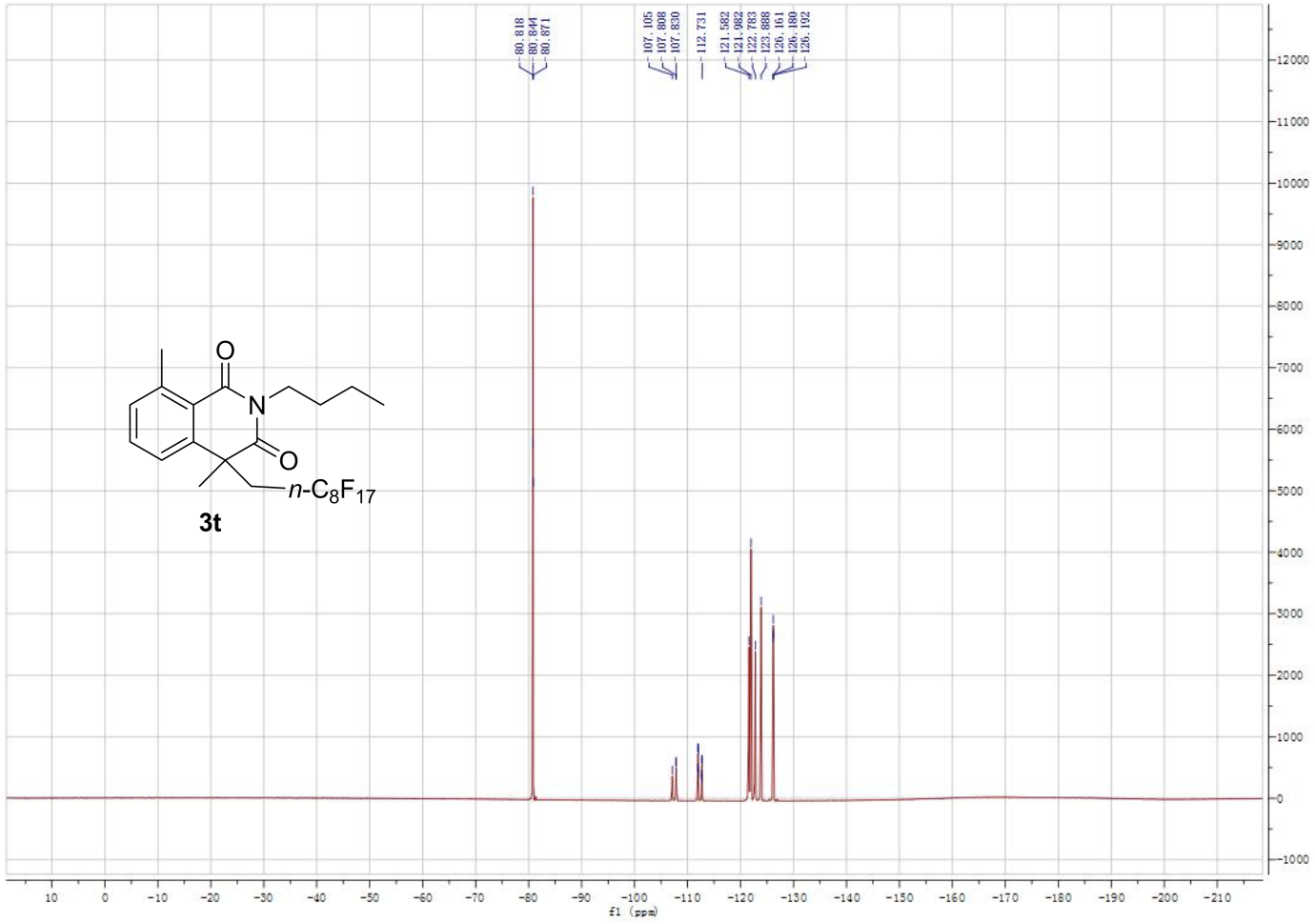
2-butyl-4-(2,2,3,3,4,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluorononyl)-4,8-dimethylisoquinoline-1,3(2*H*,4*H*)-dione(3t).



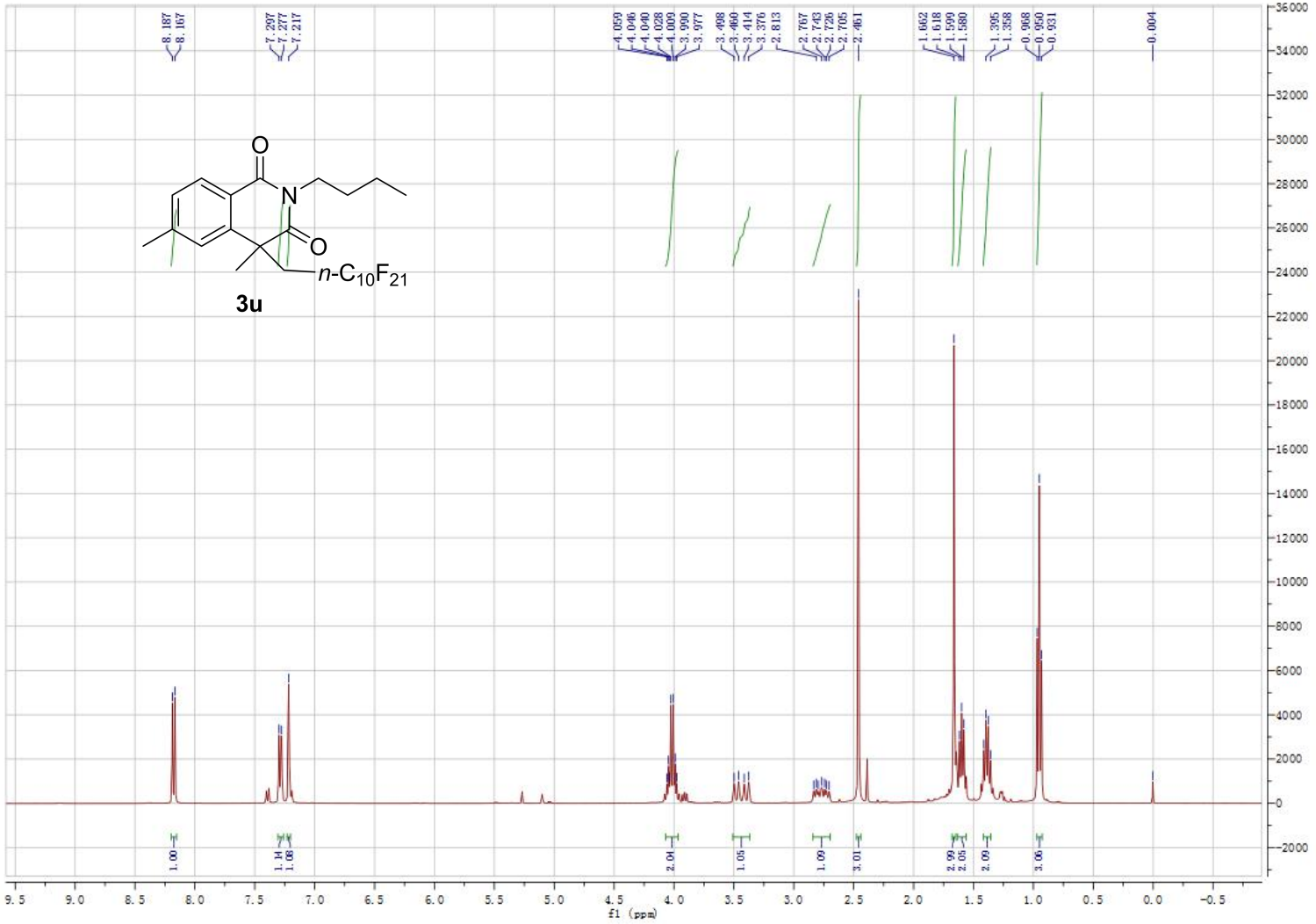
2-butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluorononyl)-4,8-dimethylisoquinoline-1,3(2*H*,4*H*)-dione(3t).



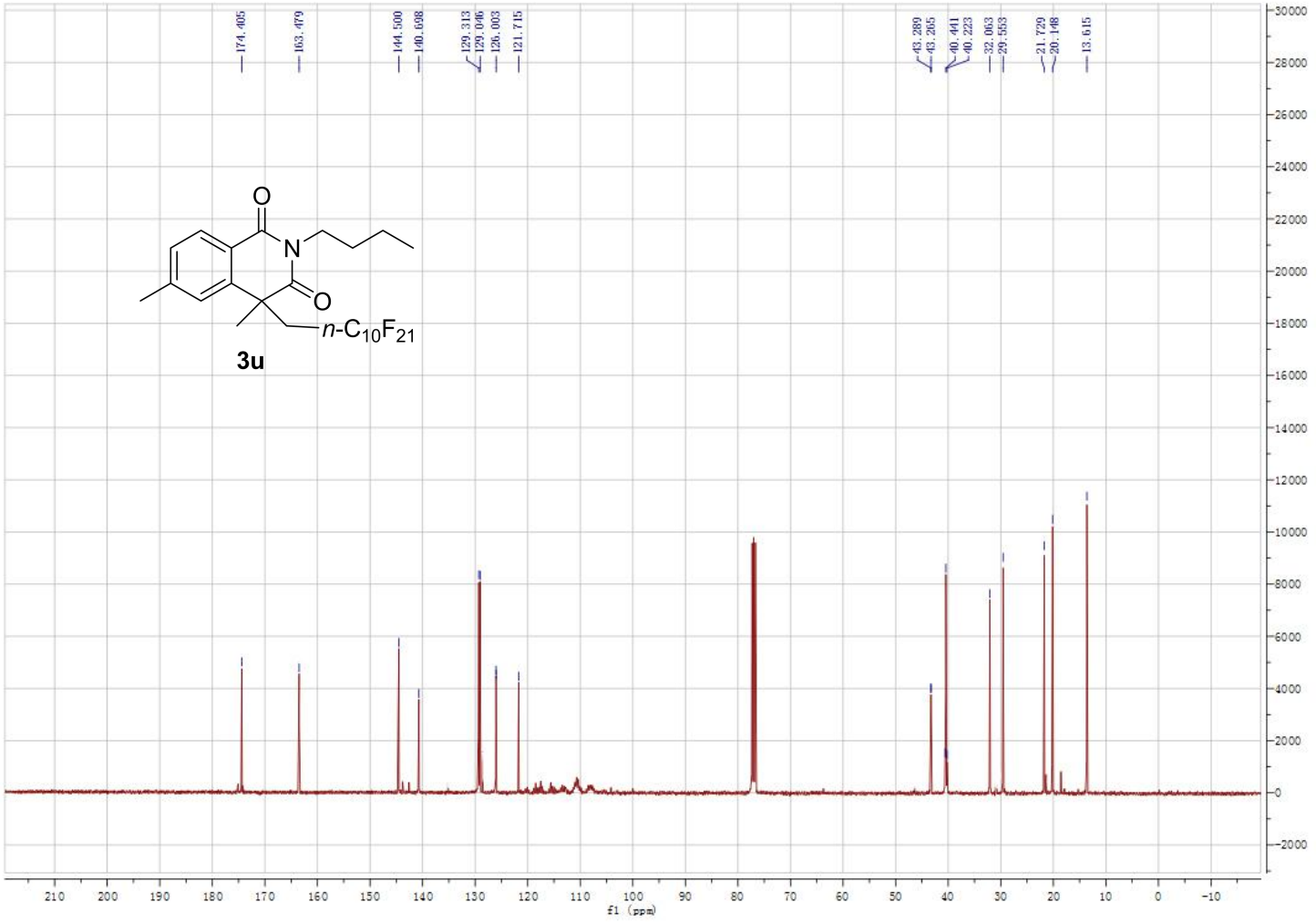
2-butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluorononyl)-4,8-dimethylisoquinoline-1,3(2*H*,4*H*)-dione(3t).



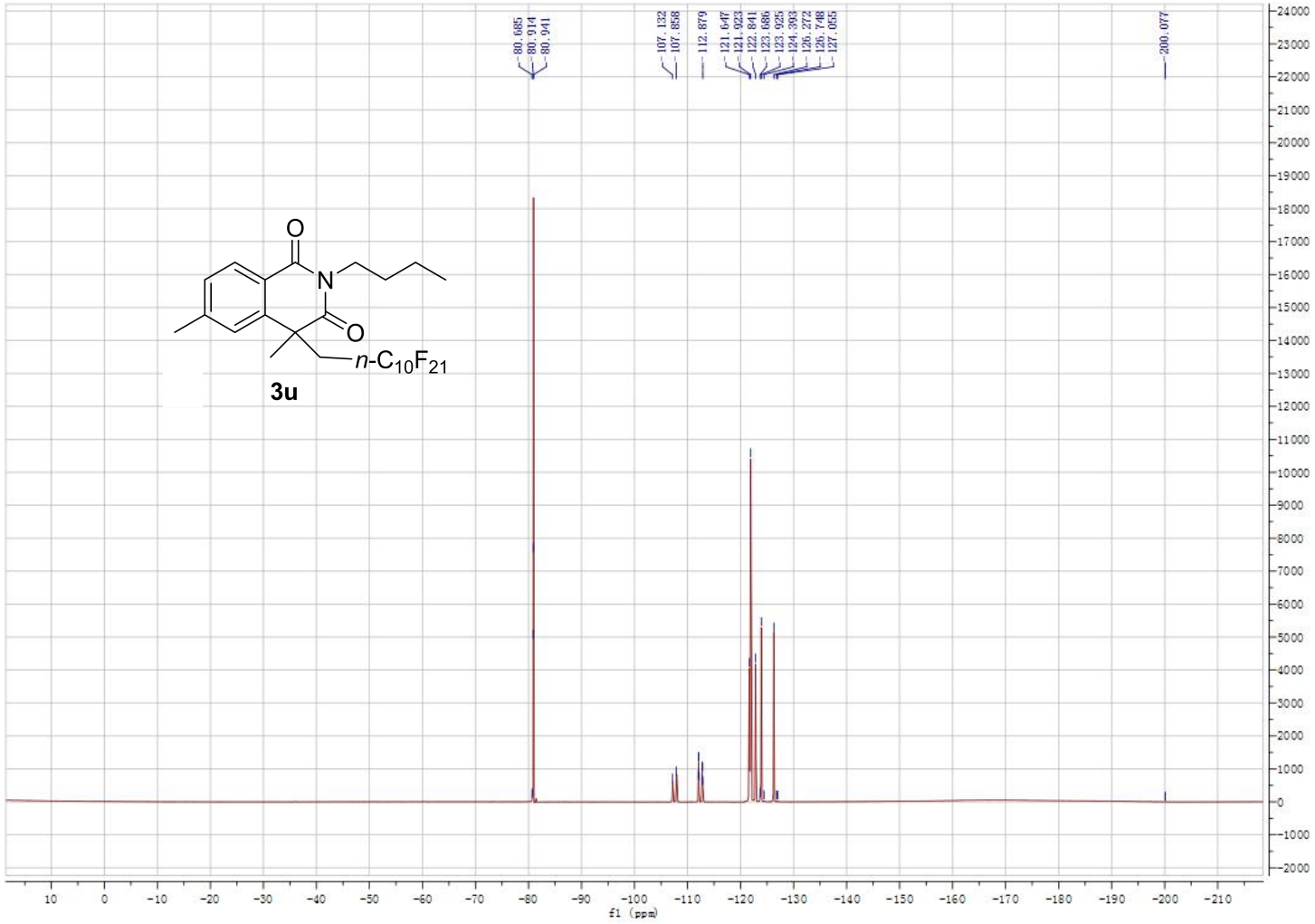
2-butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-henicosafluoroundecyl)-4,6-dimethylisoquinoline-1,3(2H,4H)-dione(3u).



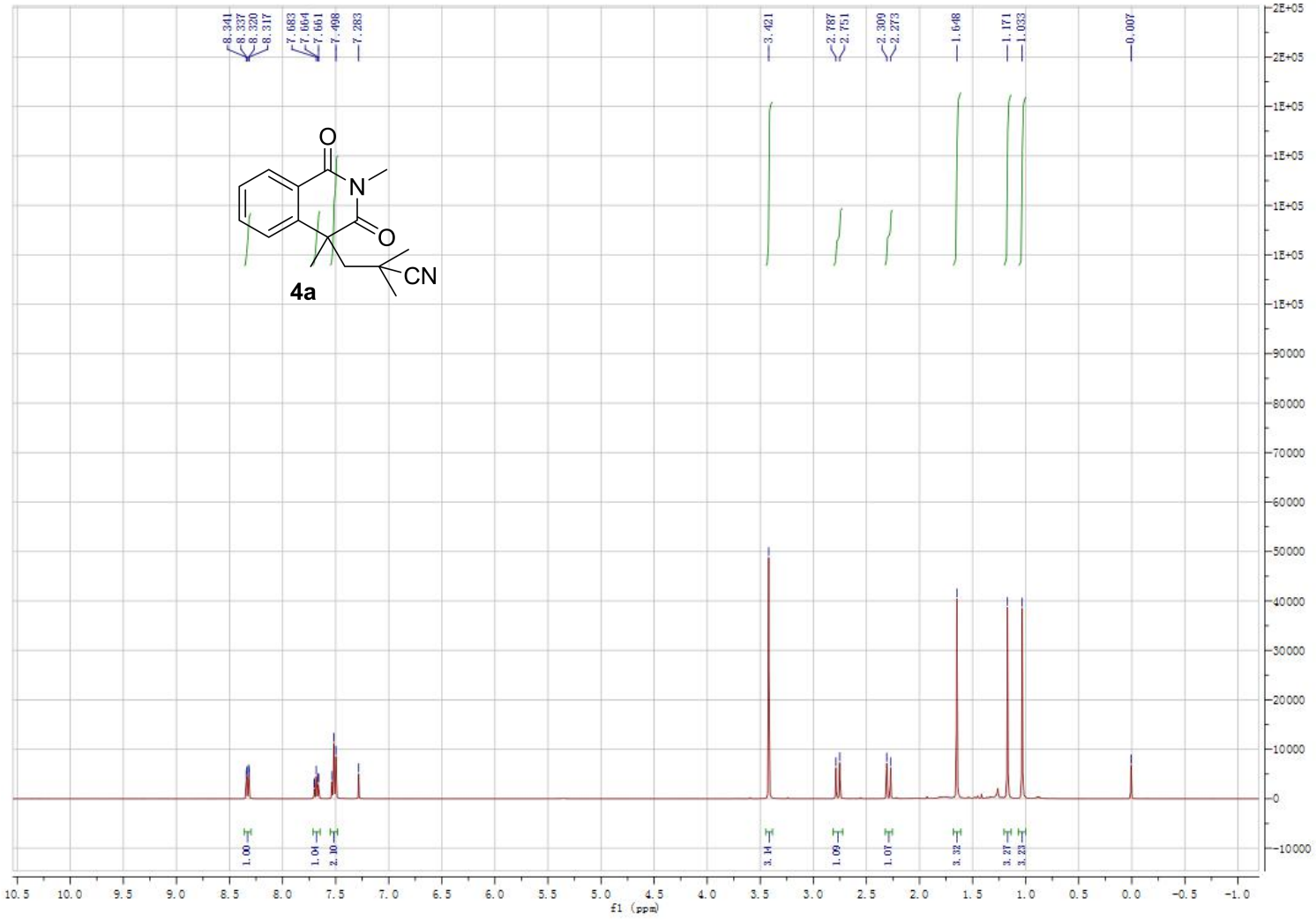
2-butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-henicosafluoroundecyl)-4,6-dimethylisoquinoline-1,3(2H,4H)-dione(3u).



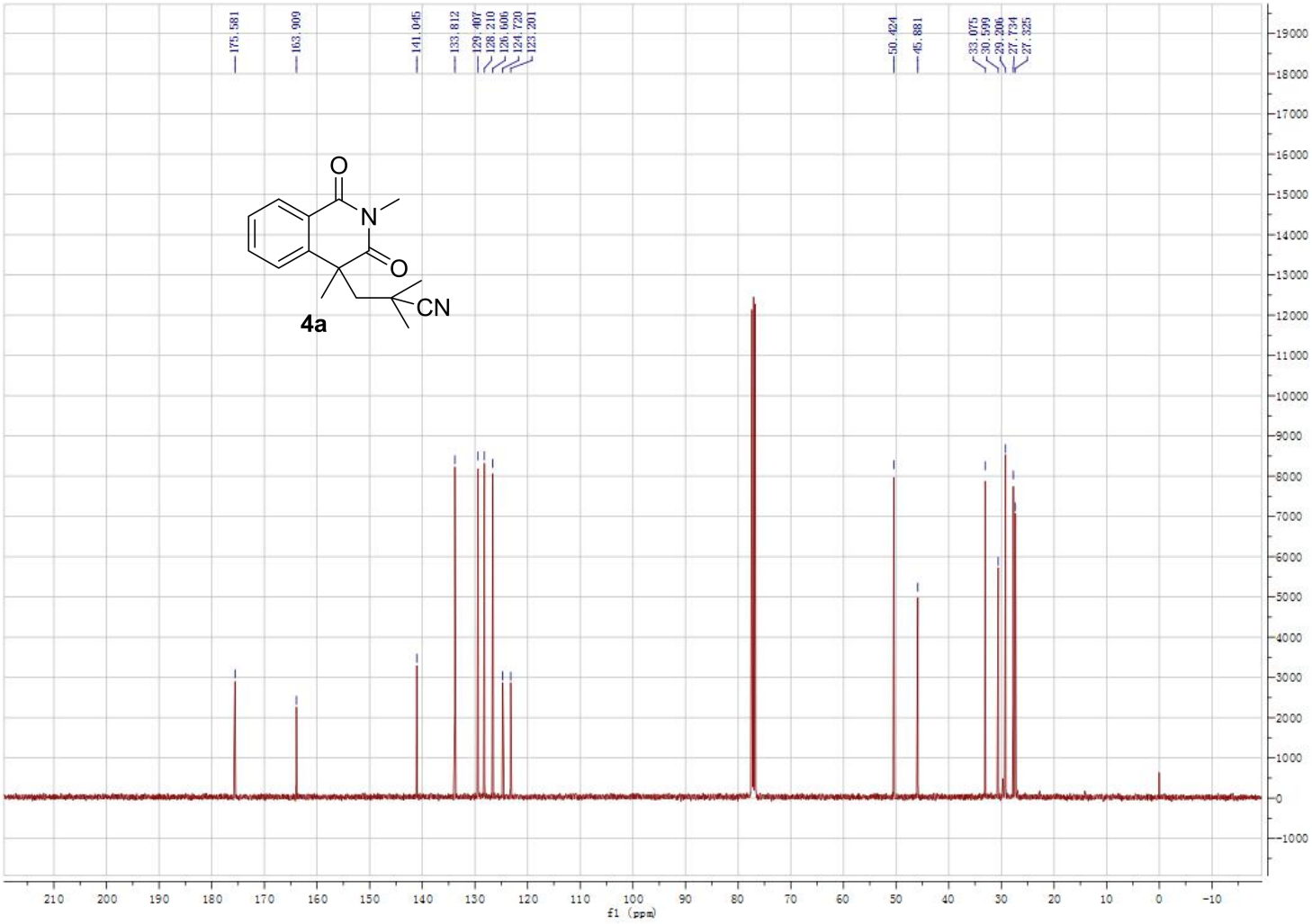
2-butyl-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-henicosafluoroundecyl)-4,6-dimethylisoquinoline-1,3(2H,4H)-dione(3u).



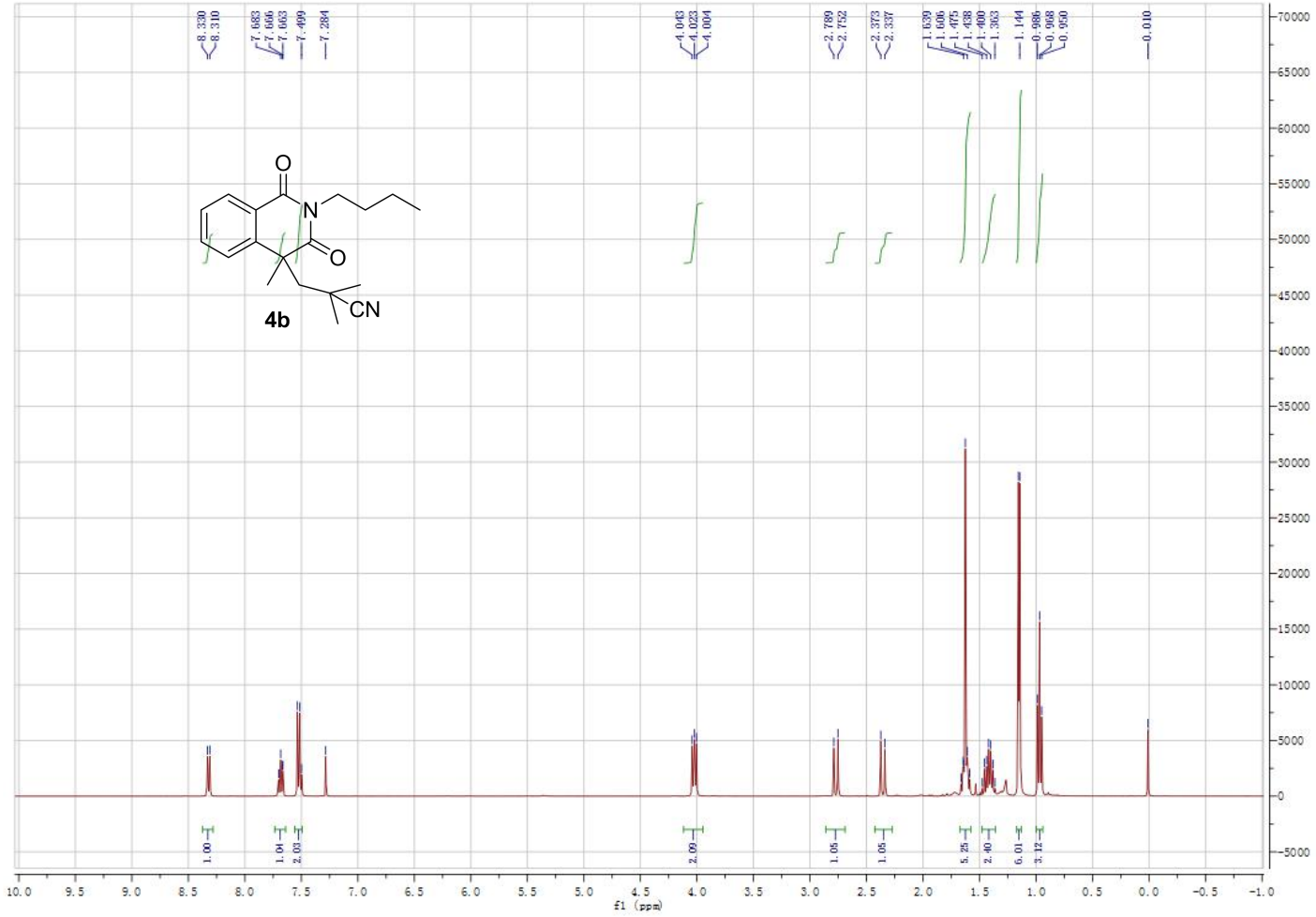
3-(2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4a).



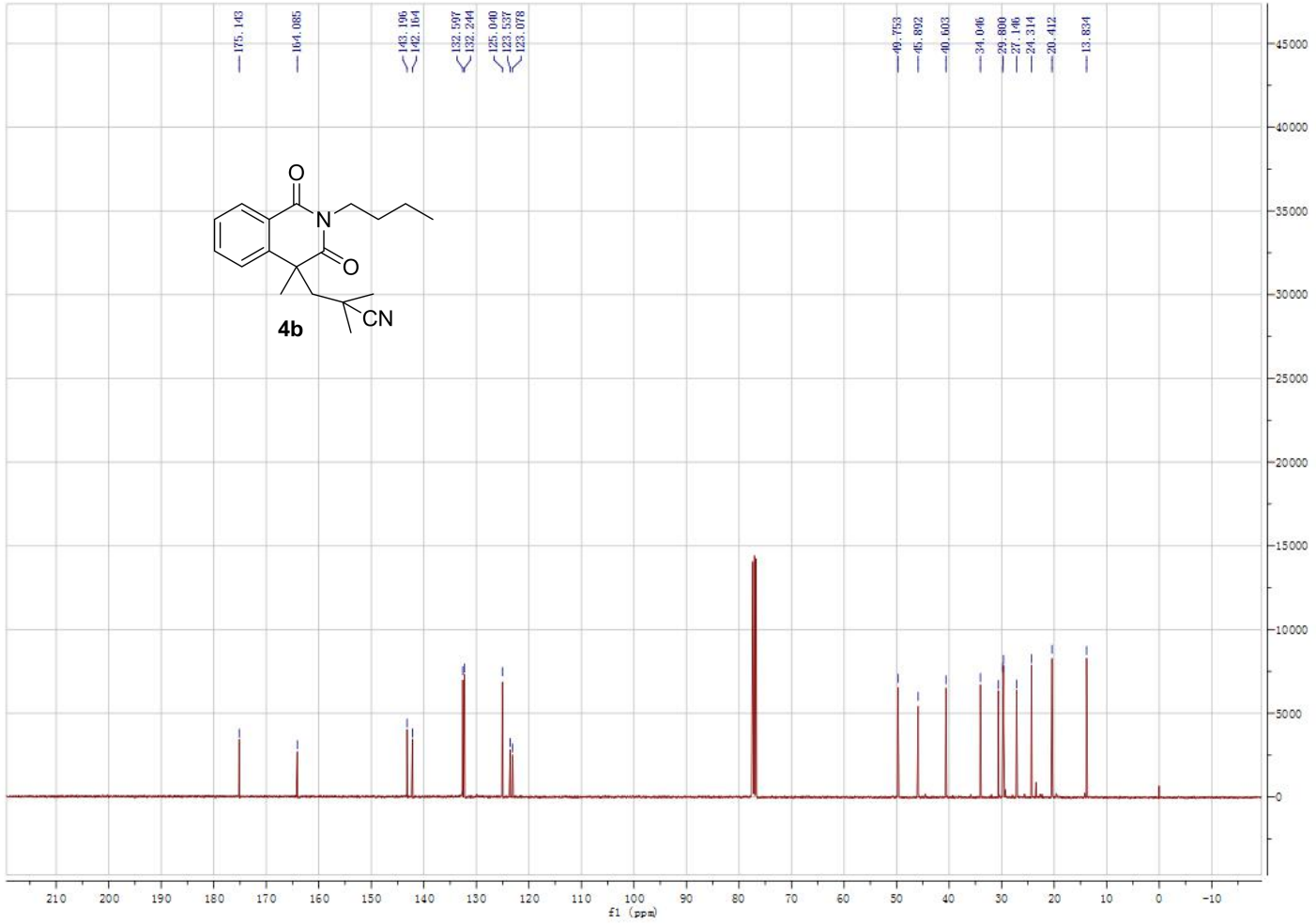
3-(2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4a).



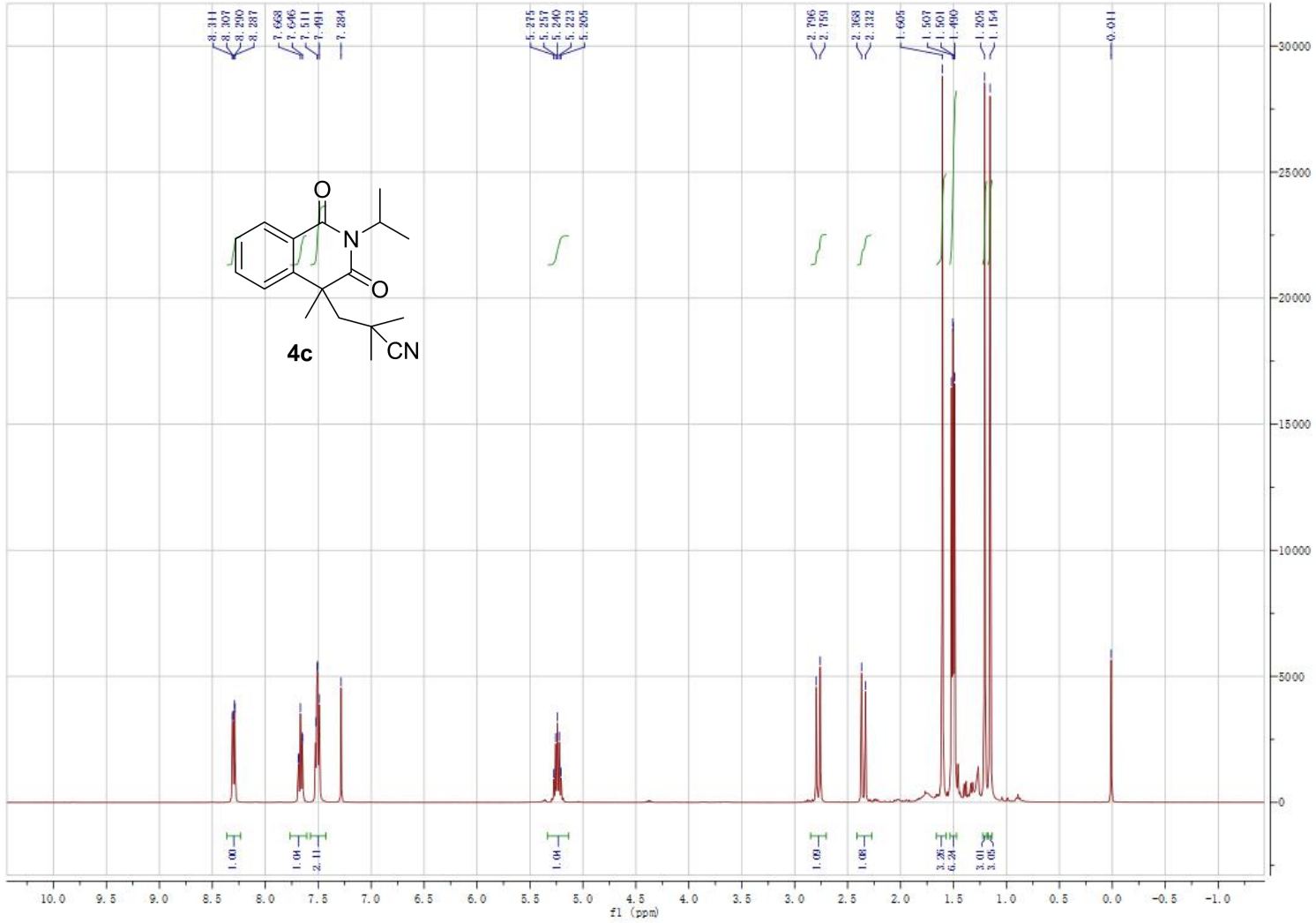
3-(2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4b).



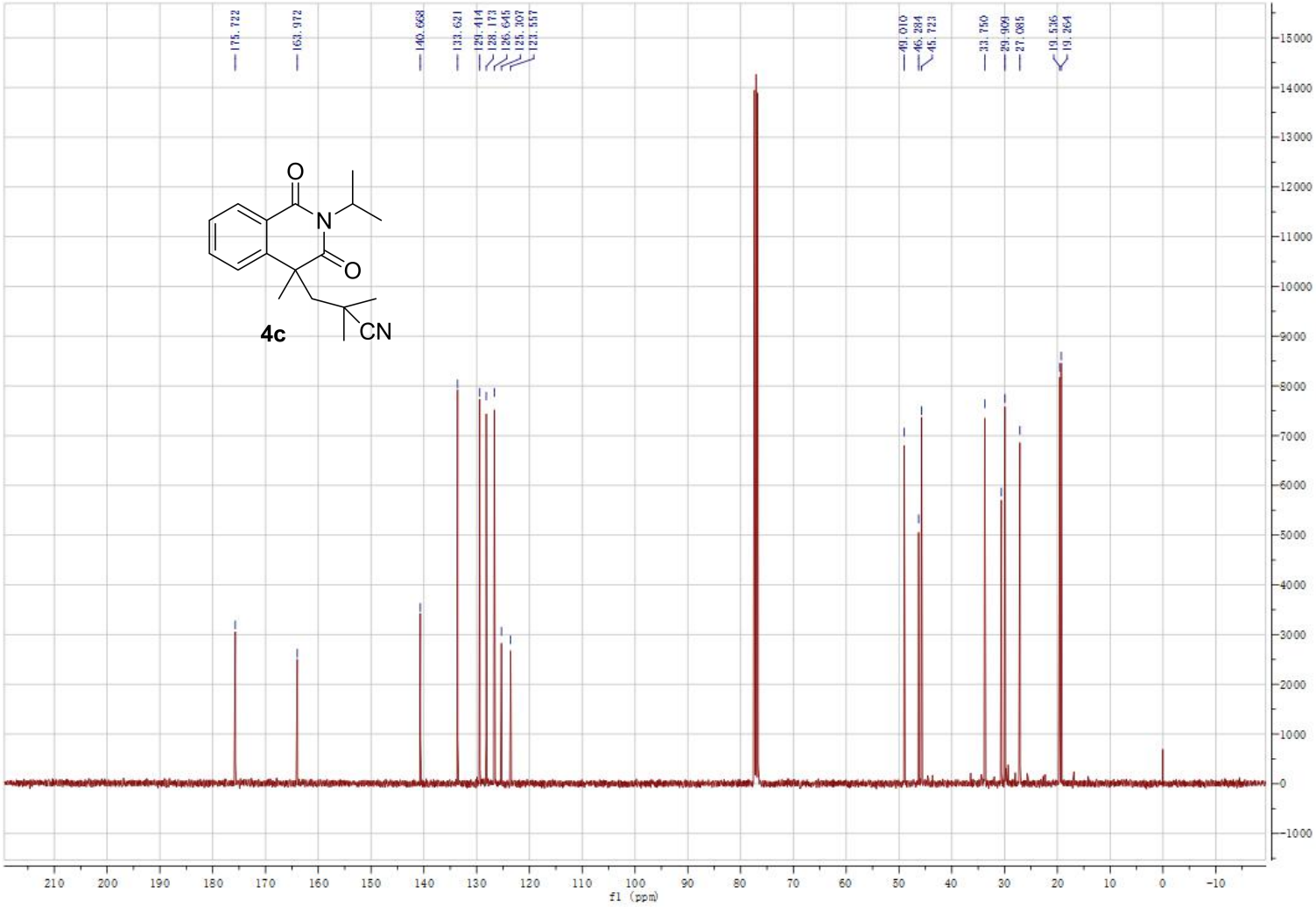
3-(2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4b).



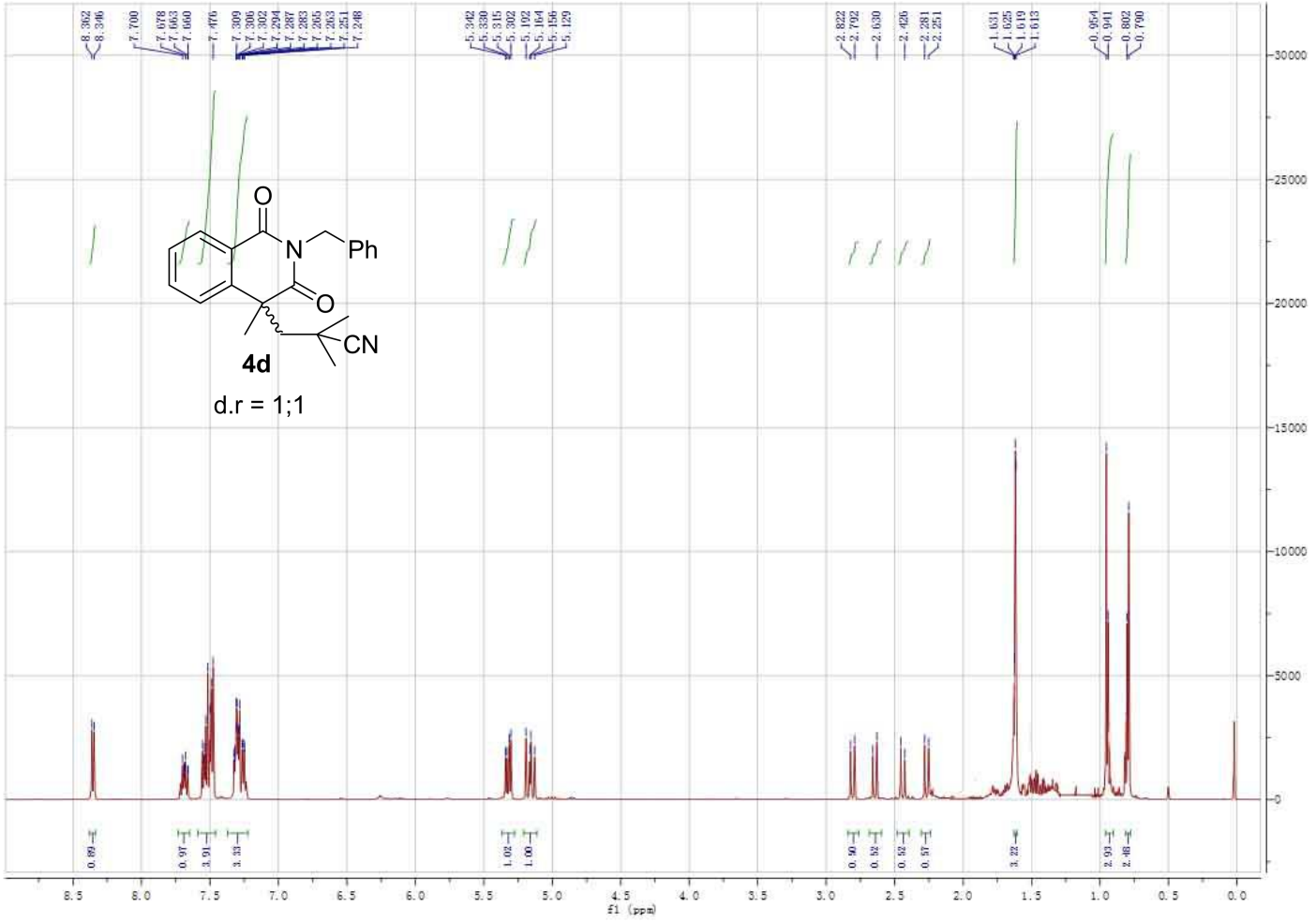
3-(2-isopropyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4c).



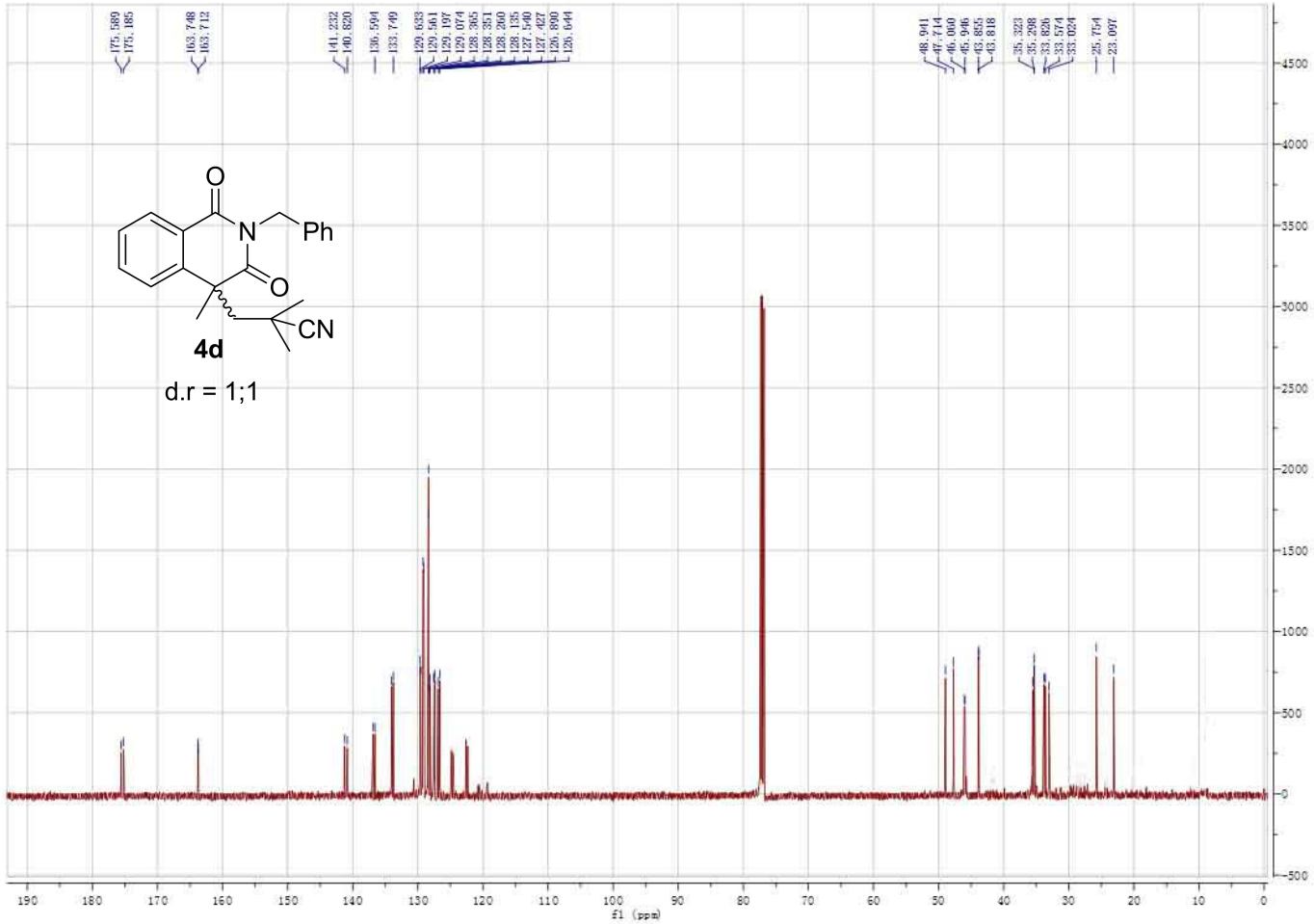
3-(2-isopropyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4c).



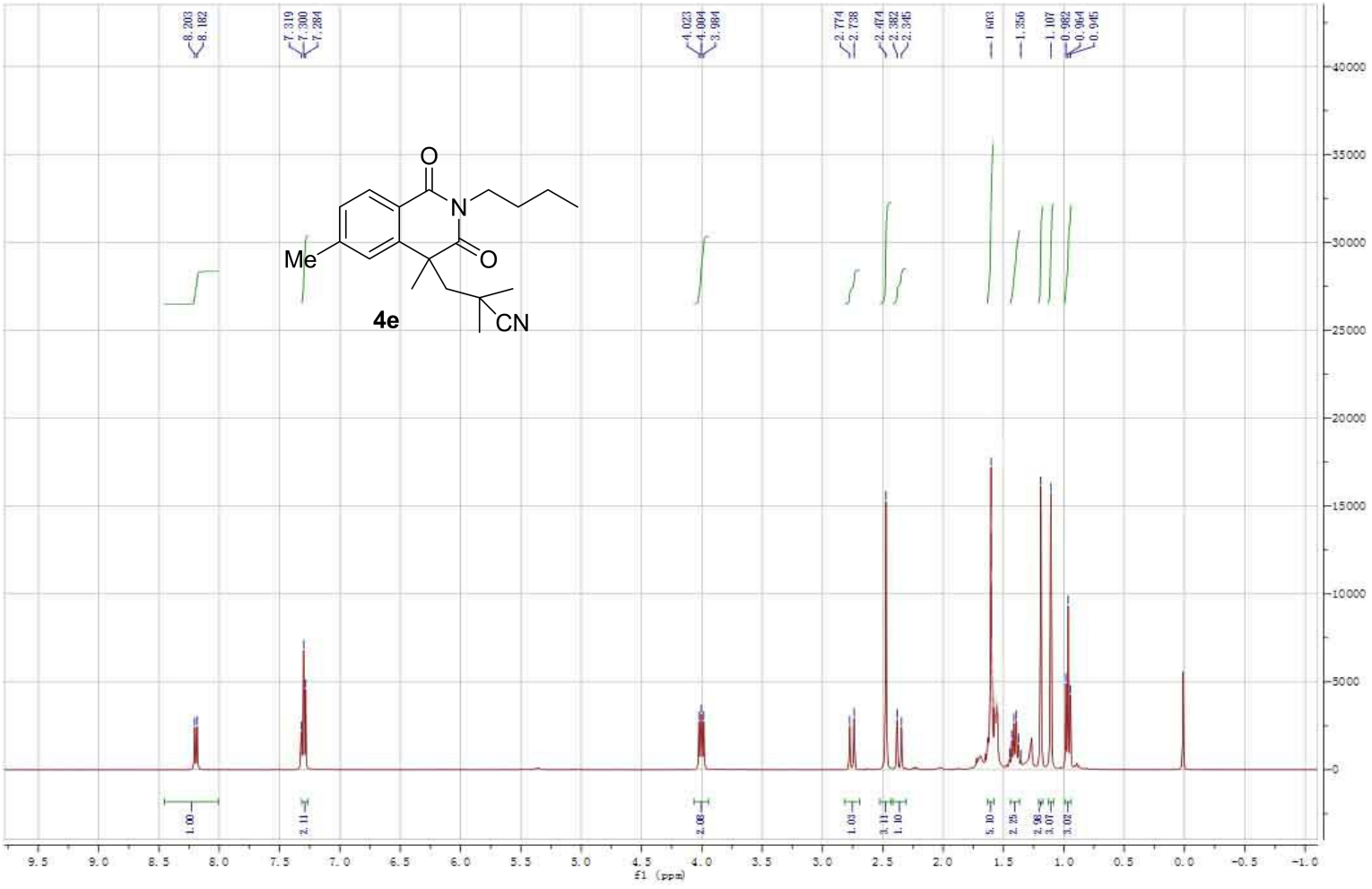
3-(2-benzyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4d).



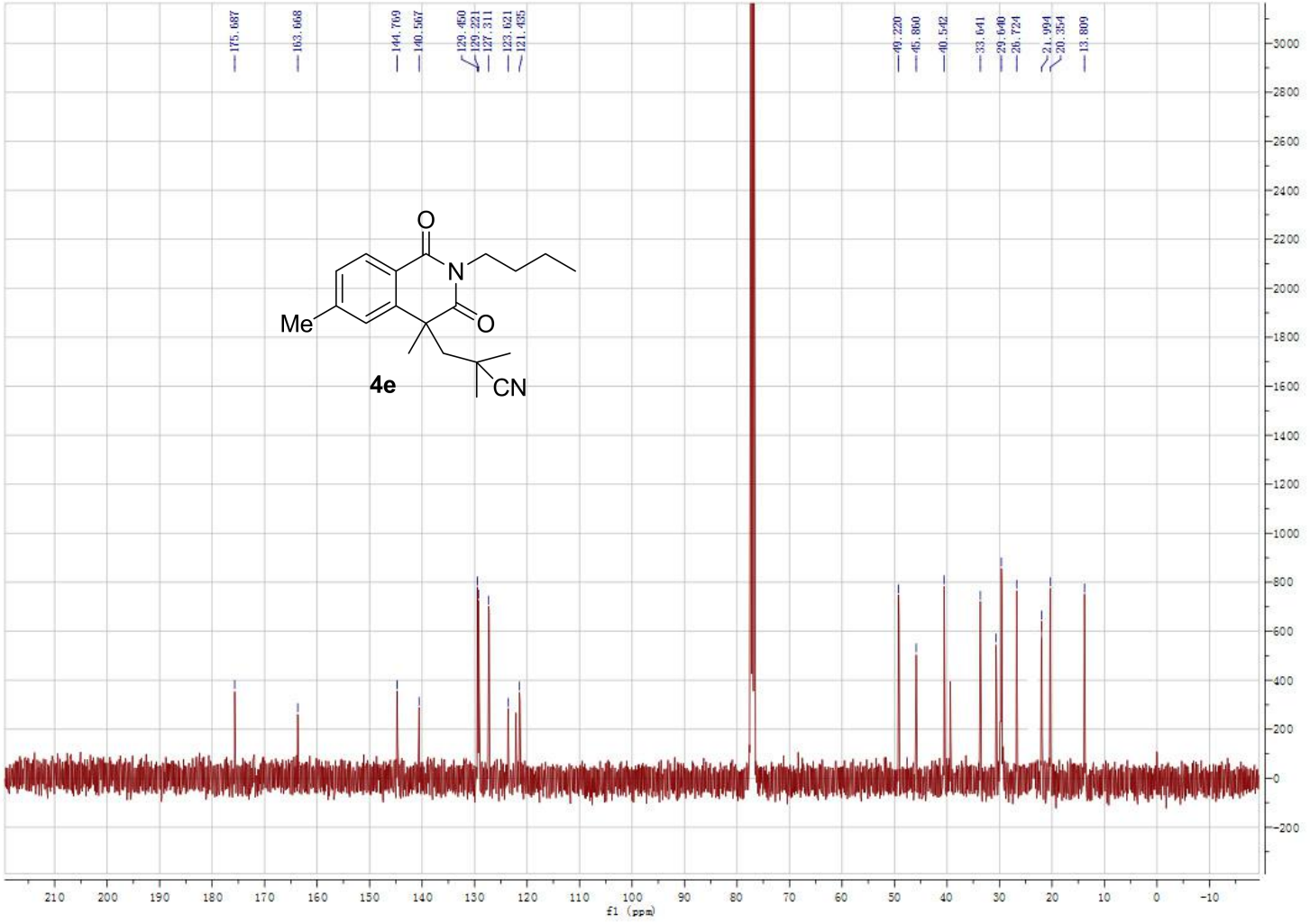
3-(2-benzyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4d)



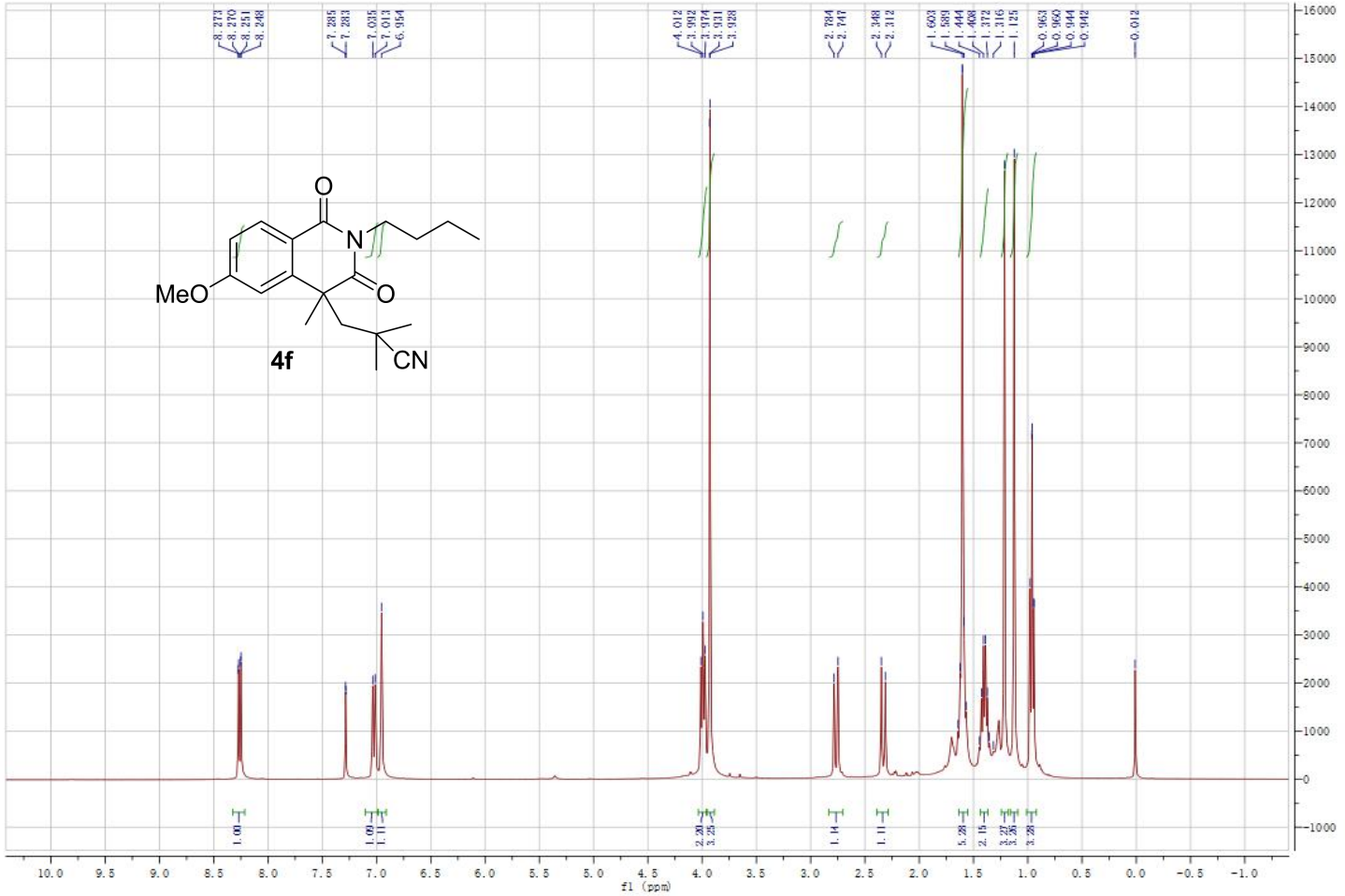
3-(2-butyl-4,6-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4e).



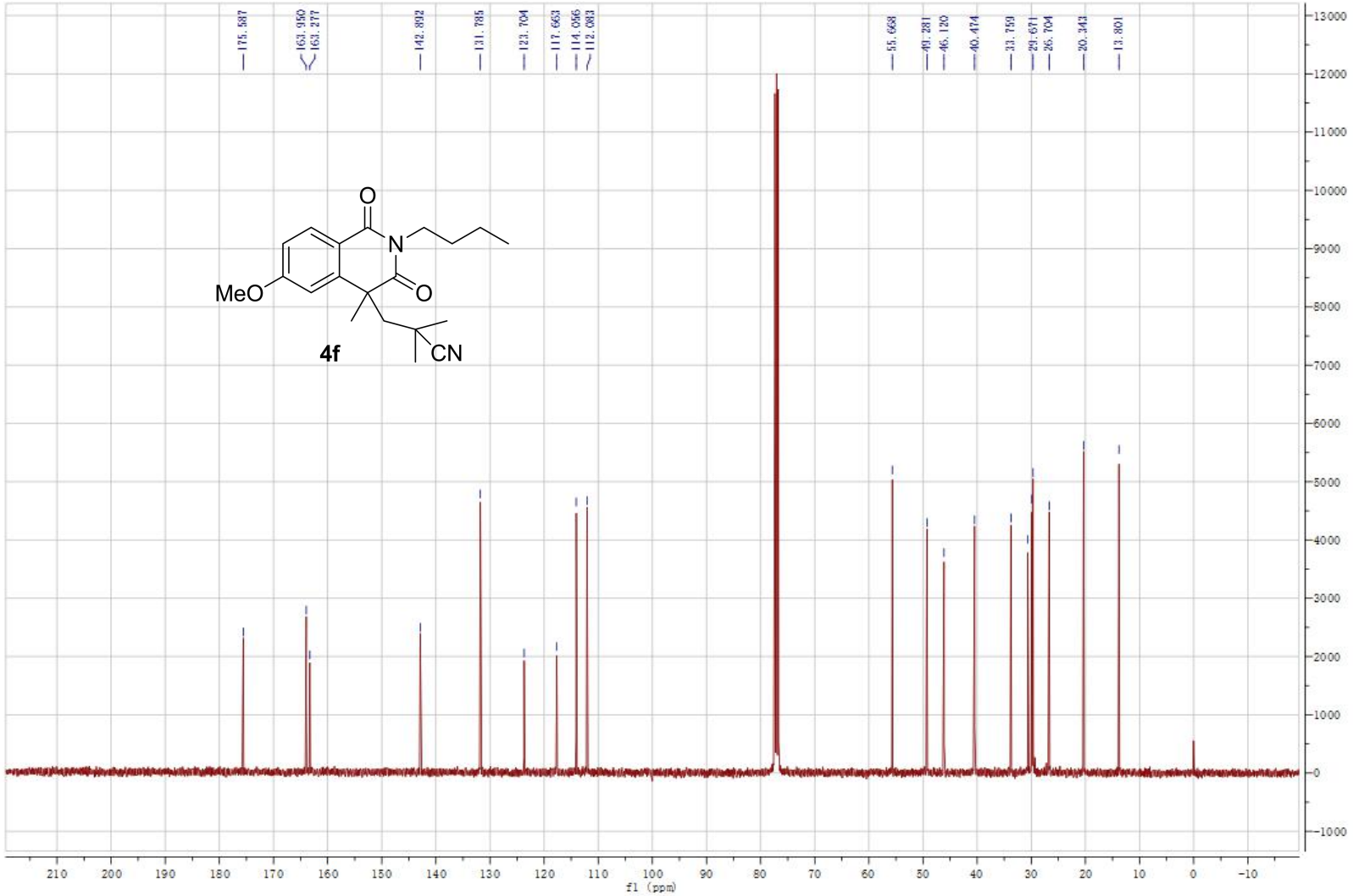
3-(2-Butyl-4,6-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4e).



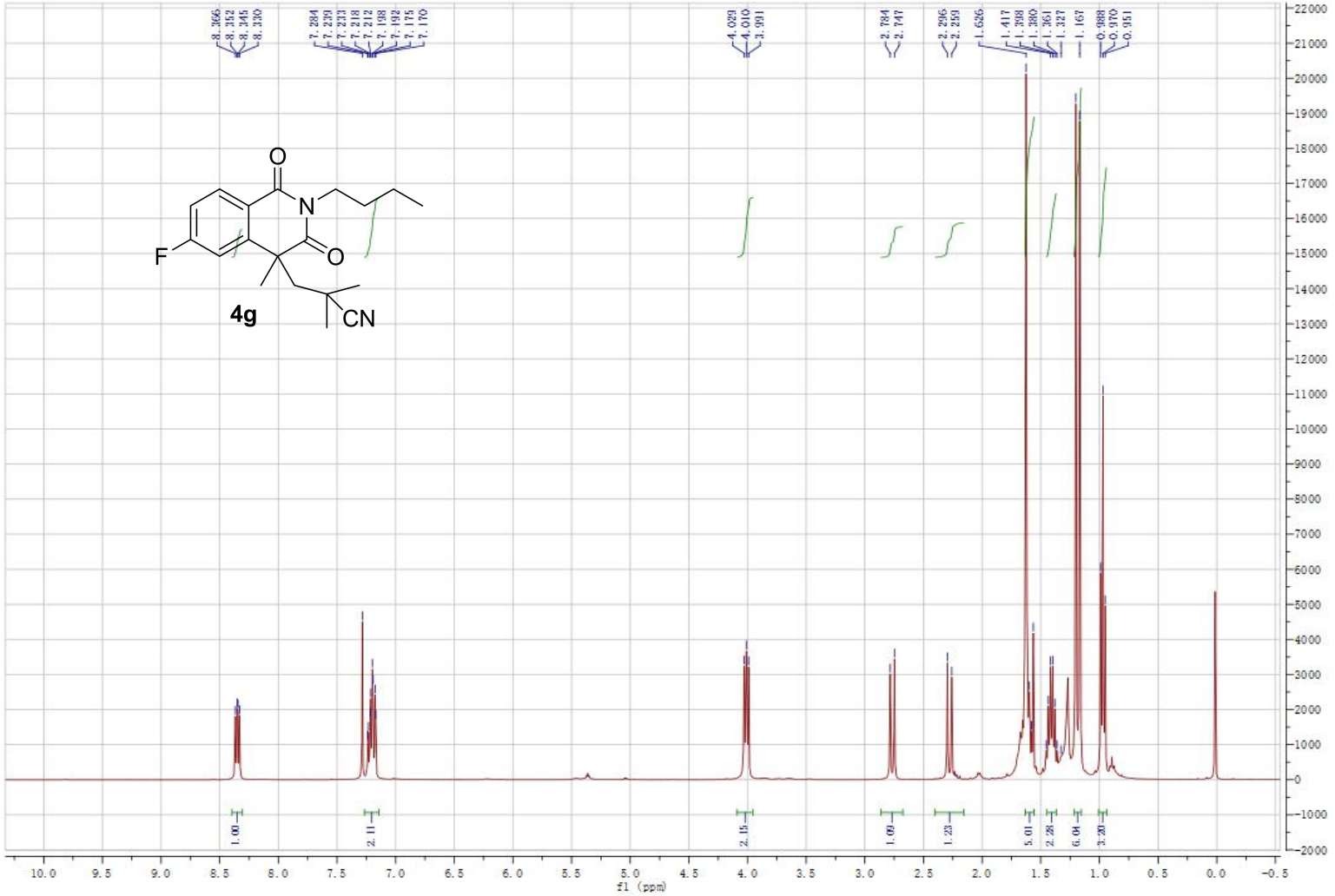
3-(2-butyl-6-methoxy-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4f).



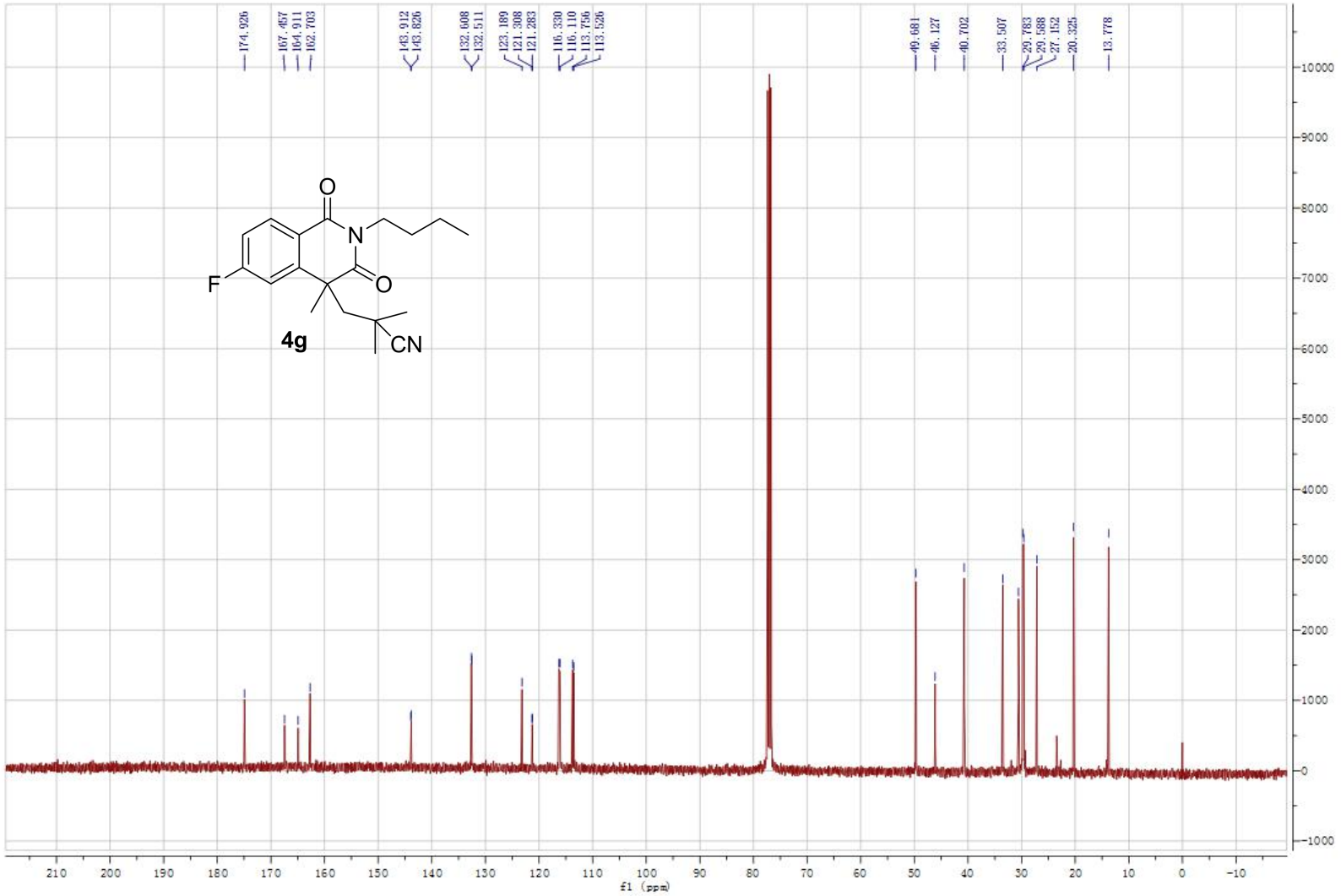
3-(2-butyl-6-methoxy-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4f).



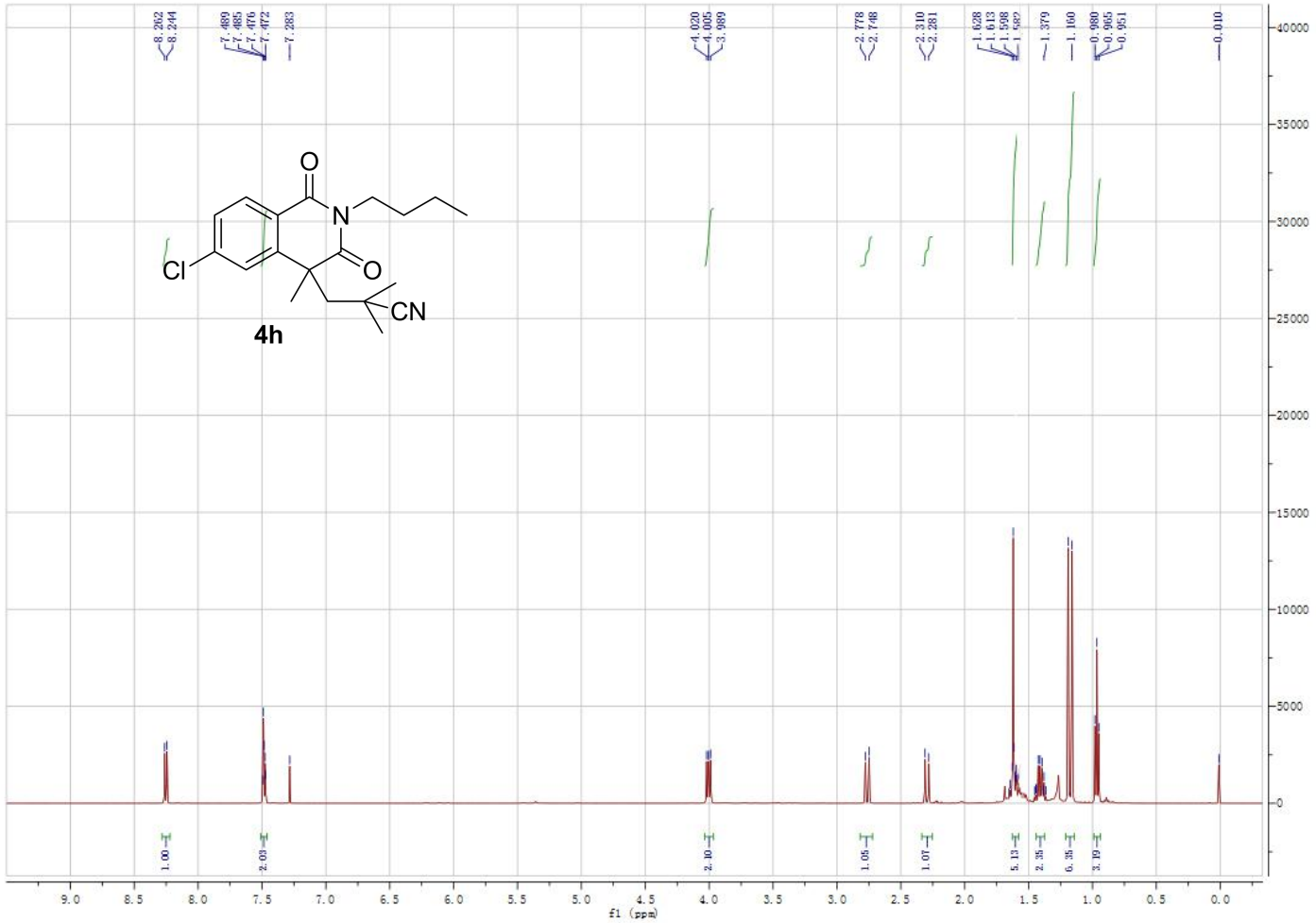
3-(2-butyl-6-fluoro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4g).



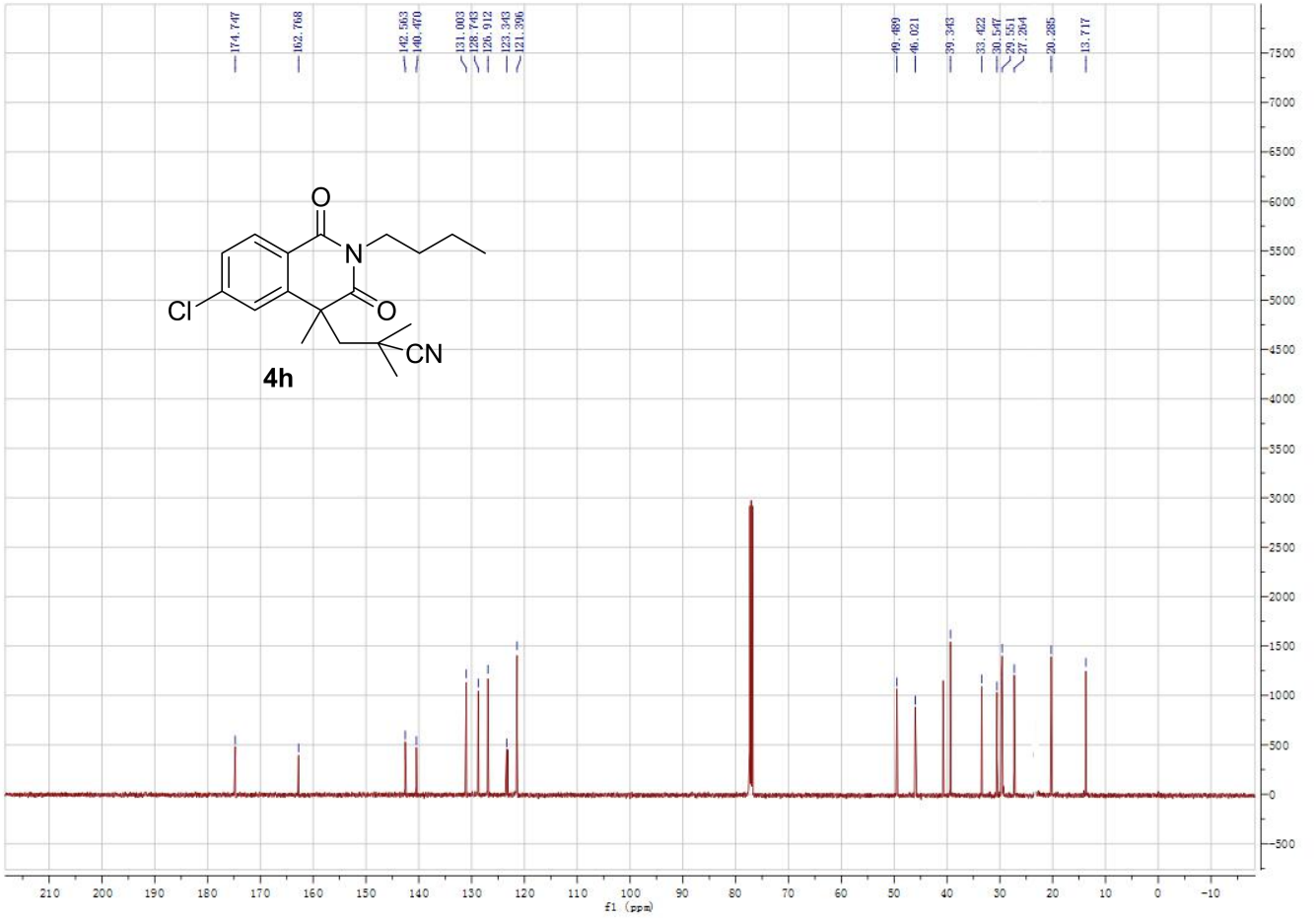
3-(2-butyl-6-fluoro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4g).



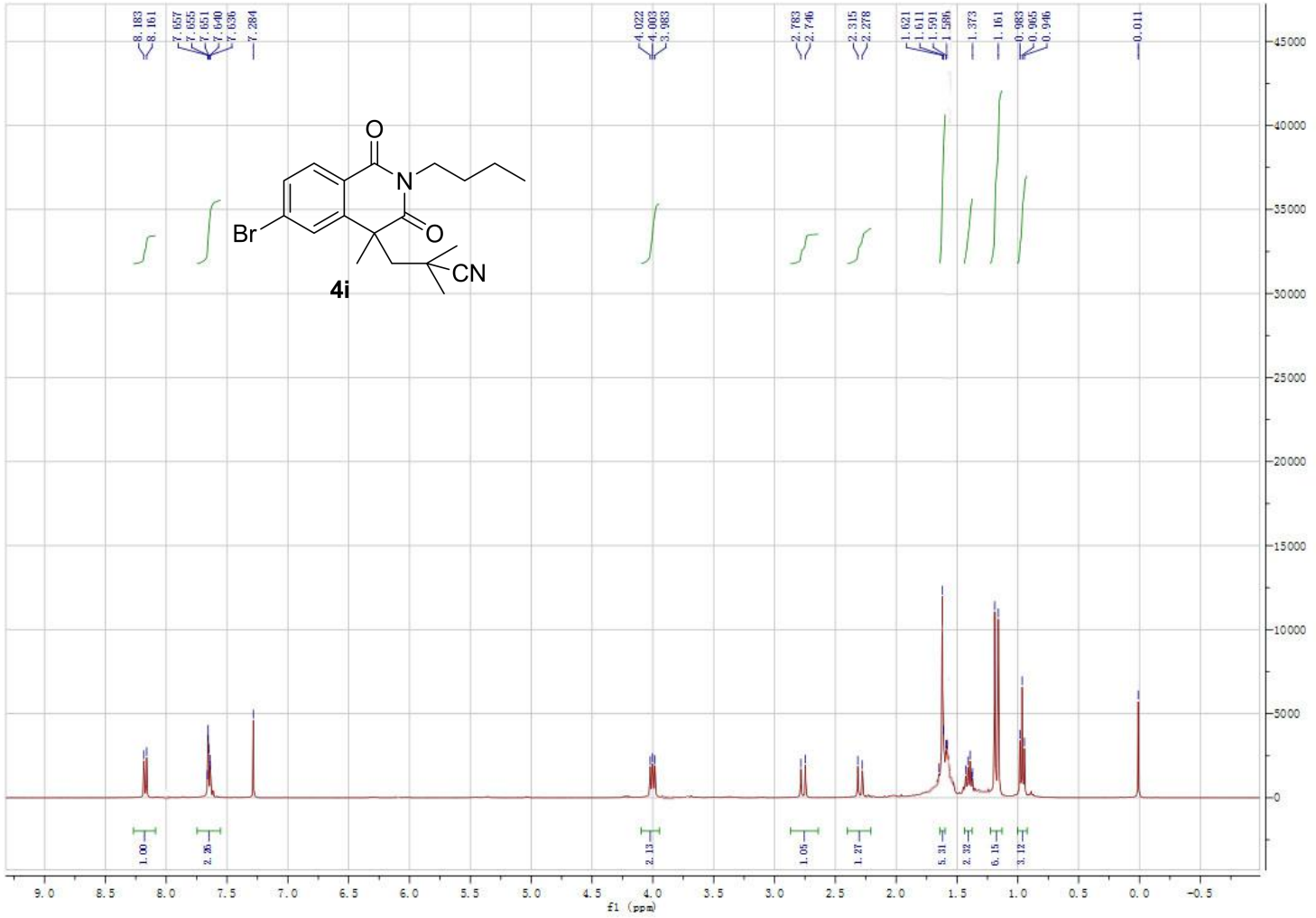
3-(2-butyl-6-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4h).



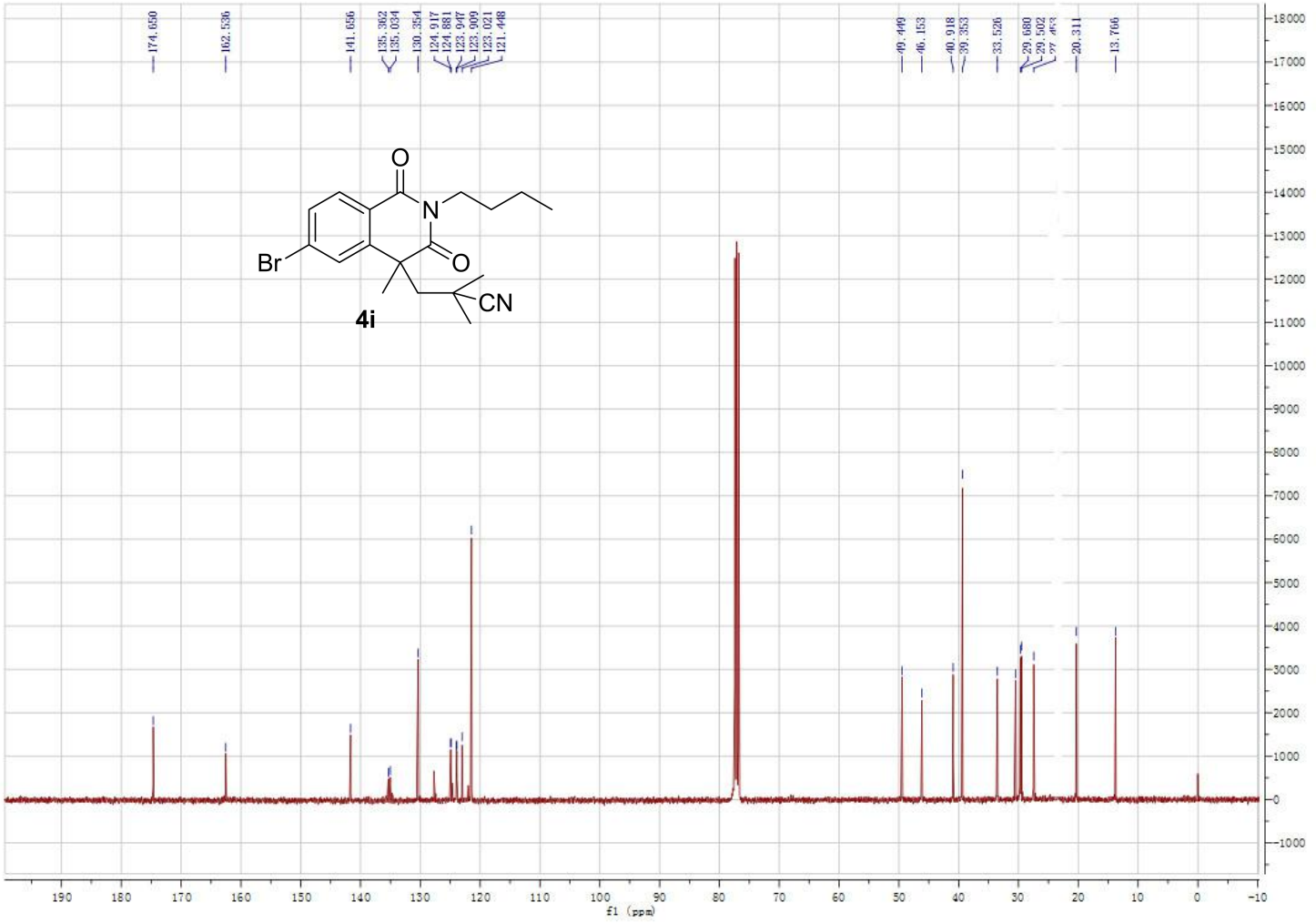
3-(2-butyl-6-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4h).



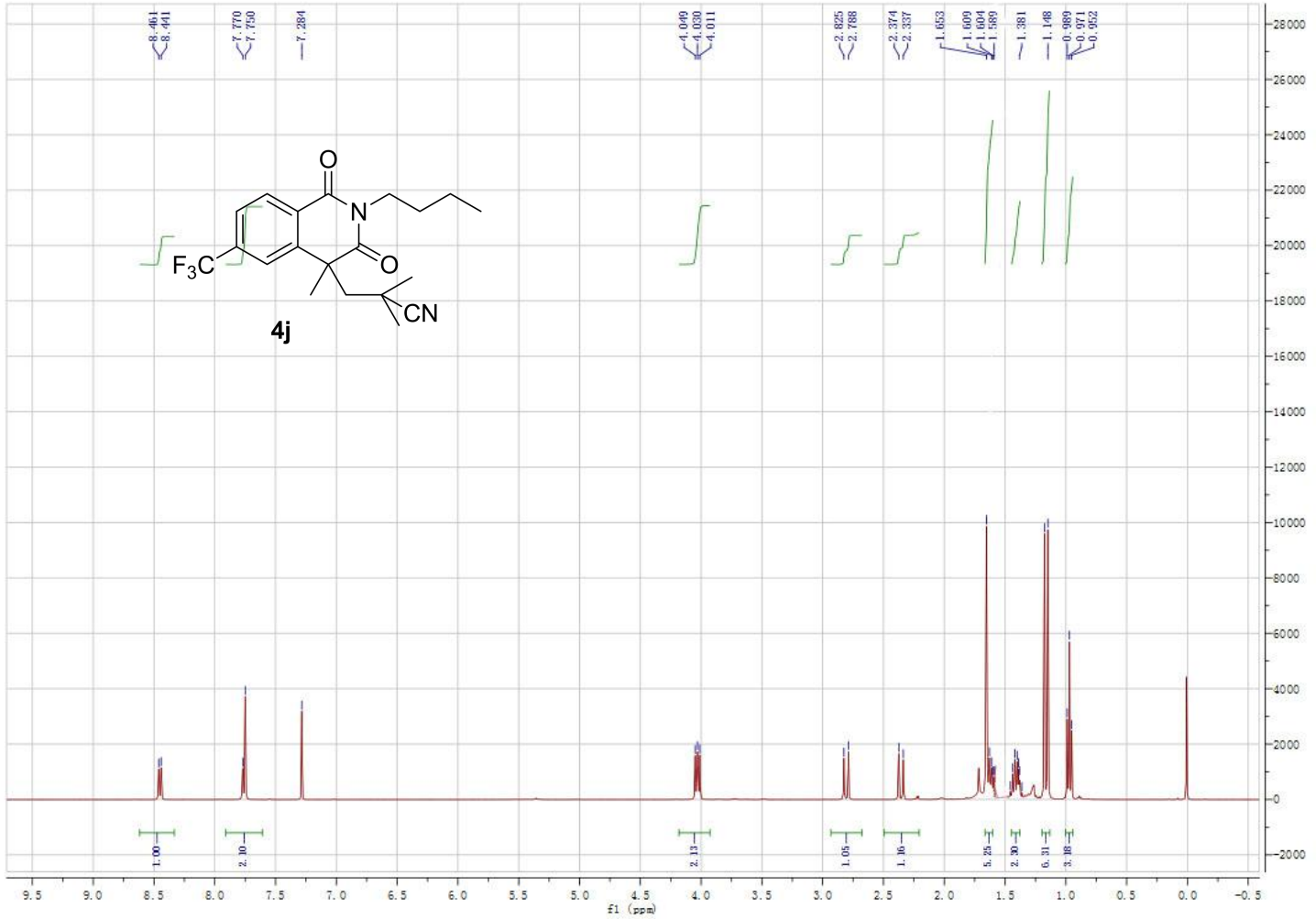
3-(6-bromo-2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4i).



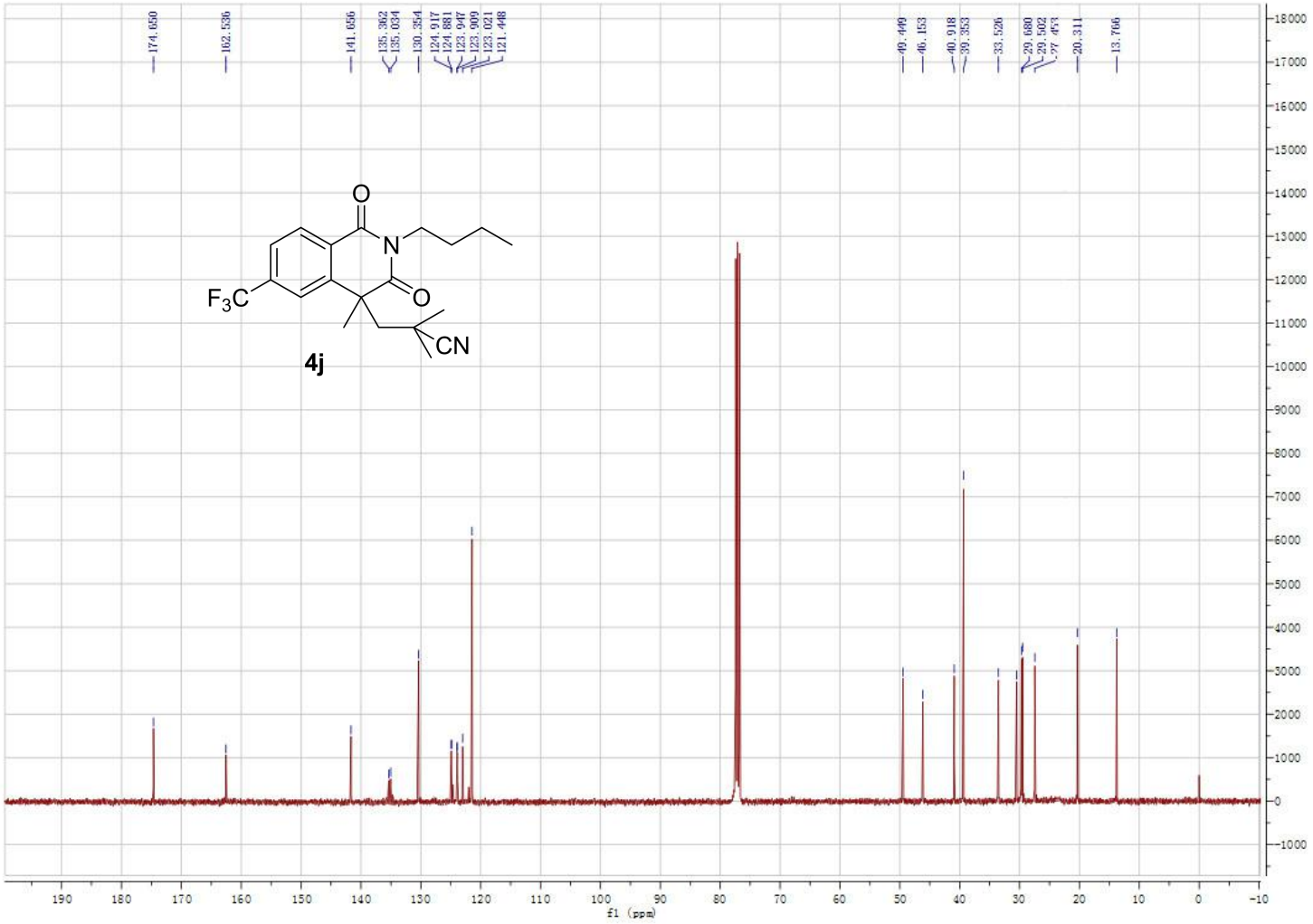
3-(6-bromo-2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4i).



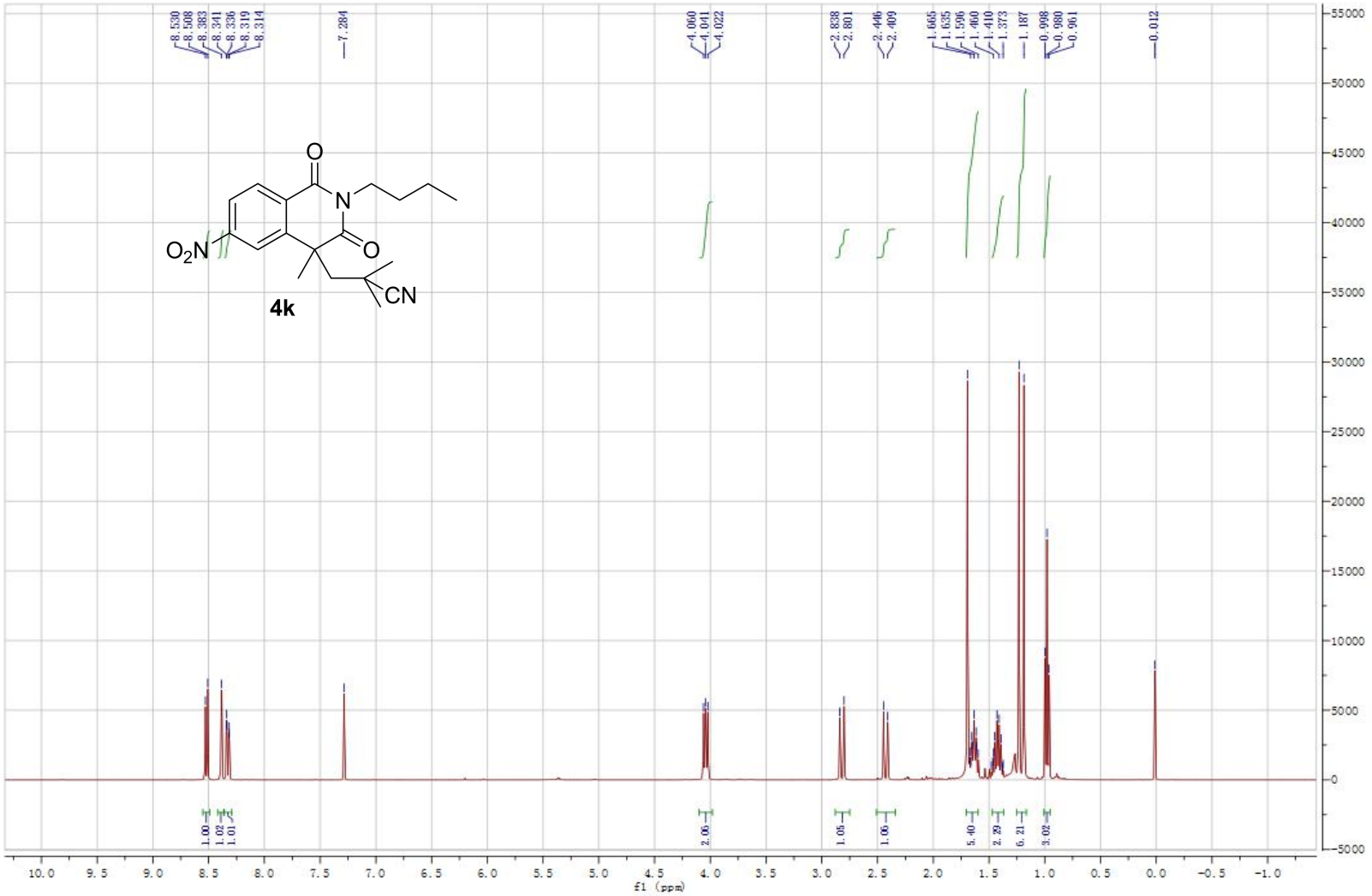
3-(2-butyl-4-methyl-1,3-dioxo-6-(trifluoromethyl)-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4j).



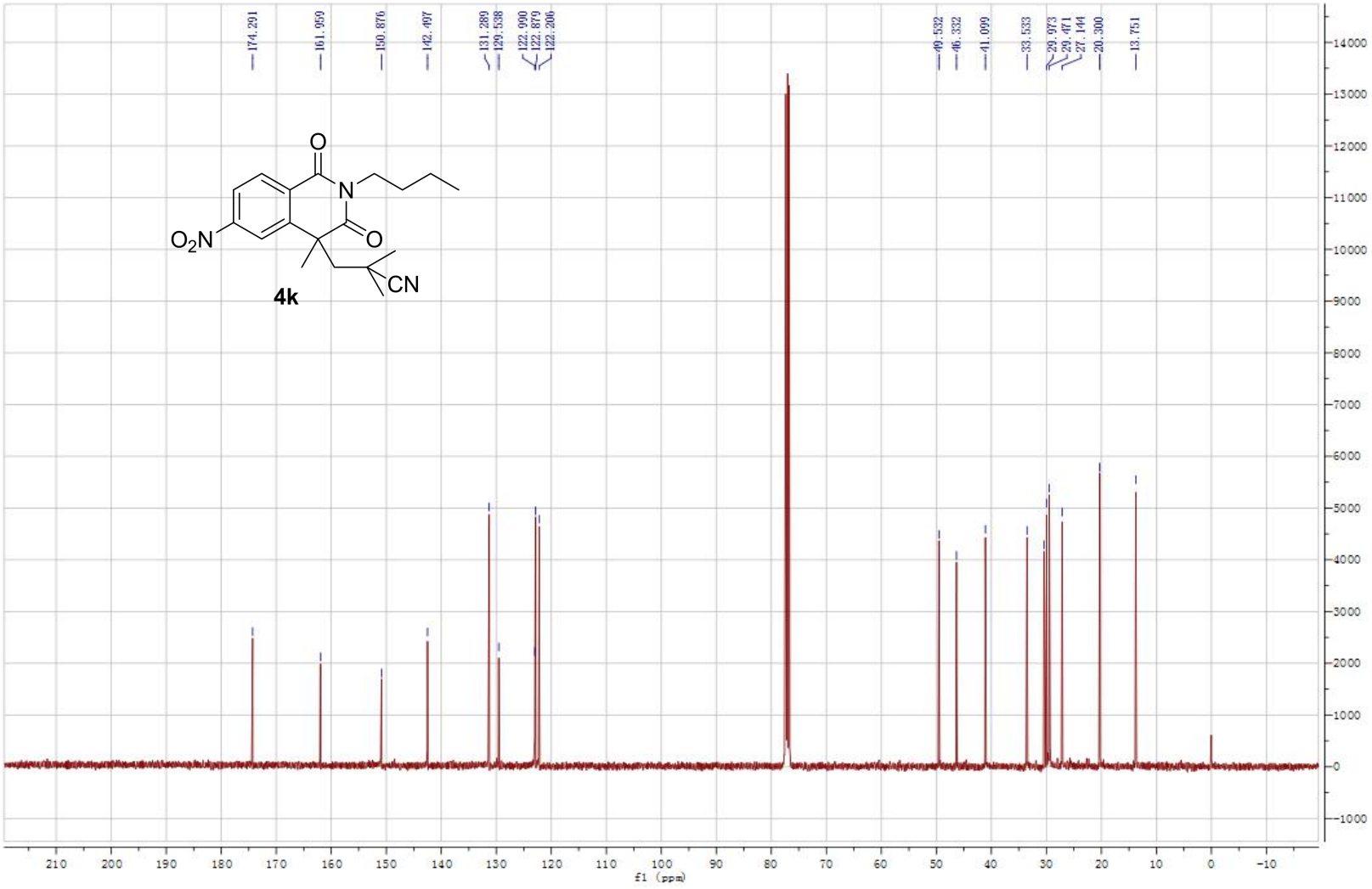
3-(2-butyl-4-methyl-1,3-dioxo-6-(trifluoromethyl)-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4j).



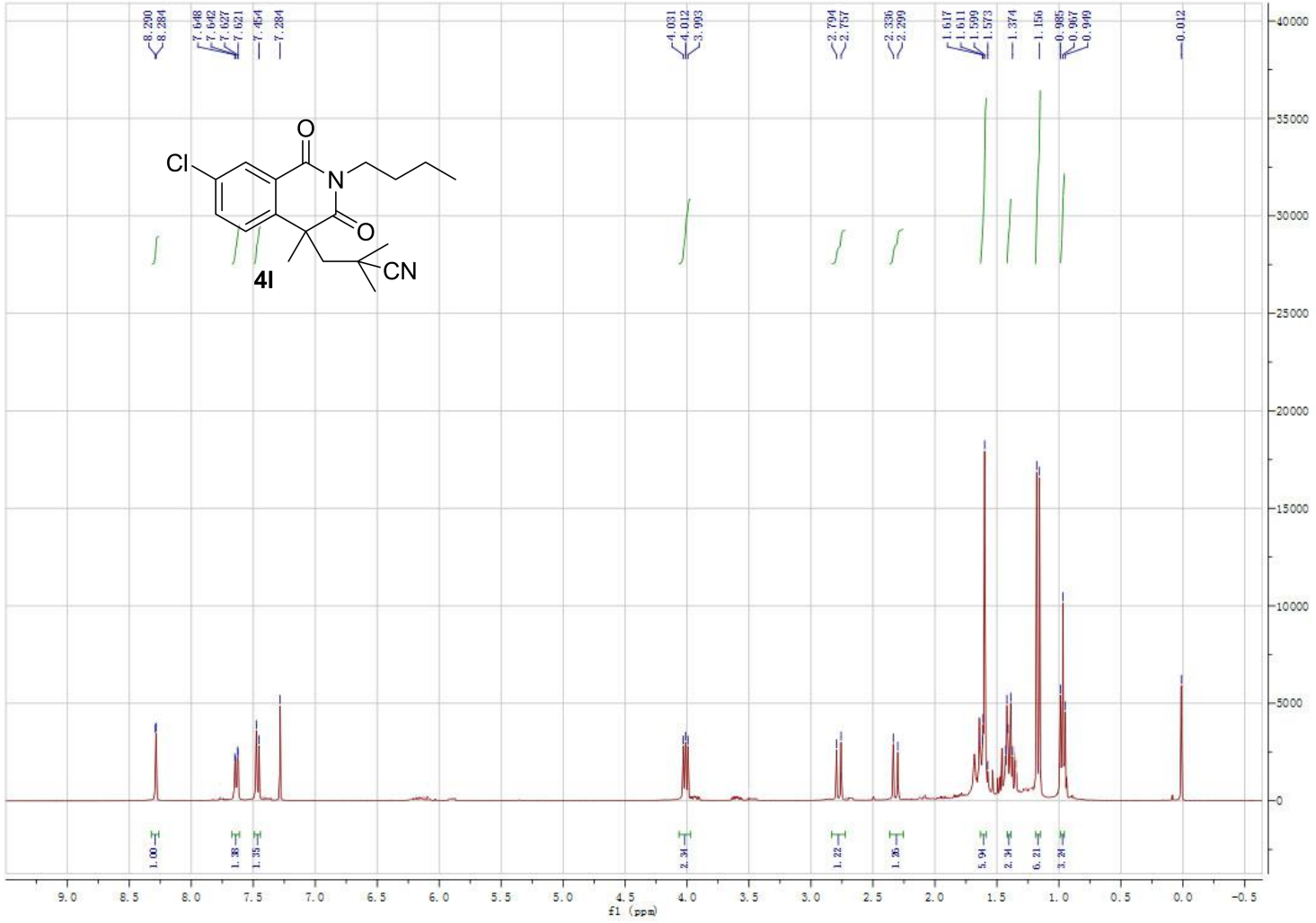
3-(2-butyl-4-methyl-6-nitro-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4k).



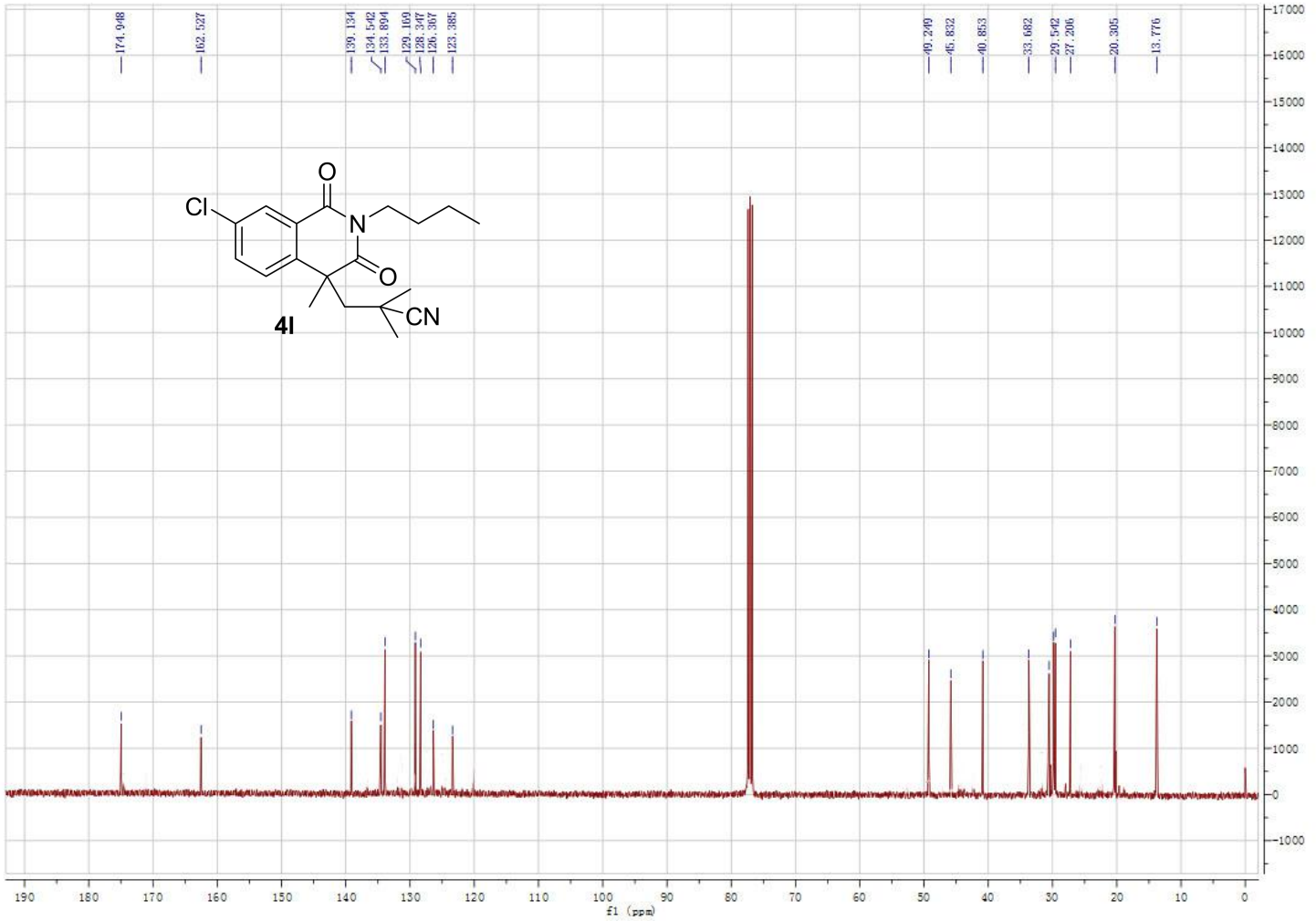
3-(2-butyl-4-methyl-6-nitro-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4k).



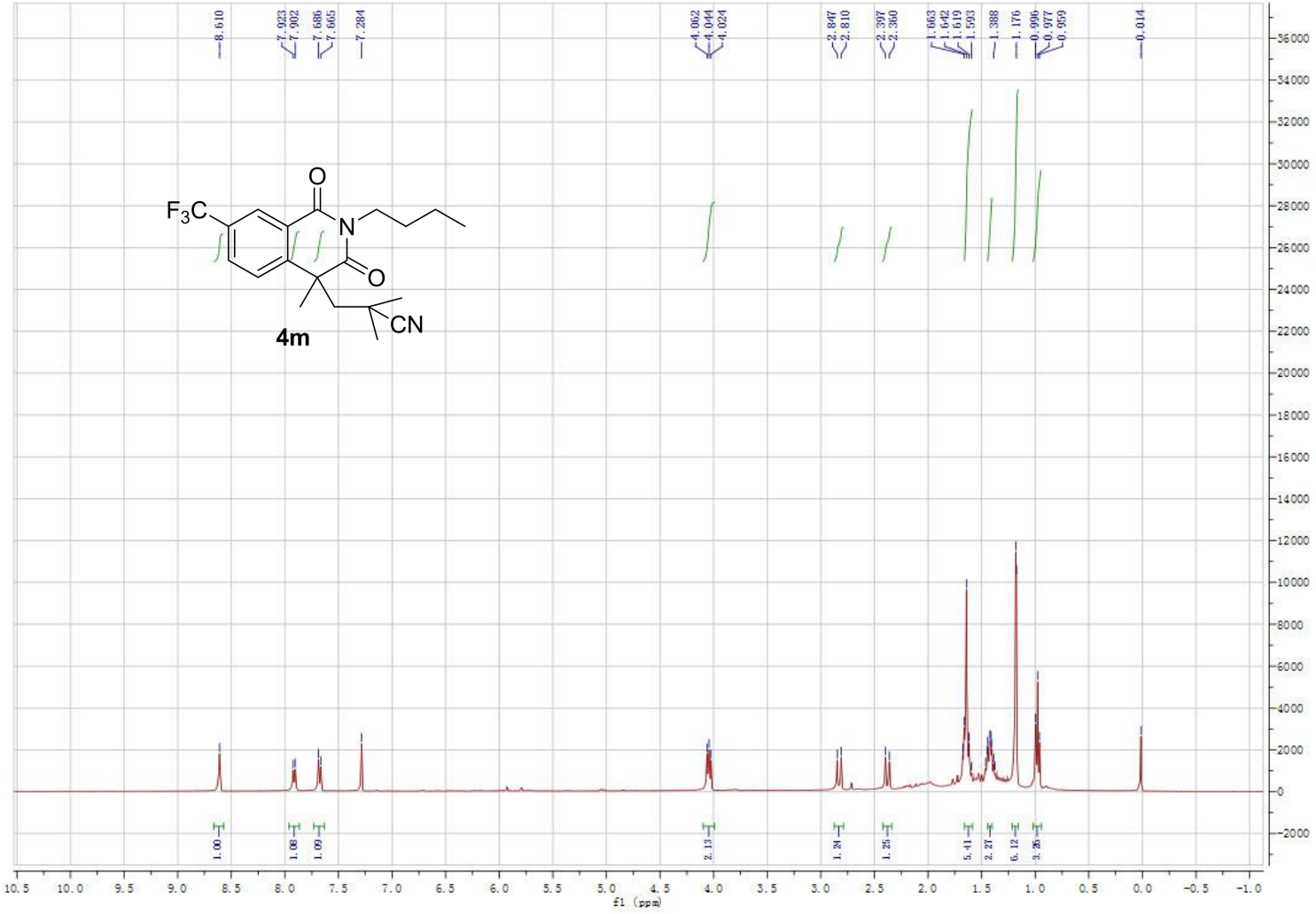
3-(2-butyl-7-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4l).



3-(2-butyl-7-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4l).



3-(2-butyl-4-methyl-1,3-dioxo-7-(trifluoromethyl)-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4m).



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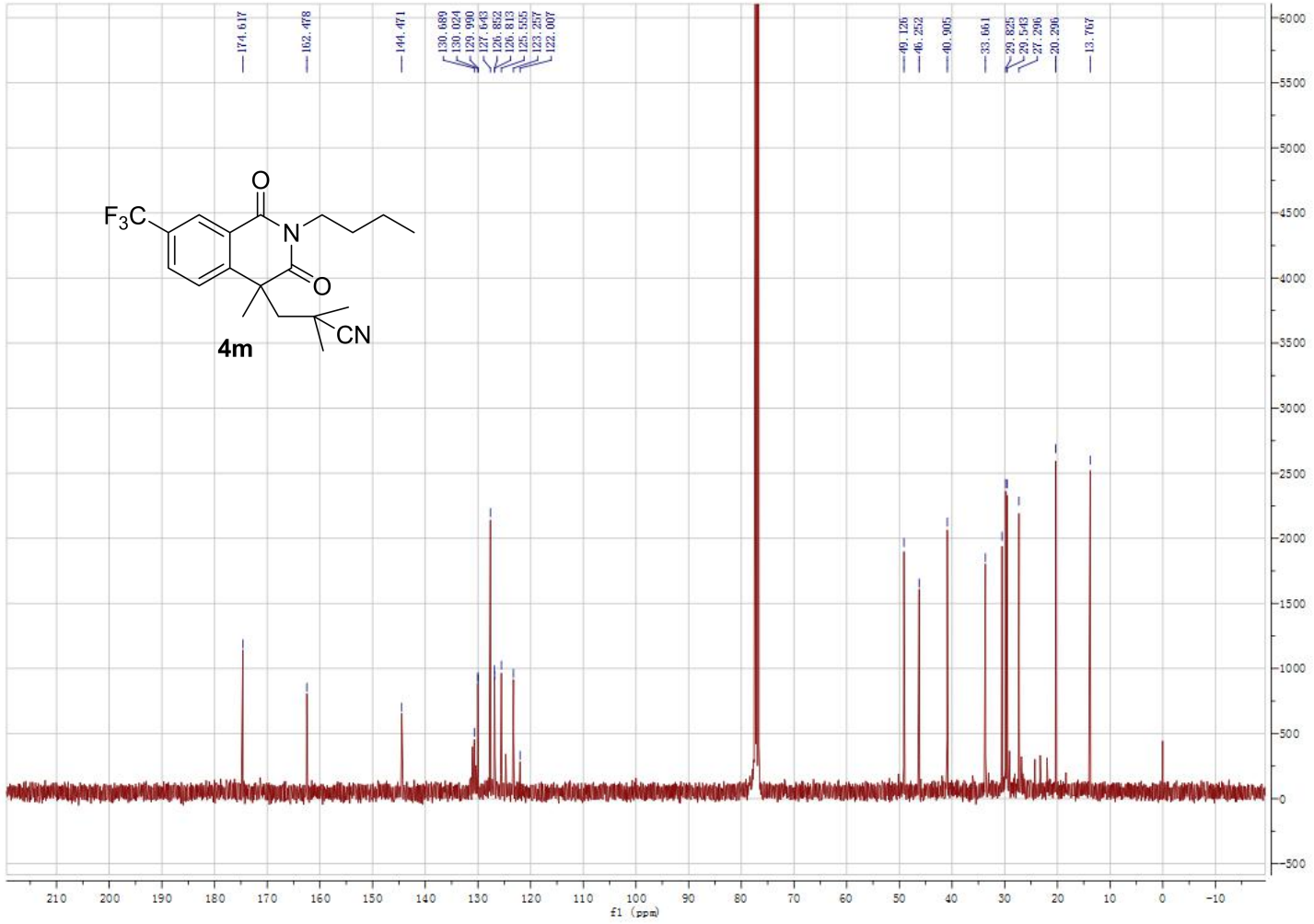
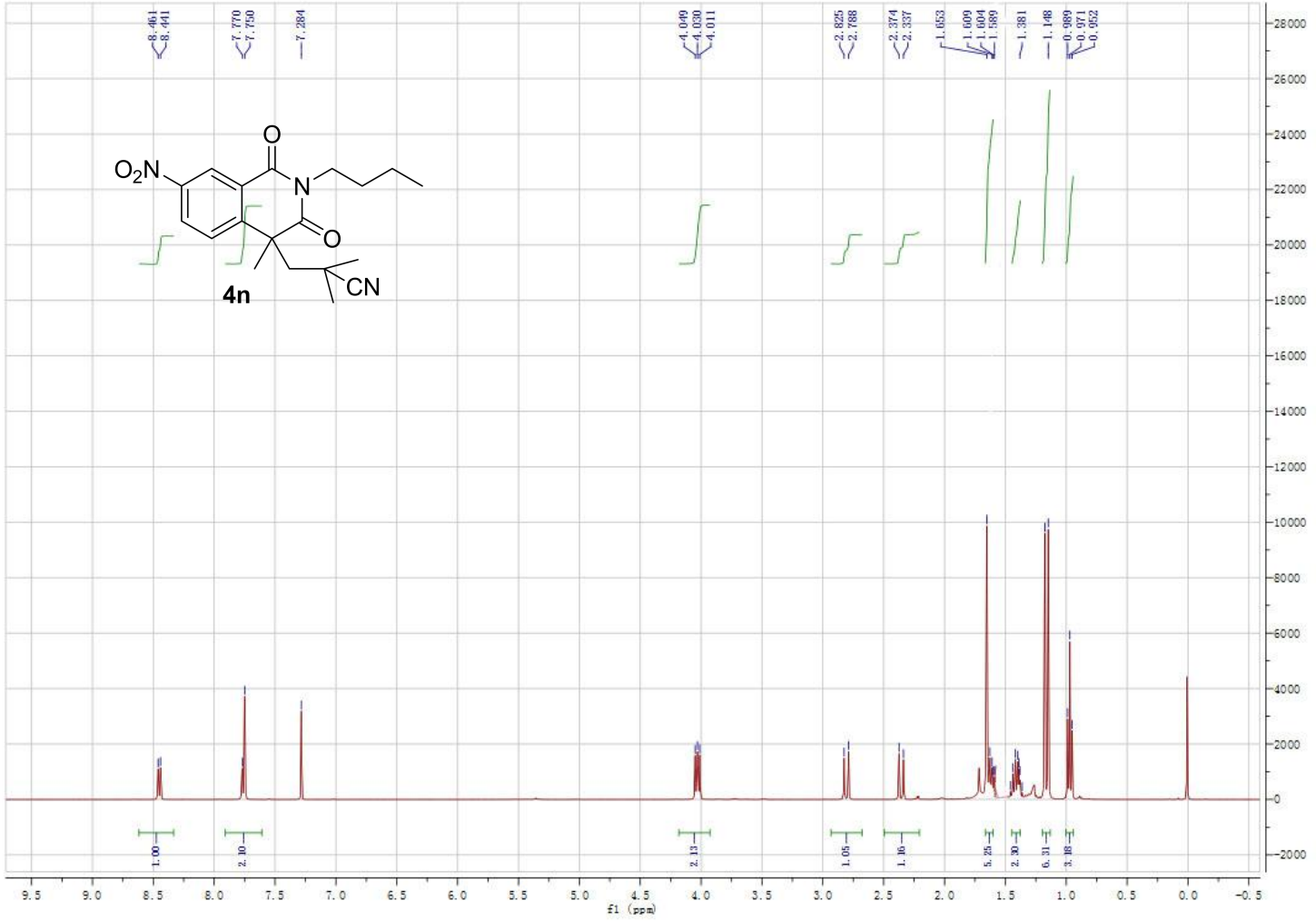
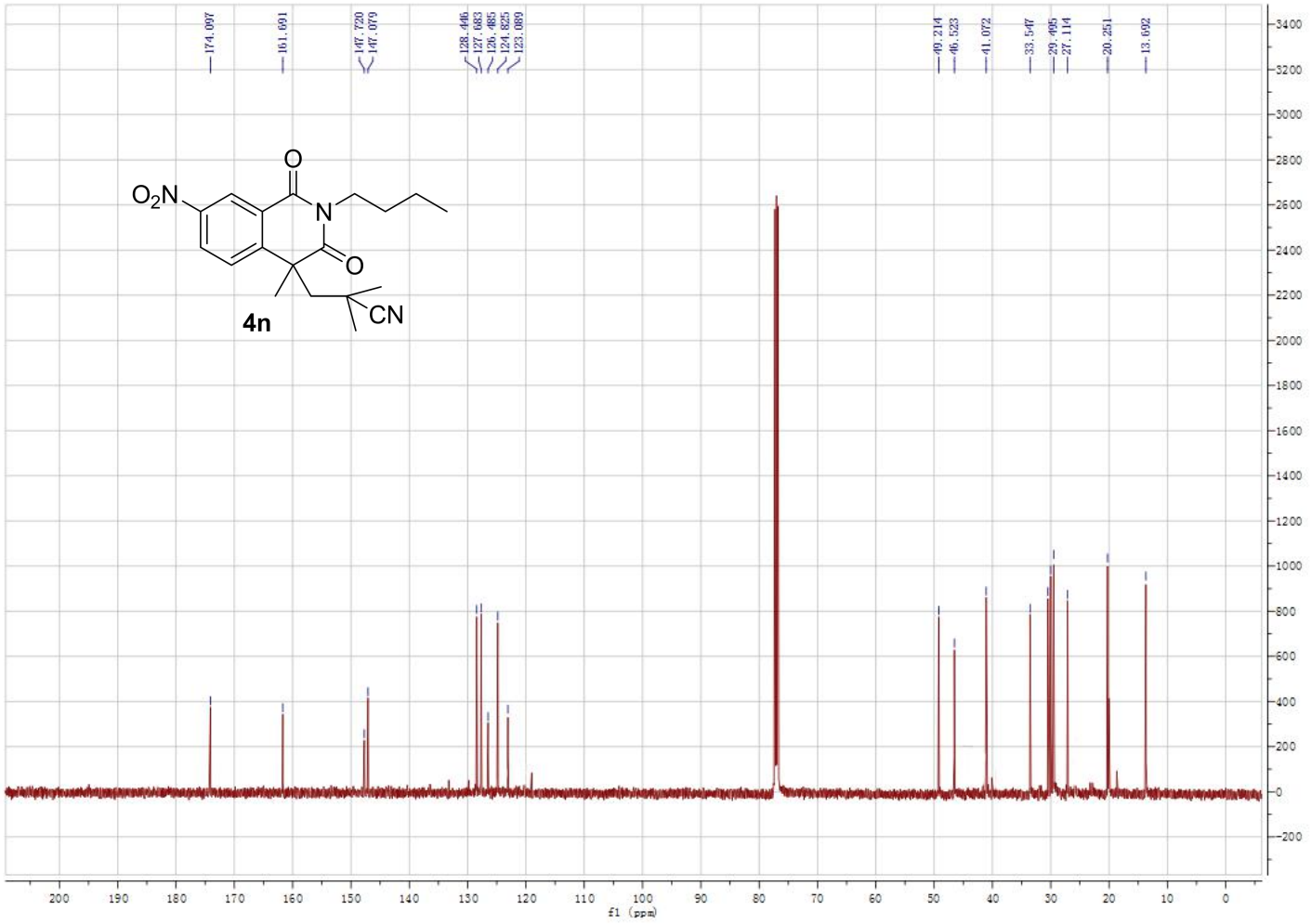


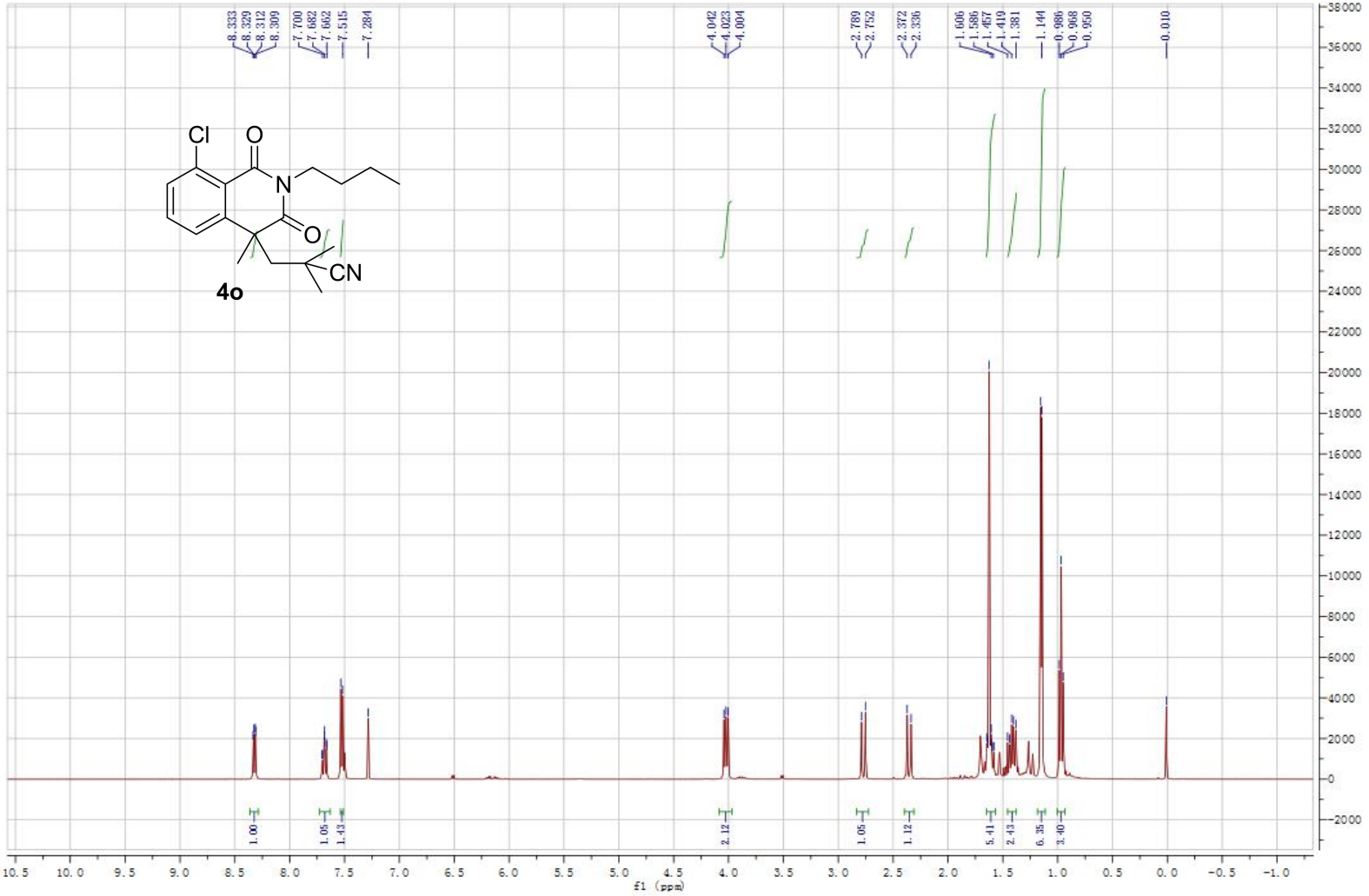
3-(2-butyl-4-methyl-7-nitro-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4n).



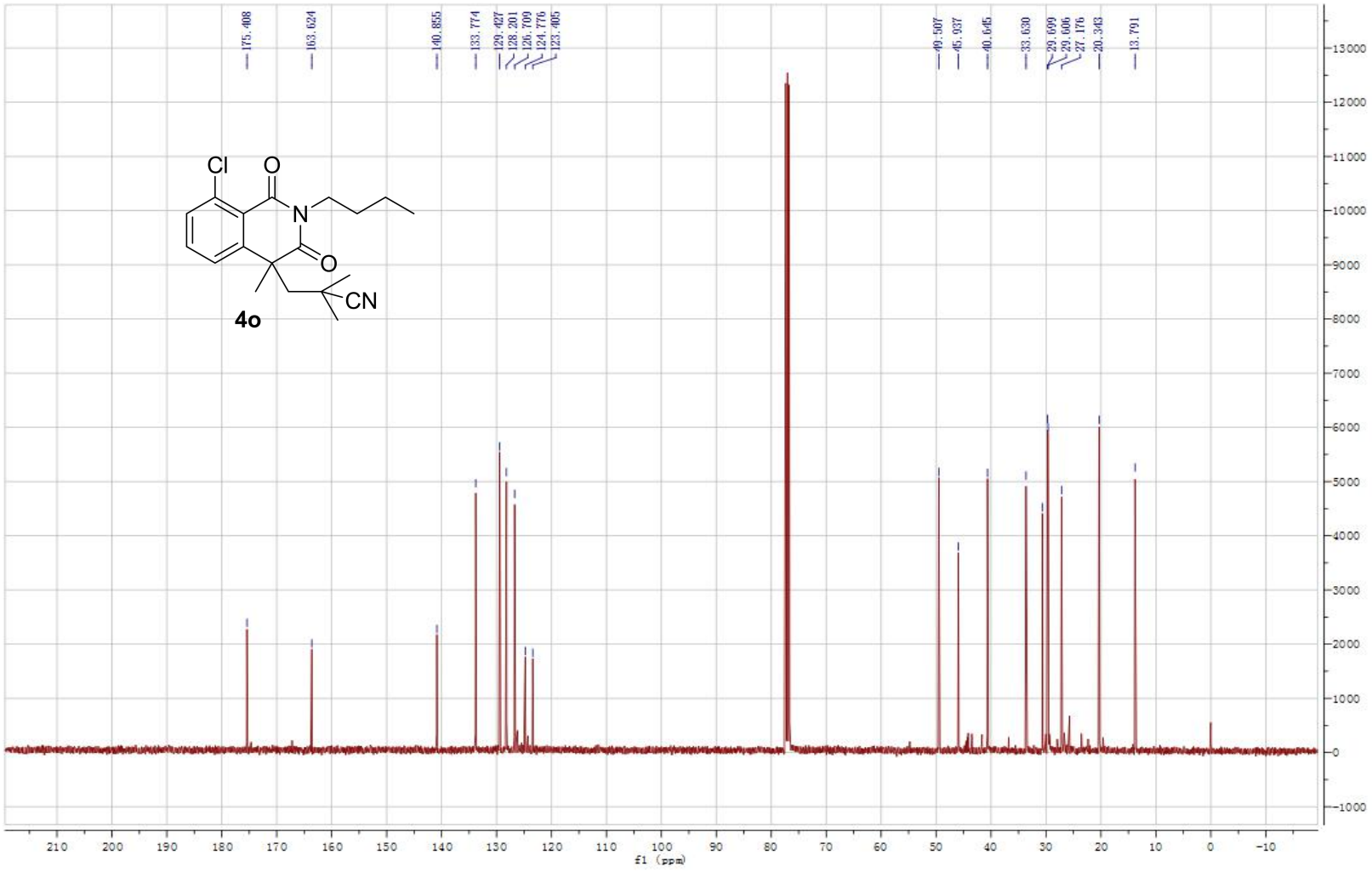
3-(2-butyl-4-methyl-7-nitro-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4n).



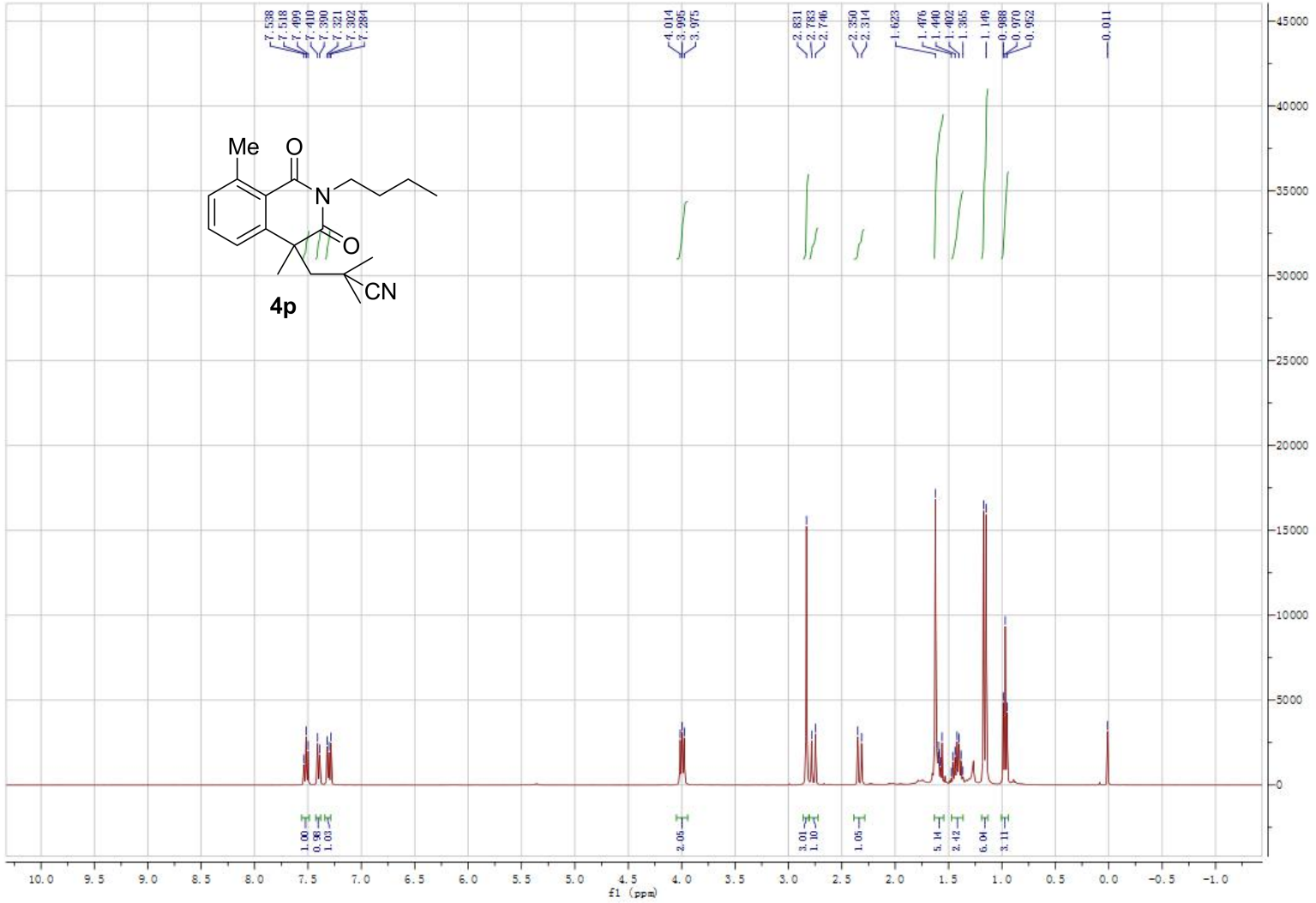
3-(2-butyl-8-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4o).



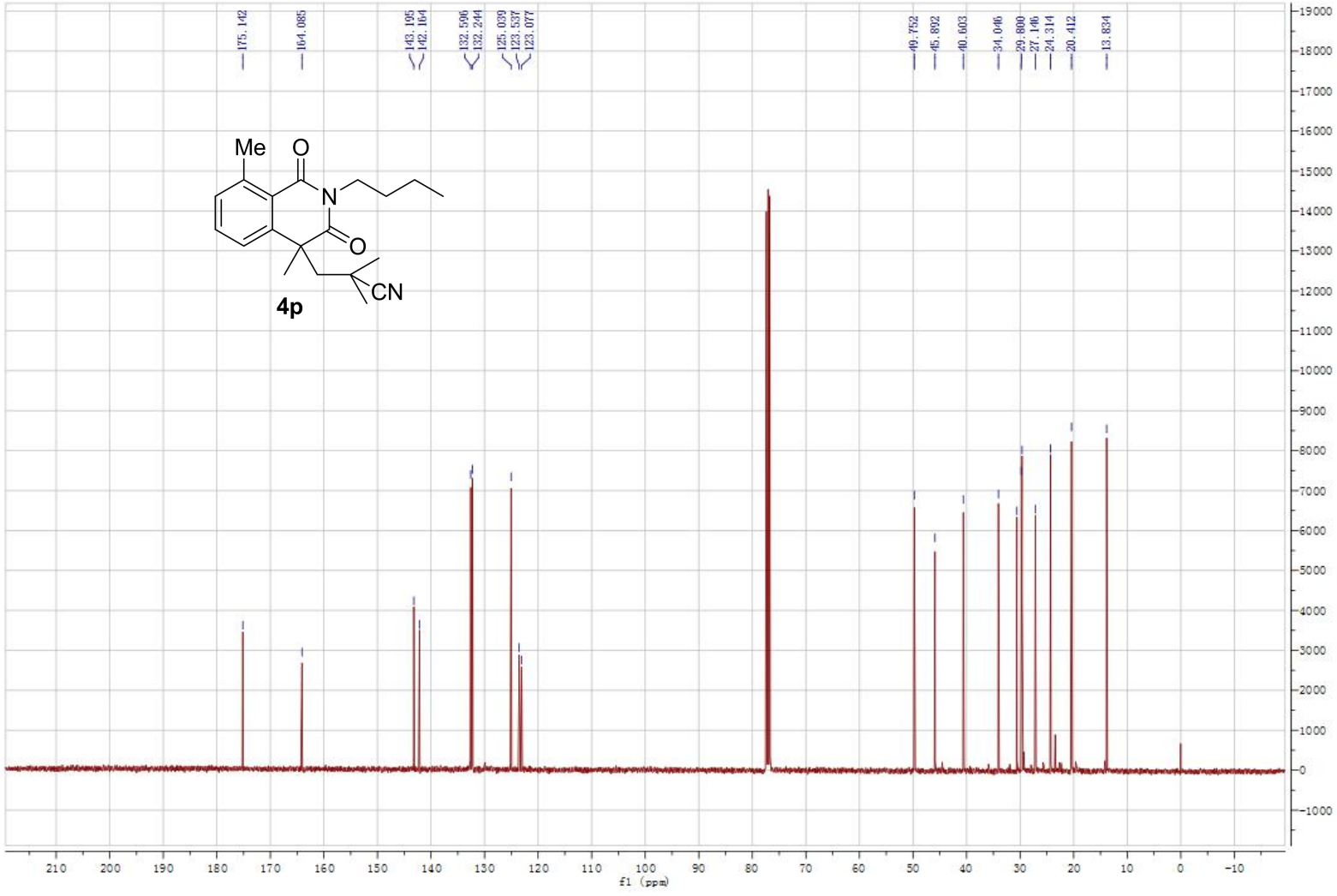
3-(2-butyl-8-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4o).



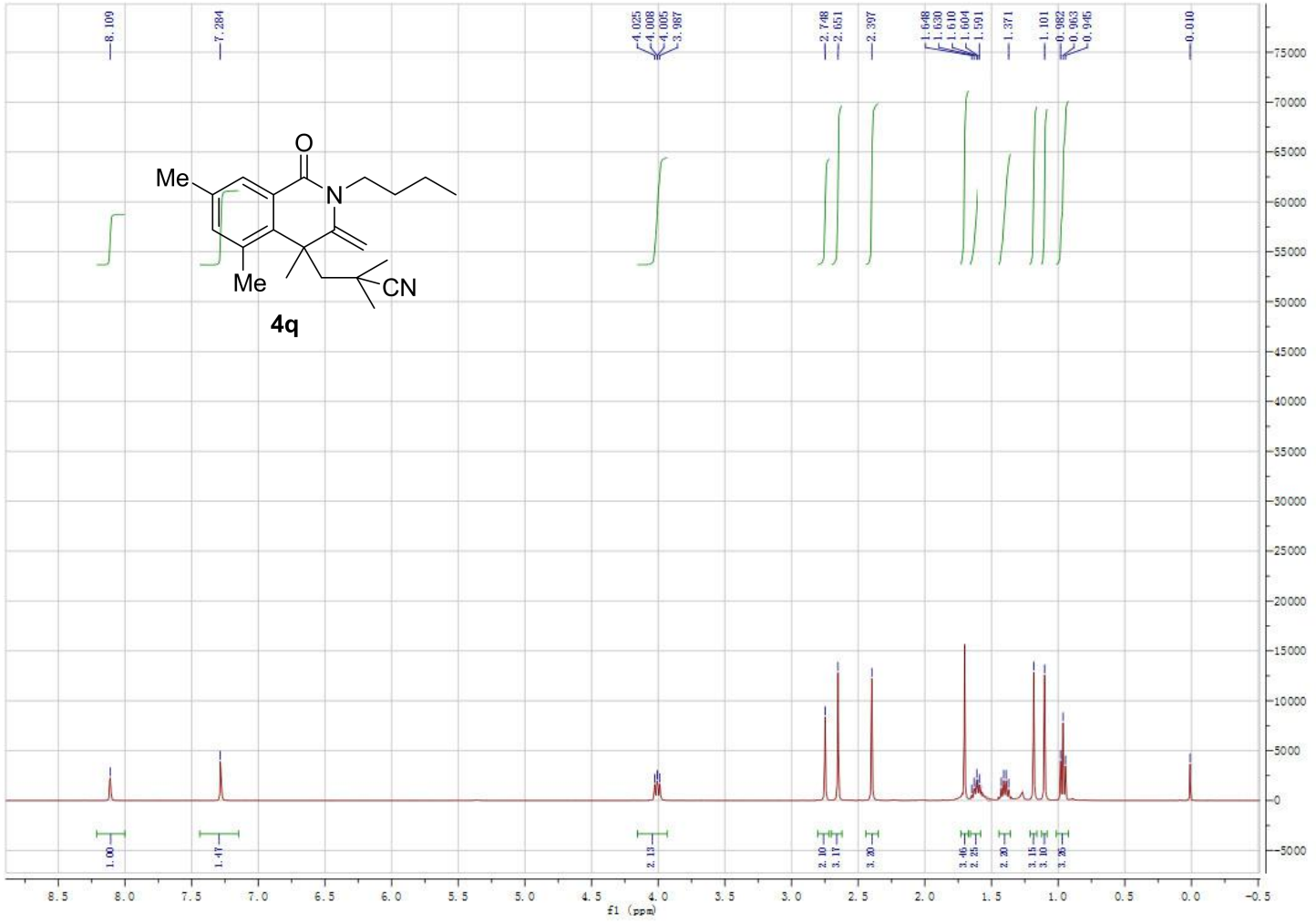
3-(2-butyl-4,8-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4p).



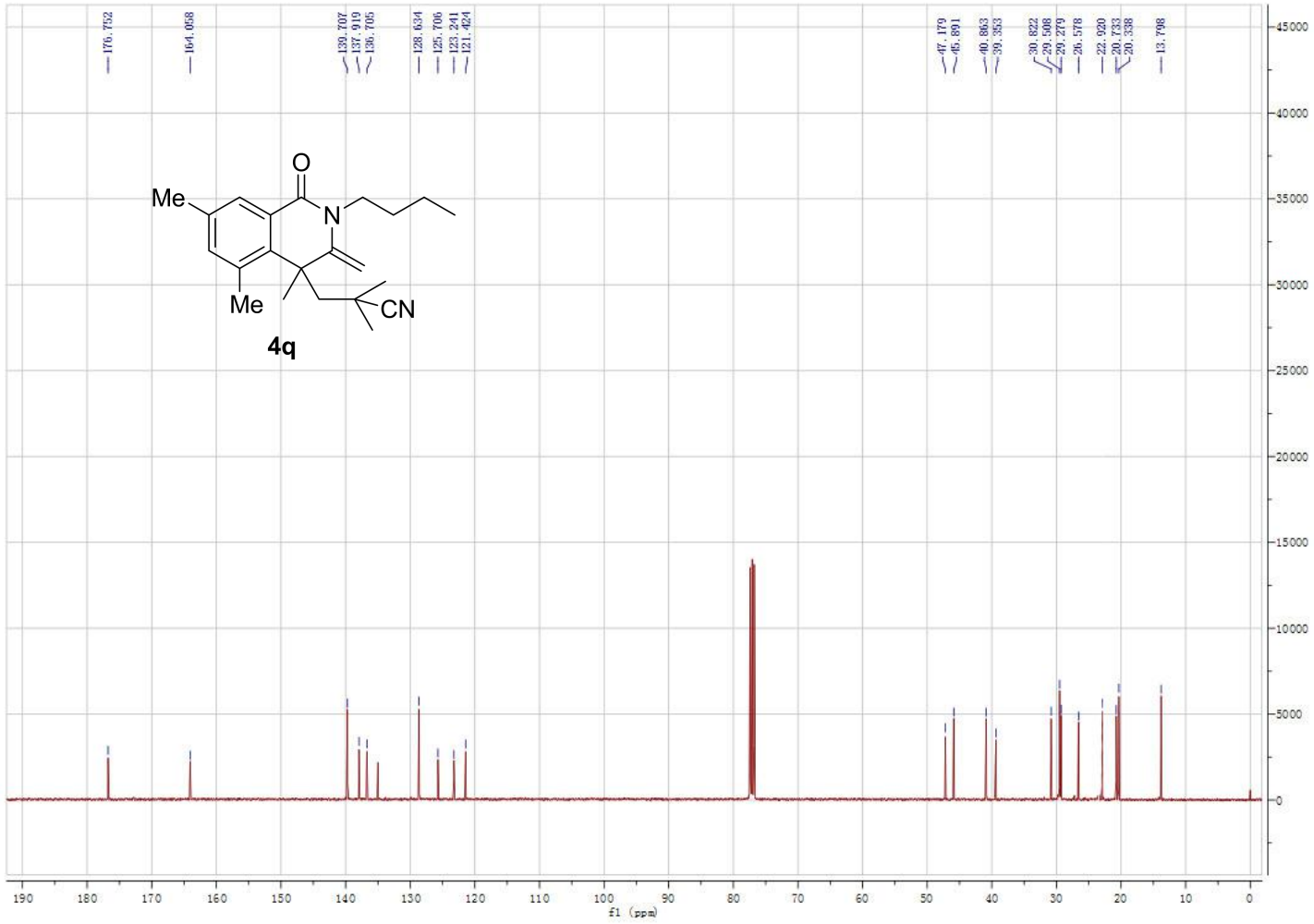
3-(2-butyl-4,8-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4p).



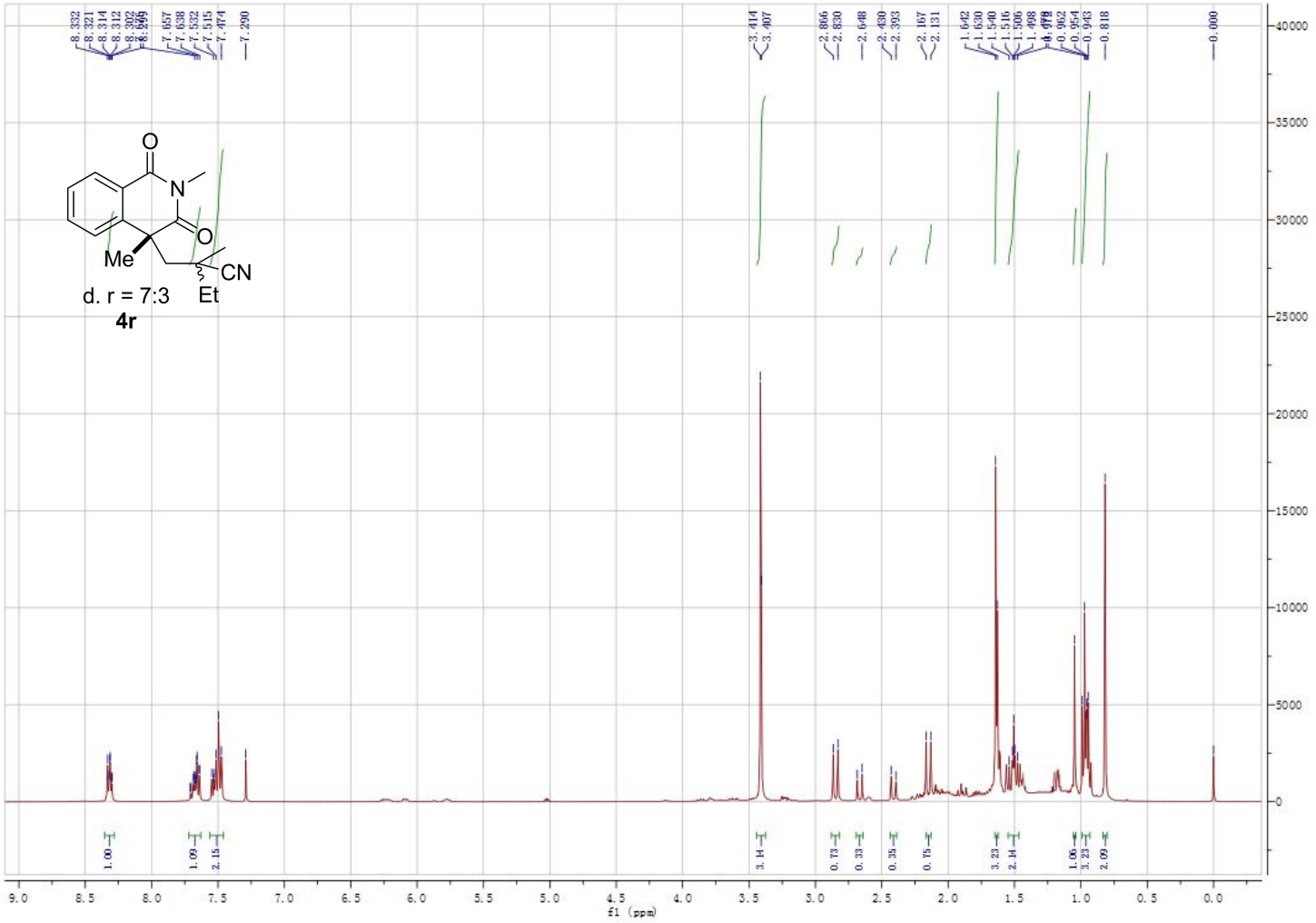
3-(2-butyl-4,5,7-trimethyl-3-methylene-1-oxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4q).



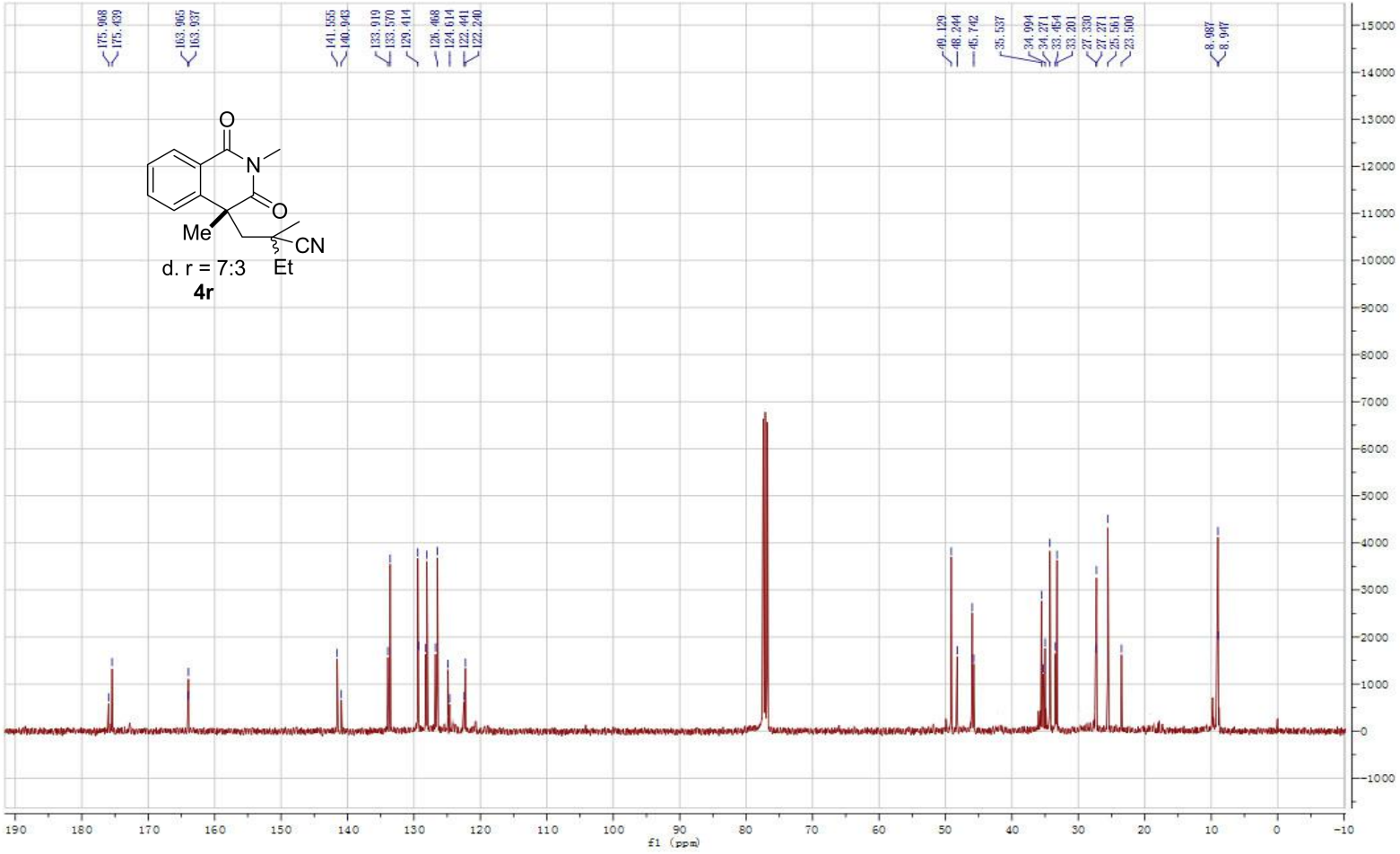
3-(2-butyl-4,5,7-trimethyl-3-methylene-1-oxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanenitrile(4q).



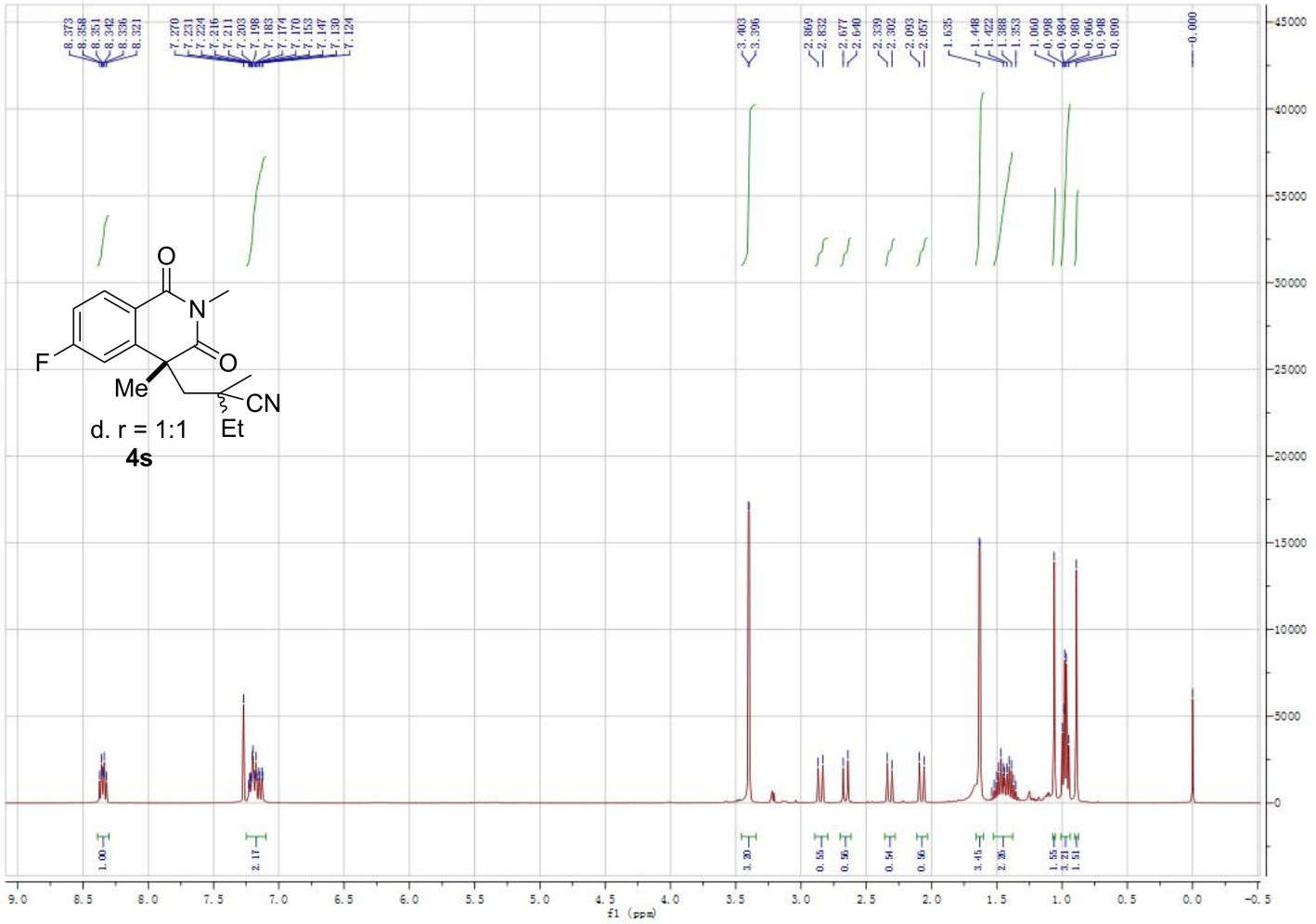
2-((2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)-2-methylbutanenitrile(4r).



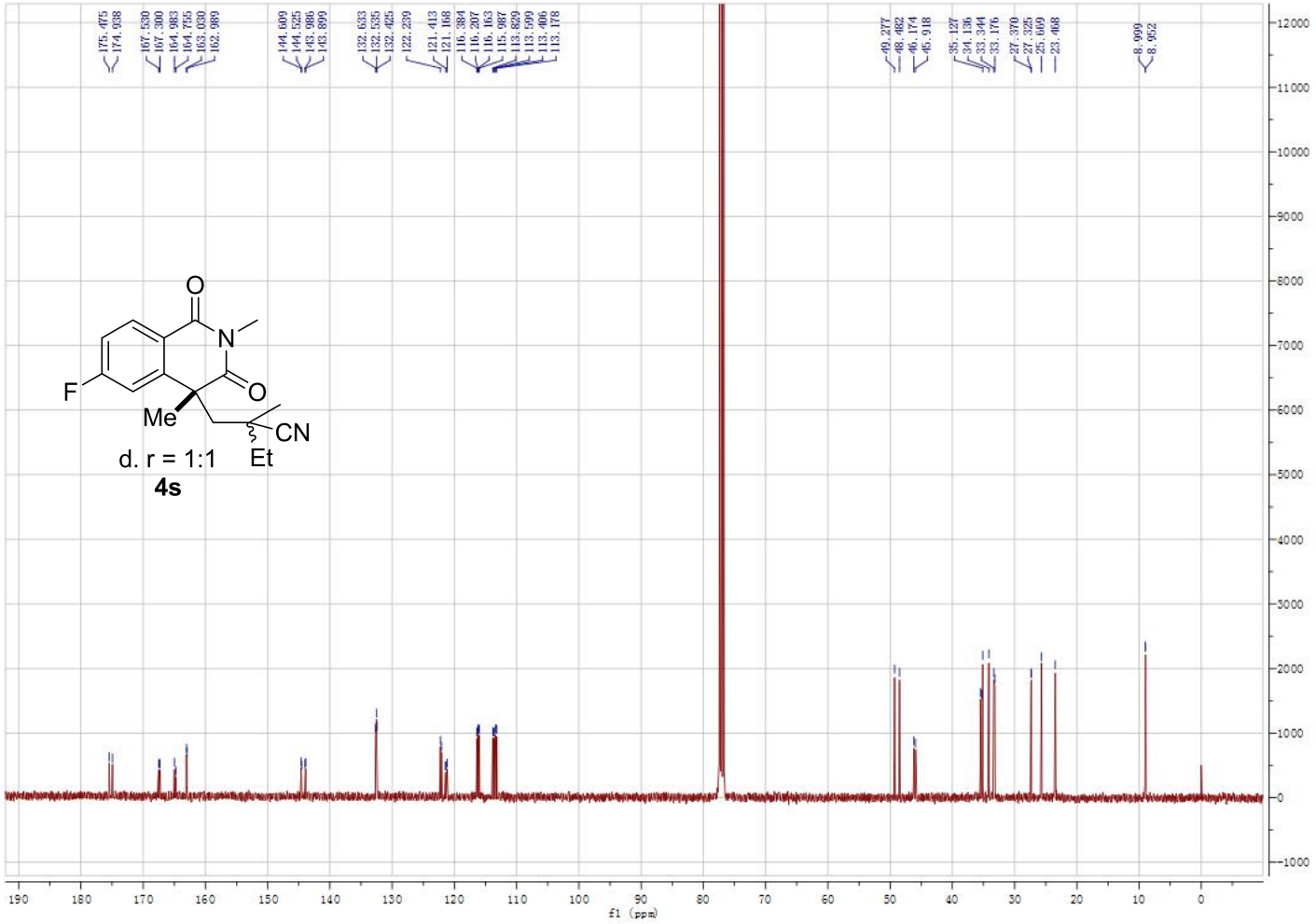
2-((2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)-2-methylbutanenitrile(4r).



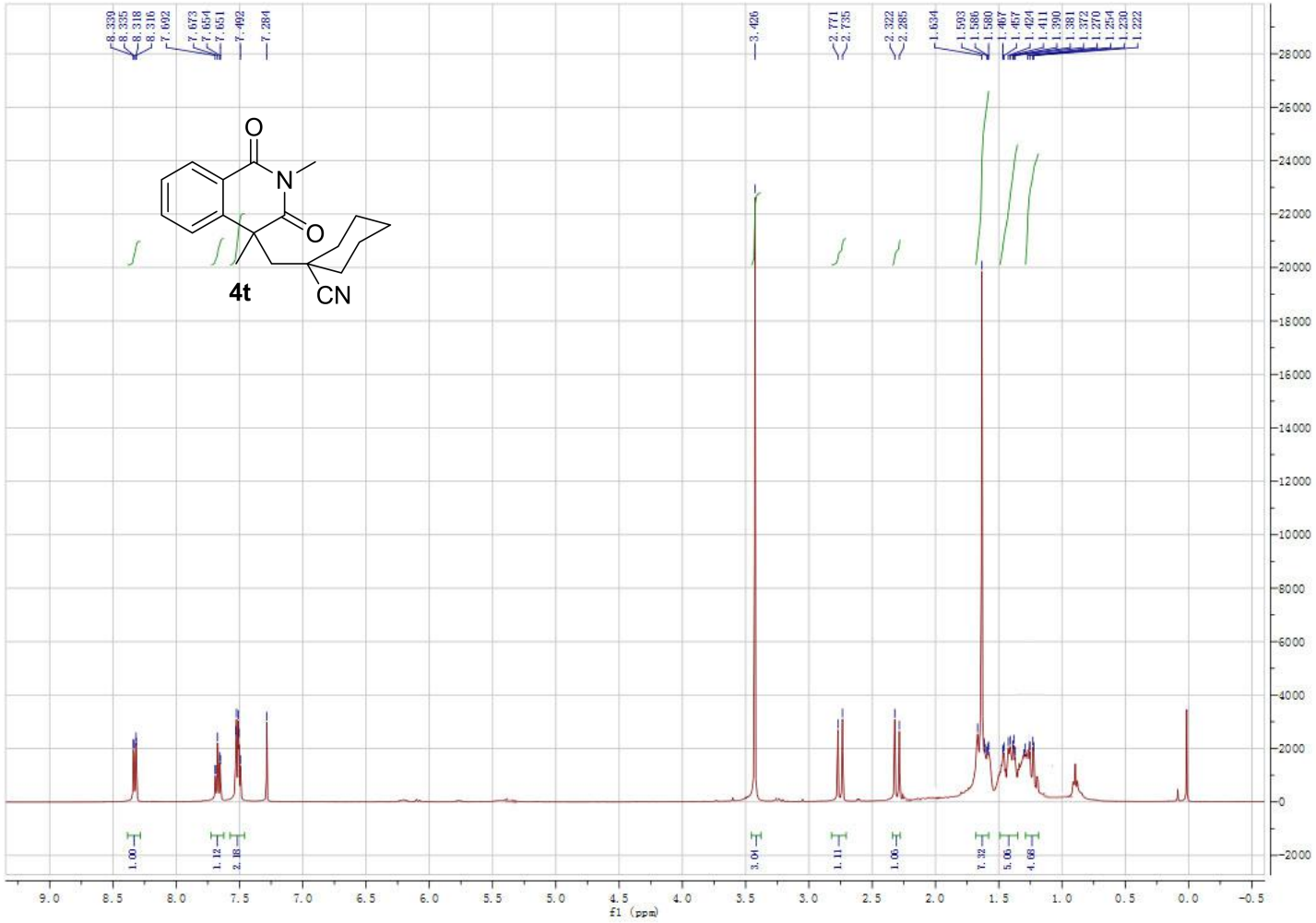
2-((6-fluoro-2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)-2-methylbutanenitrile(4s)



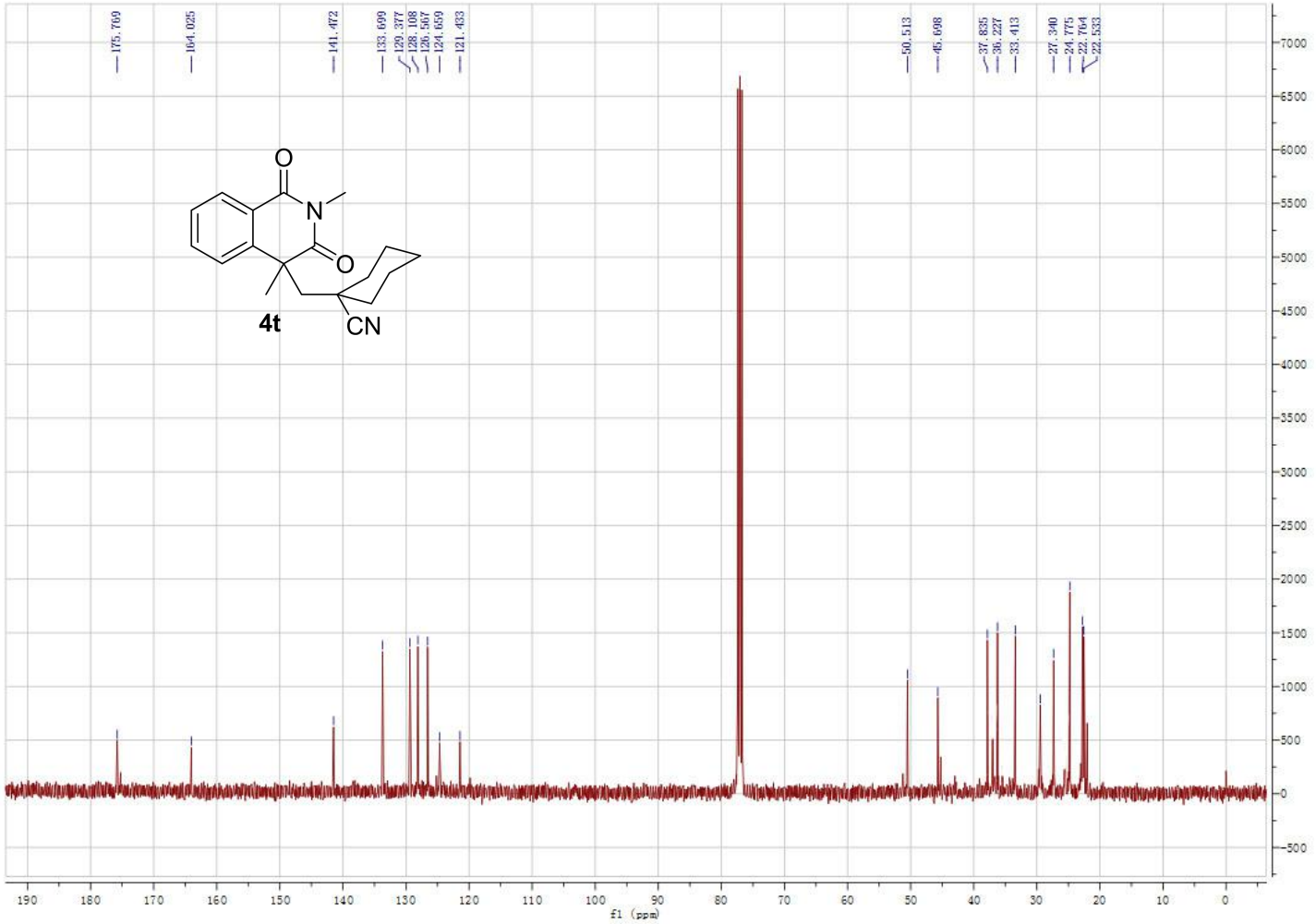
2-((6-fluoro-2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)-2-methylbutanenitrile(4s)



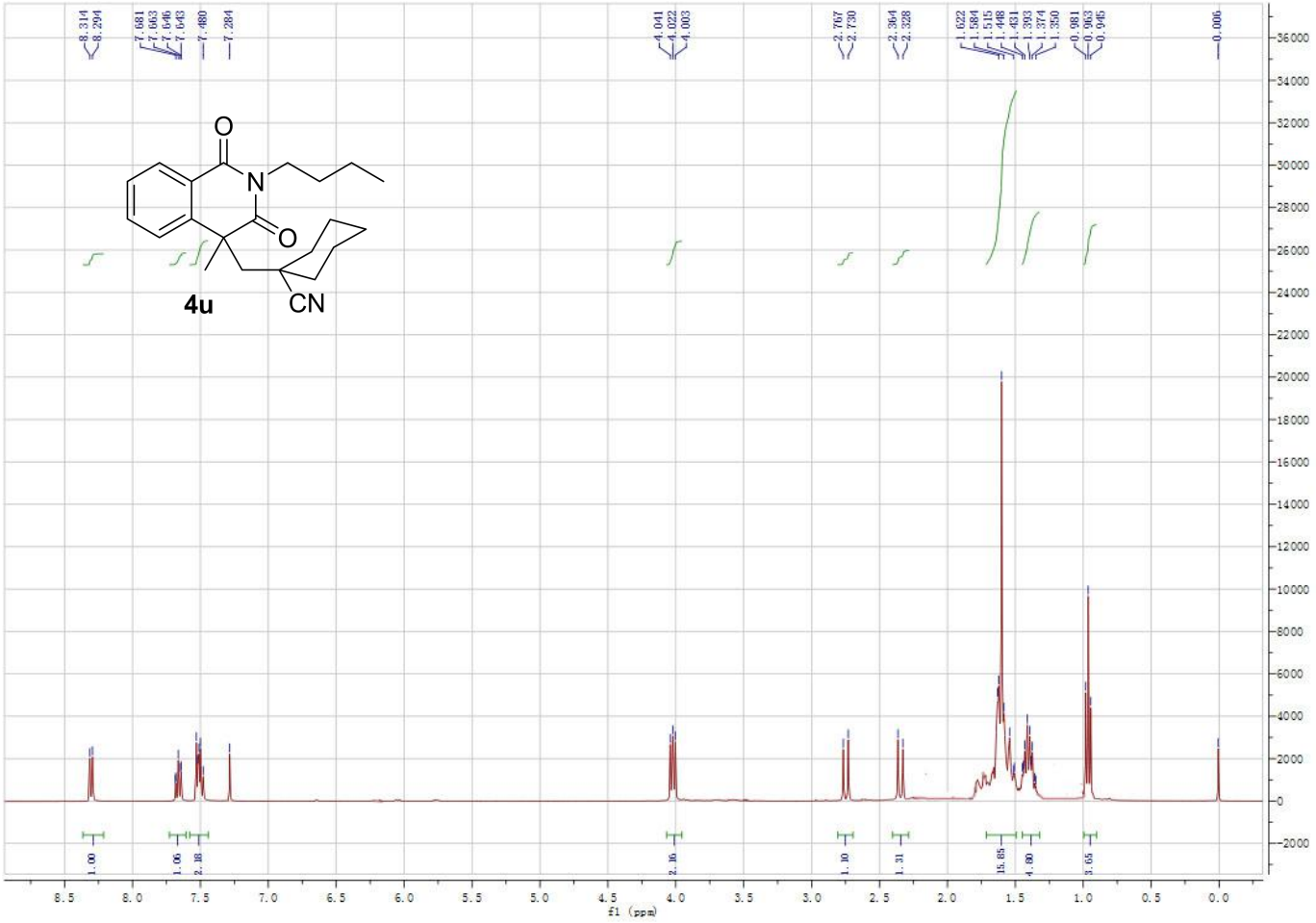
1-((2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4t).



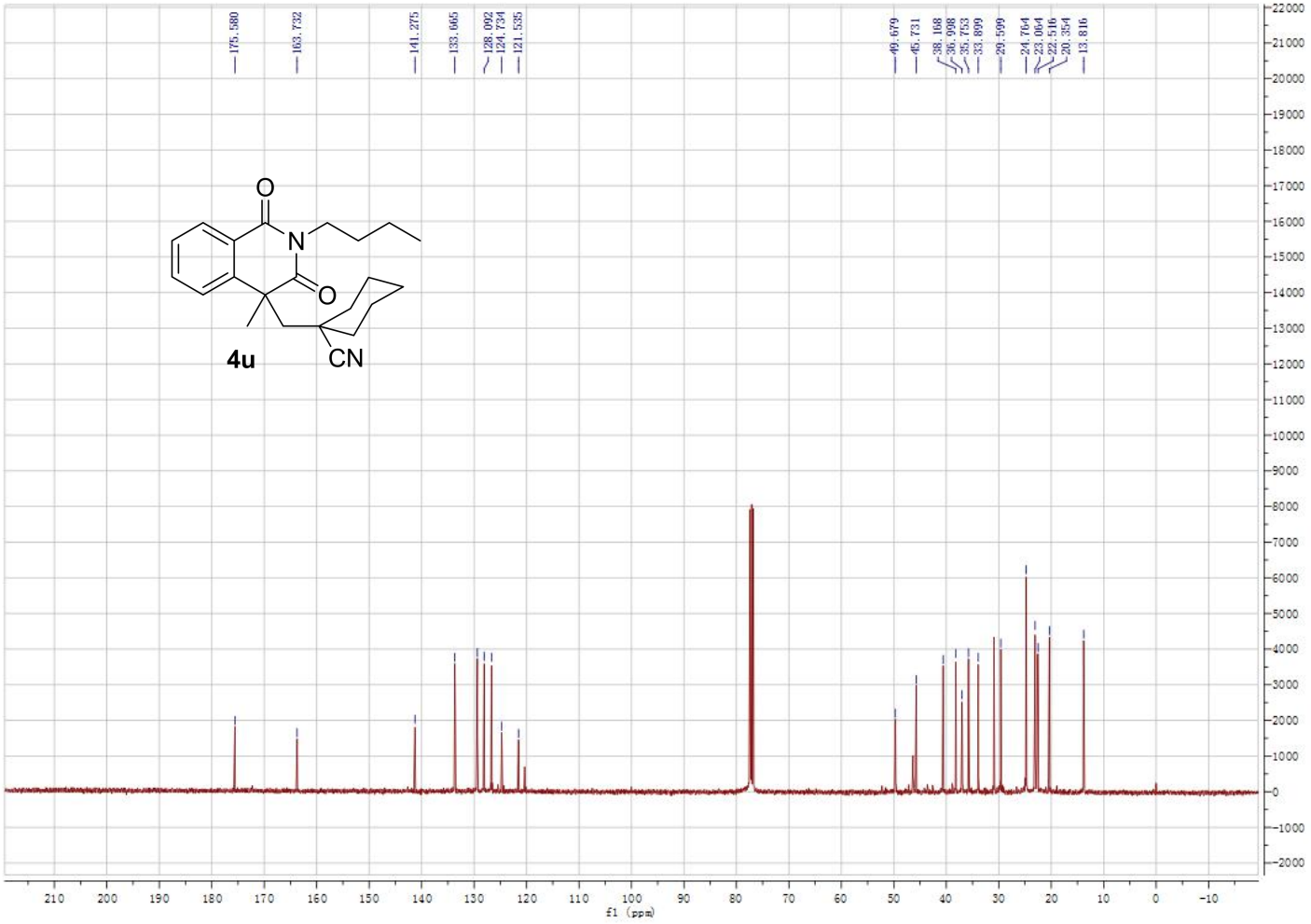
1-((2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4t).



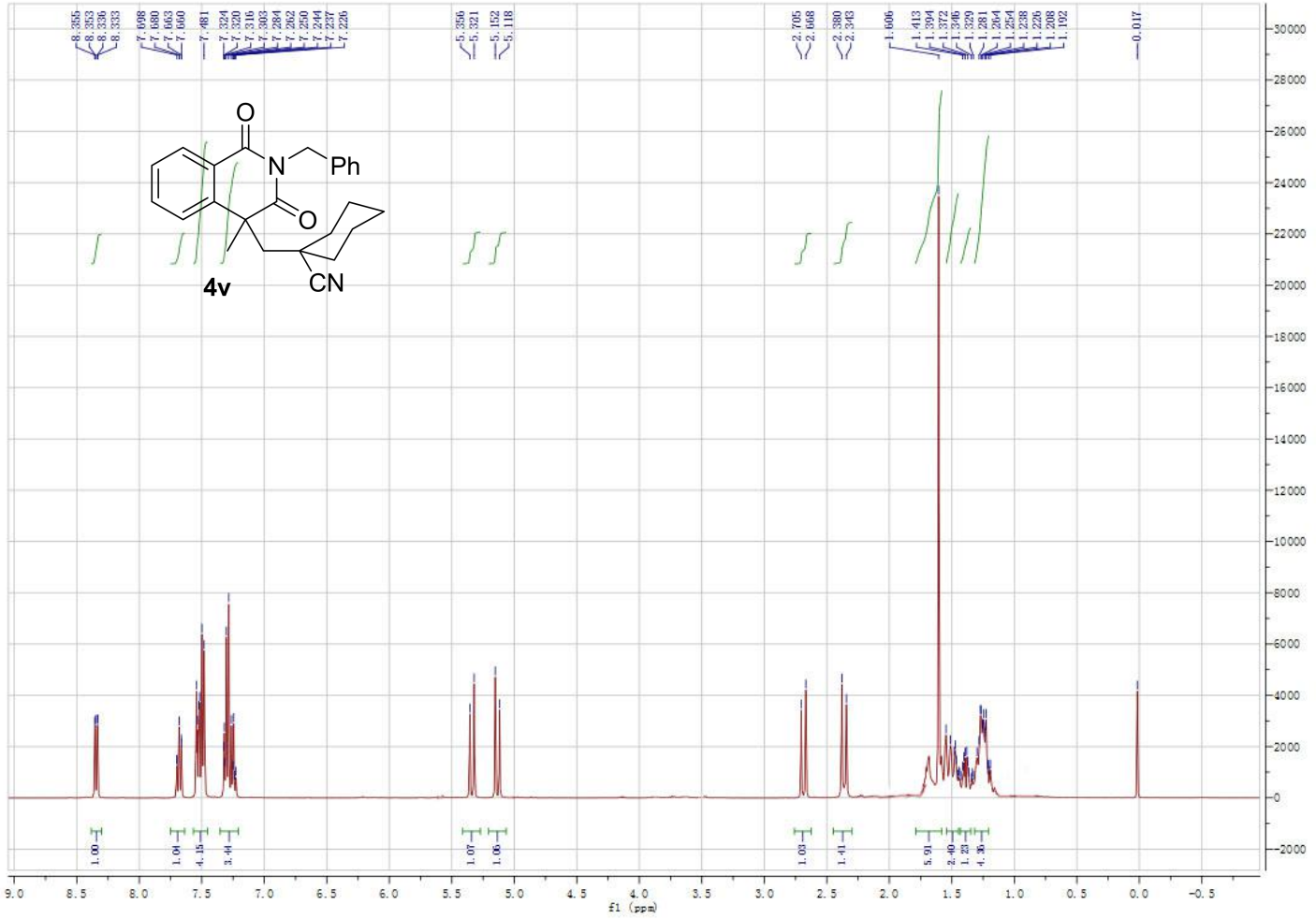
1-((2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4u)



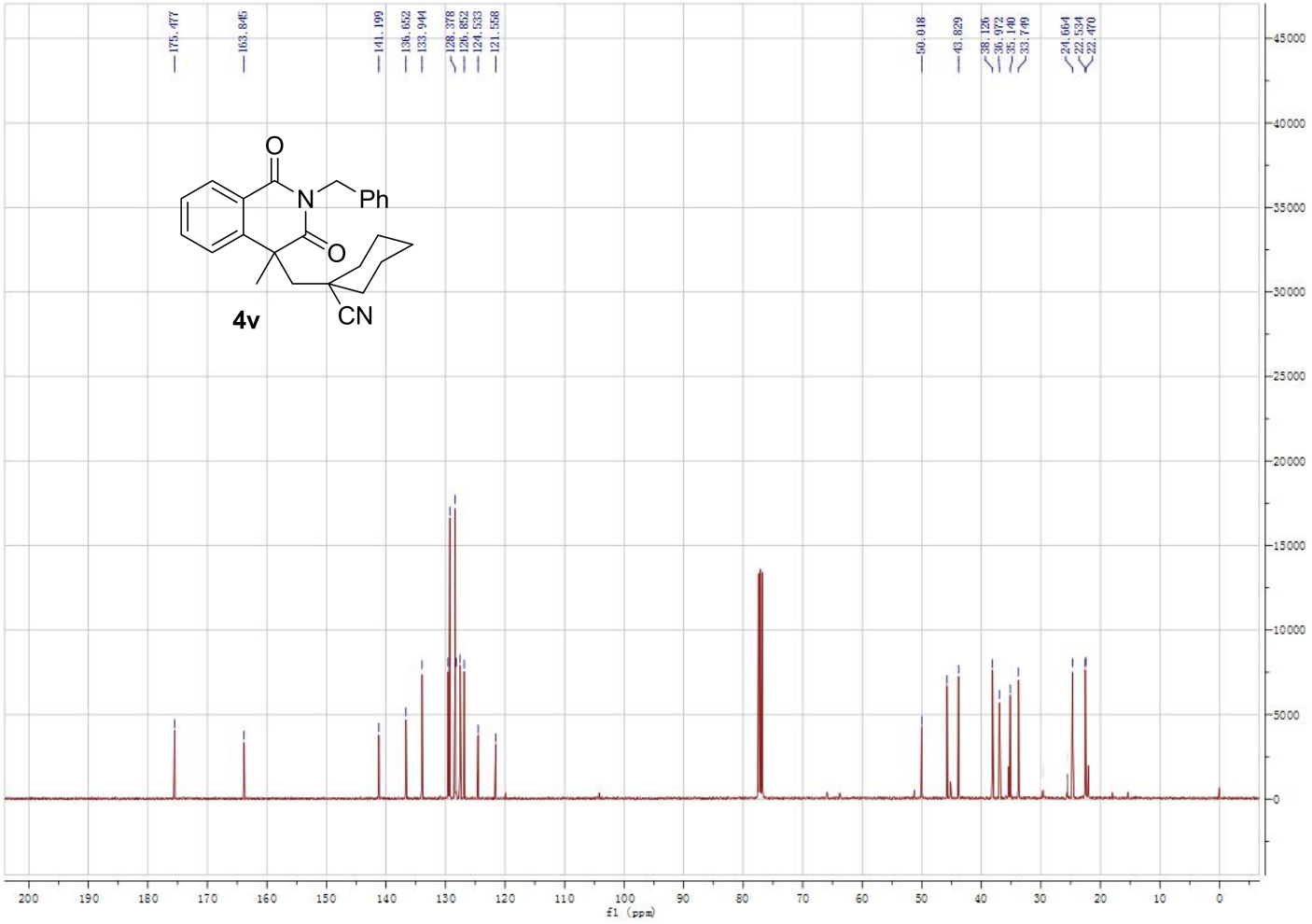
1-((2-butyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4u)



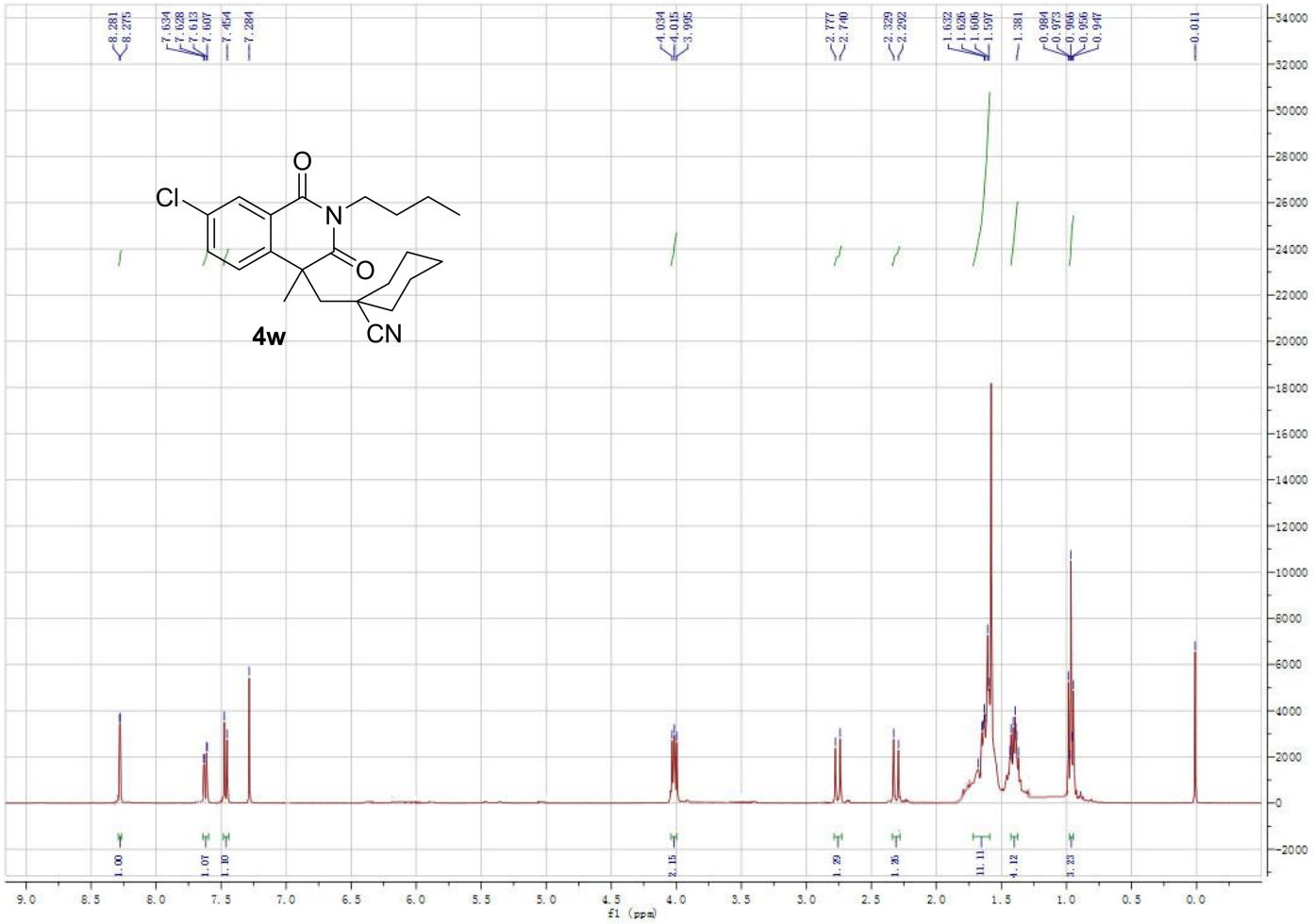
1-((2-benzyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4v).



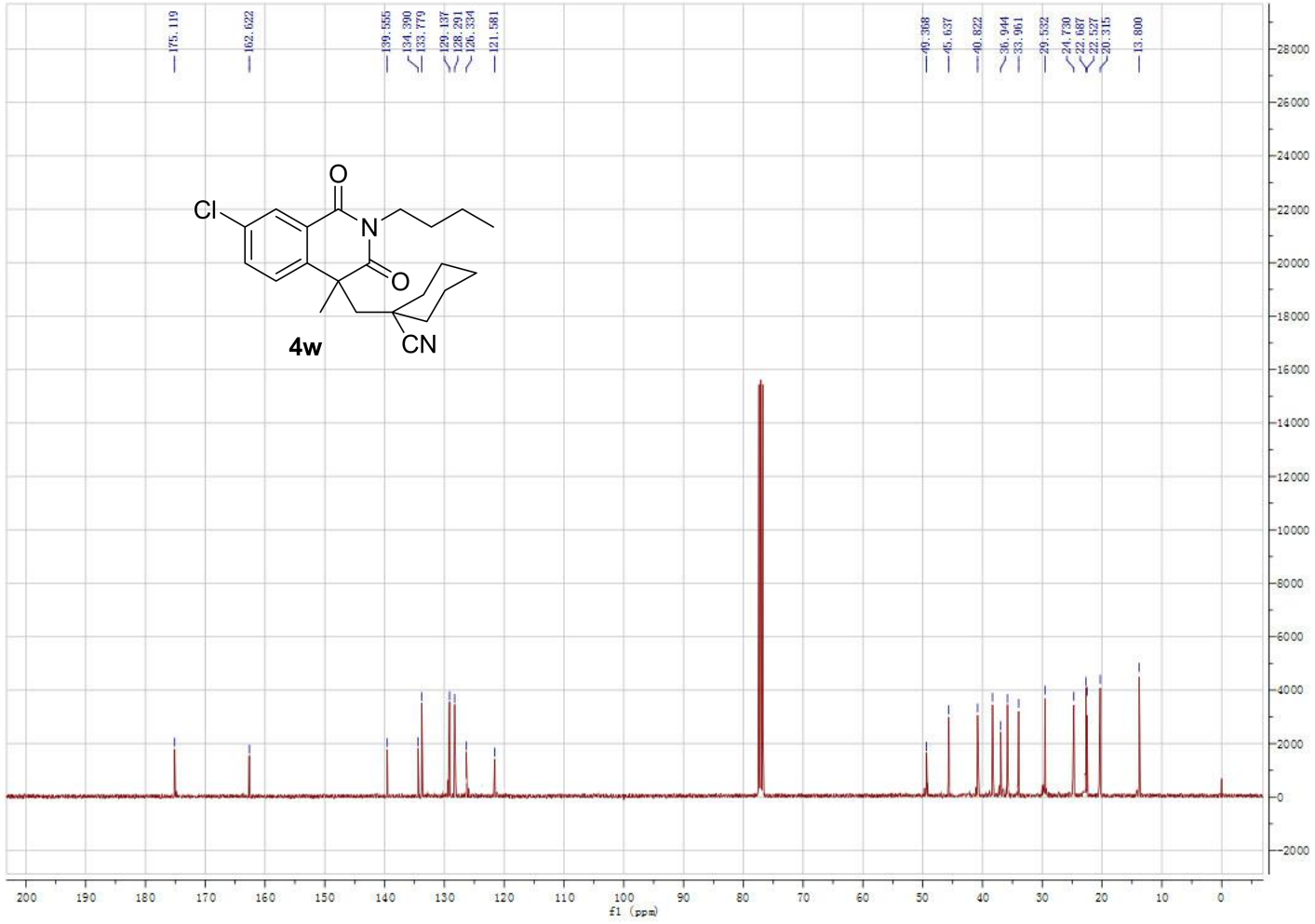
1-((2-benzyl-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile (4v).



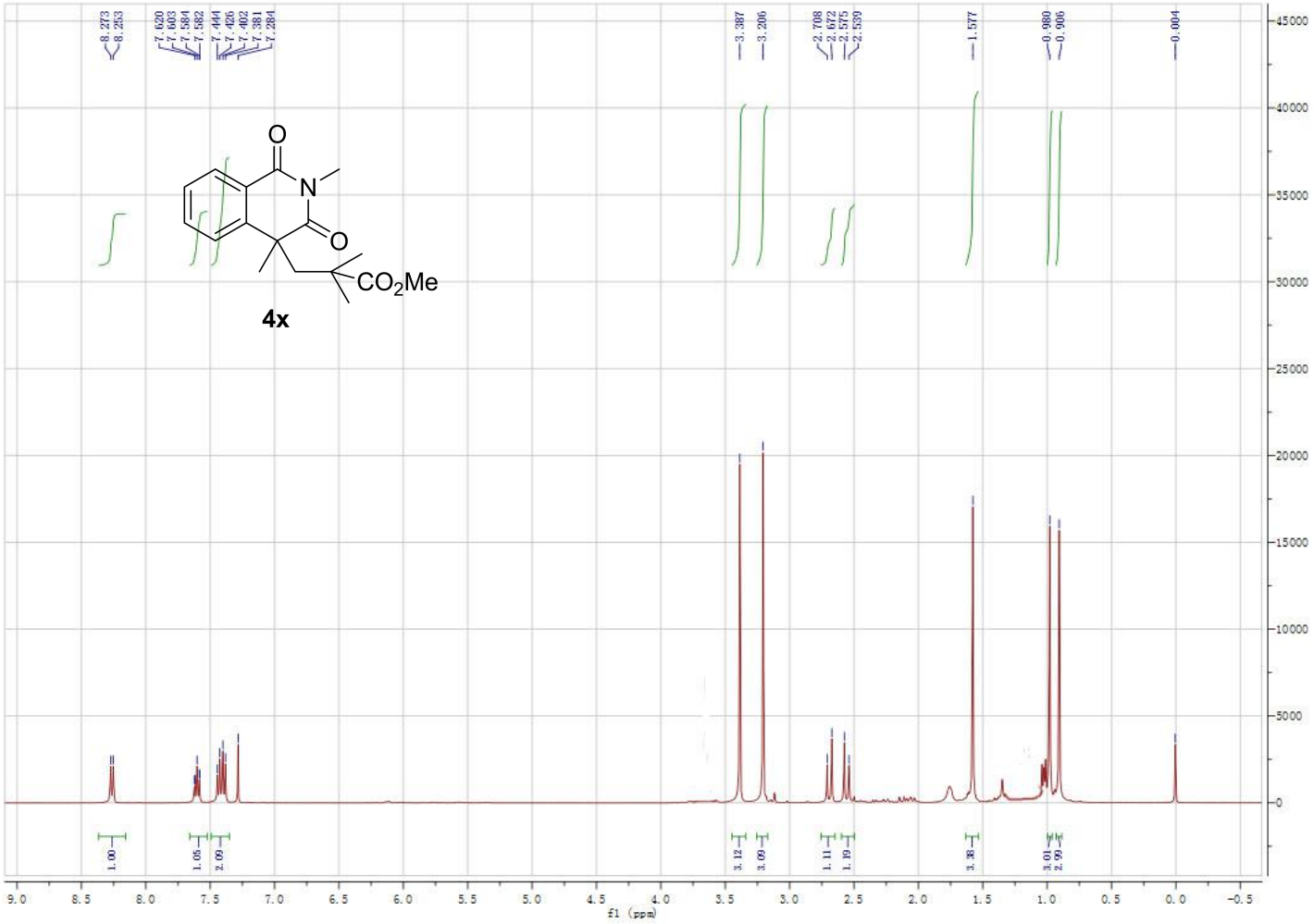
1-((2-butyl-7-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4w).



1-((2-butyl-7-chloro-4-methyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)methyl)cyclohexanecarbonitrile(4w).



methyl 3-(2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanoate (4x).



methyl 3-(2,4-dimethyl-1,3-dioxo-1,2,3,4-tetrahydroisoquinolin-4-yl)-2,2-dimethylpropanoate (4x).