Supporting Information

CHOLINE CHLORIDE CATALYZED ECO-FRIEND AND EFFECTIVE ONE-POT SYNTHESIS OF 9-ARYLACRIDINE-1,8-DIONE AND HEXAHYDROQUINOLINE VIA THE HANTZSCH TYPE REACTION

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9-Phenyl-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4a**) Pale yellow solid; FT-IR (KBr disc): *v* 3278, 1637, 1606, 1483, 1219, 708; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 1.99 (d, *J* = 16.1 Hz, 2H, CH_2), 2.17 (d, *J* = 16.4 Hz, 2H, CH_2), 2.33 (d, *J* = 16.9 Hz, 2H, CH_2), 2.44 (d, *J* = 17.0 Hz, 2H, CH_2), 4.81 (s, 1H, CH), 7.01-7.04 (m, 1H, Ar-H), 7.15 (s, 4H, Ar-H), 9.25 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 27.0, 29.6, 32.6, 33.3, 50.8, 111.9, 125.9, 128.0, 128.1, 147.6, 149.8, 194.8.

9-(4-Methylphenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4b**) Pale yellow solid; FT-IR (KBr disc): *v* 3278, 1645, 1606,1498, 1358, 1211; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 6H, 2CH_3), 1.00 (s, 6H, 2CH_3), 1.97 (d, *J* = 16.1 Hz, 2H, CH_2), 2.16 (d, *J* = 18.0 Hz, 2H, CH_2), 2.18 (s, 3H, CH_3), 2.31 (d, *J* = 16.9 Hz, 2H, CH_2), 2.44 (d, *J* = 17.0 Hz, 2H, CH_2), 4.77 (s, 1H, CH), 6.95 (d, *J* = 8.0 Hz, 2H, Ar-H), 7.04 (d, *J* = 8.0 Hz, 2H, Ar-H), 9.21 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 20.5, 26.4, 29.1, 32.1, 32.3, 50.2, 111.6, 127.5, 128.0, 134.2, 144.3, 149.0, 194.2.

9-(3-Methylphenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4c**) Pale yellow solid; FT-IR (KBr disc): *v* 3285, 1645, 1613,1490, 1358, 1226; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 1.99 (d, *J* = 16.1 Hz, 2H, CH_2), 2.16 (d, *J* = 16.1 Hz, 2H, CH_2), 2.20 (s, 3H, CH_3), 2.34 (d, *J* = 16.5 Hz, 2H, CH_2), 2.44 (d, *J* = 17.0 Hz, 2H, CH_2), 4.78 (s, 1H, CH), 6.84 (d, *J* = 7.4 Hz, 1H, Ar-H), 6.93 (d, *J* = 7.7 Hz, 1H, Ar-H), 6.97 (s, 1H, Ar-H), 7.03 (t, *J* = 7.5 Hz, 1H, Ar-H), 9.22 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 21.1, 26.4, 29.0, 32.1, 32.6, 50.2, 111.5, 124.6, 126.0, 127.5, 128.4, 136.1, 147.1, 149.1, 194.2.

9-(2-Methylphenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4d**) Yellow solid; FT-IR (KBr disc): *v* 3300, 1652, 1598,1482, 1366, 1226; ^{1}H NMR(500 MHz, DMSO-d_6): 0.83 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 1.93 (d, *J* = 16.2 Hz, 2H, CH_2), 2.15 (d, *J* = 16.2 Hz, 2H, CH_2), 2.30 (d, *J* = 16.9 Hz, 2H, CH_2), 2.46 (d, *J* = 16.9 Hz, 2H, CH_2), 2.70 (s, 3H, CH_3), 4.83 (s, 1H, CH), 6.87-6.92 (m, 2H, Ar-H), 6.98 (t, *J* = 7.2 Hz, 1H, Ar-H), 7.02 (d, *J* = 6.7 Hz, 1H, Ar-H), 9.21 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 19.5, 26.2, 29.1, 29.2, 32.0, 50.2, 113.1, 125.2, 125.5, 127.8, 128.9, 135.3, 147.1, 148.9, 194.4.

9-(4-Methoxyphenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4e**) Pale yellow solid; FT-IR (KBr disc): *v* 3208, 1637, 1613,1475, 1358, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 1.98 (d, *J* = 16.1 Hz, 2H, CH_2), 2.16 (d, *J* = 16.1 Hz, 2H, CH_2), 2.31 (d, *J* = 17.0 Hz, 2H, CH_2), 2.43 (d, *J* = 17.0 Hz, 2H, CH_2), 3.66 (s, 3H, OCH_3), 4.75 (s, 1H, CH), 6.72(d, *J* = 8.3 Hz, 2H, Ar-H), 7.06 (d, *J* = 8.3 Hz, 2H, Ar-H), 9.20 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.5, 29.0, 31.8, 32.1, 50.2, 54.8, 111.6, 112.9, 128.4, 139.5, 148.9, 157.0, 194.3.

9-(3-Methoxyphenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4f**) Yellow solid; FT-IR (KBr

disc): *v* 3192, 1637, 1614,1483, 1358, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.88 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 2.00 (d, *J* = 16.1 Hz, 2H, CH_2), 2.17 (d, *J* = 16.1 Hz, 2H, CH_2), 2.33 (d, *J* = 17.1 Hz, 2H, CH_2), 2.44 (d, *J* = 17.0 Hz, 2H, CH_2), 3.66 (s, 3H, OCH_3), 4.80 (s, 1H, CH), 6.61 (d, *J* = 8.0 Hz, 1H, Ar-H), 6.70 (s, 1H, Ar-H), 6.74 (d, *J* = 7.7 Hz, 1H, Ar-H), 7.06 (t, *J* = 7.9 Hz, 1H, Ar-H), 9.25 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.4, 29.0, 32.1, 32.6, 50.2, 54.7, 110.3, 111.3, 113.8, 119.9, 128.4, 148.5, 149.3, 158.7, 194.3.

9-(2-Methoxyphenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4g**) Yellow solid; FT-IR (KBr disc): *v* 3061, 1645, 1606,1482, 1366, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.82 (s, 6H, 2CH_3), 0.99 (s, 6H, 2CH_3), 1.89 (d, *J* = 16.2 Hz, 2H, CH_2), 2.11 (d, *J* = 16.2 Hz, 2H, CH_2), 2.23 (d, *J* = 16.9 Hz, 2H, CH_2), 2.41 (d, *J* = 16.9 Hz, 2H, CH_2), 3.67 (s, 3H, OCH_3), 4.92 (s, 1H, CH), 6.72 (t, *J* = 7.4 Hz, 1H, Ar-H), 6.80 (d, *J* = 7.7 Hz, 1H, Ar-H), 7.00 (t, *J* = 8.2 Hz, 1H, Ar-H), 7.17 (d, *J* = 7.5 Hz, 1H, Ar-H), 9.16 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 25.9, 29.3, 31.3, 31.9, 50.4, 55.0, 110.0, 110.8, 119.1, 126.6, 131.4, 133.8, 149.5, 157.5, 193.9.

9-(4-Chlorophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4h**) Yellow solid; FT-IR (KBr disc): *v* 3177, 1645, 1606, 1483, 1366, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 1.99 (d, *J* = 16.0 Hz, 2H, CH_2), 2.17 (d, *J* = 16.1 Hz, 2H, CH_2), 2.33 (d, *J* = 17.0 Hz, 2H, CH_2), 2.45 (d, *J* = 17.0 Hz, 2H, CH_2), 4.79 (s, 1H, CH), 7.16 (d, *J* = 8.5 Hz, 2H, Ar-H), 7.22 (d, *J* = 8.5 Hz, 2H, Ar-H), 9.31 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.4, 29.0, 32.1, 32.6, 50.1, 111.0, 127.5, 129.4, 129.9, 146.0, 149.4, 194.3.

9-(3-Chlorophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4i**) Pale yellow solid; FT-IR (KBr disc): *v* 3177, 1645, 1613, 1490, 1373, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 2.01 (d, *J* = 16.1 Hz, 2H, CH_2), 2.18 (d, *J* = 16.1 Hz, 2H, CH_2), 2.35 (d, *J* = 17.0 Hz, 2H, CH_2), 2.46 (d, *J* = 17.1 Hz, 2H, CH_2), 4.80 (s, 1H, CH), 7.09-7.11 (m, 2H, Ar-H), 7.15 (s, 1H, Ar-H), 7.20 (t, *J* = 7.8 Hz, 1H, Ar-H), 9.34 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.4, 29.0, 32.1, 33.0, 50.1, 111.8, 125.4, 126.1, 127.5, 129.5, 132.1, 149.4, 149.6, 194.3.

9-(2-Chlorophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4j**) Pale yellow solid; FT-IR (KBr disc): *v* 3076, 1645, 1498, 1366, 1219, 1142; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 6H, 2CH_3), 1.01 (s, 6H, 2CH_3), 1.92 (d, *J* = 16.0 Hz, 2H, CH_2), 2.14 (d, *J* = 16.1 Hz, 2H, CH_2), 2.28 (d, *J* = 16.9 Hz, 2H, CH_2), 2.45 (d, *J* = 17.0 Hz, 2H, CH_2), 5.08 (s, 1H, CH), 7.03 (t, *J* = 7.7 Hz, 1H, Ar-H), 7.14 (t, *J* = 7.5 Hz, 1H, Ar-H), 7.18 (d, *J* = 7.9 Hz, 1H, Ar-H), 7.28 (d, *J* = 7.7 Hz, 1H, Ar-H), 9.30 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.3, 29.1, 31.9, 32.9, 50.2, 110.7, 126.1, 126.9, 129.0, 131.9, 132.3, 144.1, 149.6, 194.0.

9-(4-Bromophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4k**) Pale yellow solid; FT-IR (KBr disc): *v* 3447, 1652, 1606,1490, 1358, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 6H, 2CH_3),

1.01 (s, 6H, $2CH_3$), 1.99 (d, J = 16.1 Hz, 2H, CH_2), 2.17 (d, J = 16.1 Hz, 2H, CH_2), 2.32 (d, J = 17.0 Hz, 2H, CH_2), 2.45 (d, J = 17.0 Hz, 2H, CH_2), 4.77 (s,1H, CH), 7.11 (d, J = 8.4 Hz, 2H, Ar-H), 7.36 (d, J = 8.4 Hz, 2H, Ar-H), 9.31 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.5, 29.0, 32.1, 32.7, 50.1, 110.9, 118.4, 129.9, 130.4, 146.5, 149.4, 194.3.

9-(3-Bromophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4l**) Pale yellow solid; FT-IR (KBr disc): v 3440, 1653, 1606,1490, 1359, 1226; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 6H, $2CH_3$), 1.01 (s, 6H, $2CH_3$), 2.01 (d, J = 16.0 Hz, 2H, CH_2), 2.18 (d, J = 16.1 Hz, 2H, CH_2), 2.35 (d, J = 16.8 Hz, 2H, CH_2), 2.46 (d, J = 17.1 Hz, 2H, CH_2), 4.78 (s,1H, CH), 7.12-7.16 (m, 2H, Ar-H), 7.22-7.25 (m, 1H, Ar-H), 7.30 (s, 1H, Ar-H), 9.34 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.3, 29.0, 32.1, 33.0, 50.1, 110.8, 120.9, 126.5, 127.7, 128.3, 129.9, 130.4, 149.6, 194.3.

9-(2-Bromophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4m**) Pale yellow solid; FT-IR (KBr disc): v 3440, 1652, 1613, 1490, 1358, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 6H, $2CH_3$), 1.00 (s, 6H, $2CH_3$), 1.92 (d, J = 16.0 Hz, 2H, CH_2), 2.14 (d, J = 16.1 Hz, 2H, CH_2), 2.29 (d, J = 16.9 Hz, 2H, CH_2), 2.44 (d, J = 17.0 Hz, 2H, CH_2), 5.05 (s,1H, CH), 6.94 (t, J = 7.6 Hz, 1H, Ar-H), 7.18 (t, J = 7.4 Hz, 1H, Ar-H), 7.25 (d, J = 7.7 Hz, 1H, Ar-H), 7.36 (d, J = 7.9 Hz, 1H, Ar-H), 9.29 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.4, 29.0, 31.9, 34.9, 50.2, 111.2, 122.8, 126.8, 127.1, 131.6, 132.3, 146.1, 149.4, 194.0.

9-(4-Nitrophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4n**) Yellow solid; FT-IR (KBr disc): v 3386, 1645, 1591,1474, 1335, 1219; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 6H, $2CH_3$), 1.01 (s, 6H, $2CH_3$), 1.99 (d, J = 16.0 Hz, 2H, CH_2), 2.19 (d, J = 16.1 Hz, 2H, CH_2), 2.36 (d, J = 16.8 Hz, 2H, CH_2), 2.48 (d, J = 18.5 Hz, 2H, CH_2), 4.91 (s, 1H, CH), 7.42 (d, J = 8.8 Hz, 2H, Ar-H), 8.08 (d, J = 8.8 Hz, 2H, Ar-H), 9.45 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 27.0, 29.5, 32.6, 34.4, 50.6, 111.0, 123.5, 129.4, 146.0, 150.5, 155.1, 194.7.

9-(3-Nitrophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4o**) Pale yellow solid; FT-IR (KBr disc): v 3278, 1645, 1606,1498, 1352, 1219; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 6H, $2CH_3$), 1.02 (s, 6H, $2CH_3$), 2.00 (d, J = 16.1 Hz, 2H, CH_2), 2.20 (d, J = 16.1 Hz, 2H, CH_2), 2.37 (d, J = 17.1 Hz, 2H, CH_2), 2.48 (d, J = 16.8 Hz, 2H, CH_2), 4.93 (s, 1H, CH), 7.50 (t, J = 7.9 Hz, 1H, Ar-H), 7.62 (d, J = 7.6 Hz, 1H, Ar-H), 7.93-7.97 (m, 2H, Ar-H), 9.44 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 26.9, 29.5, 32.7, 34.0, 50.5, 111.1, 121.2, 122.5, 129.7, 134.9, 147.9, 149.7, 150.5, 194.9.

9-(2-Nitrophenyl)-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4p**) Yellow solid; FT-IR (KBr disc): v 3447, 1637, 1536,1482, 1366, 1226; ^{1}H NMR(500 MHz, DMSO-d_6): 0.85 (s, 6H, $2CH_3$), 1.00 (s, 6H, $2CH_3$), 1.93 (d, J = 16.0 Hz, 2H, CH_2), 2.14 (d, J = 16.0 Hz, 2H, CH_2), 2.32 (d, J = 16.8 Hz, 2H, CH_2), 2.45 (d, J = 17.0 Hz, 2H, CH_2), 5.62 (s, 1H, CH), 7.26 (t, J = 7.7 Hz, 1H, Ar-H), 7.34 (d, J = 7.9 Hz, 1H, Ar-H), 7.52 (t, J = 7.6 Hz, 1H, Ar-H), 7.71 (d, J = 8.1 Hz, H, Ar-H), 9.34 (s, 1H, NH);

^{13}C NMR(125 MHz, DMSO-d_6): 27.1, 29.3, 29.9, 32.5, 50.7, 111.6, 124.1, 127.0, 130.8, 133.0, 142.2, 148.6, 150.3, 194.6.

9-isopropyl-3,3,6,6-tetramethyl-1,8-dioxodecahydroacridine (**4q**) Yellow solid; FT-IR (KBr disc): *v* 3271, 2959, 2870, 1638, 1610, 1485, 1377; ^{1}H NMR (500 MHz, DMSO-d_6): 0.65 (d, *J* = 6.8 Hz, 6H, 2CH_3), 1.03 (s, 6H, 2CH_3), 1.05 (s, 6H, 2CH_3), 1.50-1.56 (m, 1H, CH), 2.11 (d, *J* = 16.2 Hz, 2H, CH_2), 2.17 (d, *J* = 16.2 Hz, 2H, CH_2), 2.30 (d, *J* = 17.2 Hz, 2H, CH_2), 2.38 (d, *J* = 17.2 Hz, 2H, CH_2), 3.80 (d, *J* = 3.6 Hz, 1H, CH), 9.08 (s, 1H, NH); ^{13}C NMR (125 MHz, DMSO-d_6): 19.10, 26.49, 29.40, 30.93, 31.68, 34.75, 50.46, 109.34, 150.85, 194.91.

The characterization data of products ***5***

2,7,7-Trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5a**) Pale yellow solid; FT-IR (KBr disc): *v* 3294, 3078, 2961, 1699, 1614, 1475, 1382, 1204; ^{1}H NMR(500 MHz, DMSO-d_6): 0.82 (s, 3H, CH_3), 0.99 (s, 3H, CH_3), 1.10 (t, *J* = 7.1 Hz, 3H, CH_3), 1.96 (d, *J* = 16.1 Hz, 1H, CH_2), 2.14 (d, *J* = 16.1 Hz, 1H, CH_2), 2.26-2.29 (m, 4H, CH_2, CH_3), 2.39 (d, *J* = 17.0 Hz, 1H, CH_2), 3.95 (q, *J* = 7.0 Hz, 2H, CH_2), 4.84 (s, 1H, CH), 7.02-7.06 (m, 1H, Ar-H), 7.12-7.17 (m, 4H, Ar-H), 9.01 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.6, 18.7, 27.0, 29.6, 32.6, 36.3, 50.8, 59.5, 104.1, 110.5, 126.1, 127.9, 128.2, 145.4, 148.1, 150.0, 167.3, 194.7.

2,7,7-Trimethyl-5-oxo-4-(4-methylphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5b**) Pale yellow solid; FT-IR (KBr disc): *v* 3275, 3208, 3084, 2953, 1699, 1614, 1490, 1382, 1212; ^{1}H NMR(500 MHz, DMSO-d_6): 0.85 (s, 3H, CH_3), 1.00 (s, 3H, CH_3), 1.13 (t, *J* = 7.1 Hz, 3H, CH_3), 1.97 (d, *J* = 16.1 Hz, 1H, CH_2), 2.15 (d, *J* = 16.1 Hz, 1H, CH_2), 2.19 (s, 3H, CH_3), 2.26-2.30 (m, 4H, CH_2, CH_3),. 2.41 (d, *J* = 17.0 Hz, 1H, CH_2), 3.97 (q, *J* = 7.1 Hz, 2H, CH_2), 4.81 (s, 1H, CH), 6.97 (d, *J* = 7.9 Hz, 2H, Ar-H), 7.03 (d, *J* = 8.0 Hz, 2H, Ar-H), 8.98 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.2, 20.5, 26.4, 29.1, 32.1, 35.3, 50.2, 58.9, 103.7, 110.0, 127.3, 128.2, 134.4, 144.6, 144.7, 149.3, 166.8, 194.1.

2,7,7-Trimethyl-5-oxo-4-(3-methylphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5c**) Pale yellow solid; FT-IR (KBr disc): *v* 3293, 3076, 2953, 1699, 1614, 1475, 1382, 1212; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.14 (t, *J* = 7.1 Hz, 3H, CH_3), 1.98 (d, *J* = 16.1 Hz, 1H, CH_2), 2.16 (d, *J* = 16.1 Hz, 1H, CH_2), 2.21 (s, 3H, CH_3), 2.29 (d, *J* = 21.8 Hz, 4H, CH_2, CH_3), 2.41 (d, *J* = 17.0 Hz, 1H, CH_2), 3.93-4.03 (m, 2H, CH_2), 4.82 (s, 1H, CH), 6.87 (d, *J* = 7.4 Hz, 1H, Ar-H), 6.94 (d, *J* = 7.7 Hz, 1H, Ar-H), 6.96 (s, 1H, Ar-H), 7.06 (t, *J* = 7.5 Hz, 1H, Ar-H), 8.99 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.2, 21.1, 26.4, 29.1, 32.1, 35.7, 50.2, 58.9, 103.7, 109.9, 124.5, 126.3, 127.7, 128.2, 136.3, 144.7, 147.6, 149.5, 166.8, 194.2.

2,7,7-Trimethyl-5-oxo-4-(2-methylphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5d**) Pale yellow solid; FT-IR (KBr disc): *v* 3301, 3076, 2960, 1707, 1614, 1483, 1374, 1204; ^{1}H NMR(500 MHz, DMSO-d_6): 0.80 (s, 3H, CH_3), 1.00 (s, 3H, CH_3), 1.09 (t, *J* = 7.1 Hz, 3H, CH_3), 1.92 (d, *J* = 16.2 Hz, 1H, CH_2), 2.13 (d, *J* = 16.2 Hz, 1H, CH_2), 2.25-2.28 (m, 4H, CH_2, CH_3), 2.41 (d, *J* = 16.9 Hz, 1H, CH_2), 2.60 (s, 3H, CH_3), 3.91-4.00 (m, 2H, CH_2), 4.92 (s, 1H, CH), 6.92 (q, *J* = 7.6 Hz, 2H, Ar-H), 7.01 (t, *J* = 7.8 Hz, 1H, Ar-H), 7.11 (d, *J* = 7.7 Hz, 1H, Ar-H), 8.97 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.4, 19.3, 26.3, 29.0, 32.0, 32.2, 50.3, 59.0, 105.1, 111.4, 125.4, 125.8, 128.5, 129.1, 134.7, 144.3, 147.6, 149.1, 167.0, 194.2.

2,7,7-Trimethyl-5-oxo-4-(4-methoxyphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5e**) Pale yellow solid; FT-IR (KBr disc): *v* 3270, 3208, 3084, 2953, 1699, 1606, 1490, 1382, 1227; ^{1}H NMR(500 MHz, DMSO-d_6): 0.85 (s, 3H, CH_3), 1.00 (s, 3H, CH_3), 1.13 (t, *J* = 7.1 Hz, 3H, CH_3), 1.97 (d, *J* = 16.1 Hz, 1H, CH_2), 2.15 (d, *J* = 16.1 Hz, 1H, CH_2), 2.26-2.30 (m, 4H, CH_2, CH_3), 2.40 (d, *J* = 17.0 Hz, 1H, CH_2), 3.67 (s, 3H, OCH_3), 3.97 (q, *J* = 7.1 Hz, 2H, CH_2), 4.79 (s, 1H, CH), 6.73 (d, *J* = 8.5 Hz, 2H, Ar-H), 7.05 (d, *J* = 8.5 Hz, 2H, Ar-H), 8.98 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.2, 26.5, 29.1, 32.1, 34.9, 50.2, 54.8, 58.9, 103.9, 110.1, 113.0, 128.3, 140.0, 144.5, 149.1, 157.2, 166.9, 194.2.

2,7,7-Trimethyl-5-oxo-4-(3-methoxyphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5f**) Pale yellow solid; FT-IR (KBr disc): *v* 3301, 3076, 2953, 1699, 1614, 1483, 1382, 1281, 1196; ^{1}H NMR(500 MHz, DMSO-d_6): 0.87 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.14 (t, *J* = 7.1 Hz, 3H, CH_3), 1.99 (d, *J* = 16.1 Hz, 1H, CH_2), 2.17 (d, *J* = 16.1 Hz, 1H, CH_2), 2.29 (d, *J* = 17.0 Hz, 4H, CH_2, CH_3), 2.41 (d, *J* = 17.0 Hz, 1H, CH_2), 3.67 (s, 3H, OCH_3), 3.99 (q, *J* = 7.1 Hz, 2H, CH_2), 4.84 (s, 1H, CH), 6.65 (d, *J* = 8.1 Hz, 1H, Ar-H), 6.69 (s, 1H, Ar-H), 6.73 (d, *J* = 7.7 Hz, 1H, Ar-H), 7.09 (t, *J* = 7.9 Hz, 1H, Ar-H), 9.03 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.2, 26.4, 29.1, 32.1, 35.7, 50.2, 54.7, 59.0, 103.5, 109.8, 110.5, 113.6, 119.7, 128.7, 144.9, 149.1, 149.5, 158.8, 166.8, 194.2.

2,7,7-Trimethyl-5-oxo-4-(2-methoxyphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5g**) Pale yellow solid; FT-IR (KBr disc): *v* 3294, 3076, 2960, 1699, 1614, 1483, 1382, 1227; ^{1}H NMR(500 MHz, DMSO-d_6): 0.84 (s, 3H, CH_3), 1.00 (s, 3H, CH_3), 1.10 (t, *J* = 7.1 Hz, 3H, CH_3), 1.89 (d, *J* = 16.0 Hz, 1H, CH_2), 2.11 (d, *J* = 16.1 Hz, 1H, CH_2), 2.19 (s, 3H, CH_3), 2.24 (d, *J* = 16.9 Hz, 1H, CH_2), 2.39 (d, *J* = 16.9 Hz, 1H, CH_2), 3.69 (s, 3H, OCH_3), 3.88-3.96 (m, 2H, CH_2), 5.05 (s, 1H, CH), 6.75 (t, *J* = 7.4 Hz, 1H, Ar-H), 6.83 (d, *J* = 8.2 Hz, 1H, Ar-H), 7.04 (t, *J* = 7.7 Hz, 1H, Ar-H), 7.10 (d, *J* = 7.4 Hz, 1H, Ar-H), 8.91 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.0, 18.0, 26.2, 29.2, 31.9, 32.8, 50.4, 55.1, 58.7, 102.9, 108.6, 111.0, 119.4, 126.9, 130.4, 134.9, 144.0, 149.9, 157.1, 167.2, 193.7.

2,7,7-Trimethyl-5-oxo-4-(4-chlorophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5h**) Pale yellow solid; FT-IR (KBr disc): *v* 3276, 3200, 3078, 2964, 1703, 1608, 1487, 1372, 1213; ^{1}H NMR(500 MHz, DMSO-d_6): 0.83 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.12 (t, *J* = 7.0 Hz, 3H, CH_3), 1.98 (d, *J* = 16.1 Hz, 1H, CH_2), 2.17 (d, *J* = 16.1 Hz, 1H, CH_2), 2.28 (d, *J* = 14.4 Hz, 4H, CH_2, CH_3), 2.42 (d, *J* = 17.0 Hz, 1H, CH_2), 3.97 (q, *J* = 7.0 Hz, 2H, CH_2), 4.85 (s, 1H, CH), 7.16 (d, *J* = 8.1 Hz, 2H, Ar-H), 7.24 (d, *J* = 8.0 Hz, 2H, Ar-H), 9.09 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.2, 26.4, 29.0, 32.1, 35.5, 50.1, 59.0, 103.1, 109.6, 127.6, 129.2, 130.1, 145.3, 146.5, 149.5, 166.6, 194.2.

2,7,7-Trimethyl-5-oxo-4-(3-chlorophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5i**) Pale yellow solid; FT-IR (KBr disc): *v* 3276, 3212, 3078, 2958, 1697, 1609, 1487, 1379, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.85 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.13 (t, *J* = 7.0 Hz, 3H, CH_3), 2.00 (d, *J* = 16.1 Hz, 1H, CH_2), 2.18 (d, *J* = 16.1 Hz, 1H, CH_2), 2.32 (d, *J* = 12.2 Hz, 4H, CH_2, CH_3), 2.42 (d, *J* = 17.1 Hz, 1H, CH_2), 3.93-4.03 (m, 2H, CH_2), 4.85 (s, 1H, CH), 7.10-7.15 (m, 3H, Ar-H), 7.23 (t, *J* = 7.6 Hz, 1H, Ar-H), 9.12 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.0, 18.2, 26.3, 29.0, 32.1, 36.0, 50.1, 59.1, 102.9, 109.4, 125.6, 126.1, 127.3, 129.7, 132.2, 145.5, 149.7, 149.9, 166.5, 194.2.

2,7,7-Trimethyl-5-oxo-4-(2-chlorophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5j**) Pale yellow solid; FT-IR (KBr disc): *v* 3295, 3219, 3078, 2964, 1697, 1614, 1481, 1372, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.85 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.08 (t, *J* = 6.9 Hz, 3H, CH_3), 1.92 (d, *J* = 16.0 Hz, 1H, CH_2,), 2.14 (d, *J* = 16.1 Hz, 1H, CH_2,), 2.27 (d, *J* = 18.2 Hz, 4H, CH_2, CH_3), 2.42 (d, *J* = 16.8 Hz, 1H, CH_2), 3.92-3.95 (m, 2H, CH_2), 5.19 (s, 1H, CH), 7.07 (t, *J* = 7.4 Hz, 1H, Ar-H), 7.16-7.22 (m, 2H, Ar-H), 7.29 (d, *J* = 7.6 Hz, 1H, Ar-H), 9.06 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.0, 18.1, 26.4, 29.0, 31.9, 34.9, 50.2, 58.9, 103.2, 109.5, 126.6, 127.2, 128.9, 131.4, 131.9, 144.9, 145.1, 149.6, 166.7, 193.8.

2,7,7-Trimethyl-5-oxo-4-(4-Bromophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5k**) Pale yellow solid; FT-IR (KBr disc): *v* 3276, 3200, 3078, 2964, 1697, 1602, 1487, 1372, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.84 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.12 (t, *J* = 7.0 Hz, 3H, CH_3), 1.98 (d, *J* = 16.1 Hz, 1H, CH_2), 2.17 (d, *J* = 16.1 Hz, 1H, CH_2), 2.28 (d, *J* = 14.2 Hz, 4H, CH_2, CH_3), 2.41 (d, *J* = 17.0 Hz, 1H, CH_2), 3.97 (q, *J* = 7.0 Hz, 2H, CH_2), 4.83 (s, 1H, CH), 7.11 (d, *J* = 8.2 Hz, 2H, Ar-H), 7.38 (d, *J* = 8.1 Hz, 2H, Ar-H), 9.08 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.1, 18.2, 26.4, 29.0, 32.1, 35.6, 50.1, 59.0, 103.0, 109.6, 118.6, 129.7, 130.5, 145.3, 146.9, 149.5, 166.6, 194.2.

2,7,7-Trimethyl-5-oxo-4-(3-Bromophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5l**) Pale yellow solid; FT-IR (KBr disc): *v* 3276 (N-H), 3200, 3078, 2958, 1697, 1609, 1487,

1372, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.86 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.13 (t, J = 7.1 Hz, 3H, CH_3), 2.00 (d, J = 16.1 Hz, 1H, CH_2), 2.18 (d, J = 16.1 Hz, 1H, CH_2), 2.30-2.33 (m, 4H, CH_2, CH_3), 2.43 (d, J = 17.1 Hz, 1H, CH_2), 3.93-4.04 (m, 2H, CH_2), 4.83 (s, 1H, CH), 7.14-7.19 (m, 2H, Ar-H), 7.27-7.30 (m, 2H, Ar-H), 9.11 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.0, 18.3, 26.3, 29.0, 32.1, 36.0, 50.1, 59.1, 102.9, 109.4, 120.9, 126.5, 128.5, 130.0, 130.3, 145.5, 149.8, 150.2, 166.5, 194.2.

2,7,7-Trimethyl-5-oxo-4-(2-Bromophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5m**) Pale yellow solid; FT-IR (KBr disc): v 3301, 3200, 3078, 2958, 1691, 1614, 1487, 1379, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.85 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.09 (t, J = 7.1 Hz, 3H, CH_3), 1.92 (d, J = 16.1 Hz, 1H, CH_2), 2.14 (d, J = 16.1 Hz, 1H, CH_2), 2.24-2.29 (m, 4H, CH_2, CH_3), 2.42 (d, J = 16.9 Hz, 1H, CH_2), 3.91-4.01 (m, 2H, CH_2), 5.15 (s, 1H, CH), 6.97 (t, J = 7.4 Hz, 1H, Ar-H), 7.22 (t, J = 7.4 Hz, 1H, Ar-H), 7.28 (d, J = 7.7 Hz, 1H, Ar-H), 7.39 (d, J = 7.9 Hz, 1H, Ar-H), 9.05 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.2, 18.1, 26.4, 29.0, 31.9, 37.0, 50.3, 58.8, 103.7, 109.9, 122.3, 127.3, 127.4, 131.4, 132.2, 144.7, 147.0, 149.5, 166.8, 193.8.

2,7,7-Trimethyl-5-oxo-4-(4-nitrophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5n**) orange solid; FT-IR (KBr disc): v 3279, 3194, 3071, 2963, 1705, 1605, 1497, 1358, 1219; ^{1}H NMR (500 MHz, DMSO-d_6): 0.82 (s, 3H, CH_3), 1.01 (s, 3H, CH_3), 1.11 (t, J = 7.1 Hz, 3H, CH_3), 1.98 (d, J = 16.1 Hz, 1H, CH_2), 2.18 (d, J = 16.1 Hz, 1H, CH_2), 2.31 (d, J = 16.5 Hz, 4H, CH_2, CH_3), 2.44 (d, J = 17.0 Hz, 1H, CH_2), 3.97 (q, J = 7.0 Hz, 2H, CH_2), 4.98 (s, 1H, CH), 7.42 (d, J = 8.5 Hz, 2H, Ar-H), 8.09 (d, J = 8.5 Hz, 2H, Ar-H), 9.22 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.02, 18.3, 26.4, 28.9, 32.1, 36.6, 50.0, 59.2, 102.3, 109.0, 123.1, 128.7, 145.6, 146.1, 150.0, 154.9, 166.3, 194.2.

2,7,7-Trimethyl-5-oxo-4-(3-nitrophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5o**) Pale yellow solid; FT-IR (KBr disc): v 3289, 3212, 3078, 2958, 1697, 1621, 1487, 1367, 1213; ^{1}H NMR(500 MHz, DMSO-d_6): 0.84 (s, 3H, CH_3), 1.02 (s, 3H, CH_3), 1.11 (t, J = 7.1 Hz, 3H, CH_3) 1.99 (d, J = 16.1 Hz, 1H, CH_2), 2.19 (d, J = 16.1 Hz, 1H, CH_2), 2.34 (d, J = 14.8 Hz, 4H, CH_2, CH_3), 2.45 (d, J = 17.1 Hz, 1H, CH_2), 3.93-4.02 (m, 2H, CH_2), 4.98 (s, 1H, CH), 7.52 (t, J = 7.7 Hz, 1H, Ar-H), 7.62 (d, J = 7.6 Hz, 1H, Ar-H), 7.98 (d, J = 8.1 Hz, 2H, Ar-H), 9.23 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 14.0, 18.3, 26.3, 29.0, 32.1, 36.4, 50.0, 59.2, 102.6, 109.2, 120.8, 121.9, 129.3, 134.2, 146.0, 147.3, 149.7, 150.1, 166.3, 194.2.

2,7,7-Trimethyl-5-oxo-4-(2-nitrophenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5p**) Yellow solid; FT-IR (KBr disc): v 3295, 3092, 2958, 1697, 1627, 1506, 1367, 1220; ^{1}H NMR(500 MHz, DMSO-d_6): 0.77 (s, 3H, CH_3), 0.97-1.02 (m, 6H, 2CH_3), 1.89 (d, J = 16.0 Hz, 1H, CH_2), 2.11 (d, J = 16.1 Hz, 1H, CH_2), 2.25 (d, J = 17.0 Hz, 1H, CH_2), 2.30 (s, 3H, CH_3), 2.40 (d, J = 17.0 Hz, 1H, CH_2), 3.87-3.97 (m, 2H, CH_2), 5.65 (s, 1H, CH), 7.30 (t, J = 7.7 Hz, 1H, Ar-H), 7.42 (d,

J = 7.8 Hz, 1H, Ar-H), 7.57 (t, *J* = 7.5 Hz, 1H, Ar-H), 7.72 (d, *J* = 8.1 Hz, 1H, Ar-H), 9.11 (s, 1H, NH); ^{13}C NMR(125 MHz, DMSO-d_6): 13.8, 18.2, 26.3, 28.8, 31.8, 32.0, 50.0, 59.0, 103.0, 109.7, 123.5, 126.8, 130.6, 132.7, 141.9, 145.7, 147.6, 149.7, 166.5, 193.9.

2,7,7-Trimethyl-5-oxo-4-isopropyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylic acid ethyl ester (**5q**) Yellow solid; FT-IR (KBr disc): *v* 3281, 2959, 2872, 1680, 1489, 1391, 1225; ^{1}H NMR (500 MHz, DMSO-d_6): 0.65 (d, *J* = 6.5 Hz, 6H, 2CH_3), 1.03 (d, *J* = 6.6 Hz, 6H, 2CH_3), 1.20 (t, *J* = 7.1 Hz, 3H, CH_3), 1.46-1.54 (m, 1H, CH), 2.10 (d, *J* = 16.1 Hz, 1H, CH_2), 2.16 (d, *J* = 16.1 Hz, 1H, CH_2), 2.23 (s, 3H, CH_3), 2.27 (d, *J* = 17.2 Hz, 1H, CH_2), 2.36 (d, J = 17.1 Hz, 1H, CH_2), 3.79 (d, *J* = 4.3 Hz, 1H, CH), 4.00-4.12 (m, 2H, CH_2), 8.85 (s, 1H, NH); ^{13}C NMR (125 MHz, DMSO-d_6): 14.24, 18.01, 18.54, 26.52, 29.43, 31.70, 34.59, 35.06, 50.49, 58.80, 101.32, 107.66, 145.30, 150.94, 167.84, 194.77.

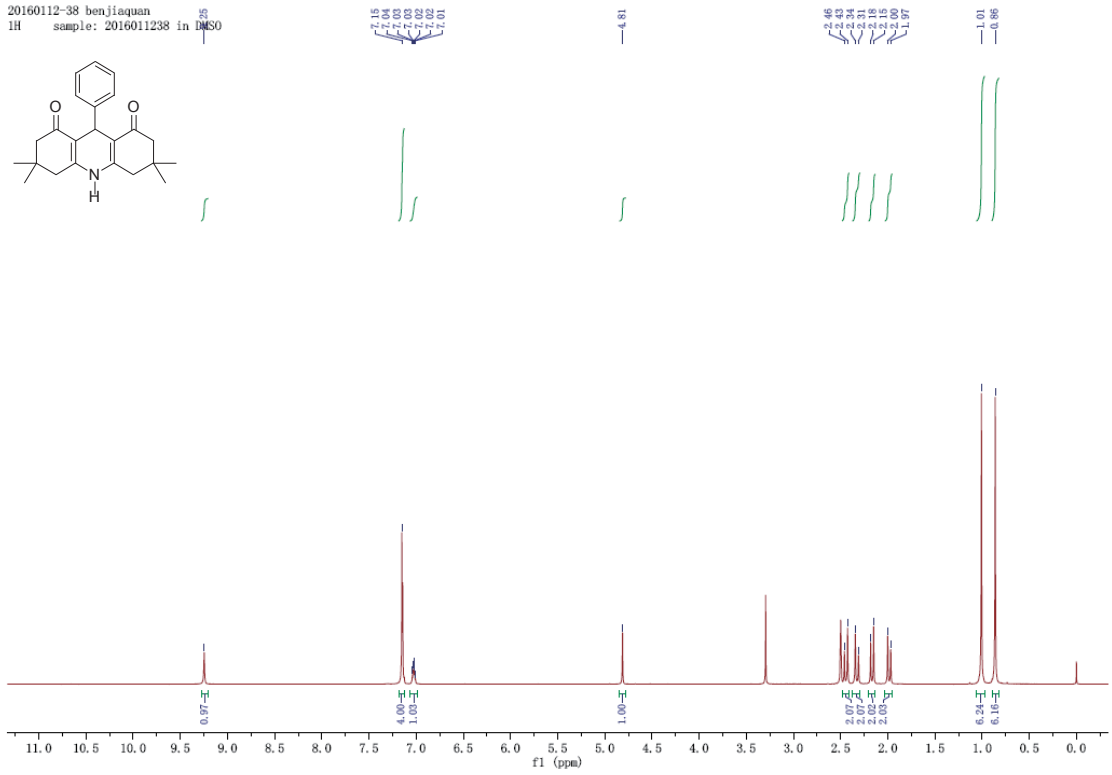
The characterization data of products ***6***

2-Amino-4-phenyl-5,6,7,8-tetrahydro-7,7-dimethyl-5-oxo-4*H*-chromene-3-carbonitrile (**6a**) White solid, 94% yield; FT-IR (KBr disc): *v* 3323, 3252, 3211, 3084, 2964, 2885, 2199, 1682, 1603, 1369, 1215; ^{1}H NMR (500 MHz, DMSO-d_6): 0.97 (s, 3H, CH_3), 1.05 (s, 3H, CH_3), 2.11 (d, *J* = 16.1 Hz, 1H, CH_2), 2.26 (d, *J* = 16.1 Hz, 1H, CH_2), 2.49-2.56 (m, 2H, CH_2), 4.19 (s, 1H, CH), 6.98 (s, 2H, NH_2), 7.15-7.20 (m, 3H, Ar-H), 7.29 (t, *J* = 7.5 Hz, 2H, Ar-H); ^{13}C NMR (125 MHz, DMSO-d_6): 26.77, 28.34, 31.74, 35.54, 49.95, 58.33, 112.72, 119.64, 126.50, 127.10, 128.26, 144.69, 158.46, 162.42, 195.56.

2-Amino-4-(4-methylphenyl)-5,6,7,8-tetrahydro-7,7-dimethyl-5-oxo-4*H*-chromene-3-carbonitrile (**6b**) White solid, 90% yield; FT-IR (KBr disc): *v*3265, 3221, 3088, 2924, 2895, 2191, 1680, 1639, 1601, 1367, 1250; ^{1}H NMR (500 MHz, DMSO-d_6): 0.96 (s, 3H, CH_3), 1.04 (s, 3H, CH_3), 2.10 (d, *J* = 16.1 Hz, 1H, CH_2), 2.23-2.26 (m, 4H, CH_2, CH_3), 2.47-2.55 (m, 2H, CH_2), 4.14 (s, 1H, CH), 6.94 (s, 2H, NH_2), 7.03 (d, *J* = 7.5 Hz, 2H, Ar-H), 7.09 (d, *J* = 7.7 Hz, 2H, Ar-H); ^{13}C NMR (125 MHz, DMSO-d_6): 20.53, 26.73, 28.36, 31.73, 35.14, 49.97, 58.46, 112.85, 119.66, 127.02, 128.81, 135.55, 141.76, 158.40, 162.20, 195.53.

2-Amino-4-(4-chlorophenyl)-5,6,7,8-tetrahydro-7,7-dimethyl-5-oxo-4*H*-chromene-3-carbonitrile (**6c**) White solid, 93% yield; FT-IR (KBr disc): *v* 3381, 3323, 3182, 2889, 2189, 1676, 1634, 1603, 1489, 1366, 1217; ^{1}H NMR (500 MHz, DMSO-d_6): 0.95 (s, 3H, CH_3), 1.04 (s, 3H, CH_3), 2.11 (d, *J* = 16.0 Hz, 1H, CH_2), 2.25 (d, *J* = 16.1 Hz, 1H, CH_2), 2.48-2.55 (m, 2H, CH_2), 4.21 (s, 1H, CH), 7.04 (s, 2H, NH_2), 7.18 (d, *J* = 8.4 Hz, 2H, Ar-H), 7.35 (d, *J* = 8.4 Hz, 2H, Ar-H); ^{13}C NMR (125 MHz, DMSO-d_6): 26.83, 28.25, 31.73, 35.08, 49.91, 57.77, 112.31, 119.47, 128.23, 129.06, 131.06, 143.68, 158.46, 162.55, 195.58.

2-Amino-4-(4-Bromophenyl)-5,6,7,8-tetrahydro-7,7-dimethyl-5-oxo-4*H*-chromene-3-carbonitrile (**6d**) White solid, 94% yield; FT-IR (KBr disc): *v* 3329, 3217, 2961, 2880, 2193, 1659, 1601, 1487, 1367, 1211; ^{1}H NMR (500 MHz, DMSO-d_6): 0.95 (s, 3H, CH_3), 1.04 (s, 3H, CH_3), 2.11 (d, J = 16.1 Hz, 1H, CH_2), 2.25 (d, J = 16.1 Hz, 1H, CH_2), 2.47-2.55 (m, 2H, CH_2), 4.19 (s, 1H, CH), 7.04 (s, 2H, NH_2), 7.12 (d, J = 8.1 Hz, 2H, Ar-H), 7.48 (d, J = 8.2 Hz, 2H, Ar-H); ^{13}C NMR (125 MHz, DMSO-d_6): 26.83, 28.25, 31.74, 35.16, 49.91, 57.70, 112.24, 119.46, 119.55, 129.46, 131.15, 144.12, 158.45, 162.56, 195.58.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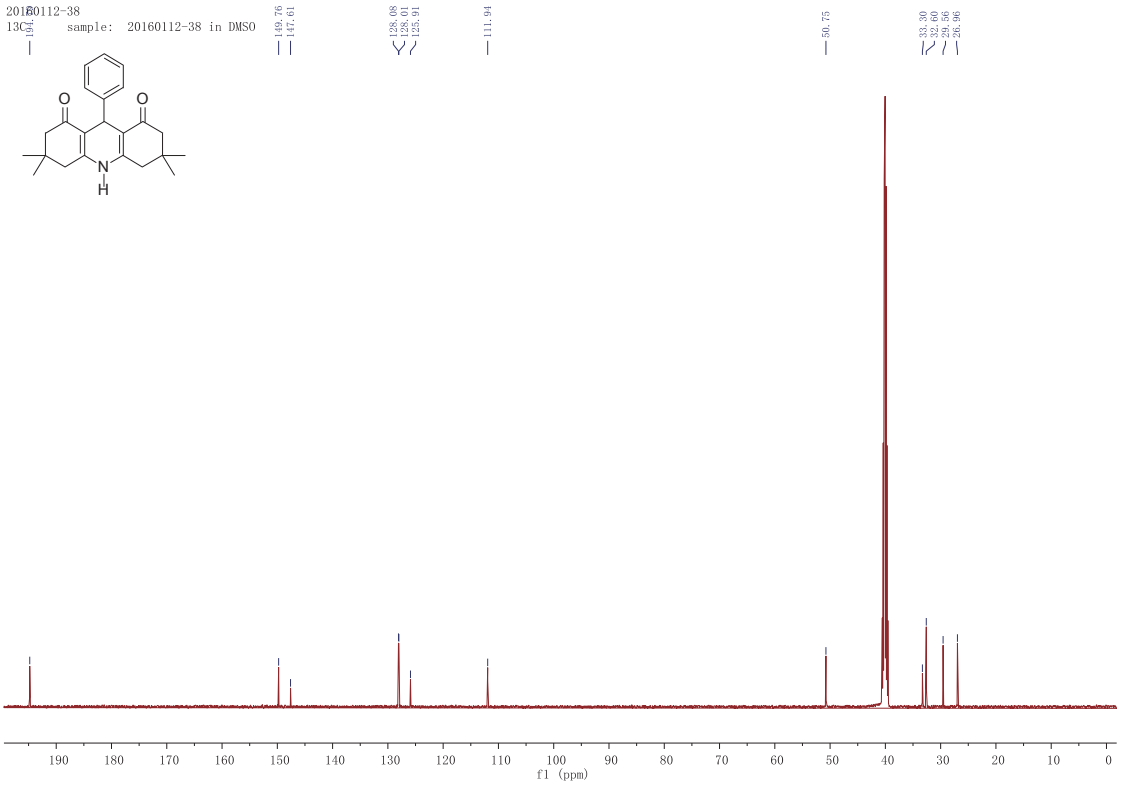
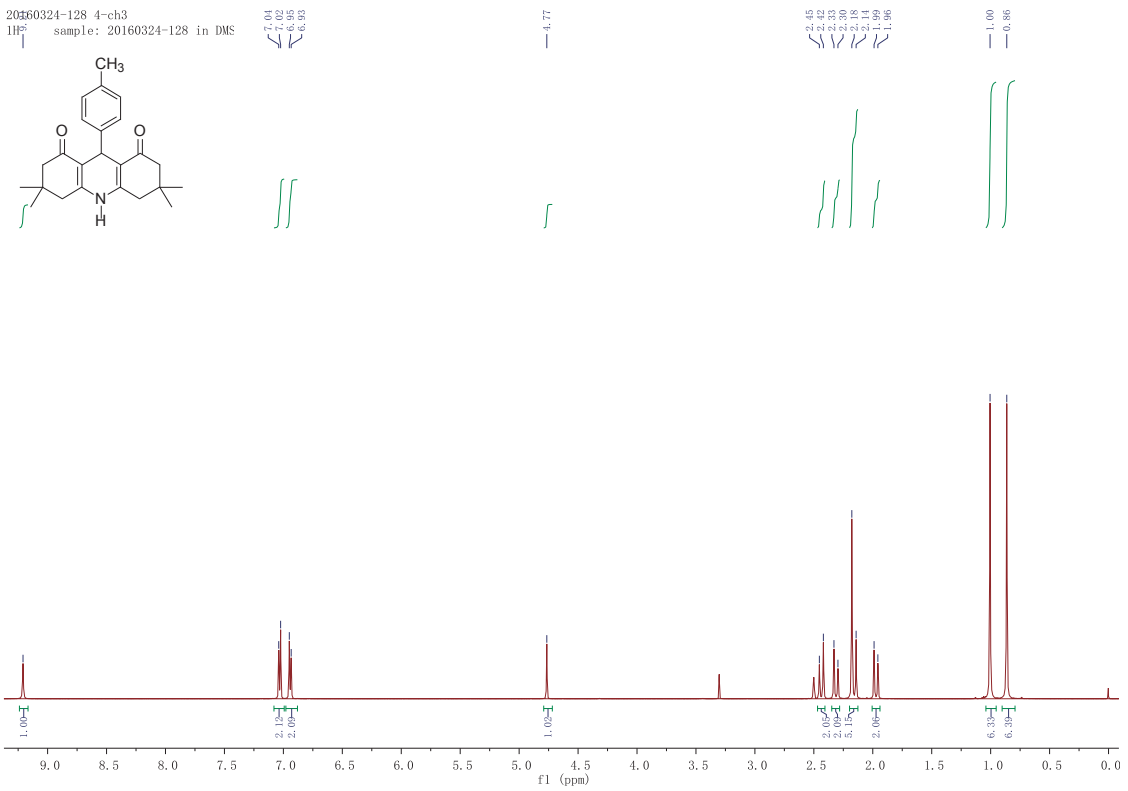
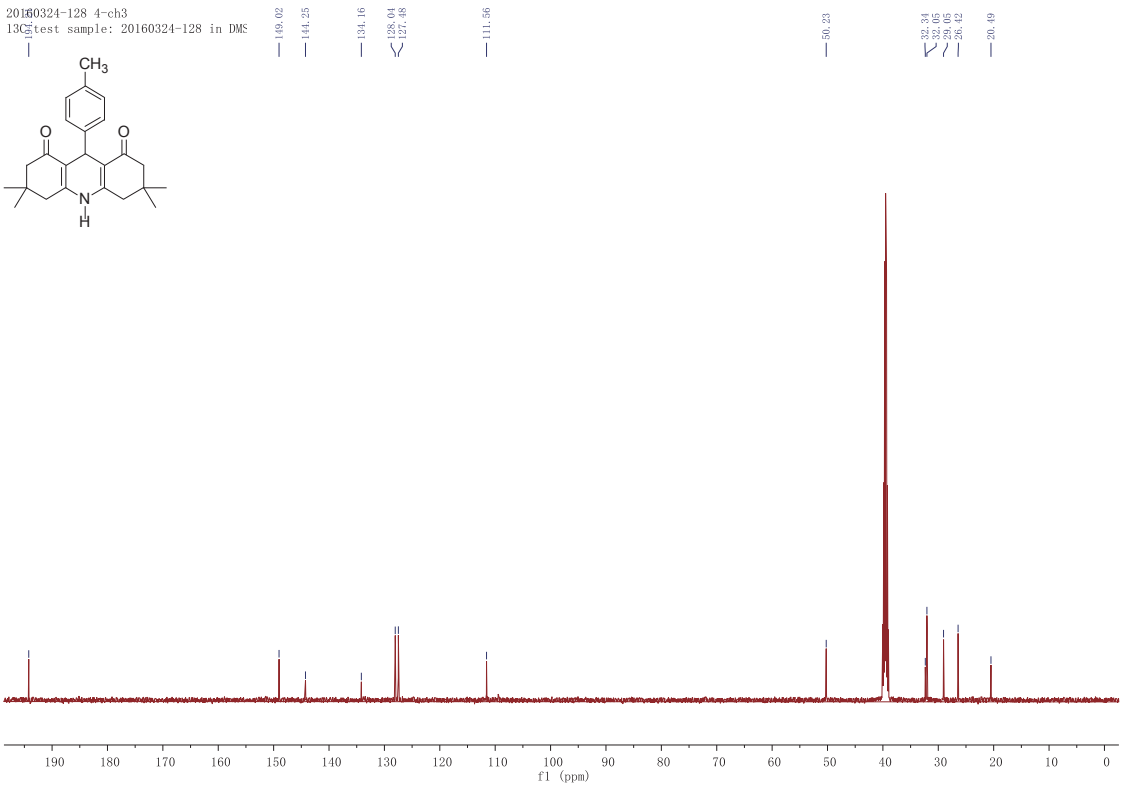
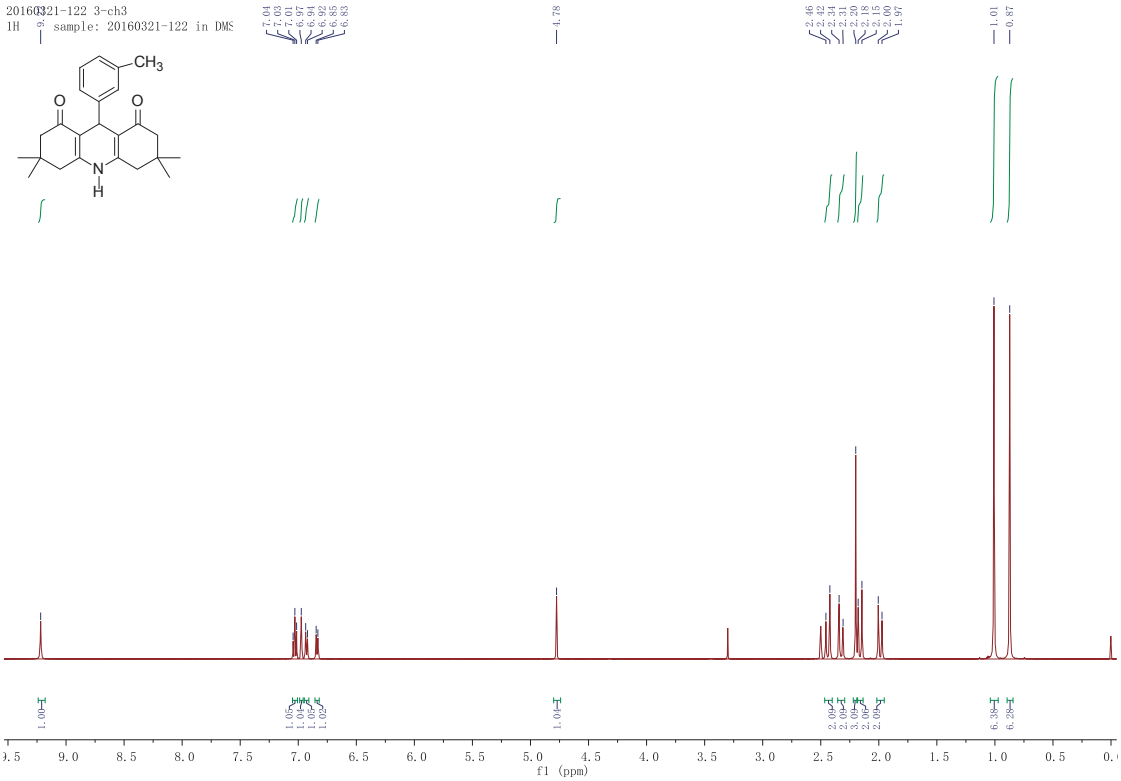
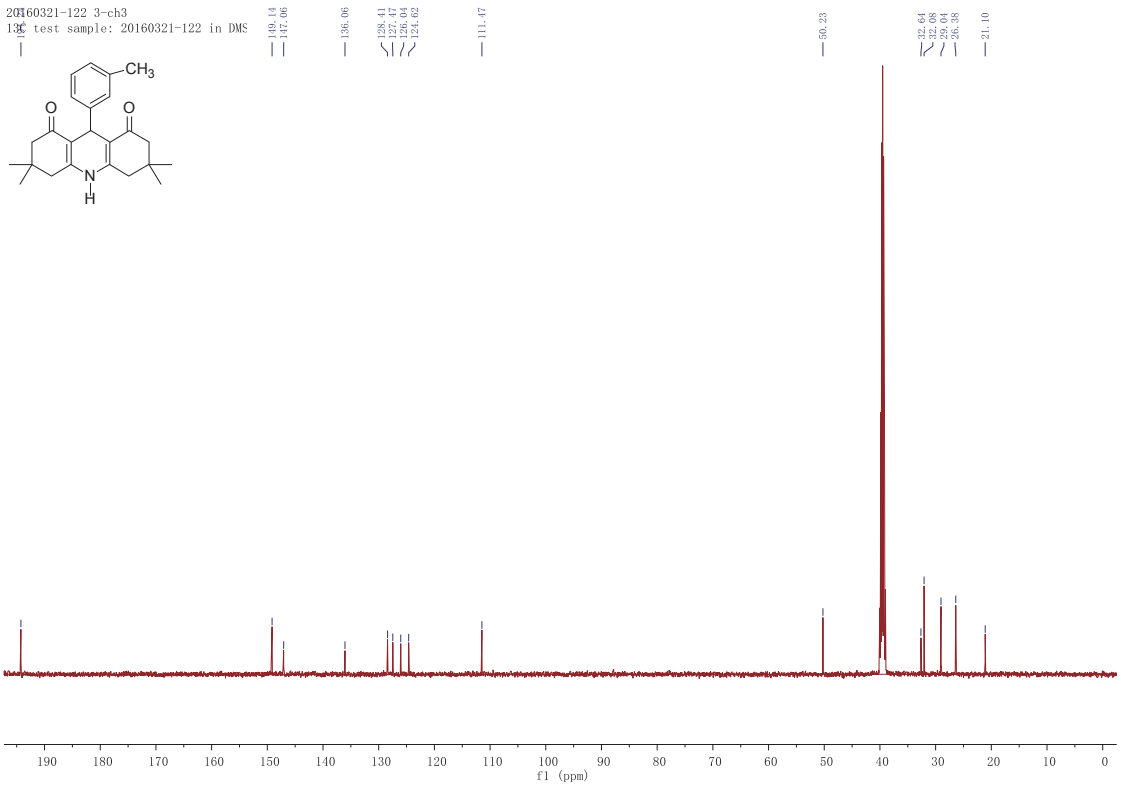
4.00
1.03
1.00
2.07
2.07
2.02
2.03
6.24
6.16
f1 (ppm)

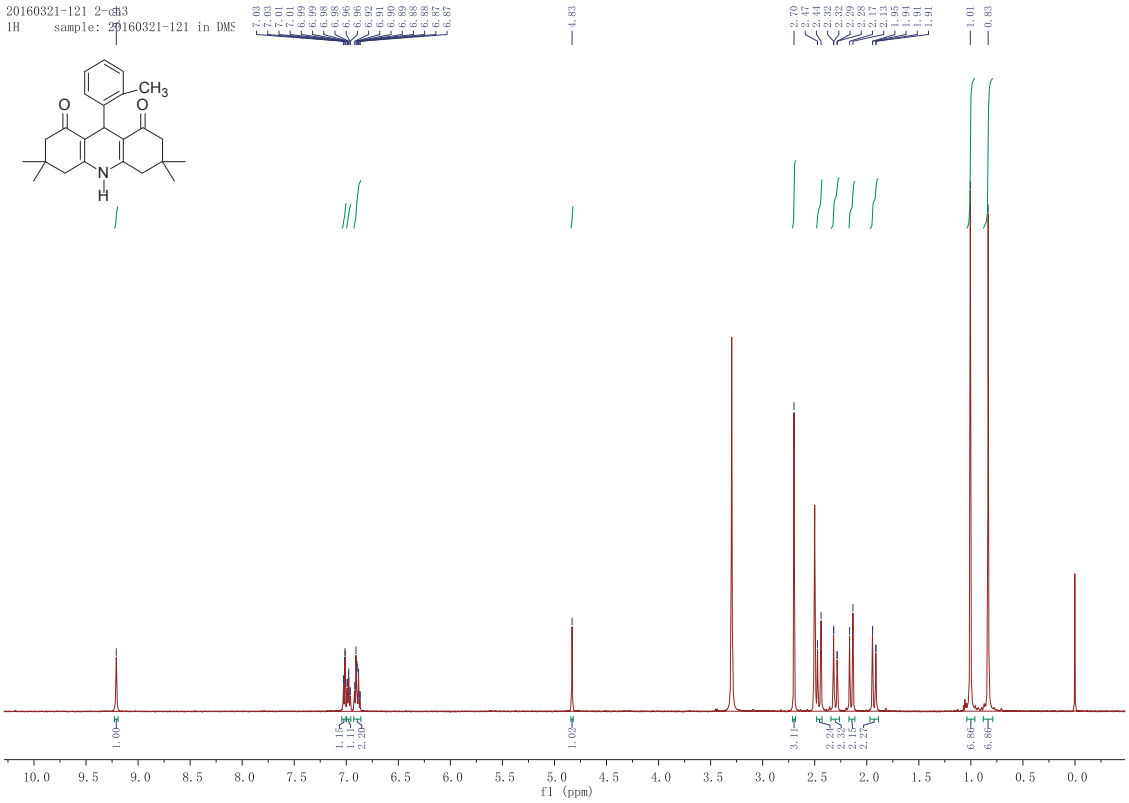

20160112-38
13C sample: 20160112-38 in DMSO
149.76
147.61
128.08
128.01
125.91
111.94
50.75
33.30
32.60
29.96
26.96
f1 (ppm)

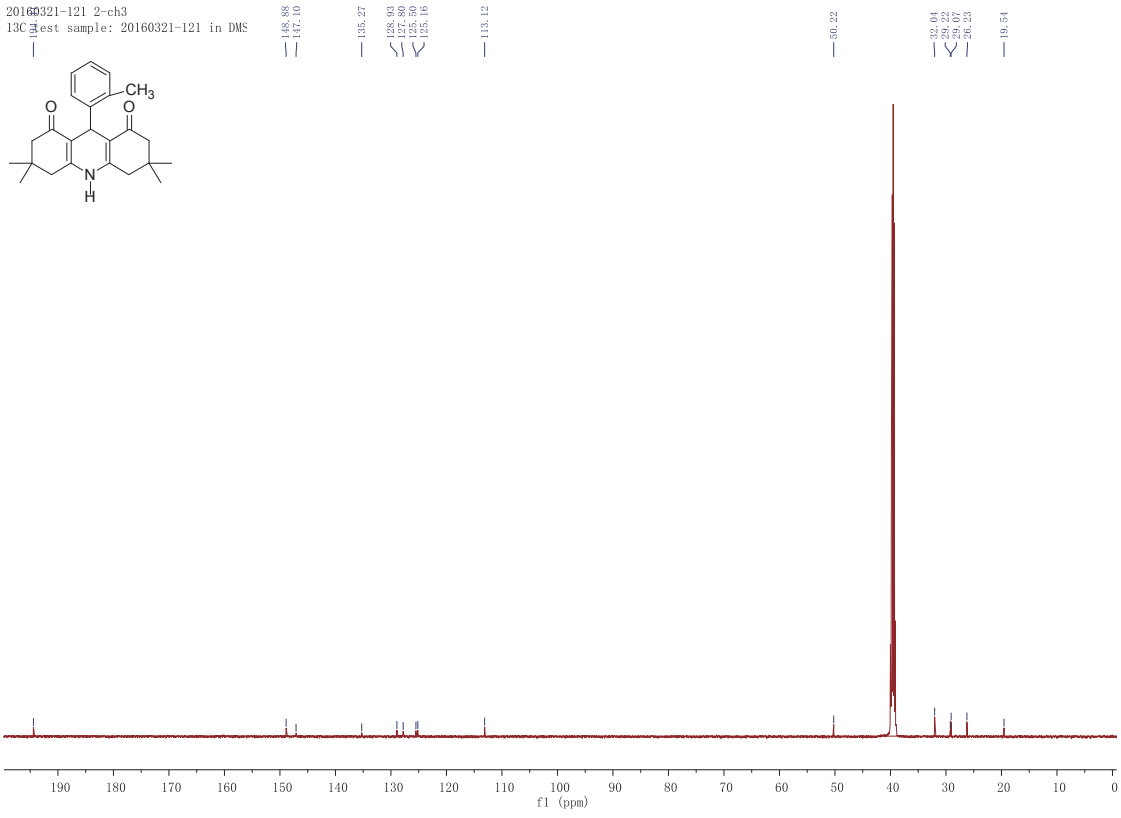

20160324-128 4-ch3
1H
sample: 20160324-128 in DMS
7.04
7.02
6.95
6.93
4.77
2.45
2.42
2.33
2.30
2.18
2.14
1.99
1.96
1.00
0.86
CH3
O
O
N
H
1.00
2.12
2.09
1.02
2.05
2.09
5.15
2.06
6.33
6.39
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

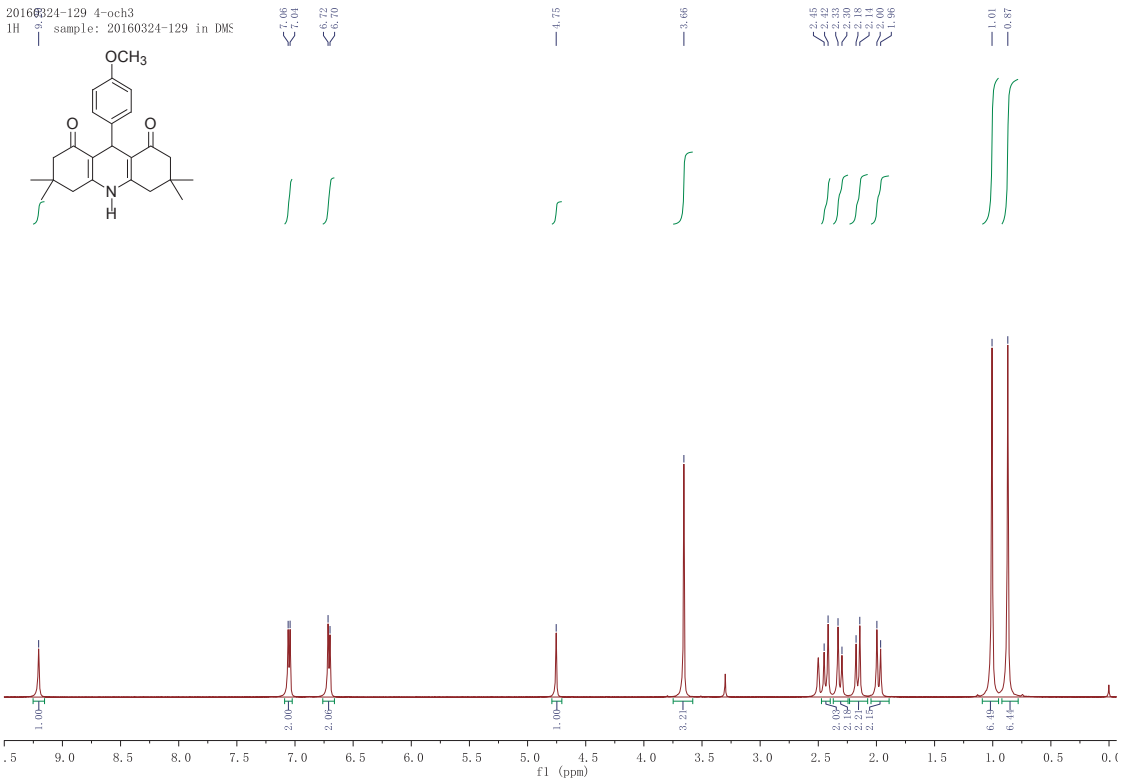

20160324-128 4-ch3
13C
test sample: 20160324-128 in DMS
149.02
144.25
134.16
128.04
127.48
111.56
50.23
32.34
32.05
29.05
26.42
20.49
CH3
O
O
N
H
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

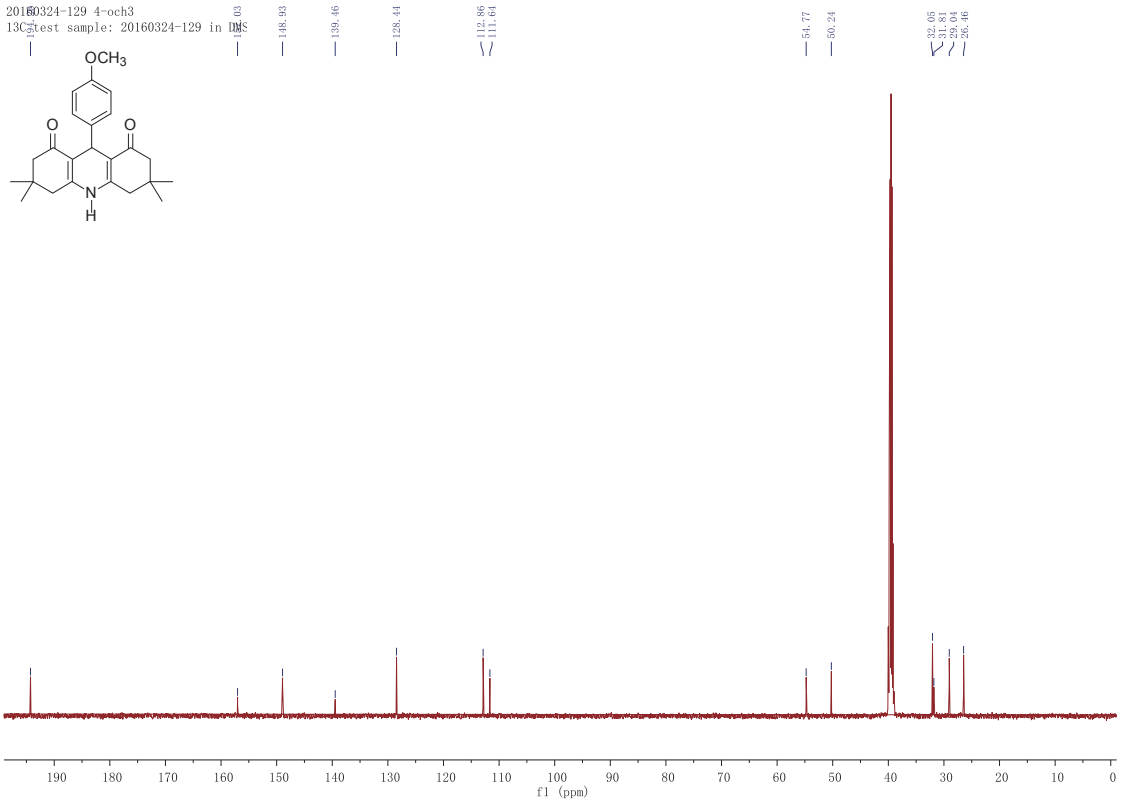

20160321-122 3-ch3
1H
sample: 20160321-122 in DMS
7.04
7.03
7.01
6.97
6.94
6.92
6.85
6.83
4.78
2.46
2.42
2.34
2.31
2.20
2.18
2.15
2.10
1.97
1.01
0.87
1.00
1.05
1.00
1.00
1.00
1.04
2.00
2.00
3.00
2.00
2.00
6.38
6.28
f1 (ppm)

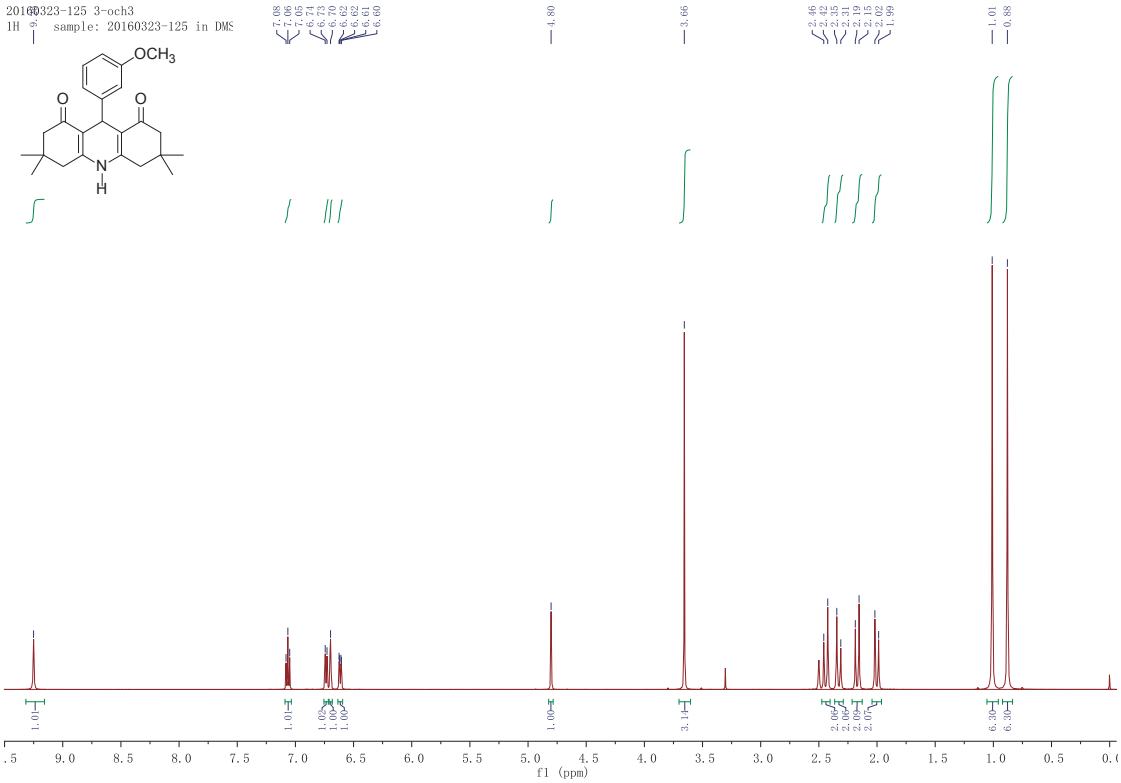

20160321-122 3-ch3
13C
test sample: 20160321-122 in DMS
149.14
147.06
136.06
128.41
127.47
126.04
124.62
111.47
50.23
32.64
32.08
28.94
26.38
21.10
f1 (ppm)

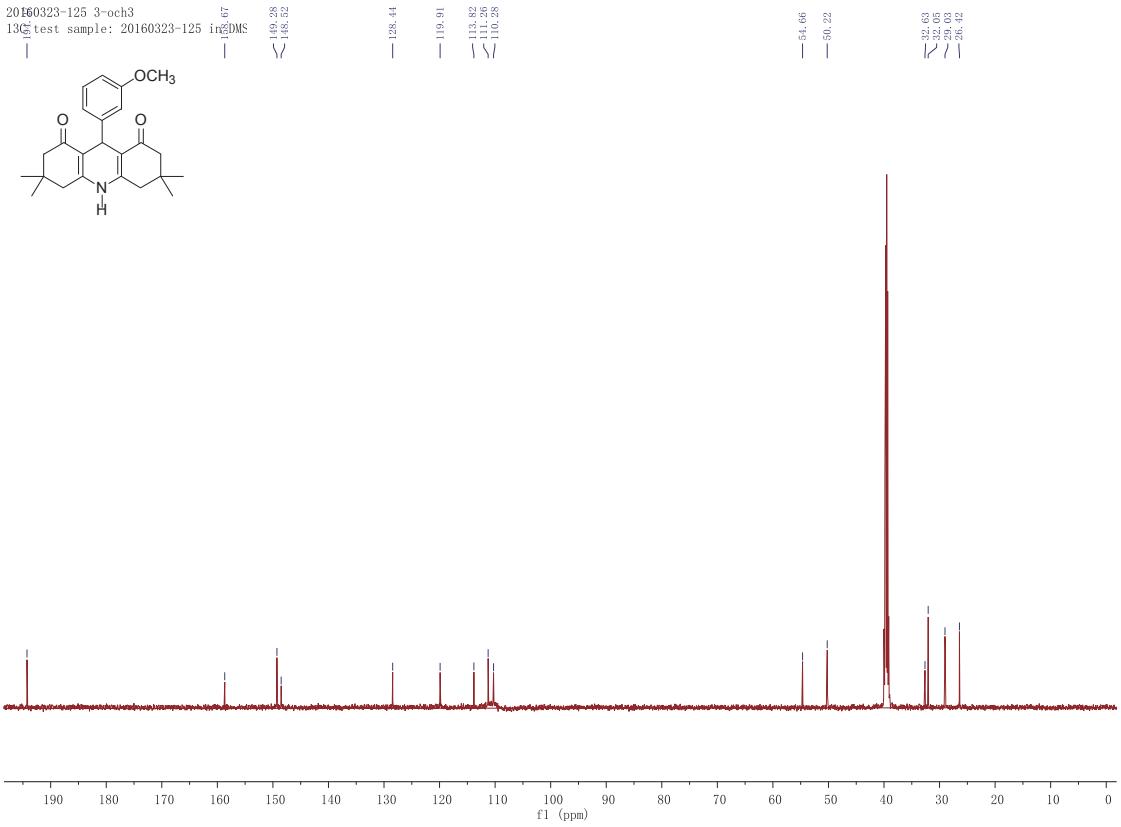

20160321-121 2-ch3
1H sample: 20160321-121 in DMS
7.03
7.03
7.01
7.01
6.99
6.99
6.98
6.98
6.96
6.96
6.92
6.91
6.90
6.89
6.88
6.88
6.87
6.87
4.83
2.70
2.47
2.44
2.32
2.32
2.29
2.28
2.17
2.13
1.95
1.94
1.91
1.91
1.01
0.83
CH3
O
O
N
H
1.00
1.15
1.11
2.20
1.02
3.11
2.24
2.32
2.15
2.27
6.86
6.86
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

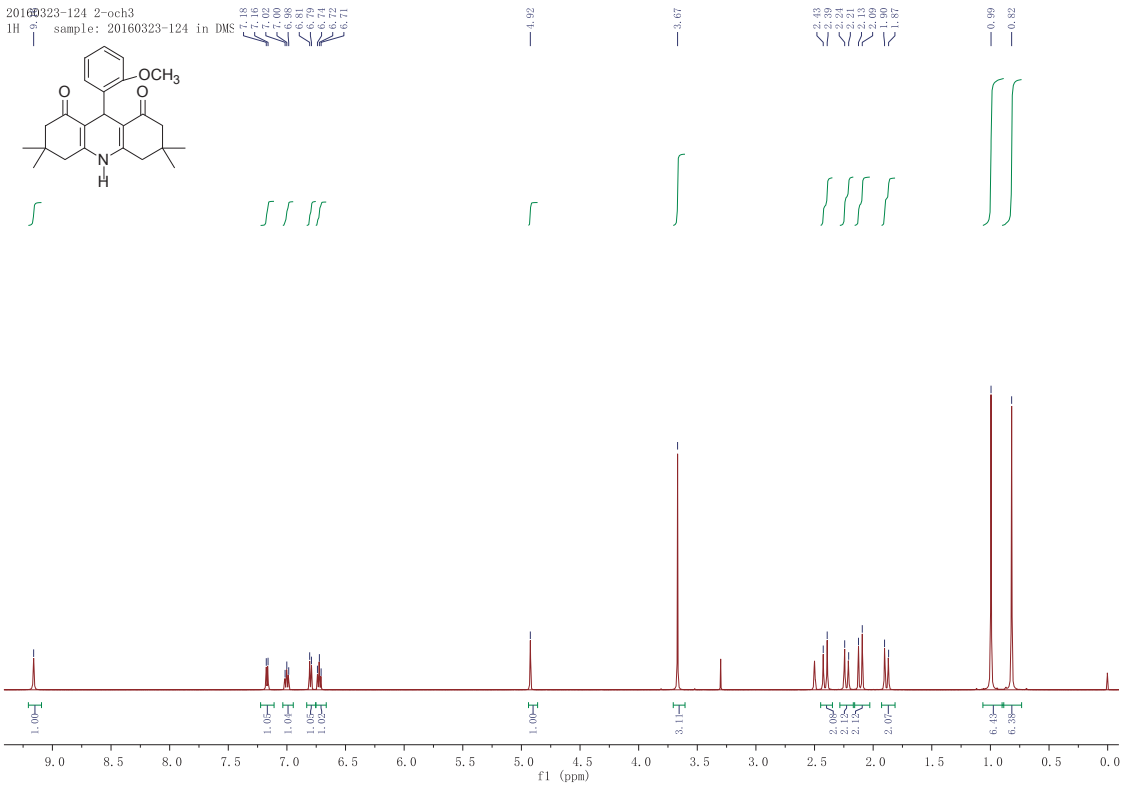

20160321-121 2-ch3
13C test sample: 20160321-121 in DMS
194.
148.88
147.10
135.27
128.93
127.80
125.60
125.16
113.12
50.22
32.04
29.22
29.07
26.23
19.54
CH3
O
O
N
H
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

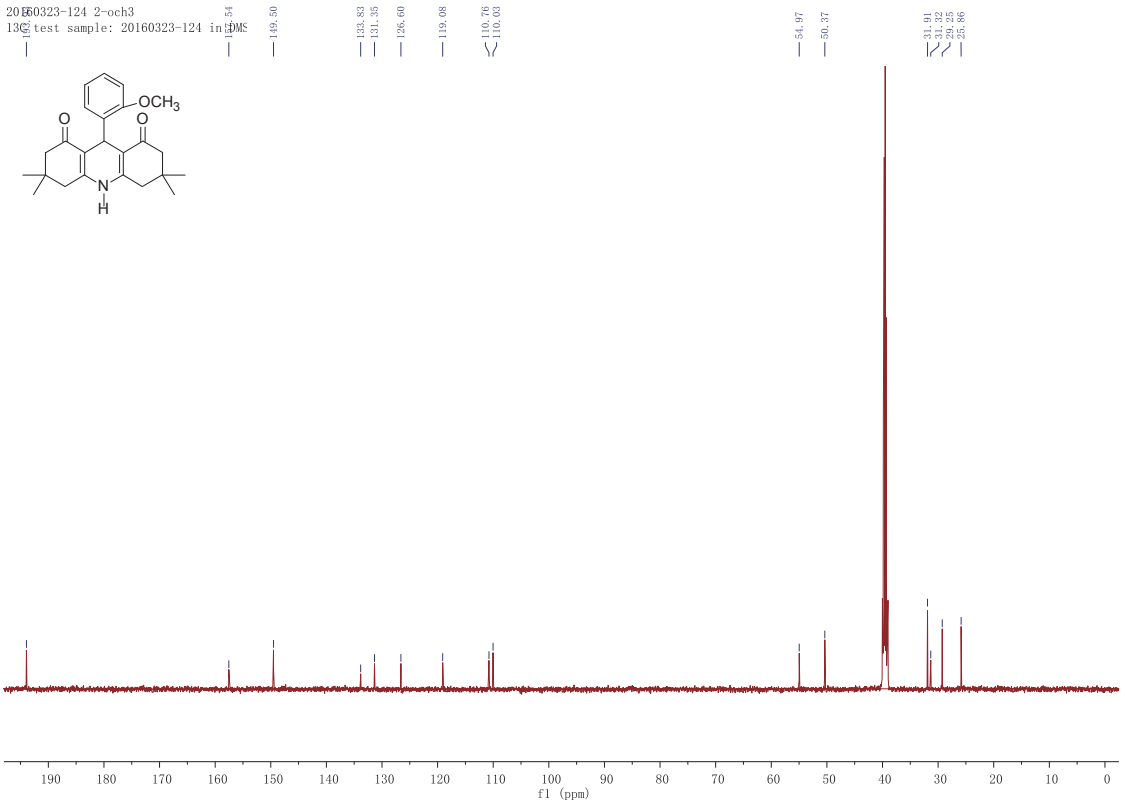

20160324-129 4-och3
1H sample: 20160324-129 in DMS
OCH3
O
O
N
H
7.06
7.04
6.72
6.70
4.75
3.66
2.45
2.42
2.33
2.30
2.18
2.14
2.00
1.96
1.01
0.87
1.00
2.00
2.06
1.00
3.21
2.05
2.02
2.01
2.15
6.40
6.44
f1 (ppm)

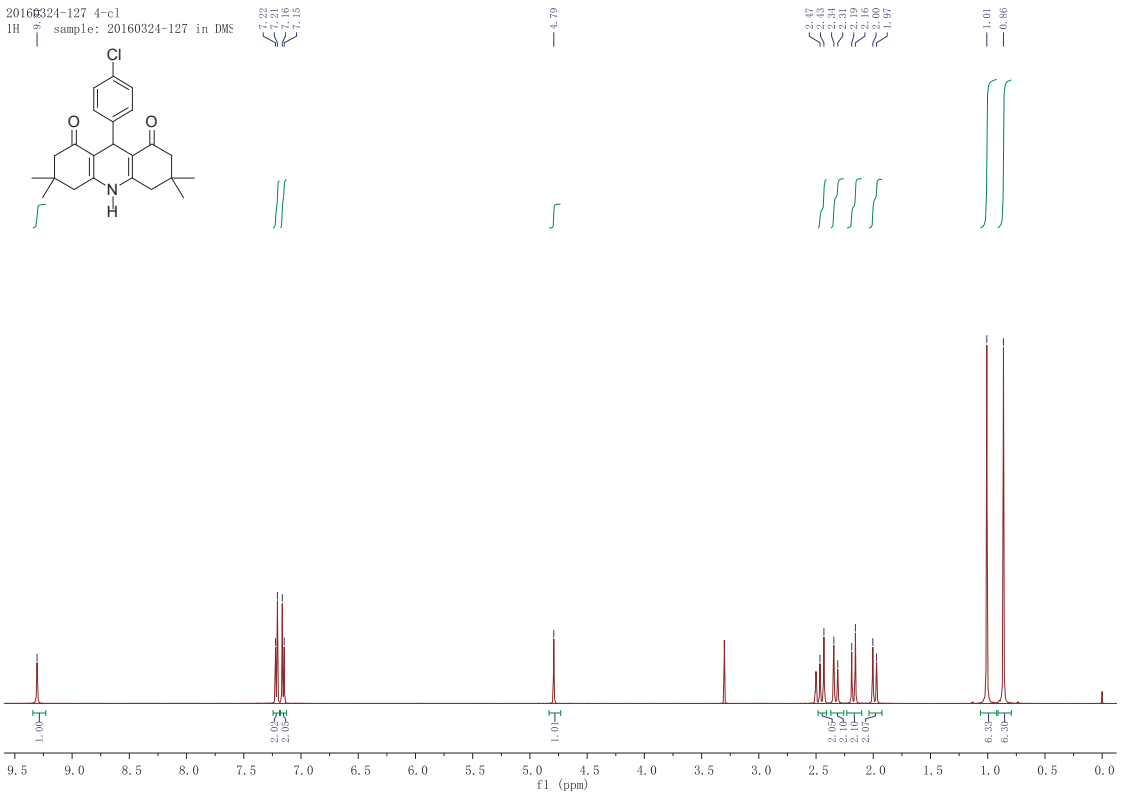

20160324-129 4-och3
13C test sample: 20160324-129 in DMS
OCH3
O
O
N
H
148.93
139.46
128.44
112.86
111.64
54.77
50.24
32.05
31.81
29.04
26.46
f1 (ppm)

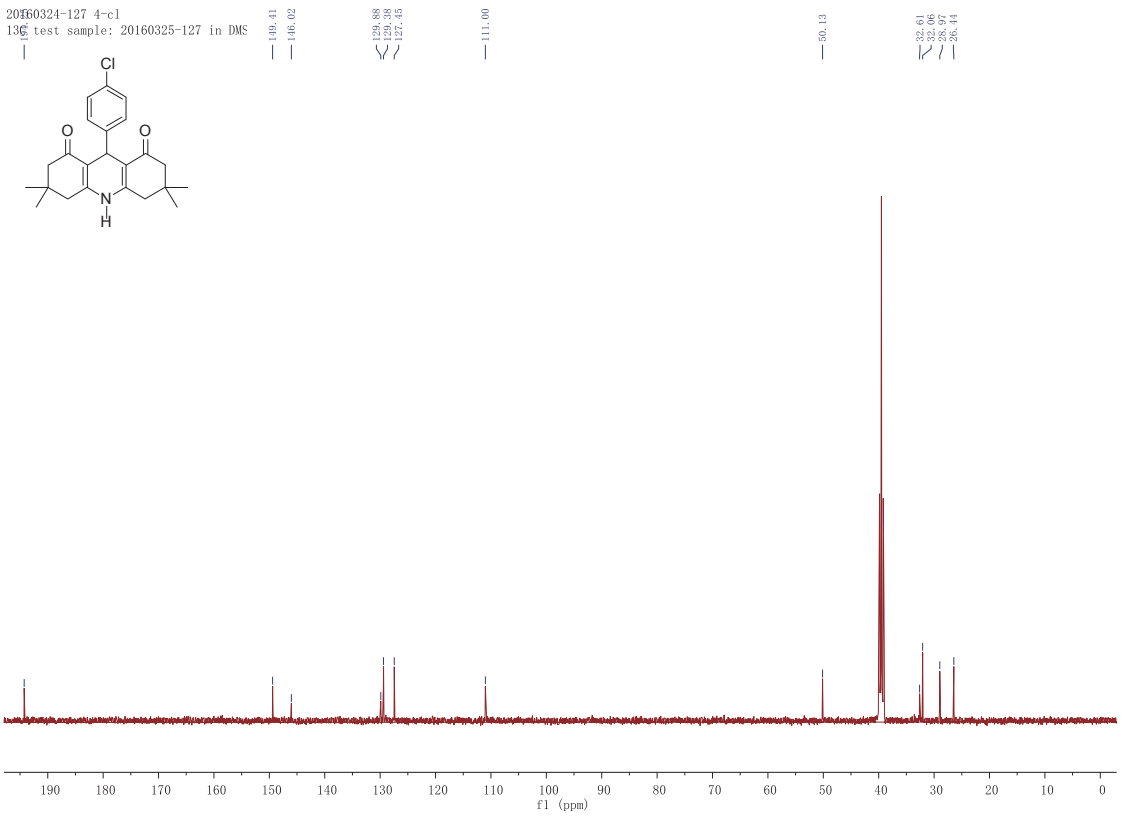

20160323-125 3-och3
1H
sample: 20160323-125 in DMS
OCH3
O
O
N
H
7.08
7.06
7.05
6.74
6.73
6.70
6.62
6.62
6.61
6.60
4.80
3.66
2.46
2.42
2.35
2.31
2.19
2.15
2.02
1.99
1.01
0.88
1.01
1.04
1.02
1.00
1.00
1.00
3.14
2.06
2.07
2.04
2.05
6.30
6.30
f1 (ppm)

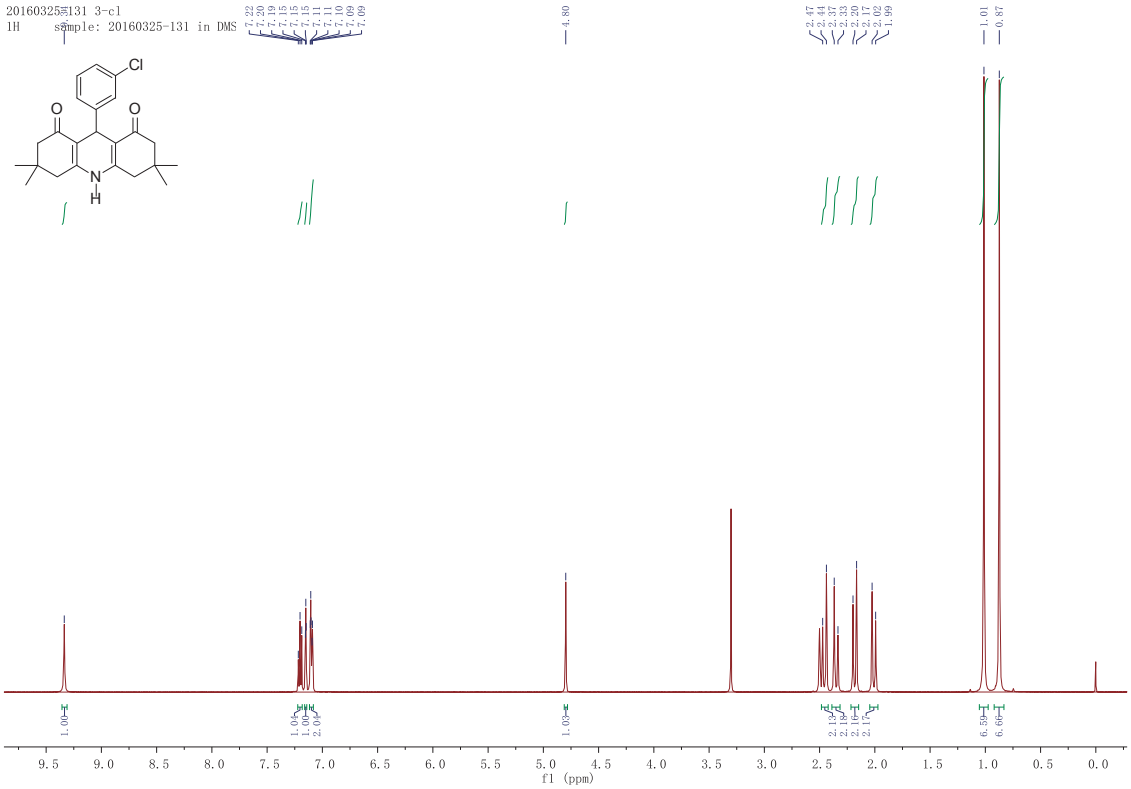

20160323-125 3-och3
13C
test sample: 20160323-125 in DMS
OCH3
O
O
N
H
158.67
149.28
148.52
128.44
119.91
113.82
111.96
110.58
54.66
50.22
32.63
32.05
29.03
26.42
f1 (ppm)

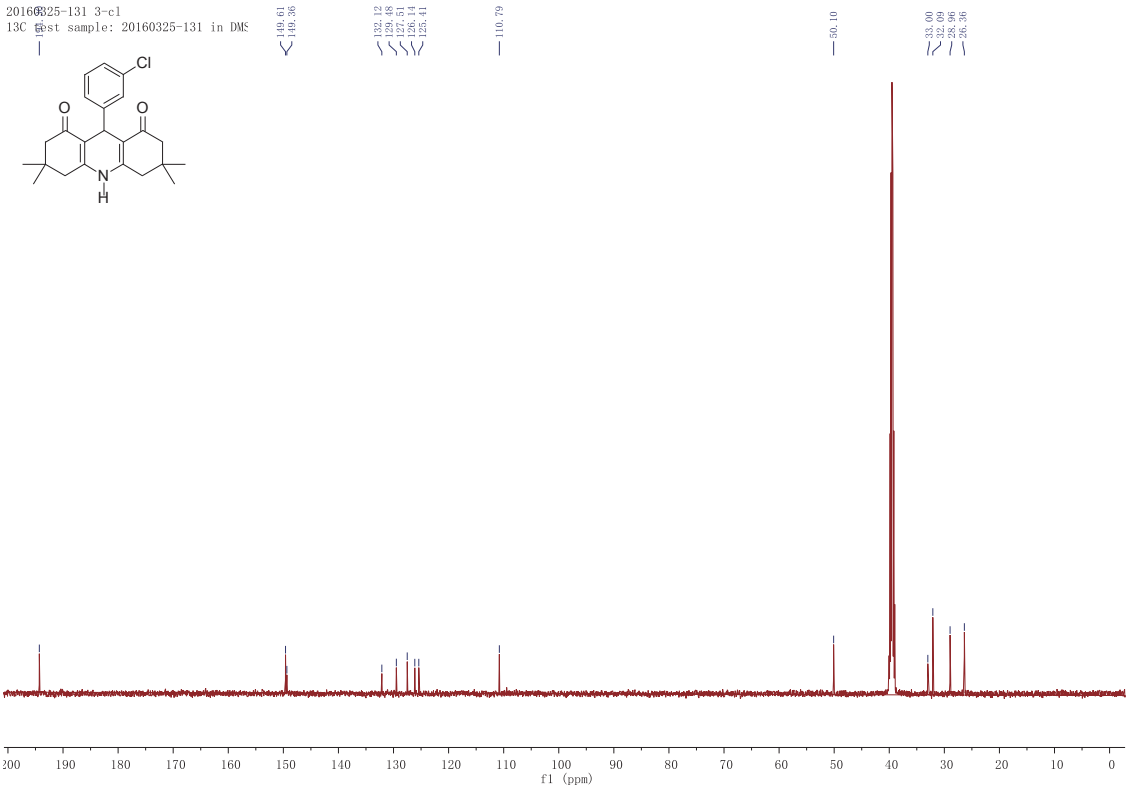

20160323-124 2-och3
1H
sample: 20160323-124 in DMS
OCH3
O
O
N
H
7.18
7.16
7.02
7.00
6.98
6.81
6.79
6.74
6.72
6.71
4.92
3.67
2.43
2.39
2.24
2.21
2.13
2.09
1.90
1.87
0.99
0.82
1.00
1.05
1.04
1.05
1.02
1.00
3.11
2.09
2.12
2.12
2.07
6.43
6.38
f1 (ppm)

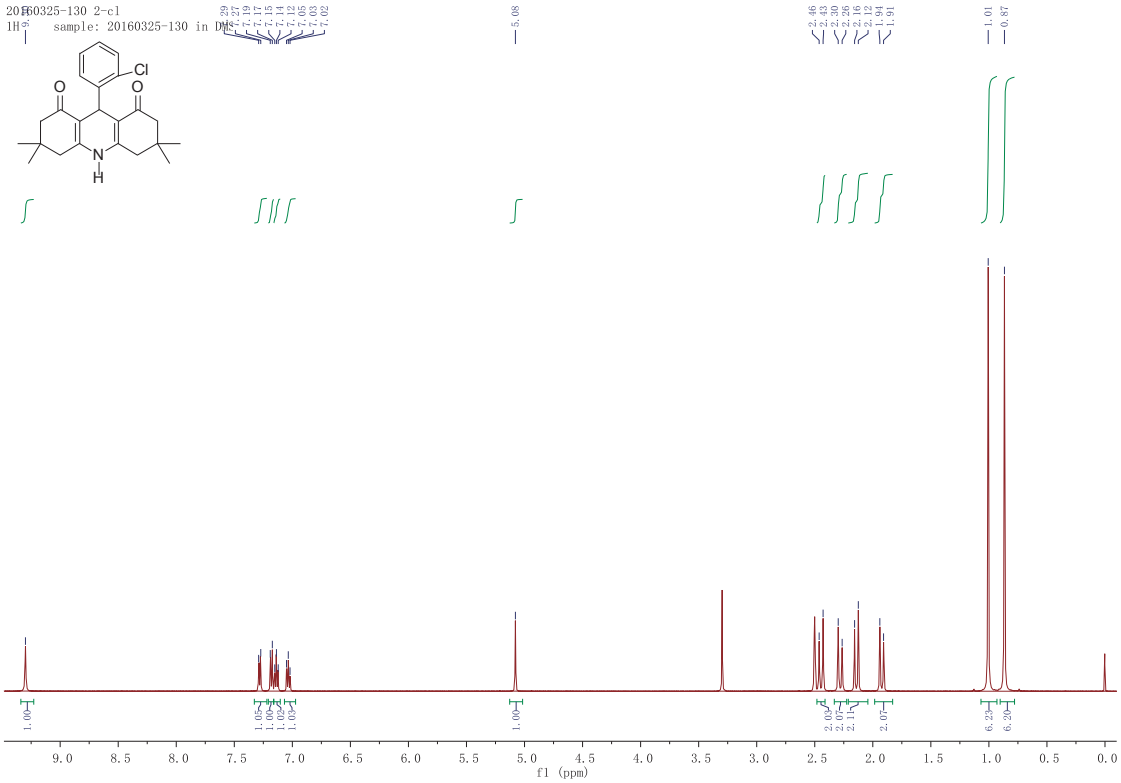

20160323-124 2-och3
13C test sample: 20160323-124 in DMS
OCH3
O
O
N
H
154.54
149.50
133.83
131.35
126.60
119.08
110.76
110.63
54.97
50.37
31.91
31.32
29.25
25.86
f1 (ppm)

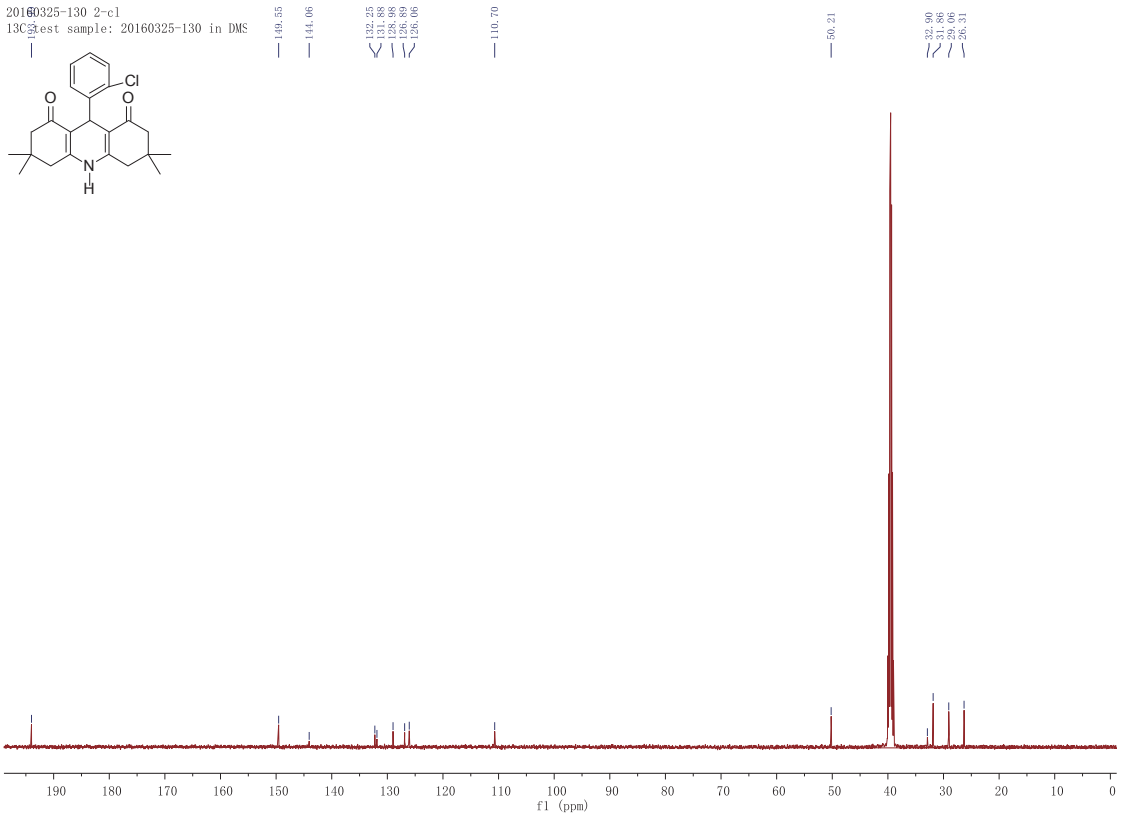

20160324-127 4-cl
1H sample: 20160324-127 in DMS
Cl
O
O
N
H
7.22
7.21
7.16
7.15
4.79
2.47
2.43
2.34
2.31
2.19
2.16
2.00
1.97
1.01
0.86
1.00
2.02
2.05
1.01
2.07
2.10
2.10
2.07
6.33
6.30
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

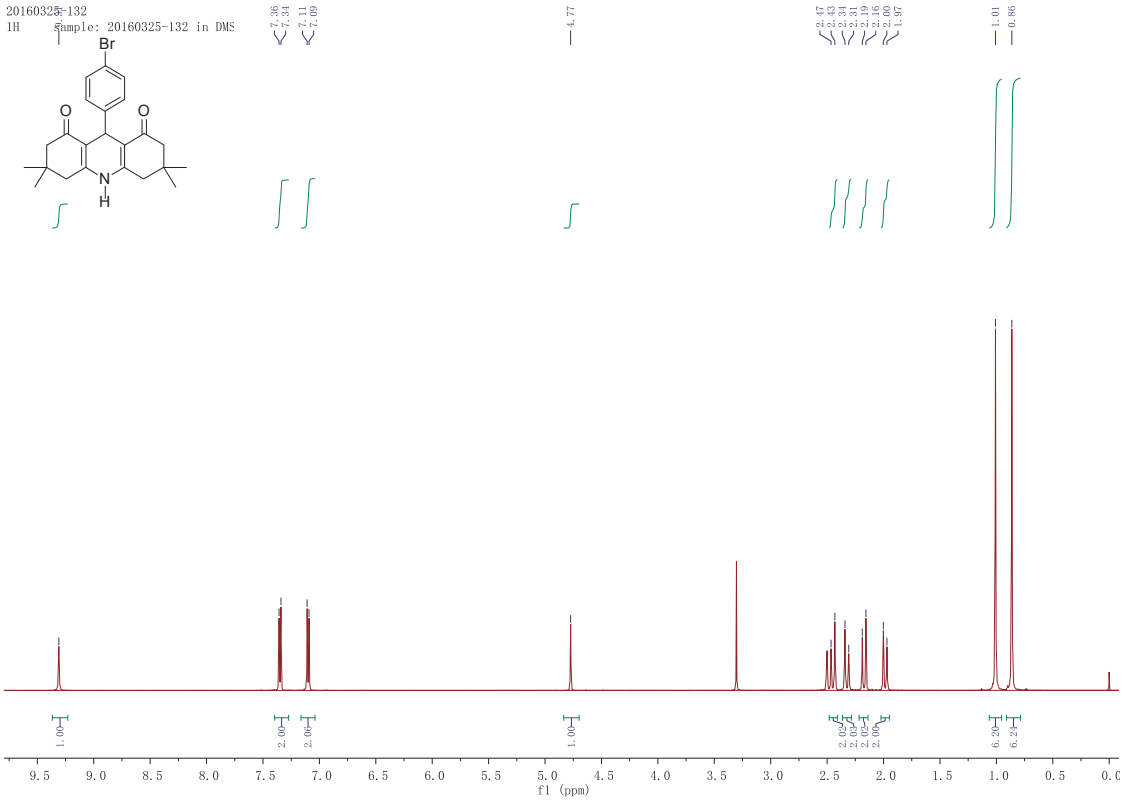

20160324-127 4-cl
13C test sample: 20160325-127 in DMS
Cl
O
O
N
H
149.41
146.02
129.88
129.38
127.45
111.00
50.13
32.61
32.06
28.97
26.44
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

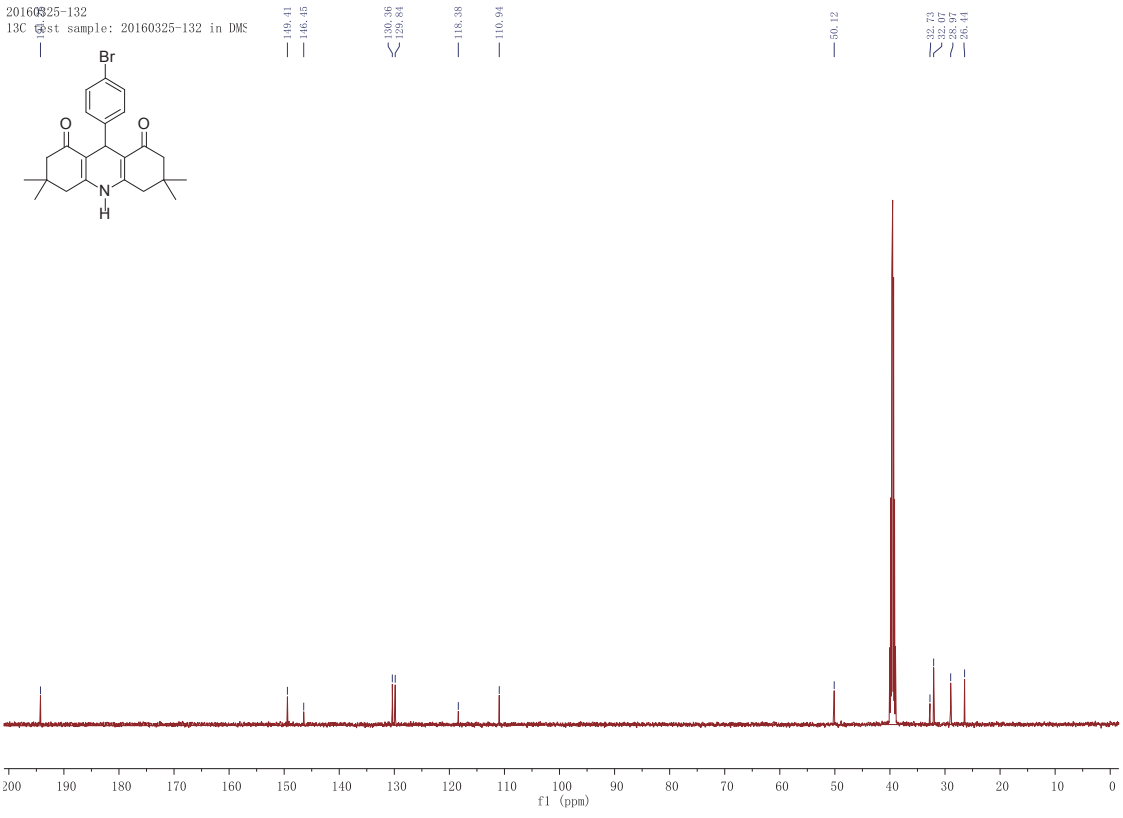

20160325-131 3-cl
1H sample: 20160325-131 in DMS
Cl
O
O
N
H
7.22
7.19
7.19
7.15
7.15
7.15
7.11
7.11
7.10
7.09
7.09
4.80
2.47
2.44
2.37
2.33
2.20
2.17
2.02
1.99
1.01
0.87
1.00
1.00
1.00
2.04
1.03
2.19
2.18
2.14
2.17
6.59
6.66
f1 (ppm)

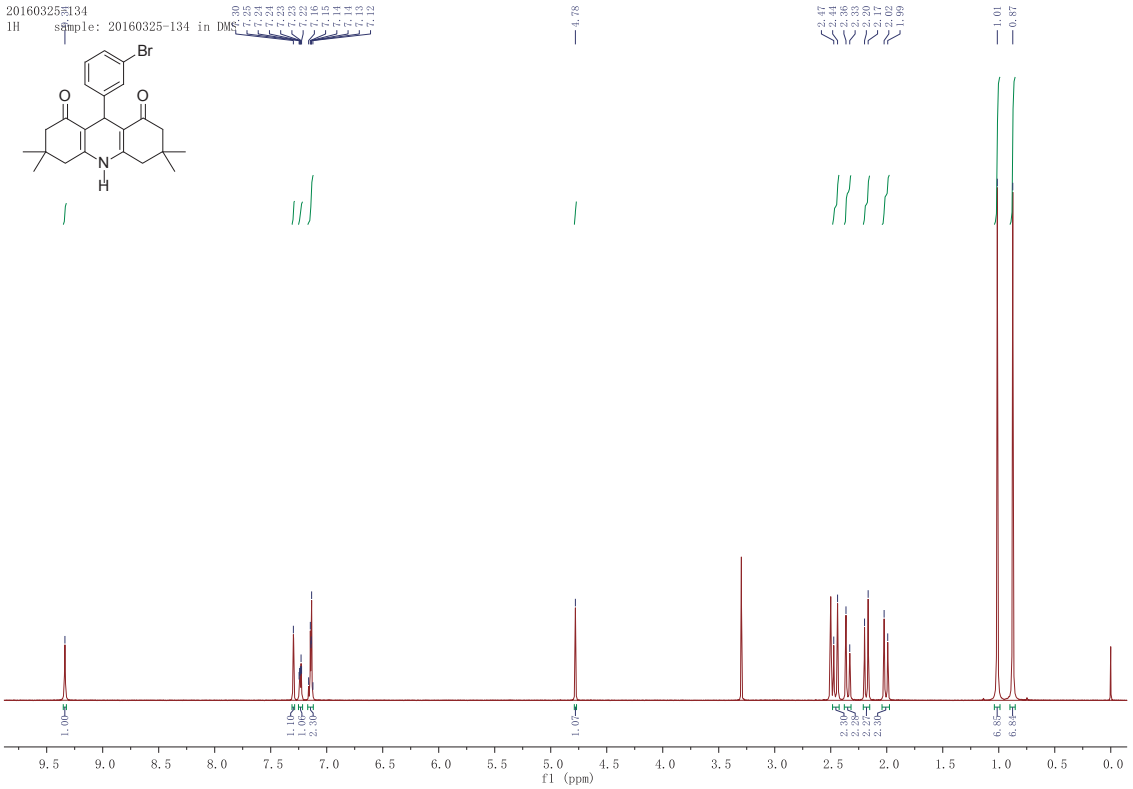

20160325-131 3-cl
13C test sample: 20160325-131 in DMS
Cl
O
O
N
H
149.61
149.36
132.12
129.48
127.51
126.54
125.41
110.79
50.10
33.00
32.09
28.96
26.36
f1 (ppm)

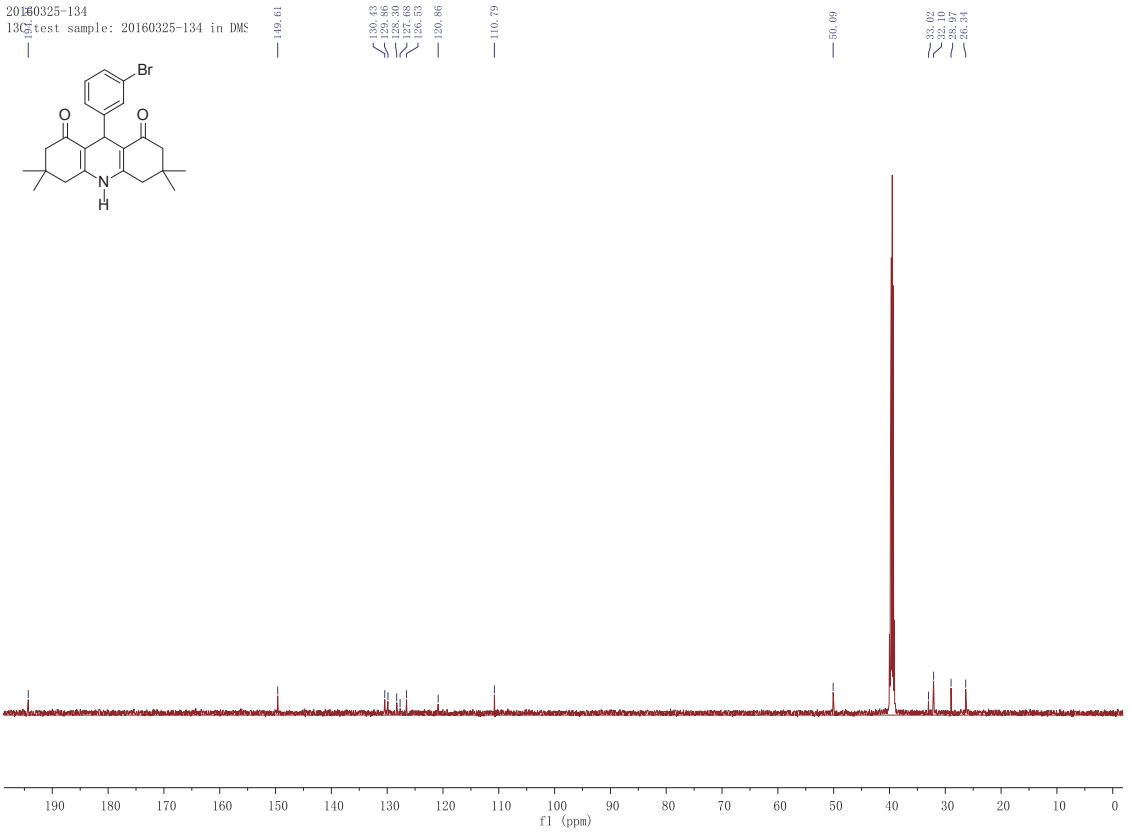

20160325-130 2-cl
1H
sample: 20160325-130 in DMS
Cl
O
O
N
H
9.29
7.27
7.19
7.17
7.15
7.14
7.12
7.05
7.03
7.02
5.08
2.46
2.43
2.30
2.25
2.16
2.12
1.94
1.91
1.01
0.87
1.00
1.05
1.06
1.02
1.05
1.00
2.03
2.07
2.14
2.07
6.25
6.26
f1 (ppm)

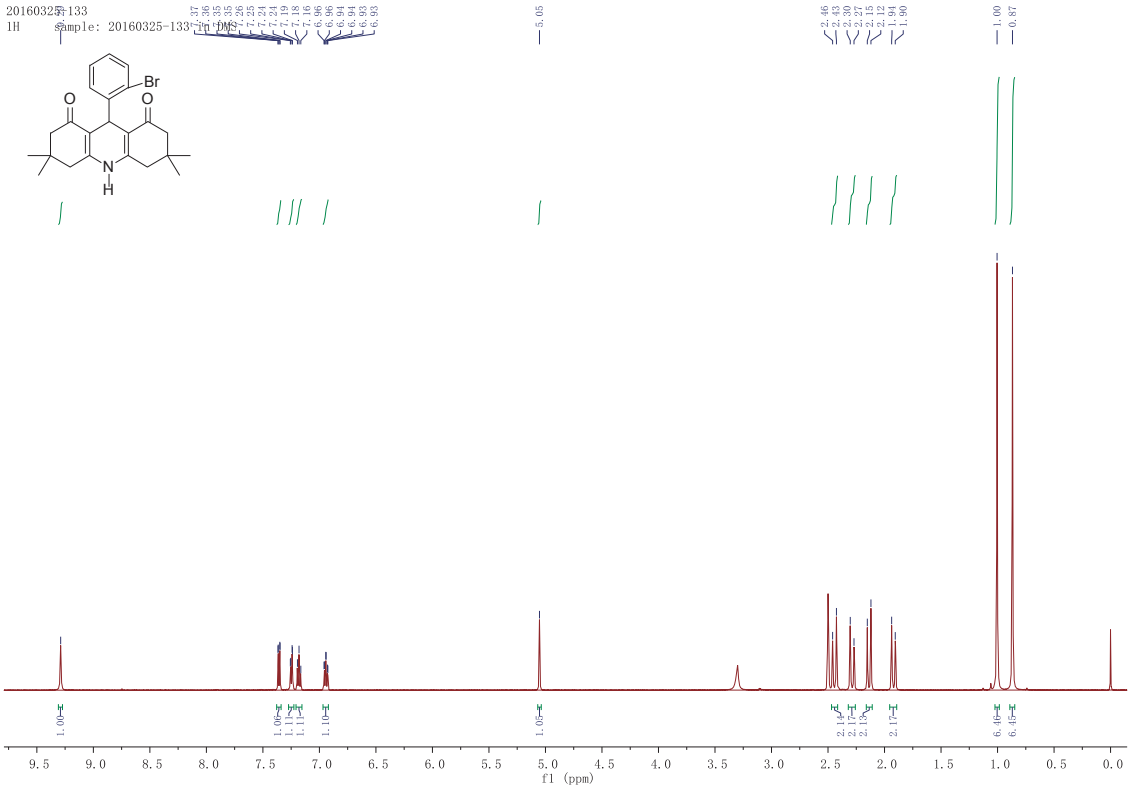

20160325-130 2-cl
13C
test sample: 20160325-130 in DMS
Cl
O
O
N
H
193.55
149.55
144.06
132.25
131.88
128.98
126.89
126.06
110.70
50.21
32.90
31.86
29.06
26.31
f1 (ppm)

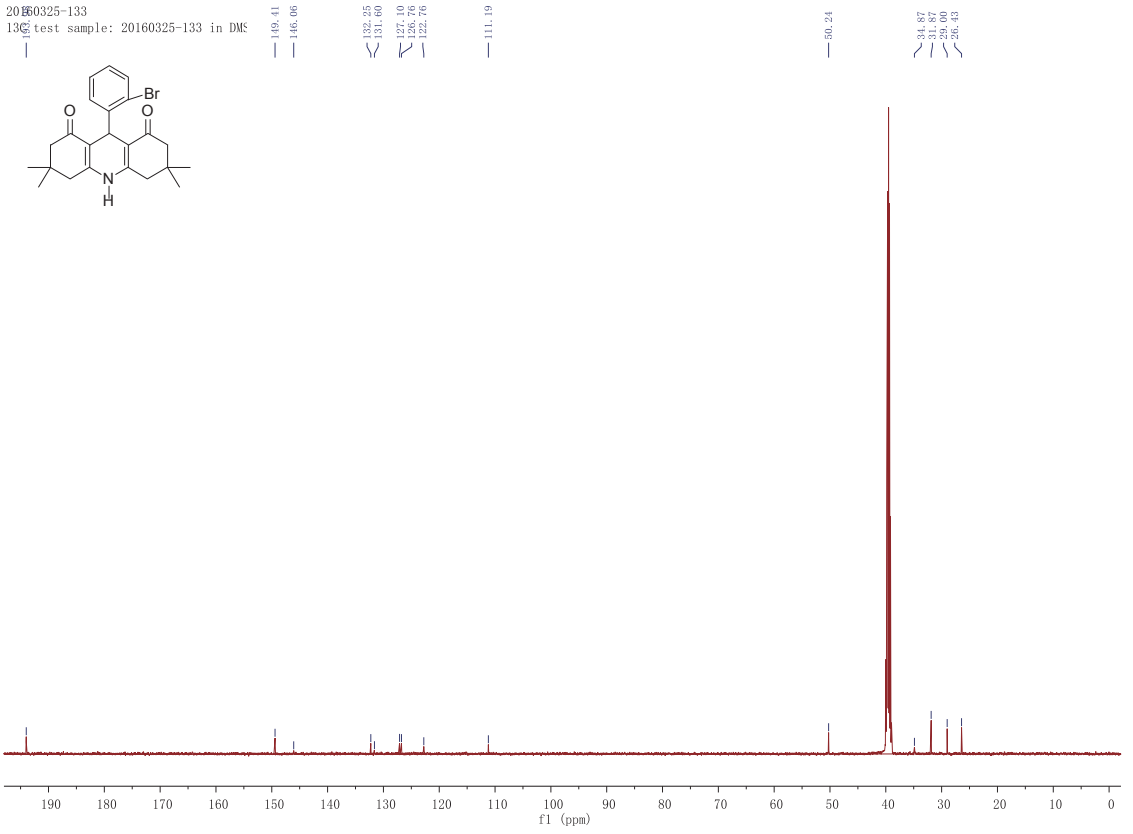

20160325-132
1H Sample: 20160325-132 in DMS
Br
O
O
N
H
7.36
7.34
7.11
7.09
4.77
2.47
2.43
2.34
2.31
2.19
2.15
2.00
1.97
1.01
0.86
1.00
2.00
2.06
1.00
2.02
2.03
2.05
2.00
6.20
6.24
f1 (ppm)

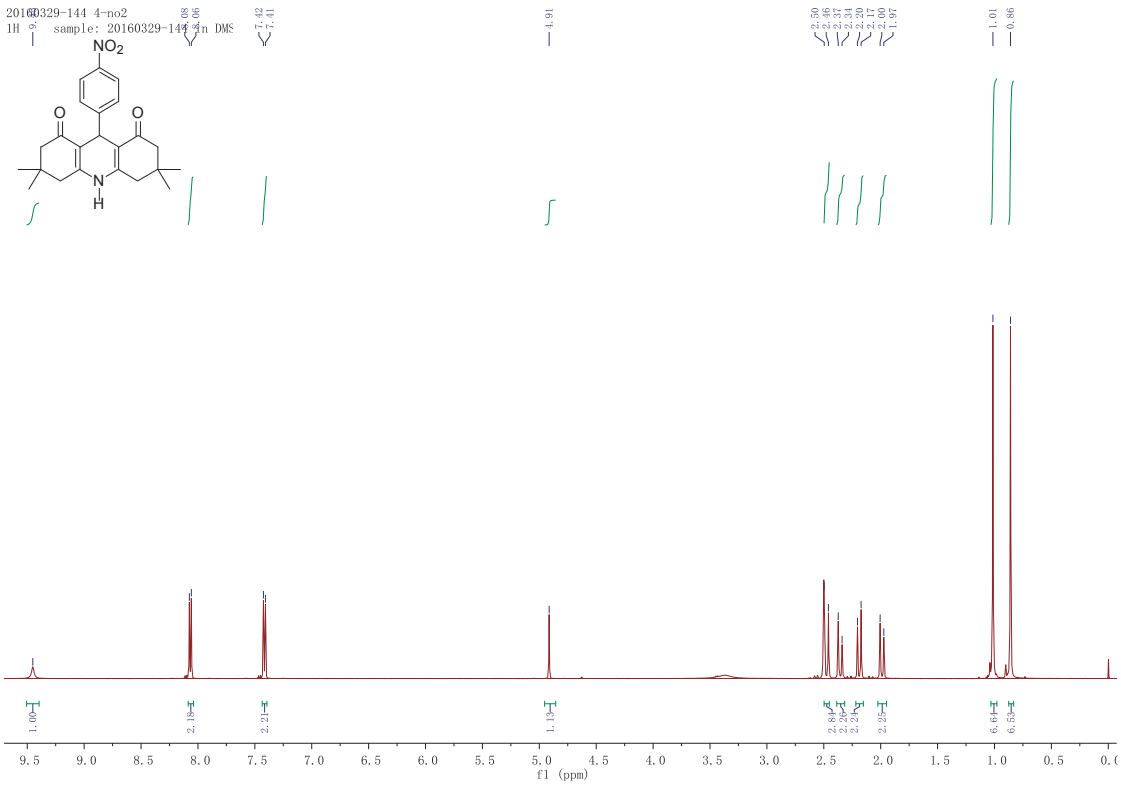

20160325-132
13C Sample: 20160325-132 in DMS
Br
O
O
N
H
149.41
146.45
130.36
129.84
118.38
110.94
50.12
32.73
32.07
28.97
26.44
f1 (ppm)

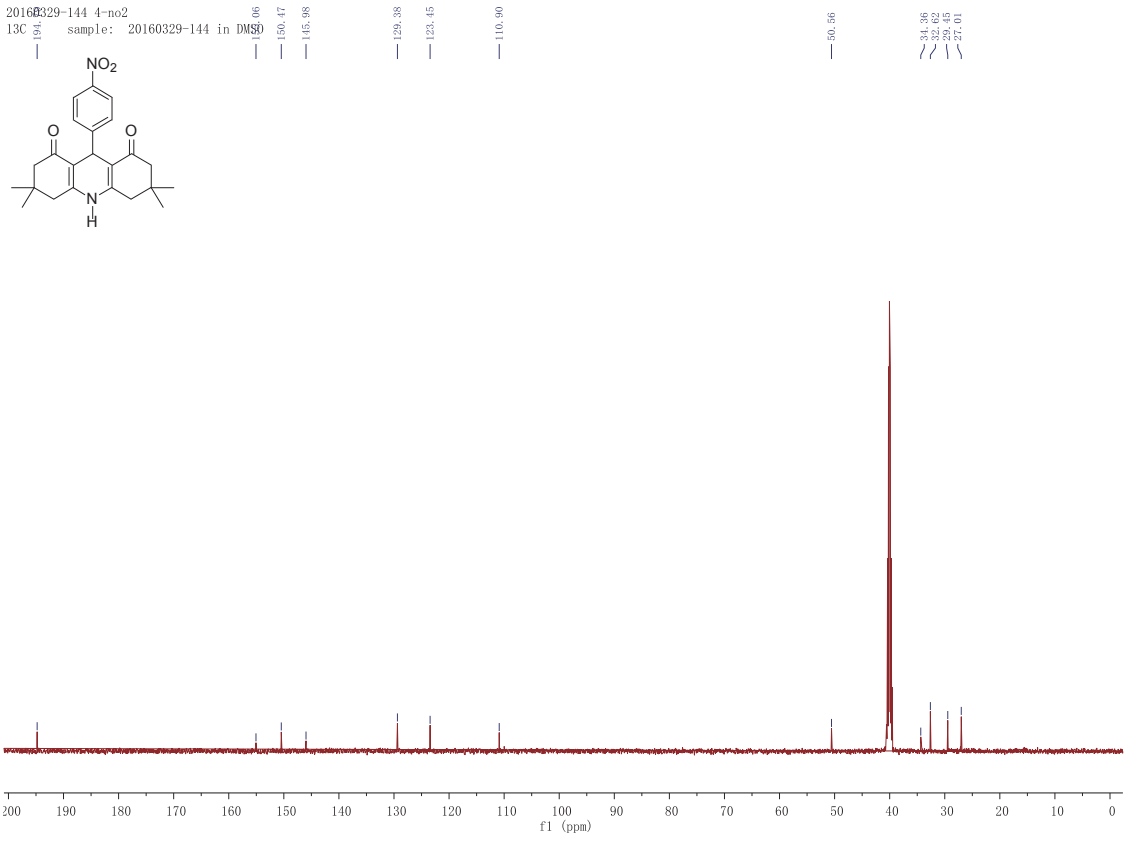

20160325-134
1H sample: 20160325-134 in DMS
Br
O
O
N
H
7.30
7.25
7.24
7.24
7.23
7.23
7.22
7.16
7.15
7.14
7.14
7.13
7.12
4.78
2.47
2.44
2.36
2.33
2.20
2.17
2.02
1.99
1.01
0.87
1.00
1.10
1.06
2.30
1.07
2.30
2.29
2.27
2.30
6.85
6.84
f1 (ppm)

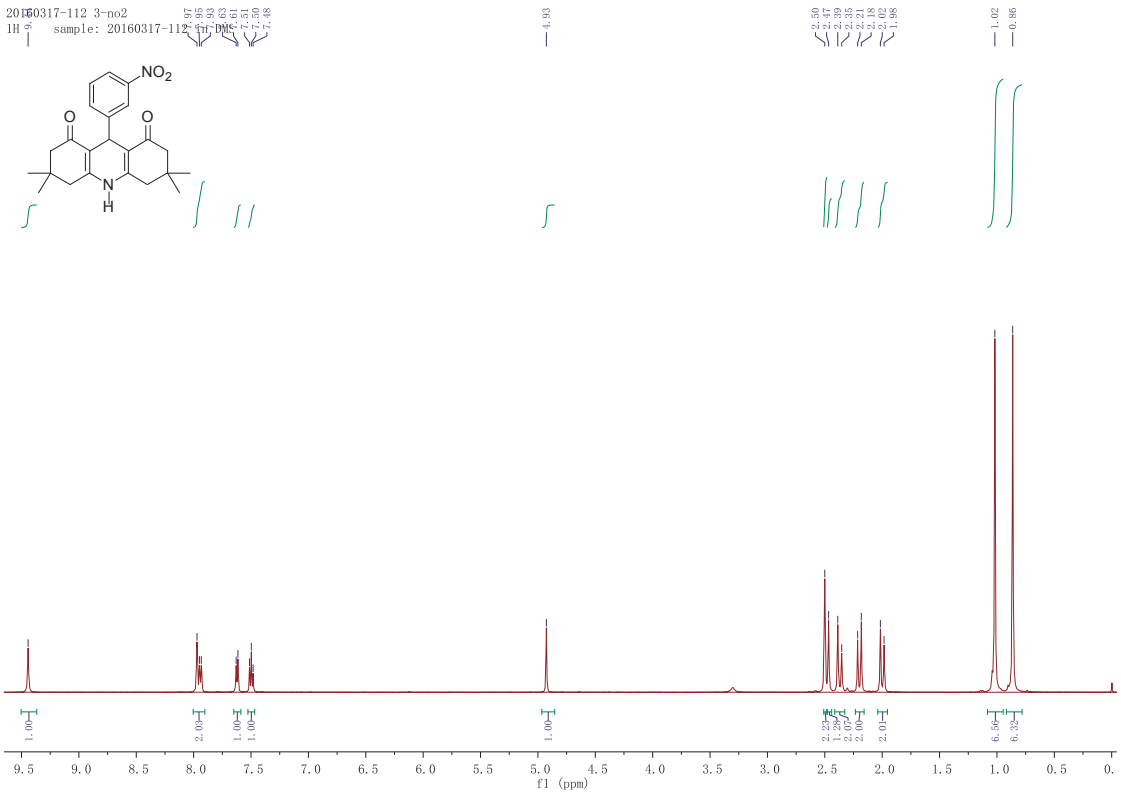

20160325-134
13C test sample: 20160325-134 in DMS
Br
O
O
N
H
197.61
149.61
130.43
129.86
128.30
127.68
126.53
120.86
110.79
50.09
33.02
32.10
28.97
26.34
f1 (ppm)

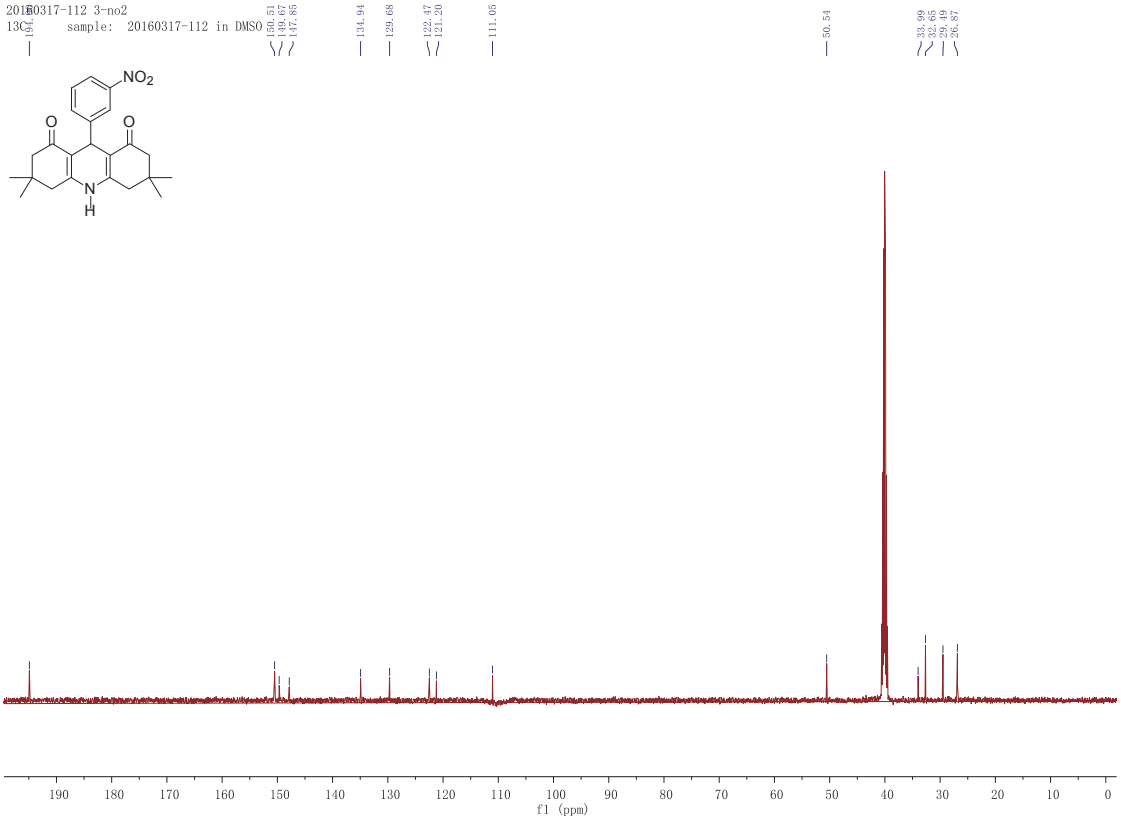

20160325-133
1H
sample: 20160325-133 in DMS
Br
O
O
N
H
7.37
7.36
7.35
7.35
7.26
7.25
7.24
7.24
7.19
7.18
7.16
6.96
6.96
6.94
6.94
6.93
6.93
5.05
2.46
2.43
2.30
2.27
2.15
2.12
1.94
1.90
1.00
0.87
1.00
1.06
1.13
1.14
1.10
1.03
2.14
2.17
2.18
2.17
6.46
6.45
f1 (ppm)

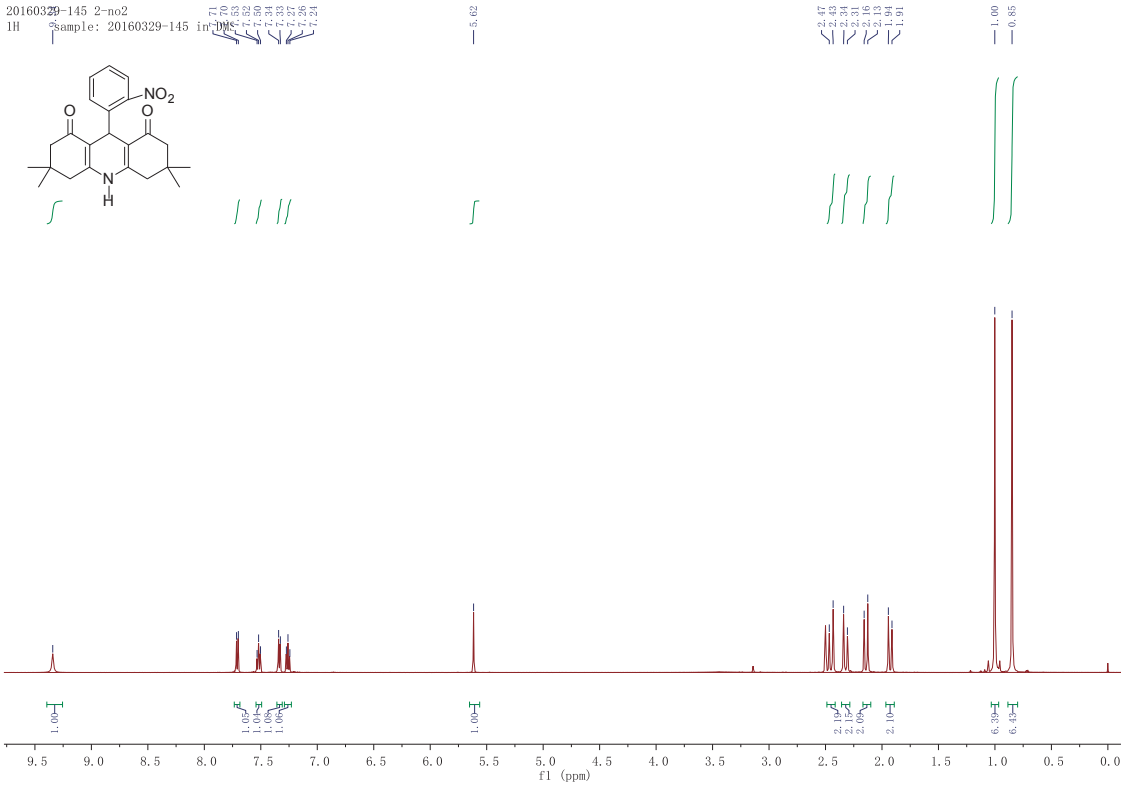

20160325-133
13C test sample: 20160325-133 in DMS
Br
O
O
N
H
149.41
146.06
132.25
131.60
127.10
126.76
122.76
111.19
50.24
34.87
31.87
28.60
26.43
f1 (ppm)

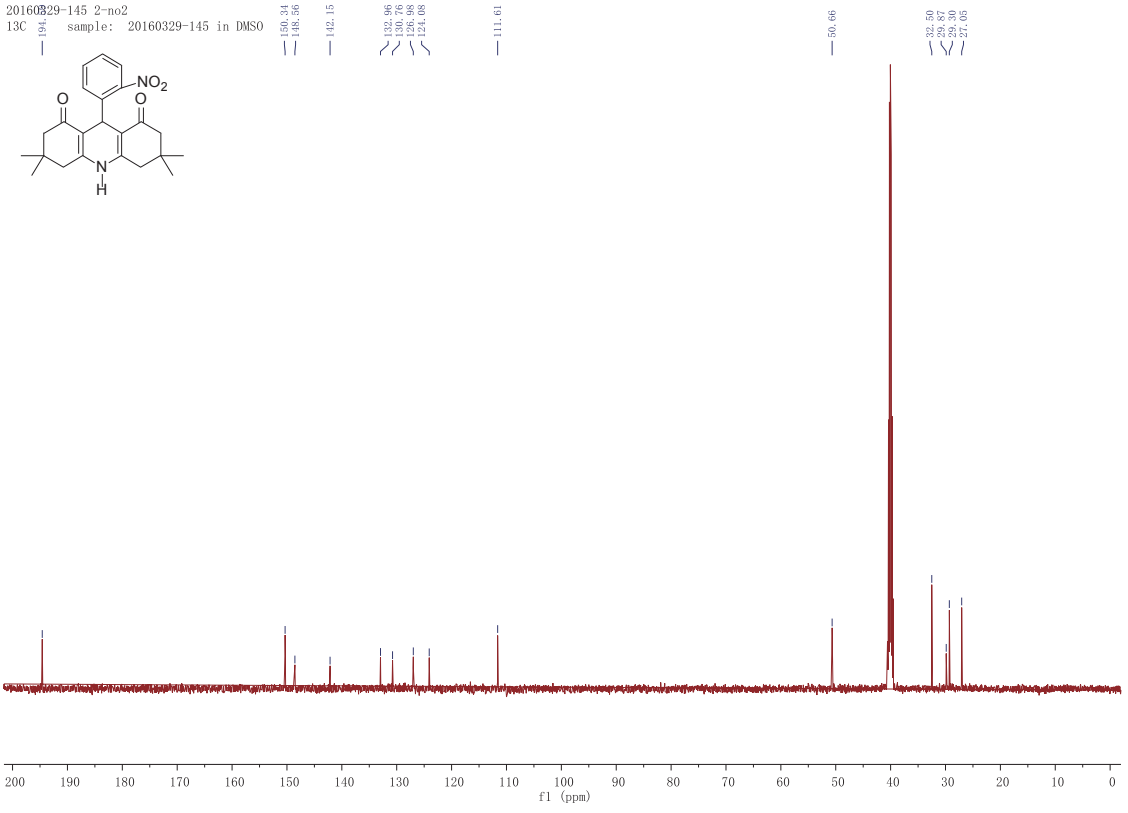

20160329-144 4-no2
1H
sample: 20160329-144 in DMS
NO2
O
O
N
H
8.08
8.06
7.42
7.41
4.91
2.50
2.46
2.37
2.34
2.20
2.17
2.00
1.97
1.01
0.86
1.00
2.18
2.21
1.13
2.84
2.26
2.24
2.25
6.64
6.55
f1 (ppm)

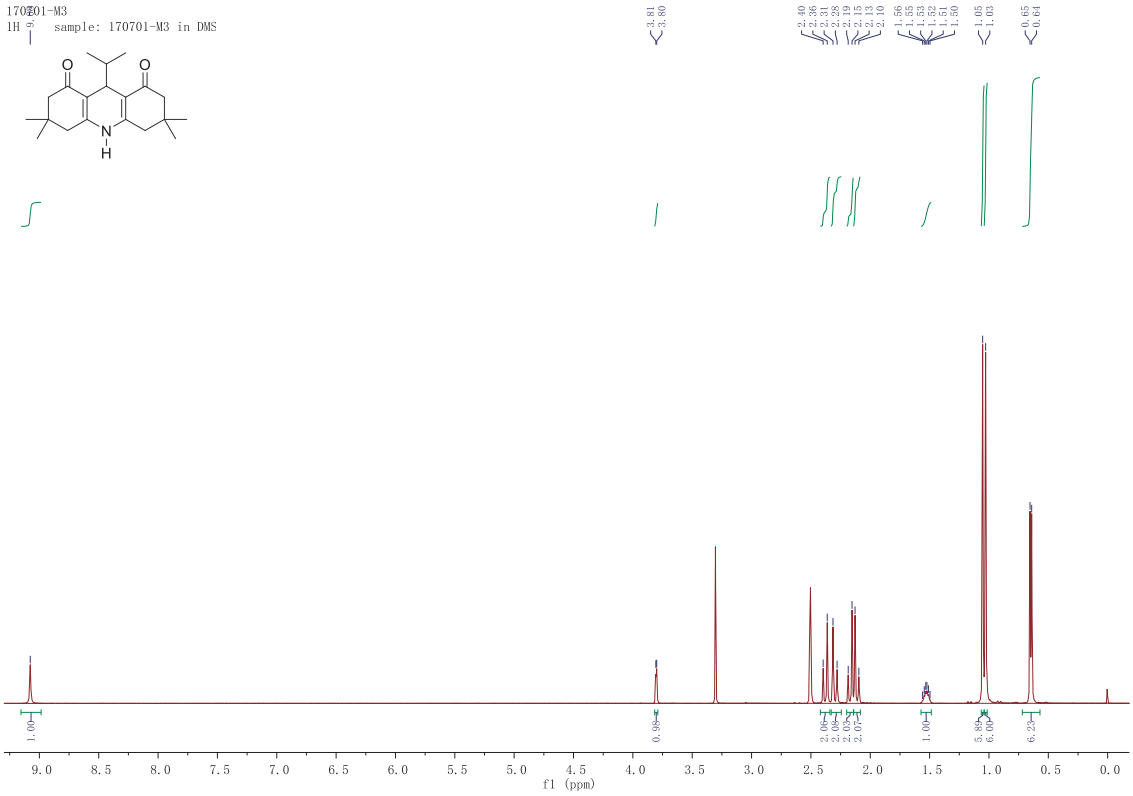

20160329-144 4-no2
13C
sample: 20160329-144 in DMSO
NO2
O
O
N
H
194.
156.06
150.47
145.98
129.38
123.45
110.90
50.56
34.36
32.62
29.45
27.01
f1 (ppm)

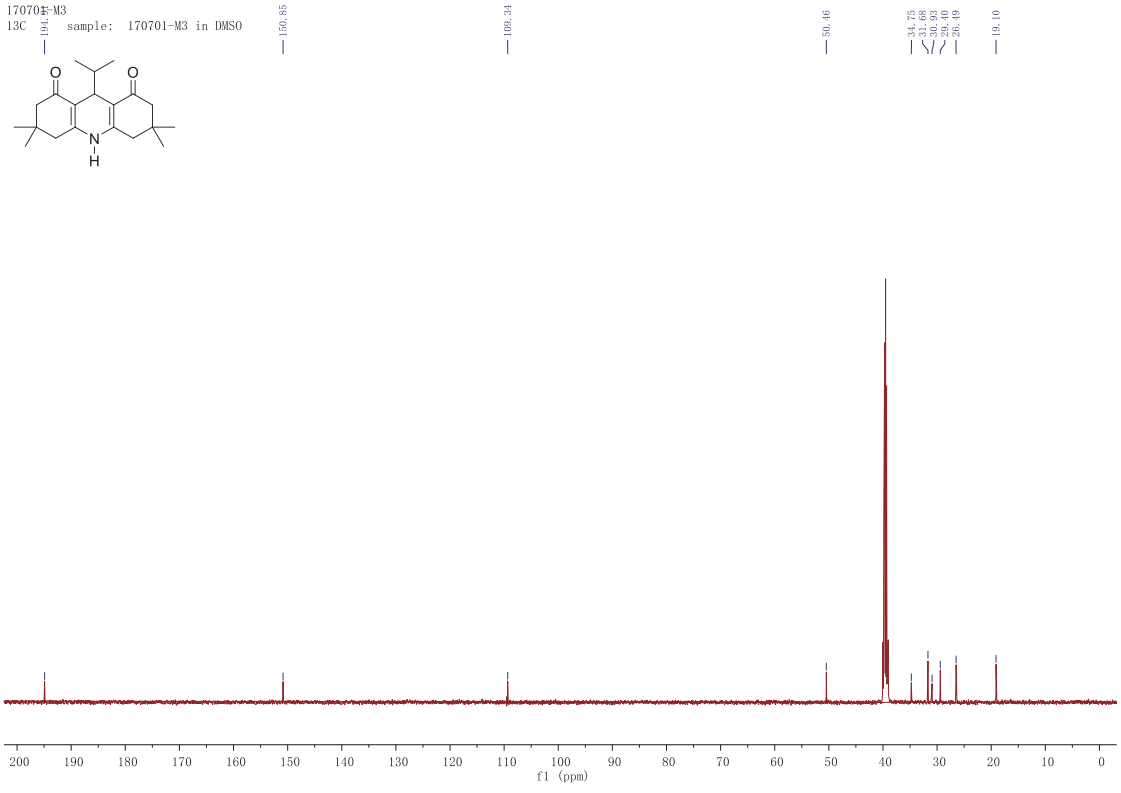

20160317-112 3-no2
1H NMR
sample: 20160317-112 in DMSO
9.47
8.05
7.93
7.63
7.61
7.51
7.50
7.48
4.93
2.50
2.47
2.39
2.35
2.21
2.18
2.02
1.98
1.02
0.86
NO2
O
O
N
H
1.00
2.03
1.00
1.00
1.00
2.23
1.29
2.00
2.01
6.59
6.32
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.
f1 (ppm)

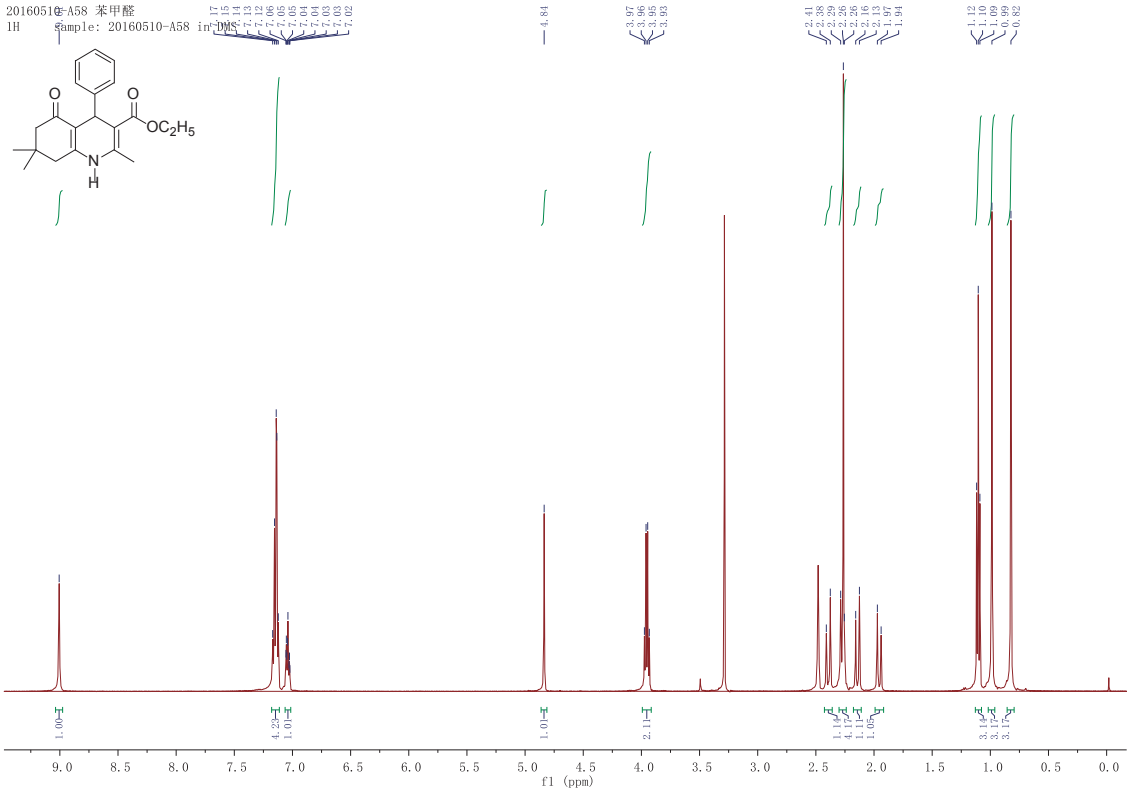

20160317-112 3-no2
13C NMR
sample: 20160317-112 in DMSO
150.51
149.67
147.85
134.94
129.68
122.47
121.20
111.05
50.54
33.99
32.45
28.49
26.87
NO2
O
O
N
H
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

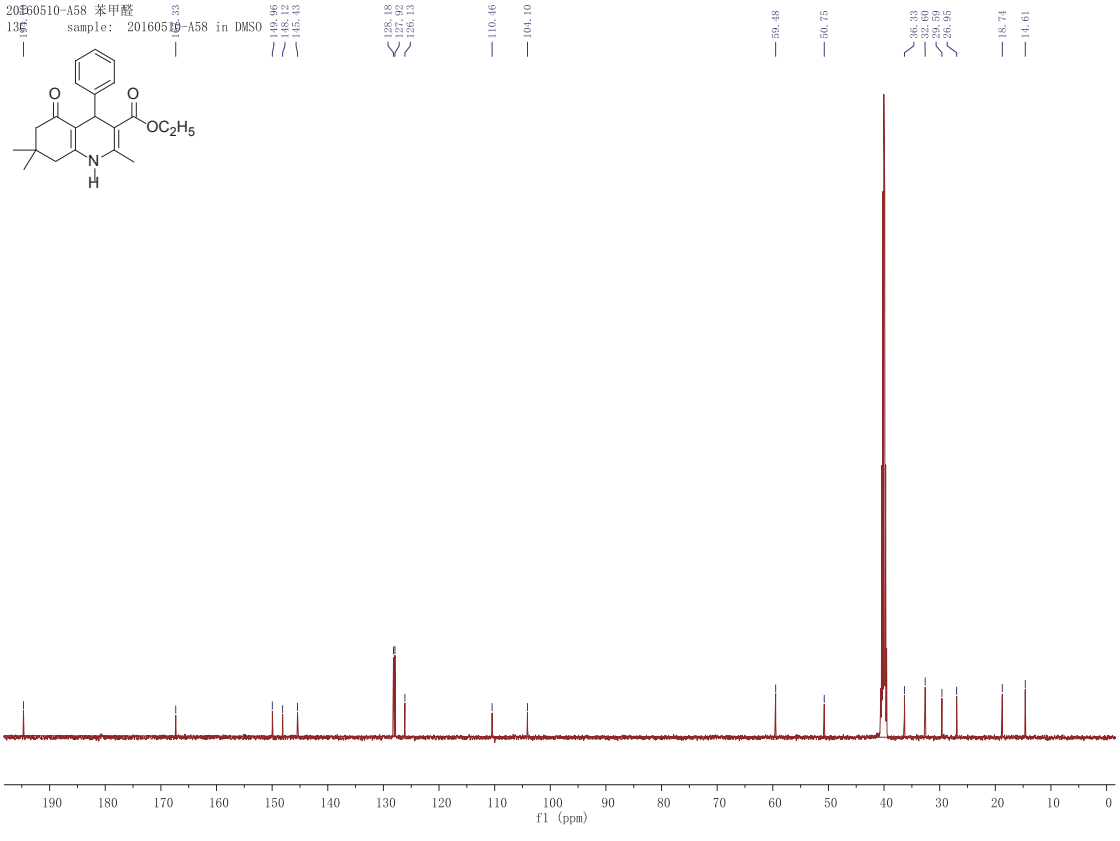

20160329-145 2-no2
1H sample: 20160329-145 in DMS
NO2
O
O
N
H
7.71
7.70
7.53
7.52
7.50
7.34
7.33
7.27
7.26
7.24
5.62
2.47
2.43
2.34
2.31
2.16
2.13
1.94
1.91
1.00
0.85
1.00
1.05
1.04
1.08
1.06
1.00
2.19
2.15
2.06
2.10
6.39
6.43
f1 (ppm)

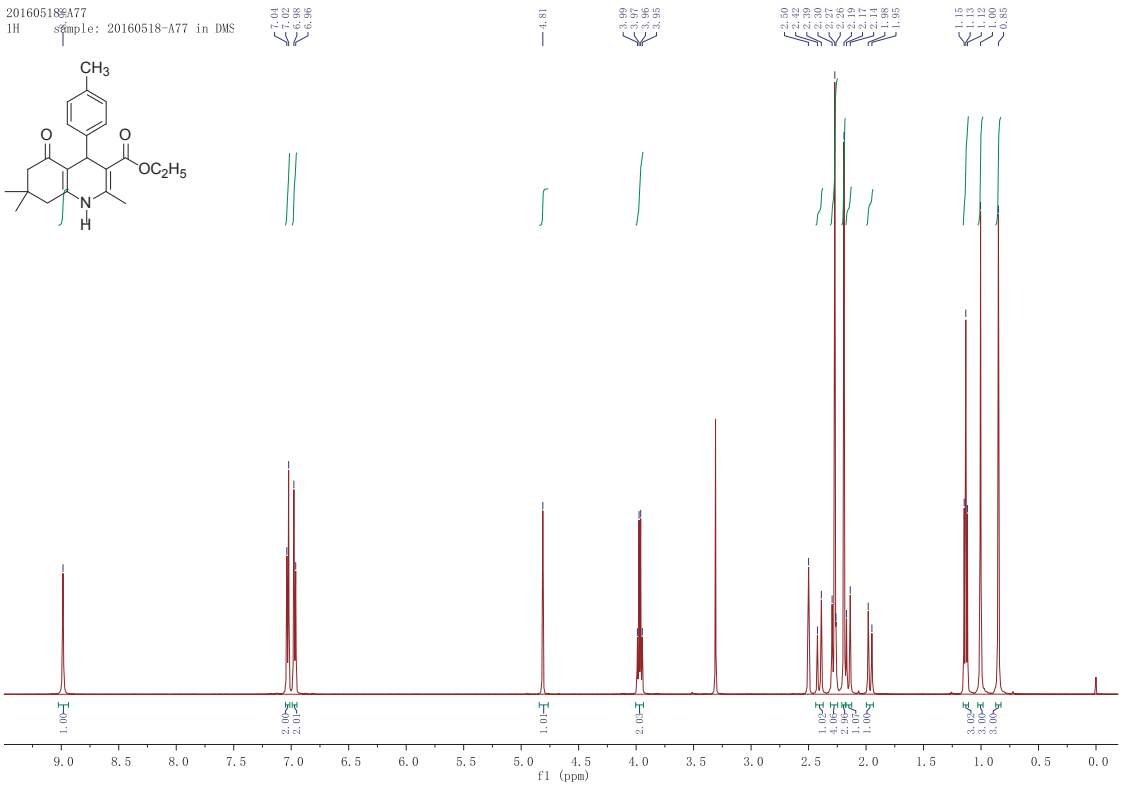

20160329-145 2-no2
13C sample: 20160329-145 in DMSO
NO2
O
O
N
H
194.
150.34
148.56
142.15
132.96
130.76
126.98
124.08
111.61
50.66
32.50
29.87
29.30
27.05
f1 (ppm)

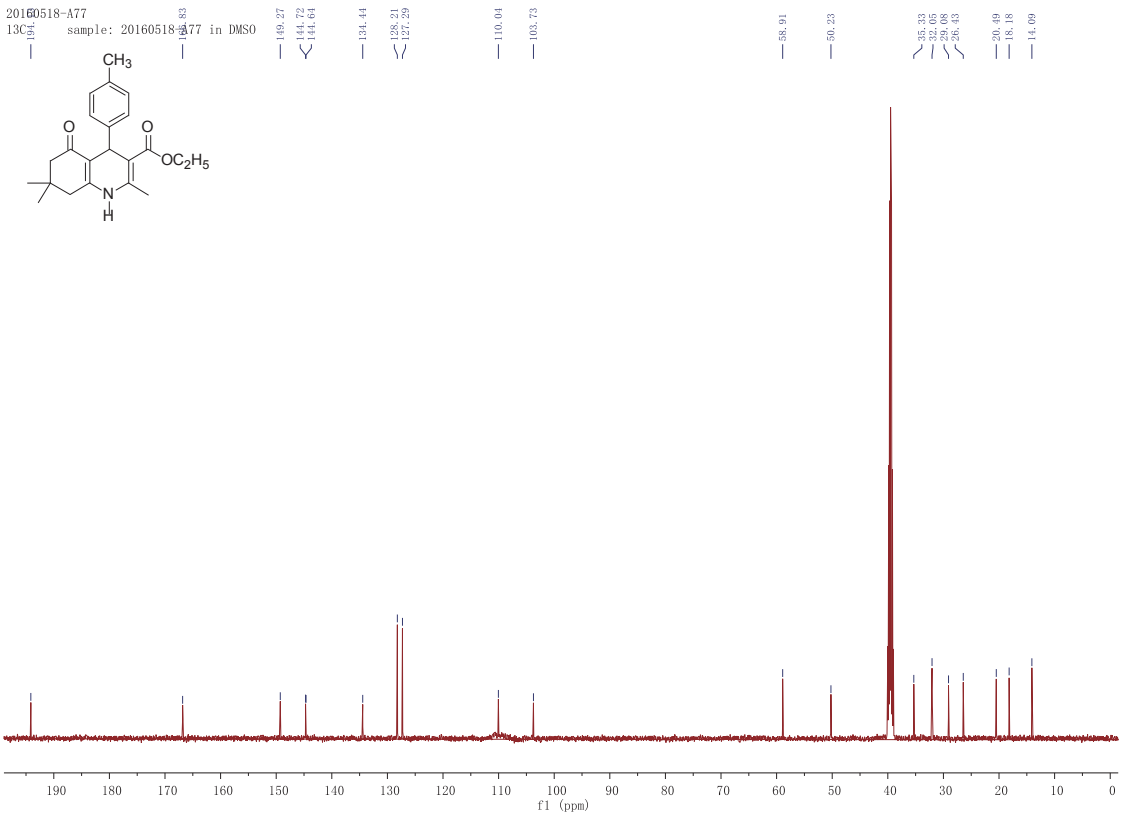

170701-M3
1H
sample: 170701-M3 in DMS
9.
3.81
3.80
2.40
2.36
2.31
2.28
2.19
2.15
2.13
2.10
1.56
1.55
1.53
1.52
1.51
1.50
1.05
1.03
0.65
0.64
1.00
0.98
2.00
2.08
2.05
2.07
1.00
5.88
6.00
6.23
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

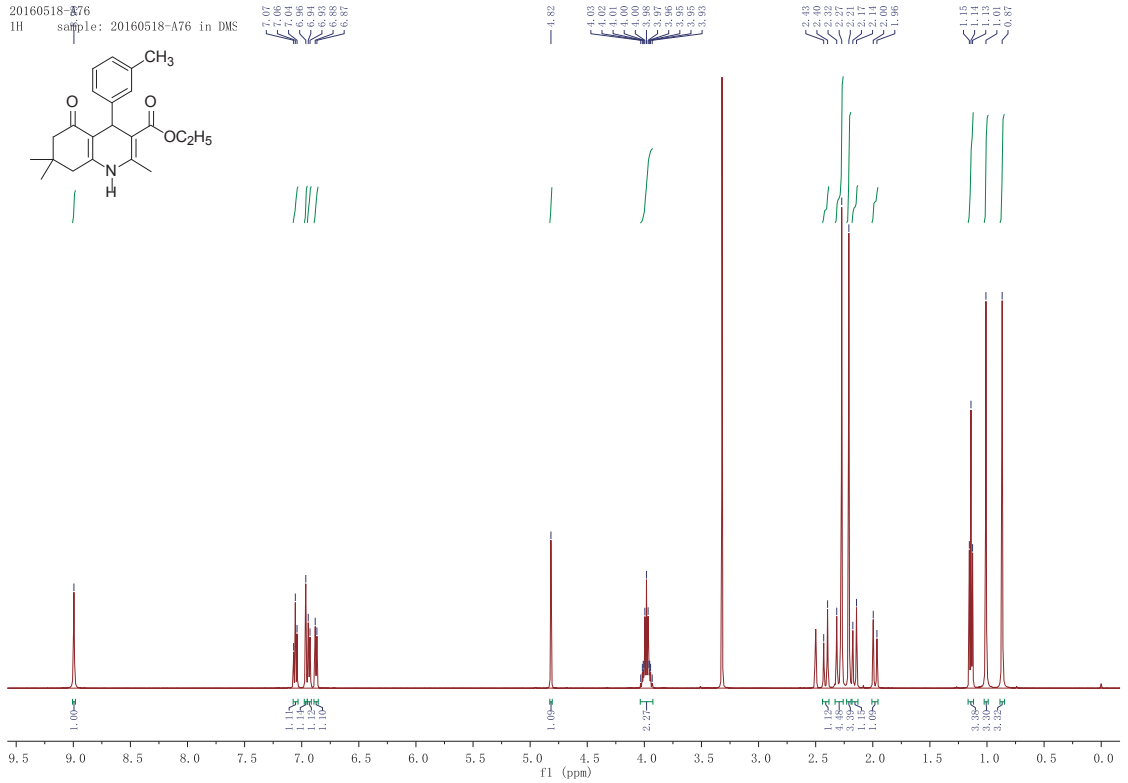

170701-M3
13C
194.
sample: 170701-M3 in DMSO
150.85
109.34
50.46
34.75
31.68
30.93
29.40
26.49
19.10
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

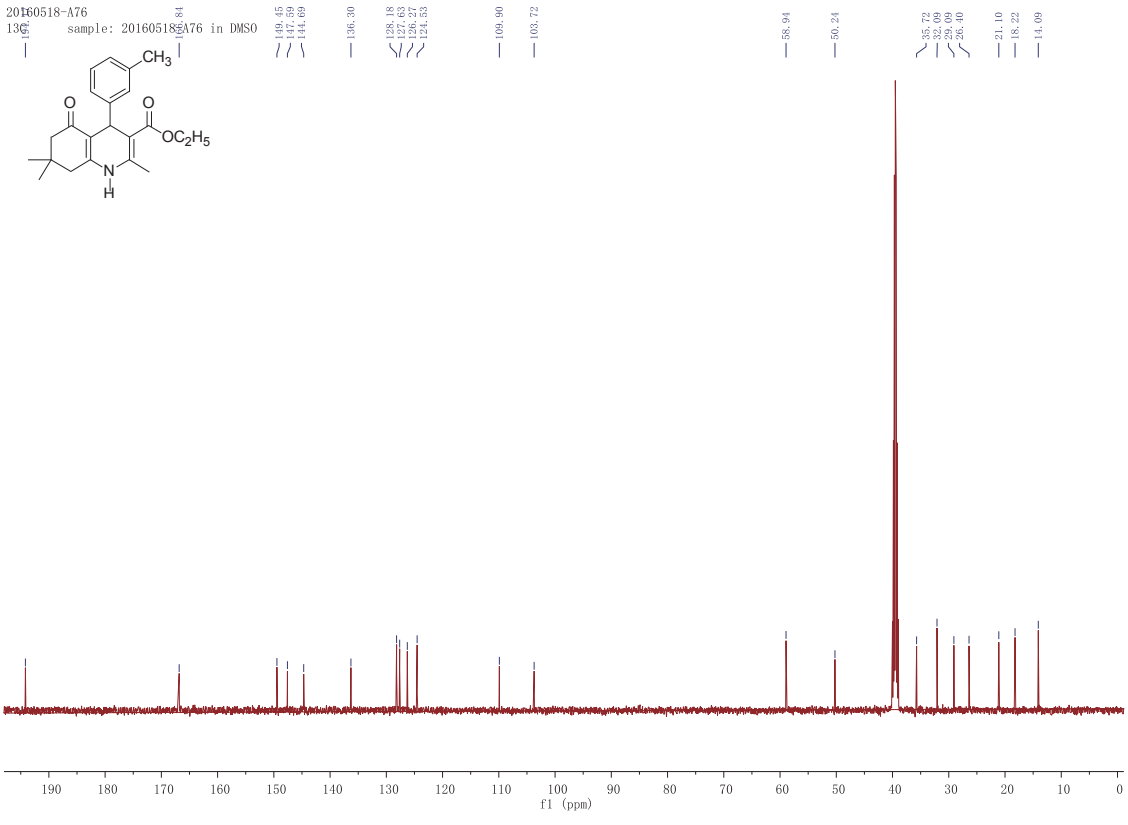

20160510-A58 苯甲醛
1H
sample: 20160510-A58 in DMSO
f1 (ppm)

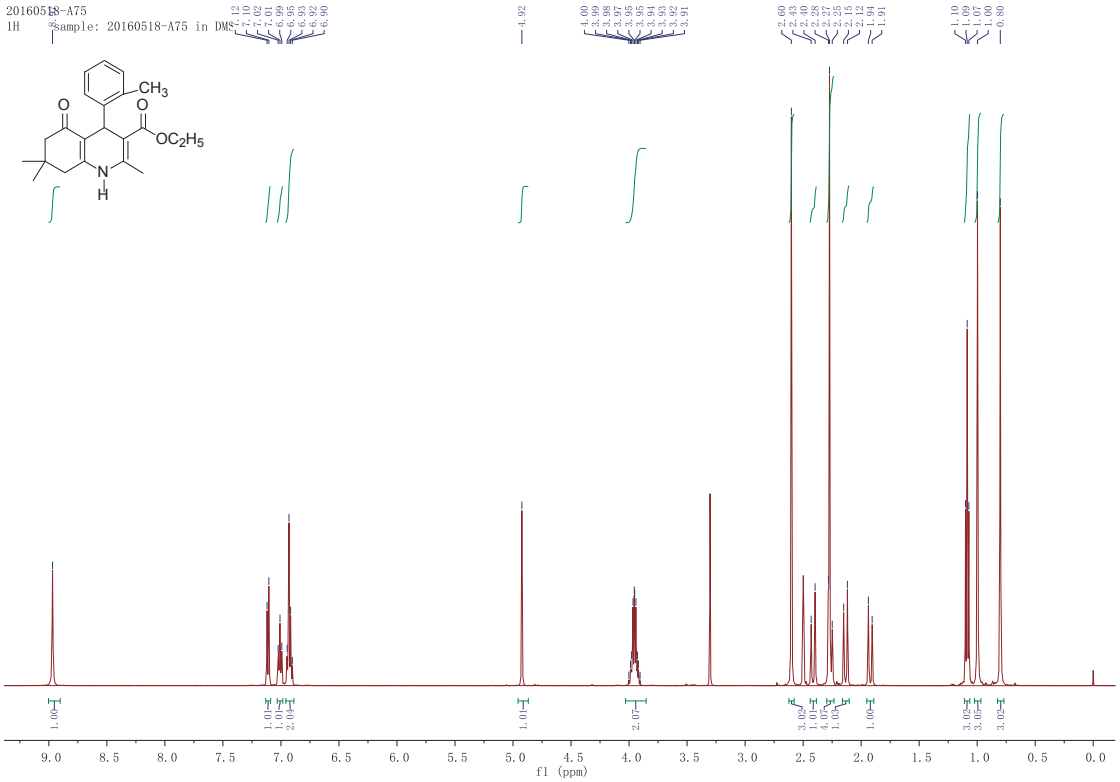

20160510-A58 苯甲醛
13C
sample: 20160510-A58 in DMSO
f1 (ppm)

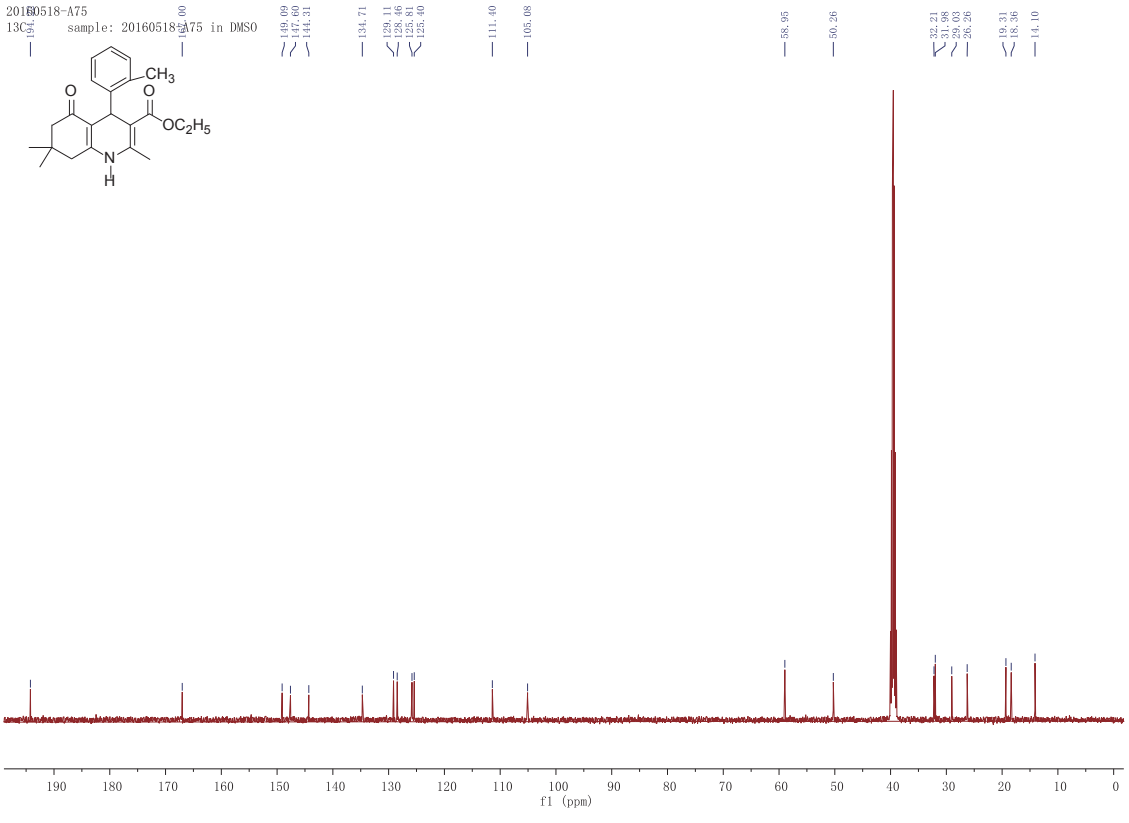

20160518-A77
1H sample: 20160518-A77 in DMS
f1 (ppm)

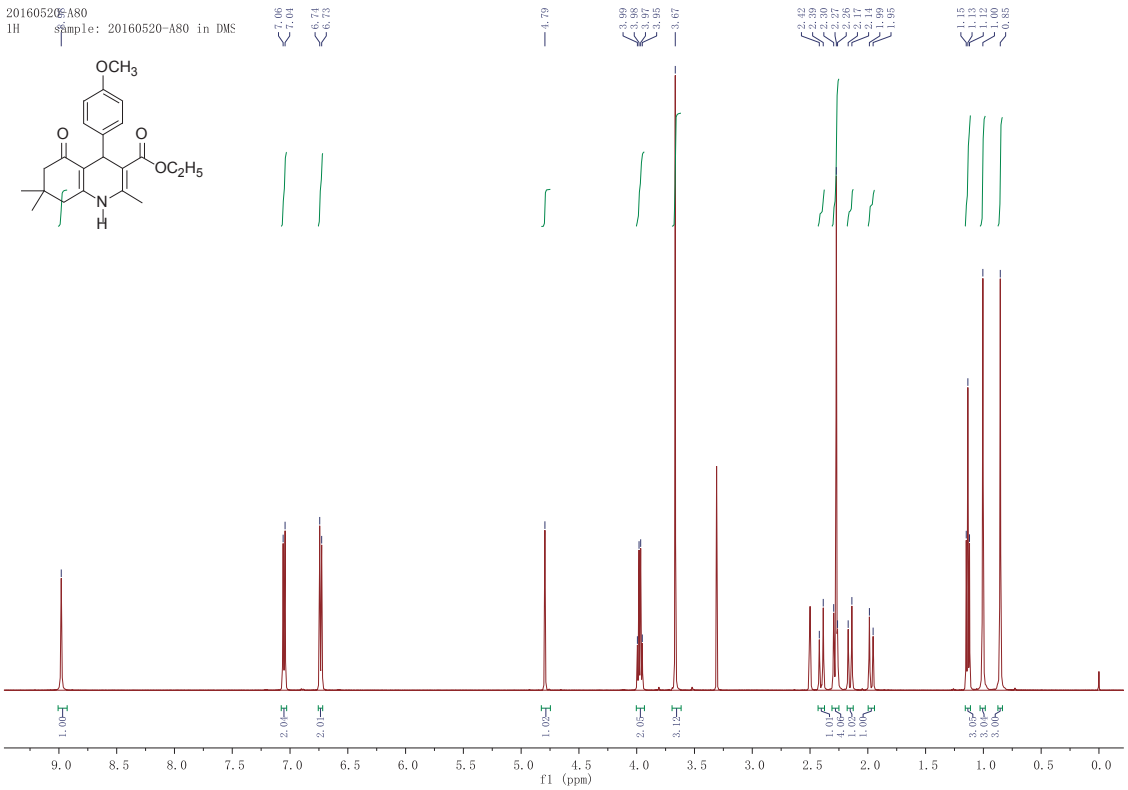

20160518-A77
13C sample: 20160518-A77 in DMSO
f1 (ppm)

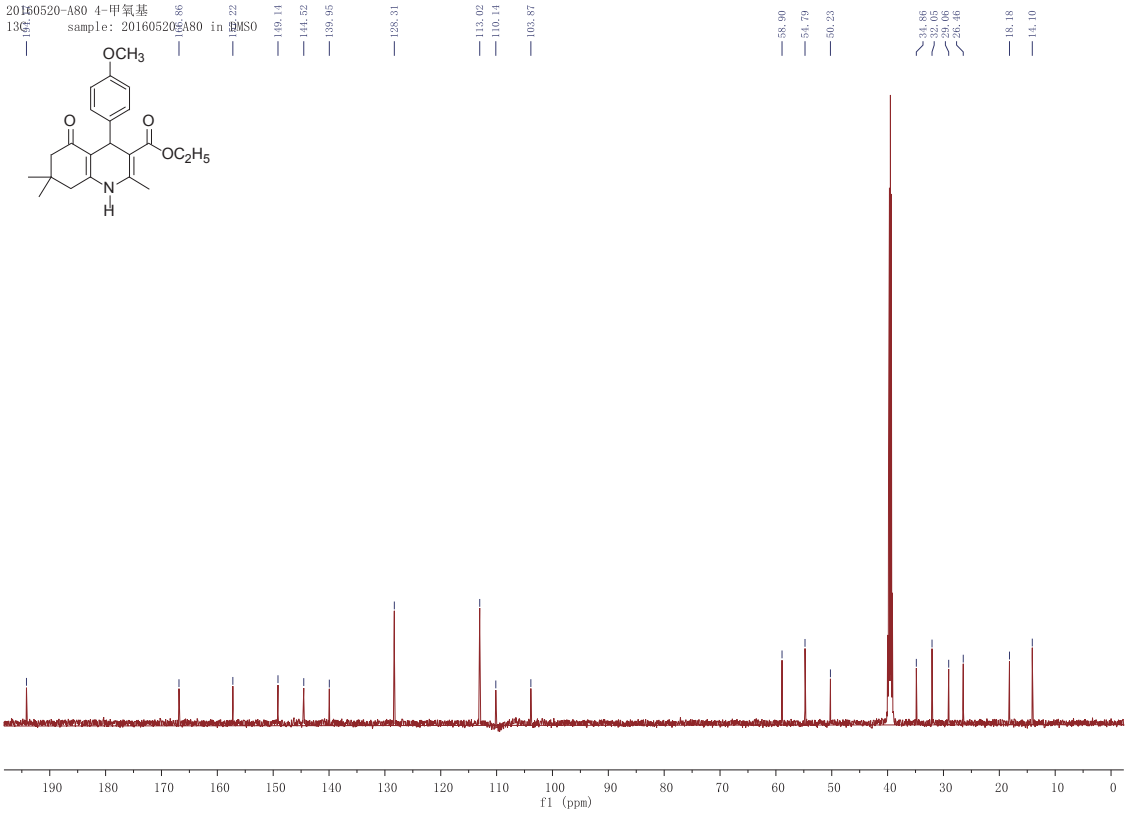

20160518-A76
1H sample: 20160518-A76 in DMS
f1 (ppm)

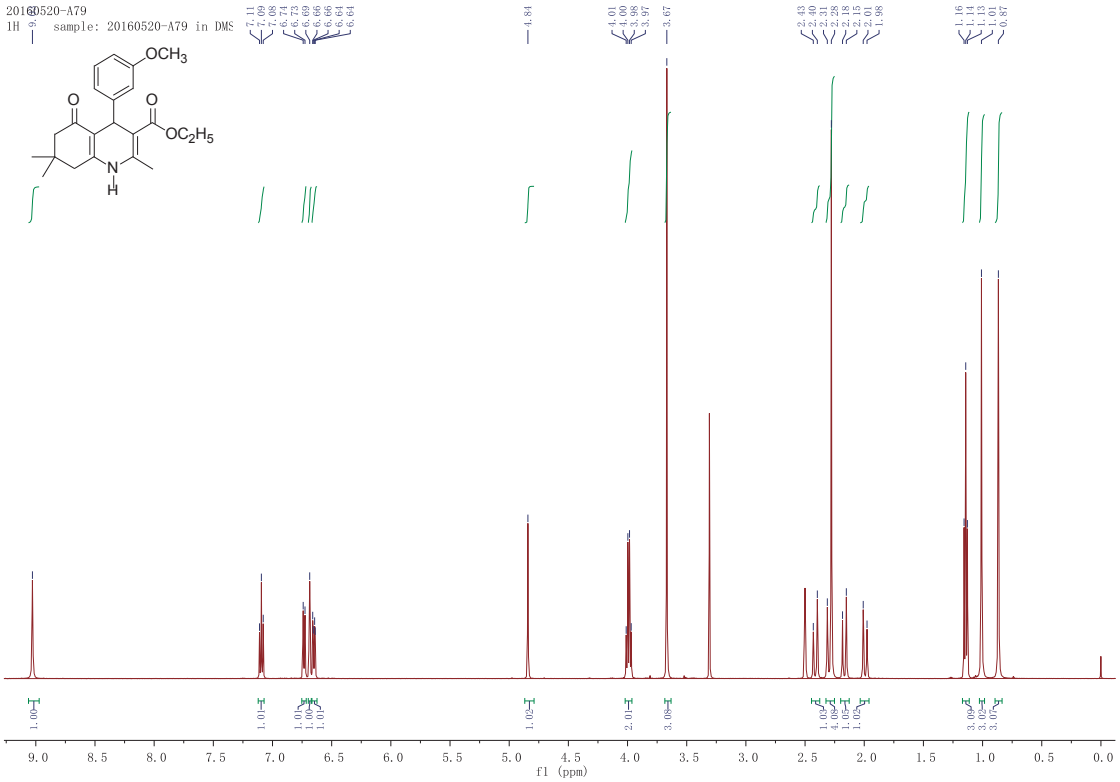

20160518-A76
13C sample: 20160518-A76 in DMSO
f1 (ppm)

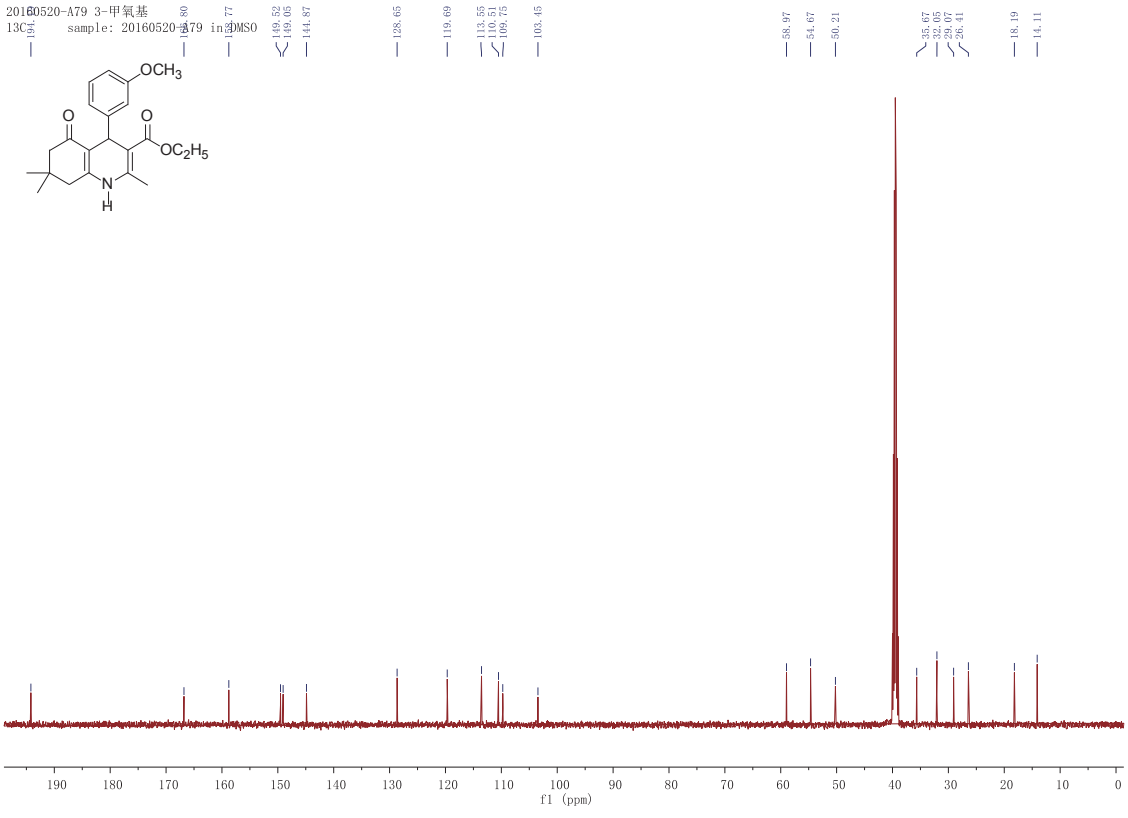

20160518-A75
1H sample: 20160518-A75 in DMSO
f1 (ppm)

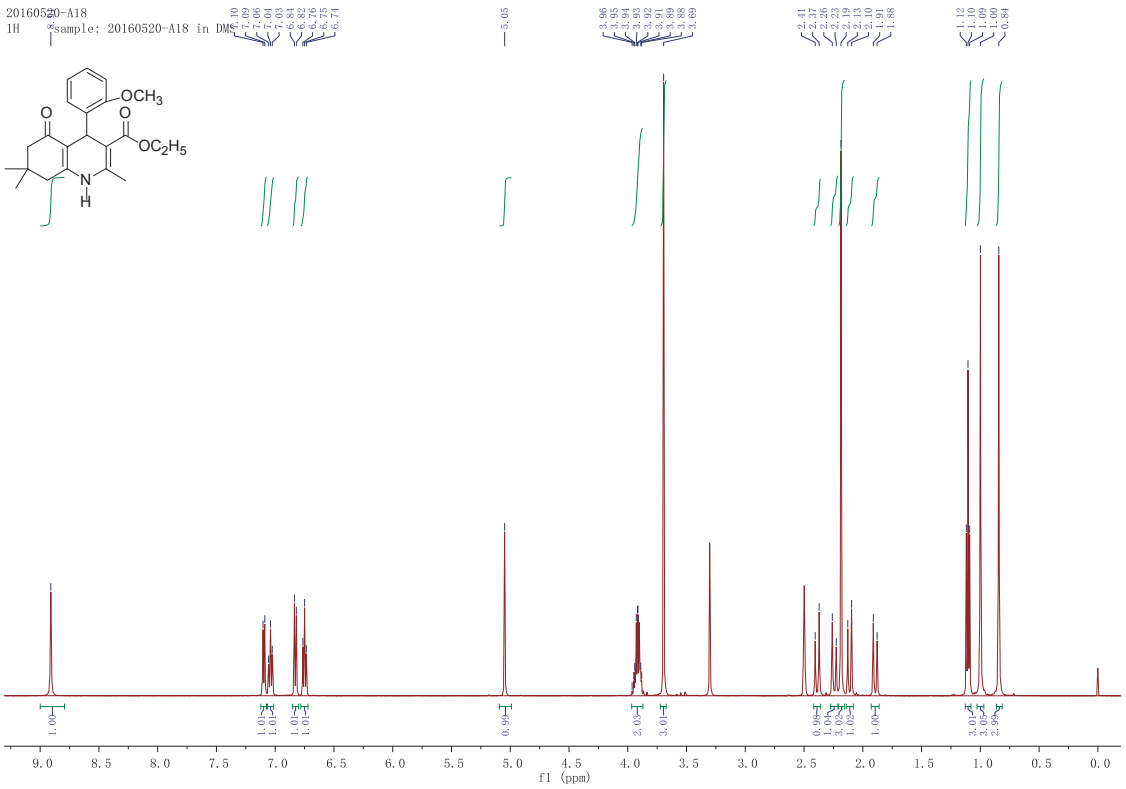

20160518-A75
13C sample: 20160518-A75 in DMSO
f1 (ppm)

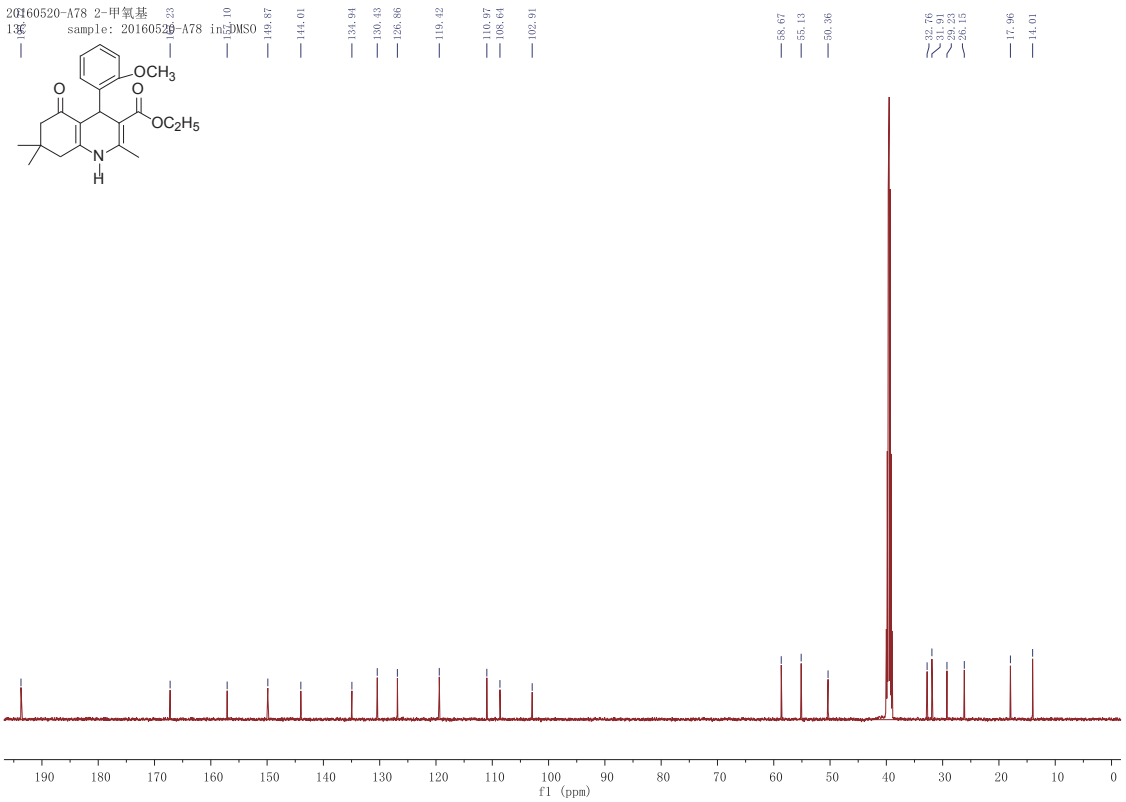

20160520-A80
1H sample: 20160520-A80 in DMS
OCH3
O
O
OC2H5
N
H
7.06
7.04
6.74
6.73
4.79
3.99
3.98
3.97
3.95
3.67
2.42
2.39
2.30
2.27
2.26
2.17
2.14
1.99
1.95
1.15
1.13
1.12
1.00
0.85
1.00
2.04
2.01
1.02
2.05
3.12
1.03
4.06
1.02
1.00
3.05
3.04
3.00
f1 (ppm)

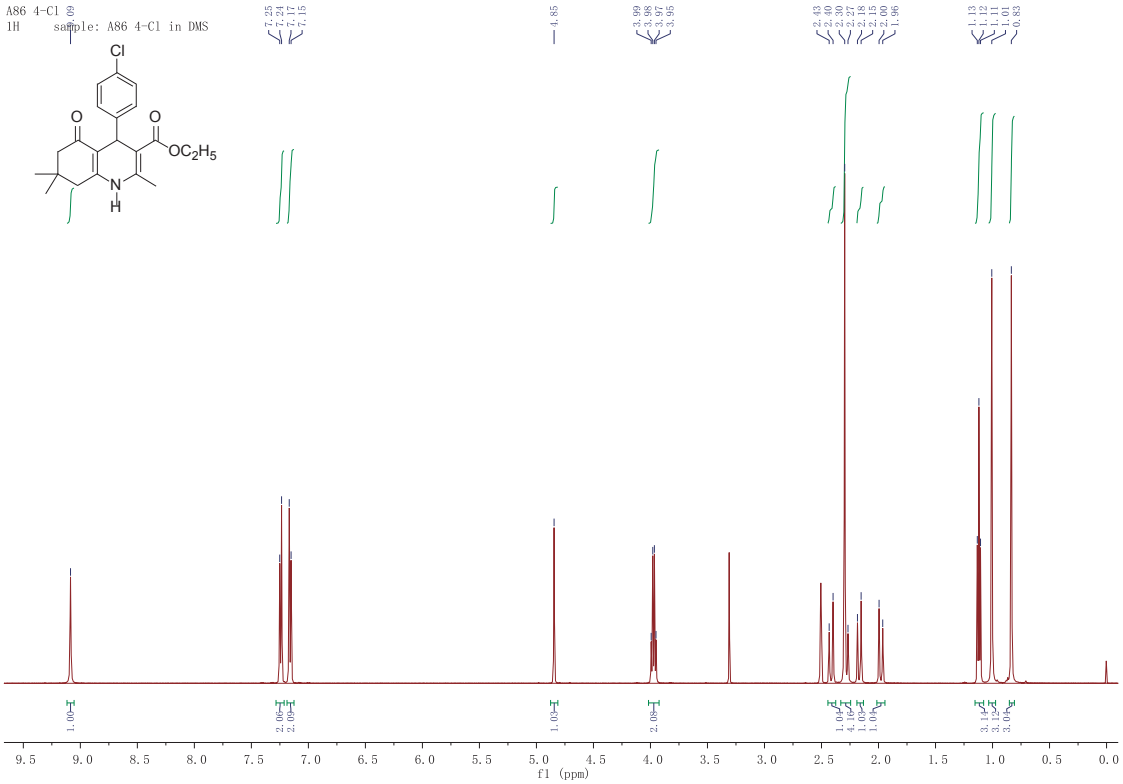

20160520-A80 4-甲氧基
13C sample: 20160520-A80 in DMSO
OCH3
O
O
OC2H5
N
H
149.14
144.52
139.95
128.31
113.02
110.14
103.87
58.90
54.79
50.23
34.86
32.05
29.96
26.46
18.18
14.10
f1 (ppm)

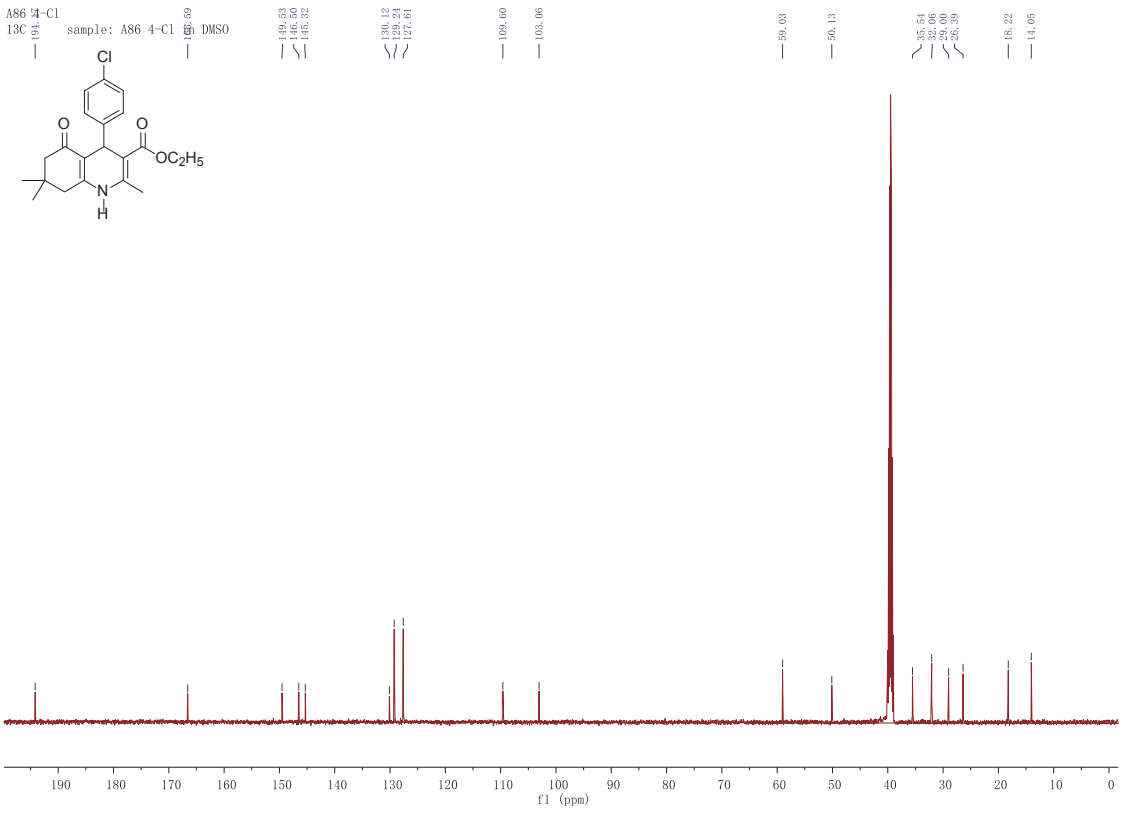

20160520-A79
1H
sample: 20160520-A79 in DMS
OCH3
O
O
OC2H5
N
H
f1 (ppm)

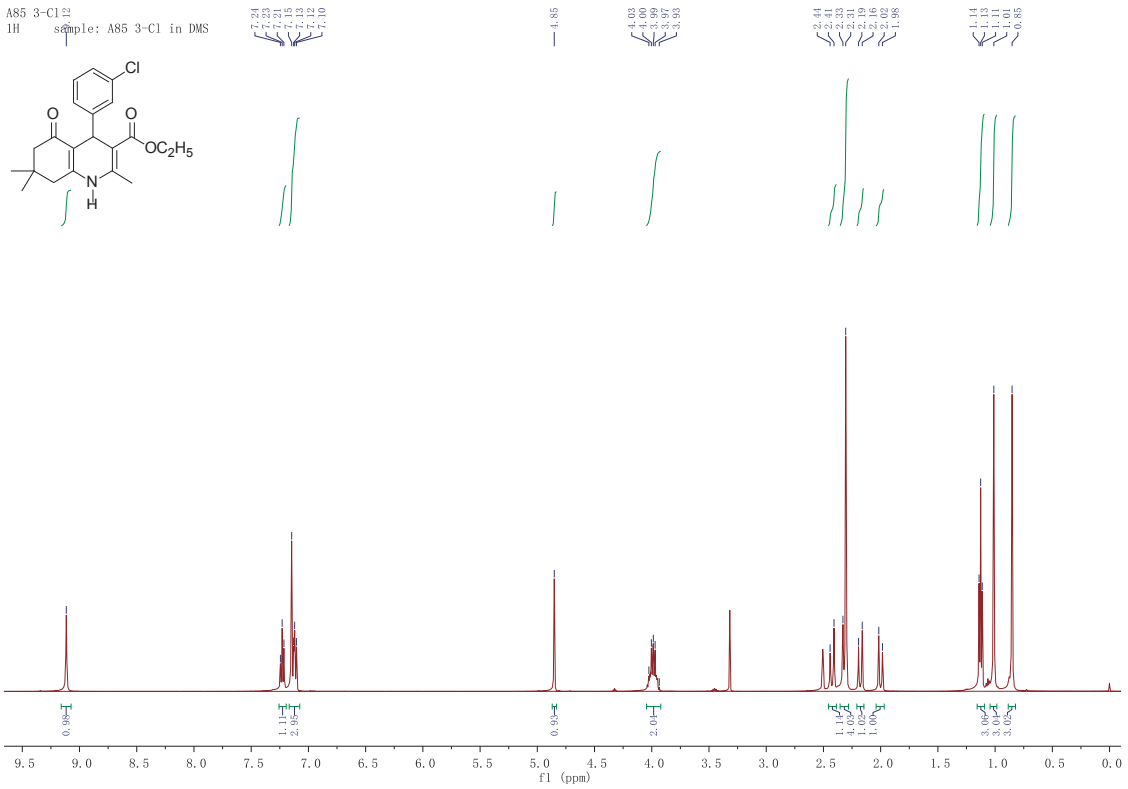

20160520-A79 3-甲氧基
13C
sample: 20160520-A79 in DMSO
OCH3
O
O
OC2H5
N
H
f1 (ppm)

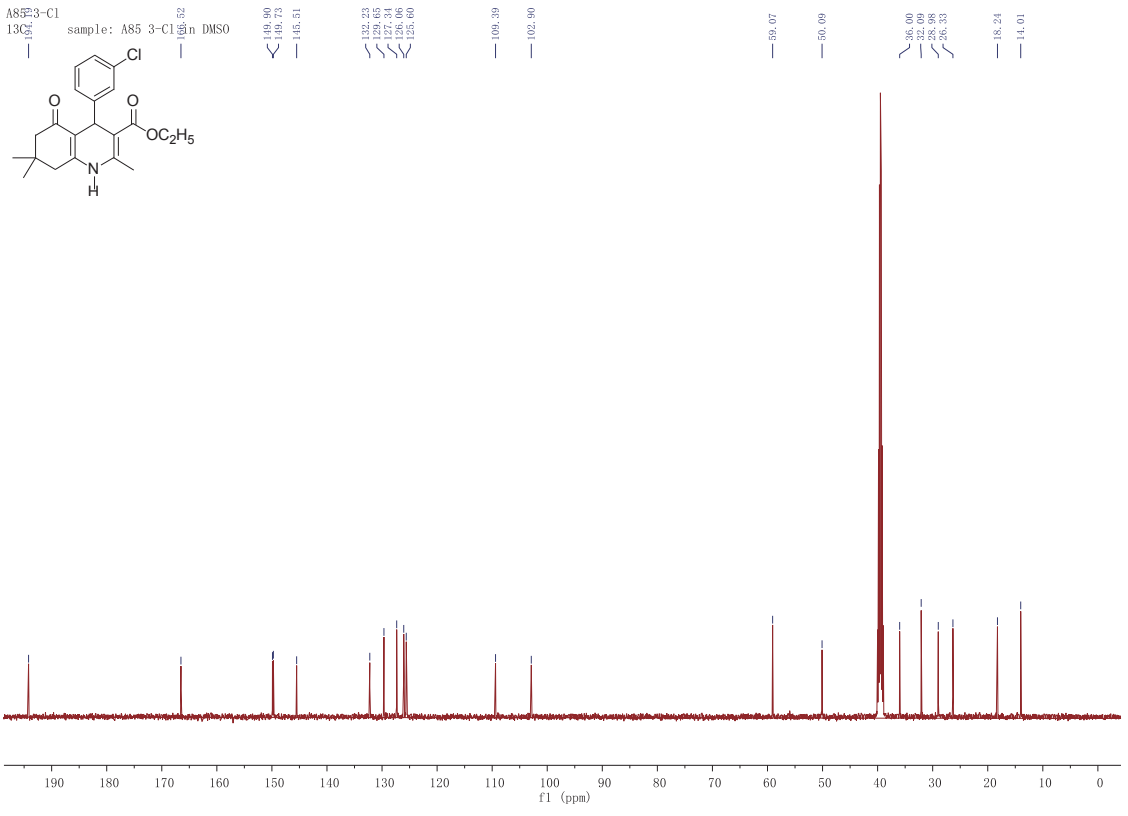

20160520-A18
1H
sample: 20160520-A18 in DMSO
OCH3
O
O
OC2H5
N
H
f1 (ppm)

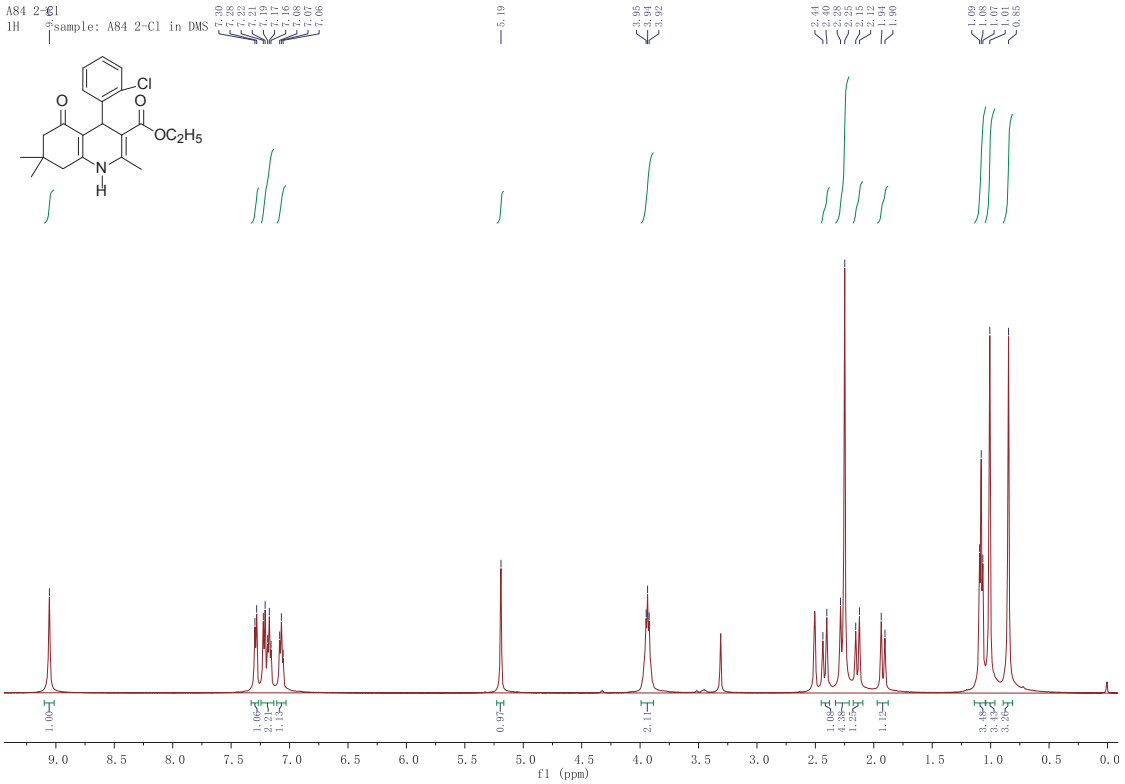

20160520-A78 2-甲氧基
13C
sample: 20160520-A78 in DMSO
OCH3
O
O
OC2H5
N
H
f1 (ppm)

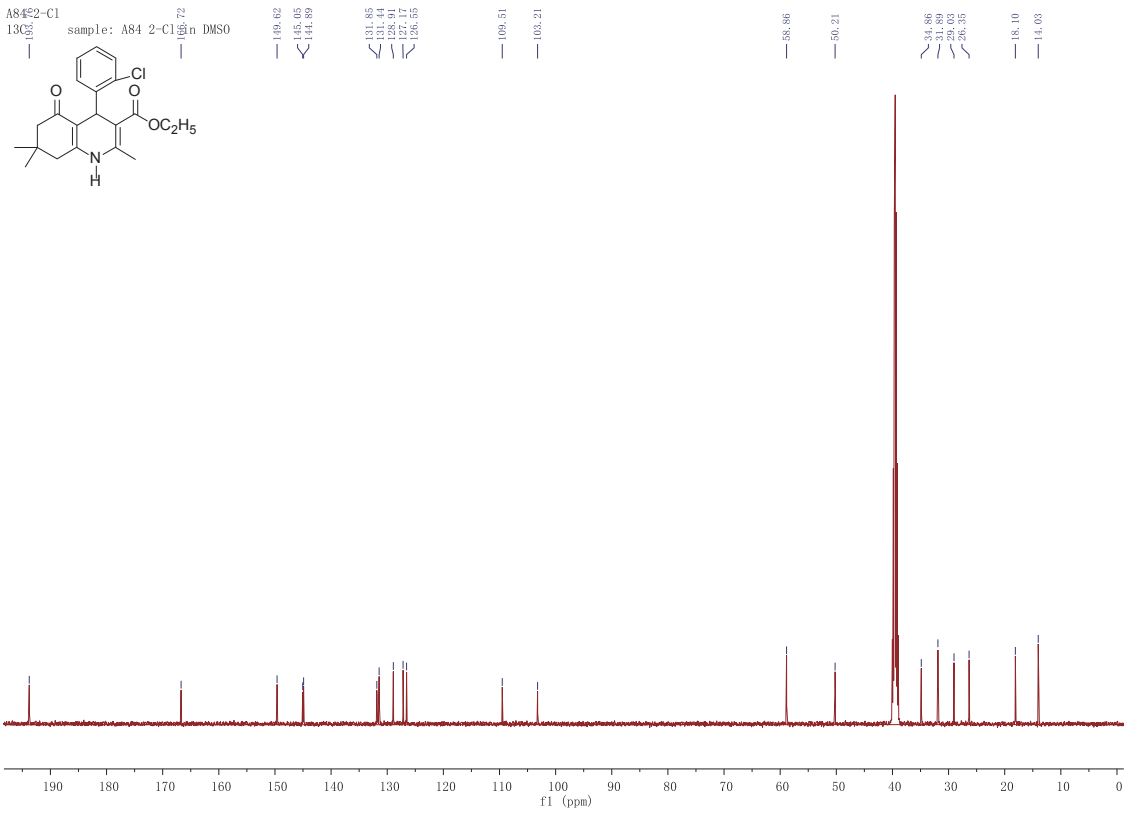

A86 4-Cl
1H sample: A86 4-Cl in DMS
9.09
7.25
7.24
7.17
7.15
4.85
3.99
3.98
3.97
3.95
2.43
2.40
2.30
2.27
2.18
2.15
2.00
1.96
1.13
1.12
1.11
1.01
0.83
Cl
O
O
OC2H5
N
H
1.00
2.06
2.09
1.03
2.08
1.04
4.16
1.02
1.04
3.14
3.12
3.04
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

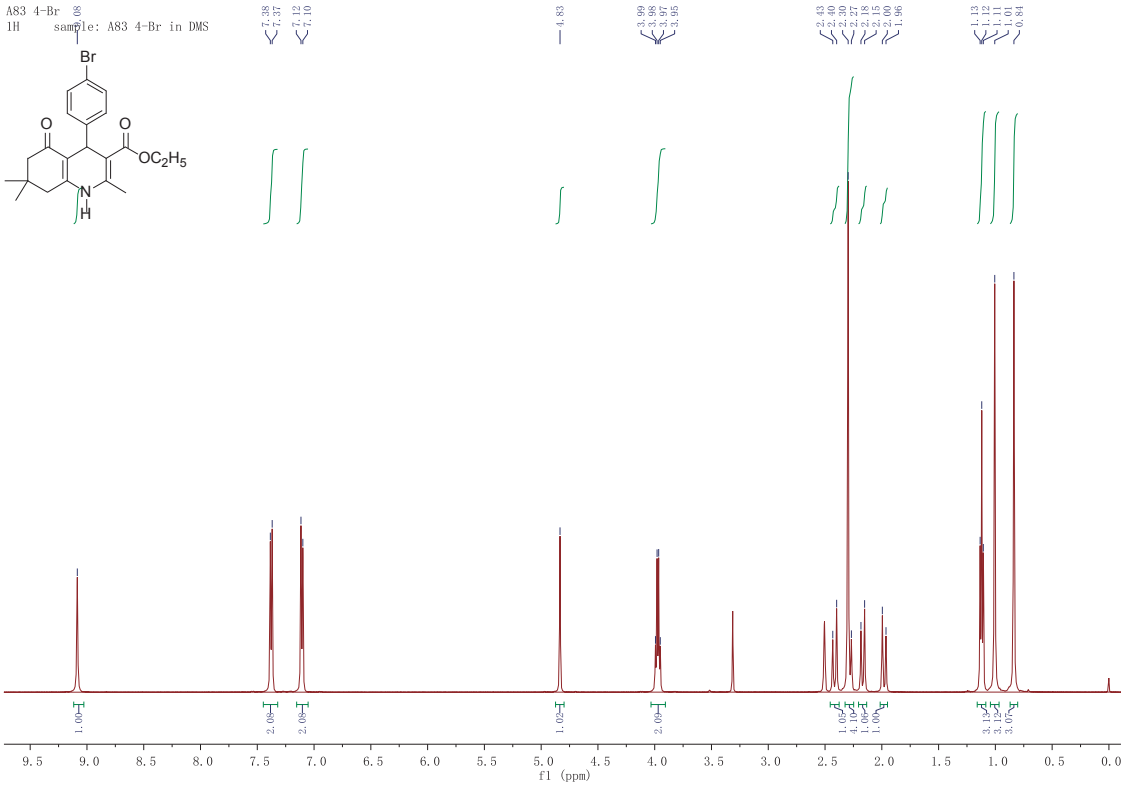

A86 4-Cl
13C sample: A86 4-Cl in DMSO
194.59
149.53
146.50
145.32
130.12
129.24
127.61
109.60
103.06
59.03
50.13
35.54
32.06
29.00
26.39
18.22
14.05
Cl
O
O
OC2H5
N
H
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

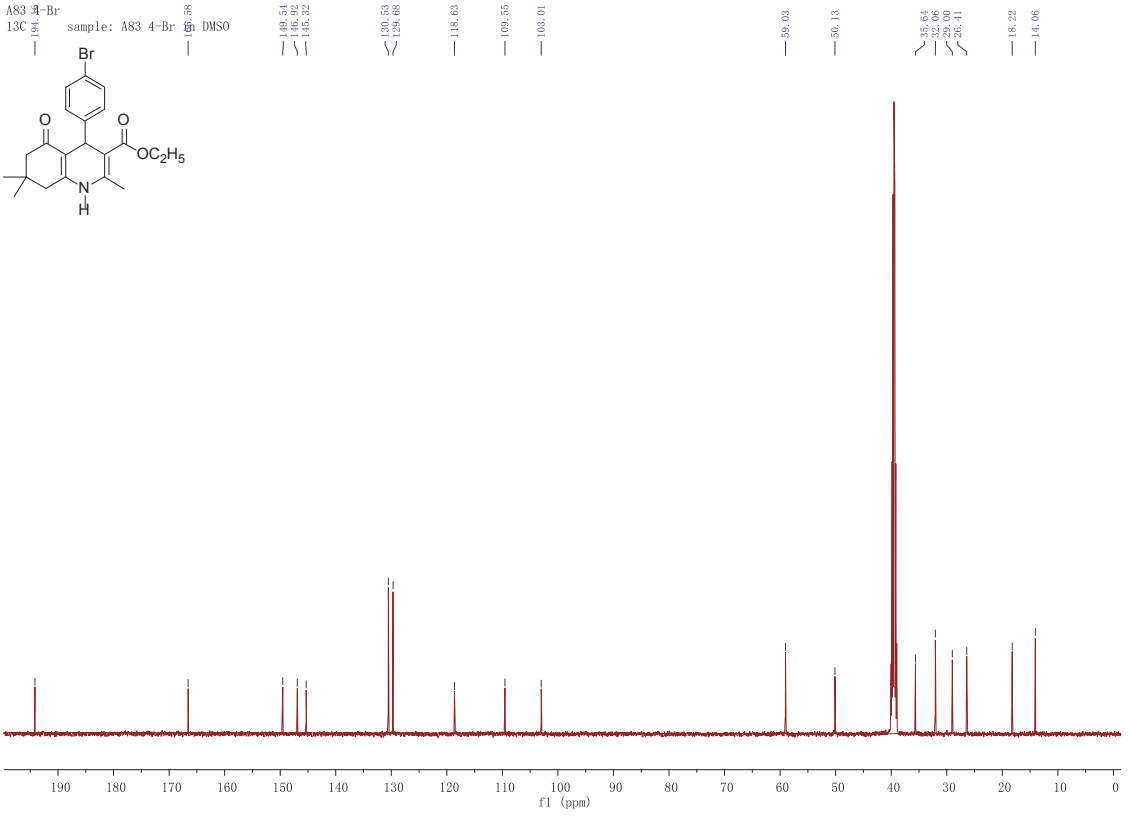

A85 3-Cl
1H sample: A85 3-Cl in DMS
Cl
O
O
OC2H5
N
H
f1 (ppm)

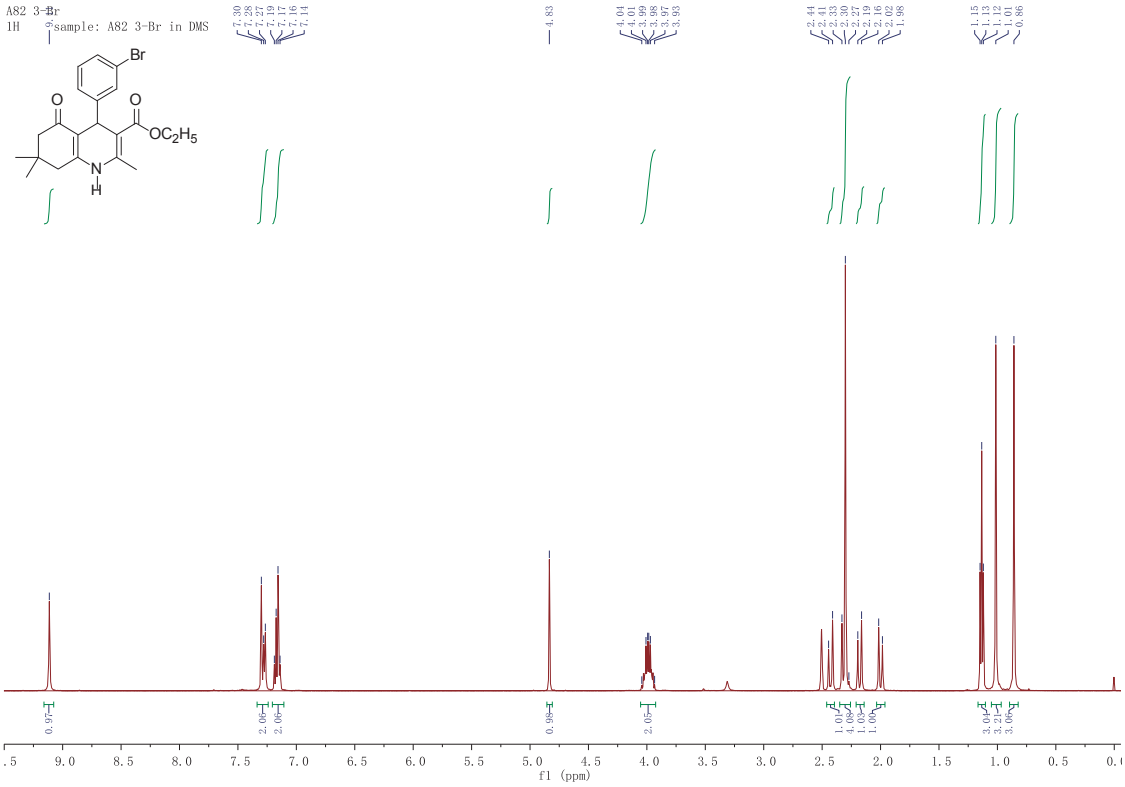

A85 3-Cl
13C sample: A85 3-Cl in DMSO
Cl
O
O
OC2H5
N
H
f1 (ppm)

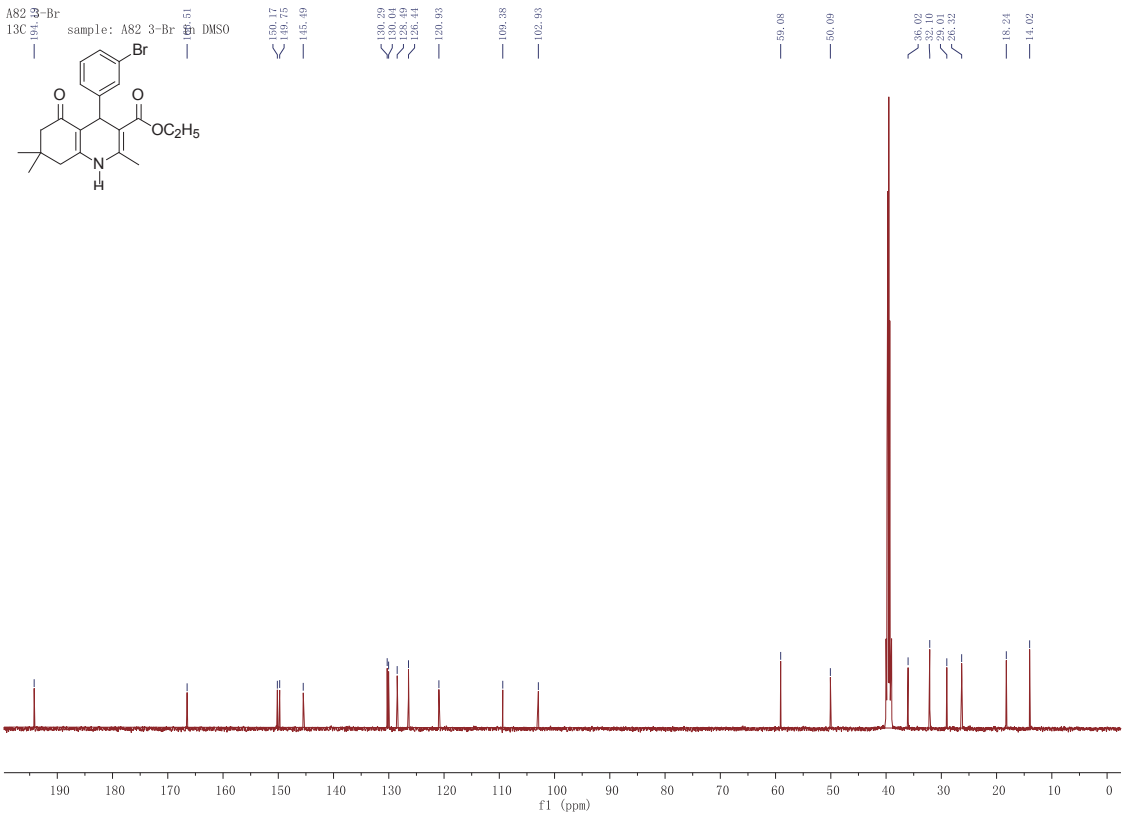

A84 2-Cl
1H
sample: A84 2-Cl in DMS
f1 (ppm)

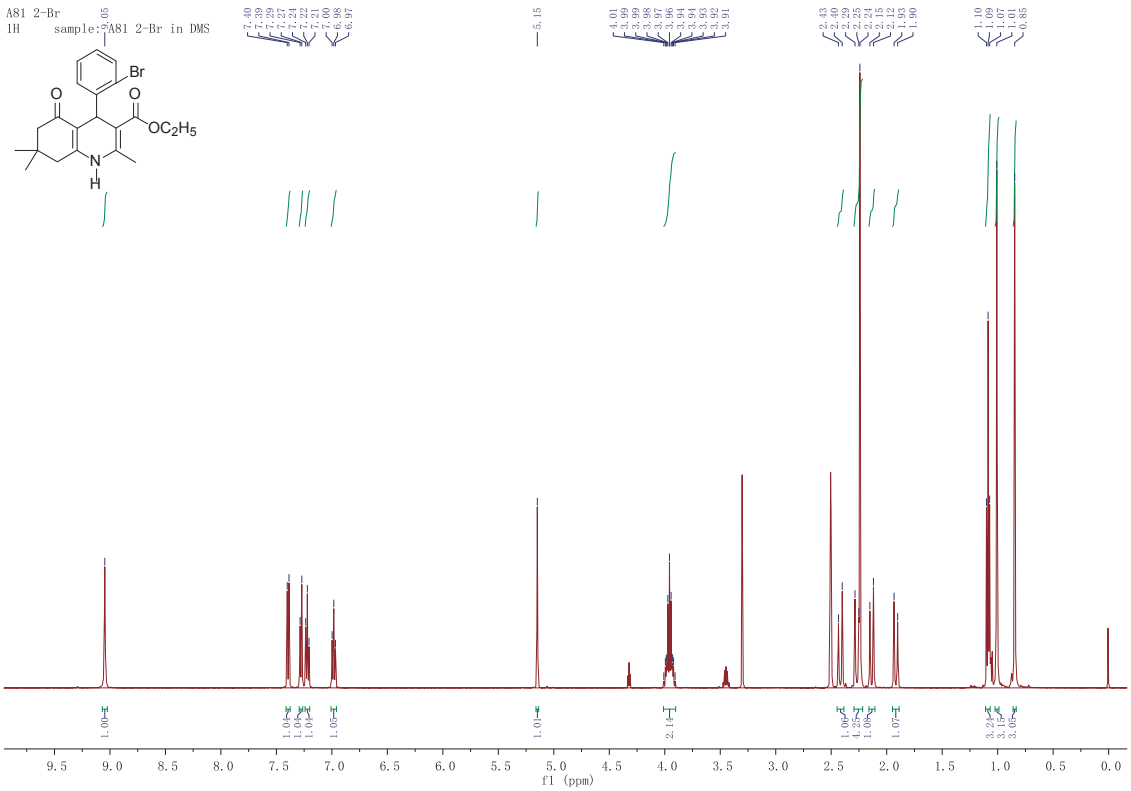

A84-2-Cl
13C
sample: A84 2-Cl in DMSO
f1 (ppm)

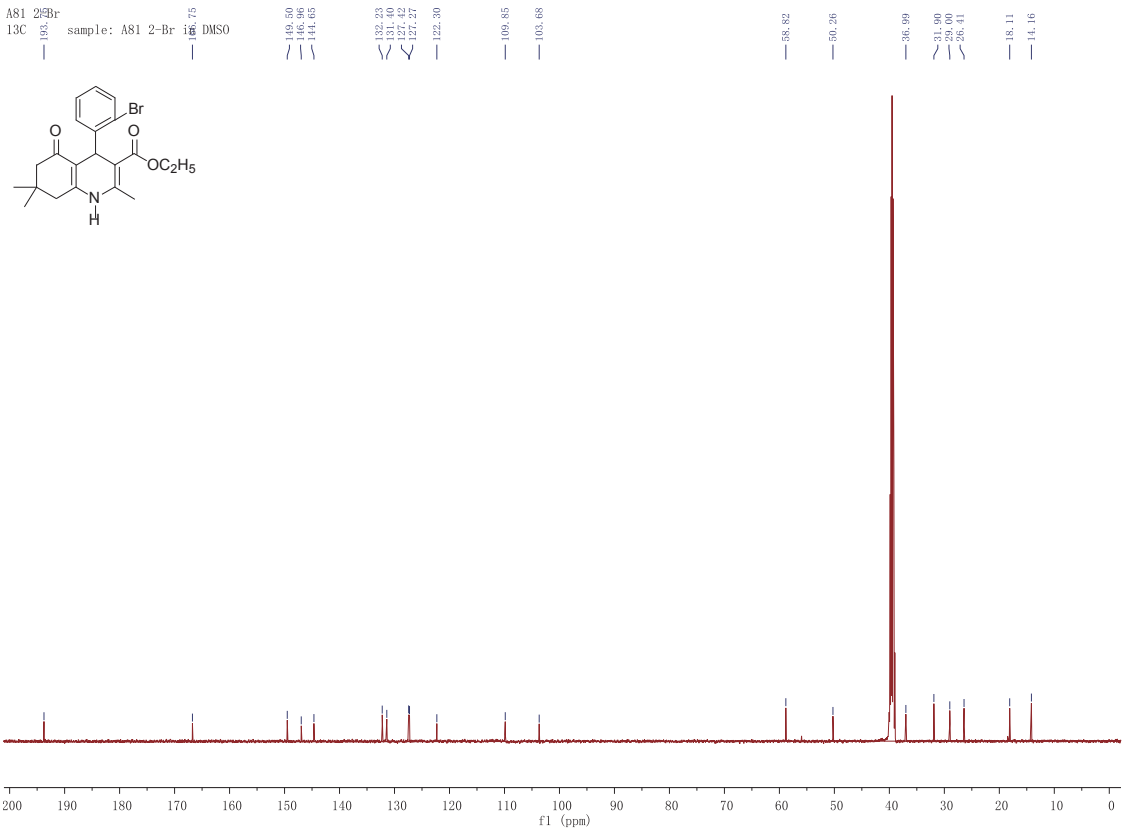

A83 4-Br
1H sample: A83 4-Br in DMS
Br
O
O
OC2H5
N
H
f1 (ppm)

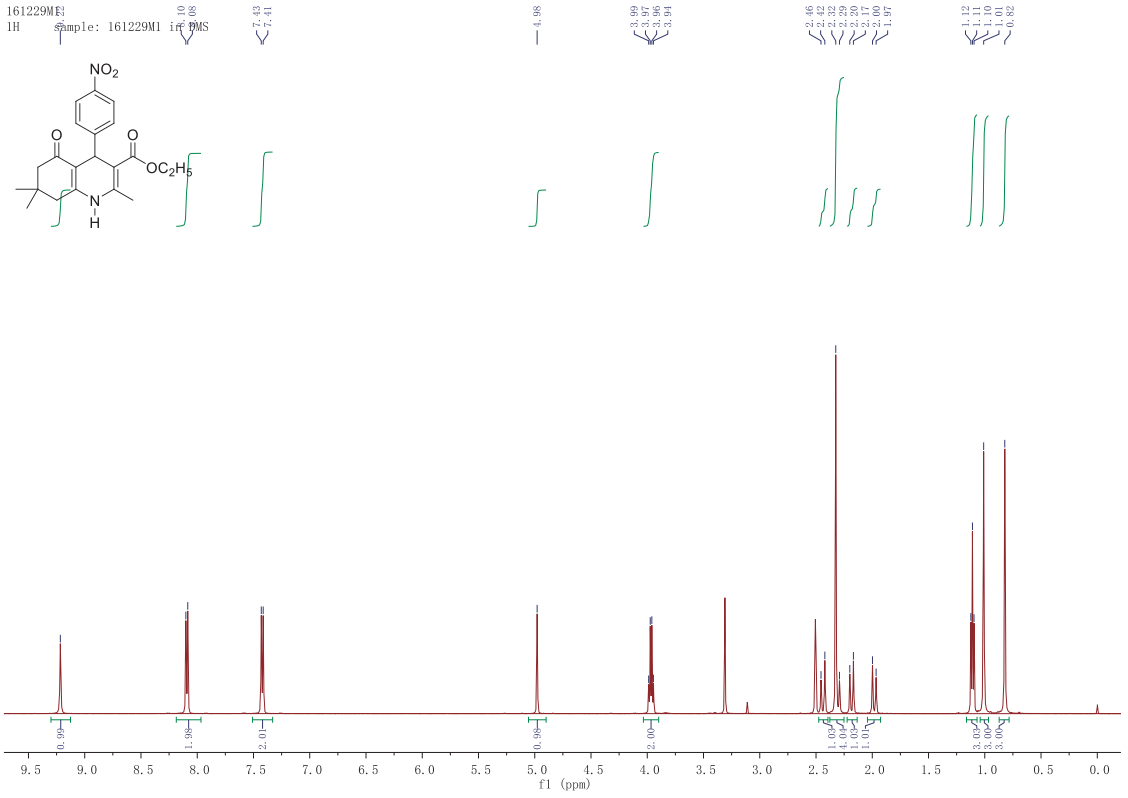

A83 4-Br
13C sample: A83 4-Br in DMSO
Br
O
O
OC2H5
N
H
f1 (ppm)

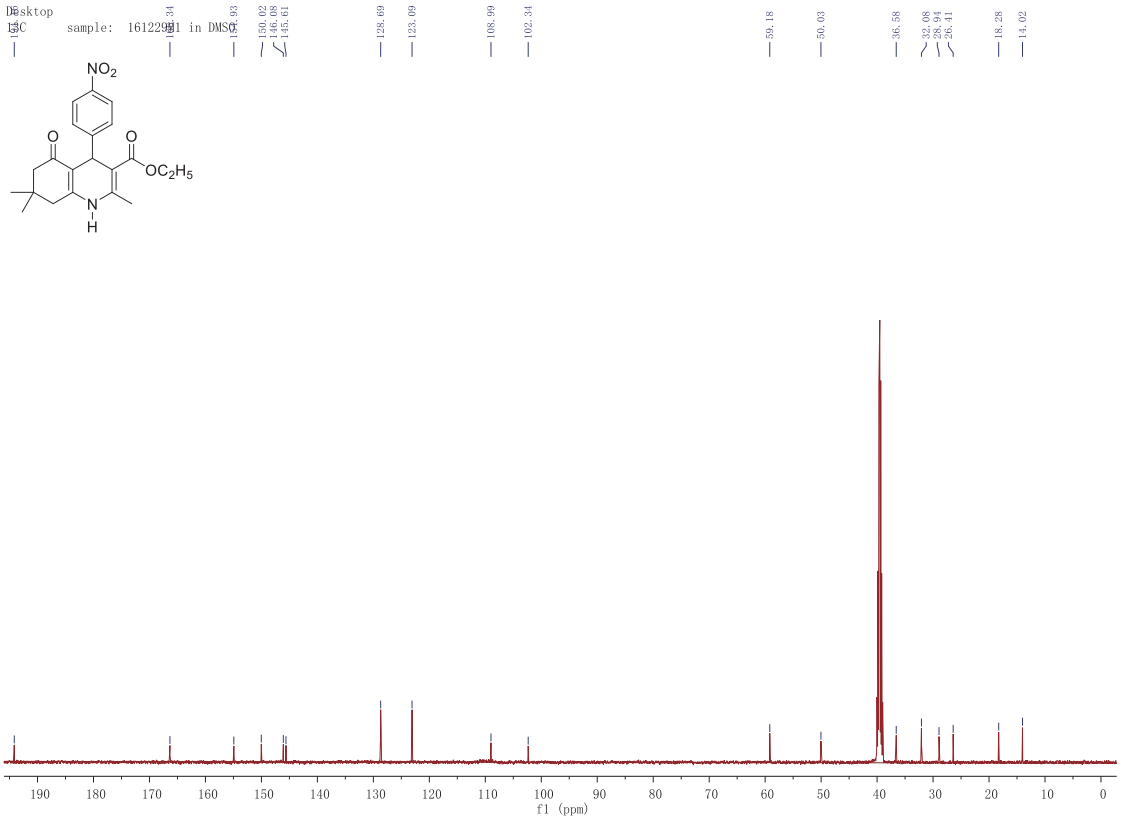

A82 3-Br
1H
sample: A82 3-Br in DMS
Br
O
O
OC2H5
N
H
7.30
7.28
7.27
7.19
7.17
7.16
7.14
4.83
4.04
4.01
3.99
3.98
3.97
3.93
2.44
2.41
2.33
2.30
2.27
2.19
2.16
2.02
1.98
1.15
1.13
1.12
1.01
0.86
0.97
2.06
2.06
0.98
2.05
1.01
4.08
1.05
1.00
3.04
3.21
3.06
f1 (ppm)

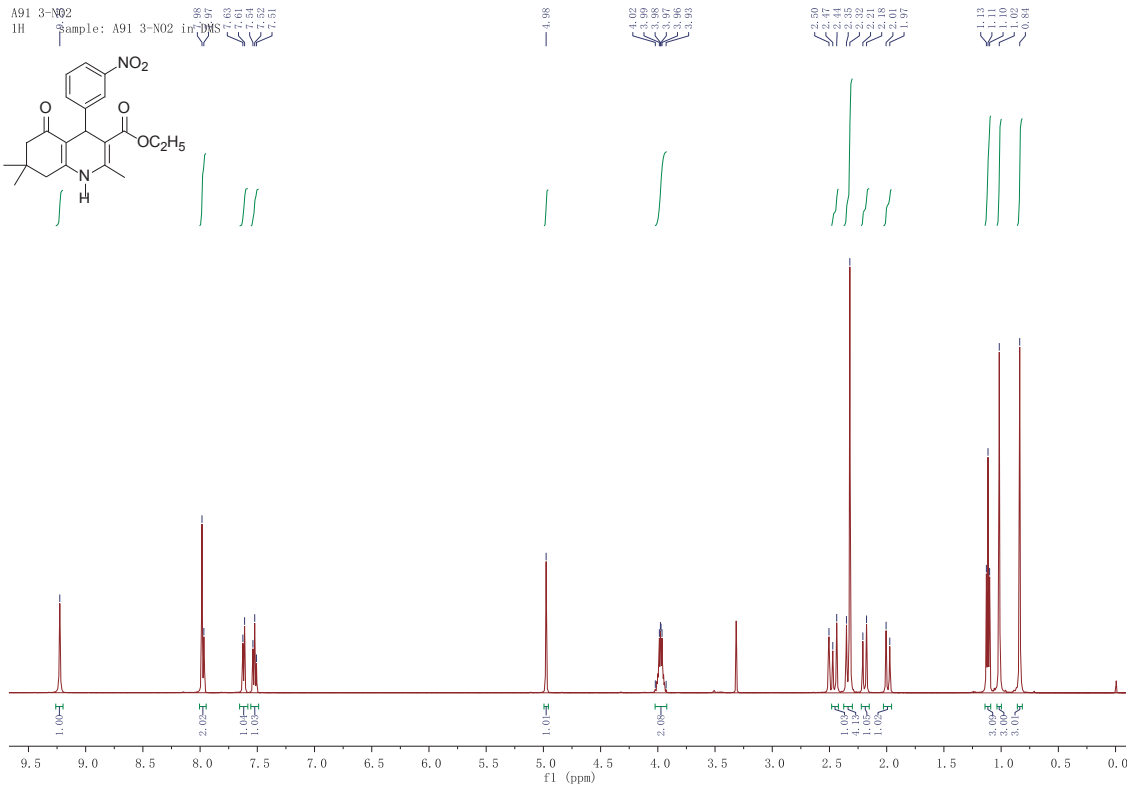

A82 3-Br
13C
sample: A82 3-Br in DMSO
Br
O
O
OC2H5
N
H
194.43
165.51
150.17
149.75
145.49
130.29
130.04
128.49
126.44
120.93
109.38
102.93
59.08
50.09
36.02
32.10
29.01
26.32
18.24
14.02
f1 (ppm)

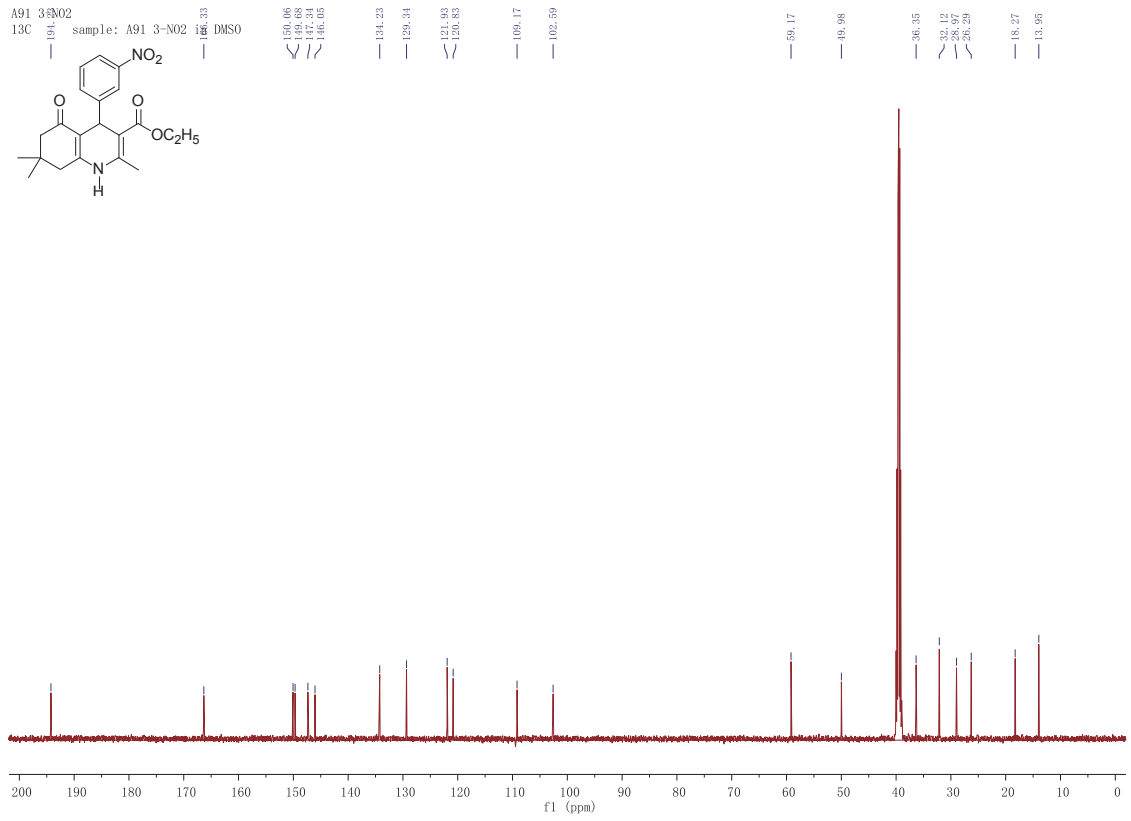

A81 2-Br
1H sample: A81 2-Br in DMS
Br
O
O
OC2H5
N
H
f1 (ppm)

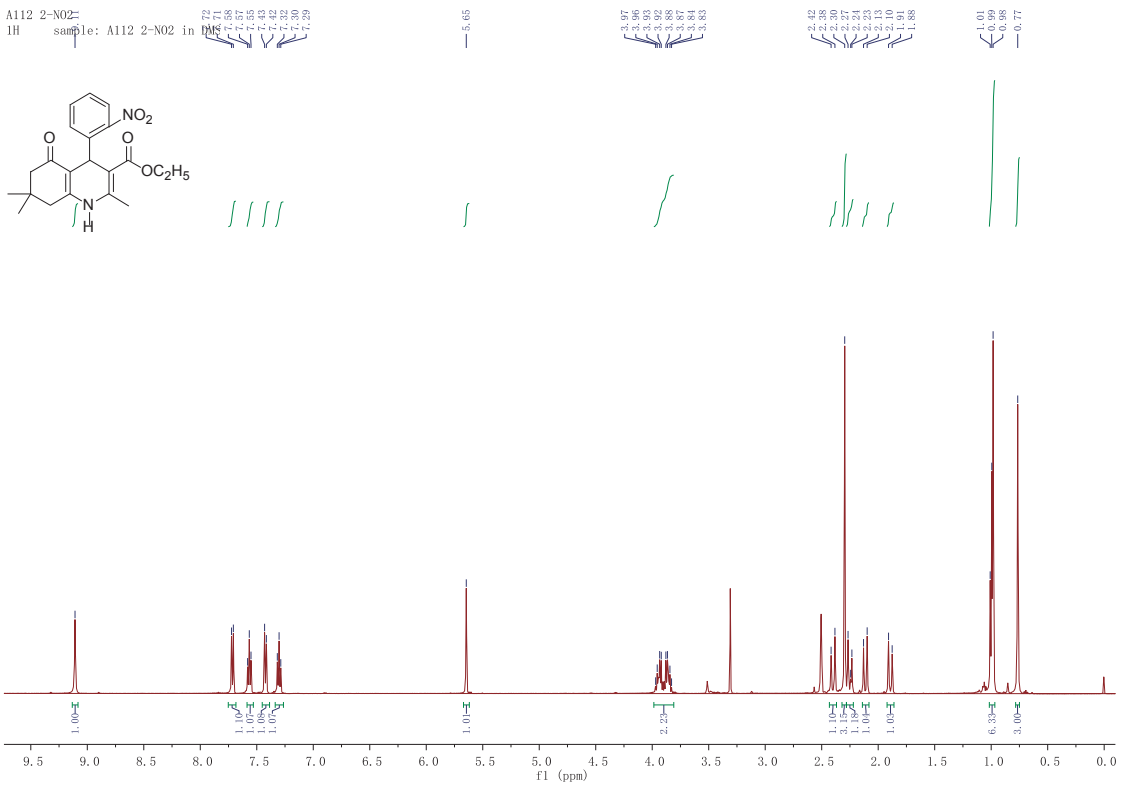

A81 2-Br
13C sample: A81 2-Br in DMSO
Br
O
O
OC2H5
N
H
f1 (ppm)

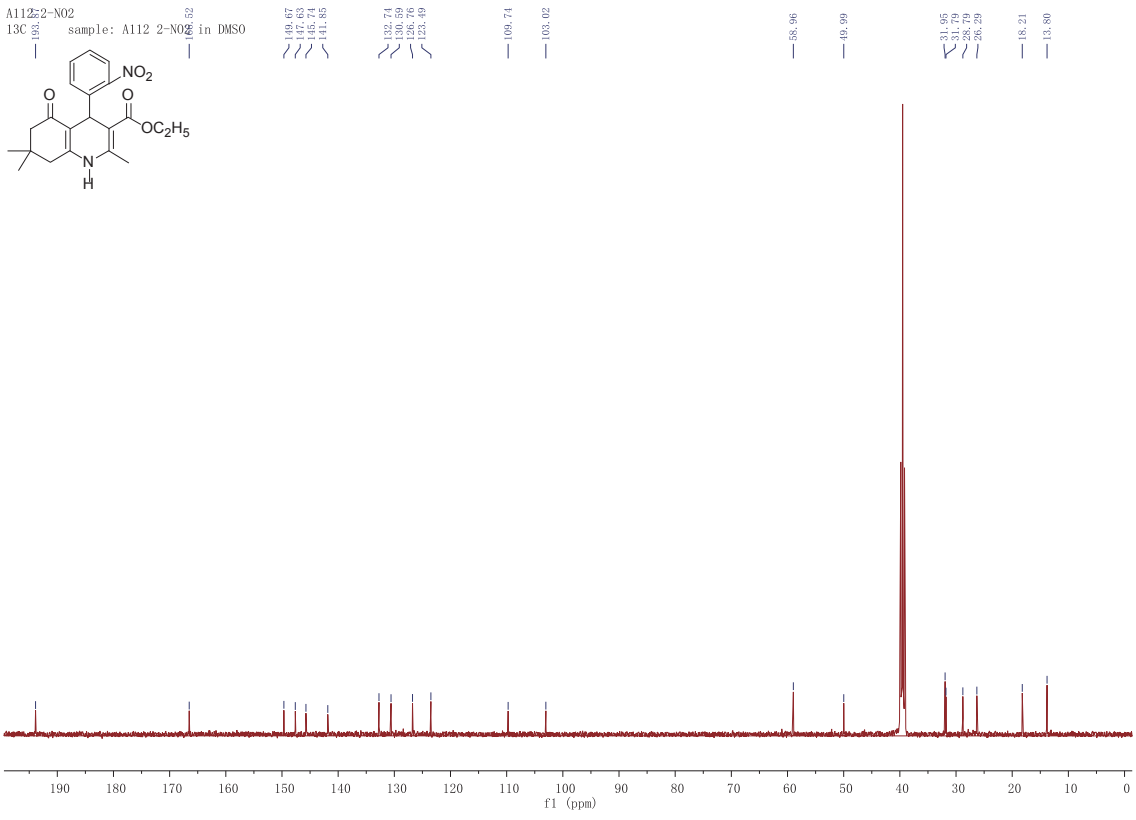

161229M1
1H
sample: 161229M1 in DMS
NO2
O
O
OC2H5
N
H
f1 (ppm)

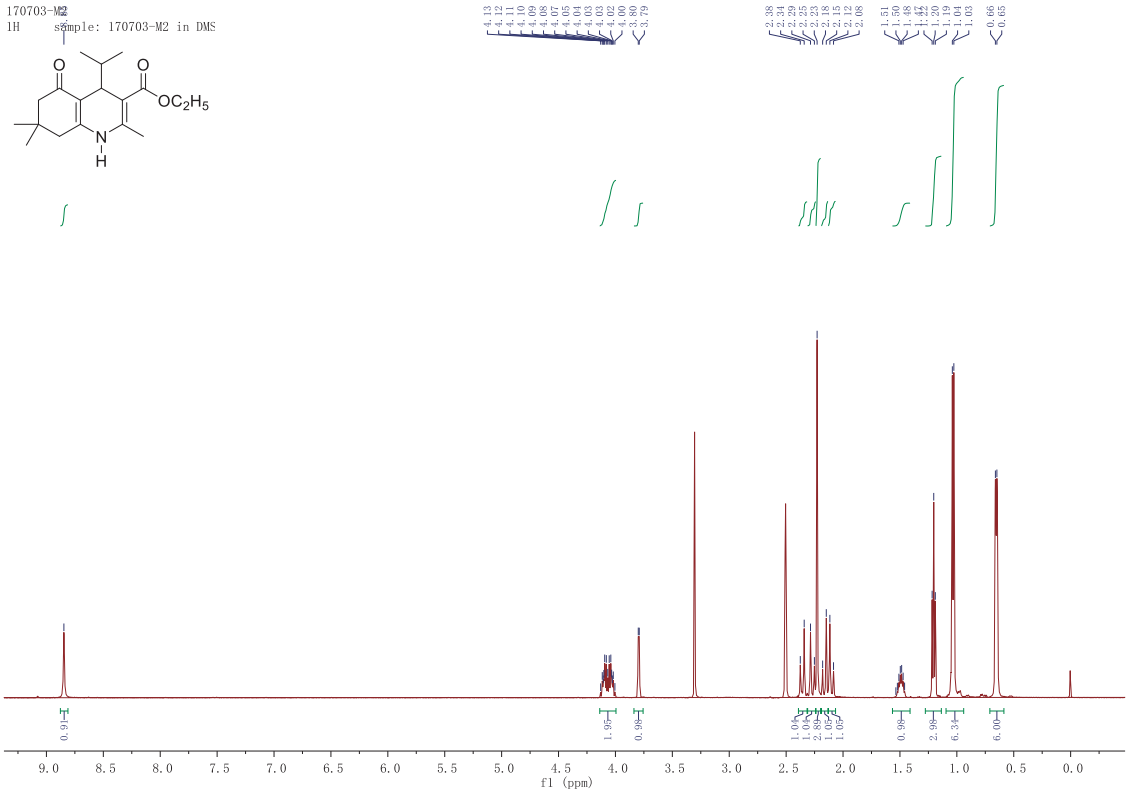

Desktop
13C
sample: 161229M1 in DMSO
NO2
O
O
OC2H5
N
H
f1 (ppm)

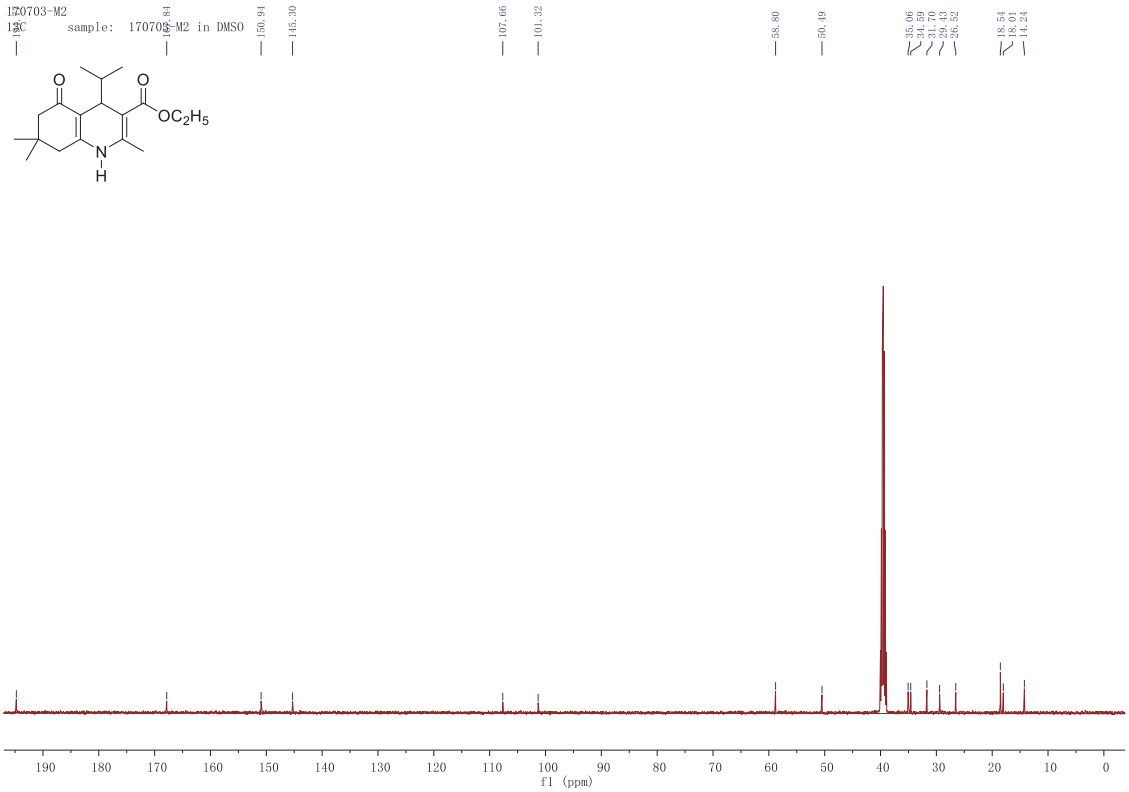

A91 3-NO2
1H
sample: A91 3-NO2 in DMSO
NO2
O
O
OC2H5
N
H
f1 (ppm)

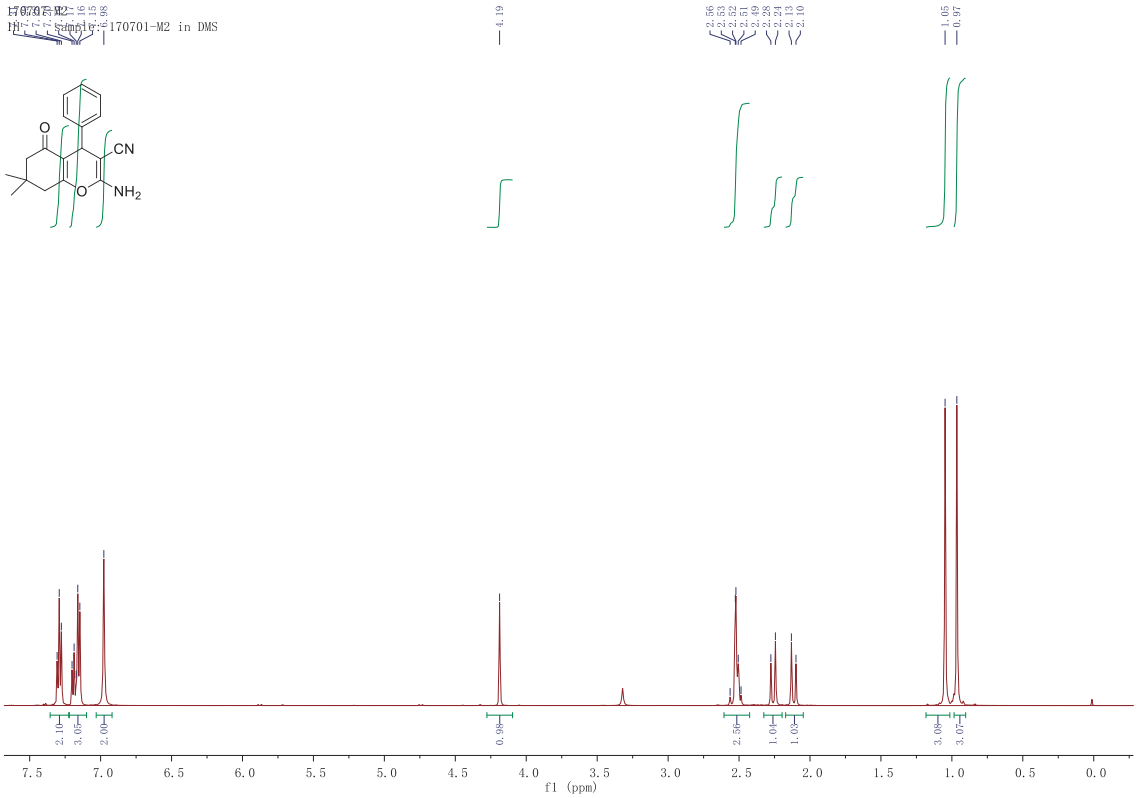

A91 3-NO2
13C
sample: A91 3-NO2 in DMSO
NO2
O
O
OC2H5
N
H
f1 (ppm)

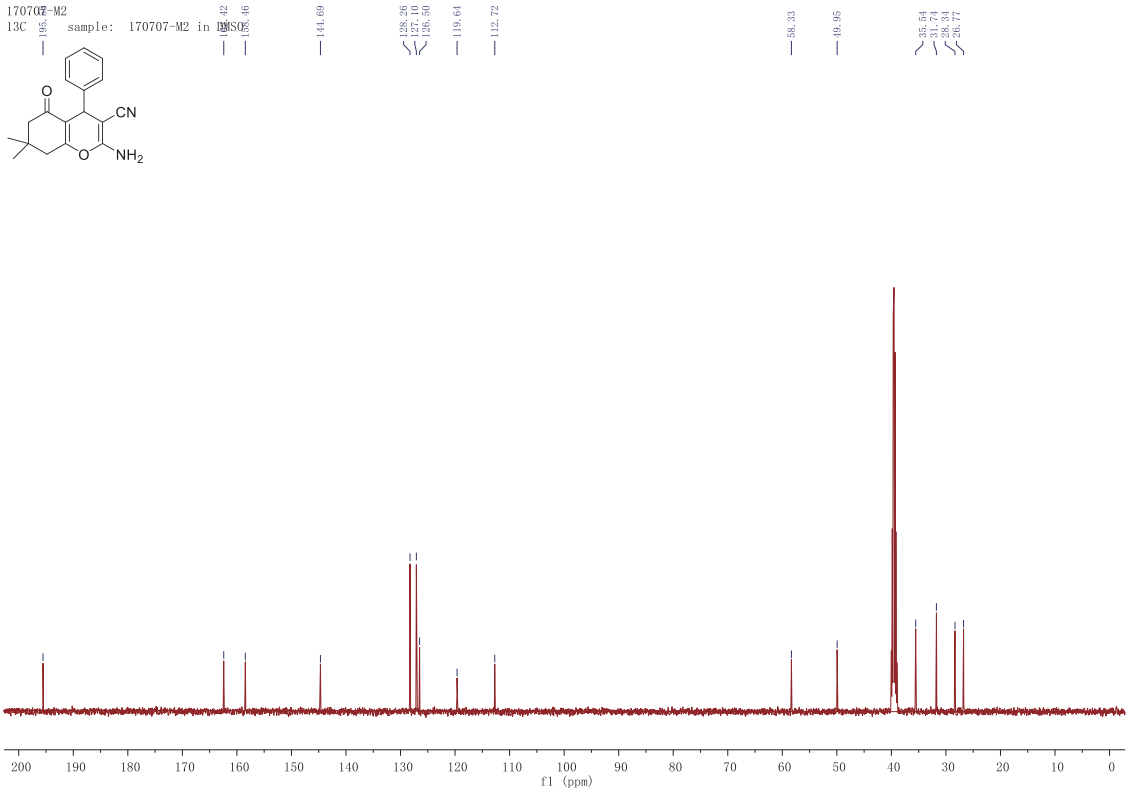

A112 2-NO2
1H sample: A112 2-NO2 in DMS
NO2
O
O
OC2H5
N
H
f1 (ppm)

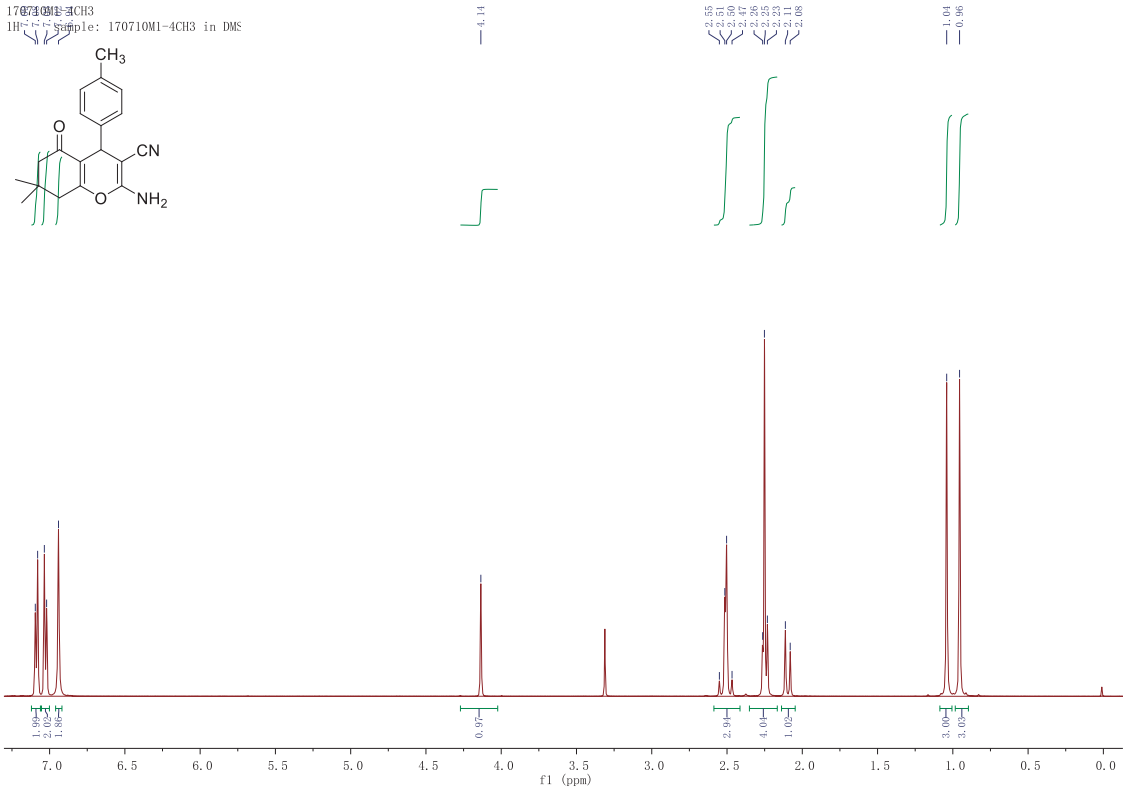

A112 2-NO2
13C sample: A112 2-NO2 in DMSO
NO2
O
O
OC2H5
N
H
f1 (ppm)

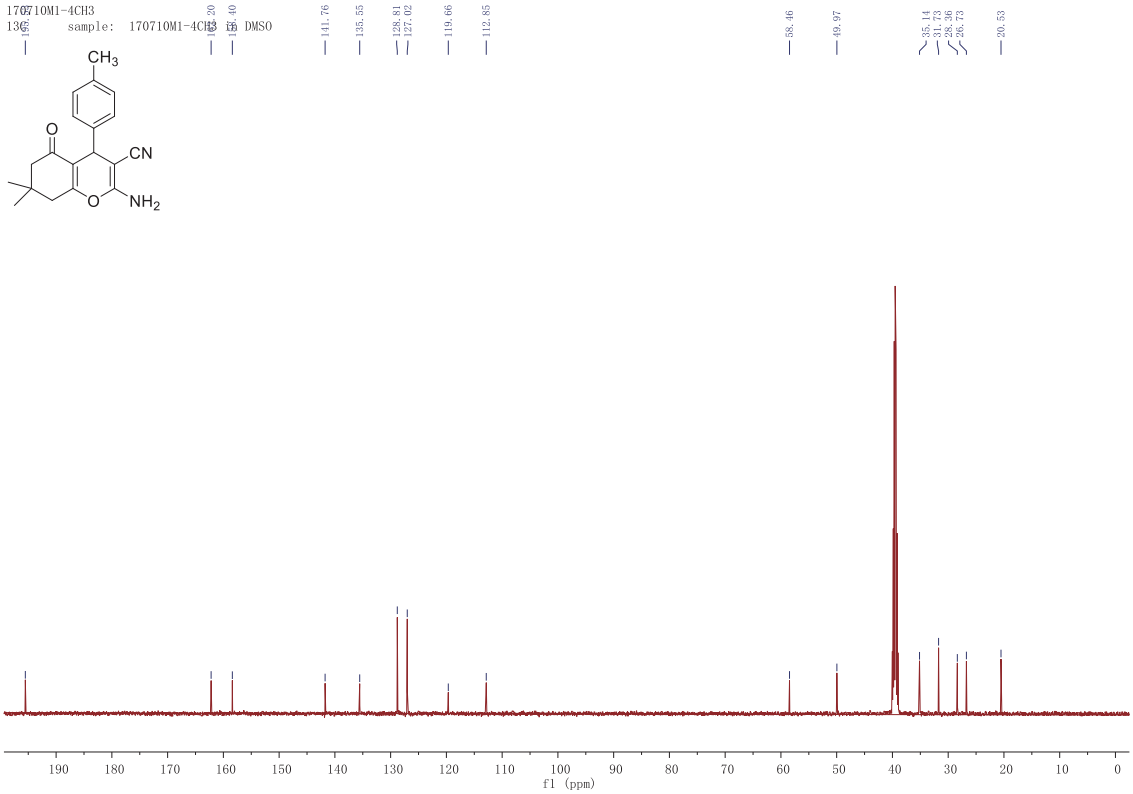

170703-M2
1H sample: 170703-M2 in DMS
f1 (ppm)

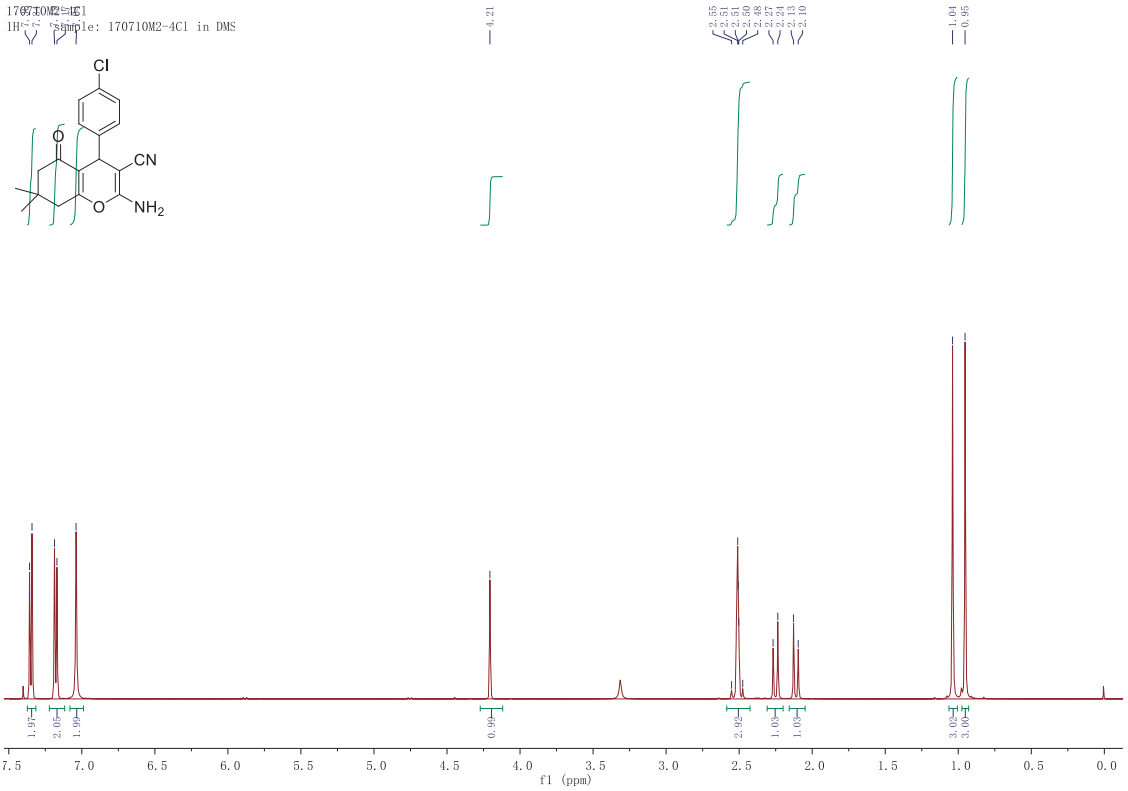

170703-M2
13C sample: 170703-M2 in DMSO
f1 (ppm)

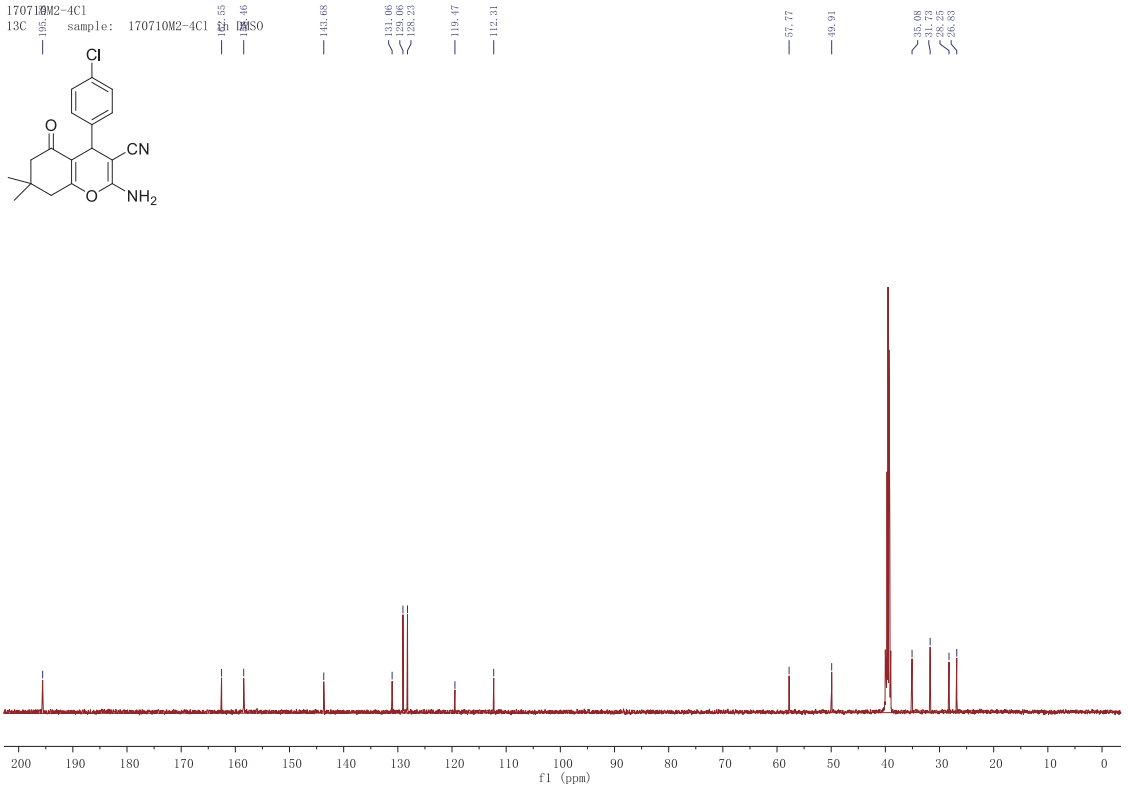

170701-M2
1H sample: 170701-M2 in DMS
4.19
2.56
2.53
2.52
2.51
2.49
2.28
2.14
2.13
2.10
1.05
0.97
O
CN
O
NH2
2.10
3.05
2.00
0.98
2.56
1.04
1.05
3.08
3.07
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

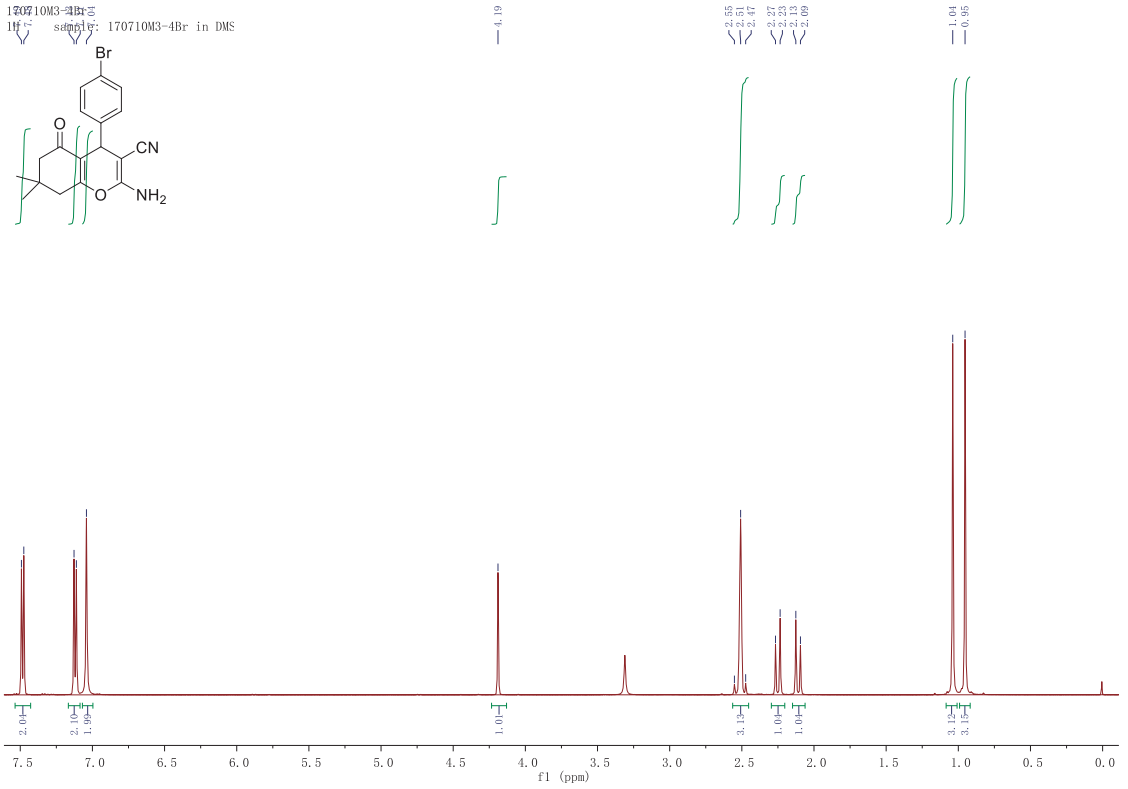

170707-M2
13C sample: 170707-M2 in DMSO
195.42
158.46
144.69
128.26
127.10
126.50
119.64
112.72
58.33
49.95
35.54
31.74
28.34
26.77
O
CN
O
NH2
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

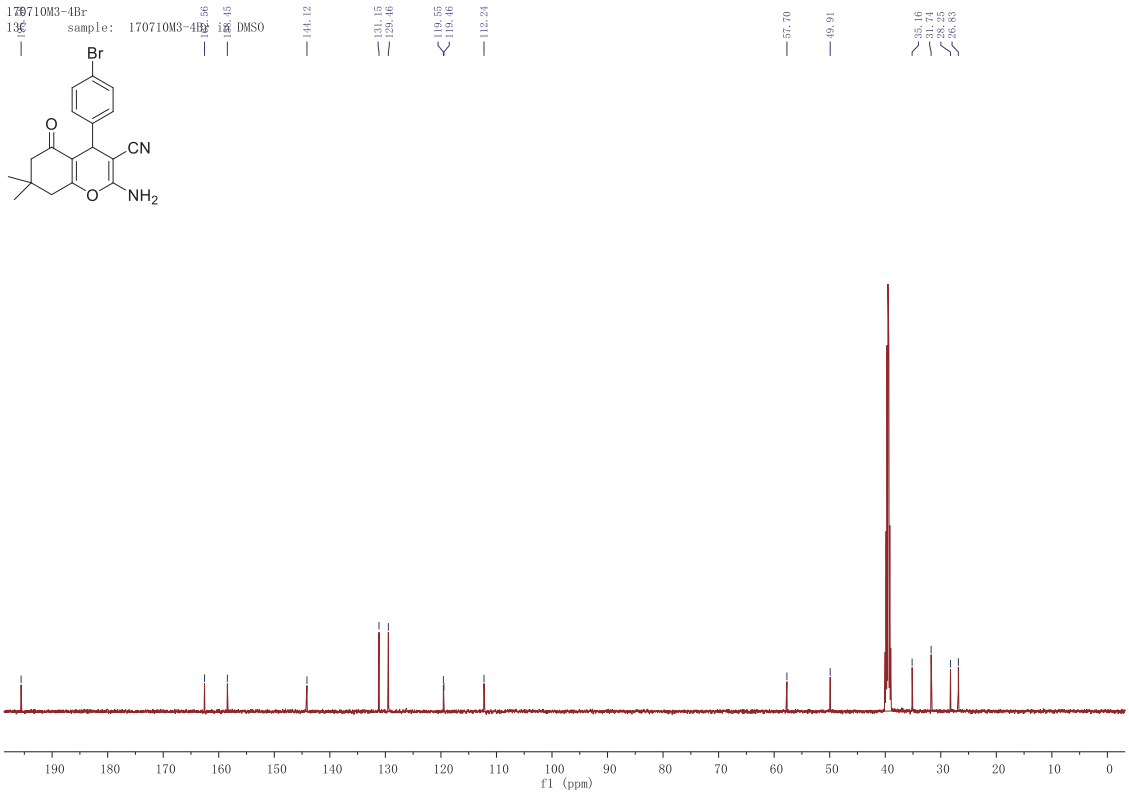

170710M1-4CH3
1H-NMR Sample: 170710M1-4CH3 in DMS
4.14
2.55
2.51
2.50
2.47
2.26
2.25
2.23
2.11
2.08
1.04
0.96
CH3
O
CN
NH2
1.00
2.02
1.86
0.97
2.94
4.04
1.02
3.00
3.03
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


170710M1-4CH3
13C-NMR sample: 170710M1-4CH3 in DMSO
158.20
157.40
141.76
135.55
128.81
127.02
119.66
112.85
58.46
49.97
35.14
31.73
28.36
26.73
20.53
CH3
O
CN
NH2
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


1H
sample: 170710M2-4Cl in DMS
Cl
O
CN
O
NH2
4.21
2.55
2.51
2.50
2.48
2.27
2.24
2.13
2.10
1.04
0.95
1.97
2.05
1.99
0.99
2.92
1.03
1.03
3.02
3.00
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


13C
sample: 170710M2-4Cl
DMSO
195.
162.55
157.46
143.68
131.06
129.06
128.23
119.47
112.31
57.77
49.91
35.08
31.73
28.25
26.83
Cl
O
CN
O
NH2
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


sample: 170710M3-4Br in DMS
Br
O
CN
O
NH2
4.19
2.55
2.51
2.47
2.27
2.23
2.13
2.09
1.04
0.95
2.04
2.10
1.99
1.01
3.13
1.04
1.04
3.12
3.15
f1 (ppm)


sample: 170710M3-4Br DMSO
Br
O
CN
O
NH2
144.12
131.15
129.46
119.55
119.46
112.24
57.70
49.91
35.16
31.74
28.25
26.83
f1 (ppm)