Supplementary Information

A new rapid multicomponent domino heteroannulation of heterocyclic ketene aminals: solvent-free regioselective synthesis of functionalized benzo[*g*]imidazo[1,2-*a*]quinolinediones

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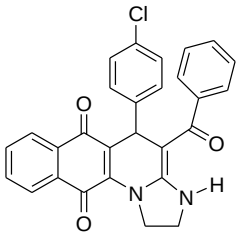
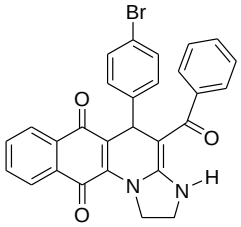
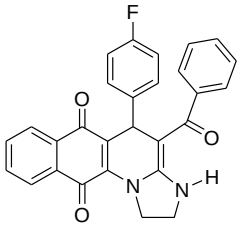


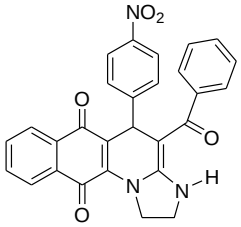
4-Benzoyl-5-(4-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4a). Black Solid, mp. 247–248 ℃; IR (KBr, *v*, cm^{-1}): 3294 (NH), 1663 (C=O), 1636 (C=O), 1258 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.54 (s, 1H, NH), 6.80–7.98 (m, 13H, ArH), 5.22 (s, 1H, CH), 4.53–4.58 (m, 1H, CH_2), 4.33–4.39 (m, 1H, CH_2), 3.77–3.87 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.6, 181.7, 180.6, 156.4, 146.0, 142.2, 139.9, 134.9, 133.9, 131.6, 131.5, 131.2, 129.5, 128.6, 126.7, 125.7, 122.2, 86.4, 47.7, 44.1, 36.7; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{20}N_2O_3Cl$, 467.1162; found, 467.1158.



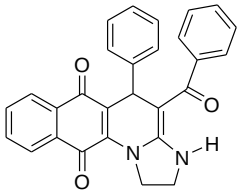
4-Benzoyl-5-(4-bromophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4b). Black solid, mp. 252–253 ℃; IR (KBr, *v*, cm^{-1}): 3295 (NH), 1662 (C=O), 1640 (C=O), 1257 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.53 (s, 1H, NH), 6.74–7.97 (m, 13H, ArH), 5.20 (s, 1H, CH), 4.52–4.58 (m, 1H, CH_2), 4.32–4.38 (m, 1H, CH_2), 3.77–3.86 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.6, 181.7, 180.6, 156.4, 146.4, 142.2, 140.0, 135.0, 133.9, 131.5, 129.9, 129.4, 128.6, 126.7, 126.6, 125.7, 122.1, 119.8, 86.3, 47.7, 44.1, 36.8; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{20}N_2O_3Br$, 511.0657; found,511.0665.



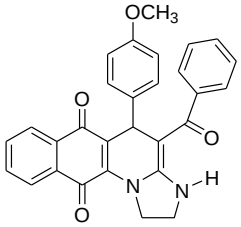
4-Benzoyl-5-(4-fluorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4c). Black solid, mp. 239–240 ℃; IR (KBr, *v*, cm^{-1}): 3299 (NH), 1667 (C=O), 1637 (C=O), 1258 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.52 (s, 1H, NH), 6.80–7.97 (m, 13H, ArH), 5.21 (s, 1H, CH), 4.53–4.58 (m, 1H, CH_2), 4.32–4.38 (m, 1H, CH_2), 3.77–3.87 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.7, 181.7, 180.7, 161.1($^{1}J_{CF}$=239.4 Hz), 156.4, 143.3, 142.3, 139.9, 134.9, 133.8, 131.4, 129.4, 128.6, 126.6, 125.7, 122.5, 115.3 ($^{2}J_{CF}$=21 Hz), 86.7, 47.7, 44.1, 36.5; HRMS (ESI-TOF, $[M+H]^+$): calcd for $C_{28}H_{20}N_2O_3F$, 451.1458; found, 451.1462.



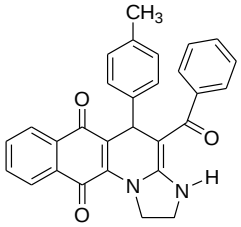
4-Benzoyl-5-(4-nitrophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4d). Black solid, mp. 252–253 ℃; IR (KBr, *v*, cm^{-1}): 3295 (NH), 1667 (C=O), 1641 (C=O), 1521 (NO_2), 1347 (NO_2), 1258 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.52 (s, 1H, NH), 6.80–7.97 (m, 13H, ArH), 7.04–7.99 (m, 13H, ArH), 5.37 (s, 1H, CH), 4.54–4.59 (m, 1H, CH_2), 4.38–4.42 (m, 1H, CH_2), 3.81–3.89 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.6, 181.5, 180.5, 156.2, 154.2, 146.3, 142.1, 140.2, 134.9, 133.8, 131.5, 131.4, 129.4, 128.9, 128.7, 126.6, 125.7, 123.8, 121.2, 85.9, 47.6, 44.1, 37.6; HRMS (ESI-TOF, $[M+H]^+$): calcd for $C_{28}H_{20}N_3O_5$, 478.1403; found, 478.1412.



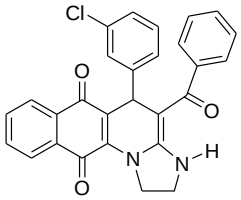
4-Benzoyl-5-phenyl-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4e). Black solid, mp. 246–247 ℃; IR (KBr, *v*, cm^{-1}): 3296 (NH), 1688 (C=O), 1636 (C=O), 1258 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.52 (s, 1H, NH), 6.82–7.97 (m, 14H, ArH), 5.23 (s, 1H, CH), 4.53–4.59 (m, 1H, CH_2), 4.33–4.39 (m, 1H, CH_2), 3.78–3.85 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.6, 181.7, 180.7, 156.5, 147.0, 142.3, 139.9, 134.9, 133.8, 131.6, 129.4, 128.7, 127.5, 126.7, 126.7, 126.6, 125.7, 122.8, 86.7, 47.7, 44.1, 37.0; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{21}N_2O_3$, 433.1552; found, 433.1565.



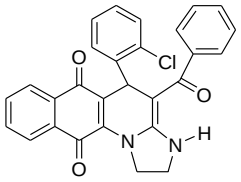
4-Benzoyl-5-(4-methoxyphenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4f). Red solid, mp. 219–220 ℃; IR (KBr, *v*, cm^{-1}): 3292 (NH), 1665 (C=O), 1632 (C=O), 1255 (OCH_3); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.51 (s, 1H, NH), 6.65–7.96 (m, 13H, ArH), 5.15 (s, 1H, CH), 4.52–4.58 (m, 1H, CH_2), 4.31–4.37 (m, 1H, CH_2), 3.76–3.86 (m, 2H, CH_2), 3.60 (s, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.6, 181.8, 180.8, 158.1, 156.5, 142.3, 139.5, 139.2, 134.9, 133.8, 131.7, 131.4, 129.4, 128.6, 128.5, 126.8, 126.6, 125.7, 123.3, 114.1, 86.9, 55.4, 47.7, 44.1, 36.0; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{23}N_2O_4$, 463.1658; found, 463.1662.



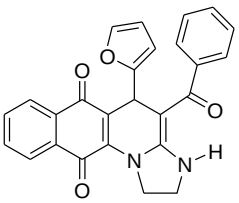
4-Benzoyl-5-(p-tolyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4g). Black solid, mp. 239–240 ℃; IR (KBr, *v*, cm^{-1}): 3296 (NH) , 1669 (C=O), 1659 (C=O), 1637 (C=O), 1257 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.51 (s, 1H, NH), 6.71–7.96 (m, 13H, ArH), 5.19 (s, 1H, CH), 4.52–4.57 (m, 1H, CH_2), 4.31–4.37 (m, 1H, CH_2), 3.76–3.86 (m, 2H, CH_2), 2.13 (s, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.5, 181.7, 180.7, 156.6, 144.1, 142.3, 139.8, 135.8, 134.9, 133.8, 131.6, 131.4, 129.4, 128.5, 127.4, 126.8, 126.6, 125.7, 123.0, 86.9, 47.7, 44.1, 36.5, 21.0; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{29}H_{23}N_2O_3$, 447.1709; found, 447.1712.



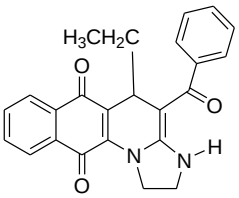
4-Benzoyl-5-(3-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4h). Black solid, mp. 226–27 ℃; IR (KBr, *v*, cm^{-1}): 3272 (NH), 1671 (C=O), 1637 (C=O), 1255 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.54 (s, 1H, NH), 7.97–7.98 (m, 13H, ArH), 5.20 (s, 1H, CH), 4.54–4.59 (m, 1H, CH_2), 4.33–4.39 (m, 1H, CH_2), 3.76–3.87 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.7, 181.7, 180.8, 156.4, 149.7, 142.6, 138.1, 134.9, 133.9, 132.4, 131.6, 130.7, 128.6, 127.5, 126.7, 125.8, 122.5, 121.8, 86.4, 47.4, 43.9, 37.3; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{20}N_2O_3Cl$, 467.1162; found, 467.1168.



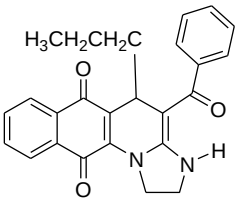
4-Benzoyl-5-(2-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4i). Black solid, mp. 226–27 ℃; IR (KBr, *v*, cm^{-1}): 3284 (NH), 1671 (C=O), 1640 (C=O), 1258 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.48 (s, 1H, NH), 6.84–7.99 (m, 13H, ArH), 5.64 (s, 1H, CH), 4.57–4.62 (m, 1H, CH_2), 4.42–4.48 (m, 1H, CH_2), 3.73–3.87 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 192.3, 181.4, 180.8, 156.1, 144.3, 142.4, 140.3, 135.0, 133.7, 132.3, 131.8, 131.6, 131.3, 129.9, 129.4, 128.8, 127.3, 126.9, 126.6, 125.7, 121.6, 86.6, 47.5, 43.9, 36.6; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{20}N_2O_3Cl$, 467.1162; found, 467.1168.



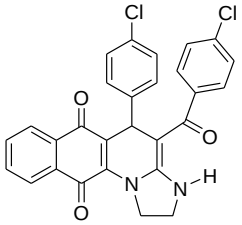
4-Benzoyl-5-(furan-2-yl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4j). Black solid, mp. 204–205 ℃; IR (KBr, *v*, cm^{-1}): 3290 (NH), 1671 (C=O), 1637 (C=O), 1254 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.48 (s, 1H, NH), 7.26–8.01 (m, 9H, ArH), 7.36 (s, 1H, *furan*-H), 6.20 (s, 1H, *furan*-H), 5.70 (s, 1H, *furan*-H), 5.34 (s, 1H, CH), 4.51–4.54 (m, 1H, CH_2), 4.35–4.39 (m, 1H, CH_2), 3.79–3.84 (m, 1H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.2, 181.3, 180.6, 157.7, 156.8, 142.4, 142.0, 140.6, 135.0, 133.9, 131.6, 129.5, 128.6, 126.8, 126.7, 125.8, 119.3, 110.8, 105.5, 83.9, 47.7, 44.1, 31.2; HRMS (ESI-TOF, $[M+H]^+$): calcd for $C_{26}H_{19}N_2O_4$, 423.1345, found, 423.1351.



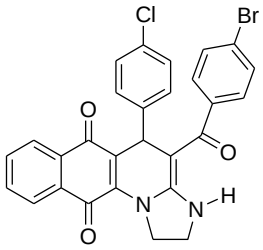
4-Benzoyl-5-ethyl-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4k). Black solid, mp. 180–181 ℃; IR (KBr, *v*, cm^{-1}): 3291 (NH), 1669 (C=O), 1637 (C=O), 1260 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.38 (s, 1H, NH), 7.33–8.00 (m, 9H, ArH), 4.47–4.52 (m, 1H, CH), 4.27–4.33 (m, 1H, CH_2), 4.00–4.13 (m, 1H, CH_2), 3.71–3.81 (m, 2H, CH_2), 1.06–1.18(m, 2H, CH_2), 0.49–0.52(m, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.6, 182.3, 180.9, 157.1, 142.6, 141.1, 135.0, 133.7, 131.8, 129.6, 128.8, 127.2, 126.6, 125.7, 123.3, 85.7, 47.7, 44.0, 32.2, 30.9, 9.8; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{24}H_{21}N_2O_3$, 385.1552, found, 385.1565.



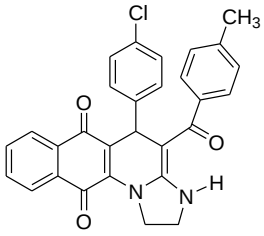
4-Benzoyl-5-propyl-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4l). Black solid, mp. 182–183 ℃; IR (KBr, *v*, cm^{-1}): 3287 (NH), 1670 (C=O), 1633 (C=O); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 9.36 (s, 1H, NH), 7.36–8.02 (m, 9H, ArH), 4.50–4.56 (m, 1H, CH), 4.29–4.35 (m, 1H, CH_2), 4.18–4.20 (m, 1H, CH_2), 3.76–3.84 (m, 2H, CH_2), 1.06–1.18 (m, 2H, CH_2), 0.89–1.21 (m, 4H, CH_2×2), 0.54–0.57 (m, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 191.4, 181.9, 180.6, 157.1, 142.3, 140.8, 134.8, 133.7, 131.9, 131.6, 129.4, 128.7, 127.3, 126.6, 125.8, 123.8, 86.3, 47.7, 44.0, 30.6, 18.1, 14.1; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{25}H_{23}N_2O_3$, 399.1709, found, 399.1715.



4-(4-Chlorobenzoyl)-5-(4-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11 (1*H*,5*H*)-dione (4m). Black solid, mp. 234–235 ℃; IR (KBr, *v*, cm^{-1}): 3246 (NH), 1671 (C=O), 1636 (C=O), 1256 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.53 (s, 1H, NH), 6.83–7.96 (m, 12H, ArH), 5.15 (s, 1H, CH), 4.52–4.58 (m, 1H, CH_2), 4.32–4.38 (m, 1H, CH_2), 3.77–3.86 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 190.1, 181.7, 180.6, 156.5, 145.8, 141.0, 139.8, 135.0, 134.0, 133.9, 131.6, 131.4, 131.4, 129.5, 128.7, 128.6, 126.6, 125.8, 122.3, 86.4, 47.7, 44.2, 36.7; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{19}N_2O_3Cl_2$, 501.0773; found, 501.0780.

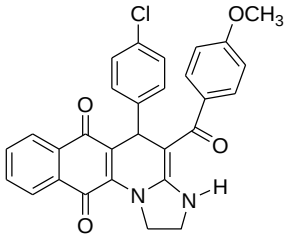


4-(4-Bromobenzoyl)-5-(4-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11 (1*H*,5*H*)-dione (4n). Black solid, mp. 244–245 ℃; IR (KBr, *v*, cm^{-1}): 3242 (NH), 1669 (C=O), 1634 (C=O), 1256 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.52 (s, 1H, NH), 6.84–7.96 (m, 12H, ArH), 5.15 (s, 1H, CH), 4.52–4.58 (m, 1H, CH_2), 4.33–4.39 (m, 1H, CH_2), 3.76–3.86 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 190.1, 181.8, 180.6, 156.5, 145.8, 141.3, 139.9, 135.0, 133.9, 131.7, 131.6, 131.4, 131.4, 129.5, 128.9, 128.7, 126.6, 125.7, 122.2, 122.2, 86.3, 47.7, 44.1, 36.7; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{19}N_2O_3ClBr$, 545.0268; found, 545.0272.

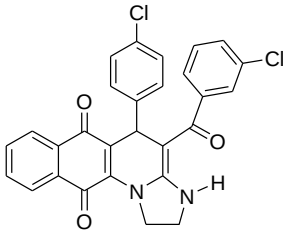


5-(4-Chlorophenyl)-4-(4-methylbenzoyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11 (1*H*,5*H*)-dione (4o). Black solid, mp. 240–241 ℃; IR (KBr, *v*, cm^{-1}): 3275 (NH), 1673 (C=O), 1637 (C=O), 1254 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.47 (s, 1H, NH), 6.83–7.96 (m, 12H, ArH), 5.26 (s, 1H, CH), 4.51–4.56 (m, 1H, CH_2), 4.32–4.38 (m, 1H, CH_2), 3.75–3.85 (m, 2H, CH_2), 2.34 (s, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 191.6, 181.7, 180.6, 156.4, 145.9, 140.1, 139.4, 139.0, 134.9, 133.9, 131.6, 131.5, 131.3, 129.4, 129.1, 128.7, 128.6,

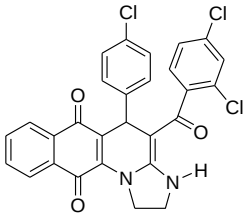
126.9, 126.6, 125.7, 122.1, 86.3, 47.7, 44.1, 36.6, 21.5; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{29}H_{22}N_2O_3Cl$, 481.1319; found, 481.1325.



5-(4-Chlorophenyl)-4-(4-methoxybenzoyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11 (1*H*,5*H*)-dione (4p). Black solid, mp. 213–214 ℃; IR (KBr, *v*, cm^{-1}): 3281 (NH), 1663 (C=O), 1639 (C=O), 1250 (OCH_3); ^1H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.44 (s, 1H, NH), 6.84–7.96 (m, 12H, ArH), 5.33 (s, 1H, CH), 4.50–4.55 (m, 1H, CH_2), 4.31–4.37 (m, 1H, CH_2), 3.76–3.84 (m, 5H, CH_2, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 191.2, 181.8, 180.7, 160.5, 156.4, 145.9, 140.0, 134.9, 134.5, 133.8, 131.7, 131.5, 131.2, 129.4, 129.3, 128.7, 128.6, 126.6, 125.8, 122.2, 113.9, 86.4, 55.8, 47.7, 44.0, 36.7; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{29}H_{22}N_2O_4Cl$, 497.1268; found, 497.1265.

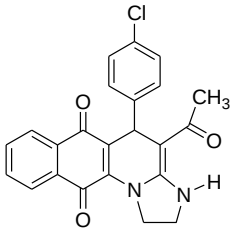


4-(3-Chlorobenzoyl)-5-(4-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11 (1*H*,5*H*)-dione (4q). Black solid, mp. 245–246 ℃; IR (KBr, *v*, cm^{-1}): 3271 (NH), 1670 (C=O), 1633 (C=O), 1254 (C–N); ^1H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.54 (s, 1H, NH), 6.85–7.98 (m, 12H, ArH), 5.17 (s, 1H, CH), 4.54–4.59 (m, 1H, CH_2), 4.34–4.40 (m, 1H, CH_2), 3.80–3.88 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm):190.1, 181.7, 180.6, 156.5, 145.8, 140.9, 139.8, 135.0, 134.0, 133.9, 131.9, 131.6, 131.5, 131.4, 129.5, 128.7, 126.6, 125.8, 122.3, 122.2, 86.4, 47.7, 44.2, 36.7; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{18}N_2O_3Cl_2$, 501.0773; found, 501.0782.

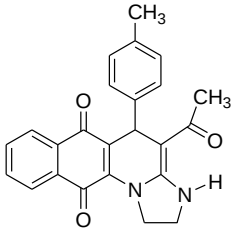


5-(4-Chlorophenyl)-4-(2,4-dichlorobenzoyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4r). Black solid, mp. 235–236 ℃; IR (KBr, *v*, cm^{-1}): 3308 (NH), 1669 (C=O), 1636 (C=O), 1256 (C–N); ^1H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.59 (s, 1H, NH), 6.85–7.98 (m, 11H, ArH), 4.77 (s, 1H, CH), 4.56–4.62 (m, 1H, CH_2), 4.32–4.39 (m, 1H, CH_2), 3.81–3.88 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 190.7, 181.6, 180.4, 156.4, 145.5, 140.1,

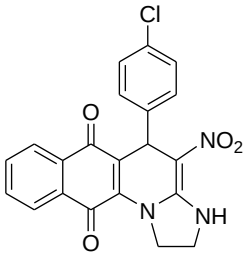
135.0, 134.1, 131.5, 130.2, 128.7, 128.0, 126.6, 125.8, 123.2, 87.1, 47.8, 44.3, 37.0; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{28}H_{18}N_2O_3Cl_3$, 535.0383; found, 535.0378.



4-Acetyl-5-(4-chlorophenyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4s). Red solid, mp. 242–243 ℃; IR (KBr, *v*, cm^{-1}): 3234 (NH), 1669 (C=O), 1644 (C=O), 1256 (C–N); ^1H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.26 (s, 1H, NH), 7.27–7.95 (m, 8H, ArH), 5.20 (s, 1H, CH), 4.49–4.54 (m, 1H, CH_2), 4.20–4.27 (m, 1H, CH_2), 3.70–3.76 (m, 2H, CH_2), 1.89 (s, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 192.7, 181.6, 180.6, 154.7, 145.8, 139.7, 134.9, 133.7, 131.7, 131.4, 130.2, 128.7, 126.5, 125.6, 122.0, 87.4, 47.5, 43.8, 37.1, 27.1; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{23}H_{18}N_2O_3Cl$, 405.1006; found, 405.1015.

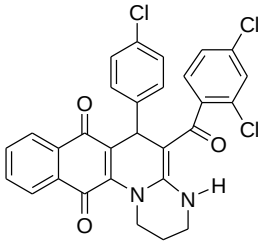


4-Acetyl-5-(p-tolyl)-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4t). Black solid, mp. 235–236 ℃; IR (KBr, *v*, cm^{-1}): 3275 (NH), 1655 (C=O), 1258 (C–N); ^1H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.26 (s, 1H, NH), 7.04–7.98 (m, 8H, ArH), 5.19 (s, 1H, CH), 4.53–4.58 (m, 1H, CH_2), 4.22–4.28 (m, 1H, CH_2), 3.73–3.81 (m, 2H, CH_2), 2.20 (s, 3H, CH_3), 1.93 (s, 3H, CH_3); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 192.4, 181.2, 180.3, 154.2, 143.5, 138.9, 135.4, 134.4, 133.2, 131.2, 130.8, 128.8, 127.7, 126.0, 125.1, 122.4, 87.2, 46.9, 43.3, 36.6, 26.6, 20.5; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{24}H_{20}N_2O_3$, 385.1552; found,385.1561.

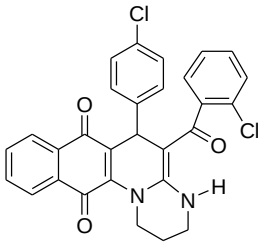


5-(4-Chlorophenyl)-4-nitro-2,3-dihydrobenzo[*g*]imidazo[1,2-*a*]quinoline-6,11(1*H*,5*H*)-dione (4u). Red solid, mp. 282–283 ℃; IR (KBr, *v*, cm^{-1}): 3353 (NH), 1672 (C=O), 1647 (C=O), 1345 (NO_2); ^1H NMR (500 MHz, DMSO-d_6) (δ, ppm): 9.68 (s, 1H, NH), 7.27–8.02 (m, 8H, ArH), 5.45 (s, 1H, CH), 4.64–4.69 (m, 1H, CH_2), 4.47–4.53 (m, 1H, CH_2), 3.87–3.90 (m, 2H, CH_2); ^{13}C NMR (125 MHz, DMSO-d_6) (δ, ppm): 190.3, 189.1, 161.6, 151.6, 148.2, 144.0, 143.1, 140.8, 140.4, 139.7, 137.5, 135.7, 134.8, 131.3, 115.5, 57.7, 53.8, 47.2; HRMS (ESI-TOF, $[M+H]^+$): calcd for

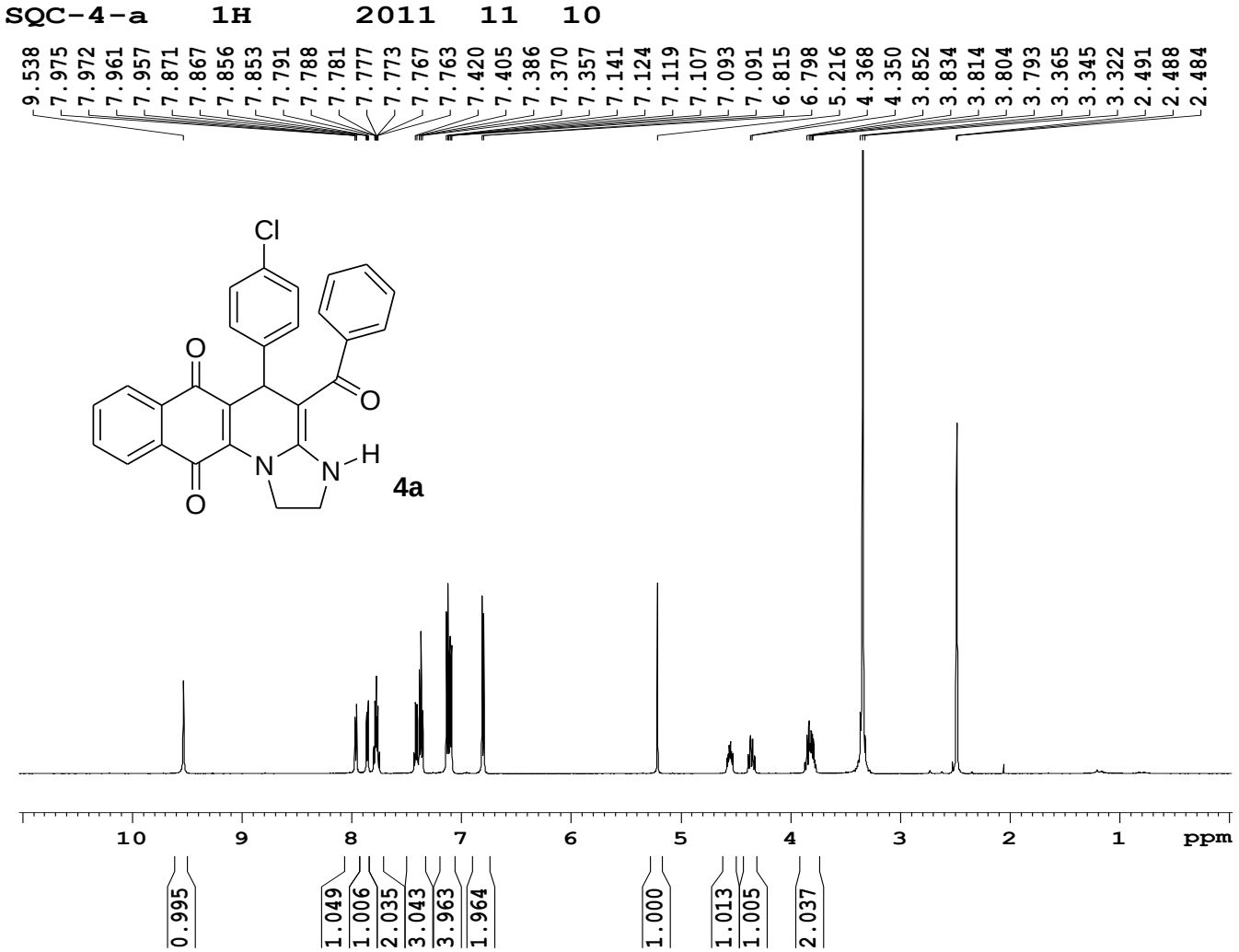
$C_{21}H_{15}N_3O_4Cl$, 408.0751; found,408.0759.



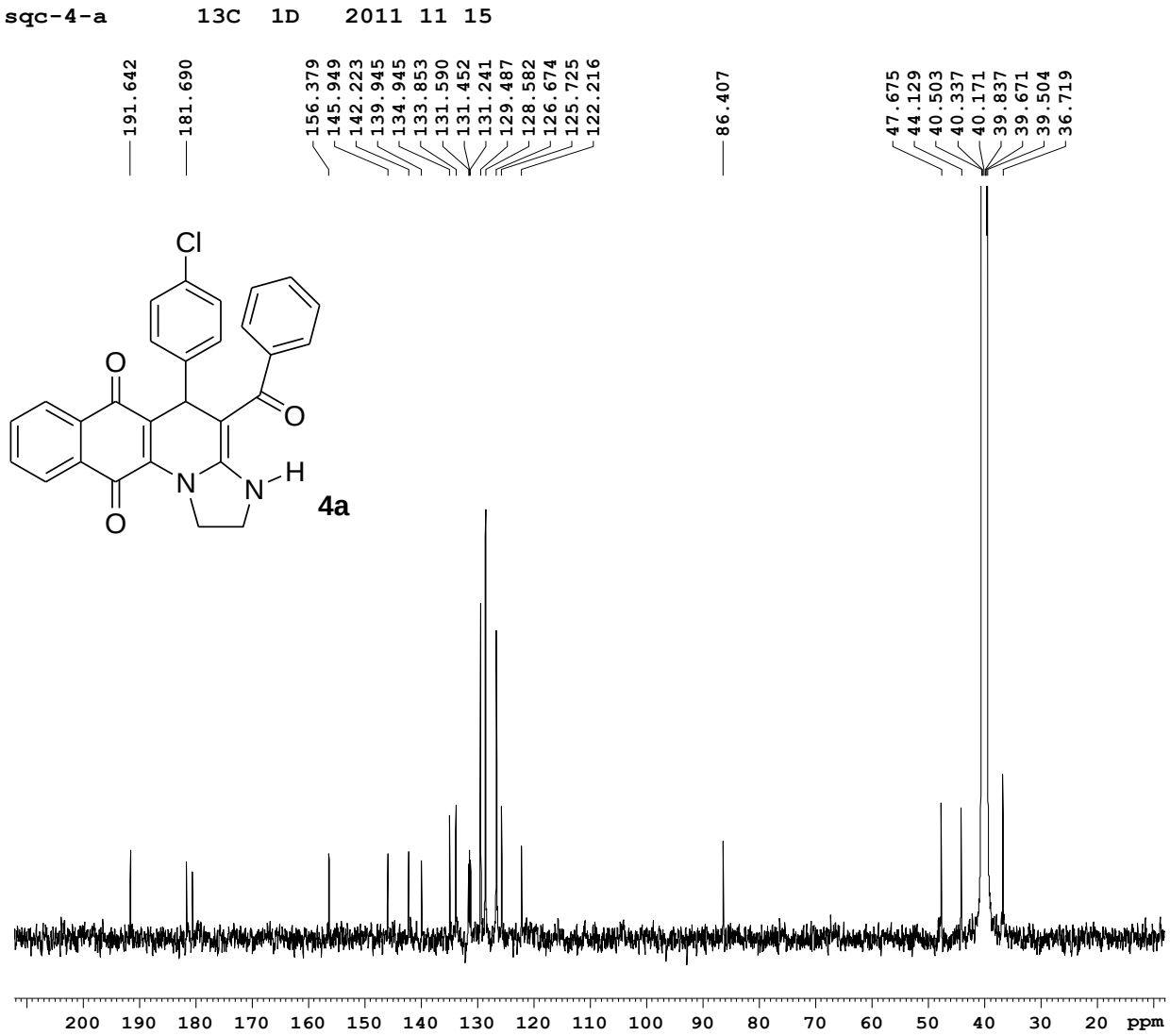
6-(4-Chlorophenyl)-5-(2,4-dichlorobenzoyl)-3,4-dihydro-1*H*-benzo[*g*]pyrimido[1,2-*a*] quinoline-7,12(2*H*,6*H*)-dione (5a). Red solid, mp 255–256 ℃. IR (KBr, *v*, cm^{-1}): 3308 (NH), 1669 (C=O), 1636 (C=O); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 11.65 (s, 1H, NH), 6.68–7.93 (m, 11H, ArH), 4.64 (s, 1H, CH), 4.52–4.58 (m, 1H, CH_2), 3.75–3.79 (m, 1H, CH_2), 2.96–3.02 (m, 2H, CH_2), 2.19–2.25 (m, 1H, CH_2), 1.97–2.05(m, 1H, CH_2) ; ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 184.8, 182.6, 180.9, 156.5, 144.0, 140.9, 139.6, 134.2, 133.7, 132.9, 130.8, 130.4, 129.3, 128.7, 127.8, 127.0, 125.8, 88.5, 46.2, 44.9, 35.8, 22.1; HRMS (ESI–TOF, $[M+H]^+$): calcd for $C_{29}H_{20}N_2O_3Cl_3$, 549.0540; found, 549.0542.



5-(2-Chlorobenzoyl)-6-(4-chlorophenyl)-3,4-dihydro-1*H*-benzo[*g*]pyrimido[1,2-*a*]quinoline-7, 12(2*H*,6*H*)-dione (5b). Red solid. mp. 248–249 ℃; IR (KBr, *v*, cm^{-1}): 3205 (NH), 1713 (C=O), 1649 (C=O), 1253 (C–N); ^{1}H NMR (500 MHz, DMSO-d_6) (*δ*, ppm): 11.73 (s, 1H, NH), 6.69–7.95 (m, 12H, ArH), 4.71 (s, 1H, CH), 4.54–4.59 (m, 1H, CH_2), 3.79–3.82 (m, 1H, CH_2), 3.60–3.69 (m, 1H, CH_2), 3.60–3.69 (m, 1H, CH_2), 3.50–3.59 (m, 1H, CH_2), 2.20–2.31 (m, 1H, CH_2), 2.00–2.10 (m, 1H, CH_2), ^{13}C NMR (125 MHz, DMSO-d_6) (*δ*, ppm): 186.2, 182.5, 181.0, 156.4, 144.2, 140.9, 134.4, 134.1, 132.9, 131.4, 130.9, 130.3, 130.1, 129.4, 128.9, 128.6, 128.5, 127.7, 127.4, 127.2, 126.9, 125.6, 88.5, 46.0, 36.1, 35.7, 22.1; HRMS (ESI-TOF, $[M+H]^+$): calcd for $C_{29}H_{21}N_2O_3Cl$, 515.0929; found, 515.0935.

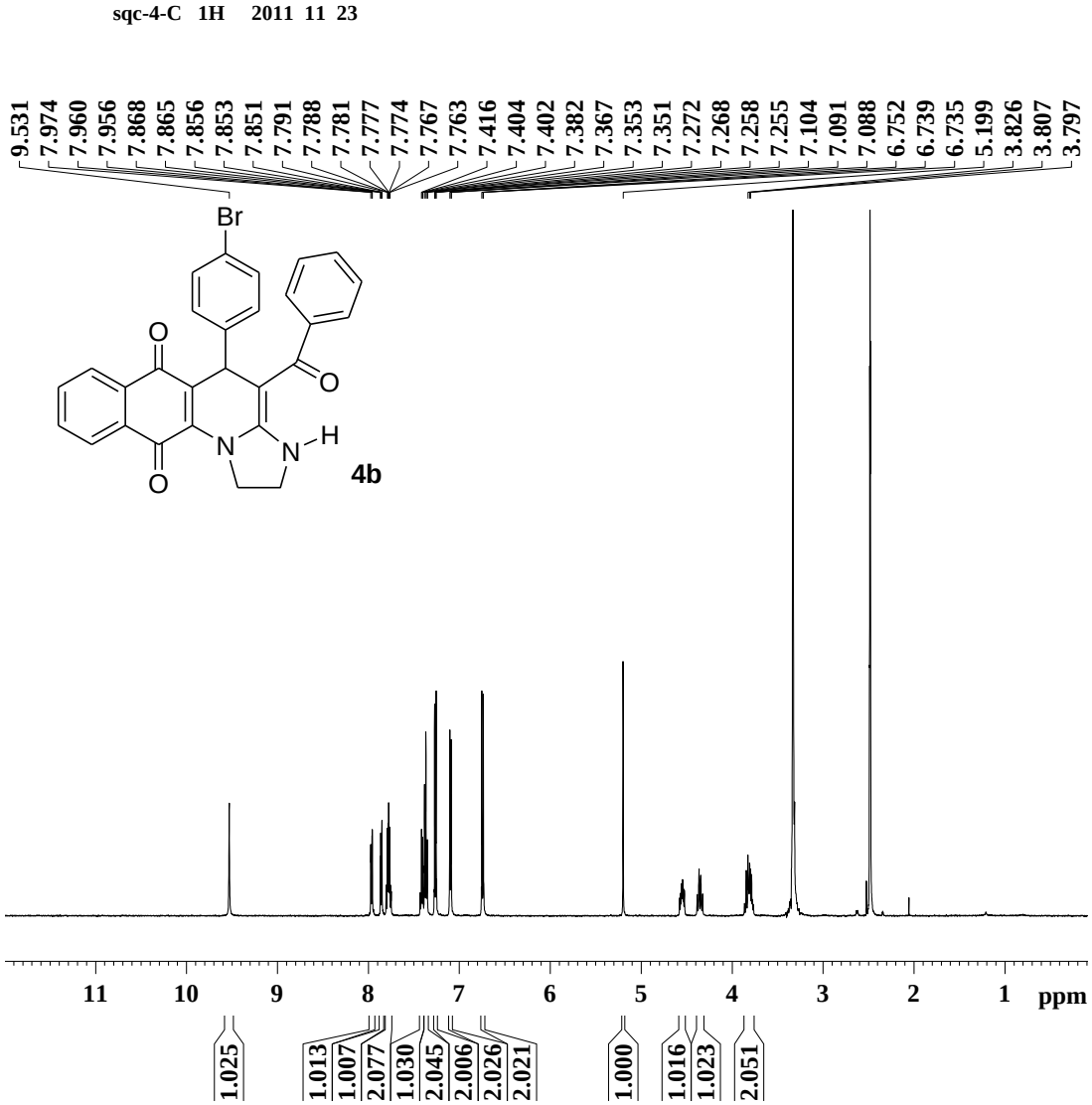


NAME	SQC-4-a
EXPNO	1
PROCNO	1
Date_	20111110
Time	19.56
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	287
DW	50.000 usec
DE	6.00 usec
TE	295.8 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300080 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



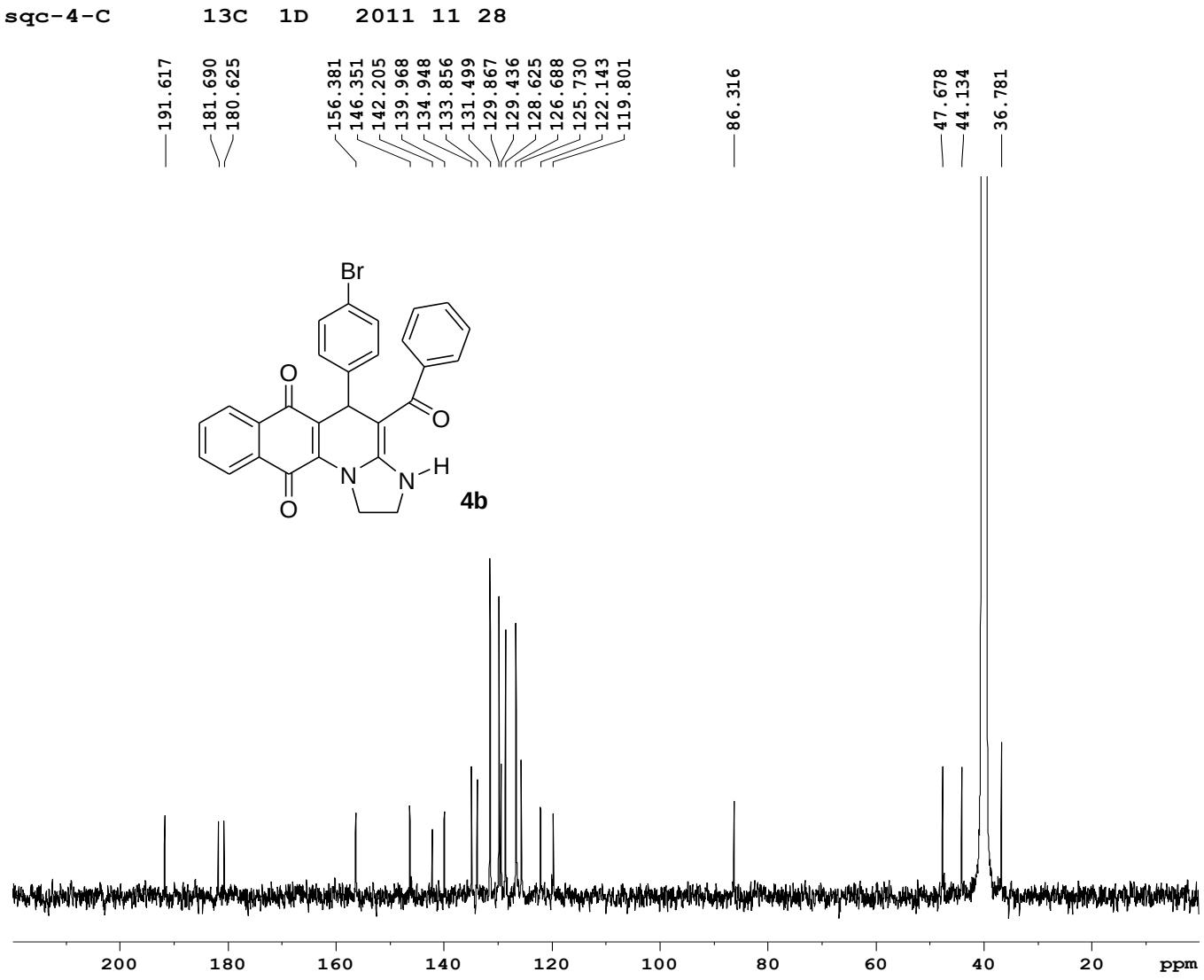
BRUKER

NAME	SQC-4-a
EXPNO	2
PROCNO	1
Date_	20111115
Time	14.14
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1482
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	297.6 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00

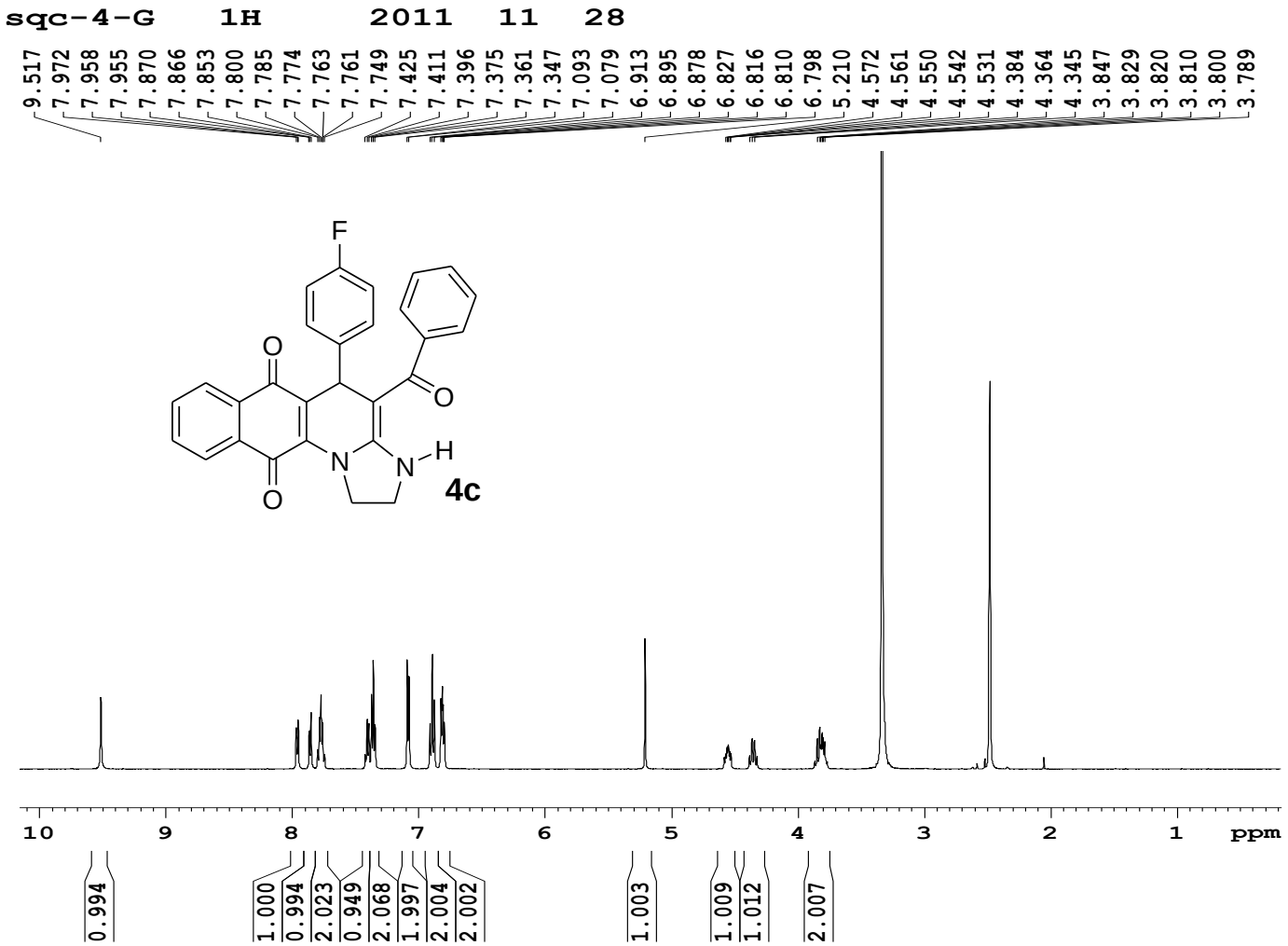


NAME sqc-4-C
EXPNO 1
PROCNO 1
Date_ 20111123
Time 16.04
INSTRUM av500
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 32768
SOLVENT DMSO
NS 4
DS 1
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 322
DW 50.000 usec
DE 6.00 usec
TE 295.1 K
D1 2.00000000 sec
TD0 1

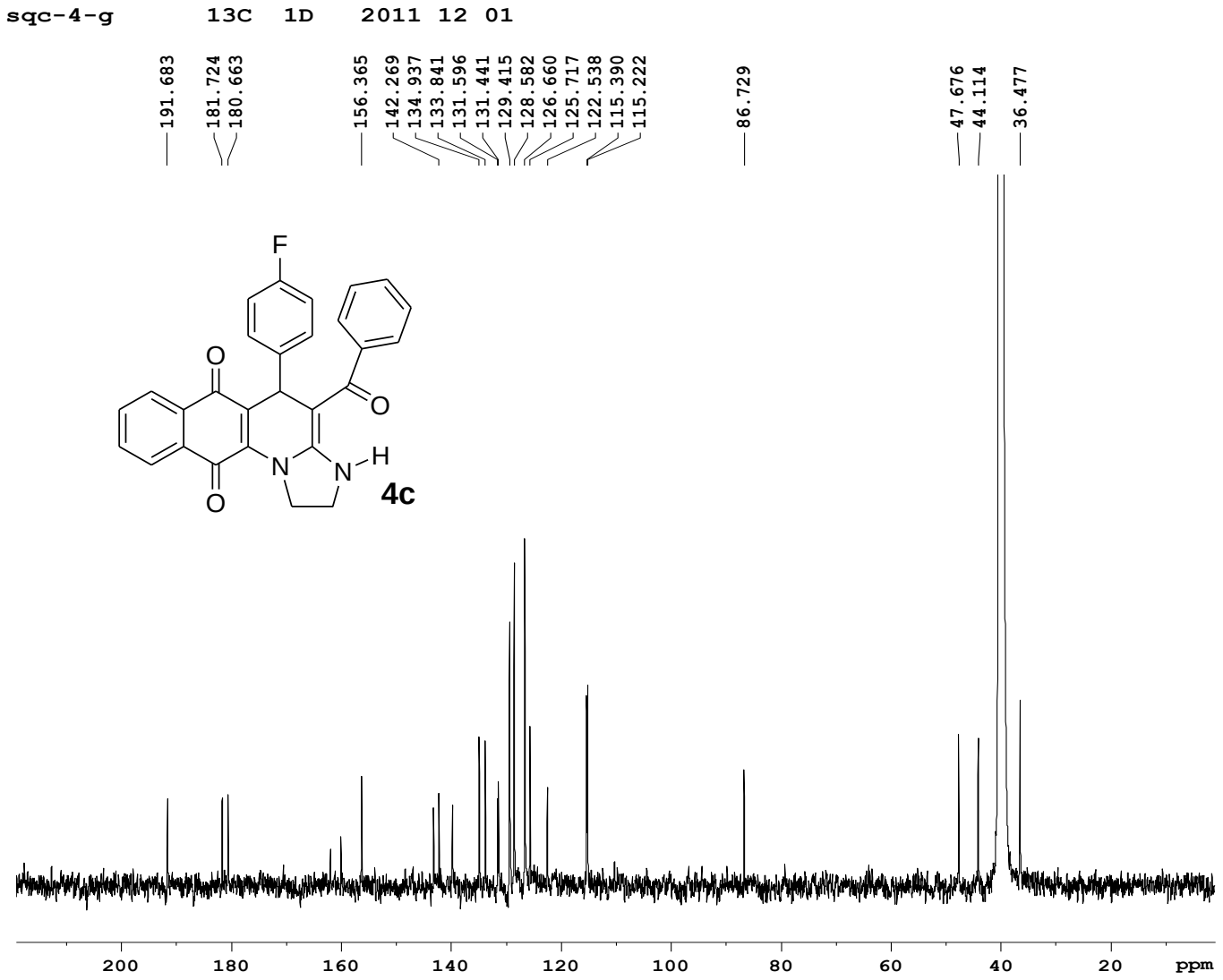
======== CHANNEL f1 ========
NUC1 1H
P1 13.50 usec
PL1 2.20 dB
SFO1 500.0335010 MHz
SI 16384
SF 500.0300101 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 2.00



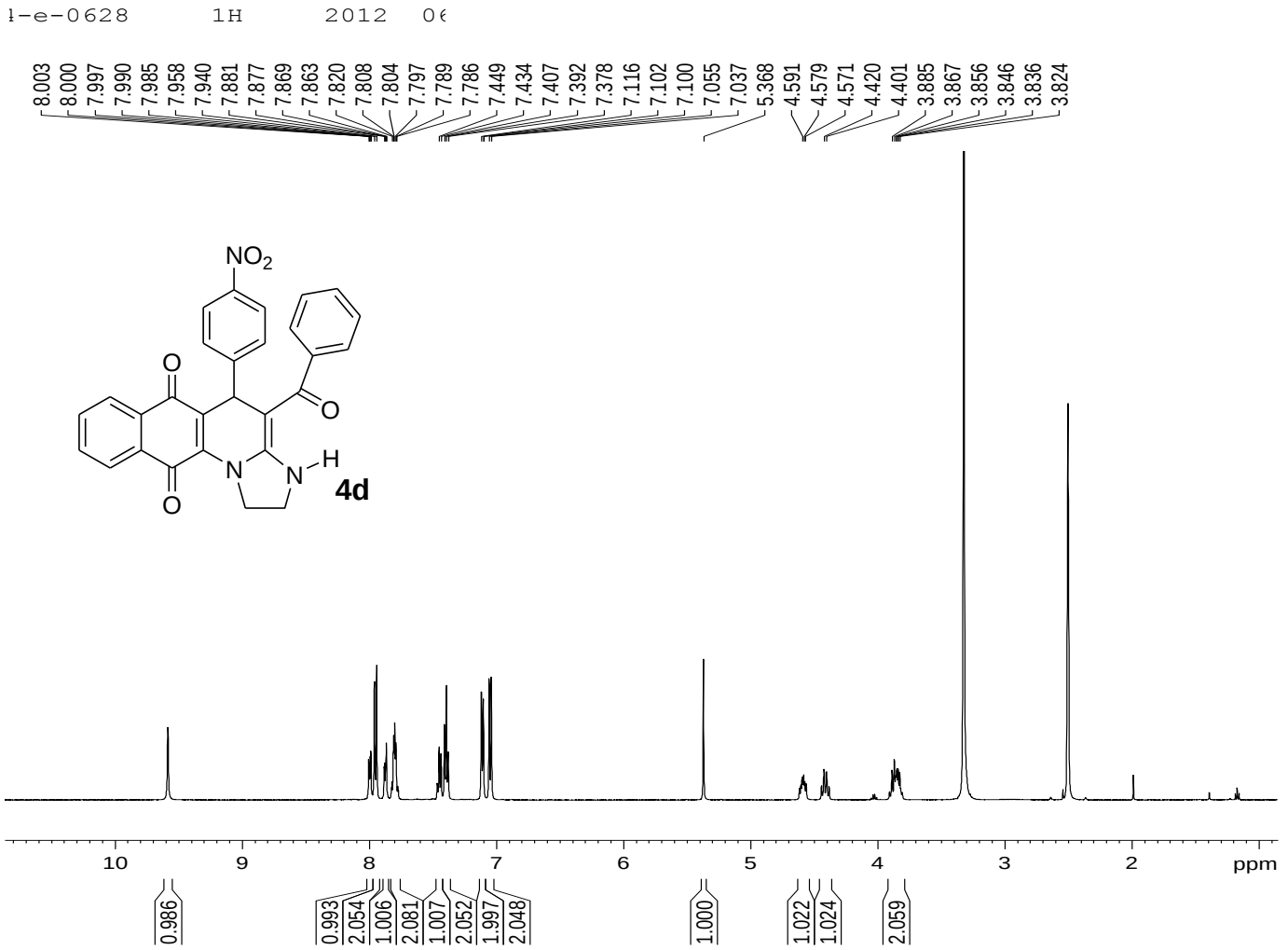
NAME	sqc-4-C
EXPNO	2
PROCNO	1
Date_	20111128
Time	9.42
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2972
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	297.7 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



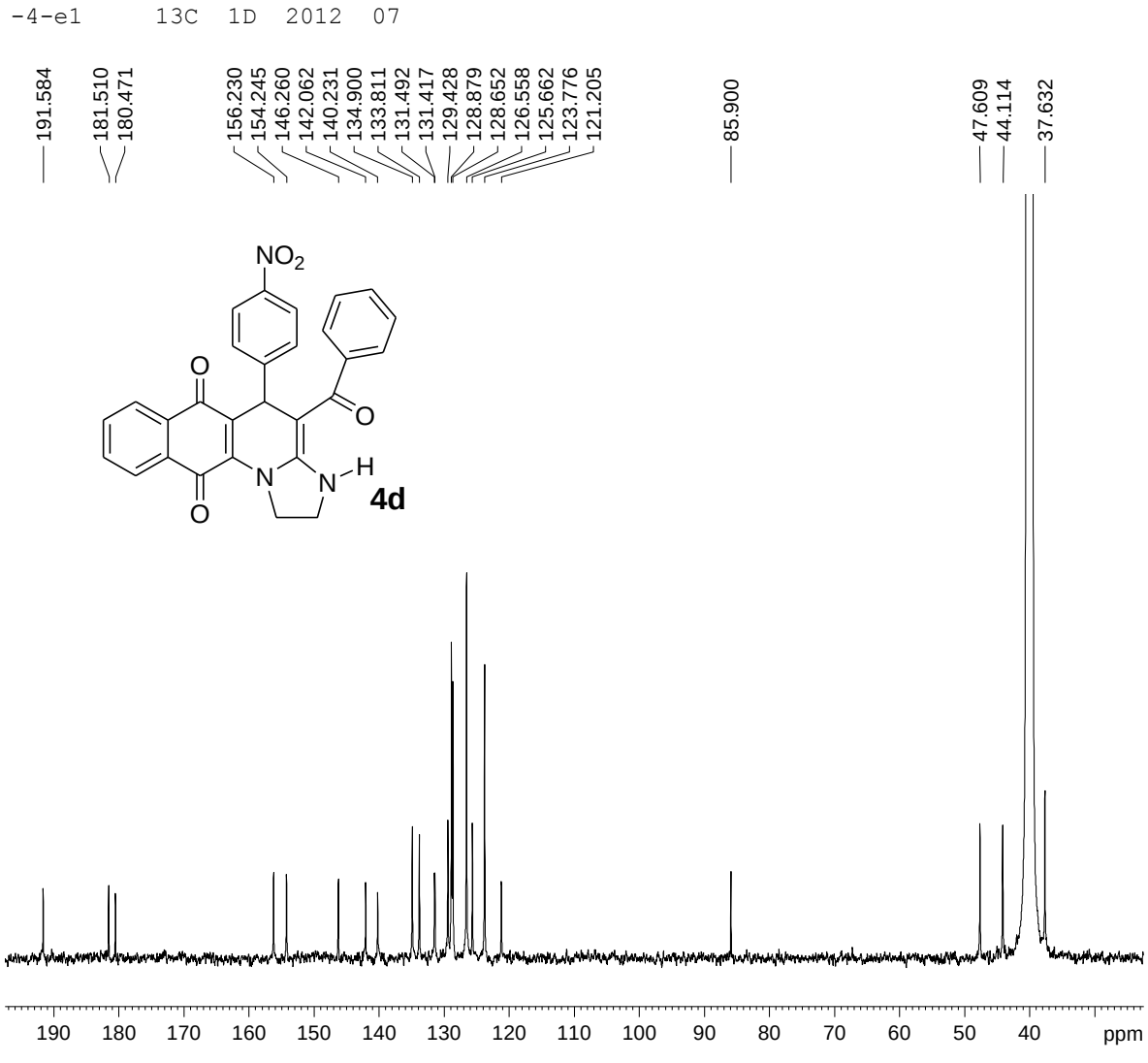
NAME	sqc-4-G
EXPNO	1
PROCNO	1
Date_	20111128
Time	19.49
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	296.4 K
D1	2.00000000 sec
TD0	1
========	CHANNEL f1 ========
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



NAME	sqc-4-G
EXPNO	2
PROCNO	1
Date_	20111201
Time	8.51
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	3169
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	295.2 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



NAME	Sqc-4-e-0626
EXPNO	1
PROCNO	1
Date_	20120628
Time	13.28
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	16
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 se
RG	203
DW	50.000 us
DE	6.00 us
TE	300.7 K
D1	2.00000000 se
TD0	1
======== CHANNEL f1 =======	
NUC1	1H
P1	13.50 us
PL1	2.20 dB
SFO1	500.0335010 MH
SI	16384
SF	500.0300015 MH
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00




```
NAME              SQC-4-e1
EXPNO                   21
PROCNO                   1
Date_             20120723
Time                 20.58
INSTRUM              spect
PROBHD   5 mm PABBO BB-
PULPROG             zgpg30
TD                   65536
SOLVENT                DMSO
NS                   12395
DS                       2
SWH              32679.738 Hz
FIDRES            0.498653 Hz
AQ               1.0027661 sec
RG                     912
DW                  15.300 use
DE                   6.00 use
TE                  298.4 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
TD0                     80

======== CHANNEL f1 ======
NUC1                   13C
P1                   12.20 use
PL1                   3.00 dB
SFO1          125.7464750 MHz

======== CHANNEL f2 ======
CPDPRG2            waltz16
NUC2                   1H
PCPD2                80.00 use
PL2                   2.00 dB
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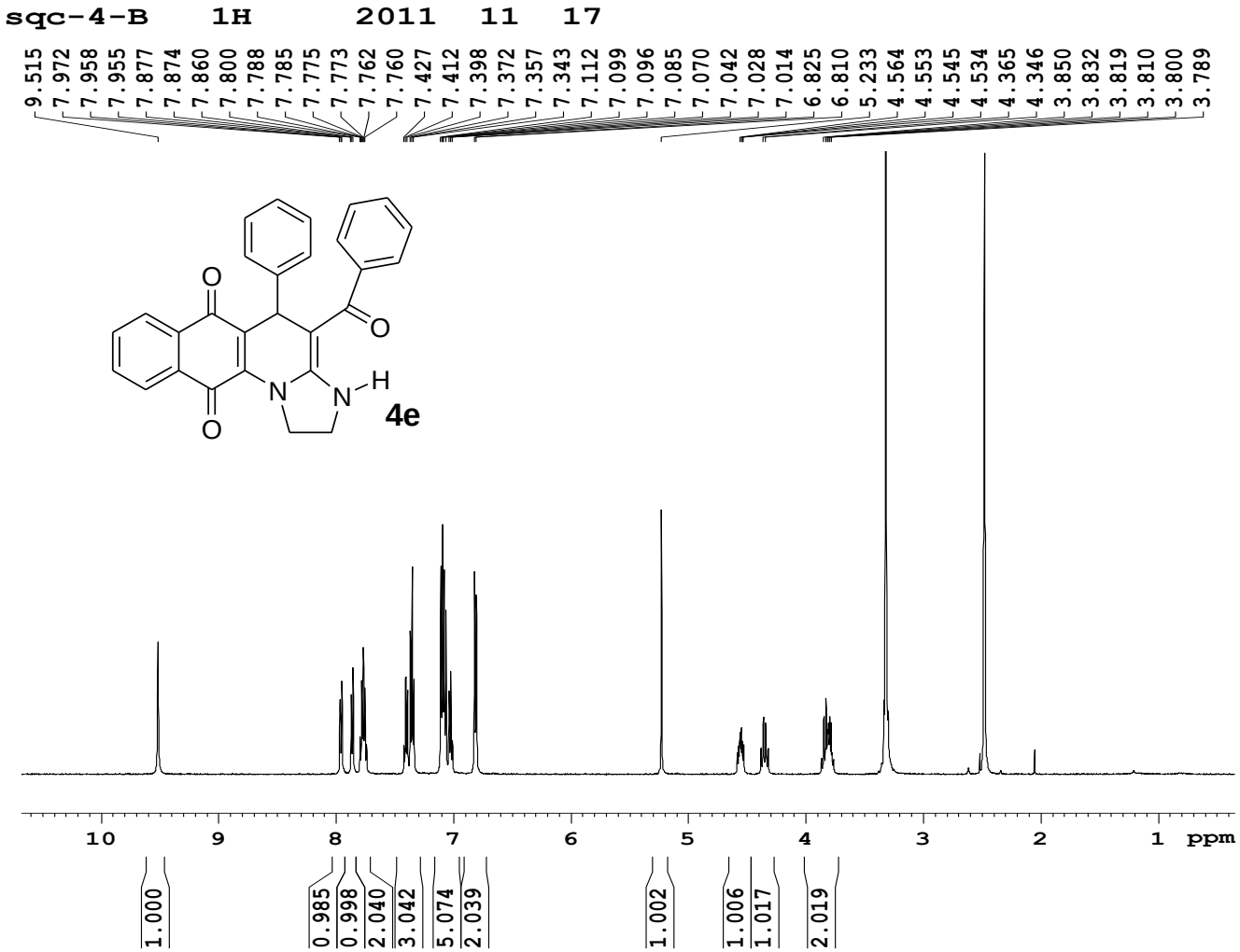
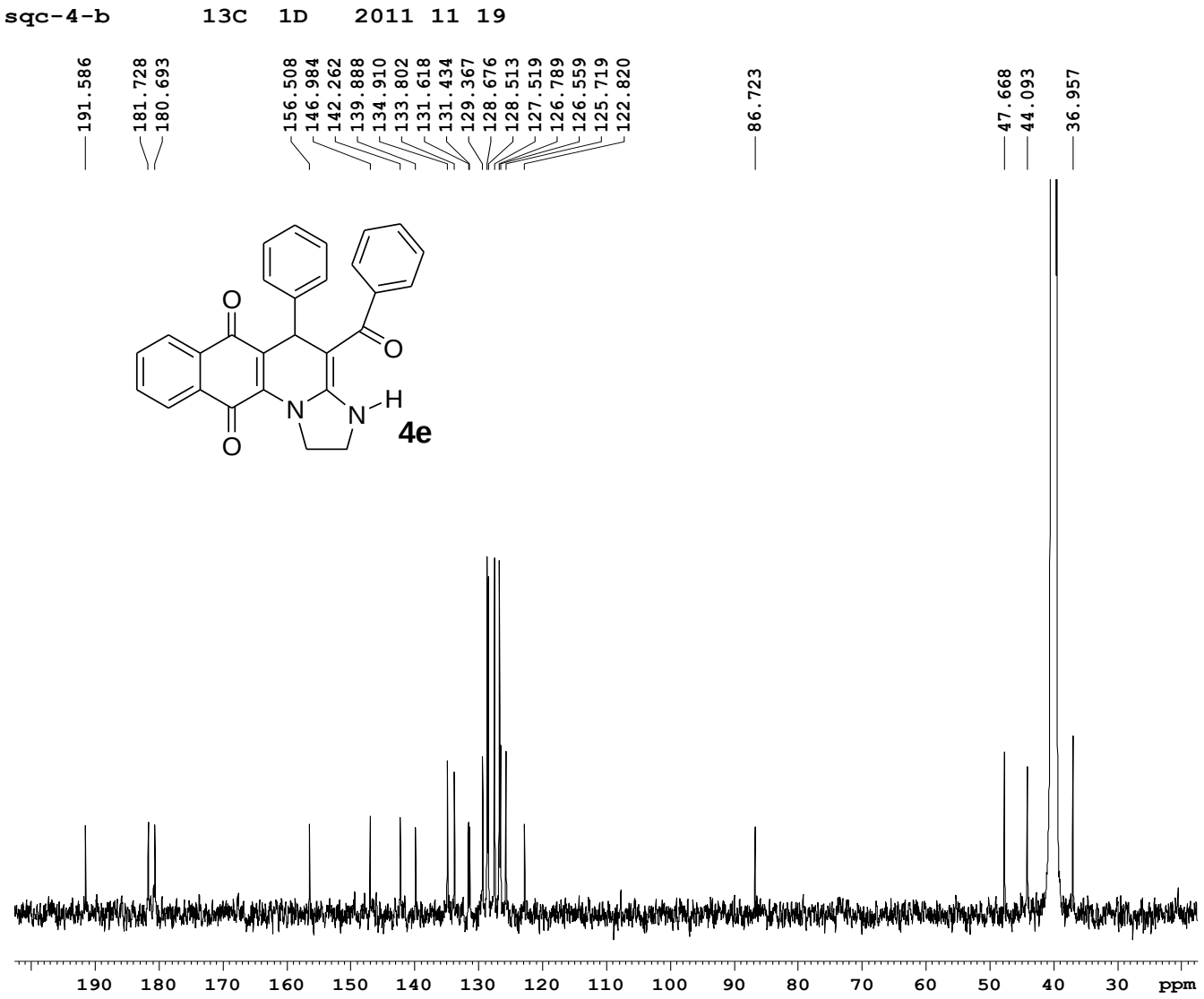
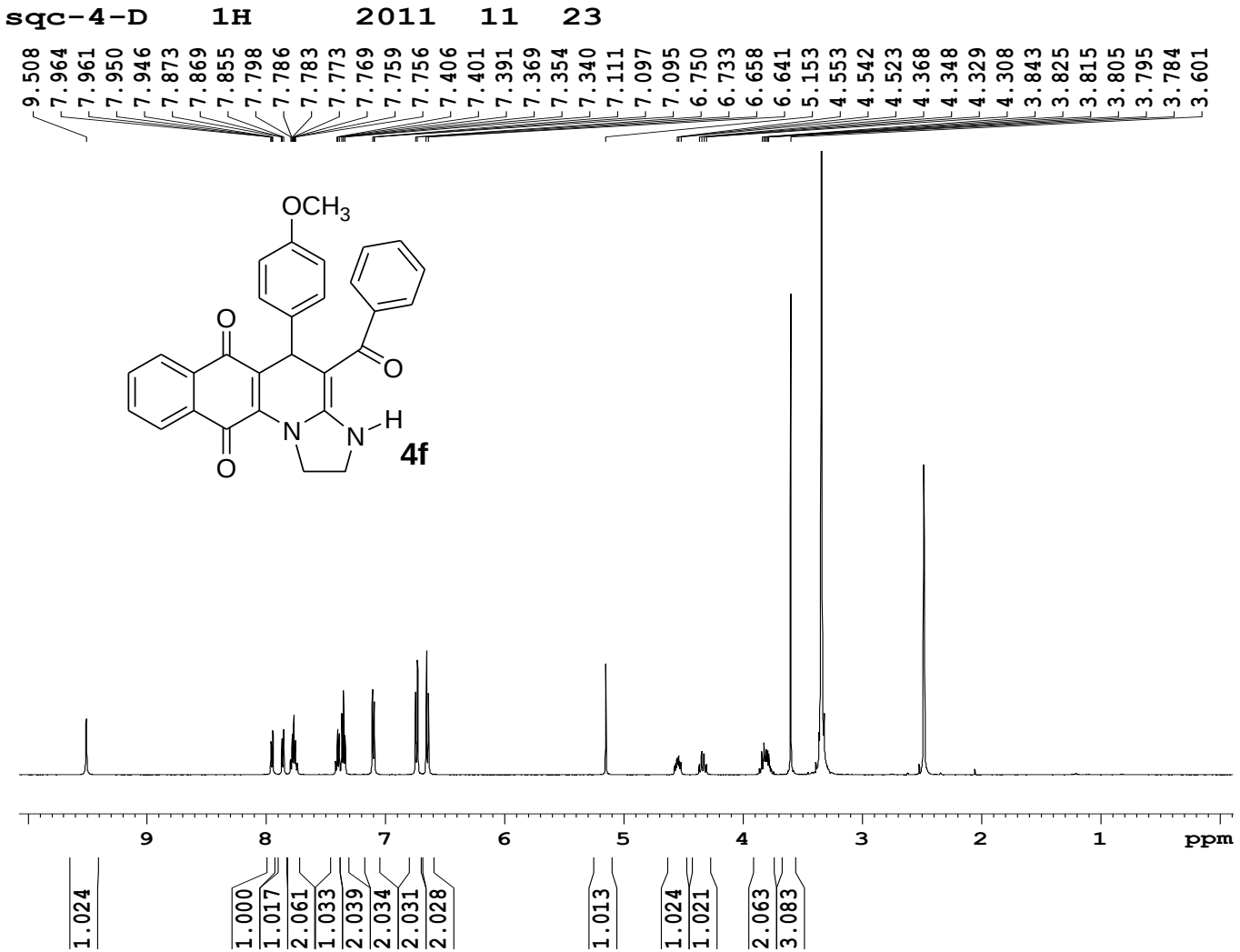


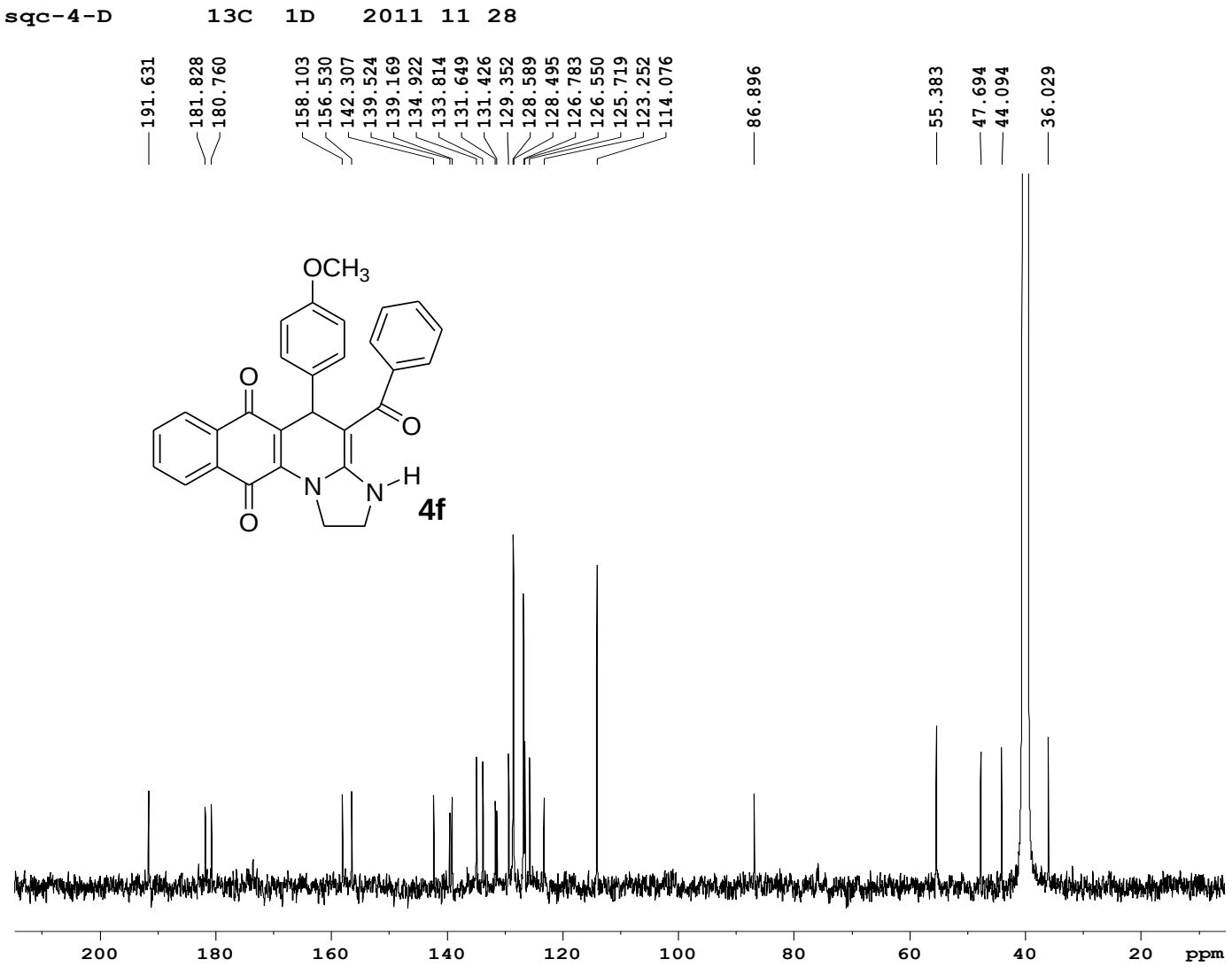
NAME	sqc-4-B
EXPNO	1
PROCNO	1
Date_	20111117
Time	22.05
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	296.3 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



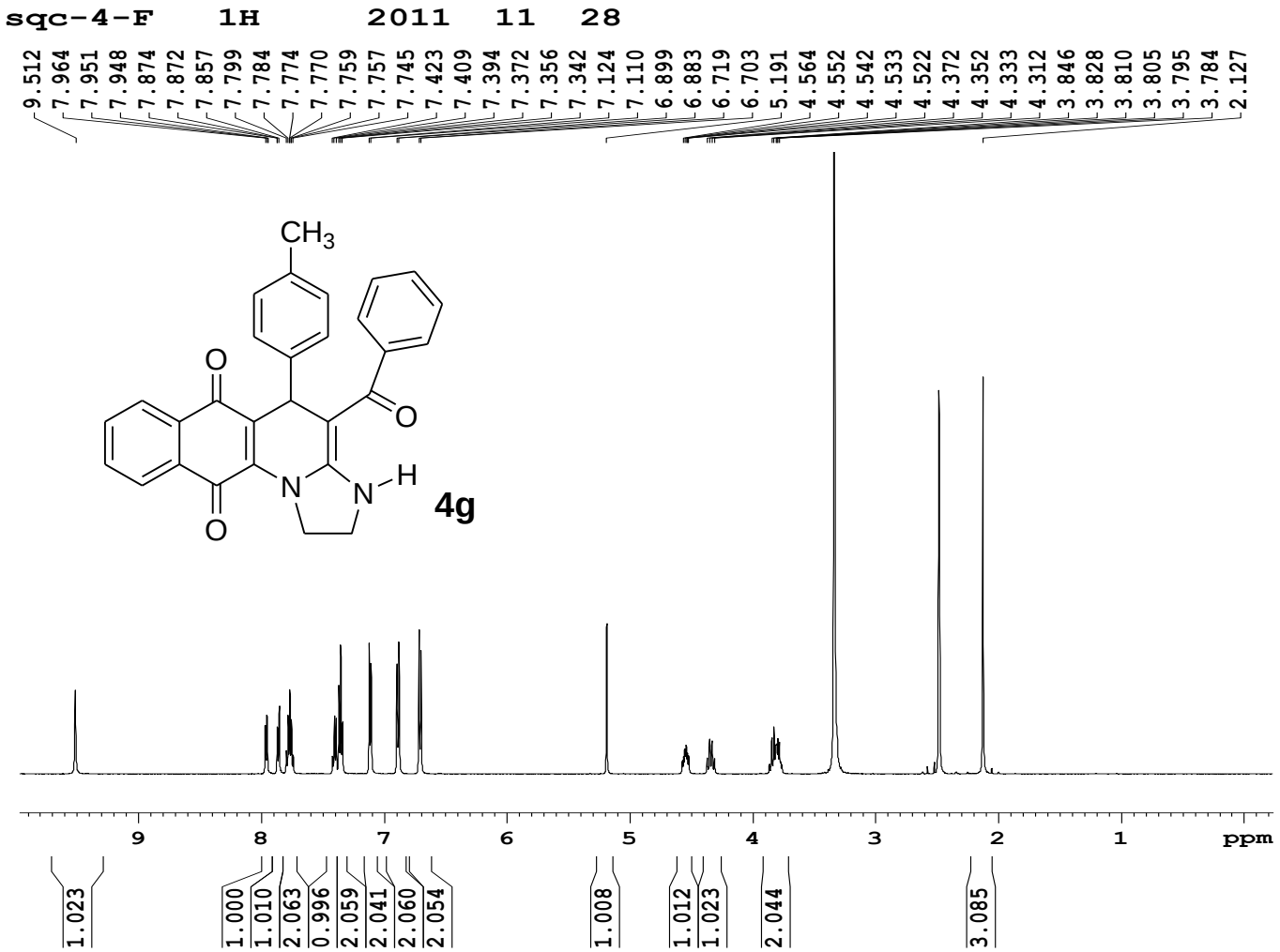
NAME	sqc-4-B
EXPNO	2
PROCNO	1
Date_	20111119
Time	13.22
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1216
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	298.0 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326413 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



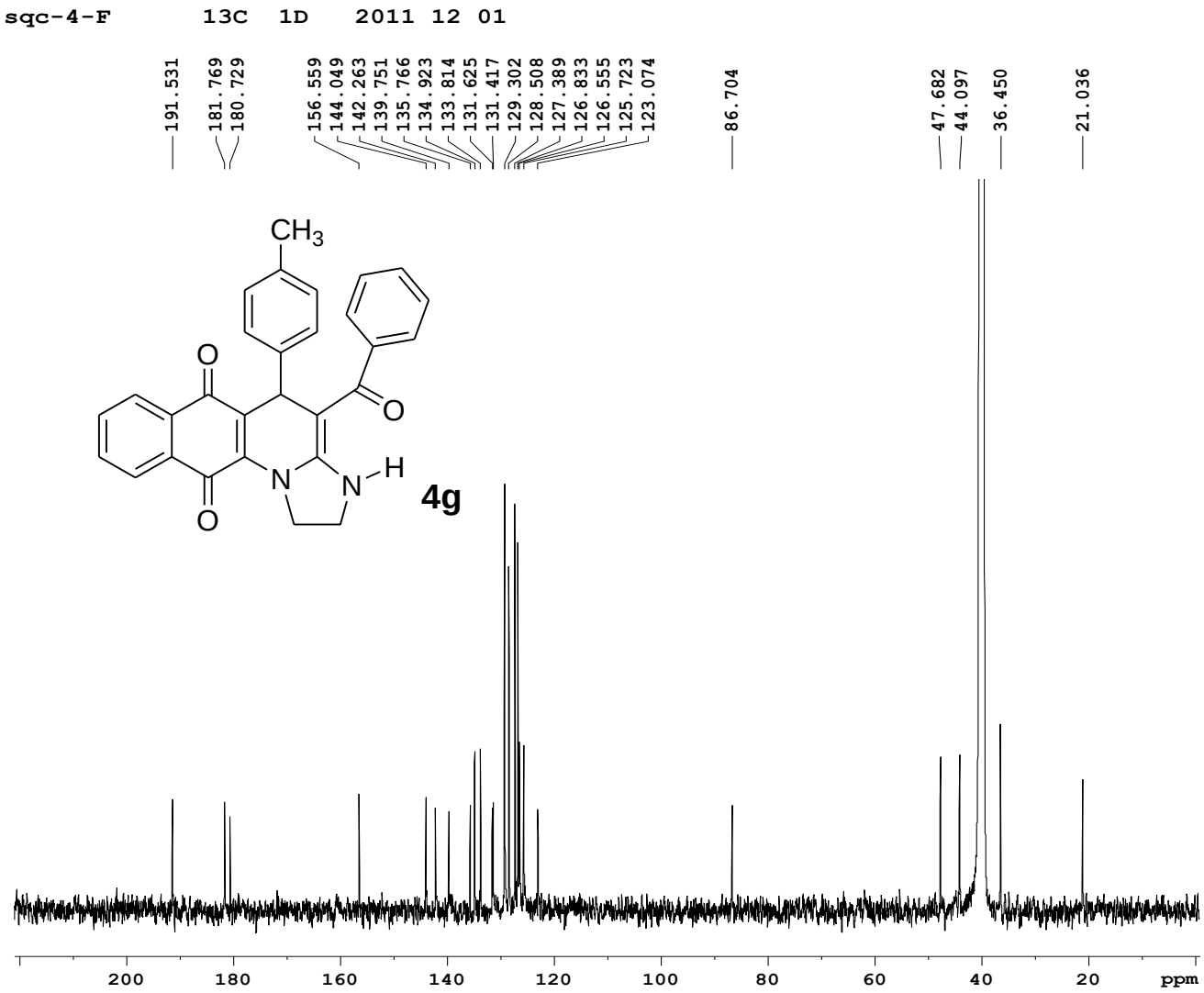
NAME	sqc-4-D
EXPNO	1
PROCNO	1
Date_	20111123
Time	19.43
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	294.7 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



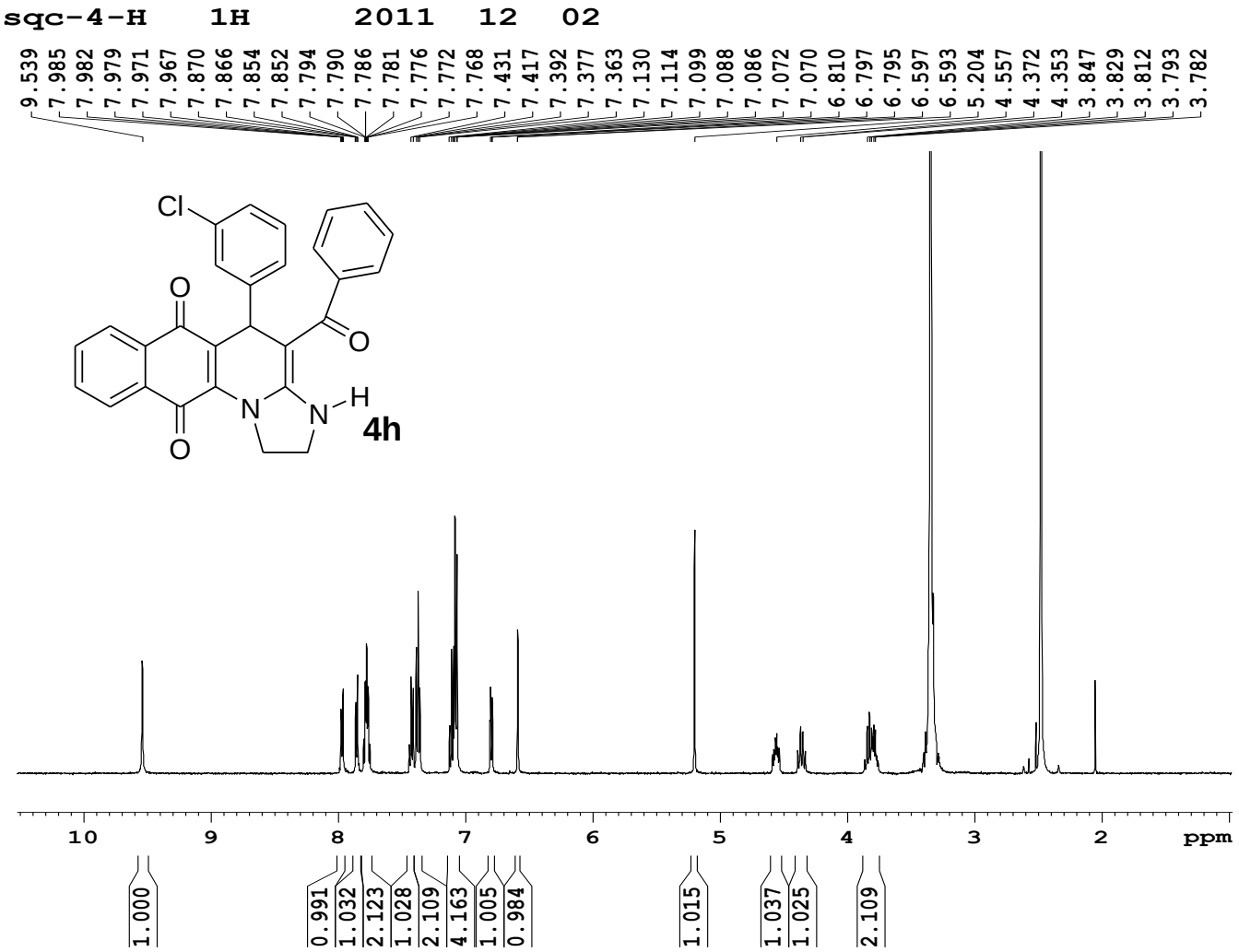
NAME	sqc-4-D
EXPNO	2
PROCNO	1
Date_	20111128
Time	10.07
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2639
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	297.9 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



NAME	sqc-4-F
EXPNO	1
PROCNO	1
Date_	20111128
Time	19.56
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	296.3 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00

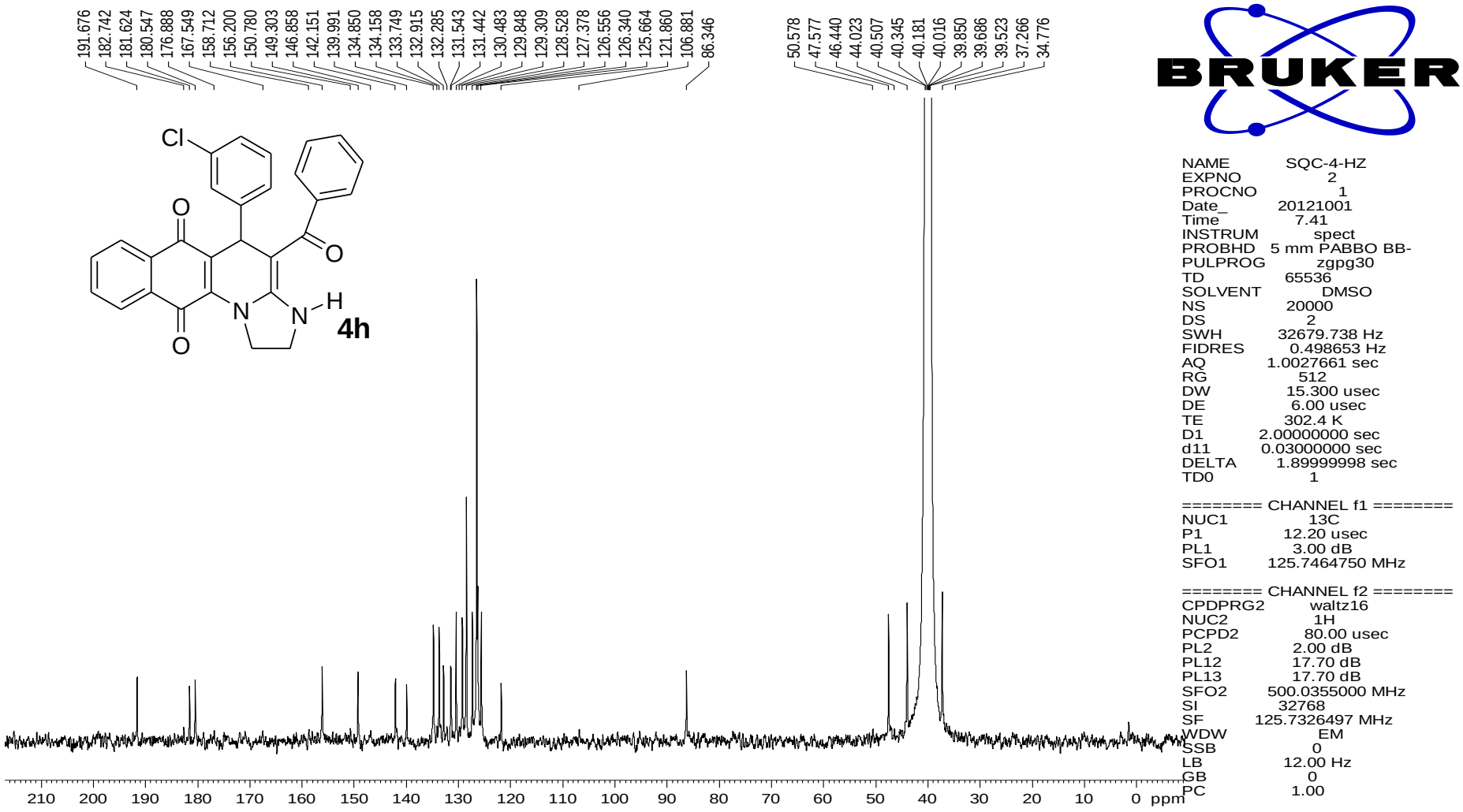


NAME	sqc-4-F	
EXPNO	2	
PROCNO	1	
Date_	20111201	
Time	13.52	
INSTRUM	av500	
PROBHD	5 mm PABBO BB-	
PULPROG	zgpg30	
TD	65536	
SOLVENT	DMSO	
NS	2180	
DS	2	
SWH	32679.738	Hz
FIDRES	0.498653	Hz
AQ	1.0027661	sec
RG	18400	
DW	15.300	usec
DE	6.00	usec
TE	295.6	K
D1	2.00000000	sec
d11	0.03000000	sec
DELTA	1.89999998	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	13C	
P1	9.60	usec
PL1	2.00	dB
SFO1	125.7464750	MHz
======== CHANNEL f2 ========		
CPDPRG2	waltz16	
NUC2	1H	
PCPD2	80.00	usec
PL2	2.20	dB
PL12	17.66	dB
PL13	17.66	dB
SFO2	500.0355000	MHz
SI	32768	
SF	125.7326387	MHz
WDW	EM	
SSB	0	
LB	6.00	Hz
GB	0	
PC	2.00	

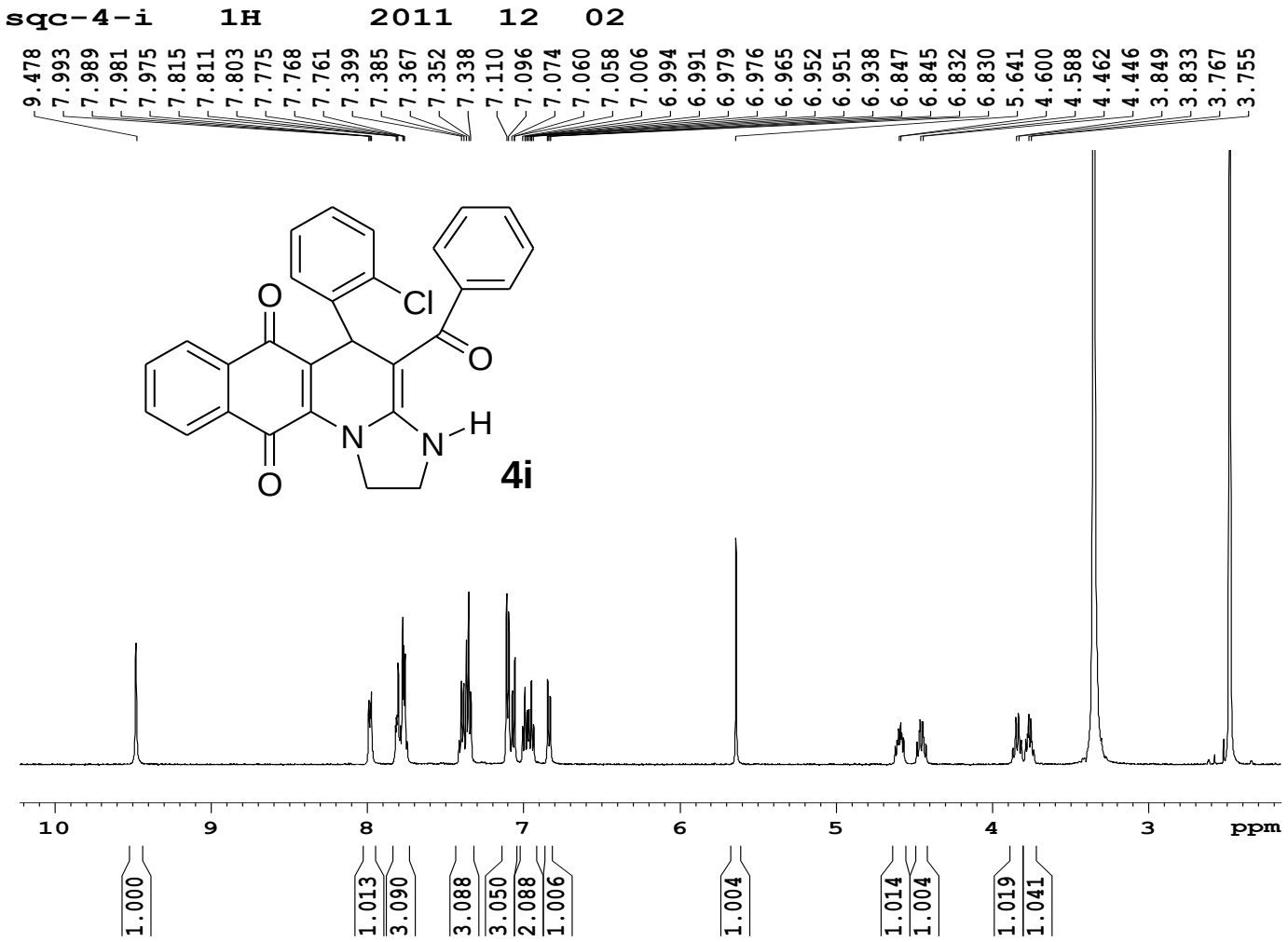


NAME	sqc-4-H
EXPNO	1
PROCNO	1
Date_	20111202
Time	21.24
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	292.3 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00

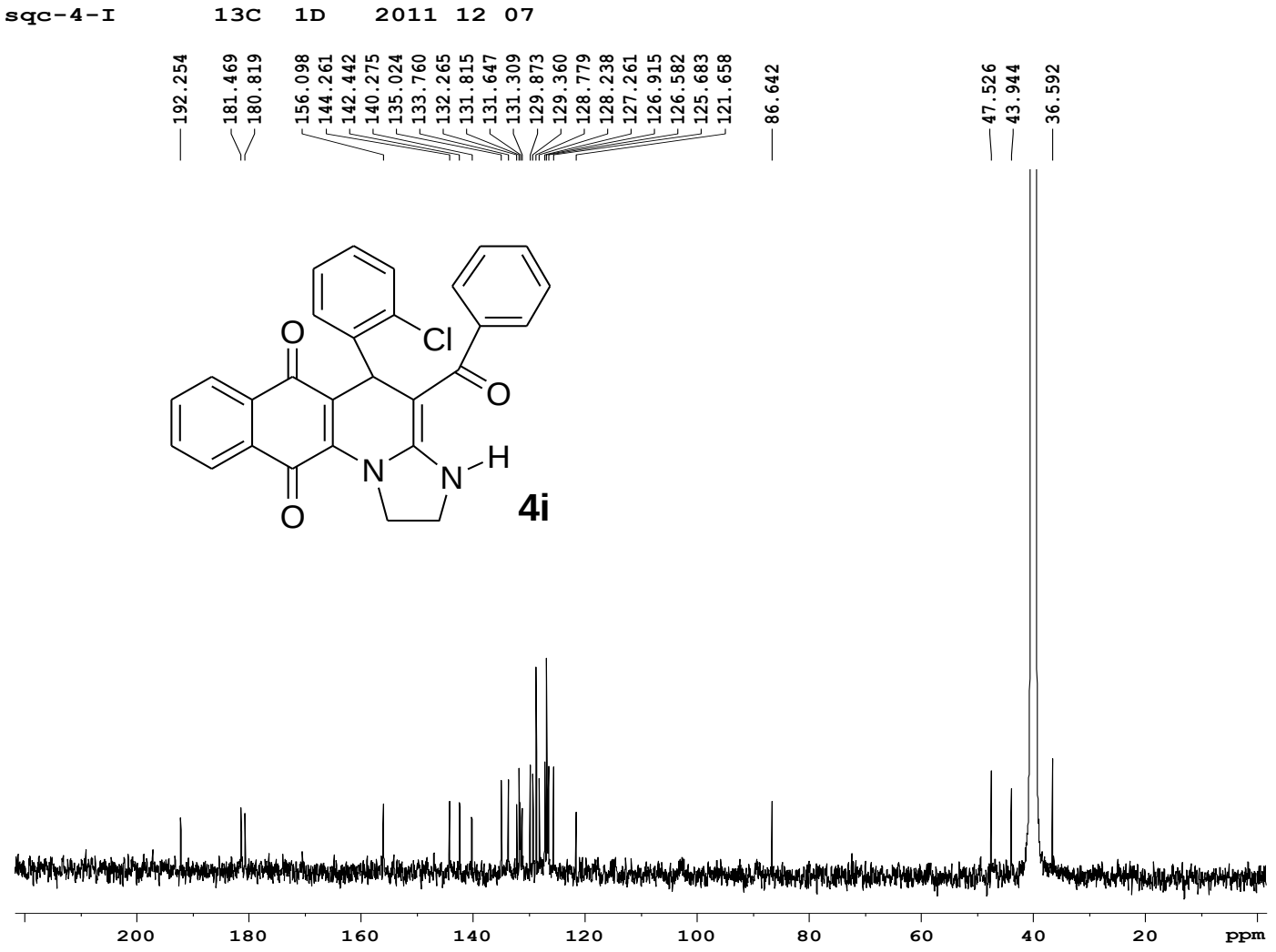
SQC-4-HZ 13C 1D 2012 09 30



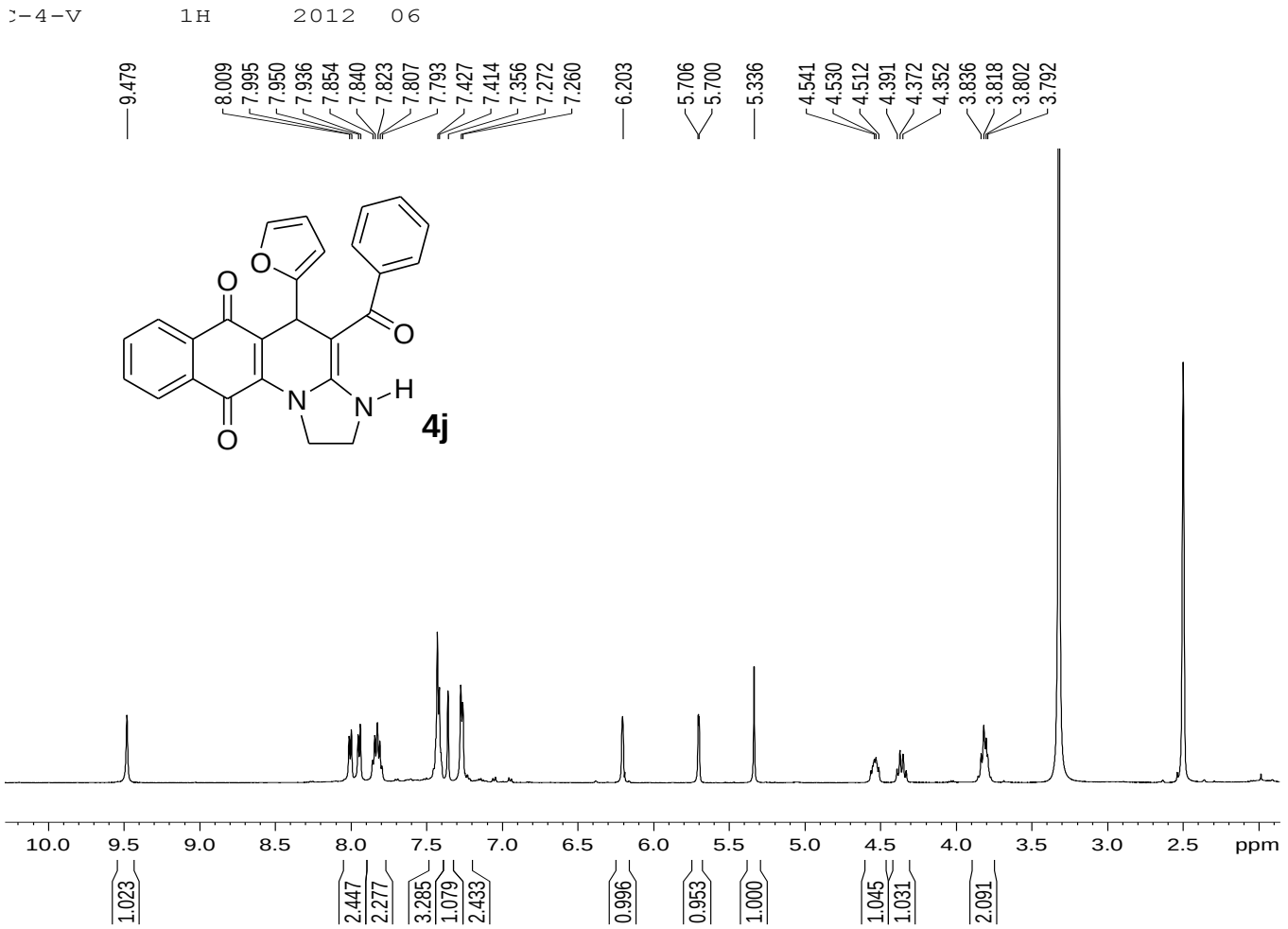
NAME	SQC-4-HZ
EXPNO	2
PROCNO	1
Date_	20121001
Time	7.41
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	20000
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	512
DW	15.300 usec
DE	6.00 usec
TE	302.4 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	12.20 usec
PL1	3.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.00 dB
PL12	17.70 dB
PL13	17.70 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326497 MHz
WDW	EM
SSB	0
LB	12.00 Hz
GB	0
PC	1.00



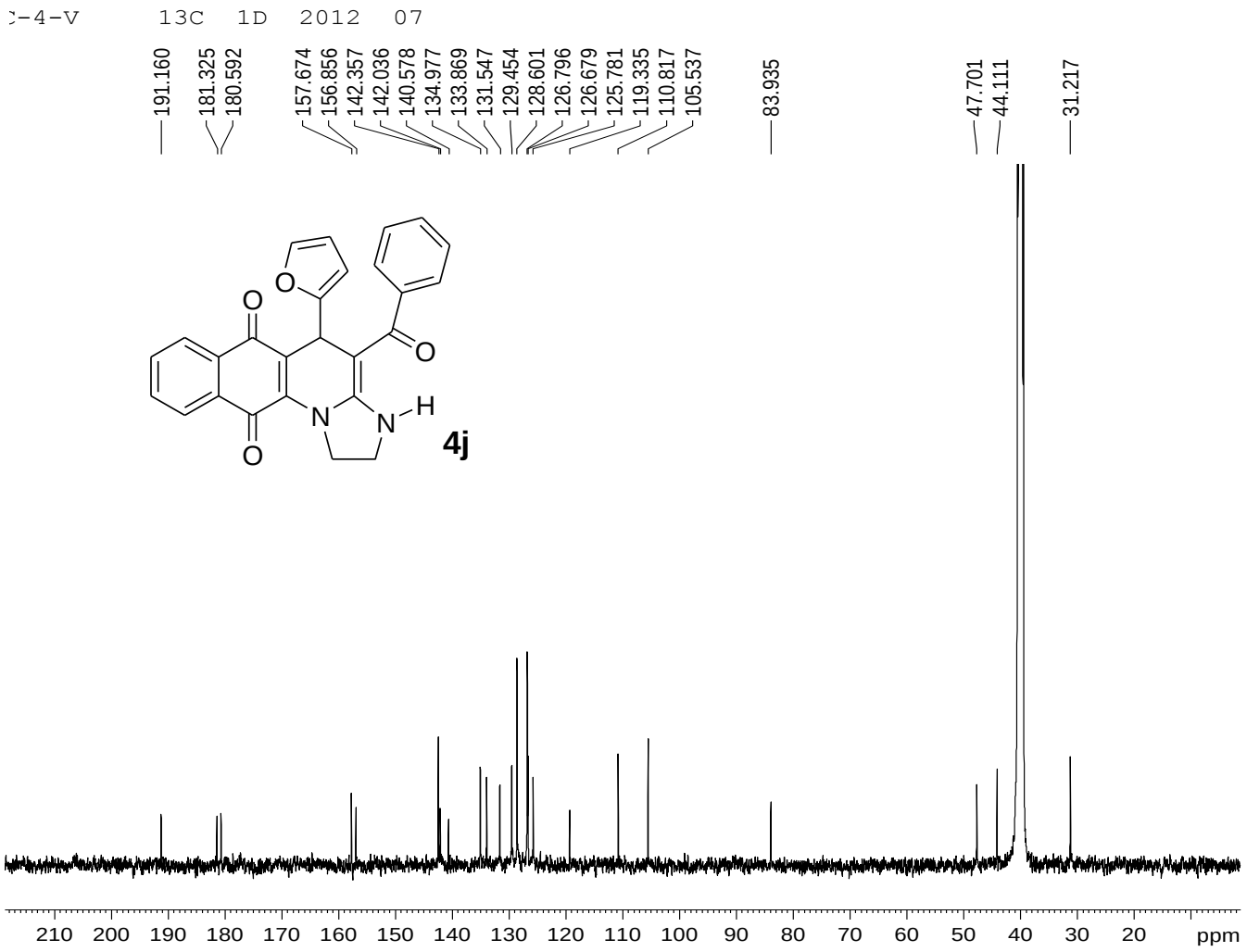
NAME	sqc-4-i
EXPNO	1
PROCNO	1
Date_	20111202
Time	21.29
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	292.4 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



NAME	sqc-4-i
EXPNO	2
PROCNO	1
Date_	20111207
Time	9.42
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2384
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	296.1 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



NAME	SQC-4-V
EXPNO	1
PROCNO	1
Date_	20120628
Time	13.50
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	16
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 se
RG	256
DW	50.000 us
DE	6.00 us
TE	300.7 K
D1	2.00000000 se
TD0	1
======== CHANNEL f1 ======	
NUC1	1H
P1	13.50 us
PL1	2.20 dB
SFO1	500.0335010 MH
SI	16384
SF	500.0300015 MH
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



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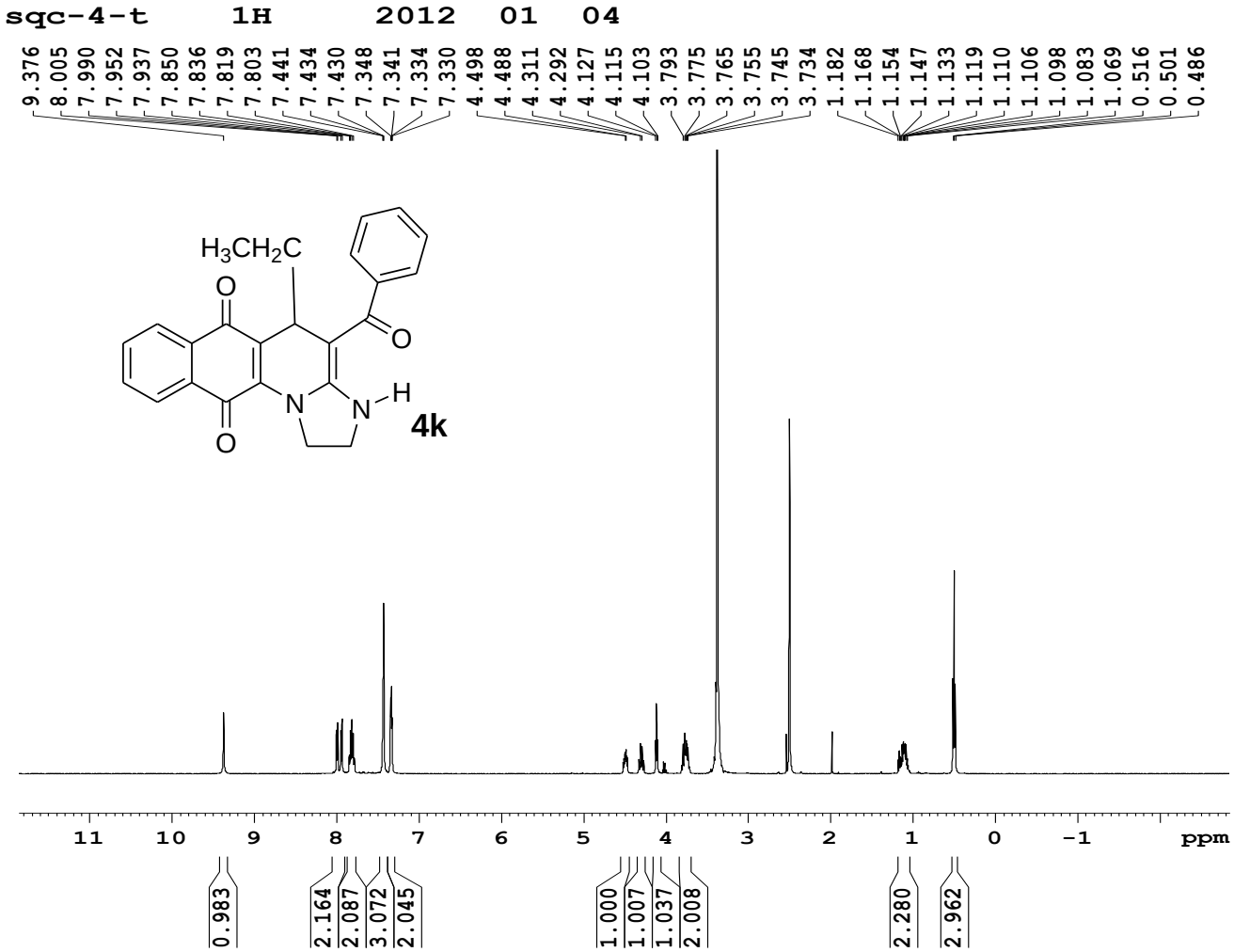
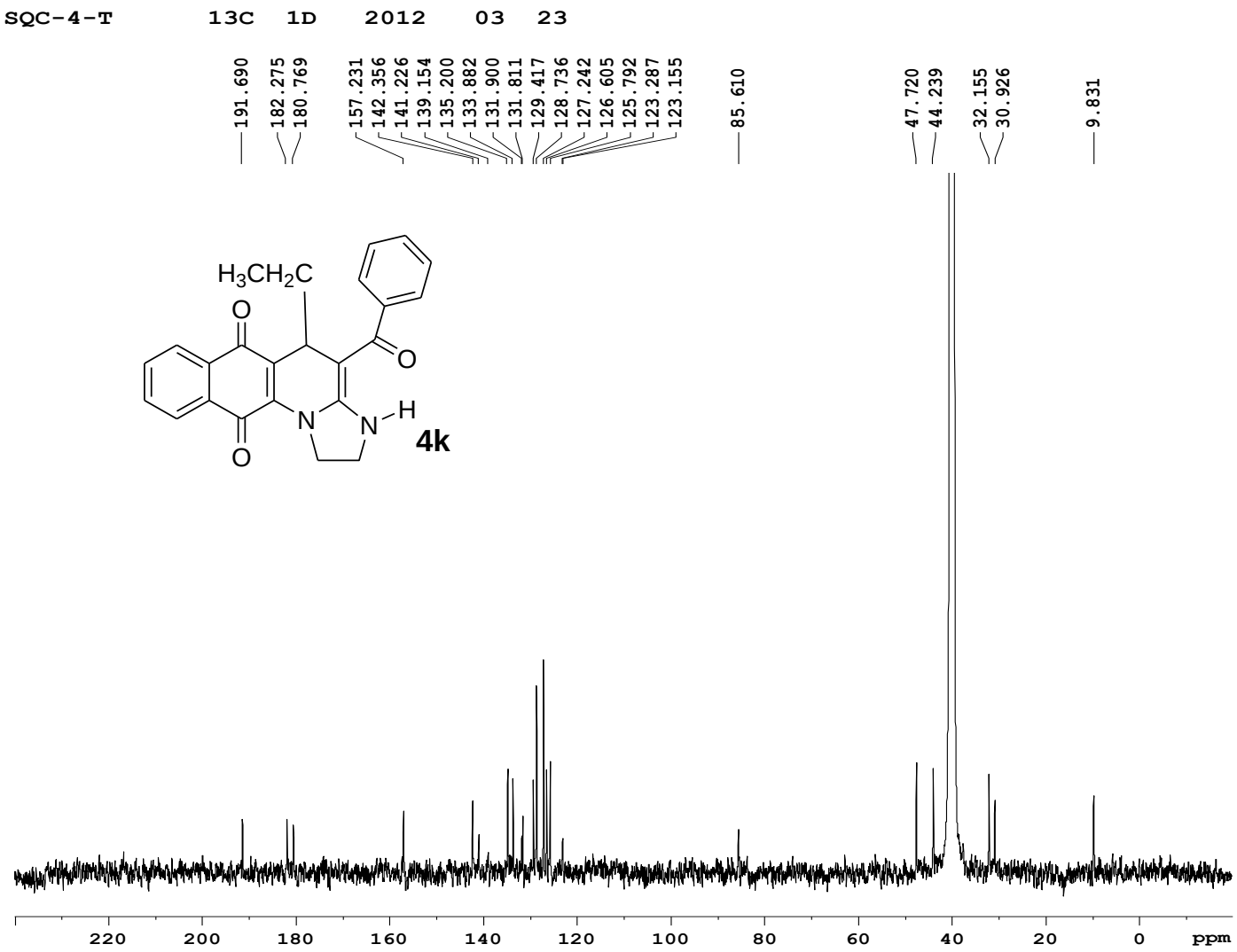
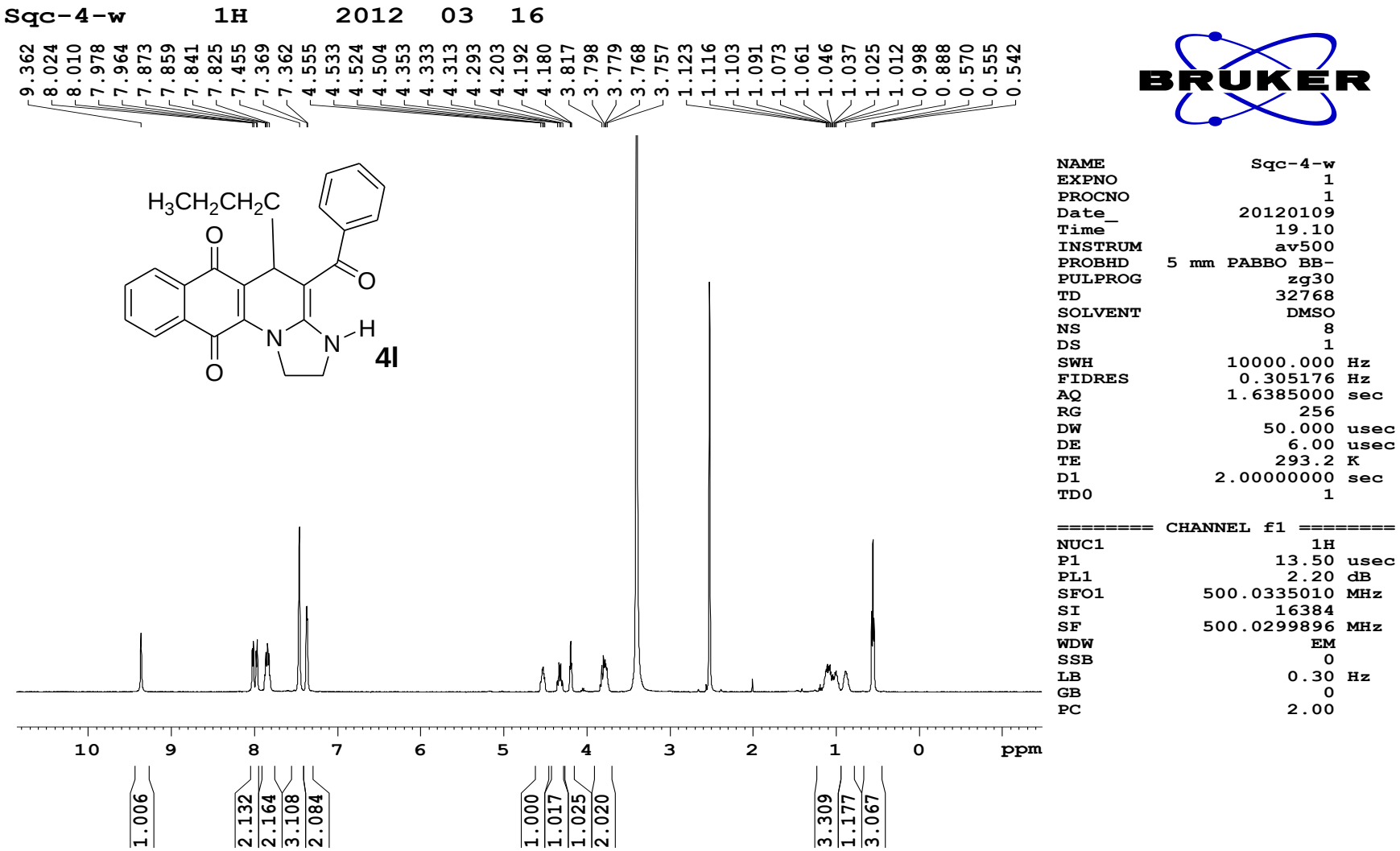
NAME	SQC-4-V
EXPNO	2
PROCNO	1
Date_	20120725
Time	11.43
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1879
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 se
RG	1820
DW	15.300 us
DE	6.00 us
TE	298.0 K
D1	2.00000000 se
d11	0.03000000 se
DELTA	1.89999998 se
TD0	1
======== CHANNEL f1 =======	
NUC1	13C
P1	12.20 us
PL1	3.00 dB
SFO1	125.7464750 MH
======== CHANNEL f2 =======	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 us
PL2	2.00 dB



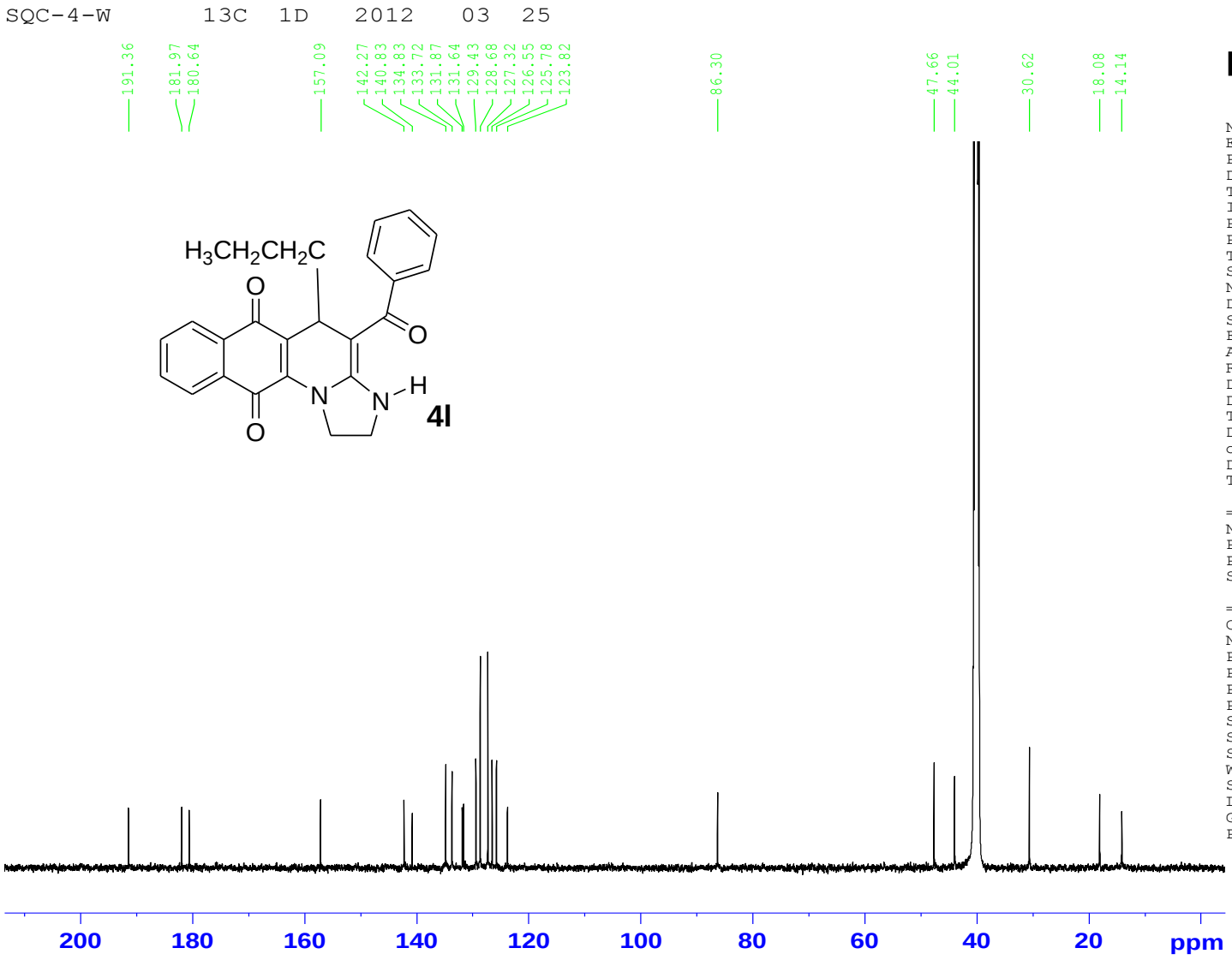
NAME	sqc-4-t	
EXPNO	12	
PROCNO	1	
Date_	20120104	
Time	14.44	
INSTRUM	av500	
PROBHD	5 mm PABBO BB-	
PULPROG	zg30	
TD	32768	
SOLVENT	DMSO	
NS	8	
DS	1	
SWH	10000.000	Hz
FIDRES	0.305176	Hz
AQ	1.6385000	sec
RG	203	
DW	50.000	usec
DE	6.00	usec
TE	292.2	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	1H	
P1	13.50	usec
PL1	2.20	dB
SFO1	500.0335010	MHz
SI	16384	
SF	500.0300008	MHz
WDW	EM	
SSB	0	
LB	0.30	Hz
GB	0	
PC	2.00	



NAME	sqc-4-t
EXPNO	2
PROCNO	1
Date_	20120323
Time	10.07
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	5794
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	14600
DW	15.300 usec
DE	6.00 usec
TE	294.1 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.60 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326332 MHz
WDW	EM
SSB	0
LB	8.00 Hz
GB	0
PC	2.00



NAME	Sqc-4-w
EXPNO	1
PROCNO	1
Date_	20120109
Time	19.10
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	256
DW	50.000 usec
DE	6.00 usec
TE	293.2 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0299896 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



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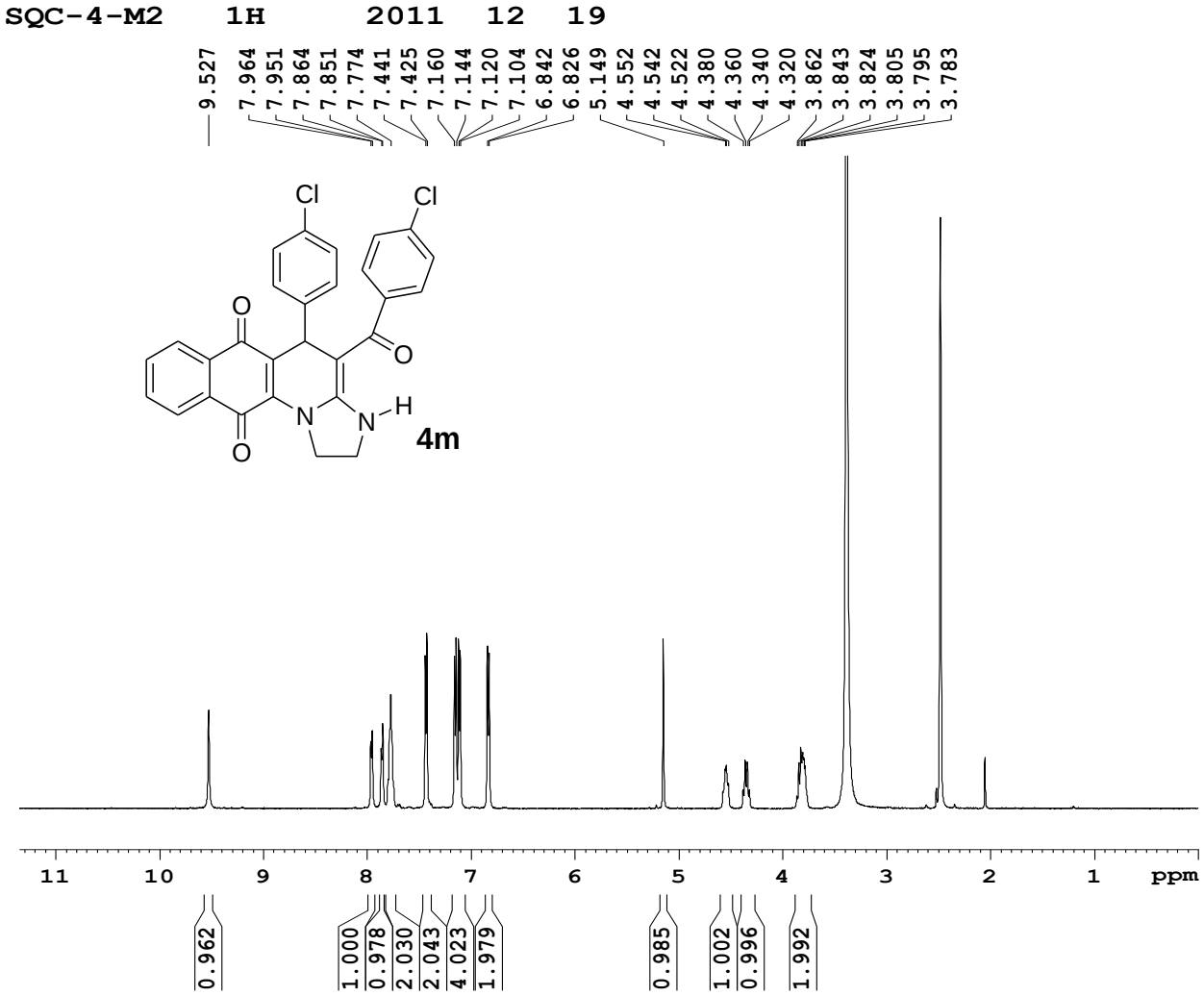
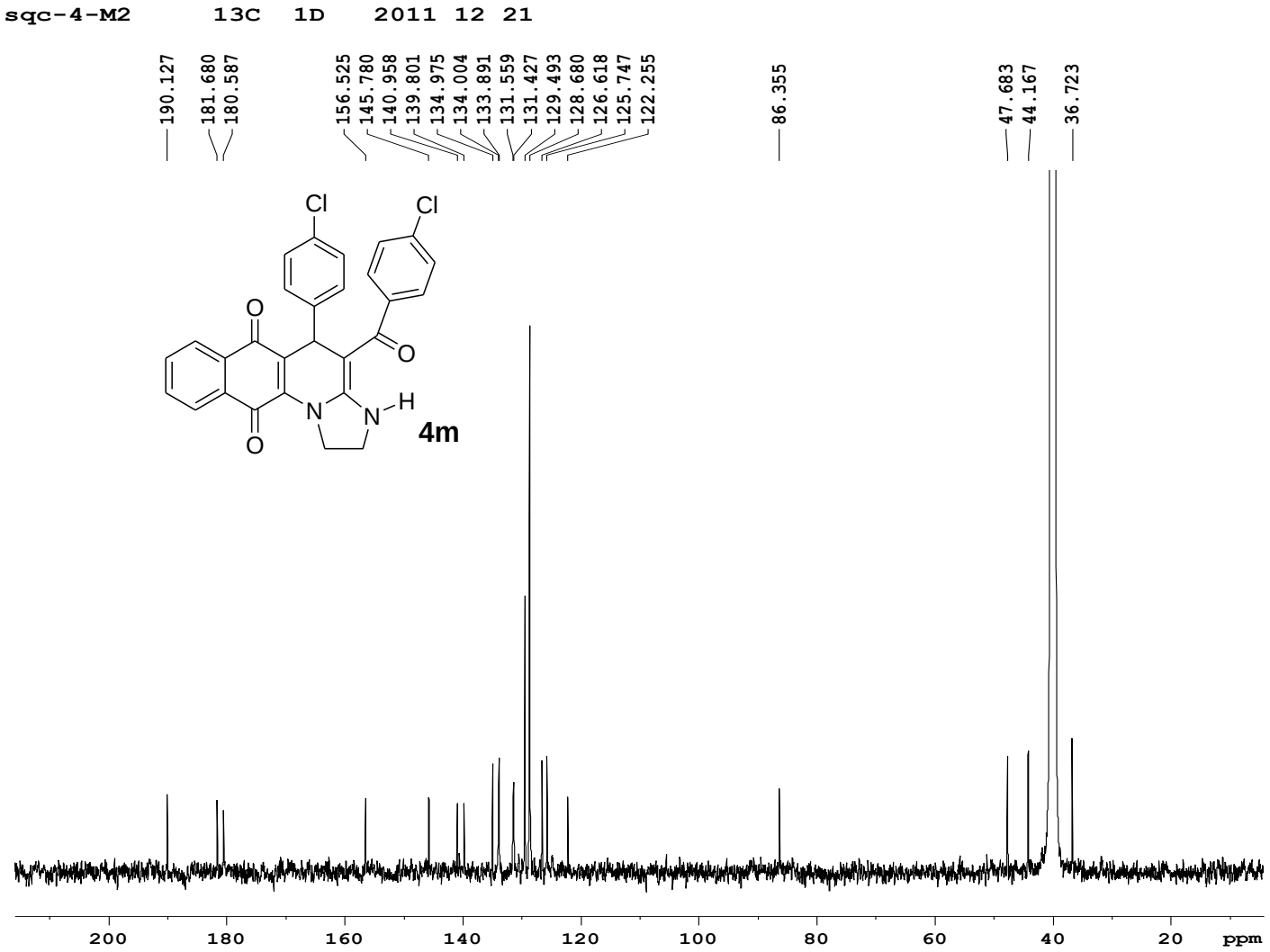
NAME	Sqc-4-w
EXPNO	2
PROCNO	1
Date_	20120326
Time	7.12
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	11175
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	14600
DW	15.300 usec
DE	6.00 usec
TE	296.9 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326332 MHz
WDW	EM
SSB	0
LB	3.00 Hz
GB	0
PC	2.00



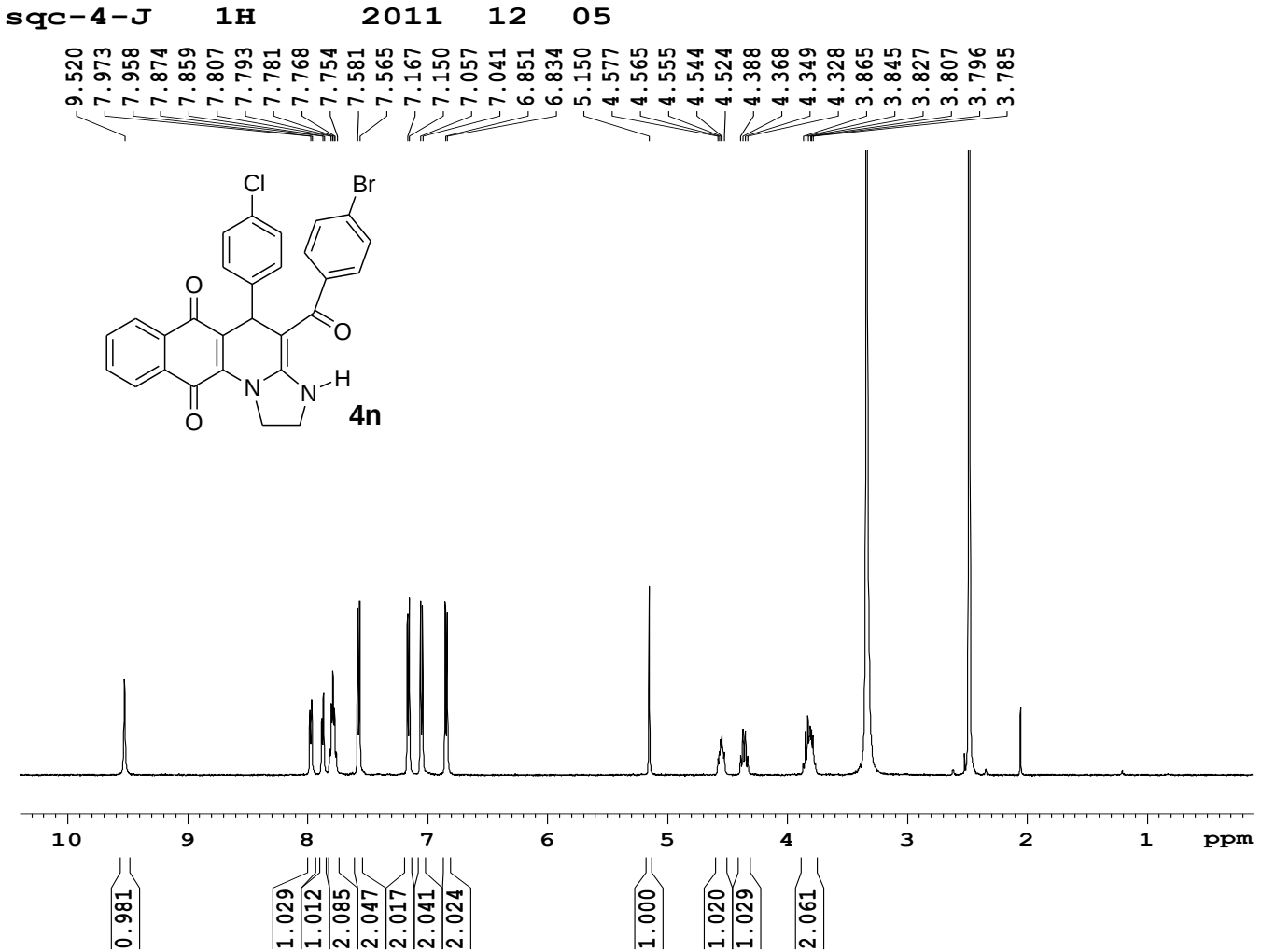
BRUKER

NAME	SQC-4-M2
EXPNO	1
PROCNO	1
Date_	20111219
Time	21.24
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	161
DW	50.000 usec
DE	6.00 usec
TE	292.2 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00

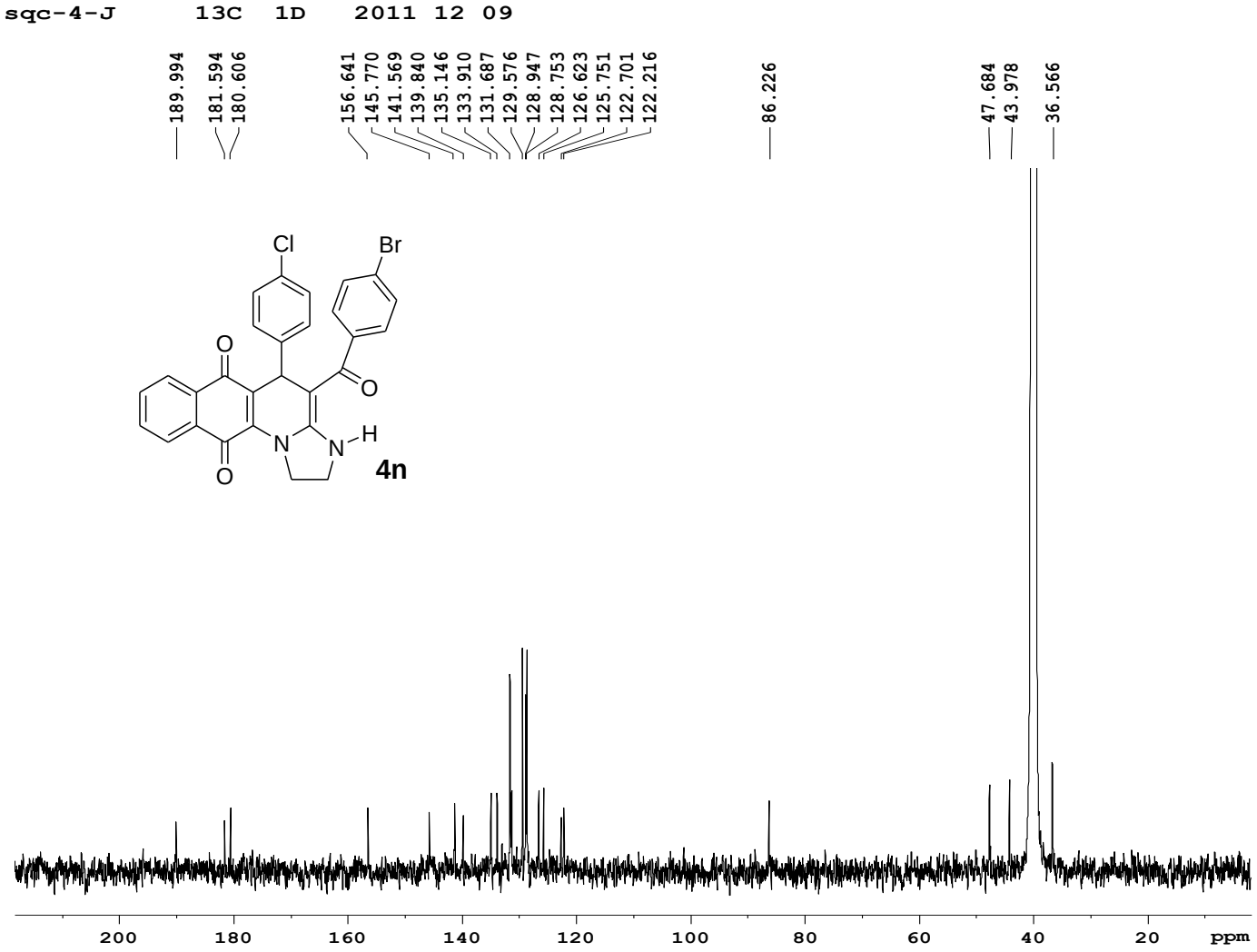


BRUKER

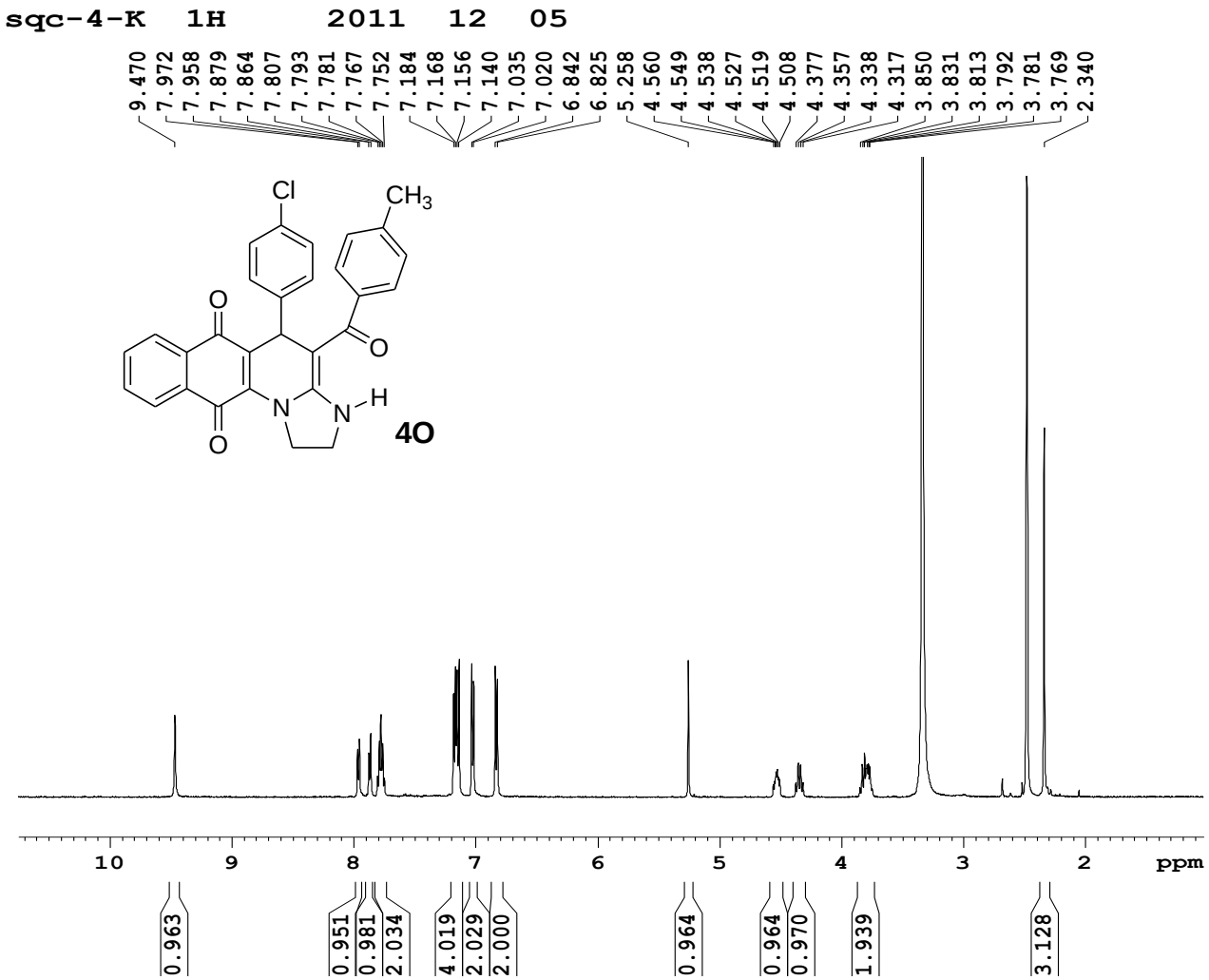
NAME	SQC-4-M2
EXPNO	2
PROCNO	1
Date_	20111221
Time	16.57
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2632
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	298.0 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



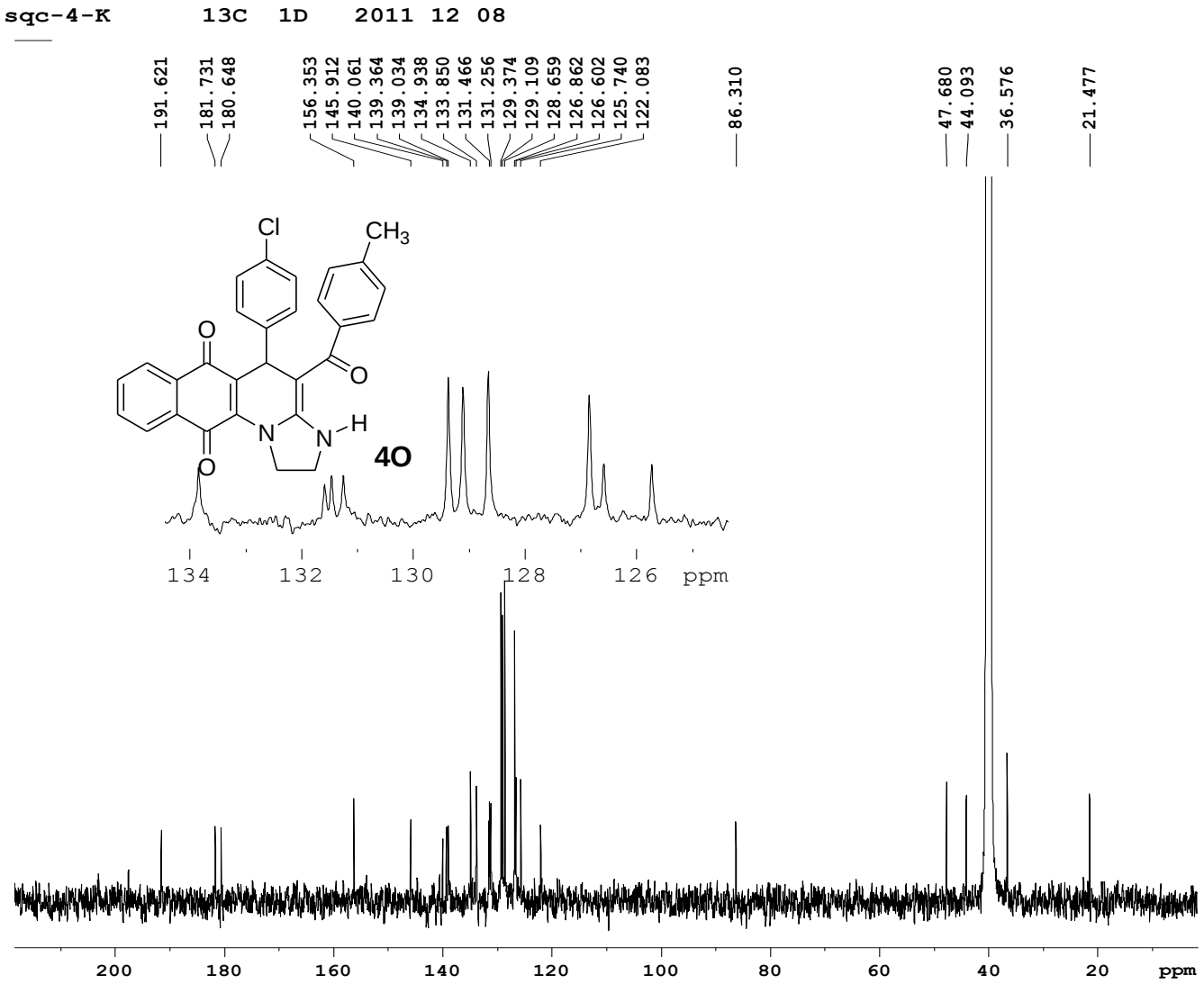
NAME	sqc-4-J	
EXPNO	1	
PROCNO	1	
Date_	20111205	
Time	20.21	
INSTRUM	av500	
PROBHD	5 mm PABBO BB-	
PULPROG	zg30	
TD	32768	
SOLVENT	DMSO	
NS	4	
DS	1	
SWH	10000.000	Hz
FIDRES	0.305176	Hz
AQ	1.6385000	sec
RG	322	
DW	50.000	usec
DE	6.00	usec
TE	295.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
NUC1	1H	
P1	13.50	usec
PL1	2.20	dB
SFO1	500.0335010	MHz
SI	16384	
SF	500.0300101	MHz
WDW	EM	
SSB	0	
LB	0.30	Hz
GB	0	
PC	2.00	



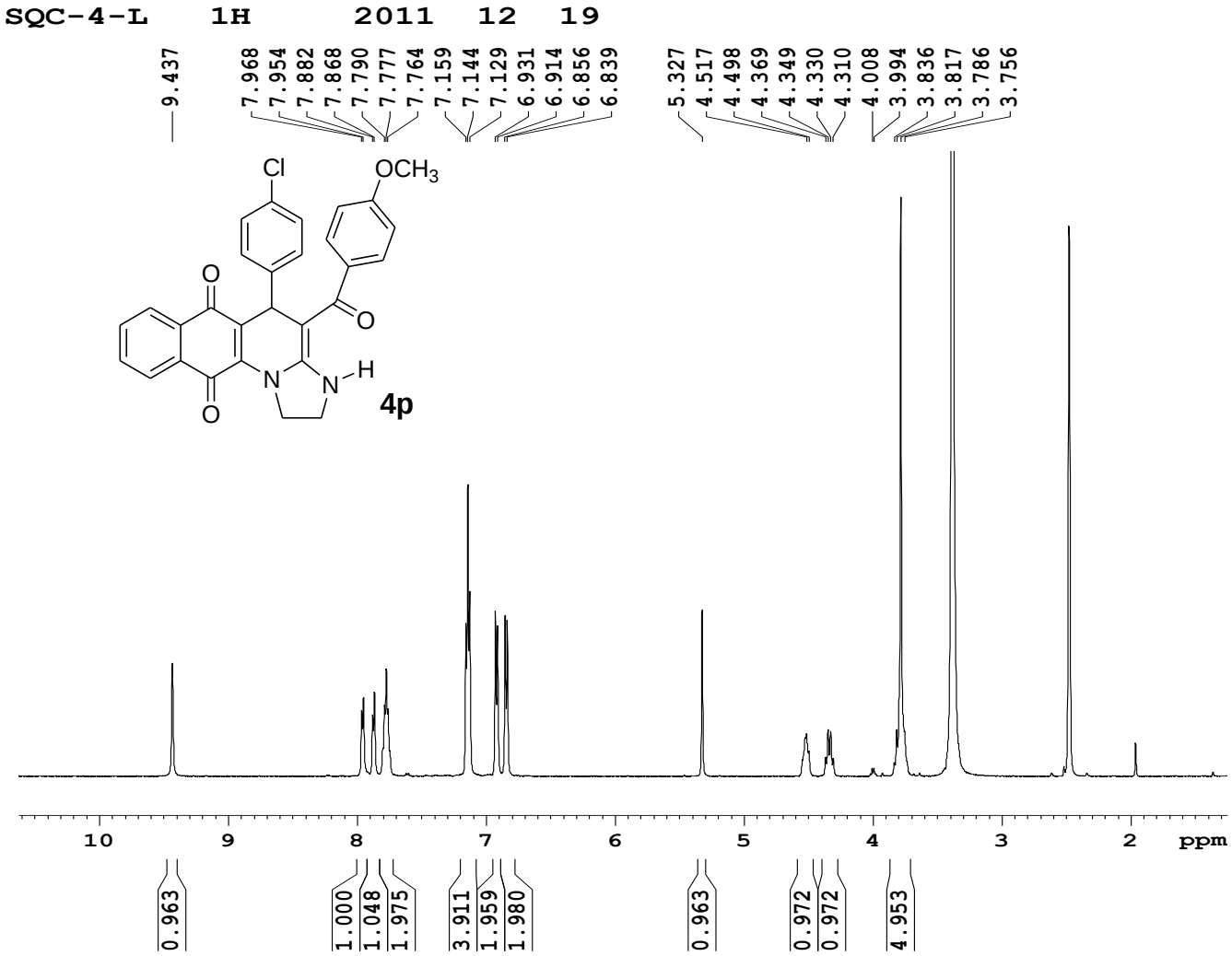
NAME	sqc-4-J
EXPNO	2
PROCNO	1
Date_	20111209
Time	13.53
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2109
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	295.5 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



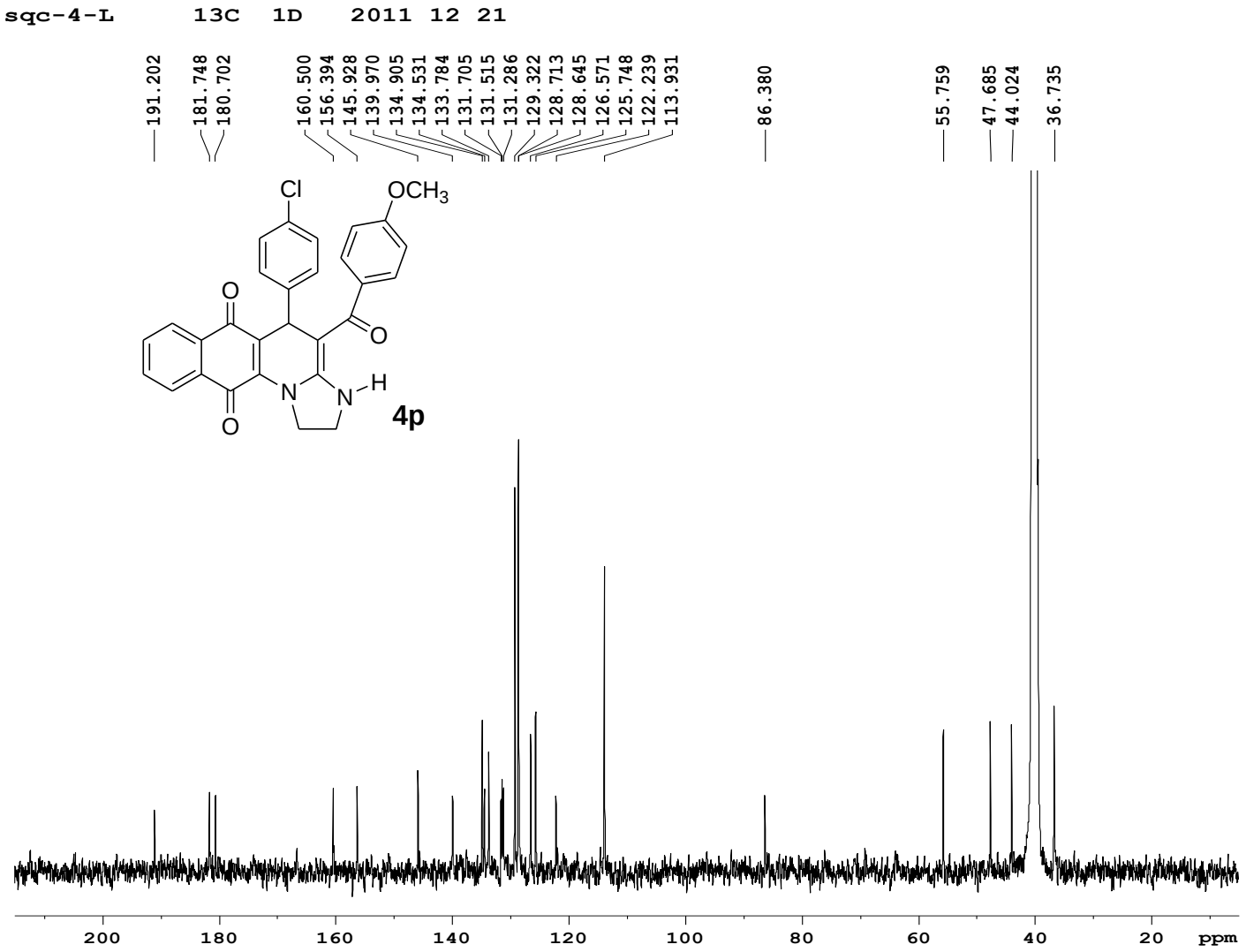
NAME	sqc-4-K
EXPNO	1
PROCNO	1
Date_	20111205
Time	20.28
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	322
DW	50.000 usec
DE	6.00 usec
TE	294.9 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



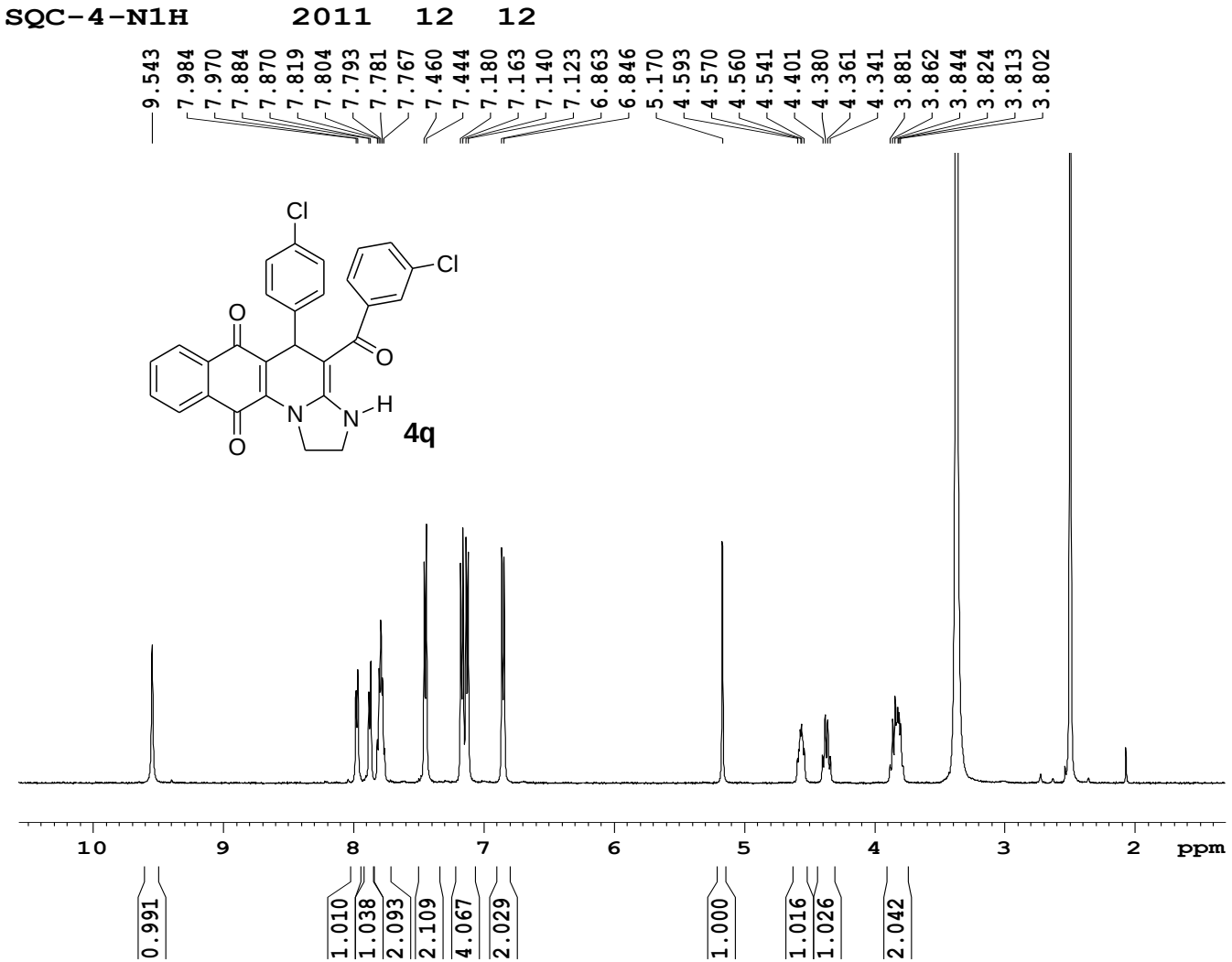
NAME	sqc-4-K
EXPNO	2
PROCNO	1
Date_	20111208
Time	17.40
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2846
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	294.8 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



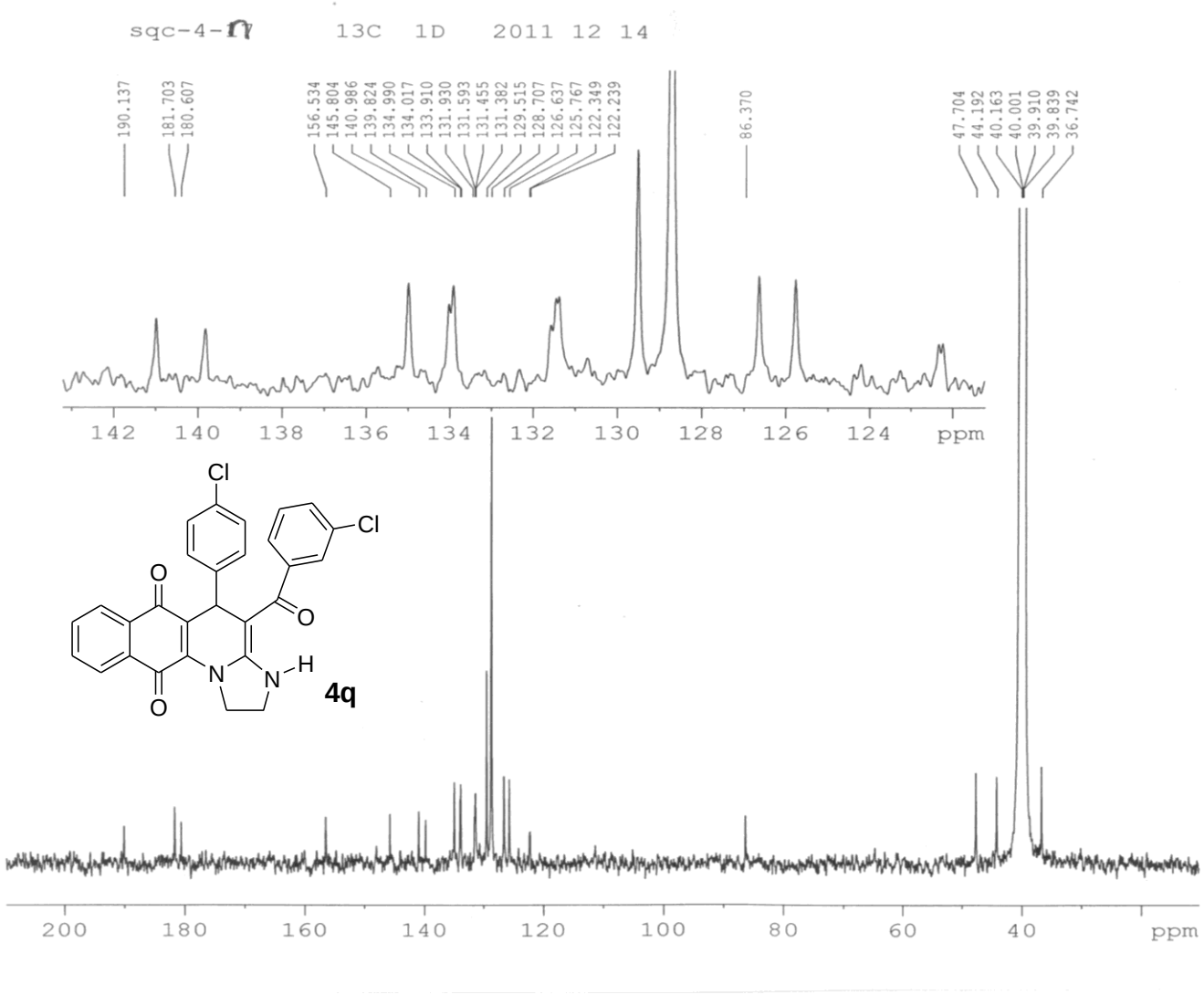
NAME	SQC-4-L
EXPNO	1
PROCNO	1
Date_	20111219
Time	21.20
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	161
DW	50.000 usec
DE	6.00 usec
TE	292.1 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



NAME	SQC-4-L
EXPNO	2
PROCNO	1
Date_	20111221
Time	12.10
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	2362
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	293.4 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326387 MHz
WDW	EM
SSB	0
LB	6.00 Hz
GB	0
PC	2.00



NAME	SQC-4-N
EXPNO	11
PROCNO	1
Date_	20111212
Time	20.55
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	228
DW	50.000 usec
DE	6.00 usec
TE	293.7 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300016 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



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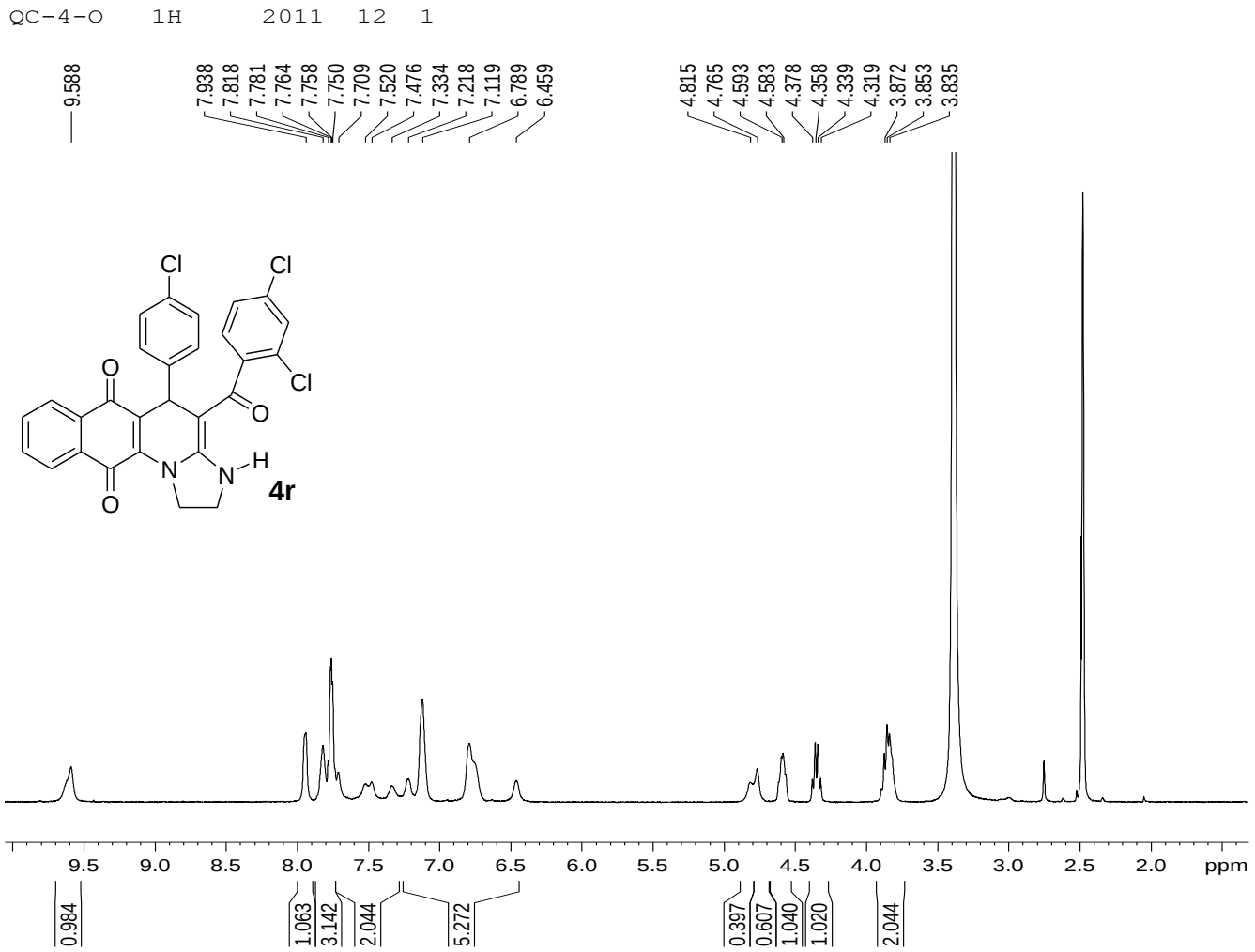
```
Current Data Parameters
NAME                  sqc-4-17
EXPNO                        2
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20111214
Time                     17.35
INSTRUM                  av500
PROBHD    5 mm PABBO BB-
PULPROG                zgpg30
TD                      65536
SOLVENT                  DMSO
NS                       2583
DS                          2
SWH                32679.738 Hz
FIDRES              0.498653 Hz
AQ                  1.0027661 sec
RG                      18400
DW                     15.300 usec
DE                      6.00 usec
TE                     297.0 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
TD0                         1

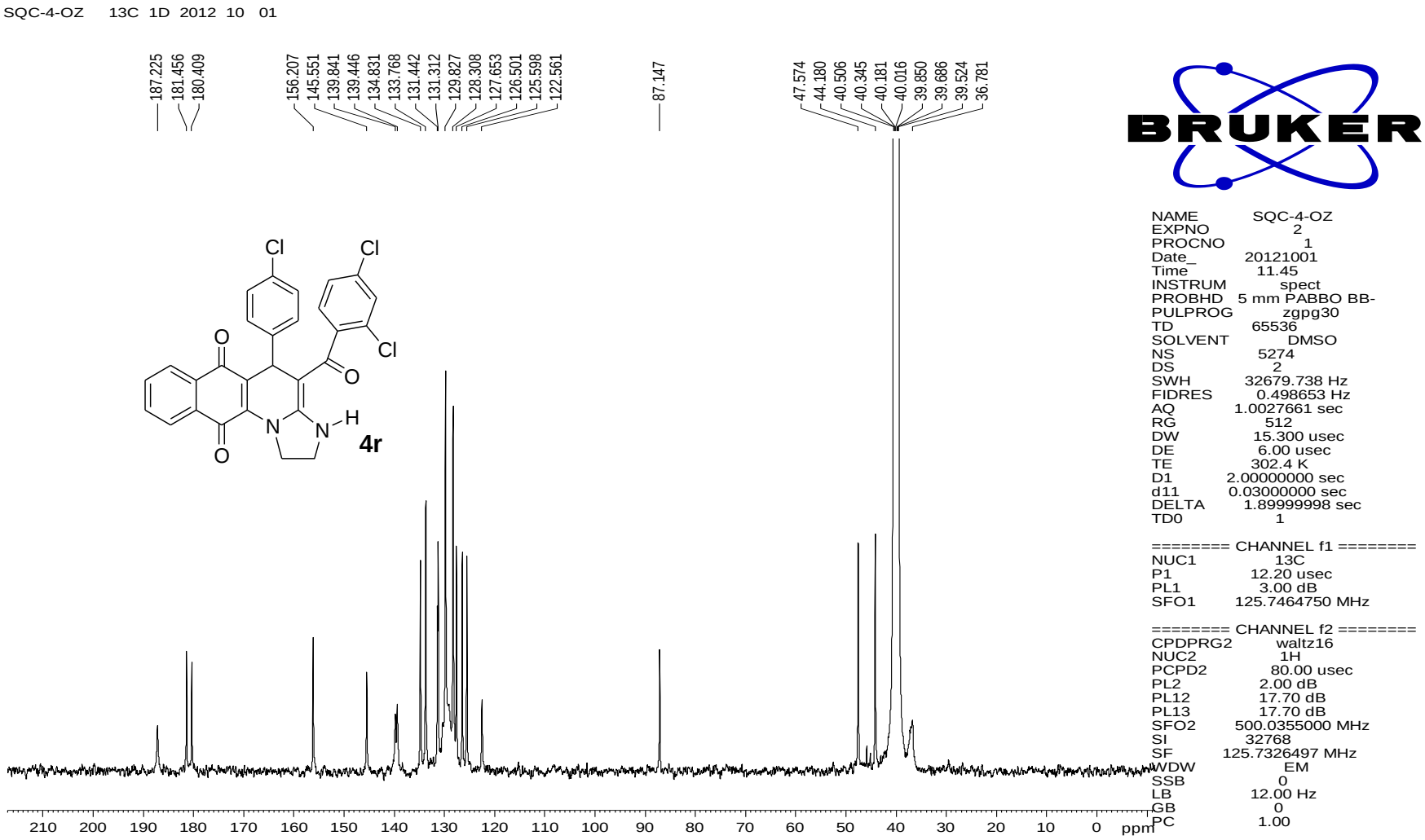
======== CHANNEL f1 ========
NUC1                      13C
P1                       9.60 usec
PL1                      2.00 dB
SFO1           125.7464750 MHz

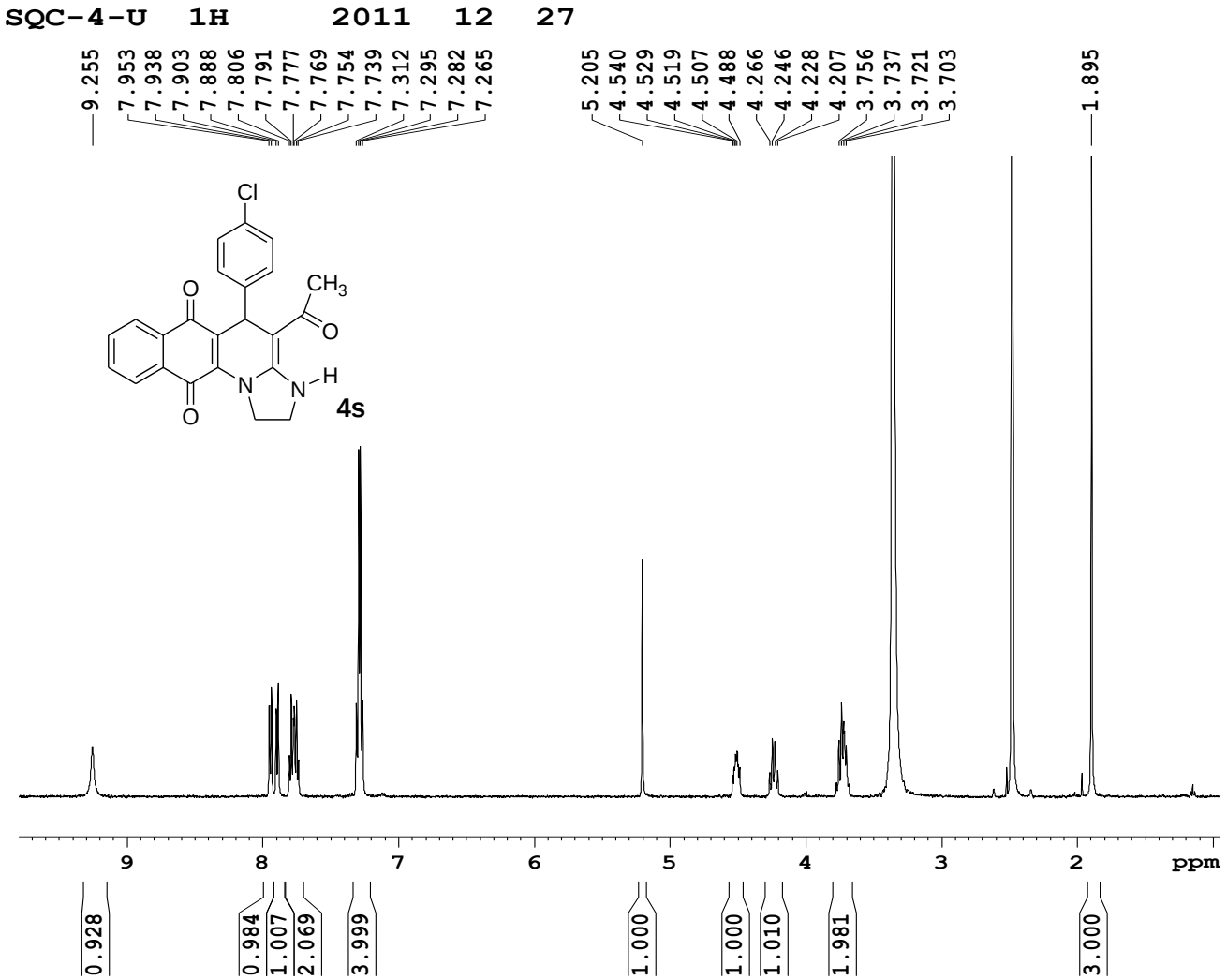
======== CHANNEL f2 ========
CPDPRG2                waltz16
NUC2                       1H
PCPD2                   80.00 usec
PL2                      2.20 dB
PL12                    17.66 dB
PL13                    17.66 dB
SFO2           500.0355000 MHz

F2 - Processing parameters
SI                        32768
SF             125.7326360 MHz
WDW                          EM
SSB                          0
LB                      10.00 Hz
GB                           0
PC                       2.00
```

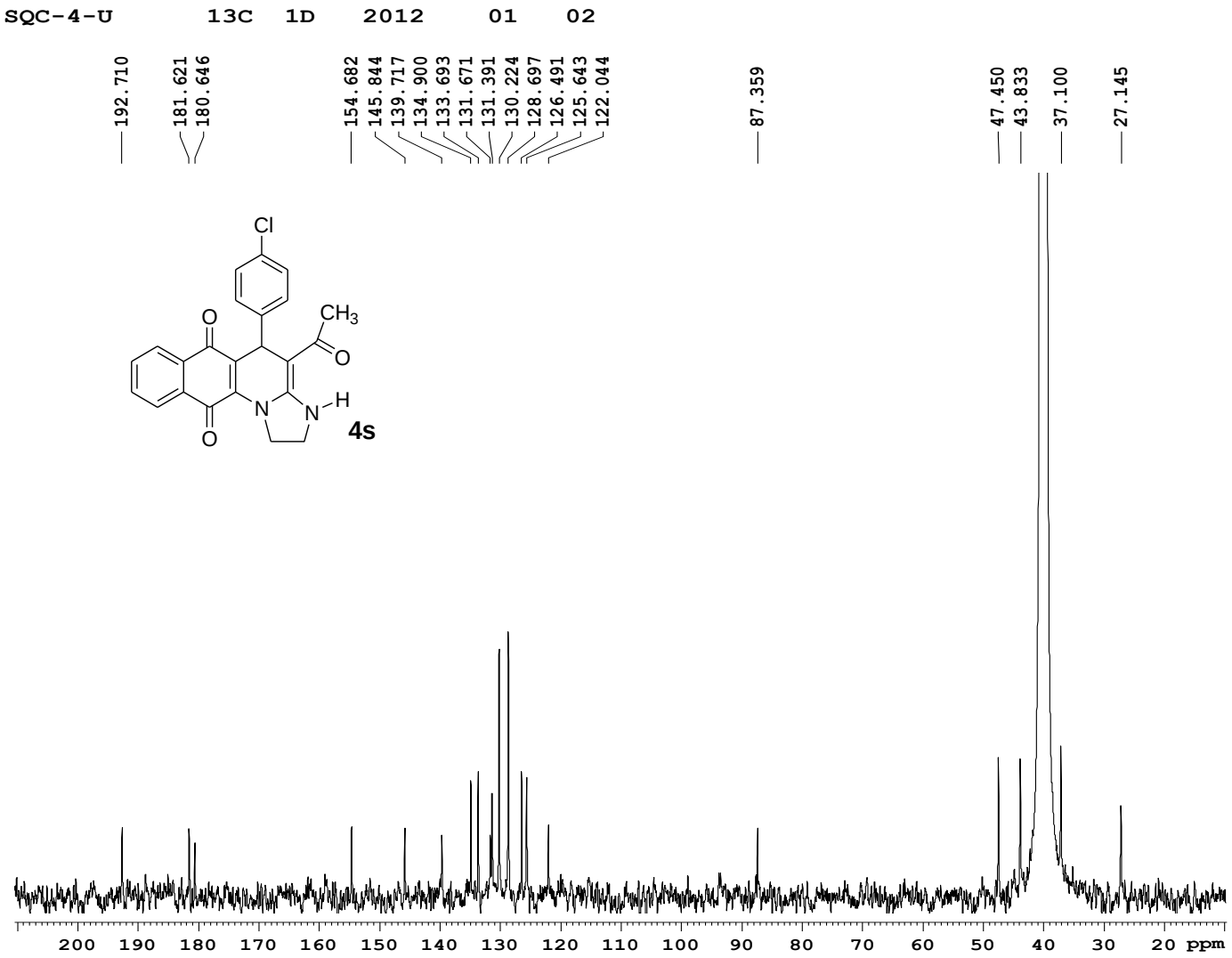


NAME	SQC-4-O
EXPNO	1
PROCNO	1
Date_	20111219
Time	21.27
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 se
RG	161
DW	50.000 us
DE	6.00 us
TE	292.2 K
D1	2.00000000 se
TD0	1
======== CHANNEL f1 ======	
NUC1	1H
P1	13.50 us
PL1	2.20 dB
SFO1	500.0335010 MH
SI	16384
SF	500.0300101 MH
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00

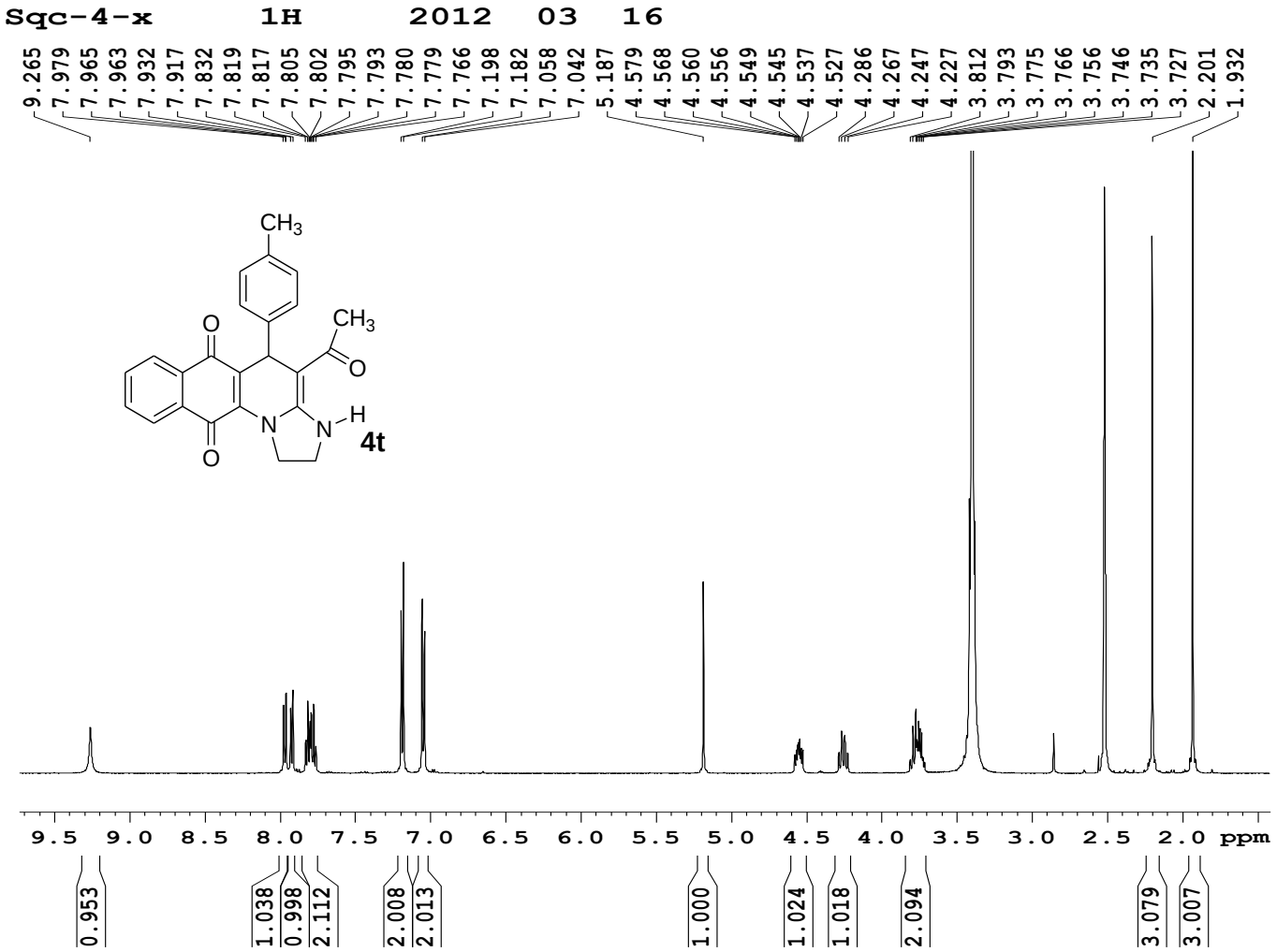




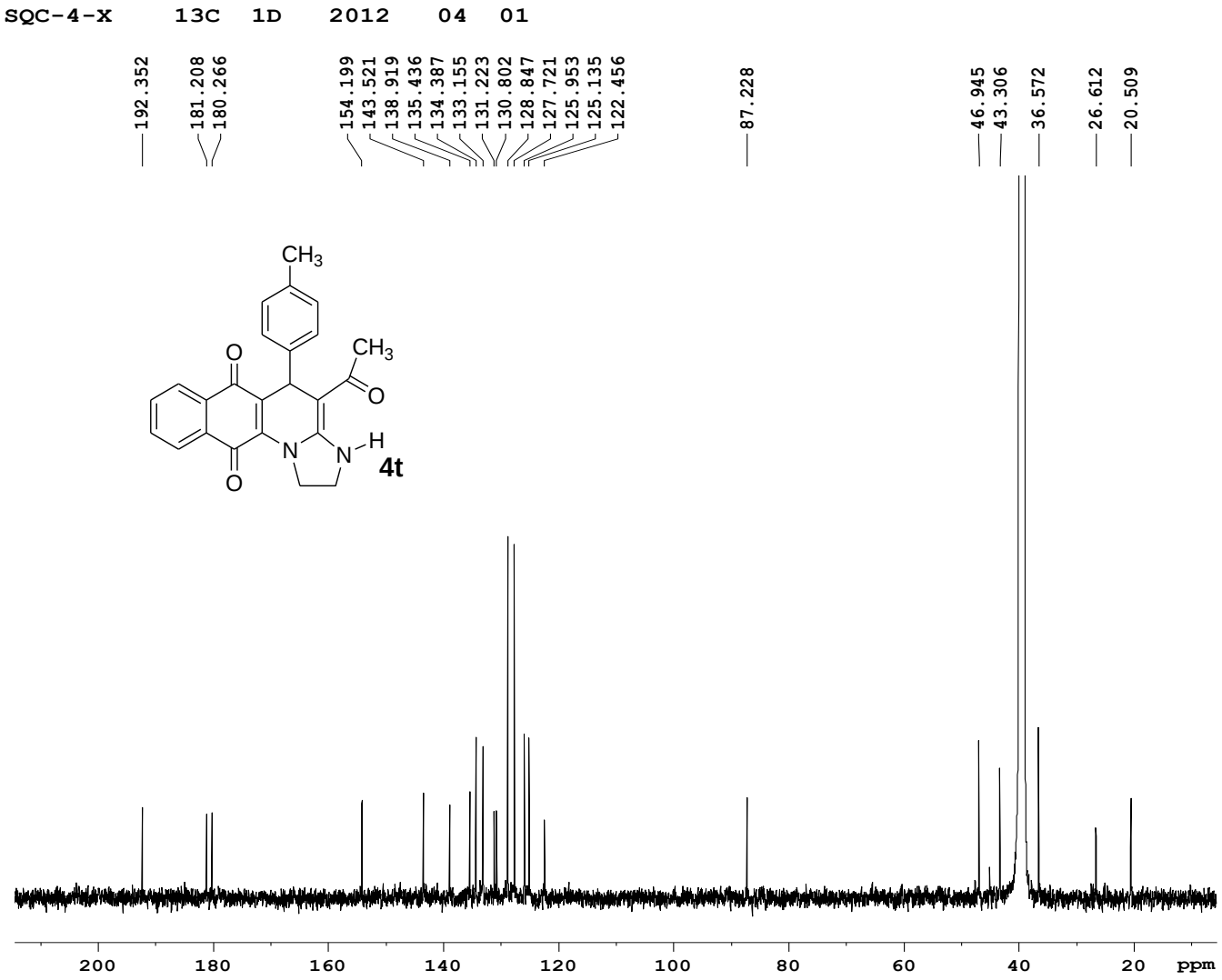
NAME	SQC-4-U
EXPNO	1
PROCNO	1
Date_	20111227
Time	19.23
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	256
DW	50.000 usec
DE	6.00 usec
TE	293.1 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



NAME	SQC-4-U
EXPNO	2
PROCNO	1
Date_	20120102
Time	3.07
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	6227
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	294.4 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.60 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326453 MHz
WDW	EM
SSB	0
LB	12.00 Hz
GB	0
PC	1.00



NAME	Sqc-4-x
EXPNO	1
PROCNO	1
Date_	20120109
Time	19.06
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	8
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	256
DW	50.000 usec
DE	6.00 usec
TE	293.2 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0299915 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00



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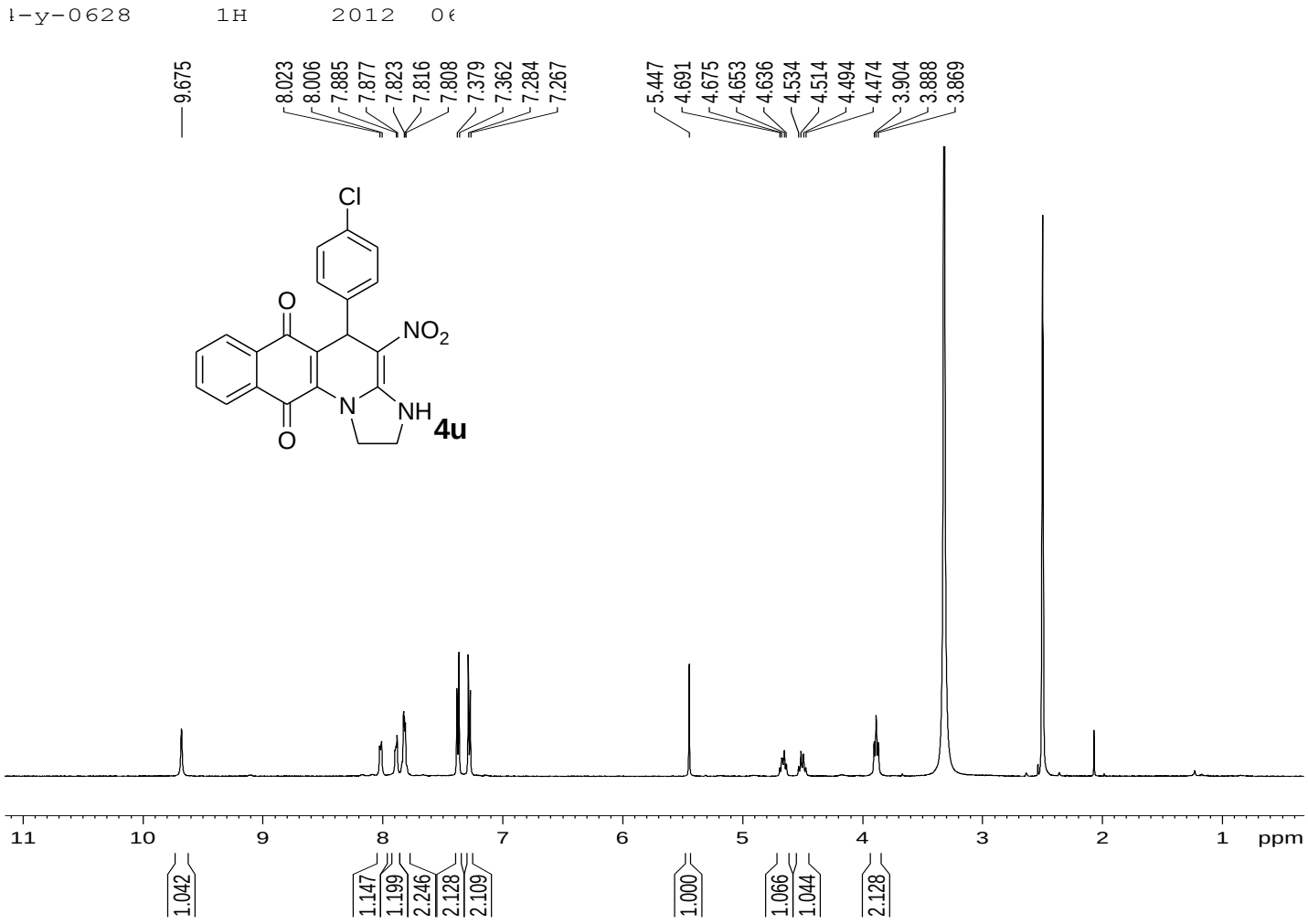
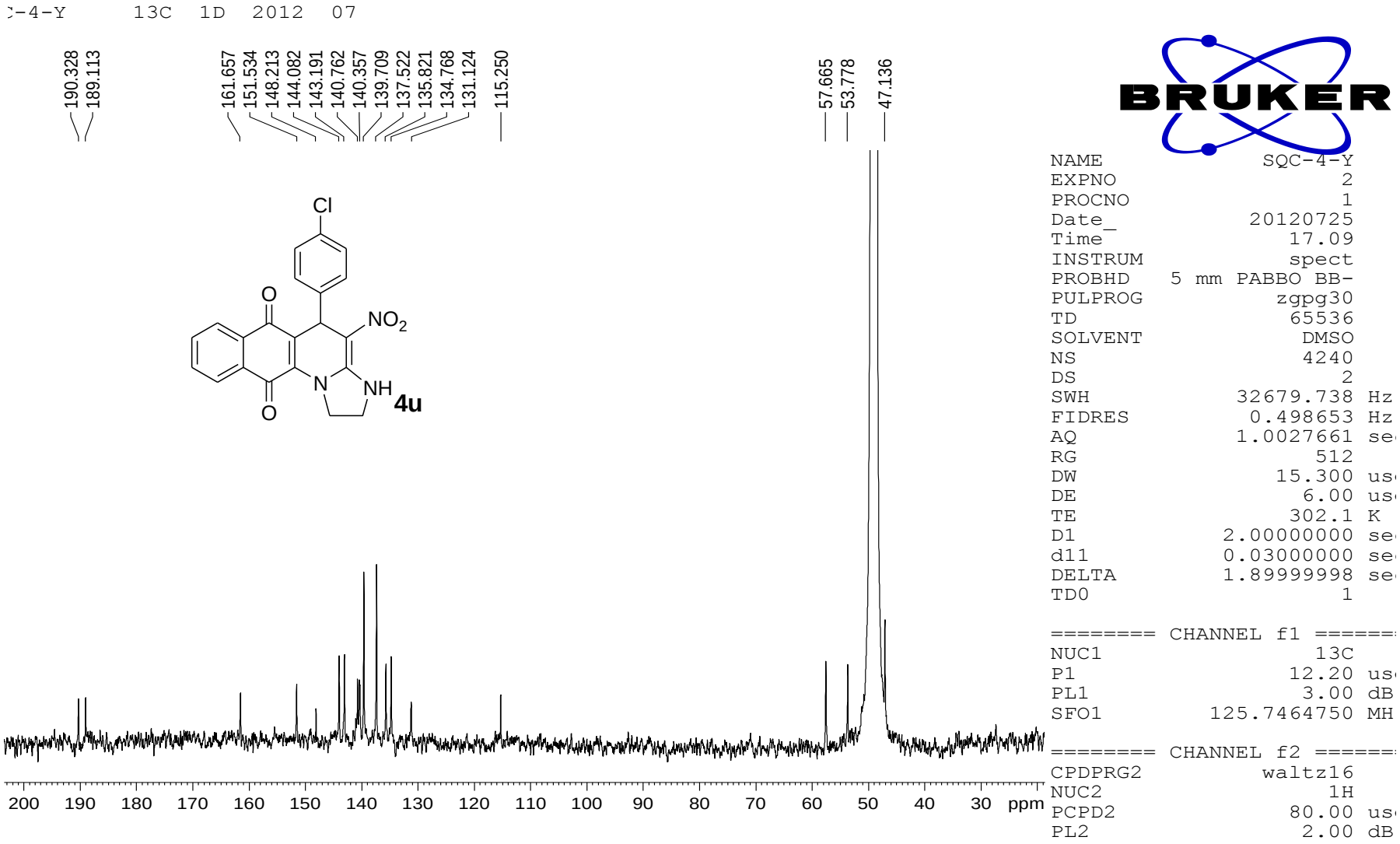
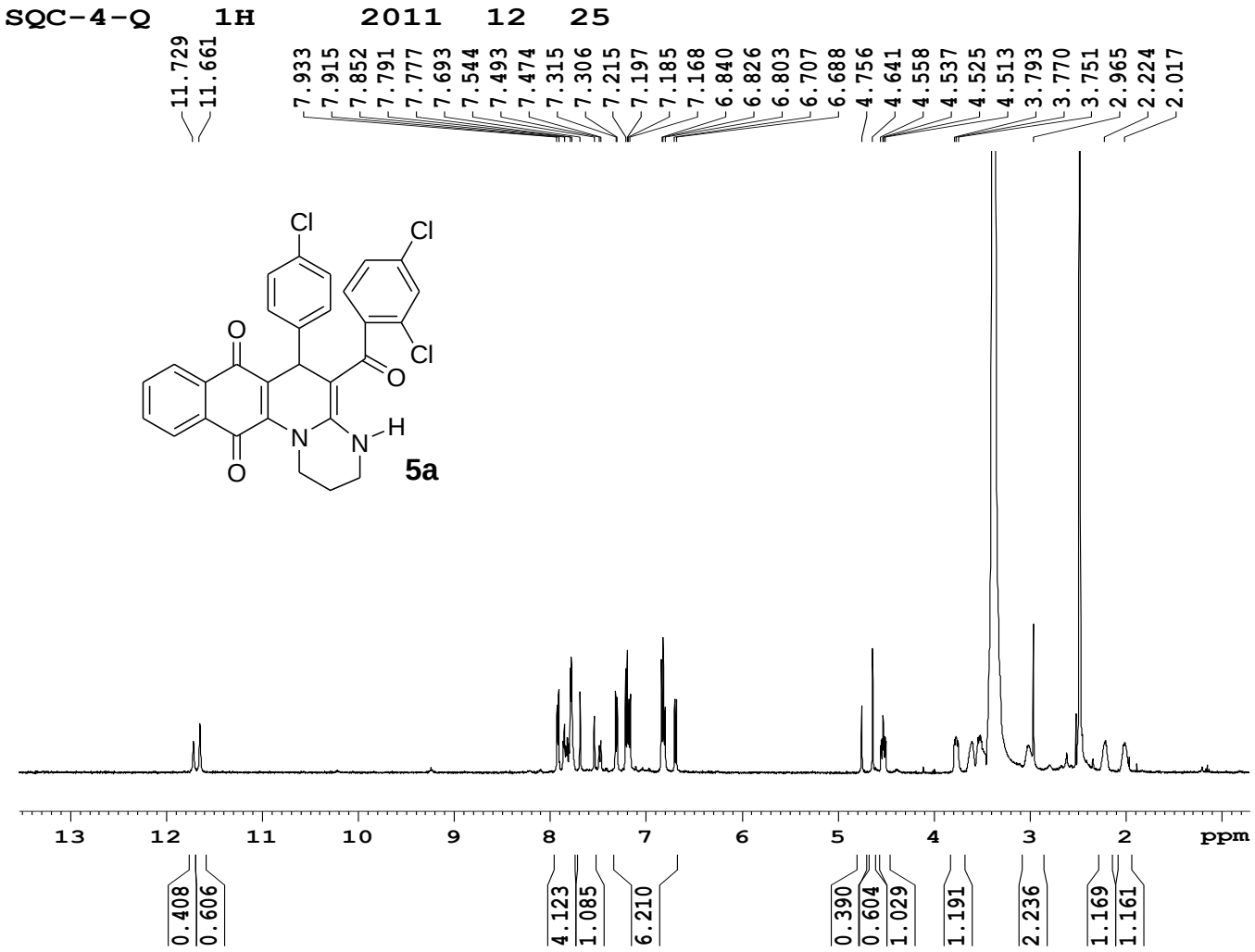
NAME	Sqc-4-x
EXPNO	22
PROCNO	1
Date_	20120402
Time	9.54
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	14126
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	724
DW	15.300 usec
DE	6.00 usec
TE	296.1 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7327069 MHz
WDW	EM
SSB	0
LB	3.00 Hz
GB	0
PC	2.00



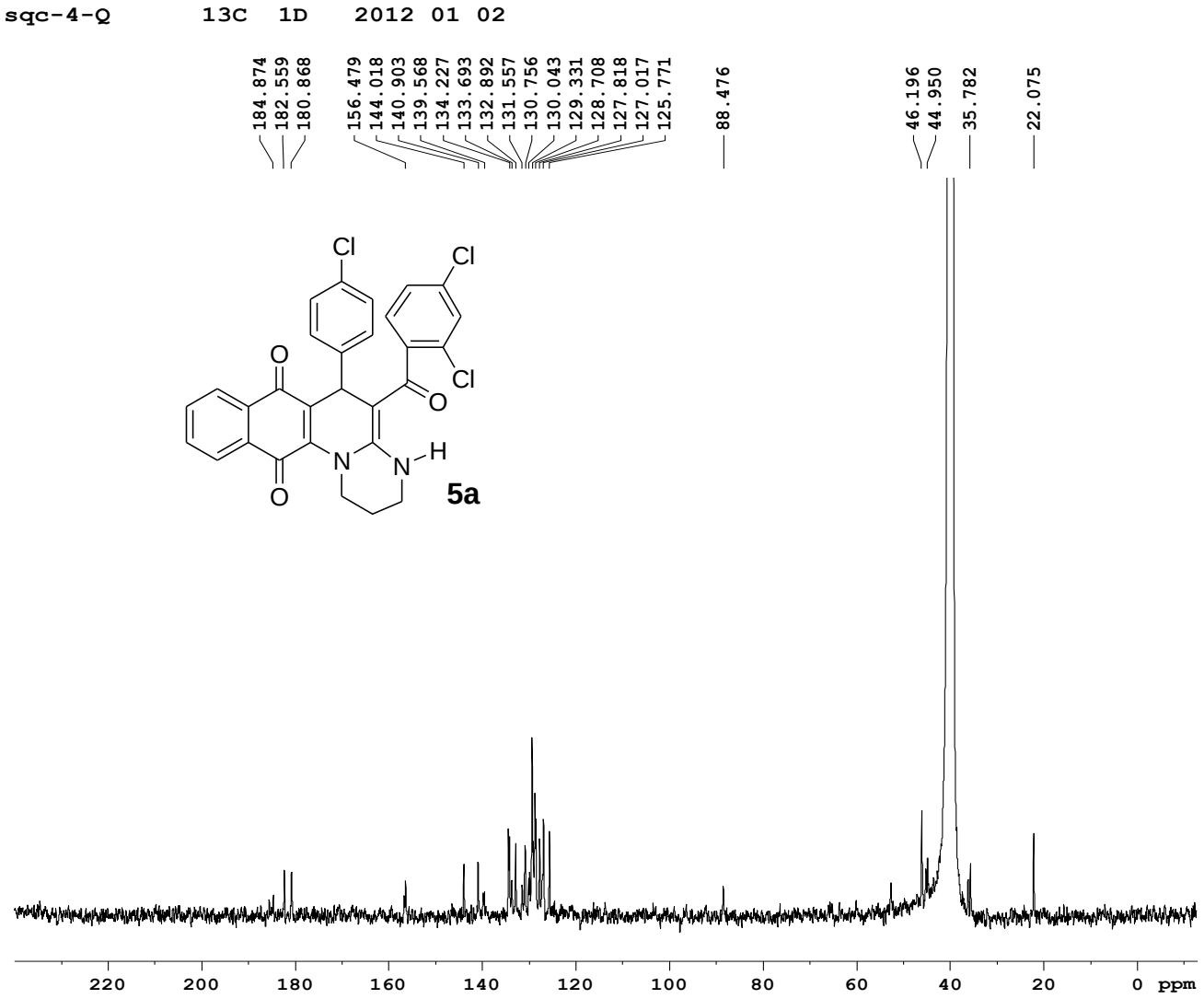

```
NAME          Sqc-4-y-0628
EXPNO                    1
PROCNO                   1
Date_             20120628
Time                 14.09
INSTRUM              av500
PROBHD    5 mm PABBO BB-
PULPROG               zg30
TD                   32768
SOLVENT                DMSO
NS                        8
DS                        1
SWH              10000.000 Hz
FIDRES           0.305176 Hz
AQ               1.6385000 sec
RG                      362
DW                50.000 use
DE                 6.00 use
TE                300.8 K
D1           2.00000000 sec
TD0                       1

======== CHANNEL f1 ======
NUC1                    1H
P1                  13.50 use
PL1                  2.20 dB
SFO1          500.0335010 MHz
SI                    16384
SF            500.0300015 MHz
WDW                     EM
SSB                      0
LB                  0.30 Hz
GB                       0
PC                    2.00
```

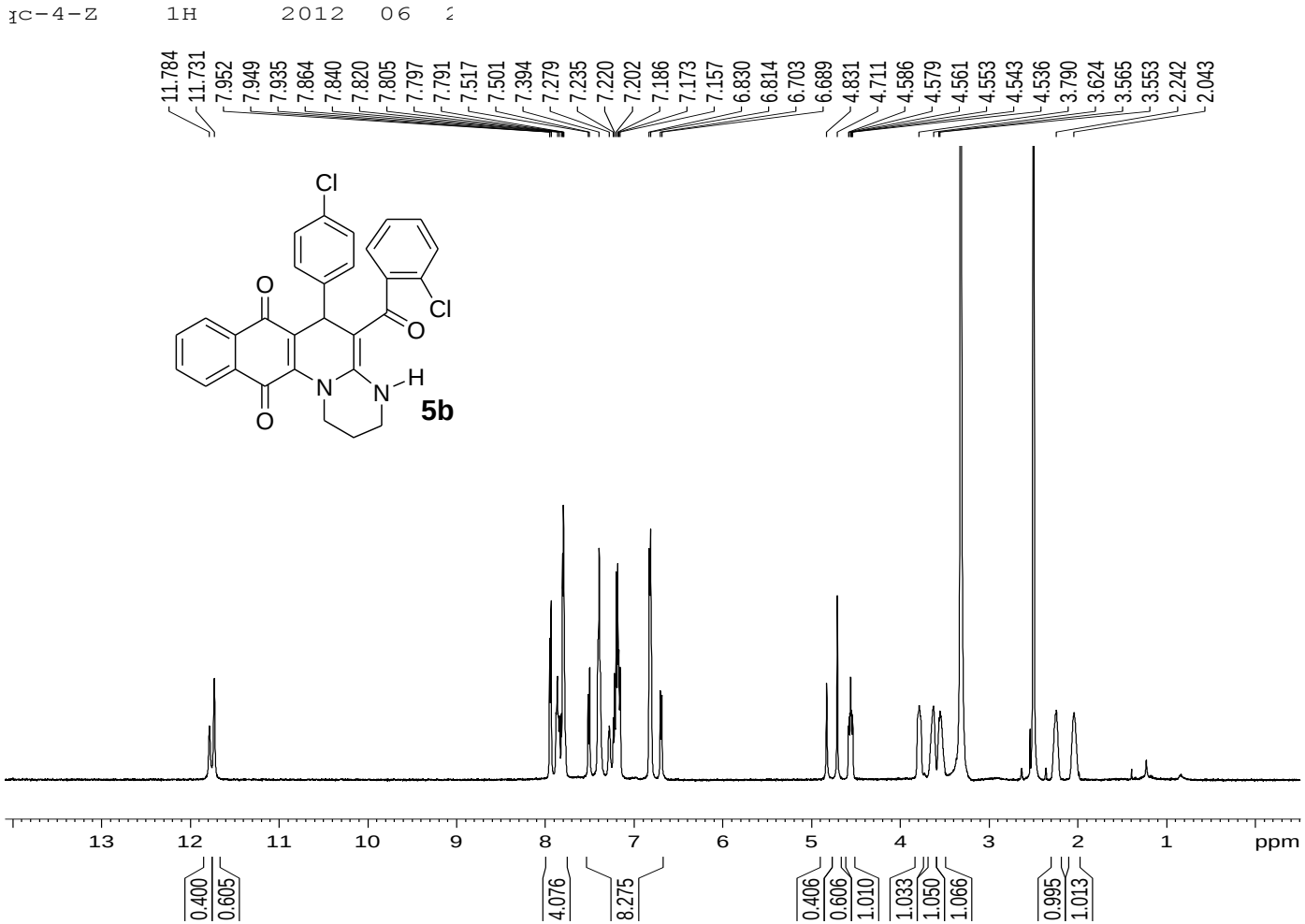


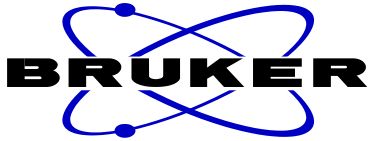


NAME	SQC-4-Q
EXPNO	1
PROCNO	1
Date_	20111225
Time	19.26
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	4
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	161
DW	50.000 usec
DE	6.00 usec
TE	293.3 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	1H
P1	13.50 usec
PL1	2.20 dB
SFO1	500.0335010 MHz
SI	16384
SF	500.0300101 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00

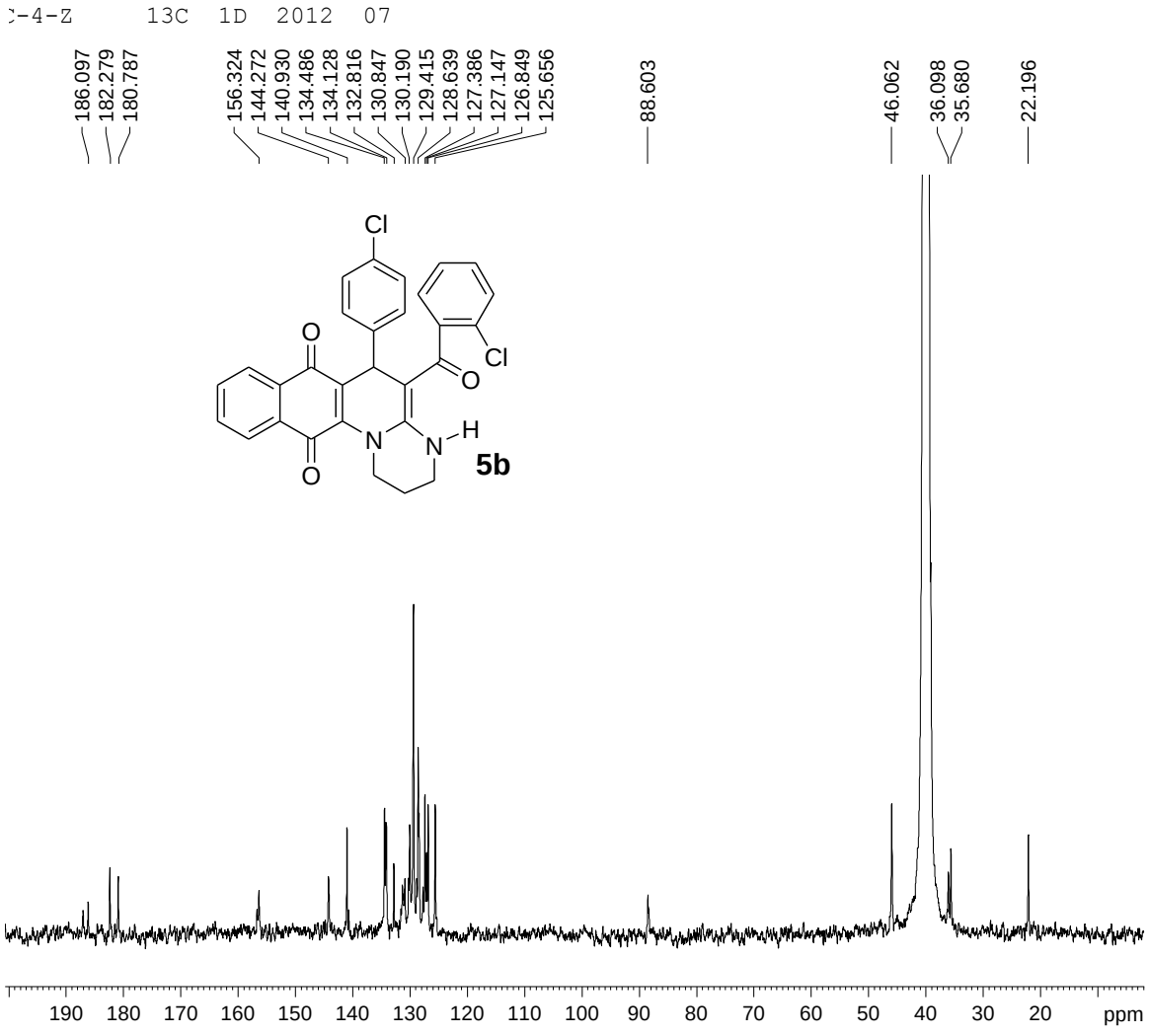


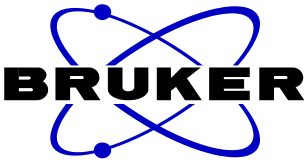
NAME	SQC-4-Q
EXPNO	2
PROCNO	1
Date_	20120103
Time	15.04
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	20000
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 sec
RG	18400
DW	15.300 usec
DE	6.00 usec
TE	296.6 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1
======== CHANNEL f1 ========	
NUC1	13C
P1	9.60 usec
PL1	2.00 dB
SFO1	125.7464750 MHz
======== CHANNEL f2 ========	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 usec
PL2	2.20 dB
PL12	17.66 dB
PL13	17.66 dB
SFO2	500.0355000 MHz
SI	32768
SF	125.7326413 MHz
WDW	EM
SSB	0
LB	10.00 Hz
GB	0
PC	2.00





NAME	Sqc-4-Z
EXPNO	1
PROCNO	1
Date_	20120628
Time	14.18
INSTRUM	av500
PROBHD	5 mm PABBO BB-
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	16
DS	1
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 se
RG	362
DW	50.000 us
DE	6.00 us
TE	300.8 K
D1	2.00000000 se
TD0	1
======== CHANNEL f1 =======	
NUC1	1H
P1	13.50 us
PL1	2.20 dB
SFO1	500.0335010 MH
SI	16384
SF	500.0300015 MH
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	2.00





NAME	SQC-4-Z
EXPNO	2
PROCNO	1
Date_	20120726
Time	6.41
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	10595
DS	2
SWH	32679.738 Hz
FIDRES	0.498653 Hz
AQ	1.0027661 se
RG	512
DW	15.300 us
DE	6.00 us
TE	299.7 K
D1	2.00000000 se
d11	0.03000000 se
DELTA	1.89999998 se
TD0	1
======== CHANNEL f1 =======	
NUC1	13C
P1	12.20 us
PL1	3.00 dB
SFO1	125.7464750 MH
======== CHANNEL f2 =======	
CPDPRG2	waltz16
NUC2	1H
PCPD2	80.00 us
PL2	2.00 dB