Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Synthesis of 4-Quinolones, Benzopyran Derivatives and other Fused Systems Based on the Domino ANRORC Reactions of (*Ortho*-fluoro)-3-benzoylchromones.

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(A) X-Ray data

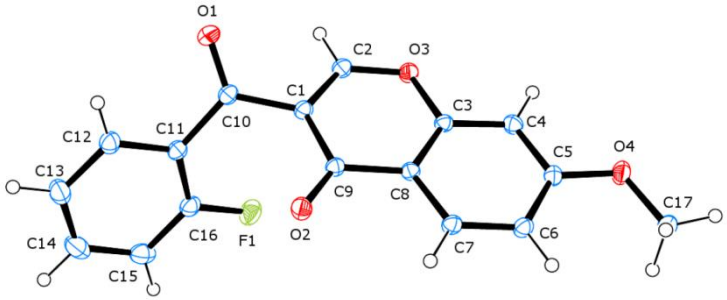


Figure 1. Crystal structure of compound **3e.**

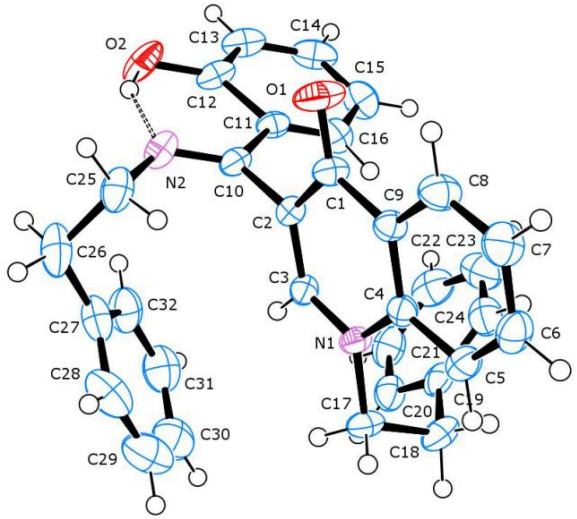


Figure 2. Crystal structure of compound **4a.**

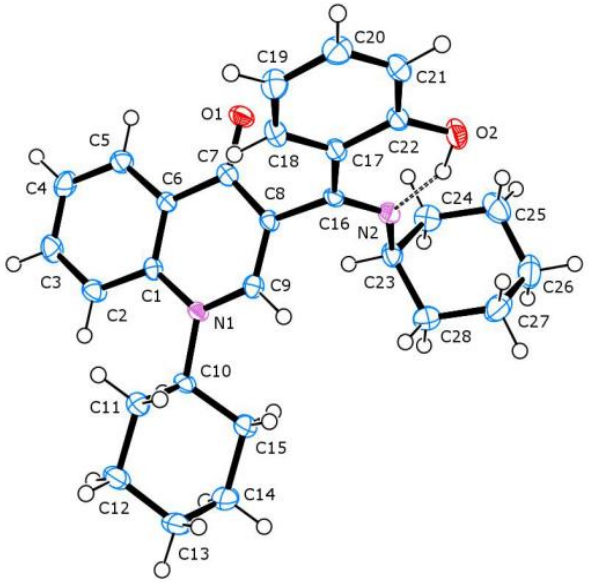


Figure 3. Crystal structure of compound **4b.**

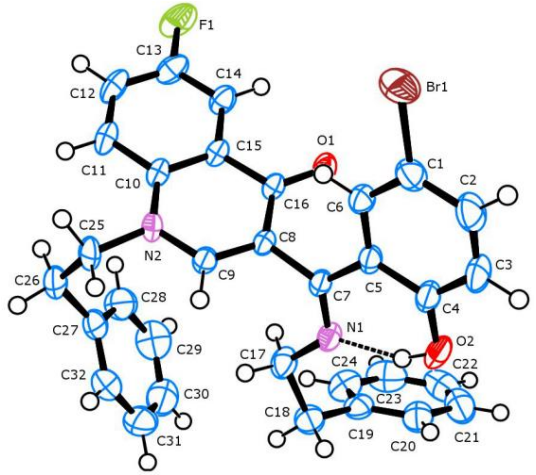


Figure 4. Crystal structure of compound **4j.**

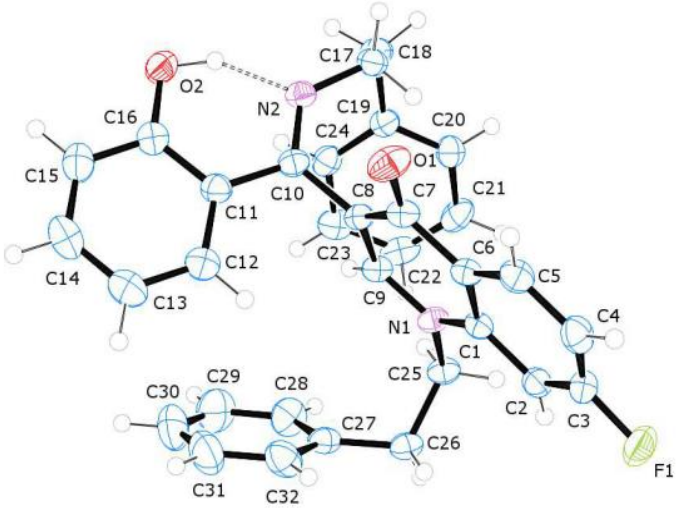


Figure 5. Crystal structure of compound **4l.**

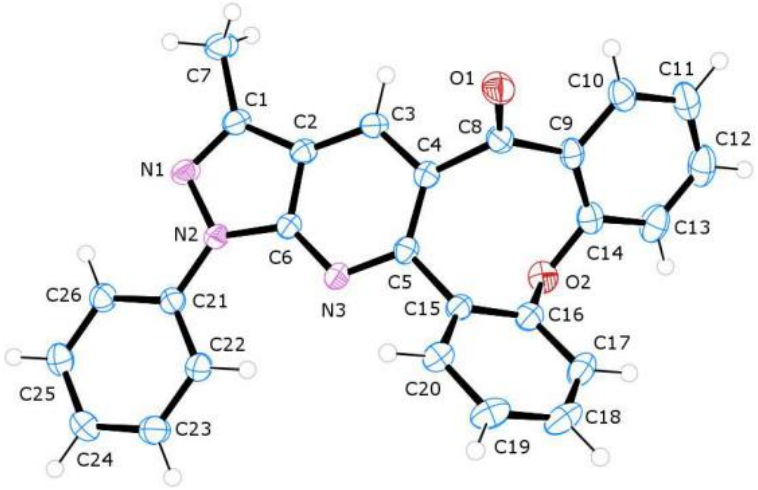


Figure 6. Crystal structure of compound **7a.**

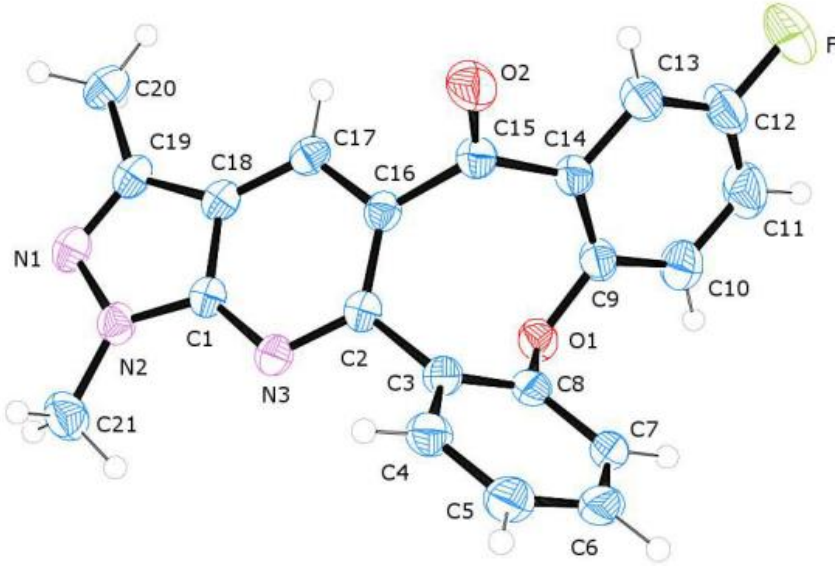


Figure 7. Crystal structure of compound **7c.**

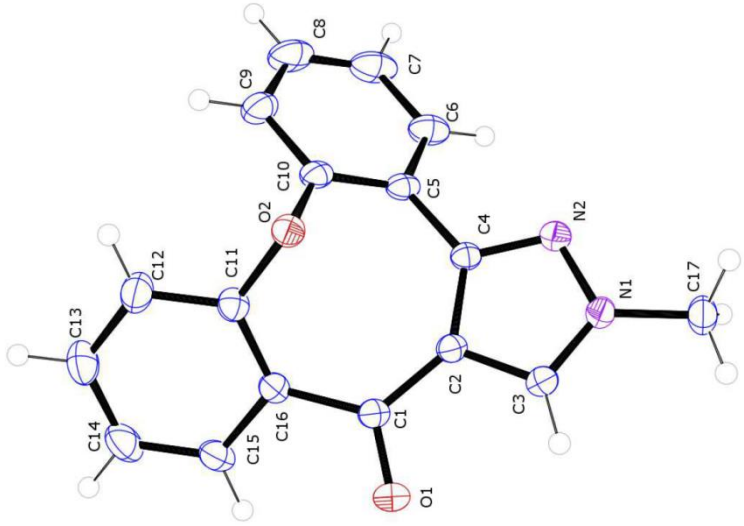


Figure 8. Crystal structure of compound **7e.**

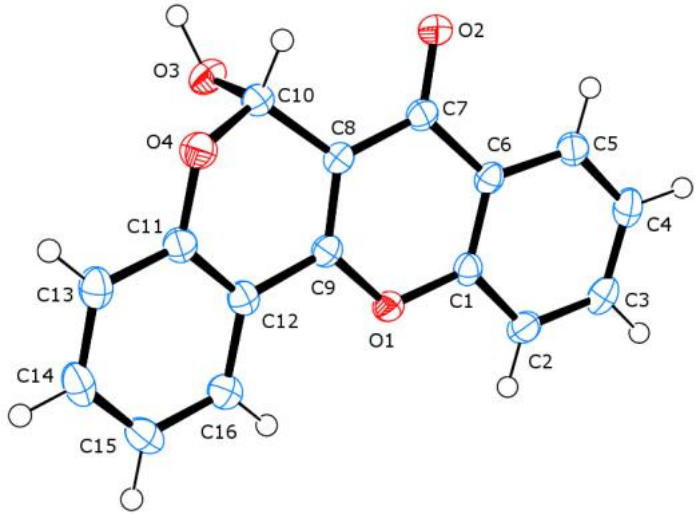
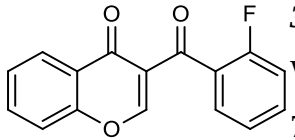


Figure 9. Crystal structure of compound **9a.**

(B) Analytical data

Chromones **3a** and **3b** are known.[1]

1. (a) Y. Zhao, T. F. Chow, R. S. Puckrin, S. E. Alfred, A. K. Korir, C. K. Larive, S. R. Cutler, *Nat. Chem. Biol.* **2007**, *3*, 716-721; (b) S. Yasuhara, T. Masumizu, T. Umeda, M. Kusunoki, S. Kutsuma, C. Oono, K. Iwashita, *jpn. kokai tokkyo koho* **1996**, JP 08193078 A 19960730.



3-(2-fluorobenzoyl)-4H-chromen-4-one 3c.

White solid (2.09 g, 78%), mp 130-131 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.04-7.10 (m, 1H, CH_{Ar}), 7.25 (dt, 1H, ^{3}J = 7.6 Hz, ^{4}J = 1.1 Hz, CH_{Ar}), 7.41-7.54 (m, 3H, CH_{Ar}), 7.68-7.76 (m, 2H, CH_{Ar}), 8.20 (dt, 1H, ^{3}J = 7.8 Hz, ^{4}J = 1.7 Hz, CH_{Ar}), 8.43 (s, 1H, CH_{Ar}).

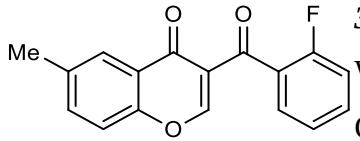
^{19}F NMR (282 MHz, $CDCl_3$): δ = -111.4 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 115.7, 116.0, 118.3 (CH), 124.4 (d, *J* = 3.1 Hz, CH), 125.0, 125.8 (C), 126.2, 126.4 (CH), 127.4 (d, ^{3}J = 12.6 Hz, C), 130.5 (d, *J* = 2.4 Hz, CH), 156.0, 159.5 (CH), 162.1 (d, ^{1}J = 253.5 Hz, CF), 174.5, 188.7 (C).

MS (GC, 70eV): *m/z* (%) = 268 (M^+, 1), 249 (100).

HRMS (EI): Calcd for $C_{16}H_9FO_3$ (M^+) 268.05302. Found 268.05297.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2922 (w), 1664 (m), 1642 (s), 1608 (s), 1563 (s), 1460 (s), 1388 (m), 1340 (m), 1300 (s), 1239 (m), 1207 (m), 1136 (m), 1099 (m), 973 (m), 864 (s), 757 (s), 706 (m), 629 (m).



3-(2-fluorobenzoyl)-6-methyl-4H-chromen-4-one 3d.

White solid (2.256 g, 80%), mp 97-99 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.27 (s, 3H, Me), 6.86-6.93 (m, 1H, CH_{Ar}), 7.06-7.11 (m, 1H, CH_{Ar}), 7.22 (s, 1H, CH_{Ar}), 7.31-7.39 (m, 2H, CH_{Ar}), 7.56 (dt, 1H, ^{3}J = 7 Hz, ^{4}J = 2 Hz,

CH_{Ar}), 7.81-7.82 (m, 1H, CH_{Ar}), 8.24 (s, 1H, CH_{Ar}).

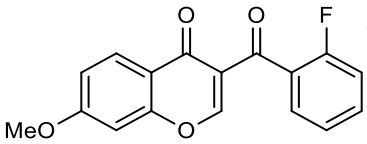
^{19}F NMR (282 MHz, $CDCl_3$): δ = -111.4 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 20.9 (Me), 115.8 (d, ^2J = 22.1 Hz, CH), 118.6 (CH), 124.4 (d, J = 3.4 Hz, CH), 125.3, 125.6 (C), 125.8 (CH), 127.4 (d, ^3J = 12.7 Hz, C), 130.4 (d, J = 1.9 Hz, CH), 134.3 (d, ^3J = 8.8 Hz, CH), 135.6 (CH), 136.4, 154.3 (C), 159.4 (CH), 161.2 (d, ^1J = 254.7 Hz, CF), 174.6, 188.9 (C).

MS (GC, 70eV): *m/z* (%) = 282 (M^+, 70), 263 (42), 253 (100), 235 (39), 187 (25), 135 (28), 95 (38).

HRMS (EI): Calcd for $C_{17}H_{11}FO_3$ (M^+) 282.06867. Found 282.06832.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 1660 (m), 1612 (s), 1555 (m), 1478 (s), 1452 (m), 1372 (w), 1311 (S), 1216 (m), 1154 (w), 1127 (w), 1103 (m), 978 (w), 941 (w), 908 (m), 863 (m), 820 (m), 802 (m), 781 (s), 766 (s), 637 (s).



3-(2-fluorobenzoyl)-7-methoxy-4H-chromen-4-one 3e.

Light brown solid (2.041 g, 88%), mp 154-155 °C. ^1H NMR (300 MHz, $CDCl_3$): δ = 3.90 (s, 3H, OMe), 6.89 (d, 1H, ^4J = 2.4 Hz, CH_{Ar}), 6.97-7.09 (m, 2H, CH_{Ar}), 7.22-7.27 (m, 1H, CH_{Ar}), 7.48-7.56 (m, 1H, CH_{Ar}), 7.72 (dt, 1H, ^3J = 7.6 Hz, ^4J = 1.7 Hz,CH_{Ar}), 8.10 (d, 1H, ^3J = 8.9 Hz, CH_{Ar}), 8.35 (s, 1H, CH_{Ar}).

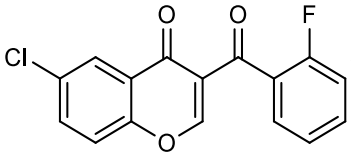
^{19}F NMR (282 MHz, $CDCl_3$): δ = -111.4 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 54.9 (OMe), 100.6 (CH), 115.4 (d, ^2J = 22.3 Hz, CH), 115.9 (CH), 118.4 (C), 124.2 (d, J = 3.2 Hz, CH), 125.7 (C), 127.4 (d, ^3J = 13.5 Hz, C), 127.6 (CH), 130.3 (d, J = 3.1 Hz, CH), 134.2 (d, ^3J = 9.7 Hz, CH), 158.1 (CH), 160.2 (d, ^1J = 254.1 Hz, CF), 172.9, 187.9 (C).

MS (GC, 70eV): *m/z* (%) = 298 (M^+, 61), 279 (35), 269 (100), 251 (28), 151 (25).

HRMS (EI): Calcd for $C_{17}H_{11}FO_4$ (M^+) 298.06359. Found 298.06287.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2852 (w), 1683 (m), 1569 (m), 1613 (s), 1454 (m), 1390 (w), 1356 (w), 1313 (m), 1278 (s), 1203 (m), 1163 (m), 1135 (m), 1089 (m), 1024 (m), 867 (m), 844 (m), 777 (s), 749 (s), 649 (m), 572 (m).



6-chloro-3-(2-fluorobenzoyl)-4H-chromen-4-one 3f.

Yellow solid (2.144 g, 71%), mp 97-99 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.07 (ddd, 1H, ^{3}J = 10.7 Hz, ^{4}J = 8.3 Hz, ^{5}J = 0.9 Hz, CH_{Ar}), 7.24-7.30 (m, 1H, CH_{Ar}), 7.48 (d, 1H, ^{3}J = 8.9 Hz, CH_{Ar}), 7.50-7.58 (m, 1H, CH_{Ar}), 7.65 (dd, 1H, ^{3}J = 8.9 Hz, ^{4}J = 2.6 Hz, CH_{Ar}), 7.72-7.77 (m, 1H, CH_{Ar}), 8.16 (d, 1H, ^{4}J = 2.6 Hz, CH_{Ar}), 8.41 (s, 1H, CH_{Ar}).

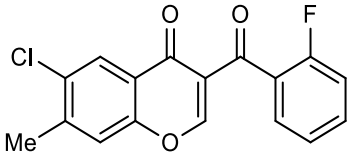
^{19}F NMR (282 MHz, $CDCl_3$): δ = -111.2 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 115.9 (d, ^{2}J = 21.8 Hz, CH), 120.0 (CH), 124.5 (d, J = 3.4 Hz, CH), 125.8 (CH), 128.9 (C), 127.1 (d, ^{3}J = 10.9 Hz, C), 130.5 (CH), 132.3 (C), 134.5, 134.6 (CH), 154.3 (C), 159.4 (CH), 161.2 (d, ^{1}J = 253.7 Hz, CF), 173.4, 188.1 (C).

MS (GC, 70eV): *m/z* (%) = 302 (M^+, 69), 273 (100), 255 (35), 207 (32), 155 (31), 123 (69), 95 (51).

HRMS (EI): Calcd for $C_{16}H_8ClFO_3$ (M^+) 303.98664. Found 303.98572.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3056 (w), 1644 (s), 1608 (s), 1560 (m) 1482 (w), 1463 (s), 1436 (m), 1335 (m), 1315 (s), 1260 (m), 1211 (m), 1140 (m), 1101 (m), 1037 (w), 985 (m), 951 (m), 887 (m), 863 (m), 835 (m), 820 (s), 783 (s), 761 (s), 735 (m), 674 (m), 631 (s).



6-chloro-3-(2-fluorobenzoyl)-7-methyl-4H-chromen-4-one 3g.

Yellow solid (2.149 g, 68%), mp 143-144 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.51 (s, 3H, Me), 7.03-7.10 (m, 1H, CH_{Ar}), 7.24-7.29 (m, 1H, CH_{Ar}), 7.40 (s, 1H, CH_{Ar}), 7.50-7.58 (m, 1H, CH_{Ar}), 7.74 (dt, 1H, ^{3}J = 7.5 Hz, ^{4}J = 1.8 Hz, CH_{Ar}), 8.15 (s, 1H, CH_{Ar}), 8.38 (s, 1H, CH_{Ar}).

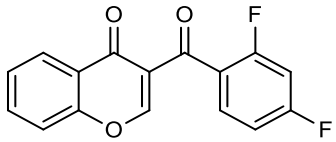
^{19}F NMR (282 MHz, $CDCl_3$): δ = -117.3 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 20.9 (Me), 100.6 (CH), 115.9 (d, ^{2}J = 22.6 Hz, CH), 120.1 (CH), 124.0 (C), 124.4 (d, J = 2.8 Hz, CH), 125.7 (C), 126.1 (CH), 127.2 (d, ^{3}J = 12.2 Hz, C), 130.5 (d, J = 2.0 Hz, CH), 132.9 (C), 134.5 (d, ^{3}J = 7.9 Hz, CH), 143.9, 154.3 (C), 161.2 (d, ^{1}J = 253.6 Hz, CF), 173.3, 188.4 (C).

MS (GC, 70eV): *m/z* (%) = 316 (M^+, 65), 287 (100), 269 (34), 221 (21), 169 (25), 123 (36), 95 (39).

HRMS (EI): Calcd for $C_{17}H_{10}O_3FCl$ (M^+) 316.02970. Found 316.02908.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3040 (w), 1651 (s), 1620 (s), 1547 (m), 1486 (w), 1452 (s), 1412 (m), 1334 (m), 1308 (s), 1259 (m), 1226 (m), 1183 (m), 1145 (m), 1126 (m), 1104 (m), 1039 (w), 1003 (m), 966 (m), 934 (w), 910 (m), 871 (s), 797 (m), 768 (s), 750 (s), 704 (w), 667 (m), 638 (s).



3-(2,4-difluorobenzoyl)-4H-chromen-4-one 3h.

Brown solid (1.71 g, 60%), mp 138-140 ºC. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 6.78-7.03 (m, 3H, CH_{Ar}), 7.43-7.55 (m, 1H, CH_{Ar}), 7.70-7.82 (m, 1H, CH_{Ar}), 8.03-8.10 (m, 1H, CH_{Ar}), 8.20-8.23 (m, 1H, CH_{Ar}), 8.44 (s, 1H, CH_{Ar}).

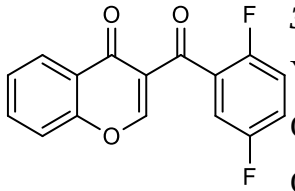
^{19}F NMR (282 MHz, $CDCl_3$): δ = -106.0 (d, ^{3}J = 13.1 Hz, CF), -102.0 (d, ^{3}J = 13.1 Hz, CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 104.3 (t, ^{2}J = 25.9 Hz, CH), 112.0 (dd, ^{2}J = 21.7 Hz, J = 3.8 Hz, CH), 118.3 (CH), 124.0 (dd, ^{3}J = 12.6 Hz, J = 3.8 Hz, C), 124.8, 125.7 (C), 126.2, 126.3 (CH), 132.3 (dd, ^{3}J = 10.6 Hz, J = 3.8 Hz, CH), 138.4 (CH), 156.0 (C), 159.5 (CH), 161.9 (dd, ^{1}J = 237.8 Hz, ^{3}J = 12.6 Hz, CF), 165.9 (dd, ^{1}J = 237.8 Hz, ^{3}J = 12.6 Hz, CF), 174.4 (d, J = 2.2 Hz, C=O), 187.3 (C=O).

MS (GC, 70eV): *m/z* (%) = 286 (M^+, 85), 267 (48), 257 (100), 239 (57), 173 (30), 141 (45).

HRMS (EI): Calcd for $C_{16}H_8F_2O_3$ (M^+) 286.04360. Found 286.04384.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3080 (w), 1640 (s), 1609 (s), 1487 (w), 1464 (s), 1426 (m), 1384 (m), 1348 (m), 1294 (m), 1213 (m), 1138 (m), 1096 (s), 1028 (w), 977 (m), 855 (s), 802 (w), 757 (s), 662 (m), 302 (m).



3-(2,5-difluorobenzoyl)-4H-chromen-4-one 3i.

Yellow solid (2.29 g, 80%), mp 138-140 ºC. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.00-7.08 (m, 1H, CH_{Ar}), 7.17-7.23 (m, 1H, CH_{Ar}), 7.38-7.54 (m, 2H, CH_{Ar}), 7.70-7.75 (m, 2H, CH_{Ar}), 8.20 (dd, 1H, ^{3}J = 8.0 Hz, ^{4}J = 1.6 Hz, CH_{Ar}), 8.45 (s, 1H, CH_{Ar}).

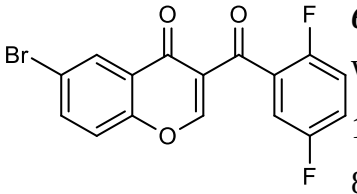
^{19}F NMR (282 MHz, $CDCl_3$): δ = -117.9 (d, J = 17.7 Hz, CF), -117.2 (d, J = 17.7 Hz, CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 116.6 (dd, ^{2}J = 25.5 Hz, J = 3.3 Hz, CH), 117.2 (dd, ^{2}J = 25.5 Hz, J = 8.2 Hz, CH), 118.3 (CH), 120.7 (dd, ^{2}J = 25.5 Hz, J = 9.4 Hz, CH), 124.9, 125.3 (C), 126.3 (d, J = 5.3 Hz, CH), 128.4 (dd, J = 16.7 Hz, J = 7.3 Hz, CH), 134.5 (CH), 156.0 (C), 157.1 (d, ^{1}J = 247.2 Hz, CF), 158.6 (d, J = 242.2 Hz, CF), 159.8 (CH), 174.4, 187.6 (C).

MS (GC, 70eV): *m/z* (%) = 286 (M^+, 80), 267 (57), 257 (100), 239 (66), 173 (35), 141 (22), 121 (39).

HRMS (EI): Calcd for $C_{16}H_8F_2O_3$ (M^+) 286.04360. Found 286.043440.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3068 (w), 1636 (s), 1614 (m), 1566 (m), 1483 (m), 1461 (s), 1422 (m), 1392 (m), 1344 (m), 1316 (m), 1287 (w), 1260 (m), 1230 (m), 1186 (s), 1131 (m), 1000 (w), 961 (w), 929 (w), 891 (m), 833 (s), 773 (s), 750 (s), 700 (m), 637 (m), 591 (w), 540 (m).



6-bromo-3-(2,5-difluorobenzoyl)-4H-chromen-4-one 3j.

White solid (2.73 g, 67%), mp 153-155 ºC. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.00-7.08 (m, 1H, CH_{Ar}), 7.17-7.27 (m, 1H, CH_{Ar}), 7.38-7.44 (m, 2H, CH_{Ar}), 7.80 (dd, 1H, ^3J = 8.0 Hz, ^4J = 2.5 Hz, CH_{Ar}), 8.31 (d, 1H, ^4J = 3 Hz, CH_{Ar}), 8.42 (s, 1H, CH_{Ar}).

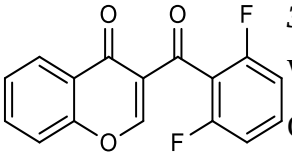
^{19}F NMR (282 MHz, $CDCl_3$): δ = -117.7 (d, *J* = 18 Hz, CF), -117.0 (d, *J* = 18 Hz, CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 116.6 (dd, ^2J = 25.6 Hz, *J* = 3.3 Hz, CH), 117.2 (dd, ^2J = 25.6 Hz, *J* = 8.7 Hz, CH), 119.9 (C), 120.2 (CH), 121.0 (dd, ^2J = 25.6 Hz, *J* = 8.6 Hz, CH), 125.4, 126.1 (C), 128.0 (dd, ^3J = 14.3 Hz, *J* = 7.2 Hz, C), 129.0 (CH), 137.5 (CH), 154.8 (C), 157.2 (d, ^1J = 248.4 Hz, CF), 158.6 (d, ^1J = 280.1 Hz, CF), 159.7 (CH), 173.1 (d, *J* = 2.3 Hz, C=O), 187.0 (C=O).

MS (GC, 70eV): *m/z* (%) = 366 (M^+, 91), 365 (35), 347 (69), 346 (12), 337 (100), 336 (48), 335 (95), 319 (68), 317 (64), 251 (36), 199 (32), 141 (50), 113 (62).

HRMS (EI): Calcd for $C_{16}H_7F_2O_3Br$ (M^+) 363.95411. Found 363.954477.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3067 (w), 1645 (s), 1606 (m), 1557 (m), 1488 (m), 1459 (s), 1423 (m), 1372 (w), 1329 (m), 1307 (m), 1278 (m), 1251 (m), 1192 (m), 1177 (s), 1126 (m), 1093 (m), 1062 (w), 1005 (w), 932 (w), 893 (m), 878 (m), 824 (s), 804 (s), 769 (m), 750 (s), 676 (s), 640 (m), 603 (m), 539 (m).



3-(2,6-difluorobenzoyl)-4H-chromen-4-one 3k.

White solid (1.859 g, 65%), mp 114-116 ºC. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 6.92-6.99 (m, 2H, CH_{Ar}), 7.37-7.48 (m, 2H, CH_{Ar}), 7.51-7.54 (m, 1H, CH_{Ar}), 7.69-7.75 (m, 1H, CH_{Ar}), 8.19 (dd, 1H, ^3J = 7.9 Hz, ^4J = 1.5 Hz, CH_{Ar}), 8.64 (s, 1H,

CH_{Ar}).

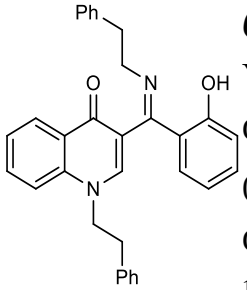
^{19}F NMR (282 MHz, $CDCl_3$): δ = -113.1 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 111.7 (dd, ^2J = 22.8 Hz, J = 2.6 Hz, CH), 118.3 (C), 123.8, 125.1, 126.4 (CH), 132.4 (t, ^3J = 10.4 Hz, CH), 134.5 (CH), 155.9 (C), 160.1 (dd, ^1J = 252.6 Hz, J = 6.5 Hz, CF), 161.6 (CH), 174.2, 185.1 (C).

MS (GC, 70eV): *m/z* (%) = 286 (M^+, 75), 267 (44), 257 (27), 239 (100), 173 (30), 141 (28), 121 (28).

HRMS (EI): Calcd for $C_{16}H_8F_2O_3$ (M^+) 286.04361. Found 286.043442.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3074 (w), 1674 (m), 1656 (s), 1611 (m), 1552 (m), 1459 (s), 1384 (m), 1307 (m), 1286 (m), 1265 (m), 1232 (m), 1206 (m), 1144 (m), 994 (s), 964 (s), 865 (m), 789 (s), 760 (s), 717 (s), 680 (m), 591 (m).



(Z)-3-((2-hydroxyphenyl)(phenethylimino)methyl)-1-phenethylquinolin-4(1H)-one 4a.

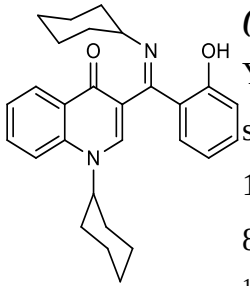
Yellow solid (0.349 g, 74%), mp 172-174 °C. ^1H NMR (300 MHz, DMSO-d_6): δ = 2.85-2.90 (m, 2H, CH_2), 3.10-3.14 (m, 2H, CH_2), 3.34-3.52 (m, 2H, CH_2), 4.55-4.63 (m, 2H, CH_2), 6.62 (t, 1H, ^3J = 7.5 Hz, CH_{Ar}), 6.76-6.83 (m, 2H, CH_{Ar}), 7.07-7.30 (m, 11H, CH_{Ar}), 7.50 (t, 1H, , ^3J = 7.6 Hz, CH_{Ar}), 7.64 (s, 1H, CH_{Ar}), 7.84-8.00 (m, 2H, CH_{Ar}), 8.25 (d, 1H, ^3J = 7.6 Hz, CH_{Ar}), 15.4 (s, 1H, OH).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 34.0, 36.1, 52.3, 53.4 (CH_2), 113.1 (C), 117.1, 117.2, 117.3 (CH), 119.4 (C), 124.1, 126.0, 126.2, 126.6, 128.3, 128.4, 128.7, 128.9, 130.6, 132.0, 132.6 (CH), 137.2, 139.2, 139.7 (C), 143.5 (CH), 162.3, 169.6, 172.9 (C).

MS (GC, 70eV): *m/z* (%) = 472 (M^+, 100), 455 (20), 381 (18), 367 (35), 354 (98), 262 (26), 105 (97).

HRMS (ESI): Calcd for $C_{32}H_{29}N_2O_2$ (M+H) 473.22336. Found 473.22235.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3027 (w), 1712 (w), 1660 (w), 1623 (m), 1605 (m), 1598 (m), 1553 1486 (m), 1451 (m), 1375 (m), 1338 (m), 1307 (m), 1229 (m), 1183 (m), 1149 (m), 1082 (m), 1000 (m), 926 (m), 855 (m), 742 (s), 694 (s), 627 (m), 559 (m).



(Z)-1-cyclohexyl-3-((cyclohexylimino)(2-hydroxyphenyl)methyl)quinolin-4(1H)-one 4b.

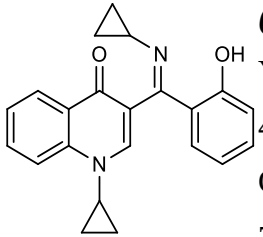
Yellow solid (0.214 g, 50%), mp 230-231 ºC. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 1.20-1.80 (m, 21H, cyclohexyl), 4.73 (br. s, 1H, cyclohexyl), 6.64 (t, 1H, ^{3}J = 8.1 Hz, CH_{Ar}), 6.86 (d, 1H, ^{3}J = 8.1 Hz, CH_{Ar}), 6.86 (d, 1H, ^{3}J = 8.1 Hz, CH_{Ar}), 7.25 (t, 1H, ^{3}J = 7.1 Hz, CH_{Ar}), 7.47 (t, 1H, ^{3}J = 7.1 Hz, CH_{Ar}), 7.83 (t, 1H, ^{3}J = 8.1 Hz, CH_{Ar}), 8.06 (d, 1H, ^{3}J = 9.1 Hz, CH_{Ar}), 8.22-8.29 (m, 2H, CH_{Ar}), 16.09 (s, 1H, OH).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 23.4, 24.6, 25.1, 25.2, 31.4, 31.6, 32.9, 33.4 (cyclohxyl CH_2), 57.7, 58.8 (cyclohexyl CH), 113.9 (C), 116.4, 117.1, 117.5 (CH), 119.8 (C), 123.8, 126.2 (CH), 128.2 (C), 130.5, 131.9, 132.6, 138.9 (CH), 139.9, 163.1, 167.7, 172.9 (C).

MS (GC, 70eV): *m/z* (%) = 428 (M^+, 90), 411 (26), 345 (27), 332 (100), 250 (35). 220 (18), 171 (14).

HRMS (EI): Calcd for $C_{28}H_{32}N_2O_2$ (M^+) 428.24638. Found 428.24655.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3307 (w), 2922 (m), 2848 (w), 1626 (m), 1582 (m), 1554 (m), 1486 (m), 1445 (w), 1361 (m), 1309 (w), 1257 (w), 1216 (m), 1190 (w), 1150 (w), 1099 (w), 1002 (w), 913 (w), 889 (m), 859 (w), 838 (w), 750 (s), 709 (m), 635 (w), 575 (w), 534 (w).



(Z)-1-cyclopropyl-3-((cyclopropylimino)(2-hydroxyphenyl)methyl)quinolin-4(1H)-one 4c.

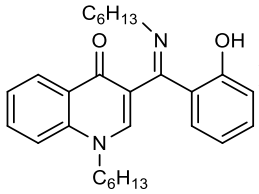
Yellow viscous oil (0.165 g, 48%). ^{1}H NMR (300 MHz, DMSO-d_6): δ = 0.84-1.06 (m, 4H, cyclopropyl, CH_2), 1.24-1.31 (m, 4H, cyclopropyl, CH_2), 2.84-2.94 (m, 1H, cyclopropyl CH), 3.44-3.51 (m, 1H, cyclopropyl CH), 6.64 (t, 1H, ^{3}J = 7.2 Hz, CH_{Ar}), 6.89 (d, 1H, ^{3}J = 7.7 Hz, CH_{Ar}), 7.04-7.07 (m, 1H, CH_{Ar}), 7.14-7.20 (m, 1H, CH_{Ar}), 7.41-7.47 (m, 1H, CH_{Ar}), 7.71-7.78 (m, 2H, CH_{Ar}), 7.99 (d, 1H, ^{3}J = 8.6 Hz, CH_{Ar}), 8.47 (d, 1H, ^{3}J = 8.3 Hz, CH_{Ar}), 14.51 (s, 1H, OH).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 7.8, 10.0 (cyclopropyl CH_2), 33.9, 34.0 (CH), 114.3 (C), 116.8, 117.4, 117.1 (CH), 120.1 (C), 124.1, 125.8 (CH), 125.9 (C), 130.3, 131.3, 132.3 (CH), 141.3 (C), 142.8 (CH), 161.0, 167.6, 173.4 (C).

MS (GC, 70eV): *m/z* (%) = 344 (M^+, 4), 238 (100), 221 (18), 147 (76), 121 (43).

HRMS (ESI): Calcd for $C_{22}H_{21}N_2O_2$ (M+H) 345.15975. Found 345.16062.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2922 (w), 1620 (m), 1586 (s), 1480 (s), 1401 (w), 1339 (m), 1247 (m), 1166 (m), 1113 (w), 1035 (w), 943 (w), 866 (w), 752 (s), 704 (m), 644 (m).



(Z)-1-hexyl-3-((hexylimino)(2-hydroxyphenyl)methyl)quinolin-4(1H)-one 4d.

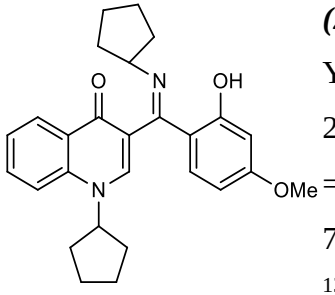
Brown viscous oil (0.281 g, 65%). ^{1}H NMR (300 MHz, $CDCl_3$): δ = 0.53-0.60 (m, 6H, hexyl), 0.94-1.12 (m, 12H, hexyl), 1.37-1.63 (m, 4H, hexyl), 3.19 (br.s, 2H, CH_2 hexyl), 3.88 (t, 2H, ^{3}J = 7.1 Hz, CH_2), 6.30-6.35 (m, 1H, CH_{Ar}), 6.70 (d, 1H, ^{3}J = 8.3 Hz, CH_{Ar}), 6.83 (dd, 1H, ^{3}J = 8.0 Hz, ^{4}J = 1.7 Hz, CH_{Ar}), 6.92-6.97 (m, 1H, CH_{Ar}), 7.16-7.26 (m, 3H, CH_{Ar}), 7.44-7.50 (m, 1H, CH_{Ar}), 8.23 (dd, 1H, ^{3}J = 8.1 Hz, ^{4}J = 1.5 Hz, CH_{Ar}), 15.6 (s, 1H, OH).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 13.8, 14.0 (Me), 22.4, 22.5, 26.4, 27.1, 28.8, 30.5, 31.2, 31.5, 51.2, 53.7 (CH_2), 114.8 (C), 115.6, 116.8, 118.5 (CH), 119.6 (C), 124.4 (CH), 127.1 (C), 127.7, 130.4, 132.3, 132.6 (CH), 139.3 (C), 142.6 (CH), 164.6, 168.2, 174.0 (C).

MS (GC, 70eV): *m/z* (%) = 432 (M^+, 74), 375 (100), 334 (72), 248 (28).

HRMS (EI): Calcd for $C_{28}H_{36}N_2O_2$ (M^+) 432.27713. Found 432.27756.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3038 (w), 2924 (s), 2854 (m), 1621 (s), 1603 (s), 1577 (s), 1552 (s), 1489 (s), 1451 (m), 1413 (m), 1389 (m), 1345 (m), 1311 (m), 1269 (m), 1232 (s), 1176 (m), 1152 (m), 1055 (w), 966 (w), 864 (w), 824 w), 786 (w), 753 (s), 706 (m), 660 (w), 625 (w), 529 (w).



(Z)-1-cyclopentyl-3-((cyclopentylimino)(2-hydroxy-4-methoxyphenyl)methyl)quinolin-4(1H)-one 4e.

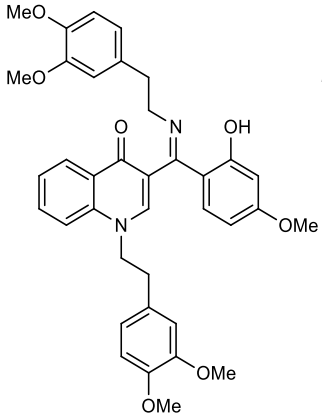
Yellow solid (0.237 g, 55%), mp 220-222 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 1.56-2.03 (m, 14H, cyclopentyl), 2.27-2.36 (m, 2H, cyclopentyl), 3.76 (s, 3H, OMe), 3.83-3.90 (m, 1H, NCH), 4.97-5.04 (m, 1H, NCH), 6.09 (dd, 1H, ^{3}J = 8.8 Hz, ^{4}J = 2.4 Hz, CH_{Ar}), 6.35 (d, 1H, ^{4}J = 2.6 Hz, CH_{Ar}), 6.88 (d, 1H, ^{3}J = 9.0 Hz, CH_{Ar}), 7.43-7.49 (m, 1H, CH_{Ar}), 7.59 (s, 1H, CH_{Ar}), 7.68-7.79 (m, 2H, CH_{Ar}), 8.52-8.56 (m, 1H, CH_{Ar}), 15.8 (br. s, 1H, OH).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 23.8, 24.2, 24.3, 32.2, 32.3, 32.4, 34.2, 35.1 (cyclopentyl CH_2), 55.2 (OMe), 60.2, 61.0 (cyclopentyl CH), 102.3, 105.5 (CH), 112.6, 114.6 (C), 115.6, 124.4 (CH), 127.3 (C), 127.9, 131.8, 132.6, 138.1 (CH), 140.4, 164.2, 166.4, 171.6, 173.8 (C).

MS (GC, 70eV): *m/z* (%) = 430 (M^+, 67), 413 (35), 399 (23), 361 (21), 348 (100), 293 (35). 251 (23), 168 (35).

HRMS (EI): Calcd for $C_{27}H_{30}N_2O_3$ (M^+) 430.22509. Found 430.22451.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2952 (w), 2859 (w), 1581 (s), 1552 (m), 1514 (w), 1485 (m), 1444 (m), 1412 (w), 1345 (m), 1281 (w), 1208 (s), 1169 (m), 1119 (m), 1100 (m), 1035 (m), 957 (m), 856 (w), 831 (m), 796 (m), 752 (s), 708 (m), 645 (w).



(Z)-1-(3,4-dimethoxyphenethyl)-3-(((3,4-dimethoxyphenethyl)imino)(2-hydroxy-4-methoxyphenyl)methyl)quinolin-4(1H)-one 4f.

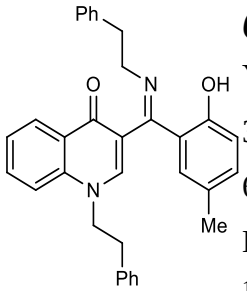
Yellow solid (0.473 g, 76%), mp 91-93 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.85-3.18 (m, 4H, 2xCH_2), 3.28-3.44 (m, 1H, CH_2), 3.60 (s, 3H, OMe), 3.70 (s, 3H, OMe), 3.76 (s, 3H, OMe), 3.77 (s, 3H, OMe), 3.80 (s, 3H, OMe), 3.82-3.86 (m, 1H, CH_2), 3.91-4.02 (m, 1H, CH_2), 4.36-4.50 (m, 1H, CH_2), 6.02 (dd, 1H, ^3J = 8.9 Hz, ^4J = 2.5 Hz, CH_{Ar}), 6.33 (d, 1H, ^4J = 2.5 Hz, CH_{Ar}), 6.40-6.73 (m, 8H, CH_{Ar}), 7.45-7.61 (m, 2H, CH_{Ar}), 7.74-7.81 (m, 1H, CH_{Ar}), 8.50 (dd, 1H, ^3J = 8.0 Hz, ^4J = 1.5 Hz, CH_{Ar}), 16.0 (br. s, 1H, OH).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 34.2, 36.4, 51.1, 54.8 (CH_2), 55.1, 55.5, 55.7, 55.8, 55.9 (OMe), 102.2, 105.3, 111.2, 111.7, 111.8 (CH), 112.3 (C), 112.4 (CH), 113.8 (C), 115.6, 120.6, 121.1, 124.6 (CH), 127.0 (C), 127.9 (CH), 128.6 (C), 131.8 (CH), 132.3 (C), 132.8 (CH), 139.0 (C), 143.2 (CH), 147.3, 148.7, 149.3, 164.2, 167.7, 171.0, 173.9 (C).

MS (GC, 70eV): *m/z* (%) = 622 (M^+, 26), 458 (80), 444 (46), 292 (39), 165 (100).

HRMS (EI): Calcd for $C_{37}H_{38}N_2O_7$ (M^+) 622.26735. Found 622.26549.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2934 (w), 1589 (m), 1550 (m), 1513 (s), 1488 (m), 1462 (m), 1415 (m), 1344 (w), 1260 (s), 1232 (s), 1138 (s), 1060 (w), 1024 (s), 840 (m), 808 (m), 762 (s), 707 (w), 641 (w).



(Z)-3-((2-hydroxy-5-methylphenyl)(phenethylimino)methyl)-1-phenethylquinolin-4(1H)-one 4g.

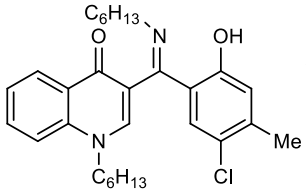
Yellow solid (0.360 g, 74%), mp 172-174 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.07 (s, 3H, Me), 2.91-3.17 (m, 4H, 2xCH_2), 3.29-3.39 (m, 1H, CH_2), 3.68-3.77 (m, 1H, CH_2), 4.19-4.41 (m, 2H, CH_2), 6.65 (s, 1H, CH_{Ar}), 6.71-6.73 (m, 1H, CH_{Ar}), 6.81-6.87 (m, 1H, CH_{Ar}), 6.99-7.01 (m, 3H, CH_{Ar}), 7.05-7.32 (m, 8H, CH_{Ar}), 7.46 (t, 1H, ^{3}J = 7.5 Hz, CH_{Ar}), 7.57 (t, 1H, ^{3}J = 8.5 Hz, CH_{Ar}), 7.73-7.79 (m, 1H, CH_{Ar}), 8.50 (dd, 1H, ^{3}J = 8.1 Hz, ^{3}J = 1.7 Hz, CH_{Ar}), 14.9 (br. s, 1H, OH).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 20.5 (Me), 34.8, 36.9, 53.1, 54.5 (CH_2), 114.9 (C), 115.5, 117.6 (CH), 119.3 (C), 124.3, 126.0 (CH), 126.8 (C), 127.2, 127.6, 128.3, 128.5, 128.9, 129.0, 130.2, 132.7, 133.0 (CH), 136.4, 139.2, 139.9 (C), 142.0 (CH), 160.9, 168.5, 174.1 (C).

MS (GC, 70eV): *m/z* (%) = 486 (M^+, 25), 368 (22), 261 (14), 236 (25), 207 (18), 105 (27).

HRMS (EI): Calcd for $C_{33}H_{31}N_2O_2$ (M+H) 487.238. Found 487.23816.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2920 (w), 1621 (m), 1576 (s), 1551 (m), 1487 (s), 1454 (m), 1414 (w), 1377 (m), 1345 (m), 1284 (m), 1229 (m), 1149 (m), 1083 (w), 1029 (w), 903 (w), 821 (m), 748 (s), 698 (s).



(Z)-3-((5-chloro-2-hydroxy-4-methylphenyl)(hexylimino)methyl)-1-hexylquinolin-4(1H)-one 4h.

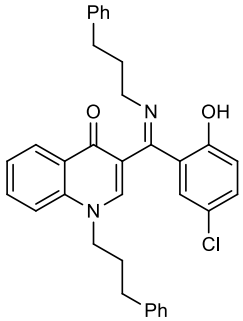
Yellow solid (0.331 g, 69%), mp 128-130 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 0.79-0.87 (m, 6H, hexyl), 1.20-1.37 (m, 12H, hexyl), 1.61-1.72 (m, 2H, hexyl), 1.87 (br.s, 2H, CH_2), 2.24 (s, 3H, Me), 3.22-3.33 (m, 1H, CH_2), 3.51-3.62 (m, 1H, CH_2), 4.16 (t, 2H, ^{3}J = 7.0 Hz, CH_2), 6.78 (s, 1H, CH_{Ar}), 7.02 (s, 1H, CH_{Ar}), 7.41-7.52 (m, 3H, CH_{Ar}), 7.70-7.77 (m, 1H, CH_{Ar}), 8.46 (dd, 1H, ^{3}J = 8.0 Hz, ^{4}J = 1.5 Hz, CH_{Ar}), 15.9 (br. s, 1H, OH).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 13.8, 13.9, 20.2 (Me), 22.3, 22.4, 26.3, 27.0, 28.8, 30.3, 31.2, 31.5 (CH_2), 114.0 (C), 115.7 (CH), 118.4 (C), 120.8, 121.7, 124.5 (CH), 127.1 (C), 127.6, 129.7, 132.7 (CH), 139.3, 140.8 (C), 142.6 (CH), 163.7, 167.3, 173.9 (C).

MS (GC, 70eV): *m/z* (%) = 480 (M^+, 69), 463 (23), 423 (100), 382 (63), 179 (16).

HRMS (ESI): Calcd for $C_{29}H_{37}N_2O_2Cl$ (M+H) 481.26163. Found 481.26226.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3041 (w), 2926 (m), 2855 (w), 1623 (m), 1599 (s), 1577 (s), 1552 (m), 1490 (s), 1461 (m), 1384 (m), 1271 (w), 1231 (s), 1168 (s), 1135 (w), 1055 (w), 1008 (w), 965 (w), 883 (w), 858 (m), 795 (w), 763 (s), 732 (w), 708 (m), 690 (m), 626 (w), 576 (w).



(Z)-3-((5-chloro-2-hydroxyphenyl)((3-phenylpropyl)imino)methyl)-1-(3-phenylpropyl)quinolin-4(1H)-one 4i.

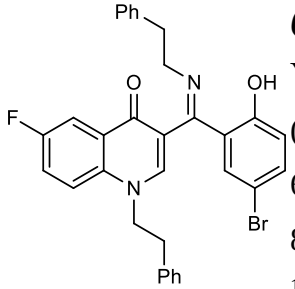
Orange solid (0.441 g, 77%), mp 87-89 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.00-2.32 (m, 4H, 2xCH_2), 2.71-2.77 (m, 4H, 2xCH_2), 3.30-3.41 (m, 1H, CH_2), 3.58-3.71 (m, 1H, CH_2), 4.07-4.22 (m, 2H, CH_2), 6.94 (d, 1H, ^{3}J = 8.9 Hz, CH_{Ar}), 7.07-7.40 (m, 14H, CH_{Ar}), 7.45-7.51 (m, 1H, CH_{Ar}), 7.67-7.77 (m, 1H, CH_{Ar}), 8.51 (dd, 1H, ^{3}J = 8.1 Hz, ^{4}J = 1.6 Hz, CH_{Ar}), 15.4 (s, 1H, OH).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 30.0, 31.7, 32.5, 33.3, 50.5, 52.7 (CH_2), 114.2 (C), 115.6, 120.0 (CH), 120.3, 121.4 (C), 124.6, 125.7, 126.6 (CH), 127.0 (C), 127.7, 128.2, 128.4, 128.7, 129.4, 132.2, 132.8 (CH), 139.3, 139.4, 141.3 (C), 142.2 (CH), 163.0, 167.9, 173.8 (C).

MS (GC, 70eV): *m/z* (%) = 534 (M^+, 13), 443 (100), 430 (14), 91 (47).

HRMS (EI): Calcd for $C_{34}H_{31}N_2O_2Cl$ (M+H) 535.21468. Found 535.21473.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3025 (w), 2924 (w), 1623 (s), 1600 (s), 1576 (s), 1552 (m), 1487 (s), 1415 (w), 1379 (m), 1328 (w), 1287 (m), 1226 (m), 1173 (m), 1087 (w), 1029 (w), 983 (w), 883 (w), 822 (m), 745 (s), 697 (s), 647 (m), 529 (w).



(Z)-3-((5-bromo-2-hydroxyphenyl)(phenethylimino)methyl)-6-fluoro-1-phenethylquinolin-4(1H)-one 4j.

Yellow solid (0.274 g, 48%), mp 200-202 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 2.93-3.11 (m, 4H, 2xCH_2), 3.26-3.37 (m, 1H, CH_2), 3.66-3.76 (m, 1H, CH_2), 4.25 (t, 2H, ^{3}J = 6.8 Hz, CH_2), 6.49 (s, 1H, CH_{Ar}), 6.81 (d, 1H, ^{3}J = 8.8 Hz, CH_{Ar}), 6.96-6.97 (m, 2H, CH_{Ar}), 6.98-6.99 (m, 1H, CH_{Ar}), 7.11-7.28 (m, 9H, CH_{Ar}), 7.48-7.58 (m, 2H, CH_{Ar}), 8.11 (dd, 1H, ^{3}J = 8.6 Hz, ^{4}J = 2.6 Hz, CH_{Ar}), 15.57 (br. s, 1H, OH).

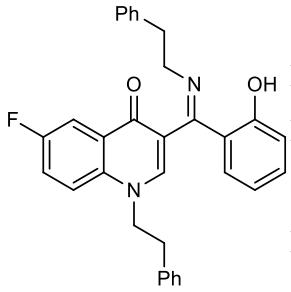
^{19}F NMR (282 MHz, DMSO-d_6): δ = -115.4 (CF).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 34.9, 36.8, 53.2, 55.0 (CH_2), 108.7 (C), 112.5 (d, J = 23 Hz, CH), 113.2 (C), 117.9 (d, J = 8 Hz, CH), 120.2 (CH), 120.9 (C), 121.5 (d, J = 26 Hz, CH), 126.3, 127.5, 128.4, 128.5, 129.1, 132.3, 135.0 (CH), 135.7, 136.1, 139.5 (C), 142.0 (CH), 159.5 (d, J = 249 Hz, CF), 162.6, 167.5, 173.1 (C).

MS (GC, 70eV): *m/z* (%) = 570 (M^+, 30), 568 (32), 450 (31), 360 (32), 310 (35), 105 (100).

HRMS (EI): Calcd for $C_{32}H_{26}N_2O_2FBr$ (M^+) 568.11562. Found 568.11507.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2919 (w), 1619 (m), 1581 (m), 1556 (m), 1489 (m), 1380 (m), 1332 (m), 1281 (m), 1226 (m), 1169 (m), 1081 (w), 1056 (w), 999 (w), 925 (w), 895 (w), 818 (m), 786 (w), 748 (m), 698), 565 (m).



(Z)-6-fluoro-3-((2-hydroxyphenyl)(phenethylimino)methyl)-1-phenethylquinolin-4(1H)-one 4k.

Brown viscous oil (0.382 g, 78%). ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.99 (t, 2H, ^3J = 6.9 Hz, CH_2), 3.10 (t, 2H, ^3J = 6.9 Hz, CH_2), 3.56 (br. s, 1H, CH_2), 3.66-3.76 (m, 1H, CH_2), 4.26 (t, 2H, ^3J = 6.4 Hz, CH_2), 6.53-6.59 (m, 2H, CH_{Ar}), 6.70-6.73 (m, 1H, CH_{Ar}), 6.93-6.97 (m, 3H, CH_{Ar}), 7.12-7.27 (m, 9H, CH_{Ar}), 7.47-7.59 (m, 2H, CH_{Ar}), 8.15 (dd, 1H, ^3J = 8.7 Hz, ^4J = 2.7 Hz, CH_{Ar}), 15.32 (br. s, 1H, OH).

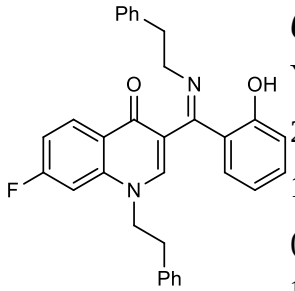
^{19}F NMR (282 MHz, $CDCl_3$): δ = -116.3 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 34.8, 36.7, 53.2, 55.1 (CH_2), 108.7 (C), 112.6 (d, ^2J = 23.4 Hz, CH), 114.0 (C), 117.4 (CH), 117.8 (d, ^3J = 8 Hz, CH), 118.0 (CH), 119.5 (C), 121.3 (d, ^2J = 25.6 Hz, CH), 126.1, 127.5, 128.4 (d, ^3J = 11.3 Hz, CH), 129.1 (d, J = 3.0 Hz, CH), 130.3, 132.2 (CH), 135.6, 136.1, 139.9 (C), 142.3 (CH), 159.4 (d, ^1J = 247.7 Hz, CF), 163.3, 168.1, 173.2 (C).

MS (GC, 70eV): *m/z* (%) = 490 (M^+, 33), 385 (13), 372 (32), 315 (19), 283 (18), 105 (28), 73 (100).

HRMS (EI): Calcd for $C_{32}H_{27}N_2O_2F$ (M+H) 491.21293. Found 491.21309.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3388 (w), 3025 (w), 2927 (w), 1602 (m), 1560 (m), 1490 (s), 1453 (m), 1380 (m), 1335 (m), 1281 (m), 1224 (m), 1175 (m), 1151 (m), 1083 (w), 1030 (w), 895 (m), 815 (m), 748 (s), 697 (s).



(Z)-7-fluoro-3-((2-hydroxyphenyl)(phenethylimino)methyl)-1-phenethylquinolin-4(1H)-one 4l.

Yellow solid (0.196 g, 40%), mp 201-203 ºC. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.96-3.01 (m, 2H, CH_2), 3.07-3.11 (m, 2H, CH_2), 3.30-3.39 (m, 1H, CH_2), 3.73-3.82 (m, 1H, CH_2), 4.07-4.28 (m, 2H, CH_2), 6.46 (s, 1H, CH_{Ar}), 6.53-6.59 (m, 1H, CH_{Ar}), 6.72 (dd, 1H, ^{3}J = 7.9 Hz, ^{4}J = 1.5 Hz, CH_{Ar}), 6.90-6.98 (m, 3H, CH_{Ar}), 7.12-7.27 (m, 11H, CH_{Ar}), 8.47-8.53 (m, 1H, CH_{Ar}), 15.47 (br. s, 1H, OH).

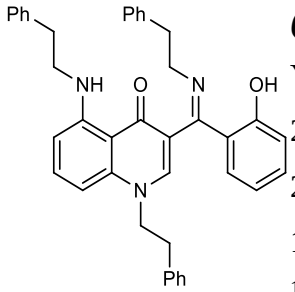
^{19}F NMR (282 MHz, $CDCl_3$): δ = -103.8 (CF).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 34.5, 37.0, 53.3, 55.0 (CH_2), 101.7 (d, *J* = 25.8 Hz, CH), 113.2 (d, *J* = 23.2 Hz, CH), 115.2 (C), 117.7 (d, *J* = 38.6 Hz, CH), 119.6, 123.6 (C), 126.1, 127.5, 128.4, 128.6, 128.7, 129.1, 129.2, 130.3 (CH), 131.0 (d, *J* = 10.1 Hz, CH), 132.2 (CH), 139.9 (C), 140.6 (d, *J* = 11.7 Hz, C), 142.6, 163.2 (C), 165.4 (d, *J* = 251.4 Hz, CF), 168.0, 173.4 (C).

MS (GC, 70eV): *m/z* (%) = 490 (M^+, 13), 434 (12), 403 (20), 373 (14), 347 (52), 315 (100), 283 (67).

HRMS (EI): Calcd for $C_{32}H_{27}N_2O_2F$ (M+H) 491.21293. Found 491.21247.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 1633 (m), 1608 (m), 1495 (w), 1463 (m), 1374 (w), 1330 (w), 1305 (w), 1249 (s), 1187 (w), 1148 (m), 1118 (w), 1084 (w), 1024 (w), 925 (w), 849 (m), 745 (s), 700 (s).



(Z)-3-((2-hydroxyphenyl)(phenethylimino)methyl)-1-phenethyl-5-(phenethylamino)quinolin-4(1H)-one 4m.

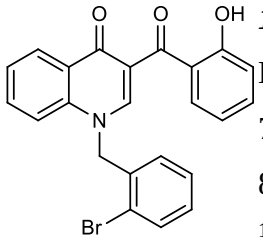
Yellow viscous oil (0.252 g, 41%). ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.96-3.13 (m, 6H, 3xCH_2), 3.37-3.46 (m, 4H, 2xCH_2), 4.09 (br. s, 1H, CH_2), 4.55-4.63 (m, 1H, CH_2), 6.28 (s, 1H, CH_{Ar}), 6.42 (d, 1H, ^{3}J = 7.5 Hz, CH_{Ar}), 6.53-6.59 (m, 2H, CH_{Ar}), 6.78-6.81 (m, 1H, CH_{Ar}), 6.90-7.00 (m, 3H, CH_{Ar}), 7.12-7.31 (s, 14H, CH_{Ar}), 7.46 (t, 1H, ^{3}J = 8.4 Hz, CH_{Ar}), 10.32 (t, 1H, ^{3}J = 4.6 Hz, NH), 15.57 (br. s, 1H, OH).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 34.1, 35.3, 37.0, 44.9, 53.0, 55.5 (CH_2), 99.5, 103.0 (CH), 111.9, 114.7 (C), 117.2, 118.0 (CH), 119.6 (C), 126.1, 126.3, 127.2, 128.3, 128.4, 128.6, 128.7, 129.0, 129.2, 130.5, 132.1, 133.9, 136.6 (CH), 139.4, 139.9 (C), 140.9 (CH), 141.7, 152.3, 163.5, 168.7, 177.8 (C).

MS (GC, 70eV): *m/z* (%) = 591 (M^+, 16), 500 (15), 396 (18), 105 (15), 43 (100).

HRMS (ESI): Calcd for $C_{40}H_{38}N_3O_2$ (M+H) 592.29585. Found 592.29622.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3207 (w), 3026 (w), 2922 (w), 2851 (w), 1631 (m), 1596 (m), 1570 (m), 1513 (m), 1469 (m), 1452 (m), 1303 (m), 1268 (m), 1186 (m), 1152 (m), 1080 (w), 908 (w), 850 (w), 796 (w), 746 (s), 697 (s).



1-(2-bromobenzyl)-3-(2-hydroxybenzoyl)quinolin-4(1H)-one 4n.

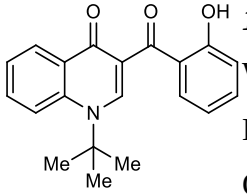
Brown viscous oil (0.225 g, 52%). ^{1}H NMR (300 MHz, DMSO-d_6): δ = 5.68 (br. s, 2H, CH_2), 6.84-6.94 (m, 3H, CH_{Ar}), 7.27-7.34 (m, 2H, CH_{Ar}), 7.39-7.49 (m, 3H, CH_{Ar}), 7.57 (dd, 1H, ^3J = 7.8 Hz, ^4J = 1.6 Hz, CH_{Ar}), 7.69-7.77 (m, 2H, CH_{Ar}), 8.26 (dd, 1H, ^3J = 8.0 Hz, ^4J = 1.5 Hz, CH_{Ar}), 8.60 (br. s, 1H, CH_{Ar}), 11.02 (s, 1H, OH).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 55.8 (CH_2), 116.7, 117.2, 118.8 (CH), 120.9, 121.7, 123.5 (C), 124.8, 126.4, 127.5 (CH), 127.8 (C), 128.3, 129.8, 132.1, 133.0, 133.1, 134.6 (CH), 139.4 (C), 147.6 (CH), 159.1, 173.7, 196.4 (C).

MS (GC, 70eV): *m/z* (%) = 433 (M^+, 33), 385 (13).

HRMS (EI): Calcd for $C_{23}H_{16}BrNO_3$ (M^+) 433.03136. Found 433.03158.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3029 (w), 1615 (m), 1484 (m), 1384 (w), 1347 (m), 1271 (s), 1233 (m), 1145 (m), 1025 (w), 948 (w), 860 (w), 812 (m), 752 (s), 702 (m), 627 (m), 586 (m), 546 (m).



1-(tert-butyl)-3-(2-hydroxybenzoyl)quinolin-4(1H)-one 4o.

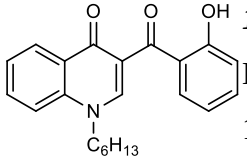
White solid (0.177 g, 55%), mp 230-231 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 1.15 (s, 9H, *t*-Bu), 6.34 (d, 1H, ^3J = 10.6 Hz, CH_{Ar}), 7.01 (d, 1H, ^3J = 8.3 Hz, CH_{Ar}), 7.16 (t, 1H, ^3J = 8.0 Hz, CH_{Ar}), 7.51 (t, 1H, ^3J = 7.0 Hz, CH_{Ar}), 7.77-7.87 (m, 2H, CH_{Ar}), 7.97 (t, 1H, ^3J = 8.1 Hz, CH_{Ar}), 8.06 (d, 1H, ^3J = 7.7 Hz, CH_{Ar}), 8.08 (d, 1H, ^3J = 7.7 Hz, CH_{Ar}), 16.09 (br. s, 1H, OH).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 30.1 (*t*-Bu), 49.6 (*Ct*-Bu), 80.1 (CH), 111.8, 115.8 (C), 118.4, 118.6, 120.9, 123.6, 125.0, 125.2, 133.3, 134.1 (CH), 154.4, 154.6, 155.1, 173.4 (C).

MS (GC, 70eV): *m/z* (%) = 321 (M^+, 30), 264 (64), 249 (100).

HRMS (EI): Calcd for $C_{20}H_{19}NO_3$ (M^+) 321.13594. Found 321.136189.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3303 (w), 2965 (w), 1638 (s), 1604 (m), 1561 (m), 1514 (w), 1465 (s), 1419 (s), 1360 (w), 1327 (w), 1311 (w), 1258 (m), 1205 (m), 1142 (m), 1099 (m), 1023 (w), 949 (w), 900 (w), 869 (m), 840 (m), 755 (s), 709 (s), 673 (m), 614 (m), 555 (m).



1-hexyl-3-(2-hydroxybenzoyl)quinolin-4(1H)-one 4d'.

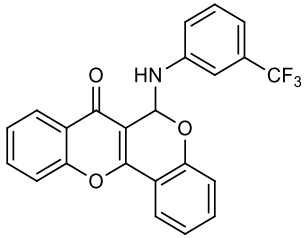
Brown viscous oil (0.325 g, 93%). ^{1}H NMR (250 MHz, $CDCl_3$): δ = 0.84-0.90 (m, 3H, hexyl), 1.23-1.36 (m, 6H, hexyl), 1.86-1.90 (m, 2H, hexyl), 4.14-4.20 (m, 2H, hexyl), 6.78-6.84 (m, 1H, CH_{Ar}), 6.94-6.97 (m, 1H, CH_{Ar}), 7.40-7.50 (m, 3H, CH_{Ar}), 7.66-7.73 (m, 2H, CH_{Ar}), 8.00 (s, 1H, CH_{Ar}), 8.50 (d, 1H, ^3J = 7.9 Hz, CH_{Ar}), 12.05 (s, 1H, OH).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 13.8 (Me), 22.4, 26.3, 28.8, 31.2, 54.0 (CH_2), 115.8, 117.7 (CH), 118.5 (C), 119.9, 120.6, 124.9 (CH), 127.8 (C), 128.6 (CH), 132.8 (C), 133.5, 136.2, 139.0, 146.2 (CH), 162.4, 174.2, 198.7 (C).

MS (GC, 70eV): *m/z* (%) = 349 (M^+, 76), 350 (100).

HRMS (EI): Calcd for $C_{22}H_{23}NO_3$ (M^+) 349.16779. Found 349.16793.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2927 (w), 2856 (w), 1625 (s), 1596 (s), 1548 (m), 1484 (m), 1460 (m), 1418 (w), 1345 (m), 1269 (m), 1227 (m), 1150 (m), 1122 (w), 1033 (w), 979 (w), 907 (m), 866 (w), 755 (m), 724 (s), 643 (m), 595 w), 563 (w).



6-((3-(trifluoromethyl)phenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5a.

Yellow solid (0.303 g, 74%), mp 277-279 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 6.83 (d, 1H, ^3J = 7.7 Hz, C*H*NH), 7.04-7.07 (m, 2H, CHN*H*, CH_{Ar}), 7.14-7.27 (m, 3H, CH_{Ar}), 7.40-7.45 (m, 1H, CH_{Ar}), 7.49-7.58 (m, 3H, CH_{Ar}), 7.84-7.91 (m, 2H, CH_{Ar}), 8.05-8.13 (m, 2H, CH_{Ar}).

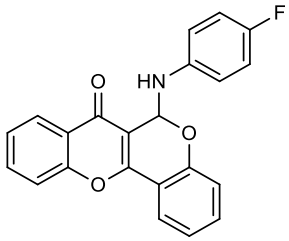
^{19}F NMR (282 MHz, DMSO-d_6): δ = -61.3 (CF_3).

^{13}C NMR (75.5 MHz, DMSO-d_6): δ = 76.9 (C*H*NH), 109.4 (q, *J* = 4 Hz, CH), 110.0 (C), 114.5 (q, *J* = 4 Hz, CH), 115.4 (C), 117.0, 118.3, 122.1 (CH), 123.6 (C), 123.9 (CH), 124.3 (q, ^1J = 272 Hz, CF_3), 125.0, 125.7 (CH), 129.9 (q, ^2J = 31 Hz, CCF_3), 130.2, 133.9, 134.6 (CH), 145.9, 154.3, 155.1, 155.2, 173.5 (C).

MS (GC, 70eV): *m/z* (%) = 409 (M^+, 1), 249 (100).

HRMS (ESI): Calcd for $C_{23}H_{14}NNaO_3F_3$ (M+Na) 432.0818. Found 432.08149.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3297 (w), 1634 (m), 1601 (m), 1563 (m), 1539 (m), 1489 (m), 1466 (m), 1425 (s), 1342 (s), 1312 (m), 1263 (m), 1214 (m), 1166 (m), 1136 (m), 1089 (s), 1068 (s), 1025 (m), 996 (w), 927 (m), 868 (m), 856 (m), 760 (s), 695 (s), 564 (m).



6-((4-fluorophenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5b.

Yellow solid (0.309 g, 84%), mp 274-276 ºC. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 6.71 (d, 1H, ^3J = 8.0 Hz, C*H*NH), 6.86-6.91 (m, 2H, CH_{Ar}), 6.99-7.07 (m, 4H, CHN*H*, CH_{Ar}), 7.23 (t, 1H, ^3J = 8.0 Hz, CH_{Ar}), 7.48-7.58 (m, 2H, CH_{Ar}), 7.83-7.93 (m, 2H, CH_{Ar}), 8.03-8.12 (m, 2H, CH_{Ar}).

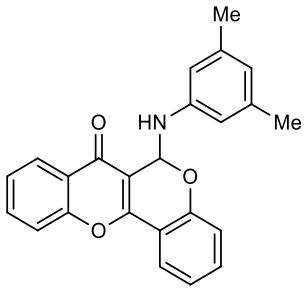
^{19}F NMR (282 MHz, DMSO-d_6): δ = -126.5 (CF).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 77.8 (C*H*NH), 110.3 (C), 114.4 (d, ^3J = 8.0 Hz, CH), 115.3 (CH), 115.5 (C), 115.6 (CH), 118.4 (d, ^3J = 8.0 Hz, CH), 121.7 (CH), 123.7 (C), 123.8, 125.0, 125.6, 133.8, 134.5 (CH), 140.1 (d, ^2J = 50.8 Hz, C), 141.9, 154.5, 155.2 (C), 155.6 (d, ^1J = 232.8 Hz, CF), 173.5 (C=O).

MS (GC, 70eV): *m/z* (%) = 359 (M^+, 1), 249 (100).

HRMS (ESI): Calcd for $C_{22}H_{15}FNO_3$ (M+H) 360.10305. Found 360.1038.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3312 (m), 2958 (w), 1636 (s), 1603 (m), 1563 (w), 1530 (m), 1506 (s), 1464 (s), 1426 (s), 1347 (w), 1306 (m), 1253 (w), 1207 (m), 1149 (m), 1130 (m), 1088 (m), 1027 (w), 921 (s), 867 (m), 825 (s), 760 (s), 700 (m), 658 (m), 603 (m), 554 (m).



6-((3,5-dimethylphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5c.

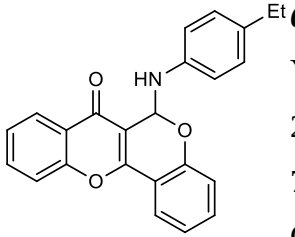
Yellow solid (0.203 g, 55%), mp 278-280 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 2.19 (s, 6H, Me), 6.39 (s, 1H, CH_{Ar}), 6.50 (s, 2H, CH_{Ar}), 6.72 (d, 1H, ^{3}J = 7.7 Hz, C*H*NH), 6.91 (d, 1H, ^{3}J = 8.1 Hz, CH_{Ar}), 7.04 (d, 1H, ^{3}J = 7.7 Hz, C*H*NH), 7.22 (t, 1H, ^{3}J = 7.7 Hz, CH_{Ar}), 7.47-7.57 (m, 2H, CH_{Ar}), 7.84-7.90 (m, 2H, CH_{Ar}), 8.02-8.12 (m, 2H, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 369 (M^+, 10), 249 (100).

HRMS (ESI): Calcd for $C_{24}H_{20}NO_3$ (M+H) 370.14377. Found 370.14331.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3311 (m), 1631 (s), 1601 (s), 1559 (m), 1464 (m), 1424 (s), 1356 (w), 1336 (m), 1309 (m), 1256 (m), 1215 (w), 1185 (m), 1139 (m), 1097 (m), 1025 (w), 994 (w), 917 (m), 866 (m), 851 (m), 820 (m), 756 (s), 690 (m), 624 (w), 535 (m).



6-((4-ethylphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5d.

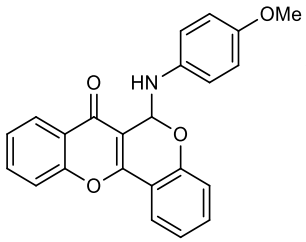
Yellow solid (0.306 g, 83%), mp 248-249 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 1.14 (t, 3H, ^{3}J = 7.6 Hz, Me), 2.44-2.54 (m, 2H, CH_2), 6.70 (d, 1H, ^{3}J = 8.0 Hz, C*H*NH), 6.80 (d, 2H, ^{3}J = 8.4 Hz, CH_{Ar}), 6.92 (m, 1H, ^{3}J = 7.8 Hz, CH_{Ar}), 7.01 (d, 3H, ^{3}J = 8.4 Hz, CHN*H*, CH_{Ar}), 7.22 (t, 1H, ^{3}J = 7.5 Hz, CH_{Ar}), 7.47-7.56 (m, 2H, CH_{Ar}), 7.82-7.91 (m, 2H, CH_{Ar}), 8.02-8.11 (m, 2H, CH_{Ar}).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 16.0 (Me), 27.4 (CH_2), 77.7 (C*H*NH), 110.3 (C), 113.4 (CH), 115.6 (C), 118.4, 118.5, 121.7 (CH), 123.7 (C), 123.8, 125.0, 125.5, 128.2 (CH), 133.5 (C), 133.7, 134.4 (CH), 143.1, 154.5, 154.9, 155.1, 173.5 (C).

MS (GC, 70eV): *m/z* (%) = 369 (M^+, 2), 249 (100).

HRMS (ESI): Calcd for $C_{24}H_{20}NO_3$ (M+H) 370.14377. Found 370.14351.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3318 (m), 2958 (w), 1626 (s), 1559 (m), 1520 (m), 1465 (m), 1428 (s), 1358 (w), 1300 (m), 1254 (m), 1186 (w), 1137 (m), 1097 (m), 947 (w), 920 (m), 866 (m), 823 (m), 759 (s), 700 (m), 601 (m), 534 (m).



6-((4-methoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5e.

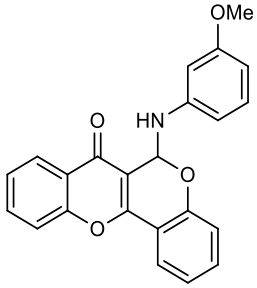
Yellow solid (0.211 g, 57%), mp 238-240 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 3.68 (s, 3H, OMe), 6.66-6.83 (m, 5H, C*H*NH, CH_{Ar}), 7.01-7.04 (m, 1H, CHN*H*), 7.20-7.24 (m, 2H, CH_{Ar}), 7.50-7.54 (m, 2H, CH_{Ar}), 7.86 (br. s, 2H, CH_{Ar}), 8.02-8.11 (m, 2H, CH_{Ar}).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 55.2 (OMe), 78.3 (C*H*NH), 114.4, 114.5 (CH), 115.6 (C), 118.3, 118.4, 121.7 (CH), 123.7 (C), 123.8, 125.0, 125.5, 133.7, 134.4 (CH), 139.1, 152.3, 154.6, 154.8, 155.1, 173.5 (C).

MS (GC, 70eV): *m/z* (%) = 371 (M^+, 3), 249 (100).

HRMS (ESI): Calcd for $C_{23}H_{18}NO_4$ (M+H) 372.12303. Found 372.12293.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3328 (m), 1637 (s), 1601 (m), 1552 (w), 1509 (s), 1462 (m), 1424 (s), 1342 (w), 1292 (m)1230 (s), 1209 (m), 1136 (m), 1097 (m), 1036 (m), 922 (m), 852 (m), 814 (s), 759 (s), 700 (s), 655 (m), 551 (m).



6-((3-methoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5f.

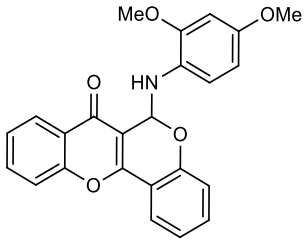
Yellow solid (0.226 g, 61%), mp 239-241 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 3.70 (s, 3H, OMe), 6.31-6.35 (m, 1H, CH_{Ar}), 6.43-6.50 (m, 2H, CH_{Ar}), 6.72 (d, 1H, ^{3}J = 7.7 Hz, C*H*NH), 7.03-7.12 (m, 3H, CHN*H*, CH_{Ar}), 7.23 (t, 1H, ^{3}J = 7.5 Hz, CH_{Ar}), 7.48-7.58 (m, 2H, CH_{Ar}), 7.83-7.93 (m, 2H, CH_{Ar}), 8.03-8.13 (m, 2H, CH_{Ar}).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 54.7 (OMe), 77.4 (C*H*NH), 99.3, 103.9, 106.1 (CH), 110.2, 115.5 (C), 118.4, 118.5, 121.8 (CH), 123.9 (C), 123.9, 125.0, 125.6, 129.8, 133.7, 134.5 (CH), 146.6, 154.5, 155.0, 155.1, 160.2, 173.5 (C).

MS (GC, 70eV): *m/z* (%) = 371 (M^+, 3), 249 (100).

HRMS (ESI): Calcd for $C_{23}H_{18}NO_4$ (M+H) 372.12303. Found 372.12329.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3309 (m), 1632 (s), 1598 (s), 1559 (m), 1487 (m), 1464 (m), 1429 (s), 1359 (w), 1313 (m), 1255 (m), 1227 (w), 1203 (m), 1161 (m), 1099 (m), 1044 (m), 925 (m), 858 (m), 829 (m), 756 (s), 686 (s), 662 (m), 532 (m).



6-((2,4-dimethoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5g.

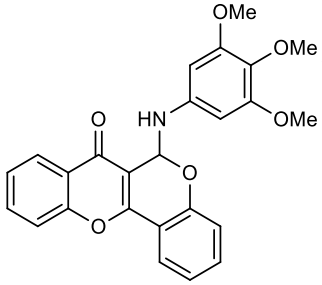
Black solid (0.120 g, 30%), mp 214-216 ^{o}C. ^{1}H NMR (300 MHz, DMSO-*d*$_6$): δ = 3.62 (s, 3H, OMe), 3.71 (s, 3H, OMe), 5.93 (d, 1H, ^{3}J = 8.2 Hz, CH_{Ar}), 6.49-6.52 (m, 2H, CH_{Ar}), 6.69 (d, 1H, ^{3}J = 8.0 Hz, C*H*NH), 6.99 (d, 1H, ^{3}J = 8.0 Hz, CHN*H*), 7.15-7.23 (m, 2H, CH_{Ar}), 7.46-7.55 (m, 2H, CH_{Ar}), 7.81-7.87 (m, 2H, CH_{Ar}), 8.00-8.11 (m, 2H, CH_{Ar}).

^{13}C NMR (62.9 MHz, DMSO-*d*$_6$): δ = 55.2, 55.2 (OMe), 78.1 (C*H*NH), 99.2, 104.2 (CH), 110.1 (C), 112.2 (CH), 115.9 (C), 118.2, 121.7, 123.9, 125.3 (CH), 128.3, 133.5, 134.2, 147.5, 152.7, 154.4, 155.2, 173.8 (C).

MS (GC, 70eV): *m/z* (%) = 401 (M^{+}, 4), 249 (100).

HRMS (ESI): Calcd for $C_{24}H_{20}NO_5$ (M+H) 402.1336. Found 402.13361.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3352 (s), 1637 (s), 1606 (m), 1564 (w), 1524 (m), 1465 (m), 1425 (s), 1312 (w), 1259 (m), 1205 (s), 1144 (m), 1095 (m), 1033 (m), 921 (m), 830 (m), 754 (s), 698 (m), 617 (w).



6-((3,4,5-trimethoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5h.

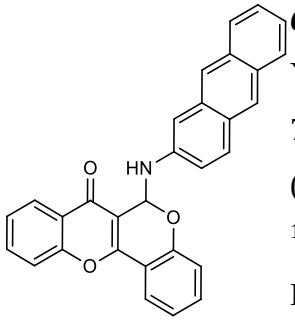
Yellow solid (0.302 g, 70%), mp 265-267 ^{o}C. ^{1}H NMR (300 MHz, DMSO-*d*$_6$): δ = 3.57 (s, 3H, OMe), 3.74 (s, 6H, 2xOMe), 6.18 (s, 2H, CH_{Ar}), 6.74 (d, 1H, ^{3}J = 7.4 Hz, C*H*NH), 6.95 (d, 1H, ^{3}J = 7.4 Hz, CH_{Ar}), 7.08 (d, 1H, ^{3}J = 8.2 Hz, C*H*NH), 7.22 (t, 1H, ^{3}J = 7.4 Hz, CH_{Ar}), 7.50-7.57 (m, 2H, CH_{Ar}), 7.84-7.92 (m, 2H, CH_{Ar}), 8.03-8.12 (m, 2H, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 431 (M^{+}, 3), 249 (100).

HRMS (ESI): Calcd for $C_{25}H_{22}NO_6$ (M+H) 432.14416. Found 432.14418.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3322 (m), 2938 (w), 1638 (s), 1600 (s), 1563 (m), 1530 (m), 1509 (m), 1456 (s), 1422 (s), 1348 (w), 1310 (w), 1236 (s), 1196 (s), 1121 (s), 1101 (s), 1010 (m), 912 (m), 883 (m), 850 (m), 804 (m), 757 (s), 705 (m), 651 (m).



6-(anthracen-2-ylamino)chromeno[4,3-b]chromen-7(6H)-one 5i.

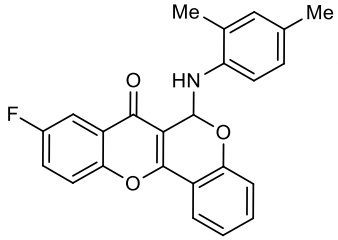
Yellow solid (0.238 g, 54%), mp 297-298 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 6.99 (d, 1H, ^{3}J = 7.7 Hz, C*H*NH), 7.07-7.13 (m, 2H, CHN*H*, CH_{Ar}), 7.25-7.30 (m, 1H, CH_{Ar}), 7.37-7.61 (m, 6H, CH_{Ar}), 7.91-8.02 (m, 5H, CH_{Ar}), 8.10-8.16 (m, 2H, CH_{Ar}), 8.38 (d, 2H, ^{3}J = 14.9 Hz, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 441 (M^+, 1), 249 (100), 193 (47), 165 (25).

HRMS (ESI): Calcd for $C_{30}H_{20}NO_3$ (M+H) 442.14377. Found 442.14405.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3329 (m), 1623 (s), 1602 (m), 1548 (m), 1462 (m), 1422 (s), 1353 (m), 1323 (m), 1272 (w), 1229 (m), 1204 (m), 1183 (m), 1124 (m), 1092 (m), 998 (w), 946 (w), 913 (m), 867 (s), 812 (m), 776 (m), 760 (s), 741 (s), 686 (m), 609 (m), 584 (m), 566 (m), 538 (m).



6-((2,4-dimethylphenyl)amino)-9-fluorochromeno[4,3-b]chromen-7(6H)-one 5j.

Yellow solid (0.143 g, 37%), mp 240-242 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 1.89 (s, 3H, Me), 2.19 (s, 3H, Me), 6.00 (t, 1H, ^{3}J = 8.2 Hz, CH_{Ar}), 6.67 (d, 1H, ^{3}J = 7.8 Hz, C*H*NH), 6.82 (br. s, 1H, CH_{Ar}), 6.95-7.06 (m, 2H, CHN*H*, CH_{Ar}), 7.17-7.24 (m, 2H, CH_{Ar}), 7.47-7.56 (m, 1H, CH_{Ar}), 7.75-8.05 (m, 4H, CH_{Ar}).

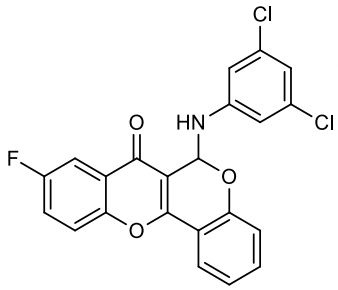
^{19}F NMR (282 MHz, DMSO-d_6): δ = -115.5 (CF).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 387 (M^+, 3), 267 (100), 121 (19).

HRMS (ESI): Calcd for $C_{24}H_{19}NFO_3$ (M+H) 388.13435. Found 388.13504.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3353 (w), 1633 (s), 1603 (s), 1565 (m), 1515 (m), 1478 (s), 1454 (s), 1410 (s), 1367 (m), 1318 (m), 1247 (m), 1212 (m), 1187 (m), 1134 (m), 1088 (m), 1010 (w), 954 (w), 918 (m), 861 (m), 823 (m), 807 (m), 774 (s), 757 (s), 744 (s), 700 (m), 659 (m).



6-((3,5-dichlorophenyl)amino)-9-fluorochromeno[4,3-b]chromen-7(6H)-one 5k.

White solid (0.304 g, 71%), mp 285-286 °C. ^{1}H NMR (300 MHz, DMSO-*d*$_6$): δ = 6.83 (d, 1H, ^{3}J = 7.6 Hz, C*H*NH), 6.90 (br. s, 3H, CH_{Ar}), 7.10 (d, 1H, ^{3}J = 8.1 Hz, CHN*H*), 7.25 (t, 1H, ^{3}J = 7.2 Hz, CH_{Ar}), 7.51-7.60 (m, 2H, CH_{Ar}), 7.78-7.83 (m, 2H, CH_{Ar}), 7.96-8.00 (m, 1H, CH_{Ar}), 8.06 (m, 1H, CH_{Ar}).

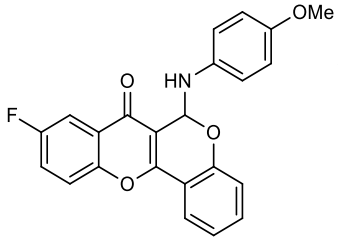
^{19}F NMR (282 MHz, DMSO-*d*$_6$): δ = -114.9 (CF).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 427 (M^+, 1), 267 (100).

HRMS (ESI): Calcd for $C_{22}H_{11}NCl_2FO_3$ (M+H) 426.01055. Found 426.01175.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3290 (m), 1626 (m), 1580 (s), 1556 (s), 1479 (m), 1446 (m), 1409 (m), 1356 (m), 1272 (w), 1253 (m), 1209 (m), 1129 (m), 1105 (m), 1088 (m), 1014 (w), 989 (w), 961 (m), 923 (m), 872 (m), 824 (m), 773 (m), 763 (s), 746 (m), 668 (m), 611 (m).



9-fluoro-6-((4-methoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5l.

Yellow solid (0.187 g, 48%), mp 249-251 °C. ^{1}H NMR (300 MHz, DMSO-*d*$_6$): δ = 3.68 (s, 3H, OMe), 6.66 (d, 1H, ^{3}J = 7.6 Hz, C*H*NH), 6.77-6.86 (m, 5H, CH_{Ar}), 7.02 (d, 1H, ^{3}J = 8.2 Hz, CHN*H*), 7.22 (m, 1H, ^{3}J = 7.6 Hz, CH_{Ar}), 7.51 (t, 1H, ^{3}J = 7.0 Hz, CH_{Ar}), 7.76-7.90 (m, 2H, CH_{Ar}), 7.95-8.09 (m, 2H, CH_{Ar}).

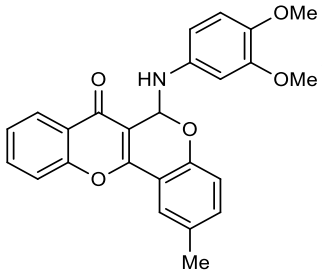
^{19}F NMR (282 MHz, DMSO-*d*$_6$): δ = -115.2 (CF).

^{13}C NMR (62.9 MHz, DMSO-*d*$_6$): δ = 55.2 (OMe), 77.2 (C*H*NH), 109.7 (d, *J* = 24 Hz, CH), 109.8 (C), 114.5, 114.6 (CH), 115.4 (C), 118.4 (CH), 121.2 (d, *J* = 9 Hz, CH), 121.7 (CH), 122.4 (d, *J* = 25 Hz, CH), 123.8 (CH), 124.9 (d, *J* = 7 Hz, C), 133.8 (CH), 139.1, 151.6, 152.3, 154.6, 155.2 (C), 159.0 (d, *J* = 245 Hz, CF), 172.8 (C).

MS (GC, 70eV): *m/z* (%) = 389 (M^+, 3), 267 (100).

HRMS (ESI): Calcd for $C_{23}H_{17}FNO_4$ (M+H) 390.11361. Found 390.11406.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3310 (m), 1626 (s), 1614 (s), 1599 (s), 1581 (m), 1558 (s), 1510 (s), 1479 (s), 1462 (s), 1410 (s), 1347 (w), 1313 (w), 1273 (m), 1232 (s), 1208 (s), 1178 (m), 1135 (s), 1092 (m), 1026 (m), 955 (w), 880 (m), 818 (s), 774 (s), 761 (s), 747 (s), 650 (w), 583 (m), 555 (m).



6-((3,4-dimethoxyphenyl)amino)-2-methylchromeno[4,3-b]chromen-7(6H)-one 5m.

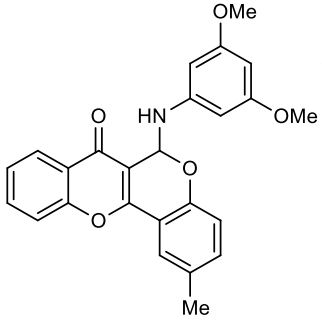
Yellow solid (0.249 g, 60%), mp 258-260 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 2.38 (s, 3H, Me), 3.67 (s, 3H, OMe), 3.69 (s, 3H, OMe), 6.44-6.46 (m, 2H, CH_{Ar}), 6.64 (d, 1H, ^{3}J = 7.8 Hz, C*H*NH), 6.74 (d, 1H, ^{3}J = 7.8 Hz, CH_{Ar}), 6.81 (d, 1H, ^{3}J = 7.8 Hz, CH_{Ar}), 6.94 (d, 1H, ^{3}J = 7.8 Hz, CHN*H*), 7.29-7.33 (m, 1H, CH_{Ar}), 7.51-7.56 (m, 1H, CH_{Ar}), 7.83-7.7.91 (m, 3H, CH_{Ar}), 8.09 (d, 1H, ^{3}J = 7.4 Hz, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 415 (M^+, 3), 263 (100).

HRMS (ESI): Calcd for $C_{25}H_{22}NO_5$ (M+H) 416.14925. Found 416.14892.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3312 (m), 1635 (s), 101 (m), 1515 (m), 1463 (s), 1429 (s), 1355 (w), 1318 (m), 1296 (w), 1257 (m), 1227 (s), 1202 (s), 1168 (m), 1134 (s), 1106 (s), 1028 (m), 928 (m), 910 (m), 859 (m), 828 (s), 786 (m), 757 (s), 702 (m), 670 (m).



6-((3,5-dimethoxyphenyl)amino)-2-methylchromeno[4,3-b]chromen-7(6H)-one 5n.

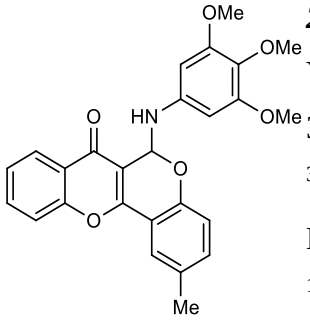
Yellow solid (0.203 g, 49%), mp 268-270 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 2.38 (s, 3H, Me), 3.68 (s, 6H, 2xOMe), 5.92 (t, 1H, ^{4}J = 2.0 Hz, CH_{Ar}), 6.04 (d, 2H, ^{4}J = 2.0 Hz, CH_{Ar}), 6.67 (d, 1H, ^{3}J = 7.7 Hz, C*H*NH), 6.96 (d, 1H, ^{3}J = 8.3 Hz, CH_{Ar}), 7.02 (d, 1H, ^{3}J = 7.7 Hz, CHN*H*), 7.30-7.34 (m, 1H, CH_{Ar}), 7.51-7.57 (m, 1H, CH_{Ar}), 7.83-7.7.93 (m, 3H, CH_{Ar}), 8.10 (d, 1H, ^{3}J = 8.1 Hz, CH_{Ar}).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 20.2 (Me), 54.8 (OMe), 77.1, 90.8, 92.2 (CH), 110.3, 115.3 (C), 118.2, 118.4, 123.5 (CH), 123.7 (C), 125.0, 125.6 (CH), 130.9 (C), 134.5 (CH), 147.2, 152.4, 155.2, 161.1, 173.5 (C).

MS (GC, 70eV): *m/z* (%) = 415 (M^+, 3), 263 (100).

HRMS (ESI): Calcd for $C_{25}H_{22}NO_5$ (M+H) 416.14925. Found 416.14974.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3317 (m), 1634 (m), 1596 (s), 1564 (s), 1540 (m), 1465 (s), 1429 (s), 1343 (w), 1296 (w), 1224 (w), 1195 (s), 1175 (m), 1144 (s), 1109 (s), 1059 (m), 1001 (m), 928 (m), 910 (m), 860 (s), 812 (s), 786 (m), 758 (s), 705 (m), 677 (s), 621 (m), 560 (m).



2-methyl-6-((3,4,5-trimethoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5o.

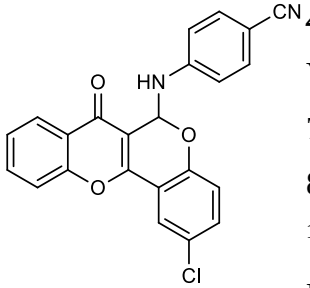
Yellow solid (0.174 g, 39%), mp 271-272 ºC. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 2.38 (s, 3H, Me), 3.57 (s, 3H, OMe), 3.73 (s, 6H, 2xOMe), 6.17 (s, 2H, CH_{Ar}), 6.69 (d, 1H, ^{3}J = 7.6 Hz, CH_{Ar}), 6.89 (d, 1H, ^{3}J = 7.6 Hz, C*H*NH), 6.97 (d, 1H, ^{3}J = 7.8 Hz, CHN*H*), 7.31-7.33 (m, 1H, CH_{Ar}), 7.52-7.57 (m, 1H, CH_{Ar}), 7.84-7.7.91 (m, 3H, CH_{Ar}), 8.09 (d, 1H, ^{3}J = 7.6 Hz, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 445 (M^+, 21), 263 (100), 168 (19).

HRMS (ESI): Calcd for $C_{26}H_{24}NO_6$ (M+H) 446.15981. Found 446.16022.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3323 (m), 1636 (m), 1602 (m), 1566 (m), 1510 (m), 1465 (m), 1429 (s), 1341 (w), 1239 (m), 1192 (m), 1129 (s), 1110 (s), 1013 (m), 909 (m), 856 (m), 807 (m), 776 (m), 760 (s), 706 (m), 665 (m), 630 (m), 605 (m), 545 (m).



4-((2-chloro-7-oxo-6,7-dihydrochromeno[4,3-b]chromen-6-yl)amino)benzonitrile 5p.

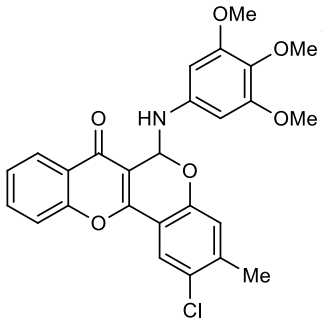
Yellow solid (0.196 g, 49%), mp 288-289 ºC. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 6.90 (d, 1H, ^{3}J = 8.2 Hz, C*H*NH), 7.01 (d, 2H, ^{3}J = 8.6 Hz, CHN*H*), 7.10 (d, 1H, ^{3}J = 8.6 Hz, CH_{Ar}), 7.53-7.64 (m, 4H, CH_{Ar}), 7.85-7.94 (m, 3H, CH_{Ar}), 8.09-8.12 (m, 2H, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 398 (M^+, 4), 402 (100), 400 (26).

HRMS (ESI): Calcd for $C_{23}H_{13}ClN_2O_3$ (M-H) 399.05488. Found 399.05419.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3279 (w), 2919 (w), 2220 (m), 1603 (m), 1531 (m), 1463 (m), 1428 (s), 1318 (m), 1255 (m), 1212 (m), 1170 (m), 1089 (m), 1011 (m), 943 (m), 866 (m), 815 (s), 762 (s), 644 (m).



2-chloro-3-methyl-6-((3,4,5-trimethoxyphenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5q.

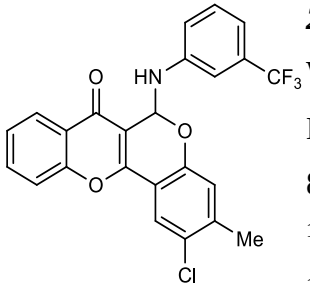
Yellow solid (0.187 g, 39%), mp 289-291 ºC. ^{1}H NMR (300 MHz, DMSO-*d*$_6$): δ = 2.35 (s, 3H, Me), 3.57 (s, 3H, OMe), 3.74 (s, 6H, 2xOMe), 6.17 (s, 2H, CH_{Ar}), 6.77 (br. s, 1H, C*H*NH), 6.96 (br. s, 1H, CH_{Ar}), 7.14 (br. s, 1H, CHN*H*), 7.55 (br. s, 1H, CH_{Ar}), 7.90-8.09 (m, 4H, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 479 (M^+, 4), 297 (100).

HRMS (ESI): Calcd for $C_{26}H_{22}NClO_6$ (M+H) 480.12084. Found 480.12112.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3317 (w), 1637 (m), 1605 (s), 1533 (m), 1510 (m), 1461 (m), 1424 (s), 1341 (w), 1288 (w), 1247 (m), 1209 (m), 1124 (s), 998 (m), 914 (m), 847 (m), 802 (m), 762 (s), 679 (m), 565 (m).



2-chloro-3-methyl-6-((3-(trifluoromethyl)phenyl)amino)chromeno[4,3-b]chromen-7(6H)-one 5r.

White solid (0.297 g, 65%), mp 297-299 ºC. ^{1}H NMR (300 MHz, DMSO-*d*$_6$): δ = 2.33 (s, 3H, Me), 6.83 (d, 1H, ^{3}J = 7.9 Hz, C*H*NH), 7.05-7.21 (m, 4H, CHN*H*, CH_{Ar}), 7.39-7.58 (m, 3H, CH_{Ar}), 7.90-7.93 (m, 2H, CH_{Ar}), 8.04 (s, 1H, CH_{Ar}), 8.10 (m, 1H, CH_{Ar}).

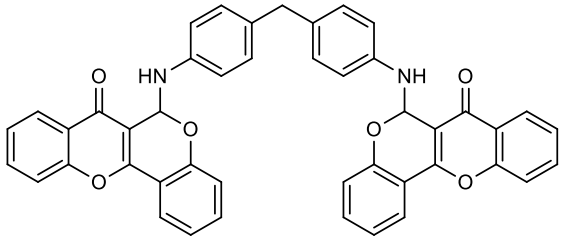
^{19}F NMR (282 MHz, DMSO-*d*$_6$): δ = -61.2 (CF_3).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 457 (M^+, 1), 297 (100), 161 (26).

HRMS (ESI): Calcd for $C_{24}H_{15}NClF_3NaO_3$ (M+Na) 480.05848. Found 480.05841.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3307 (w), 1614 (m), 1573 (w), 1540 (m), 1477 (m), 1427 (m), 1337 (s), 1294 (w), 1270 (w), 1246 (w). 1165 (m), 1111 (s), 1068 (s), 1005 (w), 974 (w), 921 (m), 893 (s), 876 (m), 856 (m), 838 (m), 783 (m), 764 (s), 695 (m), 675 (m), 554 (m).



6,6'-((methylenebis(4,1-phenylene))bis(azanediyl))bis(chromeno[4,3-b]chromen-7(6H)-one) 5s.

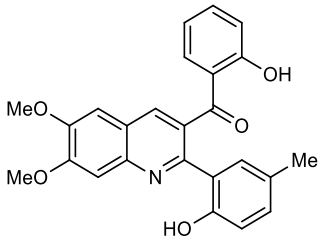
Yellow solid (0.555 g, 80%), mp more than 375 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 3.76 (s, 2H, CH_2), 6.75 (d, 2H, ^{3}J = 8.0 Hz, CH_{Ar}), 6.85 (d, 4H, ^{3}J = 8.3 Hz, CH_{Ar}), 7.00-7.09 (m, 8H, CH_{Ar}), 7.23-7.28 (m, 2H, CH_{Ar}), 7.51-7.61 (m, 4H, CH_{Ar}), 7.87-7.93 (m, 4H, CH_{Ar}), 8.06-8.10 (m, 2H, CH_{Ar}), 8.13-8.16 (m, 2H, CH_{Ar}).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 694 (M^+, 21), 263 (100).

HRMS (ESI): Calcd for $C_{45}H_{30}N_2O_6$ (M+H) 695.21766. Found 695.21771.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3305 (m), 1626 (s), 1559 (s), 1517 (m), 1466 (m), 1427 (s), 1297 (m), 1249 (m), 1212 (m), 1137 (m), 1095 (m), 915 (m), 849 (m), 812 (m), 754 (s), 701 (m), 663 (m), 599 (m), 558 (m).



(2-(2-hydroxy-5-methylphenyl)-6,7-dimethoxyquinolin-3-yl)(2-hydroxyphenyl)methanone 6a.

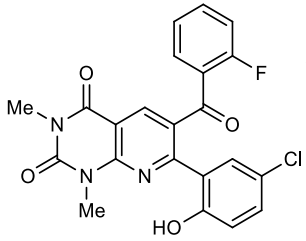
Yellow solid (0.042 g, 10%), mp 173-174 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.08 (s, 3H, Me), 4.04 (s, 3H, OMe), 4.10 (s, 3H, OMe), 6.62-6.69 (m, 1H, CH_{Ar}), 6.92 (d, 1H, ^{3}J = 8.4 Hz, CH_{Ar}), 7.00-7.05 (m, 2H, CH_{Ar}), 7.11 (s, 1H, CH_{Ar}), 7.14-7.24 (m, 3H, CH_{Ar}), 7.42 (s, 1H, CH_{Ar}), 8.15 (s, 1H, Py), 11.84 (s, 1H, OH), 12.72 (br. s, 1H, OH).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 20.2 (Me), 56.3, 56.5 (OMe), 105.3, 106.5, 117.9, 118.2, 119.0 (CH), 119.1, 120.1, 121.1, 128.4, 129.4 (C), 130.1, 131.2, 132.4, 136.9, 138.1 (CH), 142.9, 150.9, 153.7, 154.6, 158.2, 161.3, 201.8 (C).

MS (GC, 70eV): *m/z* (%) = 415 (M^+, 3), 263 (100).

HRMS (ESI): Calcd for $C_{25}H_{22}NO_5$ (M+H) 416.14925. Found 416.14892.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3305 (s), 1619 (w), 1580 (w), 1499 (m), 1474 (m), 1372 (w), 1282 (w), 1243 (m), 1195 (m), 1155 (m), 1009 (m), 953 (w), 910 (w), 886 (w), 851 (m), 827 (m), 777 (m), 757 (m), 711 (m), 689 (m), 656 (m).



7-(5-chloro-2-hydroxyphenyl)-6-(2-fluorobenzoyl)-1,3-dimethylpyrido[2,3-d]pyrimidine-2,4(1H,3H)-dione 6b.

Yellow viscous oil (0.290 g, 66%). ^{1}H NMR (300 MHz, DMSO-d_6): δ = 3.47 (s, 3H, Me), 3.75 (s, 3H, Me), 6.88-6.96 (m, 2H, CH_{Ar}), 7.18-7.28 (m, 2H, CH_{Ar}), 7.31-7.37 (m, 2H, CH_{Ar}), 7.58-7.64 (m, 1H, CH_{Ar}), 8.53 (s, 1H, Py), 11.34 (s, 1H, OH).

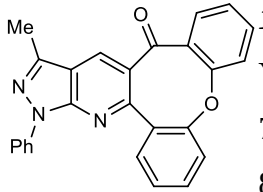
^{19}F NMR (282 MHz, DMSO-d_6): δ = -114.5 (CF).

^{13}C NMR data not obtained due to poor solubility.

MS (GC, 70eV): *m/z* (%) = 439 (M^+, 27), 419 (19), 285 (100), 257 (16), 154 (21).

HRMS (ESI): Calcd for $C_{22}H_{14}N_3O_4FCl$ (M+H) 440.10077. Found 440.08074.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 1716 (w), 1657 (m), 1631 (m), 1596 (s), 1568 (m), 1464 (m), 1413 (m), 1368 (m), 1344 (m), 1285 (m), 1199 (m), 1110 (m), 1019 (w), 938 (w), 913 (w), 830 (m), 806 (w), 750 (m), 685 (m), 645 (m), 600 (w).



13-methyl-11-phenyldibenzo[2,3:7,8]oxocino[4,5-b]pyrazolo[4,3-e]pyridin-15(11H)-one 7a.

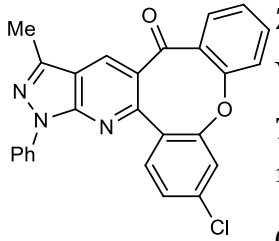
Yellow solid (0.214 g, 53%), mp 250-251 °C. ^{1}H NMR (250 MHz, $CDCl_3$): δ = 2.40 (s, 3H, Me), 6.07-7.10 (m, 1H, CH_{Ar}), 7.17-7.45 (m, 7H, CH_{Ar}), 7.51-7.57 (m, 1H, CH_{Ar}), 7.66 (dd, 1H, ^{3}J = 7.4 Hz, ^{3}J = 1.7 Hz, CH_{Ar}), 7.98-8.01 (m, 2H, CH_{Ar}), 8.28-8.31 (m, 2H, CH_{Ar}).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 12.5 (Me), 115.7 (C), 120.6, 121.7, 122.4, 125.0, 125.6, 126.1, 129.0, 130.1, 130.6, 130.8, 130.9, 131.6 (CH), 132.8, 133.7 (C), 135.2 (CH), 139.4, 143.3, 150.7, 151.1, 127.5, 161.1, 194.9 (C).

MS (GC, 70eV): *m/z* (%) = 403 (M^+, 100).

HRMS (ESI): Calcd for $C_{26}H_{18}N_3O_2$ (M+H) 404.13935. Found 404.1389.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3064 (s), 1645 (w), 1594 (s), 1495 (m), 1446 (m), 1382 (m), 1340 (w), 1308 (m), 1280 (s), 1210 (m), 1120 (m), 1102 (m), 1080 (m), 998 (w), 908 (w), 781 (m), 754 (s), 711 (m), 689 (s), 661 (m), 626 (m), 607 (m).



7-chloro-13-methyl-11-phenyldibenzo[2,3:7,8]oxocino[4,5-b]pyrazolo[4,3-e]pyridin-15(11H)-one 7b.

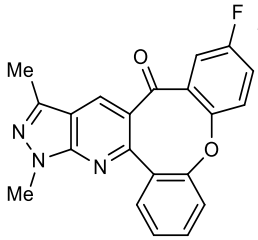
Yellow viscous oil (0.175 g, 40%). ^{1}H NMR (250 MHz, $CDCl_3$): δ = 2.58 (s, 3H, Me), 7.03 (d, 1H, ^{3}J = 8.6 Hz, CH_{Ar}), 7.18-7.36 (m, 4H, CH_{Ar}), 7.41-7.63 (m, 4H, CH_{Ar}), 7.99-8.02 (m, 2H, Py, CH_{Ar}), 8.24-8.28 (m, 2H, CH_{Ar}).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 12.5 (Me), 116.0 (C), 120.8, 122.3, 123.3, 125.3, 125.9, 129.1, 130.3, 130.4 (CH), 130.7 (C), 131.0 (CH), 131.5 (C), 131.8 (CH), 132.7, 135.1 (C), 135.4 (CH), 139.3, 143.4, 149.7, 150.6, 156.0, 160.8, 194.5 (C).

MS (GC, 70eV): *m/z* (%) = 437 (M^+, 100).

HRMS (ESI): Calcd for $C_{26}H_{16}N_3O_2Cl$ (M^+) 437.09256. Found 437.09255.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3068 (w), 1632 (m), 1596 (m), 1507 (m), 1468 (m), 1413 (m), 1377 (m), 1340 (w), 1303 (m), 1278 (m), 1243 (m), 1210 (m), 1158 (m), 1120 (m), 1088 (m), 1000 (w), 945 (m), 876 (m), 812 (m), 768 (s), 711 (m), 683 (m), 626 (m).



2-fluoro-11,13-dimethyldibenzo[2,3:7,8]oxocino[4,5-b]pyrazolo[4,3-e]pyridin-15(11H)-one 7c.

Yellow solid (0.215 g, 60%), mp 223-225 °C. ^{1}H NMR (250 MHz, $CDCl_3$): δ = 2.51 (s, 3H, Me), 4.08 (s, 3H, Me), 7.07-7.10 (m, 1H, CH_{Ar}), 7.19-7.38 (m, 4H, CH_{Ar}), 7.61-7.70 (m, 2H, CH_{Ar}), 7.97 (s, 1H, Py).

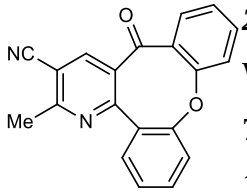
^{19}F NMR (282 MHz, $CDCl_3$): δ = -116.8 (CF).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 12.4, 33.7 (Me), 113.6 (C), 117.6 (d, *J* = 25.6 Hz, CH), 121.5 (CH), 121.6 (d, *J* = 23.9 Hz, CH), 123.9 (d, *J* = 7.8 Hz, CH), 126.4, 130.6, 130.9 (CH), 132.0 (d, *J* = 6.6 Hz, C), 133.6, 141.4 (C), 151.0 (d, *J* = 27.6 Hz, C), 157.2 (d, *J* = 2.5 Hz, C), 157.6 (C), 159.2 (d, *J* = 245.3 Hz, CF), 193.7 (C).

MS (GC, 70eV): *m/z* (%) = 359 (M^+, 100).

HRMS (ESI): Calcd for $C_{21}H_{14}N_3O_2F$ (M+H) 360.11453. Found 360.11428.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3070 (w), 1654 (m), 1597 (m), 1554 (w), 1480 (m), 1450 (m), 1412 (m), 1330 (w), 1259 (m), 1213 (m), 1181 (s), 1121 (m), 1016 (m), 914 (m), 891 (m), 848 (m), 835 (m), 781 (m), 765 (s), 744 (m), 708 (m), 637 (m), 594 (m).



2-methyl-5-oxo-5H-dibenzo[2,3:7,8]oxocino[4,5-b]pyridine-3-carbonitrile 7d.

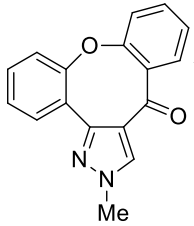
White solid (0.175 g, 56%), mp 180-181 °C. ^{1}H NMR (250 MHz, $CDCl_3$): δ = 2.89 (s, 3H, Me), 7.15-7.18 (m, 1H, CH_{Ar}), 7.29-7.34 (m, 2H, CH_{Ar}), 7.38-7.48 (m, 2H, CH_{Ar}), 7.61-7.68 (m, 2H, CH_{Ar}), 7.90 (s, 1H, Py), 8.03 (dd, 1H, ^{3}J = 7.8 Hz, ^{4}J = 1.7 Hz, CH_{Ar}).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 23.8 (Me), 108.3, 116.3 (C), 121.9, 122.8, 125.4, 126.5 (CH), 129.9 (C), 130.1, 131.8, 131.9 (CH), 132.3, 135.7 (C), 136.2, 140.5 (CH), 153.4, 157.1, 161.2, 162.7, 192.1 (C).

MS (GC, 70eV): *m/z* (%) = 312 (M^+, 100), 283 (60), 271 (27), 258 (43).

HRMS (EI): Calcd for $C_{20}H_{12}N_2O_2$ (M^+) 312.08933. Found 312.08883.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2229 (w), 1636 (m), 1582 (m), 1537 (w), 1474 (m), 1452 (m), 1429 (m), 1310 (m), 1281 (m), 1222 (s), 1160 (m), 1099 (m), 992 (w), 931 (w), 887 (m), 854 (m), 770 (s), 746 (s), 706 (s), 674 (m), 658 (m).



1-methyldibenzo[2,3:7,8]oxocino[4,5-c]pyrazol-4(1H)-one 7e.

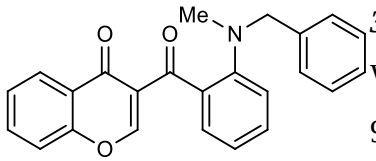
White solid (0.174 g, 63%), mp 147-148 °C. ^{1}H NMR (250 MHz, $CDCl_3$): δ = 4.00 (s, 3H, Me), 7.23-7.29 (m, 2H, CH_{Ar}), 7.38-7.56 (m, 4H, CH_{Ar}), 7.87-7.93 (m, 2H, CH_{Ar}), 8.29 (s, 1H, pyrrazole).

^{13}C NMR (62.9 MHz, $CDCl_3$): δ = 39.6 (Me), 122.3, 123.1 (CH), 123.9 (C), 125.7, 126.0 (CH), 127.0 (C), 129.5, 130.6, 131.6 (CH), 132.1 (C), 134.2, 137.7 (CH), 145.7, 157.5, 159.0, 185.4 (C).

MS (GC, 70eV): *m/z* (%) = 276 (M^+, 100), 248 (24).

HRMS (EI): Calcd for $C_{17}H_{12}N_2O_2$ (M^+) 276.08933. Found 276.08903.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3132 (w), 1619 (m), 1593 (m), 1519 (m), 1456 (m), 1311 (m), 1256 (m), 1202 (m), 1186 (s), 1107 (m), 1007 (w), 918 (s), 859 (m), 816 (m), 777 (m), 748 (m), 716 (s), 665 (m).



3-(2-(benzyl(methyl)amino)benzoyl)-4H-chromen-4-one 8a.

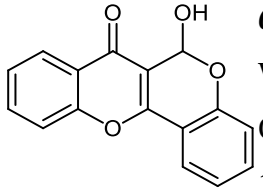
White solid (0.336 g, 91%), mp 149-150 °C. ^{1}H NMR (300 MHz, $CDCl_3$): δ = 2.28 (s, 3H, Me), 3.90 (q, 2H, ^{3}J = 9.7 Hz, CH_2), 6.48 (s, 1H, chromone), 7.04-7.11 (m, 2H, CH_{Ar}), 7.15-7.33 (m, 5H, CH_{Ar}), 7.38-7.49 (m, 2H, CH_{Ar}), 7.53-7.56 (m, 1H, CH_{Ar}), 7.65-7.72 (m, 1H, CH_{Ar}), 7.89 (dd, 1H, ^{3}J = 8.2 Hz, ^{4}J = 1.8 Hz, CH_{Ar}), 8.27 (dd, 1H, ^{3}J = 8.0 Hz, ^{4}J = 1.5 Hz, CH_{Ar}).

^{13}C NMR (75.5 MHz, $CDCl_3$): δ = 35.5 (Me), 56.6 (CH_2), 88.4, 109.2, 114.8 (C), 116.36, 117.9, 120.8, 123.6 (CH), 124.4 (C), 125.1, 126.0, 127.0, 128.2, 128.6, 133.6, 133.9 (CH), 155.5, 156.5, 157.7, 175.1 (C).

MS (GC, 70eV): *m/z* (%) = 369 (M^+, 1), 249 (100), 120 (27).

HRMS (ESI): Calcd for $C_{24}H_{20}NO_3$ (M+H) 370.14377. Found 370.14384.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 2997 (w), 1640 (m), 1601 (m), 1563 (m), 1485 (w), 1463 (m), 1416 (s), 1350 (m), 1330 ‘(m), 1258 (m), 1209 (m), 1164 (m), 1148 (m), 1107 (w), 1047 (s), 994 (w), 964 (m), 906 (m), 882 (m), 840 (m)m 790 (w), 758 (s), 744 (s), 698 (s), 663 (m), 638 (m).



6-hydroxychromeno[4,3-b]chromen-7(6H)-one 9a.

White solid (0.021 g, 8%), mp 240-241 °C. ^{1}H NMR (300 MHz, DMSO-d_6): δ = 6.55 (s, 1H, C*H*OH), 7.16-7.27 (m, 2H, CH_{Ar}), 7.50-7.61 (m, 2H, CH_{Ar}), 7.64 (br. s, 1H, CHO*H*), 7.79-7.90 (m, 2H, CH_{Ar}), 8.01-8.04 (m, 1H, CH_{Ar}), 8.09-8.12 (m, 1H, CH_{Ar}).

^{13}C NMR (62.9 MHz, DMSO-d_6): δ = 87.3 (CHOH), 111.5, 114.6 (C), 117.9, 118.5, 122.0, 123.6 (CH), 123.7 (C), 125.0, 125.6, 133.8, 134.5 (CH), 154.1, 154.6, 155.1, 173.8 (C).

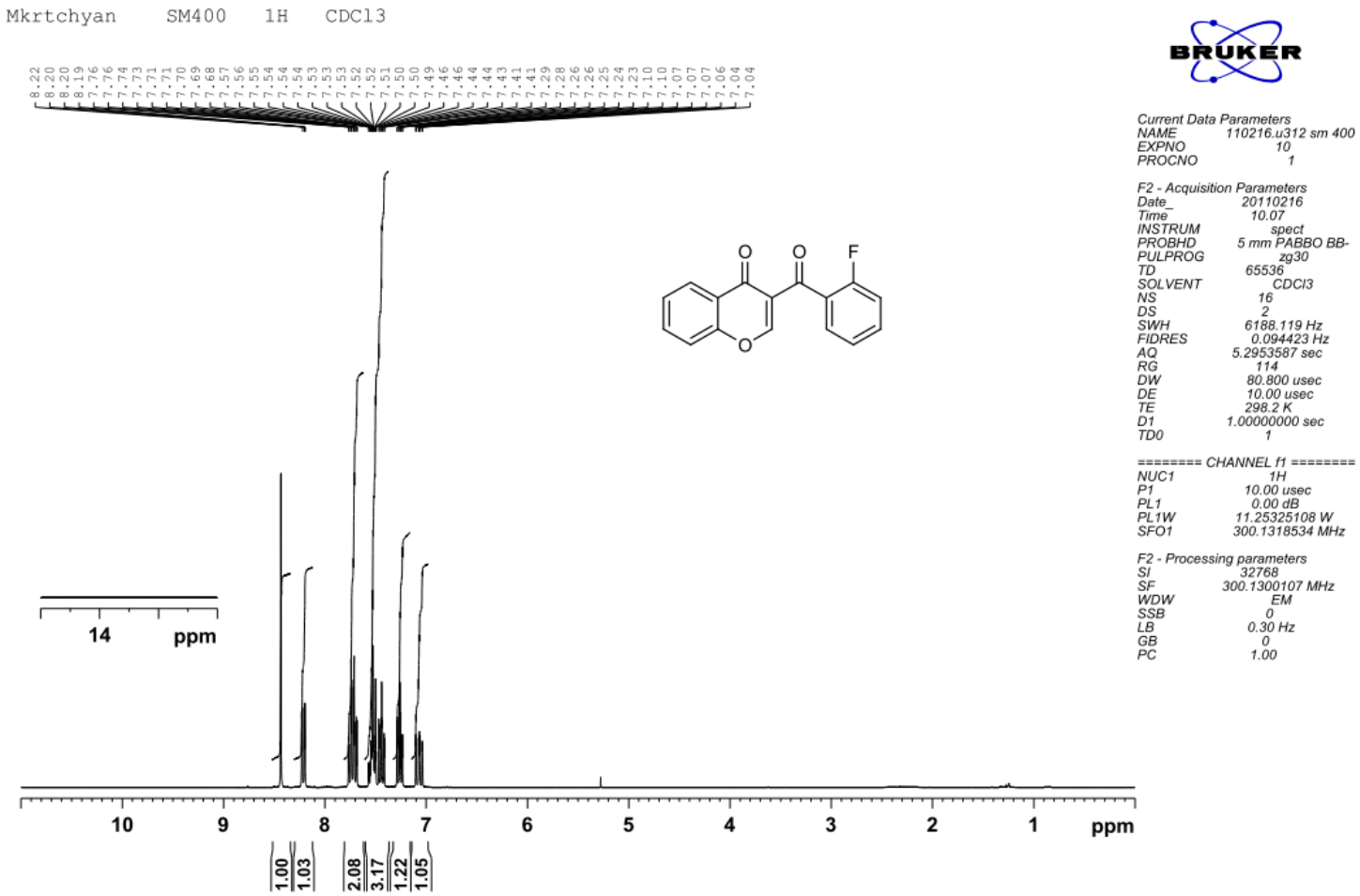
MS (GC, 70eV): *m/z* (%) = 266 (M^+, 100).

HRMS (EI): Calcd for $C_{16}H_{10}O_4$ (M+Na) 289.04713. Found 289.04668.

IR (ATR, cm^{-1}): $\tilde{\nu}$ = 3024 (w), 1641 (m), 1600 (m), 1557 (m), 1477 (w), 1416 (s), 1351 (m), 1331 (m), 1258 (m), 1210 (m), 1164 (m), 1100 (w), 1051 (s), 994 (w), 906 (m), 882 (m), 840 (m)m 790 (w), 758 (s), 698 (s), 650 (m).

(C) Copies of ^{1}H and ^{13}C NMR spectra

Compound 3c



BRUKER

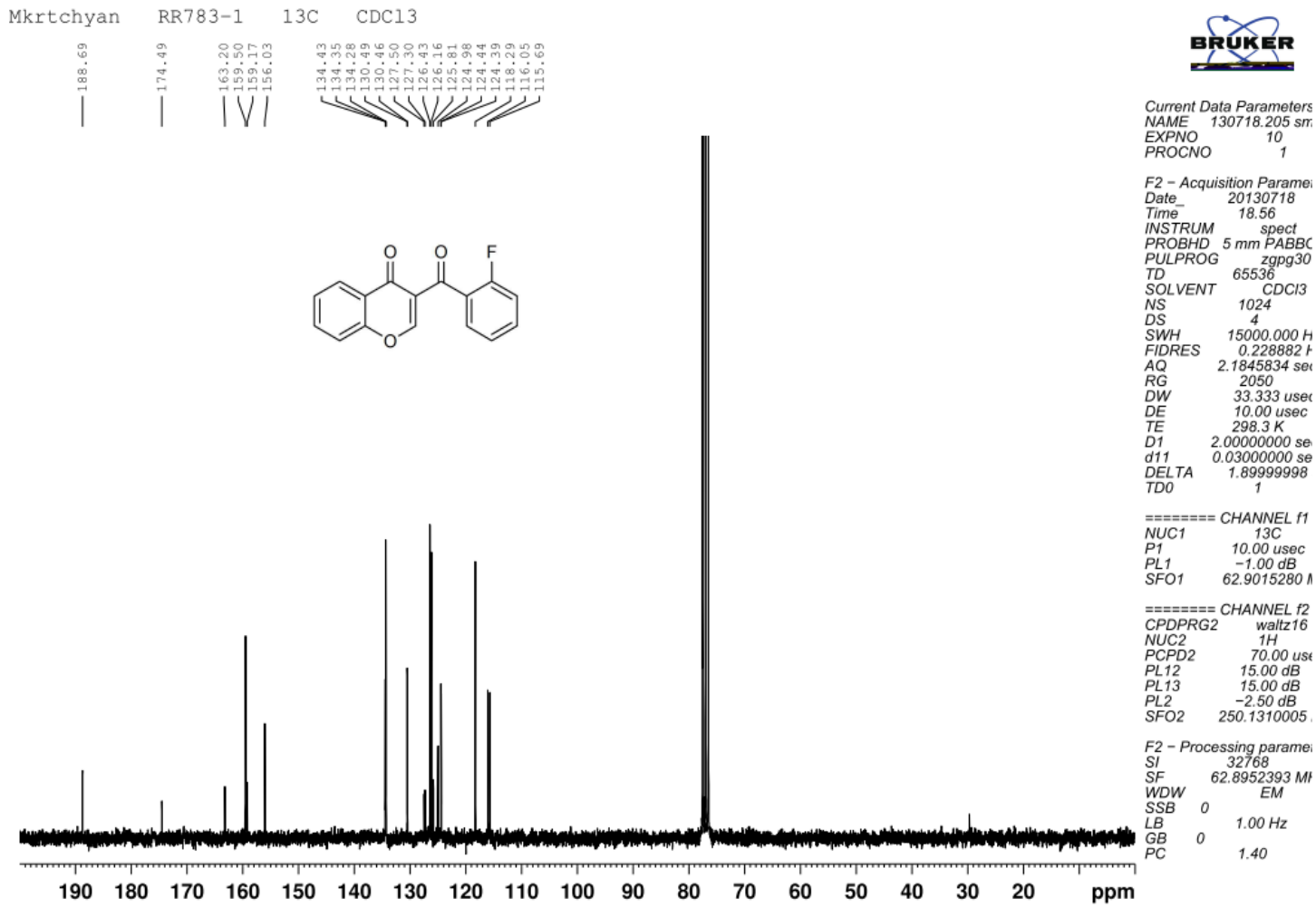
Current Data Parameters
NAME 110216.u312 sm 400
EXPNO 10
PROCNO 1

F2 - Acquisition Parameters
Date_ 20110216
Time 10.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 114
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

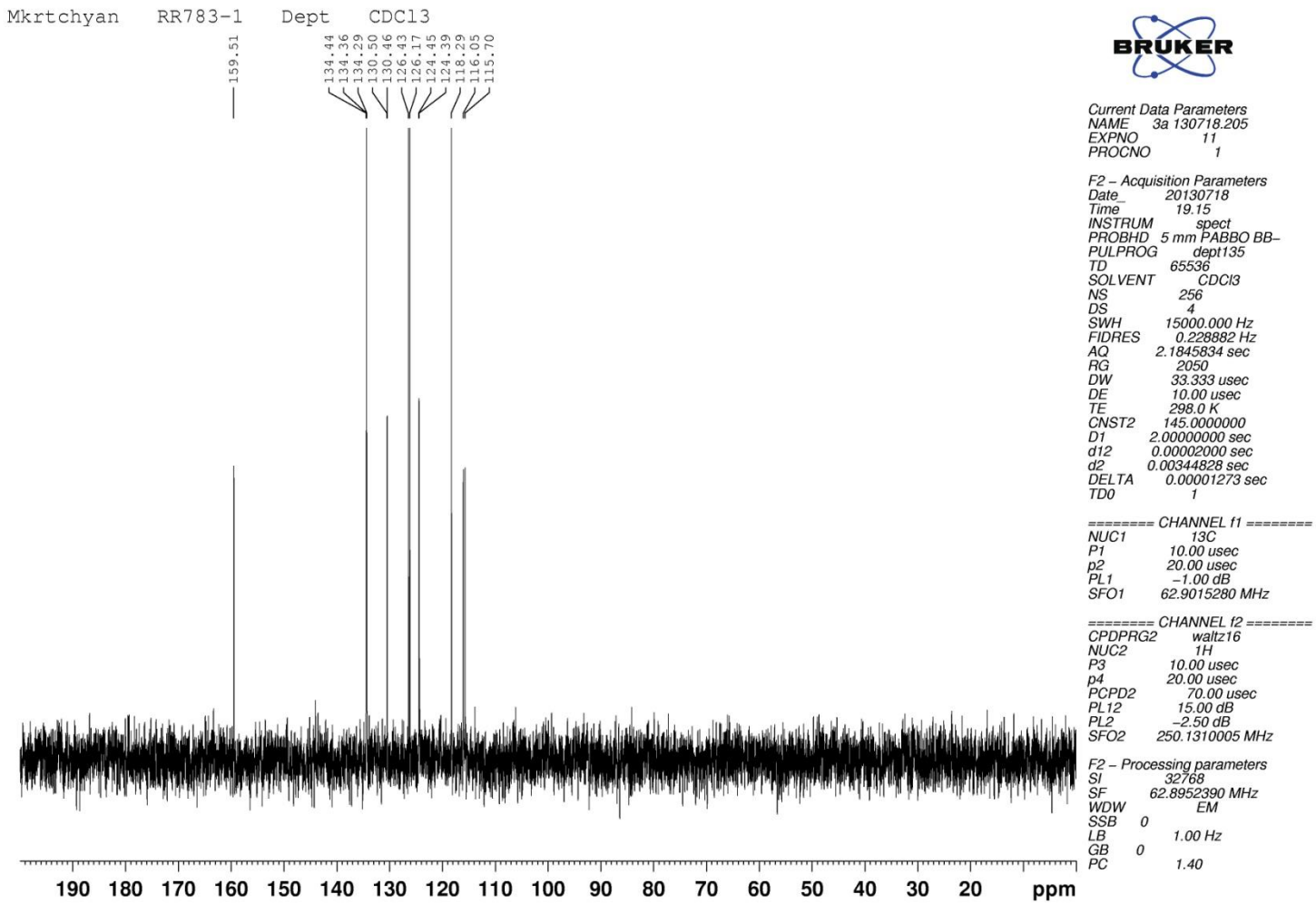
======== CHANNEL f1 ========
NUC1 1H
P1 10.00 usec
PL1 0.00 dB
PL1W 11.25325108 W
SFO1 300.1318534 MHz

F2 - Processing parameters
SI 32768
SF 300.1300107 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

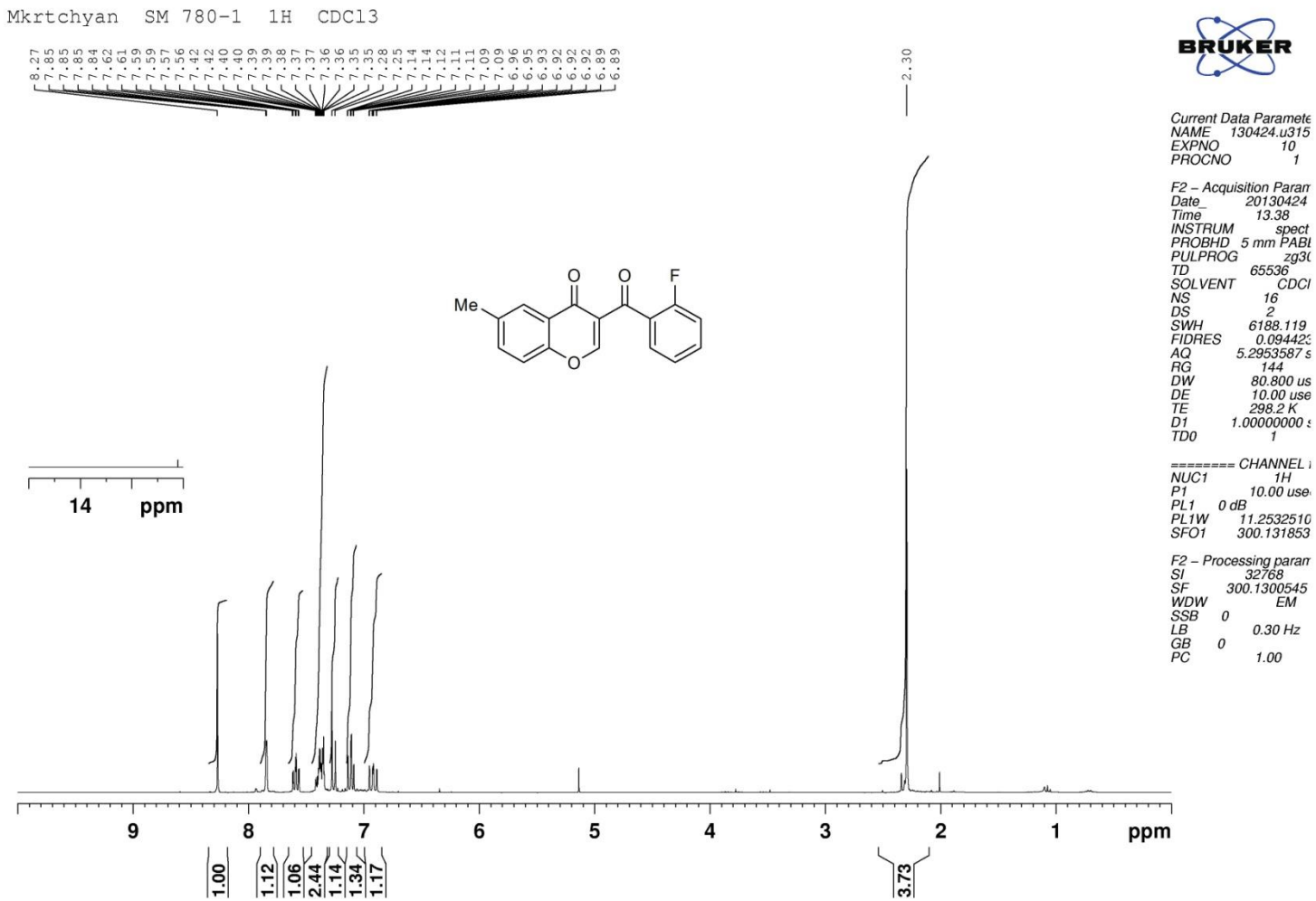
Compound 3c


Mkrtchyan RR783-1 13C CDCl3
188.69
174.49
163.20
159.50
159.17
156.03
134.43
134.35
134.28
130.49
130.46
127.50
127.30
126.43
126.16
125.81
124.98
124.44
124.39
118.29
116.05
115.69
O
O
F
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 130718.205 sm
EXPNO 10
PROCNO 1
F2 - Acquisition Parame
Date_ 20130718
Time 18.56
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000 H
FIDRES 0.228882 H
AQ 2.1845834 se
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.3 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 -1.00 dB
SFO1 62.9015280 M
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 use
PL12 15.00 dB
PL13 15.00 dB
PL2 -2.50 dB
SFO2 250.1310005
F2 - Processing parame
SI 32768
SF 62.8952393 MH
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

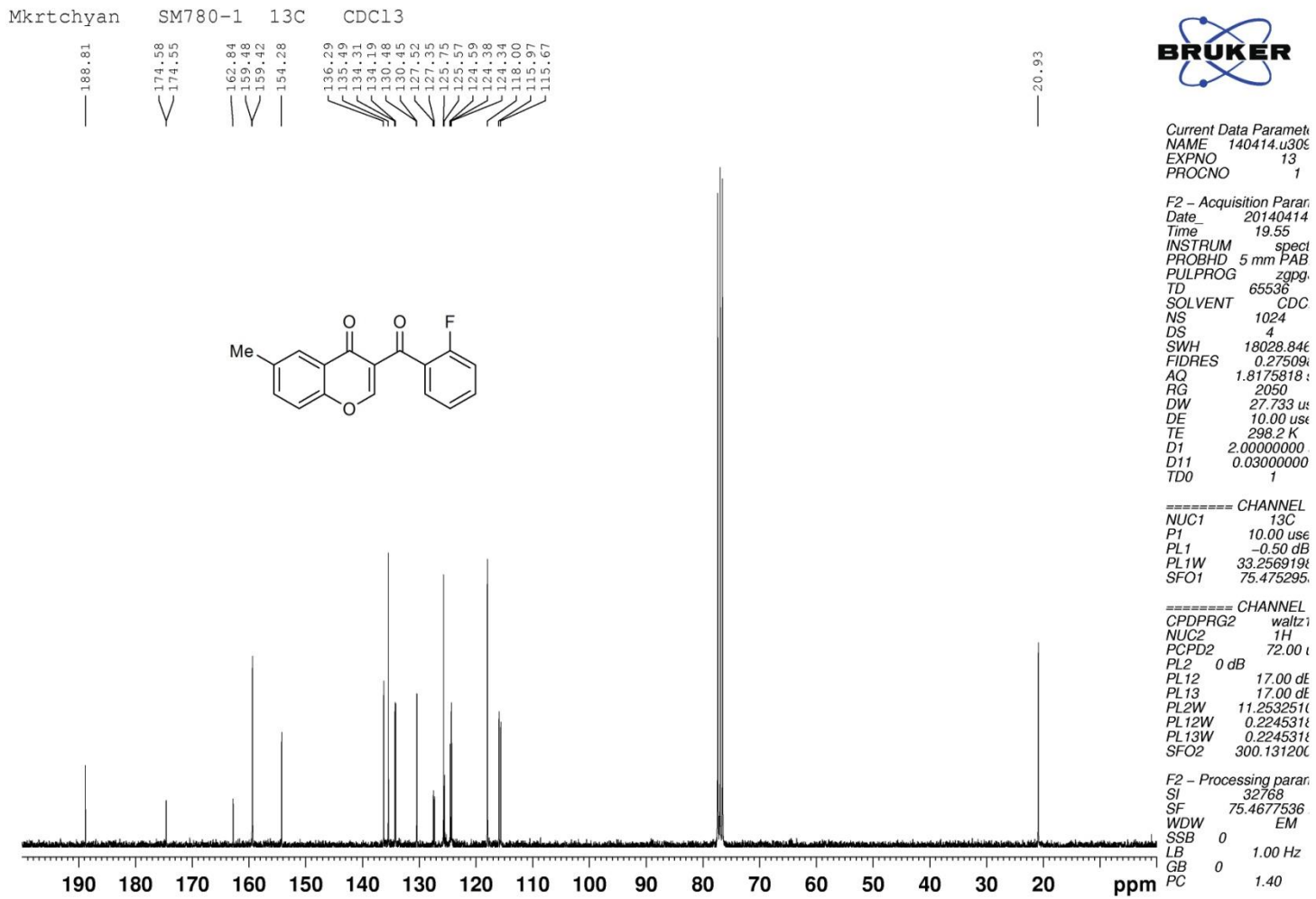
Compound 3c


Mkrtchyan RR783-1 Dept CDCl3
159.51
134.44
134.36
134.29
130.50
130.46
126.43
126.17
124.45
124.39
118.29
116.05
115.70
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 3a 130718.205
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20130718
Time 19.15
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT CDCl3
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

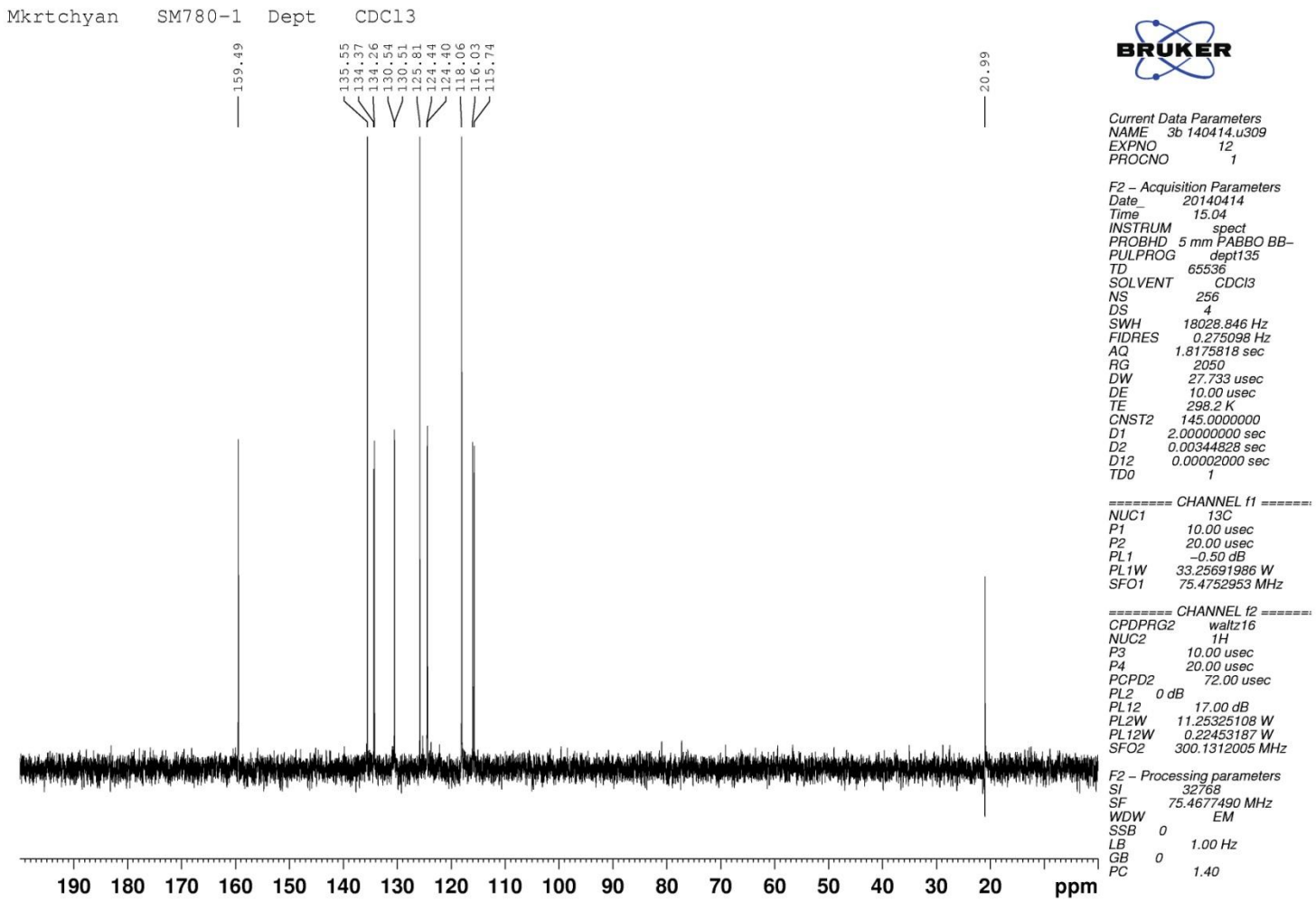
Compound 3d


Mkrtchyan SM 780-1 1H CDCl3
8.27 7.85 7.85 7.85 7.84 7.62 7.61 7.59 7.59 7.57 7.56 7.42 7.42 7.40 7.40 7.39 7.39 7.38 7.37 7.37 7.36 7.36 7.35 7.35 7.28 7.25 7.14 7.14 7.12 7.11 7.11 7.09 7.09 6.96 6.95 6.93 6.92 6.92 6.92 6.89 6.89
2.30
Me
O
O
F
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.00 1.12 1.06 2.44 1.14 1.34 1.17
3.73
BRUKER
Current Data Paramete
NAME 130424.u315
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130424
Time 13.38
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zg30
TD 65536
SOLVENT CDCl
NS 16
DS 2
SWH 6188.119
FIDRES 0.094423
AQ 5.2953587 s
RG 144
DW 80.800 us
DE 10.00 use
TE 298.2 K
D1 1.00000000 s
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 use
PL1 0 dB
PL1W 11.2532510
SFO1 300.131853
F2 – Processing param
SI 32768
SF 300.1300545
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

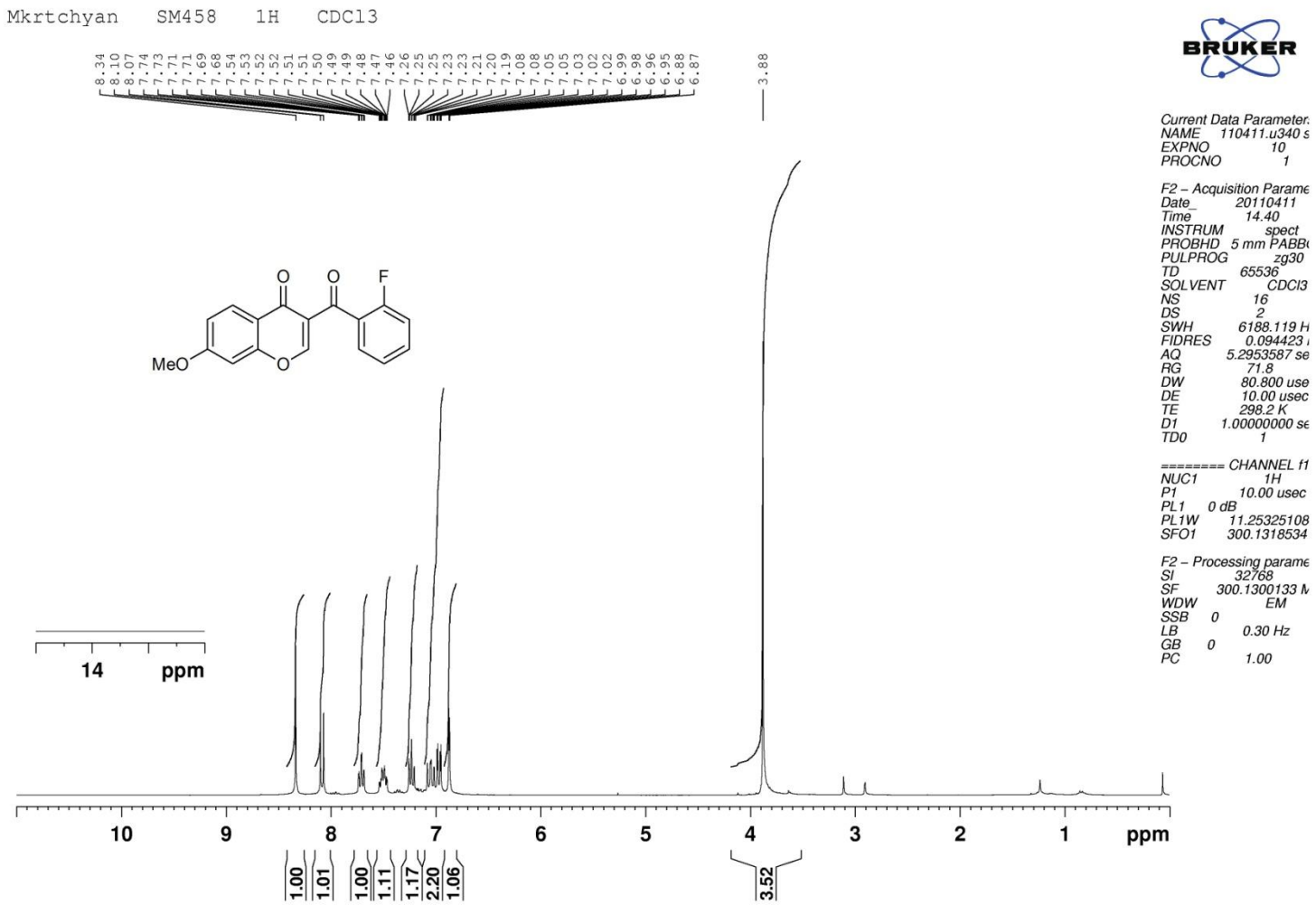
Compound 3d


Mkrtchyan SM780-1 13C CDCl3
188.81
174.58
174.55
162.84
159.48
159.42
154.28
136.29
135.49
134.31
134.19
130.48
130.45
127.52
127.35
125.75
125.57
124.59
124.38
124.34
118.00
115.97
115.67
20.93
Me
O
O
F
O
BRUKER
Current Data Paramet
NAME 140414.u30
EXPNO 13
PROCNO 1
F2 – Acquisition Paran
Date_ 20140414
Time 19.55
INSTRUM spect
PROBHD 5 mm PAB
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 18028.84
FIDRES 0.27509
AQ 1.8175818
RG 2050
DW 27.733 u
DE 10.00 us
TE 298.2 K
D1 2.00000000
D11 0.03000000
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 us
PL1 –0.50 dB
PL1W 33.256919
SFO1 75.475295
======== CHANNEL
CPDPRG2 waltz
NUC2 1H
PCPD2 72.00
PL2 0 dB
PL12 17.00 d
PL13 17.00 d
PL2W 11.253251
PL12W 0.224531
PL13W 0.224531
SFO2 300.131200
F2 – Processing paran
SI 32768
SF 75.4677536
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

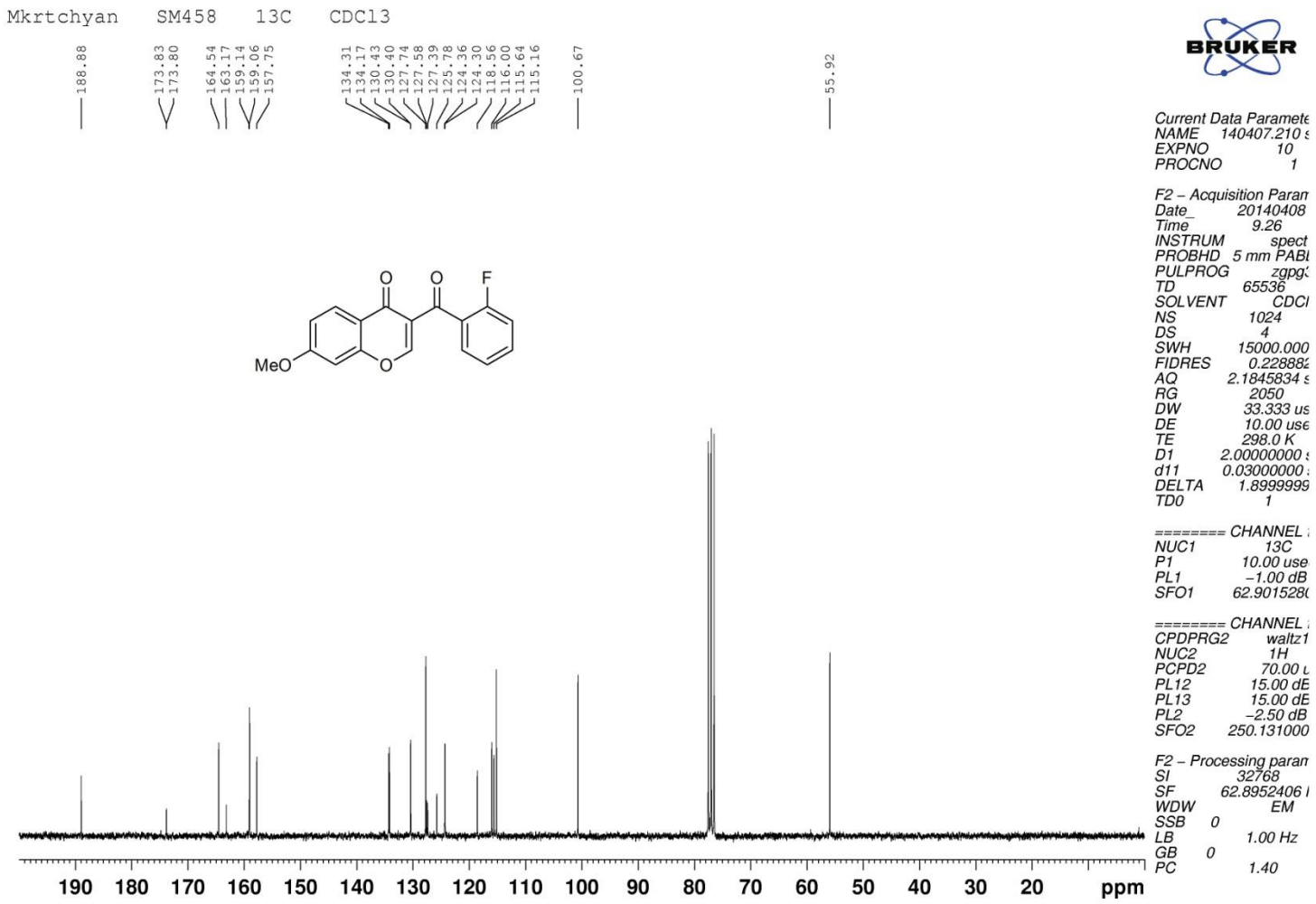
Compound 3d


Mkrtchyan SM780-1 Dept CDCl3
159.49
135.55
134.37
134.26
130.54
130.51
125.81
124.44
124.40
118.06
116.03
115.74
20.99
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 3b 140414.u309
EXPNO 12
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140414
Time 15.04
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT CDCl3
NS 256
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 2050
DW 27.733 usec
DE 10.00 usec
TE 298.2 K
CNST2 145.0000000
D1 2.00000000 sec
D2 0.00344828 sec
D12 0.00002000 sec
TD0 1
======== CHANNEL f1 =======
NUC1 13C
P1 10.00 usec
P2 20.00 usec
PL1 –0.50 dB
PL1W 33.25691986 W
SFO1 75.4752953 MHz
======== CHANNEL f2 =======
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
P4 20.00 usec
PCPD2 72.00 usec
PL2 0 dB
PL12 17.00 dB
PL2W 11.25325108 W
PL12W 0.22453187 W
SFO2 300.1312005 MHz
F2 – Processing parameters
SI 32768
SF 75.4677490 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

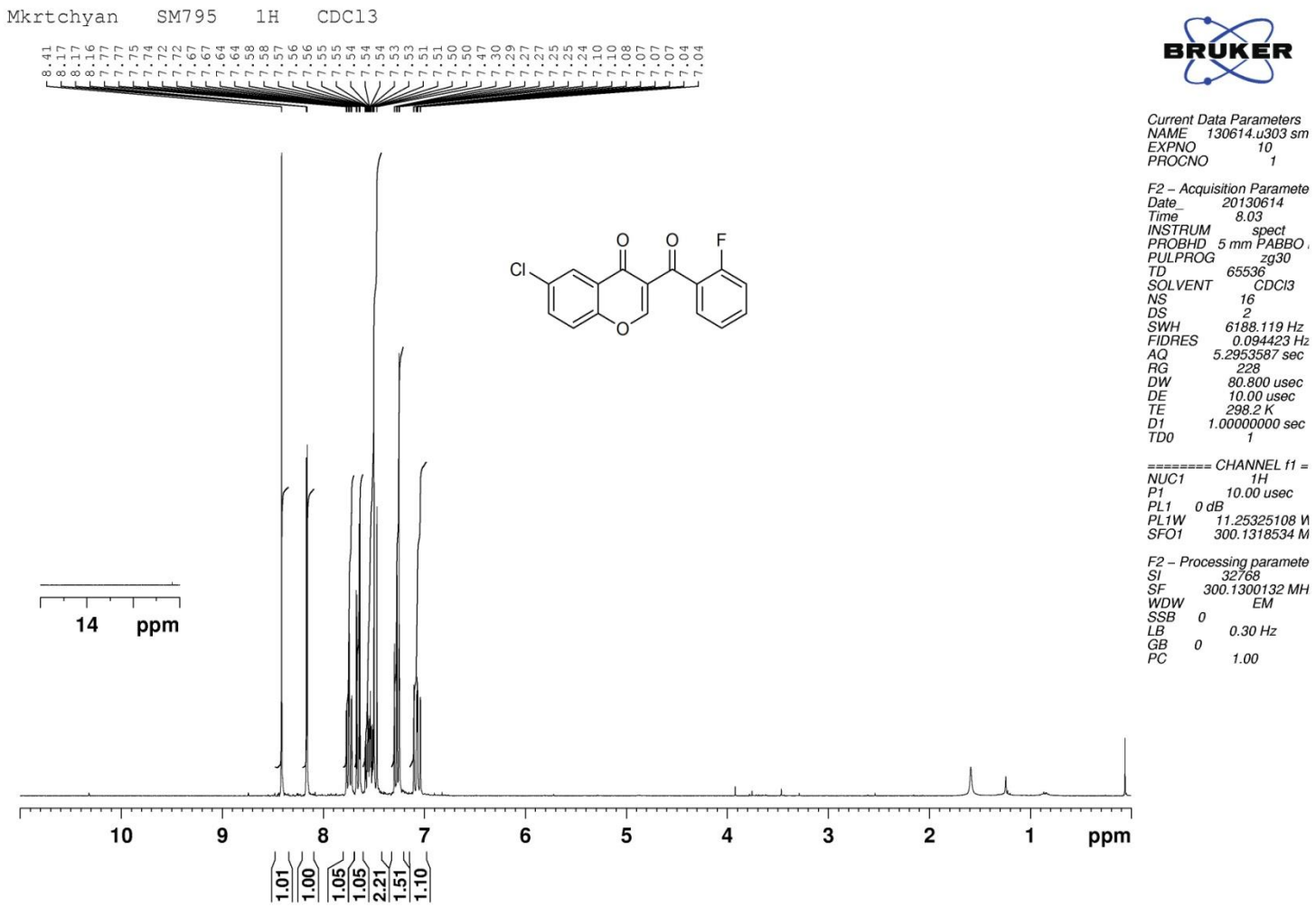
Compound 3e


Mkrtchyan SM458 1H CDCl3
8.34 8.10 8.07 7.74 7.73 7.71 7.71 7.69 7.68 7.54 7.53 7.52 7.51 7.51 7.50 7.49 7.49 7.48 7.47 7.46 7.26 7.25 7.23 7.23 7.21 7.20 7.19 7.08 7.08 7.05 7.05 7.03 7.02 7.02 6.99 6.98 6.96 6.95 6.88 6.87
3.88
O O F
MeO O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.00 1.01 1.00 1.11 1.17 2.20 1.06 3.52
BRUKER
Current Data Parameter
NAME 110411.u340 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110411
Time 14.40
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423
AQ 5.2953587 se
RG 71.8
DW 80.800 use
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing parame
SI 32768
SF 300.1300133 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

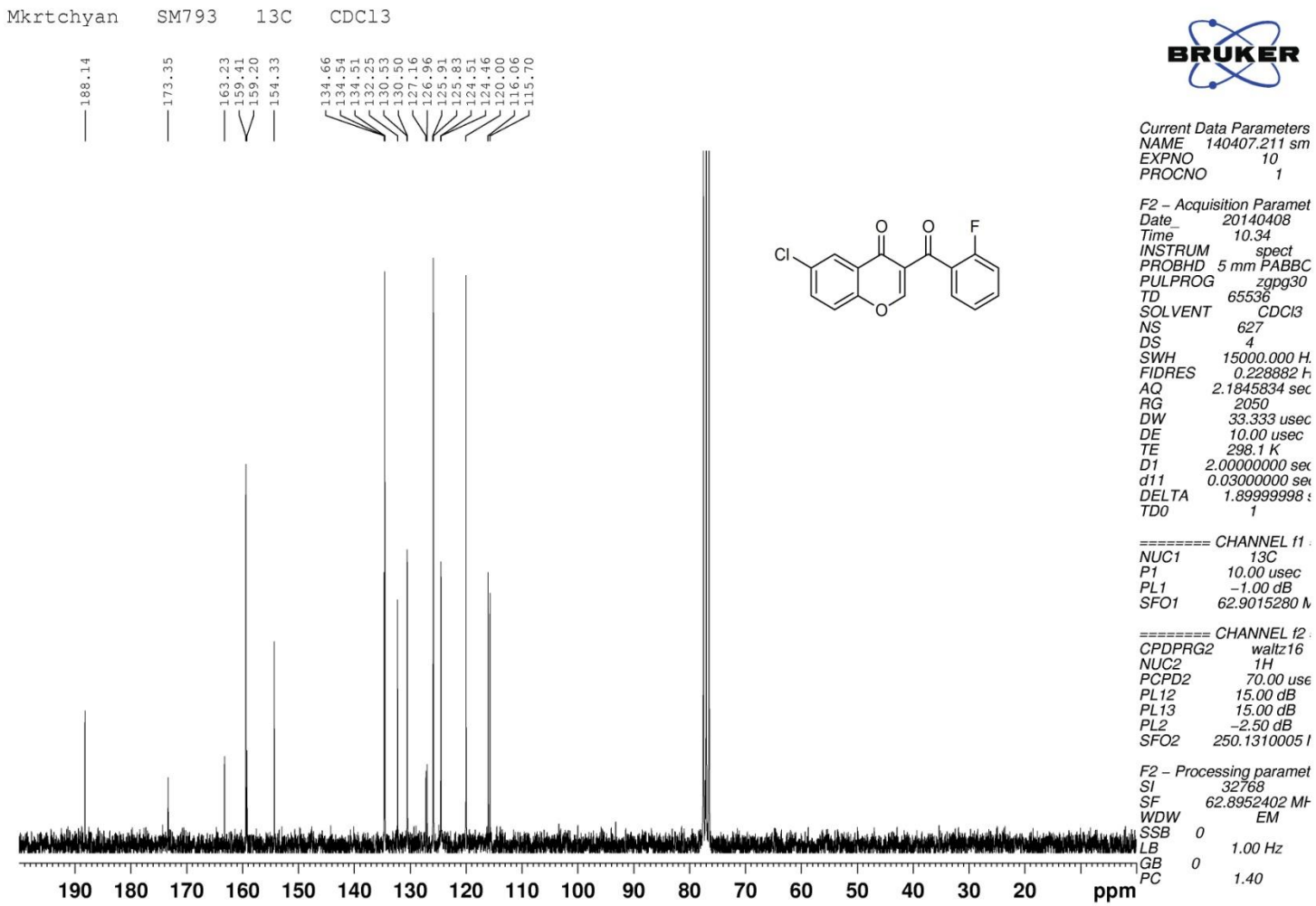
Compound 3e


Mkrtchyan SM458 13C CDCl3
188.88
173.83
173.80
164.54
163.17
159.14
159.06
157.75
134.31
134.17
130.43
130.40
127.74
127.58
127.39
125.78
124.36
124.30
118.56
116.00
115.64
115.16
100.67
55.92
O
O
F
MeO
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramete
NAME 140407.210 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20140408
Time 9.26
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zgpg3
TD 65536
SOLVENT CDCl
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.0 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528(
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dE
PL13 15.00 dE
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing param
SI 32768
SF 62.8952406 I
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

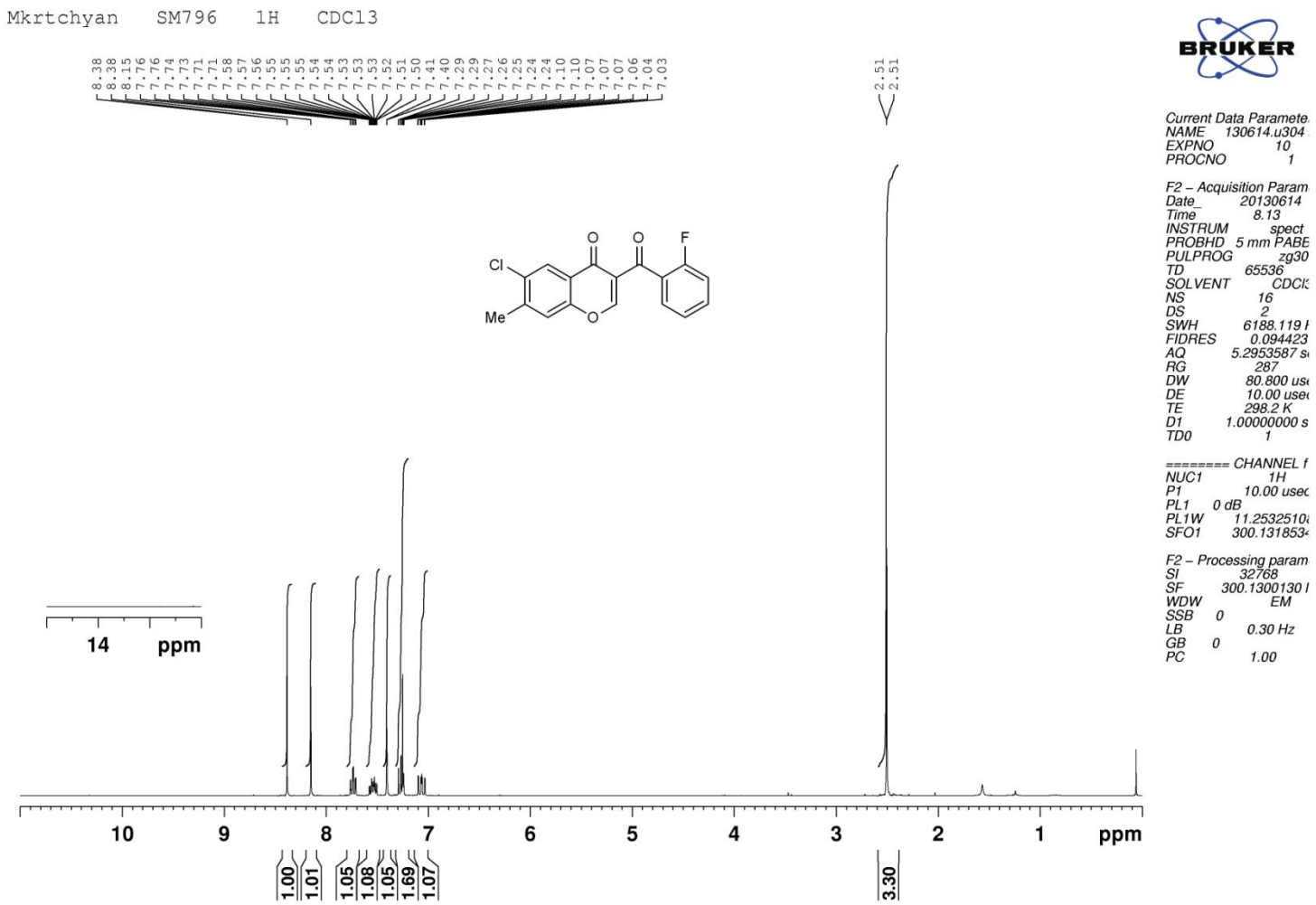
Compound 3f


Mkrtchyan SM795 1H CDCl3
8.41 8.17 8.17 8.16 7.77 7.77 7.75 7.74 7.72 7.72 7.67 7.67 7.64 7.64 7.58 7.58 7.57 7.56 7.56 7.55 7.55 7.54 7.54 7.54 7.53 7.53 7.51 7.51 7.50 7.50 7.47 7.30 7.29 7.27 7.27 7.25 7.24 7.10 7.10 7.08 7.07 7.07 7.04 7.04
Cl
O
O
F
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.01 1.00 1.05 1.05 2.21 1.51 1.10
BRUKER
Current Data Parameters
NAME 130614.u303 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramete
Date_ 20130614
Time 8.03
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 228
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 =
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing paramete
SI 32768
SF 300.1300132 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

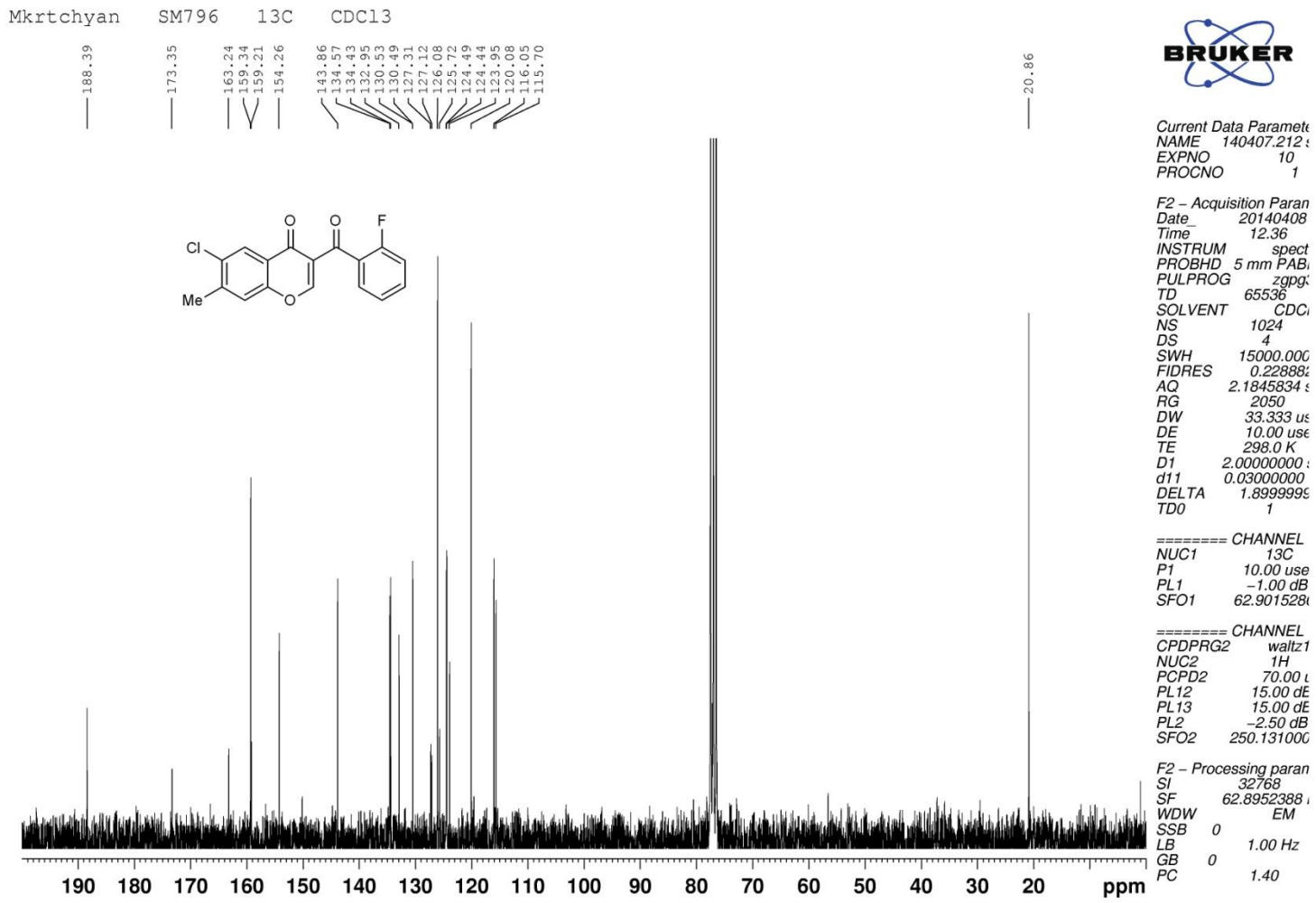
Compound 3f


Mkrtchyan SM793 13C CDCl3
188.14
173.35
163.23
159.41
159.20
154.33
134.66
134.54
134.51
132.25
130.53
130.50
127.16
126.96
125.91
125.83
124.51
124.46
120.00
116.06
115.70
Cl
O
O
F
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 140407.211 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramet
Date_ 20140408
Time 10.34
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 627
DS 4
SWH 15000.000 H
FIDRES 0.228882 H
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.1 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 s
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 −1.00 dB
SFO1 62.9015280 M
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 use
PL12 15.00 dB
PL13 15.00 dB
PL2 −2.50 dB
SFO2 250.1310005 I
F2 – Processing paramet
SI 32768
SF 62.8952402 MH
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

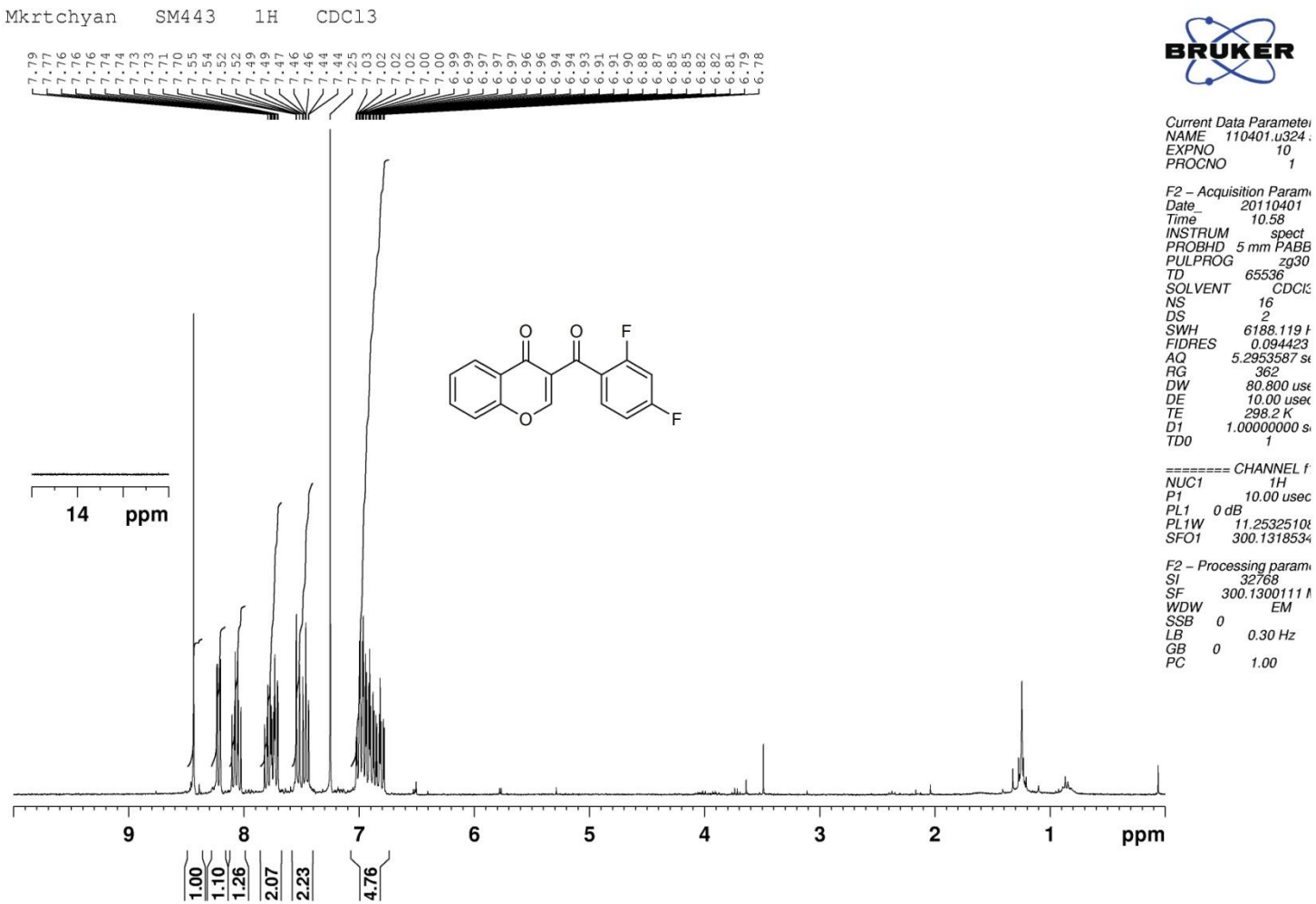
Compound 3g


Mkrtchyan SM796 1H CDCl3
8.38 8.38 8.15 7.76 7.76 7.74 7.73 7.71 7.71 7.58 7.57 7.56 7.55 7.55 7.54 7.54 7.53 7.53 7.53 7.52 7.51 7.50 7.41 7.40 7.29 7.29 7.27 7.26 7.25 7.24 7.24 7.10 7.10 7.07 7.07 7.06 7.04 7.03
2.51 2.51
Cl
Me
O
O
F
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.00 1.01 1.05 1.08 1.05 1.69 1.07
3.30
Current Data Parameter
NAME 130614.u304
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130614
Time 8.13
INSTRUM spect
PROBHD 5 mm PABE
PULPROG zg30
TD 65536
SOLVENT CDCl
NS 16
DS 2
SWH 6188.119
FIDRES 0.094423
AQ 5.2953587 s
RG 287
DW 80.800 us
DE 10.00 use
TE 298.2 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.2532510
SFO1 300.131853
F2 – Processing param
SI 32768
SF 300.1300130
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

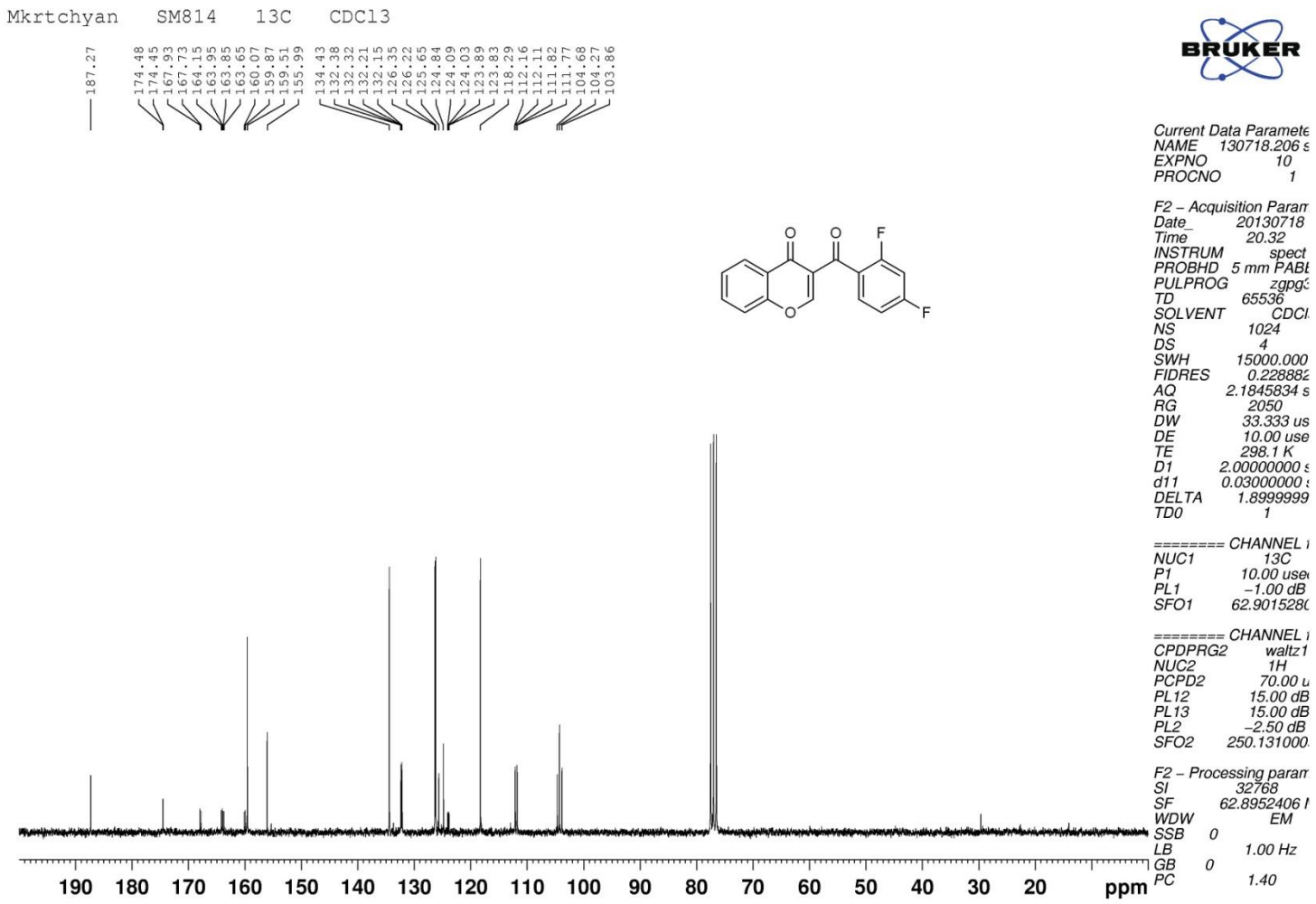
Compound 3g


Mkrtchyan SM796 13C CDCl3
188.39
173.35
163.24
159.34
159.21
154.26
143.86
134.57
134.43
132.95
130.53
130.49
127.31
127.12
126.08
125.72
124.49
124.44
123.95
120.08
116.05
115.70
20.86
O
O
F
Cl
Me
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramet
NAME 140407.212
EXPNO 10
PROCNO 1
F2 – Acquisition Paran
Date_ 20140408
Time 12.36
INSTRUM spect
PROBHD 5 mm PAB
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 15000.00
FIDRES 0.22888
AQ 2.1845834
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.0 K
D1 2.00000000
d11 0.03000000
DELTA 1.899999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00
PL12 15.00 dE
PL13 15.00 dE
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing paran
SI 32768
SF 62.8952388
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

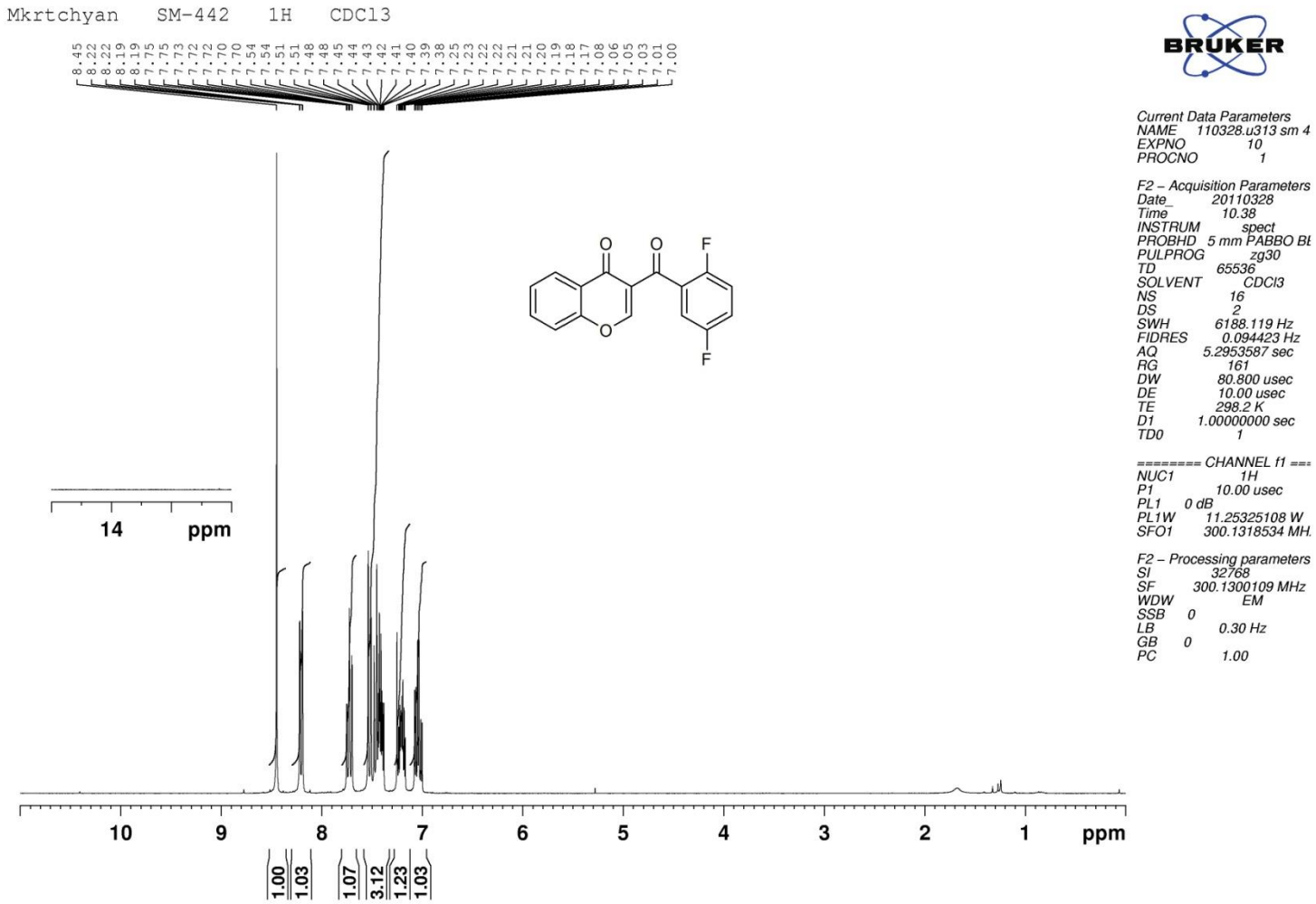
Compound 3h


Mkrtchyan SM443 1H CDCl3
7.79 7.77 7.76 7.76 7.76 7.74 7.74 7.73 7.73 7.71 7.70 7.55 7.54 7.52 7.52 7.49 7.49 7.47 7.46 7.46 7.44 7.44 7.25 7.03 7.02 7.02 7.02 7.00 7.00 6.99 6.99 6.97 6.97 6.97 6.96 6.96 6.94 6.94 6.93 6.91 6.91 6.90 6.88 6.87 6.85 6.85 6.82 6.82 6.81 6.79 6.78
O O F
O F
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.00 1.10 1.26 2.07 2.23 4.76
BRUKER
Current Data Parameter
NAME 110401.u324
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20110401
Time 10.58
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119
FIDRES 0.094423
AQ 5.2953587 s
RG 362
DW 80.800 us
DE 10.00 usec
TE 298.2 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.131853
F2 – Processing param
SI 32768
SF 300.1300111
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

Compound 3h


Mkrtchyan SM814 13C CDCl3
187.27
174.48
174.45
167.93
167.73
164.15
163.95
163.85
163.65
160.07
159.87
159.51
155.99
134.43
132.38
132.32
132.21
132.15
126.35
126.22
125.65
124.84
124.09
124.03
123.89
123.83
118.29
112.16
112.11
111.82
111.77
104.68
104.27
103.86
O
O
F
O
F
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Paramete
NAME 130718.206 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130718
Time 20.32
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zgpg3
TD 65536
SOLVENT CDCl
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.1 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing param
SI 32768
SF 62.8952406
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

Compound 3i



BRUKER

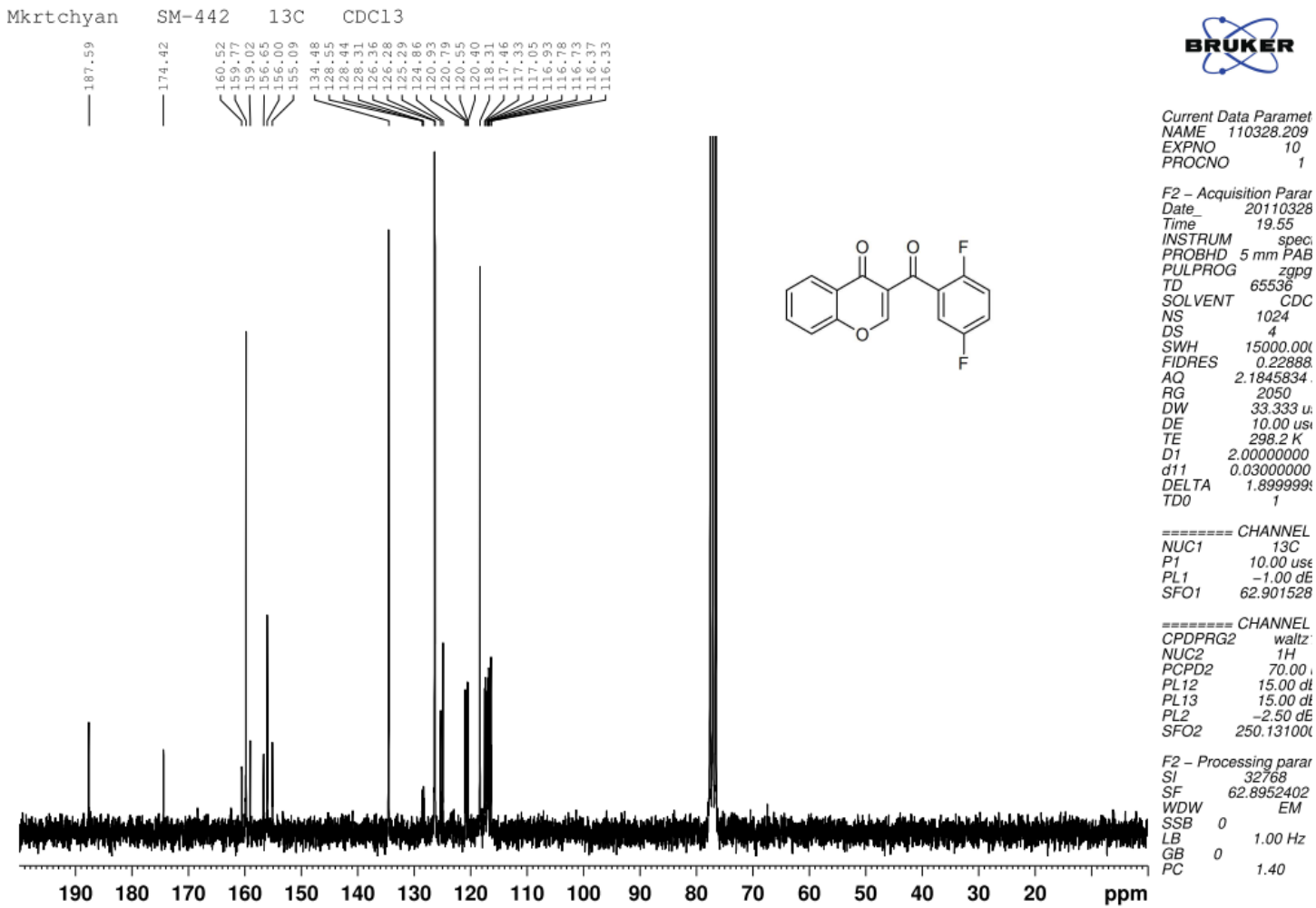
Current Data Parameters
NAME 110328.u313 sm 4
EXPNO 10
PROCNO 1

F2 – Acquisition Parameters
Date_ 20110328
Time 10.38
INSTRUM spect
PROBHD 5 mm PABBO BI
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 161
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1

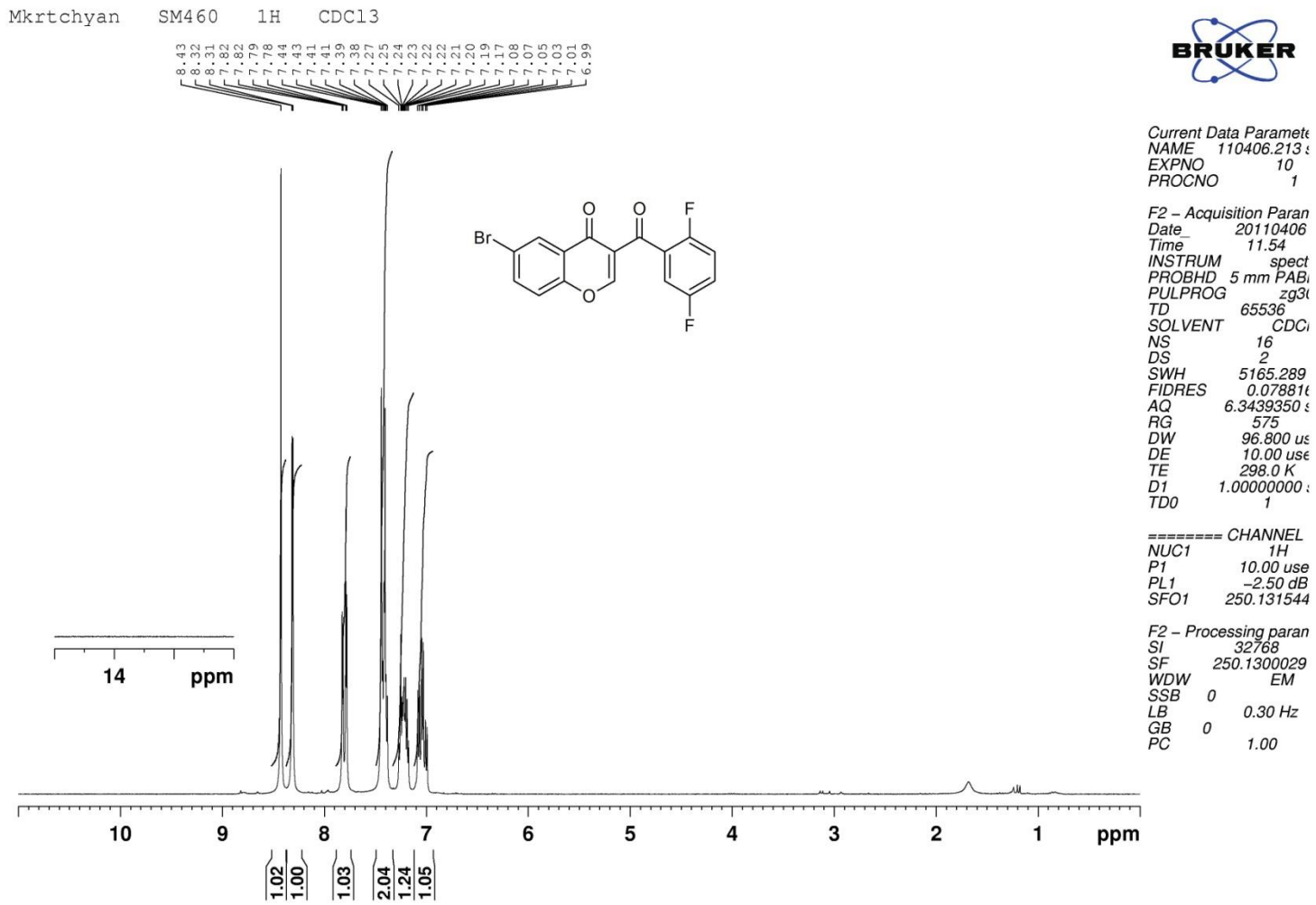
======== CHANNEL f1 ===
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 MH

F2 – Processing parameters
SI 32768
SF 300.1300109 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

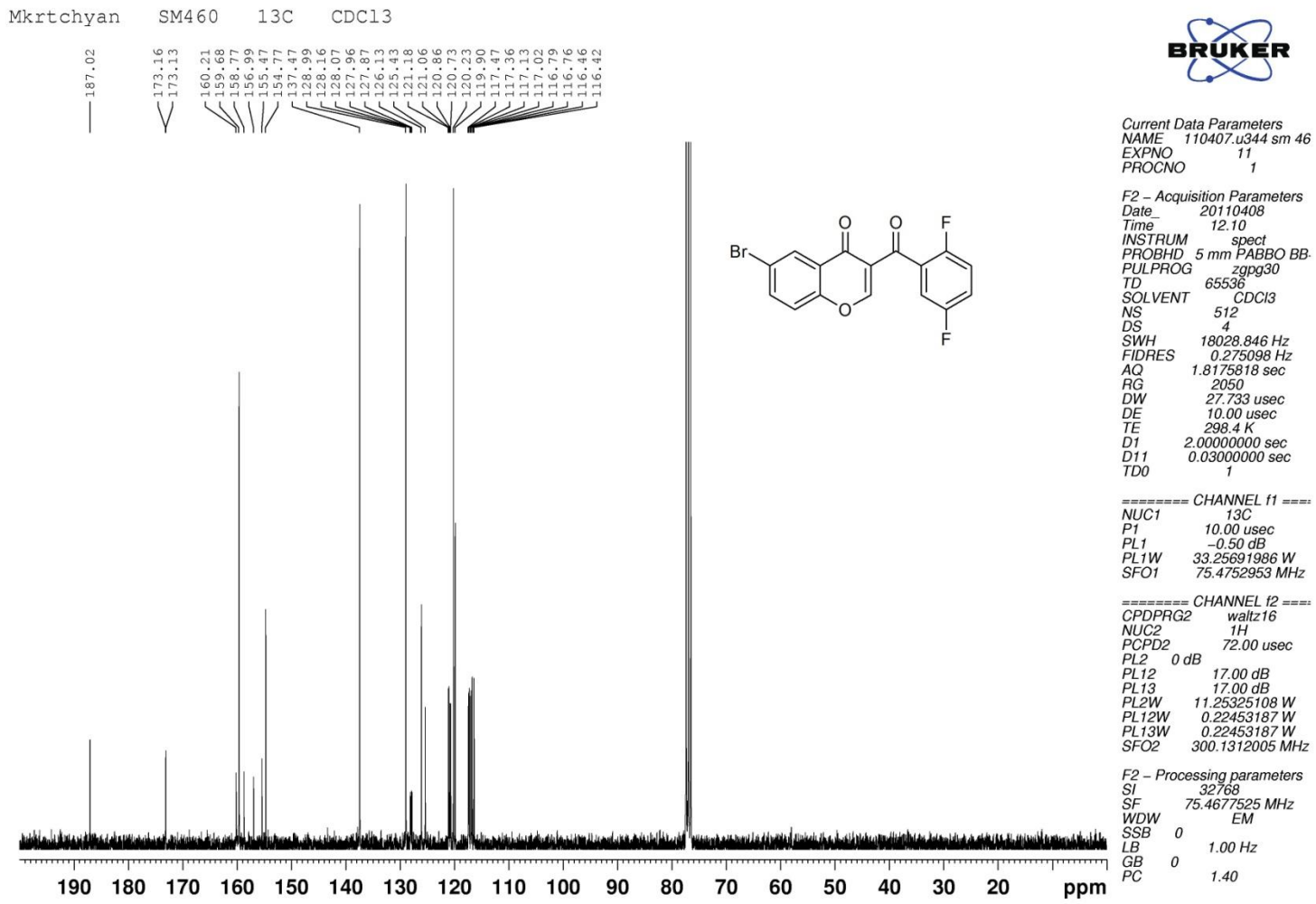
Compound 3i


Mkrtchyan SM-442 13C CDCl3
187.59
174.42
160.52
159.77
159.02
156.65
156.00
155.09
134.48
128.55
128.44
128.31
126.36
126.28
125.29
124.86
120.93
120.79
120.55
120.40
118.31
117.46
117.33
117.05
116.93
116.78
116.73
116.37
116.33
O
O
F
O
F
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramet
NAME 110328.209
EXPNO 10
PROCNO 1
F2 – Acquisition Parar
Date_ 20110328
Time 19.55
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 15000.00
FIDRES 0.22888
AQ 2.1845834
RG 2050
DW 33.333 u
DE 10.00 us
TE 298.2 K
D1 2.00000000
d11 0.03000000
DELTA 1.899999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dE
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz
NUC2 1H
PCPD2 70.00
PL12 15.00 dE
PL13 15.00 dE
PL2 –2.50 dE
SFO2 250.13100
F2 – Processing parar
SI 32768
SF 62.8952402
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

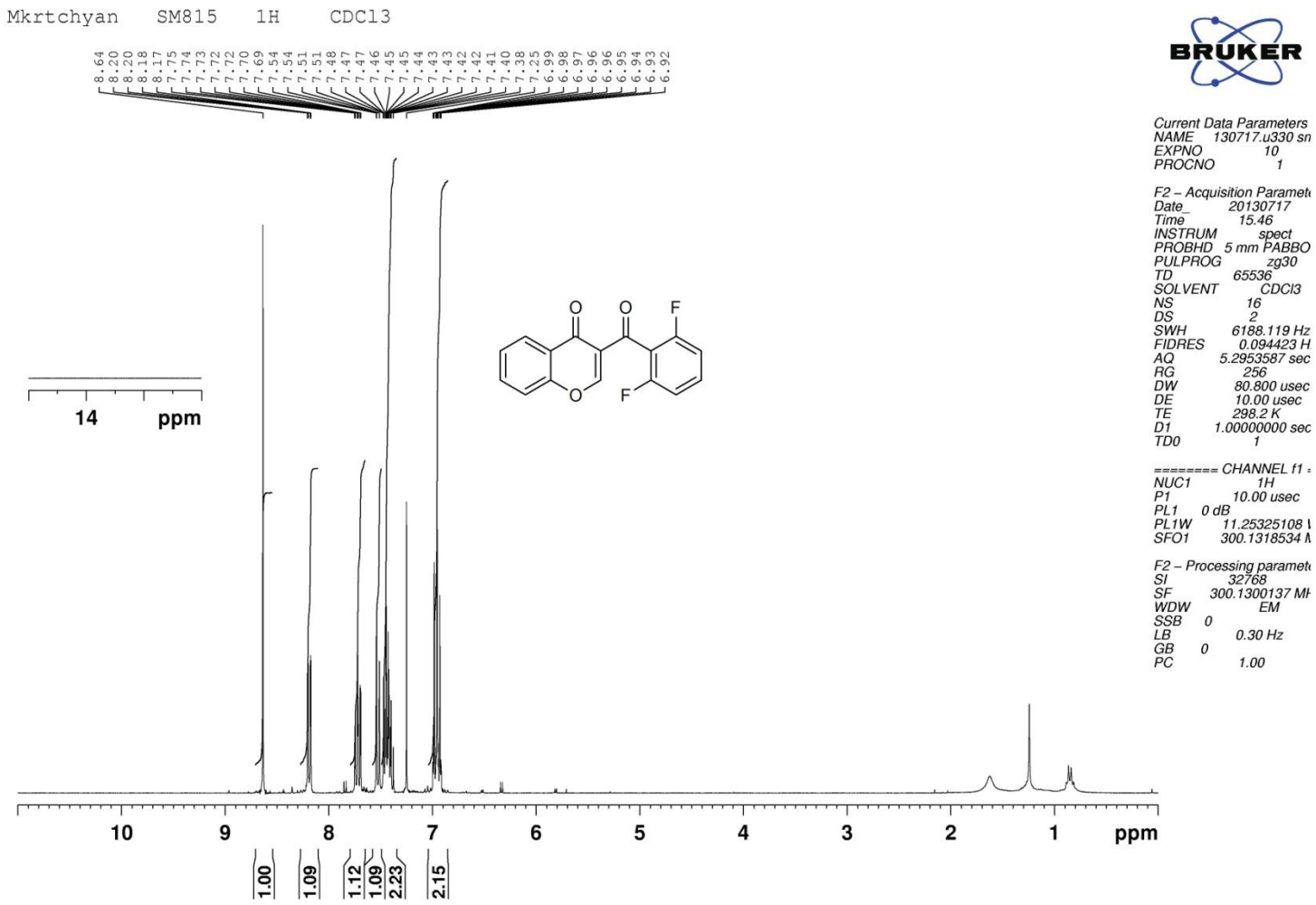
Compound 3j


Mkrtchyan SM460 1H CDCl3
8.43
8.32
8.31
7.82
7.82
7.79
7.78
7.44
7.43
7.41
7.41
7.39
7.38
7.27
7.25
7.24
7.23
7.22
7.22
7.21
7.20
7.19
7.17
7.08
7.07
7.05
7.03
7.01
6.99
Br
O
O
F
O
F
14
ppm
10
9
8
7
6
5
4
3
2
1
ppm
1.02
1.00
1.03
2.04
1.24
1.05
BRUKER
Current Data Paramete
NAME 110406.213 s
EXPNO 10
PROCNO 1
F2 – Acquisition Paran
Date_ 20110406
Time 11.54
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zg30
TD 65536
SOLVENT CDCl
NS 16
DS 2
SWH 5165.289
FIDRES 0.07881
AQ 6.3439350 s
RG 575
DW 96.800 us
DE 10.00 use
TE 298.0 K
D1 1.00000000 s
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 use
PL1 –2.50 dB
SFO1 250.131544
F2 – Processing paran
SI 32768
SF 250.1300029
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

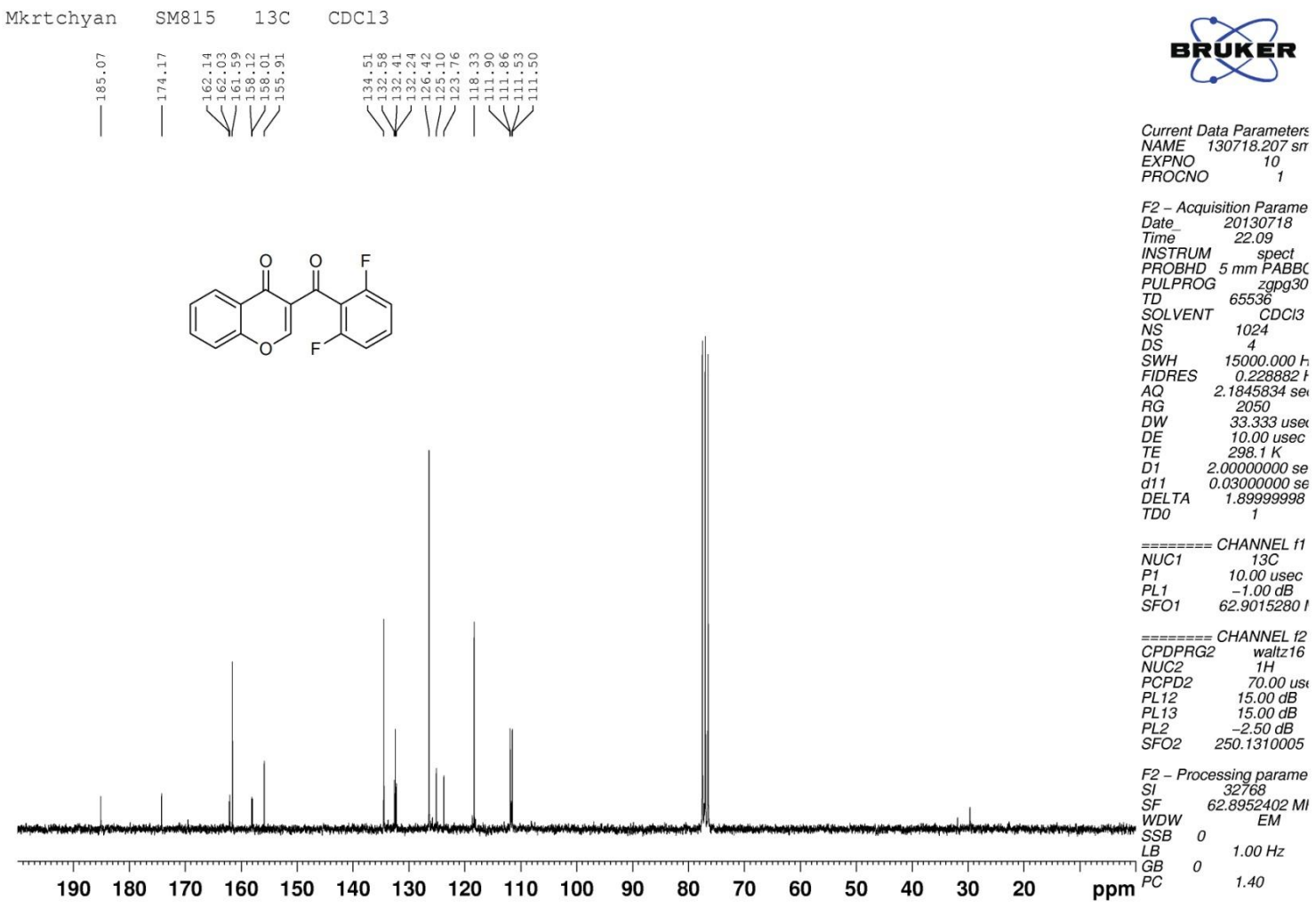
Compound 3j


Mkrtchyan SM460 13C CDCl3
187.02
173.16
173.13
160.21
159.68
158.77
156.99
155.47
154.77
137.47
128.99
128.16
128.07
127.96
127.87
126.13
125.43
121.18
121.06
120.86
120.73
120.23
119.90
117.47
117.36
117.13
117.02
116.79
116.76
116.46
116.42
Br
O
O
F
O
F
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 110407.u344 sm 46
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20110408
Time 12.10
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 512
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 2050
DW 27.733 usec
DE 10.00 usec
TE 298.4 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ====
NUC1 13C
P1 10.00 usec
PL1 –0.50 dB
PL1W 33.25691986 W
SFO1 75.4752953 MHz
======== CHANNEL f2 ====
CPDPRG2 waltz16
NUC2 1H
PCPD2 72.00 usec
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.25325108 W
PL12W 0.22453187 W
PL13W 0.22453187 W
SFO2 300.1312005 MHz
F2 – Processing parameters
SI 32768
SF 75.4677525 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

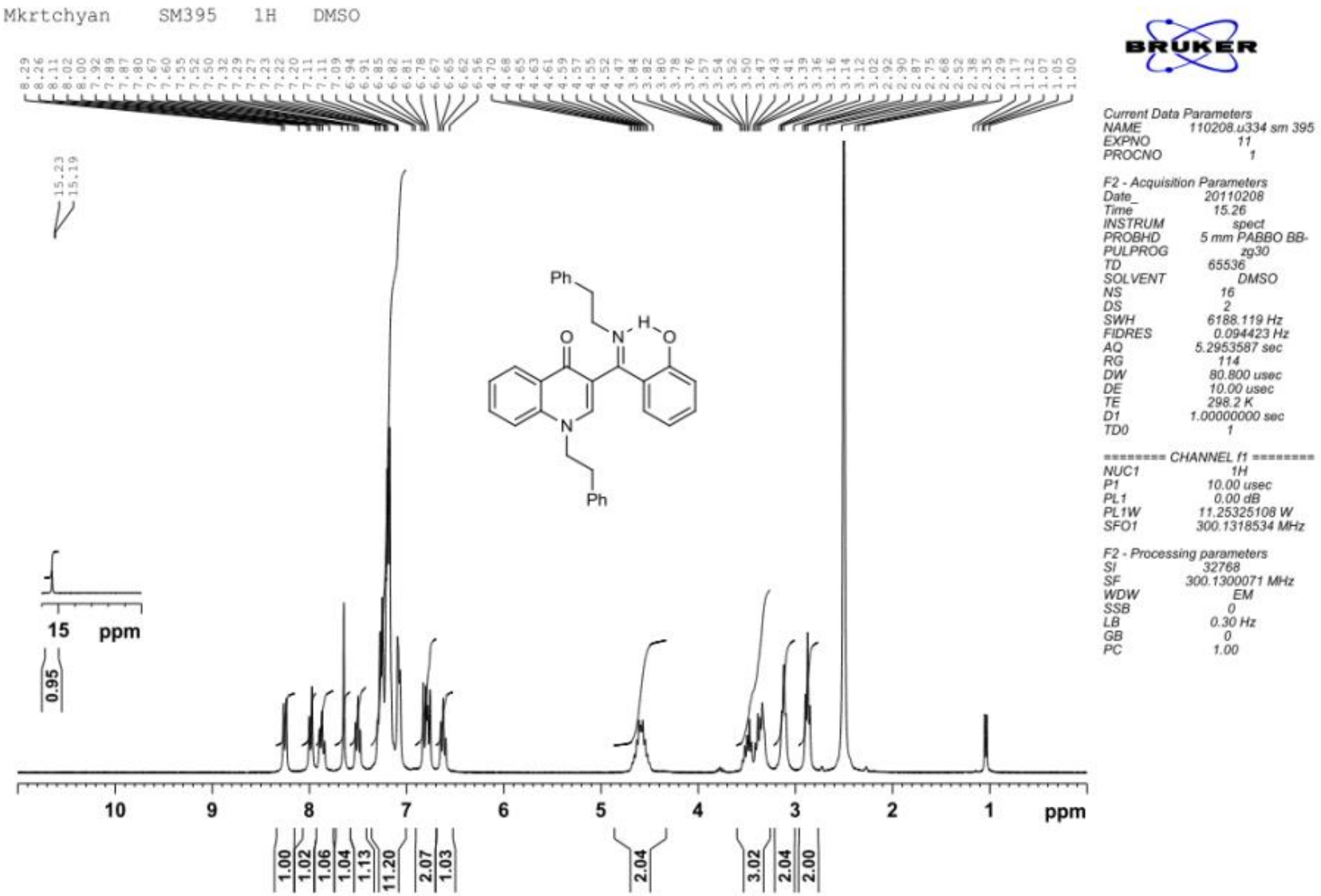
Compound 3k


Mkrtchyan SM815 1H CDCl3
8.64 8.20 8.20 8.18 8.17 7.75 7.74 7.73 7.72 7.72 7.70 7.69 7.54 7.54 7.51 7.51 7.48 7.47 7.47 7.46 7.45 7.45 7.44 7.43 7.43 7.42 7.42 7.41 7.40 7.38 7.25 6.99 6.98 6.97 6.96 6.96 6.95 6.94 6.93 6.92
14 ppm
O O F
O F
10 9 8 7 6 5 4 3 2 1 ppm
1.00 1.09 1.12 1.09 2.23 2.15
BRUKER
Current Data Parameters
NAME 130717.u330 sn
EXPNO 10
PROCNO 1
F2 – Acquisition Paramet
Date_ 20130717
Time 15.46
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 H
AQ 5.2953587 sec
RG 256
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 =
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing paramet
SI 32768
SF 300.1300137 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

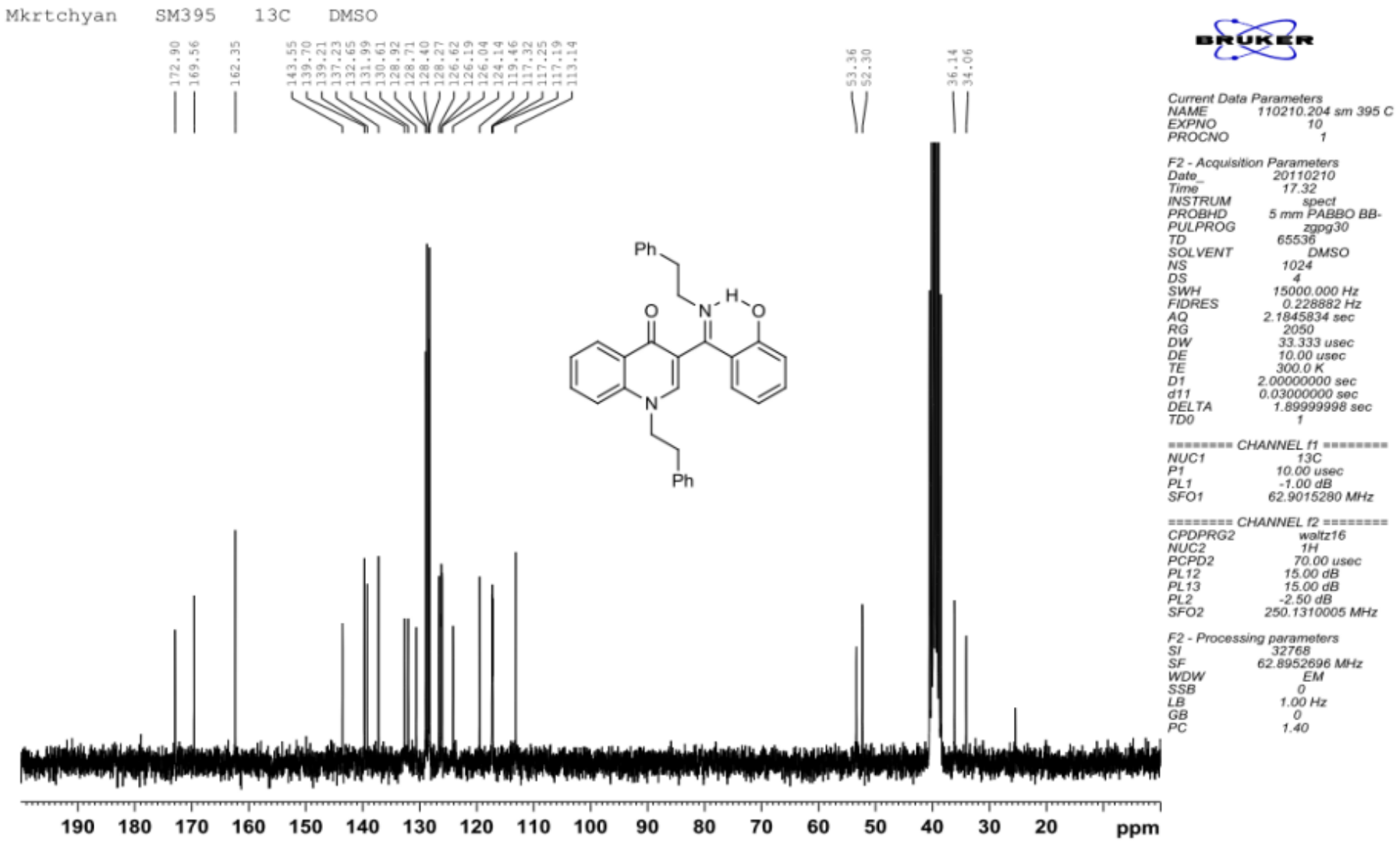
Compound 3k


Mkrtchyan SM815 13C CDCl3
185.07
174.17
162.14
162.03
161.59
158.12
158.01
155.91
134.51
132.58
132.41
132.24
126.42
125.10
123.76
118.33
111.90
111.86
111.53
111.50
O
O
F
O
F
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 130718.207 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20130718
Time 22.09
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000 H
FIDRES 0.228882 H
AQ 2.1845834 se
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.1 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280 M
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 use
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952402 MH
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

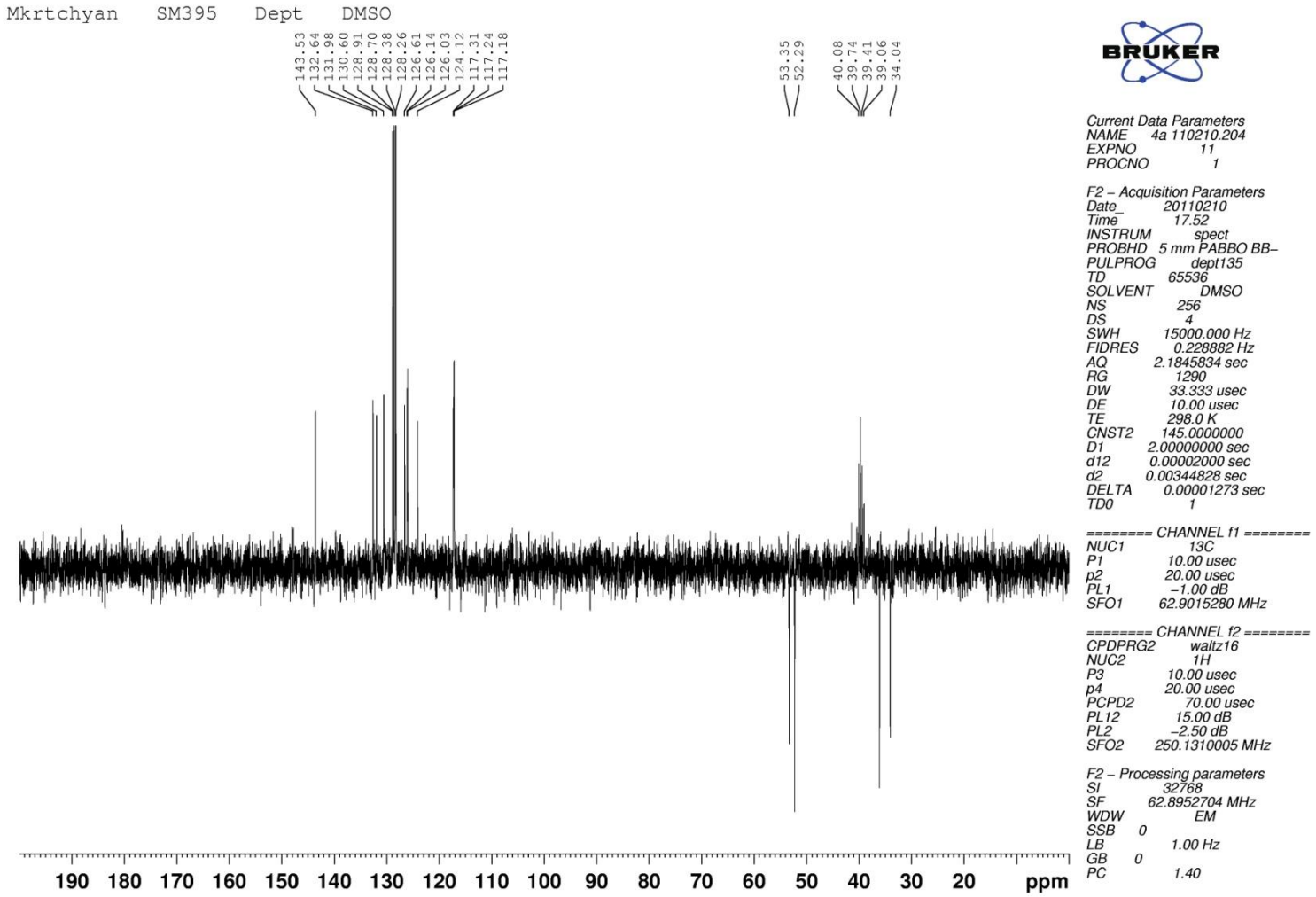
Compound 4a


Mkrtchyan SM395 1H DMSO
BRUKER
Current Data Parameters
NAME 110208.u334 sm 395
EXPNO 11
PROCNO 1
F2 - Acquisition Parameters
Date_ 20110208
Time 15.26
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 114
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.00 usec
PL1 0.00 dB
PL1W 11.25325108 W
SFO1 300.1318534 MHz
F2 - Processing parameters
SI 32768
SF 300.1300071 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
Ph
N
H
O
O
N
Ph
15 ppm
0.95
10 9 8 7 6 5 4 3 2 1 ppm
1.00 1.02 1.06 1.04 1.13 11.20 2.07 1.03 2.04 3.02 2.04 2.00

Compound 4a


Mkrtchyan SM395 13C DMSO
172.90
169.56
162.35
143.55
139.70
139.21
137.23
132.65
131.99
130.61
128.92
128.71
128.40
128.27
126.62
126.19
126.04
124.14
119.46
117.32
117.25
117.19
113.14
53.36
52.30
36.14
34.06
Ph
N
H
O
O
N
Ph
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 110210.204 sm 395 C
EXPNO 10
PROCNO 1
F2 - Acquisition Parameters
Date_ 20110210
Time 17.32
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 1024
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 300.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
PL1 -1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL12 15.00 dB
PL13 15.00 dB
PL2 -2.50 dB
SFO2 250.1310005 MHz
F2 - Processing parameters
SI 32768
SF 62.8952696 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

Compound 4a



Current Data Parameters
NAME 4a 110210.204
EXPNO 11
PROCNO 1

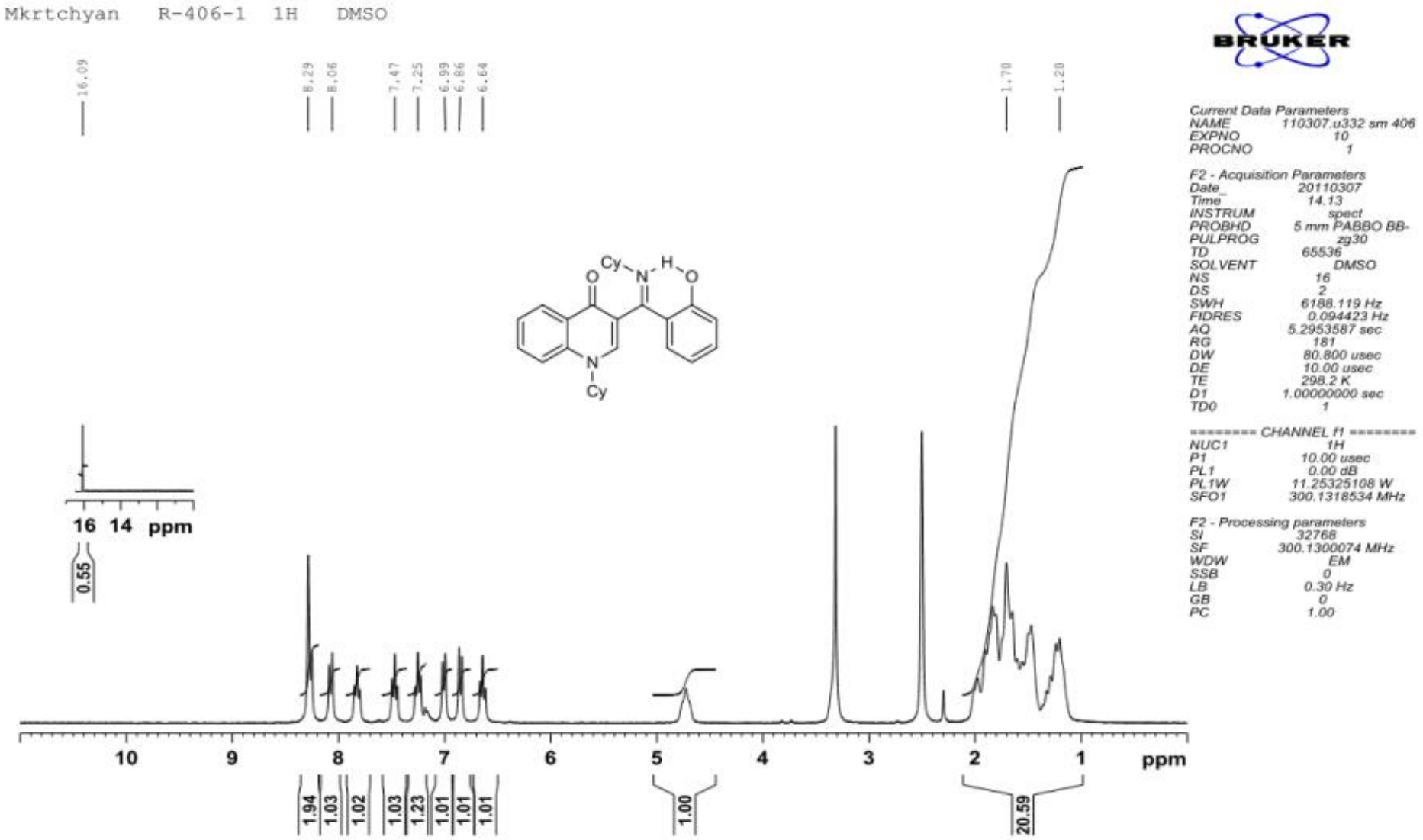
F2 – Acquisition Parameters
Date_ 20110210
Time 17.52
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT DMSO
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 1290
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1

======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz

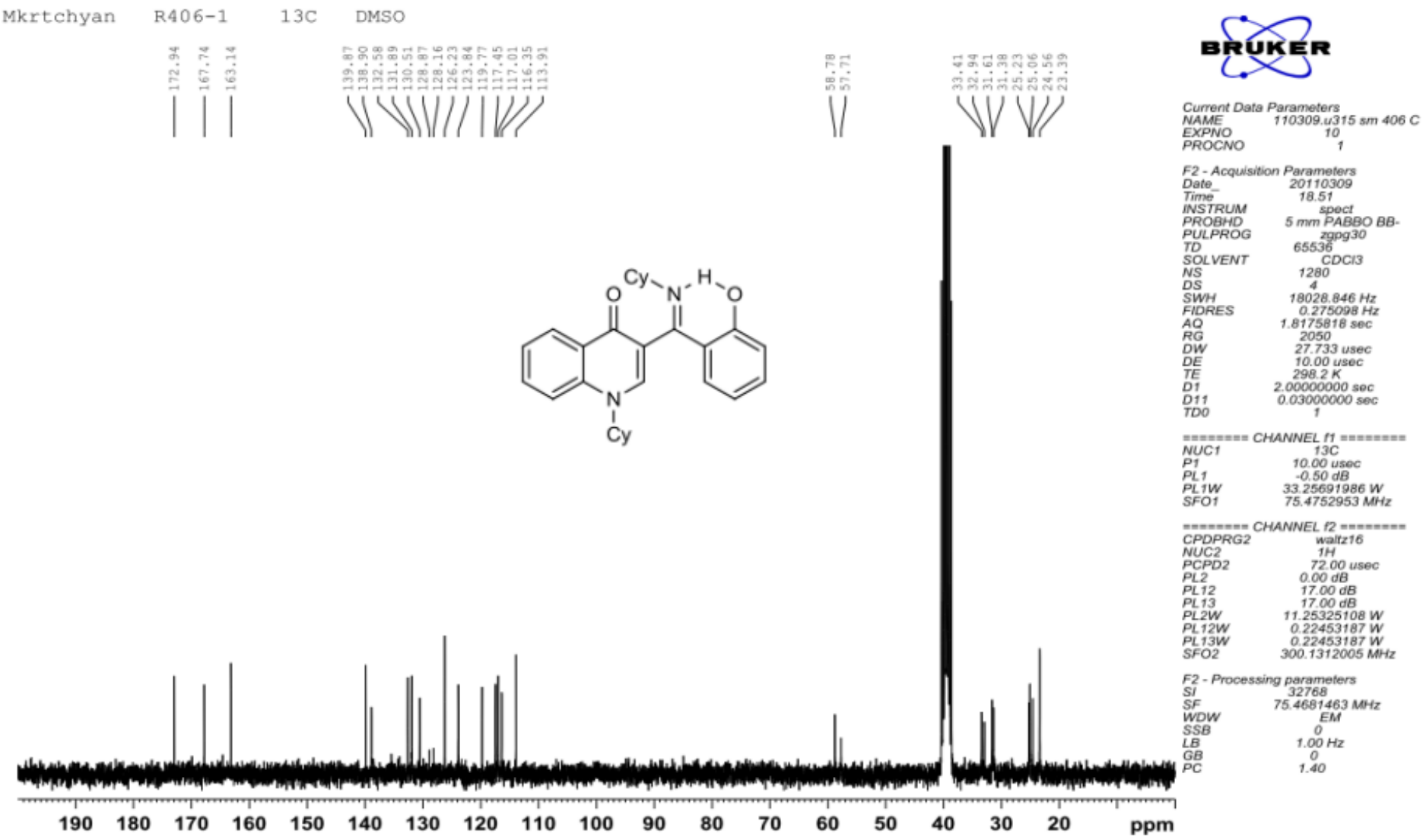
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz

F2 – Processing parameters
SI 32768
SF 62.8952704 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

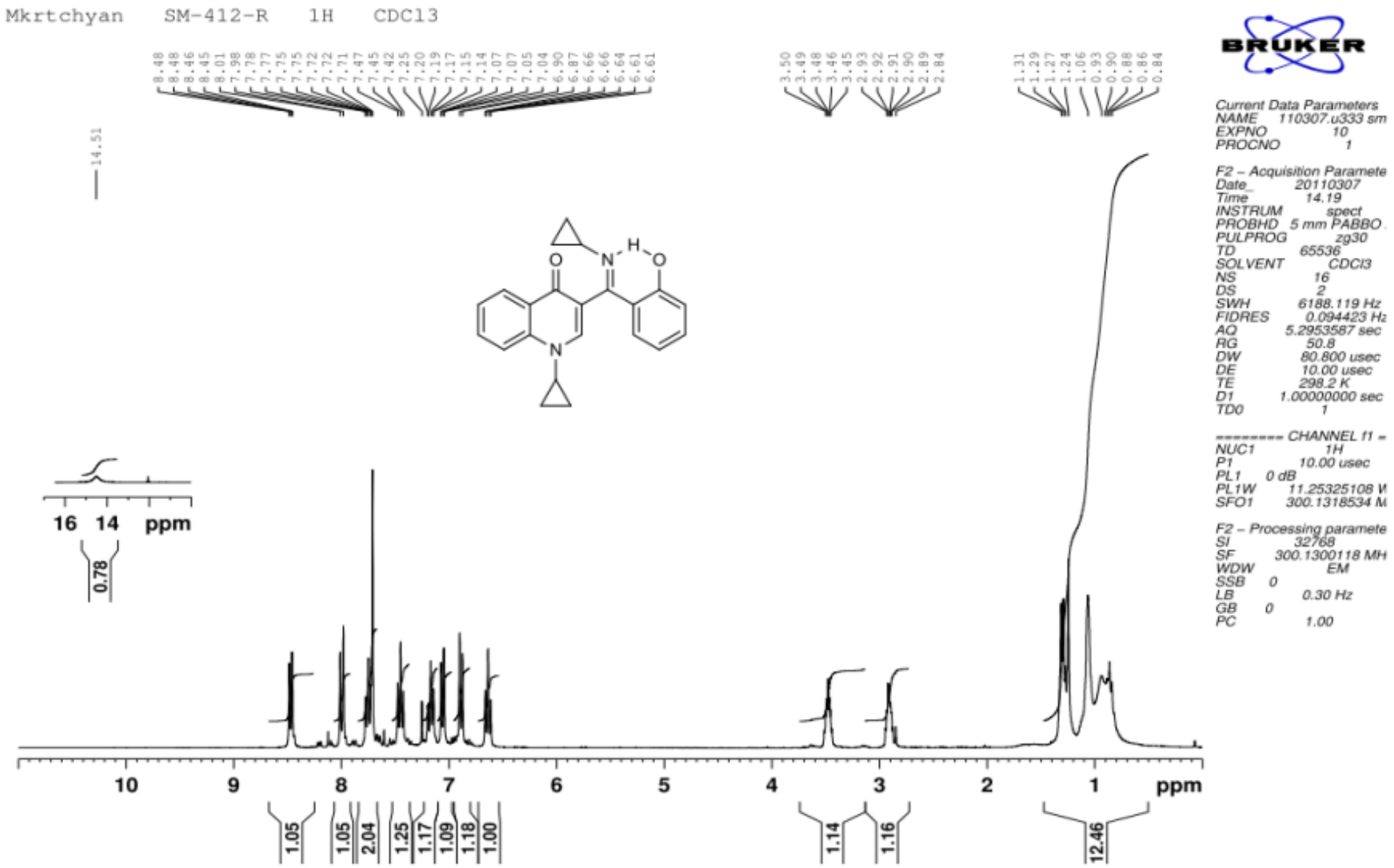
Compound 4b


Mkrtchyan R-406-1 1H DMSO
16.09
8.29
8.06
7.47
7.25
6.99
6.86
6.64
1.70
1.20
Cy
N
H
O
O
N
Cy
16 14 ppm
0.55
10 9 8 7 6 5 4 3 2 1 ppm
1.94
1.03
1.02
1.03
1.23
1.01
1.01
1.01
1.00
20.59
BRUKER
Current Data Parameters
NAME 110307.u332 sm 406
EXPNO 10
PROCNO 1
F2 - Acquisition Parameters
Date_ 20110307
Time 14.13
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 181
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.00 usec
PL1 0.00 dB
PL1W 11.25325108 W
SFO1 300.1318534 MHz
F2 - Processing parameters
SI 32768
SF 300.1300074 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

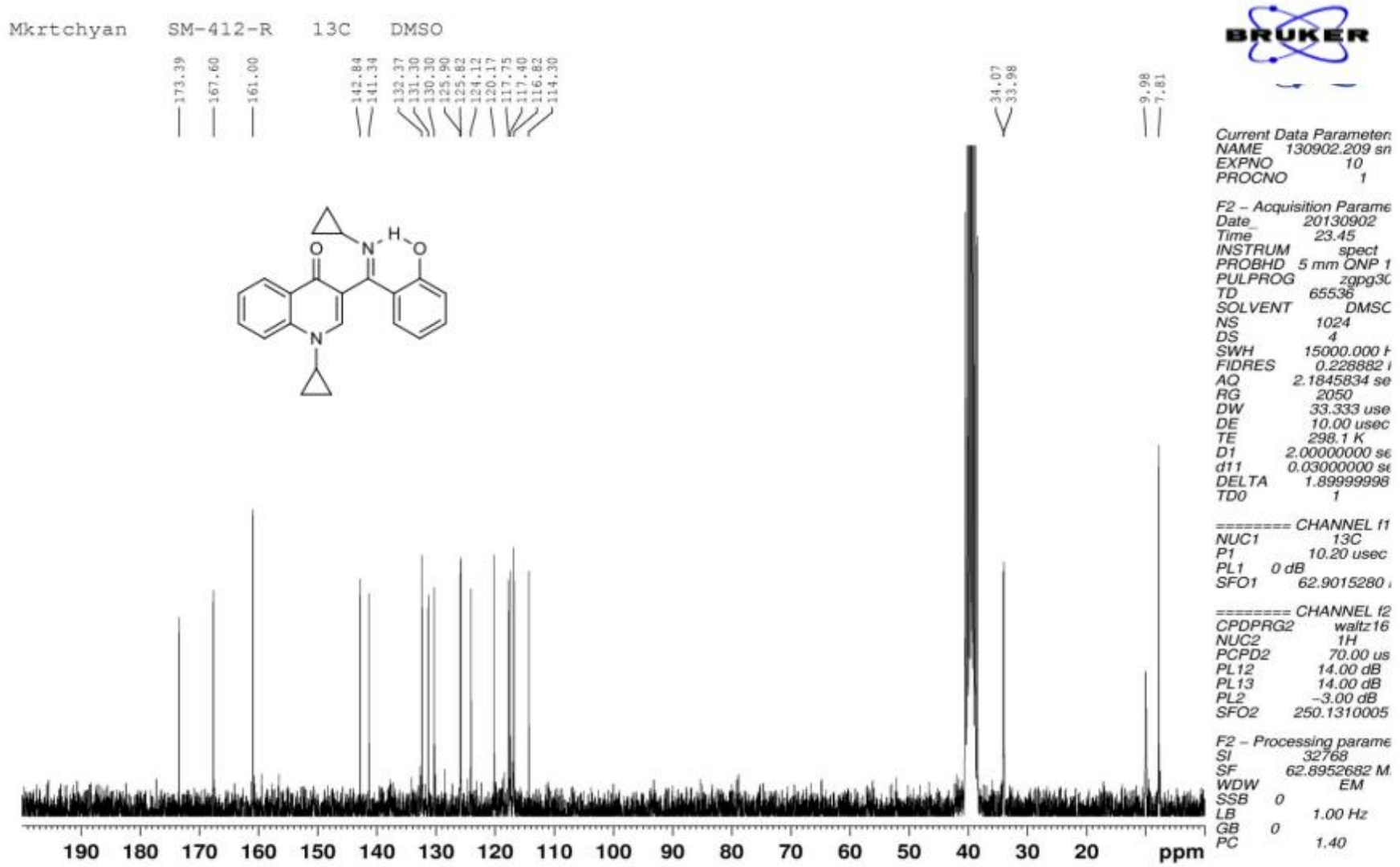
Compound 4b


Mkrtchyan R406-1 13C DMSO
172.94
167.74
163.14
139.87
138.90
132.58
131.89
130.51
128.87
128.16
126.23
123.84
119.77
117.45
117.01
116.35
113.91
58.78
57.71
33.41
32.94
31.61
31.38
25.23
25.06
24.56
23.39
Cy
N
H
O
O
N
Cy
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 110309.u315 sm 406 C
EXPNO 10
PROCNO 1
F2 - Acquisition Parameters
Date_ 20110309
Time 18.51
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1280
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 2050
DW 27.733 usec
DE 10.00 usec
TE 298.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
PL1 -0.50 dB
PL1W 33.25691986 W
SFO1 75.4752953 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 72.00 usec
PL2 0.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.25325108 W
PL12W 0.22453187 W
PL13W 0.22453187 W
SFO2 300.1312005 MHz
F2 - Processing parameters
SI 32768
SF 75.4681463 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

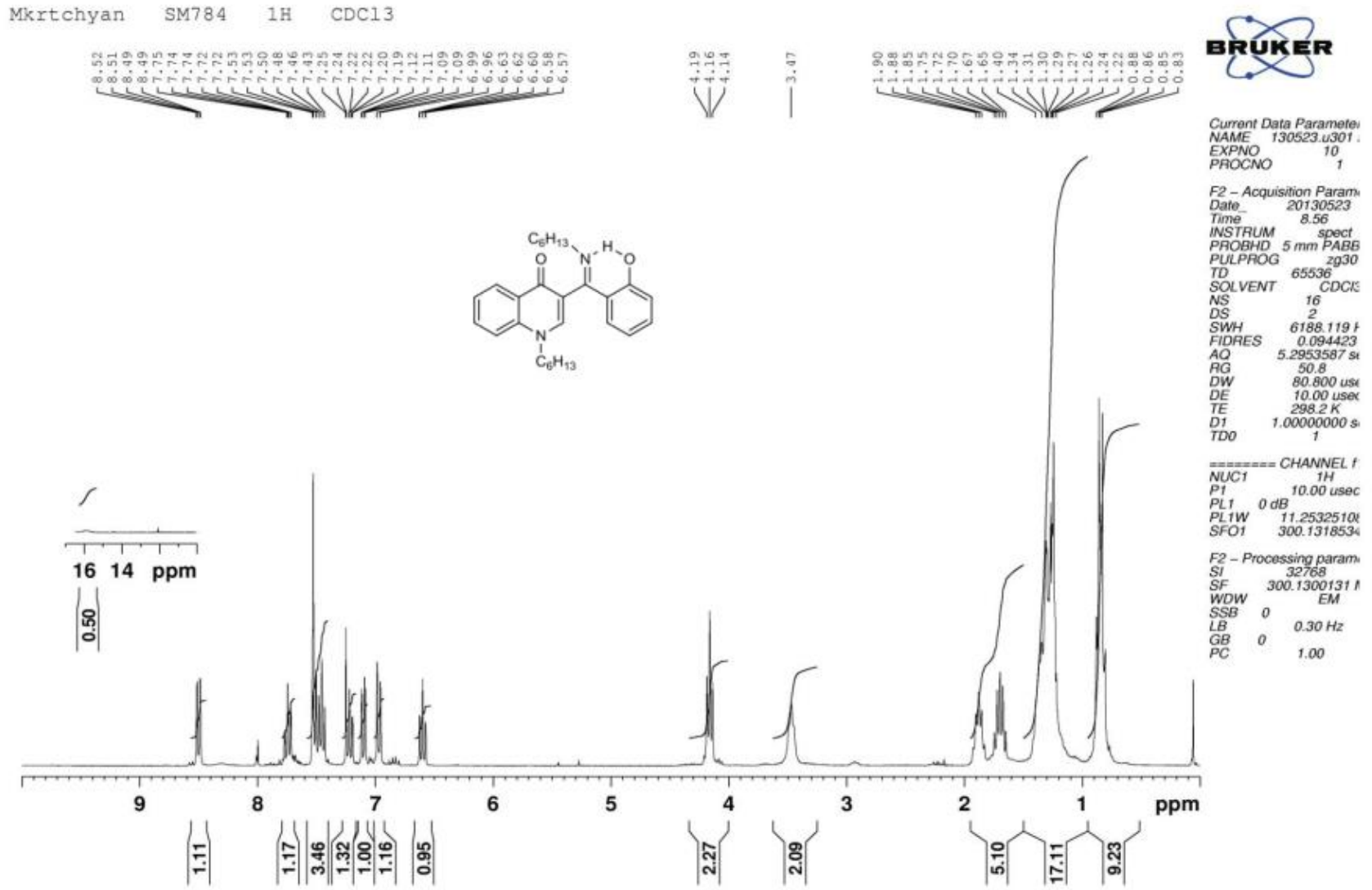
Compound 4c


Mkrtchyan SM-412-R 1H CDCl3
BRUKER
Current Data Parameters
NAME 110307.u333 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramete
Date_ 20110307
Time 14.19
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 50.8
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing paramete
SI 32768
SF 300.1300118 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
ppm
1.05
1.05
2.04
1.25
1.17
1.09
1.18
1.00
1.14
1.16
12.46
0.78

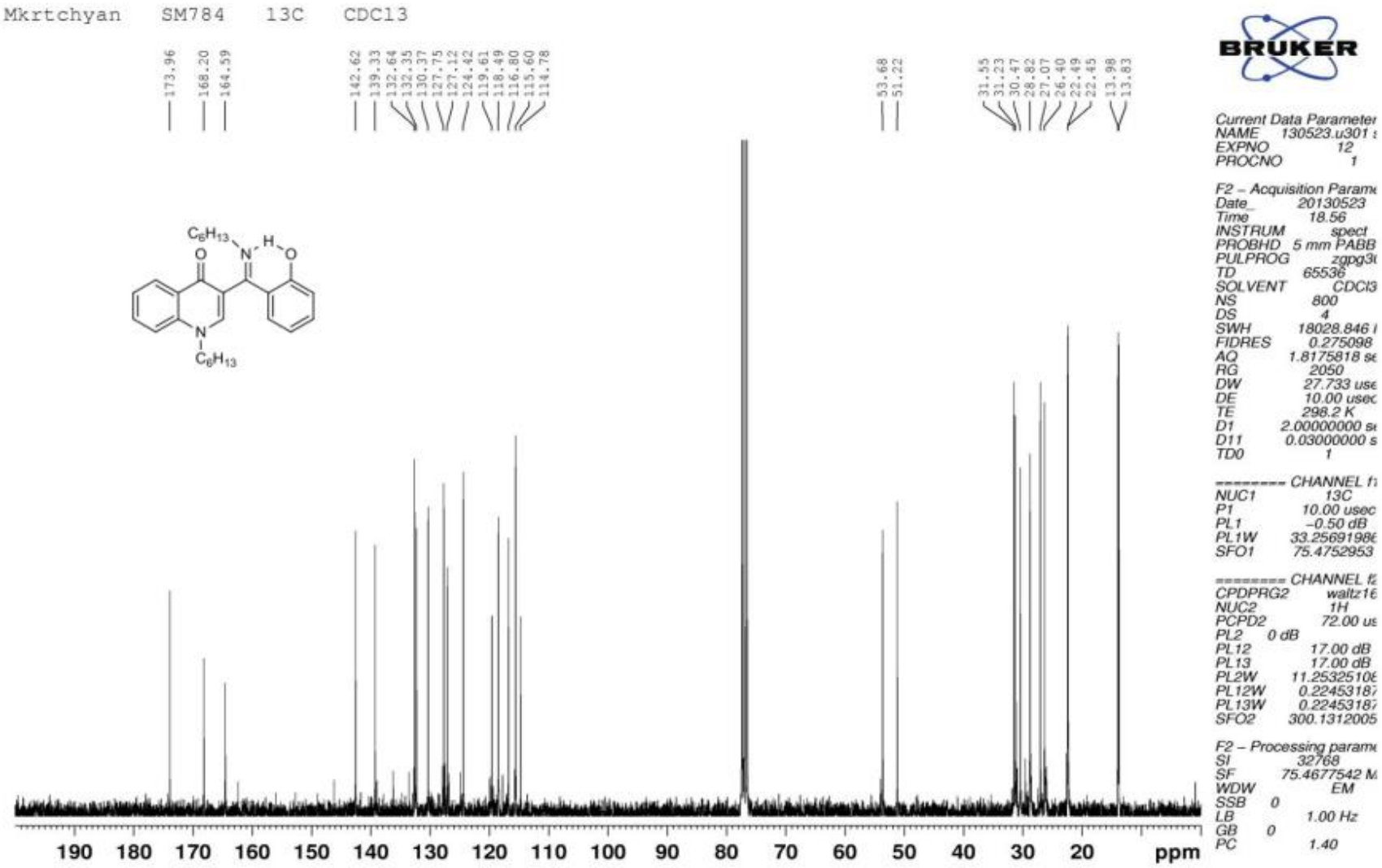
Compound 4c


Mkrtchyan SM-412-R 13C DMSO
173.39
167.60
161.00
142.84
141.34
132.37
131.30
130.30
125.90
125.82
124.12
120.17
117.75
117.40
116.82
114.30
34.07
33.98
9.98
7.81
O
N
H
O
N
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Parameter
NAME 130902.209 sn
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20130902
Time 23.45
INSTRUM spect
PROBHD 5 mm QNP 1
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 1024
DS 4
SWH 15000.000 H
FIDRES 0.228882
AQ 2.1845834 se
RG 2050
DW 33.333 use
DE 10.00 usec
TE 298.1 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.20 usec
PL1 0 dB
SFO1 62.9015280
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 us
PL12 14.00 dB
PL13 14.00 dB
PL2 -3.00 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952682 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

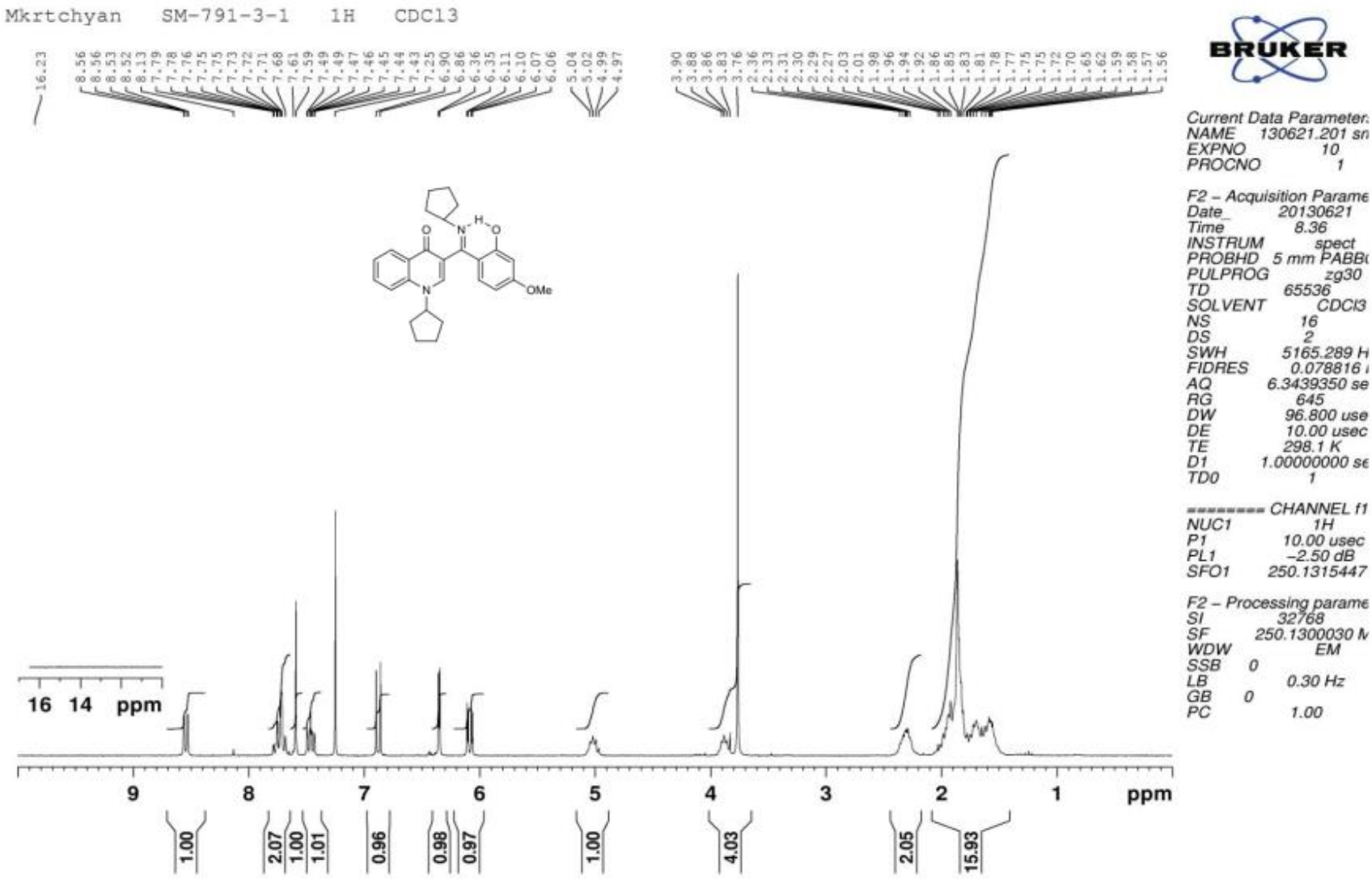
Compound 4d


Mkrtchyan SM784 1H CDCl3
BRUKER
8.52 8.51 8.49 8.49 7.75 7.74 7.74 7.72 7.72 7.53 7.53 7.50 7.48 7.46 7.43 7.25 7.24 7.22 7.22 7.20 7.19 7.12 7.11 7.09 7.09 6.99 6.96 6.63 6.62 6.60 6.58 6.57
4.19 4.16 4.14
3.47
1.90 1.88 1.85 1.75 1.72 1.70 1.67 1.65 1.40 1.34 1.31 1.30 1.29 1.27 1.26 1.24 1.22 0.88 0.86 0.85 0.83
Current Data Parameter
NAME 130523.u301
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130523
Time 8.56
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423
AQ 5.2953587 s
RG 50.8
DW 80.800 us
DE 10.00 usec
TE 298.2 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing param
SI 32768
SF 300.1300131 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
C6H13
O
N
H
O
N
C6H13
16 14 ppm
0.50
9 8 7 6 5 4 3 2 1 ppm
1.11 1.17 3.46 1.32 1.00 1.16 0.95 2.27 2.09 5.10 17.11 9.23

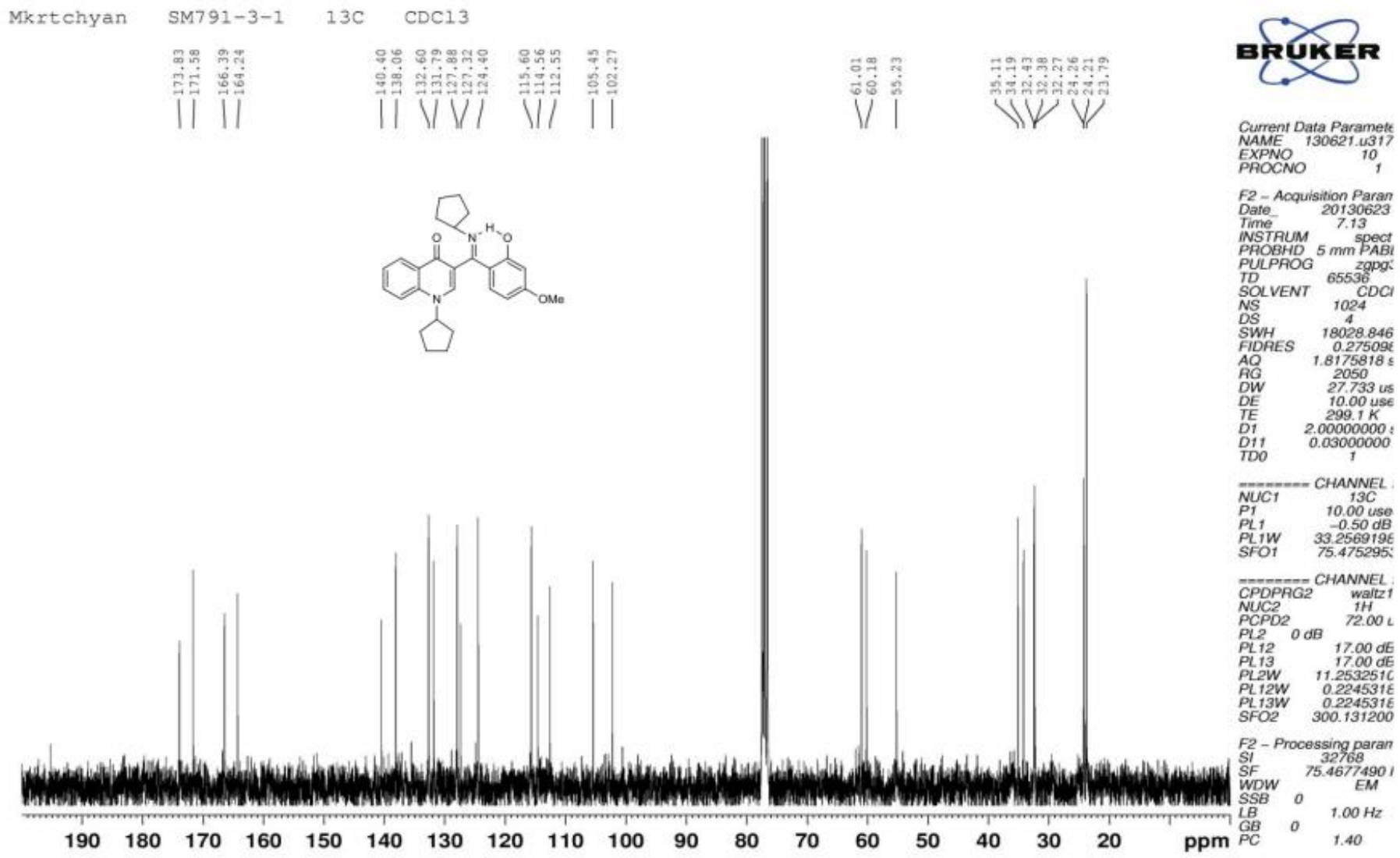
Compound 4d


Mkrtchyan SM784 13C CDC13
173.96
168.20
164.59
142.62
139.33
132.64
132.35
130.37
127.75
127.12
124.42
119.61
118.49
116.80
115.60
114.78
53.68
51.22
31.55
31.23
30.47
28.82
27.07
26.40
22.49
22.45
13.98
13.83
BRUKER
Current Data Parameter
NAME 130523.u301
EXPNO 12
PROCNO 1
F2 – Acquisition Param
Date_ 20130523
Time 18.56
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT CDCl3
NS 800
DS 4
SWH 18028.846
FIDRES 0.275098
AQ 1.8175818 s
RG 2050
DW 27.733 us
DE 10.00 usec
TE 298.2 K
D1 2.00000000 s
D11 0.03000000 s
TD0 1
CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 -0.50 dB
PL1W 33.2569198
SFO1 75.4752953
CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 72.00 us
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.2532510
PL12W 0.2245318
PL13W 0.2245318
SFO2 300.1312005
F2 – Processing param
SI 32768
SF 75.4677542 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

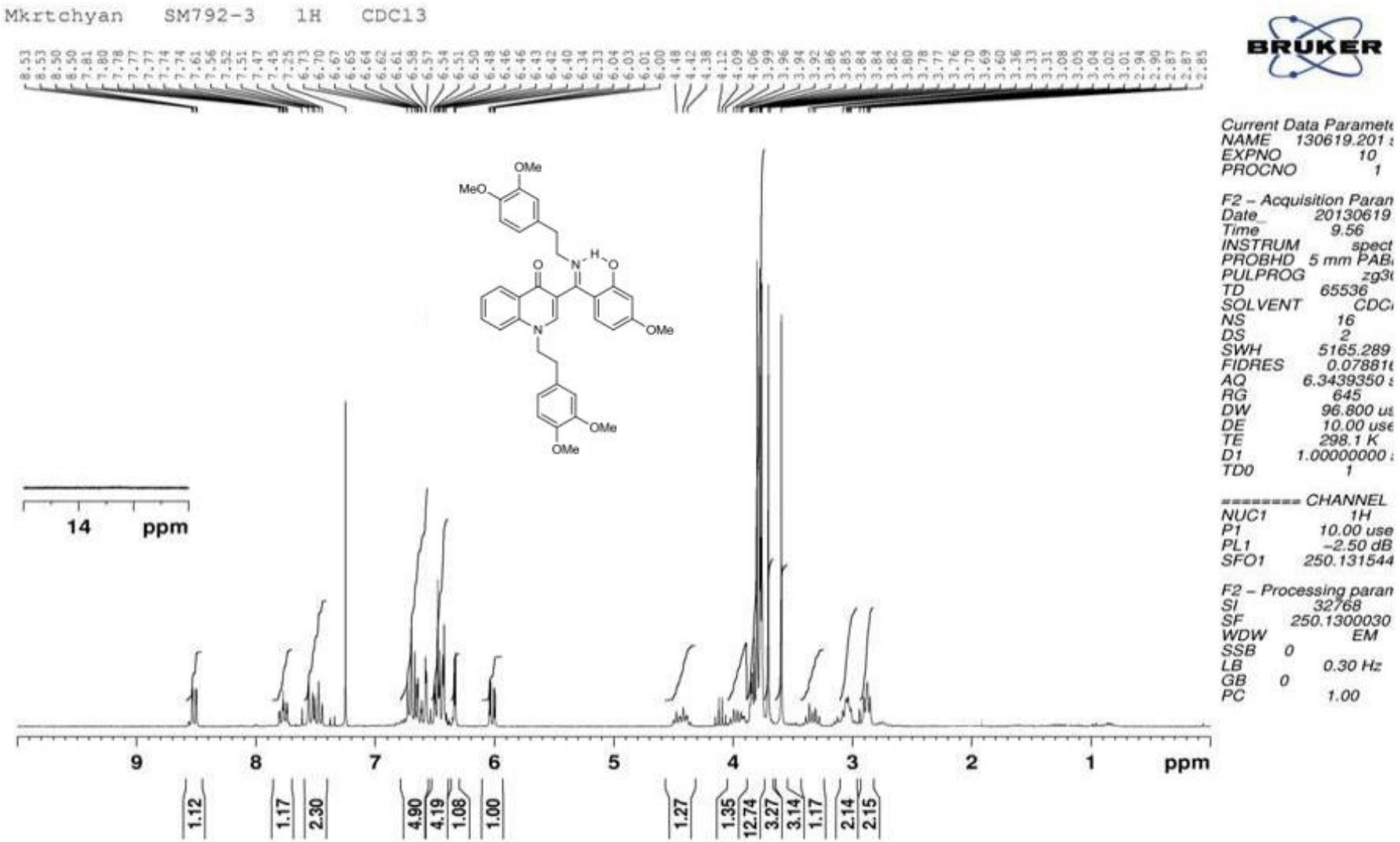
Compound 4e


Mkrtchyan SM-791-3-1 1H CDCl3
BRUKER
OMe
16 14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.00 2.07 1.00 1.01 0.96 0.98 0.97 1.00 4.03 2.05 15.93
Current Data Parameter
NAME 130621.201 sn
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20130621
Time 8.36
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 5165.289 H
FIDRES 0.078816
AQ 6.3439350 se
RG 645
DW 96.800 use
DE 10.00 usec
TE 298.1 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.1315447
F2 – Processing parame
SI 32768
SF 250.1300030 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

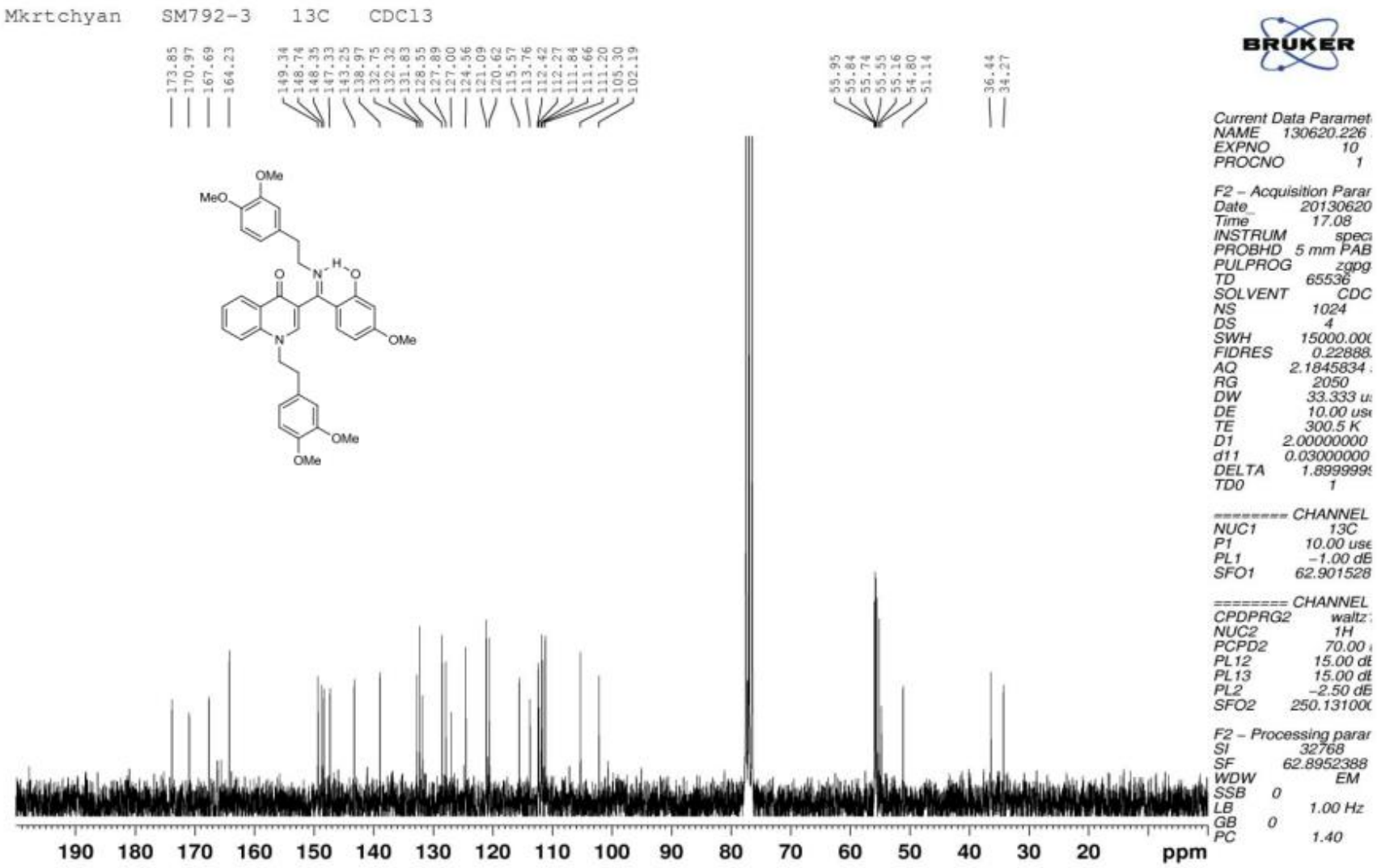
Compound 4e


Mkrtchyan SM791-3-1 13C CDCl3
173.83
171.58
166.39
164.24
140.40
138.06
132.60
131.79
127.88
127.32
124.40
115.60
114.56
112.55
105.45
102.27
61.01
60.18
55.23
35.11
34.19
32.43
32.38
32.27
24.26
24.21
23.79
OMe
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramete
NAME 130621.u317
EXPNO 10
PROCNO 1
F2 - Acquisition Paran
Date_ 20130623
Time 7.13
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zgpg
TD 65536
SOLVENT CDCl
NS 1024
DS 4
SWH 18028.846
FIDRES 0.27509
AQ 1.8175818 s
RG 2050
DW 27.733 us
DE 10.00 use
TE 299.1 K
D1 2.00000000
D11 0.03000000
TD0 1
CHANNEL
NUC1 13C
P1 10.00 use
PL1 -0.50 dB
PL1W 33.256919
SFO1 75.475295
CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 72.00
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.253251
PL12W 0.224531
PL13W 0.224531
SFO2 300.131200
F2 - Processing paran
SI 32768
SF 75.4677490
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

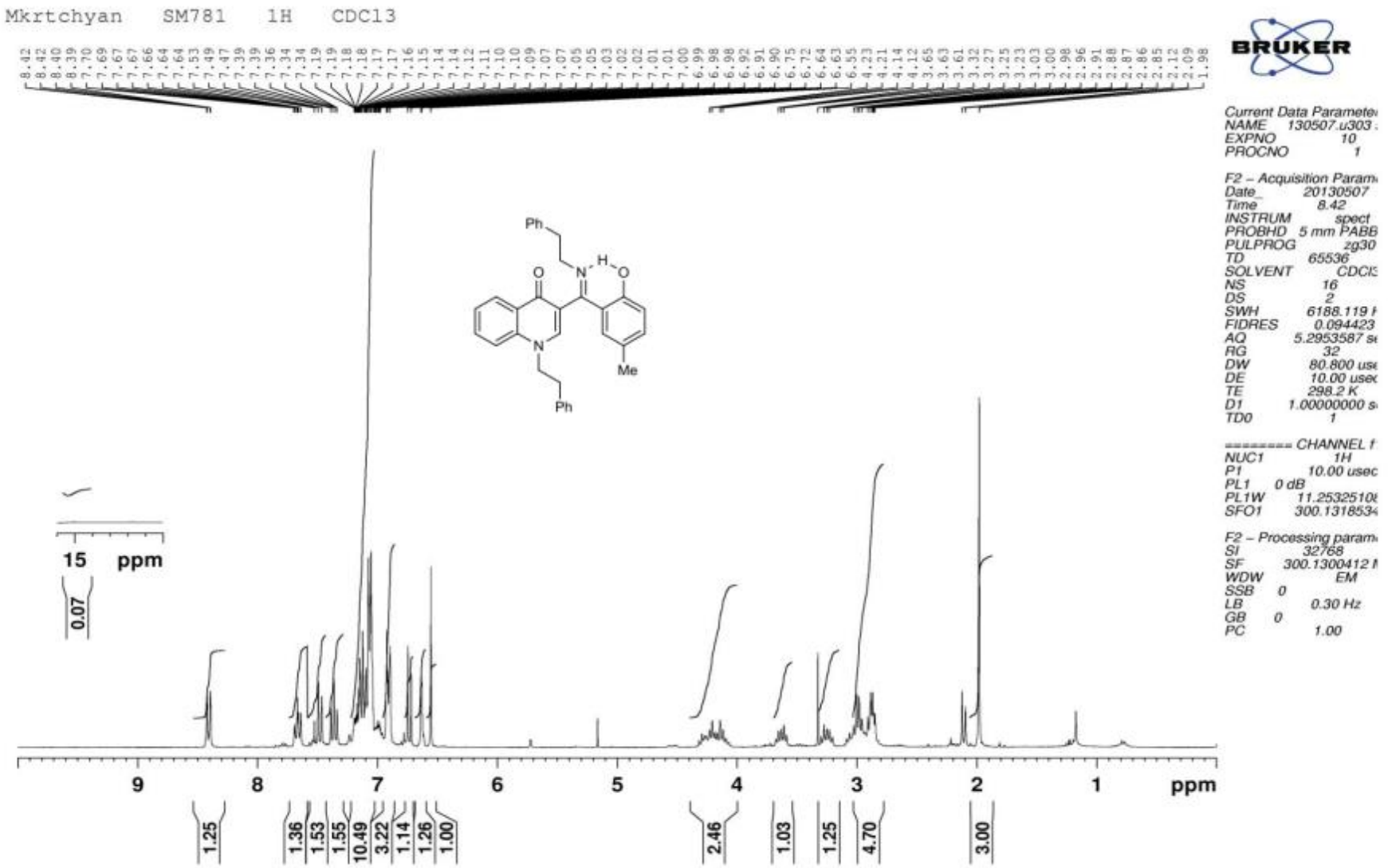
Compound 4f


Mkrtchyan SM792-3 1H CDC13
BRUKER
Current Data Paramete
NAME 130619.201
EXPNO 10
PROCNO 1
F2 – Acquisition Paran
Date 20130619
Time 9.56
INSTRUM spect
PROBHD 5 mm PAB
PULPROG zg3
TD 65536
SOLVENT CDC
NS 16
DS 2
SWH 5165.289
FIDRES 0.07881
AQ 6.3439350
RG 645
DW 96.800 us
DE 10.00 use
TE 298.1 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 use
PL1 –2.50 dB
SFO1 250.131544
F2 – Processing paran
SI 32768
SF 250.1300030
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
OMe
MeO
OMe
OMe
OMe
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.12 1.17 2.30 4.90 4.19 1.08 1.00 1.27 1.35 12.74 3.27 3.14 1.17 2.14 2.15

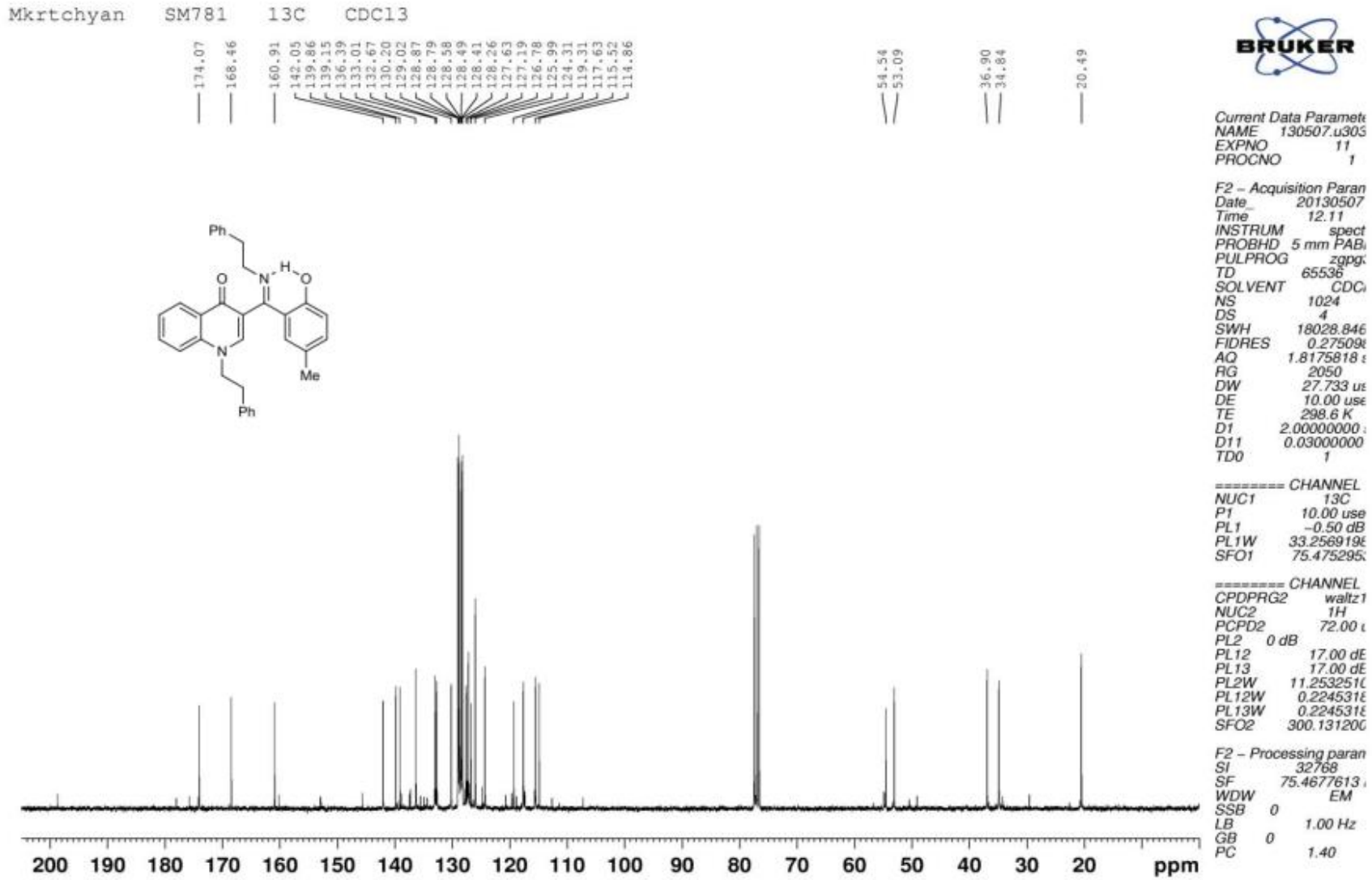
Compound 4f


Mkrtchyan SM792-3 13C CDCl3
173.85
170.97
167.69
164.23
149.34
148.74
148.35
147.33
143.25
138.97
132.75
132.32
131.83
128.55
127.89
127.00
124.56
121.09
120.62
115.57
113.76
112.42
112.27
111.84
111.66
111.20
105.30
102.19
55.95
55.84
55.74
55.55
55.16
54.80
51.14
36.44
34.27
OMe
MeO
OMe
OMe
OMe
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Paramet
NAME 130620.226
EXPNO 10
PROCNO 1
F2 – Acquisition Parar
Date 20130620
Time 17.08
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 15000.00
FIDRES 0.22888
AQ 2.1845834
RG 2050
DW 33.333 u
DE 10.00 us
TE 300.5 K
D1 2.00000000
d11 0.03000000
DELTA 1.899999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 us
PL1 –1.00 dB
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz
NUC2 1H
PCPD2 70.00
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.13100
F2 – Processing parar
SI 32768
SF 62.8952388
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

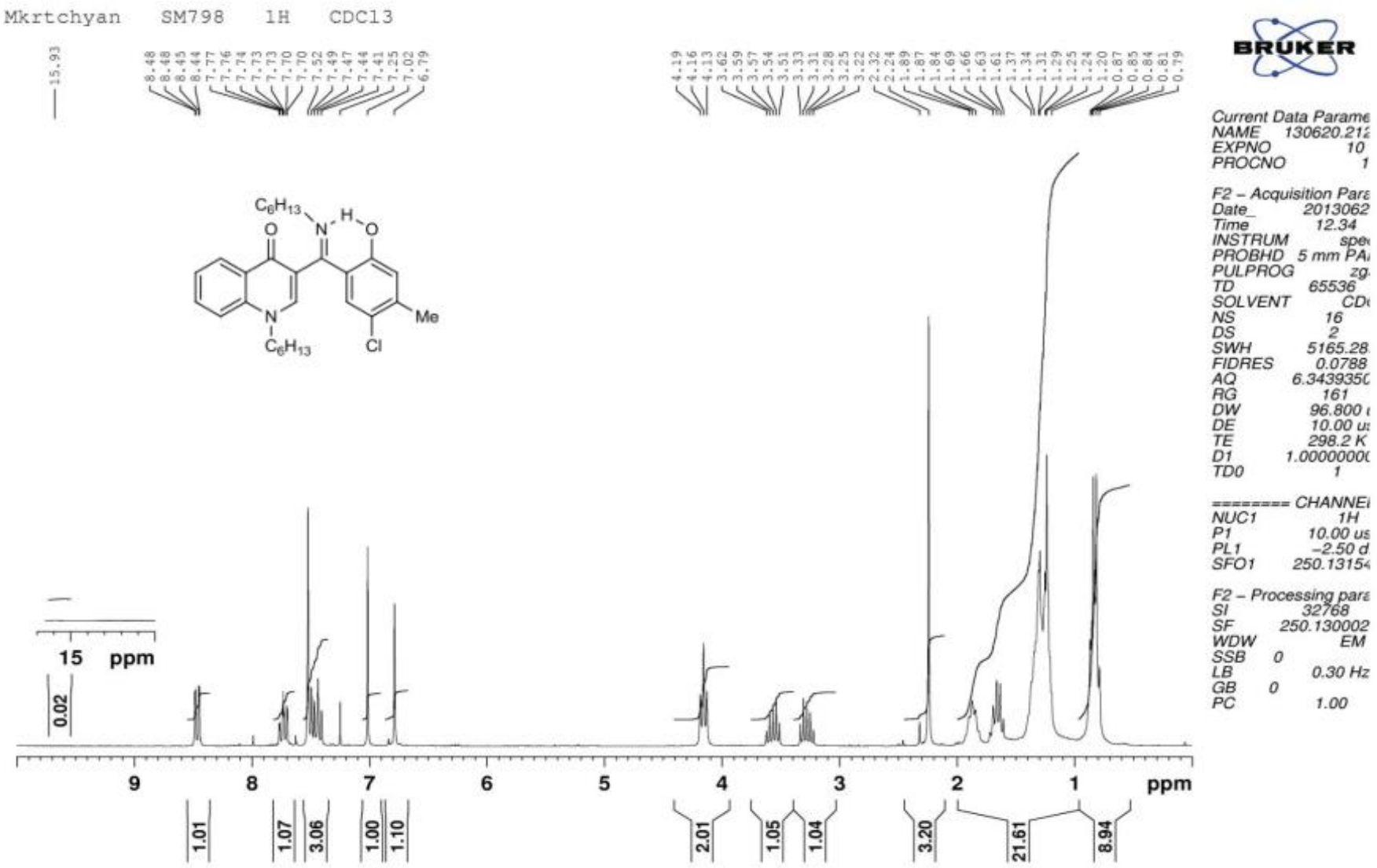
Compound 4g


Mkrtchyan SM781 1H CDCl3
BRUKER
Ph
N
H
O
O
N
Me
Ph
15 ppm
0.07
9 8 7 6 5 4 3 2 1 ppm
1.25
1.36
1.53
1.55
10.49
3.22
1.14
1.26
1.00
2.46
1.03
1.25
4.70
3.00

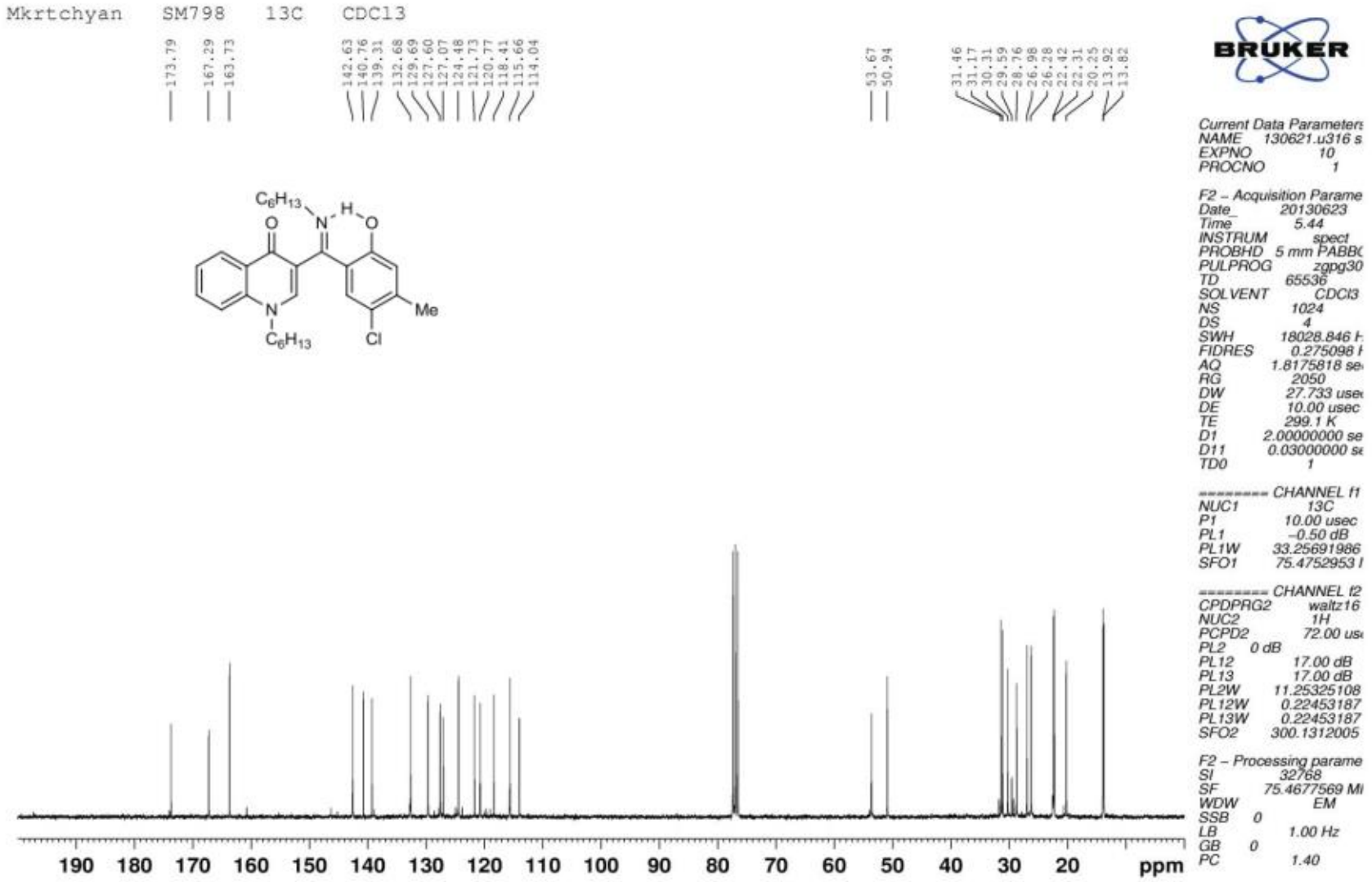
Compound 4g


Mkrtchyan SM781 13C CDCl3
174.07
168.46
160.91
142.05
139.86
139.15
136.39
133.01
132.67
130.20
129.02
128.87
128.79
128.58
128.49
128.41
128.26
127.63
127.19
126.78
125.99
124.31
119.31
117.63
115.52
114.86
54.54
53.09
36.90
34.84
20.49
Ph
N
H
O
O
N
Me
Ph
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramete
NAME 130507.u303
EXPNO 11
PROCNO 1
F2 – Acquisition Paran
Date_ 20130507
Time 12.11
INSTRUM spect
PROBHD 5 mm PAB
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 18028.846
FIDRES 0.27509
AQ 1.8175818
RG 2050
DW 27.733 us
DE 10.00 use
TE 298.6 K
D1 2.00000000
D11 0.03000000
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –0.50 dB
PL1W 33.256919
SFO1 75.475295
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 72.00
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.253251
PL12W 0.224531
PL13W 0.224531
SFO2 300.131200
F2 – Processing paran
SI 32768
SF 75.4677613
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

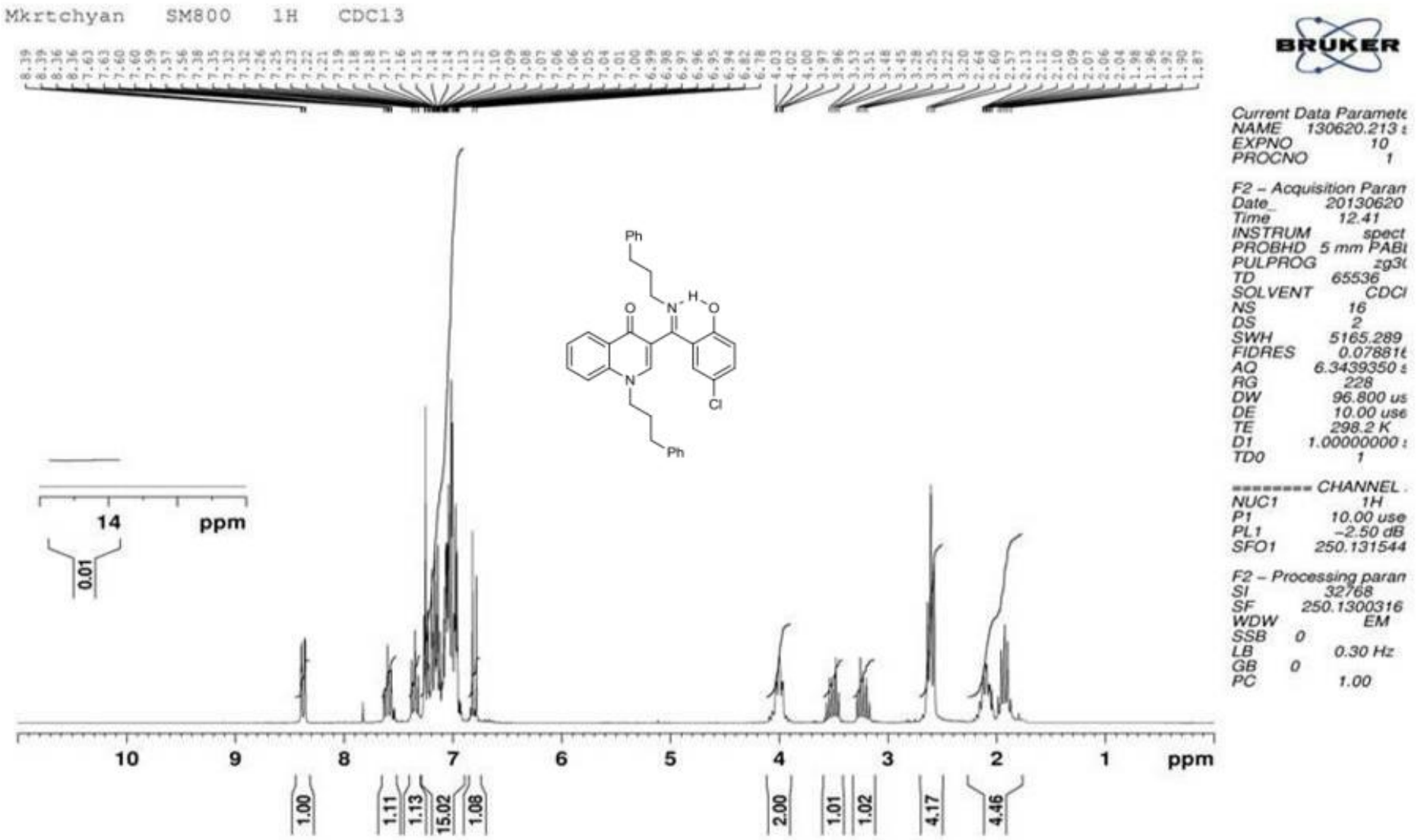
Compound 4h


Mkrtchyan SM798 1H CDCl3
BRUKER
Current Data Parame
NAME 130620.212
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2013062
Time 12.34
INSTRUM spe
PROBHD 5 mm PA
PULPROG zg
TD 65536
SOLVENT CD
NS 16
DS 2
SWH 5165.28
FIDRES 0.0788
AQ 6.343935
RG 161
DW 96.800
DE 10.00 us
TE 298.2 K
D1 1.0000000
TD0 1
======== CHANNEl
NUC1 1H
P1 10.00 us
PL1 –2.50 d
SFO1 250.1315
F2 – Processing para
SI 32768
SF 250.130002
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
ppm
1.01
1.07
3.06
1.00
1.10
2.01
1.05
1.04
3.20
21.61
8.94

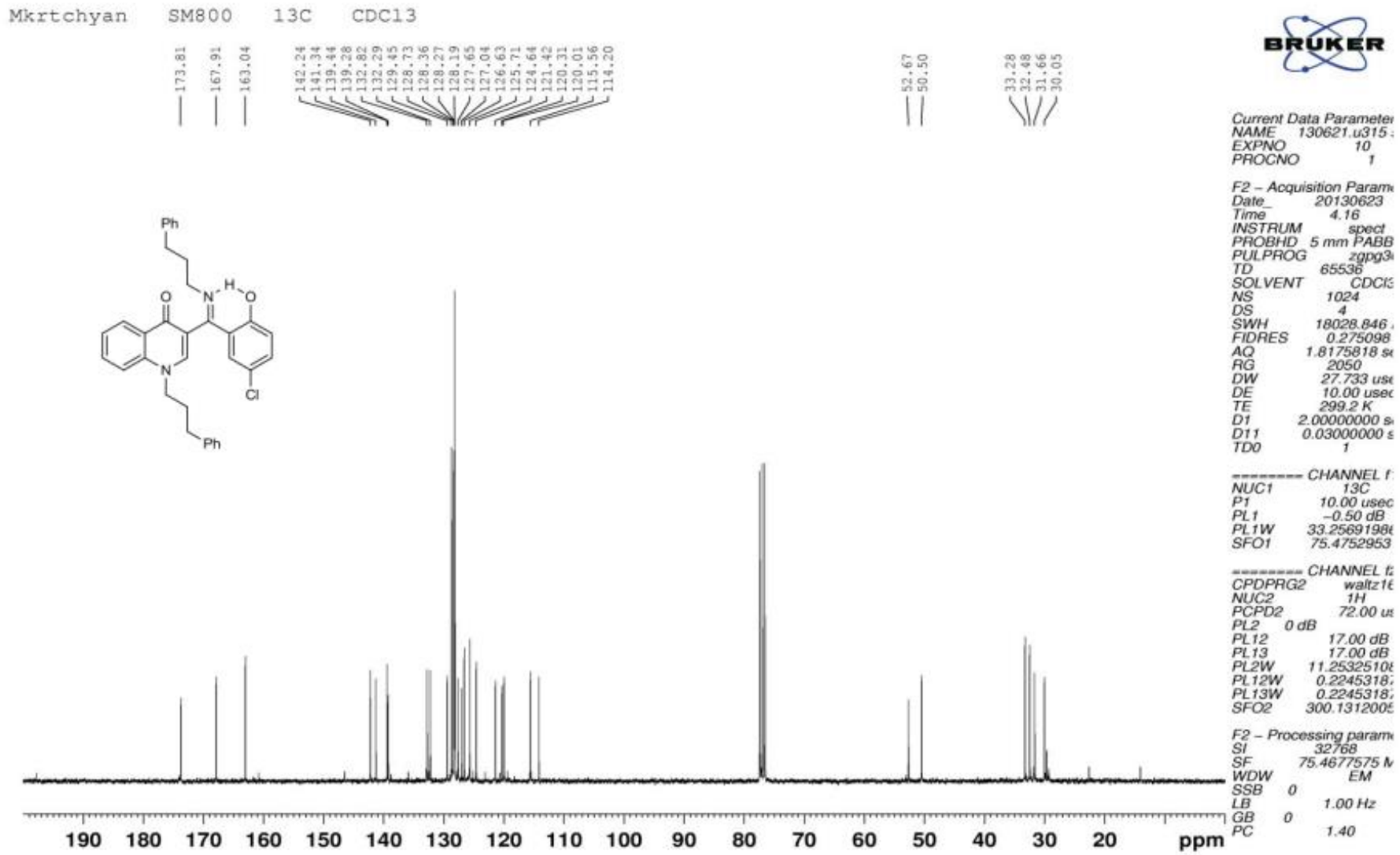
Compound 4h


Mkrtchyan SM798 13C CDCl3
173.79
167.29
163.73
142.63
140.76
139.31
132.68
129.69
127.60
127.07
124.48
121.73
120.77
118.41
115.66
114.04
53.67
50.94
31.46
31.17
30.31
29.59
28.76
26.98
26.28
22.42
22.31
20.25
13.92
13.82
BRUKER
Current Data Parameters
NAME 130621.u316 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20130623
Time 5.44
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 18028.846 H
FIDRES 0.275098 H
AQ 1.8175818 se
RG 2050
DW 27.733 use
DE 10.00 usec
TE 299.1 K
D1 2.00000000 se
D11 0.03000000 s
TD0 1
CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 -0.50 dB
PL1W 33.25691986
SFO1 75.4752953 I
CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 72.00 us
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.25325108
PL12W 0.22453187
PL13W 0.22453187
SFO2 300.1312005
F2 – Processing parame
SI 32768
SF 75.4677569 MI
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

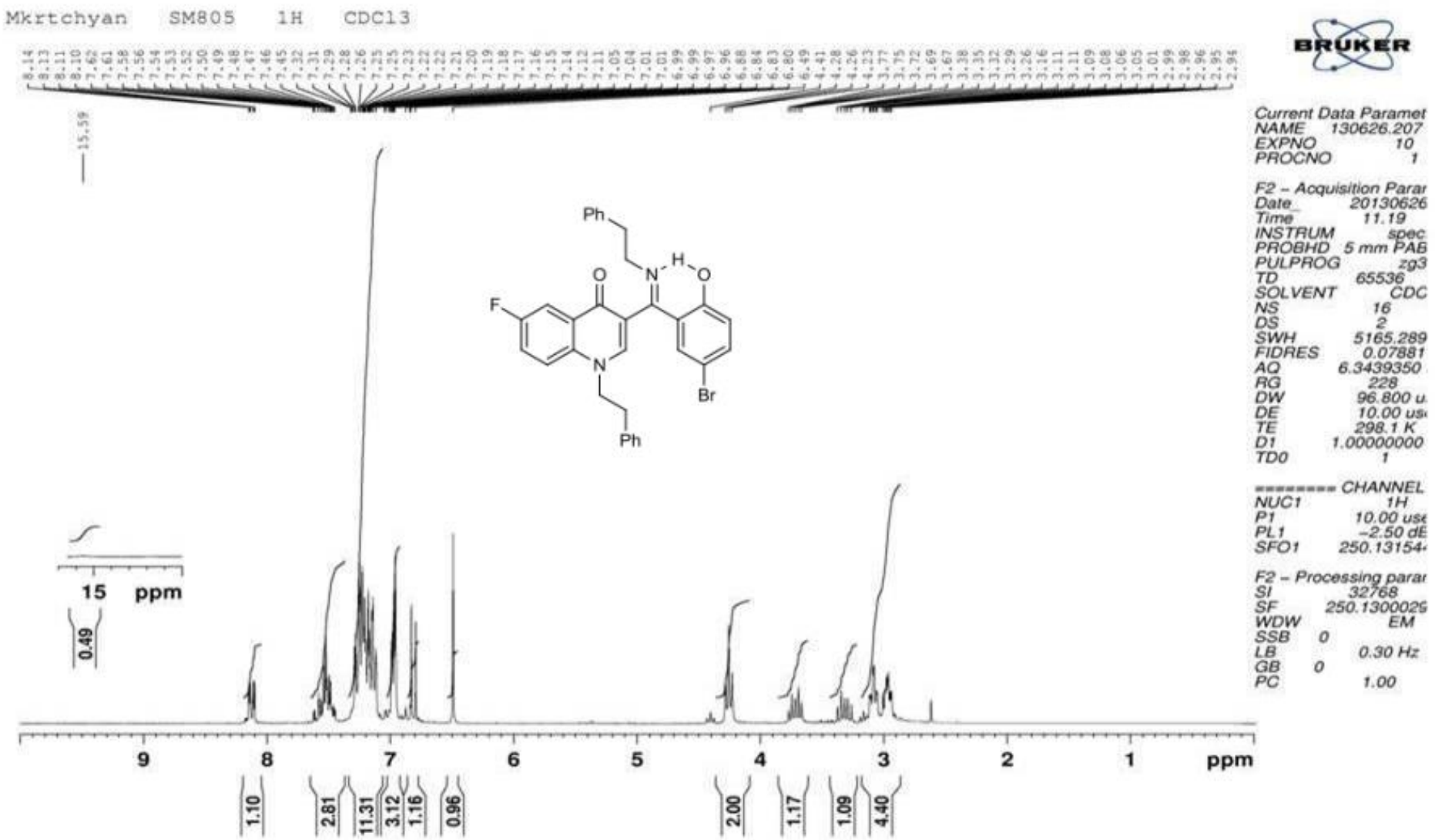
Compound 4i


Mkrtchyan SM800 1H CDC13
BRUKER
Current Data Paramete
NAME 130620.213
EXPNO 10
PROCNO 1
F2 – Acquisition Paran
Date_ 20130620
Time 12.41
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zg30
TD 65536
SOLVENT CDCl
NS 16
DS 2
SWH 5165.289
FIDRES 0.07881
AQ 6.3439350
RG 228
DW 96.800 us
DE 10.00 use
TE 298.2 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 use
PL1 –2.50 dB
SFO1 250.131544
F2 – Processing paran
SI 32768
SF 250.1300316
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
Ph
N
H
O
O
N
Cl
Ph
14
ppm
0.01
10
9
8
7
6
5
4
3
2
1
ppm
1.00
1.11
1.13
15.02
1.08
2.00
1.01
1.02
4.17
4.46

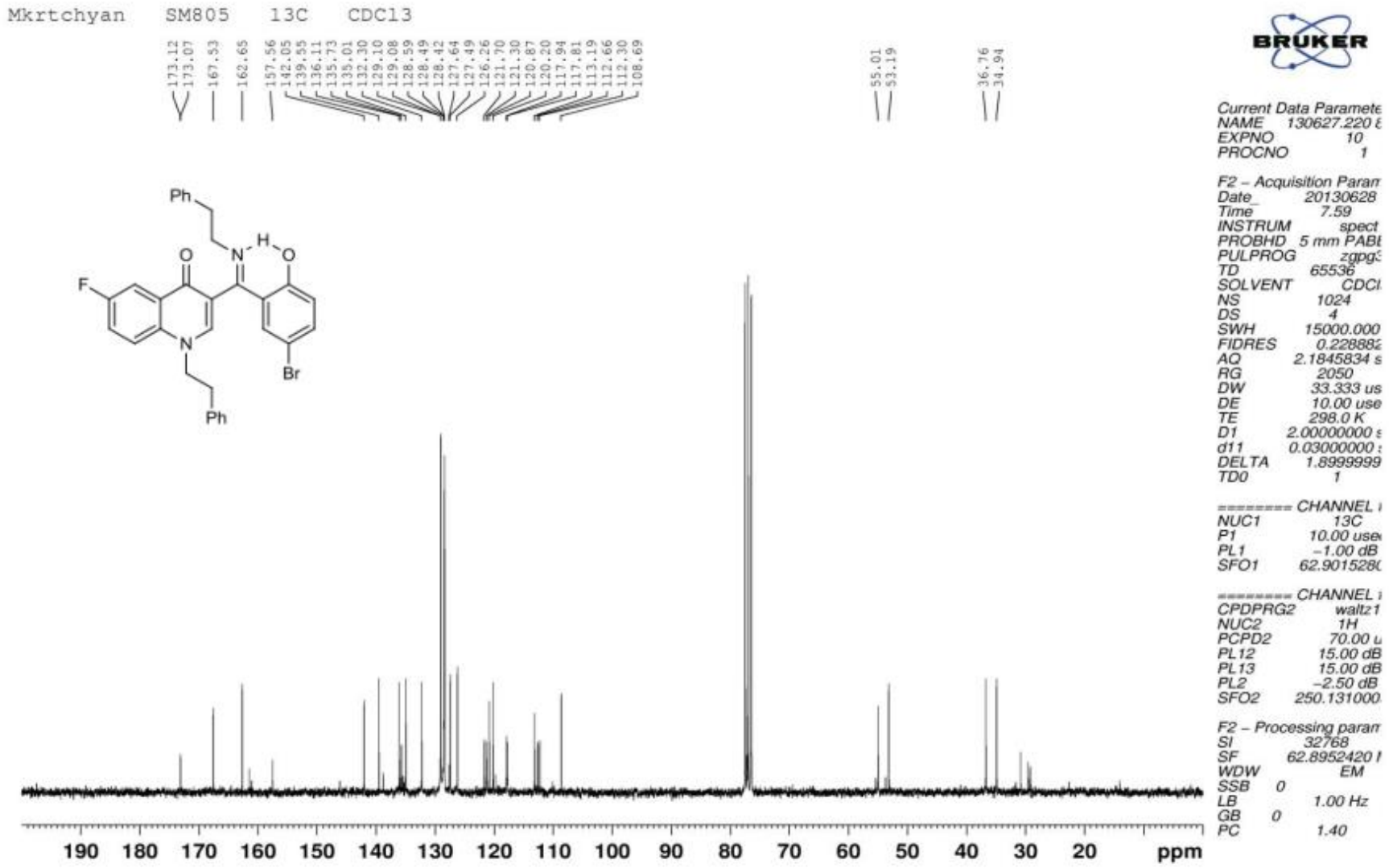
Compound 4i


Mkrtchyan SM800 13C CDCl3
173.81
167.91
163.04
142.24
141.34
139.44
139.28
132.82
132.29
129.45
128.73
128.36
128.27
128.19
127.65
127.04
126.63
125.71
124.64
121.42
120.31
120.01
115.56
114.20
52.67
50.50
33.28
32.48
31.66
30.05
Ph
N
H
O
O
N
Cl
Ph
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 130621.u315
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130623
Time 4.16
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 18028.846
FIDRES 0.275098
AQ 1.8175818 s
RG 2050
DW 27.733 us
DE 10.00 usec
TE 299.2 K
D1 2.00000000 s
D11 0.03000000 s
TD0 1
CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 -0.50 dB
PL1W 33.2569198
SFO1 75.4752953
CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 72.00 us
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.2532510
PL12W 0.2245318
PL13W 0.2245318
SFO2 300.131200
F2 – Processing param
SI 32768
SF 75.4677575 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

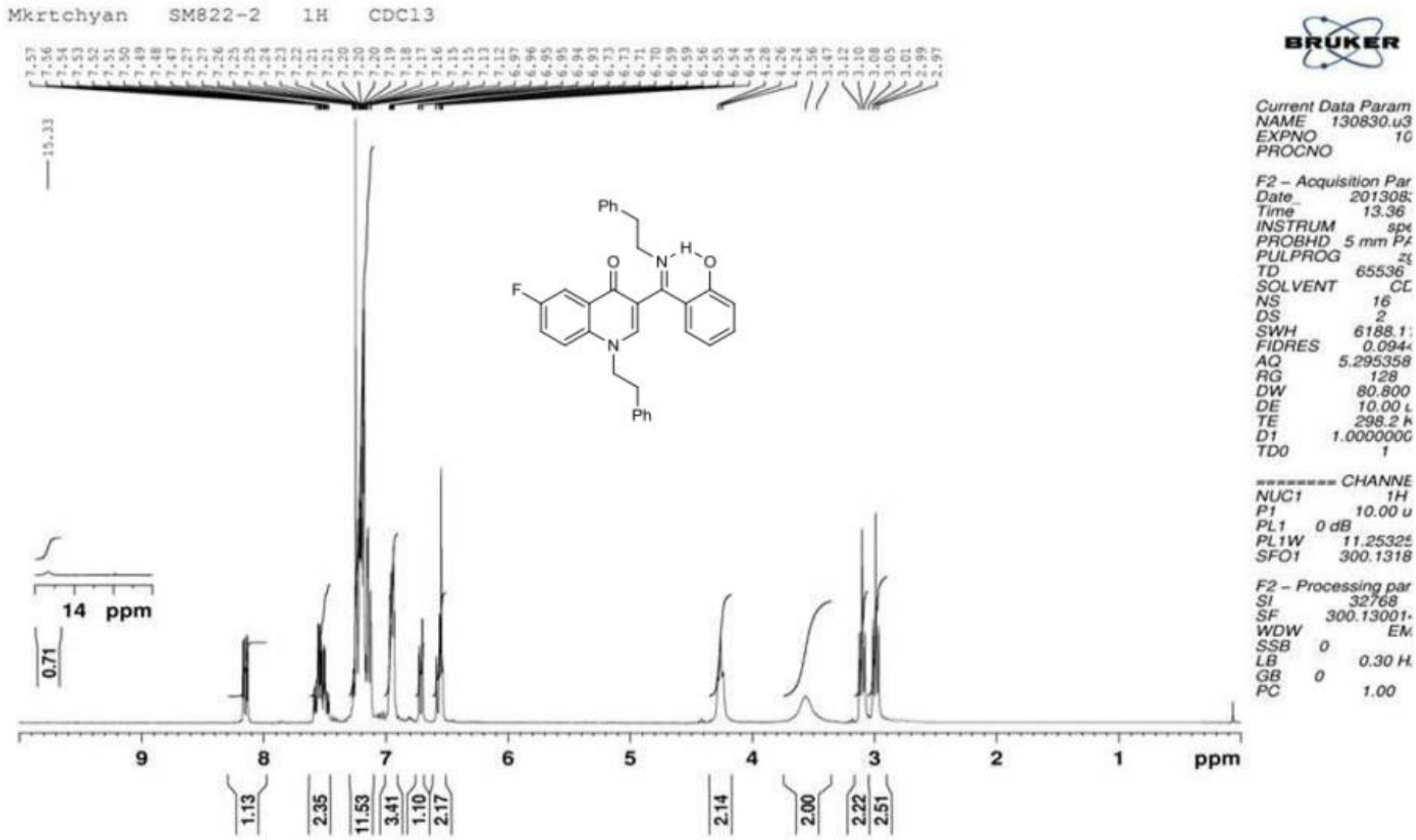
Compound 4j


Mkrtchyan SM805 1H CDCl3
BRUKER
Current Data Paramet
NAME 130626.207
EXPNO 10
PROCNO 1
F2 – Acquisition Parar
Date_ 20130626
Time 11.19
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zg3
TD 65536
SOLVENT CDC
NS 16
DS 2
SWH 5165.289
FIDRES 0.07881
AQ 6.3439350
RG 228
DW 96.800 u
DE 10.00 us
TE 298.1 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 us
PL1 -2.50 dB
SFO1 250.13154
F2 – Processing parar
SI 32768
SF 250.1300025
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
15.59
Ph
N
H
O
O
F
N
Br
Ph
15 ppm
0.49
9
8
7
6
5
4
3
2
1
ppm
1.10
2.81
11.31
3.12
1.16
0.96
2.00
1.17
1.09
4.40

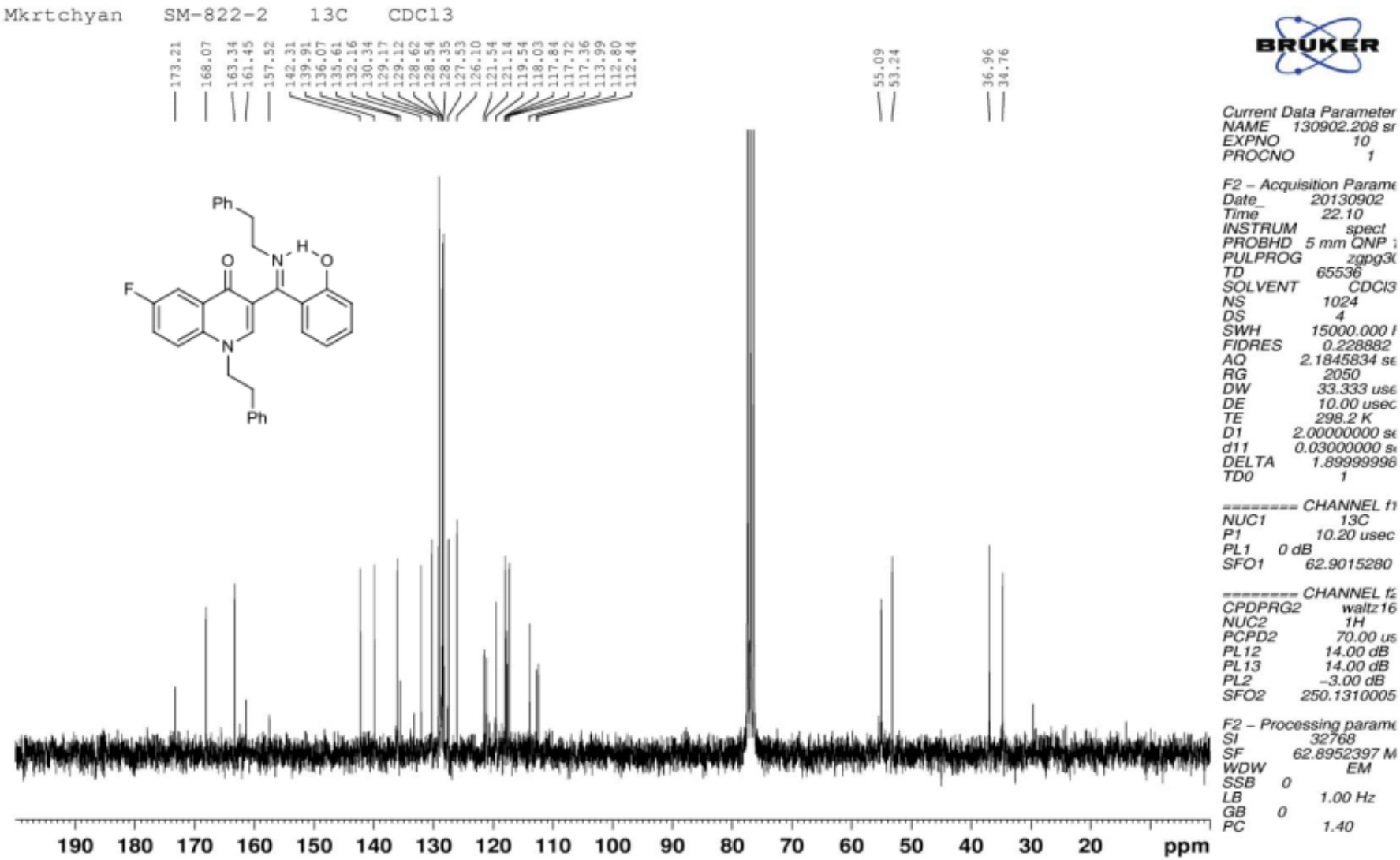
Compound 4j


Mkrtchyan SM805 13C CDCl3
173.12
173.07
167.53
162.65
157.56
142.05
139.55
136.11
135.73
135.01
132.30
129.10
129.08
128.59
128.49
128.42
127.64
127.49
126.26
121.70
121.30
120.87
120.20
117.94
117.81
113.19
112.66
112.30
108.69
55.01
53.19
36.76
34.94
Ph
N
H
O
O
F
N
Br
Ph
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramete
NAME 130627.220 E
EXPNO 10
PROCNO 1
F2 – Acquisition Paran
Date_ 20130628
Time 7.59
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zgpg3
TD 65536
SOLVENT CDCl
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.0 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528(
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing paran
SI 32768
SF 62.8952420 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

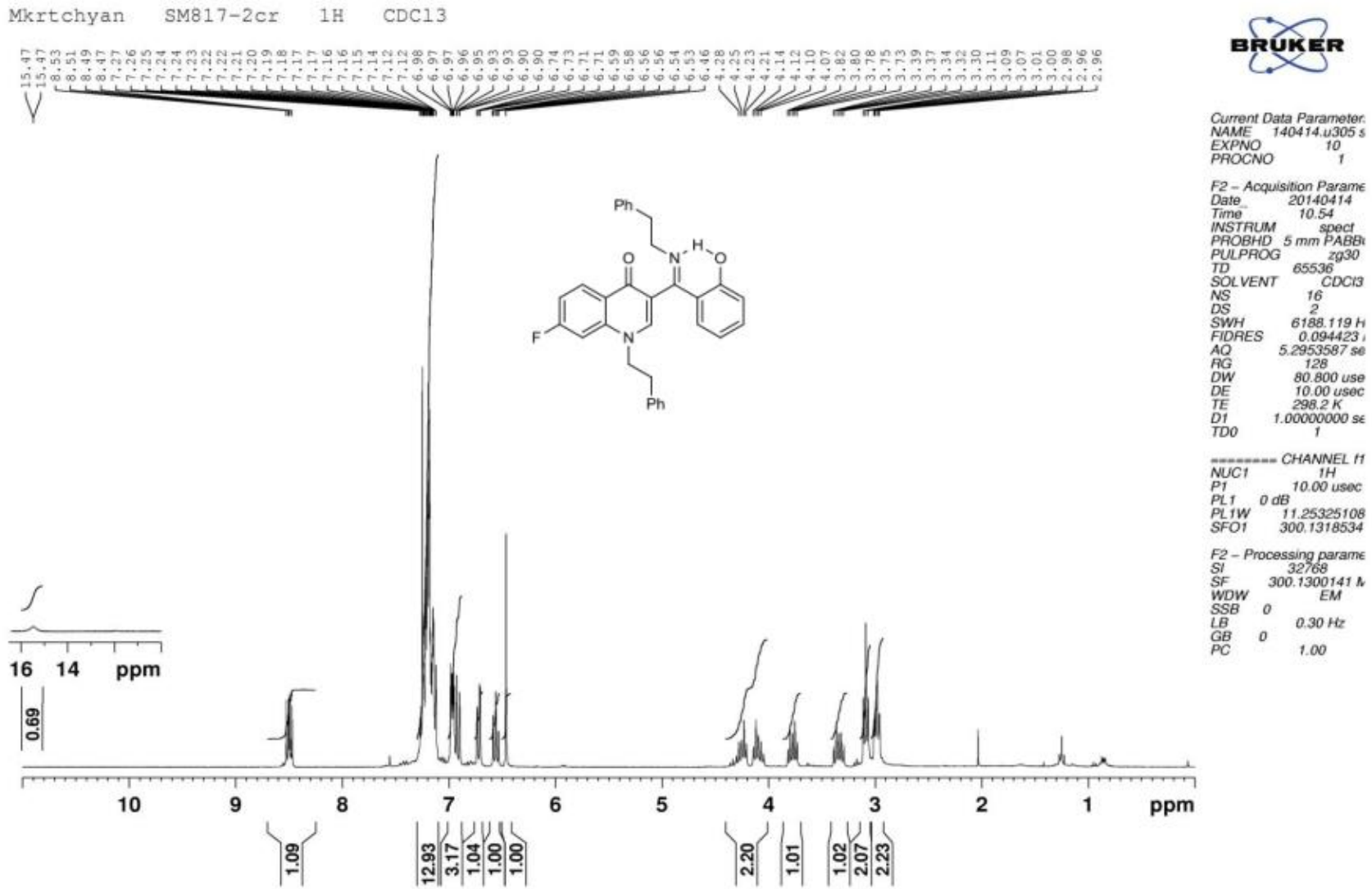
Compound 4k


Mkrtchyan SM822-2 1H CDC13
BRUKER
Current Data Param
NAME 130830.u3
EXPNO 10
PROCNO
F2 – Acquisition Par
Date_ 201308
Time 13.36
INSTRUM spe
PROBHD 5 mm PA
PULPROG zg
TD 65536
SOLVENT CD
NS 16
DS 2
SWH 6188.1
FIDRES 0.094
AQ 5.295358
RG 128
DW 80.800
DE 10.00
TE 298.2 K
D1 1.0000000
TD0 1
======== CHANNE
NUC1 1H
P1 10.00 u
PL1 0 dB
PL1W 11.25325
SFO1 300.1318
F2 – Processing par
SI 32768
SF 300.13001
WDW EM
SSB 0
LB 0.30 H
GB 0
PC 1.00
Ph
N
H
O
F
O
N
Ph
14 ppm
0.71
9
8
7
6
5
4
3
2
1
ppm
1.13
2.35
11.53
3.41
1.10
2.17
2.14
2.00
2.22
2.51

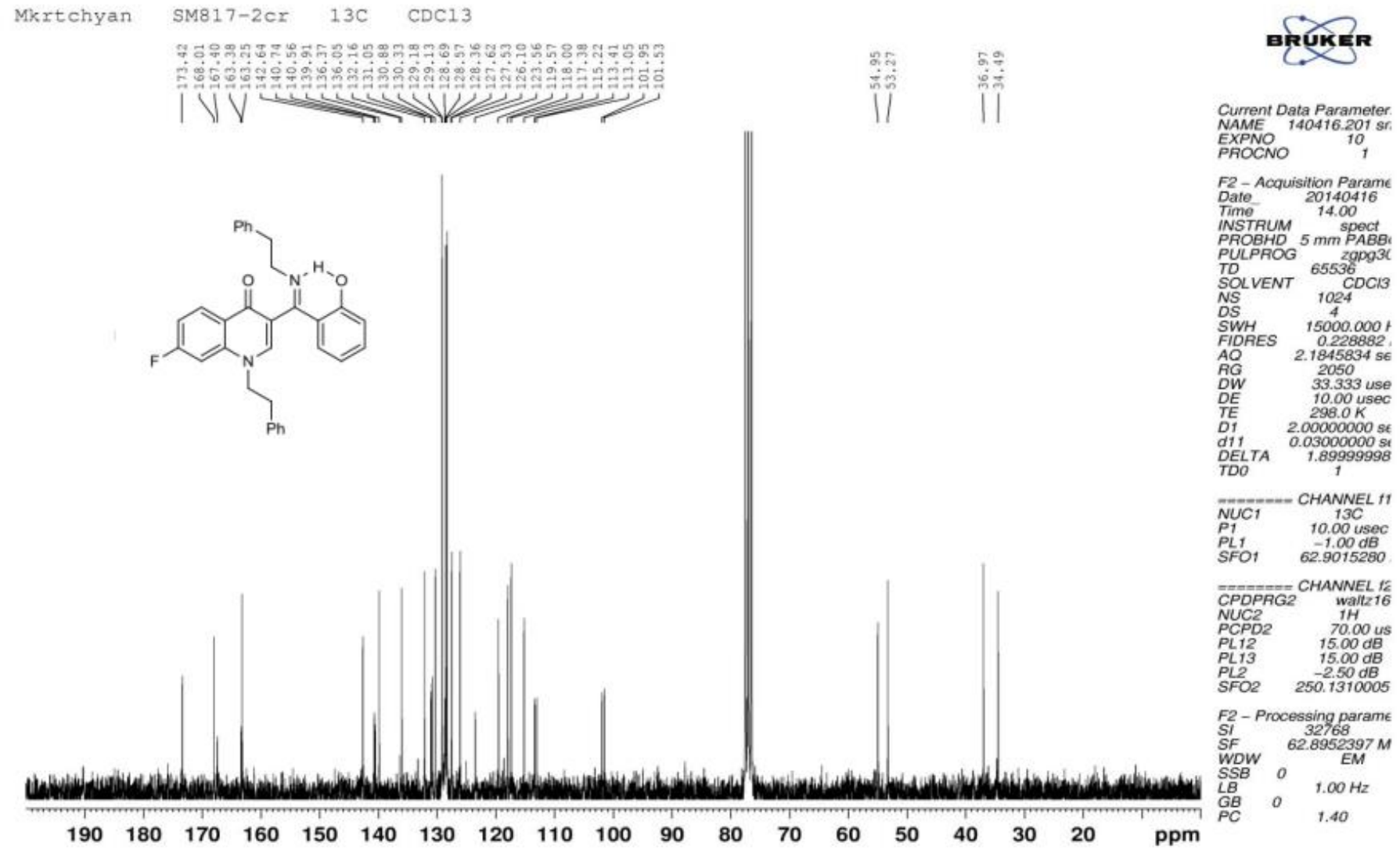
Compound 4k


Mkrtchyan SM-822-2 13C CDCl3
173.21
168.07
163.34
161.45
157.52
142.31
139.91
136.07
135.61
132.16
130.34
129.17
129.12
128.62
128.54
128.35
127.53
126.10
121.54
121.14
119.54
118.03
117.84
117.72
117.36
113.99
112.80
112.44
55.09
53.24
36.96
34.76
Ph
N
H
O
O
F
N
Ph
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 130902.208 sr
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20130902
Time 22.10
INSTRUM spect
PROBHD 5 mm QNP
PULPROG zgpg3
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 se
RG 2050
DW 33.333 use
DE 10.00 usec
TE 298.2 K
D1 2.00000000 se
d11 0.03000000 s
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.20 usec
PL1 0 dB
SFO1 62.9015280
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 us
PL12 14.00 dB
PL13 14.00 dB
PL2 -3.00 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952397 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

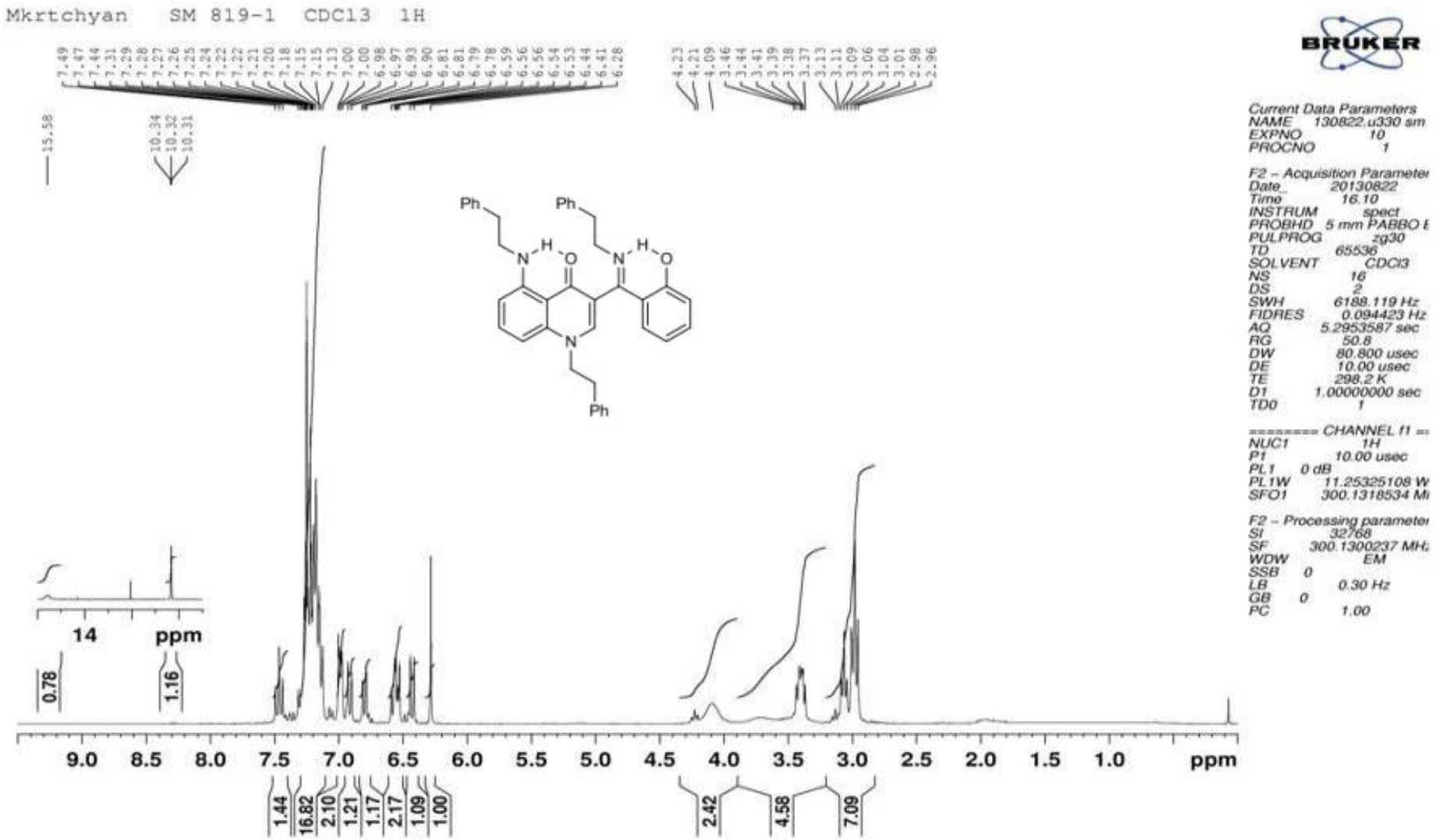
Compound 4l


Mkrtchyan SM817-2cr 1H CDCl3
BRUKER
Current Data Parameter
NAME 140414.u305 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20140414
Time 10.54
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423
AQ 5.2953587 se
RG 128
DW 80.800 use
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing parame
SI 32768
SF 300.1300141 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
Ph
N
H
O
O
F
N
Ph
16 14 ppm
0.69
10 9 8 7 6 5 4 3 2 1 ppm
1.09
12.93
3.17
1.04
1.00
1.00
2.20
1.01
1.02
2.07
2.23

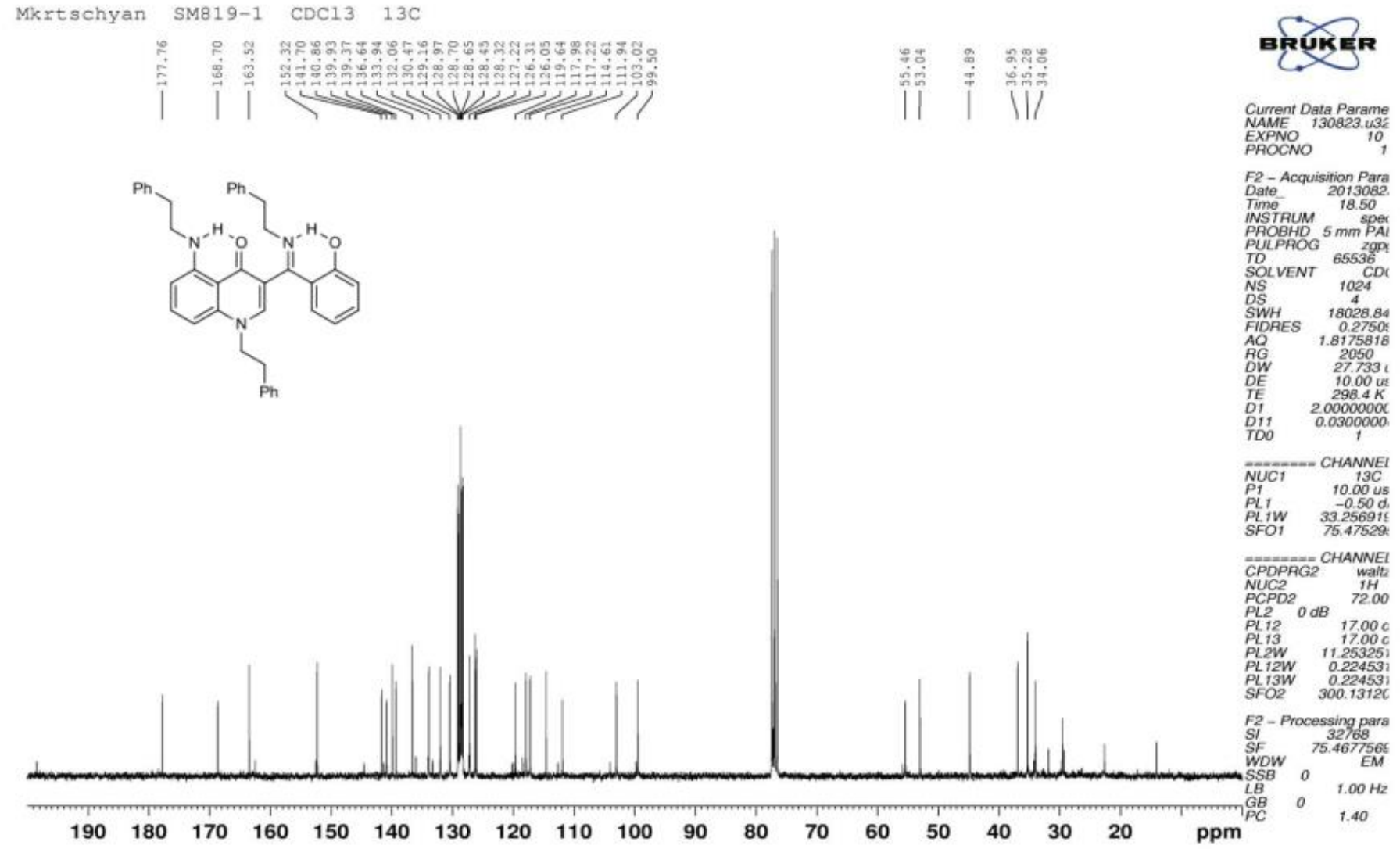
Compound 4l


Mkrtchyan SM817-2cr 13C CDCl3
173.42
168.01
167.40
163.38
163.25
142.64
140.74
140.56
139.91
136.37
136.05
132.16
131.05
130.88
130.33
129.18
129.13
128.69
128.57
128.36
127.62
127.53
126.10
123.56
119.57
118.00
117.38
115.22
113.41
113.05
101.95
101.53
54.95
53.27
36.97
34.49
Ph
N
H
O
O
F
N
Ph
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 140416.201 sr
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20140416
Time 14.00
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 se
RG 2050
DW 33.333 use
DE 10.00 usec
TE 298.0 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 -1.00 dB
SFO1 62.9015280
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 us
PL12 15.00 dB
PL13 15.00 dB
PL2 -2.50 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952397 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

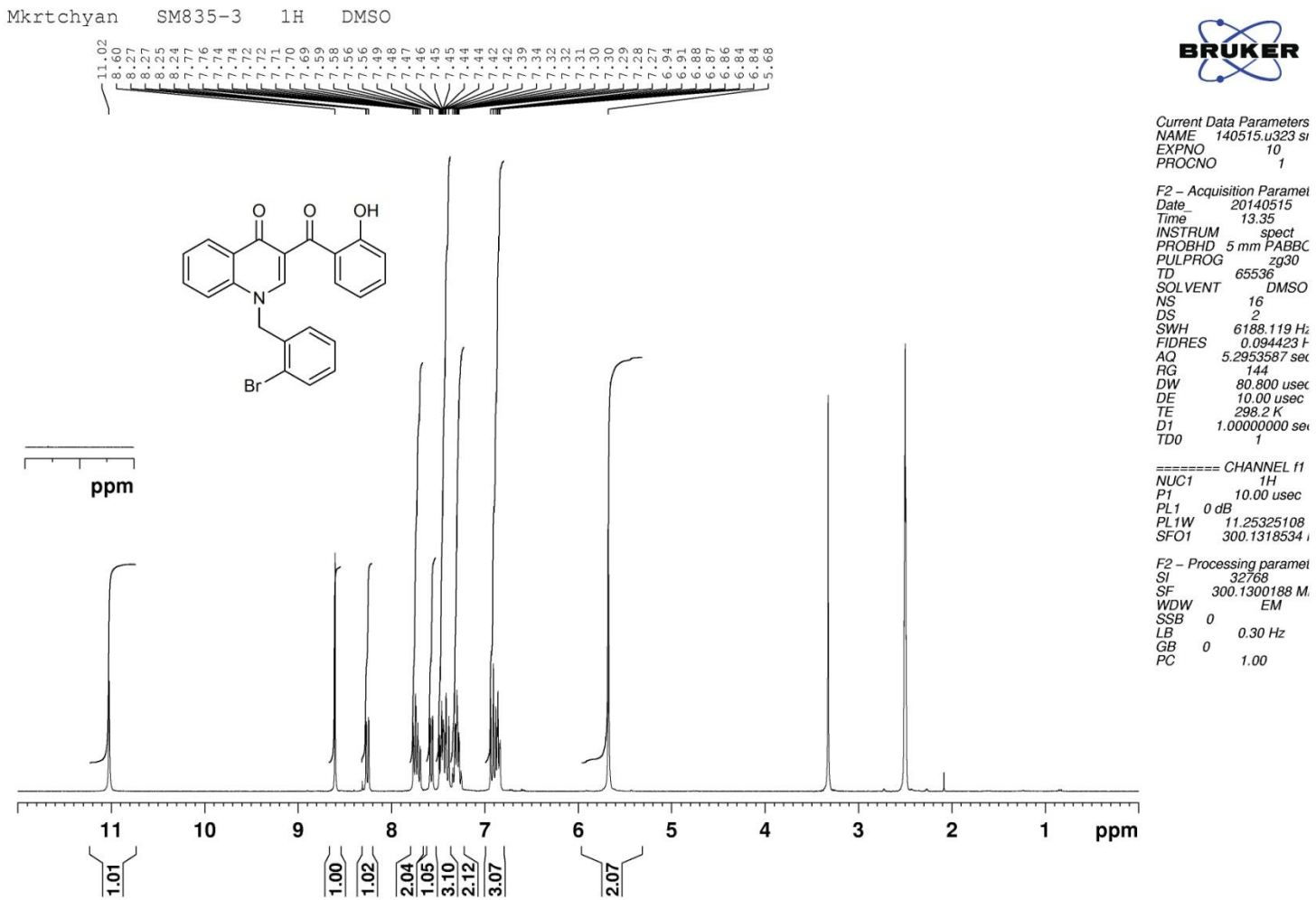
Compound 4m


Mkrtchyan SM 819-1 CDCl3 1H
BRUKER
Current Data Parameters
NAME 130822.u330 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20130822
Time 16.10
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 50.8
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing parameter
SI 32768
SF 300.1300237 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
Ph
Ph
Ph
14 ppm
0.78
1.16
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 ppm
1.44
16.82
2.10
1.21
1.17
2.17
1.09
1.00
2.42
4.58
7.09

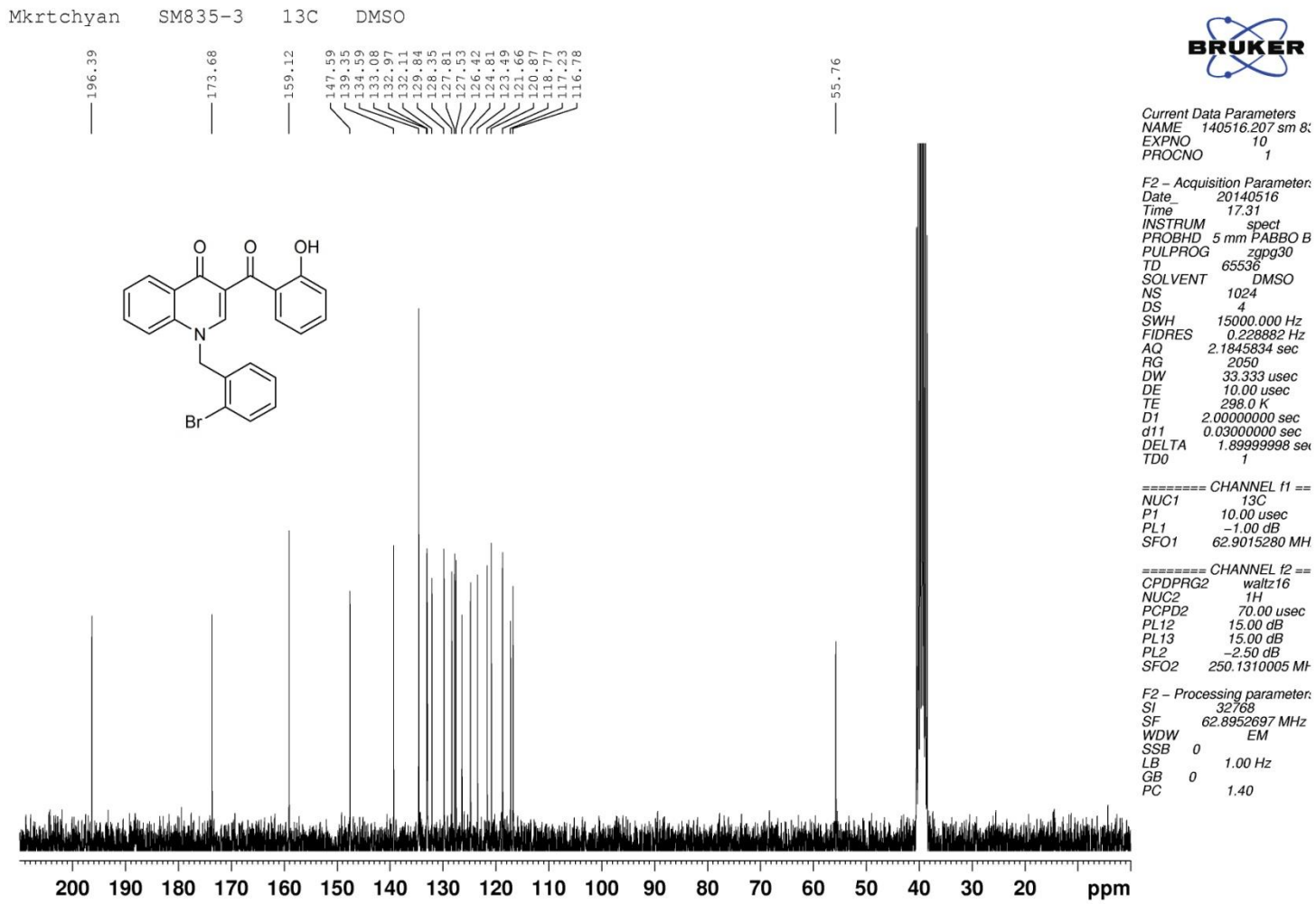
Compound 4m


Mkrtschyan SM819-1 CDCl3 13C
177.76
168.70
163.52
152.32
141.70
140.86
139.93
139.37
136.64
133.94
132.06
130.47
129.16
128.97
128.70
128.65
128.45
128.32
127.22
126.31
126.05
119.64
117.98
117.22
114.61
111.94
103.02
99.50
55.46
53.04
44.89
36.95
35.28
34.06
Ph
Ph
Ph
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parame
NAME 130823.u32
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2013082
Time 18.50
INSTRUM spe
PROBHD 5 mm PA
PULPROG zgp
TD 65536
SOLVENT CD
NS 1024
DS 4
SWH 18028.84
FIDRES 0.2750
AQ 1.8175818
RG 2050
DW 27.733
DE 10.00 u
TE 298.4 K
D1 2.0000000
D11 0.0300000
TD0 1
CHANNEL
NUC1 13C
P1 10.00 us
PL1 –0.50 d
PL1W 33.256915
SFO1 75.47529
CHANNEL
CPDPRG2 walt
NUC2 1H
PCPD2 72.00
PL2 0 dB
PL12 17.00 d
PL13 17.00 d
PL2W 11.25325
PL12W 0.22453
PL13W 0.22453
SFO2 300.1312
F2 – Processing para
SI 32768
SF 75.467756
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

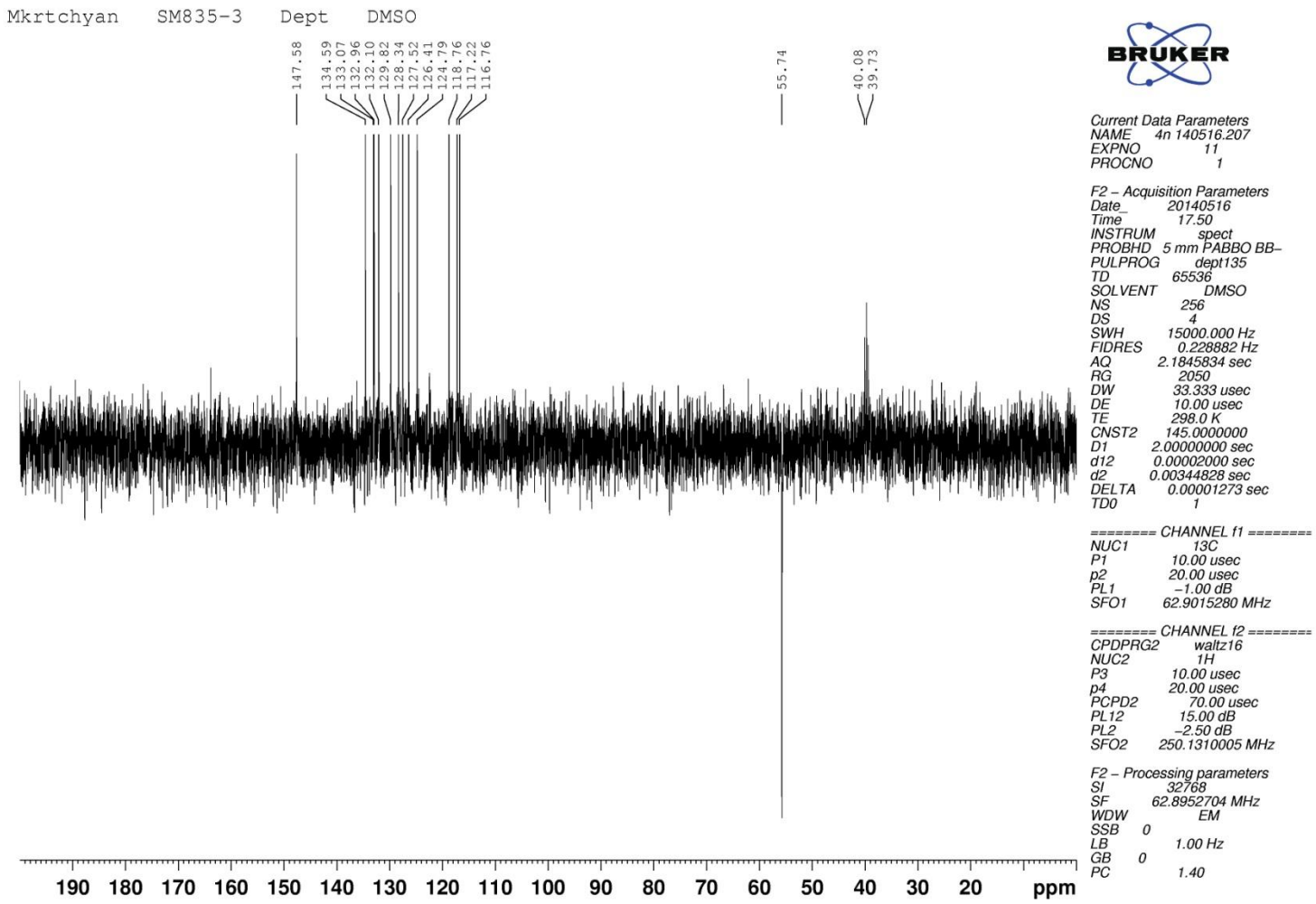
Compound 4n


Mkrtchyan SM835-3 1H DMSO
11.02
8.60
8.27
8.27
8.25
8.24
7.77
7.76
7.74
7.74
7.72
7.72
7.71
7.70
7.69
7.59
7.58
7.56
7.56
7.49
7.48
7.47
7.46
7.45
7.45
7.44
7.44
7.42
7.42
7.39
7.34
7.32
7.32
7.31
7.30
7.30
7.29
7.28
7.27
6.94
6.91
6.88
6.87
6.86
6.84
6.84
5.68
O
O
OH
N
Br
ppm
11
10
9
8
7
6
5
4
3
2
1
ppm
1.01
1.00
1.02
2.04
1.05
3.10
2.12
3.07
2.07
BRUKER
Current Data Parameters
NAME 140515.u323 s
EXPNO 10
PROCNO 1
F2 – Acquisition Paramet
Date_ 20140515
Time 13.35
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423 H
AQ 5.2953587 sec
RG 144
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing paramet
SI 32768
SF 300.1300188 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

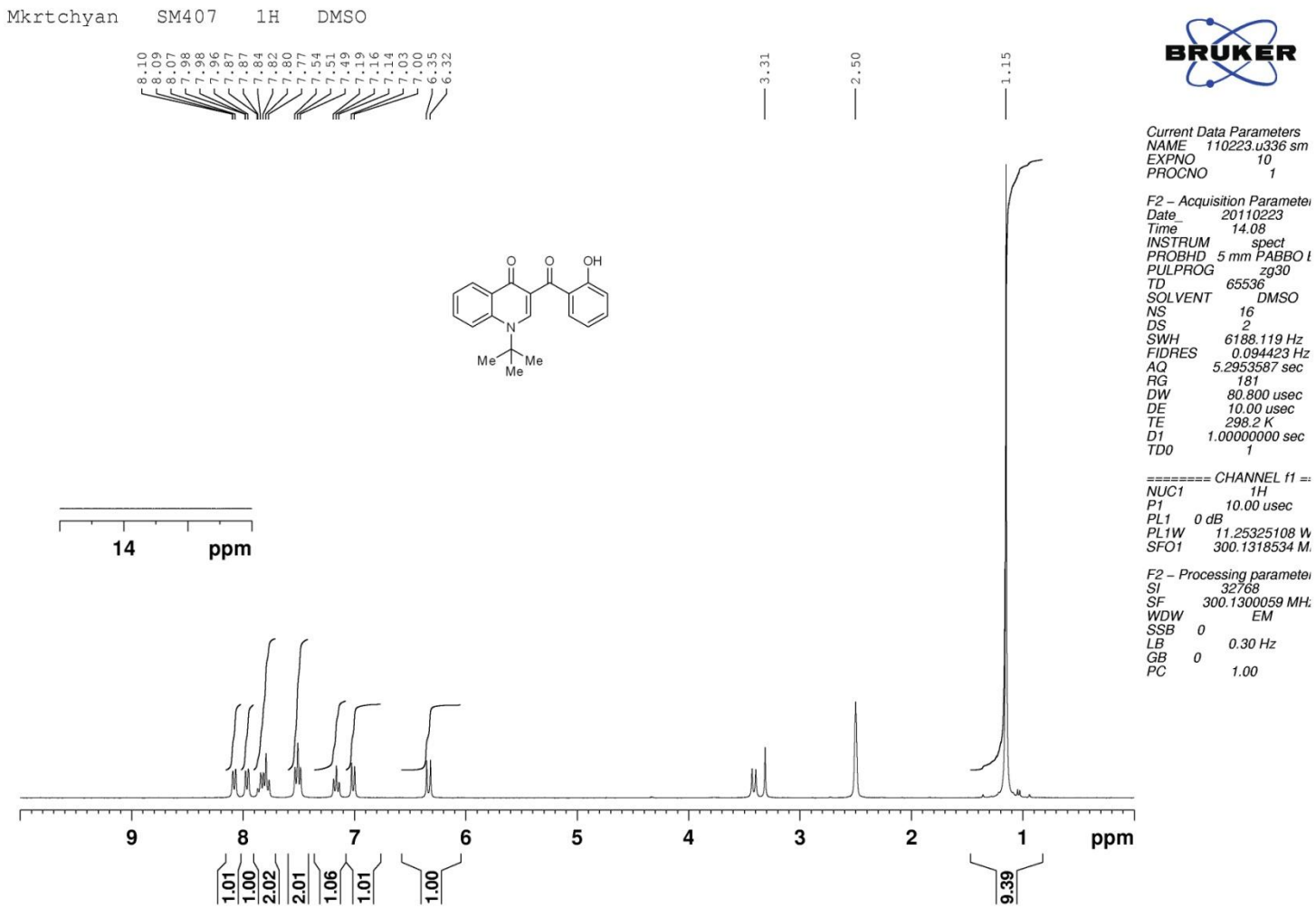
Compound 4n


Mkrtchyan SM835-3 13C DMSO
196.39
173.68
159.12
147.59
139.35
134.59
133.08
132.97
132.11
129.84
128.35
127.81
127.53
126.42
124.81
123.49
121.66
120.87
118.77
117.23
116.78
55.76
O
O
OH
N
Br
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 140516.207 sm 8
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20140516
Time 17.31
INSTRUM spect
PROBHD 5 mm PABBO B
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 1024
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 se
TD0 1
======== CHANNEL f1 ==
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MH
======== CHANNEL f2 ==
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MH
F2 – Processing parameter
SI 32768
SF 62.8952697 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

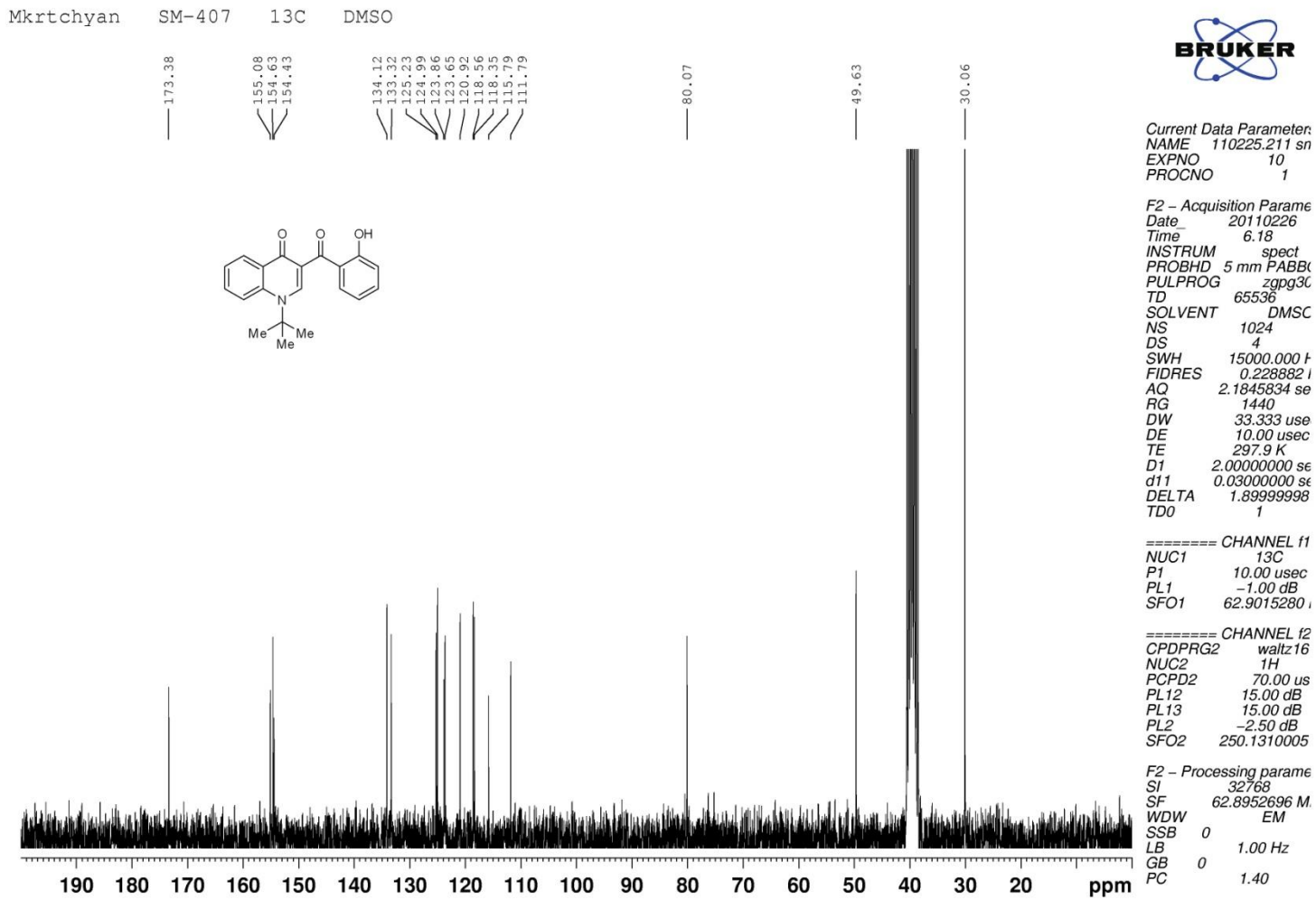
Compound 4n


Mkrtchyan SM835-3 Dept DMSO
147.58
134.59
133.07
132.96
132.10
129.82
128.34
127.52
126.41
124.79
118.76
117.22
116.76
55.74
40.08
39.73
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Parameters
NAME 4n 140516.207
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140516
Time 17.50
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT DMSO
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952704 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

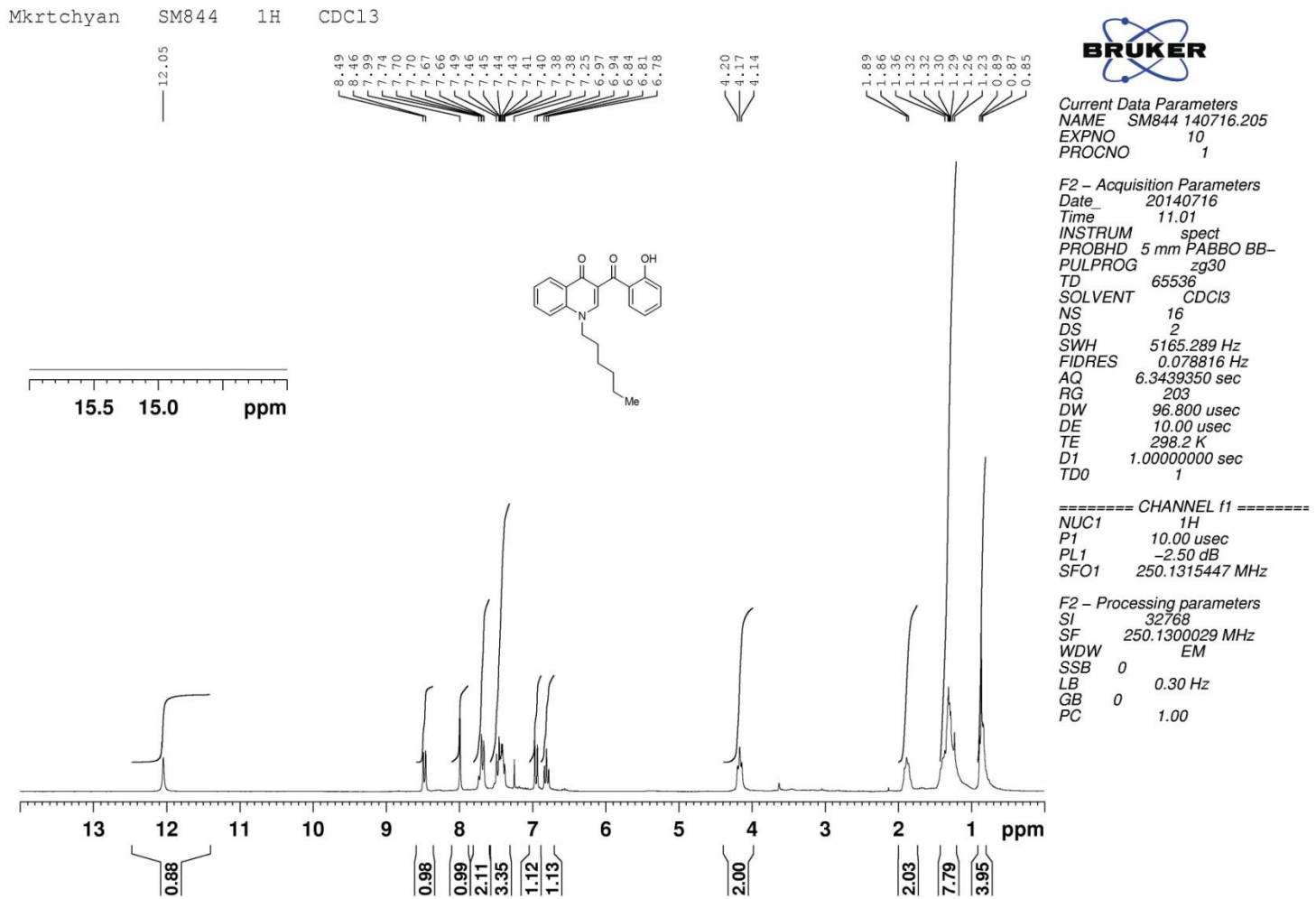
Compound 4o


Mkrtchyan SM407 1H DMSO
8.10
8.09
8.07
7.98
7.98
7.96
7.87
7.87
7.84
7.82
7.80
7.77
7.54
7.51
7.49
7.19
7.16
7.14
7.03
7.00
6.35
6.32
3.31
2.50
1.15
OH
Me
Me
Me
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.01
1.00
2.02
2.01
1.06
1.01
1.00
9.39
Current Data Parameters
NAME 110223.u336 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20110223
Time 14.08
INSTRUM spect
PROBHD 5 mm PABBO I
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 181
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing parameter
SI 32768
SF 300.1300059 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

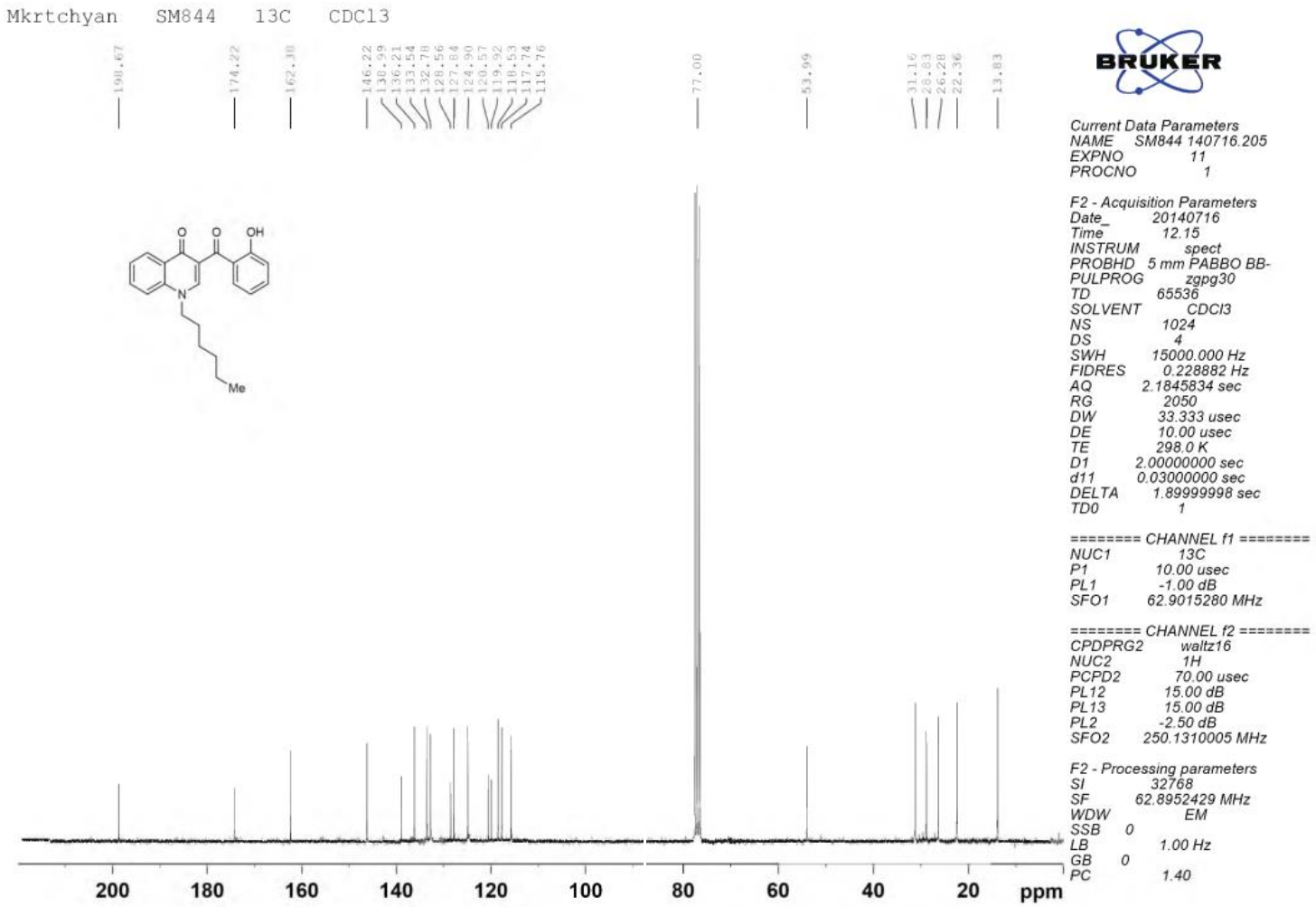
Compound 4o


Mkrtchyan SM-407 13C DMSO
173.38
155.08
154.63
154.43
134.12
133.32
125.23
124.99
123.86
123.65
120.92
118.56
118.35
115.79
111.79
80.07
49.63
30.06
O
O
OH
N
Me
Me
Me
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 110225.211 sn
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110226
Time 6.18
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT DMSO
NS 1024
DS 4
SWH 15000.000 H
FIDRES 0.228882
AQ 2.1845834 se
RG 1440
DW 33.333 use
DE 10.00 usec
TE 297.9 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 us
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952696 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

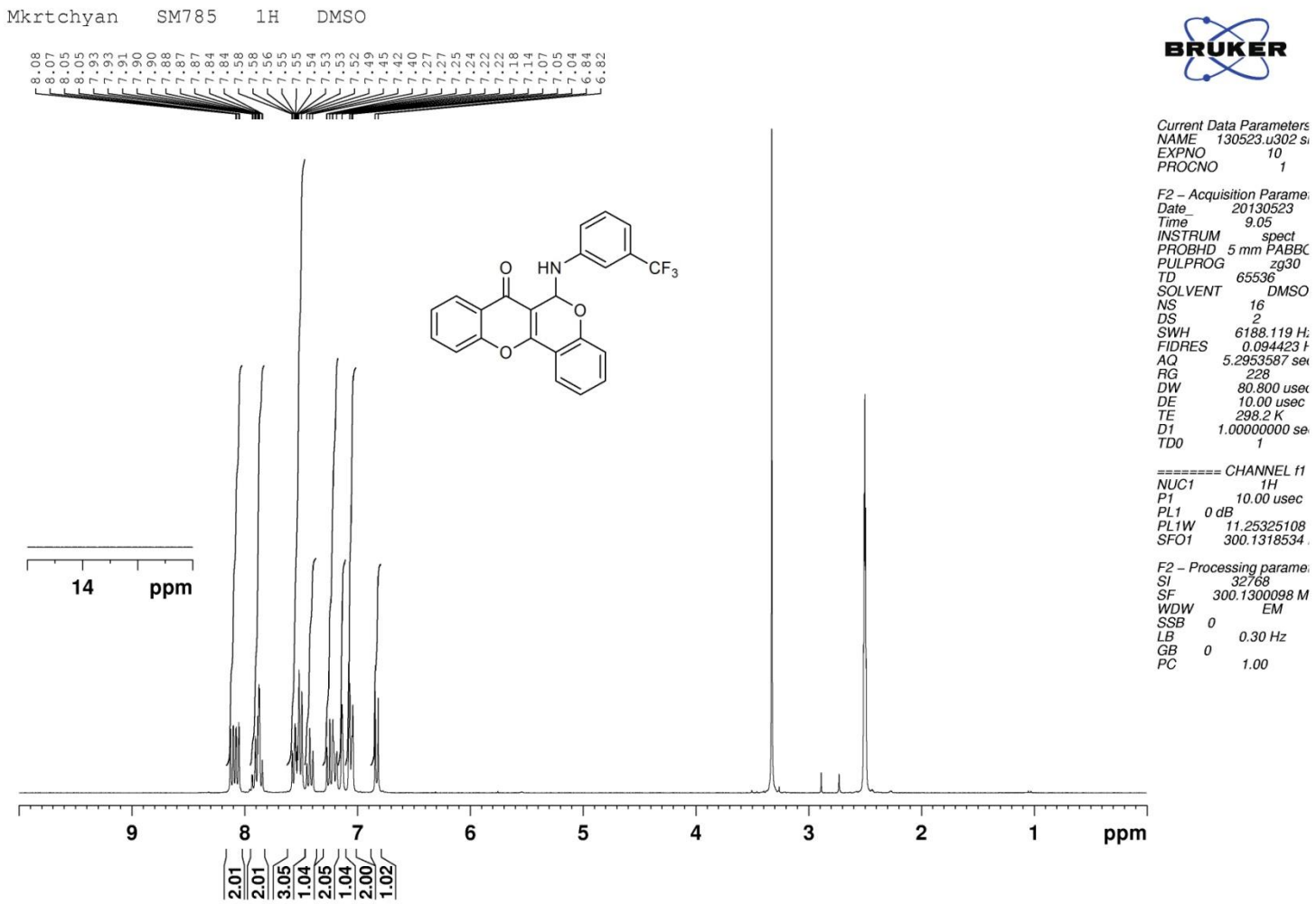
Compound 4d'


Mkrtchyan SM844 1H CDCl3
12.05
8.49
8.46
7.99
7.74
7.70
7.70
7.67
7.66
7.49
7.46
7.45
7.44
7.43
7.41
7.40
7.38
7.38
7.25
6.97
6.94
6.84
6.81
6.78
4.20
4.17
4.14
1.89
1.86
1.36
1.32
1.32
1.30
1.29
1.26
1.23
0.89
0.87
0.85
O
O
OH
N
Me
15.5 15.0 ppm
13 12 11 10 9 8 7 6 5 4 3 2 1 ppm
0.88
0.98
0.99
2.11
3.35
1.12
1.13
2.00
2.03
7.79
3.95
BRUKER
Current Data Parameters
NAME SM844 140716.205
EXPNO 10
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140716
Time 11.01
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 5165.289 Hz
FIDRES 0.078816 Hz
AQ 6.3439350 sec
RG 203
DW 96.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.1315447 MHz
F2 – Processing parameters
SI 32768
SF 250.1300029 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

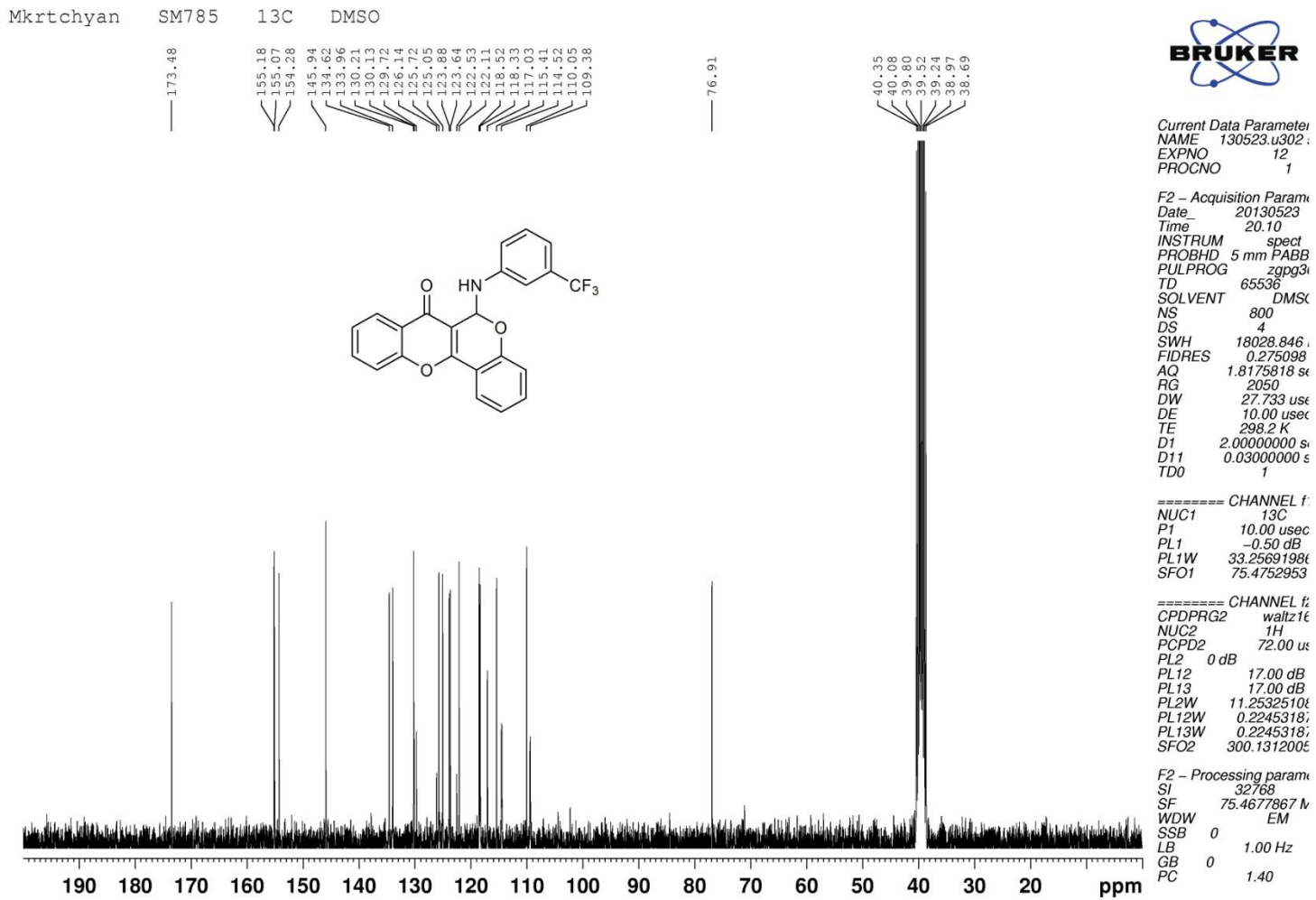
Compound 4d'


Mkrtchyan SM844 13C CDCl3
190.67
174.22
162.38
146.22
130.99
136.21
133.54
132.78
126.56
127.84
124.90
120.57
119.92
110.53
117.74
115.76
77.00
53.99
31.16
28.83
26.28
22.36
13.83
O
O
OH
N
Me
200
180
160
140
120
100
80
60
40
20
ppm
BRUKER
Current Data Parameters
NAME SM844 140716.205
EXPNO 11
PROCNO 1
F2 - Acquisition Parameters
Date_ 20140716
Time 12.15
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
PL1 -1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL12 15.00 dB
PL13 15.00 dB
PL2 -2.50 dB
SFO2 250.1310005 MHz
F2 - Processing parameters
SI 32768
SF 62.8952429 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

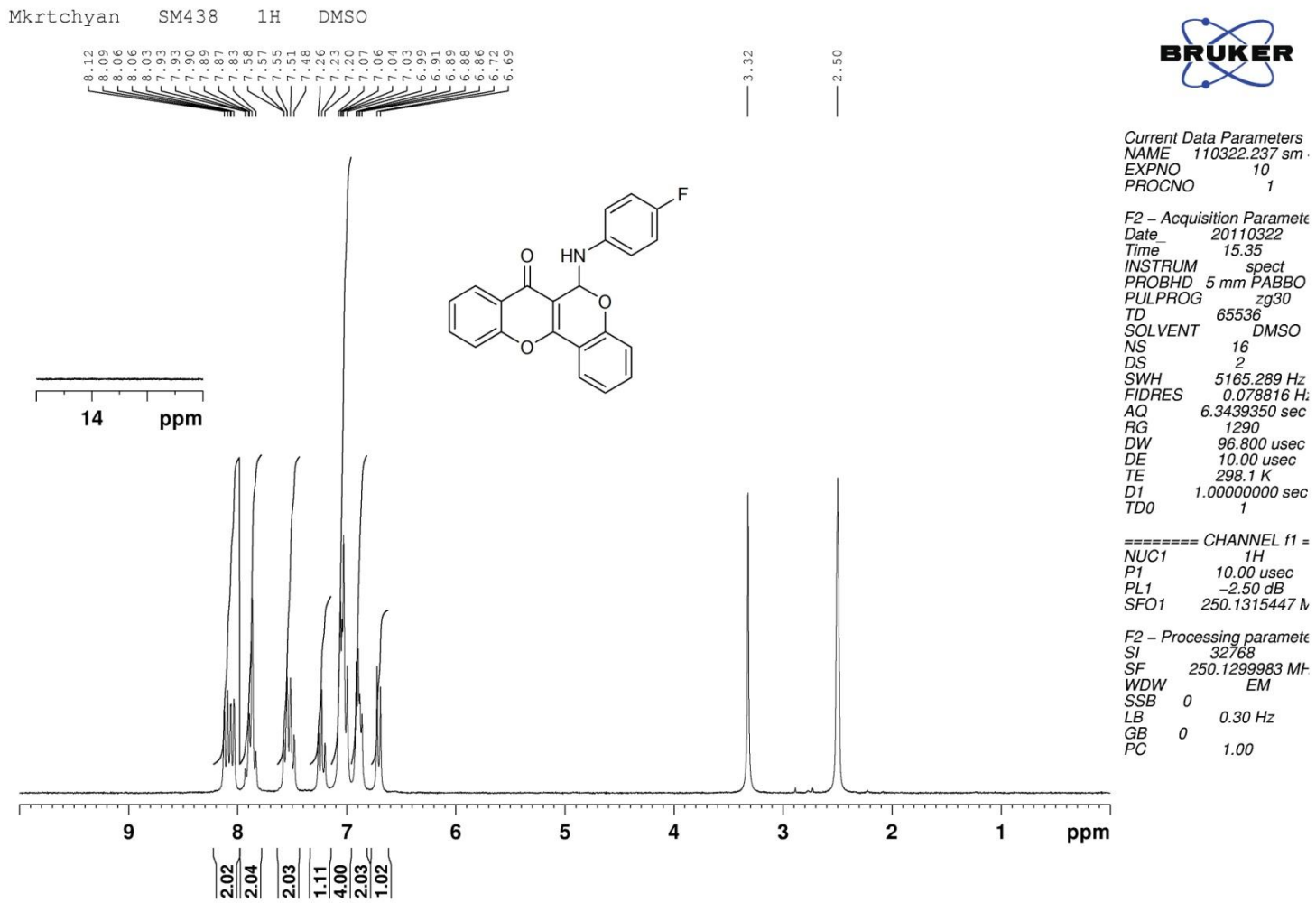
Compound 5a


Mkrtchyan SM785 1H DMSO
8.08 8.07 8.05 8.05 7.93 7.93 7.91 7.90 7.90 7.88 7.87 7.87 7.84 7.84 7.58 7.58 7.56 7.55 7.55 7.54 7.53 7.53 7.52 7.49 7.45 7.42 7.40 7.27 7.27 7.25 7.24 7.22 7.22 7.18 7.14 7.07 7.05 7.04 6.84 6.82
O HN CF3 O O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
2.01 2.01 3.05 1.04 2.05 1.04 2.00 1.02
BRUKER
Current Data Parameters
NAME 130523.u302 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20130523
Time 9.05
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423 H
AQ 5.2953587 se
RG 228
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing parame
SI 32768
SF 300.1300098 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

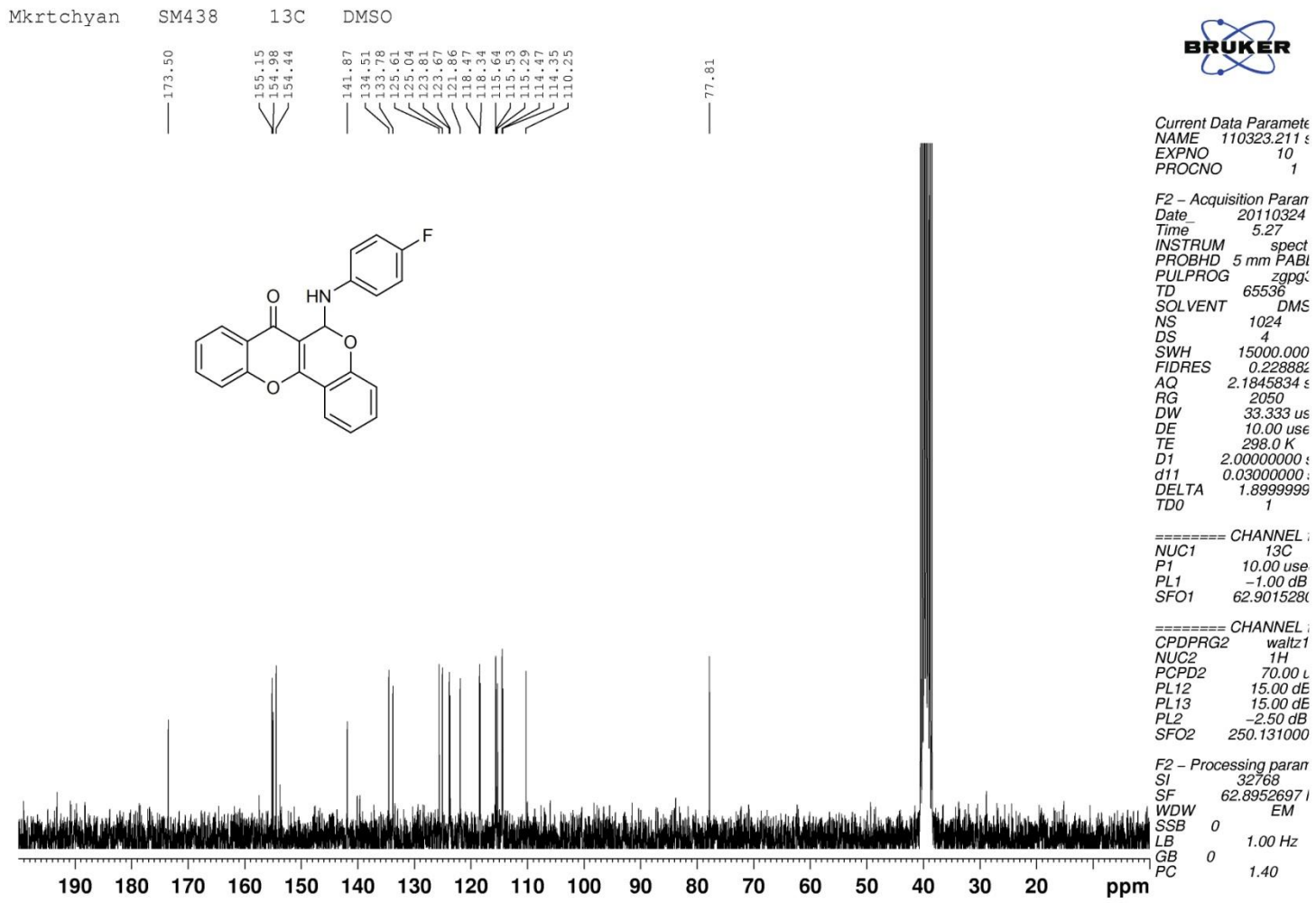
Compound 5a


Mkrtchyan SM785 13C DMSO
173.48
155.18
155.07
154.28
145.94
134.62
133.96
130.21
130.13
129.72
126.14
125.72
125.05
123.88
123.64
122.53
122.11
118.52
118.33
117.03
115.41
114.52
110.05
109.38
76.91
40.35
40.08
39.80
39.52
39.24
38.97
38.69
O
HN
CF3
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 130523.u302
EXPNO 12
PROCNO 1
F2 – Acquisition Param
Date_ 20130523
Time 20.10
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT DMS
NS 800
DS 4
SWH 18028.846
FIDRES 0.275098
AQ 1.8175818 s
RG 2050
DW 27.733 us
DE 10.00 usec
TE 298.2 K
D1 2.00000000 s
D11 0.03000000 s
TD0 1
======== CHANNEL f
NUC1 13C
P1 10.00 usec
PL1 –0.50 dB
PL1W 33.2569198
SFO1 75.4752953
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 72.00 us
PL2 0 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 11.2532510
PL12W 0.2245318
PL13W 0.2245318
SFO2 300.131200
F2 – Processing param
SI 32768
SF 75.4677867 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

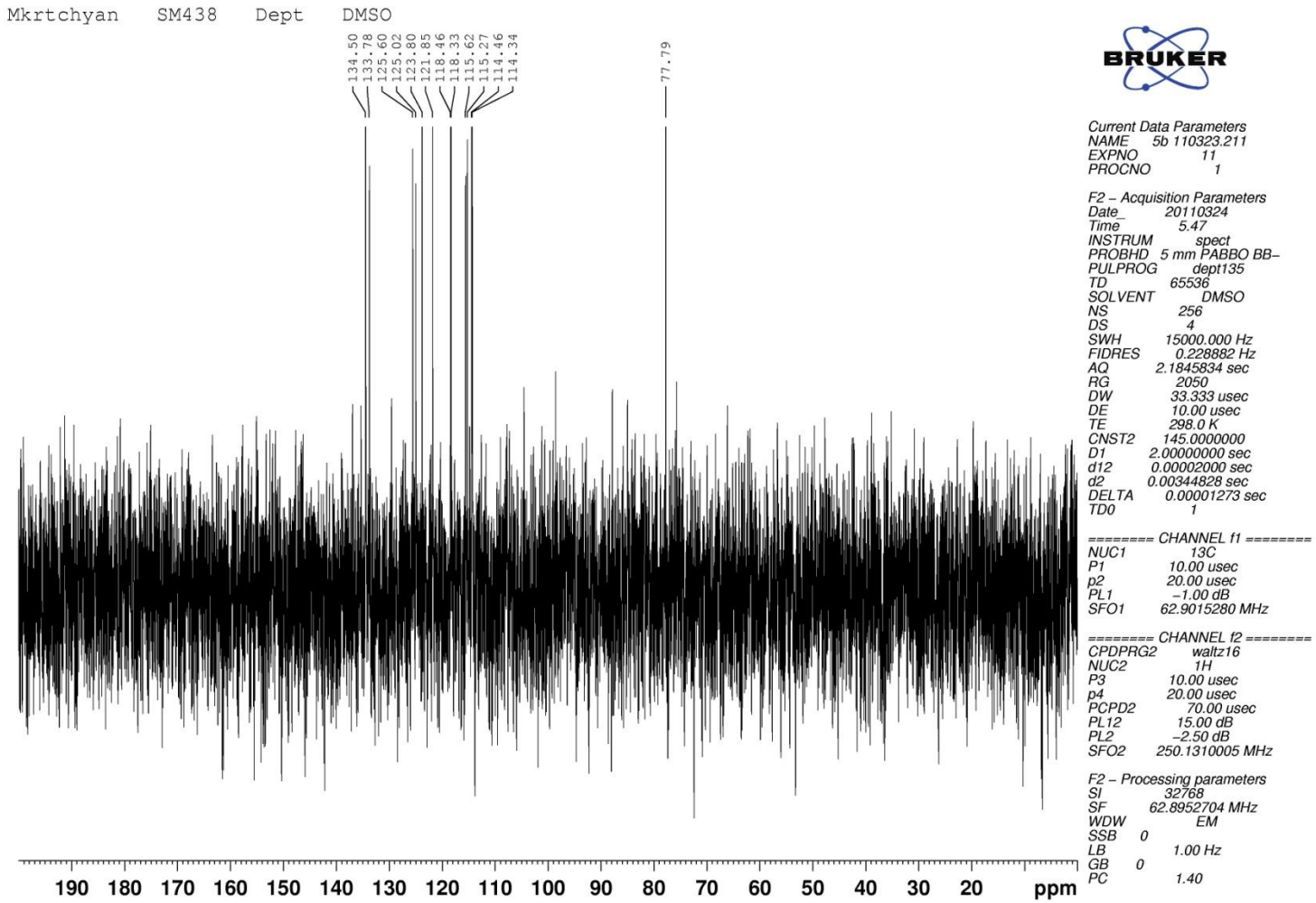
Compound 5b


Mkrtchyan SM438 1H DMSO
8.12
8.09
8.06
8.06
8.03
7.93
7.93
7.90
7.89
7.87
7.83
7.58
7.57
7.55
7.51
7.48
7.26
7.23
7.20
7.07
7.06
7.04
7.03
6.99
6.91
6.89
6.88
6.86
6.72
6.69
3.32
2.50
F
HN
O
O
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
2.02
2.04
2.03
1.11
4.00
2.03
1.02
BRUKER
Current Data Parameters
NAME 110322.237 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20110322
Time 15.35
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 5165.289 Hz
FIDRES 0.078816 H
AQ 6.3439350 sec
RG 1290
DW 96.800 usec
DE 10.00 usec
TE 298.1 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 =
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.1315447 M
F2 – Processing parameter
SI 32768
SF 250.1299983 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

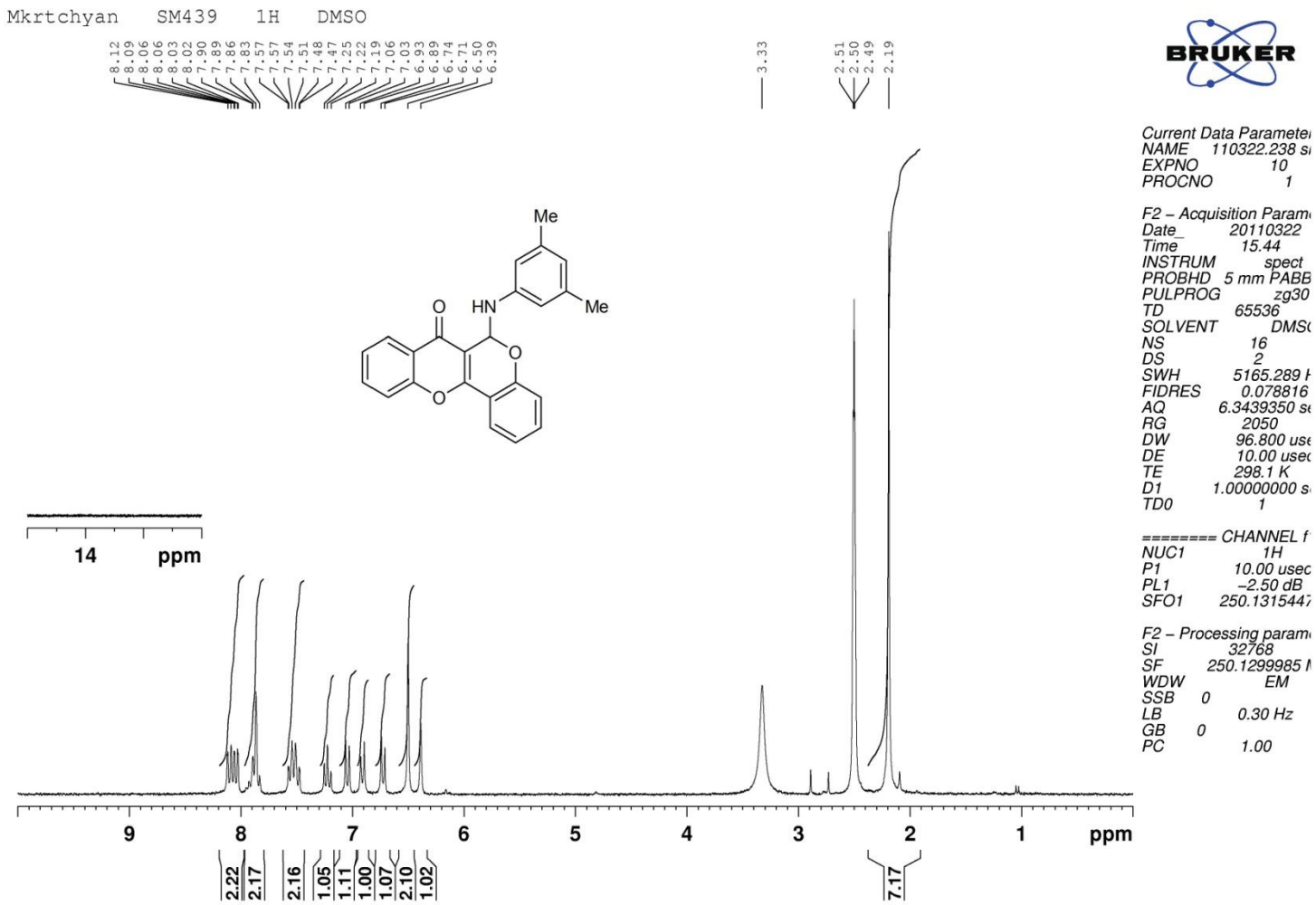
Compound 5b


Mkrtchyan SM438 13C DMSO
173.50
155.15
154.98
154.44
141.87
134.51
133.78
125.61
125.04
123.81
123.67
121.86
118.47
118.34
115.64
115.53
115.29
114.47
114.35
110.25
77.81
F
HN
O
O
O
BRUKER
Current Data Paramete
NAME 110323.211 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20110324
Time 5.27
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zgpg3
TD 65536
SOLVENT DMS
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.0 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528(
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing param
SI 32768
SF 62.8952697 I
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

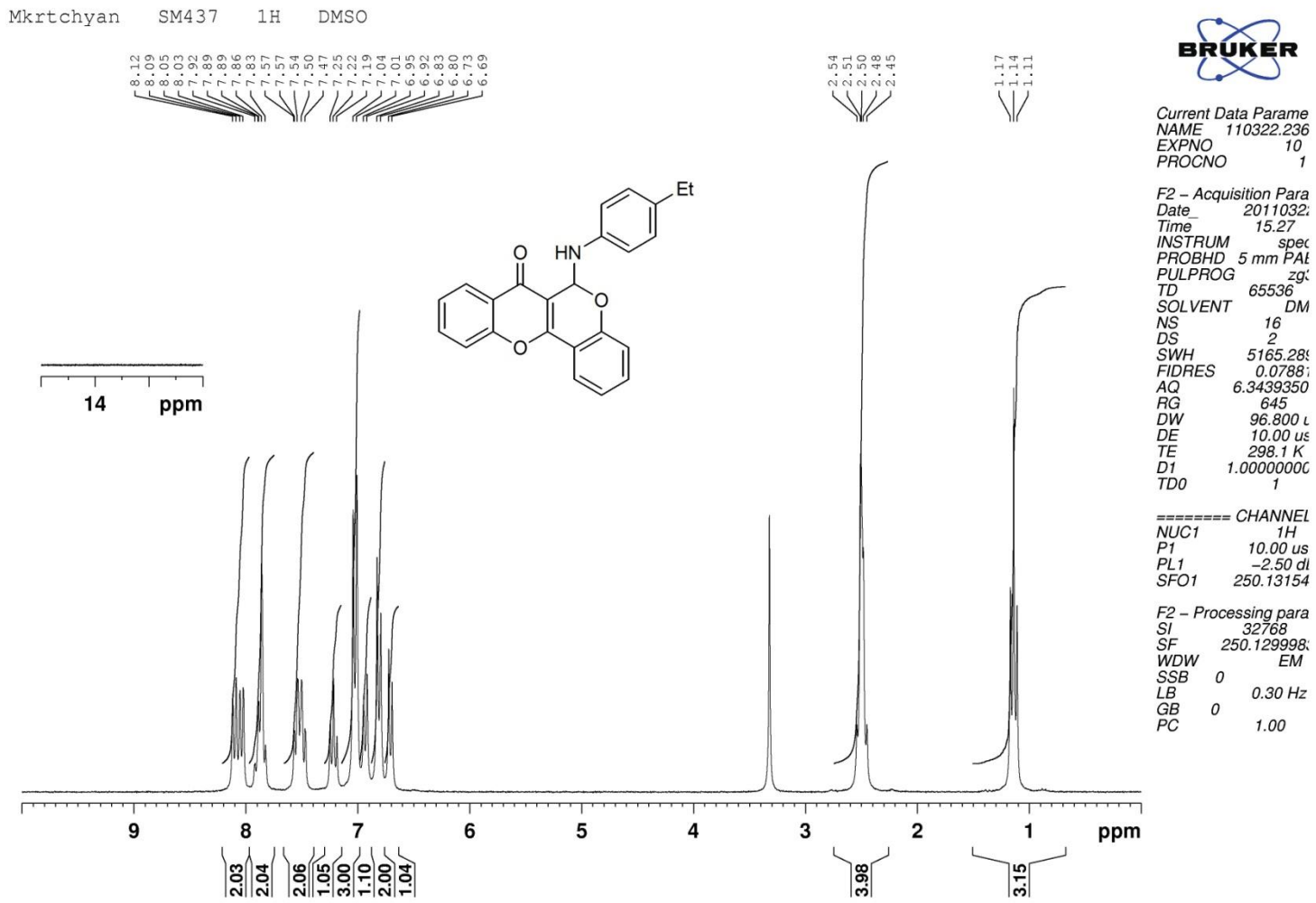
Compound 5b


Mkrtchyan SM438 Dept DMSO
134.50
133.78
125.60
125.02
123.80
121.85
118.46
118.33
115.62
115.27
114.46
114.34
77.79
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Parameters
NAME 5b 110323.211
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20110324
Time 5.47
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT DMSO
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952704 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

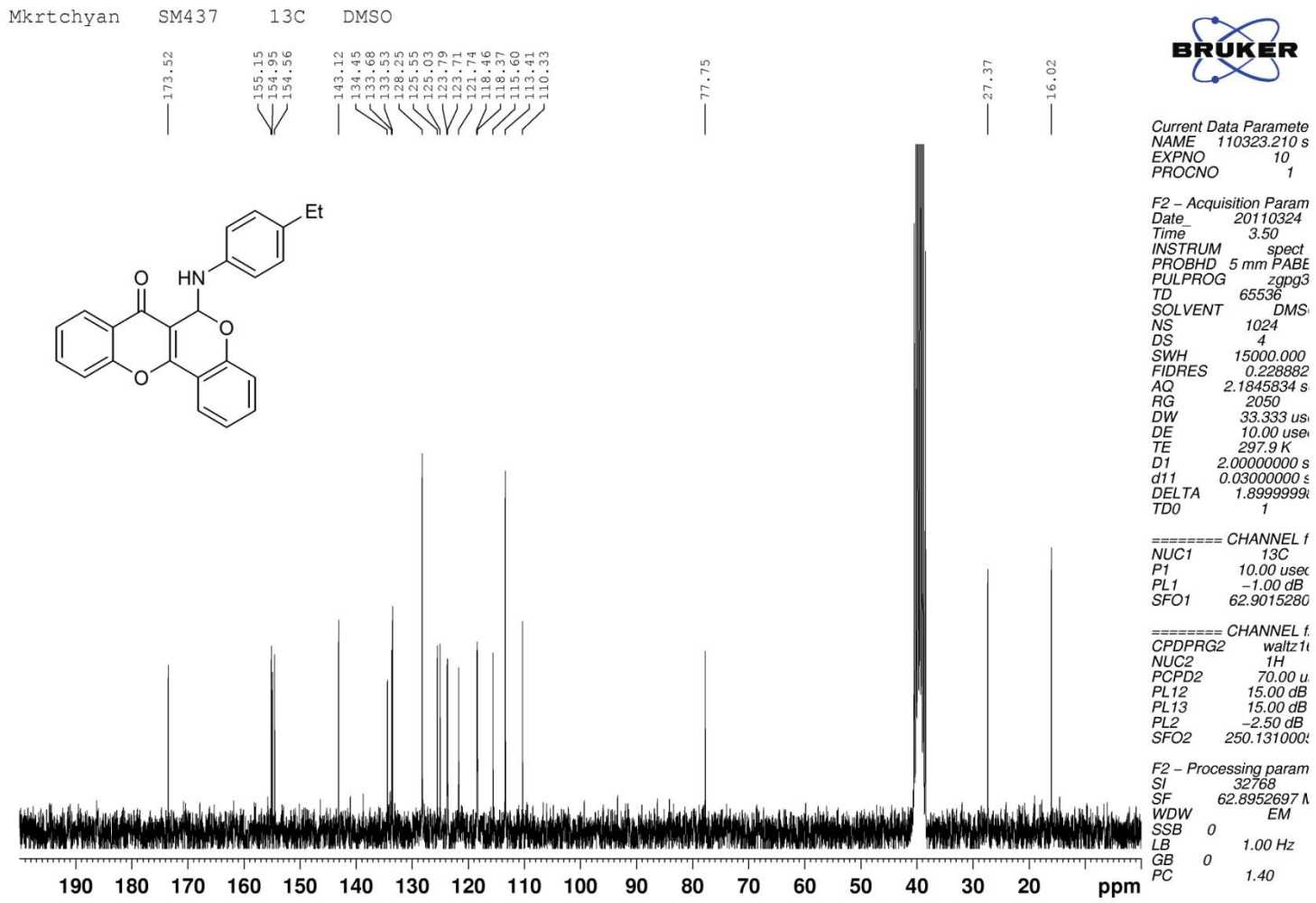
Compound 5c


Mkrtchyan SM439 1H DMSO
8.12
8.09
8.06
8.06
8.03
8.02
7.90
7.89
7.86
7.83
7.57
7.57
7.54
7.51
7.48
7.47
7.25
7.22
7.19
7.06
7.03
6.93
6.89
6.74
6.71
6.50
6.39
3.33
2.51
2.50
2.49
2.19
Me
HN
Me
O
O
O
14 ppm
9
8
7
6
5
4
3
2
1
ppm
2.22
2.17
2.16
1.05
1.11
1.00
1.07
2.10
1.02
7.17
BRUKER
Current Data Parameter
NAME 110322.238 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20110322
Time 15.44
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT DMS
NS 16
DS 2
SWH 5165.289 H
FIDRES 0.078816
AQ 6.3439350 s
RG 2050
DW 96.800 us
DE 10.00 use
TE 298.1 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.1315447
F2 – Processing param
SI 32768
SF 250.1299985 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

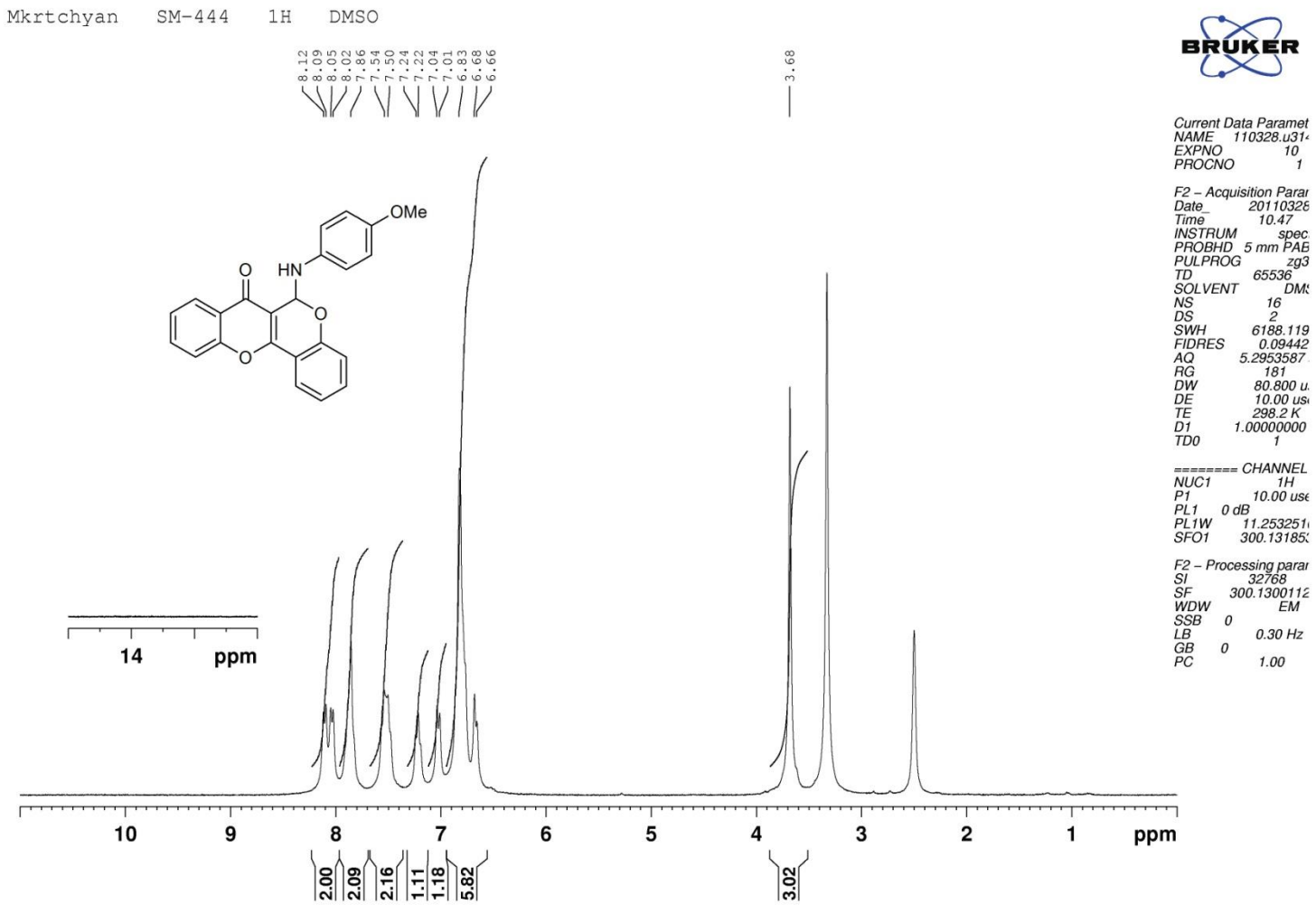
Compound 5d


Mkrtchyan SM437 1H DMSO
8.12
8.09
8.05
8.03
7.92
7.89
7.89
7.86
7.83
7.57
7.57
7.54
7.50
7.47
7.25
7.22
7.19
7.04
7.01
6.95
6.92
6.83
6.80
6.73
6.69
2.54
2.51
2.50
2.48
2.45
1.17
1.14
1.11
Et
HN
O
O
O
14 ppm
9
8
7
6
5
4
3
2
1
ppm
2.03
2.04
2.06
1.05
3.00
1.10
2.00
1.04
3.98
3.15
BRUKER
Current Data Parame
NAME 110322.236
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 20110322
Time 15.27
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zg3
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 5165.28
FIDRES 0.0788
AQ 6.3439350
RG 645
DW 96.800 u
DE 10.00 us
TE 298.1 K
D1 1.0000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 us
PL1 –2.50 dB
SFO1 250.13154
F2 – Processing para
SI 32768
SF 250.129998
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

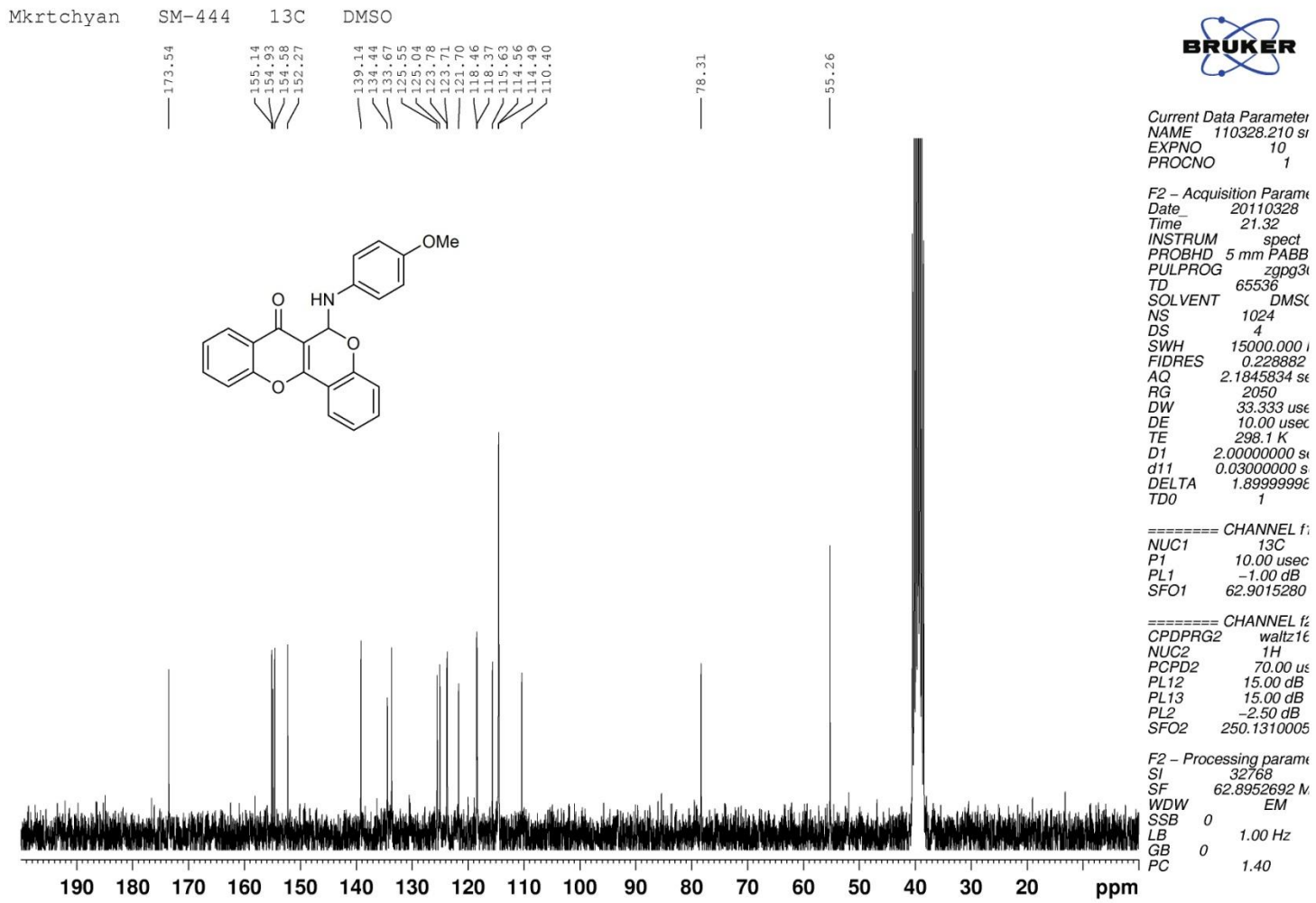
Compound 5d


Mkrtchyan SM437 13C DMSO
173.52
155.15
154.95
154.56
143.12
134.45
133.68
133.53
128.25
125.55
125.03
123.79
123.71
121.74
118.46
118.37
115.60
113.41
110.33
77.75
27.37
16.02
Et
HN
O
O
O
BRUKER
Current Data Paramete
NAME 110323.210 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20110324
Time 3.50
INSTRUM spect
PROBHD 5 mm PABE
PULPROG zgpg3
TD 65536
SOLVENT DMS
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 297.9 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL f
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280
======== CHANNEL f
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing param
SI 32768
SF 62.8952697
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

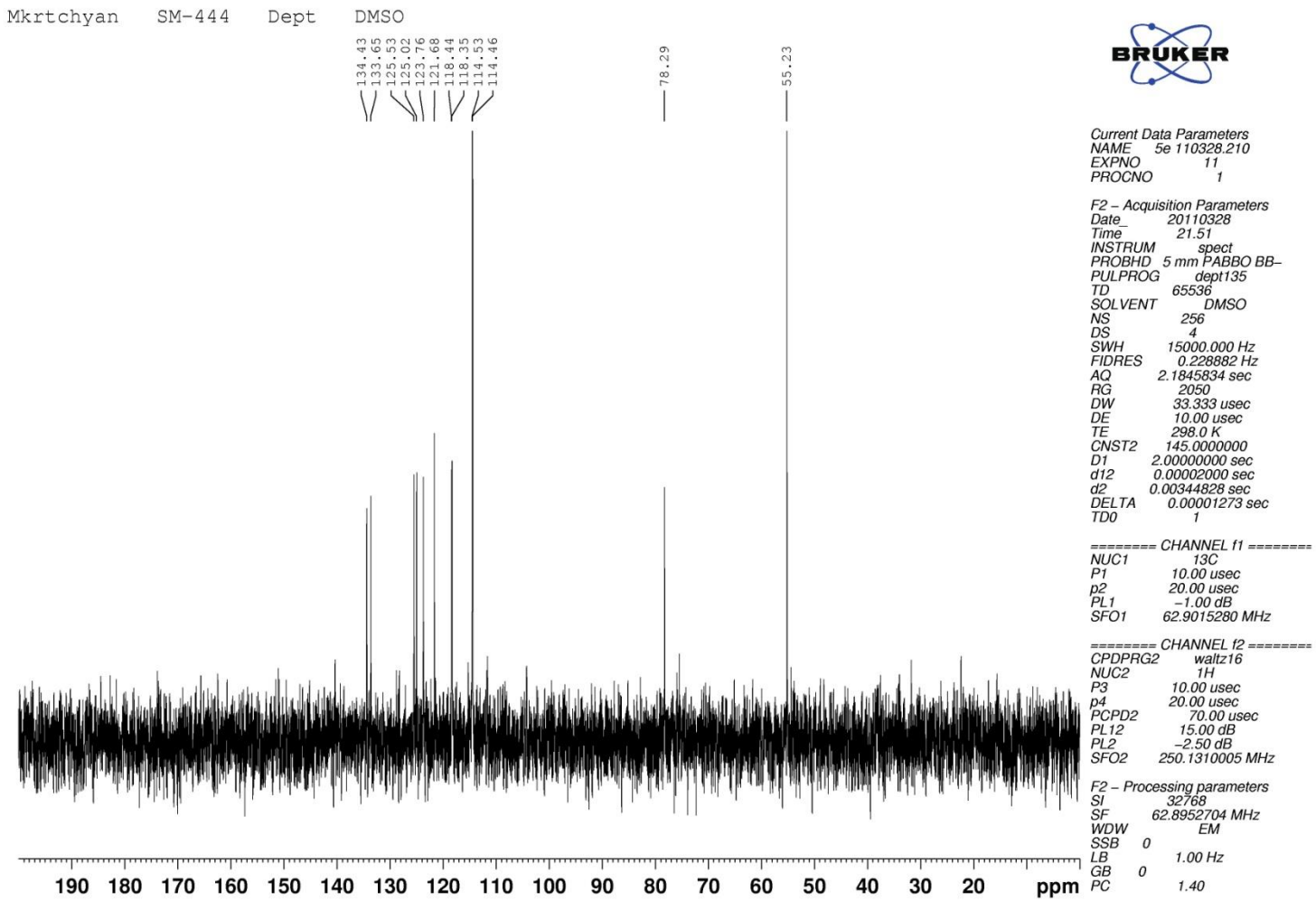
Compound 5e


Mkrtchyan SM-444 1H DMSO
8.12
8.09
8.05
8.02
7.86
7.54
7.50
7.24
7.22
7.04
7.01
6.83
6.68
6.66
3.68
OMe
HN
O
O
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
2.00
2.09
2.16
1.11
1.18
5.82
3.02
BRUKER
Current Data Paramet
NAME 110328.u31
EXPNO 10
PROCNO 1
F2 – Acquisition Parar
Date_ 20110328
Time 10.47
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zg3
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 6188.119
FIDRES 0.09442
AQ 5.2953587
RG 181
DW 80.800 u
DE 10.00 us
TE 298.2 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 use
PL1 0 dB
PL1W 11.253251
SFO1 300.13185
F2 – Processing parar
SI 32768
SF 300.1300112
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

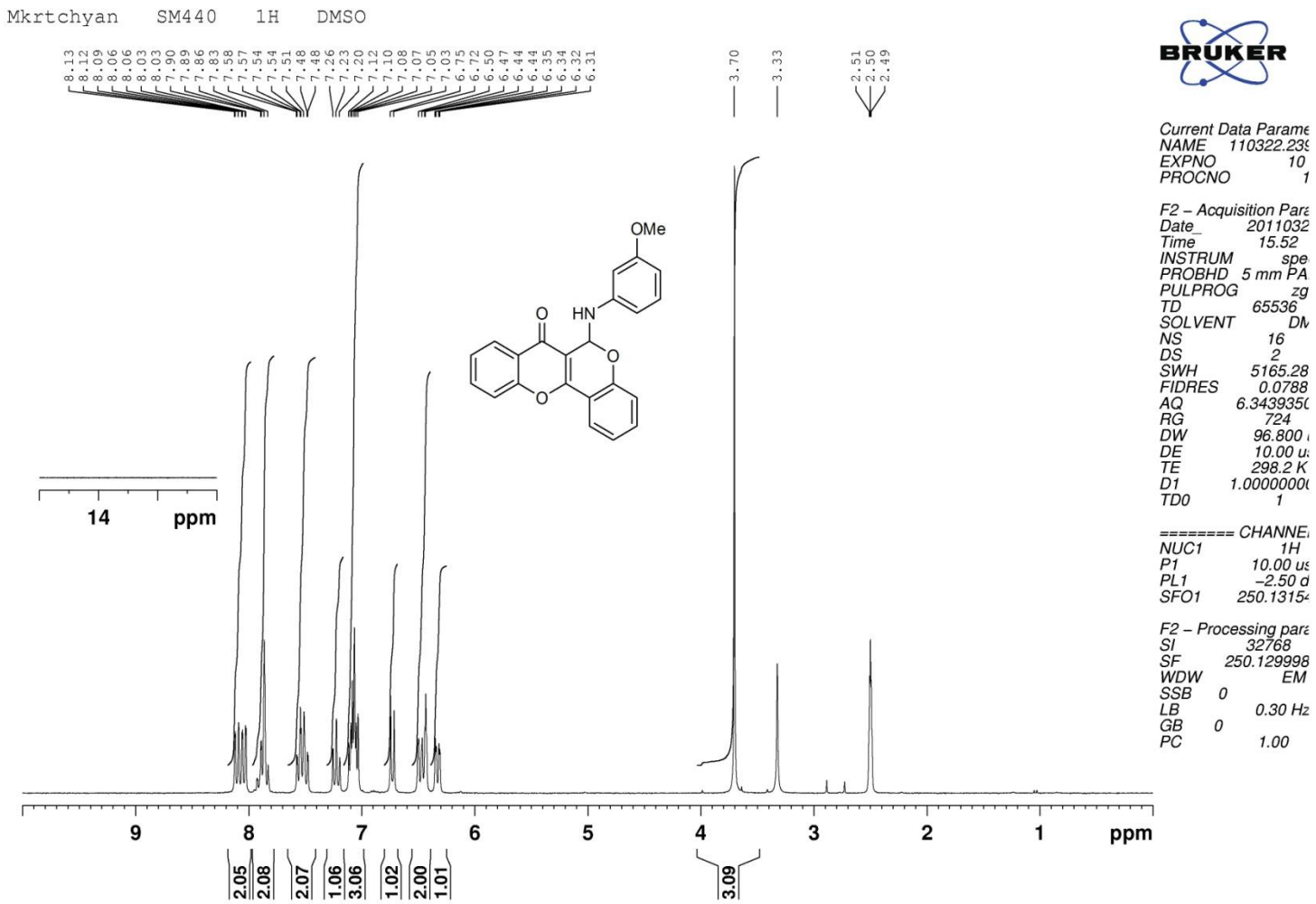
Compound 5e


Mkrtchyan SM-444 13C DMSO
173.54
155.14
154.93
154.58
152.27
139.14
134.44
133.67
125.55
125.04
123.78
123.71
121.70
118.46
118.37
115.63
114.56
114.49
110.40
78.31
55.26
OMe
HN
O
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 110328.210 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110328
Time 21.32
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT DMS
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 usec
TE 298.1 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL f
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280
======== CHANNEL f
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952692 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

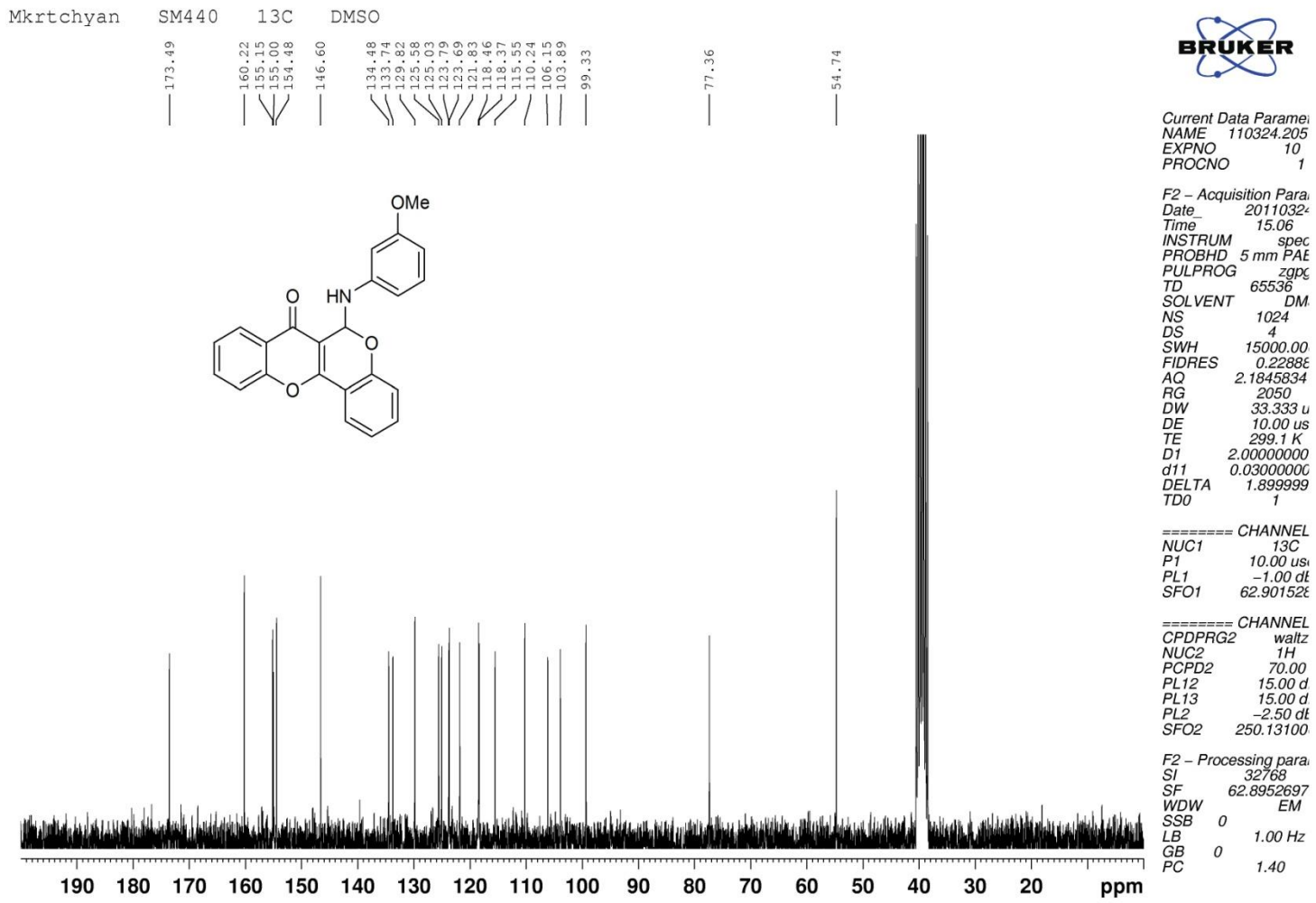
Compound 5e


Mkrtchyan SM-444 Dept DMSO
134.43
133.65
125.53
125.02
123.76
121.68
118.44
118.35
114.53
114.46
78.29
55.23
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Parameters
NAME 5e 110328.210
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20110328
Time 21.51
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT DMSO
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952704 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

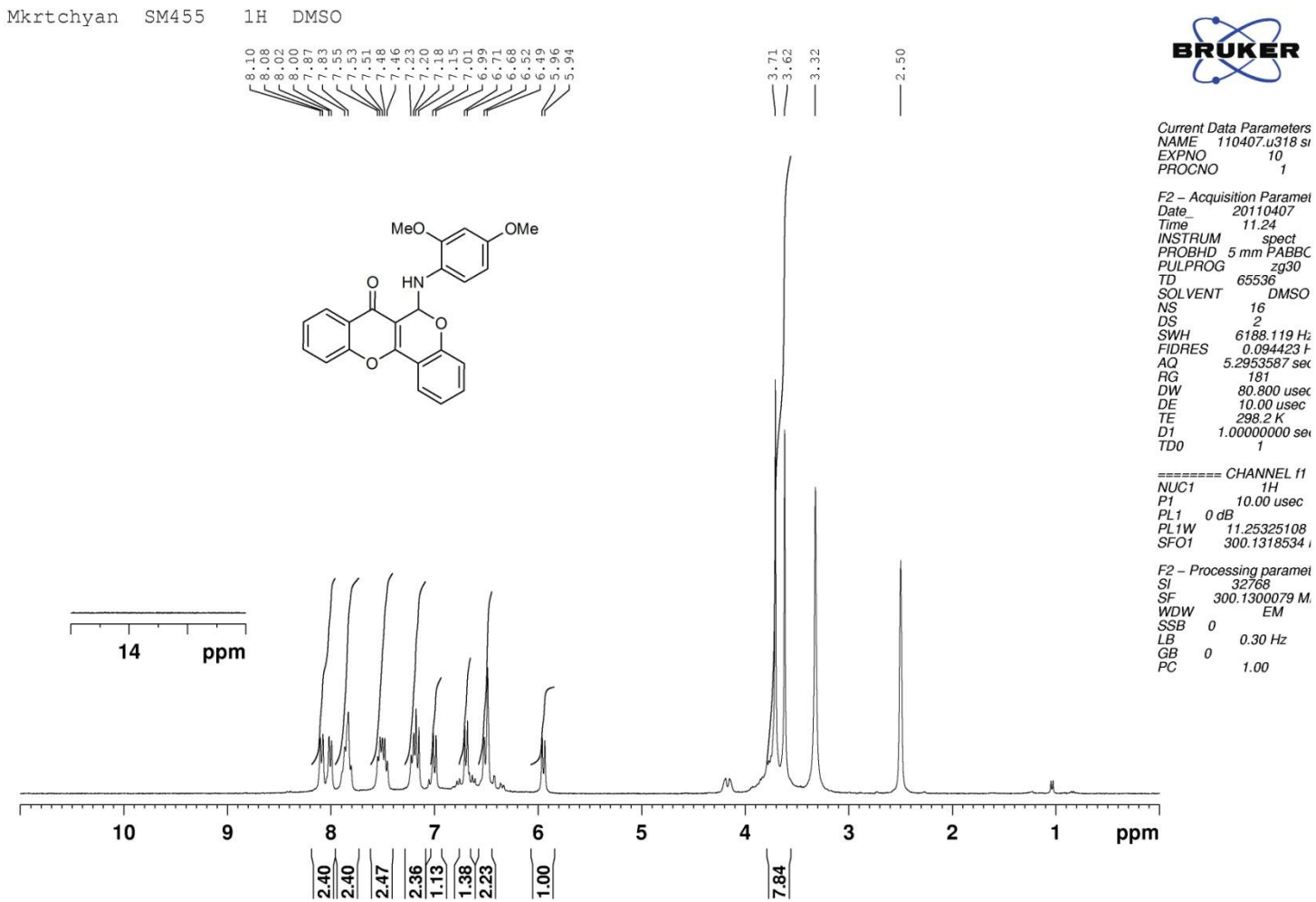
Compound 5f


Mkrtchyan SM440 1H DMSO
8.13 8.12 8.09 8.06 8.06 8.03 8.03 7.90 7.89 7.86 7.83 7.58 7.57 7.54 7.54 7.51 7.48 7.48 7.26 7.23 7.20 7.12 7.10 7.08 7.07 7.05 7.03 6.75 6.72 6.50 6.47 6.44 6.44 6.35 6.34 6.32 6.31
3.70 3.33
2.51 2.50 2.49
OMe
HN
O
O
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
2.05 2.08 2.07 1.06 3.06 1.02 2.00 1.01 3.09
BRUKER
Current Data Parame
NAME 110322.23
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2011032
Time 15.52
INSTRUM spe
PROBHD 5 mm PA
PULPROG zg
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 5165.28
FIDRES 0.0788
AQ 6.3439350
RG 724
DW 96.800
DE 10.00 u
TE 298.2 K
D1 1.0000000
TD0 1
======== CHANNE
NUC1 1H
P1 10.00 us
PL1 –2.50 d
SFO1 250.1315
F2 – Processing para
SI 32768
SF 250.129998
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

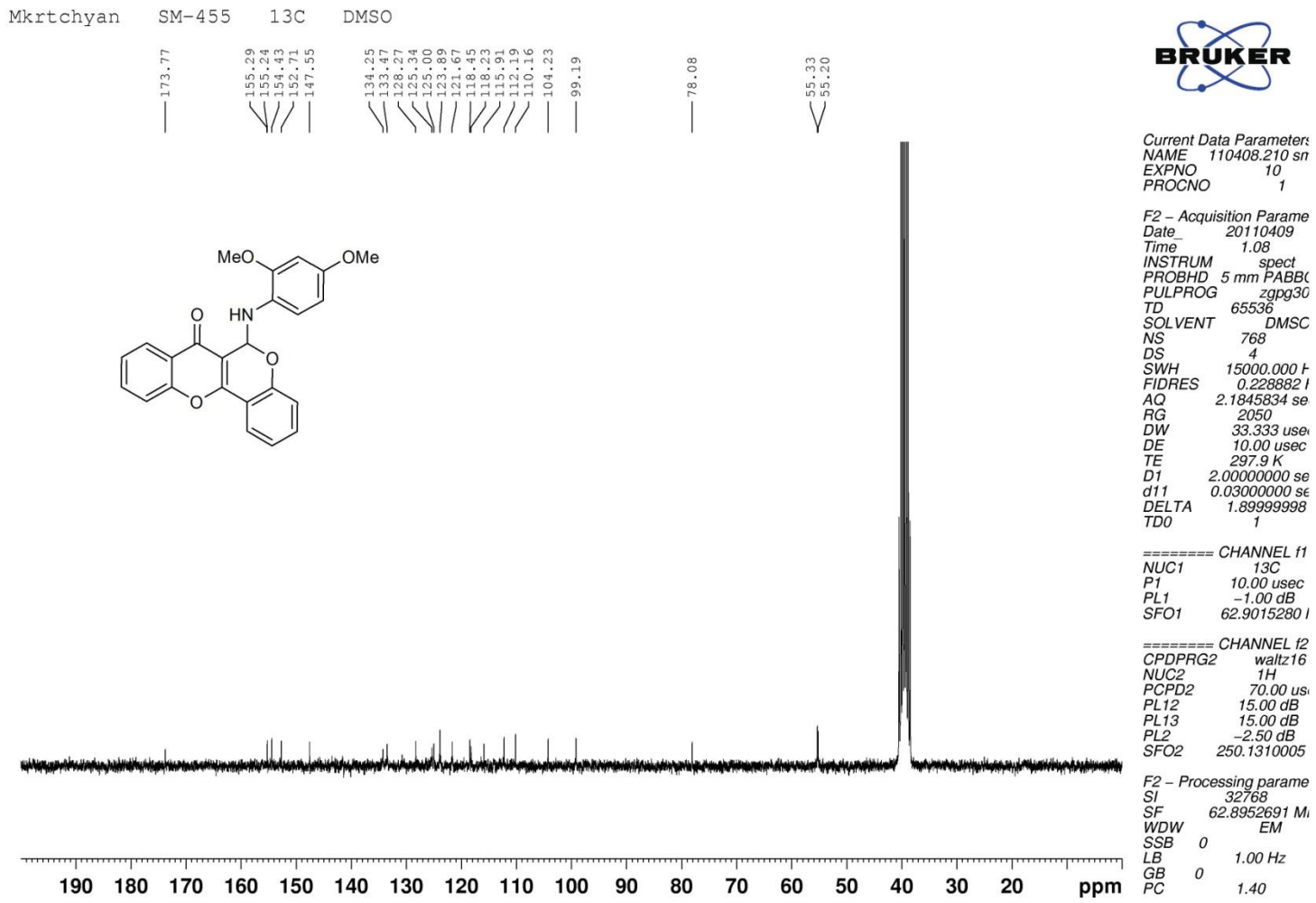
Compound 5f


Mkrtchyan SM440 13C DMSO
173.49
160.22
155.15
155.00
154.48
146.60
134.48
133.74
129.82
125.58
125.03
123.79
123.69
121.83
118.46
118.37
115.55
110.24
106.15
103.89
99.33
77.36
54.74
OMe
HN
O
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parame
NAME 110324.205
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 20110324
Time 15.06
INSTRUM spec
PROBHD 5 mm PAE
PULPROG zgpg
TD 65536
SOLVENT DM
NS 1024
DS 4
SWH 15000.00
FIDRES 0.22888
AQ 2.1845834
RG 2050
DW 33.333 u
DE 10.00 us
TE 299.1 K
D1 2.00000000
d11 0.03000000
DELTA 1.899999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 us
PL1 –1.00 dB
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz
NUC2 1H
PCPD2 70.00
PL12 15.00 d
PL13 15.00 d
PL2 –2.50 dB
SFO2 250.13100
F2 – Processing para
SI 32768
SF 62.8952697
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

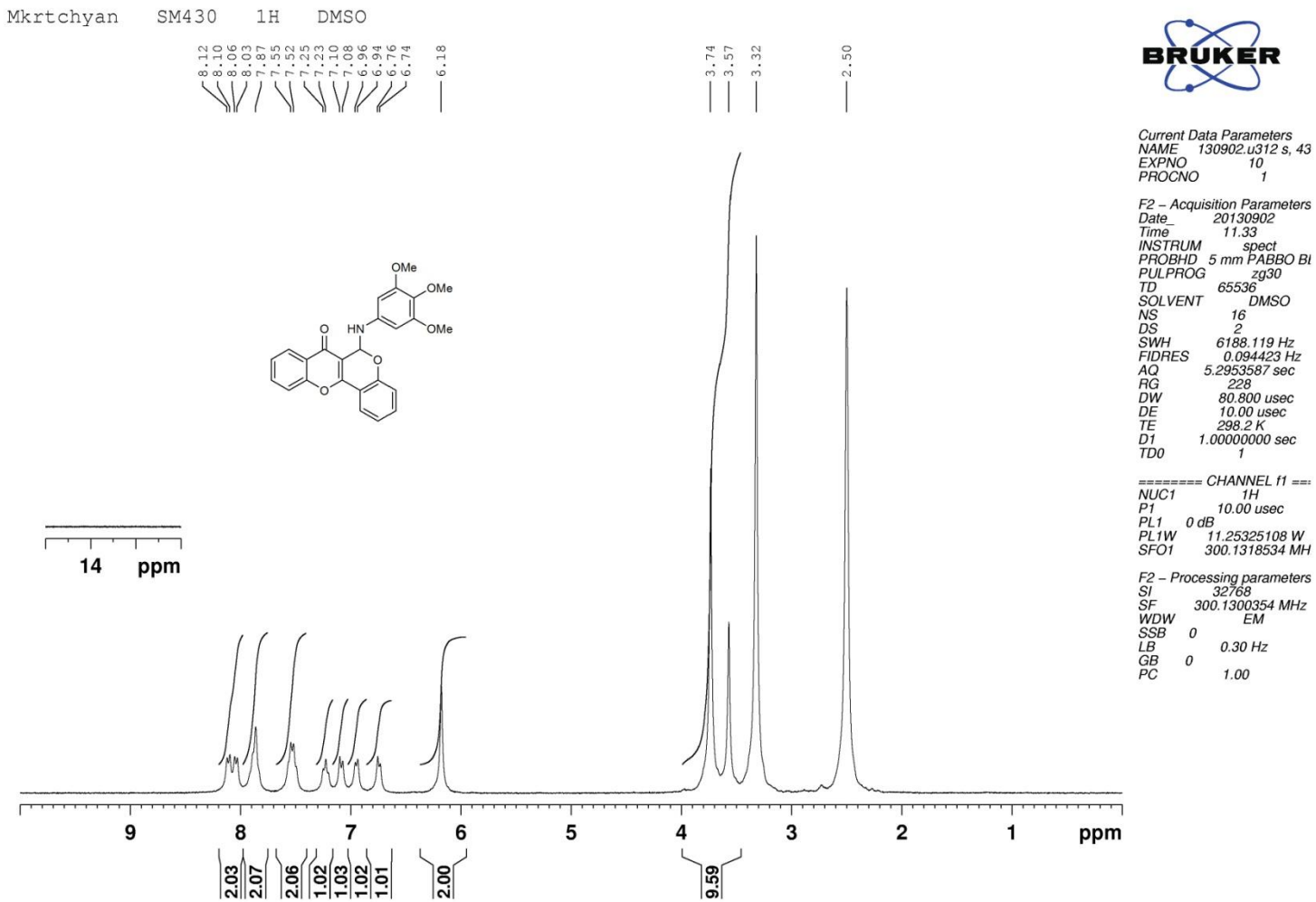
Compound 5g


Mkrtchyan SM455 1H DMSO
8.10
8.08
8.02
8.00
7.87
7.83
7.55
7.53
7.51
7.48
7.46
7.23
7.20
7.18
7.15
7.01
6.99
6.71
6.68
6.52
6.49
5.96
5.94
3.71
3.62
3.32
2.50
MeO
OMe
HN
O
O
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
2.40
2.40
2.47
2.36
1.13
1.38
2.23
1.00
7.84
BRUKER
Current Data Parameters
NAME 110407.u318 s
EXPNO 10
PROCNO 1
F2 – Acquisition Paramet
Date_ 20110407
Time 11.24
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 H
AQ 5.2953587 sec
RG 181
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing paramet
SI 32768
SF 300.1300079 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

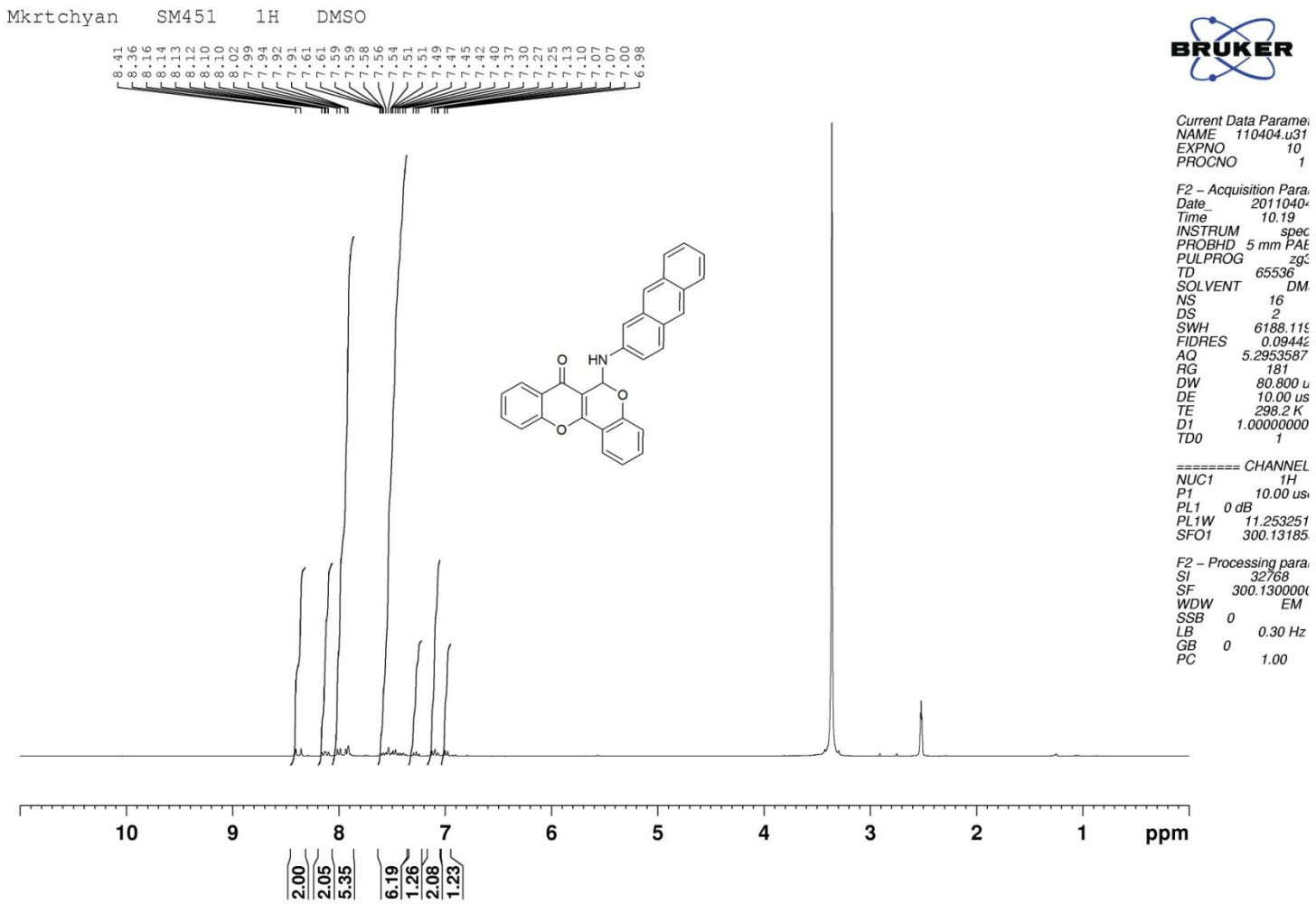
Compound 5g


Mkrtchyan SM-455 13C DMSO
173.77
155.29
155.24
154.43
152.71
147.55
134.25
133.47
128.27
125.34
125.00
123.89
121.67
118.45
118.23
115.91
112.19
110.16
104.23
99.19
78.08
55.33
55.20
MeO
OMe
HN
O
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 110408.210 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110409
Time 1.08
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 768
DS 4
SWH 15000.000 H
FIDRES 0.228882 H
AQ 2.1845834 se
RG 2050
DW 33.333 use
DE 10.00 usec
TE 297.9 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280 M
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 us
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952691 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

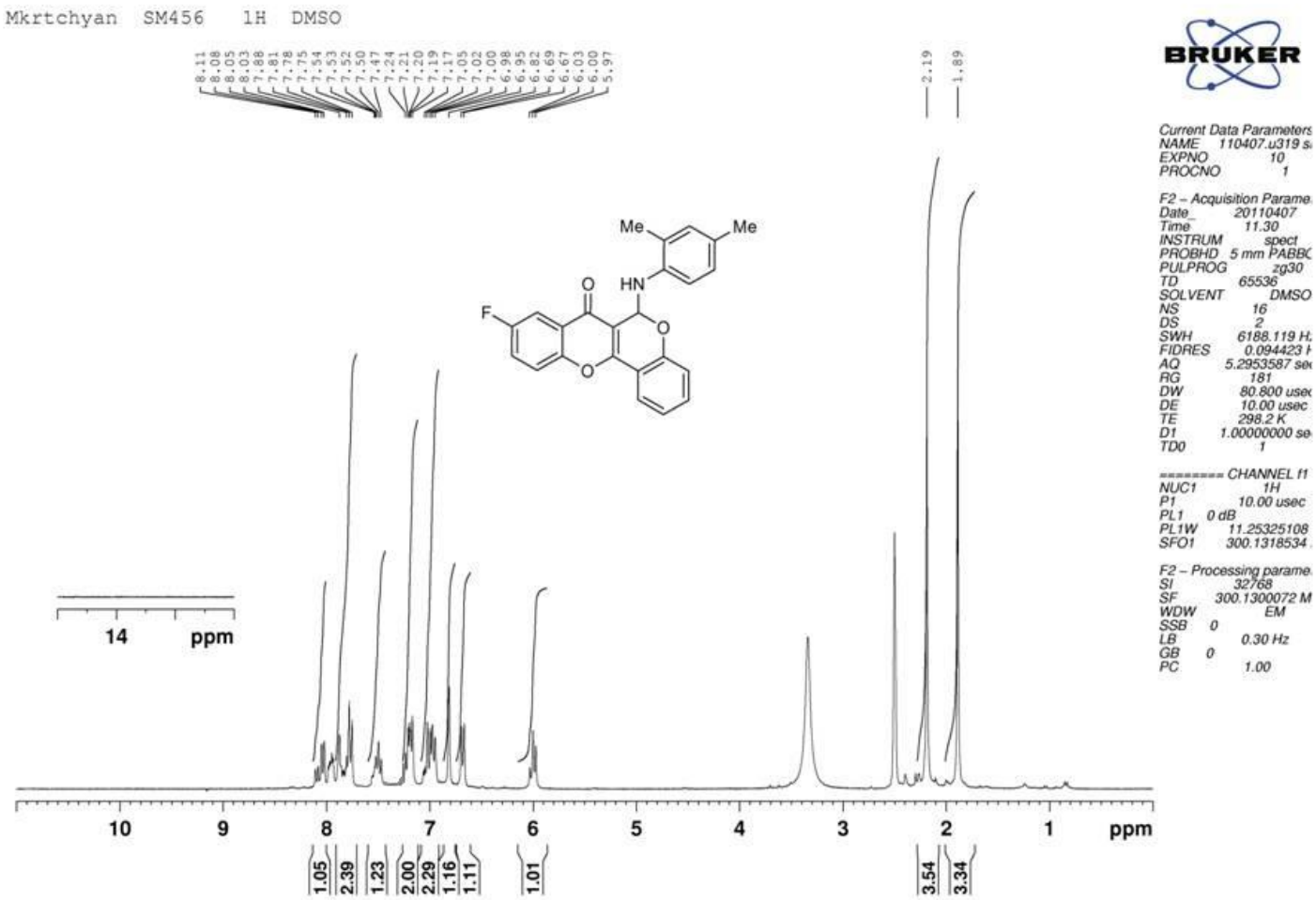
Compound 5h


Mkrtchyan SM430 1H DMSO
8.12
8.10
8.06
8.03
7.87
7.55
7.52
7.25
7.23
7.10
7.08
6.96
6.94
6.76
6.74
6.18
3.74
3.57
3.32
2.50
OMe
OMe
OMe
HN
O
O
O
14 ppm
9
8
7
6
5
4
3
2
1
ppm
2.03
2.07
2.06
1.02
1.03
1.02
1.01
2.00
9.59
Current Data Parameters
NAME 130902.u312 s, 43
EXPNO 10
PROCNO 1
F2 – Acquisition Parameters
Date_ 20130902
Time 11.33
INSTRUM spect
PROBHD 5 mm PABBO BI
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 228
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 MH
F2 – Processing parameters
SI 32768
SF 300.1300354 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

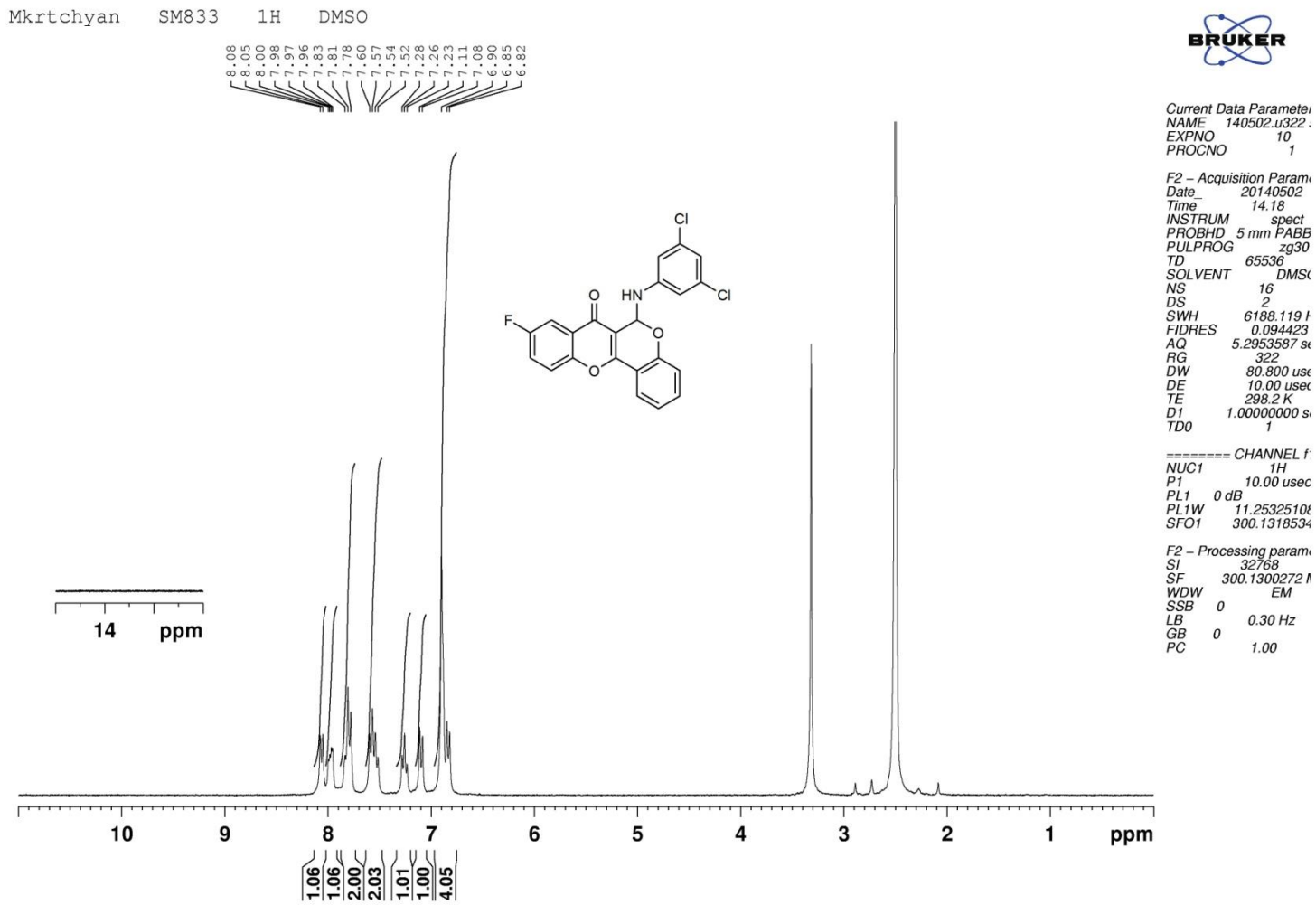
Compound 5i


Mkrtchyan SM451 1H DMSO
8.41 8.36 8.16 8.14 8.13 8.12 8.10 8.10 8.02 7.99 7.94 7.92 7.91 7.61 7.61 7.59 7.59 7.58 7.56 7.54 7.51 7.51 7.49 7.47 7.45 7.42 7.40 7.37 7.30 7.27 7.25 7.13 7.10 7.07 7.07 7.00 6.98
HN
O
O
O
10 9 8 7 6 5 4 3 2 1 ppm
2.00 2.05 5.35 6.19 1.26 2.08 1.23
BRUKER
Current Data Parame
NAME 110404.u31
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2011040
Time 10.19
INSTRUM spec
PROBHD 5 mm PAE
PULPROG zg
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 6188.11
FIDRES 0.0944
AQ 5.2953587
RG 181
DW 80.800 u
DE 10.00 us
TE 298.2 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 us
PL1 0 dB
PL1W 11.253251
SFO1 300.13185
F2 – Processing para
SI 32768
SF 300.130000
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

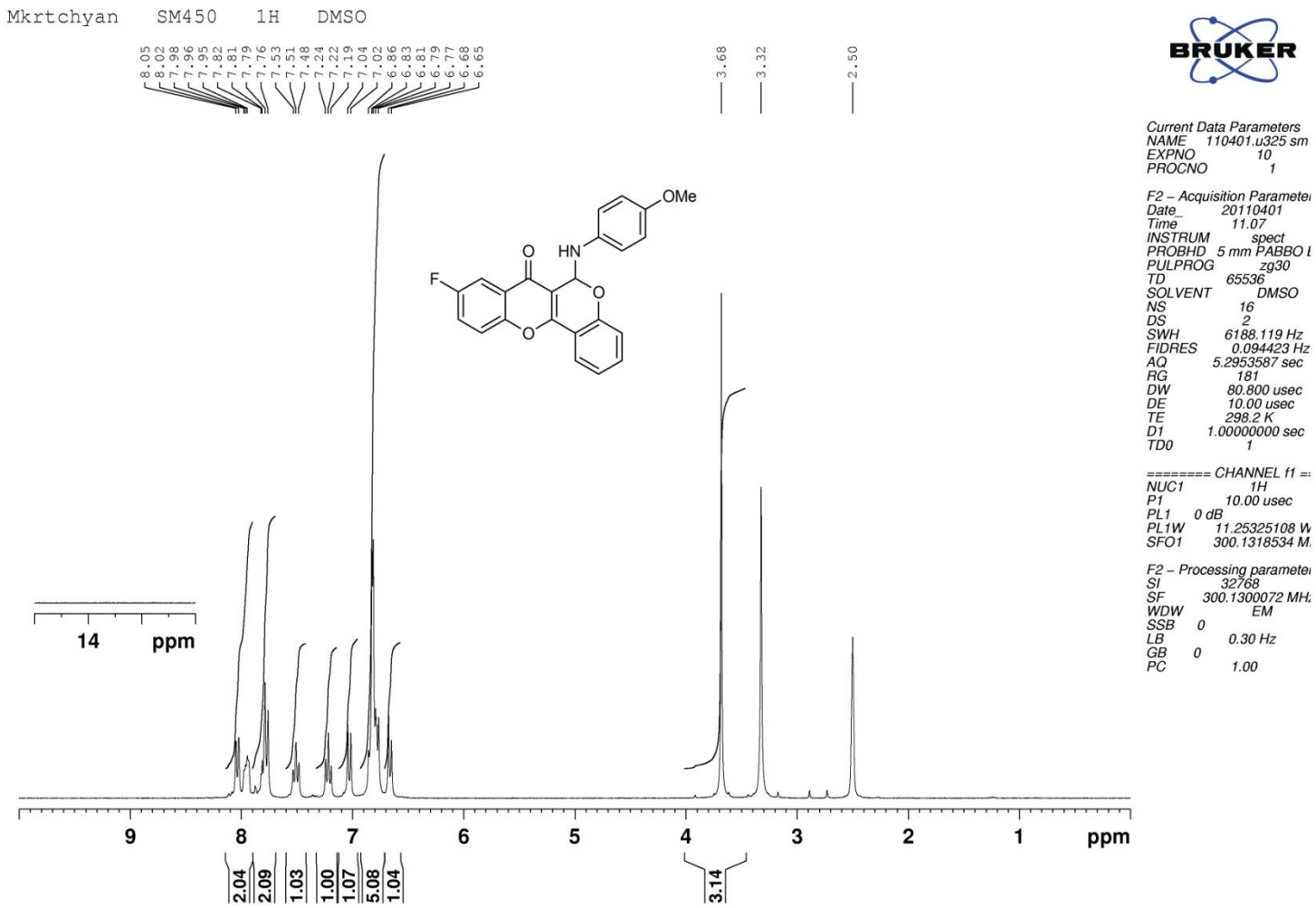
Compound 5j


Mkrtchyan SM456 1H DMSO
8.11
8.08
8.05
8.03
7.88
7.81
7.78
7.75
7.54
7.53
7.52
7.50
7.47
7.24
7.21
7.20
7.19
7.17
7.05
7.02
7.00
6.98
6.95
6.82
6.69
6.67
6.03
6.00
5.97
2.19
1.89
Me
Me
HN
O
F
O
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.05
2.39
1.23
2.00
2.29
1.16
1.11
1.01
3.54
3.34
BRUKER
Current Data Parameters
NAME 110407.u319 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110407
Time 11.30
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423 H
AQ 5.2953587 se
RG 181
DW 80.800 use
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing parame
SI 32768
SF 300.1300072 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

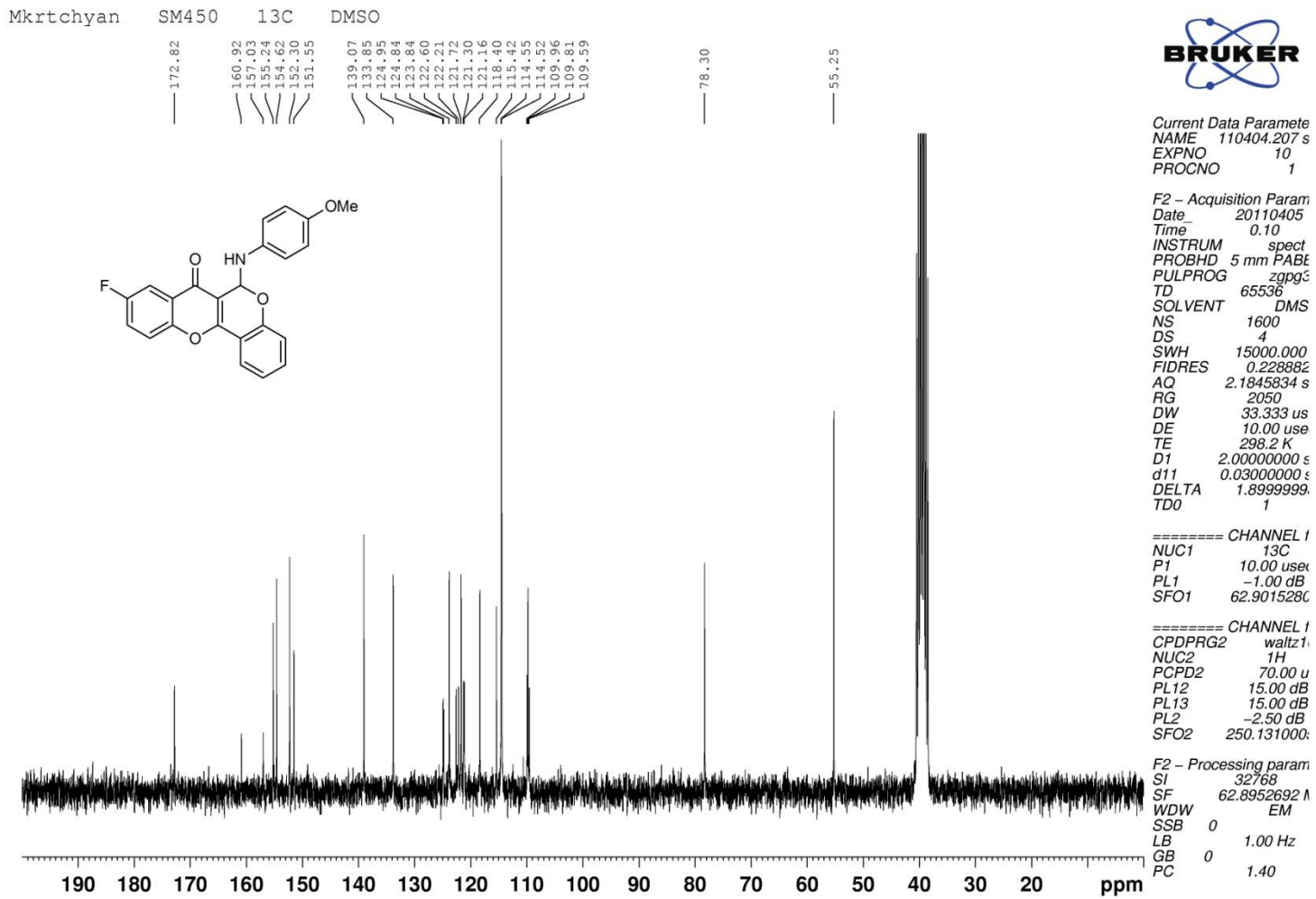
Compound 5k


Mkrtchyan SM833 1H DMSO
8.08
8.05
8.00
7.98
7.97
7.96
7.83
7.81
7.78
7.60
7.57
7.54
7.52
7.28
7.26
7.23
7.11
7.08
6.90
6.85
6.82
Cl
HN
Cl
O
F
O
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.06
1.06
2.00
2.03
1.01
1.00
4.05
BRUKER
Current Data Parameter
NAME 140502.u322
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20140502
Time 14.18
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119
FIDRES 0.094423
AQ 5.2953587 s
RG 322
DW 80.800 us
DE 10.00 usec
TE 298.2 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing param
SI 32768
SF 300.1300272
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

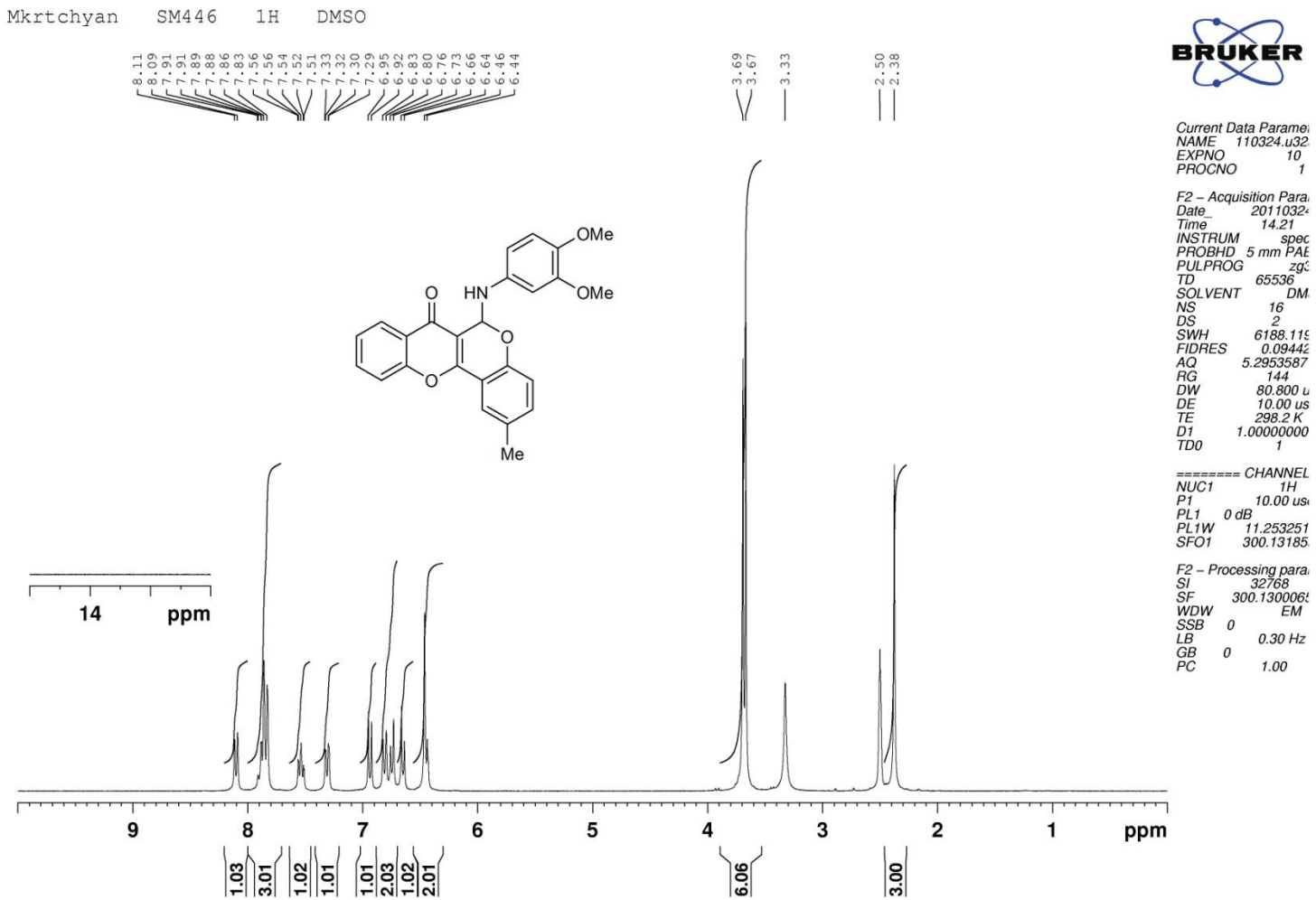
Compound 5l


Mkrtchyan SM450 1H DMSO
8.05
8.02
7.98
7.96
7.95
7.82
7.81
7.79
7.76
7.53
7.51
7.48
7.24
7.22
7.19
7.04
7.02
6.86
6.83
6.81
6.79
6.77
6.68
6.65
3.68
3.32
2.50
OMe
HN
O
F
O
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
2.04
2.09
1.03
1.00
1.07
5.08
1.04
3.14
BRUKER
Current Data Parameters
NAME 110401.u325 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20110401
Time 11.07
INSTRUM spect
PROBHD 5 mm PABBO I
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 181
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing parameter
SI 32768
SF 300.1300072 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

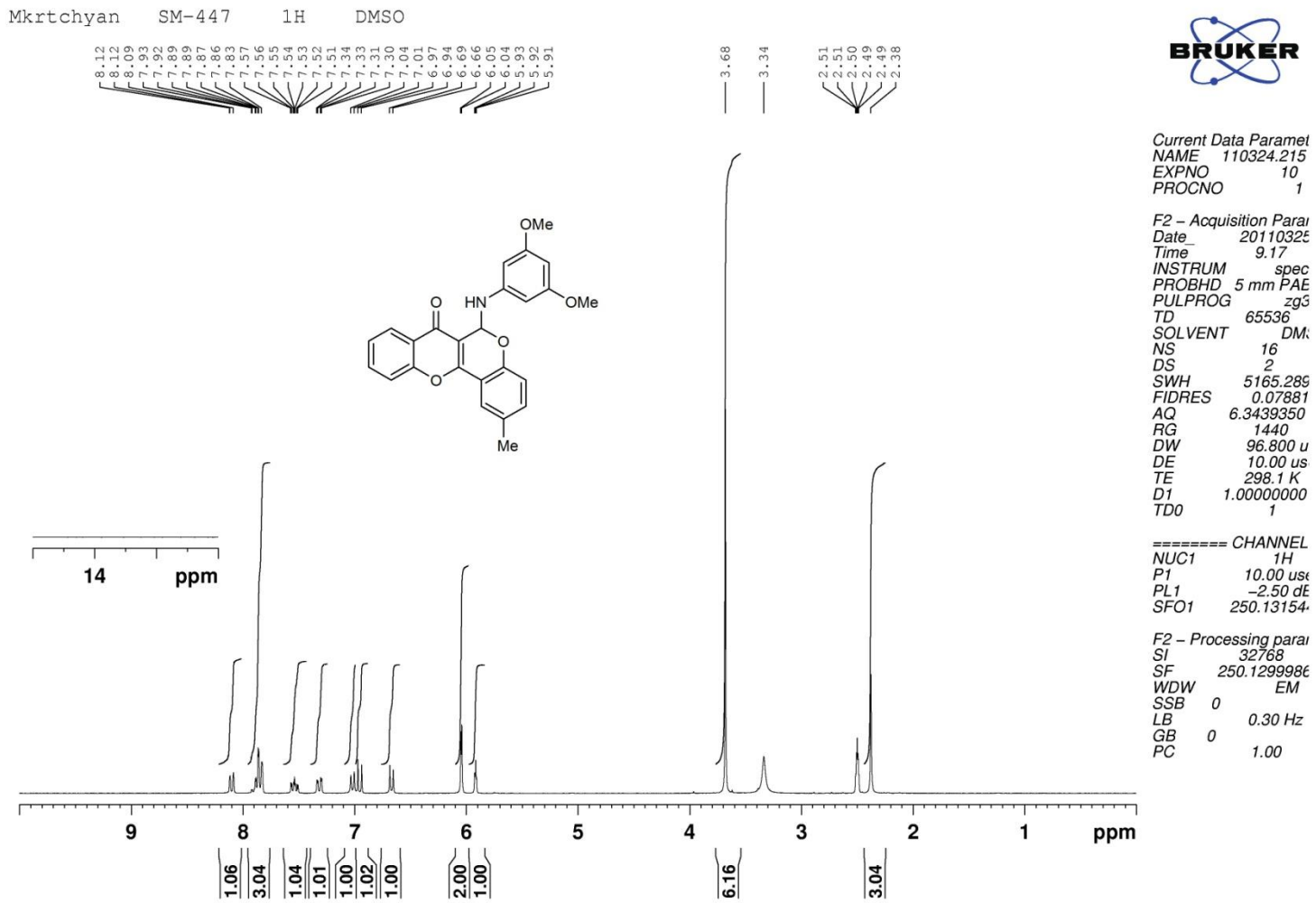
Compound 5l


Mkrtchyan SM450 13C DMSO
172.82
160.92
157.03
155.24
154.62
152.30
151.55
139.07
133.85
124.95
124.84
123.84
122.60
122.21
121.72
121.30
121.16
118.40
115.42
114.55
114.52
109.96
109.81
109.59
78.30
55.25
OMe
HN
O
F
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Paramete
NAME 110404.207 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20110405
Time 0.10
INSTRUM spect
PROBHD 5 mm PABI
PULPROG zgpg3
TD 65536
SOLVENT DMS
NS 1600
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.2 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL f
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528
======== CHANNEL f
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing param
SI 32768
SF 62.8952692 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

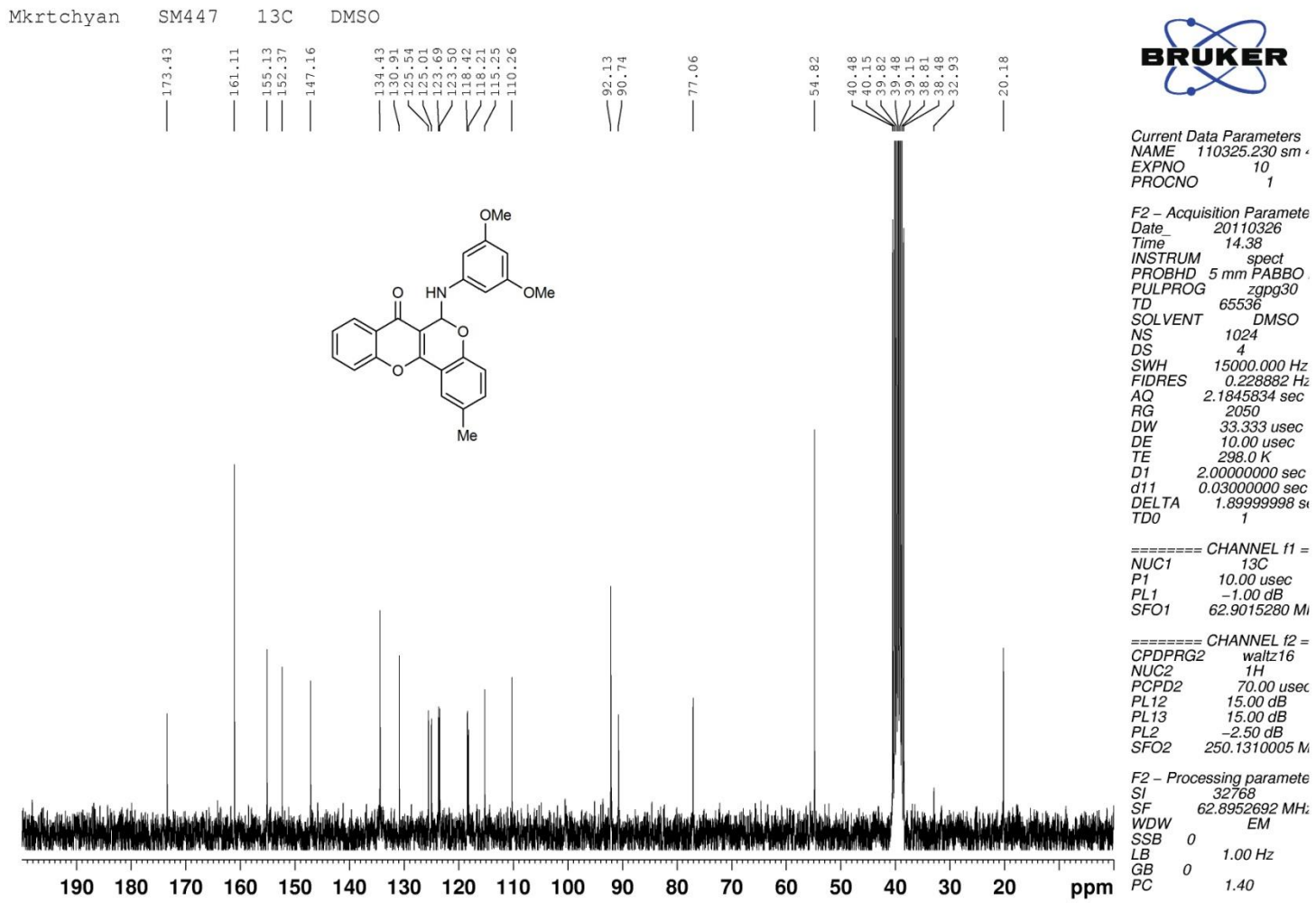
Compound 5m


Mkrtchyan SM446 1H DMSO
8.11
8.09
7.91
7.91
7.89
7.88
7.86
7.83
7.56
7.56
7.54
7.52
7.51
7.33
7.32
7.30
7.29
6.95
6.92
6.83
6.80
6.76
6.73
6.66
6.64
6.46
6.44
3.69
3.67
3.33
2.50
2.38
OMe
OMe
HN
O
O
O
Me
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.03
3.01
1.02
1.01
1.01
2.03
1.02
2.01
6.06
3.00
BRUKER
Current Data Parame
NAME 110324.u32
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2011032
Time 14.21
INSTRUM spec
PROBHD 5 mm PAE
PULPROG zg
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 6188.11
FIDRES 0.0944
AQ 5.2953587
RG 144
DW 80.800 u
DE 10.00 us
TE 298.2 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 us
PL1 0 dB
PL1W 11.253251
SFO1 300.13185
F2 – Processing para
SI 32768
SF 300.130006
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

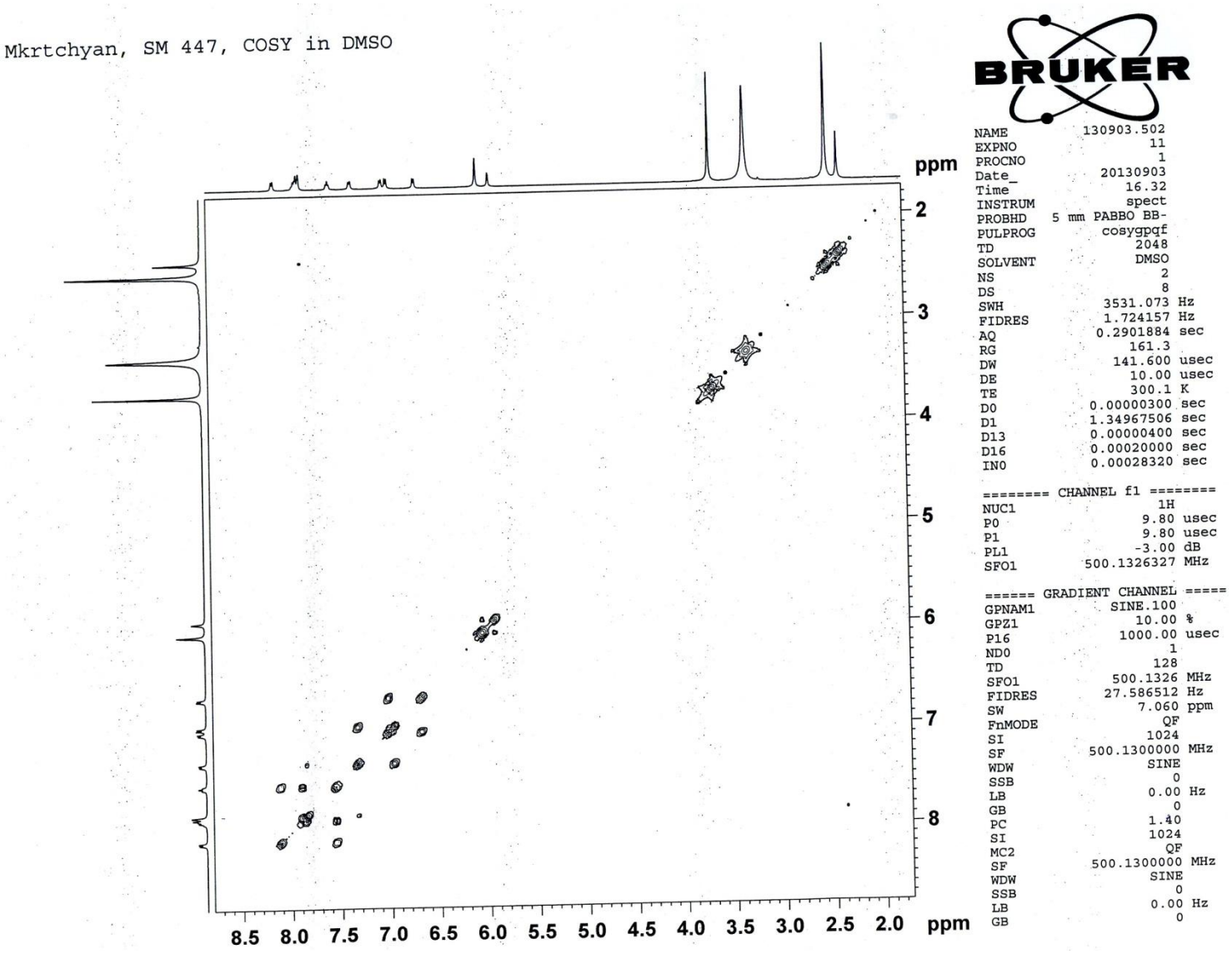
Compound 5n


Mkrtchyan SM-447 1H DMSO
8.12 8.12 8.09 7.93 7.92 7.89 7.89 7.87 7.86 7.83 7.57 7.56 7.55 7.54 7.53 7.52 7.51 7.34 7.33 7.31 7.30 7.04 7.01 6.97 6.94 6.69 6.66 6.05 6.04 5.93 5.92 5.91
3.68 3.34
2.51 2.51 2.50 2.49 2.49 2.38
OMe
HN
OMe
O
O
O
Me
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.06 3.04 1.04 1.01 1.00 1.02 1.00 2.00 1.00 6.16 3.04
BRUKER
Current Data Paramet
NAME 110324.215
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2011032
Time 9.17
INSTRUM spec
PROBHD 5 mm PAE
PULPROG zg3
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 5165.28
FIDRES 0.0788
AQ 6.3439350
RG 1440
DW 96.800 u
DE 10.00 us
TE 298.1 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 us
PL1 –2.50 dB
SFO1 250.1315
F2 – Processing para
SI 32768
SF 250.129998
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

Compound 5n


Mkrtchyan SM447 13C DMSO
173.43
161.11
155.13
152.37
147.16
134.43
130.91
125.54
125.01
123.69
123.50
118.42
118.21
115.25
110.26
92.13
90.74
77.06
54.82
40.48
40.15
39.82
39.48
39.15
38.81
38.48
32.93
20.18
OMe
HN
OMe
O
O
O
Me
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 110325.230 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramete
Date_ 20110326
Time 14.38
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 1024
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 s
TD0 1
======== CHANNEL f1 =
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280 M
======== CHANNEL f2 =
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 M
F2 – Processing paramete
SI 32768
SF 62.8952692 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

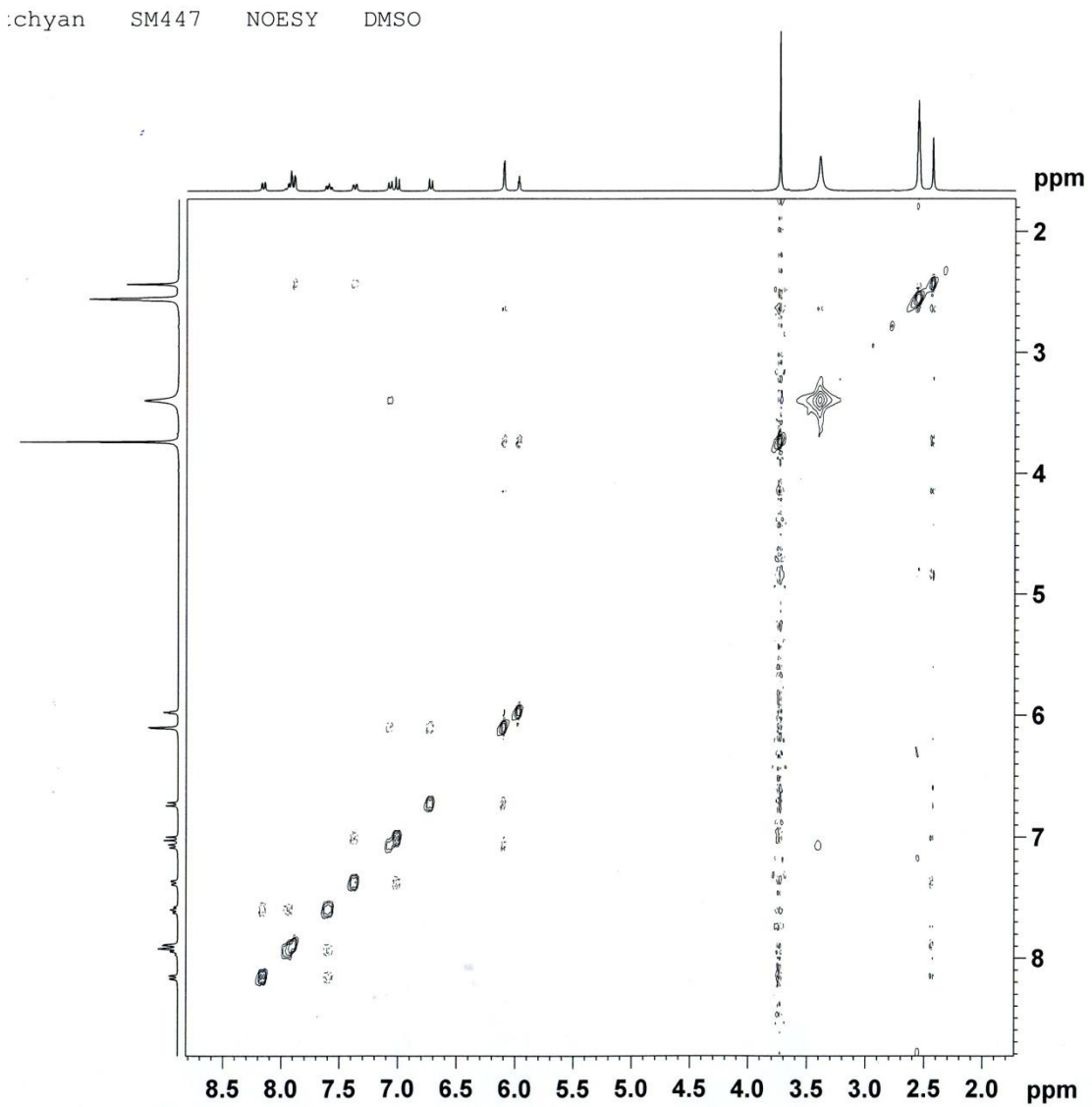
Compound 5n



BRUKER

NAME	130903.502
EXPNO	11
PROCNO	1
Date_	20130903
Time	16.32
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	cosygpqf
TD	2048
SOLVENT	DMSO
NS	2
DS	8
SWH	3531.073 Hz
FIDRES	1.724157 Hz
AQ	0.2901884 sec
RG	161.3
DW	141.600 usec
DE	10.00 usec
TE	300.1 K
D0	0.00000300 sec
D1	1.34967506 sec
D13	0.00000400 sec
D16	0.00020000 sec
IN0	0.00028320 sec
======== CHANNEL f1 ========	
NUC1	1H
P0	9.80 usec
P1	9.80 usec
PL1	-3.00 dB
SFO1	500.1326327 MHz
====== GRADIENT CHANNEL =====	
GPNAM1	SINE.100
GPZ1	10.00 %
P16	1000.00 usec
ND0	1
TD	128
SFO1	500.1326 MHz
FIDRES	27.586512 Hz
SW	7.060 ppm
FnMODE	QF
SI	1024
SF	500.1300000 MHz
WDW	SINE
SSB	0
LB	0.00 Hz
GB	0
PC	1.40
SI	1024
MC2	QF
SF	500.1300000 MHz
WDW	SINE
SSB	0
LB	0.00 Hz
GB	0

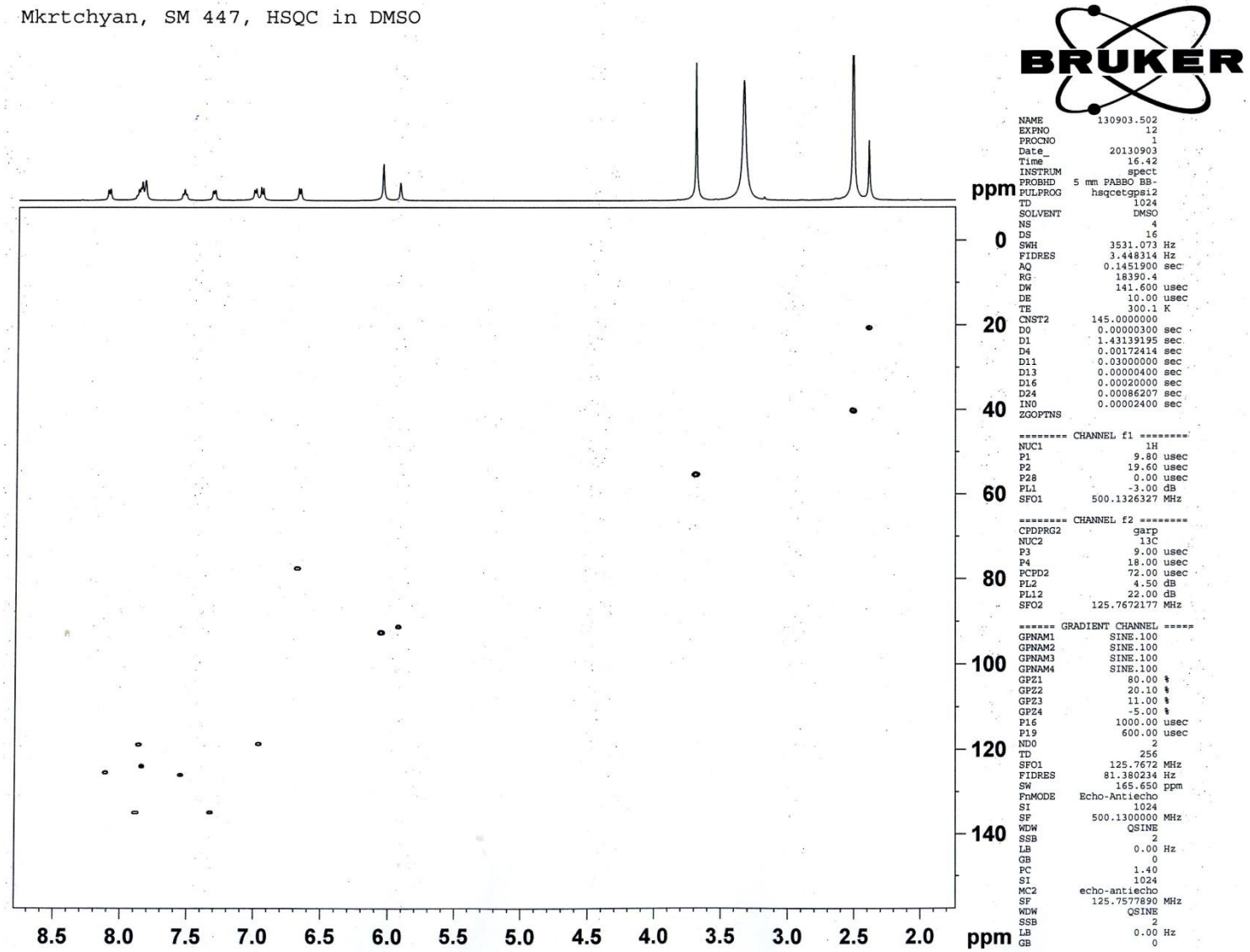
Compound 5n



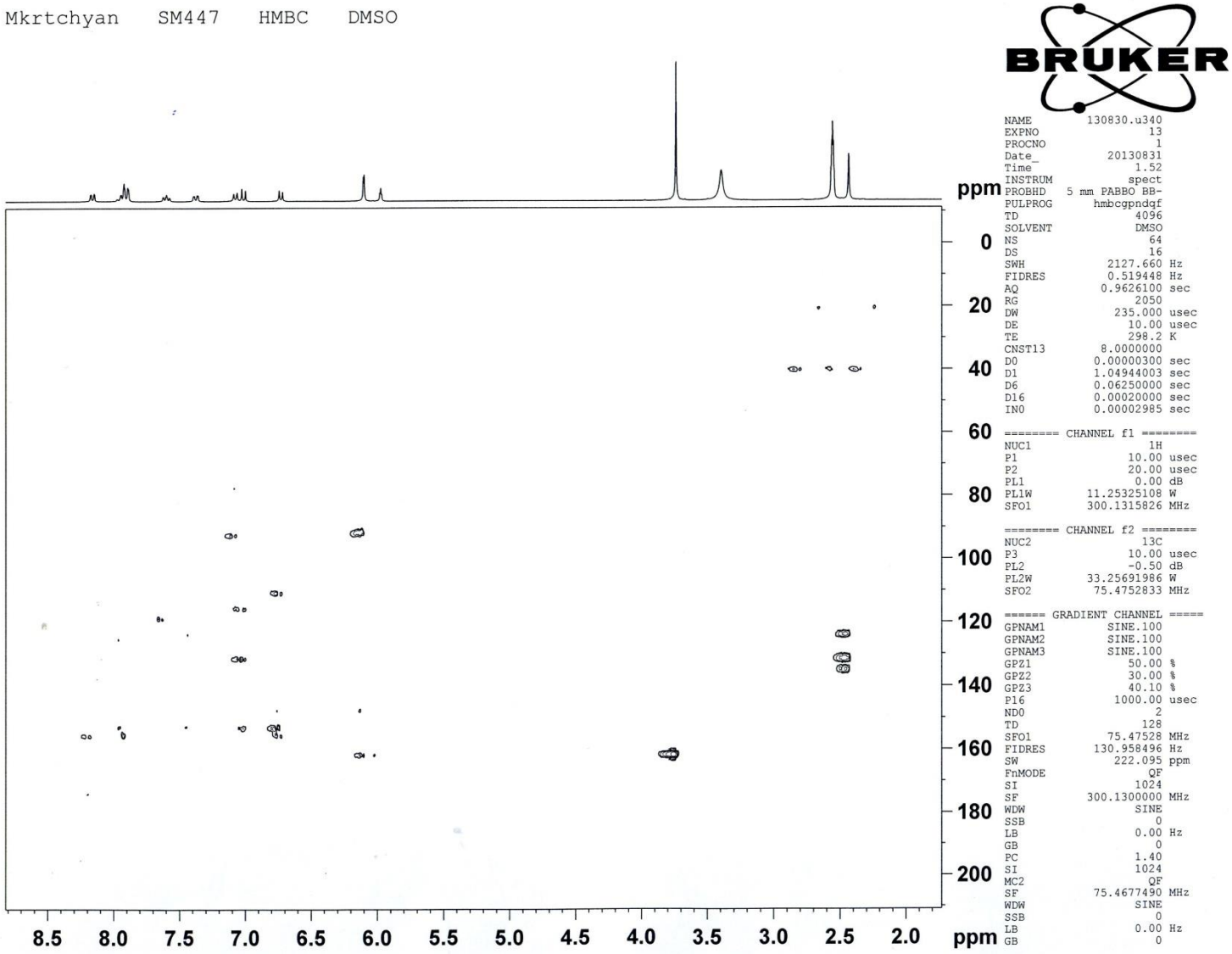
BRUKER

NAME	130830.u340	
EXPNO	14	
PROCNO	1	
Date_	20130831	
Time	6.36	
INSTRUM	spect	
PROBHD	5 mm PABBO BB-	
PULPROG	noesyph	
TD	2048	
SOLVENT	DMSO	
NS	16	
DS	4	
SWH	2127.660	Hz
FIDRES	1.038896	Hz
AQ	0.4813300	sec
RG	64	
DW	235.000	usec
DE	10.00	usec
TE	298.2	K
D0	0.00022227	sec
D1	1.85295296	sec
D8	1.50000000	sec
IN0	0.00047000	sec
======== CHANNEL f1 ========		
NUC1	1H	
P1	10.00	usec
PL1	0.00	dB
PL1W	11.25325108	W
SFO1	300.1315826	MHz
ND0	1	
TD	256	
SFO1	300.1316	MHz
FIDRES	8.311171	Hz
SW	7.089	ppm
FnMODE	States-TPPI	
SI	1024	
SF	300.1300000	MHz
WDW	QSINE	
SSB	2	
LB	0.00	Hz
GB	0	
PC	1.00	
SI	1024	
MC2	States-TPPI	
SF	300.1300000	MHz
WDW	QSINE	
SSB	2	
LB	0.00	Hz
GB	0	

Compound 5n


Mkrtchyan, SM 447, HSQC in DMSO
BRUKER
ppm
0
20
40
60
80
100
120
140
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
ppm
NAME 130903.502
EXPNO 12
PROCNO 1
Date_ 20130903
Time 16.42
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG hsqcetgpsi2
TD 1024
SOLVENT DMSO
NS 4
DS 16
SWH 3531.073 Hz
FIDRES 3.448314 Hz
AQ 0.1451900 sec
RG 18390.4
DW 141.600 usec
DE 10.00 usec
TE 300.1 K
CNST2 145.0000000
D0 0.00000300 sec
D1 1.43139195 sec
D4 0.00172414 sec
D11 0.03000000 sec
D13 0.00000400 sec
D16 0.00020000 sec
D24 0.00086207 sec
IN0 0.00002400 sec
ZGOPTNS
======== CHANNEL f1 ========
NUC1 1H
P1 9.80 usec
P2 19.60 usec
P28 0.00 usec
PL1 -3.00 dB
SFO1 500.1326327 MHz
======== CHANNEL f2 ========
CPDPRG2 garp
NUC2 13C
P3 9.00 usec
P4 18.00 usec
PCPD2 72.00 usec
PL2 4.50 dB
PL12 22.00 dB
SFO2 125.7672177 MHz
====== GRADIENT CHANNEL =====
GPNAM1 SINE.100
GPNAM2 SINE.100
GPNAM3 SINE.100
GPNAM4 SINE.100
GPZ1 80.00 %
GPZ2 20.10 %
GPZ3 11.00 %
GPZ4 -5.00 %
P16 1000.00 usec
P19 600.00 usec
ND0 2
TD 256
SFO1 125.7672 MHz
FIDRES 81.380234 Hz
SW 165.650 ppm
FnMODE Echo-Antiecho
SI 1024
SF 500.1300000 MHz
WDW QSINE
SSB 2
LB 0.00 Hz
GB 0
PC 1.40
SI 1024
MC2 echo-antiecho
SF 125.7577890 MHz
WDW QSINE
SSB 2
LB 0.00 Hz
GB 0

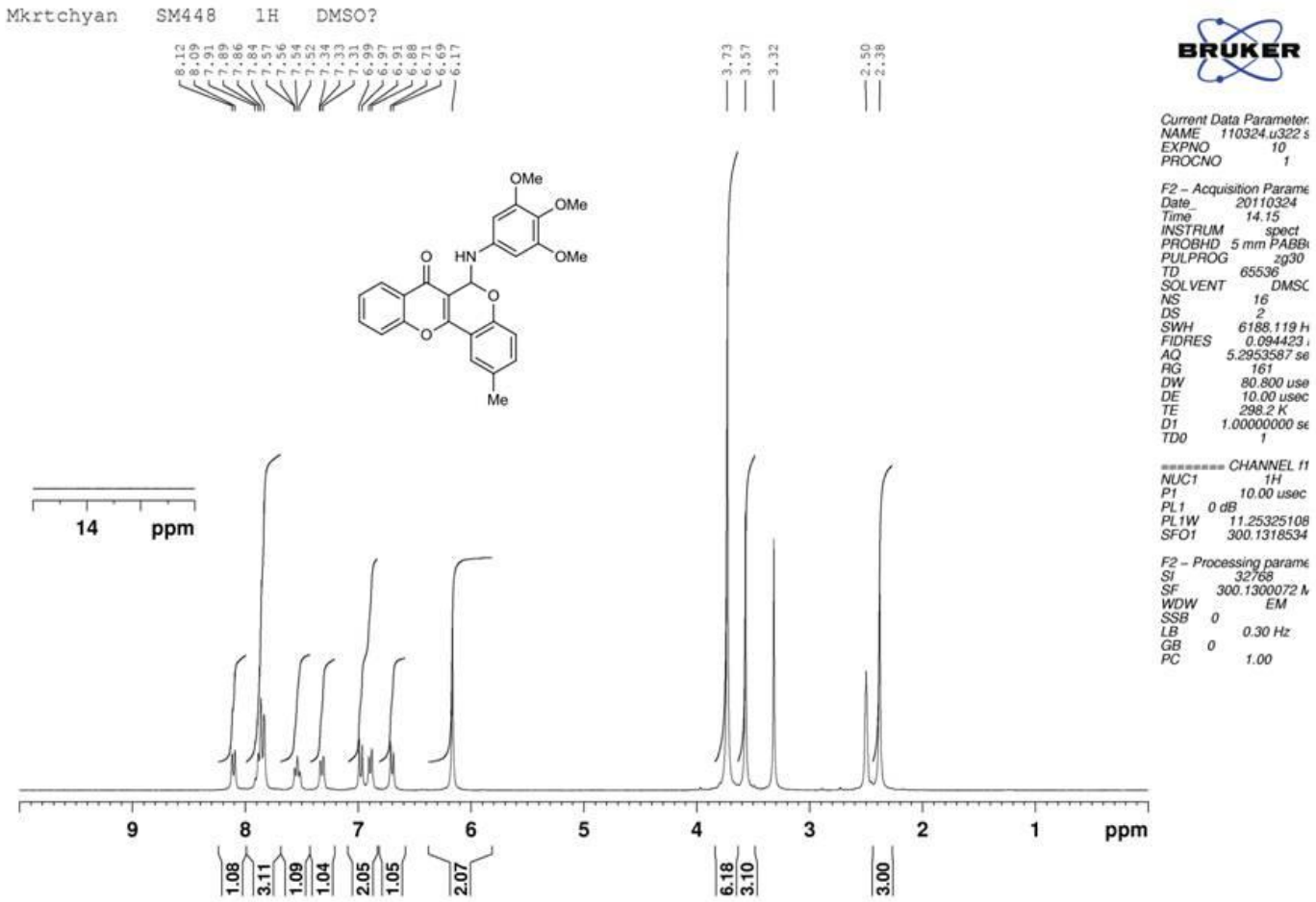
Compound 5n



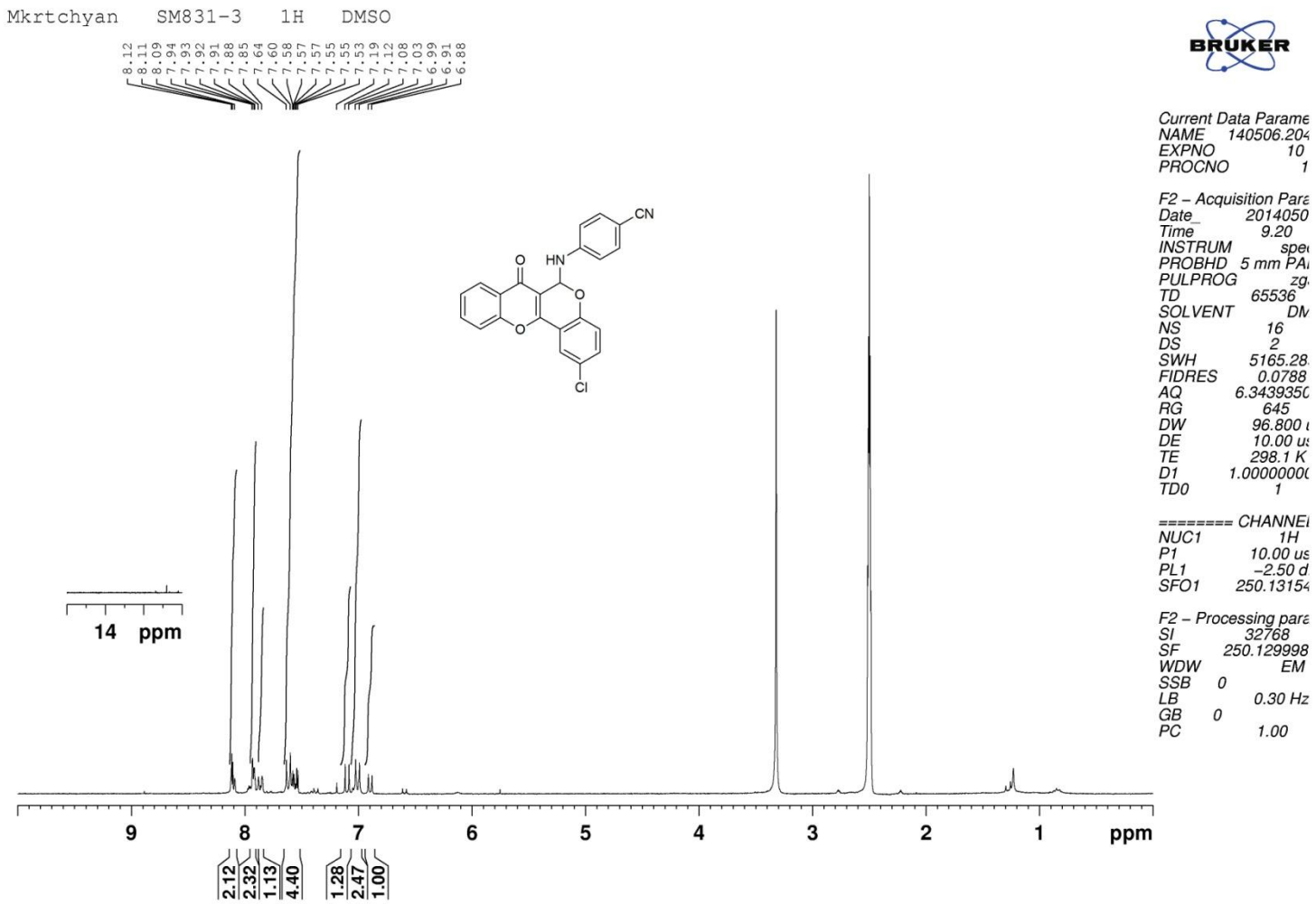
BRUKER

NAME	130830.u340
EXPNO	13
PROCNO	1
Date_	20130831
Time	1.52
INSTRUM	spect
PROBHD	5 mm PABBO BB-
PULPROG	hmbcgpndqf
TD	4096
SOLVENT	DMSO
NS	64
DS	16
SWH	2127.660 Hz
FIDRES	0.519448 Hz
AQ	0.9626100 sec
RG	2050
DW	235.000 usec
DE	10.00 usec
TE	298.2 K
CNST13	8.0000000
D0	0.00000300 sec
D1	1.04944003 sec
D6	0.06250000 sec
D16	0.00020000 sec
IN0	0.00002985 sec
======== CHANNEL f1 ========	
NUC1	1H
P1	10.00 usec
P2	20.00 usec
PL1	0.00 dB
PL1W	11.25325108 W
SFO1	300.1315826 MHz
======== CHANNEL f2 ========	
NUC2	13C
P3	10.00 usec
PL2	-0.50 dB
PL2W	33.25691986 W
SFO2	75.4752833 MHz
====== GRADIENT CHANNEL =====	
GPNAM1	SINE.100
GPNAM2	SINE.100
GPNAM3	SINE.100
GPZ1	50.00 %
GPZ2	30.00 %
GPZ3	40.10 %
P16	1000.00 usec
ND0	2
TD	128
SFO1	75.47528 MHz
FIDRES	130.958496 Hz
SW	222.095 ppm
FnMODE	QF
SI	1024
SF	300.1300000 MHz
WDW	SINE
SSB	0
LB	0.00 Hz
GB	0
PC	1.40
SI	1024
MC2	QF
SF	75.4677490 MHz
WDW	SINE
SSB	0
LB	0.00 Hz
GB	0

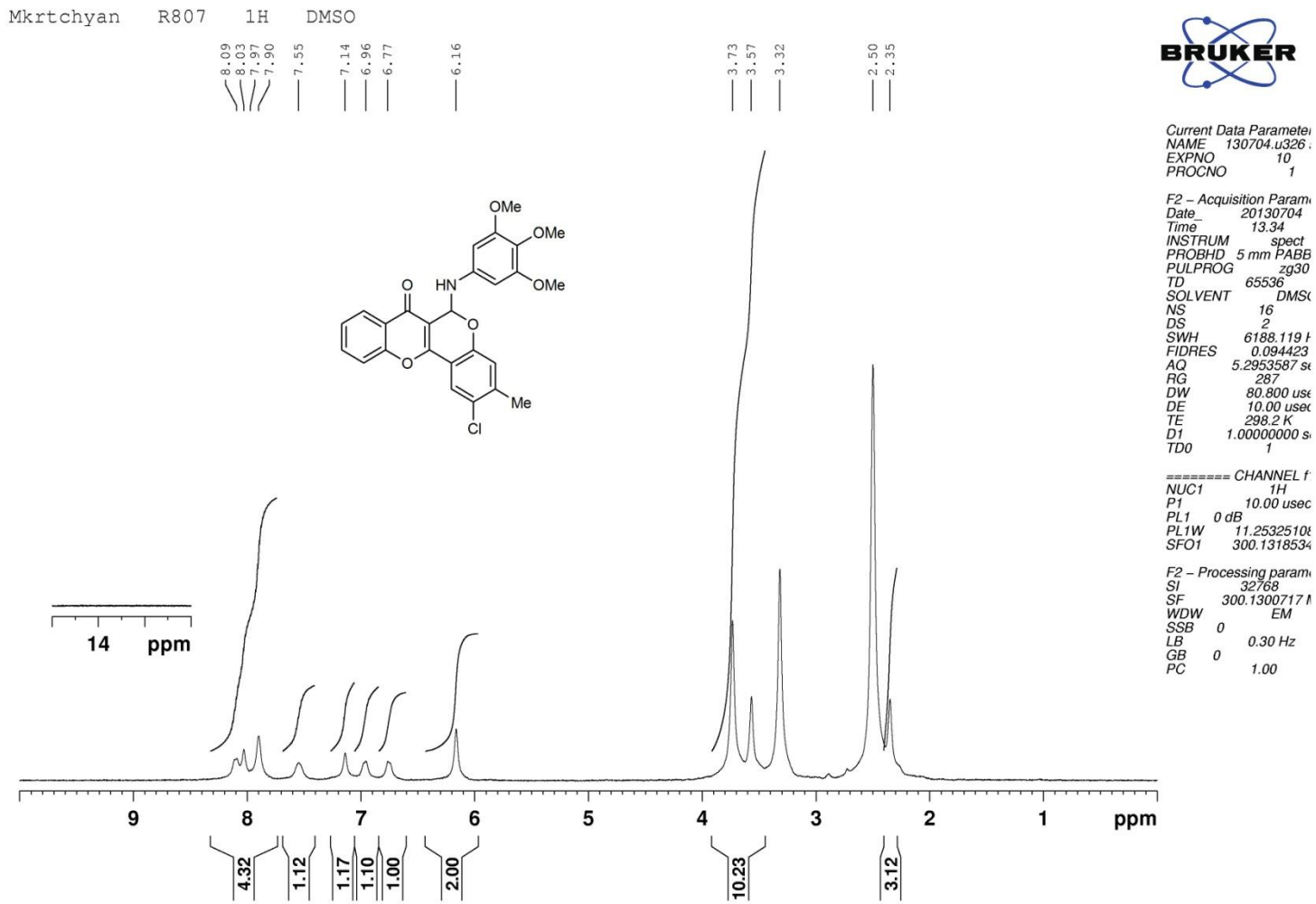
Compound 5o


Mkrtchyan SM448 1H DMSO?
8.12
8.09
7.91
7.89
7.86
7.84
7.57
7.56
7.54
7.52
7.34
7.33
7.31
6.99
6.97
6.91
6.88
6.71
6.69
6.17
3.73
3.57
3.32
2.50
2.38
OMe
OMe
OMe
HN
O
O
O
Me
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.08
3.11
1.09
1.04
2.05
1.05
2.07
6.18
3.10
3.00
BRUKER
Current Data Parameter
NAME 110324.u322 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110324
Time 14.15
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423
AQ 5.2953587 se
RG 161
DW 80.800 use
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing parame
SI 32768
SF 300.1300072 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

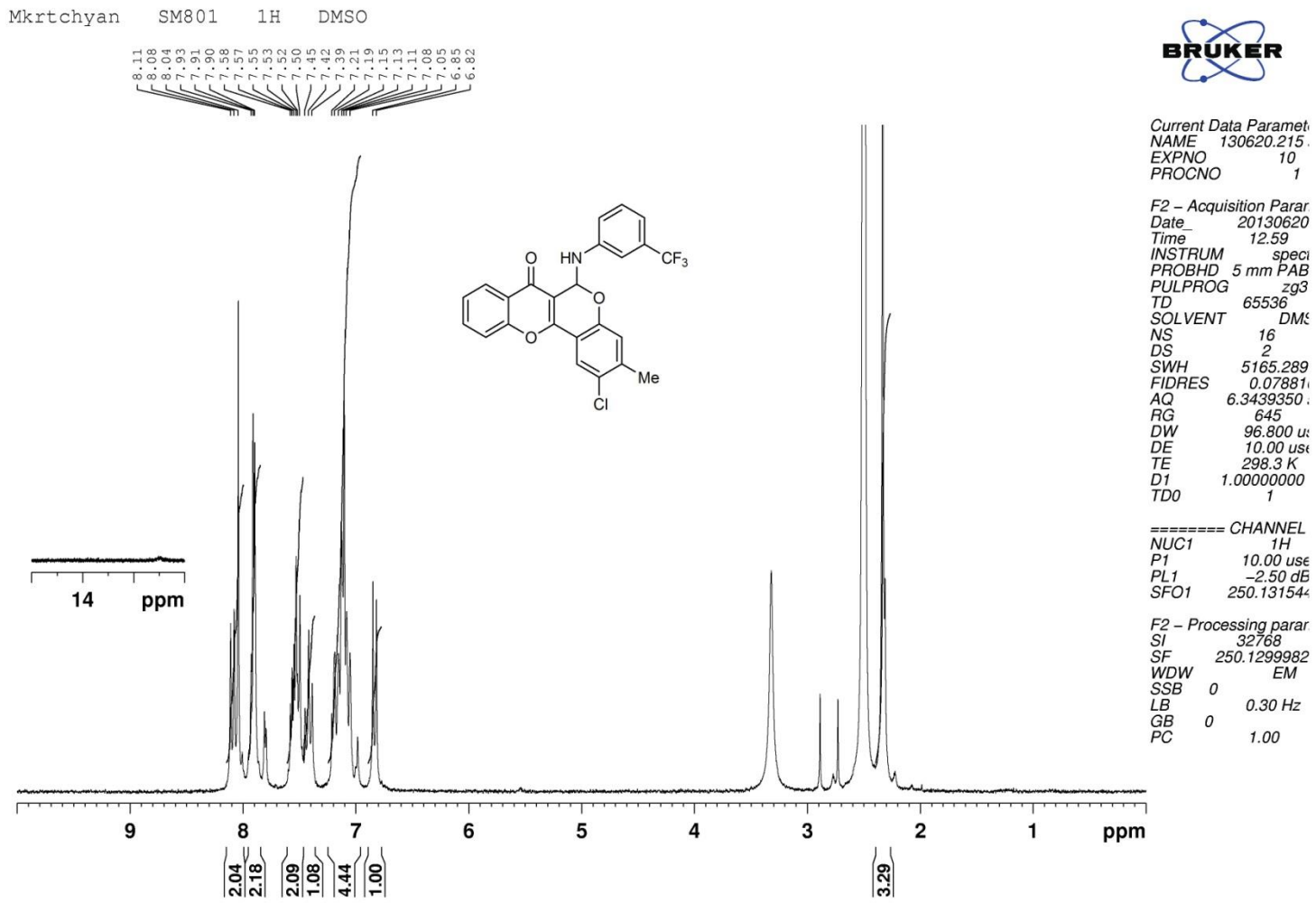
Compound 5p


Mkrtchyan SM831-3 1H DMSO
8.12
8.11
8.09
7.94
7.93
7.92
7.91
7.88
7.85
7.64
7.60
7.58
7.57
7.57
7.55
7.55
7.53
7.19
7.12
7.08
7.03
6.99
6.91
6.88
CN
HN
O
O
O
Cl
14 ppm
9
8
7
6
5
4
3
2
1
ppm
2.12
2.32
1.13
4.40
1.28
2.47
1.00
BRUKER
Current Data Parame
NAME 140506.204
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2014050
Time 9.20
INSTRUM spe
PROBHD 5 mm PA
PULPROG zg
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 5165.28
FIDRES 0.0788
AQ 6.3439350
RG 645
DW 96.800 u
DE 10.00 us
TE 298.1 K
D1 1.0000000
TD0 1
======== CHANNEl
NUC1 1H
P1 10.00 us
PL1 –2.50 d
SFO1 250.13154
F2 – Processing para
SI 32768
SF 250.129998
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

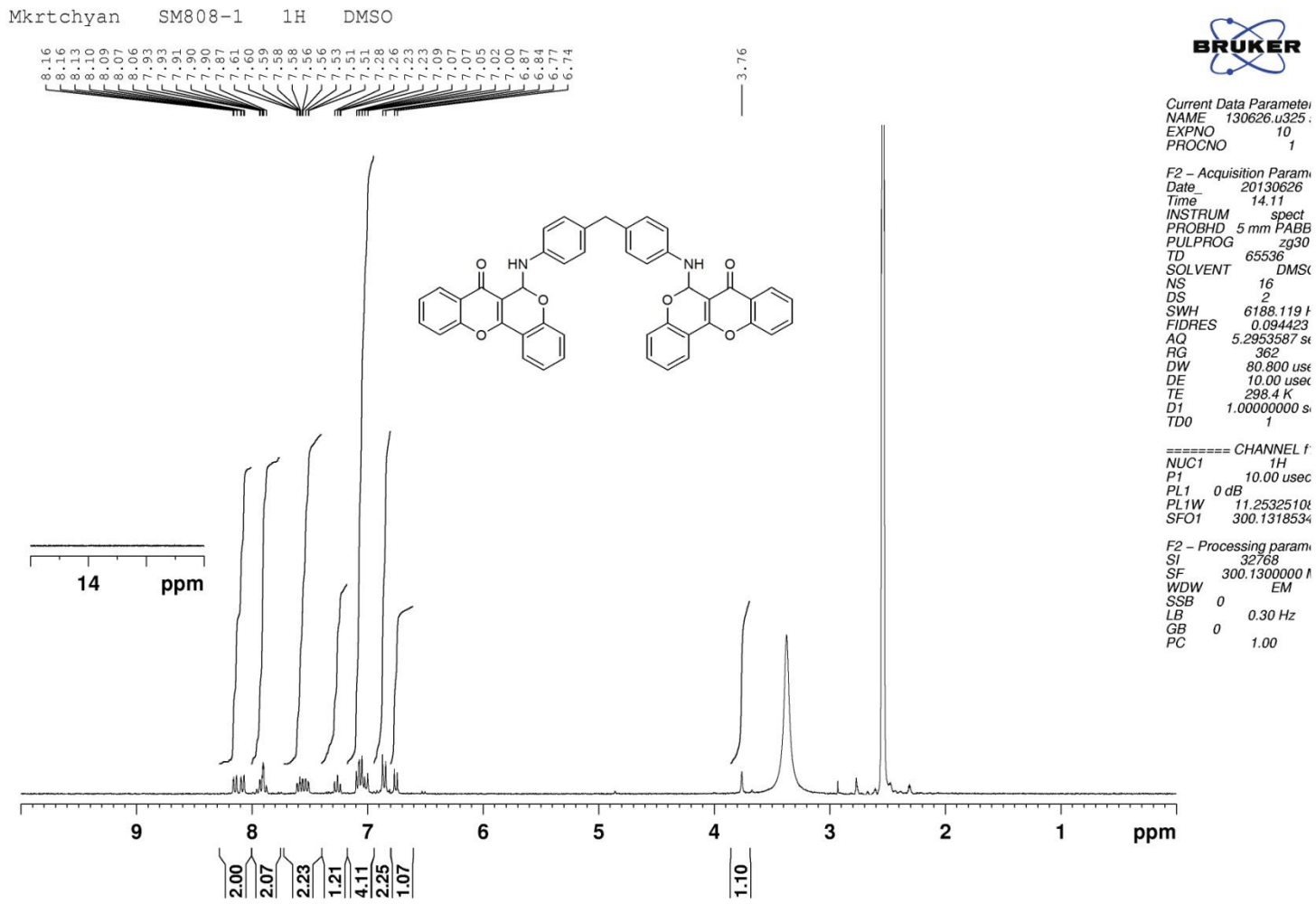
Compound 5q


Mkrtchyan R807 1H DMSO
8.09
8.03
7.97
7.90
7.55
7.14
6.96
6.77
6.16
3.73
3.57
3.32
2.50
2.35
OMe
OMe
OMe
HN
O
O
O
Me
Cl
14 ppm
9
8
7
6
5
4
3
2
1
ppm
4.32
1.12
1.17
1.10
1.00
2.00
10.23
3.12
BRUKER
Current Data Parameter
NAME 130704.u326
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130704
Time 13.34
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT DMS
NS 16
DS 2
SWH 6188.119
FIDRES 0.094423
AQ 5.2953587 s
RG 287
DW 80.800 us
DE 10.00 usec
TE 298.2 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.2532510
SFO1 300.1318534
F2 – Processing param
SI 32768
SF 300.1300717
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

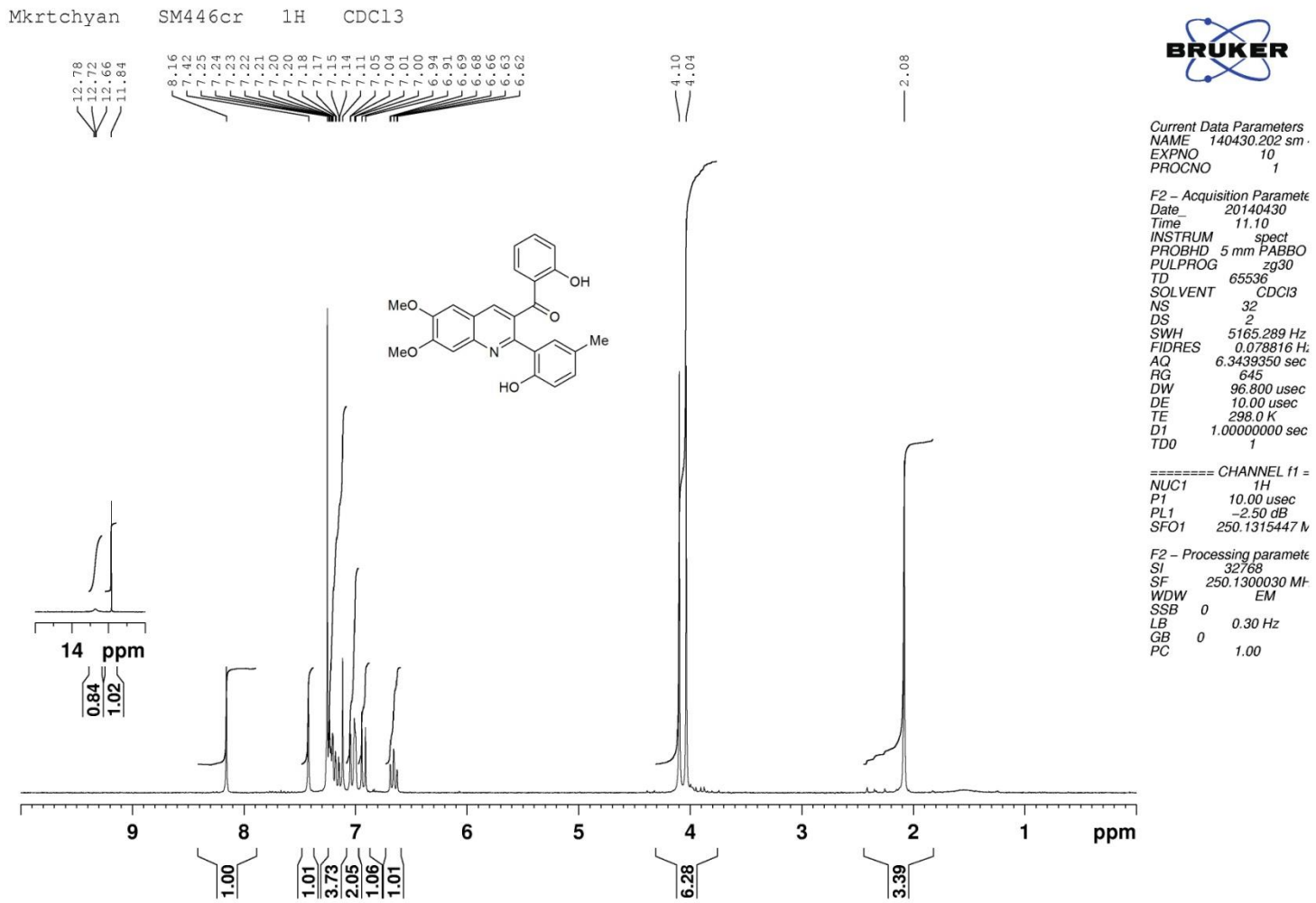
Compound 5r


Mkrtchyan SM801 1H DMSO
8.11
8.08
8.04
7.93
7.91
7.90
7.58
7.57
7.55
7.53
7.52
7.50
7.45
7.42
7.39
7.21
7.19
7.15
7.13
7.11
7.08
7.05
6.85
6.82
O
HN
CF3
O
O
Me
Cl
14 ppm
9
8
7
6
5
4
3
2
1
ppm
2.04
2.18
2.09
1.08
4.44
1.00
3.29
BRUKER
Current Data Paramet
NAME 130620.215
EXPNO 10
PROCNO 1
F2 – Acquisition Parar
Date_ 20130620
Time 12.59
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zg3
TD 65536
SOLVENT DM
NS 16
DS 2
SWH 5165.289
FIDRES 0.07881
AQ 6.3439350
RG 645
DW 96.800 u
DE 10.00 us
TE 298.3 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 us
PL1 –2.50 dB
SFO1 250.13154
F2 – Processing parar
SI 32768
SF 250.1299982
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

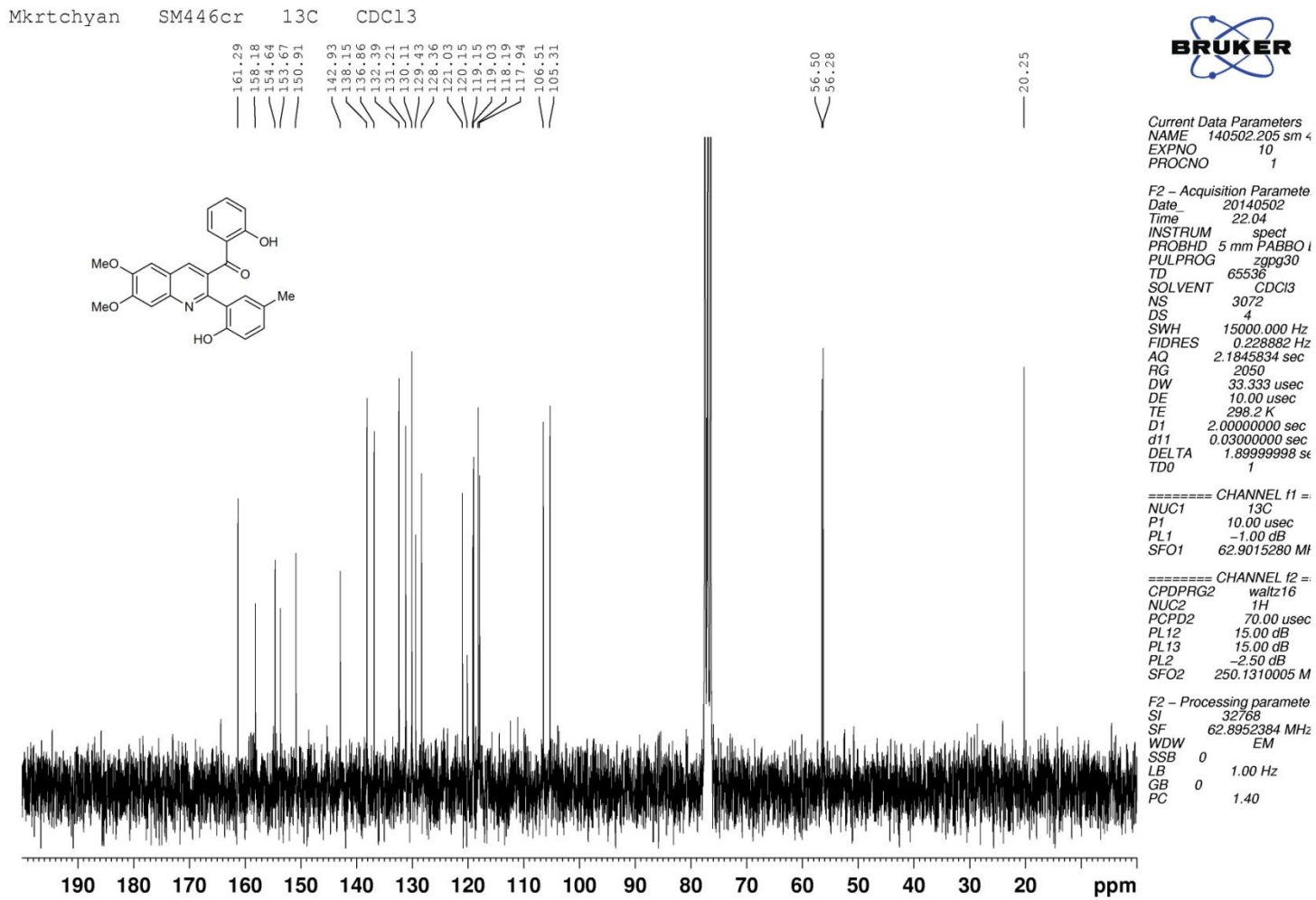
Compound 5s


Mkrtchyan SM808-1 1H DMSO
8.16 8.16 8.13 8.10 8.09 8.07 8.06 7.93 7.93 7.91 7.90 7.90 7.87 7.61 7.60 7.59 7.58 7.58 7.56 7.56 7.53 7.51 7.51 7.28 7.26 7.23 7.23 7.09 7.07 7.07 7.05 7.02 7.00 6.87 6.84 6.77 6.74
3.76
HN
NH
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
2.00 2.07 2.23 1.21 4.11 2.25 1.07
1.10
BRUKER
Current Data Parameter
NAME 130626.u325
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20130626
Time 14.11
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zg30
TD 65536
SOLVENT DMS
NS 16
DS 2
SWH 6188.119
FIDRES 0.094423
AQ 5.2953587 s
RG 362
DW 80.800 us
DE 10.00 usec
TE 298.4 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.2532510
SFO1 300.1318534
F2 – Processing param
SI 32768
SF 300.1300000
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

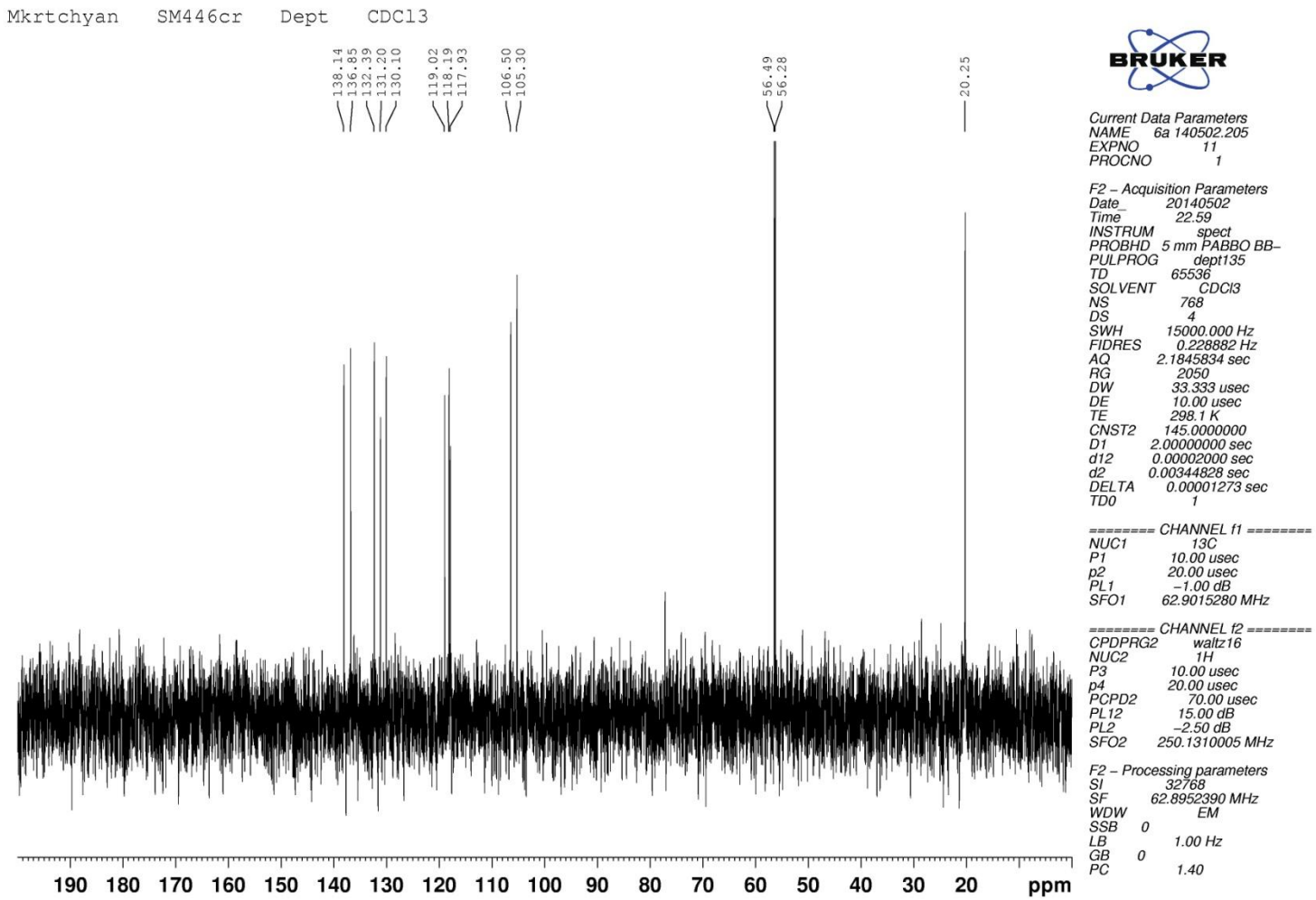
Compound 6a


Mkrtchyan SM446cr 1H CDCl3
12.78
12.72
12.66
11.84
8.16
7.42
7.25
7.24
7.23
7.22
7.21
7.20
7.20
7.18
7.17
7.15
7.14
7.11
7.05
7.04
7.01
7.00
6.94
6.91
6.69
6.68
6.66
6.63
6.62
4.10
4.04
2.08
MeO
MeO
OH
O
N
Me
HO
14 ppm
0.84
1.02
9
8
7
6
5
4
3
2
1
ppm
1.00
1.01
3.73
2.05
1.06
1.01
6.28
3.39
BRUKER
Current Data Parameters
NAME 140430.202 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20140430
Time 11.10
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 32
DS 2
SWH 5165.289 Hz
FIDRES 0.078816 Hz
AQ 6.3439350 sec
RG 645
DW 96.800 usec
DE 10.00 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 =
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.1315447 M
F2 – Processing parameter
SI 32768
SF 250.1300030 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

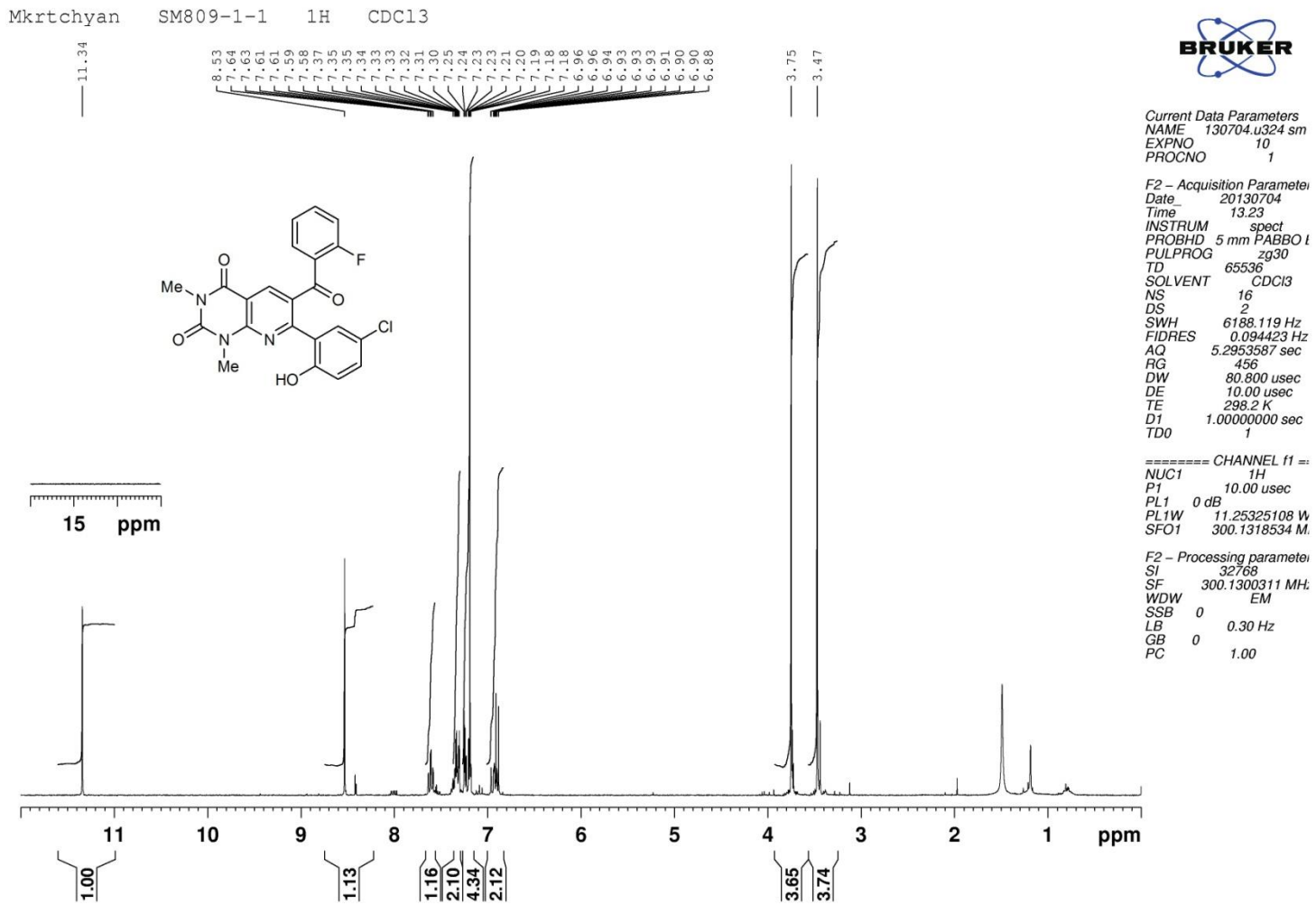
Compound 6a


Mkrtchyan SM446cr 13C CDCl3
161.29
158.18
154.64
153.67
150.91
142.93
138.15
136.86
132.39
131.21
130.11
129.43
128.36
121.03
120.15
119.15
119.03
118.19
117.94
106.51
105.31
56.50
56.28
20.25
OH
MeO
MeO
O
N
Me
HO
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Parameters
NAME 140502.205 sm 4
EXPNO 10
PROCNO 1
F2 – Acquisition Paramete
Date_ 20140502
Time 22.04
INSTRUM spect
PROBHD 5 mm PABBO I
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 3072
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.2 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 se
TD0 1
======== CHANNEL f1 =
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MH
======== CHANNEL f2 =
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 M
F2 – Processing paramete
SI 32768
SF 62.8952384 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

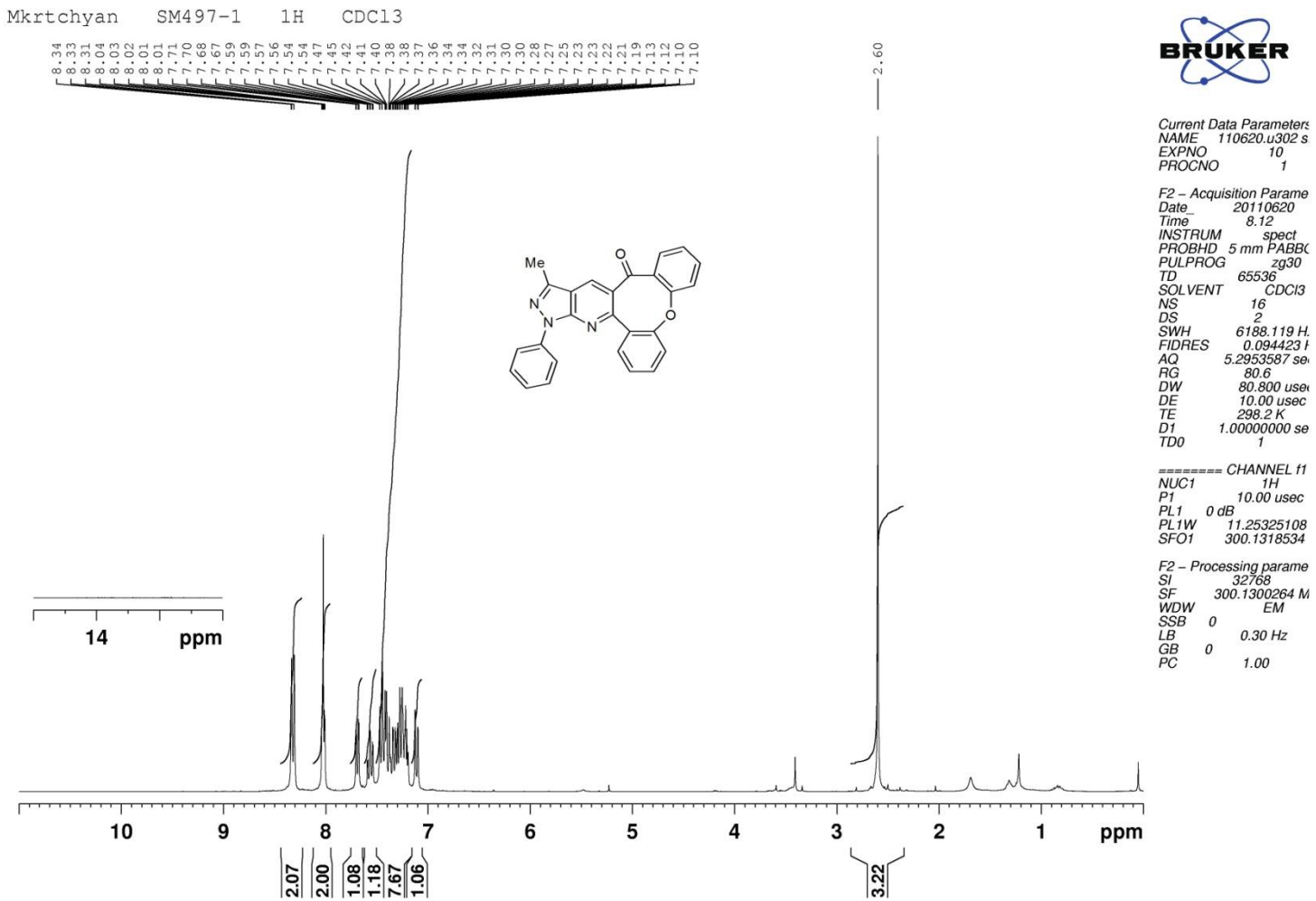
Compound 6a


Mkrtchyan SM446cr Dept CDCl3
138.14
136.85
132.39
131.20
130.10
119.02
118.19
117.93
106.50
105.30
56.49
56.28
20.25
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Parameters
NAME 6a 140502.205
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140502
Time 22.59
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT CDCl3
NS 768
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.1 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

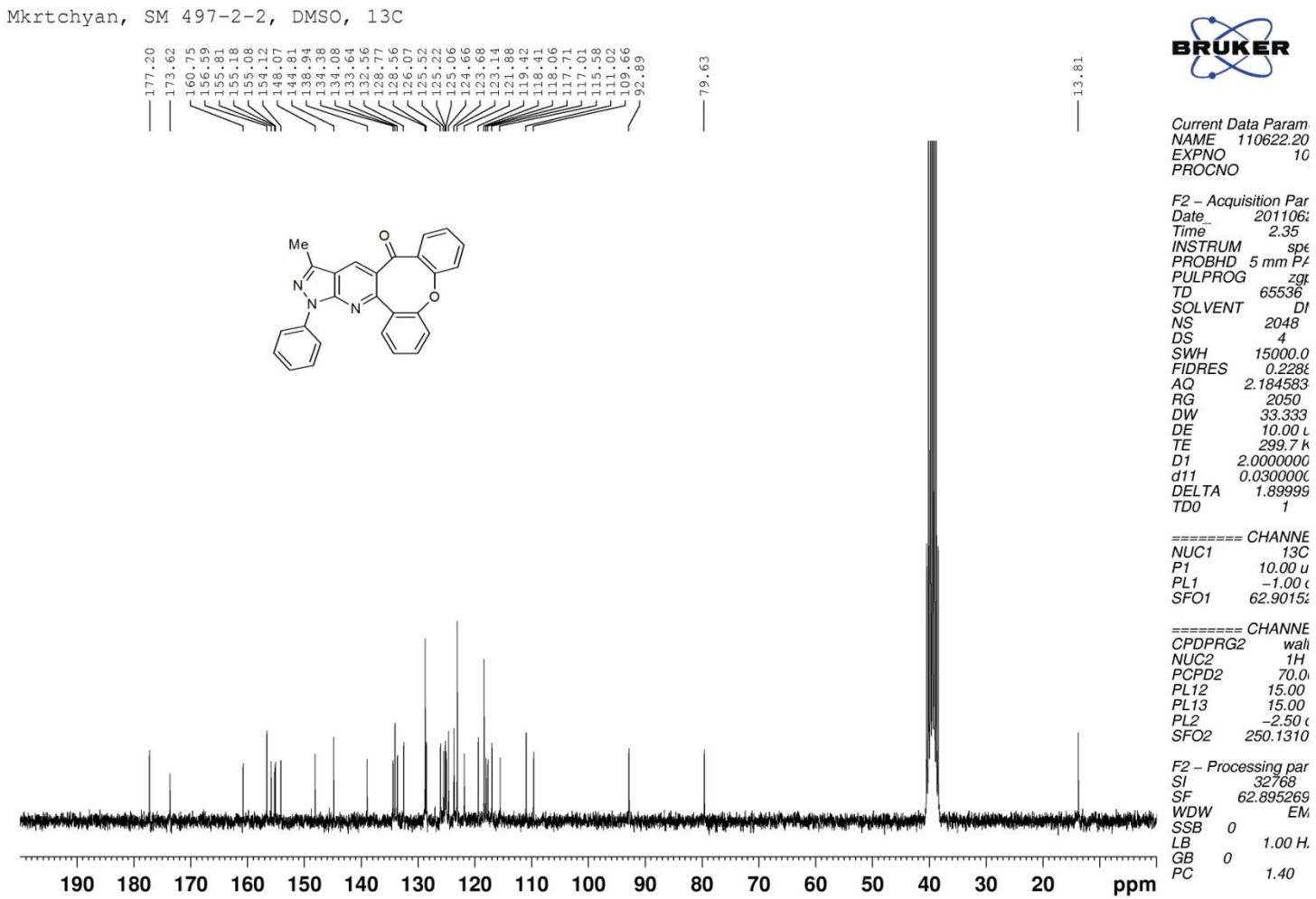
Compound 6b


Mkrtchyan SM809-1-1 1H CDCl3
11.34
8.53 7.64 7.63 7.61 7.61 7.59 7.58 7.37 7.35 7.35 7.34 7.33 7.33 7.32 7.31 7.30 7.25 7.24 7.23 7.23 7.21 7.20 7.19 7.18 7.18 6.96 6.96 6.94 6.93 6.93 6.93 6.91 6.90 6.90 6.88
3.75
3.47
Me
N
O
O
N
Me
N
O
F
Cl
HO
15 ppm
11 10 9 8 7 6 5 4 3 2 1 ppm
1.00 1.13 1.16 2.10 4.34 2.12 3.65 3.74
BRUKER
Current Data Parameters
NAME 130704.u324 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parameter
Date_ 20130704
Time 13.23
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 456
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing parameter
SI 32768
SF 300.1300311 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

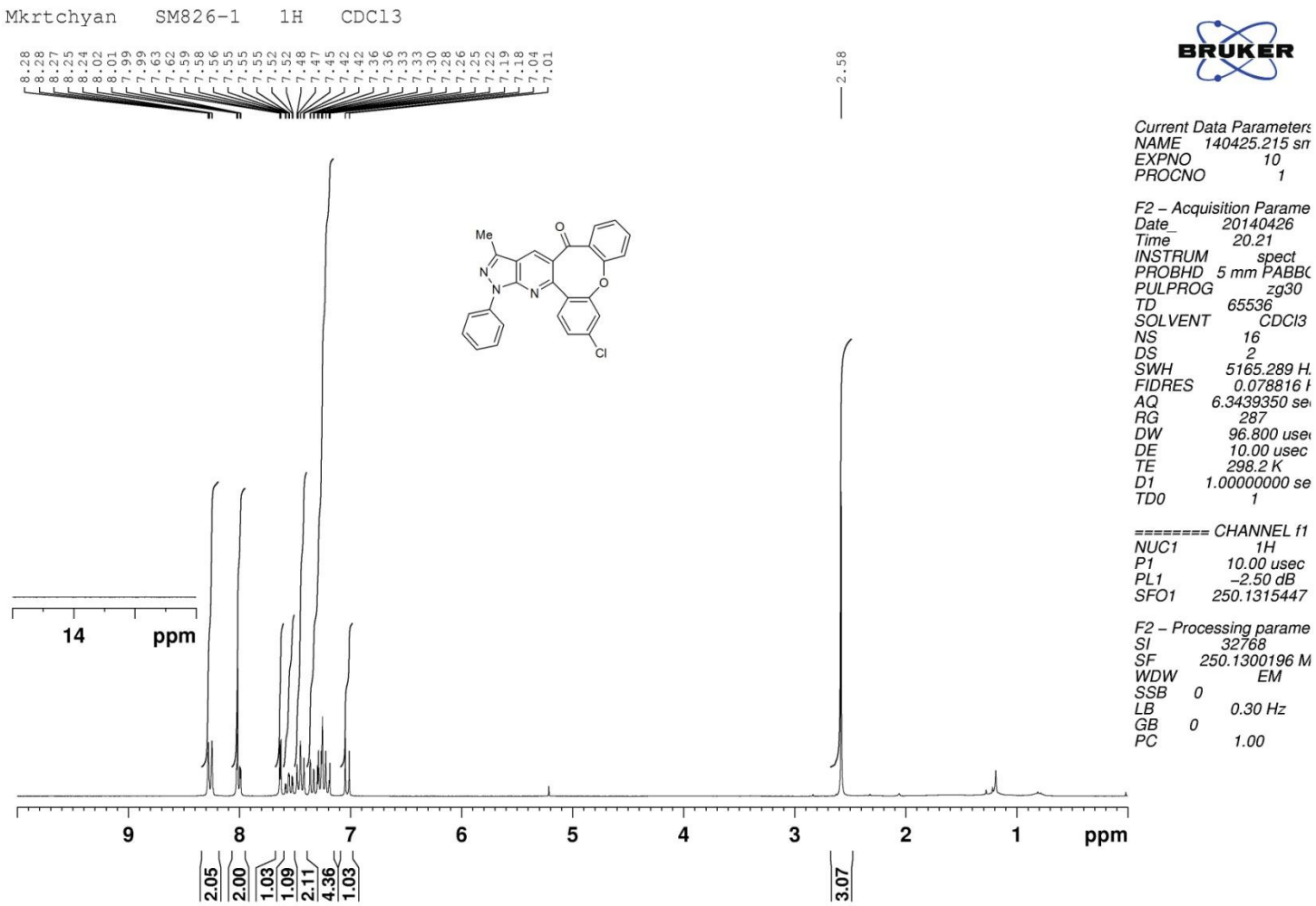
Compound 7a


Mkrtchyan SM497-1 1H CDCl3
8.34 8.33 8.31 8.04 8.03 8.02 8.01 8.01 7.71 7.70 7.68 7.67 7.59 7.59 7.57 7.56 7.54 7.54 7.47 7.45 7.42 7.41 7.40 7.38 7.38 7.37 7.36 7.34 7.34 7.32 7.31 7.30 7.30 7.28 7.27 7.25 7.23 7.23 7.22 7.21 7.19 7.13 7.12 7.10 7.10
2.60
Me
N
N
O
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
2.07 2.00 1.08 1.18 7.67 1.06
3.22
BRUKER
Current Data Parameters
NAME 110620.u302 s
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20110620
Time 8.12
INSTRUM spect
PROBHD 5 mm PABB(
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 H
FIDRES 0.094423 H
AQ 5.2953587 se
RG 80.6
DW 80.800 use
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108
SFO1 300.1318534
F2 – Processing parame
SI 32768
SF 300.1300264 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

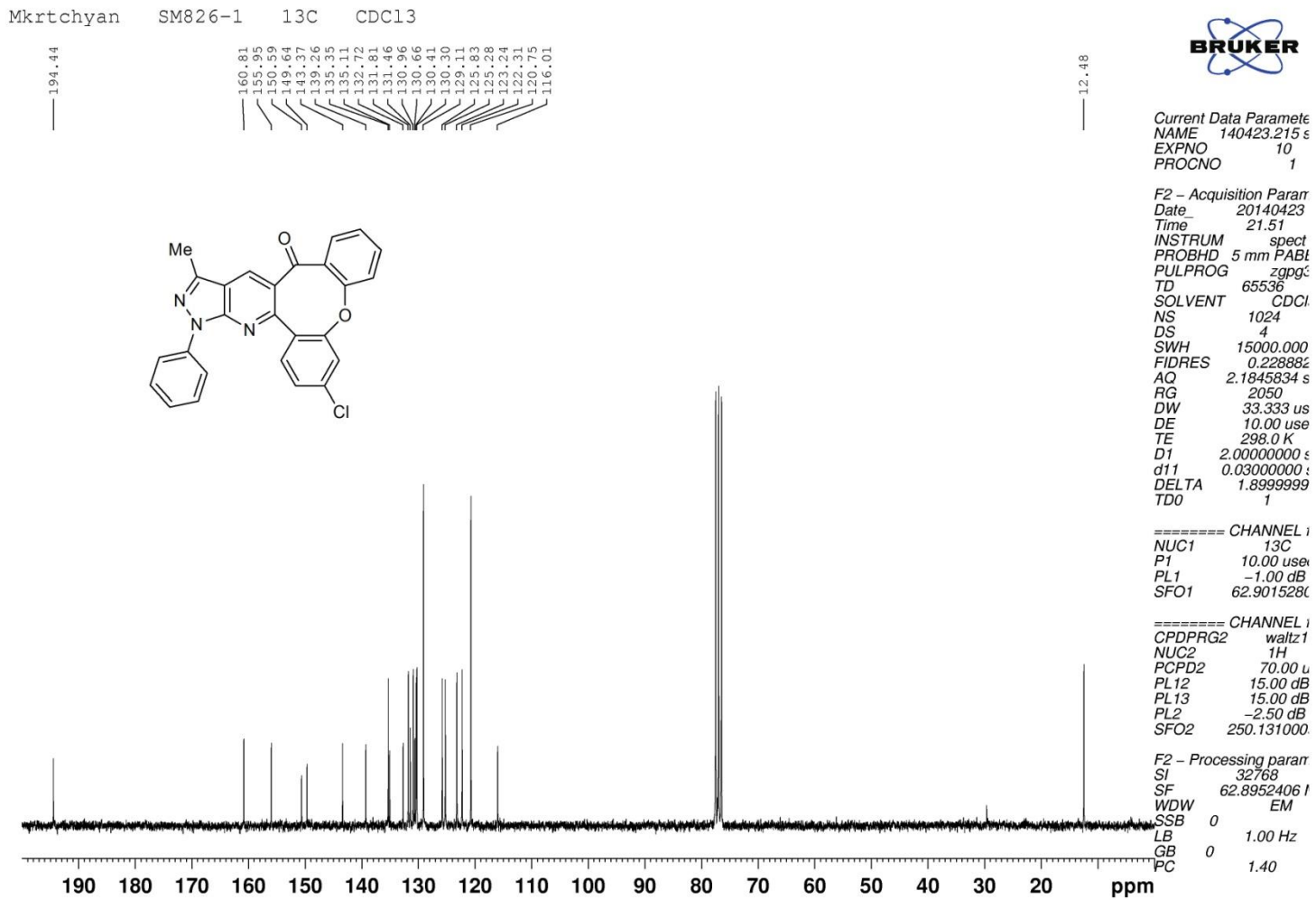
Compound 7a


Mkrtchyan, SM 497-2-2, DMSO, 13C
177.20
173.62
160.75
156.59
155.81
155.18
155.08
154.12
148.07
144.81
138.94
134.38
134.08
133.64
132.56
128.77
128.56
126.07
125.52
125.22
125.06
124.66
123.68
123.14
121.88
119.42
118.41
118.06
117.71
117.01
115.58
111.02
109.66
92.89
79.63
13.81
Me
O
N
N
N
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Param
NAME 110622.20
EXPNO 10
PROCNO
F2 – Acquisition Par
Date_ 2011062
Time 2.35
INSTRUM spe
PROBHD 5 mm PA
PULPROG zg
TD 65536
SOLVENT DI
NS 2048
DS 4
SWH 15000.0
FIDRES 0.2288
AQ 2.184583
RG 2050
DW 33.333
DE 10.00 u
TE 299.7 k
D1 2.0000000
d11 0.0300000
DELTA 1.89999
TD0 1
======== CHANNE
NUC1 13C
P1 10.00 u
PL1 –1.00 d
SFO1 62.9015
======== CHANNE
CPDPRG2 wali
NUC2 1H
PCPD2 70.0
PL12 15.00
PL13 15.00
PL2 –2.50 d
SFO2 250.1310
F2 – Processing par
SI 32768
SF 62.895269
WDW EM
SSB 0
LB 1.00 H
GB 0
PC 1.40

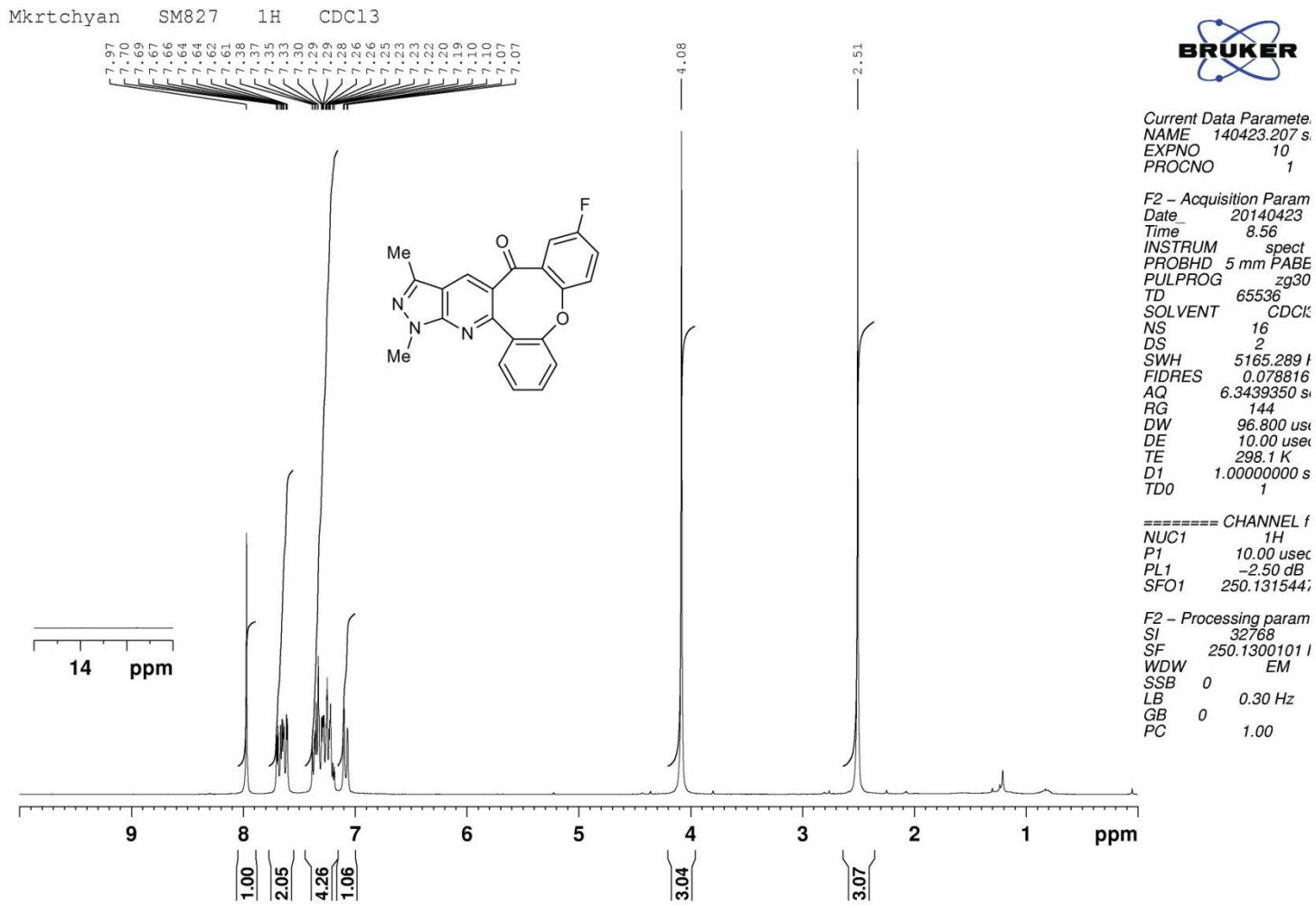
Compound 7b


Mkrtchyan SM826-1 1H CDCl3
8.28 8.28 8.27 8.25 8.24 8.02 8.01 7.99 7.99 7.63 7.62 7.59 7.58 7.56 7.55 7.55 7.55 7.52 7.52 7.48 7.47 7.45 7.42 7.42 7.36 7.36 7.33 7.33 7.30 7.28 7.26 7.25 7.22 7.19 7.18 7.04 7.01
2.58
Me
O
N
N
O
Cl
14 ppm
9 8 7 6 5 4 3 2 1 ppm
2.05 2.00 1.03 1.09 2.11 4.36 1.03
3.07
BRUKER
Current Data Parameters
NAME 140425.215 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20140426
Time 20.21
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 5165.289 H
FIDRES 0.078816 H
AQ 6.3439350 se
RG 287
DW 96.800 use
DE 10.00 usec
TE 298.2 K
D1 1.00000000 se
TD0 1
======== CHANNEL f1
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.1315447
F2 – Processing parame
SI 32768
SF 250.1300196 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

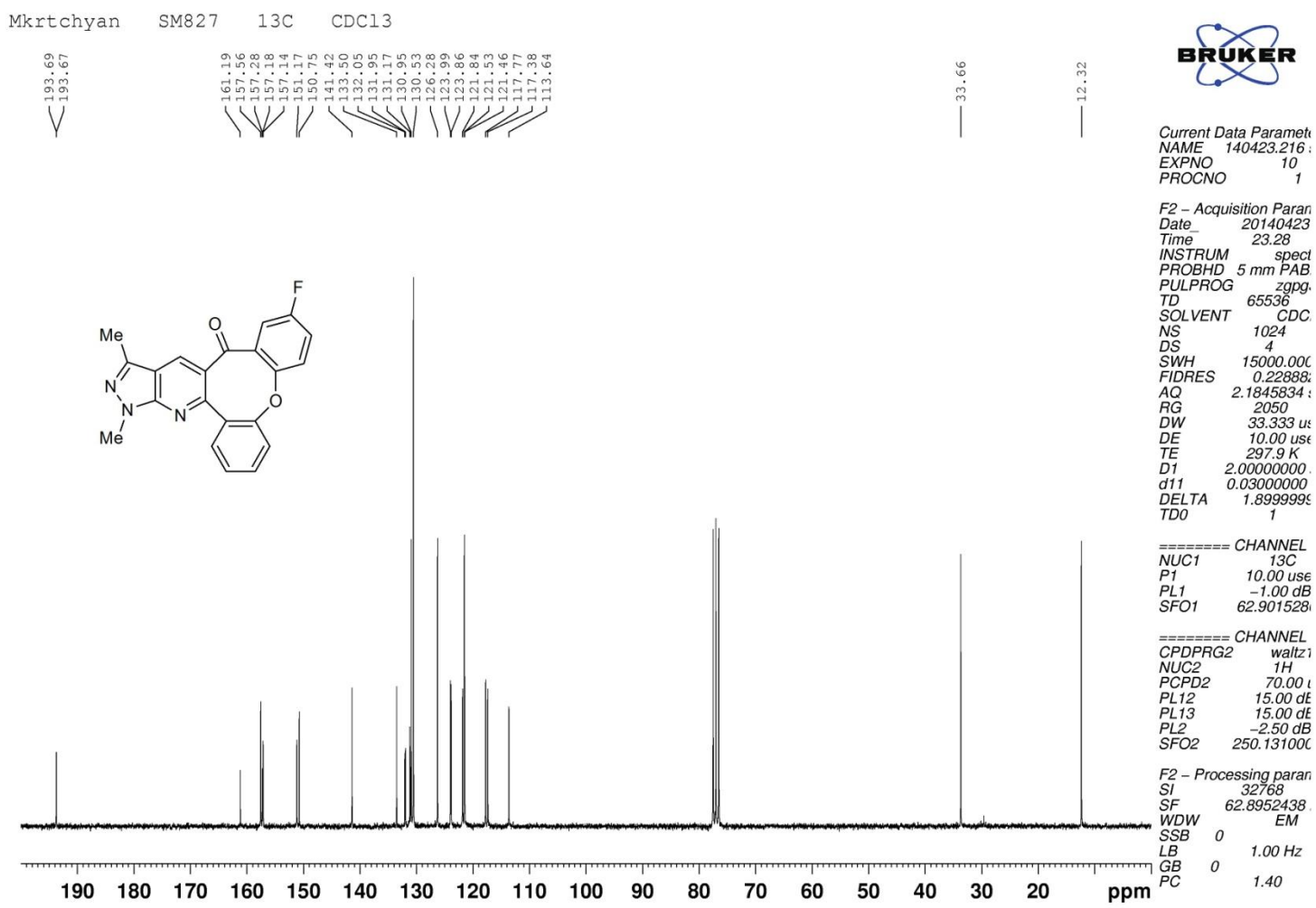
Compound 7b


Mkrtchyan SM826-1 13C CDCl3
194.44
160.81
155.95
150.59
149.64
143.37
139.26
135.35
135.11
132.72
131.81
131.46
130.96
130.66
130.41
130.30
129.11
125.83
125.28
123.24
122.31
120.75
116.01
12.48
Me
N
N
N
O
O
Cl
BRUKER
Current Data Paramete
NAME 140423.215 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20140423
Time 21.51
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3
TD 65536
SOLVENT CDCl
NS 1024
DS 4
SWH 15000.000
FIDRES 0.228882
AQ 2.1845834 s
RG 2050
DW 33.333 us
DE 10.00 use
TE 298.0 K
D1 2.00000000 s
d11 0.03000000 s
DELTA 1.8999999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528(
======== CHANNEL
CPDPRG2 waltz1
NUC2 1H
PCPD2 70.00 u
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.131000
F2 – Processing param
SI 32768
SF 62.8952406 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

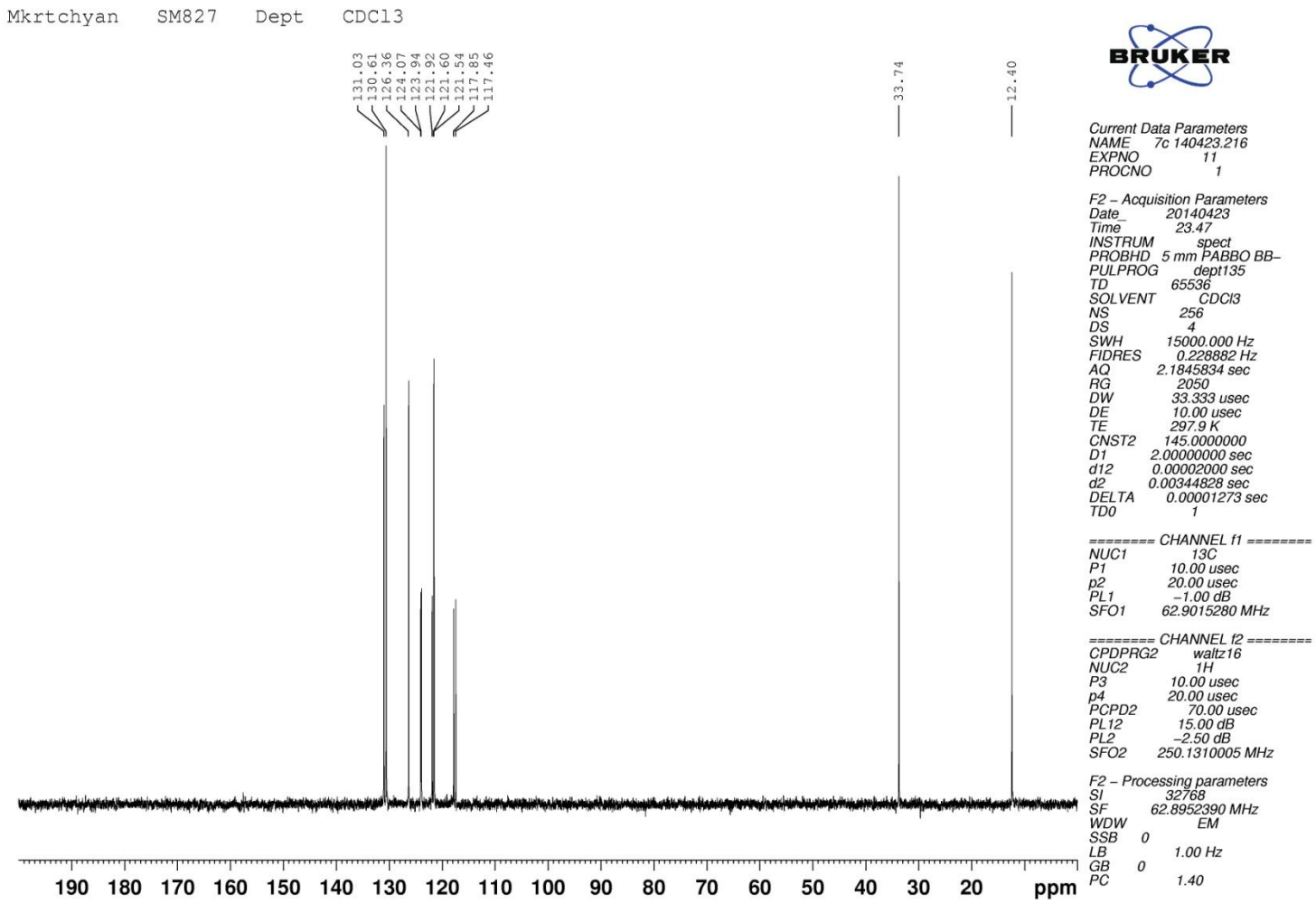
Compound 7c


Mkrtchyan SM827 1H CDCl3
7.97
7.70
7.69
7.67
7.66
7.64
7.64
7.62
7.61
7.38
7.37
7.35
7.33
7.30
7.29
7.29
7.28
7.26
7.26
7.25
7.23
7.23
7.22
7.20
7.19
7.10
7.10
7.07
7.07
4.08
2.51
F
Me
N
N
Me
O
N
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.00
2.05
4.26
1.06
3.04
3.07
BRUKER
Current Data Parameter
NAME 140423.207 s
EXPNO 10
PROCNO 1
F2 – Acquisition Param
Date_ 20140423
Time 8.56
INSTRUM spect
PROBHD 5 mm PABE
PULPROG zg30
TD 65536
SOLVENT CDCl
NS 16
DS 2
SWH 5165.289 H
FIDRES 0.078816
AQ 6.3439350 s
RG 144
DW 96.800 us
DE 10.00 use
TE 298.1 K
D1 1.00000000 s
TD0 1
======== CHANNEL f
NUC1 1H
P1 10.00 usec
PL1 –2.50 dB
SFO1 250.131544
F2 – Processing param
SI 32768
SF 250.1300101 M
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

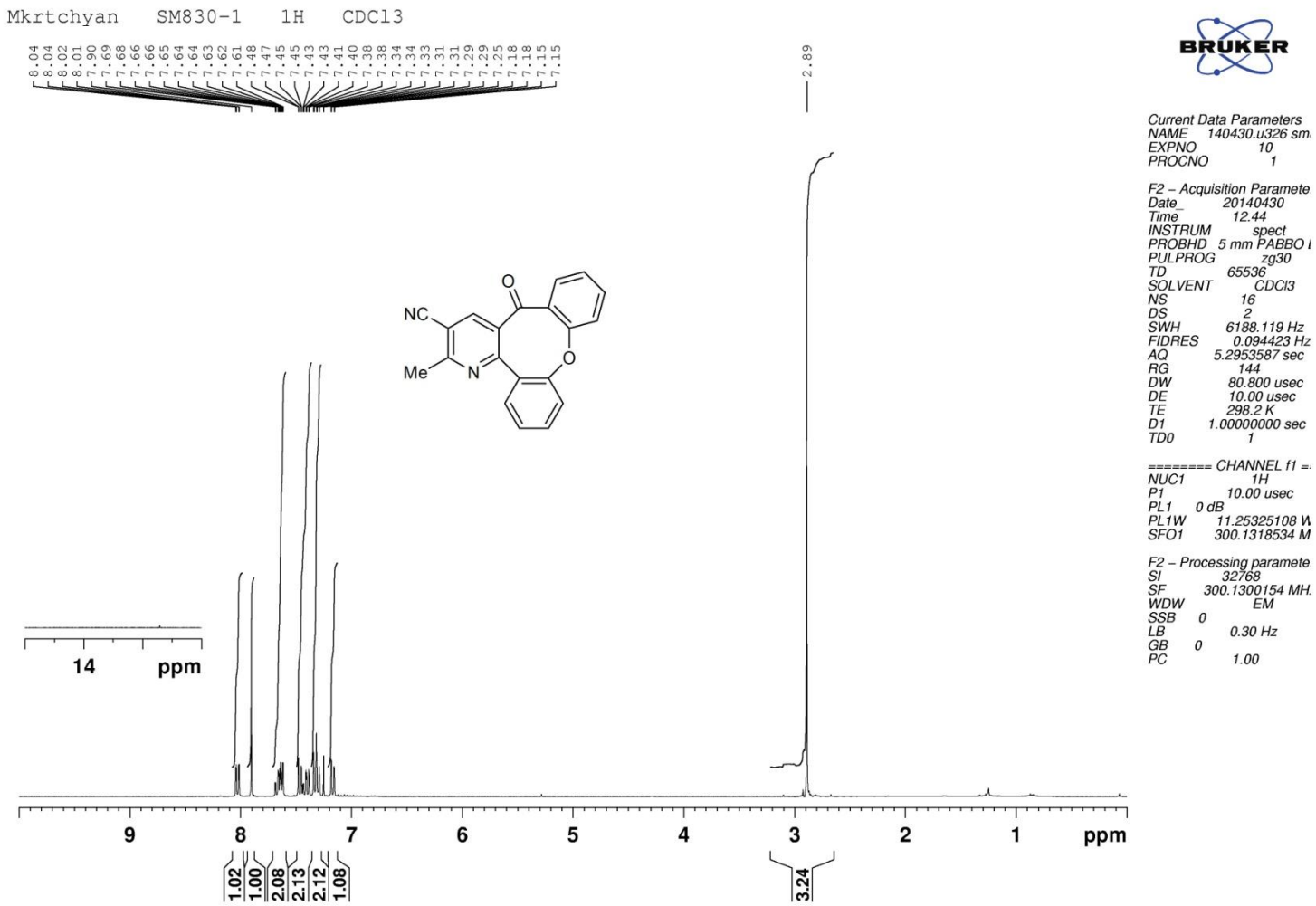
Compound 7c


Mkrtchyan SM827 13C CDCl3
193.69
193.67
161.19
157.56
157.28
157.18
157.14
151.17
150.75
141.42
133.50
132.05
131.95
131.17
130.95
130.53
126.28
123.99
123.86
121.84
121.53
121.46
117.77
117.38
113.64
33.66
12.32
Me
N
N
Me
O
O
F
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
Current Data Paramet
NAME 140423.216
EXPNO 10
PROCNO 1
F2 – Acquisition Paran
Date_ 20140423
Time 23.28
INSTRUM spect
PROBHD 5 mm PAB
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 15000.00
FIDRES 0.22888
AQ 2.1845834
RG 2050
DW 33.333 us
DE 10.00 use
TE 297.9 K
D1 2.00000000
d11 0.03000000
DELTA 1.899999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 use
PL1 –1.00 dB
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz
NUC2 1H
PCPD2 70.00
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.13100
F2 – Processing paran
SI 32768
SF 62.8952438
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

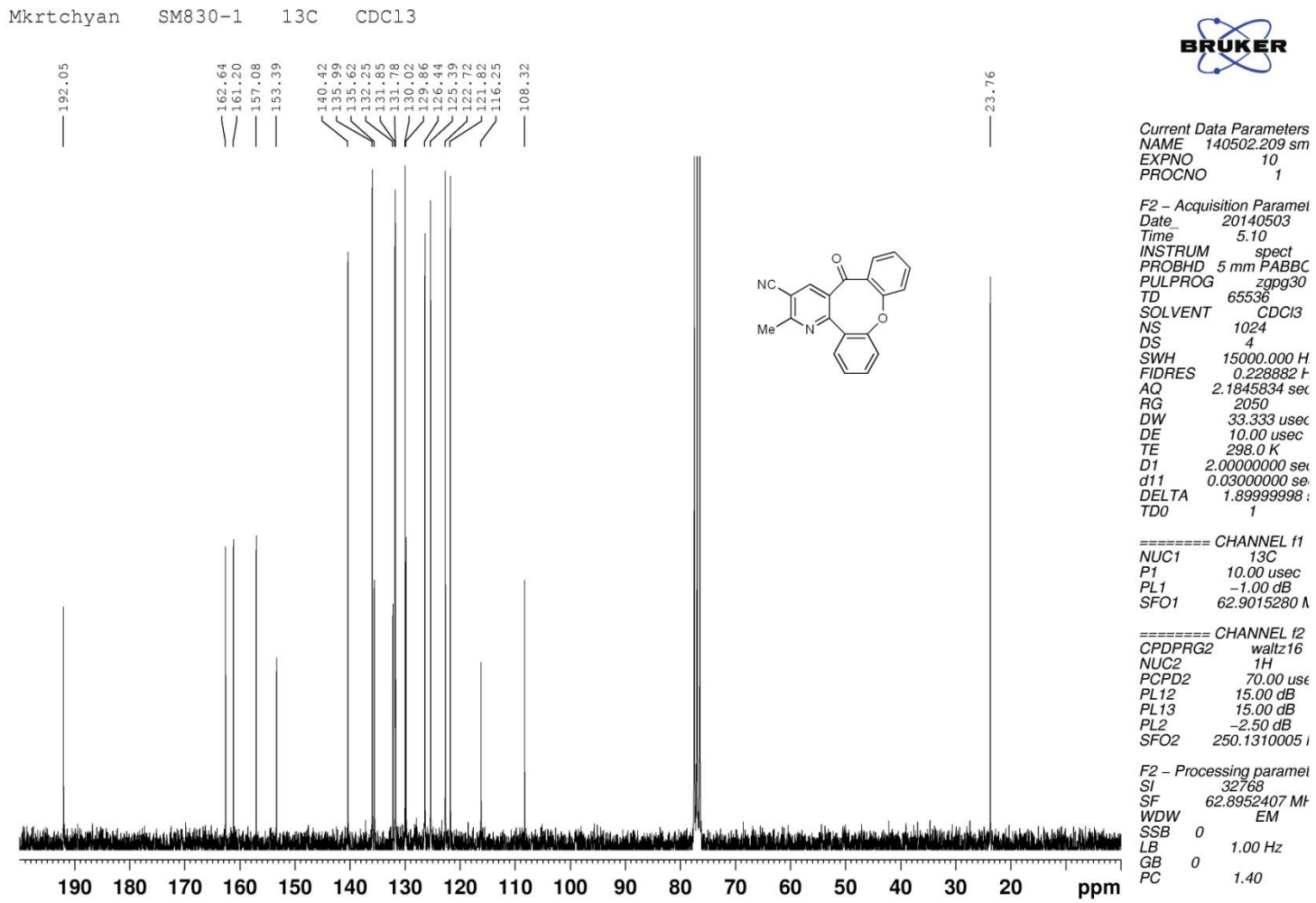
Compound 7c


Mkrtchyan SM827 Dept CDCl3
131.03
130.61
126.36
124.07
123.94
121.92
121.60
121.54
117.85
117.46
33.74
12.40
BRUKER
Current Data Parameters
NAME 7c 140423.216
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140423
Time 23.47
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT CDCl3
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 297.9 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

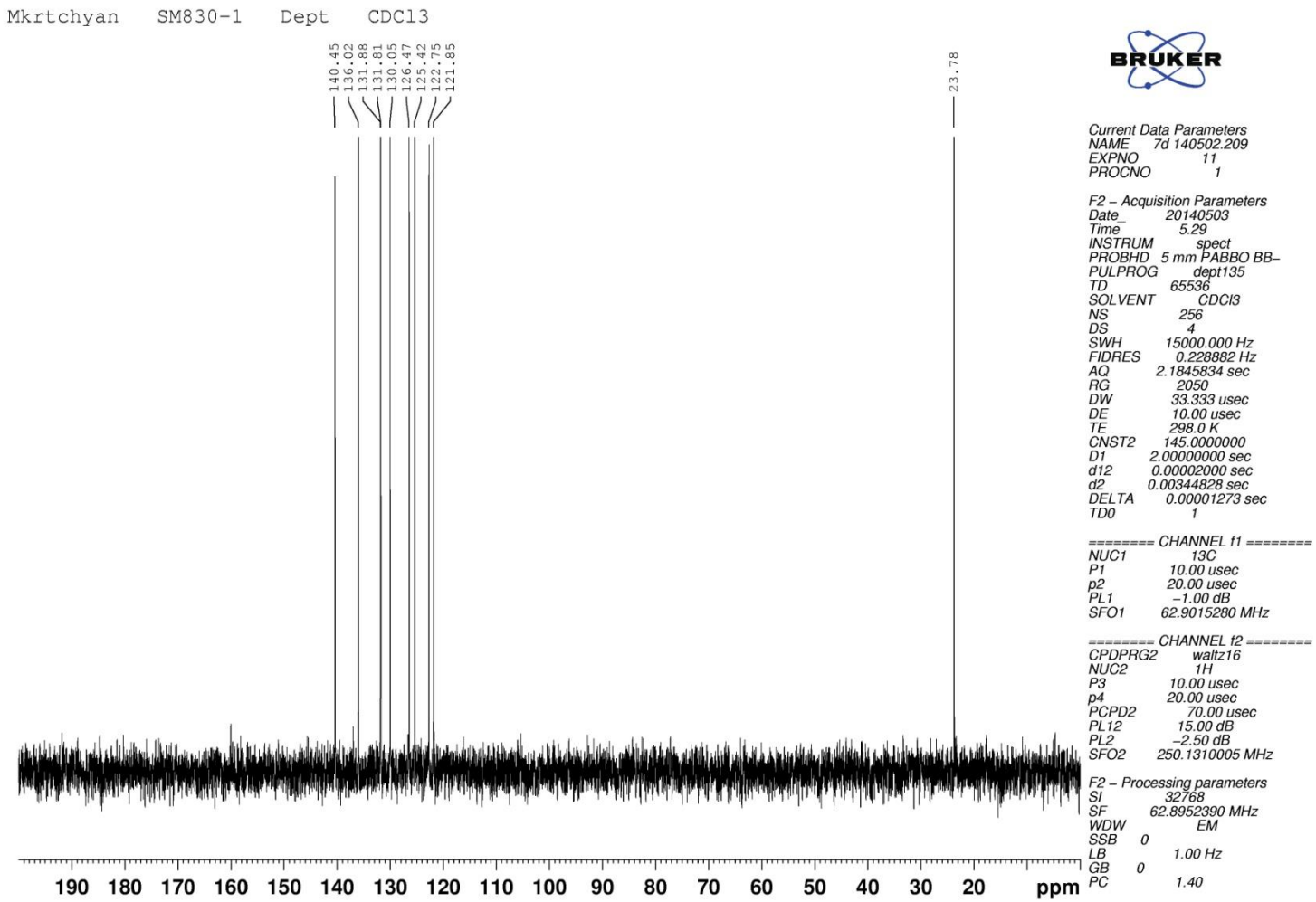
Compound 7d


Mkrtchyan SM830-1 1H CDCl3
8.04 8.04 8.02 8.01 7.90 7.69 7.68 7.66 7.66 7.65 7.64 7.64 7.63 7.62 7.61 7.48 7.47 7.45 7.45 7.43 7.43 7.41 7.40 7.38 7.38 7.34 7.34 7.33 7.31 7.29 7.29 7.25 7.18 7.18 7.15 7.15
2.89
NC
Me
N
O
O
14 ppm
9 8 7 6 5 4 3 2 1 ppm
1.02 1.00 2.08 2.13 2.12 1.08
3.24
BRUKER
Current Data Parameters
NAME 140430.u326 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramete
Date_ 20140430
Time 12.44
INSTRUM spect
PROBHD 5 mm PABBO i
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 144
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 =
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing paramete
SI 32768
SF 300.1300154 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

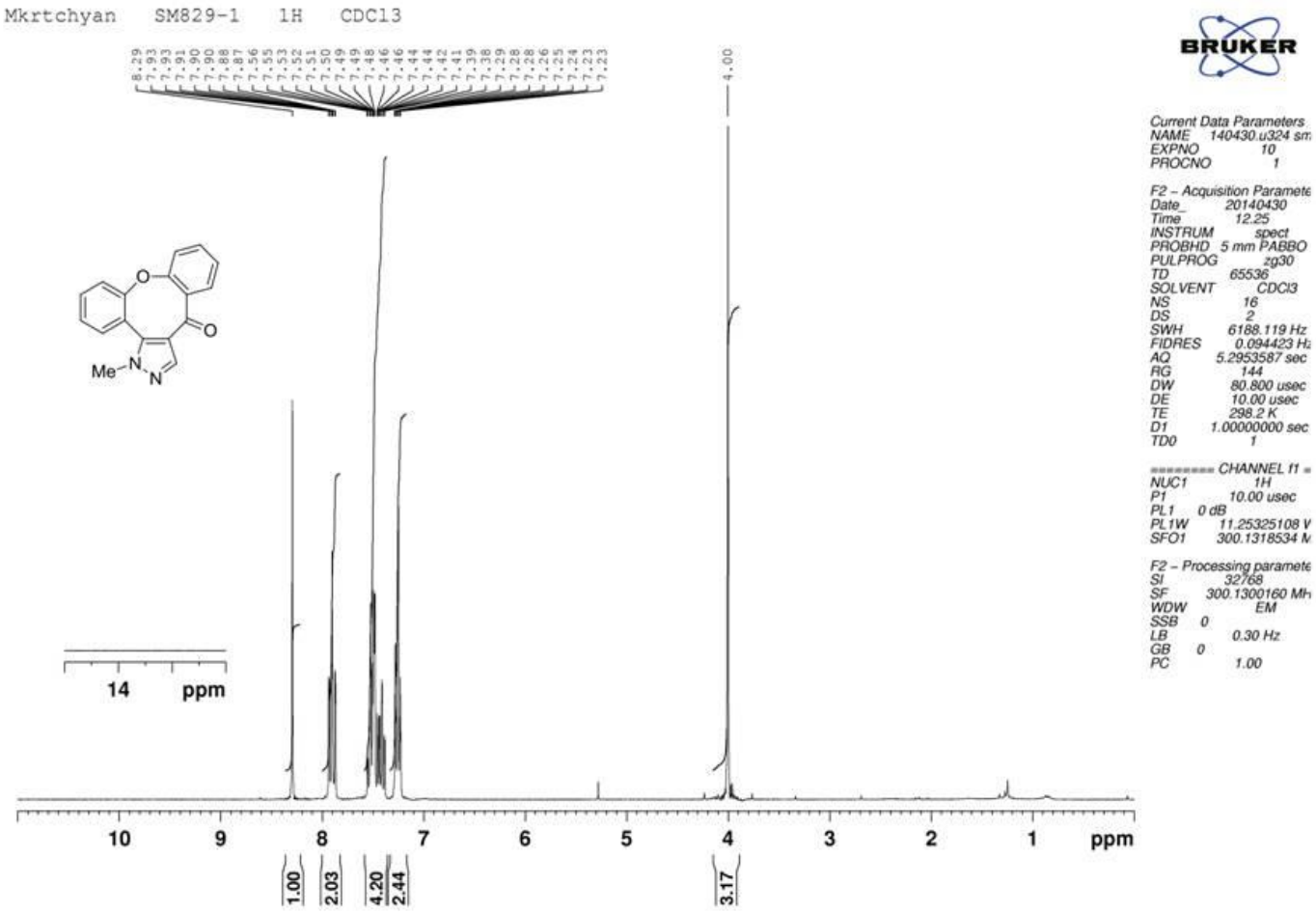
Compound 7d


Mkrtchyan SM830-1 13C CDCl3
192.05
162.64
161.20
157.08
153.39
140.42
135.99
135.62
132.25
131.85
131.78
130.02
129.86
126.44
125.39
122.72
121.82
116.25
108.32
23.76
NC
Me
N
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 140502.209 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramet
Date_ 20140503
Time 5.10
INSTRUM spect
PROBHD 5 mm PABBC
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000 H
FIDRES 0.228882 H
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
D1 2.00000000 se
d11 0.03000000 se
DELTA 1.89999998 s
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280 M
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 use
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 M
F2 – Processing paramet
SI 32768
SF 62.8952407 MH
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

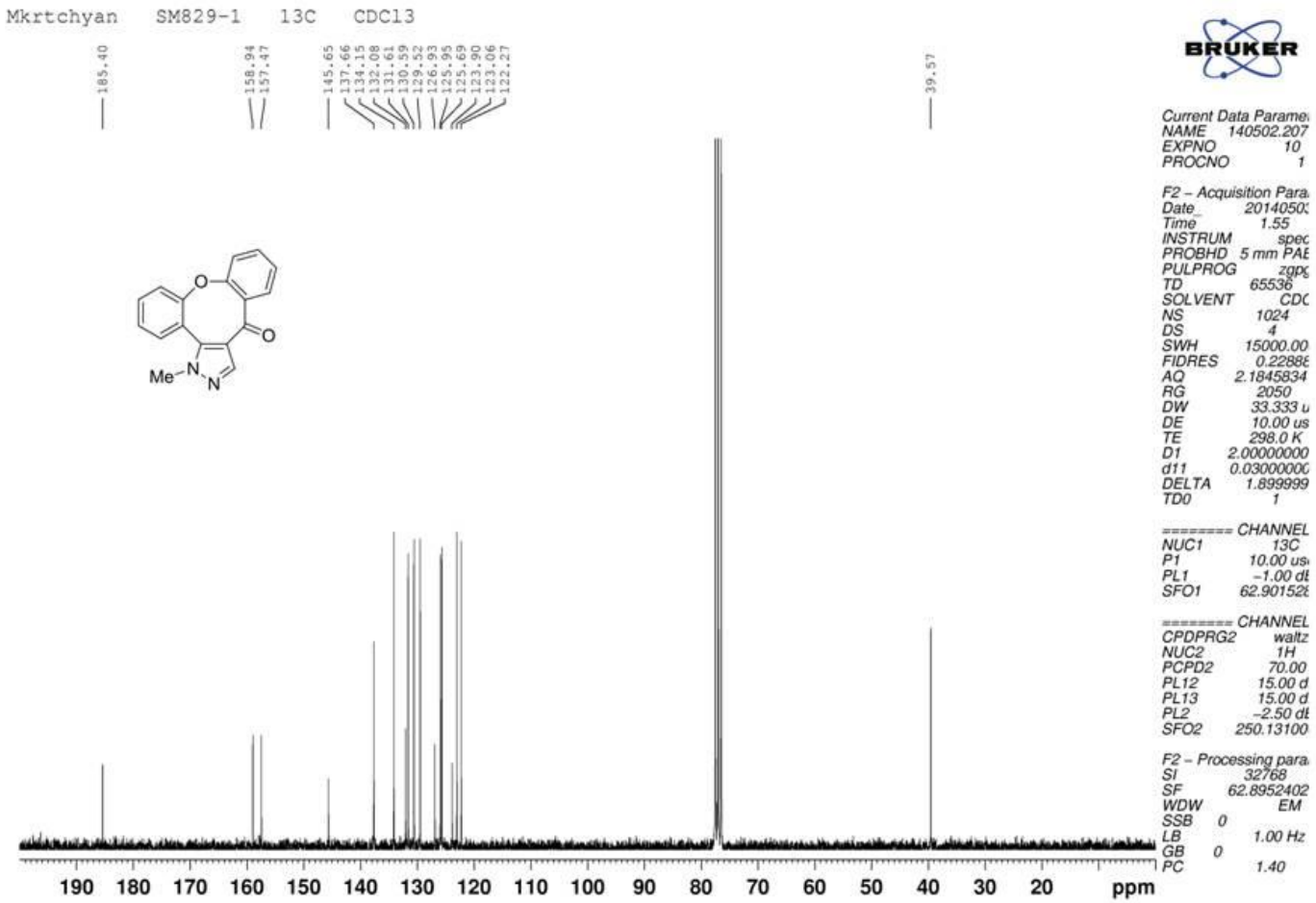
Compound 7d


Mkrtchyan SM830-1 Dept CDCl3
140.45
136.02
131.88
131.81
130.05
126.47
125.42
122.75
121.85
23.78
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 7d 140502.209
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140503
Time 5.29
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT CDCl3
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.0 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

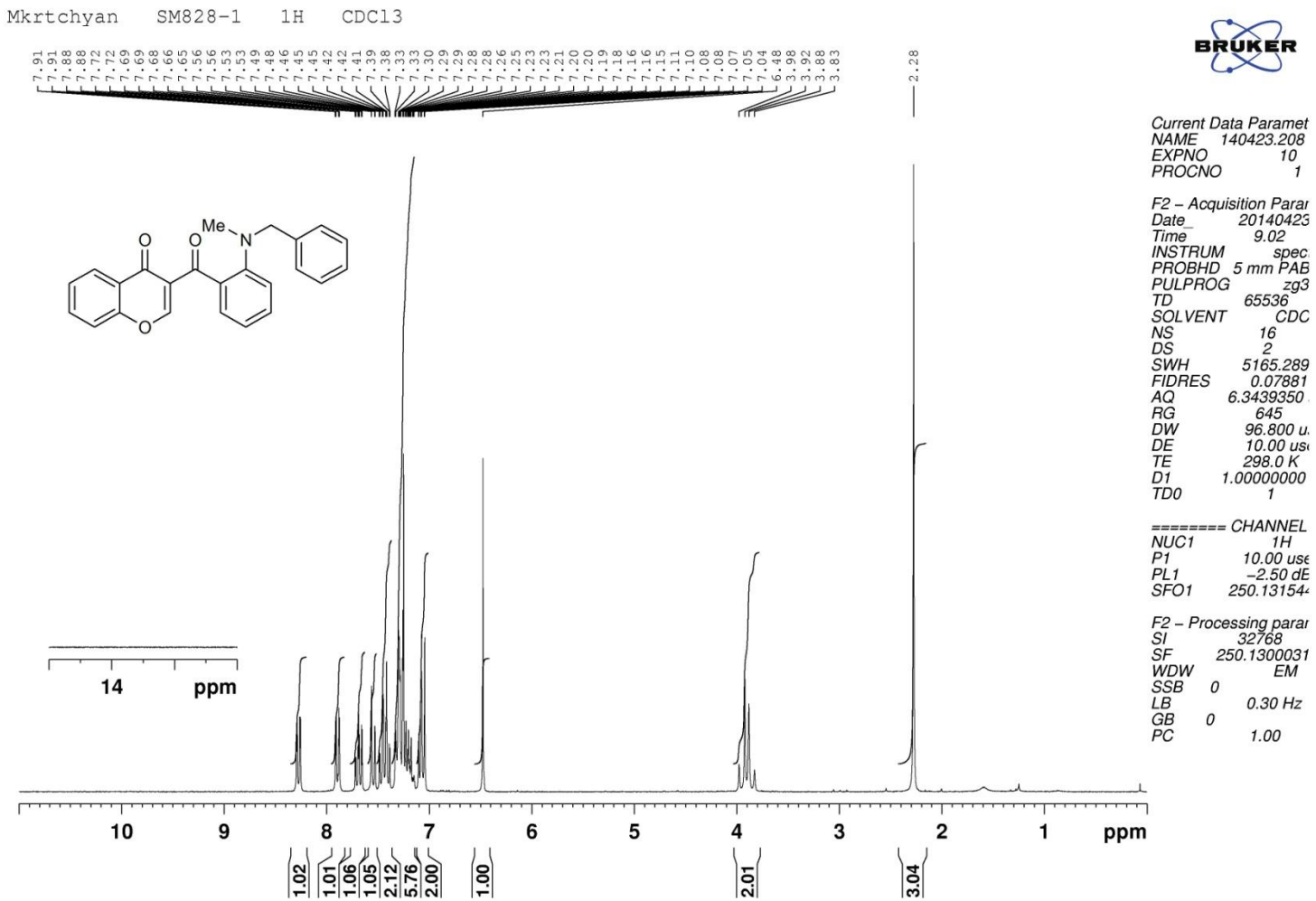
Compound 7e


Mkrtchyan SM829-1 1H CDCl3
8.29 7.93 7.93 7.91 7.90 7.90 7.88 7.87 7.56 7.55 7.53 7.52 7.51 7.50 7.49 7.49 7.48 7.46 7.46 7.44 7.44 7.42 7.41 7.39 7.38 7.29 7.28 7.28 7.26 7.25 7.24 7.23 7.23
4.00
O
O
Me
N
N
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.00 2.03 4.20 2.44 3.17
BRUKER
Current Data Parameters
NAME 140430.u324 sm
EXPNO 10
PROCNO 1
F2 – Acquisition Paramete
Date_ 20140430
Time 12.25
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 16
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 144
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ==
NUC1 1H
P1 10.00 usec
PL1 0 dB
PL1W 11.25325108 W
SFO1 300.1318534 M
F2 – Processing paramete
SI 32768
SF 300.1300160 MH
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

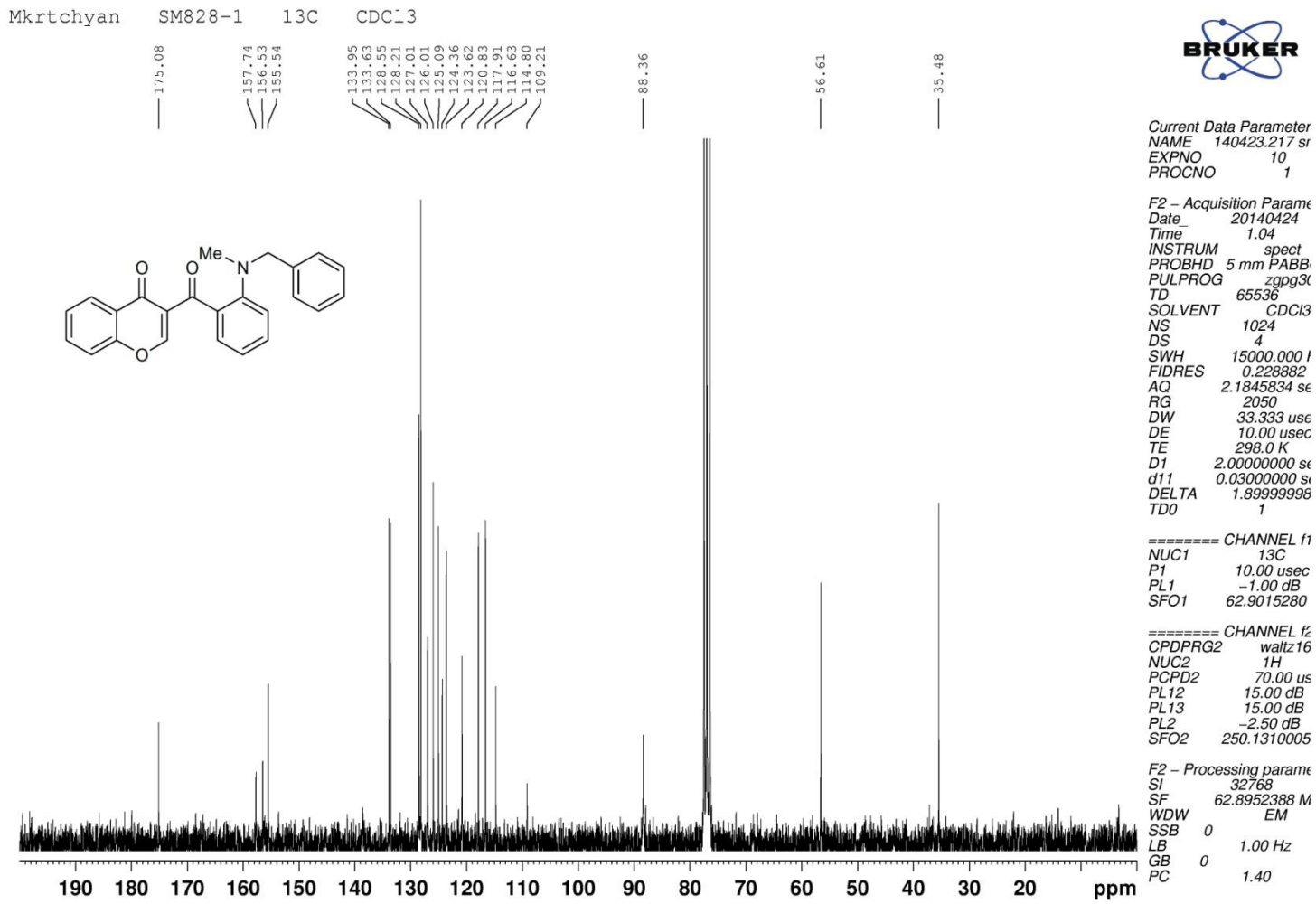
Compound 7e


Mkrtchyan SM829-1 13C CDCl3
185.40
158.94
157.47
145.65
137.66
134.15
132.08
131.61
130.59
129.52
126.93
125.95
125.69
123.90
123.06
122.27
39.57
Me
N
N
O
O
BRUKER
Current Data Parame
NAME 140502.207
EXPNO 10
PROCNO 1
F2 – Acquisition Para
Date_ 2014050
Time 1.55
INSTRUM spec
PROBHD 5 mm PAE
PULPROG zgpg
TD 65536
SOLVENT CDC
NS 1024
DS 4
SWH 15000.00
FIDRES 0.22888
AQ 2.1845834
RG 2050
DW 33.333 u
DE 10.00 us
TE 298.0 K
D1 2.00000000
d11 0.03000000
DELTA 1.899999
TD0 1
======== CHANNEL
NUC1 13C
P1 10.00 us
PL1 -1.00 dB
SFO1 62.901528
======== CHANNEL
CPDPRG2 waltz
NUC2 1H
PCPD2 70.00
PL12 15.00 d
PL13 15.00 d
PL2 -2.50 dB
SFO2 250.13100
F2 – Processing para
SI 32768
SF 62.8952402
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

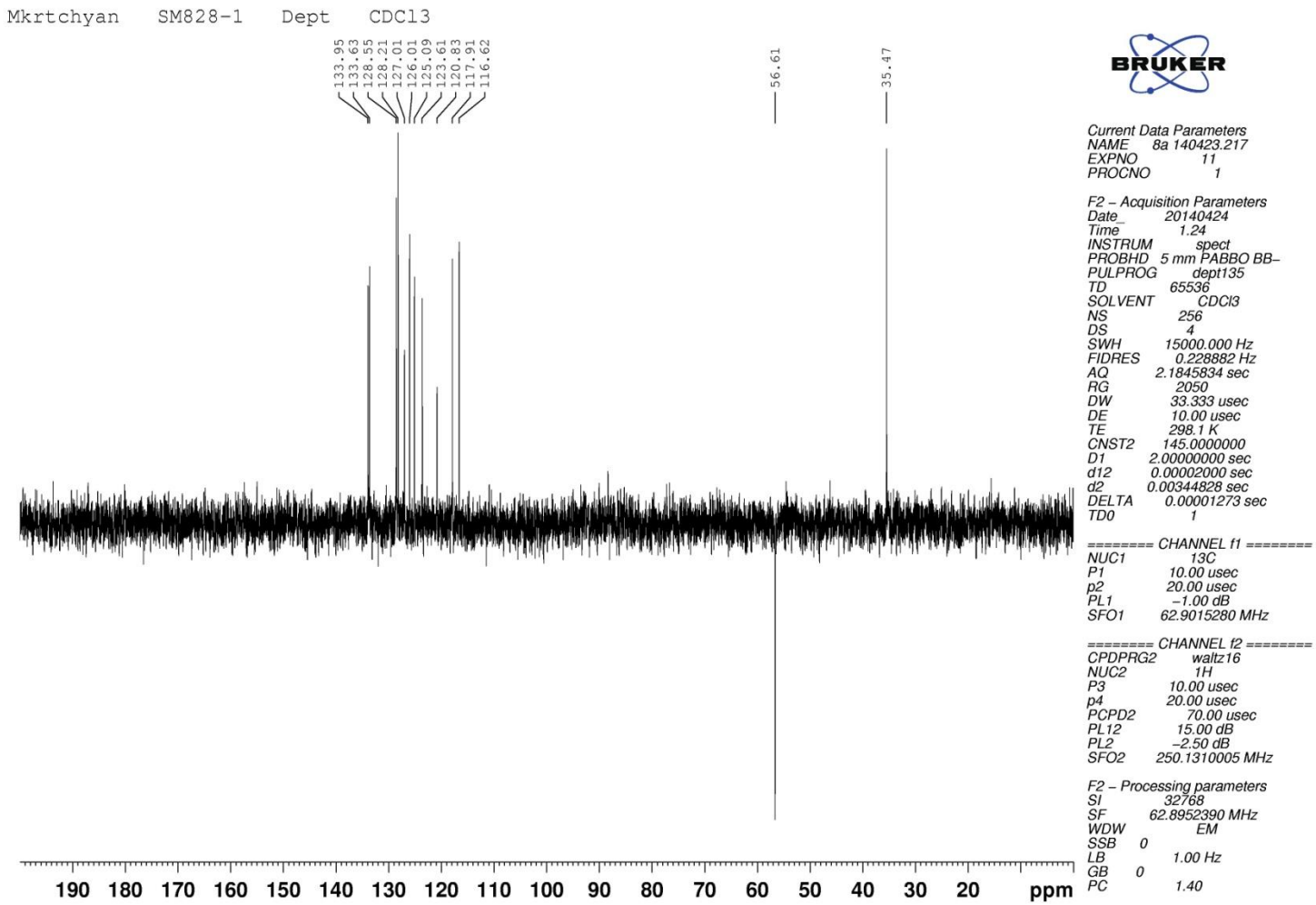
Compound 8a


Mkrtchyan SM828-1 1H CDCl3
7.91 7.91 7.88 7.88 7.72 7.72 7.69 7.69 7.68 7.66 7.65 7.56 7.56 7.53 7.53 7.49 7.48 7.46 7.45 7.45 7.42 7.42 7.41 7.39 7.38 7.33 7.33 7.30 7.29 7.29 7.28 7.28 7.26 7.25 7.23 7.23 7.21 7.20 7.20 7.19 7.18 7.16 7.16 7.15 7.11 7.10 7.08 7.08 7.07 7.05 7.04 6.48 3.98 3.92 3.88 3.83
2.28
Me
N
O
O
O
14 ppm
10 9 8 7 6 5 4 3 2 1 ppm
1.02 1.01 1.06 1.05 2.12 5.76 2.00 1.00 2.01 3.04
BRUKER
Current Data Paramet
NAME 140423.208
EXPNO 10
PROCNO 1
F2 – Acquisition Parar
Date_ 20140423
Time 9.02
INSTRUM spec
PROBHD 5 mm PAB
PULPROG zg3
TD 65536
SOLVENT CDC
NS 16
DS 2
SWH 5165.289
FIDRES 0.07881
AQ 6.3439350
RG 645
DW 96.800 u
DE 10.00 us
TE 298.0 K
D1 1.00000000
TD0 1
======== CHANNEL
NUC1 1H
P1 10.00 use
PL1 –2.50 dE
SFO1 250.13154
F2 – Processing parar
SI 32768
SF 250.1300031
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

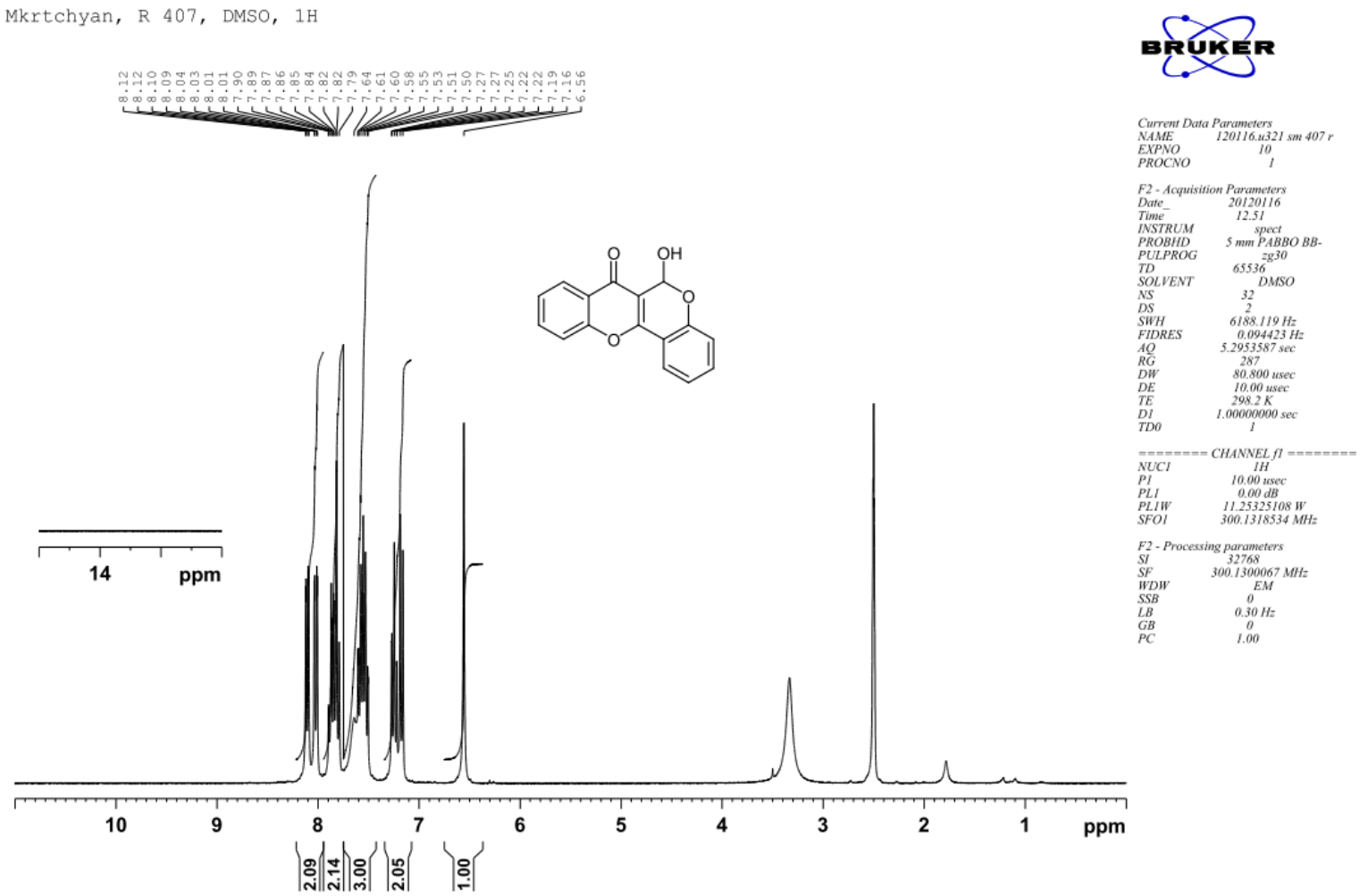
Compound 8a


Mkrtchyan SM828-1 13C CDCl3
175.08
157.74
156.53
155.54
133.95
133.63
128.55
128.21
127.01
126.01
125.09
124.36
123.62
120.83
117.91
116.63
114.80
109.21
88.36
56.61
35.48
Me
N
O
O
O
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameter
NAME 140423.217 sr
EXPNO 10
PROCNO 1
F2 – Acquisition Parame
Date_ 20140424
Time 1.04
INSTRUM spect
PROBHD 5 mm PABB
PULPROG zgpg3(
TD 65536
SOLVENT CDCl3
NS 1024
DS 4
SWH 15000.000 I
FIDRES 0.228882
AQ 2.1845834 se
RG 2050
DW 33.333 use
DE 10.00 usec
TE 298.0 K
D1 2.00000000 se
d11 0.03000000 s
DELTA 1.89999998
TD0 1
======== CHANNEL f1
NUC1 13C
P1 10.00 usec
PL1 –1.00 dB
SFO1 62.9015280
======== CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 us
PL12 15.00 dB
PL13 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005
F2 – Processing parame
SI 32768
SF 62.8952388 M
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

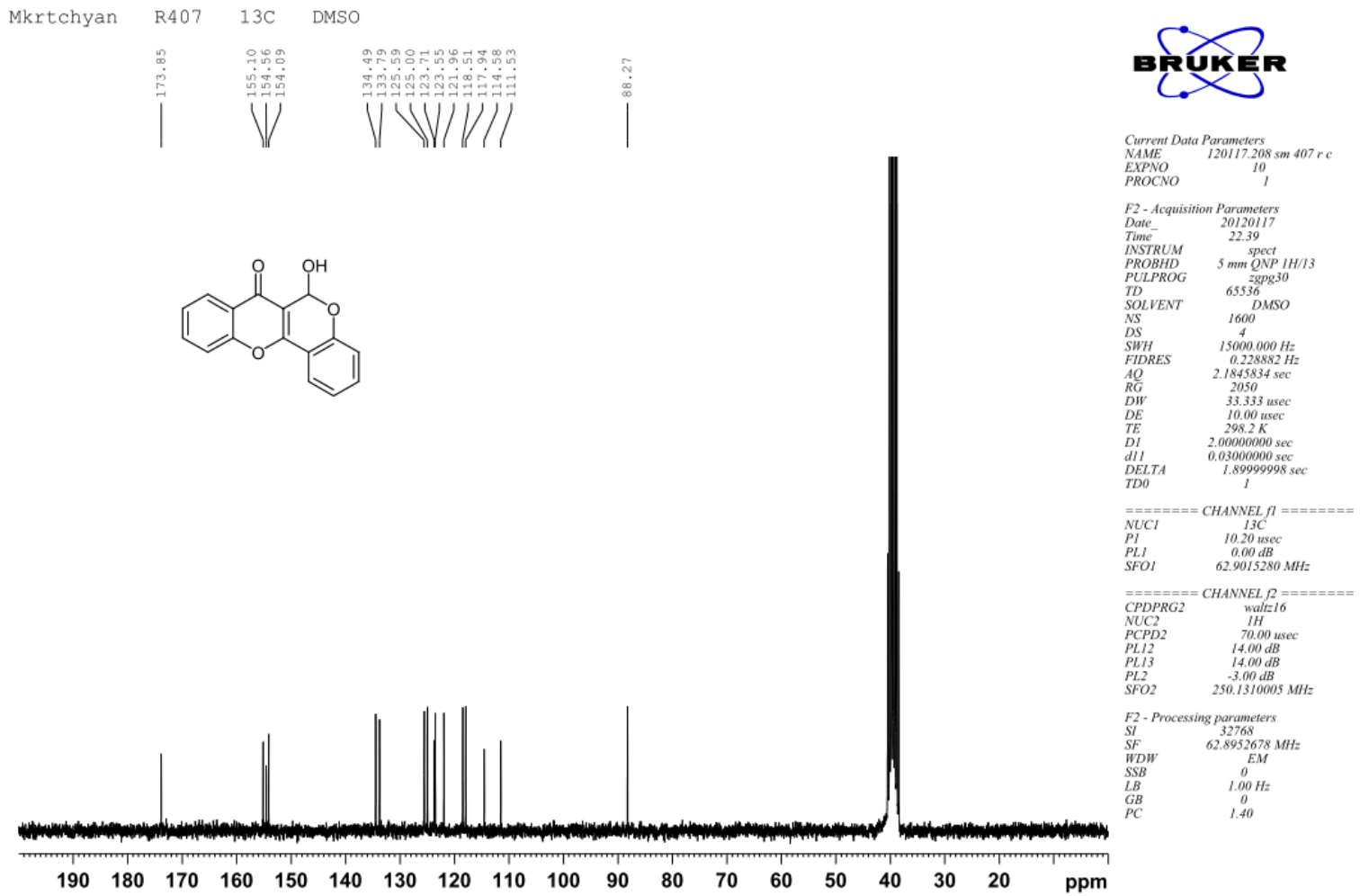
Compound 8a


Mkrtchyan SM828-1 Dept CDCl3
133.95
133.63
128.55
128.21
127.01
126.01
125.09
123.61
120.83
117.91
116.62
56.61
35.47
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm
BRUKER
Current Data Parameters
NAME 8a 140423.217
EXPNO 11
PROCNO 1
F2 – Acquisition Parameters
Date_ 20140424
Time 1.24
INSTRUM spect
PROBHD 5 mm PABBO BB–
PULPROG dept135
TD 65536
SOLVENT CDCl3
NS 256
DS 4
SWH 15000.000 Hz
FIDRES 0.228882 Hz
AQ 2.1845834 sec
RG 2050
DW 33.333 usec
DE 10.00 usec
TE 298.1 K
CNST2 145.0000000
D1 2.00000000 sec
d12 0.00002000 sec
d2 0.00344828 sec
DELTA 0.00001273 sec
TD0 1
======== CHANNEL f1 ========
NUC1 13C
P1 10.00 usec
p2 20.00 usec
PL1 –1.00 dB
SFO1 62.9015280 MHz
======== CHANNEL f2 ========
CPDPRG2 waltz16
NUC2 1H
P3 10.00 usec
p4 20.00 usec
PCPD2 70.00 usec
PL12 15.00 dB
PL2 –2.50 dB
SFO2 250.1310005 MHz
F2 – Processing parameters
SI 32768
SF 62.8952390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

Compound 9a


Mkrtchyan, R 407, DMSO, 1H
8.12
8.12
8.10
8.09
8.04
8.03
8.01
8.01
7.90
7.89
7.87
7.86
7.85
7.84
7.82
7.82
7.79
7.64
7.61
7.60
7.58
7.55
7.53
7.51
7.50
7.27
7.27
7.25
7.22
7.22
7.19
7.16
6.56
O
OH
O
O
14
ppm
10
9
8
7
6
5
4
3
2
1
ppm
2.09
2.14
3.00
2.05
1.00
BRUKER
Current Data Parameters
NAME 120116.u321 sm 407 r
EXPNO 10
PROCNO 1
F2 - Acquisition Parameters
Date_ 20120116
Time 12.51
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 32
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 287
DW 80.800 usec
DE 10.00 usec
TE 298.2 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
NUC1 1H
P1 10.00 usec
PL1 0.00 dB
PL1W 11.25325108 W
SFO1 300.1318534 MHz
F2 - Processing parameters
SI 32768
SF 300.1300067 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

Compound 9a



BRUKER

Current Data Parameters

NAME	120117.208 sm 407 r c
EXPNO	10
PROCNO	1

F2 - Acquisition Parameters

Date_	20120117
Time	22.39
INSTRUM	spect
PROBHD	5 mm QNP 1H/13
PULPROG	zgpg30
TD	65536
SOLVENT	DMSO
NS	1600
DS	4
SWH	15000.000 Hz
FIDRES	0.228882 Hz
AQ	2.1845834 sec
RG	2050
DW	33.333 usec
DE	10.00 usec
TE	298.2 K
D1	2.00000000 sec
d11	0.03000000 sec
DELTA	1.89999998 sec
TD0	1

======== CHANNEL f1 ========

NUC1	13C
P1	10.20 usec
PL1	0.00 dB
SFO1	62.9015280 MHz

======== CHANNEL f2 ========

CPDPRG2	waltz16
NUC2	1H
PCPD2	70.00 usec
PL12	14.00 dB
PL13	14.00 dB
PL2	-3.00 dB
SFO2	250.1310005 MHz

F2 - Processing parameters

SI	32768
SF	62.8952678 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40