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Supporting Information

for

$AgNTf_2$-catalyzed formal [3 + 2] cycloaddition of ynamides with unprotected isoxazol-5-amines: efficient access to functionalized 5-amino-1*H*-pyrrole-3-carboxamide derivatives

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Characterization data and ^1H and ^{13}C NMR spectra for all new compounds

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General information.

Reactions were carried out in open flask and monitored by thin-layer chromatography (TLC) carried out on silica plates, visualized by irradiation with UV light. Commercially available reagents were used without further purification. ^{1}H and ^{13}C NMR spectra were recorded at 500 MHz for ^{1}H nuclei, 125.8 MHz for ^{13}C nuclei. Chemical shifts (δ) are reported in units of parts per million (ppm); signals are referenced to TMS (0.00 ppm) or solvent residual peak (DMSO-d_6, 2.5 ppm for ^{1}H and 39.5 ppm for ^{13}C) as an internal standard. Coupling constants (J) are given in Hz, and multiplicity is abbreviated as: s (singlet), d (doublet), dd (doublet of doublets), t (triplet), q (quartet), and m (multiplet). All melting points are uncorrected and determined on a X-4 digital microscopic melting point apparatus. HRMS were measured using electrospray ionization (ESI).

Synthesis of substrates

Ynamide compounds **4a**–**q** were prepared according to the known literatures [1]. The isoxazol-5-amines **8a**–**e** are commercially available reagents.

Ref: [1] (*a*) Zhu, J.; Wang, Q.; Meng, X.; Zhao, C.; Sun, X.; Tian L.; Cao, Z. *Eur. J. Org. Chem*. **2019**, *2019*, 4066–4070; doi:10.1002/ejoc.201900604 (*b*) Saito, N.; Saito, K.; Shiro M.; Sato, Y. *Org. Lett*. **2011**, *13*, 2718–2721. doi: 10.1021/ol200812y

Characterization data for all new compounds

N-(4-Acetyl-5-methyl-3-phenyl-1H-pyrrol-2-yl)-N,4-dimethylbenzenesulfonamide (**6**): white solid, m.p. 157.8-159.0 ℃, yield 32.0 mg, 42%; R_f = 0.32 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.62 (s, 1H), 7.35 (d, *J* = 8.3 Hz, 2H), 7.26 (d, *J* = 8.1Hz, 2H), 7.22 (d, *J* = 7.4 Hz, 1H), 7.17 (dd, *J* = 7.1, 7.1 Hz, 2H), 6.92 (d, *J* = 7.0 Hz, 2H), 2.91 (s, 3H), 2.40 (s, 3H), 2.38 (s, 3H), 1.70 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 194.1, 143.5, 135.0, 134.7, 132.7, 130.0, 129.6, 127.6, 127.3, 126.7, 123.0, 121.3, 119.9, 38.5, 30.3, 21.0, 13.7. HRMS (ESI) m/z calcd for $C_{21}H_{23}N_2O_3S$ $(M+H)^+$ 383.1424, found 383.1426.

5-((N,4-Dimethylphenyl)sulfonamido)-2-methyl-4-phenyl-1H-pyrrole-3-carboxamide (**10aa**): white solid, m.p. 176.5-178.5 ℃, yield 75.9 mg, 99%; R_f = 0.16 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.22 (s, 1H), 7.37 (d, *J* = 8.2 Hz, 2H), 7.25 (d, *J* = 8.1Hz, 2H), 7.23-7.13 (m, 3H), 6.99 (d, *J* = 6.4 Hz, 2H), 6.76 (s, 1H) 5.87 (s, 1H), 2.96 (s, 3H), 2.39 (s, 3H), 2.32 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.3, 135.1, 134.0, 129.57, 129.52, 128.8, 127.7, 127.3, 126.3, 122.3, 119.4, 114.4, 38.6, 21.0, 14.5. HRMS (ESI) m/z calcd for $C_{20}H_{22}N_3O_3S$ $(M+H)^+$ 384.1376, found 384.1375.

5-((N,4-Dimethylphenyl)sulfonamido)-4-(4-methoxyphenyl)-2-methyl-1H-pyrrole-3-carboxamide (**10ba**): white solid, m.p. 196.0-198.0 ℃, yield 81.9 mg, 99%; R_f = 0.17 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.21 (s, 1H), 7.38 (d, *J* = 8.3 Hz, 2H), 7.25 (d, *J* = 8.1 Hz, 2H), 6.89 (d, *J* = 8.7 Hz, 2H), 6.72 (d, *J* = 8.7 Hz, 2H+1H), 5.89 (b, 1H), 3.74 (s, 3H), 2.97 (s, 3H), 2.39 (s, 3H), 2.33 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 158.0, 143.2, 135.3, 130.8, 129.5, 129.1, 127.2, 125.9, 122.3, 118.9, 114.0, 113.2, 54.9, 38.7, 21.0, 12.6. HRMS (ESI) m/z calcd for $C_{21}H_{24}N_3O_4S$ $(M+H)^+$ 414.1482, found 414.1486.

5-((N,4-Dimethylphenyl)sulfonamido)-2-methyl-4-(p-tolyl)-1H-pyrrole-3-carboxamide (**10ca**): white solid, m.p. 182.6-184.6 ℃, yield 78.6 mg, 99%; R_f = 0.18 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.22 (s, 1H), 7.37 (d, *J* = 8.2 Hz, 2H), 7.25 (d, *J* = 8.1 Hz, 2H), 6.97 (d, *J* = 7.8 Hz, 2H), 6.86 (d, *J* = 7.9 Hz, 2H), 6.74 (b, 1H), 5.74 (b, 1H), 2.97 (s, 3H), 2.39 (s, 3H), 2.33 (s, 3H), 2.29 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.2, 135.6, 135.3, 130.9, 129.5, 129.4, 129.1, 128.4, 127.2, 122.3, 119.3, 114.1, 38.7, 21.0, 20.7, 12.5. HRMS (ESI) m/z calcd for $C_{21}H_{24}N_3O_3S$ $(M+H)^+$ 398.1533, found 398.1530.

4-(4-(tert-Butyl)phenyl)-5-((N,4-dimethylphenyl)sulfonamido)-2-methyl-1H-pyrrole-3-carboxamide (**10da**): white solid, m.p. 195.7-197.6 ℃, yield 74.7 mg, 85%; R_f = 0.16 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.23 (s, 1H), 7.35 (d, *J* = 8.1 Hz, 2H), 7.22 (d, *J* = 8.2 Hz, 2H), 7.19 (d, *J* = 8.2 Hz, 2H), 6.95 (d, *J* = 8.1 Hz, 2H), 6.74 (b, 1H), 5.84 (b, 1H), 2.98 (s, 3H), 2.37 (s, 3H), 2.32 (s, 3H), 1.29 (s, 9H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.8, 148.6, 143.1, 135.2, 130.9, 129.4, 129.3, 128.9, 127.3, 124.4, 122.2, 119.3, 114.2, 38.7, 34.1, 31.2, 21.0, 12.5. HRMS (ESI) m/z calcd for $C_{24}H_{30}N_3O_3S$ $(M+H)^+$ 440.2002, found 440.2006.

5-((N,4-Dimethylphenyl)sulfonamido)-4-(4-fluorophenyl)-2-methyl-1H-pyrrole-3-carboxamide (**10ea**): white solid, m.p. 185.9-187.9 ℃, yield 79.5 mg, 99%; R_f = 0.15 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.23 (s, 1H), 7.28 (d, *J* = 8.2 Hz, 2H), 7.25 (d, *J* = 8.1 Hz, 2H), 7.04-6.93 (m, 4H), 6.79 (b, 1H), 6.11 (b, 1H), 3.03 (s, 3H), 2.38 (s, 3H), 2.30 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 161.0 (d, *J* = 242.7 Hz), 143.3, 135.3, 131.3 (d, *J* = 8.0 Hz), 130.2 (d, *J* = 3.3 Hz), 129.5, 128.3, 127.2, 122.4, 118.5, 114.7, 114.4 (d, *J* = 21.2 Hz), 38.8, 21.0, 12.4. HRMS (ESI) m/z calcd for $C_{20}H_{21}FN_3O_3S$ $(M+H)^+$ 402.1282, found 402.1286.

4-(4-Chlorophenyl)-5-((N,4-dimethylphenyl)sulfonamido)-2-methyl-1H-pyrrole-3-carboxamide (**10fa**): white solid, m.p. 192.2-194.0 ℃, yield 82.8 mg, 99%; R_f = 0.14 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.26 (s, 1H), 7.35 (d, *J* = 8.0 Hz, 2H), 7.22 (d, *J* = 8.0 Hz, 2H), 7.17 (d, *J* = 8.1 Hz, 2H), 6.98 (d, *J* = 8.2 Hz, 2H), 6.82 (b, 1H), 6.32 (b, 1H), 3.07 (s, 3H), 2.39 (s, 3H), 2.29 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.3, 135.4, 132.9, 131.0, 130.8, 129.4, 128.1, 127.5, 127.1, 122.5, 118.4, 114.9, 38.9, 21.0, 12.3. HRMS (ESI) m/z calcd for $C_{20}H_{21}ClN_3O_3S$ $(M+H)^+$ 418.0987, found 418.0985.

4-(4-Bromophenyl)-5-((N,4-dimethylphenyl)sulfonamido)-2-methyl-1H-pyrrole-3-carboxamide (**10ga**): white solid, m.p. 210.9-212.5 ℃, yield 91.3 mg, 99%; R_f = 0.16 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.27 (s, 1H), 7.34 (d, *J* = 8.1 Hz, 2H), 7.30 (d, *J* = 8.3 Hz, 2H), 7.22 (d, *J* = 8.1 Hz, 2H), 6.92 (d, *J* = 8.3 Hz, 2H), 6.83 (b, 1H), 6.34 (b, 1H), 3.08 (s, 3H), 2.40 (s, 3H), 2.29 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.3, 135.4, 133.3, 131.3, 130.4, 129.4, 128.1, 127.1, 122.4, 119.4, 118.5, 114.9, 39.0, 21.1, 12.3. HRMS (ESI) m/z calcd for $C_{20}H_{21}BrN_3O_3S$ $(M+H)^+$ 462.0482, found 462.0478.

5-((N,4-Dimethylphenyl)sulfonamido)-2-methyl-4-(m-tolyl)-1H-pyrrole-3-carboxamide (**10ha**): white solid, m.p. 183.4-185.4 ℃, yield 78.6 mg, 99%; R_f = 0.16 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.24 (s, 1H), 7.37 (d, *J* = 8.1 Hz, 2H), 7.25 (d, *J* = 8.1 Hz, 2H), 7.07 (dd, *J* = 7.5, 7.5 Hz, 1H), 7.00 (d, *J* = 7.5 Hz, 1H), 6.80 (d, *J* = 7.5 Hz, 1H), 6.74 (b, 1H), 6.71 (s, 1H), 5.78 (b, 1H), 2.96 (s, 3H), 2.38 (s, 3H), 2.33 (s, 3H), 2.15 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.2, 136.7, 135.2, 133.9, 130.1, 129.5, 128.9, 127.7, 127.2, 127.1, 126.8, 122.2, 119.2, 114.2, 38.6, 21.0, 20.9, 12.5. HRMS (ESI) m/z calcd for $C_{21}H_{24}N_3O_3S$ $(M+H)^+$ 398.1533, found 398.1536.

4-(3-Chlorophenyl)-5-((N,4-dimethylphenyl)sulfonamido)-2-methyl-1H-pyrrole-3-carboxamide (**10ia**): white solid, m.p. 193.2-194.9 ℃, yield 82.8 mg, 99%; R_f = 0.16 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.29 (s, 1H), 7.37 (d, *J* = 8.2 Hz, 2H), 7.24 (d, *J* = 8.1 Hz, 2H), 7.22-7.13 (m, 2H), 6.99 (ddd, *J* = 6.6, 1.4, 2.0 Hz, 1H), 6.95 (s, 1H), 6.87 (b, 1H), 6.43 (b, 1H), 3.06 (s, 3H), 2.34 (s, 3H), 2.29 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.4, 136.2, 135.1, 132.2, 129.5, 129.2, 128.8, 127.94, 127.93, 127.1, 125.8, 122.5, 118.1, 115.1, 38.7, 21.1, 12.2. HRMS (ESI) m/z calcd for $C_{20}H_{21}ClN_3O_3S$ $(M+H)^+$ 418.0987, found 418.0985.

5-((N-isopropyl-4-methylphenyl)sulfonamido)-2-methyl-4-phenyl-1H-pyrrole-3-carboxamide (**10ka**): white solid, m.p. 158.7-160.3 ℃, yield 41.2 mg, 50%; R_f = 0.22 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 10.93 (s, 1H), 7.64 (d, *J* = 8.1 Hz, 2H), 7.37 (d, *J* = 8.0 Hz, 2H), 7.27 (s, 5H), 6.78 (b, 1H), 5.83 (b, 1H), 3.85 (sept, *J* = 6.3 Hz, 1H), 2.41 (s, 3H), 2.38 (s, 3H), 0.88 (d, *J* = 6.3 Hz, 3H), 0.48 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.8, 143.2, 137.4, 134.5, 130.2, 129.7, 127.6, 127.4, 126.6, 123.1, 116.5, 114.6, 51.9, 21.4, 21.2, 21.0, 12.5. HRMS (ESI) m/z calcd for $C_{22}H_{26}N_3O_3S$ $(M+H)^+$ 412.1689, found 412.1685.

5-((N-Butyl-4-methylphenyl)sulfonamido)-2-methyl-4-phenyl-1H-pyrrole-3-carboxamide (**10la**): white solid, m.p. 169.5-171.5 ℃, yield 68.1 mg, 80%; R_f = 0.19 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.12 (s, 1H), 7.50 (d, *J* = 8.2 Hz, 2H), 7.32 (d, *J* = 8.1 Hz, 2H), 7.24-7.12 (m, 3H), 6.97 (d, *J* = 6.9 Hz, 2H), 6.73 (b, 1H), 5.73 (b, 1H), 3.13 (b, 2H), 2.41 (s, 3H), 2.34 (s, 3H), 1.22-1.14 (m, 2H), 1.03 (dq, *J* = 7.4, 7.3 Hz, 2H), 0.67 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.7, 143.3, 135.9, 134.0, 129.6 (2C), 129.4, 127.7, 127.4, 126.5, 120.4, 119.8, 114.3, 49.7, 29.8, 21.0, 18.9, 13.4, 12.5. HRMS (ESI) m/z calcd for $C_{23}H_{28}N_3O_3S$ $(M+H)^+$ 426.1846, found 426.1845.

2-Methyl-5-((4-methyl-N-phenylphenyl)sulfonamido)-4-phenyl-1H-pyrrole-3-carboxamide (**10ma**): white solid, m.p. 189.0-191.0 ℃, yield 83.8 mg, 94%; R_f = 0.21 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.57 (s, 1H), 7.38 (d, *J* = 3.6 Hz, 2H), 7.33-7.14 (m, 8H), 7.12-6.99 (m, 4H), 6.80 (b, 1H), 6.00 (b, 1H), 2.39 (s, 3H), 2.36 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.6, 143.7, 141.2, 136.1, 133.9, 129.6, 129.53, 129.51, 129.0, 127.7, 127.5, 126.8, 126.6, 126.2, 121.0, 120.9, 114.8, 21.0, 12.5. HRMS (ESI) m/z calcd for $C_{25}H_{24}N_3O_3S$ $(M+H)^+$ 446.1533, found 446.1529.

5-(N-Benzylmethylsulfonamido)-2-methyl-4-phenyl-1H-pyrrole-3-carboxamide (**10na**): white solid, m.p. 180.9-182.4 ℃, yield 75.2 mg, 98%; R_f = 0.20 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.31 (s, 1H), 7.34-7.26 (m, 3H), 7.26-7.17 (m, 3H), 7.14-7.00 (m, 4H), 6.73 (b, 1H), 5.67 (b, 1H), 4.47 (s, 2H), 2.97 (s, 3H), 2.34 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.6, 135.9, 134.1, 129.9, 129.4, 128.5, 128.1, 127.8, 127.5, 126.7, 120.8, 120.7, 114.1, 54.1, 39.3, 12.6. HRMS (ESI) m/z calcd for $C_{20}H_{22}N_3O_3S$ $(M+H)^+$ 384.1376, found 384.1380.

2-Methyl-5-((N-methyl-2-nitrophenyl)sulfonamido)-4-phenyl-1H-pyrrole-3-carboxamide (**10oa**): white solid, m.p. 200.6-202.6 ℃, yield 82.1 mg, 99%; R_f = 0.16 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.47 (s, 1H), 7.79 (d, *J* = 7.8 Hz, 1H), 7.74 (dd, *J* = 7.9, 7.4 Hz, 1H), 7.56 (dd, *J* = 7.6, 7.6 Hz, 1H), 7.45 (d, *J* = 7.9 Hz, 1H), 7.14-7.07 (m, 3H), 7.04-6.97 (m, 2H), 6.80 (b, 1H), 5.94 (b, 1H), 3.24 (s, 3H), 2.35 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.6, 147.1, 134.6, 133.4, 132.2, 130.9, 130.5, 129.4, 129.3, 127.7, 126.4, 124.2, 121.1, 120.1, 114.5, 40.2, 12.5. HRMS (ESI) m/z calcd for $C_{19}H_{19}N_4O_5S$ $(M+H)^+$ 415.1071, found 415.1072.

2-Methyl-5-((N-methyl-4-nitrophenyl)sulfonamido)-4-phenyl-1H-pyrrole-3-carboxamide (**10pa**): white solid, m.p. 198.6-200.1 ℃, yield 82.1 mg, 99%; R_f = 0.17 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.34 (s, 1H), 8.15 (d, *J* = 8.9 Hz, 2H), 7.69 (d, *J* = 8.8 Hz, 2H), 7.08-6.98 (m, 3H), 7.04-7.67 (m, 2H), 6.80 (b, 1H), 5.99 (b, 1H), 3.21 (s, 3H), 2.31 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 166.6, 149.6, 143.9, 133.7, 129.4, 128.9, 128.5, 127.7, 126.2, 124.2, 121.5, 119.8, 114.7, 45.1, 12.4. HRMS (ESI) m/z calcd for $C_{19}H_{19}N_4O_5S$ $(M+H)^+$ 415.1071, found 415.1075.

5-((N,4-Dimethylphenyl)sulfonamido)-2,4-diphenyl-1H-pyrrole-3-carboxamide (**10ab**): white solid, m.p. 195.1-197.8 ℃, yield 87.3 mg, 98%; R_f = 0.22 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.50 (s, 1H), 7.62 (d, *J* = 7.5 Hz, 2H), 7.48-7.38 (m, 4H), 7.32-7.16 (m, 9H), 7.11 (b, 1H), 3.15 (s, 3H), 2.39 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 168.3, 143.3, 135.4, 133.7, 131.8, 129.5, 128.9, 128.3, 127.7, 127.3, 126.9, 126.8, 126.7, 126.0, 124.5, 120.2, 117.9, 38.6, 21.0. HRMS (ESI) m/z calcd for $C_{25}H_{24}N_3O_3S$ $(M+H)^+$ 446.1533, found 446.1531.

5-((N,4-Dimethylphenyl)sulfonamido)-4-phenyl-2-(p-tolyl)-1H-pyrrole-3-carboxamide (**10ac**): white solid, m.p. 189.5-191.7 ℃, yield 88.2 mg, 96%; R_f = 0.18 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 11.41 (s, 1H), 7.49 (d, *J* = 8.1 Hz, 2H), 7.42 (d, *J* = 8.2 Hz, 2H), 7.25 (d, *J* = 8.1 Hz, 2H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.20-7.14 (m, 6H), 7.07 (b, 1H), 3.13 (s, 3H), 2.38 (s, 3H), 2.33 (s, 3H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 168.4, 143.3, 136.2, 135.5, 133.7, 129.5, 129.0, 128.88, 128.87, 127.7, 127.3, 126.9, 126.7, 126.0, 124.2, 120.2, 117.4, 38.7, 21.0, 20.8. HRMS (ESI) m/z calcd for $C_{26}H_{26}N_3O_3S$ $(M+H)^+$ 460.1689, found 460.1685.

5-((N,4-Dimethylphenyl)sulfonamido)-2-isopropyl-4-phenyl-1H-pyrrole-3-carboxamide (**10ad**): white solid, m.p. 176.3-178.1 ℃, yield 80.7 mg, 98%; R_f = 0.20 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 10.90 (s, 1H), 7.33 (d, *J* = 8.3 Hz, 2H), 7.23 (d, *J* = 8.3 Hz, 2H), 7.20-7.14 (m, 3H), 7.12-7.06 (m, 2H),

6.82 (b, 1H), 6.09 (b, 1H), 3.48 (sept, *J* = 7.0 Hz, 1H), 3.06 (s, 3H), 2.37 (s, 3H), 1.20 (d, *J* = 7.0 Hz, 6H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 167.3, 143.1, 137.6, 135.4, 134.1, 129.41, 129.37, 127.7, 127.3, 126.0, 122.5, 118.8, 113.6, 38.6, 25.3, 22.3, 21.0. HRMS (ESI) m/z calcd for $C_{22}H_{26}N_3O_3S$ $(M+H)^+$ 412.1689, found 412.1688.

2-(tert-Butyl)-5-((N,4-dimethylphenyl)sulfonamido)-4-phenyl-1H-pyrrole-3-carboxamide (**10ae**): white solid, m.p. 198.1-200.7 ℃, yield 32.3 mg, 38%; R_f = 0.56 (hexanes/EtOAc = 1/1); ^{1}H NMR (DMSO-*d6, 500MHz*): δ 10.41 (s, 1H), 7.35 (d, *J* = 8.1 Hz, 2H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.18-7.10 (m, 6H), 6.95 (b, 1H), 3.10 (s, 3H), 2.36 (s, 3H), 1.32 (s, 9H); ^{13}C NMR (DMSO-*d6, 125.8MHz*): δ 169.9, 142.9, 135.8, 134.31, 134.26, 129.3, 128.7, 127.5, 127.2, 125.5, 121.3, 118.5, 115.8, 38.8, 32.7, 30.1, 21.0. HRMS (ESI) m/z calcd for $C_{23}H_{28}N_3O_3S$ $(M+H)^+$ 426.1846, found 426.1845.

X-ray structure and data of 10ad

X-ray diffraction data were collected on a Bruker SMART APEX diffractometer. Diffraction experiments employed graphite-monochromated Mo Kα radiation (λ=0.71073 Å). Colorless blocks were obtained by slow evaporation of a EtOAc/hexanes (v/v: 1:5) solution of **10ad** at room temperature. CCDC 1916501 (**10ad**) contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif.

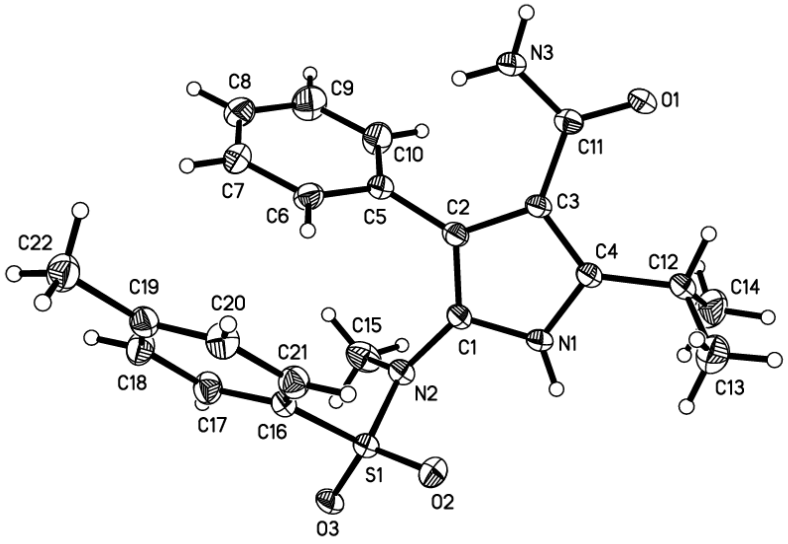


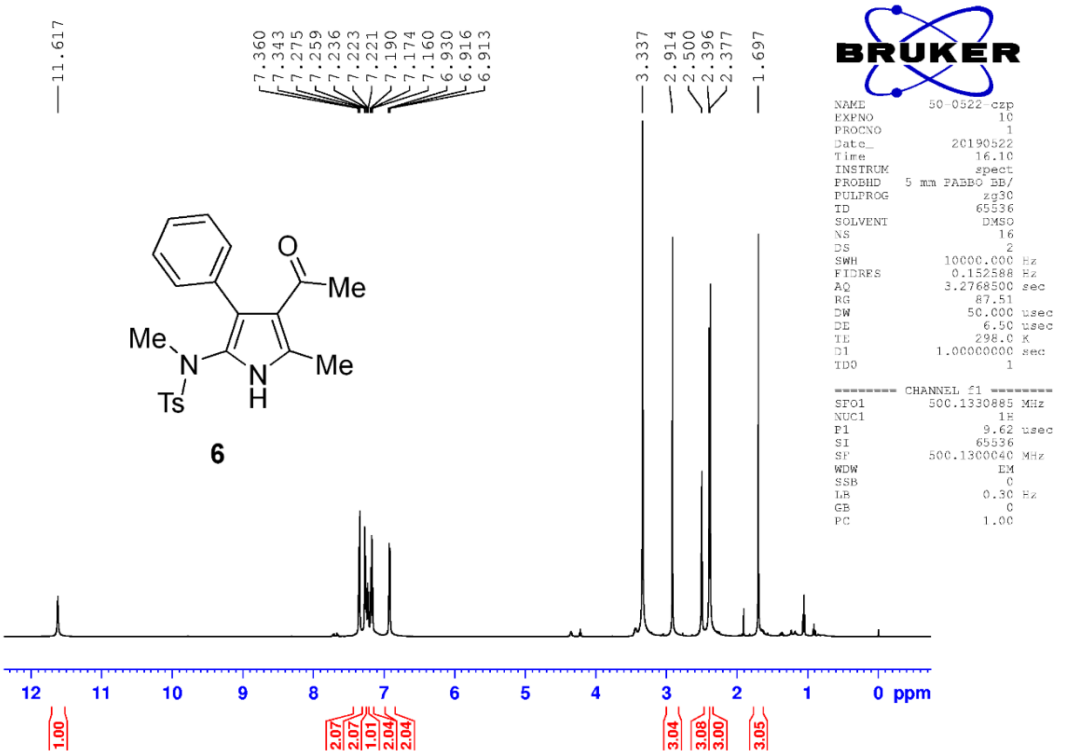
Figure 1 X-ray structure of **10ad**.

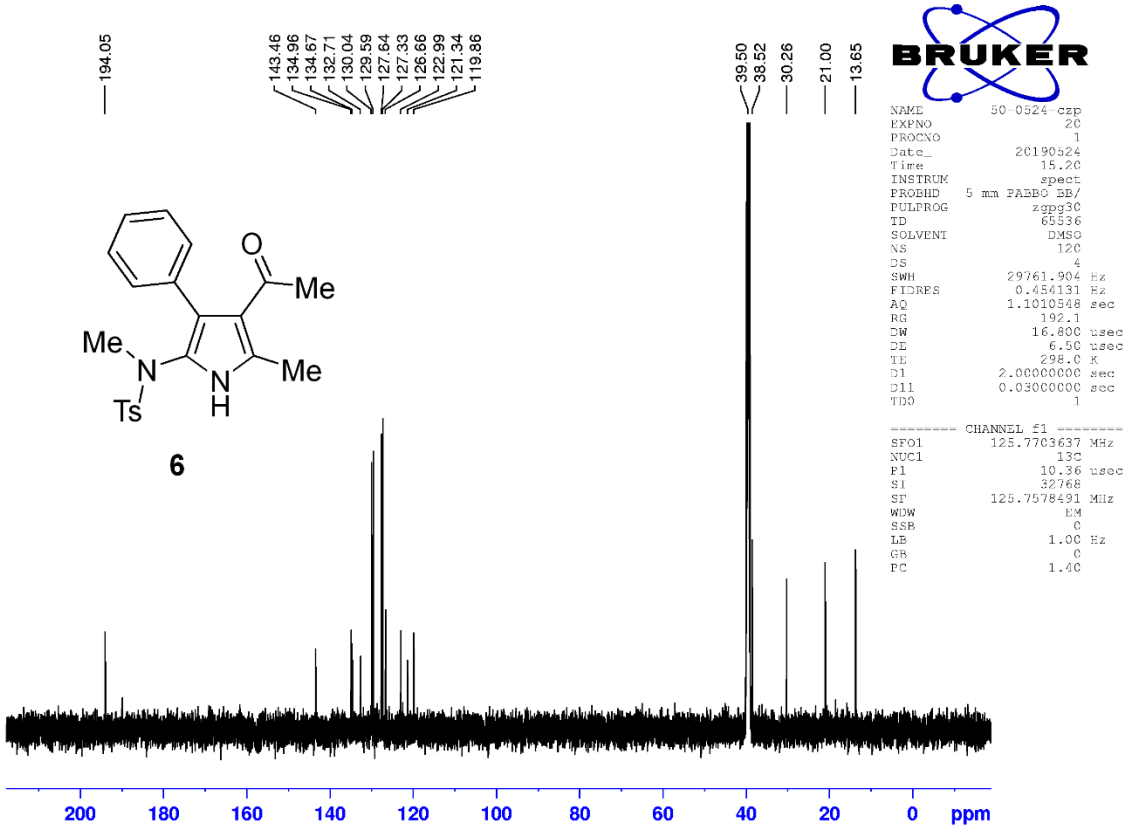
Table 1 crystal data and structure refinement for **10ad**.

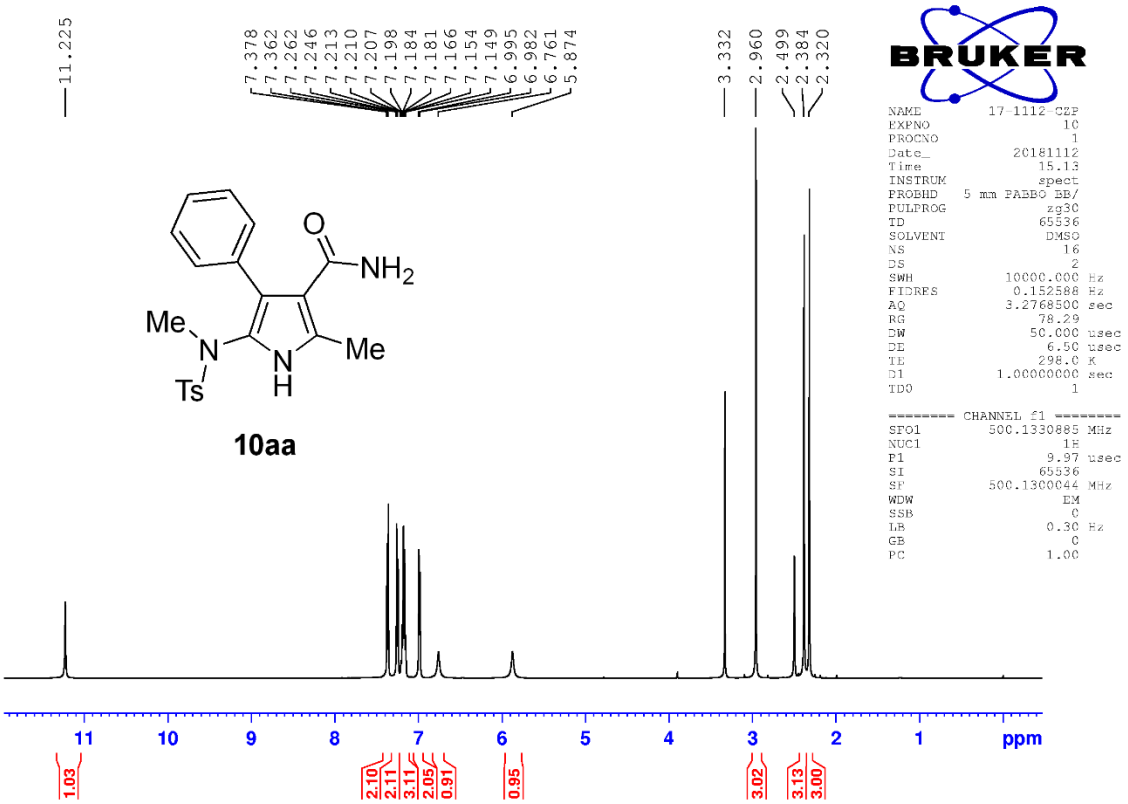
	Compound 10ad
Identification code	190410i
Empirical formula	C22 H25 N3 O3 S
Formula weight	411.51
Temperature	298(2) K
Wavelength	0.71073 A
Crystal system, space group	Monoclinic, P2(1)/c
Unit cell dimensions	a = 17.4461(15) A alpha = 90 deg. b = 6.7560(6) A beta = 119.320(4) deg. c = 21.3479(19) A gamma = 90 deg.
Volume	2193.9(3) A^3
Z, Calculated density	4, 1.246 Mg/m^3
Absorption coefficient	0.174 mm^-1
F(000)	872
Crystal size	0.27 x 0.18 x 0.10 mm
Theta range for data collection	2.19 to 25.02 deg.
Limiting indices	-18<=h<=20, -8<=k<=8, -25<=l<=13

Reflections collected / unique	10595 / 3857 [R(int) = 0.0716]
Completeness to theta = 25.02	99.9 %
Absorption correction	Semi-empirical from equivalents
Max. and min. transmission	0.9828 and 0.9544
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	3857 / 1 / 262
Goodness-of-fit on F^2	0.868
Final R indices [I>2sigma(I)]	R1 = 0.0583, wR2 = 0.1379
R indices (all data)	R1 = 0.1088, wR2 = 0.1596
Largest diff. peak and hole	0.408 and -0.361 e.A^-3

Copies of NMR spectra



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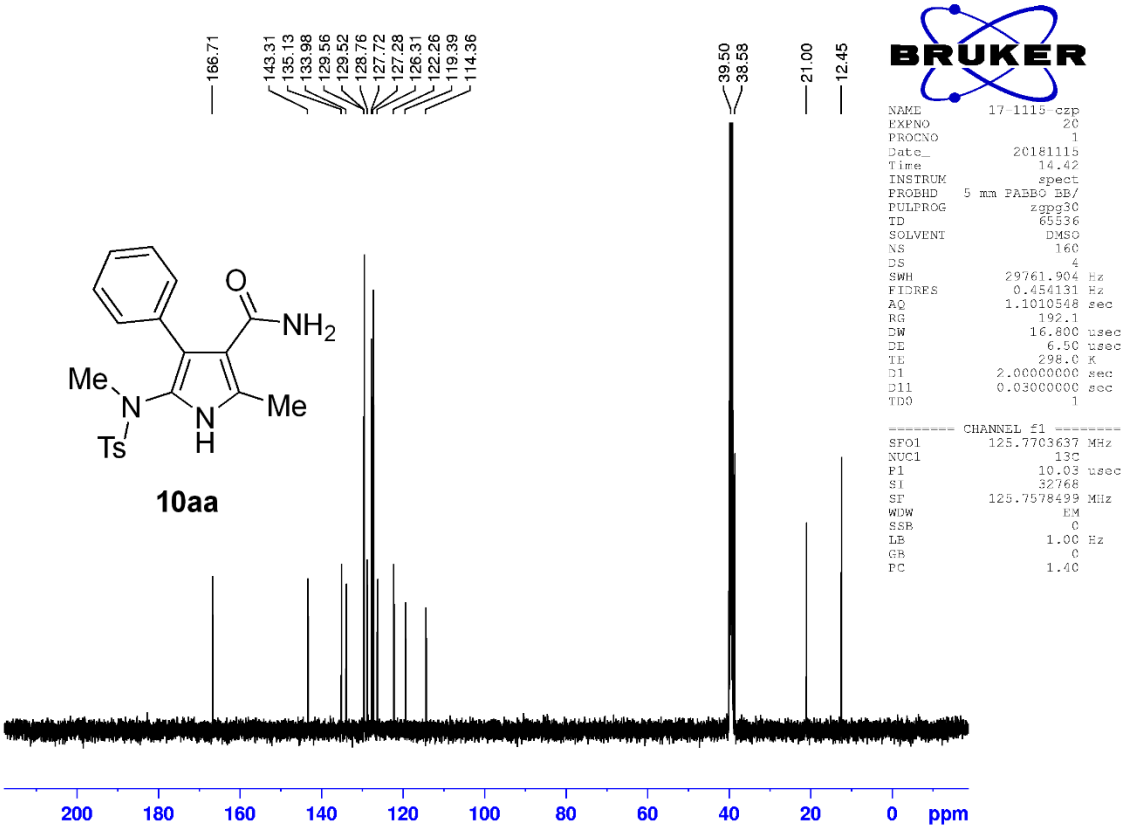
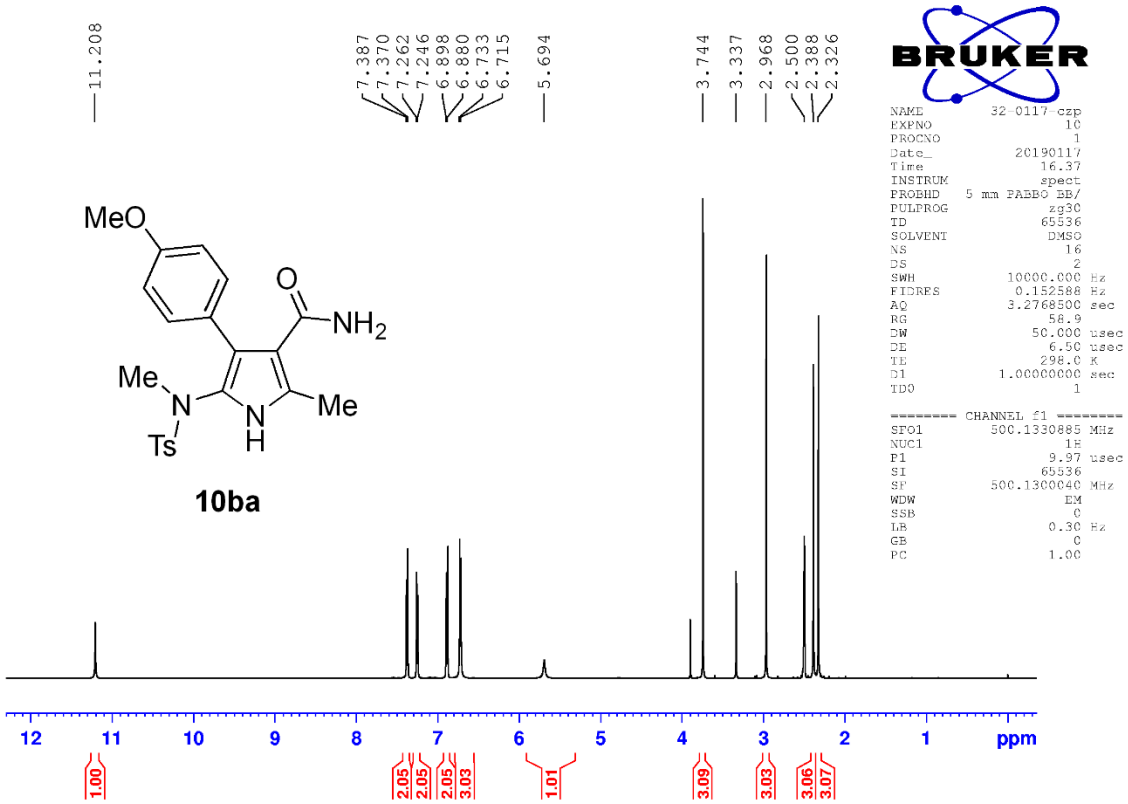
7.362
7.262
7.246
7.213
7.210
7.207
7.198
7.184
7.181
7.166
7.154
7.149
6.995
6.982
6.761
5.874
3.332
2.960
2.499
2.384
2.320
BRUKER
NAME 17-1112-CZP
EXPNO 10
PROCNO 1
Date_ 20181112
Time 15.13
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2768500 sec
RG 78.29
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
CHANNEL f1
SFO1 500.1330885 MHz
NUC1 1H
P1 9.97 usec
SI 65536
SF 500.1300044 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
O
NH2
Me
N
Me
N
H
Ts
10aa
11 10 9 8 7 6 5 4 3 2 1 ppm
1.03
2.10
2.11
3.11
2.05
0.91
0.95
3.02
3.13
3.00


166.71
143.31
135.13
133.98
129.56
129.52
128.76
127.72
127.28
126.31
122.26
119.39
114.36
39.50
38.58
21.00
12.45
BRUKER
NAME 17-1115-czp
EXPNO 20
PROCNO 1
Date_ 20181115
Time 14.42
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 160
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010548 sec
RG 192.1
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
CHANNEL f1
SFO1 125.7703637 MHz
NUC1 13C
P1 10.03 usec
SI 32768
SF 125.7578499 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
O
NH2
Me
N
Me
N
H
Ts
10aa
200 180 160 140 120 100 80 60 40 20 0 ppm




```
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EXPNO                    10
PROCNO                    1
Date_              20190117
Time                  16.37
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT               DMSO
NS                      16
DS                       2
SWH             10000.000 Hz
FIDRES              0.152588 Hz
AQ                3.2768500 sec
RG                     58.9
DW                   50.000 usec
DE                    6.50 usec
TE                  298.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            500.1330885 MHz
NUC1                      1H
P1                     9.97 usec
SI                    65536
SF              500.1300040 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```

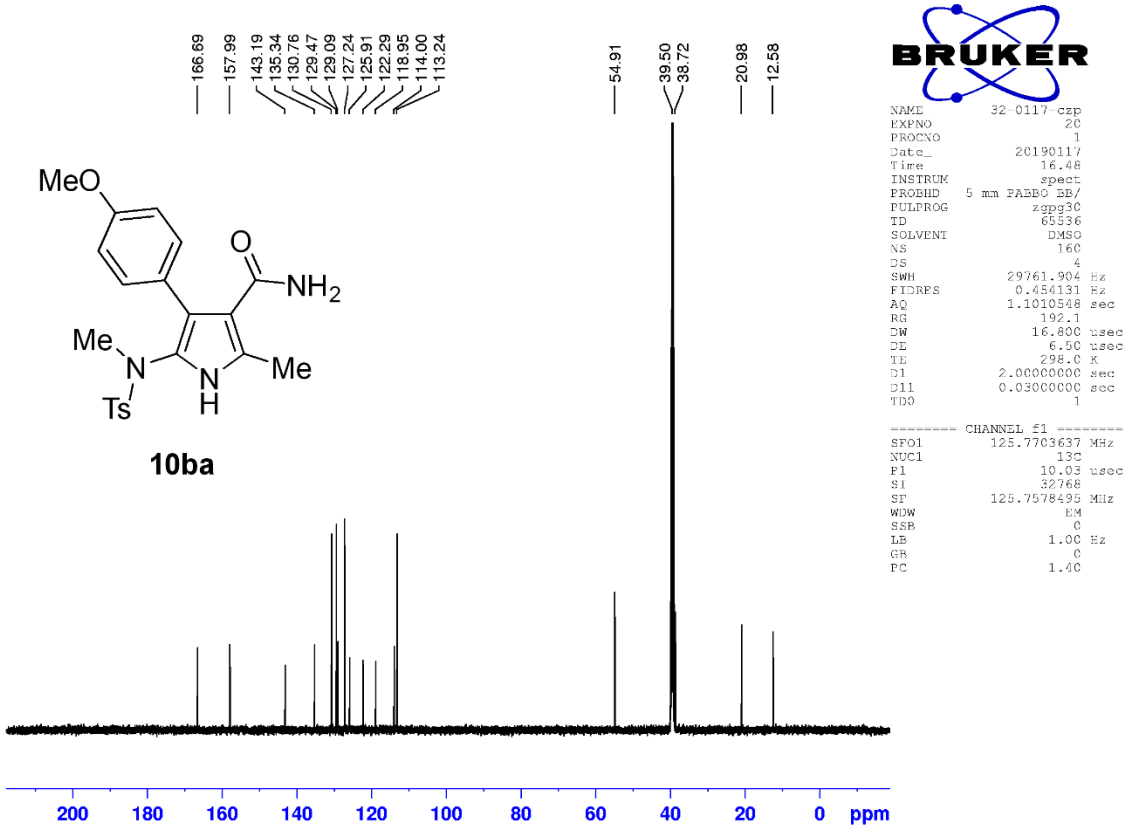


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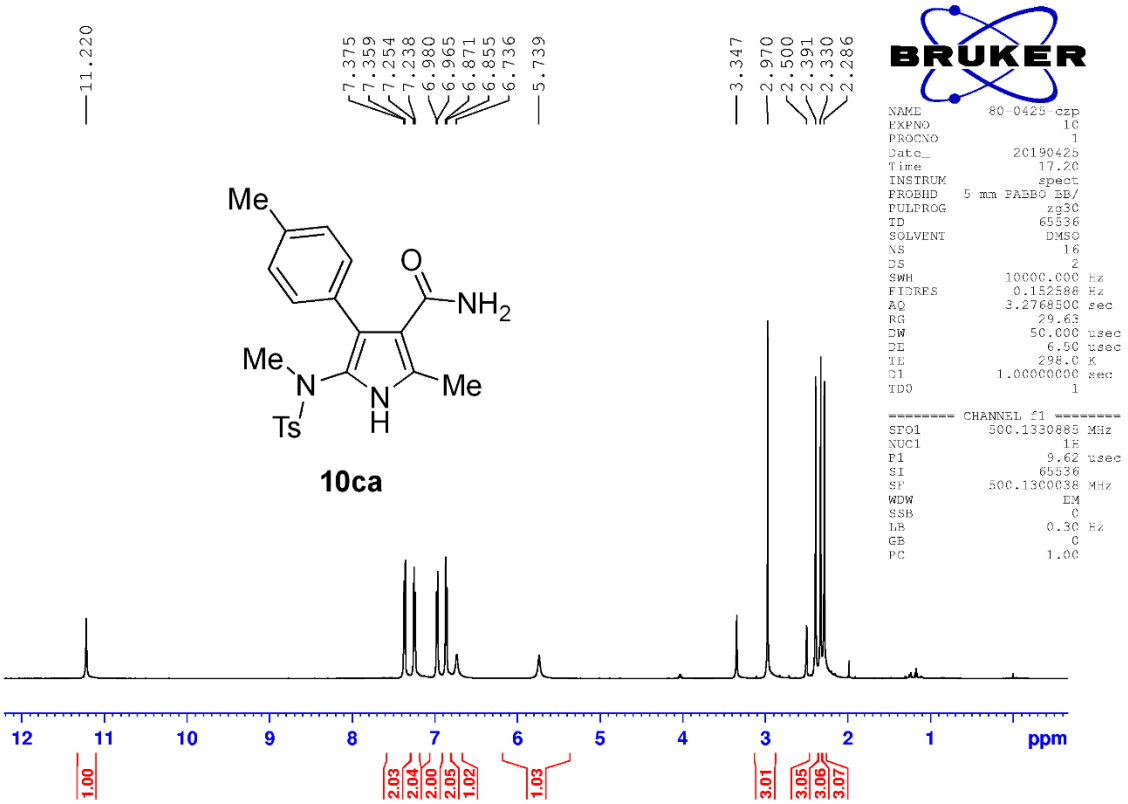
PROCNO                    1
Date_              20190117
Time                  16.48
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG             zgpg30
TD                   65536
SOLVENT               DMSO
NS                     160
DS                       4
SWH             29761.904 Hz
FIDRES              0.454131 Hz
AQ                1.1010548 sec
RG                    192.1
DW                   16.800 usec
DE                    6.50 usec
TE                  298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            125.7703637 MHz
NUC1                      13C
P1                    10.03 usec
SI                    32768
SF              125.7578495 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40
```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7.359
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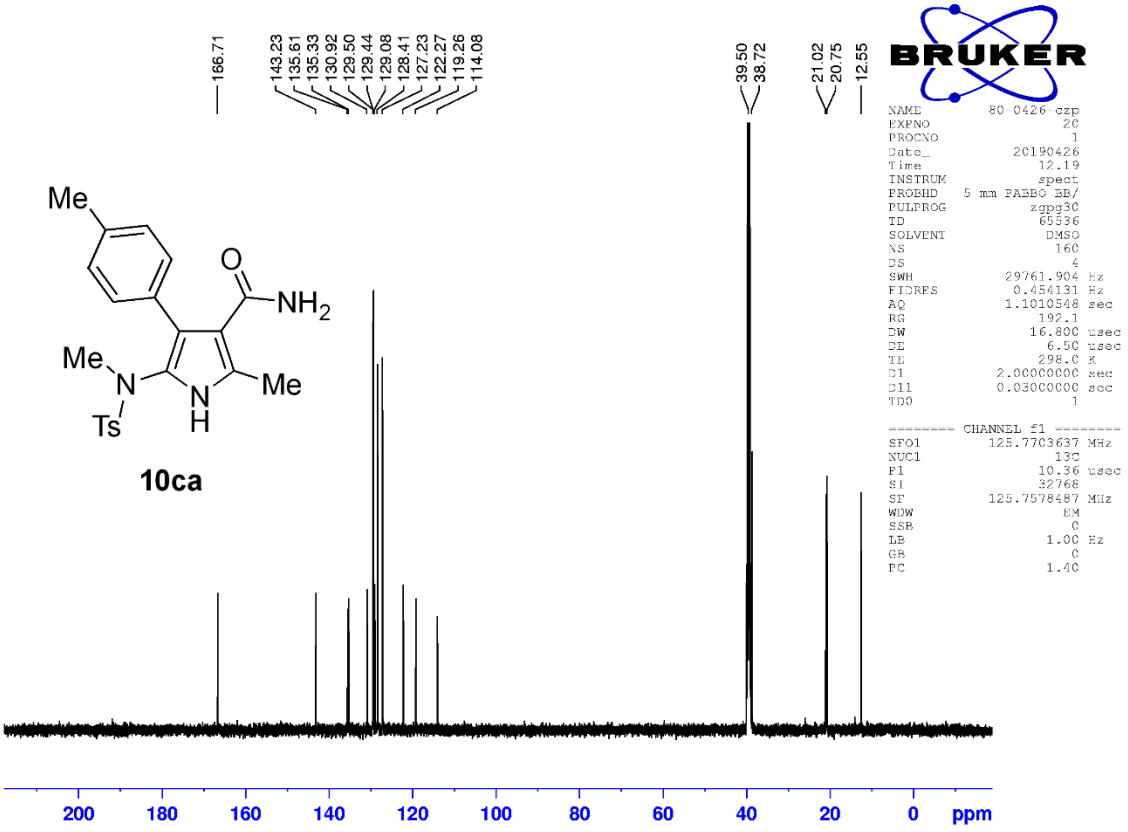
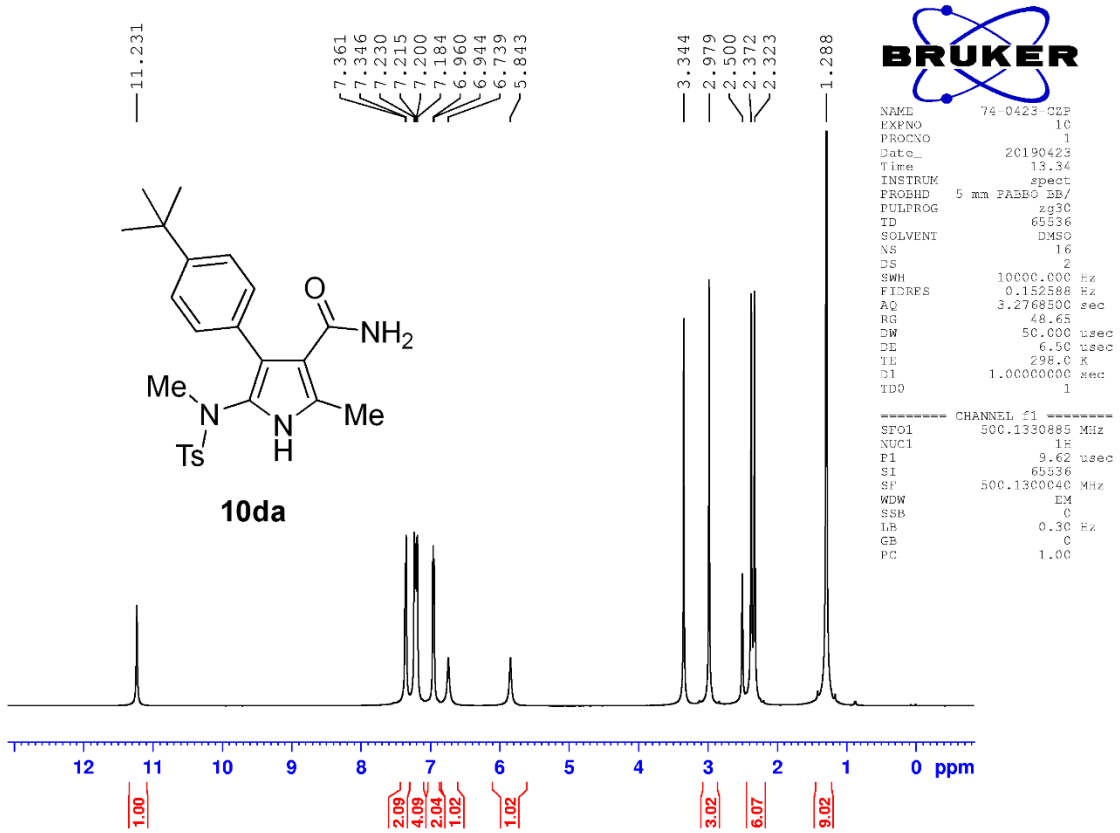
7.238
6.980
6.965
6.871
6.855
6.736
5.739
3.347
2.970
2.500
2.391
2.330
2.286
Me
O
NH2
Me
N
N
H
Me
Ts
10ca
NAME 80-0425-czp
EXPNO 10
PROCNO 1
Date_ 20190425
Time 17.20
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2768500 sec
RG 29.63
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
CHANNEL f1
SFO1 500.1330885 MHz
NUC1 1H
P1 9.62 usec
SI 65536
SF 500.1300038 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
12 11 10 9 8 7 6 5 4 3 2 1 ppm
1.00
2.03
2.04
2.00
2.05
1.02
1.03
3.01
3.05
3.06
3.07

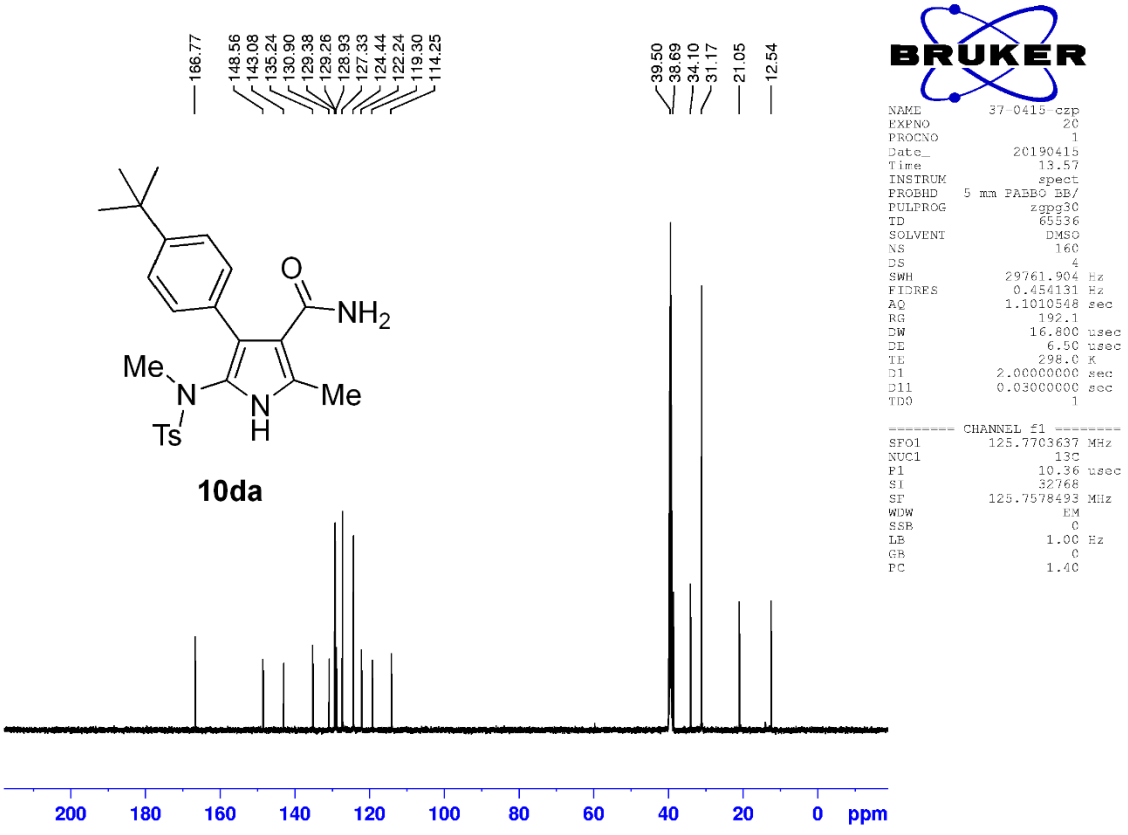

166.71
143.23
135.61
135.33
130.92
129.50
129.44
129.08
128.41
127.23
122.27
119.26
114.08
39.50
38.72
21.02
20.75
12.55
Me
O
NH2
Me
N
N
H
Me
Ts
10ca
NAME 80-0426-czp
EXPNO 20
PROCNO 1
Date_ 20190426
Time 12.19
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 160
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010548 sec
RG 192.1
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
CHANNEL f1
SFO1 125.7703637 MHz
NUC1 13C
P1 10.36 usec
SI 32768
SF 125.7578487 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
200 180 160 140 120 100 80 60 40 20 0 ppm



BRUKER

```
NAME            74-0423-CZP
EXPNO                    10
PROCNO                    1
Date_              20190423
Time                  13.34
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT               DMSO
NS                      16
DS                       2
SWH            10000.000 Hz
FIDRES             0.152588 Hz
AQ             3.2768500 sec
RG                    48.65
DW                50.000 usec
DE                 6.50 usec
TE                298.0 K
D1             1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1          500.1330885 MHz
NUC1                    1H
P1                   9.62 usec
SI                  65536
SF            500.1300040 MHz
WDW                     EM
SSB                      0
LB                    0.30 Hz
GB                       0
PC                    1.00
```



BRUKER

```
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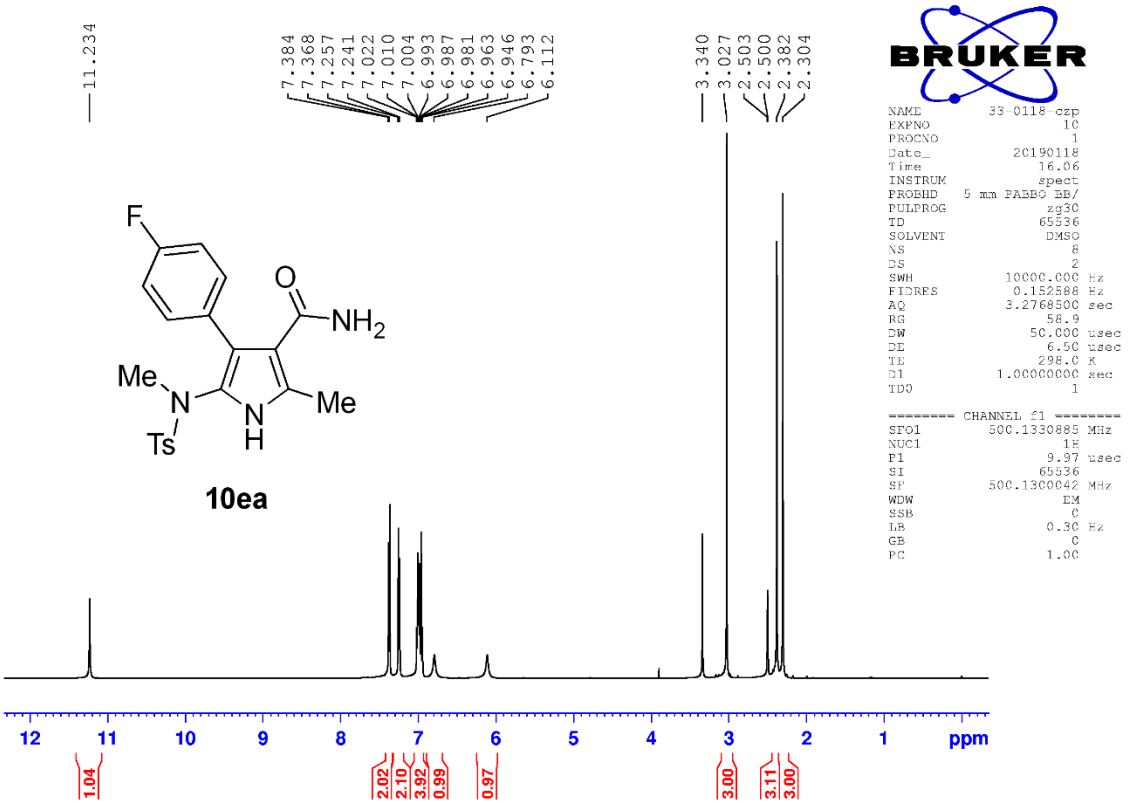
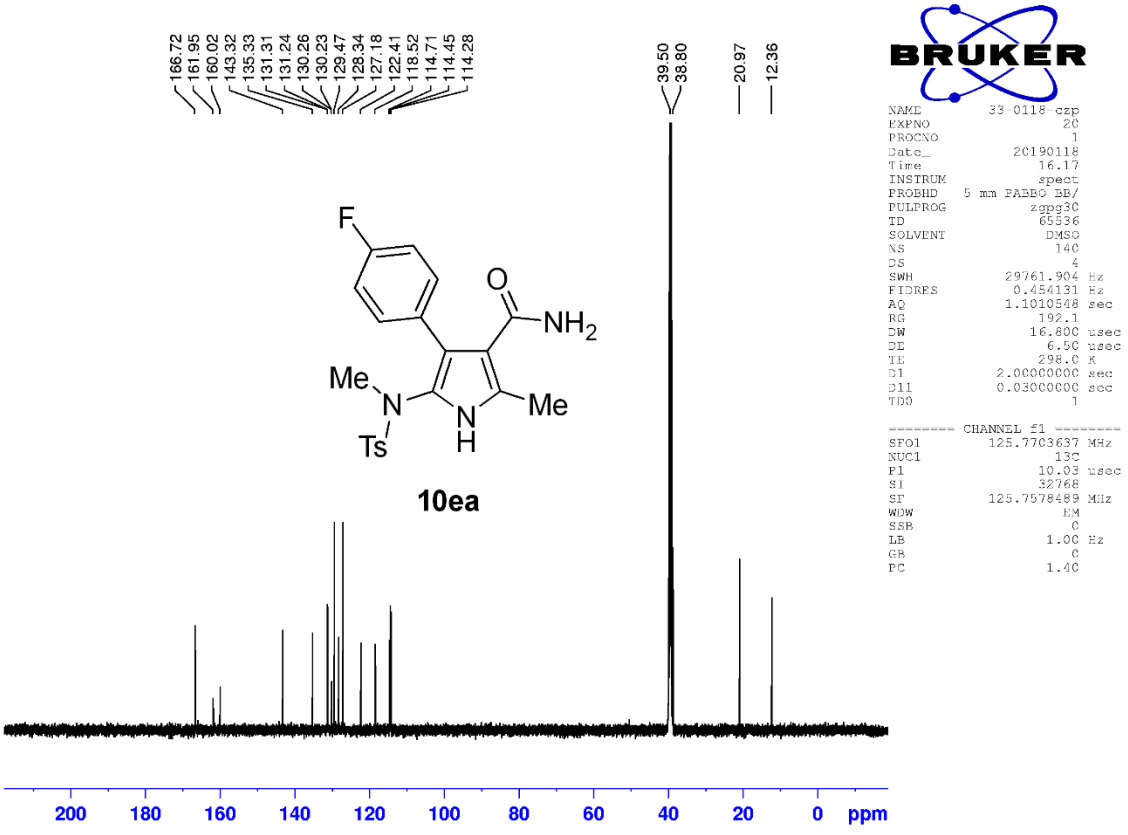
EXPNO                    20
PROCNO                    1
Date_              20190415
Time                  13.57
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG             zgpg30
TD                   65536
SOLVENT               DMSO
NS                     160
DS                       4
SWH            29761.904 Hz
FIDRES             0.454131 Hz
AQ             1.1010548 sec
RG                   192.1
DW                16.800 usec
DE                 6.50 usec
TE                298.0 K
D1             2.00000000 sec
D11            0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1          125.7703637 MHz
NUC1                    13C
P1                  10.36 usec
SI                  32768
SF            125.7578493 MHz
WDW                     EM
SSB                      0
LB                    1.00 Hz
GB                       0
PC                    1.40
```



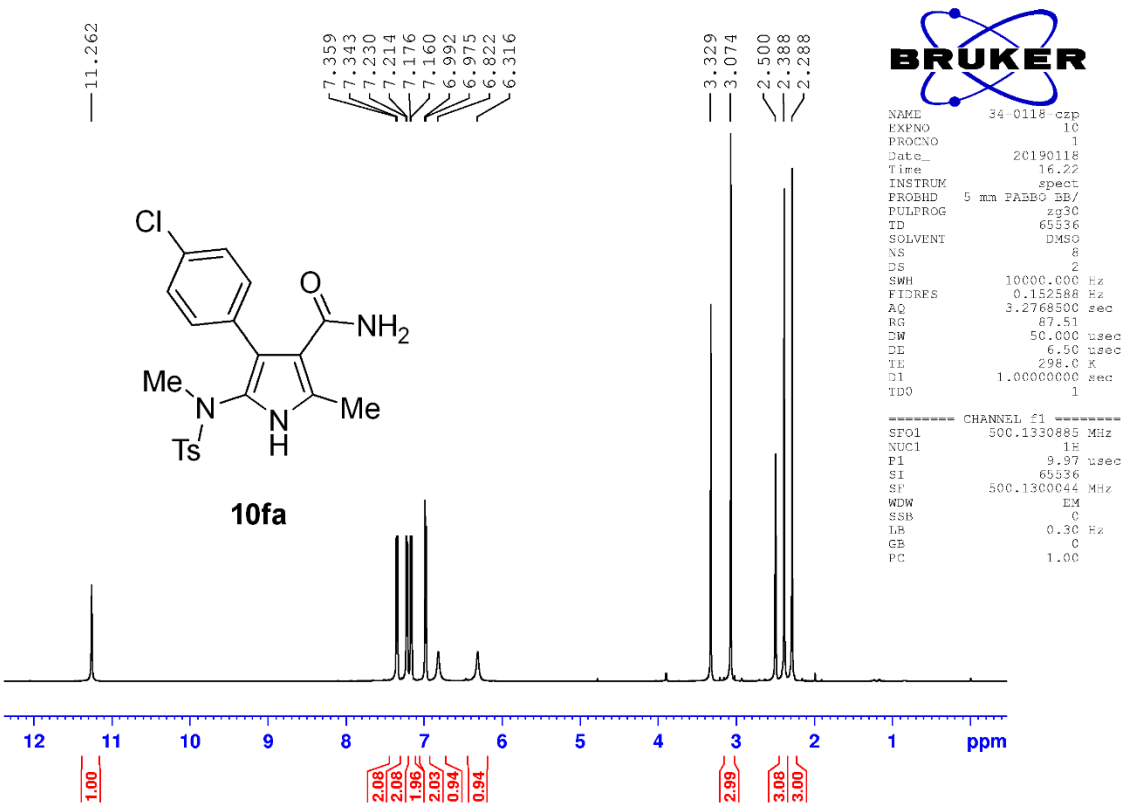

```
NAME            33-0118-czp
EXPNO                    10
PROCNO                    1
Date_              20190118
Time                  16.06
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT                DMSO
NS                        8
DS                        2
SWH           10000.000 Hz
FIDRES            0.152588 Hz
AQ                3.2768500 sec
RG                     58.9
DW                50.000 usec
DE                 6.50 usec
TE                  298.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1          500.1330885 MHz
NUC1                    1H
P1                   9.97 usec
SI                   65536
SF            500.1300042 MHz
WDW                     EM
SSB                      0
LB                    0.30 Hz
GB                       0
PC                    1.00
```



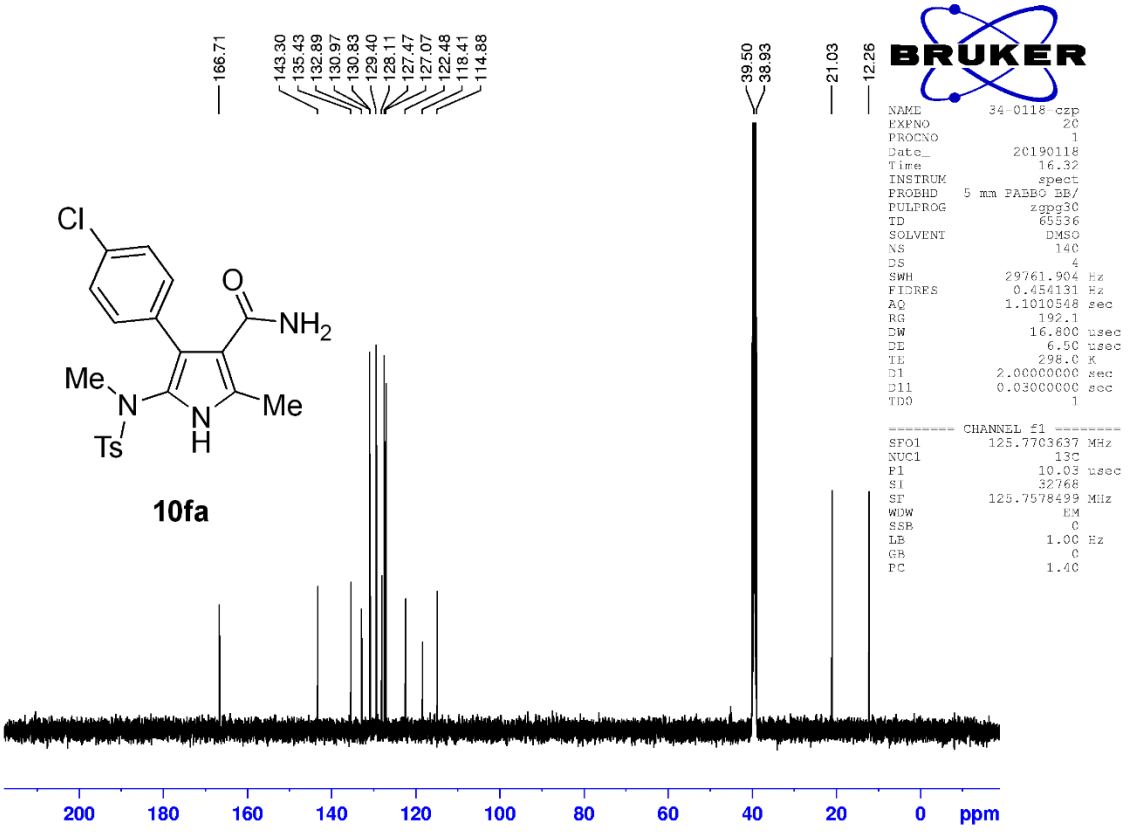

```
NAME            33-0118-czp
EXPNO                    20
PROCNO                    1
Date_              20190118
Time                  16.17
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG             zgpg30
TD                   65536
SOLVENT                DMSO
NS                      140
DS                        4
SWH           29761.904 Hz
FIDRES            0.454131 Hz
AQ                1.1010548 sec
RG                    192.1
DW                16.800 usec
DE                 6.50 usec
TE                  298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1          125.7703637 MHz
NUC1                    13C
P1                  10.03 usec
SI                   32768
SF            125.7578489 MHz
WDW                     EM
SSB                      0
LB                    1.00 Hz
GB                       0
PC                    1.40
```




```
NAME          34-0118-czp
EXPNO              10
PROCNO              1
Date_          20190118
Time              16.22
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG           zg30
TD               65536
SOLVENT           DMSO
NS                   8
DS                   2
SWH          10000.000 Hz
FIDRES        0.152588 Hz
AQ            3.2768500 sec
RG                87.51
DW               50.000 usec
DE                6.50 usec
TE              298.0 K
D1            1.00000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1         500.1330885 MHz
NUC1                1H
P1                9.97 usec
SI               65536
SF         500.1300044 MHz
WDW                 EM
SSB                  0
LB                0.30 Hz
GB                   0
PC                1.00
```




```
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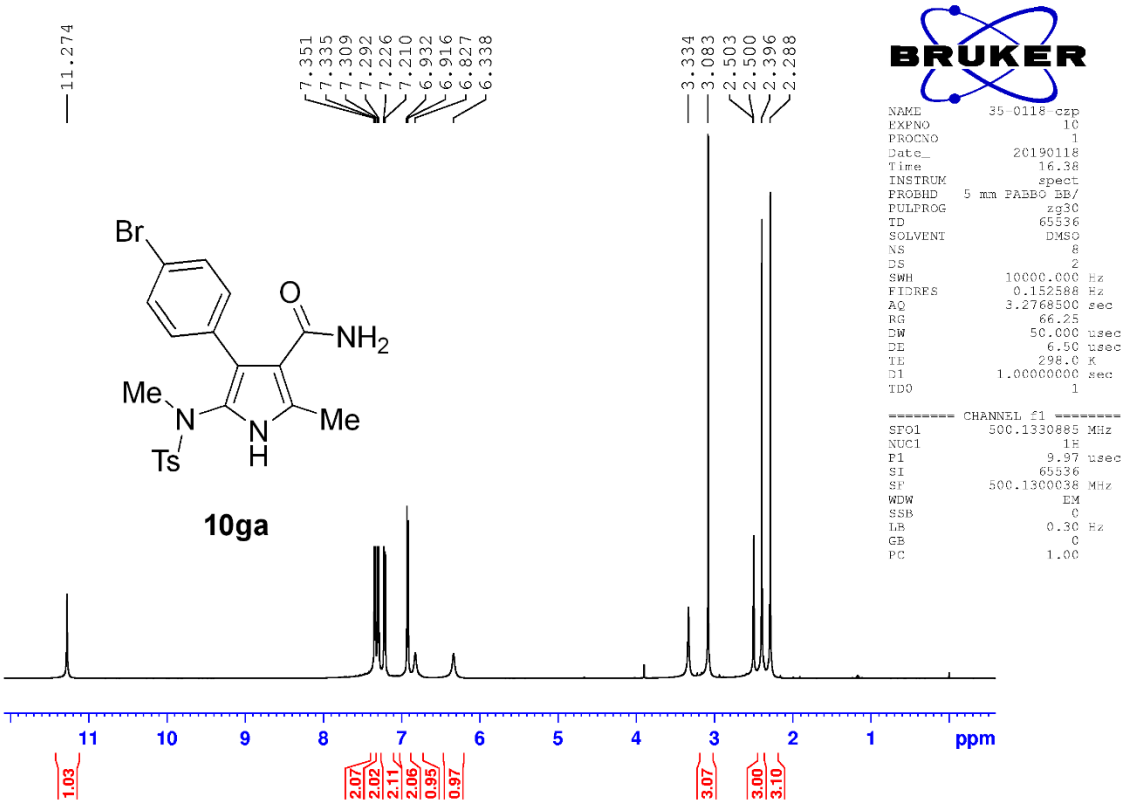
EXPNO              20
PROCNO              1
Date_          20190118
Time              16.32
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT           DMSO
NS                 140
DS                   4
SWH          29761.904 Hz
FIDRES        0.454131 Hz
AQ            1.1010548 sec
RG                192.1
DW               16.800 usec
DE                6.50 usec
TE              298.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1         125.7703637 MHz
NUC1                13C
P1               10.03 usec
SI               32768
SF         125.7578499 MHz
WDW                 EM
SSB                  0
LB                1.00 Hz
GB                   0
PC                1.40
```




```
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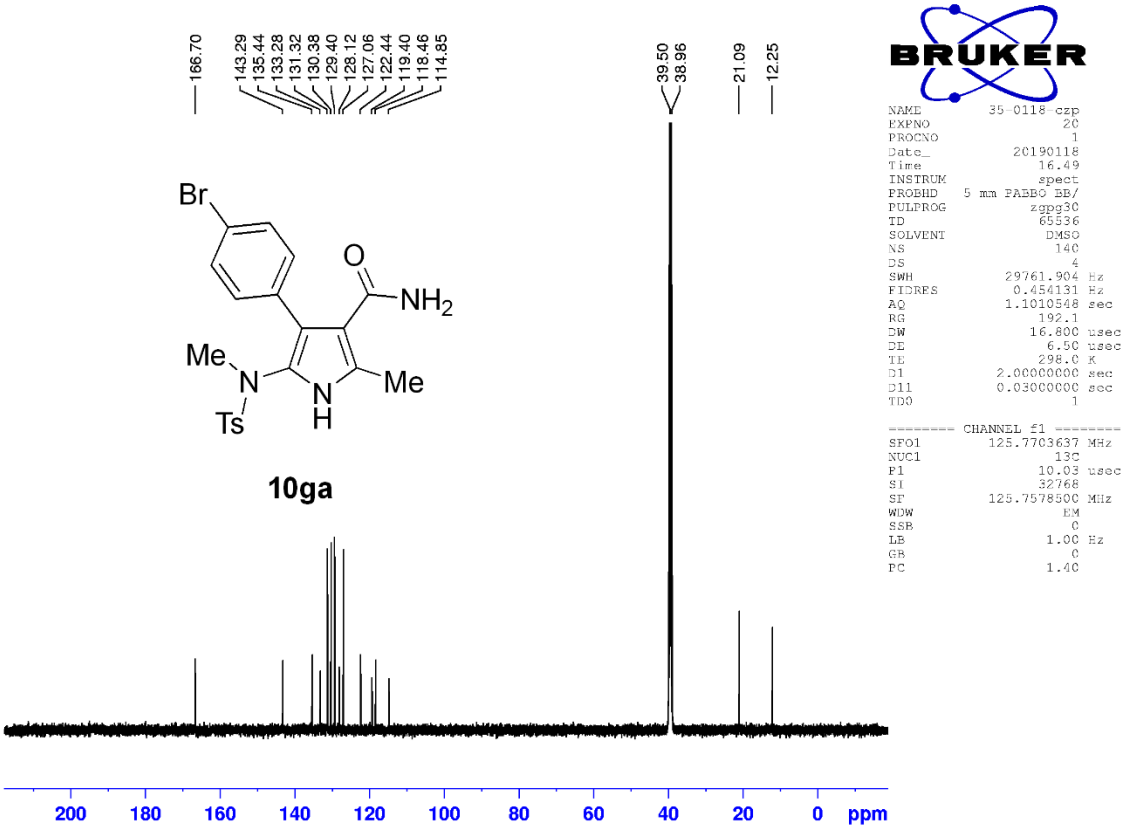
EXPNO                        10
PROCNO                        1
Date_                  20190118
Time                      16.38
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                   DMSO
NS                            8
DS                            2
SWH                 10000.000 Hz
FIDRES                0.152588 Hz
AQ                    3.2768500 sec
RG                        66.25
DW                       50.000 usec
DE                         6.50 usec
TE                       298.0 K
D1                    1.00000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                500.1330885 MHz
NUC1                        1H
P1                         9.97 usec
SI                        65536
SF                  500.1300038 MHz
WDW                         EM
SSB                          0
LB                        0.30 Hz
GB                           0
PC                        1.00
```

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EXPNO                        20
PROCNO                        1
Date_                  20190118
Time                      16.49
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                   DMSO
NS                          140
DS                            4
SWH                 29761.904 Hz
FIDRES                0.454131 Hz
AQ                    1.1010548 sec
RG                        192.1
DW                       16.800 usec
DE                         6.50 usec
TE                       298.0 K
D1                    2.00000000 sec
D11                   0.03000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                125.7703637 MHz
NUC1                        13C
P1                        10.03 usec
SI                        32768
SF                  125.7578500 MHz
WDW                         EM
SSB                          0
LB                        1.00 Hz
GB                           0
PC                        1.40
```
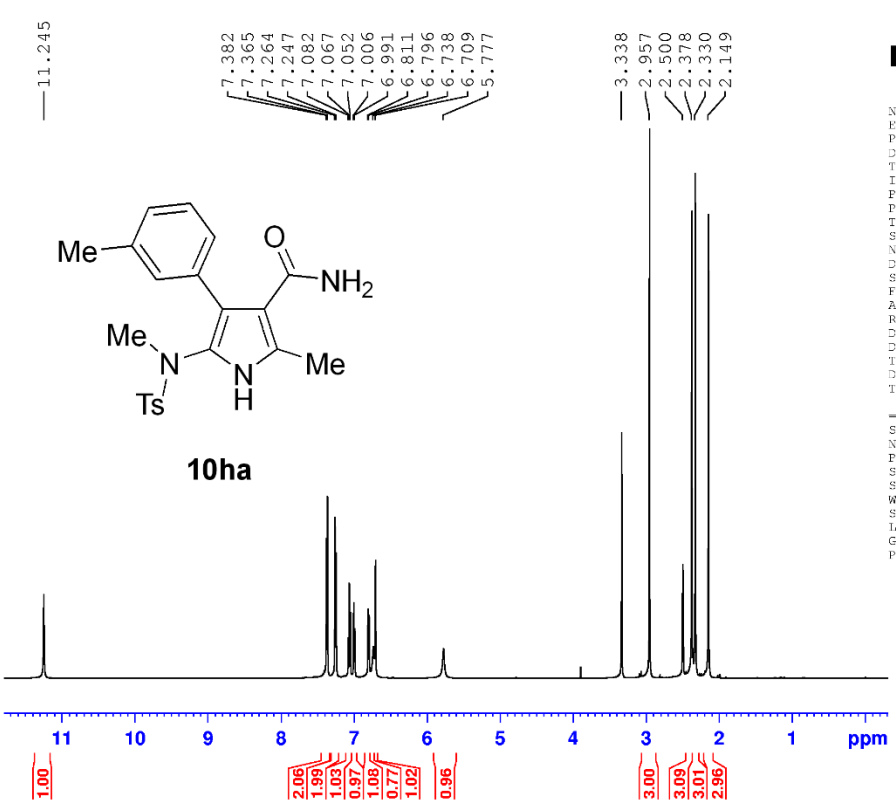
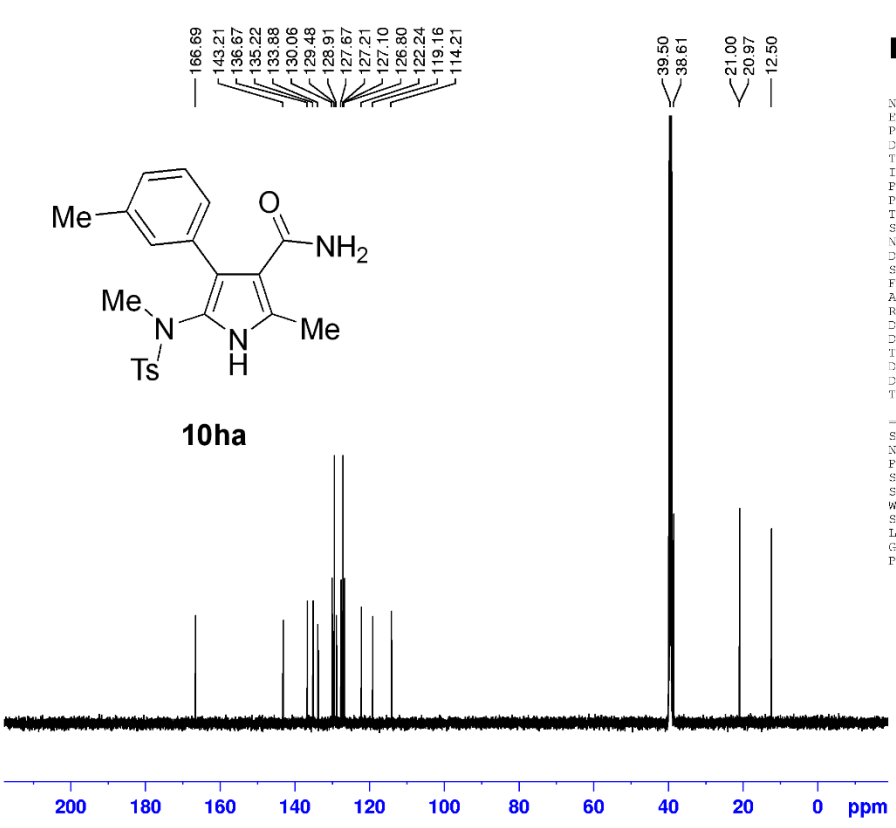



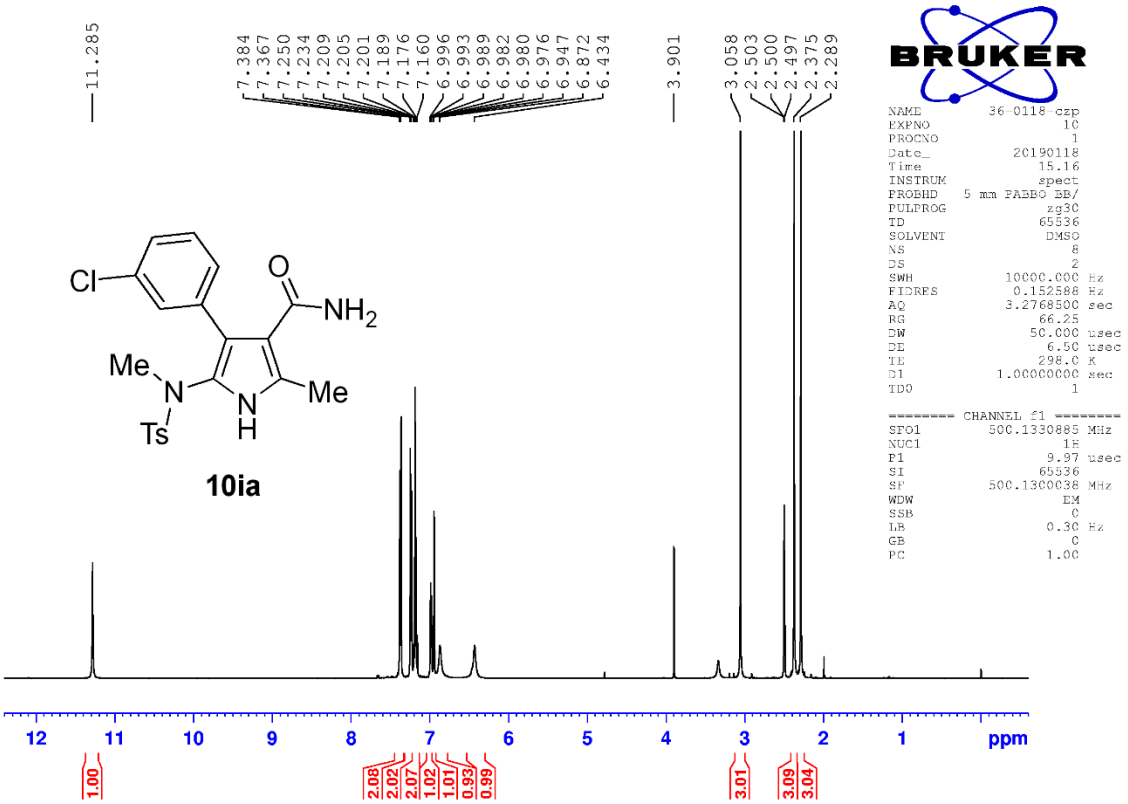
BRUKER

```
NAME                31-0117-czp
EXPNO                        10
PROCNO                        1
Date_                  20190117
Time                      16.20
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                   DMSO
NS                          16
DS                           2
SWH                  10000.000 Hz
FIDRES               0.152588 Hz
AQ                   3.2768500 sec
RG                        58.9
DW                      50.000 usec
DE                        6.50 usec
TE                      298.0 K
D1                   1.00000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                 500.1330885 MHz
NUC1                         1H
P1                         9.97 usec
SI                        65536
SF                   500.1300042 MHz
WDW                          EM
SSB                           0
LB                         0.30 Hz
GB                            0
PC                         1.00
```

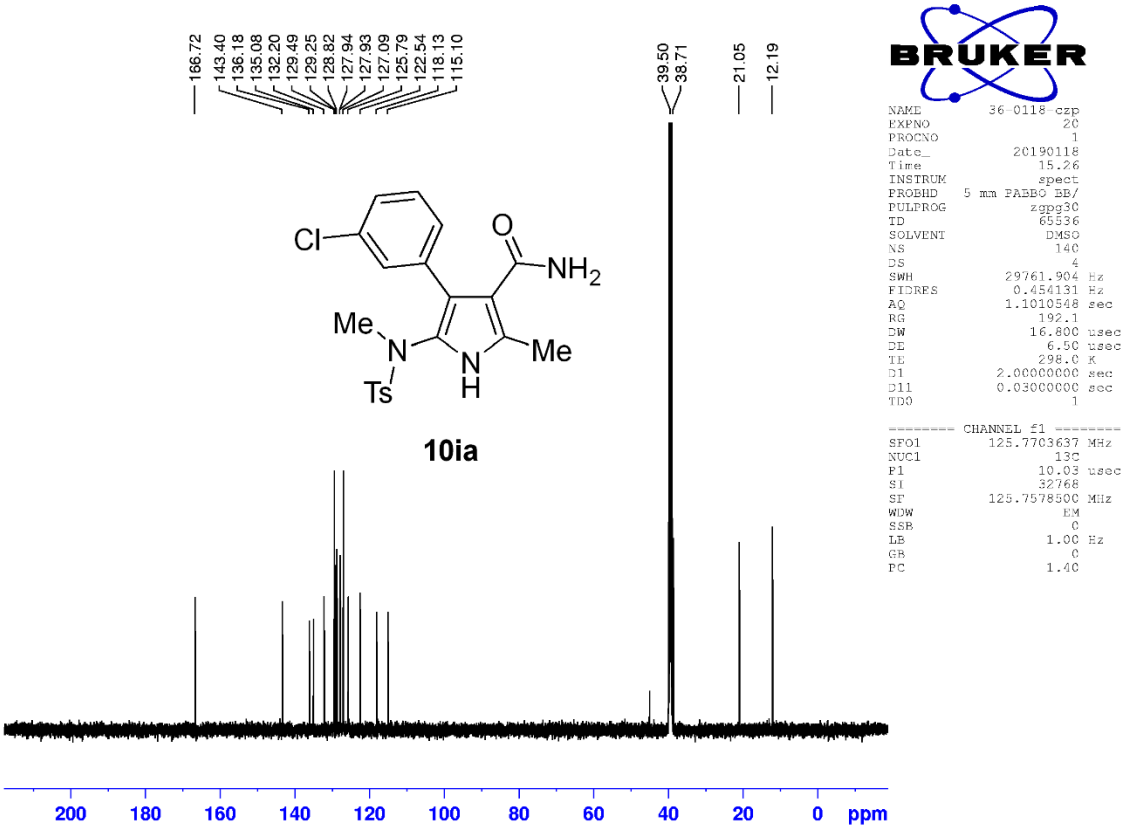


BRUKER

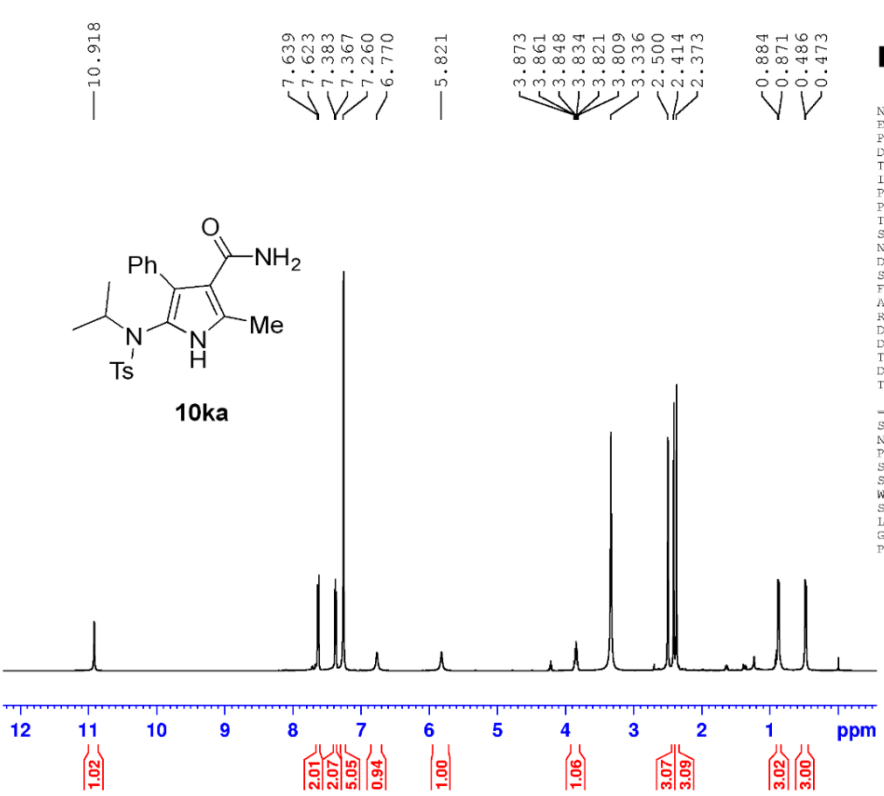
```
NAME                31-0117-czp
EXPNO                        20
PROCNO                        1
Date_                  20190117
Time                      16.32
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                   DMSO
NS                         160
DS                           4
SWH                  29761.904 Hz
FIDRES               0.454131 Hz
AQ                   1.1010548 sec
RG                        192.1
DW                      16.800 usec
DE                        6.50 usec
TE                      298.0 K
D1                   2.00000000 sec
D11                  0.03000000 sec
TD0                           1

======== CHANNEL f1 ========
SFO1                 125.7703637 MHz
NUC1                         13C
P1                        10.03 usec
SI                        32768
SF                   125.7578499 MHz
WDW                          EM
SSB                           0
LB                         1.00 Hz
GB                            0
PC                         1.40
```



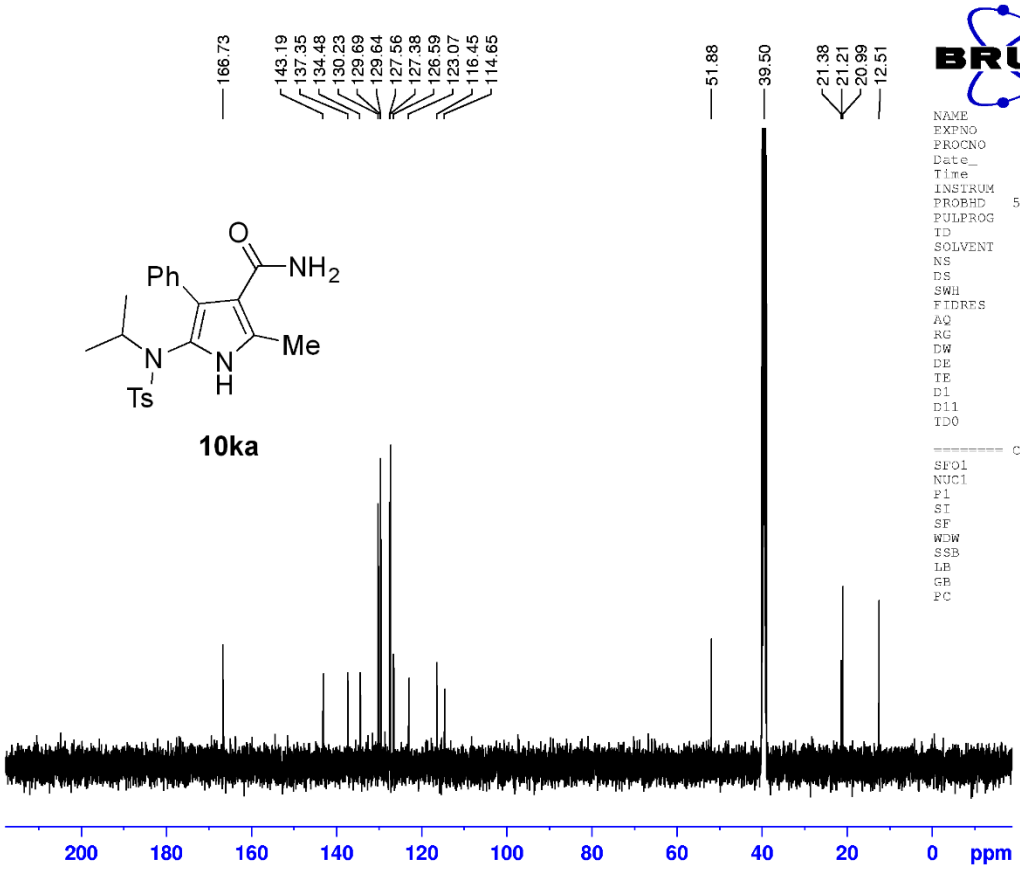

```
NAME          36-0118-czp
EXPNO              10
PROCNO              1
Date_          20190118
Time              15.16
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG           zg30
TD               65536
SOLVENT           DMSO
NS                   8
DS                   2
SWH          10000.000 Hz
FIDRES        0.152588 Hz
AQ            3.2768500 sec
RG                66.25
DW               50.000 usec
DE                6.50 usec
TE               298.0 K
D1            1.00000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1         500.1330885 MHz
NUC1               1H
P1                9.97 usec
SI               65536
SF         500.1300038 MHz
WDW                EM
SSB                 0
LB               0.30 Hz
GB                  0
PC               1.00
```



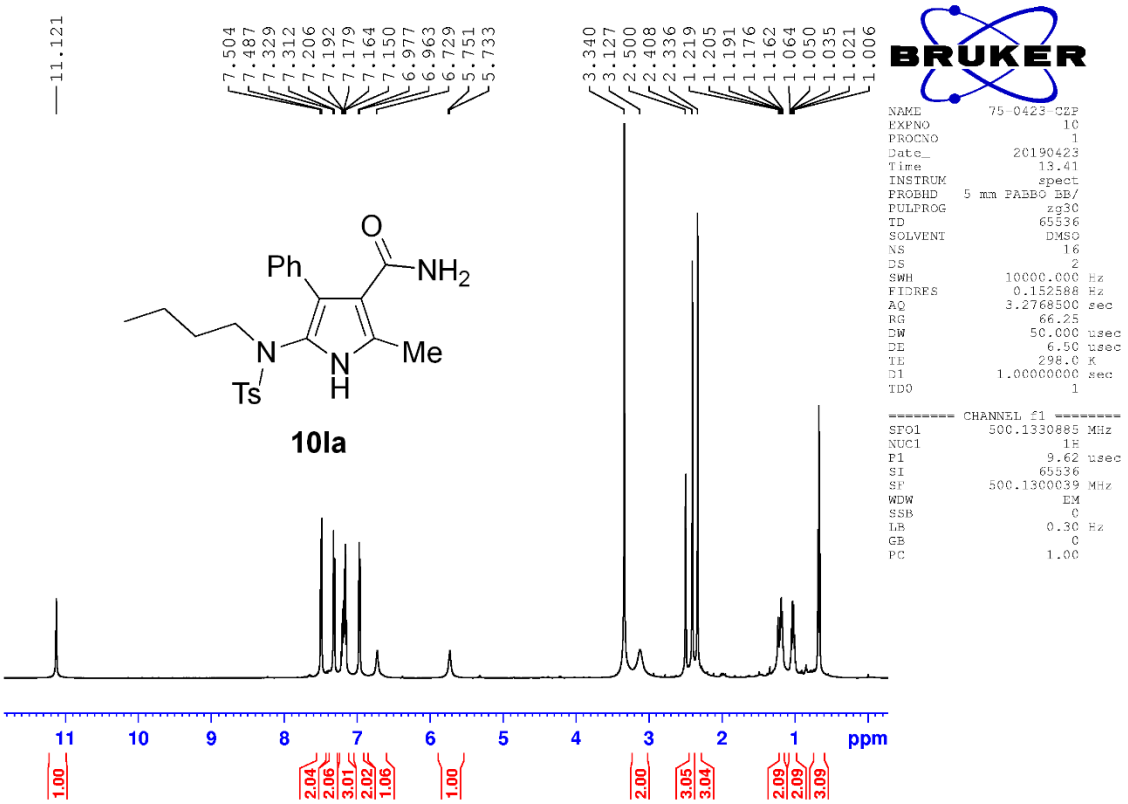

```
NAME          36-0118-czp
EXPNO              20
PROCNO              1
Date_          20190118
Time              15.26
INSTRUM           spect
PROBHD   5 mm PABBO BB/
PULPROG         zgpg30
TD               65536
SOLVENT           DMSO
NS                 140
DS                   4
SWH          29761.904 Hz
FIDRES        0.454131 Hz
AQ            1.1010548 sec
RG                192.1
DW               16.800 usec
DE                6.50 usec
TE               298.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                  1

======== CHANNEL f1 ========
SFO1         125.7703637 MHz
NUC1               13C
P1               10.03 usec
SI               32768
SF         125.7578500 MHz
WDW                EM
SSB                 0
LB               1.00 Hz
GB                  0
PC               1.40
```

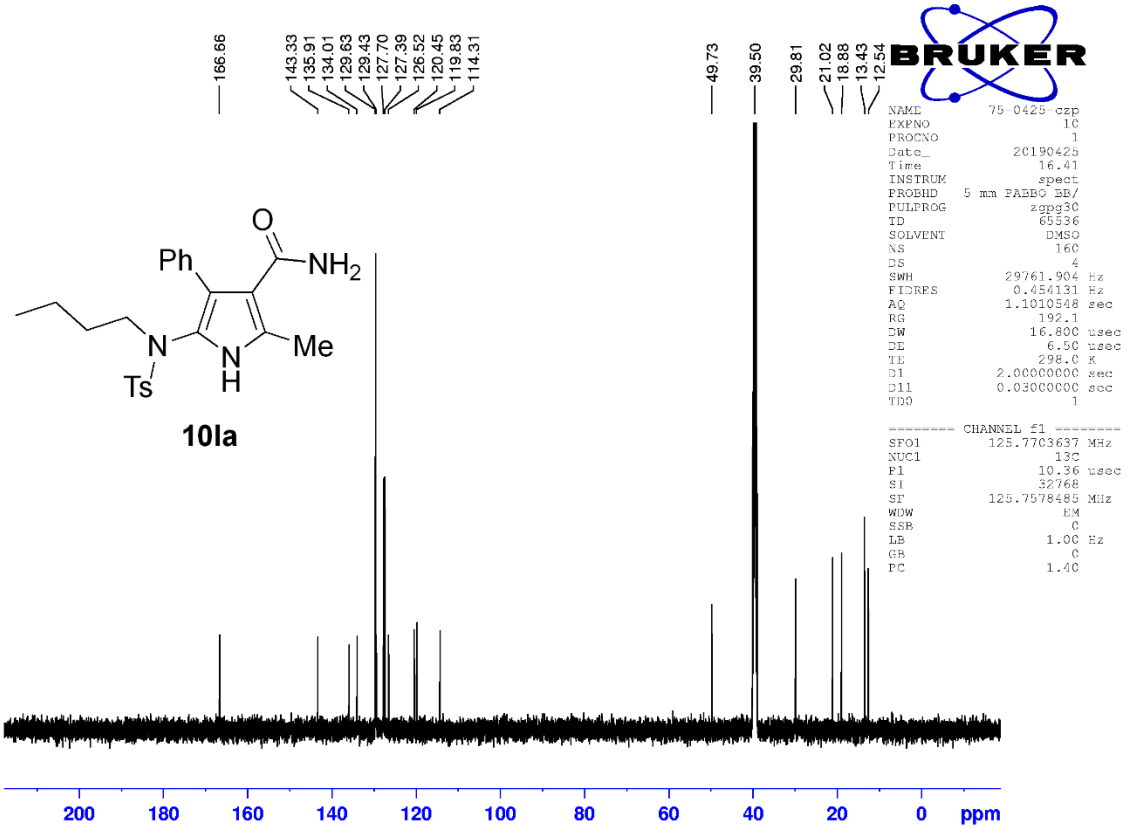


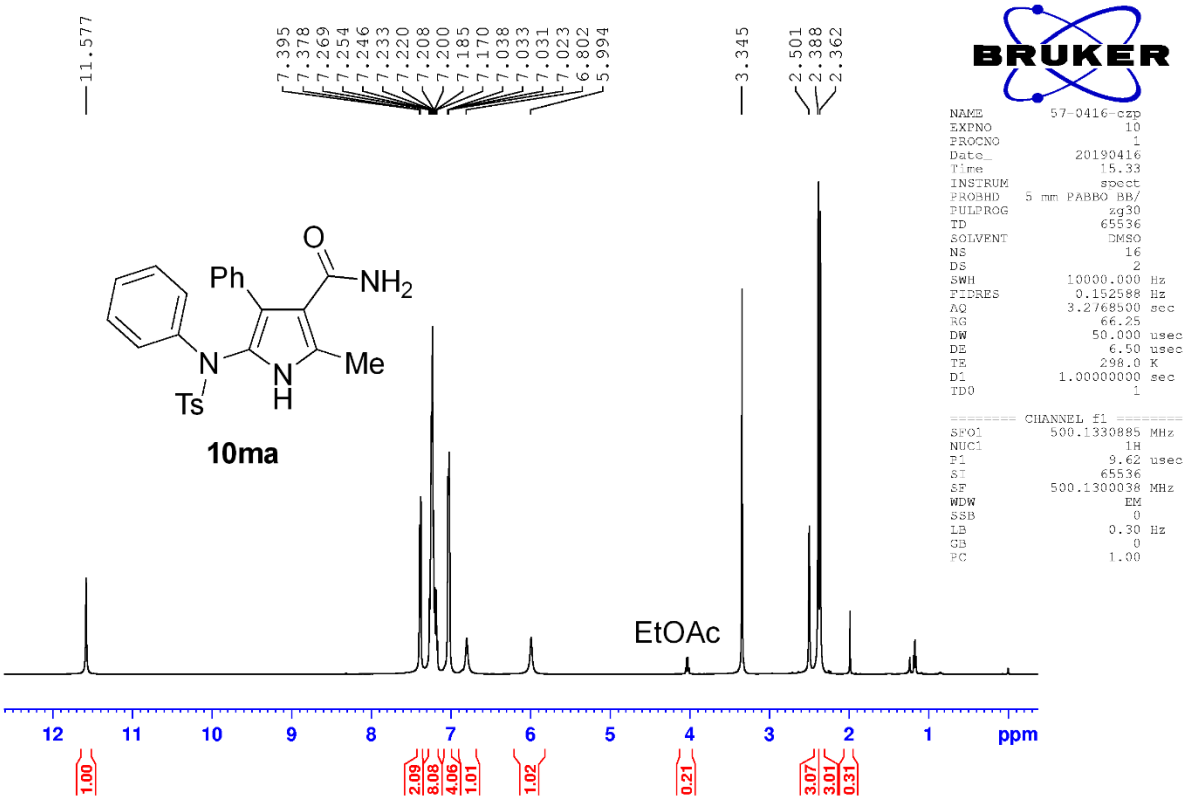

```
NAME            czp-0701-01
EXPNO                    10
PROCNO                    1
Date_             20190701
Time                 15.23
INSTRUM              spect
PROBHD   5 mm PABBO BB/
PULPROG              zg30
TD                  65536
SOLVENT              DMSO
NS                     16
DS                      2
SWH           10000.000 Hz
FIDRES            0.152588 Hz
AQ                3.2768500 sec
RG                   106.4
DW                  50.000 usec
DE                   6.50 usec
TE                  298.0 K
D1                1.00000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1            500.1330885 MHz
NUC1                    1H
P1                   9.62 usec
SI                  65536
SF              500.1300045 MHz
WDW                     EM
SSB                      0
LB                    0.30 Hz
GB                       0
PC                    1.00
```



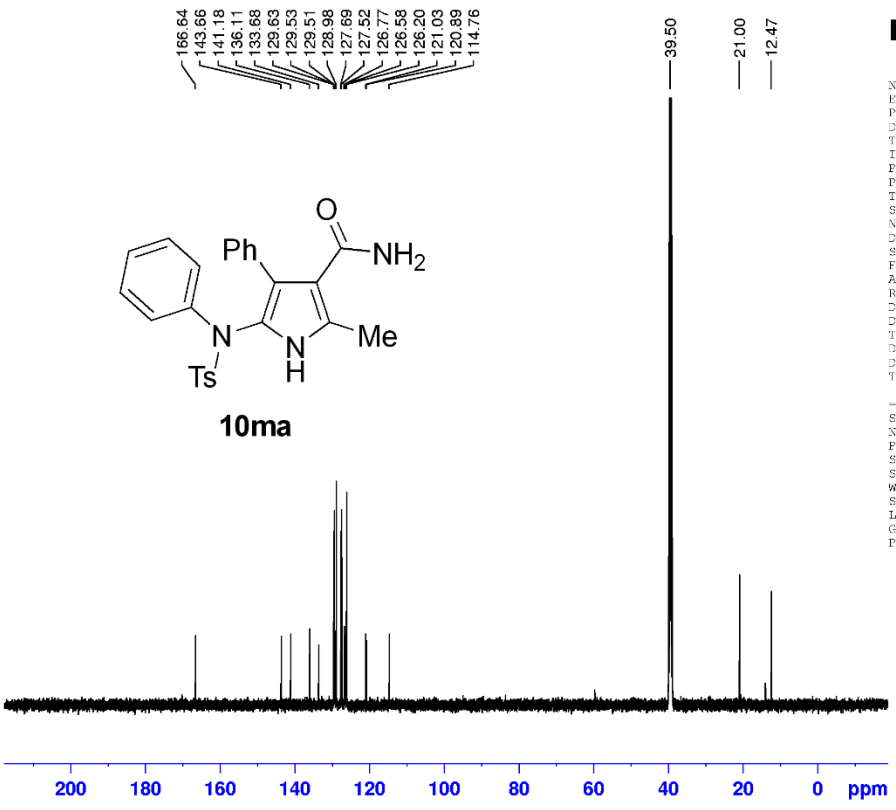

```
NAME            czp-0701-01
EXPNO                    20
PROCNO                    1
Date_             20190701
Time                 15.35
INSTRUM              spect
PROBHD   5 mm PABBO BB/
PULPROG            zgpg30
TD                  65536
SOLVENT              DMSO
NS                    160
DS                      4
SWH           29761.904 Hz
FIDRES            0.454131 Hz
AQ                1.1010548 sec
RG                   192.1
DW                  16.800 usec
DE                   6.50 usec
TE                  298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                     1

======== CHANNEL f1 ========
SFO1            125.7703637 MHz
NUC1                    13C
P1                  10.36 usec
SI                  32768
SF              125.7578504 MHz
WDW                     EM
SSB                      0
LB                    1.00 Hz
GB                       0
PC                    1.40
```


11.121
7.504
7.487
7.329
7.312
7.206
7.192
7.179
7.164
7.150
6.977
6.963
6.729
5.751
5.733
3.340
3.127
2.500
2.408
2.336
1.219
1.205
1.191
1.176
1.162
1.064
1.050
1.035
1.021
1.006
Ph
O
NH2
N
Me
N
H
Ts
10la
NAME 75-0423-CZP
EXPNO 10
PROCNO 1
Date_ 20190423
Time 13.41
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2768500 sec
RG 66.25
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
CHANNEL f1
SFO1 500.1330885 MHz
NUC1 1H
P1 9.62 usec
SI 65536
SF 500.1300039 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
11 10 9 8 7 6 5 4 3 2 1 ppm
1.00 2.04 2.06 3.01 2.02 1.06 1.00 2.00 3.05 3.04 2.09 2.09 3.09

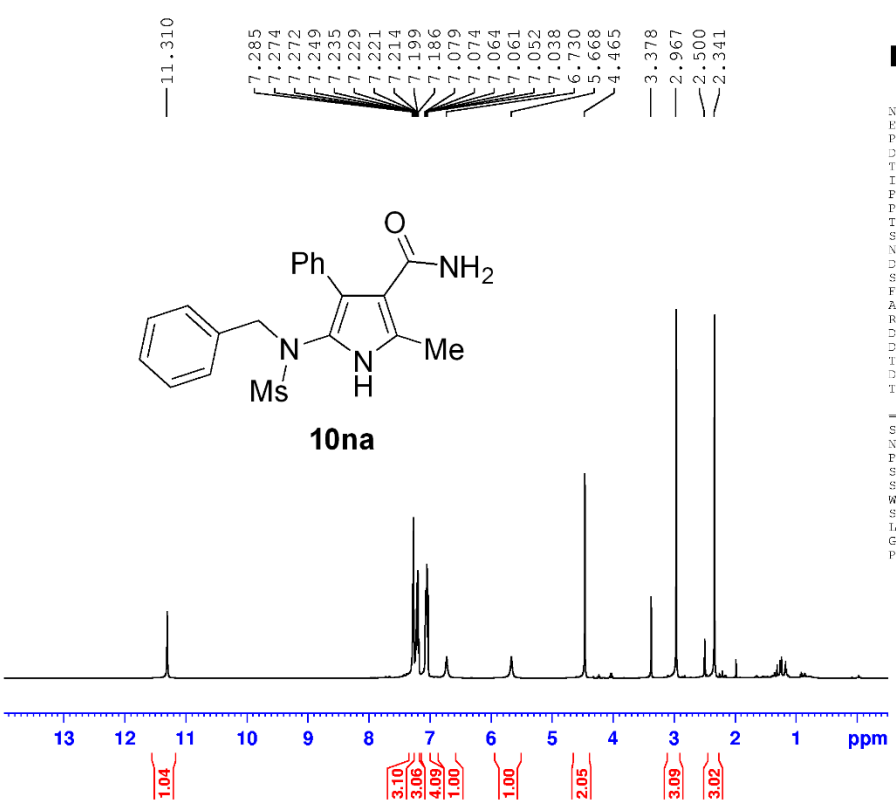

166.66
143.33
135.91
134.01
129.63
129.43
127.70
127.39
126.52
120.45
119.83
114.31
49.73
39.50
29.81
21.02
18.88
13.43
12.54
Ph
O
NH2
N
Me
N
H
Ts
10la
NAME 75-0425-czp
EXPNO 10
PROCNO 1
Date_ 20190425
Time 16.41
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 160
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010548 sec
RG 192.1
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
CHANNEL f1
SFO1 125.7703637 MHz
NUC1 13C
P1 10.36 usec
SI 32768
SF 125.7578485 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
200 180 160 140 120 100 80 60 40 20 0 ppm




```
NAME            57-0416-czp
EXPNO                    10
PROCNO                    1
Date_              20190416
Time                  15.33
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT               DMSO
NS                      16
DS                       2
SWH           10000.000 Hz
FIDRES        0.152588 Hz
AQ            3.2768500 sec
RG                   66.25
DW                 50.000 usec
DE                  6.50 usec
TE                 298.0 K
D1            1.00000000 sec
TD0                      1

======== CHANNEL f1 ========
SFO1        500.1330885 MHz
NUC1                   1H
P1                   9.62 usec
SI                  65536
SF          500.1300038 MHz
WDW                    EM
SSB                     0
LB                   0.30 Hz
GB                      0
PC                   1.00
```

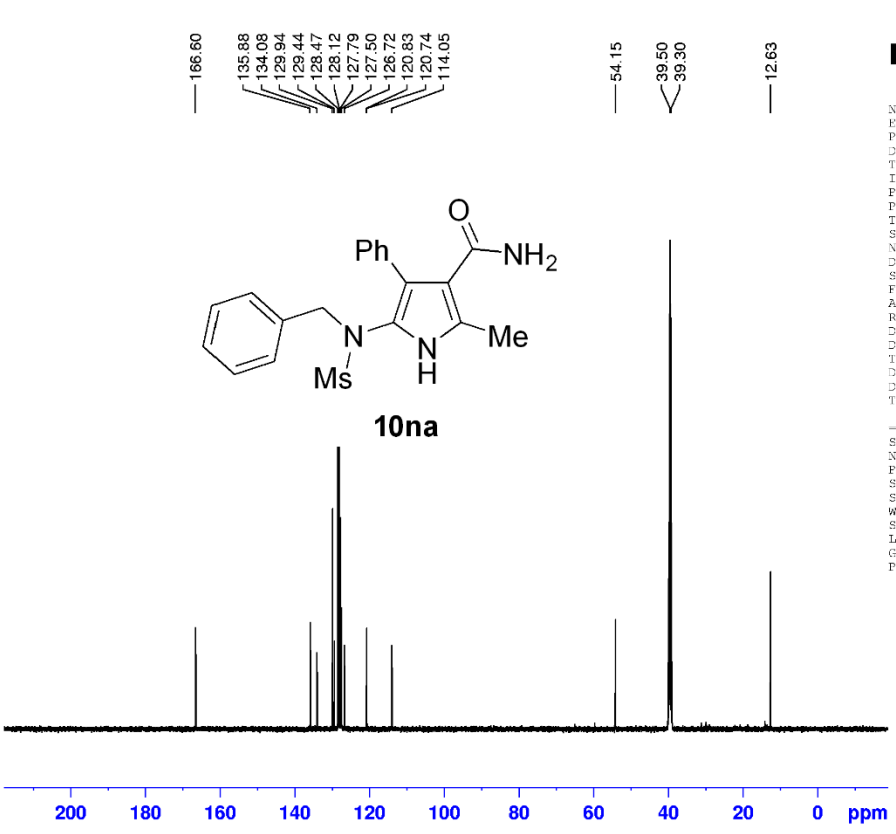



```
NAME            44-0416-czp
EXPNO                    20
PROCNO                    1
Date_              20190416
Time                  16.04
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG            zgpg30
TD                   65536
SOLVENT               DMSO
NS                     160
DS                       4
SWH           29761.904 Hz
FIDRES        0.454131 Hz
AQ            1.1010548 sec
RG                   192.1
DW                 16.800 usec
DE                  6.50 usec
TE                 298.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0                      1

======== CHANNEL f1 ========
SFO1        125.7703637 MHz
NUC1                   13C
P1                  10.36 usec
SI                   32768
SF          125.7578500 MHz
WDW                    EM
SSB                     0
LB                   1.00 Hz
GB                      0
PC                   1.40
```



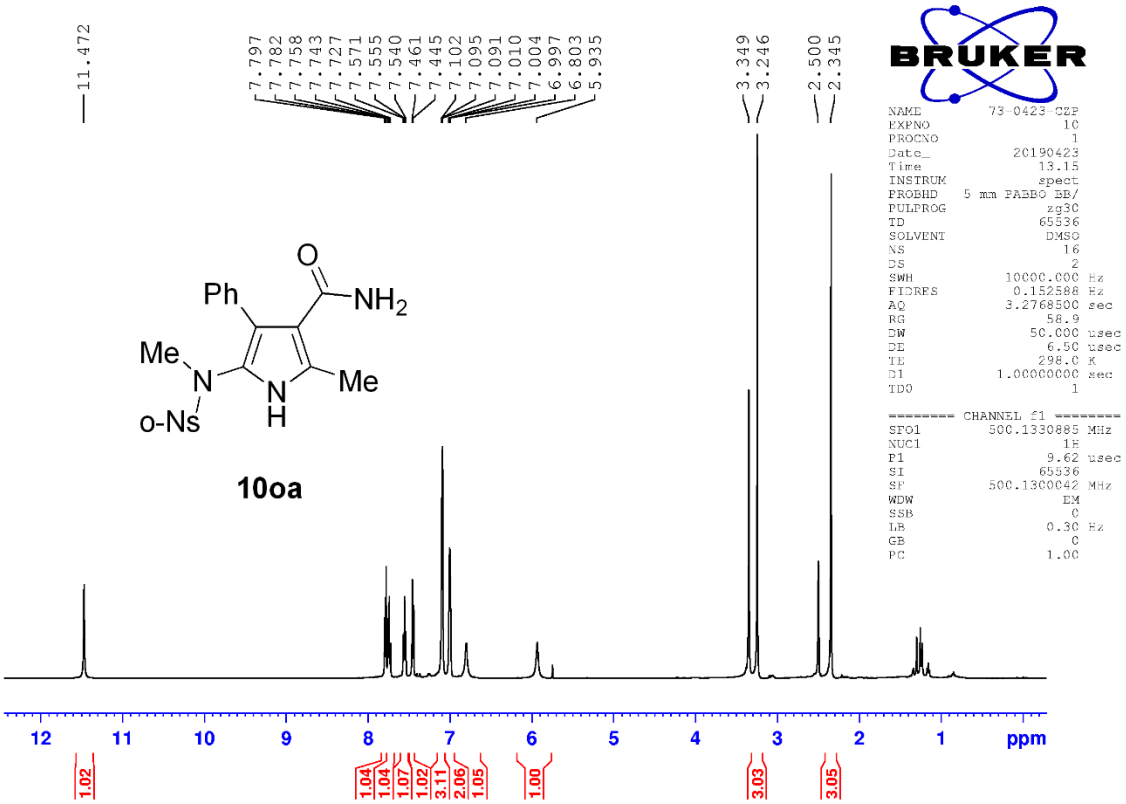
BRUKER

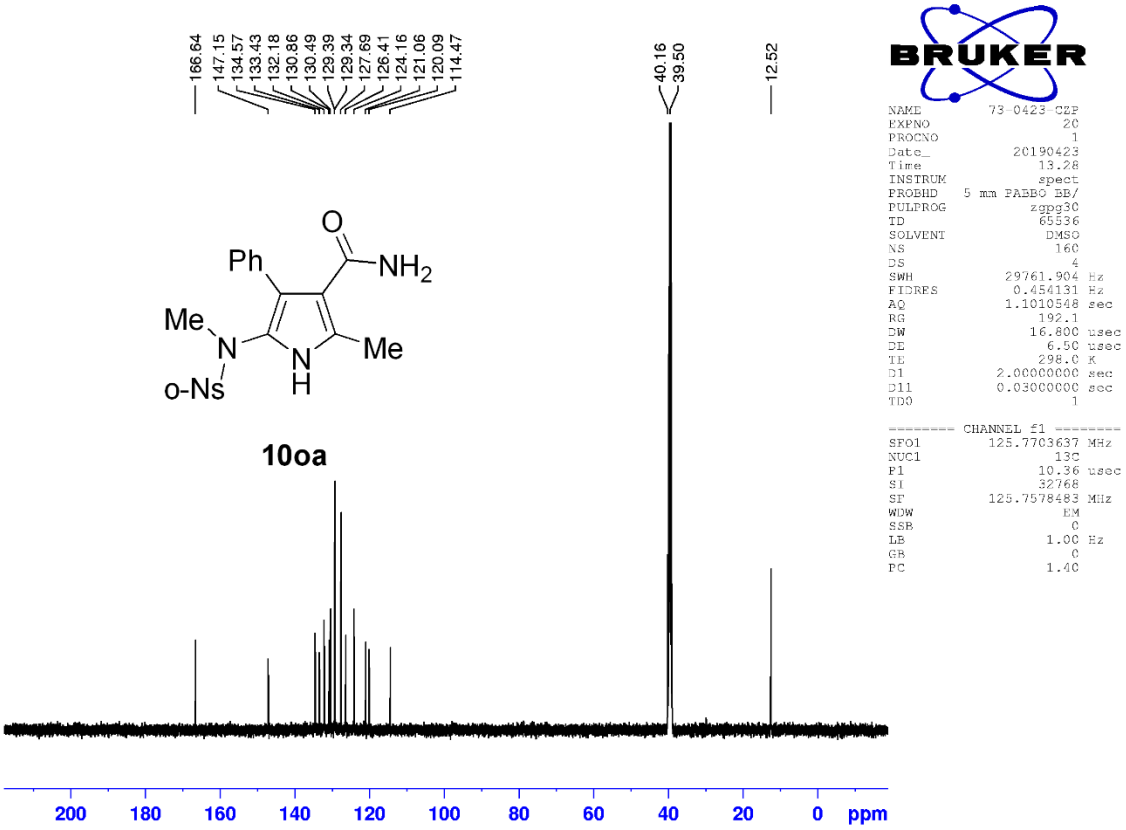
```
NAME              27-0409-czp
EXPNO                      10
PROCNO                      1
Date_              20190410
Time                    9.51
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH               10000.000 Hz
FIDRES                0.152588 Hz
AQ                3.2768500 sec
RG                     29.63
DW                    50.000 usec
DE                     6.50 usec
TE                    298.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             500.1330885 MHz
NUC1                       1H
P1                       9.62 usec
SI                      65536
SF               500.1300042 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

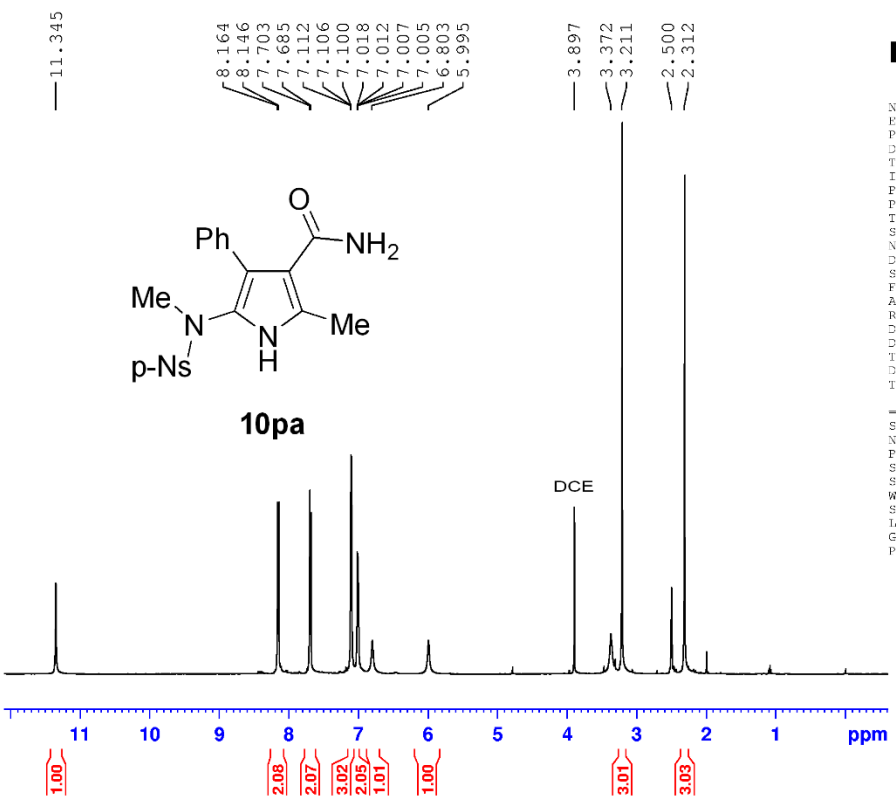


BRUKER

```
NAME              27-0411-CZP
EXPNO                      20
PROCNO                      1
Date_              20190411
Time                   15.35
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                      160
DS                        4
SWH               29761.904 Hz
FIDRES                0.454131 Hz
AQ                1.1010548 sec
RG                     192.1
DW                   16.800 usec
DE                     6.50 usec
TE                    298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                        1

======== CHANNEL f1 ========
SFO1             125.7703637 MHz
NUC1                       13C
P1                     10.36 usec
SI                      32768
SF               125.7578483 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

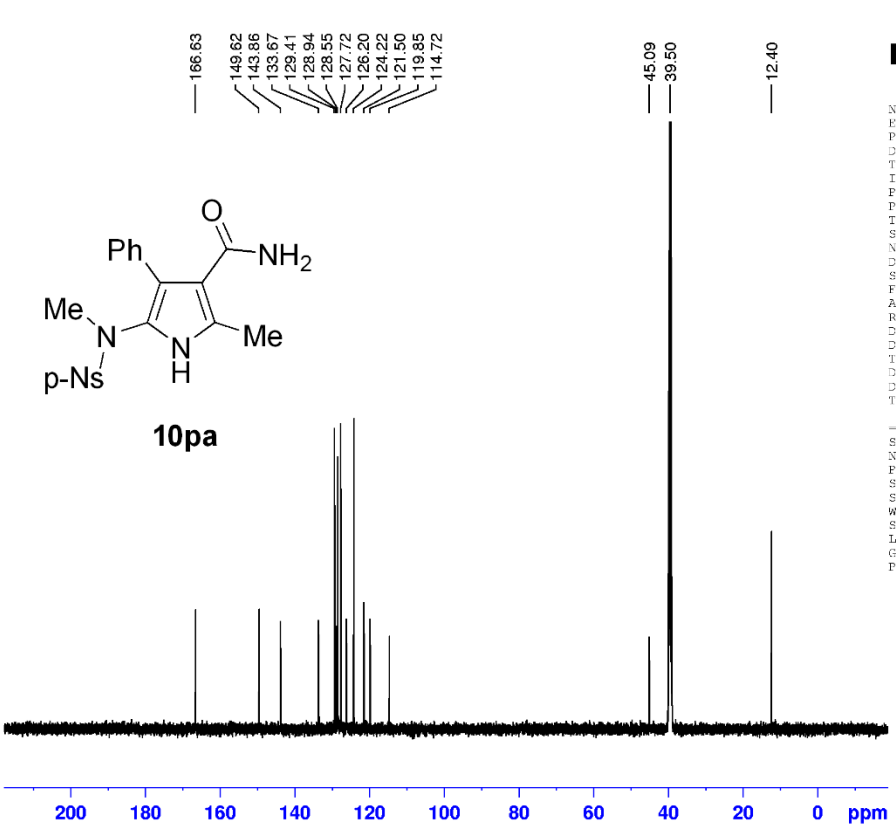

11.472
7.797
7.782
7.758
7.743
7.727
7.571
7.555
7.540
7.461
7.445
7.102
7.095
7.091
7.010
7.004
6.997
6.803
5.935
3.349
3.246
2.500
2.345
Ph
O
NH2
Me
N
N
H
Me
o-Ns
10oa
BRUKER
NAME 73-0423-CZP
EXPNO 10
PROCNO 1
Date_ 20190423
Time 13.15
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2768500 sec
RG 58.9
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
CHANNEL f1
SFO1 500.1330885 MHz
NUC1 1H
P1 9.62 usec
SI 65536
SF 500.1300042 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
12 11 10 9 8 7 6 5 4 3 2 1 ppm
1.02 1.04 1.04 1.07 1.02 3.11 2.06 1.05 1.00 3.03 3.05


166.64
147.15
134.57
133.43
132.18
130.86
130.49
129.39
129.34
127.69
126.41
124.16
121.06
120.09
114.47
40.16
39.50
12.52
Ph
O
NH2
Me
N
N
H
Me
o-Ns
10oa
BRUKER
NAME 73-0423-CZP
EXPNO 20
PROCNO 1
Date_ 20190423
Time 13.28
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 160
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010548 sec
RG 192.1
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
CHANNEL f1
SFO1 125.7703637 MHz
NUC1 13C
P1 10.36 usec
SI 32768
SF 125.7578483 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
200 180 160 140 120 100 80 60 40 20 0 ppm



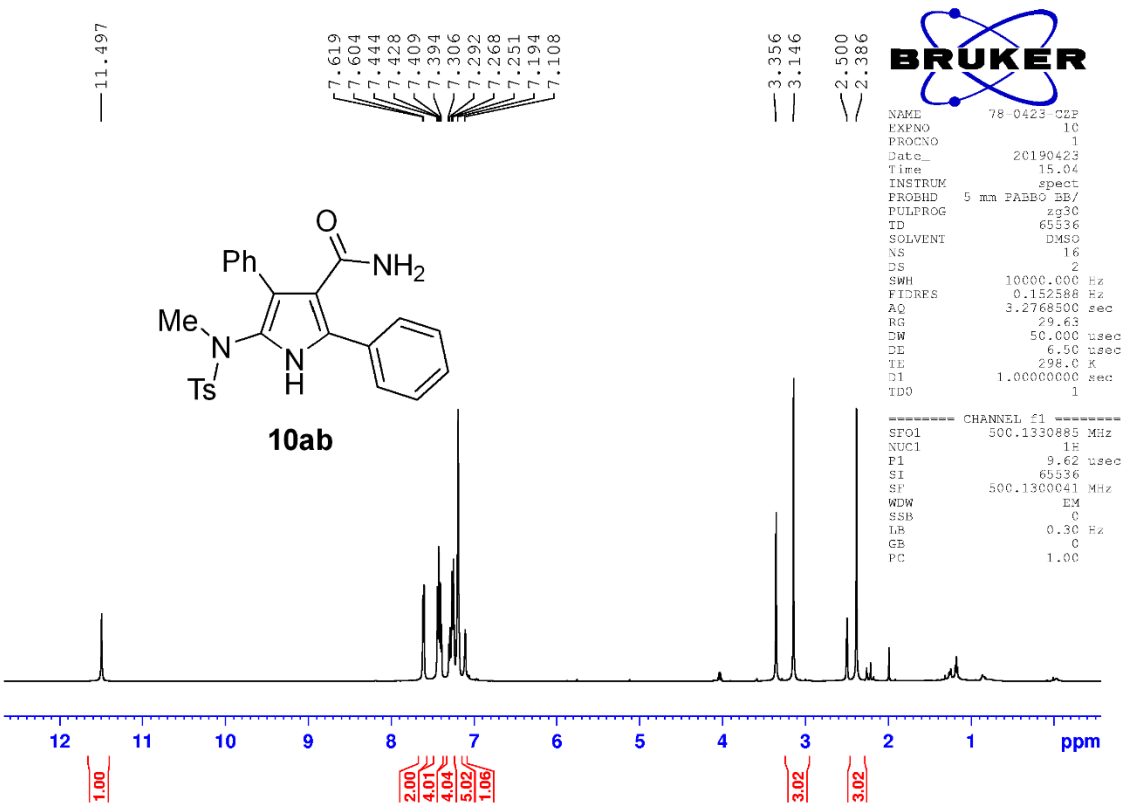
BRUKER

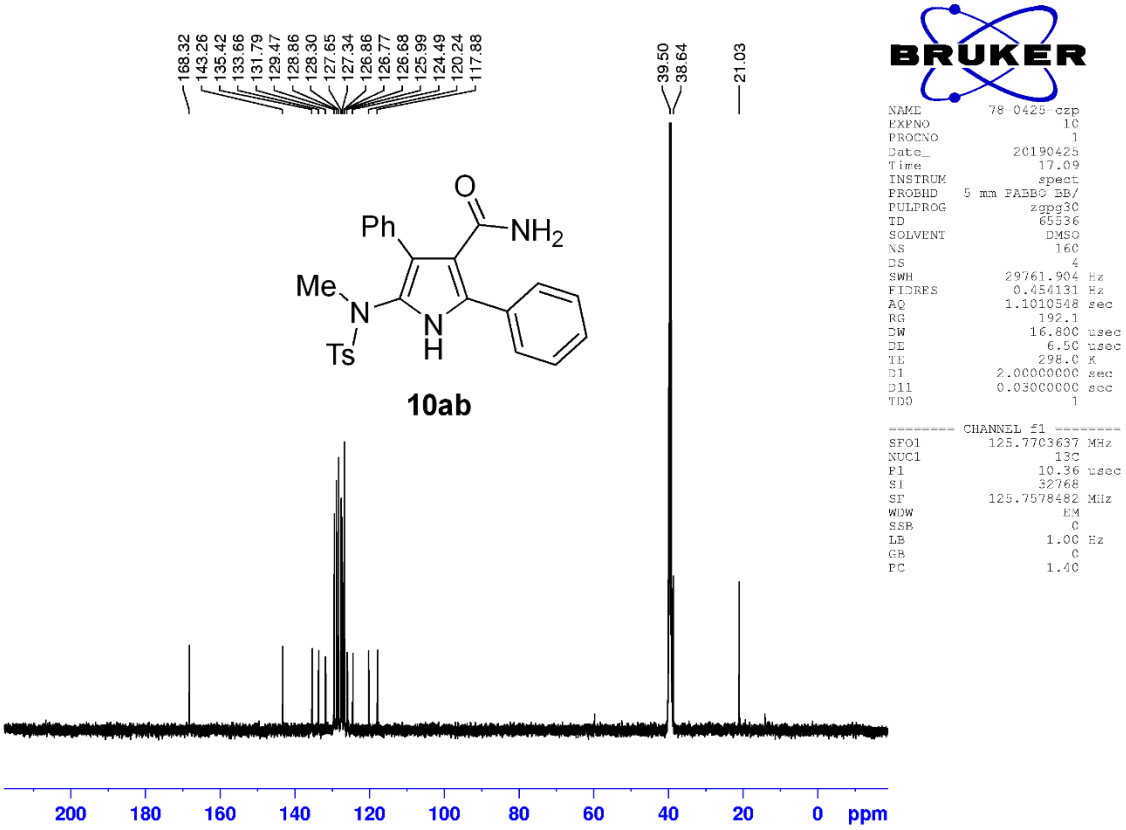
```
NAME            38-0412-czp
EXPNO                    10
PROCNO                    1
Date_              20190412
Time                  13.30
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT               DMSO
NS                      16
DS                       2
SWH              10000.000 Hz
FIDRES           0.152588 Hz
AQ               3.2768500 sec
RG                    54.73
DW                  50.000 usec
DE                    6.50 usec
TE                  298.0 K
D1               1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            500.1330885 MHz
NUC1                      1H
P1                      9.62 usec
SI                     65536
SF              500.1300040 MHz
WDW                      EM
SSB                       0
LB                     0.30 Hz
GB                        0
PC                     1.00
```

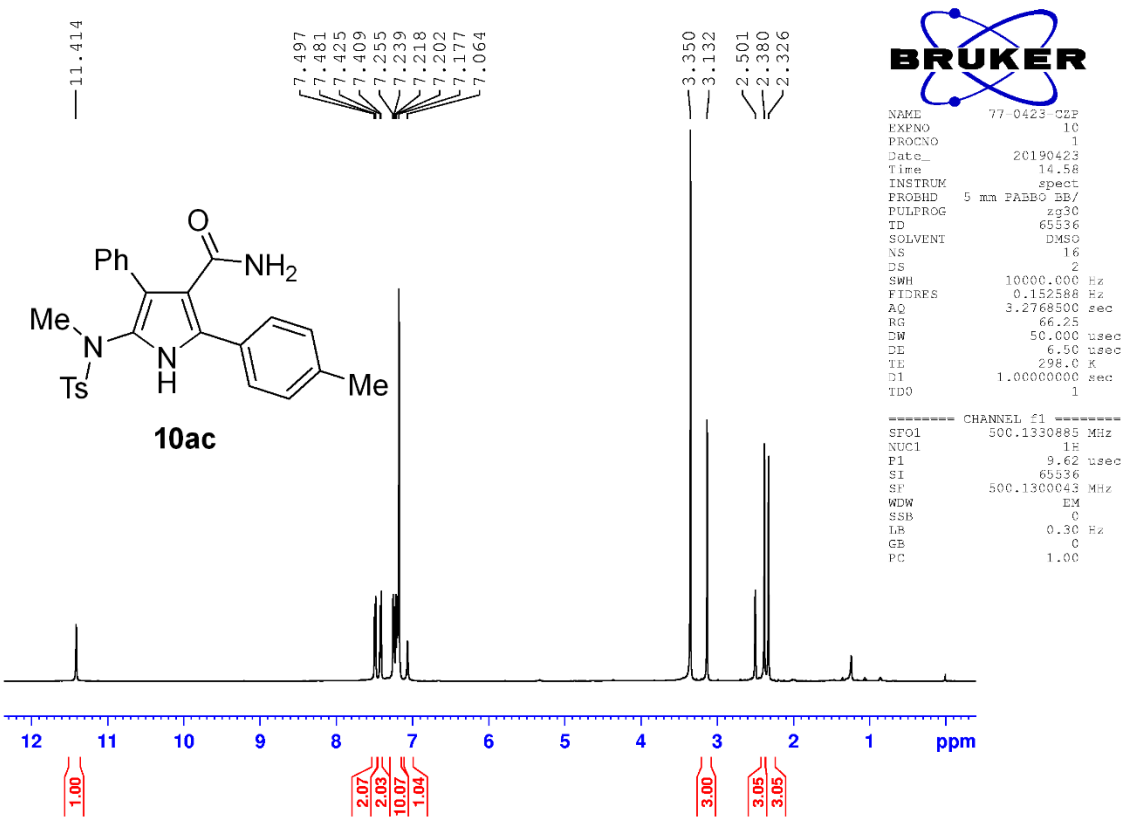


BRUKER

```
NAME            38-0415-czp
EXPNO                    20
PROCNO                    1
Date_              20190415
Time                  14.10
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG             zgpg30
TD                   65536
SOLVENT               DMSO
NS                     160
DS                       4
SWH              29761.904 Hz
FIDRES           0.454131 Hz
AQ               1.1010548 sec
RG                    192.1
DW                  16.800 usec
DE                    6.50 usec
TE                  298.0 K
D1               2.00000000 sec
D11              0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1            125.7703637 MHz
NUC1                      13C
P1                     10.36 usec
SI                     32768
SF              125.7578485 MHz
WDW                      EM
SSB                       0
LB                     1.00 Hz
GB                        0
PC                     1.40
```

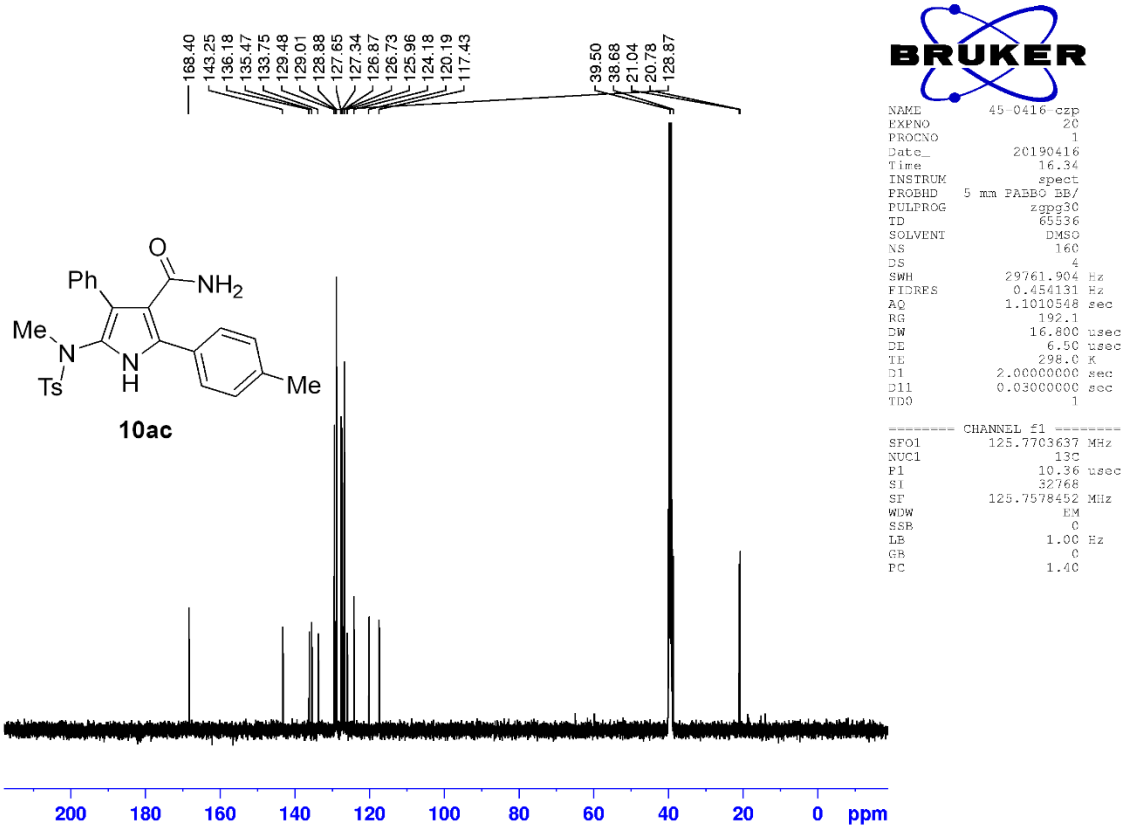

11.497
7.619
7.604
7.444
7.428
7.409
7.394
7.306
7.292
7.268
7.251
7.194
7.108
3.356
3.146
2.500
2.386
Ph
O
NH2
Me
N
N
H
Ts
10ab
BRUKER
NAME 78-0423-CZP
EXPNO 10
PROCNO 1
Date_ 20190423
Time 15.04
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2768500 sec
RG 29.63
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 500.1330885 MHz
NUC1 1H
P1 9.62 usec
SI 65536
SF 500.1300041 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
12 11 10 9 8 7 6 5 4 3 2 1 ppm
1.00
2.00
4.01
4.04
5.02
1.06
3.02
3.02


168.32
143.26
135.42
133.66
131.79
129.47
128.86
128.30
127.65
127.34
126.86
126.77
126.68
125.99
124.49
120.24
117.88
39.50
38.64
21.03
Ph
O
NH2
Me
N
N
H
Ts
10ab
BRUKER
NAME 78-0425-czp
EXPNO 10
PROCNO 1
Date_ 20190425
Time 17.09
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 160
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010548 sec
RG 192.1
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 125.7703637 MHz
NUC1 13C
P1 10.36 usec
SI 32768
SF 125.7578482 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
200 180 160 140 120 100 80 60 40 20 0 ppm



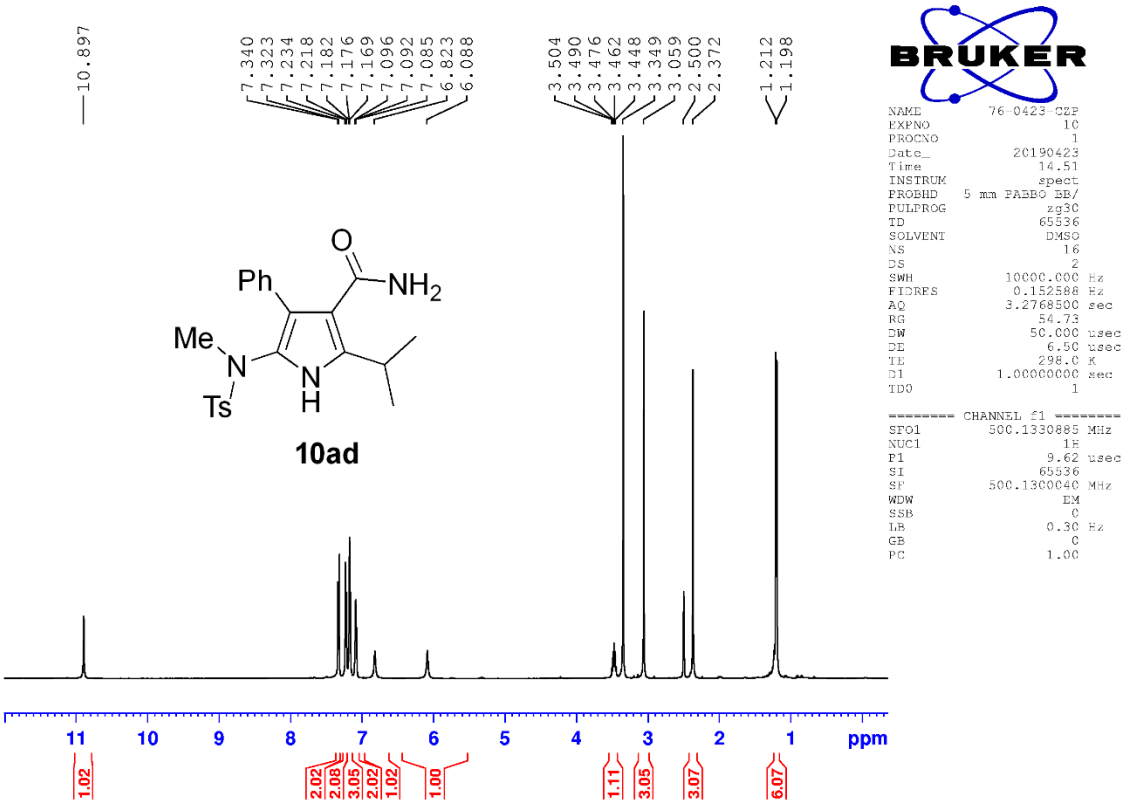
BRUKER

```
NAME            77-0423-CZP
EXPNO                    10
PROCNO                    1
Date_              20190423
Time                  14.58
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH               10000.000 Hz
FIDRES                0.152588 Hz
AQ                3.2768500 sec
RG                    66.25
DW                   50.000 usec
DE                    6.50 usec
TE                   298.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1             500.1330885 MHz
NUC1                       1H
P1                       9.62 usec
SI                      65536
SF               500.1300043 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```

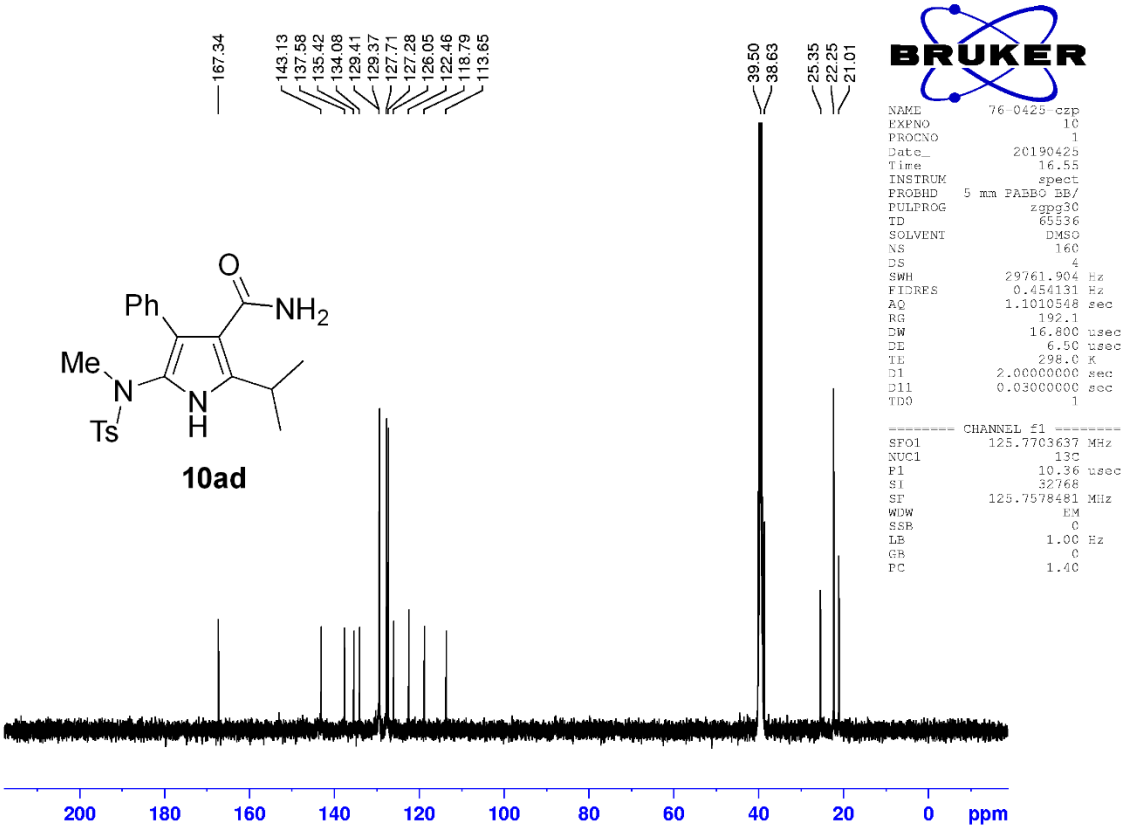


BRUKER

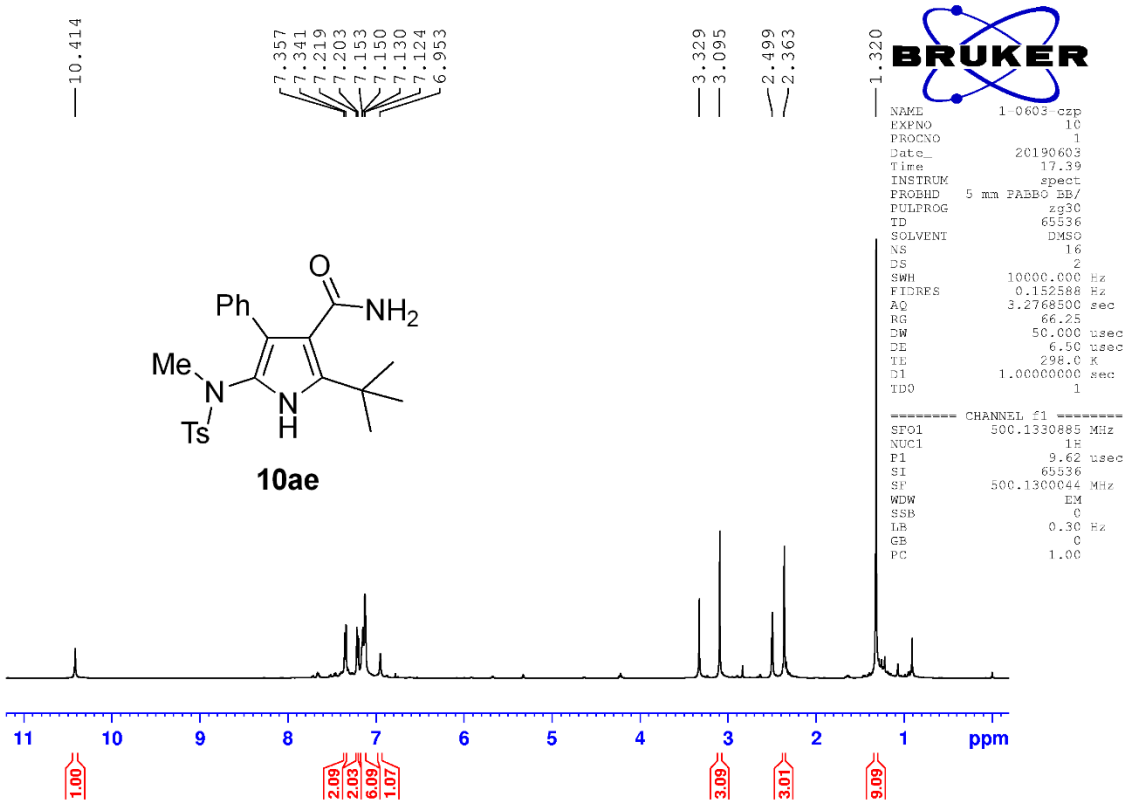
```
NAME            45-0416-czp
EXPNO                    20
PROCNO                    1
Date_              20190416
Time                  16.34
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG             zgpg30
TD                    65536
SOLVENT                DMSO
NS                      160
DS                        4
SWH               29761.904 Hz
FIDRES                0.454131 Hz
AQ                1.1010548 sec
RG                    192.1
DW                   16.800 usec
DE                    6.50 usec
TE                   298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1             125.7703637 MHz
NUC1                       13C
P1                     10.36 usec
SI                      32768
SF               125.7578452 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```

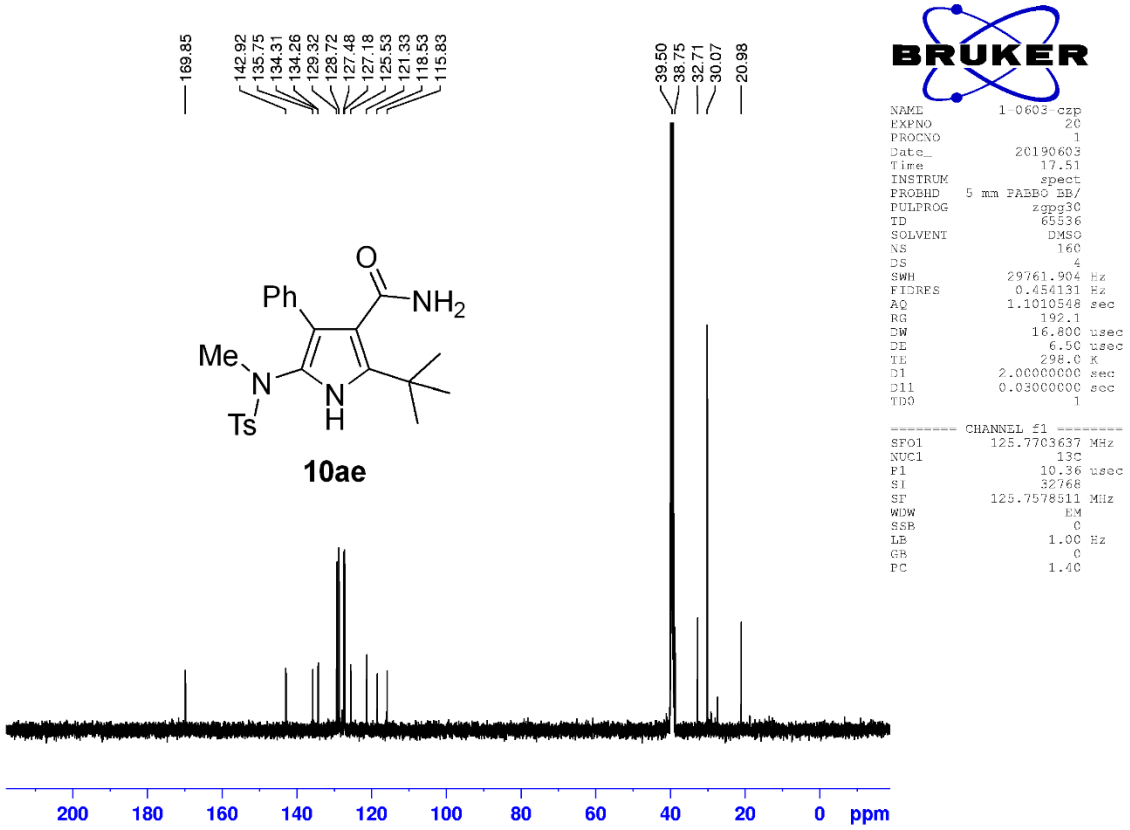



```
NAME            76-0423-CZP
EXPNO                    10
PROCNO                    1
Date_              20190423
Time                  14.51
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG               zg30
TD                   65536
SOLVENT                DMSO
NS                       16
DS                        2
SWH              10000.000 Hz
FIDRES               0.152588 Hz
AQ                3.2768500 sec
RG                     54.73
DW                    50.000 usec
DE                     6.50 usec
TE                   298.0 K
D1                1.00000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1             500.1330885 MHz
NUC1                      1H
P1                      9.62 usec
SI                     65536
SF               500.1300040 MHz
WDW                       EM
SSB                        0
LB                      0.30 Hz
GB                         0
PC                      1.00
```




```
NAME            76-0425-czp
EXPNO                    10
PROCNO                    1
Date_              20190425
Time                  16.55
INSTRUM               spect
PROBHD   5 mm PABBO BB/
PULPROG            zgpg30
TD                   65536
SOLVENT                DMSO
NS                      160
DS                        4
SWH              29761.904 Hz
FIDRES               0.454131 Hz
AQ                1.1010548 sec
RG                     192.1
DW                    16.800 usec
DE                     6.50 usec
TE                   298.0 K
D1                2.00000000 sec
D11               0.03000000 sec
TD0                       1

======== CHANNEL f1 ========
SFO1             125.7703637 MHz
NUC1                      13C
P1                     10.36 usec
SI                     32768
SF               125.7578481 MHz
WDW                       EM
SSB                        0
LB                      1.00 Hz
GB                         0
PC                      1.40
```


10.414
7.357
7.341
7.219
7.203
7.153
7.150
7.130
7.124
6.953
3.329
3.095
2.499
2.363
1.320
BRUKER
NAME 1-0603-czp
EXPNO 10
PROCNO 1
Date_ 20190603
Time 17.39
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zg30
TD 65536
SOLVENT DMSO
NS 16
DS 2
SWH 10000.000 Hz
FIDRES 0.152588 Hz
AQ 3.2768500 sec
RG 66.25
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 1.00000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 500.1330885 MHz
NUC1 1H
P1 9.62 usec
SI 65536
SF 500.1300044 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
Ph
O
NH2
Me
N
Ts
N
H
10ae
11
10
9
8
7
6
5
4
3
2
1
ppm
1.00
2.09
2.03
6.09
1.07
3.09
3.01
9.09


169.85
142.92
135.75
134.31
134.26
129.32
128.72
127.48
127.18
125.53
121.33
118.53
115.83
39.50
38.75
32.71
30.07
20.98
BRUKER
NAME 1-0603-czp
EXPNO 20
PROCNO 1
Date_ 20190603
Time 17.51
INSTRUM spect
PROBHD 5 mm PABBO BB/
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 160
DS 4
SWH 29761.904 Hz
FIDRES 0.454131 Hz
AQ 1.1010548 sec
RG 192.1
DW 16.800 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
======== CHANNEL f1 ========
SFO1 125.7703637 MHz
NUC1 13C
P1 10.36 usec
SI 32768
SF 125.7578511 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
Ph
O
NH2
Me
N
Ts
N
H
10ae
200
180
160
140
120
100
80
60
40
20
0
ppm