

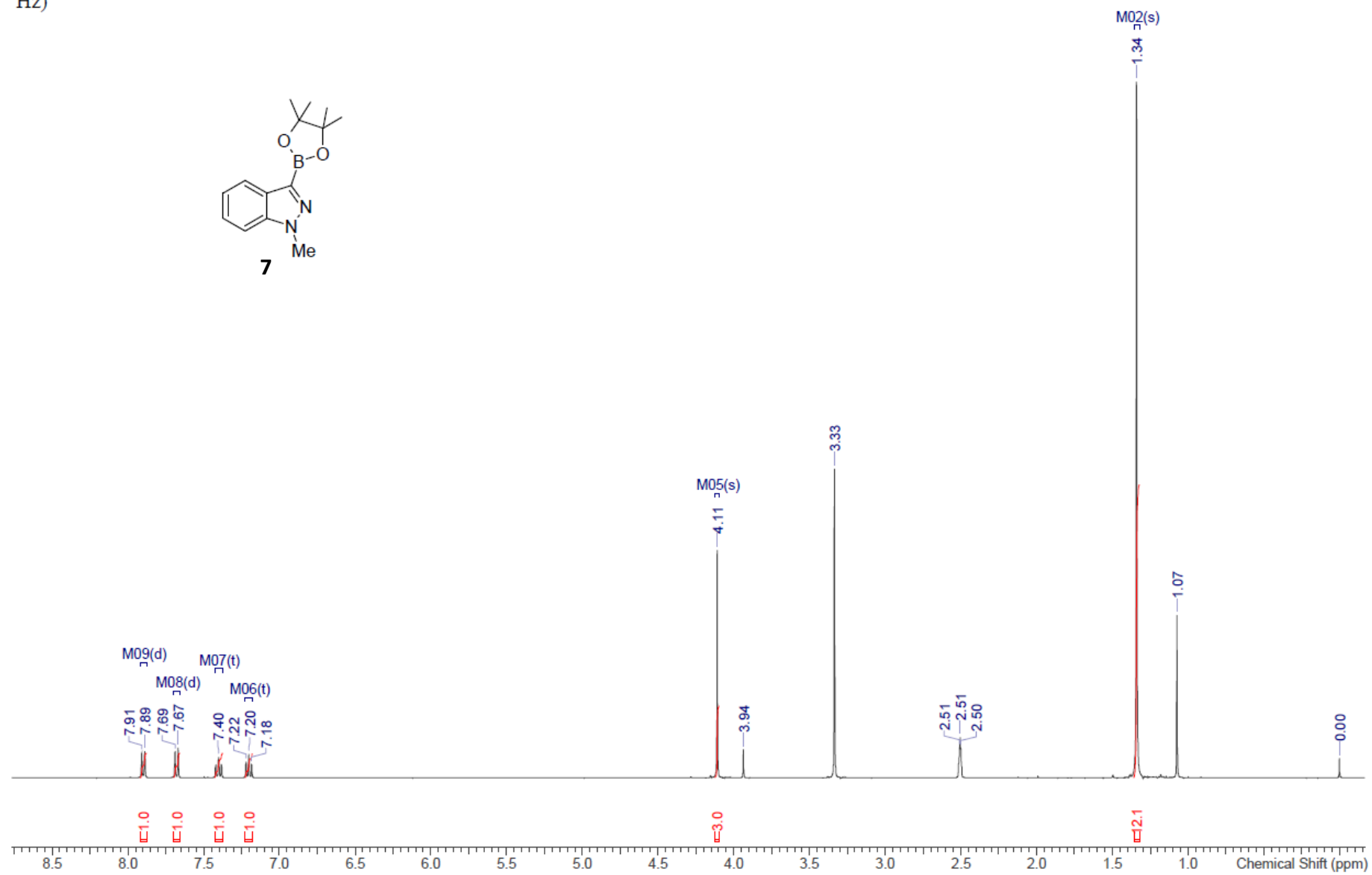
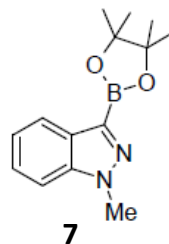
Synthesis of 3-Aryl-1*H*-Indazoles via iridium-catalysed C-H borylation and Suzuki-Miyaura coupling

Ben. A. Egan and Paul M. Burton

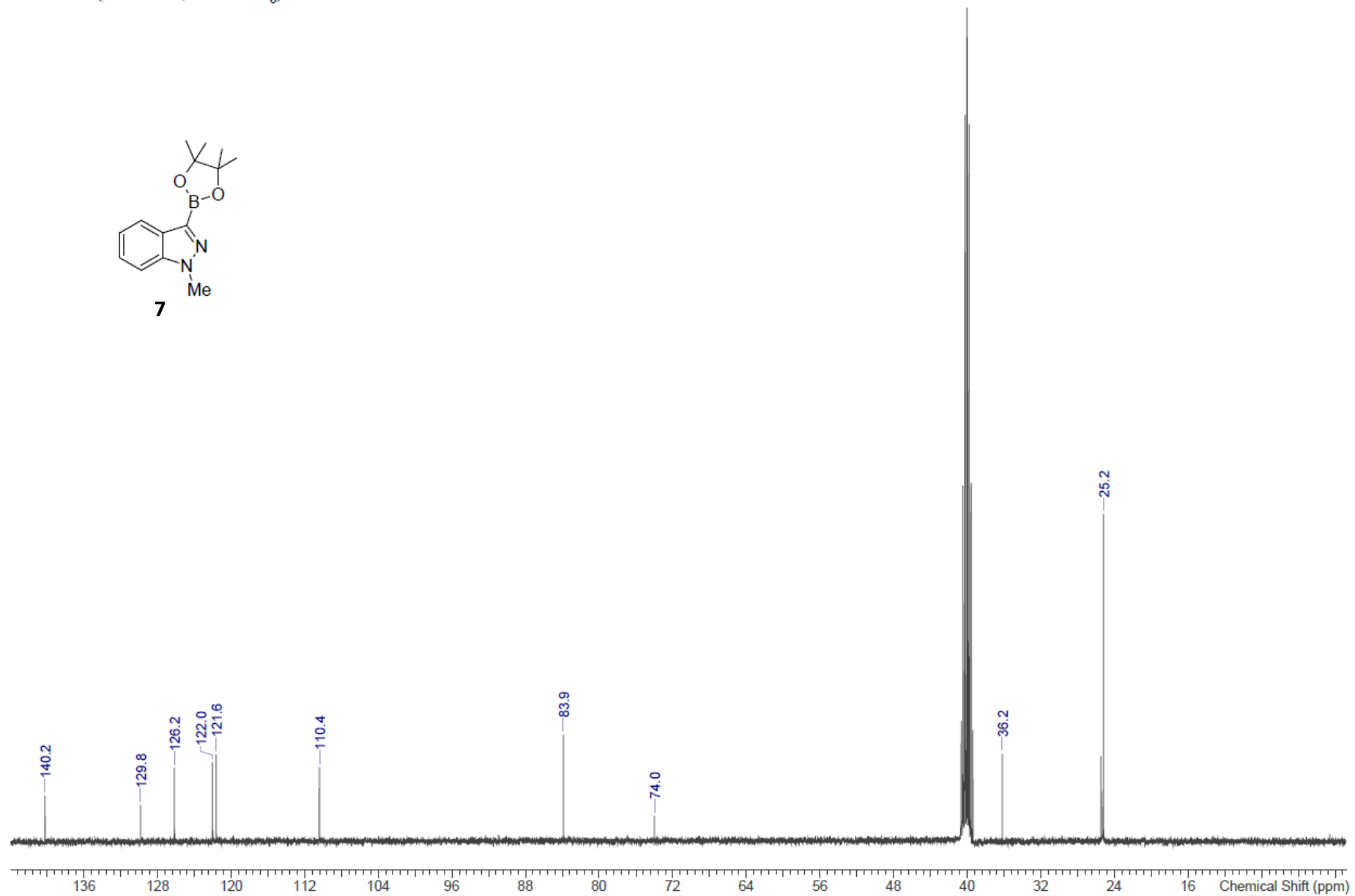
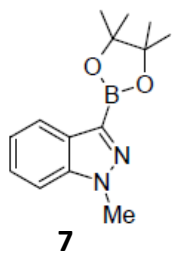
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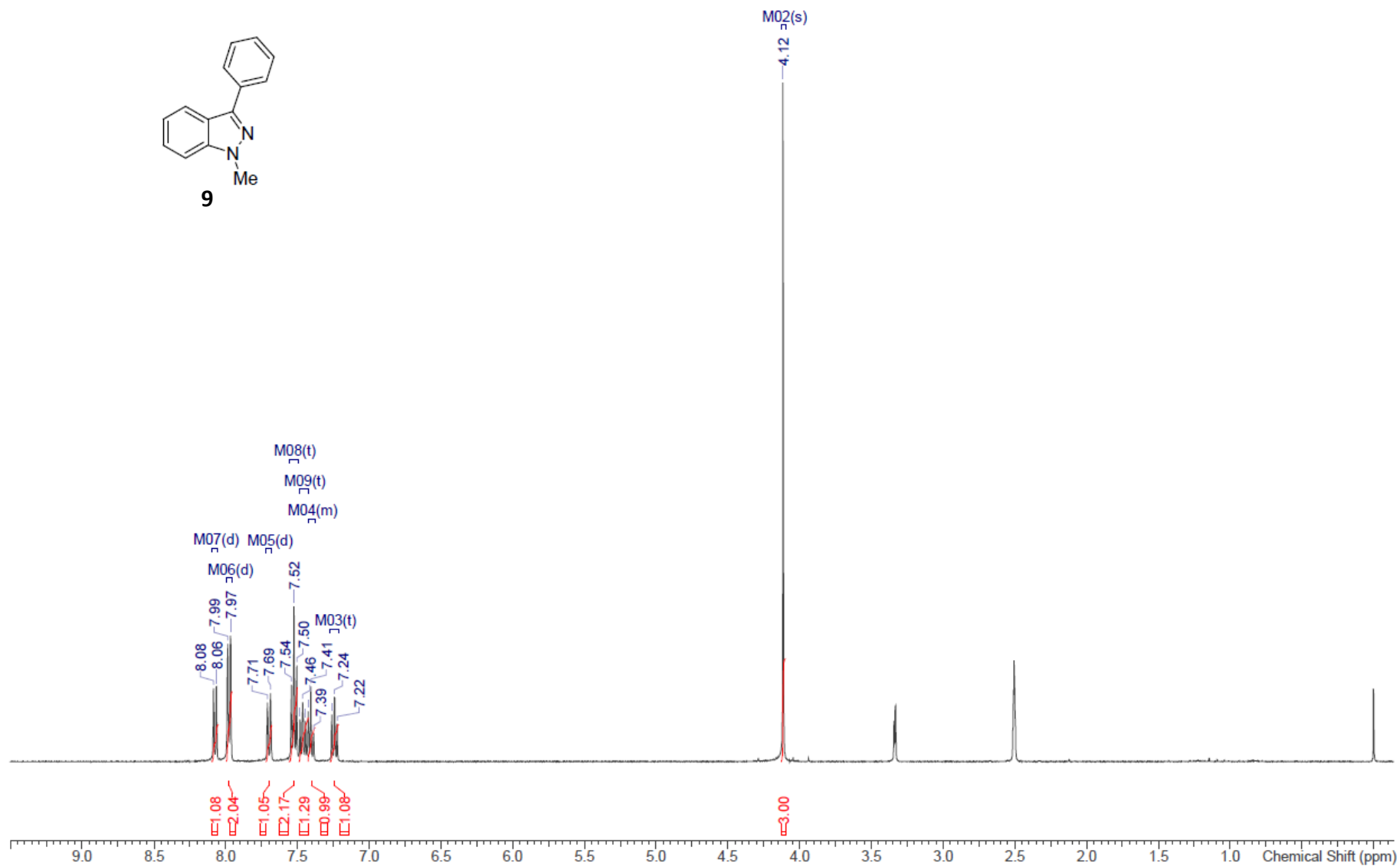
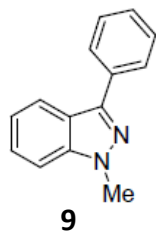
^1H NMR (400 MHz, $\text{DMSO}-d_6$) δ ppm 1.34 (12 H, s) 4.11 (3 H, s) 7.21 (1 H, t, $J=7.2$ Hz) 7.40 (1 H, t, $J=7.3$ Hz) 7.68 (1 H, d, $J=8.4$ Hz) 7.90 (1 H, d, $J=8.1$ Hz)



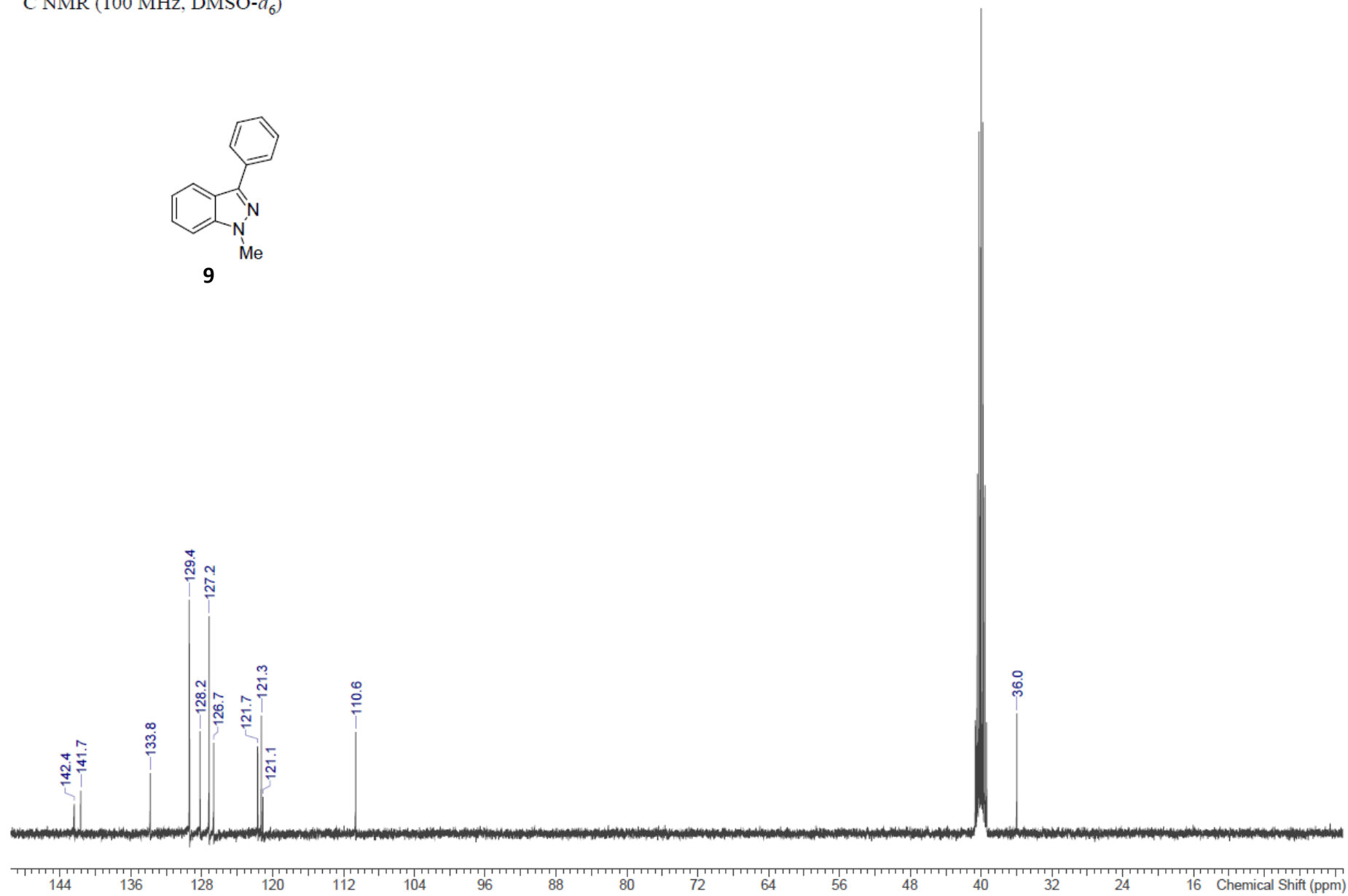
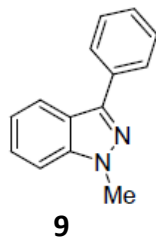
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



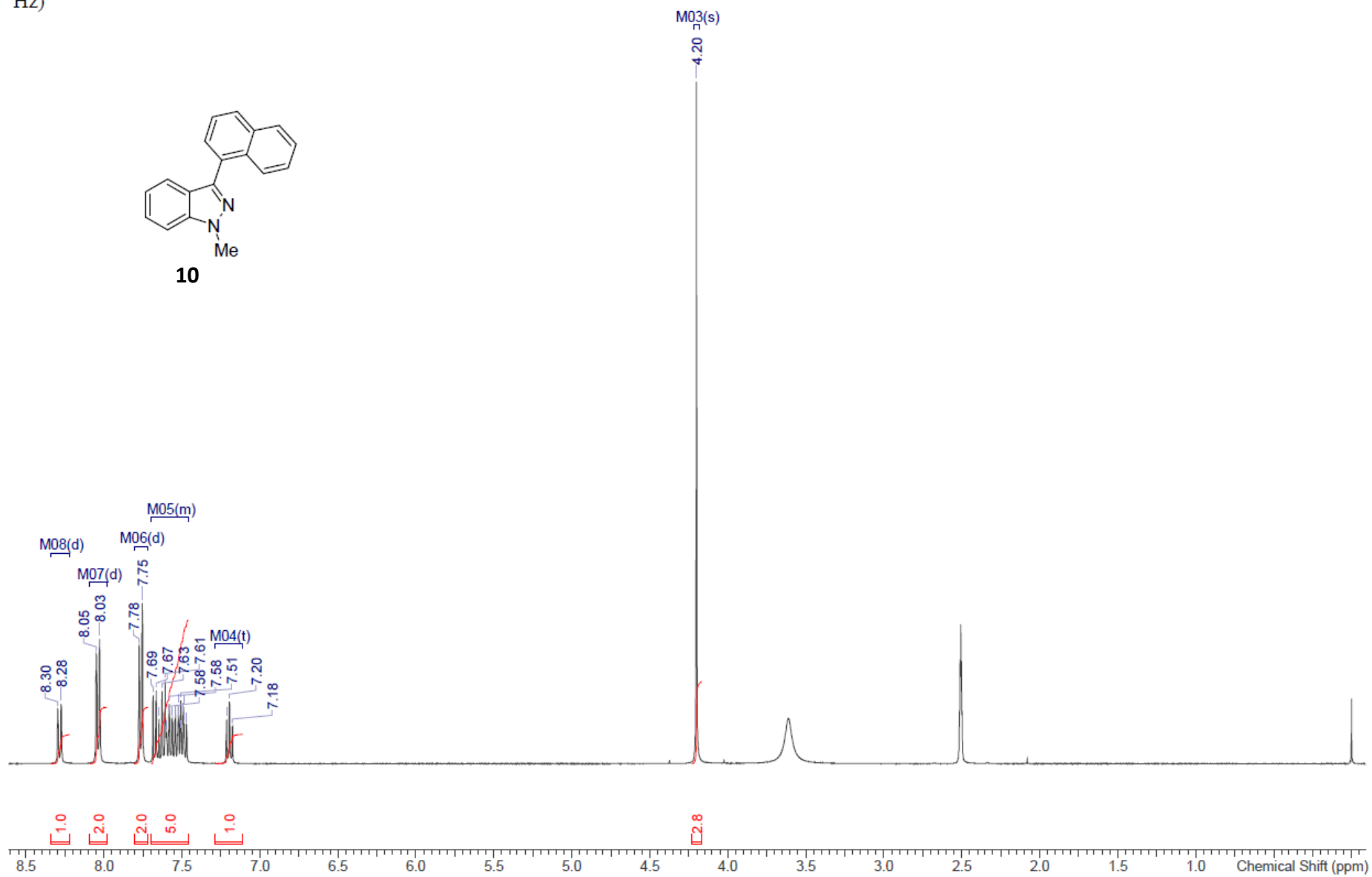
^1H NMR (400 MHz, $\text{DMSO}-d_6$): 4.12 (3 H, s) 7.24 (1 H, t, $J=7.6$ Hz) 7.38 - 7.43 (1 H, m) 7.46 (1 H, t, $J=7.6$ Hz) 7.52 (2 H, t, $J=7.6$ Hz) 7.70 (1 H, d, $J=8.3$ Hz) 7.98 (2 H, d, $J=7.3$ Hz) 8.07 (1 H, d, $J=8.3$ Hz)



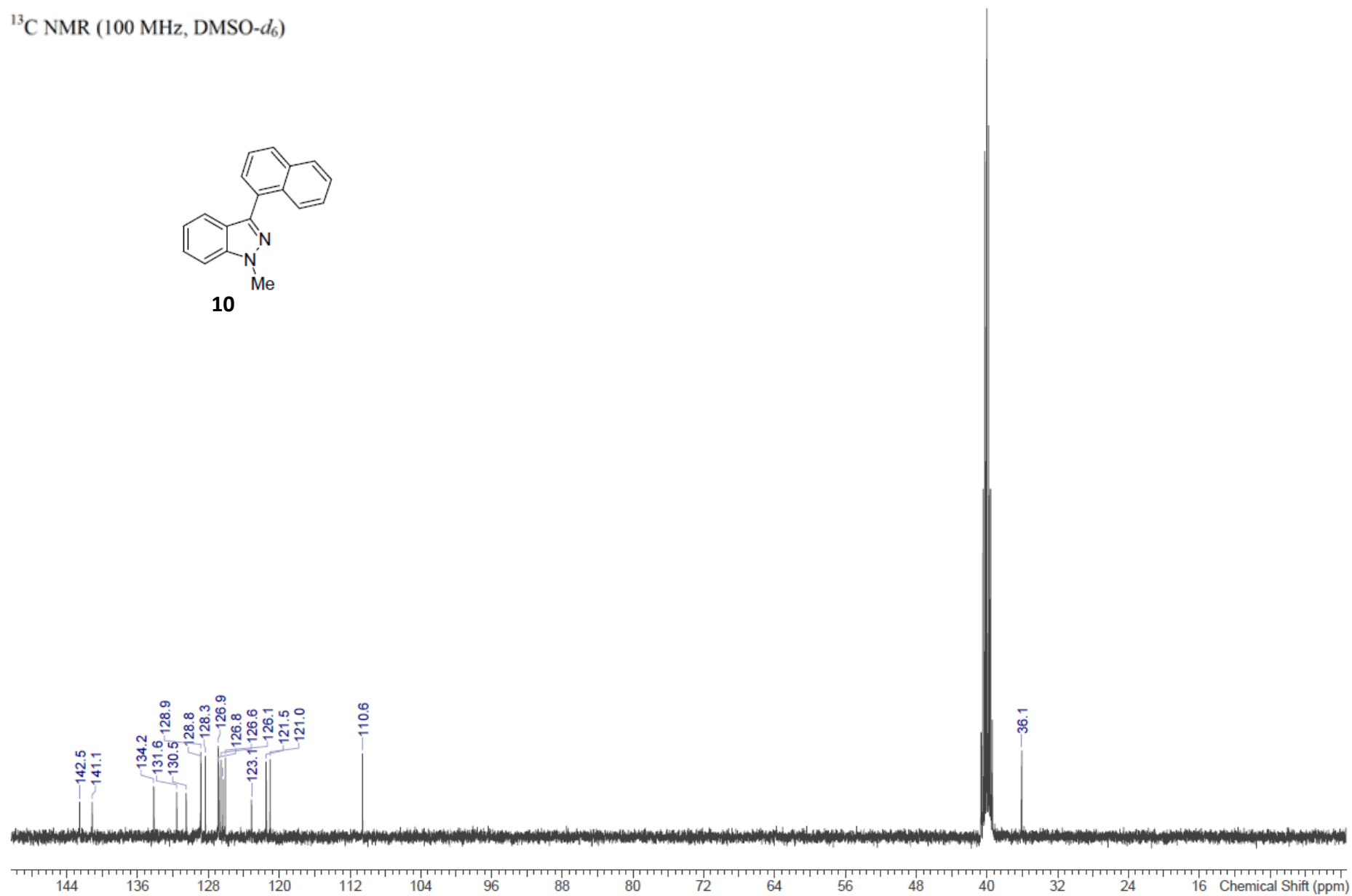
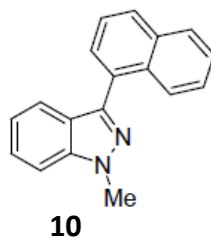
^{13}C NMR (100 MHz, DMSO- d_6)



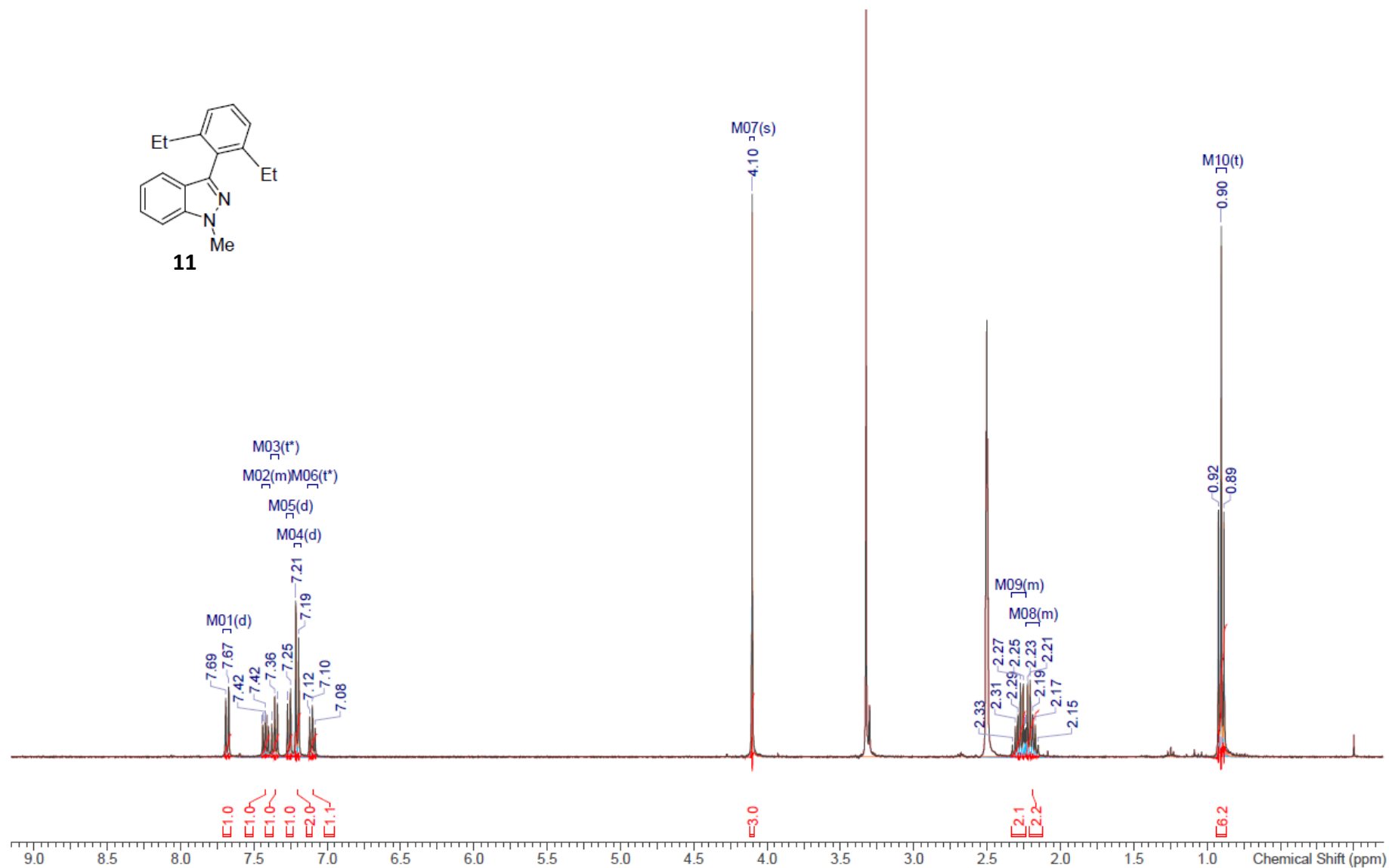
^1H NMR (400 MHz, $\text{DMSO-}d_6$): 4.20 (3 H, s) 7.20 (1 H, t, $J=7.5$ Hz) 7.46 - 7.69 (5 H, m) 7.76 (2 H, d, $J=7.7$ Hz) 8.04 (2 H, d, $J=8.1$ Hz) 8.29 (1 H, d, $J=8.3$ Hz)



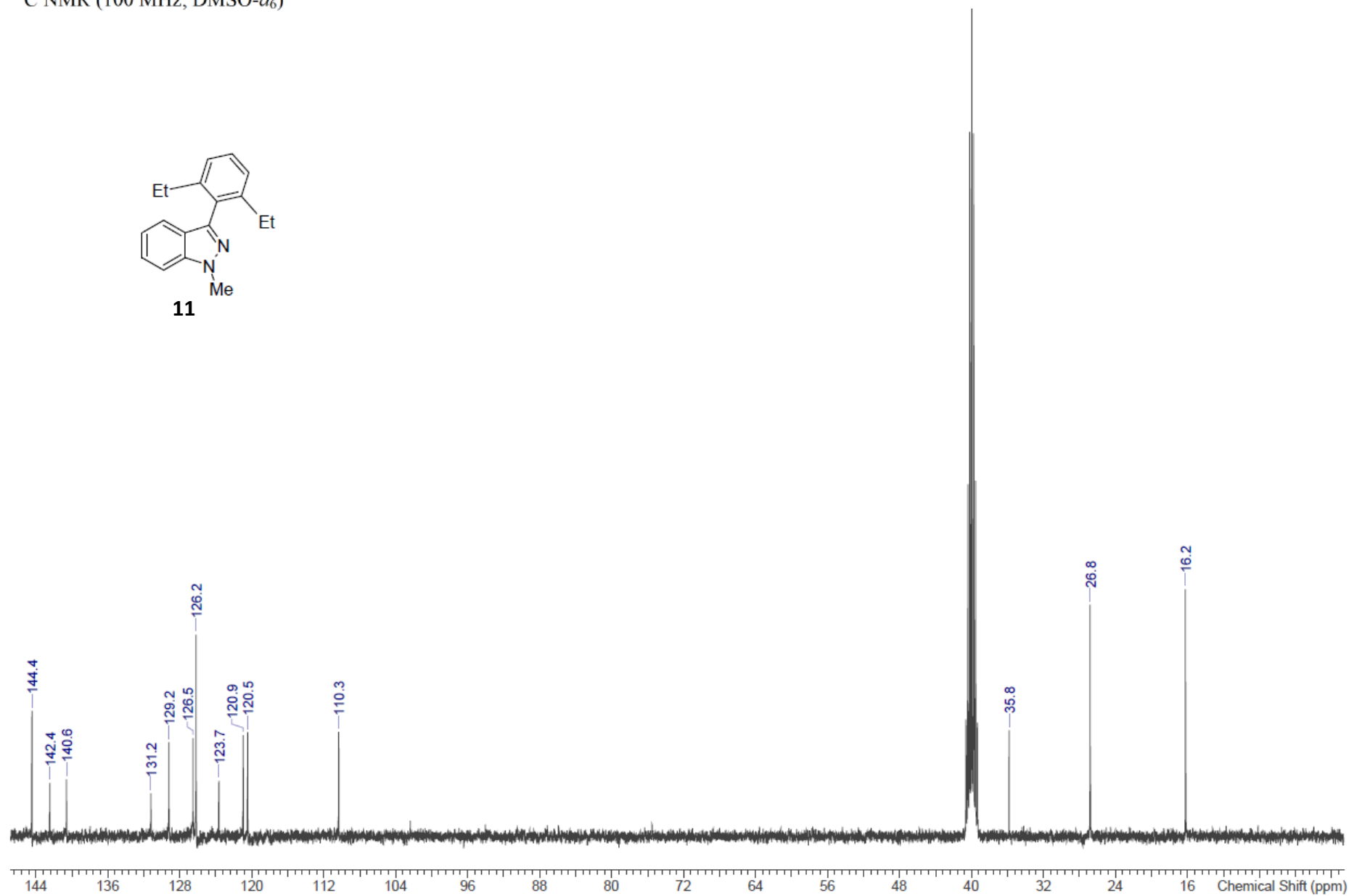
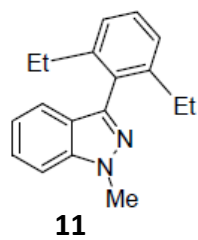
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



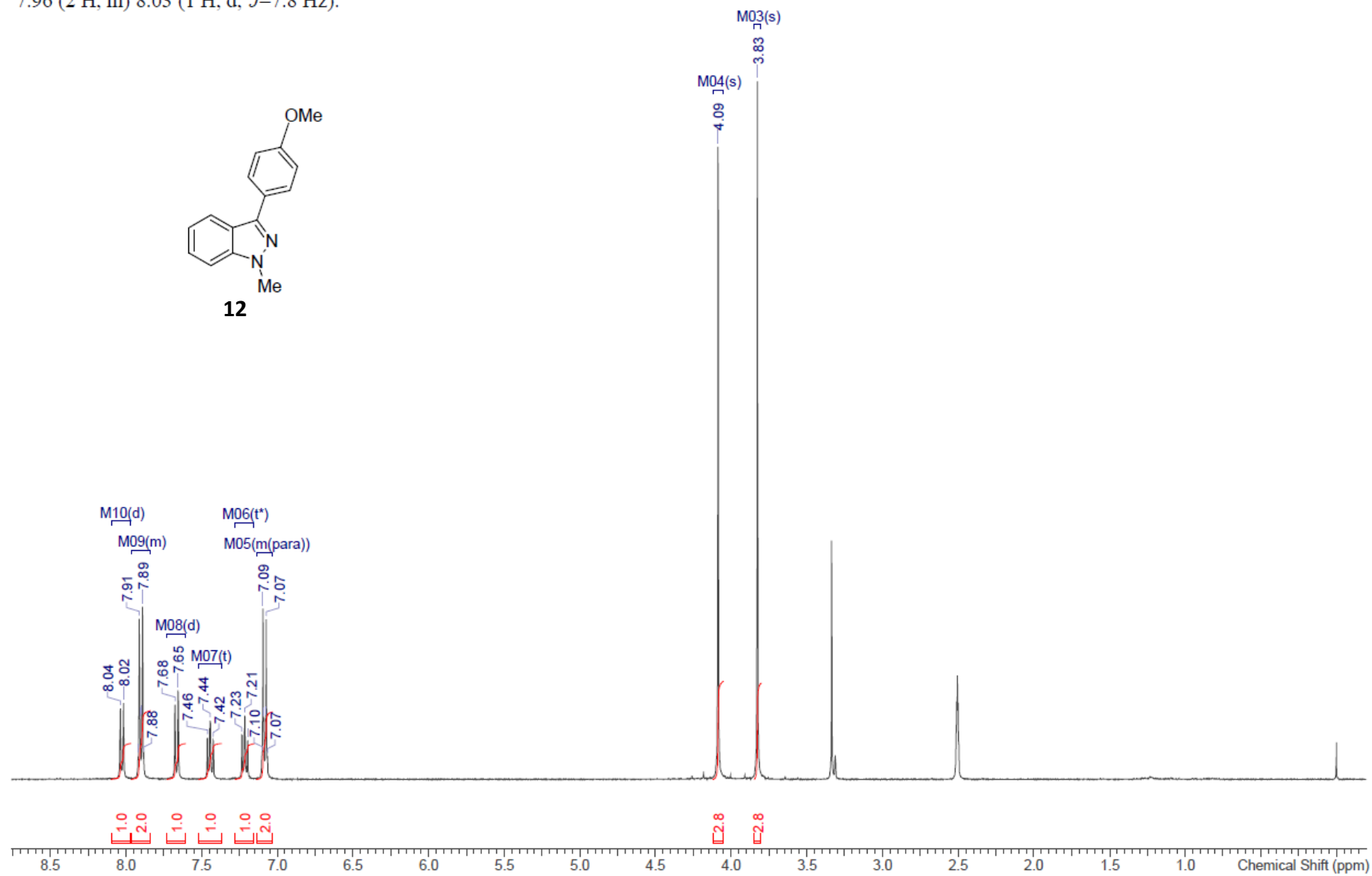
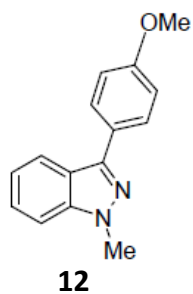
¹H NMR (400 MHz, DMSO-*d*₆): 0.90 (6 H, t, *J*=7.5 Hz) 2.15 - 2.24 (2 H, m) 2.24 - 2.34 (2 H, m) 4.10 (3 H, s) 7.10 (1 H, t, *J*=7.1 Hz) 7.20 (2 H, d, *J*=7.7 Hz) 7.26 (1 H, d, *J*=8.2 Hz) 7.36 (1 H, t, *J*=7.7 Hz) 7.40 - 7.44 (1 H, m) 7.68 (1 H, d, *J*=8.6 Hz)



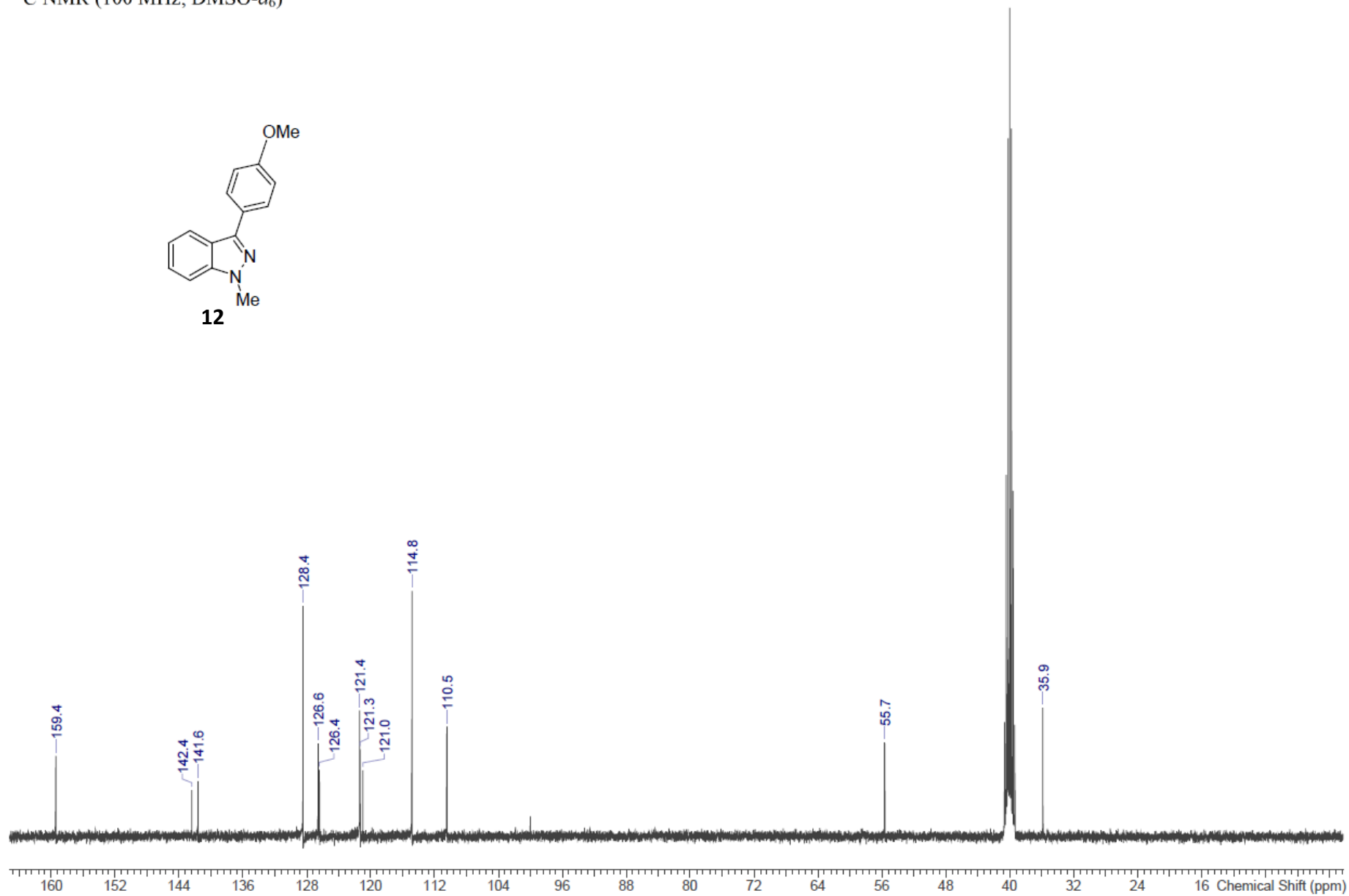
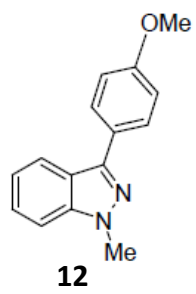
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



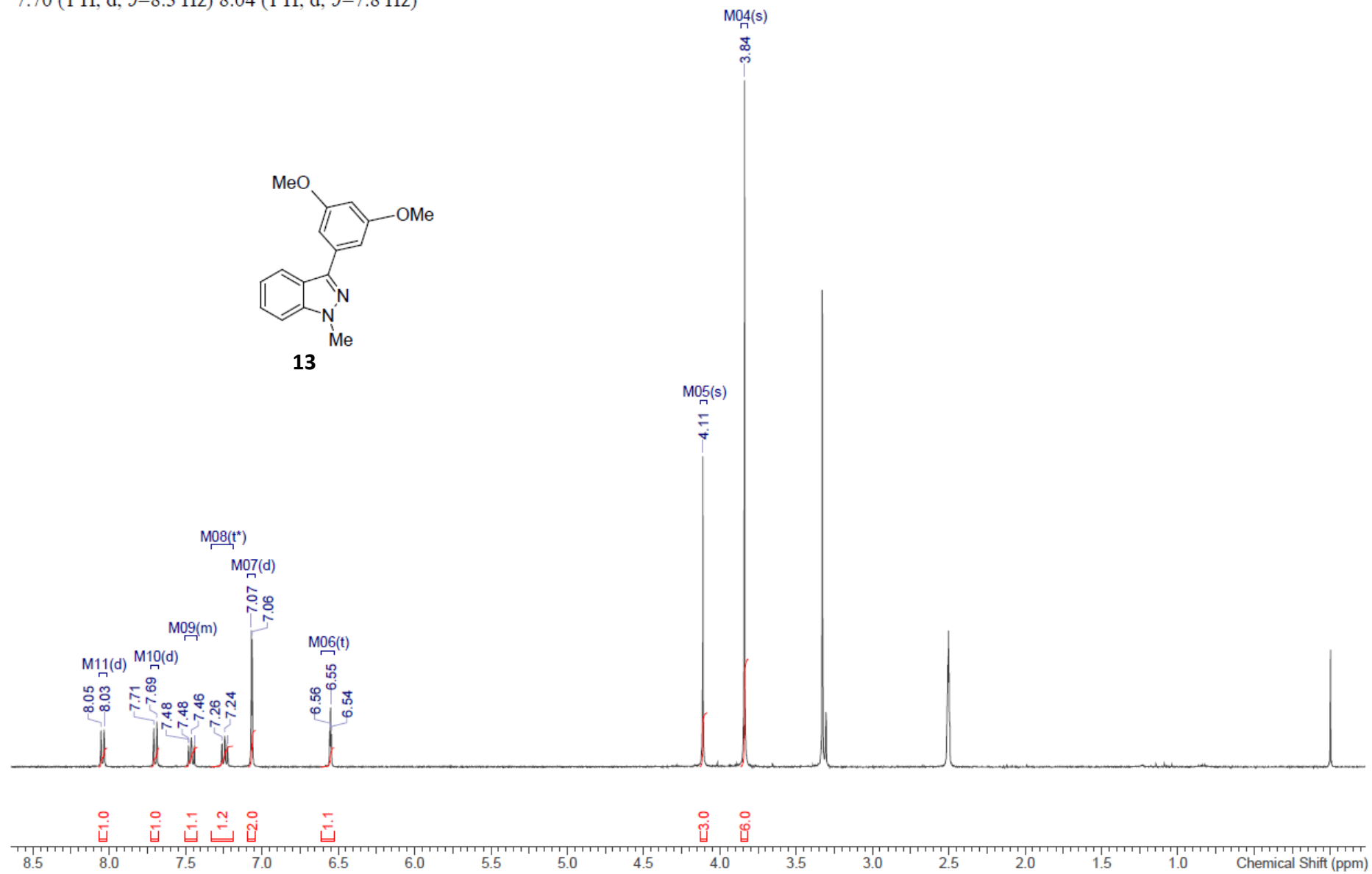
^1H NMR (400 MHz, $\text{DMSO}-d_6$): 3.83 (3 H, s) 4.09 (3 H, s) 7.03 - 7.14 (2 H, m) 7.21 (1 H, t, $J=7.5$ Hz) 7.45 (1 H, t, $J=7.5$ Hz) 7.67 (1 H, d, $J=8.3$ Hz) 7.84 - 7.96 (2 H, m) 8.03 (1 H, d, $J=7.8$ Hz).



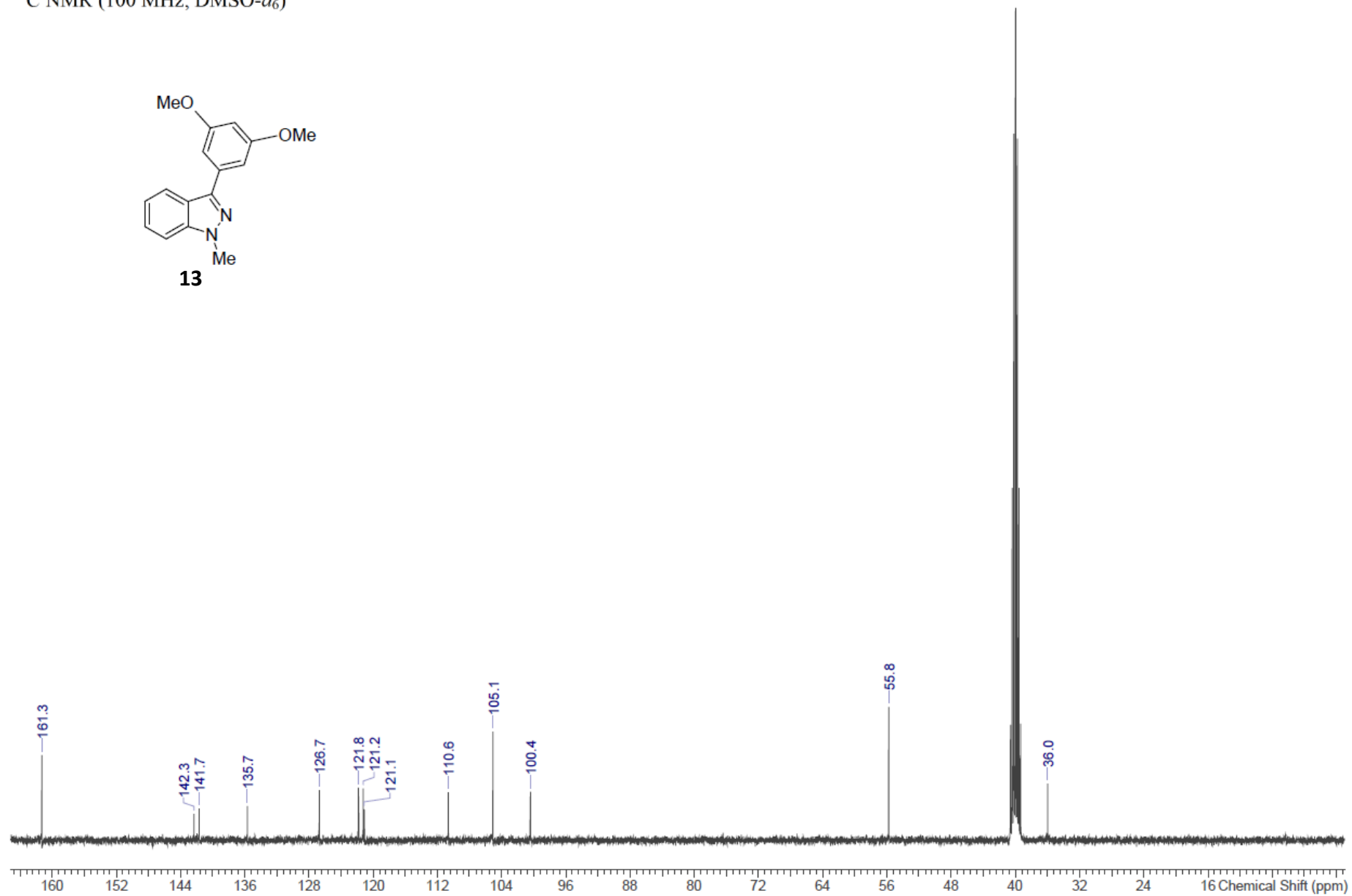
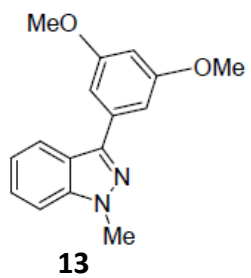
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



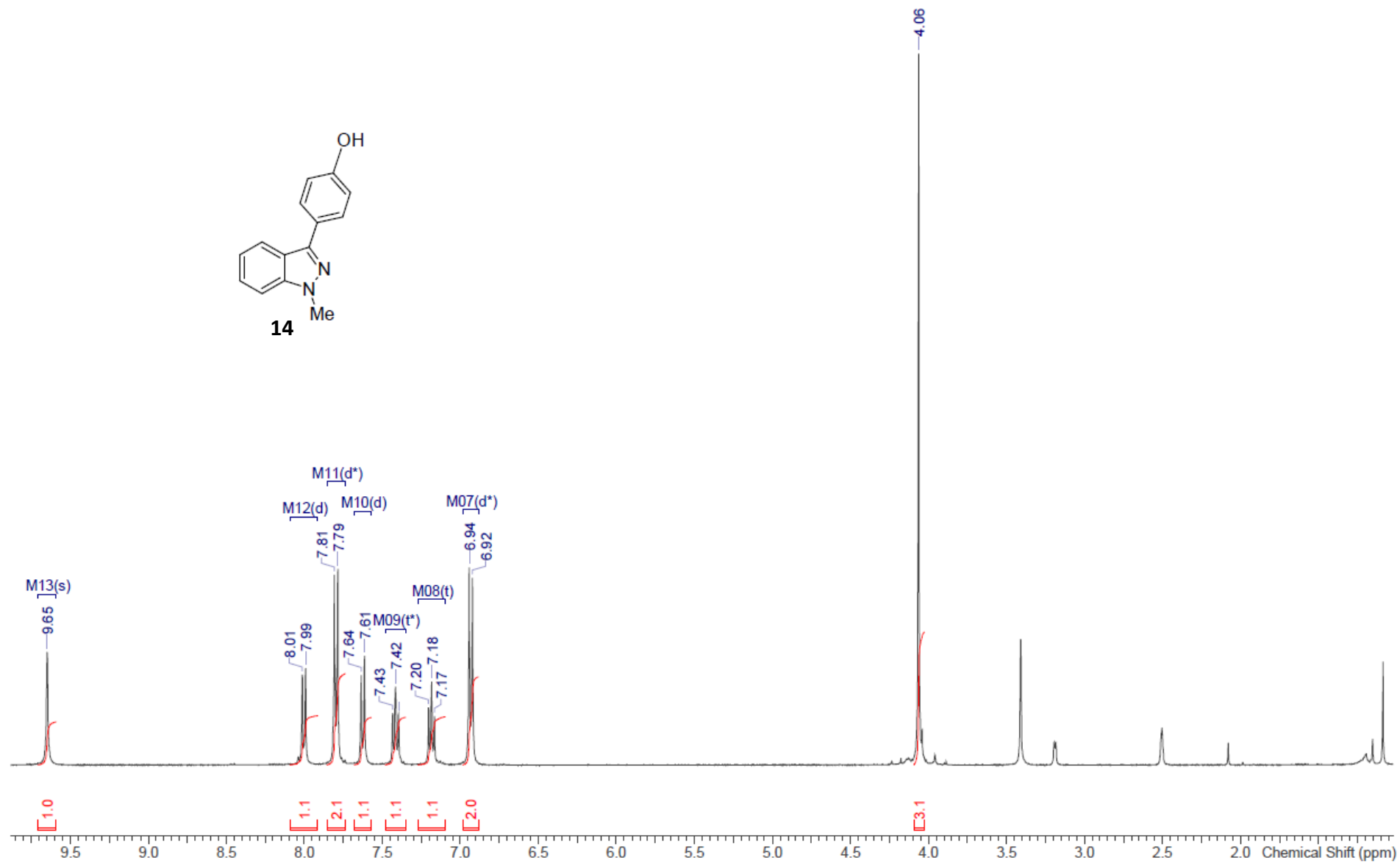
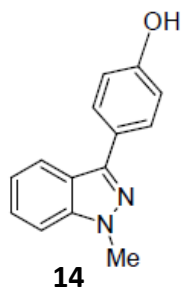
^1H NMR (400 MHz, $\text{DMSO-}d_6$) δ ppm 3.84 (6 H, s) 4.11 (3 H, s) 6.55 (1 H, t, $J=2.2$ Hz) 7.06 (2 H, d, $J=2.4$ Hz) 7.24 (1 H, t, $J=7.6$ Hz) 7.42 - 7.50 (1 H, m) 7.70 (1 H, d, $J=8.3$ Hz) 8.04 (1 H, d, $J=7.8$ Hz)



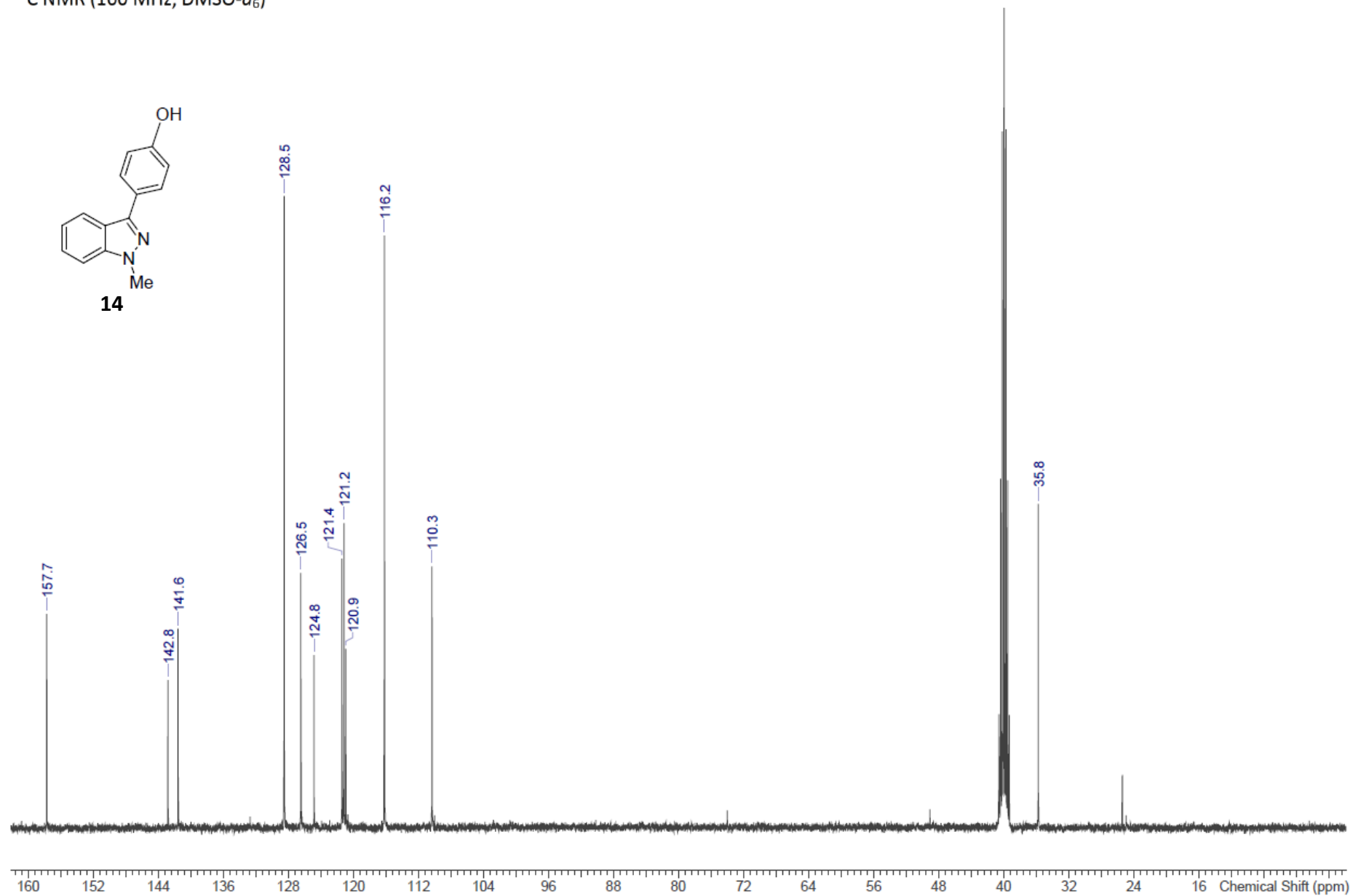
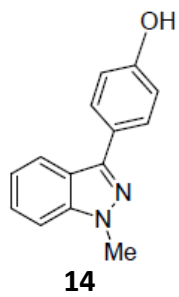
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



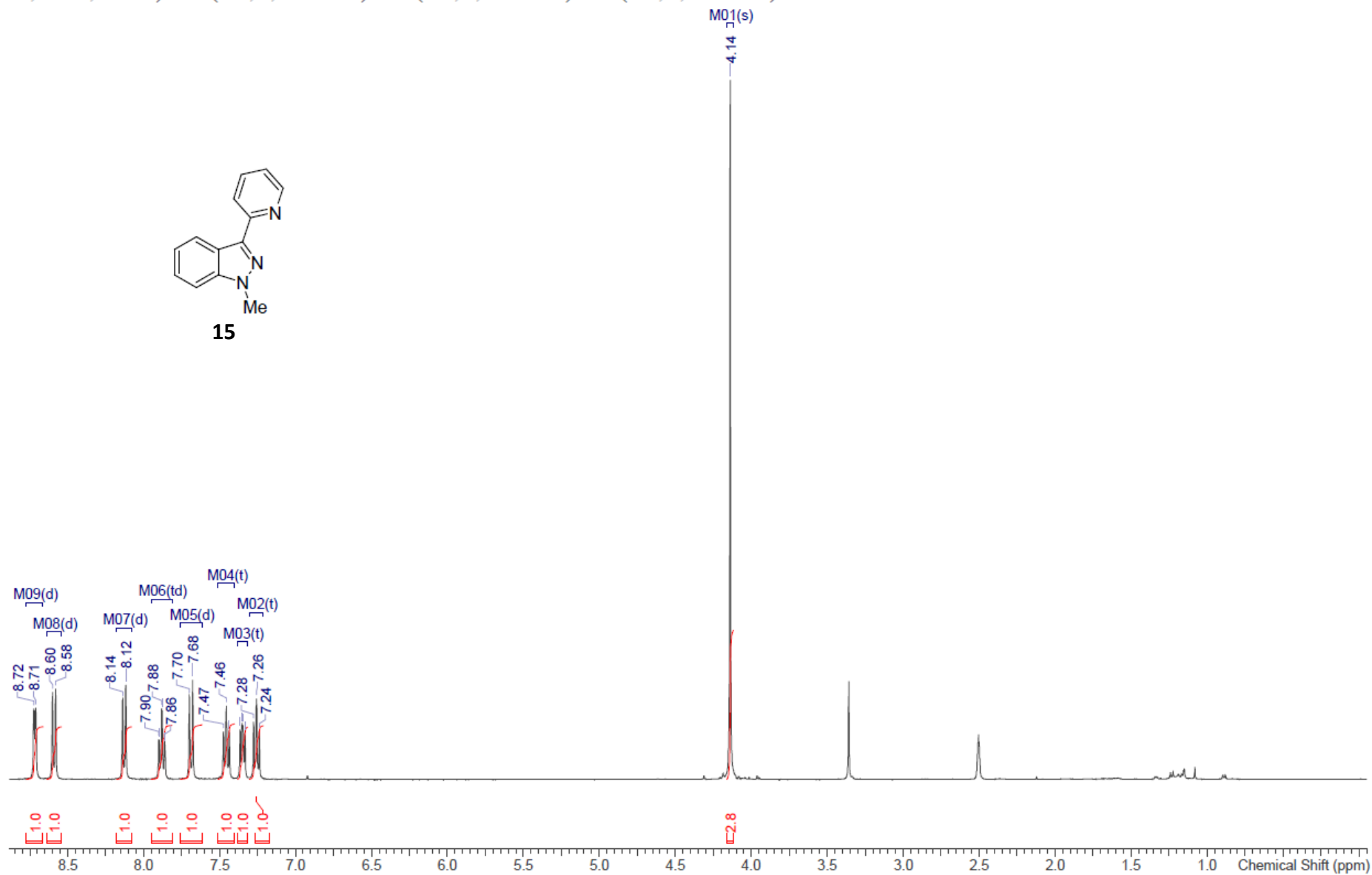
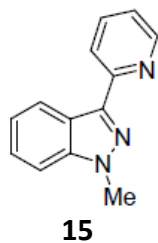
^1H NMR (400 MHz, $\text{DMSO}-d_6$): 4.06 (3 H, s) 6.93 (2 H, d, $J=8.6$ Hz) 7.18 (1 H, t, $J=7.5$ Hz) 7.42 (1 H, t, $J=7.6$ Hz) 7.62 (1 H, d, $J=8.6$ Hz) 7.80 (2 H, d, $J=8.6$ Hz) 8.00 (1 H, d, $J=8.2$ Hz) 9.65 (1 H, s).



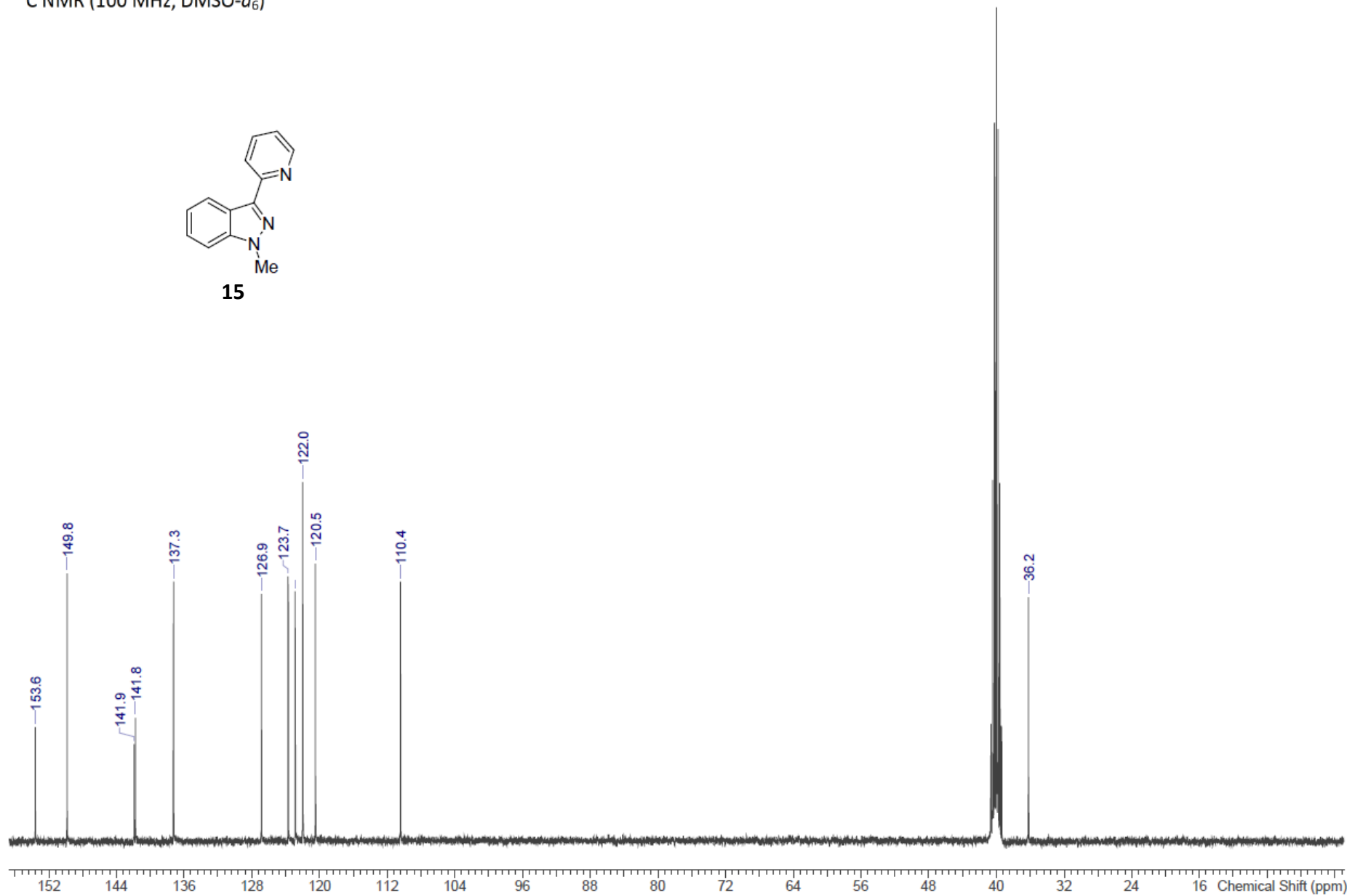
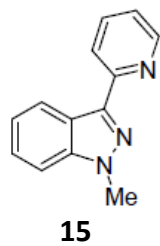
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



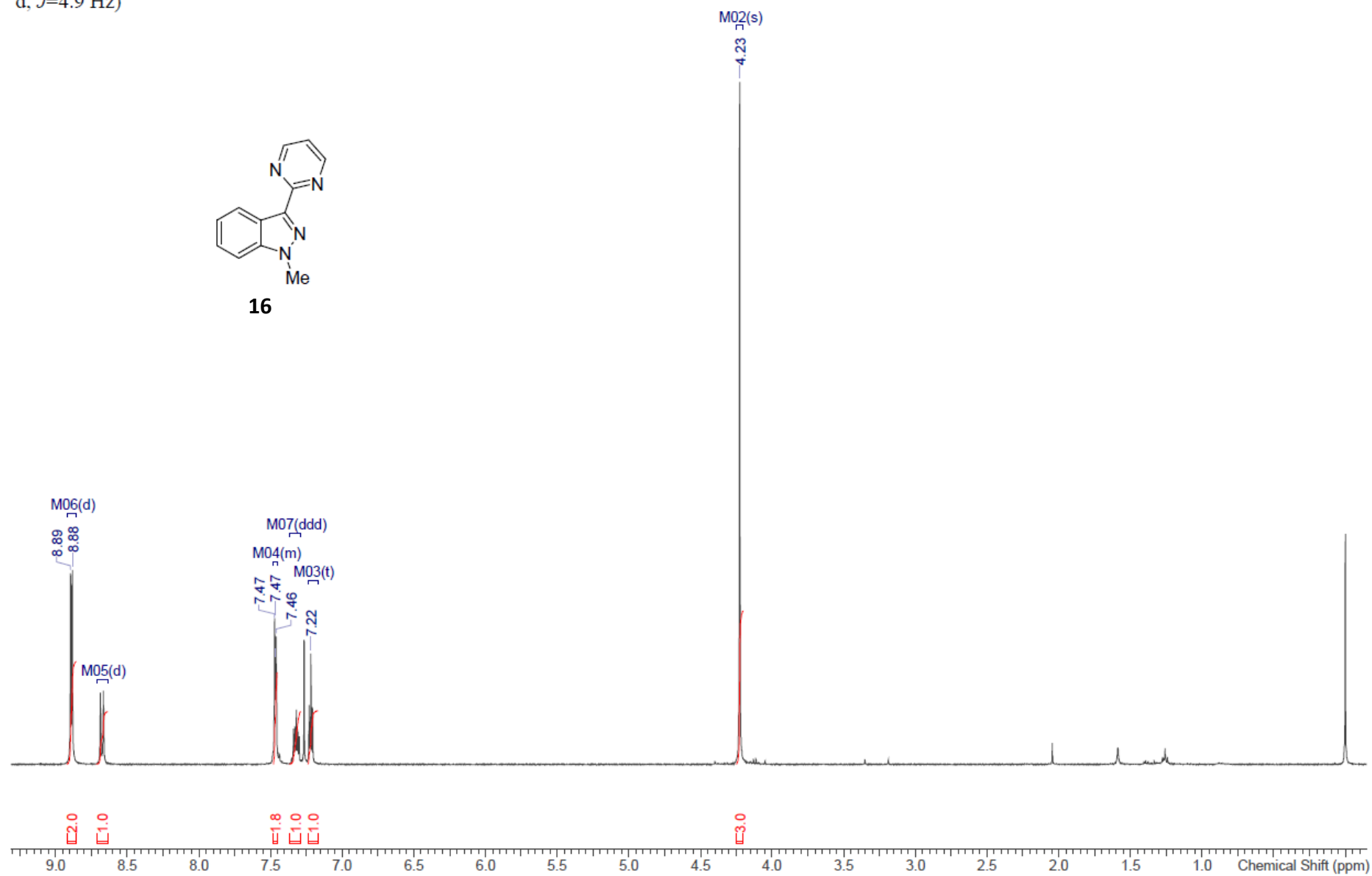
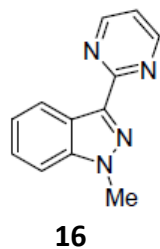
^1H NMR (400 MHz, $\text{DMSO-}d_6$) δ ppm 4.14 (3 H, s) 7.26 (1 H, t, $J=7.5$ Hz) 7.35 (1 H, t, $J=6.2$ Hz) 7.46 (1 H, t, $J=7.6$ Hz) 7.69 (1 H, d, $J=8.6$ Hz) 7.88 (1 H, td, $J=7.8, 1.7$ Hz) 8.13 (1 H, d, $J=7.9$ Hz) 8.59 (1 H, d, $J=8.2$ Hz) 8.72 (1 H, d, $J=4.8$ Hz)



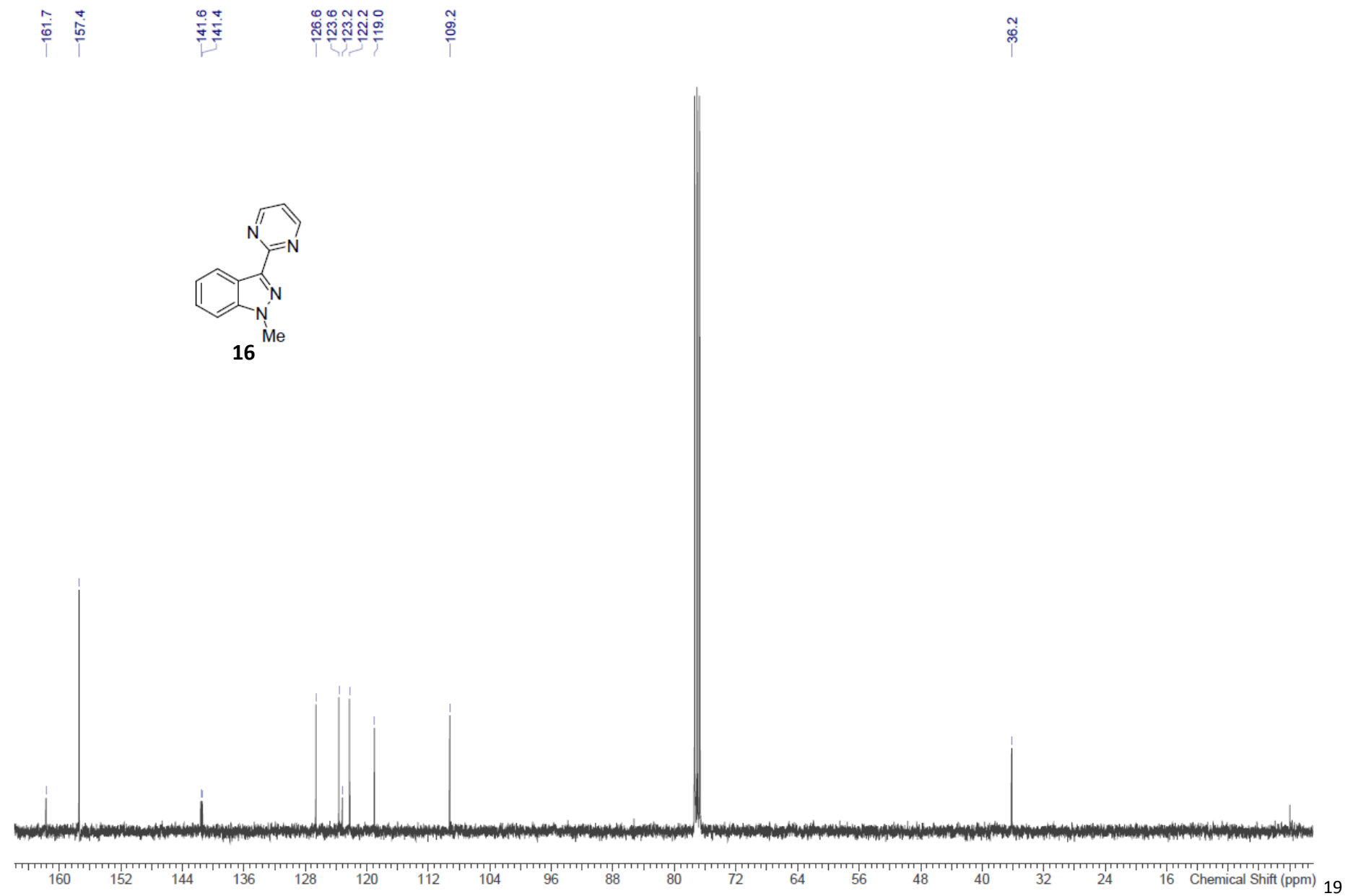
^{13}C NMR (100 MHz, $\text{DMSO-}d_6$)



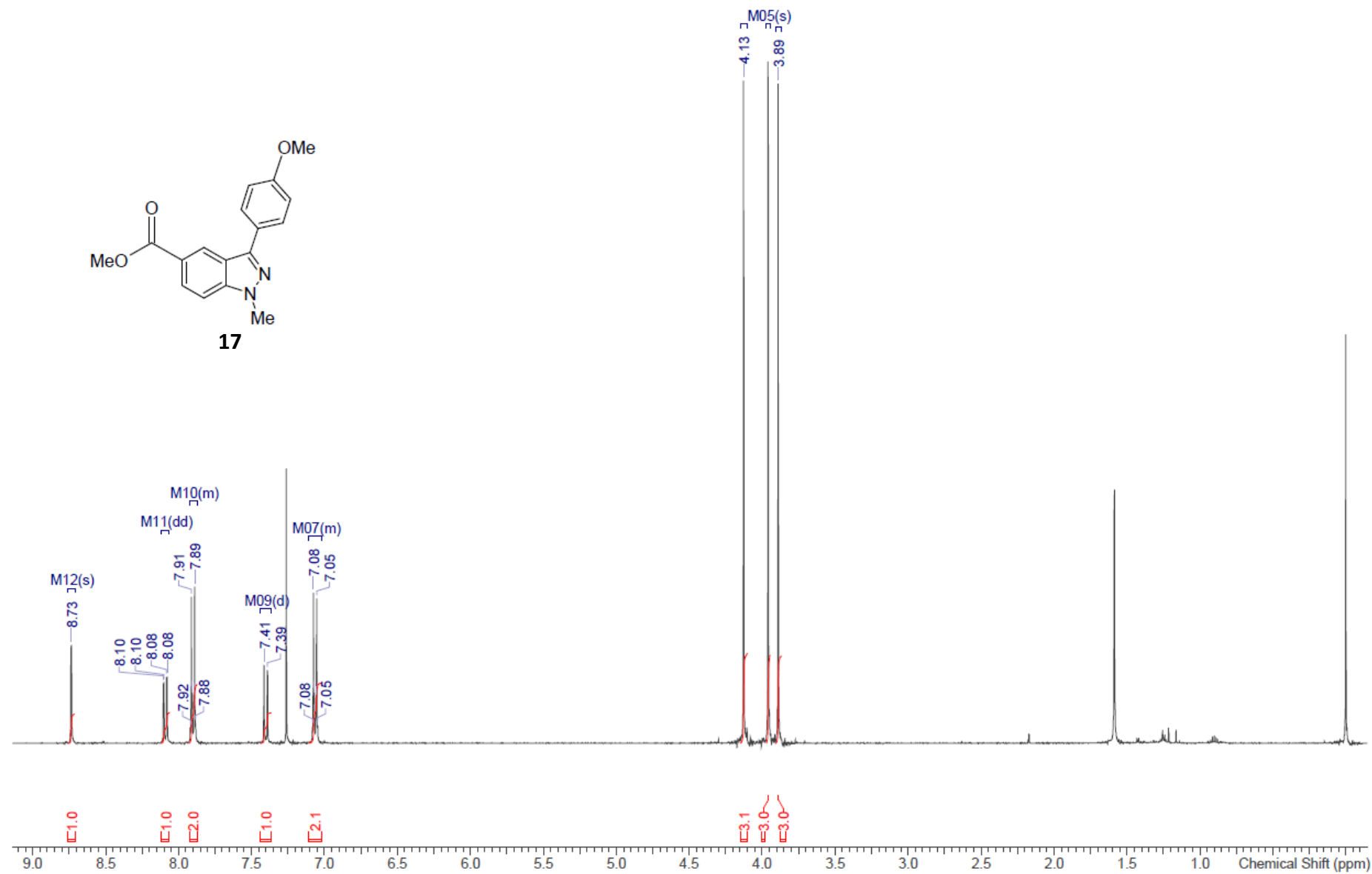
^1H NMR (500 MHz, CDCl_3): 4.23 (3 H, s) 7.22 (1 H, t, $J=4.8$ Hz) 7.32 (1 H, ddd, $J=8.1, 4.7, 3.2$ Hz) 7.45 - 7.48 (1 H, m) 8.68 (1 H, d, $J=8.2$ Hz) 8.89 (2 H, d, $J=4.9$ Hz)



^{13}C NMR (100 MHz, CDCl_3)



^1H NMR (400 MHz, CDCl_3): 3.89 (3 H, s) 3.95 (3 H, s) 4.13 (3 H, s) 7.02 - 7.11 (2 H, m) 7.40 (1 H, d, $J=8.8$ Hz) 7.87 - 7.93 (2 H, m) 8.09 (1 H, dd, $J=8.8$, 1.5 Hz) 8.74 (1 H, s).



¹³C NMR (100 MHz, CDCl₃)

—167.4

—159.9

—145.5

—143.1

—128.8

—127.2

—125.5

—125.0

—122.9

—121.3

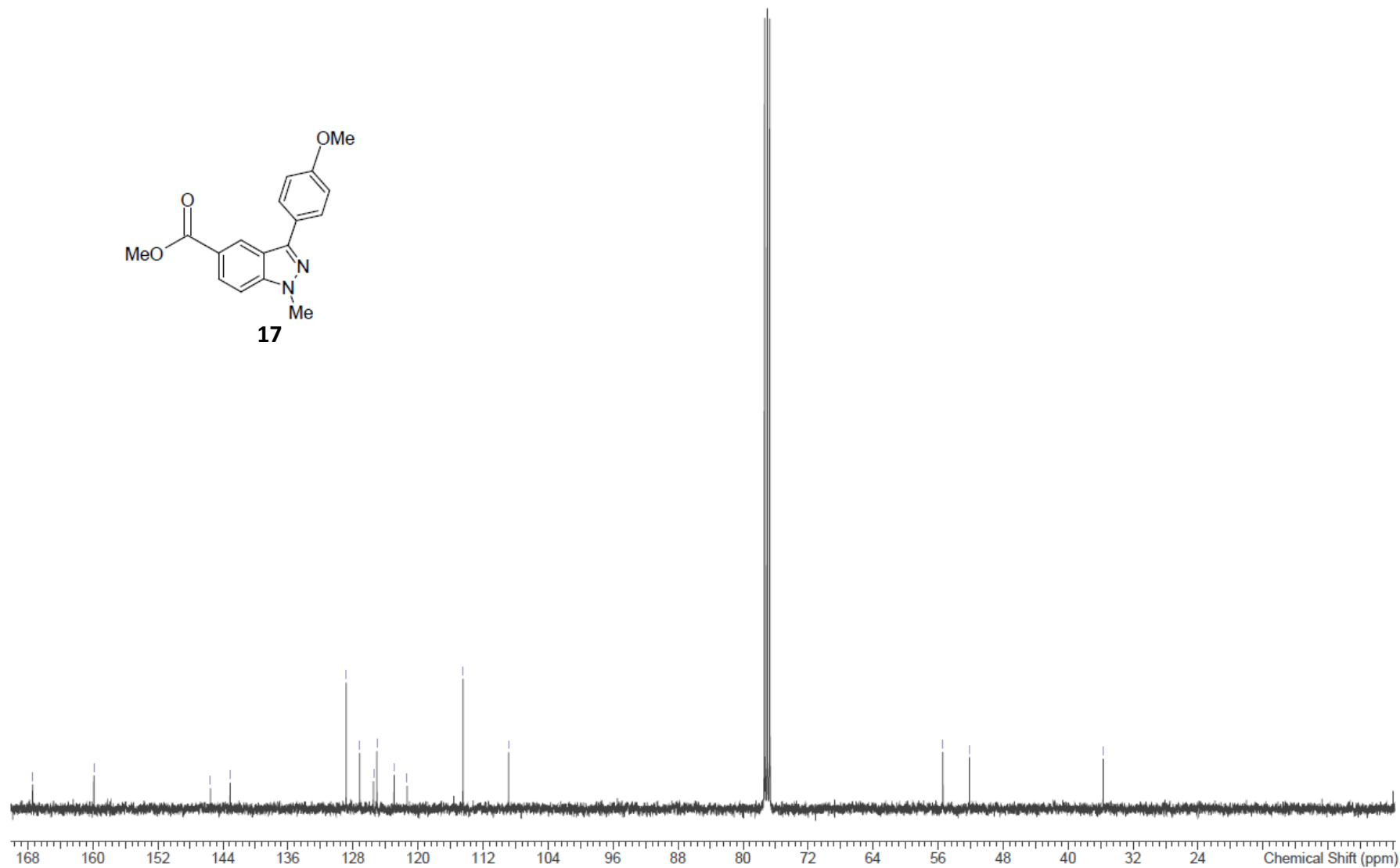
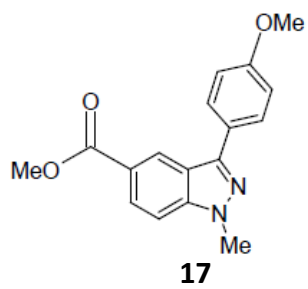
—114.4

—108.8

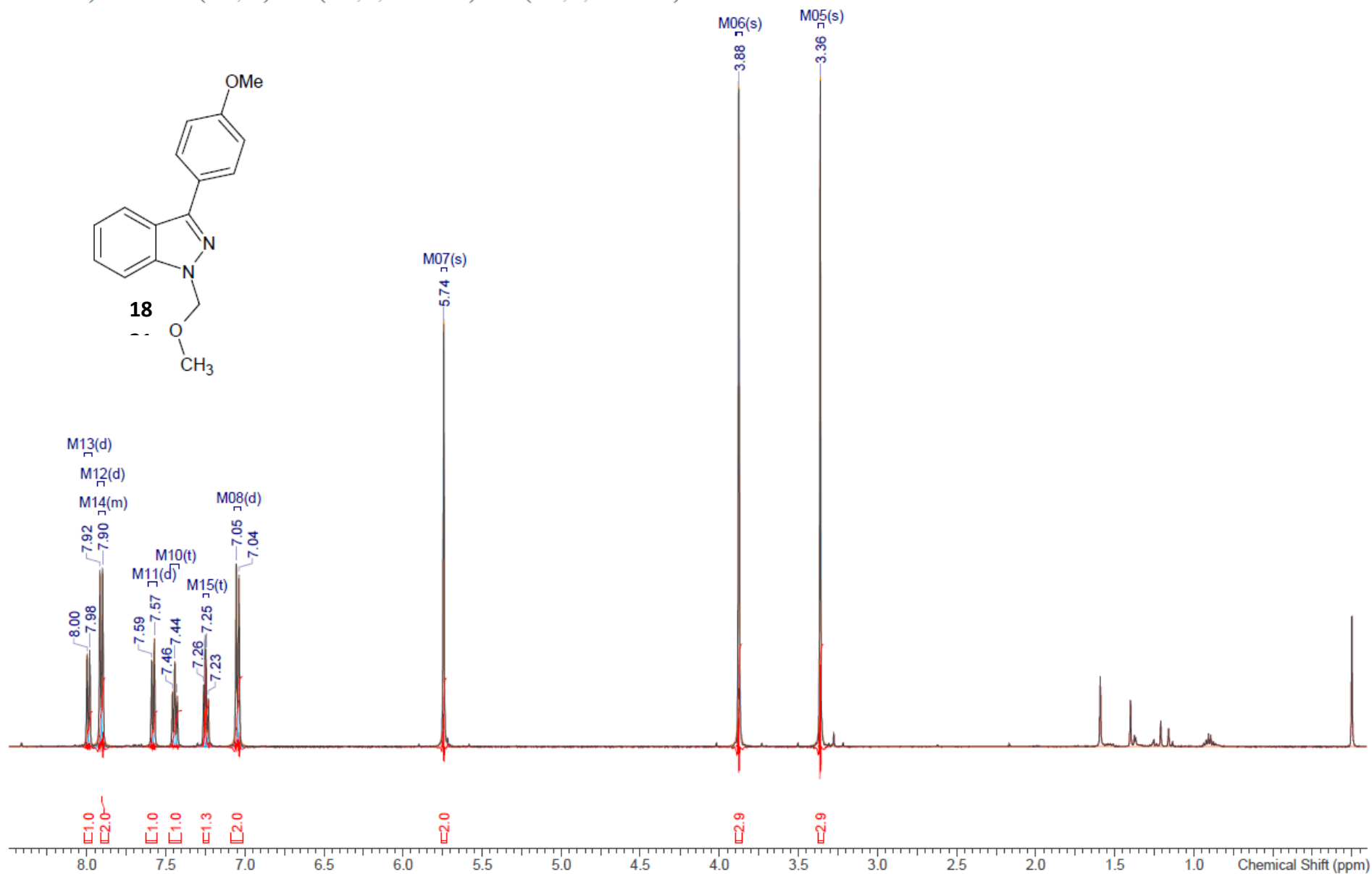
—55.4

—52.1

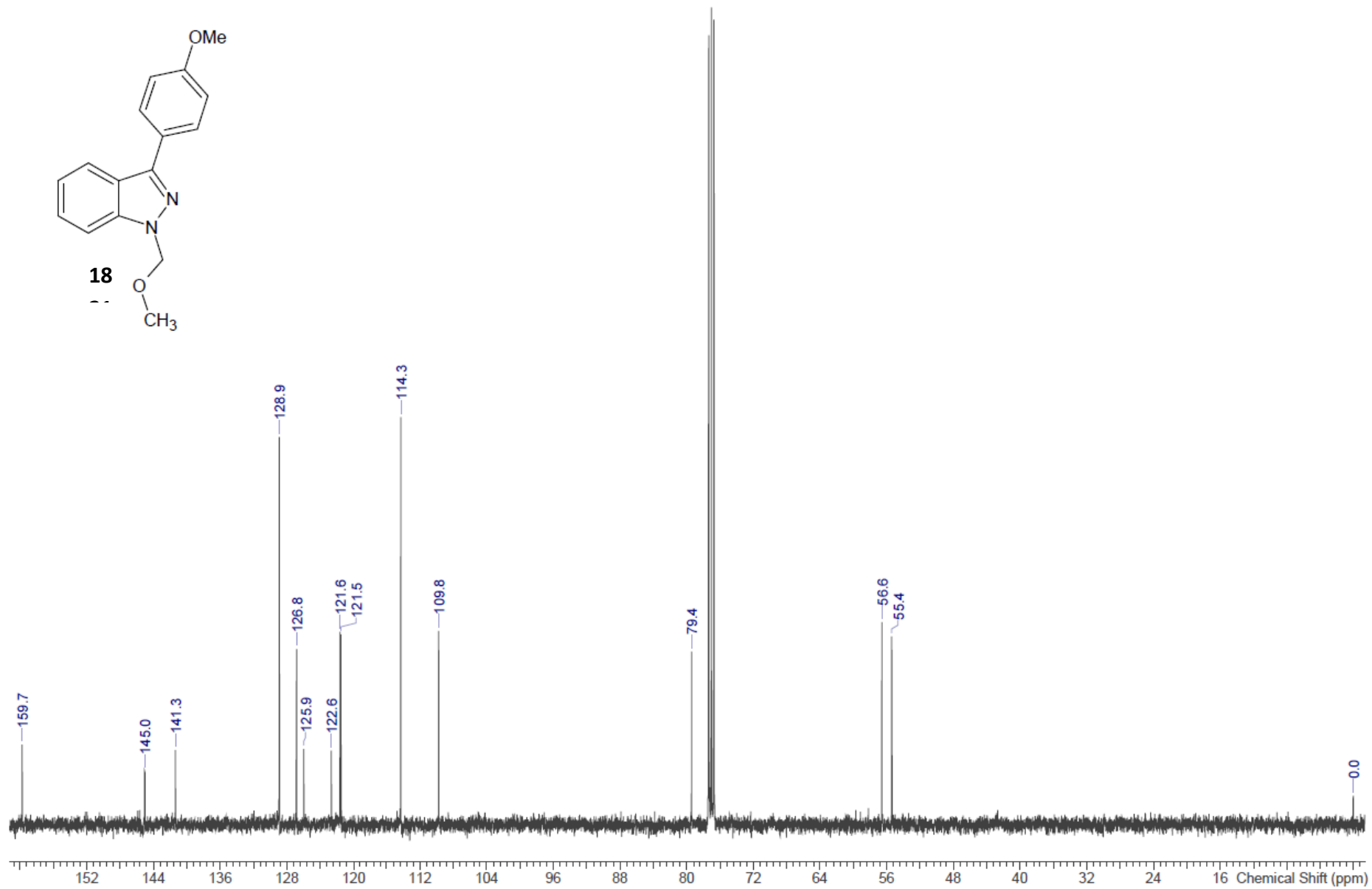
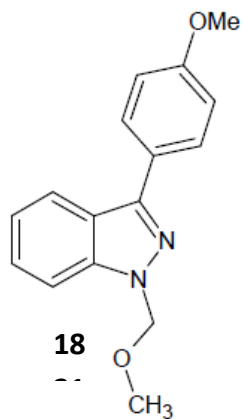
—35.7



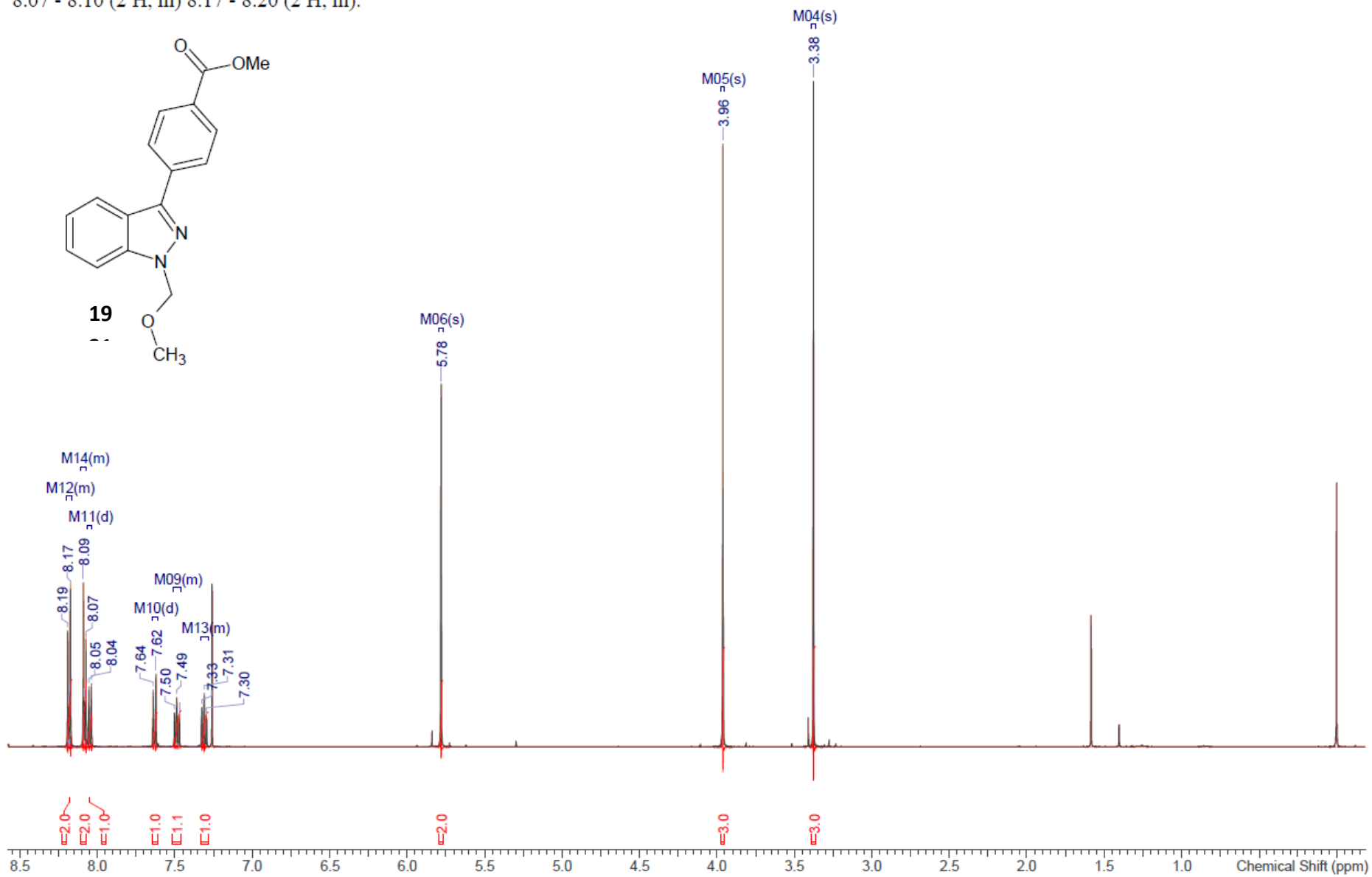
^1H NMR (500 MHz, CDCl_3): 3.36 (3 H, s) 3.88 (3 H, s), 5.74 (2 H, s) 7.05 (2 H, d, $J=8.4$ Hz) 7.25 (1 H, t, $J=7.7$ Hz) 7.44 (1 H, t, $J=7.6$ Hz) 7.58 (1 H, d, $J=8.4$ Hz) 7.89 - 7.93 (1 H, m) 7.91 (2 H, d, $J=8.3$ Hz) 7.99 (1 H, d, $J=8.1$ Hz).



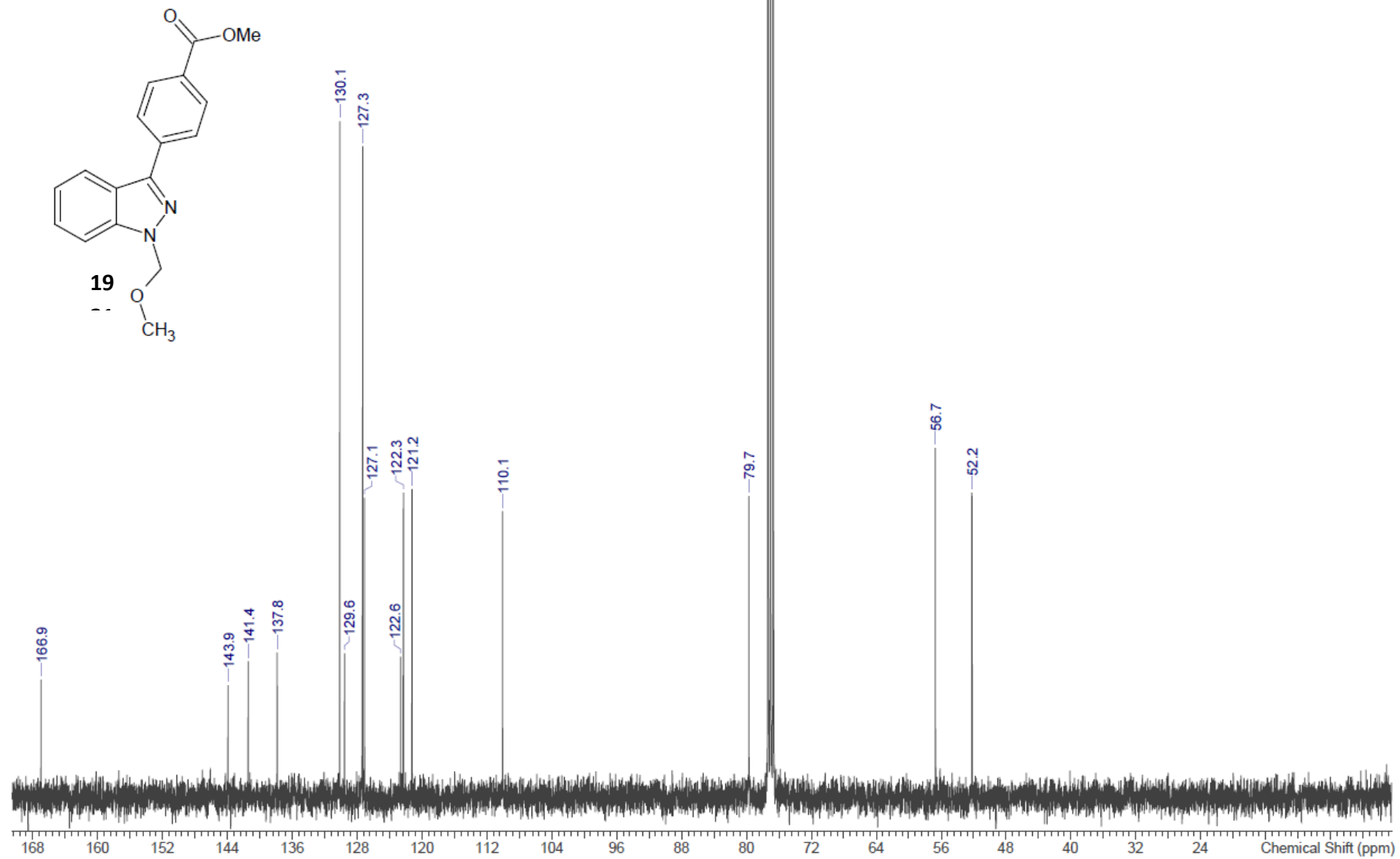
^{13}C NMR (100 MHz, CDCl_3) δ ppm 55.4, 56.6, 79.4, 109.8, 114.3, 121.5, 121.6, 122.6, 125.9, 126.8, 128.9, 141.3, 145.0, 159.7.



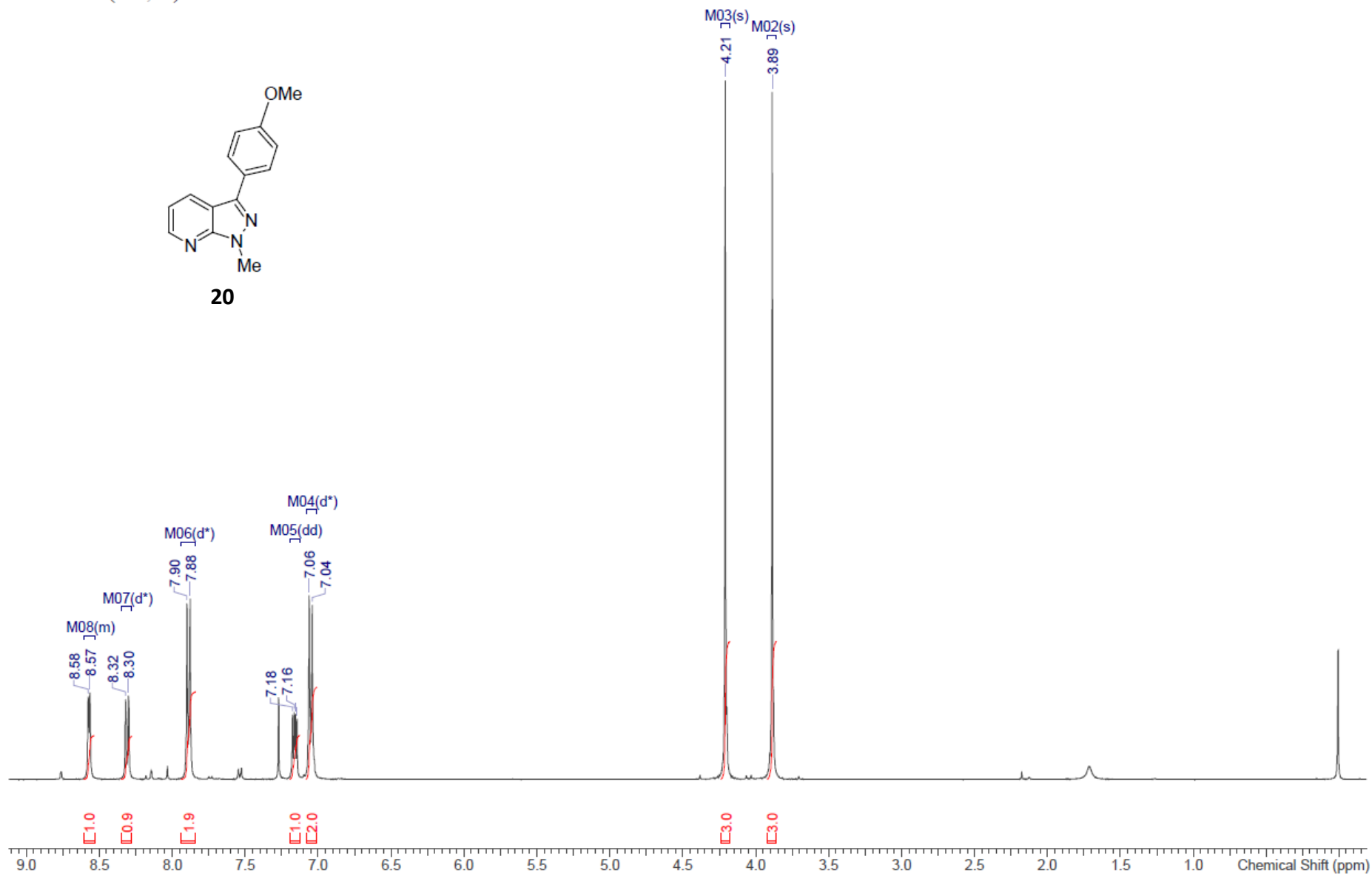
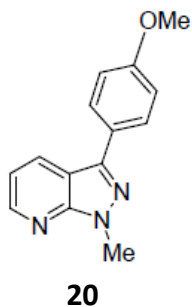
^1H NMR (500 MHz, CDCl_3): 3.38 (3 H, s) 3.96 (3 H, s) 5.78 (2 H, s) 7.28 - 7.33 (1 H, m) 7.46 - 7.51 (1 H, m) 7.63 (1 H, d, $J=8.5$ Hz) 8.05 (1 H, d, $J=8.2$ Hz) 8.07 - 8.10 (2 H, m) 8.17 - 8.20 (2 H, m).



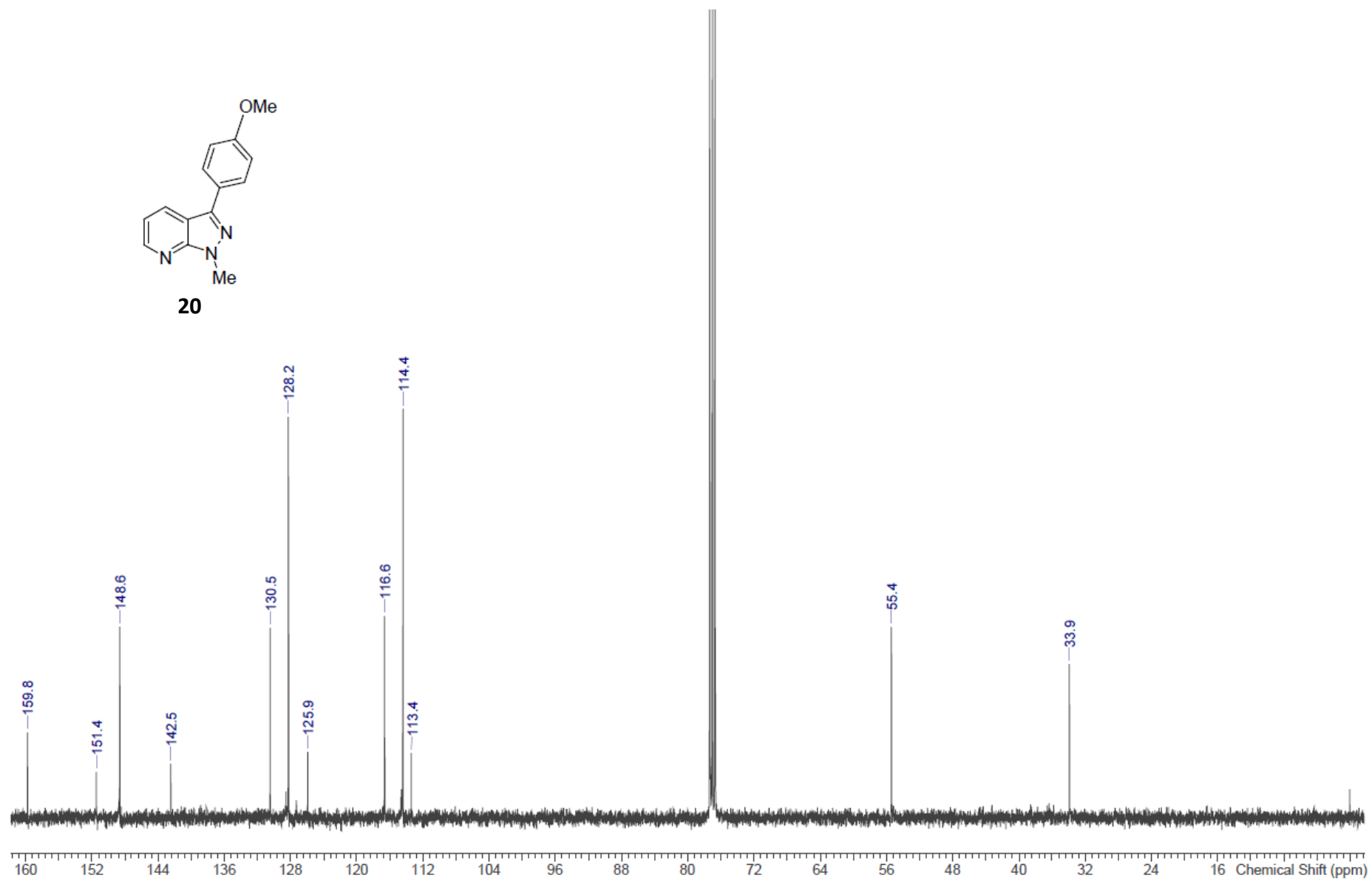
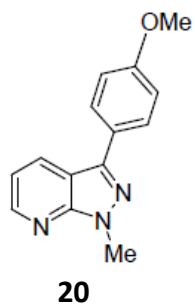
^{13}C NMR (101 MHz, CDCl_3) δ ppm 52.2, 56.7, 79.7, 110.1, 121.2, 122.3, 122.6, 127.1, 127.3, 129.6, 130.1, 137.8, 141.4, 143.9, 166.9.



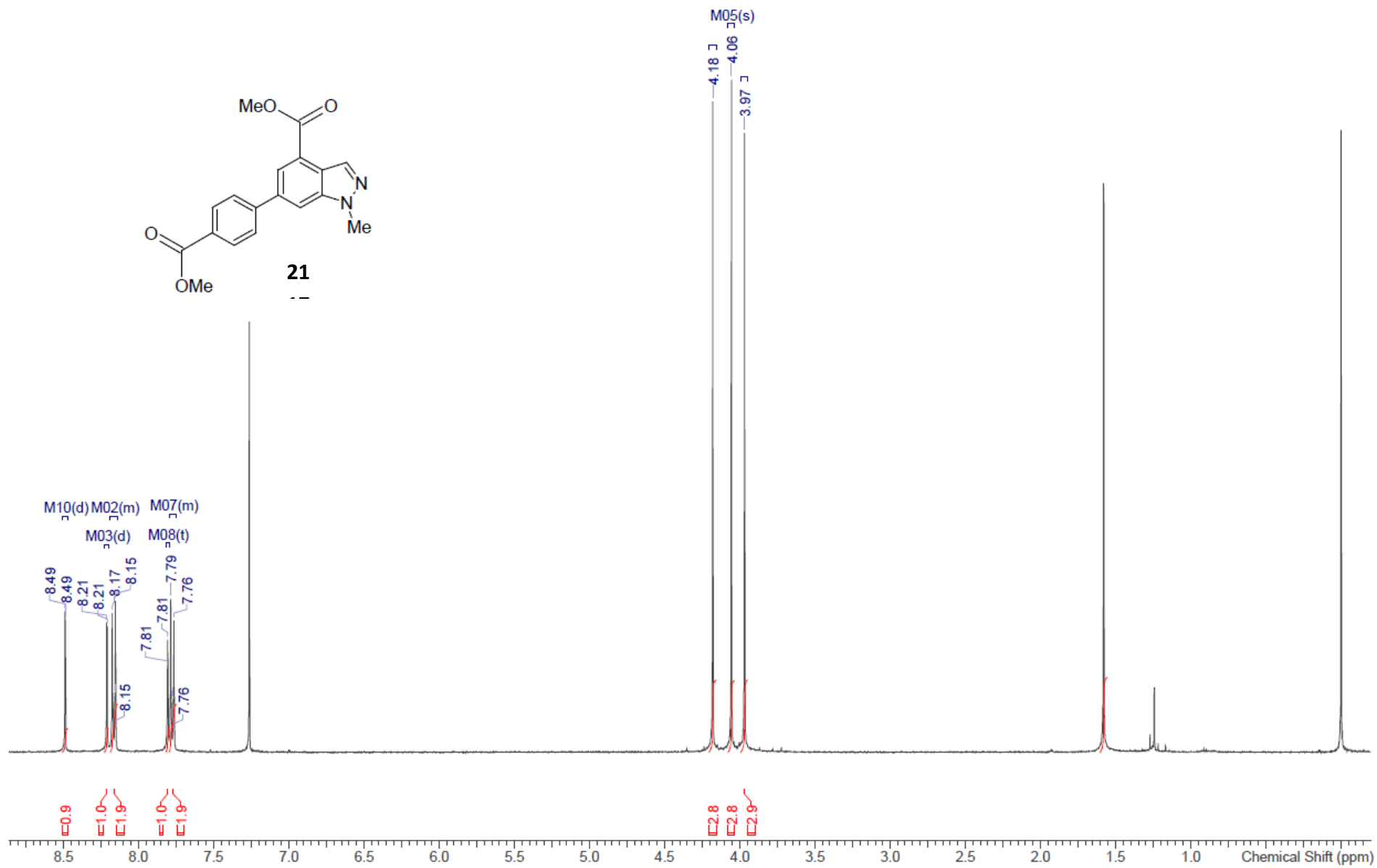
^1H NMR (400 MHz, CDCl_3): 3.89 (3 H, s) 4.20 (3 H, s) 7.05 (2 H, d, $J=8.7$ Hz) 7.16 (1 H, dd, $J=8.1, 4.5$ Hz) 7.89 (2 H, d, $J=8.7$ Hz) 8.31 (1 H, d, $J=8.1$ Hz) 8.53 - 8.61 (1 H, m).



^{13}C NMR (100 MHz, CDCl_3)



^1H NMR (400 MHz, CDCl_3): 3.97 (3 H, s) 4.06 (3 H, s) 4.18 (3 H, s) 7.75 - 7.80 (2 H, m) 7.81 (1 H, t, $J=1.1$ Hz) 8.14 - 8.19 (2 H, m) 8.21 (1 H, d, $J=1.3$ Hz) 8.49 (1 H, d, $J=0.9$ Hz).



^{13}C NMR (100 MHz, CDCl_3)

