Electronic Supplementary Information

Synthesized 3-(2-isocyano-6-methylbenzyl)-1H-indole Enhanced Susceptibility of *Serratia marcescens* to Kanamycin by Occluding Quorum Sensing

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Supplementary data

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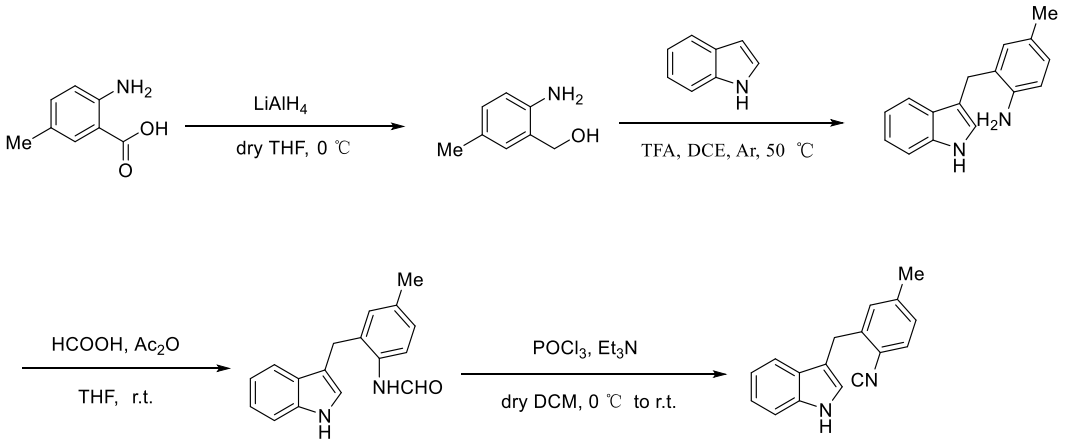
1 Chemical synthesis

1.1 Chemistry general information

Reagents were purchased from commercial sources and were used as received. ^{1}H and ^{13}C Nuclear Magnetic Resonance (NMR) spectra were recorded on Bruker Avance 400 Ultrashield NMR spectrometers. ^{19}F NMR spectra were recorded on a Varian 400 instrument spectrometer. Chemical shifts (δ) were given in parts per million (ppm) and were measured downfield from internal tetramethylsilane (TMS). High-resolution mass spectrometry (HRMS) data were obtained on an FTICR-MS instrument (Ionspec 7.0 T). The melting points were determined on an X-4 microscope melting point apparatus and were corrected. Conversion was monitored by thin layer chromatography (TLC). Flash column chromatography was performed over silica gel (200-300 mesh).

1.2 Synthesis of 3-(2-isocyanobenzyl)-1H-indole derivatives.

Synthesis of 3-(2-isocyanobenzyl)-1H-indole derivatives candidates (**27** was selected as example)



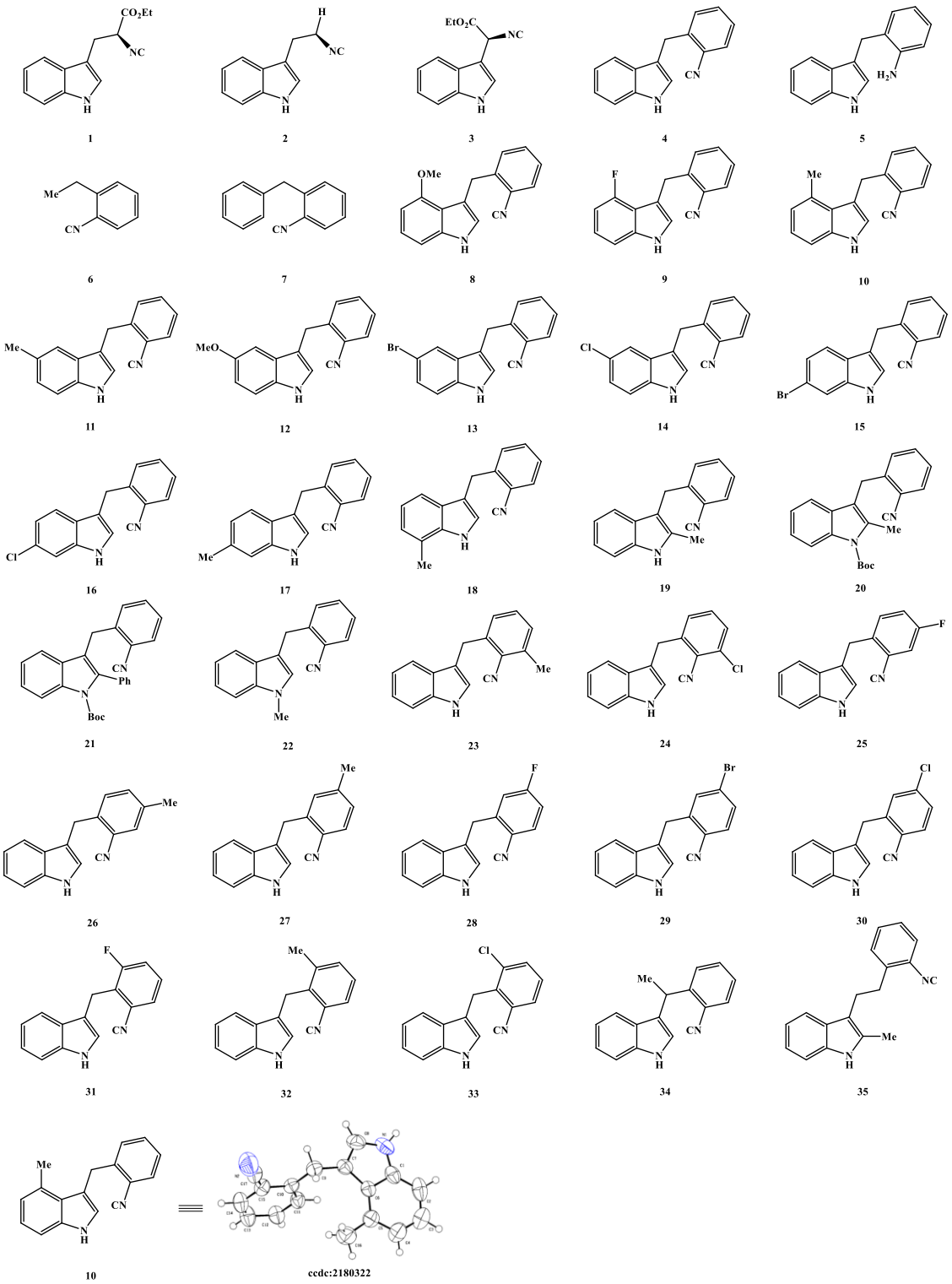
Scheme S1. Synthesis of compound **27**

To a solution of $LiAlH_4$ (15 mmol) in anhydrous THF (20 mL) was added 2-amino-5-methylbenzoic acid (10 mmol) dropwise at 0 °C. Then, the mixture was gradually warmed to room temperature. When the reaction was complete as monitored by TLC, water was added to quench the reaction, and the mixture was extracted with ethyl acetate three times. The combined organic layer was dried over anhydrous Na_2SO_4, filtered, and evaporated to afford the desired product (2-amino-5-methylphenyl)methanol 1.303 g, 95% yield.

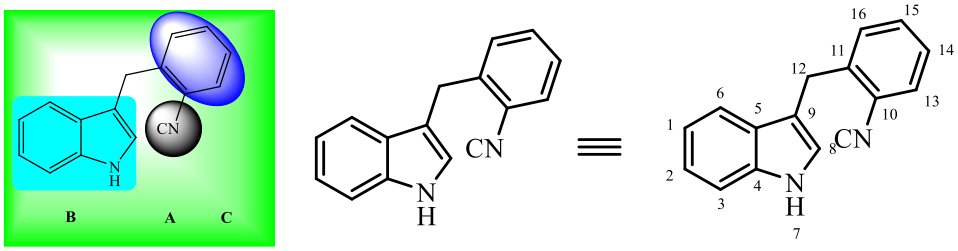
To a solution of (2-amino-5-methylphenyl)methanol (9.5 mmol) and 1H-indole (7.9 mmol) in 1,2-dichloroethane (40 mL). After degassing with argon and four evacuation/backfill cycles with argon, trifluoroacetic acid (2.85 mmol) was added dropwise, then the mixture was heated with oil bath at 50 °C. When the reaction was complete as monitored by TLC, aqueous solution of saturated Na_2CO_3 was added, and the mixture was extracted with dichloromethane three times. The combined organic layer was dried over anhydrous Na_2SO_4, filtered, and evaporated, and the resulting mixture was purified by column chromatography on silica gel to afford the product 4-methyl-2-((1*H*-indol-3-yl)methyl)aniline1.347 g, 60% yield.

To a 50 mL flask were added formic acid (28.5 mmol) and acetic anhydride (11.4 mmol). The reaction mixture was stirred at room temperature for 1 h, then a solution of 4-methyl-2-((1*H*-indol-3-yl)methyl)aniline in THF was added. When the reaction was complete as monitored by TLC, the mixture was adjusted to pH 7 with NaOH solution (1M), extracted with ethyl acetate three times. The combined organic layer was dried over anhydrous Na_2SO_4, filtered and evaporated, and the resulting mixture was purified by column chromatography on silica gel to afford the product *N*-(4-methyl-2-((1H-indol-3-yl)methyl)phenyl)formamide 1.22 g, 81% yield.

To a 100 mL flask were added *N*-(4-methyl-2-((1*H*-indol-3-yl)methyl)phenyl)formamide (4.6 mmol) and 20 mL anhydrous DCM. After degassing with argon and four evacuation/backfill cycles with argon, triethylamine (23 mmol) was added, then the mixture was cooled to 0 °C， and phosphorus oxychloride (9.2 mmol) was added to the solution. When the reaction was complete as monitored by TLC, aqueous solution of saturated Na_2CO_3 was added, extracted with ethyl acetate three times. The combined organic layer was dried over anhydrous Na_2SO_4, filtered, and evaporated, and the resulting mixture was purified by column chromatography on silica gel to afford the product **27** 0.79g, 70% yield.

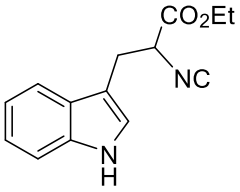


Scheme S2. Chemical structures of all 3-(2-isocyanobenzyl)-1H-indole derivatives for QS inhibitory testing against *S. marcescens*.

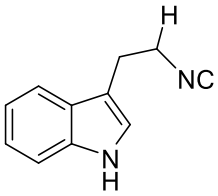


Scheme S3 Design strategy and lead compound

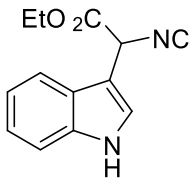
1.3 Characterization data



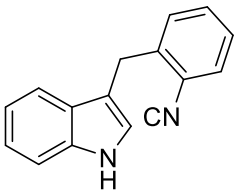
ethyl 3-(1H-indol-3-yl)-2-isocyanopropanoate (**1**). Yellow oil, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25 (s, 1H), 7.74 – 7.50 (m, 1H), 7.38 (dt, *J* = 8.1, 0.9 Hz, 1H), 7.24 – 7.18 (m, 2H), 7.18 – 7.10 (m, 1H), 4.52 (dd, *J* = 8.0, 4.8 Hz, 1H), 4.20 (qd, *J* = 7.1, 2.0 Hz, 2H), 3.51 – 3.19 (m, 2H), 1.22 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6, 136.1, 126.8, 123.7, 122.4, 119.8, 118.2, 111.5, 108.7, 62.8, 29.5, 13.9. IR(KBr) 3417, 3075, 2923, 2119, 1740, 1384 cm^{-1}; HRMS(ESI): calcd for $C_{14}H_{14}N_2O_2$ $[M+H]^+$ 243.1134, found 243.1130.



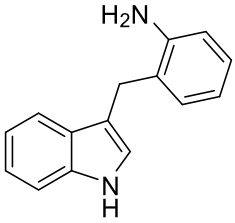
3-(2-isocyanoethyl)-1H-indole (**2**). Colorless solid, mp 80 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (s, 1H), 7.56 (dd, *J* = 7.9, 1.0 Hz, 1H), 7.42 – 7.35 (m, 1H), 7.27 – 7.18 (m, 1H), 7.18 – 7.12 (m, 2H), 3.67 (tt, *J* = 7.0, 1.8 Hz, 2H), 3.23 – 3.11 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.9, 136.2, 126.8, 122.6, 122.4, 119.8, 118.2, 111.4, 111.1, 42.4, 25.8. IR(KBr) 3417, 3075, 2920, 2119, 1330 cm^{-1}; HRMS(ESI): calcd for $C_{11}H_{10}N_2$ $[M+H]^+$ 171.0922, found 171.0919.



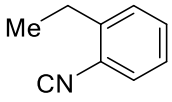
ethyl 2-(1H-indol-3-yl)-2-isocyanoacetate (**3**). Yellow oil, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.24 (s, 1H), 7.52 – 7.29 (m, 5H), 5.65 (dd, *J* = 7.4, 0.9 Hz, 1H), 4.38 – 4.09 (m, 2H), 1.36 – 1.06 (m, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.5, 160.1, 129.0, 128.6, 127.2, 62.2, 55.1, 14.0. IR(KBr) 3417, 3075, 2921, 2119, 1708, 1384, cm^{-1}; HRMS(ESI): calcd for $C_{13}H_{12}N_2O_2$ $[M+H]^+$ 229.0977, found 229.0972.



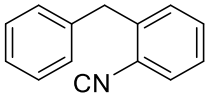
3-(2-isocyanobenzyl)-1H-indole(**4**). Yellow solid, mp 65 °C, 75% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (s, 1H), 7.57 (d, J = 7.4 Hz, 1H), 7.43 (d, J = 8.1 Hz, 2H), 7.34 – 7.30 (m, 2H), 7.29 – 7.23 (m, 2H), 7.19 – 7.10 (m, 2H), 4.31 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.3, 137.8, 136.4, 130.0, 129.4, 127.2, 127.0, 126.9, 123.0, 122.2, 119.6, 119.0, 112.8, 111.3, 28.1. IR(KBr) 3406, 3055, 2919, 2122, 1631, 743 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{12}N_2$ [M-H]$^-$ 231.0928, found 231.0924.



2-((1H-indol-3-yl)methyl)aniline n-me(**5**). Colorless solid, mp 112 °C, 40% yield, petroleum ether : EtOAc = 4:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (s, 1H), 7.51 (d, J = 7.9 Hz, 1H), 7.19 – 6.99 (m, 7H), 6.73 (td, J = 7.4, 1.2 Hz, 1H), 6.64 – 6.53 (m, 2H), 3.90 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.9, 136.7, 130.7, 127.6, 127.5, 125.6, 122.6, 122.3, 119.6, 119.2, 119.0, 116.1, 113.6, 111.5, 28.3. IR(KBr) 3020, 2923, 2846, 1384 cm^{-1}; HRMS(ESI): calcd for $C_{15}H_{14}N_2$ [M+H]+ 223.1235, found 223.1236.

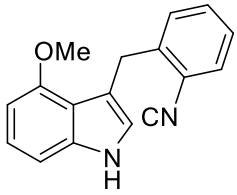


1-ethyl-2-isocyanobenzene (**6**). Yellow oil, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.28 (m, 3H), 7.21 (td, J = 7.5, 1.8 Hz, 1H), 2.80 (q, J = 7.6 Hz, 2H), 1.28 (t, J = 7.6 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.6, 140.7, 129.5, 129.0, 126.8, 126.7, 25.5, 13.9. IR(KBr) 3075, 2923, 2119, 1638, 1384 cm^{-1}; HRMS(ESI): calcd for $C_{14}H_{11}N$ [M+H]$^+$ 132.0813, found 132.0810.

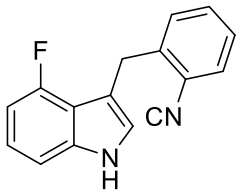


1-benzyl-2-isocyanobenzene (**7**). Yellow solid, mp 60 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 (dd, J = 7.8, 1.5 Hz, 1H), 7.32 – 7.27 (m, 3H), 7.26 – 7.15 (m, 5H), 4.10 (s, 2H). ^{13}C NMR (100

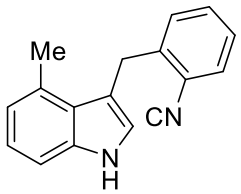
MHz, $CDCl_3$) δ 166.6, 138.5, 137.8, 130.4, 129.5, 129.1, 128.7, 127.3, 127.0, 126.7, 38.1. IR(KBr) 3075, 2920, 1638, 1384 cm^{-1}; HRMS(ESI): calcd for C_9H_9N $[M+H]^+$, 194.0970 found 194.0975.



3-(2-isocyanobenzyl)-4-methoxy-1H-indole (**8**). Colorless solid, mp 112 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 7.98 (s, 1H), 7.36 (d, *J* = 7.7 Hz, 1H), 7.25 – 7.13 (m, 3H), 7.09 (t, *J* = 8.0 Hz, 1H), 6.97 (d, *J* = 8.2 Hz, 1H), 6.89 (d, *J* = 2.4 Hz, 1H), 6.46 (d, *J* = 7.8 Hz, 1H), 4.40 (s, 2H), 3.82 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.5, 130.2, 129.1, 126.5, 126.4, 123.1, 121.6, 113.5, 107.9, 104.4, 99.6, 55.0, 29.0. IR(KBr) 3291, 2920, 2840 ,1250 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2O$ $[M+H]^+$ 263.1184, found 263.1180.

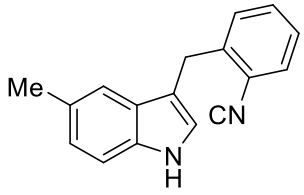


4-fluoro-3-(2-isocyanobenzyl)-1H-indole(**9**). Yellow solid, mp 106 °C, 66% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) *δ* 7.89 (s, 1H), 7.35 (d, *J* = 8.0 Hz, 1H), 7.20 (d, *J* = 8.2 Hz, 1H), 7.11 – 6.89 (m, 4H), 6.87 – 6.74 (m, 2H), 4.05 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) *δ* 166.30, 160.68, 158.22, 135.30, 132.70 (d, *J* = 3.9 Hz), 130.24 (d, *J* = 8.6 Hz), 125.93, 122.01, 121.17, 118.55, 117.73, 115.78 (d, *J* = 20.9 Hz), 112.88 (d, *J* = 25.4 Hz), 111.25, 110.32 (d, *J* = 1.8 Hz), 26.34.^{19}F NMR (376 MHz, $CDCl_3$) *δ* -114.17. IR(KBr) 3447, 3060, 2921, 2132, 1588, 1415, 746cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}FN_2$ [M-H]- 249.0834, found 249.0827.

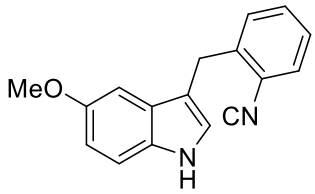


3-(2-isocyanobenzyl)-4-methyl-1H-indole (**10**). White solid, mp 90 °C, 68% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) *δ* 8.23 (s, 1H), 7.81 – 7.72 (m, 1H), 7.53 – 7.47 (m, 1H), 7.45 – 7.40 (m, 1H), 7.37 – 7.27 (m, 3H), 7.17 (dd, *J* = 8.0, 1.9 Hz, 1H), 7.10 (d, *J* = 2.5 Hz, 1H), 4.40 (s, 2H), 2.43 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) *δ* 165.3, 136.8, 136.2, 134.5, 130.1, 129.6, 127.0, 126.9,

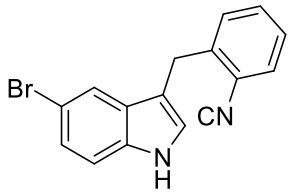
122.9, 121.8, 119.2, 118.7, 112.4, 111.3, 27.4, 20.3. IR(KBr) 3399, 3054, 2918, 2851, 2120, 1577, 744 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M-H]^-$ 245.1084, found 245.1079.



3-(2-isocyanobenzyl)-5-methyl-1H-indole(**11**). Brown solid, mp 115 °C, 70% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 7.89 (s, 1H), 7.34 – 7.29 (m, 1H), 7.26 (s, 1H), 7.21 – 7.16 (m, 3H), 7.15 – 7.10 (m, 1H), 6.99 (dd, J = 8.3, 1.6 Hz, 1H), 6.88 (d, J = 2.4 Hz, 1H), 4.16 (s, 2H), 2.39 (s, 3H) . ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.1, 138.0, 134.8, 130.1, 129.5, 128.9, 127.6, 127.0, 126.9, 126.0, 123.9, 123.4, 118.6, 112.1, 111.1, 28.1, 21.7. IR(KBr) 3293, 3022, 2923, 2853, 2140 ,1626, 764 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M-H]^-$ 245.1084, found 245.1091.

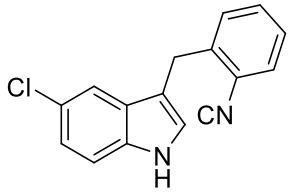


3-(2-isocyanobenzyl)-5-methoxy-1H-indole(**12**). White solid, mp 149 °C, 70% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 7.96 (s, 1H), 7.42 – 7.36 (m, 1H), 7.29 – 7.25 (m, 4H), 7.24 – 7.18 (m, 1H), 7.04 (d, J = 2.4 Hz, 1H), 6.94 (d, J = 2.4 Hz, 1H), 6.86 (dd, J = 8.8, 2.5 Hz, 1H), 4.21 (s, 1H), 3.82 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.1, 137.7, 131.5, 130.0, 129.4, 127.7, 127.0, 126.9, 123.8, 112.6, 112.3, 112.0, 100.9, 55.9, 28.0. IR(KBr) 3396, 3106, 3055, 2927, 2832, 2121, 1211, 727 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2O$ $[M-H]^-$ 261.1033, found 261.1044.

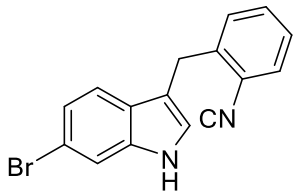


5-bromo-3-(2-isocyanobenzyl)-1H-indole(**13**). Brown solid, mp 111 °C, 60% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 8.10 (s, 1H), 7.50 (d, J = 1.8 Hz, 1H), 7.28 – 7.23 (m, 1H), 7.18 – 7.06 (m, 5H), 6.89 (d, J = 2.4 Hz, 1H), 4.04 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.2, 137.3, 135.1, 129.9,

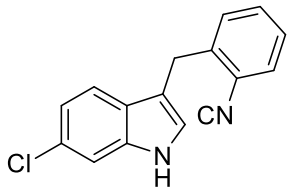
129.6, 129.0, 127.3, 127.0, 126.0, 125.1, 124.4, 121.5, 112.9, 112.4, 28.0. IR(KBr) 3395, 3020, 2922, 2119, 1663, 1451, 763 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}BrN_2$ $[M-H]^-$ 309.0033, found 309.0043.



5-chloro-3-(2-isocyanobenzyl)-1H-indole(**14**). Brown solid, mp 112 °C, 70% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 8.18 (s, 1H), 7.44 (s, 1H), 7.35 (d, J = 6.9 Hz, 1H), 7.27 – 7.19 (m, 4H), 7.11 (dd, J = 8.6, 2.0 Hz, 1H), 7.03 (s, 1H), 4.16 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.2, 137.3, 134.8, 129.9, 129.6, 128.4, 127.2, 127.0, 126.0, 125.3, 124.6, 122.6, 118.4, 112.5, 112.4, 28.0. IR(KBr) 3281, 3059, 2924, 2141, 1625, 1448, 764 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}ClN_2$ $[M-H]^-$ 265.0538, found 265.0532.

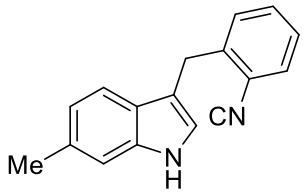


6-bromo-3-(2-isocyanobenzyl)-1H-indole (**15**). Brown solid, mp 89 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 8.06 (s, 1H), 7.53 (d, J = 1.7 Hz, 1H), 7.36 (dd, J = 13.0, 7.7 Hz, 2H), 7.29 (dd, J = 8.1, 1.4 Hz, 1H), 7.25 – 7.16 (m, 3H), 7.08 – 7.00 (m, 1H), 4.21 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 164.9, 137.3, 137.2, 134.9, 129.9, 129.5, 127.2, 126.9, 126.7, 126.1, 123.6, 123.0, 120.2, 115.8, 114.2, 28.0. IR(KBr) 3410, 3075, 2933, 1384, 722 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}BrN_2$ $[M+H]^+$ 311.0184, found 311.0180.

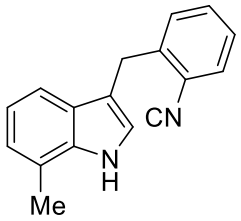


6-chloro-3-(2-isocyanobenzyl)-1H-indole(**16**). Brown solid, mp 97 °C, 68% yield; petroleum ether : EtOAc = 5:1. ^1H NMR (400 MHz, $CDCl_3$) δ 8.13 (s, 1H), 7.34 (t, J = 8.6 Hz, 2H), 7.28 (d, J = 1.9 Hz, 1H), 7.24 – 7.14 (m, 3H), 7.02 (dd, J = 8.4, 1.8 Hz, 1H), 6.96 (d, J = 2.4 Hz, 1H), 4.16 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.1, 137.4, 136.7, 129.9, 129.5, 128.1, 127.2, 127.0, 125.8, 123.8, 120.3, 119.8, 112.9, 111.3. IR(KBr) 3320, 3070, 2921, 2141, 1618, 1408, 771 cm^{-1}; HRMS(ESI):

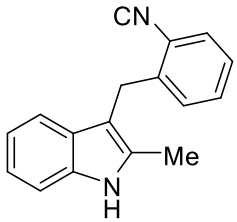
calcd for $C_{16}H_{11}ClN_2$ [M-H]$^-$ 265.0538, found 265.0532.



3-(2-isocyanobenzyl)-6-methyl-1H-indole(**17**). Brown solid, mp 97 °C, 65% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (s, 1H), 7.60 (d, J = 8.1 Hz, 1H), 7.50 (dd, J = 7.5, 1.7 Hz, 1H), 7.42 – 7.27 (m, 3H), 7.25 (s, 1H), 7.14 (d, J = 8.1 Hz, 1H), 7.04 (d, J = 2.4 Hz, 1H), 4.39 (s, 2H), 2.65 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.3, 138.1, 137.1, 132.0, 130.2, 129.6, 127.1, 127.0, 125.3, 122.8, 121.5, 118.8, 112.5, 111.6, 28.3, 22.0. IR(KBr) 3356, 3057, 2916, 2854, 2137, 1626, 769 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ [M-H]$^-$ 245.1084, found 245.1085.

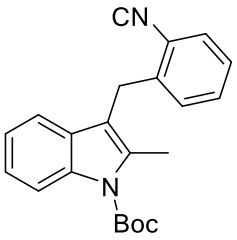


3-(2-isocyanobenzyl)-7-methyl-1H-indole(**18**). Brown solid, mp 116 °C, 70% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00 (s, 1H), 7.36 – 7.31 (m, 2H), 7.24 – 7.14 (m, 3H), 7.04 – 6.96 (m, 3H), 4.21 (s, 2H), 2.44 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.1, 137.9, 136.0, 130.1, 129.5, 127.0, 126.9, 126.8, 122.9, 122.8, 120.6, 119.9, 116.7, 113.2, 28.2, 16.7. IR(KBr) 3318, 3047, 2924, 2852, 2143, 1618, 744 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ [M-H]$^-$ 245.1084, found 245.1081.

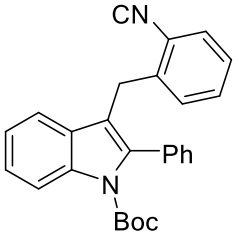


3-(2-isocyanobenzyl)-2-methyl-1H-indole (**19**). Brown solid, mp 91 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (s, 1H), 7.41 – 7.36 (m, 1H), 7.33 – 7.28 (m, 2H), 7.22 – 7.16 (m, 2H), 7.17 – 7.08 (m, 1H), 7.07 – 6.98 (m, 2H), 4.18 (s, 2H), 2.40 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.3, 137.8, 135.4, 132.5, 129.5, 129.4, 128.7, 126.7, 126.7, 121.3, 119.5, 118.2, 110.3,

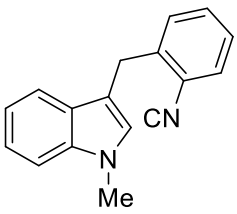
107.9, 26.4, 11.9. IR(KBr) 3417, 3075, 2925, 2119, 1638, 1384, cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M+H]^+$ 247.1235, found 247.1230.



tert-butyl 3-(2-isocyanobenzyl)-2-methyl-1H-indole-1-carboxylate (**20**). Colorless solid, mp 120 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.13 (d, *J* = 8.9 Hz, 1H), 7.45 – 7.36 (m, 1H), 7.25 – 7.22 (m, 2H), 7.21 – 7.13 (m, 3H), 6.98 – 6.91 (m, 1H), 4.16 (s, 2H), 2.56 (s, 3H), 1.70 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.7, 150.7, 136.5, 135.8, 135.0, 129.7, 129.5, 129.0, 127.0, 126.7, 123.7, 122.6, 118.0, 115.5, 114.4, 83.8, 28.3, 26.0, 14.2. IR(KBr) 3075, 2923, 2120, 1638, 1384 cm^{-1}; HRMS(ESI): calcd for $C_{22}H_{22}N_2O_2$ $[M+H]^+$ 347.1760, found 347.1764.

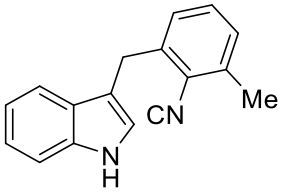


tert-butyl 3-(2-isocyanobenzyl)-2-phenyl-1H-indole-1-carboxylate (**21**). Colorless solid, mp 140 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 (d, *J* = 8.4 Hz, 1H), 7.41 – 7.32 (m, 5H), 7.31 – 7.24 (m, 2H), 7.23 (dd, *J* = 1.6, 0.7 Hz, 1H), 7.21 – 7.17 (m, 3H), 7.01 (dd, *J* = 5.5, 3.8 Hz, 1H), 4.03 (s, 2H), 1.25 (s, 9H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.5, 150.1, 137.8, 136.8, 136.7, 133.7, 129.5, 129.4, 129.2, 129.1, 128.1, 127.9, 126.9, 126.6, 124.8, 122.9, 119.1, 116.5, 115.4, 83.3, 27.5, 26.4. IR(KBr) 3075, 2922, 2122, 1700, 1384 cm^{-1}; HRMS(ESI): calcd for $C_{27}H_{24}N_2O_2$ $[M+H]^+$ 409.1916, found 409.1911.

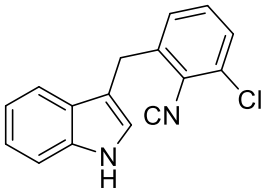


3-(2-isocyanobenzyl)-1-methyl-1H-indole(**22**). Yellow solid, mp 130 °C, 60% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 7.48

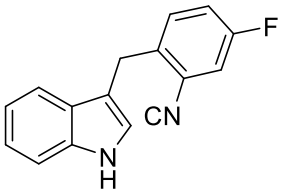
(d, J = 7.9 Hz, 1H), 7.31 (d, J = 7.6 Hz, 1H), 7.27 – 7.16 (m, 4H), 7.13 (m, 1H), 7.09 – 7.03 (m, 1H), 6.85 (s, 1H), 4.18 (s, 2H), 3.66 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.6, 138.1, 137.3, 130.1, 129.5, 127.8, 127.8, 127.0, 126.9, 121.9, 119.2, 119.2, 111.3, 109.5, 32.8, 28.0. IR(KBr) 3052, 2922, 2851, 2119, 1602, 1491, 740 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M+H]^+$ 247.1230, found 247.1222.



3-(2-isocyano-3-methylbenzyl)-1H-indole(**23**). Brown solid, mp 137 °C, 66% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (s, 1H), 7.50 (d, J = 7.9 Hz, 1H), 7.35 – 7.27 (m, 1H), 7.20 – 7.13 (m, 1H), 7.12 – 7.03 (m, 4H), 6.99 (d, J = 2.4 Hz, 1H), 4.20 (s, 2H), 2.41 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.2, 137.8, 136.4, 135.2, 128.9, 128.1, 127.4, 127.3, 123.2, 122.2, 119.6, 119.1, 112.9, 111.4, 28.5, 19.1. IR(KBr) 3301, 3041, 2919, 2850, 2141, 1619, 742 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M-H]^-$ 245.1084, found 245.1097.

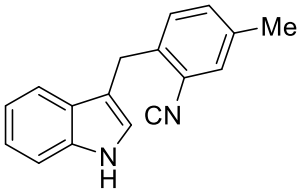


3-(3-chloro-2-isocyanobenzyl)-1H-indole(**24**). Brown solid, mp 61 °C, 60% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (s, 1H), 7.42 (d, J = 8.0 Hz, 1H), 7.24 (d, J = 8.2 Hz, 1H), 7.15 – 7.10 (m, 2H), 7.06 – 7.02 (m, 1H), 7.01 – 6.92 (m, 2H), 6.88 (d, J = 2.5 Hz, 1H), 4.12 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.9, 139.9, 136.2, 130.7, 129.5, 128.0, 127.3, 126.9, 123.2, 122.0, 119.5, 118.6, 111.6, 111.4, 28.5. IR(KBr) 3406, 3058, 2918, 2119, 1640, 1353, 747 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}ClN_2$ $[M-H]^-$ 265.0538, found 265.0537.

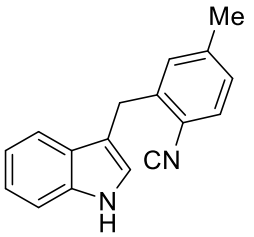


3-(4-fluoro-2-isocyanobenzyl)-1H-indole(**25**). Brown solid, mp 123 °C, 65% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.89 (s, 1H), 7.35 (d, J = 7.9 Hz, 1H), 7.20 (d, J = 8.2 Hz, 1H), 7.10 – 6.90 (m, 4H), 6.84 (d, J = 2.4 Hz, 1H), 6.80 (m, 1H), 4.05 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.3, 160.7,

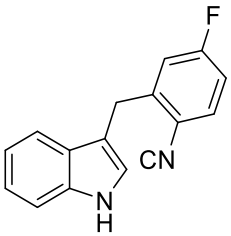
158.2, 135.3, 132.7 (d, J = 3.9 Hz), 130.2 (d, J = 8.6 Hz), 125.9, 122.0, 121.2, 118.6, 117.7, 115.9, 115.7, 113.0, 112.8, 111.2, 110.3, 26.3. ^{19}F NMR (376 MHz, $CDCl_3$) δ -114.17. IR(KBr) 3392, 3058, 2918, 2128, 1639, 1092, 746 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}FN_2$ [M-H]$^-$ 249.0834, found 249.0823.



3-(2-isocyano-4-methylbenzyl)-1H-indole(**26**). Brown solid, mp 138 °C, 68% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 (s, 1H), 7.30 – 7.24 (m, 1H), 7.10 – 7.05 (m, 3H), 6.96 (dd, J = 8.2, 7.1 Hz, 1H), 6.93 – 6.88 (m, 1H), 6.75 – 6.66 (m, 2H), 4.26 (s, 2H), 2.33 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 164.9, 137.8, 136.0, 129.7, 128.7, 128.4, 125.8, 125.5, 124.8, 122.6, 121.3, 120.0, 111.6, 108.2, 28.5, 18.6. IR(KBr) 3330, 3051, 2921, 2853, 2138, 1548, 756 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ [M-H]$^-$ 245.1084, found 245.1080.

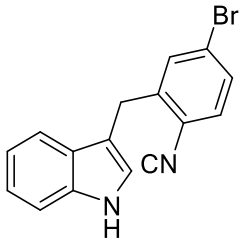


3-(2-isocyano-5-methylbenzyl)-1H-indole(**27**). Brown solid, mp 91 °C, 66% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.22 (s, 1H), 7.78 (d, J = 7.8 Hz, 1H), 7.49 – 7.46 (m, 1H), 7.43 – 7.37 (m, 2H), 7.36 – 7.31 (m, 1H), 7.25 (s, 1H), 7.14 – 7.09 (m, 2H), 4.39 (s, 2H), 2.37 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.5, 140.1, 137.8, 136.6 (d, J = 1.4 Hz), 130.8, 127.9, 127.4, 126.9, 123.6, 123.4, 122.3, 119.7, 119.1, 112.9, 111.7 (d, J = 1.9 Hz), 28.2, 21.5. IR(KBr) 3347, 3053, 2908, 2843, 2141, 1616, 738 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ [M+H]$^+$ 247.1230, found 247.1227.

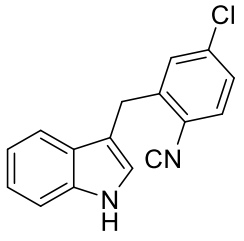


3-(5-fluoro-2-isocyanobenzyl)-1H-indole (**28**). Brown solid, mp 79 °C, 75% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12

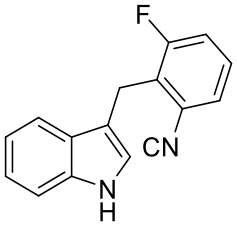
(s, 1H), 7.51 – 7.43 (m, 1H), 7.39 – 7.30 (m, 2H), 7.25 – 7.16 (m, 1H), 7.13 – 7.03 (m, 2H), 6.88 (m, 2H), 4.20 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.4, 163.8, 161.3, 141.0 (d, J = 8.1 Hz), 136.6, 128.7 (d, J = 9.1 Hz), 127.1, 123.5, 122.4, 119.9, 118.9, 117.2, 116.9, 114.4, 114.2, 111.7 (d, J = 8.8 Hz), 28.2. ^{19}F NMR (376 MHz, $CDCl_3$) δ -108.28. IR(KBr) 3445, 3059, 2922, 2132, 1615, 1338, 745 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}FN_2$ $[M-H]^-$ 249.0834, found 249.0823.



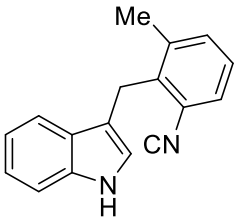
3-(5-bromo-2-isocyanobenzyl)-1H-indole (**29**). Brown solid, mp 120 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (s, 1H), 7.49 (dd, J = 7.9, 1.1 Hz, 1H), 7.41 – 7.33 (m, 3H), 7.25 – 7.20 (m, 2H), 7.15 – 7.07 (m, 2H), 4.22 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.0, 139.9, 136.4, 133.0, 130.3, 128.2, 127.0, 123.5, 123.1, 122.4, 119.8, 118.8, 112.0, 111.3, 27.9. IR(KBr) 3417, 3070, 2120, 1380, 710 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}BrN_2$ $[M+H]^+$ 311.0184, found 311.0182.



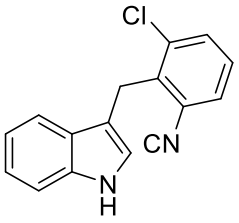
3-(5-chloro-2-isocyanobenzyl)-1H-indole(**30**). Brown solid, mp 60 °C, 70% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (s, 1H), 7.47 (d, J = 6.8 Hz, 1H), 7.36 – 7.32 (m, 1H), 7.26 (d, J = 8.4 Hz, 1H), 7.22 – 7.19 (m, 2H), 7.16 – 7.08 (m, 2H), 7.02 (d, J = 2.4 Hz, 1H), 4.18 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.8, 139.8, 136.5, 135.4, 130.1, 128.0, 127.3, 127.0, 123.2, 122.4, 122.0, 119.8, 118.8, 111.8, 111.4, 28.0. IR(KBr) 3408, 3086, 2919, 2126, 1634, 1342, 746 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}ClN_2$ $[M-H]^-$ 265.0538, found 265.0541.



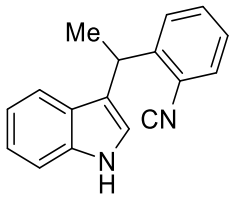
3-(2-fluoro-6-isocyanobenzyl)-1H-indole (**31**). Yellow solid, mp 105 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (s, 1H), 7.74 (d, *J* = 7.8 Hz, 1H), 7.34 (d, *J* = 8.0 Hz, 1H), 7.25 – 6.98 (m, 6H), 4.26 (s, 2H).^{13}C NMR (100 MHz, CDCl3) δ 167.5, 153.8, 136.1, 128.0 (d, *J* = 10.1 Hz), 126.9, 126.2, 123.1 (d, *J* = 3.7 Hz), 123.1, 122.2, 119.7, 118.9 (d, *J* = 3.5 Hz), 117.0, 116.8, 112.2, 111.1, 21.4. ^{19}F NMR (376 MHz, $CDCl_3$) δ -112.8. IR(KBr) 3410, 3075, 2920, 1384, 700 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}FN_2$ $[M+H]^+$ 251.0985, found 251.0980.



3-(2-isocyano-6-methylbenzyl)-1H-indole(**32**). Brown solid, mp 116 °C, 67% yield; petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 7.88 (s, 1H), 7.61 (d, *J* = 7.7 Hz, 1H), 7.28 – 7.22 (m, 2H), 7.18 – 7.08 (m, 4H), 6.52 – 6.46 (m, 1H), 4.20 (s, 2H), 2.25 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) *δ* 165.4, 138.9, 136.4, 136.1, 131.5, 127.3, 127.0, 125.0, 122.2, 122.0, 119.5, 118.8, 112.8, 111.3, 25.5, 19.9. IR(KBr) 3397, 3059, 2923, 2868, 2124, 1616, 744 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M-H]^-$ 245.1084, found 245.1090.



3-(2-chloro-6-isocyanobenzyl)-1H-indole(**33**). Brown solid, mp 101 °C, 70% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 7.86 (s, 1H), 7.73 – 7.64 (m, 1H), 7.31 (dd, *J* = 8.1, 1.3 Hz, 1H), 7.18 – 7.12 (m, 2H), 7.12 – 7.06 (m, 2H), 7.00 (t, *J* = 8.0 Hz, 1H), 6.71 – 6.68 (m, 1H), 4.30 (s, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) *δ* 167.6, 136.3, 136.3, 135.7, 131.1, 128.0, 127.8, 127.2, 126.1, 123.0, 122.2, 119.7, 119.2, 111.7, 111.5, 26.4. IR(KBr) 3417, 3075, 2923, 2119, 1638, 1384, 740 cm^{-1}; HRMS(ESI): calcd for $C_{16}H_{11}ClN_2$ $[M-H]^-$ 265.0538, found 265.0536.



3-(1-(2-isocyanophenyl)ethyl)-1H-indole(**34**). Yellow solid, mp 121 °C, 75% yield, petroleum ether : EtOAc = 5:1. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21 (s, 1H), 7.57 – 7.47 (m, 3H), 7.40 – 7.33 (m, 2H), 7.33 – 7.27 (m, 2H), 7.27 – 7.18 (m, 2H), 5.04 (q, J = 7.1 Hz, 1H), 1.90 (d, J = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.4, 143.3, 136.9, 129.9, 128.5, 127.2, 127.1, 126.8, 122.3, 122.2, 119.6, 119.5, 119.0, 111.6, 32.9, 21.0. IR(KBr) 3420, 3075, 2930, 2923, 2119, 1638, 1380, 742 cm^{-1}; HRMS(ESI): calcd for $C_{17}H_{14}N_2$ $[M+H]^+$ 247.1235, found 247.1236.

Reference.

1. S. Ghorai, Y. Lin, Y. Xia, D. J. Wink and D. Lee, Silver-catalyzed selective multicomponent coupling reactions of arynes with nitriles and isonitriles, Org. let. 2019, 22, 642-647.

2. S. Tang, S. Ding, D. Li, L. Li, H. Zhao, M. Chai and J. Wang, Palladium-catalysed imidoylative spirocyclization of 3-(2-isocyanoethyl) indoles, Chem. Commun, 2021, 57, 10576-10579.

3. A. Porcheddu, G. Giacomelli and M. Salaris, Microwave-assisted synthesis of isonitriles: a general simple methodology, J. Org. Chem. 2005, 70, 2361-2363.

4. S. Tang, S.-W. Yang, H. Sun, Y. Zhou, J. Li and Q. Zhu, Pd-Catalyzed Divergent C (sp2)–H Activation/Cycloimidoylation of 2-Isocyano-2, 3-diarylpropanoates, Org. let. 2018, 20, 1832-1836.

5. S. Sharma, R. A. Maurya, K. I. Min, G. Y. Jeong and D. P. Kim, Odorless isocyanide chemistry: an integrated microfluidic system for a multistep reaction sequence, *Angew. Chem. Int. Ed.* 2013, 52, 7564-7568.

6. W. Liu, J. Li, P. Querard and C.-J. Li, Transition-metal-free C–C, C–O, and C–N cross-couplings enabled by light, J. Am. Chem. Soc. 2019, 141, 6755-6764.

7. Zhang, J.; Xu, W.; Qu, Y. Visible-light-induced radical isocyanide insertion protocol for the synthesis of difluoromethylated spiro [indole-3, 3′-quinoline] derivatives.

Chem. Commun. 2020, 56, 15212-15215.

2 Quorum sensing inhibitory preliminary screenings

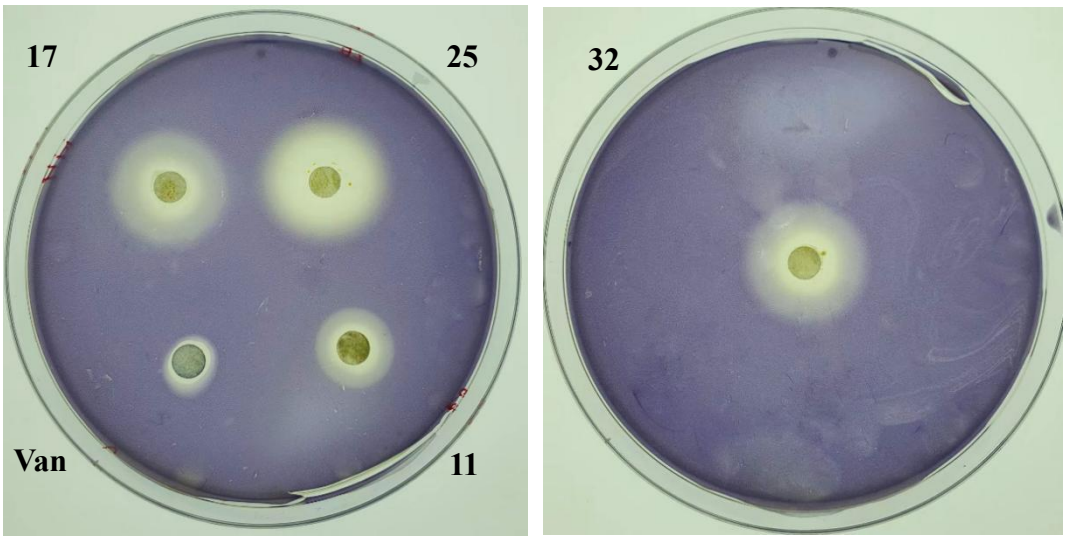


Fig. S1 QS inhibitory screenings of the representative compounds **11**, **17**, **25** and **32** against *C. violaceum* CV026. The concentration was 100 mg/mL of compounds for QS inhibitory screening. The strain *C. violaceum* CV026 was cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

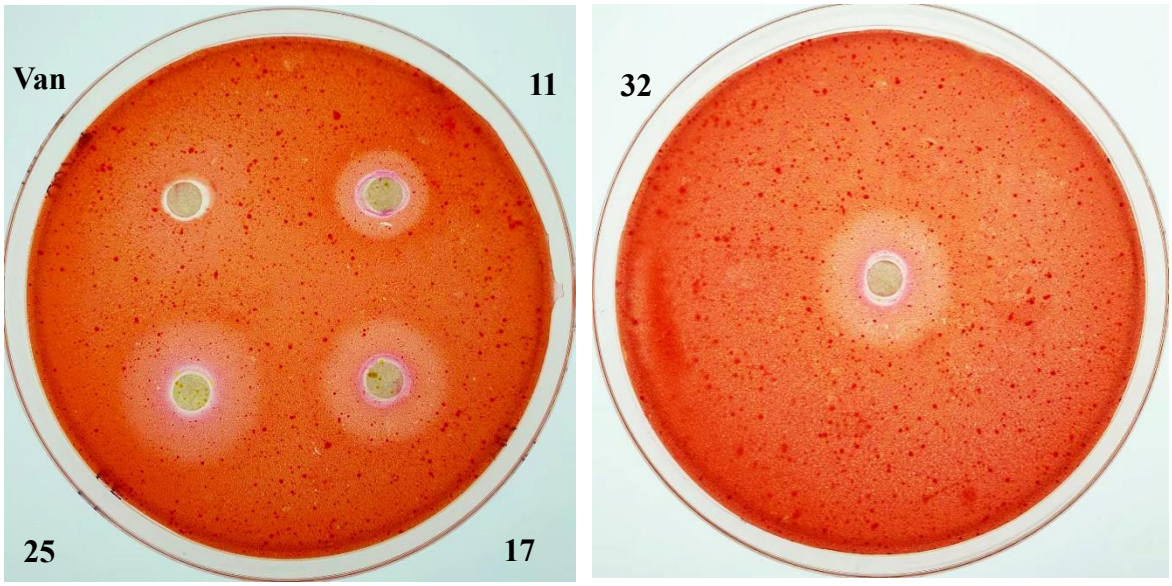


Fig. S2 QS inhibitory screenings of the representative compounds **11**, **17**, **25** and **32**

against *marcescens* NJ01. The concentration was 100 mg/mL of compounds for QS inhibitory screening. The strain *S. marcescens* NJ01 was cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

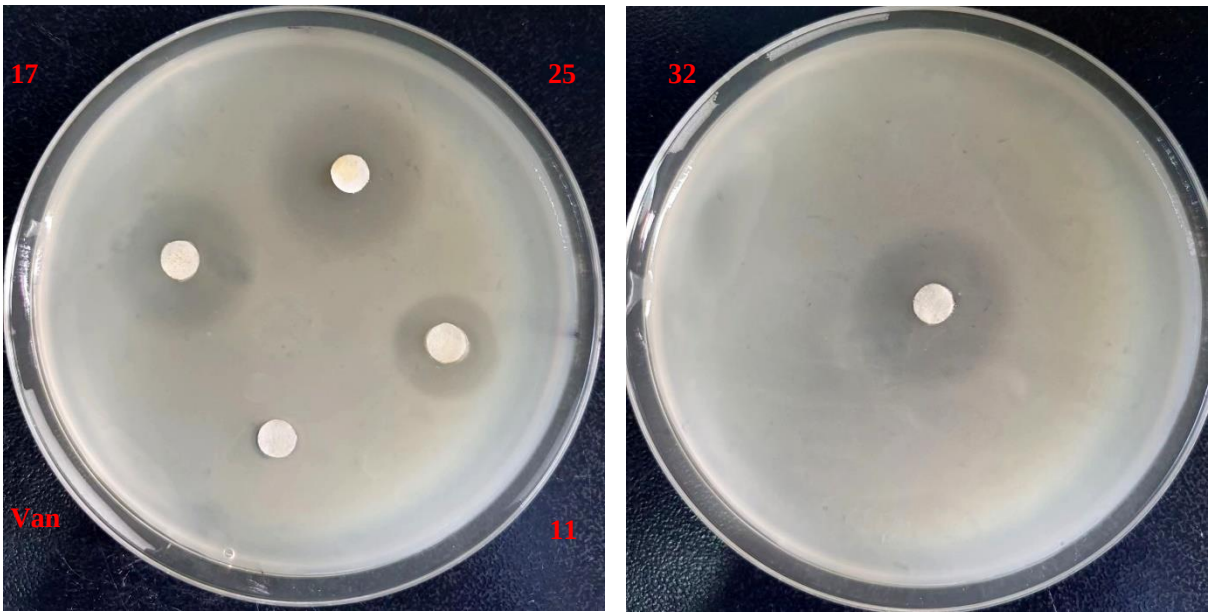


Fig. S3 QS inhibitory screenings of the representative compounds **11**, **17**, **25** and **32** against *marcescens* 4547. The concentration was 100 mg/mL of compounds for QS inhibitory screening. The strain *S. marcescens* 4547 was cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

2.1 Some Supplementary Methods

Biofilm formation inhibition assay

Biofilms were cultivated in LB broth supplemented with or without IMBI in 24-well plates (1). After 24 h of static incubation, cultures and planktonic cells were removed and sessile cells were stained with 0.05% crystal violet, and rinsed using distilled water. After dissolution with 95% ethanol, biofilm biomass was measured at OD_{570}. Biofilms of *S. marcescens* NJ01 were cultivated in 24-well plates with circular glass coverslips, as mentioned above. After cultivation, coverslips were washed with PBS, fixed with 2.5% glutaraldehyde, and dehydrated with ethanol. Samples were then freeze-dried, gold-coated, and detected with SEM (JSM6360, JEOL, Tokyo, Japan). The other was stained with 0.1% (w/v) acridine orange. Samples were imaged using CLSM (LEICA TCS SP8, Germany).

Virulence factors assays

(i)**Protease activity determination** (2)**.** Overnight *S. marcescens* NJ01 seed solution was added to LB broth (1:100, vol/vol) supplemented with IMBI ((0.78, 1.56, and 3.12 μg/mL)), and cultured at 28 °C and 180 rpm for 24 h. DMSO served as a negative control. VAN served as a negative control. The overnight culture was centrifuged at 4 °C and 8 000 rpm for 5 min. Briefly, **7**5 μL of culture supernatant were mixed with 125 μL of 2% azocasein buffered substrate in 1M Tris-HCl (pH 8.0), and incubated at 37 ℃ for 15 min. After incubation, 600 μL of 10% trichloroacetic acid were added to each reaction tube, after 30 min, the mixtures were centrifuged. An aliquot 700 μL of 1 M NaOH was added to the supernatant to terminate the reaction, and then determined OD_{440}.

(II) **lipas**e **activity** dete**rmination** (3), 100 μL of culture supernatant were added to 900 μL of the buffered substrate containing 1 volume of 0.3% (w/v) *p*-nitrophenyl palmitate (*p*-NPP) in isopropanol and 9 volumes of 0.2% (w/v) sodium deoxycholate and 0.1%

(w/v) gummi arabicum in 50 mM Na_2PO_4 buffer and incubated in the dark for 1 h. The supernatant was centrifuged, and then measured at OD_{410}.

(III)**Hemolysin activity determination**(4), 100 μL of culture supernatant was mixed with 900 μL of sheep's blood suspension and incubated at 37 ℃ for 1 h. *The supernatant was again centrifuged (4°C, 3,000 rpm, 10 min) and absorbance was determined at* OD_{530}.

(IV)**EPS assay** (5). *S. marcescens* culture was incubated at 28 ℃, 180 rpm for 24 h in 24-well plates. After, biofilms were washed with distilled water followed by the addition of 500 μL of 0.9% NaCl, 5% phenol and 2.5 mL of 0.2% hydrazine sulfate. Then incubation for 1h in the dark, determined OD_{490}.

(V)**Prodigiosin assay**.(6). cell pellets were washed and resuspended with the same volume of acidified ethanol (4%, 1 M HCl) followed by 5 min of centrifugation. Then, the pigments were determined at OD_{534}.

(VI)**Swarming motility**(7), 1 μL of bacterial culture was inoculated in the swarming medium. The plates were cultivated at 28 °C, overnight, then swarming was determined.

Quantitative real-time polymerase chain reaction (qRT-PCR)

Briefly, 40 μL *S. marcescens* of 24 h culture was added to 4 mL of fresh LB broth supplemented with DMSO or 1.56 μg/mL of IMBI. Overnight, cells were harvested by centrifugation. Total RNA was isolated from the *S. marcescens* pellet cells with an RNA extraction kit (Sangon Biotech, Shanghai, China). Isolated RNA was reversely transcribed into cDNA using RT6 cDNA synthesis kit (Sangon Biotech, Shanghai, China). The qRT-PCR reactions were accomplished using the LineGene 9600 Plus (Sangon Biotech, Shanghai, China). The *rplU* gene was used as the internal control (8). The primers are shown in Table S4.

1. Lee J-H, Cho MH, Lee J. 2011. 3-indolylacetonitrile decreases Escherichia coli O157:H7 biofilm formation and Pseudomonas aeruginosa virulence. Environ Microbiol 13:62–73. doi:10.1111/j.1462-2920.2010.02308.x.
2. Coulthurst SJ, Williamson NR, Harris AKP, Spring DR, Salmond GPC. 2006. Metabolic and regulatory engineering of Serratia marcescens: mimicking phage-mediated horizontal acquisition of antibiotic biosynthesis and quorum-sensing capacities. Microbiology (Reading, England) 152:1899–1911. doi:10.1099/mic.0.28803-0.
3. Patel U, Chandpura J, Chauhan K, Gupte S. 2018. Screening and Isolation of an Organic Solvent Tolerant Lipase Producing Bacteria from Various Oil Contaminated Sites. IJAM 21:22–36. doi:10.46798/ijam.2018.v21i01.004.
4. Padmavathi AR, Abinaya B, Pandian SK. 2014. Phenol, 2,4-bis(1,1-dimethylethyl) of marine bacterial origin inhibits quorum sensing mediated biofilm formation in the uropathogen Serratia marcescens. Biofouling 30:1111–1122. doi:10.1080/08927014.2014.972386.
5. Badireddy AR, Korpol BR, Chellam S, Gassman PL, Engelhard MH, Lea AS, Rosso KM. Spectroscopic characterization of extracellular polymeric substances from Escherichia coli and *Serratia marcescens*: suppression using sub-inhibitory concentrations of bismuth thiols. Biomacromolecules. 2008; **9**:3079–89.
6. Badireddy AR, Korpol BR, Chellam S, Gassman PL, Engelhard MH, Lea AS, Rosso KM. 2008. Spectroscopic characterization of extracellular polymeric substances from Escherichia coli and Serratia marcescens: suppression using sub-inhibitory concentrations of bismuth thiols. Biomacromolecules 9:3079–3089. doi:10.1021/bm800600p.
7. Pearson MM. 2019. Methods for Studying Swarming and Swimming Motility. Methods in molecular biology (Clifton, N.J.) 2021:15–25. doi:10.1007/978-1-4939-9601-8_3.
8. Srinivasan R, Mohankumar R, Kannappan A, Karthick Raja V, Archunan G, Karutha Pandian S, Ruckmani K, Veera Ravi A. 2017. Exploring the Anti-quorum Sensing and Antibiofilm Efficacy of Phytol against Serratia marcescens

Associated Acute Pyelonephritis Infection in Wistar Rats. Front Cell Infect Microbiol 7:498. doi:10.3389/fcimb.2017.00498.

3 MICs determination

Table S1 MICs of compounds **1–35**

Compounds	MICs (μg/mL)	
	NJ01	4547
VAN	>96	>96
CPF	0.01	0.01
KAN	3	3
1	>96	>96
2	96	6
3	12	12
4	24	12
5	12	12
6	96	48
7	>96	48
8	6	12
9	3	6
10	6	>96
11	12	12
12	48	12
13	24	24
14	12	24
15	12	12
16	24	12
17	24	12
18	48	24
19	>96	6
20	24	12

21	>96	24
22	>96	>96
23	24	12
24	2	6
25	12	12
26	>96	>96
27	96	12
28	6	12
29	6	>96
30	24	6
31	12	6
32	12	12
33	6	12
34	12	24
35	24	12

Control: Ciprofloxacin (CPF), vanillic acid (VAN). The MICs of β-nitrostyrene derivatives against *S. marcescens* was determined using the 2-fold serially diluted method . In brief, 200 μL of m-NPe was added to 96-well plates and cultured overnight at 28 ℃. Absorbance was determined at OD_{620}. All the strains were cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium. Color mark: QS activity compounds.

4 Biofilm inhibition

Table S2 Biofilm inhibition rates of *S. marcescens* NJ01 in 1/2MICs and 1/4MICs

Compounds	Biofilm inhibition	Biofilm inhibition
	1/2 MICs	1/4 MICs
1	0.21±0.022	0.09±0.015
2	0.28±0.041	0.06±0.022
3	0.34±0.049	0.13±0.039
4	0.46±0.012	0.38±0.047
5	0.51±0.032	0.34±0.021
6	0.51±0.018	0.41±0.073
7	0.44±0.039	0.35±0.018
8	0.50±0.036	0.40±0.009
9	0.35±0.013	0.23±0.044
10	0.66±0.013	0.33±0.02
11	0.32±0.005	0.19±0.02
12	0.28±0.015	0.24±0.018
13	0.46±0.03	0.33±0.046
14	0.48±0.09	0.26±0.022
15	0.10±0.034	0.28±0.032
16	0.49±0.035	0.30±0.012
17	0.50±0.039	0.31±0.109
18	0.58±0.008	0.52±0.017
19	0.26±0.025	0.15±0.042
20	0.38±0.002	0.27±0.023
21	0.64±0.029	0.39±0.02
22	0.35±0.02	0.28±0.034
23	0.41±0.024	0.31±0.044
24	0.40±0.034	0.30±0.022
25	0.58±0.002	0.28±0.085

26	0.56±0.01	0.31±0.064
27	0.40±0.035	0.2±0.017
28	0.48±0.012	0.38±0.031
29	0.56±0.01	0.42±0.039
30	0.38±0.051	0.19±0.028
31	0.33±0.01	0.28±0.01
32	0.60±0.007	0.48±0.013
33	0.42±0.024	0.19±0.068
34	0.47±0.009	0.29±0.034
35	0.30±0.038	0.23±0.024
Control	0.42±0.014	0.32±0.006

Control: Vanillic acid (VAN). The biofilms were cultivated in LB broth supplemented with or without the compounds in 24-well plates . After 24 h of static incubation, cultures and planktonic cells were removed and sessile cells were stained with 0.05% crystal violet, and rinsed using distilled water. After dissolution with 95% ethanol, biofilm biomass was measured at OD_{570}. All the strains were cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

5 Prodigiosin inhibition

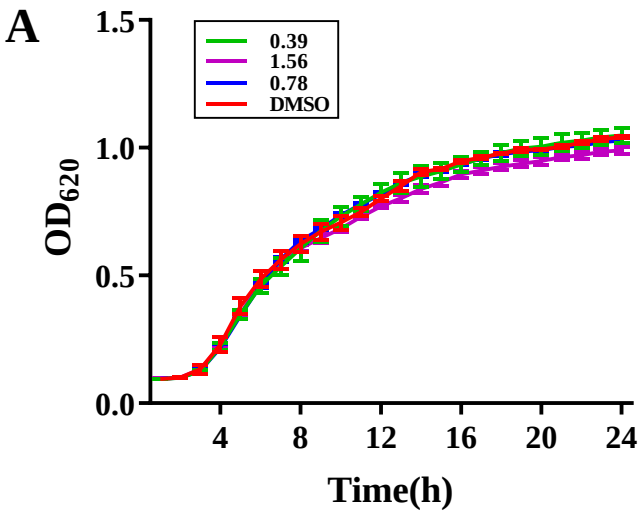
Table S3 Prodigiosin inhibition rates of *S. marcescens* NJ01 at 1/2MICs

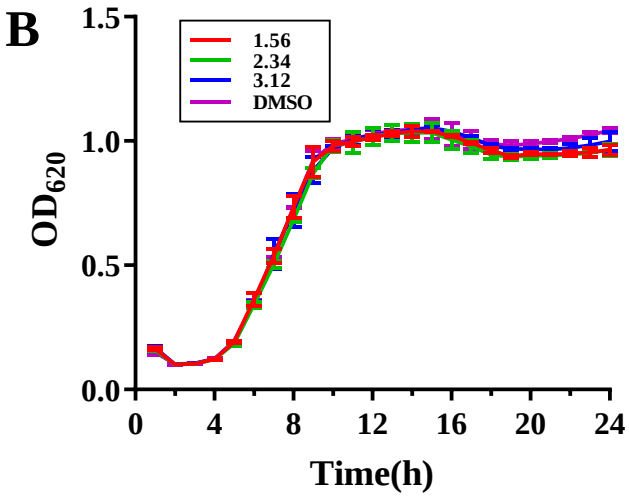
Compounds	Prodigiosin inhibition
1	0.45 ±0.018
2	0.46 ±0.038
3	0.43 ±0.109
4	0.67 ±0.052
5	0.48 ±0.027
6	0.63 ±0.044
7	0.66 ±0.035
8	0.46 ±0.057
9	0.23 ±0.040
10	0.59 ±0.119
11	0.46 ±0.061
12	0.34 ±0.061
13	0.61 ±0.082
14	0.52 ±0.061
15	0.53 ±0.013
16	0.38 ±0.036
17	0.58 ±0.013
18	0.61 ±0.018
19	0.44 ±0.036
20	0.31 ±0.054
21	0.63 ±0.055
22	0.49 ±0.005
23	0.40 ±0.066
24	0.61 ±0.013
25	0.26 ±0.131
26	0.29 ±0.155

27	0.40 ±0.039
28	0.55 ±0.064
29	0.20 ±0.057
30	0.44 ±0.049
31	0.62 ±0.021
32	0.68 ±0.022
33	0.29 ±0.018
34	0.50 ±0.029
35	0.55 ±0.120
Control	0.58 ±0.048

Positive control: Vanillic acid (VAN). For prodigiosin assay, the *S. marcescens* NJ01 was grown in the absence or presence of compounds at 30 ℃ for 20 h and centrifuged at 12,000 rpm for 10 min. Acidified ethanol (1 mL of 4% 1M HCl in ethanol) was added to the cell pellets obtained and vortexed vigorously to extract prodigiosin. After centrifugation, supernatant absorbances were measured at 534 nm. The strain *S. marcescens* NJ01 was cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

6 Growth profile





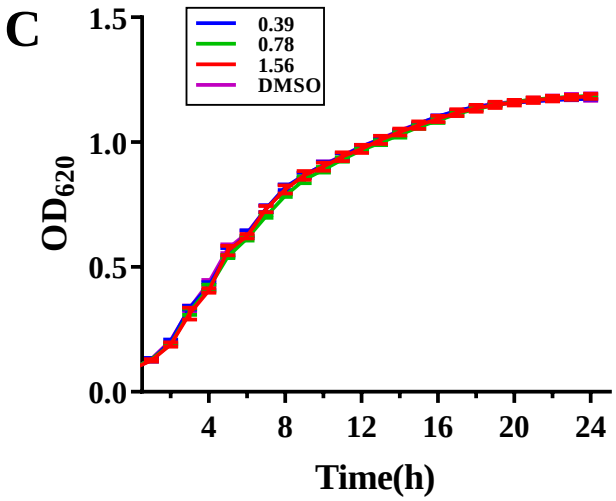


Fig. S5 Growth profiles of *S. marcescens* treated with IMBI. (A) Growth profiles of *S. marcescens* NJ01. (B) Growth profiles of *S. marcescens* NJ01. (C) Growth profiles of *S. marcescens* 4547. Growth was evaluated at various concentrations of IMBI (0.39, 0.78, and 1.56 μg/mL or 1.56, 2.34, and 3.12 μg/mL) for 24 h. DMSO was used as the negative control. Error bars represent standard deviations of three measurements. All the strains were cultured at 28 °C, with Luria Bertani (LB) broth (pH 7.0) medium.

7 Virulence factor production

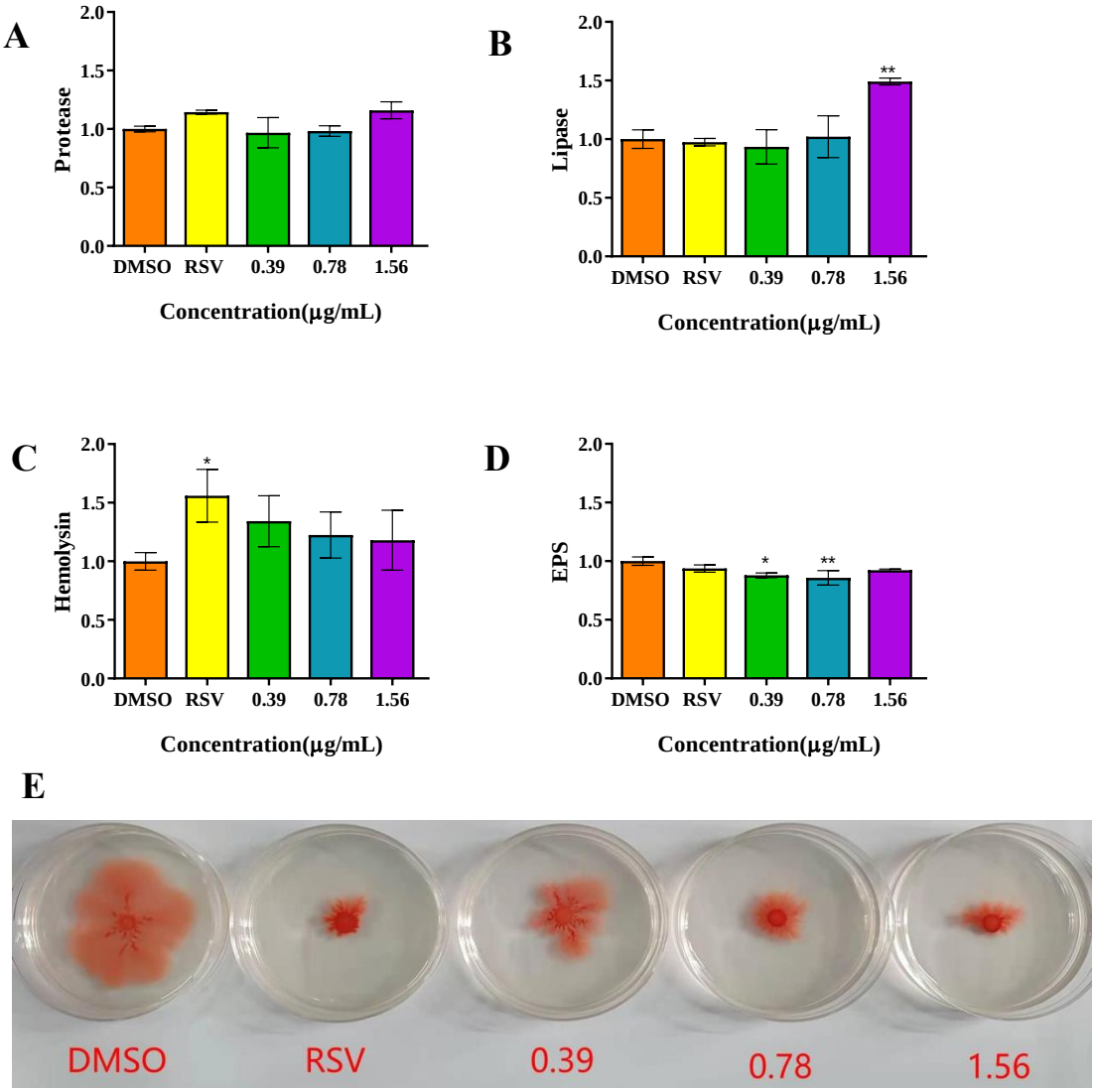


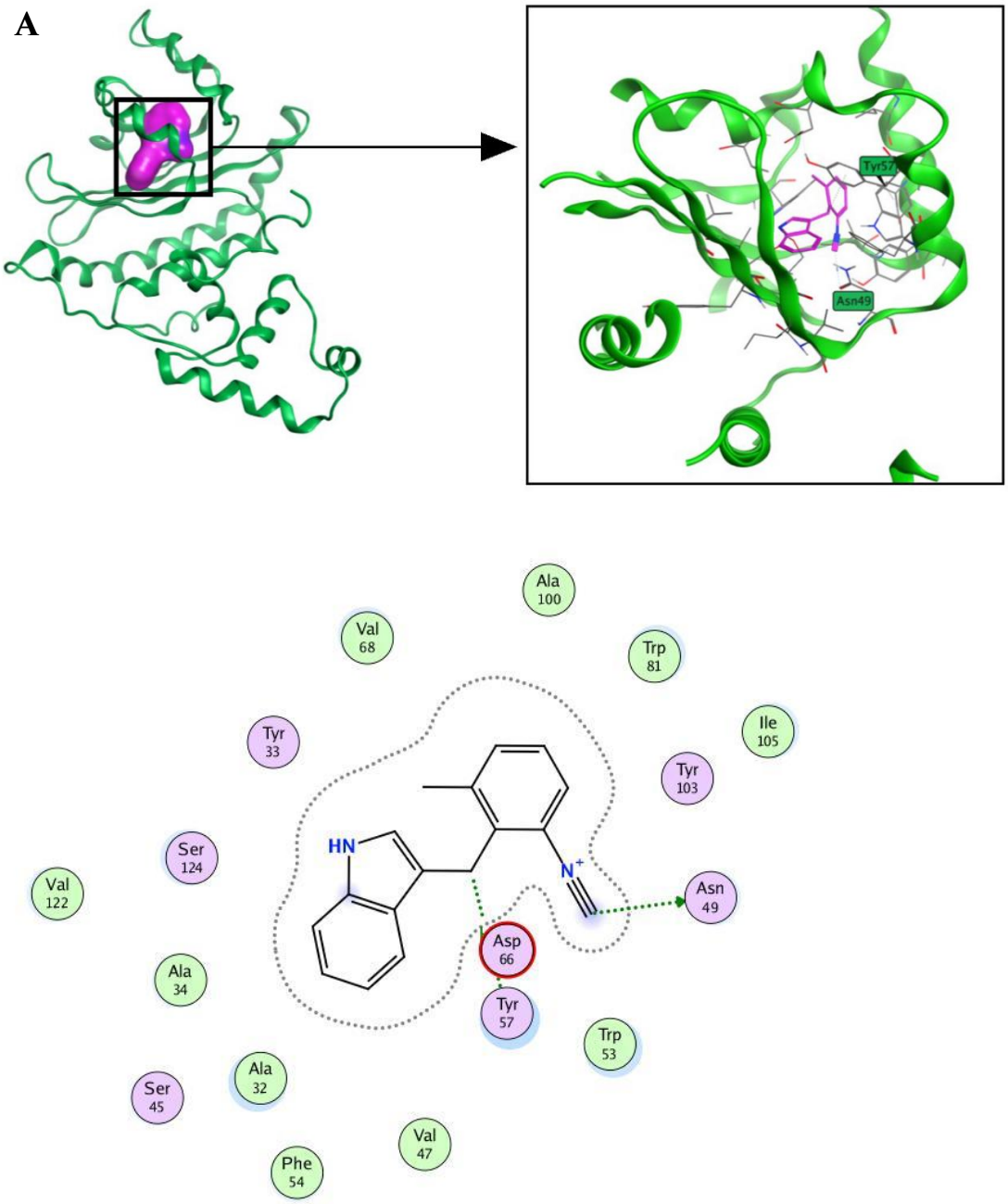
Fig. S5. Inhibitory effects of IMBI on virulence factor production of *S. marcescens* NJ01. (A) Protease. (B) Lipase. (C) Hemolysin. (D) EPS. (E) Swarming motility. Positive control VAN, and negative control DMSO. Statistical difference was determined by one-way ANOVA test. (***) $p < 0.001$ vs. DMSO. All the strains were cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

8 PCR primers for qRT-PCR

Table S4 PCR primers for qRT-PCR

gene	primer direction	sequence (5′ → 3′)
fimC	*fimC* Forward	AAGATCGCACCGTACAAACC
	fimC Reverse	TTTGCACCGCATAGTTCAAG
bsmA	*bsmA* Forward	TAGTCCGCACACTCATCGC
	bsmA Reverse	GATCTCCTGCGCCTGTGC
pigP	*pigP* Forward	GAACATGTTGGCAATGAAAA
	pigP Reverse	ATGTAACCCAGGAATTGCAC
flhC	*flhC* Forward	AAGAAGCCAAGGACATTCAG
	flhC Reverse	TTCCCAGGTCATAAACCAGT
rssB	*rssB* Forward	TAACGAACTGCTGATGCTGT
	rssB Reverse	GATCTTGCGCCGTAAATTAT
rsmA	*rsmA* Forward	CAACACCGAGTAAGCGAAGG
	rsmA Reverse	ACGAAAGGAACGCCGATT
rplU	*rplU* Forward	GCTTGGAAAAGCTGGACATC
	rplU Reverse	TACGGTGGTGTTTACGACGA

9 Molecular docking



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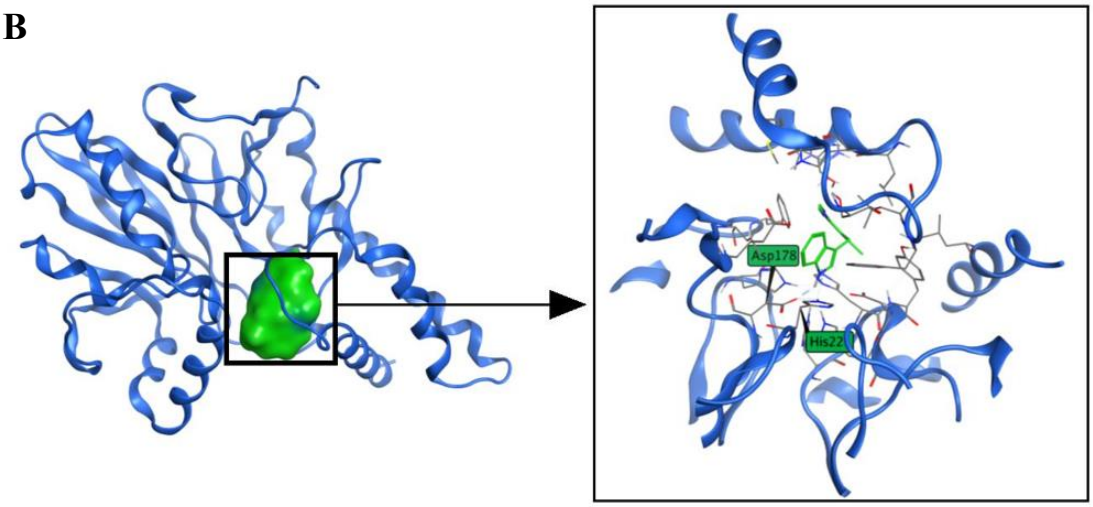
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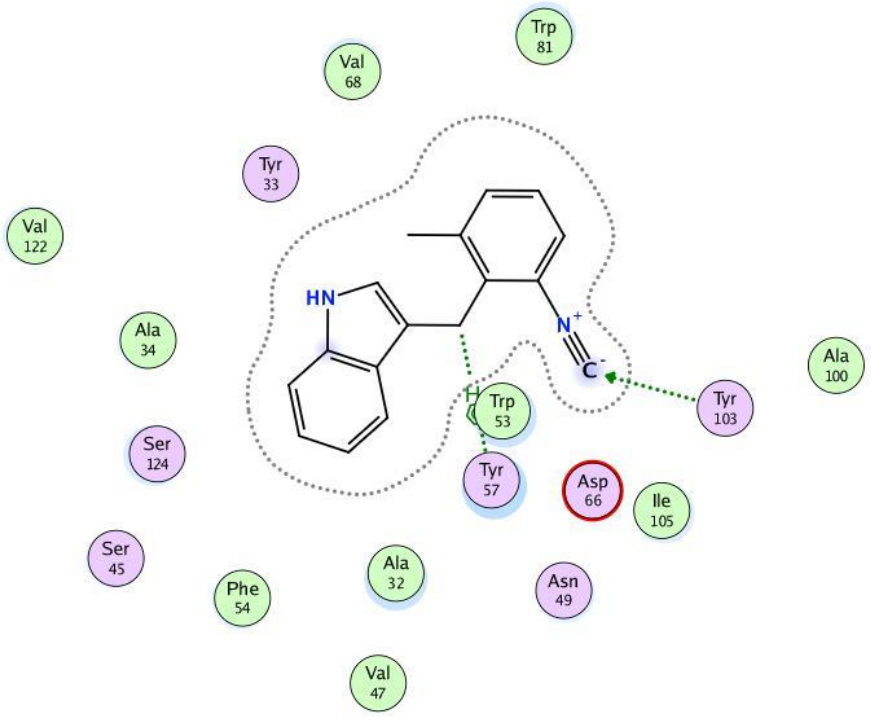
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Val 47

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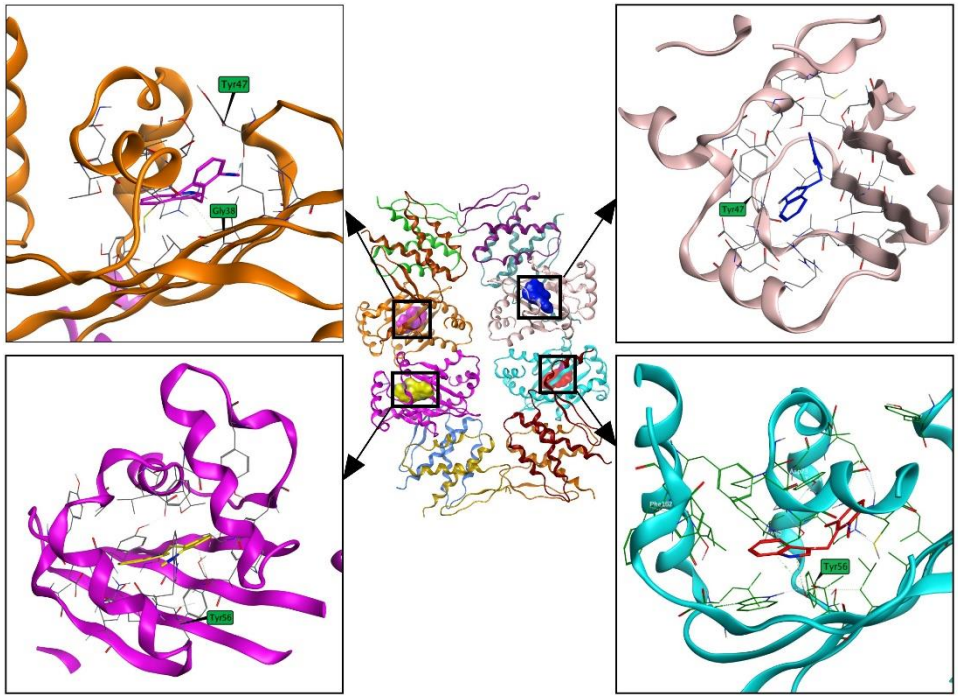
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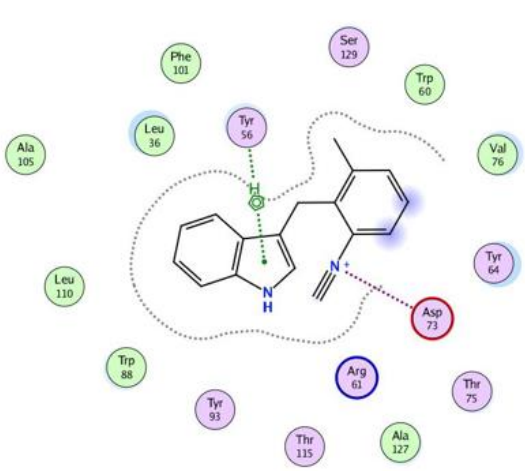
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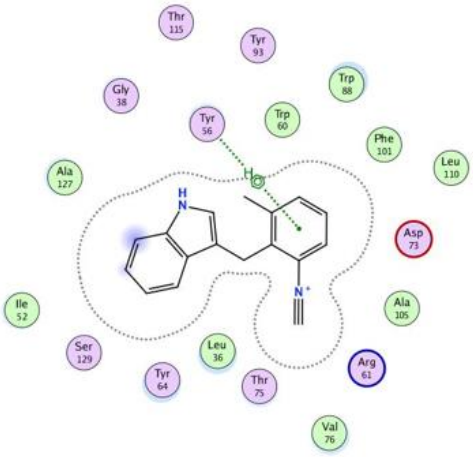
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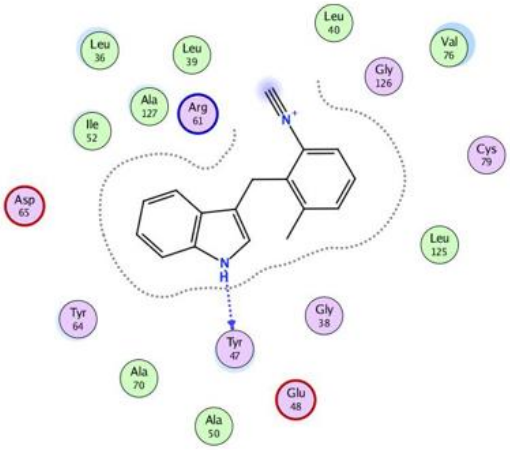
Val 76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Leu 36
Leu 39
Val 76
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Ile 52
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Gly 38
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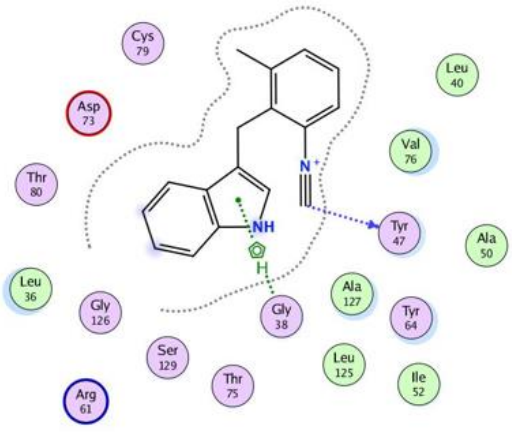
Ala 70
Glu 48
Ala 50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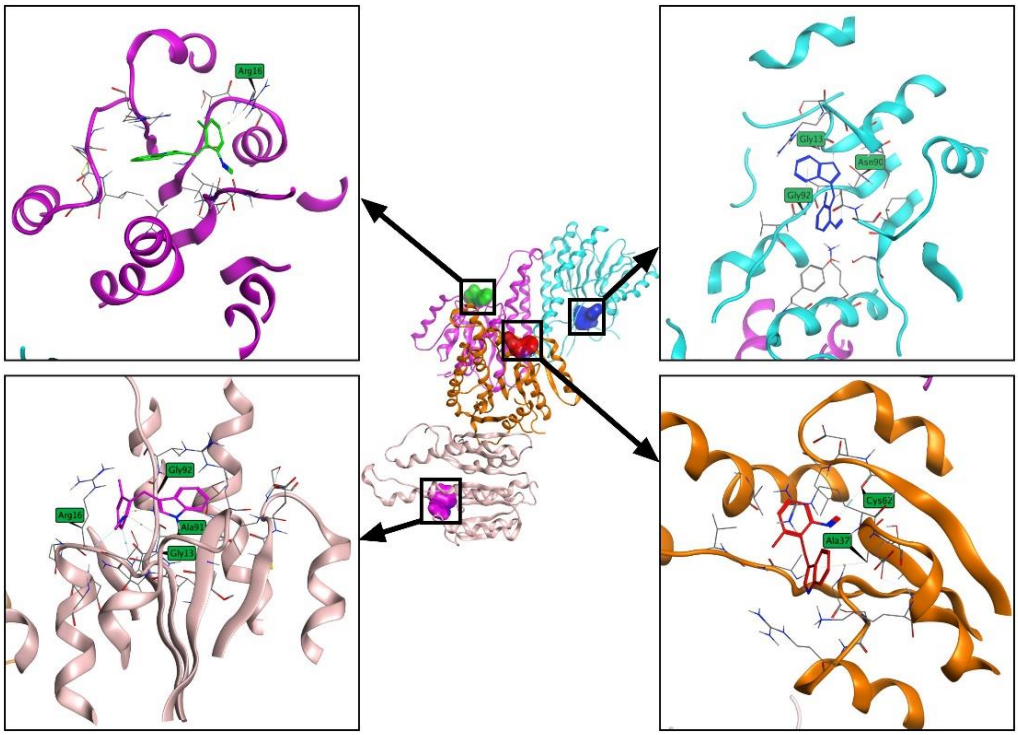
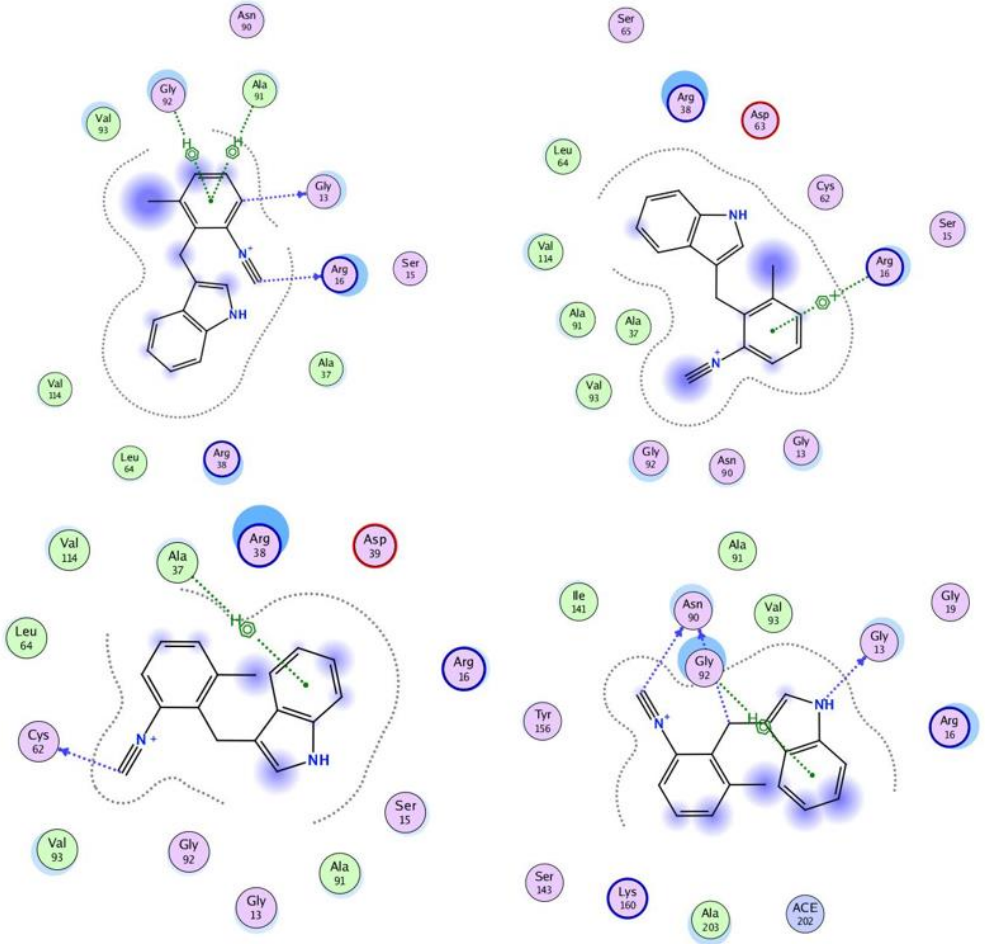
Arg 61

D





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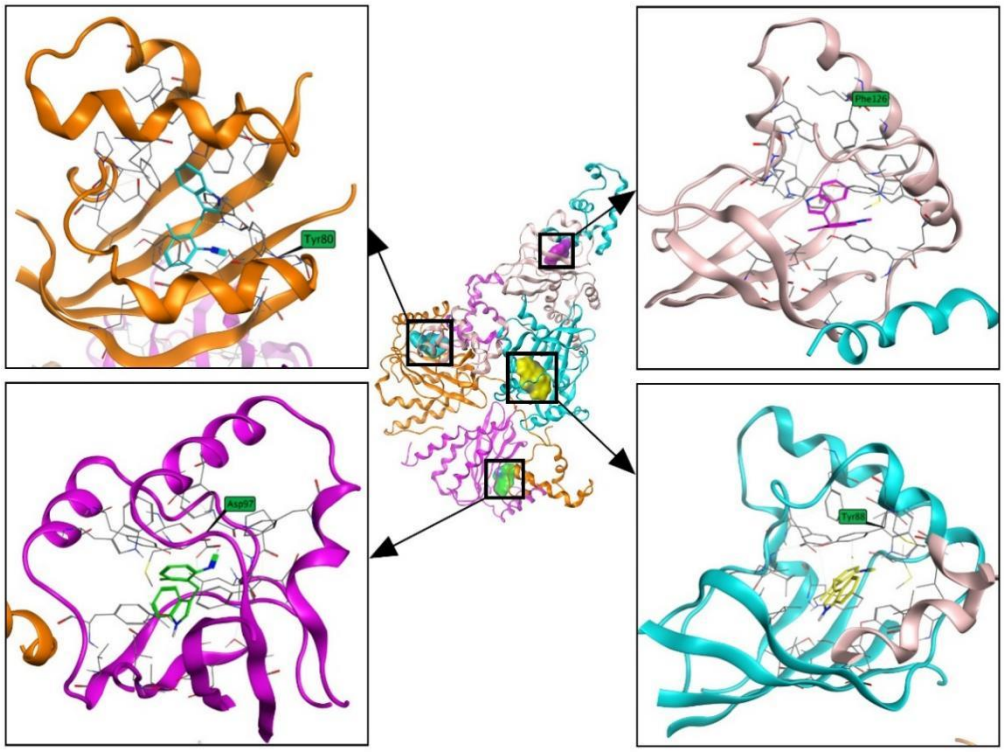
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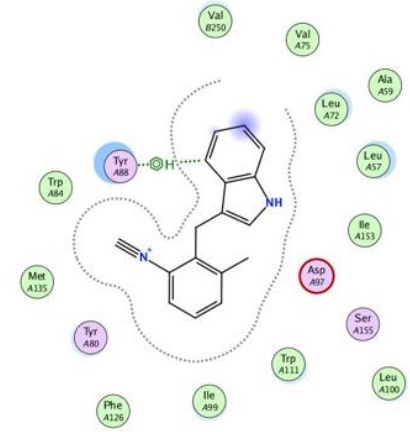
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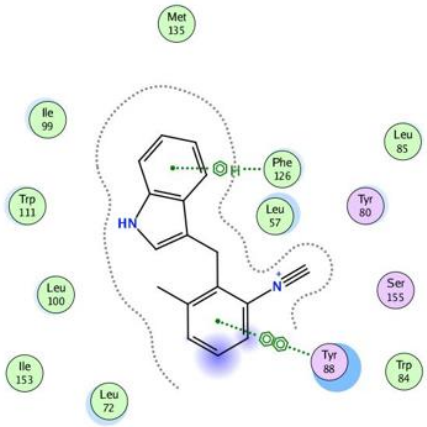
Ile A99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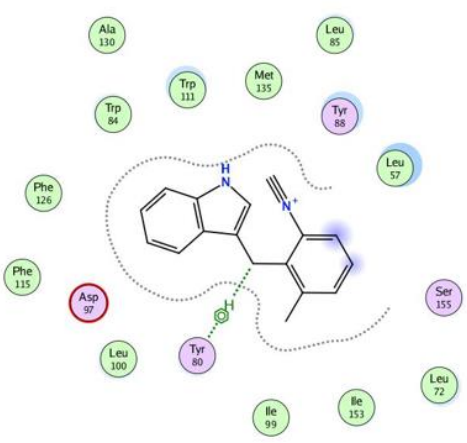
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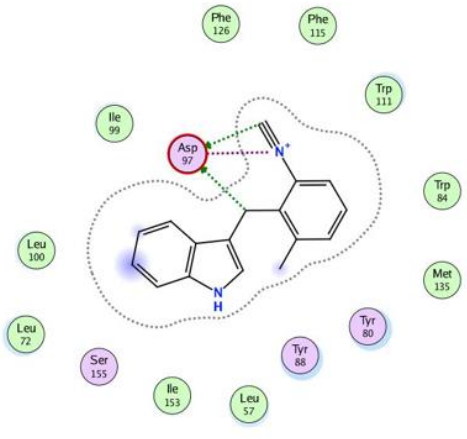
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Asp 97
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Met 135
Tyr 80
Leu 72
Tyr 88
Ser 155
Ile 153
Leu 57

Fig. S6. Molecular Docking profiles. The 3D and 2D schematics of receptor-ligand interactions of different protein with IMBI respectively, using the Discovery Studio 4.0 program. (A) IMBI with SmaR. (B) IMBI with RhlR. (C) IMBI with RhlI. (D) IMBI with LasR. (E) IMBI with CviR.

10 Molecular dynamic simulations (MDs) and energy calculations (E_{bind})

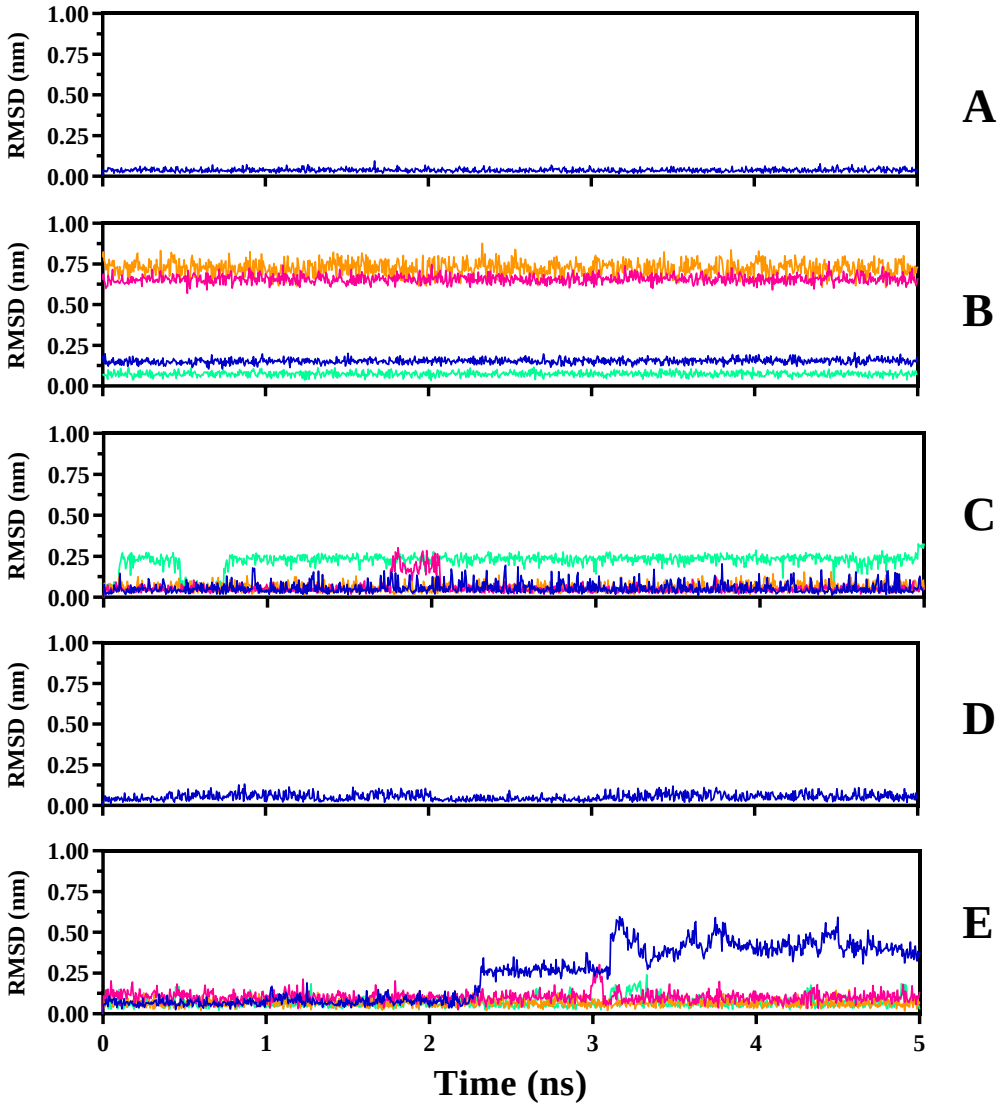


Fig. S7. RMSD profiles. MD simulation studies for target proteins bound with IMBI. Time-dependent plots for RMSD of atomic positions, IMBI for the H-bonds, H-π

interaction and π-π interaction with SmaR, RhlI, RhlR, LasR, and CviR. (A) SmaR; (B) CviR; (C)RhlI; (D) RhlR; and (E) LasR.

11 Cytotoxicities

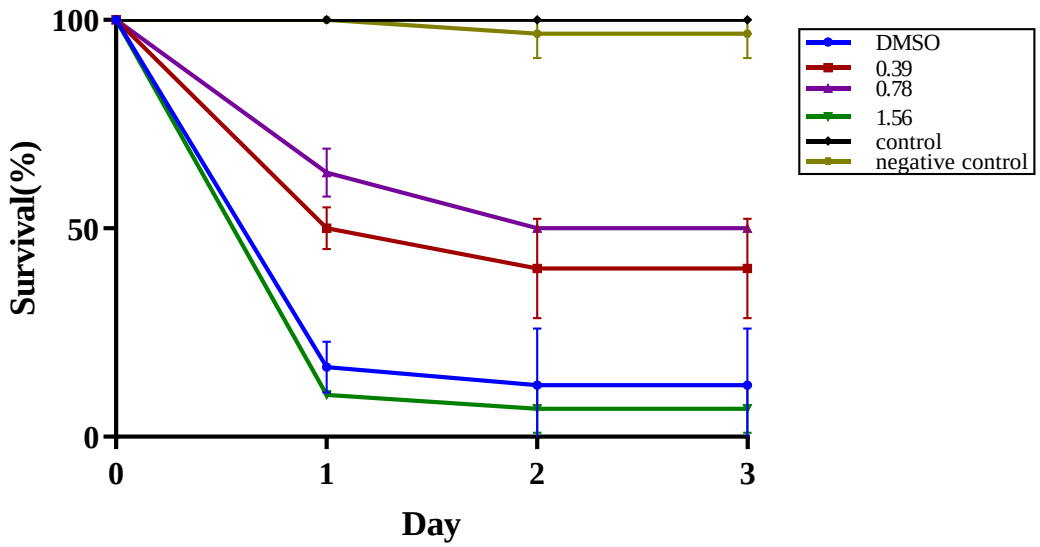
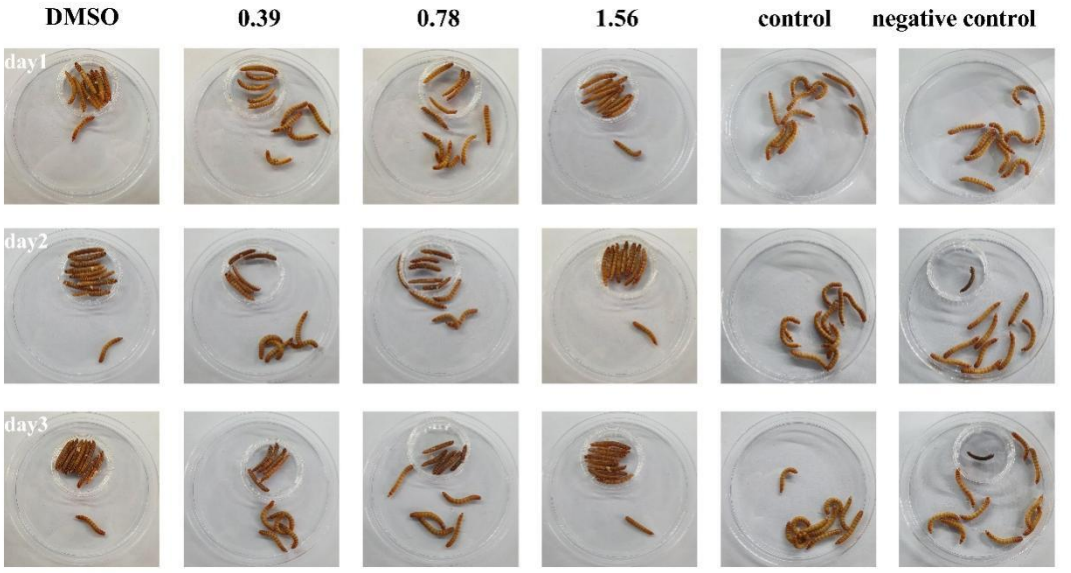


Fig. S8. Mortalities of *T. molitor* larvae injected *S. marcescens* NJ01 with IMBI at 0.39, 0.78, and 1.56 μg/mL. DMSO (injected alone *S. marcescens* and DMSO), negative control (injected alone 1.56 μg/mL IMBI), control (injected alone DMSO). All the strains were cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.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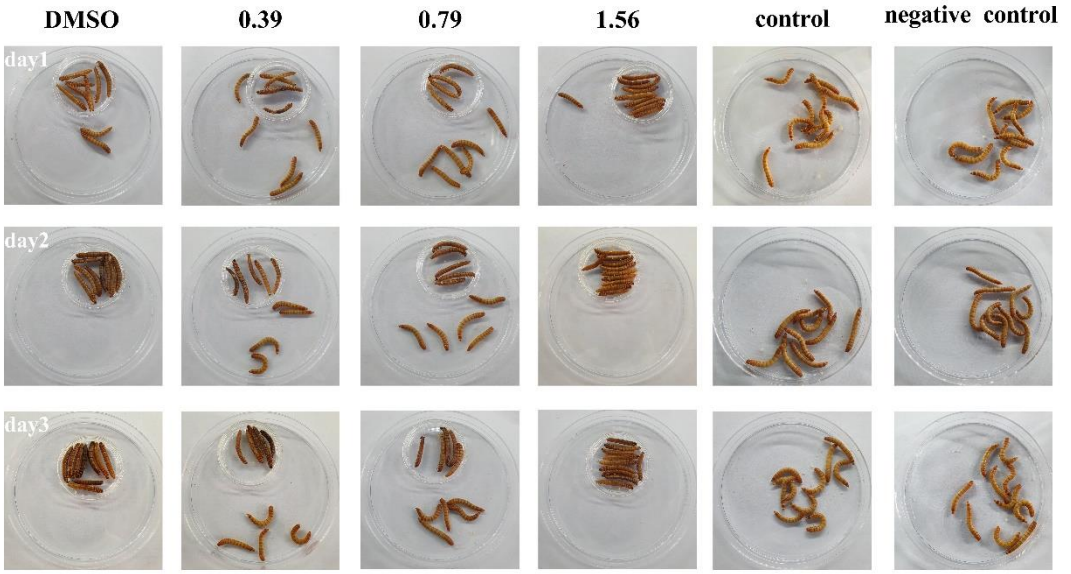
0.39
0.78
1.56
control
negative control
day1
day2
day3


DMSO
0.39
0.79
1.56
control
negative control
day1
day2
day3

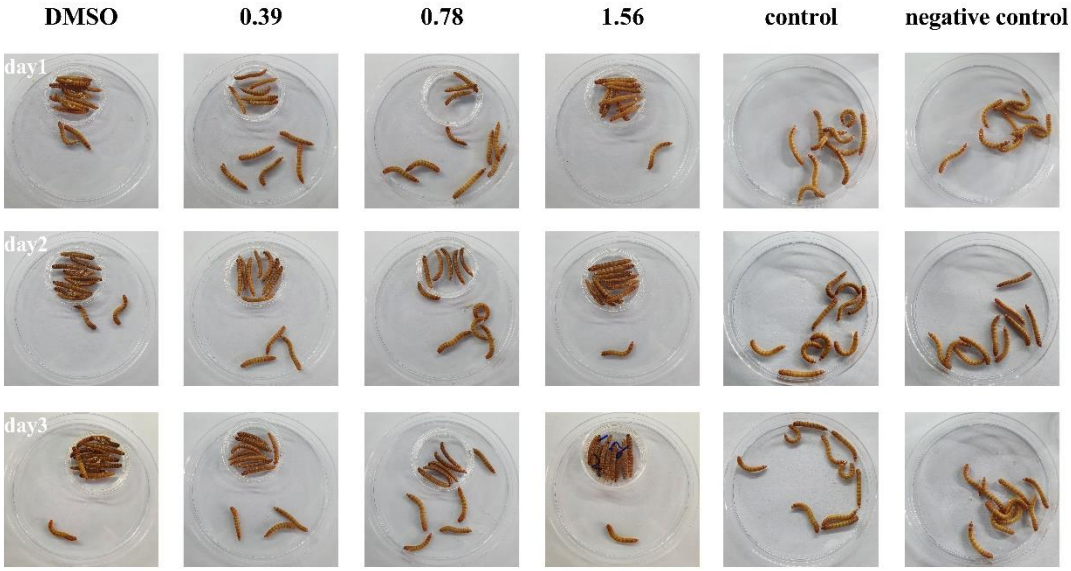
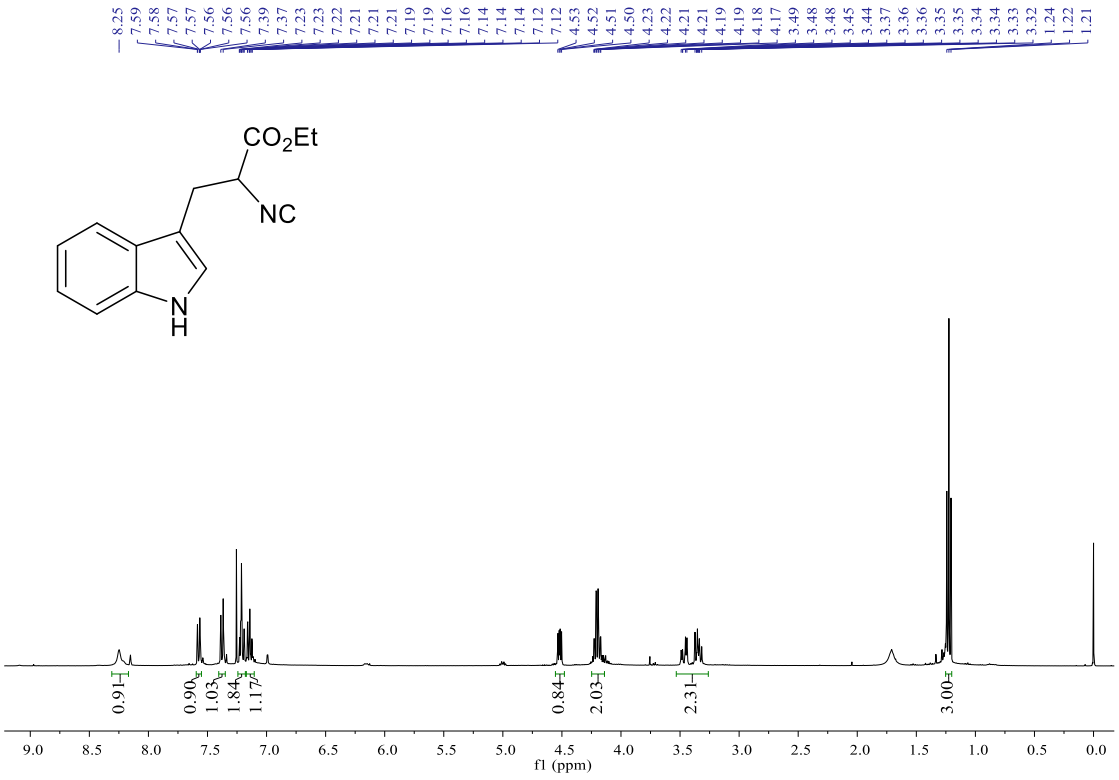

DMSO
0.39
0.78
1.56
control
negative control
day1
day2
day3

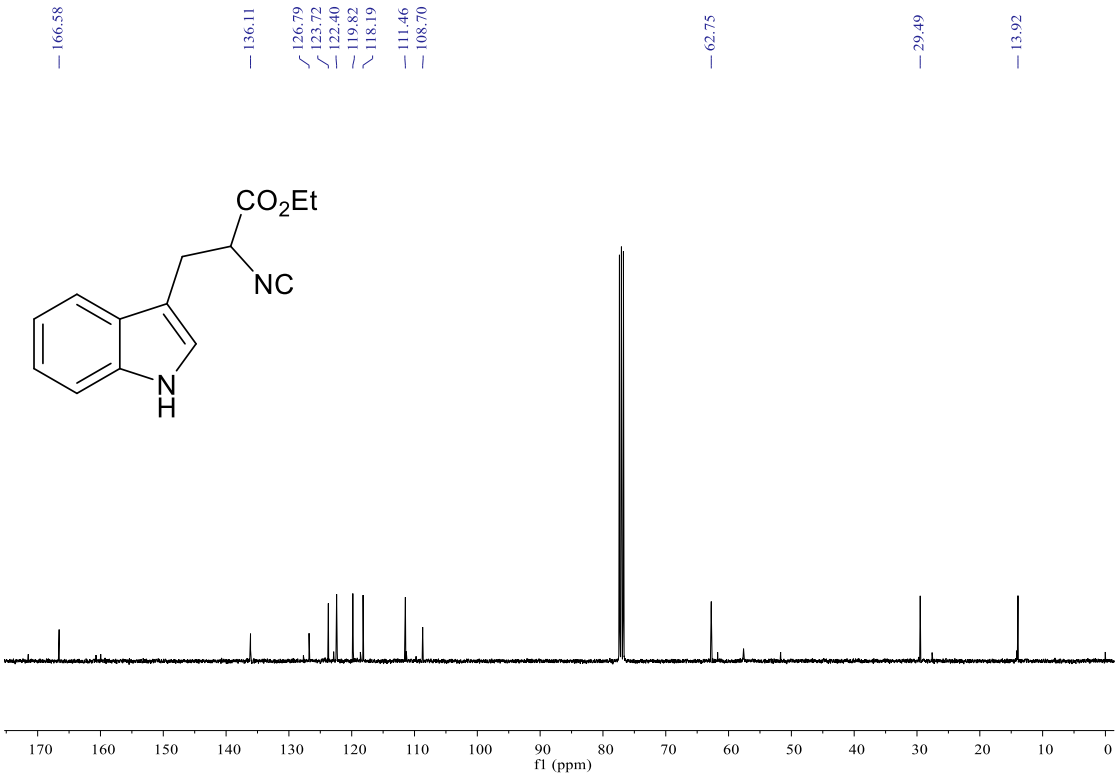
Fig. S9 Mortalities of *T. molitor* larvae injected *S. marcescens* NJ01 with IMBI at 0.39, 0.78, and 1.56 μg/mL. DMSO (injected alone *S. marcescens* and DMSO), negative control (injected alone 1.56 μg/mL IMBI), control (injected alone DMSO). All the strains were cultured at 28°C, with Luria Bertani (LB) broth (pH 7.0) medium.

12 Copies of spectra.

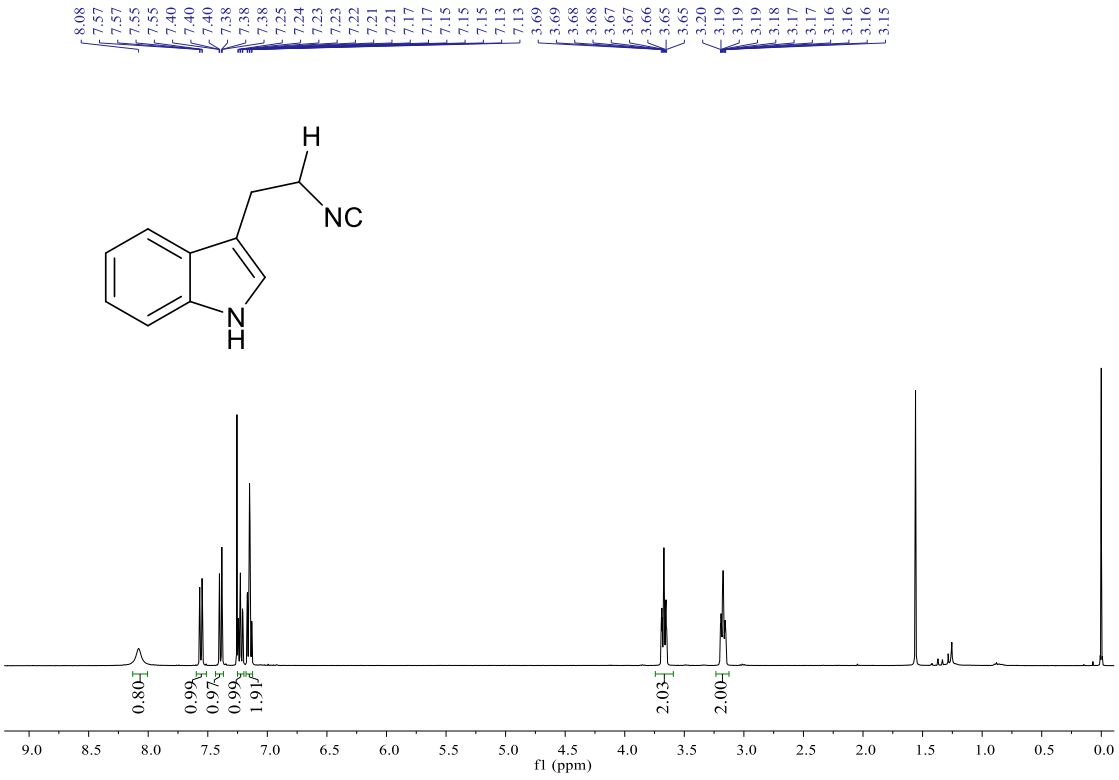
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **1**



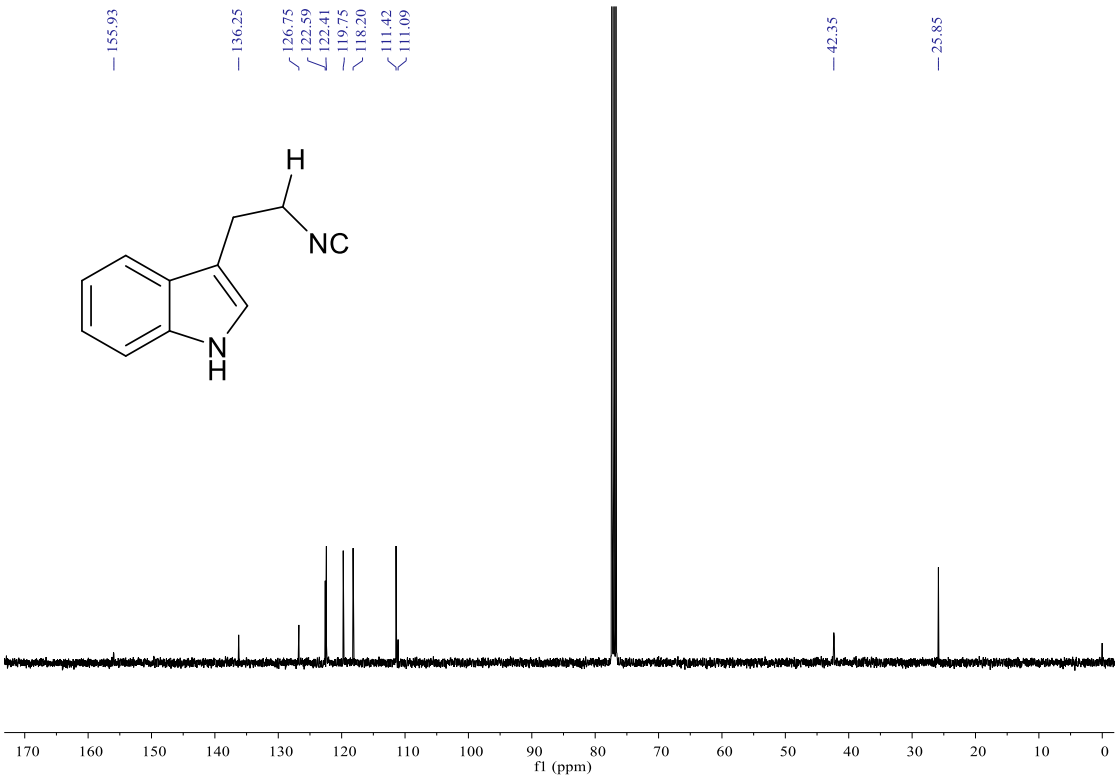
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **1**



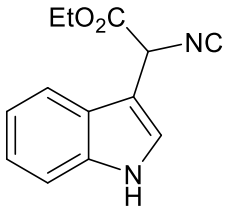
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **2**

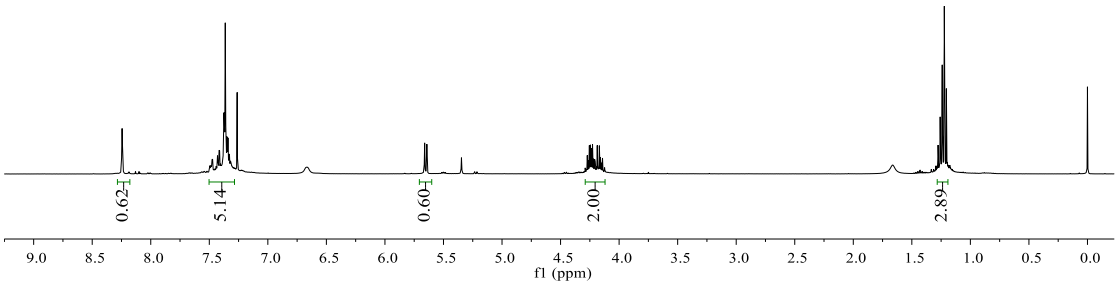


^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **2**

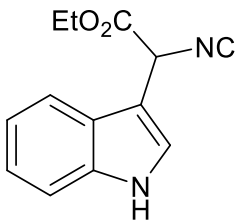


^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3**

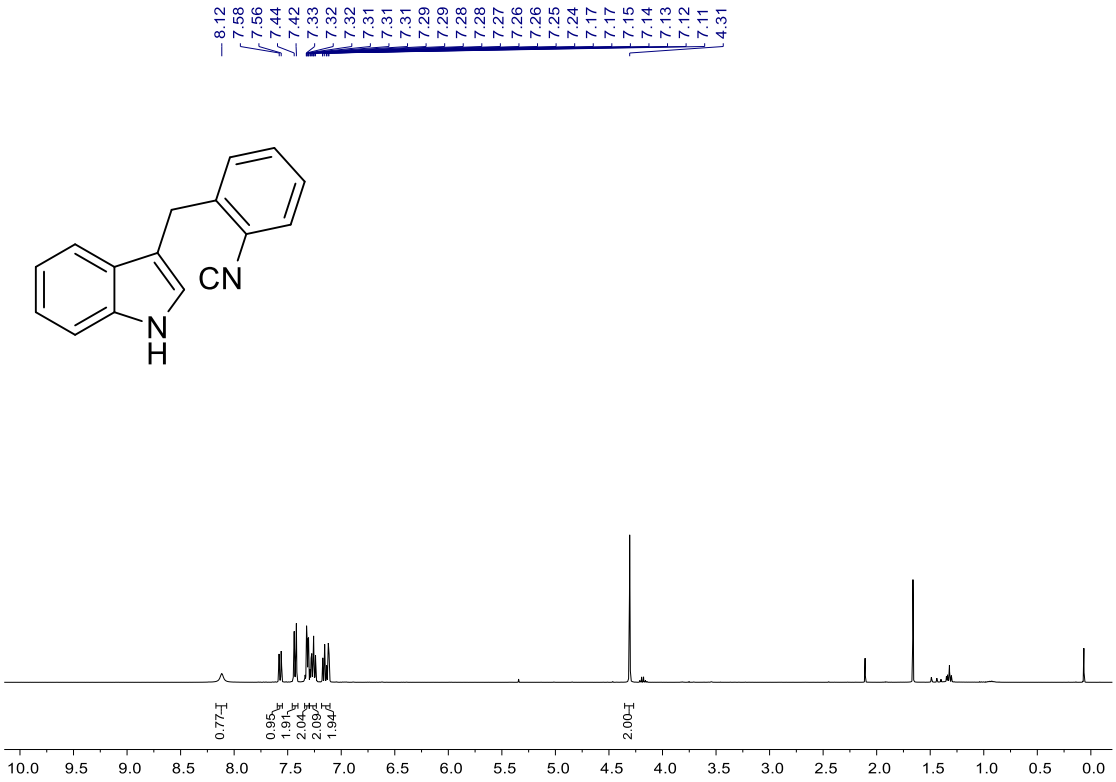




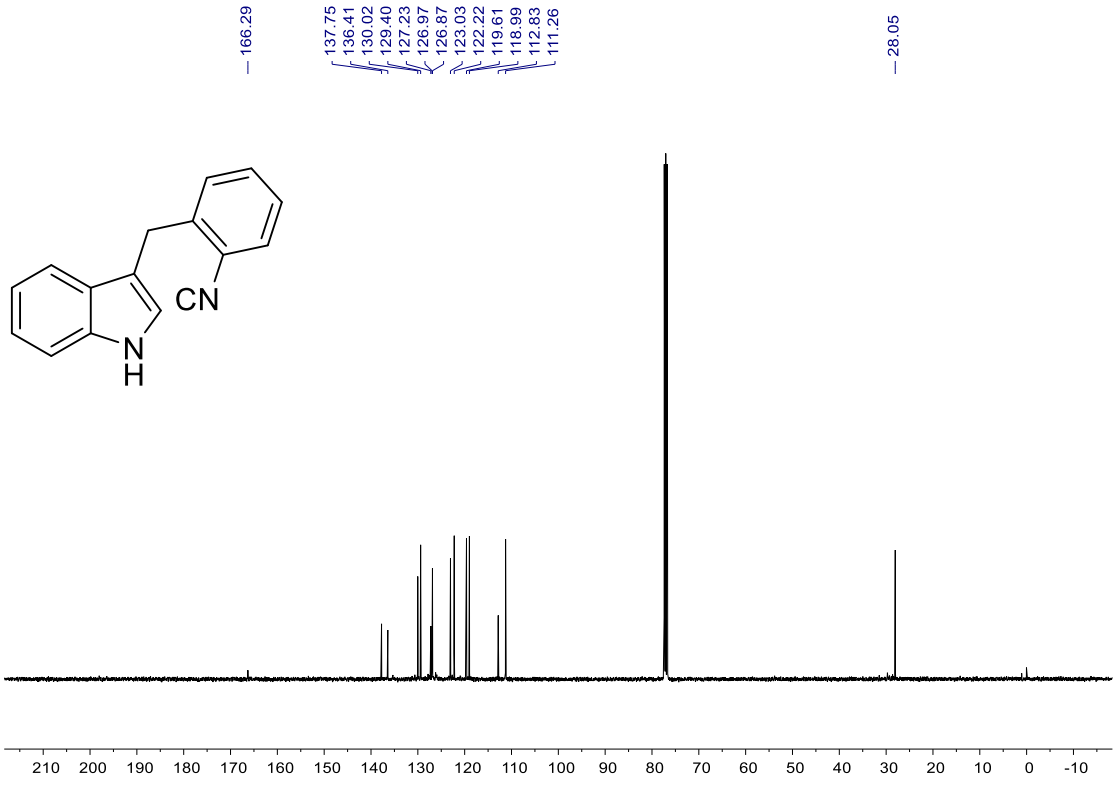
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **3**



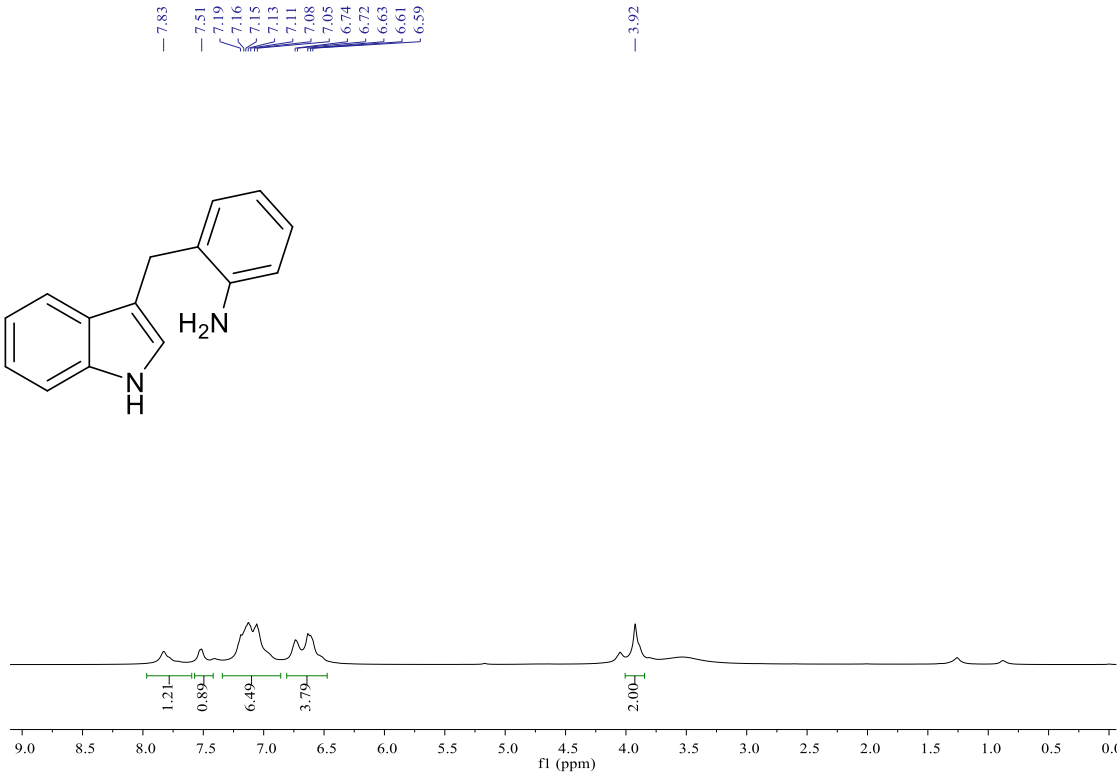
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **4**



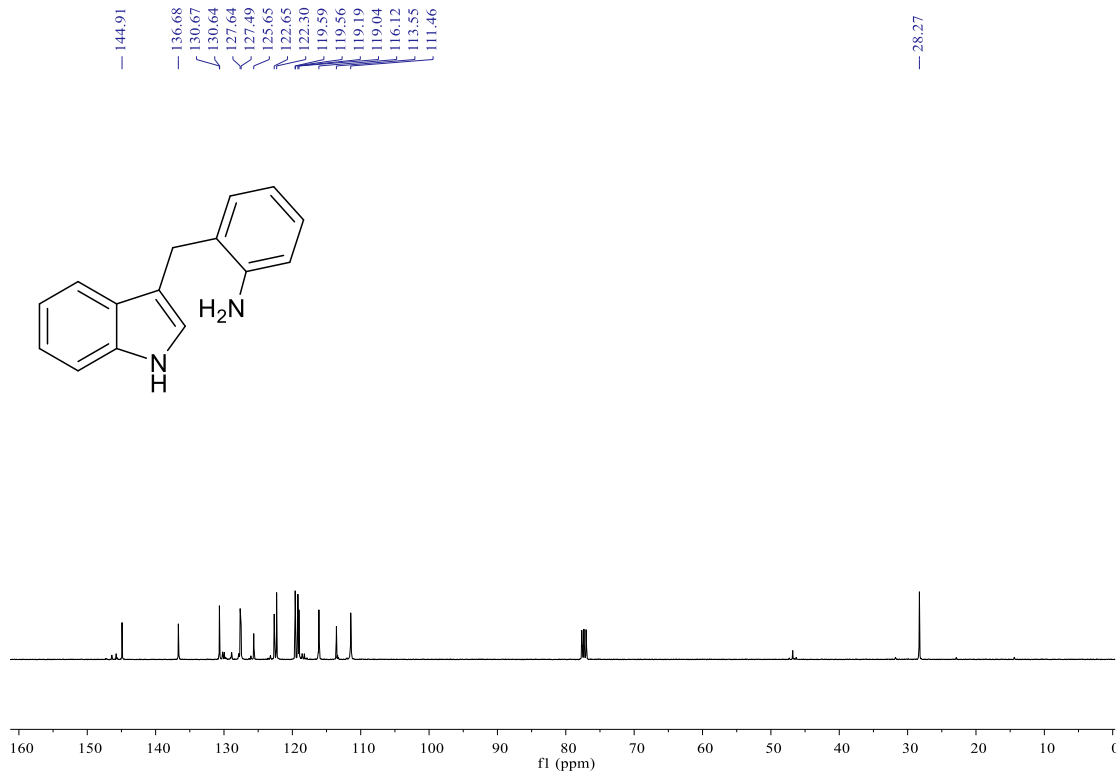
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **4**



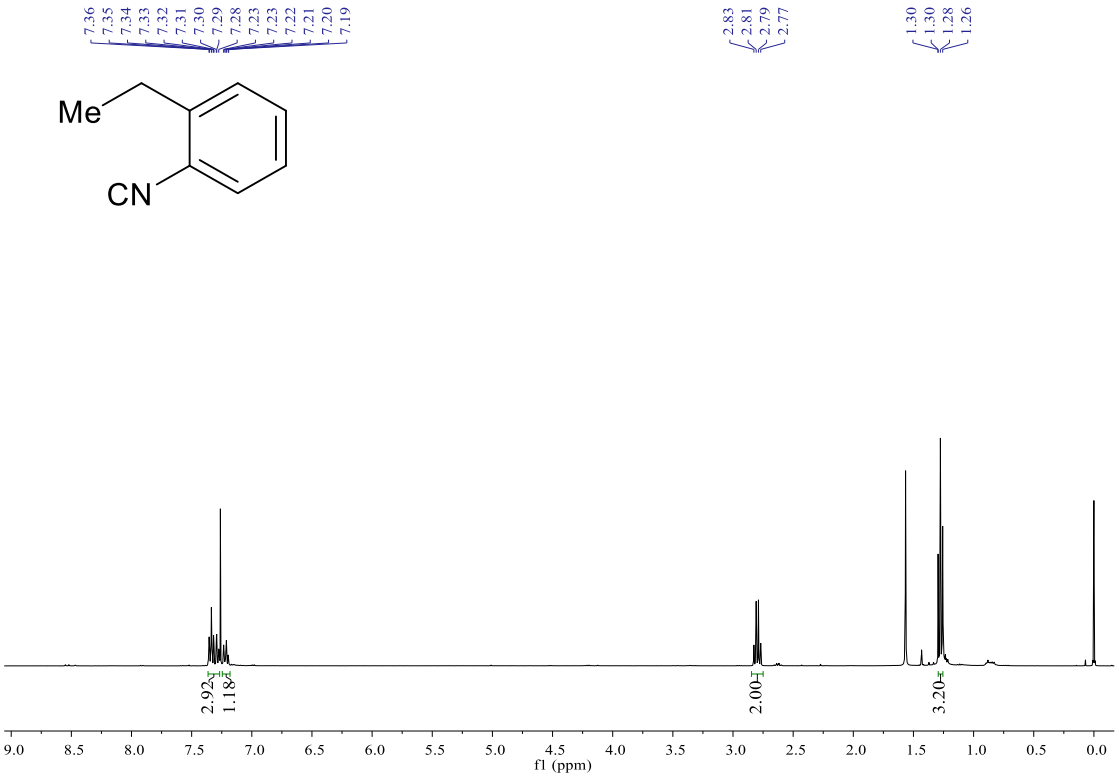
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5**



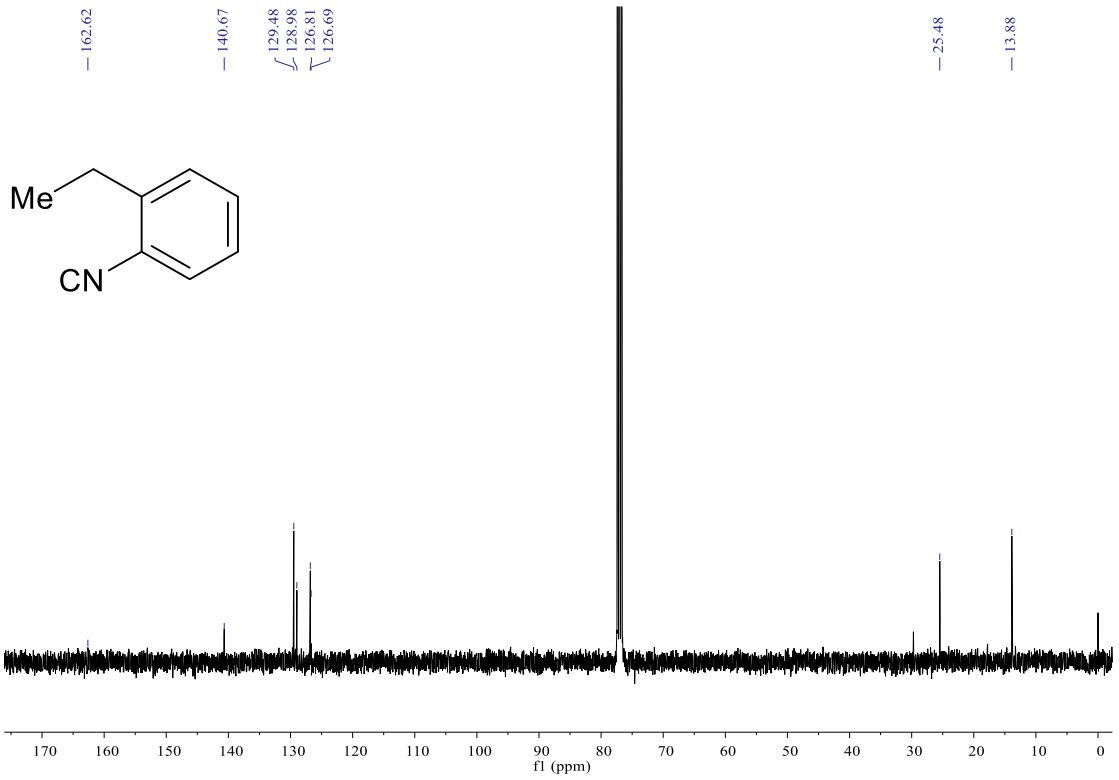
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **5**



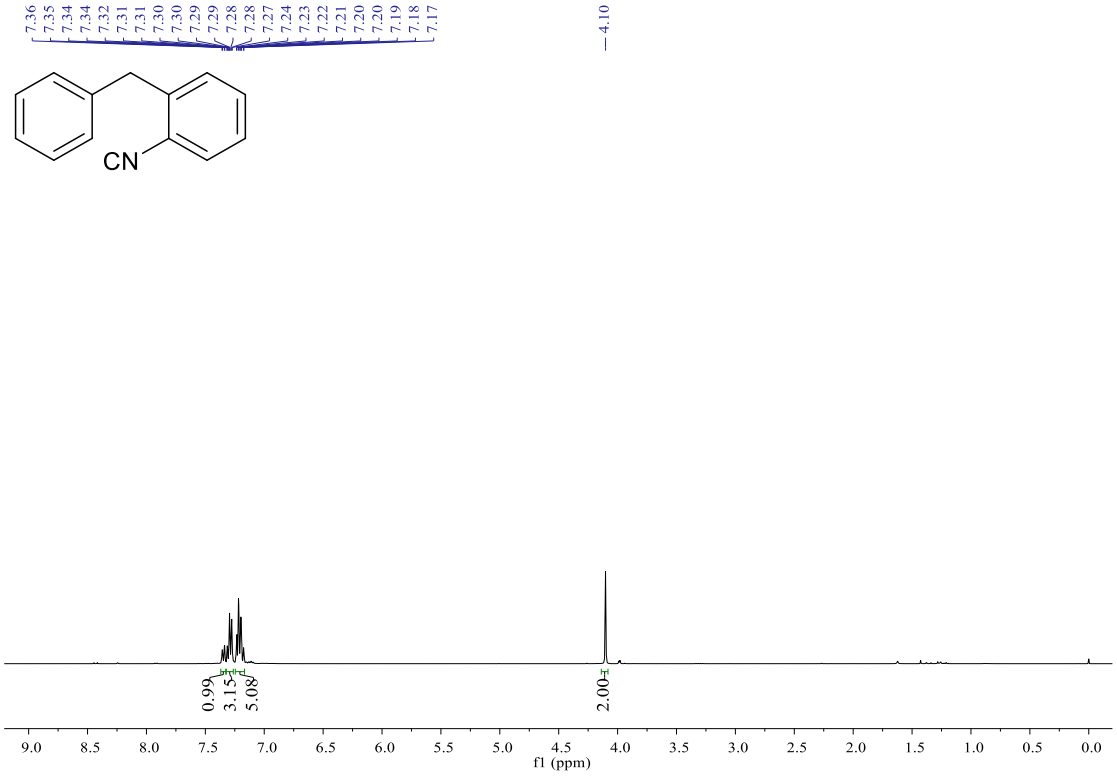
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **6**



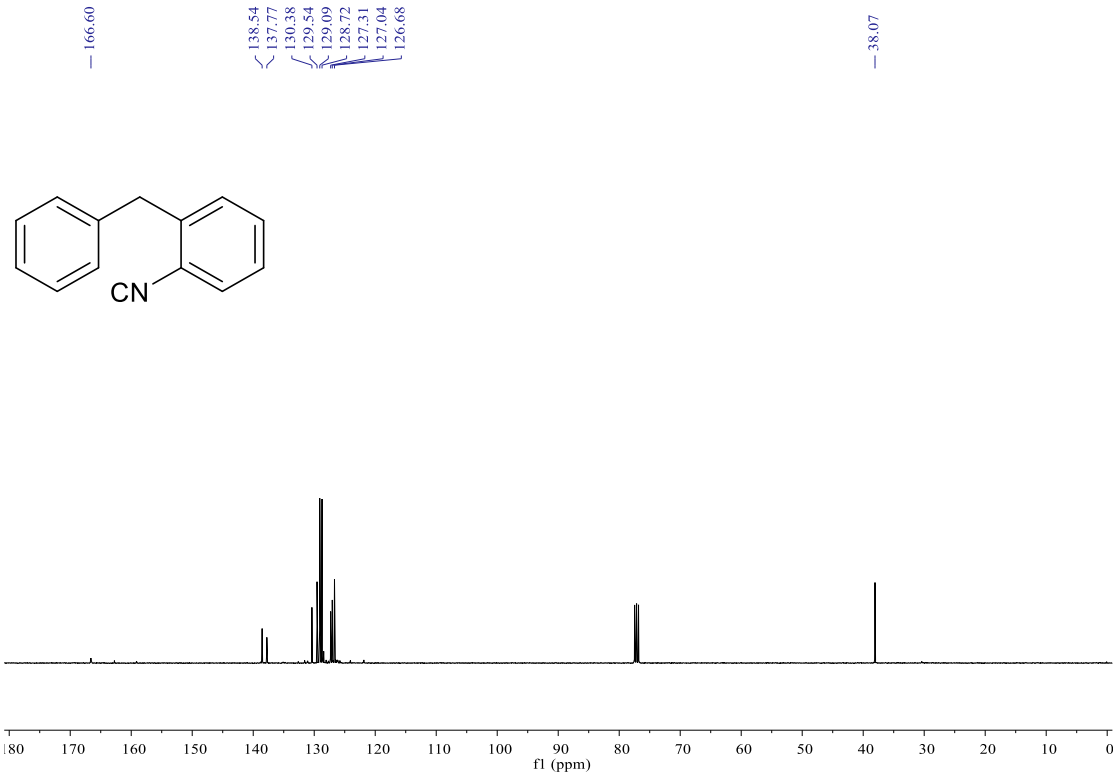
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **6**



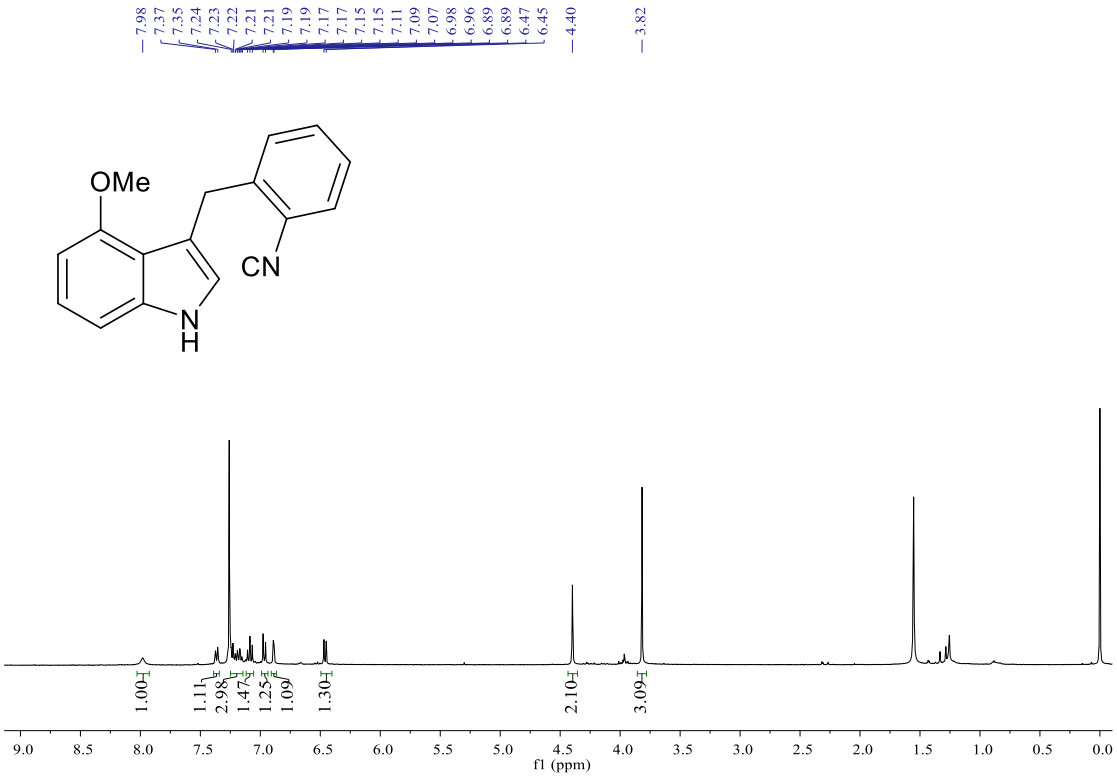
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **7**



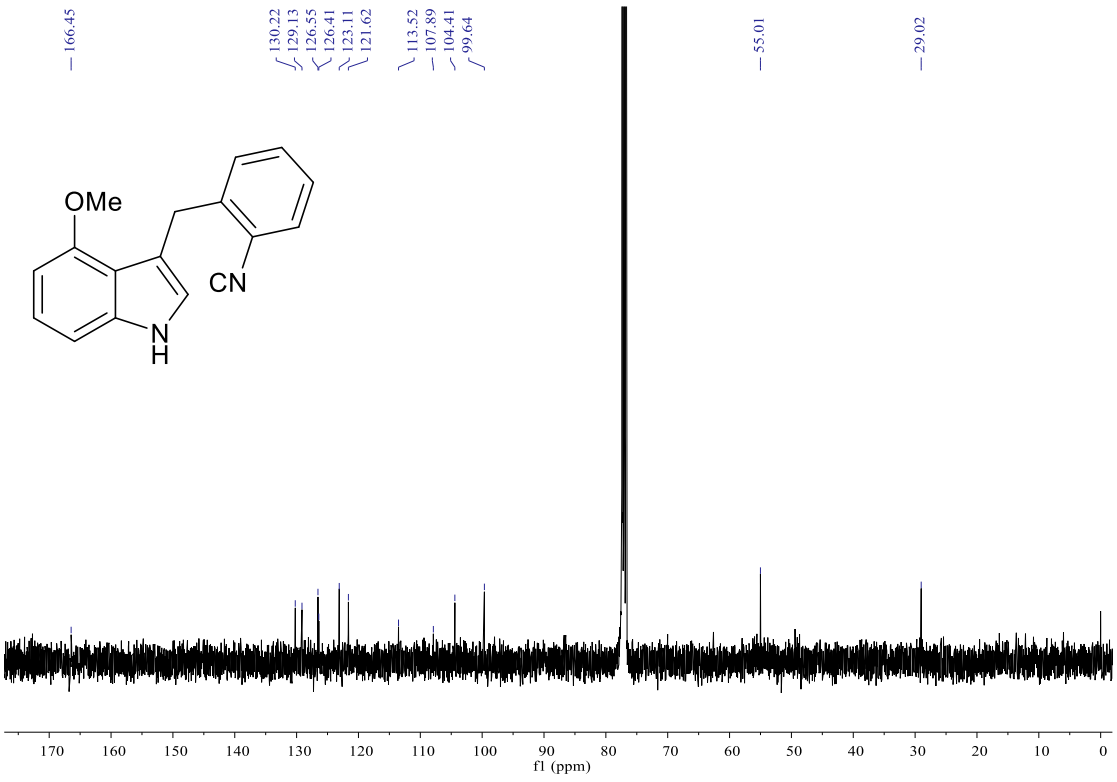
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **7**



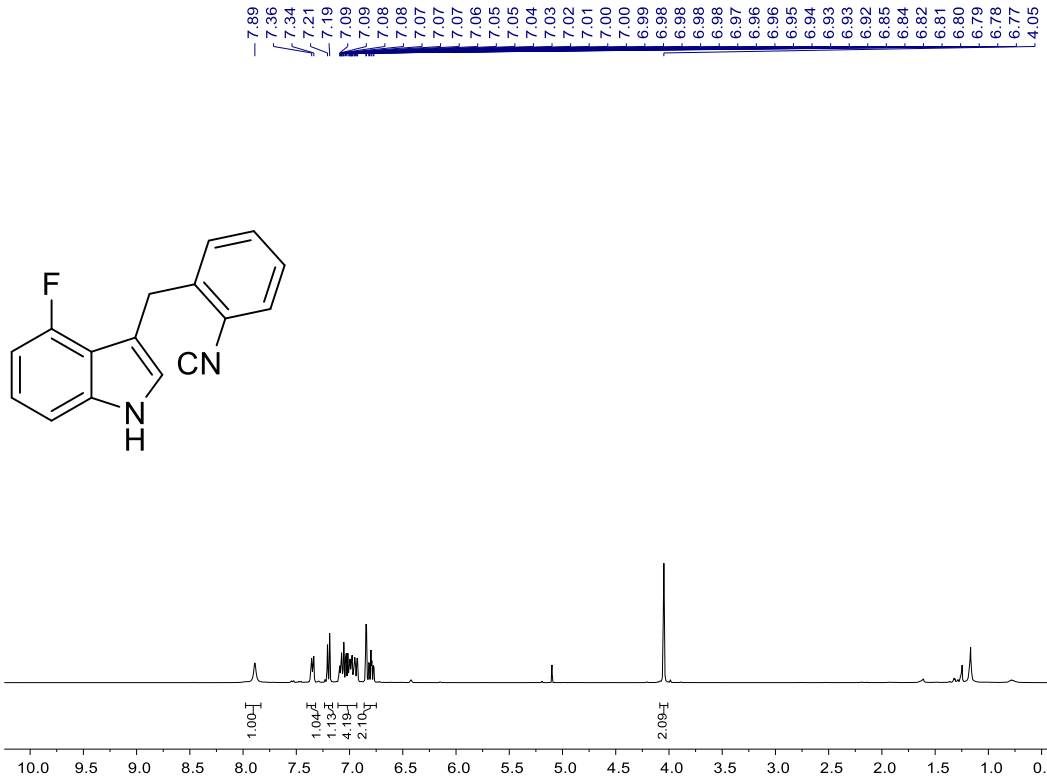
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **8**



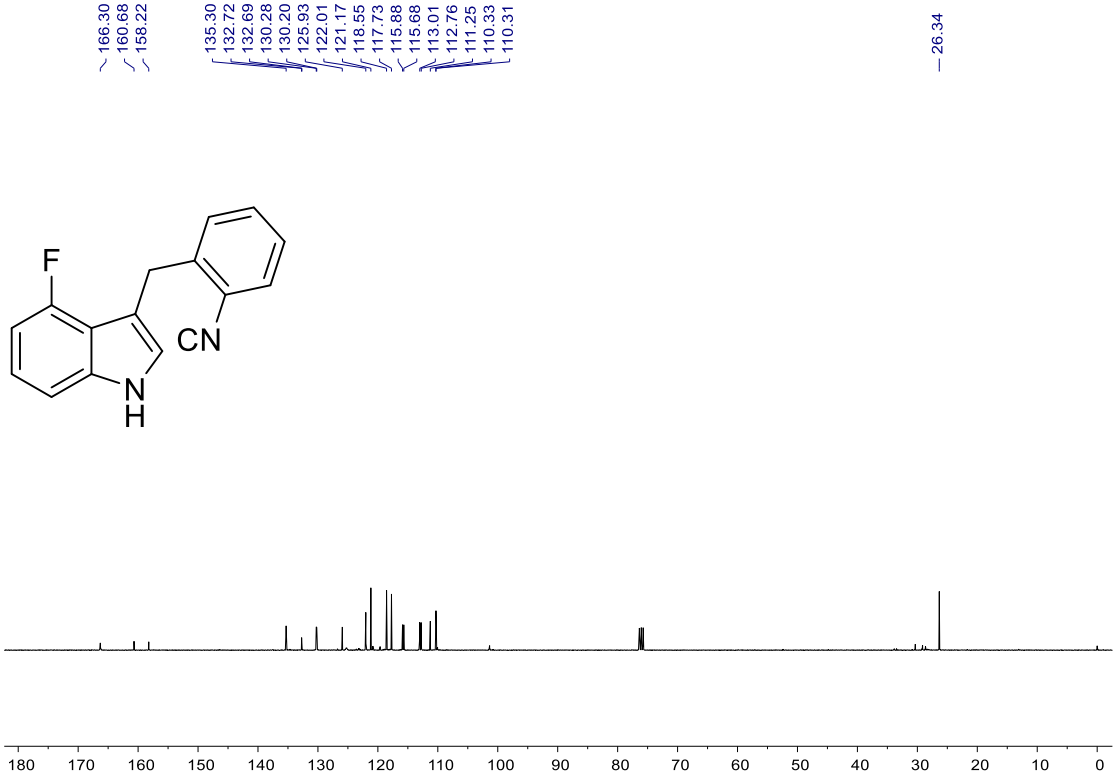
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **8**



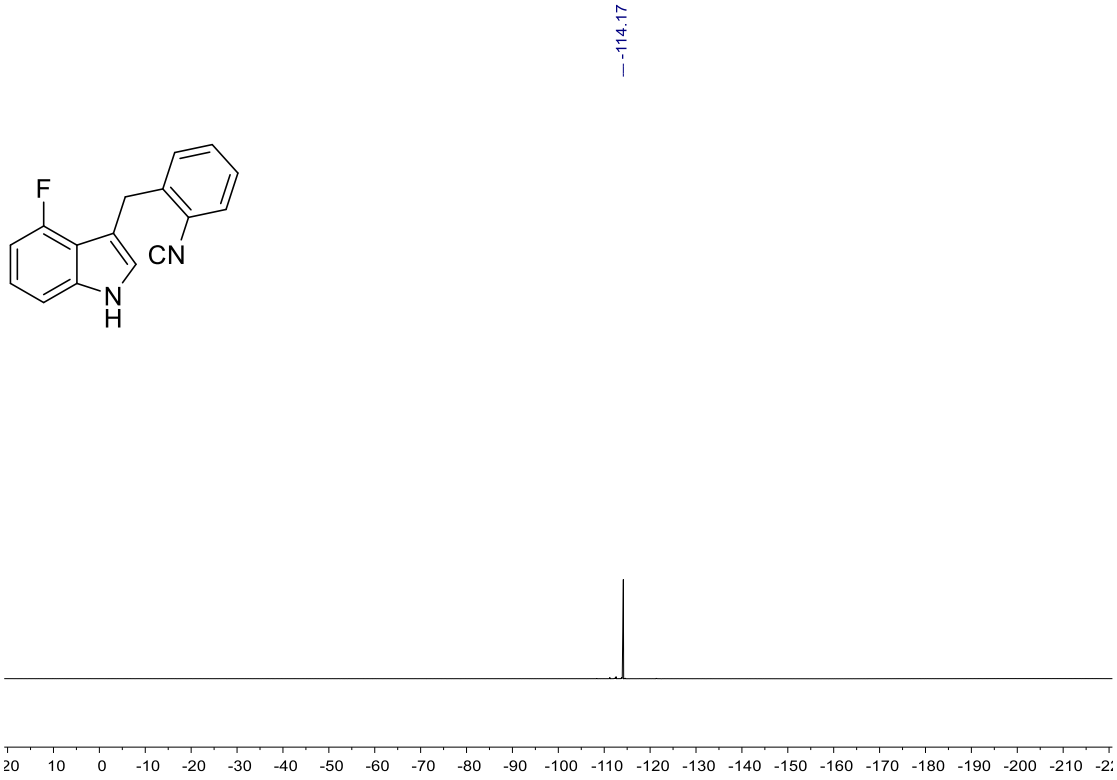
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **9**



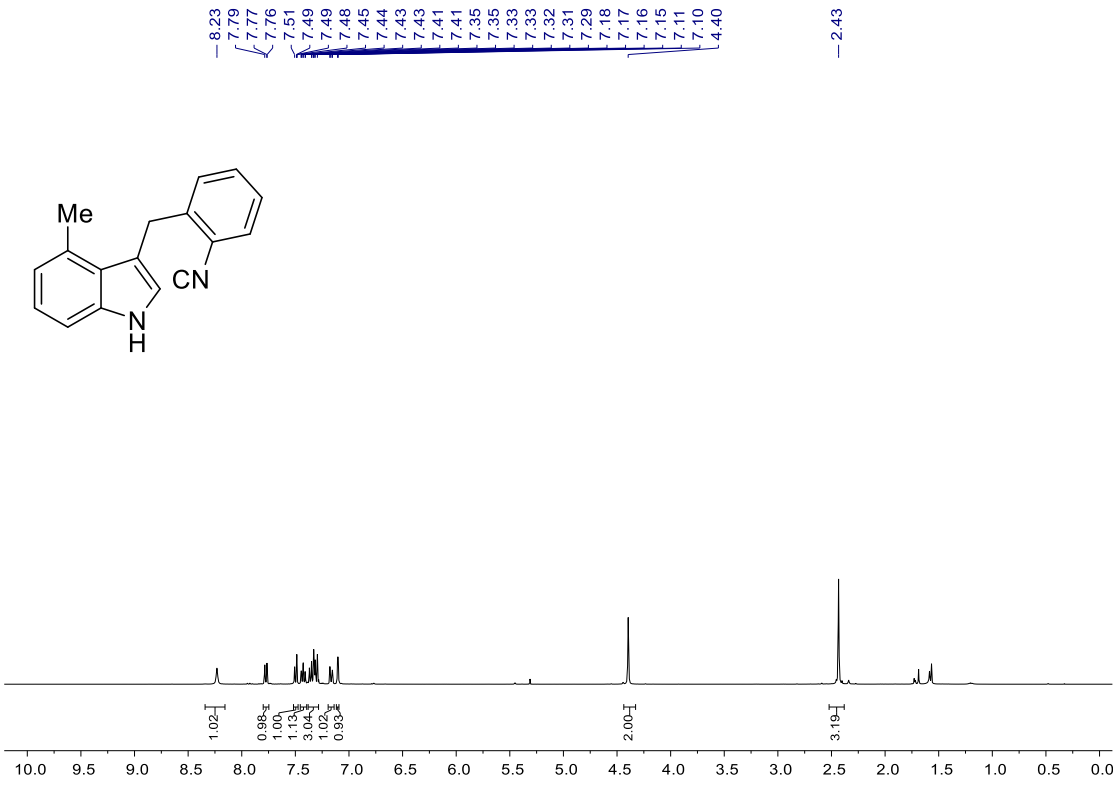
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **9**



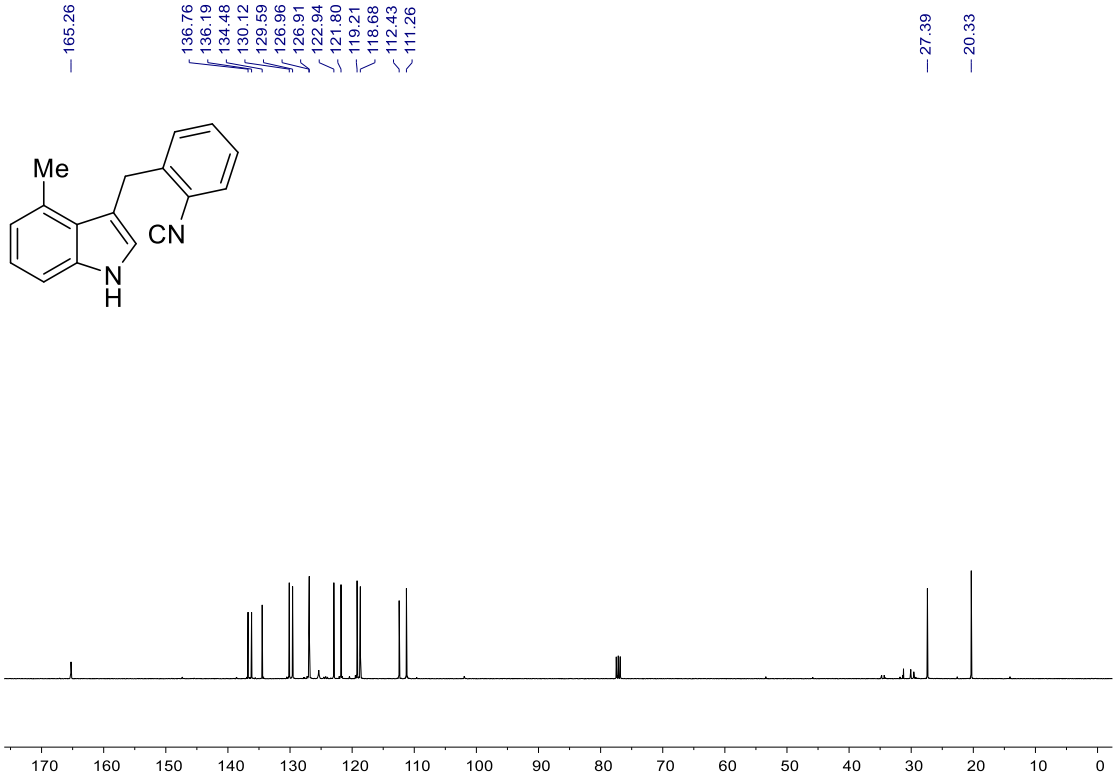
^{19}F NMR (376 MHz, $CDCl_3$) spectrum of **9**



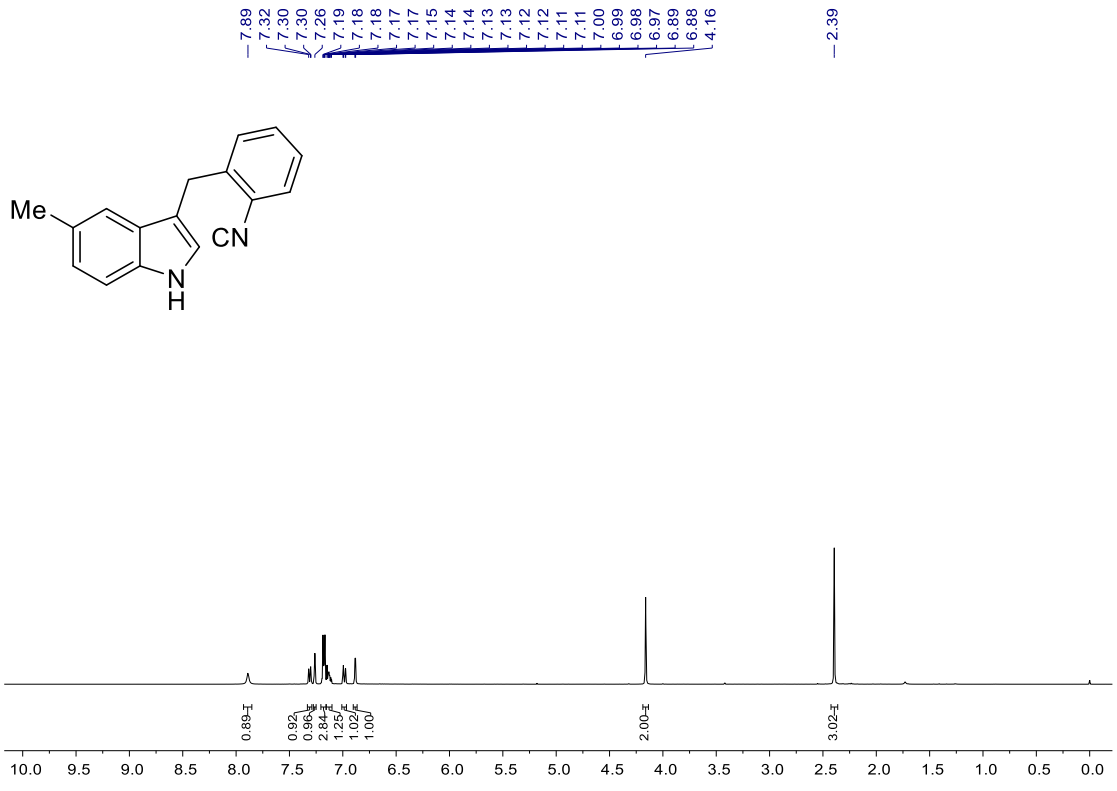
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **10**



^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **10**



^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **11**



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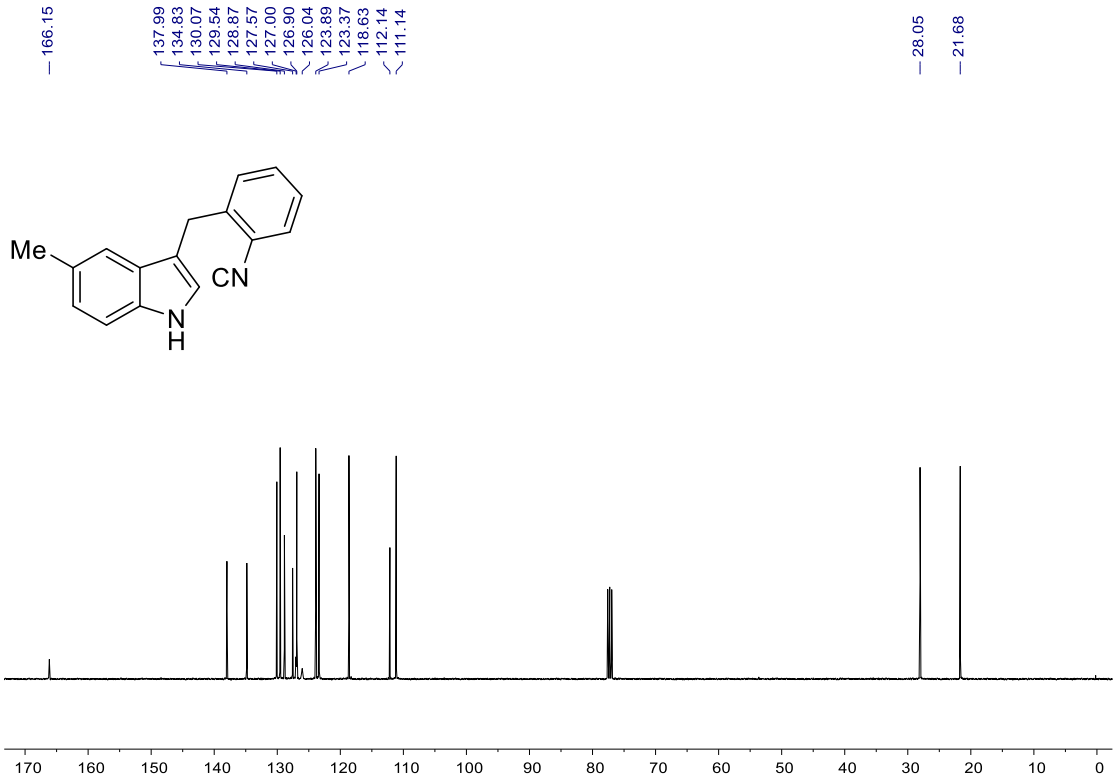
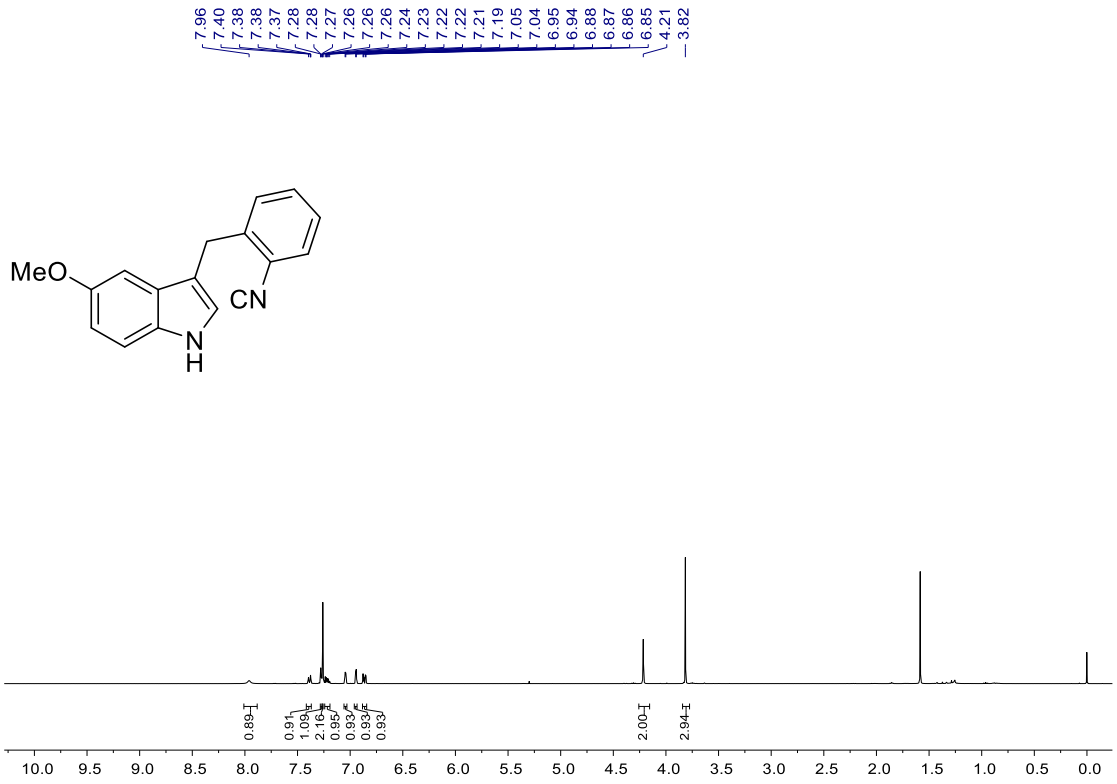
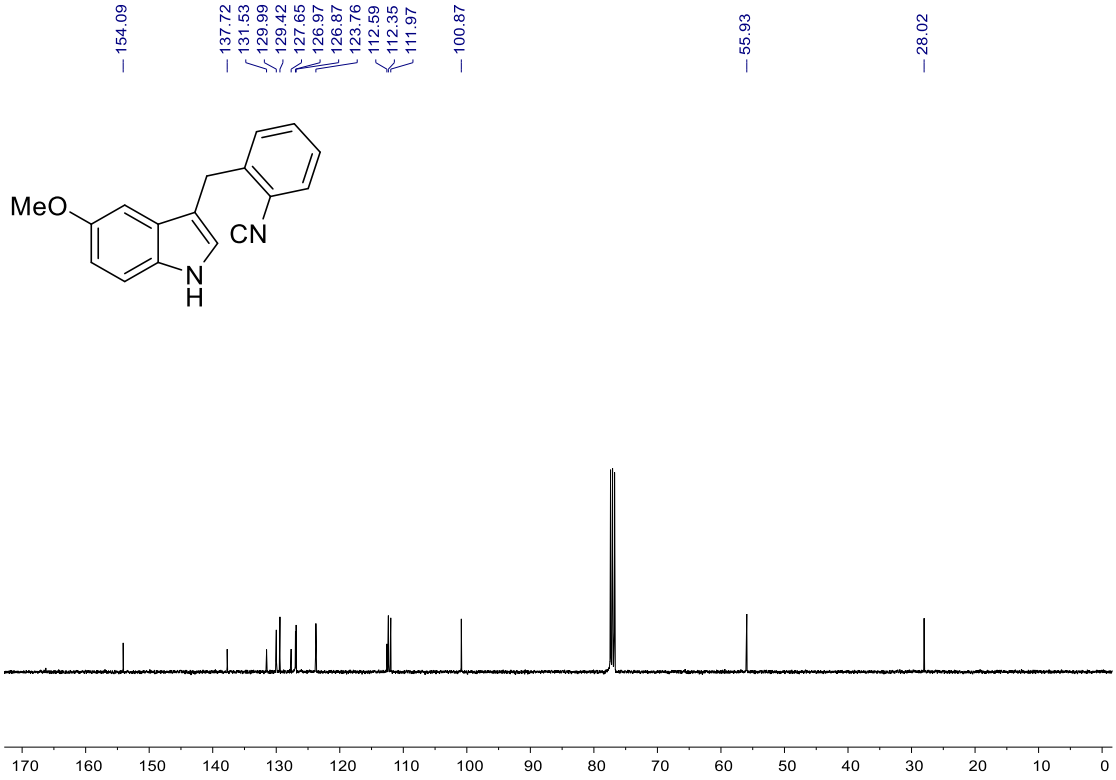


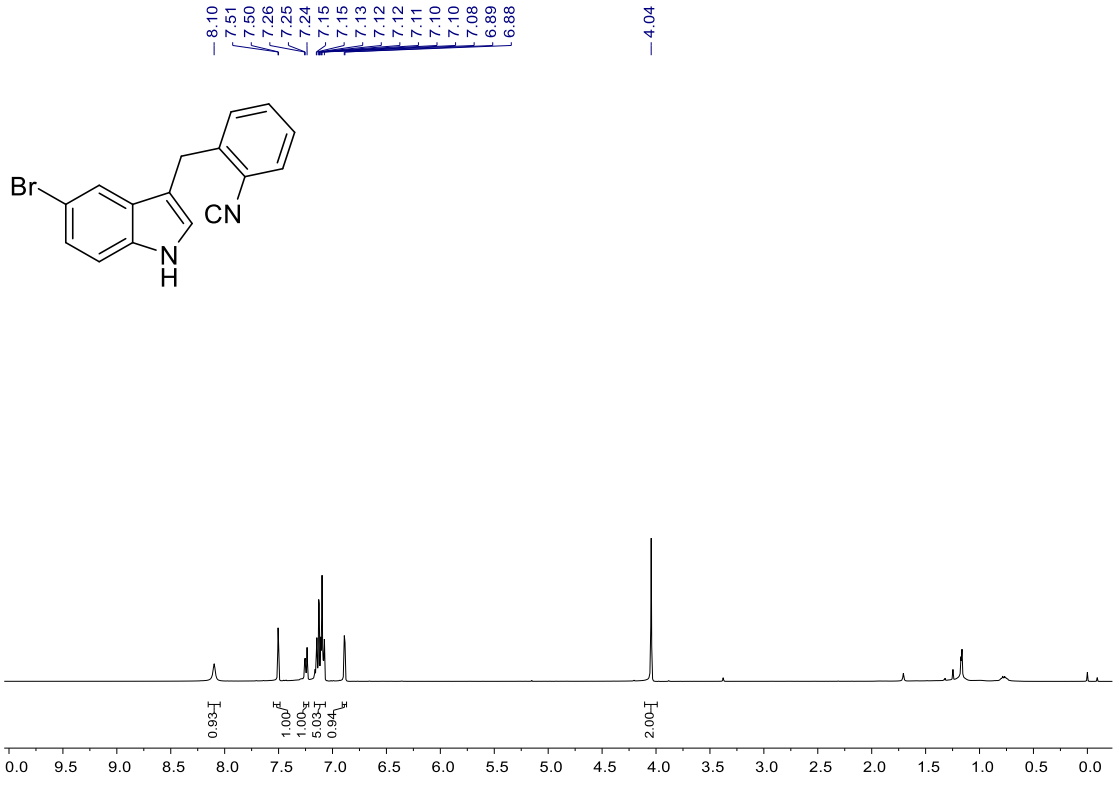
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **12**



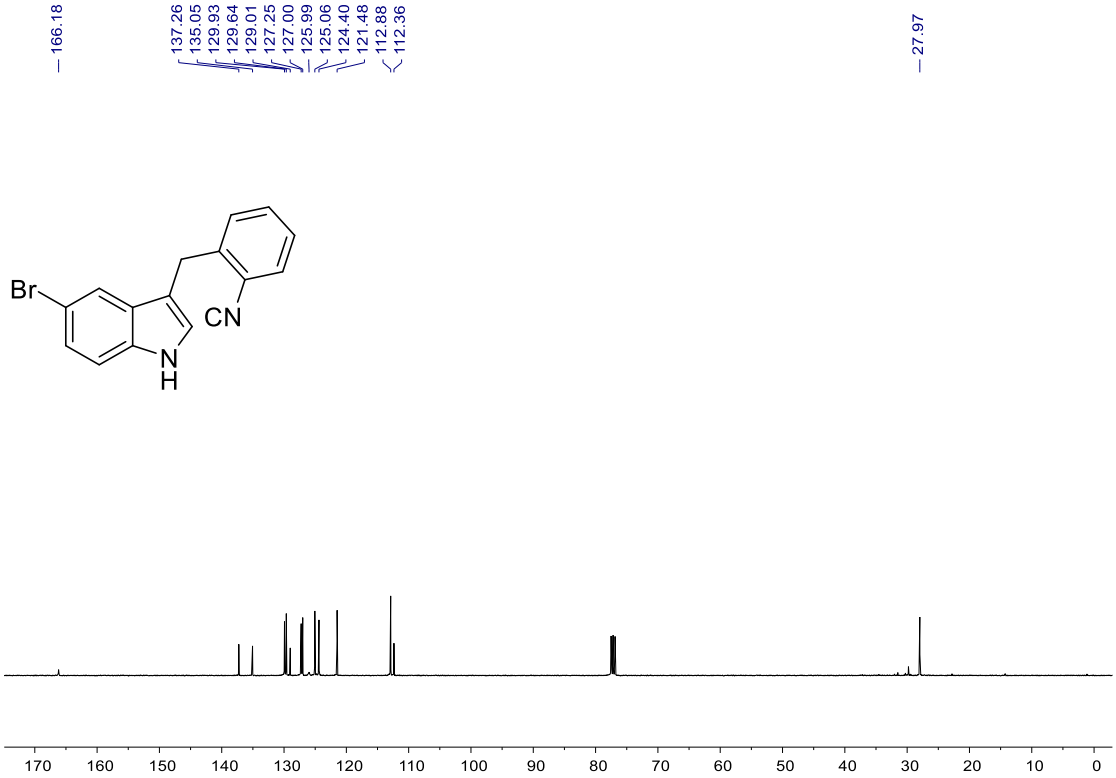
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **12**



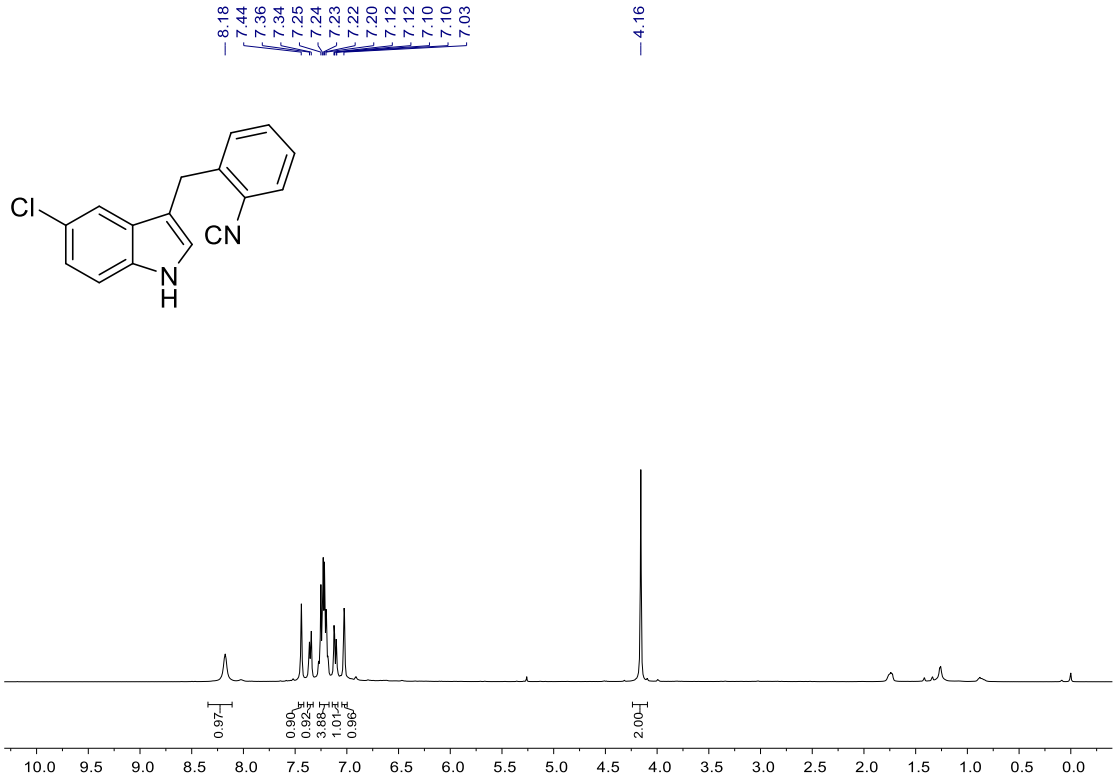
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **13**



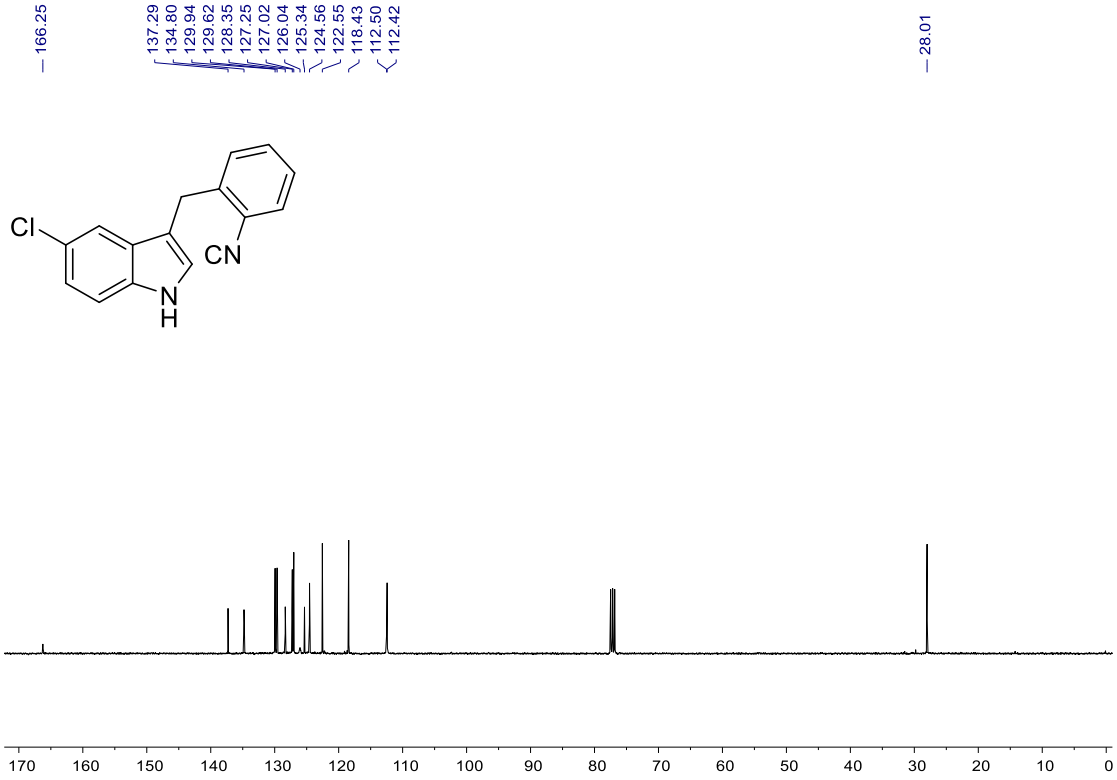
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **13**



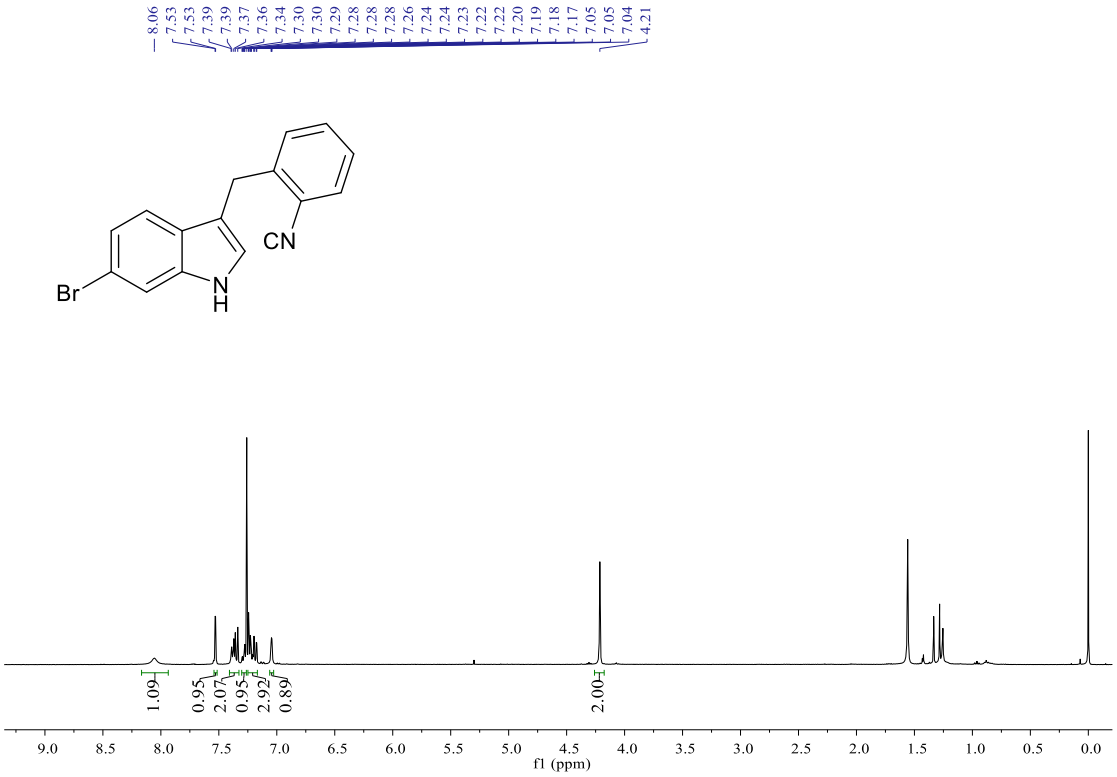
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **14**



^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **14**



^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **15**



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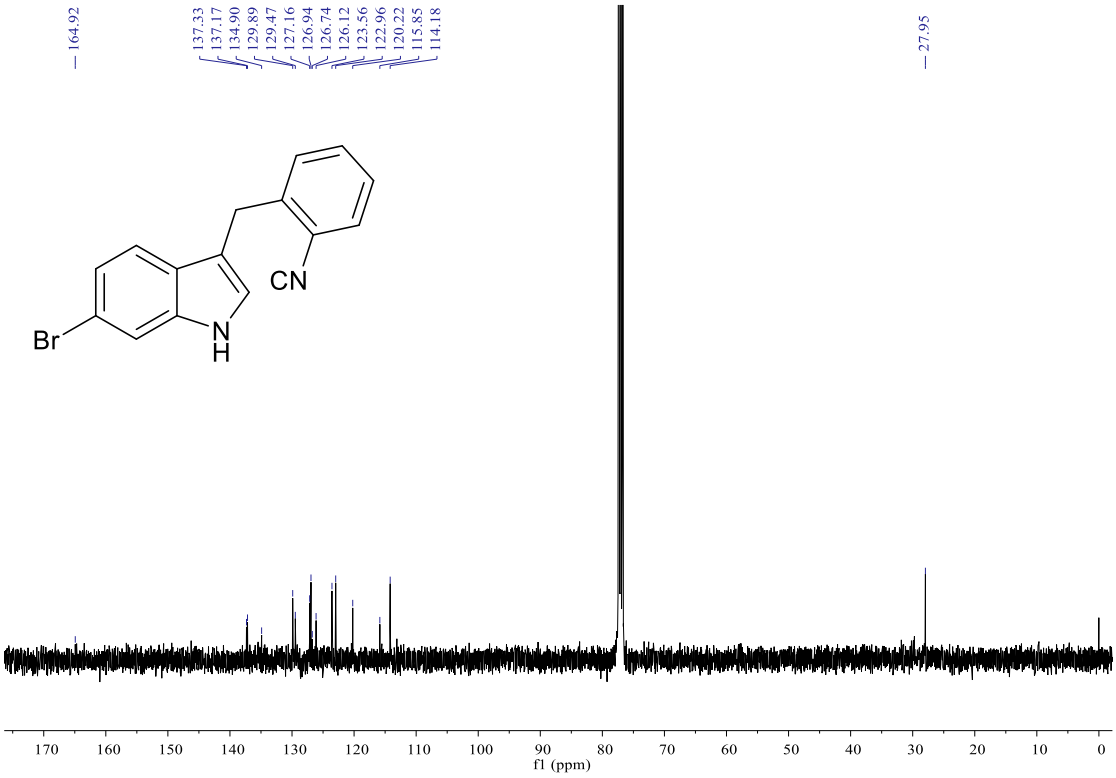
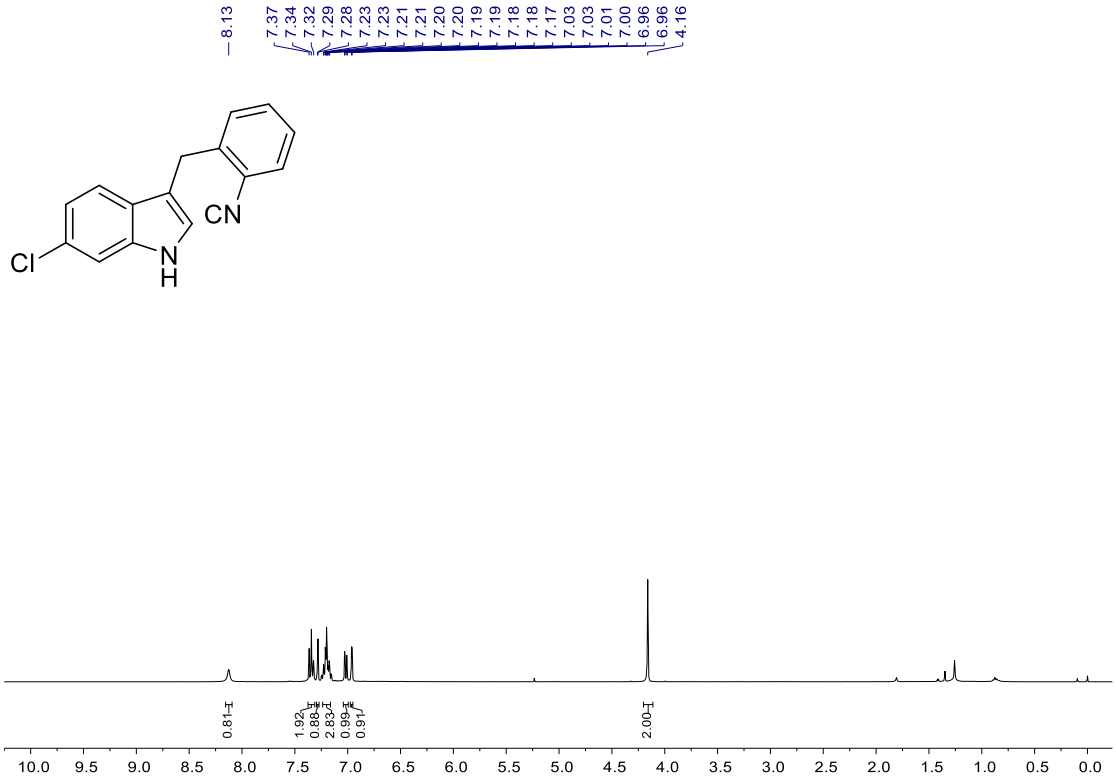
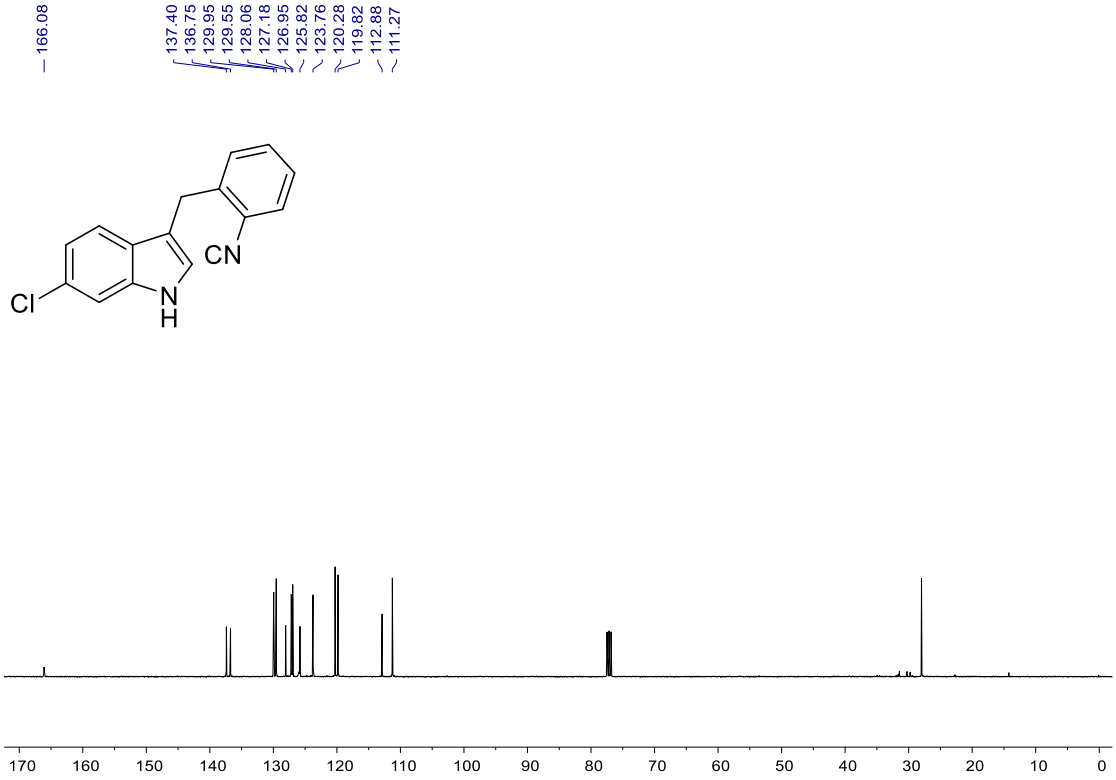


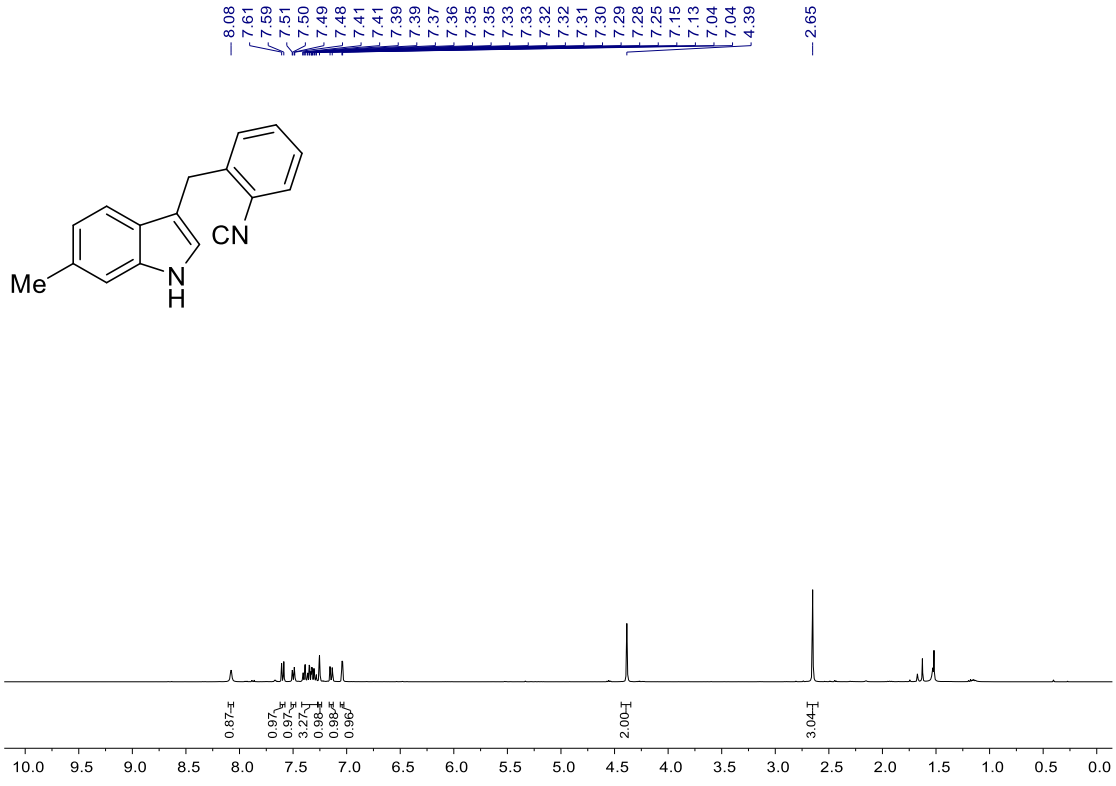
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **16**



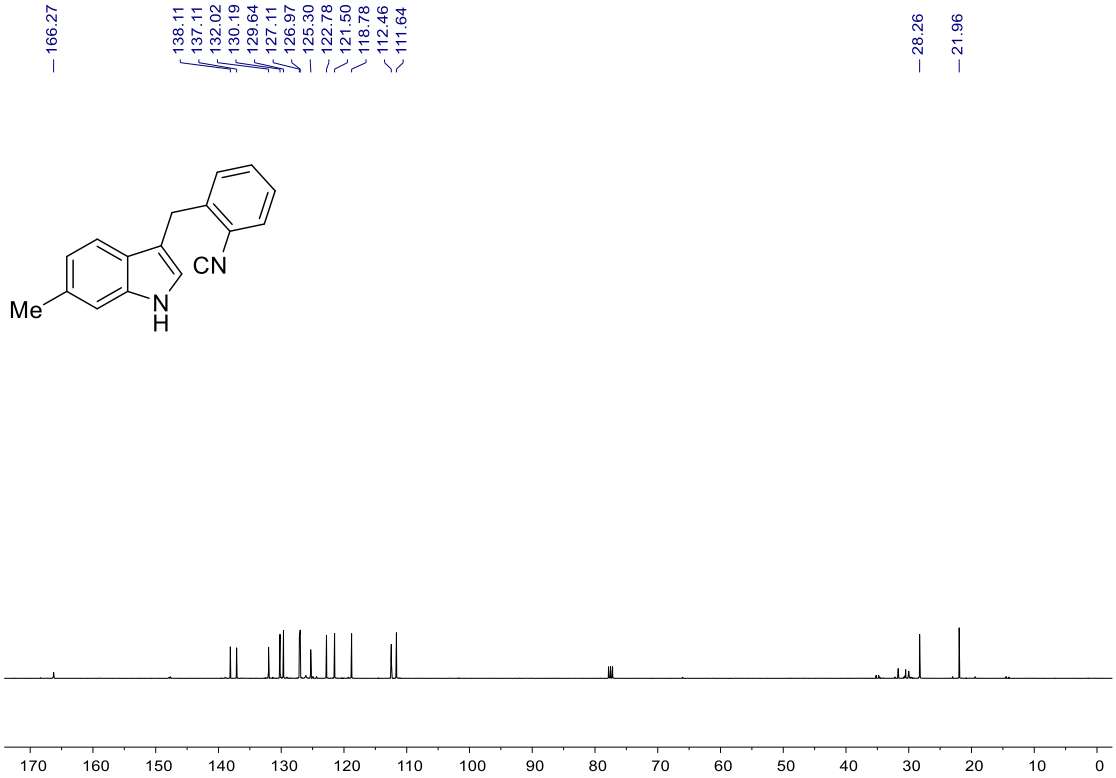
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **16**



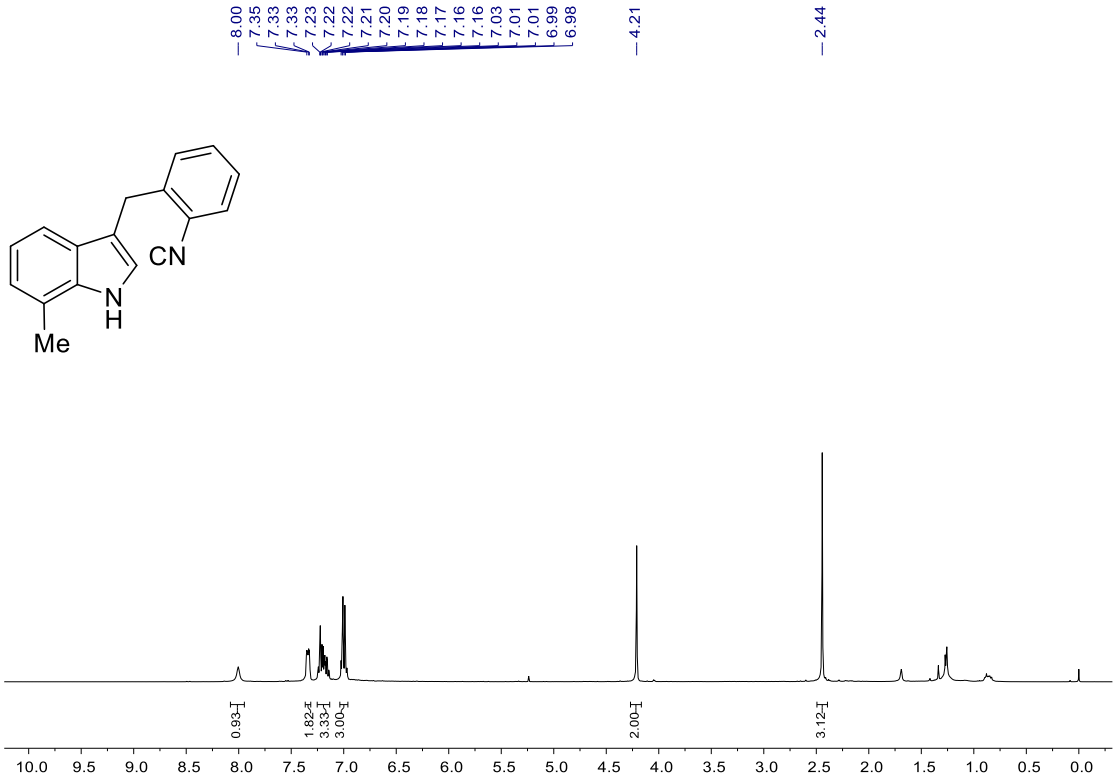
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **17**



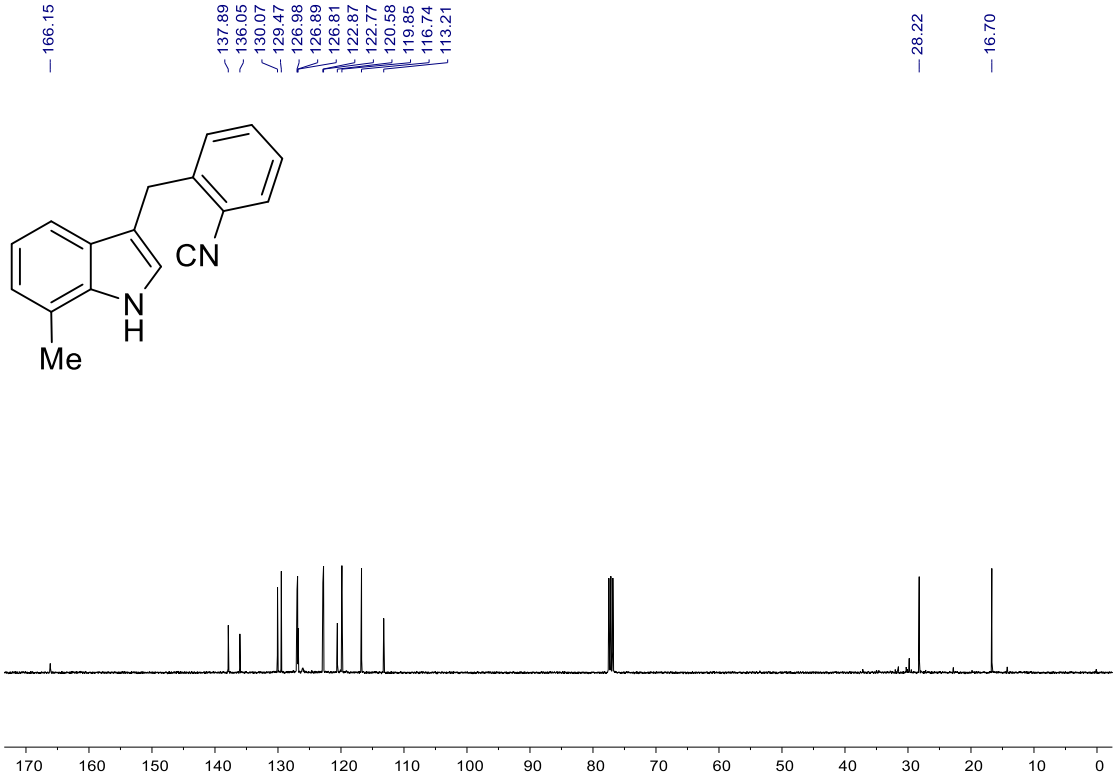
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **17**



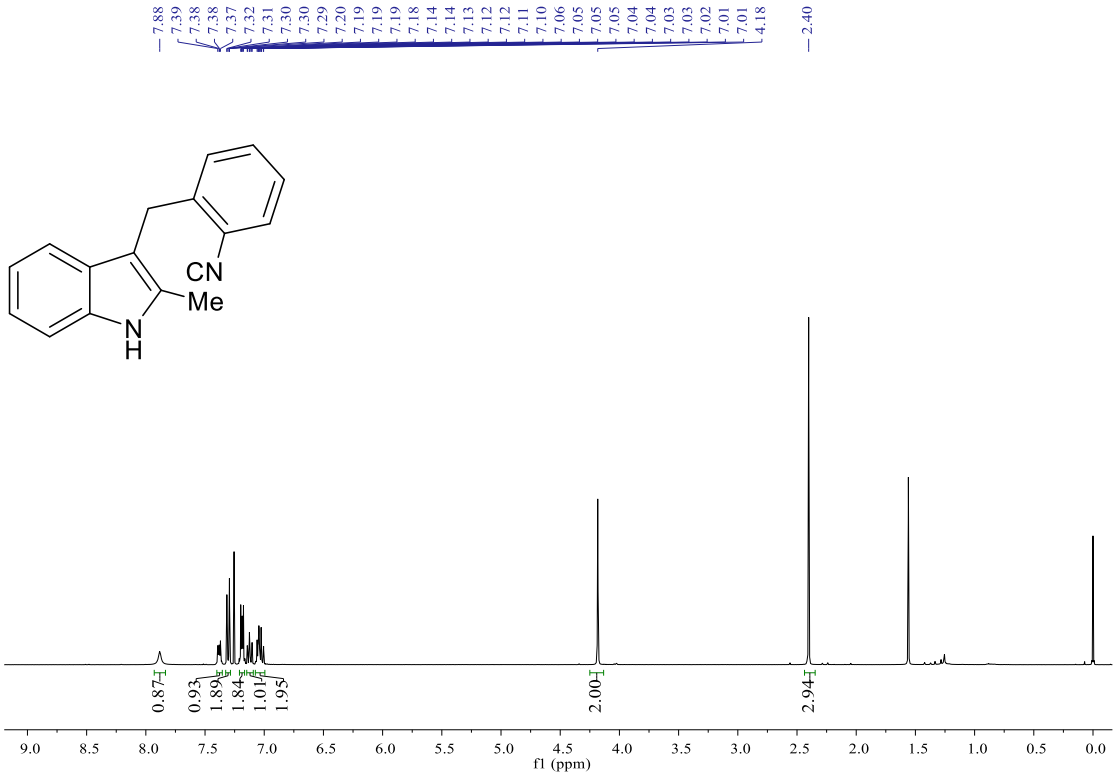
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **18**



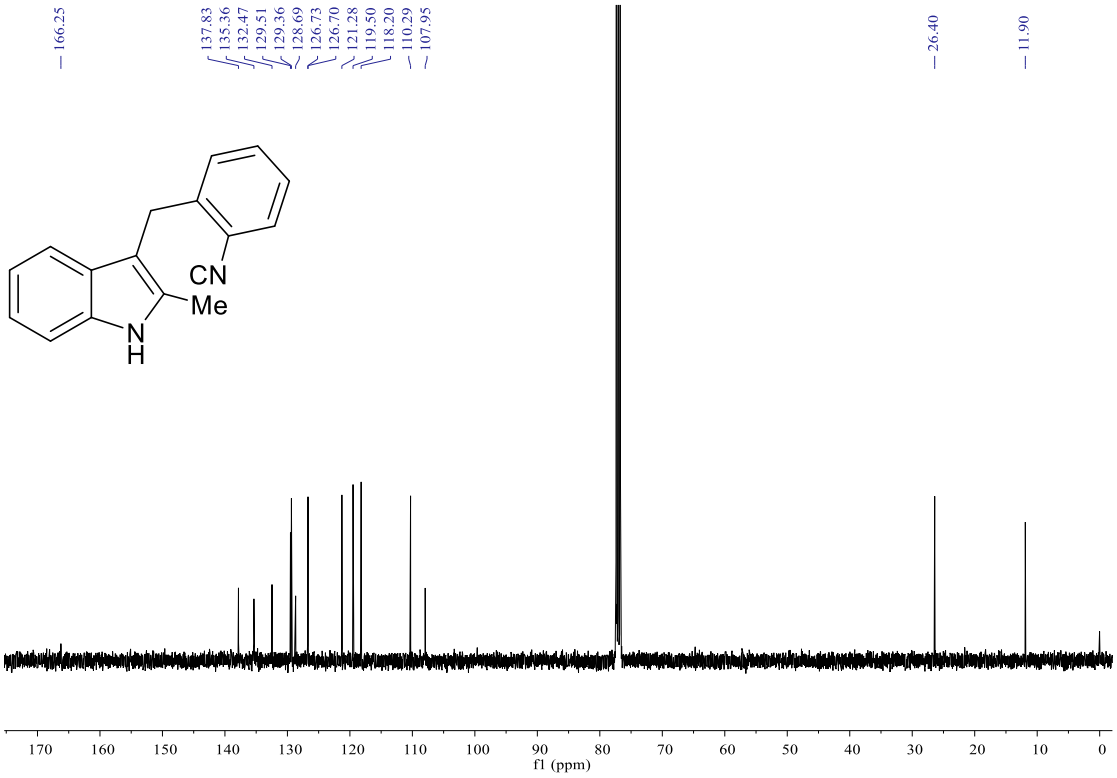
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **18**



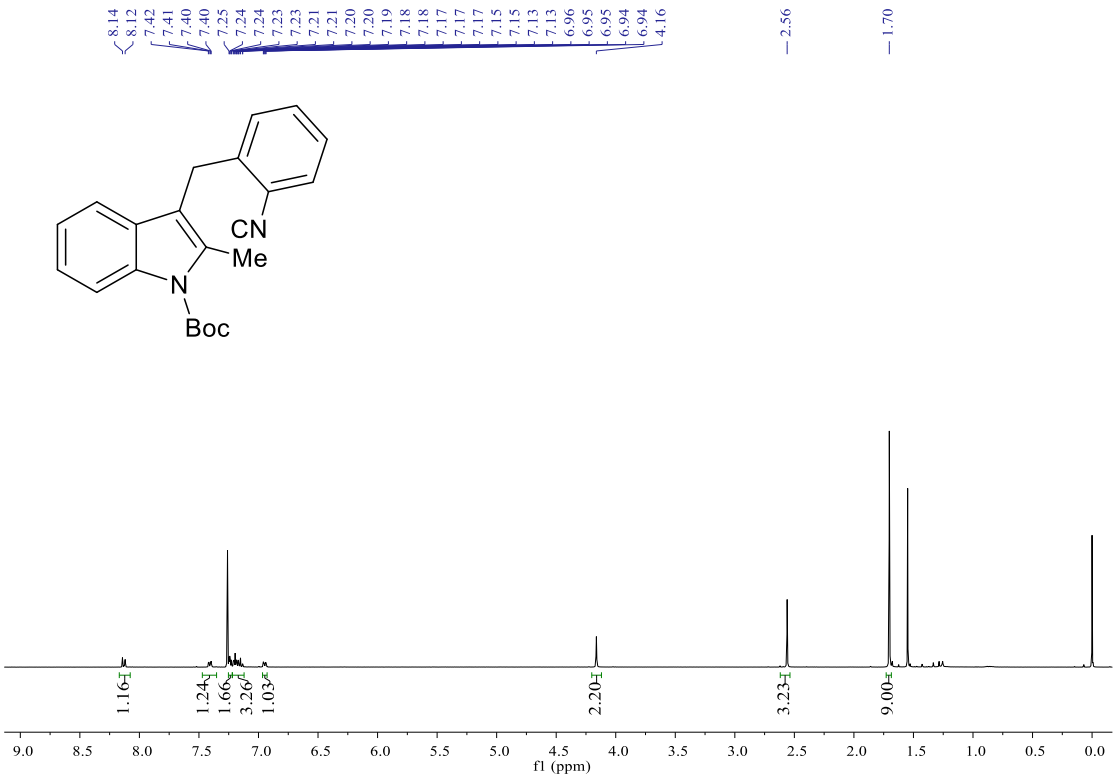
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **19**



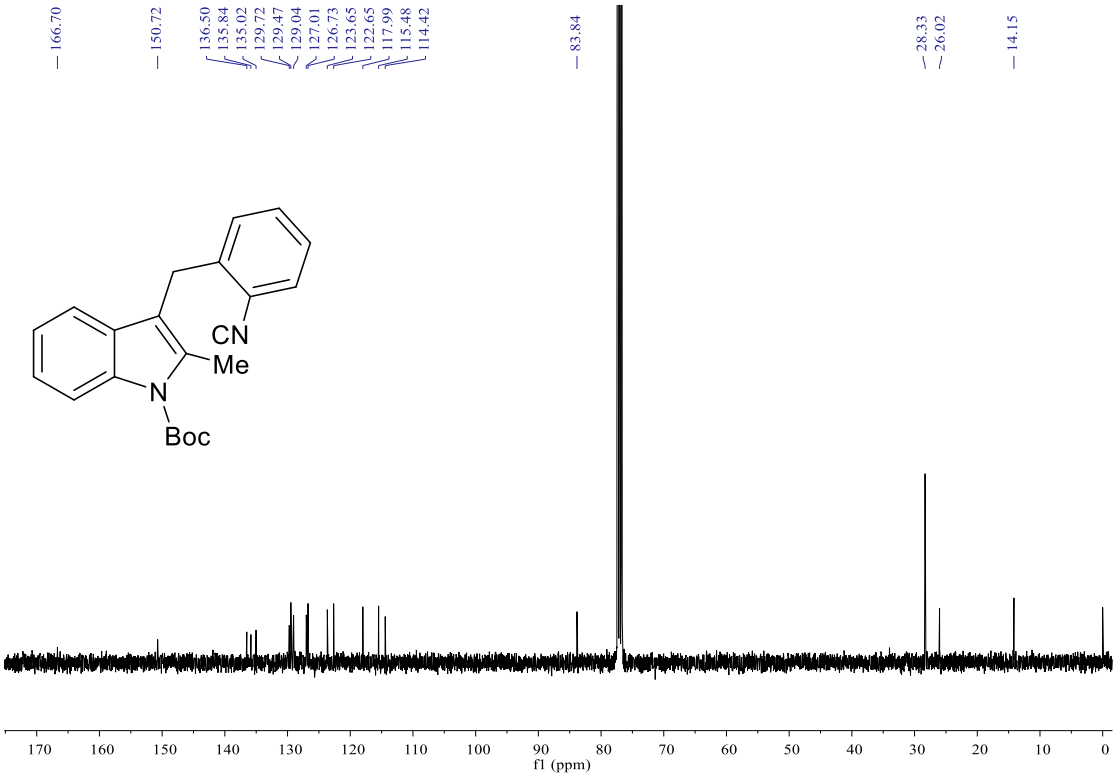
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **19**



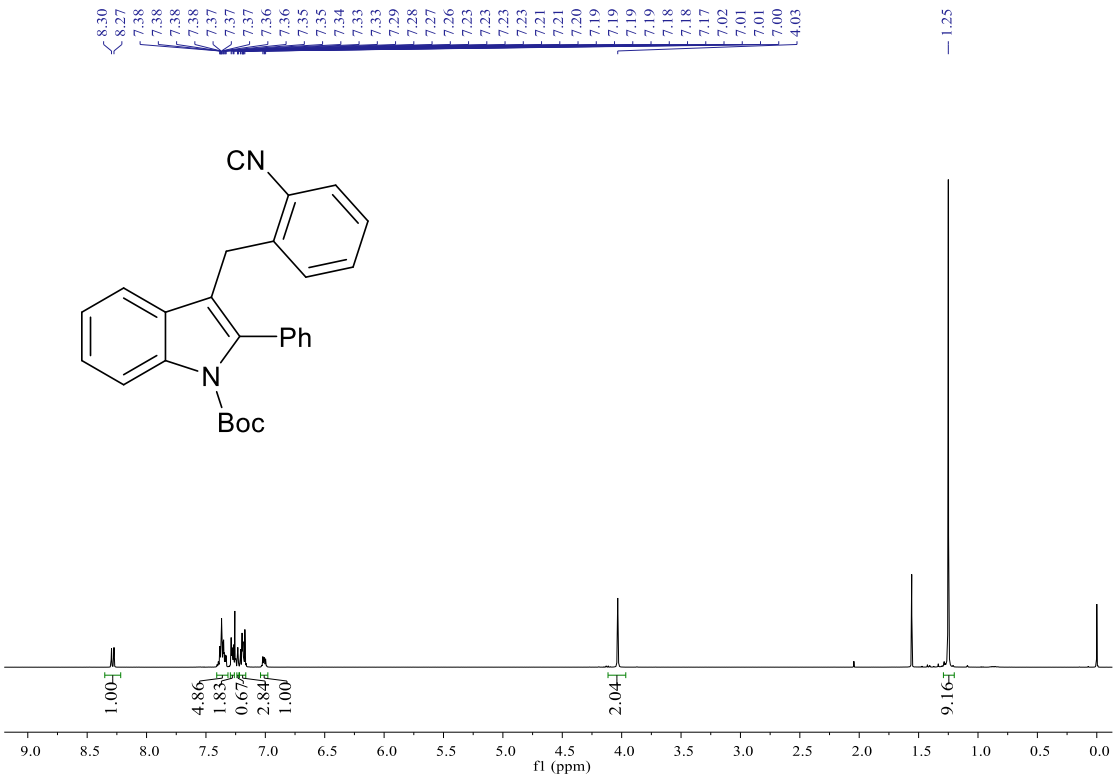
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **20**



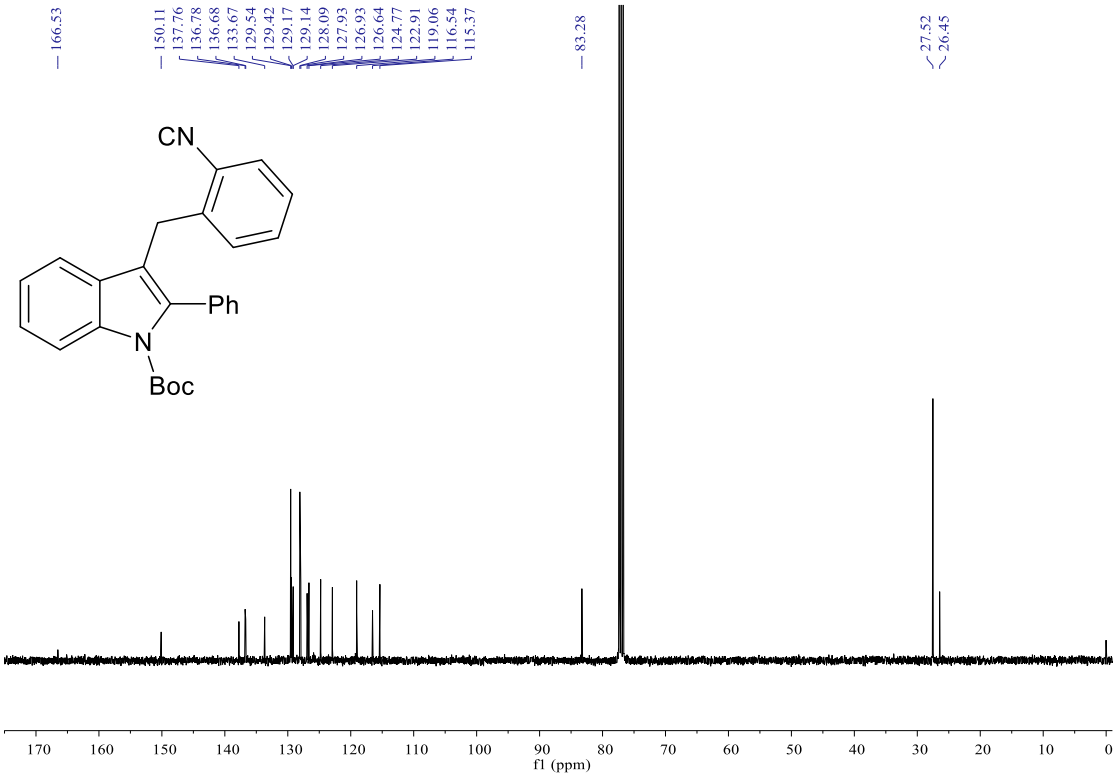
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **20**



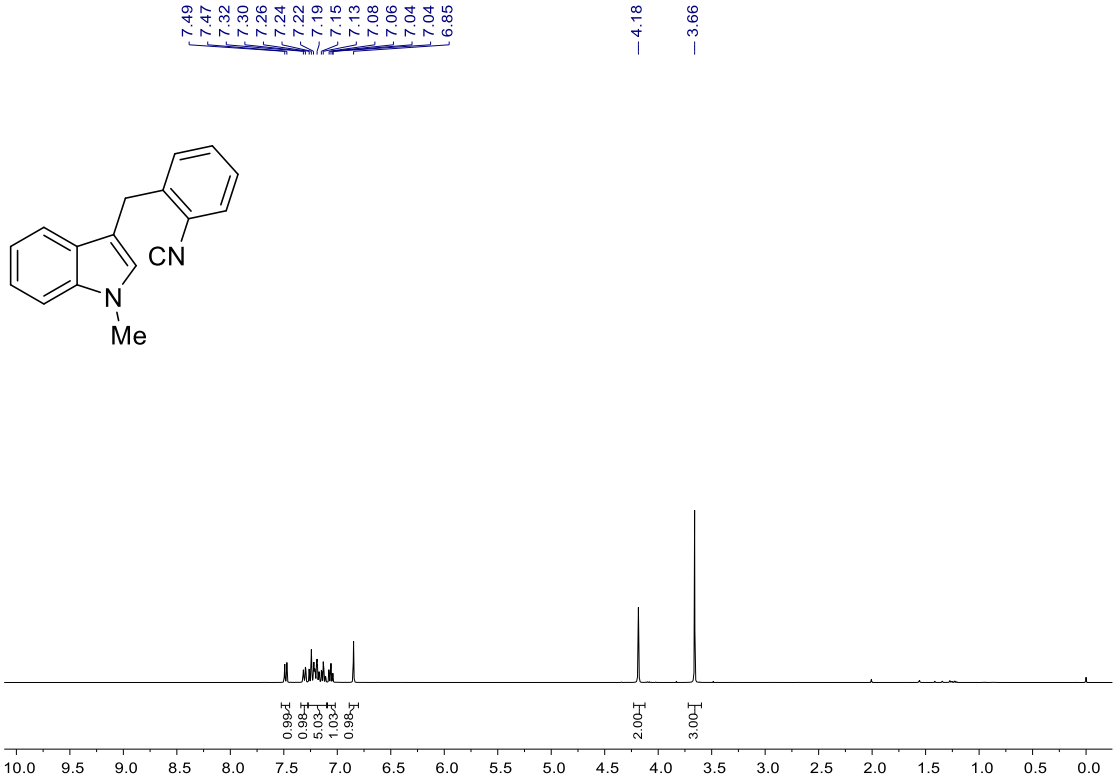
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **21**



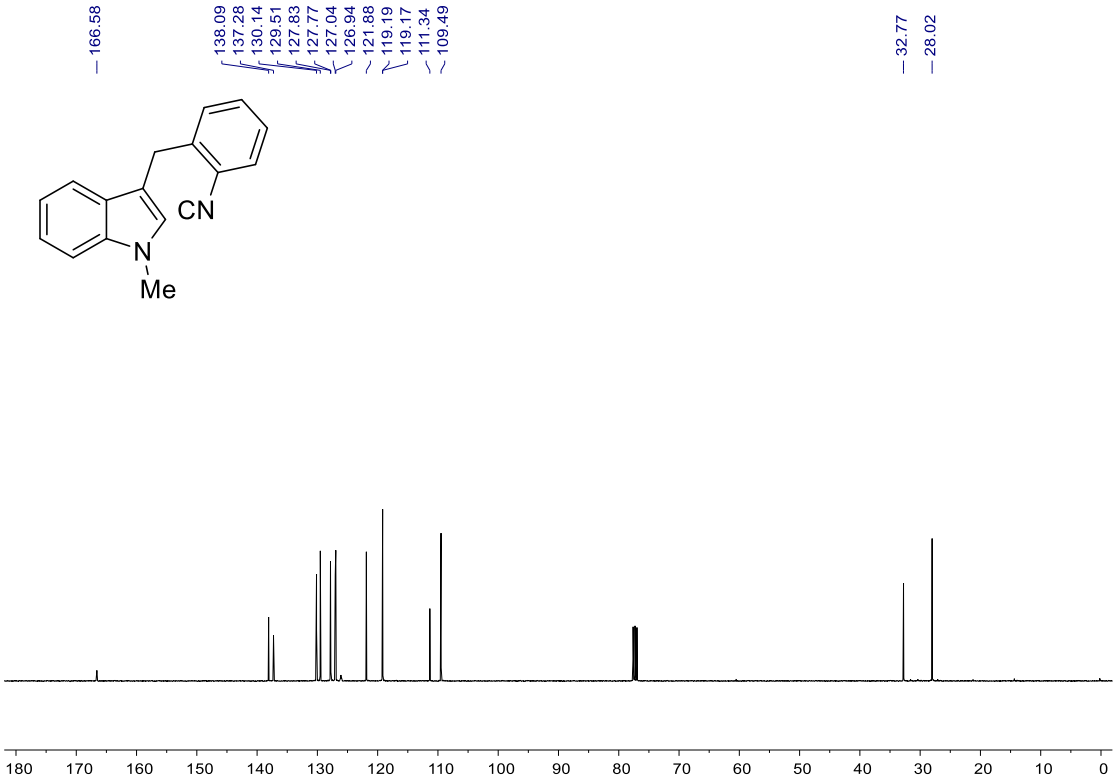
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **21**



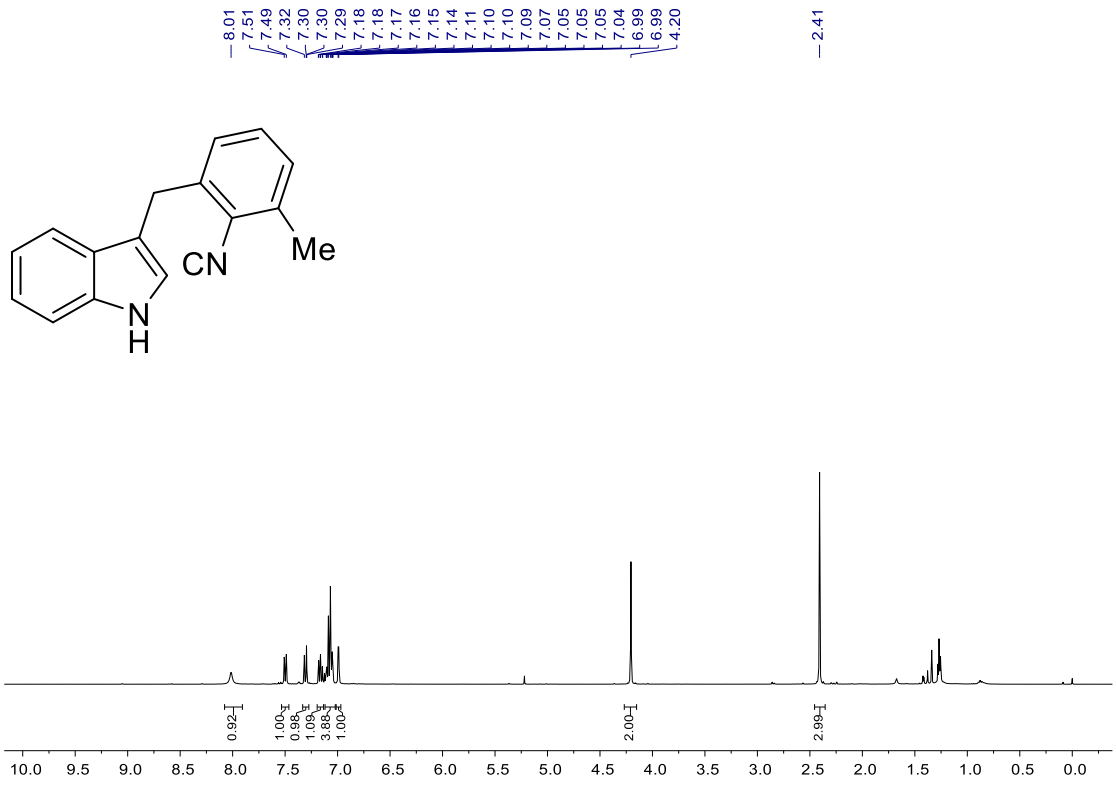
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **22**



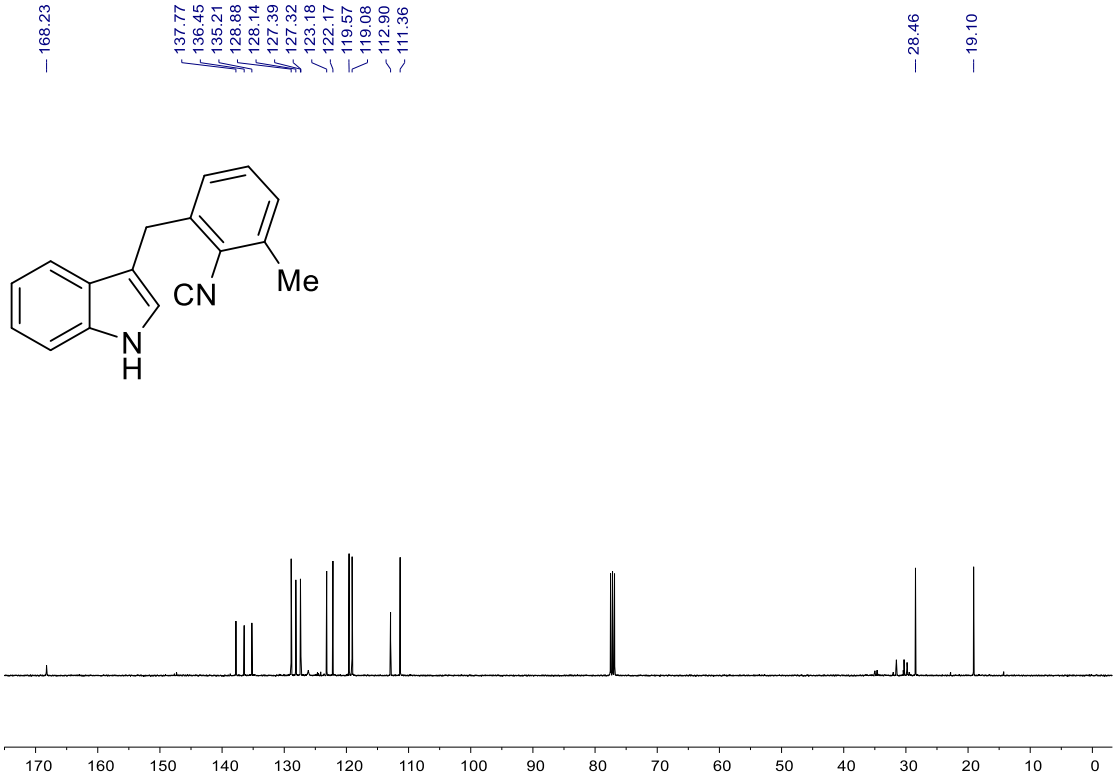
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **22**



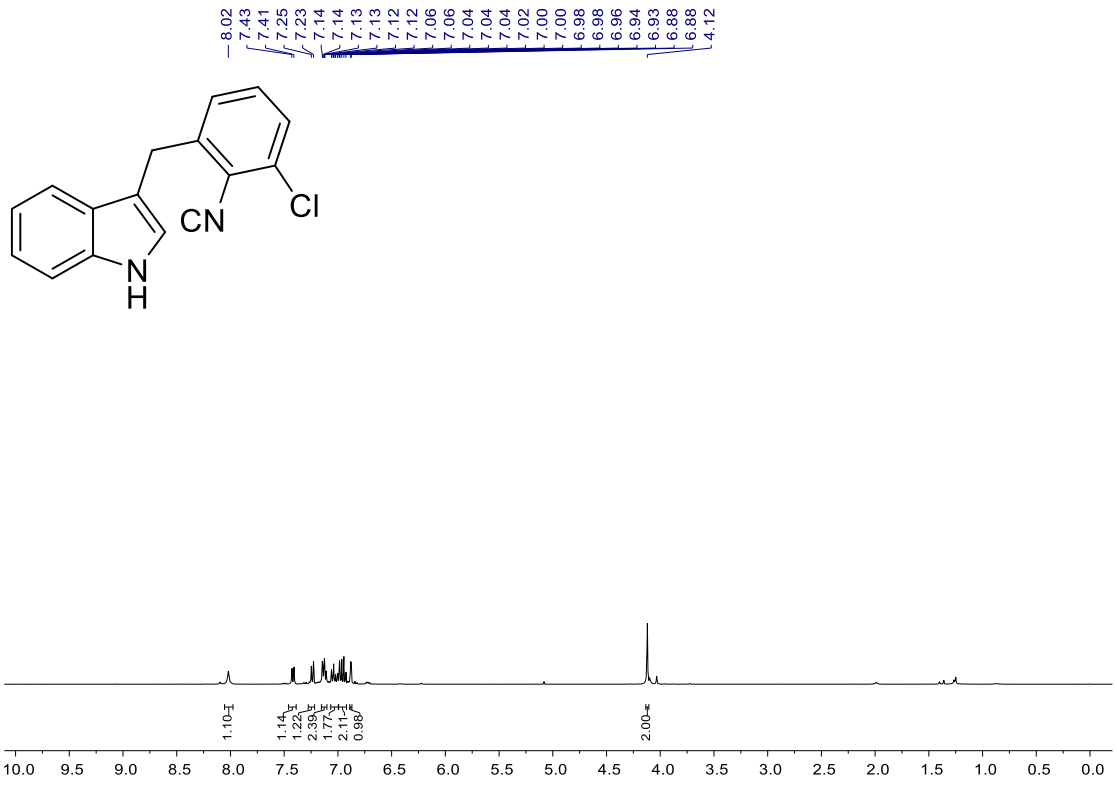
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **23**



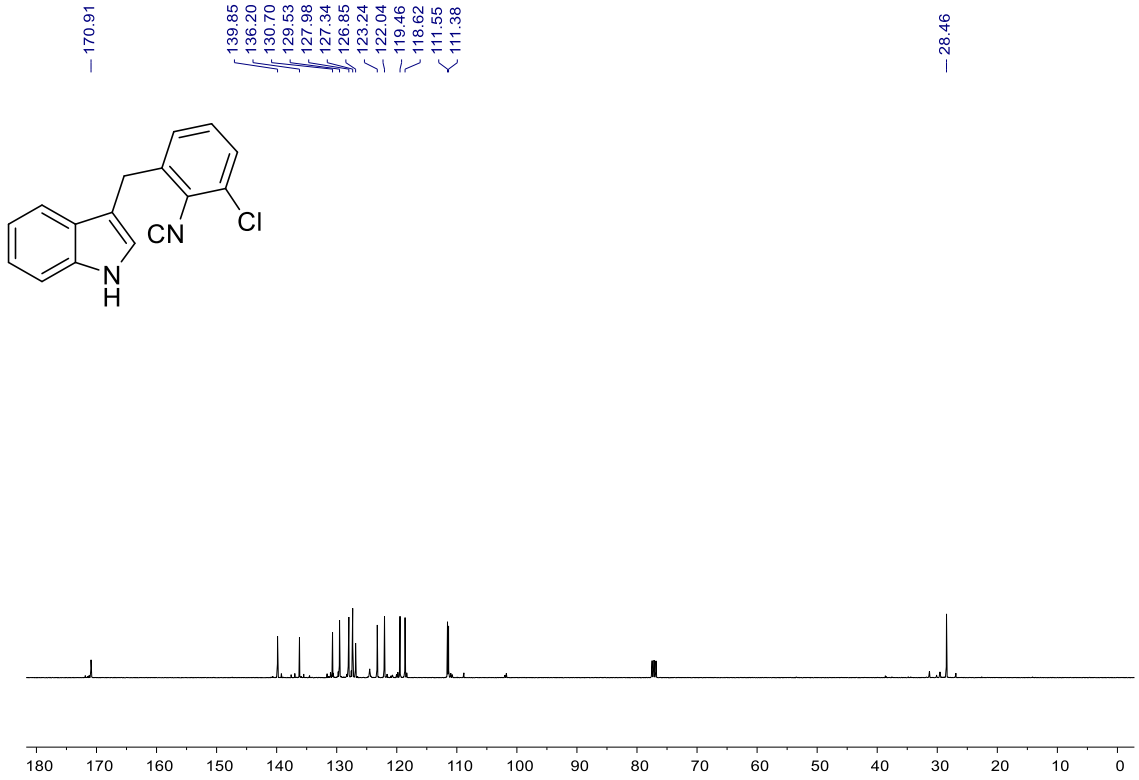
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **23**



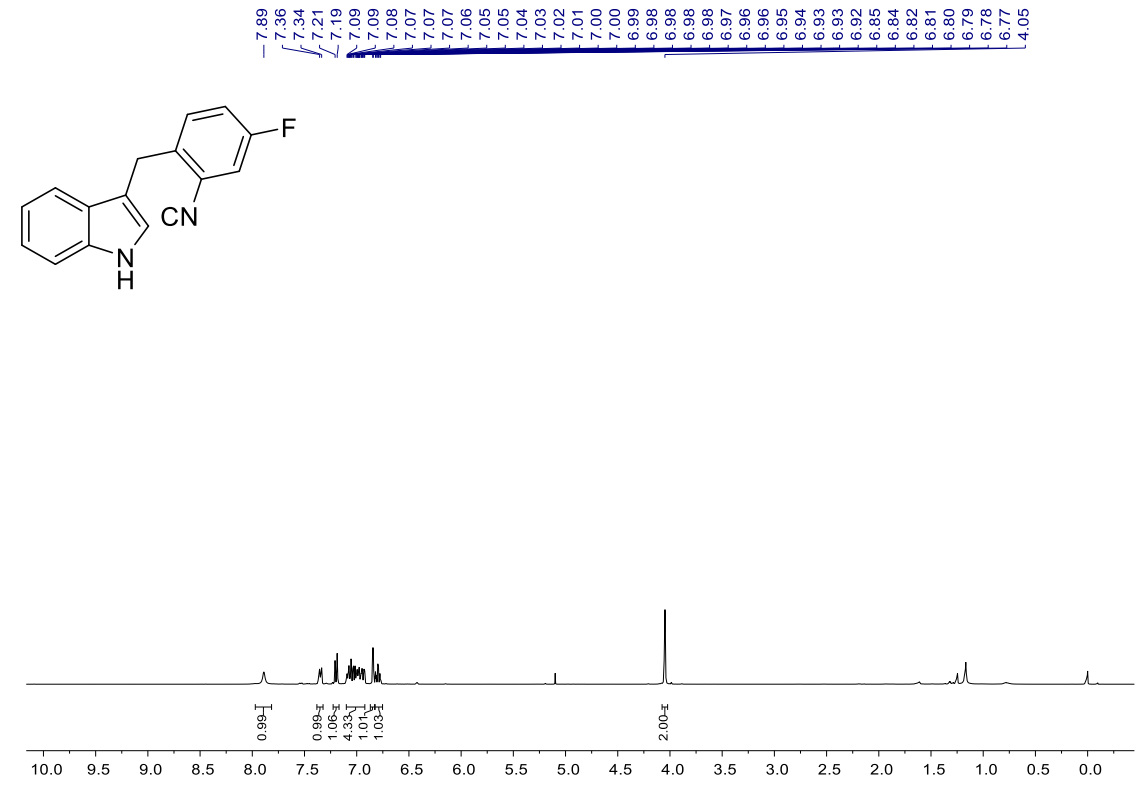
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **24**



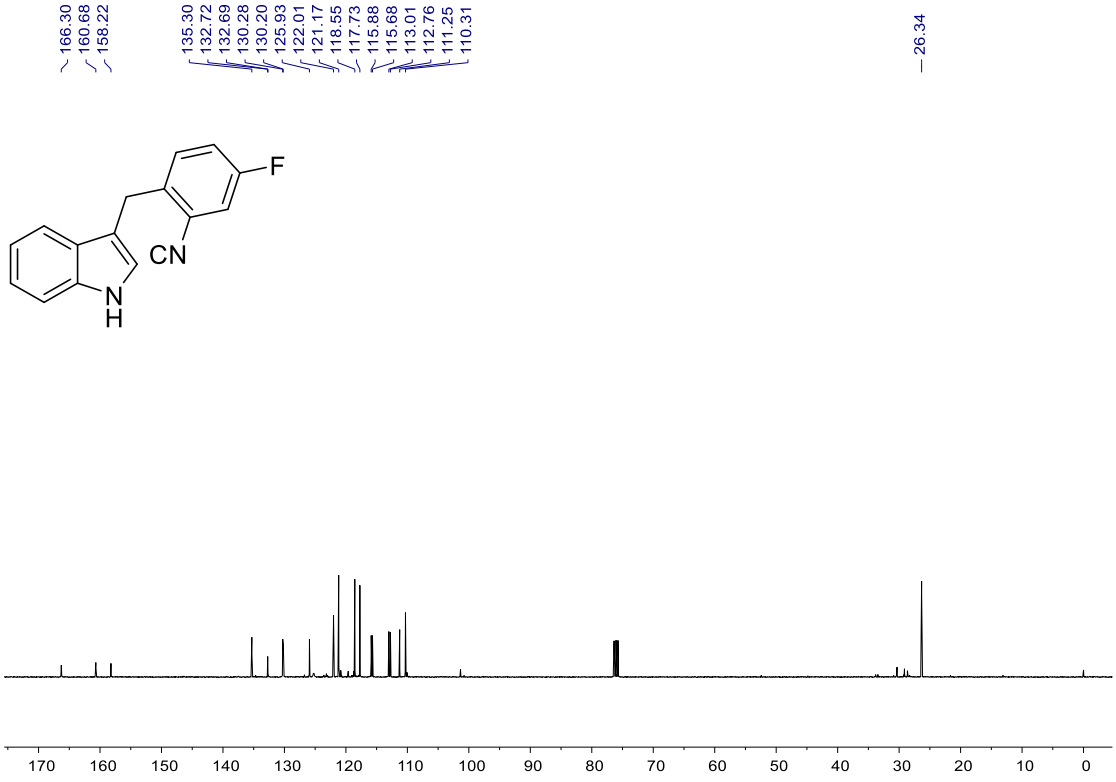
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **24**



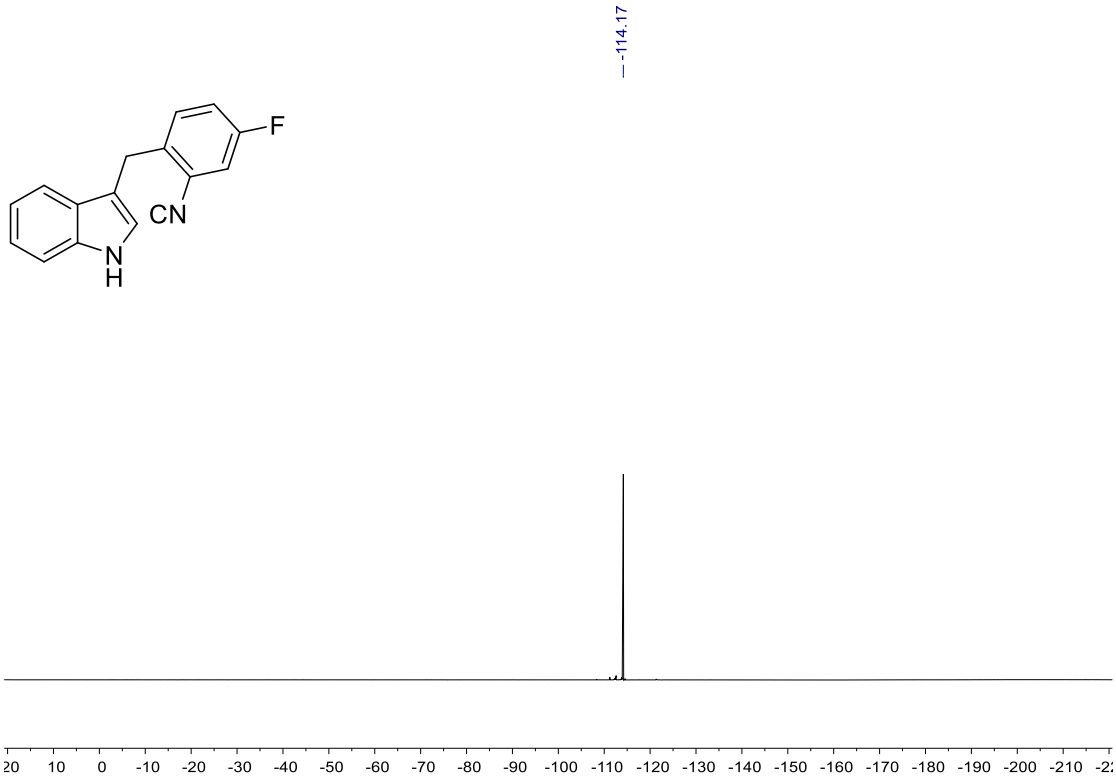
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **25**



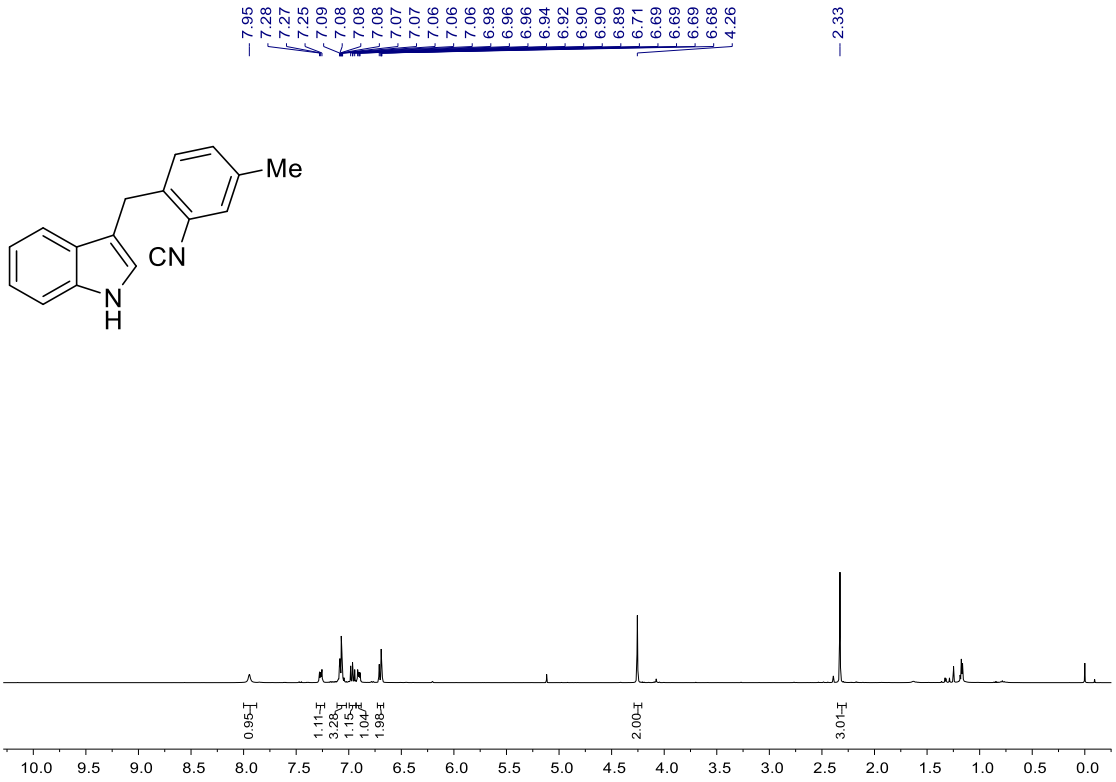
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **25**



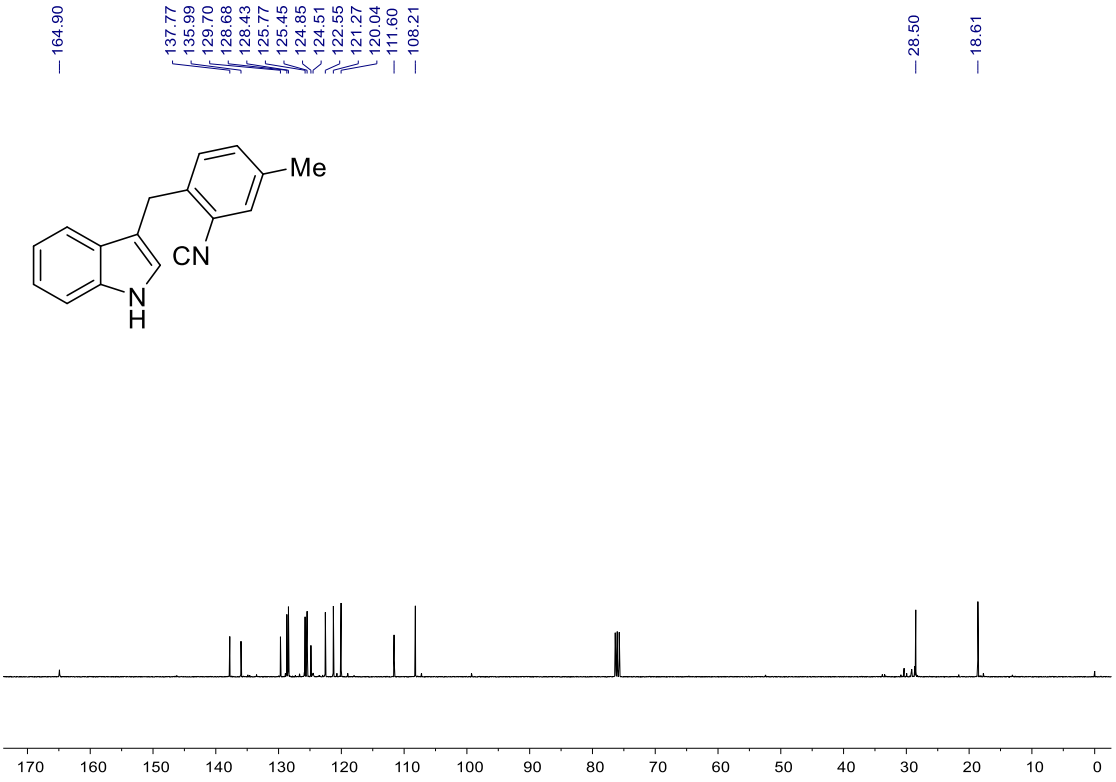
^{19}F NMR (376 MHz, $CDCl_3$) spectrum of **25**



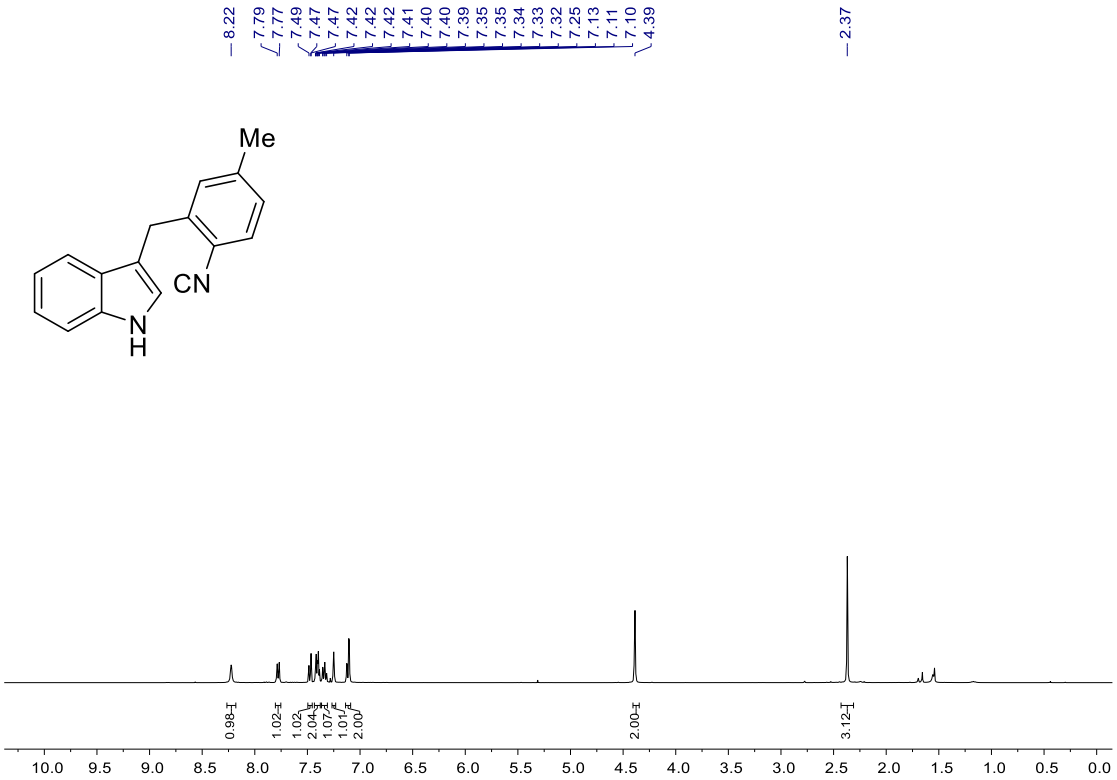
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **26**



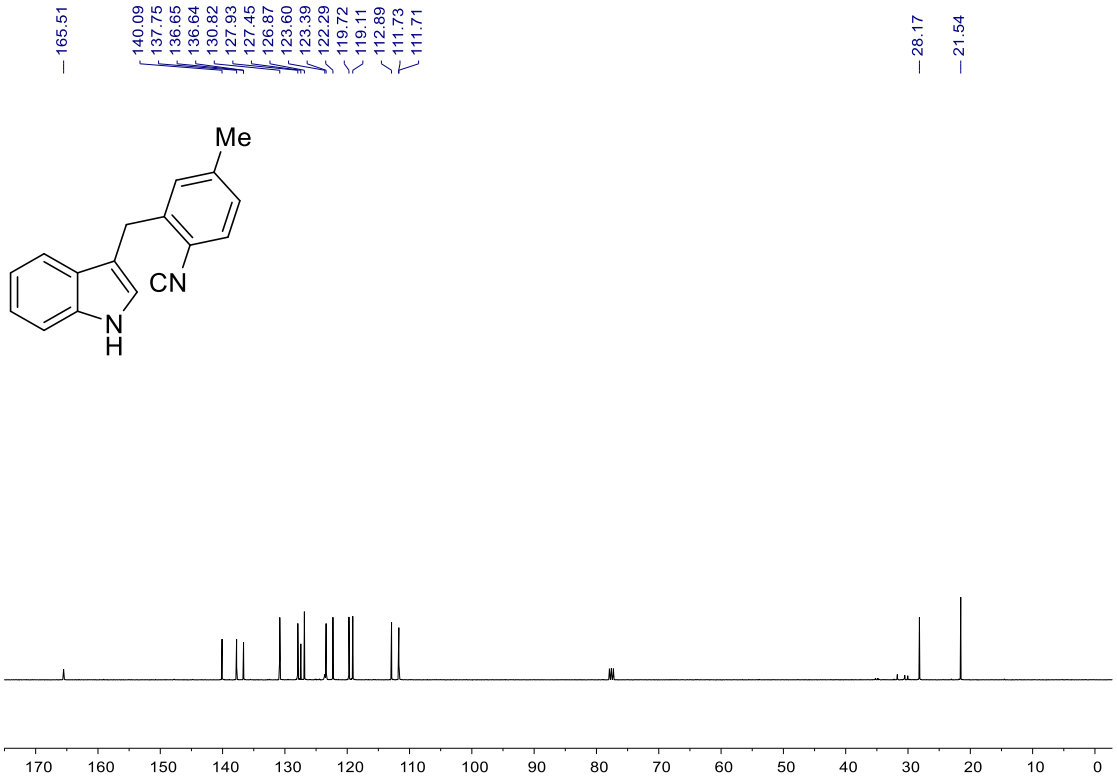
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **26**



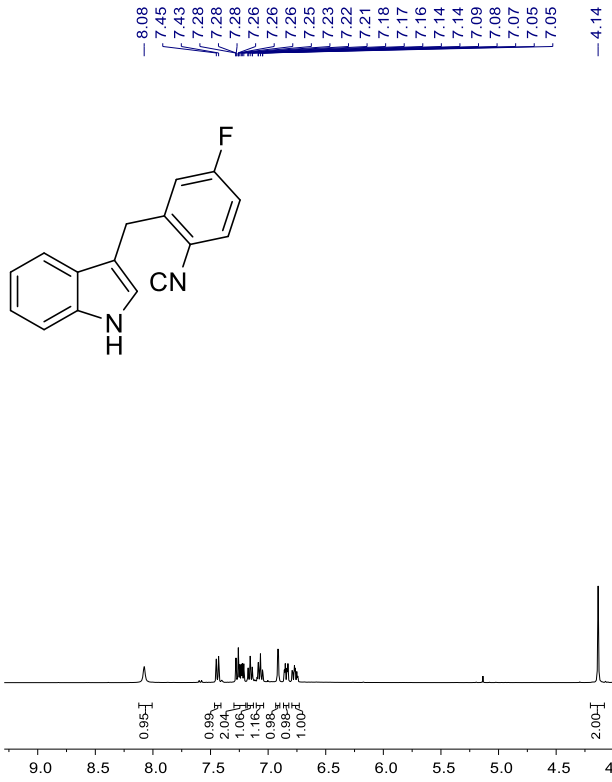
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **27**



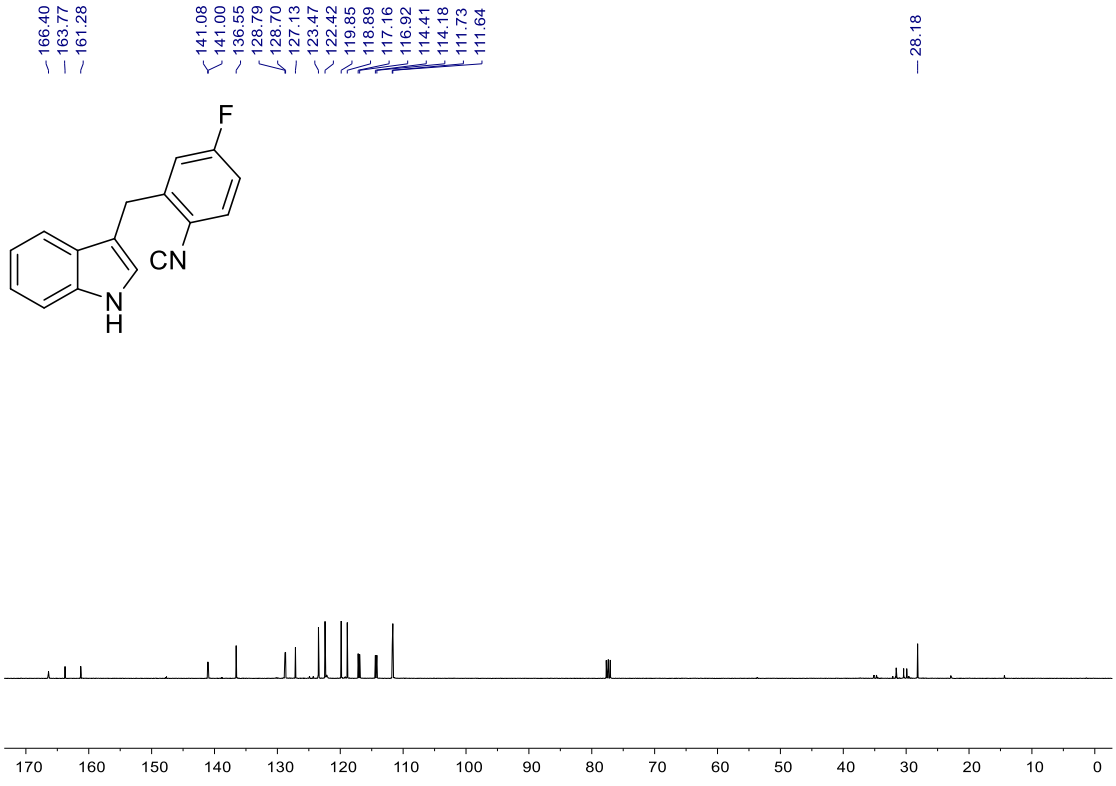
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **27**



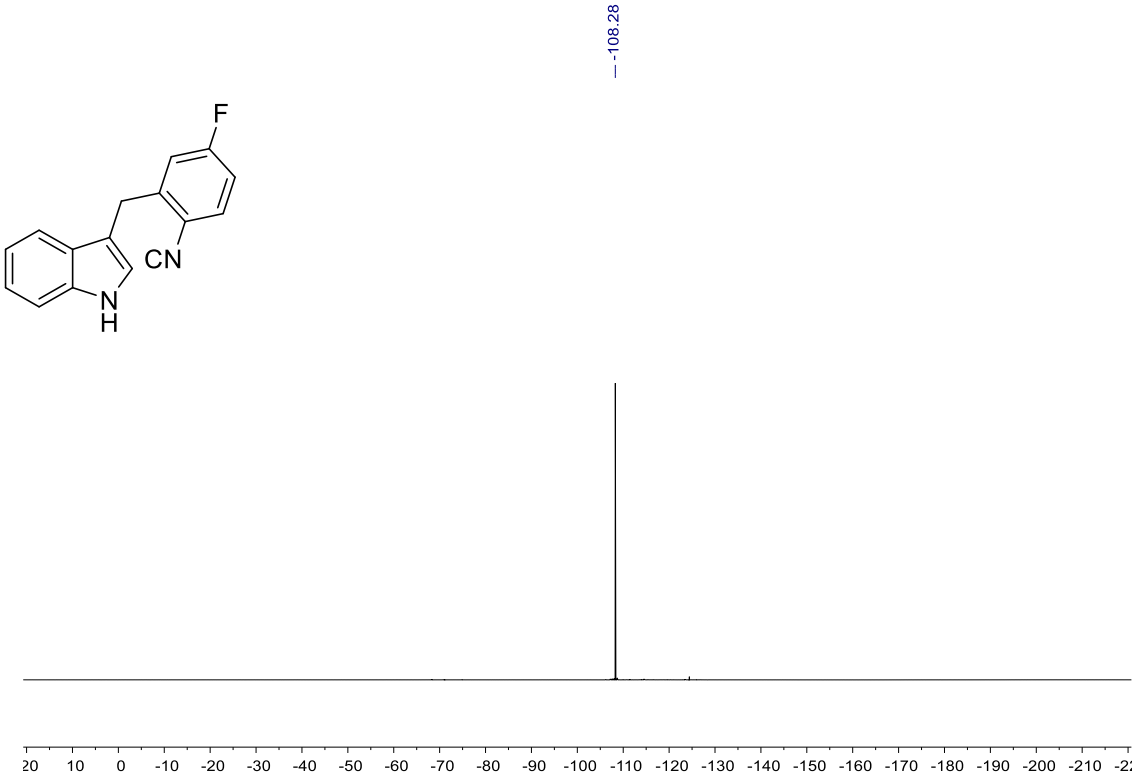
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **28**



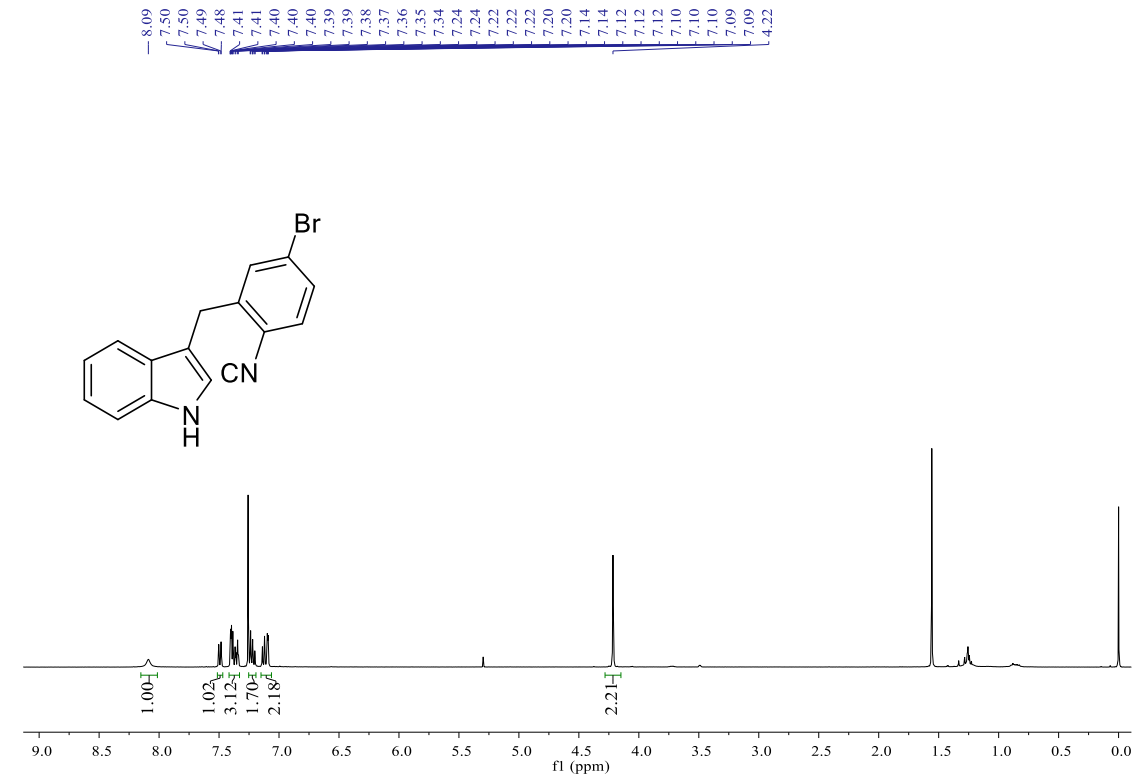
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **28**



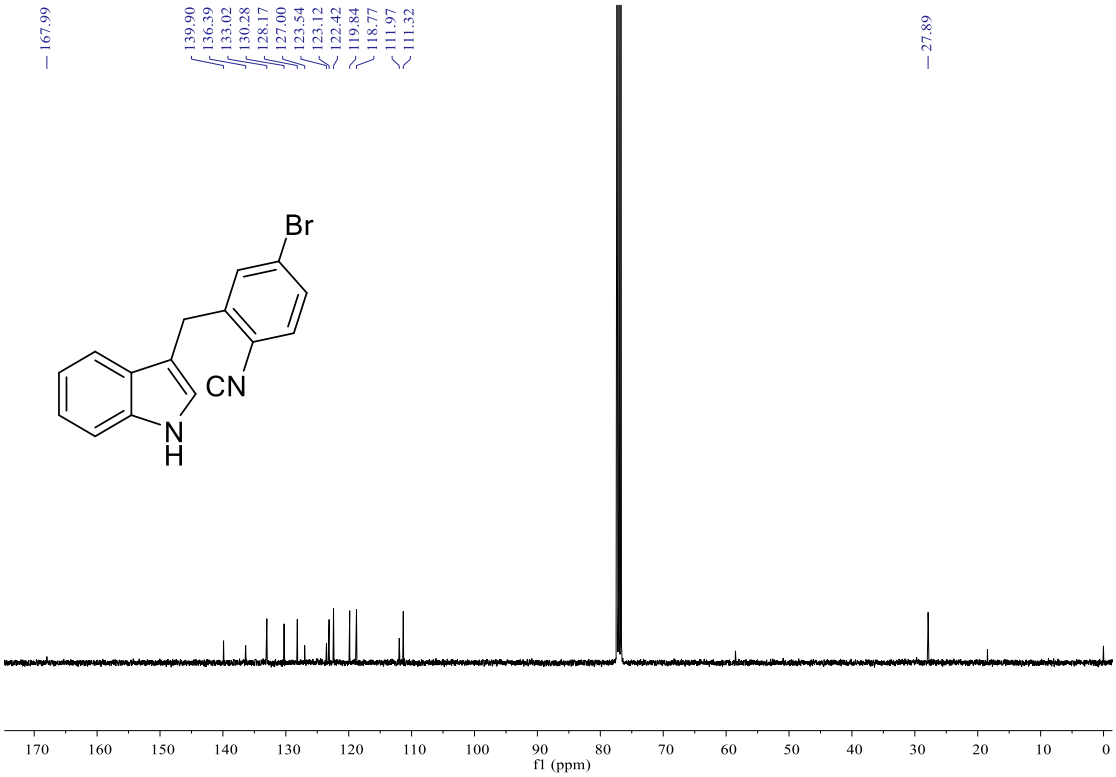
^{19}F NMR (376 MHz, $CDCl_3$) spectrum of **28**



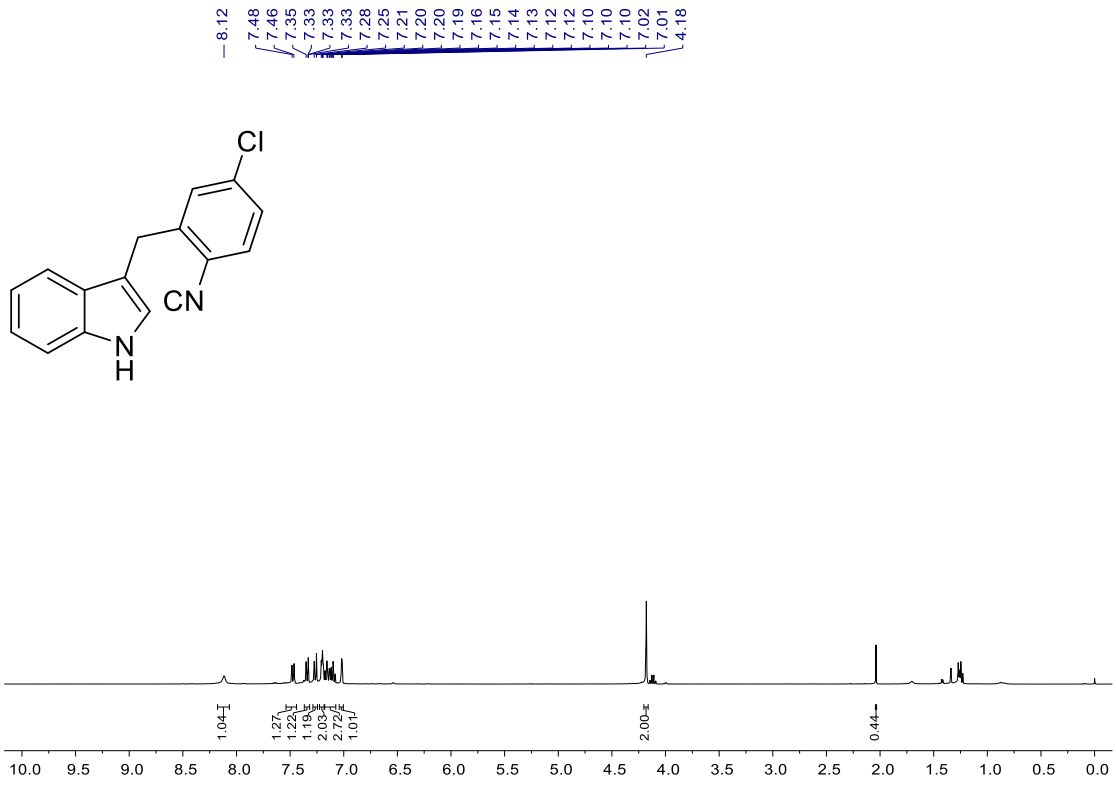
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **29**



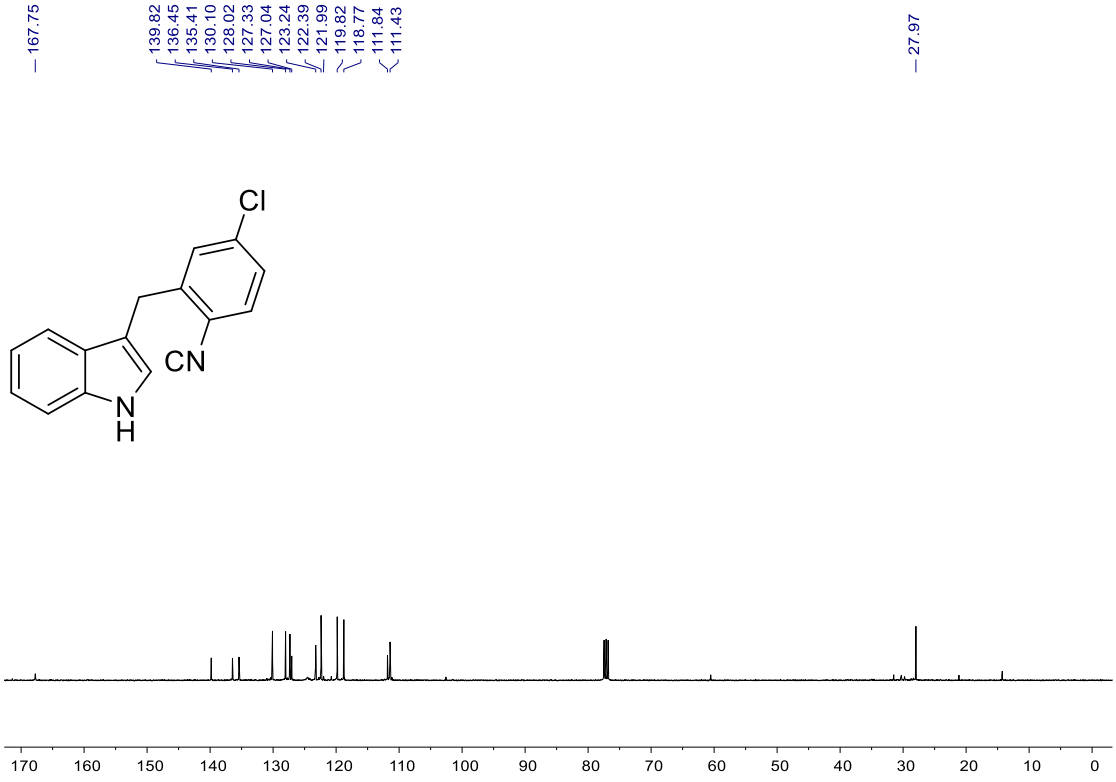
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **29**



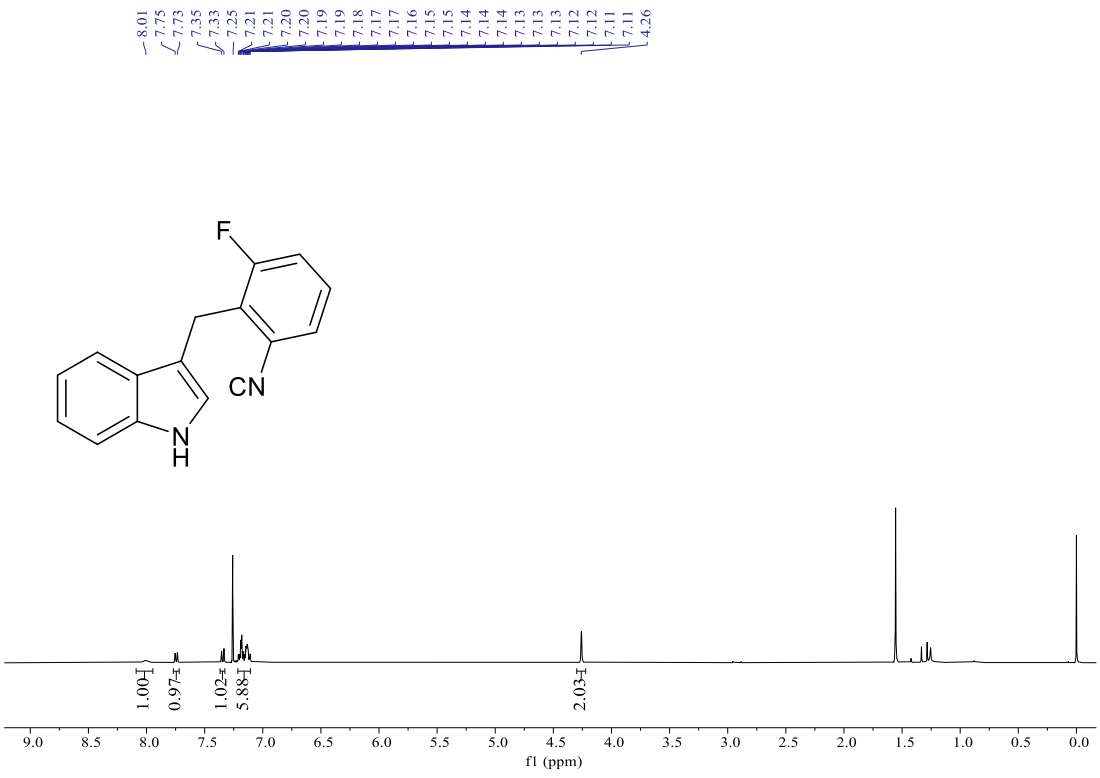
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **30**



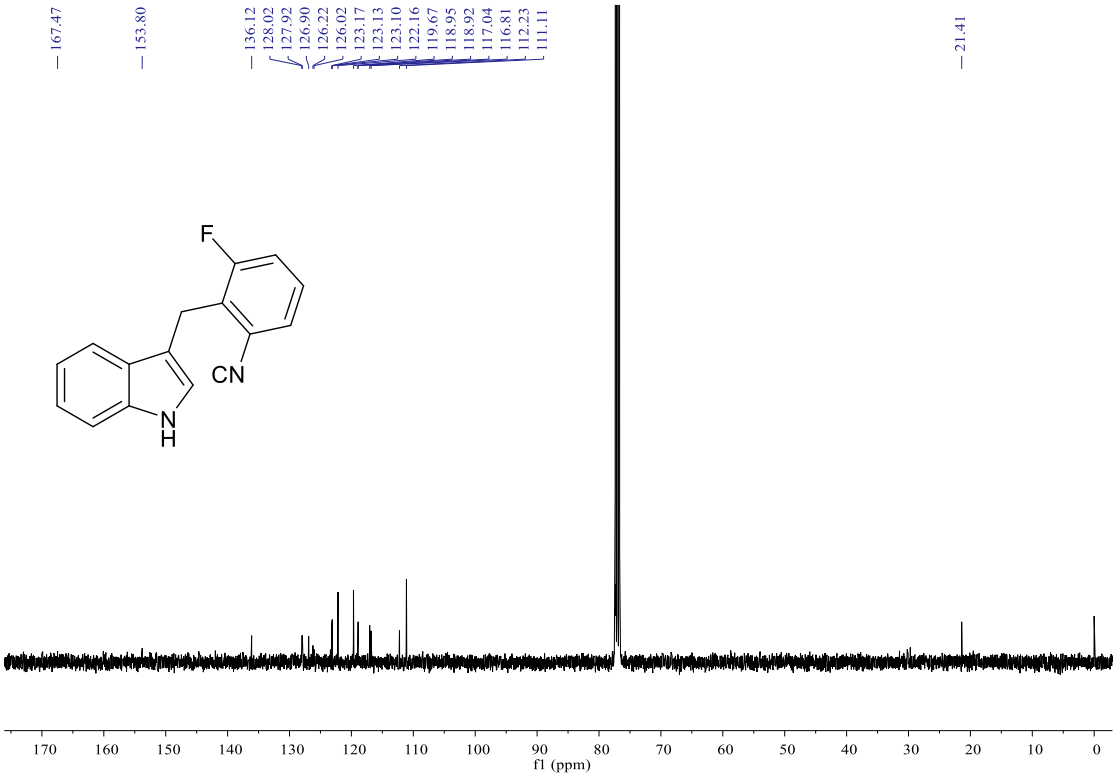
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **30**



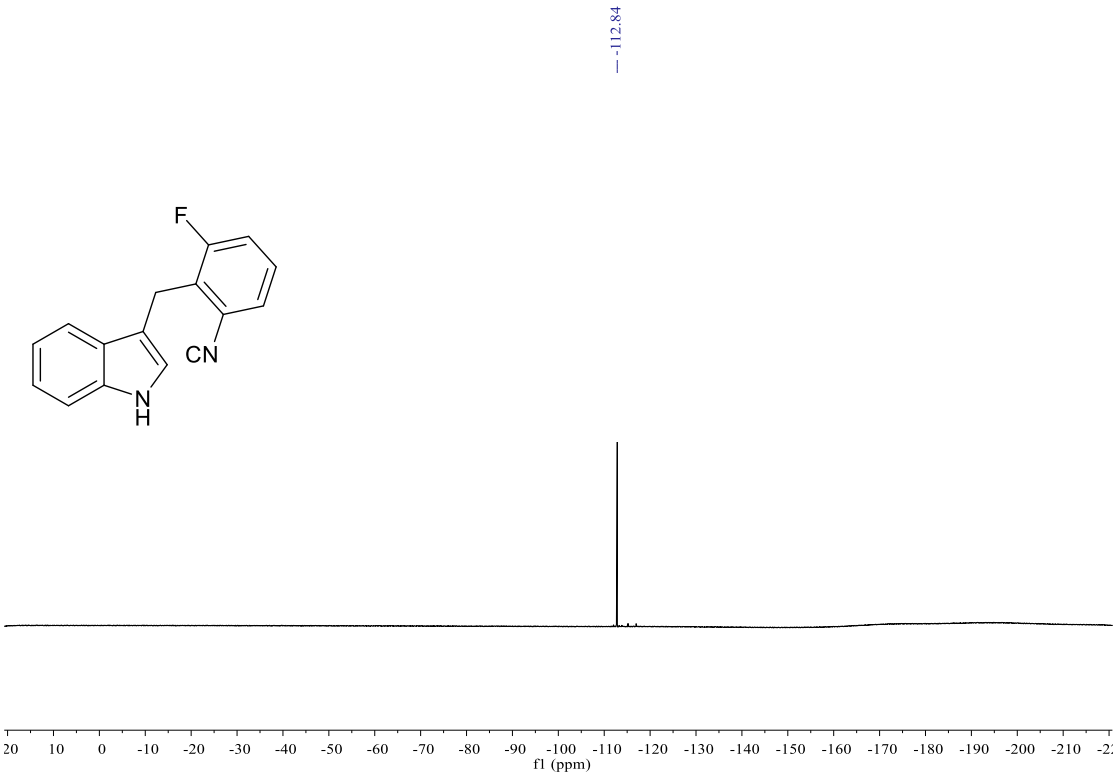
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **31**



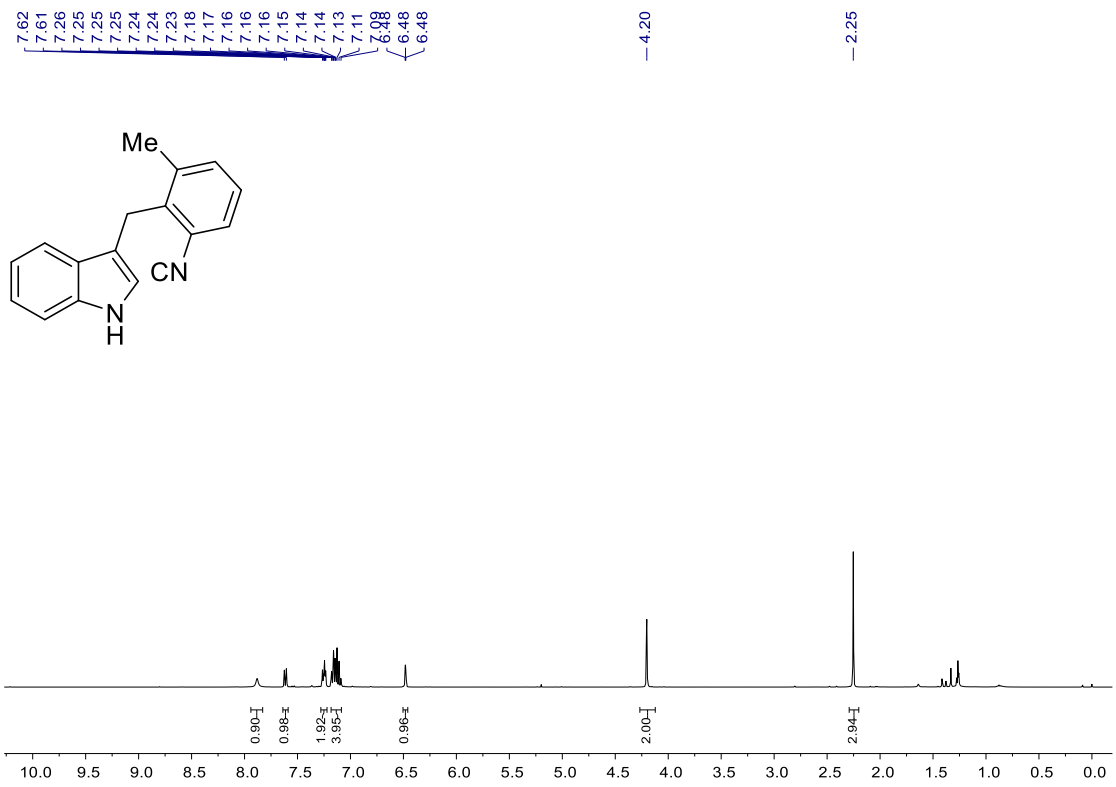
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **31**



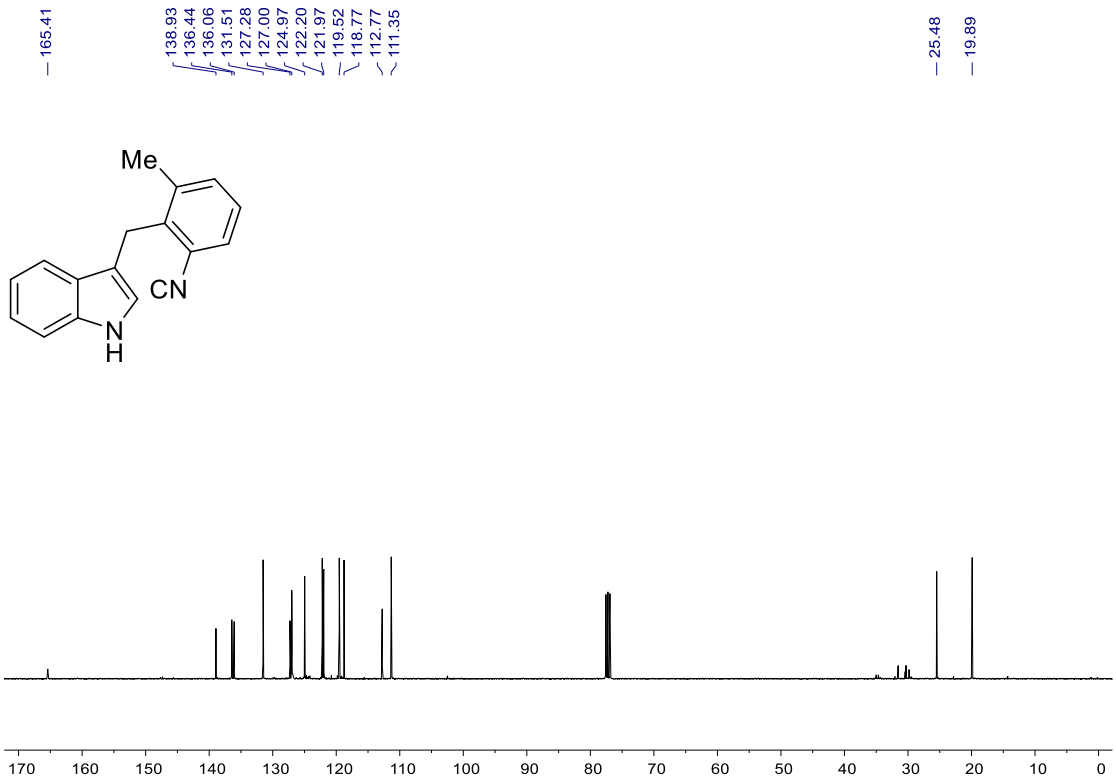
^{19}F NMR (376 MHz, $CDCl_3$) spectrum of **31**



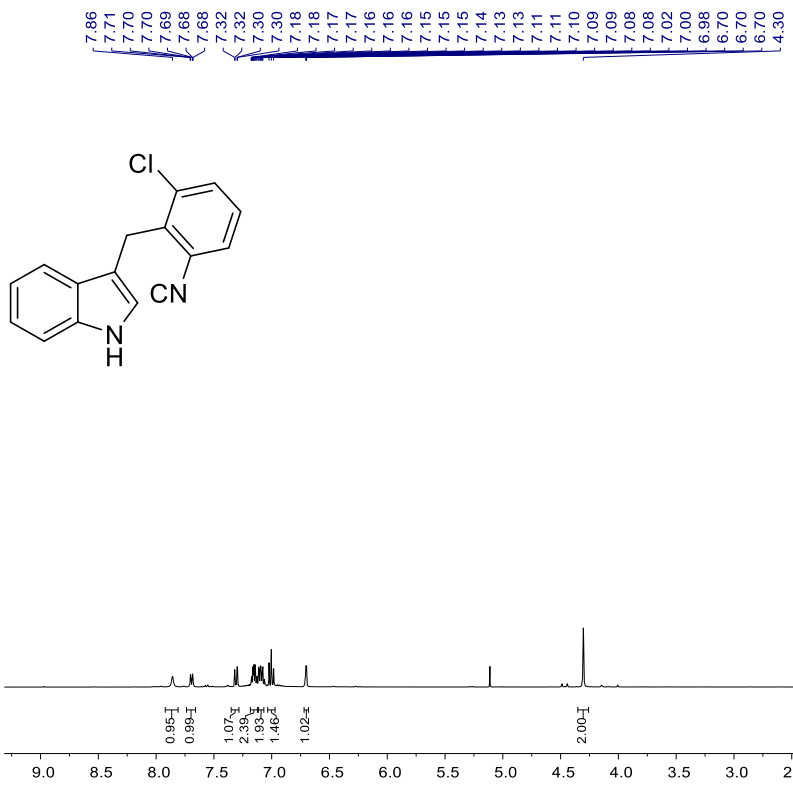
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **32**



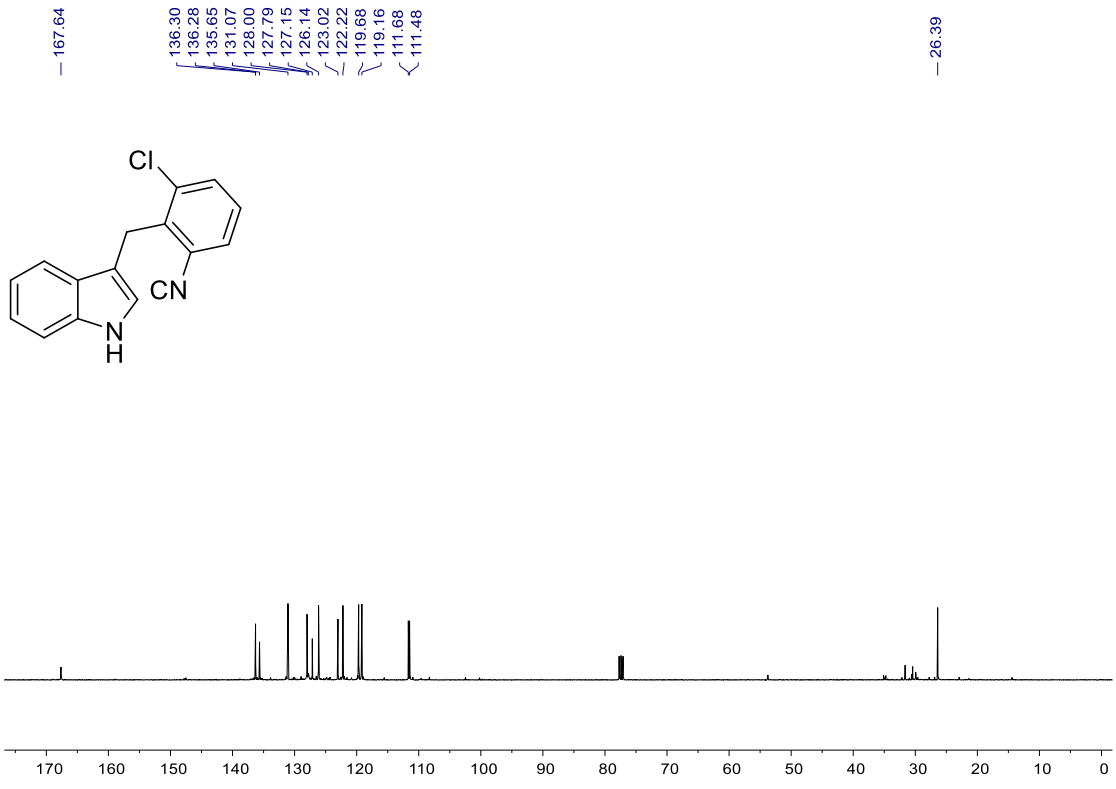
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **32**



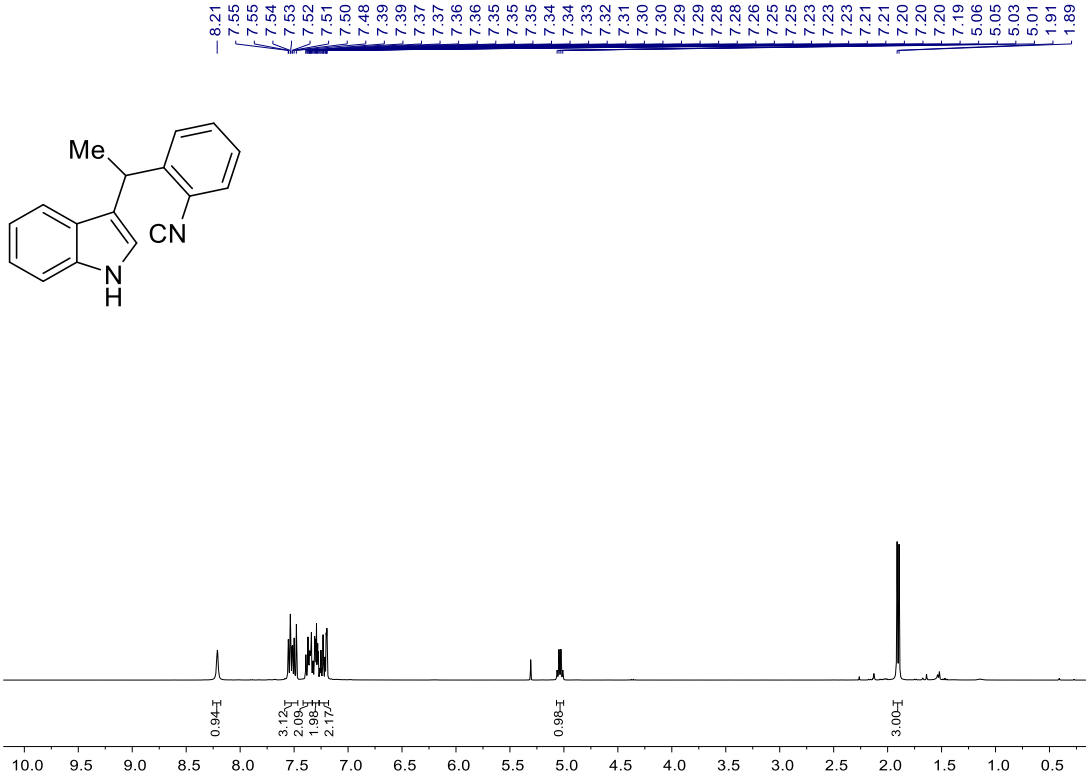
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **33**



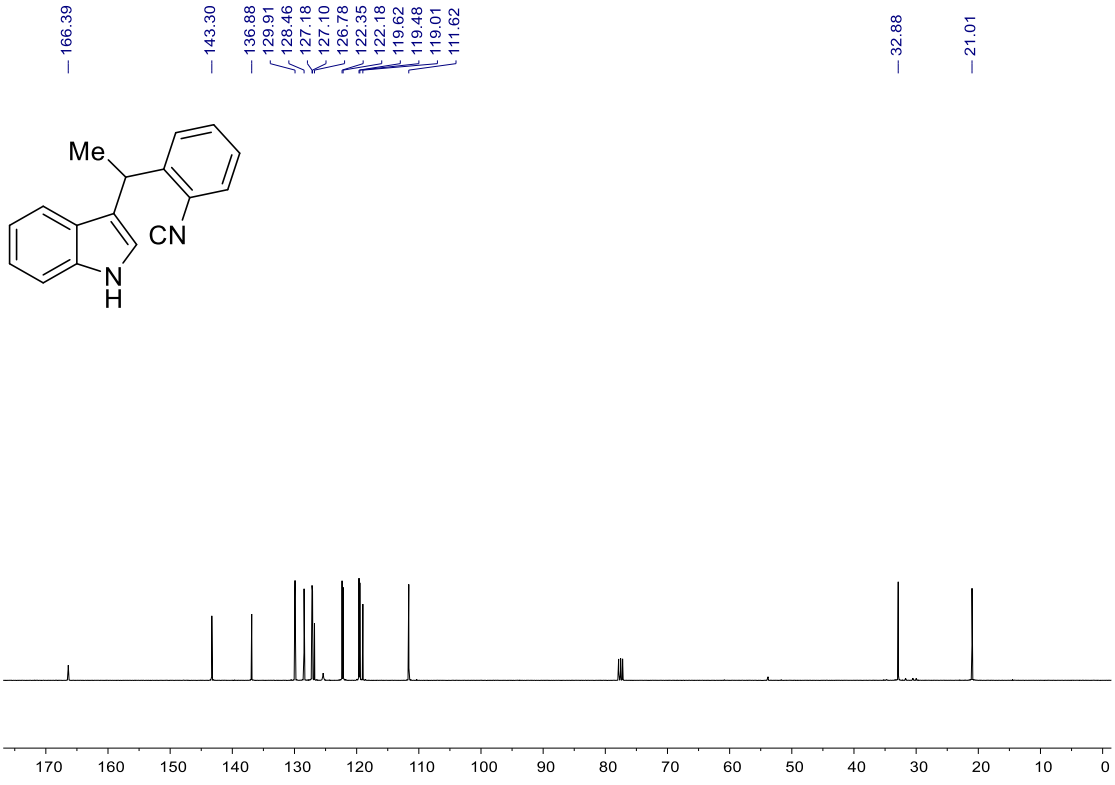
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **33**



^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **34**



^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **34**



13 X-ray crystallographic data

X-ray Crystallographic Data of Compound **10** (ccdc: 2180322)

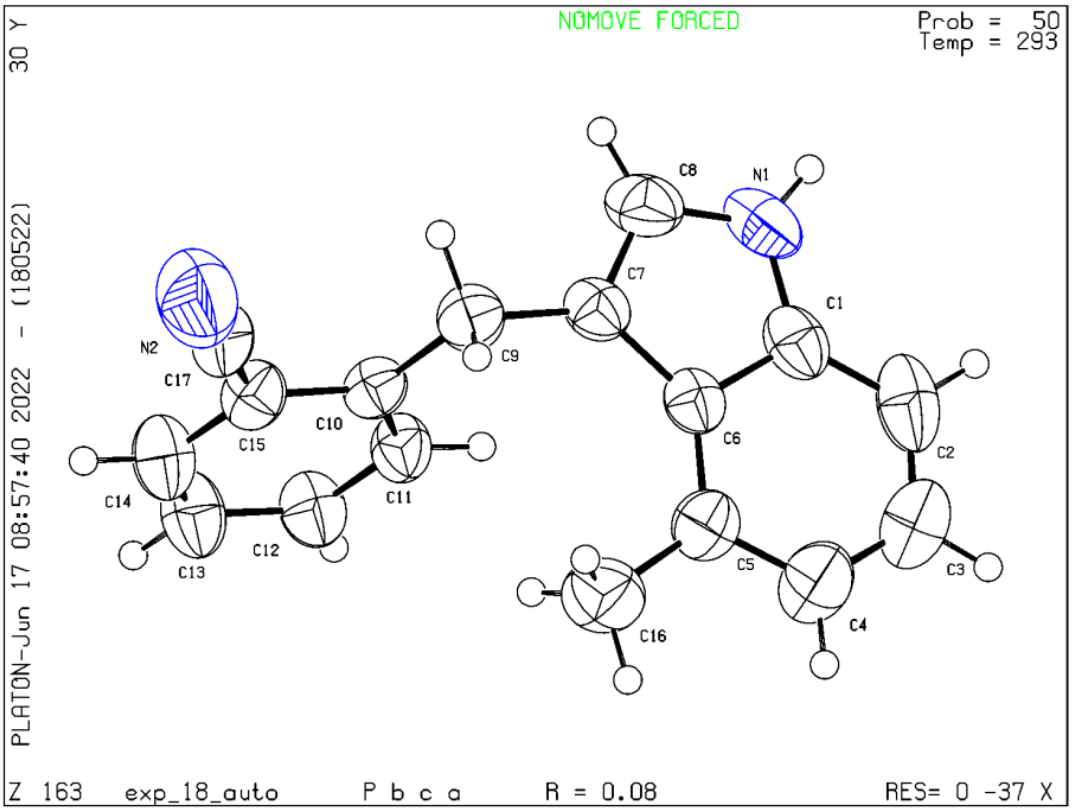


Table S5 Crystal data and structure refinement for **10.**

Identification code	**10**
Empirical formula	C17H14N2
Formula weight	246.29
Temperature/K	293(2)
Crystal system	orthorhombic
Space group	Pbca
a/Å	18.9159(18)
b/Å	7.2471(6)
c/Å	19.580(2)
α/°	90
β/°	90
γ/°	90
Volume/Å3	2684.1(4)
Z	8
ρcalcg/cm3	1.214
μ/mm-1	0.072
F(000)	1032.0
Crystal size/mm3	0.12 × 0.11 × 0.1
Radiation	Mo Kα (λ = 0.71073)
2Θ range for data collection/°	7.084 to 52.744
Index ranges	-23 ≤ h ≤ 17, -8 ≤ k ≤ 9, -24 ≤ l ≤ 24
Reflections collected	12002
Independent reflections	2730 [Rint = 0.0948, Rsigma = 0.0911]
Data/restraints/parameters	2730/0/174
Goodness-of-fit on F2	1.058
Final R indexes [I>=2σ (I)]	R1 = 0.0816, wR2 = 0.1734
Final R indexes [all data]	R1 = 0.1577, wR2 = 0.2308
Largest diff. peak/hole / e Å-3	0.32/-0.39

Table S6 Fractional Atomic Coordinates ($\times 10^4$) and Equivalent Isotropic Displacement Parameters (Å2×103) for **10**. Ueq is defined as 1/3 of of the trace of the orthogonalised UIJ tensor.

Atom	x	y	z	U(eq)
C17	7305.3(16)	-162(4)	6686.5(17)	48.5(8)
N1	3954.2(14)	1274(4)	6921.9(15)	68.0(9)
C10	6227.6(15)	365(3)	6107.7(16)	46.0(8)
C6	4775.9(15)	3142(4)	6468.9(15)	46.7(8)
C15	6929.1(17)	-213(4)	6097.6(17)	53.7(9)
C7	5120.6(16)	1502(4)	6738.0(15)	50.2(8)
C11	5873.7(17)	303(4)	5482.9(16)	52.6(8)
C1	4049.7(16)	2937(4)	6600.6(16)	57.6(9)
C12	6189.1(18)	-309(4)	4892.1(18)	59.0(9)
C9	5887.0(16)	1007(4)	6768.8(17)	56.2(9)
C14	7255.8(18)	-824(4)	5502(2)	67.8(10)
C5	5013.0(18)	4762(4)	6143.6(18)	58.4(9)
C2	3557.2(19)	4283(6)	6418(2)	76.9(12)
C13	6884.0(19)	-881(5)	4899.0(19)	68.8(10)
C8	4597(2)	444(5)	7000.3(18)	66(1)
N2	7625(2)	-81(5)	7159(3)	114.3(14)
C16	5776.6(19)	5125(5)	5988(2)	79.2(12)
C3	3807(2)	5829(5)	6100(2)	84.2(13)
C4	4515(2)	6043(5)	5967(2)	77.8(12)

Table S7 Anisotropic Displacement Parameters (Å2×103) for **10**. The Anisotropic displacement factor exponent takes the form: -2π2[h2a*2U11+2hka*b*U12+].

Atom	U11	U22	U33	U23	U13	U12
C17	31.9(17)	68.1(18)	45.4(18)	-3.9(14)	-25.2(15)	2.5(13)
N1	51.5(18)	100(2)	52.5(18)	6.2(15)	7.9(15)	-13.7(15)
C10	44.8(19)	47.4(15)	45.8(18)	2.0(12)	-10.4(15)	-1.8(12)
C6	46.5(18)	59.8(18)	34.0(15)	-6.2(13)	-2.0(14)	1.9(13)
C15	48(2)	51.4(17)	62(2)	-1.8(14)	-9.1(17)	-1.1(13)
C7	49.9(19)	63.6(17)	37.2(16)	0.0(14)	-1.1(15)	-2.2(14)
C11	43.7(18)	62.9(18)	51(2)	-0.4(14)	-4.7(15)	6.3(13)
C1	52(2)	77(2)	43.9(19)	-10.5(15)	4.8(16)	0.7(15)
C12	54(2)	73.0(19)	51(2)	-9.1(15)	-2.9(17)	2.9(15)
C9	56(2)	66.2(19)	46.6(19)	3.1(15)	-4.7(16)	4.8(14)
C14	47(2)	80(2)	76(3)	-12.3(19)	-2(2)	6.9(16)
C5	60(2)	54.3(17)	61(2)	-3.3(15)	-3.7(17)	0.6(15)
C2	50(2)	113(3)	68(3)	-26(2)	-7(2)	18(2)
C13	57(2)	86(2)	63(2)	-20.1(18)	0(2)	9.2(18)
C8	72(2)	78(2)	48(2)	12.8(16)	3.3(19)	-4.3(18)
N2	82(3)	111(3)	150(4)	1(3)	20(3)	5(2)
C16	69(3)	73(2)	96(3)	10(2)	-1(2)	-15.8(17)
C3	79(3)	72(2)	101(4)	-2(2)	-9(2)	21(2)
C4	73(3)	66(2)	95(3)	3.6(19)	-9(2)	6.5(19)

Table S8 Bond Lengths for **10.**

Atom	Atom	Length/Å	Atom	Atom	Length/Å
C17	C15	1.355(4)	C7	C9	1.495(4)
C17	N2	1.108(5)	C7	C8	1.354(4)
N1	C1	1.372(4)	C11	C12	1.375(4)
N1	C8	1.365(4)	C1	C2	1.395(5)
C10	C15	1.392(4)	C12	C13	1.378(5)
C10	C11	1.395(4)	C14	C13	1.375(5)
C10	C9	1.519(4)	C5	C16	1.500(5)
C6	C7	1.454(4)	C5	C4	1.367(5)
C6	C1	1.405(4)	C2	C3	1.366(5)
C6	C5	1.409(4)	C3	C4	1.374(5)
C15		C14		1.392(4)	

Table S9 Bond Angles for **10.**

Atom	Atom	Atom	Angle/˚	Atom	Atom	Atom	Angle/˚
N2	C17	C15	177.9(4)	N1	C1	C6	107.8(3)
C8	N1	C1	108.8(3)	N1	C1	C2	130.1(3)
C15	C10	C11	115.8(3)	C2	C1	C6	122.2(3)
C15	C10	C9	120.6(3)	C11	C12	C13	120.2(3)
C11	C10	C9	123.6(3)	C7	C9	C10	116.8(3)
C1	C6	C7	106.6(3)	C13	C14	C15	120.1(3)
C1	C6	C5	118.8(3)	C6	C5	C16	123.0(3)
C5	C6	C7	134.6(3)	C4	C5	C6	117.5(3)
C17	C15	C10	118.7(3)	C4	C5	C16	119.5(3)
C17	C15	C14	119.2(3)	C3	C2	C1	117.3(4)
C10	C15	C14	122.1(3)	C14	C13	C12	119.2(3)
C6	C7	C9	130.2(3)	C7	C8	N1	111.0(3)
C8	C7	C6	105.8(3)	C2	C3	C4	121.1(3)
C8	C7	C9	123.9(3)	C5	C4	C3	123.1(4)
C12		C11		C10		122.7(3)	

Table S10 Torsion Angles for **10.**

A	B	C	D	Angle/°	A	B	C	D	Angle/°
C17	C15	C14	C13	-179.8(3)	C1	N1	C8	C7	-0.2(4)
N1	C1	C2	C3	179.8(3)	C1	C6	C7	C9	-177.1(3)
C10	C15	C14	C13	-0.4(5)	C1	C6	C7	C8	0.5(3)
C10	C11	C12	C13	-0.5(5)	C1	C6	C5	C16	179.2(3)
C6	C7	C9	C10	-76.5(4)	C1	C6	C5	C4	-0.7(5)
C6	C7	C8	N1	-0.2(4)	C1	C2	C3	C4	0.0(6)
C6	C1	C2	C3	0.2(5)	C9	C10	C15	C17	-1.1(4)
C6	C5	C4	C3	0.9(6)	C9	C10	C15	C14	179.4(3)
C15	C10	C11	C12	0.8(4)	C9	C10	C11	C12	-179.0(3)
C15	C10	C9	C7	-176.7(3)	C9	C7	C8	N1	177.6(3)
C15	C14	C13	C12	0.7(5)	C5	C6	C7	C9	1.5(6)
C7	C6	C1	N1	-0.6(3)	C5	C6	C7	C8	179.1(3)
C7	C6	C1	C2	179.0(3)	C5	C6	C1	N1	-179.5(3)
C7	C6	C5	C16	0.8(6)	C5	C6	C1	C2	0.2(5)
C7	C6	C5	C4	-179.2(3)	C2	C3	C4	C5	-0.6(7)
C11	C10	C15	C17	179.1(3)	C8	N1	C1	C6	0.5(3)
C11	C10	C15	C14	-0.3(4)	C8	N1	C1	C2	-179.1(3)
C11	C10	C9	C7	3.1(4)	C8	C7	C9	C10	106.4(4)
C11	C12	C13	C14	-0.2(5)	C16	C5	C4	C3	-179.0(4)

Table S11 Hydrogen Atom Coordinates (Å×104) and Isotropic Displacement Parameters (Å2×103) for **10**.

Atom	x	y	z	U(eq)
H1	3555.16	828.17	7052.47	82
H11	5405.51	691.76	5465.28	63
H12	5932.94	-337.49	4486.86	71
H9A	5944.75	37.62	7106.01	67
H9B	6145.65	2075.14	6931.68	67
H14	7726.43	-1194.4	5512.27	81
H2	3078.14	4132.59	6509.35	92
H13	7098.63	-1300.12	4500.88	83
H8	4666.02	-698.27	7206.51	79
H16A	6035.91	5239.34	6407.14	119
H16B	5817.71	6247.61	5730.88	119
H16C	5965.09	4118.97	5725.68	119
H3	3491.97	6752.31	5972.31	101
H4	4663.04	7111.34	5745.61	93