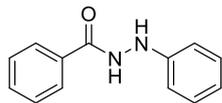


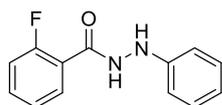
Design, Synthesis, and Biological Evaluation of *N'*-Phenylhydrazides as Potential Antifungal Agents

Supporting information

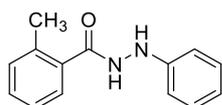
Characterizations of target compounds



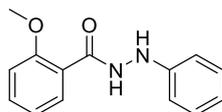
N'-phenylbenzohydrazide (**A**₁). Yield: 96%; white crystal; m.p. 153.0–153.9 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.36 (d, *J* = 3.0 Hz, 1H), 7.93 (s, 1H), 7.91 (d, *J* = 1.6 Hz, 1H), 7.90 (d, *J* = 3.1 Hz, 1H), 7.61 – 7.54 (m, 1H), 7.50 (t, *J* = 7.3 Hz, 2H), 7.15 (dd, *J* = 8.5, 7.2 Hz, 2H), 6.79 (d, *J* = 7.5 Hz, 2H), 6.72 (t, *J* = 7.3 Hz, 1H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.8, 150.0, 133.5, 132.1, 129.2, 128.9, 127.7, 119.1, 112.8.



2-fluoro-*N'*-phenylbenzohydrazide (**A**₂). Yield: 65%; white crystal; m.p. 131.2–133.6 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.19 (s, 1H), 7.65 (td, *J* = 7.4, 1.8 Hz, 1H), 7.61 – 7.54 (m, 1H), 7.39 – 7.27 (m, 2H), 7.22 – 7.15 (m, 2H), 6.82 (d, *J* = 7.6 Hz, 2H), 6.73 (t, *J* = 7.3 Hz, 1H).

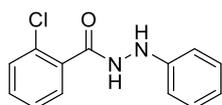


2-methyl-*N'*-phenylbenzohydrazide (**A**₃). Yield: 69%; white crystal; m.p. 163.3–164.7 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.06 (d, *J* = 3.0 Hz, 1H), 7.94 (d, *J* = 3.0 Hz, 1H), 7.46 (d, *J* = 7.5 Hz, 1H), 7.37 (t, *J* = 7.4 Hz, 1H), 7.31 – 7.26 (m, 2H), 7.18 (t, *J* = 7.7 Hz, 2H), 6.82 (d, *J* = 8.1 Hz, 2H), 6.73 (t, *J* = 7.2 Hz, 1H), 2.38 (s, 3H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 169.4, 149.9, 136.1, 135.6, 131.0, 130.2, 129.2, 127.7, 126.1, 119.0, 112.7, 19.8.

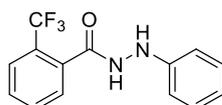


2-methoxy-*N'*-phenylbenzohydrazide (**A**₄). Yield: 65%; white crystal; m.p. 80.6–81.8 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.85 (s, 1H), 7.64 (d, *J* = 7.5 Hz, 1H), 7.50 (t, *J* = 7.8 Hz, 1H), 7.21 – 7.15 (m, 3H), 7.06 (t, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 8.1 Hz, 2H), 6.74 (t, *J* = 7.2 Hz, 1H), 3.91 (s, 3H); ¹³C NMR (100 MHz, DMSO-

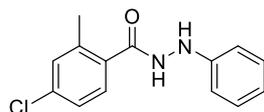
d_6): δ 166.3, 157.3, 149.9, 132.5, 130.3, 129.1, 123.5, 120.9, 118.9, 112.8, 112.3, 56.2.



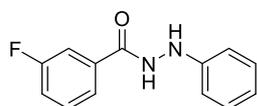
2-chloro-N'-phenylbenzohydrazide (A₅). Yield: 62%; white crystal; m.p. 150.1–150.8 °C; ¹H NMR (400 MHz, DMSO- d_6): δ 10.21 (d, J = 2.0 Hz, 1H), 8.02 (s, 1H), 7.59 – 7.38 (m, 4H), 7.18 (t, J = 7.7 Hz, 2H), 6.86 (d, J = 7.9 Hz, 2H), 6.73 (t, J = 7.1 Hz, 1H); ¹³C NMR (100 MHz, DMSO- d_6): δ 166.7, 149.6, 135.7, 131.7, 130.7, 130.2, 129.6, 129.2, 127.7, 119.1, 112.8.



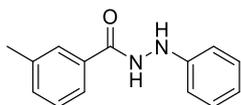
N'-phenyl-2-(trifluoromethyl)benzohydrazide (A₆). Yield: 55%; White flocculent solid; m.p. 149.9–151.1 °C; ¹H NMR (400 MHz, DMSO- d_6): δ 10.47 (s, 1H), 7.97 (s, 1H), 7.79 (d, J = 7.8 Hz, 1H), 7.73 (ddd, J = 9.9, 2.6, 1.5 Hz, 1H), 7.57 (td, J = 8.0, 5.8 Hz, 1H), 7.44 (td, J = 8.3, 1.7 Hz, 1H), 7.16 (dd, J = 8.6, 7.2 Hz, 2H), 6.81 (s, 2H), 6.73 (t, J = 7.3 Hz, 1H).



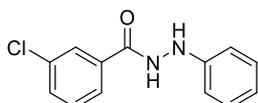
4-chloro-2-methyl-N'-phenylbenzohydrazide (A₇). Yield: 66%; White flocculent solid; m.p. 190.8–191.5 °C; ¹H NMR (400 MHz, DMSO- d_6): δ 10.11 (d, J = 2.5 Hz, 1H), 7.94 (d, J = 2.7 Hz, 1H), 7.48 (d, J = 8.1 Hz, 1H), 7.40 (s, 1H), 7.37 (d, J = 8.1 Hz, 1H), 7.17 (t, J = 7.7 Hz, 2H), 6.81 (d, J = 8.2 Hz, 2H), 6.73 (t, J = 7.2 Hz, 1H), 2.38 (s, 3H); ¹³C NMR (100 MHz, DMSO- d_6): δ 168.5, 149.7, 138.9, 134.7, 134.3, 130.7, 129.6, 129.2, 126.0, 119.1, 112.6, 19.5. ESI-MS m/z 261.0789 [M+H]⁺.



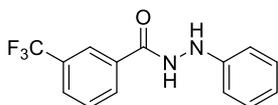
3-fluoro-N'-phenylbenzohydrazide (A₈). Yield: 75%; white crystal; m.p. 150.3–150.8 °C; ¹H NMR (400 MHz, DMSO- d_6): δ 10.48 (d, J = 3.0 Hz, 1H), 7.97 (d, J = 2.9 Hz, 1H), 7.79 (d, J = 7.7 Hz, 1H), 7.73 (dt, J = 9.7, 2.2 Hz, 1H), 7.57 (td, J = 8.0, 5.8 Hz, 1H), 7.44 (td, J = 8.5, 2.6 Hz, 1H), 7.16 (dd, J = 8.5, 7.2 Hz, 2H), 6.84 – 6.77 (m, 2H), 6.73 (t, J = 7.3 Hz, 1H); ¹³C NMR (100 MHz, DMSO- d_6): δ 165.5 (d, J = 2.6 Hz), 162.4 (d, J = 244.7 Hz), 149.8, 135.7 (d, J = 6.6 Hz), 131.2 (d, J = 8.0 Hz), 129.2, 123.9 (d, J = 3.1 Hz), 119.2, 119.0 (d, J = 21.1 Hz), 114.6 (d, J = 22.8 Hz), 112.8.



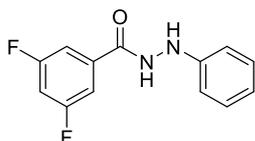
3-methyl-N'-phenylbenzohydrazide (A₉). Yield: 74%; white crystal; m.p. 155.9–157.1 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.33 (d, *J* = 2.5 Hz, 1H), 7.92 (d, *J* = 2.5 Hz, 1H), 7.75 (s, 1H), 7.74 – 7.69 (m, 1H), 7.38 (d, *J* = 4.6 Hz, 2H), 7.15 (t, *J* = 7.7 Hz, 2H), 6.79 (d, *J* = 8.0 Hz, 2H), 6.72 (t, *J* = 7.2 Hz, 1H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.9, 150.0, 138.2, 133.5, 132.66, 129.2, 128.8, 128.3, 124.8, 119.0, 112.7, 21.4.



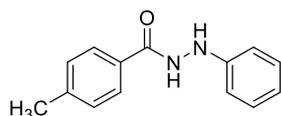
3-chloro-N'-phenylbenzohydrazide (A₁₀). Yield: 75%; white crystal; m.p. 152.9–153.1 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.50 (s, 1H), 7.97 (d, *J* = 8.8 Hz, 2H), 7.89 (d, *J* = 7.8 Hz, 1H), 7.67 (d, *J* = 8.0 Hz, 1H), 7.56 (t, *J* = 7.8 Hz, 1H), 7.16 (t, *J* = 7.9 Hz, 2H), 6.79 (d, *J* = 8.0 Hz, 2H), 6.73 (t, *J* = 7.3 Hz, 1H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 165.4, 149.7, 135.4, 133.8, 132.02, 131.0, 129.2, 127.6, 126.5, 119.2, 112.8.



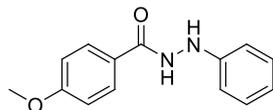
N'-phenyl-3-(trifluoromethyl)benzohydrazide (A₁₁). Yield: 59%; white flocculent solid; m.p. 110.7–112.1 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.64 (s, 1H), 8.29 – 8.21 (m, 2H), 7.97 (d, *J* = 8.5 Hz, 1H), 7.78 (t, *J* = 7.8 Hz, 1H), 7.17 (dd, *J* = 8.6, 7.2 Hz, 2H), 6.82 (d, *J* = 7.4 Hz, 2H), 6.74 (t, *J* = 7.3 Hz, 1H).



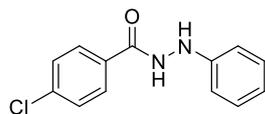
3,5-difluoro-N'-phenylbenzohydrazide (A₁₂). Yield: 58%; white solid; mp. 147.5–148.3 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.20 (s, 1H), 8.00 (d, *J* = 16.6 Hz, 1H), 7.66 (t, *J* = 7.2 Hz, 1H), 7.56 (q, *J* = 6.8, 6.4 Hz, 1H), 7.32 (q, *J* = 8.1, 7.0 Hz, 2H), 7.18 (t, *J* = 7.7 Hz, 2H), 6.83 (d, *J* = 8.0 Hz, 2H), 6.74 (t, *J* = 7.3 Hz, 1H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 164.5, 159.6 (d, *J* = 249.2 Hz), 149.6, 133.1 (d, *J* = 8.2 Hz), 130.4 (d, *J* = 3.0 Hz), 129.2, 125.1 (d, *J* = 3.5 Hz), 123.4 (d, *J* = 15.4 Hz), 119.1, 116.6 (d, *J* = 21.9 Hz), 112.7.



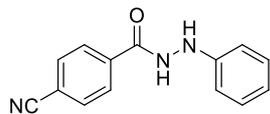
4-methyl-N'-phenylbenzohydrazide (A₁₃). Yield: 78%; white solid; m.p. 161.4–162.1 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.29 (d, *J* = 3.0 Hz, 1H), 7.88 (d, *J* = 2.9 Hz, 1H), 7.83 (d, *J* = 7.9 Hz, 2H), 7.31 (d, *J* = 7.9 Hz, 2H), 7.15 (t, *J* = 7.7 Hz, 2H), 6.78 (d, *J* = 8.0 Hz, 3H), 6.71 (t, *J* = 7.3 Hz, 1H), 2.37 (s, 3H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.6, 150.0, 142.0, 130.6, 129.4, 129.2, 127.7, 119.0, 112.7, 21.4.



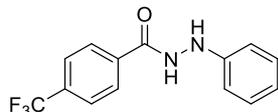
4-methoxy-N'-phenylbenzohydrazide (A₁₄). Yield: 73%; light yellow solid; m.p. 169.9–170.9 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.23 (d, *J* = 3.0 Hz, 1H), 7.91 (d, *J* = 8.7 Hz, 2H), 7.85 (d, *J* = 2.9 Hz, 1H), 7.14 (t, *J* = 7.7 Hz, 2H), 7.03 (d, *J* = 8.8 Hz, 2H), 6.77 (d, *J* = 8.0 Hz, 2H), 6.71 (t, *J* = 7.2 Hz, 1H), 3.82 (s, 3H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.2, 162.3, 150.1, 129.6, 129.1, 125.6, 119.0, 114.1, 112.7, 55.8.



4-chloro-N'-phenylbenzohydrazide (A₁₅). Yield: 83%; white crystal; m.p. 186.5–187.4 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.46 (d, *J* = 2.9 Hz, 1H), 8.02 – 7.89 (m, 3H), 7.59 (d, *J* = 8.5 Hz, 2H), 7.22 – 7.10 (m, 2H), 6.79 (d, *J* = 7.9 Hz, 2H), 6.73 (t, *J* = 7.3 Hz, 1H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 165.8, 149.8, 136.9, 132.2, 129.7, 129.2, 129.0, 119.1, 112.8.

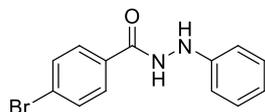


4-cyano-N'-phenylbenzohydrazide (A₁₆). Yield: 61%; light yellow solid; m.p. 165.8–166.3 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.64 (s, 1H), 8.11 – 7.99 (m, 5H), 7.17 (t, *J* = 7.7 Hz, 2H), 6.81 (d, *J* = 8.0 Hz, 2H), 6.74 (t, *J* = 7.3 Hz, 1H); ¹³C NMR (100 MHz, DMSO): δ 165.4, 149.6, 137.5, 133.0, 129.2, 128.6, 119.3, 118.7, 114.5, 112.8.



N'-phenyl-4-(trifluoromethyl)benzohydrazide (A₁₇). Yield: 64%; white crystal; m.p. 186.5–187.5 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.63 (d, *J* = 2.3 Hz, 1H),

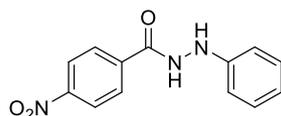
8.15 (d, $J = 8.1$ Hz, 2H), 8.04 (d, $J = 2.3$ Hz, 1H), 7.90 (d, $J = 8.2$ Hz, 2H), 7.18 (t, $J = 7.7$ Hz, 2H), 6.83 (d, $J = 8.1$ Hz, 2H), 6.75 (t, $J = 7.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 165.7, 149.7, 137.3, 132.0 (q, $J = 31.9$ Hz), 129.2, 125.9 (q, $J = 3.7$ Hz), 124.3 (q, $J = 272.5$ Hz), 119.2, 112.8.



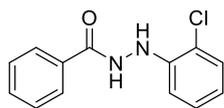
4-bromo-N'-phenylbenzohydrazide (**A₁₈**). Yield: 81%; white crystal; m.p. 193.3–194.3 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.46 (d, $J = 2.9$ Hz, 1H), 7.95 (d, $J = 2.9$ Hz, 1H), 7.87 (d, $J = 8.4$ Hz, 2H), 7.77 – 7.69 (m, 2H), 7.16 (t, $J = 7.8$ Hz, 2H), 6.79 (d, $J = 8.0$ Hz, 2H), 6.73 (t, $J = 7.2$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 165.9, 149.8, 132.6, 132.0, 129.9, 129.2, 125.8, 119.2, 112.8.



4-isopropyl-N'-phenylbenzohydrazide (**A₁₉**). Yield: 65%; white crystal; m.p. 197.0–197.4 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.31 (s, 1H), 7.87 (d, $J = 7.9$ Hz, 3H), 7.37 (d, $J = 7.9$ Hz, 2H), 7.15 (t, $J = 7.6$ Hz, 2H), 6.78 (d, $J = 8.0$ Hz, 2H), 6.71 (t, $J = 7.2$ Hz, 1H), 2.95 (hept, $J = 6.9$ Hz, 1H), 1.23 (s, 3H), 1.22 (s, 3H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.7, 152.7, 150.0, 131.1, 129.1, 127.9, 126.8, 119.0, 112.7, 33.8, 24.1.

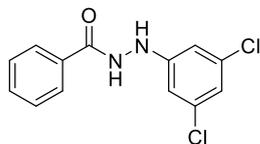


4-nitro-N'-phenylbenzohydrazide (**A₂₀**). Yield: 60%; yellow solid; m.p. 197.4–198.1 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.70 (d, $J = 2.8$ Hz, 1H), 8.36 (d, $J = 8.8$ Hz, 2H), 8.15 (d, $J = 8.8$ Hz, 2H), 8.06 (d, $J = 2.6$ Hz, 1H), 7.17 (t, $J = 7.9$ Hz, 2H), 6.81 (d, $J = 8.0$ Hz, 2H), 6.74 (t, $J = 7.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 165.2, 149.7, 149.5, 139.1, 129.3, 129.3, 124.1, 119.3, 112.8.

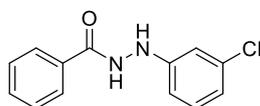


N'-(2-chlorophenyl)benzohydrazide (**B₁**). Yield: 60%; white solid; m.p. 145.2–146.9 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.53 (d, $J = 1.8$ Hz, 1H), 7.94 (d, $J = 7.4$ Hz, 2H), 7.63 (d, $J = 1.7$ Hz, 1H), 7.60 (t, $J = 7.4$ Hz, 1H), 7.52 (t, $J = 7.5$ Hz, 2H), 7.32 (d, $J = 7.8$ Hz, 1H), 7.16 (t, $J = 7.7$ Hz, 1H), 6.84 (d, $J = 8.0$ Hz, 1H), 6.77

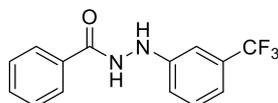
(t, $J = 7.6$ Hz, 1H); ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$): δ 166.7, 145.3, 133.1, 132.3, 129.6, 129.0, 128.2, 127.8, 120.1, 117.8, 113.4.



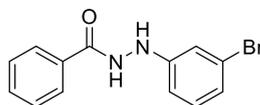
N'-(3,5-dichlorophenyl)benzohydrazide (**B₂**). Yield: 60%; light powder flocculent solid; m.p. 183.2–184.1 °C; ^1H NMR (400 MHz, $\text{DMSO-}d_6$): δ 10.54 (s, 1H), 8.58 (s, 1H), 7.96 (d, $J = 7.4$ Hz, 2H), 7.61 (t, $J = 7.2$ Hz, 1H), 7.53 (t, $J = 7.5$ Hz, 3H), 6.86 (s, 1H), 6.77 (s, 2H); ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$): δ 166.8, 152.4, 134.9, 132.8, 132.4, 129.0, 127.8, 117.8, 110.8.



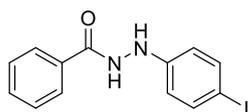
N'-(3-chlorophenyl)benzohydrazide (**B₃**). Yield: 65%; Brown crystal; m.p. 137.8–141.1 °C; ^1H NMR (400 MHz, $\text{DMSO-}d_6$): δ 10.44 (s, 1H), 8.25 (s, 1H), 7.94 (d, $J = 7.9$ Hz, 2H), 7.59 (t, $J = 7.3$ Hz, 1H), 7.52 (t, $J = 7.6$ Hz, 2H), 7.17 (t, $J = 7.9$ Hz, 1H), 6.77 (d, $J = 6.2$ Hz, 2H), 6.74 (s, 1H); ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$): δ 166.8, 151.6, 133.9, 133.1, 132.2, 130.9, 129.0, 127.8, 118.5, 112.0, 111.4.



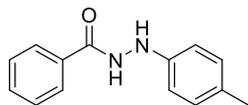
N'-(3-(trifluoromethyl)phenyl)benzohydrazide (**B₄**). Yield: 57%; brown solid; m.p. 167.7–168.5 °C; ^1H NMR (400 MHz, $\text{DMSO-}d_6$): δ 10.50 (d, $J = 2.5$ Hz, 1H), 8.41 (d, $J = 2.5$ Hz, 1H), 8.05 – 7.85 (m, 2H), 7.63 – 7.57 (m, 1H), 7.53 (t, $J = 7.5$ Hz, 2H), 7.39 (t, $J = 7.8$ Hz, 1H), 7.05 (d, $J = 2.8$ Hz, 1H), 7.03 (s, 2H); ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$): δ 166.8, 150.6, 133.1, 132.3, 130.4, 130.1 (q, $J = 31.3$ Hz), 129.0, 127.8, 124.8 (q, $J = 272.3$ Hz), 116.2, 115.1 (q, $J = 3.9$ Hz), 108.5 (q, $J = 4.1$ Hz).



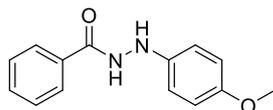
N'-(3-bromophenyl)benzohydrazide (**B₅**). Yield: 67%; light yellow crystal; m.p. 155.6–157.4 °C; ^1H NMR (400 MHz, $\text{DMSO-}d_6$): δ 10.43 (d, $J = 2.6$ Hz, 1H), 8.23 (d, $J = 2.5$ Hz, 1H), 7.95 – 7.88 (m, 2H), 7.60 (t, $J = 7.3$ Hz, 1H), 7.52 (t, $J = 7.5$ Hz, 2H), 7.11 (t, $J = 8.0$ Hz, 1H), 6.95 – 6.83 (m, 2H), 6.78 (dd, $J = 8.1, 2.1$ Hz, 1H); ^{13}C NMR (100 MHz, $\text{DMSO-}d_6$): δ 166.8, 151.7, 133.1, 132.2, 131.2, 129.0, 127.8, 122.5, 121.4, 114.8, 111.7.



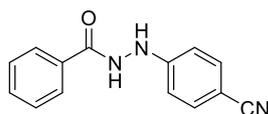
N'-(4-iodophenyl)benzohydrazide (**B**₆). Yield: 73%; Brown crystal; m.p. 165.8–166.2 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.43 (d, *J* = 2.5 Hz, 1H), 8.16 (s, 1H), 7.92 (d, *J* = 7.4 Hz, 2H), 7.58 (t, *J* = 7.2 Hz, 1H), 7.51 (t, *J* = 7.5 Hz, 3H), 7.46 (d, *J* = 8.4 Hz, 2H), 6.64 (d, *J* = 8.5 Hz, 2H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.7, 149.9, 137.6, 133.29, 132.2, 128.9, 127.8, 115.3, 80.3.



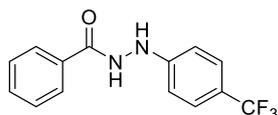
N'-(*p*-tolyl)benzohydrazide (**B**₇). Yield: 66%; white solid; m.p. 137.5–138.2 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.35 (d, *J* = 3.3 Hz, 1H), 7.95 – 7.86 (m, 2H), 7.74 (d, *J* = 3.2 Hz, 1H), 7.61 – 7.53 (m, 1H), 7.50 (t, *J* = 7.5 Hz, 2H), 6.97 (d, *J* = 8.1 Hz, 2H), 6.71 (d, *J* = 8.1 Hz, 2H), 2.18 (s, 3H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.7, 147.7, 133.5, 132.0, 129.6, 128.9, 127.7, 113.0, 20.6.



N'-(4-methoxyphenyl)benzohydrazide (**B**₈). Yield: 67%; white solid; m.p. 132.6–133.4 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.37 (d, *J* = 3.6 Hz, 1H), 7.92 (d, *J* = 6.7 Hz, 1H), 7.61 (d, *J* = 3.6 Hz, 1H), 7.57 (d, *J* = 7.4 Hz, 1H), 7.50 (t, *J* = 7.5 Hz, 2H), 6.78 (s, 4H), 3.67 (s, 3H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.7, 153.2, 143.8, 133.5, 132.0, 128.9, 127.7, 114.7, 114.3, 55.7.

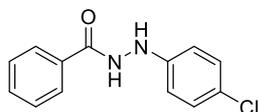


N'-(4-cyanophenyl)benzohydrazide (**B**₉). Yield: 62%; white solid; m.p. 190.2–190.7 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.54 (d, *J* = 1.8 Hz, 1H), 8.84 (d, *J* = 1.8 Hz, 1H), 7.93 (d, *J* = 7.6 Hz, 2H), 7.57 (tt, *J* = 15.1, 7.4 Hz, 6H), 6.84 (d, *J* = 8.5 Hz, 2H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 166.8, 153.5, 133.9, 132.9, 132.4, 129.0, 127.8, 120.5, 112.2, 99.4.

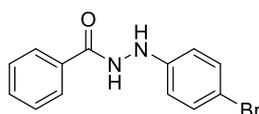


N'-(4-(trifluoromethyl)phenyl)benzohydrazide (**B**₁₀). Yield: 56%; white needle like solid; m.p. 153.4–154.6 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.53 ((d, *J* = 2.0 Hz, 1H), 8.61 (d, *J* = 2.2 Hz, 1H), 7.94 (d, *J* = 7.5 Hz, 2H), 7.60 (t, *J* = 7.3 Hz, 1H),

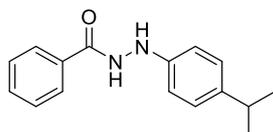
7.52 (dd, $J = 16.9, 8.2$ Hz, 4H), 6.89 (d, $J = 8.4$ Hz, 2H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.8, 153.1, 133.1, 132.3, 129.0, 127.8, 126.7 (q, $J = 3.8$ Hz), 125.5 (q, $J = 271.69$ Hz), 118.7 (q, $J = 31.7$ Hz), 112.0.



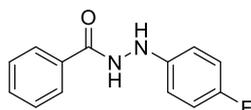
N'-(4-chlorophenyl)benzohydrazide (**B₁₁**). Yield: 74%; Brown crystal; m.p. 140.3–141.3 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.41 (d, $J = 2.7$ Hz, 1H), 8.12 (d, $J = 2.7$ Hz, 1H), 7.92 (d, $J = 7.0$ Hz, 2H), 7.59 (t, $J = 7.3$ Hz, 1H), 7.51 (t, $J = 7.5$ Hz, 2H), 7.22 – 7.16 (m, 2H), 6.82 – 6.75 (m, 2H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.7, 148.9, 133.2, 132.2, 129.0, 128.9, 127.7, 122.3, 114.2.



N'-(4-bromophenyl)benzohydrazide (**B₁₂**). Yield: 68%; Brown crystal; m.p. 138.2–139.6 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.41 (d, $J = 2.7$ Hz, 1H), 8.14 (d, $J = 2.6$ Hz, 1H), 7.98 – 7.83 (m, 2H), 7.61 – 7.55 (m, 1H), 7.51 (t, $J = 7.5$ Hz, 2H), 7.34 – 7.27 (m, 2H), 6.77 – 6.70 (m, 2H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.7, 149.3, 133.2, 132.2, 131.8, 128.9, 127.7, 114.7, 109.8.

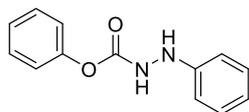


N'-(4-isopropylphenyl)benzohydrazide (**B₁₃**). Yield: 62%; white solid; m.p. 142.8–143.5 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.35 (s, 1H), 7.92 (s, 1H), 7.90 (d, $J = 1.6$ Hz, 1H), 7.74 (s, 1H), 7.60 – 7.55 (m, 1H), 7.50 (t, $J = 7.4$ Hz, 2H), 7.06 – 6.99 (m, 2H), 6.76 – 6.69 (m, 2H), 2.76 (p, $J = 6.9$ Hz, 1H), 1.16 (s, 3H), 1.14 (s, 3H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.7, 148.0, 139.1, 133.5, 132.0, 128.9, 127.7, 126.9, 112.9, 33.1, 24.7. ESI-MS m/z 255.1492 [M+H] $^+$.

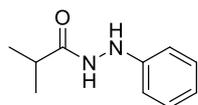


N'-(4-fluorophenyl)benzohydrazide (**B₁₄**). Yield: 74%; white solid; m.p. 139.2–139.6 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.40 (d, $J = 3.2$ Hz, 1H), 7.91 (dd, $J = 10.7, 5.4$ Hz, 4H), 7.62 – 7.54 (m, 1H), 7.50 (t, $J = 7.4$ Hz, 2H), 7.00 (t, $J = 8.9$ Hz, 2H), 6.81 (dd, $J = 8.9, 4.6$ Hz, 2H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.8, 156.4 (d, $J = 233.4$ Hz), 146.5, 133.4, 132.1, 128.97, 127.7, 115.6 (d, $J = 22.4$ Hz), 114.0 (d,

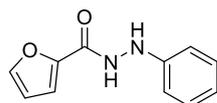
$J = 7.5$ Hz).



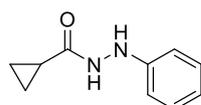
phenyl 2-phenylhydrazine-1-carboxylate (**C₁**). Yield: 62%; white solid; m.p. 112.5–114.3 °C, ¹H NMR (400 MHz, DMSO-*d*₆) δ 9.59 (d, $J = 2.8$ Hz, 1H), 7.66 (d, $J = 2.9$ Hz, 1H), 7.12 (dd, $J = 8.7, 7.1$ Hz, 2H), 6.71 – 6.66 (m, 3H), 2.15 (t, $J = 7.4$ Hz, 2H), 1.55 (p, $J = 7.3$ Hz, 2H), 1.28 (tdt, $J = 10.3, 7.1, 4.2$ Hz, 4H), 0.88 (t, $J = 6.9$ Hz, 3H).



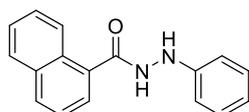
N'-phenylisobutyrohydrazide (**C₂**). Yield: 90%; white crystal; m.p. 134.9–135.7 °C, ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.58 (d, $J = 2.4$ Hz, 1H), 7.64 (d, $J = 2.7$ Hz, 1H), 7.12 (t, $J = 7.8$ Hz, 2H), 6.70 – 6.65 (m, 3H), 2.49 – 2.43 (m, 1H), 1.06 (d, $J = 6.9$ Hz, 6H).



N'-phenylfuran-2-carbohydrazide (**C₃**). Yield: 62%; white needle like solid; m.p. 141.2–142.3 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.28 (s, 1H), 7.91 (d, $J = 4.8$ Hz, 3H), 7.25 (d, $J = 3.5$ Hz, 1H), 7.15 (t, $J = 7.7$ Hz, 2H), 6.72 (dd, $J = 14.1, 7.5$ Hz, 3H), 6.67 (dd, $J = 3.4, 1.7$ Hz, 1H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 158.4, 149.8, 147.0, 146.0, 129.2, 119.0, 114.5, 112.6, 112.2.

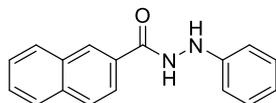


N'-phenylcyclopropanecarbohydrazide (**C₄**). Yield: 85%; white crystal; m.p. 181.9–183.6 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.83 (s, 1H), 7.69 (s, 1H), 7.13 (t, $J = 7.7$ Hz, 2H), 6.71 – 6.63 (m, 3H), 1.64 (ddd, $J = 10.5, 7.9, 4.7$ Hz, 1H), 0.78 – 0.62 (m, 4H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 173.1, 149.9, 129.1, 118.8, 112.5, 12.4, 6.7.

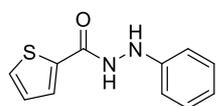


N'-phenyl-1-naphthohydrazide (**C₅**). Yield: 61%; White flocculent solid; m.p. 184.1–184.7 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.36 (s, 1H), 8.24 – 8.17 (m, 1H), 8.08 (d, $J = 8.3$ Hz, 1H), 8.05 – 7.98 (m, 2H), 7.78 (d, $J = 6.9$ Hz, 1H), 7.65 –

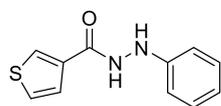
7.50 (m, 3H), 7.21 (t, $J = 7.7$ Hz, 2H), 6.89 (d, $J = 7.9$ Hz, 2H), 6.76 (t, $J = 7.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 168.9, 149.9, 133.6, 133.1, 130.8, 130.4, 129.3, 128.8, 127.4, 126.8, 126.1, 125.5, 119.1, 112.7.



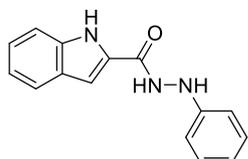
N'-phenyl-2-naphthohydrazide (**C**₆). Yield: 68%; white needle like solid; m.p. 172.4–173.6 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.56 (s, 1H), 8.59 (s, 1H), 8.04 (dt, $J = 15.1, 8.4$ Hz, 5H), 7.63 (p, $J = 6.6$ Hz, 2H), 7.19 (t, $J = 7.6$ Hz, 2H), 6.87 (d, $J = 8.0$ Hz, 2H), 6.75 (t, $J = 7.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 166.9, 150.0, 134.8, 132.6, 130.8, 129.4, 129.2, 128.5, 128.2, 128.1, 127.3, 124.5, 119.1, 112.8.



N'-phenylthiophene-2-carbohydrazide (**C**₇). Yield: 65%; white needle like solid; m.p. 138.5–139.6 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.41 (s, 1H), 7.98 (s, 1H), 7.92 (d, $J = 3.8$ Hz, 1H), 7.83 (d, $J = 4.9$ Hz, 1H), 7.20 (t, $J = 4.4$ Hz, 1H), 7.16 (t, $J = 7.7$ Hz, 2H), 6.77 (d, $J = 8.0$ Hz, 2H), 6.72 (t, $J = 7.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 161.8, 149.8, 138.3, 131.8, 129.28, 128.9, 128.6, 119.1, 112.7.

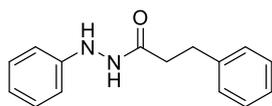


N'-phenylthiophene-3-carbohydrazide (**C**₈). Yield: 61%; white needle like solid; m.p. 182.4–183.6 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 10.22 (s, 1H), 8.26 (dd, $J = 3.0, 1.3$ Hz, 1H), 7.91 (s, 1H), 7.63 (dd, $J = 5.1, 2.9$ Hz, 1H), 7.59 (dd, $J = 5.1, 1.3$ Hz, 1H), 7.15 (dd, $J = 8.6, 7.2$ Hz, 2H), 6.77 (d, $J = 7.6$ Hz, 2H), 6.71 (td, $J = 7.3, 1.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 162.5, 149.9, 136.3, 129.8, 129.2, 127.5, 127.1, 119.0, 112.7.

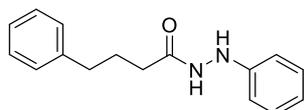


N'-phenyl-1H-indole-2-carbohydrazide (**C**₉). Yield: 55%; brown solid; m.p. 231.6–232.3 °C; ^1H NMR (400 MHz, DMSO- d_6): δ 11.68 (s, 1H), 10.38 (d, $J = 2.7$ Hz, 1H), 7.99 (d, $J = 2.6$ Hz, 1H), 7.65 (d, $J = 8.0$ Hz, 1H), 7.45 (d, $J = 8.2$ Hz, 1H), 7.29 (s, 1H), 7.18 (dt, $J = 15.9, 7.5$ Hz, 3H), 7.06 (t, $J = 7.5$ Hz, 1H), 6.80 (d, $J = 8.0$ Hz, 2H), 6.72 (t, $J = 7.3$ Hz, 1H); ^{13}C NMR (100 MHz, DMSO- d_6): δ 161.8, 149.9,

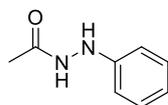
137.0, 130.3, 129.2, 124.0, 122.0, 120.3, 119.0, 112.8, 112.6, 103.3.



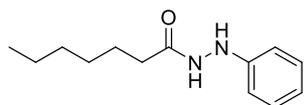
N',3-diphenylpropanehydrazide (**C₁₀**). Yield: 73%; light yellow solid; m.p. 91.6–92.7 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.58 (d, *J* = 2.3 Hz, 1H), 7.65 (d, *J* = 2.6 Hz, 1H), 7.34 – 7.26 (m, 2H), 7.26 – 7.18 (m, 3H), 7.06 (dd, *J* = 8.5, 7.2 Hz, 2H), 6.66 (t, *J* = 7.3 Hz, 1H), 6.57 – 6.50 (m, 2H), 2.87 (t, *J* = 7.5 Hz, 2H), 2.49 (d, *J* = 7.5 Hz, 2H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 171.6, 149.7, 141.4, 129.0, 128.8, 128.7, 126.4, 118.7, 112.5, 35.3, 31.3.



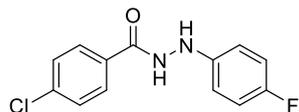
N',4-diphenylbutanehydrazide (**C₁₁**). Yield: 69%; yellow crystal; m.p. 99.8–100.8 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.62 (d, *J* = 3.0 Hz, 1H), 7.68 (d, *J* = 2.9 Hz, 1H), 7.34 – 7.23 (m, 2H), 7.23 – 7.17 (m, 3H), 7.13 (dd, *J* = 8.5, 7.1 Hz, 2H), 6.68 (t, *J* = 8.0 Hz, 3H), 2.64 – 2.53 (m, 2H), 2.19 (t, *J* = 7.4 Hz, 2H), 1.85 (p, *J* = .07.6 Hz, 2H).



N'-phenylacetohydrazide (**C₁₂**). Yield: 88%; white crystal; m.p. 122.7–123.4 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.59 (s, 1H), 7.64 (s, 1H), 7.12 (dd, *J* = 8.7, 7.0 Hz, 2H), 6.72 – 6.65 (m, 3H), 1.89 (s, 3H).

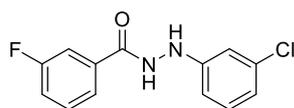


N'-phenylheptanehydrazide (**C₁₃**). Yield: 84%; white crystal; m.p. 97.3–98.2 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 9.58 (s, 1H), 7.66 (s, 1H), 7.11 (t, *J* = 7.9 Hz, 2H), 6.71 – 6.65 (m, 3H), 2.15 (t, *J* = 7.3 Hz, 2H), 1.54 (t, *J* = 7.1 Hz, 2H), 1.28 (s, 6H), 0.91 – 0.84 (m, 3H).

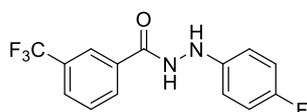


4-chloro-N'-(4-fluorophenyl)benzohydrazide (**D₁**). Yield: 62%; white solid; m.p. 158.4–159.1 °C; ¹H NMR (400 MHz, DMSO-*d*₆): δ 10.49 (d, *J* = 3.1 Hz, 1H), 7.98 – 7.91 (m, 3H), 7.62 – 7.56 (m, 2H), 7.01 (t, *J* = 8.9 Hz, 2H), 6.86 – 6.77 (m, 2H); ¹³C NMR (100 MHz, DMSO-*d*₆): δ 165.8, 156.4 (d, *J* = 233.8 Hz), 146.3, 137.0, 132.1,

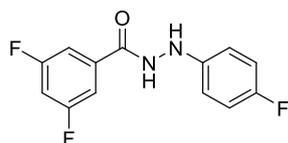
129.7, 129.0, 115.6 (d, $J = 22.3$ Hz), 114.0 (d, $J = 7.5$ Hz).



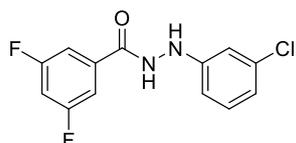
N'-(3-chlorophenyl)-3-fluorobenzohydrazide (**D₂**). Yield: 70%; white needle shaped crystal; m.p. 199.1–212.2 °C; ¹H NMR (400 MHz, DMSO-*d*₆) δ 10.54 (d, $J = 2.6$ Hz, 1H), 8.31 (d, $J = 2.6$ Hz, 1H), 7.83 – 7.69 (m, 2H), 7.59 (td, $J = 8.0, 5.8$ Hz, 1H), 7.46 (td, $J = 8.6, 2.7$ Hz, 1H), 7.18 (t, $J = 7.9$ Hz, 1H), 6.82 – 6.69 (m, 3H). ¹³C NMR (100 MHz, DMSO-*d*₆) δ 165.5 (d, $J = 2.5$ Hz), 163.6, 161.2, 151.4, 135.4 (d, $J = 6.9$ Hz), 133.9, 131.2 (d, $J = 8.1$ Hz), 130.9, 124.0 (d, $J = 2.9$ Hz), 119.2 (d, $J = 21.1$ Hz), 118.6, 114.6 (d, $J = 22.9$ Hz), 112.0, 111.4. ESI-MS m/z 265.0538 [M+H]⁺.



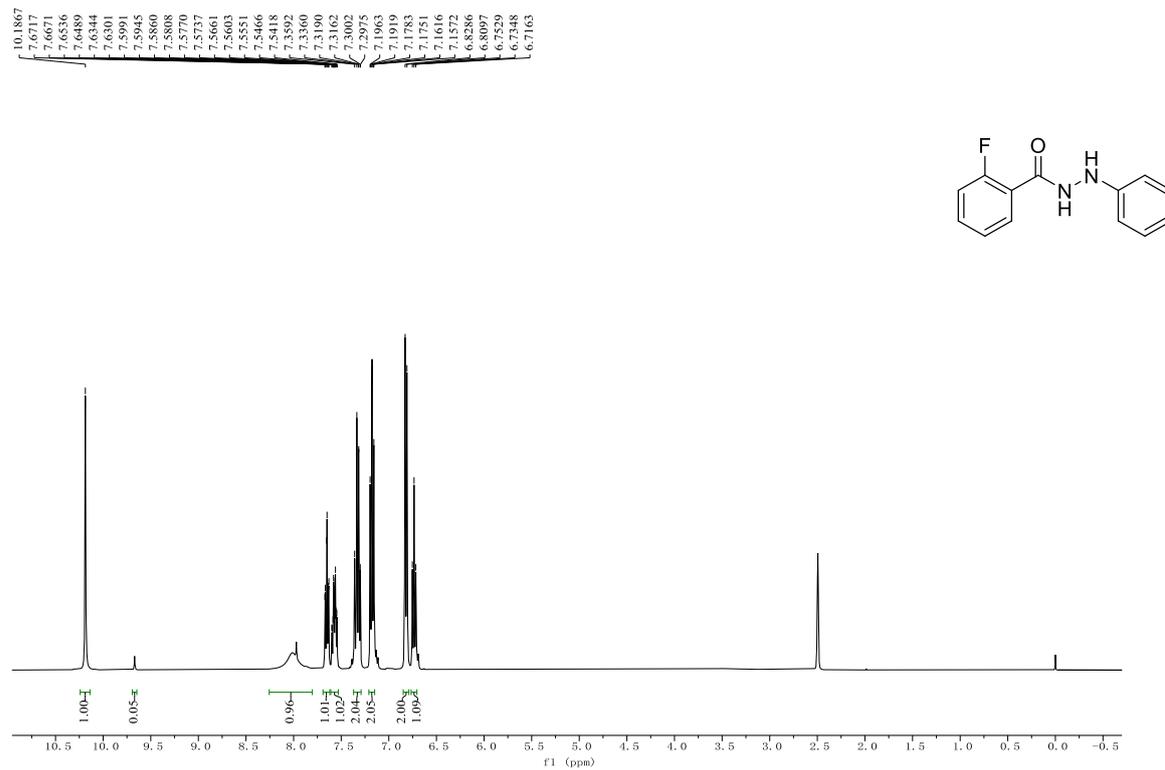
N'-(4-fluorophenyl)-3-(trifluoromethyl)benzohydrazide (**D₃**). Yield: 65%; white flaky solid; m.p. 180.4–186.5 °C; ¹H NMR (400 MHz, DMSO-*d*₆) δ 10.68 (d, $J = 3.1$ Hz, 1H), 8.26 (d, $J = 2.3$ Hz, 1H), 8.25 – 8.21 (m, 1H), 8.04 – 7.91 (m, 2H), 7.78 (t, $J = 7.8$ Hz, 1H), 7.08 – 6.95 (m, 2H), 6.88 – 6.77 (m, 2H). ¹³C NMR (100 MHz, DMSO-*d*₆) δ 165.3, 157.6, 155.3, 146.2, 146.2, 134.2, 131.9, 130.3, 129.7 (q, $J = 32.0$ Hz), 128.7 (d, $J = 3.8$ Hz), 125.8 – 122.8 (m), 115.7 (d, $J = 22$ Hz), 114.0 (d, $J = 7.6$ Hz).



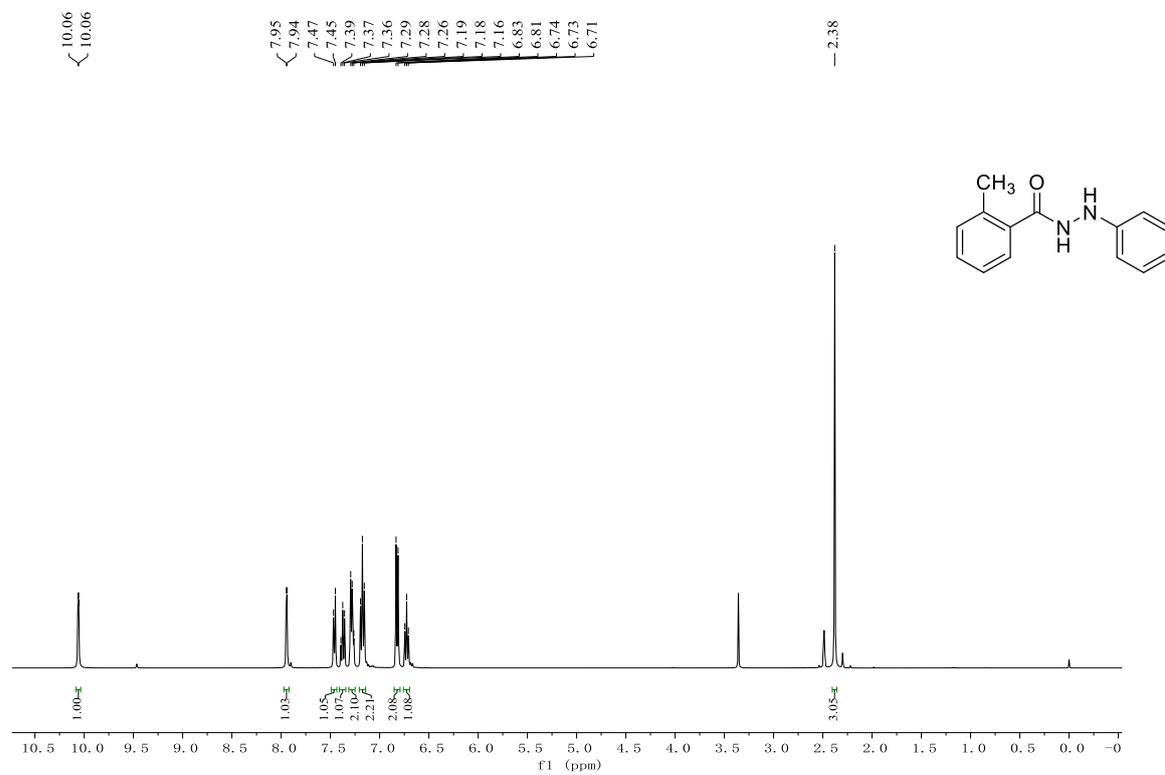
3,5-difluoro-*N'*-(4-fluorophenyl)benzohydrazide (**D₄**). Yield: 71%; White needle shaped crystal; m.p. 189.6–197.9 °C; ¹H NMR (400 MHz, DMSO-*d*₆) δ 10.59 (d, $J = 3.1$ Hz, 1H), 8.01 (d, $J = 3.0$ Hz, 1H), 7.69 – 7.59 (m, 2H), 7.53 (tt, $J = 9.1, 2.4$ Hz, 1H), 7.06 – 6.95 (m, 2H), 6.87 – 6.75 (m, 2H). ¹³C NMR (100 MHz, DMSO-*d*₆) δ 164.3 (t, $J = 2.8$ Hz), 163.9 (d, $J = 12.7$ Hz), 161.5 (d, $J = 12.8$ Hz), 156.4 (d, $J = 233.6$ Hz), 146.1 (d, $J = 1.8$ Hz), 136.7 (t, $J = 8.6$ Hz), 115.7 (d, $J = 22.3$ Hz), 114.1 (d, $J = 7.7$ Hz), 111.8 – 110.8 (m), 107.7 (t, $J = 25.9$ Hz). ESI-MS m/z 267.0740 [M+H]⁺.



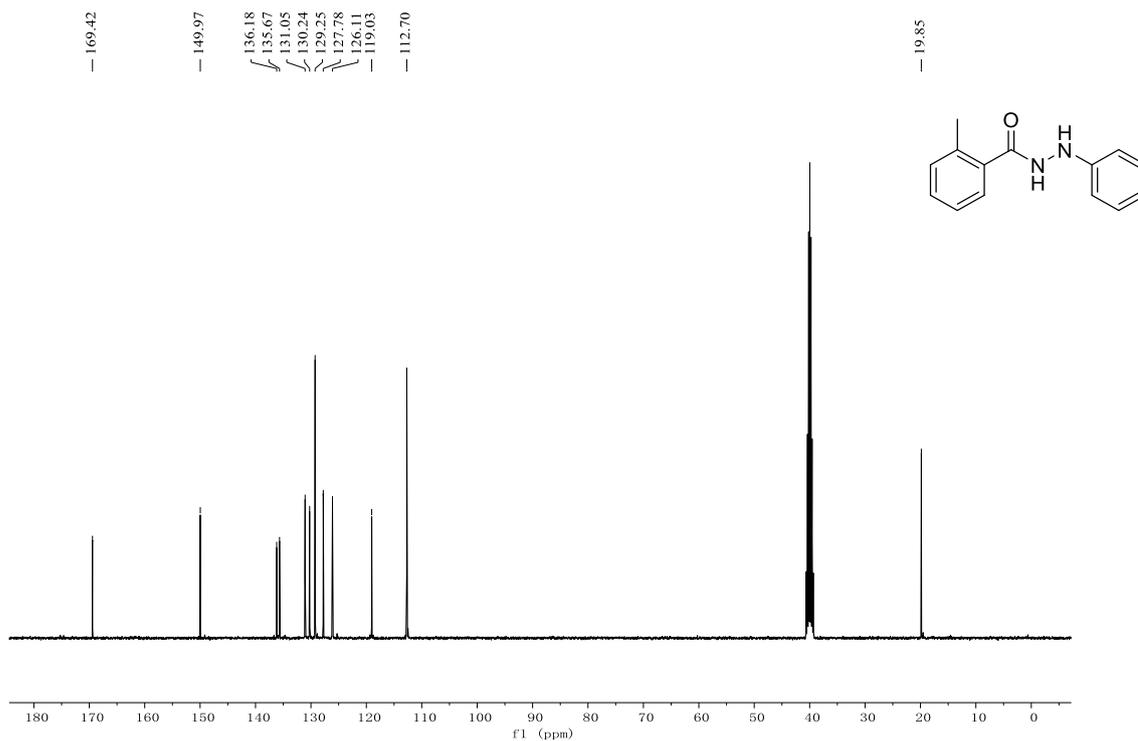
N'-(3-chlorophenyl)-3,5-difluorobenzohydrazide (**D₅**): Yield, 65%; white solid; m.p. 205.5–209.5 °C; ¹H NMR (400 MHz, DMSO-*d*₆) δ 10.61 (d, $J = 2.4$ Hz, 1H),



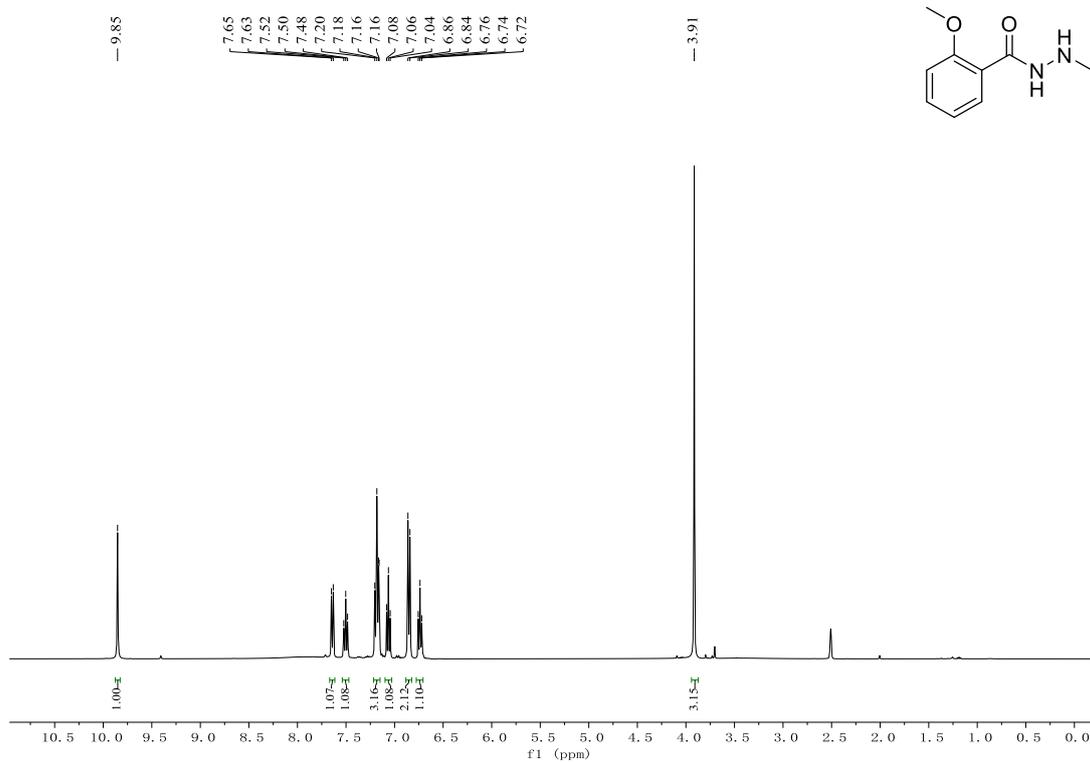
The ^1H NMR spectrum of Az.



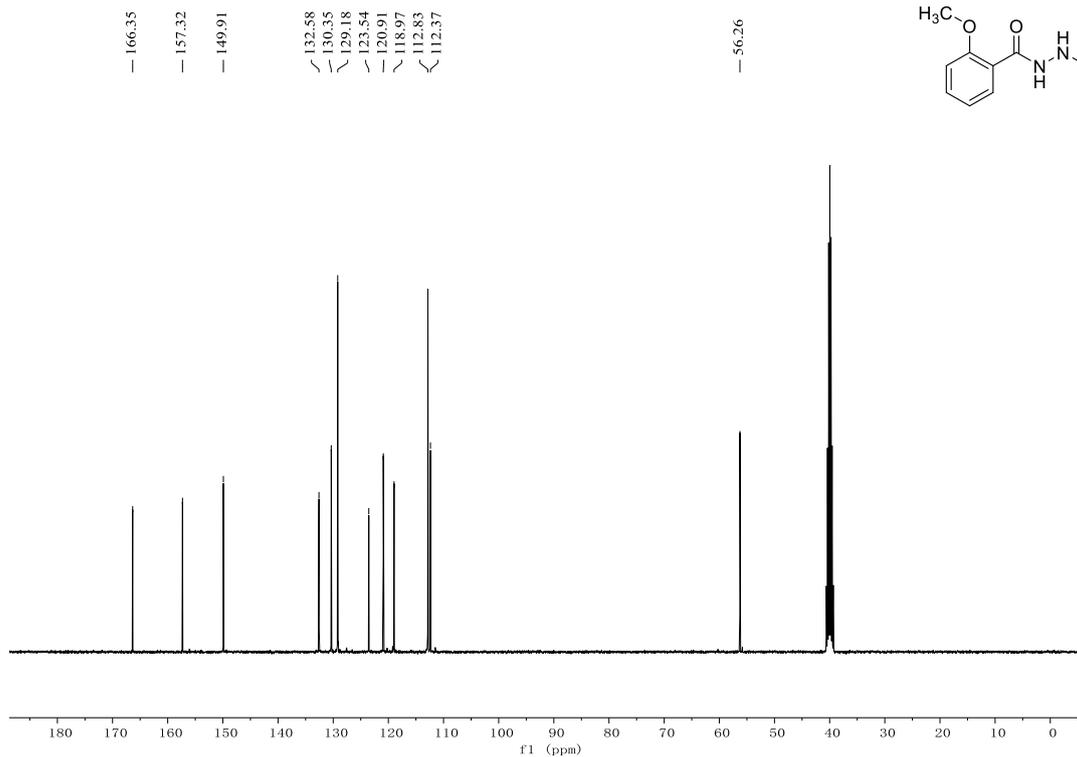
The ^1H NMR spectrum of A3.



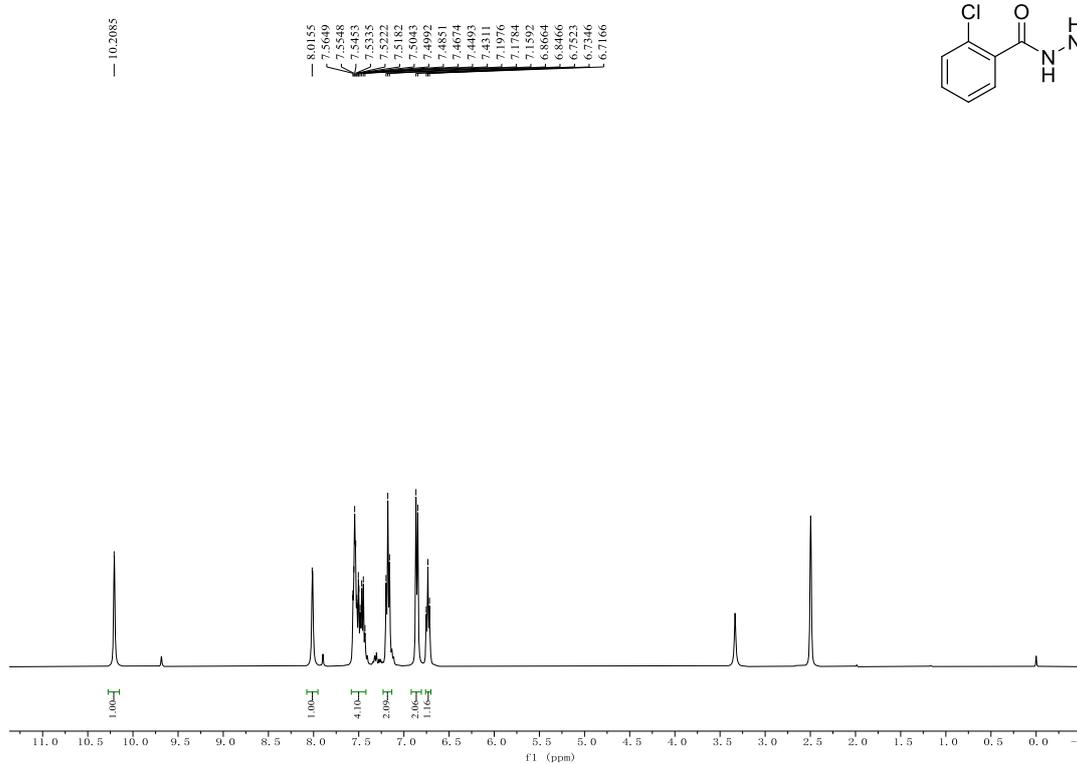
The ^{13}C NMR spectrum of A₃.



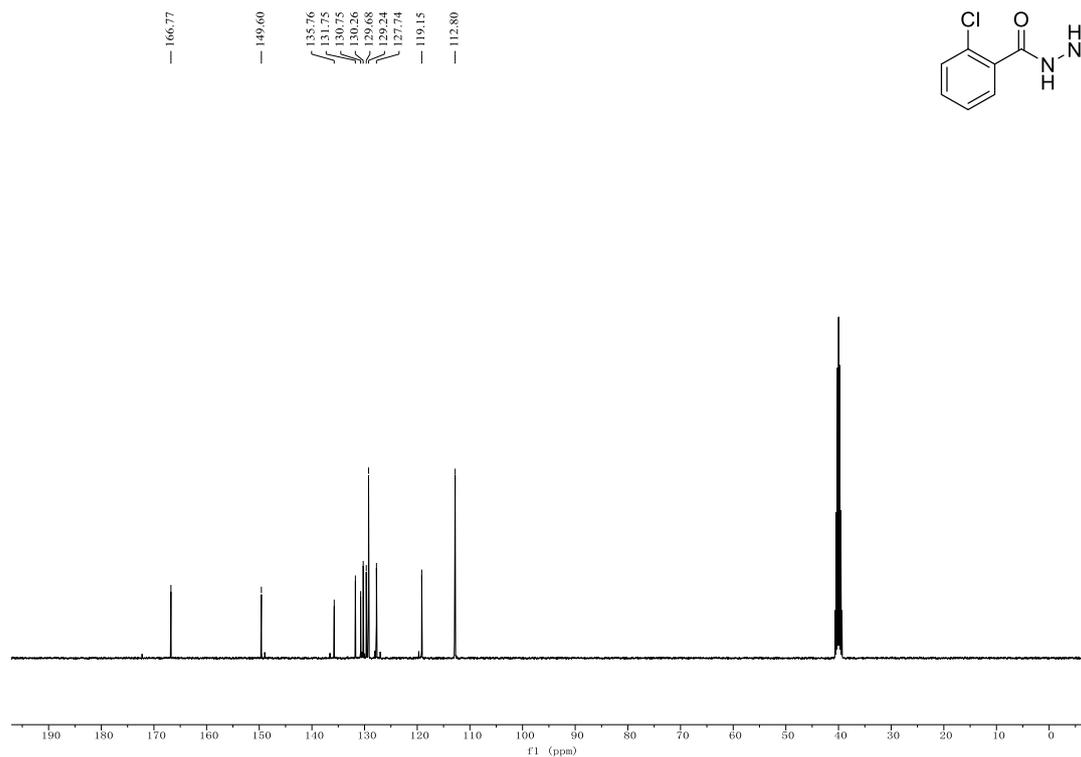
The ^1H NMR spectrum of A₄.



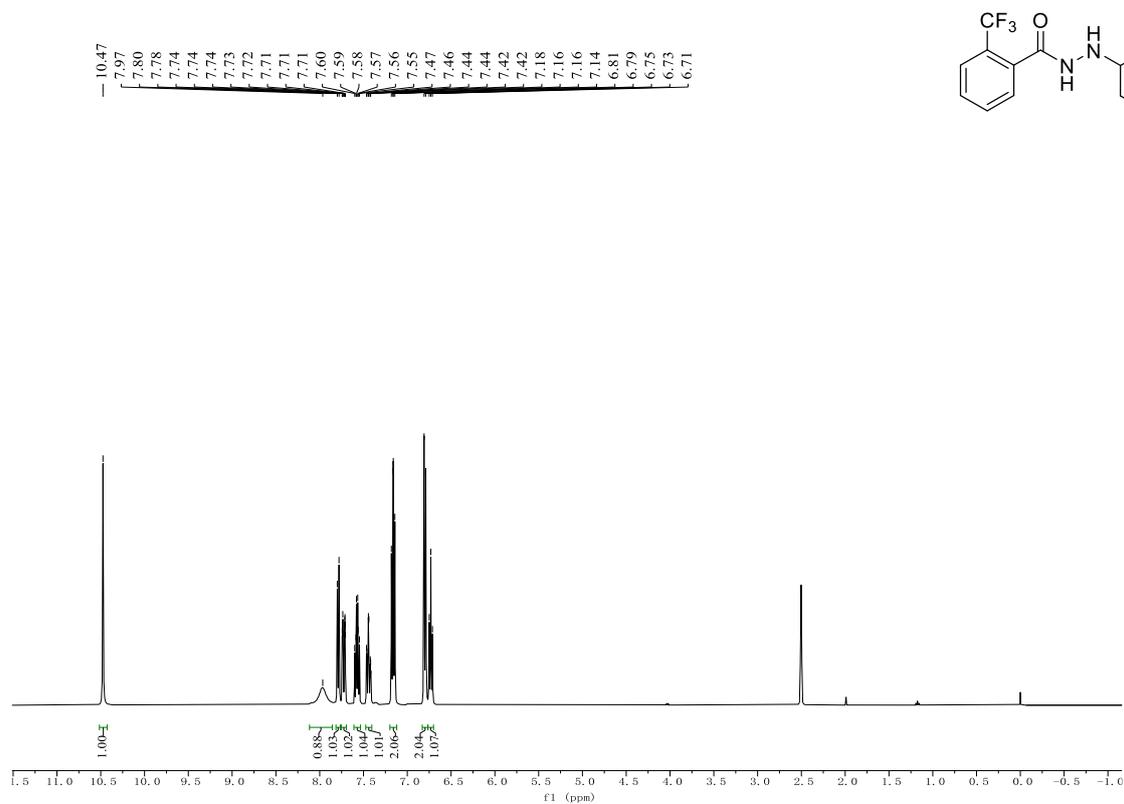
The ^{13}C NMR spectrum of A4.



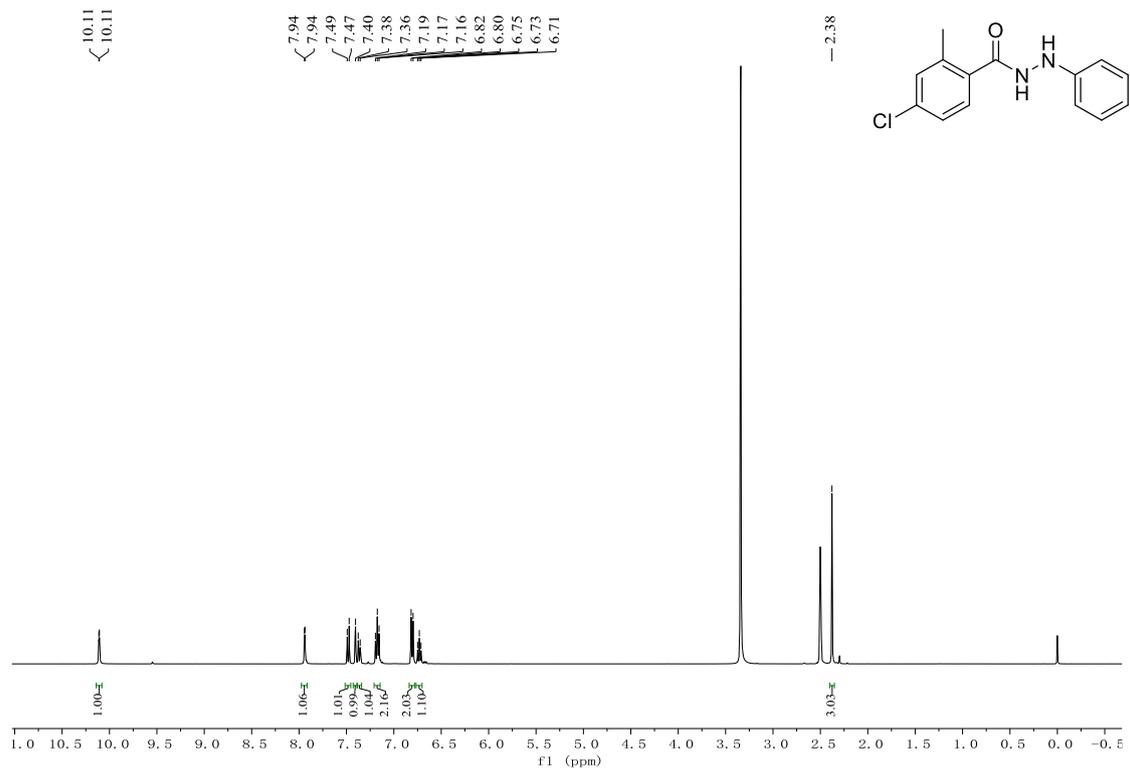
The ^1H NMR spectrum of A5.



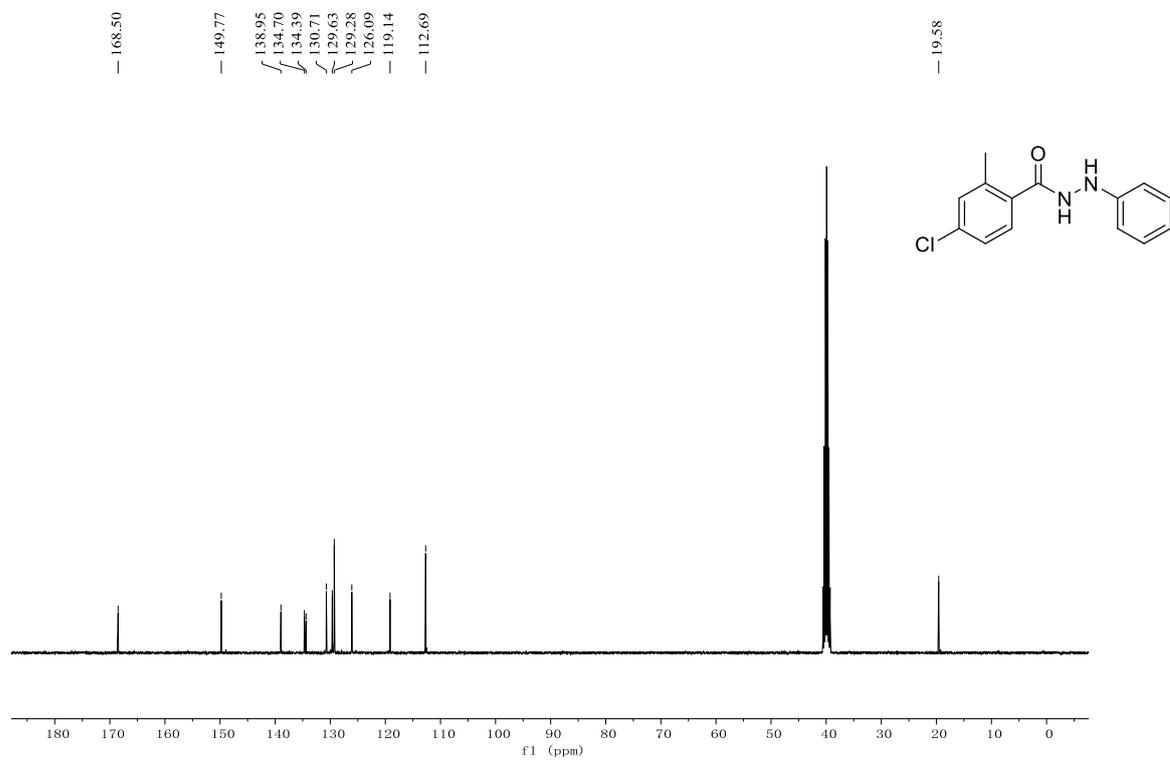
The ^{13}C NMR spectrum of A5.



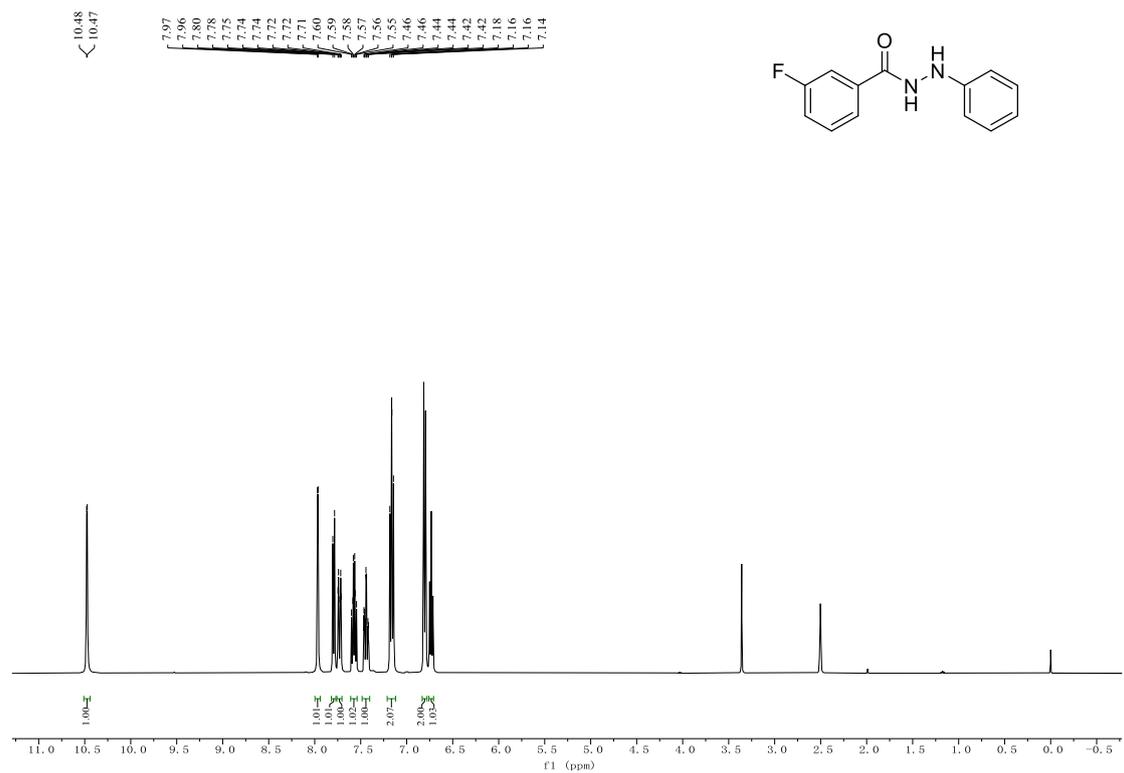
The ^1H NMR spectrum of A6.



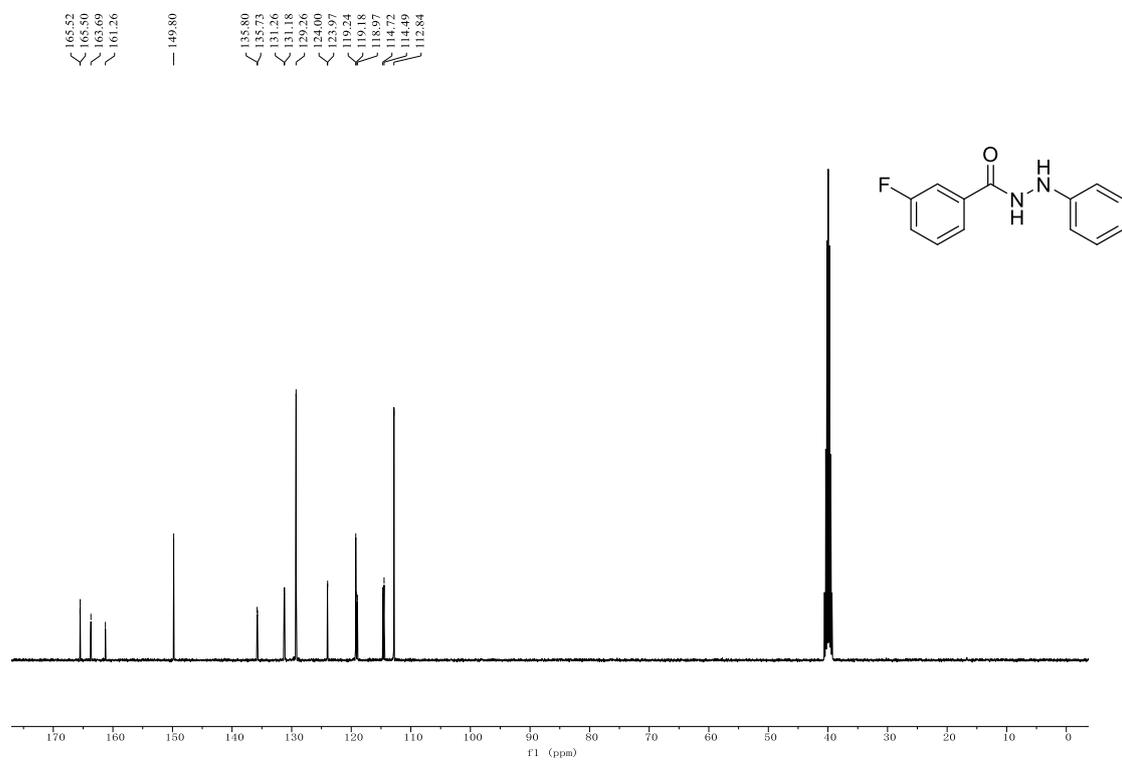
The ^1H NMR spectrum of A7.



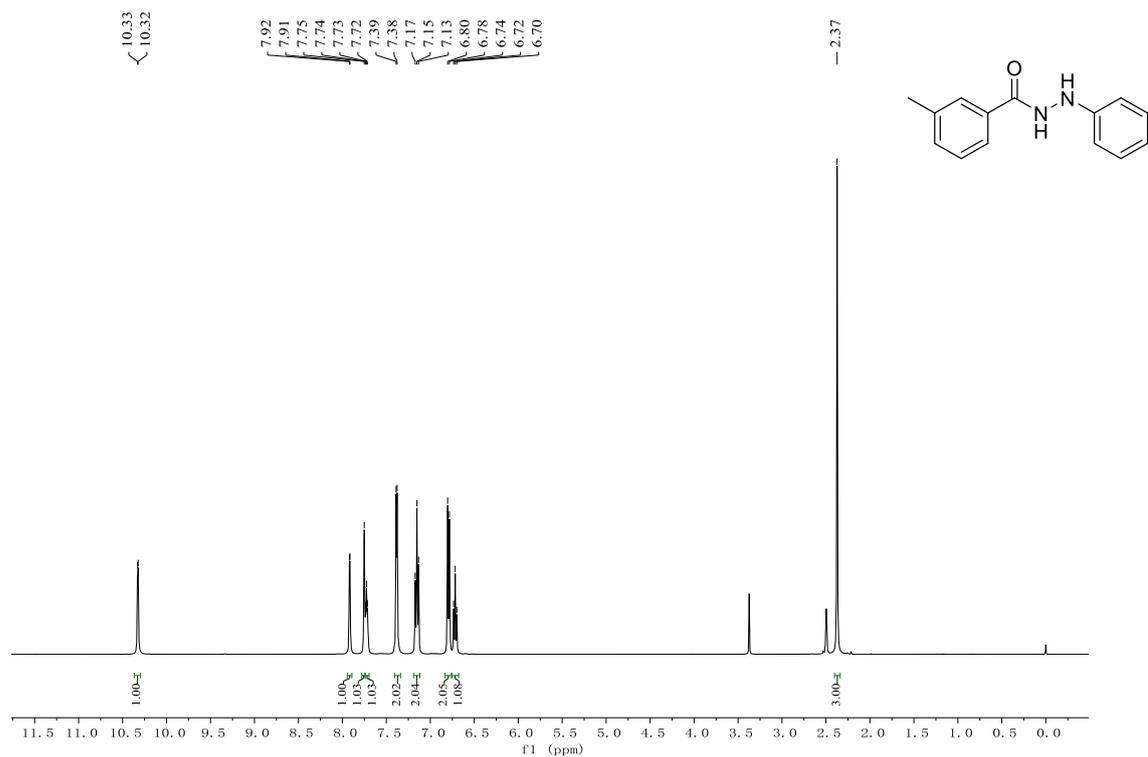
The ^{13}C NMR spectrum of A7.



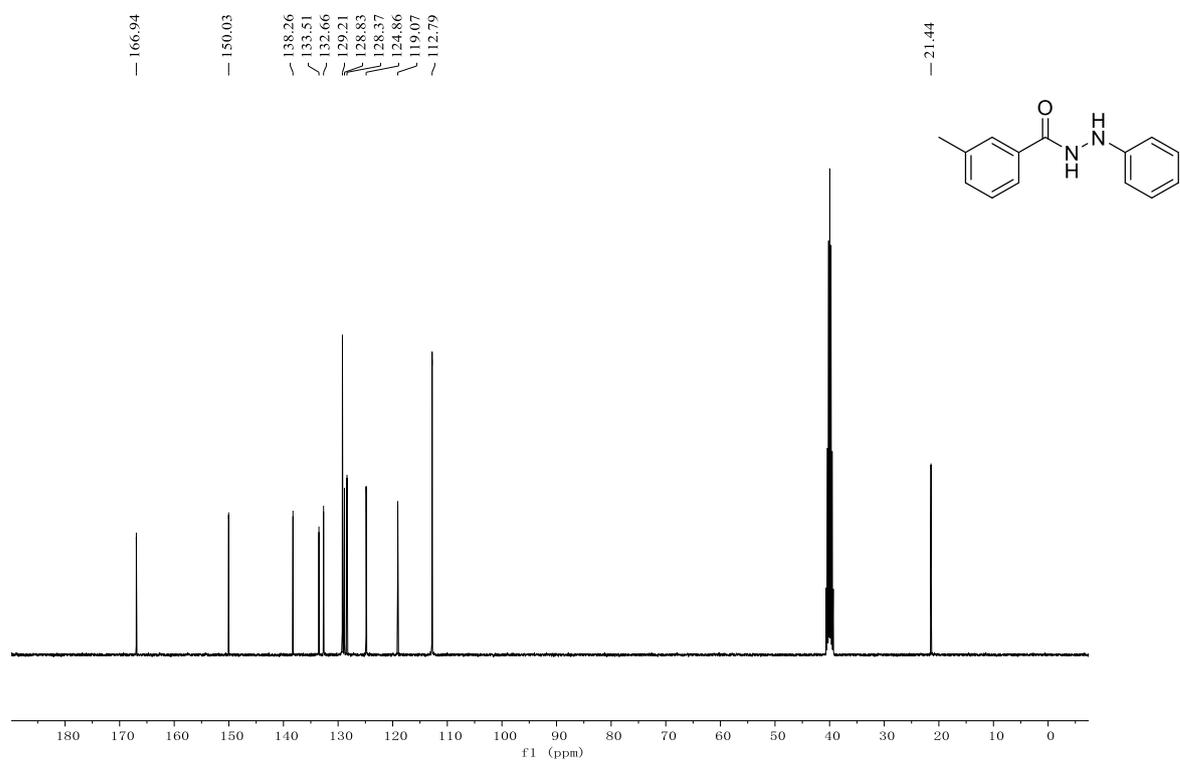
The ¹H NMR spectrum of **A8**.



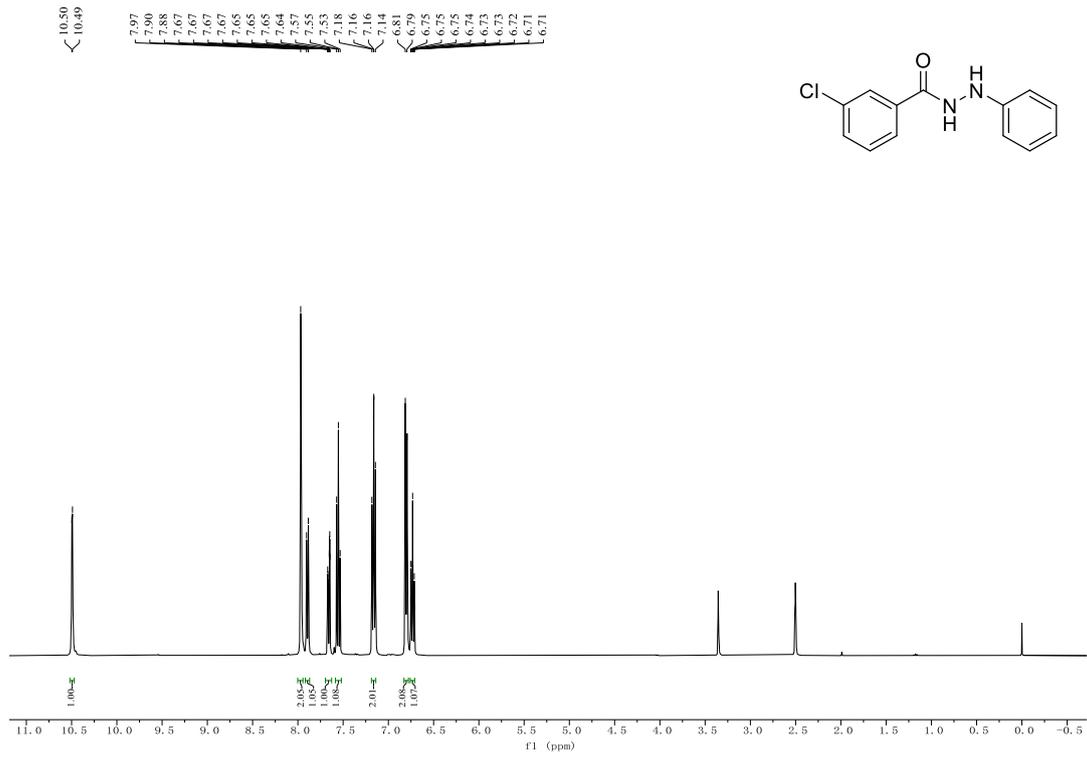
The ¹³C NMR spectrum of **A8**.



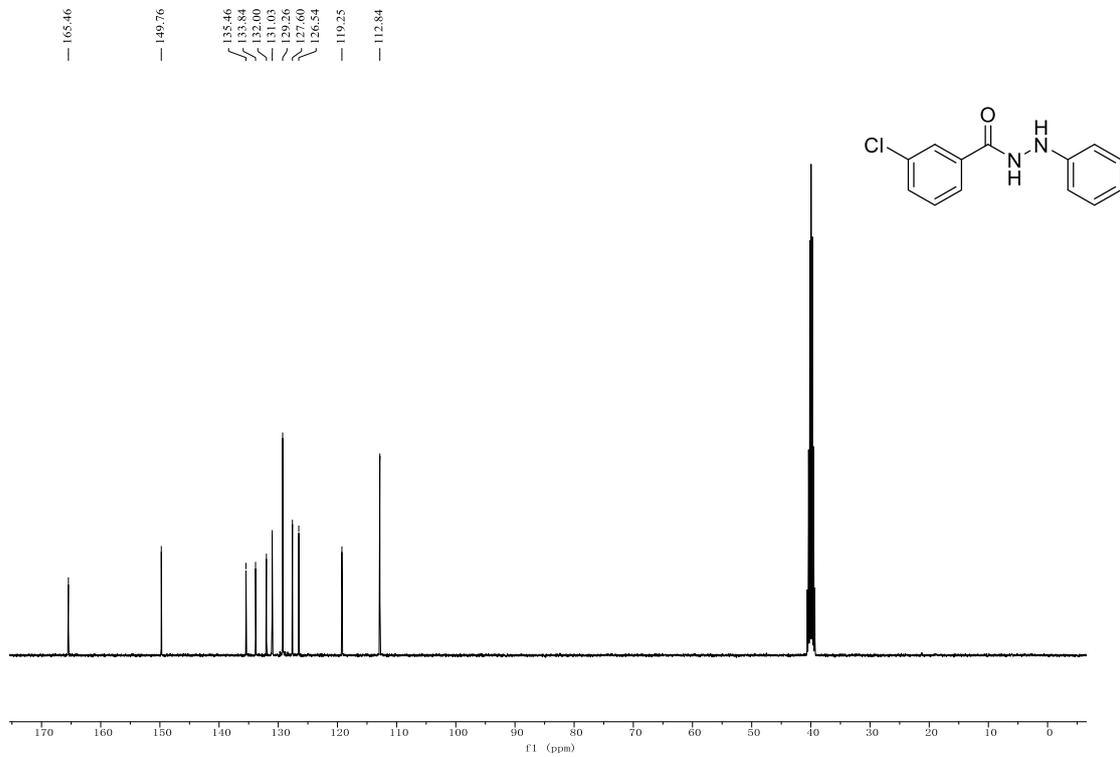
The ¹H NMR spectrum of A₉.



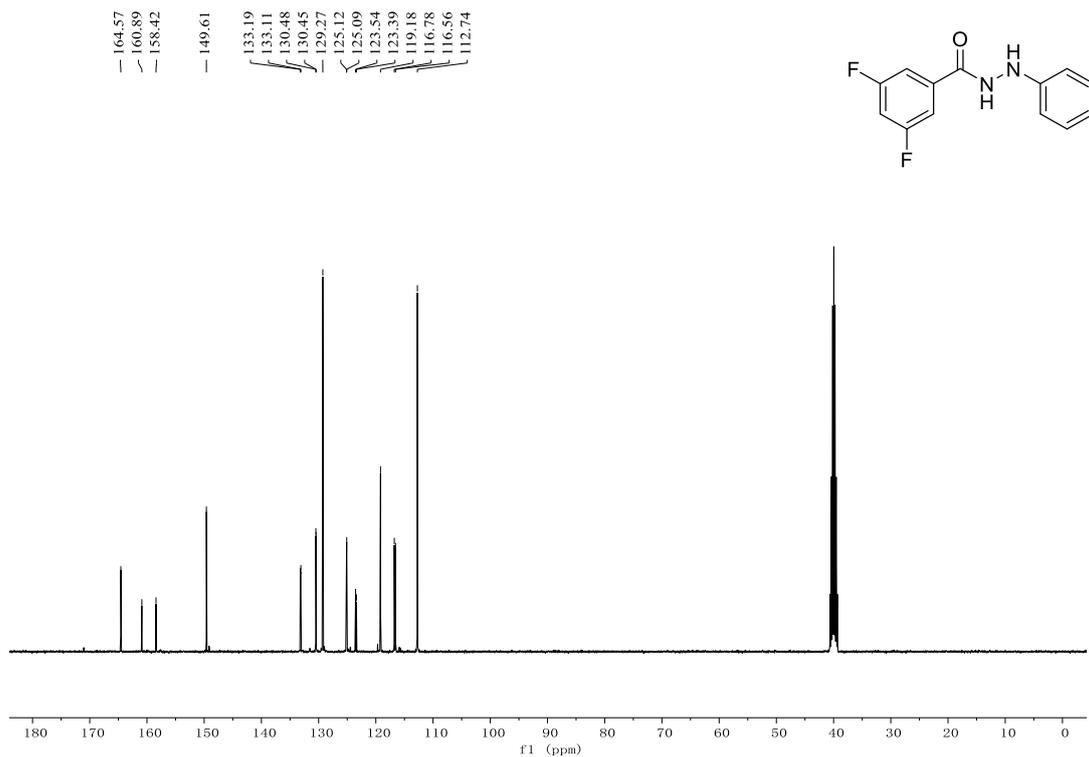
The ¹³C NMR spectrum of A₉.



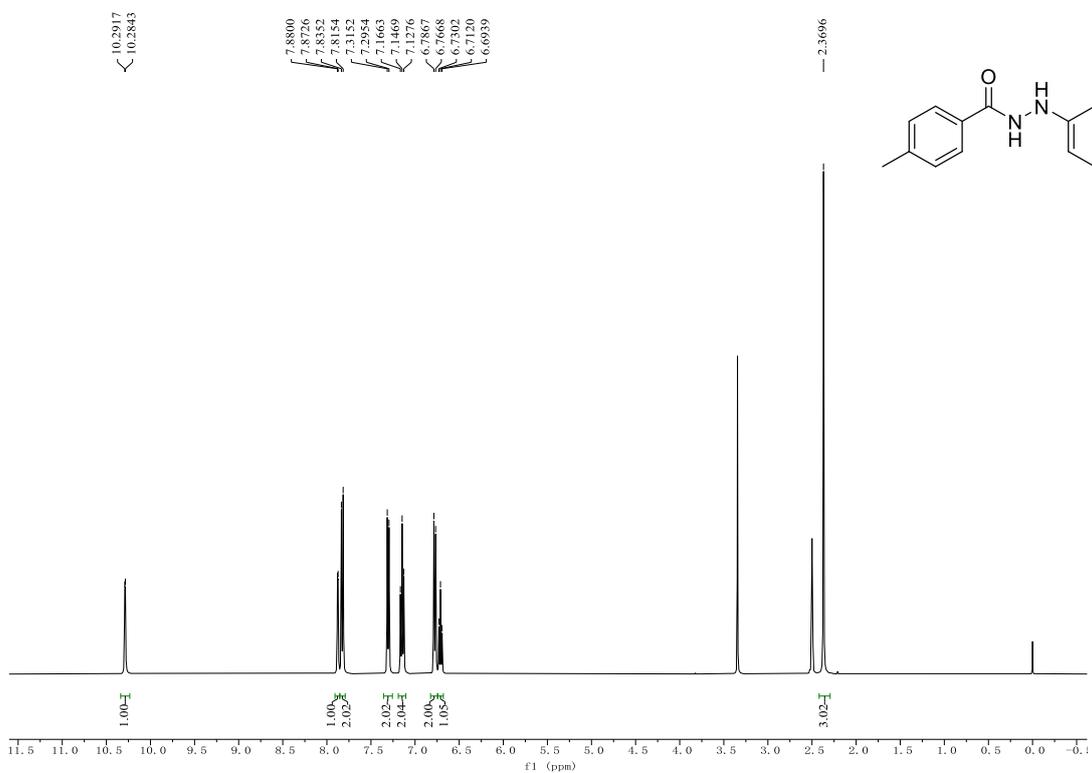
The ^1H NMR spectrum of A₁₀.



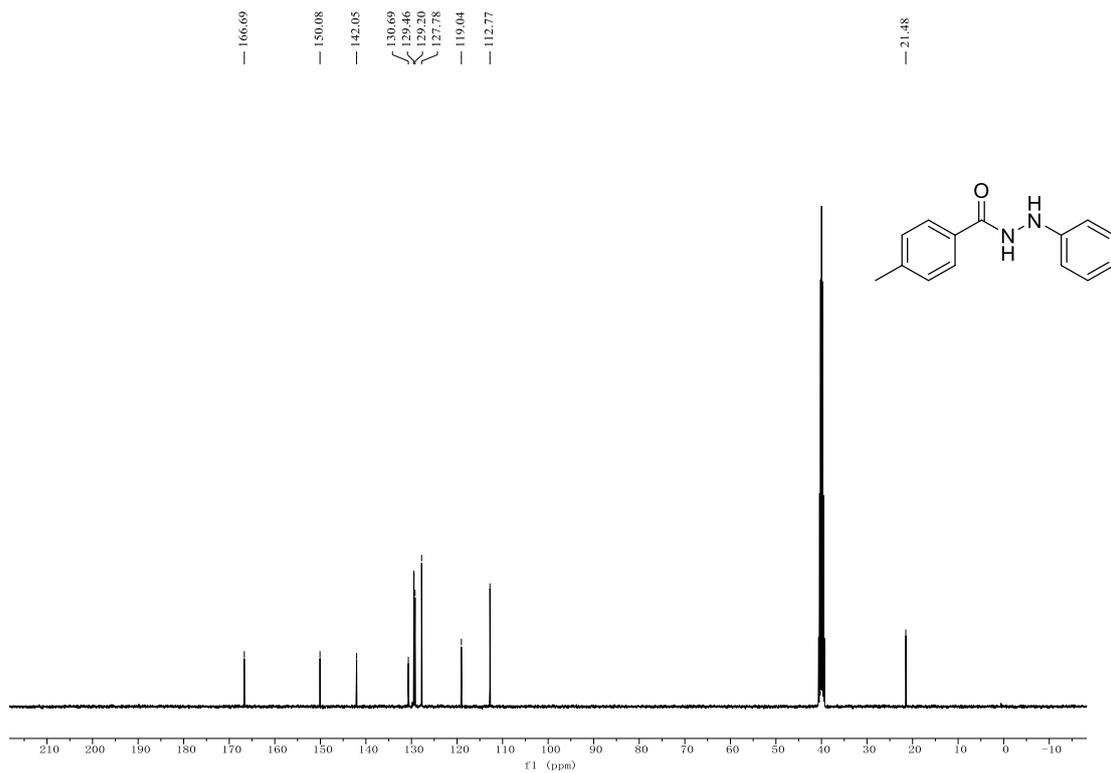
The ^{13}C NMR spectrum of A₁₀.



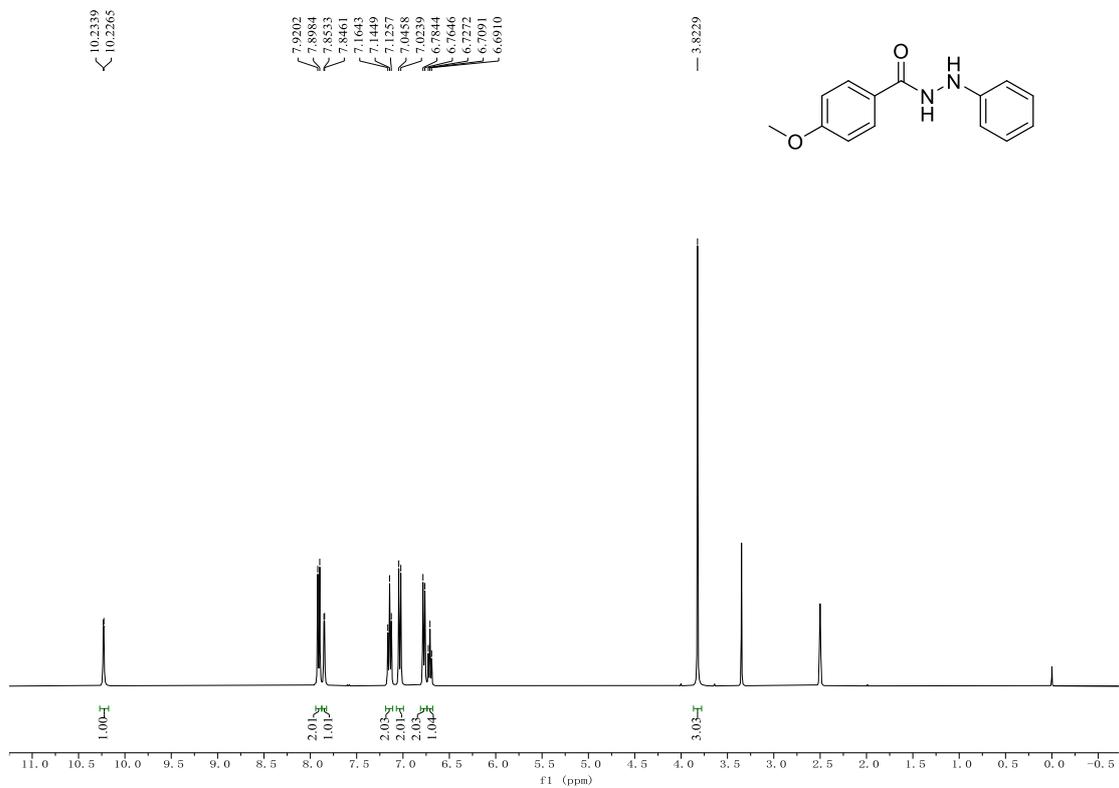
The ^{13}C NMR spectrum of A12.



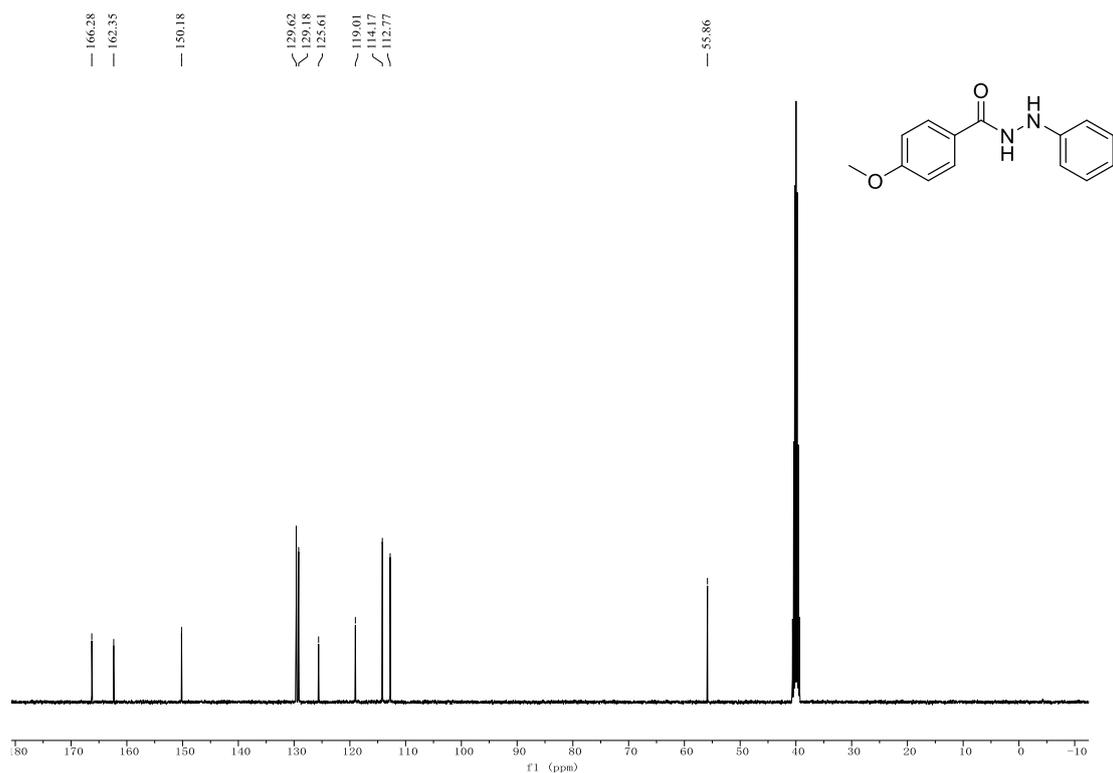
The ^1H NMR spectrum of A13.



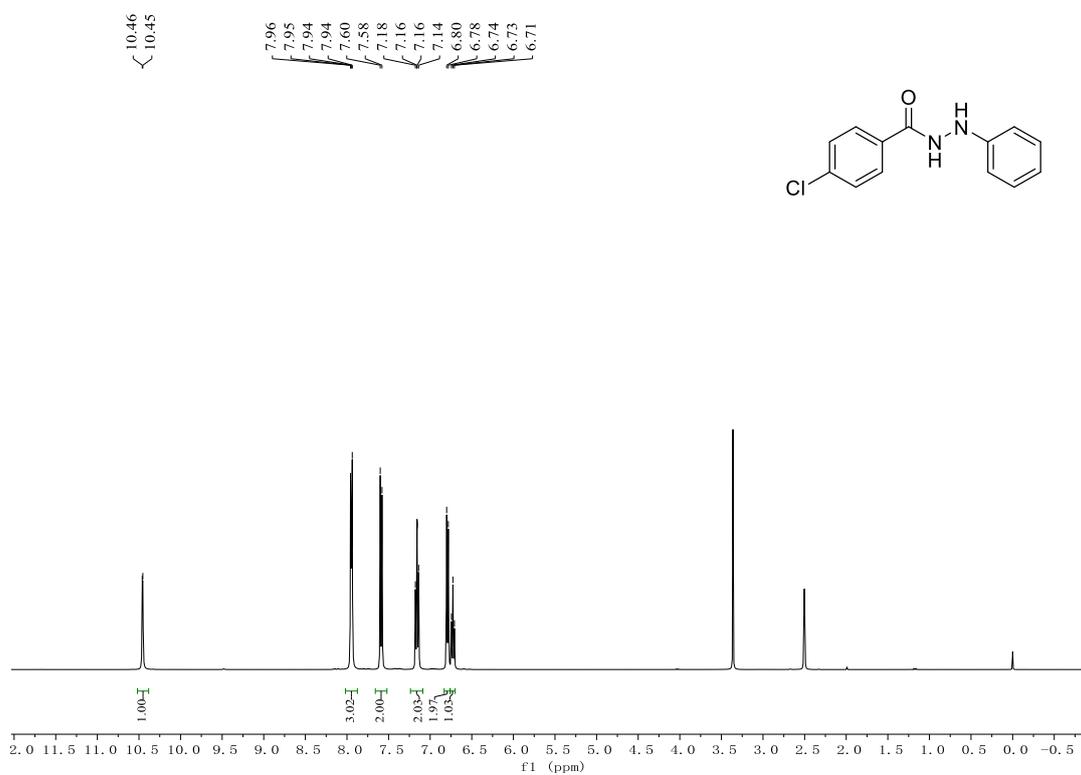
The ^{13}C NMR spectrum of **A13**.



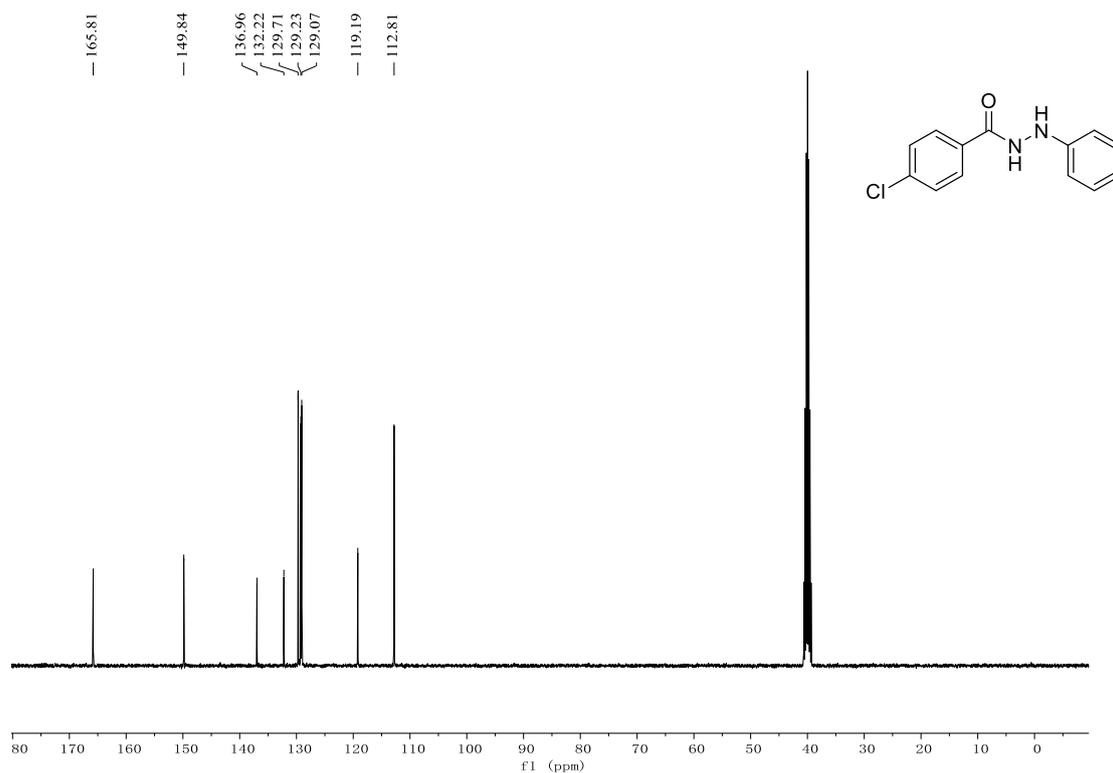
The ^1H NMR spectrum of **A14**.



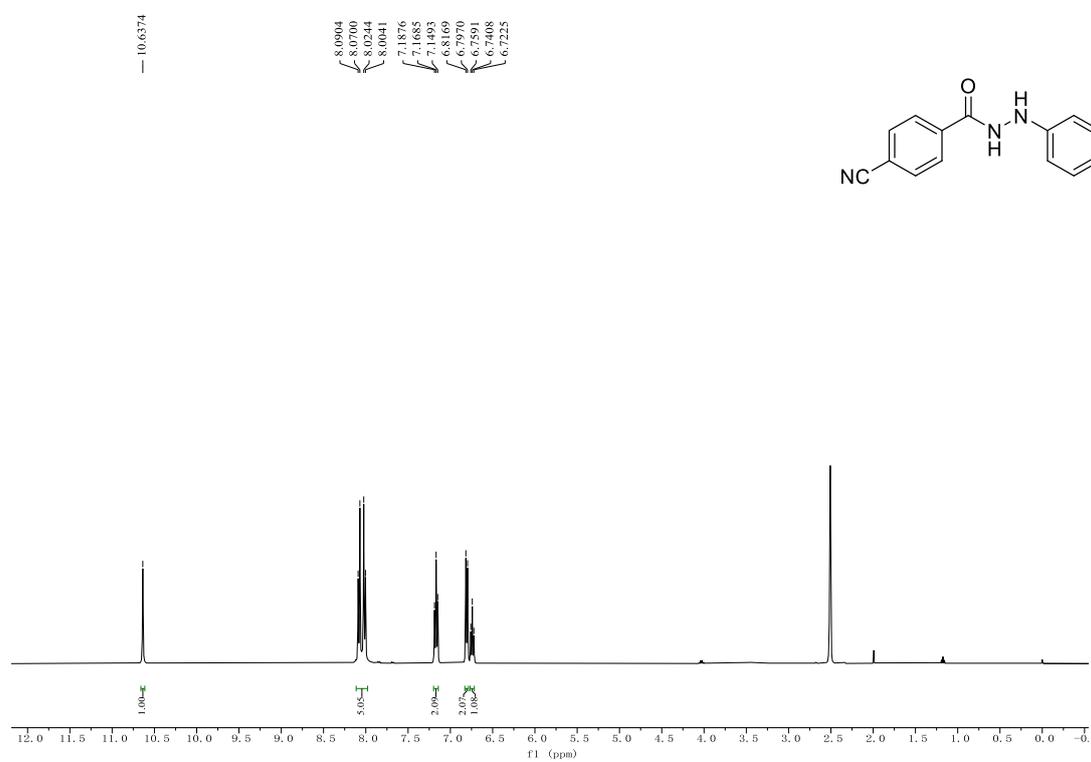
The ^{13}C NMR spectrum of A14.



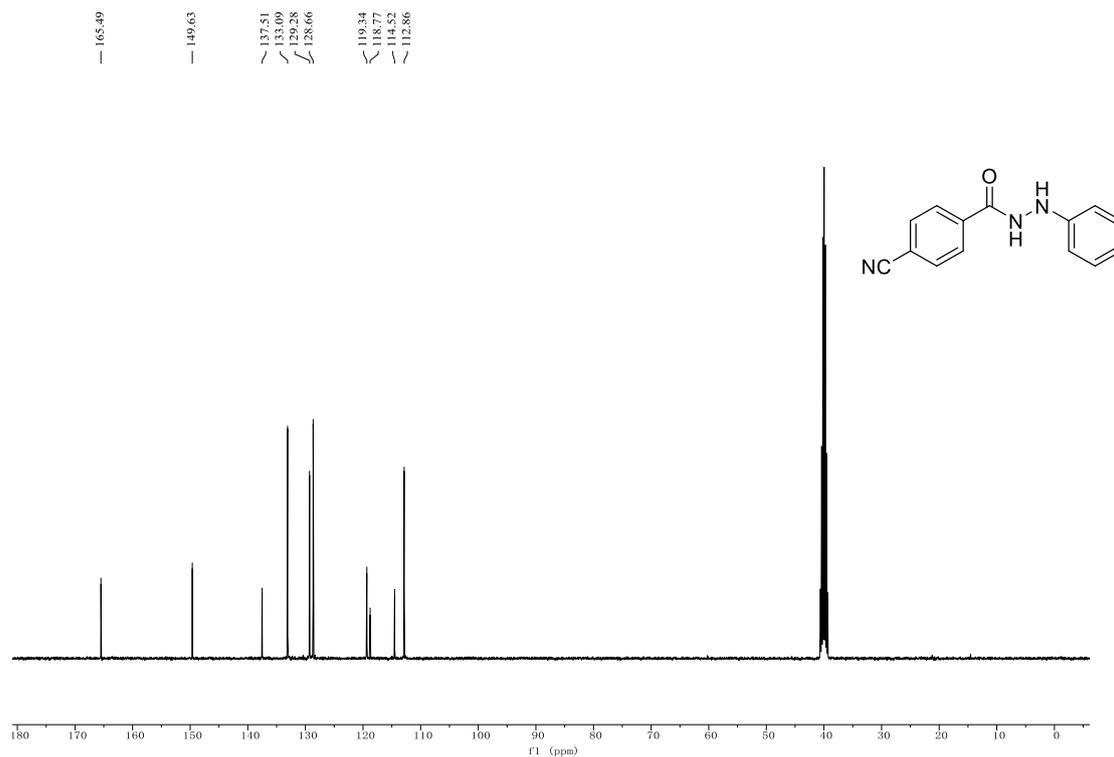
The ^1H NMR spectrum of A15.



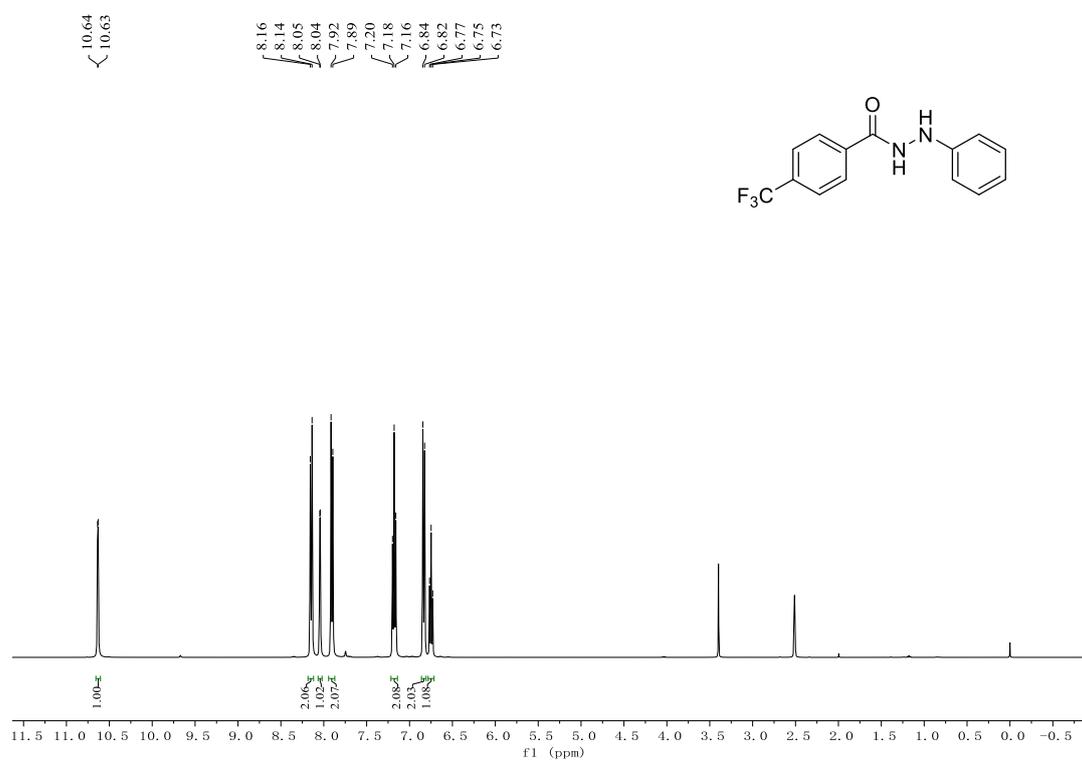
The ^{13}C NMR spectrum of A15.



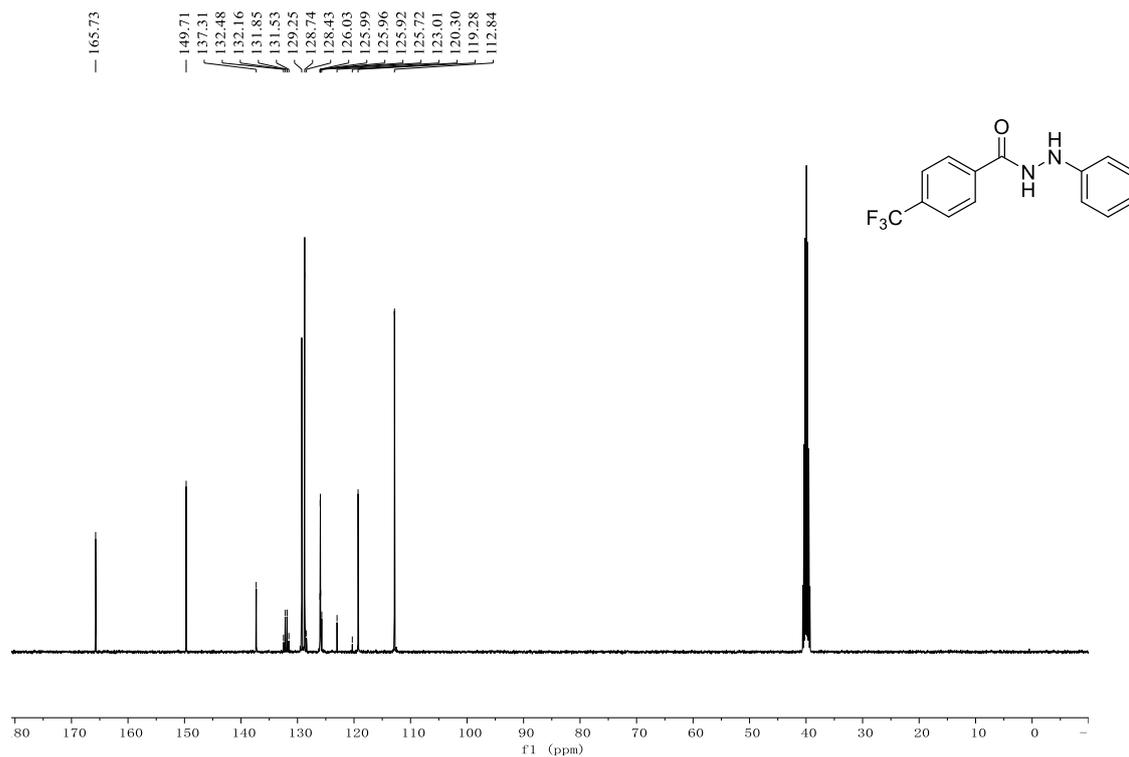
The ^1H NMR spectrum of A16.



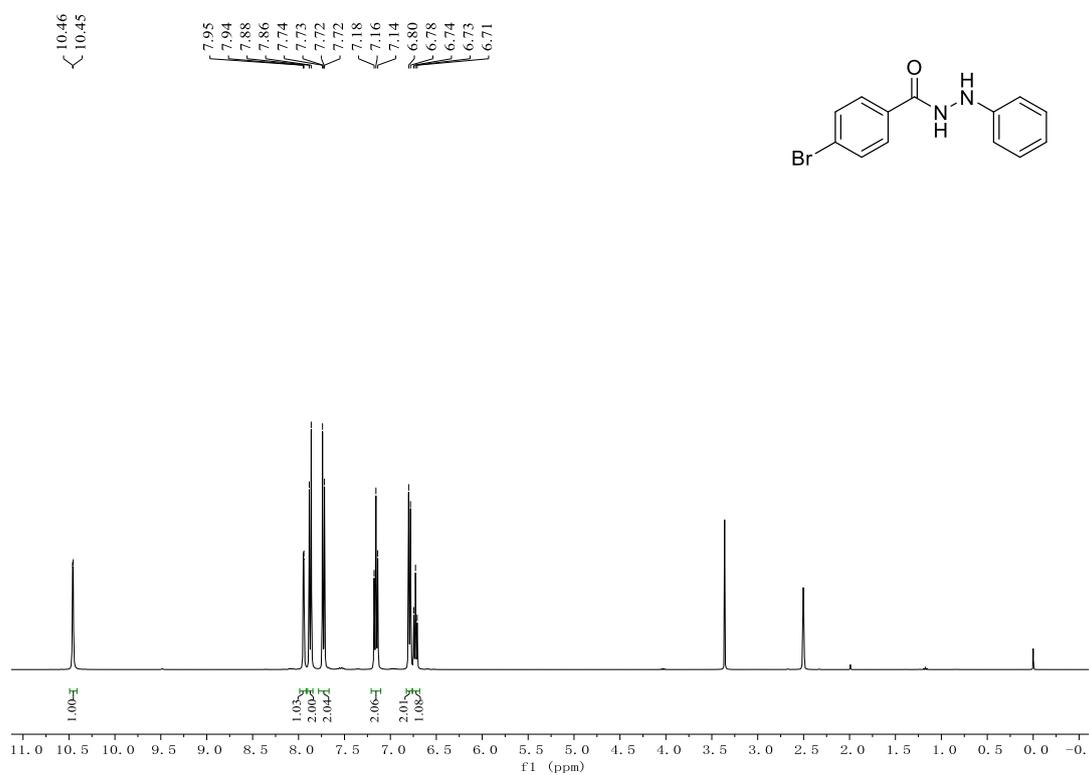
The ^{13}C NMR spectrum of A16.



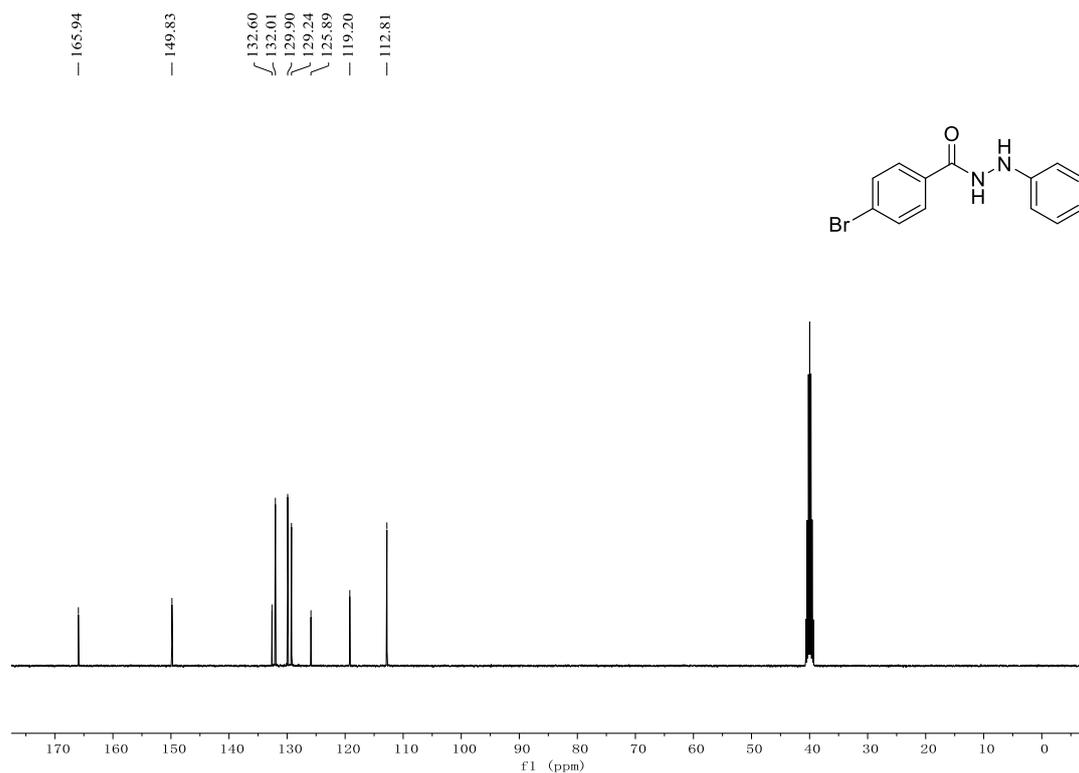
The ^1H NMR spectrum of A17.



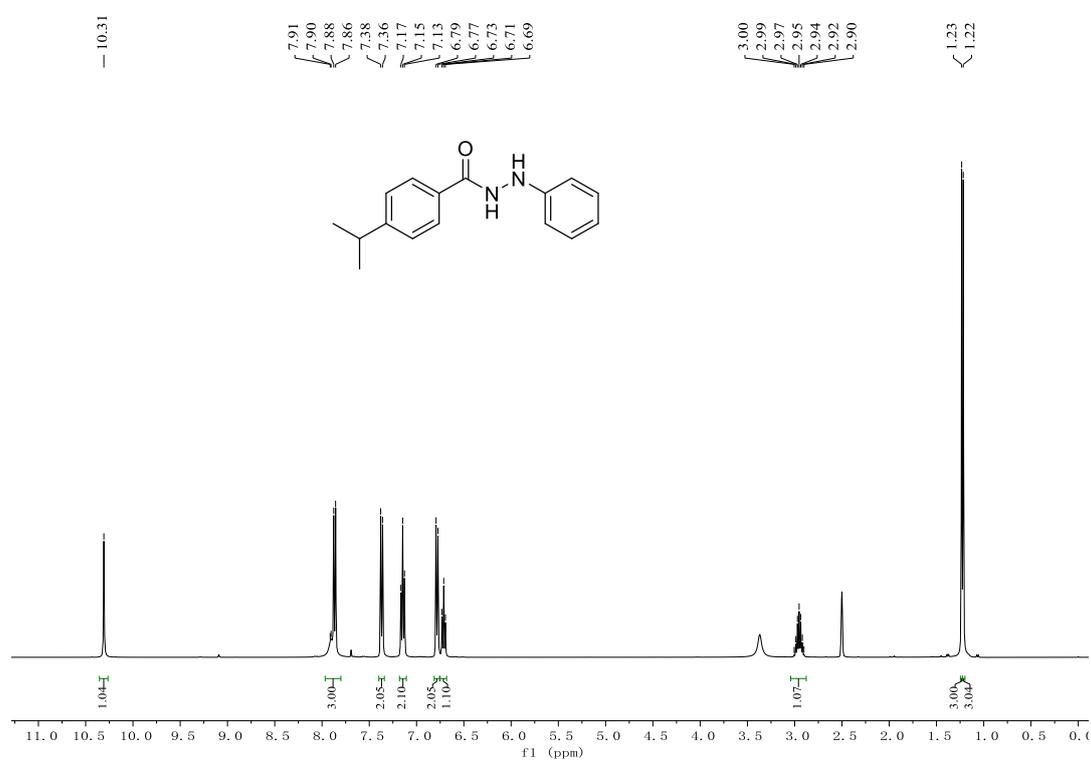
The ^{13}C NMR spectrum of A17.



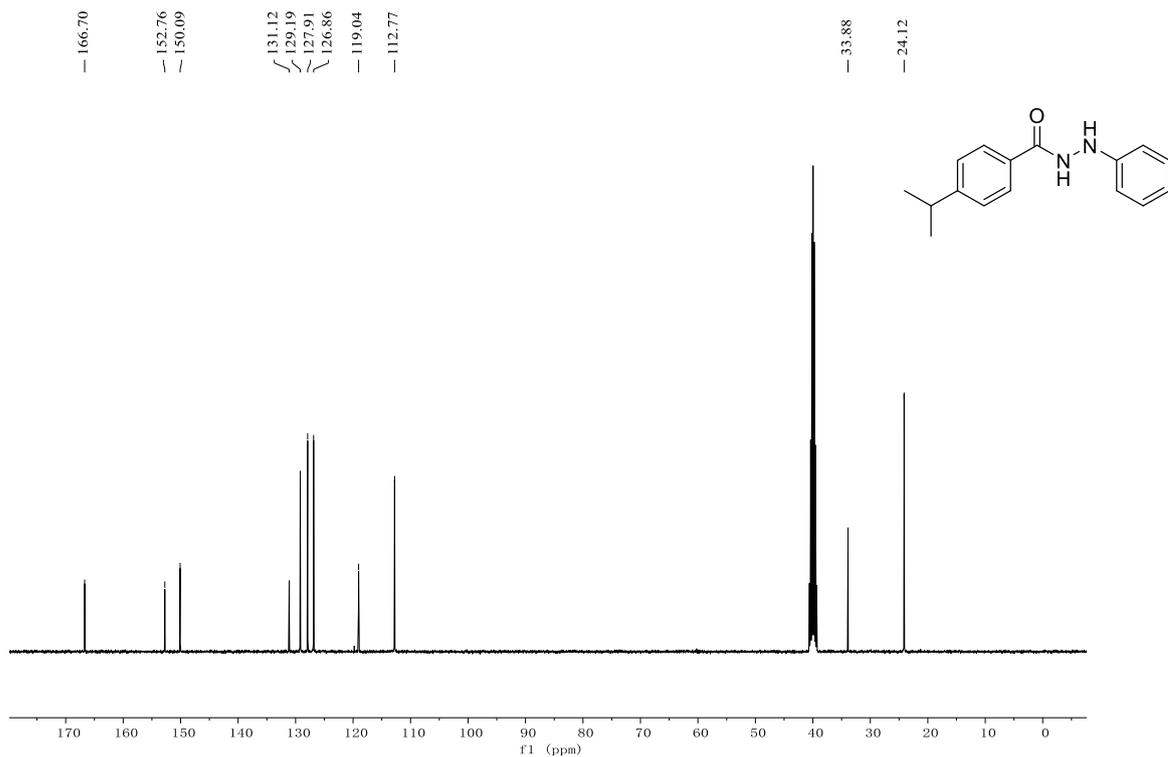
The ^1H NMR spectrum of A18.



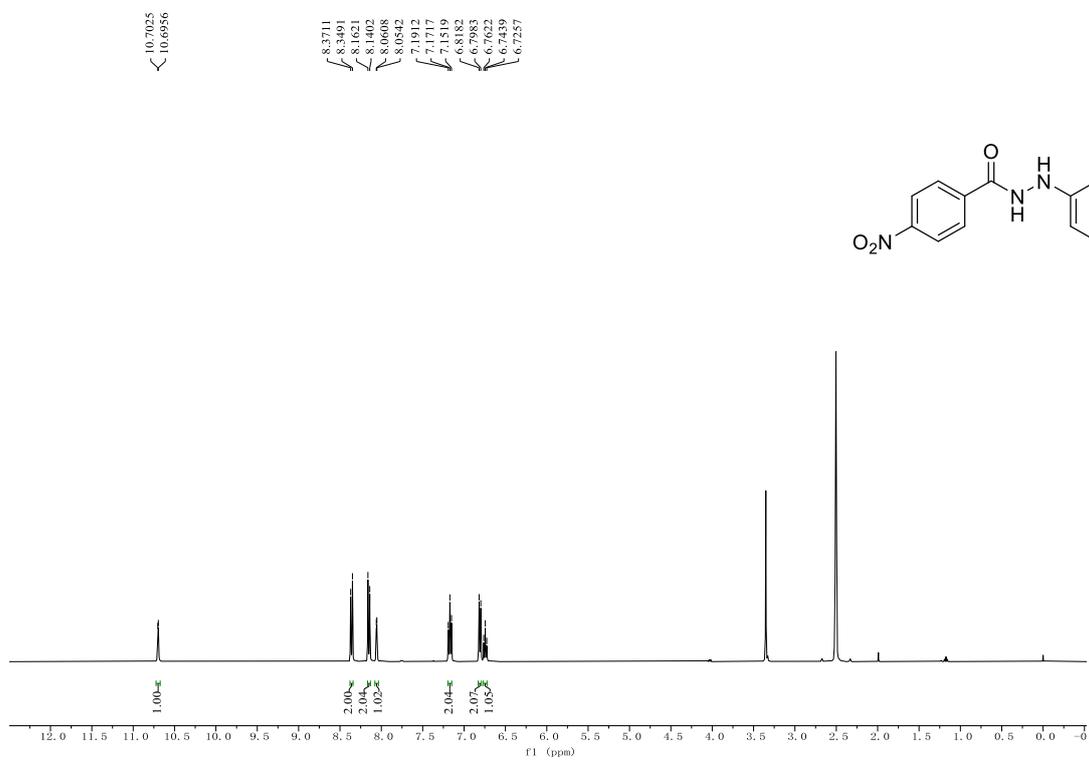
The ^{13}C NMR spectrum of A18.



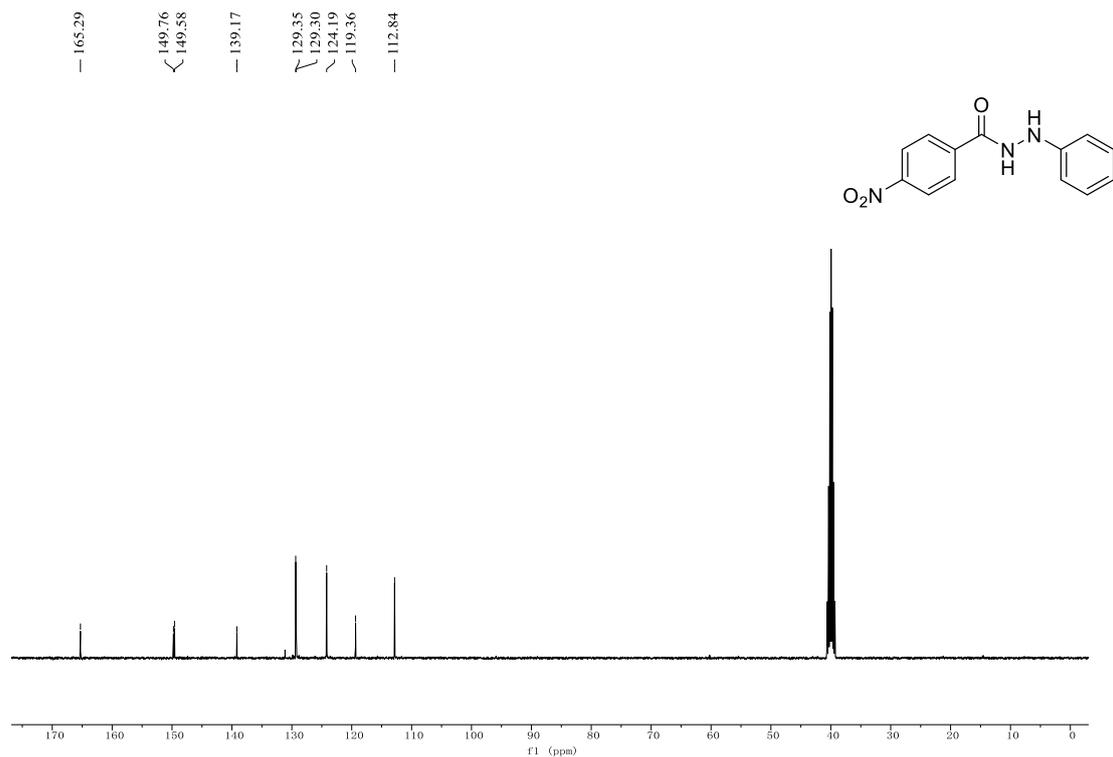
The ^1H NMR spectrum of A19.



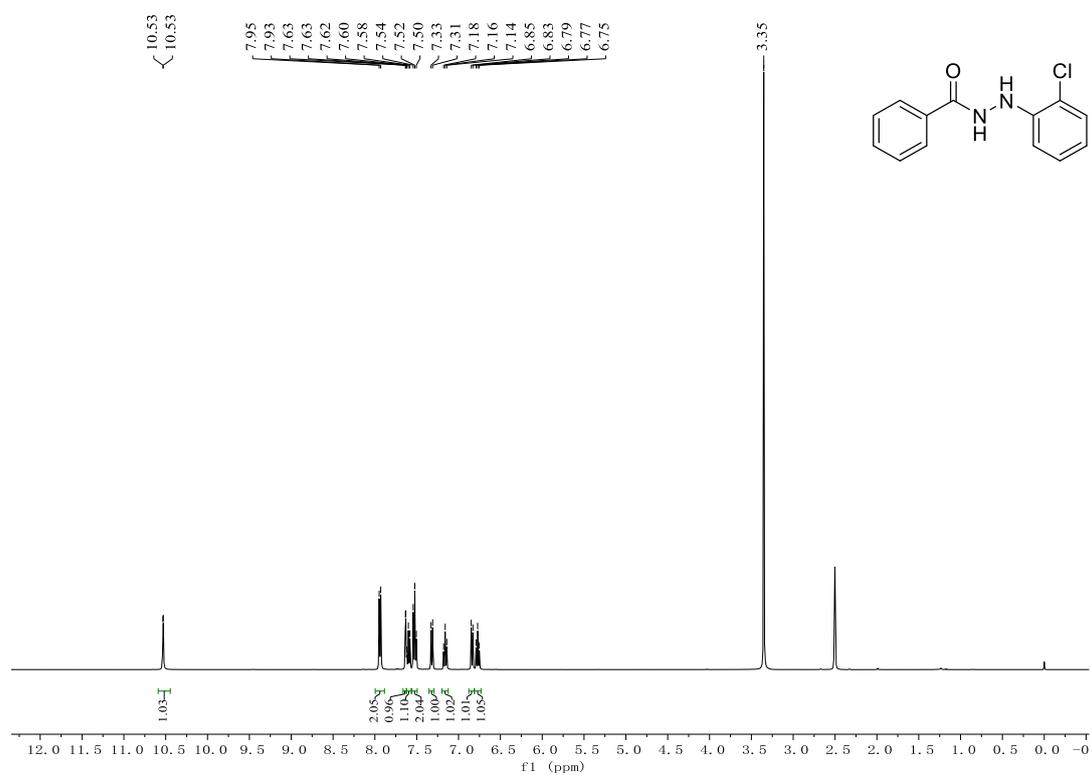
The ^{13}C NMR spectrum of A19.



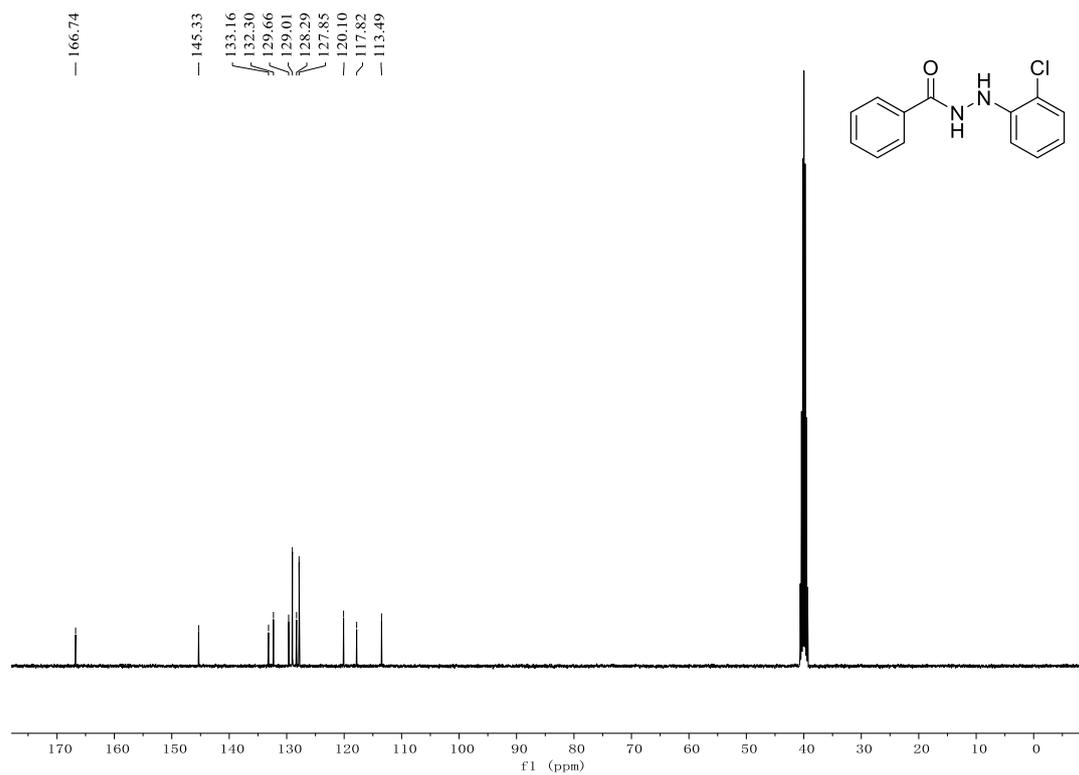
The ^1H NMR spectrum of A20.



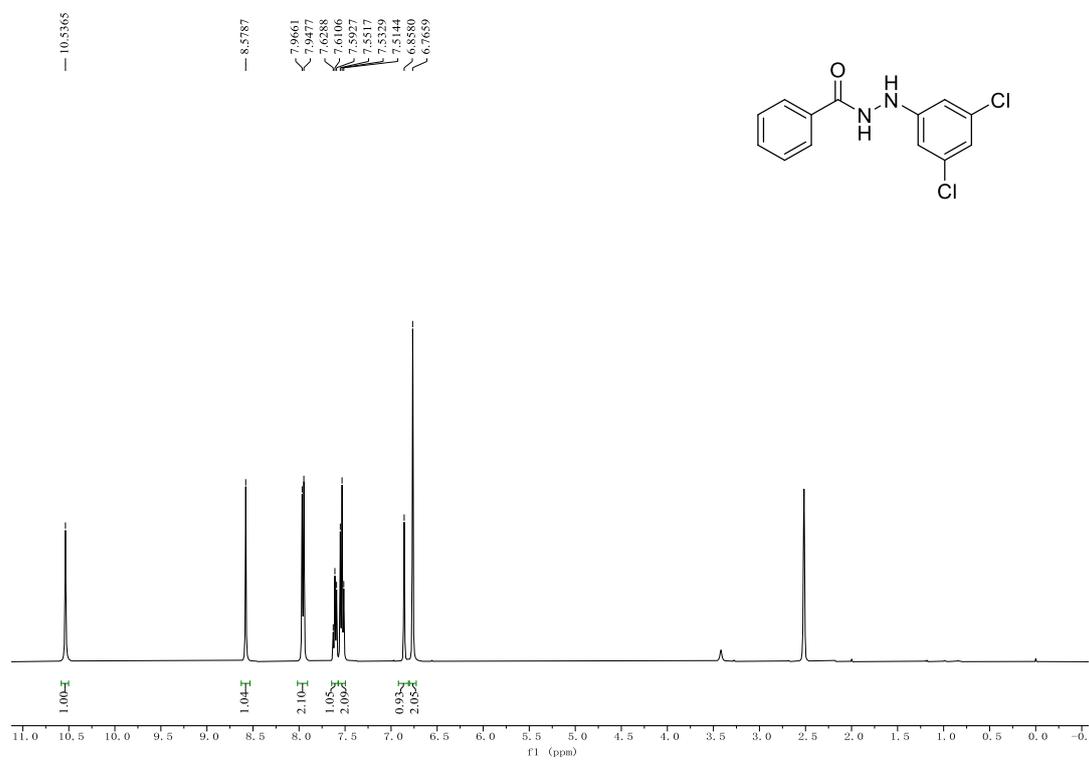
The ^{13}C NMR spectrum of A₂₀.



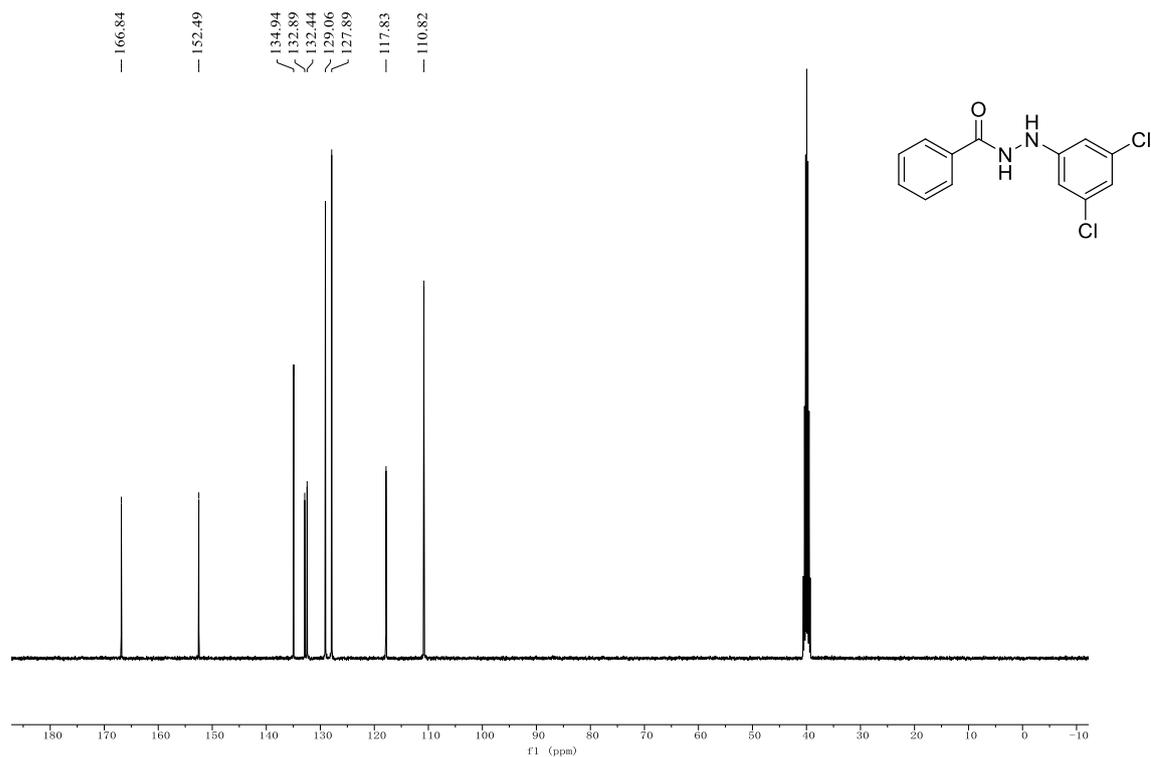
The ^1H NMR spectrum of B₁.



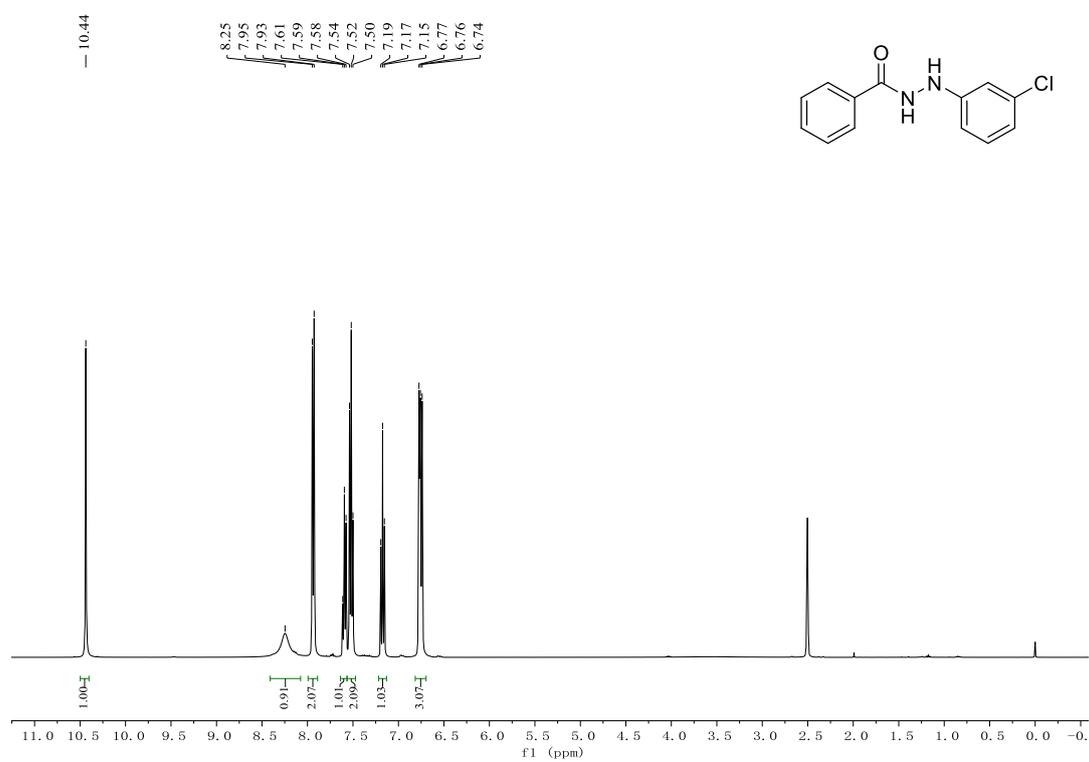
The ¹³C NMR spectrum of **B1**.



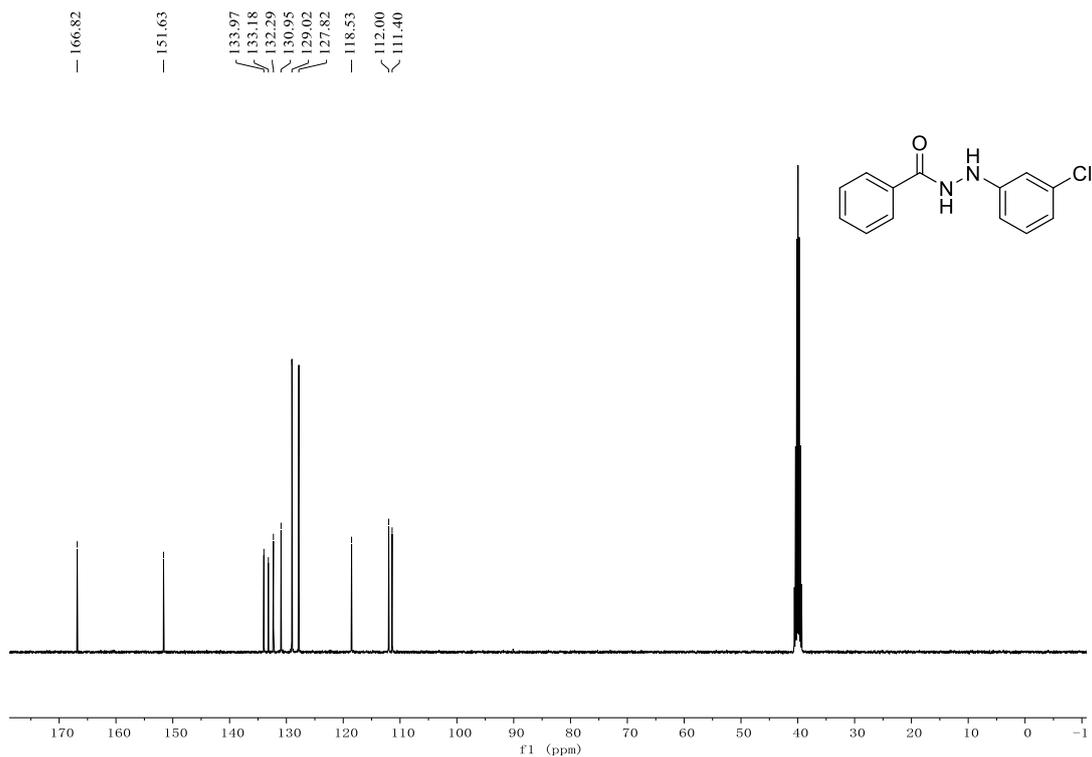
The ¹H NMR spectrum of **B2**.



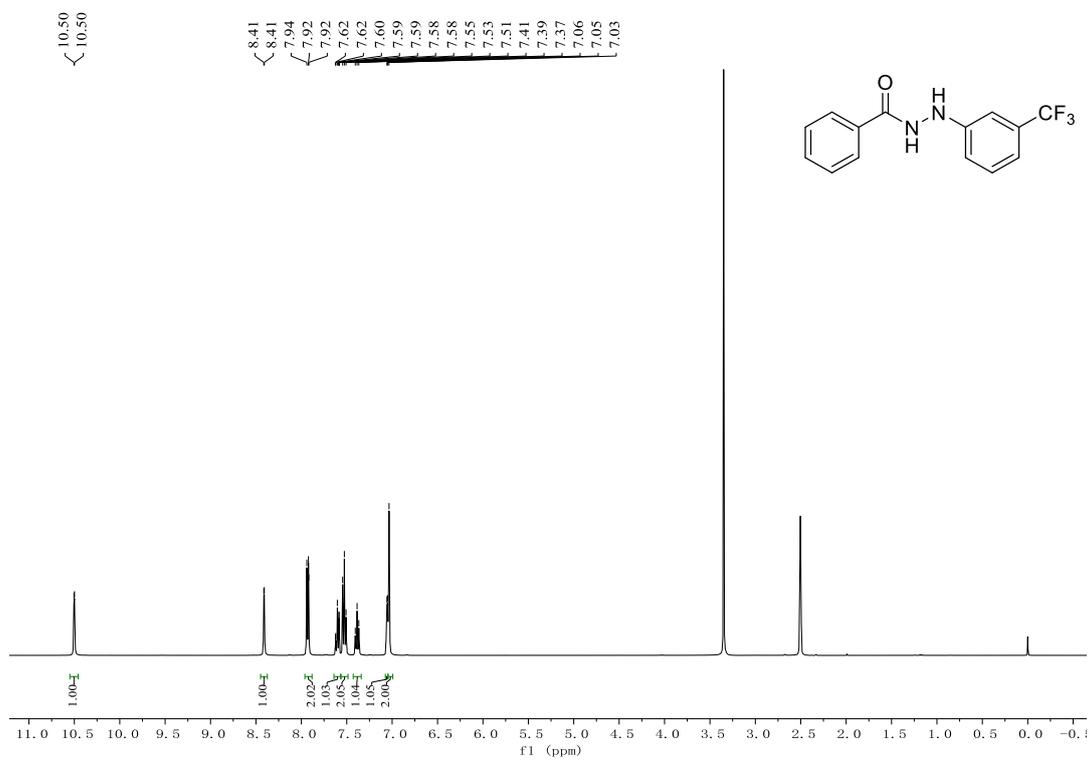
The ^{13}C NMR spectrum of B₂.



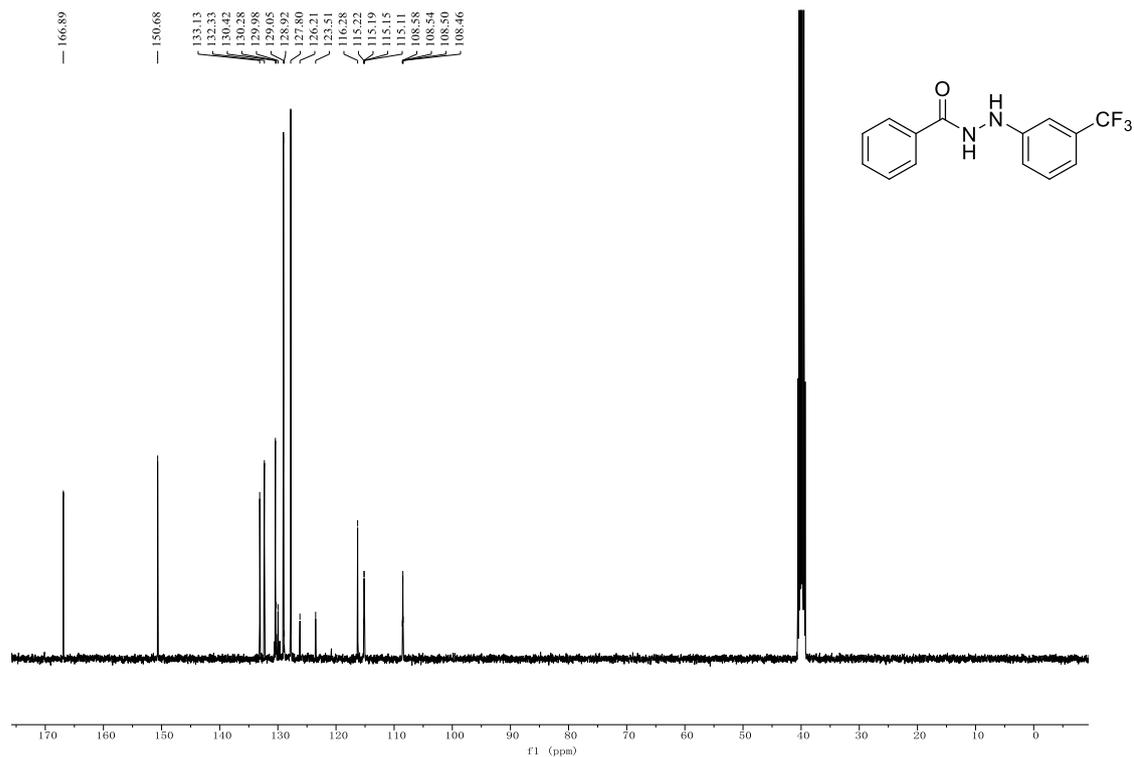
The ^1H NMR spectrum of B₃.



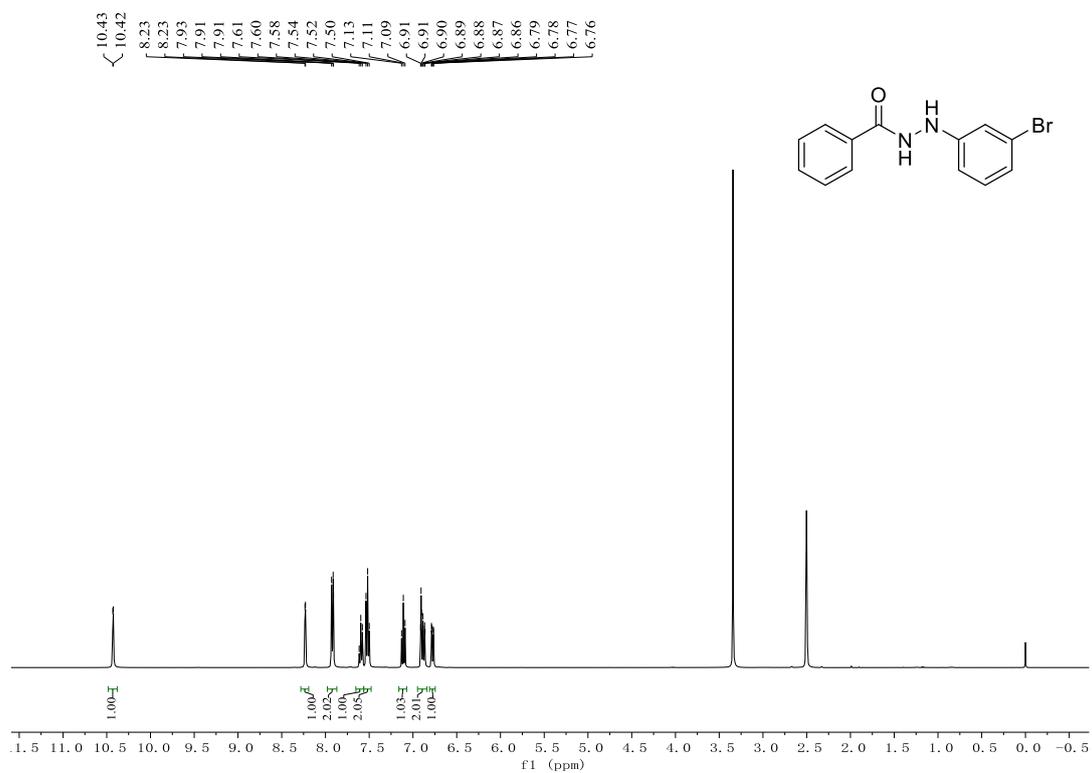
The ^{13}C NMR spectrum of B₃.



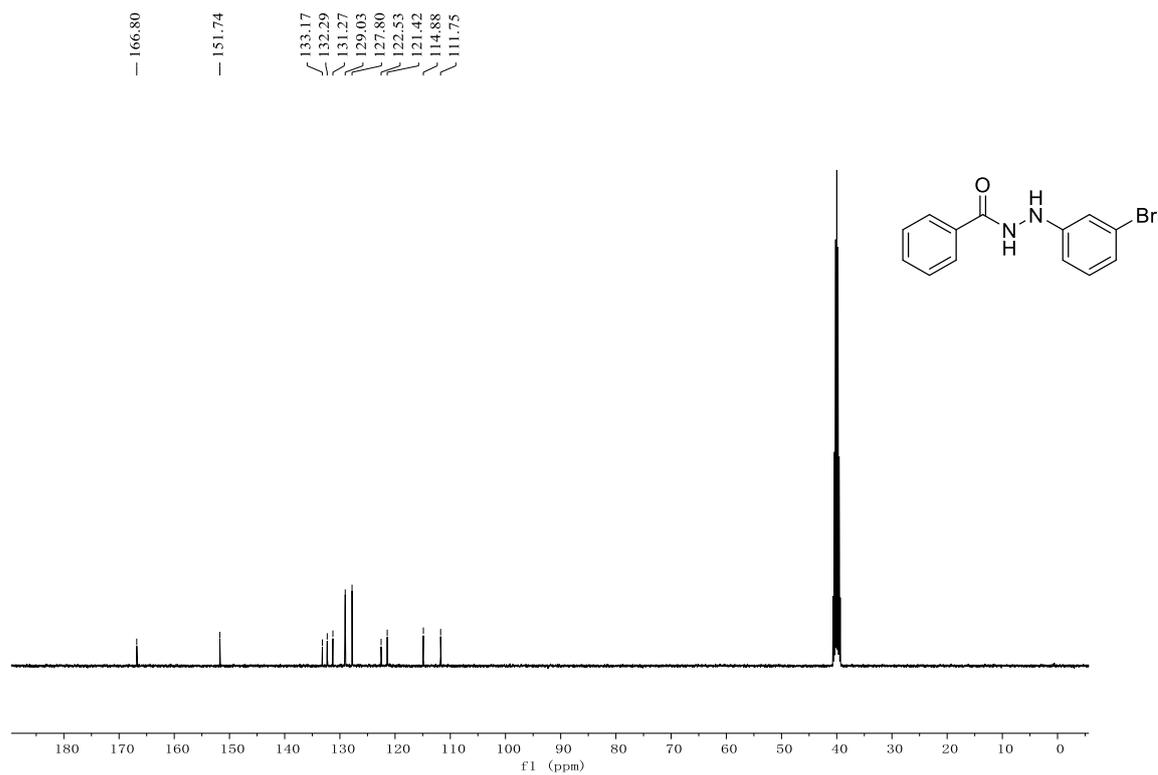
The ^1H NMR spectrum of B₄.



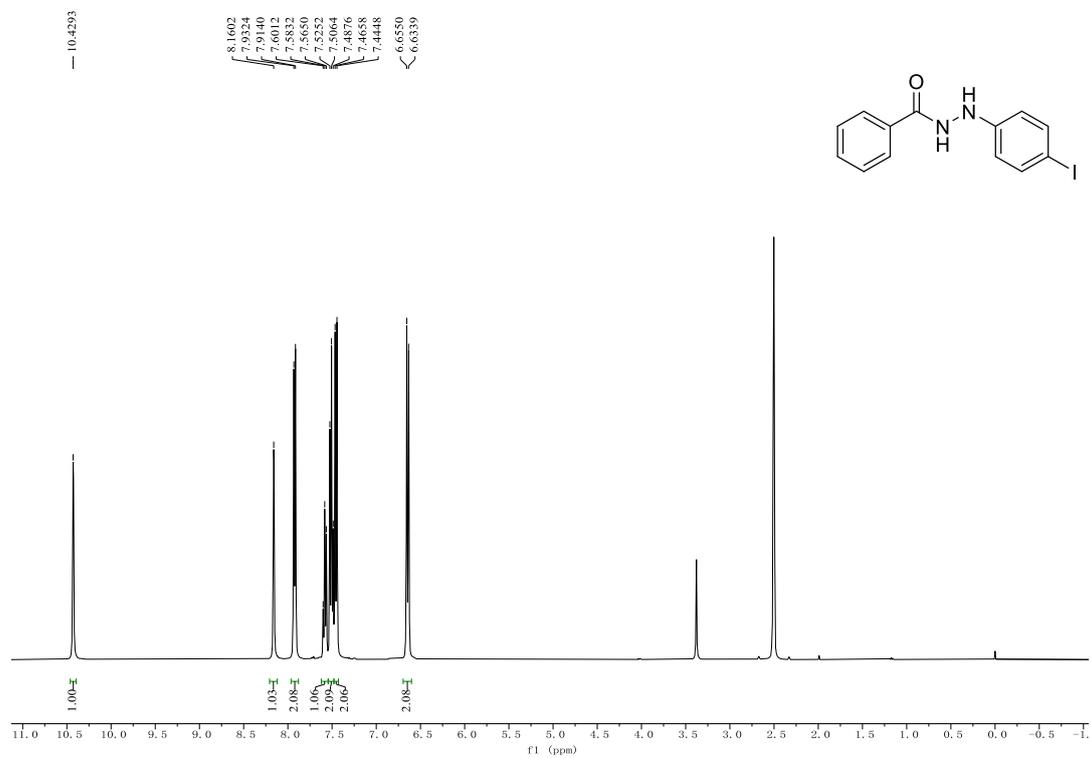
The ^{13}C NMR of **B4**.



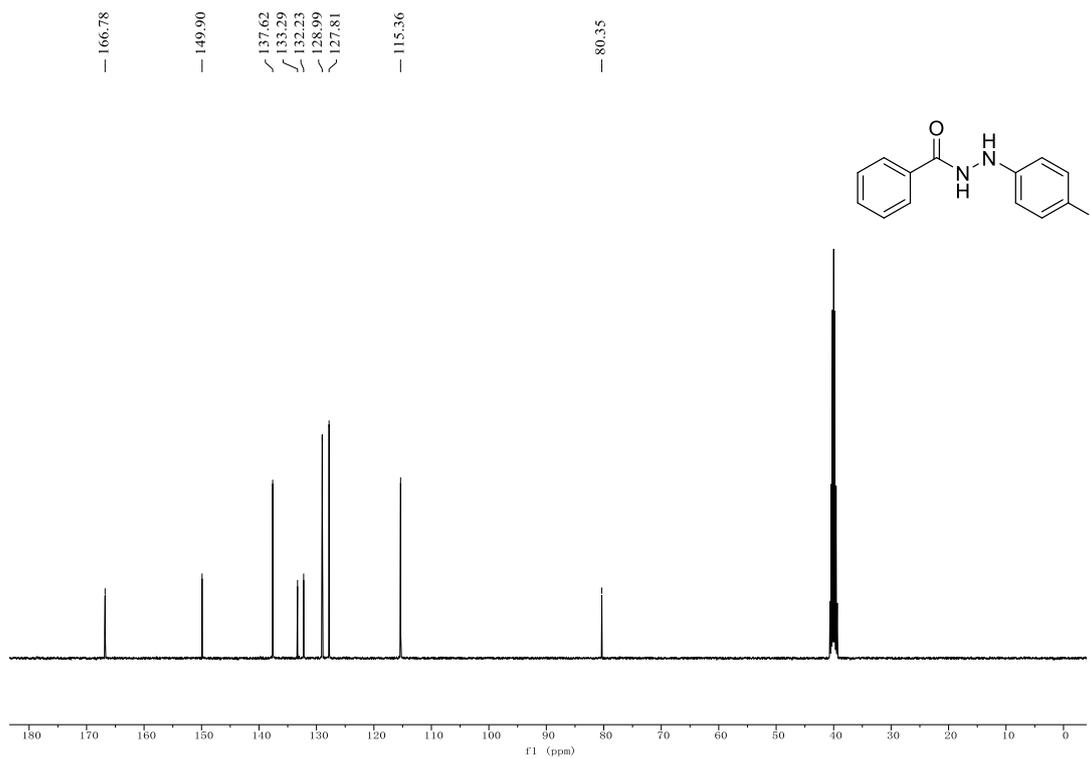
The ^1H NMR spectrum of **B5**.



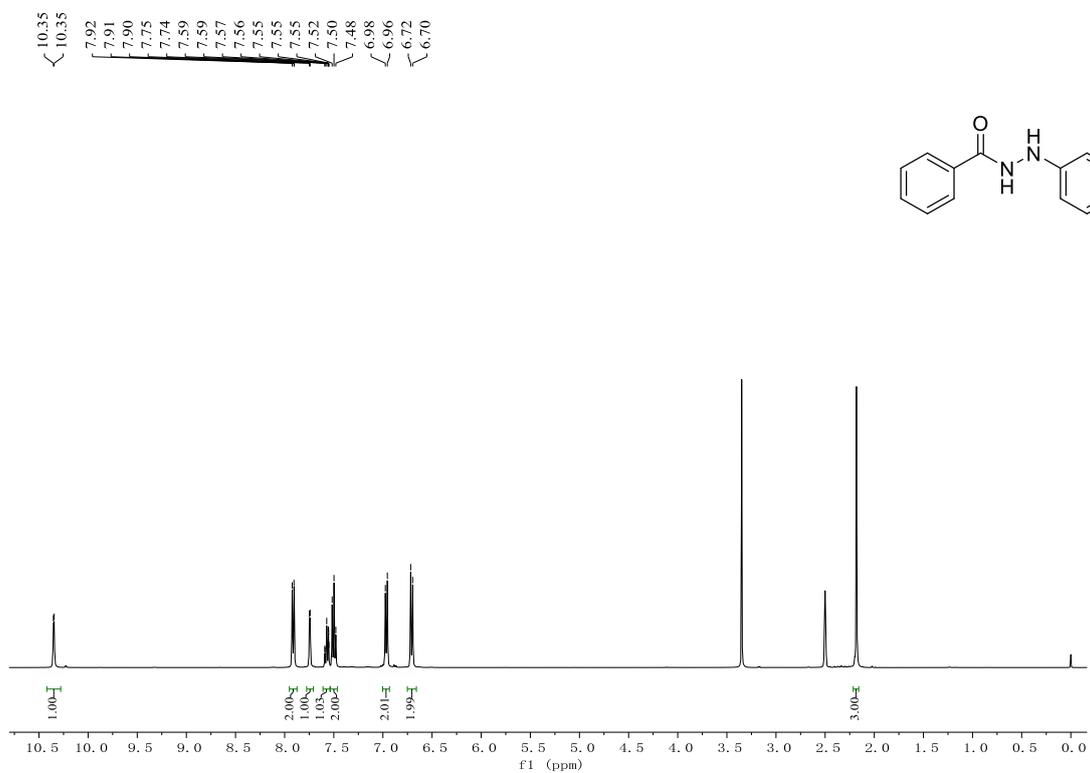
The ^{13}C NMR spectrum of B₅.



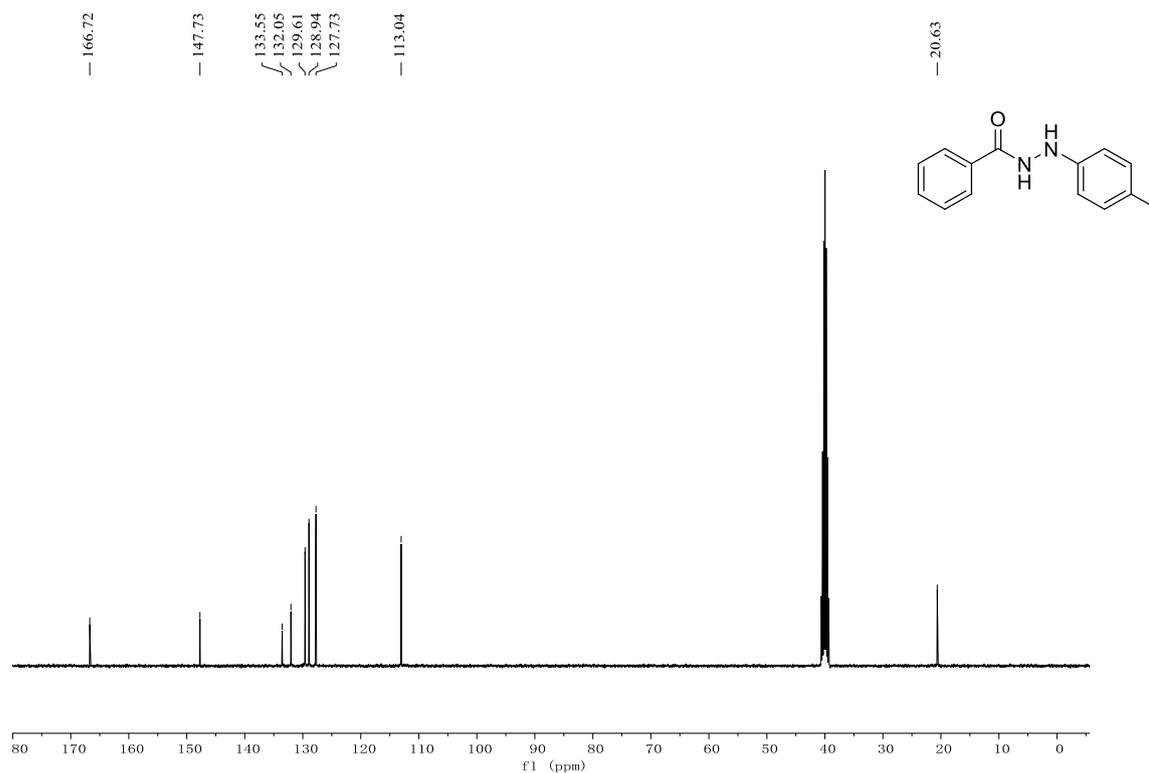
The ^1H NMR spectrum of B₆.



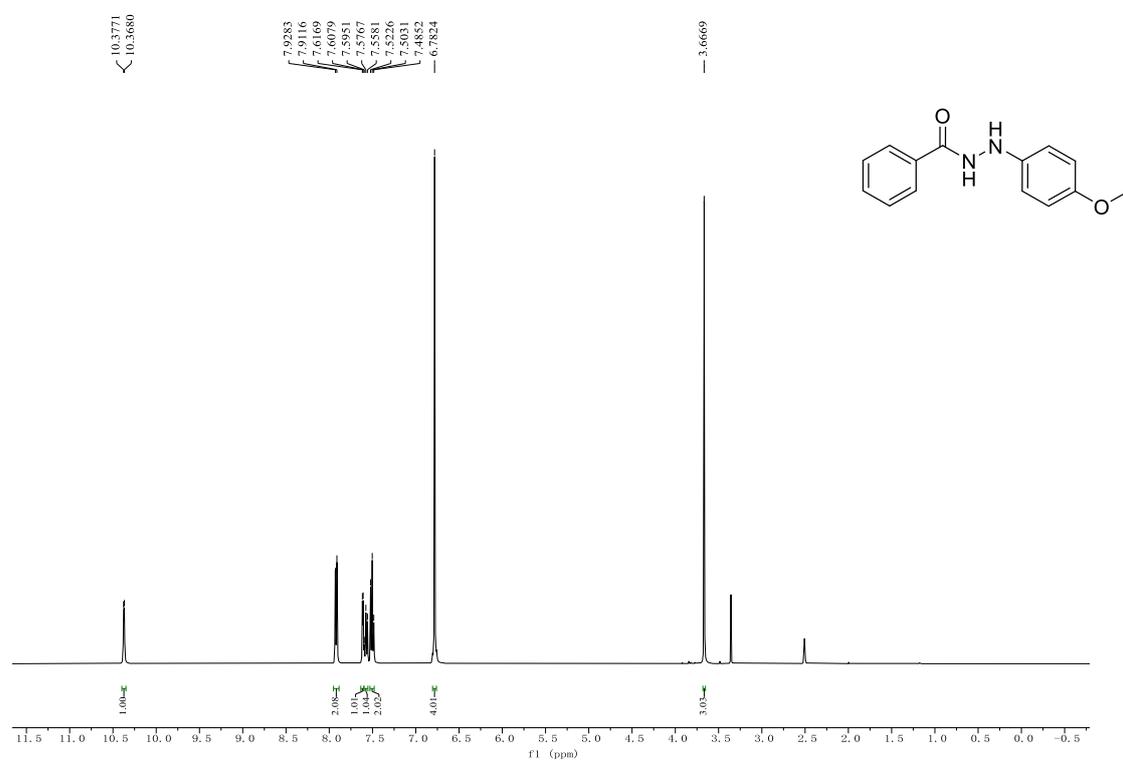
The ^{13}C NMR spectrum of **B6**.



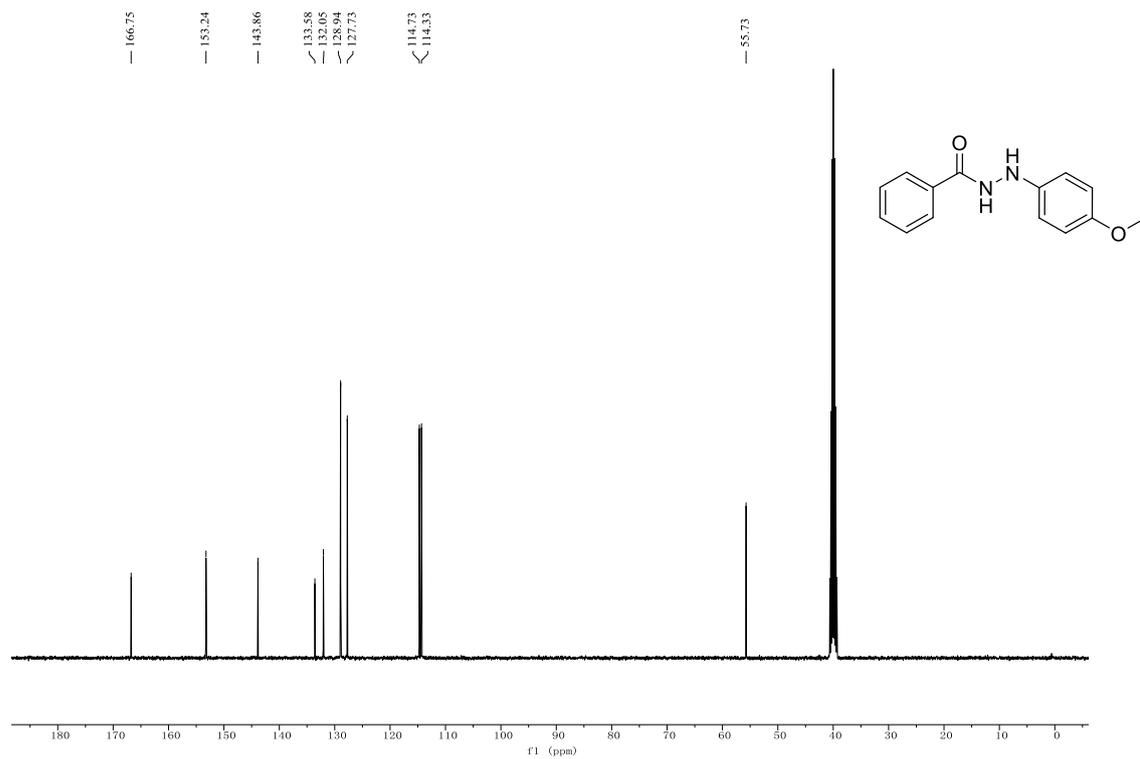
The ^1H NMR spectrum of **B7**.



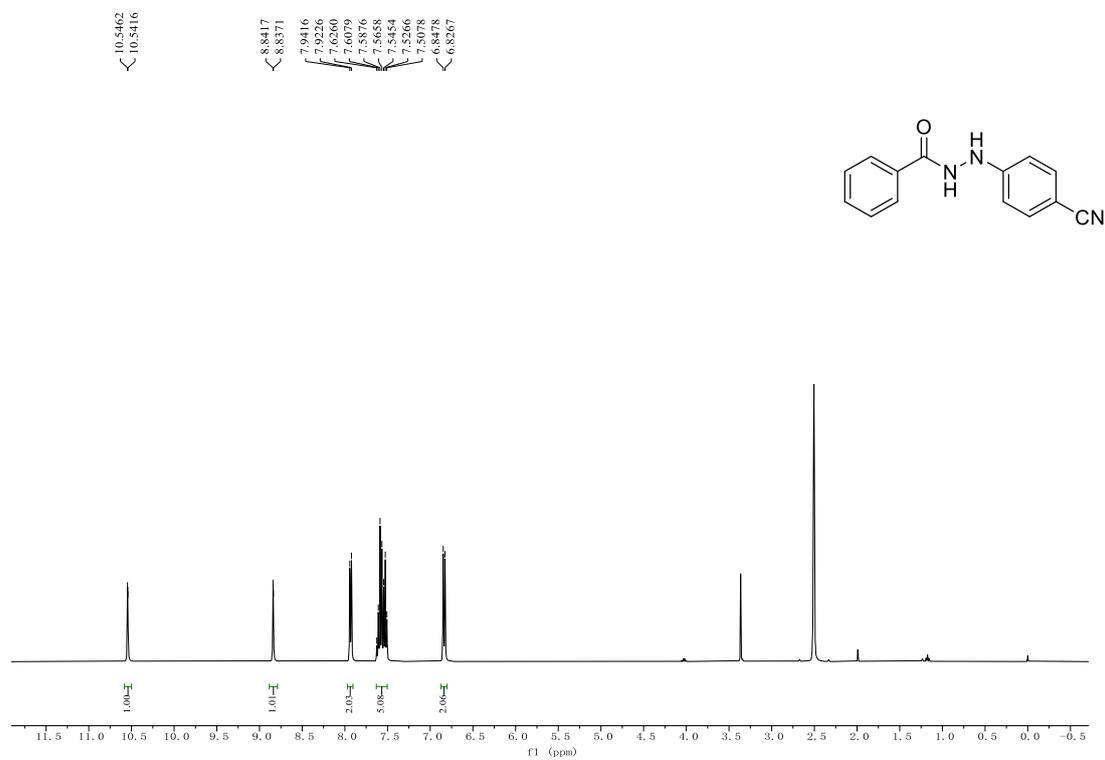
The ^{13}C NMR spectrum of B7.



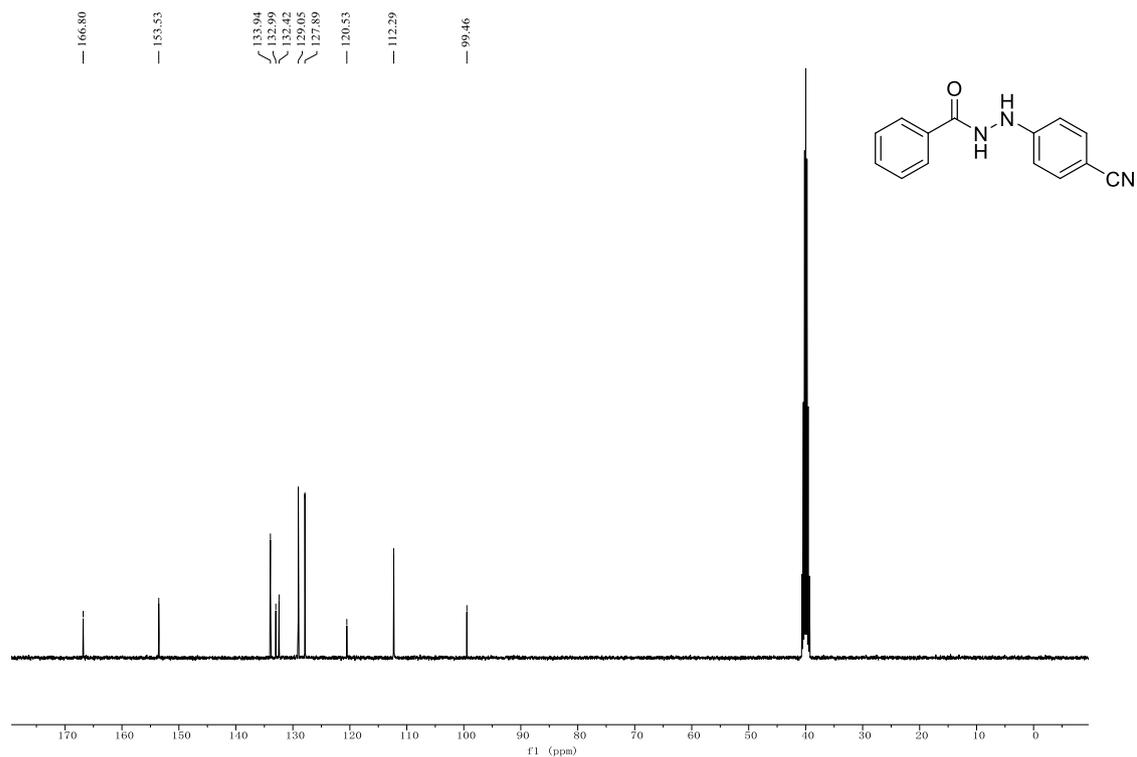
The ^1H NMR spectrum of B8.



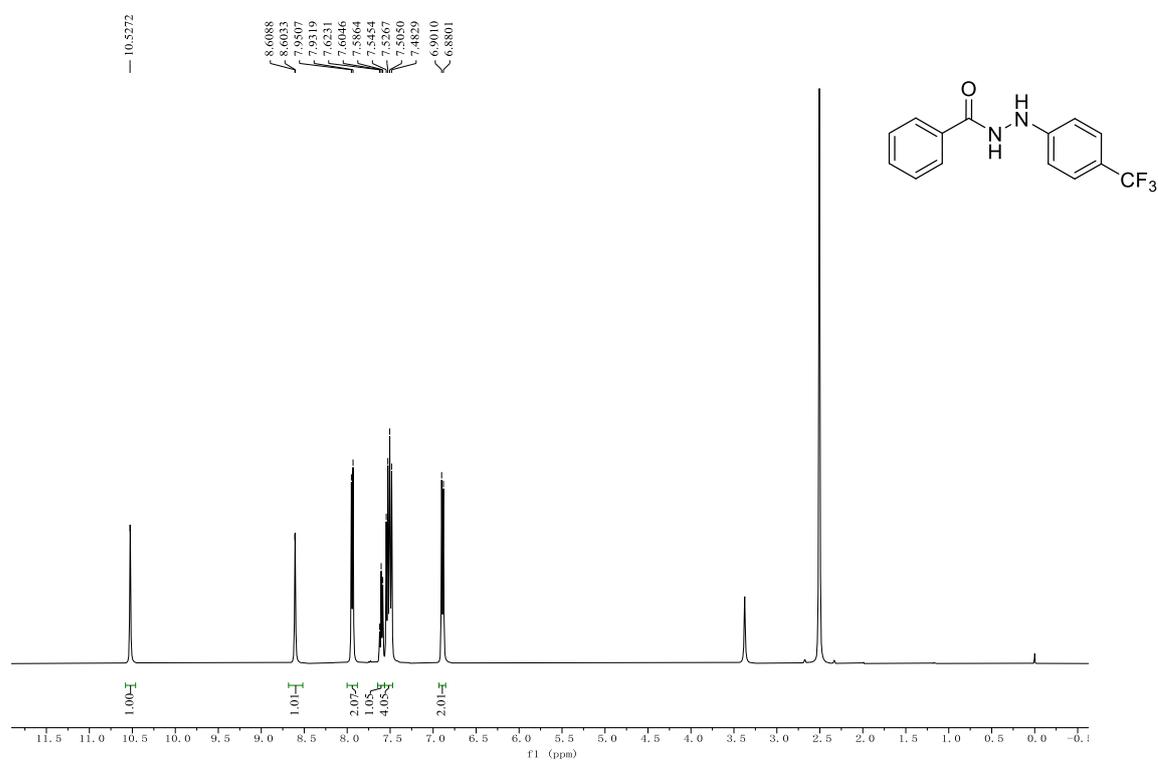
The ^{13}C NMR spectrum of B₈.



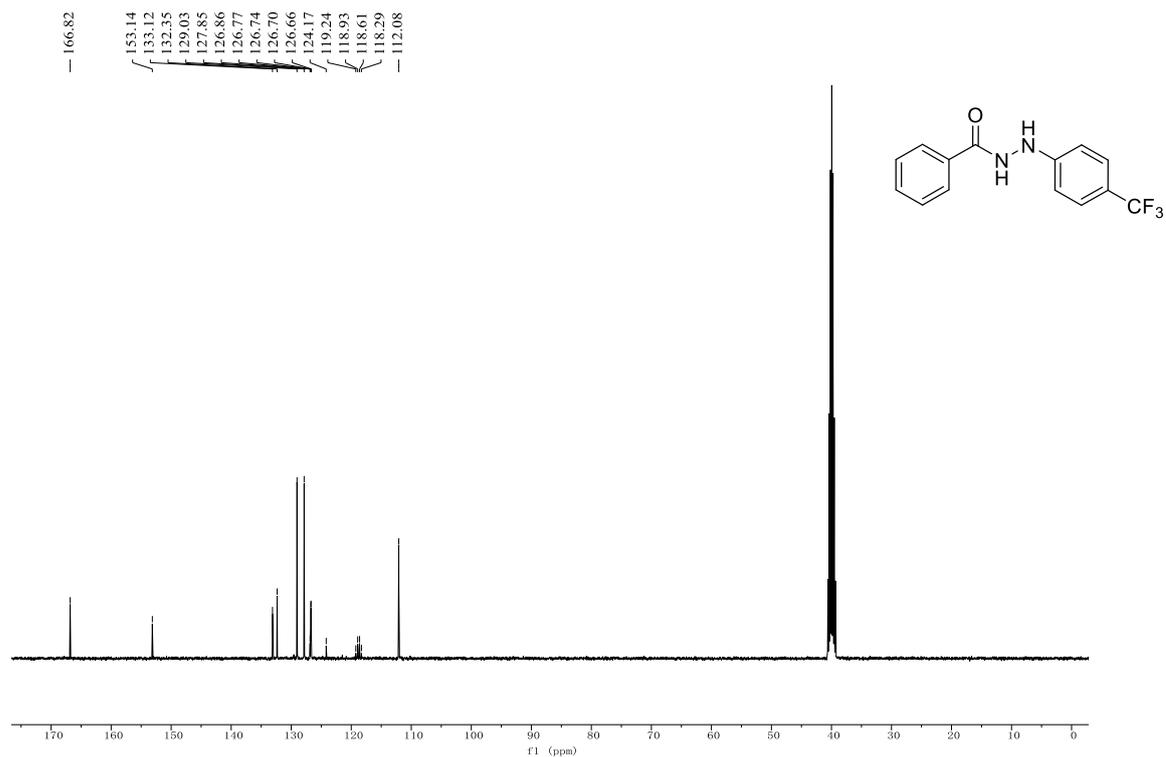
The ^1H NMR spectrum of B₉.



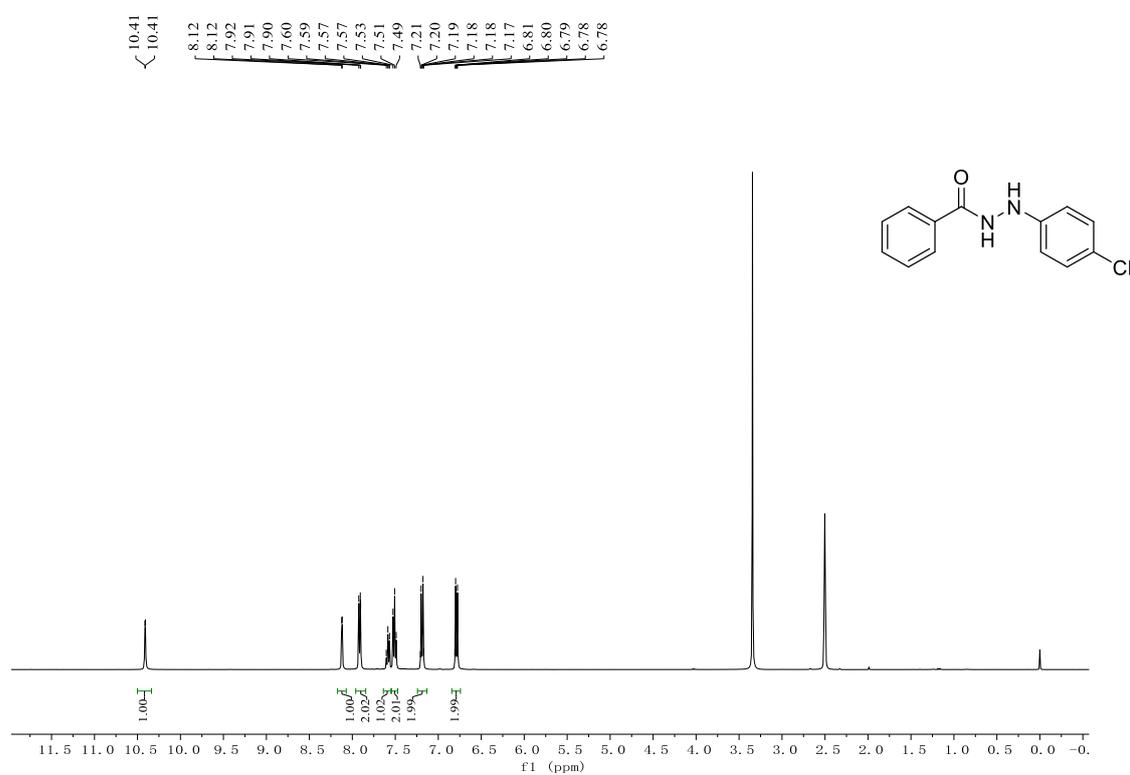
The ¹³C NMR spectrum of **B9**.



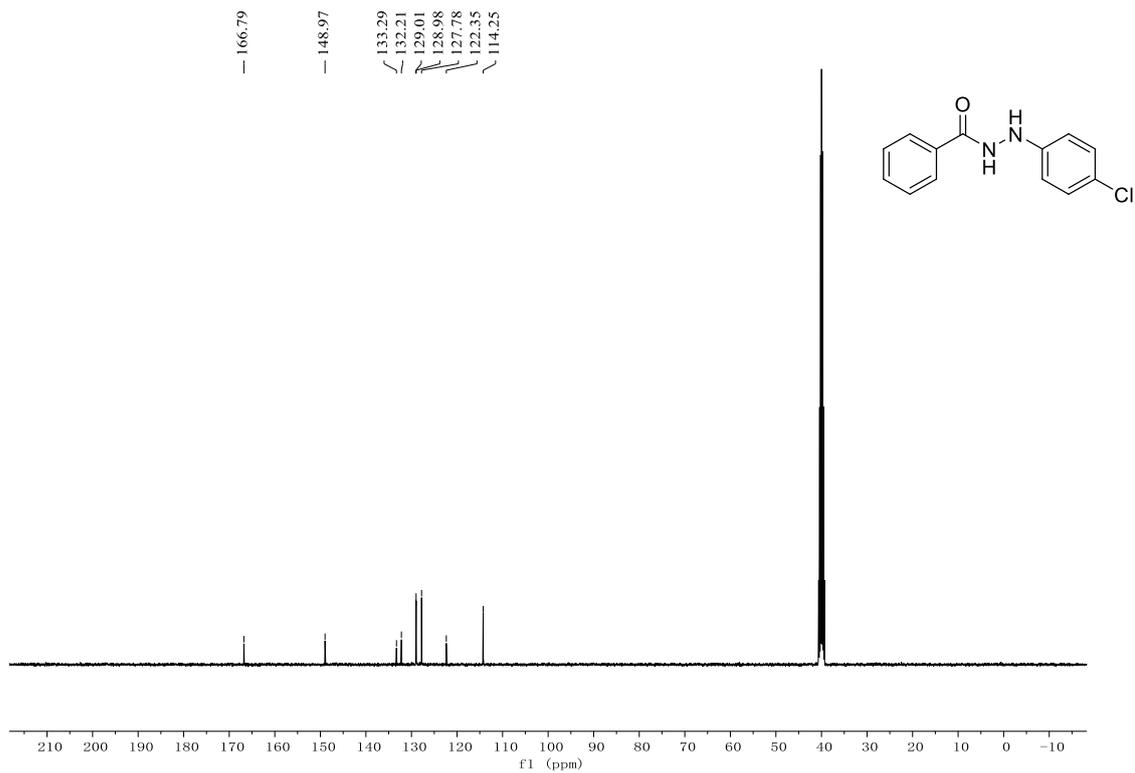
The ¹H NMR spectrum of **B10**.



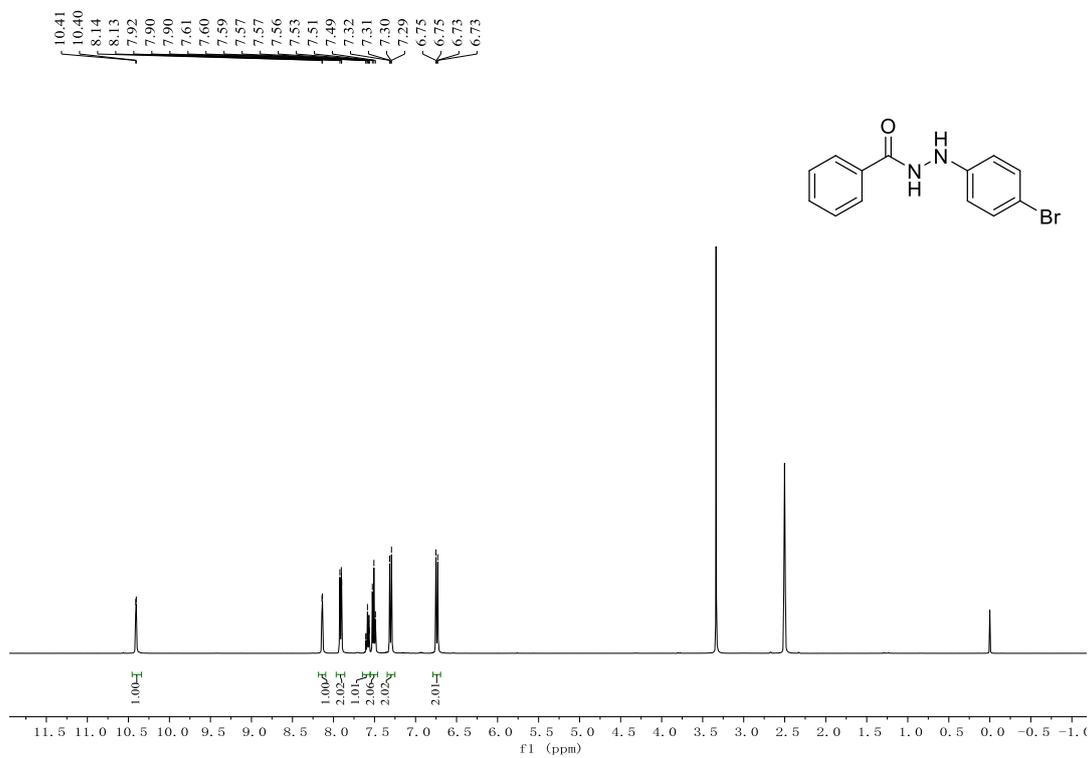
The ^{13}C NMR spectrum of **B10**.



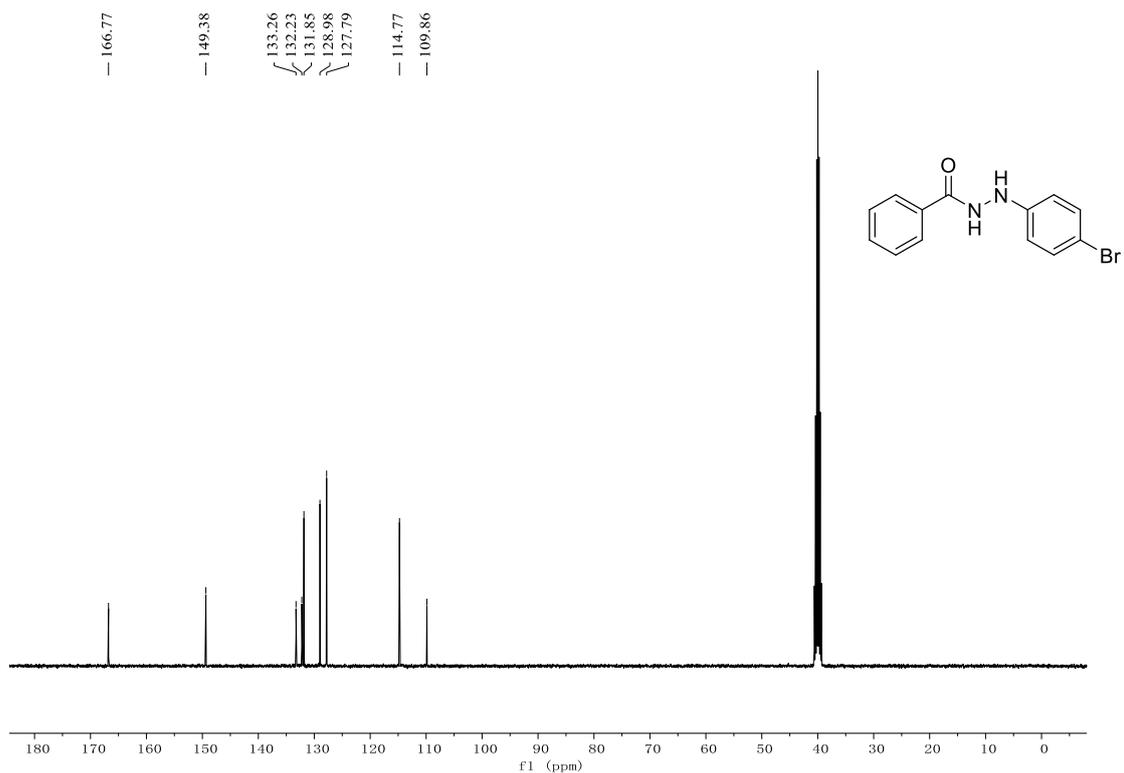
The ^1H NMR spectrum of **B11**.



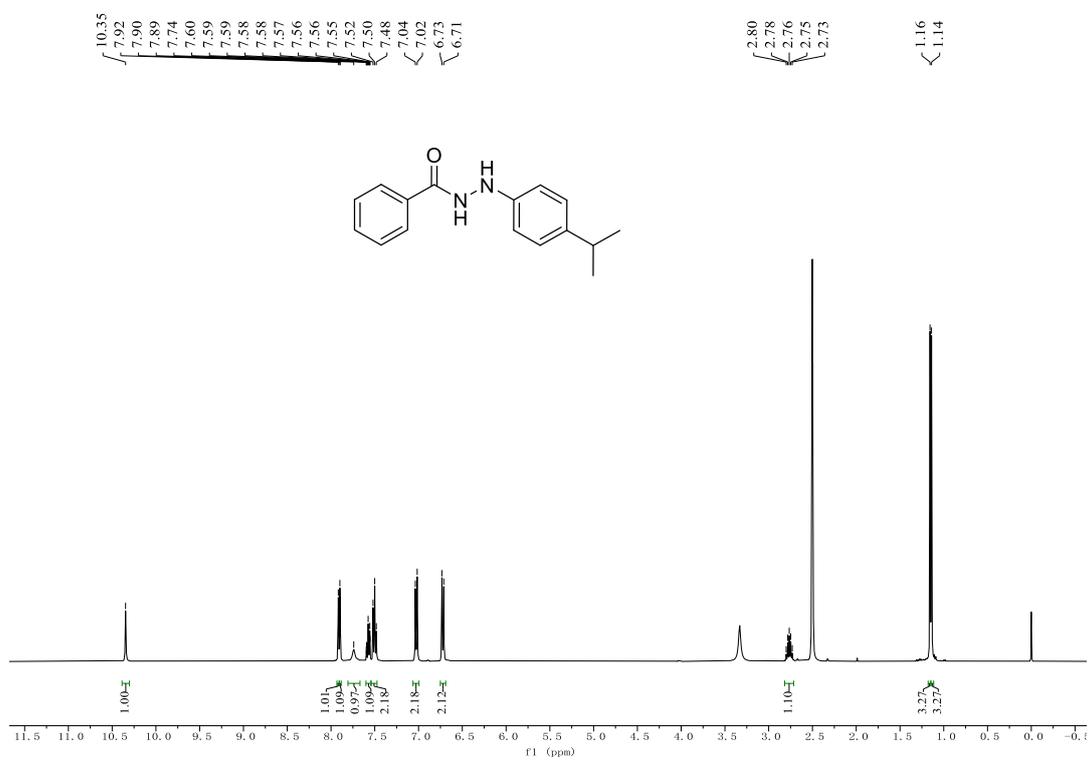
The ^{13}C NMR spectrum of **B11**.



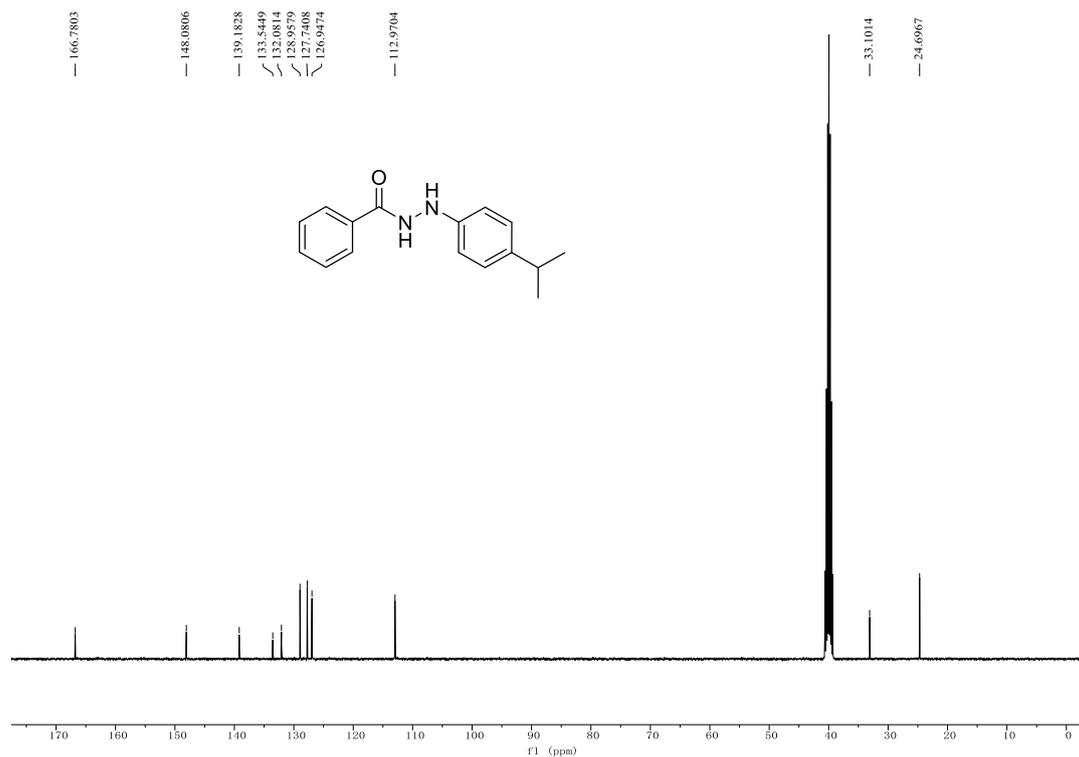
The ^1H NMR spectrum of **B12**.



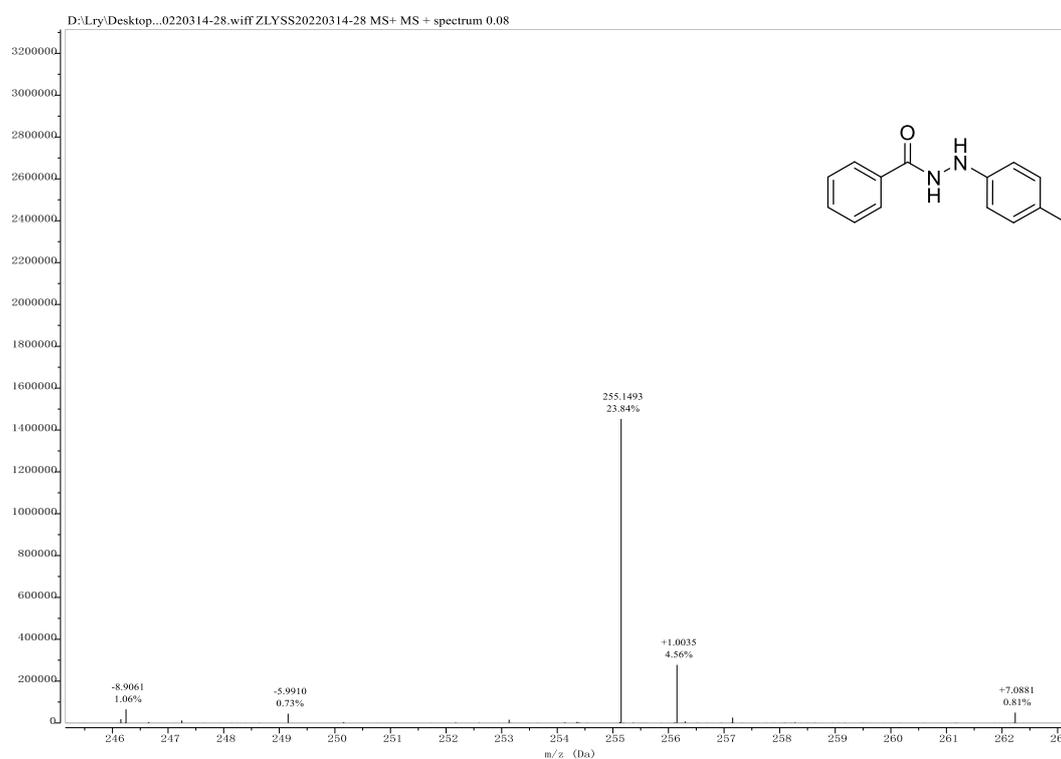
The ^{13}C NMR spectrum of B12.



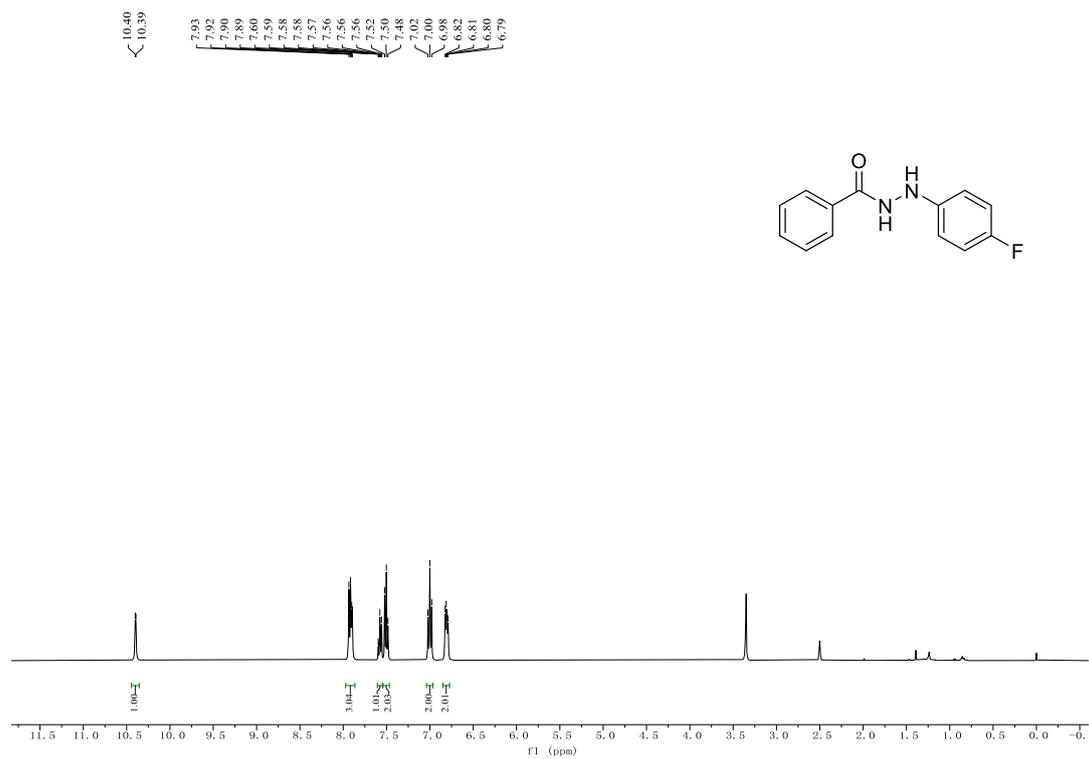
The ^1H NMR spectrum of B13.



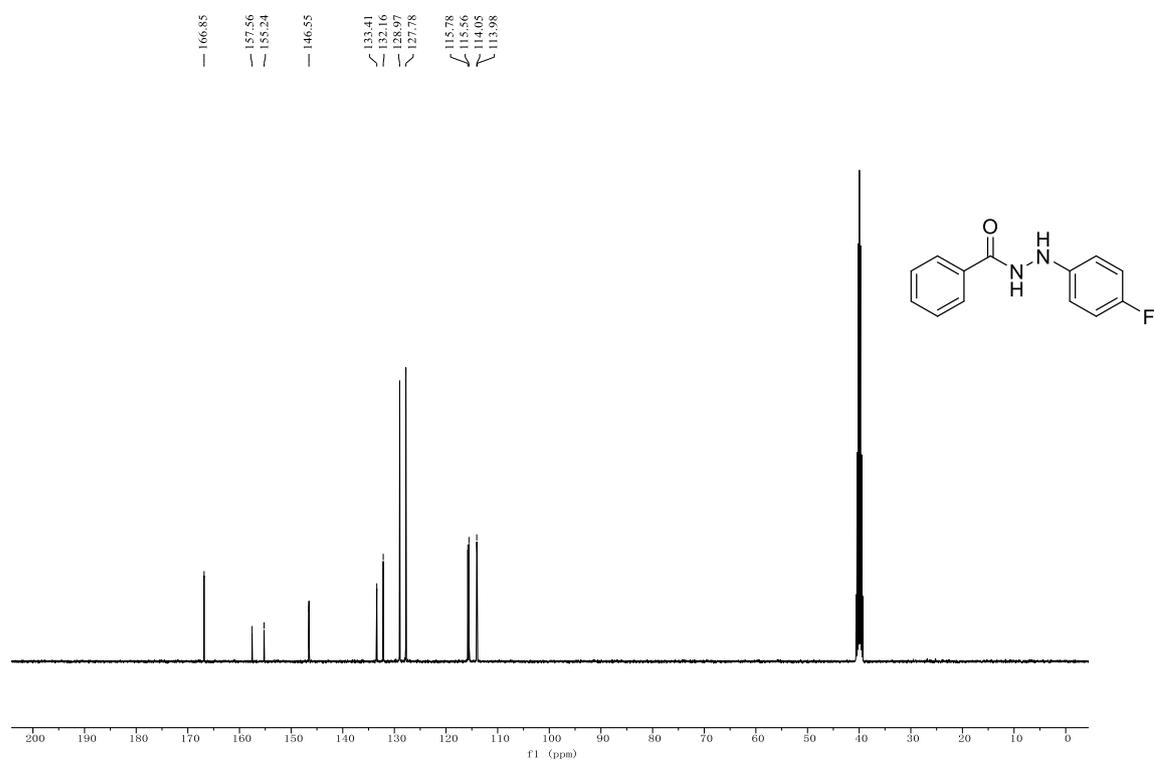
The ^{13}C NMR spectrum of **B13**.



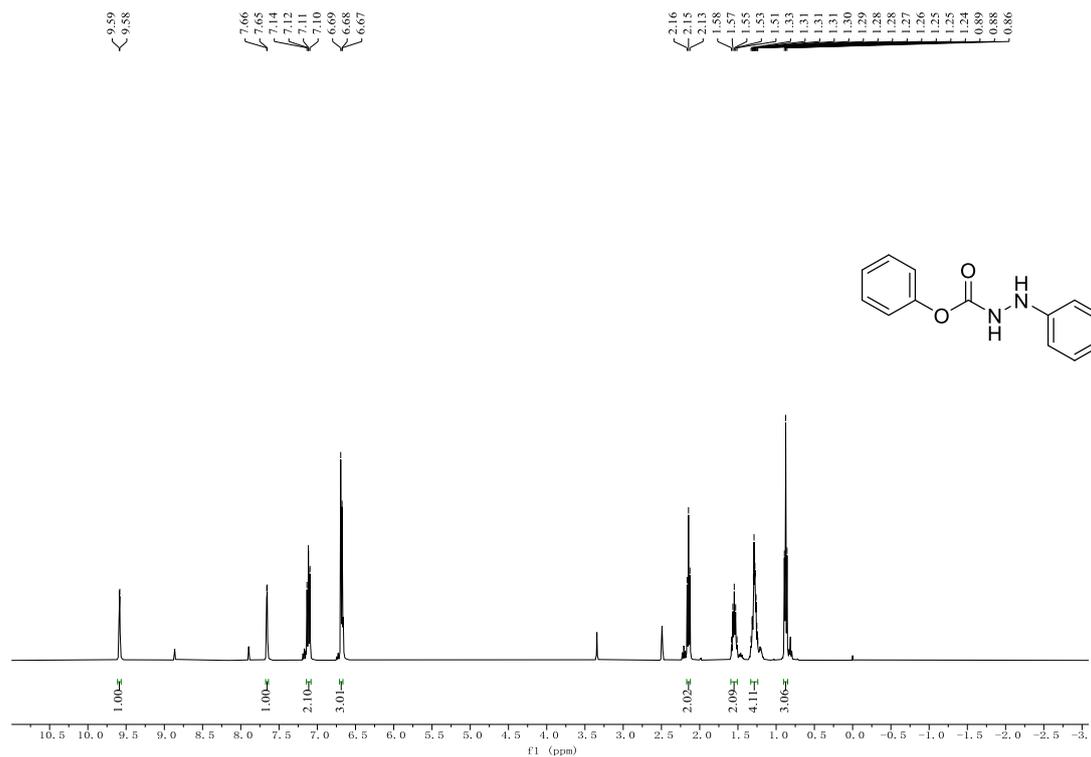
The HRMS spectrum of **B13**.



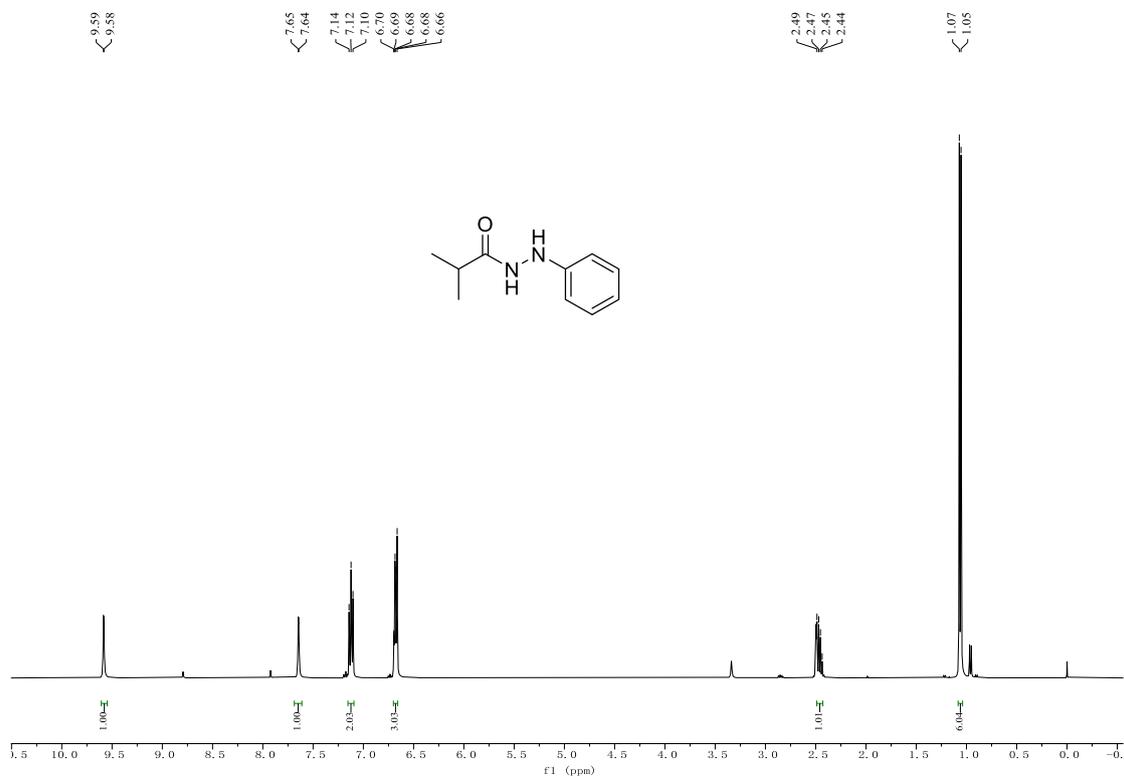
The ¹H NMR spectrum of B14.



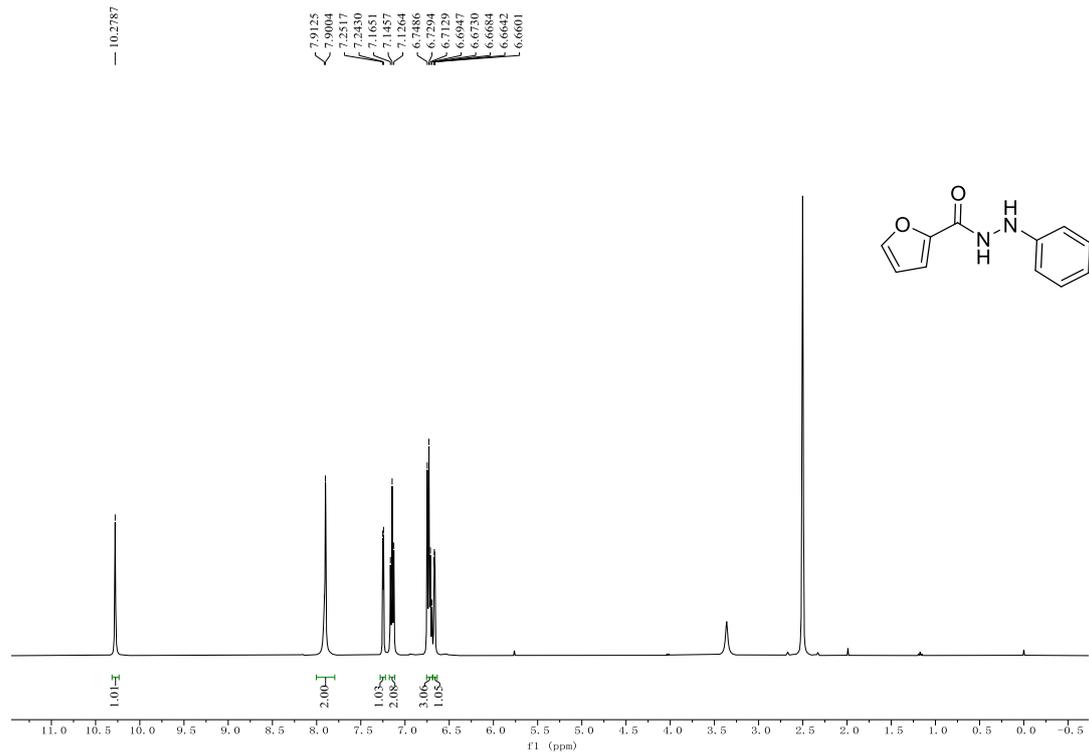
The ¹³C NMR spectrum of B14.



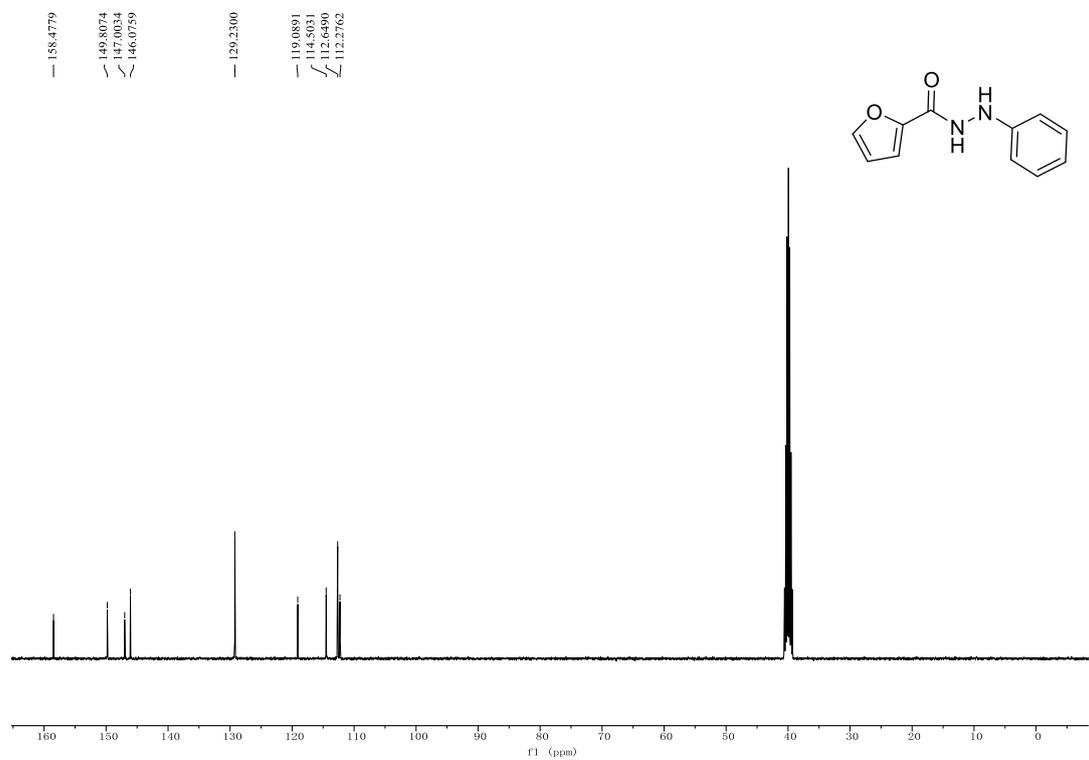
The ¹H NMR spectrum of C₁.



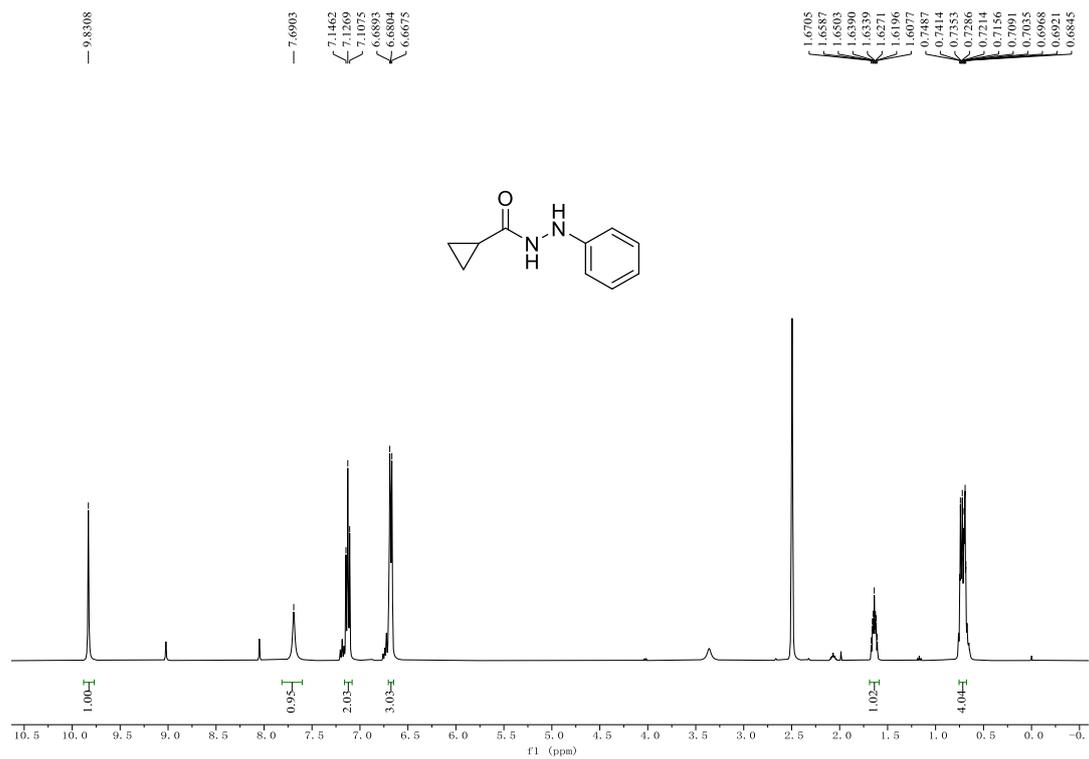
The ¹H NMR spectrum of C₂.



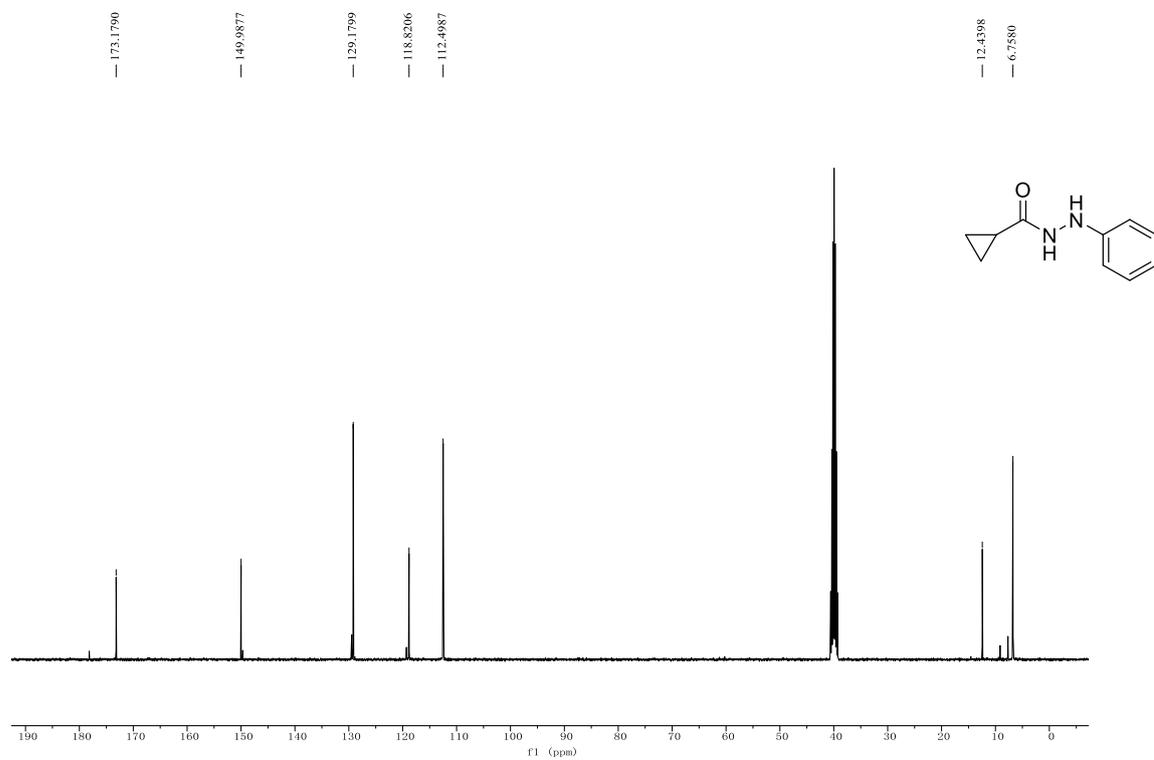
The ^1H NMR spectrum of C_3 .



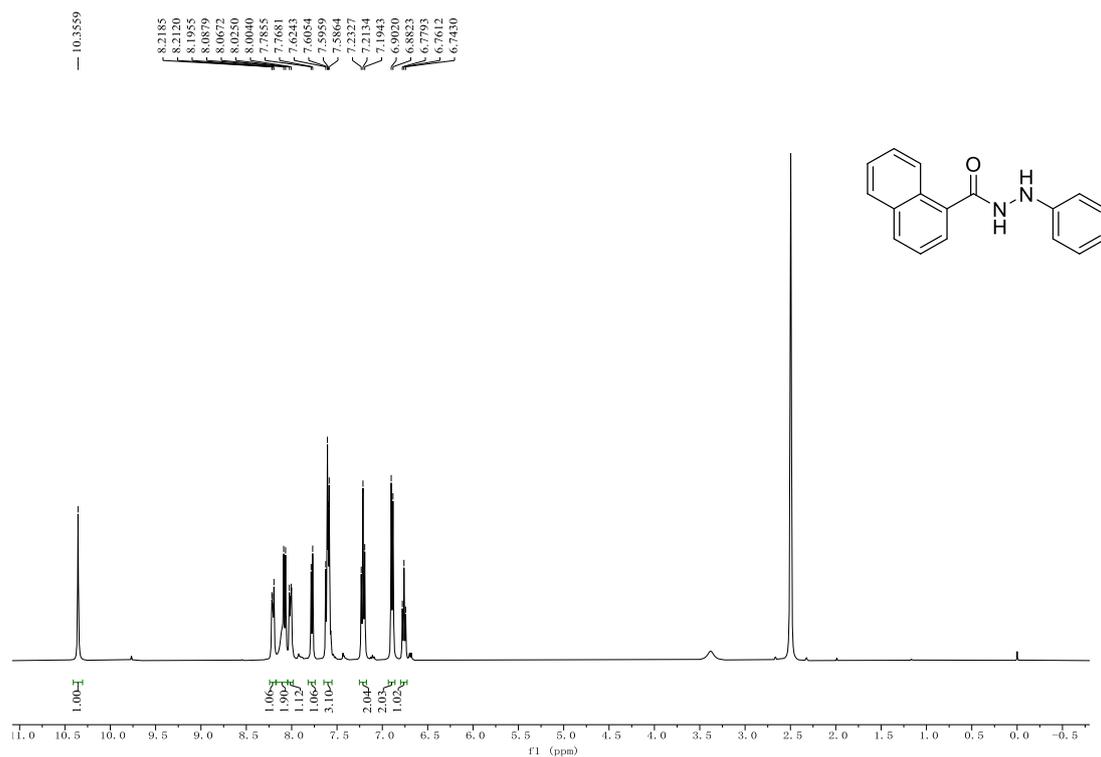
The ^{13}C NMR spectrum of C_3 .



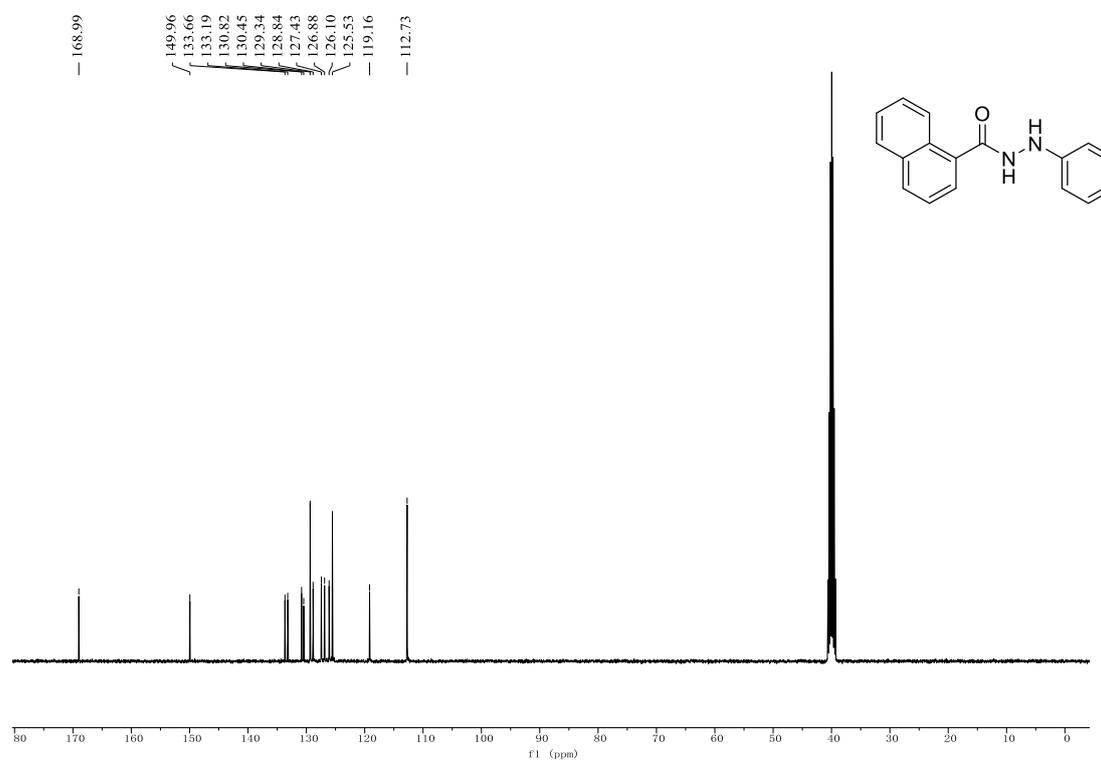
The ¹H NMR spectrum of **C₄**.



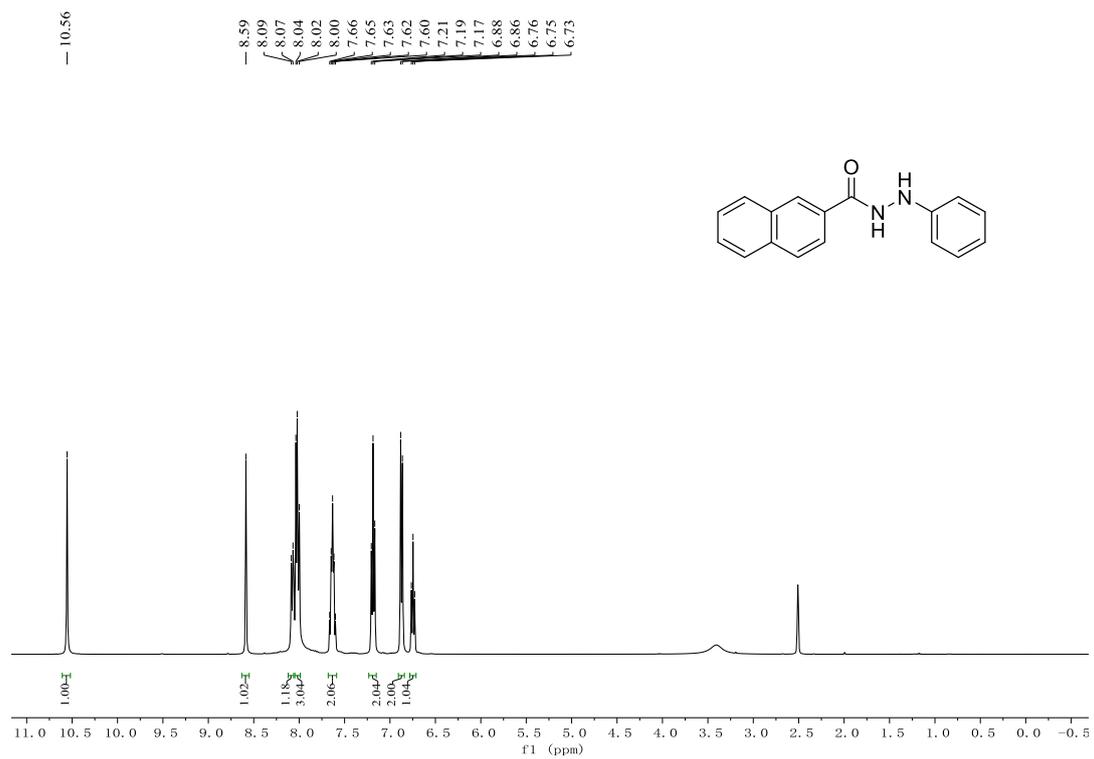
The ¹³C NMR spectrum of **C₄**.



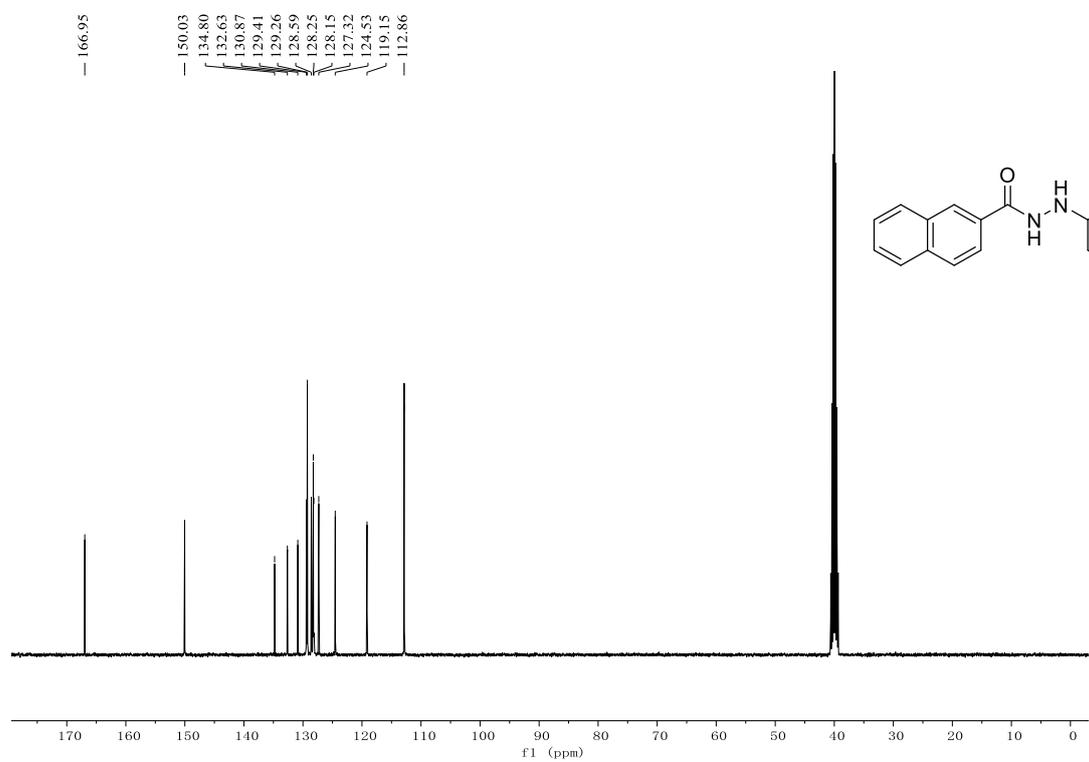
The ¹H NMR spectrum of C₅.



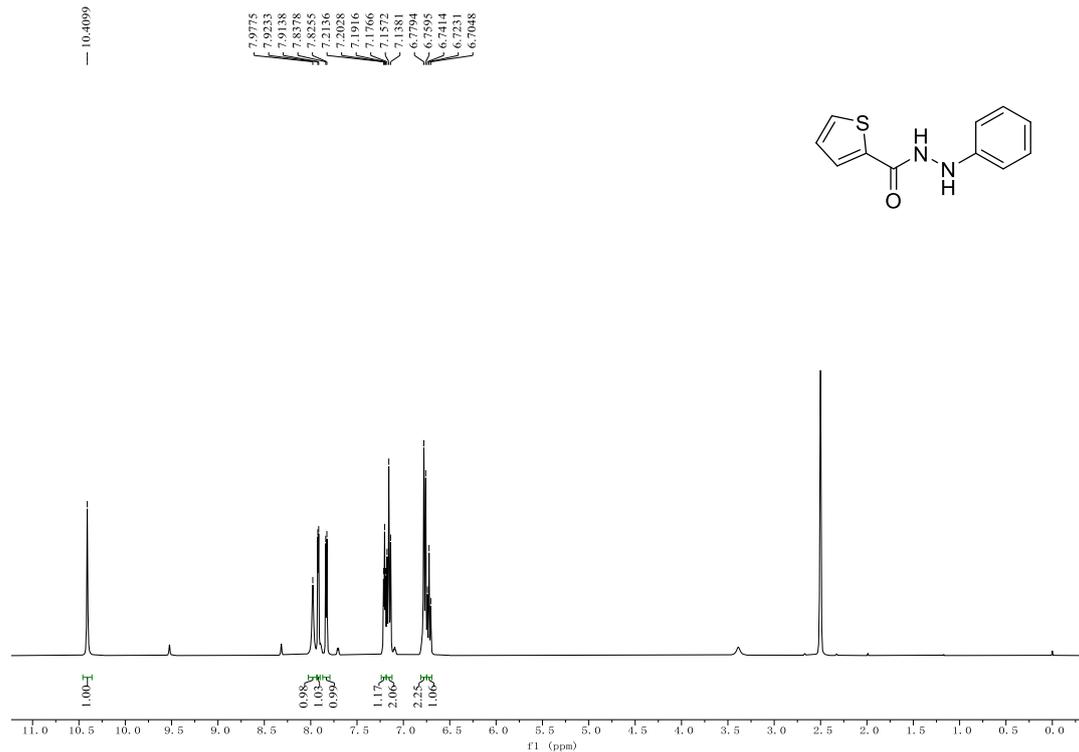
The ¹³C NMR spectrum of C₅.



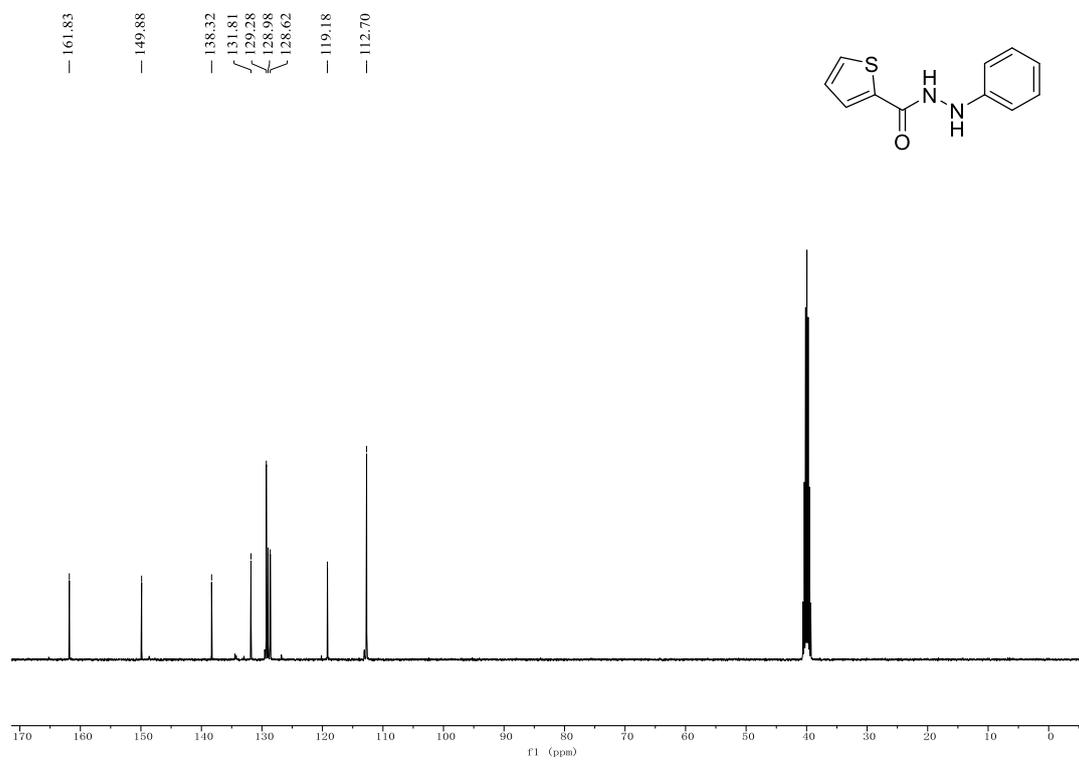
The ¹H NMR spectrum of C₆.



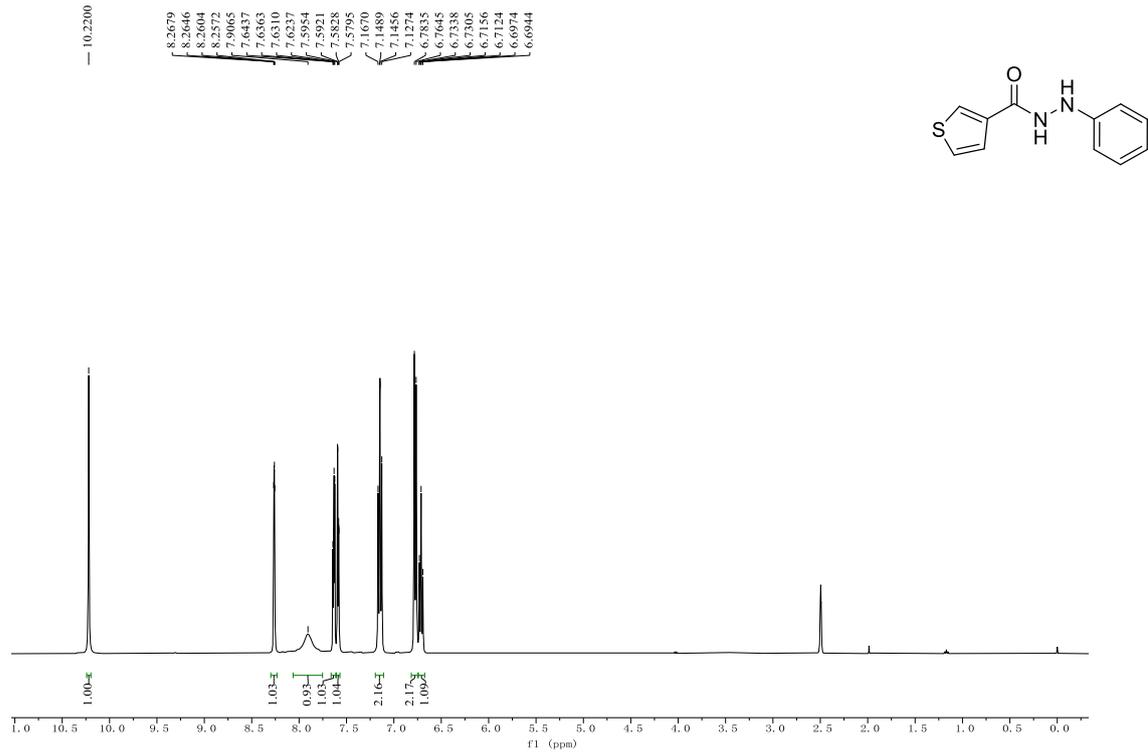
The ¹³C NMR spectrum of C₆.



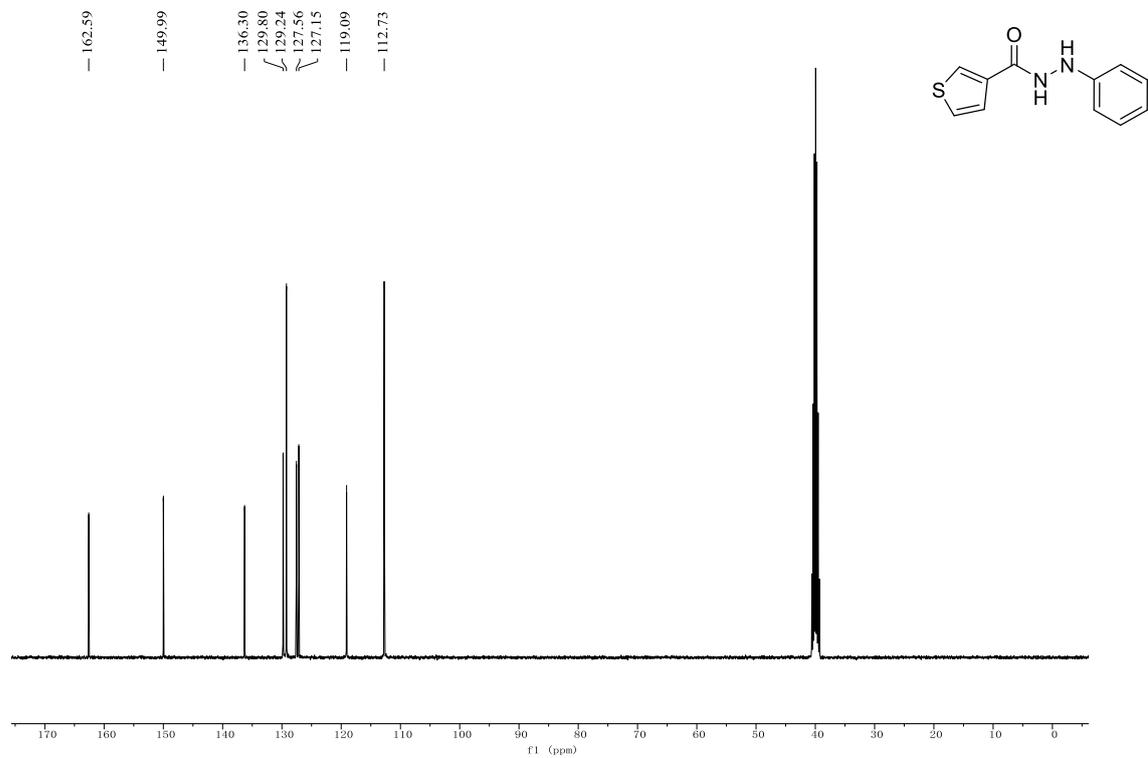
The ^1H NMR spectrum of C_7 .



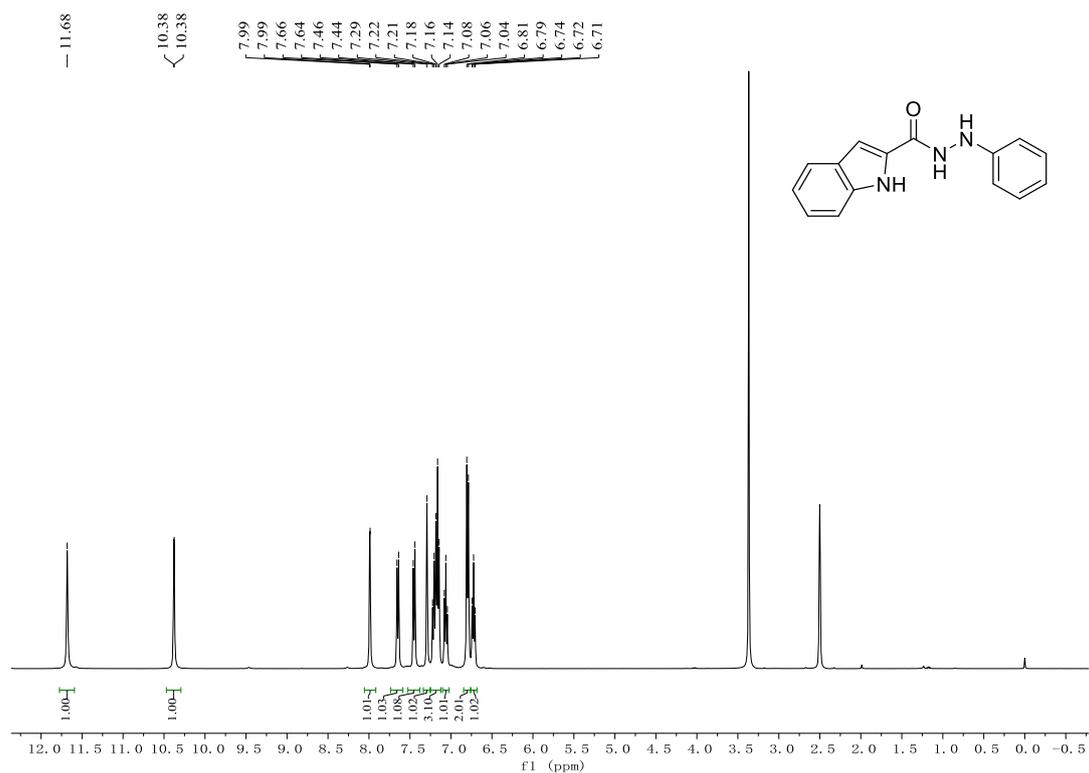
The ^{13}C NMR spectrum of C_7 .



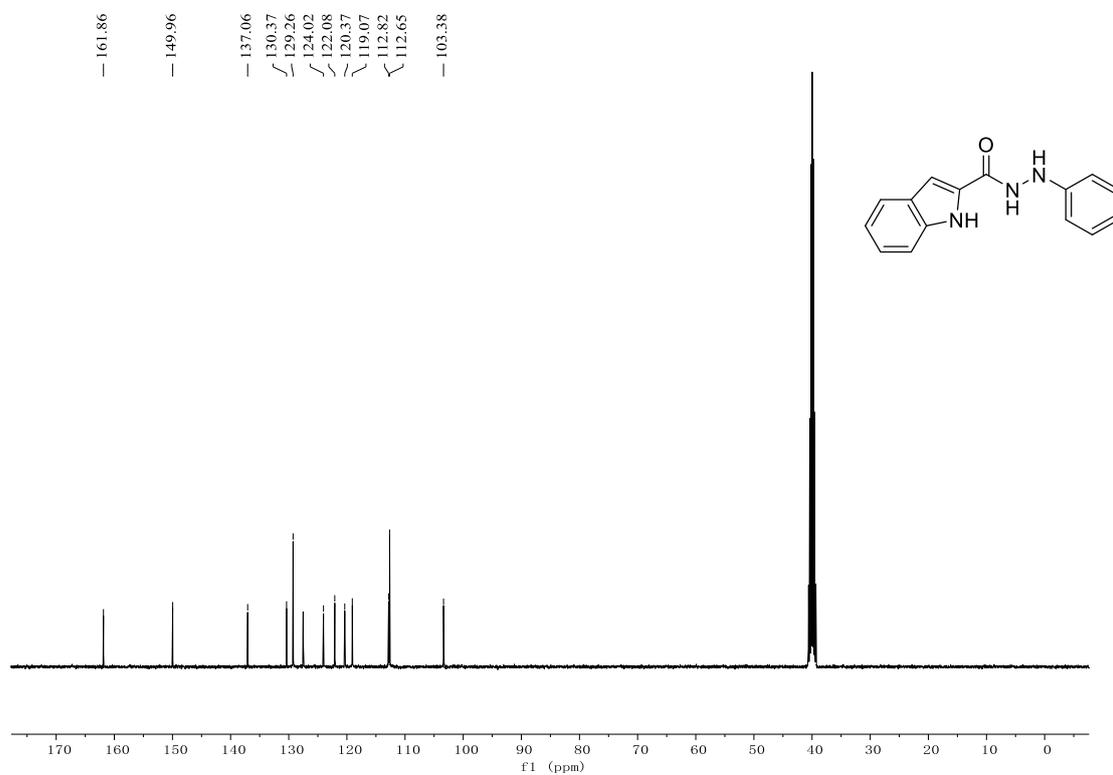
The ¹H NMR spectrum of C8.



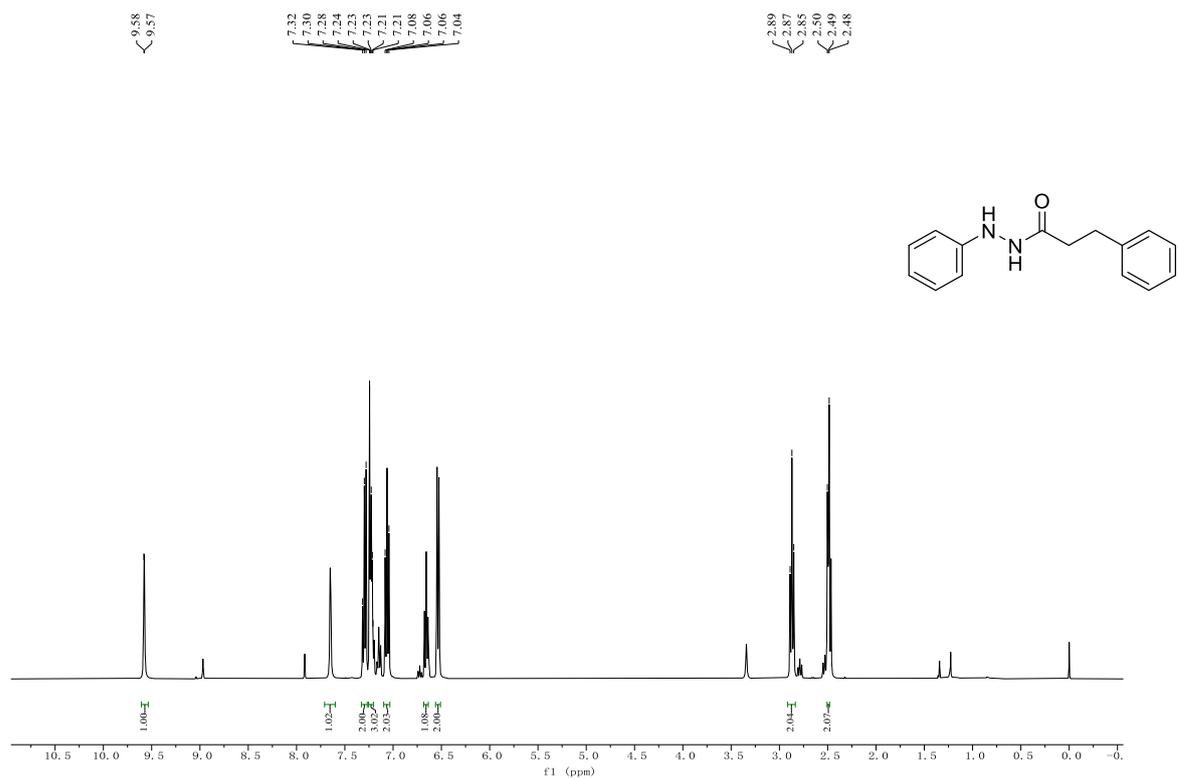
The ¹³C NMR spectrum of C8.



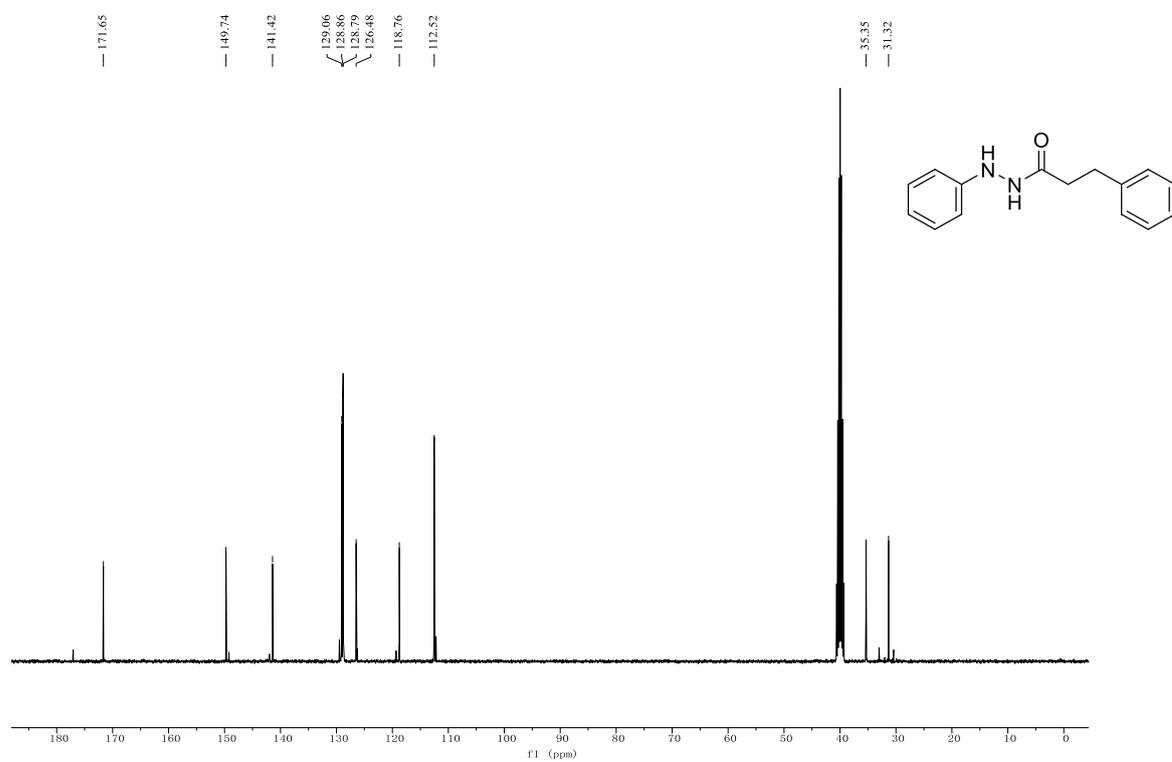
The ^1H NMR spectrum of C₉.



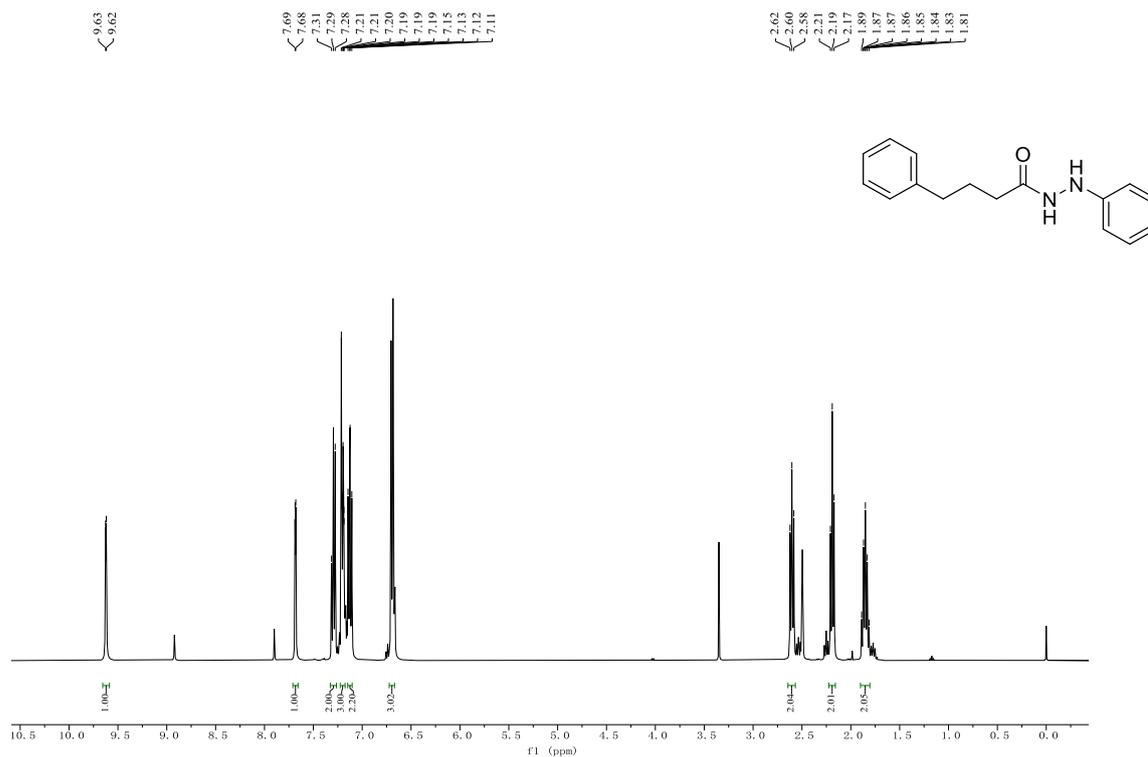
The ^{13}C NMR spectrum of C₉.



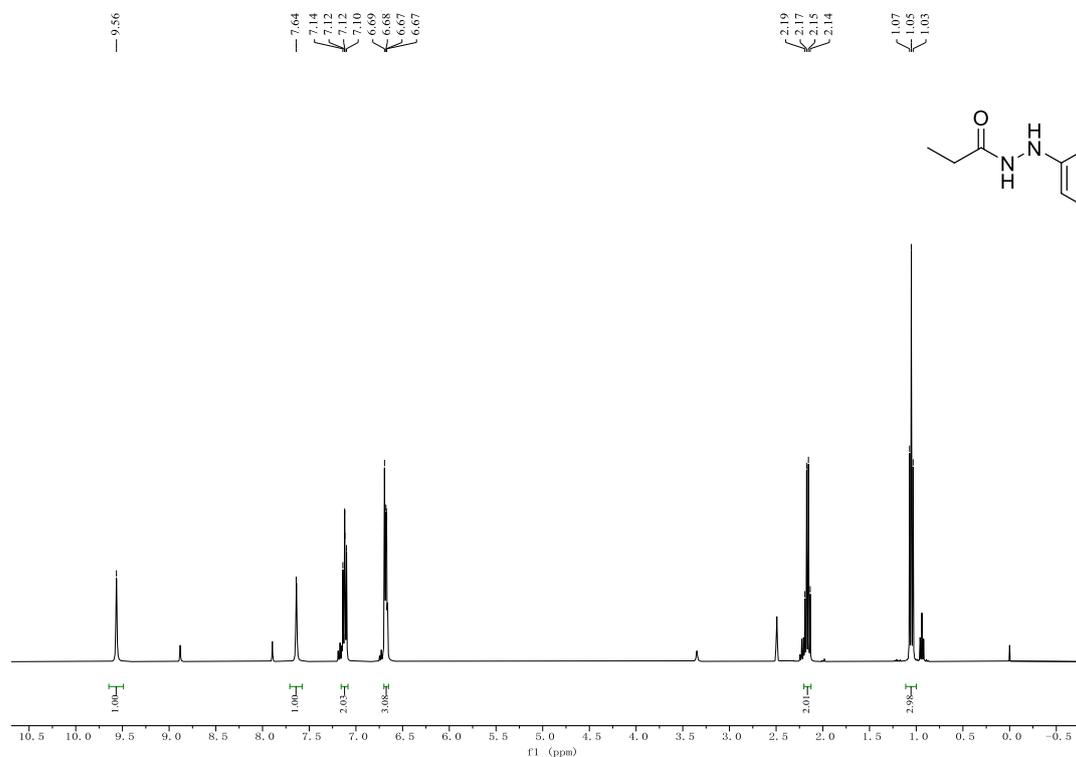
The ¹H NMR spectrum of C₁₀.



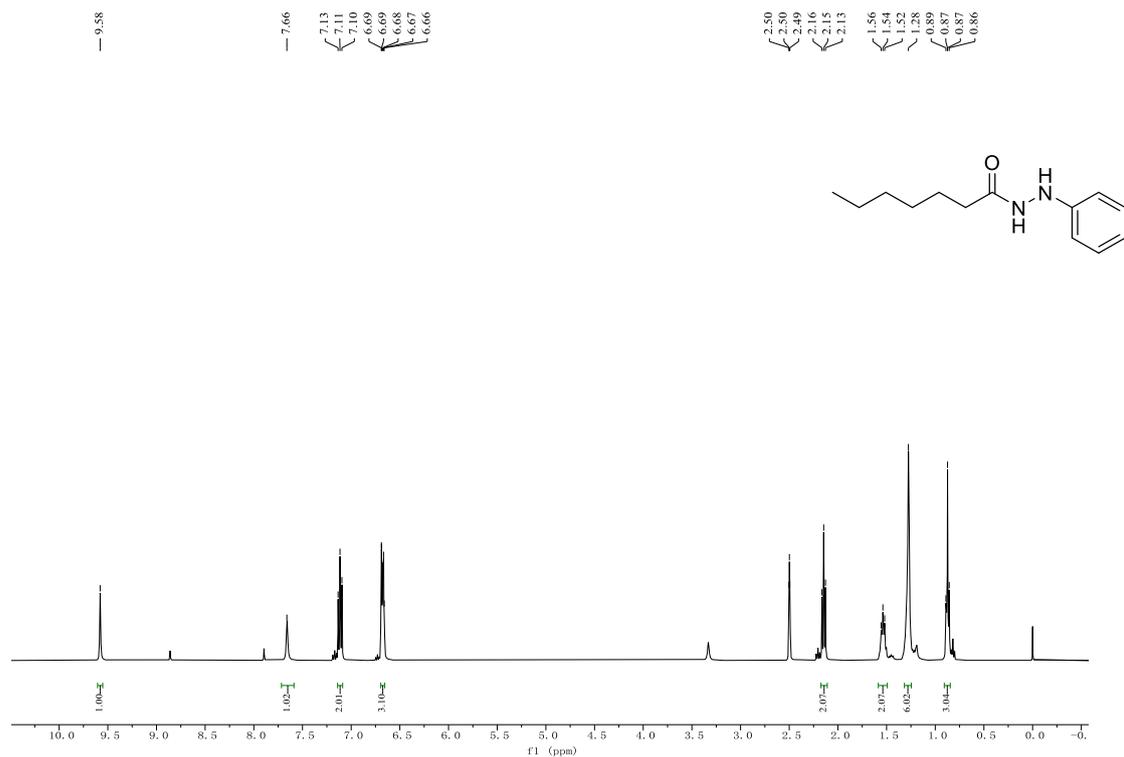
The ¹³C NMR spectrum of C₁₀.



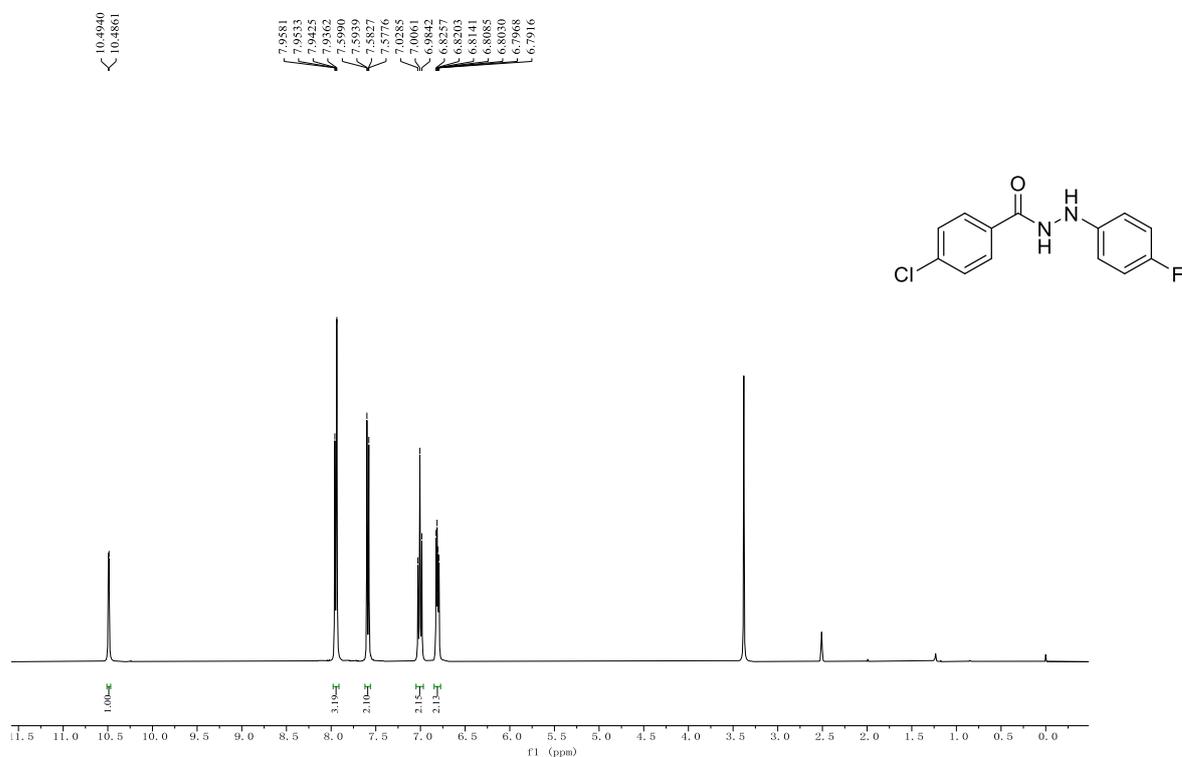
The ¹H NMR spectrum of C₁₁.



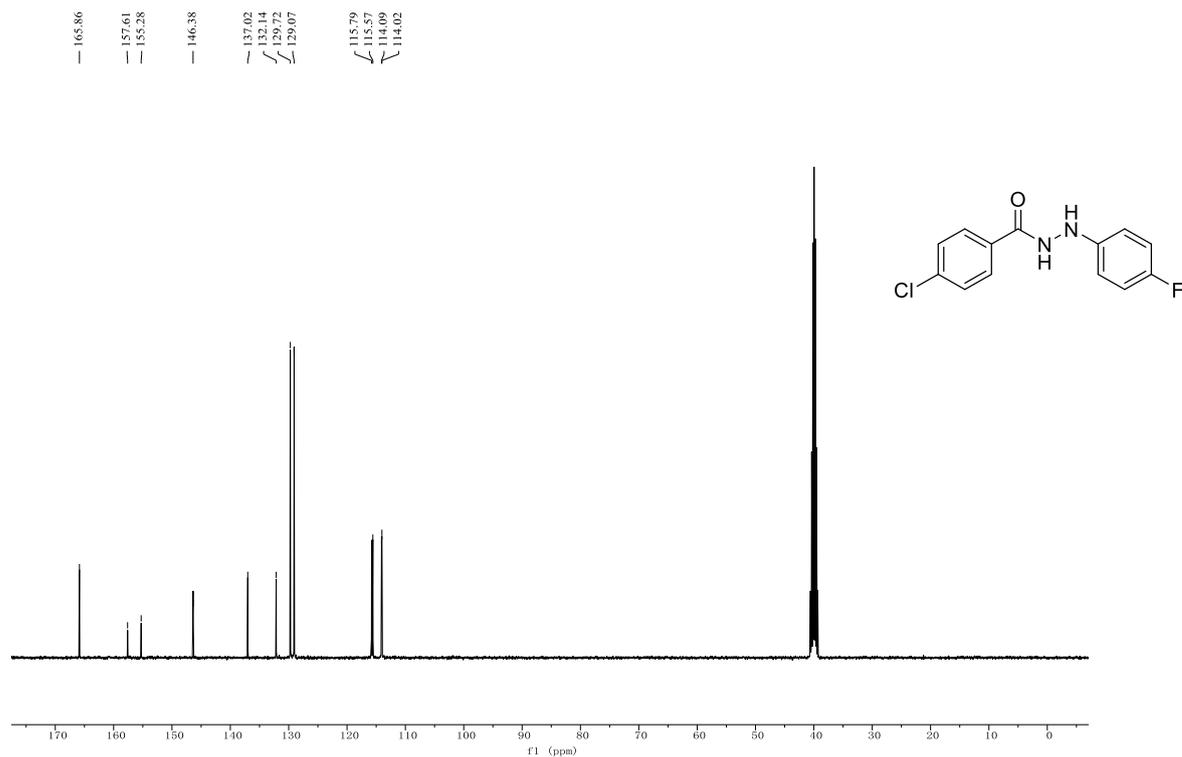
The ¹H NMR spectrum of C₁₂.



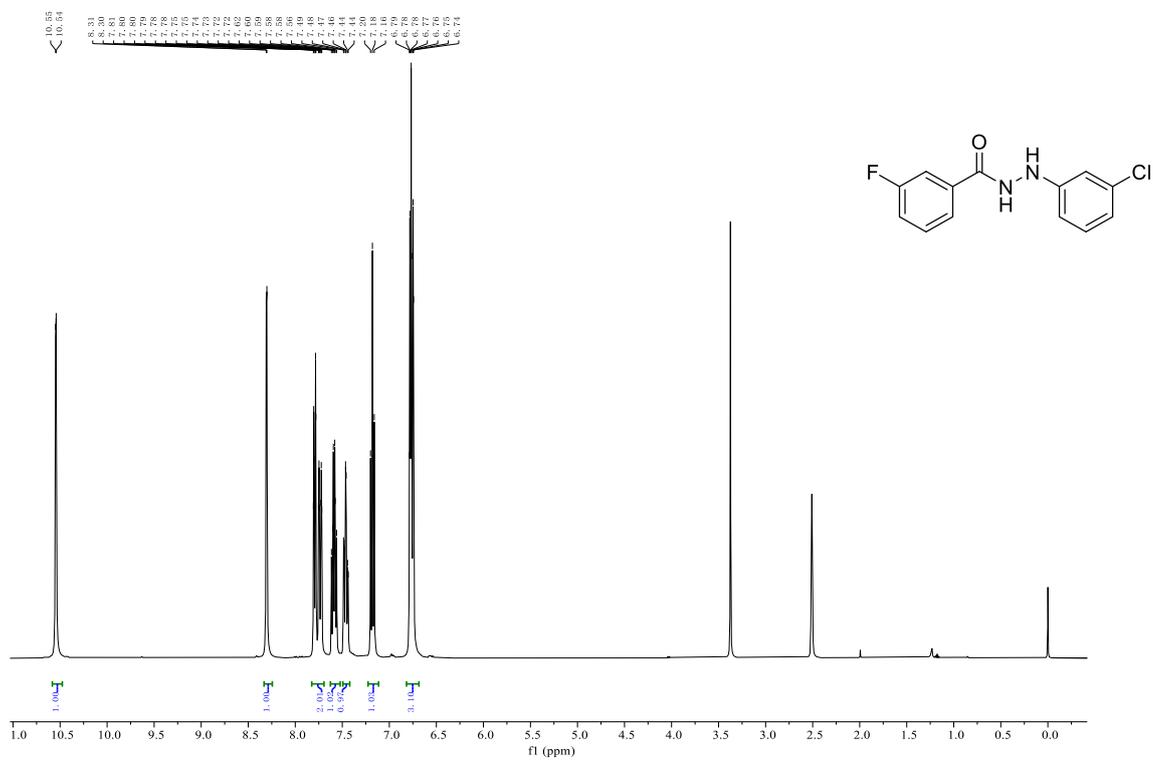
The ^1H NMR spectrum of **C13**.



The ^1H NMR spectrum of **D1**.



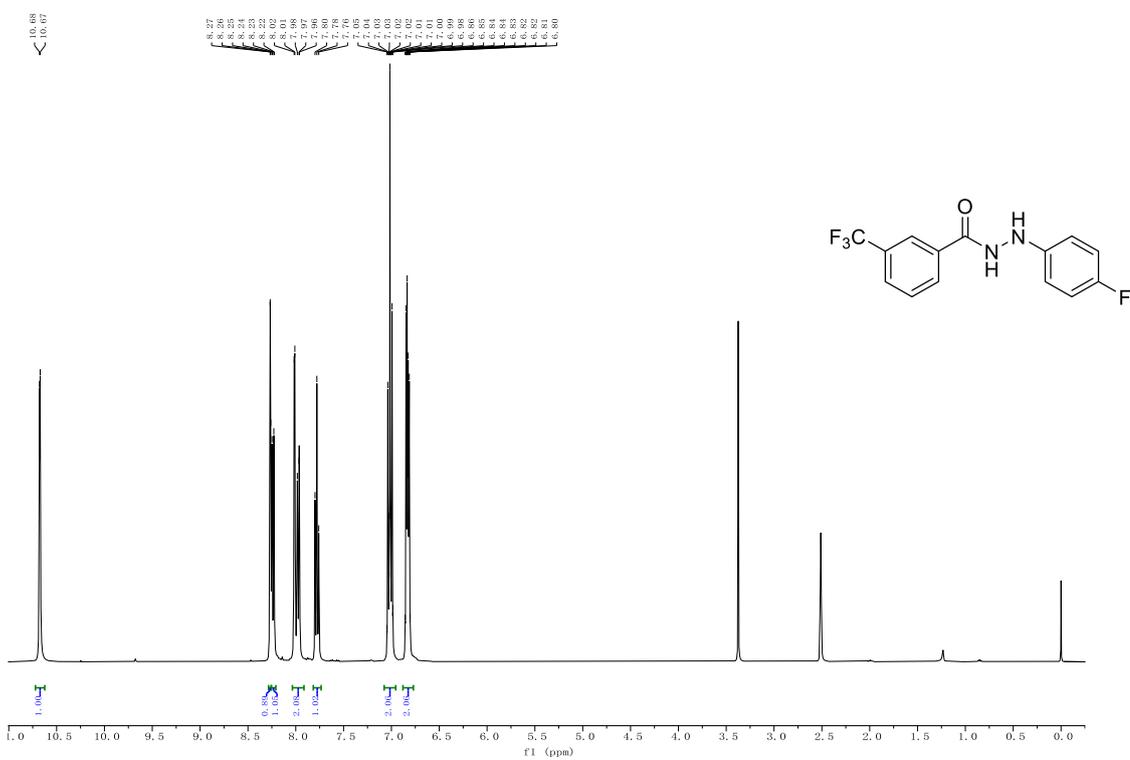
The ^{13}C NMR spectrum of D1.



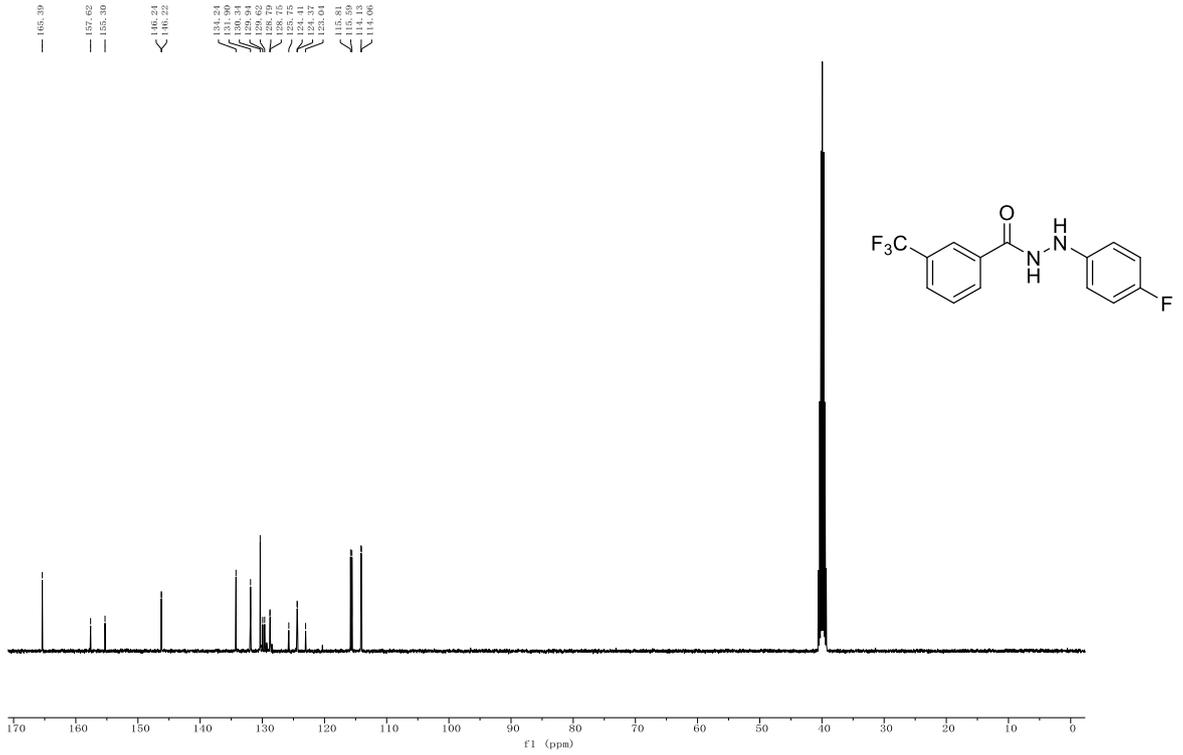
The ^1H NMR spectrum of D2.



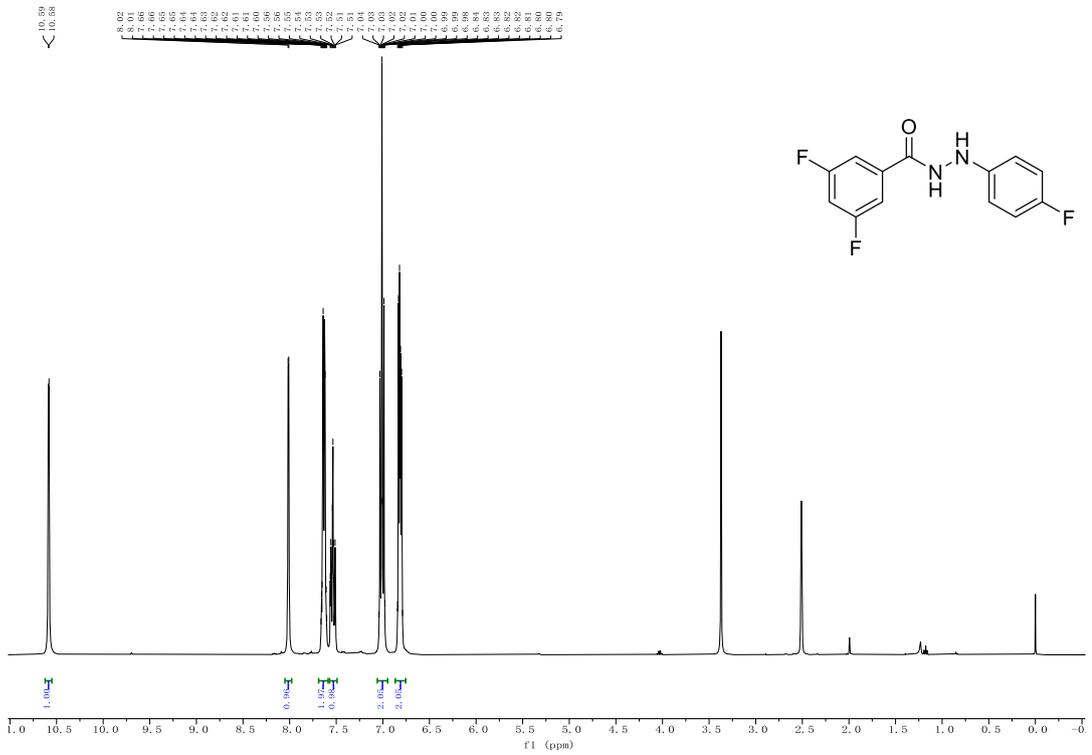
The ^{13}C NMR spectrum of **D2**.



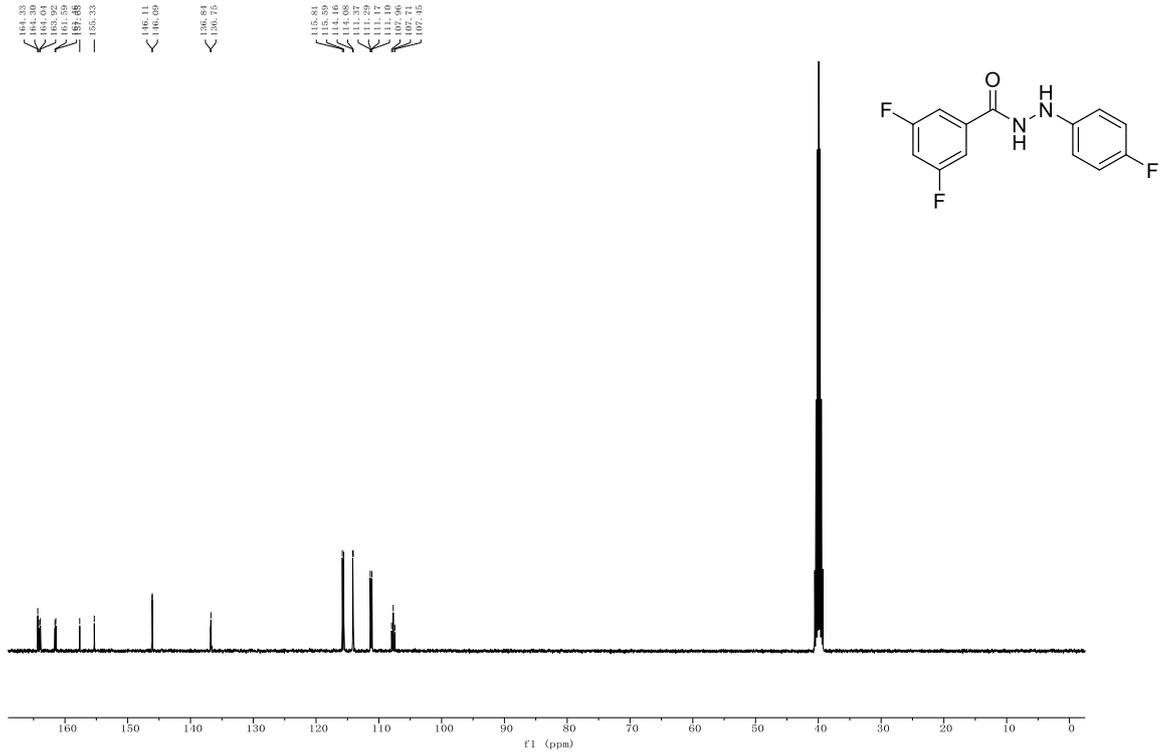
The ^1H NMR spectrum of **D3**.



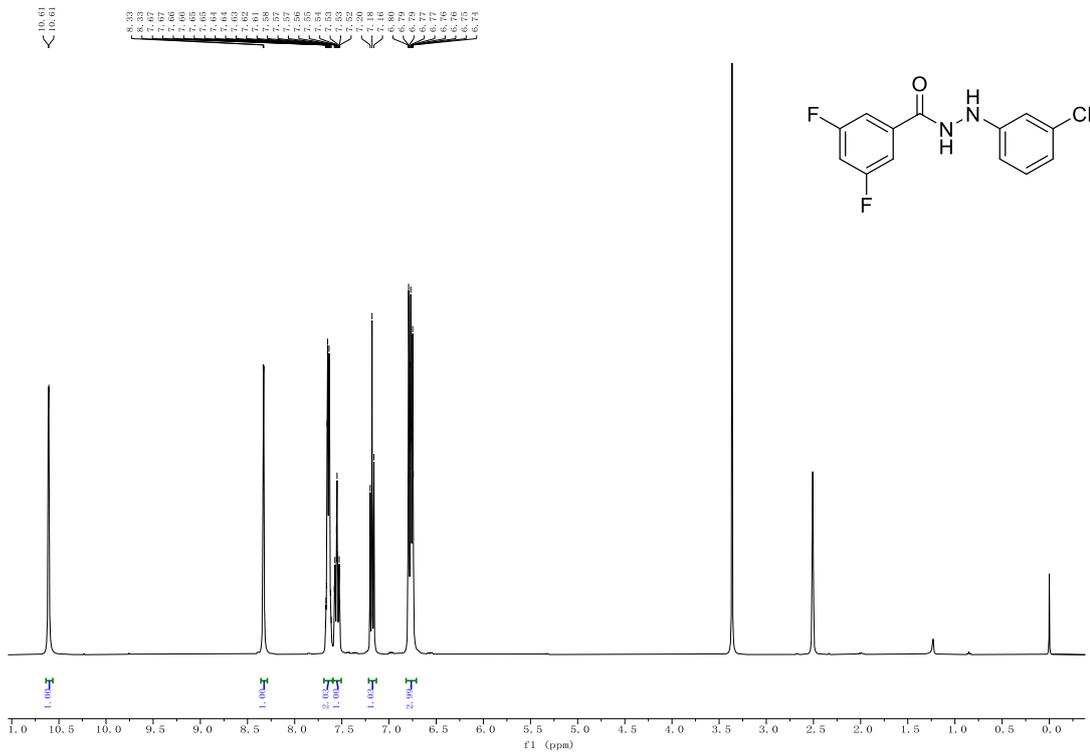
The ^{13}C NMR spectrum of D₃.



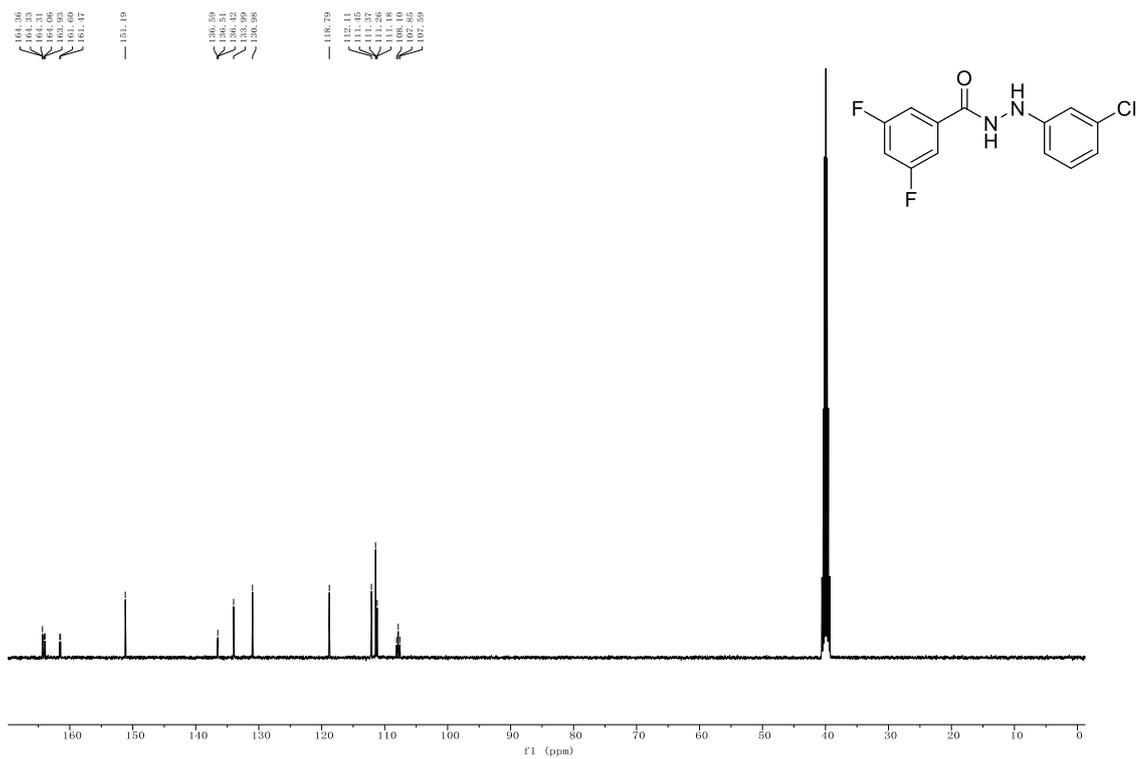
The ^1H NMR spectrum of D₄.



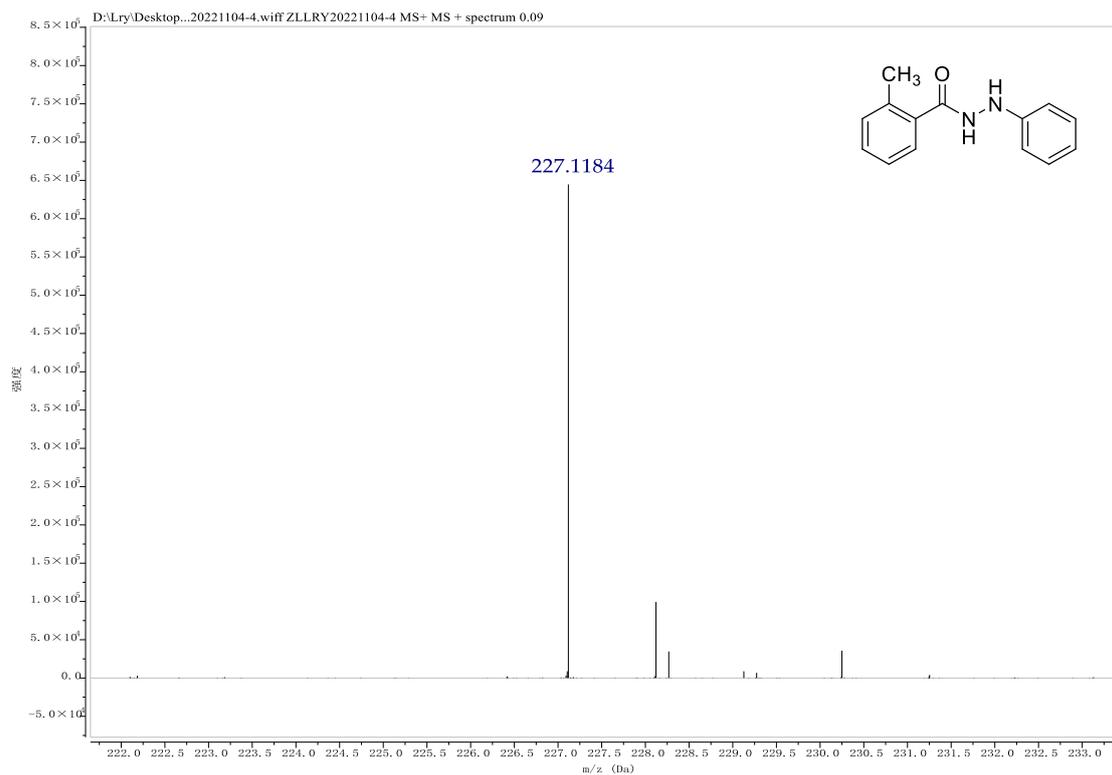
The ^{13}C NMR spectrum of D₄.



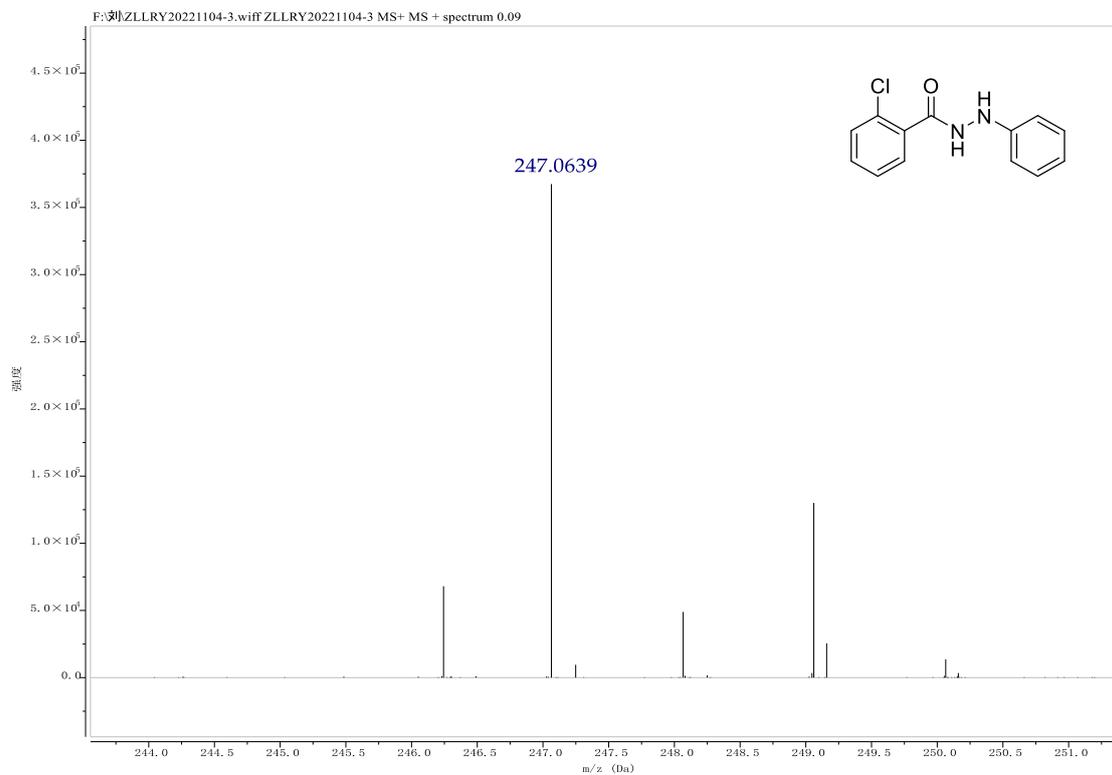
The ^1H NMR spectrum of D₅.



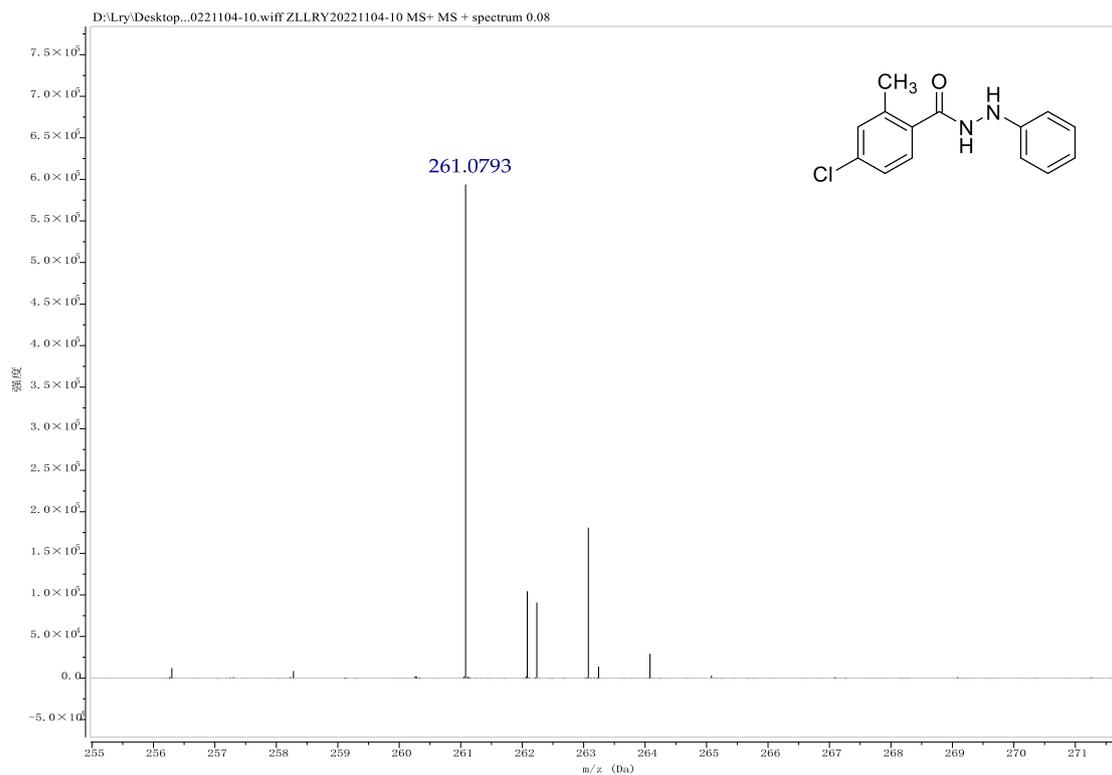
The ^{13}C NMR spectrum of **D₅**.



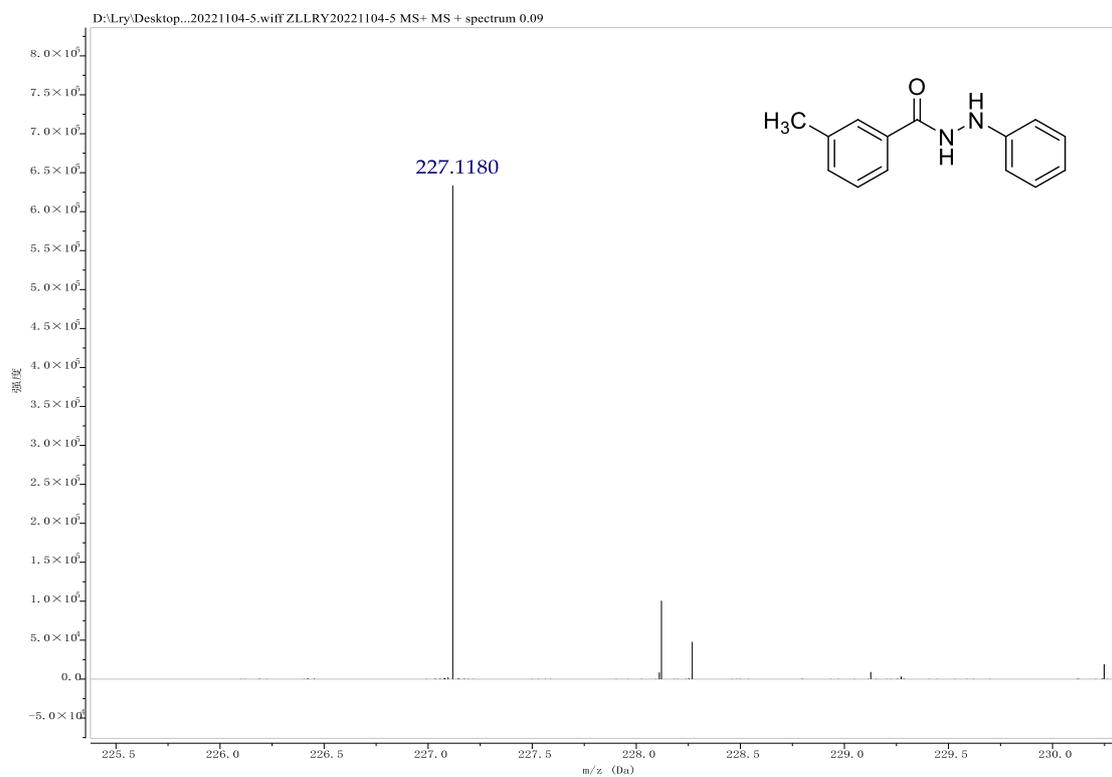
The HRMS spectrum of A₃.



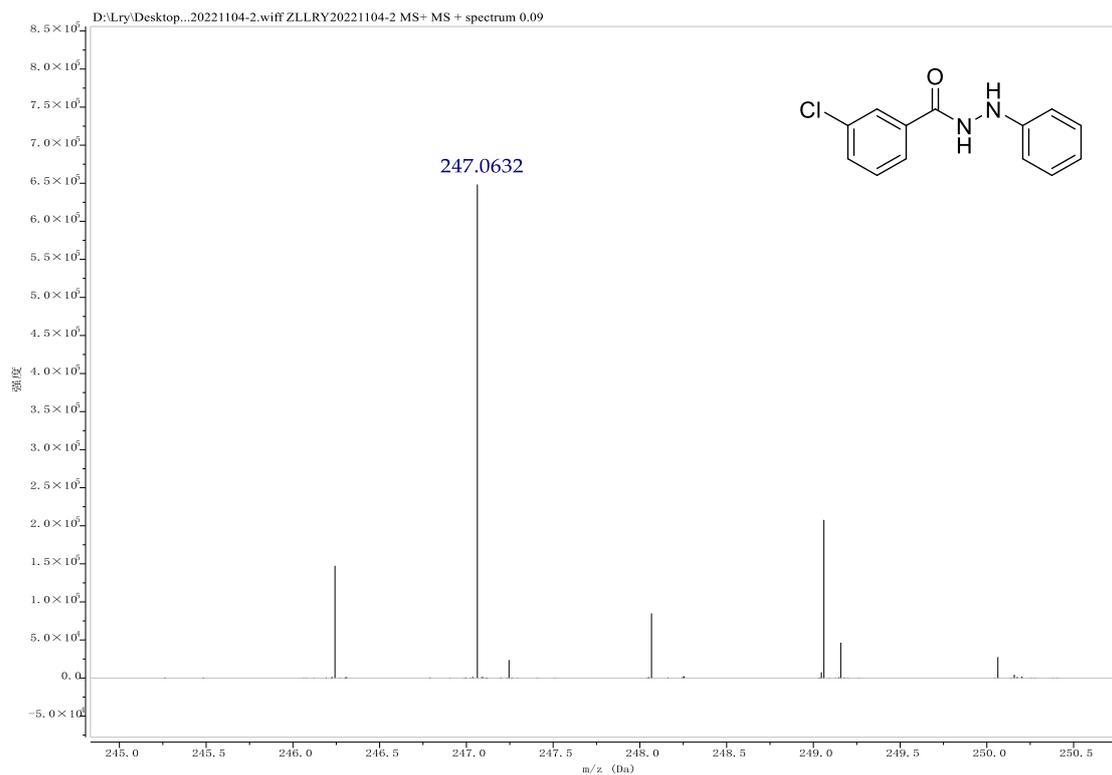
The HRMS spectrum of A₅.



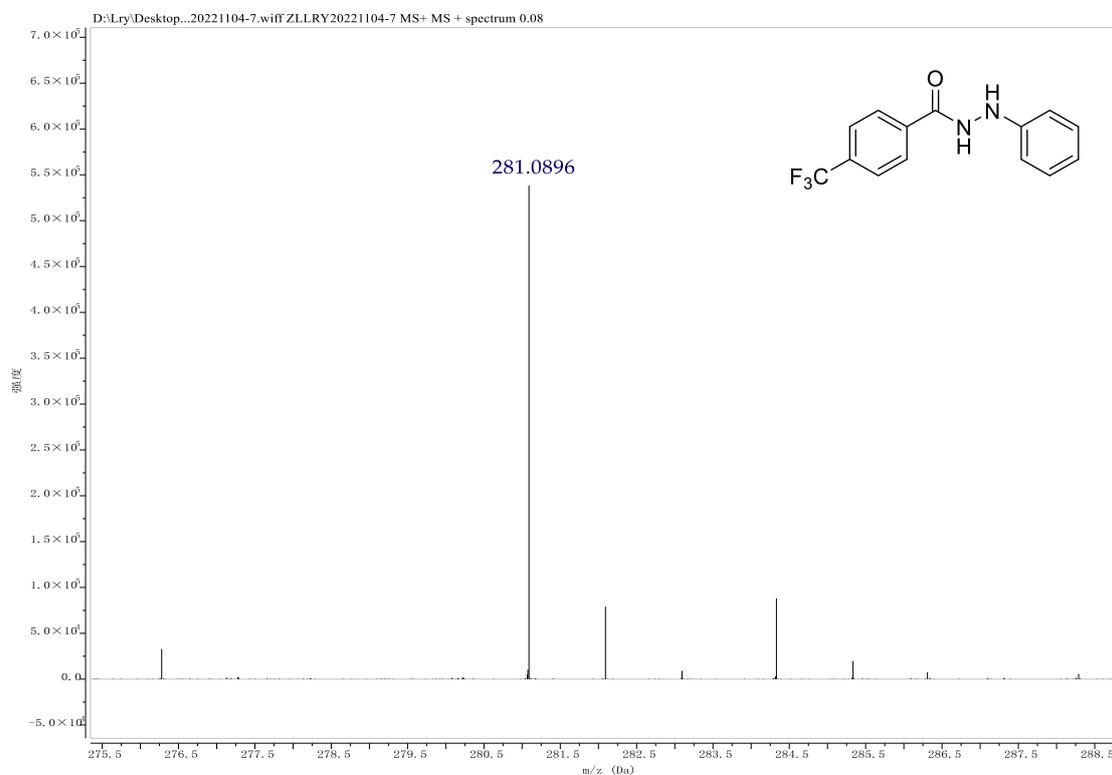
The HRMS spectrum of **A₇**.



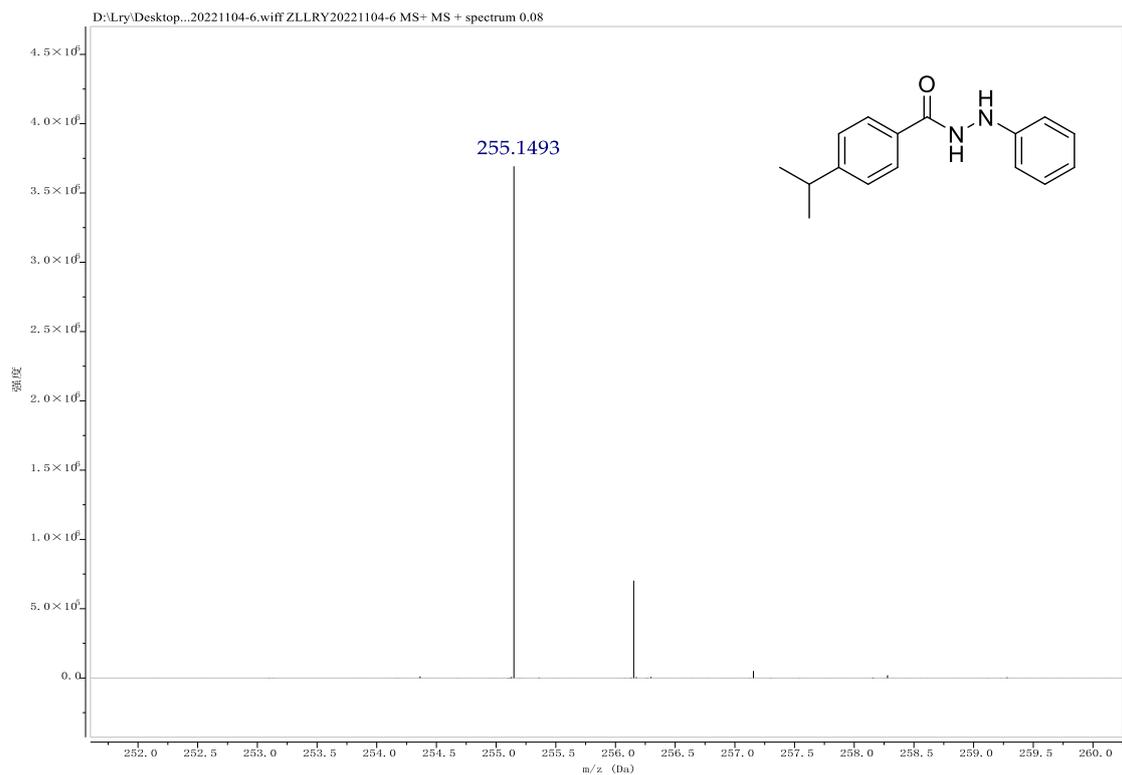
The HRMS spectrum of **A₉**.



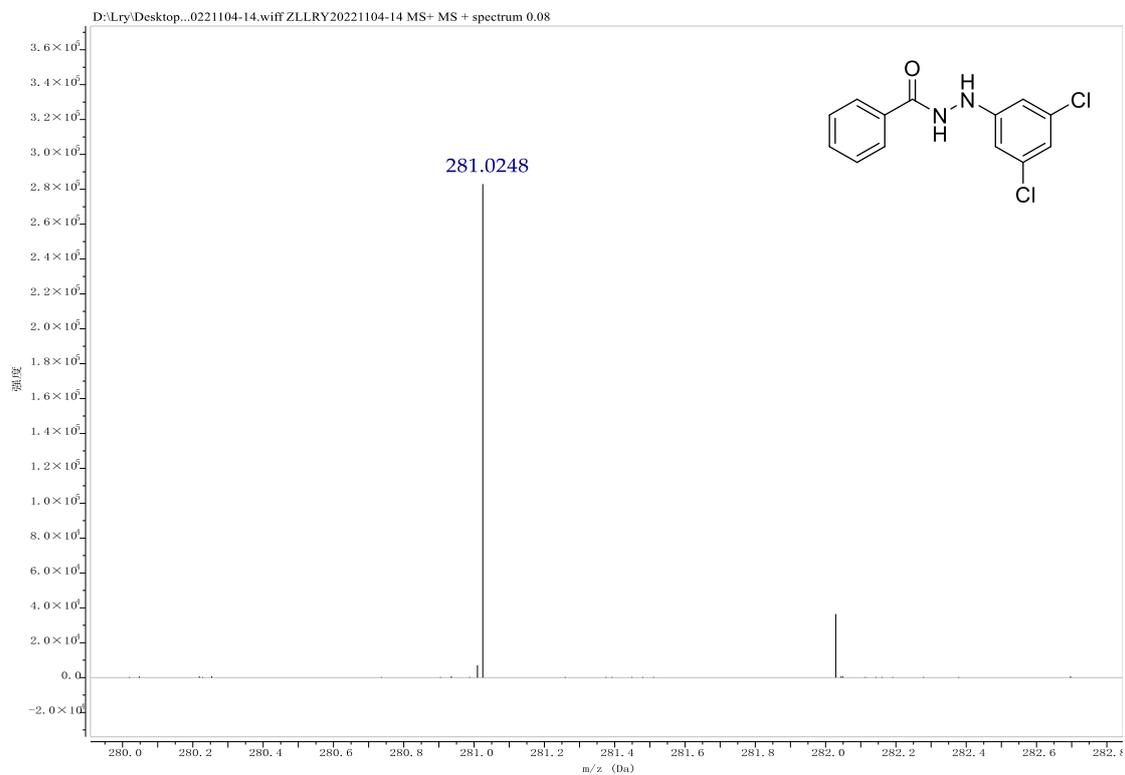
The HRMS spectrum of **A10**.



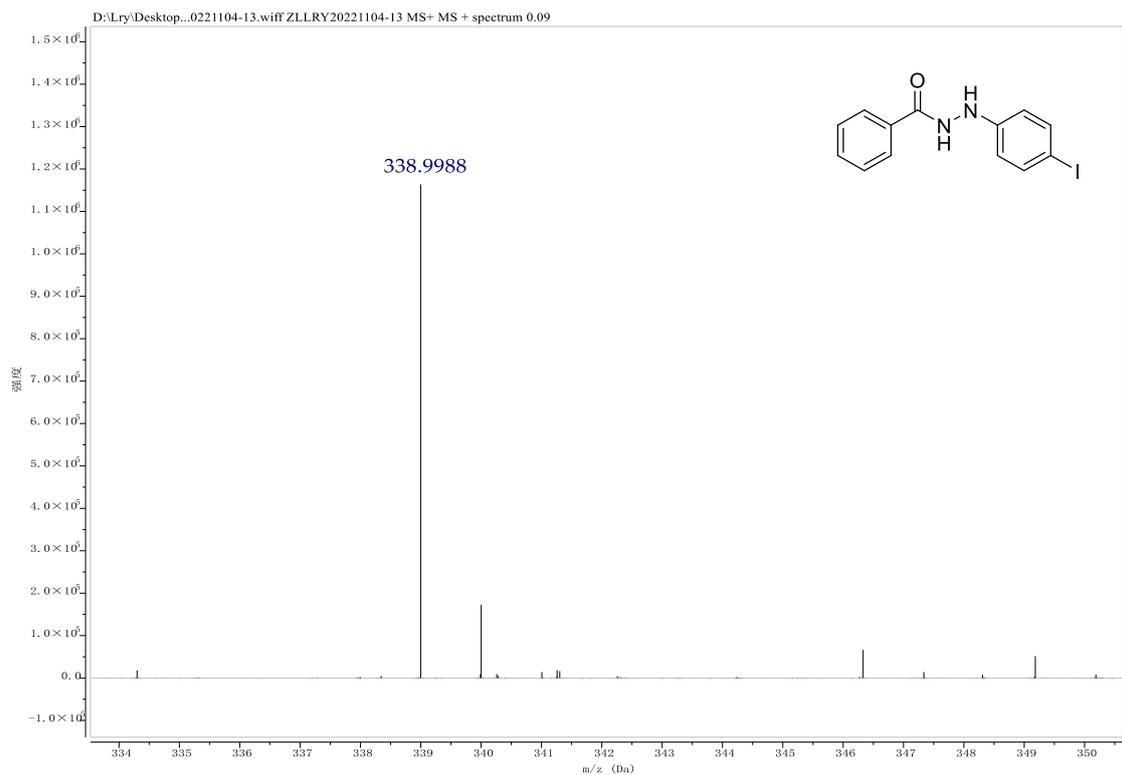
The HRMS spectrum of **A17**.



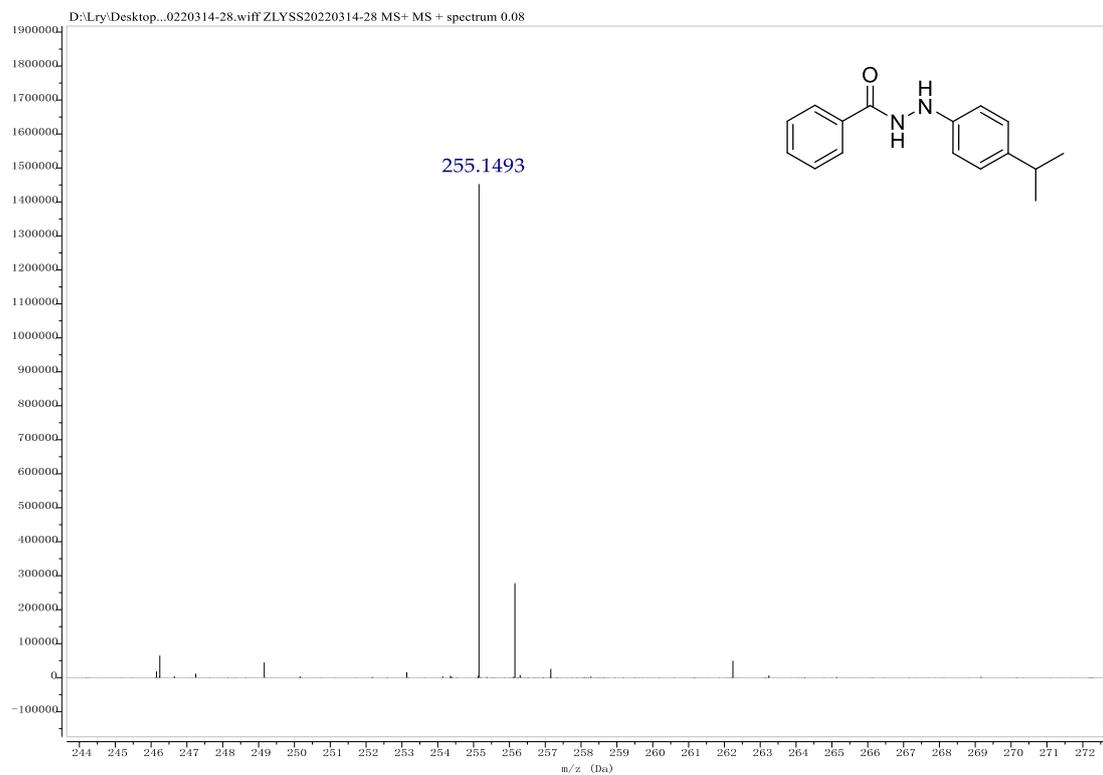
The HRMS spectrum of **A19**.



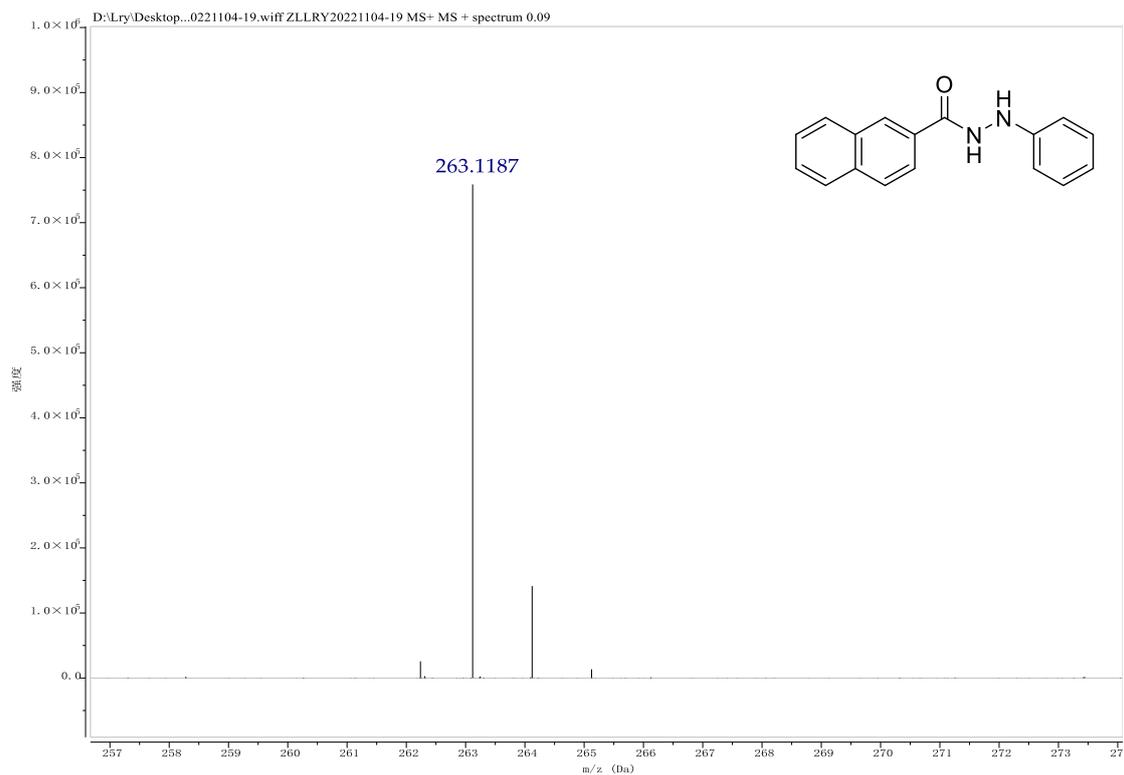
The HRMS spectrum of **B2**.



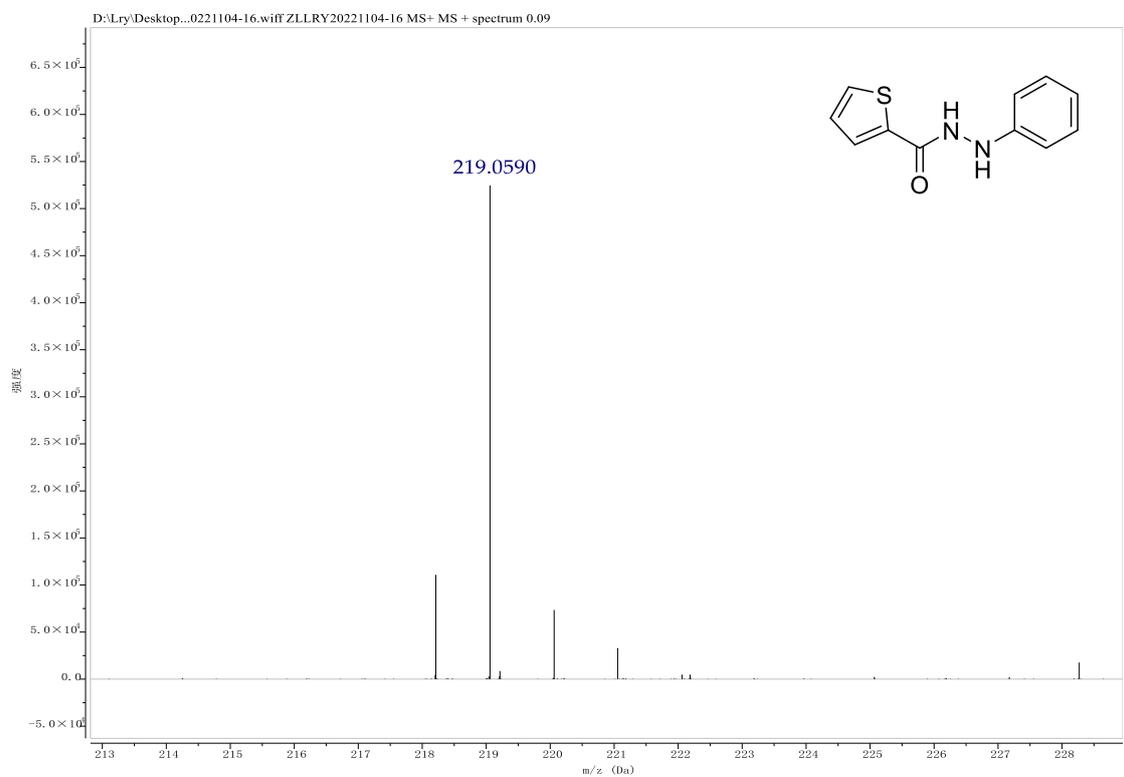
The HRMS spectrum of **B₆**.



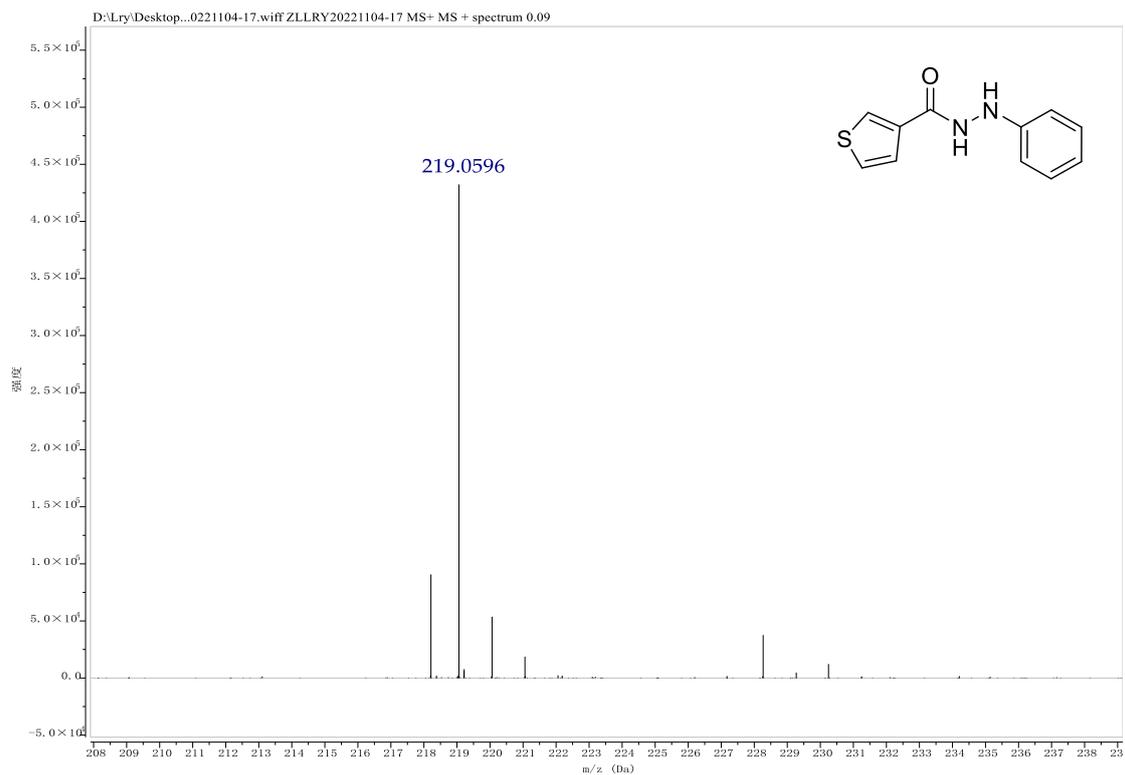
The HRMS spectrum of **B₁₃**.



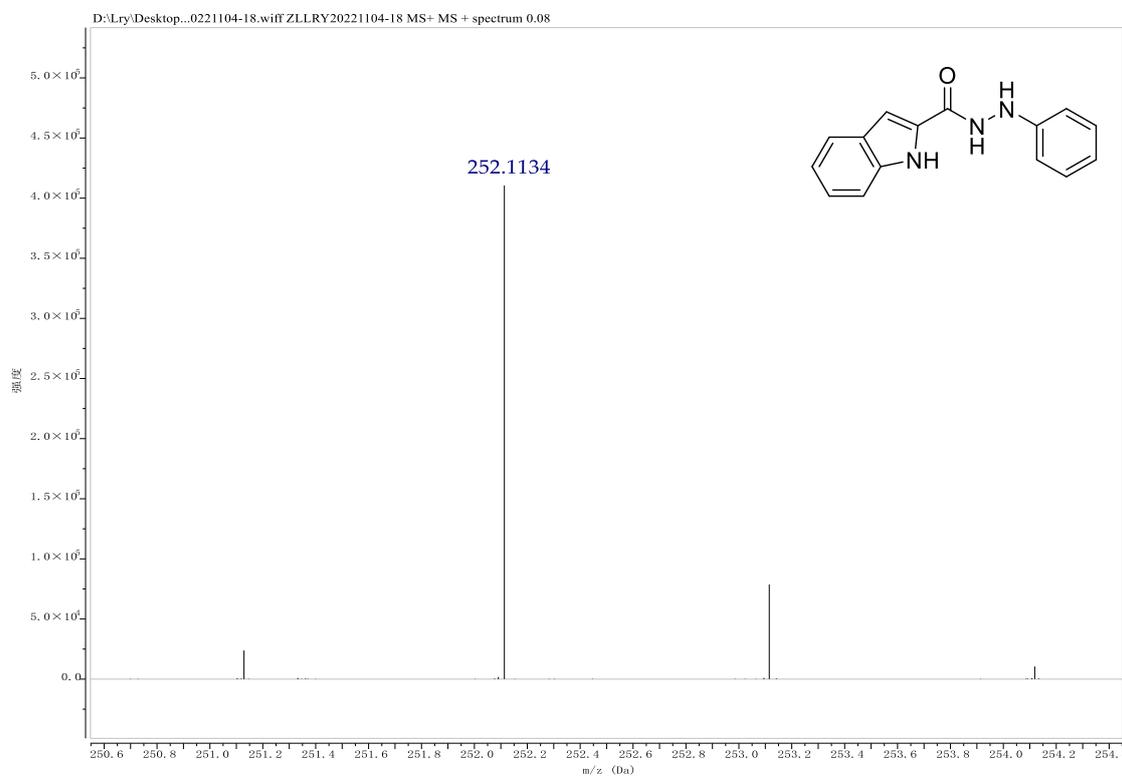
The HRMS spectrum of C₆.



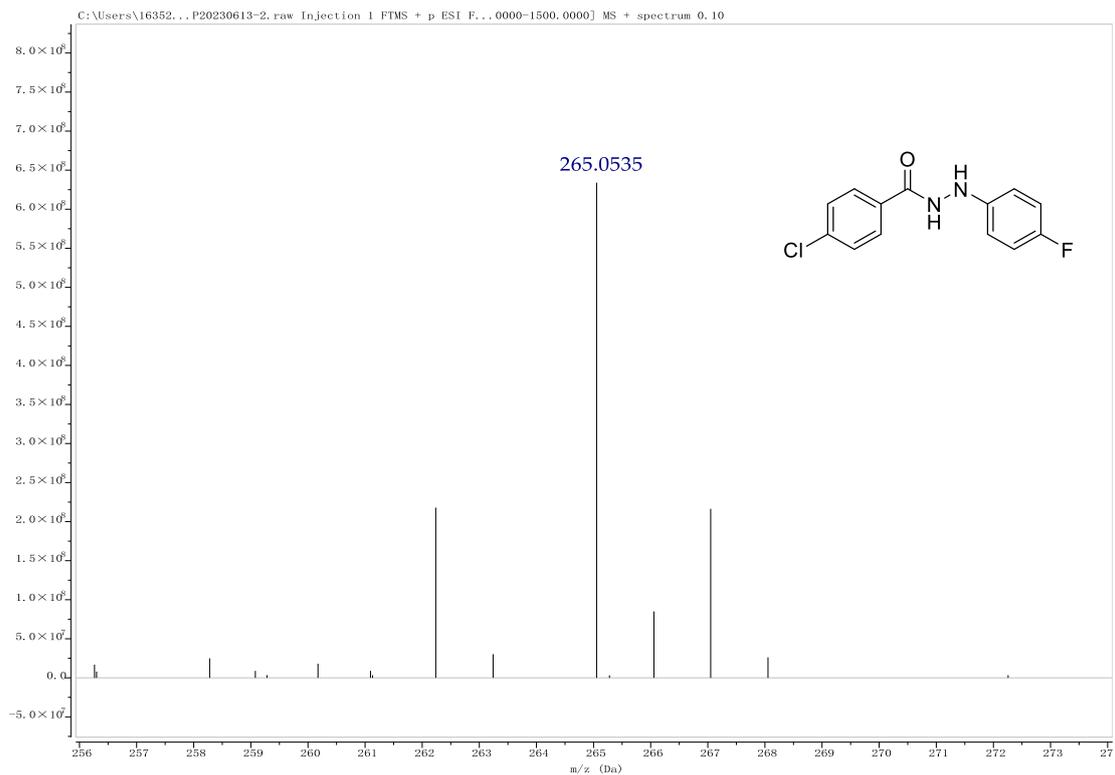
The HRMS spectrum of C₇.



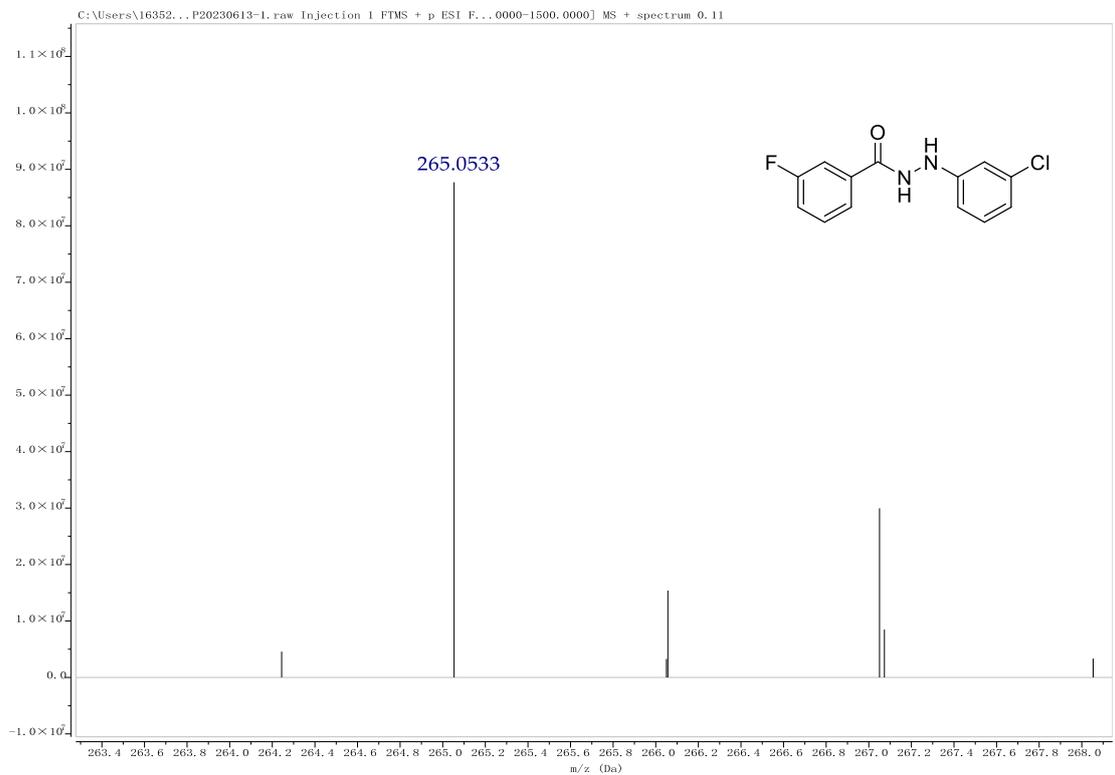
The HRMS spectrum of C₈.



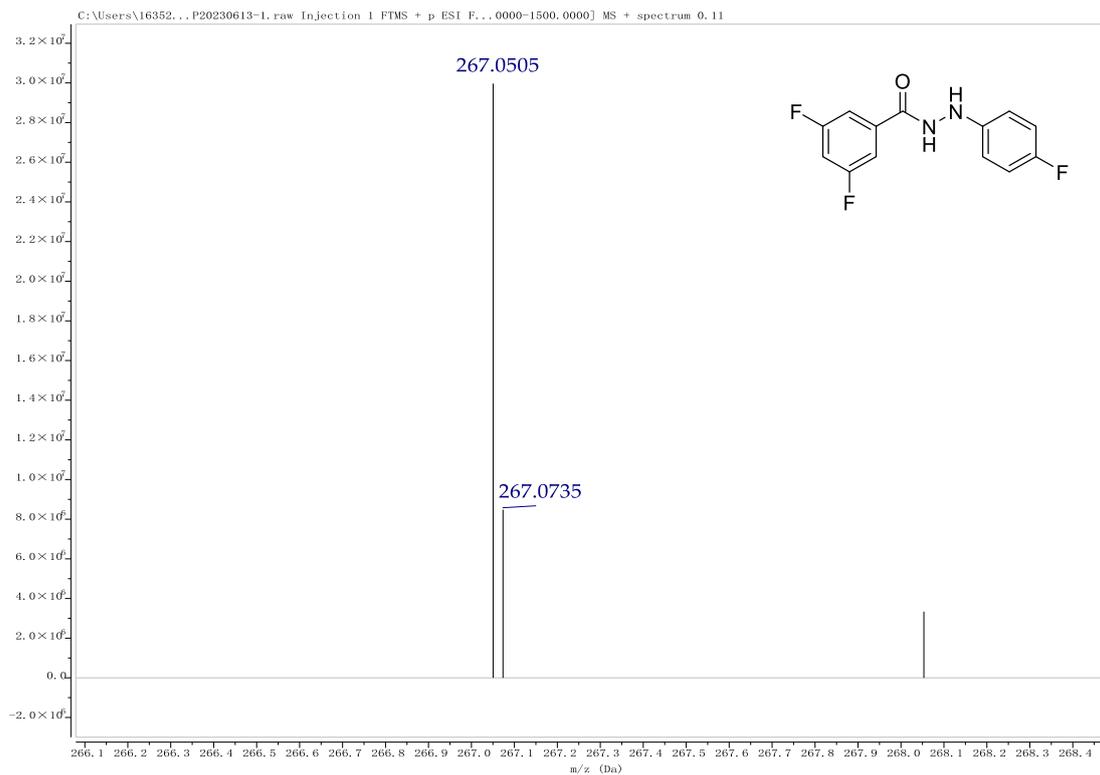
The HRMS spectrum of C₉.



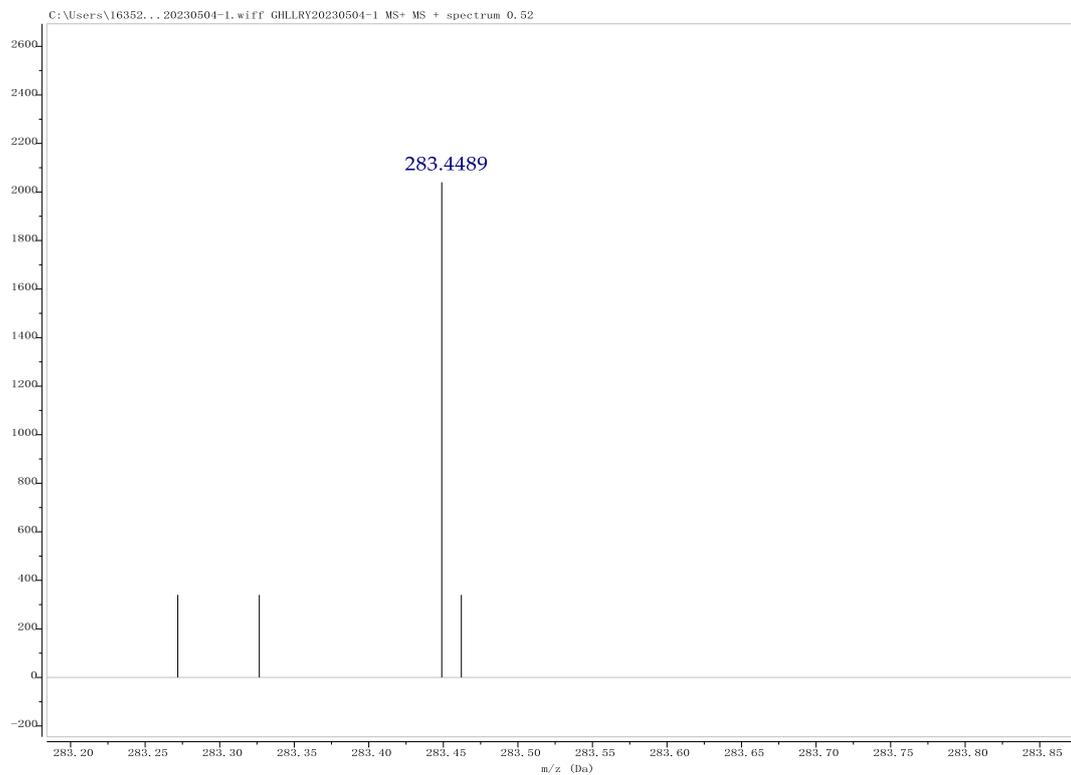
The HRMS spectrum of D₁.



The HRMS spectrum of D₂.



The HRMS spectrum of **D₄**.



The HRMS spectrum of **D₅**.