

Green Synthesis of Spirooxindoles via Lipase-Catalyzed One-Pot Tandem Reaction in Aqueous Media

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Table S1: Optimization of temperature for the one-pot tandem synthesis of 4a.

O=C1c2ccccc2c(=O)[nH]1 + O=C1CCCCC1 + N#CC#N
 $\xrightarrow[\text{temp. 72 h}]{\text{PPL, H}_2\text{O}}$
N#CC1=C(C#N)C(=C(N)C#N)C2=CC=CC=C2C(=O)N1

1a **2a** **3** **4a**

Entry	Temp (°C)	Yield (%)
1	20	trace
2	30	60
3	40	88
4	50	65

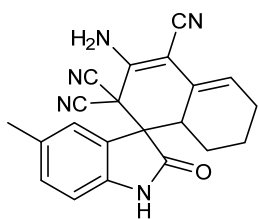
Reaction condition: **1a** (0.2 mmol), **2a** (0.2 mmol), **3** (0.6 mmol), PPL (15 mg), H₂O (3 ml), 72 h. Isolated yield.

Figure S1: Data of Products

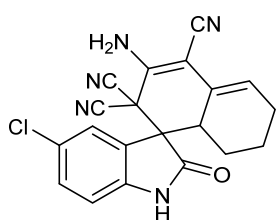
4a: 3'-amino-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. White solid, 60.0 mg, 88% yield. ¹H NMR (400 MHz, DMSO-*d*₆) δ 11.37 (s, 1H), 7.55 (s, 2H), 7.40 – 7.36 (m, 1H), 7.07 (t, *J* = 7.7 Hz, 1H), 7.01 (d, *J* = 7.8 Hz, 1H), 6.87 (d, *J* = 7.7 Hz, 1H), 5.92 – 5.91 (m, 1H), 2.90 (d, *J* = 11.0 Hz, 1H), 2.15 (d, *J* = 19.3 Hz, 1H), 1.99 – 1.84 (m, 1H), 1.63 (s, 1H), 1.55 – 1.45 (m, 3H), 0.46 (q, *J* = 12.5 Hz, 1H). ¹³C NMR (101 MHz, DMSO-*d*₆) δ 173.75, 143.36, 142.81, 131.37, 125.94, 125.46, 124.14, 123.47, 122.96, 116.05, 111.19, 111.15, 110.70, 81.98, 55.06, 42.66, 37.46, 25.03, 23.93, 20.69. **HRMS** (ESI): *m/z* [M+Na]⁺ calcd for [C₂₀H₁₅N₅ONa]⁺ 364.1169; found: 364.1109.

4b: 3'-amino-4-chloro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. Yellow solid, 50.4 mg, 67% yield. ¹H NMR (400 MHz, DMSO-*d*₆) δ 11.73 (s, 1H), 7.41 – 7.30 (m, 3H), 7.08 (d, *J* = 8.1 Hz, 1H), 6.98 (d, *J* = 7.8 Hz, 1H), 5.72 (dd, *J* = 5.4, 2.7 Hz, 1H), 2.88 (d, *J* = 12.2 Hz, 1H), 2.16 (d, *J* = 19.4 Hz, 1H), 2.06 – 2.00 (m, 1H), 1.69 (d, *J* = 13.1 Hz, 1H), 1.52 – 1.48 (m, 2H). ¹³C NMR (101 MHz, DMSO-*d*₆) δ 172.61, 145.72, 143.23, 132.89, 131.37, 127.83, 125.72, 121.77, 121.71, 116.62, 110.91, 110.70, 110.43, 85.12, 58.89,

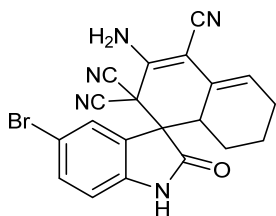
41.91, 38.32, 25.05, 24.57, 21.40. **HRMS** (ESI): m/z $[M+Na]^+$ calcd for $[C_{20}H_{14}ClN_5ONa]^+$ 398.0779; found: 398.0770.



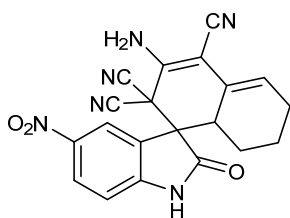
4c: 3'-amino-5-methyl-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. White solid, 56.9 mg, 80% yield. 1H NMR (400 MHz, DMSO- d_6) δ 11.29 (s, 1H), 7.55 (s, 2H), 7.21 – 7.19 (m, 1H), 6.91 (d, J = 7.9 Hz, 1H), 6.65 (s, 1H), 5.93 – 5.92 (m, 1H), 5.76 (s, 1H), 2.89 (d, J = 11.7 Hz, 1H), 2.23 (s, 3H), 2.19 – 2.12 (m, 1H), 1.97 – 1.90 (m, 1H), 1.65 (d, J = 13.3 Hz, 1H), 1.57 – 1.44 (m, 2H), 0.49 (q, J = 12.8, 12.0 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.70, 142.81, 141.00, 132.10, 131.72, 125.95, 125.78, 124.04, 123.09, 116.07, 111.23, 110.96, 110.76, 81.98, 55.10, 42.68, 37.46, 25.01, 23.91, 21.57, 20.72. **HRMS** (ESI): m/z $[M+Na]^+$ calcd for $[C_{21}H_7N_5ONa]^+$ 378.1325; found: 378.1311.



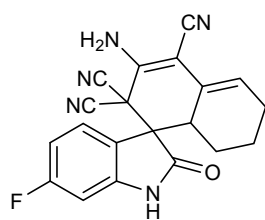
4d: 3'-amino-5-chloro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. Yellow solid, 62.4 mg, 83% yield. 1H NMR (400 MHz, DMSO- d_6) δ 11.59 (s, 1H), 7.66 (s, 2H), 7.49 (dd, J = 8.4, 2.1 Hz, 1H), 7.06 (d, J = 8.4 Hz, 1H), 6.77 (d, J = 2.2 Hz, 1H), 5.97 – 5.95 (m, 1H), 2.92 (d, J = 10.9 Hz, 1H), 2.16 (d, J = 19.3 Hz, 1H), 1.99 (s, 1H), 1.64 (s, 1H), 1.59 – 1.46 (m, 2H), 0.49 (q, J = 10.9 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.61, 142.75, 142.41, 135.74, 126.93, 125.44, 124.47, 123.28, 121.75, 115.85, 112.50, 111.19, 110.81, 81.83, 54.79, 42.36, 37.27, 24.89, 23.79, 20.53. **HRMS** (ESI): m/z $[M+Na]^+$ calcd for $[C_{20}H_{14}ClN_5ONa]^+$ 398.0779; found: 398.0764.



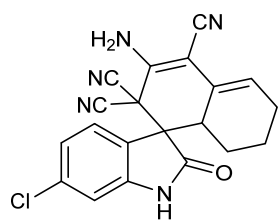
4e: 3'-amino-5-bromo-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. White solid, 73.1 mg, 87% yield. 1H NMR (400 MHz, DMSO- d_6) δ 11.60 (s, 1H), 7.66 (s, 2H), 7.61 (dd, J = 8.4, 2.0 Hz, 1H), 7.01 (d, J = 8.4 Hz, 1H), 6.90 (d, J = 2.0 Hz, 1H), 5.96 (dt, J = 5.0, 2.4 Hz, 1H), 2.94 – 2.91 (m, 1H), 2.19 – 2.13 (m, 1H), 1.96 (dd, J = 19.0, 5.8 Hz, 1H), 1.67 (d, J = 14.3 Hz, 1H), 1.59 – 1.48 (m, 2H), 0.49 (q, J = 10.9 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.27, 142.89, 142.54, 134.36, 127.89, 125.41, 125.21, 124.77, 115.83, 114.82, 113.30, 110.79, 110.57, 81.78, 55.15, 42.48, 37.42, 25.00, 23.90, 20.62. **HRMS** (ESI): m/z $[M+Na]^+$ calcd for $[C_{20}H_{14}BrN_5ONa]^+$ 442.0274; found: 442.0261.



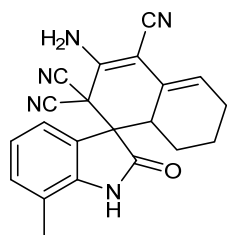
4f: 3'-amino-5-nitro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. Gray solid, 58.0 mg, 75% yield. 1H NMR (400 MHz, DMSO- d_6) δ 11.22 (s, 1H), 7.58 (s, 2H), 7.00 – 6.93 (m, 2H), 6.42 (d, J = 2.4 Hz, 1H), 5.92 (dd, J = 5.2, 2.7 Hz, 1H), 2.90 (d, J = 10.7 Hz, 1H), 2.18 – 2.13 (m, 1H), 1.94 (t, J = 14.1 Hz, 1H), 1.66 (d, J = 13.1 Hz, 1H), 1.59 – 1.44 (m, 2H), 0.49 (q, J = 12.1 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.46, 155.52, 142.82, 136.53, 125.84, 124.26, 124.21, 115.96, 114.49, 113.35, 111.49, 111.14, 110.69, 81.82, 55.79, 42.64, 37.43, 25.03, 23.93, 20.70. **HRMS** (ESI): m/z $[M+Na]^+$ calcd for $[C_{20}H_{14}N_6O_3Na]^+$ 409.1020; found: 409.1002.



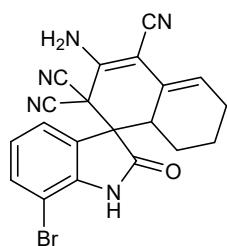
4g: 3'-amino-6-fluoro-2-oxo-6',7',8',8a'-tetrahydro-2'H-sp-iro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. Light yellow solid, 56.8 mg, 79% yield. ^1H NMR (400 MHz, DMSO- d_6) δ 11.60 (s, 1H), 7.60 (s, 2H), 6.97 – 6.86 (m, 3H), 5.95 (dt, J = 5.2, 2.5 Hz, 1H), 2.92 (dd, J = 10.4, 4.2 Hz, 1H), 2.20 – 2.14 (m, 1H), 2.00 – 1.90 (m, 1H), 1.67 (d, J = 13.9 Hz, 1H), 1.60 – 1.43 (m, 2H), 0.56 – 0.44 (m, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 174.07, 165.18, 162.74, 145.30, 142.62, 127.40, 125.66, 124.45, 118.90, 115.98, 110.83 (d, J = 36.8 Hz), 109.91 (d, J = 22.5 Hz), 99.54 (d, J = 27.4 Hz), 81.90, 54.79, 42.61, 37.39, 25.01, 23.88, 20.63. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{20}\text{H}_{14}\text{FN}_5\text{ONa}]^+$ 382.1075; found: 382.1052.



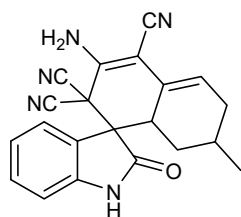
4h: 3'-amino-6-chloro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. Yellow solid, 61.6 mg, 82% yield. ^1H NMR (400 MHz, DMSO- d_6) δ 11.60 (s, 1H), 7.62 (s, 2H), 7.19 (dd, J = 8.3, 2.0 Hz, 1H), 7.06 (d, J = 2.0 Hz, 1H), 6.88 (d, J = 8.2 Hz, 1H), 5.96 – 5.93 (m, 1H), 2.92 (dd, J = 10.0, 5.8 Hz, 1H), 2.19 – 2.13 (m, 1H), 1.98 – 1.90 (m, 1H), 1.67 (d, J = 14.1 Hz, 1H), 1.60 – 1.56 (m, 1H), 1.50 – 1.47 (m, 1H), 0.50 (q, J = 10.9 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.72, 144.87, 142.52, 135.85, 127.04, 125.55, 124.58, 123.39, 121.86, 115.96, 112.61, 111.30, 110.92, 81.94, 54.90, 42.47, 37.38, 25.00, 23.90, 20.64. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{20}\text{H}_{14}\text{ClN}_5\text{ONa}]^+$ 398.0779; found: 398.0753.



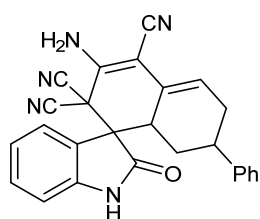
4i: 3'-amino-7-methyl-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. White solid, 64.0 mg, 90% yield. ^1H NMR (400 MHz, DMSO- d_6) δ 11.41 (s, 1H), 7.55 (s, 2H), 7.20 (d, J = 7.7 Hz, 1H), 6.98 (t, J = 7.7 Hz, 1H), 6.71 (d, J = 7.6 Hz, 1H), 5.91 – 5.90 (m, 1H), 2.90 (d, J = 11.8 Hz, 1H), 2.25 (s, 3H), 2.20 – 2.11 (m, 1H), 1.94 – 1.85 (m, 1H), 1.65 (dd, J = 13.7, 5.4 Hz, 1H), 1.58 – 1.44 (m, 2H), 0.47 (q, J = 10.9 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 174.31, 142.84, 141.91, 132.62, 126.00, 124.04, 123.39, 122.68 (2C), 120.58, 116.07, 111.27, 110.72, 81.96, 55.20, 42.70, 37.56, 25.02, 23.96, 20.69, 16.99. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{21}\text{H}_{17}\text{N}_5\text{ONa}]^+$ 378.1325; found: 378.1304.



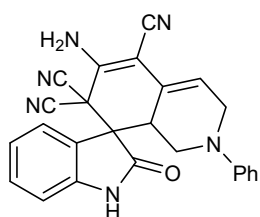
4j: 3'-amino-7-bromo-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. White solid, 73.1 mg, 87% yield. ^1H NMR (400 MHz, DMSO- d_6) δ 11.58 (s, 1H), 7.59 (s, 2H), 6.95 – 6.85 (m, 3H), 5.93 (dt, J = 5.1, 2.5 Hz, 1H), 2.90 (dd, J = 9.8, 5.7 Hz, 1H), 2.15 (dt, J = 19.3, 5.8 Hz, 1H), 1.97 – 1.88 (m, 1H), 1.68 – 1.63 (m, 1H), 1.59 – 1.42 (m, 2H), 0.48 (q, J = 12.2, 11.1 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.71, 142.78, 142.44, 134.43, 125.51, 125.18, 124.63, 124.60 (2C), 115.94, 110.87, 110.59, 103.61, 81.99, 56.01, 42.58, 37.61, 25.00, 22.87, 20.64. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{20}\text{H}_{14}\text{BrN}_5\text{ONa}]^+$ 442.0274; found: 442.0248.



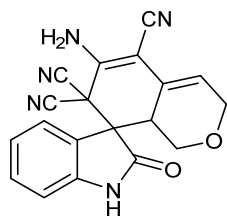
4k: 3'-amino-7'-methyl-2-oxo-6',7',8',8a'-tetrahydro-2'H-sp-iro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. White solid, 60.4 mg, 85% yield. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) δ 11.38 (s, 1H), 7.58 (s, 2H), 7.40 (td, $J = 7.8$, 1.3 Hz, 1H), 7.10 – 7.07 (m, 1H), 7.03 (d, $J = 7.8$ Hz, 1H), 6.88 (d, $J = 7.7$ Hz, 1H), 5.91 (dt, $J = 5.1$, 2.4 Hz, 1H), 2.99 (dd, $J = 9.9$, 5.2 Hz, 1H), 2.27 – 2.22 (m, 1H), 1.73 (s, 1H), 1.59 – 1.46 (m, 2H), 0.81 (d, $J = 6.4$ Hz, 3H), 0.26 (q, $J = 11.8$ Hz, 1H). ^{13}C NMR (101 MHz, $\text{DMSO}-d_6$) δ 173.68, 143.34, 142.91, 131.41, 125.76, 125.45, 123.92, 123.51, 122.91, 116.09, 111.19, 110.68, 81.81, 54.94, 42.71, 38.03, 33.82, 32.17, 27.61, 21.99, 19.08. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{21}\text{H}_{17}\text{N}_5\text{O}_2\text{Na}]^+$ 378.1325; found: 378.1319.



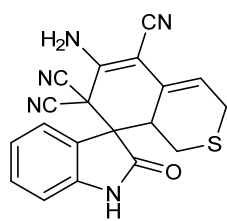
4l: 3'-amino-2-oxo-7'-phenyl-6',7',8',8a'-tetrahydro-2'H-sp-iro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile. Yellow solid, 76.8 mg, 90% yield. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) δ 11.34 (s, 1H), 7.66 (s, 2H), 7.43 – 7.39 (m, 1H), 7.23 (t, $J = 7.4$ Hz, 2H), 7.14 (dt, $J = 15.7$, 7.4 Hz, 2H), 7.07 (d, $J = 7.6$ Hz, 2H), 7.01 (d, $J = 7.8$ Hz, 1H), 6.94 (d, $J = 7.7$ Hz, 1H), 6.01 (dt, $J = 5.2$, 2.5 Hz, 1H), 3.20 – 3.18 (m, 1H), 3.01 – 2.95 (m, 1H), 2.43 – 2.37 (m, 1H), 2.14 – 2.05 (m, 1H), 1.61 – 1.58 (m, 1H), 0.74 (q, $J = 11.9$ Hz, 1H). ^{13}C NMR (101 MHz, $\text{DMSO}-d_6$) δ 173.58, 145.40, 143.31, 143.15, 131.53, 128.99 (2C), 127.07 (2C), 126.93, 125.80, 125.49, 123.74, 123.63, 122.76, 116.07, 111.29, 111.14, 110.65, 81.63, 54.99, 42.74, 38.47, 38.34, 33.04, 31.70. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{26}\text{H}_{19}\text{N}_5\text{O}_2\text{Na}]^+$ 440.1482; found: 440.1457.



4m: 6'-amino-2-oxo-2'-phenyl-1',2',3',8a'-tetrahydro-7'H-spiro[indoline-3,8'-isoquinoline]-5',7',7'-tricarbonitrile. Yellow solid, 70.3 mg, 84% yield. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) δ 11.42 (s, 1H), 7.71 (s, 2H), 7.39 (td, $J = 7.8$, 1.2 Hz, 1H), 7.33 – 7.21 (m, 5H), 7.08 (t, $J = 7.7$ Hz, 1H), 7.00 (d, $J = 7.8$ Hz, 1H), 6.89 (d, $J = 7.7$ Hz, 1H), 5.86 (dt, $J = 4.8$, 2.2 Hz, 1H), 3.47 – 3.39 (m, 2H), 3.31 – 3.25 (m, 1H), 3.12 (d, $J = 7.7$ Hz, 1H), 2.72 – 2.60 (m, 2H), 1.30 (t, $J = 10.3$ Hz, 1H). ^{13}C NMR (101 MHz, $\text{DMSO}-d_6$) δ 175.18, 147.00, 144.91, 144.76, 133.13, 130.59 (2C), 128.67 (2C), 128.53, 127.40, 127.09, 125.35, 125.23, 124.36, 117.67, 112.90, 112.74, 112.25, 83.23, 56.59, 44.34, 40.07, 34.64, 33.30. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{25}\text{H}_{18}\text{N}_6\text{O}_2\text{Na}]^+$ 441.1434; found: 441.1417.



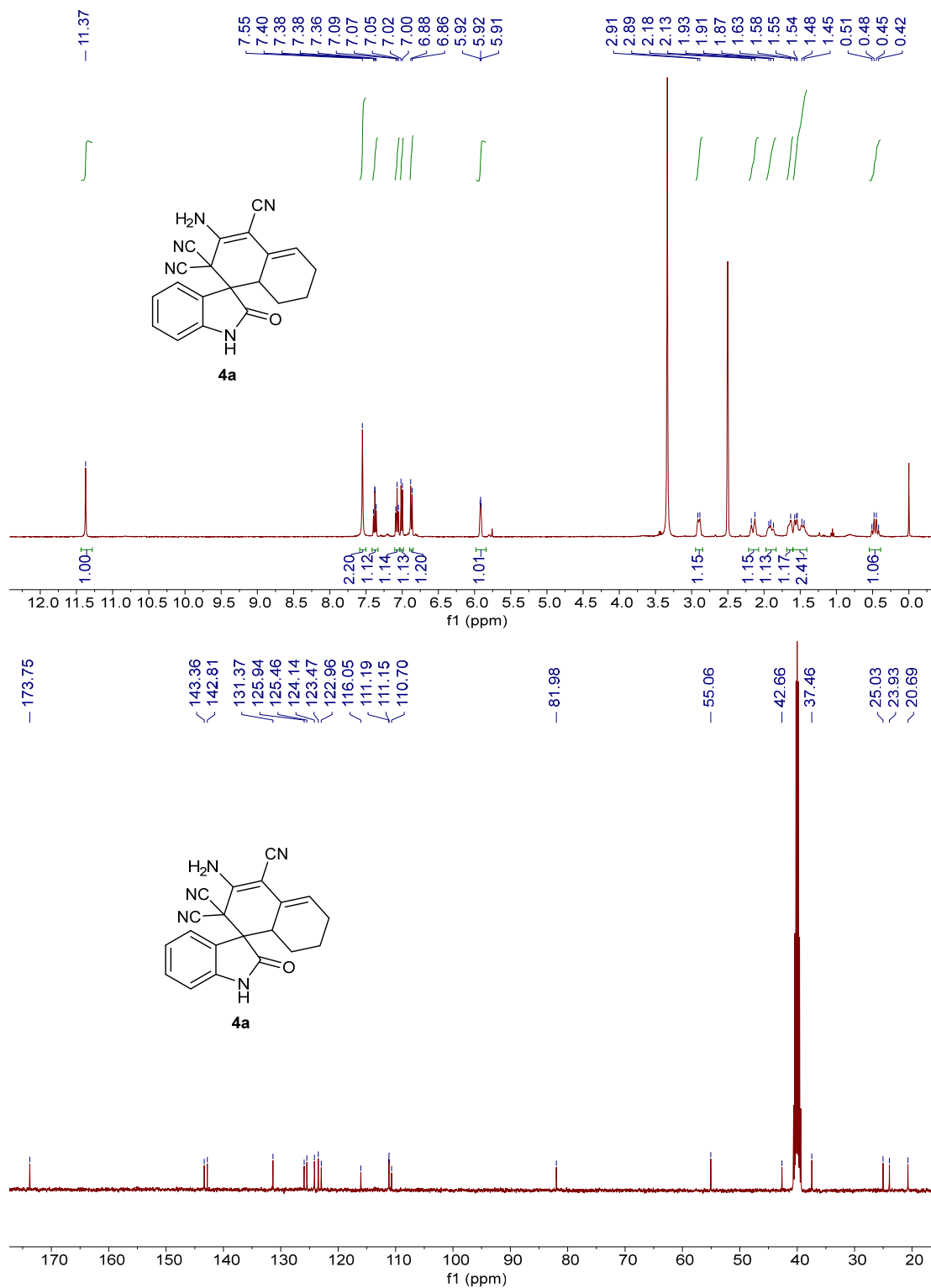
4n: 6'-amino-2-oxo-3',8a'-dihydrospiro[indoline-3,8'-isochromene]-5',7',7'(1'H)-tricarbonitrile. Gray solid, 61.8 mg, 90% yield. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) δ 11.48 (s, 1H), 7.82 (s, 2H), 7.41 (td, $J = 7.7$, 1.3 Hz, 1H), 7.11 (td, $J = 7.7$, 1.1 Hz, 1H), 7.03 (d, $J = 7.8$ Hz, 1H), 6.93 (d, $J = 7.6$ Hz, 1H), 5.91 (dt, $J = 4.0$, 2.2 Hz, 1H), 4.26 (dt, $J = 17.8$, 2.9 Hz, 1H), 4.00 (ddd, $J = 17.9$, 3.8, 2.1 Hz, 1H), 3.69 (dd, $J = 10.6$, 5.0 Hz, 1H), 3.11 (d, $J = 8.6$ Hz, 1H), 2.46 (d, $J = 10.2$ Hz, 1H). ^{13}C NMR (101 MHz, $\text{DMSO}-d_6$) δ 172.81, 143.66, 143.01, 131.74, 125.42, 124.10, 123.78, 122.02, 120.87, 115.58, 111.54, 110.80, 110.17, 80.25, 65.84, 63.87, 52.42, 42.79, 35.92. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{19}\text{H}_{13}\text{N}_5\text{O}_2\text{Na}]^+$ 366.0961; found: 366.0935.



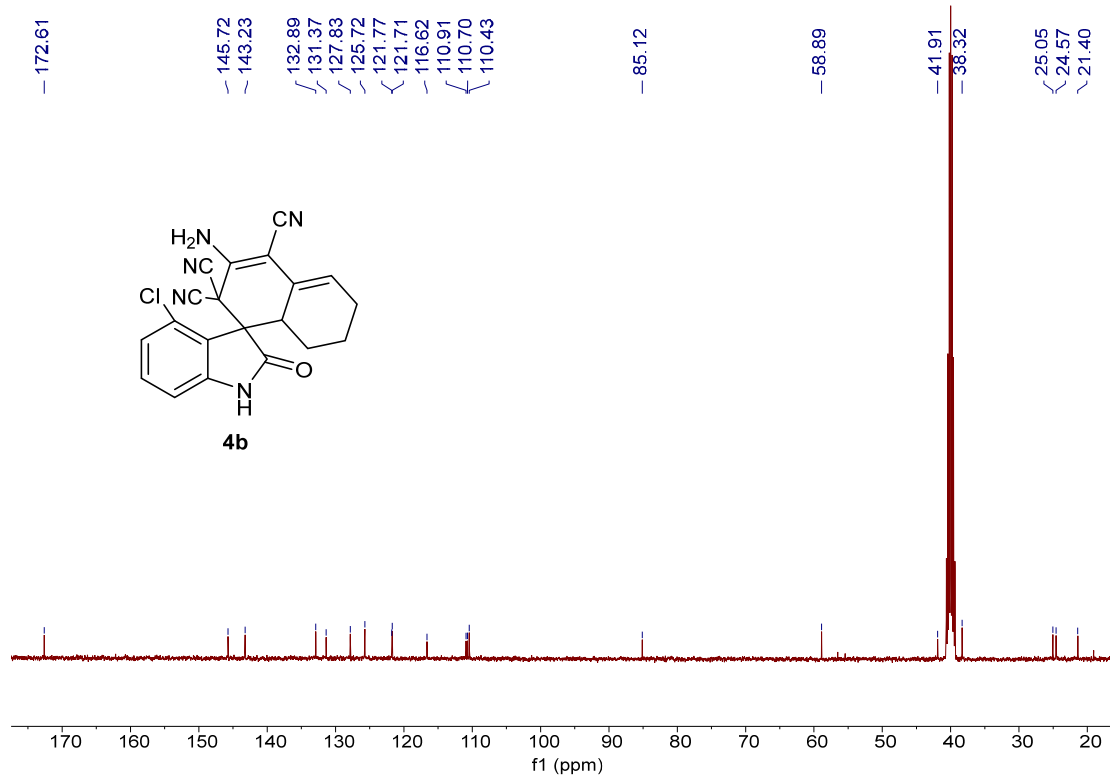
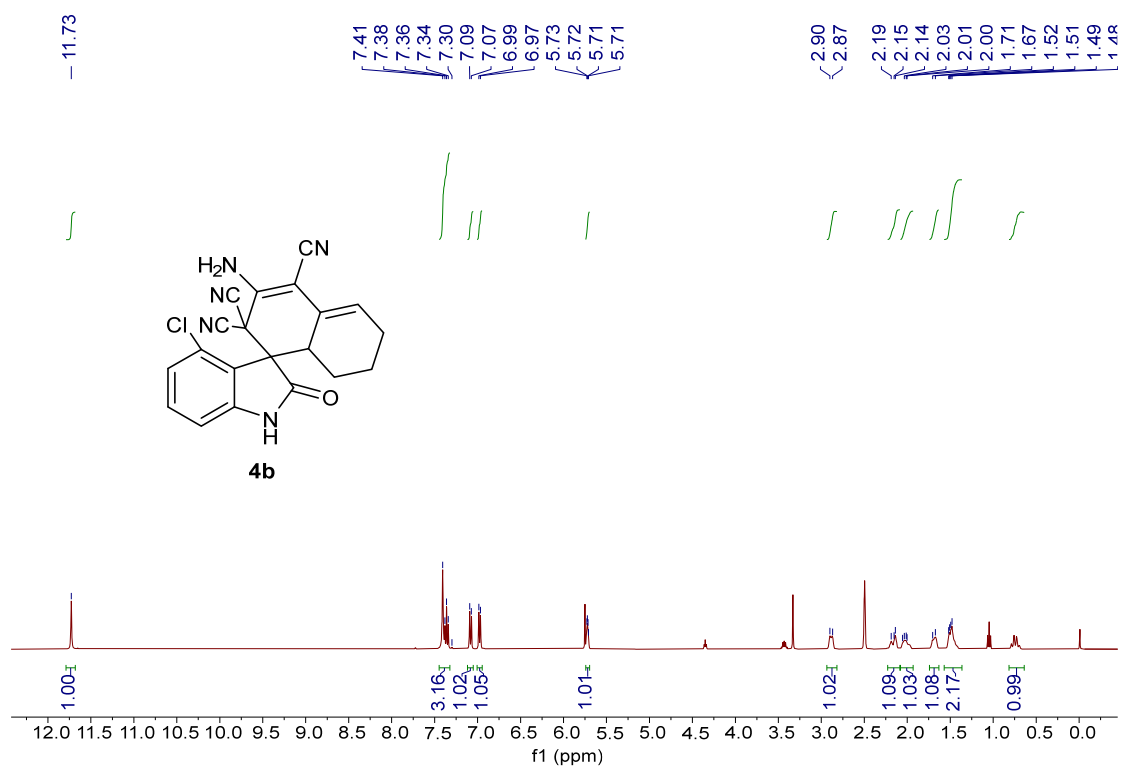
4o: 6'-amino-2-oxo-3',8a'-dihydrospiro[indoline-3,8'-isothiochromene]-5',7',7'(1'H)-tricarbonitrile. Gray solid, 60.4 mg, 84% yield. ^1H NMR (400 MHz, DMSO- d_6) δ 11.53 (s, 1H), 7.74 (s, 2H), 7.42 (td, J = 7.8, 1.3 Hz, 1H), 7.10 (td, J = 7.7, 1.1 Hz, 1H), 7.05 (d, J = 7.8 Hz, 1H), 6.90 (d, J = 7.7 Hz, 1H), 6.15 (dt, J = 5.8, 2.5 Hz, 1H), 3.48 – 3.38 (m, 1H), 3.19 – 3.11 (m, 2H), 2.49 – 2.45 (m, 1H), 1.76 (dd, J = 13.0, 10.8 Hz, 1H). ^{13}C NMR (101 MHz, DMSO- d_6) δ 173.20, 143.29, 131.74, 126.76, 125.54, 123.75, 121.93, 121.40, 115.88, 111.51, 110.91, 110.28, 82.00, 54.97, 42.84, 38.21, 25.43, 25.28. **HRMS** (ESI): m/z $[\text{M}+\text{Na}]^+$ calcd for $[\text{C}_{19}\text{H}_{13}\text{N}_5\text{OSNa}]^+$ 382.0733; found: 382.0711.

Figure S2: Spectra of Products

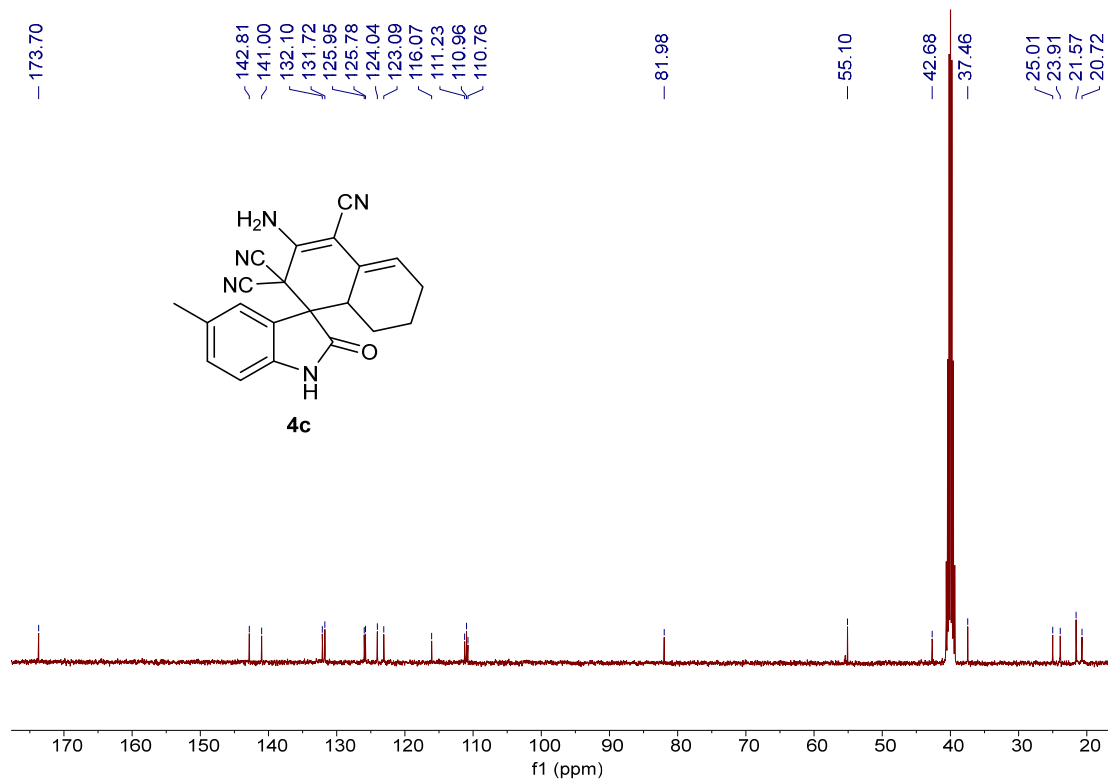
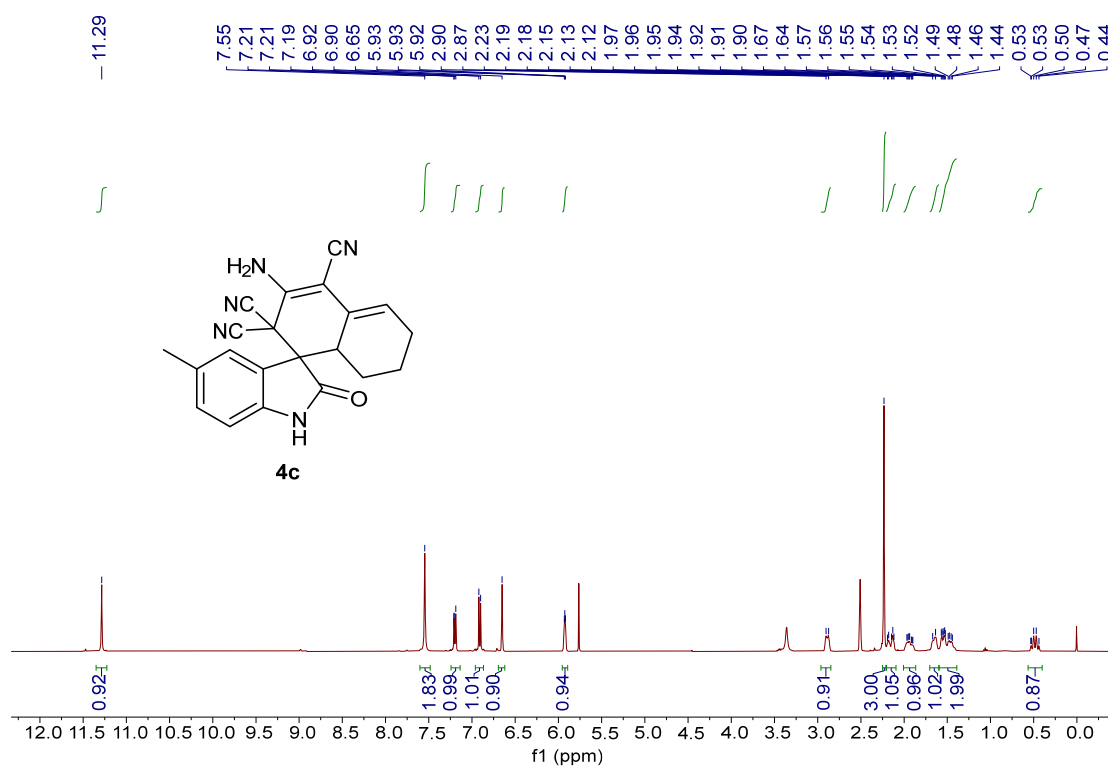
4a: 3'-amino-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile.



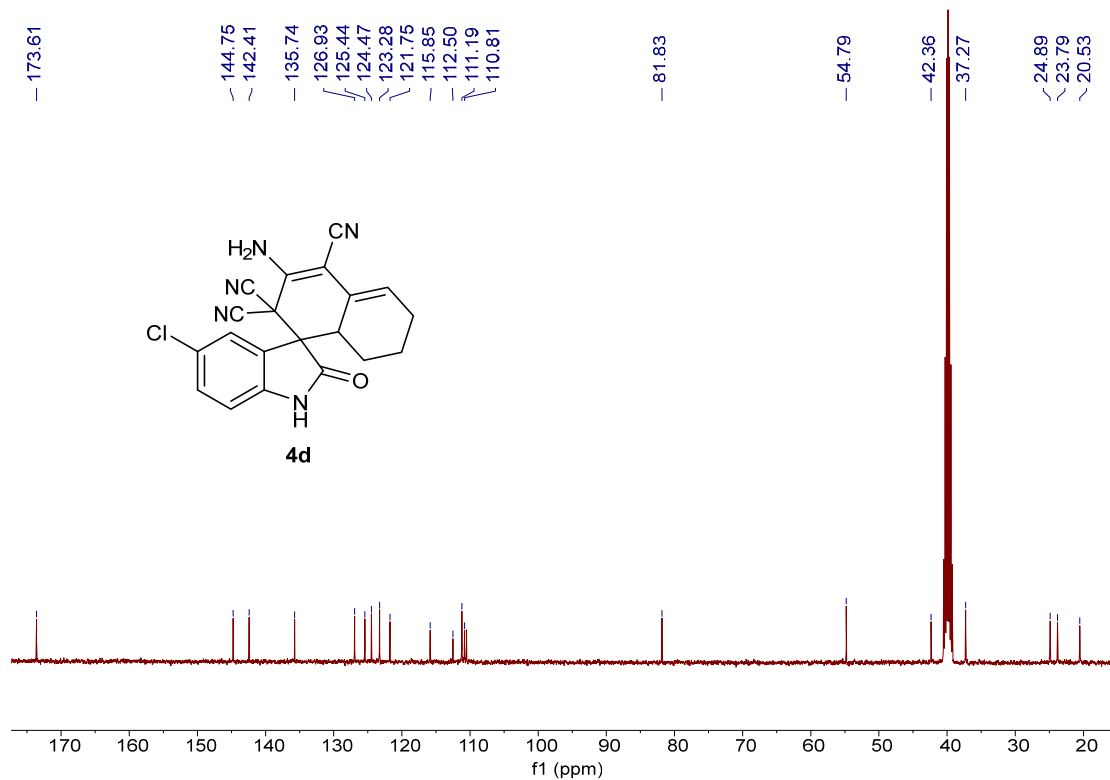
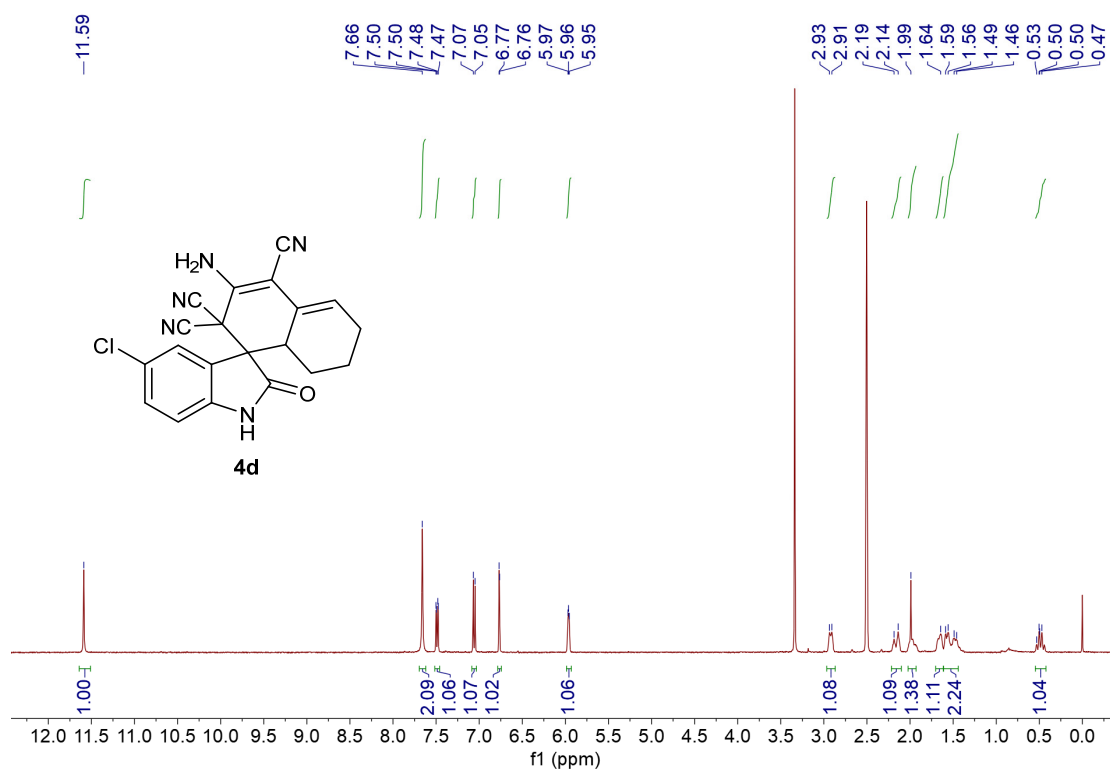
4b: 3'-amino-4-chloro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile.



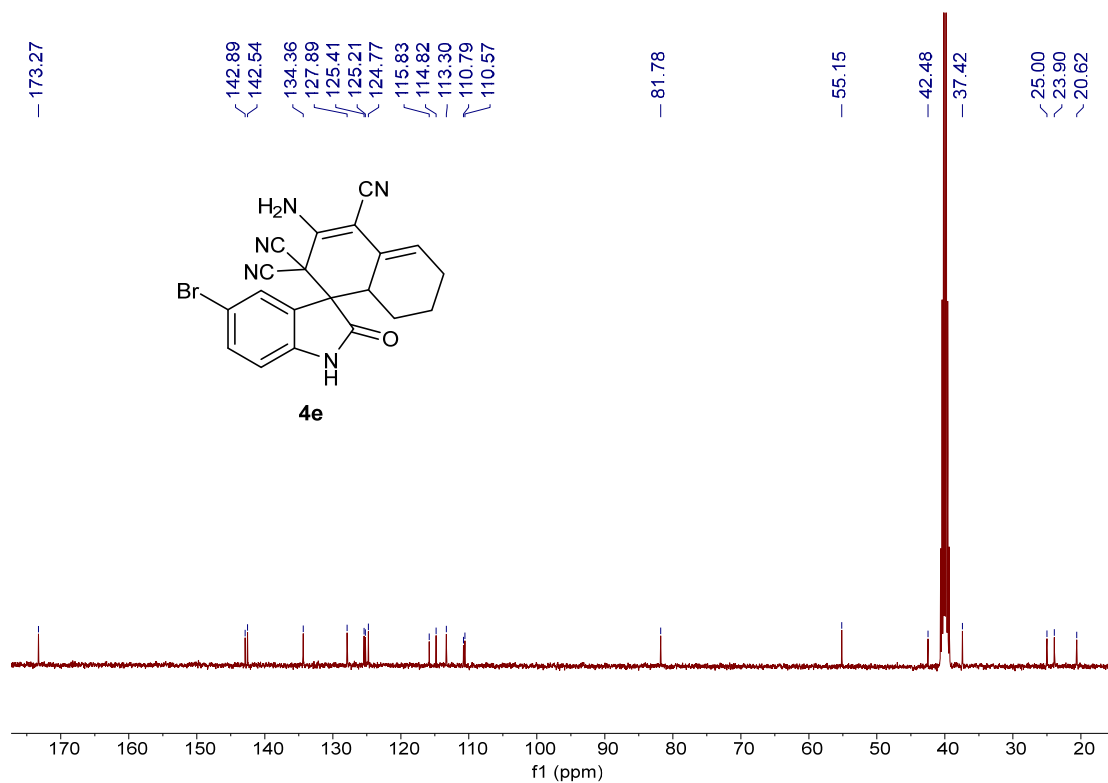
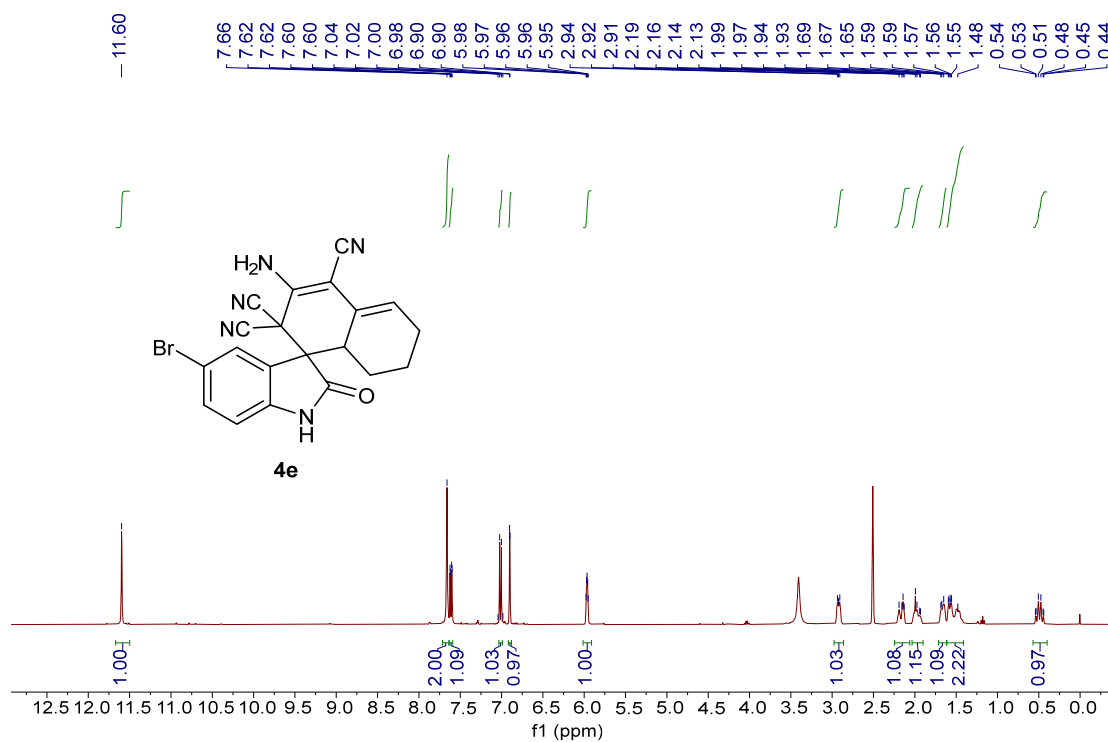
4c: 3'-amino-5-methyl-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



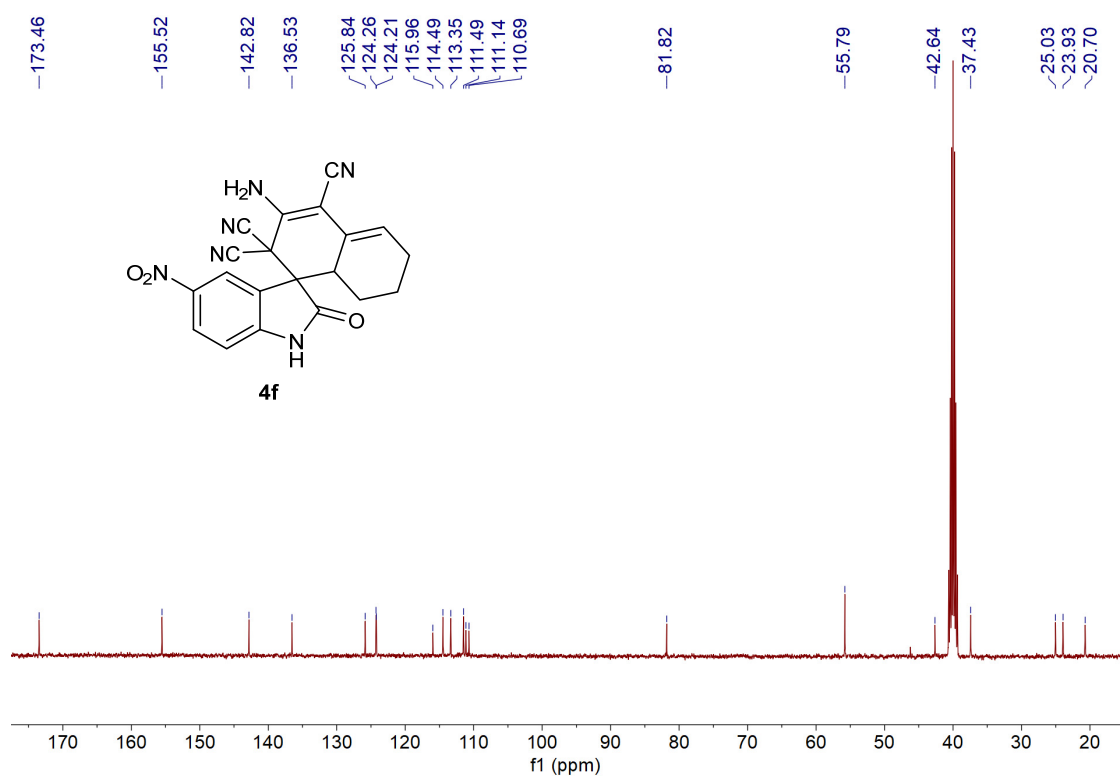
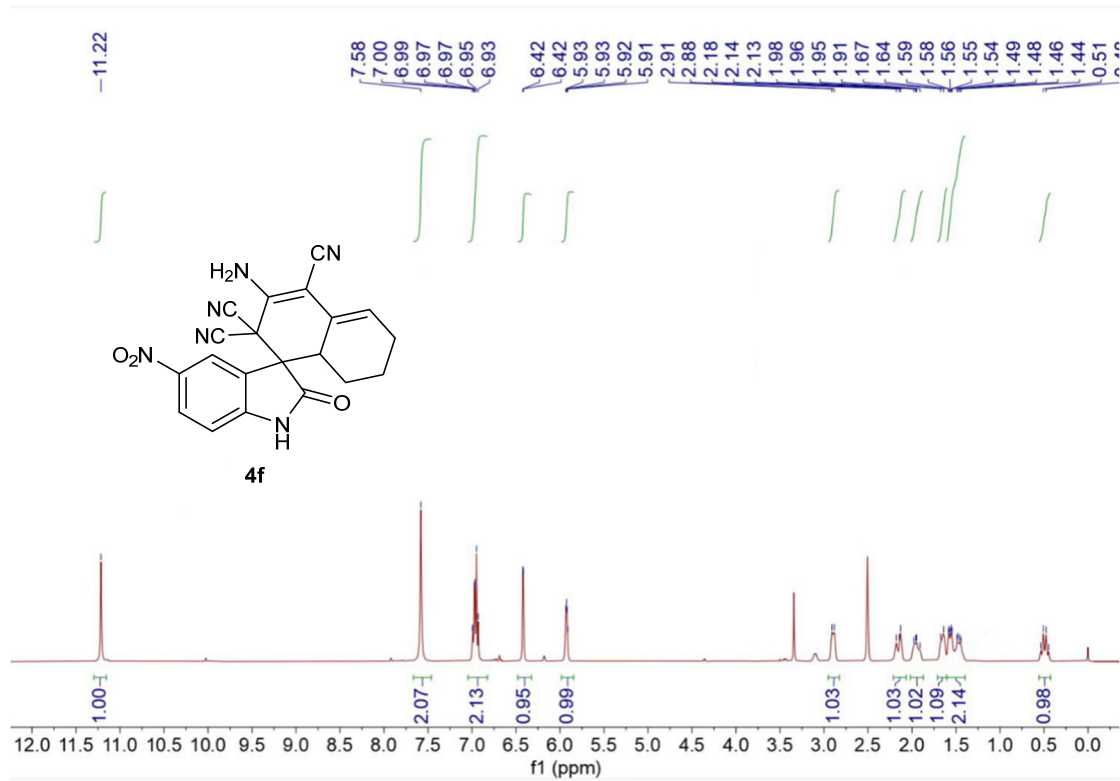
4d: 3'-amino-5-chloro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile.



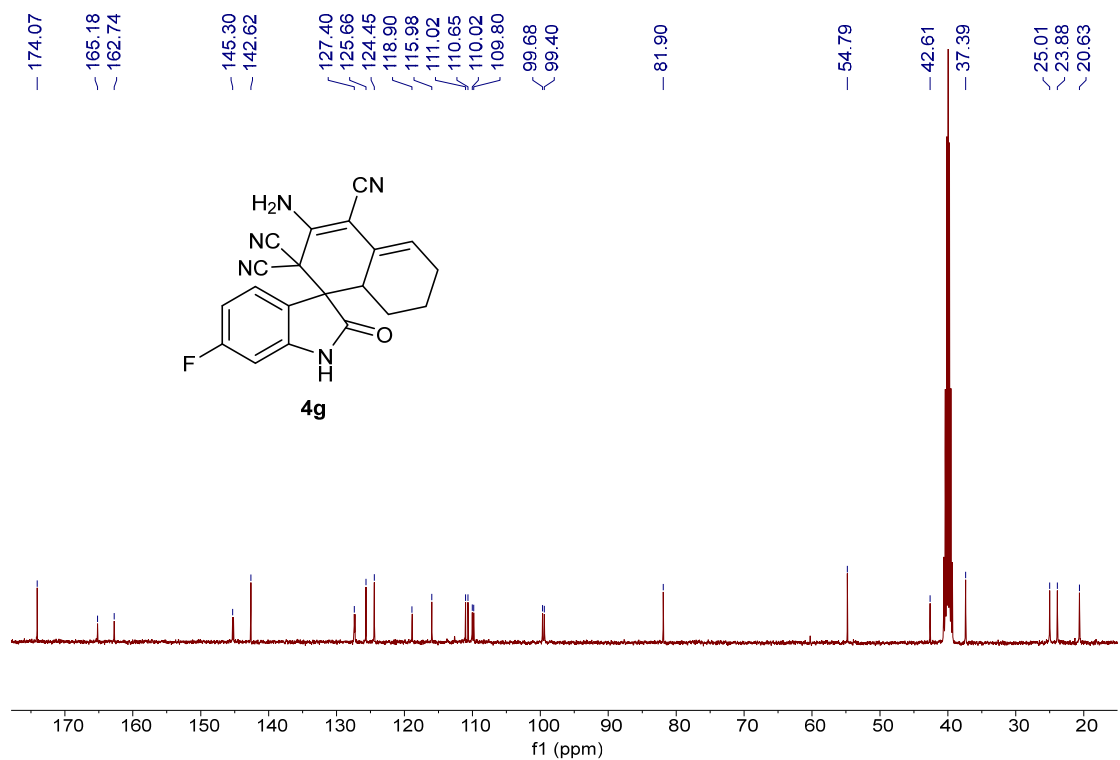
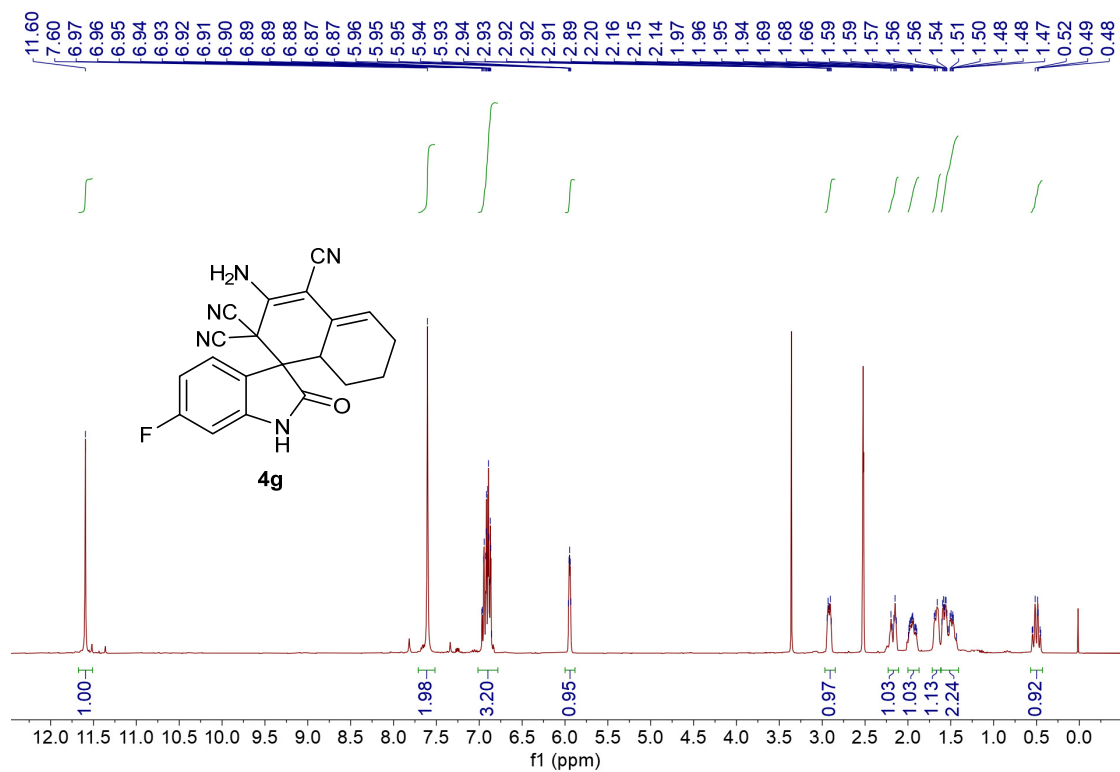
4e: 3'-amino-5-bromo-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



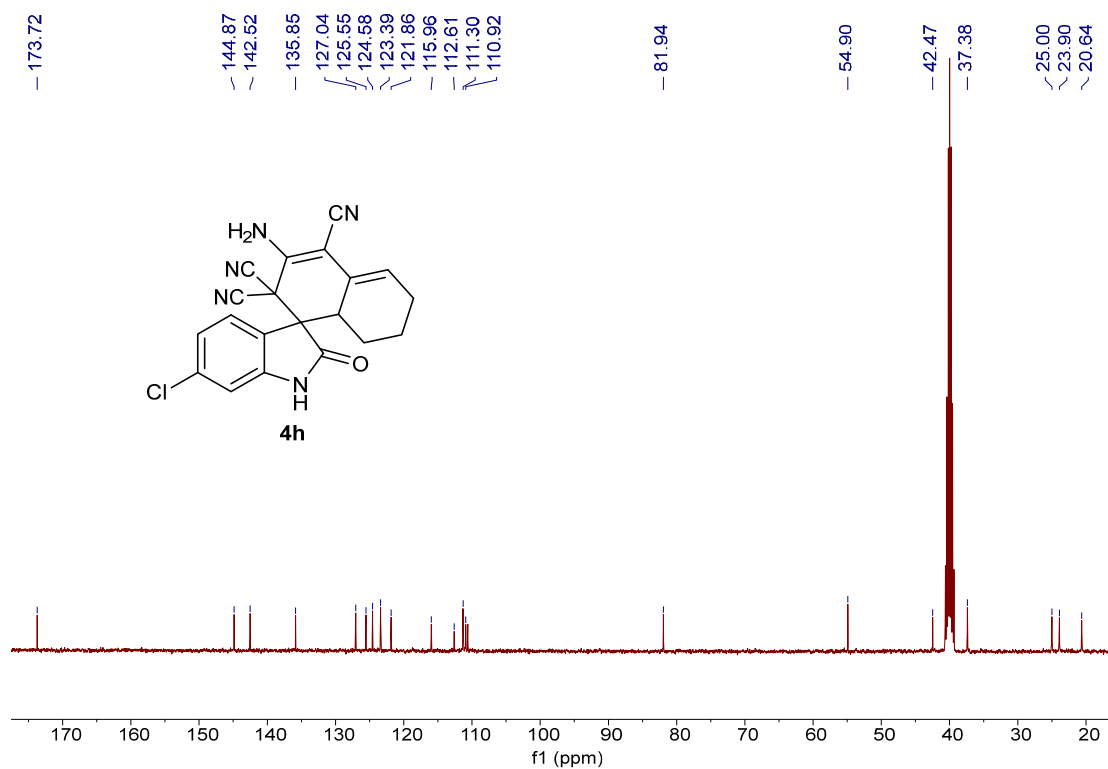
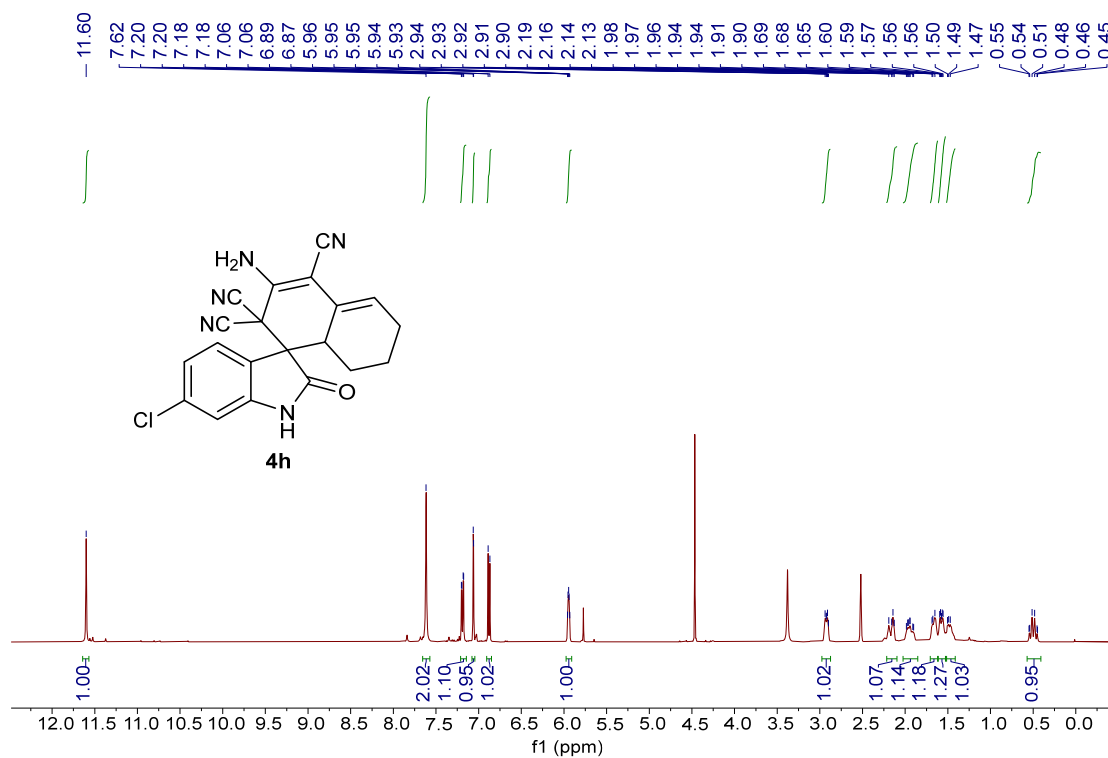
4f: 3'-amino-5-nitro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



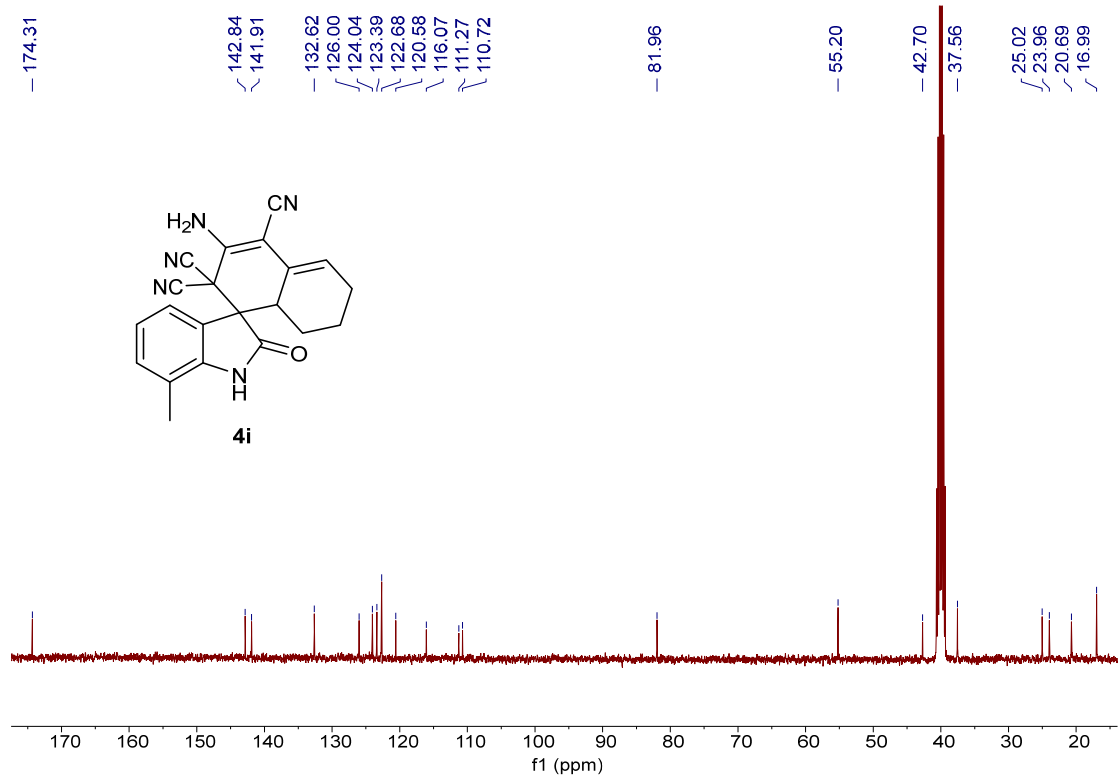
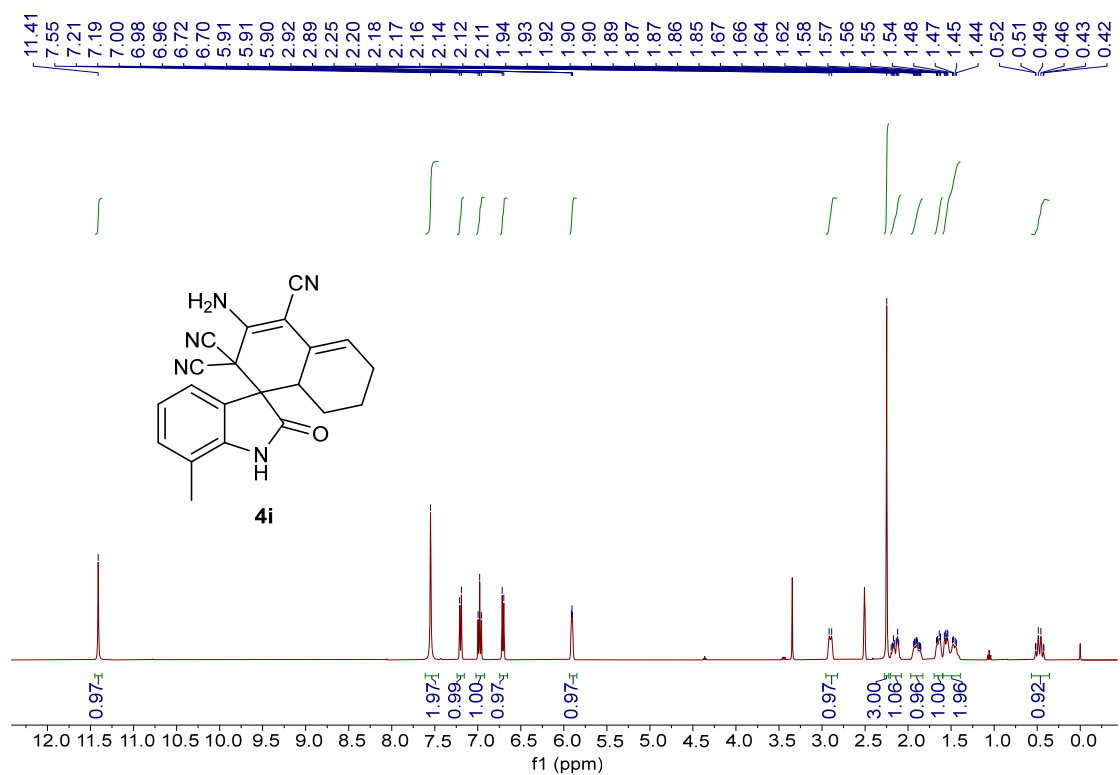
4g: 3'-amino-6-fluoro-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



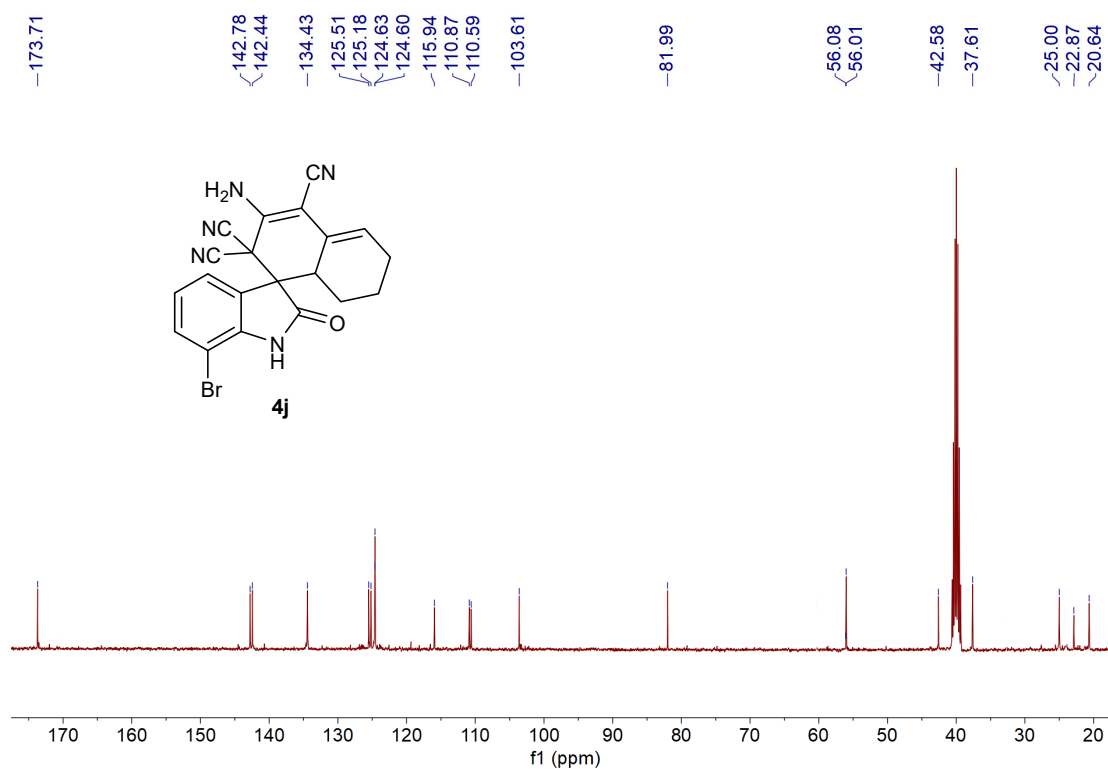
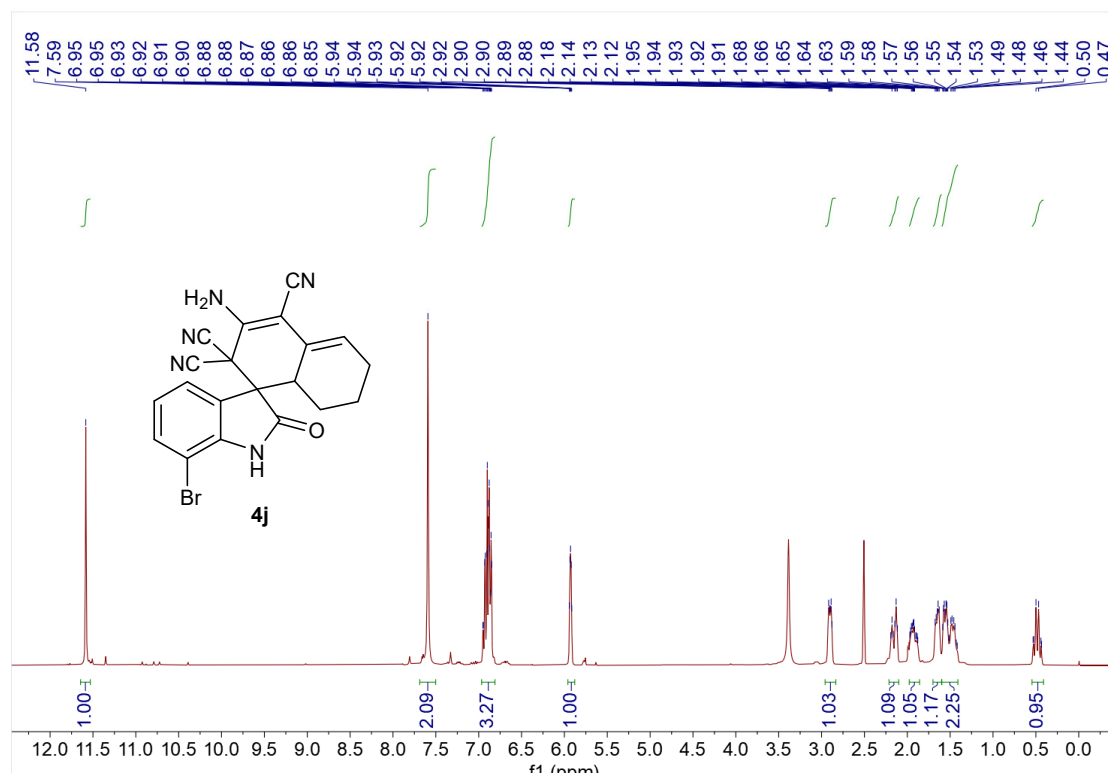
4h: 3'-amino-6-chloro-2-oxo-6',7',8',8a'-tetrahydro-2'H-s-piro[indoline-3,1'-naphthalene]-2',2',4'-tricarbonitrile.



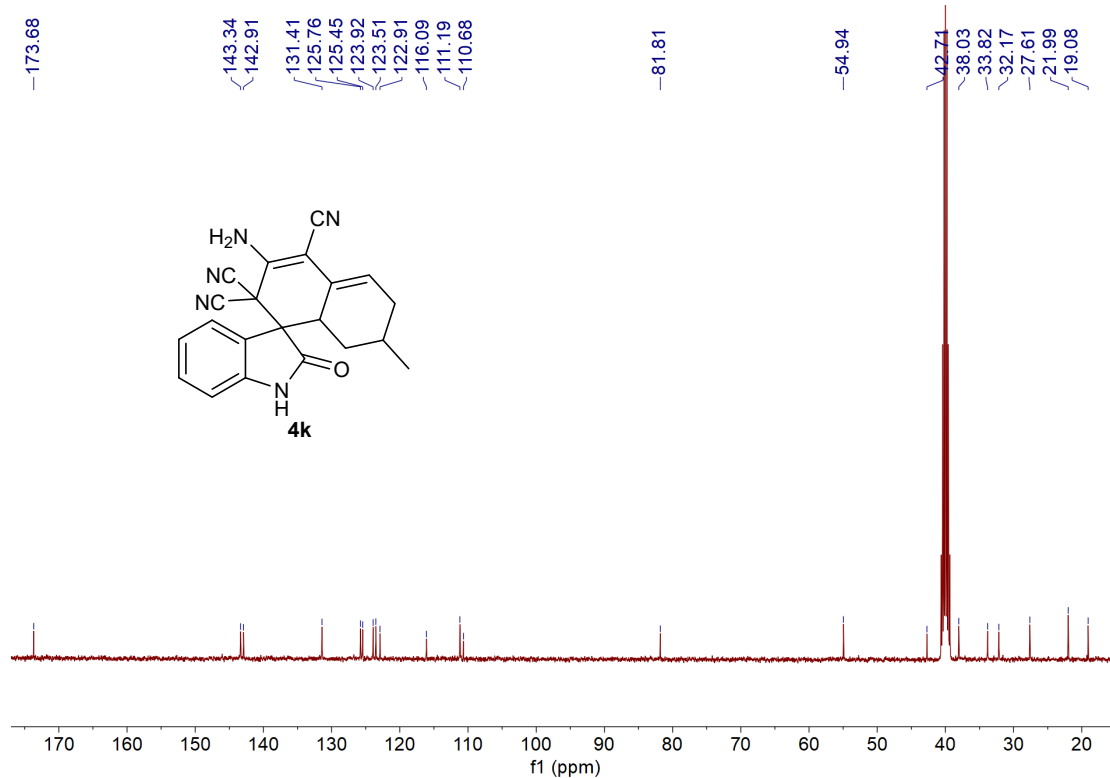
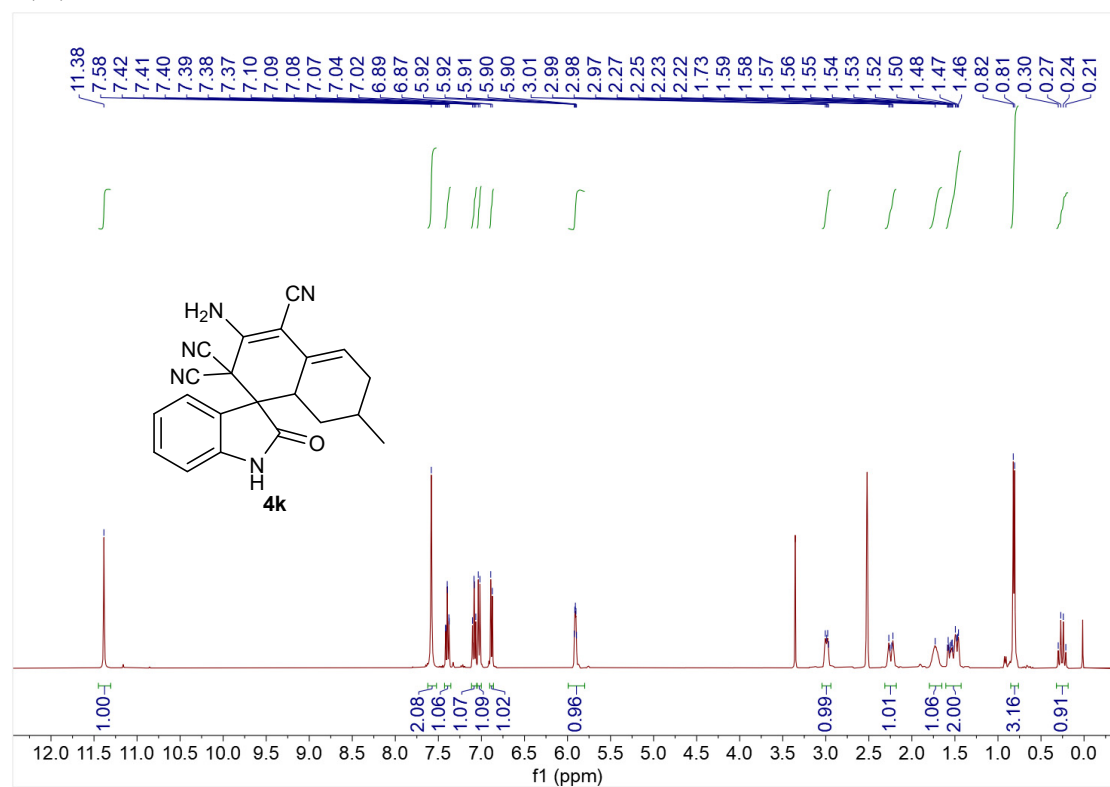
4i: 3'-amino-7-methyl-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



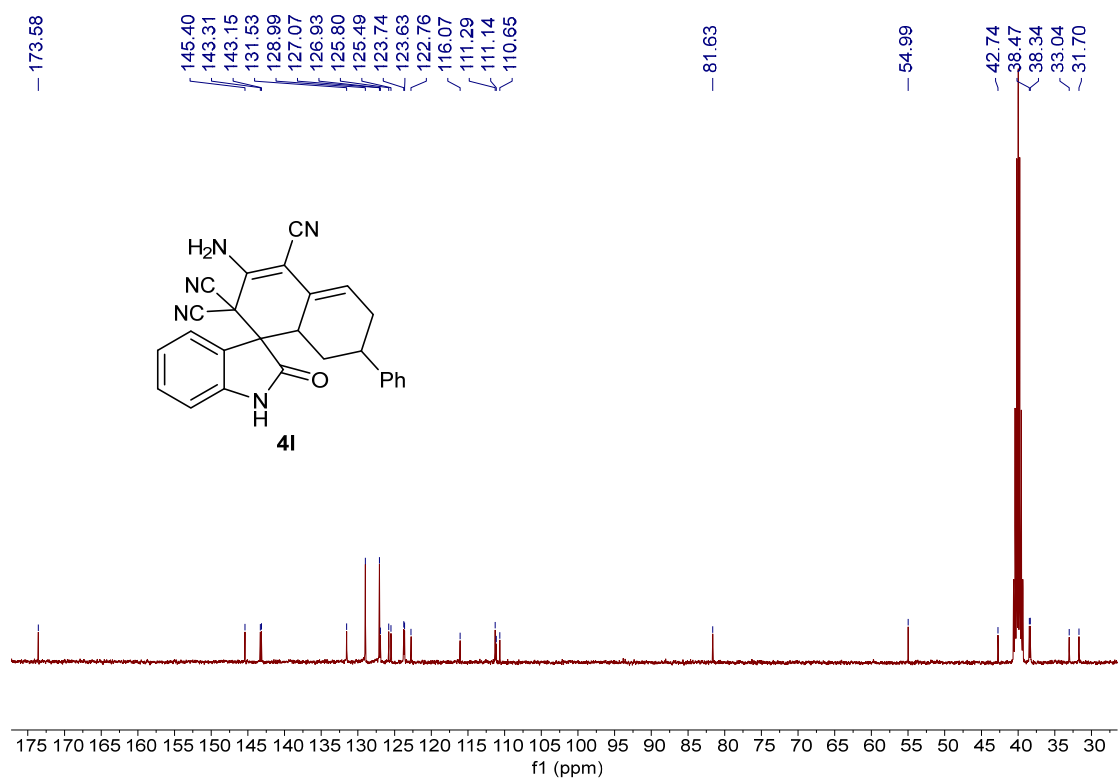
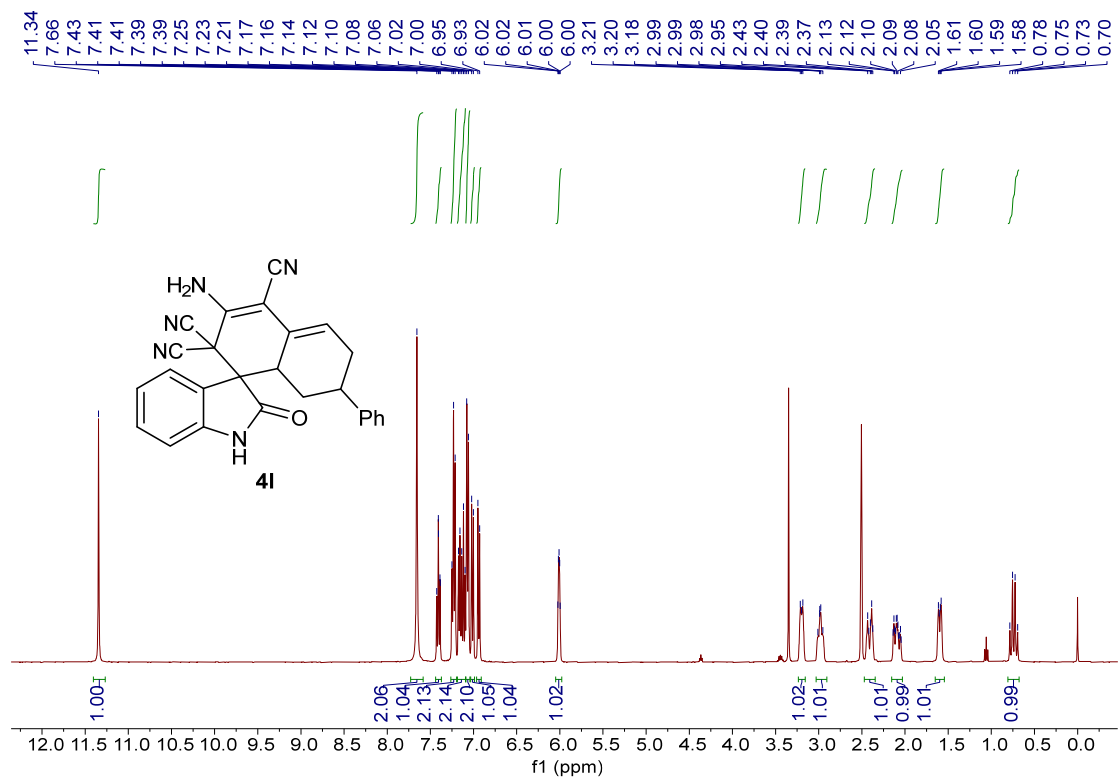
4j: 3'-amino-7-bromo-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



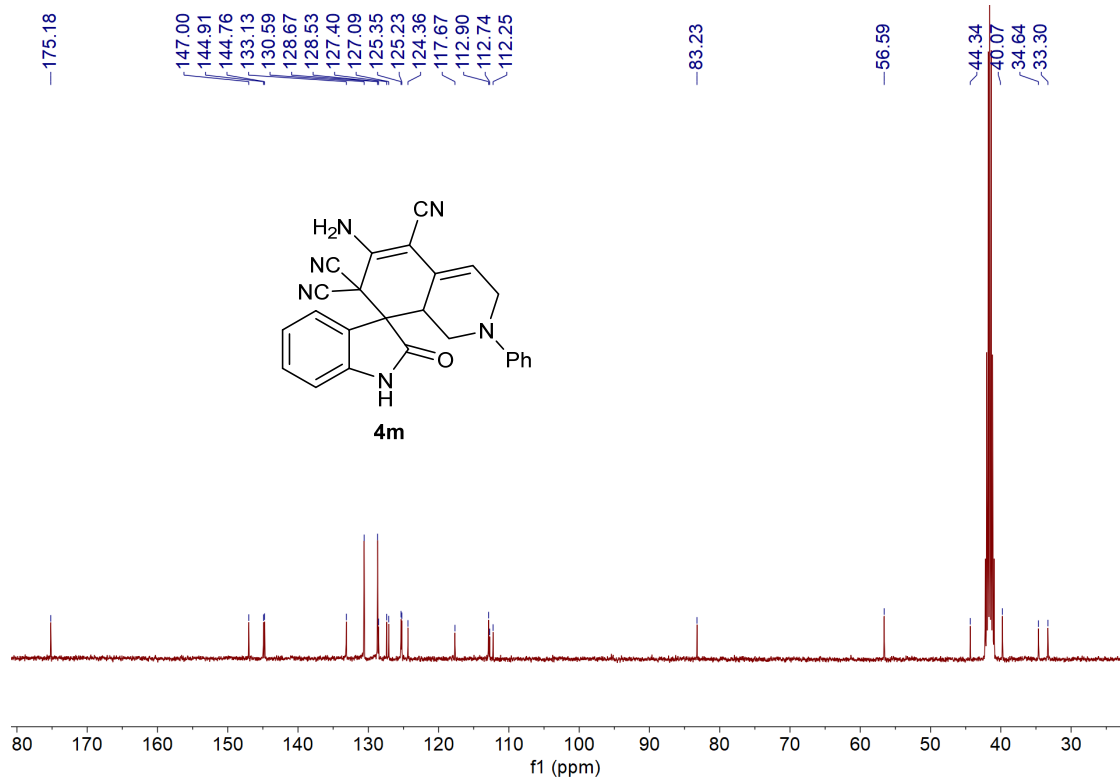
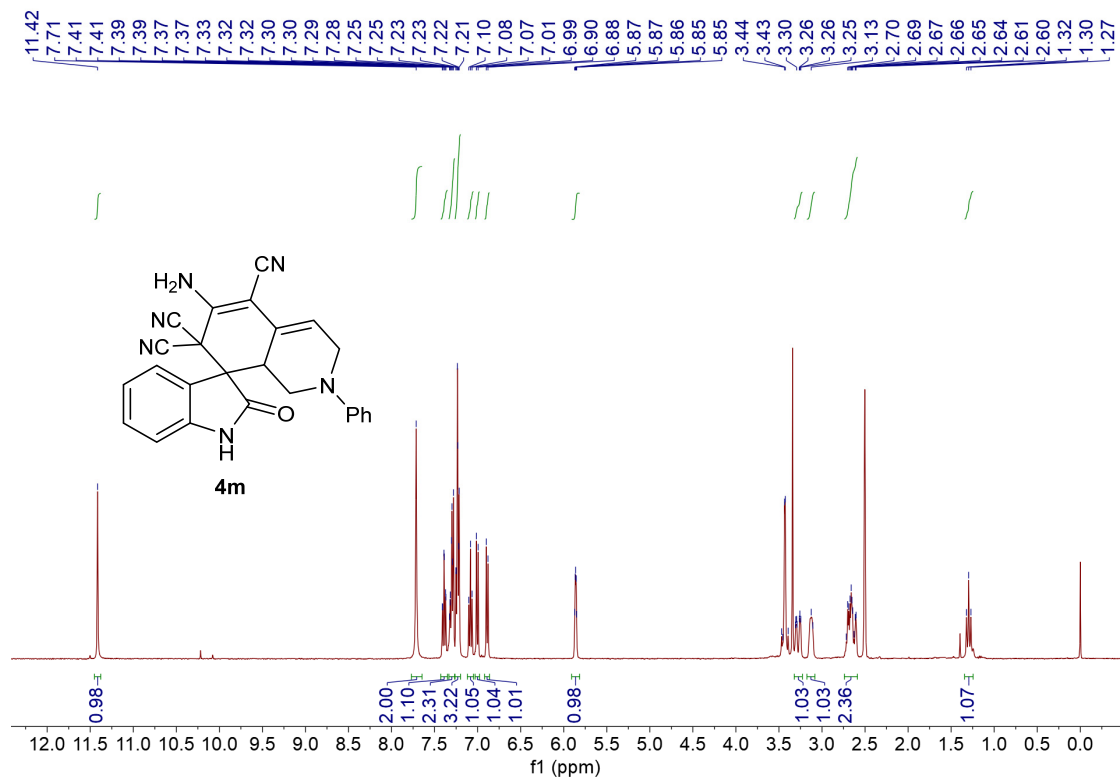
4k: 3'-amino-7'-methyl-2-oxo-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-nap-hthalene]-2',2',4'-tricarbonitrile.



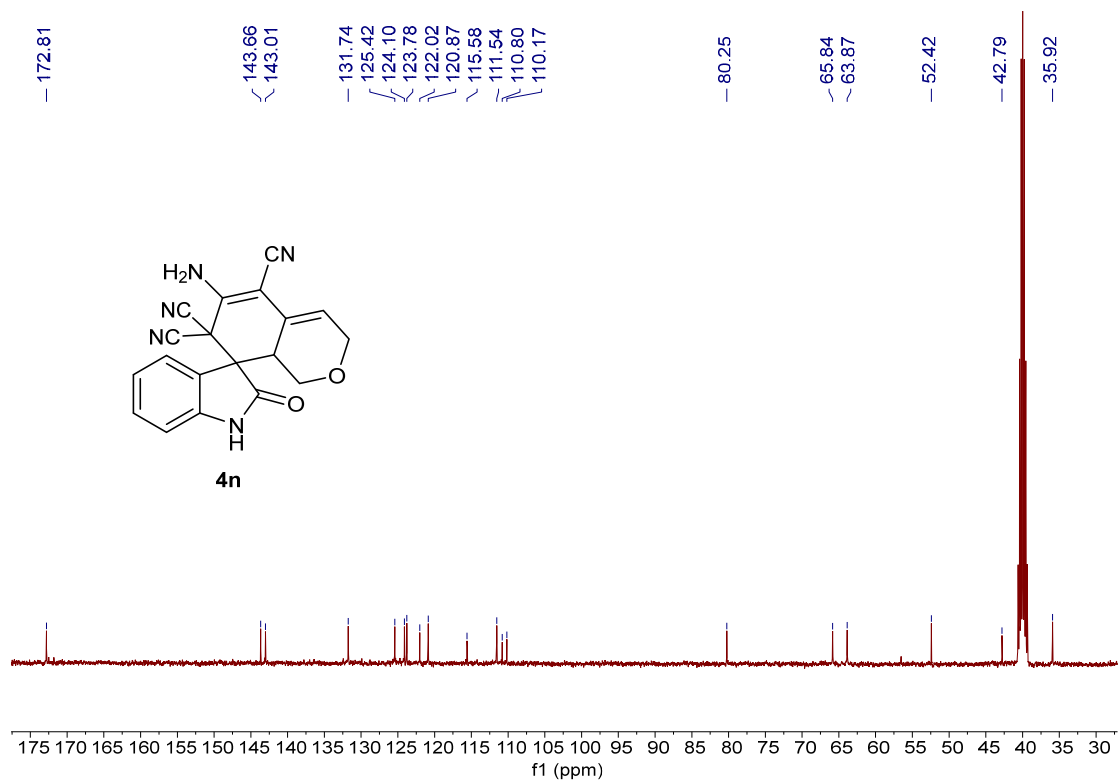
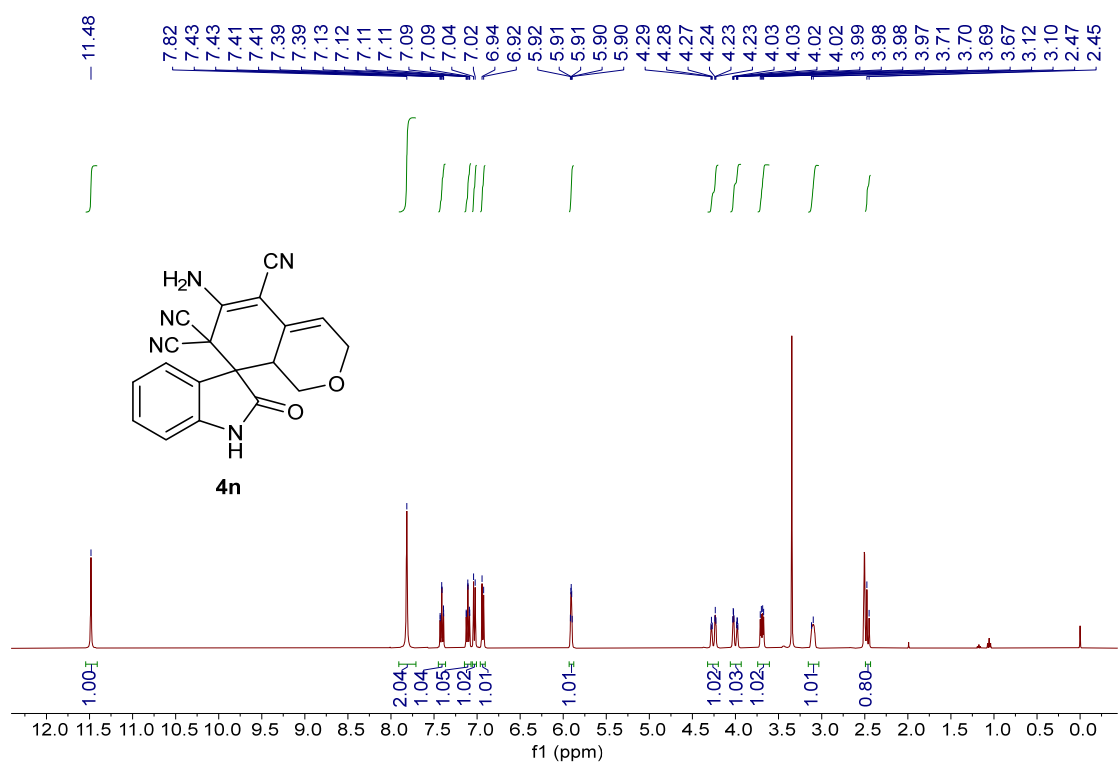
4l: 3'-amino-2-oxo-7'-phenyl-6',7',8',8a'-tetrahydro-2'H-spiro[indoline-3,1'-naph-thalene]-2',2',4'-tricarbonitrile.



4m: 6'-amino-2-oxo-2'-phenyl-1',2',3',8a'-tetrahydro-7'H-spiro[indoline-3,8'-isoquinoline]-5',7',7'-tricarbonitrile.



4n: 6'-amino-2-oxo-3',8a'-dihydrospiro[indoline-3,8'-isochro-mene]-5',7',7'(1'H)-tricarbonitrile.



4o: 6'-amino-2-oxo-3',8a'-dihydrospiro[indoline-3,8'-isothio-chromene]-5',7'-(1'H)-tricarbonitrile.

