

# Supporting Information

## Halogen Bond-Catalyzed Friedel-Crafts Reactions of Aldehydes and Ketones Using a Bidentate Halogen Bond Donor Catalyst: Synthesis of Symmetrical Bis(indolyl)methanes

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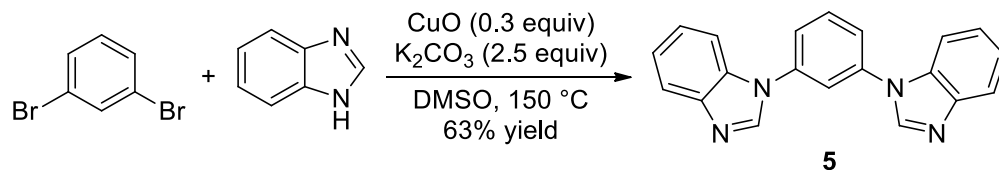
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## 1. General information

Reagents were purchased from the Acros, Aldrich, or Lancaster chemical companies, and were used as received. Reactions were monitored by thin-layer chromatography (TLC) analysis using GF<sub>254</sub> silica gel coated plates. Chromatography was performed using silica gel (230-400 mesh, Merck). NMR spectra were recorded on a Bruker DRX-400/DRX-500 spectrometer operating at 400/500 MHz for <sup>1</sup>H analysis, 100/125 MHz for <sup>13</sup>C analysis and 376 MHz for <sup>19</sup>F analysis. Chemical shift data is expressed in ppm with reference to TMS. High-resolution EI-MS/ESI-MS data was recorded on a Bruker APEX IV mass spectrometer.

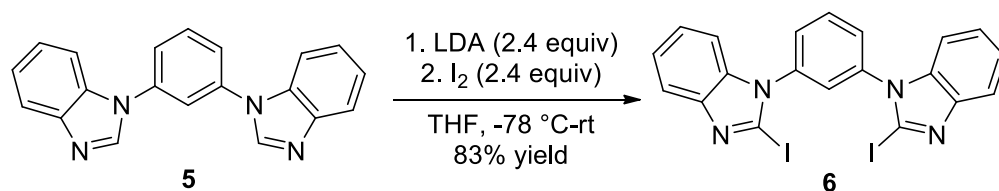
## 2. Synthesis of 4, 4-BF<sub>4</sub>, 9 and 10

### A. 1,3-Bis(1*H*-benzo[*d*]2midazole-1-yl)benzene (**5**)<sup>1</sup>



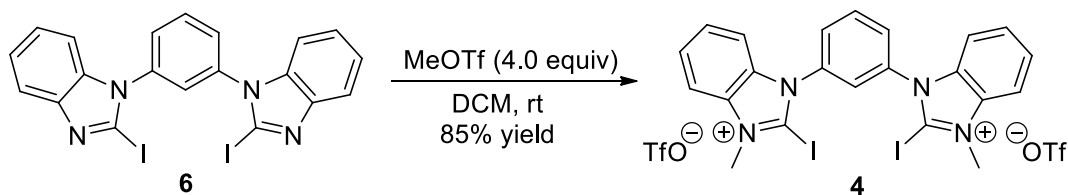
Under an Ar atmosphere, 1,3-dibromobenzene (1.5 mL, 12 mmol, 1.0 equiv), benzimidazole (3.5 g, 30 mmol, 2.5 equiv), CuO (0.31 g, 4 mmol, 0.3 equiv), K<sub>2</sub>CO<sub>3</sub> (4.1 g, 30 mmol, 2.5 equiv) and dry DMSO (60 mL) were combined and stirred at 150 °C for 48 h. The reaction mixture was then cooled to room temperature, diluted with ethyl acetate (150 mL) and filtered through a short plug of celite. The filtrate was washed with water (2 × 100 mL) and brine (100 mL). The organic layer was dried with anhydrous Na<sub>2</sub>SO<sub>4</sub>, filtered, and concentrated. The crude product was purified by silica gel chromatography using dichloromethane:methanol (20:1) as the eluent to afford **5** as a white solid (2.35 g, 63% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 8.15 (s, 2H), 7.84-7.87 (m, 2H), 7.75-7.79(m, 1H) 7.68-7.69 (t, *J* = 2.0 Hz, 1 H), 7.57-7.61 (m, 4H), 7.32-7.34 (m, 4H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>): δ = 144.1, 142.0, 138.0, 133.3, 131.8, 124.2, 123.3, 123.1, 120.9, 119.1, 110.2. M/S (ESI) for C<sub>20</sub>H<sub>14</sub>N<sub>4</sub> (M+H): calculated 311.1291, found 311.1283.

**B. 1,3-Bis(2-iodo-1*H*-benzo[*d*]3midazole-1-yl)benzene (**6**)<sup>2</sup>**



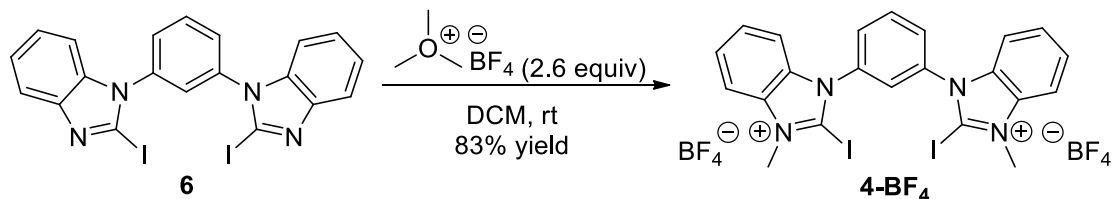
Under an Ar atmosphere, LDA (Lithium diisopropylamide) (1.9 mL, 1.0 M in hexane, 10.8 mmol, 2.4 equiv) were added to a solution of dry THF (10 mL) at 0 °C. The solution was then cooled to -78 °C and **5** (1.4 g, 4.5 mmol, 1.0 equiv) in dry THF (120 mL) was added dropwise. The reaction mixture was stirred for 2 h and then a solution of iodine (2.74 g, 10.8 mmol, 2.4 equiv) in dry THF (23 mL) was added dropwise. The resulting reaction mixture was gradually warmed to room temperature and stirred for 24 h more. The solvent was then removed, and the residue was dissolved in dichloromethane (300 mL) and washed with a saturated Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solution (200 mL). The separated aqueous layer was extracted with additional dichloromethane (300 mL) and the combined organic layers were dried over Na<sub>2</sub>SO<sub>4</sub>, filtered, and concentrated. The crude product was purified by silica gel chromatography using dichloromethane:ethyl acetate (10:1) as the eluent to afford **6** as a yellow solid (2.1 g, 3.8 mmol, 83% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ = 7.84-7.87 (t, *J* = 8.0 Hz, 1H), 7.79-7.81 (d, *J* = 8.0 Hz, 2H), 7.66-7.68 (dd, *J* = 2.0 Hz, 2.0 Hz, 2 H), 7.52 (t, *J* = 2.0 Hz, 1H), 7.23-7.31 (m, 6H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>) δ = 145.6, 138.1, 137.4, 131.3, 129.5, 128.4, 124.2, 123.3, 119.7, 110.1, 102.9. M/S (ESI) for C<sub>20</sub>H<sub>12</sub>I<sub>2</sub>N<sub>4</sub> (M+H): calculated 562.9224, found 562.9200.

### C. Catalyst 4



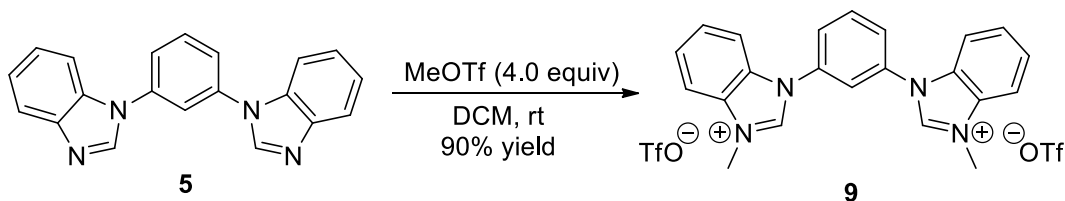
Under an Ar atmosphere, **6** (0.42 g, 0.75 mmol, 1.0 equiv) was dissolved in dichloromethane (25 mL). Methyl triflate (3.0 mmol, 4.0 equiv) was then added dropwise and the solution was stirred at room temperature for 24 h. The solvent was removed, and the residue was dissolved in acetonitrile (2 mL). Catalyst **4** was precipitated as a white solid (0.57 g, 85%) by the addition of diethyl ether (25 mL).  $^1\text{H}$  NMR (500 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 8.13-8.18 (q,  $J$  = 7.5 Hz, 1H), 7.96-8.03 (m, 4H), 7.84 (s, 1 H), 7.63-7.74 (m, 4H), 7.54-7.58 (t,  $J$  = 10.0 Hz, 2H), 4.18 (s, 6H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 137.3, 135.9, 135.0, 134.4, 132.5, 129.5, 128.7, 128.3, 123.2, 120.6, 115.7, 114.5, 114.4, 114.2, 114.0, 37.9. M/S (ESI) for  $\text{C}_{24}\text{H}_{18}\text{F}_6\text{I}_2\text{N}_4\text{O}_6\text{S}_2$  ( $\text{M}+\text{H}$ ): calculated 890.8734, found 890.7513.

### D. Catalyst 4-BF<sub>4</sub>



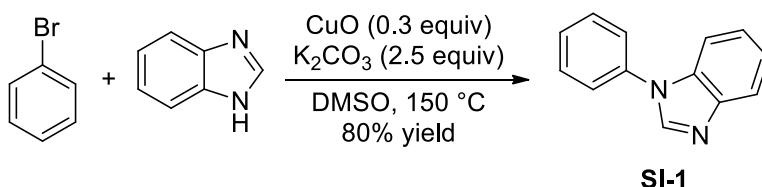
Under an Ar atmosphere, **6** (0.09 g, 0.16 mmol, 1.0 equiv) was dissolved in dichloromethane (6.5 mL). Trimethyloxonium tetrafluoroborate (0.06 g, 0.42 mmol) was then added and the solution was stirred at room temperature for 24 h and the reaction was quenched with MeOH (10.0 mL). The solvent was removed, and the residue was dissolved in MeOH (3 mL). Catalyst **4-BF<sub>4</sub>** was precipitated as a white solid (0.10 g, 83%) by the addition of diethyl ether (25 mL).  $^1\text{H}$  NMR (400 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 8.13-8.16 (m, 1H), 7.95-8.03 (m, 4H), 7.83 (s, 1 H), 7.70-7.72 (m, 2H), 7.63-7.67 (t,  $J$  = 7.8 Hz, 2H), 7.54-7.60 (m, 2H), 4.18 (s, 6H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 137.2, 135.0, 134.4, 132.5, 128.8, 128.4, 114.9, 114.5, 114.4, 114.2, 114.0, 37.9.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CD}_3\text{CN}$ ): -151.72, -151.77. M/S (ESI) for  $\text{C}_{22}\text{H}_{18}\text{B}_2\text{F}_8\text{I}_2\text{N}_4$  ( $\text{M}-\text{OTf}$ ): calculated 679.0181, found 678.9630.

## E. Compound 9



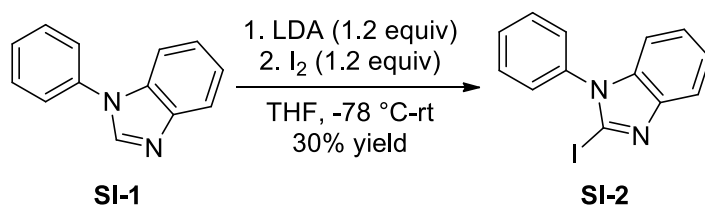
Under an Ar atmosphere, **5** (0.23 g, 0.75 mmol, 1.0 equiv) was dissolved in dichloromethane (25 mL). Methyl triflate (3.0 mmol, 4.0 equiv) was then added dropwise and the solution was stirred at room temperature for 24 h. The solvent was removed, and the residue was dissolved in acetonitrile (2 mL). Compound **9** was precipitated as a white solid (0.43 g, 90%) by the addition of diethyl ether (25 mL).  $^1\text{H}$  NMR (500 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 9.53 (s, 2H), 8.04-8.10 (m, 4H), 7.92-8.01 (m, 2H), 7.90-7.92 (m, 2H), 7.76-7.82 (m, 4H), 4.21 (s, 6H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 143.2, 135.7, 133.8, 133.3, 132.5, 129.1, 128.7, 128.5, 123.5, 123.3, 120.7, 114.8, 114.5, 34.7. M/S (ESI) for  $\text{C}_{24}\text{H}_{20}\text{F}_6\text{N}_4\text{O}_6\text{S}_2$  (M-OTf): calculated 489.1203, found 489.1187.

## F. 1-Phenyl-1*H*-benzo[d]imidazole (**SI-1**)<sup>1</sup>



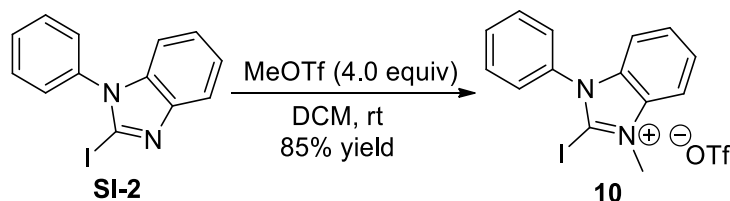
Under an Ar atmosphere, bromobenzene (1.3 mL, 12 mmol, 1.0 equiv), benzimidazole (3.5 g, 30 mmol, 2.4 equiv), CuO (0.31 g, 4 mmol, 0.3 equiv),  $\text{K}_2\text{CO}_3$  (4.1 g, 30 mmol, 2.5 equiv) and dry DMSO (60 mL) were combined and were stirred at 150 °C for 48 h. The reaction mixture was then cooled to room temperature, diluted with ethyl acetate (150 mL) and filtered through a short plug of celite. The filtrate was washed with water (2 × 100 mL) and brine (100 mL). The organic layer was dried with anhydrous  $\text{Na}_2\text{SO}_4$ , filtered, concentrated. The crude product was purified by silica gel chromatography using methanol:dichloromethane (30:1) to afford **SI-1** as a pale yellow oil (1.86 g, 80%).  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 8.27-8.29 (d,  $J$  = 9.0 Hz, 1H), 7.87-7.89 (q,  $J$  = 3.0 Hz, 1 H), 7.52-7.60 (m, 5H), 7.47-7.50 (t,  $J$  = 7.3 Hz, 1H), 7.34-7.39 (m, 2H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 143.5, 143.0, 136.2, 133.6, 130.2, 128.4, 124.3, 124.1, 123.3, 120.4, 110.8. M/S (ESI) for  $\text{C}_{13}\text{H}_{10}\text{N}_2\text{O}$  (M+H): calculated 195.0917, found 195.0912.

**G. 2-Iodo-1-phenyl-1*H*-benzo[*d*]imidazole (**SI-2**)<sup>2</sup>**



Under an Ar atmosphere, *n*-BuLi (2.3 mL, 2.4 M in hexane, 5.4 mmol, 1.2 equiv) was added dropwise to a solution of 0.8 mL (*i*Pr)<sub>2</sub>NH (0.8 mL, 5.8 mmol, 1.3 equiv) in dry THF (10 mL) at 0 °C. After stirring for 15 min, the solution was cooled to -78 °C and **SI-1** (0.87 g, 4.5 mmol, 1.0 equiv) in dry THF (60 mL) was added dropwise. The reaction mixture was stirred for 2 h and then a solution of iodine (1.37 g, 5.4 mmol, 1.2 equiv) in dry THF (12 mL) was added dropwise. The resulting reaction mixture was gradually warmed to room temperature and stirred 24 h more. The solvent was then removed, and the residue was dissolved in dichloromethane (150 mL) and washed with saturated Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solution (100 mL). The separated aqueous layer was extracted with additional dichloromethane (150 mL) and the combined organic layers obtained were dried over Na<sub>2</sub>SO<sub>4</sub>, filtered, and concentrated. The crude product was purified by silica gel chromatography using dichloromethane:ethyl acetate (5:1) as the eluent to afford **SI-2** as a yellow solid (0.43 g, 1.35 mmol, 30% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.78-7.80 (d, *J* = 8.5 Hz, 1H), 7.56-7.62 (m, 3H), 7.39-7.41 (m, 2H), 7.24-7.27 (m, 1H), 7.18-7.21 (t, *J* = 7.3 Hz, 1H), 7.13-7.14 (d, *J* = 8.0 Hz, 1H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 145.5, 137.6, 136.7, 129.9, 129.7, 128.3, 123.7, 122.8, 119.3, 110.4, 103.6. M/S (ESI) for C<sub>13</sub>H<sub>9</sub>IN<sub>2</sub> (M+H): calculated 321.9961, found 321.9905.

## H. Catalyst 10

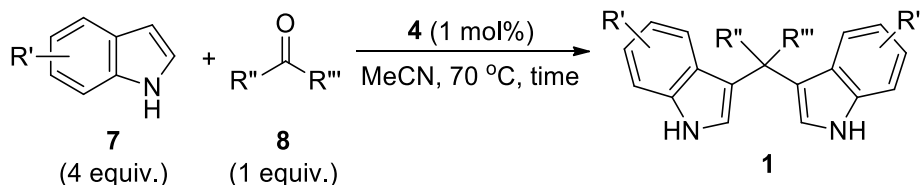


Under an Ar atmosphere, **SI-2** (0.24 g, 0.75 mmol, 1.0 equiv) was dissolved in dichloromethane (25 mL). Methyl triflate (3.0 mmol, 4.0 equiv) was then added dropwise and the solution was stirred at room temperature for 24 h. The solvent was removed, and the residue was dissolved in acetonitrile (2 mL). Catalyst **10** was precipitated as a white solid (0.31g, 85% yield) by addition of diethyl ether (25 mL).  $^1\text{H}$  NMR (500 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 7.93-7.95 (d,  $J$  = 8.5 Hz, 1H), 7.75-7.82 (m, 3H), 7.68-7.70 (t,  $J$  = 4.0 Hz, 1H), 7.55-7.60 (m, 3H), 7.37-7.39 (d,  $J$  = 8.0 Hz, 1H), 4.15 (s, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CD}_3\text{CN}$ ):  $\delta$  = 135.9, 135.7, 135.0, 132.8, 131.7, 128.8, 128.7, 128.5, 128.2, 123.4, 120.8, 114.9, 114.9, 37.8. M/S (ESI) for  $\text{C}_{15}\text{H}_{12}\text{F}_3\text{IN}_2\text{O}_3\text{S}$  (M-OTf): calculated 335.0040, found 335.0028.

## References:

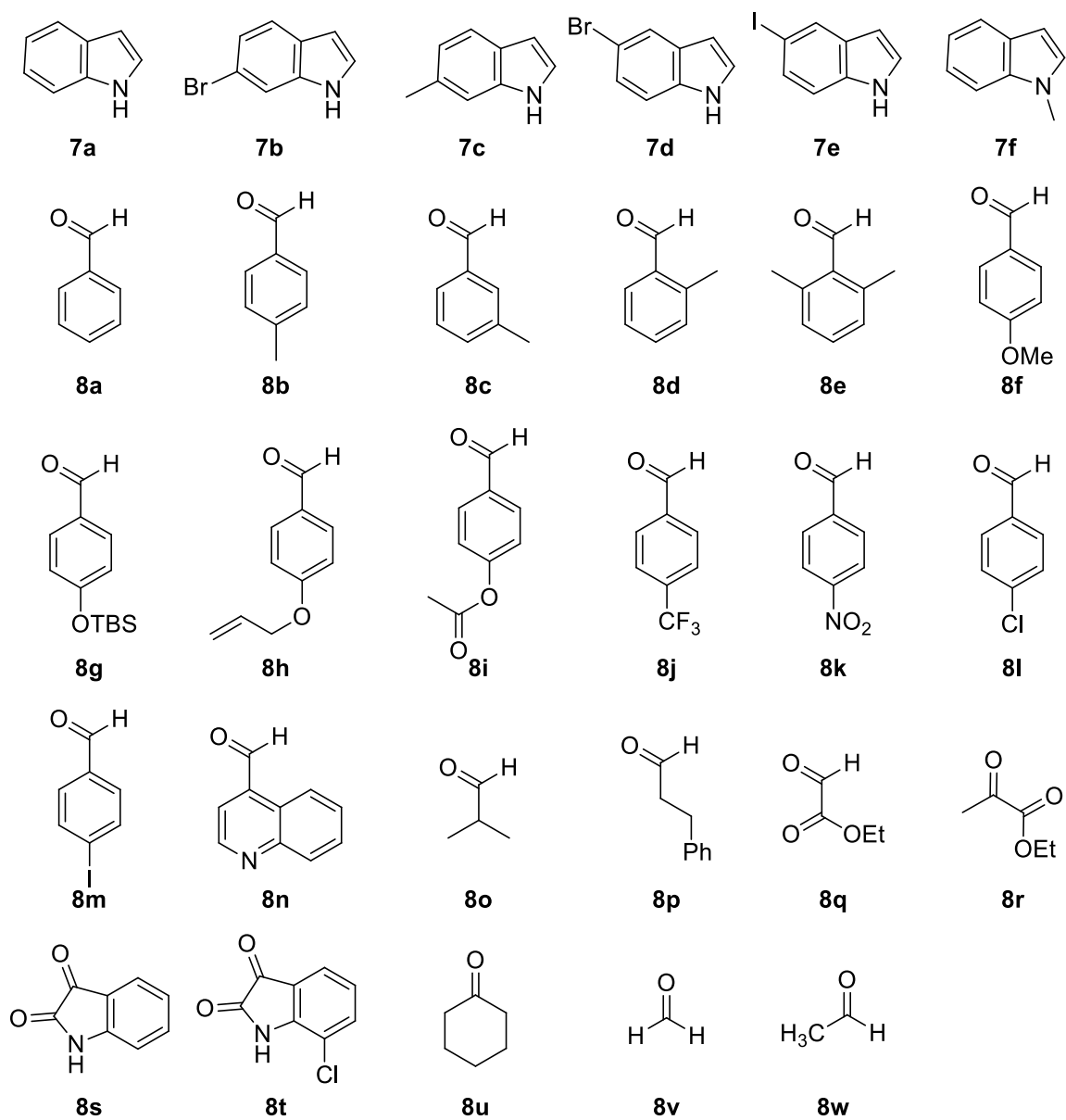
1. (a) Zhang, H.; Cai, Q.; Ma, D. *J. Org. Chem.* **2005**, *70*, 5164. (b) Ganta, S.; Chand, D. K. *Dalton Trans.* **2015**, *44*, 15181.
2. Jungbauer, S. H.; Huber, S. M. *J. Am. Chem. Soc.* **2015**, *137*, 12110.

## 3. General procedure for Friedel-Crafts reactions



Indole **7** (4.0 mmol), and **4** (8.9 mg, 0.01 mmol) were added to a 1-dram vial equipped with a stirring bar. Acetonitrile (2 mL) was added followed by the aldehyde or ketone **8** (1.0 mmol). The reaction was stirred and heated to 70 °C. The progress of the reaction was monitored by TLC. When the reaction was determined to be complete, the solvent was removed and the crude product was purified by silica gel chromatography to afford product **1**.

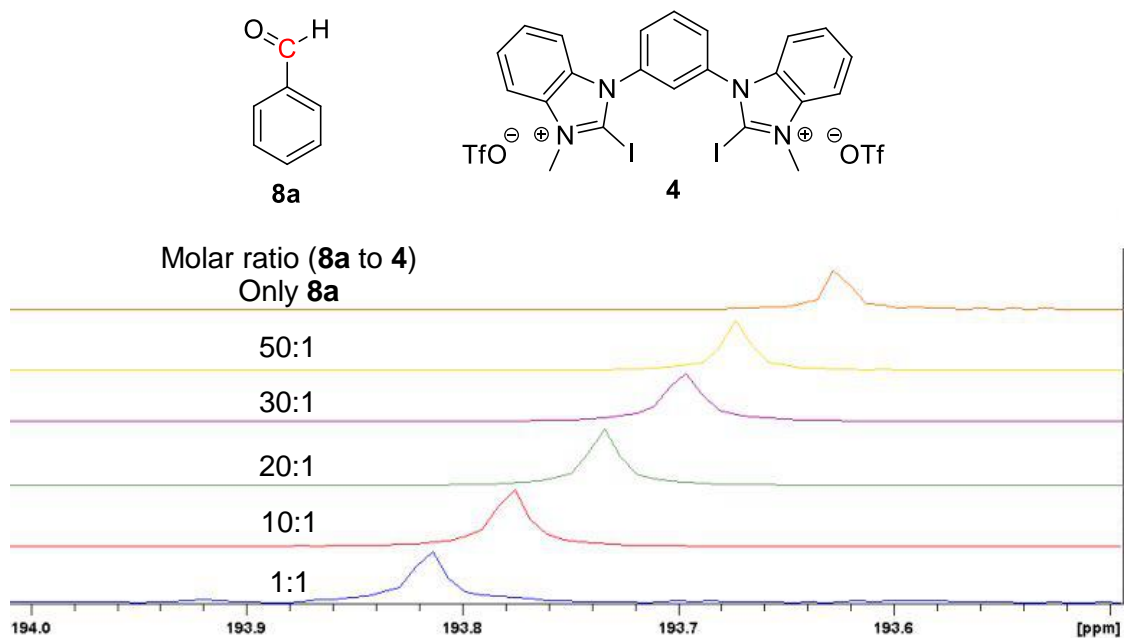
**4. Figure SI-1. Structures of indoles 7a-f and aldehydes and ketones 8a-w**



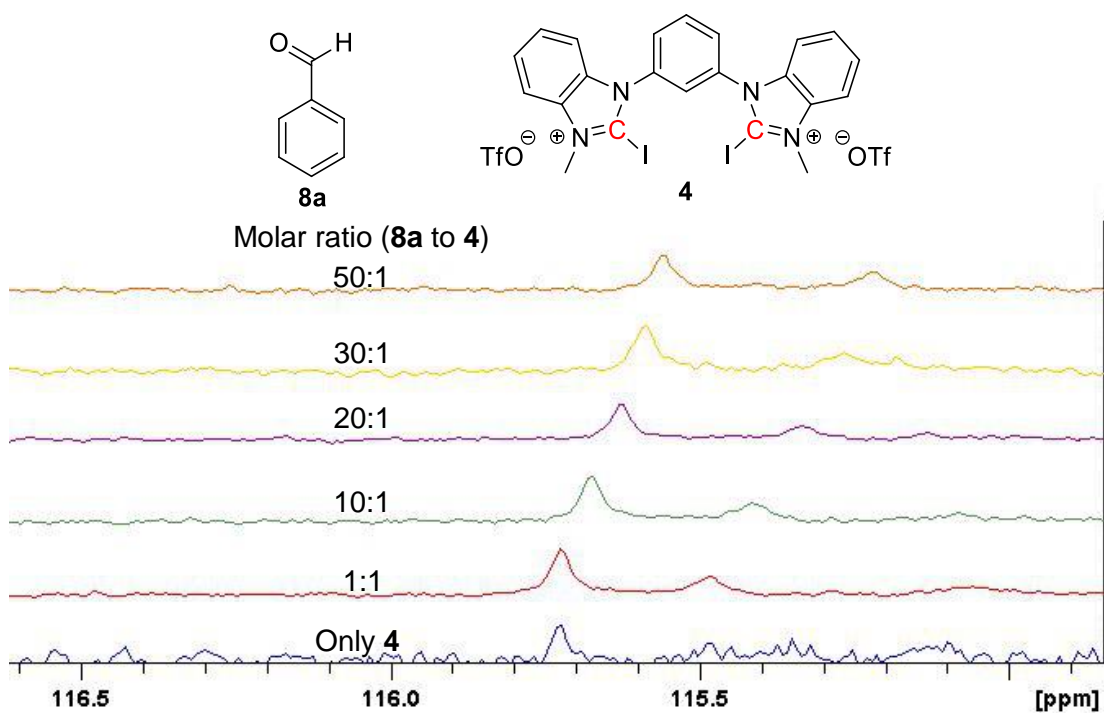


## 5. Figure SI-2. NMR experiments

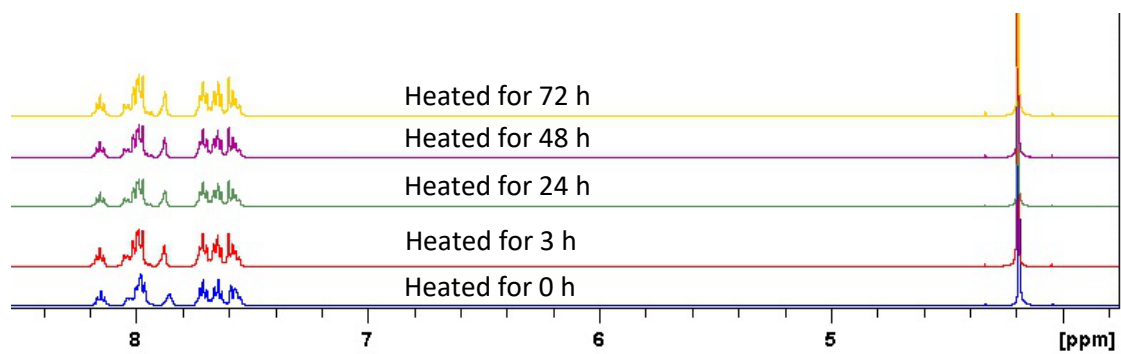
A.  $^{13}\text{C}$  NMR shift of  $\text{C}=\text{O}$  carbon of **8a**



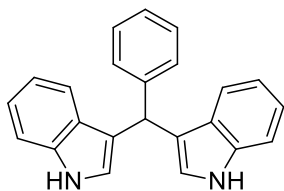
B.  $^{13}\text{C}$  NMR shift of  $\text{C}=\text{I}$  carbon on catalyst



C.  $^1\text{H}$  NMR study of catalyst **4** when heated at 70 °C

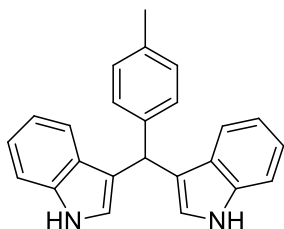


## 6. Characterization data for bis(indolyl)methanes 1a-1ab



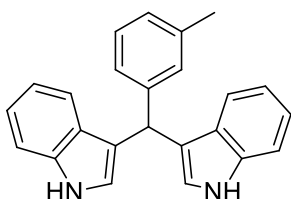
### 3,3'-(Phenylmethylene)bis(1*H*-indole) (**1a**)<sup>1</sup>

The reaction between **7a** and **8a** required 3 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1a** as a red solid (302 mg, 94% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.89 (s, 2H), 7.38-7.39 (d, *J* = 8.0 Hz, 2H), 7.33-7.35 (d, *J* = 8.5 Hz, 4H), 7.25-7.28 (m, 2H), 7.18-7.22 (m, 1H), 7.14-7.18 (m, 2H), 6.98-7.01 (m, 2H), 6.64 (dd, *J* = 0.5 Hz, 1.0 Hz, 2H), 5.88 (s, 1H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 144.1, 136.8, 128.9, 128.3, 127.2, 126.3, 123.7, 122.1, 120.1, 119.9, 119.4, 111.2, 40.3. M/S (ESI) for C<sub>23</sub>H<sub>18</sub>N<sub>2</sub> (M-H): calculated 321.1386 found 321.1383.



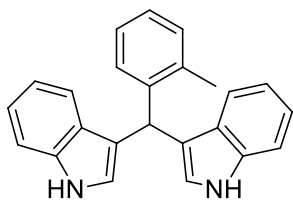
### 3,3'-(*p*-Tolylmethylene)bis(1*H*-indole) (**1b**)<sup>1</sup>

The reaction between **7a** and **8b** required 11 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1b** as a red solid (319 mg, 95% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.69 (s, 2H), 7.36-7.38 (d, *J* = 8.0 Hz, 2H), 7.28 (s, 2H), 7.19-7.21 (t, *J* = 4.0 Hz, 2H), 7.12-7.15 (m, 2H), 7.05-7.06 (d, *J* = 8.0 Hz, 2H), 6.96-6.99 (m, 2H), 6.54-6.55 (d, *J* = 1.5 Hz, 2H), 5.81 (s, 1H), 2.30 (s, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 141.1, 136.8, 135.6, 129.0, 128.7, 127.2, 123.7, 122.0, 120.1, 120.0, 119.3, 111.2, 39.9, 21.2. M/S (ESI) for C<sub>24</sub>H<sub>20</sub>N<sub>2</sub> (M-H): calculated 335.1543, found 335.1530.



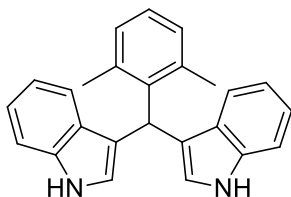
### 3,3'-(*m*-Tolylmethylene)bis(1*H*-indole) (**1c**)<sup>1</sup>

The reaction between **7a** and **8c** required 12 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1c** as a red solid (329 mg, 98%). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.76 (s, 2H), 7.37-7.39 (d, *J* = 8.0 Hz, 2H), 7.28-7.30 (d, *J* = 8.0 Hz, 2H), 7.10-7.16 (m, 5H), 6.97-7.01 (m, 3H), 6.57-6.58 (dd, *J* = 1.0 Hz, 1.0 Hz, 2H), 5.82 (s, 1H), 2.27 (s, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 144.1, 137.8, 136.8, 129.6, 128.2, 127.2, 127.0, 125.9, 123.7, 122.0, 120.1, 119.9, 119.3, 111.1, 40.2, 21.7. M/S (ESI) for C<sub>24</sub>H<sub>20</sub>N<sub>2</sub> (M-H): calculated 335.1543, found 335.1527.



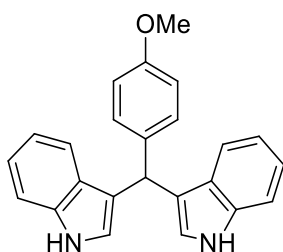
### 3,3'-(*o*-Tolylmethylene)bis(1*H*-indole) (**1d**)<sup>1</sup>

The reaction between **7a** and **8d** required 20 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1d** as a red solid (326 mg, 97%). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.72 (s, 2H), 7.33-7.34 (d, *J* = 8.0 Hz, 2H), 7.29-7.30 (d, *J* = 8.0 Hz, 2H), 7.18-7.21 (t, *J* = 6.5 Hz, 1H), 7.10-7.16 (m, 3H), 7.06-7.07 (m, 1H), 6.97-7.02 (m, 3H), 6.46-6.47 (dd, *J* = 0.5 Hz, 1.0 Hz, 2H), 6.00 (s, 1H) 2.36 (s, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 142.2, 136.8, 136.2, 130.3, 128.5, 127.3, 126.2, 125.9, 124.0, 122.0, 119.9, 119.3, 119.2, 111.2, 36.3, 19.7. M/S (ESI) for C<sub>24</sub>H<sub>20</sub>N<sub>2</sub> (M-H): calculated 335.1543, found 335.1529.



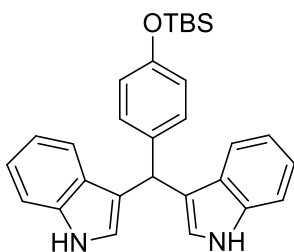
### 3,3'-((2,6-Dimethylphenyl)methylene)bis(1*H*-indole) (**1e**)

The reaction between **7a** and **8e** required 72 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (1:1) as the eluent to afford **1e** as a red solid (35mg, 10%). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.90 (s, 2H), 7.36-7.38 (d, *J* = 8.5 Hz, 2H), 7.27-7.29 (d, *J* = 8.0 Hz, 2H), 7.17-7.20 (t, *J* = 7.5 Hz, 2H), 7.08-7.11 (t, *J* = 7.5 Hz, 1H), 6.98-7.02 (m, 4H), 6.65 (s, 2H), 6.27 (s, 1H), 2.19 (s, 6H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>): δ = 139.8, 137.4, 136.8, 129.5, 127.6, 126.3, 123.7, 122.0, 120.1, 119.3, 117.7, 111.1, 36.2, 21.5. M/S (EI) for C<sub>25</sub>H<sub>22</sub>N<sub>2</sub>: calculated 350.1783, found 350.1778.



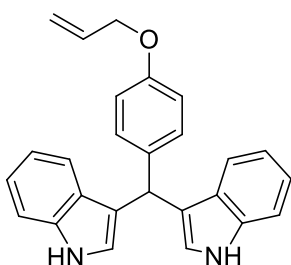
### 3,3'-((4-Methoxyphenyl)methylene)bis(1*H*-indole) (**1f**)<sup>1</sup>

The reaction between **7a** and **8f** required 9 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (3:1) as the eluent to afford **1f** as orange foam (327 mg, 93% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.87 (s, 2H), 7.38-7.39 (d, *J* = 8.0 Hz, 2H), 7.33-7.35 (d, *J* = 8.0 Hz, 2H), 7.23-7.25 (t, *J* = 4.5 Hz, 2H), 7.14-7.17 (m, 2H), 6.98-7.01 (t, *J* = 7.5 Hz, 2H), 6.80-6.83 (m, 2H), 6.63-6.64 (dd, *J* = 0.5 Hz, 1.0 Hz, 2H), 5.83 (s, 1H), 3.77 (s, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 158.0, 136.9, 136.4, 129.7, 127.2, 123.7, 122.0, 120.2, 120.1, 119.3, 113.7, 111.1, 55.4, 39.5. M/S(ESI) for C<sub>24</sub>H<sub>20</sub>N<sub>2</sub>O (M-H): calculated 351.1492, found 351.1481.



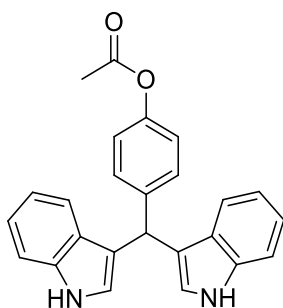
### 3,3'-((4-((Tert-butyldimethylsilyl)oxy)phenyl)methylene)bis(1*H*-indole) (**1g**)<sup>2</sup>

The reaction between **7a** and **8g** required 5 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (5:1) as the eluent to **1g** as a red solid. (371 mg, 82% yield). <sup>1</sup>H NMR (500MHz, CDCl<sub>3</sub>): δ = 7.83 (s, 2H), 7.39-7.41 (d, *J* = 8.0 Hz, 2H), 7.33-7.35 (d, *J* = 8.0 Hz 2H), 7.16-7.23 (m, 4H), 7.00-7.03 (t, *J* = 7.5 Hz, 2H), 6.77-6.79 (d, *J* = 8.5 Hz, 2H), 6.60 (s, 2H), 5.84 (s, 1H), 1.00 (s, 9H), 0.20 (s, 6H). <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>): δ = 154.0, 136.9, 136.8, 129.7, 127.2, 123.7, 122.0, 120.2, 120.1, 119.8, 119.3, 111.1, 39.5, 25.8, 18.3, -4.3. M/S (EI) for C<sub>29</sub>H<sub>32</sub>N<sub>2</sub>OSi: calculated 452.2284, found 452.2279.



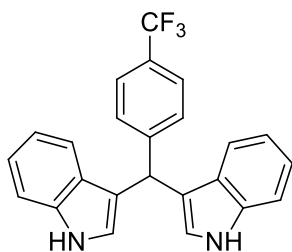
### 3,3'-((4-(Allyloxy)phenyl)methylene)bis(1*H*-indole) (**1h**)<sup>3</sup>

The reaction between **7a** and **8h** required 12 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (5:1) as the eluent to afford **1h** as a red solid (333 mg, 88% yield). <sup>1</sup>H NMR (500MHz, CDCl<sub>3</sub>): δ = 7.89 (s, 2H), 7.39-7.40 (d, *J* = 8.0 Hz, 2H), 7.33-7.35 (d, *J* = 8.0 Hz, 2H), 7.23-7.26 (m, 2H), 7.15-7.18 (m, 2H), 7.00-7.03 (m, 2H), 6.83-6.85 (m, 2H), 6.62 (s, 2H), 6.04-6.09 (m, 1H), 5.84 (s, 1H), 5.39-5.43 (m, 1H), 5.27-5.29 (dd, *J* = 1.0 Hz, 1.0 Hz, 1H), 4.50-4.51 (m, 2H). <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>): δ = 157.1, 136.8, 136.6, 133.7, 129.7, 127.2, 123.7, 122.0, 120.1, 119.3, 117.7, 114.5, 111.2, 69.0, 39.5. M/S (EI) for C<sub>26</sub>H<sub>22</sub>N<sub>2</sub>O: calculated 378.1732, found 378.1727.



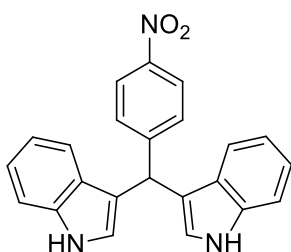
### 4-(Di(1*H*-indol-3-yl)methyl)phenyl acetate (**1i**)<sup>4</sup>

The reaction between **7a** and **8i** required 48 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1i** as a red solid (350 mg, 92% yield). <sup>1</sup>H NMR (500MHz, CDCl<sub>3</sub>): δ = 7.59 (s, 2H), 7.30-7.32 (d, *J* = 8.0 Hz, 2H), 7.17-7.20 (t, *J* = 7.3 Hz, 4H), 7.09-7.12 (t, *J* = 8.0 Hz, 2H), 6.94-6.97 (m, *J* = 3.8 Hz, 2H), 6.89-6.90 (d, *J* = 8.5 Hz, 2H), 6.25 (s, 2H), 5.76 (s, 1H), 2.23 (s, 3H). <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>): δ = 170.1, 148.9, 141.8, 136.7, 129.7, 127.0, 124.0, 121.9, 121.2, 119.8, 119.2, 119.2, 111.3, 39.5, 21.3. M/S (EI) for C<sub>25</sub>H<sub>20</sub>N<sub>2</sub>O<sub>2</sub>: calculated 380.1525, found 380.1512.



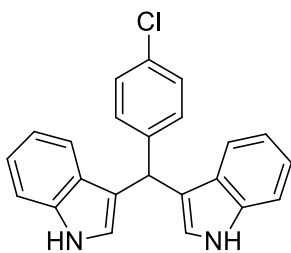
### 3,3'-((4-(Trifluoromethyl)phenyl)methylene)bis(1*H*-indole) (**1j**)<sup>1</sup>

The reaction between **7a** and **8j** required 1.5 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1j** as a red solid. (371 mg, 95% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.94 (s, 2H), 7.50-7.52 (d, *J* = 8.0 Hz, 2H), 7.42-7.44 (d, *J* = 8.0 Hz, 2H), 7.33-7.35 (m, 4H), 7.16-7.19 (m, 2H), 6.99-7.02 (m, 2H), 6.61-6.62 (t, *J* = 1.0 Hz, 2H), 5.93 (s, 1H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 148.3, 136.8, 129.1, 128.7, 128.5, 127.0, 125.6, 125.4, 125.3, 125.3, 123.8, 123.5, 122.3, 119.9, 119.6, 118.9, 111.3, 40.2. M/S (ESI) for C<sub>24</sub>H<sub>17</sub>F<sub>3</sub>N<sub>2</sub> (M-H): calculated 389.1260, found 389.1242.



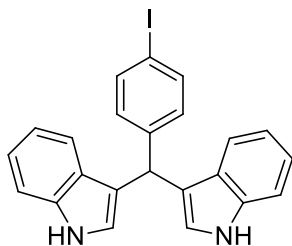
### 3,3'-((4-Nitrophenyl)methylene)bis(1*H*-indole) (**1k**)<sup>4</sup>

The reaction between **7a** and **8k** required 12 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (2:1) as the eluent to afford **1k** as an orange solid (338 mg, 92% yield). <sup>1</sup>H NMR (500 MHz, Acetone-d<sub>6</sub>): δ = 10.14 (s, 2H), 8.14-8.16 (d, *J* = 8.5 Hz, 2H), 7.63-7.64 (d, *J* = 8 Hz, 2H), 7.42-7.44 (d, *J* = 8.0 Hz, 2H), 7.36-7.38 (d, *J* = 7.5 Hz, 2H), 7.09-7.12 (t, *J* = 6.5 Hz, 2H), 6.94-6.95 (t, *J* = 3.5 Hz, 2H), 6.90-6.92 (d, *J* = 13.5 Hz, 2H), 6.10 (s, 1H). <sup>13</sup>C NMR (125 MHz, Acetone-d<sub>6</sub>): δ = 153.9, 147.3, 138.1, 130.5, 127.8, 124.8, 124.1, 122.4, 120.0, 119.6, 118.4, 112.3, 41.0. M/S (EI) for C<sub>25</sub>H<sub>17</sub>N<sub>3</sub>O<sub>2</sub>: calculated 367.1321, found 367.1318.



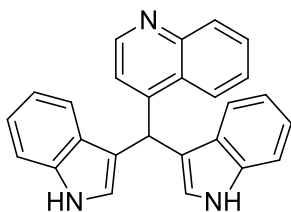
### 3,3'-((4-Chlorophenyl)methylene)bis(1*H*-indole) (**1l**)<sup>1</sup>

The reaction between **7a** and **8l** required 1.5 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1l** as a red foam (328 mg, 92% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.91 (s, 2H), 7.35-7.36 (m, 4H), 7.25-7.27 (m, 2H), 7.22-7.25 (m, 2H), 7.16-7.19 (m, 2H), 6.99-7.03 (t, *J* = 9.8 Hz, 2H), 6.63-6.64 (dd, *J* = 0.5 Hz, 1.0 Hz, 2H), 5.85 (s, 1H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 142.7, 136.8, 131.9, 130.2, 128.5, 127.0, 123.7, 122.2, 120.0, 119.5, 119.4, 111.2, 39.8. M/S (ESI) for C<sub>23</sub>H<sub>17</sub>ClN<sub>2</sub> (M+H): calculated 357.1153, found 357.0955.



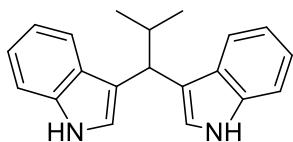
### 3,3'-((4-Iodophenyl)methylene)bis(1*H*-indole) (**1m**)<sup>5</sup>

The reaction between **7a** and **8m** required 2.5 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (4:1) as the eluent to afford **1m** as a red foam (416 mg, 93% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.86 (s, 2H), 7.59-7.60 (d, *J* = 8.5 Hz, 2H), 7.34-7.39 (m, 4H), 7.18-7.21 (t, *J* = 7.8 Hz, 2H), 7.08-7.10 (d, *J* = 8.5 Hz, 2H), 7.02-7.05 (m, 2H), 6.60-6.62 (t, *J* = 6.3 Hz, 2H), 5.83 (s, 1H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 143.9, 137.4, 136.8, 131.0, 127.0, 123.8, 122.2, 119.9, 119.5, 119.1, 111.3, 91.6, 39.9. M/S (EI) for C<sub>23</sub>H<sub>17</sub>I<sub>N</sub><sub>2</sub>: calculated 448.0436, found 448.0439.



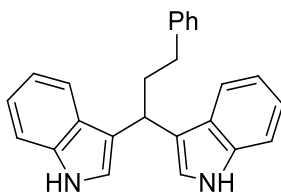
### Arsindoline A (**1n**)<sup>6</sup>

The reaction between **7a** and **8n** required 18 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (2:1) as the eluent to afford **1n** as a red solid (280 mg, 75% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 8.73-8.74 (d, *J* = 3.5 Hz, 1H), 8.14-8.15 (d, *J* = 8.5 Hz, 2H), 8.04-8.06 (d, *J* = 10.0 Hz, 2H), 7.65-7.68 (t, *J* = 7.8 Hz, 1H), 7.41-7.44 (t, *J* = 7.5 Hz, 1H), 7.36-7.38 (d, *J* = 8.0 Hz, 4H), 7.18-7.21 (t, *J* = 7.8 Hz, 2H), 7.15 (d, *J* = 4.0 Hz, 1H), 7.00-7.03 (t, *J* = 7.5 Hz, 2H), 6.65 (s, 1H), 6.56 (s, 2H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 150.6, 149.7, 148.7, 136.9, 130.2, 129.1, 127.5, 126.9, 126.7, 124.5, 124.3, 122.4, 121.1, 119.7, 117.9, 111.4, 35.7. M/S (ESI) for C<sub>26</sub>H<sub>19</sub>N<sub>3</sub> (M+H): calculated 374.1652, found 374.1642.



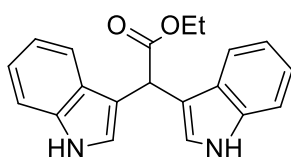
### 3,3'-(2-Methylpropylidene)bis(1*H*-indole) (**1o**)<sup>1</sup>

The reaction between **7a** and **8o** required 11 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (5:1) as the eluent to afford **1o** as a white foam (231 mg, 80% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.60-6.62 (d, *J* = 8.0 Hz, 2H), 7.48 (s, 2H), 7.07-7.19 (m, 4H), 7.01-7.04 (t, *J* = 7.0 Hz, 2H), 6.82-6.83 (d, *J* = 8.0 Hz, 2H), 4.18-4.19 (d, *J* = 8.0 Hz, 1H), 2.53-2.62 (m, 1H), 0.95-0.97 (d, *J* = 6.5 Hz, 6H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 136.3, 127.7, 121.8, 121.7, 119.7, 119.7, 119.0, 111.2, 41.2, 33.0, 21.9. M/S (ESI) for C<sub>20</sub>H<sub>20</sub>N<sub>2</sub> (M+H): calculated 289.1699, found 289.1685.



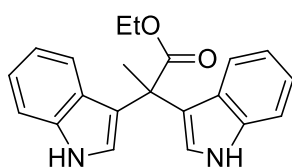
### 3,3'-(3-Phenylpropane-1,1-diyl)bis(1*H*-indole) (**1p**)<sup>4</sup>

The reaction between **7a** and **8p** required 30 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (3:1) as the eluent to afford **1p** as a red foam (273 mg, 78% yield). <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>CN): δ = 9.06 (s, 2H), 7.44-7.46 (dd, *J* = 1.0 Hz, 1.0 Hz, 2H), 7.34-7.36 (m, 2H), 7.25-7.28 (t, *J* = 7.5 Hz, 2H), 7.16-7.19 (m, 5H), 7.04-7.07 (m, 2H), 6.89-6.93 (m, 2H), 4.45 (s, 1H), 2.65-2.67 (d, *J* = 8.5 Hz, 2H), 2.51-2.53 (d, *J* = 8.0 Hz, 2H). <sup>13</sup>C NMR (125 MHz, CD<sub>3</sub>CN): δ = 143.9, 137.8, 129.5, 129.3, 127.9, 126.6, 122.9, 122.2, 120.2, 120.1, 119.4, 112.3, 38.0, 35.2, 34.4. M/S (ESI) for C<sub>25</sub>H<sub>22</sub>N<sub>2</sub> (M+H): calculated 351.1856, found 351.1824.



### Ethyl 2,2-di(1*H*-indol-3-yl)acetate (**1q**)<sup>7</sup>

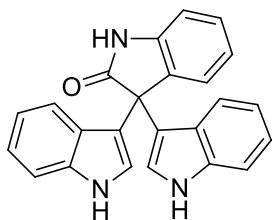
The reaction between **7a** and **8q** required 0.5 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (6:1) as the eluent to afford **1q** as a red solid. (270 mg, 85% yield). <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>Cl): δ = 8.00 (s, 2H), 7.61-7.63 (t, *J* = 3.8 Hz, 2H), 7.28-7.30 (d, *J* = 8.0 Hz, 2H), 7.15-7.18 (m, 2H), 7.06-7.09 (m, 2H), 7.00 (d, *J* = 2.5 Hz, 2H), 5.49 (s, 1H), 4.18-4.23 (q, *J* = 7.2 Hz, 2H), 1.23-1.26 (t, *J* = 7.0 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CD<sub>3</sub>Cl): δ = 173.7, 136.5, 126.8, 123.5, 122.2, 119.7, 119.4, 113.7, 111.4, 61.3, 40.8, 14.4. M/S (ESI) for C<sub>28</sub>H<sub>18</sub>N<sub>2</sub>O<sub>2</sub> (M+H): calculated 319.1441, found 319.1428.



### Ethyl 2,2-di(1*H*-indol-3-yl)propanoate (**1r**)<sup>8</sup>

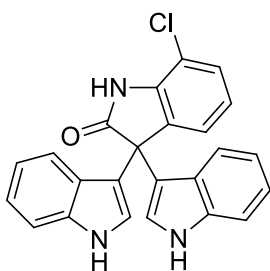
The reaction between **7a** and **8r** required 2 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (5:1) as the eluent to afford **1r** as a white solid (242 mg, 73% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.98 (s, 2H), 7.52-7.54 (dd, *J* = 0.5 Hz, 0.5 Hz, 2H), 7.34-7.36 (d, *J* = 8.5 Hz, 2H), 7.14-7.17 (m, 2H), 7.00-7.02 (m, 2H), 6.96 (d, *J* = 2.5 Hz, 2H), 4.14-4.18 (q, *J* = 7.2 Hz, 2H), 2.12 (s, 3H), 1.10-1.13 (t, *J* = 7.3 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 175.6, 136.9, 126.2, 123.1, 121.8, 121.7, 119.3, 119.2, 111.4, 61.3, 46.5, 26.0, 14.3. M/S (ESI) for C<sub>21</sub>H<sub>20</sub>N<sub>2</sub>O<sub>2</sub> (M+Na): calculated 355.1417, found 355.1400.





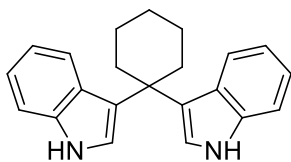
### Trisindoline (**1s**)<sup>6</sup>

The reaction between **7a** and **8s** required 12 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (1:1) as the eluent to afford **1s** as a white solid (335 mg, 92% yield). <sup>1</sup>H NMR (500 MHz, DMSO-d<sub>6</sub>): δ = 10.95 (d, *J* = 1.5 Hz, 2H), 10.59 (s, 1H), 7.34-7.36 (d, *J* = 8.0 Hz, 2H), 7.21-7.24 (t, *J* = 7.0 Hz, 4H), 6.98-7.03 (m, 3H), 6.91-6.94 (m, 1H), 6.84-6.85 (d, *J* = 2.5 Hz, 2H), 6.78-6.81 (m, 2H). <sup>13</sup>C NMR (125 MHz, DMSO-d<sub>6</sub>): δ = 178.7, 141.3, 136.9, 134.6, 127.8, 125.7, 124.9, 124.3, 121.4, 120.9, 120.8, 118.2, 114.3, 111.6, 109.6, 52.6. M/S (ESI) for C<sub>24</sub>H<sub>17</sub>N<sub>3</sub>O (M+H): calculated 364.1444, found 364.1430.



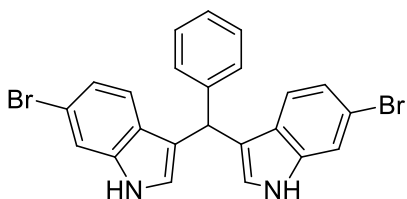
### 3,3-Di(1H-indol-3-yl)-7-chloroindolin-2-one (**1t**)<sup>9</sup>

The reaction between **7a** and **8t** required 15 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (1:1) as the eluent to afford **1t** as an off white solid (310 mg, 78% yield). <sup>1</sup>H NMR (500 MHz, DMSO-d<sub>6</sub>): δ = 11.04 (s, 1H), 11.02 (s, 2H), 7.36-7.37 (d, *J* = 8.5 Hz, 2H), 7.30-7.32 (d, *J* = 8.5 Hz, 1H), 7.18-7.22 (m, 3H), 7.01-7.04 (t, *J* = 7.5 Hz, 2H), 6.94-6.97 (t, *J* = 7.8 Hz, 1H), 6.86 (d, *J* = 2.0 Hz, 2H), 6.80-6.83 (t, *J* = 7.5 Hz, 2H). <sup>13</sup>C NMR (125 MHz, DMSO-d<sub>6</sub>): δ = 178.6, 139.0, 137.0, 136.3, 127.9, 125.5, 124.4, 123.5, 122.9, 121.1, 120.6, 118.4, 113.8, 113.6, 111.7, 53.5. M/S (ESI) for C<sub>24</sub>H<sub>16</sub>ClN<sub>3</sub>O (M+H): calculated 398.1055, found 398.1036.



### 3,3'-(Cyclohexane-1,1-diyl)bis(1H-indole) (**1u**)<sup>10</sup>

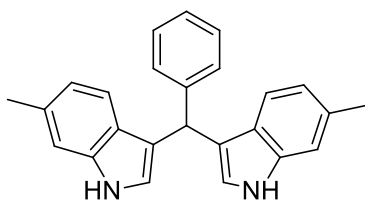
The reaction between **7a** and **8u** required 15 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (5:1) as the eluent to afford **1u** as a yellow solid. (260 mg, 83% yield). <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>CN): δ = 9.08 (s, 2H), 7.34 (dd, *J* = 0.5 Hz, 2.5 Hz, 2H), 7.28-7.31 (m, 4H), 6.91-6.94 (m, 2H), 6.70-6.74 (m, 2H), 2.46-2.48 (t, *J* = 5.8 Hz, 4H), 1.62-1.67 (m, 4H), 1.57-1.58 (m, 2H). <sup>13</sup>C NMR (125 MHz, CD<sub>3</sub>CN): δ = 138.2, 127.3, 123.9, 123.2, 121.7, 121.7, 118.9, 112.2, 39.8, 37.9, 27.6, 23.8. M/S (EI) for C<sub>22</sub>H<sub>22</sub>N<sub>2</sub>: calculated 314.1783, found 314.1774.



### 3,3'-(Phenylmethylene)bis(6-bromo-1*H*-indole) (**1v**)<sup>11</sup>

The reaction between **7b** and **8a** required 31 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (3:1) as the eluent to afford **1v** as a red solid. (421 mg, 88% yield).

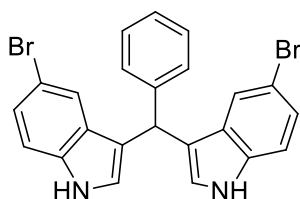
<sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>CN):  $\delta$  = 9.18 (s, 2H), 7.57-7.58 (d,  $J$  = 1.5 Hz, 2H), 7.28-7.33 (m, 4H), 7.17-7.22 (m, 3H), 7.02-7.04 (dd,  $J$  = 1.5 Hz, 1.5 Hz, 2H), 6.75 (t,  $J$  = 1.0 Hz, 2H), 5.84 (s, 1H). <sup>13</sup>C NMR (125 MHz, CD<sub>3</sub>CN):  $\delta$  = 145.3, 138.7, 129.4, 129.3, 127.2, 126.9, 125.6, 122.7, 121.8, 119.9, 115.5, 115.2, 40.7. M/S (ESI) for C<sub>23</sub>H<sub>16</sub>Br<sub>2</sub>N<sub>2</sub> (M+H): calculated 478.9753, found 478.9547.



### 3,3'-(Phenylmethylene)bis(6-methyl-1*H*-indole) (**1w**)<sup>12</sup>

The reaction between **7c** and **8a** required 6 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (3:1) as the eluent to afford **1w** as a red solid (336 mg, 96% yield). <sup>1</sup>H NMR (500 MHz,

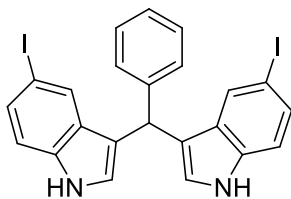
CDCl<sub>3</sub>):  $\delta$  = 7.60 (s, 2H), 7.33-7.39 (m, 2H), 7.30-7.33 (m, 4H), 7.24-7.27 (m, 1H), 7.11 (s, 2H), 6.89-6.91 (m, 2H), 6.51 (s, 2H), 5.87 (s, 1H), 2.49-2.50 (d,  $J$  = 3.0 Hz, 6H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>):  $\delta$  = 144.3, 137.2, 131.7, 128.8, 128.3, 126.1, 125.1, 123.1, 121.0, 119.7, 119.6, 111.2, 40.3, 21.8. M/S (ESI) for C<sub>25</sub>H<sub>22</sub>N<sub>2</sub> (M-H): calculated 349.1699, found 349.1681.



### 3,3'-(Phenylmethylene)bis(5-bromo-1*H*-indole) (**1x**)<sup>11</sup>

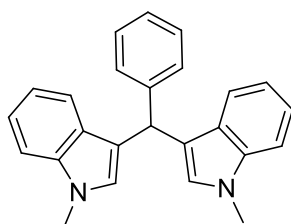
The reaction between **7d** and **8a** required 24 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (3:1) as the eluent to afford **1x** as a red solid. (440 mg, 92% yield). <sup>1</sup>H NMR (500 MHz, CD<sub>3</sub>CN):  $\delta$  =

9.25 (s, 2H), 7.41 (d,  $J$  = 2.0 Hz, 2H), 7.29-7.35 (d,  $J$  = 8.5 Hz, 6H), 7.22-7.25 (m, 1H), 7.19-7.21 (dd,  $J$  = 1.5 Hz, 2.0 Hz, 2H), 6.79 (t,  $J$  = 1.3 Hz, 2H), 5.82 (s, 1H). <sup>13</sup>C NMR (125 MHz, CD<sub>3</sub>CN):  $\delta$  = 145.1, 136.6, 129.6, 129.4, 129.3, 127.3, 126.2, 125.1, 122.6, 119.3, 114.3, 112.5, 40.5. M/S (ESI) for C<sub>23</sub>H<sub>16</sub>Br<sub>2</sub>N<sub>2</sub> (M+H): calculated 478.9753, found 478.9548.



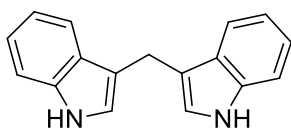
### 3,3'-(Phenylmethylene)bis(5-iodo-1*H*-indole) (**1y**)<sup>13</sup>

The reaction between **7e** and **8a** required 22 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (3:1) as the eluent to afford **1y** as a red solid. (527 mg, 92% yield). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>): δ = 7.97 (s, 2H), 7.68 (s, 2H), 7.41-7.44 (dd, *J* = 1.2 Hz, 1.2 Hz, 2H), 7.24-7.32 (m, 5H), 7.14-7.16 (d, *J* = 8.8 Hz, 2H), 6.60 (d, *J* = 2.0 Hz, 2H), 5.74 (s, 1H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 143.2, 136.0, 130.6, 129.6, 128.7, 128.7, 128.6, 126.7, 124.5, 119.0, 113.3, 83.1, 40.0. M/S (EI) for C<sub>23</sub>H<sub>16</sub>I<sub>2</sub>N<sub>2</sub>: calculated 573.9403, found 573.9419.



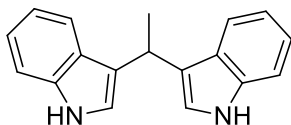
### 3,3'-(Phenylmethylene)bis(1-methyl-1*H*-indole) (**1z**)<sup>12</sup>

The reaction between **7f** and **8a** required 15 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (8:1) as the eluent to afford **1z** as a pink solid (308 mg, 88% yield). <sup>1</sup>H NMR (500MHz, CDCl<sub>3</sub>): δ = 7.37-7.39 (m, 2H), 7.29-7.35 (m, 2H), 7.24-7.28 (m, 4H), 7.18-7.22 (m, 3H), 6.97-7.00 (m, 2H), 6.52 (d, *J* = 0.5 Hz, 2H), 5.88 (s, 1H), 3.67 (s, 6H). <sup>13</sup>C NMR (125MHz, CDCl<sub>3</sub>): δ = 144.6, 137.5, 128.8, 128.4, 128.3, 127.6, 126.1, 121.5, 120.2, 118.8, 118.4, 109.2, 40.2, 32.8. M/S (ESI) for C<sub>25</sub>H<sub>22</sub>N<sub>2</sub> (M+H): calculated 351.1856, found 351.1839.



### Arundine (**1aa**)<sup>6</sup>

The reaction was performed according to the general procedure using **7a** (117 mg, 1.0 mmol), **4** (8.9 mg, 0.01 mmol) and **8v** (35-40 wt. % in H<sub>2</sub>O) (4.0 mmol) at room temperature. The reaction time was 30 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (6:1) as the eluent to afford **1aa** as a brown solid (153 mg, 62% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.86 (s, 2H), 7.62-7.63 (d, *J* = 8.0 Hz, 2H), 7.34-7.35 (d, *J* = 8.0 Hz, 2H), 7.17-7.20 (t, *J* = 14.5 Hz, 2H), 7.07-7.10 (t, *J* = 7.3 Hz, 2H), 6.92 (s, 2H), 4.24 (s, 2H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 136.6, 127.7, 122.3, 122.0, 119.4, 119.3, 115.8, 111.2, 21.3. M/S (ESI) for C<sub>17</sub>H<sub>14</sub>N<sub>2</sub> (M+H): calculated 247.1230, found 247.1228.



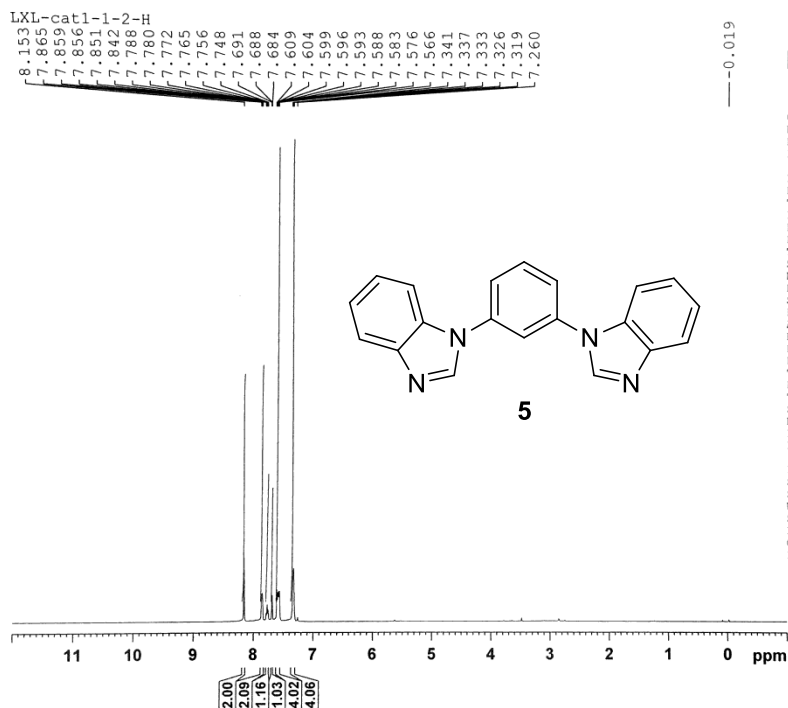
### Vibrindole A (**1ab**)<sup>6</sup>

The reaction was performed according to the general procedure using **7a** (117 mg, 1.0 mmol), **4** (8.9 mg, 0.01 mmol) and **8w** (50 wt. % in EtOH) (4.0 mmol) at room temperature. The reaction time was 58 h and product purification by silica gel chromatography was carried out using hexane:ethyl acetate (6:1) as the eluent to afford **1ab** as a white solid (195 mg, 75% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.84 (s, 2H), 7.56-7.58 (t, *J* = 4.0 Hz, 2H), 7.33-7.34 (d, *J* = 8.0 Hz, 2H), 7.14-7.17 (m, 2H), 7.02-7.05 (m, 2H), 6.91 (t, *J* = 1.3 Hz, 2H), 4.65-4.70 (q, *J* = 7.0 Hz, 1H), 1.80-1.81 (d, *J* = 7.0 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 136.8, 127.1, 121.9, 121.8, 121.3, 119.9, 119.2, 111.2, 28.3, 21.9. M/S (ESI) for C<sub>18</sub>H<sub>16</sub>N<sub>2</sub> (M+H): calculated 261.1386, found 261.1375.

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## 7. NMR spectra



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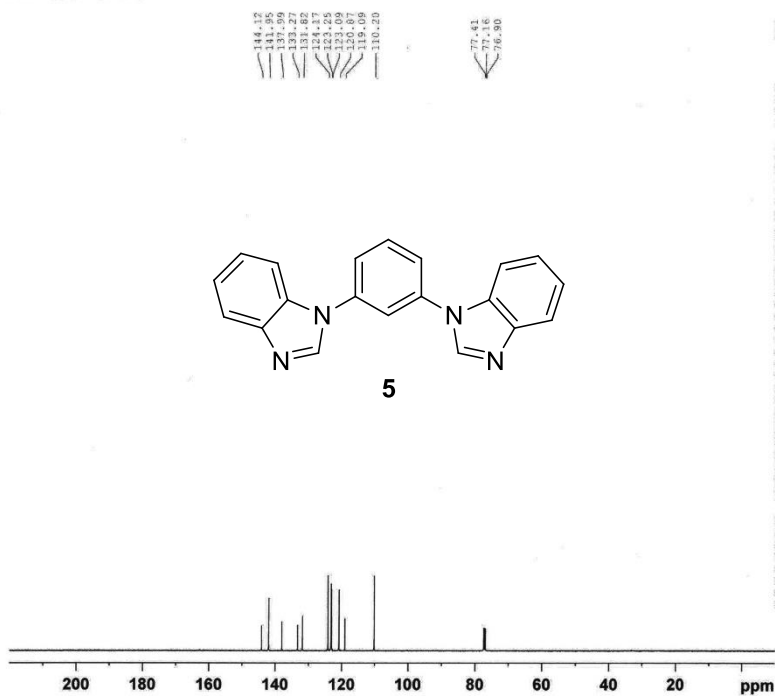


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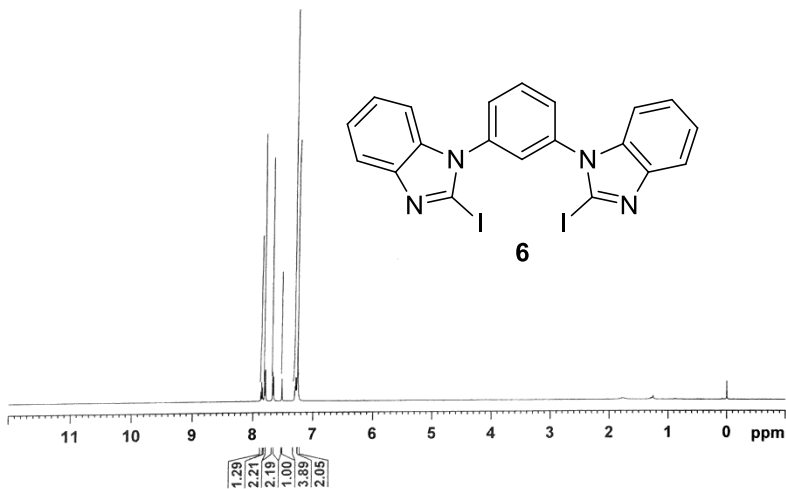
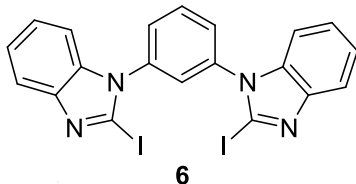
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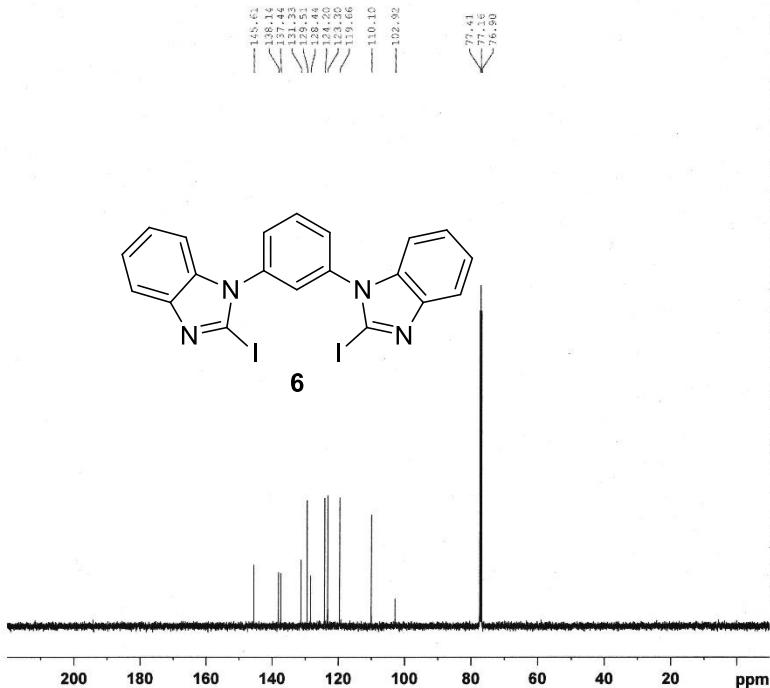
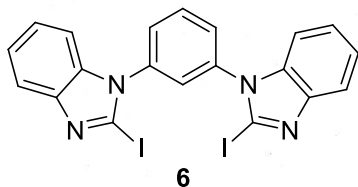
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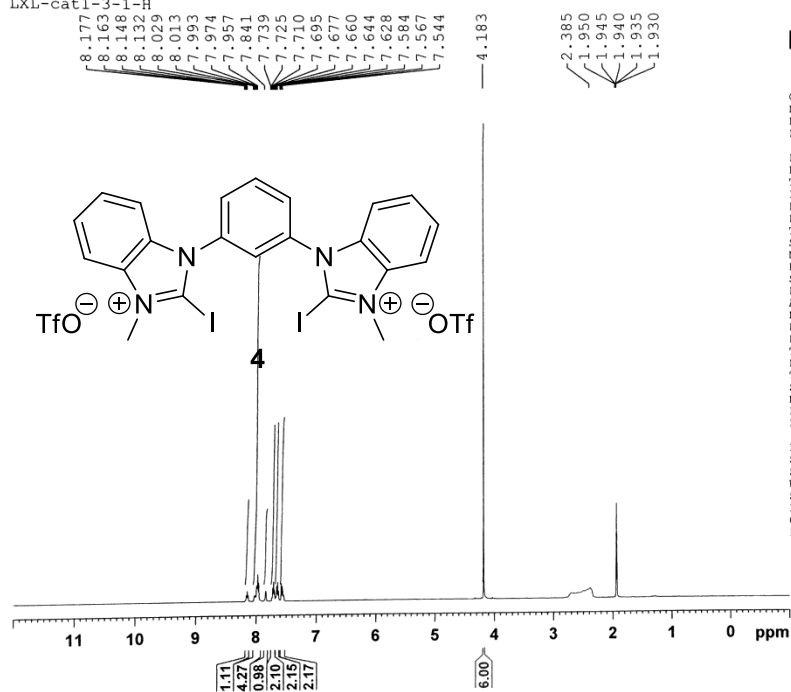
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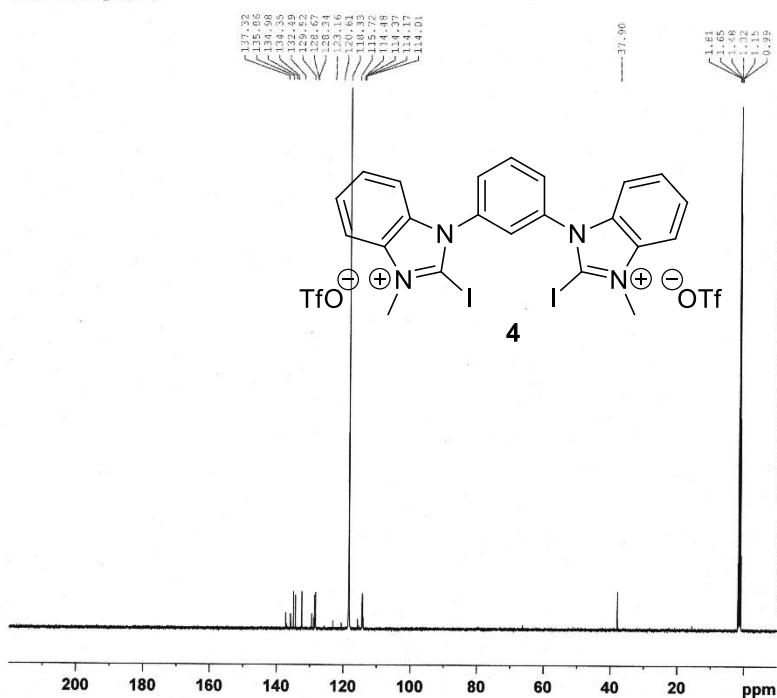


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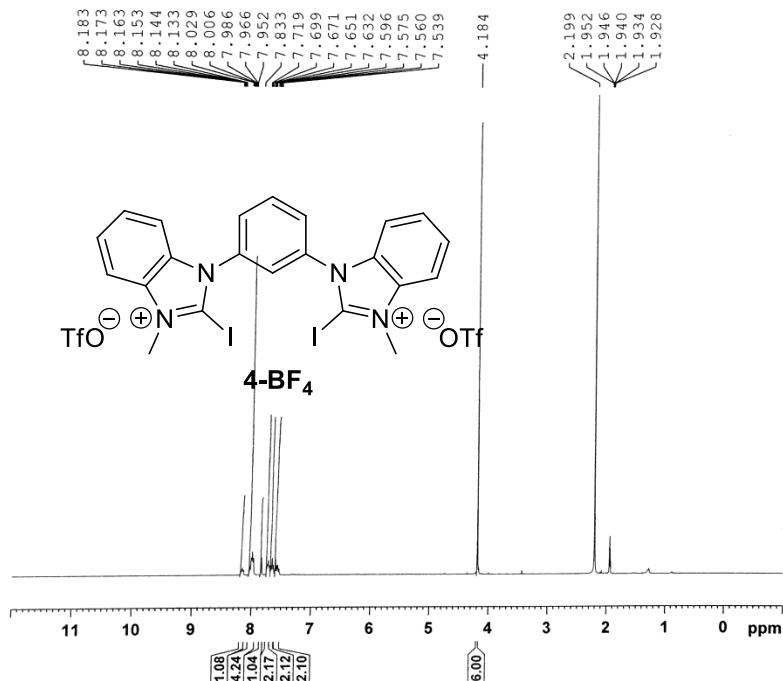
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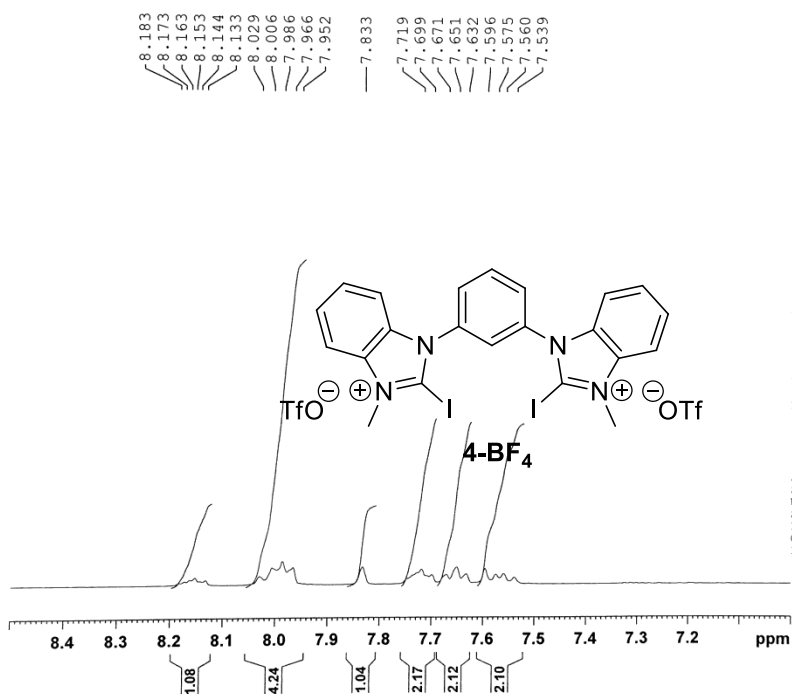
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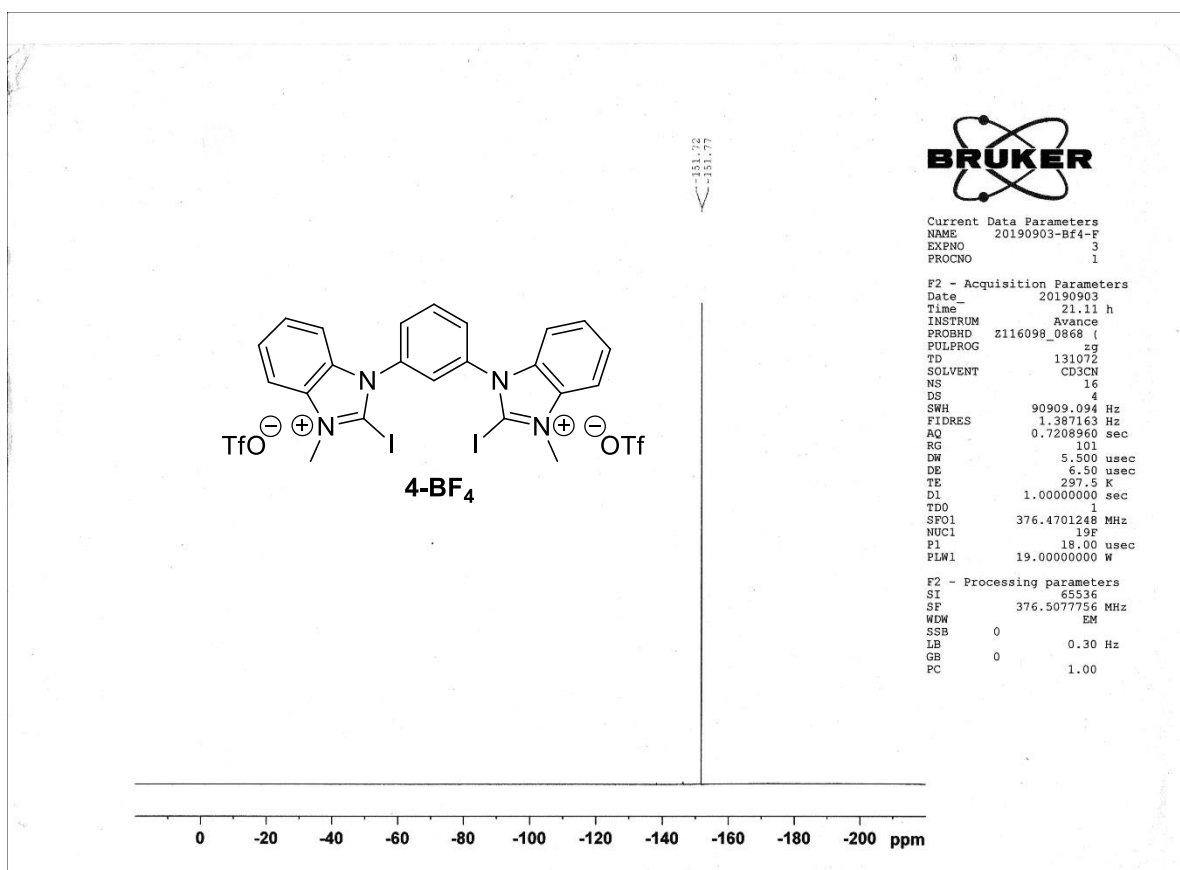
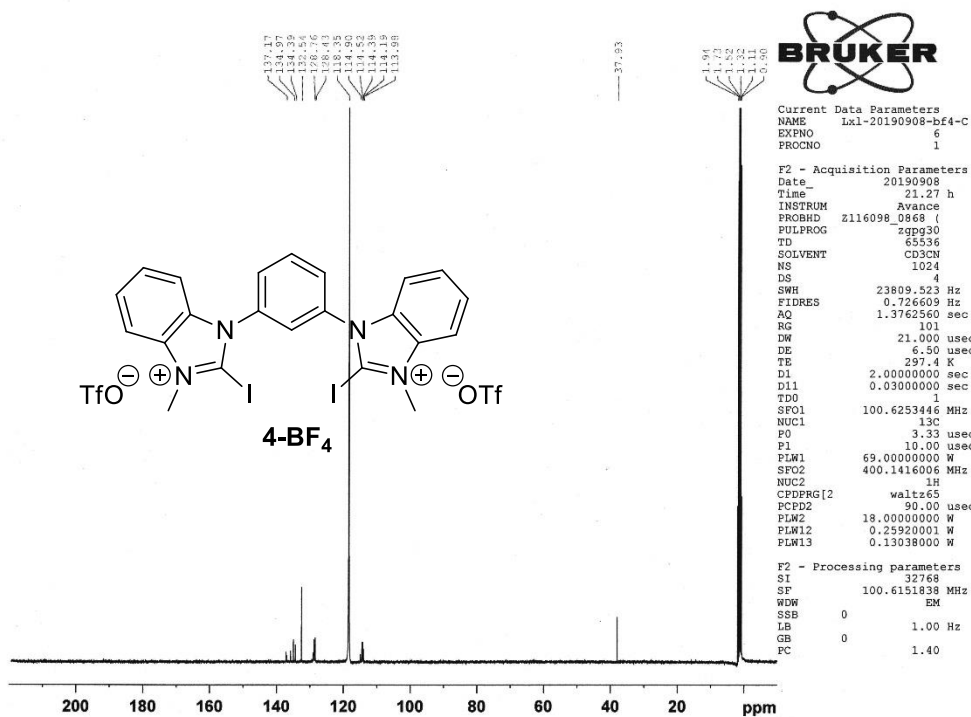


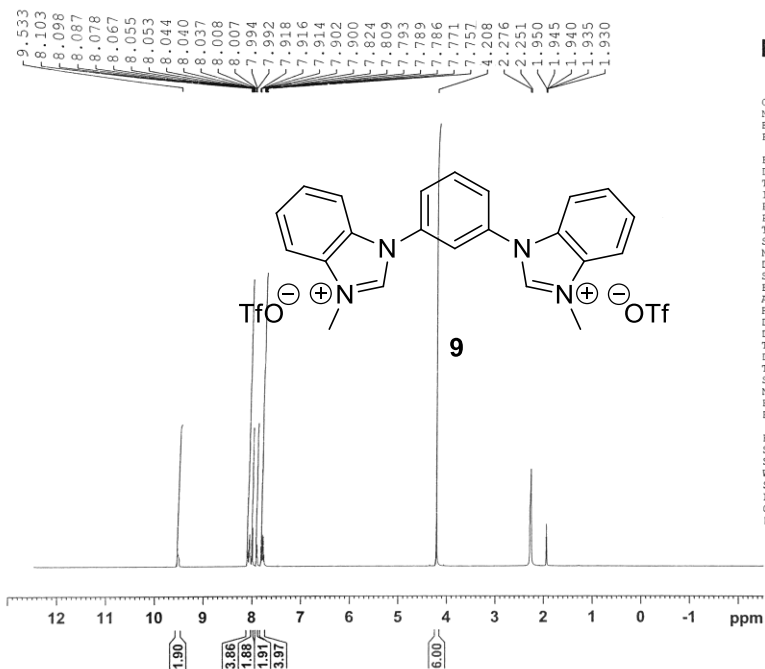
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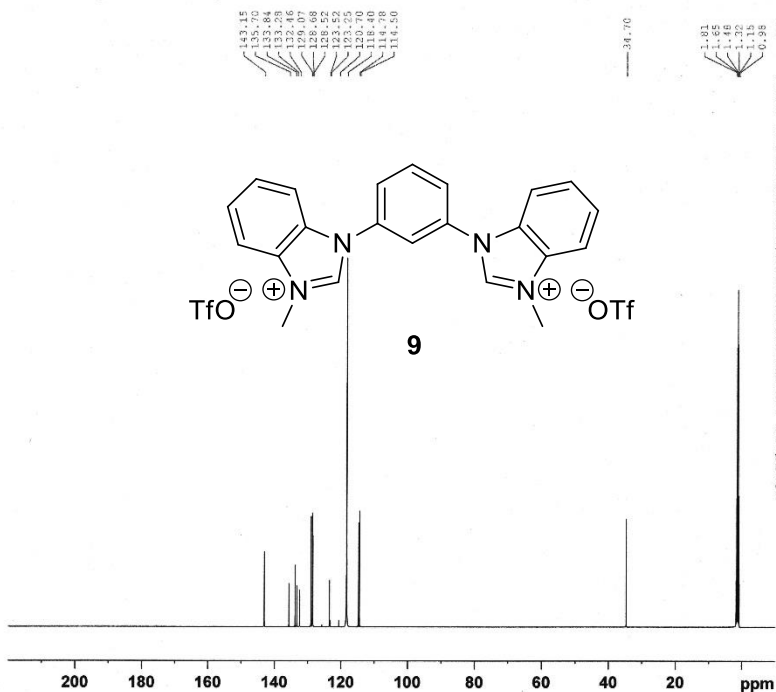


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Time 14.01 h  
INSTRUM spect  
PROBHD Z119470\_0274 ( )  
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 77.68  
DW 66.667 usec  
DE 6.50 usec  
TE 296.3 K  
D1 1.00000000 sec  
TD0 1  
SFO1 500.1325007 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300141 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

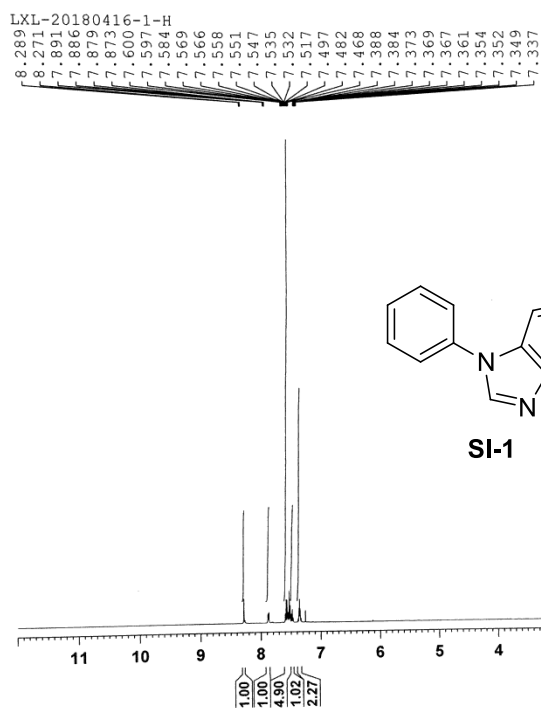
LXL-catalyst 2 overnight-C



Current Data Parameters  
NAME LXL-catalyst 2 overnight-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180803  
Time 6.32 h  
INSTRUM spect  
PROBHD Z119470\_0274 ( )  
PULPROG zgpg30  
TD 32768  
SOLVENT CDCl3  
NS 10000  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 298.6 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100017 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG12 waltz16  
PCPD2 80.00 usec  
PLW2 23.04899924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7576620 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



— -0.000

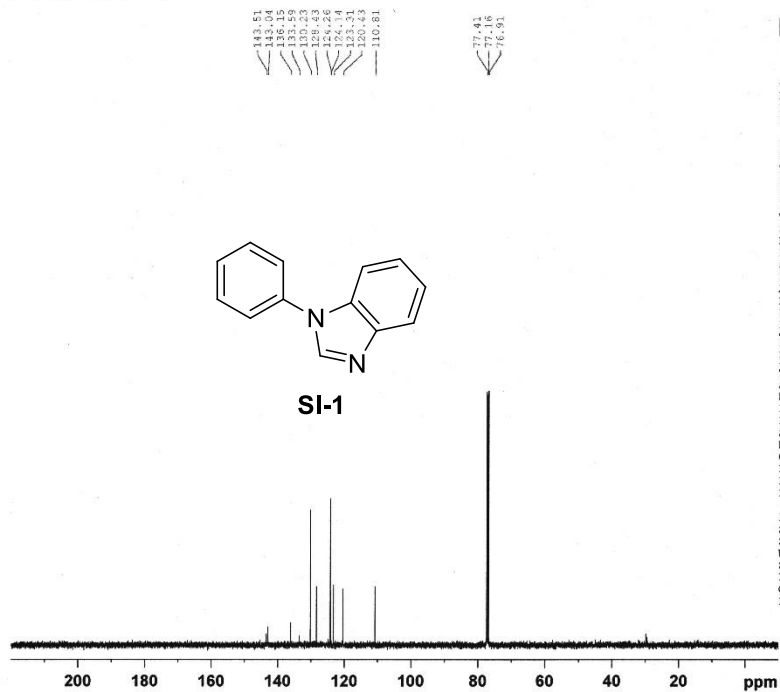


Current Data Parameters  
NAME LXL-20180416-1-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180416  
Time 13.31 h  
INSTRUM spect  
PROBHD Z119470\_0274 (zg30)  
PULPROG 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 86.75  
DW 66.667 usec  
DE 6.50 usec  
TE 296.3 K  
D1 1.00000000 sec  
TDO 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300109 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

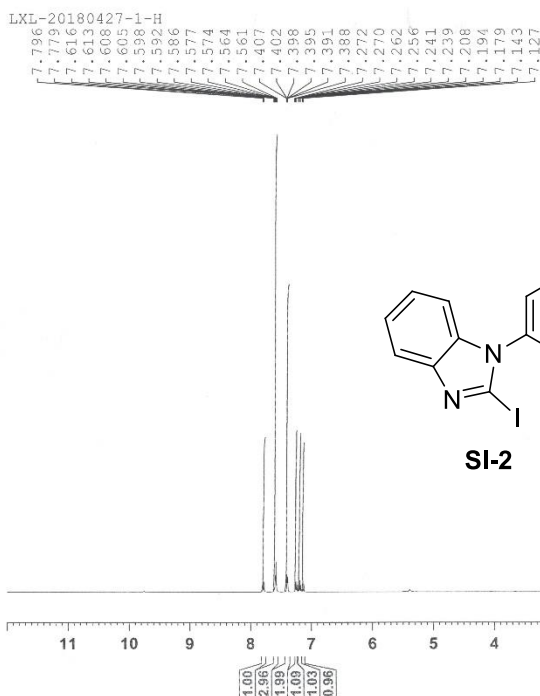
LXL-20180416-1-C



Current Data Parameters  
NAME LXL-20180416-1-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180416  
Time 13.41 h  
INSTRUM spect  
PROBHD Z119470\_0274 (zgdc30)  
PULPROG 32768  
SOLVENT CDCl3  
NS 43  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.6 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7577756 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



0.000

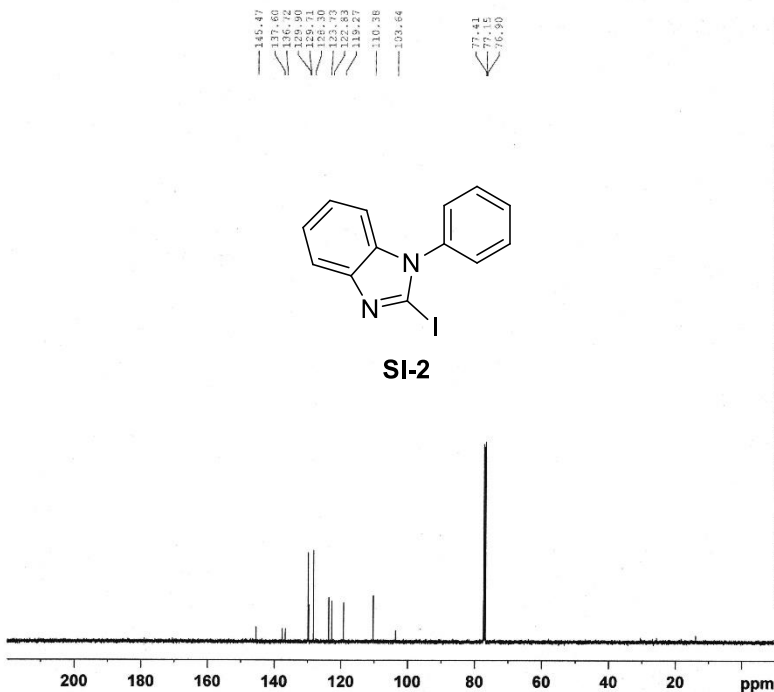


Current Data Parameters  
NAME LXL-20180427-1-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date 20180427  
Time 19.10 h  
INSTRUM spect  
PROBHD Z119470\_0274 (1  
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 59.43  
DW 66.667 usec  
DE 6.50 usec  
TE 297.1 K  
D1 1.00000000 sec  
TDO 1  
SFO1 500.1325007 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65336  
SF 500.1300109 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
CB 0  
PC 1.00

LXL-20180427-1-C

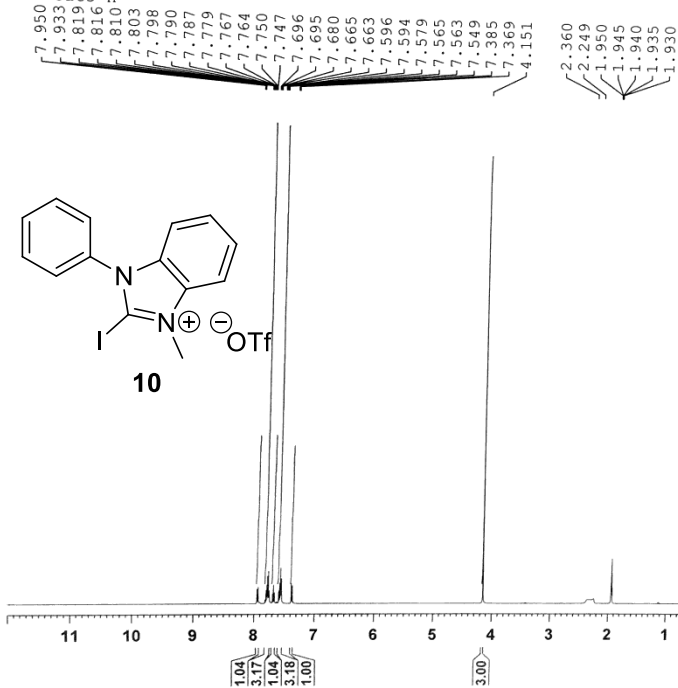


Current Data Parameters  
NAME LXL-20180427-1-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date 20180427  
Time 19.20 h  
INSTRUM spect  
PROBHD Z119470\_0274 (1  
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl3  
NS 27  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.3 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7577775 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
CB 0  
PC 1.40

LXL-cat3-H

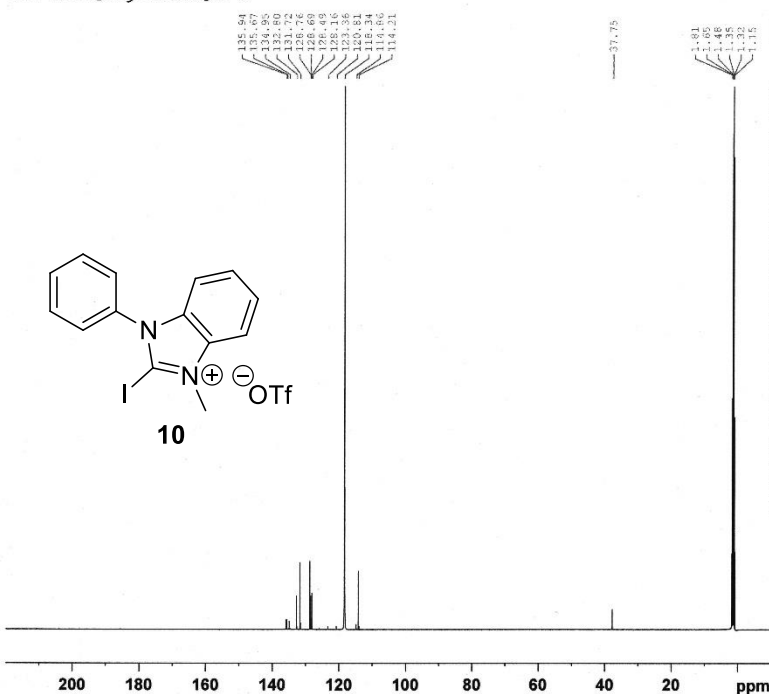


Current Data Parameters  
NAME LXL-cat3-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180429  
Time\_ 19.24 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zg30  
TD 32768  
SOLVENT CDCl<sub>3</sub>  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 117.5  
DW 66.667 usec  
DE 6.50 usec  
TE 297.4 K  
D1 1.00000000 sec  
TD0 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300139 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

LXL-catalyst2-overnight-C

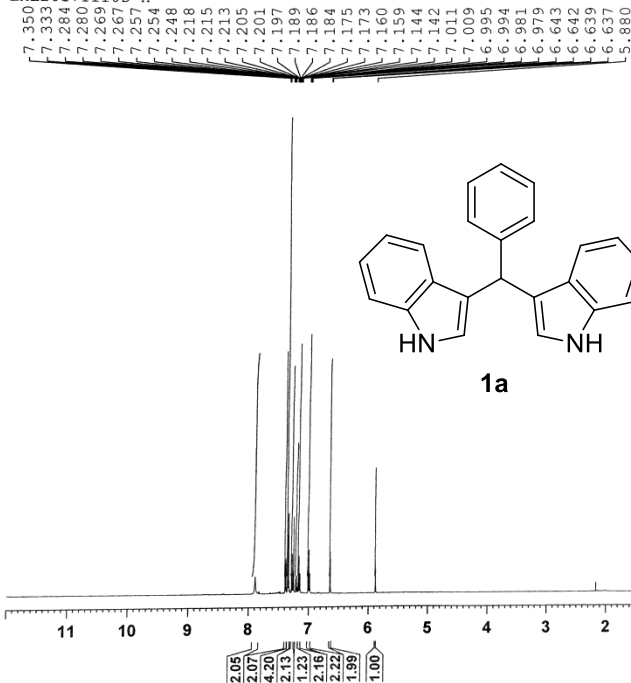


Current Data Parameters  
NAME LXL-catalyst2-overnight-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180802  
Time\_ 7.05 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl<sub>3</sub>  
NS 10000  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.1 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPOPG12 waltz16  
PCPD2 80.00 usec  
ELW2 23.04959924 W  
PLW2 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7576619 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40

LXL20171110D-H

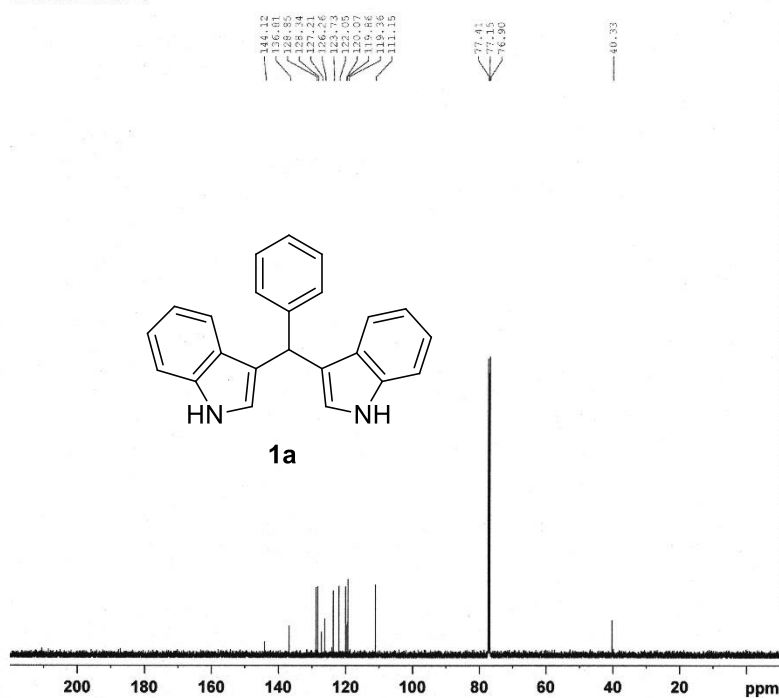


Current Data Parameters  
 NAME LXL20171110D-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20171110  
 Time 16.37 h  
 INSTRUM spect  
 PROBD 2119470\_0274  
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 94.85  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.7 K  
 D1 1.00000000 sec  
 TDO 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300181 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL20171110D-C



Current Data Parameters  
 NAME LXL20171110D-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20171110  
 Time 16.46 h  
 INSTRUM spect  
 PROBD 2119470\_0274  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 65  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.1 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 PCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7577738 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

7.694  
7.377  
7.361  
7.275  
7.259  
7.205  
7.200  
7.189  
7.148  
7.146  
7.132  
7.118  
7.116  
7.061  
7.045  
6.992  
6.991  
6.976  
6.962  
6.961  
6.545  
6.542  
5.814



```

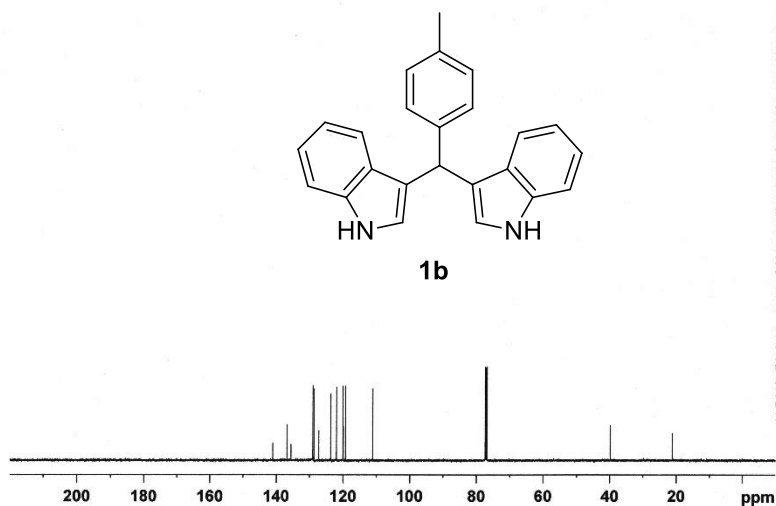
Current Data Parameters
NAME          LXL14-H
EXPNO        1
PROCNO       1

F2 - Acquisition Parameters
Date_         20171220
Time          18.56 h
INSTRUM       spect
PROBHD        T19470  0274
PULPROG       zg30
TD            32768
SOLVENT       DMS
NS            1601
DS            1
SWH           7500.000 Hz
FIDRES        0.17764 Hz
AQ            2.1845334 sec
RG            54.39
WDW            66.667 usedec
DE            6.90 usedec
TE            296.8 K
D1            1.0000000 sec
TOD           1
SF01          500.1325060 MHz
NUC1           1H
P1            10.00 usedec
PL1           23.5000000 W

F2 - Processing parameters
SI            65536
SF            500.1300419 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

```

141.11  
136.77  
135.60  
129.04  
128.68  
127.20  
123.68  
121.97  
120.07  
119.95  
119.29  
111.15



```

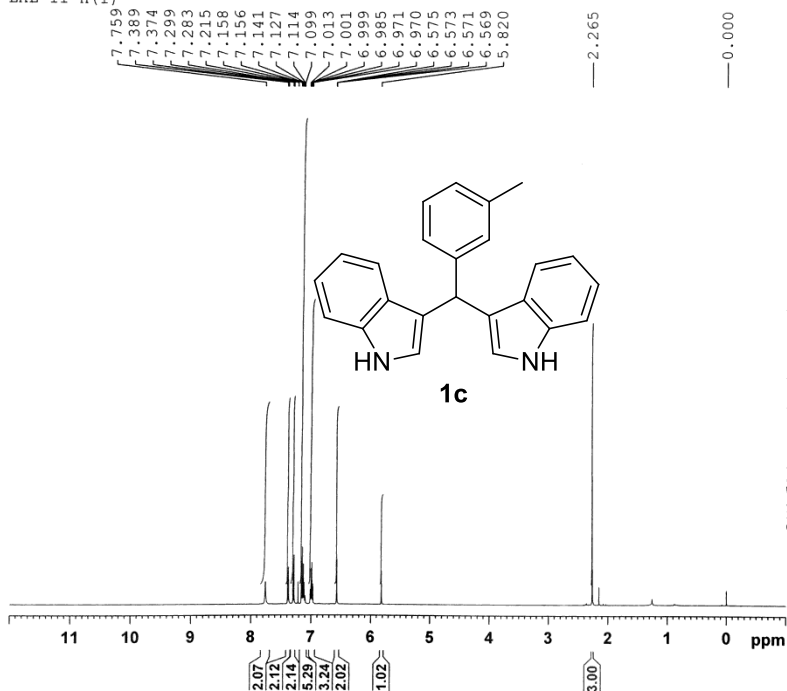
Current Data Parameters
NAME          LXI14-C
EXPNO         1
PROCNO        1

F2 - Acquisition Parameters
Date_         20171220
Time          19.06 h
INSTRUM       spect
PROBHD        T1z19470 0.7
PULPROG       zgpg30
TD            32768
SOLVENT       CDCl3
NS            67
DS            4
SWH           31250.000 Hz
FIDRES        1.907349 Hz
AQ            0.524380 sec
RG            2050
WDW            16.00 usec
SSB            6.50 usec
LB             294.3 K
DE            2.0000000 sec
D1            0.0300000 sec
DD            1
F2P1          125.7716219 MHz
NUC1           13C
P1            130.00 usec
PLW1          81.2910037 W
PCPDPRG2      500.1320005 MHz
NUC2           1H
PCPDPRG2      waltz16
PCPG2         80.00 usec
PLW2          23.049999924 W
PLM12         0.3670131 W

F2 - Processing parameters
SI            32768
SF            125.757788 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40

```

LXL-11-H(1)

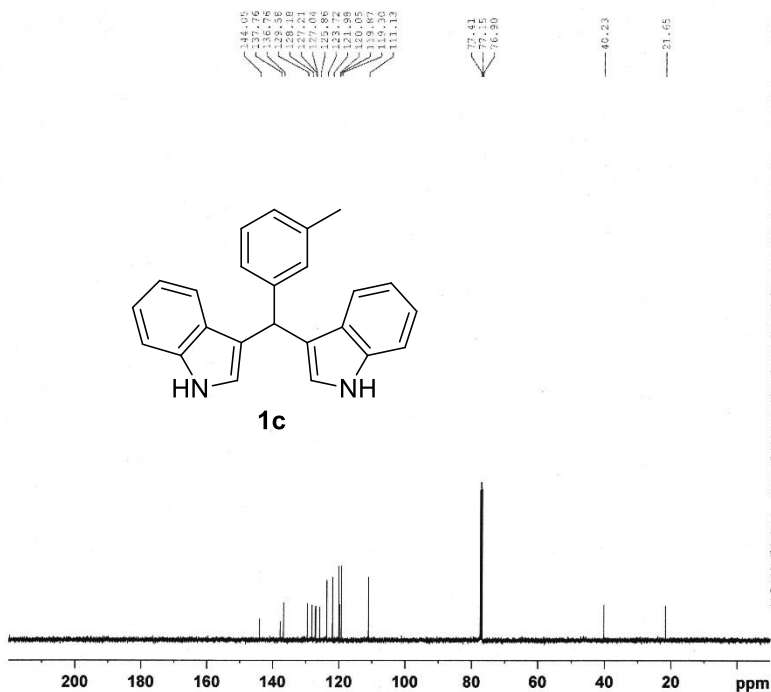


Current Data Parameters  
 NAME LXL-11-H(1)  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20171211  
 Time 13.31 h  
 INSTRUM spect  
 PROBRD Z119470\_0274 ( )  
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 59.43  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.3 K  
 D1 1.00000000 sec  
 TD0 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300342 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL-11-C

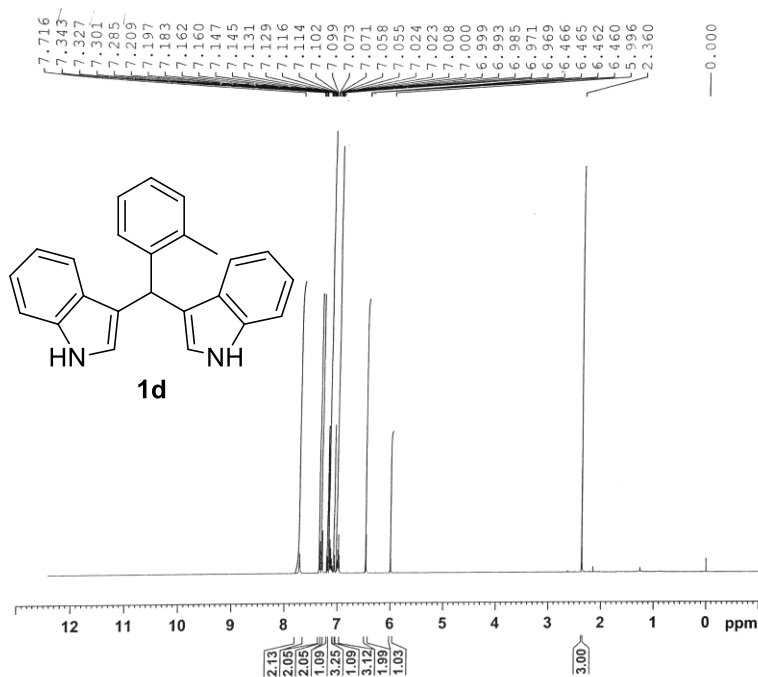


Current Data Parameters  
 NAME LXL-11-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20171211  
 Time 13.40 h  
 INSTRUM spect  
 PROBRD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 28  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.1 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 ECPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7577797 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40





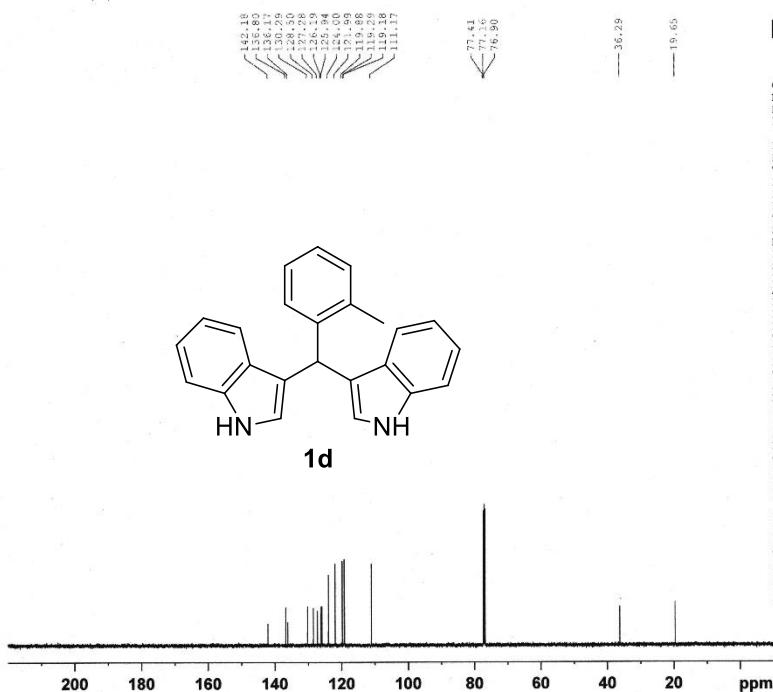
**BRUKER**

Current Data Parameters  
NAME LXL-12-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171211  
Time\_ 13.11 h  
INSTRUM spect  
PROBHD Z119470\_0274 ( )  
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 4  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 54.39  
DW 66.667 usec  
DE 6.50 usec  
TE 296.2 K  
D1 1.00000000 sec  
TDO  
SFO1 500.1325007 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300371 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

LXL-12-C(1)

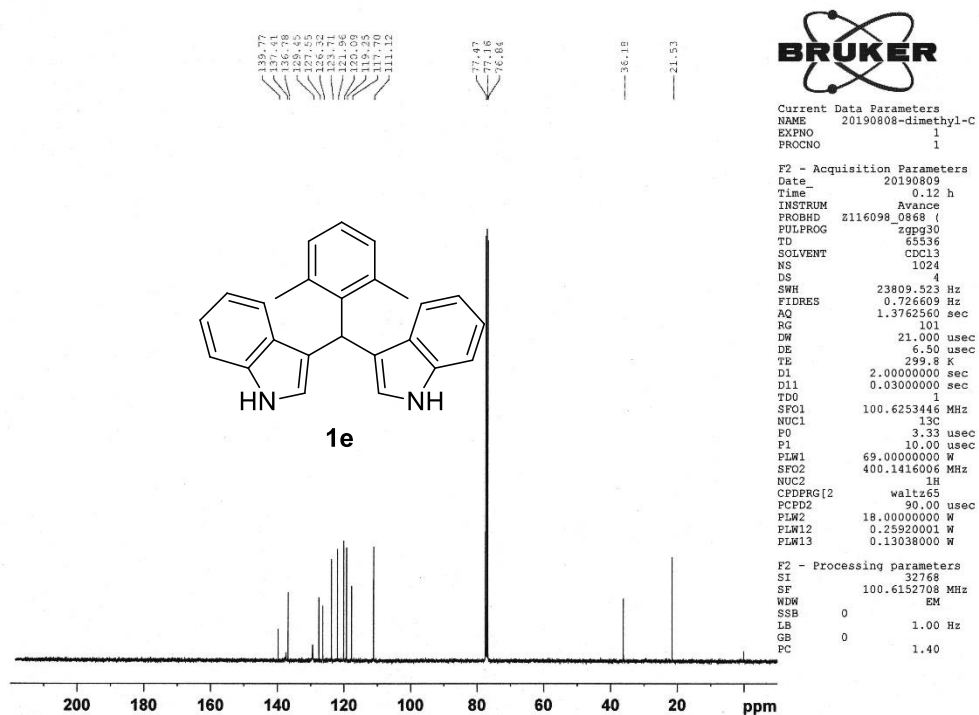
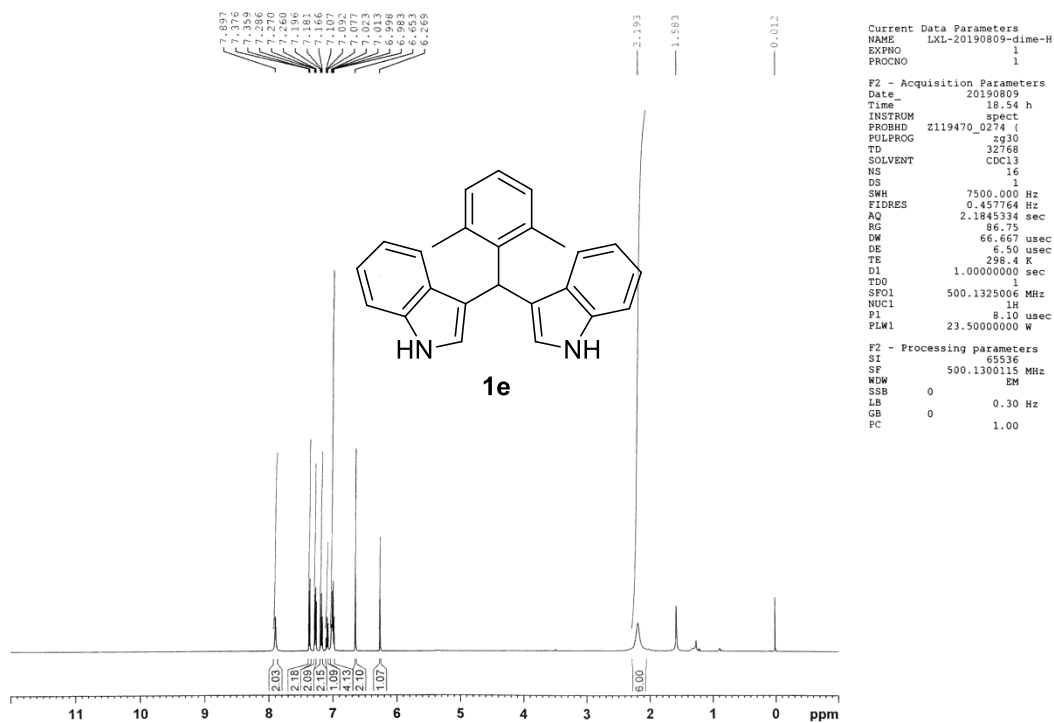


**BRUKER**

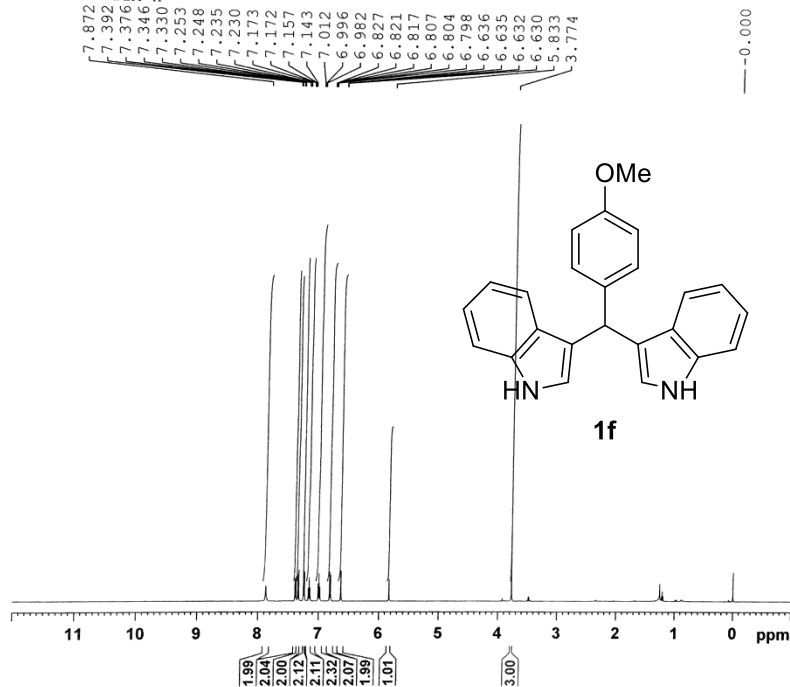
Current Data Parameters  
NAME LXL-12-C(1)  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171211  
Time\_ 13.23 h  
INSTRUM spect  
PROBHD Z119470\_0274 ( )  
PULPROG zgpg30  
TD 32768  
SOLVENT CDCl3  
NS 33  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.9 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG[2] waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7577804 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



LXL20171121A-H

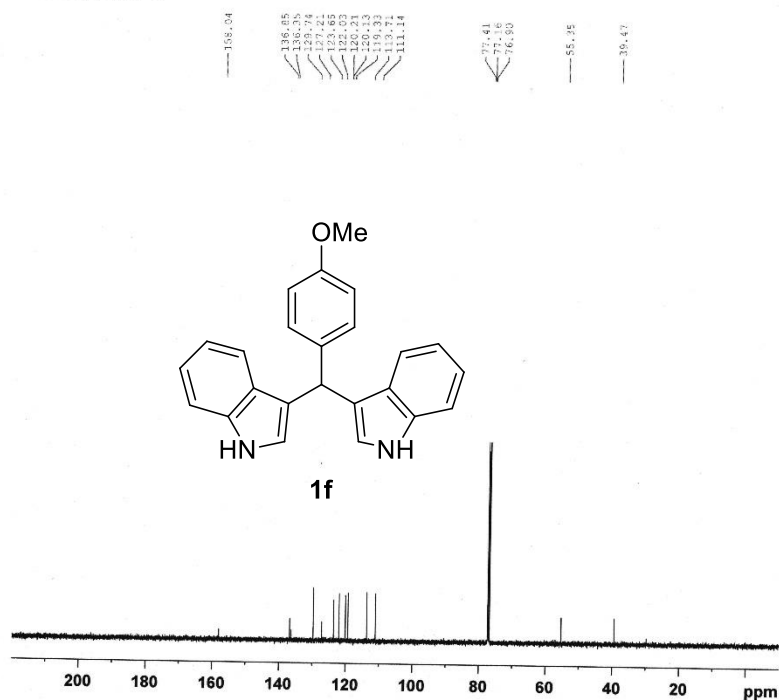


Current Data Parameters  
 NAME LXL20171121A-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171121  
 Time 17.59 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl<sub>3</sub>  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 117.5  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.2 K  
 D1 1.00000000 sec  
 TD0  
 SFO1 500.1325006 MHz  
 NUC1 <sup>1</sup>H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300179 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL20171121A-C

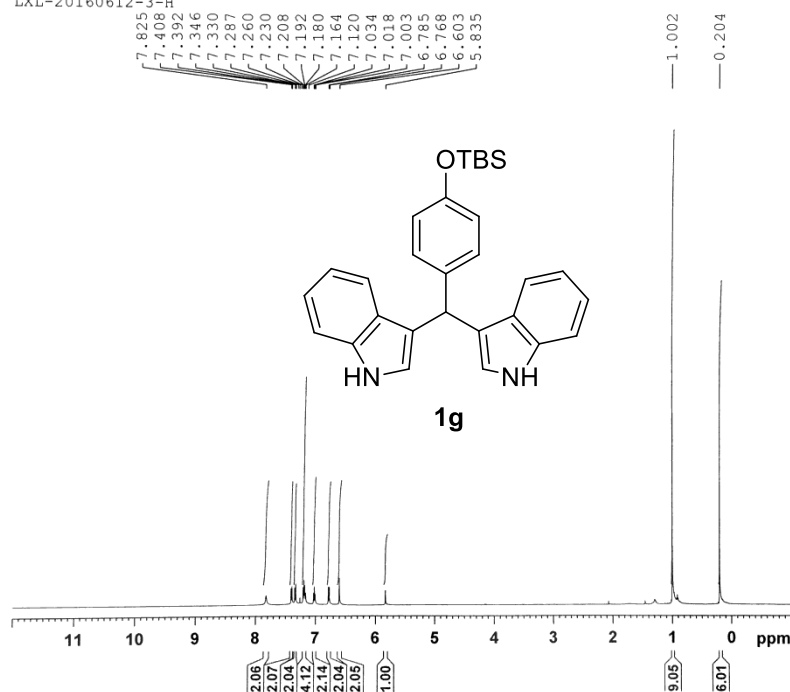


Current Data Parameters  
 NAME LXL20171121A-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171121  
 Time 18.10 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl<sub>3</sub>  
 NS 90  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.9 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1  
 SFO1 125.7716219 MHz  
 NUC1 <sup>13</sup>C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 <sup>1</sup>H  
 CPDPRG2 waltz16  
 PCPD2 30.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7577731 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

LXL-20160612-3-H

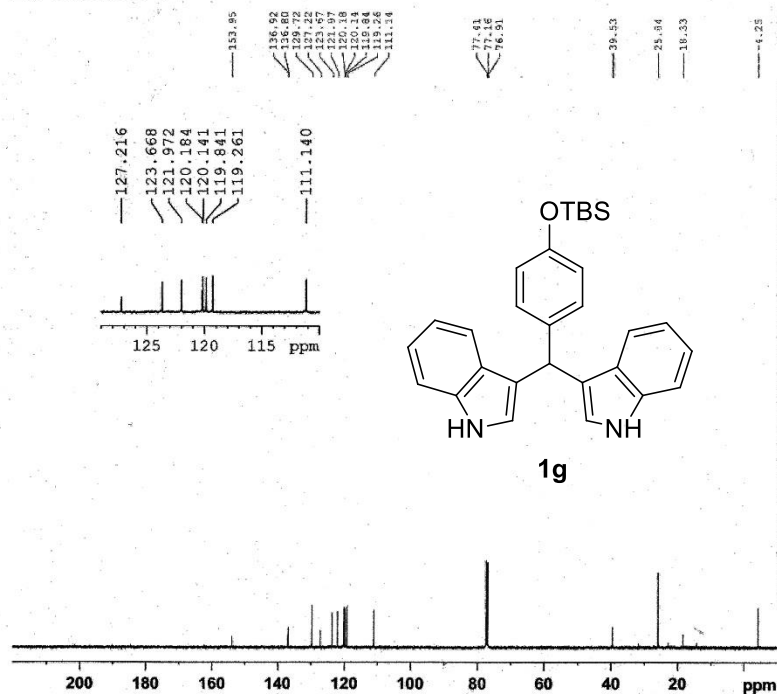


Current Data Parameters  
 NAME LXL-20160612-3-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20180612  
 Time 17.54 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (   
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 48.59  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 297.0 K  
 D1 1.00000000 sec  
 TDO 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300117 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

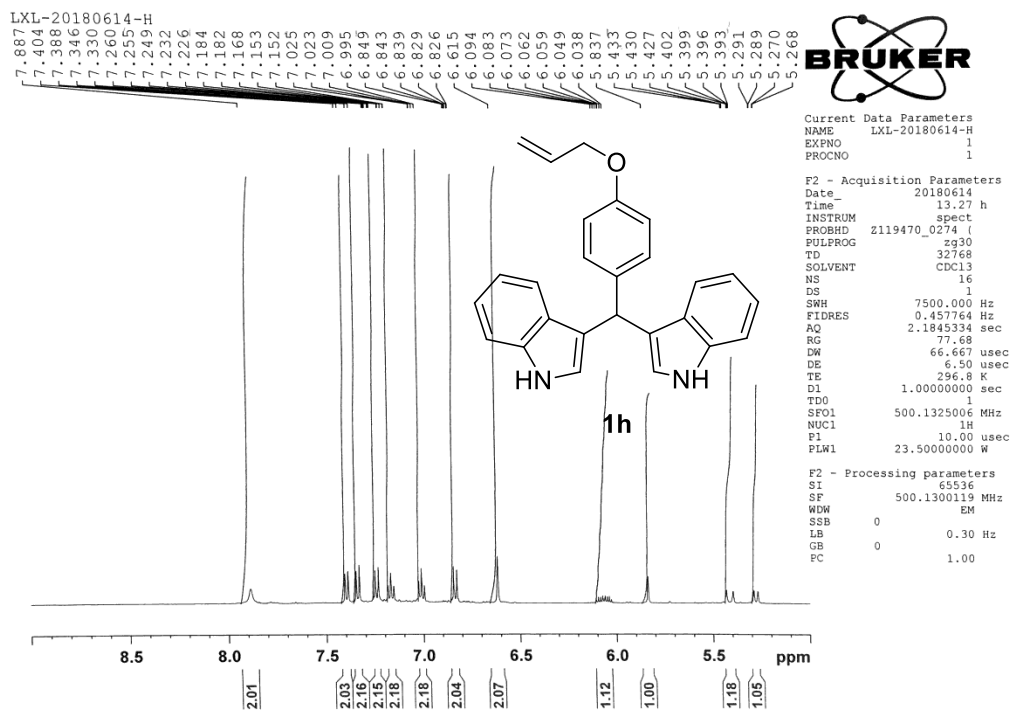
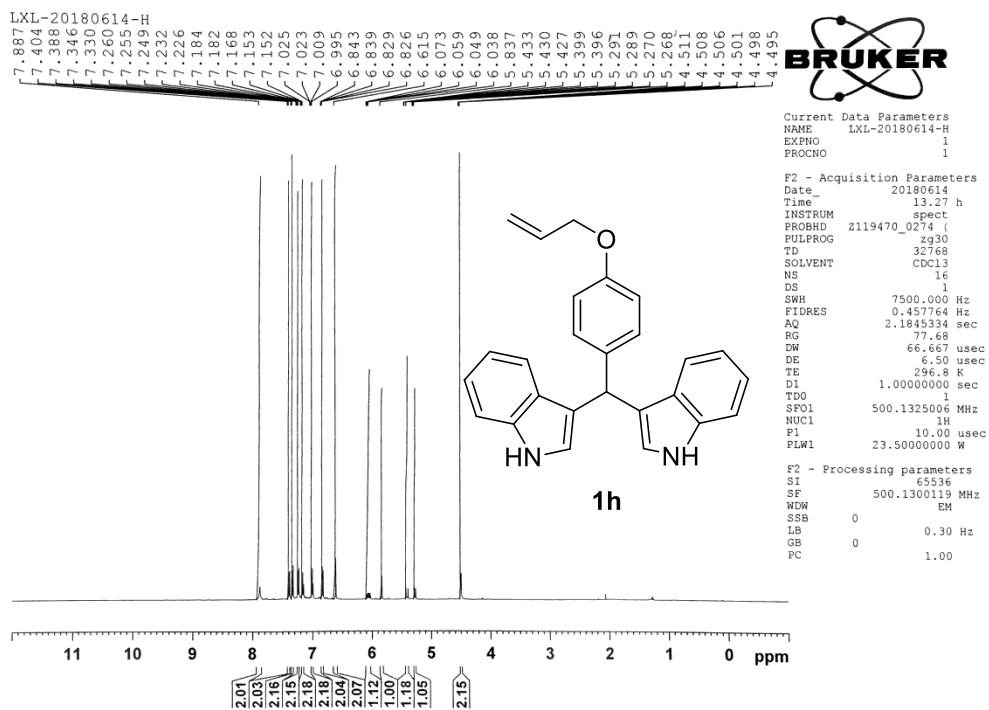
LXL-20180612-4-C



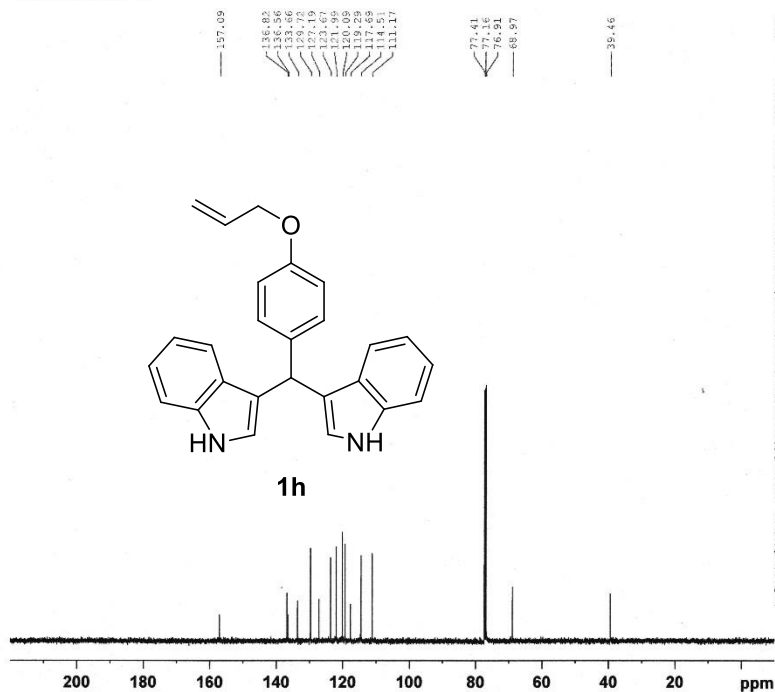
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 NAME LXL-20180612-4-C  
 EXPNO 1  
 PROCNO 1

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 Time 18.09 h  
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 PULPROG zgpg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 46  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.8 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 PCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
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 GB 0  
 PC 1.40



LXL-20180614-C

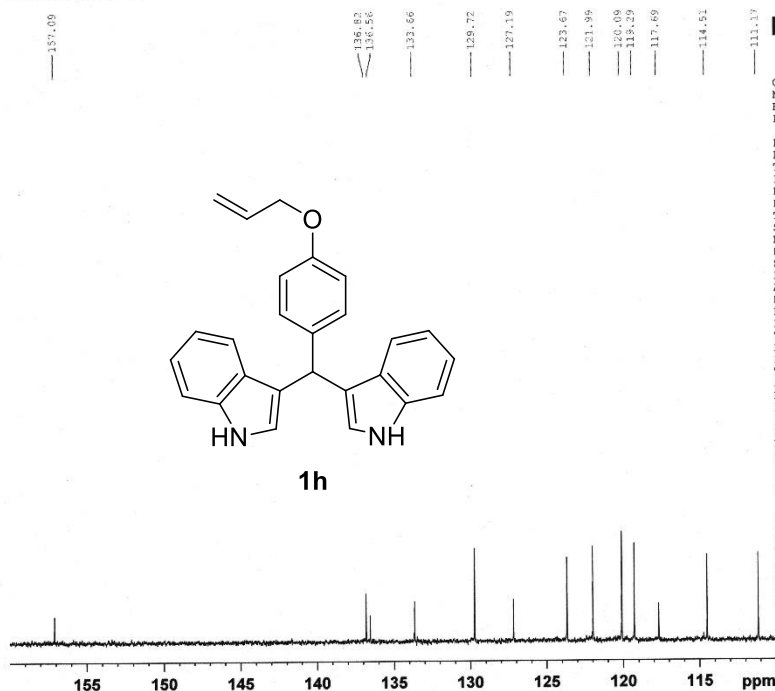


Current Data Parameters  
 NAME LXL-20180614-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20180614  
 Time 13.35 h  
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 PROBHD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 121  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 298.6 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 PCPD2 80.00 usec  
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 PLW12 0.36701301 W

F2 - Processing parameters  
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 PC 1.40

LXL-20180614-C

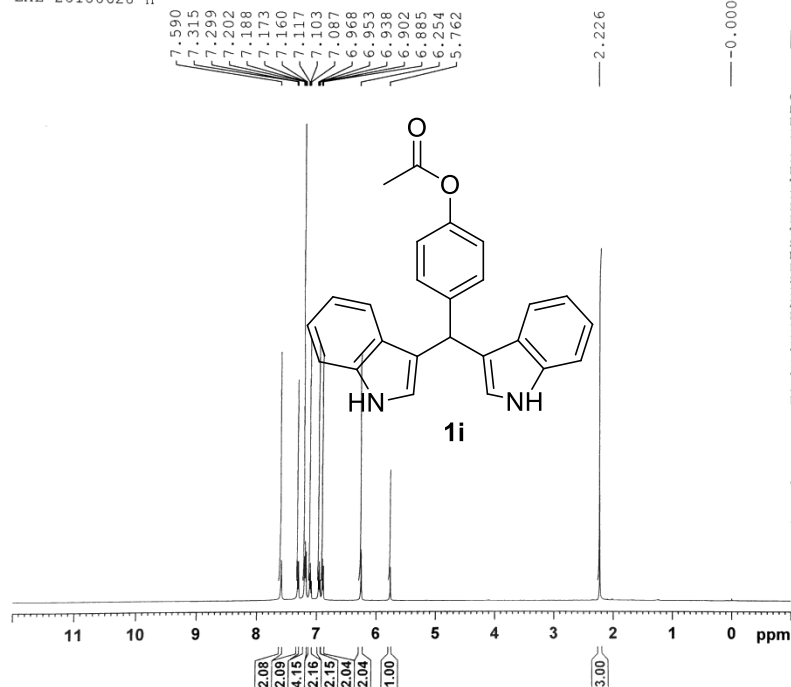


Current Data Parameters  
 NAME LXL-20180614-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
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 Time 13.35 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 121  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
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 DE 6.50 usec  
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 D1 2.00000000 sec  
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 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
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 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
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 PLW12 0.36701301 W

F2 - Processing parameters  
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LXL-20180628-H

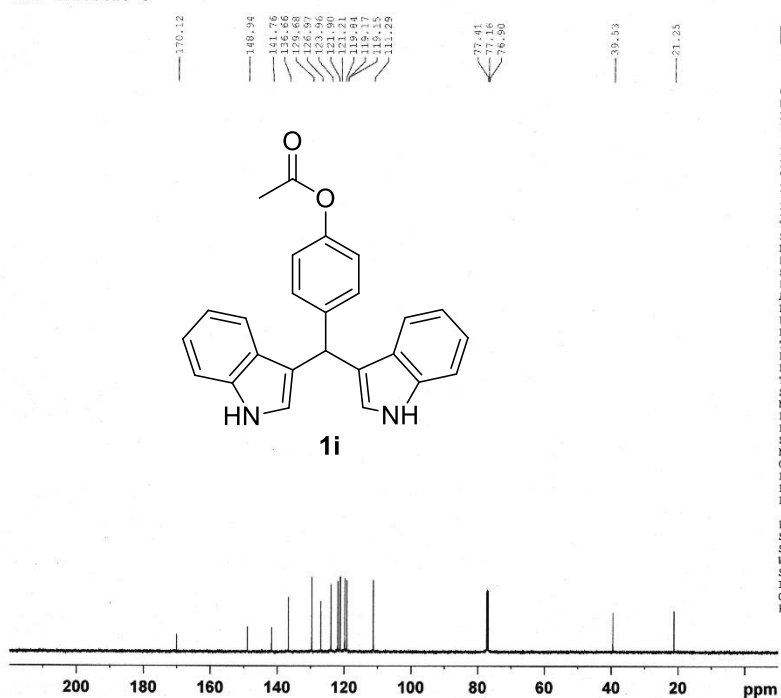


Current Data Parameters  
NAME LXL-20180628-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180628  
Time 12.35 h  
INSTRUM spect  
PROBHD Z119470\_0274  
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 21.1  
DW 66.667 usec  
DE 6.50 usec  
TE 296.7 K  
D1 1.00000000 sec  
TDO 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
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WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

LXL-20180628-C

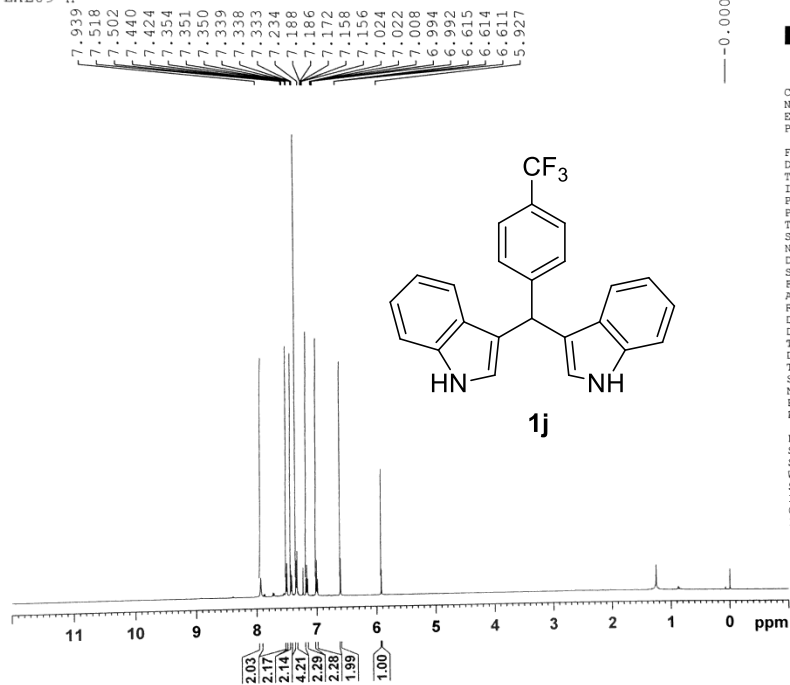


Current Data Parameters  
NAME LXL-20180628-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20180628  
Time 12.40 h  
INSTRUM spect  
PROBHD Z119470\_0274  
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl3  
NS 30  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.9 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
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WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40

LXL09-H

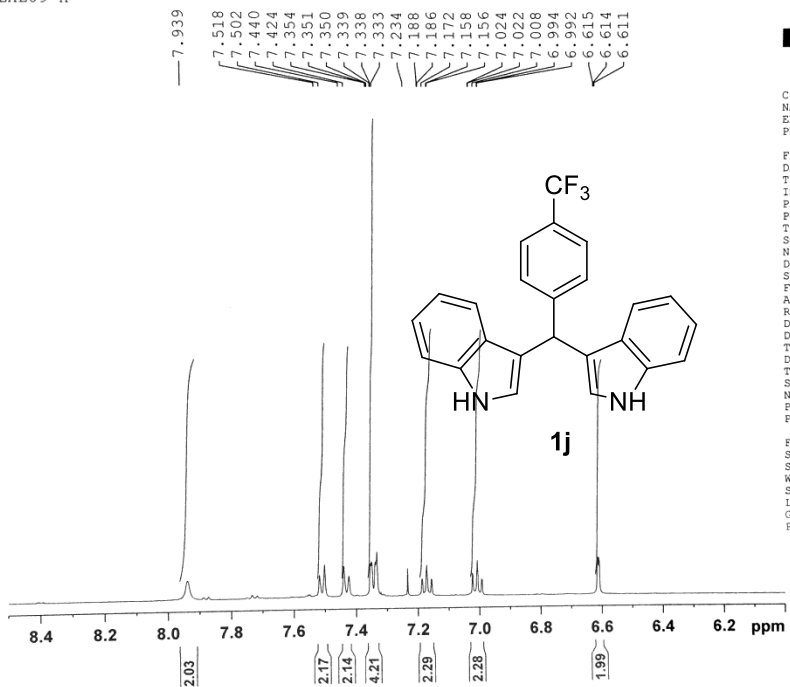


Current Data Parameters  
 NAME LXL09-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171207  
 Time 11.52 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (   
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 86.75  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 297.1 K  
 D1 1.00000000 sec  
 TD0 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
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 SF 500.1300248 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL09-H



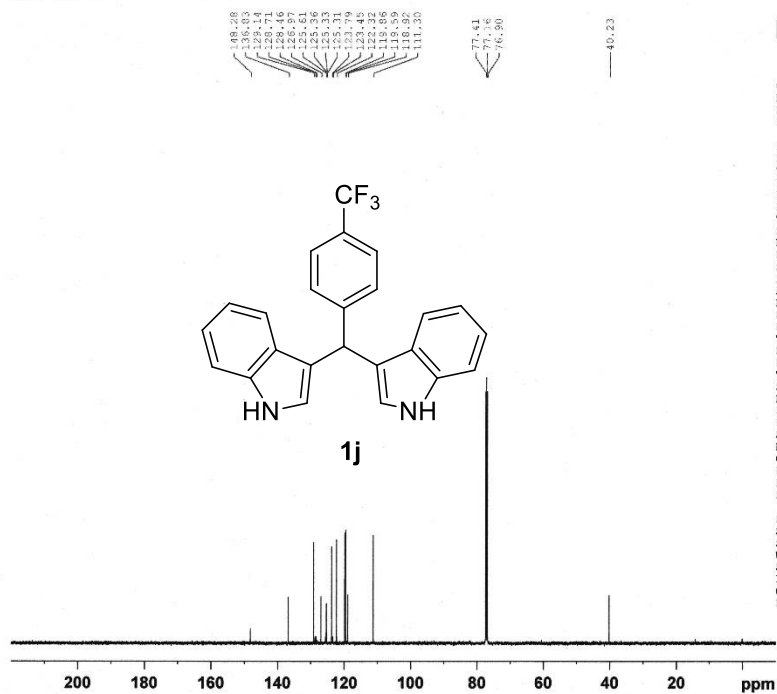
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 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171207  
 Time 11.52 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (   
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 86.75  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 297.1 K  
 D1 1.00000000 sec  
 TD0 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

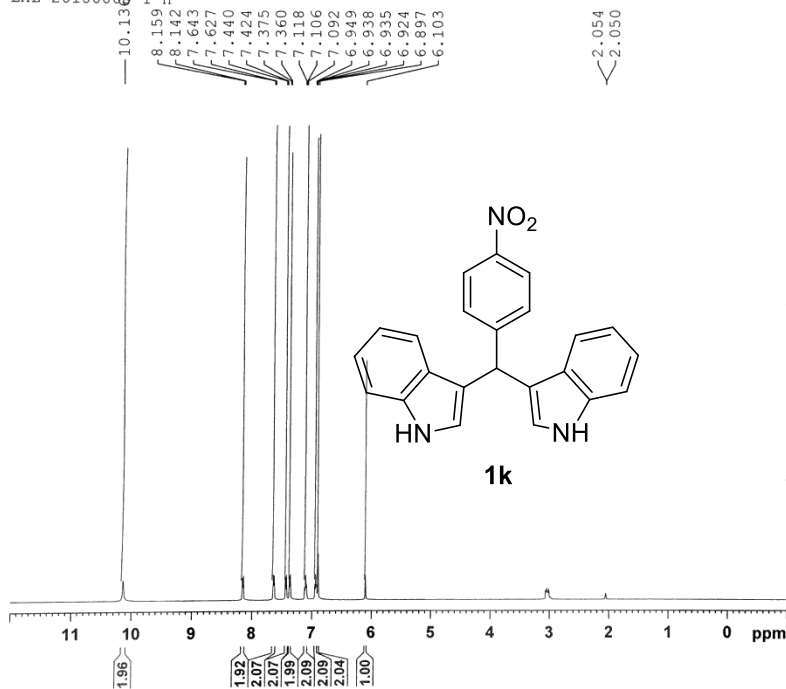
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 WDW EM  
 SSB 0  
 LB 0.30 Hz  
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 PC 1.00



LXL-CF3-C



LXL-20180803-1-H

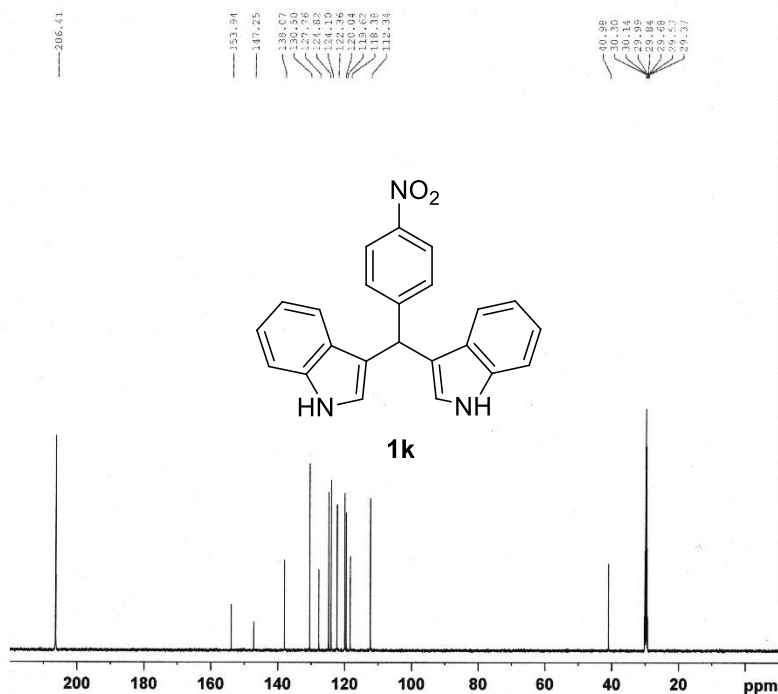


Current Data Parameters  
 NAME LXL-20180803-1-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20180803  
 Time 23.22 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (zg30)  
 PULPROG zg30  
 TD 32768  
 SOLVENT Acetone  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 42.4  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.8 K  
 D1 1.00000000 sec  
 TDO 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300058 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

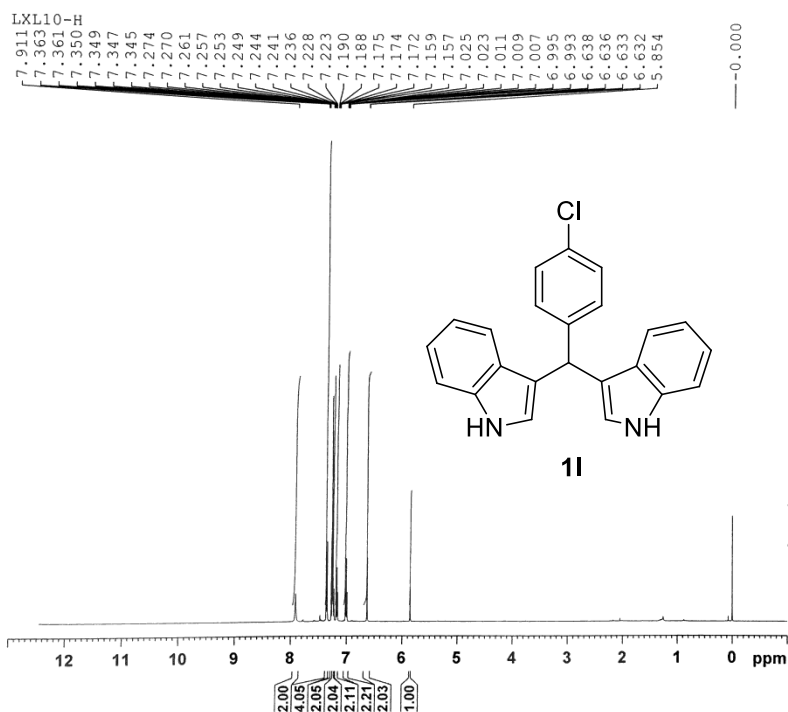
LXL-20180803-1-C



Current Data Parameters  
 NAME LXL-20180803-1-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20180803  
 Time 23.30 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (zgdc30)  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT Acetone  
 NS 136  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 296.7 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 PCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7576829 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

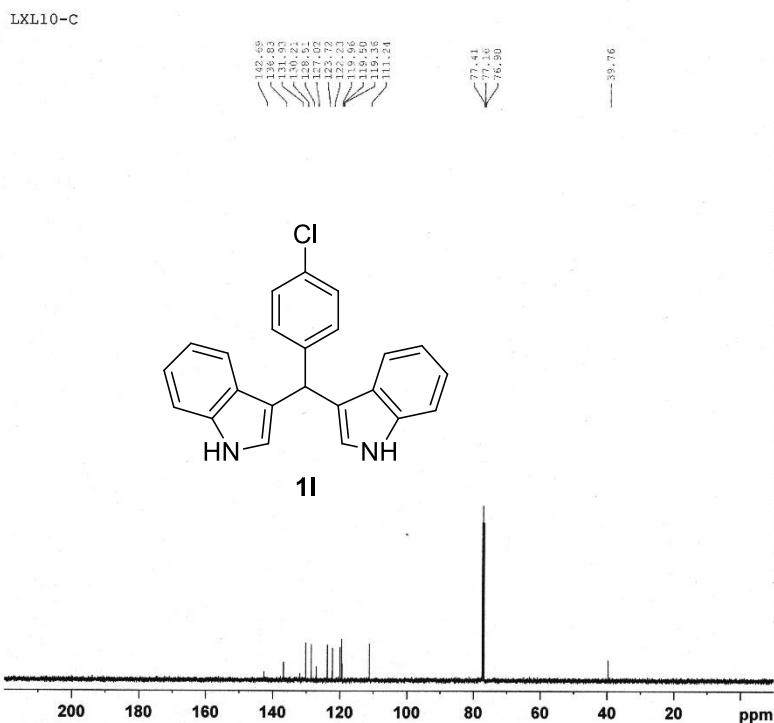


**BRUKER**

Current Data Parameters  
NAME LXL10-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date 20171207  
Time 12.08 h  
INSTRUM spect  
PROBHD Z119470\_0274 (1  
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 131.75  
DW 66.667 usec  
DE 6.50 usec  
TE 297.2 K  
D1 1.00000000 sec  
TDO 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300174 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



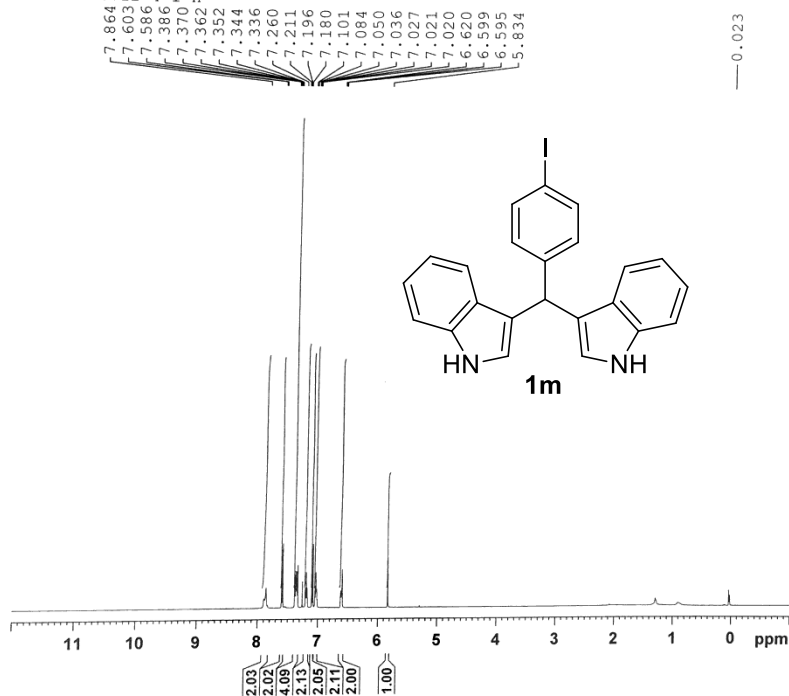
**BRUKER**

Current Data Parameters  
NAME LXL10-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date 20171207  
Time 12.18 h  
INSTRUM spect  
PROBHD Z119470\_0274 (1  
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl3  
NS 67  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.4 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7577728 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40

LXL-20190712-4-I-H



0.023

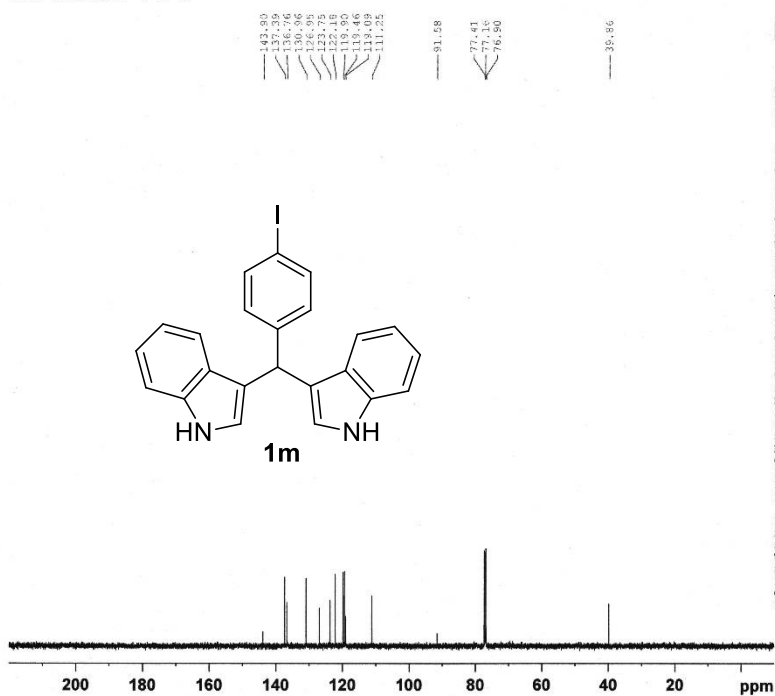


Current Data Parameters  
NAME LXL-20190712-4-I-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20190712  
Time 11:40 h  
INSTRUM spect  
PROBHD Z124032\_0021  
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 117.5  
DW 66.667 usec  
DE 6.50 usec  
TE 296.2 K  
D1 1.00000000 sec  
TDO 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 6.45 usec  
PLW1 14.00000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300121 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

LXL-20190712-4-I-C

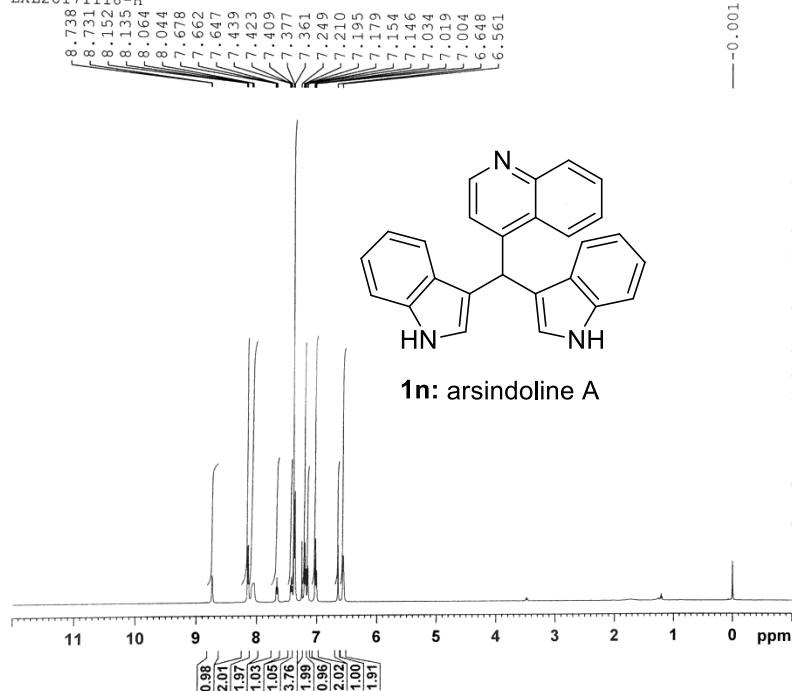


Current Data Parameters  
NAME LXL-20190712-4-I-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20190712  
Time 11:53 h  
INSTRUM spect  
PROBHD Z124032\_0021  
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl3  
NS 115  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 296.2 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TDO 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 14.00 usec  
PLW1 96.75700378 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 14.00000000 W  
PLW12 0.09100500 W

F2 - Processing parameters  
SI 32768  
SF 125.7577800 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40

LXL20171118-H



-0.001

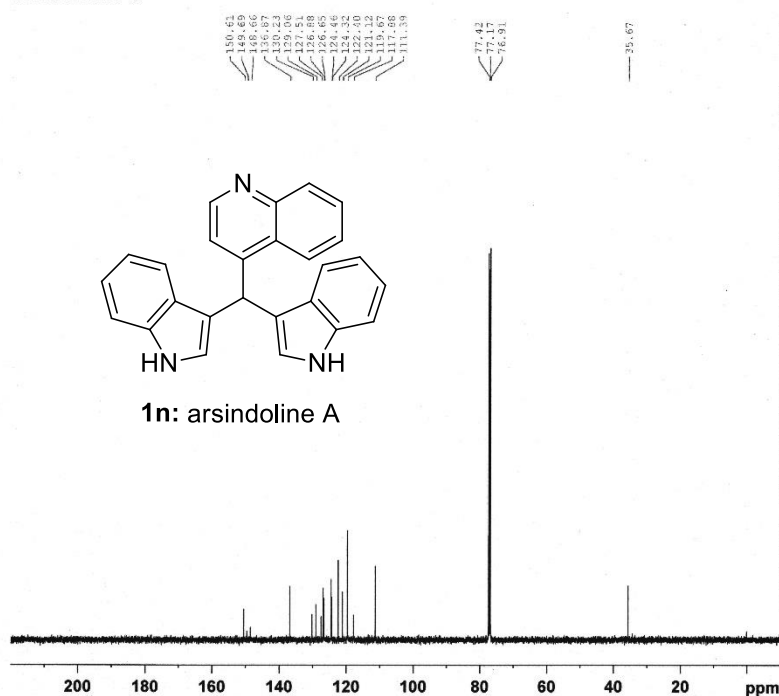


Current Data Parameters  
 NAME LXL20171118-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20171118  
 Time 15.38 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (1H)  
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 108  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.7 K  
 D1 1.00000000 sec  
 TDO 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300173 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL20171118-C



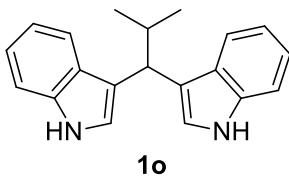
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 NAME LXL20171118-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20171118  
 Time 16.01 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 (1H)  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 318  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.5 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 FCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7577733 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

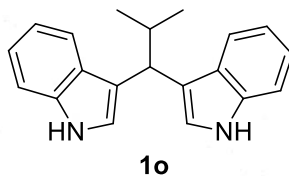
Chemical structure of **1o** is shown above the spectrum.

<sup>1</sup>H NMR spectrum (CDCl<sub>3</sub>) of compound **1o**. The spectrum shows peaks in the aromatic region (6.8–7.6 ppm) and aliphatic region (0.9–4.2 ppm). Integration values are provided below the baseline: 2.01, 1.94, 3.93, 1.96, 1.94, 0.98, 1.01, and 6.00. Chemical shifts (delta) are listed at the top: 7.617, 7.601, 7.483, 7.185, 7.149, 7.123, 7.100, 7.086, 7.070, 7.041, 7.028, 7.013, 6.826, 6.823, 4.191, 4.175, 2.622, 2.609, 2.595, 2.582, 2.566, 2.553, 2.540, 2.526, 0.965, and 0.952. A reference peak for TMS is at 0.000 ppm.



Current Data Parameters	
NAME	LXL-(18)-(5)H
EXPNO	1
PROCNO	1
F2 - Acquisition Parameters	
Date_	20180118
Time	15.58 h
PROBHD	spect
TD	2119470_0274
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	1
DS	16
SWH	7500.000 Hz
FIDRES	0.457764 Hz
AQ	2.1845334 sec
RG	21.1
DW	66.667 usec
DE	6.50 usec
DT	296.8 K
D1	1.0000000 sec
TD0	1
SFO1	500.1325006 MHz
NUC1	1H
PL1	10.00 usec
PLW1	23.5000000 W
F2 - Processing parameters	
SI	65536
CF	500.1300666 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

Chemical structure of compound **1o** is shown above the <sup>13</sup>C NMR spectrum. The structure is 2-(2-isopropyl-1H-indol-3-yl)pyrrole. The <sup>13</sup>C NMR spectrum (CDCl<sub>3</sub>) shows peaks at the following chemical shifts (ppm): 136.25, 127.73, 127.70, 121.77, 121.65, 119.73, 118.63, 118.03, 117.90, 111.16, 77.41, 77.16, 76.81, 41.16, 32.98, and 21.93.



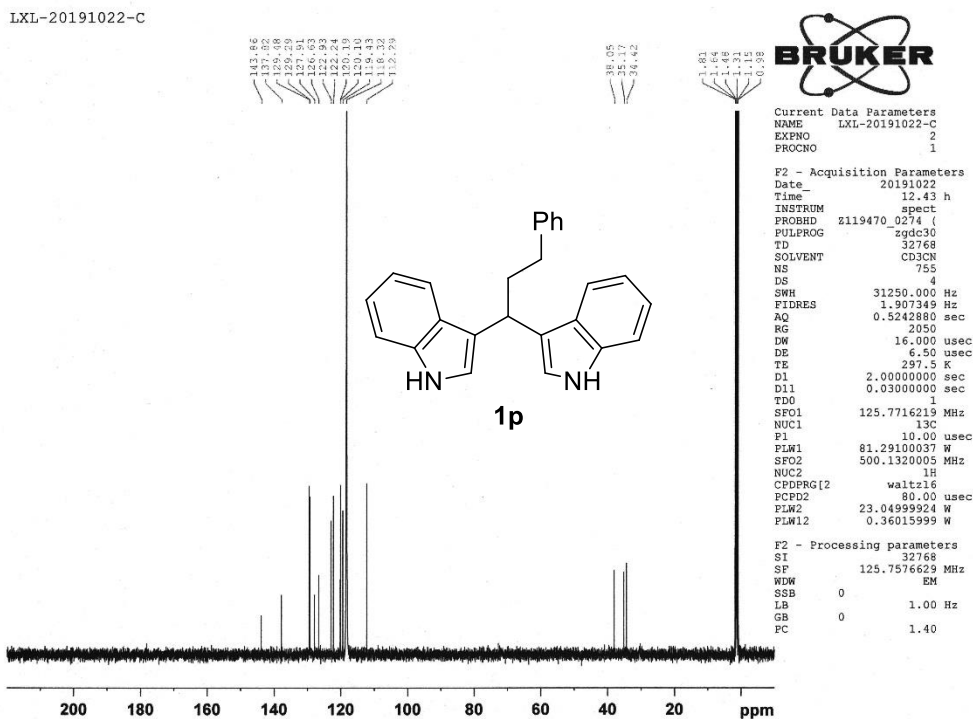
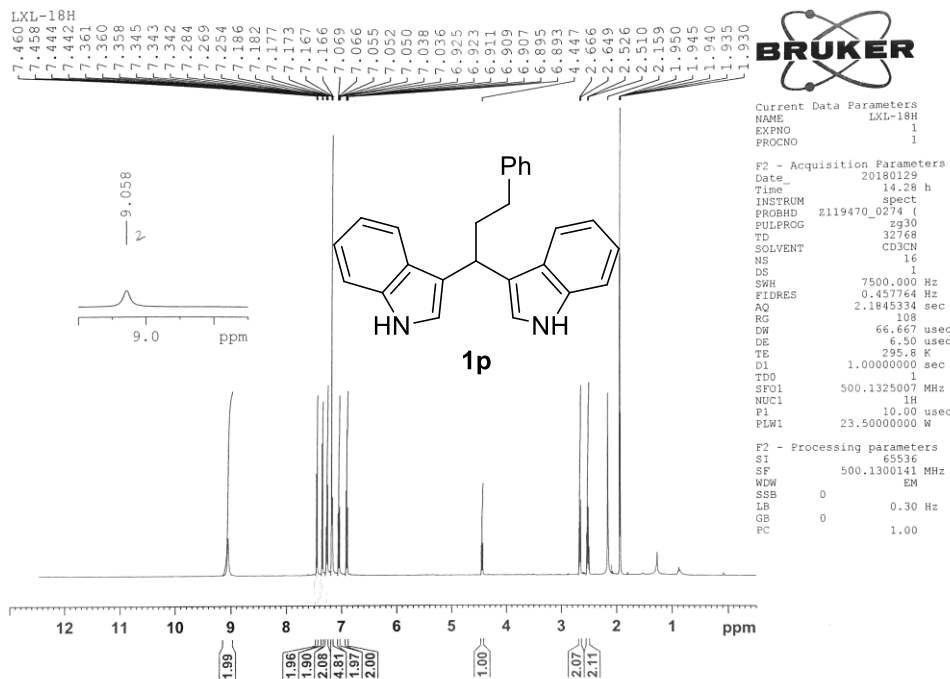
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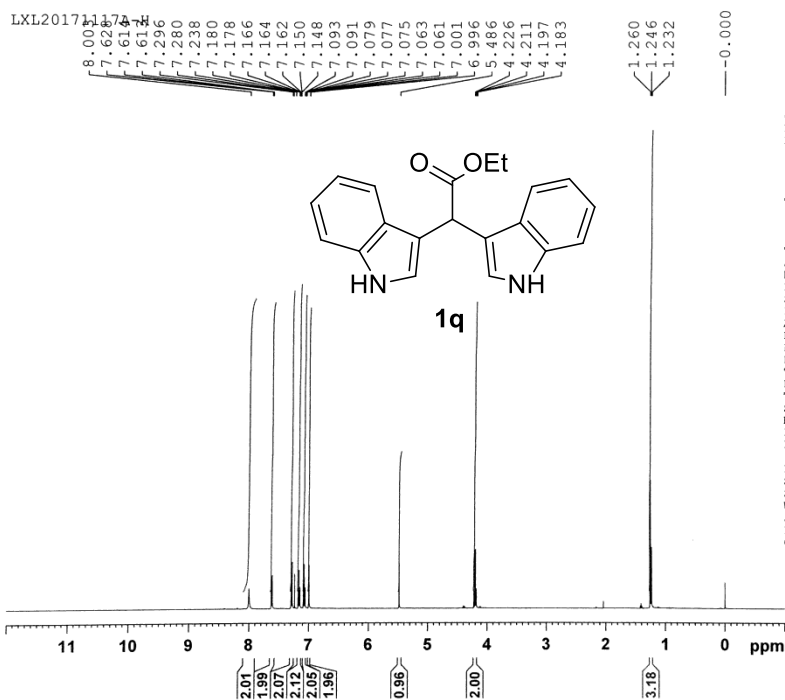
Current Data Parameters
NAME          LXL18-(5)C
EXPNO         1
PROCNO        1

F2 - Acquisition Parameters
Date_         20180118
Time          16.10 h
INSTRUM       spect
PROBHD        ZN19470 0274
PULPROG       zgdc30
TD            32768
SOLVENT       CDCl3
NS            25
DS            4
SWH           31250.00 MHz
FIDRES        1.907349 Hz
AQ            0.5242880 sec
RG            2050
DW            16.000 usec
DE            6.50 usec
TE            297.3 K
D1            2.00000000 sec
D11           0.03000000 sec
TDO           1
F0            125.7716219 MHz
NUC1          13C
P1            10.00 usec
PL1           81.29100037 Hz
FLW1          50.13200005 MHz
NUC2          1H
PCPDPRG2     waltz12
CPD2          80.00 usec
FLW2          23.04049924 W
FLM12        0.36701301 W

F2 - Processing parameters
SI            32768
SF            125.777891 MHz
WDW           EM
SSB           0
GB            0
PC            1.40

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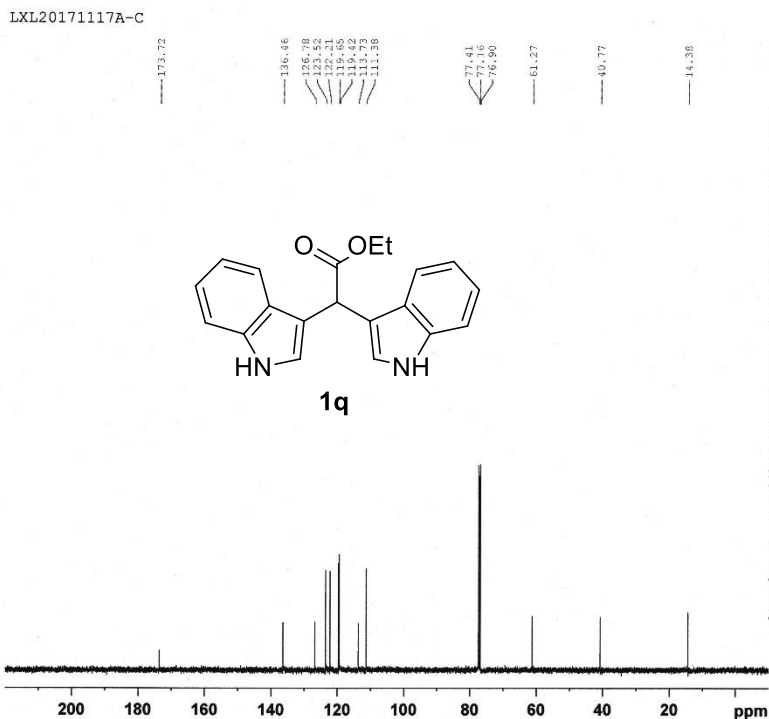


**BRUKER**

Current Data Parameters  
NAME LXL20171117A-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171117  
Time 17.03 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 86.75  
DW 66.667 usec  
DE 6.50 usec  
TE 296.6 K  
D1 1.00000000 sec  
TD0 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300229 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



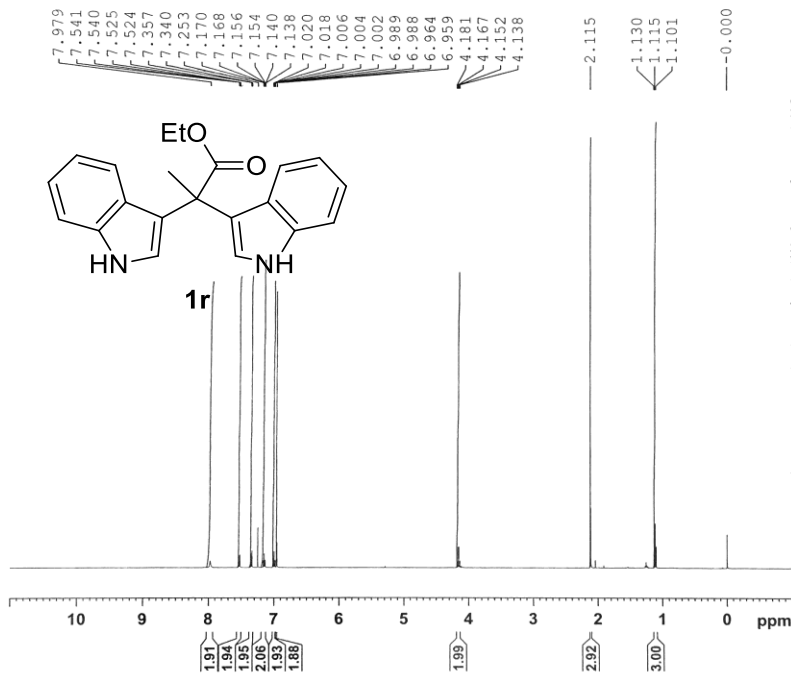
**BRUKER**

Current Data Parameters  
NAME LXL20171117A-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171117  
Time 17.14 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl3  
NS 75  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.1 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7577759 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



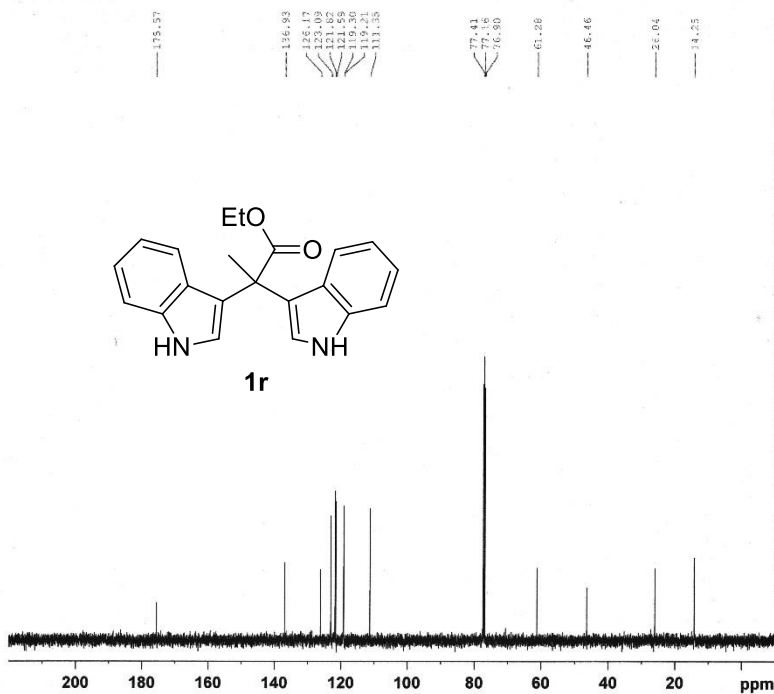


Current Data Parameters  
NAME LXL15-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171221  
Time 15.36 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zg30  
TD 32768  
SOLVENT CDCl3  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 86.75  
DW 66.667 usec  
DE 6.50 usec  
TE 297.4 K  
D1 1.0000000 sec  
TD0 1  
SFO1 500.1325007 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.5000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300154 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

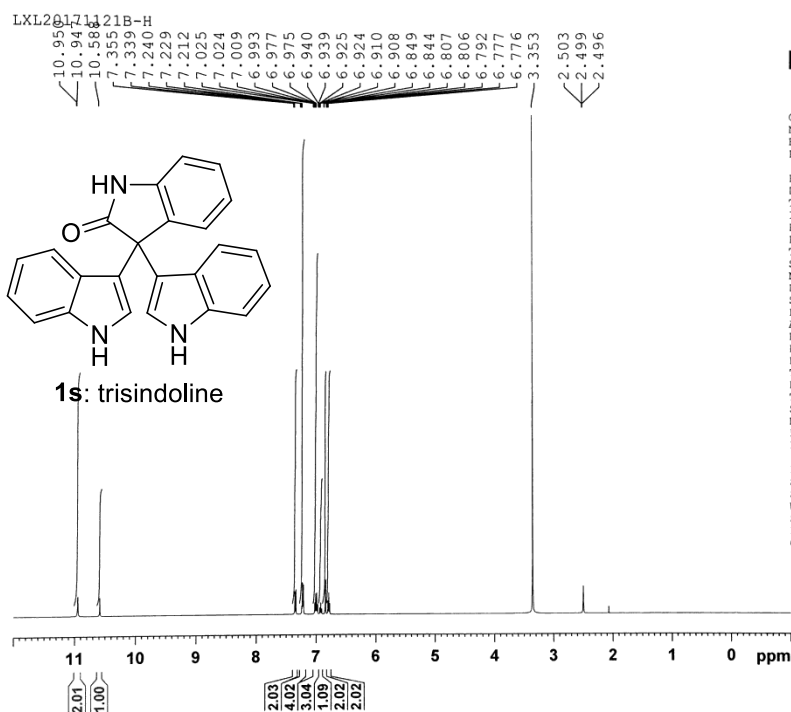
LXL-FC-01-C



Current Data Parameters  
NAME LXL-FC-01-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20190410  
Time 22.13 h  
INSTRUM spect  
PROBHD Z124032\_0021 (   
PULPROG zgdc30  
TD 32768  
SOLVENT CDCl3  
NS 55  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 299.4 K  
D1 2.0000000 sec  
D11 0.0300000 sec  
TD0 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 14.00 usec  
PLW1 96.75700378 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 14.00000000 W  
PLW12 0.09100500 W

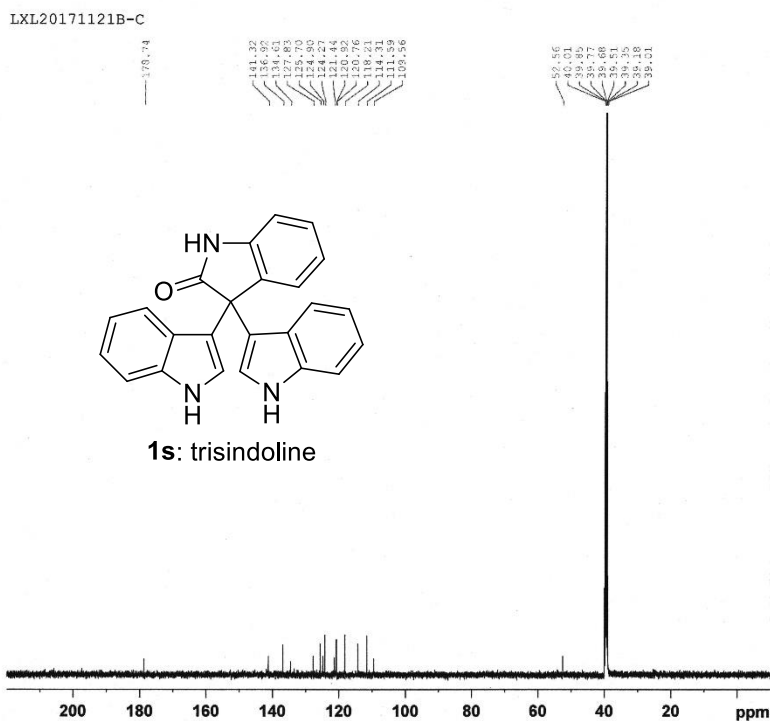
F2 - Processing parameters  
SI 32768  
SF 125.7577758 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



Current Data Parameters  
NAME LXL20171121B-H  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171121  
Time 18.17 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zg30  
TD 32768  
SOLVENT DMSO  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 108  
DW 66.667 usec  
DE 6.50 usec  
TE 296.8 K  
D1 1.00000000 sec  
TD0 1  
SFO1 500.1325005 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

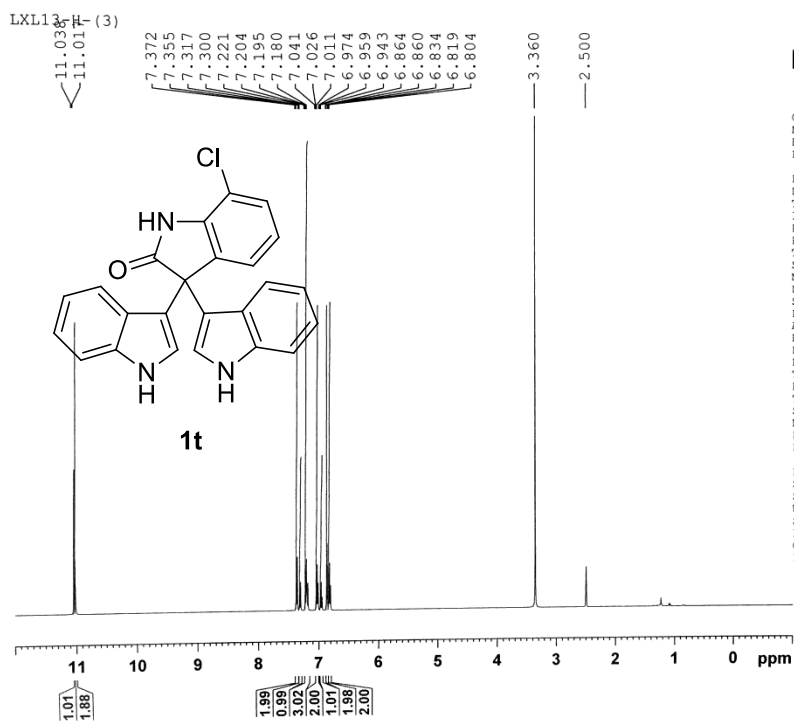
F2 - Processing parameters  
SI 65536  
SF 500.1300021 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00



Current Data Parameters  
NAME LXL20171121B-C  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date\_ 20171121  
Time 18.31 h  
INSTRUM spect  
PROBHD Z119470\_0274 (   
PULPROG zgdc30  
TD 32768  
SOLVENT DMSO  
NS 146  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 297.9 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 30.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

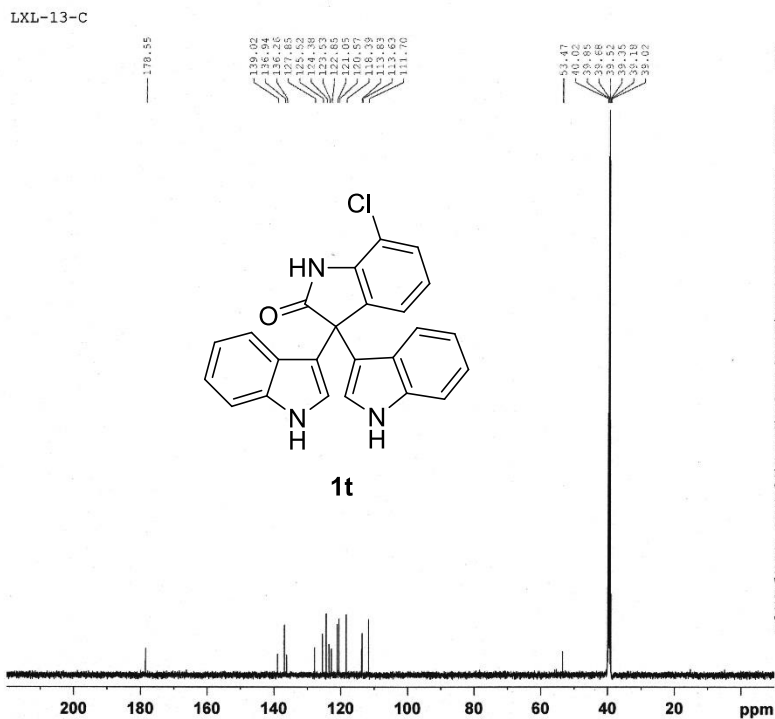
F2 - Processing parameters  
SI 32768  
SF 125.7578471 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



Current Data Parameters  
 NAME LXL13-H (3)  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171222  
 Time 13.39 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zg30  
 TD 32768  
 SOLVENT DMSO  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 86.75  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.6 K  
 DI 1.00000000 sec  
 TDO 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

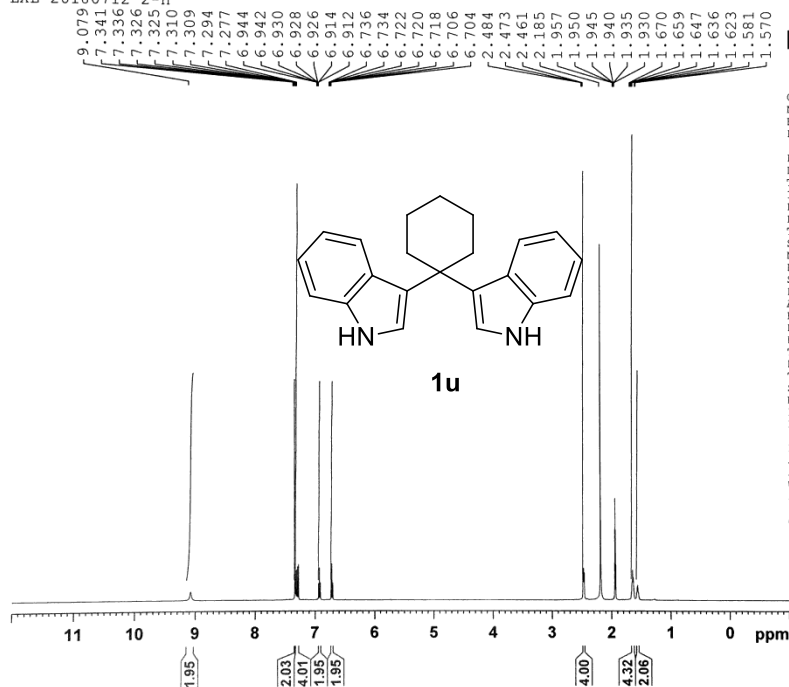
F2 - Processing parameters  
 SI 65536  
 SF 500.1300019 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



Current Data Parameters  
 NAME LXL-13-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20180712  
 Time 11.49 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 83  
 DS 4  
 SWH 31250.000 Hz

LXL-20180712-2-H

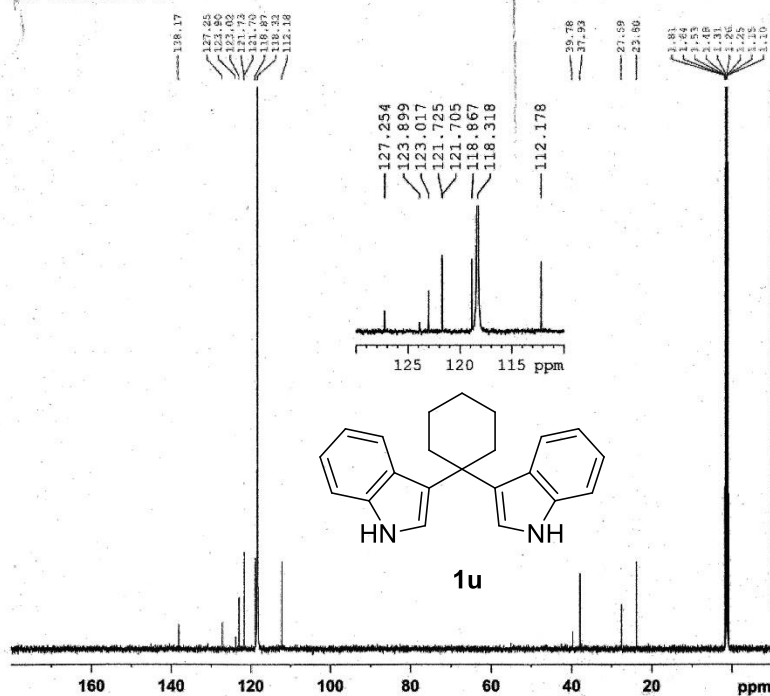


Current Data Parameters  
 NAME LXL-20180712-2-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date 20180712  
 Time 11.56 h  
 INSTRUM spect  
 PROBHD Z119470\_0274  
 PULPROG zg30  
 TD 32768  
 SOLVENT CD3CN  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 86.75  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 297.2 K  
 D1 1.00000000 sec  
 TD0 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300140 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL-20180712-2-C



Current Data Parameters  
 NAME LXL-20180712-2-C  
 EXPNO 1  
 PROCNO 1

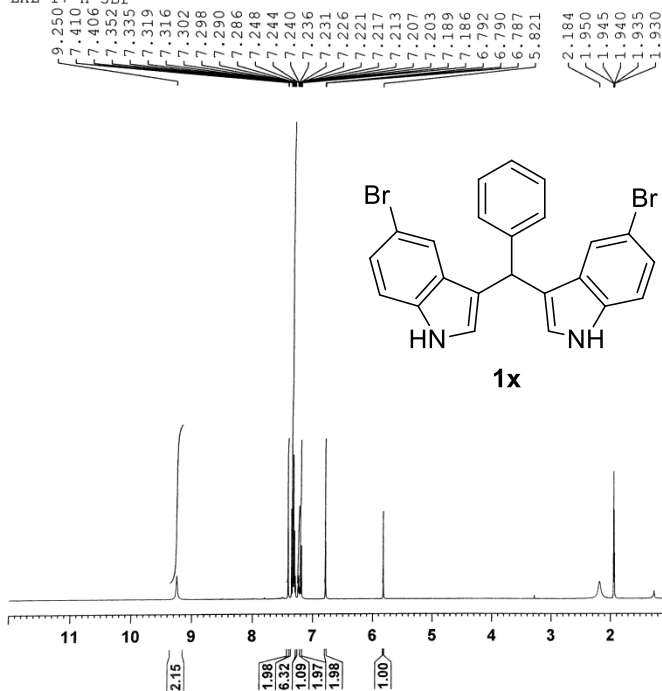
F2 - Acquisition Parameters  
 Date 20180712  
 Time 12.08 h  
 INSTRUM spect  
 PROBHD Z119470\_0274  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CD3CN  
 NS 245  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 299.1 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 PCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7576629 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40





LXL-17-H 5Br

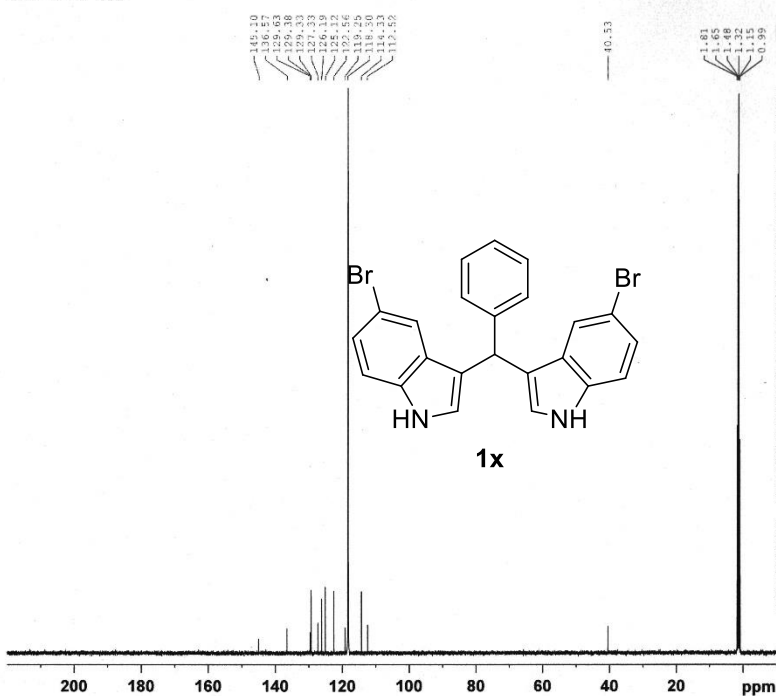


Current Data Parameters  
NAME LXL-17-H 5Br  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date 20180107  
Time 17.24 h  
INSTRUM spect  
PROBHD Z119470\_0274 (zg30)  
PULPROG zg30  
TD 32768  
SOLVENT CD3CN  
NS 16  
DS 1  
SWH 7500.000 Hz  
FIDRES 0.457764 Hz  
AQ 2.1845334 sec  
RG 86.75  
DW 66.667 usec  
DE 6.50 usec  
TE 297.4 K  
D1 1.00000000 sec  
TD0 1  
SFO1 500.1325006 MHz  
NUC1 1H  
P1 10.00 usec  
PLW1 23.50000000 W

F2 - Processing parameters  
SI 65536  
SF 500.1300140 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
PC 1.00

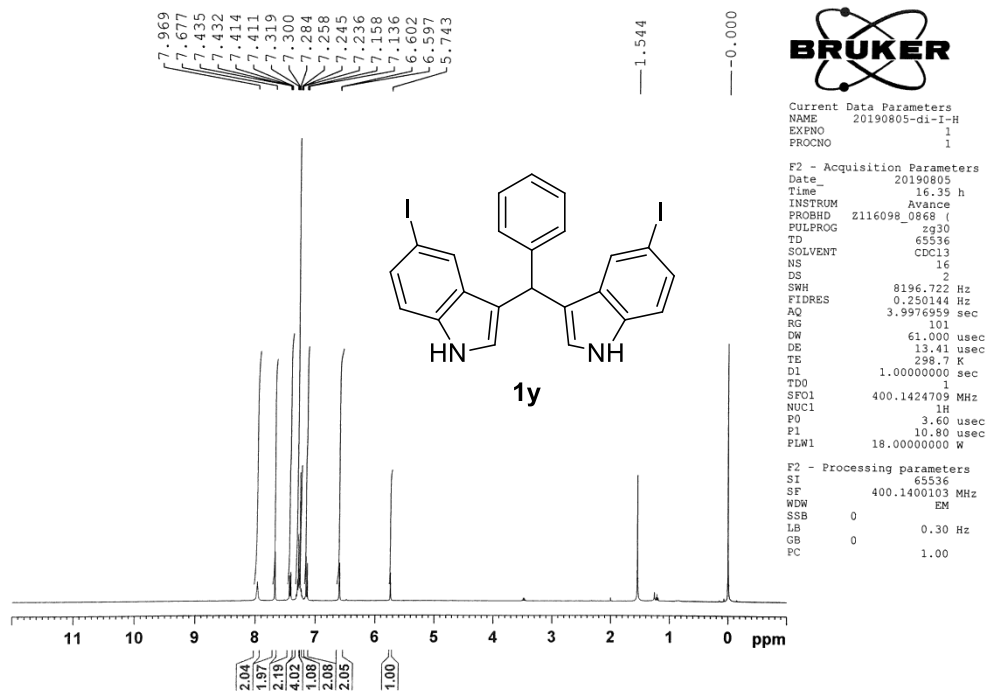
LXL-17-C 5Br



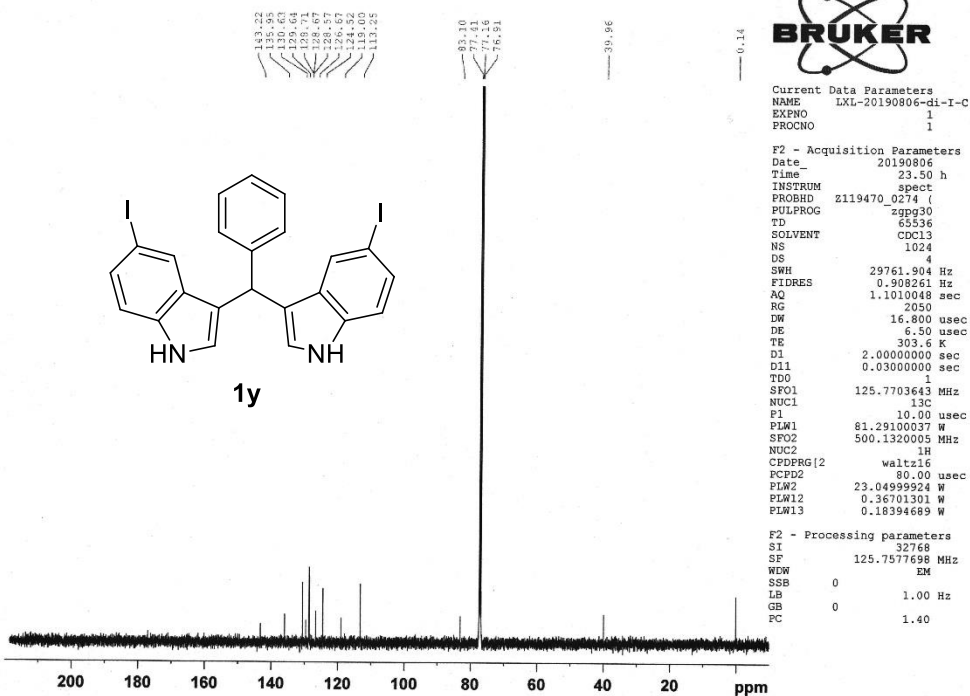
Current Data Parameters  
NAME LXL-17-C 5Br  
EXPNO 1  
PROCNO 1

F2 - Acquisition Parameters  
Date 20180107  
Time 17.38 h  
INSTRUM spect  
PROBHD Z119470\_0274 (zgdc30)  
PULPROG zgdc30  
TD 32768  
SOLVENT CD3CN  
NS 118  
DS 4  
SWH 31250.000 Hz  
FIDRES 1.907349 Hz  
AQ 0.5242880 sec  
RG 2050  
DW 16.000 usec  
DE 6.50 usec  
TE 298.3 K  
D1 2.00000000 sec  
D11 0.03000000 sec  
TD0 1  
SFO1 125.7716219 MHz  
NUC1 13C  
P1 10.00 usec  
PLW1 81.29100037 W  
SFO2 500.1320005 MHz  
NUC2 1H  
CPDPRG2 waltz16  
PCPD2 80.00 usec  
PLW2 23.04999924 W  
PLW12 0.36701301 W

F2 - Processing parameters  
SI 32768  
SF 125.7576638 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
PC 1.40



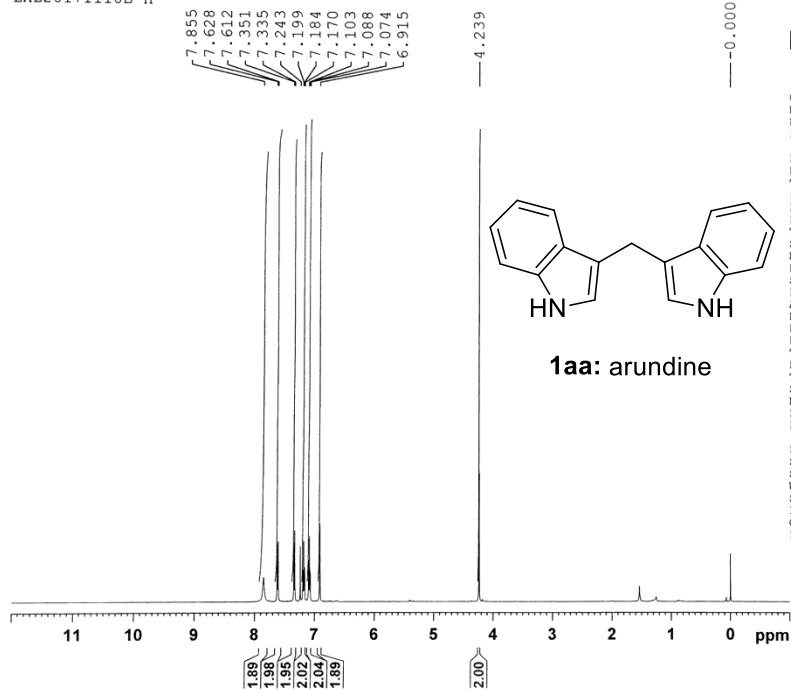
LXL-20190806-di-I-C







LXL20171110B-H

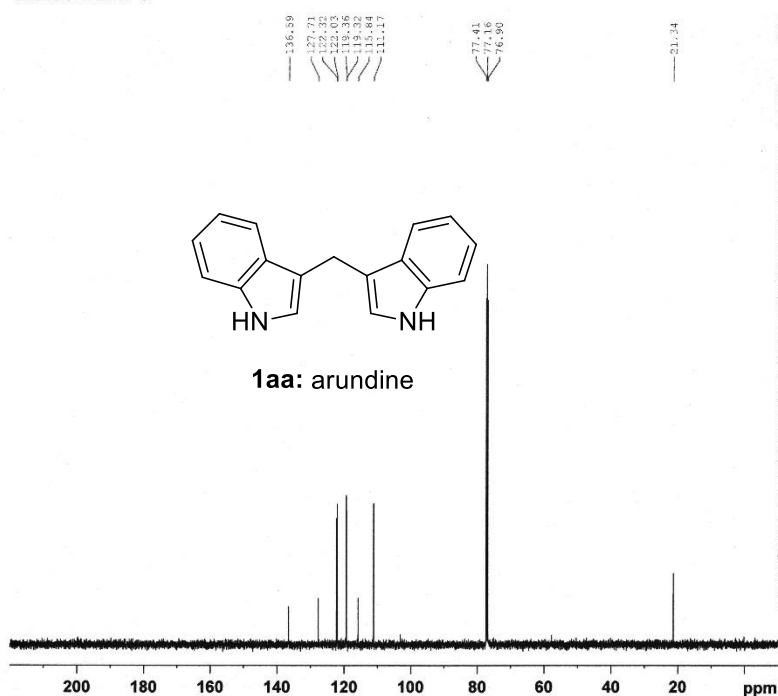


Current Data Parameters  
 NAME LXL20171110B-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171110  
 Time 15.50 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 94.85  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.7 K  
 D1 1.00000000 sec  
 TDO 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300205 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL20171110B-C

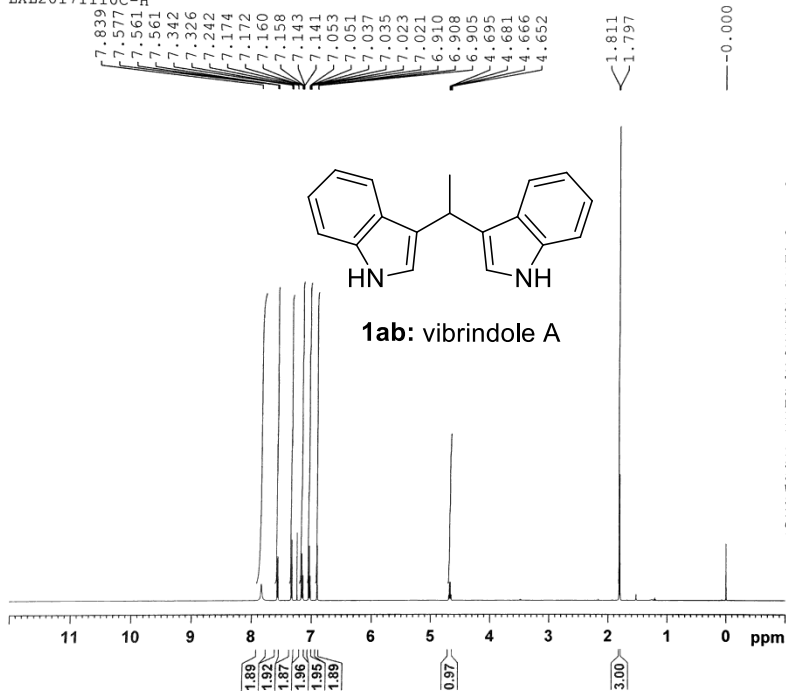


Current Data Parameters  
 NAME LXL20171110B-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171110  
 Time 16.05 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 121  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.3 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TDO 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG12 waltz16  
 PCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7577737 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

LXL20171110C-H

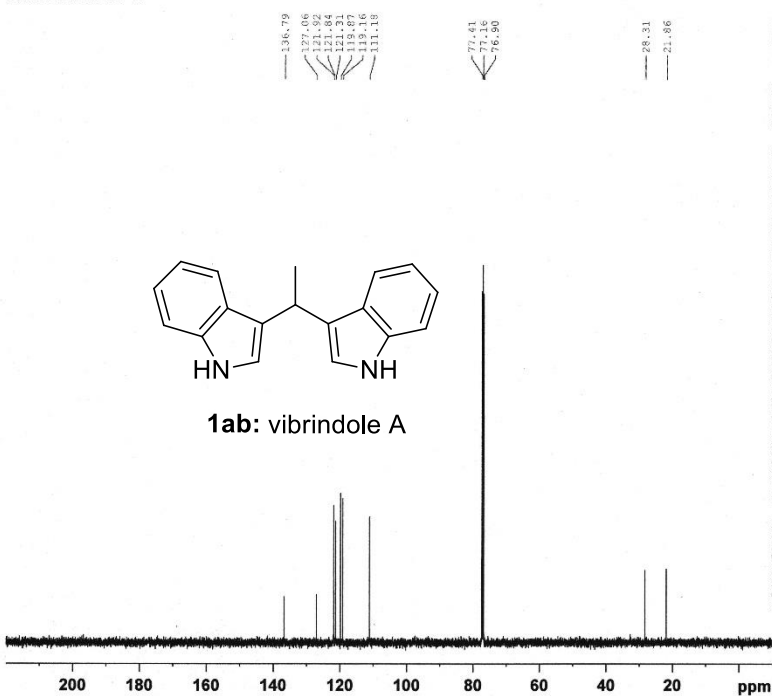


Current Data Parameters  
 NAME LXL20171110C-H  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171110  
 Time 16.16 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zg30  
 TD 32768  
 SOLVENT CDCl3  
 NS 16  
 DS 1  
 SWH 7500.000 Hz  
 FIDRES 0.457764 Hz  
 AQ 2.1845334 sec  
 RG 94.85  
 DW 66.667 usec  
 DE 6.50 usec  
 TE 296.8 K  
 D1 1.00000000 sec  
 TD0 1  
 SFO1 500.1325006 MHz  
 NUC1 1H  
 P1 10.00 usec  
 PLW1 23.50000000 W

F2 - Processing parameters  
 SI 65536  
 SF 500.1300208 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00

LXL20171110C-C



Current Data Parameters  
 NAME LXL20171110C-C  
 EXPNO 1  
 PROCNO 1

F2 - Acquisition Parameters  
 Date\_ 20171110  
 Time 16.30 h  
 INSTRUM spect  
 PROBHD Z119470\_0274 ( )  
 PULPROG zgdc30  
 TD 32768  
 SOLVENT CDCl3  
 NS 88  
 DS 4  
 SWH 31250.000 Hz  
 FIDRES 1.907349 Hz  
 AQ 0.5242880 sec  
 RG 2050  
 DW 16.000 usec  
 DE 6.50 usec  
 TE 297.0 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1  
 SFO1 125.7716219 MHz  
 NUC1 13C  
 P1 10.00 usec  
 PLW1 81.29100037 W  
 SFO2 500.1320005 MHz  
 NUC2 1H  
 CPDPRG2 waltz16  
 PCPD2 80.00 usec  
 PLW2 23.04999924 W  
 PLW12 0.36701301 W

F2 - Processing parameters  
 SI 32768  
 SF 125.7577736 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40