

## Supplementary material

### Figure captions

**Figure S1.**  $^1\text{H}$  NMR spectrum of compound **14a**.

**Figure S2.**  $^1\text{H}$  NMR spectrum of compound **15a**.

**Figure S3.**  $^1\text{H}$  NMR spectrum of compound **16a**.

**Figure S4.**  $^1\text{H}$  NMR spectrum of compound **17a**.

**Figure S5.**  $^1\text{H}$  NMR spectrum of compound **14b**.

**Figure S6.**  $^1\text{H}$  NMR spectrum of compound **15b**.

**Figure S7.**  $^1\text{H}$  NMR spectrum of compound **16b**.

**Figure S8.**  $^1\text{H}$  NMR spectrum of compound **17b**.

**Figure S9.**  $^1\text{H}$  NMR spectrum of compound **18a**.

**Figure S10.**  $^1\text{H}$  NMR spectrum of compound **19a**.

**Figure S11.**  $^1\text{H}$  NMR spectrum of compound **20a**.

**Figure S12.**  $^1\text{H}$  NMR spectrum of compound **21a**.

**Figure S13.**  $^1\text{H}$  NMR spectrum of compound **18b**.

**Figure S14.**  $^1\text{H}$  NMR spectrum of compound **19b**.

**Figure S15.**  $^1\text{H}$  NMR spectrum of compound **20b**.

**Figure S16.**  $^1\text{H}$  NMR spectrum of compound **21b**.

**Figure S17.**  $^1\text{H}$  NMR spectrum of compound **1a**.

**Figure S18.**  $^{13}\text{C}$  NMR spectrum of compound **1a**.

**Figure S19.**  $^1\text{H}$  NMR spectrum of compound **2a**.

**Figure S20.**  $^{13}\text{C}$  NMR spectrum of compound **2a**.

**Figure S21.**  $^1\text{H}$  NMR spectrum of compound **3a**.

**Figure S22.**  $^{13}\text{C}$  NMR spectrum of compound **3a**.

**Figure S23.**  $^1\text{H}$  NMR spectrum of compound **4a**.

**Figure S24.**  $^{13}\text{C}$  NMR spectrum of compound **4a**.

**Figure S25.**  $^1\text{H}$  NMR spectrum of compound **1b**.

**Figure S26.**  $^{13}\text{C}$  NMR spectrum of compound **1b**.

**Figure S27.**  $^1\text{H}$  NMR spectrum of compound **2b**.

**Figure S28.**  $^{13}\text{C}$  NMR spectrum of compound **2b**.

**Figure S29.**  $^1\text{H}$  NMR spectrum of compound **3b**.

**Figure S30.**  $^{13}\text{C}$  NMR spectrum of compound **3b**.

**Figure S31.**  $^1\text{H}$  NMR spectrum of compound **4b**.

**Figure S32.**  $^{13}\text{C}$  NMR spectrum of compound **4b**.

**Figure S33.**  $^1\text{H}$  NMR spectrum of compound **5a**.

**Figure S34.**  $^{13}\text{C}$  NMR spectrum of compound **5a**.

**Figure S35.**  $^1\text{H}$  NMR spectrum of compound **6a**.

**Figure S36.**  $^{13}\text{C}$  NMR spectrum of compound **6a**.

**Figure S37.**  $^1\text{H}$  NMR spectrum of compound **7a**.

**Figure S38.**  $^{13}\text{C}$  NMR spectrum of compound **7a**.

**Figure S39.**  $^1\text{H}$  NMR spectrum of compound **8a**.

**Figure S40.**  $^{13}\text{C}$  NMR spectrum of compound **8a**.

**Figure S41.**  $^1\text{H}$  NMR spectrum of compound **5b**.

**Figure S42.**  $^{13}\text{C}$  NMR spectrum of compound **5b**.

**Figure S43.**  $^1\text{H}$  NMR spectrum of compound **6b**.

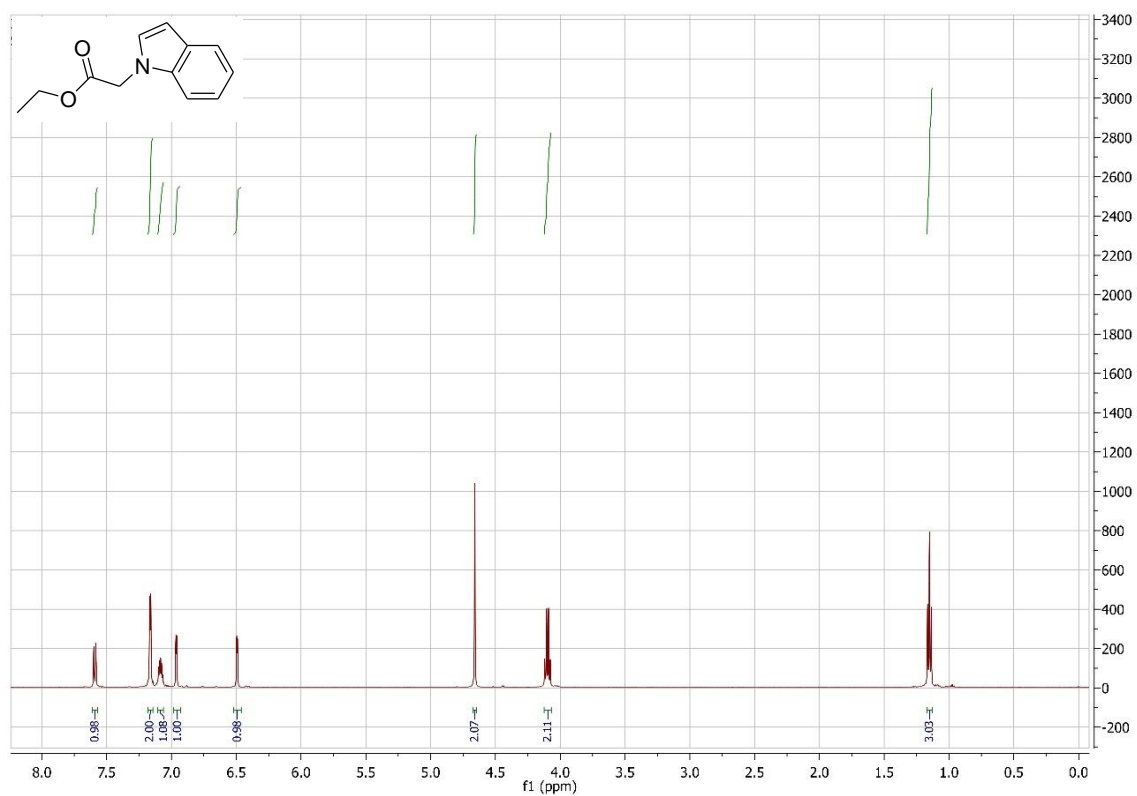
**Figure S44.**  $^{13}\text{C}$  NMR spectrum of compound **6b**.

**Figure S45.**  $^1\text{H}$  NMR spectrum of compound **7b**.

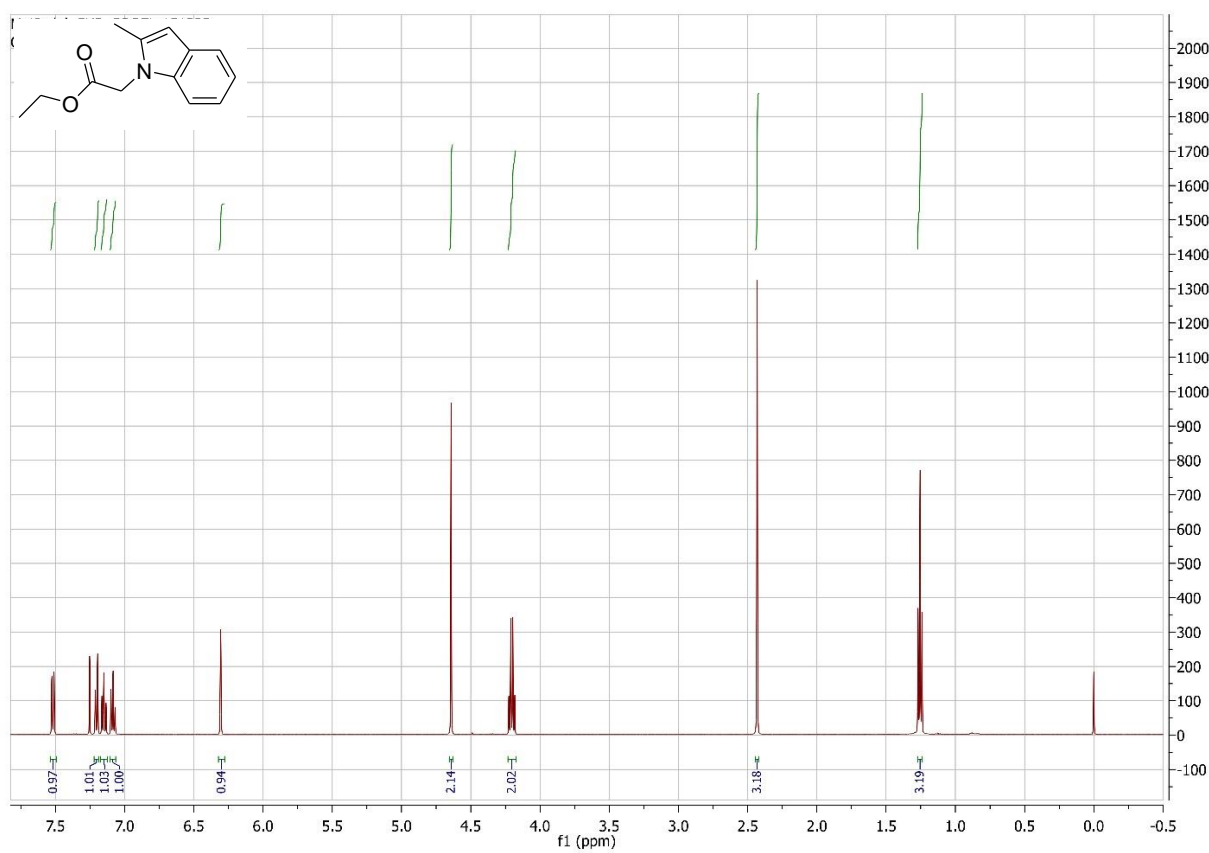
**Figure S46.**  $^{13}\text{C}$  NMR spectrum of compound **7b**.

**Figure S47.**  $^1\text{H}$  NMR spectrum of compound **8b**.

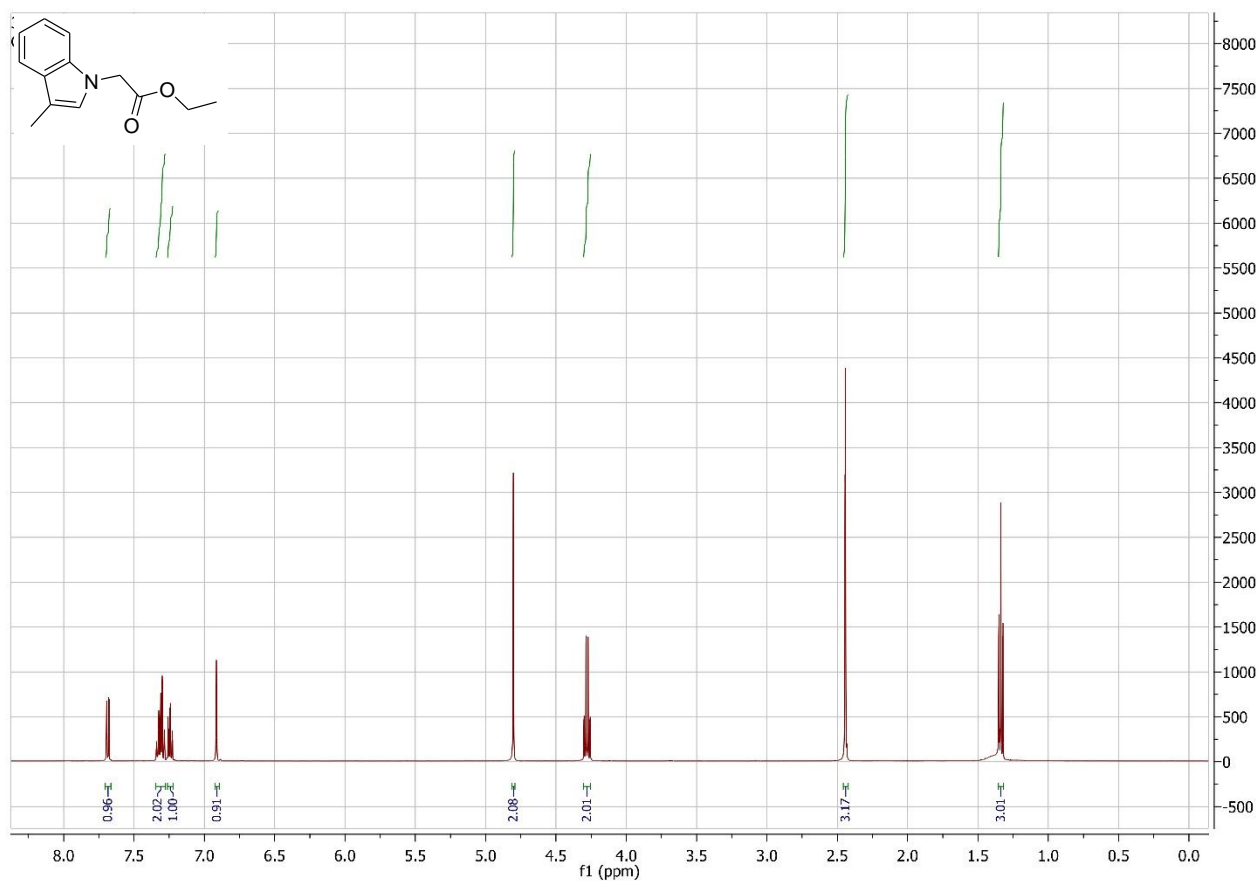
**Figure S48.**  $^{13}\text{C}$  NMR spectrum of compound **8b**.



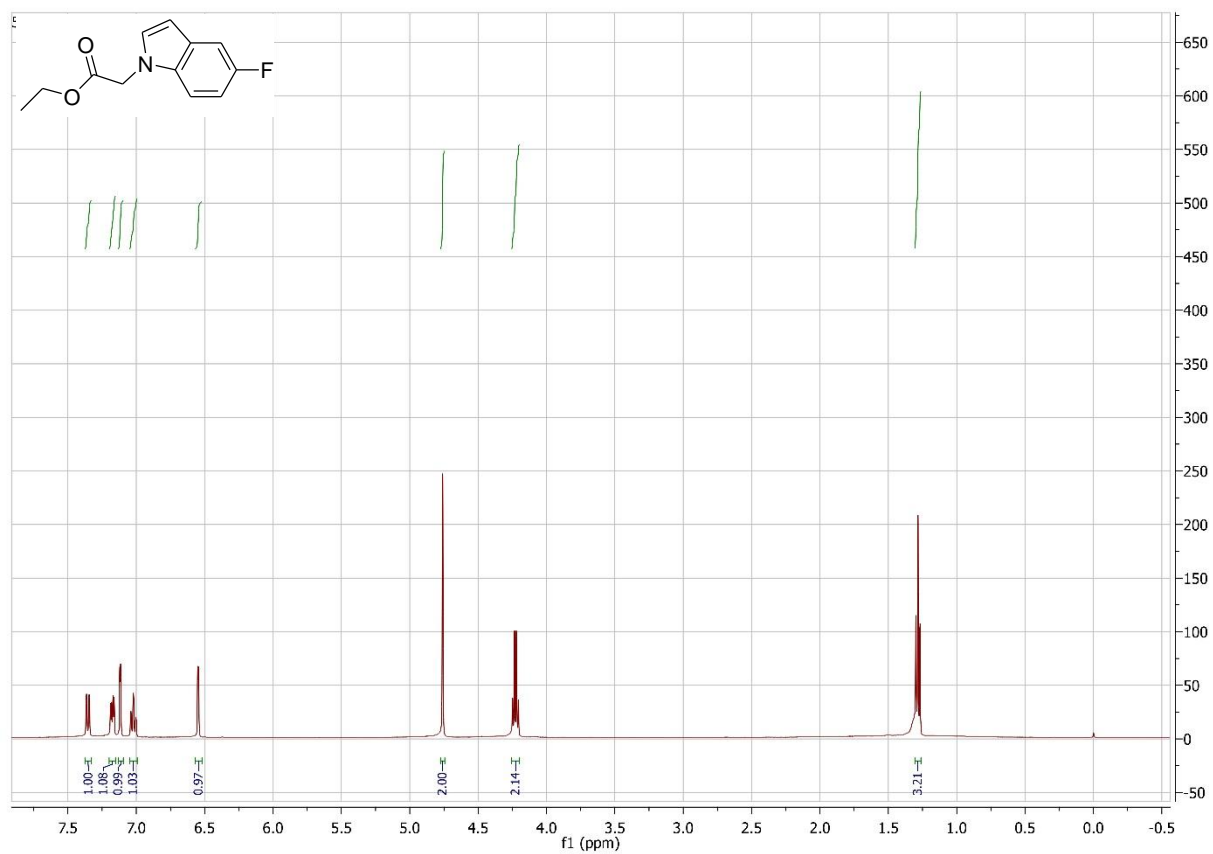
**Figure S1.** <sup>1</sup>H NMR spectrum of compound 14a.



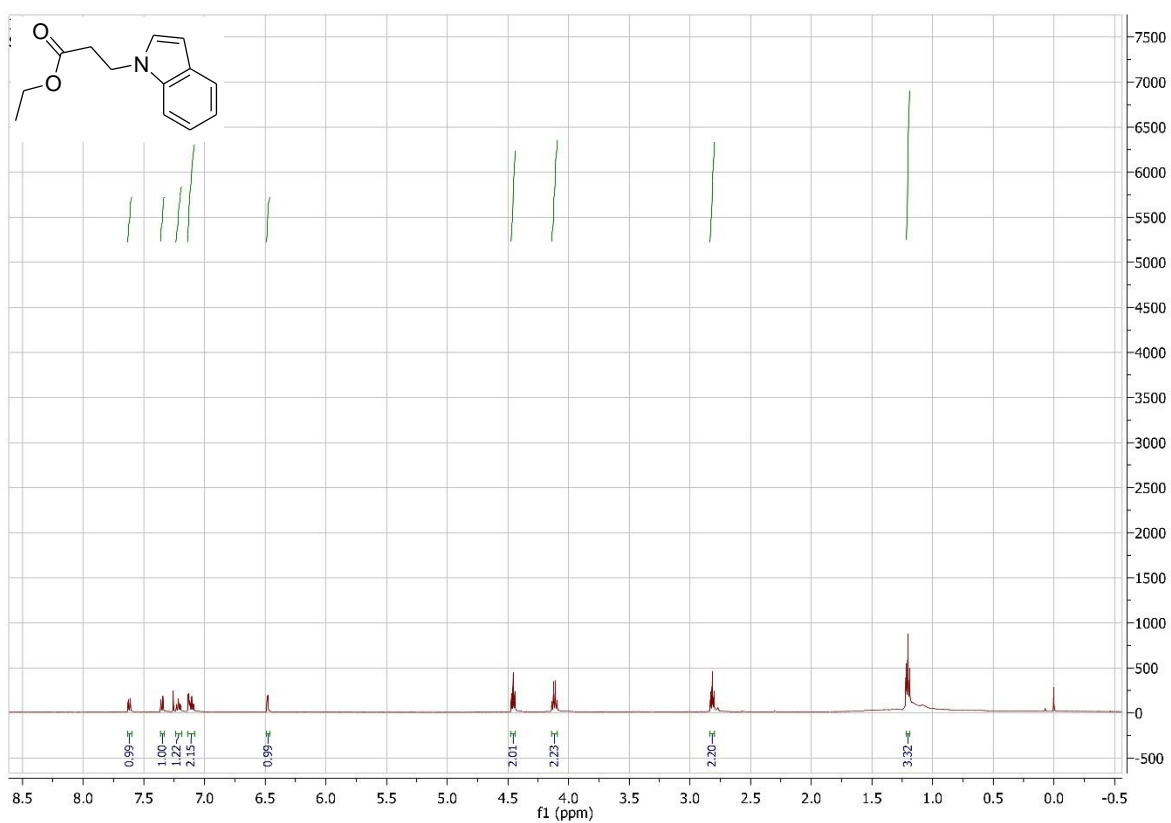
**Figure S2.** <sup>1</sup>H NMR spectrum of compound 15a.



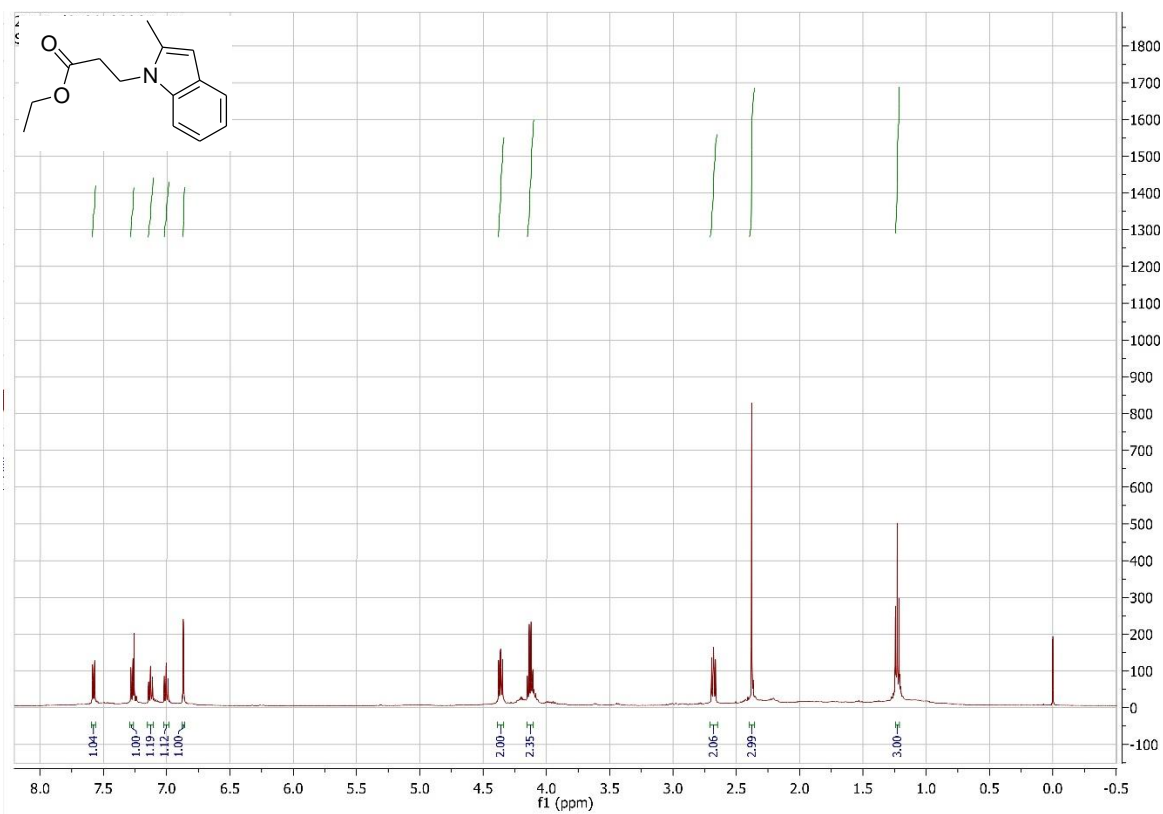
**Figure S3.** <sup>1</sup>H NMR spectrum of compound **16a**.



**Figure S4.** <sup>1</sup>H NMR spectrum of compound **17a**.



**Figure S5.** <sup>1</sup>H NMR spectrum of compound **14b**.



**Figure S6.** <sup>1</sup>H NMR spectrum of compound **15b**.

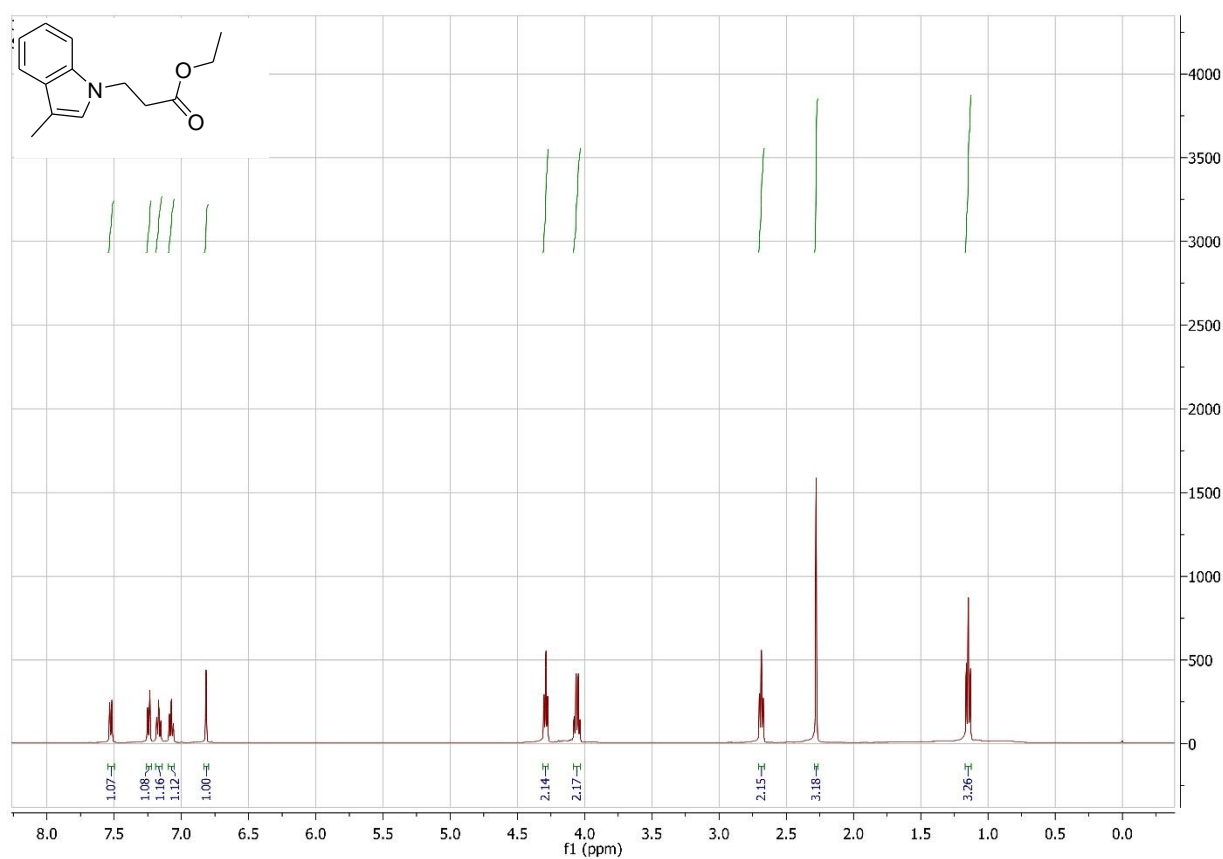


Figure S7. <sup>1</sup>H NMR spectrum of compound 16b.

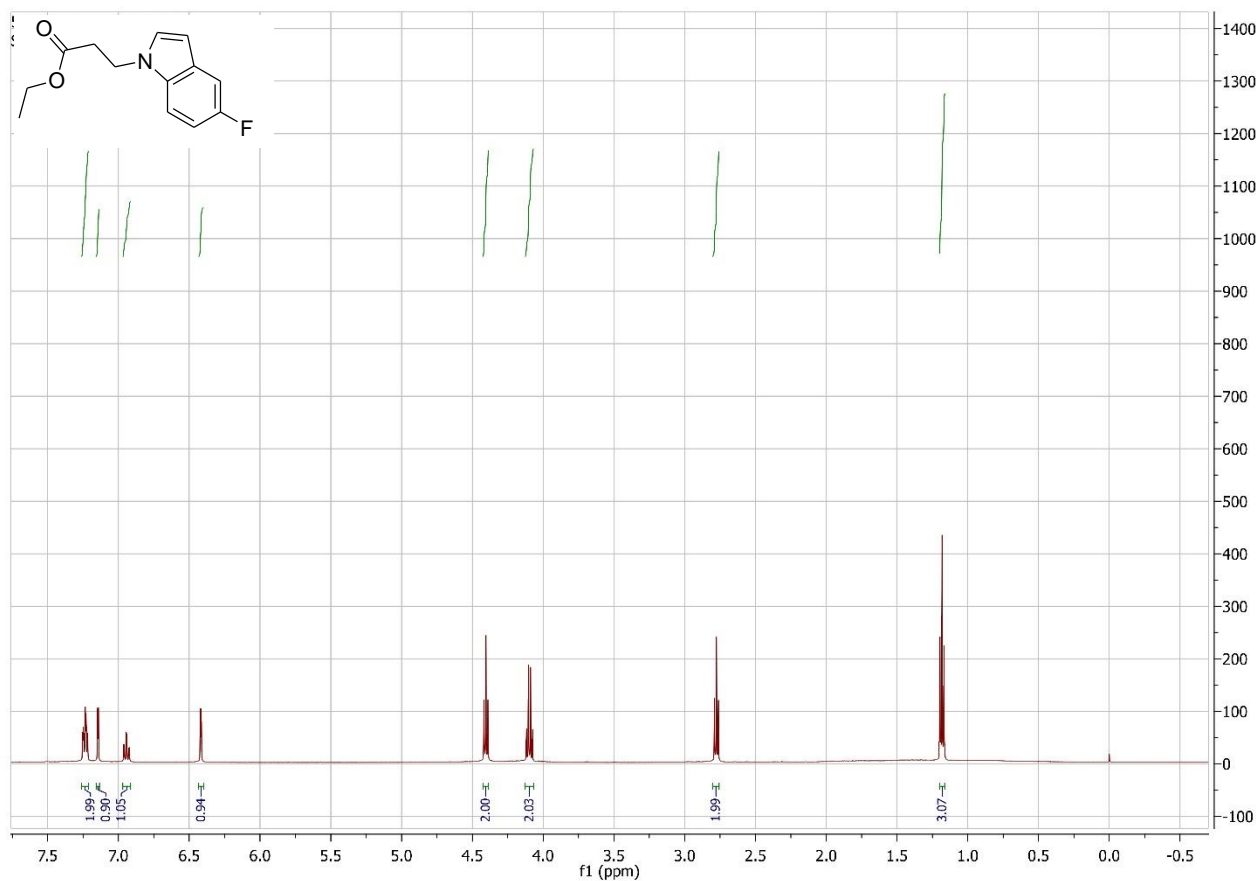
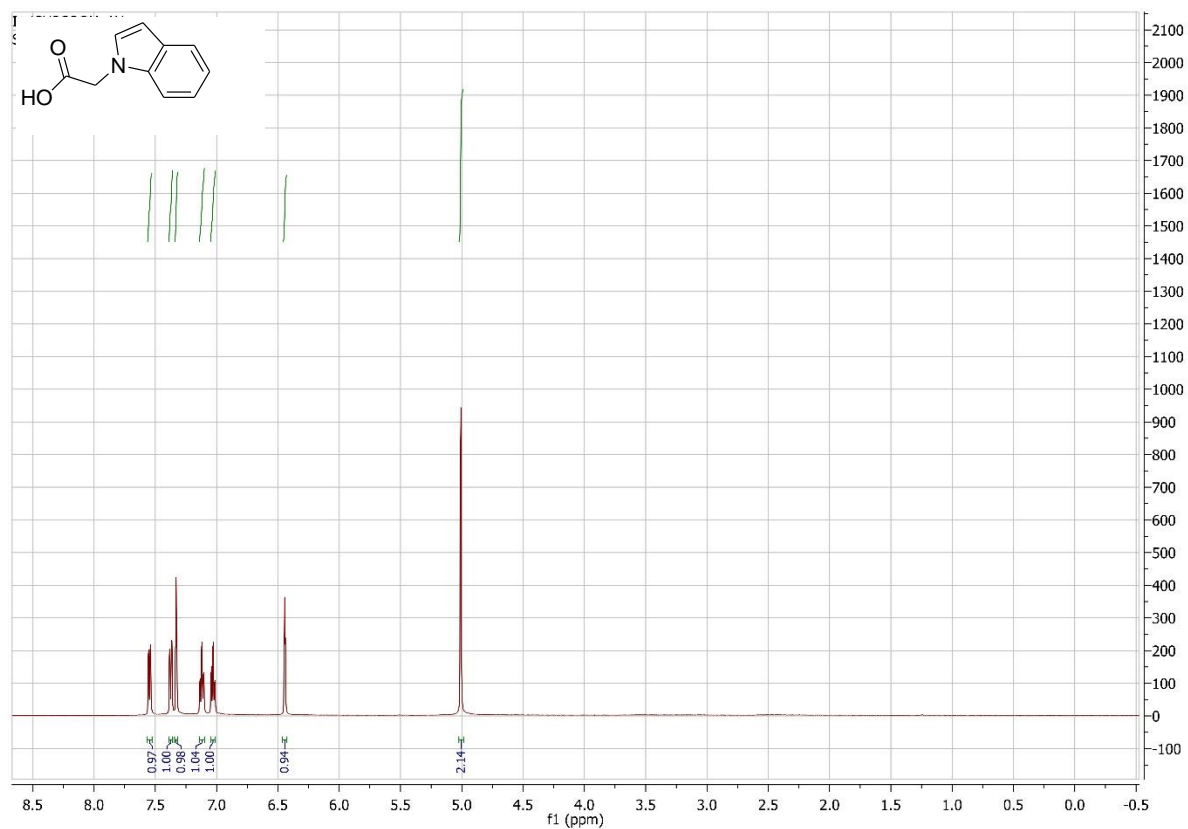
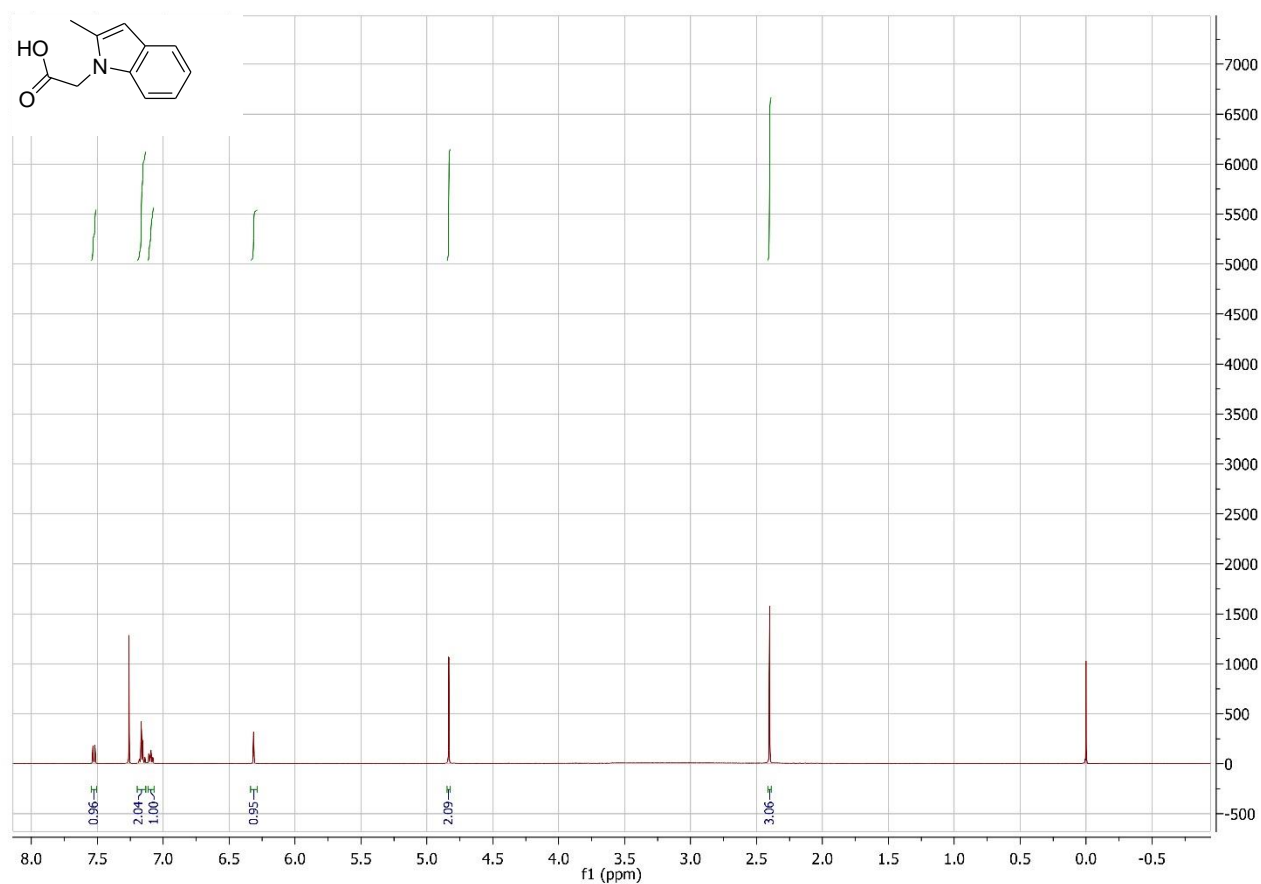


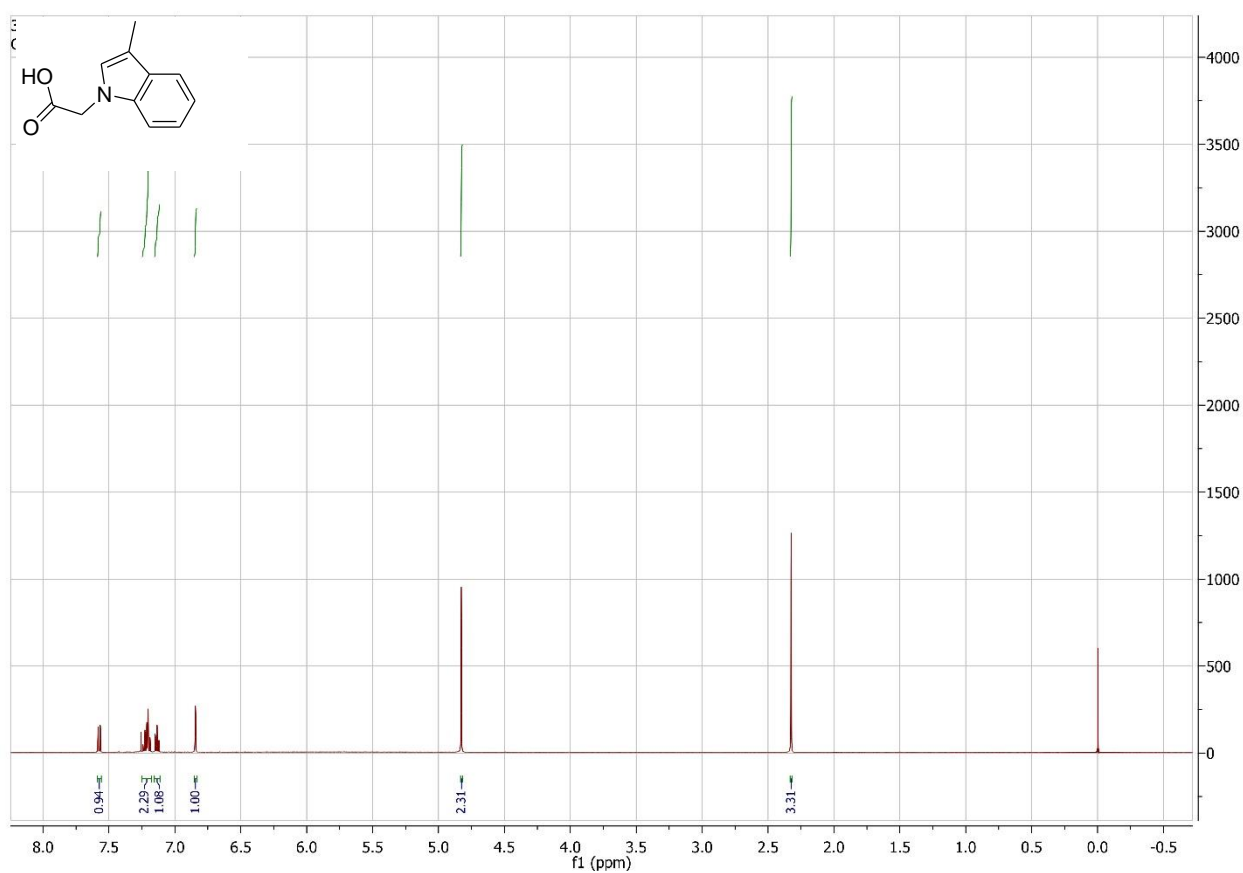
Figure S8. <sup>1</sup>H NMR spectrum of compound 17b.



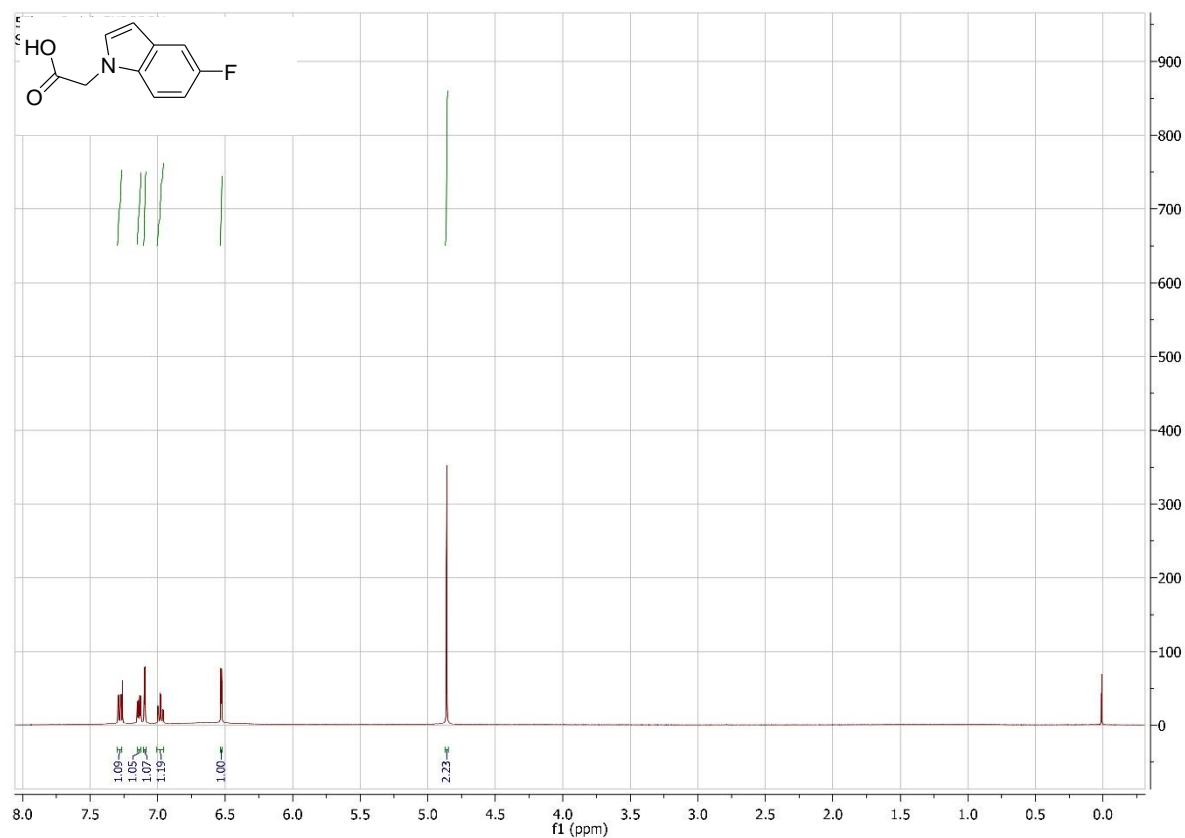
**Figure S9.** <sup>1</sup>H NMR spectrum of compound **18a**.



**Figure S10.** <sup>1</sup>H NMR spectrum of compound **19a**.

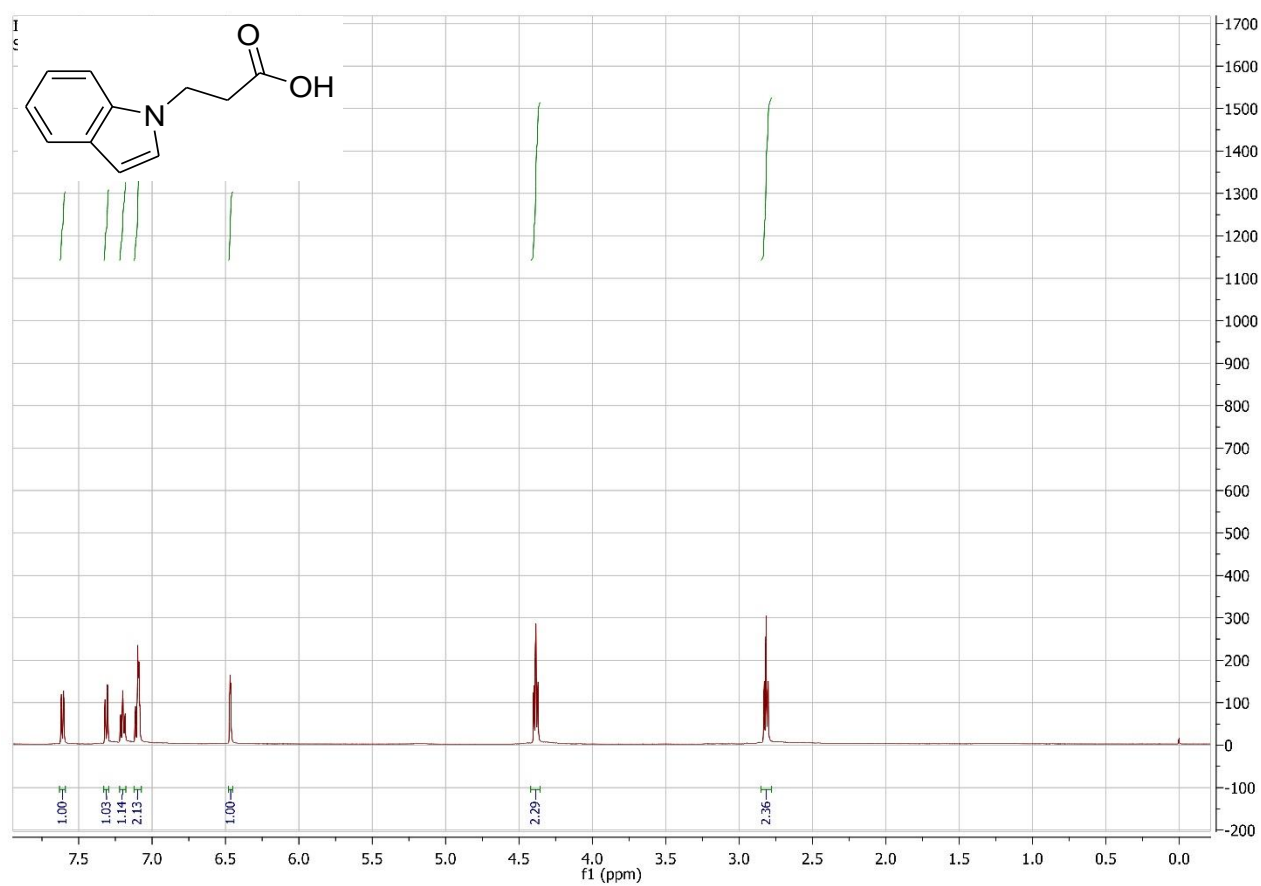


**Figure S11.** <sup>1</sup>H NMR spectrum of compound **20a**.

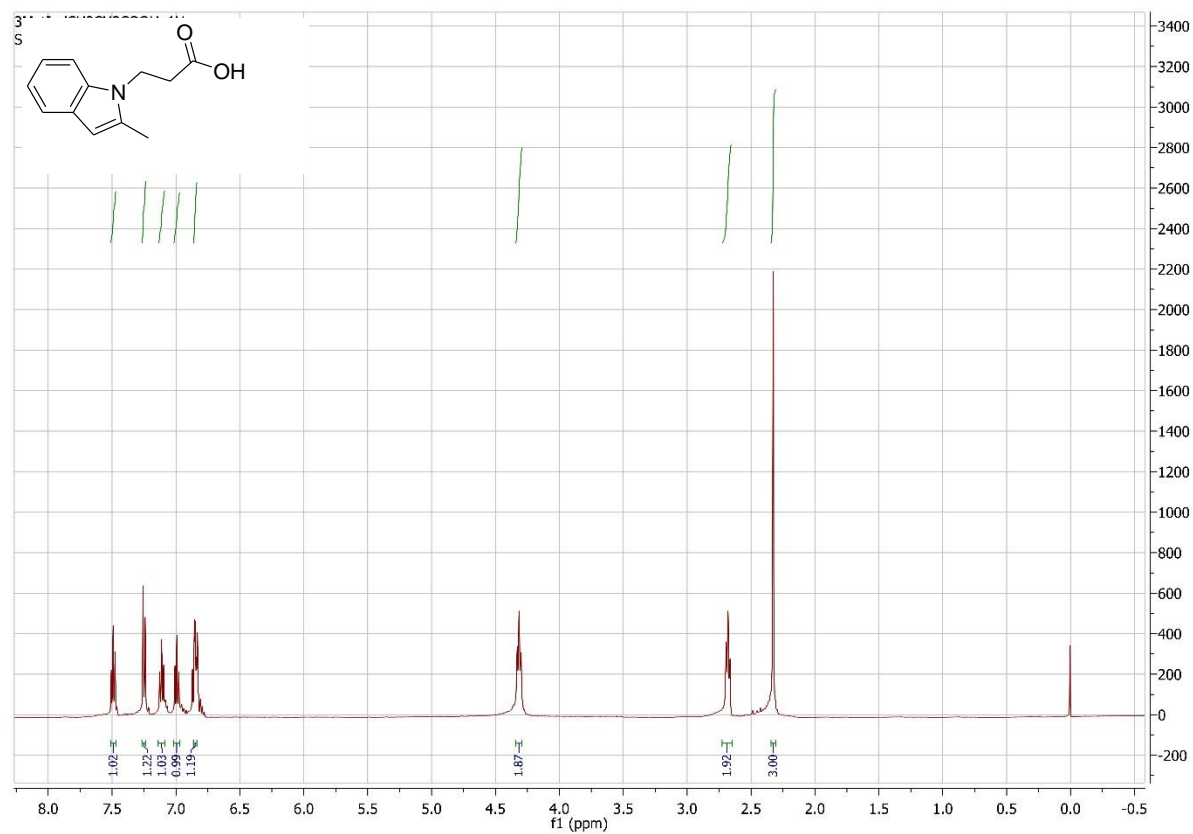


**Figure S12.** <sup>1</sup>H NMR spectrum of compound **21a**.





**Figure S13.** <sup>1</sup>H NMR spectrum of compound **18b**.



**Figure S14.** <sup>1</sup>H NMR spectrum of compound **19b**.

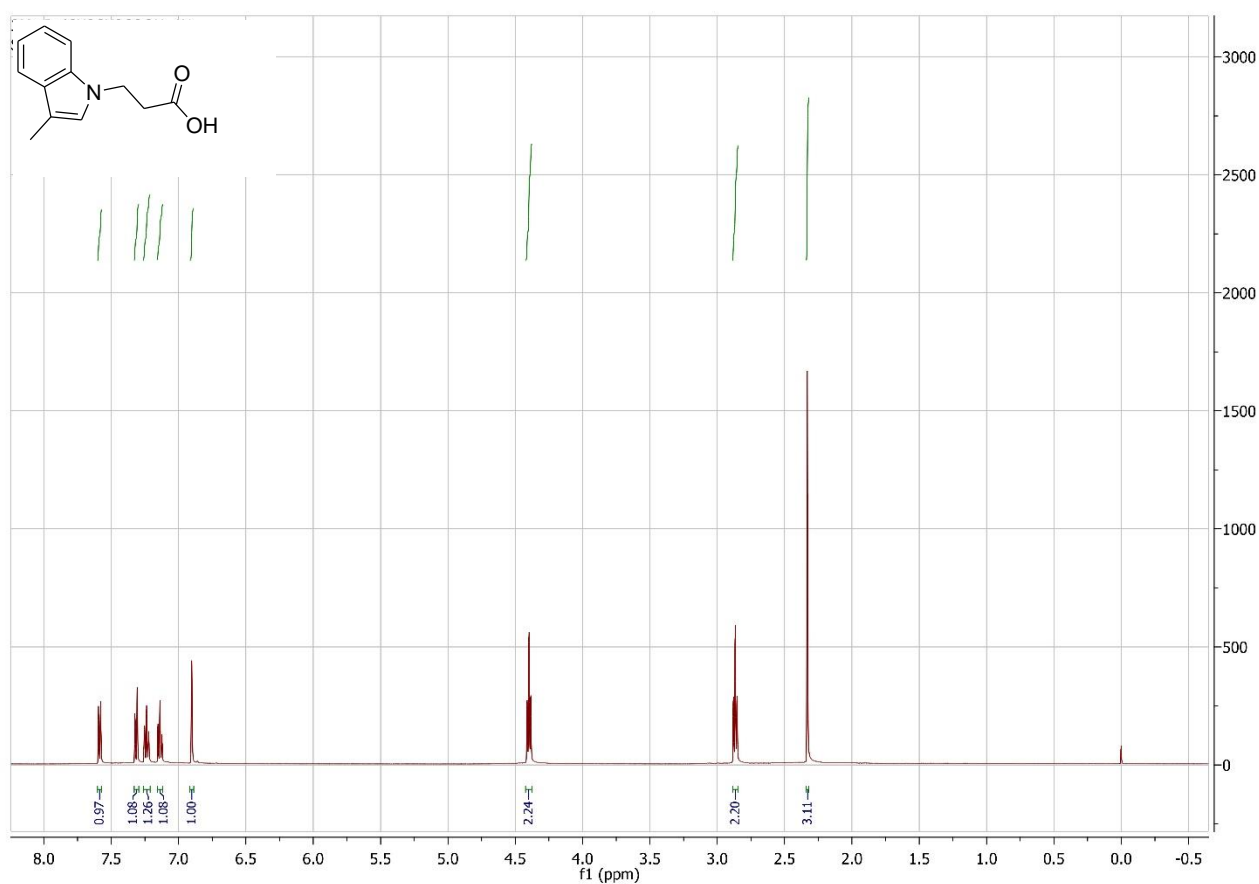


Figure S15. <sup>1</sup>H NMR spectrum of compound 20b.

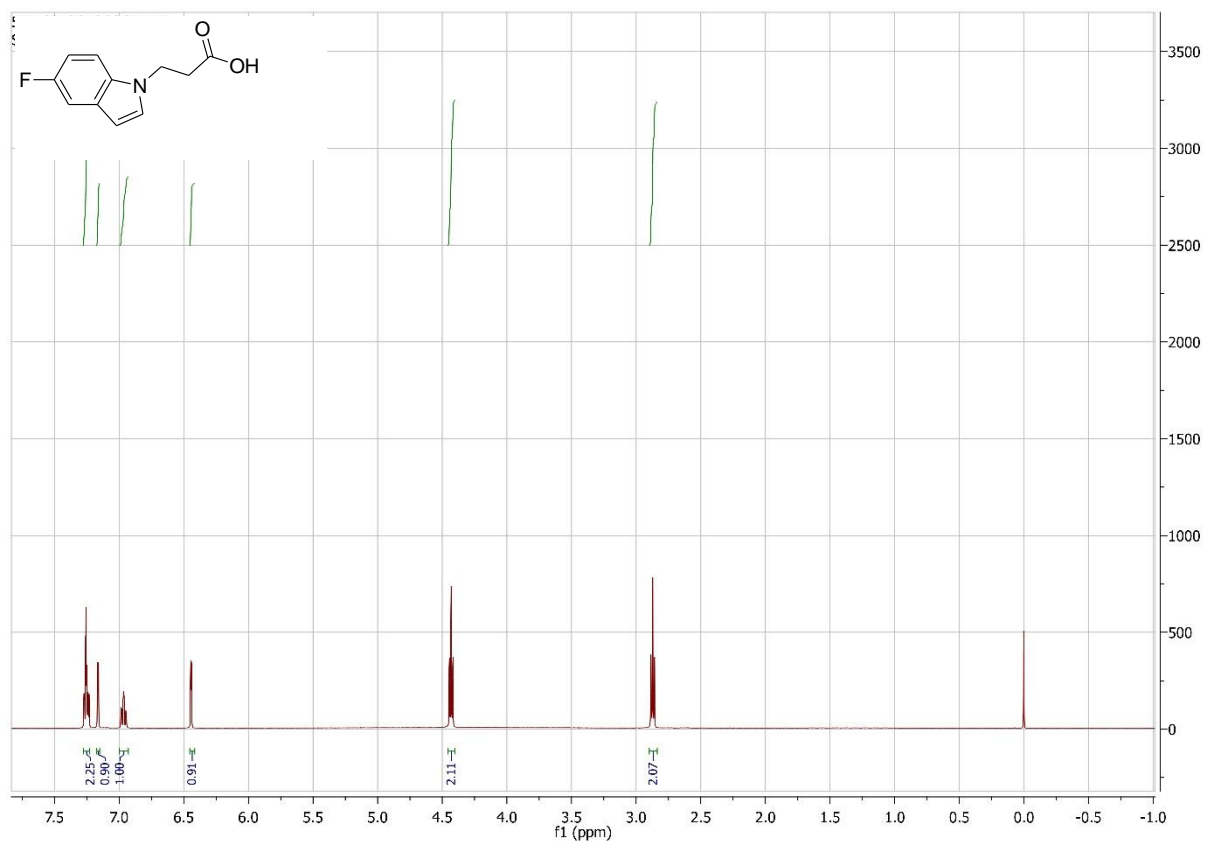
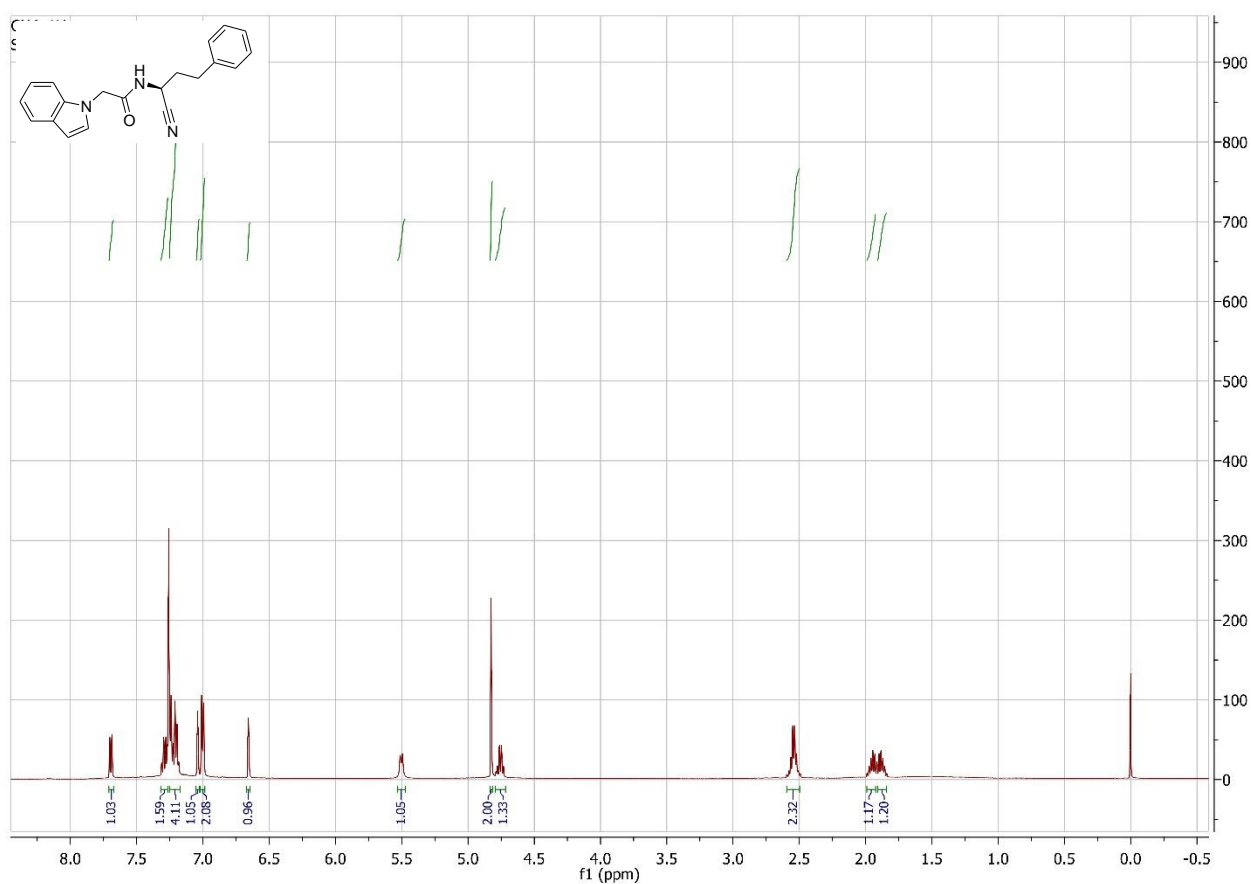
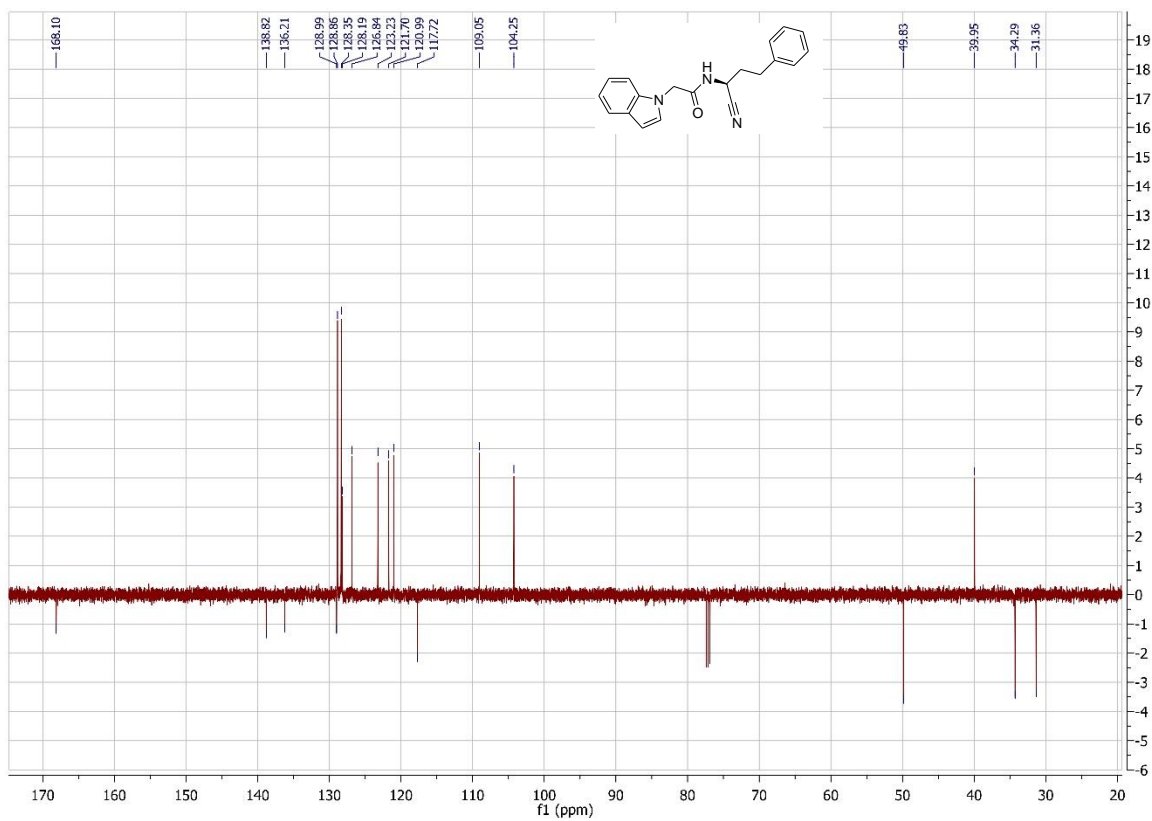


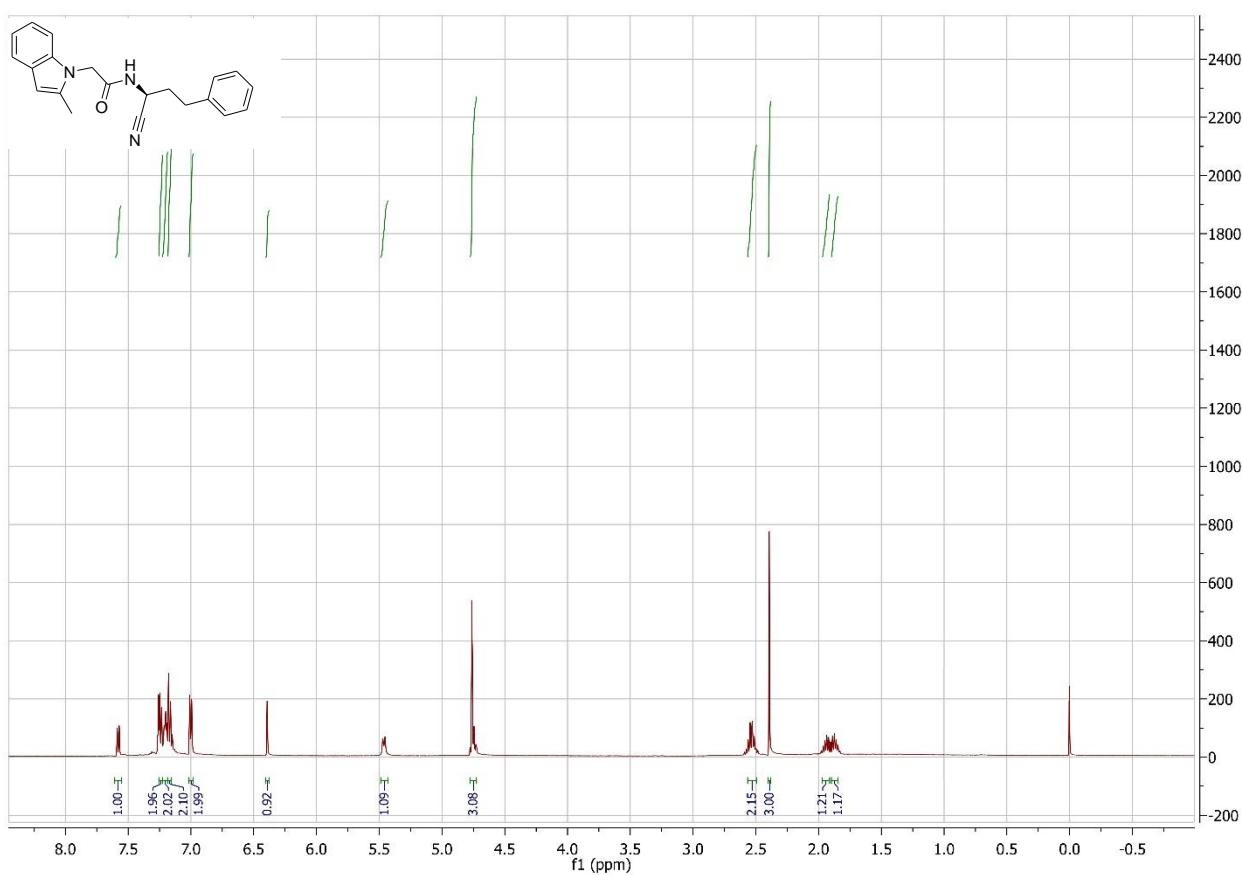
Figure S16. <sup>1</sup>H NMR spectrum of compound 21b.



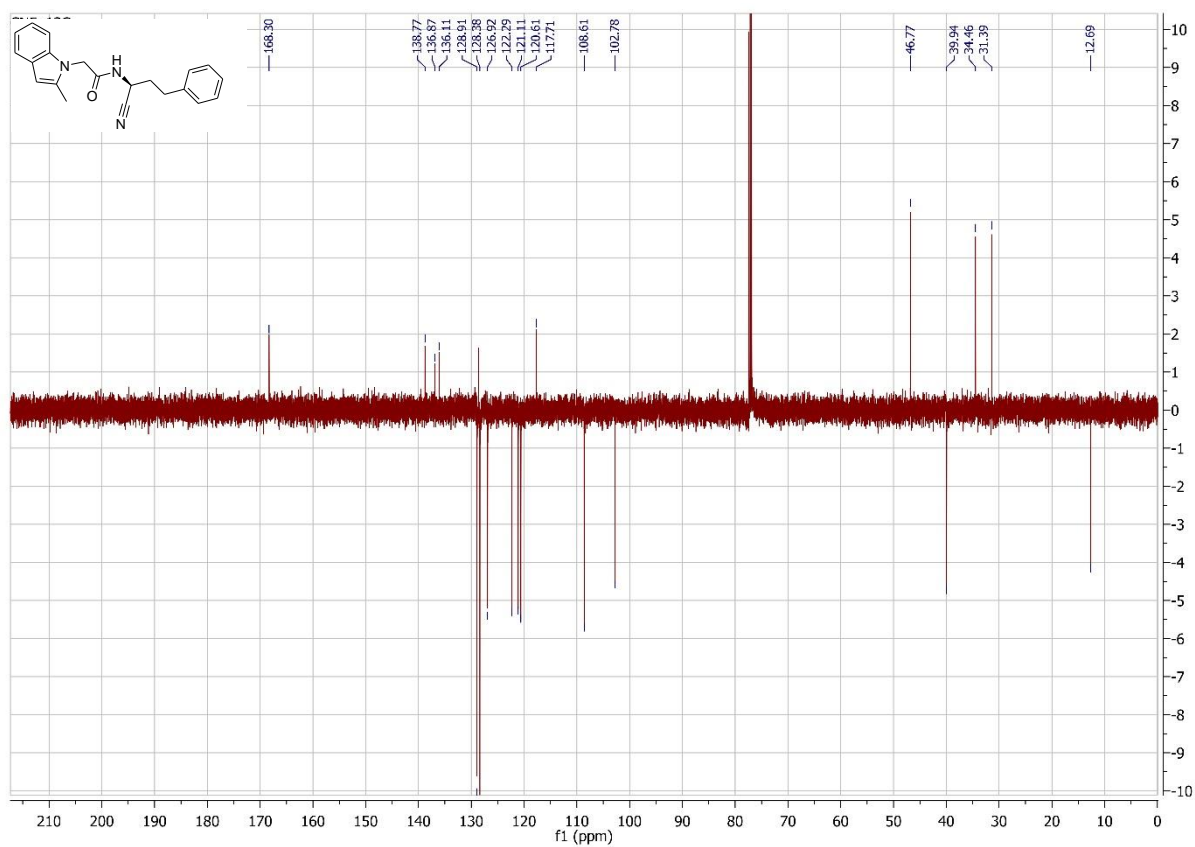
**Figure S17.** <sup>1</sup>H NMR spectrum of compound **1a**.



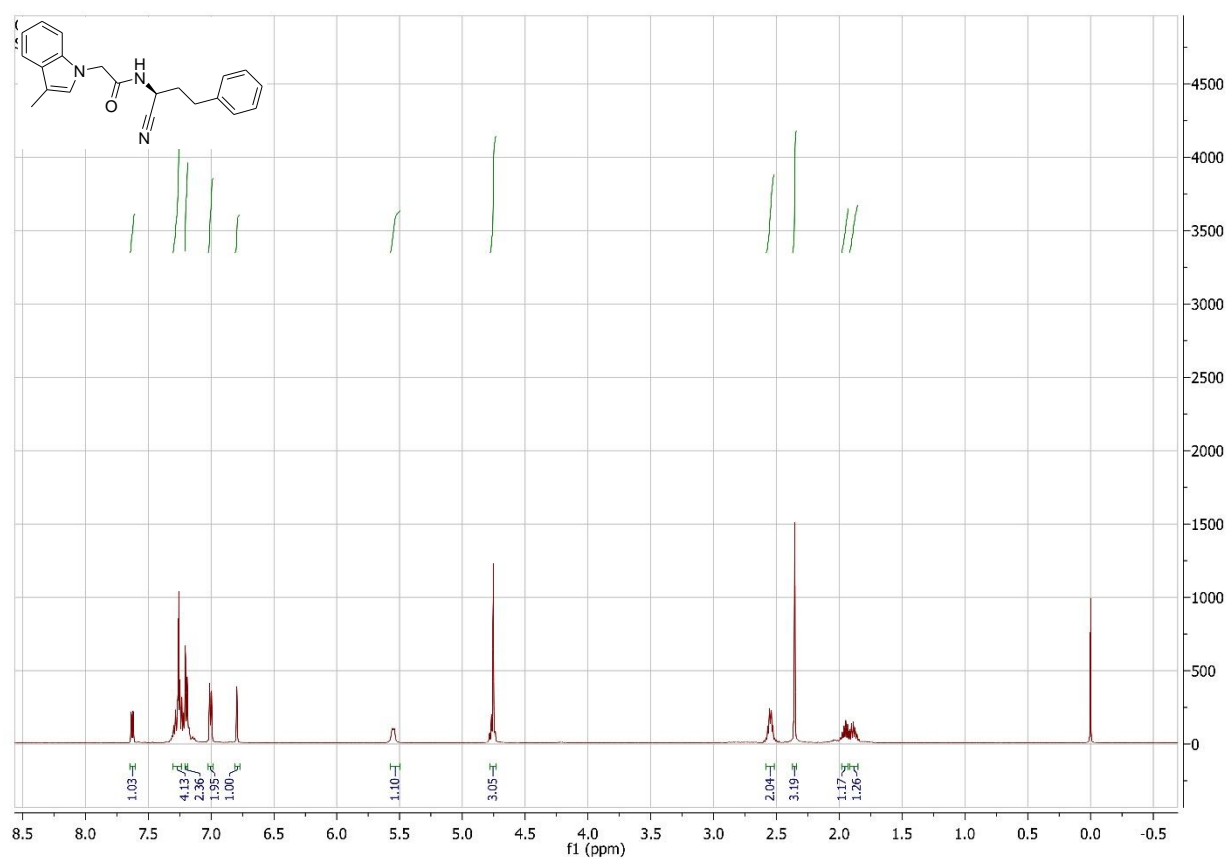
**Figure S18.** <sup>13</sup>C NMR spectrum of compound **1a**.



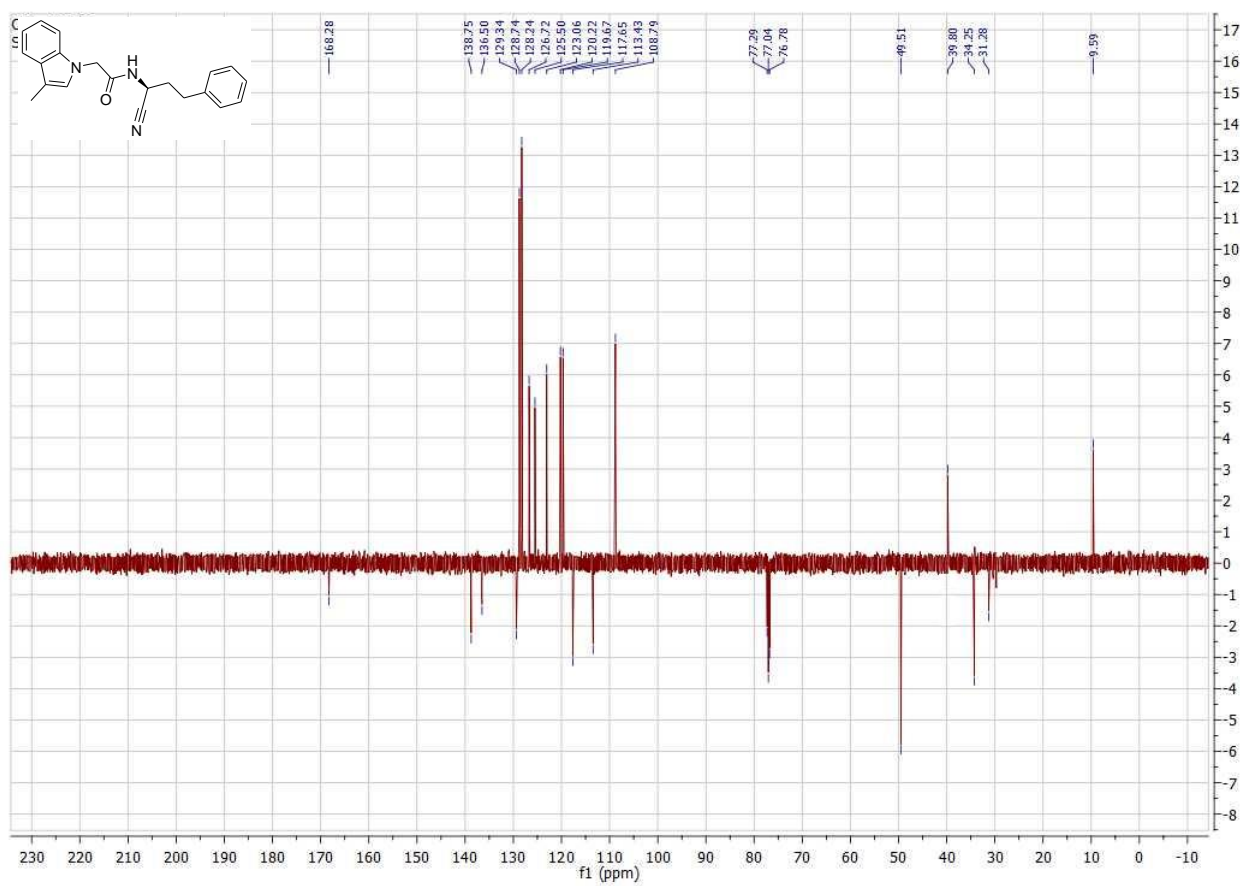
**Figure S19.** <sup>1</sup>H NMR spectrum of compound 2a.



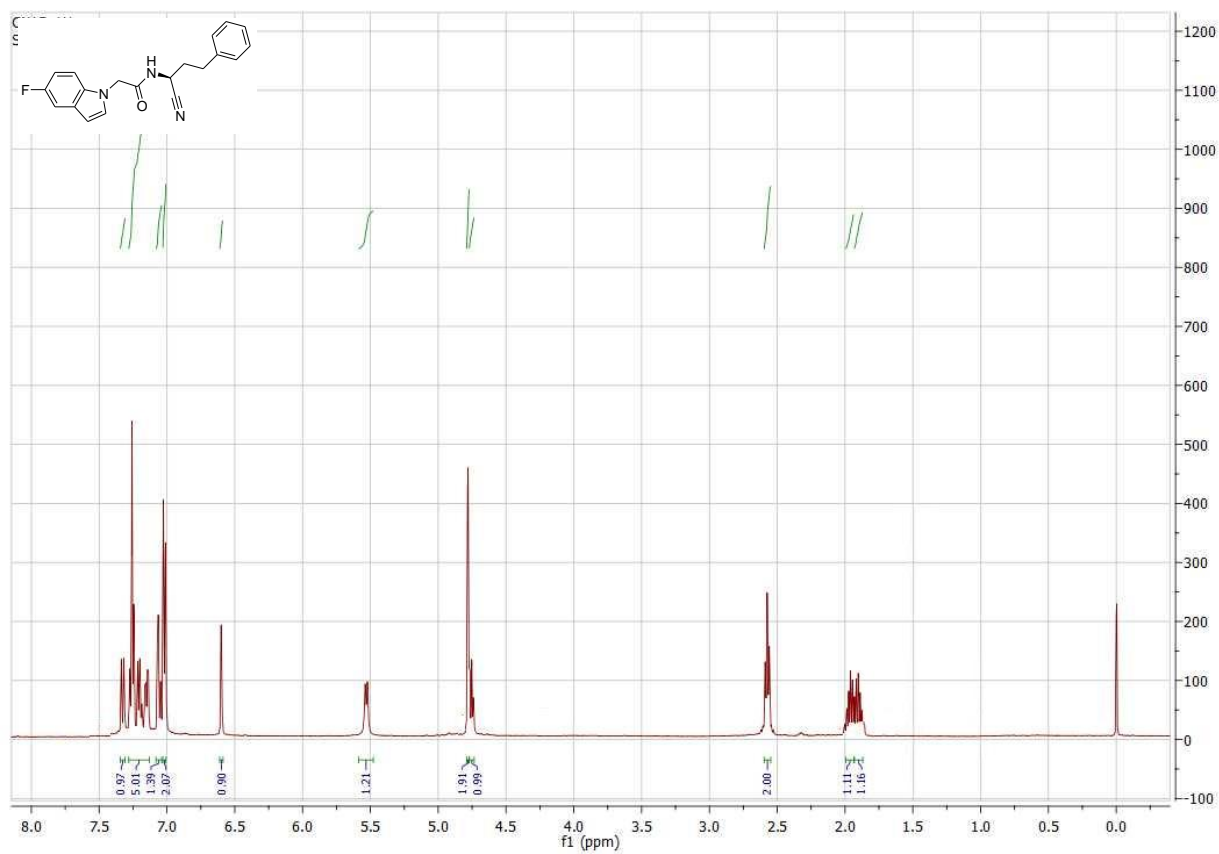
**Figure S20.** <sup>13</sup>C NMR spectrum of compound 2a.



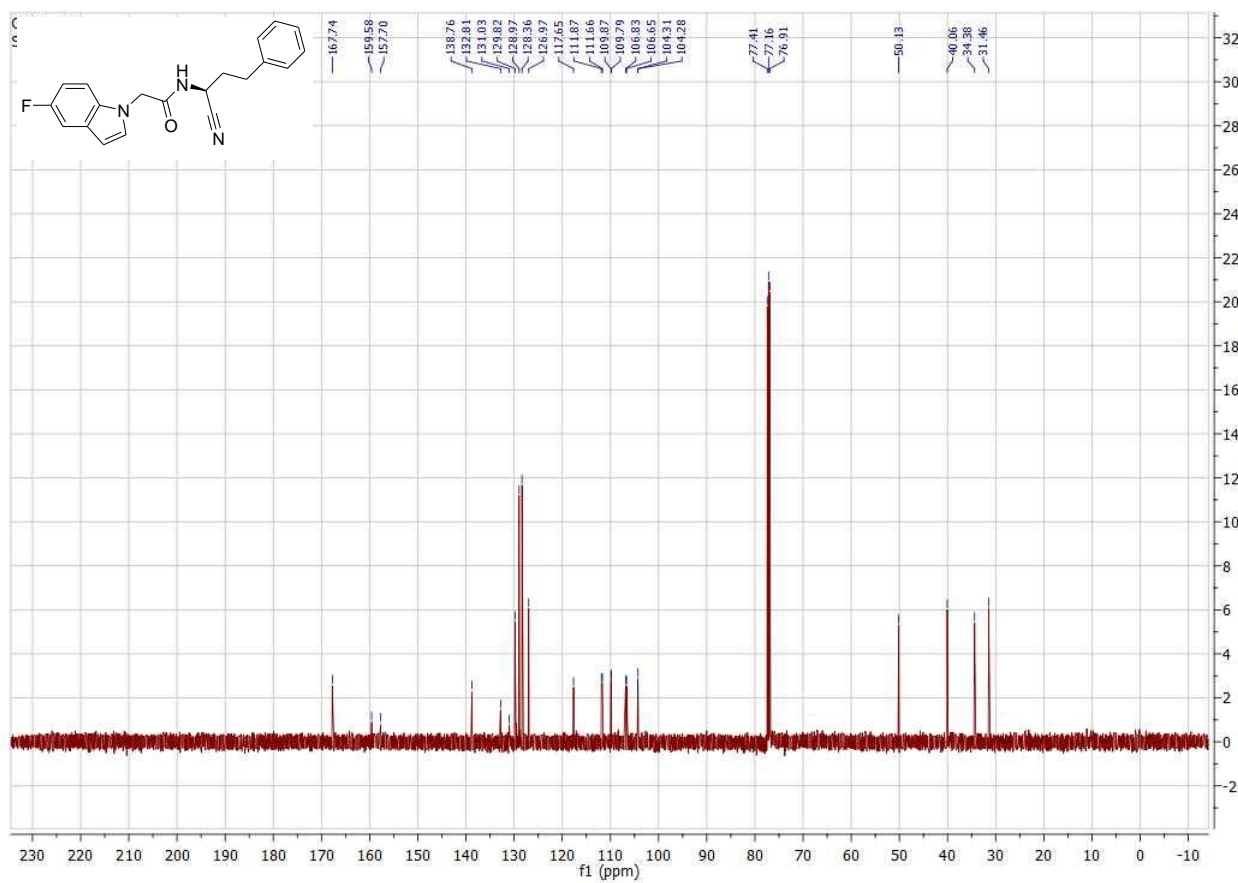
**Figure S21.** <sup>1</sup>H NMR spectrum of compound **3a**.



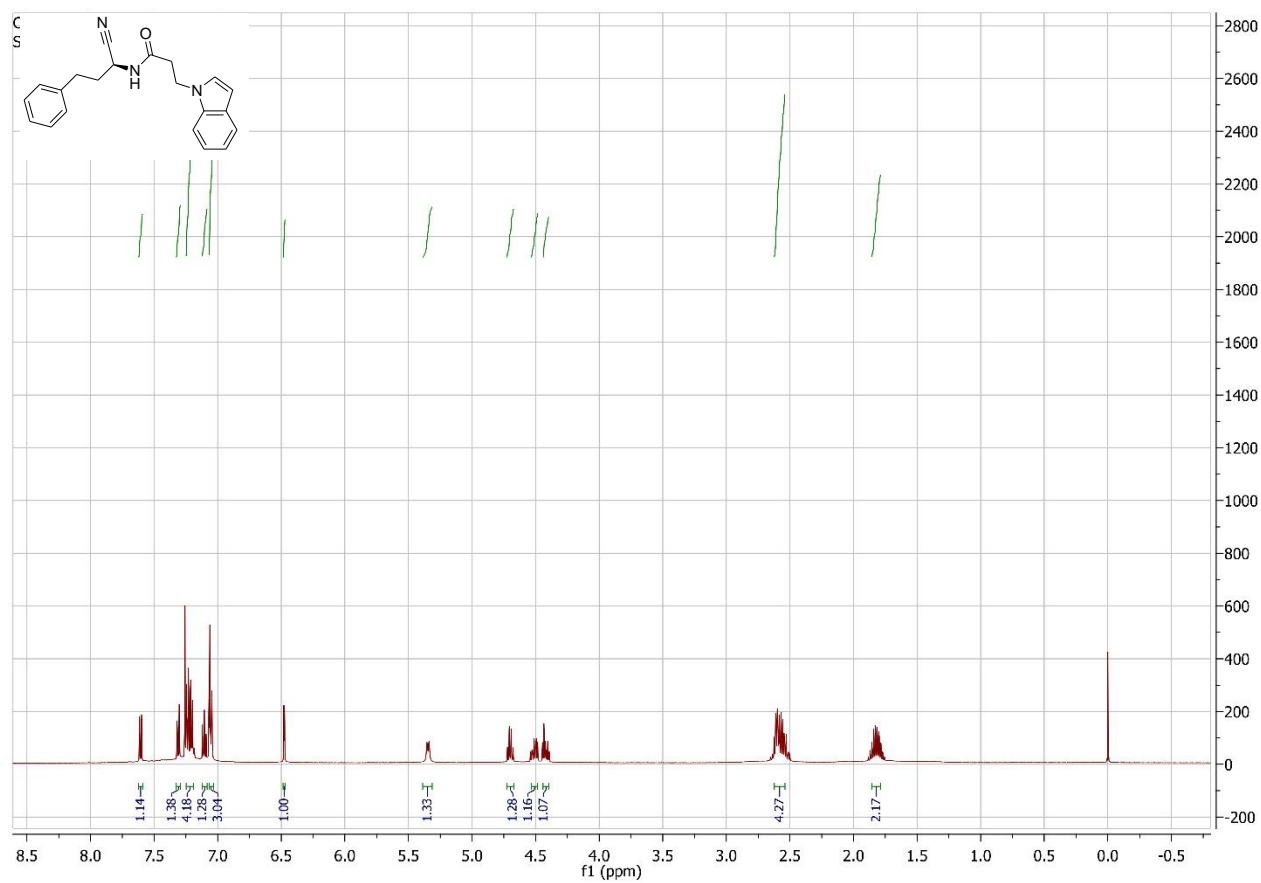
**Figure S22.** <sup>13</sup>C NMR spectrum of compound **3a**.



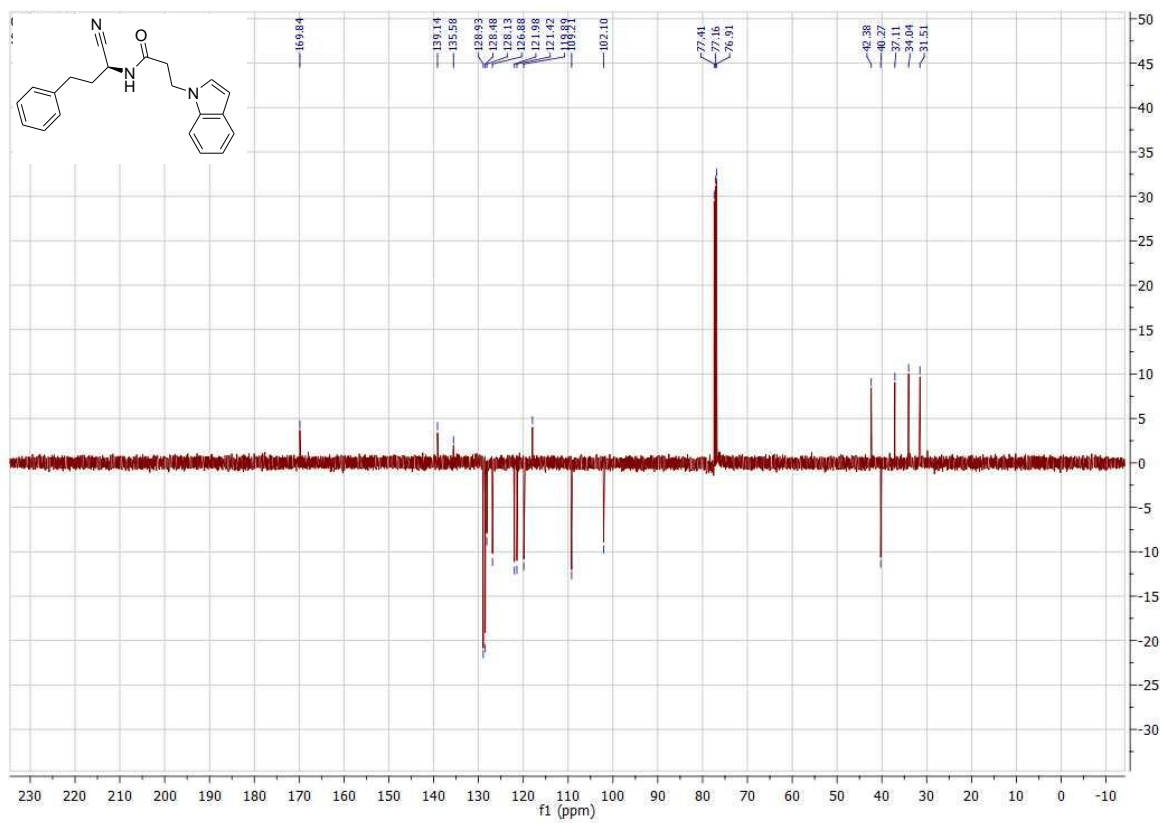
**Figure S23.** <sup>1</sup>H NMR spectrum of compound 4a.



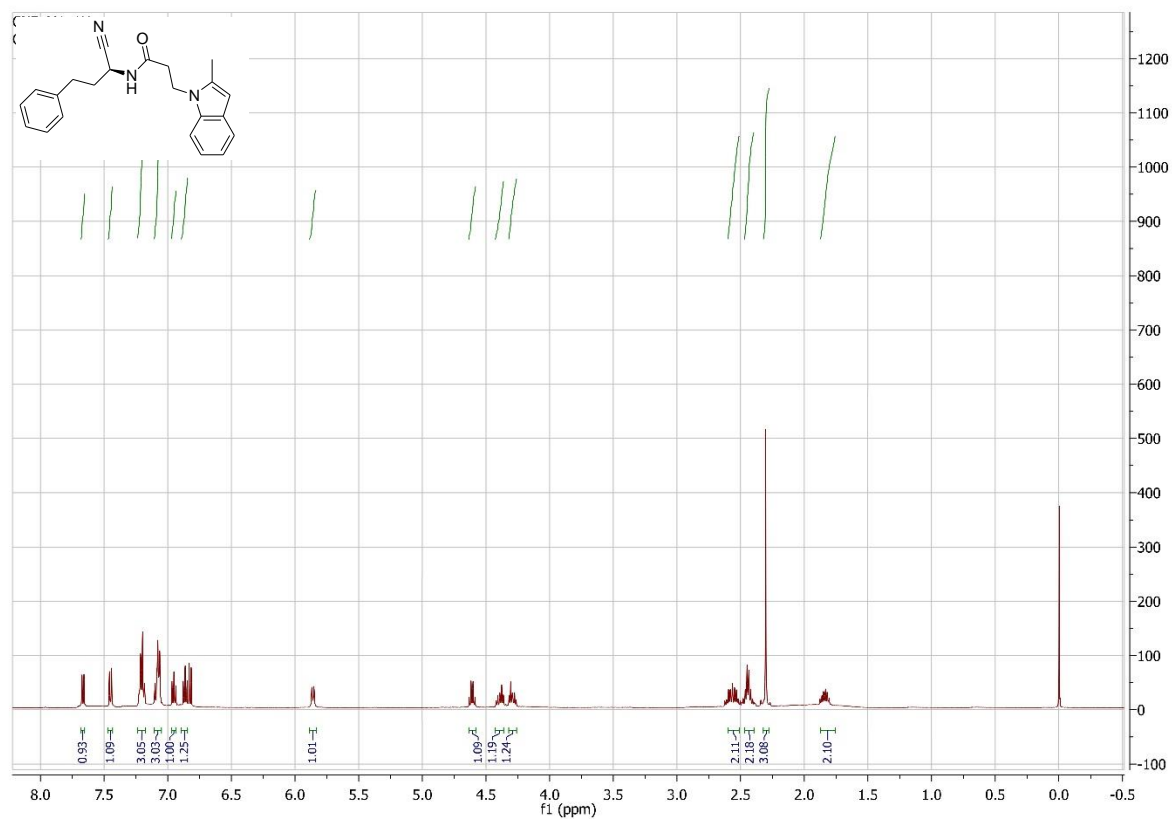
**Figure S24.** <sup>13</sup>C NMR spectrum of compound 4a.



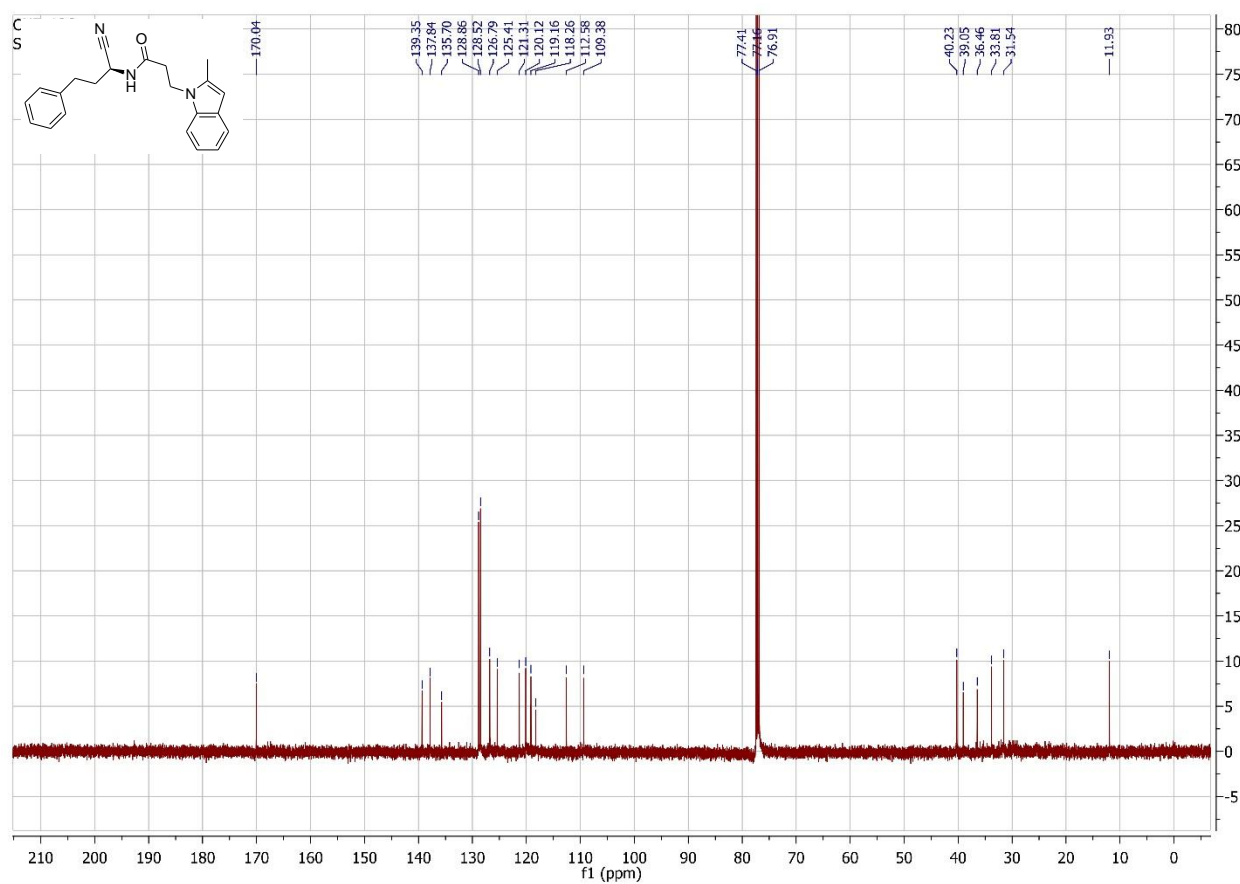
**Figure S25.** <sup>1</sup>H NMR spectrum of compound **1b**.



**Figure S26.** <sup>13</sup>C NMR spectrum of compound **1b**.

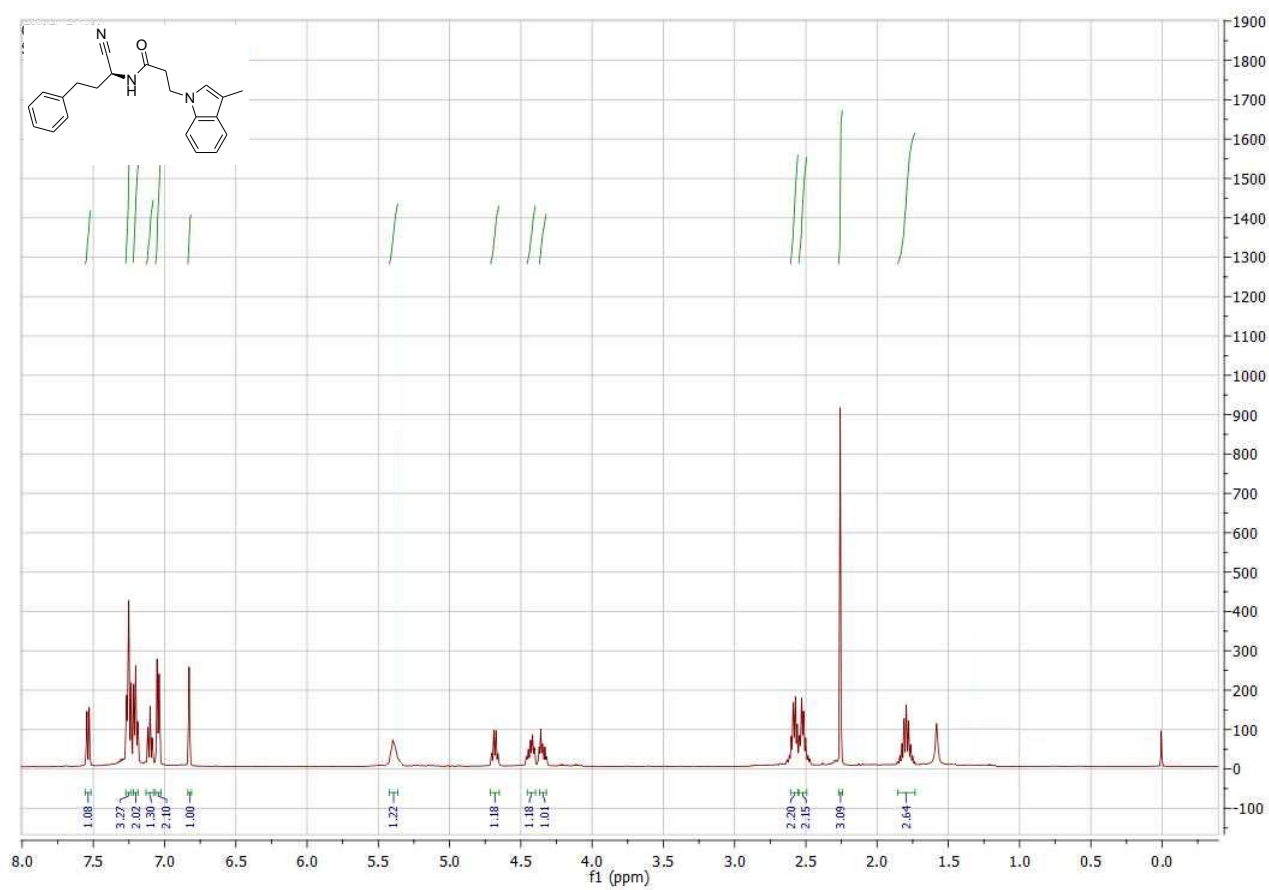


**Figure S27.** <sup>1</sup>H NMR spectrum of compound 2b.

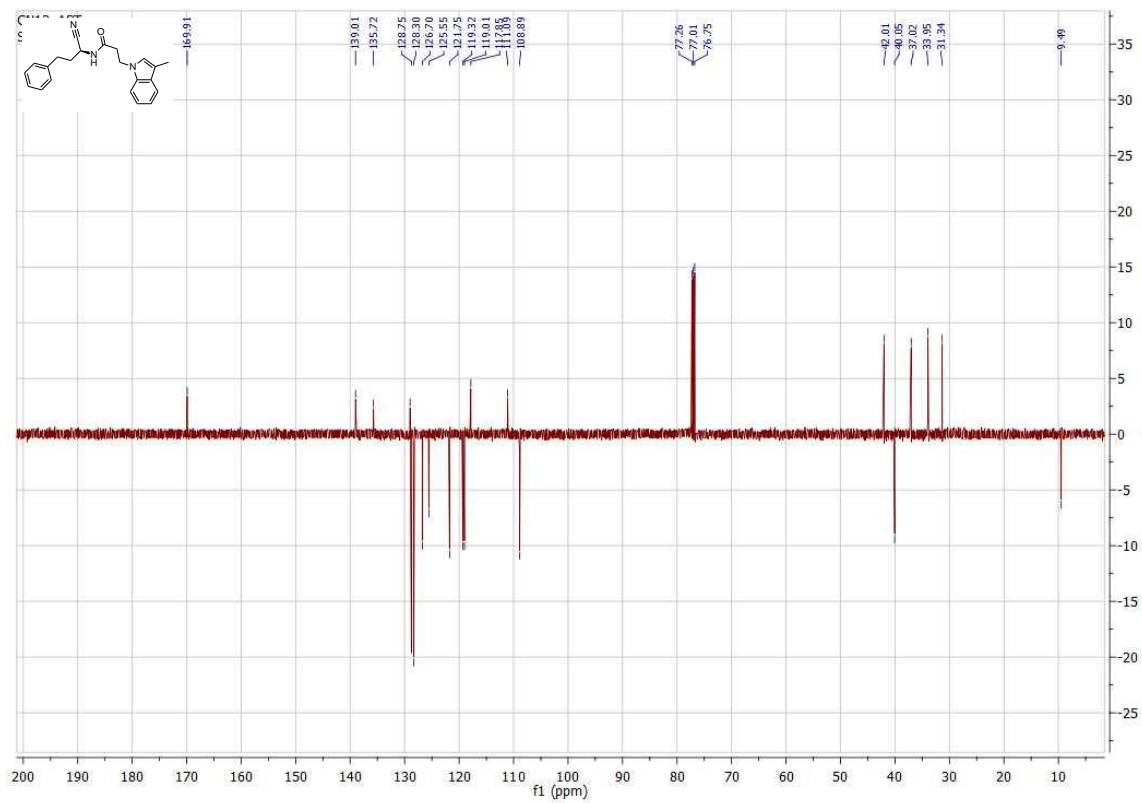


**Figure S28.** <sup>13</sup>C NMR spectrum of compound 2b.

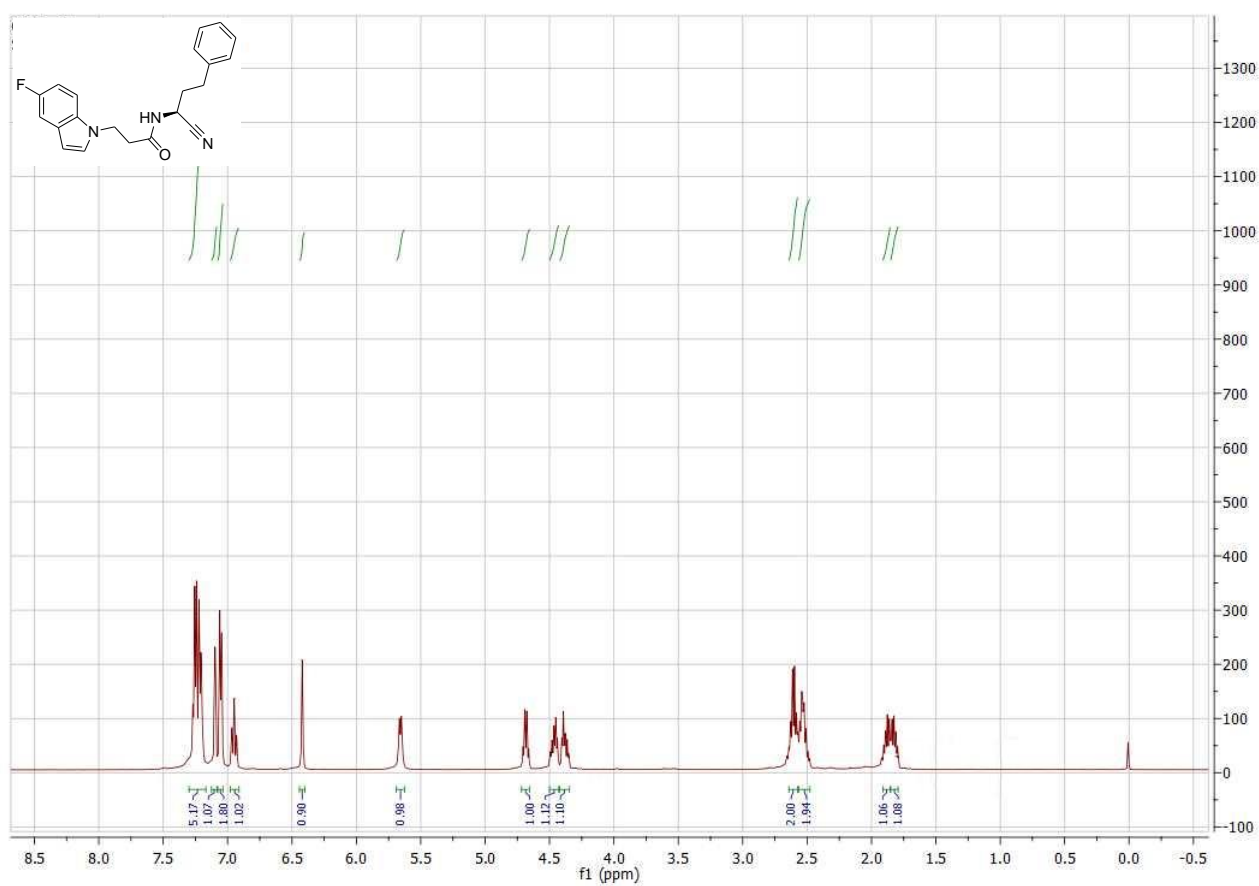




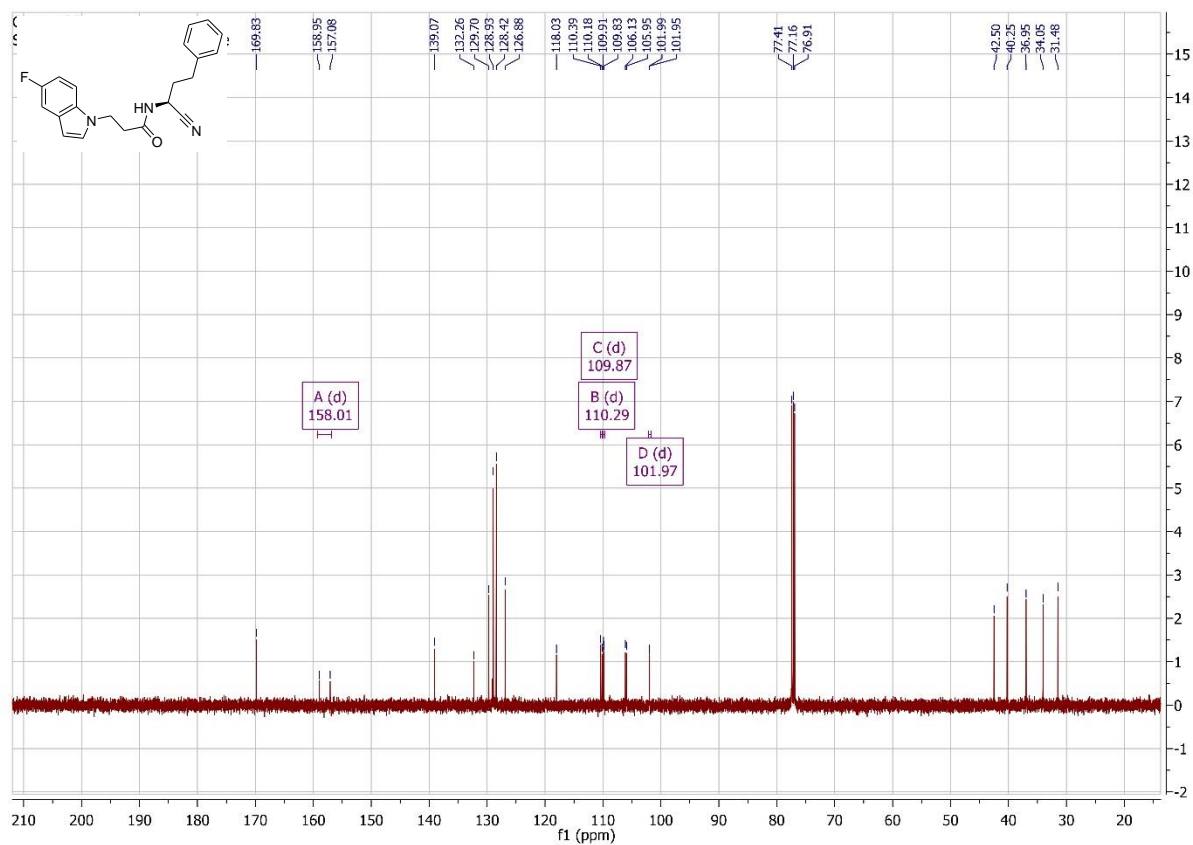
**Figure S29.** <sup>1</sup>H NMR spectrum of compound **3b**.



**Figure S30.** <sup>13</sup>C NMR spectrum of compound **3b**.



**Figure S31.** <sup>1</sup>H NMR spectrum of compound **4b**.



**Figure S32.** <sup>13</sup>C NMR spectrum of compound **4b**.

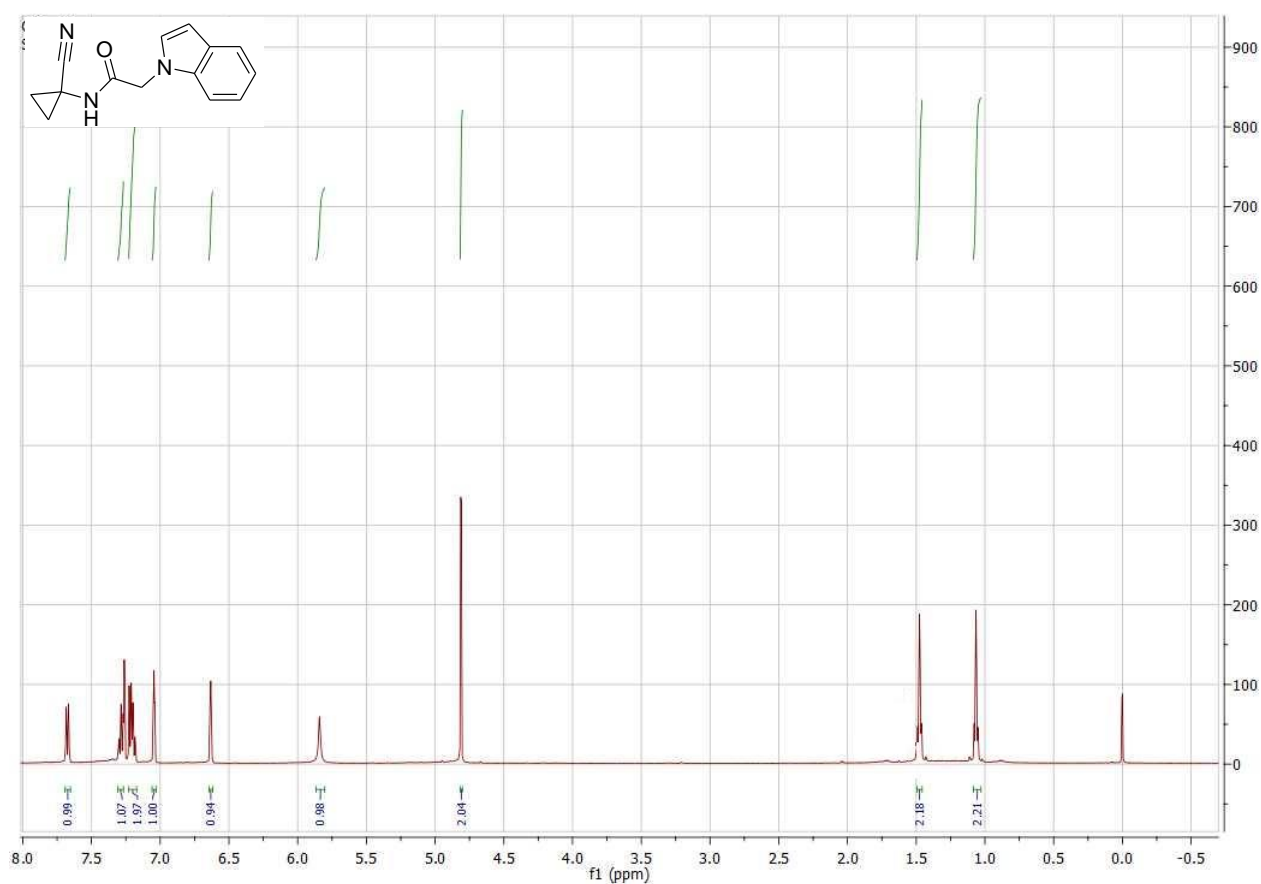


Figure S33.  $^1\text{H}$  NMR spectrum of compound **5a**.

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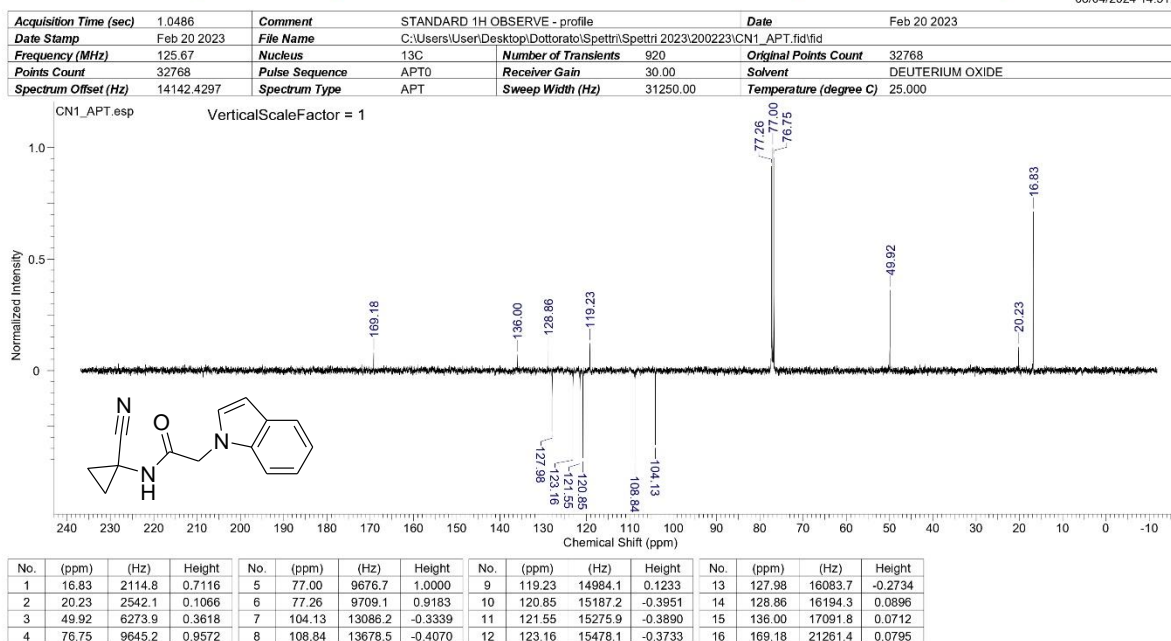


Figure S34.  $^{13}\text{C}$  NMR spectrum of compound **5a**.

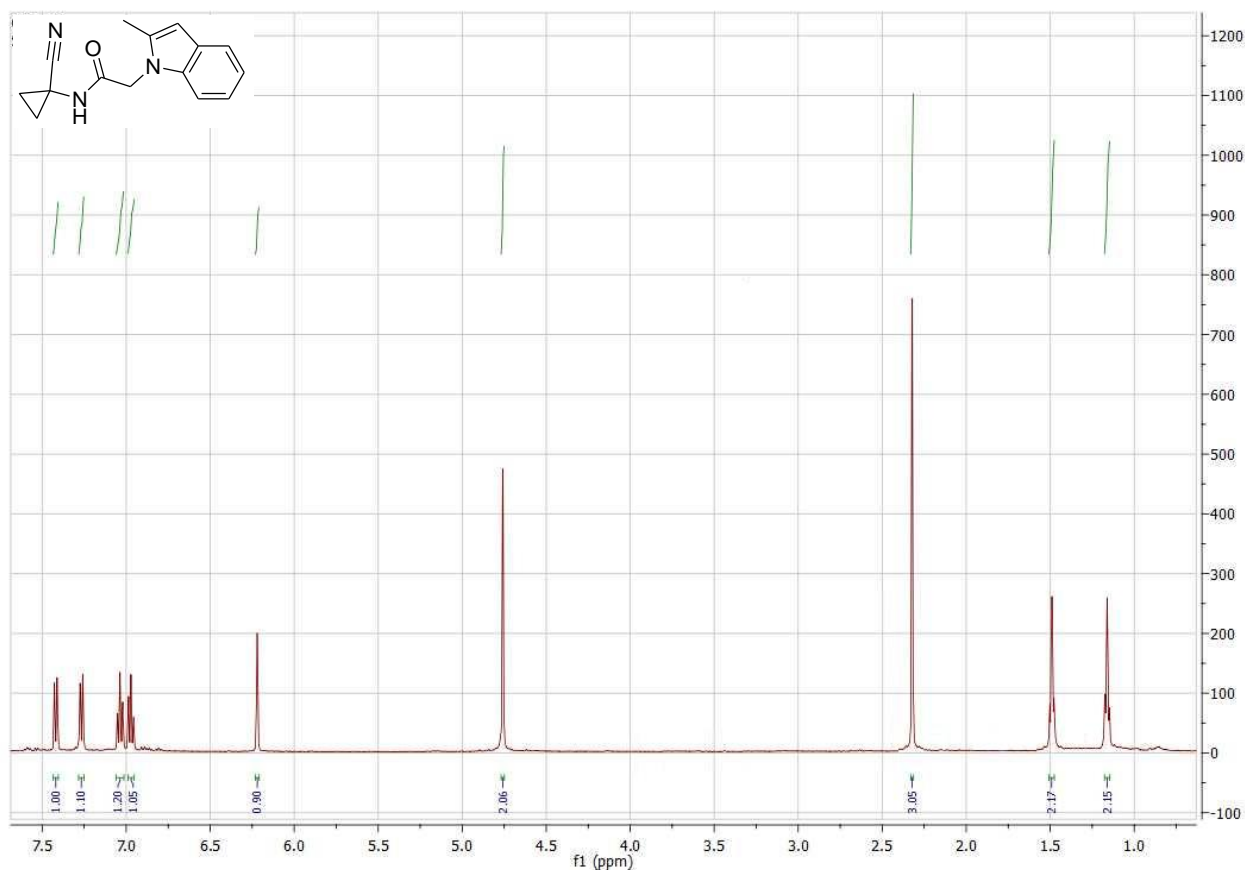
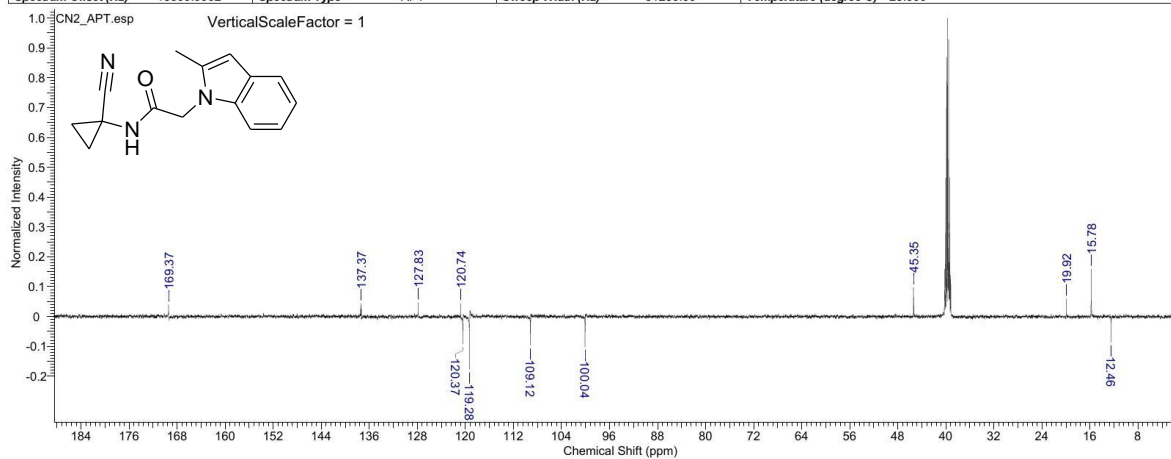


Figure S35.  $^1\text{H}$  NMR spectrum of compound **6a**.

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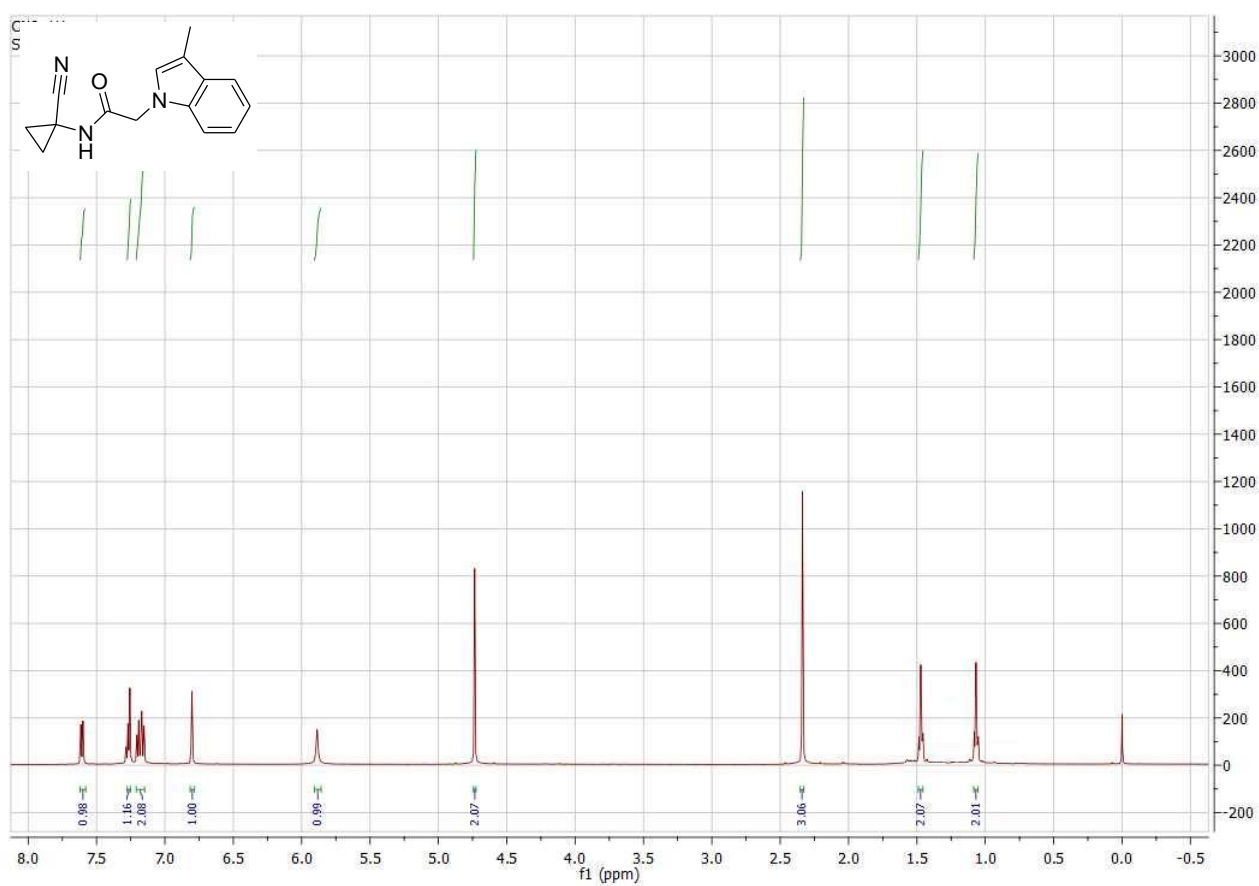
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Spectrum Offset (Hz)	13509.9902	Spectrum Type	APT	Sweep Width (Hz)	31250.00
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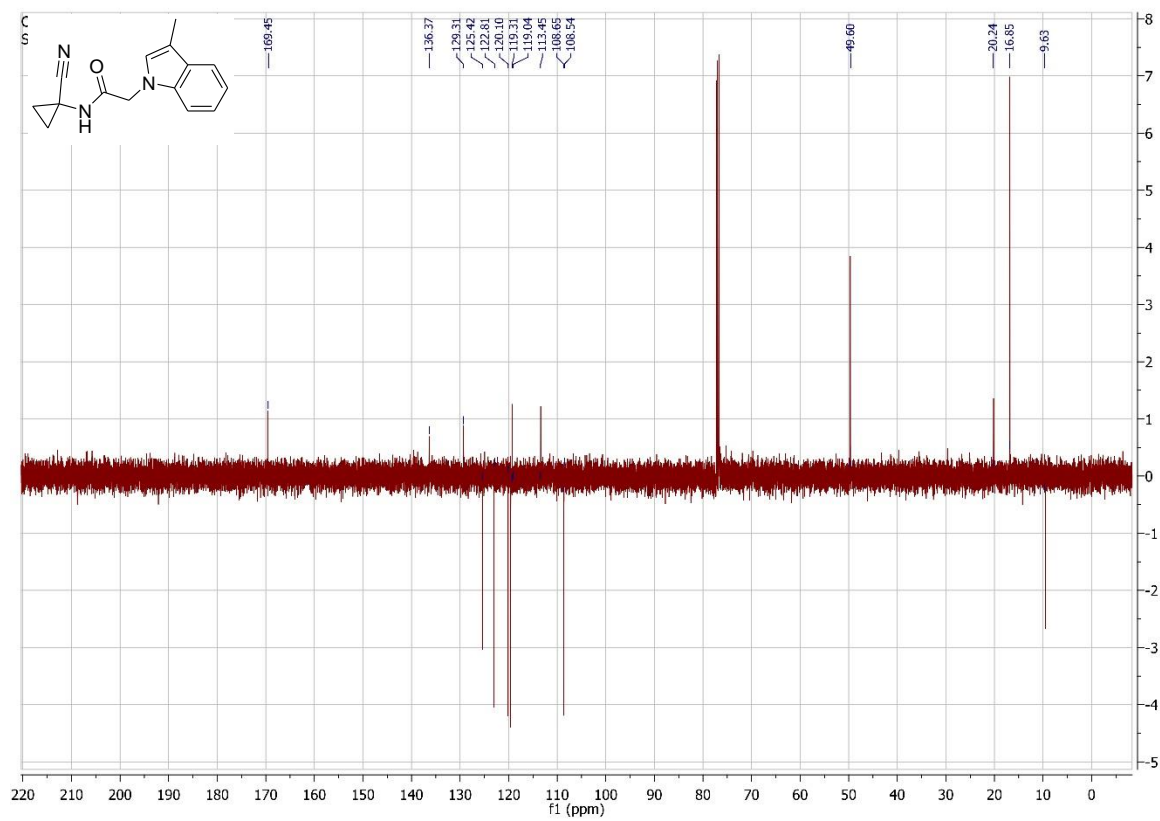


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2	15.78	1983.1	0.1582	5	100.04	12572.0	-0.1030	8	120.37	15127.0	-0.0933	11	137.32	17257.6	0.0259
3	19.92	2503.8	0.0588	6	109.12	13713.6	-0.0975	9	120.74	15173.7	0.0437	12	137.37	17263.3	0.0430

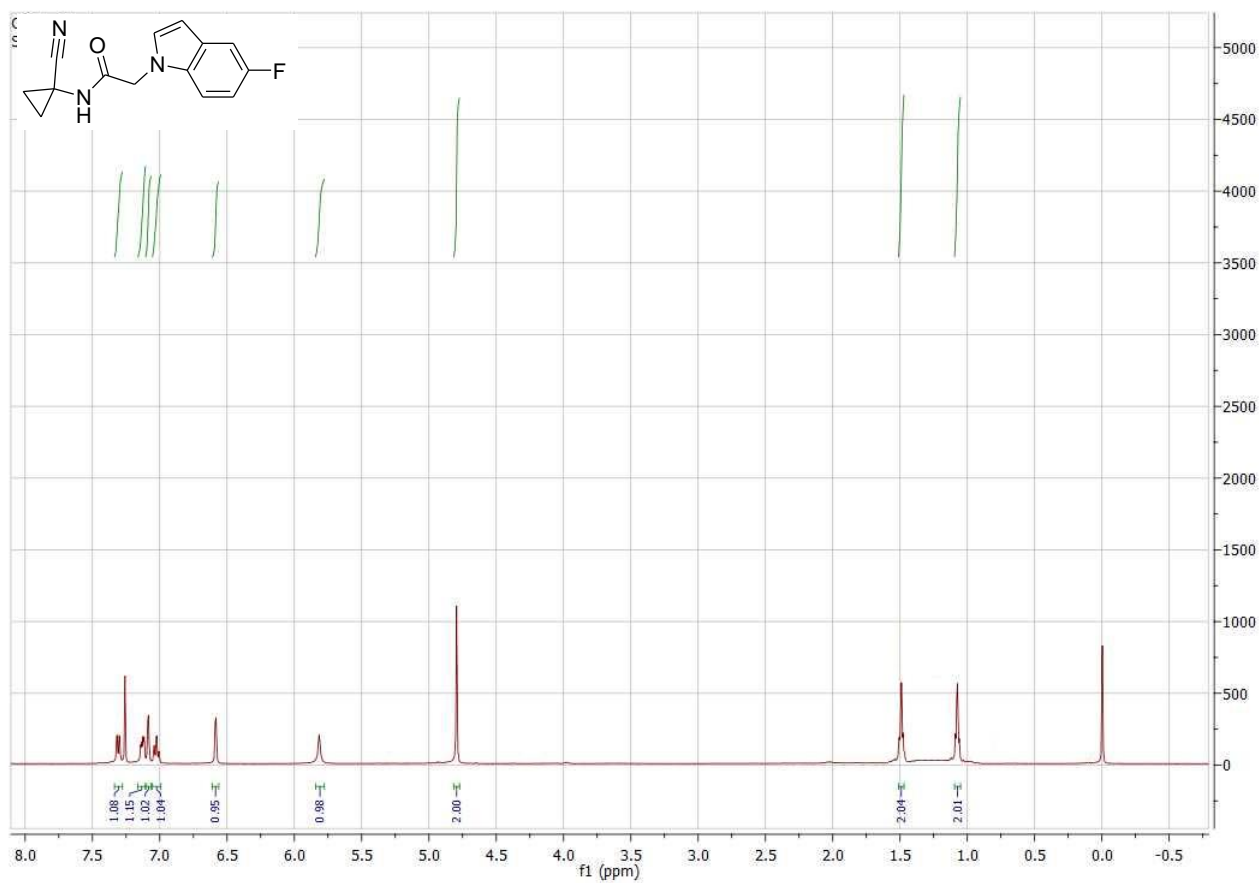
Figure S36.  $^{13}\text{C}$  NMR spectrum of compound **6a**.



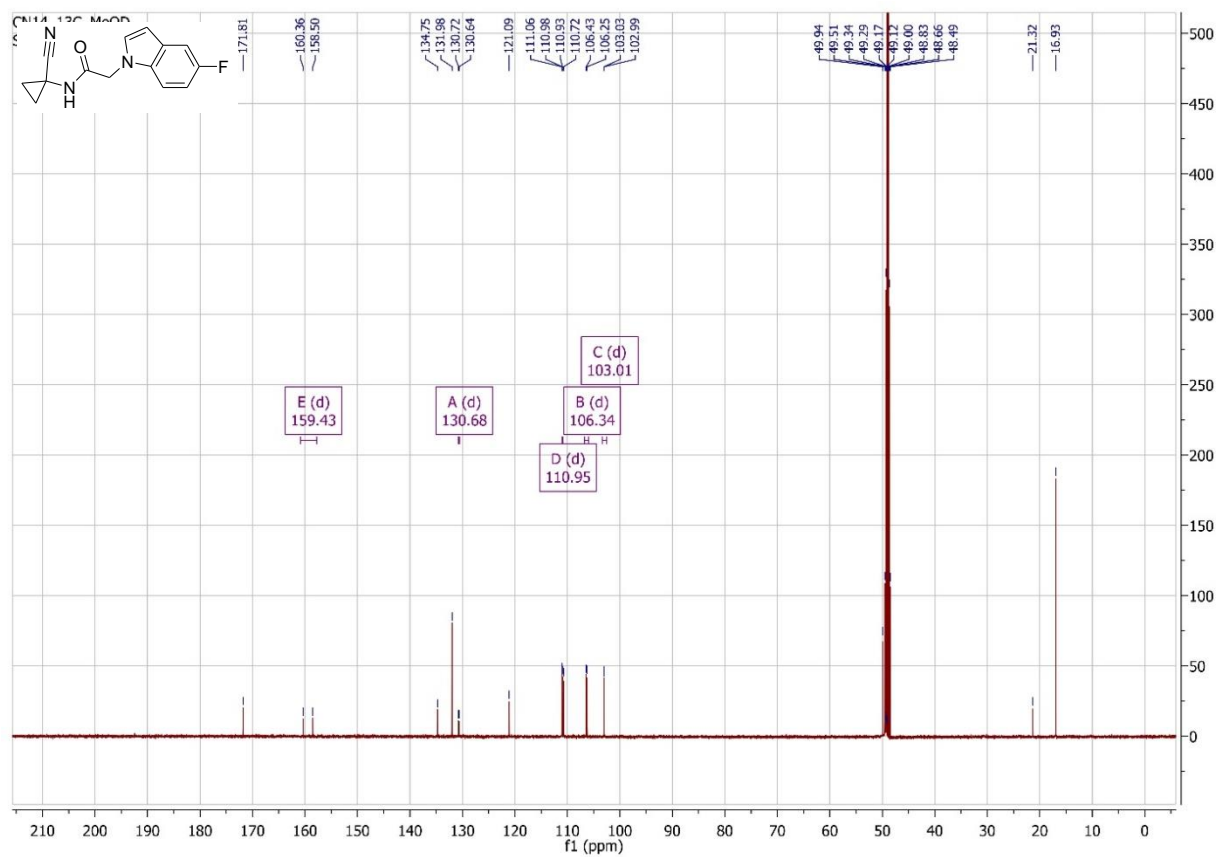
**Figure S37.** <sup>1</sup>H NMR spectrum of compound **7a**.



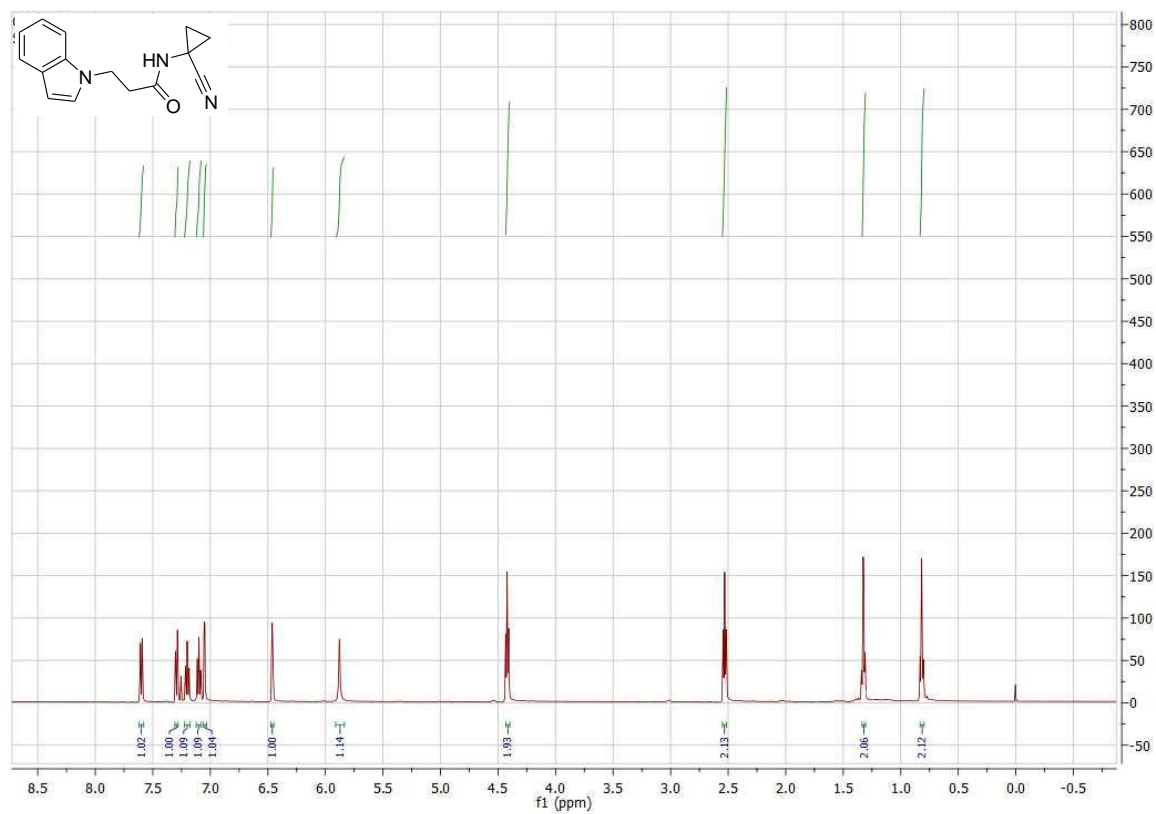
**Figure S38.** <sup>13</sup>C NMR spectrum of compound **7a**.



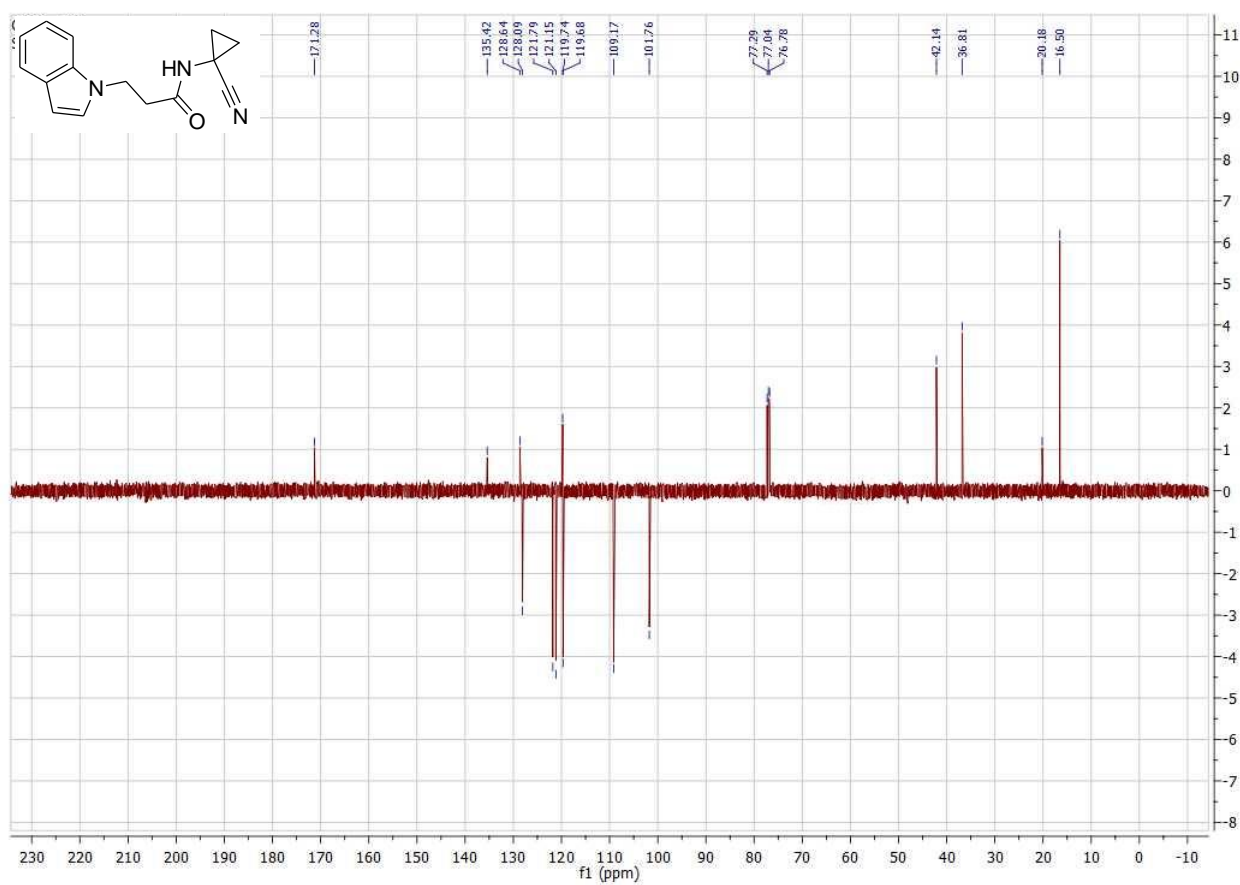
**Figure S39.** <sup>1</sup>H NMR spectrum of compound **8a**.



**Figure S40.** <sup>13</sup>C NMR spectrum of compound **8a**.

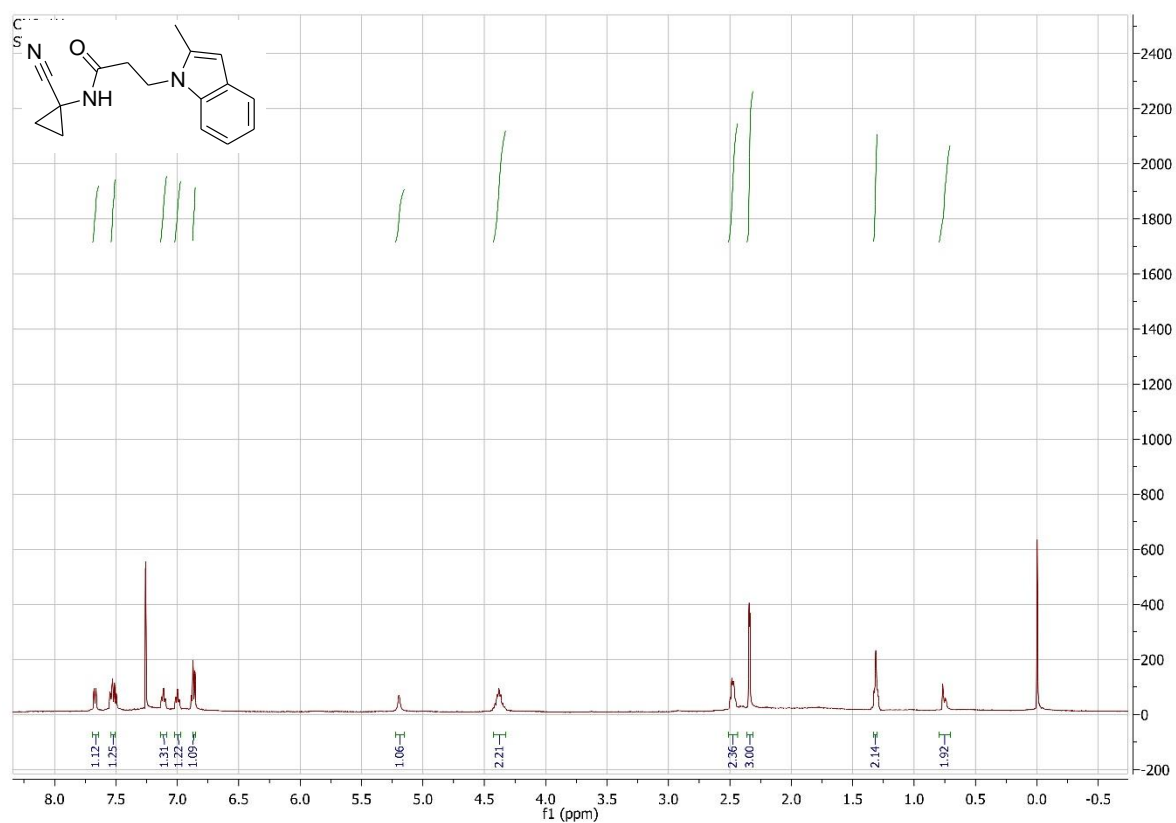


**Figure S41.** <sup>1</sup>H NMR spectrum of compound **5b**.

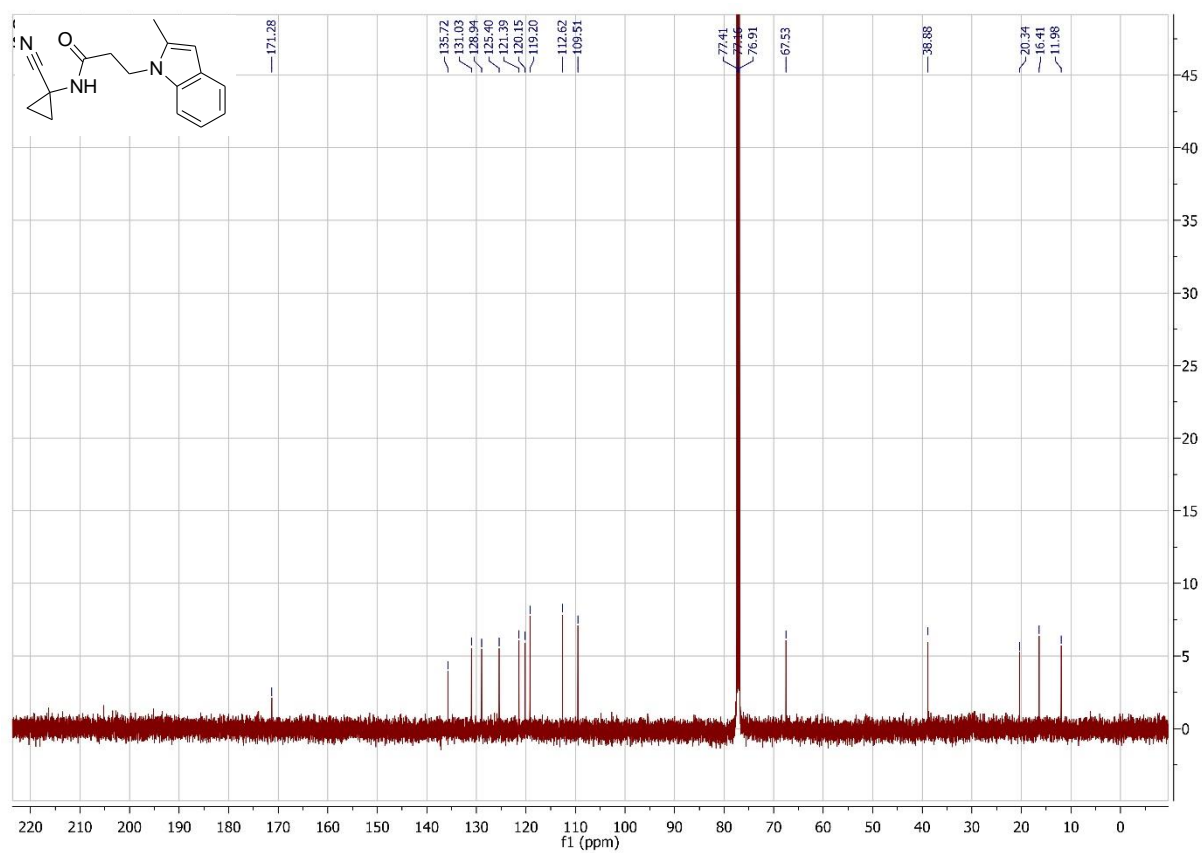


**Figure S42.** <sup>13</sup>C NMR spectrum of compound **5b**.



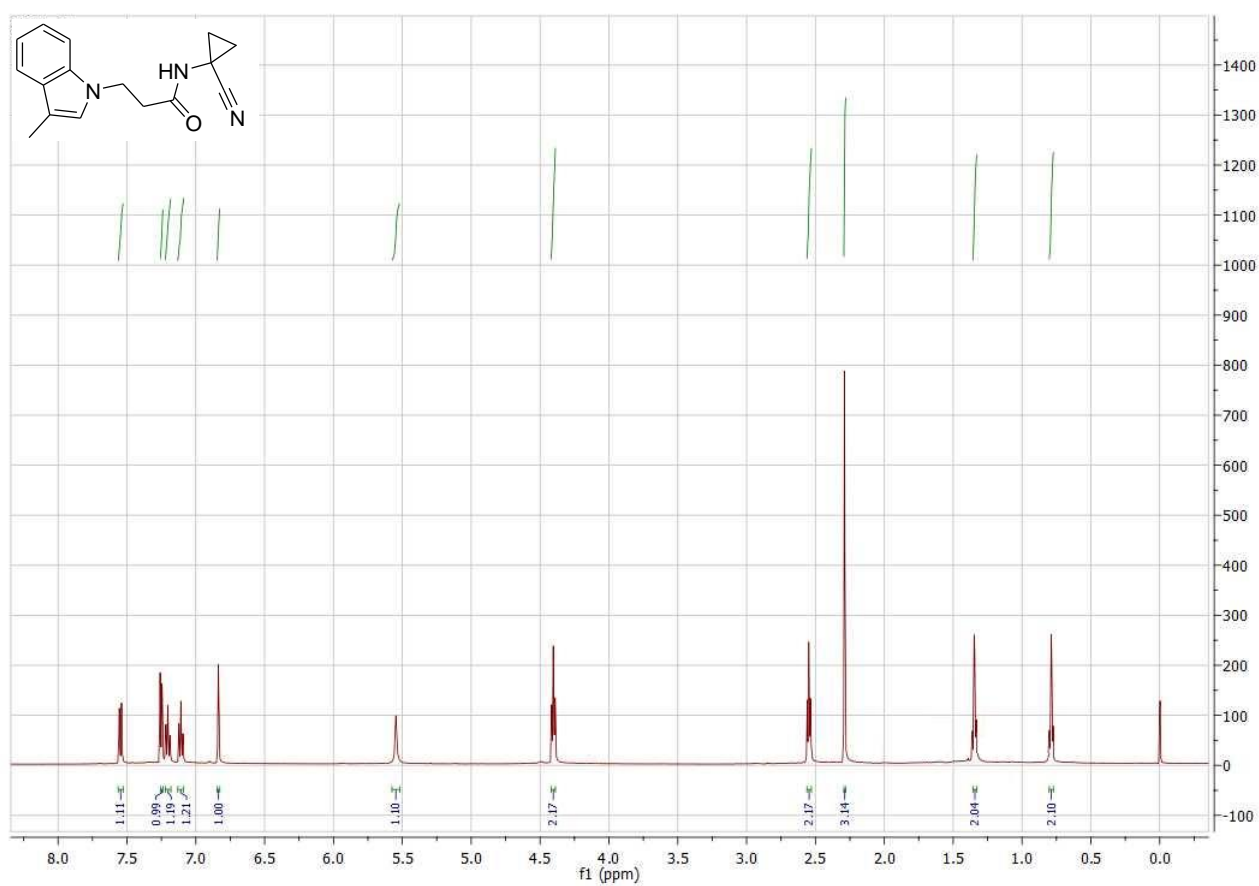


**Figure S43.** <sup>1</sup>H NMR spectrum of compound **6b**.

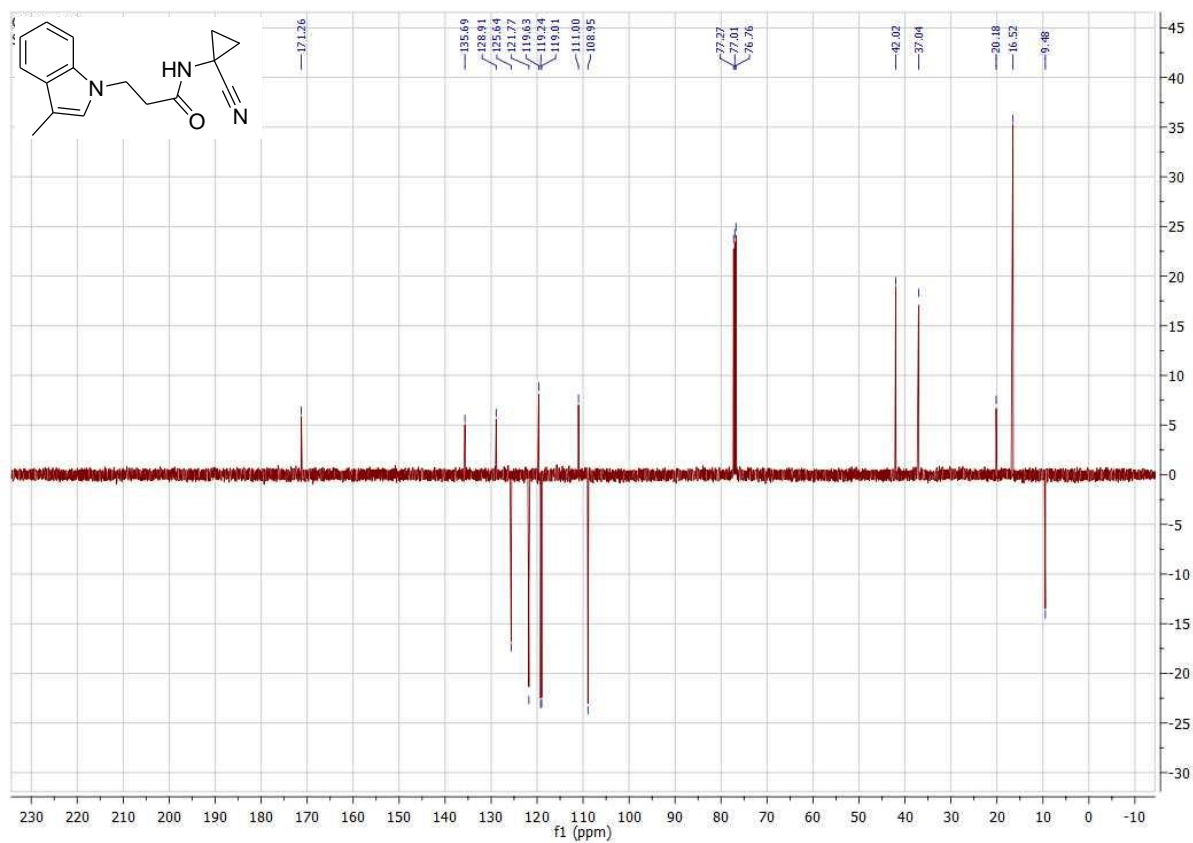


**Figure S44.** <sup>13</sup>C NMR spectrum of compound **6b**.

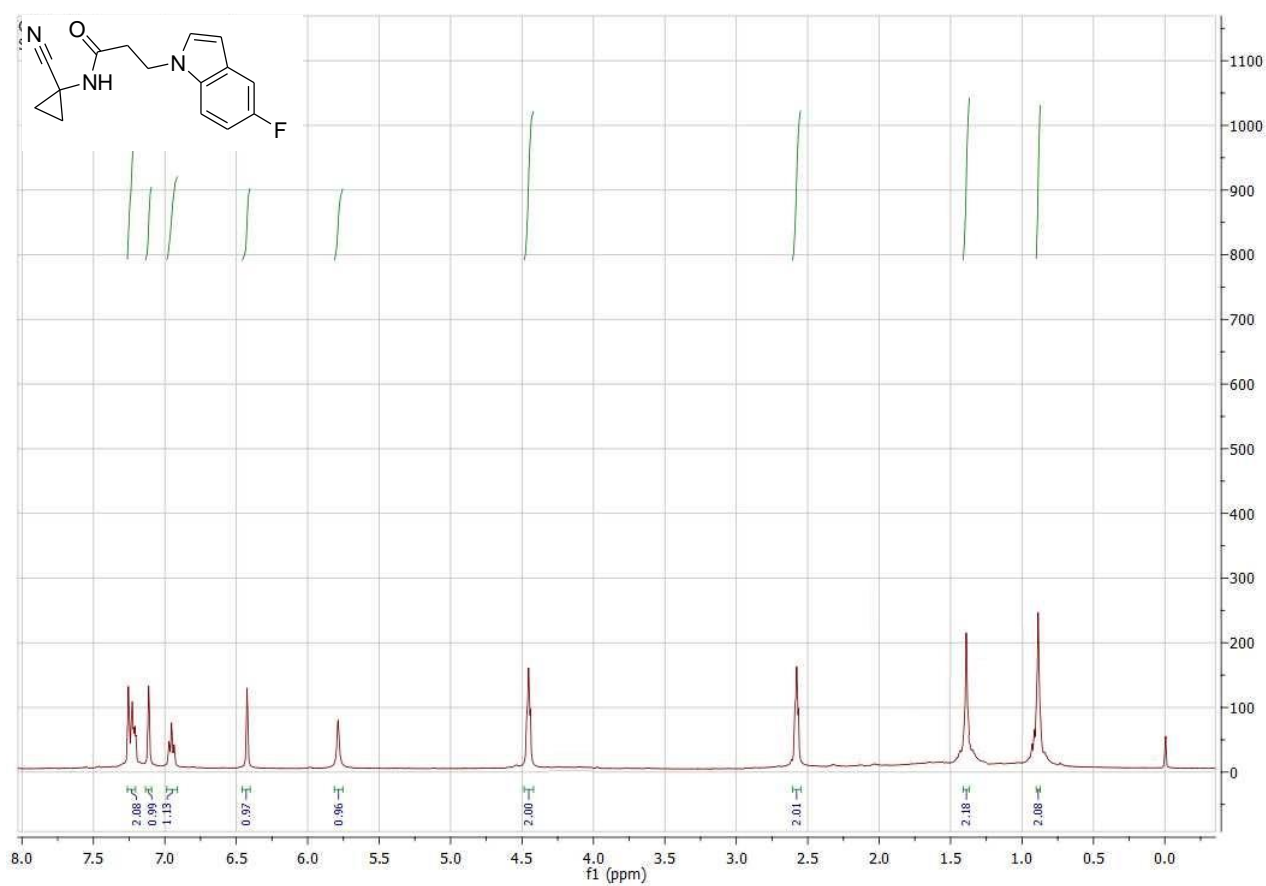




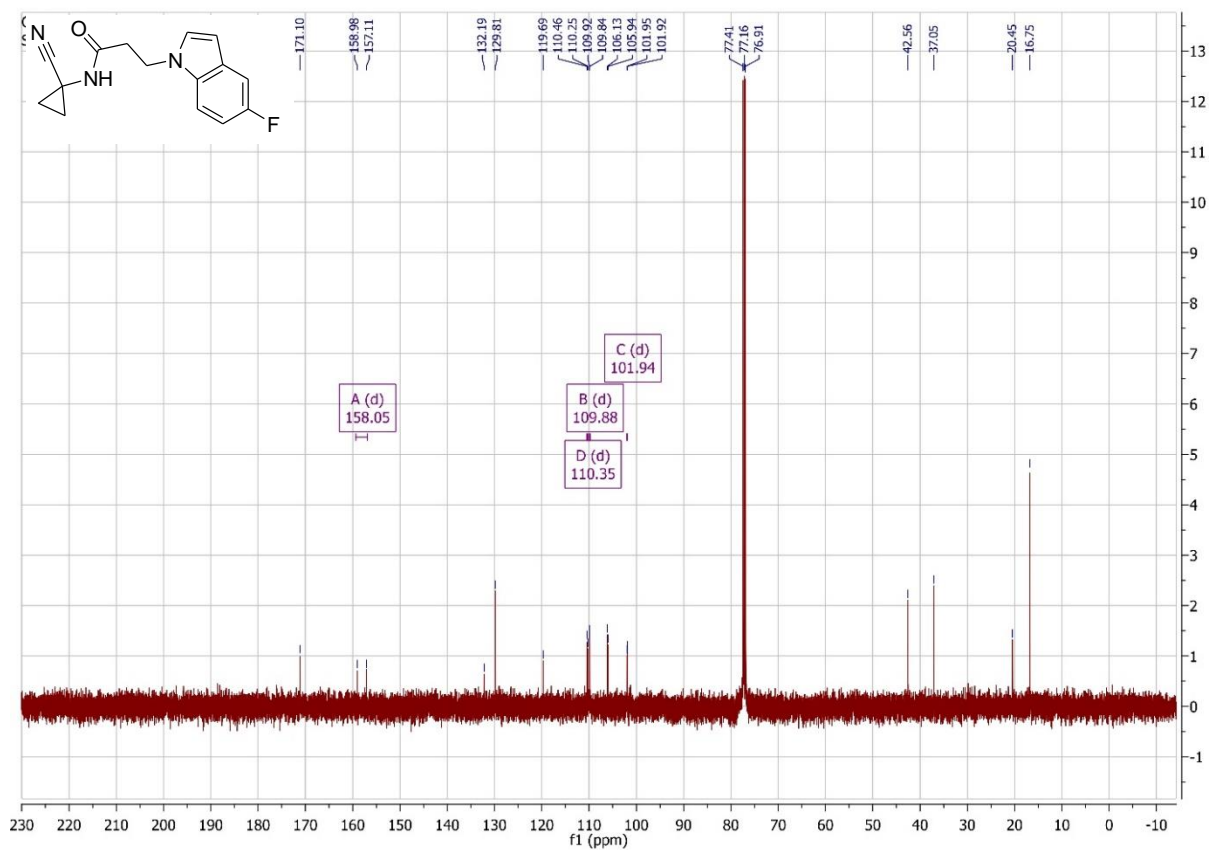
**Figure S45.** <sup>1</sup>H NMR spectrum of compound **7b**.



**Figure S46.** <sup>13</sup>C NMR spectrum of compound **7b**.



**Figure S47.** <sup>1</sup>H NMR spectrum of compound **8b**.



**Figure S48.** <sup>13</sup>C NMR spectrum of compound **8b**.