

# 5 Supplementary material

## Copies of $^1\text{H}$ and $^{13}\text{C}$ NMR spectra of compounds

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**Scheme S1:** Synthesis of furoic acid (**1**) by oxidation of furfural with  
 (a) 30%  $\text{H}_2\text{O}_2$  in the presence CuCl as a catalyst, (b) 70% *t*-BuOOH in  
 the presence  $\text{CuBr}_2$  as a catalyst. Synthesis of 2,5-furandicarboxylic  
 acid (**4**) (c) using 70% *t*-BuOOH and  $\text{CuBr}_2$  as a catalyst

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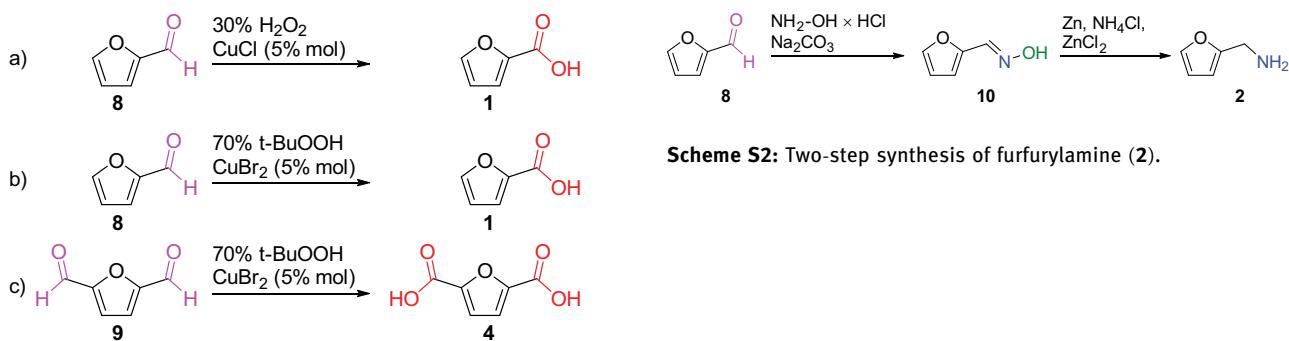
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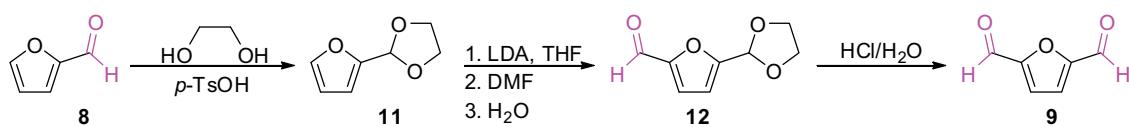
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**Scheme S2:** Two-step synthesis of furfurylamine (**2**).



**Scheme S3:** Three-step synthesis of furan-2,5-dicarboxaldehyde (**9**).

**Table S1:** Optimization of conditions for the synthesis of furfurylamine (2)

Entry	Reaction time of second step [min]	Solvent used for extraction	Yield [%]
1	15	<i>n</i> -Heptane	16 <sup>a</sup>
2	20	MTBE	63
3	30	MTBE	76
4	60	MTBE	76

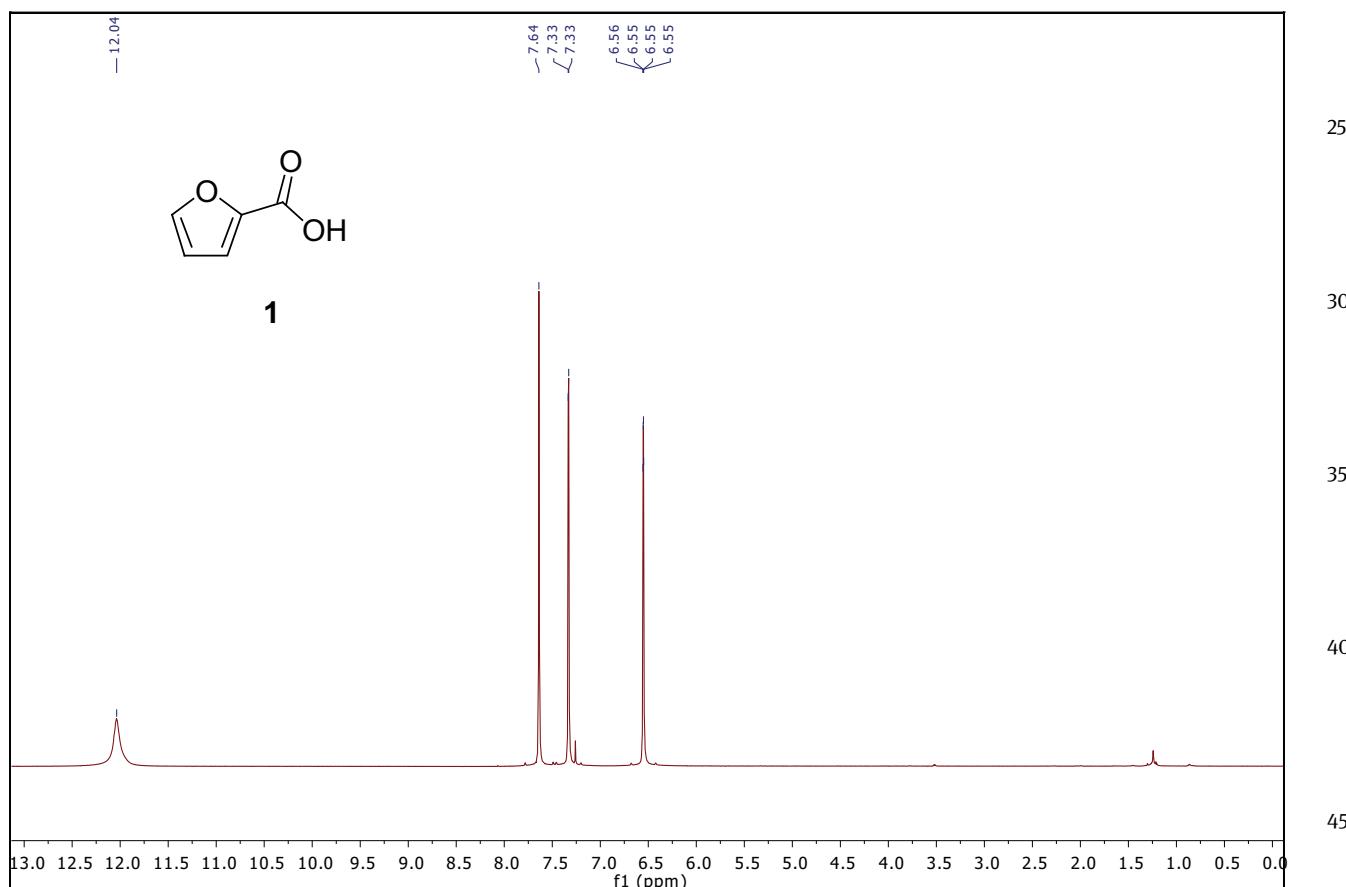
<sup>a</sup>Reaction yield under original procedure conditions.

**Table S2:** Optimization of 2-(2-furanyl)-1,3-dioxolane (**11**) synthesis

Solvent	Boiling point of the solvent [°C]	Reaction time [h]	Yield [%]
Toluene	110	4	68
Toluene	110	8	72
1,2-Dichloroethane	83	6	71
1,2-Dichloroethane	83	8	82
MTBE	55	4	0

## Copies of <sup>1</sup>H and <sup>13</sup>C NMR spectra of compounds

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**Figure S1:** <sup>1</sup>H NMR (700 MHz, CDCl<sub>3</sub>) of compound **1**.

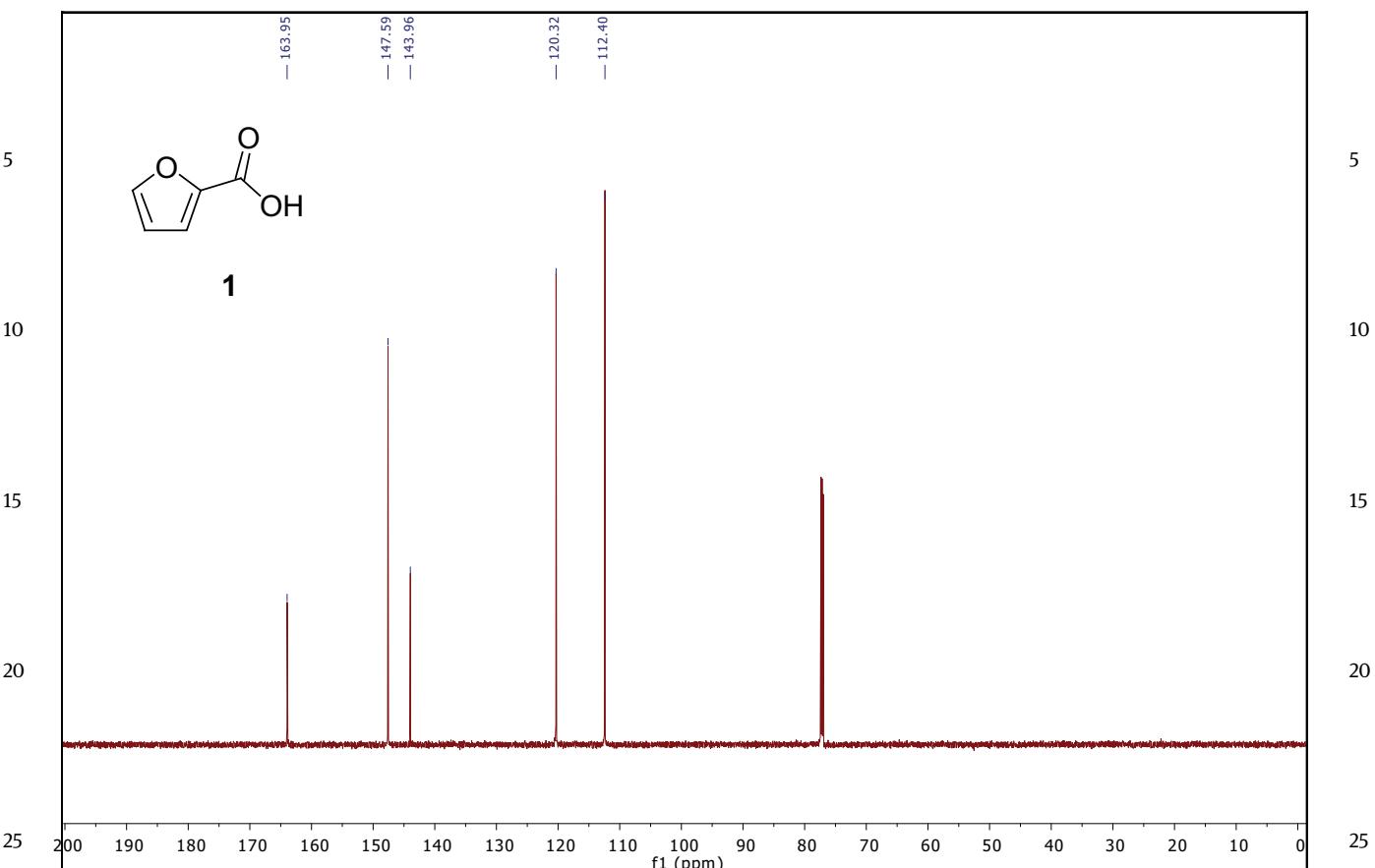


Figure S2:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound 1.

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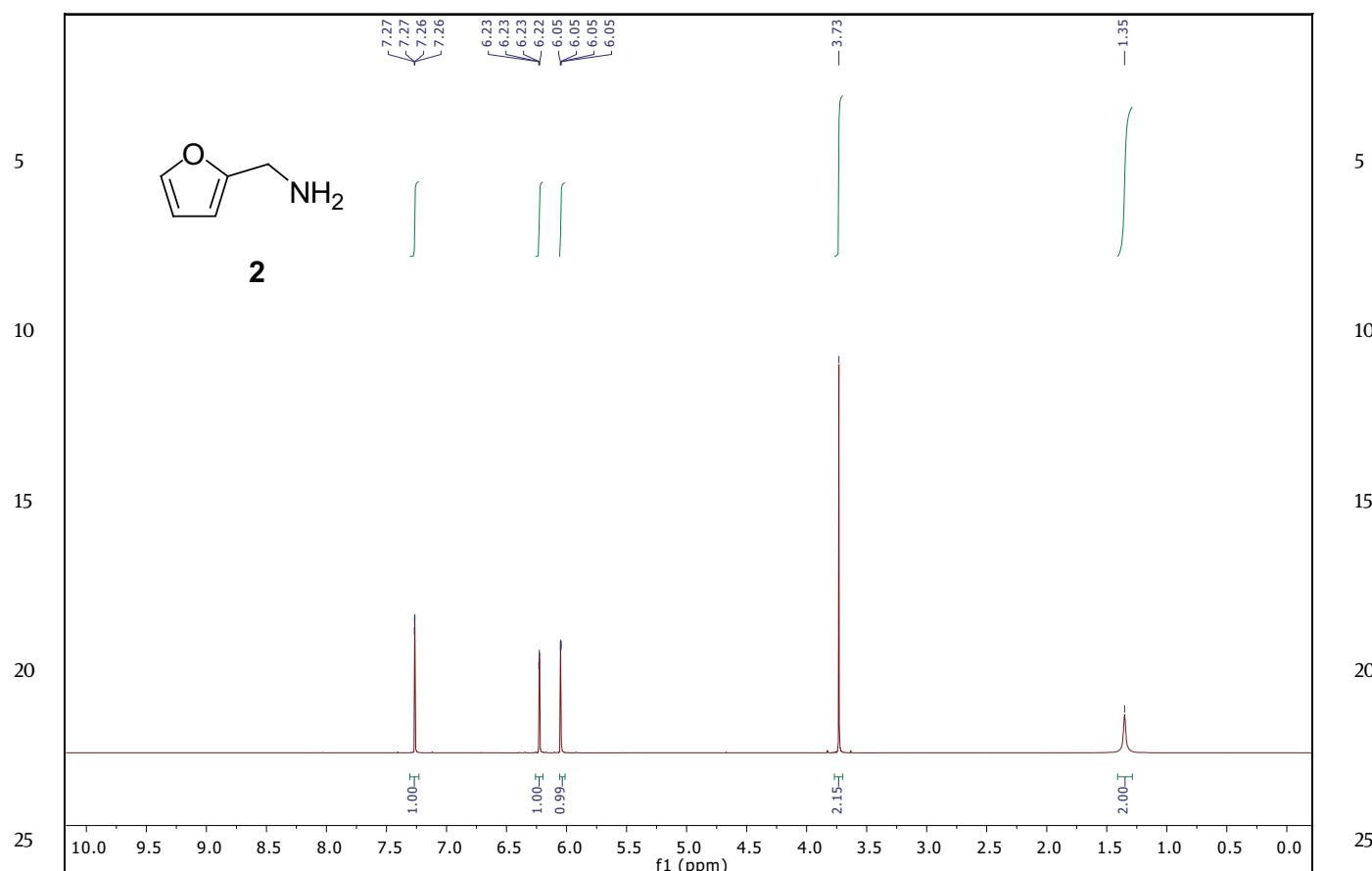


Figure S3:  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound 2.

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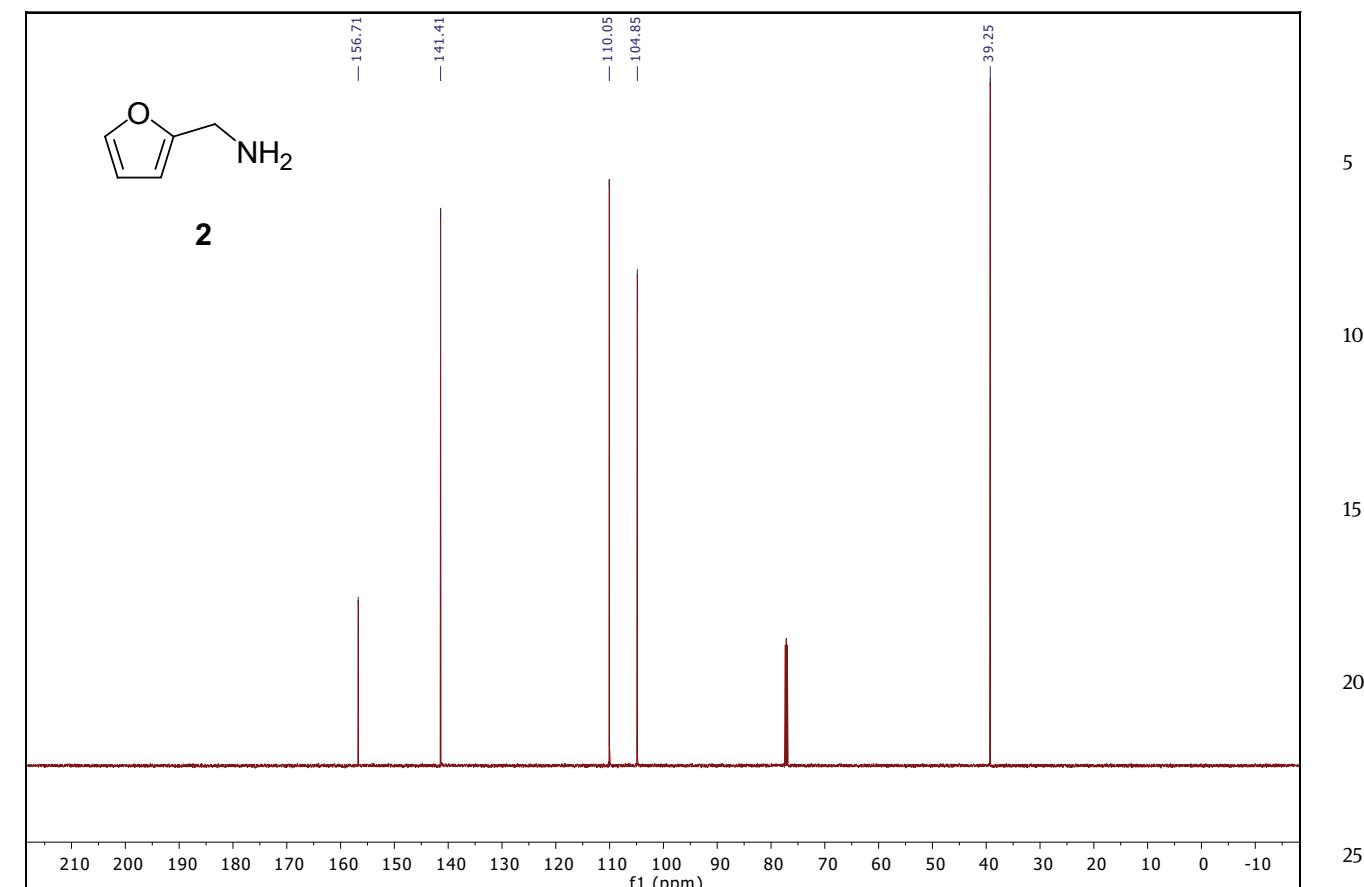


Figure S4:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound 2.

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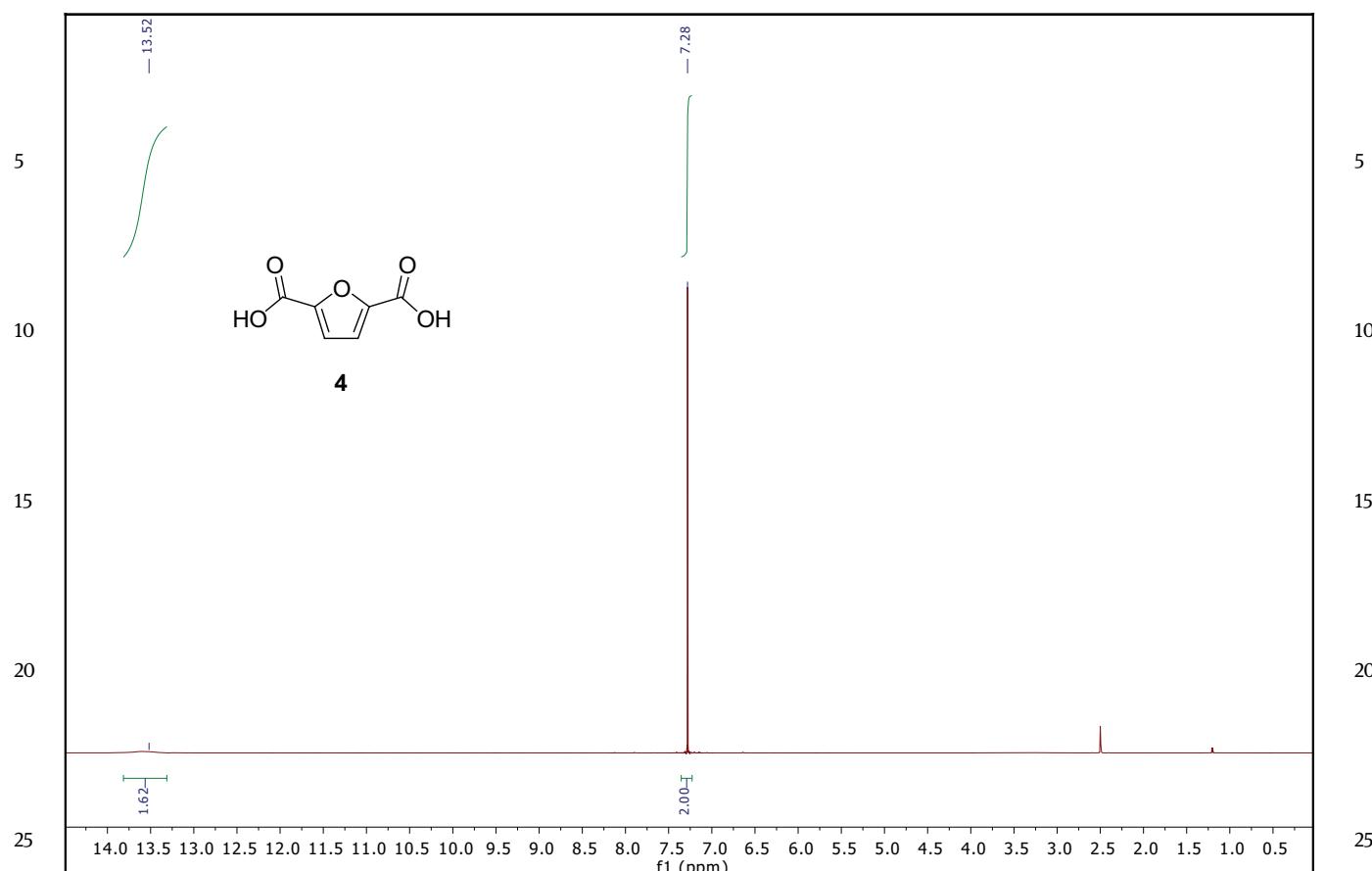
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**Figure S5:**  $^1\text{H}$  NMR (700 MHz, DMSO- $d_6$ ) of compound 4.

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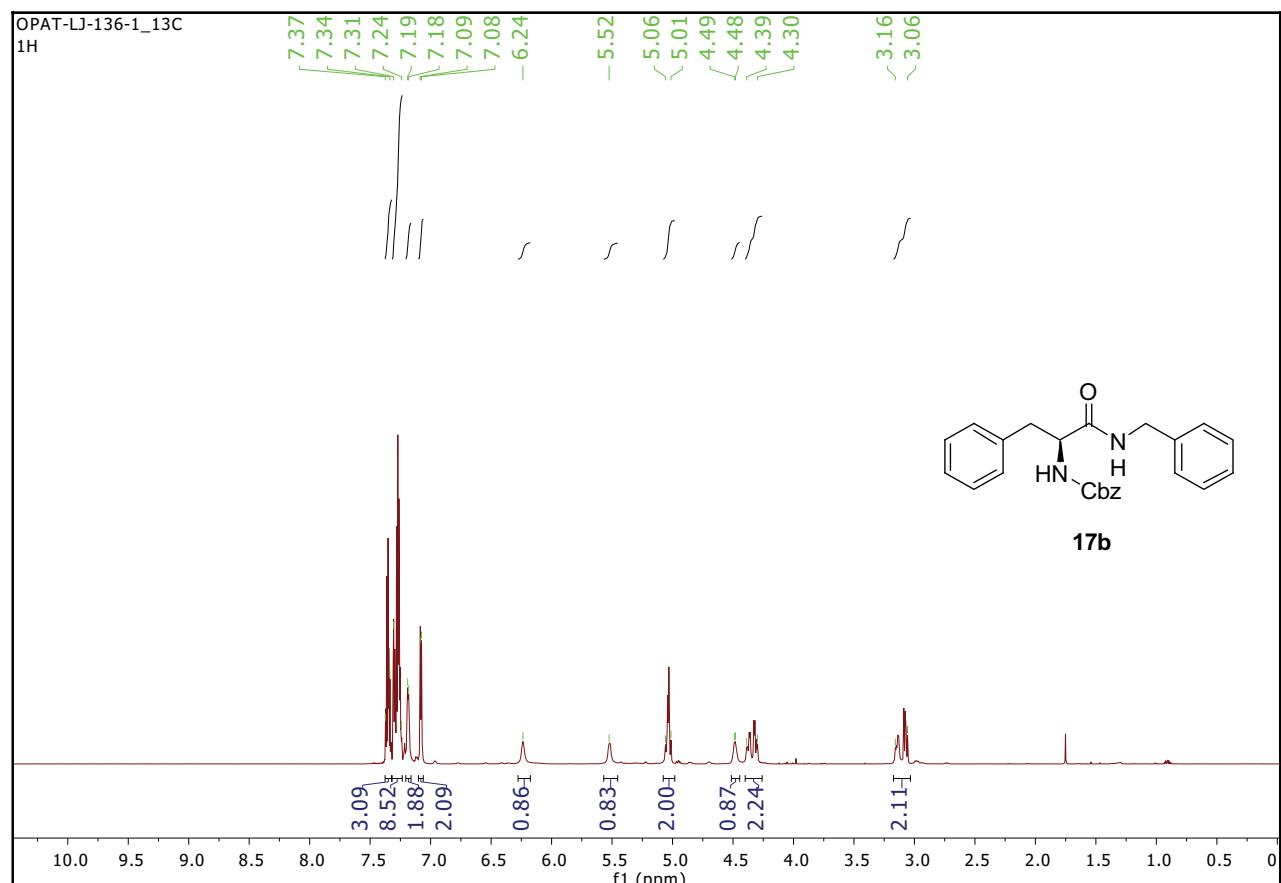


Figure S6: <sup>13</sup>C NMR (176 MHz, DMSO-d<sub>6</sub>) of compound **4**.

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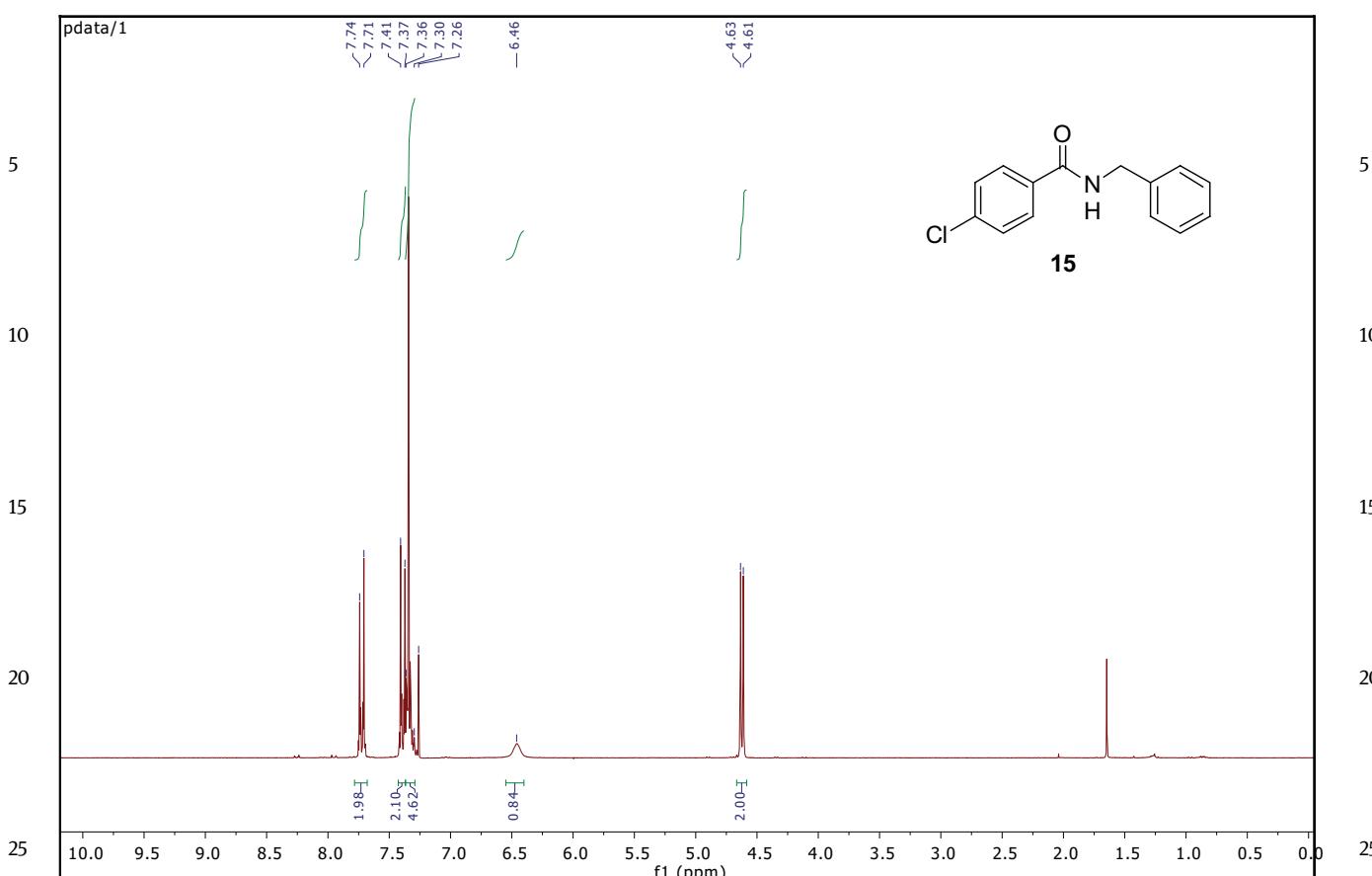
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**Figure S7:**  $^1\text{H}$  NMR (250 MHz,  $\text{CDCl}_3$ ) of compound **15**.

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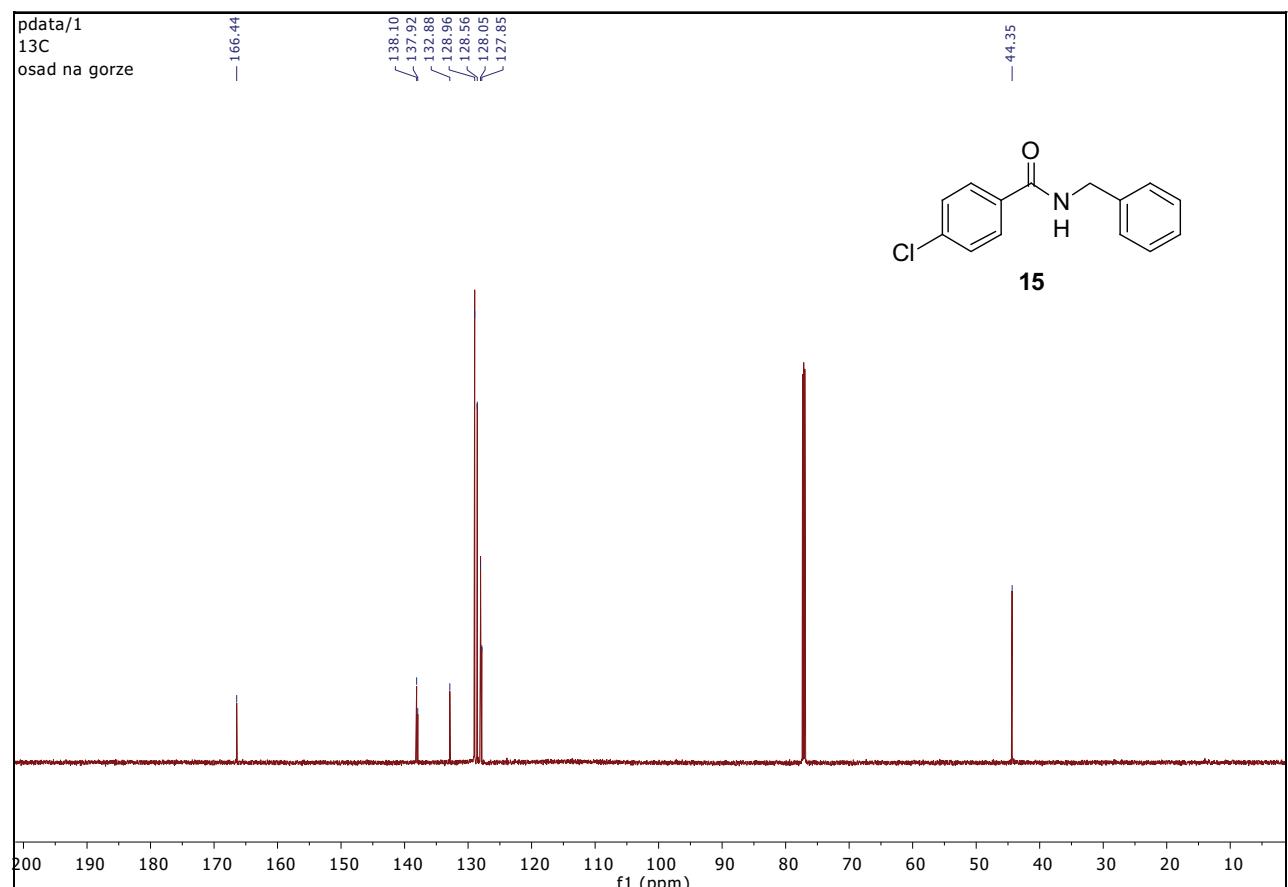


Figure S8:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound **15**.

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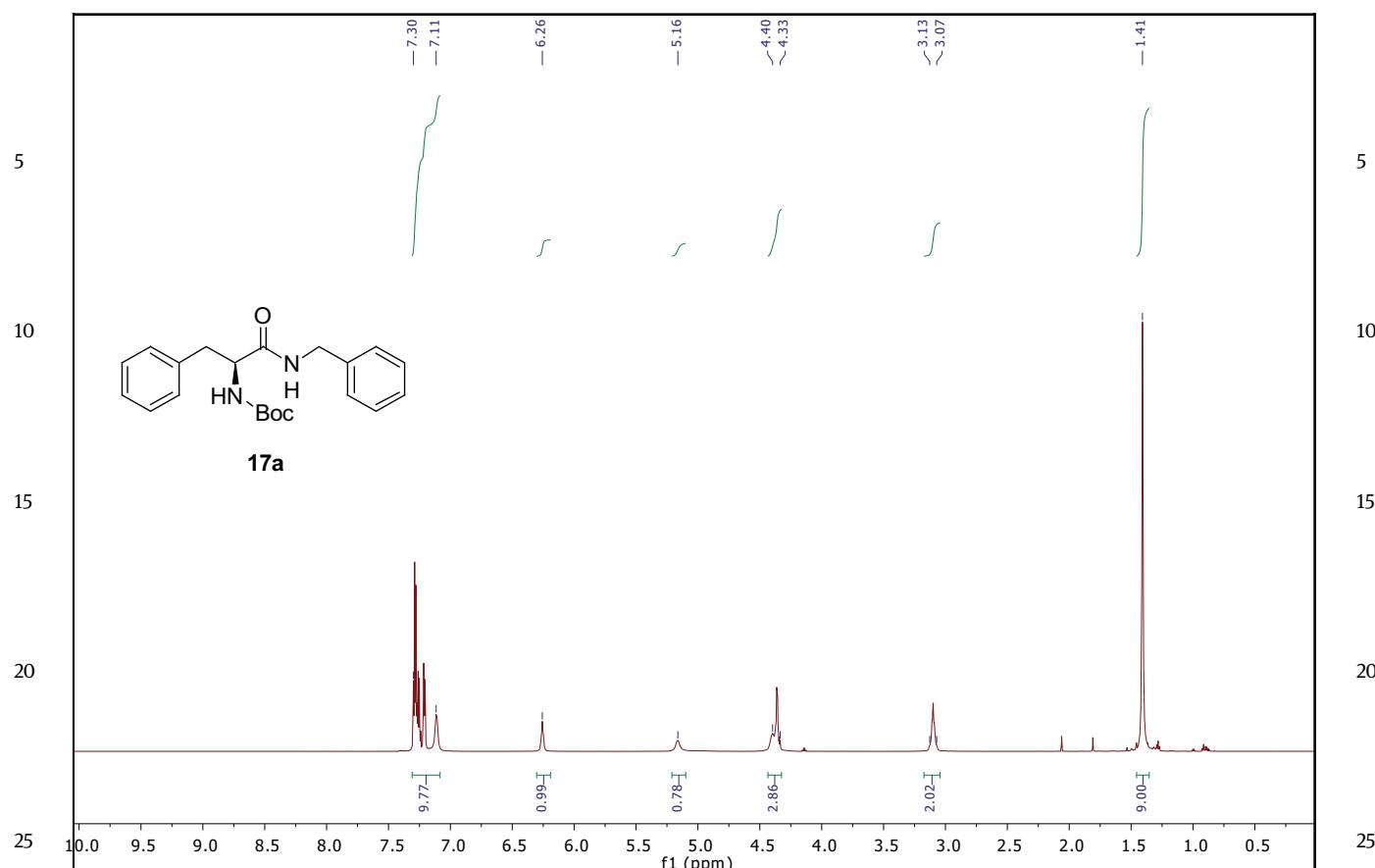
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**Figure S9:**  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound **17a**.

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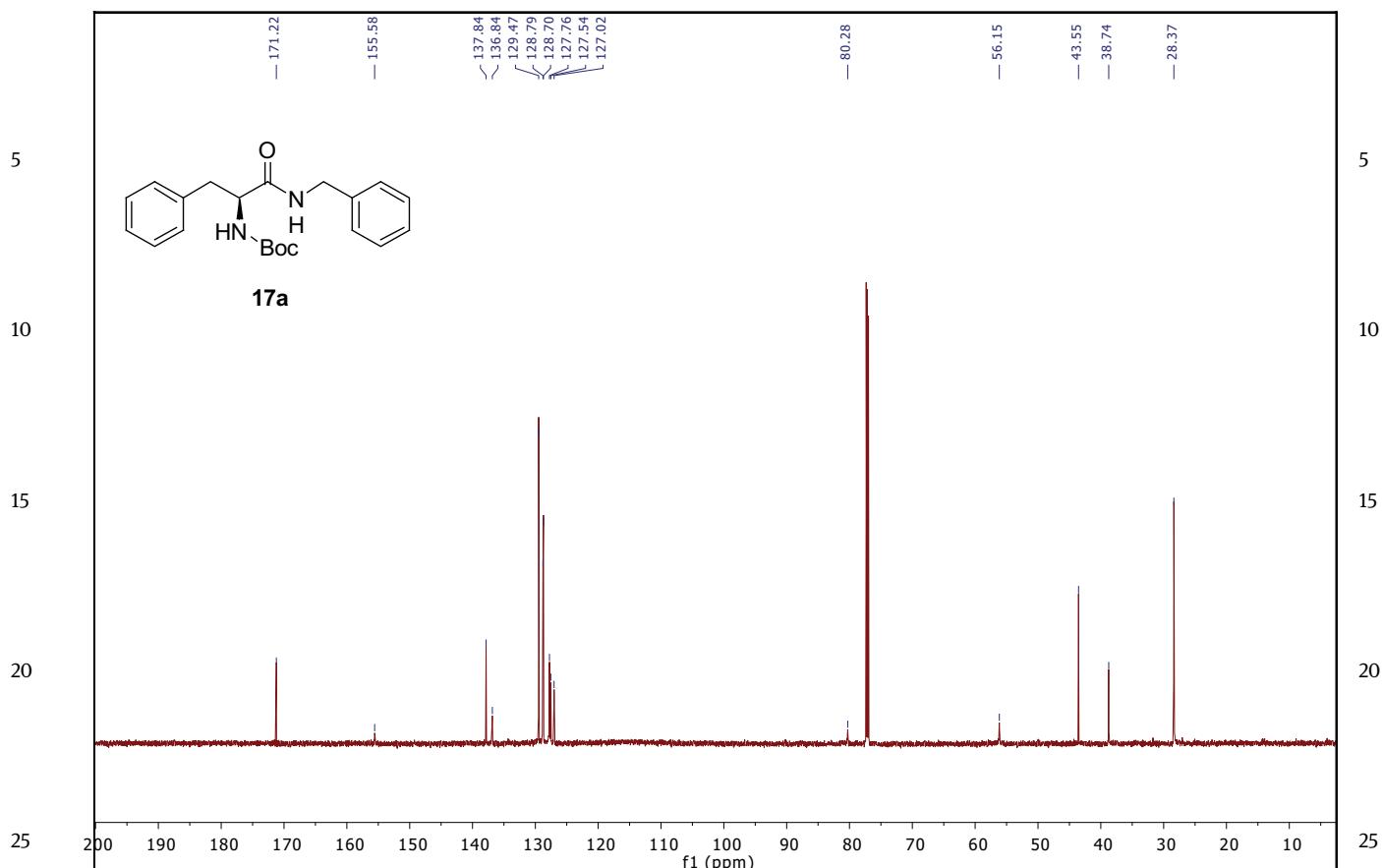


Figure S10:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound **17a**.

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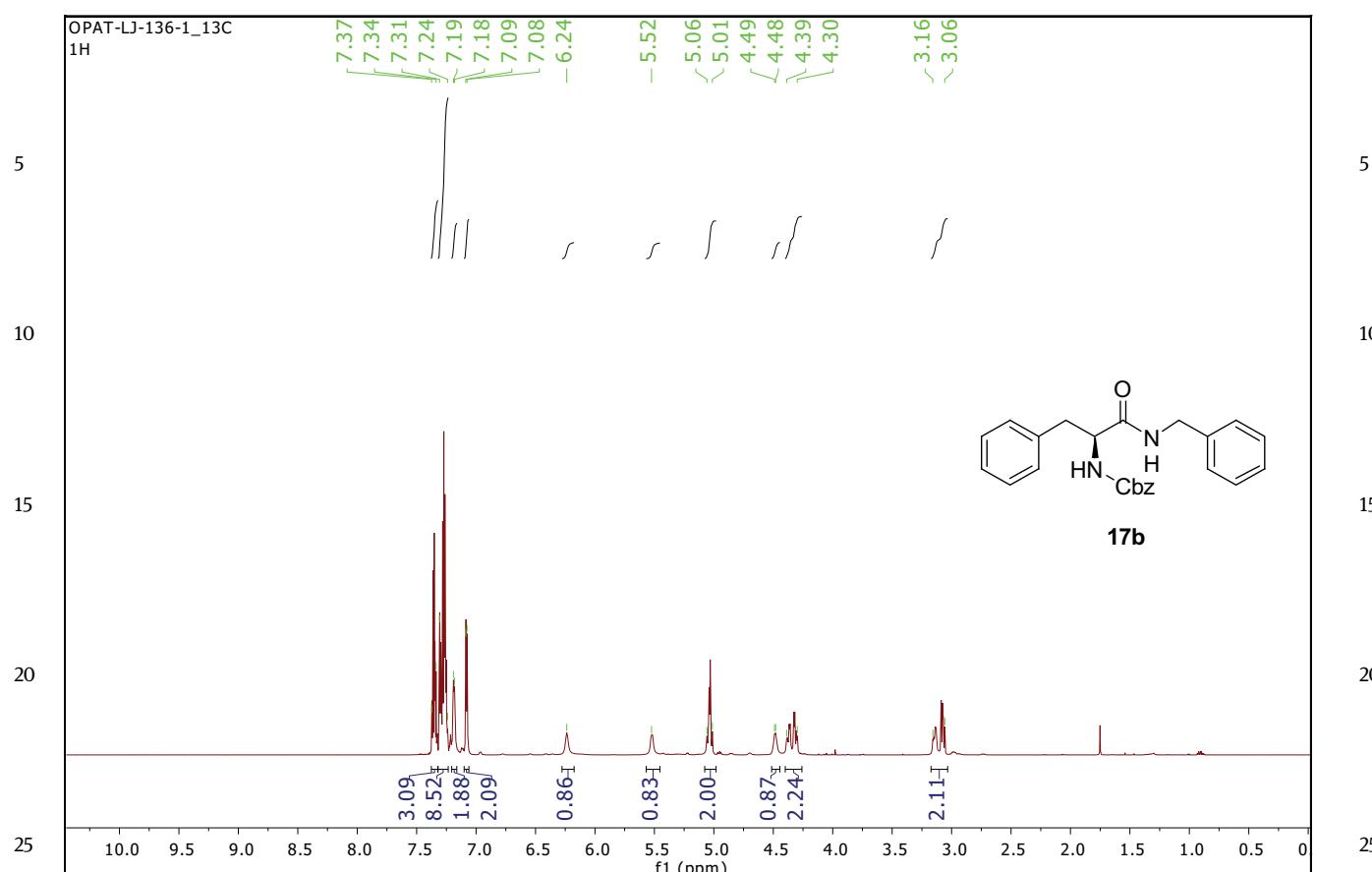
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**Figure S11:**  $^1\text{H}$  NMR(700 MHz,  $\text{CDCl}_3$ ) of compound **17b**.

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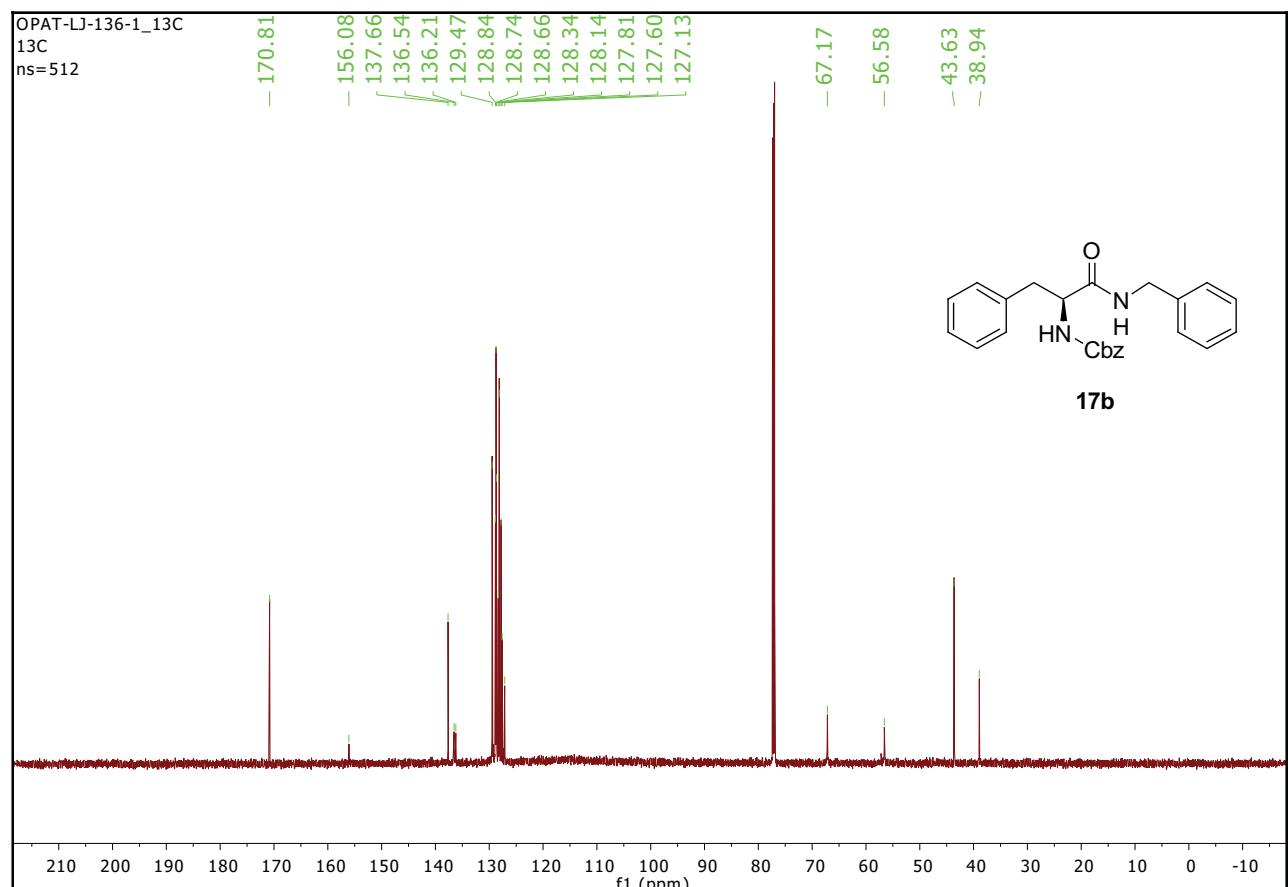


Figure S12:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound 17b.

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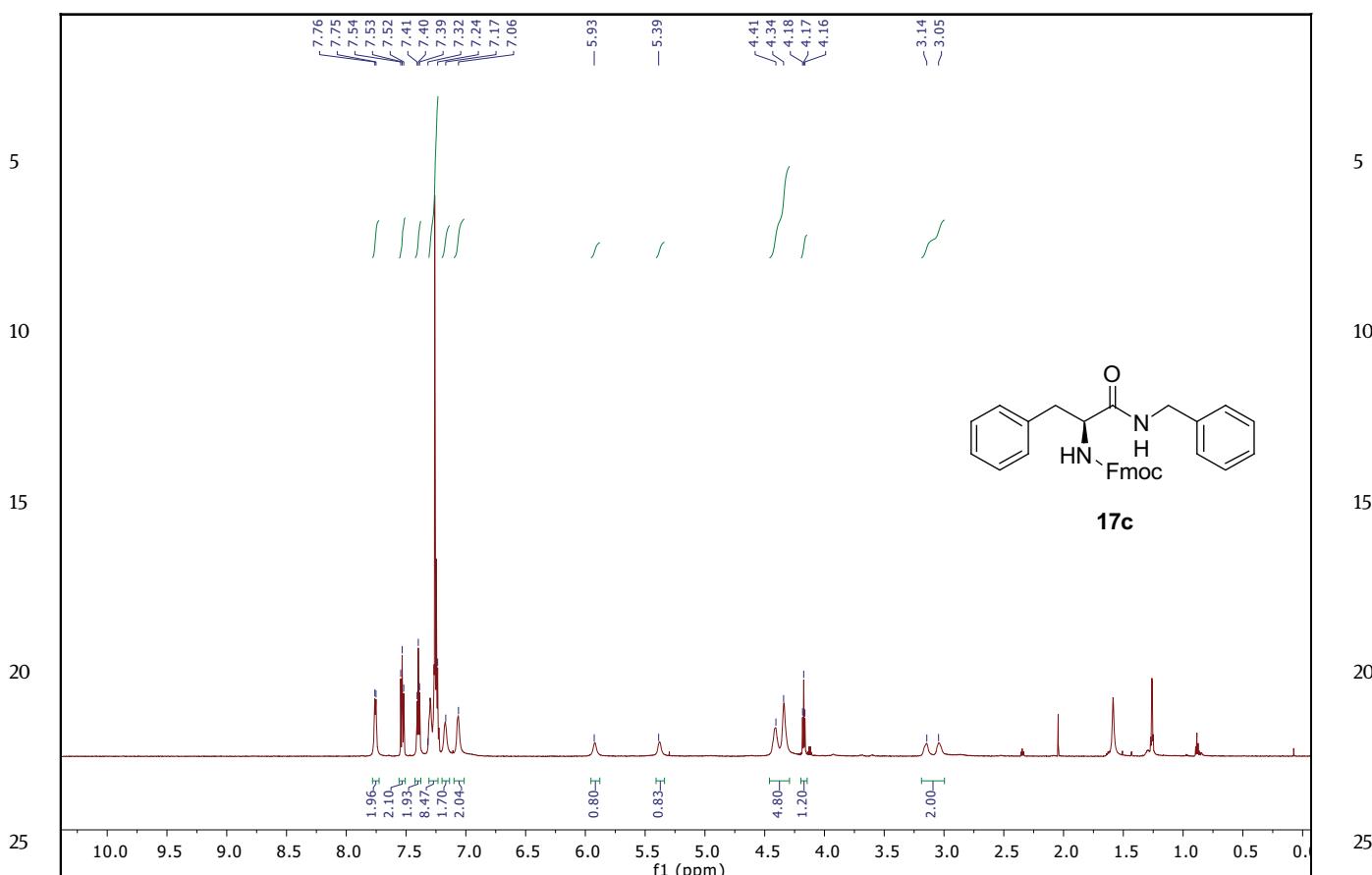
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**Figure S13:**  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound **17c**.

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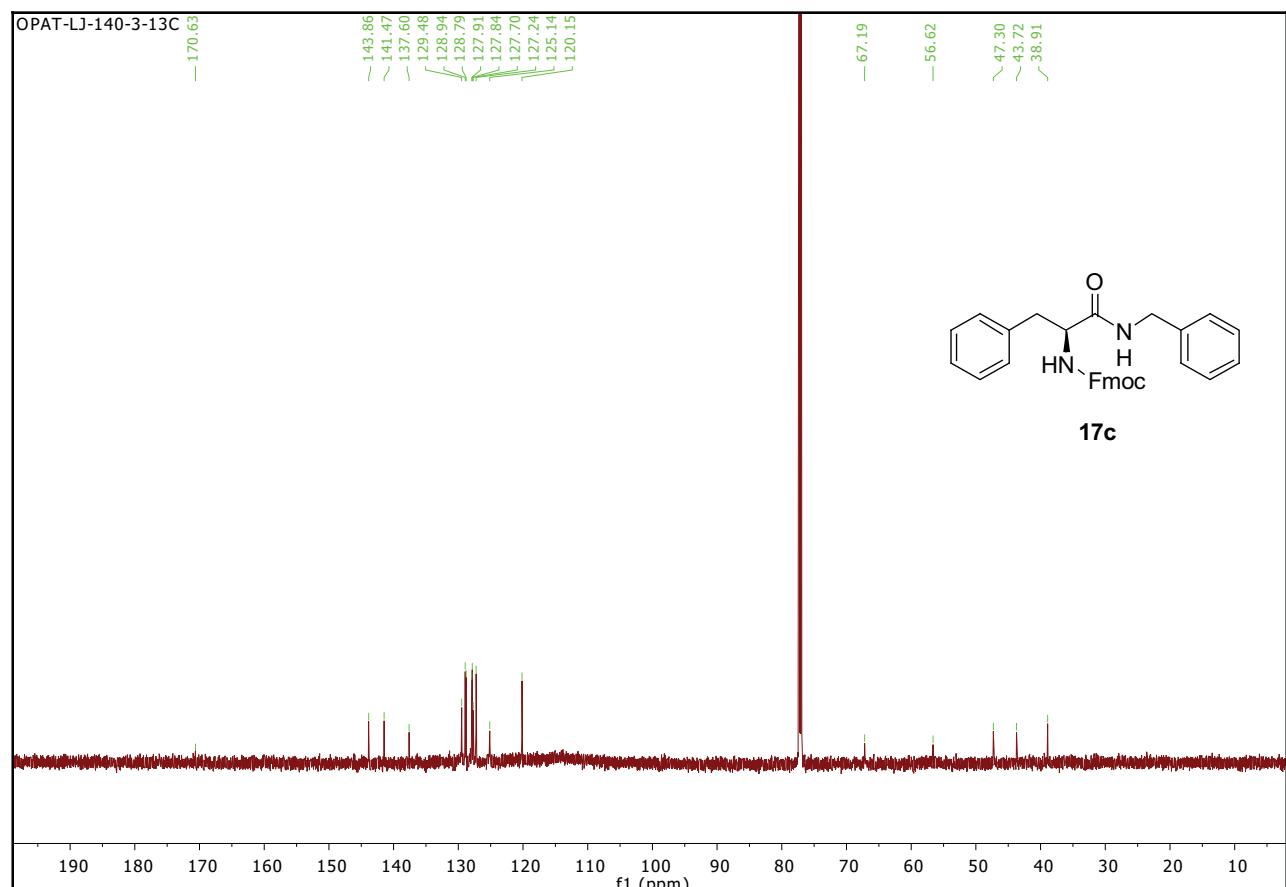


Figure S14:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound **17c**.

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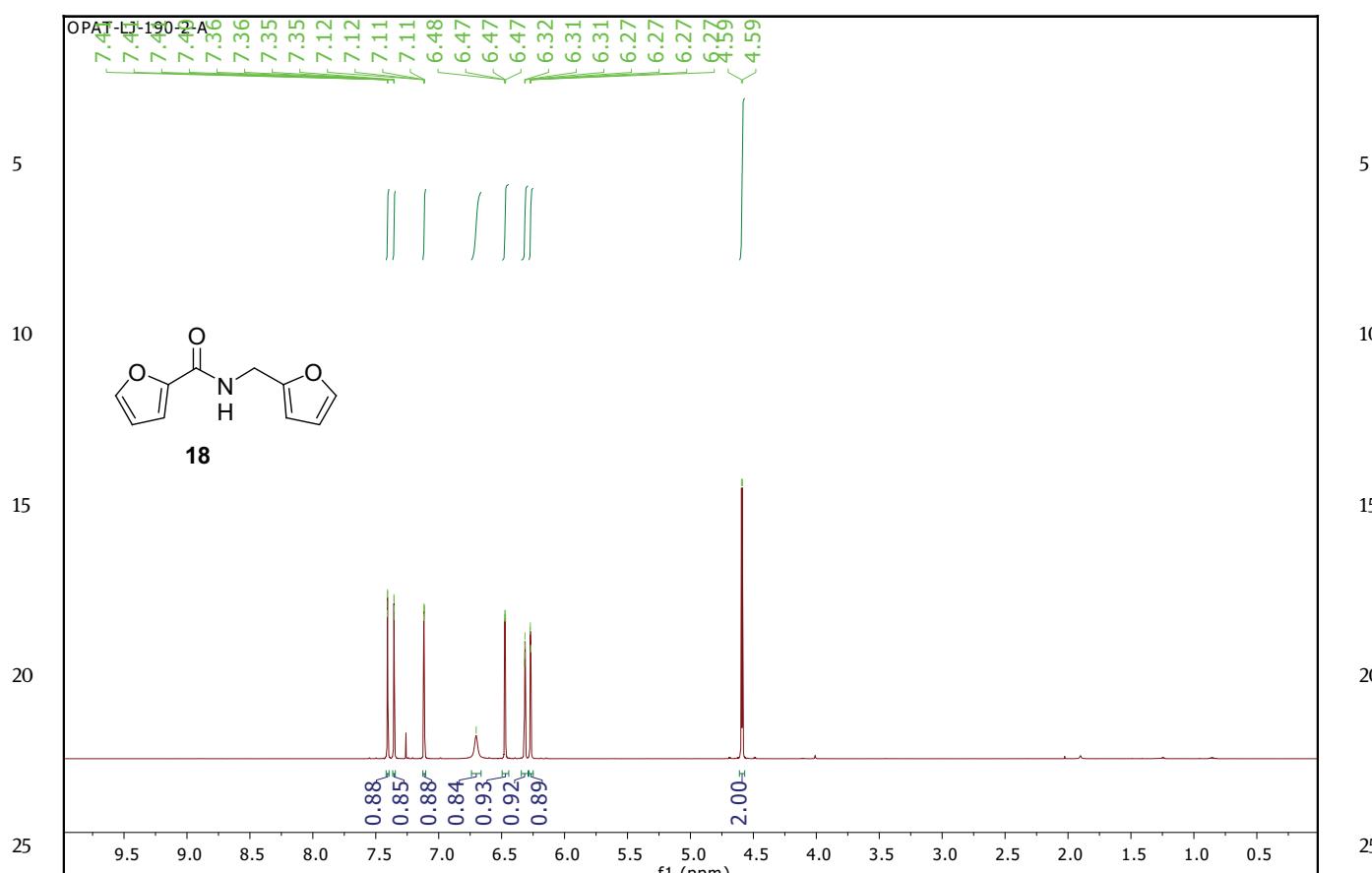
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**Figure S15:**  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound **18**.

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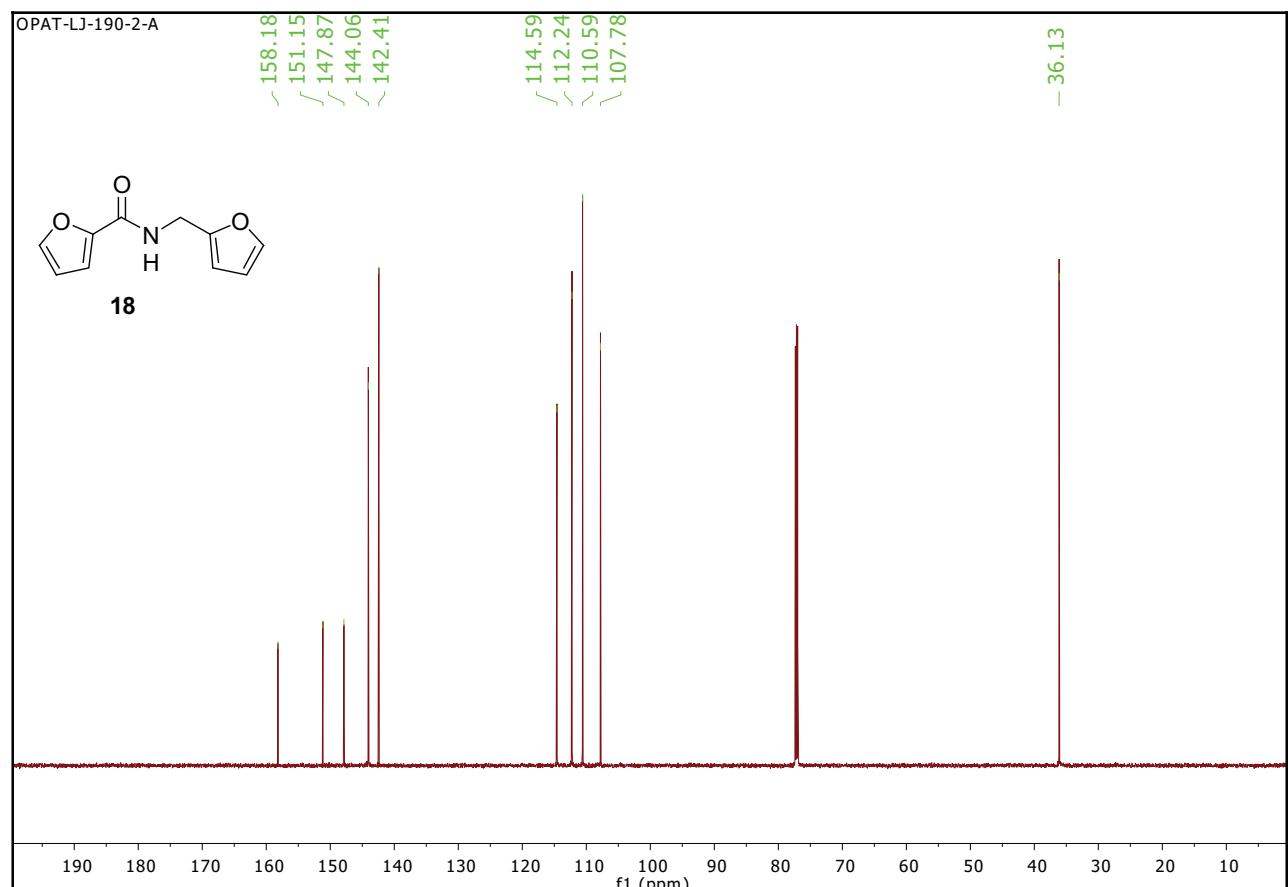


Figure S16:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound **18**.

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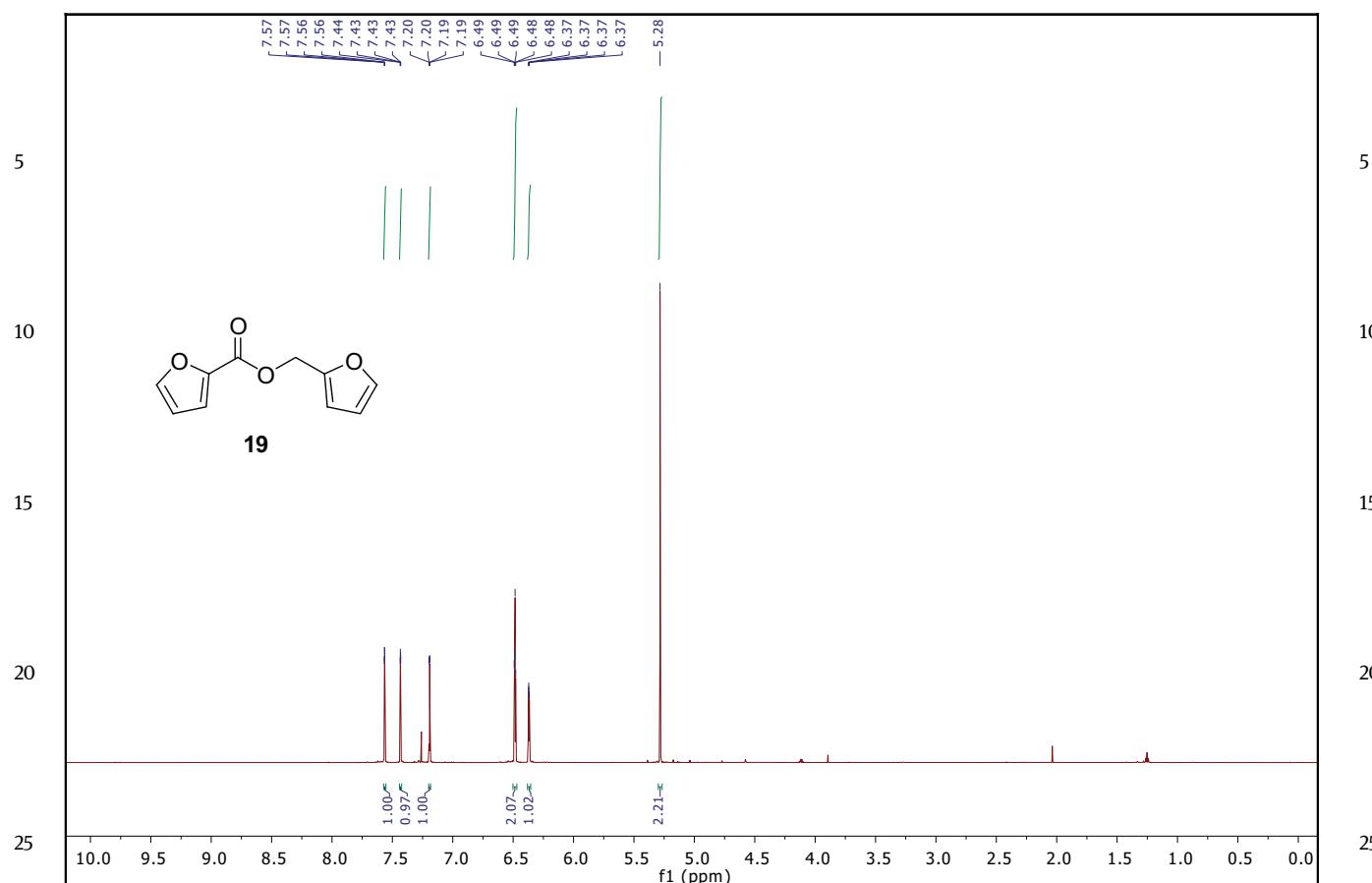
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**Figure S17:**  $^1\text{H}$  NMR (700 MHz, CDCl<sub>3</sub>) of compound **19**.

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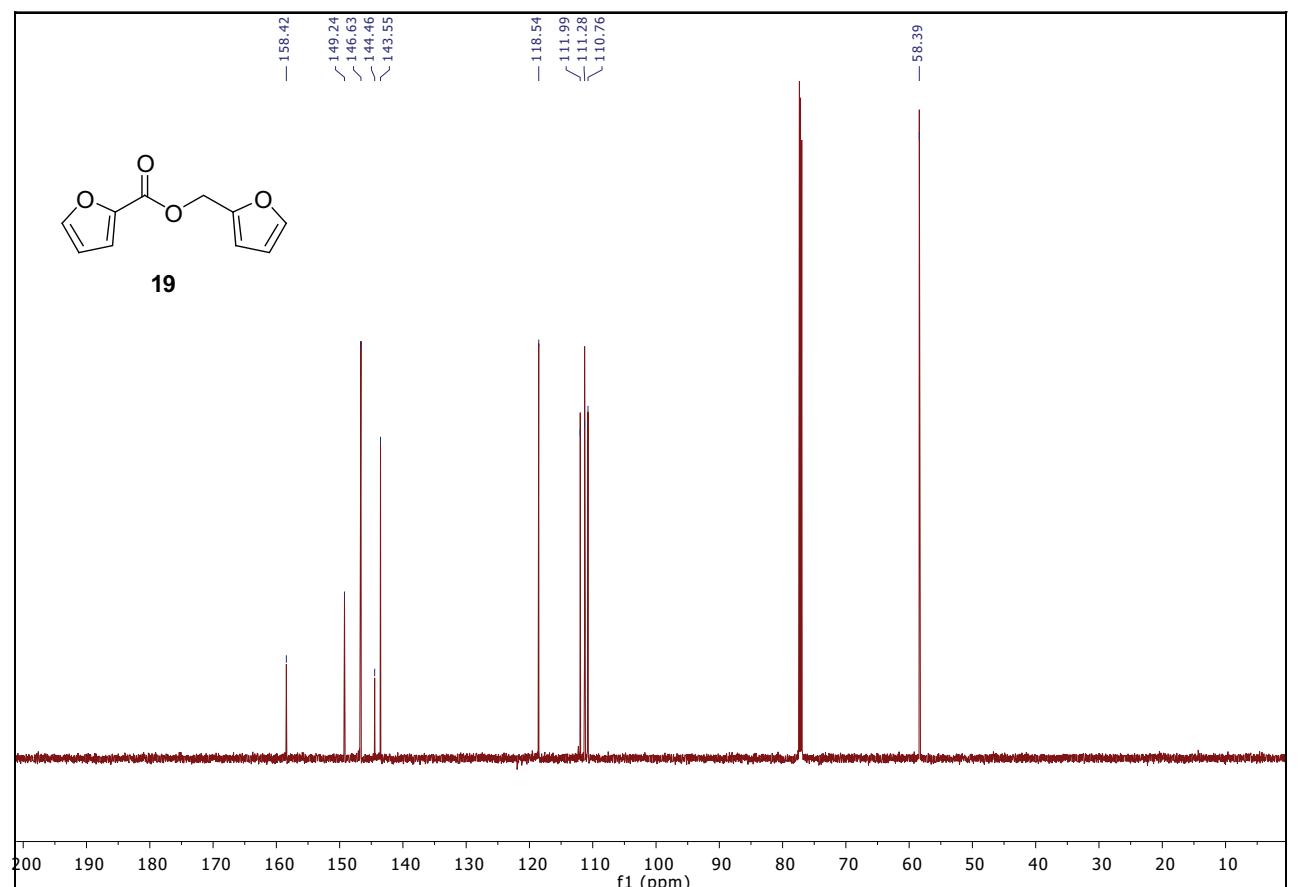


Figure S18:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound **19**.

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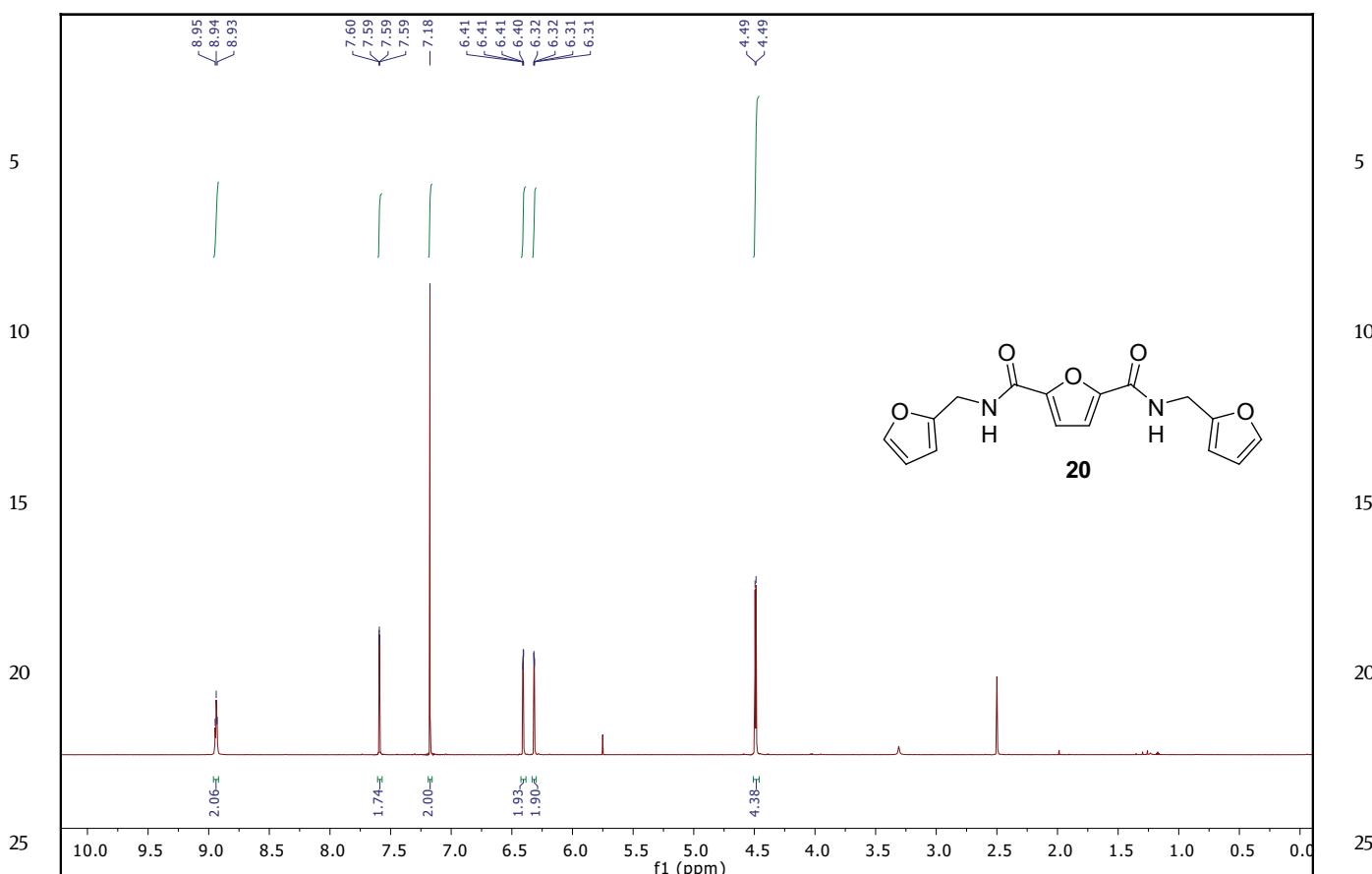
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**Figure S19:**  $^1\text{H}$  NMR (700 MHz, DMSO-d6) of compound **20**.

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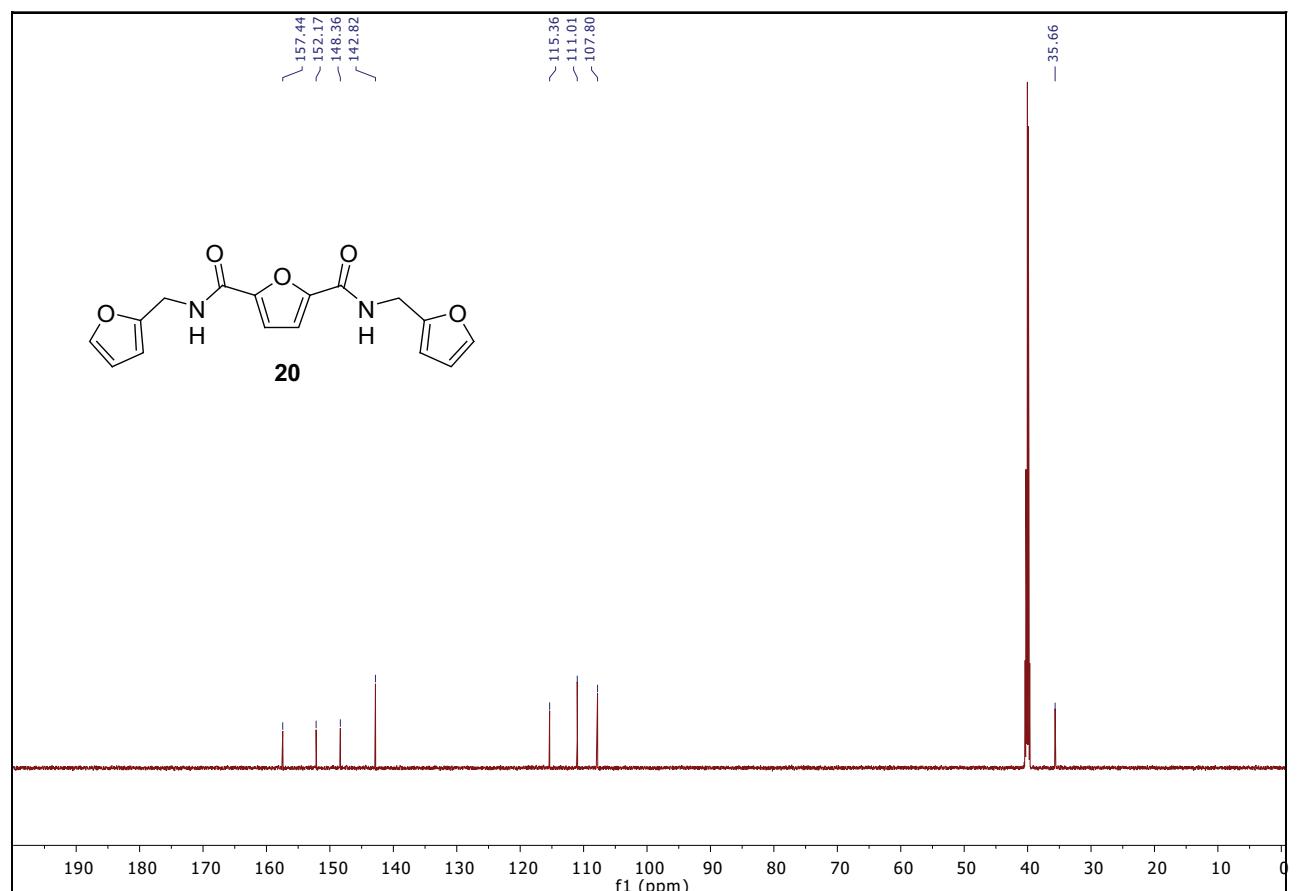


Figure S20:  $^{13}\text{C}$  NMR (176 MHz,  $\text{DMSO-d}_6$ ) of compound 20.

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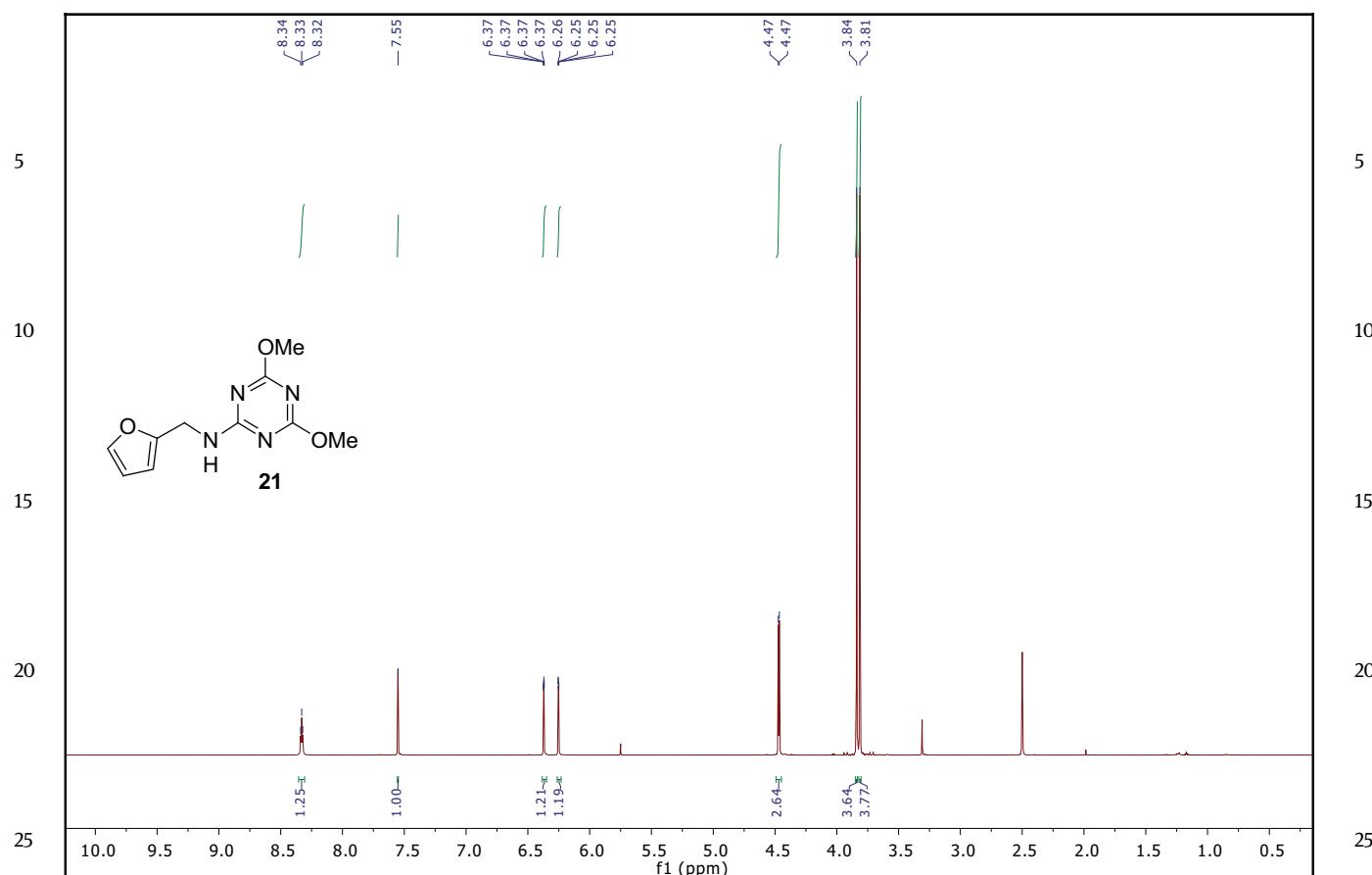


Figure S21: <sup>1</sup>H NMR (700 MHz, DMSO-d<sub>6</sub>) of compound 21.

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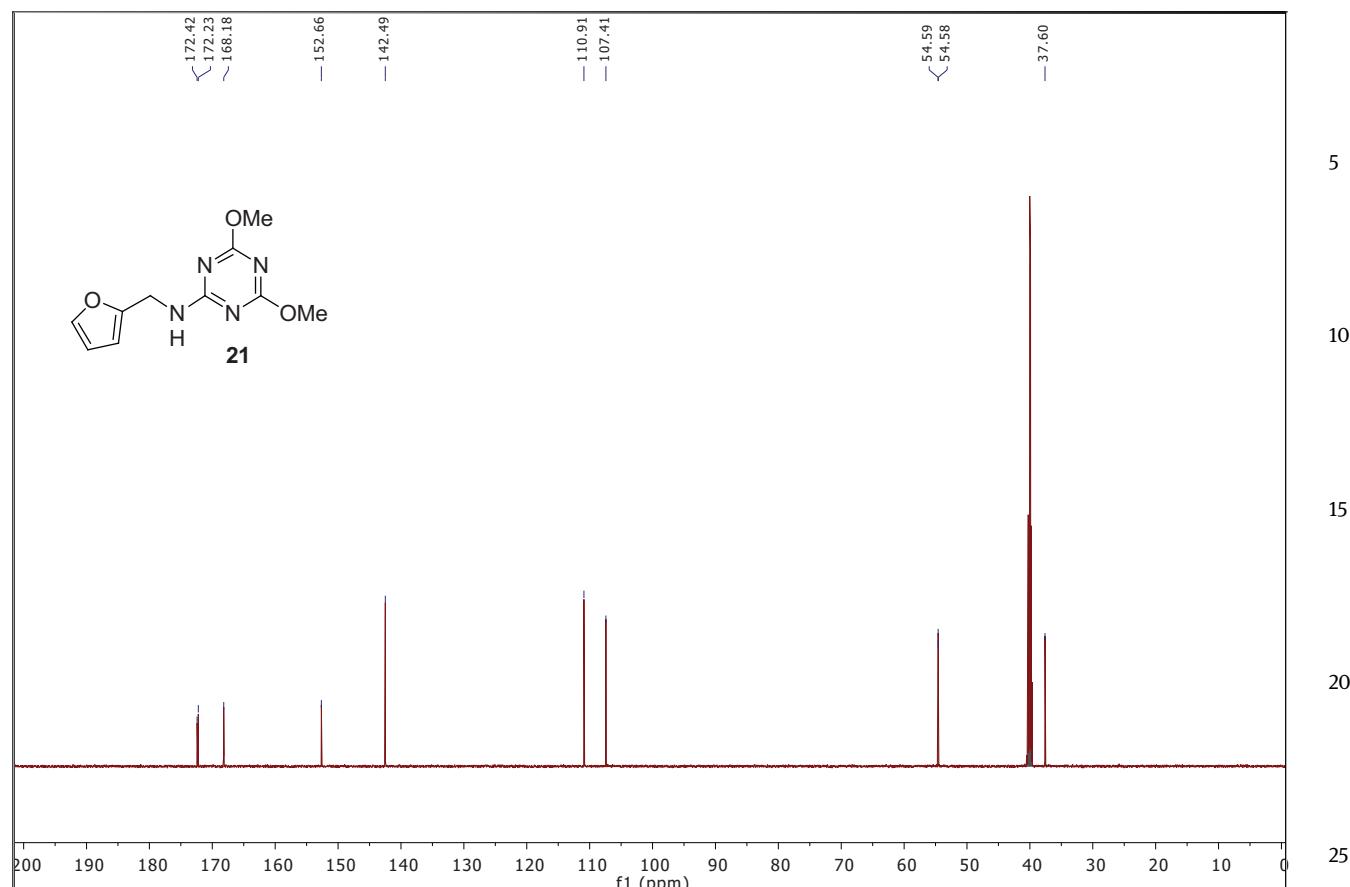


Figure S22:  $^{13}\text{C}$  NMR (176 MHz,  $\text{DMSO-d}_6$ ) of compound 21.

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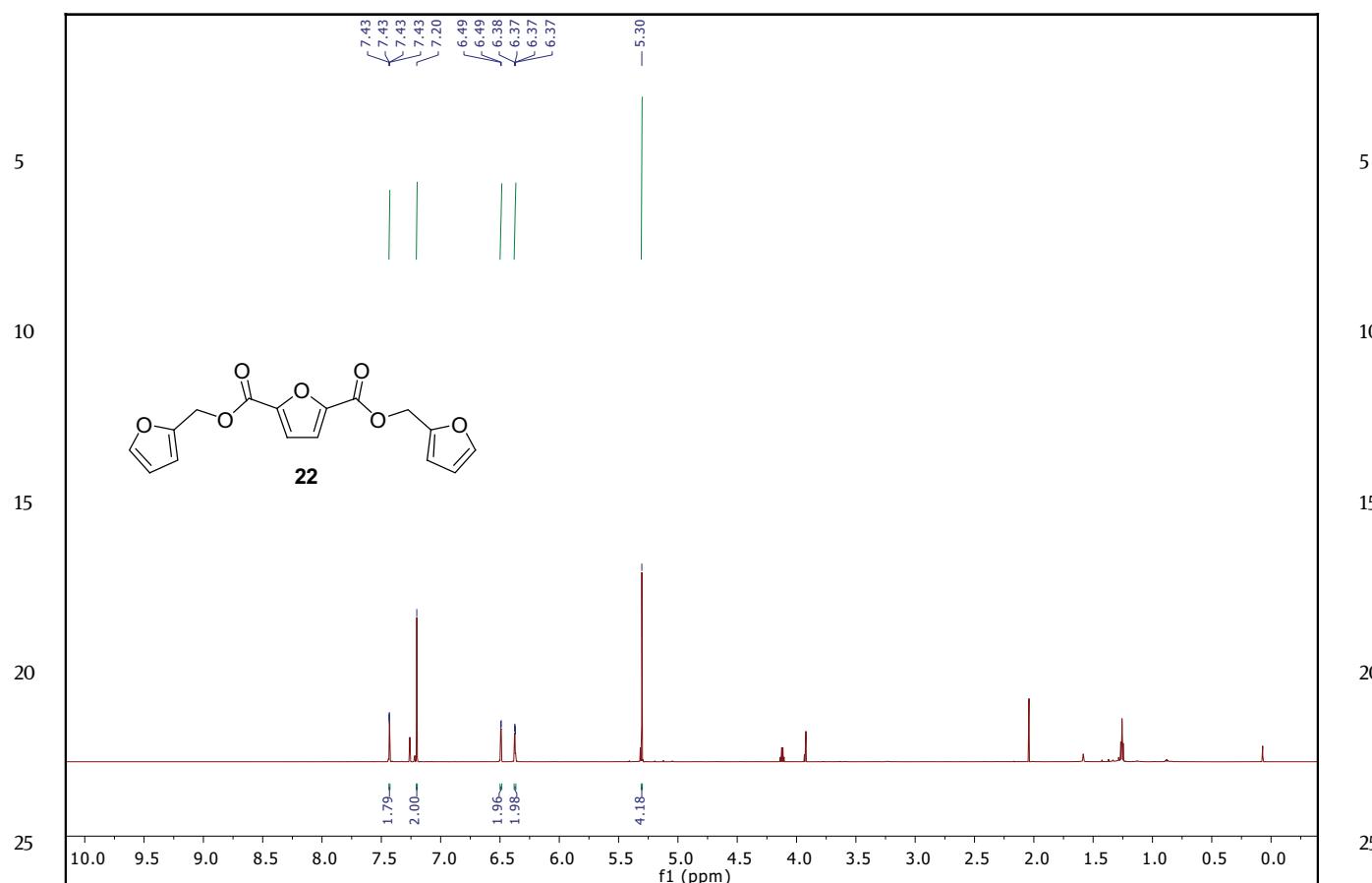
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**Figure S23:**  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound 22.

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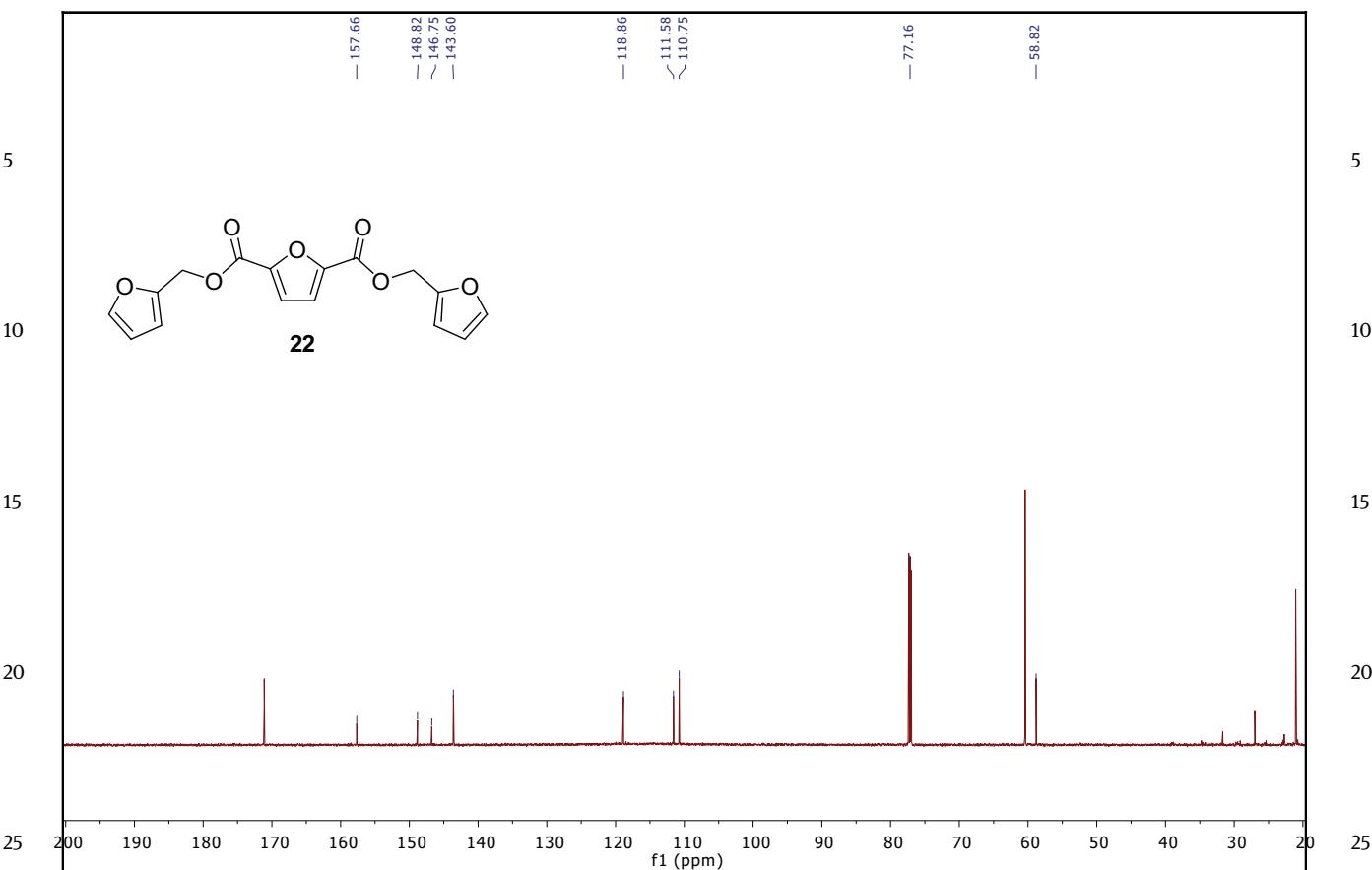


Figure S24: <sup>13</sup>C NMR (176 MHz, CDCl<sub>3</sub>) of compound 22.

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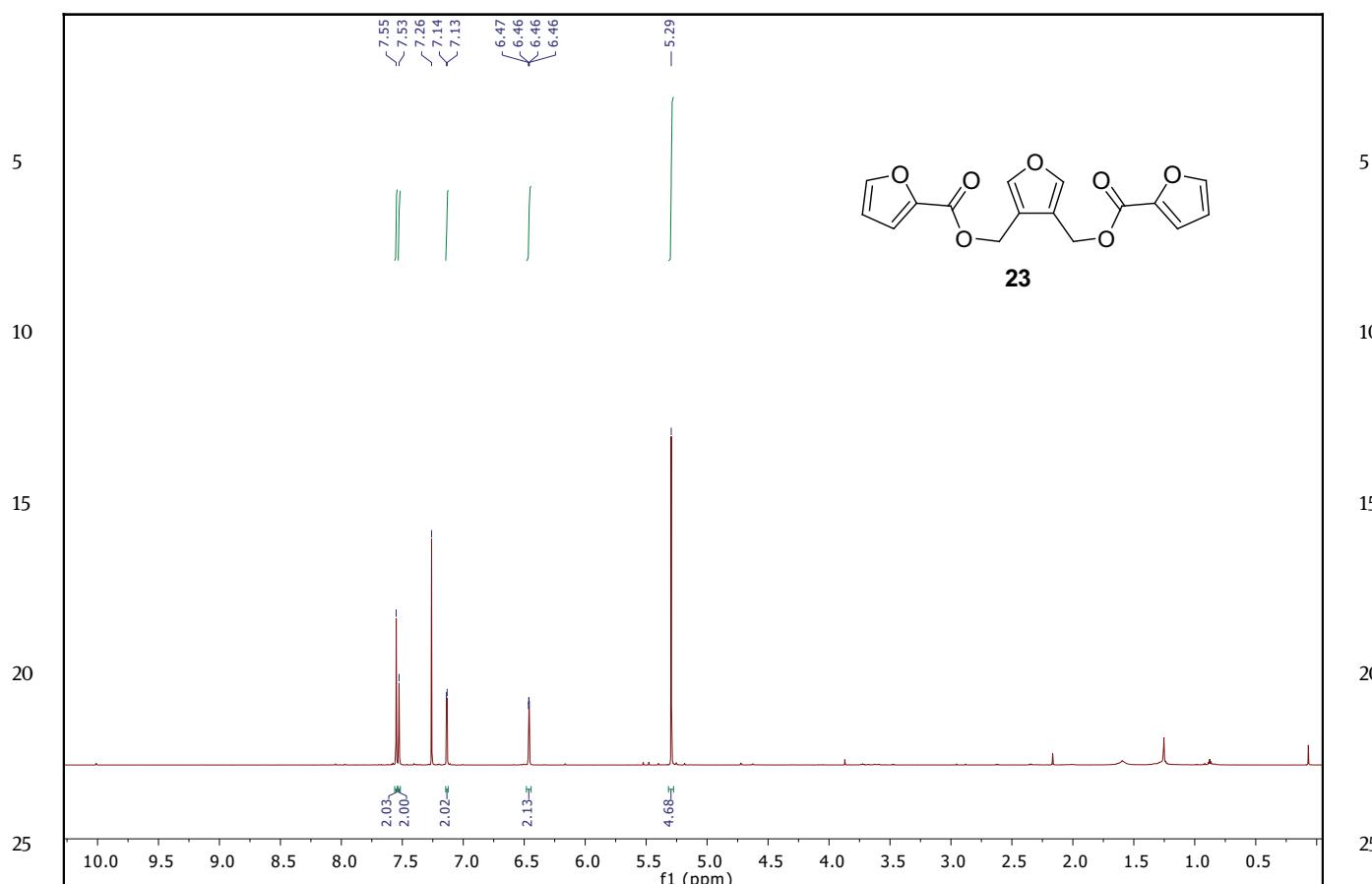
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**Figure S25:**  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound 23.

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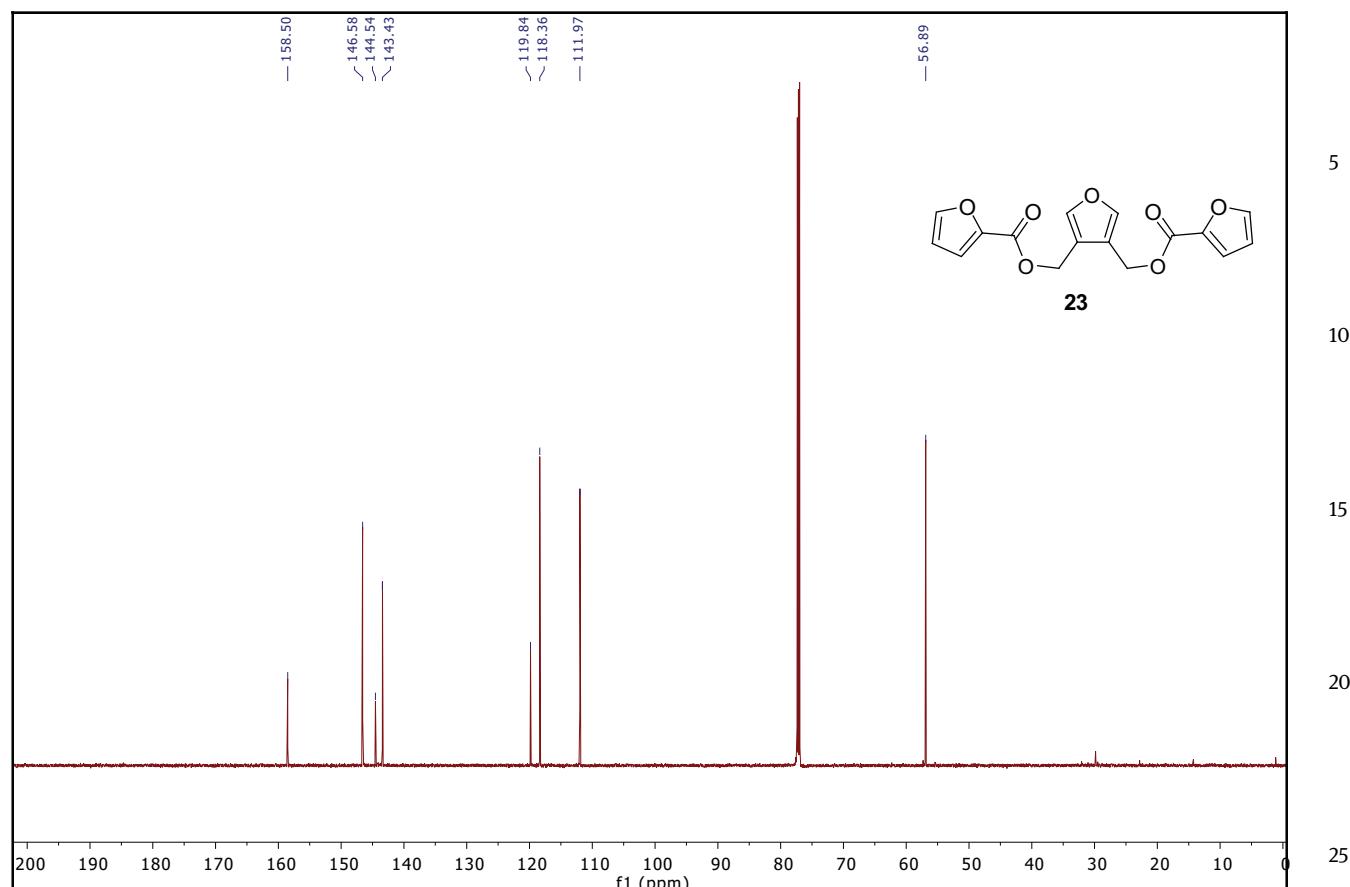


Figure S26:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound 23.

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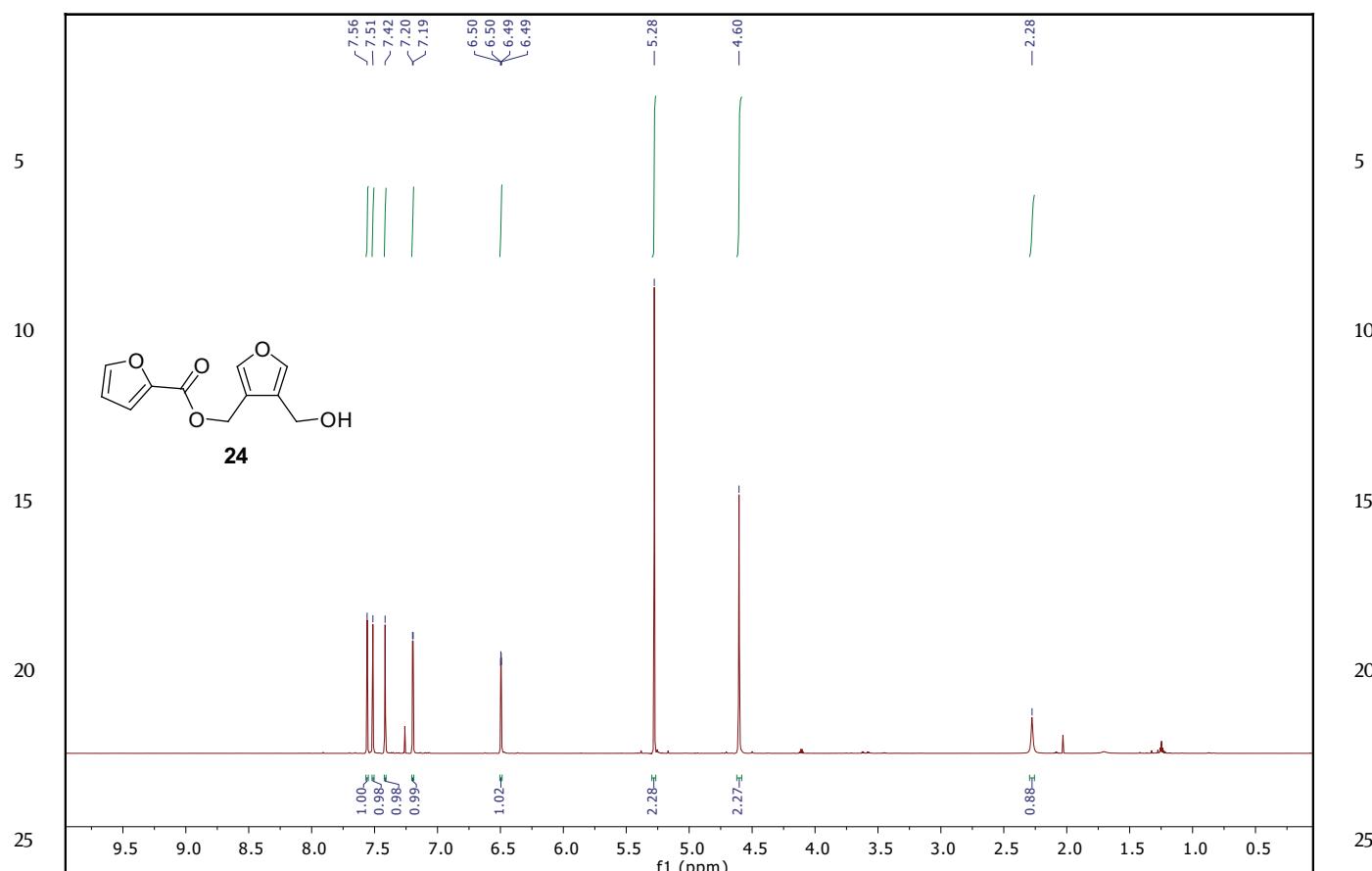
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**Figure S27:**  $^1\text{H}$  NMR (700 MHz,  $\text{CDCl}_3$ ) of compound 24.

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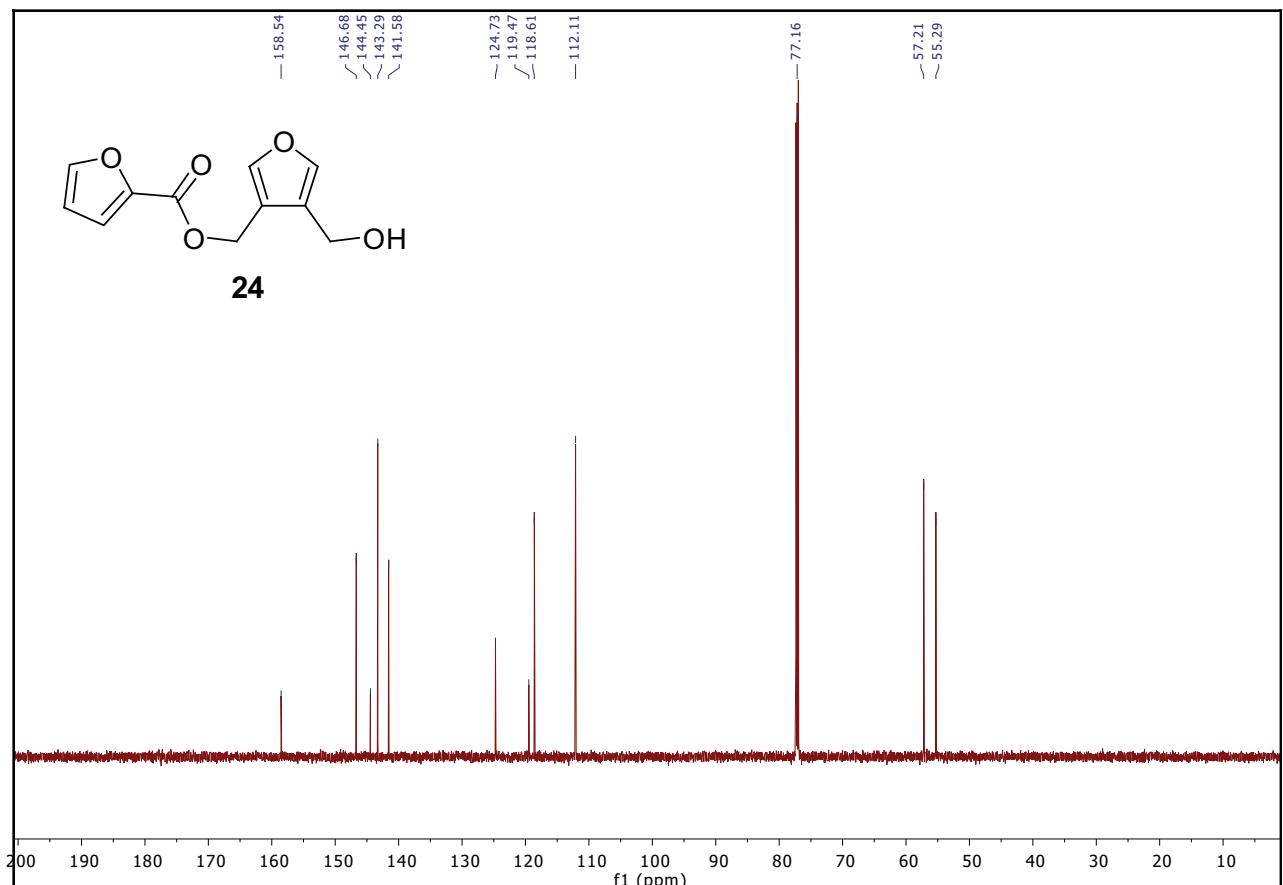


Figure S28:  $^{13}\text{C}$  NMR (176 MHz,  $\text{CDCl}_3$ ) of compound 24.

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