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Electronic Supplementary Information (ESI)

# Development of a microwave-assisted sustainable conversion of furfural hydrazones to functionalised phthalimides in ionic liquids

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#### Synthesis of hydrazones 1

#### 2-Furaldehyde dimethylhydrazone 1a



A mixture of furfural (0.83 mL, 10.0 mmol) and *N*,*N*-dimethylhydrazine (0.91 mL, 12.0 mmol) in EtOH (60 mL) was stirred at room temperature for 90 min. Water (30 mL) was added and the reaction mixture was concentrated using a rotary evaporator to remove EtOH. The remaining aqueous mixture was extracted with  $CH_2Cl_2$  (3 × 30 mL). The organic layer was dried (Na<sub>2</sub>SO<sub>4</sub>), filtered and concentrated *in vacuo* to afford the product as a brown liquid (1.29 g, 94%);  $v_{max}$  (film/cm<sup>-1</sup>); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  7.37 (br s, 1H, OCH), 7.12 (s, 1H, NCH), 6.39 (dd, *J* = 3.3, 1.8 Hz, 1H, CCHC*H*), 6.35 (d, *J* = 3.3 Hz, 1H, CCH), 2.95 (s, 6H, 2 × CH<sub>3</sub>); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>)  $\delta$  152.2, 142.0, 123.4, 111.3, 107.4, 42.9; HRMS: Found (ESI): [M+H]<sup>+</sup> 139.08729 C<sub>7</sub>H<sub>11</sub>N<sub>2</sub>O, requires 139.08714; Data in agreement with the literature.<sup>1</sup>

#### 5-Methyl-2-furaldehyde dimethylhydrazone 1b



A mixture of 5-methyl-2-furfural (0.99 mL, 10.0 mmol) and *N*,*N*-dimethylhydrazine (0.83 mL, 11.0 mmol) in EtOH (200 mL) was stirred at room temperature for 3 h. Water (30 mL) was added and EtOH was removed *in vacuo*. The remaining aqueous mixture was extracted with Et<sub>2</sub>O (3 × 50 mL). The organic layer was dried (Na<sub>2</sub>SO<sub>4</sub>), filtered and concentrated *in vacuo* to afford the product as an orange liquid (1.18 g, 76%); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  7.09 (s, 1H, NCH), 6.24 (d, *J* = 2.8 Hz, 1H, NCCH), 5.98 (d, *J* = 2.8 Hz, 1H, CH<sub>3</sub>CC*H*), 2.92 (s, 6H, 2 × CH<sub>3</sub>), 2.33 (s, 3H, CH<sub>3</sub>); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>)  $\delta$  152.4, 150.5, 124.5, 109.3, 107.5, 77.37, 43.1, 13.9.

#### 5-Bromo-2-furaldehyde dimethylhydrazone 1c



A mixture of 5-bromo-2-fulfural (352 mg, 2.01 mmol), MgSO<sub>4</sub> (808 mg), and *N*,*N*-dimethylhydrazine (176 mg, 2.94 mmol) in CH<sub>2</sub>Cl<sub>2</sub> (2 mL) was stirred at room temperature for 15 h. The reaction mixture was filtered and the filtrate was concentrated to give crude hydrazone as a pale red liquid (407 mg, 99 %); <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  6.99 (s, 1H,

NCH), 6.31 (d, J = 3.5 Hz, 1H, NCCH), 6.31 (d, J = 3.5 Hz, 1H, BrCCH), 2.95 (s, 6H, 2 × CH<sub>3</sub>); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>)  $\delta$  154.2, 121.8, 121.1, 113.1, 108.5, 42.6.



### 4-((2,2-dimethylhydrazono)methyl)-2-phenylisoindoline-1,3-dione 3a



### 4-((2,2-Dimethylhydrazono)methyl)-2-ethylisoindoline-1,3-dione 3b



# 4-((2,2-Dimethylhydrazono)methyl)-2-propylisoindoline-1,3-dione 3c



2-Butyl-4-((2,2-dimethylhydrazono)methyl)isoindoline-1,3-dione 3d



### 4-((2,2-Dimethylhydrazono)methyl)-2-pentylisoindoline-1,3-dione 3e



# 4-((2,2-Dimethylhydrazono)methyl)-2-hexylisoindoline-1,3-dione 3f



### 4-((2,2-Dimethylhydrazono)methyl)-2-heptylisoindoline-1,3-dione 3g



4-((2,2-Dimethylhydrazonoe)methyl)-2-octylisoindoline-1,3-dione 3h



### 4-((2,2-Dimethylhydrazono)methyl)-2-nonylisoindoline-1,3-dione 3i



### 4-((2,2-Dimethylhydrazono)methyl)isoindoline-1,3-dione 3j



### 2-Cyclohexyl-4-((2,2-dimethylhydrazono)methyl)isoindoline-1,3-dione 3k



#### 2-Allyl-4-((2,2-dimethylhydrazono)methyl)isoindoline-1,3-dione 3l



### 2-Benzyl-4-((2,2-dimethylhydrazono)methyl)isoindoline-1,3-dione 3m

# 4-((2,2-Dimethylhydrazono)methyl)-2-(4-methoxybenzyl)isoindoline-1,3-dione





### 4-((2,2-Dimethylhydrazono)methyl)-2-phenethylisoindoline-1,3-dione 3o



4-((2,2-Dimethylhydrazono)methyl)-2-ethyl-7-methylisoindoline-1,3-dione 3p



4-((2,2-Dimethylhydrazono)methyl)-7-methyl-2-phenylisoindoline-1,3-dione 3q



### 4-((2,2-dimethylhydrazono)methyl)-2-hexyl-7-methylisoindoline-1,3-dione 3r



### 4-((2,2-Dimethylhydrazono)methyl)-2-ethyl-7-hydroxyisoindoline-1,3-dione 3s



4-((2,2-Dimethylhydrazono)methyl)-7-hydroxy-2-phenylisoindoline-1,3-dione 3t

### 2-Furaldehyde dimethylhydrazone 1a









### 5-Bromo-2-furaldehyde dimethylhydrazone 1c