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Introduction of two new imidazole-based bis-dicationic Brönsted acidic ionic liquids and comparison of their catalytic activity in the synthesis of barbituric acid derivatives

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$^1$H NMR spectrum of 1,4-di(1H-imidazol-1-yl)butane [Bisim]
\[^{13}\text{C NMR} \text{ spectrum of 1,4-di(1H-imidazol-1-yl)butane [Bisim]}\]
$^1$H NMR spectrum of 1,1’-(butane-1,4-diyl)bis(1H-imidazol-3-ium)hydrogen sulfate [$H_2$-Bisim][HSO$_4$]$_2$
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pH metric titration of [H$_2$-Bisim][HSO$_4$]$_2$

pH metric titration of [H$_2$-Bisim][ClO$_4$]$_2$
New products:

5-((1-methyl-1H-pyrrol-2-yl)methylene)pyrimidine-2,4,6(1H,3H,5H)-trione [Table 3, Entry 20]

FT-IR (KBr, cm\(^{-1}\)) \(\nu_{\text{max}}\): 3416, 3178, 3097, 3027, 2828, 1735, 1689, 1654, 1559, 1497, 1451, 1290, 1208, 1148, 1063.

FT-IR spectra of 5-((1-methyl-1H-pyrrol-2-yl)methylene)pyrimidine-2,4,6(1H,3H,5H)-trione
$^1$H NMR (400 MHz, DMSO-$d_6$) $\delta$ (ppm): 3.94 (s, 3H), 6.49 (dd, $J_1=4.4$ Hz, $J_2=2.4$ Hz, 1H), 7.69 (t, $J=2.0$, 1H), 8.28 (s, 1H), 8.49 (dd, $J_1=4.4$ Hz, $J_2=1.6$ Hz, 1H), 11.03 (s, 1H), 11.19 (s, 1H);

$^1$H NMR spectra of 5-((1-methyl-1H-pyrrol-2-yl)methylene)pyrimidine-2,4,6(1H,3H,5H)-trione
$^{13}\text{C NMR}$ (100 MHz, DMSO-$d_6$) \( \delta \) (ppm): 34.3, 106.6, 111.7, 126.9, 128.9, 136.5, 137.6, 150.2, 150.3, 162.4, 164.5.

$^{13}\text{C NMR}$ spectra of 5-((1-methyl-1H-pyrrol-2-yl)methylene)pyrimidine-2,4,6(1H,3H,5H)-trione
5-((1-methyl-1H-pyrrol-2-yl)methylene)pyrimidine-2,4,6(1H,3H,5H)-trione [Table 4, Entry 18]

**FT-IR (KBr, cm⁻¹)** \( \tilde{\nu}_{\text{max}} \): 3415, 3318, 3216, 3196, 3010, 2942, 2852, 2789, 2192, 1715, 1661, 1568, 1471, 1399, 134, 1277, 1208, 1174, 1070, 983, 798.

**FT-IR spectra of 7-amino-5-(3-bromophenyl)-2,4-dioxo-1,3,4,5-tetrahydro-2H-pyrano[2,3-d]pyrimidine-6-carbonitrile**
$^{1}$H NMR (400 MHz, DMSO-$d_6$) $\delta$ (ppm): 4.30 (s, 1H), 7.24 (s, 2H), 7.26-7.34 (m, 2H), 7.45-7.48 (m, 2H), 11.14 (s, 1H), 12.15 (s, 1H).

$^{1}$H NMR spectra of 7-amino-5-(3-bromophenyl)-2,4-dioxo-1,3,4,5-tetrahydro-2$H$-pyrano[2,3-$d$]pyrimidine-6-carbonitrile

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$^{13}$C NMR (100 MHz, DMSO-$d_6$) $\delta$ (ppm): 35.3, 58.0, 87.6, 119.0, 121.5, 126.5, 129.6, 130.0, 130.4, 146.8, 149.4, 152.4, 157.6, 162.4.

$^{13}$C NMR of 7-amino-5-(3-bromophenyl)-2,4-dioxo-1,3,4,5-tetrahydro-2H-pyrano[2,3-$d$]pyrimidine-6-carbonitrile
Reusability of the catalysts in the preparation of 5-arylidene babituric acid derivative 4-chlorobenzaldehyde.

Reusability of the catalysts in the preparation of pyrano[2,3-d]pyrimidinone derivative of 4-chlorobenzaldehyde.