Electronic Supplementary Information for:

Systematic Structure Control of Ammonium Iodide Salts as Feasible UCST-type Forward Osmosis Draw Solutes for the Treatment of Wastewater

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c) 

\[ \text{Me}_3\text{NH} + \text{CH}_3\text{CH}_2I \rightarrow \text{ACN} \rightarrow 3\text{PEAI} \]

\( [\text{N}] \)

\( \text{ solvent} \)

\( \delta \) ppm

\( 6.0 \quad 5.5 \quad 5.0 \quad 4.5 \quad 4.0 \quad 3.5 \quad 3.0 \quad 2.5 \quad 2.0 \quad 1.5 \quad 1.0 \quad 0.5 \)


d) 

\[ \text{Me}_2\text{NNH} + \text{CH}_3I \rightarrow \text{EtOH} \rightarrow \text{HM2I} \]

\( [\text{N}] \)

\( \text{ solvent} \)

\( \delta \) ppm

\( 6.5 \quad 6.0 \quad 5.5 \quad 5.0 \quad 4.5 \quad 4.0 \quad 3.5 \quad 3.0 \quad 2.5 \quad 2.0 \quad 1.5 \quad 1.0 \quad 0.5 \)


e) 

\[ \text{Me}_2\text{NNH} + \text{CH}_3I \rightarrow \text{ACN} \rightarrow \text{HM4I} \]

\( [\text{N}] \)

\( \text{ solvent} \)

\( \delta \) ppm

\( 6.0 \quad 5.5 \quad 5.0 \quad 4.5 \quad 4.0 \quad 3.5 \quad 3.0 \quad 2.5 \quad 2.0 \quad 1.5 \quad 1.0 \quad 0.5 \)
N,N,N',N'-Tetramethyl-1,6-diaminohexane

N,N,N',N'-Tetramethyl-1,6-diaminohexane

solvent

A

B

C

D

100  90  80  70  60  50  40  30  20  10  0  5

b' c' d'

b c d

a' a b c' d'

A' B' C' D'

A B C D

6.0  5.0  4.5  4.0  3.5  3.0  2.5  2.0  1.5  1.0  0.5  0.0
Figure S1. Synthetic scheme and $^1$H NMR spectra of a) 3MBAI ($^1$H NMR (300 MHz, D$_2$O, δ): 3.90 (hept, J = 6.6 Hz, 1H), 3.34 (q, J = 7.4 Hz, 1H), 2.81 (s, 1H), 1.45 – 1.36 (m, 6H), 1.36 – 1.27 (m, 2H)), b) 3MOAI ($^1$H NMR (300 MHz, D$_2$O, δ): 3.37 – 3.26 (m, 1H), 3.11 (s, 4H), 1.86 – 1.70 (m, 1H), 1.36 (d, J = 3.5 Hz, 2H), 1.29 (s, 3H), 0.87 (dd, J = 8.8, 4.8 Hz, 1H)), c) 3PEAI ($^1$H NMR (300 MHz, D$_2$O, δ): 3.30 (q, J = 7.3 Hz, 1H), 3.21 – 3.09 (m, 3H), 1.79 – 1.60 (m, 3H), 1.33 – 1.20 (m, 1H), 0.95 (t, J = 7.3 Hz, 4H)), d) HM2I ($^1$H NMR (300 MHz, D$_2$O, δ): 4.04 (s, 1H), 3.31 (s, 4H)), e) HM4I ($^1$H NMR (300 MHz, D$_2$O, δ): 3.40 (d, J = 5.9 Hz, 1H), 3.14 (s, 4H), 1.95 – 1.79 (m, 1H)), f) N,N,N',N'-tetramethyl-1,6-diaminohexane ($^1$H NMR (300 MHz, D$_2$O,δ): 2.26 (dd, J = 17.1, 9.1 Hz, 4H), 2.15 (s, 12H), 1.56 – 1.36 (m, 4H), 1.29 (d, J = 6.7 Hz, 4H)) and HM6I ($^1$H NMR (300 MHz, D$_2$O, δ): 3.41 – 3.28 (m, 1H), 3.12 (s, 4H), 1.83 (d, J = 2.7 Hz, 1H), 1.54 – 1.36 (m, 1H)), g) N,N,N',N'-tetramethyl-1,6-diaminohexane ($^{13}$C NMR (75 MHz, D$_2$O, δ): 58.68 (s), 43.93 (s), 26.74 (s), 26.33 (s)) and HM6I ($^{13}$C NMR (75 MHz, D$_2$O, δ): 66.52 (s), 66.78 (s), 53.25 – 52.77 (m), 27.92 (s), 25.31 (s), 22.32 (s), 16.59 (s)), h) 1,8-diaminooctane ($^1$H NMR (300 MHz, D$_2$O, δ): 2.65 (t, J = 7.0 Hz, 4H), 1.57 – 1.43 (m, 8H)) and HM8I ($^1$H NMR (300 MHz, D$_2$O, δ): 3.36 – 3.22 (m, 1H), 3.08 (s, 4H), 1.75 (d, J = 7.2 Hz, 1H), 1.36 (s, 2H)), i) 1,8-diaminooctane ($^{13}$C NMR (75 MHz, D$_2$O, δ): 40.91 (s), 32.39 (s), 29.13 (s), 26.57 (s)) and HM8I ($^{13}$C NMR (75 MHz, D$_2$O, δ): 66.78 (s), 53.25 – 52.77 (m), 27.92 (s), 25.31 (s), 22.32 (s), 16.59 (s)), and j) HE2I ($^1$H NMR (300 MHz, D$_2$O, δ): 3.70 (s, 1H), 3.45 (q, J = 7.2 Hz, 3H), 1.34 (t, J = 7.2 Hz, 4H)).
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<td>22</td>
<td>11.6(^a)</td>
</tr>
<tr>
<td>3PEAI</td>
<td>5</td>
<td>6</td>
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<tr>
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<td>5</td>
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<td>78</td>
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</table>

All units: mL (volume) except for \(^{a}\) g (weight).

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![Figure S2](image)

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