Electronic Supplementary Information (ESI) for

Effects of sodium chloride on rheological behaviour of the Gemini-like Surfactants

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Additional Results

![Viscosity-shear rate graph](image_url)
Fig.S1 Steady rheological curves of 15 mM EAPA solutions at different NaCl concentrations and 25 °C
Fig. S2 Variation in surface tension with concentration of p-EAPA at 25 °C (a: C(NaCl)=0 mM, b: C(NaCl)=50 mM, c: C(NaCl)=100 mM, d: C(NaCl)=200 mM, e: C(NaCl)=300 mM.)

The C(NaCl) refers to the NaCl concentration of 15 mM p-EAPA, and different concentrations of p-EAPA were obtained by diluting 15 mM p-EAPA.

The minimum average area per surfactant molecule $A_{\text{min}}$ was calculated by Gibbs adsorption equation:

$$\Gamma_{\text{max}} = -\frac{1}{2.303 nRT}(\frac{\partial \gamma}{\partial \log C})_T$$

$$A_{\text{min}} = \frac{1}{N_A \Gamma_{\text{max}}}$$

where, $\Gamma_{\text{max}}$ (µmol/m$^2$) is the saturated adsorption amounts of the surfactants, $(\partial \gamma/\partial \log C)_T$ is the slope of the surface tension curve, $R = 8.31$ J / (mol·K), $T = 298.15$ K, $N_A = 6.02 \times 10^{23}$, $n$ is a constant which depends on the number of species constituting the surfactant and which are adsorbed at the interface. And $n$ takes 2 for an ionic surfactant where the surfactant ion and the counterion are univalent, while $n$ takes 3 for Gemini surfactants. Therefore, $n$ takes 3 in this research.

The length $l_c$(cm) and volume $V$(cm$^3$) of hydrophobic chain of surfactants was obtained by characteristic parameters of surfactants:

$$l_c = (1.50 + 1.265 n_c) \times 10^{-8}$$
$$V = (27.4 + 26.9 n_c) \times 10^{-24}$$

Where $n_c$ is the number of carbon atoms in hydrophobic chain of surfactants and takes 21 according to the structure of UC$_{22}$AMPM.
According to the $A_{\text{min}}$, $lc$ and $v$, the packing parameter $p$ can be calculated by $p=V/A_{\text{min}}lc$. And the calculated results were listed in the Table.S1.

**Table.S1** The Surface parameters of p-EAPA system at different NaCl concentrations and 25 °C

<table>
<thead>
<tr>
<th>C(NaCl)/mM</th>
<th>$lc$(nm)</th>
<th>$V$(nm$^3$)</th>
<th>$A_{\text{min}}$(nm$^2$)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>0.653</td>
<td>0.3232</td>
</tr>
<tr>
<td>50</td>
<td>2.8065</td>
<td></td>
<td>0.623</td>
<td>0.3388</td>
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<tr>
<td>100</td>
<td></td>
<td>0.5923</td>
<td>0.578</td>
<td>0.3651</td>
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<tr>
<td>200</td>
<td></td>
<td></td>
<td>0.503</td>
<td>0.4196</td>
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<tr>
<td>300</td>
<td></td>
<td></td>
<td>0.459</td>
<td>0.4598</td>
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