Electronic Supplementary Material (ESI) for Soft Matter.

Electronic Supplementary Information

How the Cation 1-butyl-3-methylimidazolium Impacts on the Interaction between the Entrapped Water and the Reverse Micelles Interface Created with an Ionic Liquid-like Surfactant

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Table S1. Apparent diameter (d_{app}) and polydispersity index (PDI) values of benzene/bmim-AOT/water RMs obtained at 25 °C varying W_0. [bmim-AOT] = 0.05 M.

W_0	d_{app} (nm)	PDI
3.0	2.6 ± 0.1	0.07
3.5	2.9 ± 0.1	0.07
4.0	3.2 ± 0.1	0.05
4.5	3.7 ± 0.2	0.02
5.0	3.9 ± 0.2	0.03

Table S2. ^{1}H NMR chemical shifts (in ppm) for bmim-AOT and Na-AOT surfactants in Cl_3CD. [Surfactants] = 0.05 M.

H	Chemical shift (ppm)	
	bmim-AOT	**Na-AOT**
H_2	9.52	-
H_4 and H_5	7.43 and 7.54	-
H1	4.25	4.29
H1`	3.27 – 3.22	3.17 – 3.15
H3`	4.16	3.95
H3	4.18	4.08

Table S3. *dn/dc*, Micellar molecular weight (M_W) and aggregation numbers (N_{agg}) values of benzene/bmim-AOT/water and benzene/Na-AOT/water RMs obtained varying the surfactant concentration at $W_0 = 5$.

Micellar system	$\mathbf{M_s}$[a] (g mol^{-1})	***dn/dc*** (mL g^{-1})	$\mathbf{M_w}$ (g mol^{-1})	$\mathbf{N_{agg}}$[b]
benzene/Na-AOT/water	444.6	0.0661 ± 0.0002	8850 ± 392	17 ± 1
benzene/bmim-AOT/water	560.78	0.0608 ± 0.0001	15198 ± 1174	23 ± 2

[a] M_s = molecular weight of surfactant monomer. [b] $N_{agg} = M_w/(M_s + W_0*M_{H2O})$. M_{H2O} = water molecular weight. M_W was determined using the equation $KC/R_\theta = 1/M_W + 2\ A_2C$, where C is the surfactant concentration, R_θ is the Rayleigh ratio, A_2 is the 2nd virial coefficient and K is an optical constant ($K = 4\pi^2 n_0^2 (dn/dc)^2/N_A\lambda^4$ where n_0 is the solvent refractive index, λ is the wavelength of the incident light (488 nm), and N_A is the Avogadro number).

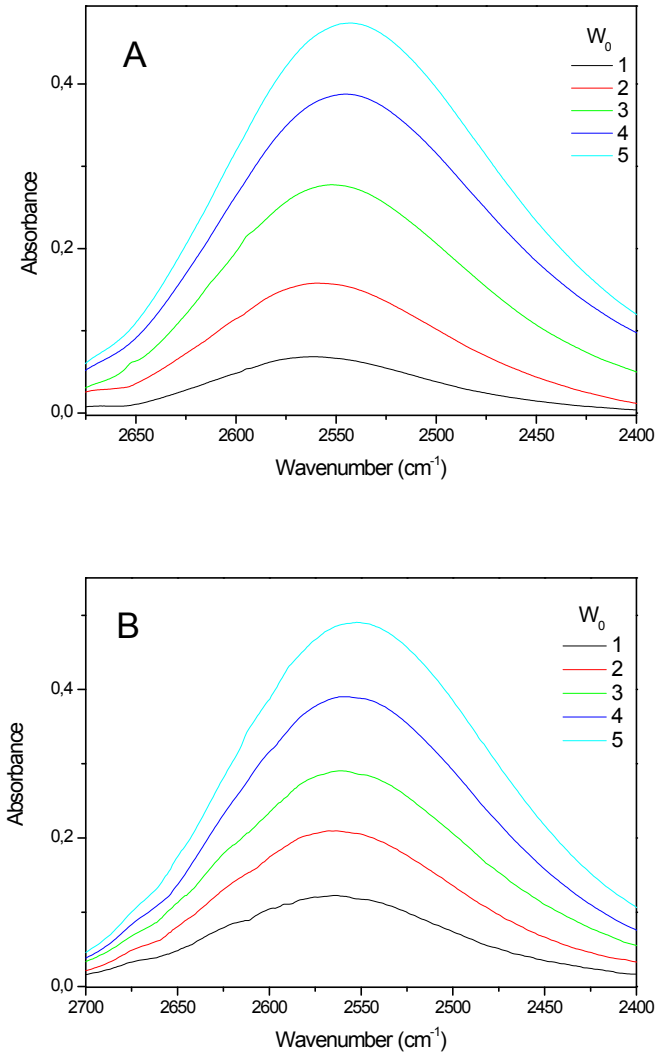

Figure S1. FT-IR spectra of benzene/surfactant/HDO RMs at different W_0 values in the region of 2640-2420 cm^{-1}. A) bmim-AOT and B) Na-AOT. [surfactant] = 0.2 M.

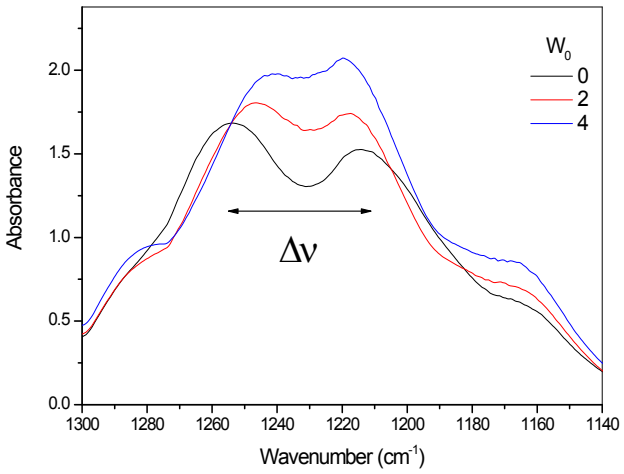

Figure S2. FT-IR spectra of chlorobenzene/Na-AOT/water RMs at different W_0 values in the region of 1300-1140 cm^{-1} ($\nu_{asym}SO_3$). The chlorobenzene bands have been subtracted. [Na-AOT] = 0.05 M.

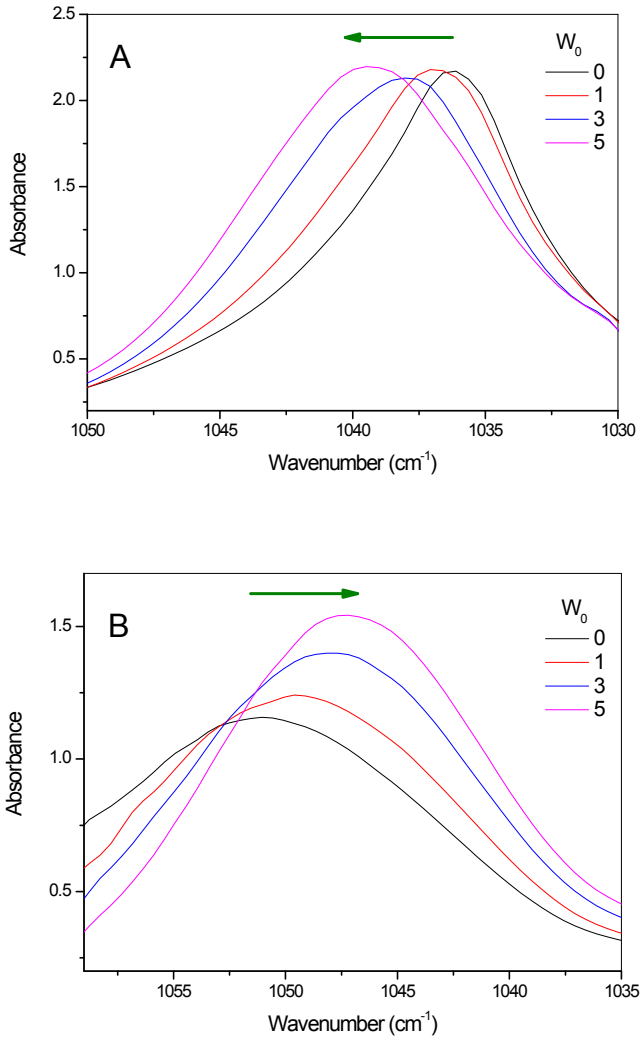

Figure S3. FT-IR spectra of chlorobenzene/surfactant/water RMs at different W_0 values in the region of symmetrical sulfonate mode. (A) bmim-AOT and (B) Na-AOT. The chlorobenzene bands have been subtracted. [Surfactant] = 0.05 M.

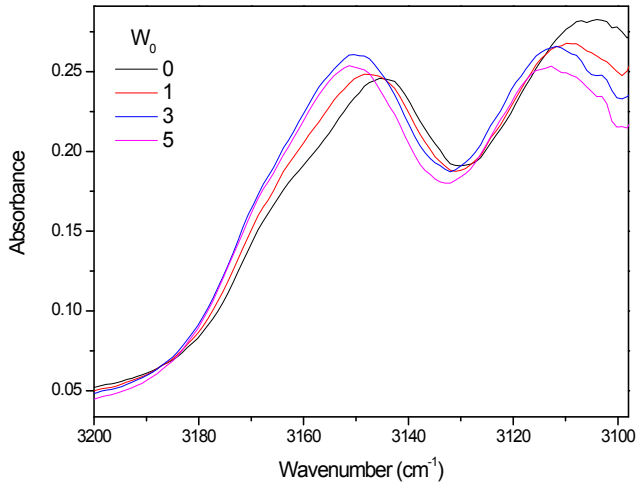

Figure S4. FT-IR spectra of $bmim^+$ in chlorobenzene/bmim-AOT RMs at different W_0 values, in the region of 3200-3100 cm^{-1}. [bmim-AOT] = 0.05 M. The chlorobenzene bands have been subtracted.

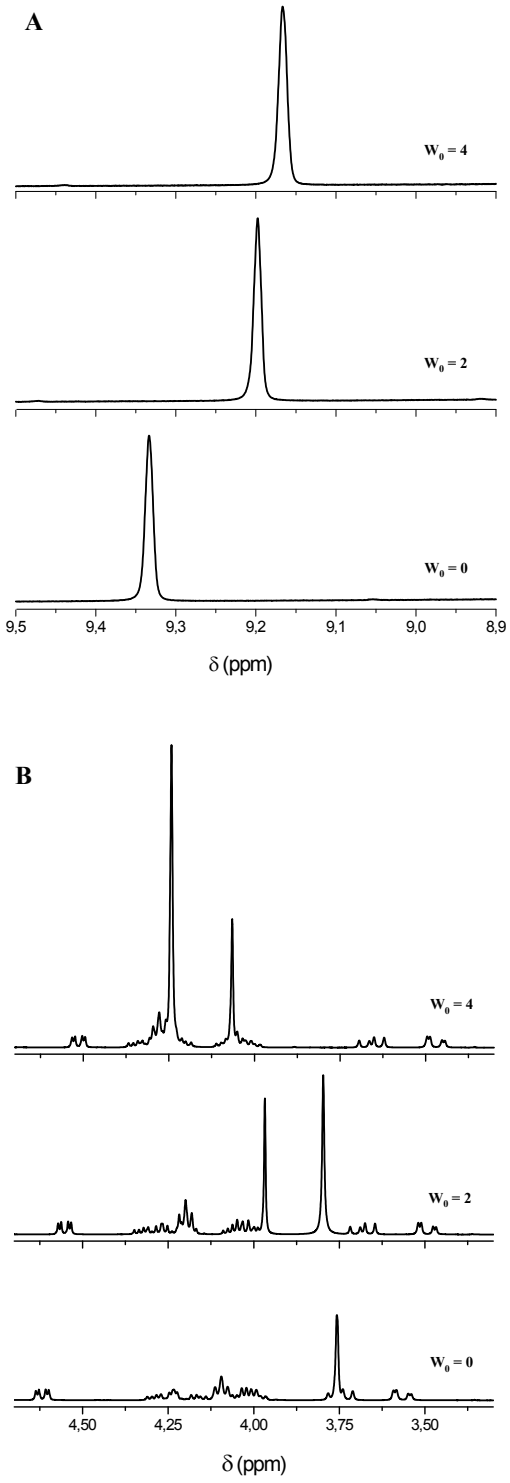

Figure S5. Typical ^{1}H NMR spectra for benzene/bmim-AOT RMs at different W_0 in the region of 9.5-8.9 ppm (A) and 4.7-3.3 ppm (B). [bmim-AOT] = 0.05 M.

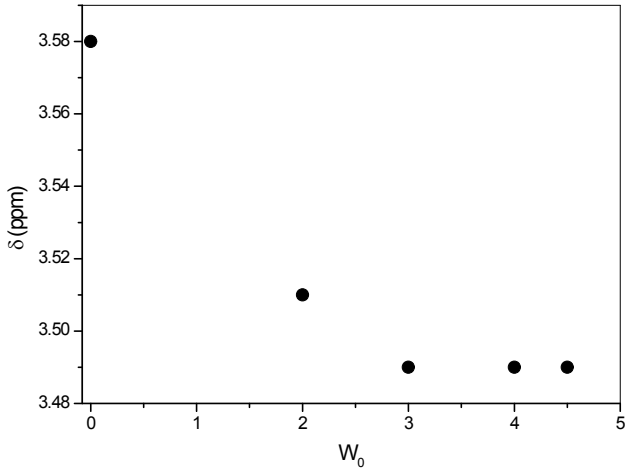

Figure S6. ^{1}H NMR chemical shifts of AOT H1` in benzene/bmim-AOT/water RMs at different W_0. [bmim-AOT] = 0.05 M.

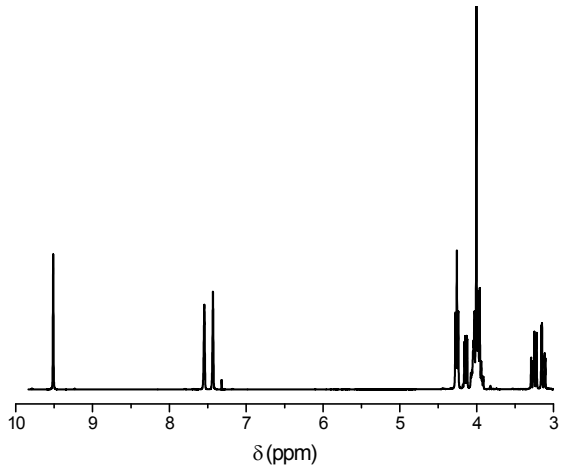

Figure S7. ^{1}H NMR spectrum of bmim-AOT in Cl_3CD. [bmim-AOT] = 0.05 M.

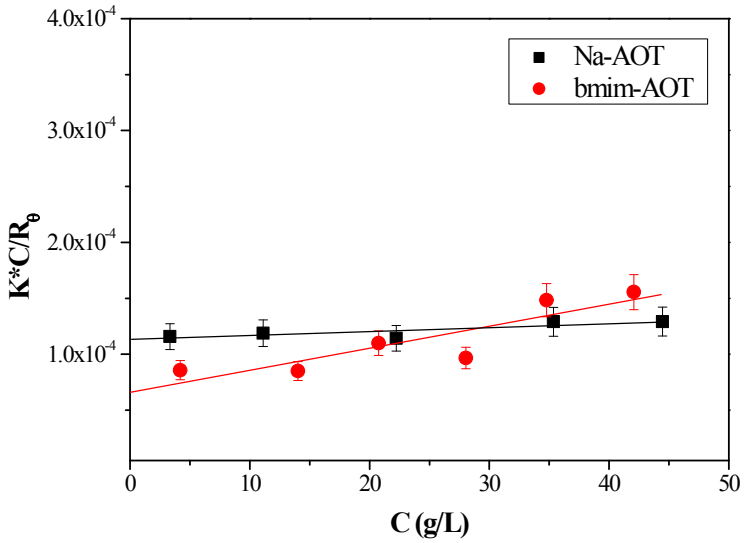

Figure S8. Debye plots of K^*C/R_θ in benzene/surfactant/water RMs as a function of the surfactant concentration (C) obtained by SLS at 90° scattering angle.