

Supporting Information:

**On the effect of the nature of counterions on the
self-assembly of polyoxyethylene alkylether
carboxylic acids.**

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Table S1: Parameters for the ionization process of Arginine, Choline hydroxide, and Sodium hydroxide obtained from the fitting of the apparent partial molar volume and compressibility data. Uncertainties from the fit are reported in parentheses.

	V_0 ($\text{cm}^3 \text{ mol}^{-1}$)	V_i ($\text{cm}^3 \text{ mol}^{-1}$)	K_0 ($\text{cm}^3 \text{ mol}^{-1} \text{ GPa}^{-1}$)	K_i ($\text{cm}^3 \text{ mol}^{-1} \text{ GPa}^{-1}$)	ΔV_t ($\text{cm}^3 \text{ mol}^{-1}$)	ΔK_t ($\text{cm}^3 \text{ mol}^{-1} \text{ GPa}^{-1}$)
$\text{C}_{18:1}\text{E}_9\text{CH}_2\text{COOH}$ Arginine	125.9(4)	106.7(4)	3900(200)	9100(200)	-19.2(8)	5200(400)
$\text{C}_{18:1}\text{E}_9\text{CH}_2\text{COOH}$ Choline	108.5(7)	115.4(7)	1800(400)	3000(400)	7(1)	1200(800)
$\text{C}_{18:1}\text{E}_9\text{CH}_2\text{COOH}$ NaOH	1.6(7)	13.2(8)	100(50)	750(50)	12(2)	650(100)
$\text{C}_{18:1}\text{E}_5\text{CH}_2\text{COOH}$ Arginine	124.5(6)	108.3(5)	4200(300)	8500(300)	-16(1)	4300(600)
$\text{C}_{18:1}\text{E}_5\text{CH}_2\text{COOH}$ Choline	103.0(2)	105.9(2)	3800(100)	5000(100)	2.9(4)	1200(200)
$\text{C}_{18:1}\text{E}_5\text{CH}_2\text{COOH}$ NaOH	-2.9(2)	3(2)	-220(20)	230(20)	5.9(4)	450(40)

Table S2: Fit parameters obtained from the analysis of the small-angle neutron scattering patterns from 1vol% solutions of $C_{18:1}E_9CH_2COOH$ partially neutralized with different counterions. A model of core-shell prolate ellipsoids, with rotational axis A and equatorial axes B , and shell thickness T was used. The value of B was kept constant at 2 nm. A charged hard-sphere structure feature, characterized by a charge of Z electron charges per sphere and radius R_{HS} was used to describe the interaction between the ellipsoids. N_{agg} is the number of surfactant molecules per micelle. ϕ_w is the volume fraction of water in the shell. Uncertainties from the fit are reported in parentheses.

CI	R	A (nm)	B (nm)	T (nm)	R_{HS} (nm)	Z	N_{agg}	Z/N_{agg}	ϕ_w
T = 25 °									
—	0	17.7(1)	2*	1.5(1)	—	—	640(10)	—	0.59(1)
NaOH	0.2	8.1(2)	2*	1.4(1)	8.6(8)	32(2)	292(9)	0.11(1)	0.50(1)
NaOH	0.5	4.7(1)	2*	1.3(1)	6.5(1)	32(1)	168(5)	0.19(1)	0.61(1)
Arginine	0.2	4.7(1)	2*	1.5(1)	8.0(1)	29(1)	170(5)	0.17(1)	0.68(1)
Arginine	0.5	3.8(1)	2*	1.8(1)	8.2(1)	33(1)	136(5)	0.24(1)	0.74(1)
Choline	0.2	4.9(1)	2*	1.6(1)	7.9(1)	30(1)	179(5)	0.16(1)	0.68(1)
Choline	0.5	3.8(1)	2*	2.0(1)	7.9(1)	33(2)	137(5)	0.25(1)	0.77(1)
T = 40 °									
None	—	46.8(5)	2*	1.2(1)	—	—	1690(20)	—	0.50(2)
NaOH	0.2	6.0(1)	2*	1.3(1)	8.6(1)	29(1)	217(5)	0.13(1)	0.59(1)
NaOH	0.5	4.1(1)	2*	1.5(1)	8.8(1)	31(1)	148(5)	0.21(1)	0.68(1)
Arginine	0.2	5.4(1)	2*	1.5(1)	8.0(1)	29(1)	195(4)	0.15(1)	0.66(1)
Arginine	0.5	3.7(1)	2*	1.7(1)	8.1(1)	32(1)	135(5)	0.24(1)	0.73(1)
Choline	0.2	6.2(1)	2*	1.6(1)	7.9(5)	31(1)	225(5)	0.14(1)	0.68(1)
Choline	0.5	3.7(1)	2*	1.9(1)	7.7(1)	33(1)	135(5)	0.24(1)	0.77(1)