Electronic Supplementary Information

Specific ion effects induced by mono-valent salts in like-charged aggregates in water

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Experimental Methods:

Small angle X-ray scattering (SAXS) measurements were carried out at the beamline (BL16B1) of Shanghai Synchrotron Radiation Facility. The X-ray wavelength was 0.124 nm, and a Mar165 CCD detector (2048 × 2048 pixels with pixel size 80 μm) was employed to collect two-dimensional (2D) SAXS patterns. The sample-to-detector distance was 5235 mm and 2125 mm respectively to achieve high resolution or higher order peaks located at larger q value. Fit2D software from European Synchrotron Radiation Facility was used to analyze SAXS patterns in terms of the scattering vector $q = (4\pi \sin\theta)/\lambda$, with 2θ as the scattering angle and λ as the X-ray wavelength.

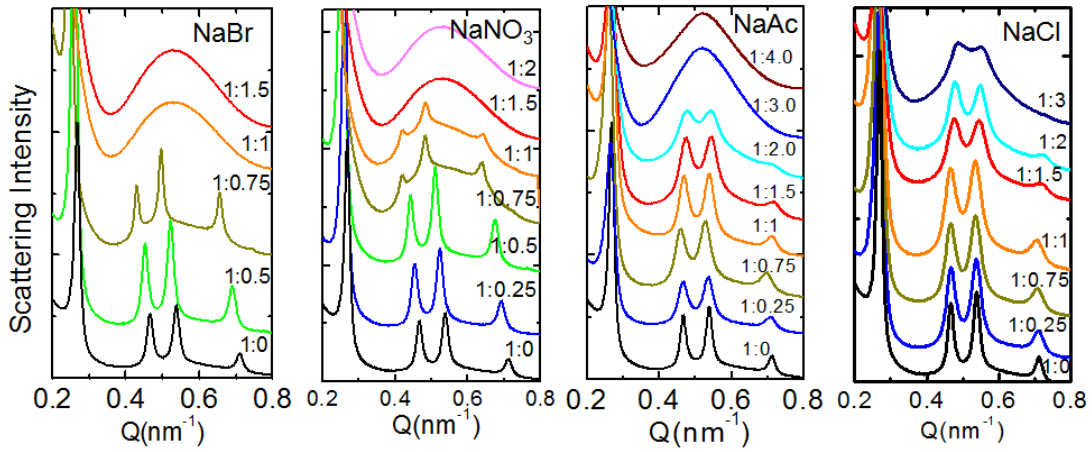

Figure S1 SAXS of 1.5wt% P_7COONa_3 aqueous solution mixed with different salts at varying mole ratio aged for two weeks;

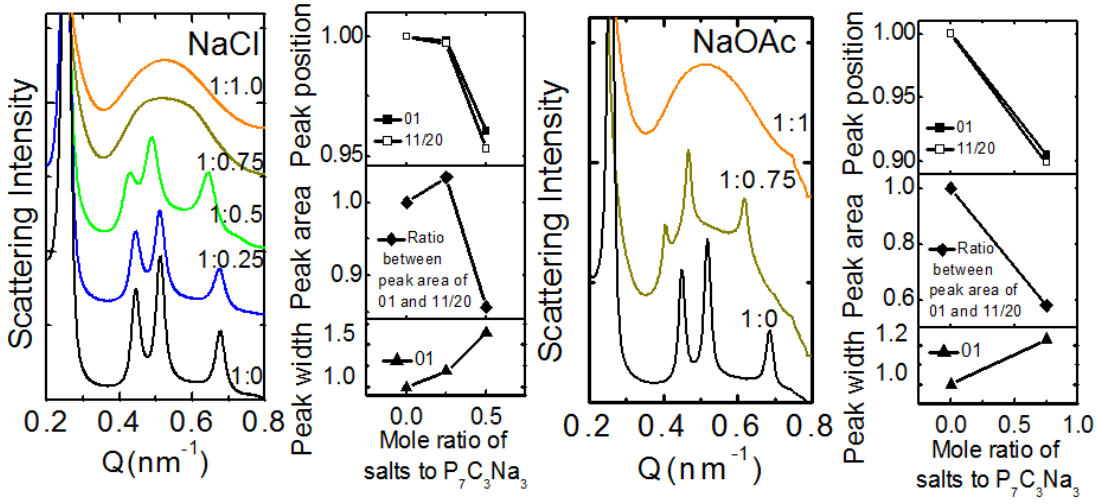

Figure S2 (a) SAXS of 1.5wt% P7COONa3 in aqueous solution of NaCl at varying mole ratio aged for four weeks; (b) Parameters of 01 and 11/20 scattering peaks derived from (a) versus mole ratio of NaCl to P_7COONa_3; (c) and (d) SAXS and fitting parameters of mixture with NaOAc aged for four weeks.

Table S1 Classification of salts and summary of behavior for some peak parameters derived by fitting SAXS. Numbers colored in red indicate a decrease compared to the original value of pure 1.5wt% P7COONa3 solution, those in blue an increase.

Classification / Properties	**Class Ⅰ Electrostatic effects**			**Class Ⅱ Two mechanisms competing**		
Two weeks aging	**no inflection point**			**inflection of peak positions**		
Salt	NaBr	KCl	$NaNO_3$	CsCl	NaOAc	NaCl
Critical mole ratio: *Rc*	1.0	1.5	1.5	1.0	0.75	1.0
Scaled peak position variation of (01) %	-7.5~0	-10~0	-10~0	-5~2.5	-2~2	-1~1
Scaled peak width variation of (01) %	-8~0	-26~22	-27~10	0~165	0~170	0~156
Four weeks aging	**no inflection point**			**no inflection point**		
Critical mole ratio: *Rc*	1.0			1.5	1.0	0.75
Scaled peak position variation of (01) %	-8.0~0			-1.2~0	-9.5~0	-4~0
Scaled peak width variation of (01) %	-26~0.3			0~84	0~23	0~64