Cover Page for Supporting Information

Manuscript title: The investigation of the specific behavior for the cationic block structure and its excellent flocculation performance in high turbidity water treatment

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Text S1. Analytical methods for K_M, R_p and C_v.

The dialysis and conductometric titration methods were used to determine the K_M and R_p, and the K_M was calculated by the following Formula (1):

$$K_M = \frac{[NaPAA **** ATAC]}{[NaPAA]_f [ATAC]_f}$$

(1)

In Formula (1), *[NaPAA****ATAC]* referred to the concentration of the association of NaPAA and ATAC, *[NaPAA]$_f$* and *[ATAC]$_f$* were the free concentration when the dialysis kept balance. Meanwhile, the free concentration of NaPAA and ATAC was measured by conductometric titration method. Prior to the determination of polymerization rate (R_p), the monomer conversion rate was controlled to less than 10%, and the R_p was calculated by the following Formula (2):

$$R_p = k \times [M] \tag{2}$$

In Formula (2), *[M]* referred to the initial concentration of monomer, and *k* was the slope of the $Y_t = ln[1/(1-C_t)]$ plot (a fitting straight line), where C_t is the monomer conversion (*C*) with a given reaction time at 2 min, 4 min, 6 min, 8 min and 10 min, and it was determined by gravimetric method.[1]

$$Conversion = \frac{m_0 \cdot m_2}{m \cdot m_1} \tag{3}$$

where *m* is the total weight of the monomers (AM and ATAC) for the copolymerization, m_0 is the weight of the obtained product after copolymerization, m_1 is the copolymerization weight used for purification, and m_2 is the copolymerization weight after purification.

Text S2. Analytical method for Fractal dimension (D$_f$)

Fractal dimension (D$_f$) could be determined by the light scattering method from the negative slope of log-log plot by a well-known power-law relation:.[2,3]

$$I \propto Q^{D_f} \tag{4}$$

where *I* is the light intensity, and *Q* is the scatter vector which can be given according to the following equation:

$$\frac{4\pi n\, sin(\theta/2)}{\lambda} \tag{5}$$

where λ is the wavelength of radiation in vacuum (635 nm in this work), *n* is the refractive index of the dispersion medium (1.33 for water), and θ is the scattering angle, respectively.

References

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3 J. Greenwood, T. Rainey and W. O. S. Doherty, *Journal of Colloid & Interface Science*, 2007, **306**, 66-71.