

Supporting Information for:

One-pot synthesis and aqueous solution properties of pH-responsive schizophrenic diblock copolymer nanoparticles prepared via RAFT aqueous dispersion polymerization

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PCEA homopolymer

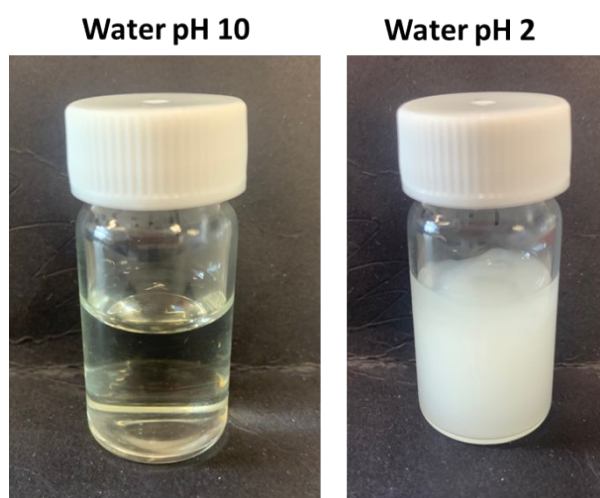


Figure S1. Digital photographs recorded for a PCEA homopolymer: (left-hand image) fully dissolved in aqueous alkaline solution (pH 10) and (right-hand image) insoluble in aqueous acidic solution (pH 2).

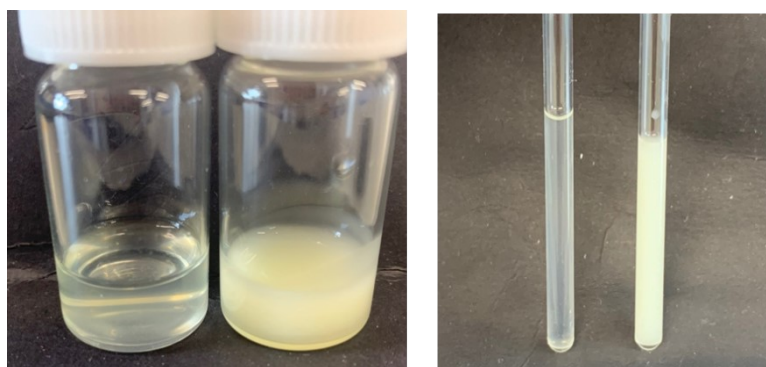


Figure S2. Digital photographs recorded at 20 °C for the initial transparent reaction solution containing the CEA monomer (left-hand vial or NMR tube) and the final pale yellow turbid reaction mixture (right-hand vial or NMR tube) containing the PDEA₆₇-PCEA₁₃₅ nanoparticles. These images are consistent with an aqueous *dispersion* polymerization formulation, rather than an aqueous *emulsion* polymerization formulation.

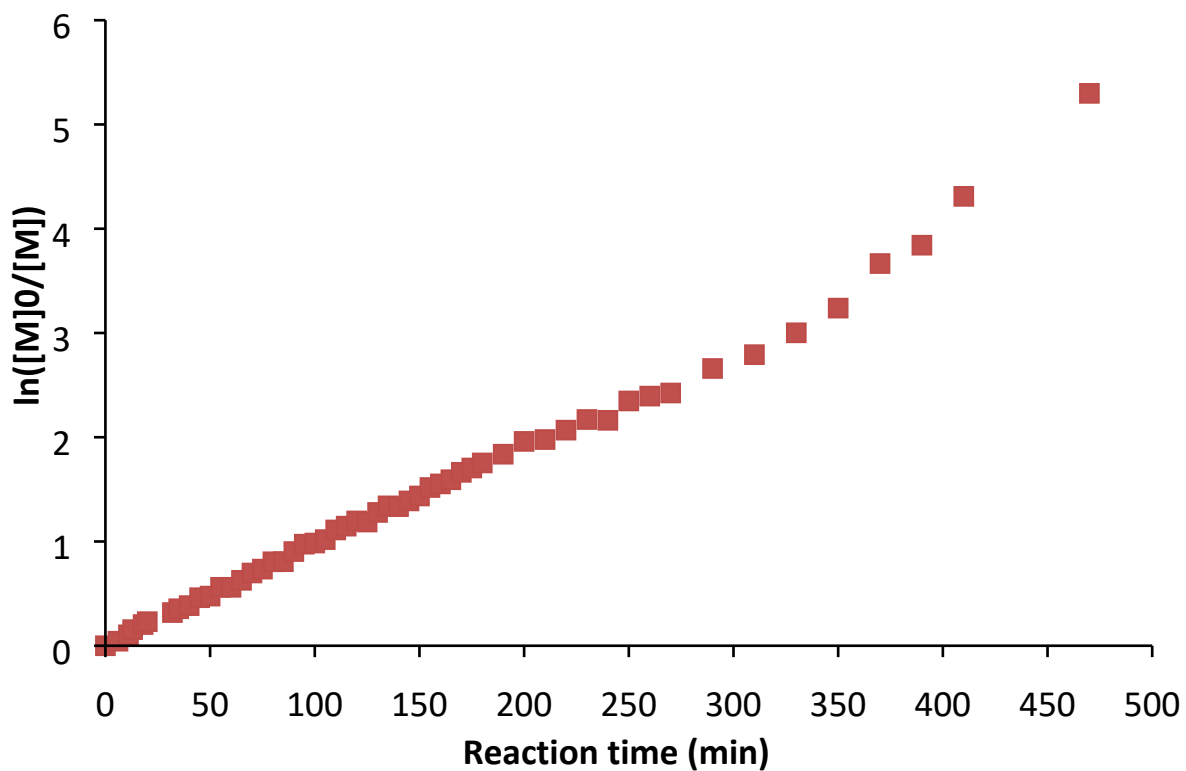


Figure S3. Semi-logarithmic kinetic plot for the RAFT aqueous dispersion polymerization of CEA targeting PDEA₆₇-PCEA₁₃₅ diblock copolymer nanoparticles obtained by *in situ* ¹H NMR spectroscopy studies. The corresponding conversion vs. time curve is shown in Figure 1 of the main manuscript. The above data indicate first-order kinetics with respect to CEA up to first 90% conversion.

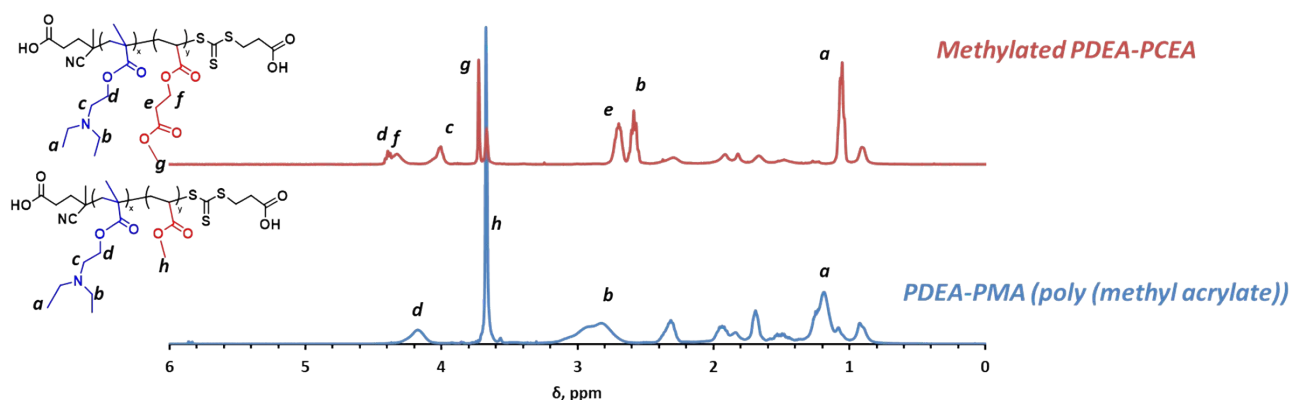


Figure S4. ^1H NMR spectra recorded in CDCl_3 for a selectively methylated $\text{PDEA}_{67}\text{-PCEA}_{75}$ diblock copolymer (upper red spectrum) obtained after treating the $\text{PDEA}_{67}\text{-PCEA}_{75}$ precursor with excess TMSDAM (see main manuscript for full experimental details). Unexpectedly, such methylation produces two distinct signals labelled *g*. The major signal corresponds to that expected for the desired methylated PCEA block. The minor signal corresponds to the methyl ester protons of methyl acrylate repeat units. This latter assignment is confirmed by comparison with the methyl ester signal *h* in the spectrum recorded for a poly2-(diethylamino)ethyl methacrylate)-poly(methyl acrylate) (PDEA-PMA) diblock copolymer reference, which was prepared by RAFT solution polymerization of methyl acrylate in methanol using a PDEA_{67} precursor. Peak integration of the signals in the red spectrum indicates that up to 39% of the CEA repeat units are converted into methyl acrylate during the selective methylation protocol, presumably via transesterification. However, it is emphasized that no detectable hydrolysis of the acrylic ester bond in the PCEA block occurs during its synthesis via RAFT aqueous dispersion polymerization of CEA at pH 2. Moreover, TMSDAM derivatization results in methylation of the acrylic acid residues that are generated in situ (as well as the remaining 60% CEA residues), which ensures that the methylated diblock copolymer is fully soluble in the GPC eluent (THF).

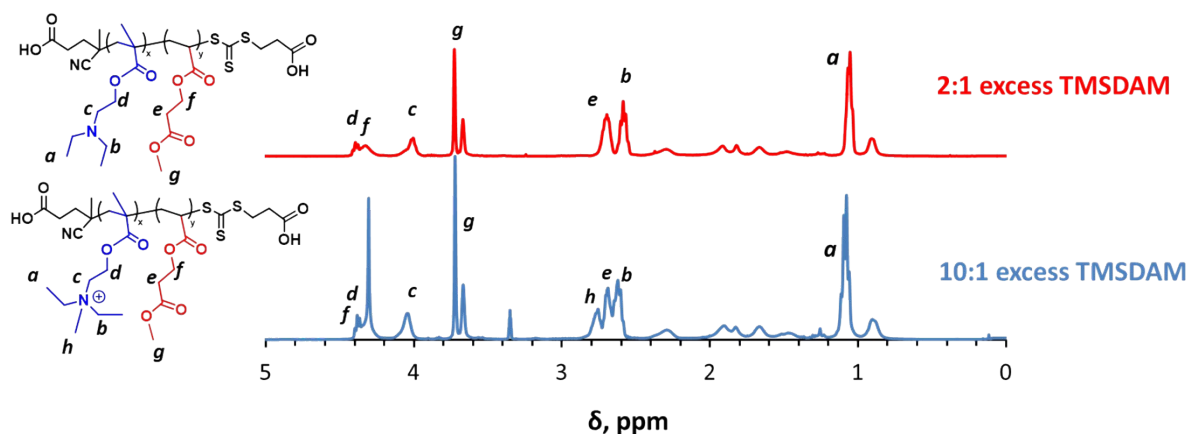


Figure S5. ^1H NMR spectra recorded after methylation of a $\text{PDEA}_{67}\text{-PCEA}_{75}$ diblock copolymer using either a two-fold (red spectrum) or a ten-fold (blue spectrum) excess of TMSDAM. In the latter case, an extra signal *h* is observed at 2.75 ppm, indicating (unwanted) partial quaternization of the PDEA block.

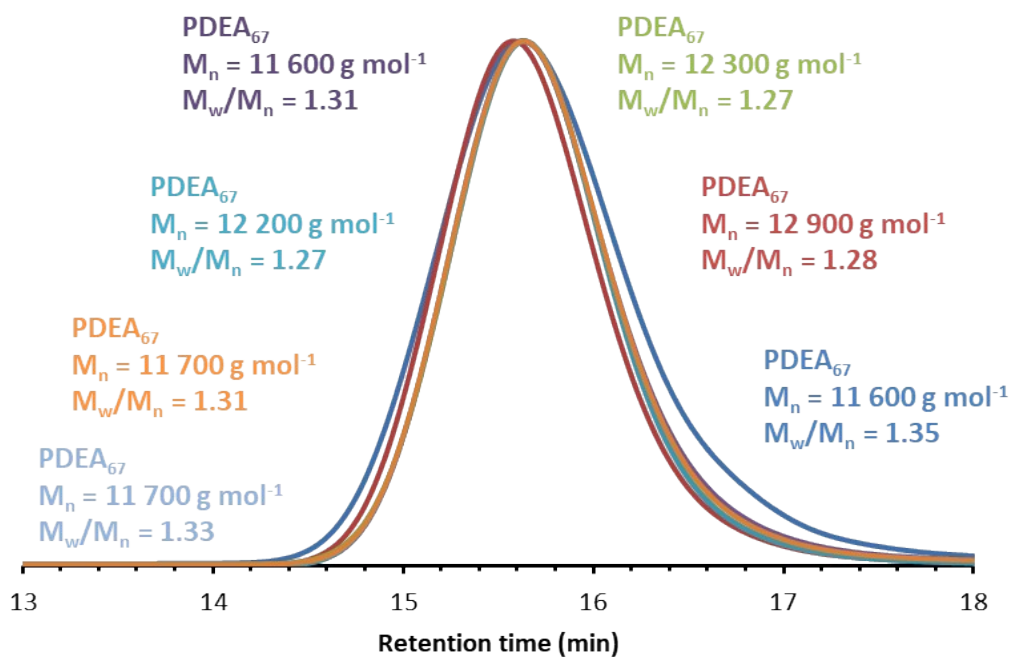


Figure S6. Overlaid GPC curves recorded for the seven PDEA₆₇ precursors prepared during the one-wholly aqueous pot synthesis of a series of PDEA₆₇-PCEA₅₀₋₂₀₀ diblock copolymer nanoparticles (see Table 1). In each case, an aliquot was extracted for ¹H NMR spectroscopy and GPC analysis after a reaction time of 100 min at 44 °C. These GPC data indicate reasonably good reproducibility for this first-stage polymerization.