

Electronic Supporting Information

Anion conducting multiblock poly(arylene ether sulfone)s containing hydrophilic segments densely functionalized with quaternary ammonium groups

*Eva Annika Weiber, David Meis & Patric Jannasch**

Department of Chemistry, Polymer & Materials Chemistry, Lund University

P.O. Box 124, Lund SE-221 00, Sweden

* E-mail: patric.jannasch@chem.lu.se

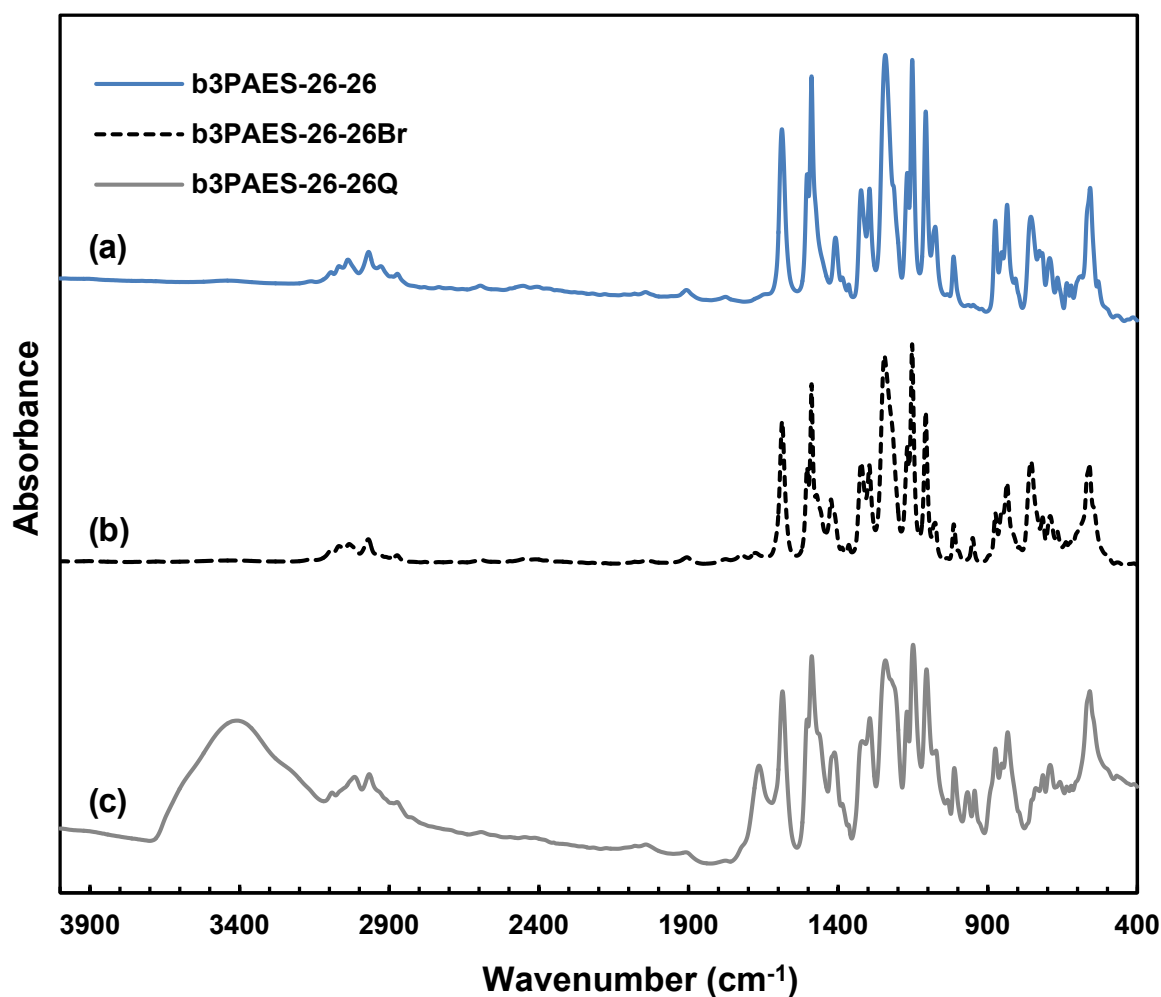


Figure S1. FTIR spectra of an unmodified multiblock copolymer (a), after benzylbromination (b), and after quaternization (c). The unmodified material showed the characteristic bands commonly observed in PAES, e.g., at 1490 and 1589 cm⁻¹ originating from *para* aromatic ring stretching, and at 1154 cm⁻¹ corresponding to the SO₂ asymmetric stretching. There were no significant differences between the spectrum of the benzylbrominated and the unmodified material. The spectrum of the quaternized copolymer showed a large water band at around 3400 cm⁻¹ and a signal appearing at 1678 cm⁻¹ originating from the QA groups.

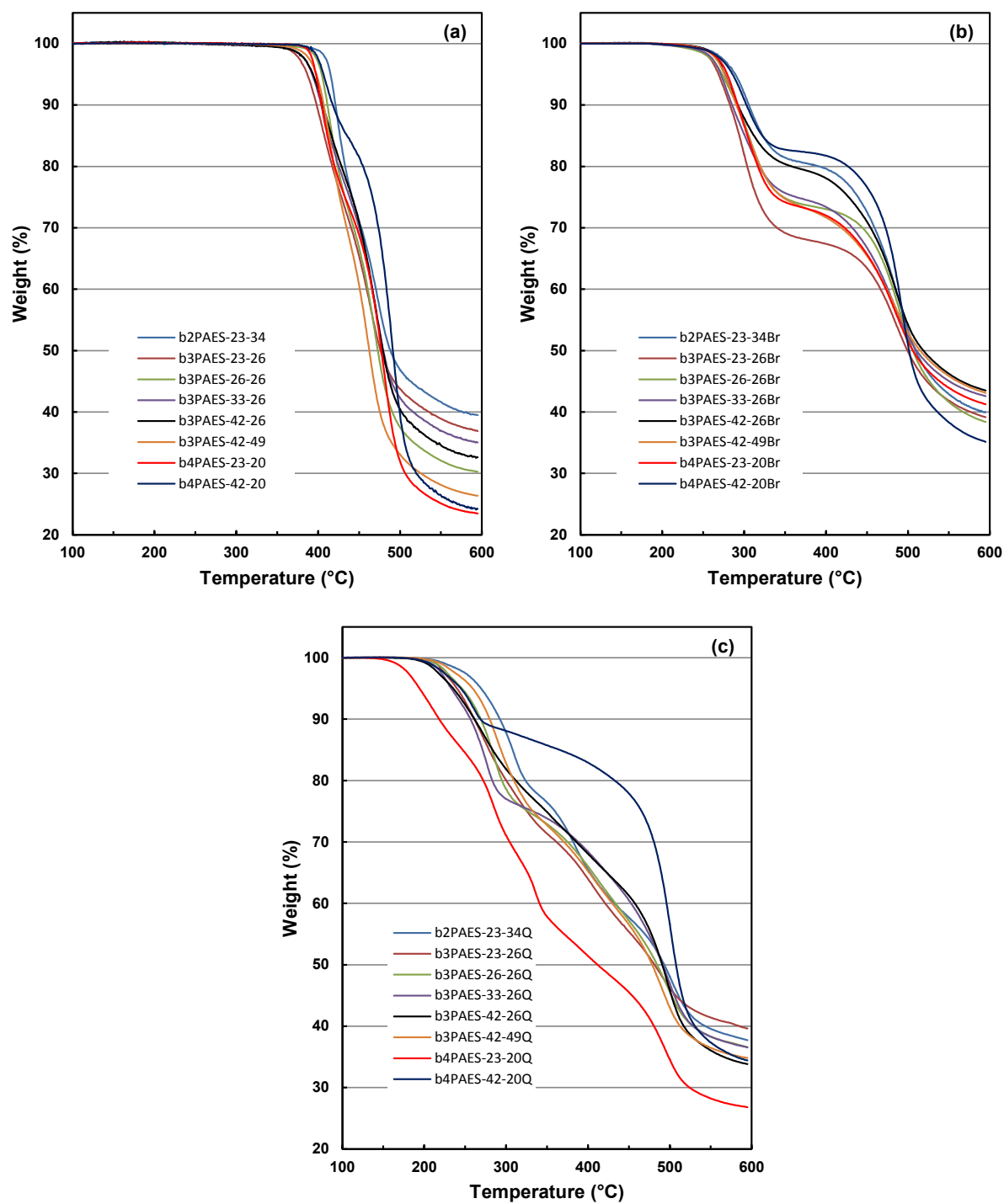


Figure S2. TGA traces of the neat multiblock copolymers (a), their brominated derivatives (b), and the quaternized AEMs (c).

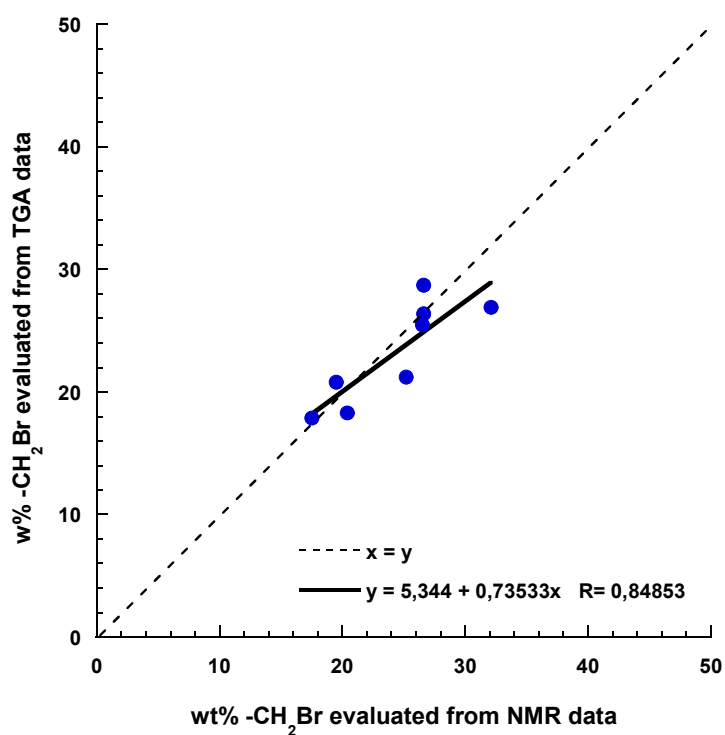


Figure S3. Correlation between the wt% of bromomethyl group found by ¹H NMR spectroscopy in the multiblock copolymers and the magnitude of the weight loss between 200 and 350 °C detected by TGA. The dashed line indicates $y = x$.

Membrane stability under alkaline conditions

The stability of a tetra-QA functionalized PAES under alkaline conditions was evaluated by immersing a membrane (IEC = 0.8 meq. g⁻¹) in 1 M aq. NaOH at 40 °C for 7 days. The ¹H NMR spectra of the material before and after the stability test are presented in Figure S4a and b, respectively. The preparation of the polymer and membrane are described in ref. 23.

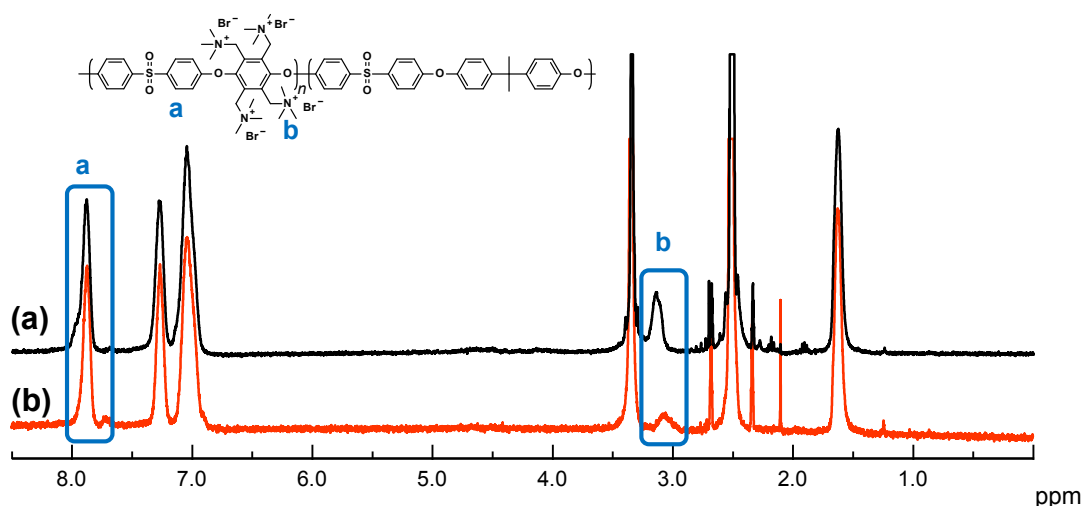


Figure S4. ¹H NMR spectra of a quaternized PAES before (a) and after (b) immersion in alkaline solution (1 M aq. NaOH at 40 °C). The ratio between integrated signals **a** and **b** decreased from 1.0:0.45, before the experiment, to 1.0:0.075 after the treatment. Thus, signal **b** decreased by approximately 80% in intensity to indicate a significant loss of benzyltrimethylammonium groups. After the alkaline treatment the membrane became quite brittle.

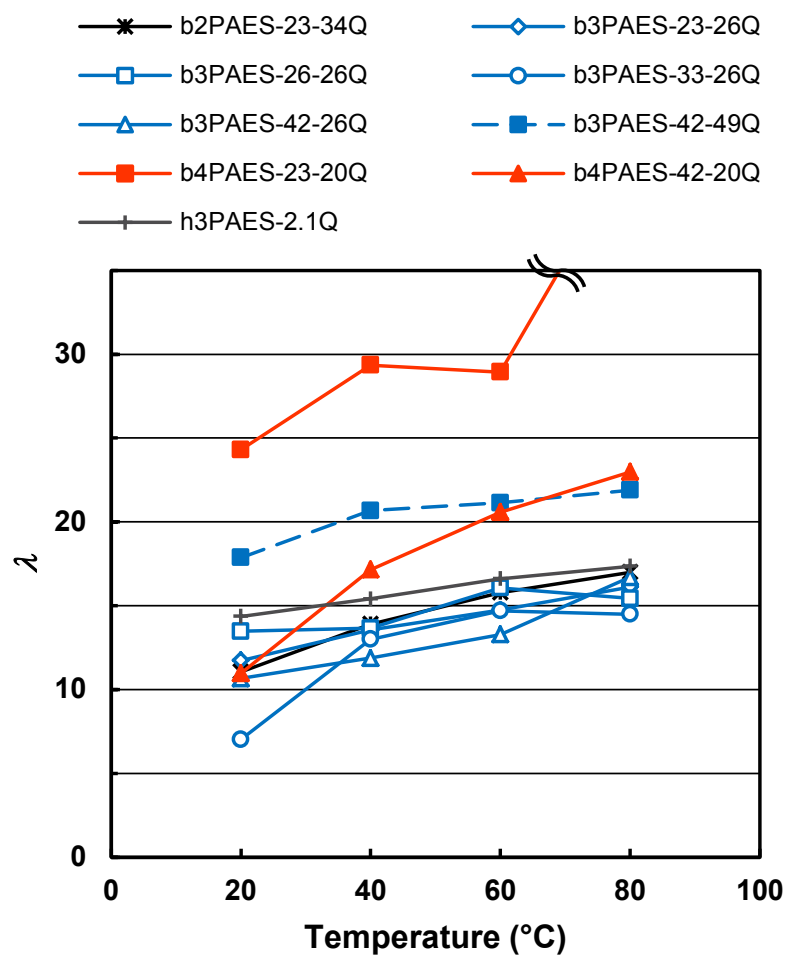


Figure S5. Hydration number (λ) of the AEMs as a function of temperature.