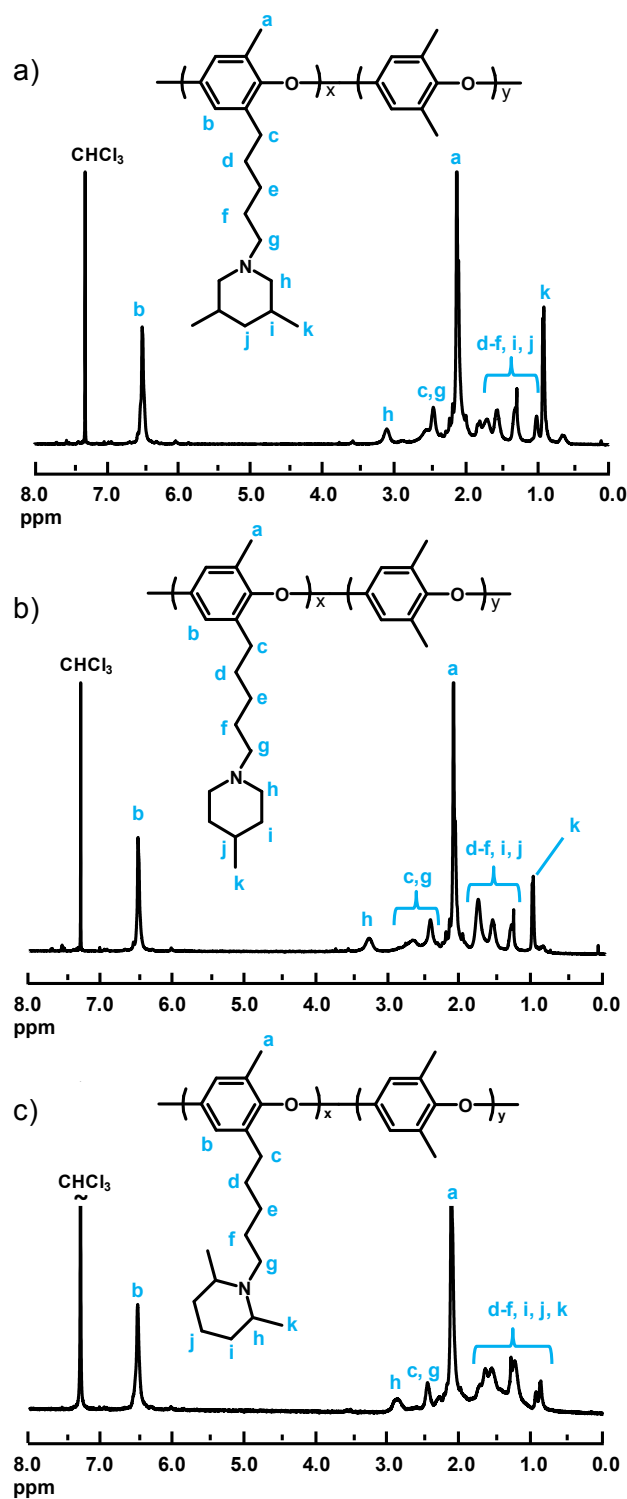


**Electronic Supplementary Information (ESI)**

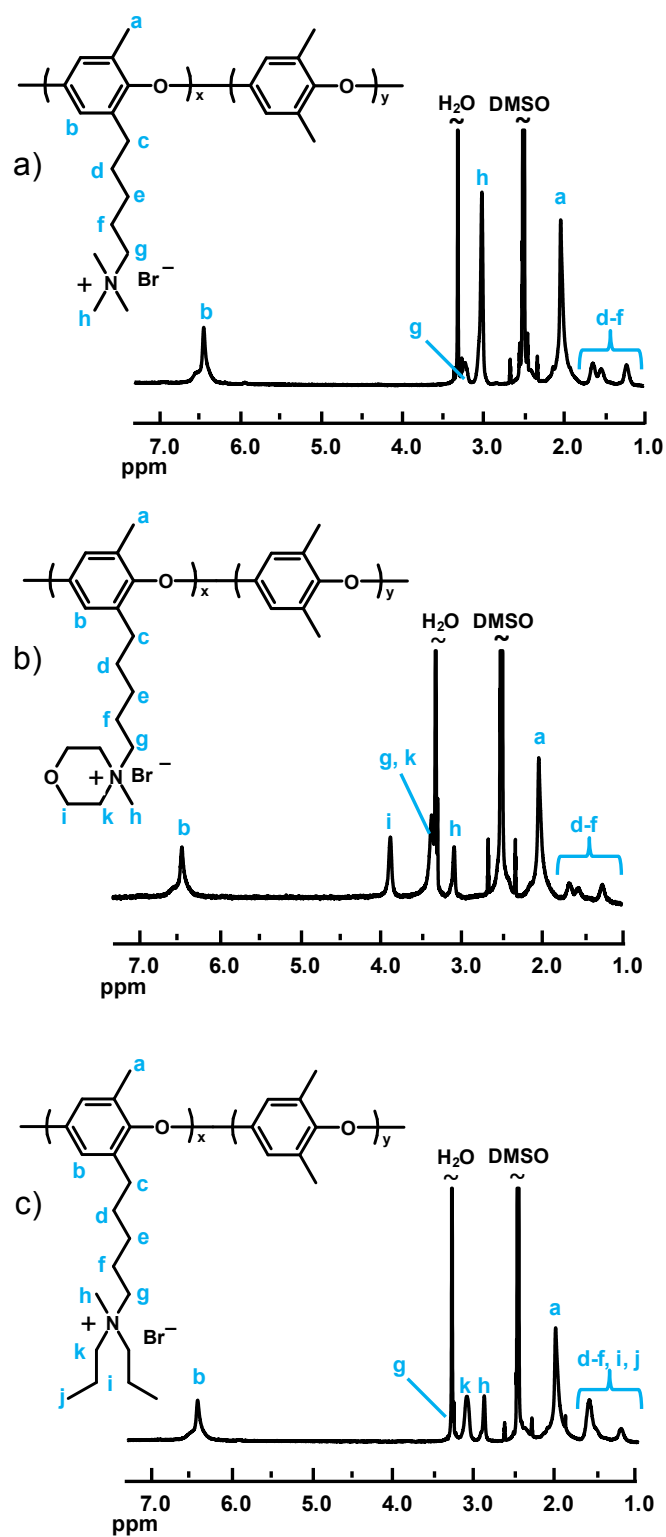
**A comparative study of anion-exchange membranes tethered with different hetero-cycloaliphatic quaternary ammonium hydroxides**

**Hai-Son Dang and Patric Jannasch\***

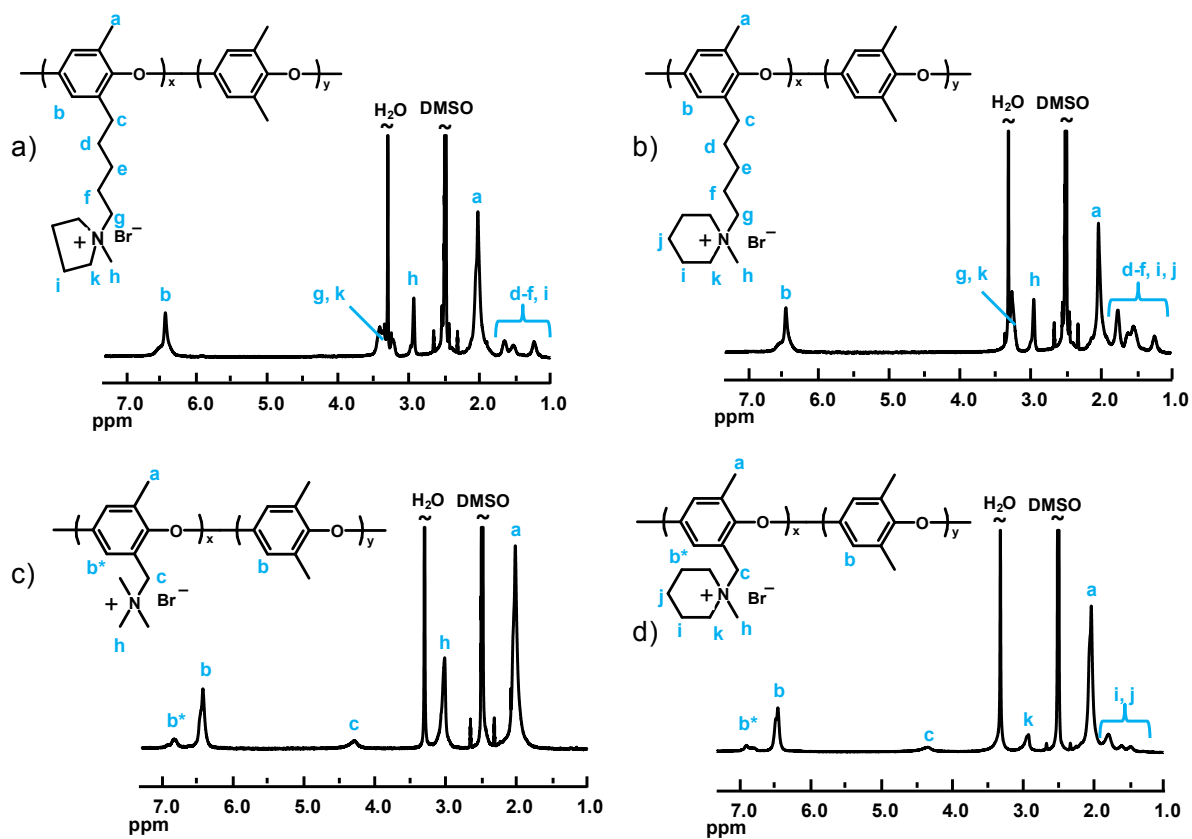
Department of Chemistry, Polymer & Materials Chemistry, Lund University, P.O. Box 124,  
Lund SE-221 00, Sweden



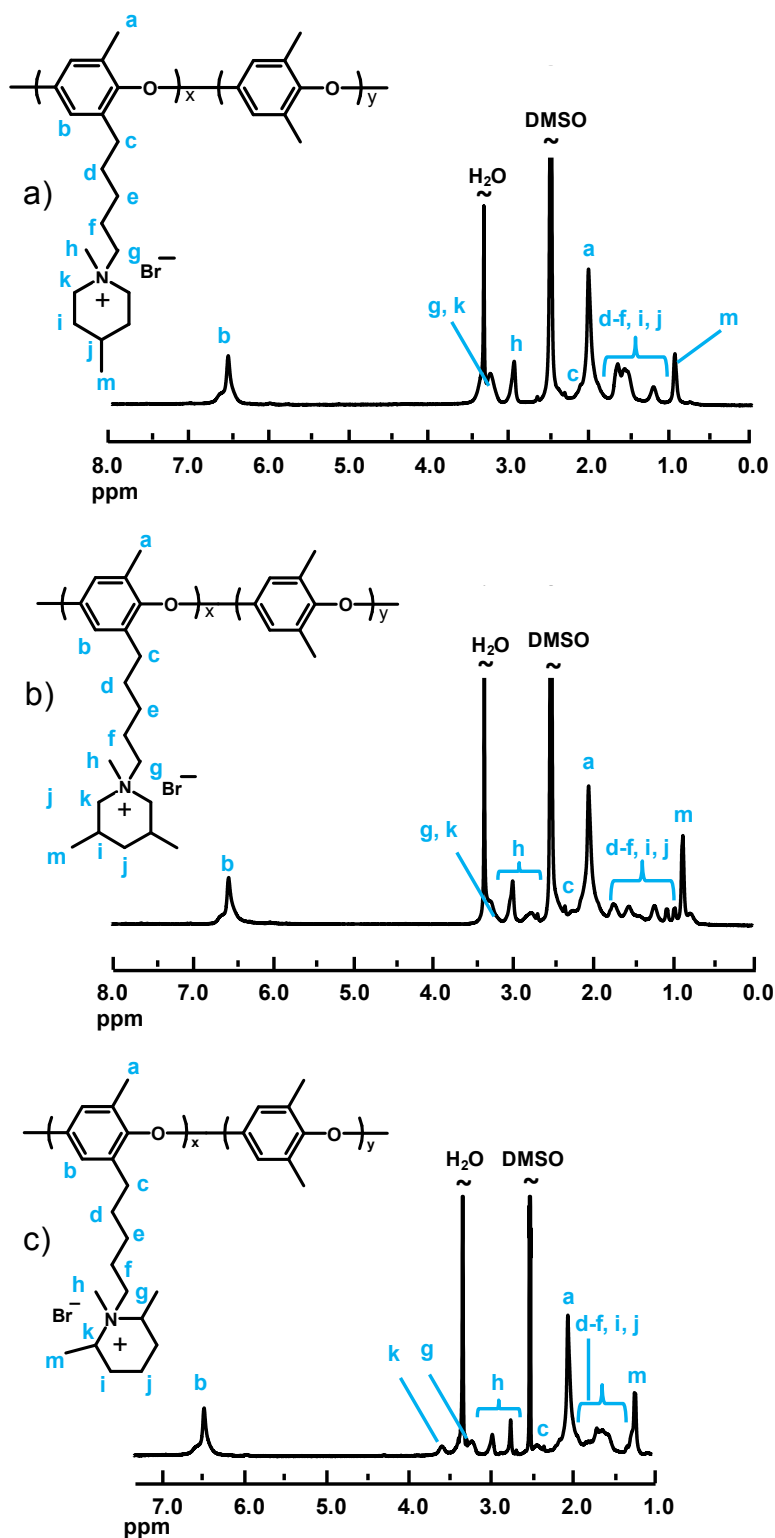
**Fig. S1**  $^1\text{H}$  NMR spectra of PPO functionalized with tertiary amine groups: (a) PPO5-3,5DMPip precursor, (b) PPO5-4MPip precursor and (c) PPO5-2,6DMPip precursor. Data recorded with chloroform-*d* solutions.



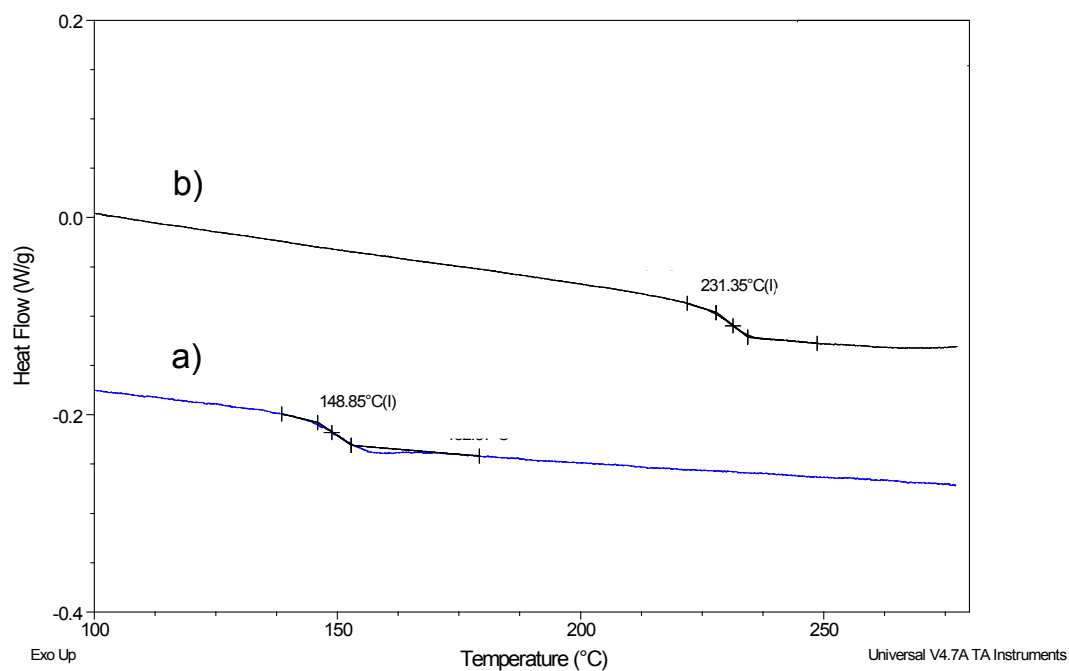
**Fig. S2**  $^1\text{H}$  NMR spectra of PPOs with QAs on pentyl spacer units: (a) PPO5-TMA, (b) PPO5-Mor and (c) PPO5-DPMA. Data recorded with  $\text{DMSO}-d_6$  solutions.



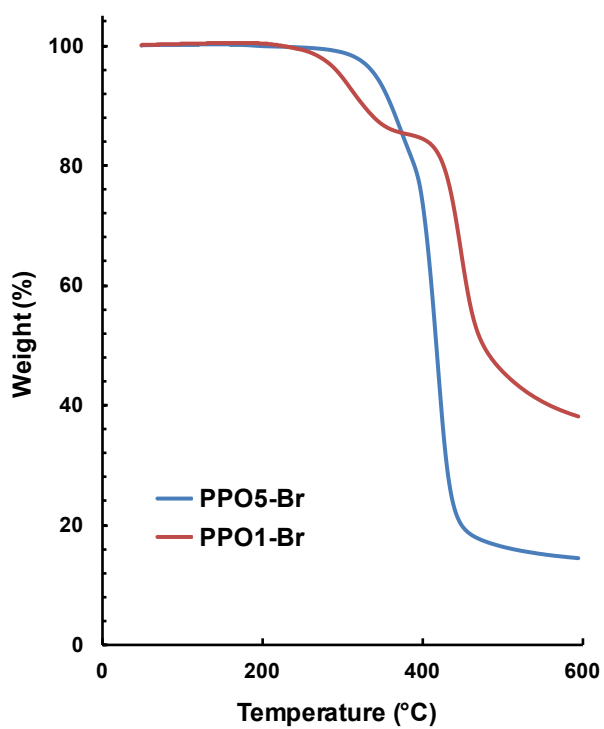
**Fig. S3**  $^1\text{H}$  NMR spectra of PPOs functionalized with QAs: (a) PPO5-Pyr, (b) PPO5-Pip, (c) PPO1-TMA and (d) PPO1-Pip. Data recorded with  $\text{DMSO}-d_6$  solutions.



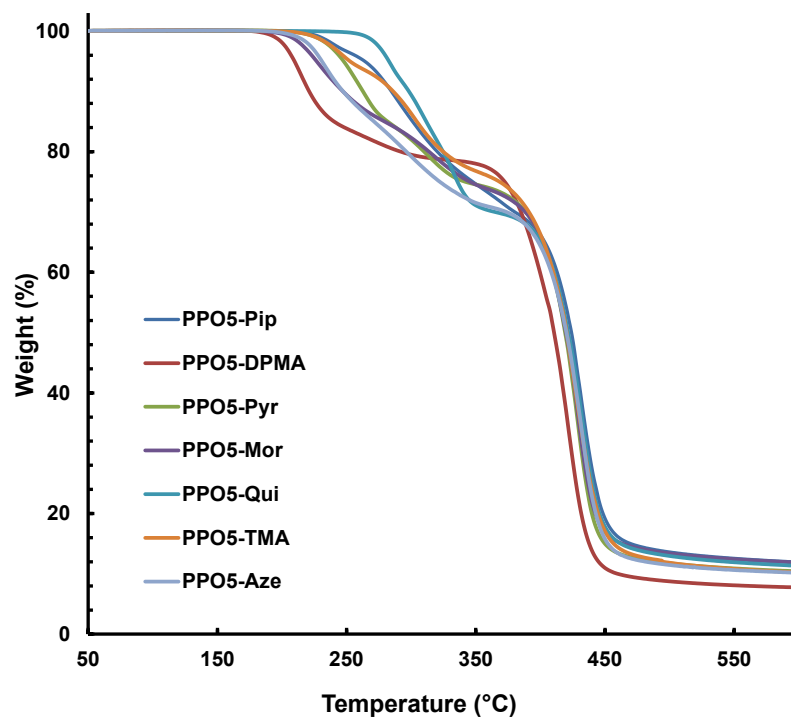
**Fig. S4**  $^1\text{H}$  NMR spectra of PPOs with QAs on pentyl spacer units: (a) PPO5-4MPip, (b) PPO5-3,5DMPip and (c) PPO5-2,6DMPip. Data recorded with  $\text{DMSO}-d_6$  solutions.



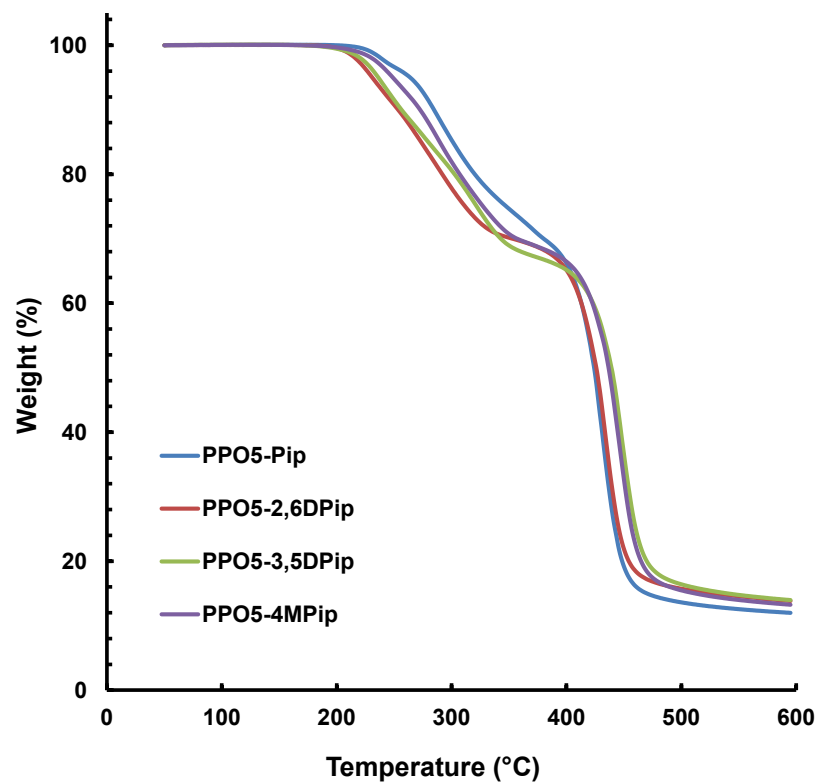
**Fig. S5** DSC traces of the brominated PPO precursors: (a) PPO5-Br and (b) PPO1-Br.  $T_g$  values are indicated in the plots.



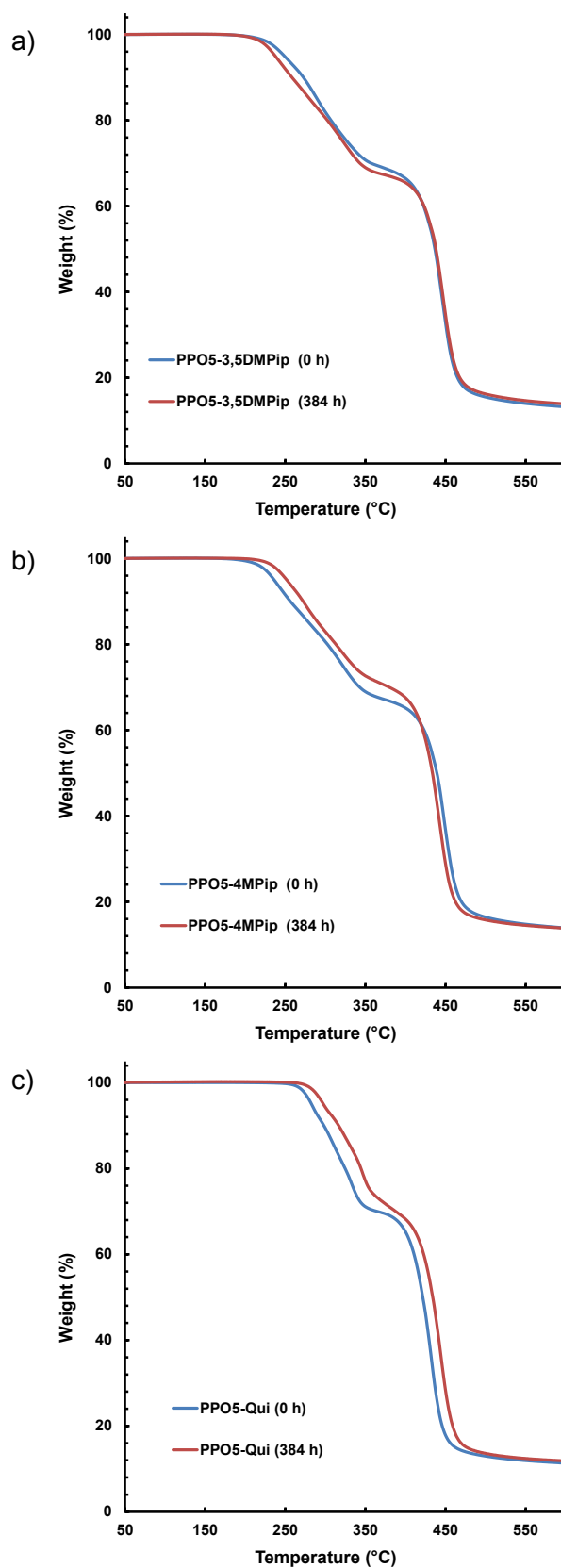
**Fig. S6** TGA traces of the brominated PPO precursors, PPO5-Br and PPO1-Br. Data recorded at 10 °C min<sup>-1</sup> under N<sub>2</sub>.



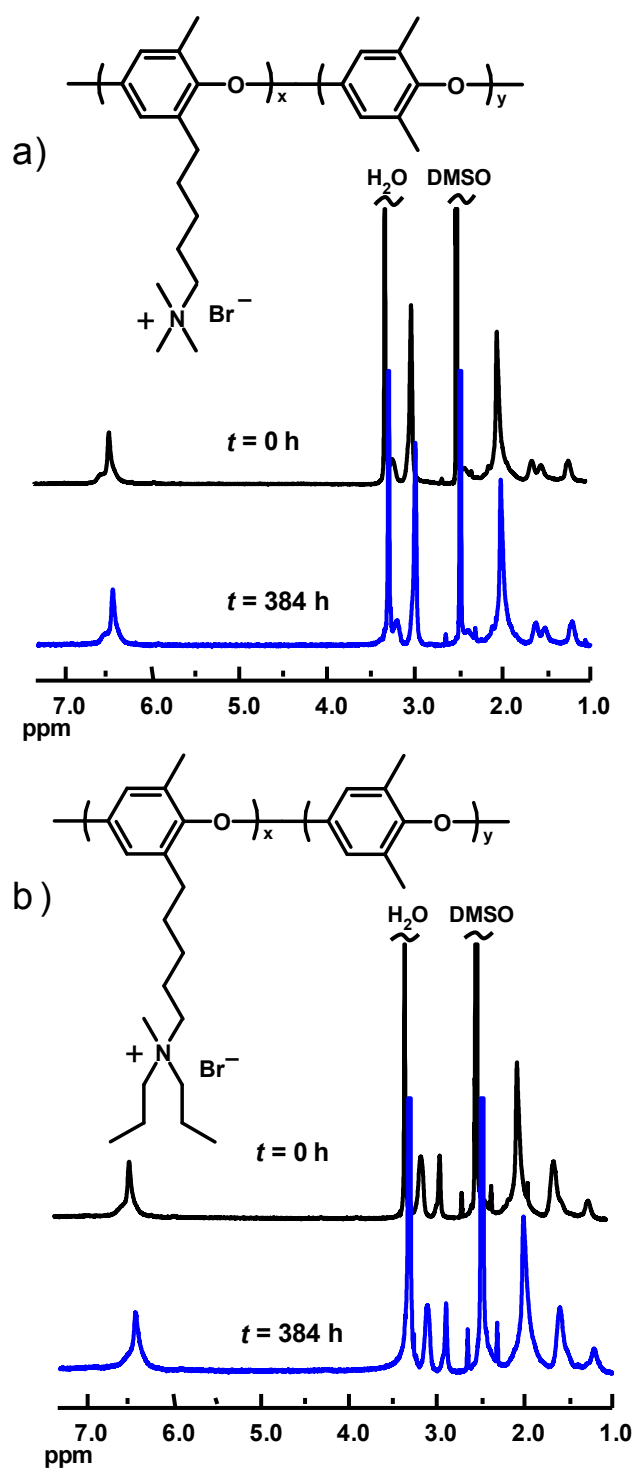
**Fig. S7** TGA traces of AEMs in the Br<sup>-</sup> form: PPO5-Pip, PPO5-DPMA, PPO5-Pyr, PPO5-Mor, PPO5-Qui, PPO5-TMA and PPO5-Aze. Data recorded at 10 °C min<sup>-1</sup> under N<sub>2</sub>.



**Fig. S8** TGA traces of AEMs in the Br<sup>-</sup> form: PPO5-Pip, PPO5-2,6DMPip, PPO5-3,5DMPip and PPO5-4MPip. Data recorded at 10 °C min<sup>-1</sup> under N<sub>2</sub>.



**Fig. S9** TGA traces of AEMs in the Br<sup>-</sup> form before and after immersion in 1 M aq. NaOH at 90 °C during 384 h: (a) PPO5-3,5DMPip, (b) PPO5-4MPip, (c) PPO5-Qui. Data recorded at 10 °C min<sup>-1</sup> under N<sub>2</sub>.



**Fig. S10**  $^1\text{H}$  NMR spectra of PPOs tethered with two non-cyclic QAs via alkyl spacer chains before and after immersion of the respective AEM in 1 M aq. NaOH at 90 °C during 384 h: (a) PPO5-TMA, (b) PPO5-DPMA. Spectra were recorded in  $\text{DMSO}-d_6$  after ion-exchange to the  $\text{Br}^-$  form.