Supporting Information

Table S1 contains the degree of functionalization for multiple bromination reactions for the tetramethylbisphenol A-based poly(sulfone)s.

Table S1. Degree of functionalization for brominated poly(sulfone) samples demonstrating repeatability of the reaction.

Sample	DF[a] Trial 1	DF Trial 2	DF Trial 3	DF Trial 4	DF Trial 5
100-3	1.4	1.4	1.4	1.4	1.4
100-2	0.9	0.9	1.0		
40-3	0.9	1.1	1.0	1.1	
60-4	1.5	1.6	1.6		
80-4	1.6	1.6	1.5		
80-3	1.4	1.3			
40-4	1.1	1.2	1.3		
60-3	1.1	1.2	1.1		

a) Number of bromomethyl groups on average per repeat unit by ^{1}H NMR.

Table S2 contains the numerical data for Figures 3, 4, 6 and 7.

Table S2. Properties of tetramethylbiphenol A-based anion exchange membranes.

Sample[a]	IEC (meq g^{-1})[b]	σ_{HCO3-} @ 30 °C (mS cm^{-1})[c]	$E_{a\sigma}$ (kJ mol^{-1})	$P_{CH3OH} * 10^{-7}$ @ 30 °C (cm^2 s^{-1})	E_{aP} (kJ mol^{-1})	Water uptake (wt %)	λ[d]
100-3-H	2.09	27.3	11.8	41	9.5	166	44
100-3	2.07	21.3	16.2	21	10.8	120	32
100-2-H	1.50	6.89	17.2	5.3	19.0	61	22
100-2	1.48	6.48	18.4	3.7	21.0	55	20
80-4	2.40	14.6	18.8	-	-	124	29
80-3-H	2.05	13.3	19.6	10	11.0	84	22
80-3	2.08	12.2	20.1	8.0	12.1	73	19
60-4-H	2.37	16.7	17.7	21	11.8	137	32
60-4	2.31	13.6	19.0	17	12.7	105	24
60-3-H	1.90	11.0	20.1	8.4	13.4	70	20
60-3	1.87	8.51	20.8	6.7	16.4	52	15
40-4-H	2.10	13.3	19.9	-	-	80	21
40-4	2.08	11.2	21.7	9.2	15.5	75	20
40-3-H	1.85	10.0	23.0	6.7	15.4	58	17
40-3	1.84	8.50	24.0	5.5	16.5	55	16

[a] "H" designates membranes from homogeneous amination.
[b] Titrated values.
[c] Measure in DI water.
[d] The number of absorbed water molecules per quaternary ammonium group.

Tables S3 and S4 contain temperature-dependent data for bicarbonate conductivity and methanol permeability from which activation energies were calculated. All temperature-dependent data displayed Arrhenius behavior.

Table S3. Bicarbonate conductivity for individual samples as a function of temperature used to calculate activation energies.

Sample	σ_{HCO3-} (mS cm^{-1})		
	30 ºC	50 ºC	70 ºC
100-3-H	27.3	36.5	-
100-3	21.3	31.7	45.0
100-2-H	6.89	10.3	15.2
100-2	6.48	10.1	15.1
80-4	14.6	25.7	33.8
80-3-H	13.3	20.3	33.4
80-3	12.2	20.3	31.3
60-4-H	16.7	25.1	36.9
60-4	13.6	22.5	32.8
60-3-H	11.0	18.5	28.0
60-3	8.51	14.8	23.0
40-4-H	13.3	21.3	33.0
40-4	11.2	20.9	31.4
40-3-H	10.0	17.7	29.0
40-3	8.50	15.2	27.0

Table S4. Methanol permeability for individual samples as a function of temperature used to calculate activation energies.

Sample	Methanol permeability (10^{-7} cm^2 s^{-1})				
	30 ºC	40 ºC	50 ºC	60 ºC	70 ºC
100-3-H	41.3	45.6	52.2	57.5	-
100-3	20.7	-	26.5	29.4	34.7
100-2-H	5.25	-	9.01	-	12.6
100-2	3.71	-	6.97	-	9.74
80-3-H	10.0	-	13.3	-	16.6
80-3	8.03	-	11.7	-	14.0
60-4-H	21.2	-	28.1	32.4	-
60-4	16.7	-	21.3	-	30.2
60-3-H	8.41	-	12.0	-	15.6
60-3	6.67	-	10.4	-	14.2
40-4	9.19	-	13.8	-	22.8
40-3-H	6.73	-	9.76	-	13.7
40-3	5.47	-	7.54	-	11.8

Figure S1 shows small-angle x-ray scattering (SAXS) data for two selected AEM samples. Both samples were stained in 5 wt % phosphotunstic acid in deionized water to try to enhance the electron density contrast in the sample. SAXS experiments were performed for many different membranes in this study and all showed curves approximated by those of Figure S1.

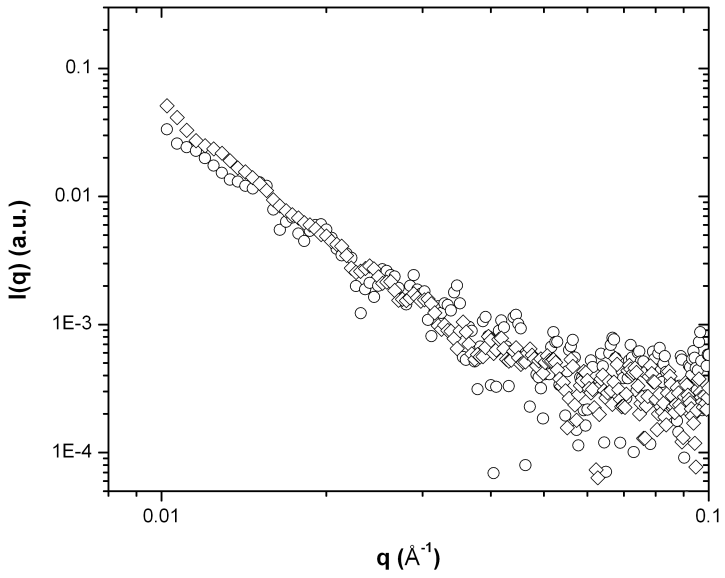

Figure S1. Small-angle x-ray scattering profiles of tetramethylbisphenol-A derived anion exchange membranes, 100-2 (○), 40-3 (◇).