Supporting information for

“What is behind a gas stream scrubbing liquid? Monoethanolamine/water mixtures as seen by dielectric relaxation spectroscopy”

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Table S1: Molality (m_1) of MEA (1) in water (2), associated molar concentrations (c_1, c_2), molar (x_1) and mass (w_1) fractions of the studied MEA/water mixtures, together with their density (ρ), viscosity (η), and the degree of MEA protonation ($\alpha_{\mathrm{MEA\cdot H^+}}$) at 298.15 K.

m_1 (mol·kg^{-1})	ρ (g·cm^{-3})	η (mPa·s)	c_1 (M)	c_2 (M)	$x_1 \times 100$	$w_1 \times 100$	$\alpha_{\mathrm{MEA\cdot H^+}}{}^a$ $\times 100$
0.000	0.99703	0.890	0.000	55.34	0.000	0.000	
0.101	0.99721	0.939	0.100	55.02	0.1815	0.6126	1.762
0.254	0.99747	0.979	0.250	54.52	0.4562	1.530	1.119
0.517	0.99808	1.01	0.500	53.71	0.922	3.060	0.792
1.066	0.99916	1.06	1.000	52.07	1.885	6.114	0.561
2.275	1.00160	1.35	2.000	48.82	3.936	12.20	0.397
4.419	1.00582	1.77	3.500	43.97	7.374	21.25	0.300
7.087	1.01042	2.51	4.998	39.14	11.32	30.21	0.251
11.89	1.01676	4.00	6.996	32.72	17.61	42.03	0.212
19.04	1.02216	6.47	8.997	26.23	25.54	53.77	0.187
31.12	1.02547	10.5	11.00	19.62	35.92	65.53	0.169
67.52	1.02418	16.8	13.47	11.09	54.88	80.48	0.153
144.37	1.01960	19.2	14.99	5.765	72.23	89.81	0.145
	1.01142	18.6	16.56	0.000	100.0	100.0	

^{a} Estimated from pK_a = 9.5 [1].

Table S2: Static permittivities (ε_s), permittivities at infinite frequency (ε_∞), amplitudes (S_j; $j = 1 \ldots 4$), relaxation times (τ_j) and values of the reduced error function (σ) of the investigated MEA/water mixtures at 298.15 K. See Main Manuscript for the selected relaxation models; data for neat water were taken from Ref. [2].^{a}

c (M)	S_1	S_2	S_3	S_4	τ_1 (ps)	τ_2 (ps)	τ_3 (ps)	τ_4 (ps)	ε_s	ε_∞	$10^2\sigma$
0.000			72.42	2.43			8.35	0.28	78.37	3.52	
0.100			71.99	2.32			8.46	0.36	77.83	3.52^b	0.66
0.250			71.79	2.22			8.67^c	0.50	77.53	3.52^b	1.63
0.500	0.39		70.07	2.95	$120^{b,d}$		9.09	0.79	76.92	3.52^b	1.51
1.000	0.32	6.40	63.30	2.36	111	16^b	9.39	0.33	75.91	3.52^b	1.92
2.000	1.71	12.12	53.11	2.07	66.9	16.4	10.7	1.49	73.63	4.62	1.58
3.500	1.99	21.43	40.59	1.82	104	22.9	12.3	0.92	70.23	4.41	1.40
4.998	3.10	27.95	29.38	1.39	111	29.3	14.1	1.62	66.71	4.89	0.52
6.996	4.13	34.79	16.38	1.62	156	41.5	16.0	3.84	62.01	5.09	0.61
8.997	7.41	35.50	7.62	2.00	190	54.7	19.6	2.80	56.86	4.34	0.20
11.00	9.07	30.44	5.68	1.68	276	78.9	24.8	2.43	50.88	4.02	0.68
13.50	10.23	21.77	5.28	1.37	399	113	33.9	3.53	42.61	3.95	0.18
14.99	11.02	16.34	4.65	1.37	439	115	33.3	3.28	37.07	3.68	0.18
16.56	10.57	10.92	4.02	1.42	457	99.2	30.4	3.82	30.45	3.51	0.14

^{a} The relative uncertainty of the obtained parameters is generally better than 1% for ε_s, and 5% for τ_j, S_j and ε_∞. ^{b} Parameter not adjusted in the fit; ^{c} $\alpha_3 = 0.002$; ^{d} $\alpha_2 = 0.164$.

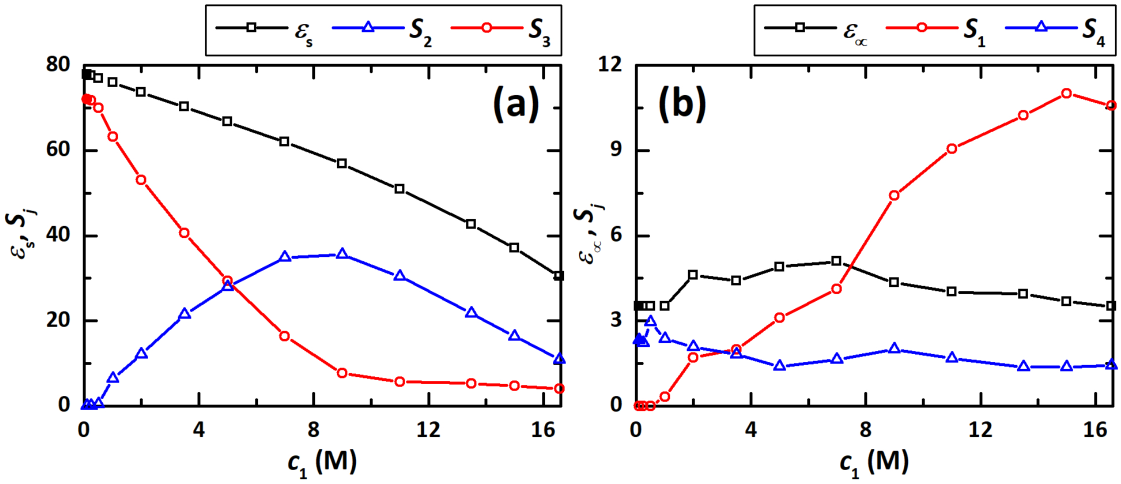

Figure S1: (a) Static permittivity, ε_{s} (black squares), and amplitudes S_2 (blue triangles) and S_3 (red circles) of the best-fitting relaxation model (Table S2) describing the dielectric spectra of MEA/water mixtures at 298.15 K. (b) Corresponding amplitudes S_1 (red circles) and S_4 (black triangles) and high-frequency permittivity, ε_∞ (black squares). Filled symbols for ε_{s}, S_3, S_4 & ε_∞ are data for neat water taken from Ref. [2].

References

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