

Supplementary Information for

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Viscosity Scaling of the Self-diffusion and Velocity Cross-correlation

Coefficients of Two Functionalised Ionic Liquids and of their Non-functionalized Analogues.

Phys. Chem. Chem. Phys. 2014, **xx**, 0000-0000.

Table S1. Self-diffusion coefficients.

[N ₁₁₂₅][Tf ₂ N]				[N _{112,20CO1}][Tf ₂ N]			
<i>T</i> /°C	10 ¹² <i>D</i> ₊ /m ² ·s ⁻¹	<i>T</i> /°C	10 ¹² <i>D</i> ₋ /m ² ·s ⁻¹	<i>T</i> /°C	10 ¹² <i>D</i> ₊ /m ² ·s ⁻¹	<i>T</i> /°C	10 ¹² <i>D</i> ₋ /m ² ·s ⁻¹
29.97	12.10	39.98	17.89	39.87	12.51	34.94	9.72
29.97	11.03	39.99	17.38	39.89	12.53	34.93	10.66
29.97	11.27	39.99	18.47	39.90	13.31	39.80	13.85
30.02	11.81	39.99	18.20	40.01	12.66	39.82	13.56
39.74	18.35	44.73	21.18	49.62	21.15	49.64	20.22
39.82	19.65	44.73	21.96	49.63	21.31	49.64	20.94
39.88	18.79	44.73	21.51	49.68	21.91	49.65	21.26
39.89	19.07	44.74	21.08	59.68	30.61	49.66	20.84
39.89	19.54	49.65	29.73	59.70	30.77	59.82	32.22
49.56	30.61	49.65	29.73	59.72	30.62	59.82	32.23
49.56	29.12	49.66	29.24	59.75	30.90	59.83	30.81
49.56	29.64	49.67	28.05	69.71	43.96	59.83	32.48
49.61	31.17	54.69	34.75	69.72	44.98	70.04	45.77
49.64	31.80	54.69	34.58	69.73	44.05	70.05	49.18
49.64	32.86	54.69	34.70	69.74	46.02	70.06	48.80
49.65	31.78	54.74	33.76	74.79	51.76	70.06	48.63
49.71	31.29	59.83	43.56	74.79	54.69	80.69	69.43
59.59	45.32	59.83	42.32	74.81	53.05	80.71	68.04
59.62	47.28	59.83	40.78	74.90	51.91	80.65	64.66
59.63	44.83	59.85	39.32	80.21	68.66	80.67	63.93
59.64	45.76	69.59	53.73	80.26	68.66	91.14	95.01
59.67	47.09	69.60	54.30	80.27	67.38	91.11	91.33
59.72	44.79	69.60	58.49	89.66	82.73	91.09	93.46
59.73	45.99	69.62	56.22	89.85	79.57	91.09	97.13
59.77	44.80	74.95	64.03	89.95	84.92		
69.80	63.50	74.95	65.72	89.97	86.50		
69.80	63.91	74.96	68.17				
69.85	60.35	75.00	70.25				
80.43	83.55	80.20	80.33				
80.44	87.26	80.20	75.16				
80.46	84.38	80.20	81.57				
80.46	85.71	80.20	76.03				
89.65	105.12	84.71	85.78				
89.68	109.93	84.72	86.53				

89.77	104.40	84.73	89.40				
89.83	103.21	89.97	98.78				
		89.98	99.85				
		89.98	101.45				
		90.00	100.80				

Table S1 (continued).

[N ₁₁₂₇][Tf ₂ N]				[N _{112,20201}][Tf ₂ N]			
<i>T</i> /°C	10 ¹² <i>D</i> ₊ /m ² ·s ⁻¹	<i>T</i> /°C	10 ¹² <i>D</i> ₋ /m ² ·s ⁻¹	<i>T</i> /°C	10 ¹² <i>D</i> ₊ /m ² ·s ⁻¹	<i>T</i> /°C	10 ¹² <i>D</i> ₋ /m ² ·s ⁻¹
39.91	13.74	39.98	13.15	10.06	7.97	24.96	14.86
39.92	12.93	39.98	14.81	10.07	7.83	24.99	16.90
39.93	12.89	39.99	13.90	10.11	8.71	25.04	16.78
44.66	17.06	40.00	13.91	10.11	8.52	29.91	20.85
44.66	17.07	49.88	20.73	15.07	11.37	29.87	21.67
44.66	16.03	49.88	20.22			29.86	18.98
49.61	21.57	49.89	21.57	15.24	11.05	39.84	32.25
49.99	20.97	49.89	20.98	15.25	11.17	39.81	32.37
50.00	22.11	59.72	29.52	19.92	14.03	39.82	33.02
50.02	21.15	69.80	43.29	19.92	13.74	39.82	33.28
50.02	21.68	69.80	43.76	19.93	14.58	49.61	45.84
59.66	33.10	69.81	43.67	19.93	13.59	49.63	44.25
59.68	30.54	69.81	45.31	19.93	15.14	49.63	47.24
59.68	31.69	79.65	61.97	24.93	18.87	49.64	45.26
59.72	33.58	79.66	65.51	24.96	19.11	59.85	59.67
69.69	46.68	79.66	62.99	24.98	17.47	59.83	65.74
69.71	45.16	79.70	61.91	25.00	19.17	59.83	60.62
69.72	44.52	84.64	70.95	25.00	17.54	59.83	58.83
69.78	44.78	84.67	70.95	25.01	17.27	69.84	84.91
74.84	51.76	84.68	71.96	29.86	21.62	69.80	81.89
79.74	63.27	84.68	73.87	29.86	22.44	69.80	79.73
79.75	63.65	89.91	89.94	29.87	23.05	69.80	78.30
79.82	60.90	89.92	84.10	29.88	22.64	80.69	104.79
79.90	63.98	89.92	86.21	39.81	33.87	80.68	112.03
90.03	80.03	89.93	79.90	39.82	33.76	80.69	113.35
90.03	83.64			39.83	34.37	80.68	107.18
90.07	83.40			39.84	36.32	91.22	135.10
90.10	84.84			49.85	49.96	91.09	136.82
				49.89	48.72	91.30	136.98
				49.89	50.47	91.04	145.75
				49.90	51.13		
				59.80	65.27		
				59.81	67.19		
				59.83	70.17		

				59.85	66.81		
				69.58	90.68		
				69.66	92.57		
				69.67	91.58		
				69.67	90.83		
				79.64	118.95		
				79.80	115.82		
				79.81	117.13		
				79.82	116.80		
				89.84	149.94		
				89.95	150.06		
				89.95	147.87		
				89.99	152.49		

Table S2. Velocity cross-correlation and distinct diffusion coefficients and Nernst-Einstein deviation parameters.

[N ₁₁₂₅][Tf ₂ N]							
<i>T</i> /°C	10 ¹⁵ <i>f</i> ₊₊ /m ⁵ ·mol ⁻¹ ·s ⁻¹	10 ¹⁵ <i>f</i> ₋ /m ⁵ ·mol ⁻¹ ·s ⁻¹	10 ¹⁵ <i>f</i> ₊₋ /m ⁵ mol ⁻¹ ·s ⁻¹	10 ¹² <i>D</i> ₊₊ ^d /m ² ·s ⁻¹	10 ¹² <i>D</i> ₋₋ ^d /m ² ·s ⁻¹	10 ¹² <i>D</i> ₊₋ ^d /m ² ·s ⁻¹	Δ (± 0.04)
0			-0.152			-0.973	
5			-0.226			-1.445	
10			-0.326			-2.078	
15			-0.456			-2.903	
20			-0.624			-3.954	
25			-0.833			-5.263	
30	-1.501		-1.089	-10.74		-6.861	
40	-2.911	-4.905	-1.764	-18.00	-30.71	-11.04	0.353
50	-4.851	-7.630	-2.686	-28.49	-47.46	-16.70	0.373
60	-7.298	-11.28	-3.888	-42.82	-69.74	-24.03	0.384
70	-10.18	-15.98	-5.403	-61.38	-98.10	-33.18	0.389
80	-13.42	-21.78	-7.258	-84.38	-132.97	-44.29	0.390

[N _{112,0co1}][Tf ₂ N]							
<i>T</i> /°C	10 ¹⁵ <i>f</i> ₊₊ / m ⁵ ·mol ⁻¹ ·s ⁻¹	10 ¹⁵ <i>f</i> ₋ /m ⁵ ·mol ⁻¹ ·s ⁻¹	10 ¹⁵ <i>f</i> ₊₋ /m ⁵ mol ⁻¹ ·s ⁻¹	10 ¹² <i>D</i> ₊₊ ^d /m ² ·s ⁻¹	10 ¹² <i>D</i> ₋₋ ^d /m ² ·s ⁻¹	10 ¹² <i>D</i> ₊₋ ^d /m ² ·s ⁻¹	Δ (± 0.04)
0			-0.079			-0.533	
5			-0.128			-0.860	
10			-0.198			-1.325	
15			-0.294			-1.963	
20			-0.423			-2.814	
25			-0.591			-3.915	
30			-0.802			-5.296	
35		-2.64	-0.820		-16.45	-6.980	
40	-1.56	-3.27	-1.375	-10.21	-21.43	-9.025	0.259
50	-2.56	-5.32	-2.187	-16.72	-34.72	-14.26	0.271
60	-4.04	-8.23	-3.267	-26.20	-53.30	-21.17	0.289
70	-6.07	-12.11	-4.652	-39.10	-77.99	-29.96	0.306
80	-8.75	-17.11	-6.353	-56.02	-109.5	-40.66	0.324

Table S2 (continued).

$[N_{1127}][Tf_2N]$							
$T/^\circ C$	$10^{15} f_{++}/$ $m^5 \cdot mol^{-1} \cdot s^{-1}$	$10^{15} f_{-}$ $/m^5 \cdot mol^{-1} \cdot s^{-1}$	$10^{15} f_{+}$ $/m^5 mol^{-1} \cdot s^{-1}$	$10^{12} D_{++}^d$ $/m^2 \cdot s^{-1}$	$10^{12} D_{--}^d$ $/m^2 \cdot s^{-1}$	$10^{12} D_{+-}^d$ $/m^2 \cdot s^{-1}$	Δ (± 0.04)
0			-0.107			-0.623	
5			-0.161			-0.933	
10			-0.236			-1.358	
15			-0.334			-1.918	
20			-0.462			-2.646	
25			-0.625			-3.567	
30			-0.828			-4.710	
40	-2.70	-3.94	-1.378	-15.28	-22.26	-7.786	0.400
50	-4.31	-6.28	-2.149	-24.18	-35.27	-12.07	0.408
60	-6.51	-9.50	-3.182	-36.30	-52.97	-17.75	0.417
70	-9.39	-13.70	-4.513	-52.02	-75.96	-25.01	0.424
80	-12.97	-18.99	-6.188	-71.43	-104.6	-34.08	0.427

$[N_{112,20201}][Tf_2N]$							
$T/^\circ C$	$10^{15} f_{++}/$ $m^5 \cdot mol^{-1} \cdot s^{-1}$	$10^{15} f_{-}$ $/m^5 \cdot mol^{-1} \cdot s^{-1}$	$10^{15} f_{+}$ $/m^5 mol^{-1} \cdot s^{-1}$	$10^{12} D_{++}^d$ $/m^2 \cdot s^{-1}$	$10^{12} D_{--}^d$ $/m^2 \cdot s^{-1}$	$10^{12} D_{+-}^d$ $/m^2 \cdot s^{-1}$	Δ (± 0.04)
0			-0.410			-2.542	
5			-0.578			-3.569	
10	-1.43		-0.790	-8.79		-4.865	
15	-1.90		-1.051	-11.64		-6.451	
20	-2.48		-1.368	-15.16		-8.366	
25	-3.19	-4.51	-1.747	-19.43	-27.50	-10.65	0.363
30	-4.04	-5.66	-2.192	-24.55	-34.40	-13.32	0.365
40	-6.26	-8.57	-3.285	-37.75	-51.74	-19.83	0.373
50	-9.20	-12.36	-4.692	-55.14	-74.10	-28.13	0.381
60	-12.92	-17.08	-6.439	-76.97	-101.7	-38.36	0.387
70	-17.52	-22.79	-8.505	-103.7	-134.9	-50.33	0.394
80	-22.87	-29.44	-10.98	-134.5	-173.1	-64.55	0.396