Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Supplementary Information

Do H-Bonds Explain Strong Ion Aggregation in Ethylammonium Nitrate + Acetonitrile Mixtures?

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Table 1 Density, ρ, electrical conductivity, κ, molar conductivity, Λ, and viscosity, η, of EAN+AN mixtures as a function of EAN mole fraction, x_{EAN}, at 25 °C.

x_{EAN}	ρ / g cm^{-3}	κ / S m^{-1}	Λ / mS m^2 mol^{-1}	x_{EAN}	η / mPa s
0	0.78664	–	–	0	0.3413[a]
0.0091	0.78536	0.291	1.694	0.1000	0.730
0.0155	0.79093	0.383	1.318	0.2000	1.43
0.0312	0.80407	0.565	0.9717	0.3500	3.20
0.0570	0.82491	0.832	0.7938	0.4998	6.36
0.0996	0.85879	1.264	0.7051	0.5999	9.67
0.1166	0.87039	1.468	0.7068	0.7000	15.1
0.1501	0.89057	1.791	0.6849	0.8002	20.9
0.2000	0.92578	2.319	0.6820	0.9500	33.6
0.2398	0.94666	2.718	0.6840	1	38.6
0.3008	0.98195	3.135	0.6498	–	–
0.3500	1.00768	3.368	0.6161	–	–
0.4002	1.02858	3.619	0.5968	–	–
0.5017	1.07085	3.599	0.5003	–	–
0.6123	1.11355	3.436	0.4137	–	–
0.6989	1.13739	3.118	0.3448	–	–
0.7967	1.16500	2.800	0.2850	–	–
0.8948	1.18790	2.525	0.2401	–	–
0.9500	1.19966	2.381	0.2188	–	–
1	1.21047	2.238	0.1998	–	–

[a] taken from Ref. 1

Table 2 Dielectric relaxation parameters of EAN+AN mixtures at 25 °C: static permittivity, ε_s, high frequency limit of permittivity, ε_∞, relaxation amplitudes, S_j, relaxation times, τ_j (in ps), symmetrical, α_1, and asymmetrical, β_1, width parameter and reduced error function, χ_r^2, as a function of EAN mole fraction, x_{EAN}, and molar concentration of EAN, c_{EAN} (in mol L^{-1}).

x_{EAN}	c_{EAN}	ε_s	S_1	α_1	β_1	τ_1	S_2	τ_2	ε_∞	$\chi_r^2 \cdot 10^4$
0	0	35.84	–	–	–	–	32.51	3.32	3.33	–
0.0091	0.172	38.28	4.85	0.31	1.00	20.4	29.92	3.42	3.51	174
0.0155	0.291	39.88	9.08	0.36	1.00	16.7	28.19	3.36	2.61	141
0.0312	0.582	43.79	17.16	0.38	1.00	20.4	24.58	3.45	2.05	511
0.0570	1.048	49.12	26.63	0.44	1.00	27.7	20.62	3.82	1.87	489
0.0996	1.793	52.87	32.91	0.42	1.00	37.3	17.66	4.60	2.30	528
0.1166	2.077	54.71	37.52	0.45	1.00	36.7	15.64	4.96	1.56	429
0.1501	2.615	53.31	37.57	0.42	1.00	34.5	13.55	5.05	2.19	605
0.2000	3.400	48.95	35.01	0.38	1.00	29.7	10.94	5.17	3.00	463
0.2398	3.973	47.54	37.13	0.36	1.00	25.4	7.87	6.36	2.54	361
0.3008	4.825	43.80	31.41	0.33	1.00	31.0	7.91	7.23	4.48	100
0.3500	5.467	38.02	30.48	0.25	1.00	22.7	3.28	4.93	4.26	258
0.4001	6.063	35.62	27.56	0.23	1.00	24.4	3.32	6.02	4.74	177
0.5017	7.193	31.17	23.52	0.18	1.00	28.8	2.71	4.09	4.93	226
0.6123	8.304	28.54	20.87	0.18	1.00	39.1	2.16	3.62	5.51	45.1
0.6989	9.042	27.39	21.13	0.13	0.79	60.3	2.57	0.816	3.68	82.5
0.7968	9.825	27.65	21.69	0.12	0.70	92.5	2.25	0.746	3.70	150
0.8947	10.519	28.21	22.64	0.07	0.57	153	2.64	0.204	2.92	64.4
0.9500	10.880	27.98	22.50	0.04	0.55	162	3.33	0.192	2.16	124
1	11.198	28.38	22.89	0.00	0.51	203	3.38	0.171	2.11	148

References

1 J. Barthel, R. Neueder and P. Schröder, *Electrolyte Data Collection, Part 1c: Conductivites, Transfer Numbers, Limiting Ionic Conductivities of Solutions of Aprotic, Protophobic Solvents. I: Nitriles*, Dechema: Franfurt, 1996; Vol. XII.