Supplementary Information

Mixtures of [TMA][EPPS] ionic liquid plus methanol, ethanol, or water: Thermophysical properties and molecular interactions

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Table S1. Experimental densities ρ for binary system of [TMA][EPPS] (1) + solvents (2), at unsaturated and saturated conditions, at temperature T = 298.15 K under pressure p = 101.3 kPa[a]

Water		Methanol		Ethanol	
m (mol.kg^{-1})	ρ (g.cm^{-3})	m (mol.kg^{-1})	ρ (g.cm^{-3})	m (mol.kg^{-1})	ρ (g.cm^{-3})
0.342	1.0138	0.341	0.8192	0.342	0.8157
0.768	1.0314	0.768	0.8522	0.768	0.8474
1.317	1.0505	1.317	0.8868	1.316	0.8794
2.048	1.0708	2.048	0.9222	2.048	0.9144
2.993	1.0854	3.042	0.9586	2.370	0.9250
3.972	1.0993	3.763	0.9776	2.526	0.9370
4.696	1.1083	3.975	0.9810	2.915*	0.9375
5.593	1.1152	4.182	0.9876	3.331*	0.9390
6.413	1.1216	4.347	0.9890	3.513*	0.9382
6.242	1.1197	4.688	0.9970		
6.989*	1.1244	5.226*	1.0020		
7.456*	1.1260	5.696*	1.0011		
8.145*	1.1260	6.179*	1.0030		
		6.313*	1.0004		

[a] m is molality. Combined expanded uncertainties U_c are $U_c(T)$ = 0.2 K, $U_c(p)$ = 4 kPa, $U_c(\rho)$ = 1 x 10^{-4} g·cm^{-3} and U_c (m) = 0.002 mol·kg^{-1} (level of confidence = 0.95, k = 2).
*Saturated condition

Table S2. Solubilities S and densities at solubility limits ρ* for [TMA][EPPS] in solvents at temperature T = 298.15 K under pressure p = 101.3 kPa [a]

Solvent	S/mol·kg^{-1}	ρ*/g·cm^{-3}
water	6.78	1.1261
methanol	4.88	1.0009
ethanol	2.57	0.9389

[a] Combined expanded uncertainties U_c are $U_c(T)$ = 0.2 K, $U_c(P)$ = 4 kPa and, $U_c(\rho*)$ = 1 x 10^{-3} g·cm^{-3} (level of confidence = 0.95, k = 2). Relative standard uncertainty u_r is $u_r(S)$ = 0.02.

Table S3. Experimental viscosities η for binary systems of [TMA][EPPS] (1) + solvents (2) at temperatures T = (283.15 to 333.15) K under pressure p = 101.3 kPa [a]

T/K	η/mPa·s			
	m = 0.342 mol·kg^{-1}	m = 0.768 mol·kg^{-1}	m = 1.317 mol·kg^{-1}	m = 2.048 mol·kg^{-1}
[TMA][EPPS] (1) + water (2)				
283.15	1.79	2.76	4.68	9.34
288.15	1.55	2.36	3.94	7.64
293.15	1.36	2.04	3.35	6.32
298.15	1.20	1.78	2.88	5.31
303.15	1.07	1.57	2.50	4.56
308.15	0.96	1.39	2.19	3.92
313.15	0.86	1.25	1.94	3.40
323.15	0.71	1.02	1.55	2.63
333.15	0.60	0.85	1.28	2.09
[TMA][EPPS] (1) + methanol (2)				
283.15	0.94	1.40	2.22	4.19
288.15	0.87	1.28	2.01	3.71
293.15	0.80	1.17	1.82	3.30
298.15	0.74	1.08	1.66	2.95
303.15	0.69	0.99	1.51	2.66
308.15	0.64	0.92	1.39	2.37
313.15	0.60	0.85	1.28	2.16
323.15	0.52	0.74	1.09	1.80
333.15	0.46	0.64	0.94	1.53
[TMA][EPPS] (1) + ethanol (2)				
283.15	2.17	3.43	5.85	11.2
288.15	1.95	3.04	5.10	9.50
293.15	1.76	2.71	4.53	8.14
298.15	1.59	2.43	3.99	7.03
303.15	1.44	2.18	3.54	6.10
308.15	1.31	1.96	3.15	5.34
313.15	1.19	1.78	2.82	4.76
323.15	1.00	1.46	2.29	3.75
333.15	0.84	1.22	1.88	3.02

[a] m is molality. Combined expanded uncertainties U_c are $U_c(T)$ = 0.2 K, $U_c(p)$ = 4 kPa and U_c (m) = 0.002 mol·kg^{-1} (level of confidence = 0.95, k = 2). Relative standard uncertainty u_r is $u_r(\eta)$ = 0.02.

Table S4. Correlated results of the VFT equation for binary systems of [TMA][EPPS] (1) + solvents (2) at temperatures T = (283.15 to 333.15) K under pressure p = 101.3 kPa [a]

m/mol·kg^{-1}	η_∞/mPa·s	B/K	T_0/K	$10^2 \cdot AARD^b$
[TMA][EPPS] (1) + water (2)				
0.342	0.02758	588.99	141.98	0.03
0.768	0.03693	572.18	150.50	0.09
1.317	0.04433	600.29	154.35	0.07
2.048	0.05260	639.50	159.68	0.24
[TMA][EPPS] (1) + methanol (2)				
0.342	0.00522	1615.77	-27.82	0.05
0.768	0.00893	1383.61	9.50	0.09
1.317	0.01245	1307.23	30.95	0.08
2.048	0.02499	1037.06	80.74	0.25
[TMA][EPPS] (1) + ethanol (2)				
0.342	0.00174	2317.86	-41.93	0.23
0.768	0.00380	1905.28	3.16	0.05
1.317	0.00466	1886.21	18.75	0.19
2.048	0.03529	981.48	112.75	0.23

[a] m is molality, η_∞, B, and T_0 are the coefficients of eq. 5. Combined expanded uncertainties U_c are $U_c(T)$ = 0.2 K, $U_c(p)$ = 4 kPa and U_c (m) = 0.002 mol·kg^{-1} (level of confidence = 0.95, k = 2).

[b] $AARD = \frac{1}{n}\sum_{i=1}^{n}\left|\frac{\eta^{\text{calc}} - \eta^{\text{expt}}}{\eta^{\text{expt}}}\right|$, where n is the number of data points, and the superscripts of "calc" and "expt" represent calculated and experimental values, respectively.