Supplementary Material

Odd-even effect on the formation of aqueous biphasic systems formed by 1-alkyl-3-methylimidazolium chloride ionic liquids and salts

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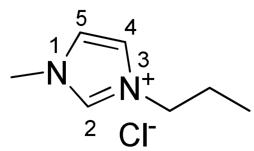
Ionic liquid synthesis

The reagents used in the synthesis of the odd alkyl chain sized 1-alkyl-3-methylimidazolium chloride ILs were acquired from Sigma Aldrich with the following purities: 1-methylimidazole (99% - pre distilled before reaction), 1-chloropropane (98% - pre distilled before reaction), 1-chloropentane (99% - pre distilled before reaction), 1-chloroheptane (99 % - pre distilled before reaction), 1-chlorononane (98%), 1-chloroundecane (98%) and 1-chlorotridecane (98%).

The synthesis procedure for each ionic liquid is described below.

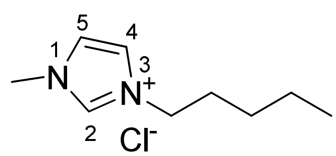
1-methyl-3-propylimidazolium chloride



In a sealed tube, 1-chloropropane (10 g, 0.127 mol) was added, at room temperature, to a stirred acetone solution of 1-methylimidazole (10.35 g, 0.126 mol). ***The solution was stirred at reflux for 3 days. At room temperature, the reaction mixture*** was washed several times with a mixture of ethyl acetate/acetone (1:1). ***The resulting product solution was filtered and the solvent evaporated. The 1-methyl-3-propylimidazolium chloride was*** dried under vacuum for 3 days at 50ºC, and its purity (≥98%) was monitored by ^{1}H-NMR.

^{1}H-NMR (D_2O): 0.91 (t, *J* =7.4, N(3)-CH_2-CH_2-C**H₃**), 1.88 (h, *J* =7.3, N(3)-CH_2-C**H₂**-CH_3), 3.90 (s, N(1)-C**H₃**), 4.1596 (t, *J* =7.0, N(3)-**CH₂**-CH_2-CH_3), 7.43 (d, *J* =1.7 , C(5)**H**), 7.48 (d, *J* =1.6, C(4)**H**), 8.71 (s, C(2)**H**).

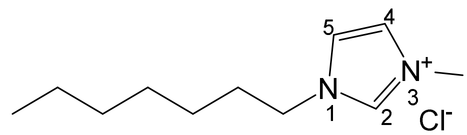
1-methyl-3-pentylimidazolium chloride



In a sealed tube, 1-chloropentane (10 g, 93.9 mmol) was added, at room temperature, to an equimolar stirred acetone solution of 1-methylimidazole (7.63 g, 92.9 mmol). ***The solution was stirred at reflux for 3 days. At room temperature, the reaction mixture*** was washed several times with a mixture of ethyl acetate/ acetone (1:1). ***The resulting product solution was then filtered, and the solvent evaporated. The 1-methyl-3-pentylimidazolium chloride was*** dried under vacuum for 3 days at 50ºC, and its purity (≥98%) was monitored by ^{1}H-NMR.

^{1}H-NMR (D_2O): 0.91 (t, *J* =7.4, N(3)-CH_2-CH_2-C**H₃**), 1.88 (h, *J* =7.3, N(3)-CH_2-C**H₂**-CH_3),3.90 (s, N(1)-C**H₃**), 4.1596 (t, *J* =7.0, N(3)-**CH₂**-CH_2-CH_3), 7.43 (d, *J* =1.7 , C(5)**H**), 7.48(d, *J* =1.6, C(4)**H**), 8.71 (s, C(2)**H**).

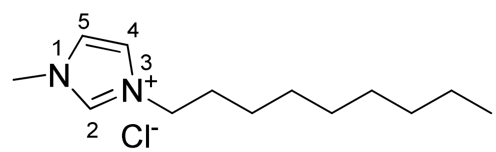
1-heptyl-3-methylimidazolium chloride



In a sealed tube, 1-chloroheptane (10 g, 74.3 mmol) was added, at room temperature, to a stirred ethyl acetate solution of 1-methylimidazole (6.04 g, 73.5 mmol). ***The solution was stirred at reflux for 3 days. At room temperature, the reaction mixture*** was washed several times with a mixture of ethyl acetate/ diethyl ether (1**:**1). ***The resulting product solution was then filtered, and the solvent evaporated. The 1-heptyl-3-methylimidazolium chloride was*** dried under vacuum for 4 days at 50ºC, and its purity (≥98%) was monitored by ^{1}H-NMR.

^{1}H-NMR ($CDCl_3$): 0.89 (t, *J* =5.0, N(3)-CH_2- CH_2-(CH_2)$_4$-C**H$_3$**), 1.28-1.35 (m, N(3)-CH_2-CH_2-(C**H$_2$)$_4$**-CH_3), 1.92 (qt, *J* =6.2, N(3)-CH_2-C**H$_2$**-(CH_2)$_4$-CH_3), 4.14 (s, N(1)-C**H$_3$**), 4.32 (t, *J* =7.4, N(3)-C**H$_2$**-CH_2-(CH_2)$_4$-CH_3), 7.40-7.42 (m, C(5)**H** +C(4)**H**), 10.92 (s, C(2)**H**).

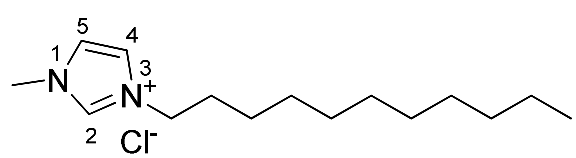
1-methyl-3-nonylimidazolium chloride



In a sealed tube, 1-chlorononane (10 g, 61.4 mmol) was added, at the room temperature, to a stirred ethyl acetate solution of 1-methylimidazole (4.99 g, 60.8 mmol). ***The solution was stirred at reflux for 3 days. At room temperature, the reaction mixture*** was washed several times with diethyl ether. ***The resulting product solution was then filtered, and the solvent evaporated. The 1-methyl-3-nonylimidazolium chloride was*** dried under vacuum for 5 days at 50ºC, and its purity (≥98%) was monitored by ^{1}H-NMR.

^{1}H-NMR ($CDCl_3$): 0.80 (t, *J* =6.4, N(3)-CH_2- CH_2-(CH_2)$_6$-C**H$_3$**), 1.16-1.28 (m, N(3)-CH_2-CH_2-(C**H$_2$)$_6$**-CH_3), 1.83 (qt, *J* = 7.0, N(3)-CH_2-C**H$_2$**-(CH_2)$_6$-CH_3), 4.06 (s, N(1)-C**H$_3$**), 4.25 (t, *J* = 7.4, N(3)-C**H$_2$**-CH_2-(CH_2)$_6$-CH_3), 7.30 (s, C(5)**H**), 7.47(s, C(4)**H**), 10.59 (s, C(2)**H**).

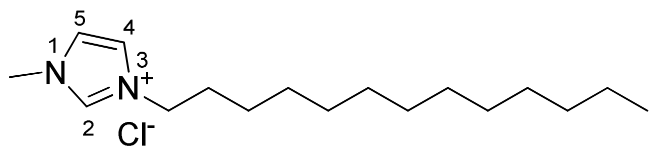
1-methyl-3-undecylimidazolium chloride



In a sealed tube, 1-chloroundecane (10 g, 52.4 mmol) was added, at room temperature, to a stirred ethyl acetate/*n*-hexane (3:1) solution of 1-methylimidazole (4.99 g, 60.8 mmol). ***The solution was stirred at reflux for 3 days. At room temperature, the reaction mixture*** was washed several times with solution of diethyl ether/*n*-hexane (1:1). ***The resulting product solution was then filtered, and the solvent evaporated. The 1-methyl-3-undecylimidazolium chloride was*** dried under vacuum for 5 days at 50ºC, and its purity (≥98%) was monitored by ^{1}H-NMR.

^{1}H-NMR ($CDCl_3$): 0.82 (t, J = 6.6, N(3)-CH_2- CH_2-(CH_2)$_8$-C**H**$_3$), 1.18-1.26 (m, N(3)-CH_2-CH_2-(C**H**$_2$)$_8$-CH_3), 1.83 (qt, J = 6.6, N(3)-CH_2-C**H**$_2$-(CH_2)$_8$-CH_3), 4.06 (s, N(1)-C**H**$_3$), 4.24 (t, J = 7.4, N(3)-C**H**$_2$-CH_2-(CH_2)$_8$-CH_3), 7.32 (s, C(5)**H**), 7.51 (s, C(4)**H**), 10.56 (s, C(2)**H**).

1-methyl-3-tridecylimidazolium chloride



In a sealed tube, 1-chlorotridecane (10g, 45.7 mmol) was added, at room temperature, to a stirred ethyl acetate/*n*-hexane (2:1) solution of 1-methylimidazole (4.50 g, 54.8 mmol). ***The solution was stirred at reflux for 6 days. At room temperature, the reaction mixture*** was washed several times with solution of diethyl ether/*n*-hexane (1:2). ***The resulting product solution was then filtered, and the solvent evaporated. The 1-methyl-3-tridecylimidazolium chloride was*** dried under vacuum for 6 days at 50ºC, and its purity (≥98%) was monitored by ^{1}H-NMR.

^{1}H-NMR ($CDCl_3$): 0.83 (t, J = 6.1, N(3)-CH_2- CH_2-(CH_2)$_{10}$-C**H**$_3$), 1.20-1.29 (m, N(3)-CH_2-CH_2-(C**H**$_2$)$_{10}$-CH_3), 1.84 (qt, J = 6.2, N(3)-CH_2-C**H**$_2$-(CH_2)$_{10}$-CH_3), 4.03 (s, N(1)-C**H**$_3$), 4.21 (t, J = 7.1, N(3)-C**H**$_2$-CH_2-(CH_2)$_{10}$-CH_3), 7.31 (s, C(5)**H**), 7.53 (s, C(4)**H**), 10.53 (s, C(2)**H**).

Results

Tables S1 to S11 present the weight fraction solubility data for the ternary systems composed of each ionic liquid, K_3PO_4 and water.

Table S1. Experimental weight fraction data for the binodal curve of the system [C_2C_1im]Cl (1) + K_3PO_4 (2) + H_2O at (298±1) K.

[C_2C_1im]Cl			
w_1	w_2	w_1	w_2
42.4736	2.05007	19.4197	15.8780
39.1197	3.19878	18.3988	16.7694
36.6881	4.58615	17.2631	17.778
35.3781	5.06655	16.2416	18.7101
33.9474	5.5809	15.2522	19.6293
32.1609	6.70962	14.3758	20.4335
30.8572	7.46324	13.5164	21.265
29.8057	7.87396	12.8178	21.9236
28.5809	8.57225	12.1283	22.5854
26.9569	9.66828	11.5721	23.0936
25.5355	10.9185	10.8873	23.8391
24.5372	11.4355	10.3676	24.3602
23.1775	12.3871	9.79722	24.9615
21.8787	13.3632	9.17092	25.6598
20.421	14.6334		

Table S2. Experimental weight fraction data for the binodal curve of the system $[C_3C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

[C₃C₁im]Cl			
w_1	w_2	w_1	w_2
43.3495	0.82545	21.6837	13.2749
41.6988	1.48216	20.7872	14.0302
40.2235	2.13652	19.8404	14.8904
38.8345	2.67767	18.9674	15.6711
37.5450	3.22592	18.3695	16.0754
36.4334	3.67081	17.7405	16.5787
35.2484	4.13547	16.9357	17.3734
34.1754	4.53703	16.2309	18.0569
32.9580	5.20338	15.6823	18.5227
31.6796	5.95189	15.0050	19.2275
30.6009	6.56500	14.4043	19.8099
29.6072	7.06396	13.9089	20.2474
28.5506	7.74274	13.2356	21.0050
27.2135	8.73833	12.5717	21.5104
26.3781	9.19619	12.1381	21.9639
25.3101	10.0363	11.7380	22.3779
24.3612	10.8059	10.9589	23.4157
23.3696	11.5528	10.2133	24.0156
22.3483	12.3992		

Table S3. Experimental weight fraction data for the binodal curve of the system $[C_4C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

[C₄C₁im]Cl			
w_1	w_2	w_1	w_2
45.4838	2.06911	21.4720	12.9265
43.4337	2.75198	20.6923	13.4154
41.7515	3.35993	19.7927	14.1485
40.2710	3.73489	19.2128	14.481
38.6885	4.24295	18.3656	15.1795
37.2518	4.73464	17.6382	15.7236
35.8451	5.22344	16.9586	16.2670
34.7256	5.48637	16.4532	16.6083
33.1147	6.31531	15.8647	17.0863
32.1651	6.61588	15.3124	17.5079
30.8873	7.22566	14.7910	17.9755
29.6905	7.80129	14.2231	18.4711
28.4895	8.44295	13.6583	19.0327
27.1204	9.29483	13.2525	19.3552

26.1492	9.79614	12.8327	19.6860
25.0601	10.5692	12.4769	19.9685
24.1660	11.0572	12.0400	20.3835
23.2397	11.5956	11.7630	20.5673
22.0918	12.4754	11.4189	20.8567

Table S4. Experimental weight fraction data for the binodal curve of the system $[C_5C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_5C_1im]Cl$			
w_1	w_2	w_1	w_2
38.7523	4.35077	16.6690	15.8680
36.9105	4.91839	16.0528	16.3110
35.5649	5.59859	15.4069	16.8474
33.8089	6.13025	14.8058	17.2931
32.4247	6.72532	14.2350	17.7473
31.1494	7.26116	13.7495	18.0732
29.9155	7.78986	13.2414	18.5059
28.7605	8.25482	12.7675	18.9567
27.7258	8.69601	12.3550	19.2712
26.2724	9.62862	11.9614	19.5817
25.2931	10.0137	11.5743	19.8947
24.1746	10.7377	11.1933	20.2401
23.0604	11.4722	10.8827	20.4912
22.0581	12.1145	10.5456	20.8262
21.2550	12.5667	10.2615	21.0576
20.2626	13.2862	10.0088	21.2547
19.4909	13.8272	9.66271	21.6328
18.7053	14.4211	9.45135	21.7488
17.9297	15.0159	9.18553	21.9940
17.3929	15.3124	8.88846	22.3738

Table S5. Experimental weight fraction data for the binodal curve of the system $[C_6C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_6C_1im]Cl$			
w_1	w_2	w_1	w_2
45.8041	3.05468	8.96025	22.3152
43.8694	3.72775	8.86242	22.3246
41.9299	4.43954	8.68612	22.5040
39.2098	5.14167	8.51128	22.6729
36.1663	6.22768	8.34686	22.8053
33.4020	7.28346	8.19569	22.9622
30.9441	8.30337	8.03455	23.1374

28.8745	9.15438	7.89928	23.2333
27.5821	9.94133	7.73737	23.3757
26.0533	10.5109	7.58680	23.5143
25.3543	10.8103	7.45007	23.6722
23.3520	11.9828	7.31257	23.8085
22.7530	12.2125	7.18691	23.9266
21.7811	12.8268	7.05645	24.0173
20.9806	13.3789	6.93109	24.1219
20.2254	13.9400	6.81323	24.2146
19.5404	14.4021	6.70301	24.3327
18.9178	14.8093	6.58793	24.4278
18.3398	15.2020	6.41613	24.6380
17.7891	15.5399	6.25980	24.8646
17.2437	15.9202	6.10902	25.0604
16.7397	16.1924	5.94393	25.1630
16.2905	16.4965	5.86147	25.2883
15.8367	16.7952	5.77665	25.3660
15.7217	16.6732	5.75799	25.2841
15.3056	16.9476	5.67136	25.3818
14.7955	17.4171	5.59039	25.4413
14.4349	17.6676	5.48553	25.5535
14.1082	17.9042	5.39094	25.6639
13.5631	18.2053	5.29352	25.7614
13.0667	18.7542	5.20954	25.8605
12.7765	18.9417	5.12199	25.9498
12.5079	19.1284	5.04423	26.0741
12.1712	19.4589	4.96883	26.1736
11.9400	19.5966	4.87487	26.1864
11.6331	19.9026	4.73992	26.3235
11.4134	20.0587	4.60978	26.4643
11.2202	20.1808	4.47263	26.6435
10.9364	20.4776	4.34278	26.8221
10.7494	20.6187	4.21543	26.9914
10.5522	20.7473	4.10404	27.1196
10.3083	21.0009	4.00599	27.3146
10.0642	21.2432	3.90484	27.4558
9.82099	21.4747	3.79491	27.4908
9.65384	21.5758	3.6642	27.7367
9.44169	21.7688	3.57069	27.8898
9.27937	21.8994	3.47229	27.9895
9.12176	21.9949	3.37962	28.1560

Table S6. Experimental weight fraction data for the binodal curve of the system $[C_7C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

[C₇C₁im]Cl			
w_1	w_2	w_1	w_2
47.0911	3.49038	20.7483	14.6479
43.5153	4.39759	19.8522	15.1909
41.6869	5.01900	18.9327	15.8507
40.4257	5.51509	18.3417	16.1840
38.1574	6.46900	17.7539	16.5377
36.7570	6.90923	17.0143	17.1035
34.9661	7.59085	16.3621	17.5732
33.4045	8.26735	15.8908	17.8681
31.8310	8.97253	15.3283	18.2230
30.5264	9.47537	14.8697	18.4969
28.9085	10.3001	14.3019	18.9689
27.5601	10.9147	13.7904	19.3231
26.3241	11.5662	13.3938	19.5686
25.0129	12.2944	12.9426	19.9155
23.6914	13.0906	12.5112	20.2279
22.7869	13.630	12.1026	20.5390
22.3211	13.7948	11.6459	20.9418
21.5086	14.2686	11.2997	21.2249

Table S7. Experimental weight fraction data for the binodal curve of the system $[C_8C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_8C_1im]Cl$			
w_1	w_2	w_1	w_2
55.4815	1.8885	24.8996	12.5330
53.2271	2.5512	23.8129	13.0803
50.9985	3.0454	22.8651	13.6376
49.1947	3.5143	21.8570	14.2811
47.0433	3.9924	21.0341	14.7765
45.1795	4.5273	20.6763	14.9635
43.2352	5.0840	19.9868	15.3331
41.4909	5.6110	19.0826	16.0264
39.2889	6.4617	18.4865	16.2817
37.8833	6.8092	17.7985	16.8147
36.9596	7.1955	17.2504	17.1385
35.5314	7.6708	16.5758	17.5334
33.6098	8.5814	15.9285	18.0023
31.9323	9.1307	15.5313	18.1822
30.6397	9.7234	15.0274	18.5611

29.4163	10.2183	14.5132	18.9608
27.9628	11.0132	14.0337	19.4006
26.6112	11.7668	13.7148	19.5349
25.7619	12.2139	13.2873	19.8681

Table S8. Experimental weight fraction data for the binodal curve of the system $[C_9C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_9C_1im]Cl$			
w_1	w_2	w_1	w_2
54.3451	3.7098	20.0483	16.5574
52.0688	4.1262	19.4767	16.8313
49.6804	4.7419	18.9338	17.1541
47.8868	5.0933	18.2882	17.6006
46.0552	5.5510	17.8077	17.8480
43.4484	6.6447	16.9744	18.3522
41.7471	7.1684	16.3285	18.8682
40.0692	7.5539	15.7304	19.1442
38.8351	7.9399	15.2959	19.5030
37.3904	8.4227	14.8891	19.8250
35.2041	9.2642	14.4443	20.1288
34.2250	9.6260	14.0250	20.4467
32.6892	10.4505	13.6713	20.7113
31.9444	10.7646	13.2332	20.9115
30.6835	11.4255	12.9203	21.1580
29.4278	11.9534	12.5003	21.1295
28.6080	12.1886	12.0831	21.5916
27.5282	12.7960	11.7052	21.7772
26.4721	13.3800	11.3659	22.1029
25.4465	13.9535	11.1300	22.2350
24.6389	14.2639	10.8879	22.4466
23.5260	14.9306	10.6557	22.6281
22.4026	15.7879	10.4138	22.9431
21.5564	15.9763	10.2473	22.9980
20.8998	16.3908	10.0450	23.1717
20.2626	16.7344	9.8418	23.3289

Table S9. Experimental weight fraction data for the binodal curve of the system $[C_{10}C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_{10}C_1im]Cl$			
w_1	w_2	w_1	w_2
33.3534	10.3154	19.4896	17.0487
31.0855	11.7748	18.8938	17.4282
29.5653	12.0415	18.3687	17.7707
28.3957	12.6125	17.8579	18.1266
27.4245	13.0595	17.4578	18.3564
26.4416	13.5421	17.0462	18.5704
25.4894	14.0337	16.6194	18.8447
25.3231	14.1714	16.1546	19.1405
24.5756	14.5434	15.7549	19.3970
23.8494	14.9236	15.3092	19.7403
23.1843	15.2406	14.9767	19.9297
22.5838	15.5405	14.5814	20.2192
21.9509	15.8972	14.1701	20.5141
21.3353	16.2497	13.7883	20.7903
20.7335	16.5962	13.4922	20.9583
20.2580	16.8333	13.1833	21.1808
19.6574	17.1955	12.8457	21.4517

Table S10. Experimental weight fraction data for the binodal curve of the system $[C_{11}C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_{11}C_1im]Cl$			
w_1	w_2	w_1	w_2
33.5943	9.4366	14.4967	20.1830
31.8731	10.2082	14.0060	20.5095
30.3561	10.9501	13.5539	20.8693
28.5231	11.9842	13.1604	21.1408
27.2992	12.5516	12.6885	21.4989
25.8157	13.4187	12.3473	21.7013
24.5147	14.1693	11.8985	22.0853
23.6161	14.5508	11.5812	22.3008
22.5357	15.1337	11.1981	22.6125
21.5774	15.6556	10.8985	22.8327
20.7023	16.1881	10.5434	23.1470
19.8791	16.6802	10.2960	23.3022
19.0864	17.1949	9.9534	23.6232
18.4784	17.5206	9.6808	23.8523
17.6729	18.1182	9.4235	24.0598
17.1900	18.3184	9.1954	24.2567

16.5080	18.8469	8.9784	24.4276
15.5214	19.4251	8.7337	24.6608
14.9455	19.8864	8.5091	24.8833

Table S11. Experimental weight fraction data for the binodal curve of the system $[C_{12}C_1im]Cl$ (1) + K_3PO_4 (2) + H_2O at (298±1) K.

$[C_{12}C_1im]Cl$			
w_1	w_2	w_1	w_2
31.7801	10.7845	9.0276	24.2042
26.4938	13.4059	8.7493	24.4470
23.6478	15.0615	8.4420	24.7409
20.0931	17.0504	8.1477	25.0506
19.1955	17.5483	7.9433	25.2260
18.3249	17.9799	7.7196	25.4045
17.6144	18.4810	7.4789	25.6769
16.9345	18.8679	7.2477	25.9312
16.2781	19.2270	7.0395	26.1491
15.4989	19.8040	6.8159	26.3705
15.0756	19.9719	6.6175	26.5821
14.3933	20.5038	6.4349	26.7711
13.7509	20.9946	6.2621	26.9504
13.2504	21.2845	6.1342	27.0394
12.6680	21.6972	6.0138	27.1400
12.2184	21.9906	5.8344	27.3627
11.7344	22.3589	5.6881	27.5227
11.3038	22.6588	5.5490	27.6575
10.8911	23.0048	5.3544	27.9509
10.5407	23.2414	5.2012	28.1658
10.2406	23.4255	5.0824	28.2951
9.9194	23.6905	4.9686	28.4153
9.5607	24.0240	4.8069	28.5305
9.2556	24.2485	4.6965	28.6625
9.0828	24.3522	4.5791	28.8233

Tables S12 to S22 present the weight fraction data for the ternary systems composed of each ionic liquid, K_2CO_3 and water.

Table S12. Experimental weight fraction data for the binodal curve of the system $[C_2C_1im]Cl$ (1) + K_2CO_3 (2) + H_2O at (298±1) K.

$[C_2C_1im]Cl$	
w_1	w_2
43.0915	7.8692
41.0621	8.6596
39.1928	9.3787
37.2907	10.1844
34.9798	11.3741
33.3388	12.1090
31.0267	13.4543
28.8768	14.7684
26.5449	16.3290
24.4297	17.7494
22.0988	19.4638
19.7710	21.3048
17.7782	22.8685
14.4015	25.8847
12.5048	27.5324

Table S13. Experimental weight fraction data for the binodal curve of the system $[C_3C_1im]Cl$ (1) + K_2CO_3 (2) + H_2O at (298±1) K.

$[C_3C_1im]Cl$			
w_1	w_2	w_1	w_2
47.7700	48.5824	20.7406	60.3099
44.4355	50.2429	19.4025	60.5191
42.5970	51.4674	17.9633	60.7510
40.6431	52.5787	16.7123	60.9138
38.5611	53.5974	15.5935	61.0576
36.8682	54.6208	13.8520	61.3156
34.5305	55.5895	12.9442	61.3927
32.8455	56.5194	12.2005	61.4579
31.1368	57.1857	11.5374	61.5034
29.1366	57.8742	10.6069	61.4763
27.4185	58.5079	9.8924	61.4575
25.4747	59.0523	9.0814	61.4052
24.0658	59.5352	8.1061	61.2542
22.2631	59.9303	6.8126	61.1844

Table S14. Experimental weight fraction data for the binodal curve of the system [C_4C_1im]Cl (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[C_4C_1im]Cl			
w_1	w_2	w_1	w_2
54.5741	1.8533	23.6070	14.3074
52.4237	2.8015	22.6077	14.9932
49.4096	3.6615	21.7940	15.5322
46.5475	4.3041	21.1394	15.9394
43.7324	4.9619	20.3556	16.4911
42.0677	5.5593	19.7442	16.9509
40.3847	6.1768	19.1824	17.2626
38.7247	6.8760	18.4234	17.8648
35.9931	7.9828	17.6448	18.5080
33.0447	9.5428	17.0820	18.9046
31.1033	10.3680	16.4150	19.4424
29.5447	11.1823	15.7995	19.9226
28.0283	12.0084	15.3319	20.4289
26.9632	12.5849	14.9463	20.6360
25.8478	13.2805	14.5806	20.8614
24.7693	13.9197	14.0070	21.3847
23.8473	14.4531	13.6313	21.6104

Table S15. Experimental weight fraction data for the binodal curve of the system [C_5C_1im]Cl (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[C_5C_1im]Cl			
w_1	w_2	w_1	w_2
51.0885	3.0255	22.0858	15.5315
47.4770	3.7618	21.3548	16.0069
45.3142	4.4073	20.4998	16.6067
43.4733	5.0000	19.9357	16.9163
41.6016	5.6658	19.1880	17.4839
40.0000	6.1962	18.3398	18.2032
38.0113	7.0553	17.7170	18.6512
36.4454	7.6365	17.1530	19.0180
34.9692	8.2643	16.4533	19.6067
33.5560	8.8848	15.9060	20.0055
32.0603	9.6469	15.3625	20.3833
30.8512	10.1839	14.8201	20.8257
29.6372	10.8008	14.4121	21.0960
28.1441	11.7903	13.8385	21.5644
26.9296	12.5643	13.3582	21.9632
26.0066	13.0125	13.0144	22.1856

24.9058	13.7044	12.5545	22.6476
24.0942	14.0902	12.1718	22.9492
23.0699	14.7767	11.8141	23.1954
		11.3916	23.5926

Table S16. Experimental weight fraction data for the binodal curve of the system [C_6C_1im]Cl (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[C_6C_1im]Cl			
w_1	w_2	w_1	w_2
47.5454	4.1599	20.0702	15.5409
45.5645	4.9288	19.4302	15.9594
43.6001	5.6489	18.8384	16.3461
41.0974	6.2329	18.2062	16.7952
39.4346	6.9337	17.6897	17.1554
37.9569	7.5225	17.1682	17.5139
36.5946	8.0731	16.6860	17.8340
35.3631	8.5669	16.0698	18.3539
34.1627	9.0466	15.6684	18.6154
33.0675	9.4489	15.1580	19.0247
32.0288	9.8847	14.7720	19.3087
30.9337	10.3843	14.4083	19.5706
30.0214	10.7745	13.9298	19.9874
29.1380	11.1409	13.6293	20.1622
27.8911	11.9258	13.2273	20.5042
27.0937	12.2694	12.8518	20.8356
26.3362	12.5696	12.5051	21.1656
25.2937	13.2113	12.2604	21.2997
24.6539	13.4538	11.9302	21.5748
23.7343	14.0348	11.6984	21.7159
22.8530	14.5916	11.4029	21.9608
22.0844	15.0741	11.0450	22.3285
20.9167	15.2340	10.7838	22.5545
20.2471	15.6779	10.5246	22.7952

Table S17. Experimental weight fraction data for the binodal curve of the system $[C_7C_1im]Cl$ (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[C₇C₁im]Cl			
w_1	w_2	w_1	w_2
42.901	6.330	19.228	16.742
41.215	6.855	18.686	17.133
39.864	7.069	18.160	17.555
38.348	7.625	17.850	17.683
36.763	8.191	17.377	18.070
35.629	8.680	16.998	18.352
33.979	9.424	16.651	18.559
32.881	9.938	16.226	18.777
31.486	9.850	15.720	19.206
30.214	10.465	15.277	19.594
29.198	11.035	14.926	19.788
28.428	11.428	14.524	20.092
27.220	12.106	14.108	20.405
26.346	12.583	13.705	20.704
25.588	13.047	13.360	20.940
24.492	13.702	12.957	21.257
23.735	14.188	12.523	21.664
23.071	14.590	12.254	21.913
22.499	14.989	11.986	22.155
22.020	15.188	11.737	22.293
21.248	15.755	11.434	22.530
20.726	16.059	11.103	22.826
19.960	16.576	10.799	23.176
19.422	16.910	10.574	23.337

Table S18. Experimental weight fraction data for the binodal curve of the system $[C_8C_1im]Cl$ (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[C₈C₁im]Cl			
w_1	w_2	w_1	w_2
54.7046	3.9531	25.5208	14.5690
52.3119	4.5214	24.6875	14.9539
50.2819	4.9016	23.7580	15.4714
48.2457	5.2466	22.9941	15.8520
45.9359	6.0010	22.1209	16.3658
43.7297	6.7537	21.2303	16.9101
41.7430	7.3814	20.6532	17.2085
39.7874	8.1377	19.8976	17.7052

38.0809	8.7383	19.2270	18.1437
36.3331	9.3978	18.6751	18.4498
34.8806	9.9784	18.0326	18.8868
33.5231	10.5471	17.4705	19.2499
32.1527	11.1729	16.8843	19.6578
30.7302	11.9130	16.3560	19.9988
29.4755	12.5145	15.7954	20.4255
28.4615	13.0256	15.3725	20.6356
27.5499	13.4438	14.7848	21.1005
26.4723	13.9757	14.4543	21.2135

Table S19. Experimental weight fraction data for the binodal curve of the system [C_9C_1im]Cl (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[C_9C_1im]Cl			
w_1	w_2	w_1	w_2
40.9588	8.5332	15.3074	21.7055
38.9564	9.0886	14.5968	22.2103
35.9808	10.6303	13.8476	22.7480
34.0890	11.3280	13.1819	23.2794
31.3302	12.7970	12.6149	23.7570
29.8843	13.2729	12.1151	24.1535
27.8793	14.3811	11.6943	24.4943
26.6390	15.0297	11.2416	24.8359
24.7340	16.2255	10.7808	25.2302
23.5834	16.7904	10.3223	25.6559
22.2329	17.6525	9.9495	25.9410
21.1878	18.2305	9.5677	26.2791
20.1446	18.8480	9.1812	26.6705
19.1365	19.4728	8.8717	26.9766
17.8672	20.3683	8.5811	27.2279
17.0576	20.8284	8.3113	27.4636
16.1729	21.4544	8.0310	27.7282
15.4765	21.9453	7.7608	28.0279

Table S20. Experimental weight fraction data for the binodal curve of the system [$C_{10}C_1$im]Cl (1) + K_2CO_3 (2) + H_2O at (298±1) K.

[$C_{10}C_1$im]Cl			
w_1	w_2	w_1	w_2
34.3936	11.1194	16.7370	20.3864
32.6246	11.8646	16.3637	20.6462
30.9436	12.5923	16.0076	20.8854

30.1487	12.9612	15.6662	21.1047
29.4048	13.2728	15.3546	21.3118
28.2639	13.9902	15.1641	21.3691
27.7056	14.1959	14.8307	21.6034
27.1117	14.4405	14.5263	21.8158
26.1026	15.1136	14.1107	22.1437
25.6193	15.3906	13.8067	22.3624
25.0699	15.6282	13.6390	22.4057
24.2207	16.1595	13.2914	22.6961
23.7419	16.3530	13.0353	22.8694
22.9960	16.8299	12.8155	23.0018
22.5681	16.9970	12.5225	23.2447
21.8683	17.4559	12.2994	23.3938
21.4653	17.6230	12.0900	23.5297
21.0963	17.7731	11.8924	23.6605
20.4964	18.1653	11.6100	23.9090
19.9323	18.5305	11.4197	24.0452
19.5858	18.6746	11.1695	24.2561
19.0830	19.0074	10.9268	24.4528
18.5842	19.3100	10.7578	24.5757
18.3021	19.4063	10.5989	24.7015
17.8954	19.6662	10.3995	24.8328
17.4975	19.9080	10.1999	25.0067
17.1145	20.1442	9.9998	25.1831

Table S21. Experimental weight fraction data for the binodal curve of the system $[C_{11}C_1im]Cl$ (1) + K_2CO_3 (2) + H_2O at (298±1) K.

$[C_{11}C_1im]Cl$			
w_1	w_2	w_1	w_2
25.2563	15.9392	12.0411	24.2924
23.8106	16.7326	11.5704	24.6415
22.1855	17.7924	10.7303	25.2785
21.2199	18.2661	10.2868	25.6588
19.9882	19.0313	9.9528	25.8996
19.3204	19.3612	9.5780	26.2293
18.2052	20.0594	9.1715	26.6055
17.1781	20.7673	8.7937	26.9448
16.5402	21.0905	8.4267	27.2726
15.9365	21.4559	8.1318	27.5243
15.1331	22.0443	7.8130	27.8162
14.4956	22.4596	7.4906	28.1450
13.7935	23.0009	7.2372	28.3705
13.1433	23.4735	6.9842	28.6103

12.4942	23.9563	6.7066	28.8993

Table S22. Experimental weight fraction data for the binodal curve of the system $[C_{12}C_1im]Cl$ (1) + K_2CO_3 (2) + H_2O at (298±1) K.

$[C_{12}C_1im]Cl$			
w_1	w_2	w_1	w_2
24.2306	15.4875	10.0132	23.8712
23.0490	16.1721	9.7288	24.1044
21.9168	16.8202	9.5239	24.2145
21.2770	17.0489	9.2838	24.4194
20.0424	17.8727	9.0555	24.6041
19.2611	18.3269	8.8454	24.7864
18.8194	18.4111	8.6046	25.0107
17.8540	19.0377	8.3891	25.1768
17.2491	19.3257	8.2007	25.3318
16.6700	19.6065	8.0052	25.4909
16.1373	19.9635	7.8215	25.6573
15.6250	20.2646	7.6044	25.8956
15.1492	20.5455	7.4431	26.0013
14.5552	21.0044	7.2482	26.2074
14.1288	21.2220	7.0996	26.3136
13.5698	21.6231	6.9042	26.5098
13.1960	21.8190	6.7234	26.6895
12.7216	22.1613	6.5579	26.8437
12.2658	22.5033	6.4271	26.9386
11.9616	22.6579	6.2685	27.0865
11.5526	22.9708	6.0874	27.2983
11.1997	23.2331	5.9448	27.4388
10.9424	23.3375	5.8371	27.5190
10.6232	23.6186	5.6585	27.6010
10.3923	23.7361	5.3947	27.9066
10.0739	24.0160	5.1748	28.1430

Table S23. Parameters A, B, and C of Equation 1 for the Ternary Systems Composed of ILs + K_3PO_4 + H_2O at 298 K and the Respective Standard Deviation (σ).

K_3PO_4	**IL**	**$A \pm \sigma$**	**$B \pm \sigma$**	**$10^5 (C \pm \sigma)$**
	$[C_2C_1im]Cl$	68.21 ± 2.05	-0.283 ± 0.012	3.38 ± 0.39
	$[C_3C_1im]Cl$	56.95 ± 0.98	-0.236 ± 0.007	4.36 ± 0.31
	$[C_4C_1im]Cl$	71.45 ± 1.37	-0.308 ± 0.008	4.76 ± 0.37
	$[C_5C_1im]Cl$	81.11 ± 2.57	-0.343 ± 0.011	5.08 ± 0.33
	$[C_6C_1im]Cl$	81.46 ± 1.29	-0.332 ± 0.006	5.98 ± 0.14

[C_7C_1im]Cl	83.21 ± 2.65	-0.312 ± 0.012	6.12 ± 0.46
[C_8C_1im]Cl	86.96 ± 1.88	-0.317 ± 0.009	6.33 ± 0.51
[C_9C_1im]Cl	101.62 ± 2.26	-0.335 ± 0.008	5.46± 0.25
[$C_{10}C_1$im]Cl	105.93 ± 12.07	-0.345 ± 0 035	5.11 ± 0.58
[$C_{11}C_1$im]Cl	90.93 ± 6.52	-0.315 ± 0.022	5.27 ± 0.33
[$C_{12}C_1$im]Cl	72.97 ± 7.55	-0.247 ± 0.029	5.96 ± 0.31

Table S24. Parameters *A*, *B*, and *C* of Equation 1 for the Ternary Systems Composed of IL + K_2CO_3 + H_2O at 298 K and Respective Standard Deviation (σ).

K_2CO_3	IL	$A \pm \sigma$	$B \pm \sigma$	$10^5 (C \pm \sigma)$
	[C_2C_1im]Cl	106.64 ± 6.83	-0.335 ± 0.020	2.05 ± 0.34
	[C_3C_1im]Cl	81.80 ± 1.82	-0.271 ± 0.008	2.85 ± 0.14
	[C_4C_1im]Cl	82.83 ± 1.95	-0.292 ± 0.01	4.42 ± 0.42
	[C_5C_1im]Cl	90.12 ± 2.15	-0.316 ± 0.009	3.90 ± 0.27
	[C_6C_1im]Cl	94.78 ± 2.70	-0.333 ± 0.010	5.29 ± 0.30
	[C_7C_1im]Cl	113.55 ± 4.89	-0.393 ± 0.014	3.52 ± 0.33
	[C_8C_1im]Cl	105.45 ± 3.12	-0.340 ± 0.011	4.42 ± 0.41
	[C_9C_1im]Cl	103.25 ± 5.93	-0.316 ± 0.017	4.07 ± 0.24
	[$C_{10}C_1$im]Cl	96.48 ± 5.01	-0.2946 ± 0.015	5.01 ± 0.19
	[$C_{11}C_1$im]Cl	95.19 ± 7.02	-0.290 ± 0.002	4.56 ± 0.10
	[$C_{12}C_1$im]Cl	88.12 ± 13.18	-0.274 ± 0.039	6.05 ± 0.32

Table S25. Weight Fraction Compositions (wt %) for the Top (T) Phase, the Initial Mixture (M), and the Bottom (B) Phase of the Ternary Systems Composed of IL + K_3PO_4 + H_2O at 298 K, and Respective Tie-Line Length (TLL) and Tie-Line Slope (TLS).

	weight fraction composition/wt %							
IL	$[IL]_T$	$[K_3PO_4]_T$	$[IL]_M$	$[K_3PO_4]_M$	$[IL]_B$	$[K_3PO_4]_B$	TLS	TLL
[C_2C_1im]Cl	37.41	4.44	29.87	11.18	2.79	35.43	-1.12	46.46
	43.54	2.50	25.14	19.06	1.15	40.65	-1.11	57.03
	32.40	6.69	25.06	13.49	3.93	33.05	-1.08	38.80
	39.57	3.66	25.15	16.48	2.24	36.84	-1.12	49.95
	41.14	3.16	30.11	13.20	1.49	39.24	-1.10	53.61
[C_3C_1im]Cl	36.95	3.34	26.15	14.20	0.85	39.67	-0.99	51.22
	41.10	1.91	26.00	17.10	0.39	42.87	-0.99	57.76
	34.54	4.42	23.89	15.09	1.29	37.72	-1.00	47.05
	26.89	9.22	22.66	13.87	1.42	37.22	-0.91	37.85
	43.17	1.38	26.09	19.19	0.15	46.26	-0.96	62.16
[C_4C_1im]Cl	36.51	4.67	24.47	15.10	1.48	35.02	-1.15	46.34
	31.10	6.99	20.78	14.73	7.60	24.61	-1.33	29.38

	33.52	5.86	24.45	13.30	3.27	30.68	-1.22	39.13
	38.75	3.90	24.54	16.55	0.84	37.67	-1.12	50.77
	40.21	3.45	24.51	17.50	0.64	38.86	-1.12	53.11
[C_5C_1im]Cl	37.73	4.88	24.13	15.04	2.54	31.19	-1.34	43.94
	34.32	6.09	24.26	13.72	3.36	29.56	-1.32	38.85
	42.32	3.55	24.20	17.01	1.53	33.84	-1.35	50.80
	40.70	3.98	23.99	16.51	1.75	33.17	-1.33	48.67
	44.06	3.13	24.03	17.81	1.35	34.43	-1.36	52.95
[C_6C_1im]Cl	43.39	3.57	23.03	17.65	1.57	32.49	-1.45	50.85
	40.56	4.35	25.13	14.89	2.43	30.40	-1.46	46.18
	32.81	7.14	24.91	13.03	2.94	29.41	-1.34	37.26
	49.02	2.33	25.16	18.14	1.09	34.10	-1.51	57.49
	53.47	1.61	25.00	20.07	0.71	35.83	-1.54	62.89
[C_7C_1im]Cl	37.44	6.28	29.98	11.05	4.73	27.22	-1.56	38.84
	46.95	3.32	29.94	15.13	0.87	35.30	-1.44	56.09
	39.04	5.68	29.92	11.99	2.32	31.06	-1.45	44.63
	42.06	4.67	30.03	13.04	1.58	32.84	-1.44	49.32
	44.89	3.85	29.96	14.05	1.32	33.63	-1.46	52.78
[C_8C_1im]Cl	35.97	7.30	30.01	11.12	4.31	27.61	-1.56	37.62
	38.59	6.29	30.22	11.65	3.49	28.78	-1.56	41.69
	44.94	4.26	29.88	13.94	1.81	32.00	-1.55	51.28
	44.09	4.49	30.14	13.12	2.72	30.06	-1.62	48.63
	46.65	3.80	30.05	14.39	1.60	32.53	-1.57	53.42
[C_9C_1im]Cl	43.12	6.32	29.98	14.00	4.48	28.89	-1.71	44.75
	46.67	5.27	29.96	14.98	3.45	30.40	-1.72	50.00
	57.01	2.95	29.88	17.98	1.88	33.48	-1.81	63.02
	50.38	4.32	29.95	16.01	2.77	31.57	-1.75	54.86
	53.20	3.69	29.96	17.05	2.03	33.10	-1.74	59.02
[$C_{10}C_1$im]Cl	26.16	13.57	10.08	25.04	5.00	28.67	-1.40	25.99
	32.32	10.64	10.18	25.97	3.73	30.44	-1.44	34.78
	39.95	7.62	10.56	26.75	2.99	31.67	-1.54	44.09
	40.65	7.38	9.91	28.90	1.63	34.70	-1.43	47.63
[$C_{11}C_1$im]Cl	35.45	8.36	22.97	16.06	7.83	25.40	-1.62	32.45
	30.82	10.49	23.01	15.48	8.56	24.71	-1.57	26.41
	41.75	5.93	22.94	17.47	5.00	28.48	-1.63	43.11
	43.56	5.33	23.03	18.04	4.02	29.81	-1.62	46.50
[$C_{12}C_1$im]Cl	29.63	11.00	9.93	25.38	3.90	29.78	-1.37	31.85
	36.02	7.54	9.89	26.55	2.63	31.82	-1.37	41.29
	38.01	6.57	10.15	27.02	2.09	32.93	-1.36	44.56

In all systems the top phase corresponds to the IL-rich phase, whereas the bottom phase corresponds to the salt-rich phase

Table S26. Weight Fraction Compositions (wt %) for the Top (T) Phase, the Initial Mixture (M), and the Bottom (B) Phase of the Ternary Systems Composed of IL + K_2CO_3 + H_2O at 298 K and Respective Tie-Line Length (TLL) and Tie-Line Slope (TLS).

	weight fraction composition/wt %							
IL	$[IL]_T$	$[K_2CO_3]_T$	$[IL]_M$	$[K_2CO_3]_M$	$[IL]_B$	$[K_2CO_3]_B$	TLS	TLL
$[C_2C_1im]Cl$	32.26	12.58	30.02	14.05	22.18	19.17	-1.53	12.04
	35.66	10.79	30.01	15.04	10.66	29.58	-1.33	31.28
	37.54	9.89	29.92	15.95	6.99	34.18	-1.26	39.03
	39.46	9.04	29.92	16.97	4.65	37.97	-1.20	45.26
	40.84	8.47	30.00	18.05	2.78	42.11	-1.13	50.80
$[C_3C_1im]Cl$	44.12	5.09	30.06	15.48	5.93	33.31	-1.35	47.48
	48.99	3.54	30.02	18.02	2.86	38.76	-1.31	58.04
	46.44	4.30	30.17	16.68	3.84	36.71	-1.31	53.53
	38.28	7.55	30.09	13.56	10.34	28.04	-1.36	34.65
	41.29	6.20	30.19	14.50	7.01	31.85	-1.34	42.82
$[C_4C_1im]Cl$	43.13	4.90	29.87	14.42	2.69	33.91	-1.39	49.77
	44.45	4.47	29.82	14.91	2.44	34.46	-1.40	51.62
	46.95	3.74	29.82	16.02	1.78	36.13	-1.39	55.58
	49.70	3.04	29.76	17.93	0.86	39.53	-1.34	60.97
	48.34	3.37	29.96	16.99	1.11	38.38	-1.35	58.79
$[C_5C_1im]Cl$	41.16	5.98	29.90	13.44	6.23	29.10	-1.51	41.89
	32.51	9.65	28.16	12.53	12.02	23.21	-1.51	24.57
	35.13	8.41	28.13	13.09	9.36	25.66	-1.49	31.01
	45.31	4.65	30.03	14.61	4.78	31.06	-1.54	48.37
	46.83	4.23	30.04	16.02	2.40	35.44	-1.42	54.30
$[C_6C_1im]Cl$	46.84	4.40	29.88	15.01	2.46	32.15	-1.60	52.34
	49.59	3.73	29.88	16.20	1.68	34.04	-1.58	56.69
	54.13	2.81	29.84	17.95	1.12	35.87	-1.60	62.48
	40.55	6.27	29.43	13.52	3.32	30.54	-1.53	44.44
	51.96	3.22	29.82	16.91	1.56	34.38	-1.62	59.25
$[C_7C_1im]Cl$	41.97	6.30	30.03	14.09	4.68	30.63	-1.53	44.53
	46.66	5.07	29.87	15.98	3.17	33.36	-1.54	51.88
	49.78	4.37	30.02	17.13	2.48	34.92	-1.55	56.31
	43.21	5.95	29.90	15.00	3.31	33.07	-1.47	48.25
	50.67	4.19	29.99	18.05	1.75	36.97	-1.49	58.88
$[C_8C_1im]Cl$	43.49	6.57	29.91	14.50	6.34	28.27	-1.71	43.02
	45.44	5.97	30.03	15.00	5.37	29.44	-1.71	46.44
	48.06	5.24	29.91	16.08	3.79	31.68	-1.67	51.56
	50.08	4.72	29.92	16.93	2.87	33.32	-1.65	55.19
	52.35	4.19	29.88	17.97	2.10	35.01	-1.63	58.95
$[C_9C_1im]Cl$	47.57	5.86	26.93	17.94	5.79	30.32	-1.71	48.41
	43.51	7.18	26.99	16.99	7.14	28.79	-1.68	42.31

	40.88	8.14	30.03	14.46	9.74	26.26	-1.72	36.03
	44.64	6.79	26.88	17.44	6.19	29.85	-1.67	44.84
	35.87	10.23	27.02	15.51	11.51	24.75	-1.68	28.35
[$C_{10}C_1$im]Cl	43.87	6.86	29.98	14.76	6.85	27.90	-1.76	42.58
	38.57	8.94	26.66	15.88	8.15	26.66	-1.72	35.21
	38.25	9.08	27.95	15.05	8.52	26.33	-1.72	34.38
	39.67	8.49	27.19	15.65	8.37	26.46	-1.74	36.09
	40.77	8.04	26.71	16.15	7.55	27.21	-1.73	38.35
[$C_{11}C_1$im]Cl	30.54	12.83	25.69	16.76	2.01	35.94	-1.23	36.71
	20.80	18.28	10.98	25.31	8.41	27.15	-1.40	15.24
	49.04	5.12	22.44	24.29	0.85	39.85	-1.39	59.40
[$C_{12}C_1$im]Cl	33.16	10.81	27.73	14.41	3.50	30.47	-1.51	35.58
	32.00	11.36	25.96	15.21	4.90	28.63	-1.57	32.13
	30.44	12.13	24.84	15.66	5.79	27.66	-1.59	29.14

In all systems the top phase corresponds to the IL-rich phase, whereas the bottom phase corresponds to the salt-rich phase

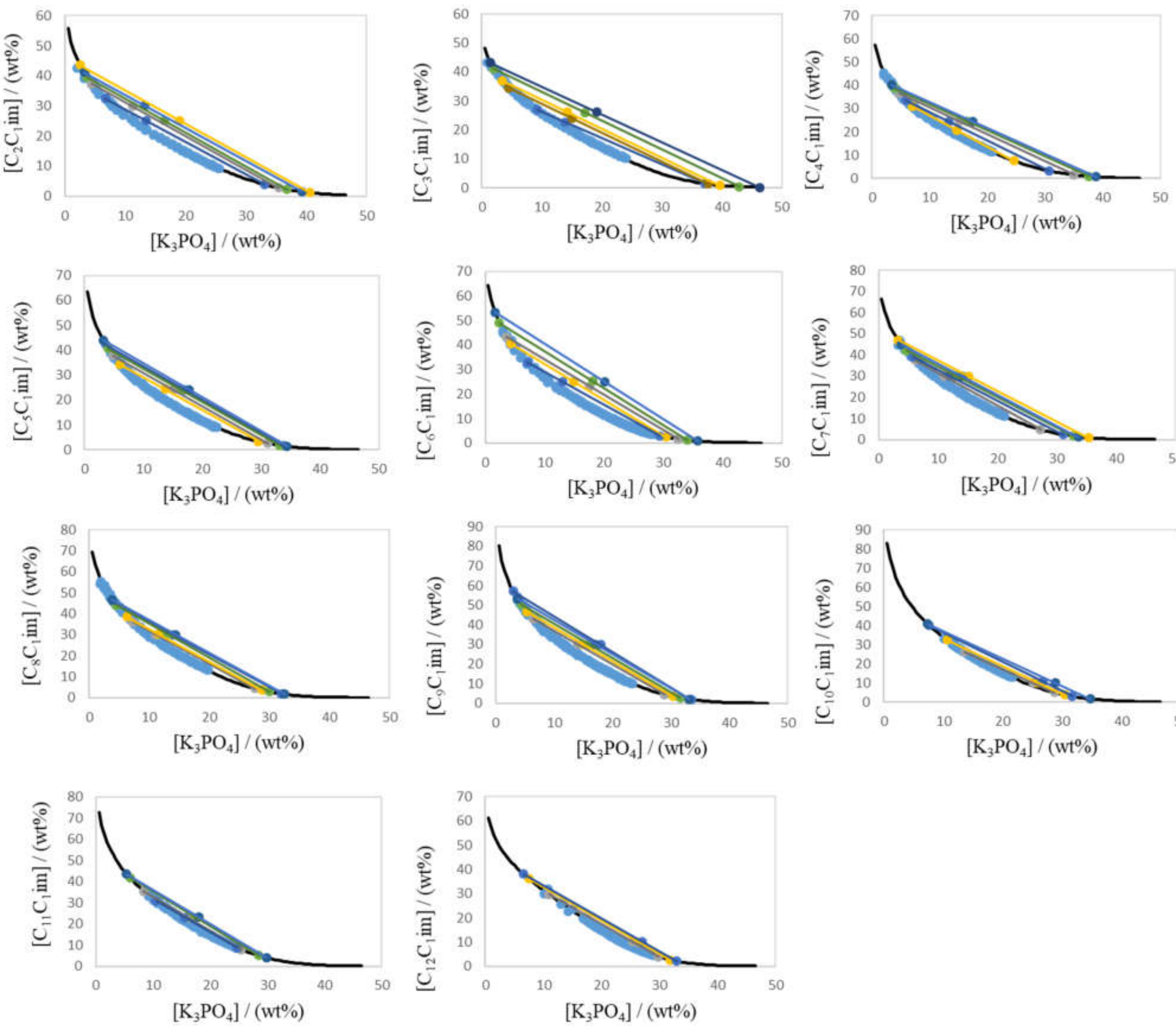


Figure S1. Binodal curves and TLs of the systems investigated with K_3PO_4 at (298 ± 1) K.

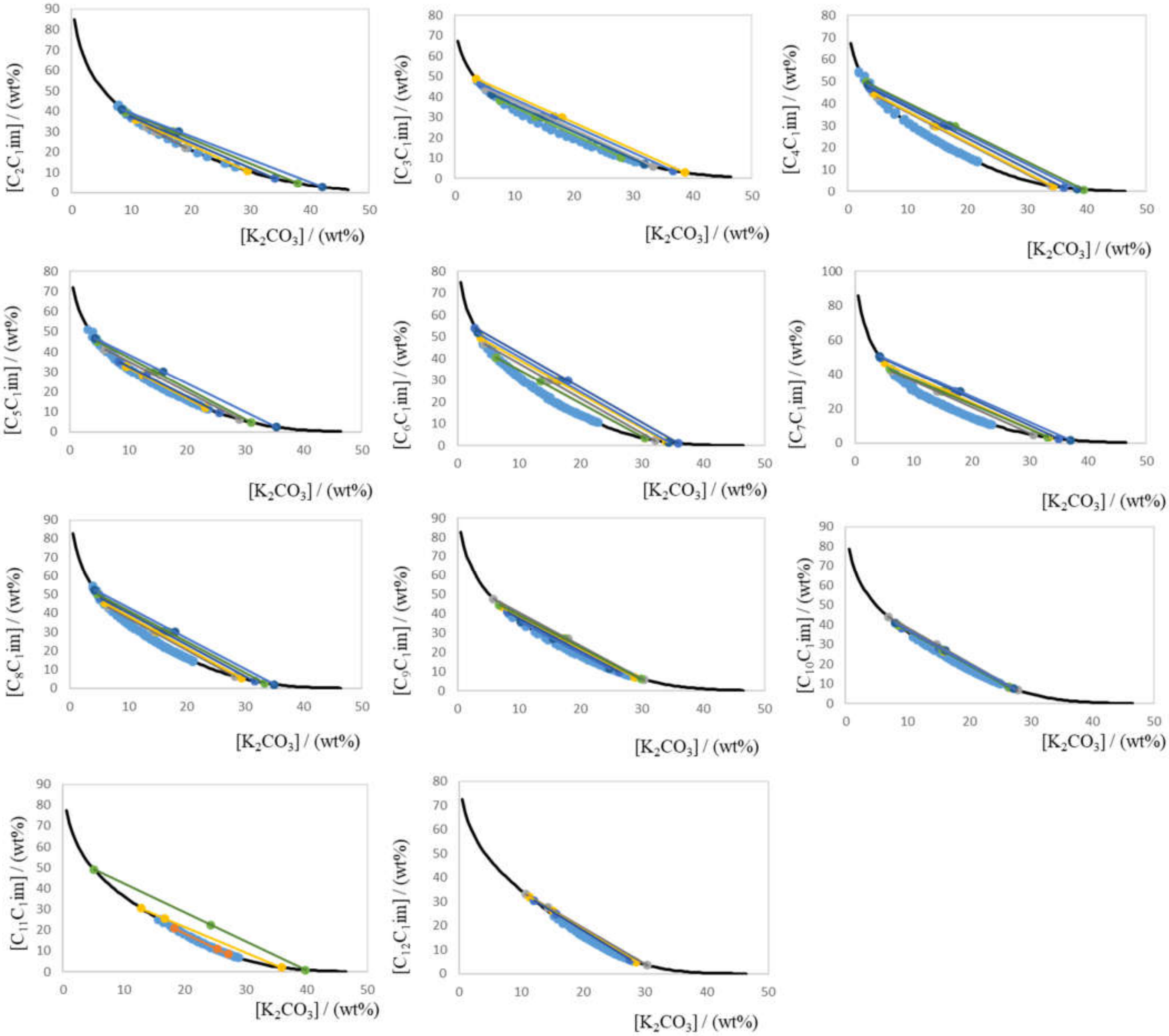


Figure S2. Binodal curves and TLs of the systems investigated with K_2CO_3 at (298 ± 1) K.

Table S27. Parameters from the Fitting of the Setschenow-Type Behavior (eq 11) and Respective Correlation Coefficients (R^2).

IL	K_s /(kg.mol $^{-1}$)	K_{IL} ($[IL]_B$ - $[IL]_T$)	R^2
$[C_2C_1im]Cl$	1.5444	-0.6148	0.9998
$[C_3C_1im]Cl$	1.8814	-0.6783	0.9996
$[C_4C_1im]Cl$	1.8814	-1.2066	0.9999
$[C_5C_1im]Cl$	2.0255	-0.6822	0.9997
$[C_6C_1im]Cl$	2.2066	-0.7518	0.9999
$[C_7C_1im]Cl$	2.3064	-0.9561	0.9996
$[C_8C_1im]Cl$	2.2168	-0.6523	0.9996
$[C_9C_1im]Cl$	2.2085	-0.7527	0.9996
$[C_{10}C_1im]Cl$	1.9450	-0.4077	0.9990
$[C_{11}C_1im]Cl$	1.7887	-0.2250	0.9995
$[C_{12}C_1im]Cl$	1.7911	-0.2005	0.9994

Table S28. Parameters from the Fitting of the Setschenow-Type Behavior (eq 11) and Respective Correlation Coefficients (R^2).

IL	K_s /(kg.mol^{-1})	K_{IL} ($[IL]_B$ - $[IL]_T$)	R^2
$[C_2C_1im]Cl$	0.6823	0.0564	1.000
$[C_3C_1im]Cl$	0.8648	-0.2599	0.9995
$[C_4C_1im]Cl$	1.2210	-0.7654	1.0000
$[C_5C_1im]Cl$	1.0419	-0.2352	0.9995
$[C_6C_1im]Cl$	1.4521	-0.9362	0.9995
$[C_7C_1im]Cl$	1.1249	-0.3525	0.9994
$[C_8C_1im]Cl$	1.2116	-0.4143	0.9998
$[C_9C_1im]Cl$	1.0658	-0.2037	0.9993
$[C_{10}C_1im]Cl$	1.1640	-0.2769	0.9998
$[C_{11}C_1im]Cl$	1.1009	-0.1639	0.9999
$[C_{12}C_1im]Cl$	1.2413	-0.23410	0.9997

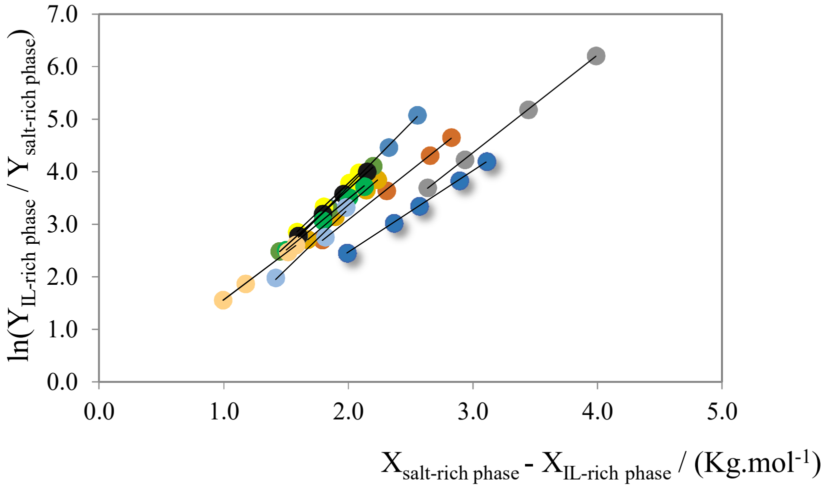


Figure S3. Setschenow-type plots for the tie-line data of the systems composed of IL, K_3PO_4 and water at 298 K: • [C_2C_1im]Cl; • [C_3C_1im]Cl; • [C_4C_1im]Cl; • [C_5C_1im]Cl; • [C_6C_1im]Cl; • [C_7C_1im]Cl; • [C_8C_1im]Cl; • [C_9C_1im]Cl; • [$C_{10}C_1$im]Cl; • [$C_{11}C_1$im]Cl; • [$C_{12}C_1$im]Cl.

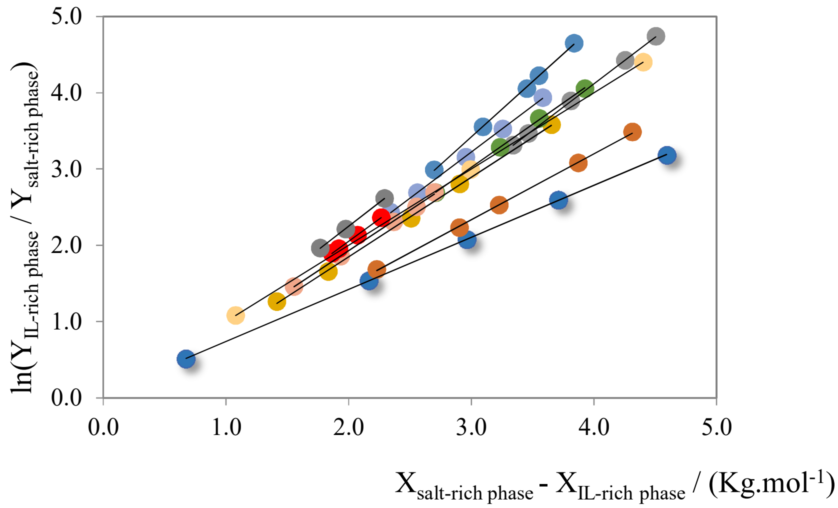


Figure S4. Setschenow-type plots for the tie-line data of the systems composed of ionic liquid, K_2CO_3 and water at 298 K: • [C_2C_1im]Cl; • [C_3C_1im]Cl; • [C_4C_1im]Cl; • [C_5C_1im]Cl; • [C_6C_1im]Cl; • [C_7C_1im]Cl; • [C_8C_1im]Cl; • [C_9C_1im]Cl; • [$C_{10}C_1$im]Cl; • [$C_{11}C_1$im]Cl; • [$C_{12}C_1$im]Cl.