Supporting Information

Odd-even effect in the formation and extraction performance of ionic-liquid-based aqueous biphasic systems

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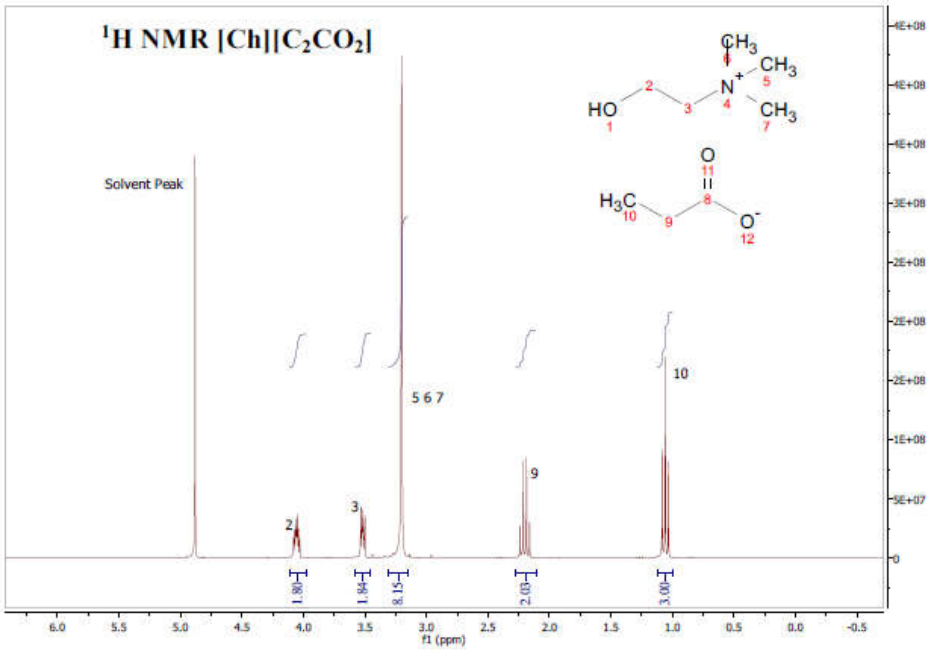
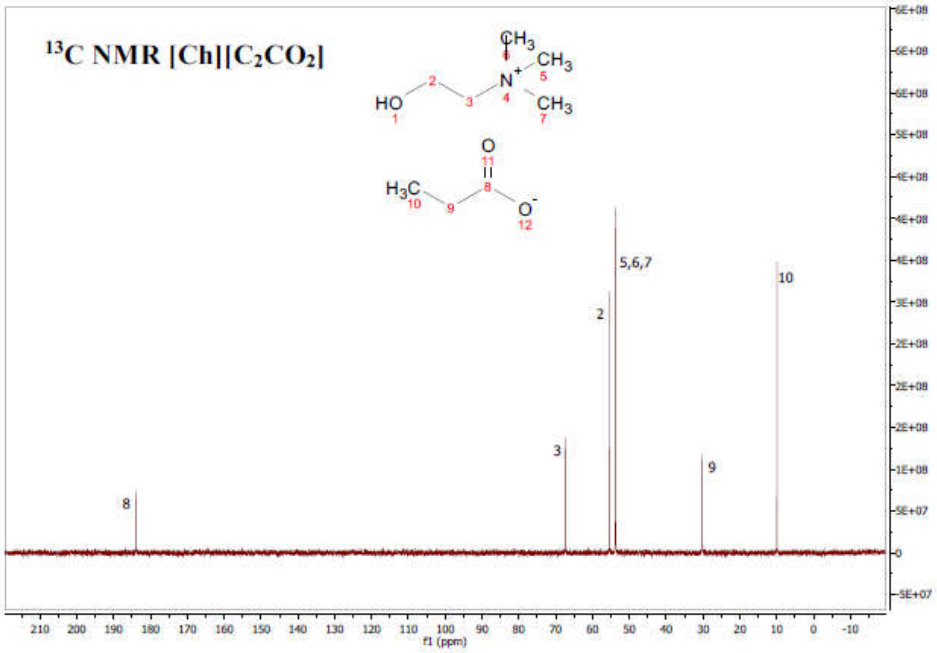
NMR spectra and data of cholinium-based ILs

Cholinium propanoate, [Ch][C_2CO_2]

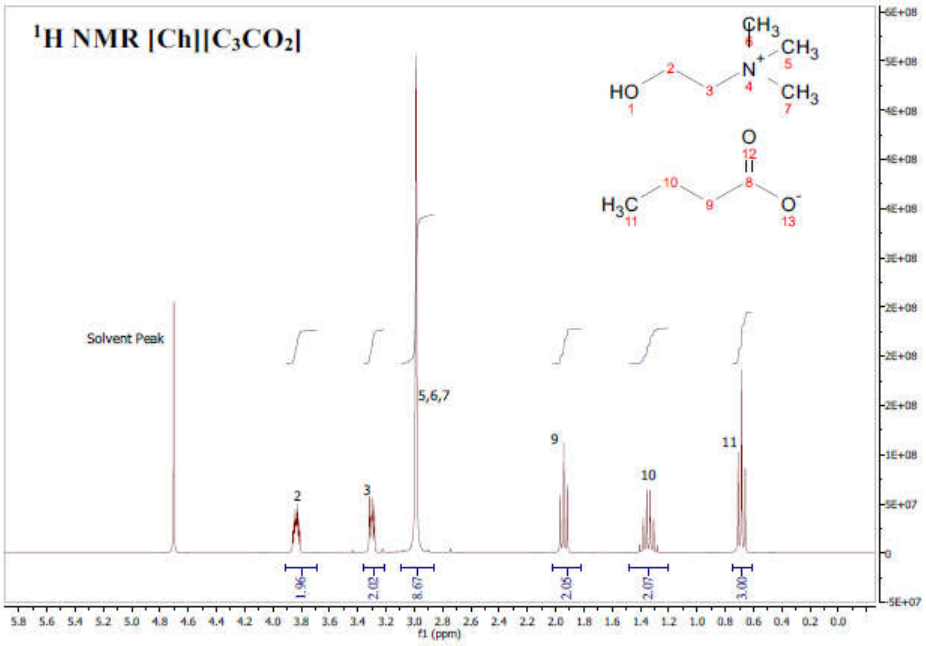


^{1}H NMR (D_2O, 300 MHz, [ppm]): 4.06 (m,); 3.52 (m, 2H); 3.20 (s, 9H); 2.20 (q, 2H, J_{HH}=7.7 Hz); 1.06 (t, 3H, J_{HH}=7.7 Hz).

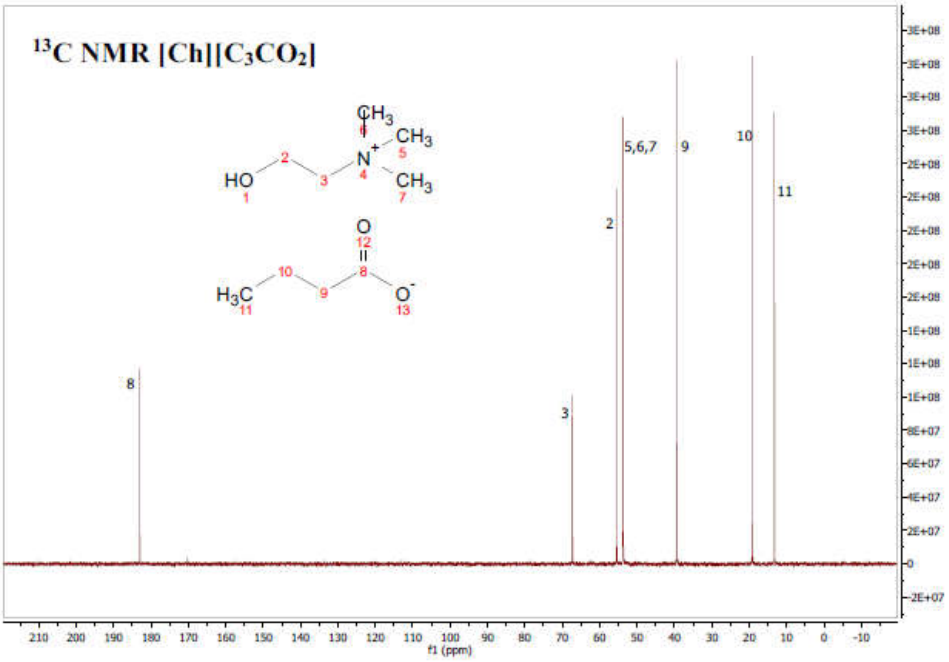


^{13}C NMR (D_2O, 75.47 MHz, [ppm]): 184.04; 67.40; 55.69; 53.75; 30.25; 9.60.

Cholinium Butanoate, [Ch][C_3CO_2]

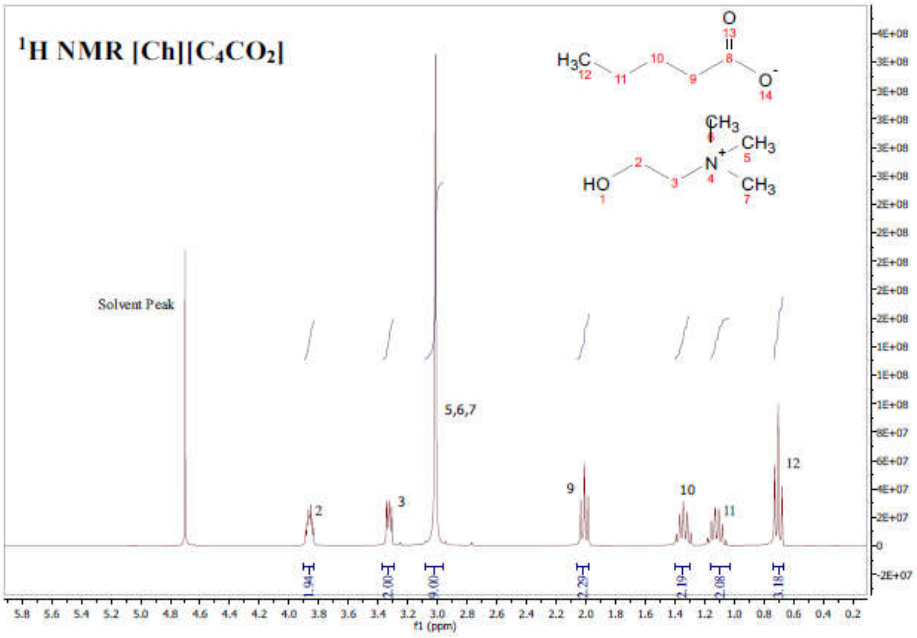


^{1}H NMR (D_2O, 300 MHz, [ppm]): 3.66 (m, 2H); 3.32 (m, 2H); 3.01 (s, 9H); 1.98 (t, 2H, J_{HH}=7.7 Hz); 1.37 (m, 2H,); 0.71 (t, 3H, J_{HH}=7.7 Hz).

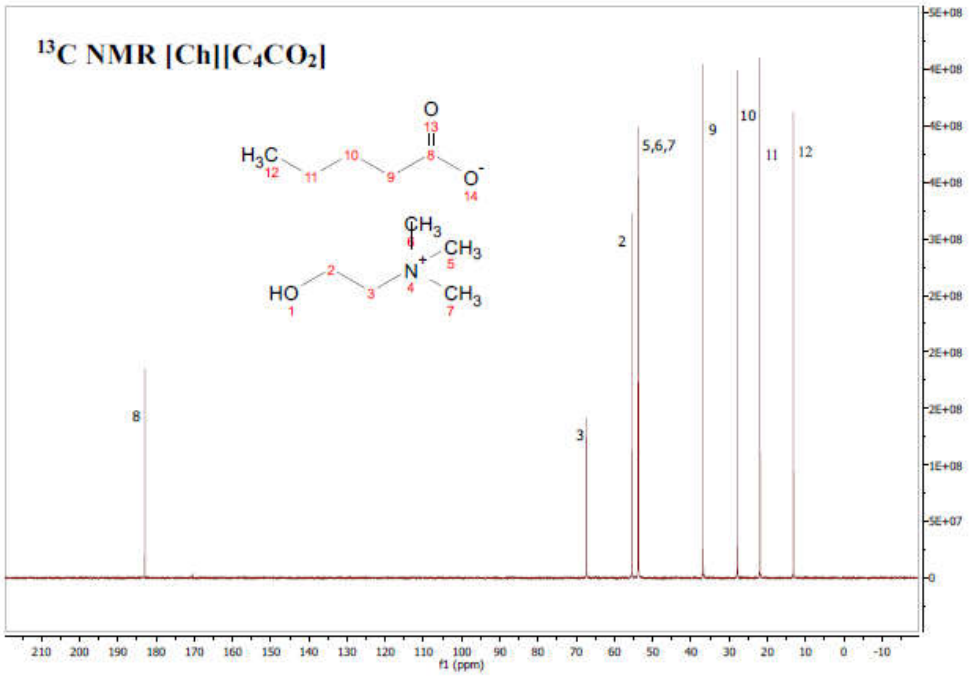


^{13}C NMR (D_2O, 75.47 MHz, [ppm]): 183.07; 67.28; 55.43; 53.68.15; 39.30; 19.12; 13.27.

Cholinium Pentanoate, [Ch][C_4CO_2]

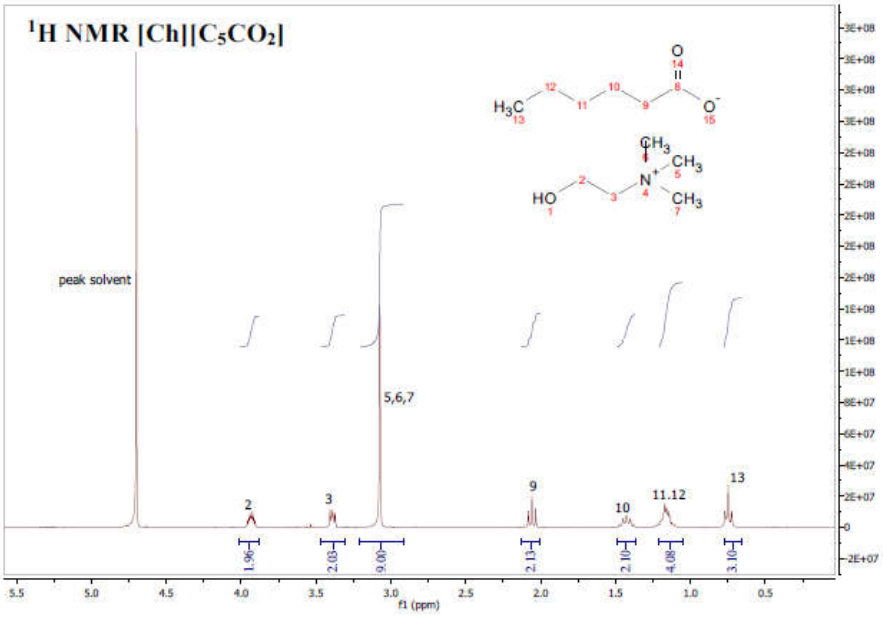


^{1}H NMR (D_2O, 300 MHz, [ppm]): 3.83 (m, 2H); 3.30 (m, 2H); 2.99 (s, 9H); 1.98 (t, 2H, J_{HH}=7.7 Hz); 1.31 (m, 2H,); 1.09 (m, 2H,); 0.68 (t, 3H, J_{HH}=7.7 Hz).

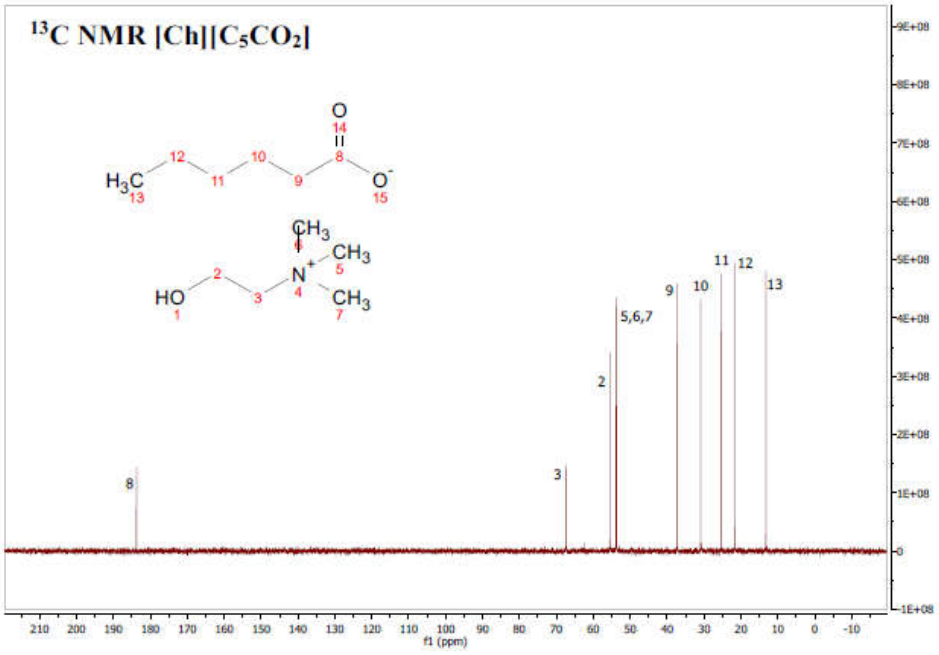


^{13}C NMR (D_2O, 75.47 MHz, [ppm]): 183.04; 67.35; 55.46; 53.71; 37.03; 27.96; 21.93; 13.57.

Cholinium Hexanoate, [Ch][C_5CO_2]

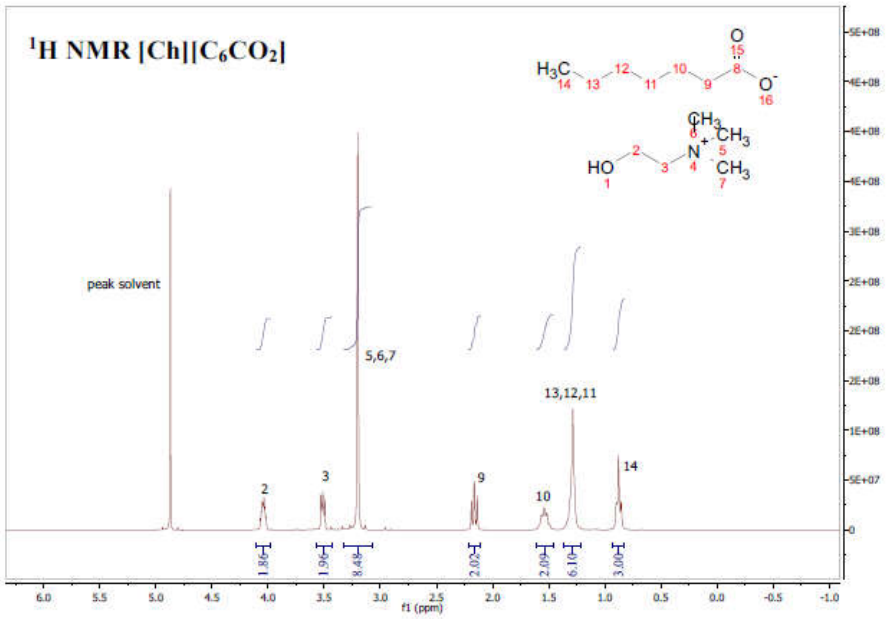


^{1}H NMR (D_2O, 300 MHz, [ppm]): 3.93 (m, 2H); 3.39 (m, 2H); 3.07 (s, 9H); 2.06 (t, 2H, J_{HH}=7.7 Hz); 1.41 (m, 2H,); 1.16 (m, 2H,); 0.75 (t, 3H, J_{HH}=7.7 Hz).

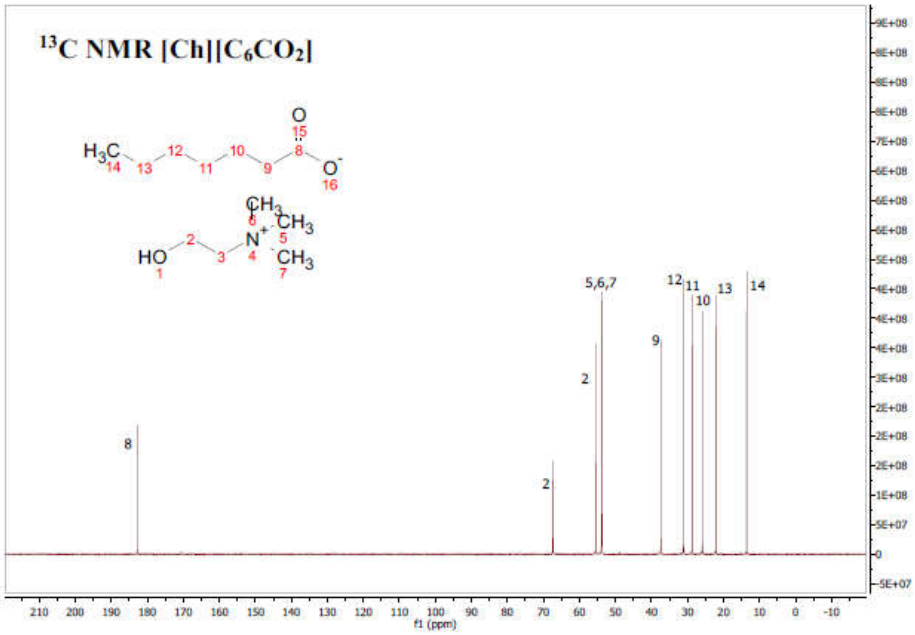


^{13}C NMR (D_2O, 75.47 MHz, [ppm]): 184.04; 67.38; 55.38; 53.74; 37.25; 30.92; 25.64; 21.55; 13.23.

Cholinium Heptanoate, [Ch][C_6CO_2]

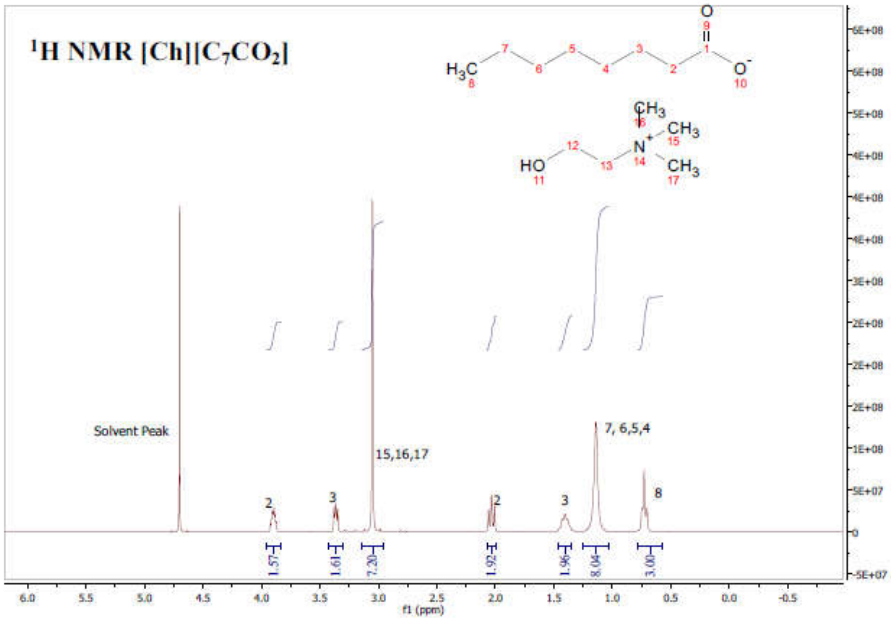


^{1}H NMR (D_2O, 300 MHz, [ppm]): 4.04 (m, 2H); 3.52 (m, 2H); 3.20 (s, 9H); 2.16 (t, 2H, J_{HH}=7.7 Hz); 1.54 (m, 2H,); 1.29 (s, 6H,); 0.88 (t, 3H, J_{HH}=7.7 Hz).

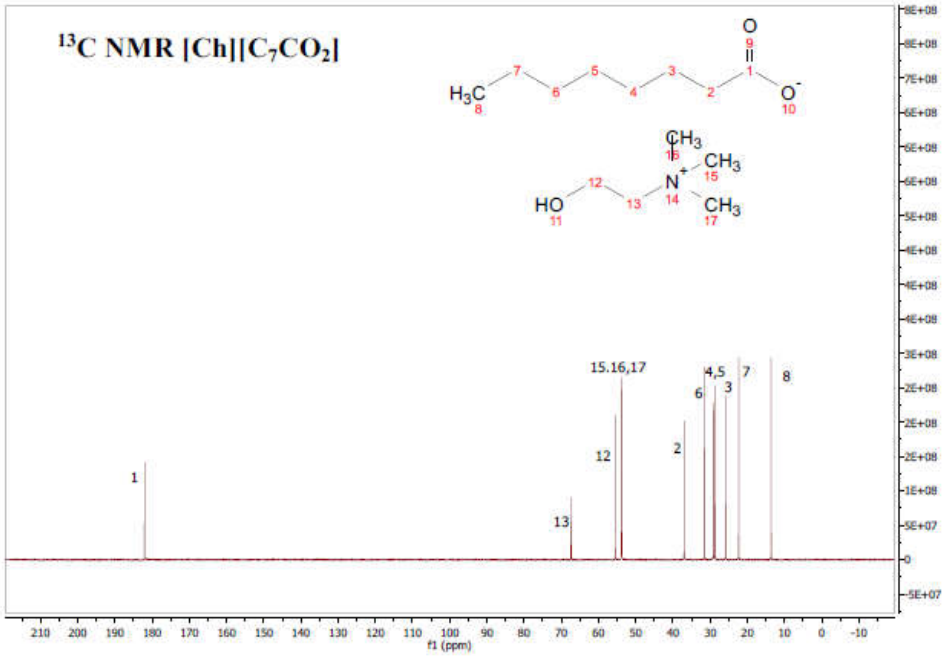


^{13}C NMR (D_2O, 75.47 MHz, [ppm]): 182.59; 68.38; 56.06; 52.32; 37.61; 30.60; 28.28; 25.63; 21.89; 13.90.

Cholinium Octanoate, [Ch][C_7CO_2]



^{1}H NMR (D_2O, 300 MHz, [ppm]): 3.90 (m, 2H); 3.34 (m, 2H); 3.05 (s, 9H); 2.03 (t, 2H, J_{HH}=7.7 Hz); 1.40 (m, 2H,); 1.14 (s, 6H,); 0.74 (t, 3H, J_{HH}=7.7 Hz).



^{13}C NMR (D_2O, 75.47 MHz, [ppm]): 182.39; 67.41; 55.36; 54.02; 36.99; 31.96; 28.94; 25.63; 22.30; 13.60.

Tables S1 to S7 present the weight fraction data for the binodal curves of the ABS formed by each ionic liquid, K_2HPO_4 and water.

Table S1. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_1CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_1CO_2] (1) + K_2HPO_4 (2) + water (3)					
$100w_1$	$100w_2$	$100w_1$	$100w_2$	$100w_1$	$100w_2$
56.62	7.79	22.68	27.09	12.58	36.50
53.55	7.37	22.53	26.91	12.53	36.36
51.66	9.23	22.15	27.48	12.31	36.78
48.90	8.74	21.91	27.18	12.26	36.64
47.35	10.36	21.02	28.50	12.05	37.06
45.67	9.99	20.90	28.33	11.97	36.83
44.23	11.57	20.25	29.31	11.69	37.37
43.21	11.31	20.14	29.15	11.65	37.24
41.95	12.73	19.57	30.02	11.37	37.79
41.02	12.45	19.47	29.86	11.33	37.66
39.86	13.80	18.94	30.67	11.09	38.14
39.41	13.64	18.85	30.53	11.05	38.01
38.40	14.83	18.59	30.93	10.88	38.36
37.64	14.54	18.41	30.62	10.84	38.24
36.74	15.63	17.75	31.66	10.68	38.57
36.36	15.47	17.65	31.48	10.64	38.45
35.52	16.51	17.18	32.24	10.49	38.77
34.85	16.20	17.10	32.08	10.46	38.66
34.10	17.14	16.71	32.71	10.30	38.98
33.78	16.98	16.64	32.57	10.27	38.88
33.04	17.91	16.24	33.22	10.06	39.30
32.71	17.74	16.16	33.06	10.01	39.10
32.02	18.63	15.75	33.75	9.78	39.58
31.77	18.48	15.62	33.47	9.75	39.48
31.10	19.36	15.28	34.04	9.62	39.77
30.85	19.20	15.21	33.89	9.59	39.67
30.24	20.00	15.05	34.17	9.36	40.16
29.98	19.83	14.91	33.87	9.31	39.94
29.43	20.57	14.61	34.40	9.06	40.47
29.20	20.41	14.55	34.27	9.01	40.26
27.89	22.18	14.40	34.53	8.83	40.66
27.69	22.01	14.29	34.26	8.81	40.56
26.71	23.34	13.72	35.28	8.64	40.94
26.53	23.18	13.67	35.15	8.62	40.85
25.64	24.42	13.43	35.60	8.46	41.19
25.31	24.10	13.37	35.46	8.42	41.00
24.48	25.27	13.17	35.83	8.17	41.56
24.32	25.11	13.12	35.71	8.13	41.36
23.61	26.13	12.87	36.16	7.95	41.79
23.45	25.96	12.83	36.03	7.91	41.58

Table S2. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_2CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_2CO_2] (1) + K_2HPO_4 (2) + water (3)					
$100w_1$	$100w_2$	$100w_1$	$100w_2$	$100w_1$	$100w_2$
59.03	4.52	17.81	27.70	9.06	37.06
54.64	4.18	17.63	27.43	8.97	36.71
52.51	6.35	17.14	28.34	8.78	37.21
48.66	5.89	16.97	28.05	8.73	37.03
46.49	8.31	16.48	28.97	8.50	37.65
44.31	7.92	16.34	28.72	8.46	37.47
42.88	9.60	15.98	29.41	8.29	37.90
40.95	9.17	15.82	29.12	8.22	37.57
39.73	10.68	15.20	30.33	8.01	38.15
38.83	10.44	15.09	30.10	7.98	37.98
37.75	11.81	14.74	30.79	7.74	38.64
36.98	11.57	14.62	30.52	7.67	38.30
36.01	12.84	14.31	31.16	7.40	39.07
35.31	12.59	14.19	30.89	7.36	38.87
34.50	13.69	13.72	31.85	7.19	39.34
33.90	13.45	13.62	31.62	7.15	39.11
33.07	14.60	13.34	32.22	6.99	39.59
32.39	14.30	13.24	31.99	6.93	39.26
31.62	15.37	12.95	32.61	6.65	40.08
31.11	15.13	12.85	32.37	6.61	39.80
30.40	16.15	12.59	32.94	6.42	40.35
29.90	15.89	12.50	32.71	6.38	40.08
28.69	17.68	12.14	33.50	6.18	40.69
28.21	17.38	12.05	33.27	6.14	40.42
27.08	19.09	11.81	33.80	5.99	40.91
26.71	18.83	11.75	33.61	5.97	40.77
26.19	19.62	11.43	34.32	5.85	41.13
25.81	19.33	11.35	34.09	5.83	40.99
24.86	20.83	11.15	34.56	5.72	41.35
24.48	20.51	11.08	34.36	5.68	41.08
23.63	21.89	10.88	34.83	5.34	42.23
23.38	21.65	10.83	34.67	5.28	41.81
22.55	23.01	10.57	35.29	5.09	42.48
22.24	22.70	10.50	35.08	5.06	42.23
21.54	23.89	10.32	35.52	4.93	42.66
21.28	23.59	10.26	35.30	4.91	42.43
20.37	25.15	10.00	35.92	4.44	44.12
20.11	24.83	9.90	35.57	4.36	43.32
19.49	25.92	9.65	36.19	4.17	44.01
19.29	25.65	9.60	36.00	4.15	43.70
18.53	26.99	9.37	36.57		
18.35	26.72	9.32	36.38		

Table S3. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_3CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_3CO_2] (1) + K_2HPO_4 (2) + water (3)					
100w_1	**100w_2**	**100w_1**	**100w_2**	**100w_1**	***100*w_2**
54.51	5.07	19.36	23.25	10.51	31.97
50.70	4.72	19.13	22.98	10.45	31.76
48.57	7.05	18.85	23.52	10.24	32.32
43.70	6.34	18.64	23.26	10.18	32.14
42.33	8.01	18.07	24.38	10.00	32.63
40.41	7.65	17.85	24.09	9.94	32.42
39.12	9.32	17.30	25.20	9.78	32.87
37.43	8.92	17.10	24.90	9.67	32.50
36.34	10.40	16.64	25.84	9.45	33.13
34.86	9.98	16.42	25.50	9.40	32.94
34.02	11.18	16.00	26.37	9.15	33.64
33.35	10.96	15.83	26.09	9.04	33.25
32.48	12.24	15.41	27.00	8.69	34.30
31.88	12.01	15.31	26.81	8.63	34.08
31.06	13.24	14.90	27.68	8.58	34.24
30.56	13.03	14.76	27.42	8.50	33.93
29.85	14.13	14.40	28.22	8.32	34.47
29.34	13.89	14.29	28.01	8.24	34.13
28.74	14.83	14.13	28.35	7.93	35.11
28.29	14.60	14.02	28.12	7.86	34.79
27.73	15.50	13.70	28.84	7.70	35.29
27.26	15.24	13.58	28.59	7.62	34.93
26.69	16.18	13.26	29.33	7.42	35.60
26.33	15.96	13.15	29.09	7.34	35.24
25.75	16.92	12.86	29.79	7.12	35.97
25.39	16.68	12.75	29.54	7.09	35.80
24.31	18.51	12.48	30.19	6.93	36.34
23.97	18.25	12.39	29.99	6.87	35.99
23.52	19.04	12.21	30.42	6.74	36.44
23.25	18.82	12.06	30.03	6.69	36.18
22.82	19.58	11.82	30.62	6.41	37.18
22.52	19.32	11.72	30.37	6.33	36.74
21.71	20.80	11.47	31.00	6.36	36.64
21.52	20.62	11.39	30.78	6.33	36.49
21.17	21.26	11.16	31.37	5.97	37.83
20.93	21.01	11.03	31.00	5.86	37.13
20.22	22.32	10.80	31.60	5.57	38.25
19.98	22.06	10.73	31.40	5.50	37.73

Table S4. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_4CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_4CO_2] (1) + K_2HPO_4 (2) + water (3)					
100w_1	**100w_2**	**100w_1**	**100w_2**	**100w_1**	**100w_2**
47.20	13.63	15.93	25.26	8.85	33.03
36.66	10.59	15.48	26.23	8.76	32.70
35.58	12.04	15.33	25.98	8.63	33.09
34.45	11.66	15.14	26.41	8.59	32.91
33.55	12.92	15.01	26.19	8.45	33.32
32.51	12.52	14.69	26.91	8.41	33.15
31.63	13.80	14.57	26.69	8.22	33.76
30.59	13.35	14.40	27.09	8.17	33.57
29.83	14.50	14.28	26.87	8.06	33.93
29.33	14.25	13.95	27.64	8.02	33.78
28.63	15.34	13.83	27.40	7.90	34.16
28.12	15.07	13.54	28.08	7.87	34.02
27.52	16.02	13.44	27.88	7.75	34.42
27.12	15.78	13.17	28.51	7.72	34.25
26.52	16.75	12.99	28.10	7.62	34.58
26.10	16.48	12.71	28.79	7.55	34.28
25.55	17.41	12.62	28.59	7.46	34.60
25.20	17.17	12.36	29.22	7.42	34.45
24.68	18.06	12.27	29.00	7.33	34.76
24.30	17.79	12.03	29.60	7.30	34.64
23.81	18.65	11.94	29.39	7.18	35.09
23.48	18.40	11.71	29.96	7.13	34.87
23.02	19.21	11.63	29.75	7.00	35.32
22.69	18.93	11.43	30.27	6.95	35.10
21.87	20.39	11.30	29.91	6.87	35.38
21.64	20.18	11.07	30.51	6.84	35.22
21.25	20.89	11.00	30.30	6.60	36.11
21.00	20.64	10.80	30.82	6.54	35.82
20.66	21.28	10.75	30.67	6.40	36.36
20.43	21.05	10.56	31.18	6.36	36.14
20.08	21.71	10.45	30.85	6.22	36.66
19.88	21.49	10.27	31.35	6.18	36.46
19.52	22.18	10.21	31.16	5.96	37.31
19.31	21.93	10.03	31.65	5.88	36.82
18.73	23.06	9.97	31.46	5.68	37.61
18.53	22.81	9.88	31.70	5.60	37.12
18.24	23.39	9.83	31.52	5.38	38.01
18.06	23.17	9.67	31.98	5.32	37.56
17.53	24.25	9.61	31.79	5.19	38.11
17.34	23.99	9.45	32.24	5.11	37.56
17.08	24.52	9.40	32.05	4.83	38.79
16.92	24.30	9.24	32.51	4.77	38.30
16.46	25.26	9.19	32.33	4.51	39.45
16.30	25.02	9.04	32.78	4.42	38.60
16.08	25.50	8.99	32.59		

Table S5. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_5CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_5CO_2] (1) + K_2HPO_4 (2) + water (3)					
$100w_1$	$100w_2$	$100w_1$	$100w_2$	$100w_1$	$100w_2$
56.58	5.57	20.22	22.86	11.82	30.59
53.28	5.24	19.87	23.50	11.74	30.38
50.91	7.68	19.66	23.26	11.64	30.61
48.26	7.27	19.39	23.76	11.56	30.39
46.32	9.38	19.21	23.54	11.34	30.95
43.01	8.71	18.91	24.11	11.27	30.75
41.53	10.47	18.71	23.85	10.95	31.58
40.60	10.24	18.19	24.85	10.82	31.20
39.28	11.86	17.99	24.58	10.63	31.70
37.60	11.35	17.70	25.16	10.56	31.50
36.37	12.94	17.52	24.90	10.35	32.08
35.64	12.68	16.99	25.95	10.31	31.94
34.75	13.87	16.82	25.70	10.20	32.24
33.74	13.47	16.58	26.20	10.14	32.07
32.92	14.60	16.43	25.97	9.95	32.60
32.31	14.34	16.20	26.46	9.83	32.20
31.59	15.36	16.03	26.18	9.49	33.16
30.99	15.07	15.60	27.08	9.38	32.81
30.29	16.09	15.46	26.84	9.15	33.48
29.78	15.82	15.25	27.30	9.05	33.13
29.17	16.73	15.10	27.03	8.82	33.82
28.66	16.43	14.72	27.85	8.73	33.47
28.05	17.36	14.64	27.70	8.54	34.05
27.60	17.08	14.46	28.11	8.45	33.70
27.08	17.89	14.32	27.84	8.12	34.73
26.59	17.57	14.12	28.27	8.04	34.39
25.99	18.52	14.02	28.07	7.47	36.20
25.61	18.24	13.66	28.90	7.25	35.13
24.61	19.87	13.55	28.67	6.70	37.04
24.28	19.61	13.38	29.07	6.55	36.24
23.81	20.39	13.28	28.84	6.14	37.72
23.47	20.10	13.13	29.20	5.99	36.77
23.03	20.84	13.03	28.97	5.59	38.31
22.73	20.57	12.73	29.67	5.49	37.61
22.04	21.76	12.63	29.43	5.10	39.18
21.73	21.45	12.49	29.78	5.00	38.39
21.34	22.13	12.40	29.56	4.52	40.45
21.08	21.85	12.14	30.21	4.41	39.45
20.41	23.07	12.05	30.01		

Table S6. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_6CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_6CO_2] (1) + K_2HPO_4 (2) + water (3)					
$100w_1$	$100w_2$	$100w_1$	$100w_2$	$100w_1$	$100w_2$
56.21	7.79	19.47	25.87	10.33	33.43
52.88	7.33	18.92	26.82	10.28	33.27
50.81	9.38	18.72	26.54	10.13	33.66
49.37	9.11	18.52	26.89	10.08	33.48
47.67	10.85	18.35	26.64	9.86	34.04
45.43	10.34	17.91	27.42	9.77	33.72
43.99	11.90	17.75	27.17	9.58	34.20
42.93	11.61	17.28	28.02	9.49	33.85
41.55	13.15	16.99	27.54	9.32	34.31
40.56	12.84	16.54	28.37	9.27	34.15
39.49	14.07	16.42	28.17	9.06	34.73
38.81	13.82	16.21	28.57	8.98	34.40
37.78	15.04	16.07	28.33	8.80	34.89
37.04	14.75	15.68	29.09	8.75	34.70
36.08	15.89	15.55	28.84	8.61	35.12
35.27	15.54	15.16	29.59	8.55	34.90
34.41	16.62	15.03	29.32	8.39	35.35
33.76	16.30	14.71	29.95	8.34	35.10
32.93	17.36	14.59	29.72	8.13	35.70
32.38	17.06	14.44	30.04	8.06	35.37
31.69	17.97	14.33	29.81	7.86	35.97
31.17	17.67	14.17	30.15	7.79	35.69
29.91	19.37	14.05	29.90	7.56	36.41
29.43	19.07	13.76	30.51	7.45	35.92
28.79	19.94	13.66	30.28	7.29	36.43
28.34	19.63	13.27	31.11	7.24	36.16
27.77	20.43	13.18	30.90	7.04	36.80
27.31	20.09	13.05	31.17	6.98	36.50
26.26	21.60	12.95	30.94	6.79	37.12
25.85	21.26	12.70	31.51	6.74	36.83
24.96	22.57	12.61	31.28	6.57	37.40
24.72	22.35	12.36	31.84	6.52	37.09
24.32	22.95	12.27	31.62	6.37	37.62
24.00	22.65	12.04	32.14	6.32	37.36
23.60	23.26	11.95	31.90	6.17	37.89
23.31	22.99	11.83	32.17	6.11	37.56
22.57	24.16	11.75	31.96	5.94	38.16
22.31	23.89	11.54	32.46	5.88	37.78
21.98	24.42	11.48	32.29	5.73	38.34
21.71	24.12	11.29	32.74	5.68	37.99
21.05	25.19	11.17	32.38	5.48	38.73
20.75	24.83	10.91	33.02	5.42	38.31
20.11	25.91	10.84	32.80	5.24	39.00
19.92	25.66	10.59	33.40	5.20	38.66
19.65	26.10	10.48	33.05		

Table S7. Experimental data for the binodal weight fraction percentage of the ABS formed by [Ch][C_7CO_2] (1) + K_2HPO_4 (2) + water (3) at (298 ± 1) K and atmospheric pressure.

[Ch][C_7CO_2] (1) + K_2HPO_4 (2) + water (3)					
$100w_1$	$100w_2$	$100w_1$	$100w_2$	$100w_1$	$100w_2$
53.94	9.55	17.76	28.78	9.56	35.02
52.62	9.32	17.57	28.47	9.51	34.83
50.68	11.16	17.34	28.88	9.37	35.19
48.18	10.61	17.18	28.60	9.29	34.87
46.54	12.28	16.72	29.42	9.06	35.46
45.34	11.96	16.59	29.20	8.96	35.08
43.95	13.42	16.21	29.90	8.74	35.68
43.05	13.14	16.07	29.63	8.69	35.49
41.76	14.54	15.86	30.02	8.59	35.78
40.82	14.21	15.70	29.71	8.53	35.54
39.64	15.53	15.36	30.36	8.34	36.08
38.74	15.18	15.21	30.08	8.30	35.90
37.69	16.37	14.88	30.72	8.17	36.27
36.90	16.03	14.76	30.48	8.12	36.06
35.92	17.18	14.43	31.13	8.04	36.30
35.24	16.85	14.30	30.85	7.97	36.00
34.33	17.96	14.00	31.46	7.78	36.55
33.81	17.69	13.89	31.20	7.75	36.39
32.27	19.59	13.66	31.66	7.62	36.77
31.71	19.25	13.55	31.42	7.55	36.45
30.97	20.19	13.42	31.69	7.39	36.95
30.42	19.83	13.33	31.46	7.32	36.61
29.80	20.64	12.95	32.24	7.09	37.35
29.31	20.31	12.87	32.02	7.01	36.95
28.07	21.96	12.64	32.51	6.84	37.51
27.68	21.65	12.55	32.28	6.78	37.23
27.08	22.47	12.33	32.76	6.61	37.79
26.71	22.17	12.23	32.51	6.57	37.52
26.21	22.87	12.03	32.96	6.40	38.07
25.79	22.50	11.95	32.73	6.35	37.72
24.86	23.85	11.74	33.19	6.20	38.24
24.53	23.54	11.66	32.96	6.15	37.97
23.67	24.80	11.46	33.41	6.04	38.36
23.38	24.49	11.39	33.20	5.98	38.01
23.00	25.06	11.21	33.62	5.81	38.64
22.67	24.71	11.14	33.42	5.75	38.28
21.97	25.79	11.06	33.62	5.63	38.72
21.73	25.50	10.98	33.40	5.57	38.24
21.37	26.06	10.71	34.05	5.36	39.01
21.14	25.77	10.60	33.71	5.32	38.72
20.50	26.79	10.44	34.11	5.16	39.36
20.29	26.52	10.37	33.87	5.11	38.96
19.69	27.49	10.21	34.25	4.92	39.71
19.46	27.17	10.15	34.05	4.85	39.18
19.19	27.63	10.00	34.44	4.70	39.82
18.96	27.31	9.95	34.26	4.65	39.40
18.42	28.24	9.69	34.92		
18.24	27.96	9.65	34.79		

Table S8. Adjusted parameters and respective standard deviations (σ) obtained by the fiiting of the experimental data by equation (1).

IL	$A \pm \sigma$	$B \pm \sigma$	$10^5 (C \pm \sigma)$
[Ch][C_1CO_2]	113.95 ± 4.78	-0.274 ± 0.011	1.12 ± 0.07
[Ch][C_2CO_2]	100.58 ± 3.16	-0.280 ± 0.009	1.41 ± 0.07
[Ch][C_3CO_2]	102.27 ± 5.05	-0.316 ± 0.015	1.52 ± 0,15
[Ch][C_4CO_2]	117.05 ± 2.31	-0.338 ± 0.527	1.80 ± 0.34
[Ch][C_5CO_2]	117.16 ± 4.44	-0.319 ± 0.011	1.90 ± 0.11
[Ch][C_6CO_2]	111.05 ± 4.46	-0.273 ± 0,010	2.25 ± 0.87
[Ch][C_7CO_2]	115.77 ± 5.50	-0.252 ± 0,012	2.23 ± 0.08

Table S9. Weight Fraction Compositions (wt %) of the Top (T) Phase, Initial Mixture (M) and Bottom (B) Phase of the ABS composed of IL + K_2HPO_4 + water, and respective TLL and Tie-Line Slope (TLS).

	weight fraction composition/wt %							
IL	**$[IL]_T$**	**$[K_2HPO_4]_T$**	**$[IL]_M$**	**$[K_2HPO_4]_M$**	**$[IL]_B$**	**$[K_2HPO_4]_B$**	**TLS**	**TLL**
[Ch][C_1CO_2]	36.28	16.01	30.24	21.11	14.12	34.70	-1.53	28.99
	37.72	15.10	30.22	21.90	8.87	41.24	-1.33	38.93
	41.47	12.92	30.13	23.04	7.58	43.17	-1.26	45.42
	41.57	12.86	30.10	23.82	4.96	47.86	-1.20	50.65
[Ch][C_2CO_2]	37.91	11.60	29.59	19.84	4.25	44.95	-1.35	47.38
	41.35	9.77	30.17	20.97	2.94	48.23	-1.31	54.36
	43.17	8.91	30.15	22.05	2.32	50.17	-1.31	58.07
	43.38	8.81	29.87	22.98	1.70	52.51	-1.36	60.39
	47.06	7.25	30.90	23.56	1.56	53.17	-1.34	64.65
[Ch][C_3CO_2]	37.73	9.68	30.16	17.01	4.15	42.25	-1.39	46.78
	37.96	9.57	30.07	18.17	1.88	48.91	-1.40	53.38
	39.97	8.64	30.14	20.02	0.93	53.81	-1.39	59.70
	41.75	7.90	30.06	21.18	0.85	54.39	-1.34	61.92
[Ch][C_4CO_2]	32.00	13.64	25.10	20.04	4.98	38.73	-1.51	36.88
	34.39	12.35	25.09	21.00	4.05	40.58	-1.51	41.44
	35.04	12.02	25.14	21.95	2.43	44.69	-1.49	46.17
	36.70	11.21	25.30	23.09	1.56	47.83	-1.54	50.75
	38.00	10.61	25.23	24.96	0.74	52.46	-1.42	56.03
[Ch][C_5CO_2]	34.41	13.57	25.26	21.99	3.65	41.89	-1.60	41.81
	36.09	12.68	25.03	23.06	2.81	43.90	-1.58	45.63
	38.05	11.71	25.15	23.90	2.23	45.58	-1.60	49.31
	40.41	10.61	25.25	24.97	1.75	47.23	-1.53	53.26
	43.16	9.44	25.19	26.09	1.56	47.98	-1.62	56.70
[Ch][C_6CO_2]	42.44	12.37	29.19	22.14	4.73	40.18	-1.53	46.85
	46.92	10.34	30.05	23.07	2.99	43.47	-1.54	55.02
	48.63	9.63	30.05	23.83	2.36	45.02	-1.55	58.25
	50.64	8.83	30.34	24.91	1.50	47.75	-1.47	62.69
[Ch][C_7CO_2]	43.99	13.13	30.20	22.88	4.37	41.14	-1.71	48.52
	46.97	11.73	30.06	23.79	3.43	42.80	-1.71	53.48
	49.36	10.66	30.08	24.91	2.24	45.48	-1.67	58.58
	53.43	8.98	30.21	25.86	1.91	46.42	-1.65	63.69

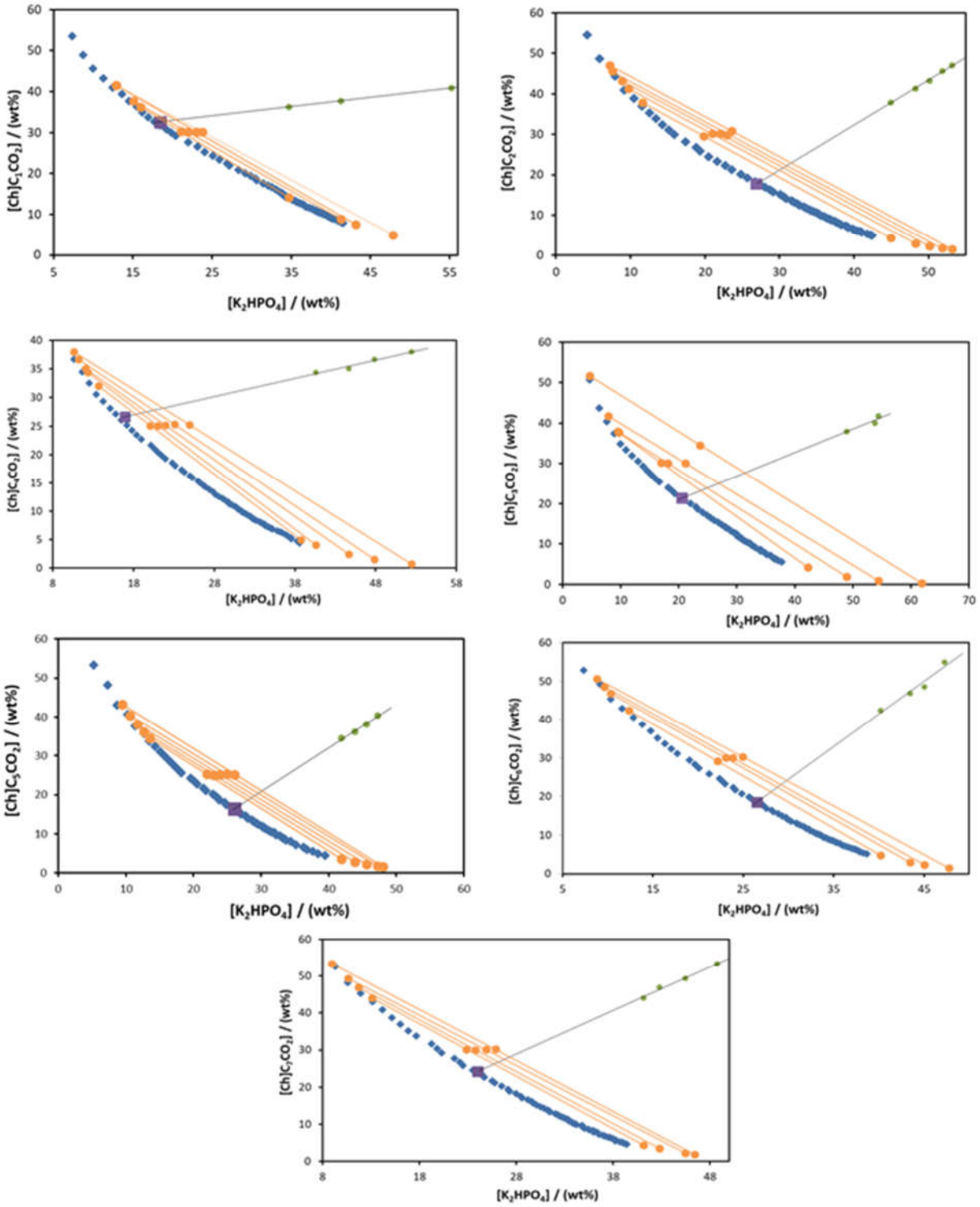


Figure S1. Phase diagrams comprising the respective TLs data required for the determination of the critical point of each ABS.

Table S10. Critical Point of each ABS composed of IL + K_2HPO_4 + H_2O determined by Equation $[IL] = f[salt] + g$ and respective correlation coefficient (R^2).

IL	R^2	critical point/wt %		
		[IL]	[K_2HPO_4]	[H_2O]
[Ch][C_1CO_2]	0.9999	32.60	18.49	48.91
[Ch][C_2CO_2]	0.9957	17.86	26.9	55.24
[Ch][C_3CO_2]	0.9995	21.33	20.56	58.02
[Ch][C_4CO_2]	0.9637	26.62	16.92	56.46
[Ch][C_5CO_2]	0.9851	16.37	26.04	57.59
[Ch][C_6CO_2]	0.9525	18.58	26.53	54.89
[Ch][C_7CO_2]	0.9879	24.18	24.01	51.81

Table S11. Salting-out coefficients (k_s) of each ABS formed by IL + K_2HPO_4 + H_2O at 298 K and correlation coefficient (R^2) of the fitting by the following equation:

$$ln\frac{[\mathrm{IL}]_\mathrm{T}}{[\mathrm{IL}]_\mathrm{B}} = k_{IL}([\mathrm{IL}]_\mathrm{B} \quad ([\mathrm{IL}]_\mathrm{T}) + \; k_s([\mathrm{Salt}]_\mathrm{B} \quad [\mathrm{Salt}]_\mathrm{T})$$

IL	k_s /(kg.mol^{-1})	k_{IL} ([IL]$_B$ - [IL]$_T$)	R^2
[Ch][C_1CO_2]	0.5085	0.2695	0.9994
[Ch][C_2CO_2]	0.6002	0.3193	0.9983
[Ch][C_3CO_2]	0.6431	0.3224	0.9999
[Ch][C_4CO_2]	0.7691	0.1120	0.9997
[Ch][C_5CO_2]	0.8292	-0.0313	1.0000
[Ch][C_6CO_2]	0.9205	-0.1016	0.9999
[Ch][C_7CO_2]	0.952	-0.1477	0.9995

The CMC of [Ch][C_6CO_2] was determined by electrical conductivity using a SevenMulti® conductivimeter (Mettler Toledo Instruments) at (298 ± 1) K, with an uncertainty of ± 0.01 mS cm^{-1}. The conductivity meter was calibrated with standard solutions of KCl with known conductivity values (84 μS cm^{-1}, 1413 cm^{-1} and 12.88 mS cm^{-1}). The conductivity measurements were carried out by continuous dilution of a concentrated solution of IL. After each addition of the IL solution, the solution was stirred and equilibrated for 10 min, and then three successive measurements of conductivity were performed. Figure S2 shows the conductivity values as a function of the IL concentration used in the CMC determination.

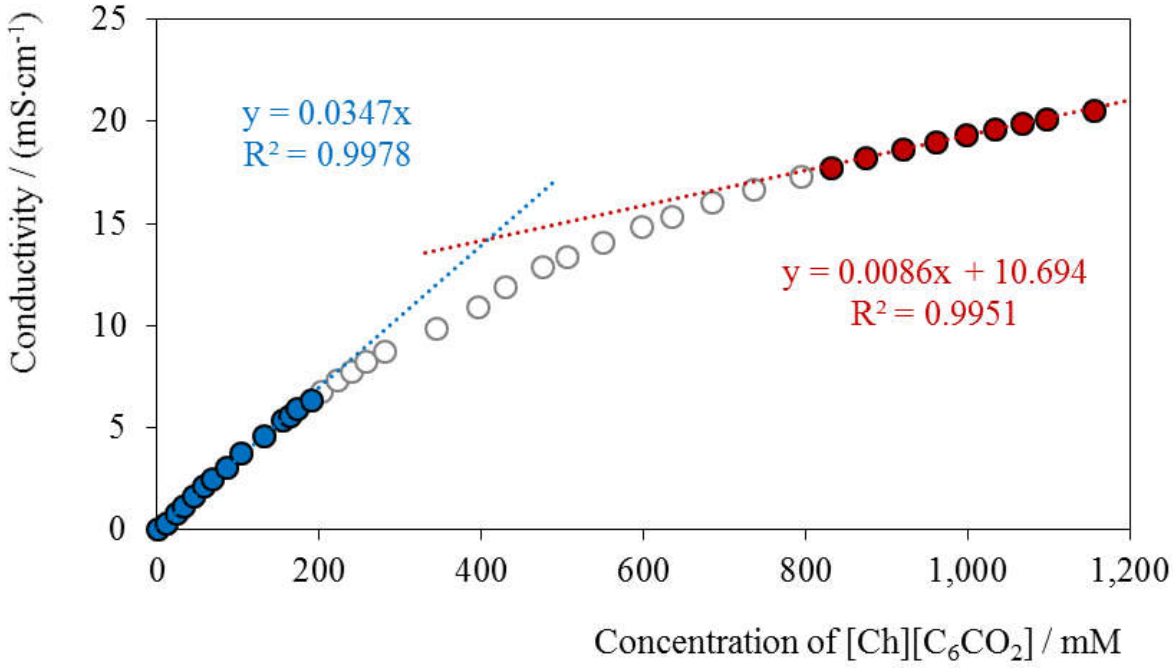


Figure S2. Conductivity as a function of the IL concentration to determine the CMC of [Ch][C_6CO_2] at 298 K.

The extraction efficiency (*EE*%), which corresponds to the percentage ratio between the weight of each amino acid in the IL-rich phase to that in the total mixture, was determined according to the following equation:

$$EE\% = \frac{w_{AA}^{IL}}{w_{AA}^{IL} + w_{AA}^{Salt}} \times 100$$

where w_{AA}^{IL} and w_{AA}^{Salt} are the total weight of each amino acid in the IL-rich and in the salt-rich aqueous phases.

Table S12. Extraction efficiencies (*EE*%) of the studied ABS for L-tryptophan, L-phenylalanine, L-tyrosine, and L-dopa, and respective standard deviation (σ), at 298 K, and pH pf the coexisting phases.

IL	$EE\%_{TRP} \pm \sigma$	$EE\%_{L\text{-}PHE} \pm \sigma$	$EE\%_{TYR} \pm \sigma$	$EE\%_{L\text{-}DOPA} \pm \sigma$	pH	
					IL-rich phase	K_2HPO_4-rich
[Ch][C_1CO_2]	99.93 ± 0.10	99.04 ± 0.05	96.93 ± 0.25	95.82 ± 1.07	10.52 ± 0.03	9.08 ± 0.57
[Ch][C_2CO_2]	99.16 ± 0.02	98.49 ± 0.05	93.92 ± 0.23	83.19 ± 0.91	8.93 ± 0.01	8.27 ± 0.28
[Ch][C_3CO_2]	99.14 ± 0.02	98.56 ± 0.03	96.95 ± 0.44	95.00 ± 0.92	10.34 ± 0.04	9.22 ± 0.38
[Ch][C_4CO_2]	98.34 ± 0.06	96.81 ± 0.07	87.54 ± 0.19	71.32 ± 0.79	9.42 ± 0.02	9.11 ± 0.14
[Ch][C_5CO_2]	98.32 ± 0.05	96.64 ± 0.18	86.00 ± 0.98	66.79 ± 2.00	9.59 ± 0.09	9.41 ± 0.12
[Ch][C_6CO_2]	98.47 ± 0.45	97.34 ± 0.11	89.86 ± 0.01	72.87 ± 0.58	9.04 ± 0.04	8.41 ± 0.24
[Ch][C_7CO_2]	98.20 ± 0.32	96.98 ± 0.05	83.13 ± 0.49	69.14 ± 1.87	9.59 ± 0.16	8.97 ± 0.29

Table S13. Partition coefficients (K_{AA}) of the studied ABS for L-tryptophan (TRP), L-phenylalanine (L-PHE), L-tyrosine (TYR), and L-dopa, and respective standard deviation (σ), at 298 K.

IL	$K_{TRP} \pm \sigma$	$K_{L\text{-}PHE} \pm \sigma$	$K_{TYR} \pm \sigma$	$K_{L\text{-}DOPA} \pm \sigma$
[Ch][C_1CO_2]	Complete extraction	78.25 ± 2.47	19.86 ± 0.86	12.76 ± 0.53
[Ch][C_2CO_2]	56.81 ± 3.29	30.38 ± 0.71	7.82 ± 0.06	2.37 ± 0.12
[Ch][C_3CO_2]	54.04 ± 0.22	32.64 ± 1.09	14.17 ± 2.79	7.12 ± 1.04
[Ch][C_4CO_2]	51.35 ± 1.32	26.25 ± 0.87	5.74 ± 0.27	2.08 ± 0.07
[Ch][C_5CO_2]	55.12 ± 3.79	28.00 ± 1.05	10.28 ± 0.85	1.97 ± 0.03
[Ch][C_6CO_2]	46.05 ± 2.18	27.05 ± 1.35	6.46 ± 0.10	1.88 ± 0.09
[Ch][C_7CO_2]	49.49 ± 3.24	27.62 ± 0.70	4.29 ± 0.88	2.14 ± 0.08

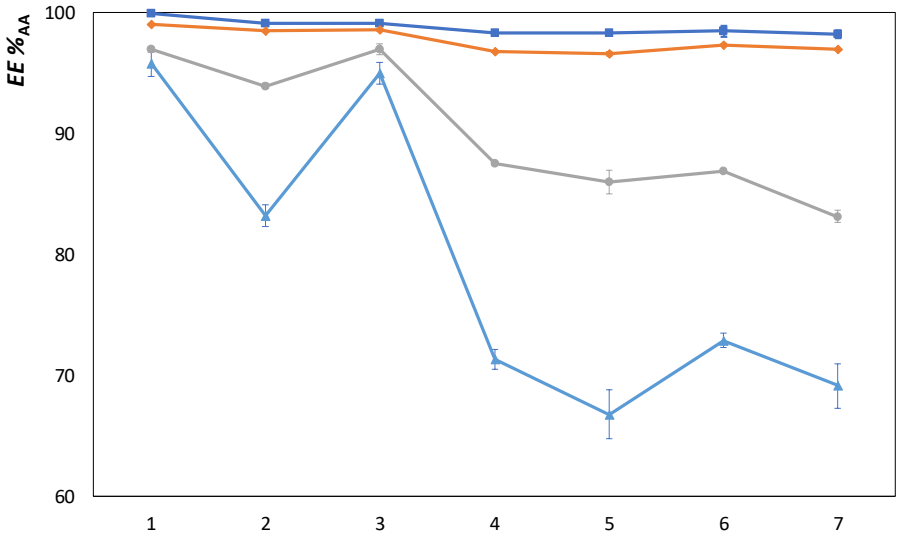


Figure S3. Extraction efficiencies (*EE*%) of the studied ABS at 25°C for L-tryptophan (■), L-phenylalanine (◆), L-tyrosine (●), and L-dopa (▲).