Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supporting Information

Solvent - Mediated Molar Conductivity of Protic Ionic Liquids

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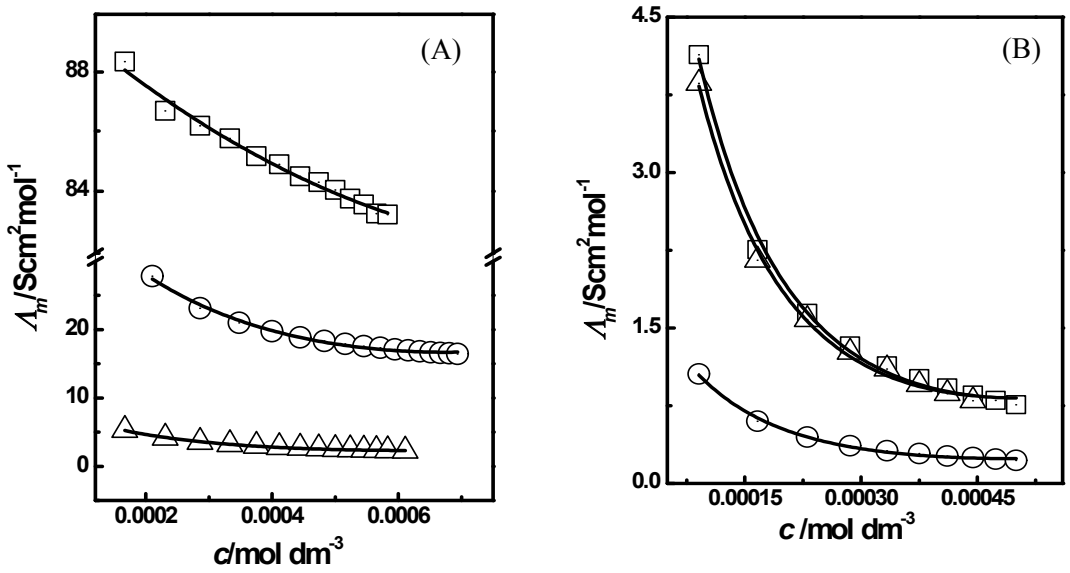


Fig. S1 (A) Λ_m of [HmIm][CH_3COO] in water (□), methanol (○), ethanol (△), (B) Λ_m of [HmIm] [CH_3COO] in dimethyl sulfoxide (□), acetonitrile (○), nitrobenzene (△) at 298.15 *K*.

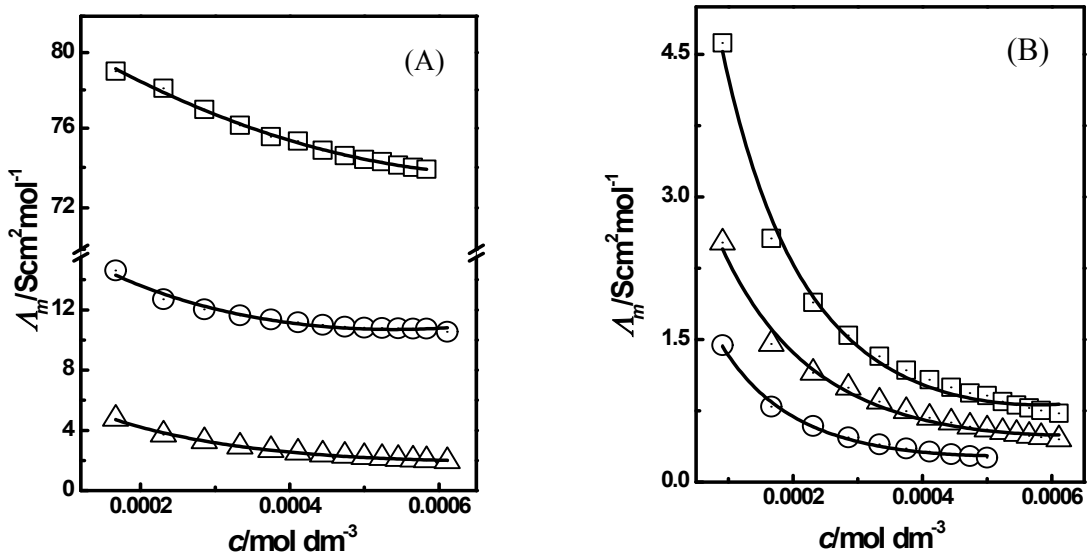


Fig.S2 (A) Λ_m of [HmIm][CH_3CH_2COO] in water (□), methanol (○), ethanol (△), (B) Λ_m of [HmIm] [CH_3CH_2COO] in dimethyl sulfoxide (□), acetonitrile (○), nitrobenzene (△) at 298.15 *K*.

Table S1. Molar conductivities, Λ_m of [HmIm][HCOO] in water, methanol and ethanol at 298.15 K.

Water		Methanol		Ethanol	
c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})
1.666	106.362	1.666	55.114	1.666	8.583
2.307	103.050	2.307	52.652	2.307	7.791
2.857	101.193	2.857	47.604	2.857	7.361
3.333	99.997	3.333	48.633	3.333	7.128
3.749	99.474	3.749	47.950	3.749	6.966
4.111	99.725	4.111	47.235	4.111	6.850
4.444	98.604	4.444	46.647	4.444	6.741
4.736	98.387	4.736	46.237	4.736	6.684
4.999	97.990	4.999	46.204	4.999	6.632
5.237	97.910	5.237	45.861	5.237	6.594
5.454	97.891	5.454	45.618	5.454	6.582
5.651	97.742	5.651	45.280	5.651	6.554
5.832	97.760	5.832	45.227	5.832	6.552
		6.109	44.355	6.109	6.410

Table S2. Molar conductivities, Λ_m of [HmIm][HCOO] in w dimethyl sulfoxide, acetonitrile and nitrobenzene 298.15 K..

Dimethyl sulfoxide		Acetonitrile		Nitrobenzene	
c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})
0.909	5.203	0.909	4.752	0.909	1.012
1.666	3.103	1.666	4.339	1.666	0.636
2.307	2.410	2.307	3.466	2.307	0.533
2.857	2.058	2.857	3.097	2.857	0.560
3.333	1.812	3.333	2.980	3.333	0.561
3.749	1.650	3.749	2.920	3.749	0.554
4.111	1.542	4.111	2.865	4.111	0.559
4.444	1.451	4.444	2.824	4.444	0.560
4.736	1.380	4.736	2.808	4.736	0.584
4.999	1.328	4.999	2.802	4.999	0.590
5.237	1.279	5.237	2.806	5.237	0.592
5.454	1.237	5.454	2.810	5.454	0.594
5.651	1.203	5.651	2.824	5.651	0.594
5.832	1.174	5.832	2.834	5.832	0.600
		6.109	2.793	6.109	

Table S3. Molar conductivities, Λ_m of [HmIm][CH_3COO] in water, methanol and ethanol at 298.15 K..

Water		Methanol		Ethanol	
c 10^{-4} (mol dm^{-3})	Λ_m (Scm^2mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^2mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^2mol^{-1})
1.666	88.355	2.105	27.835	1.666	5.294
2.307	86.670	2.857	23.108	2.307	4.129
2.856	86.177	3.478	20.966	2.857	3.535
3.333	85.746	3.999	19.736	3.333	3.189
3.749	85.153	4.444	18.869	3.749	2.955
4.111	84.888	4.827	18.312	4.111	2.797
4.444	84.496	5.161	17.903	4.444	2.668
4.736	84.304	5.454	17.551	4.736	2.571
4.999	84.048	5.713	17.331	4.999	2.496
5.237	83.761	5.945	17.123	5.237	2.428
5.454	83.571	6.153	16.966	5.454	2.381
5.651	83.268	6.341	16.811	5.651	2.344
5.832	83.237	6.511	16.694	5.832	2.307
		6.666	16.591	6.109	2.240
		6.807	16.510		
		6.938	16.430		

Table S4. Molar conductivities, Λ_m of [HmIm][CH_3COO] in dimethyl sulfoxide, acetonitrile and nitrobenzene 298.15 K..

Dimethyl sulfoxide		Acetonitrile		Nitrobenzene	
c 10^{-4} (mol dm^{-3})	Λ_m (Scm^2mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^2mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^2mol^{-1})
0.909	4.136	0.909	3.861	0.909	1.056
1.666	2.257	1.666	2.154	1.666	0.600
2.307	1.642	2.307	1.581	2.307	0.446
2.857	1.326	2.857	1.267	2.857	0.364
3.333	1.134	3.333	1.104	3.333	0.315
3.749	1.010	3.749	0.954	3.749	0.288
4.111	0.921	4.111	0.866	4.111	0.262
4.444	0.852	4.444	0.796	4.444	0.249
4.736	0.802			4.736	0.234
4.999	0.760			4.999	0.222

Table S5. Molar conductivities, Λ_m of [HmIm][CH_3CH_2COO] in water, methanol and ethanol at 298.15 K.

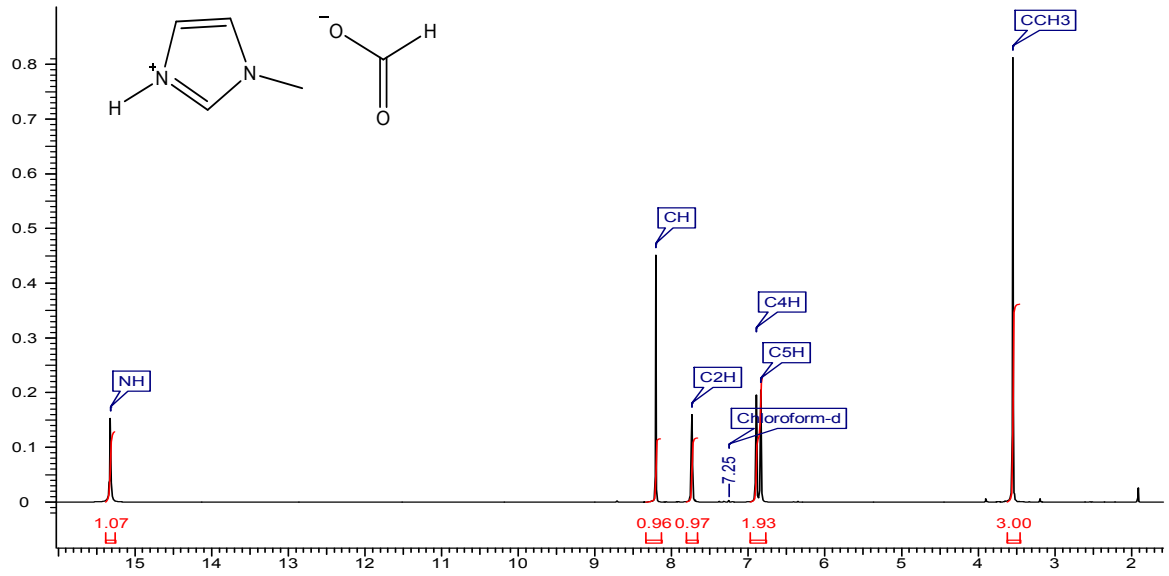
Water		Methanol		Ethanol	
c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})
1.666	78.991	1.666	14.621	1.666	4.772
2.307	78.089	2.307	12.697	2.307	3.718
2.857	76.971	2.857	12.034	2.857	3.276
3.333	76.145	3.333	11.637	3.333	2.925
3.749	75.552	3.749	11.353	3.749	2.690
4.111	75.328	4.111	11.164	4.111	2.527
4.444	74.865	4.444	10.996	4.444	2.396
4.736	74.592	4.736	10.888	4.736	2.303
4.999	74.407	4.999	10.815	4.999	2.226
5.237	74.291	5.237	10.797	5.237	2.163
5.454	74.110	5.454	10.775	5.454	2.110
5.651	73.996	5.651	10.756	5.651	2.065
5.832	73.910	5.832	10.746	5.832	2.026
		6.109	10.538	6.109	1.960

Table S6. Molar conductivities, Λ_m of [HmIm][CH_3CH_2COO] in dimethyl sulfoxide, acetonitrile and nitrobenzene at 298.15 K.

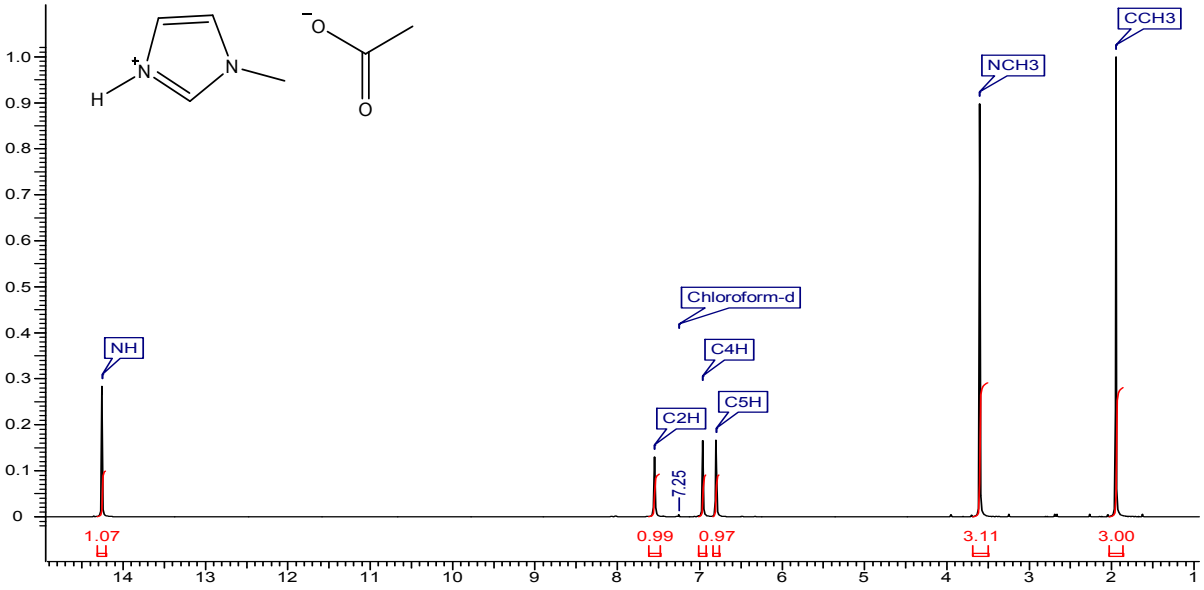
Dimethyl sulfoxide		Acetonitrile		Nitrobenzene	
c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})	c 10^{-4} (mol dm^{-3})	Λ_m (Scm^{2}mol^{-1})
0.909	4.620	0.909	2.519	0.909	1.441
1.666	2.563	1.666	1.452	1.666	0.792
2.307	1.889	2.307	1.148	2.307	0.589
2.857	1.543	2.857	0.994	2.857	0.469
3.333	1.323	3.333	0.846	3.333	0.396
3.749	1.176	3.749	0.746	3.749	0.352
4.111	1.075	4.111	0.676	4.111	0.321
4.444	0.996	4.444	0.625	4.444	0.292
4.736	0.935	4.736	0.584	4.736	0.272
4.999	0.910	4.999	0.554	4.999	0.256
5.237	0.847	5.237	0.527		
5.454	0.810	5.454	0.507		
5.651	0.780	5.651	0.486		
5.832	0.754	5.832	0.473		
6.109	0.721	6.109	0.448		

^{1}H-NMR of Ionic Liquids

^{1}H NMR, 200 MHz, $CDCl_3$: 1-methylimidazolium formate, [HmIm][HCOO] δ 15.32 (s, 1H), δ 7.73 (s, 1H), δ 6.98 (s, 1H), δ 6.83 (s, 1H), δ 3.60 (s, 3H).



^{1}H NMR, 200 MHz, $CDCl_3$: 1-methylimidazolium acetate, [HmIm][CH_3COO], δ 14.25 (s, 1H), δ 7.55 (s, 1H), δ 6.96 (s, 1H), δ 6.80 (s, 1H), δ 3.60 (s, 3H), δ 1.95 (t, 3H).



^{1}H NMR, 200 MHz, $CDCl_3$: 1-methylimidazolium propionate, [HmIm][CH_3CH_2COO], δ 13.72 (s, 1H), δ 7.52 (s, 1H), δ 6.92 (s, 1H), δ 6.76 (s, 1H), δ 3.51 (s, 3H), δ 2.21 (q, 2H), δ 0.96 (t, 3H).