Experimental Measurement of the Solubility and Diffusivity of CO_2 in Room Temperature Ionic Liquids Using a Transient Thin Liquid Film Method

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Supplementary Information

Table 1 Density vs temperature for [bmpy][Tf_2N]
Table 2 Viscosity vs temperature for [pmmim][Tf_2N] and [bmim][Tf_2N]
Table 3 CO_2 diffusion coefficients vs temperature for all ionic liquids

Table 1 Density as a function of temperature for [bmpy][Tf_2N]

T (^oC)	ρ(g/cm^3)
10.1	1.427
10.2	1.423
15	1.421
15.1	1.423
15.2	1.423
20	1.418
20.1	1.418
24.8	1.414
25	1.414
29.9	1.411
30	1.408
30	1.408
34.9	1.405
35	1.405
35	1.405
39.9	1.401
39.9	1.4
40	1.401
45	1.395
45	1.396
45	1.394
50	1.389
50	1.39

50	1.39

Table 2. Viscosities of [bmim][Tf_2N] and [pmmim][Tf_2N]

Ionic liquid	T ($^{\circ}C$)	$\eta_B(cP)$	Ionic liquid	T ($^{\circ}C$)	$\eta_B(cP)$
[bmim] [Tf_2N]	10	92.7±0.3	[pmmim] [Tf_2N]	10	201±2
	20	57.0±0.3		20	109.0±0.5
	25	45.6±0.3		25	84.1±0.3
	30	37.4±0.2		30	66.6±0.1
	40	25.9±0.1		40	44.3±0.4
	50	19.0±0.2		50	32.1±0.1

Table 3. Diffusion coefficients, D_{CO2} of CO_2 in ionic liquids.

	Diffusion Coefficient, $D\times(10^{-6}cm^2/s)$					
Ionic liquid	$10^{\circ}C$	$20^{\circ}C$	$25^{\circ}C$	$30^{\circ}C$	$40^{\circ}C$	$50^{\circ}C$
[bmim][Tf_2N]	5.9 ± 1.3	7.5 ± 0.7	7.8 ± 1.0	8.5 ± 1.9	9.0 ± 1.7	10.3 ± 2.5
[pmmim][Tf_2N]	4.0 ± 0.8	4.5 ± 0.5	5.6 ± 0.6	5.8 ± 0.4	7.9 ± 1.2	8.4 ± 2.4
[bmpy][Tf_2N]	4.3 ± 0.5	5.1 ± 0.6	5.7 ± 0.7	6.0 ± 1.0	6.9 ± 1.5	8.2 ± 1.2
[Perfluoro-hmim][Tf_2N]*	2.9 ± 0.2	3.7 ± 0.4	3.8 ± 0.1	4.4 ± 0.8	5.2 ± 0.5	6.4 ± 0.6
[bmim][BF_4]	3.4 ± 0.9	3.6 ± 0.9	3.9 ± 0.2	4.1 ± 0.3	4.3 ± 0.4	4.6 ± 1.5