

## 四丁基季磷羧酸盐离子液体的物理化学性质与 CO<sub>2</sub> 溶解度

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## Physicochemical Properties and CO<sub>2</sub> Solubility of Tetrabutylphosphonium Carboxylate Ionic Liquids

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**Table S1** Experimental densities for [P<sub>4444</sub>][CA] ILs as a function of temperature

<i>T</i> /K	$\rho$ /(g cm <sup>-3</sup> )			
	[P <sub>4444</sub> ][For]	[P <sub>4444</sub> ][Ace]	[P <sub>4444</sub> ][Prop]	[P <sub>4444</sub> ][Buty]
293.15	0.94011	0.94103	0.93182	0.93678
298.15	0.93713	0.93792	0.92869	0.93366
303.15	0.93406	0.93480	0.92555	0.93051
308.15	0.93101	0.93167	0.92239	0.92734
313.15	0.92794	0.92853	0.91921	0.92416
318.15	0.92478	0.92538	0.91603	0.92097
323.15	0.92179	0.92224	0.91285	0.91779
328.15	0.91872	0.91909	0.90967	0.91461
333.15	0.91564	0.91595	0.90649	0.91142
338.15	0.91257	0.91280	0.90331	0.90824
343.15	0.90949	0.90966	0.90014	0.90507
348.15	0.90633	0.90652	0.89698	0.90189
353.15	0.90322	0.90341	0.89381	0.89872

<sup>a</sup>standard uncertainties *u* are  $u(T) = 0.05$  K,  $u(p) = 10$  kPa,

and  $u_r(\rho) = 3.16 \cdot 10^{-5}$  g cm<sup>-3</sup>.

**Table S2 Experimental dynamic viscosities for [P<sub>4444</sub>][CA] ILs as a function of temperature**

<i>T</i> /K	$\eta$ /(mPa s)			
	[P <sub>4444</sub> ][For]	[P <sub>4444</sub> ] [Ace]	[P <sub>4444</sub> ] [Prop]	[P <sub>4444</sub> ] [Buty]
298.15	459.6	267.0	245.6	43.2
303.15	316.3	188.6	162.1	32.7
308.15	224.5	140.7	129.5	24.6
313.15	160.7	109.1	95.8	18.6
318.15	116.0	81.7	70.8	14.0
323.15	86.5	61.3	53.3	10.6
328.15	65.7	50.2	42.2	8.41
333.15	50.5	40.6	32.8	6.48
338.15	39.9	32.4	26.1	5.28
343.15	32.2	28.6	21.4	4.30
348.15	26.1	22.2	17.6	3.56

<sup>a</sup>Standard uncertainties  $u$  are  $u(T) = 0.05$  K,  $u(p) = 10$  kPa, and the relative standard uncertainty for viscosity  $u_r(\eta) = 3.16 \cdot 10^{-2}$  mPa s

**Table S3** Experimental refractive indices for [P<sub>4444</sub>][CA] ILs as a function of temperature

<i>T</i> /K	<i>n<sub>D</sub></i>			
	[P <sub>4444</sub> ][For]	[P <sub>4444</sub> ][Ace]	[P <sub>4444</sub> ][Prop]	[P <sub>4444</sub> ][Buty]
298.15	1.4878	1.4844	1.4825	1.4781
303.15	1.4860	1.4832	1.4815	1.4767
308.15	1.4846	1.4820	1.4799	1.4754
313.15	1.4834	1.4806	1.4786	1.4740
318.15	1.4820	1.4790	1.4772	1.4725
323.15	1.4804	1.4775	1.4755	1.4710
328.15	1.4790	1.4760	1.4741	1.4692
333.15	1.4776	1.4745	1.4725	1.4680
338.15	1.4763	1.4728	1.4710	1.4662
343.15	1.4750	1.4710	1.4694	1.4649

<sup>a</sup>Standard uncertainties *u* are  $u(T) = 0.05$  K,  $u(p) = 10$  kPa, and  $u_r(n_D) = 3.16 \cdot 10^{-4}$ .

**Table S4** Experimental conductivity for [P<sub>4444</sub>][CA] ILs as a function of temperature

<i>T</i> /K	$\sigma/(\mu\text{s cm}^{-1})$			
	[P <sub>4444</sub> ]For]	[P <sub>4444</sub> ] [Ace]	[P <sub>4444</sub> ] [Prop]	[P <sub>4444</sub> ] [Buty]
298.15	74.1	16.03	186.4	156.5
303.15	98.2	27.8	281	224
308.15	126.2	57.0	410	302
313.15	159.6	211	573	398
318.15	198.7	567	752	515
323.15	259	768	1024	655
328.15	323	975	1277	823
333.15	405	1218	1566	1020
338.15	501	1503	1881	1249
343.15	609	1826	2280	1506

<sup>a</sup>Standard uncertainties  $u$  are  $u(T) = 0.05$  K,  $u(p) = 10$  kPa, and  $u_r(\sigma) = 0.316\mu\text{s cm}^{-1}$ .