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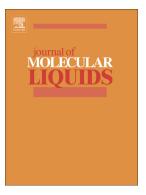
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## **Estimating Density of Ionic Liquids**

#### **Under Very High Pressure**

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Equation of state according to the Carnahan-Starling-van der Waals model has based on the anions tetrafluoborate, [BF<sub>4</sub>], proposed for ionic liquids been hexafluorophosphate,  $[PF_6]$ , and bis(trifluoromethanesufonyl)imide,  $[NTf_2]$ , available volumetric data within the MPa range of pressure. Then, the equation of state is used to estimate density in the GPa range of pressure. The hard sphere part of the equation considered a binary mixture of cation and anion spheres whose diameters exhibit a satisfactory degree of transferability among different systems with a common ion. It is shown that pressure induced vibrational frequency shift,  $\Delta v$ , of the characteristic Raman band of the stretching mode of [BF<sub>4</sub>], [PF<sub>6</sub>], and [NTf<sub>2</sub>] collapses into a master curve when  $\Delta v$  is plotted as a function of reduced density for each group of ionic liquids. Thus, Raman spectroscopy provides a validation test of the high-pressure extrapolation of the equation of state for ionic liquids.

Keywords: ionic liquid, density, high pressure, Raman.

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