Acoustic Method as a Tool for Searching New Applications of Ionic Liquids

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The design of industrial processes and the evaluation of applications for new products can only be achieved if their exact physicochemical properties are known. For the rational consideration of ionic liquids (ILs) as working fluids such as heat-transfer or hydraulic fluids on a larger or industrial scale, knowledge of the physicochemical properties of these fluids, both under ambient conditions and under high pressure, is necessary. [1,2] The high-pressure data help develop technologies that require the exposure of working liquids to changing pressure. In that context, we have investigated the speed of sound, density, isobaric and isochoric heat capacities, isentropic and isothermal compressibility coefficients, and isobaric thermal expansion coefficient as a function of pressure and temperature. The $p\rho T$, pC_pT data, and derived properties were obtained using an acoustic method. This alternative to direct methods is regarded as a precise tool for investigating the thermodynamic properties of compressed liquids. [1] The $p\rho T$ data obtained from the experimental speed of sound are considered to be the most reliable because the speed of sound can be measured accurately over a wide range of temperature and pressure values.

In this talk, the usefulness of ILs as heat-transfer media and hydraulic fluids will be analyzed and discussed in comparison with commercial working fluids. The discussion will include the above mentioned properties along with cytotoxicity, surface tension, and wettability.

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