

Thermophysical Properties of Ionic Liquids: Do We Know How to Measure them Accurately?

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Low temperature ionic liquids (LTIL's) are innovative fluids for chemical and materials processing, and the recent explosion on their measurement, molecular interpretations and property prediction, allied to the first industrial processes that start to use them as environmentally friendly solvents and reaction fluids, raises a very important point to all the scientific and industrial community, for those that have been involved in the measurement of thermophysical properties of liquids. Do we know enough about the molecular constitution and properties of these fluids, to measure correctly their properties? And if we think we know, which types of care have we to take a priori? There are several characteristics that can affect the measurement of ionic liquids that will be analyzed in this talk - Most of the properties, namely thermophysical properties like viscosity and thermal conductivity, have been measured using other liquids approach. People usually have forgotten about the structure and properties of ionic liquids and their impact in methods of measurement (sample preparation and handling, mathematical modeling, chemical reactivity), they have low to high viscosity, as the ions are not mutually independent, for most of the cases, and can form aggregates, they are electrically conducting, cations and anions have completely different sizes, the reaction or with atmospheric water or its solution in IL's is possible, their heat capacity per unit volume is rather high. The use of available instrumentation, without a careful consideration of ionic liquid properties, can therefore constitute a serious bad contribution to data bases and process designers [1,2]. It is the purpose of this talk to analyze the main problems in the measurement of thermophysical properties of RTIL's (viscosity, thermal conductivity, binary diffusion, electrical conductivity, electrical permittivity), calling the attention to the uses and misuses of traditional equipment, with or without handling care. Information will also be given about the newly created Ionic Liquids Property Awareness group of IATP and their objectives.

[1] V. M. B. Nunes, M. J. V. Lourenço, F. J. V. Santos, M. M. S. Matos Lopes and C. A. Nieto de Castro, "Accurate Measurements of Physico-Chemical Properties on Ionic Liquids and Molten Salts", in *Ionic Liquids and Molten Salts: Never the Twain*", Eds. K. E. Seddon and M. Gaune-Escard, John Wiley (2009), in press. ISBN: 978-0-471-77392-4

[2] Nieto de Castro, C.A., Santos, F.J.V., *Chimica Oggi/Chemistry Today*, 25(6), 20-23 (2007)