Report on IACT/IUPAC Project: Thermodynamics of Ionic Liquids, Ionic Liquid Mixtures, and the Development of Standardized Systems

K.N. Marsh[C, S]
Department of Chemical and Process Engineering, University of Canterbury, Christchurch, New Zealand
ken.marsh@canterbury.ac.nz

The aim of this International Association of Chemical Thermodynamics /International Union of Pure and Applied Chemistry project was to initiate systematic studies on the thermodynamic and thermophysical properties of Ionic Liquids (IL) in order to establish reference quality data for both IL's and IL liquid mixtures. There has been much scatter in the literature data for ionic liquids and their mixtures. The techniques developed for measurements on these standard reference systems should serve as a guide for other researchers in establishing reliable operating procedures and handling techniques with these fluids. The project committee members selected 1-hexyl-3-methylimidazolium bistriflate amide $(CF_3SO_2)_2N$ as the reference material and a stock was prepared and purified samples of known water content were distributed to the participants. Measurements made on the pure fluid include: heat capacity, viscosity, density, thermal conductivity, electrical conductivity, speed of sound, relative permittivity, TGA (in nitrogen and air), DSC, and melting point. Mixture properties include: gas solubility (low, medium and high solubility gases including supercritical fluids), liquid-liquid equilibria, vapor-liquid equilibria, infinite dilution activity coefficients, enthalpy of dilution, speed of sound, density and excess volumes. A summary of the measurements undertaken and the outcomes of the project will be presented.