INTERACTION PARAMETERS FROM VISCOSITY AND POLARITY OF THE IONIC LIQUID SOLUTIONS: A MODEL STUDY

S.K. Shukla and A. Kumar*

National Chemical Laboratory, Pune, India

*Corresponding author: a.kumar@ncl.res.in

Abstract:

A precise knowledge of viscosity and polarity of ionic liquids and their solutions in different solvents is essential in broadening their applications to absorption refrigeration processes. Viscosity of these solutions can be expressed in the form of certain ion-solvent interaction parameters, which indicate the nature of both ionic liquids and the solvent.

The need of a solvent for a highly viscous ionic liquid has been identified and quantified. An exponential decrease in viscosity of ionic liquids upon addition of a co-solvent is a common observation in all the solutions. This indicates that the structural changes in ionic liquids can be described by a common and single empirical or semi-empirical equation. There is a clear indication that a strong non-ideality by mixing an ionic liquid and a molecular co-solvent takes place. This is cumbersome to treat as the shape of the plot for each system is different. In order to make an effective solution of an ionic liquid for practical use, the ion-solvent interaction parameters originating from of the polarity of the media are equally potent and are quantified.

A combined approach to make an effective ionic liquid solution for the purpose of refrigeration is proposed. Two types of non-idealities were witnessed for polarity patterns. However, it is possible to analyse the polarity of these highly non-ideal solutions with the help of a preferential salvation theory. The polarity of such systems can be analysed by this theory to 1%.