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Ionanofluids, ionic liquids containing dispersed nanoparticles, show fascinating thermophysical and electrochemical properties.[1] In the last decade, some research work reported on the study of thermophysical properties of multi wall carbon nanotubes (MWCNT) based ionanofluids.[2-5] These works showed that, by adding well defined nanoparticles into ionic liquids, it is possible to tune or/and enhance their thermophysical properties and make them more suitable for electrical and thermal energy storage, and heat transfer applications.[2]

Ionanofluids samples have been prepared by adding 1% wt. MWCNT into a series of 1alkyl-3-methylimidazolium bis(trifluoromethyl)sulfonyl imide ionic liquids $[C_n mim][Tf_2N]$ (here n = 2, 4, 6, 8, 10 and 12) to find if the heat capacity of the resulting ionanofluids will be increased or decreased with respect to the original pure ionic liquids. To prepare the samples of ionanofluids, mixing of ionic liquids $[C_n mim][Tf_2N]$ and MWCNTs was performed at 220 rpm, 1 mbar pressure and 50 °C temperature for two hours on the Rotavapor R-300. A properly mixed solution was submerged for up to an hour for ultrasonic bath where it converted to viscous fluid or gel[2].

Nevertheless, the major missing topic in the literature was the study of dispersion stability of the ionanofluids. The stability of the ionanofluids is a basic but fundamental requirement to consider them as alternative energy storage materials. To the best of our knowledge for the very first time, the study was conducted on factors affecting the stability of the ionanofluids samples like; temperature, the concentration of nanoparticles, the size of a cation of ionic liquid and, aging over a long period of time. Moreover, the change in isobaric heat capacity was also measured for aged samples after long period of time (20 months) to study the variation in heat capacity due to aging.

Measurements of isobaric heat capacity were carried out as a function of temperature in range of 20 °C to 70 °C for base ionic liquids $[C_n mim][Tf_2N]$ and ionanofluids $[C_n mim][Tf_2N]$ dispersed with

MWCNT using a μDSC 3 Evo Microcalorimeter manufactured by Setaram. The measured isobaric heat capacity data of new and aged ionanofluids samples were compared to that of the pure ionic liquid to study the change in isobaric heat capacity. Minor changes in isobaric heat capacity were noted in the studied temperature range for new and aged ionanofluid samples. Furthermore, these experimental isobaric heat capacity data have been assessed by nonstatistical methods of data analysis based on mathematical gnostics (MG). Based on the thermodynamics of data and on the theory of measurement, mathematical gnostics is a novel approach towards data uncertainty.[7] MG marginal analysis was used to evaluate the interval of typical data and the tolerance interval for each measured data point. Moreover, a robust linear regression along a gnostic influence function was used to find the best curve fit for the measured data.

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