Determination of C_{60}-Thn-Tol Nanofluid Thermodiffusion Coefficient by the Conventional Thermogravitational Technique

Ane Errarte [S], Maialen Aginagalde and M. Mounir Bou-Ali [C]
Mechanical and Manufacturing Department, Mondragon Goi Eskola Politeknikoa, Arrasate, Gipuzkoa, Spain
mbouali@mondragon.edu

Over the last years, the interest of thermodiffusion phenomenon has considerably increased due to the several fields where it plays a key role. Therefore, thermodiffusion has been analysed in several types of systems such as gases, isotopes, liquid mixtures or polymer based mixtures. This work shows on ground measured novel data regarding the nanofluid mixture C_{60}-THN-Tol (0.0007-0.6000-0.3993) studied under the frame of DCMIX4 project, which was on board the ISS in the beginning of 2019. For these measurements, the conventional thermogravitational technique was used. Measurements were performed at 20 °C, 25 °C, 30 °C and 35 °C.

The thermogravitational technique allows determining the thermodiffusion coefficient analysing the variation of the concentration with the height of the column, together with some thermophysical properties. As the theory of the thermogravitational column allows relating the stationary separation to the thermodiffusion coefficient, when the mixtures reach the stationary state, five samples are extracted from different heights points. Then, their density and refractive index are measured and concentration of each species along the height of the gap is determined. Finally, knowing the density, the thermal expansion coefficient, and the dynamic viscosity of the mixture, the thermodiffusion coefficient of each component is calculated.

First results show that the thermodiffusion coefficient of tetralin increases with temperature. The opposite happens with toluene, and in the case of C_{60}, the coefficient is lower and shows small dependency on temperature.