

## **Dynamic Shadowgraphy Measurements of the Diffusion and Soret Coefficients in Triethylene Glycol - Water Binary Mixtures**

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Within the DCMIX (Diffusion Coefficients measurements in ternary MIXtures) project carried out by the European Space Agency (ESA), the transport properties of a series of ternary mixtures have been investigated on-board the International Space Station. The third campaign of the DCMIX project (DCMIX3) involves ternary mixtures of water/ethanol/triethylene glycol (TEG), where 6 different compositions including a binary were investigated at mean temperature of 25°C and 30°C. In order to predict the limit behaviours of the ternaries, previous knowledge of the transport coefficients of the associated binaries is required. Most of the measurements reported in literature on these systems were made at 25 °C. An extension of the database to other temperatures was necessary. The current work focuses on the measurement of the mass diffusion and Soret coefficients of different TEG and water binary mixtures by means of dynamic shadowgraphy. We make use of a thermodiffusion cell, where the sample is subjected to a vertical temperature gradient, and of a free-diffusion cell where two separate solution layers are put into contact creating an initial step concentration gradient at uniform temperature. The observation of the non-equilibrium density fluctuations is performed in the direction parallel to the temperature and concentration gradients. We performed measurements at 30, 50 and 70 wt% of TEG mean concentrations. For each value of the mean concentration, we carried out 3 thermodiffusion experiments by imposing a temperature difference of 20 °C, at average temperatures of 20, 25 and 30 °C; and 3 free-diffusion experiments in isothermal conditions at the same three mean temperatures. The mass diffusion and Soret coefficients were obtained from thermodiffusion experiments, and the mass diffusion coefficients from the free-diffusion experiments. Our measurements at 25 °C are in good agreement with existing data.