

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Science Results from Ground Based Research (4)

Author: Prof. Valentina Shevtsova
Université Libre de Bruxelles, Belgium

Dr. Aliaksandr Mialdun
University of Brussels, Belgium
Prof. Alexander Nepomnyashchy
Israel

DIFFUSION AND SORET IN TERNARY MIXTURES – PREPARATION OF DCMIX2 EXPERIMENT
ON THE ISS.**Abstract**

The liquids appearing in nature and industrial applications are essentially multicomponent. In mixtures, the diffusive mass transport of a given component is induced not only by its compositional gradient (main or principal diffusion), but also by the compositional gradients of the other components (cross-diffusion) and the temperature gradient (thermodiffusion, also called Soret effect). Currently, the investigation of the kinetic properties of liquid ternary mixtures obviously becomes a hot topic in the chemical physics, because only now the tools needed for carrying out reliable experimental studies in that field become available. The experimental studies of the thermodiffusion in ternary mixtures are in an early stage and the first results display that the Soret coefficients measured by different technique on the ground differ not only in values but even in signs. Therefore the need in trustworthy results is obvious.

European scientists expect to obtain bullet-proof benchmark results on the ISS for validation of ground experiments. Instrument SODI on the ISS is equipped with two-wave length diagnostic which enables to measure Soret and diffusion coefficients. The success of this technique is feasible only for definite pairs of light wavelength and for definite compositions of mixtures, because the accuracy of the methods can be strongly diminished if the matrices of contrast factors are ill-conditioned [1]. Possibility of alternative one wave approach is under consideration. Our presentation will be focused on this issue on the basis of an analytical solution and experimental results from laboratory.

References

1. V. Shevtsova and V. Sechenyh and A. Nepomnyashchy and J. C. Legros, Analysis of the application of optical two wavelength techniques to measurement of the Soret coefficients in ternary mixtures, Philos. Mag., 91, pp.3498-3518 (2011)