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Microgravity Sciences Onboard the International Space Station and Beyond - Part 2 (7)

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SORET AND DIFFUSION COEFFICIENTS MEASUREMENT OF TERNARY MIXTURES OF  
DODECANE, ISOBUTYLBENZENE AND 1,2,3,4-TETRAHYDRONAPHTHALENE ON-BOARD  
INTERNATIONAL SPACE STATION

**Abstract**

From the energy sector point of view and in particular in hydrocarbon reservoirs, accurate simulation of the various forms of mass fluxes is important in oil exploration and in optimal oil recovery. Since diffusion and thermodiffusion coefficients of binary hydrocarbon mixtures have been measured and analyzed in detail; here, we experimentally analyzed and reported the separation in a ternary hydrocarbon mixture of tetrahydronaphthalene, isobutylbenzene, and dodecane due to thermal gradient and eventually the Soret and diffusion coefficients of this mixture at five different compositions are measured. The thermodiffusion experiment was conducted by means of Mach-Zehnder Interferometer (MZI) using two wavelengths and in a low gravity environment on-board the International Space Station (ISS). In addition, we investigated the reliability and the repeatability of the MZI experiment to study thermodiffusion for ternary mixtures. Finally, according to transient behavior of the separation of the components, the mass diffusion in various compositions of this mixture has been compared and the effect of mean temperature on Soret effect is studied.