

High Precision Measurements of Thermal Diffusivity for Binary Liquid Mixtures by Using the Photoacoustic Phase in the Transmission Mode

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The analytical solution for the heat diffusion problem for a three layered system in a photothermal model, in transmission, is used to provide of a high precision Photoacoustic methodology for the measurement of the thermal diffusivity for liquids. This methodology consists of the direct measurement of the thermal-wave-length for the thermal wave inside the liquid for a fixed modulation frequency. The thermal diffusivity for mixtures of methanol and ethanol in distilled water was measured by using this photoacoustic methodology in the range of low and large alcohol concentrations and, based on the corresponding results, some empirical models are provided to take into account the behavior of this thermal property as a function of the concentration of alcohol in the solution.