FINE STRUCTURE OF RAYLEIGH LINE IN AQUEOUS SOLUTION OF NON-ELECTROLYTE

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Spectrum of a fine structure of Rayleigh line in condensed matters, including aqueous solutions of non-electrolytes, gives a possibility to determine the characteristics of high-frequency relaxation processes exerting an influence on a shape and frequency of spectral contours of a triplet. Some authors [a] supposed the existence of some pre-critical states in aqueous solutions of non-electrolytes, so-called unattainable critical points connected with formation of hydrogen bonds of a type, depending on concentration of a solution. Spectral study of spontaneous light scattering, when the intensity of exciting light is rather low, is ideal for investigation of critical phenomena in such systems, since the method does not provide any significant perturbations in the system during the process of experiment. We carried out temperature investigation of a width and shift of fine structure components in tert-butyl alcohol - water solution at different angles of scattered light. That allowed us to calculate the values of the velocity and absorption of high-frequency sound over the frequency range from 1.8 HHz to 9 HHz. The analysis of experimental results, as well as data obtained by other physical methods, allowed us to come to conclusion that, in a certain range of concentration of the solution, change in temperature leads to the transition from the state of solution with unattainable lower critical point to that with unattainable upper critical point.

[a] L. Lanshina, M. Rodnikova, and I. Chaban, J. Phys. Chem. 66, 204 (1992).