Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Using DLS Spectroscopy and Optical Probe Diffusion to examine structure of Brij Micelles KAREN WILSON, MIKE LEKAN, KIRIL STRELETZKY, Cleveland State University — We studied properties of Brij-35 surfactant micelles in solution using Dynamic Light Scattering (DLS) Spectroscopy and Optical Probe Diffusion method. Aqueous solutions of Brij-35 with concentrations ranging from 2 to 100g/L were prepared, both with and without polystyrene latex probes of diameters 24, 50, 186, 282 and 792nm. Solutions were studied at four temperatures of 10, 25, 40 and 70^oC with DLS to obtain micelle and probe diffusion coefficients (D_m, D_p). Using both diffusion coefficients we deduced micelle radius (a_m), micelle water content (δ), and number of surfactant molecules per micelle (N) using two different models. First, hard sphere model of micelles/probe interaction was used to analyze the data by two methods, after a_m was obtained from intercept of D_m(c). The first method uses the slope of D_m(c) and size of probes to determine N and δ. The second method uses the linear least-squares fit of D_p(c) for different probe sizes to determine N and δ. Both methods reveal that with increase in solution temperature a_m increases by 10%, N increases and δ decreases by a factor of 2. The second model treats micelles as core-shell particles with corona radius (a_c). This model used two different approaches based on linear least-squares fits of D_m(c) and D_p(c). We found $a_m$to be 4-4.5nm and a_c-a_m to be 1nm without relying on Stokes-Einstein equation. Results for N and δg were also consistent.

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Date submitted: 27 Nov 2007 Electronic form version 1.4