ABSTRACT

Extensive research on rheological parameters of of crude oil-water interface upon dilution using vibrational spectroscopy have been studied. The interfacial viscosity and elasticity of water-oil emulsion was considered and absorption spectra infrared region was found to consist of overtones and combinations of the fundamental molecular vibration bands attributed to stretches of hydrogen in C-H, N-H, S-H, and O-H bonds. The specific dilatational viscoelastic properties of crude oil- water interfaces upon dilution have shown remarkable outcomes. The research focuses on the effect of altering aromaticity of the solvent and the concentration of the crude oilon the viscoelastic outcome of the crude oil-water interface. A more useful dynamic interfacial tension experiments using pendant drop, asphaltene aggregation state experiments using near-infrared spectroscopy and emulsion stability experiments using bottle test, have become a veritable tool in the studies of interfacial rheological parameters in order to understand the mechanisms of film formation and emulsion stabilization. It was also established that, at a perturbation frequency w = 0.1Hz, the equilibrium storage and loss moduli passed through well-resolved maxima as a function of bulk concentration, and kinetics of film formation process. The obviously low viscoelasticity of the interfaces in systems with high bulk concentration was likely caused by high diffusion flux of interfacially active components from bulk and was not wholely attributed to interactions within the absorbed layers.

Keywords: Kinetics of film formation perturbation frequency, dilution, interfacial rheological parameters, emulsion stability, viscoelasticity, asphaltene aggregation.