

Study of highly concentrated olive oil-in-water emulsions stabilized by palm-based nonionic surfactant

ABSTRACT

Rheological properties of highly concentrated oil-in-water (O/W) emulsions (HCEs), formed by mixing palm-based nonionic surfactant, C12E6 (HLB = 11.7, CMC = 25 M), water and olive oil volume fraction $\times 78\text{vol}\%$ were investigated. Samples with lower oil volume fraction ($<85\%$) and surfactant concentration ($<8\%$) exhibited polydispersity of broader droplet size distribution (DSD). In contrast, samples with higher oil volume fraction ($>85\%$) and surfactant concentration ($>8\%$) displayed monodispersity of narrower DSD. The average droplet size decreased with increasing oil volume fraction and surfactant concentration. All frequency sweep experiments exhibited higher G' than G'' , representing the predominantly elastic nature of HCEs. The crossover of the ascendant and descendant flow curves of HCEs with higher oil volume fraction ($>85\%$) and surfactant concentration ($>8\%$) implied a structural build-up that could give rise to very high stability. The high stability was confirmed through accelerated stability test at 40°C for three months.

Keyword: Palm-based nonionic surfactant; Highly concentrated O/W emulsion; Rheology