

Stabilisation of emulsified Agarwood oil in an aqueous system using non-ionic surfactant

ABSTRACT

Owing to the annually increasing market value of pure agarwood oil, the extracted agarwood oil from *Aquilaria malaccensis* was emulsified in an aqueous solution using non-ionic surfactant (Tween 80). The surfactant concentration of 0.0167% was determined as the critical micelle concentration (CMC) with an interfacial tension value of 0.014 mNm⁻¹. The adsorption of surfactant at the oil/water interface at the CMC value, however, reduced the zeta potential of the emulsified oil from -45 to -43 mV, and increased its size from 85 to 89 nm. Outside of the CMC value, the emulsified oil droplets tended to coalesce, owing to insufficient coverage of the surfactant at oil/water interface and Ostwald ripening. The droplet size distribution and zeta potential value of the emulsified oil droplets produced at the CMC were the most stable over a month of storage. No significant changes in the emulsified droplet size occurred when the pH conditions varied from pH 3 to 10. The emulsified droplets images obtained from transmission electron microscopy analysis showed a reduction in the layer thickness of the surfactant from 30 to 10 nm in acidic condition and 30 to 19 nm in alkaline condition. The agarwood oil emulsification at CMC value enhance the stability of chemically unstable compounds from degradation.

Keyword : Agarwood oil; Nanoemulsion; Critical micelle concentration (CMC); Stability; Surfactant layer thickness.