

Abstract

Methyl ester sulfonate (MES) anionic surfactants made from natural resources are of particular interest as sustainable surfactants. They offer good physicochemical properties for applications as detergents and emulsifiers. The liquid crystal structures of MES surfactants synthesized in a previous work were determined by polarizing optical microscopy (POM) and small-angle X-ray scattering (SAXS). The emulsifying activity for each surfactant was also measured, and the stability of emulsions was estimated and compared to that induced by sodium dodecyl sulfate (SDS). The POM micrographs showed the presence of birefringent textures. Several factors, including temperature and hydration, influenced the stability of the phases and their structure. SAXS confirmed the structure of the phases formed by dry and hydrated ϕ -MES surfactants at 25 °C, giving the position of peaks corresponding to the ratio 1:2:3 and revealing the phase transitions of lamellar to double lamellar or the reverse. Also, the Bragg distance (d) decreased with an increase in chain length from 13 to 17 carbon atoms and an increase in the area per molecule of surfactant. The geometric packing parameters were also determined, and suggest that surfactants are tilted. The stability of surfactant emulsions is around 60%, which is comparable to that of SDS. The micrographs show that the emulsions formed are O/W, and an increase in chain length gives rise to a decrease in the size of the emulsion droplets. These results are confirmed by the values of hydrophilic-lipophilic balance (HLB) which reveals the hydrophilic nature of these surfactants.