67c Micellar Networks in Surfactant Solutions

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Alkyl monoglucosides form micellar networks in water over a range of compositions and conditions, and presence and nature of these networks is directly related to the presence of miscibility gaps in the phase diagram. The micelles can be directly observed by cryogenic transmission electron microscopy (cryo-TEM) and quantified by small-angle neutron scattering measurements. The temperature dependence of the phase separation observed in the binary glucoside -water mixture is explained in terms of the average curvature of the surfactant aggregate, and the phase separation mechanism interpreted in terms of a micellar network saturated in junctions. As the phase boundary is approached, junctions become energetically more favorable than end-caps, and eventually the network becomes saturated. The miscibility gap can be closed either by the addition of an ethoxylated alcohol surfactant under conditions that promote the formation of micellar end caps, or by addition of an ionic surfactant that limits the formation of junctions.