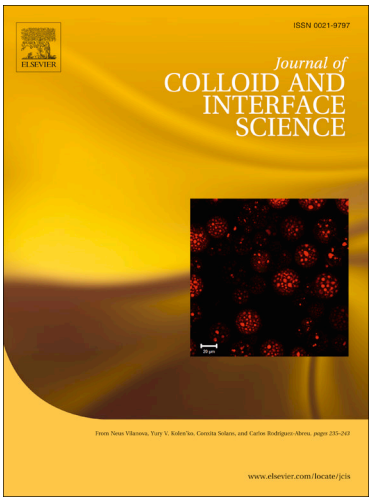


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# Nuclear magnetic resonance and small-angle X-ray scattering studies of mixed sodium dodecyl sulfate and N,N-dimethyldodecylamine N-oxide aqueous systems performed at low temperatures

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## Abstract

Surfactant crystallisation is important in many applications in the food, consumer product and medical sectors. However, these processes are not well understood. In particular, surfactant crystallisation can be detrimental to the stability of detergent formulations, such as dish liquid products, resulting in a turbid solution that fails appearance criteria. With the rising global demand for detergent products, understanding the factors that influence formulation stability is of increasing importance. To enable industry to build more robust formulations, it is important to understand the underlying chemistry of the crystallisation process. Here, a model system containing anionic (sodium dodecyl sulfate, SDS) and amphoteric (N,N-dimethyldodecylamine N-oxide, DDAO) surfactants, at concentrations typical of dish liquid products, is studied. Variable temperature $^{1}$H nuclear magnetic resonance (NMR) spectroscopy and small-angle X-ray scattering (SAXS) is used to probe the compositional and structural properties of this system, as a function of pH. On cooling, at pH 9, a mixture of hydrated crystals, predominately composed of SDS, and micelles containing both surfactants,