

## The effects of surfactant structure on micellar shape and size

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### Abstract

The structure of surfactant micelles (i.e. their shape and size) is known to be strongly dependent on surfactant molecular structure. However, the exact relationship between chain and head length and micellar structure remains unclear. In this work we have used small angle neutron scattering (SANS) to perform structural characterisation on two separate series of non-ionic alkyl ethoxylate surfactant micelles, C<sub>n</sub>E<sub>6</sub> and C<sub>12</sub>E<sub>m</sub>. It was found that the micellar core volume increased when either the tail length (n) was increased or the head length (m) was decreased. When plotted against hydrophile-lipophile balance (HLB) this observed trend was entirely consistent with previously reported findings that correlate HLB with micellar core volume. In parallel with the volume change, micelles tended to transform shape from oblate to prolate ellipsoid. The results clearly highlight the respective influences of the alkyl chain and ethoxylate group lengths on the shape and size of the micelles. This potentially has implications in predictive modelling of non-ionic surfactant systems and their application as encapsulating agents.

