

Alkylglycoside surfactants with oligomeric head-groups: investigation of self-aggregation and its implications for future applications

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The increased effort to preserve the environment has driven extensive research toward the identification of surfactants that are nontoxic, biodegradable, and synthesized from sustainable resources [1]. Alkylglycosides, which have a head-group consisting of one or several sugar moieties, promise to meet these demands. Alkylglycoside surfactants with functionalised oligomeric head group (>3 sugars) have recently proved possible to synthesize by enzymatic means [2,3]. This novel class of surfactants has been specifically designed to ensure biocompatibility and controlled biodegradability, and hence lend themselves to applications within the area of *in vivo* controlled release (e.g. food additives).

Our study focused on a surfactant comprising a long alkyl chain, 16 carbons, and a long glucose chain, 8 glucose units, which is referred to as C₁₆G₈. Since the functionalities and possible applications of C₁₆G₈ can compete with the widely used Polysorbate 80, we investigated thoroughly the self-aggregation mechanism. We characterised the system with several techniques, such as light scattering, both static (SLS) and dynamic (DLS), NMR, SAXS and SANS. The complementary use of neutrons and x-rays was crucial to determine the structure of the aggregates, since the contrast between the glucose chain and the alkyl chain differs when probed with x-rays and neutrons.

We will discuss the effect of temperature and concentration on the size and shape of the aggregates and, furthermore, the effect of different anomeric configurations [4]. The combination of these techniques allowed us to reveal the features of this novel sugar surfactant and build a fundamental knowledge required for identification and development of applications.

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