

Structure-Properties Relationship of Dimeric Surfactants from Butyl Glucosides

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Abstract: Carbohydrate containing dimeric surfactants were synthesized starting from D-glucose. Three different spacers were used to link the sugar moieties. The critical micelle concentration (CMC) for these new compounds was determined.

Introduction

Alkyl glucosides are found in nature as glycolipids, and are biosynthesized by micro-organisms using rhamnose, sophorose and trehalose as carbohydrate sources. Industrially they are prepared from fatty alcohols and carbohydrates. These compounds have surfactant properties when the alkyl chain contains at least 4 carbon atoms. Alkyl glucosides are replacing usual non ionic surfactants due to their biodegradability and to the absence of toxic effects.

Recently, a new class (type) of surfactants, named dimeric [1] or gemini [2] have been prepared. They have 2 hydrophobic chains, 2 hydrophilic groups, and a spacer (flexible or rigid) keeping away the two polar groups.

In this communication, we report on the synthesis of dimeric surfactants from butyl α -D-glucopyranoside, and we analyze their interfacial properties.

Experimental

Gemini surfactants were prepared by condensation between suitable protected butyl α -D-glucopyranoside and acyl dichlorides [3,4] (Fig. 1). The products were characterized by spectroscopic methods (NMR, IR., MS). Molecular formula were confirmed by elemental analysis. Critical micelle concentrations (CMC) of two compounds was determined by the maximum bubble pressure methods [5].

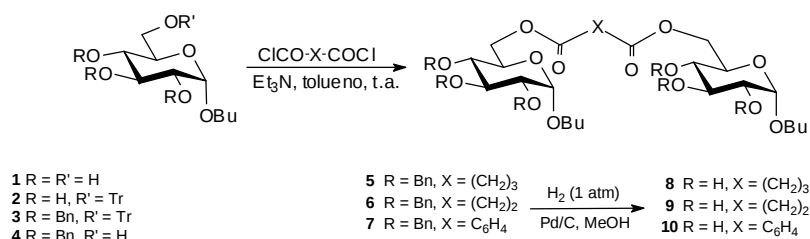


Figure 1.

Results and Discussion

CMC data showed an important (one order of magnitude) diminution of CMC of dimeric surfactants when compared to their monomeric counterpart.

On the other hand, differences in interfacial properties were observed varying the nature of the spacer and the position of linking, that can be explained from the conformation adopted by the surfactant molecule (Fig. 2).

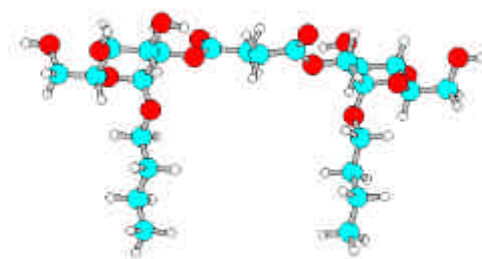


Figure 2. Optimized structure of 1,4-bis-[2-O-(*n*-butyl- α -D-glucopyranosid)] succinate calculated by AM1 method.

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References and Notes

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