Foam properties of sugar-based surfactants: a comparative study

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Foams are widely present in many fields of the industry: cosmetics, detergency, food products, or enhanced oil recovery. Since several years, environmental issues and use of eco-friendly products have been a major concern. Thus, there is a growing interest in developing sugar-based surfactants with well-controlled functional properties. Among them, foaming properties can be desired or undesired, depending on the end-use application.

However, many different foam generation processes exist and have been used to characterize surfactant foaming ability. In order to better compare the effect of structure variations on surfactant foaming properties, it is crucial to collect a large number of data using the same foaming technic and experimental procedure (A.Patist, et al, 2002. *Int.J.Cosmet.Sci.*, **2**, 45-51).

This work therefore aims at better understanding the mechanisms of foam formation and ageing of a series of commercial sugar-based surfactants bearing various hydrocarbon chain lengths (from 6 to 12 carbon) and polar head groups derived from glucose, maltose and galactose. The foam generation process used is by injecting a gas through a porous glass frit (Foamscan®, Teclis). Experimental parameters (surfactant concentration, disc porosity, gas flow rate, etc …) have been optimized to ensure the best discrimination of surfactant foaming properties. An example illustrating results obtained for a series of alkylglucoside and alkylmaltoside is presented in Figure 1.

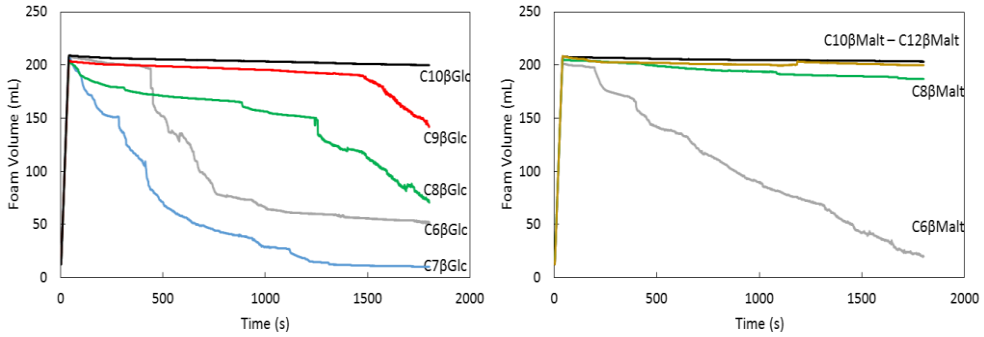

Figure 1. Influence of chain length on foam properties for (a) alkyl-β-Glucosides and (b) alkyl-β-Maltosides

Results show different effects of the alkyl chain length depending on the nature of the polar group. Interfacial properties of the surfactants have been studied in dynamic conditions (dynamic surface tension and surface viscoelasticity) as it plays a major role in foam ageing as evidenced from literature data (S.Tcholakova et al., 2011, *Langmuir*, **27,** 14807-14819; D.Georgieva, et al, 2009, *Soft Matter* **5,** 2063-2071.). Relationships and global trends will be presented to provide better knowledge of foam properties of sugar-based surfactants.

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