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Xylose Based Biosurfactants. Obtention and Physicochemical Properties

F Loulou *[1], Bidjou-Haiour[1]
[1] Université Badji-Mokhtar. Annaba 23000. Algeria
*Correspondent author email: bidjouch@yahoo.fr

ABSTRACT

Biosurfactants from sugars are considered as good emulsifiers. Surface properties of an homologous serie of products from xylose were determined such as hydrophilic-lipophilic balance, critical micelar concentration, foaming and emulsifying ability. Obtained surface tension values are between 25 $mN.m^{-1}$ for and 47,17 $mN.m^{-1}$. The surface parameters results revealed that the prepared compounds have a good surface activity. These bio-surfactants display good emulsifying and foaming abilities.

Keywords: Recovery Fibers VSF, Abaqus, Reinforced concrete Frame, CDP, Environment.

1. Introduction

Sugar fatty acid esters (SFAE) are known as non-ionic and non- toxic amphiphilic biosurfactants. Due to their diversity, biodegradability, and biocompatibility [1], they are very useful in several areas such as the food, cosmetic, and pharmaceutical industries [2]. Moreover, they have some interesting properties that make them green alternative products such as antimicrobial, antitumor and antifungal activities [3]. In addition to their biological activities, they are used for their surface-active properties such as foaming power and emulsifying ability [4]. 0n another hand, interactions between surfactants and for example drugs increases their bio-availability [5]. Surfactants are also compounds able to create self-assembled molecular clusters. We study here surface-tension and critical micellar concentration data for synthesized xylose bio-based surfactants from biomass. The obtained parameter values were discussed. Emulsifying and foaming properties were also estimated.

2. Experimental

The surface tension values were measured at 25˚C by the pendant drop method using the IT concept Tracker drop tensiometer and reported on Figure 1.

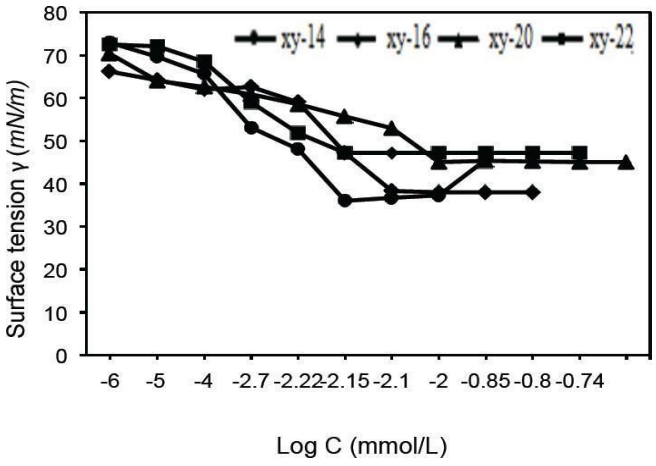

Figure 1: Surface tension measurements for xylose esters in water.

The critical micellar concentration (CMC) was calculated from the slope of the decrease in surface tension values with the increasing concentration of surface-active solutions in the plot of surface tension versus the log of the concentration (Fig.1).

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3. Results and Discussion

Surface tension measurement allows to establish a relationship between the obtained xylose surfactants and their surface-active properties. Surface tension (δ) and critical micellar concentration (CMC) were determined (Table I). The data in Table I shown that the surface tension values increase with increasing of the fatty acid chain length from 30 mN/m for xylose laurate to 47.17 mN/m for xylose behenate. These results could be explained by the steric hindrance due to the coiling of the hydrophobic chain, which leads to a hydrophobic interaction that is better known as stronger than the Van der Waals forces since the pioneering work of Kauzman [6].

Table 1: *Surfactant properties of xylose esters.*

Compound	*HLB*	*CMC (mmol/L)*	*δ (mN/m)*
1 (laurate)	10.65	0.15	30.0
2 (myristate)	9.82	0.028	37.78
3 (palmitate)	9.11	0.01	38
4 (stearate)	8.50	0.09	25.0
5 (arachidate)	7.96	0.008	45
6 (behenate)	7.49	0.007	47.17

4. Conclusions

Xylose derivatives biosurfactants were easily obtained from biomass (C12 and above) and characterized through analytical methods. Surface-active properties of xylose biosurfactants were investigated and the interfacial behaviors revealed their importance as promising candidates and safe nonionic surfactants in the food and detergency industries.

5. Acknowledgements

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