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Sugar-Based Biosurfactans as Emulsifier in Drug Design.

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Introduction :

Surfactants are widely used as emulsifiers in the pharmaceutical industry to stabilize formulations, improve drug solubility, and facilitate skin absorption. These molecules, with their hydrophilic and hydrophobic ends, help stabilize emulsions and disperse substances in an aqueous solution. Sugar fatty acid esters (SFAEs) are known as non-ionic and nontoxic amphiphilic biosurfactants. Due to their diversity, biodegradability, and biocompatibility [1] they are very useful in several areas such as food, cosmetic and pharmaceutical industries (As pharmaceutical excipient, solubilizing and emulsifying agents …) [2]. In addition, they are used for their surface-active properties such as foaming power, emulsifying ability, detergency effect, adhesion and stabilization [3]. They are widely applied in pharmaceutical productions to solubilize , stabilize drugs against degradation throughout their transport in biological systems owing to their biocompatibility and their self-assembly property [4].The interaction between surfacatant and drugs increases their bio-availability [5]. They can be synthesized by chemical or enzymatic pathway. Using renewables as raw materials makes the conversion processes fully ecologically friendly and the lipase-catalyzed synthesis also has the advantage that the product may be accepted as a natural product. Recently, the bio-catalysis of esterification by enzymes in organic solvents has become an important process for its sustainability.

In this study xylose was selected as starting material as hydrophilic head to produce non-ionic biosurfactants by enzymatic catalysis using fatty acids with various chain lengh.

Résultats :

Effect of the modification of the fatty acid tail length from C12 to C22 carbon units was investigated. The Results of esterification show a significant correlation between the activity of the lipase and the length chain of the used fatty acid was found. Figure **1** shows the time course of the esterification reaction. The obtained conversions varied from 22.5 % for lauric acid to 67.50 % for behenic acid.

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The measurement of the emulsifying ability of the products at 25 °C shows that emulsifying ability values of synthesized compounds are between 83.33% and 100%. Figure **2** shows that the chain length increases the emulsifying ability of the surfactants.

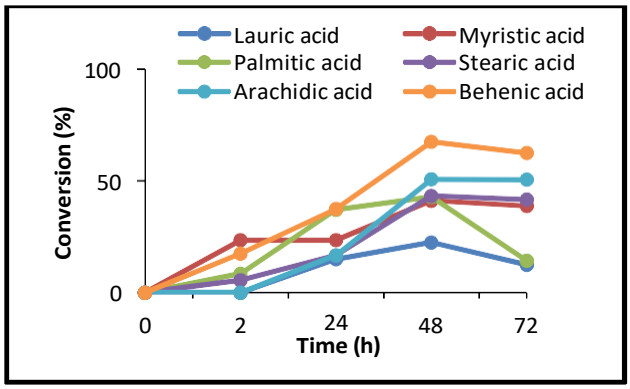

Figure 1. Reaction kinetics for xylose esters synthesis.

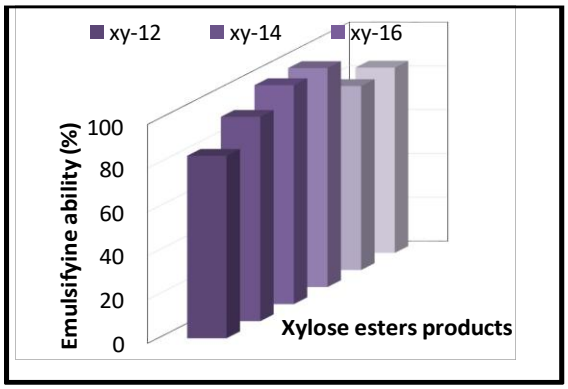

Figure 2. Emulsifying ability of xylose esters products.

Conclusion :

The highest conversion was obtained by using docosanoic acid as acylant agent (67.50 %). The emulsifying abilities of all esters exceeded 80%. The prepared compounds display a good emulsifying ability. They further can be used as emulsifier in food industries or as pharmaceutical excipient.

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