

ENZYMATIC SYNTHESIS OF SFAES USING THE COMMERCIAL IONIC LIQUID CYPHOS 104

Bioreactors, Biocatalysis, Separation Processes and Biosensors

PO - (747) - ENZYMATIc SYNTHESIS OF SFAES USING THE COMMERCIAL IONIC LIQUID CYPHOS 104

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Body

Sugar fatty acid esters (SFAEs) are compounds formed by a carbohydrate linked to one or more fatty acid (FA) chains. These molecules present interesting technological properties and are commonly used as biodegradable surfactants and emulsifiers in the food, pharmaceutical and cosmetics industries [1]. Recently, the synthesis of SFAEs using enzymes as biocatalysts proved to be a greener alternative.

The main problem associated with the synthesis of SFAEs is the different chemical nature of the substrates, which can significantly affect the effectiveness of the enzymatic synthesis and greatly compromise the yield of the process.

Lipases are quite stable biocatalysts and have been successfully used in traditional media and alternative media containing ionic liquids (ILs) [2,3]. ILs present an interesting strategy to overcome the process limitations since they generally increase enzyme stability and can be tailored to improve the solubility of a wide range of substrates. Moreover, ILs are non-volatile, non-flammable, chemically and thermally stable and biocompatible being greener alternatives to the hazardous and volatile organic solvents commonly applied [4].

In the present work, the enzymatic synthesis of SFAEs in the commercial IL CYPHOS 104 was followed and qualitatively evaluated by thin layer chromatography. The esterification between a disaccharide and vinyl laurate was performed by immobilized Lipase B from *Candida antarctica*, at 60 °C, using two agitation strategies (rotatory and orbital). The results showed that SFAEs were successfully biosynthesized in the IL CYPHOS 104 using a rotatory agitation.

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References

- [1] Gumel AM, Annuar MSM, Heidelberg T, Chisti Y. Lipase mediated synthesis of sugar fatty acid esters. *Process Biochem* 2011;46:2079–90. <https://doi.org/10.1016/j.procbio.2011.07.021>.
- [2] Ortiz C, Ferreira ML, Barbosa O, Dos Santos JCS, Rodrigues RC, Berenguer-Murcia Á, et al. Novozym 435: The “perfect” lipase immobilized biocatalyst? *Catal Sci Technol* 2019;9:2380–420. <https://doi.org/10.1039/c9cy00415g>.
- [3] Kar M, Tutusaus O, MacFarlane DR, Mohtadi R. Novel and versatile room temperature ionic liquids for energy storage. *Energy Environ Sci* 2019;12:566–71. <https://doi.org/10.1039/c8ee02437e>.
- [4] Zhao K-H, Cai Y-Z, Lin X-S, Xiong J, Halling PJ, Yang Z. Enzymatic Synthesis of Glucose-Based Fatty Acid Esters in Bisolvent Systems Containing Ionic Liquids or Deep Eutectic Solvents. *Molecules* 2016;21:1294. <https://doi.org/10.3390/molecules21101294>.

Palavras-chave : Ionic liquid, Lipase, Sugar fatty acid esters