

Enzymatic Modifications of Sugar in Supercritical Carbon Dioxide.

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Carbohydrates esters are non-ionic surfactants that have a wide range of commercial applications in cosmetic, food and pharmaceutical industry. They are produced from renewable and inexpensive raw materials, are biodegradable and non-toxic. Chemical synthesis of sugar esters is generally performed at a high temperature in the presence of an alkaline catalyst leading to a mixture of products. In this respect, the corresponding enzyme-catalyzed processes in non-conventional media are more selective. For this purpose, lipases are the most useful enzymes.[1] Moreover, supercritical carbon dioxide (SC-CO₂) constitutes an interesting alternative to the organic solvents used in the domain as it is considered to be environmentally friendlier and safer.[2] For example, its use reduces the contamination of the final products with residual solvents. This property is particularly valued in food, cosmetic and pharmaceutical industry.

Our work consists to carry out lipase catalyzed sugar modifications in SC-CO₂ and to compare the results with those obtained in organic solvents. The effect of these two different media on the enzyme stability and the yield will be described here. Moreover, the impact of various factors such as pressure, temperature, enzyme form (free or immobilized), use of co-solvent, on the course of the sugar esterification will be discussed.

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[1] P.Degn *et al.*, *Biotechnology Letters*, **1999**, 21, 275-280

[2] T.Matsuda *et al.*, *Current Organic Chemistry*, **2005**, 9, 299-315