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TOPIC(s) : Clean reactions

## Sustainable enzymatic synthesis of panthenyl monoesters in ionic liquids

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### PURPOSE OF THE ABSTRACT

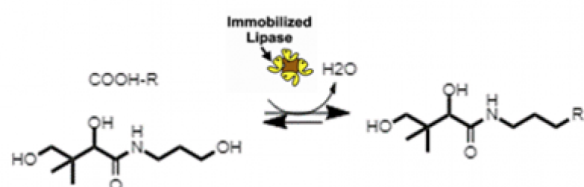
Panthenol (2,4-dihydroxy-N-(3-hidroxypropyl)-3,3-dimethylbutamide, o provitamin B5) and its derivatives (e.g. panthenyl triacetate) are compounds which present a great interest in the pharmaceutical and cosmetic industry due to their therapeutic properties and they are usually present in cosmetic products (e.g. hair conditioners, body cream, sun creams, etc.) and in pharmaceutical formulations because panthenol promotes wound healing. Panthenol esters are interesting compounds for the cosmetic industry because of its high ability to reside long time interacting with skin and hair.

Enzymatic catalysis is the most selective strategy for the synthesis of chemical compounds, being one of the pillars in the development of the Green Chemistry. In this context, it has been described a lot of applications in enzymatic catalysis for the synthesis of products with cosmetic and pharmaceutical interest.<sup>1,2</sup>

Nowadays, panthenyl esters are produced through chemist or enzymatic catalysis with carboxylic acids derivatives (e.g. acyl chlorides, etc.) in reaction media based on organic solvents. The enzymatic synthesis of esters by the esterification of a carboxylic acid with one alcohol (e.g. panthenol) is an easy, cheap and sustainable alternative against the classical organic synthetic protocol, where natural compounds (e.g. free fatty acids) can be used as substrates, and without the generation of undesirable products. This work shows a sustainable methodology for the enzymatic synthesis of panthenyl monoacyl esters by the esterification of carboxylic acid (e.g. lauric acid, myristic acid, palmitic acid or oleic acid) with panthenol catalyzed by *Candida antarctica* B lipase in ionic liquids (ILs) as reaction media. The high yield and selectivity in the developed process, together the full recovery and reuse of the ILs allowed the production of panthenyl monoacyl esters with direct application for the cosmetic industry. Besides, the appropriate design of the reaction media (e.g. substrate concentration, reaction temperature) leads in the production of different panthenyl monoesters with yield up to 80% independently of the carboxylic acid employed.

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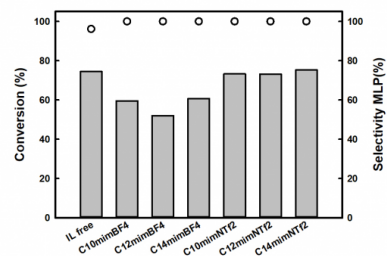
## FIGURES



### FIGURE 1

Figure 1. (A).

Scheme of the enzymatic synthesis of panthenyl monoacyl esters (PMEs) by the esterification of carboxylic acids with panthenol.



### FIGURE 2

Figure 1. (B).

Panthenyl monolaurate synthesis through esterification of lauric acid with panthenol in different reaction media.

## KEYWORDS

BIOCATALYSIS | IONIC LIQUIDS | GREEN CHEMISTRY | PANTHENYL ESTERS

## BIBLIOGRAPHY

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