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Environmental benefits of the green-chemistry based design of Pro-Xylane

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PURPOSE OF THE ABSTRACT

Pro-Xylane is a cosmetic ingredient used mainly as an anti-ageing agent in skin creams. Produced by Chimex, its chemical structure is derived from the xylose, a natural component of glycosaminoglycans and of hemicellulose.

Pro-Xylane is produced in a two-steps process: 1) The reaction of xylose and acetylacetone in water, then 2) the hydrogenation of the intermediate.

The first process developed in 2009 has then been redesign to lower its impacts, following the green chemistry principles, resulting for example in an improved yield, a lower consumption of chemicals, and a change in the catalyst.

A life cycle analysis (LCA) has been conducted to compare the first and improved processes. Taking into account all steps of the chemical production, an LCA allows to quantify the environmental impacts, such as air and water pollution, energy use or water consumption. The LCA outcome, based on detailed data collected in Chimex's factory, shows that the eco-design of the process has lead to a large decrease of impacts in main environmental areas of concern, such as the emission of greenhouse gazes. Detailed results will be described during the congress.

According to this work, LCA can be used as an useful tool to ecodesign chemical processes, especially when combined with the green chemistry thinking: 1) it helps to understand where the main environmental impacts occur and in consequence, where to focus improvement work, 2) it quantifies the environmental benefits associated with the use of the green chemistry principles.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

LCA | eco-design | Green chemistry | Life cycle assessment

BIBLIOGRAPHY