ISGC 2022

N°39 / OC
TOPIC(s) : Homogenous, heterogenous and biocatalysis / Biomass conversion

New sustainable synthetic routes to cyclic oxyterpenes using the Ecocatalyst toolbox

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PURPOSE OF THE ABSTRACT

Cyclic oxyterpenes are natural products that are mostly used as fragrances, flavours and drugs by the cosmetic, food and pharmaceutical industries. However, cyclic oxyterpenes are not abundant in nature and only a few are accessible via chemical syntheses, which are far from being ecofriendly. We report here the synthesis of six cyclic oxyterpenes deriving from ß-pinene while respecting the principles of green and sustainable chemistry. Only natural or biosourced catalysts were used in mild conditions, that were optimised for each synthesis. A new generation of eco-catalysts, derived from Mn-rich water lettuce, was prepared via green processes, characterised by MP-AES and XRPD analyses, and tested in catalysis. The epoxidation of ß-pinene led to the plat-form molecule, ß-pinene oxide, with a good yield, illustrating the efficacy of the new generation of ecocatalysts. The opening ß-pinene oxide was investigated in green conditions and led to new and regioselective syntheses of myrtenol, 7-hydroxyterpineol and perillyl alcohol. Successive oxidations of perillyl alcohol could be performed using no hazardous oxidant and were controlled using the new generation of ecocatalysts affording perillylaldehyde and cuminaldehyde.

FIGURES

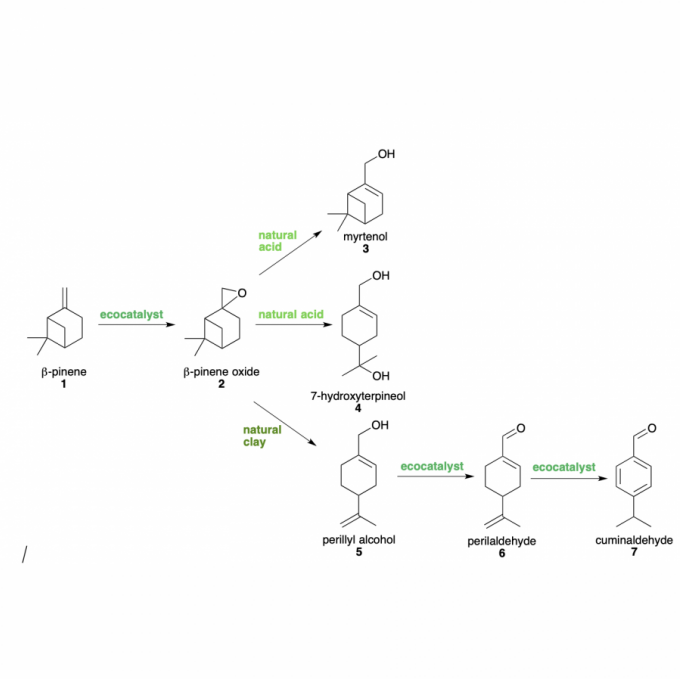

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FIGURE 1

Green synthesis of oxyterpenes using ecocatalysis

The oxidation reactions were successfully catalysed using the new generation of ecocatalysts. This new generation of ecocatalysts that derives from Mn-rich water lettuce presents a double environmental advantage, as the ecocatalysts are biosourced and sin

FIGURE 2

KEYWORDS

ecocatalysis | oxyterpenes | ß-pinene | water lettuce

BIBLIOGRAPHY