

Chemistry Department

Resolution/Separation of enantiomers: "A greener approach"



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PhD student, Doctoral Program in Sustainable Chemistry. Research interests in biocatalytic processes, high pressure and alternative solvents such as supercritical CO₂.

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Objectives

The purpose of this work is to develop a more environmentally friendly process for the preparative resolution of racemic *sec*-alcohols with facilitated separation of the two enantiomers.

Our main goal is to develop a biotransformation/extraction process using supercritical carbon dioxide (scCO₂), in the presence or absence of an ionic liquid phase.

Our model compound is racemic menthol that was chosen due to its relevance to the pharmaceutical industry.

Methodology

Study the transesterification of *rac*-menthol with different acylating agents, catalyzed by different enzymes. Use different reaction strategies:

- Select acylating agent that leads to product with longer carbon chain length than the substrate, to facilitate downstream processing with scCO₂.
- Use ionic acylating agent that reacts with and traps one of the enantiomers, while the other, unreacted enantiomer, is carried away by scCO₂.
- Use acylating agent that forms an acid that precipitates in the ionic liquid phase, driving reaction progress. Select ionic liquid with a higher affinity towards the ester product than the alcohol substrate, or vice-versa, to facilitate downstream processing with scCO₂.

Expected Results

Enzyme with good activity and high selectivity for (-)-menthol, using a given acylating agent, at a set of experimental conditions (temperature, pressure, water activity).

Phase equilibrium data for the systems studied.

Greener biotransformation/extraction process for the separation of enantiomers.

