

# Lipase catalyzed selective production of isopropyl esters and lignin derived lipophilic antioxidant esters

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# Ester and their applications

## Sustainable ester production for their application in cosmetics and personal care products



Contain esters as emulsifiers, emollients, bio lubricants replacing mineral oil

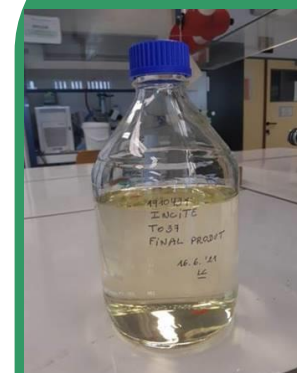
### Chemical synthesis



- 200°C
- Acid catalyst
- Use of excess solvent
- Multistep process to obtain a clean product

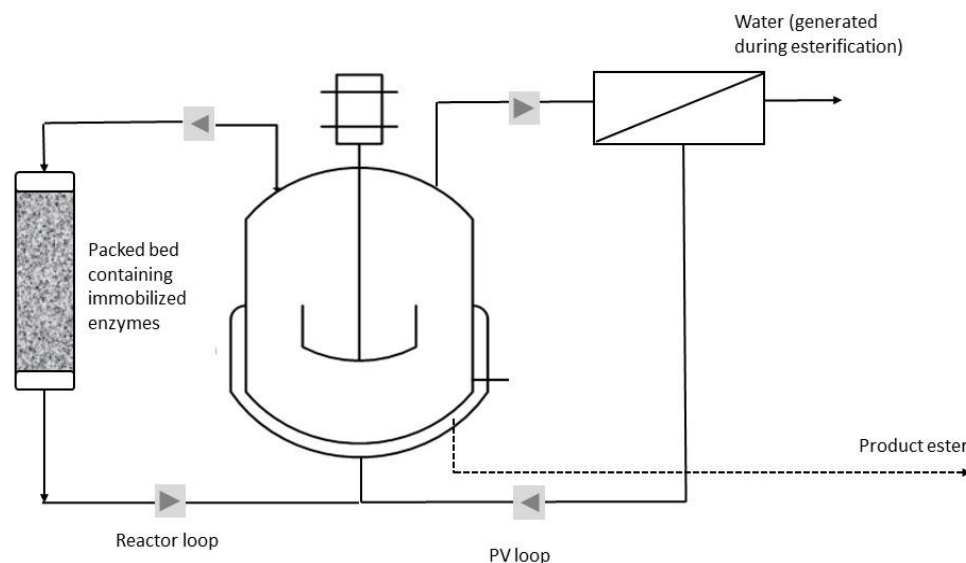
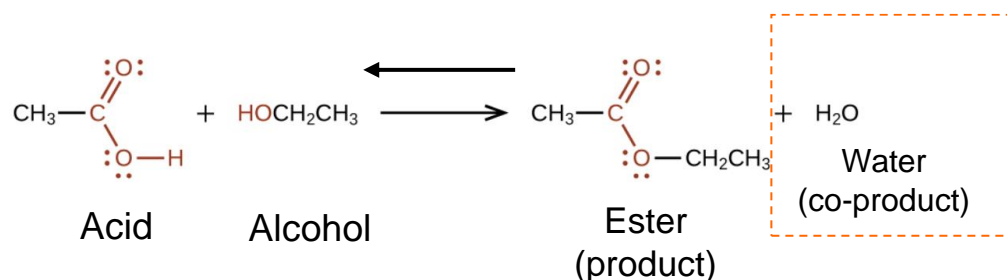
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### Enzymatic synthesis



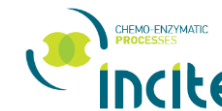
- 65°C
- Solvent free
- Biological catalyst
- Improved product quality & sustainability

# Integrated reaction and separation (water elimination by pervaporation)

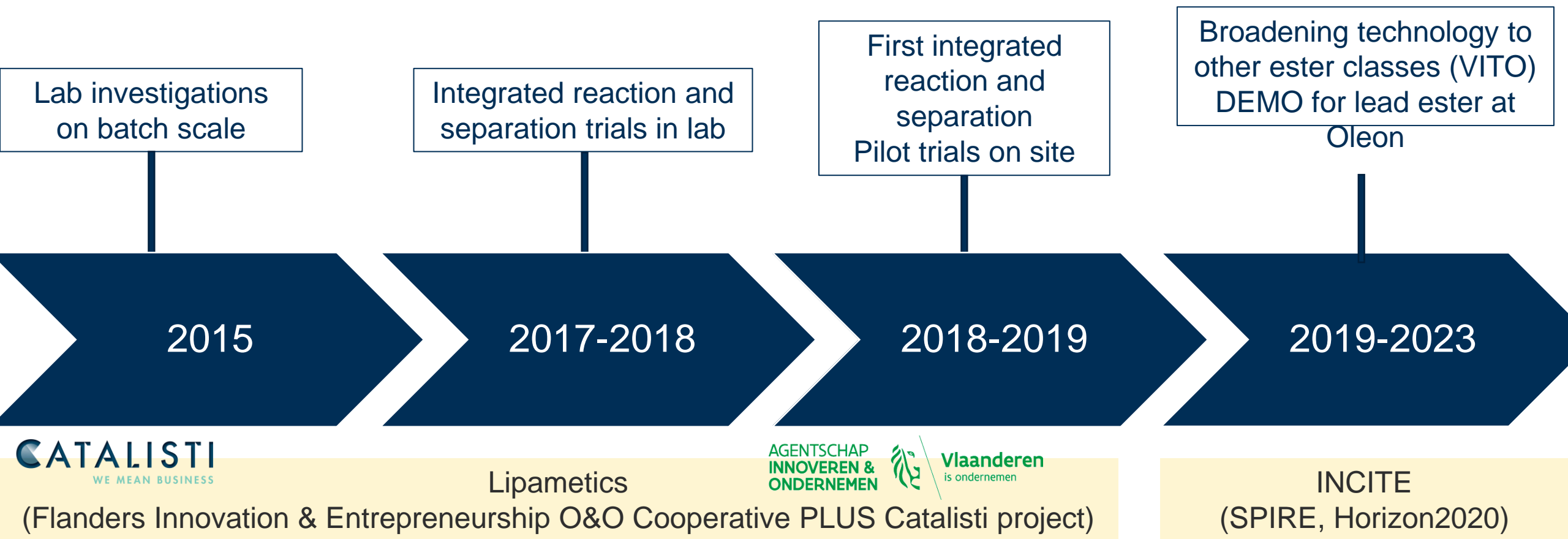


- High conversion with 99% fatty acid converted
- <20 wt% residual alcohol (in the end product) and 1-2 wt% residual acid (in the end product)
- No loss of substrates or products during water removal
- Very stable enzyme and membrane performance (>300 g product/ g enzyme)

# INCITE: scale-up trajectory



DEMO for lead ester (isopropyl palmitate) at Oelegem site (Oleon)





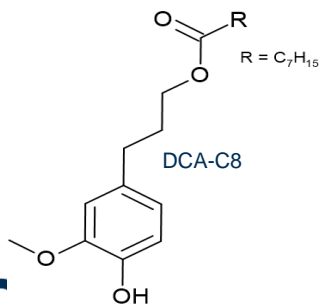
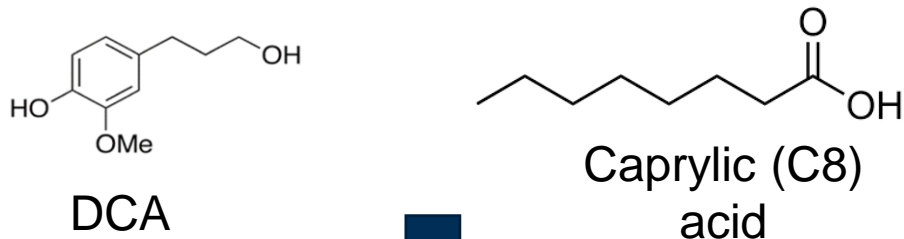
# INCITE: scale-up trajectory

DEMO plant inaugurated on 15 June 2023 at Oelegem site near Antwerp

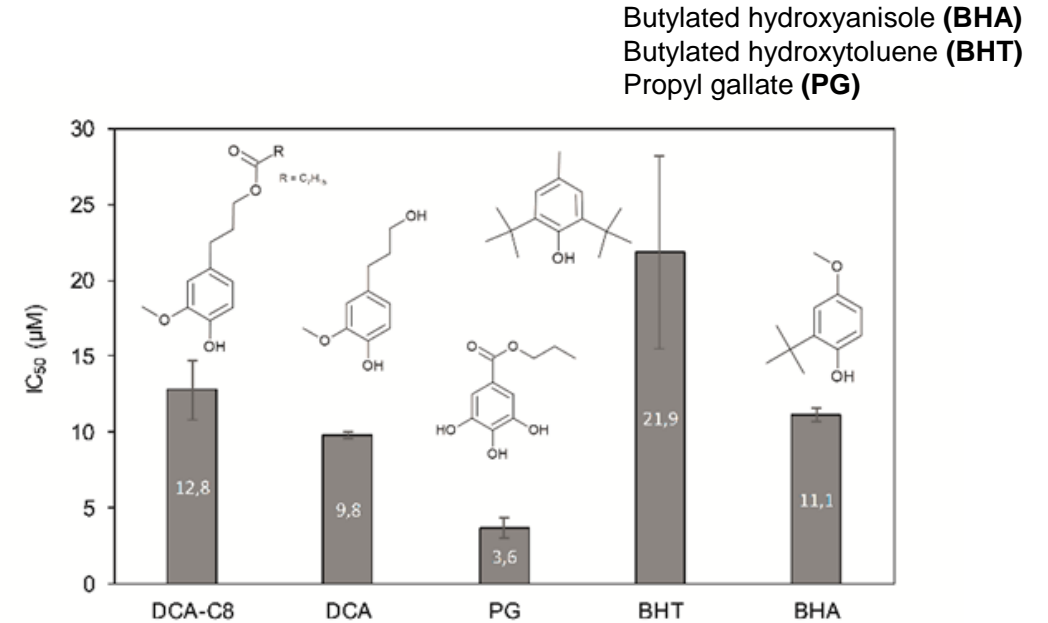
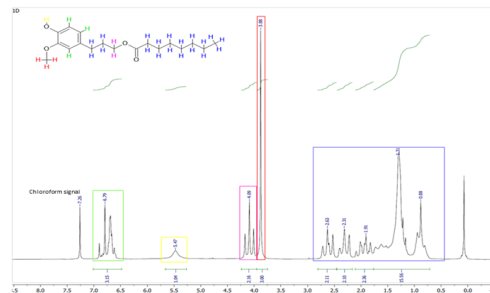


# Esters with antioxidant properties

- DCA = Dihydroconiferyl alcohol
- Product from lignin depolymerization
- Esterify –OH group in the chain with fatty acids
- Modify solubility for application
- Results showed esterification potential with a range of fatty acids.
- Caprylic acid (C8) was chosen for further reaction investigation
- Esterified product was purified



DCA-C8 product



## Antioxidant activity of DCA-C8 compared to DCA and other commercial antioxidants

IC<sub>50</sub> calculated by measuring DPPH (2,2-diphenyl-1-picrylhydrazyl) scavenging at different compound concentrations during 90 min

- IC<sub>50</sub> calculated from the linear part of the curve
- IC<sub>50</sub> value refers to the concentration of compound needed to scavenge 50% of the DPPH radical.
- A lower IC<sub>50</sub> value means a more potent antioxidant.
- Esterification of lignin fractions