TechEx.in
Tech Transfer Hub at Venture Center
Supported by NBM - BIRAC

International Centre for Genetic Engineering and Biotechnology

Technical Brief

Ref No: TechBrief/2021/13

Novel method for synthesis of cetearyl alcohol using fermentation technology

Technology Summary

Novel method for synthesis of 99% pure cetearyl (C16:C18) alcohol using bioengineered E.coli. The model assisted engineered strains produced 12.5 g/L of cetearyl alcohol in the bioreactor under fed-batch cultivation condition, the highest reported titers of long chain hydrocarbons in E. coli.

Background

Biologically-derived hydrocarbons are considered to have great potential as next-generation biofuels owing to the similarity of their chemical properties to contemporary diesel and jet fuels. However, the low yield of these hydrocarbons in biotechnological production is a major obstacle for commercialization.

Technology Description

First, a metabolic model of hydrocarbon production in E. coli was used to identify gene targets for enhanced hydrocarbon production. Based on the in silico predictions, 3 gene additions and 8 deletions were introduced into an E. coli DH5α strain. For hydrocarbon production, the culture was grown in M9 modified medium supplemented with 2% glucose as the sole carbon source. To increase the solubility and reduce the evaporation of hydrocarbon, the shake flask culture was overlaid with 10% dodecane and the flask was sealed with Parafilm. Extracellular metabolites analysis was carried out using standard analytical techniques such as HPLC and GC-FID/GC-MS. Fed-batch cultivation was then used to improve the final titer of fatty alcohol production by growing the best fatty alcohol producing strain to a high density in a 5 L bioreactor with the help of substrate feeding under controlled condition. The maximum yield of fatty alcohol was found to be 12.5 g/L after 72 h of cultivation, of which 90% was contributed by hexadecanol (C16, 66%) and octadecenol (C18:1, 24%). The accumulation of fatty aldehydes was found to be negligible

Applications

Cetearyl alcohol finds use as an opacifying agent, Emolient, Emulsifier, thickner and lubricant in cosmetics, food, and pharmaceutical industries.

Value Proposition

- Synthesis of 99% pure Cetearyl Alcohol in a clean, environmentally safe process without use of harmful chemicals or heavy metals as catalysts.
- Novel and sustainable method for the extracellular synthesis of cetearyl alcohol using fermentation technology
- Renewable source of ceteraryl alcohol, thus minimizing deforestation due to palm oil cultivation.
- Use of glucose as the only carbon source
- Ease of extraction
- Uniform and consistent product quality

Market Potential:

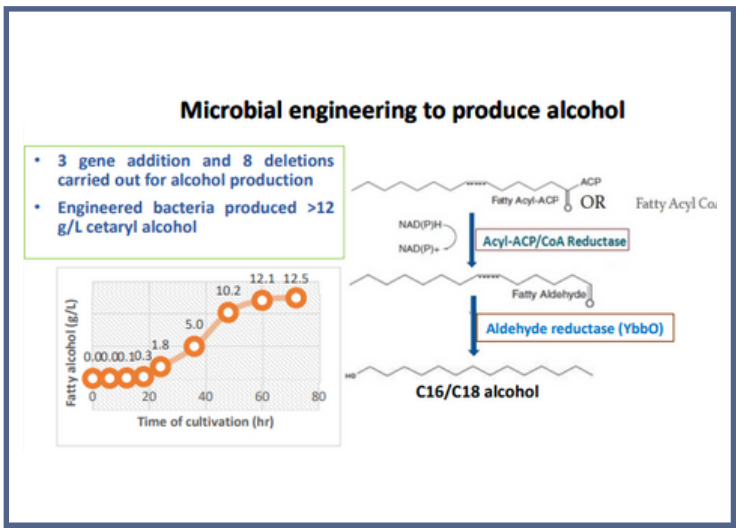
The market for cetyl stearyl alcohol is expected to attain a CAGR of 3.6% during the forecast period (2018-2023) owing to the growing utilization of fatty alcohols in cosmetics and personal care industries

References

https://www.marketsandmarkets.com/Market-Reports/paint-coating-market-156661838.html
https://www.marketsandmarkets.com/Market-Reports/plastic-additives-market-722.html

Technology Status

- Demonstrated at lab scale using a 5 L fermenter
- Patent protected
- Seeking interested industry partner



TechEx.in, Venture Center, 100, NCL Innovation Park, Dr Homi Bhabha Rd, Pune-411008 India
Phone: +91-9156465146 | Email: tto@venturecenter.co.in | Web: www.techex.in