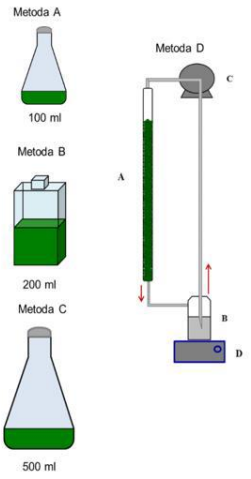
technology profile

BIOTECHNOLOGY METHOD FOR THE MANUFACTURE OF ORGANIC FINE CHEMICAL COMPOUNDS

Ideas on utilisation

Biocatalysis is an effective substitute method to the standard chemical synthesis, leading to optical active isomers. Using two strains of selected photoautothropic microorganisms as biocatalysts, Nodularia sphaerorocarpa CCALA 114 or Nostoc cf-muscorum CCALA 129 afer 3 weeks of pre - cultivation, phosphonate substrates are transformed into chiral derivatives. General procedure of biotransformation is based on adding substrate into specific cyanobacteria culture and incubation the mixture within 7 days, under continuous illumination. After that period of time there is necessary to remove the biomass and purify the end product with chromatography methods. Optical purity of the final product is confirmed with 31P NMR spectroscopy.



The invention was tested in laboratory scale with using:
- Erlenmayer's flask (A)
- simplified batch reactor (B,C)
- simplified flow bioreactor (D)

Potential adopters of technology

The following technology offer describes biotechnology method for receiving Organic Fine Chemical compounds using different strains of cyanobacteria for enantioselective bioconversion of phosphonates to chiral phosphonates derivatives with defined structure and absolute configuration. As the result high optical purity and conversion degree compounds were synthesized with very good yield.

Advantages of technology

As an alternative synthesis method leading to industrially important chemicals, biocatalytic reduction presents many advantages:
- the reaction is leading to derivatives with absolute configuration which determine compounds properties
- high optical priority – excellent enantioselectivity up to ee≥88%
- high yield - 91% in laboratory scale, while typically catalyzed synthesis reaction yield is only 60%
- low toxicity by reducing the amount of 'aggressive chemical components'
- low costs of manufacturing by replacing artificial light with solar energy to illuminate microorganisms (fotobiocatalyst)
- ecological catalyst – by using strains of cyanobacteria as a biocatalyst there is a possibility to eliminate chiral catalysts which are very expensive and in majority of cases present high toxicity
- CO2 reduction by using fotobiocatalyst

Market and context of technology

Biocatalytic methods are worth to be implemented to the manufacturing processes mostly due to low toxicity and high efficacy. Also the effectiveness of the method and its very good yield make the invention attractive to industry, especially in biotechnology or pharmaceutical segment.

Preconditions in adopting enterprises

Use of chemical compounds, bacterial strains in the biotransformation process.

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