Alkanolamide biosurfactants: Techno-economic evaluation of biocatalytic versus chemical production - DTU Orbit (04/10/2019)

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Alkanolamides are biosurfactants used in a range of products for cleaning and other applications. Recently, an environmentally benign and volume-efficient biocatalytic process for production of high-quality alkanolamides was developed in our laboratory. In the current investigation, this process is evaluated in terms of technical and economic feasibility on a multi-tonne scale using commercial process optimization software and compared with known chemical processes. Energy demands for the processes and in raw material production were also compared. A campaign for manufacturing 200 tonnes of alkanolamides was considered. When using a 20 m³ reactor and 5% (w/w) loading of an immobilized lipase (Novozym®435; Novozymes), 20 batches and a total process time of 101 hours are required for the whole campaign. The biocatalytic process was relatively more energy-efficient, but production costs were calculated to be about 1.4 times that of the corresponding conventional alkanolamide manufacturing process utilizing sodium methylate as a catalyst. The principal contributor to the extra costs is the cost of the immobilized enzyme. There is a great potential to decrease enzyme costs; industrialization may, however, depend on the possibility of obtaining a higher price for the biocatalytic product.

General information
Publication status: Published
Organisations: Lund University, Akzo Nobel Functional Chemicals AB
Contributors: Adlercreutz, D., Tufvesson, P., Karlsson, A., Hatti-Kaul, R.
Pages: 204-211
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Industrial Biotechnology
Volume: 6
Issue number: 4
ISSN (Print): 1550-9087
Ratings:
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.25 SNIP 0.553
Original language: English
DOIs:
10.1089/ind.2010.6.204
Source: orbit
Source ID: 276388
Research output: Contribution to journal › Journal article – Annual report year: 2010 › Research › peer-review