

## COUPLED PRODUCTION OF AROMA COMPOUNDS BY TWO STRAINS OF MICROORGANISMS USING MEMBRANE HYBRID SYSTEM

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Some of the natural substances are impossible to produce directly using one strain of microorganism and they must be produced via one or more intermediates requiring the use of different production strain for each one. Good example is bioproduction of phenylacetaldehyde and phenylacetic acid from 2-phenylethanol by the bacteria *Gluconobacter oxydans*. 2-Phenylethanol can be produced by the biotransformation of L-phenylalanine using yeasts *Saccharomyces cerevisiae*. Both, phenylacetaldehyde and 2-phenylethanol are strong inhibitors and its in situ removal from the fermentation medium is necessary to apply to increase the effectivity of the bioproduction. The way how to do it is by using of membrane hybrid system with immersed and external capillary membrane modules for extractive biotransformation that are the promising solution for that case.

In this work three types of aromas: 2-phenylethanol, phenylacetaldehyde and phenylacetic acid were produced in a special type of hybrid systems consisted of two interconnected membrane bioreactors containing two different production strains. In the first bioreactor (3 L stirred tank bioreactor) 2-phenylethanol from substrate L-phenylalanine was produced by *Saccharomyces cerevisiae*. Produced 2-phenylethanol was continually extracted via immersed capillary silicone rubber membrane module from the first bioreactor to the fermentation medium of the second bioreactor (15 L airlift reactor), which contained production bacteria *Gluconobacter oxydans* transforming 2-phenylethanol to phenylacetic acid or phenylacetaldehyde depending on the type of the bacteria strain. During the production of phenylacetic acid product was accumulated in the second bioreactor, while in case of production of phenylacetaldehyde product was continually extracted via external extraction unit to the regeneration unit for the extractant, where it was accumulated.

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