

Integrated ethanol fermentation and pervaporation

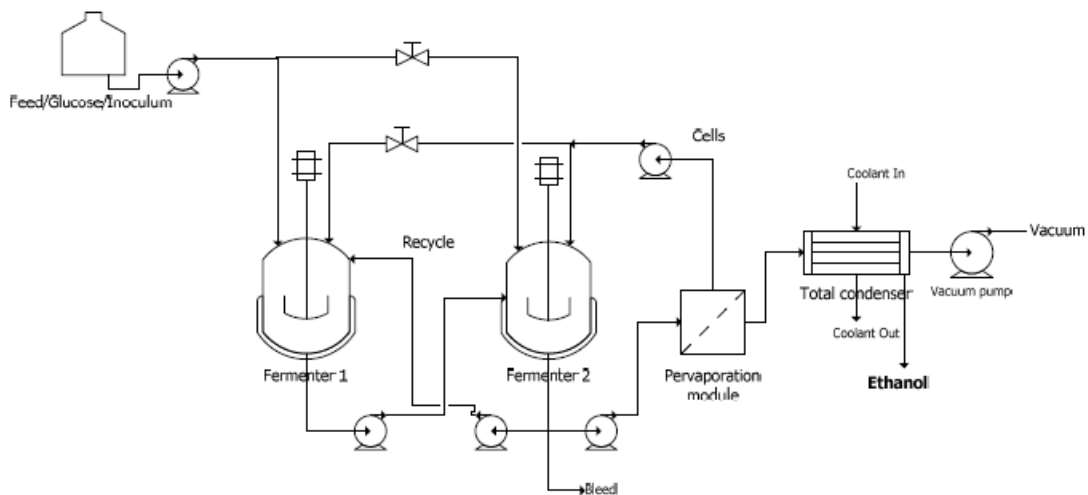
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Description

Bioethanol produced by carbohydrate fermentation is believed to be one of the best alternatives to the conventional fossil fuels. Commercially, the recovery of ethanol from fermentation broth is dominated by distillation. Due to its potentially lower energy cost pervaporation is emerging as viable option for this application. The availability of improved membranes is a prerequisite.

The aim of the research project was the development of staged ethanol fermentation coupled with cell retention and pervaporation using commercially available membranes as well as membranes prepared by partner institutes. The glucose fermentation carried out by *Saccharomyces cerevisiae* was used as model system and produced ethanol was separated from the broth by pervaporation. This involved process modelling and model based optimization of the integrated system, and experimental implementation of the integrated process.



Dissertation

S.S. Gaykawad, Membrane assisted ethanol recovery from fermentation broth. PhD Thesis, Delft University of Technology, 2016. <https://doi.org/10.4233/uuid:2a962960-0b91-48fc-be14-fc982b6cd48e>

Publications from the dissertation work

1. S. Chovau, S. Gaykawad, A.J.J. Straathof and B. Van der Bruggen, Influence of fermentation by-products on the purification of ethanol from water using pervaporation, [Bioresource Technology 102 \(2011\) 1669-1674](#).
 2. S.S. Gaykawad, L.A.M. van der Wielen, A.J.J. Straathof, Effects of yeast-originating polymeric compounds on ethanol pervaporation, [Biores. Technol. 116 \(2012\) 9-14](#).
 3. S.S. Gaykawad, Y. Zha, P. Punt, J. W. van Groenestijn, L.A.M. van der Wielen, A.J.J. Straathof, Pervaporation of ethanol from lignocellulosic fermentation broth, [Biores. Technol. 129 \(2013\) 469-476](#).
 4. S.S. Gaykawad, D. Rütze,, L.A.M. van der Wielen, A.J.J. Straathof, Vapour permeation for ethanol recovery from fermentation off-gas, [Biochem. Eng. J. 124 \(2017\) 54-63](#).
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