Process alternatives for the fermentation of glucose/xylose mixtures by *Pichia stipitis*.

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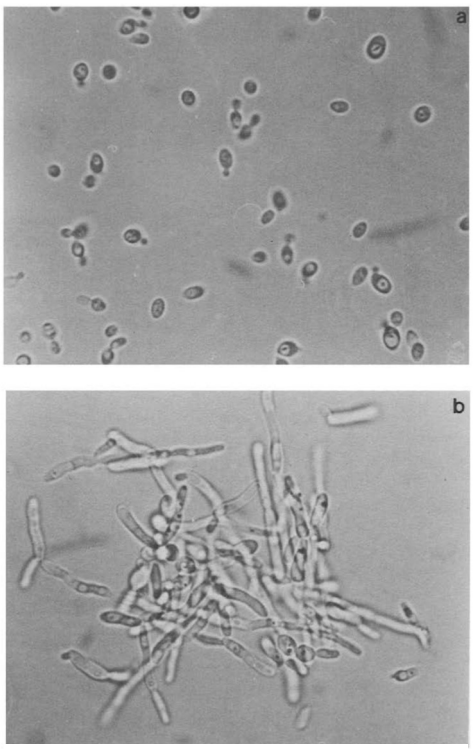
Description

Ethanol is a valuable product as an alternative for car fuel or as feedstock of (bio)chemical industry. Until now, production is concentrated on the use of *Saccharomyces cerevisiae* to produce it. Many technical substrates however contain both hexose as well as pentose sugars. Only a limited number of species are able to convert hexose sugars such as xylose. *Pichia stipitis*[1] is one of them.
In this project it was studied how to best convert a glucose/xylose mixture using this organism. First the sensitivity of *P. stipitis* for oxygen on conversion rates was measured and modelled. Next the following promising technical setups were used to study their feasibility to convert both sugars:

- Immobilization in gels. Immobilized *P. stipites*; coimmobilized *P. stipitis* and *S. cerevisiae*; and immobilized *P. stipitis* combined with suspended *S. cerevisiae* were tested and modelled.
- Reactors in series to enable sequential conversion. Either with *P. stipitis* alone, or in combination with *S. cerevisiae.*
- Using a flocculating strain, developed by forced evolution, enables high cell concentrations with possibly high conversion rates.



factor 1000 enlargement of normal *P. stipitis* CBS 5773 (top) and flocculating species CBS 7505

Comparison, also with conventional conversion with *S. cerevisiae* only, showed that the feedstock/substrate should contain at least 20 % of pentose sugars to make ethanol production feasible. This conclusion is based on a model substrate glucose/xylose. Technical feedstocks contain much more compounds that may influence the result for better or for worse.

Dissertation

Nico Grootjen, Process alternatives for the fermentation of glucose/xylose mixtures by *Pichia stipitis.* PhD Thesis, Delft University of Technology, 1991. In TUD-repository: Thesis 1991 Grootjen.

[1] Presently *Scheffersomyces stipitis*

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