Advanced recovery of volatile biobased products

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Project Description

Due to increasing concerns on environmental pollution, as well as reduction of available fossil carbon sources, a transition towards bio-based chemicals is required. However, fermentations typically lead to low product concentrations because the products inhibit the microbes. Improved separation and purification techniques may counteract this.
The focus of this project is on recovering volatile fermentation products in cost- and energy-efficient ways. The major challenges for designing an optimal downstream process are a very diluted feed stream (>90wt% water), presence of microorganisms and thermodynamic constraints due to azeotrope formation.
The proposed novel recovery processes consist of several distillation steps, whereby the first separation is performed under vacuum and without additional chemicals; conditions at which the microorganisms can remain viable. Heat pumping and heat integration are applied to minimize energy usage.

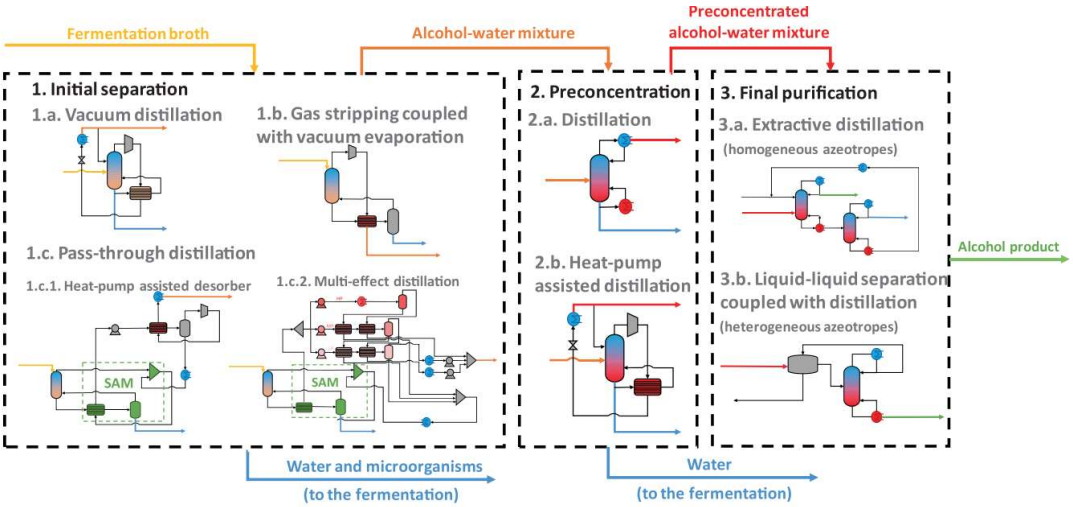

Figure: Generic flowsheets of downstream processing of alcohols from dilute fermentation broth

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