OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG
VST FAKULTÄT FÜR VERFAHRENS- UND SYSTEMTECHNIK

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Master Thesis (Experimental)

at the Chair of Process Systems Engineering
in cooperation with the Max-Planck-Institute Magdeburg

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Motivation:

Microalgae sow an enormous potential as suitable feedstock for numerous bioproducts. Ideally, an algal biorefinery valorizes exhaustively not only the pigments but all present biomacromolecules in order to achieve an economically feasible overall process. Nevertheless, the economic viability is still hampered by expensive downstreaming unit operations, especially the drying of the algal biomass due to the subsequent extraction of the lipophilic compounds. Here, the wet extraction approach opens the way to reduce the thermal and electric energy expenses. A simplified process flow diagram for the dry and the wet route is visible in Figure 1.

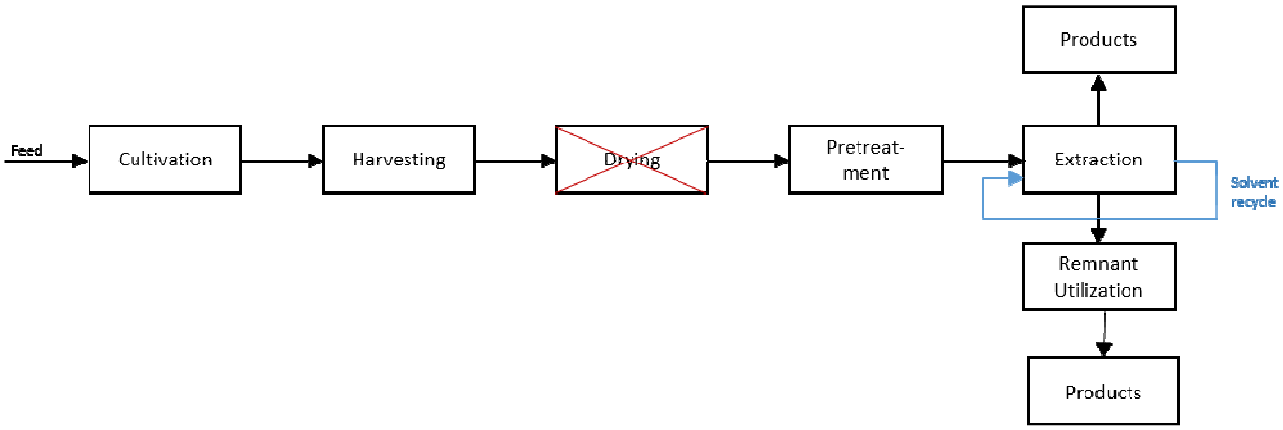

Figure 1: Process flow diagram for an algal biorefinery. In the wet extraction approach, the drying step is omitted and the lipophilic compounds are extracted from the wet biomass.

Problem definition:

The objective of the thesis to find suitable solvent mixtures applicable to extract valuables (hydrophobic or hydrophilic) from wet algal biomass. For this, the mixtures must be synthesized, and their phase behavior is to be characterized calorimetrically. The potential of the novel solvent solutions to disrupt the cell wall by chemical stress is to be investigated. After the solvent prescreening, for a few promising candidates the optimal extraction conditions are to be defined. The extractable products have to be identified and the attained yield shall be quantified for the selected solvent systems. The applicability of the solvents in large-scale processes and potential ways for solvent recycle should be addressed in the literature survey.

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