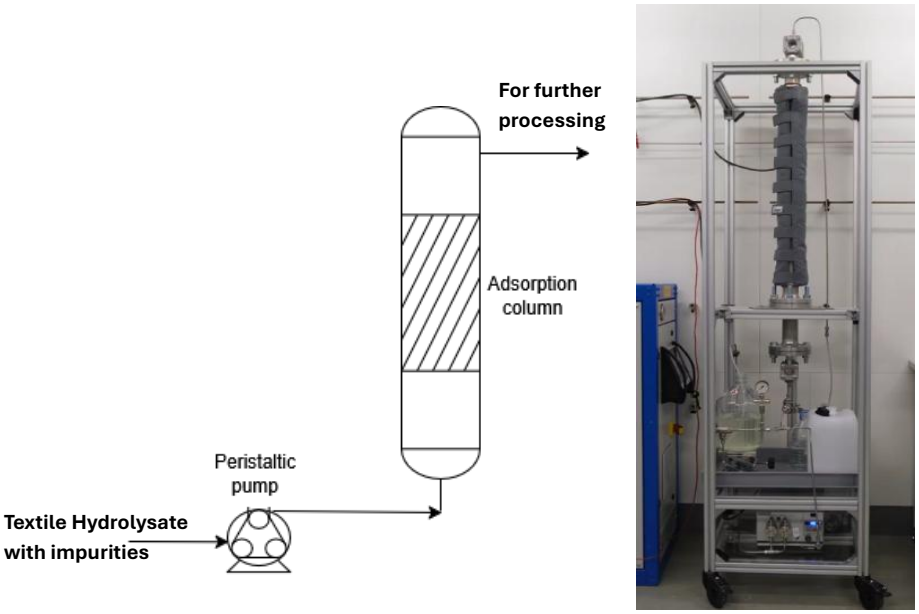
Experimental Investigation of Adsorption – Based Colour Removal from Depolymerized Textile Streams

The recycling of textile materials is a key challenge in achieving a circular economy. Chemical recycling processes enable polyester-containing used textiles to be broken down into their monomers through depolymerization, allowing the production of near-virgin raw materials. However, the main technical challenge lies in managing impurities present in the process streams. These streams are often highly coloured and contain a complex mixture of additives and auxiliary substances. Such impurities pose significant obstacles to a stable and scalable process operation. Adsorption-based dye removal offers a promising strategy to address this issue. This thesis focuses on developing and optimizing such an approach for improved process performance.



This project builds on the preliminary experimental work on adsorption for dye removal from depolymerized textile streams. Using the mini-plant column, the student will study the process in detail, optimize operating parameters such as flow rate, bed height, and impurities concentration, and analyze relationships between adsorbents and dyes. An autonomous adsorption process model will be developed based on experimental data to evaluate new feed conditions, assess the feasibility of adsorption, and estimate optimal operating parameters. Finally, the results will be used to support scale-up of the process to pilot scale and to determine the best operating conditions for efficient dye removal. If you are interested in combining experimental research with modeling and real-world process scale-up, this project offers an excellent opportunity for this and to gain valuable experience in sustainable process engineering.

Type:
Study Thesis, Project Thesis

Background:
Chemical Engineering, Process Engineering, Environmental Engineering, or related field.

Interest in experimental work and process modeling.

Basic knowledge of adsorption processes and transport phenomena is an advantage.

Research area:

Adsorption
Process Optimization

Tasks:

Experimental investigation and optimization of operating parameters.
Autonomous model creation and training of data.

Starting:

As soon as possible.

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