

Valorisation of pulp and paper industry waste streams for the production of succinic acid

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Sustainable chemical production should be based on the utilization of renewable resources such as industrial waste streams. Spent sulphite liquor is produced as waste stream in vast amounts worldwide from the pulp and paper industry through a digestion process that separates the lignin and hemicellulose from the cellulose fibers. The spent sulphite liquor contains lignosulphonates (LS) and a mixture of C-5 and C-6 sugars derived from the degradation of hemicellulose. Conventional treatment of the spent sulphite liquor leads to the separation of LS with simultaneous destruction of sugars. The obtained LS are mainly utilized in the cement industry. The utilisation of sugars as carbon sources in fermentation processes could upgrade this waste stream into a renewable feedstock for chemical production.

The main objective of this study is the utilization of spent sulphite liquor for the production of succinic acid via fermentation. Batch and fed-batch fermentations were carried out in lab-scale bioreactors using the bacterial strains *Actinobacillus succinogenes* and *Basfia succiniciproductens*. The critical concentrations of bacterial growth inhibiting compounds (e.g. methanol, acetic acid, furfural and lignosulphonates) contained in the spent sulphite liquor were identified. The potential to separate the lignosulphonates prior to fermentation was investigated. Pre-treatment of spent sulphite liquor was carried out via filtration using membranes with different molecular weight cut offs and by solvent extraction where different solvent to spent sulphite liquor ratios and pH values were tested. The pre-treated SSL was evaluated for succinic acid production. Immobilized cultures using alginate beads were carried out for both microorganisms.

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