

Electrodialysis as a step in the Nutrient recovery

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Fermentation is a metabolic process often used in a food and beverage industry, but also in pharmaceutical industry for production of bioactive substances. After the process of fermentation, residual bacterial or fungal growth medium is considered a waste stream that has to be treated accordingly. But these streams still contain valuable elements such as phosphorus (P) and nitrogen (N). The motivation for this work is to recover such elements for reuse in fermentation processes or another purpose, following the circular economy approach. The focus of this work is P recovery, since it is a depleting element of a high concern [1]. There are various methods for P recovery from wastewater [1]; one of them being electrodialysis, which can be applied to concentrate certain ions from a water solution as e.g. mineral medium used in fermentation process in the present study. Different parameters are influencing electrodialysis, such as dimensions of electrodialysis cells, type and viscosity of the medium, mobility and concentration of ions, flow rates and the temperature of the fluid. In this work, different flow rates as well as temperatures are applied in order to achieve optimized operational conditions, whereas other parameters are set to fixed values. First results show, that the presence of compounds of low interest in the mineral medium, mainly glucose and peptones, are impacting the ion separation efficiency, causing higher separation efficiency for P in the concentrate but also a longer process time. The main aim is to achieve maximum concentrations of P in the concentrate in order to provide optimum recovery conditions.

[1] Amann A., Zoboli O., Krampe J., Rechberger H., Zessner M., 2018. Egle L. Environmental impacts of phosphorus recovery from municipal wastewater. *Resources, Conservation & Recycling* (2018) 127-139