



# 10<sup>th</sup> INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

“TEN YEARS WORKING TOGETHER FOR A SUSTAINABLE FUTURE”

## Evaluation of the Electrodialysis Process in the Treatment of Phosphate Containing Solution

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### Abstract

Phosphorus (P) is inherent to all life forms. The increasing in crop production requires an increase in the use of P as fertilizer, usually produced from phosphate rocks, a non-renewable source that are being depleted. On the other side, high levels of P on surface water from wastewater and agricultural may lead to environmental problems, such as eutrophication. Therefore, the present work evaluated the technical feasibility of a 5-compartment electrodialysis (ED) cell in the treatment of phosphate containing solution, prepared using  $\text{Na}_2\text{HPO}_4 \cdot 7\text{H}_2\text{O}$  and  $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$  salts, aiming the recovery of P from municipal wastewater. Heterogeneous cation- (HDX100) and anion- (HDX200) ion-exchange membranes were used. Current-voltage curves (CVCs) showed that the current density to be used in electrodialysis tests was limited by the HDX200 anion-exchange membrane. The average percent extraction (pe%) of sodium was 92%, while for phosphate-containing species was 61%. The phosphate-containing species removal may be restricted by the formation of a non-chargeable specie,  $\text{H}_3\text{PO}_4$ , resulted from changes on the pH conditions in the diluted compartment.

**Keywords:** *phosphorus, sewage, membrane process, P-recovery.*