SUGARS AND LIGNOSULFONATES RECOVERY FROM SULFITE PULPING OF *EUCALYPTUS GLOBULUS* BY THE APPLICATION OF MEMBRANE SEPARATION PROCESSES

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The thin spent sulfite liquor (TSSL) generated in pulp and paper mills is a biomass resource that is usually concentrated and burnt in a steam boiler. Yet, the biorefinery concept may add value to the by-products contained in this liquor.

The general aim of this work was to investigate the application of membrane separation processes to TSSL produced by acidic magnesium-based sulfite pulping of *Eucalyptus globulus*. Its specific objectives were the separation of the lignosulfonates (LS) from the sugars for subsequent fermentation, the fractionation of the lignosulfonates to produce valuable products, the concentration of the xylose contained in the TSSL, and the concentration of the xylitol produced by xylose fermentation.

Preliminary laboratory experiments were conducted in total recirculation mode, at natural pH and room temperature, using several ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO) membranes, namely, Alfa Laval UFX10 pHt, DSS-FS61PP, UFX5 pHt, DSS-GR95PP, DSSETNA01PP, NF97, NF99, NF99 HF, DSS-HR98PP, RO99, Dow Filmtec NF200, NF270, Microdyn-Nadir UP010, UP005, NP010 and NP030.

Only the Microdyn-Nadir UP010 membrane displayed a wide gap between the rejections of lignosulfonates (68%) and total sugars (3%), thereby it appears to fit the dual purpose of fractionating the lignosulfonates and separating the high molecular weight LS from the sugars. The separation of the low-medium molecular weight LS from the sugars contained in the permeate might be accomplished by ion exchange. On the other hand, the Dow Filmtec NF200 membrane is the most promising one to concentrate both xylose and xylitol, bearing in mind its high rejection for sugars (96%).

Concentration experiments at a pilot plant and thorough economic assessments should be carried out to enlighten the technical-economical feasibility of the processes implied.

KEYWORDS: biorefinery; eucalyptus, lignosulfonates; membrane separation processes; pulp and paper; thin spent sulfite liquor; xylose