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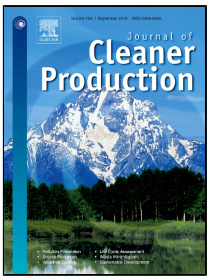

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Economic analysis of a biorefinery process for catechol production from lignin

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ABSTRACT

Recently, the valorization of the lignin fraction in the biorefinery scheme is getting more and more attention as the use of this component for the production of bio-based chemicals is crucial for the success of the integral development of lignocellulosic biorefinery processes. The present work includes the exergy performance and the economic analysis of a process for catechols production using lignin extracted from olive tree pruning. Energy and exergy calculations were obtained from the process simulation with Aspen Plus®. The exergy analysis was applied to identify the units associated with the main irreversibilities and exergy losses. The process investment and operating costs were determined as well as the derived catechol market price. The calculated total plant capital investment was about 4.9 M$ for a plant capacity of 2,544 kg feedstock /day. The estimated catechol price was 1100 $/t with a valorization ratio of 3.02. These results place the product in a competitive position in the market.

Keywords: Lignin, valorization, catechol, economic analysis, energy and exergy balances, Aspen Plus®.

INTRODUCTION

The bio-based industry is being promoted as an interesting option for energy, materials and chemicals production as an alternative to fossil resources (Parada et al, 2017). Environmental concerns have raised the attractiveness of biomass based renewable raw materials as well. Good performance in environmental and social terms is attributed to the integral biorefinery technology which uses non-food biomass resources, such as lignocellulosic biomass, for the production of high value co-products (Bennett, and Pearson, 2009).