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Improving bioethanol production from olive pruning biomass by deacetylation step prior acid hydrolysis and fermentation processes

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Abstract

In order to produce bioethanol from olive tree pruning biomass, deacetylation was performed employing sodium hydroxide. Optimal conditions were determined using experimental design techniques. The highest acetic acid removal (3.8 g/dm^3), obtained by response surface methodology, was at optimum pretreatment conditions of temperature 60 °C, 0.8% NaOH and residence time 60 min. After oxalic acid hydrolysis of pretreated biomass, the hydrolysates were directly used for ethanol production without further detoxification process.

Ethanol yields ranged from 0.19 to 0.45 g/g, reaching the maximum yield value when pretreatment was carried out at 130 °C with 100 mM oxalic acid, involving a combined severity factor (CSF) of 1.05. The highest ethanol concentration obtained from pretreated biomass was 6.2 g/dm^3 at 150 °C, using 75 mM of oxalic acid (CSF = 1.53).

Keywords: Deacetylation, Pretreatment, Oxalic acid, Fermentation, Ethanol

1. Introduction

One of the available options as a previous step for the integral use of lignocellulosic biomass and alternative platform to fossil resources, as they are scarce, could be the raw material fractionation by chemical pretreatment. The use of such inexhaustible biomass materials could allow the mitigation of petroleum supply overconsumption and worrying problems linked to the global environmental damage caused by their regular utilisation. The deconstruction of this type of renewable raw material into soluble sugars is considered as a

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