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Combined acid/alkaline-peroxide pretreatment of olive tree biomass for bioethanol production

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ACCEPTED MANUSCRIPT

2	Combined acid/alkaline-peroxide pretreatment of olive tree biomass for bioethanol production
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8	
9	Abstract
10	Olive tree biomass (OTB) can be used for producing second generation bioethanol. In
11	this work, extracted OTB was subjected to fractionation using a sequential acid/alkaline
12	oxidative pretreatment. In the first acid stage, the effects of sulfuric acid concentration
13	and reaction times at 130 °C were investigated. Up to 71% solubilization of
14	hemicellulosic sugars was achieved under optimized conditions (2.4% H ₂ SO ₄ , 84 min).
15	In the second stage, the influence of hydrogen peroxide concentration and process time
16	were evaluated at 80 °C. Approximately 80% delignification was achieved under the
17	best operational conditions (7% H_2O_2 , 90 min) within the experimental range studied.
18	This pretreatment produced a substrate with 72% cellulose that was highly accessible to
19	enzymatic attack, yielding 82 g glucose/100 g glucose in delignified OTB.
20	Ethanol production from both hemicellulosic sugars solubilized in the acid pretreatment
21	and glucose from enzymatic hydrolysis of delignified OTB yielded 15 g ethanol/100 g
22	OTB.
23	Keywords: olive tree biomass; fractionation; fermentation; Escherichia coli; SSF; mass
24	balance
25	
26	Introduction
27	Bioethanol production from lignocellulosic materials could be a sustainable way to
28	reduce dependency on fossil fuels, with the goal of contributing to the decarbonization
29	of the transport sector. An integral utilization of biomass resources within the

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